Right to Know Hazardous Substance Fact Sheets

Emergency Responder Quick Reference

This handbook contains comprehensive safety and health information for over 400 hazardous substances to assist emergency responders in the event of a chemical emergency.

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Public Health Services Division of Epidemiology, Environmental and Occupational Health Consumer, Environmental and Occupational Health Service Right to Know Program (609) 984-2202 www.nj.gov/health/rtk



Common Name: ACEPHATE

Synonyms: N-(Methoxy(methylthio)phosphinoyl)acetamide; Orthene™; Lancer® CAS No: 30560-19-1 Molecular Formula: C₄H₁₀NO₃PS RTK Substance No: 3140 Description: Colorless to white crystal or powder with an odor of rotten cabbage. It may be dissolved in a liquid "carrier."

HAZARD DATA

		· · ·
Hazard Rating	Firefighting	Reactivity
3 - Health	Acephate does not burn, however it is often dissolved in a liquid carrier which may be	Acephate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE); ALKALINE MATERIALS or STRONG BASES (such as SODIUM
DOT#: UN 2783	POISONOUS GASES ARE PRODUCED IN FIRE,	HYDROXIDE and POTASSIUM HYDROXIDE); and
ERG Guide #: 152	including Phosphorus Oxides, Sulfur Oxides and	HYPOCHLORITES.
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Solid Spill: 25 meters (50 feet) Liquid Spill: 50 meters (175 feet) Fire: 800 meters (1/2 mile)

Moisten solid spilled material, or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Acephate is hazardous to the environment and specific attention should be given to birds and honeybees.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Acephate**.

Acephate is skin absorbable.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Headache, dizziness, blurred vision, sweating, nausea and vomiting, muscle twitching, loss of coordination, convulsions, coma and death
Chronic:	Carcinogen (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Rotten cabbage
Flash Point:	199ºF (93ºC)
Vapor Pressure:	<1 mm Hg at 77°F (25°C)
Specific Gravity:	1.35 (Water = 1)
Water Solubility:	Soluble
Melting Point:	149º to 194ºF (65º to 90ºC)
Decomposes:	311ºF (155ºC)
Molecular Weight:	183.2
pH:	3.5-4.5 (1% in water)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and SilverShield®/4H®
Coveralls:	DuPont Tyvek® for solid Acephate
Respirator:	Outdoors: Full facepiece APR with Organic vapor cartridge and pesticide pre-filters
	Indoors or Liquid: Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ACETALDEHYDE

Synonyms: Ethanal; Ethyl Aldehyde; Acetic Aldehyde CAS No: 75-07-0 Molecular Formula: C₂H₄O RTK Substance No: 0001

Description: Clear, colorless liquid, or a gas above 69°F (21°C), with a sharp, fruity odor

HAZARD DATA						
Hazard Rating	Firefighting	Firefighting			Reactiv	vity
3 - Health 4 - Fire 2 - Reactivity DOT#: UN 1089 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting Acetaldehyde can spontaneously decompose or polymerize to form explosive <i>Peroxides</i> when heated, distilled, evaporated or contaminated. FLAMMABLE AND REACTIVE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. Water and foam may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to reduce vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flashback. Acetaldehyde may form an ignitable vapor/air mixture in closed tanks or containers.		Acetaldeh Peroxides Acetaldeh HYDROC BASES (s HYDROX OXIDIZIN PEROXID NITRATE KETONEs resulting i reactions)	hyde is REACTIVE and can form explosive s on prolonged contact with AIR. hyde reacts with STRONG ACIDS (such as HLORIC, SULFURIC and NITRIC); STRONG such as SODIUM HYDROXIDE and POTASSIUM IDE); AMMONIA; ALCOHOLS; ISOCYANATES; IG AGENTS (such as PERCHLORATES, DES, PERMANGANATES, CHLORATES, S, CHLORINE, BROMINE and FLUORINE); S; AMINES; and TRACE AMOUNTS of METALS in violent or explosive polymerization (uncontrolled).		
	SPILL/LEAKS				PHYS	ICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquid with fly ash, cement powder or commercial sorbern place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when ope and closing containers of Acetaldehyde. Metal containers involving the transfer of Acetaldehyde should I grounded and bonded. Neutralize water spills with Sodium Bisulfite. Keep Acetaldehyde out of confined spaces, such as sewers, be of the possibility of an explosion. DO NOT wash into sewer.		it and ening be ecause		Odor Thresh Flash Point: LEL: UEL: Auto Ignition Vapor Densit Vapor Press Specific Grav Water Solubi Boiling Point Freezing Poi Ionization Po Molecular W	old: n Temp: ty: ure: vity: ility: t: nt: otential: eight:	0.067 to 0.21 ppm -36°F (-38°C) 4% 60% 347°F (175°C) 1.52 (air = 1) 740 mm Hg at 68°F (20°C) 0.8 (water = 1) Floats and Mixes 69°F (21°C) -190°F (-123°C) 10.22 eV 44.06
EXPO	SURE LIMITS			PR	OTEC	
OSHA: 200 ppm, 8-hr NIOSH: Lowest Feasib ACGIH: 25 ppm, Ceilin IDLH: 2,000 ppm The Protective Action Cri PAC-1 = 45 ppm PA0	TWA Je Concentration Ig iteria values are: C-2 = 270 ppm PAC-3 = 840 ppm		love over espi	s:Butyl, Viton/Butyl and Barrier® (>8-hr breakthrough)alls:Tychem® BR, Responder® and TK (8-hr breakthrough)rator:>25 ppm - SCBA		
HEALTH EFFECTS			FIRST A	ID AN	D DECONTAMINATION	
Eyes: Irritation Skin: Irritation, Inhalation: Nose, the and seve edema) Headach passing of Chronic: Cancer (and severe burns rash and burning feeling on contact roat and lung irritation, with coughing, ere shortness of breath (pulmonary ne, dizziness, lightheadedness, and but nose and larynx) in animals	urns ning feeling on contact irritation, with coughing, of breath (pulmonary lightheadedness, and max) in animals Flush eyes with lar- lenses if worn. Sec Quickly remove co amounts of soap a Begin artificial resp Transfer promptly f Medical observatio		eyes with large a if worn. Seek r y remove contain ts of soap and v artificial respirat er promptly to a al observation is	amounts of v nedical atter minated clott water. ion if breathi medical fact recommence	water for at least 30 minutes. Remove contact ntion. hing and wash contaminated skin with large ing has stopped and CPR if necessary. ility. ded as symptoms may be delayed.



Common Name: ACETAMIDE

Synonyms: Acetic Acid Amide; Acetimidic Acid CAS No: 60-35-5 Molecular Formula: C₅H₅NO RTK Substance No: 2890 Description: Colorless, crystalline (sand-like) material

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Use dry chemical, CO ₂ , water spray or foam as	Acetamide reacts with OXIDIZING AGENTS (such as	
1 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and	
0 - Reactivity	including Nitrogen Oxides.	FLUORINE); STRONG ACIDS (such as	
DOT#: UN 3077	Use water spray to keep fire-exposed containers cool.	HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and	
ERG Guide #: 171		POTASSIUM HYDROXIDE); and REDUCING AGENTS.	
Hazard Class: 9 (Miscellaneous)			

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SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Potential for bioconcentration in aquatic organisms is low.

PHYSICAL PROPERTIES

Odor Threshold:	140 to 160 mg/m ³
Flash Point:	Combustible
Specific Gravity:	1.16 (water = 1)
Vapor Pressure:	10 mm Hg at 221ºF (105ºC)
Water Solubility:	Soluble
Boiling Point:	430°F (222°C)
Melting Point:	176°F (81°C)
Ionization Potential:	9.65 eV
Molecular Weight:	59.1

EXPOSURE LIMITS

No occupational exposure limits have been established for Acetamide. The Protective Action Criteria values are:

PAC-1 = 21 mg/m³; PAC-2 = 230 mg/m³;

 $PAC-3 = 1,400 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	No information
Skin:	No information
Inhalation:	Nose and throat irritation
Chronic:	Carcinogen - (Liver) in animals

PROTECTIVE EQUIPMENT

Gloves:	Rubber
Coveralls:	DuPont Tyvek®, Tychem® Polycoat, QC, CPF 1, SL, CPF 2 or equivalent
Boots:	No information
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Transfer to a medical facility.



Common Name: ACETIC ACID

Synonyms: Glacial Acetic Acid; Ethanoic Acid; Ethylic Acid CAS No: 64-19-7 Molecular Formula: CH₃ COOH or C₂H₄O₂ RTK Substance No: 0004 Description: Colorless liquid with vinegar odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE.	Reacts violently with OXIDIZING AGENTS (such as	
2 - Fire		PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Acetic Acid attacks many METALS forming flammable and explosive <i>Hydrogen gas</i> .	
0 - Reactivity	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to cool containers and disperse		
DOT#: UN 2789	vapors. Vapor is heavier than air and may explode if ignited in an enclosed space.		
ERG Guide #: 132			
Hazard Class: 8		Incompatible with CHROMIC ACID; SODIUM PEROXIDE; NITRIC ACID: ACETONE: and AMMONIUM NITRATE.	
(Corrosive)		······································	

SPILL/LEAKS

Isolation Distance: 50 to 100 meters (160 to 330 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Use water spray to disperse vapors.

Soda Ash (Sodium Carbonate) can be used to neutralize spills.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	10 ppm 8-hr TWA
NIOSH:	10 ppm 10-hr TWA, 15 ppm STEL
ACGIH:	10 ppm 10-hr TWA, 15 ppm STEL
IDLH:	50 ppm
ERPG-1:	5 ppm
ERPG-2:	35 ppm
ERPG-3:	250 ppm

	HEALTH EFFECTS
Eyes:	Irritation, burns, possible eye damage
Skin:	Irritation, burns
Acute:	Nose, throat and lung irritation, pulmonary edema, coughing, shortness of breath
Chronic:	Bronchitis, thickening and cracking of the skin

PHYSICAL PROPERTIES

Odor Threshold:	0.48 to 1.0 ppm 103°E (39°C)
	40/
LEL:	4%
UEL:	19.99%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	15 mm Hg at 77ºF (25ºC)
Water Solubility:	Soluble
Boiling Point:	244°F (118°C)
Ionization Potential:	10.66 eV

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene, Butyl Rubber
Coverall:	DuPont Tychem® CPF4, Responder®, TK, Reflector®; CHEMFAB Challenger® 4000.
Boot:	Neoprene or Butyl
Respirator:	>10 ppm - air purifying respirator with organic vapor cartridges, >100 ppm - supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Immediate medical attention is necessary. **Remove** contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Medical observation is recommended for 24 to 48 hours as symptoms may be delayed.



Common Name: ACETONE Synonyms: Dimethyl Ketone; 2-Propanone CAS No: 67-64-1 Molecular Formula: C₃H₆O RTK Substance No: 0006

Description: Clear colorless liquid with a sweet odor

		HA	ZARD D		
Hazard Rating	Firefighting	Firefighting		Reactivity	
1 - Health 3 - Fire 0 - Reactivity DOT#: UN 1090 ERG Guide #: 127 Hazard Class: 3 (Flammable)	FIRETIGNTING FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flashback. Acetone may form an ignitable vapor/air mixture in		ohol- RE. ainers distance ource and nixture in	Acetone may explode when mixed with NITROSYL PERCHLORATE; and CHLOROFORM or BROMOFORM in the presence of a BASE. Acetone reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETIC ACID; and NITRIC ACID to form explosive <i>peroxides</i> . Acetone attacks PLASTICS.	
SP	ILL/LEAKS			PH	YSICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment. Metal containers involving the transfer of Acetone should be grounded and bonded. Keep Acetone out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer as Acetone is dangerous to aquatic life in high concentrations.			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential: Molecular Weight:		13 to 62 ppm -4 °F (-20 °C) 2.5% 12.8% 869 °F (465 °C) 2 (air = 1) 180 mm Hg at 68 °F (20 °C) 0.8 (water = 1) Soluble 133 °F (56 °C) -140 °F (95.6 °C) 9.69 eV 58.1
EXPO	SURE LIMITS			PRO	
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 250 ppm, 10-hr TWA ACGIH: 500 ppm, 8-hr TWA; 750 ppm, STEL IDLH: 2,500 ppm The Protective Action Criteria values are: PAC-1 = 200 ppm PAC-2 = 3,200 ppm PAC-3 = 5,700 ppm			Gloves: Coveralls: Respirator:	Butyl, Tyche break >250 >2,50	Silver Shield®/4H® and Barrier® (>8-hr breakthrough) em® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr through) ppm - full facepiece APR with <i>Organic vapor cartridges</i> 0 ppm - SCBA
HEAL	TH EFFECTS		FIF	RST AII	D AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Nose ar wheezin Headacl lighthea	id throat irritation with coughing and g he, nausea and vomiting, dizziness, dedness and even passing out		Remove the Flush eyes v contact lens Quickly rem amounts of s Begin artifici Transfer pro	person from with large am es if worn. ove contami soap and wa ial respiration mptly to a m	n exposure. nounts of water for at least 15 minutes. Remove nated clothing and wash contaminated skin with large tter. n if breathing has stopped and CPR if necessary. nedical facility.



Common Name: ACETONITRILE

Synonyms: Methyl Cyanide; Cyanomethane CAS No: 75-05-8 Molecular Formula: C₂H₃N RTK Substance No: 0008

Description: Colorless liquid with an *Ether*-like odor

		out			
HAZARD DATA					
Hazard Rating	Firefighting	Firefighting		Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1648 ERG Guide #: 127 Hazard Class: 3 (Flammable)	FIRETIGNTING FLAMMABLE LIQUID Use dry chemical, CO2, alcohol-resistant foam as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Cyanide. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.		Acetonitril PERCHLO CHLORAT FLUORINI Acetonitril HYDROCI (such as S REDUCINI and their H NITRATIN NITROGE ACID; IND NITROGE May react flammable	le reacts violently with OXIDIZING AGENTS (such as DRATES, PEROXIDES, PERMANGANATES, TES, NITRATES, CHLORINE, BROMINE and E). le is not compatible with STRONG ACIDS (such as HLORIC, SULFURIC and NITRIC); STRONG BASES SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); IG AGENTS (such as LITHIUM, SODIUM, ALUMINUM HYDRIDES); ALKALI METALS (such as POTASSIUM); IG AGENTS; IRON SALTS of PERCHLORATE; N-FLUORINE COMPOUNDS; CHLOROSULFONIC DIUM; PERFLUOROUREA; and SULFUR and SN TRIOXIDES. with WATER, MOISTURE and STEAM to form toxic and a vapors.	
SPI	LL/LEAKS			PH	SICAL PROPERTIES
Isolation Distance: Small Spills: 50 meters (150 feet) Large Spills: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Acetonitrile out of confined spaces, such as sewers, because of the possibility of an explosion. May be toxic to aquatic life at high levels.			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potential: Molecular Weight:		98 ppm 42°F (6°C) 3% 16% 975°F (524°C) 1.42 (air = 1) 73 mm Hg at 68°F (20°C) 0.78 (water = 1) Miscible 179°F (82°C) 12.2 eV 41.1
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT		TECTIVE EQUIPMENT
OSHA: 40 ppm, 8-ł NIOSH: 20 ppm, 10 ACGIH: 20 ppm, 8-ł IDLH: 500 ppm The 60-min values are: PAC-1 =	nr TWA -hr TWA nr TWA ute Protective Action Criteria = 13 ppm PAC-2 = 50 ppm PAC-3 = 150 ppm		Gloves: Coveralls: Respirator:	Butyl, S breakth DuPont Kappler (>8-hr b >13 ppr	Silver Shield®/4H® and Viton/Butyl (>8-hr nrough) t CPF 4, BR, LV, Responder®, CSM and TK; r® Zytron® 500; and Saint-Gobain ONESuit® TEC preakthrough) m - Supplied air
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION		O AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation Flushing of the face, chest tightness, headache, nausea and vomiting, weakness and shortness of breath .		Remove the p Flush eyes w contact lense Quickly remo large amount Begin artificia necessary. Transfer to a Use Amyl Nith	berson from o ith large amo is, if worn, who we contamin s of soap an al respiration medical faci <i>rite</i> capsules	exposure. ounts of water for at least 15 minutes. Remove hile rinsing. hated clothing and wash contaminated skin with d water. Seek medical attention. if breathing has stopped and CPR if lity. if symptoms develop.	



Common Name: ACETOPHENONE

Synonyms: Acetyl Benzene; Phenyl Methyl Ketone CAS No: 98-86-2 Molecular Formula: C₈H₈O RTK Substance No: 2961 Description: Colorless to yellow-tinted liquid with a sweet, strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	COMBUSTIBLE LIQUID	Acetophenone may react with STRONG ACIDS (such as	
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	HYDRIDES); and STRONG BASES (such as SODIUM	
DOT#: UN 1993	FIRE.	heat and flammable and explosive <i>Hydrogen gas</i> .	
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	Acetophenone is not compatible with OXIDIZING AGENTS	
Hazard Class: 3 (Flammable)		(SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE BROMINE and FLUORINE); CYANIDES; ALDEHYDES; and ANHYDRIDES.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Acetophenone**.

EXPOSURE LIMITS

ACGIH: 10 ppm, 8-hr TWA

The Protective Action Criteria values are:

- PAC-1 = 6 ppm
- PAC-2 = 10 ppm
- PAC-3 = 71 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, nausea and loss
of coordination

PHYSICAL PROPERTIES

Odor Threshold:	0.36 to 0.6 ppm
Flash Point:	170°F (77°C) to 180°F (82°C)
LEL:	1.1%
UEL:	6.7 %
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	4.1 (air = 1)
Vapor Pressure:	1 mm Hg at 60°F (16°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	396°F (202°C)
Freezing Point:	68°F (20°C)
Ionization Potential:	9.28 eV
Molecular Weight:	120.15

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® CPF 4 and Responder® (>8-hr breakthrough for <i>Ketones</i> , <i>aromatic</i>)
Respirator:	>10 ppm - full facepiece APR with <i>Organic Vapor</i> filters >70 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Chemical Name: 2-ACETYLAMINOFLUORENE

Synonyms: AAF; 2-Fluorenylacetamide CAS No: 53-96-3 Molecular Formula: $C_{15}H_{13}NO$ RTK Substance No: 0010 Description: Tan powder or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 0 - Reactivity DOT#: N/A ERG Guide #: N/A Hazard Class: N/A	 - 2-Acetylaminofluorene is considered a combustible solid, but does not readily ignite. - Use dry chemical, CO₂, water spray or alcohol- resistant foam. - POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. - Use water spray to keep fire-exposed containers cool. 	- 2-Acetylaminofluorene is not compatible with CYANIDES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID ANHYDRIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILLS/LEAKS

Isolation Distance: 25 meter (75 feet)

- Dampen solid spills with water before collection.
- Collect spilled material using a wet method or a vacuum with a HEPA filter.

PHYSICAL PROPERTIES

Flash Point:	531 °F (277 °C)
Boiling Point:	577 °F (303 °C)
LEL:	No Information
UEL:	No Information
Vapor Density:	No Information
Vapor Pressure:	0.0000287 mm Hg at 25 °F (estimated)
Water Solubility:	Insoluble
Melting Point:	381 °F (194 °C)
Ionization Potential:	No Information

EXPOSURE LIMITS

OSHA:	Refer to 29 CFR 1910.1014
NIOSH:	Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.
ACGIH:	N/A
IDLH LEVEL:	N/A
PAC LEVELS:	PAC-1 = 1.2 mg/m ³ ; PAC-2 = 14 mg/m ³ ; PAC-3 = 480 mg/m ³

HEALTH EFFECTS

Eyes:	Irritation
Inhalation:	Nose, throat and lung irritation.
Skin:	May cause skin irritation.
Chronic:	Carcinogen (bladder, kidney and liver) in animals.

PROTECTIVE EQUIPMENT

Gloves:	Chemical-resistant gloves (e.g. Nitrile)
Coverall:	Protective clothing to prevent skin contact
Boot:	Protective boots to prevent skin contact
Respirator:	Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses, if worn, while rinsing.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Begin respirator support if breathing becomes difficult.



Common Name: ACETYL IODIDE

Synonyms: Ethanoyl Iodide CAS No: 507-02-8 Molecular Formula: C_2H_3IO RTK Substance No: 0017 Description: Colorless, fuming liquid which turns brown on contact with air or moisture

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 1 - Fire 1 - Reactivity DOT#: UN 1898 ERG Guide #: 156 Hazard Class: 8	Acetyl lodide may burn, but does not readily ignite. Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER directly on material itself. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>lodine vapor</i> and other <i>lodides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to knock-down vapors.	Acetyl lodide will react with WATER or MOISTURE to release toxic and corrosive <i>Hydrogen lodide</i> . Acetyl lodide reacts vigorously with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to give off heat and may react explosively if mixed with DIISOPROPYL ETHER and other ETHERS in the presence of small amounts of METAL SALTS.
(Conosive)		Acetyl lodide is corrosive to METALS.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (75 to 150 feet)

Neutralize spilled material with crushed limestone, soda ash or lime.

OSHA: N/A

NIOSH:	N/A
ACGIH:	N/A
IDLH LEVEL:	N/A

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Acute:	Lung irritation with coughing and shortness of breath (pulmonary edema)
Chronic:	Bronchitis with coughing, phlegm and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Pungent odor
Flash Point:	No information
LEL:	No information
UEL:	No information
Vapor Density:	No information
Vapor Pressure:	No information
Water Solubility:	Decomposes
Boiling Point:	221°F (105°C)

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® for Acetic Acid
Coveralls:	DuPont Tychem® Responder®, CSM, and TK for
	corrosive heavy liquid chemicals
Boots:	No information
Respirator:	Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if

necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.

March 2017



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Common Name: ACETYL CHLORIDE

Synonyms: Acetic Chloride; Ethanoyl Chloride CAS No: 75-36-5 Molecular Formula: C_2H_3CIO RTK Substance No: 0013 Description: Colorless to pale yellow, fuming liquid with a pungent odor

HAZARD DATA

Hazard Rati	ng Firefighting			Reactivity
3 - Health 3 - Fire	Acetyl Chloride is a FLAMN LIQUID. Use dry chemical or CO ₂ as	Acetyl Chloride is a FLAMMABLE AND REACTIVE LIQUID. Use dry chemical or CO ₂ as extinguishing agents.		Acetyl Chloride reacts violently with WATER to release heat and toxic and corrosive <i>Hydrogen Chloride</i> and <i>Acetic Acid</i> .
2-₩ - Reactivit DOT#: UN 171 ERG Guide #: Hazard Class: (Flamm	y DO NOT USE WATER OR F 7 POISONOUS GASES ARE I including <i>Hydrogen Chloride</i> 155 CONTAINERS MAY EXPLO 3 Use water spray to keep fire not get water inside contain Vapors may travel to a source Vapor is heavier than air and cause a fire or explosion far	 Do NOT USE WATER OR FOAM. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Do not get water inside containers. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		Acetyl Chloride reacts violently with ALCOHOLS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AMINES; POWDERED METALS; PHOSPHORUS TRICHLORIDE; and DIMETHYL SULFOXIDE.
	SPILL/LEAKS		PH	IYSICAL PROPERTIES
Isolation Distance: Small Spill in Water: 30 meters (100 feet) Large Spill in Water: 120 meters (400 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT USE WATER. Keep Acetyl Chloride out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Hazardous to the environment, especially to water.			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Molecular Weight:	Pungent 40°F (4°C) 5% 19% : 734°F (390°C) 2.7 (air = 1) 249 mm Hg at 68°F (20°C) 1.1 (water = 1) Violently reactive 124°F (51°C) -170°F (-112°C) 78.5
EXPOSURE LIMITS			PR	OTECTIVE EQUIPMENT
No occupational exposure limits have been established for Acetyl Chloride . PAC Levels: PAC-1 = 0.85 ppm; PAC-2 = 9.4 ppm; PAC-3 = 56 ppm			Gloves: Butyl Coveralls: DuPo 500; breat Respirator: Supp	l (3-hr breakthrough) ont Tychem® F and TK; Kappler® Zytron® 300 or and Saint-Gobain ONESuit® TEC (>8-hr kthrough for <i>Acid Halides)</i> olied air
Н	EALTH EFFECTS		FIRST A	ID AND DECONTAMINATION
Eyes: S Skin: S Inhalation: N C (I	evere irritation and burns evere irritation, burns, dryness, edness and blisters lose, throat and lung irritation with oughing and severe shortness of brea pulmonary edema)	th	Remove the person Flush eyes with large contact lenses if wor Quickly remove com large amounts of soa Begin artificial respir Transfer to a medica Medical observation	from exposure. e amounts of water for at least 30 minutes. Remove rn. Seek medical attention immediately. taminated clothing and wash contaminated skin with ap and water. Seek medical attention immediately. ration if breathing has stopped and CPR if necessary. al facility. is recommended as symptoms may be delayed.



Common Name: ACETYLENE

Synonyms: Ethyne; Narcilene; Ethenylene; Vinylene CAS No: 74-86-2 Molecular Formula: C₂H₂ RTK Substance No: 0015 Description: Colorless, odorless gas or the commercial product may have an *Ether*-like or garlic-like odor

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
0 - Health 4 - Fire 3 - Reactivity DOT#: UN 1001 ERG Guide #: 116 Hazard Class: 2.1 (Flammable)	Firefighting Acetylene is a FLAMMABLE GAS. Stop flow of gas or let fire burn itself out. POISONOUS GASES ARE PRODUCED IN FIRE, including flammable <i>Hydrogen gas</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to disperse gas, keep fire- exposed cylinders cool, and protect individuals attempting to stop leak. Vapors may travel to a source of ignition and flash back.		 Acetylene reacts violently with OXIDIZING AGENTS (su PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Acetylene reacts with ALKALI METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) and POWDERED METALS and their SALTS (such as COPP MERCURY and SILVER) to form explosive and shock- sensitive <i>Acetylide compounds</i> and <i>Hydrogen</i>. Acetylene is not compatible with COBALT; CESIUM HYDRIDE; IODINE; NITRIC ACID; RUBIDIUM HYDRIDE FERROSILICON; SODIUM HYDRIDE; BRASS; and OZO Acetylene reacts with WATER to form toxic <i>Ammonia</i>. Acetylene is shipped under pressure dissolved in <i>Aceton Dimethylformamide</i> to prevent fires and explosions. 	ER, ER, <u>;</u> DNE. ae or
SPI	LL/LEAKS		PHYSICAL PROPERTIES	
Isolation Distance: Small Spill: 100 mete Large Spill: 800 mete Fire: 1,600 meters (1 Keep Acetylene out of sewers, because of th Use only non-sparking	rs (330 feet) rs (1/2 mile) mile) of confined spaces, such as ne possibility of an explosion. g tools and equipment.	Odor Thre Flash Poi LEL: UEL: Auto Ignit Vapor De Vapor Pre Specific C Water Sol Boiling Pe Freezing Critical Te Ionization Molecular	reshold:226 ppm (with contaminants)pint:Extremely flammable gas2.5%100%100%100%ition: $581^{\circ}F$ ($305^{\circ}C$)ensity:0.9 (air = 1)ressure: 4.04×10^4 mm Hg at $77^{\circ}F$ ($25^{\circ}C$)Gravity:0.65 (water = 1)olubility:Very slightly solublePoint: $-118^{\circ}F$ ($-83^{\circ}C$)J Point: $-113^{\circ}F$ ($-80.6^{\circ}C$)Temp: $97.3^{\circ}F$ ($36.3^{\circ}C$)on Potential: 11.4 eV ar Weight: 26	
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT	
NIOSH: 2,500 ppm, Ceiling ACGIH: Maintain 19.5% <i>Oxygen</i> content The Protective Action Criteria values are: PAC-1 = 65,000 ppm; PAC-2 = 230,000 ppm; PAC-3 = 400,000 ppm		Gloves: Coveralls Respirato	Insulated Neoprene, Viton and Viton/Butyl s: Insulated materials for: < 19.5% Oxygen or 2,500 ppm - SCBA	
HEAL	TH EFFECTS	F	FIRST AID AND DECONTAMINATION	
Eyes:Contact frostbiteSkin:Contact frostbiteInhalation:Headac and pase	with the <i>liquid</i> can cause with the <i>liquid</i> can cause he, dizziness, lightheadedness, ising out	Remove t Immediat minutes, while flus Immerse Begin arti necessar Transfer f	the person from exposure. Itely flush with large amounts of warm water for at least 30 , lifting upper and lower lids. Remove contact lenses, if worn, shing. Seek medical attention immediately. e affected part in warm water. tificial respiration if breathing has stopped and CPR if iry. to a medical facility.	



Common Name: ACRYLAMIDE

Synonyms: Acrylic Amide; 2-Propenamide CAS No: 79-06-1 Molecular Formula: C₃H₅NO RTK Substance No: 0022 Description: Colorless to white, odorless flake-like solid

HAZARD DATA

2 Uselth Assulamids is a COMPLICTIPLE COULD Assulamids may ask marine a	
3 - RealthAcrylamide is a COMBOSTBLE SOLID.Acrylamide may polymerize of the second seco	e violently when HEATED to sed to ULTRAVIOLET STRONG BASES (such as POTASSIUM HYDROXIDE) ch as PERCHLORATES, NATES, CHLORATES, ROMINE and FLUORINE). le with MINERAL ACIDS , SULFURIC and NITRIC); (ANATES; and IYDROXYL-, AMINO-, and

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile) in all directions

- Moisten spilled material first, or use a HEPA-filter vacuum for clean-up, and deposit into sealed containers.
- DO NOT wash into sewer.
- May bioaccumulate in aquatic life.
- Severe marine pollutant.

EXPOSURE LIMITS

OSHA:	0.3 mg/m ³ , 8-hr TWA
NIOSH:	0.03 mg/m ³ , 10-hr TWA
ACGIH:	0.03 mg/m ³ , 8-hr TWA
IDLH:	60 mg/m ³

	HEALTH EFFECTS
Eyes:	Irritation, watering and inflammation
Skin:	Irritation, rash or burning feeling
Inhalation:	Nose and throat irritation with coughing and wheezing
	Confusion, disorientation, fatigue and tremors

Chronic: Cancer (pancreas) in humans

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PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	280°F (138°C)
Auto Ignition Temp:	464°F (240°C)
Vapor Density:	2.45 (air = 1)
Vapor Pressure:	0.007 mm Hg at 68°F (20°C)
Specific Gravity:	1.22 (water = 1)
Water Solubility:	Soluble (Mixes)
Boiling Point:	347° to 572°F (175° to 300°C)
Melting Point:	184°F (85°C) (Violent polymerization)
Ionization Potential:	9.5 eV
Molecular Weight:	71.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Fabrics; Kappler® Zytron® 400; and Saint-Gobain ONESuit TEC (>8-hr breakthrough for <i>Amides</i>)
Respirator:	>0.03 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ACRYLIC ACID

Synonyms: Propene Acid; Ethylene Carboxylic Acid; Vinylformic Acid CAS No: 79-10-7 Molecular Formula: $C_3H_4O_2$ RTK Substance No: 0023 Description: Clear liquid with a sharp and irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 2 - Reactivity DOT#: UN 2218 ERG Guide #: 132P	Acrylic Acid is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Acrylic Acid reacts with PURE NITROGEN; OXIDIZING AGENTS (such as PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
(Corrosive)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Vapors may travel to a source of ignition and flash back.	Acrylic Acid may polymerize explosively on contact with AMINES; AMMONIA; CHLOROSULFONIC ACID; PEROXIDES; and OLEUM, or when exposed to HEAT or DIRECT SUNLIGHT.

SPILL/LEAKS

Isolation Distance:

Small Spill - 60 meters (200 feet)

Large Spill - 500 meters (1,600 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Do not wash into sewer.

EXPOSURE LIMITS

OSHA:	N/A
NIOSH:	2 ppm, 10-hr TWA
ACGIH:	2 ppm, 8-hr TWA
IDLH LEVEL:	No information
PAC LEVELS:	PAC-1 = 1.5 ppm; PAC-2 = 46 ppm;
	PAC-3 = 180 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, burns and rash
Acute:	Nose, throat and lung irritation
Chronic:	Skin allergy with rash and itching

PHYSICAL PROPERTIES

Odor Threshold:	0.06 ppm to 1 ppm
Flash Point:	124ºF (51ºC)
LEL:	2.0%
UEL:	8.0%
Vapor Density:	2.5 (air = 1)
Relative Density:	1.05 (water = 1)
Vapor Pressure:	3 mm Hg at 68°F (20°C)
Water Solubility:	Miscible
Boiling Point:	286°F (141°C)

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Butyl, Neoprene DuPont Tychem® CPF-2, SL, CPF-4, Responder®, TK or F
Boots: Respirator:	Butyl, Neoprene >2 ppm - Full facepiece APR with OV cartridges >20 ppm - Pressure demand supplied-air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ADIPONITRILE

Synonyms: 1,4-Dicyanobutane; Hexanedinitrile Tetramethylene Cyanide CAS No: 111-69-3 Molecular Formula: C₆H₈N₂ RTK Substance No: 0027 Description: Colorless, nearly odorless, oily liquid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 2205 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Cyanide</i> . Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Adiponitrile reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Adiponitrile is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Adiponitrile decomposes above 194°F (90°C) to release toxic Hydrogen Cyanide gas.

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SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Animals and aquatic life are endangered by potential Cyanide production.

EXPOSURE LIMITS

4 ppm, 10-hr TWA NIOSH: ACGIH: 2 ppm, 8-hr TWA IDLH: None The Protective Action Criteria values are: PAC-1 = 3.85 ppm PAC-2 = 3.85 ppm PAC-3 = 150 ppm

	 FFF	ГОТС
HEP	EFF	ECIS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, weakness, confusion, nausea and vomiting, pounding of the heart and trouble breathing, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Nearly odorless
Flash Point:	199°F (93°C)
LEL:	1 to 1.7%
UEL:	5%
Auto Ignition Temp:	1,022°F (550°C)
Vapor Density:	3.73 (air = 1)
Vapor Pressure:	0.002 mm Hg at 68°F (20°C)
Specific Gravity:	0.97 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	563°F (295°C)
Freezing Point:	34°F (1°C)
Molecular Weight:	108.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl Rubber, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Nitriles, aliphatic</i>)
Coveralls:	Tychem® BR, Responder® and TK; Zytron® 400 and 500; ONESuit®TEC; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Nitriles, aliphatic</i>)
Respirator:	>2 ppm - Supplied air >150 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.



Common Name: AFLATOXINS

Synonyms: Aflatoxins B1, B2, G1 and G2 CAS No: 1402-68-2 Molecular Formula: $C_{13}H_{12}O_6$; $C_{17}H_{14}O_7$; $C_{17}H_{12}O_7$; $C_{17}H_{14}O_6$ RTK Substance No: 0029 Description: Colorless to pale yellow crystals when used in research

HAZARD DATA

2		
Hazard Rating	Firefighting	Reactivity
4 - Health	May be COMBUSTIBLE in <i>liquid</i> form.	Aflatoxins are not compatible with OXIDIZING AGENTS
Fire	extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
Reactivity		CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: None		NITRIC); STRONG BASES (such as SODIUM
ERG Guide #: None		AMMONIA; and AMINES.
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 75 meters (250 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Ventilate and wash area after clean-up is complete. DO NOT wash into sewer.

Bioaccumulation is low in aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Aflatoxins**.

HEALTH EFFECTS

Eyes:	No information
Skin:	No information
Inhalation:	Headache, nausea and vomiting
Chronic:	Cancer (liver) in humans

PHYSICAL PROPERTIES

Not available
May be combustible (liquid form)
Soluble
514° to 516°F (268° to 269°C)
312 to 330

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Transfer** promptly to a medical facility.

August 2008



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



				QUICK Reference
Common Name: ALDI	CARB			
Synonyms:TemikCAS Number:116-00Molecular Formula:C7H14IRTK Number:0031Description:White,	; Union Carbide UC-21149 6-3 N ₂ O ₂ S , crystalline (sand-like) solid wh	ich is usually form	ulated into granules	
	HAZA	RD DATA		
Hazard Rating	Firefighting		Reactivity	
Health: 3 Fire: 0 Reactivity: 0 DOT #: UN 2757 ERG #: 151 DOT Hazard: 6.1 (poison)	POISONOUS FUMES ARE F including <i>Nitrogen Oxides</i> CONTAINERS MAY EXPLO Use water spray to keep fire- cool. Use dry chemical, CO ₂ , wate extinguishing agents.	PRODUCED IN FIRE and <i>Sulfur Oxides</i> . DE IN FIRE. -exposed container er spray or foam as	, Aldicarb is not co ALKALINE SUB	ompatible with HIGHLY ISTANCES.
SPILLS	/LEAKS	P	HYSICAL PRO	PERTIES
Isolation Distances: Liquid Spill: 50 meters (150 Solid Spill: 25 meters (75 fere: Boo meters (1/2) 800 meters (1/2) Evacuate personnel. Secure and control entrance to the secure and control entrance to the secure and deposit in sealed DO NOT DRY SWEEP. Use a vacuum with a high-efficient to reduce dust during clean-up Do not allow this substance to ear sewers, as it is very toxic to an effects. Ventilate area after clean-up is control	feet) eet) mile) he area. ential ignition sources. most convenient and safe containers. ency particulate air (HEPA) filter o. hter waterways, including quatic life with long-lasting omplete.	Boiling Point: Molecular Wei Melting Point: Vapor Pressur Specific Gravi Water Solubili	Decomposes (ght: 190.23 99-100 °C (210 re: 1 x 10 ⁻⁴ mm Hg ity 1.195 at 25 °C ity: Insoluble	9-214 °F) g at 25 °C (77 °F) (77 °F)
EXPOSU	RE LIMITS	PR		UIPMENT
There are no occupational expose PAC: PAC-1 = 0.027 mg/m ³ PAC-2 = 0.3 mg/m ³ PAC-3 = 1.8 mg/m ³	 re are no occupational exposure limits for this substance. PAC-1 = 0.027 mg/m³ PAC-2 = 0.3 mg/m³ PAC-3 = 1.8 mg/m³ 		Nitrile, Neoprene Tychem® BR, CSM an High exposure - Supp pressure-demand pressure mode	nd TK or the equivalent lied-air, full facepiece, or another positive-
	TH EFFECTS	FIRST	AID AND DECO	NTAMINATION
Eyes:Blurred visionSkin:IrritationInhalation:Headache, dizzing loss of coordination:	ess, chest tightness, twitching, tion, convulsions, coma, death	Immediately flu 15 minutes. Quickly remove with large an Shampoo hair Remove the pe Begin rescue b has stopped	sh with large amounts contaminated clothing nounts of water. promptly if contaminate son from exposure. oreathing (using univers and CPR if heart actior	of water for at least g. Immediately wash area ed. eal precautions) if breathing n has stopped.

Transfer promptly to a medical facility.

June 2023



Common Name: ALDOL

Synonyms: Acetaldol; 3-Hydroxybutanal CAS No: 107-89-1 Molecular Formula: $C_4H_8O_2$ RTK Substance No: 0032 Description: Thick, colorless to pale yellow liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 2839 ERG Guide #: 153 Hazard Class: 6.1 (Toxic)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	Aldol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Aldol reacts with METALS to form flammable and explosive <i>Hydrogen gas</i> .

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Flash Point:	150 °F (66 °C)
Auto Ignition Temp:	482 °F (250 °C)
Vapor Density:	3 (air = 1)
Vapor Pressure:	21 mm Hg at 68 $^{\circ}$ F (20 $^{\circ}$ C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	174 $^{\circ}$ to 176 $^{\circ}$ F (79 $^{\circ}$ to 80 $^{\circ}$ C)
Molecular Weight:	88.1

EXPOSURE LIMITS

No occupational exposure limits have been established for **Aldol**.

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Viton/Butyl (>8-hr breakthrough for <i>Aldehydes</i> , <i>aliphatic</i>)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Aldehydes, aliphatic)

Respirator: SCBA

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Headache, dizziness, and passing out

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.	Remove
contact lenses if worn.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALDRIN

Synonyms: HHDN; Octalene CAS No: 309-00-2 Molecular Formula: C₁₂H₈Cl₆ RTK Substance No: 0033

Description: White to brown, crystalline solid, or a brown liquid, with a mild chemical odor

HAZARD DATA						
Hazard Rating	Firefighting			Reactivity		
3 - Health 0 (Solid) - Fire 3 (Liquid)- Fire 0 - Reactivity DOT#: UN 2761 (Solid) UN 2762 (Liquid) ERG Guide #: 151 (Solid) 131 (Liquid) Hazard Class: 6.1 (Poison) (Solid) 3 (Elemmable) (Liquid)	Firefighting Aldrin does not burn, however, it is often dissolved in a liquid carrier which may be flammable or combustible. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers cool.		is often may be ay, alcohol- extinguishing DUCED IN de. sed containers	Aldrin is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACID CATALYSTS; and PHENOL. Aldrin may attack METALS in the presence of WATER.		
SPIL	L/LEAKS			PHYSICAL PROPERTIES		
Isolation Distance: Spill (solid): 25 meters (75 f Spill (liquid): 50 meters (150 Fire: 800 meters (1/2 mile) Absorb Aldrin in <i>liquid solut</i> earth, or a similar material for disposal. Moisten <i>solid</i> Aldrin first or clean-up and place into sea DO NOT wash into sewer. Keep Aldrin in <i>liquid solutio</i> sewers, because of the pos Use only non-sparking tools opening and closing contair Aldrin is very toxic to aquati environment. It bioaccumu	ieet) D feet) <i>tion</i> in vermiculite, dry sand, and place into sealed containers use a HEPA-filter vacuum for iled containers for disposal. <i>n</i> out of confined spaces, such as sibility of an explosion. and equipment, especially when hers of Aldrin in <i>liquid solution</i> . ic organisms and the lates and has long-term effects.	Odor Thresho Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Molecular We		 d: Mild chemical odor e: 8 x 10⁻⁵ mm Hg at 68°F (20°C) cy: 1.6 (solid) (water = 1) cy: Very slightly soluble Decomposes 219°F (104°C) ght: 365 		
EXPOSL	JRE LIMITS			PROTECTIVE EQUIPMENT		
OSHA: 0.25 mg/m ³ , 8-hr NIOSH: 0.25 mg/m ³ , 10-hr ACGIH: 0.05 mg/m ³ , 8-hr IDLH: 25 mg/m ³ The Protective Action Criteri PAC-1 = 0.25 mg/m ³ PAC-3 = 25 mg	IA: 0.25 mg/m^3 , 8-hr TWA SH: 0.25 mg/m^3 , 10-hr TWA GIH: 0.05 mg/m^3 , 8-hr TWA H: 25 mg/m^3 Protective Action Criteria values are: AC-1 = 0.25 mg/m^3 PAC-3 = 25 mg/m^3		Gloves: Coveralls: Respirator:	Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic</i> , <i>unsaturated</i>) Tychem® BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic</i> , <i>unsaturated</i>) SCBA		
HEALTH	H EFFECTS		FIRS	T AID AND DECONTAMINATION		
Eyes:IrritationSkin:IrritationInhalation:Headache, or convulsionsChronic:Cancer (live	dizziness, nausea and vomiting, and even death r) in animals		Remove the perso Flush eyes with la contact lenses if v Quickly remove c large amounts of Begin artificial res Transfer promptly	on from exposure. arge amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with soap and water. spiration if breathing has stopped and CPR if necessary. y to a medical facility.		



Common Name: d-trans-ALLETHRIN

Synonyms: d-Allethrolone Chrysanthemumate; Bioallethrin CAS No: 28434-00-6 Molecular Formula: $C_{19}H_{26}O_3$ RTK Substance No: 3647

Description: Clear to amber colored, thick liquid with a mild odor (Pyrethroid insecticide)

HAZARD DATA

Hazard Rating	Firefighting	Reactivity						
2 - Health	d-trans-Allethrin does not burn, however, it is often dissolved in a liquid carrier which may be	d-trans-Allethrin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,						
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,						
0 - Reactivity	Use dry chemical, CO ₂ or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).						
ERG Guide #: 151	Use water spray to keep fire-exposed containers	d-trans-Allethrin can be decomposed by STRONG BASES (such as SODIUM HYDROXIDE and						
Hazard Class: 6.1	COOI.	POTASSIUM HYDROXIDE) and ULTRAVIOLET LIGHT.						
(Poison)								

SPILL/LEAKS PHYSICAL PROPERTIES **Isolation Distance:** Flash Point: 180° to 266°F (82° to 130°C) (dependent on "carrier" for a 90% solution) Spill: 50 meters (150 feet) **Specific Gravity:** 0.995 (water = 1) Fire: 800 meters (1/2 mile) Water Solubility: Insoluble Absorb liquids in dry sand, earth, or a similar material **Boiling Point:** 284° to 320°F (140° to 160°C) and place into sealed containers for disposal. DO NOT wash into sewer. **Molecular Weight:** 302.4 d-trans-Allethrin is highly toxic to fish and aquatic animals.

EXPOSURE LIMITS

No occupational exposure limits have been established for **d-trans-Allethrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Viton/Butyl, Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)
Coveralls:	Tychem® F, BR, CSM and TK (>8-hr breakthrough for <i>Hydrocarbons</i>)
Respirator:	Spill - full facepiece APR with Organic vapor filters and <i>P100 prefilters</i> Fire/Large Spill - SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation and burns	Remove the person from exposure.
Skin:	Irritation and burns with rash, itching and redness	Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary.
	Headache, nausea, vomiting, dizziness, seizures, and a loss of consciousness	Transfer promptly to a medical facility.



Common Name: ALLYL ALCOHOL

Synonyms: 2-Propen-1-ol; Allylic Alcohol; Vinylcarbinol CAS No: 107-18-6 Molecular Formula: C_3H_6O RTK Substance No: 0036 Description: Colorless liquid with a mustard-like odor

HAZARD DATA						
Hazard Rating	Firefighting			Reactiv	ity	
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 1098 ERG Guide #: 13 Hazard Class: 6. (Poise	Allyl Alcohol is a FLAMMABLE LIQ Use dry chemical, CO ₂ , water spray resistant foam as extinguishing agel POISONOUS GASES ARE PRODUC FIRE. CONTAINERS MAY EXPLODE IN F Use water spray to keep fire-exposed cool. Napor is heavier than air and may tradistance to cause a fire or explosion source. Vapors may travel to a source of ignifiash back.	Firefighting Allyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Vapors may travel to a source of ignition and flash back.			Allyl Alcohol will explode upon contact with SULFURIC ACID. Allyl Alcohol will react with CARBON TETRACHLORIDE to form potentially explosive <i>halogenated epoxides</i> (such as <i>Dichlorobutylene</i> and <i>Trichlorobutylene Oxides</i>). Allyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); TRIAZENES; BROMOMELAMINE; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); NITRIC ACID; CHLOROSULFONIC ACID; PHOSPHORUS TRICHLORIDE; and DIALLYL PHOSPHITE.	
	SPILL/LEAKS			PHY	SICAL PROPERTIES	
Isolation Distance: Small Spills: 30 meters (100 feet) Large Spills: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Allyl Alcohol out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.			Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Molecular We	old: Temp: /: re: ity: ity: ight:	0.8 to 1.1 ppm 70°F (21°C) 2.5% 18% 713°F (378°C) 2 (air = 1) 17.2 mm Hg at 68°F (20°C) 0.9 (water = 1) Miscible 206°F (97°C) 58.1	
EX	POSURE LIMITS	ľ	-	PROT	ECTIVE EQUIPMENT	
OSHA: 2 NIOSH: 2 ACGIH: 0 IDLH LEVEL: 2 PAC P LEVELS: P	ppm, 8-hr TWA ppm, 10-hr TWA; 4 ppm, STEL 5 ppm, 8-hr TWA 0 ppm AC-1 = 0.09 ppm; PAC-2 = 1.7 ppm; AC-3 = 13 ppm		Gloves: Coveralls: Respirator:	Butyl, S DuPont Respor Gobain >0.5 pp >5 ppm >20 ppr	Silver Shield®/4H® and Viton (>8-hr breakthrough) t Tychem® CPF 4, BR and LV, CSM, nder®, and TK; Kappler Zytron® 400; and Saint- ONESuit®PRO (>8-hr breakthrough) om -full facepiece APR with Organic vapor filters o - Pressure demand supplied air m – Pressure demand SCBA	
HE	ALTH EFFECTS		FIRS	ST AID	AND DECONTAMINATION	
Eyes: Irrita Skin: Irrita Inhalation: Nose coug (pulr Hear	tion and burns tion, burns and blisters e, throat and lung irritation with hing, phlegm and shortness of breath nonary edema) dache, dizziness and passing out	Remove the per Flush eyes wit contact lenses Quickly remov large amounts Begin artificial Transfer to a r Medical obser		erson from th large am s if worn. S ve contamir s of water. respiration medical fac vation is re	exposure. ounts of water for at least 15 minutes. Remove seek medical attention immediately. nated clothing. Wash contaminated skin with Seek medical attention. a if breathing has stopped and CPR if necessary. illity. commended as symptoms may be delayed.	



Common Name: ALLYL CHLORIDE

Synonyms: 3-Chloropropene; 1-Chloro-2-propene CAS No: 107-05-1 Molecular Formula: C_3H_5CI RTK Substance No: 0039 Description: Colorless, brown, yellow or purple liquid with a strong, unpleasant odor

HAZARD DATA					
Hazard Rating 3 - Health 3 - Fire 1 - Reactivity DOT#: UN 1100 ERG Guide #: 131 Hazard Class: 3 (Flammable)	ating Firefighting Image: FLAMMABLE LIQUID Use dry chemical, CO2, foam or water sprextinguishing agents. May polymerize and explode at elevated POISONOUS GASES ARE PRODUCED Image: I		r spray as ted temperatures. ED IN FIRE, osgene. RE. containers cool. ion and flash vel a distance he source.	Reactivity Allyl Chloride may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CATALYSTS; AMINES; IRON or ALUMINUM CHLORIDES; CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); and SODIUM HYDROXIDE.	
SPII			P	Attacks PLASTIC, RUBBER and COATINGS.	
Isolation Distance: Small Spill: 60 meters Large Spill: 270 meter Absorb liquids in verm activated carbon and Liquid floats on water. Harmful to aquatic life	lation Distance: all Spill: 60 meters (200 feet) ge Spill: 270 meters (900 feet) sorb liquids in vermiculite, dry sand, earth, or tivated carbon and deposit in sealed containers. uid floats on water. rmful to aquatic life in very low concentrations.		Odor Threshold: Flash Point: LEL: UEL: Relative Vapor Density: Vapor Pressure: Water Solubility: Ionization Potentia Boiling Point: Molecular Weight:	0.47 ppm -20°F (-29°C) 2.9% 11.1% 2.6 (air = 1) 295 mm Hg at 68°F (20°C) Slightly soluble al: 10.05 eV 113°F (45°C) 576.5	
OSHA: 1 ppr NIOSH: 1 ppr ACGIH: 1 ppr IDLH LEVEL: 250 p	n, 8-hr TWA n, 10-hr TWA, 2 ppm STEL n, 8-hr TWA; 2 ppm STEL opm		Gloves: 4-H Coveralls: Duf TK Boots: No Respirator: >1 can >50	 (®/Silver Shield® (>4-hr breakthrough) Pont Tychem®, CPF-4, BR and LV, Responder® and (>8-hr breakthrough) information ppm - Full-facepiece APR with Organic Vapor rtridges ppm - Supplied air 	
HEALT Eyes: Irritation, Skin: Irritation, Acute: Nose, thro coughing Headache unconscio Chronic: Limited ev May caus Cough, pl	HEFFECTS burns leading to eye damage severe burns bat and lung irritation with and shortness of breath e, dizziness and busness vidence - Cancer in animals. the mutations hlegm and shortness of breath		FIRST A Remove the person Flush eyes with lar contact lenses if w Quickly remove co large amounts of s Begin artificial resp necessary. Transfer to a medie Medical observatio	ID AND DECONTAMINATION In from exposure. ge amounts of water for at least 30 minutes. Remove orn. Seek medical attention immediately. Intaminated clothing and wash contaminated skin with oap and water. Seek medical attention immediately. Diration if breathing has stopped and CPR if cal facility. In is recommended as symptoms may be delayed.	



Common Name: ALLYL FORMATE

Synonyms: Formic Acid, Allyl Ester CAS No: 1838-59-1 Molecular Formula: $C_4H_6O_2$ RTK Substance No: 0042 Description: Colorless, clear liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Allyl Formate is a FLAMMABLE LIQUID.	Allyl Formate is not compatible with OXIDIZING
3 - Fire	resistant foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Solid streams of water may spread fire.	CHLORINE, BROMINE and FLUORINE) and
DOT#: UN 2336	POISONOUS GASES ARE PRODUCED IN FIRE.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
ERG Guide #: 131	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back.	
	Allyl Formate may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Formate.

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Allyl Formate** out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of **Allyl**

EXPOSURE LIMITS

5° to 67°F (-15° to 19.4°C)

Flash Point: Specific Gravity:

Water Solubility:

Boiling Point: Molecular Weight: 0.95 (water = 1) Slightly soluble 180° to 183°F (82° to 84°C) 86.1

PROTECTIVE EQUIPMENT		
Gloves:	Butyl (1 to4-hr breakthrough for <i>Esters, Carboxylic, Formates</i>)	
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Esters, Carboxylic</i>)	
Respirator:	SCBA	

PAC-1 = 12.5 mg/m^3 (4 ppm) PAC-2 = 75 mg/m^3 (21 ppm)

The Protective Action Criteria values are:

No occupational exposure limits have been

established for Allyl Formate.

 $PAC-3 = 400 \text{ mg/m}^3 (114 \text{ ppm})$

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALLYL IODIDE

Synonyms: 3-Iodopropene CAS No: 556-56-9 Molecular Formula: C_3H_5I RTK Substance No: 0044 Description: Yellowish, corrosive liquid that darkens on contact with air.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire 1 - Reactivity DOT#: UN 1723 ERG Guide #: 132 Hazard Class: 3 (Flammable)	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Iodide</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source	Allyl lodide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Allyl lodide is AIR and LIGHT sensitive.

SPILL/LEAKS

Isolation Distance:

Small Spill - 60 m (200 feet)

Large Spill - 330 m (1,100 feet)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established.

	HEALTH EFFECTS
Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns
Acute:	Irritation of the nose, throat and lungs with coughing, wheezing and shortness of breath
Chronic:	Coughing, phlegm and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Unpleasant, irritating
Flash Point:	61ºF (16ºC)
Specific Gravity:	1.84 (water = 1)
Vapor Density:	5.8 (air = 1)
Water Solubility:	Insoluble
Boiling Point:	217°F (103°C)
Molecular Weight:	168

	PROTECTIVE EQUIPMENT
Gloves:	Viton (31 minutes permeation) or Silver Shield®/4H® (240 minutes permeation)
Coveralls:	DuPont Tychem® F, CPF-4, BR and LV, Responder® and TK for <i>Alylic Halogens</i> (8-hr breakthrough)
Boots:	No information
Respirator:	Pressure demand supplied air

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Chemical Name: ALLYL ISOTHIOCYANATE

Synonyms: Mustard Oil CAS No: 57-06-7 Molecular Formula: C₄H₅NS RTK Substance No: 0045 Description: Colorless to pale yellow, oily liquid with an irritating odor.

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 1545 ERG Guide #: 155 Hazard Class: 6.1 (Poison)	 Combustible liquid Fire extinguishers – use dry chemical, CO₂, or foam DO NOT USE WATER Decomposition Products - Nitrogen Oxides, Sulfur Oxides and Hydrogen Cyanide Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 	- Reacts with WATER, ALCOHOLS, STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANTES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AMINES; MOISTURE; and HEAT.		

Isolation Distance: Isolate spill or leak in all directions for at least 50 meters (150 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

EXPOSURE LIMITS

ACGIH:	N/A
OSHA:	N/A
NIOSH:	N/A
	N/A

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, burns and blisters
Acute:	Nose and throat irritation
Chronic:	Cancer -Tested (Not Classifiable) May damage the fetus Symptoms of asthma - coughing and wheezing

PHYSICAL PROPERTIES			
Odor Threshold: No Information			
Flash Point:		115°F (46°C)	
LEL: No Information		No Information	
UEL:		No Information	
Vapor Density	:	3.4 (air = 1)	
Vapor Pressur Water Solubilit	e: :v:	3.7 mm Hg at 86°F (30°C) Insoluble	
Boiling Point:	Boiling Point: $304^{\circ}F(151^{\circ}C)$		
Ionization Pote	ential:	No Information	
PROTECTIVE EQUIPMENT			
Gloves:	No Information		
Coveralls:	No Information		
Boots:	No Information		
Respirator:	Supplied air		
FIRST AID AND DECONTAMINATION			
 Remove the person from exposure. Flush eyes with cool water for at least 15 minutes. Remove contaminated clothing and wash contaminated skin with soap and water. Begin rescue breathing and CPR if necessary. Transfer to a medical facility. 			



Common Name: ALLYL TRICHLOROSILANE

Synonyms: Allylsilicone Trichloride CAS No: 107-37-9 Molecular Formula: C₃H₅Cl₃Si RTK Substance No: 0047 Description: Colorless liquid with a pungent and irritating odor

· · · · · · · · · · · · · · · · · · ·		HAZARD DAT	A
Hazard Rating	Firefighting		Reactivity
3 - Health 3 - Fire 2 ₩ - Reactivity DOT#: UN 1724 (Stabilized) ERG Guide #: 155 (page 258)	Use dry chemical, CO ₂ or dry sau DO NOT USE WATER or FOAM Reignition may occur as Allyl Tr difficult to extinguish. POISONOUS GASES ARE PRO including <i>Hydrogen Chlorides, F</i> <i>Silicon Dioxide</i> . CONTAINERS MAY EXPLODE Use water spray to keep fire-exp	nd to extinguish fire. on material itself. ichlorosilane is DUCED IN FIRE, <i>Phosgene</i> and IN FIRE. osed containers cool.	Allyl Trichlorosilane reacts with WATER, MOIST AIR or STEAM to produce toxic and corrosive <i>Hydrogen Chloride gas</i> and flammable and explosive <i>Hydrogen gas</i> . Allyl Trichlorosilane is not compatible with ORGANIC ACIDS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; AMINES; STRONG ACIDS (such as
Hazard Class: 8 (Corrosive)	DO NOT get water inside contair Vapors may travel to a source of back. Vapor is heavier than air and ma cause a fire or explosion far from Allyl Trichlorosilane may autop	ners. ignition and flash y travel a distance to n the source. olymerize.	HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; ALDEHYDES; KETONES; and METALS.
SPI	LL/LEAKS		PHYSICAL PROPERTIES
Isolation Distance: Small Spills - 30 meter Large Spills - 180 meter Cover and neutralize s soda ash, lime or cem Keep out of sewers to	rs (100 feet) ers (600 feet) pill with crushed limestone, ent powder. prevent explosions.	Odor Threshold Flash Point: LEL: UEL: Vapor Density: Vapor Pressure Specific Gravity Water Solubility Boiling Point:	: Pungent $95^{\circ}F(35^{\circ}C)$ No Information No Information 6.05 (air = 1) : 10 mm Hg at $61^{\circ}F(16^{\circ}C)$: 1.2 : Reactive $241^{\circ}F(116^{\circ}C)$
EXPOS	SURE LIMITS	F	PROTECTIVE EQUIPMENT
OSHA, NIOSH and ACGIH EPA Acute Exposure Guideline Levels: (AEGLs)	No occupational exposure limits established AEGL1 = 0.60 ppm (8-hr) AEGL2 = 3.7 ppm (8-hr) AEGL3 = 8.7 ppm (8-hr) AEGL3 = 210 ppm (10 min)	Gloves: Coveralls: Boots: Respirator:	Viton® for <i>Organosilicon compounds</i> DuPont Tychem® Responder®, CSM, and TK (for heavy liquid chemicals which are toxic and corrosive) No Information >1 ppm - Supplied Air
HEAL	TH EFFECTS	FIRST	AID AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, th coughing (pulmon)Chronic:No information	and burns and burns roat and lung irritation with g and severe shortness of breath ary edema) mation	Remove the per- Flush eyes with contact lenses it Quickly remove large amounts of Begin artificial re necessary.	son from exposure. large amounts of water for at least 30 minutes. Remove worn. Seek medical attention immediately. contaminated clothing and wash contaminated skin with f soap and water. Seek medical attention immediately. espiration if breathing has stopped and CPR if

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ALUMINUM CHLORIDE

Synonyms: Aluminum Trichloride; Anhydrous Aluminum Chloride CAS No: 7446-70-0 Molecular Formula: AICI₃ RTK Substance No: 0057 Description: Yellowish or grayish-white crystalline solid or powder with a sharp odor that is water reactive

	HAZ	ZARD DAT	ТА
Hazard Rating	Firefighting	Reactivi	rity
3 - Health 0 - Fire 2-W - Reactivity DOT#: UN 1726 ERG Guide #: 137 Hazard Class: 8 (Corrosive)	Non-flammable Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER. Use water spray to keep fire-exposed containers cool. DO NOT get water inside tanks. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> . Aluminum Chloride may ignite combustibles (wood, paper and oil).	Aluminum AIR to for Aluminum CARBON ALKENES OXIDE; O ETHYLEN PERCHLO CHLORA STRONG POTASSI HALOGEI	m Chloride may react violently with WATER and MOIST rm toxic <i>Hydrogen Chloride gas</i> and heat. m Chloride is not compatible with ALUMINUM OXIDE; N OXIDE; PHENYL AZIDE; GLYCIDOL; NITROBENZENE; S; BENZOYL CHLORIDE; NAPHTHALENE; ETHYLENE DXYGEN DIFLUORIDE; NITROMETHANE; ANILINES; NIMINE; OXIDIZING AGENTS (such as ORATES, PEROXIDES, PERMANGANATES, ATES, NITRATES, CHLORINE, BROMINE and FLUORINE); B BASES (such as SODIUM HYDROXIDE and SIUM HYDROXIDE); EPICHLOROHYDRIN; ENATED HYDROCARBONS; and ALCOHOL.
SPI	LL/LEAKS	<u> </u>	PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 30 meter Large Spills: 120 meter water Fire: 800 meters (1/2) Collect powdered mate safe manner and depo Keep Aluminum Chlo where water may be p because of the possib Harmful to aquatic life	s (100 feet) when spilled in water ers (400 feet) when spilled in mile) erial in the most convenient and osit in sealed containers. ride out of confined spaces resent (such as sewers), ility of an explosion. at low concentrations.	Odor Thresho Flash Point: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei	Sharp Nonflammable y: 2.5 (air = 1) ure: 1 mm Hg at 212°F (100°C) vity: 2.7 (water = 1) lity: Decomposes : 360°F (182°C) :: 374°F (190°C) bight: 133.34
OSHA: None		Gloves:	Natural Rubber and Nitrile (for <i>solid</i>) and Neoprene (if <i>HCI</i>
NIOSH: 2 mg/m ³ , 1 ACGIH: Withdrawn IDLH: None	0-hr TWA	Coveralls: Respirator:	 gas is present) DuPont Tyvek® (for solid) and Tychem® Responder (if Hydrogen Chloride gas is present) >2 mg/m³ - Full facepiece APR with High efficiency filter If Hydrogen Chloride gas is present, use Supplied air
HEAL	TH EFFECTS	FIRS	ST AID AND DECONTAMINATION
Eyes: Severe Skin: Severe Inhalation: Nose, th coughin shortne	irritation and burns irritation and burns nroat and lung irritation with g, wheezing and severe ss of breath (pulmonary edema)	Remove the per Quickly brush large amounts lids. Remove attention imme Quickly remov excess chemic 30 minutes. S Begin artificial Transfer to a m Medical observ	berson from exposure. In off excess chemical from the face. Immediately flush with s of water for at least 30 minutes, lifting upper and lower e contact lenses, if worn, while flushing. Seek medical ediately. ve contaminated clothing. Immediately blot or brush off ical and wash gently with large amounts of water for at least Seek medical attention immediately. I respiration if breathing has stopped and CPR if necessary. medical facility. rvation is recommended as symptoms may be delayed.



Common Name: ALUMINUM FLUORIDE

Synonyms: Aluminum Trifluoride CAS No: 7784-18-1 Molecular Formula: AIF_3 RTK Substance No: 0059 Description: Odorless, white or colorless, crystalline powder

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Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Fluoride itself does	Aluminum Fluoride , in contact with SODIUM and POTASSIUM, is sensitive to impact and a violent reaction
0 - Fire	not burn.	may occur.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Aluminum Oxides</i> , <i>Fluorine</i> and	Aluminum Fluoride will explode when heated with REDUCING AGENTS (such as LITHIUM, SODIUM,
DOT#: UN 1759	Hydrogen Fluoride (in the presence of water).	ALUMINUM and their HYDRIDES).
ERG Guide #: 154	Use water spray to keep fire-exposed containers	Aluminum Fluoride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 8		NITRIC) and ACID FUMES.
(Corrosive)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into covered containers for disposal.

Harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

OSHA:2.5 mg/m³, 8-hr TWANIOSH:2.5 mg/m³, 10-hr TWAACGIH:2.5 mg/m³, 8-hr TWAIDLH:250 mg/m³(All of the above are for Fluorides)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea and vomiting, weakness, convulsions and collapse

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Density:	2.9 (air = 1)
Vapor Pressure:	1 mm Hg at 2,260°F (1,238°C)
Specific Gravity:	3.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	2,799°F (1,537°C)
Melting Point:	2,356°F (1,291°C)
Molecular Weight:	84

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene, Natural Rubber, Polyvinyl Chloride and Viton
Coveralls:	DuPont Tyvek®
Respirator:	>2.5 mg/m 3 - Full facepiece APR with High efficiency filter >25 mg/m 3 - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM HYDRIDE

Synonyms: Alane; Aluminum Trihydride CAS No: 7784-21-6 Molecular Formula: AIH₃ **RTK Substance No: 0060** Description: Colorless, white or gray powder which ignites spontaneously in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE and REACTIVE.	Aluminum Hydride ignites spontaneously in AIR or OXYGEN.
3 - Fire 2 -W - Reactivity	extinguishing agents. DO NOT USE WATER OR FOAM.	Aluminum Hydride reacts explosively with WATER and MOISTURE to form flammable <i>Hydrogen gas</i> .
DOT#: UN 2463	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Aluminum Oxides</i> .	Aluminum Hydride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 138	CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 4.3	FIRE MAY RESTART AFTER IT HAS BEEN	ETHERS with CARBON DIOXIDE as an impurity.
(Water Reactive/ Dangerous when wet)		Aluminum Hydride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and METAL SALTS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit into sealed containers.

DO NOT USE WATER OR WET METHOD.

Keep Aluminum Hydride out of confined spaces, such as sewers, because of the possibility of an explosion.

No information is available about environmental effects.

EXPOSURE LIMITS

OSHA:	5 mg/m ³ , 8-hr TWA (<i>respirable Aluminum</i>) and 15 mg/m ³ , 8-hr TWA (total <i>Aluminum</i>)
NIOSH:	5 mg/m ³ , 10-hr TWA (<i>Aluminum, pyro powders</i>)
ACGIH:	1 mg/m ³ , 8-hr TWA (<i>Aluminum</i> , respirable fraction)
IDLH:	None

HEALTH EFFECTS

Eves: Irritation and burns Skin: Irritation and burns Nose, throat and lung irritation with Inhalation: coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Unknov
Flash Point:	Flamma
Water Solubility:	Reactiv
Boiling Point:	Decom
Melting Point:	302°F (
Molecular Weight:	30

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PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
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DuPont Tyvek® Coveralls:

Respirator:

>1 mg/m³ - Full facepiece APR with High efficiency filters >10 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: ALUMINUM NITRATE

Synonyms: Aluminum Trinitrate CAS No: 13473-90-0 Molecular Formula: Al₃HNO₃ RTK Substance No: 0061 Description: Odorless, colorless to white solid

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Hazard Rating	Firefighting	Reactivity
2 - Health	Aluminum Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Aluminum Nitrate dissolves in WATER to form <i>Nitric Acid</i> .
0 - Fire	combustion of other substances.	Aluminum Nitrate is not compatible with COMBUSTIBLE
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂	MATERIALS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG
DOT#: UN 1438	POISONOUS GASES ARE PRODUCED IN FIRE,	ACIDS (such as HYDROCHLORIC, SULFURIC and
ERG Guide #: 140	including Aluminum Oxide and Nitrogen Oxides.	THIOCYANATES: OPCANIC MATERIALS; OPANIDES;
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	HALOGENATED HYDROCARBONS (such as METHYL CHLORIDE and TRICHLOROETHYLENE).
	paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Neutralize water spills with Sodium Bicarbonate (soda ash).

Aluminum Nitrate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA: 5 mg/m³ (as *respirable dust*), 8-hr TWA **NIOSH:** 2 mg/m³ (as *soluble salt*), 10-hr TWA

- **ACGIH:** 1 mg/m³ (as the *respirable fraction*)
- (All the above are for Aluminum)

The Protective Action Criteria values are:

PAC-1 = 50 mg/m³ PAC-2 = 350 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	>1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Decomposes)
Melting Point:	163°F (73°C)
Molecular Weight:	213

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with <i>P100 filters</i> >50 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM OXIDE

Synonyms: alpha-Alumina; Aluminum Trioxide CAS No: 1344-28-1 Molecular Formula: Al₂O₃ RTK Substance No: 2891 Description: White, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Oxide itself does	Aluminum Oxide is not compatible with CHLORINE TRIFLUORIDE; ETHYLENE OXIDE; OXIDIZING
0 - Fire	not burn.	AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	Dusts may form explosive mixtures in air.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: None		
ERG Guide #: None		NITRIC), and HOT CHEORINATED ROBBER.
Hazard Class: None		

SPILL/	
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Isolation Distance:

Spill: 25 meters (75 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68 °F (20 °C)
Specific Gravity:	4 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	5,396 °F (2,980 °C)
Melting Point:	3,632 °F (2,030 °C)
Molecular Weight:	101.9

EXPOSURE LIMITS

OSHA: 5 mg/m³ (as *respirable dust*) and 15 mg/m³ (as *total dust*), 8-hr TWA

ACGIH: 1 mg/m³ (as the *respirable fraction*), 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 mg/m³ PAC-2 = 170 mg/m³ PAC-3 = 990 mg/m³

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Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

Nitrile, Neoprene and Natural Rubber Tyvek®

PROTECTIVE EQUIPMENT

Coveralls: Respirator:

Gloves:

ator: >1 mg/m³ - full facepiece APR with *High efficiency filters* (N, R or P95)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM PHOSPHATE

Synonyms: Aluminum Monophosphate CAS No: 7784-30-7 Molecular Formula: AIPO₄ RTK Substance No: 0062 Description: Solid, corrosive chemical which may be in a liquid or gel form

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of	Aluminum Phosphate reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and
0 - Fire	surrounding fire. Aluminum Phosphate itself does	POTASSIUM HYDROXIDE) and STRONG ACIDS
0 - Reactivity	not burn.	
DOT ID #: UN 1760	POISONOUS GASES ARE PROCUDED IN FIRE,	
ERG Guide #: 154	including Aluminum Oxides and Phosphorus Oxides.	
Hazard Class: 8		
(Corrosive)		

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 150 feet)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

EXPOSURE LIMITS

OSHA:	15 mg/m ³ 8-hr TWA (Total Dust) 5 mg/m ³ 8-hr TWA (Respirable Dust)
NIOSH:	10 mg/m ³ 10-hr TWA (Total Dust) 5 mg/m ³ 10-hr TWA (Respirable Dust)
ACGIH:	1 mg/m ³ 8-hr TWA (Respirable Fraction)

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Acute:	Nose and throat irritation with coughing and wheezing
Chronic:	Bronchitis, coughing, wheezing and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not Combustible
LEL:	N/A
UEL:	N/A
Specific Gravity:	2.56 (water = 1)
Vapor Pressure:	0 mm Hg at 68 [°] F (20 [°] C)
Water Solubility:	Insoluble
Melting Point:	>2,732 [°] F (1,500 [°] C)

PROTECTIVE EQUIPMENT

Gloves: Coverall:	No Information DuPont Tychem® Responder® for inorganic acid salts in solution, DuPont Tychem® for hazardous dusts
Boot: Respirator:	No Information >1 mg/m ³ N95 >10 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Immediate medical attention is necessary.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.



Common Name: ALUMINUM SULFATE

Synonyms: Alum; Aluminum Trisulfate CAS No: 10043-01-3 Molecular Formula: Al₂(SO₄)₃ RTK Substance No: 0068 Description: Odorless, white or colorless, crystalline solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	CORROSIVE when in a water solution.	Aluminum Sulfate will react with WATER; MOISTURE;		
0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Sulfate itself does	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; and AMINES.		
0 - Reactivity	not burn.	Aluminum Sulfate is corrosive to METALS in the presence of WATER and MOISTURE.		
DOT#: UN 3077	DO NOT USE WATER directly on Aluminum			
ERG Guide #: 171				
Hazard Class: 9 (Environmentally Hazardous Material)	including Aluminum Oxides and Sulfur Oxides.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

For water spills, neutralize with Agricultural Lime, Crushed Limestone or Sodium Bicarbonate.

Aluminum Sulfate may be hazardous to the environment, especially to fish.

EXPOSURE LIMITS

- **NIOSH:** 2 mg/m³, 10-hr TWA (as *Aluminum*, *soluble salts*)
- **ACGIH**: 1 mg/m³, 8-hr TWA (as *Aluminum metal*, respirable fraction)

The Protective Action Criteria values are:

PAC-1 = 38 mg/m ³	PAC-3 = 380 mg/m ³
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PAC-2 = 64 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation with rash and burning feelingInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68ºF (20ºC)
Specific Gravity:	2.71 (water = 1)
Water Solubility:	Soluble
Boiling Point:	>2,912°F (1,600°C)
Melting Point:	1,292°F (700°C)
Molecular Weight:	342.1

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber and Nitrile
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with High efficiency filter >19 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 2-AMINOANTHRAQUINONE

Synonyms: AAQ; beta-Aminoanthraquinone CAS No: 117-79-3 Molecular Formula: $C_{14}H_9NO_2$ RTK Substance No: 0069 Description: Red, needle-shaped crystal or a dark brown powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	May be combustible.	2-Aminoanthraquinone is not compatible with
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: None	FIRE, including <i>Nitrogen Oxides</i> .	
ERG Guide #: None		
Hazard Class: None		

PHYSICAL PROPERTIES	
Vapor Pressure:	5 x 10 ⁻¹¹ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	Sublimes
Melting Point:	558° to 583°F (292° to 306°C)
Molecular Weight:	223.23
	PH Vapor Pressure: Water Solubility: Boiling Point: Melting Point: Molecular Weight:

EXPOSURE LIMITS

No occupational exposure limits have been established for **2-Aminoanthraquinone**.

The Protective Action Criteria values are:

No information

Cancer (liver, lymph) in animals

- $PAC-1 = 25 \text{ mg/m}^3$
- $PAC-2 = 150 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

Eyes:

Skin:

Inhalation:

Chronic:

HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Irritation	Remove the person from exposure.
Irritation	Flush eyes with large amounts of water for at least 15 minutes. Rer

Gloves:

Coveralls:

Respirator:

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

PROTECTIVE EQUIPMENT

Full facepiece APR with Organic vapor and Acid gas

Nitrile and Natural Rubber

cartridges with P100 prefilters

>25 mg/m³ - SCBA

Tyvek®

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

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Common Name: 4-AMINODIPHENYL

Synonyms: 4-Phenylaniline; 4-Aminobiphenyl CAS No: 92-67-1 Molecular Formula: $C_6H_5C_6H_4NH_2$ RTK Substance No: 0072 Description: Colorless to tan, crystalline solid

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Hazard Rating	Firefighting	Reactivity
4 - Health	Use dry chemical, CO_2 , water spray, alcohol-resistant	4-Aminodiphenyl may react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
1 - Fire	four of other four as extinguishing agents.	NITRIC); OXIDIZING AGENTS (such as
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and HEXANITROETHANE.
DOT#. NONE		4-Aminodinberyl is not compatible with
ERG Guide #: N/A		ANHYDRIDES: ORGANIC SUBSTANCES (such as
Hazard Class: N/A		ARTISOLS, ISOCYANATES, KETONES, and ALDEHYDES); METALS (such as ALUMINUM, COPPER, ZINC and their ALLOYS); and GALVANIZED STEEL

SPILL/LEAKS

Isolation Distance: 25 meters to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

EXPOSURE LIMITS OSHA: Eliminate exposure NIOSH: Lowest feasible exposure

NIUSH.	Lowest leasible exposure
ACGIH:	Lowest level possible
IDLH LEVEL:	No information

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Acute:	Headache, dizziness, blue color to the skin and lips, trouble breathing, collapse, and even death
Chronic:	Cancer (bladder)

PHYSICAL PROPERTIES

Odor Threshold:	Floral odor		
Flash Point:	>230 [°] F (110 [°] C)		
LEL:	No information		
UEL:	No information		
Vapor Density:	5.8 (air = 1)		
Vapor Pressure:	1 mm Hg at 227 ⁰ F (108.3 ⁰ C)		
Water Solubility:	Slightly soluble		
Boiling Point:	576 [°] F (302 [°] C)		
Specific Gravity:	1.16		

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield® (for aromatic Amines)
Coveralls:	DuPont Tychem® Polycoat, QC, CPF1, SL and CPF2 (for hazardous dry powders and solids)
Boots:	No information
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: 2-(2-AMINOETHOXY)ETHANOL

Synonyms: DGA; Diglycolamine CAS No: 929-06-6 Molecular Formula: C₄H₁₁NO₂ RTK Substance No: 0073 Description: Colorless liquid with a faint, fish-like or Amine odor

HAZARD DATA									
Hazard Rating	Firefighting			Reactivity					
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3055 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	 Firefighting 2-(2-Aminoethoxy)Ethanol may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or foam as extinguishing agents. Water or foam may cause frothing. DO NOT use solid streams of water. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i>. Use water spray to keep fire-exposed containers cool. 			Reactivity 2-(2-Aminoethoxy)Ethanol reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). 2-(2-Aminoethoxy)Ethanol reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to produce flammable and explosive Hydrogen gas. 2-(2-Aminoethoxy)Ethanol is not compatible with ISOCYANATES; HALOGENATED ORGANICS (such as TRICHLOROETHANE and METHYLENE CHLORIDE); METALS and their ALLOYS (such as COPPER, ZINC, and GALVANIZED IRON); PHENOLS; ALCOHOLS; EPOXIDES; ANHYDRIDES; and ACID HALIDES.					
SP	ILL/LEAKS			PH	SICAL PROPERTIES				
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of 2-(2-Aminoethoxy)Ethanol. DO NOT wash into sewer.			Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Densit Vapor Pressu Specific Grav Water Solubi Boiling Point Melting Point Molecular We pH:	Did: Temp: y: ire: vity: lity: : : : sight:	Amine odor $255^{\circ}F (124^{\circ}C)$ 2.6% 11.7% $694^{\circ}F (368^{\circ}C)$ 3.6 (air = 1) $0.01 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 1.1 (water = 1) Soluble $430^{\circ}F (221^{\circ}C)$ $10^{\circ}F (-12^{\circ}C)$ 105.2 11.8				
EXPO	SURE LIMITS			PRO	TECTIVE EQUIPMENT				
No occupational exposure limits have been established for 2-(2-Aminoethoxy)Ethanol .			Gloves: Coveralls: Respirator:	Gloves: Silver Shield®/4H® (>4-hr breakthrough) Coveralls: Tychem® fabrics; Zytron® 300; Saint-Gobain ONESuit® TEC; and Trellchem® fabrics (>8-hr breakthrough for Diethylamine) Respirator: Supplied air or SCBA FIRST AID AND DECONTAMINATION					
HEALTH EFFECTS			FIRS						
Eyes:IrritatioSkin:IrritatioblistersInhalation:Nose, tcoughinbreath	n and burns n and burns with redness and hroat and lung irritation with ng and severe shortness of (pulmonary edema)		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility Medical observation is recommended as symptoms may be delayed. 						
INFORMATION FOR EMERGENCY RESPONDERS

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Common Name: AMINOETHYLETHANOLAMINE

Synonyms: A-EA; (2-Hydroxyethyl)Ethylenediamine CAS No: 111-41-1 Molecular Formula: $C_4H_{12}N_2O$ RTK Substance No: 0074

Description: Clear, colorless, slightly thick liquid with an Ammonia-like odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health 1 - Fire	May burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing	Aminoethylethanolamine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, DROMINE and ELLIORATES, NITRATES, CHLORINE,	
0 - Reactivity	agents. Using water or foam directly on	HYDROCHLORIC, SULFURIC and NITRIC); and CELLULOSE NITRATE.	
DOT#: UN 2735	Aminoethylethanolamine may cause frothing	Aminoethylethanolamine is not compatible with HALOGENATED SOLVENTS (such as TRICHLOROETHANE and METHYLENE CHLORIDE); NITRITES; ALCOHOLS; ALDEHYDES; CRESOLS; EPICHLOROHYDRIN; ISOCYANATES; KETONES; PHENOL; and VINYL ACETATE.	
ERG Guide #: 153	and solid streams of water may be ineffective.		
Hazard Class: 8 (Corrosive)	including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.		
	Use water spray to keep fire-exposed containers cool.	In the presence of ALUMINUM and HEAT, explosive and flammable Hydrogen gas may be formed.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 35 mg/m³ PAC-2 = 250 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes: Irritation and burns

Skin:

Irritation and burns

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath.

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ammonia</i> -like
Flash Point:	270°F (132°C)
LEL:	1%
UEL:	8%
Auto Ignition Temp:	695°F (368°C)
Vapor Density:	3.6 (air = 1)
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	470°F (243°C)
Freezing Point:	-49°F (-45°C)
pH:	11.5
Molecular Weight:	104

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Diethylamine</i>)
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: N-AMINOETHYLPIPERAZINE

Synonyms: 1-(2-Aminoethyl) Morpholine CAS No: 140-31-8 Molecular Formula: $C_6H_{15}N_3$ RTK Substance No: 0075 Description: Thick, colorless to light colored liquid with an *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	N-Aminoethylpiperazine is a COMBUSTIBLE	N-Aminoethylpiperazine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
2 - Fire	Use alcohol-resistant foam fire extinguishers.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2815		SULFURIC and NITRIC); ACID CHLORIDES; ACID
ERG Guide #: 153	Use water spray to keep fire-exposed containers	ACRYLATES; SUBSTITUTED ALKYLS; ALKYLENE
Hazard Class: 8	cool.	OXIDES; EPICHLOROHYDRIN; KETONES;
(Corrosive)	N-Aminoethylpiperazine may ignite combustibles (wood, paper and oil).	ALDEHYDES; ALCOHOLS; CAPROLACTAM SOLUTION; CHLOROFORMATES; COMBUSTIBLES; CARBON MONOXIDE: and NITRITES.

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Not readily biodegradable.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Aminoethylpiperazine**.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia-like odor	
Flash Point:	200°F (93°C)	
LEL:	1.6%	
UEL:	6.5%	
Auto Ignition Temp:	>572°F (300°C)	
Vapor Density:	4.4 (air = 1)	
Vapor Pressure:	0.1 mm Hg at 68ºF (20ºC)	
Specific Gravity:	0.1 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	432°F (222°C)	
Molecular Weight:	129.24	

PROTECTIVE EQUIPMENT

Gloves:	Butyl (4 hour breakthrough)
Coveralls:	DuPont Tychem® Responder®, CSM and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit® PRO (>8-hour breakthrough)
Respirator:	Pressure demand supplied air

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

FIRST AID AND DECONTAMINATION

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: AMITROLE

Synonyms: Aminotriazole; 3-Amino-1,2,4-Triazole CAS No: 61-82-5 Molecular Formula: $C_2H_4N_4$ RTK Substance No: 0083 Description: An odorless, colorless to off-white crystalline solid or chip

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Not combustible but may be dissolved in	Amitrole is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	fiammable or compustible liquids.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO_2 , water spray, alcohol foam	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT ID #: UN 2588	or a roaming agent.	NITRIC); STRONG BASES (such as SODIUM
ERG Guide #: 151	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	HYDROXIDE and POTASSIUM HYDROXIDES); ACID ANHYDRIDES and ACID CHLORIDES.
Hazard Class: 6.1 (Poison)		Corrosive to IRON, COPPER and ALUMINUM.
()		Decomposes in LIGHT.

Odor Threshold:

Vapor Pressure:

Water Solubility:

Melting Point: Specific Gravity:

Flash Point:

LEL:

UEL:

SPILL/LEAKS

Isolation Distance: No Information

- May be hazardous to the environment, especially to plants.
- Severe marine pollutant.

EXPOSURE LIMITS

OSHA: N/A

NIOSH 0.2 mg/m³, 10-hr TWA

ACGIH: 0.2 mg/m³, 8-hr TWA

IDLH LEVEL: No Information

HFΔ	і тн	FFF	FCTS
		EFF	ECIJ

Eyes:	No Information
Skin:	No Information
Acute:	No Information
Chronic:	Carcinogen (thyroid and liver) in animals. May damage the developing fetus. May damage the liver and affect thyroid gland function.

PROTECTIVE EQUIPMENTGloves:No InformationCoverall:No InformationBoot:No InformationRespirator:>0.2 mg/m³ - Supplied air

PHYSICAL PROPERTIES

Less than 0.000008 mm Hg at $68^{\circ}F(20^{\circ}C)$

Odorless

N/A

N/A

Soluble 318^oF (159^oC)

1.14

Not Combustible

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with water. Transfer to a medical facility.



Common Name: AMMONIA

Synonyms: Anhydrous Ammonia CAS No: 7664-41-7 Molecular Formula: NH₃ RTK Substance No: 0084 Description: Colorless gas with a strong, sharp, irritating odor

HAZARD DATA				
Hazard Rating 3 - Health 1 - Fire 0 - Reactivity DOT#: UN 1005 ERG Guide #: 125 Hazard Class: 2.3 (Toxic Gases)	HAZARD DATA I Firefighting Reactivity Non-flammable gas which can ignite and burn with explosive force. Ammonia reacts violently with HALOGENS (such as FLUORINE, CHLORINE and BROMINE); ACIDS (such as HYDROGEN BROMIDE); NITROSYL CHLORIDE and HYDROGEN BROMIDE); NITROSYL CHLORIDE; CHROMYL CHLORIDE; NITROGEN DIOXIDE; NITROGEN TRICHLORIDE; BROMINE PENTAFLUORIDE; CHLORINE 5 CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool, and to absorb and disperse vapors. TRIFLUORIDE; CALCIUM HYPOCHLORITE; and forms explosive compounds that are pressure and temperature sensitive with MERCURY; GOLD OXIDES; and SILVER SALTS and OXIDES. 5 Ammonia is incompatible with CHLOROFORMATES; CYANIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); DIMETHYL SULFATE; and MANY METALS and their ALLOYS (such as ZINC, COPPER and BRASS).			
S	PILL/LEAKS		PHYSICAL PROPERTIES	
Isolation Distance: Small spills – 30 meters (100 feet) Large spills – 60 meters (200 feet) Stop flow of gas. Use water spray to absorb and disperse vapors. Hazardous to the environment. DO NOT wash into sewer		Flash LEL: UEL: Vapo Vapo Wate Boilir Ioniza	br Point: Non-flammable .: 15% .: 28% for Density: 0.6 (air = 1) for Pressure: 658 mm of Hg at 70°F (21°C) fer Solubility: Soluble ling Point: -28°F (-33.4°C) zation Potential: 10.18 eV oignition: 1,204°F (651°C)	
EXP	OSURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA: 50 NIOSH: 25 ACGIH: 25 IDLH LEVEL: 30 ERPG-1: 25 ERPG-2: 15 ERPG-3 1,3	opm (8-hr TWA) opm (10-hr TWA), 35 ppm STEL opm (8-hr TWA), 35 ppm STEL opm opm opm opm 00 ppm		ves: Nitrile, Neoprene, Butyl, Butyl/Neoprene, Viton/ Neoprene veralls: Dupont Tychem® CPE and Kappler Zytron® 500 ots: Butyl/Neoprene pirator: > 25 ppm - APR with full-facepiece and cartridges for Ammonia >250 ppm - Supplied Air >300 ppm - SCBA	
HEALTH EFFECTS FIRST AID AND DECONTAMINATION		FIRST AID AND DECONTAMINATION		
Eyes:IrritatioSkin:IrritatiocausesAcute:Nose, fcoughiChronic:An astbreath,tightne	n and burns n and burns. Contact with liquid frostbite. throat and lung irritation with ng and shortness of breath nma-like allergy with shortness of wheezing, coughing and/or chest ss	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Immerse affected part in warm water if in contact with liquid. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 		



Common Name: AMMONIUM ACETATE

Synonyms: Acetic Acid, Ammonium Salt CAS No: 631-61-8 Molecular Formula: $C_2H_7NO_2$ RTK Substance No: 0085 Description: White, crystalline solid with a slight vinegar-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Ammonium Acetate may burn, but does not readily ignite.	Ammonium Acetate is not compatible with SODIUM HYPOCHLORITE and OTHER OXIDIZING AGENTS
1 - Fire	Use dry chemical, water spray or foam as	(such as PERCHLORATES, PEROXIDES,
0 - Reactivity	extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE. BROMINE and FLUORINE); STRONG
DOT#: UN 9079	including Ammonia and Nitrogen Oxides.	ACIDS (such as HYDROCHLORIC, SULFURIC and
ERG Guide #: 171	Use water spray to keep fire-exposed containers	HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Miscellaneous Hazardous Substance)		Ammonium Acetate readily absorbs moisture from the air and releases <i>Ammonia</i> under normal conditions.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ammonium Acetate rapidly degrades in water.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 7.5 \text{ mg/m}^3$
- $PAC-2 = 50 \text{ mg/m}^3$
- PAC-3 = 250 mg/m^3

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Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/ shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Vinegar-like odorSpecific Gravity:1.1 (water = 1)Water Solubility:SolubleMelting Point:237°F (114°C)Molecular Weight:77.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>High efficiency filters</i> >7.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: AMMONIUM ARSENATE

Synonyms: Diammonium Arsenate CAS No: 7784-44-3 Molecular Formula: (NH₄)₂ HAsO₄ RTK Substance No: 0086

Description: White powder or colorless, crystalline solid with a characteristic Ammonia odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Arsenate itself	Ammonium Arsenate reacts with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
0 - Fire	does not burn.	HYDROXIDE) to produce Ammonia.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Arsenic fumes. Ammonia and Nitrogen	Ammonium Arsenate reacts with METALS (such as IRON ALLIMINUM and ZINC) in the presence of
DOT#: UN 1546	Oxides.	WATER, to produce toxic Arsine gas.
ERG Guide #: 151	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	COOI.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 to 50 meters (80 to 160 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

May be hazardous to the environment, especially to aquatic and soil organisms.

EXPOSURE LIMITS

OSHA:	0.01 mg/m³, 8-hr TWA
NIOSH:	0.002 mg/m ³ , Ceiling
ACGIH:	0.01 mg/m³, 8-hr TWA
IDLH:	5 mg/m³
PAC LEVELS:	PAC-1 = 1.5 mg/m ³ ; PAC-2 = 17 mg/m ³ ;
	PAC-3 = 100 mg/m ³
	(All of the above are for inorganic Arsenic)

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, and red, watery eyes Irritation, burns, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness
	Weakness, headache, nausea, vomiting, and muscle cramps
Chronic:	Inorganic Arsenic compounds cause skin, lung, and liver cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia-like odor
Flash Point:	Noncombustible
Vapor Density:	2 (air = 1)
Water Solubility:	Soluble
Molecular Weight:	176

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: DuPont Tyvek®

Respirator: <0.1 mg/m³ - Full facepiece APR with cartridges specific for Ammonia and High efficiency particulate pre-filters <5 mg/m³ - Supplied air >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: AMMONIUM BISULFITE

Synonyms: Ammonium Hydrogen Sulfite; Ammonium Sulfite CAS No: 10192-30-0 Molecular Formula: NH₄HSO₃ RTK Substance No: 0090 Description: Colorless to yellow, crystalline solid that is commonly used in a water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire Ammonium Bisulfite itself does	Ammonium Bisulfite reacts with WATER, STEAM and STRONG ACIDS (such as HYDROCHLORIC
0 - Fire	not burn.	SULFURIC and NITRIC) to form <i>Ammonia</i> and other
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	toxic gases.
DOT#: UN 2693	including Sulfur Oxides, Nitrogen Oxides and Ammonia.	Ammonium Bisulfite reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 8	cool.	CHLORINE, BROMINE and FLUORINE) to form flammable and reactive gases.
(Corrosive)		Ammonium Bisulfite is not compatible with LEAD
		DIACETATE: ALUMINUM: and MERCURY CHLORIDE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 30 mg/m^3

PAC-2 = 330 mg/m³

PAC-3 = 2,000 mg/m³

HEALTH EFFECTS	 	
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Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Specific Gravity:	2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Sublimes)
Molecular Weight:	99.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.





Common Name: AMMONIUM CARBONATE

Synonyms: Diammonium Carbonate; Hartshorn CAS No: 506-87-6 Molecular Formula: $(NH_{4})_2CO_3$ RTK Substance No: 0092

Description: Colorless or white, crystalline powder with a strong Ammonia odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Carbonate itself	Ammonium Carbonate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and	
0 - Fire	does not burn.	NITRIC); ACID SALTS; AMINES and other ALKALOIDS;	
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i>	ALUM; CALOMEL (MERCURY CHLORIDE); SODIUM HYPOCHLORITE; IRON SALTS; and ZINC SALTS.	
DOT#: UN 3077	Use water spray to knock down vapors.		
ERG Guide #: 171	Sufficient amounts of Ammonia gas may be		
Hazard Class: 9 (Environmentally Hazardous Material)	generated in a fire to become an explosion hazard.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Cover with plastic sheeting.

Ammonium Carbonate is hazardous to the environment

EXPOSURE LIMITS

NIOSH: 25 ppm, 10-hr TWA; 35 ppm, STEL (as Ammonia)

The Protective Action Criteria values are:

PAC-1 = 0.31 mg/m³

 $PAC-2 = 3.5 \text{ mg/m}^3$

PAC-3 = 21 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath.

PHYSICAL PROPERTIES

Flash Point: Nonflammal	ole
Specific Gravity: 1.5 (water =	1)
Water Solubility: Soluble	
Boiling Point: Decompose	s
Melting Point: 136.4°F (58	°C)
Molecular Weight: 157.1	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®

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Respirator: >0.31 mg/m³ - SCBA >25 ppm (as *Ammonia*) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: AMMONIUM CHLORIDE

Synonym: Ammonium Muriate CAS No: 12125-02-9 Molecular Formula: NH₄Cl RTK Substance No: 0093 Description: White powder or finely divided airborne particle.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	- Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Chloride itself does	- Reacts violently with AMMONIUM NITRATE;
0 - Fire	not burn.	
0 - Reactivity	- POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> , <i>Hydrogen Chloride</i> and	causing fire and explosion.
DOT#: UN 3077	Ammonia. - CONTAINERS MAY EXPLODE IN FIRE.	CARBONATES; LEAD SALTS; SILVER SALTS; OXIDIZING AGENTS (such as PERCHLORATES.
ERG Guide #: 171		PEROXIDES, PERMANGANATES, CHLORATES,
Hazard Class: 9		NITRATES, CHLORINE, BROMINE and
(Environmentally		FLUORINE); and STRONG ACIDS (such as
Hazardous		HYDROCHLORIC, SULFURIC and NITRIC).
Substance)		- Reacts with HYDROGEN CYANIDE to form
		explosive Nitrogen Trichloride.

SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet)

- Sweep spilled substance into containers.
- Keep out of waterways as this substance is toxic to aquatic organisms.

PHYSICAL PROPERTIES Odor Threshold: Odorless

Flash Point:	Noncombustible
LEL:	N/A
UEL:	N/A
Vapor Density:	1.9 (air = 1)
Vapor Pressure:	1 mm Hg at 321°F (161°C)
Water Solubility:	Soluble
Boiling Point:	968°F (520°C)
Melting Point:	640°F (338°C) (decomposes)

EXPOSURE LIMITS

ACGIH: 10 mg/m³ 8-hr TWA, 20 mg/m³ STEL **NIOSH:** 10 mg/m³ 10-hr TWA, 20 mg/m³ STEL

IDLH LEVEL: No Information

- (All the above are for Ammonium Chloride fume)
- **PAC:** PAC-1 = 20 ppm; PAC-2 = 110 ppm; PAC-3 = 330 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and possible eye damage Irritation	
Acute:	Nose, throat and lung irritation,	
	headache, drowsiness and confusion	
Chronic:	Cancer - Not tested. Asthma-like	
	allergy. May affect the kidneys.	

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber, Neoprene, Nitrile, 4H® (for <i>Inorganic Salts</i>)
Coverall:	Dupont Tychem® CPF3
Boot:	Rubber or Neoprene
Respirator:	>10 mg/m ³ N95 or N95 plus Ammonia Cartridge if a liquid
	>100 mg/m ³ SA

FIRST AID AND DECONTAMINATION

- Remove person from exposure.
- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: AMMONIUM DICHROMATE

Synonyms: Ammonium Bichromate; Chromic Acid, Diammonium Salt CAS No: 7789-09-5 Molecular Formula: (NH₄)₂Cr₂O₇ RTK Substance No: 0097 Description: Odorless, bright orange to red, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	COMBUSTIBLE SOLID that can be readily ignited and burning produces a large cloud of green residue.	Ammonium Dichromate is a STRONG OXIDIZER that reacts violently with REDUCING AGENTS (such as LITHIUM, SODIUM,
1 - Fire	Ammonium Dichromate is a STRONG OXIDIZER	ALUMINUM and their HYDRIDES); HYDRAZINE; and STRONG
1 - Reactivity	that enhances the combustion of other substances.	HYDROXIDE); and can ignite by friction with CARBIDE
i nououvity	Use water in flooding amounts to extinguish fire.	Vislant sambusting many same as samtast with Cashadidad
DOT#: UN 1439	POISONOUS GASES ARE PRODUCED IN FIRE,	COMBUSTIBLES and ORGANICS (such as PAPER and WOOD).
ERG Guide #: 141	CONTAINERS MAY EXPLODE IN FIRE.	Ammonium Dichromate is not compatible with STRONG ACIDS
Hazard Class: 5.1	Use water spray to keep fire-exposed containers	
(Oxidizer)	cool.	

SPILL/LEAKS

Isolation Distance:Odor Threshold:Spill: 25 meters (75 feet)Flash Point:Fire: 800 meters (1/2 mile)Auto Ignition Temp:Moisten spilled material first or use a HEPA-filter
vacuum for clean-up and place into sealed containers
for disposal.Auto Ignition Temp:Neutralize liquid spills with agricultural lime (CaCO3) or
sodium bicarbonate (NaHCO3).Water Solubility:DO NOT wash into sewer.Boiling Point:Ammonium Dichromate is dangerous to aquatic lifeMelting Point:

Ammonium Dichromate is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 0.005 mg/m³, 8-hr TWA NIOSH: 0.0002 mg/m³, 8-hr TWA ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 15 mg/m³ (All the above are for *Chromium VI*) The Protective Action Criteria values are: PAC-1 = 0.37 mg/m^3 PAC-2 = 6.3 mg/m^3 PAC-3 = 38 mg/m³

PHYSICAL PROPERTIES nold: Odorless

Odor Inresnold:	Odoriess
Flash Point:	Combustible
Auto Ignition Temp:	374° to 437°F (190° to 225°C)
Specific Gravity:	2.15 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	338°F (170°C) (Decomposes)
Molecular Weight:	252.1

Gloves: Nitrile, Neoprene and Natural Rubber (>8-hr breakthrough for Ammonium Dichromate in solution) Coveralls: Tyvek® (for solid Ammonium Dichromate) and Tychem® BR, CSM and TK (>8-hr breakthrough for Ammonium Dichromate in solution) Respirator: >0.0002 mg/m³ – Pressure demand SCBA

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin:	Irritation, burns and possible eye damage Irritation and burns (skin absorbable)	Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.
Inhalation:	Nose and throat irritation with coughing and wheezing	Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.
Chronic:	Cancer (lung and stomach) in humans	Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility



Common Name: AMMONIUM HYDROXIDE

Synonyms: Ammonia Water; Aqua Ammonia CAS No: 1336-21-6 Molecular Formula: NH4OH RTK Substance No: 0103 Description: Colorless solution of Ammonia in water with a pungent odor

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 2672 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	 Ammonium Hydroxide is not combustible, however in a fire Ammonia vapors are formed that can be ignited and may result in an explosion. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Ammonia and Nitrogen Oxides. Use water spray to keep fire-exposed containers cool. DO NOT get water inside containers. 			Ammoi METAL and the flamma STROM SULFU HALOO Ammoi (such a HYDRO	nium Hydroxide reacts with many HEAVY LS (such as SILVER, COPPER, LEAD and ZINC) eir SALTS to form explosive compounds and able and explosive Hydrogen gas. nium Hydroxide may read violently with NG ACIDS (such as HYDROCHLORIC, JRIC and NITRIC); DIMETHYL SULFATE; and GENS. nium Hydroxide will react with STRONG BASES as SODIUM HYDROXIDE and POTASSIUM OXIDE) to produce Ammonia gas.
SP	ILL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 Fire: 800 meters (1/2 Absorb liquids in dry s and place into sealed DO NOT use COPPE METALS when hand Neutralize with a wea <i>Acid</i>). DO NOT wash into se Ammonium Hydroxi very low concentration	 vlation Distance: ill: 50 meters (150 feet) e: 800 meters (1/2 mile) sorb liquids in dry sand, earth, or a similar material id place into sealed containers for disposal. O NOT use COPPER, ALUMINUM or GALVANIZED ETALS when handling Ammonium Hydroxide. utralize with a weak acid such as vinegar (<i>Acetic cid</i>). O NOT wash into sewer. mmonium Hydroxide is harmful to aquatic life in erry low concentrations. 		Odor Threshold Flash Point: LEL: UEL: Auto Ignition To Vapor Density: Vapor Pressure Specific Gravity Water Solubility Boiling Point: Freezing Point: Ionization Pote Molecular Weig pH:	d: emp: y: y: y: ntial: uht:	50 ppm Noncombustible 16% 27% 1,202°F (650°C) (25% Solution) 0.6 to 1.2 (air = 1) 360 mm Hg at 68°F (20°C) (25% Solution) 0.9 (water = 1) Miscible 100.4°F (38°C) (25% Solution) -72.4°F (-58°C) (25% Solution) 10.18 eV (as <i>Ammonia</i>) 35.06 13.6
EXPOSURE LIMITS				PROT	
OSHA:50 ppm, 8-hr TWANIOSH:25 ppm, 10-hr TWA; 35 ppm, STELACGIH:25 ppm, 8-hr TWA; 35 ppm, STELIDLH:300 ppm(All the above are for Ammonia)The Protective Action Criteria values are:PAC-1 = 6 ppmPAC-2 = 40 ppmPAC-3 = 100 ppm			Gloves: Coveralls: Respirator:	Butyl, N Ammon Tychem for Amr >25 ppr >100 pp	 litrile, Neoprene and Viton (>8-hr breakthrough for nium Hydroxide in less than 30% solution) n® SL, F, Responder® and TK (>8-hr breakthrough monium Hydroxide in less than 30% solution) m - full facepiece APR with cartridges specific for Ammonia pm - SCBA
HEALTH EFFECTS			FIRS	T AID	AND DECONTAMINATION
Eyes: Irritation damage Skin: Irritation Inhalation: Nose, t coughin breath	n, burns and possible eye e n and burns hroat and lung irritation, with ng, and severe shortness of (pulmonary edema)		Remove the per Flush eyes with contact lenses i Quickly remove large amounts of Begin artificial re Transfer promp Medical observa	son from large am f worn. S contami of soap a espiration tly to a m ation is re	n exposure. nounts of water for at least 30 minutes. Remove Seek medical attention nated clothing and wash contaminated skin with nd water. Seek medical attention. n if breathing has stopped and CPR if necessary. nedical facility. ecommended as symptoms may be delayed.



Hazard Rating

2 - Health

0 - Reactivity

DOT#: UN 2859

0 - Fire

including Ammonia, Vanadium fumes and Nitrogen

Common Name: AMMONIUM METAVANADATE

Synonyms: Ammonium Vanadate CAS No: 7803-55-6 Molecular Formula: H₄NO₃V RTK Substance No: 0104 Description: Clear, white or yellow, crystalline powder

HAZARD DATA				
Firefighting	Reactivity			
Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Metavanadate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE.	Ammonium Metavanadate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHI ORINE, BROMINE and ELUORINE):			

ERG Guide #: 154	Use water spray to keep fire-exposed containers
Hazard Class: 6.1	cool.
(Poison)	

SPILL/LEAKS

Oxides.

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

0.05 mg/m³, 15-min Ceiling (as Vanadium NIOSH: dust and fume)

IDLH: 35 mg/m³ (as Vanadium)

	PROTECTIVE EQUIPIVIEINT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with High efficiency particulate filter

>0.5 mg/m³ (as *Vanadium*) or potential exposure to Ammonia - Supplied air or SCBA

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation, rash and redness Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.

PHYSICAL PROPERTIES

TRIFLUORIDE.

STRONG ACIDS (such as HYDROCHLORIC.

SULFURIC and NITRIC); LITHIUM; and CHLORINE

Flash Point:	Nonflammable
Specific Gravity:	2.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	410°F (210°C) (Decomposes)
Melting Point:	392°F (200°C)
Molecular Weight:	117



Common Name: AMMONIUM MOLYBDATE

Synonyms: Ammonium Paramolybdate; Diammonium Molybdate CAS No: 13106-76-8 Molecular Formula: (NH₄)₂MoO₄ RTK Substance No: 0105 Description: White to colorless or greenish-yellow, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Molybdate itself	Ammonium Molybdate is not compatible with ALKALI METALS (such as LITHIUM, SODIUM and
0 - Fire	does not burn.	POTASSIUM); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and MOLTEN MAGNESU IM
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	
DOT#: None	including Ammonia and Nitrogen Oxides.	
ERG Guide #: None	cool.	
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	1.4 (water = 1
Water Solubility:	Soluble
Molecular Weight:	123.6

EXPOSURE LIMITS

OSHA: 5 mg/m³, 8-hr TWA (as *Molybdenum*)

ACGIH: 0.5 mg/m³, 8-hr TWA (as *Molybdenum*)

The Protective Action Criteria values are:

- PAC-1 = 30.7 mg/m³
- $PAC-2 = 51.1 \text{ mg/m}^3$
- PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, weakness, and fatigue	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
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Coveralls: Tyvek®

- **Respirator:** >0.5 mg/m³ full facepiece APR with High efficiency particulate filters
 - >30 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Г

Common Name: AMMONIUM NITRATE

Synonyms: Nitram; Ammonia Nitrate CAS No: 6484-52-2 Molecular Formula: NH₄NO₃ RTK Substance No: 0106 Description: A colorless to white or gray, crystalline solid or granule

HAZARD DATA

HAZARD DATA					
Hazard Rating	Firefighting			Reactivit	у
2 - Health 0 - Fire 3- Reactivity DOT ID #: UN 1942 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Flood with water. DO NOT USE dry chemical, CO ₂ or halogenated extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i> . CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool. Evacuate in all directions for 1,600 meters (1 mile) if fire cannot be controlled. Protect from shock.		ICED IN d FIRE ed neters	Ammoniui contamina MATERIA SHOCK. Ammoniui REDUCIN (such as H POWDER AGENTS PERMAN CHLORIN UREA; an Ammoniui SODIUM	m Nitrate is a STRONG OXIDIZER and when ated with OIL, CHARCOAL or other ORGANIC ALS, can EXPLODE and become SENSITIVE TO m Nitrate must be stored to avoid contact with NG AGENTS; COMBUSTIBLES; STRONG ACID HYDROCHLORIC, SULFURIC and NITRIC); RED METALS; METAL SALTS; OXIDIZING (such as PERCHLORATES, PEROXIDES, GANATES, CHLORATES, NITRATES, IE, BROMINE and FLUORINE); PHOSPHORUS; Id SULFUR. m Nitrate reacts with STRONG BASES (such as HYDROXIDE and POTASSIUM HYDROXIDE).
SPI	LL/LEAKS			PH۱	SICAL PROPERTIES
Isolation Distance:10 to 25 meters (30 to 80 feet)Collect with a clean shovel and place in noncombustible containers.Keep Ammonium Nitrate out of a confined space, such as a sewer, because of the possibility of an explosion.This material may be hazardous to water quality but will biodegrade.			Odor Thr Flash Poi LEL: UEL: Density: Water So Melting P Ionizatior pH:	eshold: int: lubility: ooint: n Potential:	Odorless Nonflammable N/A N/A 1.7 g/cm ³ Soluble 336°F (169°C) Decomposes at 410°F (210°C) No Information 5.4
EXPOSURE LIMITS				PRO	FECTIVE EQUIPMENT
ACGIH: N/A OSHA: N/A NIOSH: N/A IDLH LEVEL: N/A PAC1: 6.7 r PAC2: 73 rr PAC3: 440	ng/m³ ng/m³ mg/m³		Gloves: Coverall: Boot: Respirato	Butyl or CHEMF Butyl or or: N95 for Supplie	r Neoprene FAB Challenger® 5200 r Neoprene r dusts or mists rd air for unknown levels or emergency
HEAL	TH EFFECTS		FI	RST AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationAcute:Nose, thr Methemore fatigue and lipsChronic:Cancer - No inform	and burns and burns oat and lung irritation oglobinemia with headache, nd blue color to the skin and Not tested nation available		Remove t Flush eye Remove c Remove c Begin artit Transfer t	he person fro s with large a contact lenses contaminated ficial respiration o a medical fa	m exposure. mounts of water for at least 15 minutes. if worn. clothing. Wash contaminated skin with water. on if breathing has stopped and CPR if necessary. acility.



Common Name: AMMONIUM OXALATE

Synonym: Diammonium Oxalate CAS No: 1113-38-8 Molecular Formula: C₂H₈N₂O₄ **RTK Substance No: 0108** Description: Odorless, colorless, crystalline powder

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health	Ammonium Oxalate may burn, but does not readily ignite.	Ammonium Oxalate will react with solutions of SODIUM HYPOCHLORITE; AMMONIUM ACETATE; and			
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	STRONG ACIDS (such as HYDROCHLORIC,			
0 - Reactivity	extinguishing agents.	SULFURIC and NITRIC).			
DOT#: UN 2811	POISONOUS GASES ARE PRODUCED IN FIRE, including Ammonia and Nitrogen Oxides.	Ammonium Oxalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,			
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,			
Hazard Class: 6.1 (Poison)	cool.	CHLORINE, BROMINE and FLOORINE).			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 0.5 \text{ mg/m}^3$
- $PAC-2 = 4 \text{ mg/m}^3$
- $PAC-3 = 20 \text{ mg/m}^3$

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, nausea and vomiting, convulsions, coma and even death

PHYSICAL PROPERTIES

Odor Threshold: Odorless **Specific Gravity:** 1.5 (water = 1) Water Solubility: Slightly soluble **Melting Point: Molecular Weight:** pH: 6.4

158°F (70°C) 124.1

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: AMMONIUM PERSULFATE

Synonyms: Ammonium Peroxydisulfuric Acid; Diammonium Persulfate CAS No: 7727-54-0 Molecular Formula: $N_2H_8S_2O_8$ RTK Substance No: 0111

Description: Colorless, white or straw-colored, crystalline powder with a mild, unpleasant odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 0 - Fire	Ammonium Persulfate is not combustible, but it is a STRONG	AIR, LIGHT, WATER, MOISTURE, CONTAMINATION, and HEAT will cause Ammonium Persulfate to decompose and become unstable.	
1 - Reactivity	of other substances. Use water only. DO NOT USE CO ₂ as an	Ammonium Persulfate reacts violently <i>in solution</i> with IRON; POWDERED ALUMINUM; and SILVER SALTS. Ammonium Persulfate will react with COMBUSTIBLE and	
DOT#: UN 1444 ERG Guide #: 140	extinguishing agent. POISONOUS GASES ARE PRODUCED	ORGANIC MATERIALS (PAPER, GAS and FUELS) to cause fires.	
Hazard Class: 5.1 (Oxidizer)	IN FIRE, including <i>Sulfur Oxides</i> , <i>Nitrogen Oxides</i> , and <i>Ammonia</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Ammonium Persulfate may ignite	Ammonium Persulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);	
	combustibles (wood, paper and oil).	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and HEAVY and POWDERED METALS (such as COPPER NICKEL and ZINC)	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Ammonium Persulfate is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.1 mg/m³ (as *Persulfate*)

- The Protective Action Criteria values are:
- PAC-1 = 0.3 mg/m³
- $PAC-2 = 22 \text{ mg/m}^3$
- $PAC-3 = 130 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose, throat and lung irritation with
coughing and severe shortness of breath
(pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Mild, unpleasant
Flash Point:	Noncombustible
Specific Gravity:	1.98 (water = 1)
Water Solubility:	Soluble/Reactive
Boiling Point:	Decomposes
Melting Point:	Decomposes
Molecular Weight:	228.18

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - full facepiece APR with High efficiency filter >0.3 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: AMMONIUM POLYSULFIDE

Synonyms: Ammonium Sulfide; Diammonium Polysulfide CAS No: 9080-17-5 Molecular Formula: $(NH_4)_2S_x$ RTK Substance No: 0113

Description: Clear, yellow to red liquid with a rotten egg or Ammonia-like odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 0 - Fire	Ammonium Polysulfide is noncombustible but can decompose upon heating to release highly flammable gases.	Ammonium Polysulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and toxic <i>Hydrogen Sulfide gas</i> .	
1 - Reactivity DOT#: UN 2818	Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents.	Ammonium Polysulfide reacts with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to form <i>Ammonia</i> .	
ERG Guide #: 154 POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides, Sulfur Oxides, and Hydrogen Sulfide. (Corrosive) Use water spray to keep fire-exposed containers cool.		Ammonium Polysulfide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and METALS. Keep Ammonium Polysulfide away from AIR, HEAT, LIGHT and WATER	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquid with fly ash, cement powder or commercial sorbent and place into sealed containers for disposal. DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 5 ppm, Ceiling (for *Hydrogen Sulfide*)

PHYSICAL PROPERTIES

	Odor Threshold:	Rotten egg or Ammonia-like
	Flash Point:	Noncombustible
	Boiling Point:	Decomposes
Molecular Weight:		Varies

PROTECTIVE EQUIPMENT

Gloves: Butyl and Viton (>8-hr breakthrough for *liquid Ammonia*)

Coveralls: Tychem® BR, Responder®, and TK (>8-hr breakthrough for *liquid Ammonia* and *Hydrogen Sulfide*)

Respirator:

SCBA

HEALTH EFFECTS			FIRST AID AND DECONTAMINATION
Eyes:	Irritation and burns		Remove the person from exposure.
Skin:	Irritation and burns		Flush eyes with large amounts of water for at least 30 minutes. Remove
Inhalation:	Nose, throat and lung irritation with		contact lenses if worn. Seek medical attention.
innalation.	coughing, wheezing and shortness of breath		Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
	Headache dizziness nausea and		Begin artificial respiration if breathing has stopped and CPR if necessary.
	vomiting	•	Transfer promptly to a medical facility.



Common Name: AMMONIUM SULFIDE

Synonyms: Ammonium Monosulfide; Diammonium Sulfide CAS No: 12135-76-1 Molecular Formula: (NH₄)₂S RTK Substance No: 0115 Description: Yellow, crystalline solid, usually in a water solution, with a very strong rotten egg and *Ammonia*-like odor

Hazard Rating	Firefighting	Reactivity
3 - Health	CORROSIVE AND FLAMMABLE LIQUID	Ammonium Sulfide reacts explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Sulfide</i> , <i>Sulfur Oxides</i> , <i>Nitrogen</i>		Ammonium Sulfide reacts with STRONG ACIDS (such as
DOT#: UN 2683	Oxides and Ammonia. CONTAINERS MAY EXPLODE IN FIRE.	HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable <i>Hydrogen Sulfide gas</i> .
ERG Guide #: 132 Use water spray to keep 1	Use water spray to keep fire-exposed containers cool.	Ammonium Sulfide reacts with STRONG BASES (such as
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back. Ammonium Sulfide may form an ignitable vapor/air mixture in closed tanks or containers.	produce Ammonia.
		Ammonium Sulfide slowly produces Hydrogen Sulfide and Ammonia in the presence of MOISTURE.
		Ammonium Sulfide corrodes COPPER and ZINC and their

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Collect *solid* material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Keep Ammonium Sulfide out of confined spaces, such as

sewers, because of the possibility of an explosion. Dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

 NIOSH:
 10 ppm, 10-minute Ceiling

 ACGIH:
 1 ppm, 8-hr TWA; 5 ppm STEL

 IDLH:
 100 ppm

The Protective Action Criteria values are:

PAC-1 = 10 ppm PAC-2 = 15 ppm PAC-3 = 15 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns with possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, dizziness, lightheadedness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	Rotten egg and <i>Ammonia</i> -like odor
Flash Point:	72°F (22°C)
LEL:	4%
UEL:	46%
Specific Gravity:	1.0 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes
pH:	9.5 (45% aqueous solution)
Molecular Weight:	68.14

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Sulfur compounds</i>)
Coveralls:	Tychem® BR, Responder and TK (>8-hr breakthrough for <i>Hydrogen Sulfide</i>)
Respirator:	>10 ppm - SCBA Use turn out gear or flash protection if fire/ignition is the greatest hazard

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: AMMONIUM SULFITE

Synonyms: Ammonium Hydrogen Sulfite; Diamonium Sulfite CAS No: 10196-04-0 Molecular Formula: (NH₄)₂SO₃ RTK Substance No: 0116 Description: Odorless, colorless, crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Sulfite itself does	Ammonium Sulfite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form	
0 - Fire	not burn.	toxic Hydrogen Sulfide gas.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Dioxide and Nitrogen Oxides	Ammonium Sulfite is not compatible with OXIDIZING	
DOT#: UN 3077	Use water spray to keep fire-exposed containers	AGENTS (SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES, CHI ORATES, NITRATES,	
ERG Guide #: 171	cool.	CHLORINE, BROMINE and FLUORINE).	
Hazard Class: 9		Protect from WATER and MOISTURE.	
(Environmentally Hazardous Substance)			

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Ammonium Sulfite is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 10 \text{ mg/m}^{3}$
- $PAC-2 = 10 \text{ mg/m}^3$

PAC-3 = 10 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	1.41 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Sublimes)
Melting Point:	140° to 158°F (60° to 70°C) (Decomposes)
Molecular Weight:	116.14

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



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Common Name: AMYL ALCOHOL

Synonyms: 1-Pentanol; Pentyl Alcohol CAS No: 71-41-0 Molecular Formula: CH₃(CH₂)₃CH₂OH RTK Substance No: 0124 Description: Clear liquid with a mild alcohol odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
1 - Health 3 - Fire 0 - Reactivity DOT#: UN 1105 ERG Guide #: 129 Hazard Class: 3 (Flammable)	FirefightingFLAMMABLE LIQUIDUse dry chemical, CO2 or alcohol-resistant foam as extinguishing agents.Water may not be effective in fighting fires.POISONOUS GASES ARE PRODUCED IN FIRE.CONTAINERS MAY EXPLODE IN FIRE.Use water spray to keep fire-exposed containers cool.Vapors may travel to a source of ignition and flash back.Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		istant foam fires. CED IN FIRE. RE. d containers cool. tion and flash vel a distance to e source.	 Amyl Alcohol reacts violently with HYDROGEN TRISULFIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Amyl Alcohol attacks ALKALINE and EARTH ALKALINE METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM) to form flammable and explosive <i>Hydrogen gas</i>. Amyl Alcohol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; and ACETALDEHYDE.
SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills - 60 mete Large Spills - 330 me Absorb liquids in verr similar material and	ers (200 feet) ters (1,100 feet) niculite, dry sand, earth, or a deposit in sealed containers.		Odor Threshold: Flash Point: LEL: UEL: Relative Density: Vapor Density: Vapor Pressure: Water Solubility: Boiling Point: Melting Point: Molecular Weigh	0.12 to 10 ppm $91^{\circ}F (33^{\circ}C)$ 1.2% 10.5% 10.18 (water = 1) 3 (air = 1) 2 mm Hg at 77^{\circ}F (25^{\circ}C) Slightly soluble 280^{\circ}F (138^{\circ}C) -110^{\circ}F (-79^{\circ}C) at: 88.2
EXPOS	SURE LIMITS		P	ROTECTIVE EQUIPMENT
No occupational expo established.	osure limits have been		Gloves: Vi Coveralls: Di T br Boots: Ni Respirator: Si	iton, Butyl, Nitrile and Neoprene (>8-hr breakthrough) uPont Tychem®, CPF-2, SL, CPF-4, Responders® and K for <i>Aliphatic Hydroxylic compounds</i> (>8-hr eakthrough) eoprene and Butyl upplied air
HEAL	TH EFFECTS		FIRST	AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Acute: Irritation with cou of breath Headach passing Chronic: No inform	of the nose, throat and lungs ghing, wheezing, and shortness ne, dizziness, confusion and out nation		Remove the pers Flush eyes with la contact lenses if Remove contamin and water. Begin artificial res necessary. Transfer to a med	on from exposure. arge amounts of water for at least 15 minutes. Remove worn. nated clothing and wash contaminated skin with soap spiration if breathing has stopped and CPR if dical facility.



Common Name: ANILINE

Synonyms: Aminobenzene; Phenylamine CAS No: 62-53-3 Molecular Formula: C₆H₅NH₂ RTK Substance No: 0135 Description: Colorless to brown, oily liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 1547 ERG Guide #: 153 Hazard Class: 6.1 (Poisonous)	Firefighting COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from	Aniline reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and may cause fires and explosions. Aniline is not compatible with ACETIC ANHYDRIDE; CHLOROSULFONIC ACID; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ALKALIES (such as METAL HYDROXIDES and METAL CARPONATES); STRONG RASES (such as SODILIMA
	the source.	HYDROXIDE and POTASSIUM HYDROXIDE); and TOLUENE DIISOCYANATES.

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

This substance is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH: IDLH LEVEL: 5 ppm, 8-hr TWA Lowest feasible concentration 2 ppm, 8-hr TWA 100 ppm

HEALTH EFFECTS

Eyes:	Irritation with possible eye damage
Skin:	Irritation and skin rash
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness and blue color to the skin and lips (methemoglobinemia)
	Fatigue, drowsiness, convulsions, disturbance of speech, upset stomach and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	0.58 to 10
Flash Point:	158°F (70°
LEL:	1.3%
UEL:	11%
Vapor Density:	3.2 (air = 1
Vapor Pressure:	0.6 mm Hg
Specific Gravity:	1 (water =
Water Solubility:	Slightly sol
Boiling Point:	363°F (184
Ionization Potential:	7.7 eV
Molecular Weight:	93.1

I: 0.58 to 10 ppm

158°F (70°C) 1.3% 11% 3.2 (air = 1) 0.6 mm Hg at 68°F (20°C) 1 (water =1) Slightly soluble 363°F (184°C) 7.7 eV 93.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 2, CPF 4, BR, LV, SL, TK and
	Responder®; Kappler Zytron® 200; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	 >2 ppm - full facepiece APR with Organic vapor cartridge >20 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ANTIMONY

Synonyms: Antimony Metal; Antimony Powder CAS No: 7440-36-0 Molecular Formula: Sb RTK Substance No: 0141 Description: Naturally occurring, silvery-white, hard, brittle metal that is also formed from smelting *Lead* and other metals

HAZARD DATA					
Hazard Rat	ina	Firefighting			Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 28 ERG Guide #: Hazard Class:	Ing Firefighting Antimony is not combustible in bulk forn Antimony powder and dust may be CC Use sand, dry chemical, CO ₂ , water spra- extinguishing agents. DO NOT USE WATER on molten Antim POISONOUS GASES ARE PRODUCEI including Antimony Oxide and Antimon (Stibine). 170 Antimony may form an ignitable dust/ai closed tanks or containers. Finely dispersed Antimony powder and explosive mixtures in air.		m. However, DMBUSTIBLE. ay or foam as hony . D IN FIRE, <i>y Hydride</i> ir mixture in	Antimony reacts violently with HALOGENS (such as FLUORINE, CHLORINE and BROMINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions. Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and freshly formed (nascent) HYDROGEN can also form toxic <i>Antimony Hydride</i> (<i>Stibine</i>) gas. Antimony is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, and NITRATES); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); IODINE; and POWDERED METALS.	
	SPI	LL/LEAKS			PHYSICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten <i>solid</i> spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Ground and bond containers when transferring Antimony <i>powder</i>. Use only non-sparking tools and equipment. DO NOT wash into sewer. 			Flash Point: Vapor Pressurd Specific Gravit Water Solubilit Boiling Point: Melting Point: Molecular Weig	Noncombustible (bulk form) Combustible (powder and dust) re: 1 mm Hg at 1,627°F (886°C) ity: 6.69 (water = 1) ity: Insoluble $2,975°F (1,635°C)$ 1,166°F (630°C) ight: 121.8	
EXPOSURE LIMITS				PROTECTIVE EQUIPMENT	
OSHA: 0.5 mg/m^3 , 8-hr TWANIOSH: 0.5 mg/m^3 , 10-hr TWAACGIH: 0.5 mg/m^3 , 8-hr TWAIDLH: 50 mg/m^3 The Protective Action Criteria values are:PAC-1 = 1.5 mg/m^3 PAC-2 = 20 mg/m^3 PAC-3 = 50 mg/m^3			Gloves: Coveralls: Respirator:	Nitrile, Neoprene and Natural Rubber Tyvek Spill or >0.5 mg/m ³ : full facepiece APR with <i>P100 filters</i> Fire or >5 mg/m ³ : SCBA	
HEALTH EFFECTS			FIRS	ST AID AND DECONTAMINATION	
Eyes:IrritationSkin:Irritation, redness and itchy skin rashInhalation:Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache, dizziness, nausea, vomiting, and abdominal pain			Remove the pe Flush eyes with contact lenses. Quickly remove large amounts Begin artificial r Transfer promp	erson from exposure. h large amounts of water for at least 15 minutes. Remove s. re contaminated clothing and wash contaminated skin with of soap and water. respiration if breathing has stopped and CPR if necessary. ptly to a medical facility. February 2012	



Common Name: ANTIMONY POTASSIUM TARTRATE

Synonyms: Potassium Antimony Tartrate; Tartar Emetic CAS No: 28300-74-5 Molecular Formula: $C_4H_4KO_7Sb$ RTK Substance No: 0145 Description: Odorless, colorless to white, crystalline powder

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1551 ERG Guide #: 151 Hazard Class: 6.1	Extinguish fire using an agent suitable for type of surrounding fire. Antimony Potassium Tartrate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.		Antimony Potassium Tartrate is not compatible with MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); TANNIC ACID, PERCHLORIC ACID; ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); CARBONATES (such as LIME WATER); LEAD; MERCURY; SILVER SALTS; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).	
(Poison)			Antimony Potassium Tartrate can react with freshly formed HYDROGEN to form extremely flammable and poisonous <i>Stibine gas</i> .	
SPILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance:		Odor Threshold	ld: Odorless	
Spill: 25 meters (75 feet)		Flash Point:	Nonflammable	
Fire: 800 meters (1/2 mile)		Specific Gravity	ty: 2.6 (water = 1)	
Moisten spilled material first or use a HEPA-filter		Water Solubility	ty: Soluble	
for disposal.		Melting Point:	630° to 635°F (332° to 335°C)	
DO NOT wash into sewer. Antimony Potassium Tartrate is harmful to aquatic life at very low concentrations.		Molecular Weig	ght: 324.9	

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT
OSHA: 0.5 mg/m^3 , 8-hr TWA NIOSH: 0.5 mg/m^3 , 10-hr TWA ACGIH: 0.5 mg/m^3 , 8-hr TWA IDLH: 50 mg/m^3 The Protective Action Criteria values are: PAC-1 = 4.11 mg/m ³ PAC-2 = 6.86 mg/m ³ PAC-3 = 137 mg/m ³	Gloves:Nitrile and Natural RubberCoveralls:Tyvek®Respirator:>0.5 mg/m³ - full facepiece APR with P100 filters >50 mg/m³ - SCBA

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, burns and rashInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breathHeadache, dizziness, nausea and
vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ARGON

Synonyms: None CAS No: 7440-37-1 Molecular Formula: Ar RTK Substance No: 0151 Description: Odorless, tasteless, and colorless asphyxiant gas

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire Arron itself does not burn	Argon may react explosively with <i>liquid</i> NITROGEN.			
0 - Fire	CONTAINERS MAY EXPLODE IN FIRE.	Reep temperatures below 125°F (52°C).			
0 - Reactivity	Use water spray to keep fire-exposed containers				
DOT#:	COOI.				
UN 1006 (Compressed)					
UN 1951 (Cryogenic)					
ERG Guide #: 121					
Hazard Class: 2.2					
(Nonflammable)					

JFILL/LEARJ	PHYSICAL PROPERTIES		
Isolation Distance: Spill: 100 meters (330 feet) Fire: 800 meters (1/2 mile) Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Turn leaking cylinder with leak up to prevent escape of gas in liquid state. Before entering a confined space where Argon is present, check to make sure sufficient <i>Oxygen</i> (19.5%) exists.	Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Odorless Noncombustible 1.38 (air = 1) >760 mm Hg at 68°F (20°C) Slightly soluble -302°F (-186°C) -308°F (-189°C) 39.9	

EXPOSURE LIMITS

Argon decreases the amount of available Oxygen. Routinely measure Oxygen content to make sure it is at least 19.5% by volume.

The Protective Action Criteria values are:

PAC-1 = 65,000 ppm

PAC-2 = 230,000 ppm

PAC-3 = 400,000 ppm

HEALTH EFFECTS

- Irritation and burns Eyes: Skin: Irritation and burns, contact with liquid causes frostbite
- Headache, rapid breathing, dizziness, Inhalation: confusion, loss of coordination and judgment, unconsciousness, coma and death

	PROTECTIVE EQUIPMENT
Gloves:	Insulated materials
Coveralls:	Turn Out Gear
Respirator:	< 19.5% <i>Oxygen -</i> SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: ARSENIC

Synonyms: Gray Arsenic; Arsen CAS No: 7440-38-2 Molecular Formula: As RTK Substance No: 0152 Description: Silver-gray or white metallic, odorless, brittle solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
4 - Health	Arsenic is noncombustible, however, Arsenic dust	Arsenic reacts with OXIDIZING AGENTS (such as PERCHI ORATES, PEROXIDES, PERMANGANATES	
0 - Fire	flame or hot surfaces.	CHLORATES, NITRATES, CHLORINE, BROMINE and	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	FLUORINE) to cause fires and explosions.	
DOT# : UN 1558	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Arsenic reacts with ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and HYDROGEN GAS to	
ERG Guide #: 152	including Arsenic Oxides.	produce toxic Arsine gas.	
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	Arsenic is not compatible with <i>powdered</i> METALS (such as ZINC, LITHIUM, RUBIDIUM and PLATINUM);	
(F015011)		BROMINE AZIDE; LEAD MONOXIDE; and MERCURY OXIDE.	

SPILL/LEAKS

Isolation Distance:

Spills: 25 to 50 meters (75 to 150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

DO NOT wash into sewer.

Toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 0.01 mg/m³, 8-hr TWA

 NIOSH:
 0.002 mg/m³, 15-min Ceiling

 ACGIH:
 0.01 mg/m³, 8-hr TWA

 IDLH:
 5 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness
Chronic:	Weakness, headache, nausea, vomiting, and muscle cramps Cancer (skin and lung) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
Vapor Pressure:	1 mm Hg at 701°F (372°C)
Specific Gravity:	5.7 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,350°F (613°C)
Ionization Potential:	9.87 eV
Molecular Weight:	74.9

	PROTECTIVE EQUIPMENT
Gloves:	Natural Rubber, Nitrile or Silver Shield®
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter
	<0.5 mg/m ³ -Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ARSENIC DISULFIDE

Synonyms: Red Arsenic Glass; Realgar CAS No: 56320-22-0Molecular Formula: As_2S_2 RTK Substance No: 0156 Description: Reddish brown, odorless solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1557 ERG Guide #: 152 Hazard Class: 6.1 (Poison)	 Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Disulfide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> and <i>Arsenic fumes</i>. Use water spray to keep fire-exposed containers cool. 	Arsenic Disulfide may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BROMINE AZIDE; SODIUM SULFIDE; SULFUR; and POTASSIUM NITRATE. Arsenic Disulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES to form toxic Arsenic, Hydrogen Sulfide and Sulfur Dioxide fumes and vapors.
		Contact with WATER or STEAM releases toxic Hydrogen Sulfide gas.

SPILL/LEAKS

Isolation Distance:

Spills: 25 to 50 meters (80 to 160 feet)

Fire: 800 meters (1/2 mile)

Collect solid material in the most convenient and safe manner, or use a HEPA-filter vacuum to clean-up, and deposit in sealed containers.

Harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA	
NIOSH:	0.002 mg/m ³ , 15-min Ceiling	
ACGIH:	0.01 mg/m ³ , 8-hr TWA	
IDLH LEVEL:	5 mg/m ³	
	(All of the above are for inorganic	
	Arsenic compounds measured as	
	Arsenic)	

Η	IE	: /	۱L	TH	EFI	FE(СТ	S

Eyes:	Irritation, burns, red and watery eyes
Skin:	Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness
	Weakness, nausea and vomiting, headache and muscle cramps
Chronic:	Arsenic compounds cause lung and skin cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	<0 mm Hg at 68°F (20°C)
Specific Gravity:	3.5 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,049°F (565°C)
Melting Point:	585°F (307°C)
Molecular Weight:	214

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSENIC PENTAFLUORIDE

Synonyms: Arsenic Fluoride CAS No: 7784-36-3 Molecular Formula: A_8F_5 RTK Substance No: 4171 Description: Colorless gas that forms white fumes in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Stop flow of gas and use fine water spray to disperse and knock down acid vapors.	Arsenic Pentafluoride reacts with WATER; MOIST AIR; STEAM: and STRONG ACIDS (such as HYDROCHLORIC.
0 - Fire 1 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire. Arsenic	SULFURIC and NITRIC) to form toxic <i>Hydrogen Fluoride</i> and <i>Arsenic Pentoxide</i> .
	Pentafluoride itself does not burn.	Arsenic Pentafluoride reacts violently with DIACETYLENE.
DOT#: UN 1955	POISONOUS GASES ARE PRODUCED IN	Arsenic Pentafluoride is not compatible with REDUCING
ERG Guide #: 123	FIRE, including Hydrogen Fluoride and	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: 2.3 (Poison Gas)	CONTAINERS MAY EXPLODE IN FIRE.	and POTASSIUM HYDROXIDE); ORGANIC MATERIALS; and MATERIALS containing SILICA (such as GLASS).
	containers cool.	Arsenic Pentafluoride reacts with NICKEL; NICKEL ALLOYS; and COPPER in the presence of SULFUR DIOXIDE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (300 feet)

Large Spill: 800 meters (1/2 mile)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use water spray to knock down vapors.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

EXPOSURE LIMITS

OSHA: 3 ppm, 8-hr TWA

- **NIOSH:** 3 ppm, 10-hr TWA; 6 ppm, 15-min Ceiling
- ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm, Ceiling
- **IDLH:** 30 ppm The Protective Action Criteria values are: PAC-1 = 1 ppm PAC-2 = 24 ppm PAC-3 = 44 ppm
 - (All of the above are for *Hydrogen Fluoride*)

HEALTH EFFECTS

Eyes:Irritation, burns, red and watery eyesSkin:Irritation, burns, itching, rash and loss of
pigmentInhalation:Nose and throat irritation with coughing,
wheezing and hoarseness
Weakness, headache, nausea, vomiting,
and muscle crampsChronic:Arsenic compounds cause skin, liver,
and lung cancer in humans

PHYSICAL PROPERTIES

Flash Point:	Noncombustible
Vapor Density:	5.86 (air = 1)
Vapor Pressure:	>760 mm Hg at 68°F (20°C)
Specific Gravity:	6.27 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	-63°F (-53°C)
Freezing Point:	-112°F (-80°C)
Molecular Weight:	169.9

PROTECTIVE EQUIPMENT

Barrier®, Teflon® and Kel-F® (>8-hr breakthrough for *Hydrogen Fluoride*)

 Coveralls:
 Tychem® Responder® and TK; and Trellchem® HPS

 (>8-hr breakthrough for Hydrogen Fluoride)

Respirator: SCBA

Gloves:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ARSENIC TRIOXIDE

Synonyms: Arsenous Oxide; White Arsenic CAS No: 1327-53-3 Molecular Formula: As_2O_3 RTK Substance No: 0161 Description: Odorless, colorless to white crystal or powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Trioxide itself does	Arsenic Trioxide reacts with CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM	
0 - Fire	not burn. POISONOUS GASES ARE PRODUCED IN FIRE including Arsenic fumes	and ZINC); METALS (such as ALUMINUM, COPPER,	
0 - Reactivity		IRON and ZINC FILINGS); and COMPOUNDS CONTAINING CHLORINE and FLUORINE to produce toxic	
DOT#: UN 1561	Use water spray to keep fire-exposed containers	Arsine gas.	
ERG Guide #: 151	cool.	Arsenic Trioxide is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM	
Hazard Class: 6.1 (Poison)		HYDROXIDE) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES).	

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Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Fire: 800 meters (1/2 mile)	Vapor Pressure:	66 mm Hg at 594°F (312°C)
Moisten spilled material first or use a HEPA-filter	Specific Gravity:	3.74 (water = 1)
vacuum for clean-up and place into sealed containers	Water Solubility:	Insoluble
DO NOT wash into sewer	Boiling Point:	869°F (465°C)
Arsenic Trioxide is harmful to aquatic life and may	Melting Point:	379°F (193°C)
persist in the environment.	Molecular Weight:	197.8

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA NIOSH: 0.002 mg/m³, 15-min Ceiling ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 5 mg/m³ (All of the above are for *inorganic Arsenic*)

The Protective Action Criteria values are: PAC-1 = 0.4 mg/m³ PAC-2 = 3 mg/m³ PAC-3 = 9.1 mg/m³

HEALTH EFFECTS		
Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of	
Inhalation:	pigment Nose and throat irritation with coughing, wheezing and hoarseness	
	Weakness, headache, nausea, vomiting, and muscle cramps	
Chronic:	Cancer (lung) in humans and animals	

PROTECTIVE EQUIPMENT

PHYSICAL PROPERTIES

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSENIC TRISULFIDE

Synonyms: Arsenic Sesquisulfide; Arsenous Sulfide; King's Gold CAS No: 1303-33-9 Molecular Formula: As_2S_3 RTK Substance No: 0162 Description: Odorless, yellow or orange, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire Arsenic Trisulfide	Arsenic Trisulfide may react violently with POTASSIUM
0 - Fire 0 - Reactivity	itself does not burn. POISONOUS GASES ARE PRODUCED IN	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): SULFUR: and SODIUM SULFIDE.
DOT#: UN 1557 ERG Guide #: 152 Hazard Class: 6.1 Poison)	FIRE, including Arsenic Oxides, Sulfur Oxides, Hydrogen Sulfide and Arsine. Use water spray to keep fire-exposed containers cool.	Arsenic Trisulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES to produce highly toxic gases and fumes such as Hydrogen Sulfide, Arsine, and Arsenic.
1 013011)		(such as IRON, ALUMINUM and ZINC), highly toxic Arsine gas may be released.
		Arsenic Trisulfide reacts with WATER, STEAM or MOIST AIR to produce Hydrogen Sulfide gas.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Harmful to aquatic life in very low concentrations.
DO NOT wash into sewer.
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

EXPOSURE LIMITS

OSHA:0.01 mg/m³, 8-hr TWANIOSH:0.002 mg/m³, 15-min CeilingACGIH:0.01 mg/m³, 8-hr TWAIDLH:5 mg/m³
(All of the above are for inorganic Arsenic)

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness
	Weakness, nausea and vomiting, headache and muscle cramps
Chronic:	Arsenic compounds cause skin, liver, and lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	3.4 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	1,305°F (707°C)
Melting Point:	594°F (312°C)
Molecular Weight:	246

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSINE

Synonyms: Arsenic Hydride; Hydrogen Arsenide CAS No: 7784-42-1 Molecular Formula: AsH₃ RTK Substance No: 0163 Description: Colorless gas with a garlic-like odor

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
4 - Health	FLAMMABLE GAS	urn itself out	Arsine reacts with OXIDIZING AGENTS (such as	
4 - Fire	POISONOUS GASES ARE PRO	DUCED IN FIRE,	CHLORATES, NITRATES, CHLORINE, BROMINE and	
2 - Reactivity	including Arsenic Oxide and Ars	enic Trioxide.	FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);	
DOT#: UN 2188	CONTAINERS MAY VENT RAPI EXPLODE IN FIRE.	IDLY AND	POTASSIUM; and AMMONIA.	
ERG Guide #: 119	Use water spray to keep fire-exp	osed containers		
Hazard Class: 2.3	cool and "wash" the aerosol part	ticulate from the		
(Toxic gas)	Vapor is heavier than air and ma	y travel a distance		
	to cause a fire or explosion far fi	rom the source.		
SPILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance:		Odor Threshold	: Does not provide adequate warning	
Small Spills: 60 meters (200 feet)		Flash Point:	Flammable	
Large Spills: 420 meters (1 400 feet)		UEL:	78%	
Fire: 9.5 km (5.9 miles		Vapor Density:	2.7 (air = 1)	
Keep Arsine out of cor	nfined spaces, such as	Vapor Pressure	: 11,000 mm Hg at 68°F (20°C)	
sewers, because of the possibility of an explosion.		Specific Gravity	2.69 (water = 1)	
Can contaminate ground water with Arsenic Trioxide		Water Solubility	r: Soluble	
if water is used during a fire.		Boiling Point:	$-67^{\circ}F(-55^{\circ}C)$	
		Molecular Weig	itidi: 9.09 eV ht. 77 95	
		Molecular Welg	n. 11.00	

EXPOSURE LIMITS

 OSHA:
 0.05 ppm, 8-hr TWA

 NIOSH:
 0.0006 ppm, Ceiling (15-min)

 ACGIH:
 0.005 ppm, 8-hr TWA

 IDLH:
 3 ppm

PROTECTIVE	EQUIPMENT
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Gloves:	Teflon® (inner glove); insulated (outer glove)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler Zytron® 500; and Saint-Gobain ONESuit®TEC (>8-hr breakthrough)
Respirator:	>0.0006 ppm - Supplied air

HEALTH EFFECTS				
Eyes:	Contact with liquid can cause frostbite			
Skin:	Contact with liquid can cause frostbite			
Inhalation:	Lung irritation with coughing and/or shortness of breath			
Chronic:	<i>Inorganic Arsenic compounds</i> cause liver, kidney, lung and bladder cancer in humans			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ASBESTOS

Synonyms: Actinolite; Amosite; Anthophyllite; Chrysotile; Crocidolite; Tremolite CAS No: 1332-21-4 Molecular Formula: Varies RTK Substance No: 0164 Description: Group of six naturally occurring, fibrous *Silicate* minerals that range in color from white to gray, green blue or brown

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
4 - Health	Extinguish fire using an agent suitable for type of	Not reactive			
0 - Fire	surrounding life. Asbestos itseli does not bum.				
0 - Reactivity					
DOT#: NA 2212					
ERG Guide #: 171					
Hazard Class: 9					
(Miscellaneous Hazardous Substance)					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT USE COMPRESSED AIR.

EXPOSURE LIMITS

 OSHA:
 0.1 f/cc, 8-hr TWA; 1 f/cc, 30 min. Ceiling

 NIOSH:
 0.1 f/cc, 10-hr TWA

 ACGIH:
 0.1 f/cc, 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 0.05 mg/m^3

 $PAC-2 = 0.06 \text{ mg/m}^3$

 $PAC-3 = 0.3 \text{ mg/m}^3$

HEALTH EFFECTS				
No acute health effects known				
No acute health effects known				
No acute health effects known				
Cancer (lung and gastrointestinal tract) in humans				

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 8°F (20°C) (approx.)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	1,112°F (600°C)
Molecular Weight:	277 (for Chrysotile Asbestos)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.1 f/cc - full facepiece APR with <i>High efficiency filter</i> >1 f/cc (0.05 mg/m ³) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: ASPHALT, OXIDIZED

Synonyms: Bitumens, Oxidized; Blown Asphalt CAS No: 64742-93-4 Molecular Formula: Mixture RTK Substance No: 3197

Description: Air-refined or air-blown type of *Bitumens* which are blackish-brown, cement-like solids, semisolids or liquids depending on the formulation or mixture of Asphalt used

HAZARD DATA						
Hazard	Rating	Firefighting			Reactivity	
3 - Health 1 - Fire 0 - Reacti DOT#: UI ERG Guid Hazard CI (F	vity N 1999 de #: 130 lass: 3 Flammable)	Firefighting Use dry chemical, CO ₂ , or foam as extinguishing agents. DO NOT use straight water streams. Water spray and foam must be applied carefully to avoid frothing. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides, Hydrogen Sulfide</i> and <i>Formaldehyde</i> . Use water spray to keep fire-exposed containers cool. DO NOT direct water directly into any container, vessel or tank containing HOT <i>Asphalt</i> as violent eruptions may occur.		xtinguishing Water spray to avoid CED IN FIRE, <i>Sulfide</i> and d containers y container, <i>alt</i> as violent	Asphalt, Oxidized is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). HOT Asphalt, Oxidized may ignite flammables on contact. Significant concentrations of <i>Hydrogen Sulfide</i> can occur and accumulate in storage tanks and bulk transport containers. Use only non-sparking tools and equipment, especially when opening and closing containers of Asphalt, Oxidized.	
	SPIL	L/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance:Spills: 50 meters (150 feet)Fire: 800 meters (1/2 mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.Hot product can harm plant life.This chemical does not accumulate in the food chain or environment.			Odor Thresho Flash Point: LEL: UEL: Autoignition Temperature: Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point	Petroleum odor >400°F (204°C) 0.9% 7% 905°F (485°C) re: 3 mm Hg at 68°F (20°C) ity: 0.95 to 1.1 (water = 1) ity: Insoluble : 700°F (371°C) : 86°F to 266°F, (54°C to 173°C)		
	EXPOS	URE LIMITS			PROTECTIVE EQUIPMENT	
NIOSH: ACGIH: IDLH:	5 mg/m ³ , 15 Asphalt fun 0.5 mg/m ³ , 1 ppm, 8-hr <i>Hydrogen</i> 5 100 ppm (as	5-minute Ceiling (as ne) 8-hr TWA (as <i>Asphalt fume)</i> TWA; 5 ppm STEL (as Sulfide) s Hydrogen Sulfide)		Gloves: Coveralls: Boots: Respirator:	Insulated Rubber DuPont Tychem® F, Responder® and CPF 2, CPF 3, CPF 4; ONESuit® TEC; and Kappler Zytron® 300 and 500 Insulated Rubber >0.5 mg/m ³ (as <i>Asphalt fume</i>) or >1 ppm <i>Hydrogen</i> <i>Sulfide gas</i> - Supplied air	
HEALTH EFFECTS			FIRS	T AID AND DECONTAMINATION		
Eyes: Skin:	Irritation Irritation, s pigment c	severe burns, dermatitis and hange		Remove the p Immediately f minutes, lifting while flushing	erson from exposure. lush with large amounts of water for at least 15 g upper and lower lids. Remove contact lenses, if worn,	
Acute: Chronic:	Nose, thro coughing, breath Headache vomiting Cancer (s Bronchitis shortness	bat and lung irritation with wheezing and/or shortness of e, dizziness, nausea and kin) in animals. with cough, phlegm, and/or of breath.		Quickly removes the second sec	ve contaminated clothing. Immediately wash contaminated e amounts of soap and water. Seek medical attention. breathing (using universal precautions) if breathing has CPR if heart action has stopped. aptly to a medical facility.	



Common Name: ATRAZINE

Synonyms: AAtrex®, Gesaprim®, Vectal CAS No: 1912-24-9 Molecular Formula: $C_8H_{14}CIN_5$ RTK Substance No: 0171 Description: White, crystalline solid which is often mixed with a liquid (carrier).

HAZARD DATA					
Hazard Rating	Firefighting			Rea	activity
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 2763 (Solid) UN 2998 (Liquid) ERG Guide #: 151 Hazard Class: 6.1 (Poison)	 - Atrazine is a noncombustible solid. However, it may be mixed with flammable or combustible "carrier" liquids. - Use dry chemical, CO₂, water spray or a foaming agent. - POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Nitrogen Oxides</i>. - CONTAINERS MAY EXPLODE IN FIRE 			- Inc H S ar	compatible with STRONG ACIDS (such as YDROCHLORIC, SULFURIC and NITRIC) and TRONG BASES (such as SODIUM HYDROXIDE nd POTASSIUM HYDROXIDE).
SPIL	LS/LEAKS			PH۱	SICAL PROPERTIES
Isolation Distance: 5	i0 meters for liquids (150 feet)		Odor Threshold:		No information
2	25 meters for solids (75 feet)		Flash Point:		Noncombustible
- Dampen solid spills v	vith water before collection.		LEL:		No information
- Absorb liquids in veri similar material and	niculite, dry sand, earth, or a deposit in sealed containers.		UEL:		No information
- DO NOT wash into s	ewer.		Vapor Density:		No information
 Hazardo us to pla inte organisms. 	s, soil orga hisms and aquatic		Vapor Pressure:		0.0000003 mm Hg at 68°F (20°C)
			Water Solubility:		Slightly soluble
			Boiling Point:		Decomposes
			Ionization Potent	ial:	No information
EXPOS	URE LIMITS		PI	RO	TECTIVE EQUIPMENT
OSHA: N/A			Gloves: No	o info	rmation
NIOSH: 5 mg	/m ³ 10-hr TWA		Coverall: No	o info	rmation
ACGIH: 5 mg	/m ³ 8-hr TWA		Boot: No	o info	rmation
IDLH LEVEL: N/A			Respirator: Su	upplie	ed air
			Elush even with large amounts of water for at least 15 minutes		amounts of water for at least 15 minutes
Skin: Irritant Acute: Skin and Chronic: Cancer - f allergy, m	e irritation		 Figsh eyes with large amounts of water for at least 15 minutes. Remove contact lenses, if worn, while rinsing. Remove contaminated clothing. Wash contaminated skin with soap and water. Remove the person from exposure. Transfer to a medical facility. 		



Common Name: BARIUM

Synonyms: None CAS No: 7440-39-3 Molecular Formula: Ba RTK Substance No: 0180 Description: Silver to white, metallic, powder or solid

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health	Barium is a FLAMMABLE SOLID that may ignite spontaneously in AIR or on contact with WATER.	Barium reacts violently with WATER and MOIST AIR to generate flammable and explosive <i>Hydrogen gas</i> .			
3 - Fire	Use dry chemicals appropriate for extinguishing	Mixtures of finely divided Barium and HALOGENATED			
2-W - Reactivity	metal fires.	HYDROCARBONS (such as TRICHLOROETHYLENE and CARBON TETRACHI ORIDE) are explosive			
DOT#: UN 1400	DO NOT USE WATER, CO ₂ or FOAM.	Barium is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHI ORATES, NITRATES			
ERG Guide #: 138	POISONOUS GASES ARE PRODUCED IN FIRE.				
Hazard Class: 4		CHLORINE, BROMINE and FLUORINE); STRONG			
(Flammable Solid)		ACIDS (such as HYDROCHLORIC, SULFURIC and			
		NURIC); SURONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; and OXYGEN.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry sand or earth to prevent ignition and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 0.5 mg/m³, 8-hr TWA IDLH: 50 mg/m³ The Protective Action Criteria values are: PAC-1 = 1.5 mg/m³

PAC-2 = 180 mg/m³

 $PAC-3 = 1,100 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting, irregular heartbeat, muscle weakness, tremors, paralysis and even death

PHYSICAL PROPERTIES		
Flash Point:	Flammable solid	
Vapor Pressure:	10 mm Hg at 1,920°F (1,049°C)	
Specific Gravity:	3.5 (water = 1)	
Water Solubility:	Reactive	
Boiling Point:	2,084° to 2,979°F (1,140° to 1,637°C)	
Melting Point:	1,310°F (710°C)	
Molecular Weight:	137.34	

PROTECTIVE EQUIPMENT

oves:	Nitrile and Natural Rubber	
overalls:	Tyvek®	

Coveralls: T

G

Respirator: >0.5 mg/m3 - full facepiece APR with High efficiency filters >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BARIUM NITRATE

Synonyms: Barium Dinitrate; Nitric Acid, Barium Salt CAS No: 10022-31-8 Molecular Formula: BaN₂O₆ RTK Substance No: 0186 Description: Colorless to white, odorless, crystalline powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 0 - Fire	Barium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Barium Nitrate may react with COMBUSTIBLES; CHEMICALLY ACTIVE METALS (such as ALUMINUM, MAGNESIUM and ZINC); and METAL POWDERS to	
0 - Reactivity DOT#: UN 1446 ERG Guide #: 141 Hazard Class: 5.1 (Oxidizer)	Use water only. DO NOT USE CO ₂ as an extinguishing agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Barium Oxides</i> . Use water spray to keep fire-exposed containers cool. Barium Nitrate may ignite combustibles (wood, paper and oil)	Cause a fire or explosion. Barium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Barium Nitrate is a marine pollutant and may bioaccumulate.

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting, irregular heartbeat, muscle weakness, tremors, paralysis and death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	3.24 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	1,098°F (610°C)
Molecular Weight:	261.35

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber	
Coveralls:	Tyvek®	
Respirator:	>0.5 mg/m ³ - Full facepiece APR with P100 filters	
	>50 mg/m ³ - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Right to Know Hazardous Substance Fact Sheet

Common Name: BENDIOCARB

N. Health

Synonyms: Carbamic Acid, Methyl-, 2,3-(Dimethylenedioxy)Phenyl Ester; Ficam CAS No: 22781-23-3 Molecular Formula: $C_{11}H_{13}NO_4$ RTK Substance No: 0191 Description: Colorless to white, odorless powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Although Bendiocarb does not burn, it is often dissolved in a liquid carrier that may be	Bendiocarb is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE); STRONG	
DOT#: UN 2757	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and REDUCING AGENTS (such as LITHIUM, SODIUM.	
ERG Guide #: 151	including Nitrogen Oxides.		
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	ALUMINUM and their HYDRIDES).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Bendiocarb is toxic to birds and is a regulated marine pollutant.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Bendiocarb**.

PHYSICAL PROPERTIES

Odorless
3.45 x 10 ⁻⁵ mm Hg at 77°F (25°C)
1.25 (water = 1)
Insoluble
265°F (129°C)
223.2

	PROTECTIVE EQUIPMENT	
Gloves:	Nitrile and Neoprene	
Coveralls:	Tyvek®	
Respirator:	Spill: full facepiece APR with <i>P100 High efficiency filter</i> cartridges	
	Fire: SCBA	

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Mild irritation Mild irritation (skin absorbable) Headache, dizziness, blurred vision, tightness in the chest, sweating, muscle twitching and loss of coordination, convulsions, coma and death (<i>Carbamate poisoning</i>)	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Shampoo hair immediately if contaminated. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Use Atropine if symptoms develop.


Common Name: BENZ(a)ANTHRACENE

Synonyms: Naphthanthracene; Tetraphene CAS No: 56-55-3 Molecular Formula: C₁₈H₁₂ RTK Substance No: 0193 Description: Odorless, colorless to yellow brown flake, plate or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Benz(a)Anthracene may burn, but does not readily ignite.	Benz(a)Anthracene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire 0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE.	
ERG Guide #: 171	cool.	
Hazard Class: 9 (Environmentally hazardous substance)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

Bioaccumulation may occur in seafood.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	May burn
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	820°F (438°C)
Melting Point:	324°F (162°C)
Molecular Weight:	228.3

EXPOSURE LIMITS

OSHA:	0.2 mg/m ³ , 8-hr TWA (as Coal Tar Pitch Volatiles, Benzene soluble fraction)
NIOSH:	0.1 mg/m ³ , 10-hr TWA (as Coal Tar Pitch Volatiles, Cyclohexane-extractable fraction)
ACGIH:	Lowest level possible
IDLH:	80 mg/m ³ (as Coal Tar Pitch Volatiles)
PAC LEVELS:	PAC-1 = 0.6 mg/m ³ ; PAC-2 = 120 mg/m ³ ; PAC-3 = 700 mg/m ³

HEALTH EFFECTS

Eyes:	No information available
Skin:	No information available
Inhalation:	No information available
Chronic:	Cancer (liver and lung) in animals

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: BENZ(a)ANTHRACENE, 7,12-DIMETHYL-

Synonyms: 7,12 DMBA; 9,10-Dimethyl-1,2-Benzanthracene CAS No: 57-97-6 Molecular Formula: C₂₀H₁₆ RTK Substance No: 0194 Description: Yellow to greenish-yellow, crystalline solid or yellow powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE SOLID	Benz(a)Anthracene, 7,12-Dimethyl- is not compatible
2 - Fire	extinguishing agents.	with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRATES, CHLORINE, BROMINE and FLUORINE);
DOT#: UN 3077	Use water spray to keep fire-exposed containers	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as
ERG Guide #: 171	cool.	SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Environmentally Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.2 mg/m³, 8-hr TWA

NIOSH: 0.1 mg/m³, 10-hr TWA

- ACGIH: Lowest level possible
- IDLH: 80 mg/m³

(All the above are for Coal Tar Pitch Volatiles)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Cancer (skin, lung, mammary) in animals

PHYSICAL PROPERTIES

Odorless
187°F (86°C)
Insoluble
252° to 253°F (122° to 123°C)
256.4

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H® and Viton
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ (as <i>Coal Tar Pitch Volatiles</i>) - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BENZENE

Synonyms: Benzin; Benzol; Phenyl Hydride CAS No: 71-43-2 Molecular Formula: C_6H_6 RTK Substance No: 0197 Description: Clear, colorless liquid with a sweet *Petroleum*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 0 - Reactivity DOT#: UN 1114 ERG Guide #: 130 Hazard Class: 3 (Flammable)	 FLAMMABLE LIQUID Use dry chemical, CO₂, water spray or foam as extinguishing agents. Use water as fog, as spray may be ineffective and may scatter and spread fire. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to reduce vapors and keep containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 	Benzene reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Benzene ignites on contact with CHROMIC ANHYDRIDE. Benzene is not compatible with LIQUID OXYGEN, HYDROGEN, and RANEY NICKEL.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)
Large Spill: 60 meters (200 feet)
Fire: 800 meters (1/2 mile)
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
Keep Benzene out of confined spaces, such as sewers, because of the possibility of an explosion.
DO NOT wash into sewer.
Benzene is very toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 1 ppm, 8-hr TWA; 5 ppm, 15-min STEL

 NIOSH:
 0.1 ppm, 10-hr TWA; 1 ppm, 15-min STEL

 ACGIH:
 0.5 ppm, 8-hr TWA; 2.5 ppm, 15-min STEL

 IDLH:
 500 ppm

 ERPG-1: 50 ppm; ERPG-2: 150 ppm

 ERPG-3:
 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, convulsions and coma
Chronic:	Cancer (leukemia) in humans

PHYSICAL PROPERTIES

Odor Threshold:	12 ppm
Flash Point:	12°F (-11°C)
LEL:	1%
UEL:	8%
Auto Ignition Temp:	928° to 1,076°F (498° to 580°C)
Vapor Density:	2.7 (air = 1)
Vapor Pressure:	75 mm Hg at 68°F (20°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	176°F (80°C)
Freezing Point:	42°F (6°C)
Ionization Potential:	9.24 eV
Molecular Weight:	78.1

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Fluoroelastomer (>8-hr breakthrough)
Coveralls:	Tychem® CPF 3, F, BR, LV, Responder®, and TK; Zytron® 300; and ONESuit® TEC (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>Aromatic</i>)
Respirator:	>0.5 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BENZIDINE

Synonyms: 4,4'-Bianiline; Diphenylenediamine CAS No: 92-87-5 Molecular Formula: $C_{12}H_{12}N_2$ RTK Substance No: 0204

Description: White to grayish-yellow or reddish powder, darkens on exposure to light or air.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 1 - Fire 0 - Reactivity DOT ID #: UN 1885 ERG Guide #: 153 Hazard Class: 6.1 (Poisonous Material)	 Benzidine may burn, but does not readily ignite. Use dry chemical, CO₂, water spray, an alcoholresistant foam or other foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. Use water spray to keep fire-exposed containers cool. 	Benzidine may react violently with NITRIC ACID and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Benzidine is not compatible with HEAT and SUNLIGHT.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Use a vacuum with a HEPA filter or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

Toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	Lowest feasible level
NIOSH:	Lowest feasible level
ACGIH:	Eliminate exposure if possible
IDLH LEVEL:	No Information

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Acute:	Nose and throat irritation	
Chronic:	Cancer (bladder) in humans	
	Skin allergy with itching and rash	

PHYSICAL PROPERTIES		
Odor Threshold:	No Information	
Flash Point:	No Information	
LEL:	N/A	
UEL:	N/A	
Relative Density:	1.25 (water = 1)	
Relative Vapor Density:	6.36 (air = 1)	
Water Solubility:	Soluble in hot water	
Boiling Point:	752 [°] F (400 [°] C)	
Melting Point:	239°F (115°C)	

PROTECTIVE EQUIPMENT		
Gloves:	Rubber, Nitrile	
Coverall:	DuPont Tychem® fabrics (for Benzidine in 25% <i>Methanol</i>)	
Boot:	Rubber	
Respirator:	Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.

Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Transfer promptly to a medical facility.



Common Name: BENZIMIDAZOLE, 4,5-DICHLORO-2-TRIFLUOROMETHYL)-

Synonyms: Chloroflurazole CAS No: 3615-21-2 Molecular Formula: $C_8H_3Cl_2F_3N_2$ RTK Substance No: 2908 Description: White, crystalline solid or the commercial product may be brownish

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Benzimidazole, 4,5-Dichloro-2- (Trifluoromethyl)- may burn, but does not readily	Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)- may
1 - Fire	ignite.	ACENTS (such as PERCHI ORATES, PERCYIDES
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	AGENTS (such as LITHIUM, SODIUM, AI UMINUM and
ERG Guide #: 151	including Nitrogen Oxides, Chlorine and Fluorine.	their HYDRIDES); HALOGENATED ORGANICS (such as
Hazard Class: 9 (Environmentally Hazardous Material)		ACID HALIDES (such as ACETYL CHLORIDE).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Benzimidazole**, **4,5-Dichloro-2-**(**Trifluoromethyl**)-.

The Protective Action Criteria values are:

PAC-1 = 7.5 mg/m^3 PAC-2 = 13 mg/m^3

PAC-3 = 13 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation.

PHYSICAL PROPERTIES

Flash Point:	May burn
Vapor Pressure:	4 x 10 ⁻⁵ mm Hg at 72.5°F (22.5°C)
Water Solubility:	Very slightly soluble
Melting Point:	415° to 417°F (213° to 214°C)
Molecular Weight:	255

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>High efficiency filters</i> >7.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BENZOIC ACID

Synonyms: Benzenecarboxylic Acid; Benzoate; Carboxybenzene CAS No: 65-85-0Molecular Formula: $C_7H_6O_2$ RTK Substance No: 0209 Description: White, crystalline powder with a faint, pleasant odor

HAZARD DATA **Hazard Rating** Firefighting Reactivity Benzoic Acid may burn, but does not readily Benzoic Acid is not compatible with OXIDIZING 1 - Health ignite. AGENTS (such as PERCHLORATES, PEROXIDES, 1 - Fire PERMANGANATES, CHLORATES, NITRATES, Use dry chemical, CO₂, water spray or foam as CHLORINE, BROMINE and FLUORINE) and STRONG extinguishing agents. 0 - Reactivity BASES (such as SODIUM HYDROXIDE and Water or foam my cause frothing. DOT#: UN 3077 POTASSIUM HYDROXIDE). POISONOUS GASES ARE PRODUCED IN FIRE, Water solutions of Benzoic Acid can react with METALS including Phenol and Benzene. ERG Guide #: 171 to form flammable and explosive Hydrogen gas. Use water spray to keep fire-exposed containers Hazard Class: 9 cool. (Miscellaneous Vapor from molten Benzoic Acid may form Hazardous Materials) explosive mixtures.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Benzoic Acid may damage the environment.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 12.5 mg/m^3 PAC-2 = 75 mg/m^3

- $PAC-2 = 75 \text{ mg/m}^3$ PAC-3 = 400 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and possible damage
Skin:	Irritation, rash, redness and burning feeling on contact
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Faint, pleasant odor
Flash Point:	250°F (121°C)
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	1 mm Hg at 205°F (96°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	482°F (250°C)
Melting Point:	252°F (122°C)
Molecular Weight:	122.1

Gloves:	Butyl and Neoprene
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Acids, Carboxylic</i>)
Respirator:	>12.5 mg/m ³ - SCBA

DDOTECTIVE FOUNDMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: BENZO(a)PYRENE

Synonyms: 3,4-Benzopyrene; B[a]P CAS No: 50-32-8 Molecular Formula: C_{20} H₁₂ RTK Substance No: 0207 Description: Pale yellow, crystalline solid or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 1 - Fire 0 - Reactivity	Benzo(a)pyrene may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Benzo(a)pyrene reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires
DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Miscellaneous	POISONOUS GASES ARE PRODUCED IN FIRE.	and explosions.
Hazardous Materials)		

SPILL/LEAKS

Isolation Distance: 50 meters (150 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

PHYSICAL PROPERTIES

Odor Threshold:	Faint aromatic odor
Flash Point:	No information
Specific Gravity:	1.35
Vapor Density:	8.7 (air = 1)
Vapor Pressure:	5.49 X 10 ⁹ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	590° - 594°F (310° - 312°C)
Melting Point:	347º - 354 F (175º - 179ºC)

	EXPOSURE LIMITS
OSHA:	0.2 mg/m ³ , 8-hr TWA
	(as Benzene soluble fraction)
NIOSH:	0.1 mg/m³, 10-hr TWA
	(as Cyclohexane-extractable fraction)
ACGIH:	0.2 mg/m ³ , 8-hr TWA
	(as Benzene soluble aerosol)
IDLH LEVEL:	80 mg/m ³
	(All above as Coal Tar Pitch Volatiles)
PAC	PAC-1 = 0.6 mg/m ³ ; PAC-2 = 120 mg/m ³ ;
LEVELS:	PAC-3 = 700 ma/m ³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, rash and burning feeling
Chronic:	Cancer (skin and lung) in humans.
	May affect the developing fetus
	Thickening and darkening of the skin and
	warts.

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Ansell Barrier, Polyvinyl Alcohol, Viton DuPont Tychem® C3, TF, Responder® (all >8-hr permeation time)
Boots: Respirator:	No information >0.1 mg/m ³ -Pressure demand supplied-air >80 mg/m ³ – Pressure demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: BENZOYL CHLORIDE

Synonyms: Benzene Carbonyl Chloride; alpha-Chlorobenzaldehyde CAS No: 98-88-4 Molecular Formula: C7H5OCI RTK Substance No: 0214 Description: Clear, colorless, fuming liquid with a pungent odor

HAZARD DATA						
Hazard Rat	ting	Firefighting			Reactivity	
3 - Health 2 - Fire 2-₩ - Reactiv DOT#: UN 17 ERG Guide #: Hazard Class (Cor	7 36 : 137 :: 8 rrosive)	Firefighting COMBUSTIBLE AND REACTIVE LIQUID Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER or FOAM. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool.		ReactivityBenzoyl Chloride reacts violently with WATER and STEAM to produce toxic <i>Hydrogen Chloride gas</i> .Benzoyl Chloride reacts with and/or decomposes on contact with ALCOHOLS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); DIMETHYL SULFOXIDE; mixtures of ALUMINUM CHLORIDE and NAPHTHALENE; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and AMINES.Benzoyl Chloride will react with METALS (in the presence of MOISTURE or WATER) to form flammable and explosive <i>Hydrogen gas</i> .		
	SPI	LL/LEAKS			PH)	SICAL PROPERTIES
Isolation Distance: Small Spill: 150 meters (500 feet) Large Spill: 1,000 meters (3,000 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer. Harmful to aquatic life at low concentrations.			Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Ionization Por Molecular We	old: ire: ity: ity: : tential: ight:	Pungent 162°F (72°C) 1.2% 4.9% 4.9 (air = 1) 0.4 mm Hg at 68°F (20°C) 1.2 (water = 1) Reactive/Decomposes 387°F (197°C) 30°F (-1°C) 9.53 +/- 1 140.6	
EXPOSURE LIMITS				PRO	TECTIVE EQUIPMENT	
OSHA: Nor NIOSH: Nor ACGIH: 0.5 IDLH: Nor	ne ne ppm, Ce ne	illing		Gloves: Coveralls: Respirator:	Polyvin DuPont and TK Suit® T <i>Carbox</i> >0.5 pp	yl Alcohol and Viton (>8-hr breakthrough) t Tychem® F, CPF 3, BR, LV, CSM, Responder®, ; Kappler® Zytron® 500; and Saint-Gobain® ONE EC (8-hr breakthrough for <i>aromatic Acid Halides</i> , <i>ylic</i>) om - Supplied air
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION			
Eyes: Skin: Inhalation: Chronic:	Severe in Severe in Nose, the coughing shortnes alpha-Cl Chloride humans	rritation and burns rritation and burns roat and lung irritation with g, wheezing and severe s of breath (pulmonary edema) <i>hlorinated Toluenes</i> and <i>Benzoyl</i> s cause cancer (lung) in		Remove the p Flush eyes wi contact lenses Quickly remo- large amounts Begin artificia Transfer prom Medical obser	erson fro th large a s if worn. ve contar s of soap l respirati nptly to a rvation is	om exposure. amounts of water for at least 30 minutes. Remove Seek medical attention immediately. minated clothing and wash contaminated skin with and water. Seek medical attention immediately. fon if breathing has stopped and CPR if necessary. medical facility. recommended as symptoms may be delayed.



Common Name: BENZOYL PEROXIDE

Synonyms: Benoxyl; Benzoperoxide; Dibenzoyl Peroxide CAS No: 94-36-0 Molecular Formula: $C_{14}H_{10}O_4$ RTK Substance No: 0215 Description: White, granular or crystalline solid with a faint odor, which is often diluted with an unreactive

HAZARD DATA					
Hazard Rating	a Firefighting			Reactivity	1
2 - Health 4 - Fire 4 - Reactivity DOT#: UN 3104 ERG Guide #: 146 Hazard Class: 5.2 (Organic Peroxide)	Firefighting Use water or water spray. DO NOT USE HALOGENATED AGENTS. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Benzoic Acid</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Benzoyl Peroxide may ignite combustibles (wood, paper and oil).		Benzoyl Per violently with PAPER); LIT ANILINE; AI ALCOHOLS BASES (suc HYDROXID PERCHLOR CHLORATE FLUORINE) Containers o HEAT, IMPA DISCHARG Benzoyl Per DIRECT SU	roxide is a STRONG OXIDIZER which can react h COMBUSTIBLES (such as WOOD, OIL and THIUM; ALUMINUM HYDRIDE; DIMETHYL MINES; METALLIC NAPHTHENATES; S; INORGANIC and ORGANIC ACIDS; STRONG ch as SODIUM HYDROXIDE and POTASSIUM (E); ETHERS, OXIDIZING AGENTS (such as RATES, PEROXIDES, PERMANGANATES, ES, NITRATES, CHLORINE, BROMINE and); and REDUCING AGENTS. of Benzoyl Peroxide must be protected from ACT, BLOWS, SHOCKS, FRICTION or STATIC E since explosions may occur. roxide is not compatible with METALS, INLIGHT, RUBBER, and COATINGS.	
SPI	LL/LEAKS	1		PH	YSICAL PROPERTIES
Isolation Distance: 50 meters or 150 feet for liquids 25 meters or 75 feet for solids Mix spilled material with water or wetted vermiculite and deposit into polyethylene-lined or plastic containers.			Odor T Flash F Auto ig Temper Specific Vapor F Water S Melting	hreshold: point: nition rature: c Gravity: Pressure: Solubility: Point:	Faint odor 104°F (40°C) 176°F (80°C) 1.334 Less than 1 mm Hg at 68°F (20°C) Slightly soluble Decomposes explosively at 217° to 223°F (103°C to 106°C)
EXPOSURE LIMITS				PRO	
OSHA:5 mg/m³, 8-hr TWANIOSH:5 mg/m³, 10-hr TWAACGIH:5 mg/m³, 8-hr TWAIDLH LEVEL:1,500 mg/m³The Protective Action Criteria values are:PAC-1 = 15 mg/m³PAC-2 = 1,200 mg/m³PAC-3 = 7,000 mg/m³			Gloves Covera Boots: Respira	Gloves:NeopreneCoveralls:DuPont Tychem® Polycoat, QC, CPF1, SL and CPF2 for solid Benzoyl PeroxideBoots:NeopreneRespirator:> 5 mg/m³ APR with High Efficiency filters > 50 mg/m³ SA, > 1500 mg/m³ SCBA	
HEALTH EFFECTS			F	IRST AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationAcute:Nose and throat irritation with coughing and wheezingChronic:Skin allergy with itching and skin rash. Asthma-like allergy with shortness of breath, wheezing and coughing.			Remove Flush en Remove and wat Begin a necessa Transfe	e the person fro yes with large e contact lense e contaminated er. rtificial respirat ary. r to a medical	om exposure. amounts of water for at least 15 minutes. es if worn. Seek medical attention. d clothing. Wash contaminated skin with soap tion if breathing has stopped and CPR if facility.



Common Name: BENZYL CHLORIDE

Synonyms: Chloromethyl Benzene; alpha-Chlorotoluene CAS No: 100-44-7 Molecular Formula: C₆H₅CH₂Cl RTK Substance No: 0217

Description: Colorless liquid with a strong, irritating odor that causes tearing of the eyes

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	COMBUSTIBLE LIQUID	Benzyl Chloride reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	
2 - Fire	extinguishing agents.		
1 - Reactivity	including Hydrogen Chloride.	Benzyl Chloride polymerizes and releases heat and Hydrogen Chloride when in contact with most COMMON METALS (such as ALUMINUM, COPPER IRON TIN and ZINC). This reaction DOES NOT occur with	
DOT#: UN 1738	CONTAINERS MAY EXPLODE IN FIRE.		
ERG Guide #: 156	Use water spray to keep fire-exposed containers cool.	Nickel and Lead.	
Hazard Class: 6.1 (Toxic)	Unstabilized Benzyl Chloride may violently decompose, especially in the presence of METALS.	stabilize Benzyl Chloride .	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Place into nonmetallic containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Benzyl Chloride**.

DO NOT wash into sewer.

For water spills apply activated carbon at 10 times the spilled amount.

Benzyl Chloride is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:1 ppm, 8-hr TWANIOSH:1 ppm, 15-min CeilingACGIH:1 ppm, 8-hr TWAIDLH:10 ppmThe Protective Action Criteria values are:PAC-1 = 1 ppmPAC-2 = 10 ppmPAC-3 = 50 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns (skin absorbtion possible)
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, weakness and irritability
Chronic:	Cancer (thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.041 ppm	
Flash Point:	153°F (67°C)	
LEL:	1.1%	
UEL:	14%	
Auto Ignition Temp:	977° to 1,161°F (525° to 627°C)	
Vapor Density:	4.4 (water = 1)	
Vapor Pressure:	11.8 mm Hg at 77°F (25°C)	
Specific Gravity:	1.1 (air = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	354°F (178.9°C)	
Freezing Point:	-45° to -54°F (-43° to -48°C)	
Ionization Potential:	<10.6 (can be detected by a PID)	
Molecular Weight:	126 58	

PROTECTIVE EQUIPMENT

Gloves:	SilverShield®/4H® (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Description	000

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BERYLLIUM SULFATE

Synonyms: Beryllium Sulphate CAS No: 13510-49-1 Molecular Formula: BeSO₄ RTK Substance No: 3084 Description: Odorless, colorless, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity			
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Beryllium Sulfate itself does not	Beryllium Sulfate reacts violently with CARBON DUST; and FINELY DIVIDED ALUMINUM,			
0 - Fire	burn.	MAGNESIUM and POTASSIUM.			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>BervIlium Oxide</i> , <i>Sulfur Oxides</i> , and	Beryllium Sulfate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SUI FURIC and			
DOT#: UN 1566	Sulfuric Acid.	NITRIC); STRONG BASES (such as SODIUM			
ERG Guide #: 154	Use water spray to keep fire-exposed containers	HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES,			
Hazard Class: 6.1 (Poison)		PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MOLTEN LITHIUM; and CHLORINATED HYDROCARBONS			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Beryllium Sulfate is very toxic to the aquatic environment.

EXPOSURE LIMITS

OSHA:	0.002 mg/m ³ , 8-hr TWA; 0.005 mg/m ³ , 30-min Ceiling; 0.025 mg/m ³ , Peak
NIOSH:	0.0005 mg/m ³ , Ceiling
ACGIH:	0.00005 mg/m ³ , 8-hr TWA; 0.0002 mg/m ³ STEL
IDLH:	4 mg/m ³
	(All of the above are for <i>Beryllium</i>)

HEALTH EFFECTS

Eves	Irritation rodnoss itching and hurning
Lyes.	initation, redness, itching and burning
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with nasal discharge, tightness in the chest, cough, shortness of breath, and fever
Chronic:	Beryllium and Beryllium compounds cause lung cancer in humans and animals

PHYSICAL PROPERTIES

Odor Threshold:OdFlash Point:NoSpecific Gravity:2.4Water Solubility:SoMelting Point:1,0Molecular Weight:10

Odorless Nonflammable 2.4 (water = 1) Soluble 1,004°F to 1,022°F (540° to 550°C) 105

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Quickly remove contaminated clothing, and wash contaminated skin with large amounts of water.



Common Name: BIPHENTHRIN

Synonyms: Bifenthrin; Scorpion®; Talstar® CAS No: 82657-04-3 Molecular Formula: $C_{23}H_{22}CIF_3O_2$ RTK Substance No: 3194

Description: Off-white to tan, waxy solid with a faint, slightly sweet odor, often found in a thick, brown, oily solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 3349 ERG Guide #: 151 Hazard Class: 6.1	 COMBUSTIBLE SOLID or LIQUID Use dry chemical, CO₂, alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine, Fluorine, Hydrogen Chloride</i> and <i>Hydrogen Fluoride</i>. Use water spray to keep fire-exposed containers cool 	Biphenthrin may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause a fire or explosion. Biphenthrin is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); LIME; and OXYGEN.
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids with clay, dry sand or soil.

Wash area with a solution of caustic or soda ash and an alcohol (such as *Methanol* or *Isopropanol*). Then wash area with soap and water.

DO NOT wash into sewer.

Biphenthrin is highly toxic to fish and aquatic life.

EXPOSURE LIMITS

OSHA:5 mg/m³, 8-hr TWANIOSH:5 mg/m³, 10-hr TWAACGIH:5 mg/m³, 8-hr TWAIDLH:5,000 mg/m³
(All of the above are for Pyrethrum)

HEALTH EFFECTS

Eyes:	Irritation, burning and itching		
Skin:	Rash, redness, burning feeling, tingling and itching		
Inhalation:	Nose and throat irritation with sneezing, coughing and wheezing Headache, nausea and vomiting, dizziness and convulsions		

PHYSICAL PROPERTIES

Odor Threshold:	Slightly sweet odor
Flash Point:	165°F (74°C) (Technical grade)
Vapor Pressure:	1.8 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble (disperses)
Melting Point:	135° to 158°F (57° to 70°C)
Molecular Weight:	422.9
pH:	6.7

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Neoprene, Natural Rubber and Polyvinyl Chloride
Coveralls:	Tyvek®
Respirator:	> 5 mg/m ³ - Full facepiece APR with Organic vapor cartridge and particulate prefilters
	>50 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BIS(2-CHLOROETHYL) ETHER

Synonyms: DCEE; 2,2-Dichlorodiethyl Ether; Diethylene Glycol Dichloride CAS No: 111-44-4 Molecular Formula: C₄H₈Cl₂O RTK Substance No: 0232 Description: Clear, colorless liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	Uninhibited Bis(2-Chloroethyl) Ether can form explosive <i>Peroxides</i> on exposure to AIR and LIGHT.
2 - Fire 1 - Reactivity	extinguishing agents.	Bis(2-Chloroethyl) Ether reacts violently with CHLOROSULFONIC ACID and OLEUM.
DOT#: UN 1916	including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers	Bis(2-Chloroethyl) Ether decomposes with exposure to WATER, MOISTURE or STEAM to form toxic and corrosive <i>Hydrogen Chloride gas</i> .
Hazard Class: 6.1 (Poison)	Bis(2-Chloroethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 131°F (55°C)	Bis(2-Chloroethyl) Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
		NITRATES, CHLORINE, BROMINE and FLUORINE); METALS; and METAL POWDERS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

Bis(2-Chloroethyl) Ether is a marine pollutant.

PHYSICAL PROPERTIES			
Odor Threshold:	0.049 ppm		
Flash Point:	131°F (55°C)		
LEL:	2.7%		
UEL:	Not determined		
Auto Ignition Temp:	696°F (367°C)		
apor Density: 4.9 (air = 1)			
(apor Pressure: 0.7 mm Hg at 68°F (20°C)			
Specific Gravity: 1.22 (water = 1)			
Water Solubility:	Very slightly soluble/Reactive		
Boiling Point:	352°F (178°C)		
Freezing Point:	-62°F (-52°C)		
Molecular Weight:	143		

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 15 NIOSH: 5 p	ppm, 8-hr TWA ppm, 10-hr TWA; 10 ppm, STEL	Gloves:	SilverShield®/4H® and Barrier (>8-hr breakthrough for <i>Ethers, aliphatic</i>)
ACGIH: 5 ppm, 8-hr TWA; 10 ppm, STEL IDLH: 100 ppm The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 25.7 ppm PAC-3 = 100 ppm		Coveralls: Respirator:	Tychem® BR, Responder® and TK (>8-hr breakthrough) SCBA
HEALTH EFFECTS		FIRS	T AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)	Remove the per Flush eyes with contact lenses i Quickly remove large amounts o Begin artificial re	son from exposure. large amounts of water for at least 15 minutes. Remove f worn. Seek medical attention. contaminated clothing and wash contaminated skin with of soap and water. espiration if breathing has stopped and CPR if necessary.
Chronic:	Cancer (liver) in animals	Transfer promp Medical observa	tly to a medical facility. ation is recommended as symptoms may be delayed.



Common Name: BIS(CHLOROMETHYL) ETHER

Synonyms: BCME; 1,1'-Dichlorodimethyl Ether CAS No: 542-88-1 Molecular Formula: (CH₂CI)₂O RTK Substance No: 0234 Description: Colorless liquid with an irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 2249 ERG Guide #: 131 Hazard Class: 6.1 (Poison)	 FLAMMABLE LIQUID Use dry chemical, CO₂, water spray or foam as extinguishing agents. Water spray may cause foam or frothing. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrochloric Acid</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Bis(Chloromethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers. 	Bis(Chloromethyl) Ether reacts with WATER or MOIST AIR to form <i>Formaldehyde</i> and <i>Hydrogen</i> <i>Chloride gas.</i> Bis(Chloromethyl) Ether is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand or earth.

Keep **Bis(Chloromethyl) Ether** out of confined spaces, such as sewers, because of the possibility of an explosion.

Use only non-sparking tools and equipment, especially when opening and closing containers of

Bis(Chloromethyl) Ether.

DO NOT wash into sewer.

Bis(Chloromethyl) Ether is a marine pollutant.

EXPOSURE LIMITS

OSHA:	Refer to 29 CFR 1910.1003

- NIOSH: Lowest feasible concentration
- **ACGIH:** 0.001 ppm (8-hr TWA)

The Protective Action Criteria values are: PAC-1 = 0.006 ppm PAC-2 = 0.044 ppm PAC-3 = 0.18 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Acute:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (lung) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Irritating odor
Flash Point:	66°F (19°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	30 mm Hg at 72°F (22°C)
Relative Density:	1.3 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	219°F (104°C)
Freezing Point:	-43°F (-42°C)

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Ethers, aliphatic</i>)
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ethers</i> , <i>aliphatic</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BIS(2-ETHYLHEXYL) PHTHALATE

Synonyms: Di(2-Ethylhexyl) Phthalate; Dioctyl Phthalate; DOP CAS No: 117-81-7 Molecular Formula: $C_{24}H_{38}O_4$ RTK Substance No: 0238

Description: Colorless to light colored, thick liquid with a slight odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. Water or foam may cause frothing. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	Bis(2-Ethylhexyl) Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 330 meters (1,100 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Bioaccumulation of this chemical may occur in seafood.

PHYSICAL PROPERTIES

Flash Point:	420°F (215°C)
LEL:	0.3% at 474°F (245°C)
Auto Ignition Temp:	662°F (350°C)
Vapor Density:	16 (air = 1)
Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Specific Gravity:	0.99 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	725°F (385°C)
Melting Point:	-58°F (-50°C)
Molecular Weight:	391

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA:	5 mg/m ³ , 8-hr TWA	Gloves:	Neoprene and Laminate Film
NIOSH:	5 mg/m ³ , 10-hr TWA; 10 mg/m ³ , STEL	Coveralls:	DuPont Tychem® BR, LV, TK, CSM and Responder® (>8-hr breakthrough)
ACGIH:	5 mg/m ³ , 8-hr TWA	Respirator:	>5 mg/m³ - Supplied air
IDLH LEVEL:	5,000 mg/m ³		

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: BISPHENOL A

Synonyms: Diphenylolpropane; 4,4'-Isopropylidenediphenyl CAS No: 80-05-7 Molecular Formula: $C_{15}H_{16}O_2$ RTK Substance No: 2388 Description: White to light brown flake or powder with a medicine or *Phenol*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Finely divided Bisphenol A is a significant dust explosion hazard.	Bisphenol A reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Bisphenol A may burn, but does not readily ignite.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ or foam as extinguishing	CHLORINE, BROWINE and FLOORINE).
DOT#: None		(such as SODIUM HYDROXIDE and POTASSIUM
ERG Guide #: None	POISONOUS GASES ARE PRODUCED IN FIRE.	HYDROXIDE); ACID CHLORIDES; and ACID
Hazard Class: None	cool.	
	Static electricity can cause a dust explosion hazard.	

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Wash contaminated area with 60 to 70% *Ethanol* followed by soap and water.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 15 \text{ mg/m}^{3}$
- $PAC-2 = 100 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation: Nose and throat irritation with coug and wheezing.	
	Headache, hausea and vorniting

PHYSICAL PROPERTIES

Odor Threshold:	Phenol-like odor
Flash Point:	175° to 415°F (79° to 213°C)
Auto Ignition Temp:	1,112°F (600°C)
Vapor Pressure:	0.2 mm Hg at 338°F (170°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	428°F (220°C)
Melting Point:	302° to 311°F (150° to 155°C)
Molecular Weight:	228.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton (>8-hr breakthrough for <i>Hydroxylic compounds</i>)
Coveralls:	Tyvek®
Respirator:	<15 mg/m ³ - Full facepiece APR with High efficiency filter >15 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BORATE COMPOUNDS, INORGANIC

Synonyms: None CAS No: None Molecular Formula: Varies RTK Substance No: 0241 Description: White to gray powders

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Borate Compounds, Inorganic are not combustible, but may be STRONG OXIDIZERS	Borate Compounds, Inorganic are not compatible		
0 - Fire	that enhance the combustion of other substances.	WITH STRUNG ACIDS (SUCH as HYDROCHLORIC,		
0 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire.	SOLF ORIC and NITRIC).		
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE,			
ERG Guide #: None	including Boron Oxides.			
Hazard Class: None	Borate Compounds, Inorganic may ignite combustibles (wood, paper and oil).			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Borate Compounds, Inorganic may be dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (*Anhydrous* and *Pentahydrate*)

5 mg/m³, 10-hr TWA (*Decahydrate*)

ACGIH: 2 mg/m³, 8-hr TWA; 6 mg/m³, STEL (*inhalable fraction*)

The Protective Action Criteria values for *Sodium Borate* are:

PAC-1 = 1.5 mg/m^3 PAC-2 = 12.5 mg/m^3 PAC-3 = 60 mg/m^3

н	EA	LTH	EFF	ECTS	5

Eyes: Skin:	Irritation Irritation	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, dizziness, tremors, and lightheadedness	

PHYSICAL PROPERTIES

Flash Point: N	oncombustible
Vapor Pressure: <	0 mm Hg at 68°F (20°C)
Specific Gravity: 1	4 to 2.3 (water = 1)
Water Solubility: S	lightly soluble to Soluble
Boiling Point: V	aries
Melting Point: V	aries
Molecular Weight: V	aries

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber			
Coveralls:	Tyvek®			
Respirator:	>1 mg/m 3 - Full facepiece APR with High efficiency filter >10 mg/m 3 - SCBA			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BORON OXIDE

Synonyms: Boric Anhydride; Diboron Trioxide CAS No: 1303-86-2 Molecular Formula: B_2O_3 RTK Substance No: 0243

Description: Odorless, colorless or white lump, crystal or granular solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Boron Oxide itself does not	Boron Oxide reacts with WATER and MOISTURE to form <i>Boric Acid</i> .		
0 - Fire 1 - Reactivity	burn. POISONOUS GASES ARE PRODUCED IN FIRE.	Boron Oxide is not compatible with CALCIUM OXIDE; CALCIUM CHLORIDE; and BROMINE PENTAFLUORIDE.		
DOT#: None	cool.	Boron Oxide is corrosive to METALS in the presence of		
ERG Guide #: None Hazard Class: None				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	15 mg/m ³ , 8-hr TWA		
NIOSH:	10 mg/m ³ , 10-hr TWA		
ACGIH:	10 mg/m ³ , 8-hr TWA		
IDLH:	2,000 mg/m ³		
The Protective Action Criteria values are:			

PAC-1 = 30 mg/m³ PAC-3 = 500 mg/m³ PAC-2 = 300 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68°F (20°C) (approximate)
Specific Gravity:	2.46 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	3,380°F (1,860°C)
Melting Point:	842°F (450°C)
Ionization Potential:	13.5 eV
Molecular Weight:	69.64

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>10 mg/m ³ - Full facepiece APR with High efficiency filters >30 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: BORON TRIBROMIDE

Synonyms: Tribromoborane; Boron Bromide CAS No: 10294-33-4 Molecular Formula: BBr₃ RTK Substance No: 0244 Description: Colorless, fuming liquid with a strong odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 0 - Fire 2-W - Reactivity	Use dry chemical or CO ₂ . DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> and <i>Boron Oxide</i> . Use water to cool intact containers only.		Boron Tribromide reacts violently and explosively with WATER or STEAM, and decomposes on contact with ALCOHOLS, producing Hydrogen Bromide gas. Mixtures of Boron Tribromide and POTASSIUM or SODIUM can explode on impact. Boron Tribromide is not compatible with OXIDIZING AGENTS		
ERG Guide #: 157				(SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and	
Hazard Class: 8 (Corrosive)			SULFURIC and NITRIC); ETHERS; PHOSPHORUS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; and ALKALI METALS.		
SPI	LL/LEAKS			PHYS	ICAL PROPERTIES
Isolation Distance: Absorb spill with inert Do not use water. Before entering a cor Tribromide may be that an explosive co Use the explosive lim (LEL: 4%, UEL: 750 EXPOS OSHA: N/A NIOSH: 1 pp ACGIH: 1 pp	50 to 100 meters (160 to 330 feet) : material. Infined space where Boron present, check to make sure ncentration does not exist. its for <i>Hydrogen gas</i> %) SURE LIMITS	Odor Th Flash Po Relative Vapor P Water S Boiling Ionizatio Melting Gloves: Coveral Boot:		hreshold: Point: e Vapor Density: e Density: Pressure: Solubility: Point: Point: Point: Point: PROTE : No informat II: DuPont Tyo and ChemF No informat ator: >1 ppm full:	Strong Odor Not Combustible 8.6 (air = 1) 2.7 (water =1) 40 mm Hg at $57^{\circ}F$ ($14^{\circ}C$) Reacts/Decomposes 196°F (91°C) 9.7 eV -51°F (-46°C) CTIVE EQUIPMENT tion chem® BR, LV, Responder®, TK, Reflector®, Fab Challenger® 5200 tion face APR with Acid gas cartridges
HEALTH FEFECTS				>10 ppm Si	
Eyes:IrritationSkin:IrritationAcute:Cough, s edemaChronic:Bronchit May affe	, burns , burns shortness of breath, Pulmonary is, cough, shortness of breath ct the nervous system		Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Remove contaminated clothing. Wash contaminated skin with soap and water. Begin artificia I respir ation i f breathi ng h as stopp ed and CPR if necessary. Transfer to a medical facility. Observation is recommended as symptoms may be delayed.		



Common Name: BORON TRIFLUORIDE

Synonyms: Borane, Trifluoro-: Boron Fluoride: Trifluoroborane CAS No: 7637-07-2 Molecular Formula: BF₃ RTK Substance No: 0246

Description: Colorless gas with a strong odor that forms dense, white fumes in moist air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	CORROSIVE	Boron Trifluoride reacts with WATER to form toxic <i>Hydrogen Fluoride gas</i> .
0 - Fire	surrounding fire. Boron Trifluoride itself does not burn.	Boron Trifluoride reacts violently with ALKALI
1 - Reactivity	Stop flow of gas and use water spray to disperse vapors.	METALS (such as LITHIUM, SODIUM and
DOT#: UN 1008	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Boric Acid</i> .	NITRATE, BUTYL NITRATE and
ERG Guide #: 125	CONTAINERS MAY EXPLODE IN FIRE.	LIME (CALCIUM HYDROXIDE).
Hazard Class: 2.3	Use water spray to keep fire-exposed containers cool.	Boron Trifluoride attacks many METALS in the
(Poisonous gas)	Boron Trifluoride may be shipped or stored in complexes with flammable solvents (such as <i>Ethyl Ether</i>). These complexes may be a fire risk.	presence of WATER.

SPILL/LEAKS

Isolation Distance:

Small spill: 30 meters (100 feet)

Large spill: 150 meters (500 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Boron Trifluoride may be hazardous to the environment, especially to aquatic organisms.

EXPOSURE LIMITS

OSHA:	1 ppm, Ceiling
NIOSH:	1 ppm, Ceiling

ACGIH: 1 ppm, Ceiling

IDLH: 25 ppm

The Protective Action Criteria values are:

PAC-1 = 1 ppm PAC-2 = 1 ppm PAC-3 = 1 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, contact with liquid causes frostbite (skin absorbable)
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	1.6 ppm
Flash Point:	Nonflammable
Vapor Density:	2.4 (air = 1)
Vapor Pressure:	760 mm Hg at -149°F (-100.6°C)
Specific Gravity:	2.9 (water = 1)
Water Solubility:	Soluble/Reacts
Boiling Point:	-148°F (-100°C)
Freezing Point:	-197°F (-127°C)
Critical Temp:	10°F (-12.2°C)
Ionization Potential:	15.5
Molecular Weight:	67.8

PROTECTIVE EQUIPMENT

Insulated Viton/Butyl (>8-hr breakthrough) Gloves:

Coveralls: Tychem® BR, CSM and TK (>8-hr breakthrough)

Respirator: >1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
- In case of contact with *liquid* Boron Trifluoride, immerse affected part in warm water. Seek medical attention.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BROMACIL

Synonyms: 5-Bromo-3-sec-Butyl-6-Methyluracil; HyvarX CAS No: 314-40-9 Molecular Formula: $C_9H_{13}BrN_2O_2$ RTK Substance No: 0251 Description: White, crystalline solid which may be in a solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Bromacil itself does not burn.	Contact with AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and
0 - Fire	Dramaell may be disached in a flammable corrier	OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	Bromacii may be dissolved in a hammable carrier.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) will
· · · · · · · · · · · · · · · · · · ·	POISONOUS GASES ARE PRODUCED IN FIRE,	
DOT#: N/A	including Hydrogen Bromide and Nitrogen Oxides.	cause Bromacil to decompose.
ERG Guide #: N/A		
Hazard Class: N/A		

SPILL/LEAKS

Isolation Distance: No information

Dampen dry spill with water to prevent dust.

For liquid solutions, absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Toxic to aquatic organisms and wildlife.

EXPOSURE LIMITS

OSHA:	N/A
NIOSH:	10 mg/m ³ (10-hr TWA)
ACGIH:	10 mg/m ³ (8-hr TWA)
IDLH LEVEL:	No Information

HEALTH EFFECTS				
Eyes:	Irritation			
Skin:	Irritation			
Acute:	Nose and throat irritation, coughing and wheezing			
Chronic:	Lung irritation with coughing, wheezing and shortness of breath			

Odor Threshold: Odorless

Odor Threshold.	Oubliess
Flash Point:	Noncombustible
Vapor Density:	1.55 (air = 1)
Vapor Pressure:	0.0008 mm Hg at 212°F (100°C)
Water Solubility:	Soluble
Melting Point:	317°F (158°C)
Specific Gravity:	1.55

PROTECTIVE EQUIPMENT

Gloves:	Rubber
Coveralls:	DuPont Tyvek® (pesticide dust)
Boots:	Rubber
Respirator:	>10 mg/m ³ - APR with High efficiency filters >100 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: BROMINE

Synonyms: None CAS No: 7726-95-6 Molecular Formula: Br₂ RTK Substance No: 0252 Description: Dark, reddish-brown, corrosive, fuming liquid or vapor

HAZARD DA				ATA	
Hazard Rating	Firefighting			Reactivity	y
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1744 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	Firefighting Bromine is not combustible but it is a STRONG OXIDIZER which will enhance the burning of other materials. Extinguish fire using an agent suitable for type of surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE Use water spray to keep fire-exposed containers cool.		Bromine will react violently with ALUMINUM and AQUEOUS AMMONIA. Bromine is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, and their HYDRIDES); MERCURY; PHOSPHORUS; TITANIUM; POTASSIUM; SODIUM; HALOCARBONS; METAL CARBIDES; METAL SALTS; AMINES; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Contact with COMBUSTIBLE and ORGANIC MATERIALS (such as FUELS, WOOD and OILS) may cause a fire. Bromine will attack METALS (such as IRON, STEEL, STAINLESS STEEL and COPPER).		
S	PILL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Small Spills: 60 meter Large Spills: 330 me Cover with dry lime, s covered containers f	ers (200 feet) ters (1,100 feet) rand or soda ash, and place in or disposal.	Odor Thres Flash Poin Vapor Den Vapor Pres Specific Gi Water Solu Boiling Po Melting Po Ionization Molecular		eshold: nt: nsity: essure: Gravity: lubility: oint: oint: n Potential: r Weight:	0.051 - 3.5 ppm Not Combustible 5.5 (air = 1) 175 mm Hg at 68°F (20°C) 3.12 (water = 1) Very slightly soluble 138°F (58.8°C) 19.4°F (-7.25°C) 10.55 eV 159.8
EXP	DSURE LIMITS			PROT	
OSHA: 0.1 NIOSH: 0.1 ACGIH: 0.1 IDLH LEVEL: 3 pp PAC PAC LEVELS: PAC	opm, 8-hr TWA ppm, 10-hr TWA; 0.3 ppm STEL opm, 8-hr TWA; 0.2 ppm STEL m C-1 = 0.033 ppm; PAC-2 = 0.24 ppm; C-3 = 8.5 ppm		Gloves: Coveralls Boots: Respirato	Neopre water) : DuPont >8-hr bi Neopre pr: > 0.1 pp > 1 ppr > 3 ppr	ne and Nitrile (>8-hr breakthrough for <i>Bromine</i> Tychem® TK (40 min. breakthrough sat. vapor; reakthrough @ 10 g/m ²) ne om - full facepiece APR with OV/AG cartridges n - Pressure demand supplied-air n - Pressure demand SCBA
HEA	LTH EFFECTS		FI	RST AID	AND DECONTAMINATION
Eyes:IrritationSkin:Irritationhealing uAcute:IrritationcoughingChronic:Coughinheadach	burns burns, discoloration and slowly licers of nose, throat and lungs with and shortness of breath g, phlegm and shortness of breath, e, dizziness		Remove to Flush eye contact le Quickly re large amo immediate Begin arti necessari Transfer to Medical o	he person fro is with large a inses if worn. emove contan- bounts of soap ely. ficial respiration y. to a medical fa bservation is	m exposure. mounts of water for at least 30 minutes. Remove Seek medical attention immediately. ninated clothing and wash contaminated skin with and water. Seek medical attention on if breathing has stopped and CPR if acility. recommended as symptoms may be delayed.



Common Name: BROMINE PENTAFLUORIDE

Synonyms: None CAS No: 7789-30-2 Molecular Formula: BrF₅ RTK Substance No: 0254

Description: A colorless to pale yellow liquid which becomes a gas at temperatures above 104°F (40°C)

HAZARD DATA Hazard Rating Firefighting Reactivity Bromine Pentafluoride is not combustible but it is Bromine Pentafluoride reacts violently or explosively 4 - Health a STRONG OXIDIZER which enhances the with WATER; STEAM; ORGANIC COMPOUNDS (such 0 - Fire combustion of other substances. as FUELS); and HYDROGEN CONTAINING MATERIALS (such as AMMONIA and ACETIC ACID). Use dry chemical, CO₂, or dry sand as 3-W - Reactivity Bromine Pentafluoride reacts with STRONG ACIDS extinguishing agents. DOT#: UN 1745 (such as HYDROCHLORIC, SULFURIC and NITRIC) DO NOT USE WATER or FOAM as Bromine and ACID FUMES releasing highly toxic Hydrogen ERG Guide #: 144 Pentafluoride reacts violently with WATER. Bromide and Hydrogen Fluoride gas. POISONOUS GASES ARE PRODUCED IN FIRE Hazard Class: 5.1 Bromine Pentafluoride is not compatible with including Hydrogen Bromide and Hydrogen (Oxidizer) HALOGENS: SALTS: METALS: METAL OXIDES: Fluoride. SELENIUM: SULFUR: and GLASS. CONTAINERS MAY EXPLODE IN FIRE Reacts with all chemicals EXCEPT OXYGEN, NITROGEN and RARE GASES (such as HELIUM and Use water spray to keep fire-exposed containers ARGON). cool. SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold: Isolation Distance:** Pungent Flash Point: Noncombustible Small Spills: 30 meters (100 feet) **Relative Vapor** Large Spills: 215 meters (700 feet) Density: 6.05 (air = 1) Cover spilled material with dry sand, dry earth, Vapor Pressure: 328 mm Hg at 68°F (20°C) vermiculite or similar inert material and deposit in **Specific Gravity:** 2.46 (water = 1) sealed containers. Water Solubility: Decomposes/Reacts DO NOT GET WATER ON SPILLED MATERIAL. **Boiling Point:** 106°F (41°C) DO NOT ABSORB IN COMBUSTIBLE **Molecular Weight:** 174.9 ABSORBANTS. **EXPOSURE LIMITS** PROTECTIVE EQUIPMENT OSHA: None Gloves: No information Coveralls: NIOSH: DuPont Tychem® Responder®, CSM, and TK for toxic 0.1 ppm, 10-hr TWA and corrosive vapors and gases ACGIH: 0.1 ppm, 8-hr TWA Boots: No information IDLH LEVEL: No information **Respirator:** >0.1 ppm - Supplied air HEALTH EFFECTS FIRST AID AND DECONTAMINATION **Remove** the person from exposure. Eves: Irritation, burns, watery eyes Flush eyes with large amounts of water for at least 30 minutes. Remove Skin: Irritation, burns, discoloration and slow contact lenses if worn. Seek medical attention immediately. healing ulcers Quickly remove contaminated clothing and wash contaminated skin with Acute: Irritation of the nose, throat and lungs large amounts of soap and water. Seek medical attention immediately. with coughing and shortness of breath Begin artificial respiration if breathing has stopped and CPR if Coughing, phlegm and shortness of Chronic: necessary. breath, headache and dizziness Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed.

November 2007



Common Name: BROMOBENZENE

Synonyms: Phenyl Bromide CAS No: 108-86-1 Molecular Formula: C_6H_5Br RTK Substance No: 0258 Description: Clear, colorless liquid with a pleasant (aromatic) odor

HAZARD DATA							
Hazard Rati	ng	Firefighting				Reactivity	
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 251 ERG Guide #: Hazard Class: (Flamm	14 130 3 nable)	Firefighting COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. Use water spray to reduce vapors. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source			Bromobenzene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); METALLIC SALTS; BROMOBUTANE; and SODIUM.		
	SPI	LL/LEAKS			PH	IYSICAL PROPERTIES	
 Isolation Distance: Spills: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer. Use only non-sparking tools and equipment, especially when opening and closing containers of Bromobenzene. Bromobenzene is toxic to aquatic organisms. 		Odor Threst Flash Point LEL: UEL: Auto Ignitio Vapor Dens Vapor Press Specific Gra Water Solut Boiling Poin Melting Poin Ionization P		Id: Temp: ': ty: ty: ty: ential: ight:	Pleasant (aromatic) 118° to $124^{\circ}F$ (48° to $51^{\circ}C$) 0.5% 3% $1,049^{\circ}F$ ($565^{\circ}C$) 5.4 (air = 1) $5 \text{ mm Hg at } 82^{\circ}F$ ($28^{\circ}C$) 1.5 (water = 1) Insoluble $313^{\circ}F$ ($156^{\circ}C$) $-24^{\circ}F$ ($-31^{\circ}C$) $9 \pm 0.02 \text{ eV}$ 157		
E>	XPOS	URE LIMITS				PROTECTIVE EQUIPMENT	
The Protective Action Criteria values are: PAC-1 = 2.5 ppm PAC-2 = 20 ppm PAC-3 = 350 ppm			Gloves: Coveralls: Respirator:	Polyv Halog Tyche ONES break >2.5 p	inyl Alcohol and Viton (>8-hr breakthrough for gen compounds, Aromatics) em® BR, LV, Responder®, and TK; Zytron® 500; Suit®TEC; and Trellchem® HPS and VPS (>8-hr through for <i>Halogen compounds, Aromatics</i>). opm - Supplied air or SCBA		
HEALTH EFFECTS			FIRS	FIRST AID AND DECONTAMINATION			
Eyes: Ir Skin: Ir Inhalation: N a H a	rritation rritation lose and and whe leadach and pass	d throat irritation with coughing ezing ie, dizziness, lightheadedness, sing out		Remove the per Flush eyes with contact lenses Remove conta and water. Begin artificial Transfer prom	erson f h large if worn minate respira ptly to	from exposure. e amounts of water for at least 15 minutes. Remove n. ed clothing and wash contaminated skin with soap ation if breathing has stopped and CPR if necessary. a medical facility.	



Common Name: BROMOFORM

Synonyms: Methyl Tribromide; Tribromomethane CAS No: 75-25-2 Molecular Formula: CHBr₃ RTK Substance No: 0262 Description: Colorless liquid with a sweet, *Chloroform*-like odor

HAZARD DATA						
Hazard Rating	Firefighting	Reactivity				
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Bromoform itself	Mixtures of Bromoform with POTASSIUM, LITHIUM, MAGNESIUM or SODIUM are shock sensitive and can explode on impact.				
0 - Fire	does not burn.	Bromoform reacts violently with ACETONE; OXIDIZING AGENTS (suc				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> .	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);				
DOT#: UN 2515	Use water spray to keep fire-exposed	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM				
ERG Guide #: 159	containers cool.	HYDROXIDE); and POWDERED METALS (such as ALUMINUM and ZINC).				
Hazard Class: 6.1 (Poison)		Bromoform is corrosive to most METALS and attacks some PLASTICS, RUBBER and COATINGS.				
		Protect from AIR, LIGHT and excess HEAT as Bromoform will decompose.				

	SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Dis Spill: 50 met Fire: 800 met Absorb liquid similar mate disposal. DO NOT was Bromoform especially to	ers (150 feet) ers (150 feet) sters (1/2 mile) s in vermiculite, dry sand, earth, or a rial and place into sealed containers for sh into sewer. is hazardous to the environment, marine life.	Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potential: Molecular Weight:		0.19 to 15 ppm Noncombustible 8.7 (air = 1) 5 mm Hg at 68°F (20°C) 2.8 (water = 1) Slightly soluble 301°F (149°C) 48°F (8.7°C) 10.48 eV 252.75
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT	
OSHA: 0.5 NIOSH: 0.5 ACGIH: 0.5 IDLH: 85 The Protectiv	5 ppm, 8-hr TWA 5 ppm, 10-hr TWA 5 ppm, 8-hr TWA 0 ppm re Action Criteria values are: PAC-1 = 1.5 ppm; PAC-2 = 6.8 ppm PAC-3 = 41 ppm	Gloves: Viton (>8-hr breakthrough) Coveralls: Tychem® SL, BR, Responder® and TK (>8-hr breakthrough for Methyl Bromide) Respirator: >0.5 ppm - full facepiece APR with Organic Vap cartridges >25 ppm - Pressure demand supplied-air >500 ppm – Pressure demand SCBA		
	HEALTH EFFECTS	FIRS	T AID	AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation and burns Irritation and burns Nose, throat and lungs Irritation with coughing, wheezing and shortness of breath Headache, dizziness, tremors, convulsions, and passing out Cancer (large intestines) in animals	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 		



Common Name: 1-BROMOPROPANE

Synonyms: Propyl Bromide CAS No: 106-94-5 Molecular Formula: C₃H₇Br RTK Substance No: 4198 Description: Clear, colorless, liquid with a sweet odor

		НА	ZARD DATA	
Hazard Rating	Firefighting			Reactivity
2 - Health 3 - Fire 1 - Reactivity DOT#: UN 2344 ERG Guide #: 129 Hazard Class: 3 (Flammable	IngFireighting1-Bromopropane is a FLAMMABLE LIQUID.Use dry chemical, CO2, water spray or alcohol- resistant foam as extinguishing agents.POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide.44129129Use water spray to keep fire-exposed containers cool.* 3Napors may travel to a source of ignition and flash back.Napor is heavier than air and may travel a distance to cause a fire or explosion far from the source.Flow or agitation may generate electrostatic charges.		 1-Bromopropane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). 1-Bromopropane may accumulate static electricity when being filled into properly grounded containers. Grounding and bonding may not be sufficient to remove static electricity. 	
S	PILL/LEAKS		Р	HYSICAL PROPERTIES
Isolation Distance Small Spill: 60 met Large Spill: 270 me Fire: 80 meters (1/2 Absorb liquids in ve similar material and Keep 1-Bromoprop as sewers, becaus DO NOT wash into 1-Bromopropane r	ers (200 feet) eters (900 feet) 2 mile) rmiculite, dry sand, earth, or a d deposit in sealed containers. pane out of confined spaces, such e of the possibility of an explosion. sewer. may bioaccumulate.		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Tem Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Sweet odor 72°F (21°C) 4.6% 7.8% p: 914°F (490°C) 4.3 (air = 1) 143 mm Hg at 77°F (25°C) 1.35 (water = 1) Slightly soluble 160°F (71°C) -166°F (-110°C) 123
EXPOSURE LIMITS			PR	OTECTIVE EQUIPMENT
ACGIH: 10 ppm, 8-hr TWA The Protective Action Criteria values are: PAC-1 = 0.3 ppm PAC-2 = 120 ppm PAC-3 = 700 ppm			Gloves:SilvCoveralls:DulZytiAligRespirator:>10>30	er Shield®/4H® and Viton Pont Tychem® LV, Responder® and TK; Kappler® ron® 500; and Saint-Gobain ONESuit® TEC for <i>shatic Halogen compounds</i> ppm - Supplied air ppm - SCBA
HEALTH EFFECTS			FIRST /	AID AND DECONTAMINATION
Eyes: Irritat Skin: Irritat redne Inhalation: Nose cough breat Head lighth	on on, drying and cracking with ss throat and lung irritation with ning, wheezing and shortness of n ache, dizziness and eadedness		Remove the person Flush eyes with lar contact lenses if w Remove contamina and water. Begin artificial resp Transfer to a media	n from exposure. ge amounts of water for at least 15 minutes. Remove orn. ated clothing and wash contaminated skin with soap iration if breathing has stopped and CPR if necessary. cal facility.



Common Name: 2-BROMOPROPANE

Synonyms: Isopropyl Bromide; sec-Propyl Bromide CAS No: 75-26-3 Molecular Formula: C₃H₇Br RTK Substance No: 0267 Description: Colorless liquid

HA7		Δ
		~

Hazard Rating	Firefighting	Reactivity
2 - Health	2-Bromopropane is a FLAMMABLE LIQUID.	2-Bromopropane is not compatible with OXIDIZING
3 - Fire	extinguishing agents.	AGENTS (SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES CHIORATES NITRATES
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE
DOT#: UN 2344	CONTAINERS MAY EXPLODE IN FIRE.	and POTASSIUM HYDROXIDE).
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	Explosive compounds may form after prolonged
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back.	contact with AZIDES.
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

Gloves:

SPILL/LEAKS

Isolation Distance:

Eyes:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep 2-Bromopropane out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. May bioaccumulate.

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	<57°F (14°C)
Vapor Density:	4.3 (air = 1)
Vapor Pressure:	216 mm Hg at 77°F (25°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	138°F (59°C)
Melting Point:	-128°F (-89°C)
Molecular Weight:	123

	EXPOSURE LIMITS
OSHA:	None
NIOSH:	None
ACGIH:	10 ppm, 8-hr TWA (as 1-Bromopropane)
IDLH:	None

	HEALTH EFFECTS
	Irritation with redness
	Irritation with redness
on:	Nose, throat and lung irritation wit

Skin:	Irritation with redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of
	breath.

PROTECTIVE EQUIPMENT

Silver Shield®/4H® and Viton

Coveralls:	DuPont Tychem® LV, Responder® and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Aliphatic Halogen compounds</i>)
Respirator:	>10 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



Common Name: BRUCINE

	BROOME
Synonyms:	10,11-Dimethoxystrychnine; (-)Brucine Dihydrate
CAS Number:	357-57-3
Molecular Formula:	$C_{23}H_{26}N_2O_4$
RTK Number:	0270
Description:	White, odorless, crystalline (sand-like) solid with a very bitter taste

		HAZARD	DATA	
Hazard Rati	ng	Firefighting		Reactivity
Health: Fire: Reactivity: DOT #: ERG #: DOT Hazard:	4 1 UN 1570 152 6.1 (poison)	Use dry chemical, CO ₂ , water spray or foam extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .		Brucine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SPILLS/LEAKS			PHY	SICAL PROPERTIES
Isolation Distances: Liquid Spill: 50 meters (150 feet) Solid Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Do not allow this substance to enter waterways, including sewers, as it is very toxic to aquatic life with long-lasting effects. Ventilate area after clean-un is complete		Melting Point:178 °C (352 °F)Molecular Weight:394.51Boiling Point:470 °C (878 °F)Water Solubility:Slightly solubleSpecific Gravity:>1 at 20 °C (68 ° F)		
EXPOSURE LIMITS			PROT	
There are no occupational exposure limits to this substance. PAC: PAC-1 = 0.29 mg/m ³ PAC-2 = 3.2 mg/m ³ PAC-3 = 36 mg/m ³		exposure limits to this substance. //m ³ n ³	Gloves: E Coverall: T Respirator: S	Butyl or Nitrile ychem® QC or Tychem® SL Self-contained breathing apparatus with a full facepiece operated in a pressure- demand or other positive-pressure mode
ACUTE HEALTH EFFECTS		ALTH EFFECTS	FIRST AID	AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation Irritation Irritation, he ringing in th restlessnes convulsions	adache, nausea, vomiting, ne ear, disturbed vision, ss, excitement, twitching, s, paralysis, death	Immediately flush v 15 minutes. Remove contamina with soap and wa Shampoo hair imm Remove the persor Begin rescue breat breathing has sto stopped.	with large amounts of water for at least ated clothing. Wash contaminated skin ater. ediately if contaminated. n from exposure. hing (using universal precautions) if opped and CPR if heart action has

Transfer promptly to a medical facility.

June 2023



Chemical Name: 1,3-BUTADIENE

Synonyms: Biethylene; Divinyl; Vinylethylene CAS No: 106-99-0 Molecular Formula: CH₂CHCHCH₂ RTK Substance No: 0272 Description: Colorless gas, liquefied or compressed gas below 31°F (-1°C), with a gasoline-like odor.

		DO	F/NFPA DAT	A
Hazard Rating	Firefighting			Reactivity
2 - Health 4 - Fire 2 - Reactivity DOT ID #: UN 1010 ERG Guide #: 116 P	Stop flow of gas. Gas/Air mixtures are explos Cylinders may explode in fir May autopolymerize. Vapors may travel to a sour back. Vapor is heavier than air an- to cause a fire or explosion	ive. e. ce of iç d may far fro	gnition and flash travel a distance m the source.	1,3-Butadiene reacts with PHENOL; CROTONALDEHYDE; CHLORINE DIOXIDE; HALOGENS; OXYGEN; NITROGEN OXIDES; ALUMINUM TETRAHYDROBORATE; RUST; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
Hazard Class: 2.1 (Flammable gas)			_	1,3-Butadiene forms shock-sensitive compounds with COPPER and COPPER ALLOYS.
SPIL	L/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 30 meters Large Spills: 60 meters Move cylinder to a safe unless flow of gas can	e (100 feet) e (200 feet) place and allow to vent be stopped.		Odor Threshold Flash Point: LEL: UEL: Vapor Density: Vapor Pressure Water Solubility Boiling Point: Ionization Pote	 1 to 1.6 ppm -105°F (-76°C) 2% 11.5% 1.9 (air = 1) 1,824 mm Hg at 68°F (20°C) y: 1,824 mm Hg at 68°F (20°C) y: Insoluble 24°F (-4.4°C) ntial: 9.07 eV
EXPOSURE LIMITS			F	PROTECTIVE EQUIPMENT
OSHA: 1 ppm NIOSH: Lowes ACGIH: 2 ppm IDLH LEVEL: 2,000 PAC LEVEL: PAC-7 PAC-2 PAC-3	8-hr TWA, 5 ppm STEL et feasible concentration , 8-hr TWA ppm = 670 ppm; 2 = 5,300 ppm; 3 = 22,000 ppm		Gloves:	Butyl, Viton® DuPont Tychem® CPF2, SL, CPF3, CPF4, TK, and Responder®, Kappler Zytron® 300 and 500 Butyl < 5 ppm APR with Organic Vapor cartrdige < 50 ppm full facepiece APR with Organic Vapor cartridge < 1000 ppm Supplied Air
HEALTH EFFECTS			FIRST	AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation, frostbit Acute: Coughing, whe and passing ou Chronic: Cancer (lymp May damage reproductive	e ezing, headache, dizziness, t oh and blood) in humans e the male and female systems in animals		Remove the per- Flush eyes with Remove contact Immerse affecte Transfer to a me	son from exposure. large amounts of water for at least 15 minutes. lenses if worn. d part in warm water. dical facility.



Common Name: BUTANE

Synonyms: n-Butane; Butyl Hydride; Diethyl CAS No: 106-97-8 Molecular Formula: C₄H₁₀ RTK Substance No: 0273 Description: Colorless gas with a *Natural gas* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 4 - Fire 0 - Reactivity	FLAMMABLE GAS Stop flow of gas or let fire burn itself out. POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE.	Butane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1011 ERG Guide #: 115	Use water spray to disperse gas, keep fire-exposed cylinders cool, and protect individuals attempting to stop leak.	POTASSIUM HYDROXIDE); and mixtures of NICKEL CARBONYL and OXYGEN.
Hazard Class: 2.1 (Flammable gas)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 30 meters (100 feet)

Large Spills: 60 meters (200 feet)

Use water spray to keep cylinders or tanks cool.

Keep **Butane** out of confined spaces, such as sewers, because of the possibility of an explosion. Before entering a confined space where **Butane** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

Will not affect aquatic environments.

EXPOSURE LIMITS

OSHA:	None	
NIOSH:	800 ppm, 10-hr TWA	
ACGIH:	1,000 ppm, 8-hr TWA (as <i>Aliphatic</i>	
	hydrocarbon gases)	

HEALTH EFFECTS

drowsiness and passing out

Eyes:	Contact with liquid causes frostbite
Skin:	Contact with liquid causes frostbite
Inhalation:	Headache, lightheadedness,

Odor Threshold: 50,000 ppm

PHYSICAL PROPERTIES

Flash Point:	-76° to -117 ° F (-60 ° to -83 ° C)
LEL:	1.6%
UEL:	8.4%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	760 mm Hg at 77°F (25°C)
Specific Gravity:	0.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	31°F (-0.5°C)
Ionization Potential:	10.63 eV
Molecular Weight:	58.1

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Gloves:	Insulated Neoprene or Rubber	
Coveralls:	Clothes designed to prevent freezing of body tissues	
Respirator:	>800 ppm - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.Immerse affected part in warm water. Seek medical attention.Transfer to a medical facility.



Common Name: 2-BUTOXY ETHANOL

Synonyms: Butyl Cellosolve; Ethylene Glycol Monobutyl Ether; EGBE CAS No: 111-76-2 Molecular Formula: $C_6H_{14}O_2$ RTK Substance No: 0275 Description: Colorless liquid with a mild odor

HAZARD DATA					
Hazard Ratin	g Firefighting	Firefighting		Reactivity	
3 - Health 2 - Fire 0 - Reactivity DOT#: UN 2369 ERG Guide #: 1 Hazard Class: ((Poi	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water sp resistant foam as extinguishing POISONOUS GASES ARE PRO CONTAINERS MAY EXPLODE Use water spray to keep fire-exp cool.	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIR CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containe cool.		 2-Butoxy Ethanol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). 2-Butoxy Ethanol forms <i>Peroxides</i> on exposure to AIR and LIGHT. 	
	SPILL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. DO NOT wash into sewer.			Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point: Ionization Pot Molecular We	remp: /: re: ity: ity: ential: ight:	0.1 ppm 140° to $160^{\circ}F$ (60° to $71^{\circ}C$) 1.1% 10% $472^{\circ}F$ ($244^{\circ}C$) 4.1 (air =1) 0.8 mm Hg at $68^{\circ}F$ ($20^{\circ}C$) 0.9 (water = 1) Miscible $340^{\circ}F$ ($171^{\circ}C$) $-94^{\circ}F$ ($-70^{\circ}C$) 10 eV 118.2
EX	POSURE LIMITS			PROT	
OSHA: 50 pp NIOSH: 5 ppm ACGIH: 20 pp IDLH: 700 p	m, 8-hr TWA n, 10-hr TWA m, 8-hr TWA pm		Gloves: Coveralls:	Butyl, N (>8-hr b DuPont Zytron® breakthr	itrile, Neoprene, Silver Shield®/4H® and Viton reakthrough) Tychem® SL and Responder®; Kappler® 500; and Saint-Gobain ONESuit® TEC (>8-hr rough for <i>Glycol Ethers</i>)
			Respirator:	>5 ppm >50 ppn	- Full facepiece APR with Organic vapor filter
HE	EALTH EFFECTS		FIRST AID AND DECONTAMINATION		AND DECONTAMINATION
Eyes: Irri Skin: Irr Inhalation: No an Na co Chronic: Ca	itation with possible eye damage itation ose and throat irritation with coughing id wheezing ausea, vomiting, headache, dizziness, infusion and passing out ancer (liver) in animals	e damage with coughing che, dizziness, it		erson fror h large a s if worn. ve contarr of soap s respiratio tly to a m	m exposure. mounts of water for at least 15 minutes. Remove Seek medical attention. ninated clothing and wash contaminated skin with and water. Seek medical attention. on if breathing has stopped and CPR if necessary. edical facility.



Common Name: BUTOXYL

Synonyms: 3-Methoxybutyl Acetate; Methyl-1,3-Butylene Glycol Acetate CAS No: 4435-53-4 Molecular Formula: $C_7H_{14}O_3$ RTK Substance No: 0276 Description: Clear, colorless liquid with a slight, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health	COMBUSTIBLE Use dry chemical, CO ₂ , water spray or alcohol-	ButoxyI may form explosive <i>Peroxides</i> with prolonged storage or contact with AIR, LIGHT or		
2 - Fire	resistant foam as extinguishing agents.	when stored above room temperature.		
1 - Reactivity	Use water in flooding quantities as fog, as solid streams of water may be ineffective.	Butoxyl is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
DOT#: UN 2708	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,		
ERG Guide #: 127	CONTAINERS MAY EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG		
Hazard Class: 3	Use water spray to keep fire-exposed containers cool.	NITRIC): ALUMINUM: LEAD: and CHROMIUM		
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	TRIOXIDE.		
	Flow or agitation may generate electrostatic charges.			

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids with fly ash, cement powder or commercial sorbents and place in sealed containers for disposal.

DO NOT wash into sewer.

Butoxyl may accumulate static electricity.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Butoxyl**.

HEALTH FEFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing

Headache, dizziness and lightheadedness

PHYSICAL PROPERTIES

Odor Threshold:	Slightly irritating odor
Flash Point:	145° to 171°F (63° to 77°C)
LEL:	0.8 to 2.3%
UEL:	4.7 to 15%
Auto Ignition Temp:	770°F (410°C)
Vapor Density:	5 (air = 1)
Specific Gravity:	0.96 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	275° to 343°F (135° to 173°C)
Freezing Point:	-112°F (-80°C)
Molecular Weight:	146.21

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Esters Carboxylic, Acetates</i>)
Coveralls:	Tychem® BR. Responder® and TK: Trellchem® HPS and

VPS (>8-hr breakthrough for Esters Carboxylic, Acetates)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: n-BUTYL ACETATE

Synonyms: 1-Acetoxybutane; Butyl Ethanoate; Acetic Acid, Butyl Ester CAS No: 123-86-4 Molecular Formula: $C_6H_{12}O_2$ RTK Substance No: 1329 Description: Clear, colorless liquid with a fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	n-Butyl Acetate may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1123	CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM HYDROXIDE); STRONG ACIDS (such as
ERG Guide #: 129	cool and to dilute and disperse vapors.	POTASSIUM tert-BUTYLATE to cause fires and
Hazard Class: 3	Vapor is heavier than air and may travel a distance	explosions.
(Flammable)	to cause a fire or explosion far from the source.	n-Butyl Acetate may attack many PLASTICS and RUBBER.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **n-Butyl Acetate**.

Keep **n-Butyl Acetate** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 150 ppm, 8-hr TWA NIOSH: 150 ppm, 10-hr TWA; 200 ppm, STEL ACGIH: 150 ppm, 8-hr TWA; 200 ppm, STEL IDLH: 1,700 ppm The Protective Action Criteria values are: PAC-1 = 5 ppm PAC-2 = 200 ppm PAC-3 = 3,000 ppm

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, confusion, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.63 to 7.4 ppm
Flash Point:	72°F (22°C)
LEL:	1.2%
UEL:	7.6%
Auto Ignition Temp:	760°F (404°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	10 mm Hg at 68°F (20°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	260°F (127°C)
Melting Point:	-107°F (-77°C)
Ionization Potential:	10 eV
Molecular Weight	116

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield $/4H \ end \ and \ Barrier \ (>8-hr break through)$
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	At levels >10% of the LEL use turn out gear or flash protection >150 ppm - full facepiece APR with <i>Organic vapor</i> <i>cartridge</i>
	>1,500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BUTYL ACRYLATE

Synonyms: Acrylic Acid Butyl Ester CAS No: 141-32-2 Molecular Formula: $C_7H_{12}O_2$ RTK Substance No: 0278 Description: Clear, colorless liquid with a fruity, strong odor

HAZARD DATA						
Hazard Rating	Firefighting		Reactivity			
3 - Health 3 - Fire 2 - Reactivity DOT#: UN 2348 ERG Guide #: 130F Hazard Class: 3 (Flammable)	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		Butyl Acrylate is REACTIVE and can easily polymerize with HEAT, LIGHT, or by catalytic reaction with METALS. Butyl Acrylate reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions. Butyl Acrylate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; and HYDROGEN COMPOUNDS.			
SP	ILL/LEAKS			PHYSICAL PROPERTIES		
Isolation Distance: Small Spill - 60 meters (200 feet) Large Spill - 270 meters (900 feet) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Toxic to aquatic organisms.			Odor Thres Flash Point LEL: UEL: Relative De Vapor Dens Vapor Pres Water Solul Boiling Poin Molecular V	hold: : sity: sure: bility: nt: Veight:	0.035 ppm 97.7°F (36.5°C) 1.1% 9.9% 0.9 (water = 1) 4.42 (air = 1) 4 mm Hg at 68°F (20°C) Slightly soluble 293° to 300°F (145° to 149°C) 128.2	
EXPOSURE LIMITS				PROTECTIVE EQUIPMENT		
OSHA: Nor NIOSH: 10 p ACGIH: 2 pp IDLH LEVEL: No PAC PAC LEVELS: PAC	ne opm, 10-hr TWA om, 8-hr TWA information C-1 = 8.3 ppm; PAC-2 = 130 ppm; C-3 = 480 ppm	Gloves: Coveralls: Boots: Respirato		 4-H®/Silver Shield® (>8-hr breakthrough) DuPont Tychem® Responder and TK (>8-hr breakthrough) No information 2 ppm - full facepiece APR with Organic Vapor cartridges >100 ppm – Pressure demand supplied-air 		
HEAL	HEALTH EFFECTS		FIR	ST AID	AND DECONTAMINATION	
Eyes:IrritationSkin:IrritationAcute:Irritation coughin breathChronic:Headact Skin alle	and burns and burns of nose, throat and lungs with g, wheezing, and/or shortness of ne, dizziness and vomiting ergy with itching, redness and rash	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Recontact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated ski large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if nece Transfer to a medical facility. 		m exposure. mounts of water for at least 15 minutes. Remove Seek medical attention. ninated clothing and wash contaminated skin with and water. Seek medical attention. on if breathing has stopped and CPR if necessary. acility.		



Common Name: n-BUTYL ALCOHOL

Synonyms: 1-Butanol, Propyl Carbinol CAS No: 71-36-3 Molecular Formula: C₄H₁₀O RTK Substance No: 1330 Description: Colorless liquid with a strong, sweet alcohol odor

HAZARD DATA							
Hazard Rating Firefighting		Reactivity					
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1 ERG Guide # Hazard Class (Flamr	y 120 # : 129 s : 3 mable)	FIRETIGNTING n-Butyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source			Reactivity n-Butyl Alcohol will react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM) to form flammable and explosive <i>Hydrogen gas</i> . n-Butyl Alcohol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ALIPHATIC AMINES; ISOCYANATES; ACETALDEHYDE; and ETHYLENE OXIDE.		
	SPI	LL/LEAKS	-		PHYSICAL PROPERTIES		
Isolation Distance:Spill: 50 to 100 meters (160 to 330 feet)Fire: 800 meters (1/2 mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.Use only non-sparking tools and equipment, especially when opening and closing containers.Keep n-Butyl Alcohol out of confined spaces, such as sewers, because of the possibility of an explosion.n-Butyl Alcohol is readily biodegradable.EXPOSURE LIMITS			Odor Threshold: Flash Point: LEL: UEL: Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potential: Molecular Weight: PRO		1 to 15 ppm 98°F (37°C) 1.4% 11.2% 650°F (343°C) 2.6 (air = 1) 6 mm Hg at 68°F (20°C) 0.81 (water = 1) Soluble 243°F (117°C) 10.04 eV 74.1 TECTIVE EQUIPMENT		
OSHA: NIOSH: ACGIH: IDLH LEVEL	100 p 50 pp 20 pp : 1,400	opm, 8-hr TWA om, Ceiling om, Ceiling) ppm		Gloves: Coveralls Respirato	Butyl, N E: DuPont Respor ONESu or: >20 pp cartridg >200 pp	Nitrile, Neoprene and Viton (>8-hr breakthrough) t Tychem® CPF 2, SL, CPF 3, BR, LV, nder® and TK; Kappler Zytron® 300; Saint-Gobain uit®TEC or equivalent (>8-hr breakthrough) m - full-facepiece APR with Organic Vapor ges pm - Supplied air	
HEALTH EFFECTS			FI	IRST AID AND DECONTAMINATION			
Eyes: Skin: Inhalation:	Irritation Irritation cracking Nose, th coughing breath Headacl and pas	rritation, burns, tearing, eye damage rritation, burns, redness, drying and cracking of the skin Nose, throat and lung irritation with coughing, wheezing and/or shortness of preath Headache, dizziness, lightheadedness and passing out		Remove to Flush eye contact le Quickly re large amo Begin arti necessar Transfer	 ove the person from exposure. h eyes with large amounts of water for at least 15 minutes. Remove cact lenses if worn. Seek medical attention. :kly remove contaminated clothing and wash contaminated skin with e amounts of water. in artificial respiration if breathing has stopped and CPR if essary. osfer to a medical facility. 		
I	2.12 940		J	L		January 2008	



Common Name: sec-BUTYL ALCOHOL

Synonyms: Methyl Ethyl Carbinol; Butylene Hydrate; 1-Methyl Propanol CAS No: 78-92-2 Molecular Formula: $C_4H_{10}O$ RTK Substance No: 1645 Description: Colorless liquid with a strong, pleasant odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1120 ERG Guide #: 129 Hazard Class: 3 (Flammable)	sec-Butyl Alcohol is a FLAMMABL Use dry chemical, CO ₂ , alcohol-res other foaming agent as extinguishin water may not be effective in fightir POISONOUS GASES ARE PRODU FIRE. CONTAINERS MAY EXPLODE IN Use water spray to keep fire-expose cool. Vapors may travel to a source of igr flash back. Vapor is beavier than air and may tr	LE LIQUID. istant foam or ng agents, as ng fires. JCED IN FIRE. ed containers nition and	 sec-Butyl Alcohol can form explosive <i>Peroxides</i>. sec-Butyl Alcohol reacts with CHROMIUM TRIOXIDE and other OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); and ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) to form flammable and explosive <i>Hydrogen gas</i>. sec-Butyl Alcohol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and 		
	distance to cause a fire or explosio source.	n far from the	POTASSIUM HYDROXIDE); AMINES; ISOCYANATES; PERCHLORIC ACID; and ALUMINUM (when heated).		
SP	ILL/LEAKS		PHYSICAL PROPERTIES		
Isolation Distance: Small Spills: 60 meters (200 feet) Large Spills: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Before entering a confined space where sec-Butyl Alcohol may be present, check to make sure that an explosive concentration does not exist. DO NOT wash into sewer.		Odor Thres Flash Point LEL: UEL: Vapor Dens Vapor Pres Specific Gr Water Solu Boiling Poi Ionization F Molecular V	shold: 3.2 ppm ht: 75°F (24°C) 1.7% 9.8% ssity: 2.6 (air = 1) ssure: 12 mm Hg at 68°F (20°C) ravity: 0.8 (water = 1) ubility: Soluble sint: 201°F (94°C) Potential: 10.1 eV Weight: 74.1		
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT		
OSHA: 150 p NIOSH: 100 p 150 p ACGIH: 100 p IDLH LEVEL: 2,000	opm, 8-hr TWA opm, 10-hr TWA opm, 15 min STEL opm, 8-hr TWA) ppm	Gloves: Coveralls: Respirator:	Butyl, Nitrile, Neoprene, Silver Shield®/4H® and Viton (>8-hr breakthrough) DuPont Tychem® CPF 4, Responder® and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough) 		
HEALTH EFFECTS		FIR	FIRST AID AND DECONTAMINATION		
Eyes: Irritation Skin: Irritation the skin Inhalation: Nose an Headach and pas	and burns , burns, drying and cracking of d throat irritation he, dizziness, lightheadedness sing out	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 			


Common Name: tert-BUTYL ALCOHOL

Synonyms: t-Butanol; Trimethyl Carbinol CAS No: 75-65-0 Molecular Formula: C₄H₁₀O RTK Substance No: 1787 Description: Colorless liquid or crystalline solid with a mothball-like odor

HAZARD DATA			
Hazard Rating	Firefighting		Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1120 ERG Guide #: 129 Hazard Class: 3 (Flammable liquids)	tert-Butyl Alcohol is a FLAMMABLE LIQUID or SOLID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Isobutylene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		tert-Butyl Alcohol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM) to produce flammable and explosive <i>Hydrogen gas</i> . tert-Butyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; ACETALDEHYDE; and some ZINC, CHROMIUM and ALUMINUM COMPOUNDS. tert-Butyl Alcohol will decompose on contact with STRONG MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce flammable <i>Isobutylene gas</i> .
SI	PILL/LEAKS		PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 60 meter Large Spill: 270 meter Fire: 800 meters (1/2 Absorb liquids in verm similar material and o Keep tert-Butyl Alco as sewers, because o Bioconcentrations in a	s (200 feet) ers (900 feet) ermile) niculite, dry sand, earth, or a deposit in sealed containers. hol out of confined spaces, such of the possibility of an explosion. aquatic life are low.	Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Specific Gravi Water Solubili Boiling Point: Melting Point: Ionization Pot Molecular We	Id: 47 ppm 52° F (11°C) 2.4% 8.0% r: 2.55 (air = 1) re: 40 mm Hg at 77°F (25°C) ity: 0.78 (water = 1) ity: Soluble 180°F (82.4°C) : 78°F (25.7°C) : 9.7 eV ight: 74.1
EXPO	OSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 100 NIOSH: 100 ACGIH: 100 IDLH LEVEL: 1,6	0 ppm, 8-hr TWA 0 ppm, 10-hr TWA; 150 ppm, STEL 0 ppm, 8-hr TWA 500 ppm	Gloves: Coveralls: Respirator:	Butyl, Nitrile, Neoprene, Silver Shield® and Viton DuPont Tychem® CSM, Responder® and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC for <i>toxic</i> <i>liquids</i> >100 ppm - Full facepiece APR with Organic vapor filter >1,000 ppm - Supplied air
HEA	LTH EFFECTS	FIRS	T AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Nose a wheezin Headac passing	n n, drying, cracking and redness nd throat irritation with coughing and ng and shortness of breath che, dizziness, confusion and g out	Remove the po Flush eyes wit contact lenses Quickly remov large amounts Begin artificial necessary. Transfer to a r	erson from exposure. th large amounts of water for at least 15 minutes. Remove is if worn. /e contaminated clothing and wash contaminated skin with s of water. respiration if breathing has stopped and CPR if medical facility.



Common Name: BUTYLAMINE

Synonyms: 1-Butanamine; n-Butylamine CAS No: 109-73-9 Molecular Formula: C₄H₁₁N RTK Substance No: 0280 Description: Clear, colorless liquid with an Ammonia or fish-like odor.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray, or alcohol- resistant foam	Contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity DOT#: UN 1125 ERG Guide #: 132	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE) and PERCHLORYL FLUORIDE may cause fires and explosions. Butylamine is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC):
Hazard Class: 3 (Flammable liquids)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	COPPER; COPPER ALLOYS; ALUMINUM; ZINC; ISOCYANATES; ACROLEIN; PHENOLS; KETONES; ETHERS; GLYCOLS; ORGANIC HALOGENS; EPICHLOROHYDRIN; and ALCOHOLS.

SPILL/LEAKS

Isolation Distance: 800 meters or 1/2 mile

Absorb liquid in sand or other inert absorbent. DO NOT let this chemical enter the environment.

EXPOSURE LIMITS

OSHA:	5 ppm, Ceiling
NIOSH:	5 ppm, Ceiling
ACGIH:	5 ppm, Ceiling
IDLH LEVEL:	300 ppm

HEALTH EFFECT	S
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Eyes:	Irritation and burns
Skin:	Irritation, burns and blisters
Acute:	Nose, throat and lung irritation with coughing, and shortness of breath (pulmonary edema)
Chronic:	Bronchitis with coughing, phlegm and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	0.12 ppm
Flash Point:	10°F (-12.2°C)
LEL:	1.7%
UEL:	9.8%
Vapor Density:	2.5 (air = 1)
Vapor Pressure:	82 mm Hg at 68 [°] F (20 [°] C)
Water Solubility:	Miscible
Boiling Point:	172 [°] F (78 [°] C)
Ionization Potential:	8.71 eV

	PROTECTIVE EQUIPMENT
Gloves:	Butyl Rubber
Coveralls:	DuPont Tychem® CPF3, BR, LV, Responder® and TK
Boots:	No information
Respirator:	 >5 ppm APR with cartridge specific for Butylamine >50 ppm Supplied Air >300 ppm SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: tert-BUTYL CHROMATE

Synonyms: t-Butyl Chromate; Bis(tert-butyl) Chromate CAS No: 1189-85-1 Molecular Formula: $C_8H_{18}CrO_4$ RTK Substance No: 1788 Description: Clear, colorless liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	tert-Butyl Chromate may burn, but does not readily ignite.	tert-Butyl Chromate is a STRONG OXIDIZER and will react violently with REDUCING AGENTS (such as
1 - Fire	Use dry chemical, CO ₂ , water spray, alcohol-	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES)
1 - Reactivity	resistant foam or other foam as extinguishing	Water solutions of tert-Butyl Chromate react violently
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE,	with STRONG BASES (such as SODIUM HYDROXIDE
ERG Guide #: 171	including Chromium Oxide fumes.	and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Environmentally	Use water spray to keep fire-exposed containers cool.	tert-Butyl Chromate is incompatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazardous Material)	tert-Butyl Chromate may ignite combustibles (wood, paper and oil).	NITRIC); ALCOHOLS; and HYDRAZINE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer. May be harmful to aquatic life.

EXPOSURE LIMITS

OSHA:	0.1 mg/m ³ , Ceiling
NIOSH:	0.001 mg/m ³ , 10-hr TWA
ACGIH:	0.1 mg/m ³ , Ceiling
IDLH:	15 mg/m ³
	(All of the above are for <i>hexavalent Chromium</i>)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea and vomiting
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	May burn
Vapor Density:	7.9 (air = 1)
Water Solubility:	Insoluble
Melting Point:	41°F (5°C)
Freezing Point:	23°F (-5°C)
Molecular Weight:	230.3

PROTECTIVE EQUIPMENT

Gloves: Silver Shield®/4H®

Coveralls: DuPont Tychem® CSM, Responder®, and TK (for *known carcinogens*)

Respirator: >0.001 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 1,2-BUTYLENE OXIDE

Synonyms: 1,2-Epoxybutane; Ethyloxirane CAS No: 106-88-7 Molecular Formula: C_4H_8O RTK Substance No: 0287 Description: Clear, colorless liquid with a sweet, disagreeable odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 2W - Reactivity DOT#: UN 3022P ERG Guide #: 127 Hazard Class: 3 (Flammable)	 FLAMMABLE AND REACTIVE Use dry chemical, CO₂, or alcohol-resistant foam as extinguishing agents. Water may not be effective in fighting fires and 1,2-Butylene Oxide may react violently with WATER to give off heat. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Elow or anitation may generate electrostatic charges 	 1,2-Butylene Oxide may polymerize on contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHARCOAL; TIN CHLORIDES; ALUMINUM CHLORIDE; and IRON CHLORIDE, to cause fires and explosions. 1,2-Butylene Oxide reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). 1,2-Butylene Oxide may react violently with WATER to release heat
	 1,2-Butylene Oxide may form an ignitable vapor/air mixture in closed tanks or containers. 	Protect from LIGHT and COMBUSTIBLES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Use only non-sparking tools and equipment.

Metal containers involving the transfer of **1,2-Butylene Oxide** should be grounded and bonded.

Keep **1,2-Butylene Oxide** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

AIHA: 2 ppm, 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 72 ppm PAC-2 = 140 ppm PAC-3 = 330 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, lightheadedness, and passing out
Chronic:	Cancer (nose) in animals

PHYSICAL PROPERTIES

Flash Point:	-7°F (-22°C)
LEL:	1.5%
UEL:	19%
Auto Ignition Temp:	822°F (439°C)
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	180 mm Hg at 77°F (25°C)
Specific Gravity:	0.826 (water = 1)
Water Solubility:	Soluble/Reactive
Boiling Point:	145°F (63°C)
Freezing Point:	<-58°F (<-50°C)
Molecular Weight:	72

PROTECTIVE EQUIPMENT

Gloves:	Butyl (<1-hr breakthrough)
Coveralls:	Tychem® CSM (>4-hr breakthrough)

Respirator: >2 ppm - full facepiece APR with *Organic vapor filters* >20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BUTYL PROPIONATE

Synonyms: Butyl Propanoate CAS No: 590-01-2 Molecular Formula: $C_7H_{14}O_2$ RTK Substance No: 0295 Description: Colorless liquid with a fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Butyl Propionate will react with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) to produce flammable and explosive <i>Hydrogen gas</i>
0 - Reactivity DOT#: UN 1914	Solid streams of water may be ineffective. POISONOUS GASES ARE PRODUCED IN FIRE.	Butyl Propionate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES.
ERG Guide #: 130	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE). Butyl Propionate will react with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to release heat.
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Butyl Propionate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 94 ppm

PAC-2 = 94 ppm

PAC-3 = 94 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

PHYSICAL PROPERTIES				
Flash Point:	90°F (32°C)			
Auto Ignition Temp:	799°F (426°C)			
Vapor Density:	4.5 (air = 1)			
Vapor Pressure:	2.8 mm Hg at 68°F (20°C)			
Specific Gravity:	0.9 (water = 1)			
Water Solubility:	Insoluble			
Boiling Point:	295°F (146°C)			
Melting Point:	-128°F (-90°C)			
Molecular Weight:	130.2			

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Barrier® (>8-hr breakthrough for <i>Esters</i> , <i>aliphatic</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Esters, aliphatic</i>)
Respirator:	>94 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BUTYRIC ACID

Synonyms: Ethylacetic Acid; 1-Propanecarboxylic Acid CAS No: 107-92-6 Molecular Formula: $C_4H_8O_2$ RTK Substance No: 0300 Description: Colorless, oily liquid with a strong characteristic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Butyric Acid is a COMBUSTIBLE LIQUID.	Butyric Acid reacts with OXIDIZING AGENTS (such
2 - Fire	resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 2820	CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM HYDROXIDE); REDUCING AGENTS;
ERG Guide #: 153	Use water spray to keep fire-exposed containers cool.	and CHROMIUM TRIOXIDES.
Hazard Class: 8	Vapors may travel to a source of ignition and flash back.	Contact with ALUMINUM and other METALS may release flammable and explosive <i>Hydrogen</i> gas
(Corrosive)		

SPILL/LEAKS

Isolation Distance:

Eyes:

Skin:

Small Spills: 60 meters (200 feet)

Large Spills: 330 meters (1,100 feet)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

DO NOT let this chemical enter the environment.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTH EFFECTS	
Irritation and burns	
Irritation and burns	

Acute:	Irritation of nose, throat and lungs with coughing, wheezing, and/or shortness of breath
<u>.</u>	

Chronic: Cough, phlegm and shortness of breath

PHYSICAL PROPERTIES				
Odor Threshold:	Strong odor			
Flash Point:	161°F (72°C)			
LEL:	2%			
UEL:	10%			
Relative Vapor				
Density:	3 (air = 1)			
Vapor Pressure:	0.43 mm Hg at 68°F (20°C)			
Relative Density:	0.96 (water = 1)			
Water Solubility:	Soluble			
Boiling Point:	327°F (164°C)			
Melting Point:	17°F (-8°C)			

	PROTECTIVE EQUIPMENT
Gloves:	Viton® or Butyl (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Responder® and CSM (>8-hr breakthrough)
Boots:	Butyl
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CACODYLIC ACID

Synonyms: Hydroxydimethylarsine Oxide CAS No: 75-60-5 Molecular Formula: C₂H₇AsO₂ RTK Substance No: 0304 Description: Colorless to white, odorless, crystalline solid

HAZARD DATA						
Hazard Rating	g Firefighting	Firefighting		React	Reactivity	
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 1572 ERG Guide #: 15 Hazard Class: 6. (Poise	Extinguish fire using an agent su surrounding fire. Cacodylic Ac burn. POISONOUS GASES ARE PRO including <i>Arsenic Oxides</i> . Use water spray to keep fire-exp cool.	 Extinguish fire using an agent suitable for type of surrounding fire. Cacodylic Acid itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Arsenic Oxides. Use water spray to keep fire-exposed containers cool. 		Cacodylic Acid is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); CHEMICALLY ACTIVE METALS (such as POTASSIUM, MAGNESIUM and ZINC); and SODIUM BOROHYDRIDE.		
5	SPILL/LEAKS			PH	YSICAL PROPERTIES	
Isolation Distance:Spill: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.DO NOT wash into sewer.Harmful to aquatic life.			Odor Thresho Flash Point: Specific Grav Water Solubil Boiling Point Melting Point Molecular We pH:	old: ity: ity: : : sight:	Odorless Nonflammable >1.2 (water = 1) Soluble $392^{\circ}F(200^{\circ}C)$ 383° to $392^{\circ}F(195^{\circ}$ to $200^{\circ}C)$ 138 Acidic	
EXF	POSURE LIMITS			PRO	TECTIVE EQUIPMENT	
OSHA: 0.5 mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) NIOSH: None ACGIH: None			Gloves: Nitrile and Natural Rubber Coveralls: DuPont Tyvek® Respirator: <0.5 mg/m³ - Full facepiece APR with High efficiency filter			
HE	ALTH EFFECTS		FIRS	ST AIE	D AND DECONTAMINATION	
Eyes: Irrita Skin: Irrita pign Inhalation: Nos whe Wea and Chronic: Arse blac	ation, burns, red and watery eyes ation, burns, itching, rash and loss of nent e and throat irritation with coughing, eezing, and hoarseness akness, nausea, vomiting, headache muscle cramps enic and Arsenic compounds cause dder, lung, and skin cancer in nans		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 			
		_			July 2008	



Common Name: CADMIUM

Synonyms: None CAS No: 7440-43-9 Molecular Formula: Cd RTK Substance No: 0305 Description: Soft, blue-white solid, gray-black metal, or gray or white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Use dry chemicals appropriate for extinguishing metal fires.	Cadmium reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form
3 - Fire	DO NOT USE water, foam, CO ₂ or Halons.	flammable and explosive Hydrogen gas.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	Cadmium dust or powder reacts with OXIDIZING
DOT#: UN 2570	FIRE. CONTAINERS MAY EXPLODE IN FIRE	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 154	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	POTASSIUM: ZINC: SULFUR: SELENIUM: and
(Poison)	Cadmium <i>powder</i> may ignite combustibles (wood, paper and oil).	TELLURIUM to cause fires and explosions.

SPILL/LEAKS

Isolation Distance: 25 meters (75 feet)

Moisten powdered spilled material first or use a HEPAfilter vacuum for clean-up.

Collect solid material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Non-combustible solid, flammable powder/dust
Vapor Pressure:	0 mm at Hg 68°F (20°C)
Specific Gravity:	8.65
Water Solubility:	Insoluble
Melting Point:	610°F (321°C)
Boiling Point:	1,409°F (765°C)
Molecular Weight:	112.4

E	XPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH: IDLH LEVEL:	0.005 mg/m ³ , 8-hr TWA Lowest feasible concentration 0.01 mg/m ³ , 8-hr TWA (total particulates) 0.002 mg/m ³ , 8-hr TWA (respirable fraction) 9 mg/m ³ (dust or fume)	Gloves: Coveralls: Respirator:	Nitrile or Neoprene DuPont Tyvek® >0.005 mg/m ³ - APR with High efficiency filters >5 mg/m ³ - Supplied air

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Lung irritation with coughing and/or shortness of breath
Chronic:	Nausea, vomiting, Headache, fever and chills, aches and chest tightness Carcinogen (lung and prostate) in humans Teratogen in humans

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.

December 2007



Common Name: CADMIUM ACETATE

Synonyms: Bis(Acetoxy)Cadmium; Cadmium Diacetate CAS No: 543-90-8 Molecular Formula: $C_4H_6CdO_4$ RTK Substance No: 0306 Description: White to colorless, crystalline material

	HAZARD DATA					
Hazard Ra	ating	Firefighting			Reactivity	
4 - Health 0 - Fire 0 - Reactivit DOT#: UN 2 ERG Guide Hazard Clas	2570 #: 154 ss: 6.1 (Poison)	 Extinguish fire using an agent suitable for surrounding fire. Cadmium Acetate itself not burn. POISONOUS GASES ARE PRODUCED I including Cadmium Oxide. Use water spray to keep fire-exposed cont Cadmium Acetate may ignite combustible (wood, paper and oil). 		le for type of e itself does CED IN FIRE, d containers cool. ustibles	Cadmium Acetate is not compatible with SULFUR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; or STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and POTASSIUM.	
	SPI	LL/LEAKS		P	PHYSICAL PROPERTIES	
Isolation Distance: Small Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer. Cadmium Acetate is a marine pollutant. EXPOSURE LIMITS OSHA: 0.005 mg/m ³ , 8-hr TWA NIOSH: Lowest feasible concentration ACGIH: 0.01 mg/m ³ , 8-hr TWA (total particulate) 0.002 mg/m ³ , 8-hr TWA (respirable fraction)			Odor Threshold: Slightly vinegar odor Flash Point: Nonflammable Specific Gravity: 2.34 (water =1) Water Solubility: Soluble Boiling Point: Decomposes Freezing Point: 493°F (256°C) Molecular Weight: 230.5 PROTECTIVE EQUIPMENT Gloves: Nitrile and Neoprene Coveralls: DuPont Tyvek® Respirator: >0.005 mg/m³ - APR with High efficiency filters >0.05 mg/m³ - Supplied air			
HEALTH EFFECTS			FIRST /	AID AND DECONTAMINATION		
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, th coughing Nausea, chills, ac <i>Cadmiui</i> cause lu humans	Irritation Irritation Nose, throat and lung irritation with coughing and shortness of breath Nausea, vomiting, headache, fever and chills, aches, and chest tightness <i>Cadmium</i> and <i>Cadmium compounds</i> cause lung and prostate cancer in humans		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: CADMIUM BROMIDE

Synonyms: Cadmium Dibromide CAS No: 7789-42-6 Molecular Formula: CdBr₂ RTK Substance No: 0307 Description: White to yellowish, odorless, crystalline solid which changes to a powder on exposure to dry air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity					
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Bromide itself does	A mixture of Cadmium Bromide and POTASSIUM may explode on impact.					
0 - Fire	not burn.	Cadmium Bromide reacts with SULFIDES, and will form					
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Acids in WATER.					
DOT#: UN 2570	Use water spray to keep fire-exposed containers	Cadmium Bromide is not compatible with SULFURIC					
ERG Guide #: 154	cool.	EPICHLOROHYDRIN; ISOCYANATES;					
Hazard Class: 6.1	Cadmium Bromide may ignite combustibles	NITROMETHANE; and VINYL ACETATE.					
(Poison)	(wood, paper and oil).						

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 yards) Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³
	(All of the above are for Cadmium)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath
	Nausea, vomiting, headache, fever and chills, aches, and chest tightness
Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable; dust may be explosive
Specific Gravity:	5.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,585°F (863°C) (decomposes)
Freezing Point:	1,053°F (567°C)
Molecular Weight:	272.22

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene			
Coveralls:	DuPont Tyvek®			
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CADMIUM CARBONATE

Synonyms: Cadmium Monocarbonate; Otavite; Kalcit CAS No: 513-78-0 Molecular Formula: CdCO₃ RTK Substance No: 4090 Description: White, odorless crystal or powder

Nausea, vomiting, headache, fever and

Cadmium and Cadmium compounds

chills, aches, and chest tightness

cause lung and prostate cancer in

humans

Chronic:

Descriptio							
			HAZ	ZARD DATA			
Hazard R	ating	Firefighting			Reactivity		
4 - Health 0 - Fire 0 - Reactivi DOT#: UN ERG Guide Hazard Clas	ity 2570 • #: 154 ss: 6.1 (Poison)	Extinguish fire using an agent s surrounding fire. Cadmium Ca not burn. POISONOUS GASES ARE PR including <i>Cadmium Oxide</i> . Use water spray to keep fire-ex Cadmium Carbonate may igni (wood, paper and oil).	ouitable arbona ODUC posed te com	e for type of ate itself does ED IN FIRE, containers cool. nbustibles	Cadmium Carbonate reacts violently with POTASSIUM. Cadmium Carbonate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Cadmium dust may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; SELENIUM; TELLURIUM; AMMONIA; and METALS (such as ZINC and MAGNESIUM).		
	SPIL	.L/LEAKS		Р	HYSICAL PROPERTIES		
Isolation Distance: Small Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer. May be harmful to the environment.			Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Melting Point: Molecular Weight	Odorless Nonflammable; dust may explode 4.26 (water =1) Insoluble Decomposes :: 172.4			
	EXPOS	URE LIMITS		PR			
OSHA: NIOSH: ACGIH: IDLH: PAC LEVELS:	0.005 mg/m Lowest feas 0.01 mg/m ³ 0.002 mg/m fraction) 9 mg/m ³ (du (All of the a PAC-1 = 0. PAC-3 = 7	h ³ , 8-hr TWA sible concentration ³ , 8-hr TWA (total particulate) h ³ , 8-hr TWA (respirable ust or fume) bove are for <i>Cadmium</i>) 15 mg/m ³ ; PAC-2 = 1.2 mg/m ³ ; 2 mg/m ³		Gloves: Nit Coveralls: Du Respirator: >0 >0	rile and Neoprene Pont Tyvek® .005 mg/m³ - APR with High efficiency filters .05 mg/m³ - Supplied air		
HEALTH EFFECTS			1	FIRST A	AID AND DECONTAMINATION		
Eyes: Skin: Inhalation:	Irritation Irritation Nose, th coughin	roat and lung irritation with g and/or shortness of breath		Remove the perso Flush eyes with la Remove contact lenses if w	on from exposure. rge amounts of water for at least 15 minutes. vorn.		

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CADMIUM CHLORIDE

Synonyms: Cadmium Dichloride; Caddy CAS No: 10108-64-2 Molecular Formula: CdCl₂ RTK Substance No: 0308

Description: An odorless, colorless, crystalline powder

			HA	ZARD DAT	A
Hazard Ra	ating	Firefighting			Reactivity
4 - Health 0 - Fire 0 - Reactivit DOT#: UN 2 ERG Guide Hazard Clas	2570 2570 #: 154 ss: 6.1 (Poison)	 Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Chloride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide. Use water spray to keep fire-exposed containers cool. Cadmium Chloride may ignite combustibles (wood, paper and oil). 		le for type of de itself does not CED IN FIRE, d containers bustibles (wood,	Cadmium Chloride reacts violently with BROMIDE TRIFLUORIDE and POTASSIUM. Cadmium Chloride reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; SULFUR; and ZINC. Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES forms toxic <i>Chlorine gas</i> .
	SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer. Toxic to aquatic organisms and persists in the environment.			Odor Threshol Vapor Pressur Vapor Density: Specific Gravit Water Solubilit Boiling Point: Melting Point: pH: Molecular Weig	 d: Odorless a: 10 mm Hg at 1,211°F (656°C) b: 6.3 (air = 1) b: 3.3 (water =1) c: Soluble c: 1,760°F (960°C) c: 1,054°F (568°C) c: 3.5 to 5 c: 1,833 	
I	EXPO	SURE LIMITS			
OSHA: 0.005 mg/m ³ , 8-hr TWA NIOSH: Lowest feasible concentration ACGIH: 0.01 mg/m ³ , 8-hr TWA (total particulate) 0.002 mg/m ³ , 8-hr TWA (respirable fraction) IDLH: 9 mg/m ³ (All of the above are for <i>Cadmium</i>) The Protective Action Criteria values are: PAC-1 = 0.16 mg/m ³ PAC-2 = 1.2 mg/m ³ PAC-3 = 7.6 mg/m ³			Gloves: Coveralls: Respirator:	Nitrile and Neoprene DuPont Tyvek® >0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air	
HEALTH EFFECTS			FIRST	AID AND DECONTAMINATION	
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, th coughing Nausea, chills, ac <i>Cadmiur</i> lung and	roat and lung irritation with g and/or shortness of breath vomiting, headache, fever and hes, and chest tightness n and <i>Cadmium compounds</i> cause prostate cancer in humans		Remove the per- Flush eyes with contact lenses if Remove contam Begin artificial re necessary. Transfer to a me Medical observa	son from exposure. large amounts of water for at least 15 minutes. Remove worn. inated clothing and wash contaminated skin with water. espiration if breathing has stopped and CPR if edical facility. tion is recommended as symptoms may be delayed.
]		August 2016



Common Name: CADMIUM HYDROXIDE

Synonyms: Cadmium Hydrate CAS No: 21041-95-2 Molecular Formula: CdH₂O₂ RTK Substance No: 4089 Description: White powder

		HA	ZARD DATA	
Hazard Ratir	ng Firefighting			Reactivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 2570 ERG Guide #: Hazard Class: (Poi	Extinguish fire using an age surrounding fire. Cadmiur not burn. POISONOUS GASES ARE including <i>Cadmium Oxide</i> . Use water spray to keep fire 154 Cadmium Hydroxide may (wood, paper and oil). son)	 Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Hydroxide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide. Use water spray to keep fire-exposed containers cool. Cadmium Hydroxide may ignite combustibles (wood, paper and oil). 		Cadmium dust may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE; SELENIUM, TELLURIUM, AMMONIA; and METALS (such as ZINC, POTASSIUM and MAGNESIUM).
	SPILL/LEAKS		Р	HYSICAL PROPERTIES
Isolation Distan Small Spills: 25 Fire: 800 meter Moisten spilled r vacuum for clea Collect powdere and safe manne DO NOT wash i Severe marine p ED OSHA: 0.00 NIOSH: Low ACGIH: 0.07 0.00 IDLH: 9 m (All	nce: meters (75 feet) s (1/2 mile) material first or use a HEPA-filter an-up. d material in the most convenient er and deposit in sealed containers. nto sewer. bollutant. CPOSURE LIMITS D5 mg/m ³ , 8-hr TWA vest feasible concentration 1 mg/m ³ , 8-hr TWA (total particulate) D2 mg/m ³ , 8-hr TWA (respirable fract g/m ³ (dust or fume) of the above are for <i>Cadmium</i>)	pn)	Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Molecular Weight Coveralls: Du Respirator: >0. >0.	No information Nonflammable 4.8 (water =1) Insoluble No information No information : 146.4 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® .005 mg/m ³ - APR with High efficiency filters .05 mg/m ³ - Supplied air
LEVELS: PAC	C-1 = 0.13 mg/m ³ ; PAC-2 = 0.99 mg/ C-3 = 6.1 mg/m ³	י ^א ;		
HEALTH EFFECTS			FIRST A	
Eyes:	rritation rritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever a chills, aches, and chest tightness	d	Remove the perso Flush eyes with lar Remove contact lenses if w Remove contamin and water. Begin artificial resp	n trom exposure. rge amounts of water for at least 15 minutes. /orn. ated clothing and wash contaminated skin with soap piration if breathing has stopped and CPR if
Chronic:	Carcinogen - <i>Cadmium</i> and <i>Cadmiur</i> compounds cause lung and prostate cancer in humans.		necessary. Transfer to a medi Medical observatio	ical facility. on is recommended as symptoms may be delayed.



Common Name: CADMIUM NITRATE

Synonyms: Cadmium Dinitrate CAS No: 10325-94-7 Molecular Formula: Cd(NO₃)₂ RTK Substance No: 4088 Description: White, odorless crystal that absorbs moisture from the air

Description: White, odorless crystal that absorbs moisture from the air				
HAZARD DATA				
Hazard Ratir	ng Firefighting	Firefighting		Reactivity
4 - Health 0 - Fire 1 - Reactivity DOT#: UN 2570 ERG Guide #: Hazard Class: (Pois	Extinguish fire using an agent s surrounding fire. POISONOUS GASES ARE PRO including <i>Cadmium Oxide</i> and Use water spray to keep fire-exp Cadmium Nitrate may ignite co (wood, paper and oil). 6.1 son)	 Extinguish fire using an agent suitable for type of surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cadmium Oxide</i> and <i>Nitrogen Oxides</i>. Use water spray to keep fire-exposed containers cool. Cadmium Nitrate may ignite combustibles (wood, paper and oil). 		Cadmium Nitrate is highly reactive with COMBUSTIBLES; ORGANIC MATERIALS; and REDUCING AGENTS. Cadmium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; HYDROGEN AZIDE; and HYDRIDES.
	SPILL/LEAKS	ļĹ	Р	HYSICAL PROPERTIES
Isolation Distar Small Spills: 25 Fire: 800 meters Moisten spilled r vacuum for clea Collect powdere and safe manne DO NOT wash in Cadmium Nitra aquatic life. OSHA: 0.00 NIOSH: Low ACGIH: 0.01	nce: meters (75 feet) s (1/2 mile) material first or use a HEPA-filter an-up. d material in the most convenient er and deposit in sealed containers. nto sewer. te may bioaccumulate and is toxic to CPOSURE LIMITS D5 mg/m ³ , 8-hr TWA rest feasible concentration I mg/m ³ , 8-hr TWA (total particulate)		Odor Threshold: Flash Point: Water Solubility: Boiling Point: Melting Point: Molecular Weight: Molecular Weight: Coveralls: Dui Respirator: >0.	Odorless Nonflammable Soluble 270°F (132°C) 140°F (59.5°C) : 236.4 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® 005 mg/m ³ - APR with High efficiency filters
0.00 IDLH: 9 m (All PAC LEVELS: PAC PAC	02 mg/m ³ , 8-hr TWA (respirable fraction) g/m ³ (dust or fume) of the above are for <i>Cadmium</i>) C-1 = 0.21 mg/m ³ ; PAC-2 = 1.6 mg/m ³ ; C-3 = 9.9 mg/m ³		>0.	05 mg/m ³ - Supplied air
HEALTH EFFECTS		┦┞	FIRST A	
Eyes:	rritation rritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever and chills, aches, and chest tightness <i>Cadmium</i> and <i>Cadmium compounds</i> cause lung and prostate cancer in humans		Flush eyes with lar Remove contact lenses if w Remove contamina and water. Begin artificial resp necessary. Transfer to a medi Medical observation	rge amounts of water for at least 15 minutes. Forn. ated clothing and wash contaminated skin with soap biration if breathing has stopped and CPR if cal facility. on is recommended as symptoms may be delayed.



Common Name: CADMIUM OXIDE

Synonyms: Cadmium Monoxide CAS No: 1306-19-0 Molecular Formula: CdO RTK Substance No: 2200 Description: Odorless, white powder or a red or brown crystal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Oxide itself does	Cadmium Oxide reacts violently with MAGNESIUM, ALUMINUM and AMMONIUM PERCHLORATE when
0 - Fire	not burn.	heated, to cause fires and explosions.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cadmium</i> .	Cadmium Oxide explodes or ignites on contact with HYDRAZINIUM NITRATE; HYDROGEN PEROXIDE;
DOT#: UN 2570	Use water spray to keep fire-exposed containers	HYDROGEN SULFIDES; and LITHIUM.
ERG Guide #: 154	cool. Cadmium Oxide may ignite combustibles	Cadmium Oxide is not compatible with PHOSPHORUS; SULFUR; SULFUR OXIDES; SELENIUM; and ZINC.
(Poison)	(wood, paper and oil).	Contact with ACIDS releases flammable and explosive <i>Hydrogen gas</i> .

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

Bioaccumulation may occur in plants and seafood.

Severe marine pollutant.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³ (dust or fume)
	(All of the above are for Cadmium)
PAC LEVELS:	PAC-1 = 0.11 mg/m ³ ; PAC-2 = 0.87 mg/m ³ ; PAC-3 = 5.4 mg/m ³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with

	coughing and shortness of breath
	Nausea, vomiting, headache, fever and chills, aches and chest tightness
Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	1 mm Hg at 1,832ºF (1,000ºC)
Specific Gravity:	8.15 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	2,838°F (1,559°C)
Melting Point:	1,652° to 1,832°F (900° to 1,000°C)
Molecular Weight:	128.4

PROTECTIVE EQUIPMENT

Gloves:	Neoprene or Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CADMIUM STEARATE

Synonyms: Alaixol 11; Cadmium Distearate CAS No: 2223-93-0 Molecular Formula: C₂₆H₇₂CdO₄ RTK Substance No: 2201 Description: White powder with a slight fatty odor

	НА	ZARD DATA	
Hazard Rating	Firefighting		Reactivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 2570 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	 Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Stearate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide. Use water spray to keep fire-exposed containers cool. Cadmium Stearate may ignite combustibles (wood, paper and oil). 		<i>Cadmium dust</i> may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM, TELLURIUM, AMMONIA; and METALS (such as ZINC, POTASIUM and MAGNESIUM).
SPI	LL/LEAKS	Р	HYSICAL PROPERTIES
Isolation Distance: Small Spills: 25 meters Fire: 800 meters (1/2 m Moisten spilled materia vacuum for clean-up. Collect powdered materia and safe manner and DO NOT wash into sew May be harmful to the EXPOS OSHA: 0.005 mg/m NIOSH: Lowest feat ACGIH: 0.01 mg/m 0.002 mg/m IDLH: 9 mg/m ³ (c (All of the approximation of the approxi	s (75 feet) nile) Il first or use a HEPA-filter erial in the most convenient deposit in sealed containers. ver. environment. SURE LIMITS m ³ , 8-hr TWA asible concentration a ³ , 8-hr TWA (total particulate) m ³ , 8-hr TWA (Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Molecular Weight Coveralls: Du Respirator: >0. >0.	Fatty odor Nonflammable 1.21 (water =1) Insoluble 1,413°F (767°C) 22.3°F (106°C) 5 681.5 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® .005 mg/m ³ - APR with High efficiency filters .05 mg/m ³ - Supplied air
HEALTH EFFECTS		FIRST A	ID AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, t coughinNausea chills, aChronic:Cadmin cause I humans	n hroat and lung irritation with ng and/or shortness of breath a, vomiting, headache, fever and iches, and chest tightness <i>um</i> and <i>Cadmium compounds</i> ung and prostate cancer in s	Remove the perso Flush eyes with lar Remove contact lenses if w Remove contamina and water. Begin artificial resp necessary. Transfer to a medi Medical observatio	n from exposure. rge amounts of water for at least 15 minutes. vorn. ated clothing and wash contaminated skin with soap biration if breathing has stopped and CPR if ical facility. on is recommended as symptoms may be delayed.



Common Name: CADMIUM SULFATE

Synonyms: Cadmium Monosulfate CAS No: 10124-36-4 Molecular Formula: CdSO₄ RTK Substance No: 3073 Description: White or colorless, odorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of	Cadmium Sulfate reacts violently with finely divided
0 - Fire	surrounding fire. Cadmium Sulfate itself does not burn.	ALUMINUM; MAGNESIUM; CARBON DUST; and POTASSIUM.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Cadmium Sulfate is not compatible with SULFUR;
DOT#: UN 2570	including <i>Cadmium</i> Oxide and <i>Sulfur</i> Oxides.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHI ORATES
ERG Guide #: 154	cool.	NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 6.1	Cadmium Sulfate may ignite combustibles (wood,	TELLURIUM; SELENIUM; and ZINC.
(Poison)	paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Moisten spilled material first or use a HEPA filter vacuum for clean up.
Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
DO NOT wash into sewer.
May be toxic to aquatic organisms

Hazardous and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³
	(All of the above are for Cadmium)
PAC	PAC-1 = 0.19 mg/m ³ ; PAC-2 = 1.4 mg/m ³ ;
LEVELS:	PAC-3 = 8.7 mg/m ³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath
	Nausea, vomiting, headache, fever and chills, aches, and chest tightness
Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	3.08 (air = 1)
Vapor Pressure:	1 mm Hg at 741°F (394°C)
Specific Gravity:	4.69
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	1,832°F (1,000°C)
Molecular Weight:	208.5

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Right to Know Hazardous Substance Fact Sheet

Common Name: CADMIUM SULFIDE

Synonyms: Cadmium Monosulfide; Cadmium Yellow; Orange Cadmium CAS No: 1306-23-6 Molecular Formula: CdS RTK Substance No: 3081 Description: Odorless, lemon yellow to orange crystal or yellow to brown powder

		TAZ		
Hazard Rat	ing Firefighting			Reactivity
4 - Health 1 - Fire 0 - Reactivity DOT#: UN 25	Use dry chemical, water spray agents. POISONOUS GASES ARE Pl including <i>Cadmium Oxide</i> and Use water spray to keep fire-e	or foar CODUC <i>Sulfur</i> xposed	m as extinguishing CED IN FIRE, <i>r Oxides.</i> I containers cool.	Cadmium Sulfide reacts with WATER; MOISTURE: STEAM or STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable <i>Hydrogen Sulfide gas</i> . Cadmium Sulfide reacts violently or explosively with
ERG Guide #: Hazard Class: (Pe	RG Guide #: 154 azard Class: 6.1 (Poison)			IODINE MONOCHLORIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
	SPILL/LEAKS		P	HYSICAL PROPERTIES
SPILL/LEAKS Isolation Distance: Small Spills: 25 meters (75 feet) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Hazardous to the environment and persists in the environment. Marine pollutant. EXPOSURE LIMITS OSHA: 0.005 mg/m³, 8-hr TWA NIOSH: Lowest feasible concentration ACGIH: 0.01 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (respirable fraction) IDLH: 9 mg/m³ (All of the above are for Cadmium)			Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Melting Point: Molecular Weight: Molecular Weight: Coveralls: Respirator: >0. >0.	Odorless Nonflammable 4.5 to 4.8 (water = 1) Insoluble 1,796°F (980°C) 145 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® 005 mg/m ³ - APR with High efficiency filters 05 mg/m ³ - Supplied air
ŀ	HEALTH EFFECTS		FIRST A	ID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever and chills, aches, and chest tightness <i>Cadmium</i> and <i>Cadmium compounds</i> cause lung and prostate cancer in humans		Remove the person Flush eyes with lar Remove contact lenses if w Remove contamina and water. Begin artificial resp necessary. Transfer to a medi Medical observation	n from exposure. rge amounts of water for at least 15 minutes. rorn. ated clothing and wash contaminated skin with soap biration if breathing has stopped and CPR if cal facility. on is recommended as symptoms may be delayed.



Common Name: CALCIUM

Synonyms: Atomic Calcium; Elemental Calcium CAS No: 7440-70-2 Molecular Formula: Ca RTK Substance No: 0309 Description: Odorless, soft, silvery-white, metallic solid

HAZARD DATA					
Hazard Rating	Firefighting			Reactivit	ty
3 - Health	*Calcium in bulk form is not flam finely divided Calcium is FLAM	nma MA	able, but BLE and	Calcium ca MOISTUR	an react violently with WATER, STEAM, E and STRONG ACIDS (such as
1* - Fire	REACTIVE with AIR, MOIST AII	Ra	and	HYDROCH	HLORIC, SULFURIC and NITRIC) to form
2-W - Reactivity	Use dry chemical, soda ash, lime	e, o	or sand as	Finely divid	ded Calcium can ignite in AIR or in the presence of
DOT# : UN 1401	extinguishing agents. DO NOT CO ₂ OR FOAM.	US	SE WATER,	HALOGEN	NS (such as CHLORINE and FLUORINE).
ERG Guide #: 138	POISONOUS GASES ARE PRO	DU	JCED IN	HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING	
(Water Reactive)	FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT GET WATER INSIDE CONTAINERS. <i>Finely divided</i> Calcium may form an ignitable vapor/air mixture in closed tanks or containers.			AGENTS (HYDRIDE: ASH) may Calcium is	(such as LITHIUM, SODIUM, ALUMINUM and their S); and CARBONATES (such as LIME and SODA result in explosions. not compatible with OXIDIZING AGENTS (such as
				CHLORAT MERCURY TETRAOX	TES, PEROXIDES, PERMANGANATES, TES, NITRATES); METALS (such as LEAD and Y); METAL OXIDES; METAL SALTS; DINITROGEN (IDE; SILICON; and AMMONIA.
SPILL/LEAKS				PH۱	SICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Cover with dry sand, earth, or a similar material and place into dry, sealed containers for disposal. DO NOT wash into sewer. Calcium is dangerous to aquatic life at high concentrations. 			Odor Threa Flash Poin Auto Igniti Vapor Pres Specific G Water Solu Boiling Po Melting Po Molecular	shold: t: on Temp: ssure: ravity: ibility: ibility: int: Weight:	Odorless Flammable (when <i>finely divided</i>) 1,454 <u>+</u> 18°F (790 <u>+</u> -8°C) 10 mm Hg at 1,801°F (983°C) 1.54 (water = 1) Reacts 2,703°F (1,484°C) 1,548°F (842°C) 40.1
EXPO	SURE LIMITS			PRO	TECTIVE EQUIPMENT

Gloves:

Coveralls:

No occupational exposure limits have been established for Calcium.

The Protective Action Criteria values are: PAC-1 = 30 mg/m^3 $PAC-2 = 50 \text{ mg/m}^{3}$ $PAC-3 = 250 \text{ mg/m}^3$

HEALTH EFFECTS

- Eyes: Irritation and burns Skin: Irritation and burns
- Inhalation: Nose and throat irritation with coughing and wheezing

Respirator: Full facepiece APR with P95 filters >30 mg/m³ - SCBA

Nitrile and Natural Rubber

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tyvek®

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: CALCIUM ARSENATE

Synonyms: Cucumber dust; Tricalcium Orthoarsenate CAS No: 7778-44-1 Molecular Formula: $Ca_3As_2H_6O_8$ RTK Substance No: 0310 Description: Colorless to white, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of	Calcium Arsenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	not burn.	PERMANĜANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Arsenic Oxides</i> . Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE).
DOT# : UN 1573		HYDROGEN gas and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) can react
ERG Guide #: 151		Water solutions of Calcium Arsenate in contact with ACTIVE METALS (such as IRON, ALUMINUM and ZINC) may release highly toxic <i>Arsenic fumes</i> and
Hazard Class: 6.1 (Poison)		
		Arsine gas.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

DO NOT wash into sewer.

Hazardous to the environment, especially to water organisms.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA
NIOSH:	0.002 mg/m ³ , 15-min Ceiling
ACGIH:	0.01 mg/m ³ , 8-hr TWA
IDLH:	5 mg/m ³
	(All of the above are for inorganic Arsenic)

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness
	Weakness, nausea, vomiting, headache and muscle cramps
Chronic:	Arsenic compounds cause skin, lung and liver cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	3.62 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	2,651°F (1,455°C)
Molecular Weight:	398.1

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CALCIUM CARBIDE

Synonyms: Acetylenogen; Calcium Acetylide CAS No: 75-20-7 Molecular Formula: CaC₂ RTK Substance No: 0312 Description: Gravish-black lump or crystalline powder with a garlic-like odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health 3 - Fire	FLAMMABLE AND WATER REACTIVE When Calcium Carbide is exposed to WATER or MOISTURE it forms	Calcium Carbide reacts with WATER and MOISTURE to produce flammable <i>Acetylene gas</i> and <i>Lime</i> . The heat of the reaction may ignite the <i>Acetylene</i> .		
2-W - Reactivity DOT#: UN 1402 ERG Guide #: 138 Hazard Class: 4.3 (Water Reactive/ Dangerous When Wet)	 flammable Acetylene gas. Use approved Class D extinguishers or smother with dry sand, dry clay or dry ground limestone. DO NOT USE WATER, CO₂ or FOAM as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Calcium Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool. 	Calcium Carbide reacts with COPPER, SILVER, MERCURY and BRASS to form explosive compounds such as METAL ACETYLIDES. Calcium Carbide is not compatible with METHANOL; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID FUMES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and METAL SALTS and METAL OXIDES (such as IRON CHLORIDE and IRON OXIDE).		

SPILL/	LEAKS
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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Calcium Carbide**. DO NOT USE WATER OR WET METHOD.

DO NOT USE WATER OR WET METHOD.

Keep **Calcium Carbide** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Calcium Carbide is harmful to aquatic life at low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Calcium Carbide**.

The Protective Action Criteria values are: PAC-1 = 120 mg/m³ PAC-2 = 1,300 mg/m³ PAC-3 = 7,900 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, rash and burning feelingInhalation:Mouth, nose, throat and lung irritation
with coughing and severe shortness of
breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Garlic-like odor
Flash Point:	Flammable solid
LEL:	2.5% (for Acetylene gas)
UEL:	82% (for Acetylene gas)
Auto Ignition Temp:	617°F (325°C)
Specific Gravity:	2.22 (water = 1)
Water Solubility:	Reacts
Melting Point:	4,172°F (2,300°C)
Molecular Weight:	64.1

Ρ	R	0	Т	E	C.	TI	V	Έ	Ε	Q	U	IP	M	Ε	Ν	Т
•		-			•		•			S.	•					

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>30 mg/m ³ - SCBA
	Use SCBA at any level if Acetylene gas may be present

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: CALCIUM CARBONATE

Synonyms: Calcium Salt of Carbonic Acid, Chalk, Limestone CAS No: 1317-65-3 Molecular Formula: CaCO₃ RTK Substance No: 4001 Description: White to tan odorless powder or colorless crystals

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
1 - Health	Calcium Carbonate is non-combustible,	Calcium Carbonate ignites on contact with FLUORINE.			
0 - Fire	but when heated, decomposes to emit an acrid smoke and irritating vapors.	Calcium Carbonate when heated with mixture of magnesium and hydrogen causes violent explosion.			
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Calcium Carbonate is not compatible with ACIDS, ALUMINUM, AMMONIUM SALTS, FLUORINE and MAGNESIUM and HYDROGEN.			

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Vapor Pressure:	0 mm Hg	
Spill: 25 meters (75 feet)	Specific Gravity:	2.7% - 2.9%	
Fire: 800 meters (1/2 mile)	Water Solubility:	0.001%	
Lies damp methods to control dust. Toot for trace	Boiling Point:	Decomposes	
levels of radioactivity after clean-up.	Melting Point:	1,517°F – 2,442°F (Decomposes)	
Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal. DO NOT wash into sewer.	Molecular Weight:	100.1	

EXPOSURE LIMITS

OSHA:	HA: 15 mg/m ³ (total particulate)		
	5 mg/m ³ (respirable fraction) averaged over		
	an 8-hour workshift		

NIOSH: 10 mg/m³ (total particulate) 5 mg/m³ (respirable fraction) averaged over a 10-hour workshift

The Protective Action Criteria values are:

PAC-2 = 500 mg/m³

PAC-3 = 3,000 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Cough, sneezing, rhinorrhea (discharge of nasal mucus)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	> 5 mg/m ³ - N95 or higher
	>45 mg/m ³ – Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

INFORMATION FOR EMERGENCY RESPONDERS

Page 6 of 6

Common Name: CALCIUM CHROMATE

Synonyms: C.I. Pigment Yellow 33; Calcium Chrome Yellow CAS No: 13765-19-0 Molecular Formula: CaCrO RTK Substance No: 0315 Description: Odorless yellow, crystalline powder

	HAZARD DATA					
Hazard Rating	Firefighting	Reactivity				
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Material)	Extinguish fire using an agent suitable for type of surrounding fire. Calcium Chromate itself does not burn. Calcium Chromate is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chromium fumes</i> . Use water spray to keep fire-exposed containers cool. Calcium Chromate may ignite combustibles (used paper and cil)	Calcium Chromate reacts explosively with HYDRAZINE. Calcium Chromate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ORGANIC MATTER; ALUMINUM; SULFUR; BORON; and ETHANOL. Store in tightly closed containers in a cool, well-ventilated area away from PLASTICS and COMBUSTIBLES.				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

- **OSHA:** 0.1 mg/m³, Ceiling (as *Chromates*)
- **NIOSH:** 0.001 mg/m³, 10-hr TWA (as *Chromates*)
- **ACGIH:** 0.001 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³ (as *Chromates*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, itching and ulcers
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	2.89 (air = 1)
Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Specific Gravity:	2.9 (water = 1)
Water Solubility:	Slightly soluble
Melting Point:	392°F (200°C) (dihydrate)
Molecular Weight:	156.1

	PROTECTIVE EQUIPMENT	
Gloves:	ves: Butyl, Nitrile, Silver Shield®/4H® and Viton	
Coveralls:	Tyvek®	
Respirator:	>0.001 mg/m ³ - APR with High efficiency filter >0.01 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CALCIUM NITRATE

Synonyms: Calcium Saltpeter; Lime Nitrate; Nitrocalcite CAS No: 10124-37-5 Molecular Formula: Ca(NO₃)₂ RTK Substance No: 0324

Description: White to gray, odorless, crystalline or granular solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	Calcium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Mixtures of Calcium Nitrate with ALKYL ESTERS; PHOSPHORUS: TIN CHLORIDE: and REDUCING	
0 - Fire	combustion of other substances.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
3 - Reactivity	Use water in flooding quantities or extinguish fire	their HYDRIDES) may result in fires and explosions.	
DOT#: UN 1454	USING an agent suitable for type of surrounding fire.	Calcium Nitrate reacts with WATER to release heat.	
ERG Guide #: 140	including Nitrogen Oxides.	(such as HYDROCHLORIC, SULFURIC and NITRIC);	
Hazard Class: 5.1	Use water spray to keep fire-exposed containers	METAL SALTS; and COMBUSTIBLES.	
(Oxidizer)	Calcium Nitrate may ignite combustibles (wood,		
Hazard Class: 5.1 (Oxidizer)	cool. Calcium Nitrate may ignite combustibles (wood, paper and oil).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 0.91 mg/m³
- PAC-2 = 10 mg/m³
- $PAC-3 = 60 \text{ mg/m}^3$

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, dizziness, nausea and vomiting	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflamn
Specific Gravity:	2.5 (wate
Water Solubility:	Soluble
Melting Point:	1,042ºF (
Molecular Weight:	164.1

	00011033
	Nonflammable
	2.5 (water = 1)
	Soluble
	1,042ºF (561ºC)
:	164.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.91 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: CALCIUM SILICIDE

Synonyms: Calcium Disilicide; Calcium Silicon CAS No: 12013-56-8 Molecular Formula: CaSi₂ RTK Substance No: 0332 Description: Gray to black or brown, powder or chip with a repulsive odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health		Calcium Silicide reacts violently and/or explosively with WATER, STEAM, MOIST AIR, and FLUORINE.
3 - Fire 2 -W - Reactivity	Use sand, soda ash, lime or dry chemicals appropriate for extinguishing metal fires. DO NOT	Calcium Silicide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form self-igniting and toxic <i>Silane</i> gas.
DOT#: UN 1405 ERG Guide #: 138	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Silicon Oxides</i> and <i>Hydrogen</i> .	Calcium Silicide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
Hazard Class: 4.3 (Water Reactive)	CONTAINERS MAY EXPLODE IN FIRE. DO NOT get water into containers.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BORON; and IODINE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

Keep Calcium Silicide out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for Calcium Silicide.

PHYSICAL PROPERTIES

Odor Threshold:	Repulsive odor	
Flash Point:	Flammable	
Auto Ignition Temp:	1,472°F (800°C)	
Specific Gravity:	2.5 (water = 1)	
Water Solubility: Decomposes in hot water		
Melting Point: 1,292° to 1,715°F (700° to 935°C)		
Molecular Weight:	96.25	

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Polyvinyl Chloride

Coveralls: Tyvek®

Respirator: SCBA

HEALTH E	FFECTS	FIRST AID AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, throat an	d lung irritation	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary.
		Transfer promptly to a medical facility.



Common Name: CAPROLACTAM

Irritation and burns

breath

Nose, throat and lungs irritation with

coughing, wheezing and shortness of

Headache and convulsions (seizures)

Inhalation:

Synonyms: 1,6-Hexolactam; 2-Oxohexamethyleneimine CAS No: 105-60-2 Molecular Formula: C₆H₁₁NO RTK Substance No: 0337 Description: White flake or crystalline solid with an unpleasant odor, or when molten a colorless or milky-white liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Caprolactam may burn, but does not readily ignite.	Caprolactam may react violently with a mixture of
	Use dry chemical, CO ₂ , water spray or foam as	ACETIC ACID and DINITROEN TRIOXIDE.
1 - Fire	extinguishing agents.	Caprolactam is not compatible with OXIDIZING AGENTS
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	(such as PERCHLORATES, PEROXIDES,
	including Nitrogen Oxides and Ammonia.	PERMANGANATES, CHLORATES, NITRATES,
DOT#: NA 3082	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 171	cool.	BASES (such as SODIUM HYDROXIDE and
		POTASSIUM HYDROXIDE); CHLORINATED
Hazard Class: 9		HYDROCARBONS (such as METHYLENE CHLORIDE
(Miscellaneous		and TRICHLOROETHYLENE); and ALKALI METALS
Hazardous Material)		(such as LITHIUM, SODIUM and POTASSIUM).

SPILL/LEAKS	Р	HYSICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Absorb <i>molten</i> Caprolactam with fly ash, cement powder or commercial sorbent and place into sealed containers for disposal. Moisten spilled <i>solid</i> material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer. Caprolactam may be hazardous to the environment, especially to aquatic organisms. 	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Critical Temperatur Molecular Weight:	0.064 ppm 257°F (125°C) 1.4% 8% 0: 707°F (375°C) 3.9 (air = 1) 0.001 mm Hg at 68°F (20°C) 1.02 (water = 1) Highly soluble and hygroscopic 513°F (267°C) 156°F (69°C) re: 944.4°F (507°C) 113.16
EXPOSURE LIMITS	PR	
NIOSH: 1 mg/m ³ (solid), 10-hr TWA; 3 mg/m ³ STEL	Gloves: Ne	oprene

NIOSH: 1 mg/m ³ (<i>solid</i>), 10-hr TWA; 3 mg/m ³ STEL NIOSH: 0.22 ppm (<i>vapor</i>), 10-hr TWA; 0.66 ppm STEL ACGIH: 5 mg/m ³ , 8-hr TWA The Protective Action Criteria values are: PAC-1 = 3 mg/m ³ PAC-2 = 20 mg/m ³ PAC-2 = 20 mg/m ³	Gloves: Coveralls:	Neoprene Tyvek® >1 mg/m ³ solid or >0.22 ppm vapor - full facepiece APR with Organic vapor cartridges and N95 prefilters >2 mg/m ³ solid or >0.66 ppm vapor _SCRA
PAC-3 = 20 mg/m ⁻	Respirator.	>3 mg/m solid of >0.00 ppm vapor - SCBA
HEALTH EFFECTS	FIRS	ST AID AND DECONTAMINATION
Eyes: Irritation and burns Skin: Irritation and burns	Remove the pe Flush eyes wit	erson from exposure. Ih large amounts of water for at least 15 minutes. Remove

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: CAPTAFOL

Synonyms: None CAS No: 2425-06-1 Molecular Formula: $C_{10}H_9CI_4NO_2S$ RTK Substance No: 0338

Description: Colorless to pale yellow or tan, crystalline solid or powder with a strong odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Captafol does not burn, however, it is often dissolved in a liquid carrier which may be	Captafol reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
0 - Fire	flammable or combustible.	Captafol is not compatible with STRONG ACIDS (such as	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	HYDROCHLORIC, SULFURIC and NITRIC); ACID VAPORS; ACID CHLORIDES; ACID ANHYDRIDES; and	
DOT#: None	POISONOUS GASES ARE PRODUCED IN	OXIDIZING AGENTS (such as PERCHLORATES,	
ERG Guide #: None	FIRE, including Sulfur Oxides, Nitrogen Oxides,	PEROXIDES, PERMANGANATES, CHLORATES,	
Hazard Class: None	Hydrogen Chloride and Phosgene.	NITRATES, UNLORINE, BROMINE and FLOORINE).	

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Flash Point:	Noncombustible (solid)
Spill (solid): 25 meters (75 feet)	Vapor Density:	1.2 (air = 1)
Spill (liquid): 75 meters (150 feet)	Vapor Pressure:	8.3 x 10 ⁻⁹ at 68 °F (20 °C)
Fire: 800 meters (1/2 mile)	Boiling Point:	Decomposes
Moisten spilled material first or use a HEPA-filter	Melting Point:	321 °F (162 °C) (Decomposes)
vacuum for clean-up and place into sealed containers for disposal.	Molecular Weight:	349.06
Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.		
DO NOT wash into sewer.		
Captafol is very toxic to aquatic organisms.		

	EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
NIOSH:	0.1 mg/m³, 10-hr TWA	Gloves:	Nitrile and Neoprene
ACGIH:	0.1 mg/m ³ , 8-hr TWA	Coveralls:	Tyvek®
		Respirator:	>0.1 mg/m ³ - Pressure demand supplied-air

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation, rash, dryness and redness. Nose and throat irritation with coughing and wheezing Cancer (kidney, liver, small intestine) in animals	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: CAPTAN

Synonyms: Captane; Orthocide; Vanicide CAS No: 133-06-2 Molecular Formula: C₉H₈Cl₃NO₂S RTK Substance No: 0339 Description: White, odorless, crystalline solid when pure or cream to yellow powder with a strong odor (technical grade)

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health 0 - Fire	<i>Pure</i> Captan does not burn, however it is often dissolved in a liquid carrier which may be flammable or combustible.	Captan is not compatible with STRONG ALKALIES (such as LIME); TETRAETHYL PYROPHOSPHATE; OIL SPRAYS; and PARATHION.		
1 - Reactivity DOT#: UN 3077	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Captan may react with WATER to form <i>Hydrogen</i> Chloride gas.		
ERG Guide #: 171 Hazard Class: 9	including Sulfur Oxides, Nitrogen Oxides, Hydrogen Chloride and Phosgene.	MOISTURE.		
(miscellaneous/ hazardous material)	Use water spray to keep fire-exposed containers cool.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. May be hazardous to aquatic and soil organisms.

EXPOSURE LIMITS

NIOSH: ACGIH: 5 mg/m³, 10-hr TWA 5 mg/m³, 8-hr TWA (as the inhalable fraction)

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation, skin rash and itchingInhalation:Nose and throat irritationHeadache, dizziness, nausea and
vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless (when pure)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	1.74 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	Decomposes
Melting Point:	352°F (178°C)
Molecular Weight:	300.6

	PROTECTIVE EQUIPMENT
Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tyvek® or equivalent
Respirator:	>5 mg/m ³ - Full facepiece APR with Organic vapor cartridge and High efficiency pre-filters
	>50 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer to a medical facility.



Right to Know Hazardous Substance Fact Sheet

Common Name: CARBON BLACK

Synonyms: C.I. Pigment Black 7; Channel Black; Lamp Black, Furnace Black CAS No: 1333-86-4 Molecular Formula: Mixture RTK Substance No: 0342 Description: Black, odorless, finely divided powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	Carbon Black is a COMBUSTIBLE SOLID, which may contain <i>flammable Hydrocarbons</i> .	Finely dispersed particles may form explosive mixtures in air.		
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Carbon Black is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
DOT#: UN 1361	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,		
ERG Guide #: 133	cool.			
Hazard Class: 4.2 (Spontaneously combustible)				

SPILL/LEAKS

Isolation Distance:

Small Spills: 25 meters (75 feet) Large Spills: 100 meters (330 feet) Moisten spilled powder first or use a HEPA-filter vacuum for clean-up.

For solid Carbon Black, collect in the most convenient and safe manner and deposit in sealed containers.

Keep Carbon Black powder or dust out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA:	3.5 mg/m ³ , 8-hr TWA
NIOSH:	3.5 mg/m³, 10-hr TWA 0.1 mg PAHs/m³, 10-hr TWA
ACGIH:	3.0 mg/m³, 8-hr TWA
IDLH LEVEL:	1,750 mg/m ³
PAC LEVELS:	PAC-1 = 9 mg/m ³ ; PAC-2 = 99 mg/m ³ ; PAC-3 = 590 mg/m ³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Irritation of the nose, throat and lungs with coughing and wheezing
Chronic:	Carcinogen (lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless No information 0 mm Hg at 68°F (20°C) 1.8 - 2.1(water = 1) Insoluble Sublimates approx. 6,605°F (3,652°C) Sublimates approx. 6,605°F (3,652°C) 12.01

Gloves:	Natural Rubber
Coveralls:	DuPont Tychem® Polycoat, QC, CPF1, SL and CPF2
Boots:	Rubber
Respirator:	>3.0 mg/m ³ - APR with High efficiency filters
	>30 mg/m ³ - Supplied air

PROTECTIVE EQUIPMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.



Common Name: CARBON DIOXIDE

Synonyms: Carbonic Acid; Dry Ice CAS No: 124-38-9 Molecular Formula: CO₂ RTK Substance No: 0343

Description: Colorless, odorless gas commonly found as a liquid under pressure or as a solid (dry ice)

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Carbon Dioxide itself does	Dusts of various METALS (such as MAGNESIUM, ZIRCONIUM, TITANIUM and CHROMIUM) can ignite or explode when suspended in Carbon Dioxide	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	Carbon Dioxide reacts with WATER to form <i>Carbonic Acid</i> .	
DOT#: UN 1013	CONTAINERS MAY EXPLODE IN FIRE.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHI ORATES, NITRATES	
Hazard Class: 2.2 (Nonflammable gas)	Cool. Flow or agitation may generate electrostatic charges and may ignite any explosive mixtures	CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); METAL CARBIDES; METAL SALTS; and STRONG BASES (such as SODIUM HYDROXIDE and	
	present.	POTASSIUM HYDROXIDE).	

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Gas is heavier than air and may accumulate in low ceiling spaces and confined spaces.

EXPOSURE LIMITS

NIOSH: 5,000 ppm, 10-hr TWA; 30,000 ppm, STEL **IDLH:** 40,000 ppm

The Protective Action Criteria values are:

PAC-1 = 30,000 ppm

- PAC-2 = 40,000 ppm
- PAC-3 = 50,000 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns. Contact with liquid or solid ("dry ice") causes frostbite
Skin:	Irritation and burns. Contact with liquid or solid ("dry ice") causes frostbite
Inhalation:	Headache, dizziness, difficulty breathing, tremors, convulsions, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflamn
Vapor Density:	1.52 (air =
Vapor Pressure:	42,940 m
Specific Gravity:	1.5 (wate
Water Solubility:	Soluble
Boiling Point:	-109ºF (-7
Freezing Point:	-70°F (-57
Ionization Potential:	13.77 eV
Molecular Weight:	44

Odorless Nonflammable 1.52 (air = 1) 42,940 mm Hg at 68°F (20°C) 1.5 (water = 1) Soluble -109°F (-78.3°C) -70°F (-57°C) 13.77 eV

PROTECTIVE EQUIPMENT		
Gloves:	Insulated Rubber	
Coveralls:	Insulated material	
Respirator:	>5,000 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Common Name: CARBON DISULFIDE

Synonyms: Carbon Bisulfide; Carbon Sulfide; Dithiocarbonic Anhydride CAS No: 75-15-0 Molecular Formula: CS₂ RTK Substance No: 0344 Description: Clear, colorless to light yellow liquid with an unpleasant, rotten egg odor (reagent or commercial grade) and a sweet, pleasant odor when pure

Right to Know Hazardous Substance Fact Sheet

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Carbon Disulfide is a FLAMMABLE LIQUID and has a very low ignition temperature. Contact with hot steam pipes, ordinary light	Carbon Disulfide and Carbon Disulfide <i>vapor</i> can be ignited or may explode with HEAT, SHOCK and
4 - Fire	bulbs, sparks, friction or shock can ignite Carbon Disulfide or its	FRICTION or on contact with HEATED SURFACES
0 - Reactivity	Blanket fire with water to extinguish and control vapors or use dry	(such as STEAM PIPES and LIGHT BULBS).
DOT#: UN 1131	chemical or CO ₂ as extinguishing agents.	STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 131	Oxides.	OXIDE; AMINES; OXIDIZING AGENTS (such as
Hazard Class: 3 (Flammable)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
	Flow or agitation may generate electrostatic charges.	
	Carbon Disulfide may form an ignitable vapor/air mixture.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Metal containers involving the transfer of **Carbon Disulfide** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Carbon Disulfide**.

Keep **Carbon Disulfide** out of confined spaces, such as sewers, because of the possibility of an explosion.

Carbon Disulfide is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

NIOSH: 1 ppm, 10-hr TWA; 10 ppm, 15-min Ceiling **ACGIH:** 1 ppm, 8-hr TWA

IDLH: 500 ppm

The Protective Action Criteria values are:

PAC-1 = 13 ppm PAC-2 = 160 ppm PAC-3 = 480 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Headache, nausea, vomiting, dizziness,
lightheadedness, passing out and even
death

PHYSICAL PROPERTIES

Odor Threshold:	0.1 to 0.2 ppm
Flash Point:	-22°F (-30°C)
LEL:	1%
UEL:	50%
Auto Ignition Temp:	212°F (100°C)
Vapor Density:	2.67 (air = 1)
Vapor Pressure:	297 mm Hg at 68°F (20°C)
Specific Gravity:	1.26 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	115°F (46°C)
Freezing Point:	-168°F (-111°C)
Ionization Potential:	10.8 eV
Molecular Weight:	76.13

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>1 ppm - full facepiece APR with Organic vapor cartridges >10 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CARBON MONOXIDE

Synonyms: Carbonic Oxide; Exhaust Gas; Flue Gas CAS No: 630-08-0 Molecular Formula: CO RTK Substance No: 0345 Description: Colorless, odorless gas

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Hazard Rating	Firefighting	Reactivity
2 - Health 4 - Fire 0 - Reactivity DOT#: UN 1016 ERG Guide #: 119 Hazard Class: 2.3 (Poisonous Gas)	Carbon Monoxide is a FLAMMABLE GAS. Stop flow of gas and use water spray to disperse vapors. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Carbon Monoxide may form an ignitable vapor/air mixture in closed tanks or containers.	Carbon Monoxide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM). <i>Liquified, cold</i> Carbon Monoxide may react vigorously with water.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 150 meters (500 feet)

Fire: 800 meters (1/2 mile)

- Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- Keep **Carbon Monoxide** out of confined spaces, such as sewers, because of the possibility of an explosion.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Purge with *inert gas* before attempting repairs.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Carbon Monoxide**.

Carbon Monoxide is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

 OSHA:
 50 ppm, 8-hr TWA

 NIOSH:
 35 ppm, 10-hr TWA; 200 ppm, 15-min Ceiling

 ACGIH:
 25 ppm, 8-hr TWA

 IDLH:
 1,200 ppm

 The Protective Action Criteria values are:
 PAC-1 = 75 ppm

 PAC-2 = 83 ppm
 PAC-3 = 330 ppm

HEALTH EFFECTS

Eyes: Skin:	No information available Skin contact with <i>liquid</i> Carbon Monoxide can cause frostbite
Inhalation:	Headache, dizziness, lightheadedness and fatigue, convulsions and loss of consciousness

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable gas
LEL:	12%
UEL:	75%
Auto Ignition Temp:	1,125°F (607°C)
Vapor Density:	0.97 (air = 1)
Vapor Pressure:	>750 mm Hg at 68ºF (20ºC)
Specific Gravity:	0.79 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-313ºF (-192ºC)
Melting Point:	-337°F (-205°C)
Critical Temp:	-282°F (-139°C)
Ionization Potential:	14 eV
Molecular Weight:	28

PROTECTIVE EQUIPMENT

Gloves:	Insulated work gloves (double glove for spills)	
Coveralls:	Tychem® BR, Responder ® and TK (330-minute break- through) >10% LEL wear flash protection or turnout gear	
Respirator:	SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

In case of contact with *liquid* Carbon Monoxide, immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CARBON TETRACHLORIDE

Synonyms: Tetrachlorocarbon; Perchloromethane; Carbon Tet CAS No: 56-23-5 Molecular Formula: CCl₄ RTK Substance No: 0347 Description: Colorless liquid with an Ether-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Carbon Tetrachloride itself	Carbon Tetrachloride reacts with CHEMICALLY-ACTIVE METALS (such as SODIUM, POTASSIUM and
0 - Fire	does not burn.	MAGNESIUM); ZINC; ALUMINUM; POWDERED
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, or when in contact with hot surfaces, including	BERYLLIUM; FLUORINE; DIMETHYLFORMAMIDE; CALCIUM DISILICIDE; CALCIUM HYPOCHLORITE; and mintures of FTHYLENE and RENZOVI DEBOXIDE to
DOT#: UN 1846	Phosgene and Hydrogen Chloride.	mixtures of ETHYLENE and BENZUYL PERUXIDE to
ERG Guide #: 151	Use water spray to keep fire-exposed containers	Carbon Tetrachloride is not compatible with OXIDIZING
Hazard Class: 6.1 (Poisonous)		AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Carbon Tetrachloride is harmful to aquatic organisms and is hazardous to the environment and ozone layer.

EXPOSURE LIMITS

OSHA:	10 ppm, 8-hr TWA; 25 ppm, 15-min Ceiling; and 200 ppm, as a 5-min maximum Peak in any 4-hr work period
NIOSH:	2 ppm, 60-min STEL
ACGIH:	5 ppm, 8-hr TWA; 10 ppm, 15-min STEL
IDLH:	200 ppm
PAC	PAC-1 = 1.2 ppm; PAC-2 = 13 ppm;
LEVELS:	PAC-3 = 340 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns
Skin:	Severe irritation, burns, rash with blisters
Inhalation:	Headache, nausea, vomiting, diarrhea, dizziness, lightheadedness and passing out
Chronic:	Carcinogen (liver) in animals. Limited evidence that it may damage the developing fetus and male reproductive glands (testes)

PHYSICAL PROPERTIES

Odor Threshold:	>10 ppm
Flash Point:	Non-combustible
Vapor Density:	5.3 (air = 1)
Vapor Pressure:	91 mm Hg at 68ºF (20ºC)
Specific Gravity:	1.59 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	169ºF (76ºC)
Ionization Potential:	11.47 eV
Molecular Weight:	153.8

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton, Viton/Butyl and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR and LV, Responder® and TK; ONESuit® TEC; and Kappler Zytron® 300, 400 and 500 (>8-hr breakthrough)
Respirator:	>2 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CARBONYL SULFIDE

Synonyms: Carbon Oxysulfide; Oxycarbon Sulfide CAS No: 463-58-1 Molecular Formula: COS RTK Substance No: 0349 Description: Colorless gas with a *Sulfide* (rotten egg) odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Carbonyl Sulfide is a FLAMMABLE GAS.	Carbonyl Sulfide may react with WATER or MOIST AIR to form flammable and toxic gases.
4 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	Carbonyl Sulfide is not compatible with
1 - Reactivity	including Hydrogen Sulfide.	
DOT#: UN 2204	CONTAINERS MAY EXPLODE IN FIRE.	NITRATES, CHLORINE, BROMINE and
ERG Guide #: 119	Vapors may travel to a source of ignition and flash back.	FLUORINE).
Hazard Class: 2.3	Vapor is heavier than air and may travel a distance to	
(Toxic gas)	cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

If **Carbonyl Sulfide** is leaked, take the following steps: Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep **Carbonyl Sulfide** out of confined spaces, such as sewers, because of the possibility of an explosion. **Carbonyl Sulfide** may bioaccumulate.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 55 ppm PAC-3 = 150 ppm

	HEALTH EFFECTS				
Eyes:	Irritation with possible eye damage				
Skin:	Irritation and redness				
	Contact with the <i>liquefied gas</i> may cause frostbite				
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and severe shortness of breath (pulmonary edema) Nausea, vomiting, weakness and muscle cramps				

PHYSICAL PROPERTIES

Odor Threshold:	Sulfide odor
Flash Point:	Flammable gas
LEL:	12%
UEL:	29%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	9,034 mm Hg at 69.8°F (21°C)
Water Solubility:	Soluble
Boiling Point:	-58°F (-50°C)
Freezing Point:	-218°F (-139°C)
Ionization Potential:	11.19 eV
Molecular Weight:	60.08

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Sulfur compounds</i> , <i>Sulfides</i> and <i>Disulfides</i>)
Coveralls:	Tychem® BR, LV, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Sulfur compounds</i> , <i>Sulfides</i> and <i>Disulfides</i>)
Respirator:	>30 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

If exposed to *liquefied gas*, immerse affected part in warm water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CESIUM HYDROXIDE

Synonyms: Cesium Hydrate; Cesium Hydroxide Dimer CAS No: 21351-79-1 Molecular Formula: (Cs(OH)) RTK Substance No: 0354 Description: Colorless to yellow, crystalline solid, which absorbs moisture from the air and is often in solution. It is a very strong base.

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 2682 (Solid) UN 2681 (Solution) ERG Guide #: 157 (Solid) 154 (Solution) Hazard Class: 8 (Corrosive)	 Extinguish fire using an agent suitable for type of surrounding fire. Cesium Hydroxide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool. DO NOT get water inside containers. 			Cesium Hydroxide will react with WATER or MOISTURE to generate enough heat to ignite COMBUSTIBLES. Cesium Hydroxide may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and is not compatible with CARBON DIOXIDE and OXYGEN. Cesium Hydroxide attacks many METALS (such as TIN, LEAD, ALUMINUM and ZINC) to form flammable and explosive gases.
SPILL/LEAKS		I	PHYSICAL PROPERTIES	
Isolation Distance: 2 50	5 meters (75 feet) for solids meters (150 feet) for liquids		Odor Threshold: Flash Point: Specific Gravity: Vapor Pressure:	No information Not combustible 3.68 g/cm ³ 0 mm Hg at 68°F (20°C)

Water Solubility:

Melting Point:

Sweep up solid spills.

Absorb liquid spills with vermiculite or dry sand.

EXPOSURE LIMITS

OSHA: N/A NIOSH: 2 mg/m³, 10-hr TWA ACGIH: 2 mg/m³, 8-hr TWA IDLH LEVEL: N/A

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Acute:	Nose, throat and lung irritation with coughing, and shortness of breath (pulmonary edema)
Chronic:	Bronchitis with coughing, phlegm and shortness of breath

PROTECTIVE EQUIPMENT

Soluble/Reactive

522°F (272°C)

Gloves:	Butyl Rubber, Nitrile, Neoprene, Natural Rubber or VITON® for <i>corrosive bases</i> in <i>solution</i>
Coveralls:	DuPont <i>Tychem</i> ® SP, Polycoat, QC, CPF-1, SL and CPF-2 for <i>inorganic acids</i> and <i>bases</i>
Boots:	Butyl, Neoprene
Respirator:	>2 mg/m ³ APR with High Efficiency filters >20 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Chemical Name: CHLORINE

Synonym: Molecular Chlorine CAS No: 7782-50-5 Molecular Formula: Cl₂ RTK Substance No: 0367 Description: Yellow-green gas with strong irritating odor. Can be a liquid under pressure or cold temperatures.

HAZARD DATA					
Hazard Rat	ing Firefighting	Firefighting		Reactivity	
Hazard Rat 4 - Health 0 - Fire 0 - Reactivity DOT#: UN 10 ERG Guide #: Hazard Class: (Poison	Ing Firefighting Nonflammable Gas Cylinders may vent rapidly or Remove gas with fine water s DO NOT USE WATER DIRECT 17 OF THE LEAK. 124 Case SPILL/LEAKS	Firefighting Nonflammable Gas Cylinders may vent rapidly or explode when heated. Remove gas with fine water spray. DO NOT USE WATER DIRECTLY ON THE SOURCE OF THE LEAK. L/LEAKS		Reactivity Strong Oxidizer Reacts with WATER to form Acid solutions. Forms explosive compounds or reacts explosively with ACETYLENE, ETHER, FLUORINE COMPOUNDS, TURPENTINE, ALCOHOLS, HYDROGEN, FINELY DIVIDED METALS, AMMONIA, STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE), and MANY OTHER CHEMICALS.	
Isolation Distance: (All Directions): Small spill - 30 meters (100 feet) Large spill - 240 meters (800 feet) Ventilate area to disperse gas. Stop flow of gas or place leaking cylinder in a safe place. DO NOT USE WATER DIRECTLY ON THE SOURCE OF LEAK.			Odor Threshold: 0.2 to 0.4 ppmFlash Point:N/ALEL:N/AUEL:N/AVapor Density: 2.5 (air = 1)Vapor Pressure: $5,025$ mm Hg at 68° F (20° C)Solubility:Slightly solubleIonization Potential: 11.48 eV Freezing Point: -150° F (-101° C)Boiling Point: -29° F (-34° C)		
EXPOSURE LIMITS			Р	ROTECTIVE EQUIPMENT	
OSHA: NIOSH: ACGIH: IDLH LEVEL: ERPG 1 ERPG 2 ERPG 3	1 ppm Ceiling 0.5 ppm 15-minute Ceiling 0.5 ppm 8-hr, 1 ppm STEL 10 ppm 1 ppm 3 ppm 20 ppm		Gloves: B Coverall: D R Boot: N Respirator: >(>)	utyl, Neoprene, Viton® uPont Tychem® CPF3, CPF4, Responder®, TK®, eflector®, Kappler Zytron® 300 and Zytron ® 500 eoprene 0.5 ppm CCR with cartridge for Chlorine or Acid Gas 5 ppm Supplied-air respirator 10 ppm SCBA	
H	EALTH EFFECTS		FIRST	AID AND DECONTAMINATION	
Eyes: Irritation, burns and possible eye damage Skin: Irritation, burns Liquid can cause frostbite Acute: Nose, throat and lung irritation, coughing (Pulmonary edema) Headache, nausea, vomiting Chronic: Cancer - Tested (Not Classifiable). Asthma with shortness of breath, wheezing, coughing and/or chest tightness Damage to teeth, skin blisters and hoarseness		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Immediate medical attention is necessary. For contact with <i>liquified gas</i> quickly flush skin with luke warm water. Do not rub or reheat area. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Observation is recommended as symptoms may be delayed. 			
				October 2015	


Common Name: alpha-CHLOROACETOPHENONE

Synonyms: CN; Chemical Mace; Tear Gas CAS No: 532-27-4 Molecular Formula: C₈H₇CIO RTK Substance No: 0048 Description: Colorless, white or gray, crystalline solid with an irritating floral odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID	alpha-Chloroacetophenone in contact with WATER or MOIST AIR may form toxic gases such as <i>Hydrogen</i>
1 - Fire	extinguishing agents.	Chloride.
0 - Reactivity	Water or foam may cause frothing.	alpha-Chloroacetophenone is not compatible with
DOT#: UN 1697	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> .	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 153	Use water spray to keep fire-exposed containers	ALDEHYDES: NITRIC ACID: and PERCHLORIC ACID
Hazard Class: 6.1	cool.	ALDETTIDES, NITTIO AOID, and I EROHEORIO AOID.
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

PHYSICAL PROPERTIES d: 0.035 ppm (0.1 to 0.15 mg/m³)

Odor Threshold:	0.035 ppm (0.1 to 0.15 mg/m ³)
Flash Point:	244°F (118°C)
Vapor Density:	5.2 (air = 1)
Vapor Pressure:	0.005 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	471° to 473°F (244° to 245°C)
Ionization Potential:	9.4
Molecular Weight:	155

OSHA:	0.3 mg/m ³ , 8-hr TWA
NIOSH:	0.3 mg/m ³ , 10-hr TWA

- ACGIH: 0.3 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³
- 5

HEALTH EFFECTS

Eyes:	Severe irritation and burns with redness, blurred vision, pain and tearing
Skin:	Severe Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® (>4-hr breakthrough for <i>Aromatic Ketones</i>)
Coveralls:	DuPont Tychem® Responder® (>8-hr breakthrough)
Respirator:	<3 mg/m ³ -full facepiece APR with Organic vapor filters and N100 prefilter >3 mg/m ³ -Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.





Common Name: CHLOROBENZENE

Synonyms: Benzene Chloride; Phenyl Chloride CAS No: 108-90-7 Molecular Formula: C_6H_5Cl RTK Substance No: 0379

Description: Colorless to yellowish liquid with an almond-like odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 1134 ERG Guide #: 130 Hazard Class: 3 (Elammable)	FLAMMABLE LIQUID Use dry chemical, CO ₂ or foam as extinguishi Water may not be effective in fighting fires, bu used to blanket fire. POISONOUS GASES ARE PRODUCED IN F including <i>Hydrogen Chloride</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed contain		tinguishing agents. I fires, but may be CED IN FIRE, <i>osgene</i> . RE. I containers cool. rostatic charges	Chlorobenzene may react explosively with powdered SODIUM and mixtures of PHOSPHORUS TRIFLUORIDE and SODIUM. Chlorobenzene may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, ALUMINUM and POTASSIUM); NITRIC ACID; and DIMETHYL SUI FOXIDE
SPI	LL/LEAKS		l	PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 50 meters (150 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of Chlorobenzene. Keep Chlorobenzene out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Chlorobenzene is harmful to aquatic life in very low			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Ter Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potent Molecular Weigh	Almond-like odor $82^{\circ}F (28^{\circ}C)$ 1.3% 9.6% mp: $1,099^{\circ}F (593^{\circ}C)$ 3.9 (air = 1) $8.8 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 1.1 (water = 1) Very slightly soluble $270^{\circ}F (132^{\circ}C)$ $-50^{\circ}F (-46^{\circ}C)$ tial: 9.1 eV t: 112.6
EXPOSURE LIMITS			Р	ROTECTIVE EQUIPMENT
OSHA: 75 ppm, 8-hr TWA ACGIH: 10 ppm, 8-hr TWA IDLH: 1,000 ppm The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 150 ppm PAC-3 = 400 ppm			Gloves: Po (> Coveralls: Ty Tr Respirator: >1	olyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® 8-hr breakthrough) vchem® CPF 4, BR, LV, Responder®, and TK; and ellchem® HPS and VPS (>8-hr breakthrough) 10 ppm - Supplied air or SCBA
HEALTH EFFECTS			FIRST	AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Nose an Headacl and pas	, rash and burning feeling Id throat irritation he, dizziness, lightheadedness, sing out		Remove the perso Flush eyes with la contact lenses if v Quickly remove c large amounts of Begin artificial res Transfer promptly	on from exposure. arge amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with soap and water. spiration if breathing has stopped and CPR if necessary. v to a medical facility.



Common Name: CHLORODIFLUOROETHANE

Synonyms: Difluoro-1- Chloroethane; Freon 142 CAS No: 75-68-3 Molecular Formula: $C_2H_3CIF_2$ RTK Substance No: 0385 Description: Colorless gas with a slight *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE GAS	Chlorodifluoroethane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
4 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	including Phosgene, Hydrogen Fluoride, Hydrogen	NITRATES, CHLORINE, BROMINE and ELLIORINE): ALKALLMETALS (such as LITHILIM
DOT#: UN 2517 ERG Guide #: 115	Chloride, Fluorine and Carbonyl Fluoride. CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool, but	SODIUM and POTASSIUM); and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM).
Hazard Class: 2.1 (Flammable gas)	FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	DO NOT expose Chlorodifluoroethane to HEAT, FLAMES or RED HOT METAL as it will decompose to form <i>Hydrogen Fluoride</i> and <i>Phosgene gases</i> .

SPILL/LEAKS

Isolation Distance:

- Small Spill: 120 meters (400 feet)
- Large Spill or Leak: 1,000 meters (3,000 feet)

Fire: 1,600 meters (1 mile)

Turn leaking cylinder with the leak up to prevent escape of the gas in liquid form.

May cause ozone depletion.

EXPOSURE LIMITS

ERPG-1: 10,000 ppm ERPG-2: 15,000 ppm ERPG-3: 25,000 ppm

HEALTH EFFECTS

Eyes:No informationSkin:FrostbiteInhalation:Headache, dizziness, lightheadedness,
irregular heartbeat

PHYSICAL PROPERTIES

Odor Threshold:	Slightly ethereal
Flash Point:	Flammable gas
LEL:	6%
UEL:	17.9%
Auto Ignition:	1,170°F (632°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	2,540 mm Hg at 77°F (25°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	14.4°F (-9.8°C)
Freezing Point:	-203°F (-130.8°C)
Molecular Weight:	100.47

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene
Coveralls:	Clothing designed to prevent freezing of body tissues
Respirator:	>10,000 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CHLORODIFLUOROMETHANE

Synonyms: Difluoromonochloromethane; Freon 22®; Genetron-22® CAS No: 75-45-6 Molecular Formula: CHCIF₂ RTK Substance No: 0386 Description: Colorless gas with a slight *Ether*-like odor which is shipped as a liquified gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chlorodifluoromethane	Liquified Chlorodifluoromethane, poured into WATER, can be violently explosive.
0 - Fire	itself does not burn.	Contact with red-hot METAL forms toxic gases of Chlorine,
0 - Reactivity	Use water spray to reduce vapors.	Fluorine, Phosgene and Carbonyl Chloride.
DOT#: UN 1018 ERG Guide #: 126 Hazard Class: 2.2	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> , <i>Hydrogen</i> <i>Fluoride</i> , <i>Phosgene</i> , and <i>Carbonyl Chloride</i> . CONTAINERS MAY EXPLODE IN FIRE.	Chlorodifluoromethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); ALKALINE
(Nonflammable gas)	Use water spray to keep fire-exposed	EARTH METALS (such as BERYLLIUM, MAGNESIUM and
	containers cooi.	(such as HYDROCHLORIC, SULFURIC and NITRIC); and CHEMICALLY ACTIVE METALS (such as ZINC).

SPILL/LEAKS

Isolation Distance:

Large Spill: 500 meters (1/3 mile)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak

or allow cylinder to empty.

Chlorodifluoromethane is heavier than air and may accumulate in low ceiling spaces causing *Oxygen* deficiency.

Chlorodifluoromethane may be hazardous to the environment. It will accumulate and disperse in the atmosphere and damage the ozone layer.

EXPOSURE LIMITS

NIOSH: 1,000 ppm, 10-hr TWA; 1,250 ppm STEL

ACGIH: 1,000 ppm, 8-hr TWA

HEALTH EFFECTS

Eyes:	Irritation, contact with liquid causes frostbite
Skin:	Irritation, contact with liquid causes frostbite
Inhalation:	Nose, throat and lung irritation with tightness in the chest and difficulty in breathing
	Headache, nausea, dizziness, loss of coordination, passing out, and death

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ether</i> -like odor
Flash Point:	Nonflammable
Vapor Density:	2.9 (air = 1)
Vapor Pressure:	7,144 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	-41°F (-40.7°C)
Melting Point:	-251°F (-157°C)
Ionization Potential:	12. 5 eV
Molecular Weight:	86.5

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Freons</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK; Zytron® 500; ONESuit®TEC; and Trellchem® (>8-hr breakthrough for <i>Halogenated compounds</i>)
Respirator:	Supplied air or SCBA
FIRST AID AND DECONTAMINATION	
Remove the p	person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove

contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility



Common Name: CHLOROFORM

Synonyms: Trichloromethane; Formyl Trichloride CAS No: 67-66-3 Molecular Formula: CHCl₃ RTK Substance No: 0388 Description: Colorless liquid, with a pleasant, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chloroform itself does not	Chloroform reacts with CHEMICALLY ACTIVE METALS
0 - Fire	burn.	ALUMINUM; STRONG BASES (such as SODIUM
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	HYDROXIDE and POTASSIUM HYDROXIDE); and OXIDIZING AGENTS (such as PERCHI ORATES
DOT#: UN 1888	and Phosgene.	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 151	Use water spray to keep fire-exposed containers	NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
Hazard Class: 6.1	cool.	Chloroform is not compatible with ALKALI METALS (such
(Poison)		as LITHIUM); MIXTURES of WATER and STRONG ALCOHOLS; ACETONE; PERCHLORIC ACID; DINITROGEN DIOXIDE; NITROGEN TETROXIDE; and DISILANE.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Toxic to aquatic life.

EXPOSURE LIMITS

OSHA:	50 ppm, Ceiling
NIOSH:	2 ppm, 60-min STEL
ACGIH:	10 ppm, 8-hr TWA

IDLH LEVEL: 500 ppm **PAC** PAC-1 = 2 ppm: PAC-2 = 64

 PAC
 PAC-1 = 2 ppm; PAC-2 = 64 ppm;

 LEVELS:
 PAC-3 = 3,200 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns, tearing
Skin:	Irritation, burns, drying and cracking
Inhalation:	Nose and throat irritation
	Headache, nausea, dizziness and passing out
Chronic:	Cancer (liver, kidney, thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Ionization Potential:
Molecular Weight:

2.4 to 85 ppm Noncombustible 4.12 (air = 1) 160 mm Hg at 68°F (20°C) 1.5 (water = 1) Very slightly soluble 143°F (62°C) -82°F (-64°C) 11.42 eV 119.4

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield $@/4H$ and Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 4, BR, LV, Responder®, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® PRO (>8-hr breakthrough)
Respirator:	>2 ppm - Pressure demand supplied-air>500 ppm - Pressure demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: 2-(4-CHLORO-2-METHYLPHENOXY)PROPIONIC ACID

Synonyms: MCPP; MECOPROP; 2-(2-Methyl-4-Chlorophenoxy)Propionic Acid CAS No: 93-65-2 Molecular Formula: $C_{10}H_{11}CIO_3$ RTK Substance No: 3093

Description: Odorless, colorless to brown, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	2-(4-Chloro-2-Methylphenoxy)Propionic Acid does not burn, however, it may be dissolved in a	2-(4-Chloro-2-Methylphenoxy)Propionic Acid is not compatible with STRONG ACIDS (such as
0 - Fire	liquid carrier that may be flammable or	HYDROCHLORIC, SULFURIC and NITRIC) and
0 - Reactivity	combustible. POISONOUS GASES ARE PRODUCED IN FIRE.	CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
DOT#: UN 2765	including Hydrogen Chloride.	2-(4-Chloro-2-Methylphenoxy)Propionic Acid attacks
ERG Guide #: 152	Use water spray to keep fire-exposed containers	some forms of COATINGS and METALS in the presence
Hazard Class: 6.1		
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

2-(4-Chloro-2-Methylphenoxy)Propionic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for 2-(4-Chloro-2-Methyl-phenoxy)Propionic Acid.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
Vapor Pressure:	2.3 x 10 ⁻⁶ mm Hg at 68°F (20°C)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	201°F (94°C)
Molecular Weight:	214.7

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®

Respirator: SCBA

FIRST AID AND DECONTAMINATIO	N
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Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, convulsions, and loss of coordination, unconsciousness and coma
Chronic:	Cancer (lymphatic system) in humans

HEALTH EFFECTS



Common Name: 4-CHLOROPHENOL

Synonyms: p-Chlorophenol; 4-Hydroxychlorobenzene CAS No: 106-48-9 Molecular Formula: C₆H₅CIO RTK Substance No: 0401

Description: Colorless to yellow crystal with an unpleasant, penetrating odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	CORROSIVE	4-Chlorophenol is not compatible with OXIDIZING		
1 - Fire	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or foam as	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE); ORGANIC		
DOT#: UN 2020	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> and <i>Hydrogen Chloride</i> .	ACIDS; and IRON.		
ERG Guide #: 153				
Hazard Class: 6.1				
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

4-Chlorophenol is toxic to aquatic organisms and may cause long term effects to the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for **4-Chlorophenol**.

The Protective Action Criteria values are:

 $PAC-1 = 400 \text{ mg/m}^3$

 $PAC-2 = 400 \text{ mg/m}^3$

PAC-3 = 400 mg/m^3

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, restlessness, seizures, coma, and even death

PHYSICAL PROPERTIES

Odor Threshold:	30 ppm
Flash Point:	250°F (121°C)
Vapor Density:	4.4 (air = 1)
Vapor Pressure:	0.1 mm Hg at 68°F (20°C)
Specific Gravity:	1.31 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	428°F (220°C)
Melting Point:	110°F (43°C)
Molecular Weight:	128.6

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >400 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: o-CHLOROTOLUENE

Synonyms: 2-Chlorotoluene; o-Tolyl Chloride CAS No: 95-49-8 Molecular Formula: C_7H_7CI RTK Substance No: 1425 Description: Colorless liquid with a strong, irritating odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 2238 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> and <i>Hydrogen Chloride</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Do not get water into containers. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		or foam as ICED IN FIRE, <i>hloride.</i> FIRE. ed containers cool. Do nition and flash back. avel a distance to le source.	 o-Chlorotoluene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). o-Chlorotoluene reacts with WATER to form toxic <i>Hydrogen Chloride gas</i>. o-Chlorotoluene is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and may react with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID FUMES; and ELEVATED TEMPERATURES to form toxic <i>Chlorine gas</i>.
SPI	LL/LEAKS		Pł	IYSICAL PROPERTIES
Isolation Distance: Small Spills: 50 mete Large Spills: 300 met Fire: 800 meters (1/2 Absorb liquids in verm similar material and d DO NOT wash into se May bioaccumulate in	s (150 feet) ers (1,000 feet) mile) iculite, dry sand, earth, or a eposit in sealed containers. wer. aquatic life.		Odor Threshold: Flash Point: LEL: UEL: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potential: Molecular Weight:	0.32 ppm 96° to 117°F (35° to 47°C) 1.36% 7.1% 4.4 (air = 1) 4 mm Hg at 77°F (25°C) 1.08 (water = 1) Slightly soluble 318°F (159°C) 8.83 eV 126.6
EXPO	SURE LIMITS		PR	OTECTIVE EQUIPMENT
OSHA: None NIOSH: 50 ppm, 10 ACGIH: 50 ppm, 8-1 IDLH: None	hr TWA; 75 ppm, 15- min STEL		Gloves: Silv. Ha. Coveralls: DuF Zytr brea Respirator: >50 cart >50	er Shield®/4H® and Viton (>8-hr breakthrough for logenated Hydrocarbons) Pont Tychem® BR, LV, Responder® and TK; Kappler® on® 500; and Saint-Gobain ONESuit® TEC, (>8-hr akthrough for <i>Aromatic Halogens</i>) ppm -Full facepiece APR with Organic vapor ridge 0 ppm - Supplied air
HEAL	TH EFFECTS		FIRST A	ID AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, th coughin breathDizzine: convuls	and burns and burns nroat and lung irritation with g, wheezing and shortness of ss, loss of coordination, ions and coma		Remove the person f Flush eyes with large contact lenses if wor Quickly remove cont large amounts of soa Begin artificial respira Transfer to a medica	rom exposure. amounts of water for at least 15 minutes. Remove n. Seek medical attention. aminated clothing and wash contaminated skin with up and water. Seek medical attention. ation if breathing has stopped and CPR if necessary. I facility.



Common Name: CHROMIC CHLORIDE

Synonyms: Chromium Chloride; Chromium Trichloride CAS No: 10025-73-7 Molecular Formula: CrCl₃ RTK Substance No: 2248 Description: Odorless, purple or violet, flake-like, or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chromic Chloride itself does	Chromic Chloride reacts violently with LITHIUM and NITROGEN.
0 - Fire	not burn.	Chromic Chloride is not compatible with OXIDIZING
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Chlorine compounds.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: None	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); MOISTURE;
ERG Guide #: None	cool.	and WATER.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Chromic Chloride is a toxic water pollutant.

EXPOSURE LIMITS

OSHA: 0.5 mg/m^3 , 8-hr TWA NIOSH: 0.5 mg/m^3 , 8-hr TWA ACGIH: 0.5 mg/m^3 , 8-hr TWA IDLH: 25 mg/m^3 (All of the above are for *Chromium*) The Protective Action Criteria values are: PAC-1 = 4.57 mg/m³

 $PAC-2 = 7.61 \text{ mg/m}^3$

 $PAC-3 = 76.1 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Specific Gravity:	2.8 (water = 1)
Water Solubility:	Insoluble (Reacts)
Boiling Point:	2,373°F (1,300°C)
Melting Point:	2,106°F (1,152°C)
Molecular Weight:	158.35

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.5 mg/m ³ - full facepiece APR with High efficiency filters >5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: CHROMIUM

Synonyms: Chrome; Metallic Chromium CAS No: 7440-47-3 Molecular Formula: Cr RTK Substance No: 0432 Description: Hard, gray, odorless solid with a metallic luster

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chromium itself does not burn.	Chromium may react violently or explosively with AMMONIUM NITRATE; CARBON DIOXIDE	
3 - Fire	Chromium in <i>powder</i> form is FLAMMABLE	ATMOSPHERES; BROMINE PENTAFLUORIDE;	
0 - Reactivity	and a DANGEROUS FIRE HAZARD. It may also spontaneously explode in air.	Chromium is not compatible with OXIDIZING AGENTS	
DOT#: UN 3089	Use dry sand or dry chemical extinguishing agents	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES	
ERG Guide #: 170		CHLORINE, BROMINE and FLUORINE); STRONG	
Hazard Class: 4.1 (Flammable Solid)	CONTAINERS MAY EXPLODE IN FIRE. DO NOT get water inside container.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC and SULFURIC); and ALKALI METALS (such as SODIUM and POTASSIUM).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Keep **Chromium** *powder* out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA

 NIOSH:
 0.5 mg/m³, 8-hr TWA

 ACGIH:
 0.5 mg/m³, 8-hr TWA

 IDLH:
 250 mg/m³

The Protective Action Criteria values are: PAC-1 = 1.5 mg/m^3 PAC-3 = 250 mg/m^3

PAC-2 = 2.5 mg/m³

HEALTH EFFECTS	
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Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fever and chills

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid, Flammable powder
Vapor Pressure:	<0 mm Hg at 68°F (20°C) (approximate)
Specific Gravity:	7.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,788°F (2,642°C)
Melting Point:	3,452°F (1,900°C)
Molecular Weight:	52

PROTECTIVE EQUIPMENT

Gloves: Nitrile or Natural Rubber

Coveralls: Tyvek®

Respirator: >0.5 mg/m³ - full facepiece APR with High efficiency filters >1.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CHRYSENE

Synonyms: Benzo(a)phenanthrene CAS No: 218-01-9 Molecular Formula: C₁₈H₁₂ RTK Substance No: 0441 Description: Colorless to white, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	DOES NOT BURN	Chrysene is not compatible with OXIDIZING AGENTS
0 - Fire	Use dry chemical, CO_2 , water spray or foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	Use water spray to keep fire-exposed	
ERG Guide #: 171	containers cool.	
Hazard Class: 9 (Miscellaneous Hazardous Materials)		

Isolation Distance:
Spill: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Moisten spilled material first or use a HEPA-filter vacuum for clean-up.
DO NOT wash into sewer.
May biodegrade in water.

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	Noncombustible
Vapor Pressure:	6.3 x 10.9 mm Hg at 68°F (20°C)
Specific Gravity:	1.27 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	838°F (448°C)
Melting Point:	491° to 493°F (255° to 256°C)
Ionization Potential:	7.59+/-0.2 eV
Molecular Weight:	228.3

EXPOSURE LIMITS

OSHA:	0.2 mg/m ³ , 8-hr TWA
NIOSH:	0.1 mg/m ³ , 10-hr TWA
ACGIH:	Lowest level possible
IDLH:	80 mg/m ³
	(All of the above as Coal Tar Pitch Volatile)

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile or Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Supplied air >80 mg/m3 - SCBA

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.

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Eyes:	Irritation
Skin:	Irritation, rash or sunburn with blisters can occur if contaminated skin is exposed to sunlight
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Cancer (skin, liver, lungs) in animals

HEALTH EFFECTS



Common Name: C.I. FOOD RED 15

Synonyms: Basic Violet 10; Food Red 15; Rhodamine B CAS No: 81-88-9 Molecular Formula: $C_{28}H_{31}CIN_2O_3$ RTK Substance No: 0505 Description: Green crystalline or reddish-violet, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	C.I. Food Red 15 may burn, but does not readily ignite.	C.I. Food Red 15 is not compatible with OXIDIZING
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PERMANGANATES, CHI ORATES, NITRATES,
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen</i>	
ERG Guide #: None	Chloride.	
Hazard Class: None	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 1.25 mg/m^3

- $PAC-2 = 7.5 \text{ mg/m}^3$
- $PAC-3 = 50 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing, wheezing and chest tightness Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	May burn
Water Solubility:	Soluble
Melting Point:	329°F (165°C)
Molecular Weight:	479

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

- **Respirator:** <1.25 mg/m³ Full facepiece APR with *Organic vapor* filter and *High efficiency* prefilters
 - >1.25 mg/m³ Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: COAL TAR PITCH

Synonyms: Coal Tar Pitch Volatiles; Coal Tar; Pitch CAS No: 65996-93-2 Molecular Formula: Mixture RTK Substance No: 0519 Description: Dark brown to black, thick liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	FLAMMABLE LIQUID	Coal Tar Pitch is not compatible with OXIDIZING
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1136	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE).
ERG Guide #: 128	Coal Tar Pitch may form an ignitable vapor/air	
Hazard Class: 3	mixture in closed tanks or containers.	
(Flammable)		

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Coal Tar Pitch**.

Keep **Coal Tar Pitch** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Coal Tar Pitch may be hazardous to the environment, especially to aquatic organisms, and may cause long- term effects.

EXPOSURE LIMITS

OSHA: 0.2 mg/m³, 8-hr TWA (**Coal Tar Pitch** *volatiles*)

NIOSH: 0.1 mg/m³, 10-hr TWA (**Coal Tar Pitch** *volatiles*) **ACGIH:** 0.2 mg/m³, 8-hr TWA (**Coal Tar Pitch** *volatiles*)

IDLH: 80 mg/m³ (Coal Tar Pitch *volatiles*)

The Protective Action Criteria values are:

PAC-1 = 0.6 mg/m³ PAC-2 = 12.5 mg/m³ PAC-3 = 80 mg/m³

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation, rash and burning feeling	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, dizziness, irritability, fainting and coma	
Chronic:	Causes (lung, kidney, and skin) cancer in humans	

PHYSICAL PROPERTIES

Odor Threshold:	<i>Coal Tar</i> odor
Flash Point:	81° to 405°F (27° to 207°C)
Auto Ignition Temp:	>932°F (500°C)
Vapor Pressure:	<1 mm Hg at 77°F (25°C)
Specific Gravity:	>1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	>482°F (250°C)
Molecular Weight:	Mixture

PROTECTIVE EQUIPMENT

Gloves:	Silvershield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)

Coveralls: Tychem® SL and Responder® (>8-hr breakthrough for *Hydrocarbons, Aromatic Polynuclear*)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts soap and water.



Common Name: COBALT NAPHTHENATE

Synonyms: Cobalt Naphtha; Naftolite CAS No: 61789-51-3Molecular Formula: Co(C₁₁H₁₀ O₂)₂ RTK Substance No: 0523

Description: Brown powder or bluish-red solid which is often used in a solution of Mineral Oil or Mineral Spirits

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2- Health 2 - Fire 0 - Reactivity DOT#: UN 2001	Use dry chemical, CO ₂ , water spray or foam as extinguishing agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cobalt Oxide</i> . Use water spray to keep fire-exposed containers cool.	Cobalt Naphthenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as
ERG Guide #: 133 Hazard Class: 4.1	FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED.	HYDROCHLORIC, SULFURIC and NITRIC).
(Flammable solids)	Cobalt Naphthenate in powder or granular form may explode when mixed in air.	

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Aquatic life may be harmed by exposure to this chemical.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, skin allergy with itching and rash
Inholotion	Niene deue et en el lune e teste tiere unité

innaiation.	Nose, throat and lung imitation with
	coughing, wheezing and shortness of breath
Chronic:	Cobalt and Cobalt compounds may

cause lung cancer in humans.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless (solution may have Mineral Spirits odor)
Flash Point:	121°F (49°C)
LEL:	0.07%
UEL:	6%
Auto Ignition Temp:	529°F (276°C)
Vapor Density:	3.9 (air = 1)
Vapor Pressure:	1 mm Hg at 77°F (25°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	515°F (268°C)
Molecular Weight:	407

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Rubber or Nitrile for solid Cobalt Naphthenate
Coveralls:	DuPont Tyvek® for solid Cobalt Naphthenate
Respirator:	Full facepiece APR respirator with a High efficiency particulate filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: COPPER

Synonyms: Bronze Powder; Gold Bronze CAS No: 7440-50-8 Molecular Formula: Cu RTK Substance No: 0528 Description: Reddish-brown, odorless metal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire Copper itself does not burn	Finely divided Copper powder reacts violently on contact with OXIDIZING AGENTS (such as PERCHI ORATES
1 - Fire	Finely divided Copper powder may burn in air or	PEROXIDES, PERMANGANATES, CHLORATES,
1 - Reactivity	become an explosion hazard.	NITRATES, CHLORINE, BROMINE and FLUORINE);
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Copper fumes</i> and <i>Copper Oxides</i> .	POTASSIUM COMPOUNDS; SODIUM COMPOUNDS; and ACETYLENES
ERG Guide #: 171	Use water spray to keep fire-exposed containers	
Hazard Class: 9	cool.	HYDROCHI ORIC, SUI FURIC and NITRIC): 1-BROMO-
(Environmentally Hazardous Material)		2-PROPYNE; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ANHYDROUS AMMONIA.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Copper is a toxic water pollutant.

EXPOSURE LIMITS

OSHA:	1 mg/m³(Dust), 0.1 mg/m³(Fume), 8-hr TWA
NIOSH:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume), 10-hr TWA
ACGIH:	1 mg/m ³ (Dust), 0.2 mg/m ³ (Fume), 8-hr TWA
	(All the above are for Copper dust and fume)
IDLH:	100 mg/m ³ (as <i>Copper</i>)
PAC:	PAC-1 = 3 mg/m ³ ; PAC-2 = 33 mg/m ³
	$PAC-3 = 200 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
	Combustible/Explosive finely divided powder
Vapor Pressure:	1 mm Hg at 2,962°F (1,628°C)
Specific Gravity:	8.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,653°F (2,567°C)
Melting Point:	1,981ºF (1,083ºC)
Molecular Weight:	63.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	 >0.1 mg/m³ - Full facepiece APR with High efficiency filter >1 mg/m³ - Supplied air (Fume)
	>10 mg/m ³ - Supplied air (Dust/Mist)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: CUMENE

Synonyms: 2-Phenylpropane; Isopropylbenzene CAS No: 98-82-8 Molecular Formula: C_9H_{12} RTK Substance No: 0542 Description: Clear, colorless liquid with a sharp, penetrating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cumene is a FLAMMABLE LIQUID.	Cumene reacts violently with OXIDIZING AGENTS
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE);
DOT#: UN 1918	CONTAINERS MAY EXPLODE IN FIRE.	SULFURIC and NITRIC); and
ERG Guide #: 130	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	CHLOROSULFONIC ACID to cause fires and explosions.
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Cumene may form explosive <i>Peroxides</i> above 88°F (31°C).

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (150 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Keep **Cumene** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Cumene is a marine pollutant and is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	50 ppm, 8-hr TWA
NIOSH:	50 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA
IDLH:	900 ppm

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation, rash, and drying and cracking of the skin with redness
Inhalation:	Nose and throat irritation
	Headache, dizziness, loss of coordination, lightheadedness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.032 ppm
Flash Point:	92°F (33°C)
LEL:	0.9%
UEL:	6.5%
Auto Ignition:	797°F (425°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	8 mm Hg at 68°F (20°C)
Specific Gravity:	0.86 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	306°F (152°C)
Ionization Potential:	8.8 eV
Molecular Weight:	120.2

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Viton (>8-hr breakthrough) DuPont Tychem® CPF 4, BR, LV, CSM, Responder®
	and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthough)
Respirator:	<500 ppm - Full facepiece APR with Organic vapor cartridges >500 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CUPRIC ACETATE

Synonyms: Copper Diacetate; Crystals of Venus CAS No: 142-71-2 Molecular Formula: Cu(CH₃COO)₂ RTK Substance No: 0546 Description: Blue-green, crystalline solid with a slight Acetic Acid odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cupric Acetate may burn, but does not readily ignite.	Cupric Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including Acetic Acid and Copper Oxides.	NITRIC); ACETYLENE; HYDRAZINE; MERCUROUS
ERG Guide #: 171		HYPOBROMITE.
Hazard Class: 9 (Environmentally Hazardous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or sodium bicarbonate and place into sealed containers for disposal.

Cover spill with plastic sheet to prevent dissolving in rain or fire fighting water.

DO NOT wash into sewer.

Cupric Acetate is very toxic to aquatic life and it persists and bioaccumulates in the environment.

EXPOSURE LIMITS

- 0.1 mg/m³, 8-hr TWA (as *Copper fume*) OSHA: NIOSH: 0.1 mg/m³, 10-hr TWA (as Copper fume) 0.2 mg/m³, 8-hr TWA (as *Copper fume*) ACGIH:
- IDLH: 100 mg/m³ (as *Copper*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

odor

Odor Threshold:	Acetic Acid odor
Flash Point:	Noncombustible
Specific Gravity:	1.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	239°F (115°C)
Molecular Weight:	199.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.1 mg/m³ - Full facepiece APR with High efficiency particulate filter >1 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

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Common Name: CUPRIC NITRATE

Synonyms: Copper Dinitrate; Cupric Dinitrate CAS No: 3251-23-8 Molecular Formula: Cu(HNO₃)₂ RTK Substance No: 0547 Description: Bluish-green, odorless crystalline material

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cupric Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Cupric Nitrate is a strong OXIDIZER which will react with REDUCING AGENTS and other READILY OXIDIZABLE
0 - Fire	combustion of other substances.	MATERIALS (such as LITHIUM, SODIUM, ALUMINUM
0 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire. Cupric Nitrate itself does not	and their HYDRIDES); COMBUSTIBLE MATERIALS; ORGANICS; ACETIC ANHYDRIDES; ETHERS;
DOT#: UN 1477	burn.	POTASSIUM FERROCYANIDE; and <i>finely divided</i> TIN.
ERG Guide #: 140	POISONOUS GASES ARE PRODUCED IN FIRE,	Cupric Nitrate is not compatible with ACETYLENE;
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	POTASSIUM AMIDE; SODIUM HYPOBROMITE; METALS; and METAL SALTS.
	Cupric Nitrate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Moisten spilled material first or use a HEPA-filter
- vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Cupric Nitrate is very toxic to aquatic life and bioaccumulates.

EXPOSURE LIMITS

- **OSHA:** 0.1 mg/m³, 8-hr TWA (*Copper fume*)
- **NIOSH:** 0.1 mg/m³, 10-hr TWA (*Copper fume*)
- **ACGIH:** 0.2 mg/m³, 8-hr TWA (*Copper fume*)
- **IDLH:** 100 mg/m³ (as *Copper*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless Nonflammable 2.3 (*Anhydrous*) (water = 1) Soluble 338°F (170°C) (*Anhydrous*) 491° to 493°F (255° to 256°C) 187.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.1 mg/m 3 - Full facepiece APR with High efficiency filter
	>1 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CUPRIC SULFATE

Synonyms: Copper Sulfate; Blue Vitriol CAS No: 7758-98-7 Molecular Formula: CuSO₄ RTK Substance No: 0549 Description: Odorless, white or bluish-white granule or crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable	Cupric Sulfate reacts with MAGNESIUM to produce flammable and
0 - Fire	Sulfate itself does not burn.	shock-sensitive Copper Acetylides.
0 - Reactivity	POISONOUS GASES ARE	Cupric Sulfate will ignite HYDROXYLAMINE.
• nouenny	PRODUCED IN FIRE, including	Cupric Sulfate is not compatible with AMINES; METALS (such as
DOT#: UN 3077	Copper Oxides and Sulfur Oxides.	IRON, POTASSIUM, MAGNESIUM and ZINC); REDUCING
ERG Guide #: 171		AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: 0		HYDRIDES); OXIDIZING AGENTS (SUCH as PERCHLORATES,
(Environmontally		PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
		CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as
Hazardous Substance)		SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);
		ISOCYANATES; SODIUM HYPOBROMITE; AMMONIA; and
		NITROMETHANE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Cover spill with plastic sheet to prevent dissolving in rain or firefighting water.

DO NOT wash into sewer.

Cupric Sulfate is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

OSHA:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume), 8-hr TWA
NIOSH:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume),10-hr TWA
ACGIH:	1 mg/m ³ (Dust), 0.2 mg/m ³ (Fume), 8-hr TWA
	(All the above are for Copper dust and fume)
IDLH:	100 mg/m ³ (as <i>Copper</i>)
PAC:	PAC-1 = 7.5 mg/m ³ ; PAC-2 = 10 mg/m ³
	$PAC_3 = 50 \text{ mg/m}^3$

PAC-3 = 59 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, nausea, vomiting and
abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,040° to 1,202°F (560° to 650°C)
Melting Point:	>392°F (>200°C)
Molecular Weight:	249.7

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Polyvinyl Chloride
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Full facepiece APR with High efficiency particulate filter
	>1 mg/m ³ - Supplied air (Fume)
	>10 mg/m ³ - Supplied air (Dust/Mist)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CYCLOHEXANE

Synonyms: Benzene Hexahydride; Hexahydrobenzene; Hexamethylene CAS No: 110-82-7 Molecular Formula: C_6H_{12} RTK Substance No: 0565 Description: Colorless liquid with a sweet, pungent odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires.	Cyclohexane reacts explosively with NITRATES; NITROGEN DIOXIDE; and DINITROGEN TETRAOXIDE.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	Cyclohexane is not compatible with OXIDIZING AGENTS (such as
DOT#: UN 1145	Use water spray to keep fire-exposed containers cool.	PERCHLORATES, PEROXIDES,
ERG Guide #: 128 Hazard Class: 3	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
(Flammable)	Cyclohexane may form an ignitable vapor/air mixture in closed tanks or containers.	,

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Metal containers involving the transfer of **Cyclohexane** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclohexane**.

DO NOT wash into sewer.

Cyclohexane is harmful to aquatic life.

EXPOSURE LIMITS

 OSHA:
 300 ppm, 8-hr TWA

 NIOSH:
 300 ppm, 10-hr TWA

 ACGIH:
 100 ppm, 8-hr TWA

 IDLH:
 1,300 ppm

The Protective Action Criteria values are: PAC-1 = 300 ppm PAC-2 = 1,700 ppm PAC-3 = 10,000 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	25 ppm
Flash Point:	-4°F (-20°C)
LEL:	1.3%
UEL:	8.4%
Auto Ignition Temp:	473°F (245°C)
Vapor Density:	2.9 (air = 1)
Vapor Pressure:	95 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	177ºF (81ºC)
Freezing Point:	44°F (7°C)
Ionization Potential:	9.88 eV
Molecular Weight:	84.2

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>100 ppm - full facepiece APR with Organic vapor cartridges
	>300 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CYCLOHEXANONE

Synonyms: Cyclohexyl Ketone; Pimelic Ketone CAS No: 108-94-1 Molecular Formula: $C_6H_{10}O$ RTK Substance No: 0570

Description: Clear, colorless to pale yellow liquid with a mint or Acetone-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Cyclohexanone is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol-resistant	Cyclohexanone forms an explosive <i>Peroxide</i> with HYDROGEN PEROXIDE and NITRIC ACID.
2 - Fire	foam as extinguishing agents.	Cyclohexanone reacts with OXIDIZING AGENTS
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	(such as PERCHLORATES, PEROXIDES,
DOT#: UN 1915	CONTAINERS MAY EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE) and
ERG Guide #: 127	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	
	Cyclohexanone may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Metal containers involving the transfer of **Cyclohexanone** should be grounded and bonded. Use only non-sparking tools and equipment, especially

when opening and closing containers of **Cyclohexanone**.

EXPOSURE LIMITS

- OSHA: 50 ppm, 8-hr TWA NIOSH: 25 ppm, 10-hr TWA ACGIH: 20 ppm, 8-hr TWA; 50 ppm STEL
- IDLH: 700 ppm

The Protective Action Criteria values are: PAC-1 = 50 ppm PAC-2 = 50 ppm PAC-3 = 700 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.12 to 100 ppm
Flash Point:	111°F (44°C)
LEL:	1.1%
UEL:	9.4%
Auto Ignition Temp:	788°F (420°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	5.2 mm Hg at 77°F (25°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	313°F (156°C)
Freezing Point:	3°F (-16°C)
Ionization Potential:	9.14 eV
Molecular Weight:	98.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Polyvinyl Alcohol, SilverShield $\mathbb{R}/4H$ and Barrier $(>8-hr$ breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>20 ppm - full facepiece APR with <i>Organic vapor filters</i> >200 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CYCLOHEXENE

Synonyms: Benzene Tetrahydride; 1,2,3,4-Tetrahydrobenzene CAS No: 110-83-8 Molecular Formula: C_6H_{10} RTK Substance No: 0572 Description: Clear, colorless liquid with a sweet odor

HAZARI	

Hazard Rating	Firefighting	Reactivity
1 - Health 3 - Fire 0 - Reactivity	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents. Water may not be effective in fighting fires.	Cyclohexene may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2256 ERG Guide #: 130 Hazard Class: 3 (Flammable)	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire, explosion, or flashback far from the source.	Cyclohexene can form explosive Peroxides in AIR and may polymerize when exposed to STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
Hazard Class: 3 (Flammable)	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire, explosion, or flashback far from the source. Flow or agitation may generate electrostatic charges.	NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of

Cyclohexene.

Keep **Cyclohexene** out of confined spaces, such as sewers, because of the possibility of an explosion.

- OSHA:
 300 ppm, 8-hr TWA

 NIOSH:
 300 ppm, 10-hr TWA

 ACGIH:
 300 ppm, 8-hr TWA

 IDLH:
 2,000 ppm

 The Protective Action Criteria values are:
 PAC-1 = 300 ppm
 - PAC-3 = 500 ppm

HEALTH EFFECTS

Eyes:	Irritation
	Irritation
Skin:	Nose and throat irritation with coughing and wheezing
Inhalation:	Dizziness, lightheadedness, tremors (shakes), collapse and coma.

PHYSICAL PROPERTIES

Odor Threshold:	0.18 to 0.36 ppm
Flash Point:	11°F (-11.7°C)
LEL:	1.2%
UEL:	5%
Auto Ignition Temp:	471° to 590°F (244° to 310°C)
Vapor Density:	2.8 (air = 1)
Vapor Pressure:	67 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	181°F (83°C)
Freezing Point:	-154°F (-103°C)
Ionization Potential:	8.95 eV
Molecular Weight:	82.14

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, SilverShield®/4H® and Barrier (>8-hr breakthrough for <i>Hydrocarbons, alicyclic, saturated</i>)
Coveralls:	Tychem® F, BR, Responder® and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons, alicyclic, saturated</i>)
Respirator:	>300 ppm - full facepiece APR with <i>Organic vapor cartridges</i> >500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CYCLOHEXYLAMINE

Synonyms: 1-Aminocyclohexane; Hexahydroaniline; Cyclohexanamine CAS No: 108-91-8 Molecular Formula: $C_6H_{13}N$ RTK Substance No: 0576 Description: Clear, colorless to yellow liquid with a strong, fishy odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents	Cyclohexylamine is a STRONG BASE that can react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity	Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE,	BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
DOT#: UN 2357	including Nitrogen Oxides and Ammonia. CONTAINERS MAY EXPLODE IN FIRE.	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to release flammable and explosive <i>Hydrogen gas</i> .
Hazard Class: 8 (Corrosive)	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash	Cyclohexylamine is not compatible with ISOCYANATES; ORGANIC COMPOUNDS; LEAD; EPOXIDES; ACID CHLORIDES; and ACID ANHYDRIDES.
	back. Cyclohexylamine may form an ignitable vapor/air mixture in closed tanks or containers.	Cyclohexylamine attacks ALUMINUM, COPPER and ZINC.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclohexylamine**.

Metal containers involving the transfer of **Cyclohexylamine** should be grounded and bonded.

Keep **Cyclohexylamine** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Cyclohexylamine is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:NoneNIOSH:10 ppm, 10-hr TWAACGIH:10 ppm, 8-hr TWAIDLH:NoneThe Protective Action Criteria values are:PAC-1 = 1.8 ppmPAC-2 = 8.6 ppmPAC-3 = 30 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, lightheadedness, anxiety and passing out

PHYSICAL PROPERTIES

Odor Threshold:	2.6 ppm
Flash Point:	88°F (31°C)
LEL:	1.5%
UEL:	9.4%
Auto Ignition Temp:	560°F (293°C)
Vapor Density:	3.42 (air = 1)
Vapor Pressure:	11 mm Hg at 68°F (20°C)
Specific Gravity:	0.865 (water = 1)
Water Solubility:	Very soluble
Boiling Point:	274°F (134°C)
Freezing Point:	0.1°F (-17.7°C)
pH:	11.5
Ionization Potential:	8.37 eV
Molecular Weight:	99.2

	PROTECTIVE EQUIPMENT
Gloves:	SilverShield®/4H® and Barrier® (>4-hr breakthrough for Amines, aliphatic and alicyclic)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Amines, aliphatic</i> and <i>alicyclic</i>) >10% of the LEL use flash protection or turnout gear
Respirator:	>10 ppm - full facepiece APR with Organic vapor cartridges>30 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: CYCLONITE

Synonyms: Hexogen; RDX CAS No: 121-82-4 Molecular Formula: $C_3H_6N_6O_6$ RTK Substance No: 0579 Description: White, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health * - Fire	* EXPLOSIVE Evacuate and let the fire burn or use large amounts of water from a sheltered position.	Cyclonite detonates on contact with MERCURY FULMINATE. Detonation can also be initiated by SUDDEN SHOCK, HIGH TEMPERATURE and/or FRICTION.
* - Reactivity DOT#: UN 0483 ERG Guide #: 112 Hazard Class: 1.1 (Explosive)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool. Cyclonite may ignite combustibles (wood, paper and oil).	Cyclonite reacts violently with COMBUSTIBLES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Small Spill: 500 meters (1/3 mile)

Large Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Use a cleanup specialist .

Keep **Cyclonite** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	1.5 mg/m ³ , 10-hr TWA; 3 mg/m ³ , 15-min STEL
ACGIH:	0.5 mg/m ³ , 8-hr TWA
IDLH:	None

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation, rash or burning feeling	
Inhalation:	Nose and throat irritation	
	Headache, nausea, vomiting, weakness, confusion and seizures	
Chronic:	Cancer (liver) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Explodes
Exothermic Decomp:	212°F (100°C)
Vapor Pressure:	4.1 x 10 ⁻⁹ mm Hg at 68°F (20°C)
Specific Gravity:	1.82 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	528° to 536°F (276° to 280°C)
Melting Point:	402°F (206°C)
Molecular Weight:	222.2

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with High efficiency filter >0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.





Common Name: CYCLOPROPANE

Synonym: Trimethylene CAS No: 75-19-4 Molecular Formula: C_3H_6 RTK Substance No: 0588

Description: Colorless gas, or a liquid under pressure, with a mild, sweet, Petroleum-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health	Cyclopropane is a FLAMMABLE GAS.	Cyclopropane may react with OXIDIZING AGENTS
4 - Fire	DO NOT extinguish fire unless flow can be stopped.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
DOT#: UN 1027	CYLINDERS MAY EXPLODE IN FIRE.	
ERG Guide #: 115	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 2.1	back.	
(Flammable gas)	Flow or agitation may generate electrostatic charge.	

SPILL/LEAKS

Isolation Distance:

Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

If Cyclopropane is leaked, take the following steps:

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep **Cyclopropane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 600 ppm PAC-2 = 4,000 ppm

PAC-3 = 6,000 ppm

HEALTH EFFECTS

Eyes:Contact with liquid causes frostbiteSkin:Contact with liquid causes frostbiteInhalation:Headache, dizziness, nausea, loss of
coordination, lightheadedness, and
passing outChronic:Irregular heartbeats (arrhythmias),
difficulty breathing, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Petroleum-like odor
Flash Point:	Flammable gas
LEL:	2.4%
UEL:	10.4%
Auto Ignition Temp:	928°F (498°C)
Vapor Density:	1.5 (air = 1)
Vapor Pressure:	5,400 mm Hg at 77°F (25°C)
Specific Gravity:	0.68 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	-29°F (-34°C)
Freezing Point:	-197°F (-127°C)
Ionization Potential:	9.86 eV
Molecular Weight:	42

	PROTECTIVE EQUIPINEINT
Gloves:	Silver Shield®/4H®, Viton and Barrier® over insulated gloves (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, saturated</i>)
Coveralls:	Tychem® CPF 3, F, BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, saturated</i>)
Respirator:	>600 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Immerse affected part in warm water. Seek medical attention.



Common Name: 2,4-D

Synonyms: 2,4-D Acid; Dichlorophenoxyacetic Acid CAS No: 94-75-7 Molecular Formula: $C_8H_6Cl_2O_3$ RTK Substance No: 0593 Description: White to yellow, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	2,4-D does not burn, however it is often dissolved in a liquid carrier which may be flammable or	2,4-D reacts with OXIDIZING AGENTS (such as PERCHI ORATES, PEROXIDES, PERMANGANATES
1 - Fire	combustible.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	Use dry chemical, water spray or foam as extinguishing agents.	FLUORINE) to cause fires and explosions.
DOT#: UN 2765	POISONOUS GASES ARE PRODUCED IN FIRE,	HYDROCHLORIC, SULFURIC and NITRIC) and
ERG Guide #: 152	including Phosgene and Hydrogen Chloride.	AMMONIA.
Hazard Class: 6.1	Use water spray to keep fire-exposed containers	2,4-D attacks some METALS and COATINGS.
(Poison)		

SPILL/LEAKS		PHY	SICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner or use a HEPA-filter vacuum, and deposit in sealed containers. DO NOT wash into sewer. Dangerous to aquatic and plant life. Marine pollutant.	Odor Thresho Flash Point: Vapor Densit Vapor Pressu Specific Grav Water Solubi Boiling Point Melting Point Molecular We	old: y: ıre: rity: lity: : : : ight:	Odorless Nonflammable 7.63 (air = 1) 0.4 mm Hg at 320 ⁰ F (160°C) 1.42 (water = 1) Slightly soluble 320°F (160°C) 280°F (138°C) 221
EXPOSURE LIMITS		PROT	ECTIVE EQUIPMENT
OSHA: 10 mg/m³, 8-hr TWA NIOSH: 10 mg/m³, 10-hr TWA ACGIH: 10 mg/m³, 8-hr TWA IDLH LEVEL: 100 mg/m³ PAC PAC-1 = 30 mg/m³; PAC-2 = 94 mg/m³; LEVELS: PAC-3 = 500 mg/m³	Gloves: Coveralls: Respirator:	Natural I DuPont Respond ONESui >10 mg/	Rubber and Silver Shield® <i>Tychem</i> ® Polycoat, SL, TF, TK, and der®; Kappler® Zytron® 300; and Saint-Gobain t® PRO m ³ - Full facepiece APR with Organic Vapor cartridges with high efficiency pre-filters or pressure demand supplied-air g/m ³ - Pressure demand SCBA
HEALTH EFFECTS	FIRS	T AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, throat and lung irritation with coughing and shortness of breath Headache, nausea, vomiting, muscle weakness, and poor coordination in arms and legsChronic:Chlorophenoxy herbicides cause non- Hodgkins lymphoma in humans	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: DECABROMODIPHENYL ETHER

Synonyms: Bis(Pentabromophenyl)Ether CAS No: 1163-19-5 Molecular Formula: C₁₂Br₁₀O RTK Substance No: 0598 Description: White to off-white powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	 Extinguish fire using an agent suitable for type of surrounding fire. Decabromodiphenyl Ether itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> and <i>Carbonyl Bromide</i>. Use water spray to keep fire-exposed containers cool. 	Decabromodiphenyl Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Protect from DIRECT SUNLIGHT, MOISTURE and STATIC DISCHARGE.

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Nonflammable <1 mm Hg at 68°F (20°C) 3 (water = 1) Insoluble 797°F (425°C) 560° to 577°F (293° to 303°C) 952 2
	Molecular Weight:	952.2

EXPOSURE LIMITS

No occupational exposure limits have been established for Decabromodiphenyl Ether.

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Natural Rubber and Polyvinyl Chloride
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>P100 filters</i> High levels - SCBA

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation	
Chronic:	Cancer (liver) in animals	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



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RIGHT TO KNOW



HAZARDOUS SUBSTANCE FACT SHEET

Common Name:	DECEMTHION
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Synonyms:	Phosmet; APPA; Imidan; Phthalophos; PMP; Prolate; Smidan
CAS Number:	732-11-6
Molecular Formula:	C ₁₁ H ₁₂ NO ₄ PS ₂
RTK Number:	0603
Description:	White, crystalline sand-like solid with an offensive odor, it can be dissolved in a liquid carrier

Hazard Rating	Firefighting		Reactivity	
Health: 3 Fire: 1 Reactivity: 1 DOT #: UN 2783/UN 3018 ERG #: 152 DOT Hazard: 6.1 (poison)	Use dry chemical, CO ₂ , water spray, or foam extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides,</i> <i>Phosphorous Oxides</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		Decemthion is not compatible with other PESTICIDES under ALKALINE conditions.	
SPILLS/LEAK	S	PHYSIC	AL PROPERTIES	
Isolation Distances: Iquid Spill: 50 meters (150 feet) Solid Spill: 25 meters (75 feet) Melting Point: 72 °C (161 °F) Fire: 800 meters (1/2 mile) Soluble Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Absorb <i>liquids</i> in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Collect <i>powdered</i> material in the most convenient and safe manner and deposit in sealed containers. DO NOT DRY SWEEP. Do not allow this substance to enter waterways, including the sewer system, as it is very toxic to aquatic life with long-lasting effects. Ventilate the area of spill or leak. Molecular Weight: 317.32			317.32 72 °C (161 °F) Soluble 4.9 x 10 ⁻⁷ mm Hg at 20 °C (68 °F)	
EXPOSURE LIM	ITS	PROTEC		
There are no occupational exposure limits for this substance. Gloves: Nitrile and Neoprene PAC: PAC-1 = 0.049 mg/m ³ Tychem® BR, CSM, and TK PAC-2 = 0.54 mg/m ³ Respirator: Supplied-air respirator, full facepiece, pressure-demand or other positive-pressure mode			and Neoprene n® BR, CSM, and TK ed-air respirator, full facepiece, sure-demand or other positive- sure mode	
ACUTE HEALTH EFFECTS FIRST AID AND DECONTAMINATION				
Eyes:Irritation, blurred visionSkin:IrritationInhalation:Headache, dizziness, chest twitching, loss of coordin coma, death	st tightness, nation, convulsions,	Immediately flush with 15 minutes. Quickly remove contar area with large amo Shampoo hair promptl Remove the person fro Begin rescue breathin breathing has stopp stopped. Transfer promptly to a	I large amounts of water for at least minated clothing. Immediately wash unts of water. ly if contaminated. om exposure. g (using universal precautions) if led and CPR if heart action has	

June 2023



Common Name: DIACETONE ALCOHOL

Synonyms: 2-Methyl-2-Pentanol-4-One CAS No: 123-42-2 Molecular Formula: $C_6H_{12}O_2$ RTK Substance No: 0606 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 1148 ERG Guide #: 129 Hazard Class: 3	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source	Diacetone Alcohol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to form flammable and explosive <i>Hydrogen gas</i> . Diacetone Alcohol is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES to form <i>Acetone and Mesityl Alcohol</i>

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	0.28 ppm
Flash Point:	126° to 147°F (52° to 64°C)
LEL:	1.8%
UEL:	6.9%
Auto Ignition Temp:	1,118° to 1,190°F (603° to 643°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	1 mm Hg at 68°F (20°C)
Specific Gravity:	0.94 (water = 1)
Water Solubility:	Miscible
Boiling Point:	328° to 334°F (164° to 168°C)
Freezing Point:	-45° to -53°F (-43° to -47°C)
Molecular Weight:	116.2

EXPOSURE LIMITS

 OSHA:
 50 ppm, 8-hr TWA

 NIOSH:
 50 ppm, 10-hr TWA

 ACGIH:
 50 ppm, 8-hr TWA

 IDLH:
 1,800 ppm

The Protective Action Criteria values are: PAC-1 = 50 ppm PAC-2 = 50 ppm PAC-3 = 1,800 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, weakness, lightheadedness, and passing out

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR and Responder®, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)
Respirator:	>50 ppm - full facepiece APR with Organic vapor cartridges >500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 4,4'-DIAMINODIPHENYL ETHER

Synonyms: 4,4'-Oxydianiline; DADPE CAS No: 101-80-4 Molecular Formula: C₁₂H₁₂N₂O RTK Substance No: 0612 Description: Colorless crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	4,4'-Diaminodiphenyl Ether may burn, but does not readily ignite.	4,4'-Diaminodiphenyl Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
0 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	resistant foam as extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE)
DOT#: N/A	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	SULFURIC and NITRIC).
ERG Guide #: N/A	Use water spray to keep fire-exposed containers	
Hazard Class: N/A	cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Does not bioaccumulate in aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for 4,4'-Diaminodiphenyl Ether.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver and thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	426°F (219°C)
Vapor Pressure:	3.07 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	>572°F (300°C)
Melting Point:	367° to 368°F (186° to 187°C)
pH:	5
Molecular Weight:	200.3

PROTECTIVE EQUIPMENT Gloves: Nitrile and Polyethylene **Coveralls:** DuPont Tyvek® **Respirator:** Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

New Jersey Department of Health

Common Name: DIAZINON

Synonyms: Dimpylate; Basudin®; Spectracide® CAS No: 333-41-5 Molecular Formula: C₁₂H₂₁N₂O₃PS RTK Substance No: 0618

Description: Colorless, nearly odorless liquid *Organophosphate* pesticide when pure; the technical product is pale to dark brown with a faint odor; and the commercial products may be liquids, solids or powders

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	Diazinon does not burn, however, it is often dissolved in a liquid carrier which may be	Diazinon may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to		
1 - Fire	flammable or combustible.	form highly toxic and flammable Phosphine gas.		
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Diazinon is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
DOT#: UN 2783	POISONOUS GASES ARE PRODUCED IN FIRE,	PERMANGANATES, CHLORATES, NITRATES,		
ERG Guide #: 152	including Nitrogen Oxides, Sulfur Oxides and Phosphorus Oxides.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER COMPOUNDS; and WATER.		

SPILL/LEAKS

Isolation Distance:

Spill (liquid): 50 meters (150 feet)

Spill (solid): 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep *flammable solutions* of **Diazinon** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.1 mg/m³, 10-hr TWA

ACGIH: 0.01 mg/m³, 8-hr TWA

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® CSM (>8-hr breakthrough)
Respirator:	SCBA

HE	ALTI	ΗE	FFI	EC1	٢S

Eyes: Skin: Inhalation:	Irritation Irritation Headache, sweating, nausea and vomiting, loss of coordination, and death (Organophosphate poisoning)
	(Organophosphate poisoning)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.

PHY	SICAL	PROPE	RTIES
	JICAL		

Flash Point:	82 ° to 180 °F (28 ° to 82 °C) (for Diazinon in <i>solution</i> , pure Diazinon is difficult to burn)
Auto Ignition Temp:	>752 °F (>400 °C)
Vapor Pressure:	0.0001 mm Hg at 68 °F (20 °C) (<i>Solid</i>)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	>248 °F (>120 °C) (Decomposes)
Molecular Weight:	304.4



Common Name: DIBENZ(a,h)ANTHRACENE

Synonyms: 1,2,5,6-DBA; 1,2,5,6-Dibenzanthracene CAS No: 53-70-3 Molecular Formula: $C_{22}H_{14}$ RTK Substance No: 0622 Description: Colorless, white or light yellow, crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Dibenz(a,h)Anthracene may burn, but does not readily ignite	Dibenz(a,h)Anthracene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES	
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).	
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Protect from SUNLIGHT.	
ERG Guide #: 171	cool.		
Hazard Class: 9			
(Environmentally			
Hazardous Substance)			

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Vapor Pressure:	1 x 10 ⁻¹⁰ mm Hg at 68ºF (20ºC)
Spill: 25 meters (75 feet)	Specific Gravity:	1.28 (water = 1)
Fire: 800 meters (1/2 mile)	Water Solubility:	Insoluble
Moisten spilled material first or use a HEPA-filter	Boiling Point:	975°F (524°C)
vacuum for clean-up and place into sealed containers for disposal.	Melting Point:	511° to 513°F (266° to 267°C)
DO NOT wash into sewer.	Molecular Weight:	278.36
Dibenz(a,h)Anthracene may bioaccumulate in sea food.		

EXPOSURE LIMITS

No occupational exposure limits have been established for **Dibenz(a,h)Anthracene**.

The Protective Action Criteria values are:

PAC-1 = 0.0025 mg/m^3

 $PAC-2 = 0.015 \text{ mg/m}^3$

 $PAC-3 = 15 \text{ mg/m}^3$

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation, skin rash, dryness and redness	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, dizziness, nausea and vomiting	
Chronic:	Cancer (lung, skin, mammary) in animals	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters >15 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIBENZ[a,j]ACRIDINE

Synonyms: 1,2,7,8-Dibenzacridine CAS No: 224-42-0 Molecular Formula: $C_{21}H_{13}N$ RTK Substance No: 0623 Description: Yellow, crystalline powder or solid

ΗΔ	7AP	ТΔ

Hazard Rating	Firefighting	Reactivity		
2 - Health	Dibenz[a,j]Acridine may burn, but does not readily ignite.	Dibenz[a,j]Acridine may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and		
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	their HYDRIDES) to produce flammable Hydrogen gas.		
0 - Reactivity	extinguishing agents.	Dibenz[a,j]Acridine is not compatible with HALIDES		
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	(such as CHLOROFLUOROCARBONS, METHYLENE CHLORIDE and METHYL BROMIDE) and SULFATES.		
ERG Guide #: None	Use water spray to keep fire-exposed containers			
Hazard Class: None	cool.			
	dust/air mixture.			

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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Dibenz[a,j]Acridine**.

PHYSICAL PROPERTIES

Flash Point: Water Solubility: Melting Point: Molecular Weight: May burn Insoluble 421° to 426°F (216° to 219°C) 279.35

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Neoprene Coveralls: Tyvek®

Respirator:

r: Spill: full facepiece APR with *P100 filters* Fire: SCBA

		4
HEALTH EFFECTS		FIRST
Eyes: Skin: Inhalation:	Irritation Irritation Nose and throat irritation with coughing and wheezing Headache, dizziness, nausea and	Remove the person Flush eyes with la contact lenses if y Quickly remove of large amounts of Begin artificial res
Chronic:	vomiting Cancer (lung and skin) in animals	Transfer promptly

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.





Common Name: DIBORANE

Synonyms: Boroethane; Boron Hydride CAS No: 19287-45-7 Molecular Formula: B₂H₆ RTK Substance No: 0629 Description: Colorless gas with a sickly sweet of

Description: Colorless gas with a sickly, sweet odor which is usually shipped in pressurized cylinders diluted with *Hydrogen, Argon, Nitrogen* or *Helium*

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
4 - Health	FLAMMABLE AND REACTIVE GAS that can ignite on contact with AIR.	Diborane will ignite spontaneously in MOIST AIR at room temperature and will react with WATER, ALCOHOLS, and		
4 - Fire	Stop flow of gas and allow to burn out or use dry	HALOGENATED COMPOUNDS (such as CARBON		
3-₩ - Reactivity	chemical or <i>liquid Nitrogen</i> as extinguishing agents. DO NOT USE WATER or HALOGENATED	TETRACHLORIDE and TRICHLOROETHYLENE) to generate flammable and explosive <i>Hydrogen gas</i> and shock-sensitive mixtures.		
DOT#: UN 1911	AGENTS to extinguish fire as fires and explosions will occur	Diborane reacts explosively with BENZENE VAPOR; NITRIC ACID;		
ERG Guide #: 119	POISONOUS GASES ARE PRODUCED IN FIRE,	TETRAVINYL LEAD; DIMETHYL SULFOXIDE; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
Hazard Class: 2.3	including Hydrogen, Boric Acid, and Boric Oxide.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE,		
(Poisonous Gas)	CYLINDERS MAY EXPLODE IN FIRE.	BROMINE and FLUORINE).		
	Use water spray only to keep fire-exposed containers cool.	Diborane will react with AMMONIA; METAL OXIDES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and other READILY OXIDIZABLE MATERIALS to form <i>Hydrides</i> which may ignite spontaneously in air.		

SPILL/LEAKS

Isolation Distance:

Small Spill:	60 meters (200 feet)
Large Spill:	300 meters (1,000 feet)
Fire: 1,600	meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep **Diborane** out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of **Diborane**.

EXPOSURE LIMITS

OSHA:
NIOSH:
ACGIH:
IDLH LEVEL:

0.1 ppm, 8-hr TWA 0.1 ppm, 10-hr TWA 0.1 ppm, 8-hr TWA 15 ppm

PAC LEVELS: PAC-1 = 0.3 ppm; PAC-2 = 1.0 ppm; PAC-3 = 3.7 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea, vomiting, tremor, convulsions and confusion

PHYSICAL PROPERTIES

Odor Threshold:	1.8 to 3.5 ppm
Flash Point:	-130°F (-90°C)
LEL:	0.8%
UEL:	98%
Auto Ignition Temp:	104° to 122°F (40° to 50°C)
Vapor Density:	0.96 (air = 1)
Vapor Pressure:	224 mm Hg at -170ºF (-112ºC)
Specific Gravity:	0.2 to 0.4 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	-135°F (-93°C)
Melting Point:	-265°F (-165°C)
Ionization Potential:	11.4 eV
Molecular Weight:	27.7

PROTECTIVE EQUIPMENT

Gloves:	Plastic, Butyl or Rubber (<1-hr breakthrough)	
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough)	
Respirator:	>0.1 ppm – Pressure demand supplied air	
	>15 ppm – Pressure demand SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: DI-n-BUTYL PHLTHALATE

Synonyms: n-Butyl Phthalate; DBP; Dibutyl 1,2-Benzenedicarboxylate CAS No: 84-74-2 Molecular Formula: $C_{16}H_{22}O_4$ RTK Substance No: 0773 Description: Colorless to slightly yellow, oily liquid with a slight odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Di-n-Butyl Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, DEPMANCANATES, CHLORATES, NUTRATES, NUS
0 - Reactivity	extinguishing agents. Water jets may not be effective in fighting fires.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 3082	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
Hazard Class: 9	cool.	
(Environmentally Hazardous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Di-n-Butyl Phthalate is toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 5 mg/m³, 8-hr TWA

 NIOSH:
 5 mg/m³, 10-hr TWA

 ACGIH:
 5 mg/m³, 8-hr TWA

 IDLH:
 4,000 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 mg/m³ PAC-2 = 75 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness and seizures

PHYSICAL PROPERTIES

Odor Threshold:	Faint odor (<i>aromatic</i>)		
Flash Point:	315°F (157°C)		
LEL:	0.5%		
UEL:	2.5%		
Auto Ignition Temp:	757°F (403°C)		
Vapor Density:	9.6 (air = 1)		
Vapor Pressure:	<1 mm Hg at 68°F (20°C)		
Specific Gravity:	1.0 (water = 1)		
Water Solubility:	Insoluble		
Boiling Point:	644°F (340°C)		
Freezing Point:	-31°F (-35°C)		
Molecular Weight:	278.34		

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, SilverShield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough for <i>Esters</i> , <i>Carboxylic</i>)
Respirator:	>5 mg/m 3 - Full facepiece APR with High efficiency filters >50 mg/m 3 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DICAMBA

Synonyms: Banvel; Mediben CAS No: 1918-00-9 Molecular Formula: $C_8H_6Cl_2O_3$ RTK Substance No: 0634 Description: Colorless, white or brown crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
1 - Health	Extinguish fire using an agent suitable for type of	Dicamba is not compatible with SUI FURIC ACID:	
1 - Fire	surrounding fire. Dicamba itself does not burn.	STRONG BASES (such as SODIUM HYDROXIDE and	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> .	POTASSIUM HYDROXIDE); AMMONIA, ALIPHATIC AMINES; ALKANOLAMINES; ISOCYANATES;	
DOT#: UN 2769	Use water spray to keep fire-exposed containers	ALKYLENE OXIDES; and EPICHLOROHYDRIN.	
ERG Guide #: 151	cool.		
Hazard Class: 6.1			
(Poison)			

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance: 25 meters (75 feet)	Odor Threshold:	250.8 ppm
Fire: 800 meters (1/2 mile)	Flash Point:	Not combustible
Collect powdered material in the most convenient and safe manner and deposit in sealed containers.	Vapor Density:	7.64 (air = 1)
	Vapor Pressure:	0.00375 mm Hg at 212°F (100°C)
Dicamba is harmful to aquatic organisms.	Specific Gravity:	1.56 (water =1)
	Water Solubility:	Slightly soluble
	Melting Point:	237° to 241°F (114° to 116°C)
	Molecular Weight:	221

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT		
No occupational exposure limits have been established for Dicamba .	Gloves:	Rubber	
	Coveralls:	DuPont Tyvek®	
	Respirator:	APR with High efficiency filters or Supplied air	
	<u>.</u>		

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation, burns	Remove the person from exposure.
Skin: Inhalation:	Irritation, burns Nose, throat and lung irritation with coughing and shortness of breath Headache, nausea, vomiting and muscle weakness	Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
		Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if
		Transfer to a medical facility.
		January 2008


Common Name: 3,3'-DICHLOROBENZIDINE

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	3,3'-Dichlorobenzidine may burn, but does not readily ignite	3,3'-Dichlorobenzidine may react with REDUCING
1 - Fire	Use dry chemical, CO ₂ , water spray, alcohol-	AGENTS (such as LTF HIUM, SODIUM, ALUMINUM and their HYDRIDES) to produce flamm able and explosive
0 - Reactivity	resistant foam or other foam as extinguishing	Hydrogen gas.
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE.	
ERG Guide #: 171	including Nitrogen Oxides and Hydrogen	
Hazard Class: 9 (Environmentally Hazardous Substance)	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

3,3'-Dichlorobenzidine is toxic to aquatic organisms.

EXPOSURE LIMITS

Exposure by all routes should be controlled to levels as low as possible.

The Protective Action Criteria values are:

- PAC-1 = 6 mg/m^3
- $PAC-2 = 40 \text{ mg/m}^3$
- $PAC-3 = 2.000 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, nausea and
vomitingChronic:Cancer (liver, breast, bladder) in animals

PHYSICAL PROPERTIES

Auto Ignition Temp:	662°F (350°C)
Water Solubility:	Insoluble
Boiling Point:	788°F (420°C)
Melting Point:	270° to 271°F (132° to 133°C)
Molecular Weight:	253.13

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

Full facepiece APR with *P100 filters* >6 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,1-DICHLOROETHANE

Synonyms: 1,1-DCE; Ethylidene Chloride CAS No: 75-34-3 Molecular Formula: $C_2H_4Cl_2$ RTK Substance No: 0651 Description: Colorless, oily liquid with an *Ether* or *Chloroform*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	1,1 Dichloroethane reacts violently with OXIDIZING
3 - Fire	resistant foam as extinguishing agents. Solid	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	streams of water may not be effective.	POTASSIUM.
DOT#: UN 2362	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> .	1,1 Dichloroethane is not compatible with AMINES;
ERG Guide #: 130	CONTAINERS MAY EXPLODE IN FIRE.	STRONG BASES (such as SODIUM HYDROXIDE and
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	EXAMPLE 2 CONTRACTION (SUCH AS CONTRACT OF

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. Keep **1,1 Dichloroethane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

1,1 Dichloroethane is a marine pollutant.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA	
NIOSH:	100 ppm, 10-hr TWA	
ACGIH:	100 ppm, 8-hr TWA	
IDLH:	3,000 ppm	

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, nausea, vomiting, dizziness and passing out	
Chronic:	Cancer (liver, circulatory, and mammary gland) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	100 to 200 ppm
Flash Point:	2°F (-17°C)
LEL:	5.4%
UEL:	16%
Auto Ignition Temp:	856°F (458°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	182 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	135° to 138°F (57° to 59°C)
Ionization Potential:	11.06 eV
Molecular Weight:	99

	PROTECTIVE EQUIPMENT
Gloves:	Viton (2.4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder® and TK; Zytron® 500; and ONESuit® TEC (>8-hr breakthrough for <i>Halogen</i> <i>compounds</i>)
Respirator:	>100 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: 1,2-DICHLOROETHANE

Synonyms: 1,2-DCE; Ethylene Dichloride CAS No: 107-06-2 Molecular Formula: $C_2H_4Cl_2$ RTK Substance No: 0652 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam	1,2-Dichloroethane may explode when mixed with <i>liquid</i> AMMONIA; NITROGEN TETROXIDE; and other
3 - Fire	as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride, Vinyl Chloride, Acetylene and Phosgene.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 1184	CONTAINERS MAY EXPLODE IN FIRE.	1,2-Dichloroethane is not compatible with STRONG
ERG Guide #: 131	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE METALS (such as
Hazard Class: 3	fire or explosion far from the source.	POTASSIUM, SODIUM, MAGNESIUM and ZINC);
(Flammable)	Flow or agitation may generate electrostatic charges.	12-Dichloroethane attacks METALS in the presence of
	1,2-Dichloroethane may form an ignitable vapor/air mixture in closed tanks or containers.	WATER.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1,2-Dichloroethane**.

Use foam to blanket release and to suppress vapors.

Keep **1,2-Dichloroethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Sewers, because of the pos

DO NOT wash into sewer.

1,2-Dichloroethane is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

NIOSH:1 ppm, 10-hr TWA; 2 ppm, CeilingACGIH:10 ppmIDLH:50 ppmThe Protective Action Criteria values are:PAC-1 = 50 ppmPAC-2 = 200 ppmPAC-3 = 300 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, lightheadedness, confusion, tremor, loss of memory and even passing out
Chronic:	Cancer (blood vessel lung breast) in animals

PHYSICAL PROPERTIES

Odor Threshold:	88 ppm
Flash Point:	56°F (13°C)
LEL:	6.2%
UEL:	15.9%
Auto Ignition Temp:	775°F (413°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	64 mm Hg at 68°F (20°C)
Specific Gravity:	1.25 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	182°F (83°C)
Freezing Point:	-32°F (-36°C)
Ionization Potential:	11.05 eV
Molecular Weight:	98.96

Gloves:	SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	SCBA

PROTECTIVE FOLIIPMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: DICHLOROFLUOROMETHANE

Synonyms: HCFC-21; CFC 21; Freon® 21; Halon® 112; Genetron® 21 CAS No: 75-43-4 Molecular Formula: CHCl₂F RTK Substance No: 3109 Description: Colorless gas, or a compressed liquefied gas, with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Dichlorofluoromethane itself	Dichlorofluoromethane reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC)	
0 - Fire	does not burn.	and ACID FUMES to produce toxic and corrosive	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Hydrogen Fluoride and Hydrogen Chloride gases.	
DOT#: UN 1029	including Hydrogen Fluoride, Carbonyl Fluoride, Hydrogen Chloride, and Phosgene.	Dichlorofluoromethane is not compatible with POWDERED ALUMINUM; MAGNESIUM; ZINC;	
ERG Guide #: 126	CONTAINERS MAY EXPLODE IN FIRE.	SODIUM; POTASSIUM; CALCIUM; and OXIDIZING	
Hazard Class: 2.2 (Nonflammable)	Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).	

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Turn leaking cylinder with leak up to prevent escape of gas in the liquid state.

DO NOT DIRECT water jet on liquid.

DO NOT wash into sewer.

Dichlorofluoromethane is considered to be an *Ozone* depleting substance.

EXPOSURE LIMITS

Dichlorofluoromethane is an asphyxiant at high concentrations.

 NIOSH:
 10 ppm, 10-hr TWA

 ACGIH:
 10 ppm, 8-hr TWA

IDLH: 5,000 ppm

The Protective Action Criteria values are:

PAC-1 = 30 ppm PAC-2 = 100 ppm PAC-3 = 5,000 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation. Contact with liquid causes frostbite
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath
	Headache, dizziness, lightheadedness, confusion, tremors, unconsciousness and death

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ether</i> -like
Flash Point:	Nonflammable gas
Auto Ignition Temp:	972°F (522°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	1,193 mm Hg at 70°F (21°C)
Specific Gravity:	1.48 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	48°F (8.9°C)
Freezing Point:	-211°F (-135°C)
Ionization Potential:	12.39 eV
Molecular Weight:	102.92

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene (<1-hr breakthrough) and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® Responder® (>8-hr breakthrough)
Respirator:	>30 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Immerse affected part in warm water. Seek medical attention.



Common Name: 1,3-DICHLOROPROPENE

Synonyms: DCP; 3-Chloroallyl Chloride CAS No: 542-75-6 Molecular Formula: $C_3H_4Cl_2$ RTK Substance No: 0666

Description: Clear to straw-colored liquid with a sharp, sweet, irritating (Chloroform-like) odor

			ПА		
Hazard Ra	ting	Firefighting			Reactivity
2 - Health 3 - Fire		FLAMMABLE LIQUID Use dry chemical, CO ₂ , water sp extinguishing agents	oray or foam as		1,3-Dichloropropene may polymerize (uncontrolled reaction) with ALUMINUM and MAGNESIUM (and their ALLOYS): HALOGENS (such as CHLORINE, BROMINE)
0 - Reactivity	y	POISONOUS GASES ARE PRO	DUCED IN FIRE,		and FLUORINE); CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and
DOT#: UN 20	047	CONTAINERS MAY EXPLODE	IN F	IRE.	ZINC); and METAL SALTS.
ERG Guide #	#: 129	Use water spray to keep fire-exp	osed	d containers	1,3-Dichloropropene is not compatible with OXIDIZING
Hazard Class	s: 3	cool.			PERMANGANATES, CHLORATES, and NITRATES);
(Flam	nmable)	Vapors may travel to a source of	f ignition and flash		STRONG ACIDS (such as HYDROCHLORIC,
		Vapor is heavier than air and ma	iv tra	vel a distance	SOLFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE)
		to cause a fire or explosion far f	rom	the source.	
	SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Dis	tance:			Odor Thresho	bld: 1 to 3 ppm
Small Spill: 6	30 meters	(150 feet)		Flash Point:	77° to 95°F (25° to 35°C)
Large Spill: 2	270 meter	rs (900 feet)		LEL:	5%
Fire: 800 me	ters (1/2 i	mile)		UEL:	14.5%
				Vapor Density	y: $3.8 (all = 1)$
Absorb liquids	s in vermi rial and de	culite, dry sand, earth, or a		Specific Grav	ity: 1 2 (water = 1)
Keep 1.3-Dic	hloropro	pene out of confined spaces.		Water Solubil	ity: Very slightly soluble
such as sewe	ers, beca	use of the possibility of an		Boiling Point	219°F (104°C)
explosion.				Melting Point	: 232°F (111°C)
DO NOT was	sh into sev	wer.		Molecular We	sight: 111
EXPOSURE LIMITS					
OSHA: No	one			Gloves:	Viton (>8-hr breakthrough)
NIOSH: 1 p	opm, 10-h			Coveralls:	DuPont Responder® and CSM; Kappler® Zytron® 500;
	opiii, o-iii	TWA			halogen compounds)
	ne -			Respirator:	>1 ppm - Supplied air
HEALTH EFFECTS			FIRS	T AID AND DECONTAMINATION	
Eyes:	Irritation	and burns		Remove the p	erson from exposure.
Skin:	Irritation	and burns		Flush eyes wi	th large amounts of water for at least 15 minutes. Remove
Inhalation:	Nose, th	roat and lung irritation with		contact lenses	s it worn. Seek medical attention immediately.
	breath	J, wheezing and shortness of		skin with large	e amounts of soap and water.
	Headach	ne, dizziness, nausea and		Begin artificia	I respiration if breathing has stopped and CPR if necessary
	vomiting	, and passing out		Transfer prom	nptly to a medical facility.
Chronic:	Cancer (bladder and lung) in animals			



Common Name: 2,2-DICHLOROPROPIONIC ACID

Synonyms: Dalapon; 2,2-DPA CAS No: 75-99-0 Molecular Formula: C₃H₄Cl₂O₂ RTK Substance No: 0668

Description: Colorless liquid, or the commercial product can be a light tan powder, with a strong, sharp odor

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. 2.2-Dichloropropionic Acid	2,2-Dichloropropionic Acid reacts slowly with WATER and MOIST AIR to produce corrosive <i>Hydrogen Chloride</i> .			
0- Fire	itself does not burn.	2,2-Dichloropropionic Acid attacks and corrodes			
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	ALUMINUM, COPPER and their ALLOYS. 2,2-Dichloropropionic Acid is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and ELLORINE) and			
DOT#: UN 1760	FIRE, including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers				
ERG Guide #: 154	cool.				
Hazard Class: 8		STRONG ACIDS (such as HYDROCHLORIC. SULFURIC			
(Corrosive)		and NITRIC).			

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Isolation Distance:	Odor Threshold:	Strong, sharp odor
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Fire: 800 meters (1/2 mile)	Vapor Density:	4.9 (air = 1)
Cover <i>liquid</i> spills with dry lime, sand or soda ash and	Vapor Pressure:	5.1 mm Hg at 160°F (71°C)
place into sealed containers for disposal.	Specific Gravity:	1.4 (water = 1)
Moisten solid material first or use a HEPA-filter	Water Solubility:	Soluble
for disposal.	Boiling Point:	374°F (190°C)
DO NOT wash into sewer.	Melting Point:	46°F (8°C)
2,2-Dichloropropionic Acid is harmful to aquatic organisms.	Molecular Weight:	143

EXPOSURE LIMITS

NIOSH: 1 ppm (6 mg/m³), 10-hr TWA

ACGIH: 5 mg/m³, 8-hr TWA

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Neoprene, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Acids, carboxylic, substituted</i>)
Coveralls:	Tychem® F, BR, Responder® and TK (>8-hr break- through for <i>Acids, carboxylic, substituted</i>)
Respirator:	>5 mg/m ³ - APR with <i>Organic vapor</i> cartridges and <i>P100</i> prefilters >50 mg/m ³ - SCBA

PHYSICAL PROPERTIES

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Severe irritation, burns and possible eye damage	Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove
Skin:	Irritation and burns	contact lenses if worn. Seek medical attention.
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of	Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
	breath	Begin artificial respiration if breathing has stopped and CPR if necessary.
	Headache, dizziness, weakness, nausea and vomiting	Transfer promptly to a medical facility.

August 2010



Common Name: DIELDRIN

Synonyms: HEOD; Octalox®; Quintox® CAS No: 60-57-1 Molecular Formula: C₁₂H₈Cl₆O RTK Substance No: 0683

Description: White (when pure) to light-tan, crystalline or flaked powder with a chemical-like odor

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health	Dieldrin does not burn, however, it is often	Dieldrin may react violently with OXIDIZING AGENTS			
0 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE) and STRONG			
DOT#: UN 2761	Chlorine.	NITRIC).			
ERG Guide #: 151	Use water spray to keep fire-exposed containers	Dieldrin is not compatible with MINERAL ACIDS; ACID			
Hazard Class: 6.1	cool.	ZINC, and IRON and their SALTS); and ALKALI METALS			
(Poison)		(such as MAGNESIUM, SODIUM and POTASSIUM).			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Dieldrin is very toxic to aquatic life and bees. It is also persistent in the environment.

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes:	Irritation and burns
Skill.	No information available
Inhalation:	Headache, nausea, vomiting, dizziness, lightheadedness, and passing out
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.041 ppm
Flash Point:	Noncombustible
Vapor Density:	13.2 (air = 1)
Vapor Pressure:	8 x 10 ⁻⁷ mm Hg at 68ºF (20ºC)
Specific Gravity:	1.75 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	347º to 349ºF (175º to 176ºC)
Molecular Weight:	380.9

	PROTECTIVE EQUIPIWIENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.1 mg/m ³ – Pressure demand supplied air >50 mg/m ³ – Pressure demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and immediately wash contaminated skin with large amounts of soap and water.



Common Name: DIETHANOLAMINE

Synonyms: DEA; 2,2'-Dihydroxydiethylamine; Ethanol, 2,2'-Iminobis-CAS No: 111-42-2 Molecular Formula: C₄H₁₁NO₂ RTK Substance No: 0686 Description: White, crystalline solid or colorless to yellow, syrupy liquid with a mild *Ammonia*-like odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health 1 - Fire	Diethanolamine may burn, but does not readily ignite.	Diethanolamine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Diethanolamine is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE): ALDEHYDES:	
DOT#: UN 1760 ERG Guide #: 154		POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides.KETONES; ACRYLATES; ORGANIC ANHYDRIDES; HALIDES; FORMATES; and OXALATES.	KETONES; ACRYLATES; ORGANIC ANHYDRIDES; ORGANIC HALIDES; FORMATES; and OXALATES.
Hazard Class: 8		Diethanolamine reacts with NITROGEN COMPOUNDS (such as SODIUM NITRITE and NITROGEN OXIDES) to form cancer-causing <i>Nitrosamines</i> .	
		Diethanolamine reacts with CARBON DIOXIDE and absorbs MOISTURE in the air.	
		Diethanolamine is corrosive to ALUMINUM, COPPER, ZINC, and GALVANIZED IRON.	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	0.27 ppm
Spill (solid): 25 meters (75 feet)	Flash Point:	273° to 342°F (134° to 172°C)
	LEL:	1.6%
Spill (liquid): 50 meters (150 feet)	UEL:	9.8%
Fire: 800 meters (1/2 mile)	Auto Ignition Temp:	1,224°F (662°C)
	Vapor Density:	3.65 (air = 1)
Absorb liquids in dry sand, earth, or a similar material	Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
and place into sealed containers for disposal.	Specific Gravity:	1.1 (water = 1)
Moisten solid spilled material first or use a HEPA-filter	Water Solubility:	Very soluble
vacuum for clean-up and place into sealed containers	Boiling Point:	514°F (268°C)
for disposal.	Melting Point:	82°F (28°C)
DO NOT wash into sewer.	Critical Temp:	828°F (442°C)
Diethanolamine is harmful to aquatic organisms.	Molecular Weight:	105.2
EXPOSURE LIMITS	PR	OTECTIVE EQUIPMENT
NIOSH: 15 mg/m ³ , 10-hr TWA	Gloves: Buty	/l, Nitrile, Neoprene, Polyvinyl Chloride, Viton and

Coveralls:

Respirator:

NIOSH:	15 mg/m°, 10-hr TWA
ACGIH:	1 mg/m ³ , 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 25 mg/m³ PAC-2 = 150 mg/m³ PAC-3 = 300 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing

>10 mg/m³ or Fire - SCBA

P100 cartridges

Tychem® CPF 3 and CSM (>8-hr breakthrough)

>1 mg/m³ - full facepiece APR with Organic vapor and

Barrier® (>8-hr breakthrough)

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: DIETHYL CARBINOL

Synonyms: Isoamyl Alcohol; Pentan-3-ol; 3-Pentanol CAS No: 584-02-1 Molecular Formula: $C_5H_{12}O$ RTK Substance No: 0696 Description: Colorless liquid with a strong, sweet odor

НΑ	ZΑ	RD	DA	ТА	

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Hazard Rating	Firefighting	Reactivity
1 - Health	Diethyl Carbinol is a COMBUSTIBLE LIQUID that may become HIGHLY FLAMMABLE in the	Diethyl Carbinol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
2 - Fire	presence of SPARKS and STATIC DISCHARGE.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	FLUORINE) and HYDROGEN TRISULFIDE, to cause fires and explosions.
DOT#: UN 1105	POISONOUS GASES ARE PRODUCED IN FIRE.	Diethyl Carbinol will react with ALKALINE EARTH METALS (such
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash	as BERYLLIUM, MAGNESIUM and CALCIUM) to form flammable and explosive <i>Hydrogen gas</i> .
Hazard Class: 3 (Flammable)	back. Flow or agitation may generate electrostatic charges.	Diethyl Carbinol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and NITRIDES

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.
- Keep **Diethyl Carbinol** out of confined spaces, such as sewers, because of the possibility of an explosion.
- DO NOT wash into sewer.

EXPOSURE LIMITS

The Protection Action Criteria values for Pentanol are:

- PAC-1 = 150 ppm
- PAC-2 = 150 ppm
- PAC-3 = 1,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, lightheadedness
and passing out
Higher levels can cause coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Strong, sweet odor
Flash Point:	93° to 105°F (34° to 41°C)
LEL:	1.2%
UEL:	9%
Auto Ignition Temp:	650° to 680°F (343° to 360°C)
Vapor Density:	3 (air = 1)
Vapor Pressure:	8.3 mm Hg at 77°F (25°C)
Specific Gravity:	0.82 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	241°F (116°C)
Freezing Point:	-92°F (-69°C)
Ionization Potential:	9.8 +/- 0.2 eV
Molecular Weight:	88.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Viton and Barrier® (>8-hr breakthrough for <i>n-Pentanol</i>)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for Hydroxyl compounds, aliphatic)
Respirator:	>150 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIETHYLENE GLYCOL DINITRATE

Synonyms: DEGDN; Diglycol Dinitrate CAS No: 693-21-0 Molecular Formula: C₄H₈N₂O₇ RTK Substance No: 0699

Description: Colorless, odorless, thick, oily liquid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 4 - Fire	Diethylene Glycol Dinitrate is an EXPLOSIVE that can be ignited by HEAT, FRICTION, SHOCK, VIBRATION, and/or ELECTROSTATIC CHARGE.	Diethylene Glycol Dinitrate is an EXTREMELY SENSITIVE EXPLOSIVE if not properly desensitized with an additive (phlegmatizer) for stablization.	
4 - Reactivity DOT#: UN 0075	Diethylene Glycol Dinitrate is FLAMMABLE and REACTIVE and a DANGEROUS FIRE and EXPLOSION HAZARD.	Diethylene Glycol Dinitrate may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,	
ERG Guide #: 112	DO NOT FIGHT FIRE. Evacuate area and let burn.	NITRATES, CHLORINE, BROMINE and	
Hazard Class: 1 (Explosive)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES), resulting in	
	Use water spray to keep fire-exposed containers cool.	detonation.	
	Diethylene Glycol Dinitrate may ignite combustibles (wood, paper and oil).		

SPILL/LEAKS

Isolation Distance:

Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

DO NOT CLEAN-UP OR DISPOSE OF EXCEPT UNDER SUPERVISION OF A SPECIALIST.

Keep **Diethylene Glycol Dinitrate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Diethylene Glycol Dinitrate is harmful to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Diethylene Glycol Dinitrate**.

HEALTH EFFECTS

- Eyes: Skin:
- No information No information

Inhalation: Headache, fatigue, dizziness, and a blue color to the skin and lips (*methemoglobinemia*)

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight: Odorless Explosive 0.00015 mm Hg at 68°F (20°C) 1.4 (water = 1) Slightly soluble Decomposes at 387°F (197°C) 11°F (-12°C) 196

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Glycol Ethers</i>)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for <i>Glycol Ethers</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DIETHYL PHTHALATE

Synonyms: DEP; Diethyl 1,2-Benzenecarboxylate; Ethyl Phthalate CAS No: 84-66-2 Molecular Formula: $C_{12}H_{14}O_4$ RTK Substance No: 0707 Description: Odorless, colorless, oil liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	Diethyl Phthalate may burn, but does not readily ignite.	Diethyl Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
1 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	resistant foam as extinguishing agents. DO NOT	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and	
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRIC).	
ERG Guide #: 171	including Phthalic Anhydride.	Diethyl Phthalate may attack plastics.	
Hazard Class: 9 (Environmentally Hazardous Substance)	Use water spray to keep fire-exposed containers cool.		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Diethyl Phthalate may be hazardous to the environment, especially to fish.

EXPOSURE LIMITS

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ACGIH: 5 mg/m^3 , 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 15 mg/m^3 PAC-2 = 100 mg/m^3

PAC-3 = 300 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	322°F (161°C)
LEL:	0.7%
UEL:	Unknown
Auto Ignition Temp:	855°F (457°C)
Vapor Density:	7.7 (air = 1)
Vapor Pressure:	0.002 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	568°F (298°C)
Freezing Point:	-41°F (-40.6°C)
Molecular Weight:	222.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	Tychem® F, BR, CSM and TK (>8-hr breakthrough for <i>Esters, Carboxylic</i>)
Respirator:	>5 mg/m ³ - full facpiece APR with <i>P100 filters</i> Fire or >15 mg/ m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DIETHYLSTILBESTROL

Synonyms: DES; Estrogen CAS No: 56-53-1 Molecular Formula: C₁₈H₂₀O₂ RTK Substance No: 0709 Description: Odorless, tasteless, white, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Diethylstilbestrol is not compatible with OXIDIZING
1 - Fire	POISONOUS GASES ARE PRODUCED IN	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: None	cool.	POTASSIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACID CHLORIDES; and
ERG Guide #: None		ACID ANHYDRIDES.
Hazard Class: None		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Water Solubility:	Very slightly soluble
Fire: 800 meters (1/2 mile)	Melting Point:	336° to 342°F (169° to 172°C)
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Molecular Weight:	268.38
EXPOSURE LIMITS	PRO	

EXP	OSU	RE L	IMITS

The Protective Action Criteria values are:

- $PAC-1 = 0.075 \text{ mg/m}^3$
- $PAC-2 = 0.6 \text{ mg/m}^3$
- $PAC-3 = 15 \text{ mg/m}^{3}$

Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters

Nitrile and Natural Rubber

>15 mg/m³ - SCBA

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes:	Irritation	Remove the person from exposure.
Skin:	Irritation	Flush eyes with large amounts of water for at least 15 minutes. Remove
Inhalation:	Nose and throat irritation	Ouickly remove contaminated clothing and wash contaminated skin with
	Headache, nausea, dizziness, weakness and irritability	large amounts of soap and water.
Chronic:	Cancer (breast and liver) in humans	Transfer promptly to a medical facility.

Gloves:



Common Name: DIETHYL SULFATE

Synonyms: Ethyl Sulfate CAS No: 64-67-5 Molecular Formula: $C_4H_{10}O_4S$ RTK Substance No: 0710 Description: Clear, colorless, oily liquid with a mint or *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents	Diethyl Sulfate reacts slowly with WATER, and decomposes in HOT WATER, to form <i>Ethyl Alcohol, Ethyl Sulfate</i> and <i>Sulfuric Acid.</i>
1 - Reactivity DOT#: UN 1594	DO NOT USE WATER directly on Diethyl Sulfate . POISONOUS GASES ARE PRODUCED IN FIRE, including Ethyl Ethyr, Ethylono Ovide and Sulfur	Diethyl Sulfate reacts violently with a combination of 3,8-DINITRO-9-PHENYLPHENANTHRIDINE and WATER.
ERG Guide #: 152 Hazard Class: 6.1 (Poison)	Oxides. Use water spray to keep fire-exposed containers cool.	Diethyl Sulfate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and NITRATES.
		Keep Diethyl Sulfate away from METALS and MOISTURE as flammable and explosive <i>Hydrogen gas</i> can be released.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Diethyl Sulfate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Diethyl Sulfate**.

The Protective Action Criteria values are:

PAC-1 = 0.2 ppm PAC-2 = 1.5 ppm PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and abdominal pain
Chronic:	Cancer (skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Mint or <i>Ether</i> -like
Flash Point:	220°F (104°C)
LEL:	4.1%
UEL:	12.2%
Auto Ignition Temp:	817°F (436°C)
Vapor Density:	5.3 (air = 1)
Vapor Pressure:	1 mm Hg at 117°F (47°C)
Specific Gravity:	1.2 (water =1)
Water Solubility:	Insoluble
Boiling Point:	409°F (209.4°C)
Freezing Point:	-13°F (-25°C)
Molecular Weight:	154.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl/Viton (>8-hr breakthrough)
Coveralls:	Tychem® CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,1-DIFLUOROETHANE

Synonyms: Ethylidene Fluoride; Freon 152A; Genetron 100 CAS No: 75-37-6 Molecular Formula: $C_2H_4F_2$ RTK Substance No: 0715 Description: Colorless and odorless gas used as a liquefied compressed gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 4 - Fire 0 - Reactivity	FLAMMABLE GAS. Stop flow and use dry chemical, CO ₂ , water spray or foam as extinguishing agents. If flow cannot be stopped, let fire burn. POISONOUS CASES ARE PRODUCED IN FIRE	1,1-Difluoroethane may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), and forms explosive compounds with
DOT#: UN 1030 ERG Guide #: 115 Hazard Class: 2.1 (Flammable gas)	 POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Carbonyl Fluoride</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 	BARIUM; SODIUM; POTASSIUM; and other divalent light METALS and METALLIC AZIDES. 1,1-Difluoroethane is not compatible with powdered ALUMINUM and MAGNESIUM, and their ALLOYS; LIQUID OXYGEN; BRASS; and STEEL.

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (300 feet)

Large Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Stop flow of gas.

Eyes:

Skin:

Inhalation:

Keep **1,1-Difluoroethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

May be toxic to aquatic life. Considered to be an Ozone depleting substance.

EXPOSURE LIMITS

HEALTH EFFECTS

Irritation. Contact with liquid can cause

Irritation, drying and cracking of the skin

coughing, wheezing and/or shortness of

Headache, dizziness, lightheadedness

Contact with liquid can cause frostbite

Nose, throat and lung irritation with

No occupational exposure limits have been established for 1,1-Difluoroethane.

frostbite.

breath

and passing out

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
LEL:	3.7%	
UEL:	18%	
Vapor Density:	2.4 (air = 1)	
Vapor Pressure:	4,437 mm Hg at 77°F (25°C)	
Specific Gravity:	0.95 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	-16.6°F (-27°C)	
Melting Point:	-179°F (-117°C)	
Molecular Weight:	66.1	

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene or Rubber
Coveralls:	DuPont Tychem® CSM, Responder®, and TK; Kappler Zytron® 400; and Saint-Gobain ONESuit® TEC
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention. Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 1,2-DIHYDROXYBENZENE

Synonyms: Catechol; o-Dihydroxybenzene; Pyrocatechol CAS No: 120-80-9 Molecular Formula: C₆H₆O₂ RTK Substance No: 0722 Description: Colorless, crystalline solid, with a slight *Phenolic* odor, that becomes a vapor at ordinary temperatures

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or alcohol-	1,2-Dihydroxybenzene reacts violently with NITRIC ACID.
1 - Fire	resistant foam as extinguishing agents.	1,2-Dihydroxybenzene is not compatible with
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 2811	Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
ERG Guide #: 154	Flow or agitation may generate electrostatic	ACID CHLORIDES; ACID ANHYDRIDES; and STRONG
Hazard Class: 6.1 (Poison)	charge.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Small Spills: 30 meters (100 feet)

Large Spills: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

1,2-Dihydroxybenzene is moderately to highly toxic to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 5 ppm, 10-hr TWA

ACGIH: 5 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 5 ppm

PAC-2 = 7.5 ppm

PAC-3 = 20 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Dizziness, nausea, vomiting and convulsions	
	Methemoglobinemia with headache, fatigue and blue color to the skin and lips	
Chronic:	Cancer (stomach) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Phenolic odor
Flash Point:	260°F (127°C)
Auto Ignition Temp:	950°F (510°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	5 mm Hg at 219°F (104°C)
Specific Gravity:	1.34 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	473°F (245°C)
Melting Point:	221°F (105°C)
Ionization Potential:	8.15 +/- 1.0 eV
Molecular Weight:	110

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Viton (>8-hr breakthrough for aromatic Phenols)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for aromatic Phenols)
Respirator:	>5 ppm -Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: DIMEFOX

Synonyms: Bis(Dimethylamido)Fluorophosphate; DMF CAS No: 115-26-4 Molecular Formula: $C_4H_{12}FN_2OP$ RTK Substance No: 2342 Description: Colorless liquid with a fishy odor

Hazard Rating	Firefighting	Reactivity
3 - Health	Dimefox may burn, but does not readily ignite.	Dimefox can form highly toxic and flammable <i>Phosphine</i>
1 - Fire	Use dry chemical, CO ₂ or water spray as extinguishing agents.	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Dimefox is not compatible with OXIDIZING AGENTS
DOT#: None	Including Phosphine.	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 152	Use water spray to keep fire exposed containers	CHLORINE, BROMINE and FLUORINE).
Hazard Class: 6.1	cool.	DIMETOX IS COTTOSIVE TO ME I ALS.
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Dimefox may pollute waterways.

EXPOSURE LIMITS

IDLH: 1 mg/m³

The Protective Action Criteria values are:

No information

 $PAC-1 = 0.6 \text{ mg/m}^3$

PAC-2 = 1 mg/m^3

 $PAC-3 = 1 \text{ mg/m}^3$

Eyes:

Skin: No information

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, sweating, nausea and vomiting, loss of coordination, and death

vomiting, loss of coordination, and death (Organophosphate poisoning)

PHYSICAL PROPERTIES

Odor Threshold:	Fishy odor
Flash Point:	May burn
Vapor Pressure:	0.36 mm Hg at 77°F (25°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	187°F (86°C)
Molecular Weight:	154.1

PROTECTIVE EQUIPMENT

Gloves: Neoprene and Silver Shield®/4H® (>8-hr breakthrough for Organo-phosphorus compounds)

Coveralls: Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for *Organo-phosphorus compounds*)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.
- Shampoo hair immediately if contaminated.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Health Right to Know Hazardous Substance Fact Sheet

Common Name: 3,3'-DIMETHOXYBENZIDINE

Synonyms: o-Dianisidine; 3,3'-Dianisidine CAS No: 119-90-4 Molecular Formula: C₁₄H₁₆N₂O₂ **RTK Substance No: 0734** Description: Colorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	3,3'-Dimethoxybenzidine may burn, but does not readily ignite	3,3'-Dimethoxybenzidine is not compatible with
1 - Fire	Use dry chemical, CO_2 , or water spray as	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity		NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2431	including <i>Nitrogen Oxides</i> .	Protect from LIGHT, HEAT and AIR.
ERG Guide #: 153		
Hazard Class: 6.1		
(Poison)		

CD	 /	Γл	VC
	 /		

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established for 3,3'-Dimethoxybenzidine.

The Protective Action Criteria values are:

 $PAC-1 = 4 \text{ mg/m}^3$

 $PAC-2 = 25 \text{ mg/m}^3$

 $PAC-3 = 400 \text{ mg/m}^3$

HE	EAL	.ТН	EF	FΕ	CTS

Eyes:	Irritation	
Skin:	Irritation, rash, redness and itching	
Inhalation:	Nose and throat irritation	
Chronic:	Cancer (bladder, intestines, skin) in animals	

PHYSICAL PROPERTIES

Flash Point:	403°F (206°C)
Vapor Density:	8.5 (air = 1)
Vapor Pressure:	8.8 x 10 ⁻⁹ mm Hg at 77ºF (25ºC)
Water Solubility:	Very slightly soluble
Melting Point:	279°F (137°C)
Molecular Weight:	244.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters >4 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Chemical Name: DIMETHYLAMINOETHANOL

Synonym: Dimethylethanolamine CAS No: 108-01-0 Molecular Formula: C₄H₁₁NO RTK Substance No: 3111 Description: Colorless, corrosive, combustible liquid with a strong fishy odor.

NFPA RATINGS				
Hazard Rating 3 - Health 2 - Fire 0 - Reactivity DOT#: UN 2051 ERG Guide#: 132 Hazard Class: 8.3 (Corrosive)	 Firefighting Combustible Use dry chemical, CO₂, or alcohol-resistant foam, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. May flash back Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		esistant foam, as g fires. ICED IN FIRE, avel a distance the source.	Reactivity - Dimethylaminoethanol reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CHLORIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and ISOCYANATES. - Dimethylaminoethanol is not compatible with CELLULOSE NITRATE; ZINC ALLOYS; GALVANIZED IRON; COPPER and COPPER ALLOYS; NITROGEN COMPOUNDS; ACRYLATES; ALCOHOLS; ALDEHYDES; KETONES; HALOGENATED COMPOUNDS; and GLYCOLS.
DC	DIERG			PHYSICAL PROPERTIES
Isolation Distance: 6	30 meters (200 feet) for toxic, corrosive, organic liquids. rmiculite, dry sand, earth, or a deposit in non-metallic sealed		Odor Threshold Flash Point: LEL: UEL: Vapor Density: Vapor Pressure: Water Solubility Boiling Point: Ionization Poten	: No Information $105^{\circ}F (41^{\circ}C)$ 1.6 11.9 3.1 (air = 1) : 4 mm Hg at 68°F (20°C) : Soluble 272°F (133°C) attal: No Information
EXPOS	URE LIMITS		Р	ROTECTIVE EQUIPMENT
OSHA: N/A NIOSH: N/A ACGIH: N/A IDLH LEVEL: N/A			Gloves:BCoverall:NBoot:BRespirator:S	utyl, Nitrile, Polyvinyl Alcohol, Viton® lo Information utyl upplied Air
HEALT	H EFFECTS		FIRST	AID AND DECONTAMINATION
Eyes:Irritation,Skin:Irritation,Acute:Nose, thropulmonarChronic:Cancer –Symptomwheezingaffect the	burning skin burns bat and lung Irritation, y edema, headache Not tested. s of asthma – cough, , shortness of breath. May nervous system.		 Remove the per Flush eyes with contact lenses if Remove contam Begin artificial renecessary. Transfer to a me Observation is renecessary. 	son from exposure. large amount of water for at least 30 minutes. Remove worn. inated clothing and wash contaminated skin with water. espiration if breathing has stopped and CPR if edical facility. ecommended as symptoms may be delayed.
EXPOS OSHA: N/A NIOSH: N/A ACGIH: N/A IDLH LEVEL: N/A Eyes: Irritation, Skin: Irritation, Acute: Nose, thro- pulmonar Chronic: Cancer – Symptom wheezing affect the	URE LIMITS THEFFECTS burning skin burns bat and lung Irritation, y edema, headache Not tested. s of asthma – cough, , shortness of breath. May nervous system.		Ionization Poten	Itial: No Information ROTECTIVE EQUIPMENT Studyl, Nitrile, Polyvinyl Alcohol, Viton® Io Information Studyl Bupplied Air AID AND DECONTAMINATION son from exposure. large amount of water for at least 30 min utes. Refworn. sinated clothing and wash contaminated skin with vespiration if breathing has stopped and CPR if edical facility. ecommended as symptoms may be delayed.



Common Name: DIMETHYLANILINE

Synonyms: N,N-Dimethylaminobenzene; Dimethylphenylamine CAS No: 121-69-7 Molecular Formula: $C_8H_{11}N$ RTK Substance No: 0741 Description: Yellow to brownish, oily liquid with a fish-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Dimethylaniline reacts explosively with DIISOPROPYL PEROXYDICARBONATE; BENZOYL PEROXIDE; and OXIDIZING AGENTS (such as PERCHLORATES)
0 - Reactivity	resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2253	CONTAINERS MAY EXPLODE IN FIRE.	Dimethylaniline may react with METALS to release flammable and explosive <i>Hydrogen</i> gas.
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	Dimethylaniline is not compatible with STRONG ACIDS
(Poison)	Dimethylaniline , when heated, may form an ignitable vapor/air mixture in closed tanks or containers.	ACID CHLORIDES; ACID ANHYDRIDES; and CHLOROFORMATES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Dimethylaniline**.

EXPOSURE LIMITS

 OSHA:
 5 ppm, 8-hr TWA

 NIOSH:
 5 ppm, 10-hr TWA; 10 ppm STEL

 ACGIH:
 5 ppm, 8-hr TWA; 10 ppm STEL

 IDLH:
 100 ppm

The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 10 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Headache fat

nhalation: Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	0.013 ppm
Flash Point:	145°F (63°C)
LEL:	1%
UEL:	7%
Auto Ignition Temp:	700°F (371°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	1 mm Hg at 85°F (29.4°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	379°F (193°C)
Melting Point:	36.4°F (2.5°C)
Ionization Potential:	7.14 eV
Molecular Weight:	121.2

PROTECTIVE EQUIPMENT

Gloves: SilverShield®/4H® (>4-hr breakthrough)

Coveralls: Tychem® BR, Responder® and TK (>8-hr breakthrough)

Respirator:

>5 ppm - Supplied air >50 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 3,3'-DIMETHYLBENZIDINE

Synonyms: o-Toluidine CAS No: 119-93-7 Molecular Formula: C₁₄H₁₆N₂ RTK Substance No: 0742 Description: White to reddish crystal or powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	3,3'-Dimethylbenzidine may burn, but does not	3,3'-Dimethylbenzidine is not compatible with		
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,		
0 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).		
DOT#: UN 2811	POISONOUS GASES ARE PRODUCED IN FIRE.			
ERG Guide #: 154	cool.			
Hazard Class: 6.1				
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Flash Point:	471°F (244°C)
Auto Ignition Temp:	979°F (526°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	392°F (200°C)
Melting Point:	264° to 270°F (129° to 132°C)
Molecular Weight:	212.3

PROTECTIVE EQUIPMENT

EXPOSURE LIMITS

NIOSH: 0.02 mg/m³, 60-minute Ceiling

The Protective Action Criteria values are:

- $PAC-1 = 0.3 \text{ mg/m}^3$
- $PAC-2 = 2 mg/m^3$
- $PAC-3 = 100 \text{ mg/m}^3$

Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>P100 filters</i> >0.2 mg/m ³ - SCBA

Nitrile and Natural Rubber

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation No information Nose and throat irritation with coughing and wheezing. Cancer (liver, bladder, mammary gland) in animals	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Gloves:

INFORMATION FOR EMERGENCY RESPONDERS

Common Name: 2,3-DIMETHYLBUTANE

Synonyms: Diisopropyl CAS No: 79-29-8 Molecular Formula: C₆H₁₄ RTK Substance No: 0744

Description: Clear, colorless liquid H

AZARD	DATA	L

Hazard Rating	Firefighting	Reactivity
1 - Health	Use dry chemical, CO_2 , alcohol-resistant foam or other foaming agent as extinguishing agents	2,3-Dimethylbutane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
3 - Fire	Water may not be effective in fighting fires.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	FLUORINE).
DOT#: UN 2457	Use water spray to keep fire-exposed containers cool.	
ERG Guide #: 128	Vapors may travel to a source of ignition and flash	
Hazard Class: 3 (Flammable)	back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Cover with an activated carbon adsorbent and place in covered containers for disposal.

May be harmful to animal and plant life.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	100 ppm, 10-hr TWA; 510 ppm,
	15-min Ceiling
ACGIH:	500 ppm, 8-hr TWA; 1,000 ppm,
	15-min STEL
IDLH:	1,100 ppm (as <i>Hexane</i>)

HEA	LTH	I EF	FEC ^T	TS
				. •

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lungs Headache, nausea, dizziness and lightheadedness

PHYSICAL PROPERTIES

Odor Threshold:	65 to 248 ppm
Flash Point:	-20°F (-29°C)
LEL:	1.2%
UEL:	7.0%
Vapor Density:	3 (air = 1)
Vapor Pressure:	200 mm Hg at 68°F (20°C)
Specific Gravity:	0.65 - 0.66 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	122° to 145°F (50° to 63°C)
Molecular Weight:	86.2

PROTECTIVE EQUIPMENT

Gloves:	Viton, Nitrile or Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 3, CPF 4, BR and LV, Responder®, TK; Kappler Zytron® 300; and Saint- Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	>100 ppm - Supplied air

>100 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: DIMETHYLCARBAMOYL CHLORIDE

Synonyms: DMCC; Chloroformic Acid Dimethylamide CAS No: 79-44-7 Molecular Formula: C_3H_6CINO RTK Substance No: 0746 Description: Clear, colorless liquid with an unpleasant odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Dimethylcarbamoyl Chloride is a COMBUSTIBLE LIQUID.	Dimethylcarbamoyl Chloride will react with WATER, STEAM and MOISTURE to produce toxic	
2 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other	Hydrogen Chloride and Dimethylamine.	
1 - Reactivity	foam extinguishing agents.	Dimethylcarbamoyl Chloride reacts vigorously or	
DOT#: UN 2262	DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Nitrogen Oxides	explosively if mixed with DIISOPROPYL ETHER or other ETHERS in the presence of small amounts of METAL SALTS.	
Hazard Class: 8 (Corrosive)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool as water will decompose Dimethylcarbamoyl Chloride to form toxic <i>Hydrogen Chloride</i> and <i>Dimethylamine</i> .	Dimethylcarbamoyl Chloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:NoneNIOSH:Lowest feasible concentrationACGIH:0.005 ppm, 8-hr TWAIDLH:None

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea and vomiting
Chronic:	Cancer (nose and skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Unpleasant odor
Flash Point:	155°F (68°C)
Vapor Density:	3.7 (air = 1)
Vapor Pressure:	2.5 mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reactive/Decomposes
Boiling Point:	329° to 333°F (165° to 167°C)
Melting Point:	-27°F (-33°C)
Molecular Weight:	107.6

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® CSM, Responder®, and TK (for <i>known</i> carcinogens)
Respirator:	>0.005 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: DIMETHYLFORMAMIDE

Synonyms: DMF; Formyldimethylamine; N,N-Dimethylformamide CAS No: 68-12-2 Molecular Formula: C₃H₇NO RTK Substance No: 0759 Description: Colorless to pale yellow liquid with a fishy or Ammonia-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Dimethylformamide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen</i>	CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and
DOT#: UN 2265 ERG Guide #: 129	Use water spray to keep fire-exposed containers	other CHLORINATED HYDROCARBONS in the
Hazard Class: 3 (Flammable)		Dimethylformamide is not compatible with ALKYL ALUMINUM COMPOUNDS (such as TRIETHYLALUMINUM) and <i>inorganic</i> NITRATES.

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Odor Threshold:	0.47 ppm to 100 ppm	
$O_{\rm m}$ illy EQ methods (4EQ for the	Flash Point:	136°F (58°C)	
Spill: 50 meters (150 feet)	LEL:	2.2%	
Fire: 800 meters (1/2 mile)	UEL:	15.2%	
Absorb liquids in dry sand earth or a similar material	Auto Ignition Temp:	883°F (473°C)	
and place into sealed containers for disposal.	Vapor Density:	2.5 (air = 1)	
	Vapor Pressure:	4 mm Hg at 77°F (25°C)	
	Specific Gravity:	0.95 (water = 1)	
	Water Solubility:	Soluble	
	Boiling Point:	307°F (153°C)	
	Freezing Point:	-78°F (-61°C)	
	Critical Temp:	653°F (345°C)	
	Ionization Potential:	9.12 eV	
	Molecular Weight:	73.09	

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 10 ppm, 8-hr TWA NIOSH: 10 ppm, 10-hr TWA	Gloves:	Barrier® (>8-hr breakthrough)
ACGIH: 10 ppm, 8-hr TWA IDLH: 500 ppm	Respirator:	SCBA
The Protective Action Criteria values are: $PAC_1 = 2 \text{ ppm}$ $PAC_2 = 91 \text{ ppm}$ $PAC_3 = 530 \text{ ppm}$		

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,2-DIMETHYLHYDRAZINE

Synonyms: N,N'-Dimethylhydrazine; SDMH CAS No: 540-73-8 Molecular Formula: C₂H₈N₂ RTK Substance No: 1008

Description: Clear, colorless liquid, with a strong, Ammonia-like odor, that turns yellow and fumes in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 1 - Reactivity DOT#: UN 2382 ERG Guide #: 131 Hazard Class: 6.1	 FLAMMABLE AND CORROSIVE Use dry chemical, CO₂, water in flooding quantities or alcohol-resistant foam as extinguishing agents. 1,2-Dimethylhydrazine may re-ignite if not diluted with water. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 	Contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and METALLIC OXIDES (such as COPPER OXIDES, LEAD OXIDES and IRON OXIDES) may result in fires and explosions. 1,2-Dimethylhydrazine is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSUM HYDROXIDE)
(Poison)	and flashback.	Protect from AIR and LIGHT.
	Flow or agitation may generate electrostatic charges.	

LEL:

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 100 meters (300 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Use only non-sparking tools and equipment. Metal containers involving the transfer of 1,2-Dimethylhydrazine should be grounded and bonded. Keep 1,2-Dimethylhydrazine out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

ACGIH: 0.01 ppm, 8-hr TWA (as 1,1-Dimethylhydrazine)

The Protective Action Criteria values are:

PAC-1 = 1.5 ppm PAC-2 = 3 ppm PAC-3 = 11 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, lightheadedness, and passing out
Chronic:	Cancer (blood vessels, intestines, liver) in animals

PHYSICAL PROPERTIES Flash Point: 5 °F (-15 °C) 2% (for 1,1-Dimethylhydrazine) 95% (for 1 1-Dimethylhydrazine)

UEL:	95% (for 1,1-Dimethylhydrazine
Vapor Density:	0.76 (air = 1)
Specific Gravity:	0.83 (water = 1)
Water Solubility:	Soluble
Boiling Point:	178 °F (81 °C)
Melting Point:	160 °F (-9 °C)
Molecular Weight:	60.12

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough for Dimethylhydrazine)
Coveralls:	Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Dimethylhydrazine</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: DIMETHYL MERCURY

Synonyms: None CAS No: 593-74-8 Molecular Formula: C₂H₆Hg RTK Substance No: 0763 Description: Colorless liquid

Hazard Rating	Firefighting			Reactivity
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 2024 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	 Dimethyl Mercury is a FLAMMABLE LIQUID. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Mercury vapors</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		E LIQUID. or foam as CED IN FIRE, IRE. d containers ivel a distance the source.	Dimethyl Mercury reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause a fire hazard.
SPILL/LEAKS				PHYSICAL PROPERTIES

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 270 meters (900 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

DO NOT let this substance enter the environment as it bioaccumulates.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA; 0.04 mg/m ³ , STEL
NIOSH:	0.01 mg/m ³ , 10-hr TWA; 0.03 mg/m ³ , STEL
ACGIH:	0.01 mg/m ³ , 8-hr TWA; 0.03 mg/m ³ , STEL
IDLH:	2 mg/m ³
	(All the choice are as Marsumi)

(All the above are as Mercury)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Acute:	Irritation of the nose, throat and lungs with coughing, wheezing and/or shortness of breath
Chronic:	Carcinogen (kidney) in animals
	Several Methyl Mercury compounds are known teratogens
	Sore gums, tingling or "pins and needles" feeling in fingers, irritability and weakness, slurred speech and metallic taste

Odor Threshold: No information

Flash Point:	41°F (5°C)		
Vapor Density:	7.9 (air = 1)		
Vapor Pressure:	50 mm Hg at 68°F (20°C)		
Specific Gravity:	3 (water = 1)		
Water Solubility:	Insoluble		
Boiling Point:	204°F (96°C)		
Melting Point:	-45.4°F (-43°C)		
Molecular Weight:	230.7		
PROTECTIVE EQUIPMENT			
Gloves: 4-H/Silv	er Shield® (60-minutes breakthrough)		

Coveralls:	DuPont Tychem® Responder®, CSM and TK for toxic and corrosive chemical vapors
Boots:	No information
Respirator:	>0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: 2,3-DIMETHYLPENTANE

Synonyms: 3,4 Dimethylpentane CAS No: 565-59-3 Molecular Formula: C_7H_{16} RTK Substance No: 4147 Description: Colorless liquid with a gasoline odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	2,3-Dimethylpentane is not compatible
3 - Fire	extinguishing agents, as water may not be effective in fighting fires.	with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES,
DOT#: UN 1206	CONTAINERS MAY EXPLODE IN FIRE.	
FRG Guide #: 128	Use water spray to keep fire-exposed containers cool.	
	Vapors may travel to a source of ignition and flash back.	
Hazard Class: 3	Vapor is heavier than air and may travel a distance to cause a fire or	
(Flammable)	explosion far from the source.	
	Electrostatic discharges may be generated resulting in ignition or	
	explosion.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **2,3-Dimethylpentane** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 400 ppm, 8-hr TWA; 500 ppm, STEL

HEALTH EFFECTS

Eves:	Irritation
Skin:	Irritation
Skill.	Initation
Inhalation:	Nose and throat irritation
	Headache, dizziness, lack of coordination, nausea and vomiting

PHYSICAL PROPERTIES Flash Point: $< 20^{\circ}F(-7^{\circ}C)$ LEL: 1.1% UEL: 6.7% Auto Ignition Temp: $635^{\circ}F(335^{\circ}C)$ Vapor Density: 3.5 (air = 1) Vapor Pressure: 48 mm Hg at $77^{\circ}F(25^{\circ}C)$

-	0
Specific Gravity:	0.7 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	194°F (90°C)
Molecular Weight:	94.2

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>n-Heptane</i>)
Coveralls:	Tychem® CPF 3, BR, LV, Responder®, and TK; Zytron® 300; ONESuit®TEC; and Trellchem® fabrics (>8-hr breakthrough for <i>n</i> -Hexane and <i>n</i> -Heptane)
Respirator:	>400 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

 $\ensuremath{\textit{Remove}}$ contaminated clothing and wash contaminated skin with soap and water.





Common Name: 2,4-DIMETHYLPHENOL

Synonym: m-Xylenol CAS No: 105-67-9 Molecular Formula: C₈H₁₀O RTK Substance No: 0764

Description: Colorless, crystalline solid or yellow-brown liquid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	2,4-Dimethylphenol is a COMBUSTIBLE LIQUID or SOLID.	2,4-Dimethylphenol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents.	fires.
	POISONOUS GASES ARE PRODUCED IN FIRE.	
DOT#. ON 2201	Use water spray to keep fire-exposed containers	2,4-Dimethylphenol is not compatible with STRONG
ERG Guide #: 153	cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 61	2,4-Dimethylphenol can be ignited by static	NITRIC); STRONG BASES (such as SODIUM
	discharge or sparks.	HYDROXIDE and POTASSIUM HYDROXIDE); ACID
(Poison)		CHLORIDES; ACID ANHYDRIDES; and AMMONIA.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

2,4-Dimethylphenol is toxic to aquatic organisms and may bioaccumulate.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 1 mg/m^3$
- $PAC-2 = 6 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation with
coughing, wheezing and shortness of
breath
Headache, nausea and vomiting

PHYSICAL PROPERTIES

P	
Flash Point:	>230°F (>110°C)
LEL:	1.1%
UEL:	6.4%
Auto Ignition Temp:	1,110°F (599°C)
Vapor Pressure:	0.062 mm Hg at 68°F (20°C)
Specific Gravity:	0.97 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	413°F (212°C)
Melting Point:	78° to 79°F (25° to 26°C)
Ionization Potential:	8 +/- 0.2 eV
Molecular Weight:	122.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile and Viton (>8-hr breakthrough for <i>aromatic Phenols</i>)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for <i>aromatic Phenols</i>)
Respirator:	>1 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIMETHYL SULFATE

Synonyms: DMS; Methyl Sulfate; Sulfuric Acid, Dimethyl Ester CAS No: 77-78-1 Molecular Formula: $C_2H_6O_4S$ RTK Substance No: 0768 Description: Colorless, oily liquid with a faint onion-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 2 - Fire	Dimethyl Sulfate is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Dimethyl Sulfate reacts violently with concentrated AMMONIA and ignites on contact with BARIUM CHLORIDE.
1 - Reactivity DOT#: UN 1595 ERG Guide #: 156 Hazard Class: 6.1 (Poison)	 POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i>. Use water spray to keep fire-exposed containers cool and to reduce vapors. Dimethyl Sulfate may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 182°F (83°C). 	Dimethyl Sulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and SODIUM AZIDE.
		Dimethyl Sulfate decomposes in WATER and MOIST

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. **Dimethyl Sulfate** can be neutralized using dilute (<10%) *Ammonia*.

Dimethyl Sulfate is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	1 ppm, 8-hr TWA	
NIOSH:	0.1 ppm, 10-hr TWA	
ACGIH:	0.1 ppm, 8-hr TWA	
IDLH:	7 ppm	
The Protective Action Criteria values are:		
	PAC-1 = 0.024 ppm; PAC-2 = 0.12 ppm;	
	PAC-3 = 1.6 ppm	

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Irritation, burns, itching and ulcers (skin absorbable)
Inhalation:	Nose, throat and lung irritation, with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea, vomiting and coma
Chronic:	Cancer (nasal cavity and brain) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Onion-like
Flash Point:	182°F (83°C)
Auto Ignition Temp:	370°F (188°C)
Vapor Density:	4.35 (air = 1)
Vapor Pressure:	0.1 to 0.5 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	370°F (188°C)
Freezing Point:	-25°F (-32°C)
Molecular Weight:	126.1

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene, Viton/Butyl and SilverShield®/4H® (>4-hr breakthrough)
Coveralls:	Tychem® SL, C3, TF, BR, TK, and Responder (>8-hr breakthrough)
Respirator:	>0.1 ppm – Pressure demand supplied air >7 ppm – Pressure demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2,4 DINITROTOLUENE

Synonyms: 2,4-DNT; 2,4-Dinitrotoluol CAS No: 121-14-2 Molecular Formula: $C_6H_3CH_3(NO_2)_2$ RTK Substance No: 0783

Description: Orange-yellow, crystalline solid often shipped in a molten state

HAZARD DATA				
Hazard Rating Firefighting				Reactivity
3 - Health 1 - Fire 3 - Reactivity DOT#: UN 2038 ERG Guide #: 152 Hazard Class: 6.1 (Poison)	RatingFirefighting12,4-Dinitrotoluene is REACTIVE and a DANGEROUS EXPLOSION HAZARD. 2,4-Dinitrotoluene may burn, but does not readily ignite.ivity		nd a RD. oes not readily , alcohol- inguishing JCED IN FIRE, FIRE. ed containers	 2,4-Dinitrotoluene becomes explosive when exposed to PRESSURE and HIGH TEMPERATURES. 2,4-Dinitrotoluene reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); TIN; ZINC; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to cause fires and/or explosions.
SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) for solid 50 meters (150 feet) for molten Cover <i>liquid</i> spill with dry sand, earth, or a similar material and place into sealed containers for disposal. Moisten spilled <i>solid</i> material first and place into sealed containers for disposal.			Odor Threshold Flash Point: LEL: Vapor Density: Vapor Pressure Specific Gravit Water Solubilit Boiling Point: Melting Point: Molecular Weig	Slight odor $404^{\circ}F (207^{\circ}C)$ 1.4% 1.4% y: $6.27 (air = 1)$ ire: 1 mm Hg at $68^{\circ}F (20^{\circ}C)$ ity: 1.3 (water = 1) ity: Insoluble : $572^{\circ}F (300^{\circ}C)$: 153° to $158^{\circ}F (67^{\circ}$ to $70^{\circ}C)$: 182.13
EXPOS	SURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 1.5 mg/m^3 , 8-hr TWA NIOSH: 1.5 mg/m^3 , 10-hr TWA ACGIH: 0.2 mg/m^3 , 8-hr TWA IDLH: 50 mg/m^3 (All of the above are for <i>Dinitrotoluene</i>) The Protective Action Criteria values are: PAC-1 = 7.5 mg/m^3 PAC-2 = 50 mg/m^3 PAC-3 = 50 mg/m^3			Gloves: Coveralls: Respirator:	Butyl (>8-hr breakthrough for 2,4-Dinitrotoluene in 30% to 70% solution) Tyvek® (<i>solid</i> 2,4-Dinitrotoluene); Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Nitro compounds, unsubstituted</i>) SCBA
HEALTH EFFECTS			FIRS	ST AID AND DECONTAMINATION
Eyes:Irritation and burnsSkin:Irritation and burns (skin absorbable)Inhalation:Nose and throat irritation with coughing and wheezing Headache, fatigue and blue color to the skin and lips (methemoglobinemia)Chronic:Cancer (skin, mammary) in animals			Remove the per Flush eyes with contact lenses i Quickly remove large amounts o Begin artificial r Transfer promp	erson from exposure. th large amounts of water for at least 15 minutes. Remove s if worn. Seek medical attention immediately. ve contaminated clothing and wash contaminated skin with s of soap and water. Seek medical attention. I respiration if breathing has stopped and CPR if necessary. aptly to a medical facility.



Common Name: DIOXOLANE

Synonyms: 1,3-Dioxolan; Formal Glycol; Glycol Methylene Ether CAS No: 646-06-0 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 0791 Description: Clear, colorless liquid with an *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health 3 - Fire 2 - Reactivity	FLAMMABLE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires.	Dioxolane reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		
DOT#: UN 1166 ERG Guide #: 127	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	HYDROCHLORIC, SULFURIC and NITRIC) to form <i>Hemiacetals</i> and <i>Formaldehyde</i> . <i>Peroxides</i> can form on exposure to AIR.		
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.			

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

Keep **Dioxolane** out of confined spaces, such as sewers, because of the possibility of an explosion. Metal containers involving the transfer of **Dioxolane** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Dioxolane**.

Biodegradation products are not toxic.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	None
ACGIH:	20 ppm, 8-hr TWA
IDLH:	None

HEALTH EFFECTS

- Eyes: Skin:
- Irritation and burns Irritation and burns
- Inhalation: Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Odor Threshold:	Ether-like
Flash Point:	35°F (2°C)
LEL:	2.1%
UEL:	20.5%
Auto Ignition Temp:	525°F (274°C)
Vapor Density:	2.6 (air = 1)
Vapor Pressure:	79 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	78°F (26°C)
Molecular Weight:	74.09

PROTECTIVE EQUIPMENT		
Gloves:	Silver Shield®/4H® (>8-hr breakthrough for <i>Ethylene Glycol</i>)	
Coveralls:	DuPont Tychem® Responder®, CSM, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC	
Respirator:	>20 ppm - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.





Common Name: DIPHENYL

Synonyms: Biphenyl; Lemonene; Phenyl Benzene CAS No: 92-52-4 Molecular Formula: $C_{12}H_{10}$ RTK Substance No: 0795

Description: Colorless, white to yellow, leaf-like or crystalline solid with a pleasant, characteristic odor

HAZARD DATA					
Hazard Rating	Firefighting	Firefighting		React	tivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 17 Hazard Class: 9 (Miscellaneous Hazardous Material)	Diphenyl is a COMBUSTIBLE SOLID and finely dispersed particles may form explosive mixtures in air. Use dry chemical, CO ₂ , water spray or alcoholresistant foam as extinguishing agents. Water or foam may cause frothing. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.		Diphen (such a PERM CHLOI may ca	nyl is not compatible with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE) and contact ause fire and explosion.	
S	PILL/LEAKS			PH	SICAL PROPERTIES
Isolation Distance Spill: 25 meters (7 Fire: 800 meters (Moisten spilled ma vacuum for clean- for disposal. DO NOT wash into Diphenyl is very to bioaccumulation n	e: /5 feet) 1/2 mile) terial first or use a HEPA-filter up and place into sealed containers o sewer. oxic to aquatic organisms and nay occur.		Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Densit Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Ionization Po Molecular We	Temp: y: ire: rity: lity: : tential: eight:	Pleasant odor $235^{\circ}F (113^{\circ}C)$ 0.6% 5.8% $1,004^{\circ}F (540^{\circ}C)$ 5.3 (air = 1) $0.005 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 1.2 Insoluble $489^{\circ} \text{ to } 491^{\circ}F (254^{\circ} \text{ to } 255^{\circ}C)$ $156^{\circ} \text{ to } 160^{\circ}F (69^{\circ} \text{ to } 71^{\circ}C)$ 7.95 eV 154.2
EXP	OSURE LIMITS			PRO	TECTIVE EQUIPMENT
OSHA: 1 mg/m NIOSH: 1 mg/m ACGIH: 1 mg/m IDLH: 100 mg The Protective Act PAC-1 = 8 mg/m PAC-2 = 60 mg/r PAC-3 = 100 mg	³ , 8-hr TWA ³ , 10-hr TWA ³ , 8-hr TWA /m ³ ion Criteria values are: ³ m ³ /m ³		Gloves: Coveralls: Respirator:	Butyl ar Tyvek® >1 mg/r cartridg >8 mg/r	nd Neoprene m ³ - Full facepiece APR with Organic vapor ge and High efficiency particulate prefilter m ³ - Supplied air or SCBA
HEA	ALTH EFFECTS		FIRS	ST AIC	O AND DECONTAMINATION
Eyes: Irrita Skin: Irrita Inhalation: Nose coug brea Naus Chronic: Poly canc	tion tion e, throat and lung irritation with ghing, wheezing and shortness of th sea, vomiting and abdominal pain <i>achlorinated Biphenyls</i> cause liver cer in humans and animals.		Remove the p Flush eyes wi contact lense Quickly remo large amount Begin artificia Transfer pron	erson fro th large a s if worn. ve contar s of soap I respirati nptly to a	om exposure. amounts of water for at least 15 minutes. Remove minated clothing and wash contaminated skin with and water. ion if breathing has stopped and CPR if necessary. medical facility.



Common Name: 1,2-DIPHENYLHYDRAZINE

Synonyms: Hydrazobenzene; DPH CAS No: 122-66-7 Molecular Formula: $C_{12}H_{12}N_2$ RTK Substance No: 0800 Description: Odorless, white to yellow or orange crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	1,2-Diphenylhydrazine is a COMBUSTIBLE	1,2-Diphenylhydrazine is not compatible with OXIDIZING AGENTS (such as PERCHI ORATES)
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,
1 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	1,2-Diphenylhydrazine reacts with MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);
ERG Guide #: 171	CONTAINERS MAY EXPLODE IN FIRE.	ACID CHLORIDES; and ACID ANHYDRIDES to produce
Hazard Class: 9 (Environmentally Hazardous Material)	Use water spray to keep fire-exposed containers cool.	toxic Benziaine.

SPILL/LEAKS

Isolation Distance:

- Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.
- DO NOT wash into sewer.

Chronic:

1,2-Diphenylhydrazine is toxic to aquatic life and will bioaccumulate in fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for **1,2-Diphenylhydrazine**.

The Protective Action Criteria values are:

animals

PAC-1 = 120 mg/m³; PAC-2 = 1,300 mg/m³; PAC-3 = 7,900 mg/m³

	HEALTH EFFECTS
Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fatigue, dizziness and blue color to the skin and lips (<i>methemoglobinemia</i>)

Cancer (liver and mammary gland) in

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Combustible
Vapor Density:	1.158 (air = 1)
Vapor Pressure:	1 mm Hg at 217°F (103°C)
Specific Gravity:	1.158 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	559°F (293°C)
Melting Point:	253° to 259°F (123° to 126°C)
Molecular Weight:	184.24

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber and Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	Pressure demand supplied air

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: DIPROPYLENE GLYCOL METHYL ETHER

Synonyms: Dowanol® DPM; DPGME CAS No: 34590-94-8Molecular Formula: $C_7H_{16}O_3$ RTK Substance No: 0804 Description: Colorless liquid with a mild and pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Dipropylene Glycol Methyl Ether is a	Dipropylene Glycol Methyl Ether will react with
2 - Fire	COMBUSTIBLE LIQUID.	OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	Use dry chemical, CO_2 , water spray, alcohol- resistant foam or other foam as extinguishing	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: None	agents.	FLUORINE) to cause fires and explosions.
ERG Guide #: None	POISONOUS GASES ARE PRODUCED IN FIRE.	May form explosive <i>Peroxides</i> on contact with AIR.
Hazard Class: None	cool.	Hydrogen gas.

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (200 feet)

Large Spills: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

May be toxic to aquatic life.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA 150 ppm, 15-min STEL
ACGIH:	100 ppm, 8-hr TWA 150 ppm, 15-min STEL
IDLH LEVEL:	600 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness, lightheadedness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	35 ppm
Flash Point:	180°F (82°C)
LEL:	1.1%
UEL:	3.0%
Auto Ignition Temp:	518°F (270°C)
Vapor Density:	5.1 (air = 1)
Vapor Pressure:	0.28 mm Hg at 68°F (20°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Miscible
Boiling Point:	408°F (209°C)
Molecular Weight:	148.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 4, or equivalent for hydroxylic compounds (>8-hr breakthrough)
Respirator:	>100 ppm - full facepiece APR with an Organic vapor cartridge >600 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.





Common Name: DISULFOTON Svnonvms: CAS Number: 298-04-4

Molecular Formula: RTK Number:

Solvirex; Thiodemeton; Di-Syston

C8H19O2PS3

Description:

0812

Oily, colorless to yellow liquid in the Organophosphate class of pesticides; also available in granular form

HAZARD DATA Reactivity **Hazard Rating** Firefighting Store separately from Alkalis. Health: Disulfoton is COMBUSTIBLE. 4 Fire: Disulfoton may burn but does not readily ignite. 1 Use dry chemical, CO2, water spray or Reactivity: 1 foamextinguishers. UN 3018/2783 DOT #: POISONOUS GASES ARE PRODUCED IN FIRE, ERG #: 152 including Sulfur Oxides and Phosphorus Oxide DOT Hazard: 6.1 (poison) gases. CONTAINERS MAY EXPLODE IN FIRE when organic solvent is used as a carrier. SPILLS/LEAKS PHYSICAL PROPERTIES Isolation Distances: Molecular Weight: 274 38 Liquid Spill: 50 meters (150 fee) Flash Point: >82 °C (>180 °F) Solid Spill: 25 meters (75 feet) **Melting Point:** > -10°C (>13 °F) Fire: 800 meters (1/2 mile) Vapor Pressure: 0.0002 mm Hg at 20 °C (68 °F) **Specific Gravity:** 1 1 4 4 Evacuate personnel. Water Solubility: Insoluble Secure and control entrance to the area. **Boiling Point:** 132-133 °C (270-271 °F) If it is safe to do so, remove potential ignition sources. Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Do not allow this substance to enter waterways, including sewer systems, as this substance is toxic to aquatic life with long-lasting effects. Ventilate area of spill or leak after clean-up is complete. **PROTECTIVE EQUIPMENT** EXPOSURE LIMITS The following exposure limits are for **Disulfoton**: Gloves: Nitrile and Neoprene (>8-h breakthrough for Organophosphorus Compounds) NIOSH: 0.1 mg/m³, 10-hour average ACGIH: 0.1 mg/m³, 8-hour average Coverall: Tychem® BR, CSM, and TK (>8-h breakthrough for Organophosphorus Compounds) PAC: PAC-1 = 0.18 mg/m³ $PAC-2 = 2 mg/m^{3}$ >0.1 mg/m³ – supplied-air, full-facepiece, pressure-**Respirator:** PAC-3 = 8.8 mg/m³ demand or another positive-pressure mode **ACUTE HEALTH EFFECTS** FIRST AID AND DECONTAMINATION Immediately flush eyes with large amounts of water for at least Eyes: Irritation, burns, permanent damage 15 minutes, occasionally lifting upper and lower lids. Skin: Rash, burning sensation Remove contact lenses, if worn, while flushing, Inhalation: Headache, dizziness, chest tightness, twitching, loss of Quickly remove contaminated clothing. Immediately wash contaminated coordination, convulsions, pulmonary edema, coma, skin with large amounts of soap and water. death Shampoo hair promptly if contaminated. Remove the person from exposure. Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped. Transfer promptly to a medical facility. Medical observation is recommended for 24 to 48 hours after breathing overexposure.



Common Name: EPICHLOROHYDRIN

Synonyms: Chloromethyl Oxirane; 3-Chloropropylene Oxide; 1-Chloro-2,3-Epoxypropane CAS No: 106-89-8 Molecular Formula: C₃H₅CIO RTK Substance No: 0828 Description: Clear, colorless liquid with an irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Epichlorohydrin is a FLAMMABLE and REACTIVE LIQUID that can polymerize violently when exposed to	Epichlorohydrin can react with HEAT; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG
3 - Fire	HEAT.	BASES (such as SODIUM HYDROXIDE and POTASSIUM
2 - Reactivity	foam as extinguishing agents.	polymerization.
DOT#: UN 2023	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene.	Epichlorohydrin may react violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 131P	CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and ELUORINE): ALCOHOLS: AMINES (especially
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	ANILINE and ETHYLENE DIAMINE); ALUMINUM; ZINC;
(Poison)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back.	METAL SALTS (such as IRON and ALUMINUM CHLORIDE); PHENOLS; POTASSIUM TERT-BUTOXIDE; and WATER. Epichlorohydrin will react with TRICHLOROETHYLENE to form
	Epichlorohydrin may form an ignitable vapor/air mixture in closed tanks or containers.	explosive Dichloroacetylene.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of **Epichlorohydrin** should be grounded and bonded.

Keep **Epichlorohydrin** out of confined spaces, such as sewers, because of the possibility of an explosion.

Epichlorohydrin is harmful to aquatic life.

EXPOSURE LIMITS

 OSHA:
 5 ppm, 8-hr TWA

 NIOSH:
 Lowest feasible concentration

 ACGIH:
 0.5 ppm, 8-hr TWA

 IDLH:
 75 ppm

 The Protective Action Criteria values are:

 PAC-1 = 1.7 ppm
 PAC-2 = 24 ppm

 PAC-3 = 72 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns (skin absorbable)
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (nasal cavity and skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.08 to 12 ppm
Flash Point:	88°F (31°C)
LEL:	3.8%
UEL:	21%
Auto Ignition Temp:	772°F (411°C)
Vapor Density:	3.29 (air = 1)
Vapor Pressure:	13 mm Hg at 68°F (20°C)
Specific Gravity:	1.17 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	242°F (117°C)
Freezing Point:	-54°F (-47.8°C)
Ionization Potential:	10.6 eV
Molecular Weight:	92.53

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>0.5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2,3-EPOXY-1-PROPANOL

Synonyms: Glycidol; Epoxypropyl Alcohol CAS No: 556-52-5 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 0831 Description: Colorless, slightly thick liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 2 - Fire 0 - Reactivity	2,3-Epoxy-1-Propanol is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	2,3-Epoxy-1-Propanol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	2,3-Epoxy-1-Propanol may decompose and/or polymerize, with the release of HEAT, when in contact with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METALS (such as ALUMINUM,
(Poison)		COPPER and ZINC); METAL SALTS (such as IRON CHLORIDE and TIN CHLORIDE); and TRICHLOROETHYLENE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 300 meters (1,200 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

No environmental information available.

EXPOSURE LIMITS

 OSHA:
 50 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 10-hr TWA

 ACGIH:
 2 ppm, 8-hr TWA

 IDLH:
 150 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, burns, rash, dryness and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing, and shortness of breath
	Headache, dizziness, lightheadedness, and passing out
Chronic:	Cancer (lung, skin, mammary glands) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	162°F (72°C)
LEL:	3.7%
UEL:	Unknown
Auto Ignition Temp:	779°F (415°C)
Vapor Density:	2.15 (air = 1)
Vapor Pressure:	0.9 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Miscible
Boiling Point:	320°F (160°C)
Molecular Weight:	74.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Silver Shield®/4H®
Coveralls:	DuPont Tychem® BR, LV, Responder®, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Heterocyclic compounds</i> , <i>Oxygen</i> ,
Respirator:	Epoxides)
	>2 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.


Common Name: ETHANOL, 1,2-DICHLORO-, ACETATE

Synonyms: 1,2-Dichloroethyl Acetate CAS No: 10140-87-1 Molecular Formula: $C_4H_6Cl_2O_2$ RTK Substance No: 2394 Description: Water-white liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Ethanol, 1,2-Dichloro-, Acetate explodes when heated with NITRATES.
1 - Fire	extinguishing agents.	Ethanol, 1,2-Dichloro-, Acetate reacts with STRONG
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 1993	including <i>Chlorine</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE.	NITRIC) to release heat and poisonous gases (such as <i>Hydrogen Chloride</i>).
ERG Guide #: 128	Use water spray to keep fire-exposed containers	Ethanol, 1,2-Dichloro-, Acetate is not compatible with
Hazard Class: 3	cool.	STRONG BASES (such as SODIUM HYDROXIDE and
(Flammable)	Vapors may travel to a source of ignition and flash back.	as PERCHLORATES, PEROXIDES,
	Ethanol, 1,2-Dichloro-, Acetate may form an ignitable vapor/air mixture in closed tanks or containers.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Foam can be used to suppress vapors.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Ethanol**, **1,2-Dichloro-**, **Acetate**.

The Protective Action Criteria values are:

PAC-1 = 1 ppm PAC-2 = 1.71 ppm PAC-3 = 6 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Flash Point:	162.3°F (72.4°C)
Specific Gravity:	1.29 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	136° to 149°F (58° to 65°C)
Freezing Point:	-26°F (-32.2°C)
Molecular Weight:	157

	PROTECTIVE EQUIPIVIENT
Gloves:	Viton/Butyl, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem BR, CSM and TK® (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2-ETHOXYETHANOL

Synonyms: Cellosolve; Ethylene Glycol Monoethyl Ether CAS No: 110-80-5 Molecular Formula: C₄H₁₀O₂ RTK Substance No: 0839 Description: Clear, colorless liquid with a sweet odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 1171 ERG Guide #: 127 Hazard Class: 3 (Flammable)	 2-Ethoxyethanol is a COMBUSTIBLE LIQUID. Use dry chemical, CO₂, water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Flow or agitation may generate electrostatic charges. 2-Ethoxyethanol may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 111°F (44°C). 	 2-Ethoxyethanol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and form explosive <i>peroxides</i>. 2-Ethoxyethanol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and COPPER.

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of 2-Ethoxyethanol.

Metal containers involving the transfer of

2-Ethoxyethanol should be grounded and bonded. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 200 ppm, 8-hr TWA NIOSH: 0.5 ppm, 10-hr TWA ACGIH: 5 ppm, 8-hr TWA IDLH: 500 ppm The Protective Action Criteria values are:

PAC-1 = 5 ppm PAC-2 = 5 ppm PAC-3 = 500 ppm

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES			
Odor Threshold:	2.7 ppm		
Flash Point:	105° to 110°F (41° to 43°C)		
LEL:	1.7%		
UEL:	15.6%		
Auto Ignition Temp:	455°F (235°C)		
Vapor Density:	3.1 (air = 1)		
Vapor Pressure:	3.8 mm Hg at 68°F (20°C)		
Specific Gravity:	0.9 (water = 1)		
Water Solubility:	Soluble		
Freezing Point:	275°F (135°C)		
Melting Point:	-130°F (-90°C)		

	PROTECTIVE EQUIPMENT	
Gloves:	Viton/Butyl, SilverShield®/4H® and Viton (>8-hr breakthrough)	
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)	
Respirator:	SCBA	

90.1

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL ALCOHOL

Synonyms: Alcohol; Ethanol; Methylcarbinol CAS No: 64-17-5 Molecular Formula: C₂H₅OH RTK Substance No: 0844

Description: Clear, colorless liquid with a wine-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Ethyl Alcohol reacts violently with ACETYL BROMIDE and ACETYL CHLORIDE.
3 - Fire	foam as extinguishing agents.	Contact with concentrated SULFURIC ACID; POTASSIUM; and
0 - Reactivity	Solid streams of water may be ineffective.	HYDROGEN PEROXIDE can cause explosions.
• nouenny	POISONOUS GASES ARE PRODUCED IN FIRE.	Ethyl Alcohol will react with PLATINUM BLACK; CALCIUM
DOT#: UN 1170	CONTAINERS MAY EXPLODE IN FIRE.	HYPOCHLORITE; SILVER OXIDE; AMMONIA; NITRIC ACID;
FRG Guide #: 127	Use water spray to keep fire-exposed containers cool.	MERCURIC NITRATE; SILVER NITRATE; MAGNESIUM
	Vapor is heavier than air and may travel a distance to	PERCHLORATE; and other STRONG OXIDIZERS to cause fire
Hazard Class: 3	cause a fire or explosion far from the source and	and explosions.
(Flammable)	flashback.	Ethyl Alcohol reacts violently with ISOCYANATES; MINERAL
	Ethyl Alcohol may form an ignitable vapor/air mixture in	ACIDS; and CHLOROFORM.
	closed tanks or containers.	Protect from SUNLIGHT.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Alcohol**.

Keep Ethyl Alcohol out of confined spaces, such as sewers, because of the possibility of an explosion.

Metal containers involving the transfer of **Ethyl Alcohol** should be grounded and bonded.

Ethyl Alcohol may affect aquatic life.

EXPOSURE LIMITS

 OSHA:
 1,000 ppm, 8-hr TWA

 NIOSH:
 1,000 ppm, 10-hr TWA

 ACGIH:
 1,000 ppm, STEL

 IDLH:
 3,300 ppm

The Protective Action Criteria values are:

PAC-1 = 1,800 ppm PAC-2 = 3,300 ppm

PAC-3 = 15,000 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath
	Headache, drowsiness, nausea and vomiting, and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	84 ppm
Flash Point:	55 °F (13 °C)
LEL:	3%
UEL:	19%
Auto Ignition Temp:	685 °F (363 °C)
Vapor Density:	1.59 (air = 1)
Vapor Pressure:	44 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.79 (water = 1)
Water Solubility:	Soluble
Boiling Point:	173 °F (78 °C)
Melting Point:	-173 °F (-114 °C)
Ionization Potential:	10.47 eV
Molecular Weight:	46.1

PROTECTIVE EQUIPMENT

Gloves: Butyl, Neoprene, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough)

Coveralls: Tychem® CPF 3 (>8-hr breakthrough)

Respirator: >1,000 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL ALUMINUM SESQUICHLORIDE

Synonyms: Triethyltrichlorodialuminum; Triethylaluminum Sesquichloride CAS No: 12075-68-2 Molecular Formula: $C_6H_{15}Al_2Cl_3$ RTK Substance No: 0846 Description: Clear, yellow liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 3₩ - Reactivity	FLAMMABLE AND REACTIVE LIQUID Ethyl Aluminum Sesquichloride is SPONTANEOUSLY COMBUSTIBLE in AIR and REACTS VIOLENTLY with WATER to form	Ethyl Aluminum Sesquichloride IGNITES when exposed to AIR or OXYGEN and REACTS VIOLENTLY with WATER to form corrosive <i>Hydrogen Chloride</i> and flammable <i>Ethane gases</i> .
DOT#: UN 3052 ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously combustible)	corrosive <i>Hydrogen Chloride</i> and flammable <i>Ethane gases.</i> Use dry chemical or dry graphite as extinguishing agents. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Aluminum Oxide.</i> CONTAINERS MAY EXPLODE IN FIRE.	Ethyl Aluminum Sesquichloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and CARBON TETRACHLORIDE.
		Keep Ethyl Aluminum Sesquichloride dry and protect from SHOCK and HEAT.

SPILL/LEAK	S
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Isolation Distance:

- Small Spill: 30 meters (100 feet)
- Large Spill: 60 meters (200 feet)
- Fire: 800 meters (1/2 mile)
- Absorb liquids in dry sand, dry earth, or a similar material and place into sealed containers for disposal.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Aluminum Sesquichloride**.

DO NOT USE WATER OR WET METHOD.

DO NOT allow Ethyl Aluminum Sesquichloride to enter water systems.

EXPOSURE LIMITS

OSHA: None NIOSH: 2 mg/m³, 10-hr TWA (for *Aluminum Alkyls* measured as *Aluminum*) ACGIH: None

HEALTH EFFECTS

Eyes:Severe irritation and burnsSkin:Severe irritation and burnsInhalation:Nose, throat and lung irritation with
coughing, wheezing and shortness of
breath
Headache, nausea and vomiting

PHYSICAL PROPERTIES

Flash Point:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Freezing Point:
Molecular Weight:

-4°F (-20°C) 8.49 (air = 1) 0.012 mm Hg at 77°F (25°C) 1.1 (water = 1) Reacts Violently 297° to 399°F (147° to 204°C) -4°F (-20°C) 247.5

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield $/4H\$ and Barrier $(>4-hr$ break through for highly toxic chemicals)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for Organo-Metallic compounds)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL BENZENE

Synonyms: EB; Ethylbenzol; Phenylethane CAS No: 100-41-4 Molecular Formula: C_8H_{10} RTK Substance No: 0851 Description: Clear, colorless liquid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Ethyl Benzene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity DOT#: UN 1175 ERG Guide #: 130	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to reduce vapors and to keep containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
Hazard Class: 3 (Flammable)	 Vapor is neavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charges. Ethyl Benzene may form an ignitable vapor/air mixture in closed tanks or containers. 	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Ground and bond containers when transferring **Ethyl Benzene**.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Benzene**.

DO NOT wash into sewer.

Ethyl Benzene is toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 100 ppm, 8-hr TWA

 NIOSH:
 100 ppm, 10-hr TWA; 125 ppm, STEL

 ACGIH:
 20 ppm, 8-hr TWA

 IDLH:
 800 ppm

 The Protective Action Criteria values are:
 PAC-1 = 33 ppm

 PAC-3 = 1,800 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation (skin absorbable)
Inhalation:	Nose and throat irritation
	Headache, dizziness, lightheadedness loss of coordination and passing out. Very high levels can cause trouble breathing and even death.
Chronic:	Cancer (kidney, testes, lung, liver) in

PHYSICAL PROPERTIES

Odor Threshold:	2.3 ppm
Flash Point:	59° to 70°F (15° to 21°C)
LEL:	0.8%
UEL:	6.7%
Auto Ignition Temp:	810° to 860°F (432° to 460°C)
Vapor Density:	3.7 (water = 1)
Vapor Pressure:	7 mm Hg at 68°F (20°c)
Specific Gravity:	0.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	277°F (136°C)
Melting Point:	-139°F (-95°C)
Ionization Potential:	8.76 eV
Molecular Weight:	106.2

	PROTECTIVE EQUIPMENT
Gloves:	Viton/Butyl, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	>20 ppm - full facepiece APR with <i>Organic Vapor</i> <i>Cartridges</i> >200 ppm - SCBA

FIRST AID AND DECONTAMINATION

- ► Remove the person from exposure.
- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- ▶ Begin artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: ETHYL-4,4'-DICHLOROBENZILATE

Synonyms: Benzeneacetic Acid; Chlorobenzilate CAS No: 510-15-6 Molecular Formula: $C_{16}H_{14}Cl_2O_3$ RTK Substance No: 0205 Description: Colorless to pale yellow solid or a thick yellow or brownish liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	Ethyl-4,4'-Dichlorobenzilate may burn and can	Ethyl-4,4'-Dichlorobenzilate is not compatible with	
1 - Fire	also be dissolved in a flammable or combustible liquid carrier.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC): STRONG BASES (such as	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE)	
DOT#:	extinguishing agents.	and LIME).	
UN 2996 (liquid)	POISONOUS GASES ARE PRODUCED IN FIRE.		
UN 2761 (solid)	Use water spray to keep fire-exposed containers		
ERG Guide #: 151	cool.		
Hazard Class: 6.1			
(Toxic)			

SPILL/LEAKS

Isolation Distance:

- Spills (liquid): 50 meters (150 feet) (solid): 25 meters (75 feet)
- Fire: 800 meters (1/2 mile)
- Eliminate all ignition sources.
- Dampen solid spill with 60 to 70% *Ethanol* and place in sealed containers for disposal.
- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Wash all contaminated surfaces with 60 to 70% *Ethanol* and then wash with soap and water. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 8.4 mg/m³
- PAC-2 = 92 mg/m³
- PAC-3 = 550 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation with rash or burning feeling
Inhalation:	Headache, loss of appetite, nausea, vomiting and diarrhea.
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

 Vapor Pressure:
 2.2 x 10⁻⁶ mm Hg at 68°F (20°C)

 Specific Gravity:
 1.3 (water = 1)

 Water Solubility:
 Insoluble

 Boiling Point:
 295° to 316°F (146° to 158°C)

 Melting Point:
 95° to 99°F (35° to 37°C)

 Molecular Weight:
 325.2

	PROTECTIVE EQUIPMENT	
Gloves:	Viton	
Coveralls:	Tyvek®	
Respirator:	>8.4 mg/m ³ – Pressure demand Supplied-air or SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYLENEDIAMINETETRAACETIC ACID

Synonyms: Edetic Acid; EDTA; Tetrine Acid CAS No: 60-00-4 Molecular Formula: C₁₀H₁₆N₂O₈ RTK Substance No: 0876 Description: Odorless, colorless or white, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ethylenediaminetetraacetic	Ethylenediaminetetraacetic Acid reacts violently with LEAD DIOXIDE.
0 - Fire	Acid itself does not burn.	Ethylenediaminetetraacetic Acid is not compatible with
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 3077	including Nitrogen Oxides. Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
ERG Guide #: 171	cool.	STRONG ACIDS (such as HYDROCHLORIC, SULEURIC and NUTRIC): STRONG RASES (such as
Hazard Class: 9 (Miscellaneous Hazardous Material)		SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER; COPPER ALLOYS; NICKEL; ALUMINUM; AMMONIA; AMINES; ISOCYANATES; and EPICHLOROHYDRIN.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ethylenediaminetetraacetic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

The Protective Action Criteria values are:

 $PAC-1 = 125 \text{ mg/m}^3$ $PAC-2 = 150 \text{ mg/m}^3$ $PAC-3 = 150 \text{ mg/m}^3$

Gloves: Neoprene Tyvek®

Coveralls:

>125 mg/m³ - Supplied air or SCBA **Respirator:**

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation and skin rash Inhalation: Nose and throat irritation with coughing and wheezing

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer promptly to a medical facility.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	2 x 10 ⁻¹² mm Hg at 77°F (25°C)
Specific Gravity:	0.86 (water = 1)
Water Solubility:	Slightly soluble
Melting Point:	Decomposes at 464°F (240°C)
Molecular Weight:	292.3

PROTECTIVE EQUIPMENT



Common Name: ETHYLENE DIBROMIDE

Synonyms: EDB; Ethylene Bromide CAS No: 106-93-4 Molecular Formula: $C_2H_4Br_2$ RTK Substance No: 0877 Description: Colorless, thick liquid with a slightly sweet, pleasant odor

HAZARD DATA

2		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of	Ethylene Dibromide may react violently with <i>powdered</i>
0 - Fire	not burn.	Ethylene Dibromide may react with SODIUM;
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	POTASSIUM; CALCIUM; LIQUID AMMONIA;
DOT#: UN 1605	Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 154	cool.	NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG BASES (such as SODIUM HYDROXIDE
Hazard Class: 6.1		and POTASSIUM HYDROXIDE) to cause fires and
(Poison)		explosions.
		Ethylene Dibromide decomposes on HOT SURFACES to form toxic and corrosive <i>Hydrogen Bromide</i> and <i>Bromine</i> gases.

SPILL/LEAKS	PHYSICAL PROPERTIES				
Isolation Distance:	Odor Threshold:	Slightly sweet			
	Flash Point:	Noncombustible			
Spill: 30 meters (100 feet)	Vapor Density:	6.5 (air = 1)			
Fire: 800 meters (1/2 mile)	Vapor Pressure:	12 mm Hg at 68°F (20°C)			
Absorb liquids in dry sand earth or a similar material	Specific Gravity:	2.2 (water = 1)			
and place into sealed containers for disposal.	Water Solubility:	Very slightly soluble			
Use foam to blanket release and suppress vapors.	Boiling Point:	268° to 270°F (131° to 132°C)			
Ethylene Dibromide may be hazardous to the	Melting Point:	50°F (10°C)			
environment.	Ionization Potential:	9.45 eV			
	Molecular Weight:	187.8			

EXPOSUI	RE LIMITS
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OSHA: 20 ppm, 8-hr TWA; 30 ppm, Ceiling; 50 ppm Peak (5 min.)

NIOSH: 0.045, 10-hr TWA; 0.13 ppm, Ceiling

IDLH: 100 ppm

The Protective Action Criteria values are:

PAC-1 = 17 ppm PAC-2 = 24 ppm PAC-3 = 46 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, drowsiness, unconsciousness and coma
Chronic:	Cancer (nasal cavity, circulatory system, mammary gland, and other sites) in animals

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, TK and CSM (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

 $\ensuremath{\text{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ETHYLENE GLYCOL

Synonyms: 1,2-Dihydroxyethane; 1,2-Ethanediol; Ethylene Alcohol CAS No: 107-21-1 Molecular Formula: $C_2H_6O_2$ RTK Substance No: 0878 Description: Clear, colorless, thick liquid

HAZARD DATA							
Hazard Rating	Firefighting		Reactivity				
2 - Health 1 - Fire 0 - Reactivity DOT#: None ERG Guide #: 171 Hazard Class: None	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.		Ethylene Glycol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; CHLOROSULFONIC ACID; and OLEUM.				
SPI	ILL/LEAKS				PHYSI	CAL PROPERTIES	
Isolation Distance: Spill: 50 meters (150 Fire: 800 meters (1/2 Absorb liquids in verm similar material and p disposal.	feet) mile) niculite, dry sand, earth, or a place into sealed containers for		Odor The Flash Po LEL: UEL: Auto Ign Vapor Do Vapor Po Specific Water So Boiling F Freezing Critical 1 Molecula	reshold: bint: ensity: ressure: Gravity: polubility: Point: Point: Point: Femp: ar Weigh	62 23 3. 15 72 2. 0. 1. 50 38 8. 83 8. 83 81 82 81 82 81 82 81 82 81 82 82 83 83 83 83 84 83 84 84 84 84 84 84 84 84 84 84 84 84 84	2.5 ppm 32°F (111°C) 2% 5.3% 48°F (398°C) 14 (air = 1) 05 mm Hg at 68°F (20°C) 1 (water = 1) bluble 37°F (197°C) 6°F (-13°C) 33°F (445°C) 2.07	
EXPO	SURE LIMITS			F	ROTE	CTIVE EQUIPMENT	
ACGIH: 39 ppm, Ceiling The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 40 ppm PAC-3 = 60 ppm			Gloves: Butyl, Nitrile, Neoprene, Natural Rubber, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (> breakthrough) Coveralls: Tychem® SL, BR, CSM and TK; and Trellchem@ and VPS (>8-hr breakthrough) Respirator: >39 mg/m³ - full facepiece APR with Organic va P100 cartridges >39 mg/m³ in fire conditions - SCBA		e, Neoprene, Natural Rubber, Silver l®, Viton, Viton/Butyl and Barrier® (>8-hr gh) SL, BR, CSM and TK; and Trellchem® HPS >8-hr breakthrough) - full facepiece APR with <i>Organic vapor</i> and <i>P100 cartridges</i> in fire conditions - SCBA		
HEALTH EFFECTS			F	FIRST	AID A	ND DECONTAMINATION	
Eyes: Irritation Skin: Irritation Inhalation: Nose an Chronic: Headac slurred	n nd throat irritation he, nausea, vomiting, dizziness, speech, convulsions, and coma	Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.					



Common Name: ETHYLENEIMINE

Synonyms: Aminoethylene; Azacyclopropane; Aziridine; Dimethyleneimine CAS No: 151-56-4 Molecular Formula: C_2H_5N RTK Substance No: 0881

Description: Clear, colorless liquid with an Ammonia-like odor

HAZARD DATA							
Hazard Rating	Firefighting	Reactivity					
4 - Health 3 - Fire 3 - Reactivity DOT#: UN 1185 ERG Guide #: 131 Hazard Class: 6.1 (Poison)	 FILENIGITUTING FLAMMABLE and REACTIVE LIQUID Use dry chemical, water spray or alcohol-resistant foam as extinguishing agents. Ethyleneimine can polymerize violently when exposed to ELEVATED TEMPERATURES if not inhibited. The vapors of Ethyleneimine are NOT stabilized and may form polymers in vents or other confined spaces, resulting in fires and explosions. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to disperse vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flashback. Ethyleneimine may form an ignitable vapor/air mixture in closed tanks or containers. 	Reactivity Ethyleneimine can polymerize violently, if not inhibited, when exposed to ELEVATED TEMPERATURES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Ethyleneimine reacts with SODIUM HYPOCHLORITE to form explosive 1-Chloroazidine. Contact with SILVER and ALUMINUM may result in the formation of explosive compounds. Protect from HEAT, SUNLIGHT, and WATER.					

SPILL/LEAKS	PHYSICAL PROPERTIES				
Isolation Distance:	Odor Threshold:	1.5 ppm			
Small Spill: 30 meters (100 feet)	Flash Point:	12 °F (-11 °C)			
Large Spill: 100 meters (300 feet)	LEL:	3.3%			
Fire: 800 meters (1/2 mile)	UEL:	46%			
	Auto Ignition Temp:	608 °F (320 °C)			
Absorb liquids in dry sand, earth, or a noncombustible	Vapor Density:	1.5 (air = 1)			
material and place into sealed containers for disposal.	Vapor Pressure:	160 mm Hg at 68 °F (20 °C)			
Use only non-sparking tools and equipment.	Specific Gravity:	0.83 (water = 1)			
Ground and bond all metal containers when transferring	Water Solubility:	Soluble			
Koop Ethylonoimine out of confined apages, such as sowers	Boiling Point:	131 ° to 135 °F (55 ° to 57 °C)			
because of the possibility of an explosion.	Freezing Point:	-98 °F (-72 °C)			
DO NOT wash into sewer as Ethyleneimine is harmful to	Ionization Potential:	9.2 eV			
aquatic organisms.	Molecular Weight:	43			

EXPOSURE LIMITS

OSHA/NIOSH: Lowest feasible concentration ACGIH: 0.05 ppm, 8-hr TWA; 0.1 ppm, STEL IDLH: 100 ppm The Protective Action Criteria values are: PAC-1 = 0.1 ppm PAC-2 = 4.6 ppm PAC-3 = 9.9 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (lung and liver) in animals

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough)
Coveralls:	Tychem® TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: ETHYLENE OXIDE

Synonyms: Dimethylene Oxide; 1,2-Epoxyethane; ETO; Oxirane CAS No: 75-21-8 Molecular Formula: C_2H_4O RTK Substance No: 0882

Description: Colorless gas or liquid with an Ether-like odor

HAZARD DATA								
Hazard Rating	Firefighting				Reactivity			
3- Health 4 - Fire 3 - Reactivity DOT#: UN 1040 ERG Guide #: 119P Hazard Class: 2.3 (Poisonous gas)	Firefighting FLAMMABLE AND REACTIVE GAS OR LIQUID Use dry chemical, CO2, water spray, alcohol-resis foam or other foam as extinguishing agents. Let fire burn if it cannot be stopped. Ethylene Oxide must be diluted with 24 parts wat part Ethylene Oxide to stop flammability. POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers Vapor is heavier than air and may travel a distance cause a fire or explosion far from the source. Ethylene Oxide forms an ignitable vapor/air mixt closed tanks or containers. Heat or contamination may cause Ethylene Oxice			tant er to cool. e to ure in e to	Reactivity Ethylene Oxide polymerizes (self-reacts) violently on contact with HEAT; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); METAL CHLORIDES (such as FERRIC CHLORIDE and MAGNESIUM CHLORIDE); and METAL OXIDES (such as ALUMINUM OXIDE and COPPER OXIDE). Ethylene Oxide is extremely explosive in the presence of OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and AIR. Ethylene Oxide is not compatible with AMMONIA; METALS (such as POTASSIUM, SILVER and MERCURY); ALCOHOLS; MERCAPTANS; CYANIDES; AMINES; and HALOGENATED HYDROCARBONS (such as METHYLENE CHLORIDE and TRICHLOROETHYLENE).			
	SPILL/LEAKS				Pi	HYSIC	CAL PROPERTIES	
Isolation Distance: Small Spill: 30 meters (1 Large Spill: 150 meters Stop flow of gas. If sourd stopped in place, remove air, and repair leak or alle Absorb liquids in vermicu place into sealed contain Use only non-sparking to closing containers of Eth Keep Ethylene Oxide ou the possibility of an explo Use water spray to keep Turn leaking cylinder with state. No adverse ecological ef	Fire: 1,600 meters (500 feet) ce of leak is a cylinder and the leak can be the leaking cylinder to a safe place in ow cylinder to empty. Uite, dry sand, earth, or a similar materi iters for disposal. bols and equipment, especially when op cylene Oxide . Ut of confined spaces, such as sewers, osion. containers cool. In leak up to prevent escape of gas in the ffects are expected.	eters (1 mile)			Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Freezing Point Ionization Pot Molecular We	Temp: y: ire: ity: ity: tential: ight:	257 to 690 ppm -4°F (-20°C) 3% 100% 804°F (429°C) 1.5 (air = 1) 1,095 mm Hg at 68°F (20°C) 0.87 (water = 1) Miscible 51°F (11°C) -170°F (-112°C) 10.56 eV 44.06	
EXPO	SURE LIMITS				PROTE	СТІУ	E EQUIPMENT	
OSHA: 1 ppm, 8-hr TW NIOSH: <0.1 ppm, 10-h ACGIH: 1 ppm, 8-hr TW IDLH: 800 ppm The Protective Action Cri PAC-1 = 5 ppm PAC	VA; 5 ppm, 15-min Excursion nr TWA; 5 ppm, 10-min Ceiling VA iteria values are: C-2 = 45 ppm PAC-3 = 200 ppm		Gloves: Butyl and Coveralls: Tychem HPS and At 10% c Respirator: SCBA			Butyl and Silvershield®/4H® (<1-hr breakthrough) Tychem® BR, TK and Responder ®; and Trellchem® HPS and VPS (>8-hr breakthrough) At 10% of the LEL use turn-out gear or flash protection SCBA		
HEALTH EFFECTS FIRST AID AND DECONTAMINATION						ECONTAMINATION		
Eyes: Severe in causes for causes for causes for and severe in causes for and severe in causes for and severe edema) Inhalation: Nose, this and severe edema) Headach twitching Chronic:	rritation and burns rritation and burns. Contact with liquid rostbite roat and lung irritation, with coughing, ere shortness of breath (pulmonary ne, nausea, vomiting, dizziness, , and seizures leukemia) in humans		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 					



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



Common Name: FENTHION

Synonyms:	Bayte
CAS Number:	55-38
Molecular Formula:	C ₁₀ H
RTK Number:	0916
Description:	Color

ytex; Entex; Lebaycid

55-38-9 a: C₁₀H₁₅O₃PS₂

Colorless to yellow-brown liquid which usually has a garlic odor. Also available in granular form.

HAZARD DATA						
Hazard Rating	Fire	efighting		Reactivity		
Health: 3 Fire: 1 Reactivity: 1 DOT #: UN UN UN ERG #: 152 DOT Hazard: 6.1	Exti fire PO Ph 3018 CO 2783 is u 2 Use (poison) Can phy	 Extinguish fire using an agent suitable for type of surrounding fire. Fenthion itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosphorus</i> and <i>Sulfur Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE when organic solvent is used as a carrier. Use water spray to keep fire-exposed containers cool. Carrier solvents used in commercial formulations may change physical and toxicological properties. 		Fenthion is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): and ALKALINE INSECTICIDES.		
	SPILLS/L	EAKS		PHYS		
Isolation Distaures: Liquid Spill: 50 m Solid Spill: 25 m Fire: 800 Evacuate personnel. Secure and control er If it is safe to do so, re Absorb liquids in verm deposit in sealed co Collect powdered mar and deposit in sealed to so. Secure deposit in sealed co Do NOT allow this sult it is very toxic to aq Ventilate the area of so	Inces: 365 °C (689 °F) 50 meters (150 feet) 170 °C (338 °F) 25 meters (75 feet) 800 meters (1/2 mile) 9 nnel. 125 (water = 1) ntrol entrance to the area. 9.6 (air = 1) 9 so, remove potential ignition sources. Insoluble 10 vermiculite, dry sand, earth or a similar material and aled containers. 80 material in the most convenient and safe manner 10 sealed containers. DO NOT DRY SWEEP. Molecular Weight: 278.3				365 °C (689 °F) 170 °C (338 °F) 9.6 (air = 1) 1.25 (water = 1) Insoluble 87 °C (189 °F) 7.5 °C (43 °F) 278.3	
E	XPOSURE		PROTECTIVE EQUIPMENT			
The following exposu	ure limits are for F	enthion:	Gloves:	Nitrile a	and Neoprene	
ACGIH: 0.2 mg/m ³	³ . 8-hour average	9	Coverall:	Tychem	n® BR, CSM and TK, or the equivalent	
PAC: PAC-1 = 0 PAC-2 = 5 PAC-3 = 3	0.15 mg/m ³ 5.9 mg/m ³ 35 mg/m ³		Respirator:	>0.2 m dem	g/m ³ – supplied-air, full facepiece, pressure- and or another positive-pressure mode	
ACU	TE HEALT	H EFFECTS	FIRST	T AID	AND DECONTAMINATION	
Eyes: Irritation, blurred vision Skin: Irritation Inhalation: Runny nose, cough, headache, dizziness, chest tightness, twitching, loss of coordination, convulsions, coma, death			 Immediately flush eyes with large amounts of water for at least 15 minutes. Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Shampoo hair immediately if contaminated. Remove the person from exposure. Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped. Transfer promptly to a medical facility. Medical observation is required for several days as some symptoms may be delayed. 			



Common Name: FERRIC AMMONIUM CITRATE

Synonyms: Ammonium Ferric Citrate; Citric Acid, Ammonium Iron (3+) Salt CAS No: 1185-57-5 Molecular Formula: $C_6H_{13}NFeO_{10}$ RTK Substance No: 0918 Description: Yellowish-brown to red or green powder with a faint *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ferric Ammonium Citrate itself	Ferric Ammonium Citrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
0 - Fire	does not burn.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i> .	NITRATES, CHLORINE, BROMINE and FLUORINE) and IODIDES.
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Ferric Ammonium Citrate may decompose on exposure
ERG Guide #: 171	cool.	to LIGHT and MOISTURE.
Hazard Class: 9		
(Environmentally		
Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For water spills neutralize with Agricultural Lime, crushed Limestone or Sodium Bicarbonate.

DO NOT wash into sewer.

Ferric Ammonium Citrate may be toxic to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for Ferric Ammonium Citrate.

The Protective Action Criteria values are:

PAC-1 = 5.4 mg/m^3

 $PAC-2 = 500 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation

Skin: Irritation

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Ammonia-like odorFlash Point:NoncombustibleSpecific Gravity:1.8 (water = 1)Water Solubility:SolublepH:<7 in aqueous solution</th>Molecular Weight:Varies

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

>5 mg/m³ - full facepiece APR with High efficiency filters >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: FERRIC NITRATE

Synonyms: Iron(III) Nitrate; Iron Trinitrate CAS No: 10421-48-4 Molecular Formula: FeN_3O_9 RTK Substance No: 0924 Description: Pale violet, green or white, odorless, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Ferric Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Ferric Nitrate may react with ORGANIC COMPOUNDS;
0 - Fire	combustion of other substances.	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES);
0 - Reactivity	Use water only. DO NOT USE DRY CHEMICAL or	and ALKYL ESTERS to cause fires and explosions.
DOT#: UN 1466	CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Ferric Nitrate is not compatible with METALS (especially pyrophoric metals such as <i>finely divided</i> ALUMINUM and
ERG Guide #: 140	including Nitrogen Oxides and Nitric Acid.	MAGNESIUM); CYANIDE COMPOUNDS; METAL
Hazard Class: 5.1 (Oxidizer)		SALTS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ALCOHOLS; HYDRAZINE; PEROXIDES; GLYCIDOL; ETHERS; and ISOPROPYL CHI OROCARBONATE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Neutralize liquid spills with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as *Iron*)

ACGIH: 1 mg/m³, 8-hr TWA (as *Iron*)

The Protective Action Criteria values are:

PAC-1 = 13 mg/m³; PAC-2 = 140 mg/m³; PAC-3 = 850 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fatigue, dizziness and a blue color to the skin and lips (<i>methemoglobinemia</i>)

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless Nonflammable 1.7 (water = 1) Soluble Decomposes at <212°F (<100°C) 117°F (47°C) 242

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filter
	>13 mg/m ³ - Pressure demand supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: FERRIC SULFATE

Synonyms: Iron Persulfate; Iron (3+) Sulfate CAS No: 10028-22-5 Molecular Formula: $Fe_2O_{12}S_3$ RTK Substance No: 0925 Description: Odorless, grayish-white or yellow powder or crystalline, lumpy solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ferric Sulfate itself does not	Ferric Sulfate may react violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
0 - Fire	burn.	HYDROXIDE).
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides and Iron Oxides.	Ferric Sulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 3077	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 171	cool.	CHLORINE, BROMINE and FLUORINE).
Hazard Class: 9		Ferric Sulfate is hygroscopic and sensitive to light.
(Miscellaneous		
Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ferric Sulfate is dangerous to aquatic life.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as *Iron*)

ACGIH: 1 mg/m³, 8-hr TWA (as *Iron*)

The Protective Action Criteria values are:

PAC-1 = 10.7 mg/m^3

PAC-2 = 17.9 mg/m³

 $PAC-3 = 75 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	3.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes at 896°F (480°C)
Molecular Weight:	399.9

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	 >1 mg/m³ - Supplied air or full-facepiece APR with High efficiency particulate filters >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: FERROUS SULFATE

Synonyms: Copperas; Green Vitriol; Iron Monosulfate CAS No: 7720-78-7 Molecular Formula: FeSO₄ RTK Substance No: 0931 Description: Greenish, yellow-brown or white, odorless, crystalline (sand-like) powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire Ferrous Sulfate itself does not	Ferrous Sulfate may react violently or explosively on contact with ARSENIC TRIOXIDE: SODIUM NITRATE:
0 - Fire	burn.	METHYL ISOCYANOACETATE; and STRONG BASES
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	(such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Ferrous Sulfate is not compatible with OXIDIZING
ERG Guide #: 171	cool.	AGENTS (SUCH AS PERCHLORATES, PEROXIDES,
Hazard Class: 9 (Miscellanous Hazardous Material)		CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); CARBONATES (such as LIME); and GOLD and SILVER SALTS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ferrous Sulfate is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as *Iron salts*) **ACGIH:** 1 mg/m³, 8-hr TWA (as *Iron salts*)

The Protective Action Criteria values are:

- PAC-1 = 8.2 mg/m³
- $PAC-2 = 41 \text{ mg/m}^3$
- PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Nonflammable	
Specific Gravity:	3 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	572°F (300°C)	
Melting Point:	147°F (64°C)	
Molecular Weight:	151.9	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters >8 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



FONOFOS Common Name:

Synonyms:	Dyfonate; Difonatul; Difonate
CAS Number:	944-22-9
Molecular Formula:	C ₁₀ H ₁₅ OPS ₂
RTK Number:	0945
Description:	Yellow liquid with a strong odor; also available in granular form

HAZARD DATA

Hazard Rating		Firefighting	Reactivity	
Health: 3		Extinguish fire using an agent suitable for type of	Fonofos is susceptible to formation of highly toxic and	
Fire: 1		surrounding fire. Fonotos itself does not burn.	flammable <i>phosphine gas</i> in the presence of strong	
Reactivity: 1		including Oxides of Phosphorus and Oxides of	Partial oxidation by OXIDIZING AGENTS may result in	
DOT #: UN	N 3018/UN 2783	Sulfur.	the release of toxic phosphorus oxides.	
ERG #: 15	52	CONTAINERS MAY EXPLODE IN FIRE.		
DOT Hazard: 6.7	1 (poison)	Use water spray to keep fire-exposed containers cool.		
Hazard Rating Health: 3 Fire: 1 Reactivity: 1 DOT #: UN ERG #: 15 DOT Hazard: 6.7	N 3018/UN 2783 52 1 (poison)	Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Fonofos itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Oxides of Phosphorus and Oxides of Sulfur. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Reactivity Fonofos is susceptible to formation of highly toxic an flammable <i>phosphine gas</i> in the presence of stron REDUCING AGENTS such as <i>hydrides</i> . Partial oxidation by OXIDIZING AGENTS may result the release of toxic phosphorus oxides.	

SPILLS/LEAKS **PHYSICAL PROPERTIES Isolation Distances: Relative Density:** 1.16 (water = 1) >94 °C (>201 °F) Liquid Spill: 50 meters (150 feet) Flash Point: Solid Spill: 25 meters (75 feet) Molecular Weight: 246.3 Fire: 800 meters (1/2 mile) Vapor Pressure: 0.00021 mm Hg at 25 °C (77 °F) Water Solubility: Very slightly soluble Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Collect *powdered* material in the most convenient and safe manner and deposit in sealed containers. DO NOT DRY SWEEP. Do not allow this substance to enter waterways, including sewers, as it is very toxic to aquatic life with long-lasting effects. Ventilate area of spill or leak after clean-up is complete. **EXPOSURE LIMITS PROTECTIVE EQUIPMENT**

The following exposure limits are for Fonofos:

NIOSH:	0.1 mg/m ³ , 10-hour average
ACGIH:	0.1 mg/m ³ , 8-hour average
PAC:	PAC-1 = 0.3 mg/m ³
	PAC-2 = 1.3 mg/m ³
	PAC-3 = 53 mg/m ³

PAC-3 = 53 mg/m ³		
	ACUTE HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Blurred vision Irritation Headache, dizziness, blurred vision, chest tightness, twitching, loss of coordination, convulsions, coma, death	Immediately flush eyes with large amounts of water for at least 15 minutes. Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Shampoo hair immediately if contaminated. Remove the person from exposure. Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped. Transfer promptly to a medical facility. Medical observation is required for several days as some symptoms may be delayed

Gloves:

Coverall:

Respirator:

Nitrile and Neoprene

Tychem® BR, Responder® and TK or the equivalent

>0.1 mg/m³ - supplied-air, full facepiece, pressuredemand or another positive-pressure mode



Common Name: FORMALDEHYDE

Synonyms: Formalin; Methyl Aldehyde; Methylene Oxide CAS No: 50-00-0 Molecular Formula: CH₂O RTK Substance No: 0946

Description: Colorless gas with a strong odor, usually found in a Methanol and water solution

		H/	AZARD	DAT	ГА	
Hazard Rating	Firefighting			Read	ctivity	reacts violently with NITROGEN OXIDES: OXIDIZING
4 - Health 4 - Fire 0 - Reactivity DOT#: UN 1198 (Solutions, Flammable) UN 2209 (Solutions) ERG Guide #: 132 Hazard Class: UN 1198 (3, Flammable) UN 2209 (8, Corrosive)	Formaldehyde is a FLAMMABLE GAS or COMBUSTIBLE SOLUTION. Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. Use water spray to reduce vapors. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		AGEN PERM BROM ANILII HYDR Forma form to Forma HYDR SODII IRON: OXYC Pure F	MTS (such MANGAN/ MINE and NE; NITR ROGEN P aldehyde toxic <i>Bis(C</i> aldehyde ROCHLOF UM HYDF ; SILVER GEN. Formalde	as PERCHLORATES, PEROXIDES, ATES, CHLORATES, NITRATES, CHLORINE, FLUORINE); mixtures of PERCHLORIC ACID and OMETHANE; MAGNESIUM CARBONATE; and EROXIDE. reacts with PHENOL and HYDROGEN CHLORIDE to <i>Chloromethyl) Ether.</i> is not compatible with STRONG ACIDS (such as RIC, SULFURIC and NITRIC); STRONG BASES (such as ROXIDE and POTASSIUM HYDROXIDE); IODINE; ; ISOCYANATES; AMINES; ANHYDRIDES; and LIQUID hyde may polymerize (self-react).	
SPIL	.L/LEAKS				PHY	SICAL PROPERTIES
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Use only non-sparking tools and equipment, especially when opening and closing containers of Formaldehyde. Keep Formaldehyde out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Formaldehyde is harmful to aquatic life at low concentrations 			Odor Thr Flash Poi LEL: UEL: Auto Igni Vapor De Vapor Pro Specific O Water So Boiling P Freezing Ionization Molecula	eshold: int: tion Ten nsity: essure: Gravity: lubility: oint: Point: n Potenti r Weight	np: ial: t:	0.05 to 1 ppm 140° to 181°F (60° to 83°C) (solutions) 7% 73% 572°F (300°C) (gas); 806°F (430°C) (solution) 1.07 (air = 1) (gas) 760 mm Hg at 68°F (20°C) 0.8 to 1.1 (water = 1) Soluble -3°F (-19.4°C) -134°F (-92°C) 10.88 eV 30
EXPOS	URE LIMITS				PROT	
OSHA: 0.75 ppm, 8-hr TWA; 2 ppm, 15-min STEL NIOSH: 0.016 ppm, 10-hr TWA; 0.1 ppm, 15-min Ceiling ACGIH: 0.3 ppm, Ceiling IDLH: 20 ppm The Protective Action Criteria values are: PAC-1 = 0.9 ppm PAC-2 = 14 ppm PAC-3 = 56 ppm			Gloves: Coverall Respirat	s: tor:	Butyl, N Tychen SCBA	Vitrile, Neoprene and Viton (>8-hr breakthrough) n® BR, Responder® and TK (>8-hr breakthrough)
HEALTH EFFECTS				FIRS	T AID	AND DECONTAMINATION
Eyes:Severe irritSkin:Severe irritInhalation:Nose, mou coughing, (pulmonan)Chronic:Cancer (na humans	ation, burns and possible damage tation and burns th, throat and lung irritation, with and severe shortness of breath y edema) asopharynx and leukemia) in		Remove f Flush eye lenses if Quickly r amounts Begin arti Transfer Medical o	the person es with la worn. Se emove co of soap a ficial res promptly observation	on from ex arge amou eek medic ontaminat and water piration if to a med on is reco	kposure. Ints of water for at least 30 minutes. Remove contact cal attention. ted clothing and wash contaminated skin with large . Seek medical attention. breathing has stopped and CPR if necessary. ical facility. mmended as symptoms may be delayed.



Common Name: FORMIC ACID

Synonyms: Aminic Acid; Methanoic Acid CAS No: 64-18-6 Molecular Formula: CH₂O₂ RTK Substance No: 0948 Description: Colorless liquid with a strong, penetrating odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Formic Acid is a COMBUSTIBLE LIQUID.	Formic Acid reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
2 - Fire	Use dry chemical, CO ₂ , water spray or	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);	
0 - Reactivity	alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool and to reduce vanors	STRONG INORGANIC BASES (such as SODIUM HYDROXIDE an POTASSIUM HYDROXIDE); and STRONG ORGANIC BASES (such as AMINES) equation a fire and explosion becard.	
DOT#: UN 1779		Sermine Acid reacts with CHEMICALLY ACTIVE METALS (such as	
ERG Guide #: 153		POTASSIUM, SODIUM, MAGNESIUM and ZINC) to form flammat	
Hazard Class: 8		and explosive Hydrogen gas and metal salts.	
(Corrosive)		Formic Acid is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) for form poisonous <i>Carbon Monoxide gas</i> and reacts with CYANIDE SALTS to form toxic Hydrogen Cyanide gas	

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	49 ppm 122° to 156°E (50° to 60°C)
Spill: 50 meters (150 feet)	LEL:	18%
Fire: 800 meters (1/2 mile)	UEL:	57%
	Auto Ignition Temp:	1,004° to 1,114°F (540° to 601°C)
and place into sealed containers for disposal	Vapor Density:	1.6 (air = 1)
DO NOT wash into sever	Vapor Pressure:	35 mm Hg at 68°F (20°C)
Do NOT washing sever.	Specific Gravity:	1.22 (water = 1)
Dangerous to aquatic me in high concentrations.	Boiling Point:	213° to 224°F (101° to 107°C)
	Melting Point:	47°F (9°C)
	Ionization Potential:	11.05 eV

Molecular Weight:

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 5 ppm, 8-hr TWA	Gloves:	Butyl, Neoprene and Barrier® (>8-hr breakthrough)
ACGIH: 5 ppm, 8-hr TWA; 10 ppm, STEL	Coveralls:	Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (>8-br breaktbrough)
IDLH: 30 ppm The Protective Action Criteria values are:	Respirator:	SCBA
PAC-1 = 10 ppm PAC-2 = 10 ppm PAC-3 = 10 ppm		

46.02

HEALTH EFFECTS

Eyes:	Severe irritation and burns with possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Right to Know Hazardous Substance Fact Sheet

Common Name: FUEL OILS (Light)

Synonyms: #2 Heating Oil; Distillate (Light) Diesel Fuels; Fuel Oil No. 2; Diesel Oil No. 2 CAS No: None Molecular Formula: Varies RTK Substance No: 2444 Description: Brown to straw-colored, slightly thick liquids with a distinct *Petroleum* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 1202 ERG Guide #: 128 Hazard Class: 3	COMBUSTIBLE LIQUIDS Use dry chemical, CO ₂ , water fog or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> and <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	Fuel Oils are not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM).
(Fiaminable)	sufficient energy to cause a fire and/or explosion.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 330 meters (1,100 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

When off-loading bulk **Fuel Oils** for delivery or transfer, static electricity grounding must be completed prior to discharge.

DO NOT wash into sewer.

May affect aquatic life.

EXPOSURE LIMITS

OSHA: None

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ACGIH: 100 mg/m<sup>3</sup>, 8-hr TWA
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IDLH: None

The Protective Action Criteria values are: PAC-1 = 100 mg/m³ PAC-2 = 500 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, drying and cracking with redness and swelling
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, blurred vision, and loss of balance and coordination

PHYSICAL PROPERTIES

Odor Threshold:	0.7 ppm
Flash Point:	>125°F (>52°C)
LEL:	0.6% to 1.3%
UEL:	4.7% to 7.5%
Auto Ignition Temp:	351° to 624°F (177° to 329°C)
Vapor Density:	>3 (air = 1)
Vapor Pressure:	less than 1 mm Hg at 68°F (20°C)
Specific Gravity:	0.87 to 0.95 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	340° to 676°F (171° to 358°C)
Molecular Weight:	Varies

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Viton
Coveralls:	Tychem® SL and Responder®; Zytron® 200 and Zytron® 300; and ONESuit® TEC
Respirator:	 >100 mg/m³ - APR with Organic vapor cartridge and P100 prefilters >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: FURAN

Synonyms: Divinylene Oxide; Oxole CAS No: 110-00-9 Molecular Formula: C₄H₄O RTK Substance No: 0952 Description: A clear, colorless liquid with a pleasant odor, which turns brown upon standing in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	Furan reacts violently with OXIDIZING AGENTS
4 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	CHLORINE ADD
1 - Reactivity	Water may not be effective in fighting fires.	STRONG ACIDS (such as HYDROCHI ORIC.
DOT#: UN 2389	POISONOUS GASES ARE PRODUCED IN FIRE.	SULFURIC and NITRIC).
EPG Guido #: 128	CONTAINERS MAY EXPLODE IN FIRE.	Furan may form explosive Peroxides on
EKG Guide #. 120	Use water spray to keep fire-exposed containers cool.	exposure to AIR.
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	
(Flammable)	Vapor is heavier than air and may travel a distance to cause	
	a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet) Large Spills: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Keep **Furan** out of confined spaces, such as sewers, because of the possibility of an explosion. Volatile in soil and water with minimal degredation.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Furan**.

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Pleasant odor
Flash Point:	<32°F (0°C)
LEL:	2.3%
UEL:	14.3%
Vapor Density:	2.3 (air = 1)
Vapor Pressure:	493 mm Hg at 68°F (20°C)
Specific Gravity:	0.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	88°F (31°C)
Melting Point:	-122°F (-85.6°C)
Molecular Weight:	68

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Chloride, Polyvinyl Alcohol and Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder®, and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Tetrahydrofuran</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: GASOLINE

Synonyms: Benzin; Motor Fuel; Petrol CAS No: 86290-81-5 Molecular Formula: C_5H_{12} to C_9H_{20} (Mixture of hydrocarbons which vary by grade) RTK Substance No: 0957 Description: Clear colorless to amber-colored liquid with a petroleum odor

HAZARD DATA						
Hazard Ra	ating	Firefighting			Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1 ERG Guide # Hazard Class (Flam	y 203 #: 128 s: 3 mable)	FIRETIGNTING FLAMMABLE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.			Gasoline may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and NITRIC ACID.	
	SP	ILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Dis Spill: 50 met Fire: 800 me Absorb liquid similar mater disposal. Keep Gasolin sewers, beca Use only non when opening DO NOT was Gasoline is h marine pollut ACGIH: 300 The Protectiv	SPILL/LEAKS Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep Gasoline out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Gasoline. DO NOT wash into sewer. Gasoline is harmful to aquatic organisms and is a marine pollutant. EXPOSURE LIMITS ACGIH: 300 ppm, 8-hr TWA; 500 ppm, STEL		Odor Threshold:0.25 ppmFlash Point:-36°F (-38°C)LEL:1.2%UEL:7.6%Auto Ignition Temp:536° to 853°F (280° to 456°C)Vapor Density:3 to 4 (air = 1)Vapor Pressure:38 to 300 mm Hg at 68°F (20°C)Specific Gravity:0.73 (water = 1)Water Solubility:InsolubleBoiling Point:140° to 390°F (60° to 199°C)Molecular Weight:72 to 100PROTECTIVE EQUIPMENTGloves:Nitrile and Viton (>8-hr breakthrough)Coveralls:Tychem® BR, LV, Responder® and TK (>8-hr			
PAC-1 = 200 ppm PAC-2 = 1,000 ppm PAC-3 = 4,000 ppm		F	bre Respirator: >30	eakthrough) 00 ppm - Supplied air or SCBA		
	HEAL	TH EFFECTS		FIRST	AID AND DECONTAMINATION	
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, th coughin breath Headact blurred passing Cancer	and burns and burns proat and lung irritation with g, wheezing and shortness of he, nausea, weakness, dizziness, vision, irregular heartbeat, and out (liver) in animals	F F C T	Remove the perso Flush eyes with lar contact lenses if w Quickly remove co large amounts of s Begin artificial resp Transfer promptly	on from exposure. rge amounts of water for at least 15 minutes. Remove yorn. Seek medical attention. ontaminated clothing and wash contaminated skin with soap and water. piration if breathing has stopped and CPR if necessary. to a medical facility	



Common Name: GLUTARALDEHYDE

Synonyms: 1,3-Diformylpropane; Glutaral; Cidex®; Procide® CAS No: 111-30-8 Molecular Formula: C₅H₈O₂ RTK Substance No: 0960 Description: Colorless glass-like crystals that are usually in a 2% to 50% water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	Extinguish fire using an agent suitable for type of	Glutaraldehyde is not compatible with OXIDIZING				
0 - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG				
DOT#: UN 2810	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE); AMINES; ALCOHOLS and				
ERG Guide #: 153		KETONES.				
Hazard Class: 6.1						
(Poison)						

SPILL/LEAKS

Isolation Distance:

Spill (Small): 30 meters (100 feet)

(Large): 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Glutaraldehyde is very toxic to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 0.2 ppm; Ceiling

ACGIH: 0.05 ppm; Ceiling

The Protective Action Criteria values are: PAC-1 = 0.2 ppm PAC-2 = 1 ppm PAC-3 = 5 ppm

HEALTH EFFECTS

Irritation and burns Irritation and burns Nose, throat and lung irritation with coughing and wheezing and shortness of breath Headache, nausea and vomiting
Headache, nausea and vomiting.

PHYSICAL PROPERTIES

Odor Threshold:	0.04 ppm
Flash Point:	Nonflammable
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	17 mm Hg at 68°F (20°C); <0.1 mm Hg at 68°F (20°C) for <i>solutions</i>
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	369° to 372°F (187° to 189°C)
Freezing Point:	<20°F (<-7°C)
Molecular Weight:	100.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: GLYCIDALDEHYDE

Synonyms: 2,3-Epoxypropanol; Glycidal CAS No: 765-34-4 Molecular Formula: $C_3H_4O_2$ RTK Substance No: 0961 Description: Colorless liquid with a strong odor

HAZARD DATA						
Hazard Ra	ting	Firefighting			Reacti	vity
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 2 ERG Guide # Hazard Class (Flan	y 622 # : 131P s : 3 nmable)	FirefightingGlycidaldehyde is a FLAMMABLE LIQUID.Use dry chemical, CO2, water spray or alcohol- resistant foam as extinguishing agents.POISONOUS GASES ARE PRODUCED IN FIRE.CONTAINERS MAY EXPLODE IN FIRE.Use water spray to keep fire-exposed containers cool.Vapors may travel to a source of ignition and flash back.Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		Glycidal AGENT PERMA CHLOR ACIDS NITRIC HYDRC REDUC ALUMIN Glycidal substan to give o	Idehyde is not compatible with OXIDIZING S (such as PERCHLORATES, PEROXIDES, NGANATES, CHLORATES, NITRATES, INE, BROMINE and FLUORINE); STRONG (such as HYDROCHLORIC, SULFURIC and); STRONG BASES (such as SODIUM XIDE and POTASSIUM HYDROXIDE); and XIDE and POTASSIUM HYDROXIDE); and XING AGENTS (such as LITHIUM, SODIUM, NUM and their HYDRIDES). Idehyde is an <i>Epoxide</i> and an <i>Aldehyde</i> . These ices are frequently reactive and can polymerize off heat and/or cause violent reactions.	
	SPI	_L/LEAKS			PHY	SICAL PROPERTIES
Isolation Dis Small Spill: 6 Large Spill: 2 Fire: 800 me Absorb liquid similar mater Keep Glycida sewers, beca DO NOT was Bioaccumulat rapidly.	SPILL/LEAKS ion Distance: Spill: 60 meters (200 feet) Spill: 270 meters (900 feet) 800 meters (1/2 mile) b liquids in vermiculite, dry sand, earth, or a ar material and deposit in sealed containers. Glycidaldehyde out of confined spaces, such as ers, because of the possibility of an explosion. OT wash into sewer. cumulation is not significant. Biodegrades sly. EXPOSURE LIMITS cupational exposure limits have been lished for Glycidaldehyde.			Odor Thresho Flash Point: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei Gloves: Coveralls: Respirator:	Id: re: ty: ty: ty: Butyl, PV for Alde DuPont Kappler TEC (>8 Supplied	Strong odor 88°F (31°C) 2.58 (air = 1) 27 mm Hg at 77°F (25°C) 1.14 (water = 1) Miscible 234° to 235°F (112° to 113°C) -80°F (-62°C) 72.1 ECTIVE EQUIPMENT VC and Silver Shield®/4H®, (4-hr breakthrough <i>bydes</i>) Tychem® BR, LV, Responder®, and TK; ® Zytron® 500; and Saint-Gobain ONESuit® 8-hr breakthrough for <i>Aliphatic Aldehydes</i>) d air
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION			
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, thi coughing (pulmona Cancer (and burns and burns with itching and rash oat and lung irritation with and severe shortness of breath ary edema) skin) in animals		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: GLYPHOSATE

Synonyms: Glycine, N-(Phosphonomethyl)-; Glyphosat; Glyphomax; Roundup® CAS No: 1071-83-6 Molecular Formula: $C_3H_8NO_5P$ RTK Substance No: 3139 Description: Odorless, white powder, colorless, crystalline solid or an amber colored liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171	Although solid Glyphosate does not burn, it may be dissolved in a liquid carrier that is flammable or combustible. Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Phosphorus Oxides</i> . Use water spray to keep fire-exposed containers cool	Glyphosate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Glyphosate may react with IRON, GALVANIZED STEEL and UNLINED STEEL CONTAINERS to produce flammable and
Hazard Class: 9 (Environmentally Hazardous Substance)	Finely dispersed Glyphosate may form explosive mixtures in air.	explosive Hydrogen gas.

Boiling Point:

Melting Point:

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten *solid* spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Finely dispersed **Glyphosate** may accumulate static electricity.

DO NOT wash into sewer.

Glyphosate is harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Glyphosate**.

Odor Threshold:	Odorless
Flash Point:	Flammable/Combustible in solution
Vapor Pressure:	1.94 x 10 ⁻⁷ mm Hg at 113°F (45°C)
Specific Gravity:	1.74 (water = 1)
Water Solubility:	Soluble

169.07

y: Soluble
 Decomposes above 392°F (200°C)
 446°F (230°C)

PHYSICAL PROPERTIES

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton® (>8-hr breakthrough for solid Glyphosate)
Coveralls:	Tyvek® (for so <i>lid</i> Glyphosate) Tychem® BR, CSM, TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>solutions</i> containing Glyphosate)
Respirator:	Spills (solid) - full facepiece APR with <i>P100 filter cartridges</i> Spills (liquid) and Fire - SCBA

HEALTH EFFECTS

-	
Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness, nausea, vomiting, diarrhea, abdominal pain, low blood pressure and convulsions
	 * Glyphosate DOES NOT inhibit cholinesterase activity

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: HELIUM

Synonyms: None CAS No: 7440-59-7 Molecular Formula: He RTK Substance No: 0972 Description: Colorless, odorless gas or liquid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 (liquid) - Health 1 (gas) - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Helium itself does not burn. CONTAINERS MAY RUPTURE OR BURST IN FIRE.	Protect from HEAT and SUNLIGHT. Water applied directly to leak may cause ice and a dense fog or cloud.	
0 - Reactivity	Use water spray to keep fire-exposed containers cool.		
DOT#: UN 1046 (Compressed Gas) UN 1963 (Cryogenic liquid)			
ERG Guide #:			
121 (Compressed Gas) 120 (Cryogenic liquid)			
Hazard Class: 2.2 (Non-flammable Gas)			

SPILL/LEAKS

Isolation Distance: 100 meters (330 feet)

No adverse effect to plant life.

OSHA:Maintain Oxygen Level above 19.5%ACGIH:Simple AsphyxiantIDLH LEVEL:N/A	EXPOSURE LIMITS		
ACGIH:Simple AsphyxiantIDLH LEVEL:N/A	OSHA:	Maintain Oxygen Level above 19.5%	
IDLH LEVEL: N/A	ACGIH:	Simple Asphyxiant	
	IDLH LEVEL:	N/A	

	HEALTH EFFECTS
Eyes:	Contact with liquid - causes frostbite
Skin:	Contact with liquid - causes frostbite
Acute:	Headache, dizziness, lightheadedness, passing out, suffocation from lack of <i>Oxygen</i> , and death
Chronic:	No information

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Non-flammable	
Relative Density:	0.138 (air = 1)	
Vapor Pressure:	No information	
Water Solubility:	Very slightly soluble	
Boiling Point:	-452°F (-269°C)	
Melting Point:	-458°F (-272.2°C)	

PROTECTIVE EQUIPMENT

Gloves:	Resistant to tears and cold
Coveralls:	Insulating materials
Boots:	No information
Respirator:	< 19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- For skin contact, immerse affected part in warm water.

Transfer to a medical facility.



Common Name: HEXACHLOROCYCLOHEXANE (mixed isomers)

Synonyms: BHC/HCH; 1,2,3,4,5,6-Benzenehexachloride CAS No: 608-73-1 Molecular Formula: $C_6H_6CI_6$ RTK Substance No: 3334 Description: White, yellowish or brownish flake or crystalline powder with a musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Hexachlorocyclohexane does not burn, however, it is often dissolved in a liquid carrier which may be	Hexachlorocyclohexane in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE) may result in fires and explosions.
DOT#: UN 2761	POISONOUS GASES ARE PRODUCED IN FIRE	Hexachlorocyclohexane is not compatible with ALKALI
ERG Guide #: 151	Including Phosgene, Chlorine and Hydrogen	METALS (such as LITHIUM, SODIUM and POTASSIUM); REDUCING AGENTS; STRONG BASES
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	(such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; AZO and DIAZO COMPOUNDS; NITRIDES (such as AMMONIA and CYANOGEN); and EPOXIDES.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fires: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Hexachlorocyclohexane (mixed isomers) is toxic to aquatic organisms and bioaccumulates.

EXPOSURE LIMITS

OSHA:	0.5 mg/m ³ ,	8-hr TWA
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ACGIH: 0.5 mg/m³, 8-hr TWA

IDLH: 50 mg/m³ (All of the above are for *gamma-Hexachlorocyclohexane*)

HEA	LTH	EFF	ECTS
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Eyes: Skin: Inhalation:	Irritation Irritation Nose, throat and lung irritation with coughing, wheezing and shortness of	
Chronic:	Headache, nausea, vomiting, dizziness, muscle weakness and convulsions Cancer (liver) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Musty odor	
Flash Point:	Noncombustible solid	
Vapor Density:	1.85 (air = 1)	
Vapor Pressure:	0.5 mm Hg at 140°F (60°C)	
Specific Gravity:	1.67 (water = 1)	
Water Solubility:	Insoluble	
Melting Point:	149°F (65°C)	
Molecular Weight:	291	

PRO	ΤΕСΤΙ	VE EQ	UIPMENT

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Halogen compounds, Benzylic</i>)
Coveralls:	DuPont Tyvek®
Respirator:	 >0.5 mg/m³ - full facepiece APR with Organic vapor filter and High efficiency prefilters >5 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.



Common Name: HEXAMETHYLENE DIISOCYANATE

Synonyms: HDI; 1,6-Diisocyanatohexane CAS No: 822-06-0 Molecular Formula: $C_8H_{12}N_2O_2$ RTK Substance No: 0995 Description: Clear, colorless to yellow liquid with a sharp, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Hexamethylene Diisocyanate is a COMBUSTIBLE	Hexamethylene Diisocyanate may react violently with ALCOHOLS: AMINES: STRONG BASES (such as
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	SODIUM HYDROXIDE and POTASSIUM
1 - Reactivity	extinguishing agents.	HYDROXIDE); ORGANOTIN; OXIDIZING AGENTS
DOT#: UN 2281	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen Cyanide</i> .	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 156	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); STRONG
Hazard Class: 6.1	cool. Hazardous polymerization (self reaction) occurs at	NITRIC); and CARBOXYLIC ACIDS.
(Poison)	temperatures above 392°F (200°C).	Hexamethylene Diisocyanate reacts with WATER to form <i>Carbon Dioxide</i> and decomposes in WATER to form <i>Amine</i> and <i>Polyureas</i> .

Gloves:

Coveralls:

Respirator:

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Rapidly degrades in water.

PHYSICAL PROPERTIES

Odor Threshold:	0.001 ppm
Flash Point:	284°F (140°C)
LEL:	0.9%
UEL:	9.5%
Auto Ignition:	849°F (454°C)
Vapor Density:	5.81 (air = 1)
Vapor Pressure:	0.05 mm Hg at 77°F (25°C)
Specific Gravity:	1.04 (water = 1)
Water Solubility:	Reacts/Decomposes
Boiling Point:	415°F (213°C)
Molecular Weight:	168.2

PROTECTIVE EQUIPMENT

Butyl, Viton/Butyl and Silver Shield®/4H® (>8-hr

Tychem® fabrics and Zytron® 400 (>8-hr breakthrough)

EXPOSURE LIMITS

NIOSH: 0.005 ppm, 10-hr TWA; 0.02 ppm, 10-min Ceiling

- ACGIH: 0.005 ppm, 8-hr TWA
- IDLH: None

The Protective Action Criteria values are:

PAC-1 = 0.015 ppm PAC-2 = 0.2 ppm PAC-3 = 3.5 ppm

HEALTH EFFECTS

Eyes:	Severe irritation
Skin:	Severe irritation and burns, redness, eczema-like rash
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

SCBA

breakthrough)

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: HEXAMINE

Synonyms: Hexamethylenetetramine; Methenamine CAS No: 100-97-0 Molecular Formula: $C_6H_{12}N_4$ RTK Substance No: 0996 Description: Colorless to white, odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	COMBUSTIBLE SOLID	Hexamine reacts violently with SODIUM PEROXIDE;	
1 - Fire	Finely dispersed Hexamine particulate or powdered dust is an explosion hazard.	Hexamine reacts with OXIDIZING AGENTS (such as	
0 - Reactivity	Use dry chemical, water spray, sand, earth or foam	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and	
DOT#: UN 1328	as extinguishing agents.	FLUORINE) and STRONG ACIDS (such as	
ERG Guide #: 133	including <i>Nitrogen Oxides</i> .	HYDROCHLORIC, SULFURIC and NITRIC) to form toxic and corrosive gases, such as <i>Formaldehvde</i> .	
Hazard Class: 4.1	Use water spray to keep fire-exposed containers	Hexamine is not compatible with METALS (such as	
(Flammable solid)		ALUMINUM and ZINC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Hexamine**.

Keep **Hexamine** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 55 \text{ mg/m}^3$
- $PAC-2 = 610 \text{ mg/m}^3$
- $PAC-3 = 3,600 \text{ mg/m}^3$

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Nausea, vomiting, diarrhea and abdominal pain	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	482°F (250°C)
Auto Ignition Temp:	>700°F (>371°C)
Vapor Density:	4.9 (air = 1)
Vapor Pressure:	4 x 10 ⁻³ mm Hg at 77ºF (25ºC)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Sublimes
Melting Point:	505.4°F (263°C)
Ionization Potential:	<8.5 +/- 0.7 eV
Molecular Weight:	140.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Neoprene (>8-hr breakthrough)
Coveralls:	Tyvek®
Respirator:	>55 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: n-HEXANE

Synonyms: Hexyl Hydride; normal Hexane CAS No: 110-54-3 Molecular Formula: C₁₆H₁₄ RTK Substance No: 1340

Description: Colorless liquid with a Gasoline-like odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1208 ERG Guide #: 128 Hazard Class: 3 (Flammable)	 n-Hexane is a FLAMMABLE LIQUID. DO NOT attempt to extinguish fire unless flow can be stopped. Shut off supply or let burn. Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents. Use water in flooding quantities as fog as solid streams of water may spread fire. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to suppress vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charges. 	n-Hexane can react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, DINITROGEN TETRAOXIDE, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions. n-Hexane attacks some PLASTICS, RUBBER and COATINGS.	
	n-Hexane may form an ignitable vapor/air mixture in closed tanks or containers.		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Ground and bond containers when transferring n-Hexane. Use only non-sparking tools and equipment.

Keep **n-Hexane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

n-Hexane is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA NIOSH: 50 ppm, 10-hr TWA ACGIH: 50 ppm, 8-hr TWA IDLH: 1,100 ppm The Protective Action Criteria values are: PAC-1 = 400 ppm PAC-2 = 3,300 ppm PAC-3 = 8,600 ppm HEALTH EFFECTS Eyes: Irritation and burns

Skin:	Irritation and burns					
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath					
	Headache, dizziness, lightheadedness and passing out. Higher levels can cause coma and death.					

PHYSICAL PROPERTIES

65 to 248 ppm
-7°F (-22°C)
1.1%
7.5%
437°F (225°C)
3 (air = 1)
124 mm Hg at 68°F (20°C)
0.7 (water = 1)
Insoluble
156°F (69°C)
-137°F (-94°C)
10.18 eV
86.2

PROTECTIVE EQUIPMENT

Respirator:	>50 ppm or fire - SCBA				
Coveralls:	Tychem® F, CPF3, BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard.				
Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl, and Barrier® (>8-hr breakthrough)				

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: HYDRAZINE

Synonyms: Diamine; Nitrogen Hydride CAS No: 302-01-2 Molecular Formula: N_2H_4 RTK Substance No: 1006 Description: Colorless, fuming, oily liquid with an *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
4 - Health	Hydrazine is a FLAMMABLE LIQUID that may self-ignite at low temperatures.	Hydrazine is extremely reactive and/or explosive in the presence of OXIDIZING AGENTS (such as PERCHLORATES,		
4 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
3 - Reactivity	foam as extinguishing agents. Use water spray to disperse vapors.	CHLORINE, BROMINE and FLUORINE); NITRIC ACID; NITROUS OXIDES; and CHEMICALLY ACTIVE METALS (such as POTASSIUM_SODIUM_MAGNESIUM and ZINC)		
DOT#: UN 2029	POISONOUS GASES ARE PRODUCED IN FIRE,	Hydrazine reacts violently with METALS (such as SILVER, MERCURY, NICKEL, TITANIUM and ZINC); METAL OXIDES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC		
ERG Guide #: 132	CONTAINERS MAY EXPLODE IN FIRE.			
Hazard Class: 8	Use water spray to keep fire-exposed containers cool.	and NITRIC).		
(Corrosive)	Hydrazine may form an ignitable vapor/air mixture in closed tanks or containers. Vapors may travel to a source of ignition and flash back.	Hydrazine can spontaneously ignite at low temperatures or on contact with POROUS MATERIALS (such as EARTH, WOOD and CLOTH).		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand or an inert absorbent and place into sealed containers for disposal.

DO NOT use earth or combustible absorbents as fires/ explosions may occur.

Keep **Hydrazine** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Hydrazine is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 1 ppm, 8-hr TWA NIOSH: 0.03 ppm, 2-hr Ceiling ACGIH: 0.01 ppm, 8-hr TWA IDLH: 50 ppm The Protective Action Criteria values are: PAC-1 = 0.1 ppm PAC-2 = 13 ppm PAC-3 = 35 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, seizures and convulsions
Chronic:	Cancer (liver, lung, nasal cavity) in animals

PHYSICAL PROPERTIES				
Odor Threshold:	3.7 ppm			
Flash Point:	100°F (38°C)			
LEL:	2.9%			
UEL:	98%			
Auto Ignition Temp:	Varies from 74°F (23°C) to 518°F (270°C)			
Vapor Density:	1.1 (air = 1)			
Vapor Pressure:	10 mm Hg at 68°F (20°C)			
Specific Gravity:	1.01 (water = 1)			
Water Solubility:	Soluble			
Boiling Point:	236°F (113°C)			
Freezing Point:	36°F (2.2°C)			
Ionization Potential:	8.93 eV			
Molecular Weight:	32.05			

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Polyvinyl Chloride (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>10% LEL use turn out gear or flash protection SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: HYDROGEN

Synonyms: Molecular Hydrogen; Protium CAS No: 1333-74-0 Molecular Formula: H₂ RTK Substance No: 1010 Description: Colorless, odorless gas that is lighter than air

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
3 - Health	Hydrogen is a FLAMMABLE LIQUID and GAS that burns with an almost INVISIBLE FLAME.	Hydrogen is extremely FLAMMABLE and can be ignited by the cylinder valve being opened to AIR and by HEAT,			
4 - Fire	Hydrogen fires can be detected by carefully	SPARKS and STATIC ELECTRICITY.			
0 - Reactivity	approaching the area with an outstretched straw broom to make the flame visible.	Hydrogen reacts violently and explosively when mixed with OXIDIZING AGENTS (such as PERCHI ORATES			
DOT#: UN 1049 (Compressed)	Stop flow of gas or use a dry powder extinguisher to get to the place where the flow of Hydrogen can be shut off. Allow fire to burn out.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETYLENE; ETHYLENE; and OXYGEN.			
(Refrigerated Liquid)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Hydrogen is not compatible with METALS; METAL OXIDES: and METAL SALTS			
ERG Guide #: 115	Hydrogen gas is lighter than air and can accumulate in the upper sections of enclosed spaces.	Protect cylinders from physical damage and do not drag,			
Hazard Class: 2.1 (Flammable gas)	Hydrogen may form an ignitable vapor/air mixture in closed tanks or containers.	roll, slide or drop.			

SPILL/LEAKS

Isolation Distance:

should be 19.5%.

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Hydrogen**.

Metal containers involving the transfer of **Hydrogen** should be grounded and bonded.

Keep **Hydrogen** out of confined spaces, such as sewers, because of the possibility of an explosion.

Conduct air monitoring to determine that Oxygen levels are above 19.5% and that the LEL is not being exceeded.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable gas
LEL:	4%
UEL:	75%
Auto Ignition Temp:	932° to 1,060°F (500° to 571°C)
Vapor Density:	0.069 (air = 1)
Vapor Pressure:	1.24 x 10 ⁶ mm Hg at 77°F (25°C)
Specific Gravity:	0.07 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-423°F (-253°C)
Freezing Point:	-434°F (-259°C)
Molecular Weight:	2.02
Critical Temp:	-400°F (-239.9°C)
Expansion Ratio:	1 to 848 (liquid to gas)

PROTECTIVE EQUIPMENT

Gloves: Insulated Rubber and Leather

- **Coveralls:** >10% of the LEL use flash protection or turn out gear
- Respirator:

r: < 19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

HEALTH EFFECTS

PAC-1 = 65,000 ppm PAC-2 = 230,000 ppm PAC-3 = 400,000 ppm

EXPOSURE LIMITS

Hydrogen is a simple asphyxiant. Oxygen levels

The Protective Action Criteria values are:

Eyes:	Contact with <i>liquefied</i> gas can cause frostbite
Skin:	Contact with <i>liquefied</i> gas can cause frostbite
Inhalation:	Headache, dizziness, weakness, loss of

consciousness and death



Common Name: HYDROGEN BROMIDE

Synonyms: Anhydrous Hydrobromic Acid; Hydrogen Monobromide CAS No: 10035-10-6 Molecular Formula: HBr RTK Substance No: 1011

Description: Colorless gas with a strong, irritating odor, which is found as a liquefied compressed gas or in solution

HAZARD DATA Hazard Rating Firefighting Reactivity Extinguish fire using an agent suitable for type of 3 - Health Hydrogen Bromide reacts violently with STRONG surrounding fire. Hydrogen Bromide itself does BASES (such as SODIUM HYDROXIDE and 0 - Fire not burn. POTASSIUM HYDROXIDE); AMINES; OZONE; 0 - Reactivity DO NOT USE WATER directly on Hydrogen OXIDIZING AGENTS (such as PERCHLORATES, DOT#: Bromide but use water to knock down vapors. PEROXIDES, PERMANGANATES, CHLORATES, UN 1048 (Anhydrous) NITRATES, CHLORINE, BROMINE and FLUORINE); POISONOUS GASES ARE PRODUCED IN FIRE. and many ORGANIC COMPOUNDS, causing fires and UN 1788 (Solution) CONTAINERS MAY EXPLODE IN FIRE explosions. Use water spray to keep fire-exposed containers FRG Guide # Hydrogen Bromide will react with METALS (such as COPPER, cool. DO NOT get water inside containers. 125 (UN 1048) BRASS and ZINC) to release flammable and explosive Hydrogen 154 (UN 1788) aas. Hazard Class: 2.3 (Poisonous Gas) SPILL/LEAKS PHYSICAL PROPERTIES Odor Threshold: 2 ppm **Isolation Distance:** Flash Point: Nonflammable Small Spill: 30 meters (100 feet) Large Spill: 300 meters (1,000 feet) >760 mm Hg at 68°F (20°C) Vapor Pressure: Fire: 800 meters (1/2 mile) **Specific Gravity:** 3.5 (gas), 2.7 (solution) Water Solubility: Soluble Cover liquid spill with dry lime, sand or soda ash and place into sealed containers for disposal. **Boiling Point:** -88.2°F (-66.8°C) (gas), 165°F (74°C) (solution) DO NOT wash into sewer. **Freezing Point:** -121°F (-85°C) (gas) Stop flow of gas. If source of leak is a cylinder and the leak 193.6°F (89.8°C) (gas) **Critical Temp:** cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to **Ionization Potential:** 11 62 eV empty. Molecular Weight: 80.92 Turn leaking cylinder with leak up to prevent escape of gas in the liquid state. Neutralize water spills with lime, soda ash or sodium bicarbonate. Hydrogen Bromide is toxic to aquatic life. **EXPOSURE LIMITS PROTECTIVE EQUIPMENT** OSHA: 3 ppm, 8-hr TWA Gloves: Neoprene, Viton and Barrier® (>8-hr breakthrough for Inorganic Acids) NIOSH: 3 ppm, Ceiling Coveralls: Tychem® BR, Responder® and TK® (>8-hr breakthrough) ACGIH: 2 ppm, Ceiling IDLH: 30 ppm **Respirator:** SCBA The Protective Action Criteria values are: PAC-1 = 3.3 ppm PAC-2 = 72.8 ppm PAC-3 = 397 ppm FIRST AID AND DECONTAMINATION HEALTH EFFECTS Severe irritation, burns and possible eye Remove the person from exposure. Eyes: damage Flush eyes with large amounts of water for at least 30 minutes. Remove Skin: Severe irritation and burns. Contact with liquid contact lenses if worn. Seek medical attention immediately may cause frostbite Quickly remove contaminated clothing and wash contaminated skin with Inhalation: Nose, throat and lung irritation, with coughing, large amounts of water. Seek medical attention immediately. and severe shortness of breath (pulmonary For contact with *liquid* Hydrogen Bromide immerse affected part in warm water. edema) Begin artificial respiration if breathing has stopped and CPR if necessary. Headache, nausea and vomiting Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. September 2009



Common Name: HYDROGEN CHLORIDE

Synonyms: Anhydrous Hydrogen Chloride; Muriatic Acid CAS No: 7647-01-0 Molecular Formula: HCI RTK Substance No: 1012 Description: Colorless gas with a pungent odor that fumes in air, and is often found as a compressed,

liquefied gas or in a water solution						
HA		ZAR	D DATA			
Hazard Rating	Firefighting		Reactivity	Reactivity		
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1050 (Anhydrous) UN 1789 (Solution) ERG Guide #: 125 (Anhydrous) 157 (Solution) Hazard Class: 2.3 (Toxic Gas) (Anhydrous) 8 (Corresive) (Solution)	Extinguish fire using an agent suitable for type of surrounding fire. Hydrogen Chloride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine.</i> Use water spray to keep fire-exposed containers cool, but DO NOT get water into containers.		 Hydrogen Chloride may react explosively with ALCOHOLS; HYDROGEN CYANIDE; POTASSIUM PERMANGANATE; SODIUM; and TETRASELENIUM TETRANITRIDE, and may ignite on contact with FLUORINE; HEXALITHIUM DISILICIDE; METAL ACETYLIDES and CARBIDES. Hydrogen Chloride reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to form toxic <i>Chlorine gas</i> and reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Hydrogen Chloride will attack many METALS (such as COPPER, BRASS and ZINC) to release flammable and explosive <i>Hydrogen gas</i>. Hydrogen Chloride will react with ALDEHYDES and EPOXIDES to cause violent polymerization (self reaction) 			
SPIL	L/LEAKS		P			
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Cover Hydrogen Chloride in solution with dry lime, sand or soda ash and place into sealed containers for disposal. Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. DO NOT SPRAY water on leaking cylinder. Turn leaking cylinder with leak up to prevent escape of gas in liquid			Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potenti Molecular Weight:	0.255 to 10.06 ppm Nonflammable 1.3 (air = 1) >760 mm Hg at -120°F (-84°C) 1.27 (liquid) (water = 1) Soluble -121°F (-85°C) -174°F (-114°C) al: 12.74 eV : 36.47		
EXPOSI	JRE LIMITS		PR	ROTECTIVE EQUIPMENT		
OSHA: 5 ppm, Ceiling NIOSH: 5 ppm, Ceiling ACGIH: 2 ppm, Ceiling IDLH: 50 ppm The Protective Action Criteria values are: PAC-1 = 1.8 ppm PAC-2 = 22 ppm PAC-3 = 100 ppm			Gloves: Coveralls: Respirator:	Butyl, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK; ONESuit®TEC; Trellchem® HPS and VPS (>8- hr breakthrough) >2 ppm - full facepiece APR with <i>Acid gas</i> filters >20 ppm - SCBA		
HEALTH EFFECTS			FIRST A	AID AND DECONTAMINATION		
Eyes: Severe irritation, burns and possible eye damage Skin: Severe irritation and burns Contact with liquid causes frostbite Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)			 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 			



Common Name: HYDROGEN CYANIDE

Synonyms: Formonitrile; Hydrocyanic Acid; Prussic Acid CAS No: 74-90-8 Molecular Formula: HCN RTK Substance No: 1013 Description: Colorless to pale blue liquid below 78°F (26°C), and a colorless gas at higher temperatures, with a distinct bitter almond or stinky sneaker odor

HAZARD DATA					
Hazard Rating	Firefighting		Re	Reactivity	
4 - Health 4 - Fire 1 - Reactivity DOT#: UN 1051 (Anhydrous; Stabilized) ERG Guide #: 117 Hazard Class: 6.1 (Poison)	 FLAMMABLE LIQUID and GAS. Stop flow of gas or allow to burn. Do extinguish fire unless flow can be st supply or let burn. Use dry chemical, CO₂, water spray, foam or other foam as extinguishing POISONOUS GASES ARE PRODU including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FUse water spray to keep fire-expose to suppress vapors. Vapors may travel to a source of ign Hydrogen Cyanide may form an igr mixture in closed tanks or container 	AMMABLE LIQUID and GAS. op flow of gas or allow to burn. DO NOT attempt to ktinguish fire unless flow can be stopped. Shut off apply or let burn. e dry chemical, CO ₂ , water spray, alcohol-resistant am or other foam as extinguishing agents. DISONOUS GASES ARE PRODUCED IN FIRE, cluding <i>Nitrogen Oxides</i> . DNTAINERS MAY EXPLODE IN FIRE. se water spray to keep fire-exposed containers cool and suppress vapors. apors may travel to a source of ignition and flash back. /drogen Cyanide may form an ignitable vapor/air nixture in closed tanks or containers.		Anti sev res Hyo EL ST HY CA Hyo (su CH FL SU Hyo wa rea	hydrous and Unstabilized Hydrogen Cyanide are vere explosion hazards and can polymerize violently, sulting in fires and explosions. drogen Cyanide can polymerize explosively when exposed to EVATED TEMPERATURES (over 122°F or 50°C) and RONG BASES (such as SODIUM HYDROXIDE, CALCIUM 'DROXIDE, AMMONIA, AMINES and SODIUM (DROXIDE, AMMONIA, AMINES and SODIUM (RBONATE). drogen Cyanide reacts violently with OXIDIZING AGENTS ich as PERCHLORATES, PEROXIDES, PERMANGANATES, HLORATES, NITRATES, CHLORINE, BROMINE and UORINE) and STRONG ACIDS (such as HYDROCHLORIC, ILFURIC and NITRIC). drogen Cyanide solutions containing more than 4 to 5% ter are less stable than the anhydrous (dry) form and can self act and/or form explosive mixtures in air.
SPI	LL/LEAKS			Ρ	HYSICAL PROPERTIES
Isolation Distance: Spill (small): 60 meters (Spill (large): 400 meters Fire: 800 meters (1/2 mil Stop flow of gas. If source cannot be stopped in pla safe place in the open ai empty. Absorb liquids in dry sand place into sealed contain Use foam to suppress val DO NOT wash into sewer Bond and ground all cont Cyanide and use only no Hydrogen Cyanide is ve	200 feet) (1,250 feet) e) e of leak is a cylinder and the leak ce, remove the leaking cylinder to a r, and repair leak or allow cylinder to d, earth, or a similar material and ters for disposal. pors. r. ainers when transferring Hydrogen on-sparking tools and equipment. ry toxic to aquatic organisms.		Odor Threshold Flash Point: LEL: UEL: Auto Ignition T Vapor Density: Vapor Pressure Specific Gravit Water Solubilit Boiling Point: Melting Point: Ionization Pote Molecular Weig	d: emp e: y: y: y: antial ght:	2 to 10 ppm $0^{\circ}F (-18^{\circ}C)$ 5.6% 40% 1,000°F (538°C) 0.94 (gas) (air = 1) 630 mm Hg at 68°F (20°C) 0.7 (water = 1) Soluble 78°F (26°C) 7°F (-13.3°C) I: 13.6 eV 27
EXPOSURE LIMITS				PR	OTECTIVE EQUIPMENT
OSHA: 10 ppm, 8-hr TWA NIOSH: 4.7 ppm, Ceiling ACGIH: 4.7 ppm, Ceiling IDLH: 50 ppm The Protective Action Criteria values are: PAC-1 = 2 ppm PAC-2 = 7 1ppm PAC-3 = 15 ppm			Gloves: Coveralls: Respirator:	Niti Hy Tyc Hy SC	rile and Neoprene (>8-hr breakthrough for <i>liquid</i> drogen Cyanide) chem® TK (>8-hr breakthrough for <i>gaseous</i> and <i>liquid</i> drogen Cyanide) BA
HEALTH EFFECTS			FIRS	ΤA	AID AND DECONTAMINATION
Eyes:Irritation and burnsSkin:Irritation and burns (skin absorbable)Inhalation:Flushing of the face, chest tightness, headache, nausea and vomiting, weakness and shortness of breath			Remove the person Flush eyes with la contact lenses, if Quickly remove co large amounts of Begin artificial reson necessary. Transfer to a med Use Amyl Nitrite co	on fro arge a worn ontam soap spirati dical f capsu	om exposure. amounts of water for at least 15 minutes. Remove , while rinsing. ninated clothing and wash contaminated skin with and water. Seek medical attention. ion if breathing has stopped and CPR if facility. les if symptoms develop.



Common Name: HYDROGEN FLUORIDE

Synonyms: Fluoric Acid; HFA CAS No: 7664-39-3 Molecular Formula: HF RTK Substance No: 3759 Description: Colorless, fuming liquid or gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Hydrogen Fluoride is a noncombustible liquid or gas.	Hydrogen Fluoride reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and many
0 - Fire	Extinguish fire using an agent suitable for	other compounds.
1 - Reactivity	type of surrounding fire. POISONOUS GASES ARE PRODUCED	Hydrogen Fluoride reacts with WATER and STEAM to produce <i>toxic</i> and <i>corrosive gases</i> .
DOT#: UN 1052	IN FIRE, including <i>Fluorine</i> .	Hydrogen Fluoride reacts with METALS (such as IRON
ERG Guide #: 125	Use water spray to keep fire exposed	and STEEL) to produce flammable and explosive <i>Hydrogen gas</i> .
Hazard Class: 8 (Corrosive)		(such as PERCHLORATES, PEROXIDE, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); AMINES; METAL SALTS; and SILICON COMPOUNDS.

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

- If a gas leak, evacuate area and stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- If a liquid spill, allow to vaporize and disperse, or cover with sodium carbonate or an equal mixture of soda ash and slaked lime.

Water spray can be used to absorb **Hydrogen Fluoride** vapors escaping from leaking containers of *anhydrous* **Hydrogen Fluoride**. Use water in flooding quantities.

EXPOSURE LIMITS

ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm, Ceiling IDLH: 30 ppm

The Protective Action Criteria values are:

PAC-1 = 1 ppm; PAC-2 = 24 ppm; PAC-3 = 44 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, weakness, and convulsions

PHYSICAL PROPERTIES

Odor Threshold:	0.04 ppm
Flash Point:	Nonflammable
Vapor Density:	0.7 (air = 1)
Vapor Pressure:	760 mm Hg at 68ºF (20ºC)
Specific Gravity:	0.99 (water = 1)
Water Solubility:	Miscible
Boiling Point:	67°F (19.4°C)
Freezing Point:	-117.4°F (-83°C)
Ionization Potential:	15.98 eV
Molecular Weight:	20.1

PROTECTIVE EQUIPMENT

Gloves:	Barrier® (>8-h	r breakthrough)
010100.	Dunio (* 0 i	n broundinough)

Coveralls: Tychem® Responder® and TK; and Trellchem HPS (>8hr breakthrough)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.

February 2017


Common Name: HYDROGEN PEROXIDE

Synonyms: Hydrogen Dioxide CAS No: 7722-84-1 Molecular Formula: H₂O₂ RTK Substance No: 1015 Description: Colorless, odorless liquid. Pure **Hydrogen Peroxide** is unstable and an explosion risk so it is usually in a water solution.

HAZARD DATA				
Hazard Rating Firefighting				Reactivity
3 - Health 0 - Fire 3 - Reactivity DOT#: UN 2015 ERG Guide #: 1 Hazard Class: 9 (Oxidi	Hydrogen Peroxide is no STRONG OXIDIZER whi combustion of other subs Flood with water to exting DRY CHEMICAL extingu POISONOUS GASES AF 43 CONTAINERS MAY EXP Use water spray to keep f cool. Hydrogen Peroxide may paper and oil).	Firefighting Hydrogen Peroxide is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances. Flood with water to extinguish fire. DO NOT USE DRY CHEMICAL extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Hydrogen Peroxide may ignite combustibles (wood, paper and oil).		Concentrated solutions of Hydrogen Peroxide can decompose violently if trace impurities are present. Hydrogen Peroxide reacts violently with FINELY DIVIDIED METALS; REDUCING AGENTS; COMBUSTIBLES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ORGANICS; ALCOHOLS; ETHERS; KETONES; ALDEHYDES; and METALS (such as COPPER, BRASS, IRON, SILVER and ZINC). Hydrogen Peroxide is not compatible with AMMONIA and AMMONIA CARBONATES; IODIDES; and SULFITES.
	SPILL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance:Small Spills: 50 meters (150 feet)Large Spills: 100 meters (300 feet)Fire: 800 meters (½ mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.Keep Hydrogen Peroxide out of confined spaces, such as sewers, because of the possibility of an explosion.		or a ers. aces, an	Odor Flash Vapor Vapor Specii Water Boilin Meltin Ioniza Molec pH:	Threshold:Odorless - Based on a 70 - 90% Hydrogen Peroxide solutionPoint:Not combustibler Density:1.2 (air = 1)r Pressure:8 mm Hg at 77°F (25°C)ific Gravity:1.46 (water = 1)r Solubility:Solubleng Point: $286°F (141°C)$ ng Point: $12°F (-11°C)$ ation Potential:10.54 eVcular Weight:34Slightly acidic
EX	POSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 1 ppm NIOSH: 1 ppm ACGIH: 1 ppm IDLH: 75 pp The P PA PA PA	n, 8-hr TWA n, 10-hr TWA n, 8-hr TWA m rotective Action Criteria value .C-1 = 10 mg/m ³ .C-2 = 50 mg/m ³ .C-3 = 100 mg/m ³	es are:	Glove Cover Respi	PS: Nitrile, Neoprene, Natural Rubber, Silver Shield®/4H® and Viton (>8-hr breakthrough) ralls: DuPont Tychem® QC, CPF 2, BR, LV, Responder®, and TK; Kappler Zytron® 200; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough) irator: >1 ppm - Supplied air
HE	ALTH EFFECTS			FIRST AID AND DECONTAMINATION
Eyes: Irri Skin: Irri bli Inhalation: No sh	tation, burns, eye damage tation, burns, skin rash, redne sters use and throat irritation, cough ortness of breath (pulmonary	ess and ning, edema)	Remo Flush conta Quick large Begin neces Trans Medic	ove the person from exposure. a eyes with large amounts of water for at least 30 minutes. Remove act lenses if worn. Seek medical attention immediately. (Jy remove contaminated clothing and wash contaminated skin with amounts of water. Seek medical attention. a artificial respiration if breathing has stopped and CPR if ssary. sfer to a medical facility. cal observation is recommended as symptoms may be delayed.



Common Name: HYDROGEN SULFIDE

Synonyms: Dihydrogen Sulfide; Sulfurated Hydrogen; Sewer Gas CAS No: 7783-06-4 Molecular Formula: H₂S RTK Substance No: 1017

Description: Colorless gas with the odor of rotten eggs

HAZARD DATA							
Hazard Rating	ating Firefighting				Reactivit	V	
4 - Health 4 - Fire 0 - Reactivity DOT#: UN 1053 ERG Guide #: 117 Hazard Class: 2.3 (Poisonous)	FIRETIGNTING FLAMMABLE GAS Stop flow of gas and use water spray, dry chemical or CO2 to extinguish fire. Use water spray to disperse vapors. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation of Hydrogen Sulfide in <i>liquid</i> form may generate electrostatic charges. Hydrogen Sulfide may form an ignitable vapor/air mixture in closed tanks or containers.			Hydrogen Su OXIDIZING A PEROXIDES NITRATES, M STRONG NI Hydrogen Su BASES (sucl POTASSIUM Hydrogen Su some plastic	Jifide reacts violently and/or explosively with AGENTS (such as PERCHLORATES, 6, PERMANGANATES, CHLORATES, CHLORINE, BROMINE and FLUORINE); ETAL POWDERS; METAL OXIDES; and TRIC ACID. Jifide is not compatible with STRONG h as SODIUM HYDROXIDE and 1 HYDROXIDE). Jifide may react with rusty iron pipes and s.		
	SPILL/LEAKS					PHYSIC	CAL PROPERTIES
 Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile) Stop flow of gas. If source of leak is a cylinder and the leak can stopped in place, remove the leaking cylinder to a safe place in air, and repair leak or allow cylinder to empty. Use only non-sparking tools and equipment, especially when op closing containers of Hydrogen Sulfide. Turn leaking cylinder with leak up to prevent escape of gas in lic Keep Hydrogen Sulfide out of confined spaces, such as sewer of the possibility of an explosion. DO NOT wash into sewer. For water spills, neutralize with agricultural lime, crushed limest sodium bicarbonate. Hydrogen Sulfide is very toxic to aquatic organisms. 			e pen and ate. ause		Odor Thro Flash Poi LEL: UEL: Auto Igni Vapor De Vapor Pre Specific O Water So Boiling P Freezing Ionizatior Molecular	eshold: nt: nsity: essure: Gravity: lubility: oint: Point: n Potential: r Weight:	0.008 to 0.1 ppm (>100 ppm causes olfactory fatigue) Flammable 4% 45% 500°F (260°C) 1.18 (air = 1) 14,000 mm Hg at 68°F (20°C) 0.99 (water = 1) Soluble -76°F (-60°C) -122°F (-86°C) 10.46 eV 34.08
EXPO	SURE LIMITS				PRO	TECTIV	E EQUIPMENT
NIOSH:10 ppm, 10-min CeilingACGIH:1 ppm, 8-hr TWA; 5 ppm, STELIDLH:100 ppmThe Protective Action Criteria values are:PAC-1 = 0.51 ppmPAC-2 = 27 ppmPAC-3 = 50		G Cu Ru	Gloves: Insulated Neoprene, Viton and Barrier® (>8-hr breakthrough for Inorganic gases and vapors) Coveralls: Tychem® BR, Responder® and TK (>8-hr breakthrough) Respirator: >1 ppm - full facepiece PAPR with cartridges specific for Hydrogen Sulfide >10 ppm - SCBA		Viton and Barrier® (>8-hr breakthrough for <i>vapors</i>) ander® and TK (>8-hr breakthrough) be PAPR with cartridges specific for Sulfide		
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION				
Eyes: Irritation Skin: Contact Inhalation: Nose, th and seve edema) Nausea, unconso	with liquid causes frostbite roat and lung irritation, with coughing, ere shortness of breath (pulmonary dizziness, headache, iousness and even death	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 					



Common Name: HYDROQUINONE

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Hydroquinone may burn, but does not readily ignite.	Hydroquinone reacts violently with SODIUM HYDROXIDE.
1- Fire	Use dry chemical, CO ₂ , water spray or alcohol-	Hydroquinone is not compatible with OXIDIZING
0 - Reactivity	resistant foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2662	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phenol.</i>	CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 153	Use water spray to reduce vapors and to keep	BASES (such as POTASSIUM HYDROXIDE); OXYGEN;
Hazard Class: 6.1	containers cool.	allu FERRIC SALTS.
(Poison)	Hydroquinone may form an ignitable dust/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Eliminate all ignition sources.

Moisten *solid* spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, rash, burning feeling and change in skin color
Inhalation:	Nose and throat irritation
	Headache, nausea, vomiting, abdominal cramps, dizziness, and muscle twitching
Chronic:	May affect liver and kidneys

PHYSICAL PROPERTIES

Flash Point:	392°F (165°C)
Auto Ignition Temp:	950°F (510°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	1 mm Hg at 270°F (132°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble (Miscible)
Boiling Point:	547°F (286°C)
Melting Point:	338° to 340°F (170° to 171°C)
Ionization Potential:	7.95 eV
Molecular Weight:	110.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Silver Shield®/4H® (>4-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for <i>Hydroxyl compounds</i> , aromatic)
Respirator:	>1 mg/m ³ - full facepiece APR with <i>P100 cartridges</i> >50 mg/m ³ or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: HYDROXYLAMINE SULFATE

Synonym: Oxammonium Sulfate CAS No: 10039-54-0 Molecular Formula: $H_8N_2SO_6$ RTK Substance No: 1020 Description: Colorless to white, crystalline solid or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 2 - Beactivity	COMBUSTIBLE SOLID Hydroxylamine Sulfate is REACTIVE and a DANGEROUS EXPLOSION HAZARD when exposed to HEAT	Hydroxylamine Sulfate may decompose to form extremely unstable <i>Hydroxylamine</i> on exposure to CARBON DIOXIDE; MOIST AIR; and WATER; or in the presence of STRONG BASES (such as SODIUM
DOT#: UN 2865	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	HYDROXIDE and POTASSIUM HYDROXIDE) and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM).
Hazard Class: 8 (Corrosive)	Sulfate. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides, Sulfuric Acid, and Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	Hydroxylamine Sulfate is not compatible with METALS; METAL SALTS; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
	cool.	Violent decomposition may occur above 338° (170°C).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep **Hydroxylamine Sulfate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Hydroxylamine Sulfate is toxic to aquatic organisms.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 10 mg/m^3
- $PAC-2 = 75 \text{ mg/m}^{3}$

 $PAC-3 = 400 \text{ mg/m}^3$

HEALTH EFFECTS

-	
Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (Pulmonary edema)
	Methemoglobinemia with headache, fatigue and blue color to the skin and lips

PHYSICAL PROPERTIES

Vapor Density: Specific Gravity: Water Solubility: Melting Point: Molecular Weight: 1.9 (air = 1) >1 (water = 1) Soluble 338°F (170°C) 164.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	>10 ma/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: IODINE

Synonyms: Diatomic Iodine CAS No: 7553-56-2 Molecular Formula: 12 RTK Substance No: 1026 Description: Purple to black, crystalline solid with a sharp, strong odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Iodine is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of	lodine reacts violently or explosively with ACETYLENE; ACETALDEHYDE; METAL AZIDES; METAL HYDRIDES; and	
0 - Fire	other substances.	METAL CARBIDES.	
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or	Iodine forms explosive or shock-sensitive compounds when mixed with REDUCING AGENTS (such as LITHIUM,	
DOT#: UN 3085	POISONOUS GASES ARE PRODUCED IN	SODIUM, ALUMINUM and their HYDRIDES) and <i>liquid</i>	
ERG Guide #: 140	FIRE, including Hydrogen lodide and other	lodine will ignite POWDERED METALS (such as ANTIMONY,	
Hazard Class: 5.1	Iodine compounds.	MAGNESIUM and ZINC) in the presence of WATER.	
(Oxidizer) and oil).		Iodine is not compatible with COMBUSTIBLES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); HALOGENS (such as CHLORINE, BROMINE and CHLORINE TRIFLUORIDE); and ETHANOL	

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer. Iodine may be hazardous in the environment; especially to fish.	Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potential: Molecular Weight:	Sharp, strong odor Noncombustible 8.8 (air = 1) 0.3 mm Hg at 77°F (25°C) 4.93 (water = 1) Slightly soluble 365°F (185°C) 236°F (113°C) 9.31 eV 253.8	

EXPOSURE LIMITS

OSHA: 0.1 ppm, Ceiling

NIOSH: 0.1 ppm, Ceiling ACGIH: 0.01 ppm, 8-hr TWA; 0.1 ppm, STEL

IDLH: 2 ppm

The Protective Action Criteria values are: PAC-1 = 0.1 ppm; PAC-2 = 0.5 ppm; PAC-3 = 5 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, nausea, vomiting, diarrhea and abdominal pain

	Sharp, shong buoi
lash Point:	Noncombustible
apor Density:	8.8 (air = 1)
/apor Pressure:	0.3 mm Hg at 77ºF (25ºC)
Specific Gravity:	4.93 (water = 1)
Vater Solubility:	Slightly soluble
Boiling Point:	365°F (185°C)
lelting Point:	236°F (113°C)
onization Potential:	9.31 eV
Iolecular Weight:	253.8

PROTECTIVE EQUIPMENT

Gloves: Coveralls:

Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK (8-hr breakthrough)

Respirator: > 0.01ppm SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ISOAMYL ALCOHOL

Synonyms: Isopentyl Alcohol; Isobutylcarbinol CAS No: 123-51-3 Molecular Formula: C₅H₁₂O RTK Substance No: 1039 Description: Colorless liquid with a strong *Alcohol*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Isoamyl Alcohol is a COMBUSTIBLE LIQUID.	Isoamyl Alcohol reacts violently with OXIDIZING AGENTS
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, PROMINE and ELLIOPINE): PEDLICING
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
DOT#: UN 1105	FIRE.	their HYDRIDES); and HYDROGEN TRISULFIDE to cause
ERG Guide #: 129	Use water spray to keep fire-exposed containers	Isoamvi Alcohol is not compatible with ACID CHLORIDES:
Hazard Class: 3	cool.	ACID ANHYDRIDES; ALIPHATIC AMINES; CAUSTICS;
(Flammable liquid)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	ISOCYANATES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (160 feet)

Large Spill: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA; 125 ppm, 15-min STEL
ACGIH:	100 ppm, 8-hr TWA; 125 ppm, 15-min STEL
IDLH:	500 ppm

|--|

Eyes:	Irritation and burns
Skin:	Irritation, burns, drying and cracking
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath
	Headache, nausea, vomiting, dizziness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.042 ppm
Flash Point:	109°F (43°C)
LEL:	1.2%
UEL:	9%
Auto Ignition Temp:	662°F (350°C)
Vapor Density:	3.04 (air = 1)
Vapor Pressure:	2.1 mm Hg at 68°F (20°C)
Specific Gravity:	0.82 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	270°F (132°C)
Molecular Weight:	88.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 2, SL, CPF 4, CSM, and Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough)
Respirator:	>100 ppm - APR with Organic vapor cartridge or Supplied air >500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn, while rinsing.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ISOBUTANE

Synonyms: 1,1-Dimethylethane; Trimethylmethane CAS No: 75-28-5 Molecular Formula: C₄H₁₀ RTK Substance No: 1040 Description: Colorless gas or liquid under pressure with a faint gasoline odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
0 - Health 4 - Fire 0 - Reactivity	FLAMMABLE GAS Stop flow of gas or let fire burn itself out. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE	Isobutane reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETYLENE; NITROGEN OXIDES; and
DOT#: UN 1969 ERG Guide #: 115	Use water spray to disperse gas, keep fire-exposed cylinders cool, and to protect individuals attempting to stop leak.	fire and explosions.
Hazard Class: 2.1 (Flammable gas)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 100 meters (330 feet) Large Spills: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Before entering a confined space where **Isobutane** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

Keep **Isobutane** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: None

NIOSH:	800 ppm,	10-hr TWA
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ACGIH: 1,000 ppm, 8-hr TWA (as Aliphatic hydrocarbon gases)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
	Contact with the liquid can cause frostbite.
Inhalation:	Nose and throat irritation with coughing and wheezing
	Dizziness, irregular heartbeat, convulsions, loss of consciousness, coma and death

I III SIGAL I KOI EKIILO	
Odor Threshold:	Gasoline odor
Flash Point:	-117°F (-83°C)
LEL:	1.8%
UEL:	8.4%
Auto Ignition Temp:	860°F (460°C)
Vapor Density:	2 (air = 1)
Vapor Pressure:	2,611 mm Hg at 77°F (25°C)
Water Solubility:	Slightly soluble
Boiling Point:	11°F (-11.7°C)
Ionization Potential:	10.74 eV
Molecular Weight:	58.1

PHYSICAL PROPERTIES

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene or Rubber
Coveralls:	Clothes designed to prevent freezing of body tissues
Respirator:	>800 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ISOBUTYL ISOBUTYRATE

Synonyms: 2-Methylpropyl Isobutyrate CAS No: 97-85-8 Molecular Formula: $C_8H_{16}O_2$ RTK Substance No: 1047 Description: Colorless clear liquid with a fruity odor

	HAZARD DATA						
Hazard Rating	Firefighting			Reactivity			
0 - Health 3 - Fire 0 - Reactivity DOT#: UN 2528 ERG Guide #: 130 Hazard Class: 3 (Flammable)	Firefighting Isobutyl Isobutyrate is a FLAMMABLE LIQUID and a DANGEROUS FIRE HAZARD. Use alcohol-resistant foam extinguishers in a fire. Water may not be effective in fighting fires or may spread fire. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to equad a fire ar outplacien for from the equation		BLE LIQUID hers in a fire. fires or may CED IN FIRE. IRE. containers tion and flash wel a distance the source	Isobutyl Isobutyrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).			
SPIL	L/LEAKS			PHYSICAL PROPERTIES			
Isolation Distance: Small Spills: 50 meter Large Spills: 300 meter Fire: 800 meters (1/2 Absorb liquids in verm similar material and do This chemical floats or DO NOT let this chemi EXPOS No occupational expos established for Isobut	rs (150 feet) ers (1,000 feet) mile) iculite, dry sand, earth, or a eposit in sealed containers. In water. ical enter the environment. URE LIMITS sure limits have been tyl Isobutyrate.		Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point Molecular We Gloves: Coveralls: Boots: Respirator:	hold:Fruity odor101°F (38°C)0.96%7.59%ity:4.97 (air = 1)sure:10 mm Hg at 68°F (20°C)ovity:0.9 (water = 1)bility:Insolubleht:291° to 304°F (144° to 151°C)ht:-112°F (-81°C)//eight:144.2PROTECTIVE EQUIPMENTSilver Shield®/4H® (>8-hr breakthrough)DuPont Tychem® CPF 3, CPF 4, BR and LV,Responder® and TK, or equivalent, for <i>liquid organics</i> (>8-hr breakthrough)No informationPressure demand supplied air for high exposure			
HEALTH EFFECTS			FIRST AID AND DECONTAMINATIO				
Eyes:IrritationSkin:IrritationInhalation:Headache and dizziness			Remove the Flush eyes w Remove cont Remove cont and water. Transfer to a	e person from exposure. with large amounts of water for at least 15 minutes. ntact lenses if worn. ntaminated clothing and wash contaminated skin with soap a medical facility.			



Common Name: ISOOCTYL ALCOHOL

Synonyms: 6-Methyl-1-Heptanol; Oxooctyl Alcohol CAS No: 26952-21-6 Molecular Formula: $C_8H_{18}O$ RTK Substance No: 1063 Description: Clear, colorless liquid with a faint, pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 0 - Reactivity	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , or alcohol-resistant foam, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Isooctyl Alcohol may react with <i>concentrated</i> SULFURIC ACID; SODIUM PEROXIDE; HYDROGEN PEROXIDE; and OXIDIZING AGENTS (such as PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause explosions.
ERG Guide #: None Hazard Class: None	cool.	Isooctyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); AMINES; ISOCYANATES: and BORANES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Isooctyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Isooctyl Alcohol is toxic to waterfowl.

EXPOSURE LIMITS

NIOSH: 50 ppm,	, 10-hr TWA
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ACGIH: 50 ppm, 8-hr TWA

HEALTH EFFECTS

Eyes:	Irritation and burns		
Skin:	Irritation and burns		
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)		
	Headache, dizziness, lightheadedness confusion, irregular heartbeat and passing out		

PHYSICAL PROPERTIES

Odor Threshold:	0.14 ppm
Flash Point:	180°F (82°C)
LEL:	0.9%
UEL:	5.7%
Auto Ignition Temp:	530°F (277°C)
Vapor Density:	4.5 (air = 1)
Vapor Pressure:	0.4 mm Hg at 68°F (20°C)
Specific Gravity:	0.83 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	365°F (185°C)
Freezing Point:	<-105°F (<-76°C)
Molecular Weight:	130.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Viton, and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® CPF 3, CPF 4, and Responder® (>8-hr breakthrough for <i>Hydroxyl compounds</i>)
Respirator:	>50 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: ISOPENTANE

Synonyms: Ethyldimethylmethane; Isoamyl Hydride; 1,1,2-Trimethylethane CAS No: 78-78-4 Molecular Formula: C_5H_{12} RTK Substance No: 1064

Description: Colorless liquid with an alcohol or gasoline-like odor

	HAZARD DATA					
Hazard Rating	Firefighting		Reactivity			
1 - Health 4 - Fire 0 - Reactivity DOT#: UN 1265 ERG Guide #: 120 Hazard Class: 3 (Flammable)	FLAMMABLE LIQUID Use dry chemical, CO ₂ , alcohol-resi foam extinguishing agents, as wate effective in fighting fires. POISONOUS GASES ARE PRODU CONTAINERS MAY EXPLODE IN F Use water spray to keep fire-expose and to reduce vapors. Vapor is heavier than air and may tr cause a fire or explosion far from th	stant foam or other er may not be ICED IN FIRE. FIRE. ed containers cool ravel a distance to le source.	Isopentane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).			
	Flow or agitation may generate elec	trostatic charges.	PHYSICAL PROPERTIES			
SPILL/LEAKS Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of Isopentane. Keep Isopentane out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Terr Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potenti Molecular Weight	Alcohol or Gasoline-like odor $<-60^{\circ}F(<-51^{\circ}C)$ 1.4% 7.6% np: 788°F (420°C) 2.5 (air = 1) 595 mm Hg at 70°F (21°C) 0.62 (water = 1) Insoluble 82°F (28°C) -256°F (-124°C) ial: 10.2 eV :: 72.2			
EXF	POSURE LIMITS	PI	ROTECTIVE EQUIPMENT			
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 120 ppm, 10-hr TWA; 610 ppm, 15-min Ceiling ACGIH: 600 ppm, 8-hr TWA IDLH: 1,500 ppm The Protective Action Criteria values are: PAC-1 = 610 ppm PAC-3 = 20,000 ppm PAC-2 = 610 ppm		Gloves: Nit bre Coveralls: Tye ON bre Respirator: >12 >6	rile, Silver Shield®/4H®, Viton and Barrier® (>8-hr eakthrough for <i>n-Pentane</i>) chem® F, BR, LV, Responder®, and TK; Zytron® 300; IESuit®TEC; and Trellchem® HPS and VPS (>8-hr eakthrough for <i>Hydrocarbons, aliphatic, saturated</i>) 20 ppm - Supplied air 10 ppm - SCBA			
HEALTH EFFECTS		FIRST	AID AND DECONTAMINATION			
Eyes: Irrita Skin: Irrita Inhalation: Nose coug brea Heae light	tion and burns tion and burns e, throat and lung irritation with hing, wheezing and shortness of th dache, nausea, dizziness, headedness, and passing out	Remove the perso Flush eyes with lat contact lenses if w Quickly remove co large amounts of s Begin artificial resp Transfer promptly	on from exposure. rge amounts of water for at least 15 minutes. Remove yorn. Seek medical attention. ontaminated clothing and wash contaminated skin with soap and water. Seek medical attention. piration if breathing has stopped and CPR if necessary. to a medical facility.			



Common Name: ISOPRENE

Synonyms: beta-Methylbivinyl; 2-Methylbutadiene CAS No: 78-79-5 Molecular Formula: C_5H_8 RTK Substance No: 1069 Description: Colorless, volatile liquid with a mild odor

HAZARD DATA							
Hazard Rat 2 - Health 4 - Fire 2 - Reactivity DOT#: UN 12 ERG Guide #: Hazard Class (Flam	ing 18 : 130P : 3 mable)	HAZARD Firefighting FLAMMABLE AND REACTIVE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		DATA Reactivity Isoprene can easily form EXPLOSIVE PEROXIDES and can polymerize (uncontrolled reaction) with heating or on contact with many materials, resulting in fires, explosions, and container rupture. Isoprene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES), OXYGEN; ALKALI METALS (such as POTASSIUM); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE), AMMONIA; CHLORINATED SOLVENTS; ALCOHOLS, ACID CHLORIDES; ACID ANHYDRIDES; AMINES; ETHERS; and PHENOLS.			
	SPII	_L/LEAKS				PHY	SICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Isoprene out of confined spaces, such as sewers, because of the possibility of an explosion. This substance is harmful to aquatic organisms.			Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potential: Molecular Weight:		a: emp: e: y: y: y: ntial: jht:	0.005 ppm -65°F (-54°C) 2% 9% 428°F (220°C) 2.4 (air = 1) 550 mm Hg at 77°F (25°C) 0.68 (water = 1) Slightly soluble 93°F (34°C) -231°F (-146°C) 8.85+/- 0.02 68.1	
E	XPOS	URE LIMITS			I	PROT	ECTIVE EQUIPMENT
No occupational exposure limits have been established for Isoprene .			Gloves: Covera Respira	ills: [ator: 9	Viton (6.2 DuPont ⁻ and Sain for <i>Hydro</i> Supplied	2-hr breakthrough) Tychem® Responder®; Kappler® Zytron® 500; t-Gobain ONESuit® TEC (>3-hr breakthrough <i>pcarbons, Polyenes</i>) air	
HEALTH EFFECTS				FIRST AID AND DECONTAMINATIO		AND DECONTAMINATION	
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, th coughing Headacl and pas Cancer animals	roat and lung irritation with g and wheezing ne, dizziness, lightheadedness sing out (liver, lung, mammary gland) in	Remove Flush eye contact le Remove and wate Begin art Transfer		e the per yes with lenses i contam ter. artificial re prompt	rson fron large an if worn. hinated c espiratio tly to a n	n exposure. nounts of water for at least 15 minutes. Remove clothing and wash contaminated skin with soap n if breathing has stopped and CPR if necessary. nedical facility.



Common Name: ISOPROPYL ALCOHOL

Synonyms: Isopropanol; Methyl Carbinol; 2-Propanol CAS No: 67-63-0 Molecular Formula: C₃H₈O RTK Substance No: 1076 Description: Colorless liquid with a sharp, musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Isopropyl Alcohol can react with AIR and OXYGEN over time to form unstable <i>peroxides</i> that can explode.
3 - Fire 0 - Reactivity	resistant foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	Isopropyl Alcohol forms explosive mixtures, when heated, with ALUMINUM. Isopropyl Alcohol is not compatible with OXIDIZING AGENTS (such
DOT#: UN 1219 ERG Guide #: 129	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID ANHYDRIDES; ALKALLMETALS (such as LITHUM
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Isopropyl Alcohol may form an ignitable vapor/air mixture in closed tanks or containers.	SODIUM and POTASSIUM); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); ETHYLENE OXIDE; PHOSGENE; CROTONALDEHYDE; and ISOCYANATES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Use nonsparking tools and equipment.

Metal containers involving the transfer of **Isopropyl Alcohol** should be grounded and bonded.

Keep **Isopropyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Isopropyl Alcohol is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 400 ppm, 8-hr TWA

 NIOSH:
 400 ppm, 10-hr TWA; 500 ppm Ceiling

 ACGIH:
 200 ppm, 8-hr TWA; 400 ppm STEL

IDLH: 2,000 ppm

The Protective Action Criteria values are:

PAC-1 = 400 ppm PAC-2 = 2,000 ppm PAC-3 = 12,000 ppm

HEALTH EFFECTS

 Eyes:
 Irritation and burns

 Skin:
 Irritation and burns

 Inhalation:
 Nose and throat irritation with coughing and wheezing

 Headache, dizziness, confusion, loss of coordination, unconsciousness, and death

PHYSICAL PROPERTIES

Odor Threshold:	22 ppm
Flash Point:	53 ° to 57 °F (12 ° to 14 °C) (88% Isopropyl Alcohol)
LEL:	2%
UEL:	12.7%
Auto Ignition Temp:	750 °F (339 °C)
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	33 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Soluble
Boiling Point:	181 °F (83 °C)
Freezing Point:	-127 °F (-88 °C)
Critical Temp:	455 °F (235 °C)
Ionization Potential:	10.1 eV
Molecular Weight:	60.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Neoprene, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard!
Respirator:	>200 ppm - full facepiece APR with <i>Organic Vapor Cartridges</i> >2,000 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: KEROSENE

Synonyms: Fuel Oil #1; Jet Fuel (Aviation Kerosene); Range Oil CAS No: 8008-20-6 Molecular Formula: Varies RTK Substance No: 1091 Description: Colorless to vellowish, oily liquid with a strong odor

	_		IALAND DA		
Hazard Ra	ating	Firefighting		Reactivity	
2 - Health		COMBUSTIBLE		Kerosene is not compatible with OXIDIZING AGENTS	
2 - Fire		extinguishing agents.	i iodili ds	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	у	Water may not be effective in fighting	fires.	CHLORINE, BROMINE and FLUORINE) and NITRIC	
	223	POISONOUS GASES ARE PRODUC	ED IN FIRE.	ACID.	
EBG Guida f	22J #• 179	Use water spray to keep fire-exposed	containers		
	e 2	cool.			
Hazard Clas	s: 3 nmable)	Vapor is heavier than air and may tra to cause a fire or explosion far from t	vel a distance he source.		
(1.101)	initia bio)	Flow or agitation may generate electr	ostatic		
		charges.	or/oir mixturo		
		in closed tanks or containers.			
	SPI	LL/LEAKS		PHYSICAL PROPERTIES	
Isolation Dis	stance:		Odor Threshold	0.1 ppm	
Spill: 50 me	ters (150	feet)	Flash Point:	100° to 162°F (38° to 72°C)	
Fire: 800 me	eters (1/2	mile)		0.7%	
Absorb liquid	e in dry e	and earth or a similar material	Auto Ignition Te	mp: 351° to 624°F (177° to 329°C)	
and place int	to sealed	containers for disposal.	Vapor Density:	4.5 (air = 1)	
Use only non	n-sparking	tools and equipment.	Vapor Pressure:	2 to 5 mm Hg at 68°F (20°C)	
DO NOT was	sh into sev	wer.	Specific Gravity	0.81 to 0.95 (water = 1)	
Kerosene is	dangerou	is to aquatic life at high	Boiling Point:	304° to 574°F (151° to 301°C)	
concentratio	ns.		Freezing Point:	-30°F (-34°C)	
		Molecular Weigh	nt: 170 (approximately)		
E	EXPOS			PROTECTIVE EQUIPMENT	
OSHA: Non	е		Gloves:	Nitrile, Viton, Viton/Butyl, Barrier® (>8-hr breakthrough)	
NIOSH: 100	mg/m ³ , 10	-hr TWA	Coveralls:	DuPont Tychem® F, BR, CSM and TK (>8-hr breakthrough)	
ACGIH: 200	mg/m ³ , 8-h	nr TWA teria values are:		Use turnout gear or flash protection if ignition/fire is the greatest hazard.	
PAC	-1 = 290 m	g/m^3 PAC-2 = 1,100 mg/m ³	Respirator:	>100 mg/m ³ - full-faceniece APR with Organic vapor cartridge	
	PAC	C-3 = 4,100 mg/m ³		>290 mg/m ³ or fire - SCBA	
HEALTH EFFECTS		FIRS	T AID AND DECONTAMINATION		
Eyes:	Irritation		Remove the person from exposure.		
Skin:	Irritation		Flush eyes with large amounts of water for at least 15 minutes. Rem		
Inhalation:	Nose an	d throat irritation with coughing		e contaminated clothing and wash contaminated skin with	
	and whe	ezing	large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessa Transfer promptly to a medical facility.		
	vomiting	ie, uizziness, nausea and , weakness, restlessness.			
	disorient	ation and drowsiness			
	Convuls	ions and coma may follow very			
	nıgn exp	osure	L	July 2016	



Common Name: KETENE

Synonyms: Carbomethene; Ethenone; Keten CAS No: 463-51-4 Molecular Formula: CH₂=CO RTK Substance No: 1092 Description: Colorless gas with a sharp, irritating odor

HAZARD DATA						
Hazard Rating 3 - Health 3 - Fire 1 - Reactivity DOT#: None ERG Guide #: 131 Hazard Class: None	Firefighting FLAMMABLE GAS Ketene can POLYMERIZE resulting in uncontrolled reactions. These reactions may be explosive. Use dry chemical or CO ₂ as extinguishing agents. USE WATER carefully as Ketene reacts with WATER. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Ketene may form an ignitable vapor/air mixture in	ReactivityKetene can readily polymerize and may react violently with many ORGANIC COMPOUNDS.Ketene reacts with WATER to form Acetic Acid and decomposes in ALCOHOLS and AMMONIA.Ketene reacts with HYDROGEN PEROXIDE to form explosive Diacetyl Peroxide.Ketene can not be stored or shipped.				

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of **Ketene** should be grounded and bonded.

Keep **Ketene** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: 0.5 ppm, 8-hr TWA

- NIOSH: 0.5 ppm, 10-hr TWA; 1.5 ppm, 15-min STEL
- ACGIH: 0.5 ppm, 8-hr TWA; 1.5 ppm, 15-min STEL

IDLH: 5 ppm

The Protective Action Criteria values are:

PAC-1 = 0.0057ppm; PAC-2 = 0.063 ppm; PAC-3 = 0.2 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose, throat and lung irritation, with
coughing, and severe shortness of
breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Density:
Vapor Pressure:
Water Solubility:
Boiling Point:
Freezing Point:
Ionization Potential:
Molecular Weight:

Sharp, penetrating odor Flammable Gas 1.45 (air = 1) 1.04 x 10⁴ mm Hg at 77°F (25°C) Reacts -69°F (-56°C) -238°F (-150°C) 9.61 eV 42

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard!
Respirator:	>0.5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: LEAD

Synonym: Metallic Lead CAS No: 7439-92-1 Molecular Formula: Pb₂ RTK Substance No: 1096 Description: Heavy, soft, silvery-gray metal

HAZARD DATA						
Hazard Rating	Firefighting Extinguish fire using an agent suit	able	e for type of Lead reacts violently with HYDROGEN PEROXIDE			
 4 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance) 	surrounding fire. Lead itself doe POISONOUS FUMES ARE PROI including <i>Lead Oxides</i> . Use water spray to keep fire-expo cool.	s no	I containers	AMMONIUM NITRATE; ZIRCONIUM; SODIUM AZIDE; SODIUM ACETYLIDE; and CHLORINE TRIFLUORIDE. Lead is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).		
SPI	LL/LEAKS			PHYSICAL PROPERTIES		
Isolation Distance: 10 to 25 meters (30 to 80 feet) Use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. DO NOT wash into sewer.			Odor Thresh Flash Point: LEL: UEL: Specific Gra Vapor Press Water Solub Boiling Poin Melting Poin	No odor Not combustible N/A N/A vity: 11.35 at 68°F (20°C) ure: 0 mm Hg at 68°F (20°C) ility: Insoluble t: 3,164°F (1,740°C) t: 621.5°F (327.5°C)		
EXPO	SURE LIMITS		F	PROTECTIVE EQUIPMENT		
OSHA: 0.05 mg NIOSH: 0.05 mg ACGIH: 0.05 mg IDLH LEVEL: 100 mg/ PAC LEVELs: PAC-1 =	/m ³ , 8-hr TWA /m ³ , 10-hr TWA /m ³ , 8-hr TWA m ³ : 0.15 mg/m ³ ; PAC-2 = 120 mg/m ³ ; PAC-3 = 700 mg/m ³	r /	Gloves: Coveralls: Boots: Respirator:	Nitrile, Latex, Rubber DuPont <i>Tyvek</i> ® Latex, Butyl, Neoprene ≤0.5 mg/m ³ - N100 ≤2.5 mg/m ³ - full facepiece APR with High Efficiency filters ≤50 mg/m ³ - full facepiece powered APR with High Efficiency filters ≤100 mg/m ³ – Pressure-demand supplied-air >100 mg/m ³ – Pressure-demand SCBA		
HEAL	TH EFFECTS		FIRST	AID AND DECONTAMINATION		
Eyes:IrritationSkin:No InformaAcute:Headache, weaknessChronic:Lead may or kidney car Metallic tas Damage to	tion irritability, upset stomach, and cause lung, brain, stomach, and icer in humans. te, colic, muscle cramps the nervous system		Remove the Flush eyes w Remove con soap and wa Transfer to a	person from exposure. with large amounts of water for at least 15 minutes. ttact lenses if worn. taminated clothing and wash contaminated skin with tter. medical facility.		



Right to Know Hazardous Substance Fact Sheet

Common Name: LEAD ACETATE

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Synonyms: Dibasic Lead Acetate; Lead Diacetate; Salt of Saturn; Sugar of Lead CAS No: 301-04-2Molecular Formula: C₄H₆O₄Pb RTK Substance No: 1097 Description: White to gray-colored flakes, crystalline powder or solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for	Reacts violently with BROMATES; PHOSPHATES;
0 - Fire	type of surrounding fire. Lead Acetate itself does not burn.	CARBONATES; and PHENOLS.
0 - Reactivity DOT#: UN 1616	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Acetic</i> <i>Acid</i> .	HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as
ERG Guide #: 151	Use water spray to keep fire-exposed	SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);
Hazard Class: 6.1 (Poison)		HYDRATE; SULFIDES; SALICYLIC ACID; TANNIN; CITRATES; EPICHLOROHYDRIN; SULFITES; RESORCINOL; and TARTRATES.

Keep away from COMBUSTIBLES.

	SPILL/LEARS	Pn	IT SICAL PROPERTIES
Isolation I Moisten sp vacuum for Toxic to aq Hazardous environmer DO NOT w	Distance: 25 to 50 meters (80 to 160 feet) illed material first or use a HEPA-filter r clean-up. juatic organisms. to the environment and persists in the nt. ash into sewer.	Odor Threshold: Flash Point: LEL: UEL: Relative Density: Water Solubility: pH: Melting Point:	Odor of Acetic Acid Not combustible N/A N/A 3.3 (water = 1) Soluble 5.5 - 6.5 $167^{\circ}F (75^{\circ}C)$
	EXPOSURE LIMITS	PRC	TECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH: IDLH LEVI PAC LEVELS:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>) 0.05 mg/m ³ , 10-hr TWA (as <i>Lead</i>) 0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>) EL: 100 mg/m ³ (as <i>Lead</i>) PAC-1 = 5 mg/m ³ ; PAC-2 = 55 mg/m ³ ; PAC-3 = 330 mg/m ³	Gloves:NitrileCoveralls:DuPoBoots:LatexRespirator:≤0.5 m≤2.5 mfilters≤50 mEffici≤100>100	e, Latex, Rubber nt <i>Tyvek</i> ® , Butyl, Neoprene mg/m ³ - N100 mg/m ³ - full facepiece APR with High Efficiency s ng/m ³ - full facepiece powered APR with High iency filters mg/m ³ – Pressure-demand supplied-air mg/m ³ – Pressure-demand SCBA
	HEALTH EFFECTS	FIRST AI	D AND DECONTAMINATION
Eyes: Skin: Acute: Chronic:	Irritation No Information Headache, irritability, upset stomach, and weakness Cancer - Inorganic <i>Lead</i> compounds may cause lung, brain, stomach, and kidney cancer in humans. Other effects may include: metallic taste, colic, weight loss, muscle cramps and	Remove the person f Flush eyes with large contact lenses if wor Remove contaminate Transfer to a medica	rom exposure. e amounts of water for at least 15 minutes. Remove n. ed clothing and wash contaminated skin with water. I facility.



Common Name: LEAD ARSENATE

Synonyms: Acid Lead Arsenate CAS No: 7784-40-9 Molecular Formula: PbHAsO₄ RTK Substance No: 1098 Description: Odorless, heavy white powder

HAZARD DATA							
Hazard R	ating	Firefighting			Reactivity		
4 - Health 0 - Fire 0 - Reactive DOT#: UN ERG Guide Hazard Cla	ity 1617 e #: 151 ass: 6.1	 Extinguish fire using an agent suitable for type surrounding fire. Lead Arsenate itself does n burn. POISONOUS GASES ARE PRODUCED IN FIRE including <i>Lead Oxides</i> and <i>Arsenic Oxides</i>. Use water spray to keep fire-exposed contained 		e for type of elf does not CED IN senic	Lead Arsenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BROMINE AZIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ALKALI; and SULFIDES. Inorganic Arsenic can react with HYDROGEN to release highly toxic Arsine gas.		
	(Poison)	COOI.			Keep water solutions containing <i>Arsenic compounds</i> away from ACTIVE METALS (such as IRON, ALUMINUM, and ZINC) as highly toxic <i>Arsenic compounds</i> such as <i>Arsine</i> <i>gas</i> may be released.		
	SPI	LL/LEAKS			PHYSICAL PROPERTIES		
 Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Lead Arsenate is a marine pollutant and is harmful to aquatic organisms. DO NOT wash into sewer 			Odor Thres Flash Point: Vapor Dens Water Solut Melting Poin	hold:OdorlessNon-combustibleity:5.79 (water =1)bility:Insolubleht:536°F (280°C) (decomposes)			
EXPOSURE LIMITS				PROTECTIVE EQUIPMENT			
OSHA: NIOSH:	0.01 r 0.002 <i>Arse</i>	mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) . mg/m ³ , 15 minutes (as <i>nic</i>)		Gloves: Coveralls:	Nitrile, Latex, Rubber DuPont Tyvek® and Tychem®, Polycoat; QC, CPF-1, SL and CPF-2		
ACGIH: IDLH LEVE PAC LEVELS:	0.01 i E: 5 mg/ PAC-	mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) /m ³ (as <i>Arsenic</i>) 1 = 7 mg/m ³ ; PAC-2 = 77 mg/m ³ ; PAC-3 = 460 mg/m ³		Boots: Respirator:	Butyl, Neoprene >0.002 mg/m ³ - APR with High Efficiency filters ≥0.1 mg/m ³ - PAPR with High Efficiency filters or Pressure-demand supplied-air >5 mg/m ³ - Pressure-demand SCBA		
	HEAL	TH EFFECTS		FIR	ST AID AND DECONTAMINATION		
Eyes: Skin: Acute: Chronic:	Irritation a Irritation a Nose and Headache weaknes Inorganic lung, bra humans. Inorganic and lung Metallic ta Damage t	nd burns nd burns throat irritation e, irritability, upset stomach, and s <i>Lead</i> compounds may cause in, stomach, and kidney cancer in <i>Arsenic compounds</i> cause skin cancer in humans. ste, colic, muscle cramps o the nervous system		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 			
					luno 2017		



Common Name: LEAD ARSENITE

Synonyms: Lead Metaarsenite CAS No: 10031-13-7 Molecular Formula: As₂O₄Pb RTK Substance No: 1099 Description: White powder

Hazard Rating	Firefighting		Reactivity			
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1618 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	 Extinguish fire using an agent suitabl surrounding fire. Lead Arsenite itse burn. POISONOUS FUMES ARE PRODUC FIRE, including Lead Oxides and Arc Oxides. Use water spray to keep fire-exposed cool. 	e for type of olf does not CED IN s <i>enic</i> d containers	Lead Arsenite will react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Lead Arsenite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Inorganic Arsenic can react with HYDROGEN to release highly toxic Arsine gas. Keep water solutions containing Arsenic compounds away from ACTIVE METALS (such as IRON, ALUMINUM, and ZINC) as highly toxic Arsenic compounds Such as Arsine gas may be released.			
SP	ILL/LEAKS		PHYSICAL PROPERTIES			
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. DO NOT work into accurr		Odor Thr Flash Poi LEL: UEL: Relative I Water So	eshold: Odorless int: Non-combustible N/A N/A Density: 5.85 (water = 1) Iubility: Insoluble			
			PROTECTIVE EQUIPMENT			
OSHA: 0.01 NIOSH: 0.002 ACGIH: 0.01 IDLH LEVEL: 5 mg, PAC LEVELS: PAC-	mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) 2 mg/m ³ , 15 minutes (as <i>Arsenic</i>) mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) /m ³ (as <i>Arsenic</i>) 1 = 4.2 mg/m ³ ; PAC-2 = 47 mg/m ³ ; PAC-3 = 280 mg/m ³	Gloves: Coveralls Boots: Respirato	Nitrile, Latex, Rubber DuPont Tyvek®, Tychem® Polycoat, QC, CPF-1, SL and CPF-2 Butyl, Neoprene pr: >0.002 mg/m ³ - APR with High Efficiency filters >0.1 mg/m ³ - PAPR with High Efficiency filters or Pressure-demand supplied-air >5 mg/m ³ - Pressure-demand SCBA			
HEAI	TH EFFECTS	FI	RST AID AND DECONTAMINATION			
Eyes: Irritation a Skin: Irritation a Acute: Nose and Headache weaknes Chronic: Inorganic brain, sto humans. Inorganic lung can Metallic ta Damage t	and burns and burns throat irritation e, irritability, upset stomach, and ss <i>Lead</i> compounds may cause lung, omach, and kidney cancer in <i>Arsenic compounds</i> cause skin and cer in humans. aste, colic, and muscle cramps. to the nervous system.	Remove f Flush ey Remove Remove water. Transfer	the person from exposure. es with large amounts of water for at least 15 minutes. contact lenses if worn. contaminated clothing and wash contaminated skin with to a medical facility.			



Common Name: LEAD CHLORIDE

Synonyms: Lead (II) Chloride; Lead Dichloride CAS No: 7758-95-4 Molecular Formula: PbCl₂ RTK Substance No: 1101 Description: White crystalline powder

HAZARD DATA					
Hazard Rating	Firefighting		Reactiv	vity	
3 - Health 0 - Fire 0 - Reactivity	Extinguish fire using an agent suitabl type of surrounding fire. Lead Chlor itself does not burn. POISONOUS GASES ARE PRODUC FIRE, including <i>Lead Oxides</i> and <i>Hyp</i> <i>Chloride</i> .	agent suitable for Lead Chloride RE PRODUCED IN <i>kides</i> and <i>Hydrogen</i> PLODE IN FIRE. fire-exposed		Dr AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLO BROMINE and FLUORINE); and STRONG ACIDS (suc HYDROCHLORIC, SULFURIC and NITRIC).	
ERG Guide #: 151 Hazard Class: 6.1 (Poison)	CONTAINERS MAY EXPLODE IN FI Use water spray to keep fire-exposed containers cool.				
S	PILL/LEAKS				PHYSICAL PROPERTIES
SPILL/LEAKSIsolation Distance: 25 to 50 meters (80 to 160 feet)Moisten spilled material first or use a HEPA-filter vacuum for clean-up.Toxic to aquatic organisms.Hazardous to the environment and persists in the environment.DO NOT wash into sewer. EXPOSURE LIMITS OSHA:0.05 mg/m³, 8-hr TWA (as Lead)NIOSH:0.05 mg/m³, 10-hr TWA (as Lead)ACGIH:0.05 mg/m³, 8-hr TWA (as Lead)IDLH LEVEL:100 mg/m³ (as Lead)EVELS:PAC-1 = 0.2 mg/m³; PAC-2 = 160 mg/m³; PAC-3 = 940 mg/m³PAC-1 = 1.8 ppm; PAC-2 = 22 ppm; PAC-3 = 100 ppm (as Hydrogen Chloride)		Odo Flas Vapo Wate Boili Melt Spec	Odor Threshold:OdorlessFlash Point:Not combustibleVapor Density:9.6 (air = 1)Vapor Pressure:1 mm Hg at 1,017°F (547°C)Water Solubility:Slightly solubleBoiling Point:1,742°F (950°C)Melting Point:934°F (501°C)Specific Gravity:5.85 (water = 1)PROTECTIVE EQUIPMENTGloves:Butyl, Neoprene and Viton (>8-hr breakthrough)Coveralls:DuPont Tychem® BR, Responder® and TK; ONESuit®TEC; Trellchem® HPS and VPS (>8-hr breakthrough)Boots:Butyl, NeopreneRespirator: $\leq 0.5 \text{ mg/m}^3 - N100$ (as Lead) $\leq 2.5 \text{ mg/m}^3$ (as Lead) or >2 ppm but ≤ 50 ppm (as Hydrogen Chloride)- full facepiece APR with High Efficiency prefilters and Acid gas cartridges $\leq 50 \text{ mg/m}^3$ (as Lead) - Pressure-demand supplied-air >100 mg/m³ (as Lead) or >50 ppm (as Hydrogen Chloride)- Reserver demand supplied-air $>100 \text{ mg/m}^3$ (as Lead) or >50 ppm (as Hydrogen Chloride)- Reserver demand supplied-air $>100 \text{ mg/m}^3$ (as Lead) or >50 ppm (as Hydrogen Chloride)- Reserver demand supplied-air		
HE	ALTH EFFECTS			FIRS	T AID AND DECONTAMINATION
Eyes: Irritation Skin: No Inform Acute: Headach weakn Chronic: Inorganie brain, s Metallic Damage	nation e, irritability, upset stomach, and ess : <i>Lead</i> compounds may cause lung, tomach and kidney cancer in humans. aste, colic, muscle cramps to the nervous system		Rem Flus con Rem Tran	nove the p sh eyes wi tact lense nove conta nsfer to a n	berson from exposure. ith large amounts of water for at least 15 minutes. Remove is if worn. aminated clothing and wash contaminated skin with water. medical facility.



Common Name: LEAD CHROMATE

Synonyms: Chrome Yellow; Paris Yellow; Chrome Green CAS No: 7758-97-6 Molecular Formula: PbCrO₄ RTK Substance No: 1102 Description: Odorless, vellow to orange, sand-like powder.

Descripti	on: Odor	less, yellow to orange, sand-like	p p	owder.		
	HAZARD DATA					
Hazard F	rd Rating Firefighting				Reactivity	
4 - Health 0 - Fire 1 - Reactiv	/ity	 Extinguish fire using an agent suitable for type of surrounding fire. Lead Chromate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides and Chromium Oxides. 		or type of does not D IN FIRE, Dxides.	Lead Chromate reacts violently with AZO DYES, FERRIC FERROCYANIDE and DINITRONAPHTHALENE. Lead Chromate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
DOT#: UN ERG Guide Hazard Cla	N 3288 e #: 151 ass: 6.1 (Toxic)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Lead Chromate may ignite combustibles (wood, paper and oil).			CHLORINE, BROMINE and FLUORINE); HYDRAZINE; SULFUR; TANTALUM; STRONG REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM, and their HYDRIDES); COMBUSTIBLES; and ORGANIC MATERIALS.	
	SF	PILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. DO NOT wash into sewer			Odor Threshold:OdorlessFlash Point:NoncombustibleVapor Pressure:No InformationSpecific Gravity:6.3Water Solubility:InsolubleMelting Point:1,551°F (844°C)			
EXPOSURE LIMITS			Р	ROTECTIVE EQUIPMENT		
OSHA: 0.005 mg/m^3 , 8-hr TWA (as Chromium)NIOSH: 0.0002 mg/m^3 , 8-hr TWA (as Chromium)ACGIH: 0.01 mg/m^3 , 8-hr TWA (as Chromium)IDLH LEVEL: 15 mg/m^3 (as Chromium)PACLEVELS:PAC-1 = 0.036 mg/m^3 ; PAC-2 = 16 mg/m^3 ;			Gloves: Ru Coveralls: Du Boots: Bu Respirator: >0 effi >0	bber IPont Tyvek® tyl, Neoprene .0002 mg/m ³ - full facepiece powered APR with High iciency filters or pressure-demand supplied-air .01 mg/m ³ - Pressure-demand SCBA		
	HEA	LTH EFFECTS		FIRST	AID AND DECONTAMINATION	
Eyes: Skin:	Irritation a Irritation. blisters ar	nd burns Prolonged contact may cause nd deep ulcers		Remove the per Flush eyes wit Remove contact	rson from exposure. h large amounts of water for at least 15 minutes. t lenses if worn.	
Acute:	Headache weakness	e, irritability, upset stomach, and	Remove contaminated clothing and wash contaminated skin with so and water.			
	cause lun shown to animals. <i>Inorganic</i> brain, stor Metallic ta Damage t allergy	<i>Lead compounds</i> may cause lung, mach and kidney cancer in humans. aste, colic and muscle cramps o the nervous system, and skin		Transfer to a mo	edical facility.	



Common Name: LEAD CYANIDE

Synonyms: Pigment Yellow CAS No: 592-05-2 Molecular Formula: Pb(CN)₂ RTK Substance No: 1103 Description: White to vellowish powder

HAZARD DATA						
Hazard Pating	Firefighting			Poactivity		
Hazard Rating3 - Health0 - Fire0 - ReactivityDOT#: UN 1620ERG Guide #: 151Hazard Class: 6.1(Poison)	 Firefignting Extinguish fire using an agent suitable surrounding fire. Lead Cyanide itse POISONOUS GASES ARE PRODUC including Lead Oxides, Cyanides and Oxides. Use water spray to keep fire-exposed cool. DO NOT USE WATER SPRAY itself. 	for t f doe ED II I Nitr conta on r	ype of es not burn. N FIRE, <i>rogen</i> ainers material	Lead Cyanide reacts violently with MAGNESIUM. Lead Cyanide is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and WATER to form toxic and flammable <i>Hydrogen Cyanide gas</i> . Lead Cyanide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). METAL CHLORATES: and METALS.		
S	PILL/LEAKS		P	PHYSICAL PROPERTIES		
Isolation Distance: Moisten spilled mate vacuum for clean-up Toxic to aquatic orga Hazardous to the env environment. DO NOT wash into s	25 to 50 meters (80 to 160 feet) rial first or use a HEPA-filter o. nisms. vironment and persists in the ewer.		Odor Threshold Flash Point: LEL: UEL: Vapor Density: Vapor Pressure Water Solubility Boiling Point:	I: No information Non-combustible N/A N/A No information I: No information I: Slightly soluble No information		
EXPOSURE LIMITS		ſ	PF	ROTECTIVE EQUIPMENT		
OSHA: 0.05 5 m NIOSH: 0.05 5 m ACGIH: 0.05 5 m IDLH LEVEL: 100 25 r PAC LEVELS: PAC- PAC	5 mg/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ , 8-hr TWA (as <i>Cyanide</i>) 5 mg/m ³ , 10-hr TWA (as <i>Lead</i>) g/m ³ , 10-min STEL (as <i>Cyanide</i>) 5 mg/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ , TLV-Ceiling (as <i>Cyanide</i>) mg/m ³ (as <i>Lead</i>) ng/m ³ (as <i>Lead</i>) ng/m ³ (as <i>Cyanide</i>) 1 = 0.15 mg/m3; PAC-2 = 120 mg/m ³ ; PAC-3 = 700 mg/m ³ (as <i>Lead</i>) 1 = 6 mg/m3; PAC-2 = 8.3 mg/m ³ ; PAC-3 = 50 mg/m ³ (as <i>Cyanide</i>)		Gloves: Ni Coveralls: Di CI CI Boots: Bi Respirator: ≤0 ≤2 Ef ≤50 Hi ≤10 CI C1 CI	trile, Latex, Rubber uPont Tyvek®, DuPont Tychem® Polycoat, QC, PF-1, SL and CPF-2 utyl, Neoprene 5 mg/m ³ - N100 (as <i>Lead</i>) 5 mg/m ³ (as <i>Lead</i>) - full facepiece APR with High ficiency filters 0 mg/m ³ (as <i>Lead</i>) - full facepiece powered APR with hgh Efficiency filters 00 mg/m ³ (as <i>Lead</i>) or >5 but <25 mg/m ³ (as yanide) – Pressure-demand supplied-air 00 mg/m ³ (as <i>Lead</i>) or >25 mg/m ³ (as <i>Cyanide</i>) – Pressure-demand SCBA		
HEA	ALTH EFFECTS		FIRST A	AID AND DECONTAMINATION		
Eyes:No InforSkin:No InforAcute:Headachweaknecause IChronic:Inorganibrain, sMetallicDamage	mation mation he, irritability, and upset stomach, and ess. High exposure to <i>Cyanide</i> can DEATH, sometimes without warning c Lead compounds may cause lung, tomach, and kidney cancer in humans. taste, colic, muscle cramps a to the nervous system		Remove the pers Flush eyes with Remove contact Remove contant soap and water. Begin artificial necessary. Transfer to a me Use US e Cyanokit if symp <i>Amyl Nitrite</i> with	son from exposure. In large amounts of water for at least 15 minutes. Ienses if worn. Ininated clothing and wash contaminated skin with respiration if breathing has stopped and CPR if edical facility. EDA approved standard cyanide antidotal kit or ptoms of cyanide poisoning develop. Do NOT use smoke inhalation exposures.		



Common Name: LEAD DIOXIDE

Synonyms: Lead Brown; Lead Peroxide CAS No: 1309-60-0 Molecular Formula: PbO₂ RTK Substance No: 1104 Description: Odorless, brown crystals or powder

HAZARD DATA						
Hazard Rating	Firefighting	Reactivity				
3 - Health	Lead Dioxide itself does not burn.	Lead Dioxide is a STRONG OXIDIZER which may react				
0 - Fire Flood fire with water. DO NOT USE CO ₂ , dry chemicals or halogenated extinguishing agents. 1 - Reactivity DOISONOUS FUMES ARE PROPUSED IN	Flood fire with water. DO NOT USE CO2, dry	with ORGANICS, COMBUSTIBLES or REDUCING				
	AGENTS to produce enough heat to cause a file.					
DOT#: UN 1872	FIRE, including Lead Oxides.	METALS; METAL CARBIDES; SULFUR COMPOUNDS;				
ERG Guide #: 141	: 141 CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM; SODIUM; PHOSPHORUS; MAGNESIUM;				
Hazard Class: 5.1	Use water spray to keep fire-exposed containers	ACETYLIDE; HYDROXYLAMINE; HYDROGEN				
(Oxidizer)	cool.	PEROXIDE; HALOGENS; STRONG ACIDS (such as HYDROCHLORIC, SUILEURIC and NITRIC); and AMINES				

SPILL/LEAKS	PI	HYSICAL PROPE
Isolation Distance: 10 to 25 meters (30 to 80 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. DO NOT wash into sewer.	Odor Threshold: Flash Point: Relative Density: Water Solubility: Vapor Density: Melting Point:	Odorless Noncombustible 9.38 g/cm ³ Insoluble 8.2 (air = 1) Decomposes at 5

Clay

EXPOSURE LIMITS

OSHA: 0.05 mg/m^3 , 8-hr TWA (as *Lead*) NIOSH: 0.05 mg/m^3 , 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) ACGIH: IDLH 100 mg/m³ (as Lead) LEVEL: PAC **LEVELS:** PAC-1 = 0.17 mg/m³; PAC-2 = 140 mg/m³; PAC-3 = 810 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach, and kidney cancer in humans. Metallic taste, colic and muscle cramps. Damage to the nervous system.

RTIES

Point	t:	Noncombustible
ive De	ensity:	9.38 g/cm ³
r Solu	bility:	Insoluble
r Dens	sity:	8.2 (air = 1)
ng Poi	int:	Decomposes at 554°F (290°C)
	PRO	TECTIVE EQUIPMENT
es:	Nitrile, La	atex, Rubber

Giuves.	Nillie, Lalex, Rubbei		
Coveralls:	DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2		
Boots:	Butyl, Neoprene		
Respirator:	<u><</u> 0.5 mg/m ³ - N100		
	<u><2.5 mg/m³ - full facepiece APR with High Efficiency filters</u>		
	<50 mg/m ³ - full facepiece powered APR with High		
	Efficiency filters		
	<100 mg/m ³ – Pressure-demand supplied-air		
	>100 mg/m ³ – Pressure-demand SCBA		

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: LEAD FLUOBORATE

Synonyms: Lead Boron Fluoride CAS No: 13814-96-5 Molecular Formula: Pb(BF₄)₂ RTK Substance No: 1105 Description: A crystalline powder mostly used in a water solution

Description. A crystalline powder mostly used in a water solution						
HAZARD DATA						
Hazard	Rating	Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reacti DOT#: UI ERG Guid Hazard Cl (Poison)	vity N 2291 le #: 151 lass: 6.1	Use dry chemical, CO ₂ or foam as agents. Lead Fluoborate itself d burn. DO NOT USE water stream direct itself. POISONOUS GASES ARE PROE including Lead Oxides, Boron Ox Hydrogen Fluoride. CONTAINERS MAY EXPLODE IN Use water spray to keep fire-expo cool.	extinguishing loes not ly on material DUCED IN FIRE, <i>kides, Fluorine</i> and N FIRE sed containers		Liquid solutions of Lead Fluoborate, in contact with METALS, may generate explosive <i>Hydrogen gas</i> . Lead Fluoborate is not compatible with CYANIDES; CALCIUM CARBIDE; WATER-REACTIVE MATERIALS; SULFITES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
	SP	ILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Moisten pervacuum fe For liquid Neutralize Mop or pu Toxic to ac Hazardous environm	Distance: owdered ma or clean-up. spills, conta with an alk mp into a co quatic organ s to the env ent.	25 to 50 meters (80 to 160 feet) aterial first or use a HEPA-filter in spill with earth, sand, etc. ali such as <i>Sodium Carbonate</i> . ontainer. Keep out of sewers. hisms. ironment and persists in the		Odor Threshol Flash Point: Specific Gravit Boiling Point: Water Solubilit Melting Point: pH:	 d: Relatively no odor Noncombustible y: 1.70 – 1.75 (liquid) >212°F (100°C) (liquid) xy: Soluble Less than <-32°F (0°C) Acidic (0 to 0.5) (liquid) 	
EXPOSURE LIMITS				PROTECTIVE EQUIPMENT		
OSHA: NIOSH: ACGIH: IDLH LEVEL: PAC LEVELS:	0.05 mg/m 0.05 mg/m 0.05 mg/m 0.5 ppm, 8 100 mg/m 30 ppm (as PAC-1 = 0 PAC-1 = 1	 ³, 8-hr TWA (as <i>Lead</i>) ³, 10-hr TWA (as <i>Lead</i>) ³, 8-hr TWA (as <i>Lead</i>) ³, 8-hr TWA (as <i>Hydrogen Fluoride</i>) ³ (as <i>Lead</i>) ³ (as <i>Lead</i>) ³ Hydrogen Fluoride) 0.28 mg/m³; PAC-2 = 220 mg/m³; PAC-3 = 1,300 mg/m³ ppm: PAC-2 = 24 ppm: 		Gloves: La Coveralls: Du Boots: Ne Respirator: ≤0 ≤1 fi ≤5 fi 6 Coverable	minate, Nitrile or Natural Rubber µPont Tyvek® (solid) and Tychem® Responder® and TK or RF for <i>Hydrogen Fluoride</i> (HF) eoprene 0.5 mg/m ³ - N100 (as <i>Lead</i>) 2.5 mg/m ³ (as <i>Lead</i>) - full facepiece APR with High Efficiency liters 60 mg/m ³ (as <i>Lead</i>) or >0.5 ppm but ≤ 30 ppm (as HF) - full acepiece powered APR with High Efficiency prefilters and cartridge specific for HF	
	PAC-3 = 4	4 ppm (as Hydrogen Fluoride)		<u><</u> 1 >1	00 mg/m° (as <i>Lead</i>) – Pressure-demand supplied-air 00 mg/m ³ (as <i>Lead</i>) or >30 ppm (as HF) – Pressure-demand SCBA	
	HEAL	TH EFFECTS		FIRS	T AID AND DECONTAMINATION	
Eyes: Skin: Acute: Chronic:	Irritation, Irritation, Headach weakne Inorganic lung, bra in huma Metallic t Damage	burns burns e, irritability, upset stomach and ss <i>c Lead compounds</i> may cause ain, stomach and kidney cancer ns. aste, colic, muscle cramps to the nervous system		Remove the pe Flush eyes with contact lenses Remove contar Begin artificial Transfer to a m	rson from exposure. h large amounts of water for at least 15 minutes. Remove if worn. ninated clothing and wash contaminated skin with water. respiration if breathing has stopped and CPR if necessary. hedical facility.	



Common Name: LEAD FLUORIDE

Synonyms: Lead Difluoride CAS No: 7783-46-2 Molecular Formula: PbF₂ RTK Substance No: 1106 Description: Odorless white powder or a beige or gray crystalline solid

	НА	RD DAT	Α	
Hazard Rating 3 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 15 Hazard Class: 9 (Miscellaneous Hazardous Materi	ating Firefighting Use dry chemical, CO2, alcohol-resistant for water spray as extinguishing agents. Lear Fluoride itself does not burn. ity POISONOUS FUMES ARE PRODUCED I FIRE, including Hydrogen Fluoride and Let Oxides. #: 154 CONTAINERS MAY EXPLODE IN FIRE. ss: 9 Use water spray to keep fire-exposed cont cool. DO NOT get water inside containers.		ad P ad C ad C bad C bad C bad C c c tainers C c	eactivity and Fluoride is not compatible with OXIDIZING AGENTS such as PERCHLORATES, PEROXIDES, ERMANGANATES, CHLORATES, NITRATES, HLORINE, BROMINE and FLUORINE); STRONG ACIDS such as HYDROCHLORIC, SULFURIC and NITRIC); OTASSIUM; and CALCIUM CARBIDE. ontact with METALS may produce flammable and xplosive <i>Hydrogen gas</i> .
	SPILL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance Moisten spilled ma vacuum for clean Toxic to aquatic o Hazardous to the environment. DO NOT wash inte OSHA: 0.0 NIOSH: 0.0 ACGIH: 0.1 30 PAC LEVELS: PA	 ate: 25 to 50 meters (80 to 160 feet) aterial first or use a HEPA-filter -up. rganisms. environment and persists in the o sewer. KPOSURE LIMITS 05 mg/m³, 8-hr TWA (as <i>Lead</i>) 00 mg/m³ (as <i>Lead</i>		Odor Thres Flash Point Density: Boiling Poin Water Solul Melting Poin Gloves: Coveralls: Boots: Respirator:	hold: Odorless : Non-combustible 8.45 g/cm ³ ht: 2,359°F (1,293°C) bility: Slightly soluble nt: 1,515°F (824°C) PROTECTIVE EQUIPMENT Laminate, Nitrile or Natural Rubber DuPont Tyvek® (solid) and Tychem® Responder® and TK or RF for <i>Hydrogen Fluoride</i> (HF) Neoprene ≤0.5 mg/m ³ - N100 (as <i>Lead</i>) ≤2.5 mg/m ³ (as <i>Lead</i>) - full facepiece APR with High Efficiency filters ≤50 mg/m ³ (as <i>Lead</i>) or >0.5 ppm but ≤ 30 ppm (as HF) - full facepiece powered APR with High Efficiency prefilters and cartridge specific for HF <100 mg/m ³ (as <i>L eac</i>) - Pressure-demand supplied-air
P/	AC-3 = 44 ppm (as <i>Hydrogen Fluoride</i>)			<100 mg/m ³ (as <i>Lead</i>) – Pressure-demand supplied-air >100 mg/m ³ (as <i>Lead</i>) or >30 ppm (as HF) – Pressure-demand SCBA
HEALTH EFFECTS			FIRS	T AID AND DECONTAMINATION
Eyes: Irritat Skin: Irritat Acute: Head Wea Chronic: Inorg bra hur Metal Dama	ion and burns ion and burns lache, irritability, upset stomach, and akness <i>anic Lead</i> compounds may cause lung, in, stomach and kidney cancer in mans. Ilic taste, colic, and muscle cramps age to the nervous system	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minures. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin soap and water. Transfer to a medical facility. 		e person from exposure. with large amounts of water for at least 15 minutes. ntact lenses if worn. untaminated clothing and wash contaminated skin with rater. a medical facility.



Common Name: LEAD IODIDE

Synonyms: Lead II Iodide CAS No: 10101-63-0 Molecular Formula: PbI₂ RTK Substance No: 1107 Description: Bright yellow powder

	НА	ZARD	DATA	
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Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT ID #: UN 3077 ERG Guide #: 171	Use dry chemical, CO ₂ or water spray as extinguishing agents. Lead lodide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool.	Lead Iodide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
Hazard Class: 9		
(Environmentally		
Hazardous Material)		

SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)
NIOSH:	0.05 mg/m ³ , 10-hr TWA (as <i>Lead</i>)
ACGIH:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)
IDLH LEVEL:	100 mg/m ³ (as <i>Lead</i>)
PAC LEVELs:	PAC-1 = 0.33 mg/m ³ ; PAC-2 = 270 mg/m ³ ;
	PAC-3 = 1,600 mg/m ³

PHYSICAL PROPERTIES

Odor Threshold: Odorless Flash Point: Not combustible LEL: N/A UEL: N/A Specific Gravity: 6.16 (water = 1) Vapor Pressure: No information Water Solubility: Very slightly soluble in boiling water Melting Point: 756°F (402°C)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Latex, Rubber			
Coverall:	DuPont <i>Tyvek</i> ®			
Boot:	Latex, Butyl, Neoprene			
Respirator:	<u><</u> 0.5 mg/m ³ - N100 (as <i>Lead</i>)			
	<u><2.5 mg/m³ (as <i>Lead</i>) - full facepiece APR with High</u>			
	Efficiency filters			
	<50 mg/m ³ (as Lead) - full facepiece powered APR			
	with High Efficiency filters			
	<100 mg/m ³ (as <i>Lead</i>) – Pressure-demand supplied-air			
	>100 mg/m ³ (as <i>Lead</i>) – Pressure-demand SCBA			

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin:	Irritation No information	Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes.
Acute:	Headache, irritability, upset stomach, and weakness.	Remove contact lenses if worn.
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach and kidney cancer in humans.	and water. Transfer to a medical facility.
	Metallic taste, colic, muscle cramps Damage to the nervous system	



Common Name: LEAD NITRATE

Synonyms: Lead Dinitrate; Plumbous Nitrate CAS No: 10099-74-8 Molecular Formula: Pb(NO₃)₂ RTK Substance No: 1108 Description: White or colorless, sand-like solid

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1469 ERG Guide #: 141 Hazard Class: 5.1 (Oxidizer)	USE WATER ONLY. DO NOT USE Chemical or CO ₂ extinguishing agents. POISONOUS FUMES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool. Lead Nitrate may ignite combustibles.		Lead Nitrate reacts with HYDROGEN PEROXIDE; REDUCING AGENTS; POWDERED CARBON; LEAD HYPOPHOSPHITE; AMMONIUM THIOCYANATE; POTASSIUM ACETATE; and POWDERED METALS. Lead Nitrate is a STRONG OXIDIZER which may ignite ORGANICS and COMBUSTIBLE MATERIALS.		
SP	ILL/LEAKS		PHYSICAL PROPERTIES		
Isolation Distance: 25 (80 Moisten spilled material for clean-up. Toxic to aquatic organis Hazardous to the enviro environment. DO NOT wash into sewe EXPO: OSHA: 0.05 m NIOSH: 0.05 m	to 50 meters) to 160 feet) first or use a HEPA-filter vacuum ms. nment and persists in the er. SURE LIMITS g/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ , 10-hr TWA (as <i>Lead</i>) g/m ³ , 9 hr TWA (as <i>Lead</i>)	Odd Flas LEL UEL Vap Wat pH: Mel Glo Cov	or Threshold: No information sh Point: 554°F (290°C) .: N/A L: N/A bor Density: 11.0 (air = 1) ter Solubility: Soluble 3 to 4 ting Point: 878°F (470°C) PROTECTIVE EQUIPMENT ves: Nitrile, Latex, Rubber veralls: DuPont Tyvek® pts: Latex, Butyl, Neoprepe		
PAC LEVEL: 100 mg PAC LEVELs: PAC-1 =	g/m ³ (as <i>Lead</i>) g/m ³ (as <i>Lead</i>) = 0.24 mg/m ³ ; PAC-2 = 180 mg/m ³ ; PAC-3 = 1,100 mg/m ³	Res	spirator: _<0.5 mg/m ³ - N100 (as <i>Lead</i>) <2.5 mg/m ³ (as <i>Lead</i>) - full facepiece APR with High Efficiency filters <50 mg/m ³ (as <i>Lead</i>) - full facepiece powered APR with High Efficiency filters <100 mg/m ³ (as <i>Lead</i>) – Pressure-demand supplied-air >100 mg/m ³ (as <i>Lead</i>) – Pressure-demand SCBA		
HEAL	TH EFFECTS		FIRST AID AND DECONTAMINATION		
Eyes:IrritationSkin:IrritationAcute:Headache, weaknessChronic:Inorganic L brain, ston humans. I Metallic tas Damage to	irritability, upset stomach, and <i>ead compounds</i> may cause lung, hach, and kidney cancer in May be a teratogen in humans. te, colic, muscle cramps the nervous system	Ren Flus Ren wa Tra	nove the person from exposure. sh eyes with large amounts of water for at least 15 minutes. nove contact lenses if worn. nove contaminated clothing and wash contaminated skin with ter. nsfer to a medical facility.		



COMMON NAME: LEAD PHOSPHATE

Synonyms: Lead Orthophosphate; Plumbous Phosphate; Trilead Phosphate; Perlex Paste CAS No: 7446-27-7 Molecular Formula: Pb₃P₂O₈ RTK Substance No: 1110 Description: White or colorless powder

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 2291 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	Use dry chemical, CO ₂ or water spray as extinguishing agents. Lead Phosphate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Phosphorus Oxides</i> . Use water spray to keep fire-exposed containers cool.	Lead Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the	Odor Threshold:N/AFlash Point:Not combustibleWater Solubility:InsolubleMelting Point:1,857°F (1,014°C)	
environment. DO NOT wash into sewer.		
EXPOSURE LIMITS	PROTECTIVE EQUIPMENT	
OSHA: 0.05 mg/m^3 , 8-hr TWA (as Lead) NIOSH: 0.05 mg/m^3 , 10-hr TWA (as Lead) ACGIH: 0.05 mg/m^3 , 8-hr TWA (as Lead) IDLH LEVEL: 100 mg/m^3 (as Lead) PAC LEVELS: PAC-1 = 0.2 mg/m^3 ; PAC-2 = 150 mg/m^3 ; PAC-3 = 910 mg/m^3		
HEALTH EFFECTS	FIRST AID AND DECONTAMINATION	
Eyes:IrritationSkin:No InformationAcute:Headache, irritability, upset stomach, and weaknessChronic:Inorganic Lead compounds may cause lung, brain, stomach and kidney cancer in humans. Metallic taste, colic, muscle cramps Damage to the nervous system	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. Remove contaminated clothing. Wash contaminated skin with soap and water. Transfer to a medical facility. 	



Common Name: LEAD STEARATE

Synonyms: Stearic Acid, Lead Salt CAS No: 7428-48-0 Molecular Formula: Pb (C₁₈H₃₅O₂)₂ RTK Substance No: 1111 Description: White powder

HAZARD DATA			
Hazard Rating	Firefighting		Beactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Miscellaneous Hazardous Material)	Firefighting Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS FUMES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> . Use water spray to keep fire-exposed containers cool.		Lead Stearate is not compatible with POTASSIUM; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SP	ILL/LEAKS		PHYSICAL PROPERTIES
Isolation Distance: 2 Moisten spilled materi vacuum for clean-up. Toxic to aquatic orgar Hazardous to the envi environment. DO NOT wash into se	25 to 50 meters 80 to 160 feet) al first or use a HEPA-filter hisms. ronment and persists in the wer.	Odor Threshold Flash Point: LEL: UEL: Vapor Pressure Relative Vapor Density: Specific Gravity Water Solubility Melting Point:	 Slightly fatty odor >450°F (232°C) N/A N/A 1 mm Hg at 1,783°F (973°C) 26.7 (calculated) (air = 1) 1.3 to 1.4 Very slightly soluble 240°F (116°C)
EXPOSURE LIMITS		F	
OSHA:0.05 mg/m³, 8-hr TWA (as Lead)NIOSH:0.05 mg/m³, 10-hr TWA (as Lead)ACGIH:0.05 mg/m³, 8-hr TWA (as Lead)IDLH LEVEL:100 mg/m³ (as Lead)		Gloves:	Aitrile, Latex, Rubber DuPont <i>Tyvek</i> ® Latex, Butyl, Neoprene <u>c</u> 0.5 mg/m ³ - N100 (as <i>Lead</i>) <u>c</u> 2.5 mg/m ³ (as <i>Lead</i>) - full facepiece APR with High Efficiency filters <u>c</u> 50 mg/m ³ (as <i>Lead</i>) - full facepiece powered APR with High Efficiency filters <u>c</u> 100 mg/m ³ (as <i>Lead</i>) – Pressure-demand supplied-air provide the second supplied of the second suppliced of the second supplied of the second supplied of the second suppliced of the second supplied of the second suppliced of
HEAL	TH EFFECTS	FIRST	AID AND DECONTAMINATION
Eyes: No Inform Skin: No Inform Acute: Headach weaknes Chronic: Inorganic lung, bra humans Metallic t Damage	nation nation e, irritability, upset stomach, and ss <i>Lead compounds</i> may cause ain, stomach, and kidney cancer in aste, colic, muscle cramps to the nervous system	Remove the per Flush eyes with contact lenses i Remove contan and water. Transfer to a me	son from exposure. large amounts of water for at least 15 minutes. Remove f worn. ninated clothing and wash contaminated skin with soap edical facility.



Common Name: LEAD SUBACETATE

Synonyms: Basic Lead Acetate; BLA CAS No: 1335-32-6 Molecular Formula: $C_4H_{10}O_8Pb_3$ RTK Substance No: 2999 Description: White, heavy powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of	Lead Subacetate is not compatible with STRONG ACIDS
0 - Fire	surrounding fire. Lead Subacetate itself does not burn.	OXIDIZING AGENTS (such as PERCHLORATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
DOT#: UN 1616	including Lead Oxides and Acetic Acid.	STRONG BASES (such as SODIUM HYDROXIDE and
ERG Guide #: 151	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE); AMMONIA; AMINES; CRESOLS: ISOCYANATES: CHLORAL HYDRATE:
Hazard Class: 6.1	cool.	SULFIDES; SALICYLIC ACID; TANNIN; CITRATES;
(Poison)		EPICHLOROHYDRIN; SULFITES; RESORCINOL; and TARTRATES.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

ACGIH: OSHA: NIOSH: IDLH LEVEL: 0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	No Information
Acute:	Headache, irritability, upset stomach and weakenss
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach and kidney cancer in humans.
	Damage to the nervous system

PHYSICAL PROPERTIES			
Odor Threshold:	Odorless		
Flash Point:	Not combustible		
LEL:	N/A		
UEL:	N/A		
Vapor Density:	No Information		
Vapor Pressure:	No Information		
Water Solubility:	Slightly soluble		
Boiling Point:	Decomposes at 392 [°] F (200 [°] C)		
Melting Point: $167^{\circ}F(75^{\circ}C)$			

	PROTECTIVE EQUIPMENT	
Gloves:	Nitrile, Latex, Rubber	
Coveralls:	DuPont <i>Tyvek</i> ®	
Boots:	Latex, Butyl, Neoprene	
Respirator:	<0.5 mg/m ³ - N100	
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters	
	>50 mg/m ³ but <u><</u> 100 mg/m ³ Supplied Air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- Transfer to a medical facility.



Common Name: LEAD SULFIDE

Synonyms: Plumbous Sulfide; Galena CAS No: 1314-87-0 Molecular Formula: PbS RTK Substance No: 1113 Description: Silvery metallic, crystalline material or a black powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of	Lead Sulfide is incompatible with HYDROGEN	
0 - Fire	surrounding fire. Lead Suifide itself does not burn.	PEROXIDE and IODINE CHLORIDE.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE		
DOT#: UN 3077	including Lead Oxides and Sulfur Oxides.		
ERG Guide #: 171	CONTAINERS MAY EXPLODE IN FIRE.		
Hazard Class: 9	Use water spray to keep fire-exposed containers cool.		
(Miscellaneous			
Hazardous Material)			

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up.	Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity:	No information Noncombustible 1 mm Hg at 1,565 ^o F (852 ^o C) 7.5 (air = 1)	
Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. DO NOT wash into sewer.	Boiling Point: Water Solubility: Melting Point:	2,338°F (1,281°C) Insoluble 2,037°F (1,114°C)	

Gloves:

Boots:

Coveralls:

PROTECTIVE EQUIPMENT

Nitrile, Latex, Rubber DuPont Tyvek®

Latex, Butyl, Neoprene

EXPOSURE LIMITS

OSHA:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)	
NIOSH:	0.05 mg/m ³ , 10-hr TWA (as <i>Lead</i>)	
ACGIH:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)	
IDLH LEVEL:	100 mg/m ³ (as <i>Lead</i>)	
PAC		
LEVELS:	PAC-1 = 0.17 mg/m ³ ;	
	PAC-2 = 140 mg/m ³ ;	
	PAC-3 = 810 mg/m ³	

IDLH LEVI PAC LEVELS:	EL: 100 mg/m ³ (as <i>Lead</i>) PAC-1 = 0.17 mg/m ³ ; PAC-2 = 140 mg/m ³ ; PAC-3 = 810 mg/m ³	Respirator: ≤0.5 mg/m³ - N100 ≤2.5 mg/m³ - full facepiece APR with High Efficiency filters ≤50 mg/m³ - full facepiece powered APR with High Efficiency filters ≤100 mg/m³ – Pressure-demand supplied-air >100 mg/m³ – Pressure-demand SCBA	
	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION	
Eyes:	No information	Remove the person from exposure.	
Skin:	No information	Flush eyes with large amounts of water for at least 15 minutes. Remove	
Acute:	Headache, irritability, upset stomach, and weakness	contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap a	
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach and kidney cancer in humans. Metallic taste, colic, and muscle cramps Damage to the nervous system	water. Transfer to a medical facility.	
		June 2017	



Common Name: LEAD SULPHATE

Synonyms: Lead Monosulfate; Fast White CAS No: 7446-14-2 Molecular Formula: PbSO₄ RTK Substance No: 1114 Description: Odorless, white, crystalline powder

HAZARD DATA					
Hazard Rating	ng Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1794 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	Extinguish fire using an agent suitable for type of surrounding fire. Lead Sulphate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Sulfur</i> <i>Oxides</i> . Use water spray to keep fire-exposed containers cool.		e for nate CED IN Ifur	Lead Sulphate react with METALS (such as POTASSIUM, MAGNESIUM and ALUMINUM) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
SP	ILL/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.			Odor T Flash F LEL: UEL: Specifi Water S Melting	hreshold: Odorless Point: Nonflammable N/A N/A Solubility: 6.2 Solubility: Slightly soluble g Point: 2,138°F (1,170°C)	
EXPO	SURE LIMITS			PROTECTIVE EQUIPMENT	
OSHA: 0.05 mg/m ³ , 8-hr TWA (as Lead) NIOSH: 0.05 mg/m ³ , 10-hr TWA (as Lead) ACGIH: 0.05 mg/m ³ , 8-hr TWA (as Lead) IDLH LEVEL: 100 mg/m ³ (as Lead) PAC LEVELS: PAC-1 = 0.22 mg/m ³ ; PAC-2 = 170 mg/m ³ ; PAC-3 = 1,000 mg/m ³			Gloves Covera Boots: Respira	Image: String Processing Processi	
HEAL	TH EFFECTS			FIRST AID AND DECONTAMINATION	
Eyes: Severe in Skin: Irritation, Acute: Headache weaknes Chronic: Inorganic lung, bra humans. Metallic ta Damage	ritation and burns burns, rash, pigment changes e, irritability, upset stomach, and ss <i>Lead compounds</i> may cause ain, stomach, and kidney cancer in aste, colic, and muscle cramps. to the nervous system	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. Transfer to a medical facility. 			



Common Name: LEAD THIOCYANATE

Synonyms: Lead Dithiocyanate; Lead Sulfocyanate CAS No: 592-87-0 Molecular Formula: Pb (SCN)₂ RTK Substance No: 1115 Description: White to yellow crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Lead Thiocyanate itself does not burn.	Lead Thiocyanate may react explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides, Sulfur Dioxides, Nitrogen	NITRATES, CHLORINE, BROMINE and FLUORINE). Lead Thiocyanate is not compatible with STRONG
DOT#: UN 2291	Oxides and Cyanides.	ACIDS (such as HYDROCHLORIC, SULFURIC and
ERG Guide #: 151	Use water spray to keep fire-exposed containers	SODIUM, MAGNESIUM, and ALUMINUM); METAL
Hazard Class: 6.1	COOI.	HYDRIDES; and FINELY POWDERED METALS.
(Poison)		

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment. DO NOT wash into sewer.

DO NOT Wash mud sewer.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH: IDLH LEVEL: 0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	No Information
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach, and kidney cancer in humans. Metallic taste, colic, muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
LEL:	N/A
UEL:	N/A
Specific Gravity:	3.82 at 68°F (20°C)
Melting Point:	374°F (190°C) Decomposes
Water Solubility:	Slightly soluble

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Nitrile, Latex, Rubber DuPont <i>Tyvek</i> ®
Boots:	Latex, Butyl, Neoprene
Respirator:	<u><</u> 0.5 mg/m ³ - N100
	<2.5 mg/m ³ - full facepiece APR with High Efficiency filters
	<50 mg/m ³ - full facepiece powered APR with High Efficiency filters
	<100 mg/m ³ – Pressure-demand supplied-air
	>100 mg/m ³ – Pressure-demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: LIQUEFIED PETROLEUM GAS

 Synonyms: Autogas; Bottled Gas; L.P.G.; Liquefied Hydrocarbon Gas

 CAS No: 68476-85-7

 Molecular Formula: C₃H₈/C₃H₆/C₄H₁₀/C₄H₈

 RTK Substance No: 1118

 Description: Colorless, odorless gas when pure, commonly used and shipped as a liquefied, compressed gas with an odorant (*Methyl Mercaptan*)

 Hazard Rating
 Firefighting

 Parand Rating
 Firefighting

 2 - Health
 FLAMMABLE GAS

 Stop flow of gas (the gas cloud is invisible) or allow to burn.
 POISONOUS GASES ARE PRODUCED IN FIRE.

 P Beartivity
 Description Fireful OPDE IN FIRE.

V				
2 - Health FLAMMABLE GAS 4 - Fire Stop flow of gas (the gas cloud is invisible) or allow to burn. 0 - Reactivity POISONOUS GASES ARE PRODUCED IN FIRE. 0 - Reactivity CONTAINERS MAY EXPLODE IN FIRE. DOT#: UN 1075 Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back or cause a fire or explosion far from the source. Flammable gas) Flow, agitation, low humidity and other factors may generate electrostatic charges resulting in fire and/or explosion. Liquefied Petroleum Gas may form an ignitable yapor/air mixture in closed tanks or containers.		Liquefied Petroleum Gas is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		
SPI	LL/LEAKS		PHY	SICAL PROPERTIES
Isolation Distance: Spill: 100 meters (330 feet) Fire: 1,600 meters (1 mile) Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Conduct air monitoring to determine that <i>Oxygen</i> levels are above 19.5% and the Lower Explosive Limit (LEL) is not being exceeded. Use only non-sparking tools and equipment, especially when opening and closing containers of Liquefied Petroleum Gas. Keep Liquefied Petroleum Gas out of confined spaces, such as sewers, because of the possibility of an explosion. Turn leaking cylinder with leak up to prevent escape of gas in		Odor 1 Flash LEL: UEL: Auto le Vapor Vapor Specif Water Boiling Ionizat	Threshold: Point: Density: Pressure: ic Gravity: Solubility: g Point: tion Potential: ular Weight:	Odorless when pure -155°F (-104°C) <i>Propane</i> ; -105°F (-76°C) <i>Butane</i> 1.9% to 2.1% 8.5% to 9.5% 761° to 871°F (405° to 466°C) 1.4 (air = 1) >760 mm Hg at 68°F (20°C) 0.51 to 0.58 (water = 1) Insoluble >-44°F (-42°C) 10.95 eV 42 to 58
EXPO	SURE LIMITS		PROT	ECTIVE EQUIPMENT
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 1,000 ppm, 10-hr TWA ACGIH: 1,000 ppm, 8-hr TWA IDLH: 2,000 ppm The Protective Action Criteria values are: PAC-1 = 2,000 ppm PAC-1 = 2,000 ppm PAC-2 = 2,000 ppm		Gloves Covers Respir	s: Insulate alls: Use tur the gre Tychem rator: >1,000	ed Nitrile (>8-hr breakthrough for <i>Propane</i>) in out gear or flash protection if ignition/fire is atest hazard! i® Responder® (>8-hr breakthrough for <i>Propane</i>) ppm or <19.5% <i>Oxygen</i> - SCBA
HEALTH EFFECTS			FIRST AID	AND DECONTAMINATION
Eyes: Contact with liquid or gas causes frostbite Skin: Contact with liquid or gas causes frostbite Inhalation: Headache, dizziness, weakness, nausea, vomiting, loss of coordination and induced the server and depth		Remov Flush	ve the person from eyes with large an	exposure. nounts of water for at least 15 minutes. Remove



Common Name: LITHIUM

Synonym: None CAS No: 7439-93-2 Molecular Formula: Li RTK Substance No: 1119

Description: Soft, silver to grayish-white (or yellow if exposed to air), odorless metal, crystalline mass or powder

HAZARD DATA Hazard Rating Firefighting Reactivity Lithium is a COMBUSTIBLE SOLID which is Finely divided Lithium particles, powder or dust may 3 - Health WATER REACTIVE and the powder or dust may IGNITE SPONTANEOUSLY in AIR. 2 - Fire SPONTANEOUSLY IGNITE in AIR. Lithium reacts violently with MOISTURE, WATER or Use a Class D, dry sand, Met-L-X powder, STEAM to produce heat and flammable and explosive 2-W - Reactivity graphite, or Lith-X powder as extinguishing agents. Hydrogen gas and toxic Lithium Hydroxide. DOT#: UN 1415 DO NOT USE WATER, foam, CO2, or halogenated Lithium reacts violently with OXIDIZING AGENTS (such extinguishing agents. ERG Guide #: 138 as PERCHLORATES, PEROXIDES, POISONOUS GASES ARE PRODUCED IN FIRE. PERMANGANATES, CHLORATES, NITRATES, Hazard Class: 4.3 including Lithium Dioxide and Lithium Hydroxide. CHLORINE, BROMINE and FLUORINE); (Water Reactive/ CONTAINERS MAY EXPLODE IN FIRE. COMBUSTIBLES; HALOGENATED HYDROCARBONS; Dangerous when ALCOHOLS; METALS; METAL ALLOYS; METAL wet) Use water spray to keep fire-exposed containers SALTS: STRONG ACIDS (such as HYDROCHLORIC. cool. SULFURIC and NITRIC): REDUCING AGENTS (such as DO NOT get water inside containers. SODIUM, ALUMINUM and their HYDRIDES) and many FIRE MAY RESTART AFTER IT HAS BEEN other substances. EXTINGUISHED. SPILL/LEAKS PHYSICAL PROPERTIES Odorless **Isolation Distance:** 354°F (179°C)

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Keep Lithium out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Lithium**.

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, muscle weakness, confusion and seizures

Odor Threshold:
Flash Point:
Auto Ignition Temp:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

354°F (179°C) 354°F (179°C) 1 mm Hg at 1,333°F (723°C) 0.53 (water = 1) Reactive 2,448°F (1,342°C) 357°F (181°C) 6.94

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene, and Silver Shield®/4H®
Coveralls:	DuPont Tyvek®
Respirator:	Low levels - APR with High efficiency filter

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 60 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. DO NOT INTERRUPT FLUSHING. Seek medical attention immediately.
 Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of water for at least 60 minutes. DO NOT INTERRUPT WASHING. Seek medical attention immediately.
 Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: LITHIUM CARBONATE

Synonyms: Dilithium Carbonate; Carbolith CAS No: 554-13-2 Molecular Formula: Li₂CO₃ RTK Substance No: 1124 Description: White, light, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 0 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	 Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE including <i>Lithium Oxides</i>. Use water spray to keep fire-exposed containers cool. May ignite combustibles (wood, paper and oil). 	Lithium Carbonate reacts violently with FLUORINE. Lithium Carbonate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS; COMBUSTIBLES; ORGANICS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and CALCIUM HYDROXIDE.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Can harm the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.1 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	2,390°F (1,310°C)
Melting Point:	1,144°F (618°C)
pH:	11.2
Molecular Weight:	73.89

	PROTECTIVE EQUIPMENT
Gloves:	Rubber
Coveralls:	DuPont Tychem® Polycoat, QC, CPF 1, SL and CPF 2 or equivalent for <i>dry pharmaceutical chemicals</i>
Respirator:	APR with High efficiency filters, or Supplied air

NATION

minutes. Remove

taminated skin with

d CPR if

nay be delayed.

HEALTH EFFECTS		FIRST AID AND DECONTAMI
Eyes: Skin: Inhalation:	Irritation Irritation, itching and rash Nose, throat and lung irritation with coughing and shortness of breath (pulmonary edema) Headache, muscle twitching, confusion and seizures	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 contact lenses if worn. Quickly remove contaminated clothing and wash comparison of soap and water. Begin artificial respiration if breathing has stopped an necessary. Transfer to a medical facility. Medical observation is recommended as symptoms mathematical and the stopped and the symptoms mathematical observation is recommended as symptoms mathematical and the symptome mathematical and the symptome



Common Name: LITHIUM CHROMATE

Synonyms: Dilithium Chromate; Chromium Lithium Oxide CAS No: 14307-35-8 Molecular Formula: Li_2CrO_4 RTK Substance No: 1125 Description: Yellow, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Lithium Chromate itself does	Lithium Chromate is an OXIDIZER which can react with ORGANICS: COMBUSTIBLES: REDUCING AGENTS
0 - Fire	not burn.	(such as LITHIUM, SODIUM, ALUMINUM and their
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lithium Oxides and Chromium Oxides</i> .	HYDRIDES); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Mixtures of <i>Chromate</i> and ZIRCONIUM can be explosive.
ERG Guide #: 171	cool.	
Hazard Class: 5.1 (Oxidizer)	Lithium Chromate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.DO NOT wash into sewer.

May be detrimental to aquatic life.

EXPOSURE LIMITS

OSHA: 0.005 mg/m³, 8-hr TWA NIOSH: 0.001 mg/m³, 10-hr TWA ACGIH: 0.05 mg/m³, 8-hr TWA IDLH: 15 mg/m³ (as *Chromates*) All of the above are for *hexavalent Chromium* (*Cr VI*)

HEALTH EFFECTS

Eyes: Skin:	Severe irritation and burns Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and wheezing
	Nausea, muscle cramps and convulsions
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	5.72 (air = 1)
Specific Gravity:	2.2 (water = 1)
Water Solubility:	Soluble
Melting Point:	166°F (75°C)
Molecular Weight:	130

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.001 mg/m ³ - APR with High efficiency filters >0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.


Common Name: LITHIUM HYPOCHLORITE

Synonyms: Lithium Chloride Oxide; Lithium Oxychloride CAS No: 13840-33-0 Molecular Formula: LiOCI RTK Substance No: 1129 Description: White, granular solid or tablet with a *Chlorine* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 2 - Reactivity DOT#: UN 1471 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Firefighting Lithium Hypochlorite is REACTIVE and a DANGEROUS EXPLOSION HAZARD. Lithium Hypochlorite is not combustible but is a STRONG OXIDIZER which enhances the combustion of other substances. Use water in flooding quantities only. DO NOT USE CHEMICAL or CO2 as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Lithium Oxides and Chlorine. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Keactivity Lithium Hypochlorite decomposes in WATER and HEAT, and reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC), to form toxic Chlorine gas. Lithium Hypochlorite reacts explosively with HYDROCARBONS (such as FUELS and GASOLINE). Lithium Hypochlorite reacts with AMMONIA and UREA to produce flammable and explosive Nitrogen Trichloride. Lithium Hypochlorite is not compatible with METALS and COMBUSTIBLES.
	(wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Lithium Hypochlorite is highly toxic to fish and the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for Lithium Hypochlorite.

HEALTH EFFECTS

Irritation and burns
Irritation and burns
Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Headache, muscle twitching, confusion and seizures

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Melting Point: Molecular Weight: *Chlorine* odor Noncombustible 0.9 to 1 (water = 1) Soluble Decomposes at 275°F (135°C) 58.4

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Natural Rubber and Polyethylene
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: LITHIUM NITRATE

Synonyms: Nitric Acid, Lithium Salt CAS No: 7790-69-4 Molecular Formula: LiNO₃ RTK Substance No: 1130 Description: Colorless or white, crystalline powder or granule

Hazard Rating	Firefighting	Reactivity
2 - Health	Lithium Nitrate is not combustible but is a	Lithium Nitrate reacts violently or explosively with
0 - Fire	combustion of other substances.	ALUMINUM and PHOSPHORUS) and OXIDIZING
0 - Reactivity	May explode with HEAT, SHOCK, FRICTION or	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 2722	Use water only. DO NOT USE CHEMICAL or	CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 140	CO ₂ extinguishing agents.	Lithium Nitrate reacts with COMBUSTIBLES and OPGANIC MATERIALS to cause fires and explosions
Hazard Class: 5.1 (Oxidizer)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	Mixtures of Lithium Nitrate with ALKYL ESTERS form explosive ALKYL NITRATES.
	CONTAINERS MAY EXPLODE IN FIRE.	Lithium Nitrate is not compatible with STRONG ACIDS
	Use water spray to keep fire-exposed containers cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC); CYANIDE COMPOUNDS; HYPOPHOSPHITES; and TIN
	Lithium Nitrate may ignite combustibles (wood,	CHLORIDE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Use only non-sparking tools and equipment, especially when opening and closing containers of Lithium Nitrate.

EXPOSURE LIMITS

No occupational exposure limits have been established for Lithium Nitrate.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, muscle twitching, confusion and seizures

PHYSICAL PROPERTIES

Nonflammable
2.5 (water = 1)
Soluble
1,112°F (600°C)
491°F (255°C)
68.9
7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: MAGNESIUM

Synonyms: None CAS No: 7439-95-4 Molecular Formula: Mg RTK Substance No: 1136 Description: Light, silvery-white metal which can be in the form of a gray powder, thin sheet or chip

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 1 - Fire 1 - Reactivity DOT#: UN 1869 UN 1418 (powder) ERG Guide #: 138 Hazard Class: 4.1 and 4.3 UN 1869 (Flammable) UN 1418 (Water Reactive)	 Magnesium POWDER, SHEETS and CHIPS MAY SPONTANEOUSLY IGNITE on contact with AIR or MOISTURE. Use Class D fire extinguishers or dry sand, clay, graphite, or limestone to fight fires. DO NOT USE WATER, CO₂, foam or halogenated extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED. 	Finely divided Magnesium reacts with WATER, MOISTURE, STEAM and ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to release flammable and explosive Hydrogen gas. Finely divided Magnesium ignites on contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and AMMONIA; and reacts vigorously or explosively (and may form explosive compounds) with ACETYLENIC COMPOUNDS (such as ACETYLENE and ETHYLENE OXIDE); HALOCARBONS (such as CHLOROFORM and CHLOROMETHANE); AMMONIA NITRATE; CARBONATES; ARSENIC; METAL OXIDES; METAL SULFATES; OXYGEN; METAL CYANIDES; PHOSPHATES, and many other substances.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fires: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner, or use a HEPA-filter vacuum, and deposit in sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	15 mg/m ³ , 8-hr TWA
NIOSH:	None
ACGIH:	10 mg/m ³ , 8-hr TWA
IDLH:	750 mg/m ³
	All of the above are for Magnesium Oxide

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and difficulty in breathing
	Headache, fever and chills, chest tightness

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Auto Ignition Temp:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Molecular Weight:

Odorless Flammable powder 883°F (473°C) 1.7 (air = 1) 1 mm Hg at 1,149°F (621°C) 1.74 (water = 1) Insoluble, Reactive 2,012°F (1,100°C) 24.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber		
Coveralls:	DuPont Tyvek®		
Respirator:	>10 mg/m ³ - APR with High efficiency filter >100 mg/m ³ - Supplied air		

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: MAGNESIUM NITRATE

Synonyms: Magnesium Dinitrate; Nitromagnesite CAS No: 10377-60-3 Molecular Formula: MgN₂O₆ RTK Substance No: 1143 Description: Odorless, colorless or white, crystalline solid

	HAZARD DATA					
Hazard Rating	Firefighting	Reactivity				
2 - Health	Magnesium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Magnesium Nitrate may react violently with COMBUSTIBLES; ORGANIC MATERIALS; OXIDIZING				
0 - Fire	combustion of other substances.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). REDUCING				
1 - Reactivity	Flood with water.					
DOT#: UN 1474POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Magnesium Oxides</i> .		AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and DIMETHYLFORMAMIDE, causing				
ERG Guide #: 140	Use water spray to keep fire-exposed containers	fires and explosions.				
Hazard Class: 5.1	cool.	Magnesium Nitrate is not compatible with STRONG				
(Oxidizer)	Magnesium Nitrate may ignite combustibles (wood, paper and oil).	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METAL POWDERS; CYANIDES; TIN				
	May be sensitive to impact when contaminated with Organic Material.	CHLORIDE; NITRILES; and PHOSPHORUS COMPOUNDS.				
		Protect from HEAT, SPARKS, SHOCK and FRICTION.				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Magnesium Nitrate**.

The Protective Action Criteria values are: PAC-1 = 30 mg/m^3

 $PAC-2 = 50 \text{ mg/m}^3$

PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsIrritation and burnsSkin:Nose and throat irritation with coughing
and wheezing.Inhalation:Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Noncombustible	
Vapor Pressure:	0.5 mm Hg at 77°F (25°C)	
Specific Gravity:	1.46 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	626°F (330°C) (Decomposes)	
Melting Point:	192°F (89°C)	
Molecular Weight:	148.3	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber			
Coveralls:	Tyvek®			
Respirator:	Full facepiece APR with P100 filters			

>30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: MALEIC ANHYDRIDE

Synonyms: cis-Butenedioic Anhydride; Maleic Acid Anhydride CAS No: 108-31-6 Molecular Formula: C₄H₂O₃ RTK Substance No: 1152 Description: Colorless, needle-like, crystalline, flake, pellet or lumpy, fused mass with a strong, irritating odor

НΔ	7Δ	RD	D/	ΔΤΔ
ПА		RD	Ur	\ A

HAZARD DATA						
Hazard Ra	ating	Firefighting			Reactivity	 y
3 - Health 1 - Fire 1 - Reactivity DOT#: UN 2 ERG Guide # Hazard Clas (Corrosive)	y 2215 #: 156 • s: 8	Firefighting COMBUSTIBLE SOLID Use CO2, water spray or alcohol-resistant foam as extinguishing agents. DO NOT USE DRY CHEMICAL OR SOLID STREAMS OF WATER. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		Maleic Anh (such as SC HYDROXID (such as PE PERMANG CHLORINE and explosi Maleic Anh and Maleic Maleic Anh METALS (s POTASSIU BERYLLIUI CARBONA	ydride reacts violently with STRONG BASES DDIUM HYDROXIDE and POTASSIUM DE) and contact with OXIDIZING AGENTS ERCHLORATES, PEROXIDES, ANATES, CHLORATES, NITRATES, BROMINE and FLUORINE) may cause fires ions. ydride reacts with WATER to release HEAT <i>Acid.</i> ydride is not compatible with ALKALI such as LITHIUM, SODIUM and IM); ALKALINE EARTH METALS (such as M, MAGNESIUM and CALCIUM); AMINES; TES; HYDROXIDES; and AQUEOUS AMMONIA.	
	SPI	LL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of Maleic Anhydride. DO NOT wash into sewer.		Odor Thro Flash Poi LEL: UEL: Auto Ignit Vapor De Vapor Pre Specific O Water So Boiling P Ionization		eshold: nt: nsity: essure: Gravity: ubility: pint: point: Potential:	0.32 ppm 218°F (103°C) 1.4% 7.1% 890°F (477°C) 3.4 (air = 1) 0.2 mm Hg at 68°F (20°C) 1.5 (water = 1) Soluble/Reactive 396°F (202°C) 127°F (53°C) 9.9 eV 98.1	
E	EXPOS	SURE LIMITS			PROT	ECTIVE EQUIPMENT
OSHA: 0.25 ppm, 8-hr TWA NIOSH: 0.25 ppm, 10-hr TWA ACGIH: 0.0025 ppm, 8-hr TWA IDLH: 2.5 ppm The Protective Action Criteria values are: PAC-1 = 0.2 ppm; PAC-2 = 2 ppm; PAC-3 = 20 ppm			Gloves: Silver Shield®/4H® (>4-hr breakthrough) Coveralls: DuPont Tychem® Responder® (>8-hr breakthrough) Respirator: >0.0025 ppm - SCBA		Shield®/4H® (>4-hr breakthrough) nt Tychem® Responder® (>8-hr breakthrough) 25 ppm - SCBA	
HEALTH EFFECTS			FI	RST AID	AND DECONTAMINATION	
Eyes: Skin: Inhalation:	Irritation Irritation Nose, th coughing (pulmon Headach vomiting	and burns and burns roat and lung irritation with g and severe shortness of breath ary edema) he, dizziness, nausea and		Remove the Flush eye contact le Quickly re large amo Begin artite Transfer p Medical o	he person fror s with large ar nses if worn. emove contam punts of water. ficial respiration promptly to a r bservation is r	n exposure. mounts of water for at least 15 minutes. Remove Seek medical attention immediately. ninated clothing and wash contaminated skin with on if breathing has stopped and CPR if necessary. medical facility.

June 2016



Common Name: MANGANESE

Synonyms: Colloidal Manganese CAS No: 7439-96-5 Molecular Formula: Mn RTK Substance No: 1155 Description: Pure **Manganese** is a silver or grey-white, brittle solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2- Health	Manganese powder and dust are FLAMMABLE and DANGEROUS FIRE HAZARDS.	Finely divided Manganese dust can ignite spontaneously in AIR.		
3 (powder)- Fire	Use sand or dry chemicals appropriate for	Manganese reacts with STRONG ACIDS (such as		
1- Reactivity	extinguishing metal fires.	HYDROCHLORIC, SULFURIC and NITRIC), and slowly		
DOT#: UN 3089	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Manganese Oxides</i> .	with WATER or STEAM, to produce flammable and explosive <i>Hydrogen gas</i> .		
ERG Guide #: 170	Manganese powder and dust may form an	Manganese may react with OXIDIZING AGENTS (such		
Hazard Class: 4.1 (Flammable solid)	ignitable vapor/air mixture in closed tanks or containers. Use water spray to keep fire-exposed containers cool.	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); NITROGEN DIOXIDE; PHOSPHORUS; and SULFUR DIOXIDE to cause ignition and/or violent decomposition.		

Isolation Distance:	Flash Point:	Flammable powder and dust	
 Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal. Ground and bond containers when transferring Manganese powder. Use only non-sparking tools and equipment. DO NOT wash into sewer. Manganese may be hazardous to the environment, especially to aquatic organisms. 	Auto Ignition Temp: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	842°F (450°C) (<i>Dust</i>) 0 mm Hg at 68°F (20°C) 7.2 (water = 1) Insoluble 3,564°F (1,962°C) 2,271°F (1,244°C) 54.9	
EXPOSURE LIMITS	PRO	TECTIVE EQUIPMENT	
OSHA: 5 mg/m ³ , Ceiling	Gloves: Nitrile	and Neoprene	
NIOSH: 1 mg/m ³ , 8-hr TWA; 3 mg/m ³ , STEL ACGIH: 0.2 mg/m ³ (<i>inhalable</i>); 0.02 mg/m ³ (<i>respirable</i>), 8-hr TWA	Coveralls: Tyvek Use t	(® urn out gear or flash protection if ignit	

IDLH: 500 mg/m³ The Protective Action Criteria values are:

PAC-1 = 3 mg/m³ PAC-2 = 5 mg/m³ PAC-3 = 500 mg/m³

SPILL/LEAKS

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, fever and chills, aches, chest tightness and cough (<i>"metal fume fever"</i>)

Gloves:	Nitrile and Neoprene
Coveralls:	$Tyvek \ensuremath{\mathbb{R}}$ Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	Spill - full facepiece APR with <i>P100 filters</i> Fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: MERCURIC CHLORIDE

Synonyms: Mercury Dichloride; Perchloride of Mercury CAS No: 7487-94-7 Molecular Formula: HgCl₂ RTK Substance No: 1170

Description: Odorless, white crystal or powder

HAZARD DATA					
Hazard Rating	Firefighting		Re	Reactivity	
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1624 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	Mercuric Chloride itself does not burn but may explode if exposed to heat, shock or friction. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine, Hydrogen Chloride, Mercury</i> and <i>Mercury Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		Mercuric Chloride may explode with HEAT, FRICTION, SHOCK or on contact with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); SULFIDES; ACETYLENE; AMMONIA; and OXALIC ACID. Mercuric Chloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); FORMATES; PHOSPHATES; CARBONATES; ANTIMONY; BROMIDES; and BORAX. Mercuric Chloride is decomposed by SUNLIGHT and reacts when in solution with STAINLESS and CARBON STEELS, BRASS and BRONZE.		
SF	PILL/LEAKS	Γ			PHYSICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) For clean-up, use a specialized charcoal-filtered vacuum. DO NOT wash into sewer. Mercuric Chloride is very toxic to aquatic organisms.			Odor Thres Flash Point Vapor Pres Specific Gr Water Solu Boiling Poi Melting Poi Molecular Molecular Molec		old: Odorless Nonflammable Jre: 1 mm Hg at 277°F (136°C) vity: 5.4 (water = 1) lity: Soluble t: 576°F (302°C) t: 529°F (276°C) eight: 271.5 4 7
EXPO	OSURE LIMITS		· · · · · · · · · · · · · · · · · · ·		PROTECTIVE EQUIPMENT
 NIOSH: 0.05 mg/m³, 10-hr TWA (as <i>Mercury vapor</i>) 0.1 mg/m³, Ceiling (as <i>Mercury</i>) ACGIH: 0.025 mg/m³, 8-hr TWA (as <i>Mercury</i>) IDLH: 10 mg/m³ (as <i>Mercury</i>) The Protective Action Criteria values are: PAC-1 = 2 mg/m³ PAC-3 = 13.5 mg/m³ 			Gloves: Coveralls: Respirator	Gloves:Butyl, Nitrile, Neoprene, PVC, Silver Shield®/4H breakthrough for Mercury)Coveralls:Tychem® fabricsRespirator:>0.025 mg/m³ - full facepiece APR with cartridg for Mercury >2 mg/m³ - SCBA	
HEALTH EFFECTS			FI	RS	ST AID AND DECONTAMINATION
Eyes:Irritation and burnsReSkin:Irritation and burns, skin rash, itching and gray skin colorFlu colorInhalation:Nose, throat and lung irritation with coughing, wheezing and shortness of breath Nausea, vomiting and tremorsReChronic:Cancer (thyroid) in animalsTra		Remove th Flush eyes contact ler Quickly rel large amou Begin artifi Transfer p	ie pe s with nses move unts icial i romp	Derson from exposure. ith large amounts of water for at least 15 minutes. Remove is if worn. Seek medical attention. Ive contaminated clothing and wash contaminated skin with its of soap and water. al respiration if breathing has stopped and CPR if necessary. Inptly to a medical facility.	



Common Name: MERCURIC CYANIDE

Synonyms: Dicyanomercury; Mercury Cyanide CAS No: 592-04-1 Molecular Formula: C₂HgN₂ RTK Substance No: 1171

Description: Odorless, clear or white, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric Cyanide itself does	Mercuric Cyanide is slowly decomposed by WATER and LIGHT, and reacts rapidly with STRONG ACIDS (such as
0 - Fire	not burn.	HYDROCHLORIC, SULFURIC and NITRIC), to form
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	flammable and poisonous <i>Hydrogen Cyanide gas</i> .
DOT#: UN 1636	Cyanide and Nitrogen Oxides.	OXIDIZING AGENTS (such as PERCHLORATES,
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES,
Hazard Class: 6.1	C00I.	MAGNESIUM; LIQUID HYDROGEN CYANIDE; SODIUM
(Poison)		NITRATE; and SODIUM NITRITE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

For clean-up, use a specialized charcoal-filtered vacuum. Do not disturb spilled material.

DO NOT wash into sewer.

Mercuric Cyanide is harmful to aquatic life at low concentrations.

EXPOSURE LIMITS

- NIOSH: 0.05 mg/m³, 10-hr TWA (as *Mercury vapor*) 0.1 mg/m³, Ceiling (as *Mercury*) 5 mg/m³ (4.7 ppm), 15-min STEL (as *Hydrogen Cyanide*)
- IDLH: 10 mg/m³ (as *Mercury*); 50 ppm (as *Hydrogen Cyanide*)

The Protective Action Criteria values for Mercuric Cyanide are:

PAC-1 = 1.5 mg/m^3 PAC-3 = 12.6 mg/m^3

PAC-2 = 12.6 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin rash, itching and gray skin color
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and tremors

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	4 (water = 1)
Water Solubility:	Slightly soluble (mixes slowly)
Boiling Point:	Decomposes
Melting Point:	Decomposes
Ionization Potential:	11.6 eV (for Hydrogen Cyanide)
Molecular Weight:	252.6

PROTECTIVE EQUIPMENT

Gloves:	Neoprene, Nitrile, Barrier® and Silver Shield®/4H® (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Respirator:	>1.5 mg/m ³ - SCBA (for <i>solid</i> Mercuric Cyanide) Use SCBA for fires or if Mercuric Cyanide is heated

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Use** *Amyl Nitrite* capsules if symptoms of *Cyanide* poisoning develop. **Transfer** promptly to a medical facility.



Common Name: MERCURIC OXIDE

Synonyms: Yellow Oxide of Mercury; Mercury Monoxide CAS No: 21908-53-2 Molecular Formula: HgO RTK Substance No: 2537 Description: Yellow to orange-yellow, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric	Mercuric Oxide reacts violently with OXIDIZING AGENTS (such as PERCHI ORATES, PEROXIDES, PERMANGANATES,
0 - Fire	Oxide itself does not burn but may	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
0 - Reactivity	intensify a fire. POISONOUS GASES ARE	COMBUSTIBLES; PETROLEUM HYDROCARBONS; HYDROGEN PEROXIDE; DISULFUR DICHLORIDE; HYDROGEN
DOT#: UN 1641	PRODUCED IN FIRE, including	TRISULFIDE; ACETYL NITRATE; and DIBORON
ERG Guide #: 151 Hazard Class: 6.1	Mercury vapor. Use water spray to keep fire-exposed containers cool.	Section (Such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
(Poison)	Mercuric Oxide may ignite combustibles (wood, paper and oil).	Mercuric Oxide is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ETHANOL; and HYDRAZINE HYDRATE.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Use special <i>Mercury vapor</i> suppressants or special vacuums for spill collection.
DO NOT wash into sewer.
Will accumulate in aquatic organisms.
Severe marine pollutant.

EXPOSURE LIMITS

OSHA:	0.1 mg/m ³ , 8-hr TWA
NIOSH:	0.05 mg/m ³ , 10-hr TWA; 0.1 mg/m ³ , Ceiling
ACGIH:	0.025 mg/m³, 8-hr TWA
IDLH:	10 mg/m ³
PAC	PAC-1 = 1.5 mg/m ³ ; PAC-2 = 16 mg/m ³ ;
LEVELS:	PAC-3 = 30 mg/m ³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin rash, itching and gray skin color
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath Nausea, vomiting and tremors

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	11.1 (water =1)
Water Solubility:	Very slightly soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes at 932°F (500°C)
Molecular Weight:	216.54

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® Polycoat, QC, CPF 1, SL and CPF 2; Kappler® Zytron® 300; and Saint-Gobain OneSUIT® TEC
Respirator:	 >0.05 mg/m³ - APR with filter specific for <i>Mercury</i> >0.5 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Transfer** to a medical facility.



Common Name: MERCURIC SULFATE

Synonyms: Mercury Bisulfate; Mercury Persulfate CAS No: 7783-35-9 Molecular Formula: HgSO₄ RTK Substance No: 1177 Description: Odorless, white, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric Sulfate itself does	Mercuric Sulfate decomposes when exposed to WATER to form corrosive Sulfuric Acid.
0 - Fire	not burn.	Mercuric Sulfate reacts violently with HYDROGEN CHLORIDE.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE including Mercury Oxides and Sulfur	Mercuric Sulfate is not compatible with ACETYLENE; AMMONIA; ORGANIC MATERIALS: REDUCING AGENTS (such as LITHIUM.
DOT#: UN 1645	Oxides.	SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS
ERG Guide #: 151	CONTAINERS MAY EXPLODE IN FIRE.	(such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): NITROMETHANE: and
(Poison)		BUTYNEDIOL.
		Mercuric Sulfate is corrosive to METALS (such as IRON, MAGNESIUM, ZINC, LEAD and COPPER).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Use special Mercury vapor suppressants or charcoal-filtered vacuum for spill collection.

DO NOT wash into sewer.

Mercuric Sulfate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

0.1 mg/m³, 8-hr TWA OSHA:

- NIOSH: 0.05 mg/m³, 10-hr TWA 0.1 mg/m³, Ceiling
- ACGIH: 0.025 mg/m³, 8-hr TWA

 10 mg/m^3 IDLH:

The Protective Action Criteria values are: $PAC-1 = 0.037 \text{ mg/m}^3$ $PAC-2 = 0.148 \text{ mg/m}^3$ PAC-3 = 14.8 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns, rash, and itching
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and metallic taste in the mouth

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Nonflammable	
Specific Gravity:	6.47 (water = 1)	
Water Solubility:	Decomposes/Reacts	
Boiling Point:	Decomposes	
Molecular Weight:	296.6	

PROT	ECTIVE	

Gloves:	Butyl, Nitrile, Neoprene, Natural Rubber, PVC, Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Mercury</i>)
Coveralls:	Tychem® SL, CPF 3, BR, Responder® and TK (>8-hr breakthrough for <i>Mercury</i>)
Respirator:	 >0.025 mg/m³ - Full facepiece APR with filters specific for Mercury >2.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: MERCURY, ELEMENTAL AND INORGANIC COMPOUNDS

Synonyms: Colloidal Mercury; Quicksilver CAS No: 7439-97-6 Molecular Formula: Hg RTK Substance No: 1183 Description: Heavy, silvery, liquid metal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for	Mercury reacts with ACETYLENE to form explosive Acetylide.
0 - Fire	does not burn.	Mercury can form explosive compounds with AMMONIA and will explode when mixed with CHLORINE DIOXIDE; OXIDIZING
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2809	Use water spray to keep fire-exposed	BROMINE and FLUORINE); STRONG ACIDS (such as
ERG Guide #: 172	containers cool.	HYDROCHLORIC, SULFURIC and NITRIC); and METHYL
Hazard Class: 8 (Corrosive)		Mercury is not compatible with COMBUSTIBLE MATERIALS; METALS (such as ALUMINUM and COPPER); CALCIUM; SODIUM CARBIDE; AMINES; LITHIUM; and RUBIDIUM.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 500 meters (1/3 mile)

Cover spill with a *Sulfur compound* to prevent vaporization and collect with a charcoal filter vacuum.

Use *Zinc* or *Copper flakes* and a flashlight to check for remaining **Mercury** after clean-up.

Mercury is very toxic to aquatic life and bioaccumulates.

EXPOSURE LIMITS

NIOSH:0.05 mg/m³, 10-hr TWA (as Mercury vapor)
0.1 mg/m³, Ceiling (as Mercury)ACGIH:0.025 mg/m³, 8-hr TWA (as Mercury)IDLH:10 mg/m³ (as Mercury)

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

PAC-2 = 2.05 mg/m^3

PAC-3 = 4.1 mg/m^3

HEALTH EFFECTS

-	Irritation
Eyes:	Initation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath Nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	6.9 (air = 1)
Vapor Pressure:	0.002 mm Hg at 77°F (25°C)
Specific Gravity:	13.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	674°F (357°C)
Melting Point:	-38°F (-39°C)
Ionization Potential:	10.4 eV
Molecular Weight:	200.6

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® fabrics (>8-hr breakthrough)
Respirator:	 >0.025 mg/m³ - full facepiece APR with cartridges specific for Mercury >0.3 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: METHANE

Synonyms: Biogas; Fire Damp; Marsh Gas; Methyl Hydride CAS No: 74-82-8 Molecular Formula: CH₄ RTK Substance No: 1202

Description: Colorless and odorless gas or a liquid under pressure

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE GAS Stop flow of gas or allow to burn.	Methane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
4 - Fire	Methane is an explosion hazard in enclosed areas.	
0 - Reactivity	Liquefied Methane floats on water and boils. The	Methane can react violently with <i>boiling</i> WATER and
DOT#: UN 1971	POISONOUS GASES ARE PRODUCED IN FIRE	cold WATER.
ERG Guide #: 115	CONTAINERS MAY EXPLODE IN FIRE.	Liquefied Methane combined with liquefied OXYGEN can form an explosive mixture
Hazard Class: 2.1 (Flammable gas)	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash	

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Ground and bond all metal containers when transferring **Methane** and use non-sparking tools and equipment.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Keep **Methane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Methane is NOT harmful to aquatic life.

EXPOSURE LIMITS

ACGIH: Maintain 19.5% Oxygen content

The Protective Action Criteria values are: PAC-1 = 65,000 ppm PAC-2 = 230,000 ppm PAC-3 = 400,000 ppm

HEALTH EFFECTS

- Eyes: No information available
- Skin: Contact with *liquefied* gas can cause frostbite
- Inhalation: Headache, dizziness, weakness, nausea, vomiting, loss of coordination, increased breathing rate and loss of consciousness (ASPHYXIANT)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	-306 °F (-188 °C)
LEL:	5%
UEL:	15%
Auto Ignition Temp:	999 °F (537 °C)
Vapor Density:	0.55 (air = 1)
Vapor Pressure:	>760 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.42 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-259 °F (-162 °C)
Freezing Point:	-296.5 °F (-183 °C)
Critical Temp:	-116.5 °F (-82.5 °C)
Ionization Potential:	12.51 eV
Molecular Weight:	16.04

	PROTECTIVE EQUIPMENT
Gloves:	Insulated materials
Coveralls:	Tychem® CSM (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard!
Respirator:	< 19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.

Immerse affected part in warm water. Seek medical attention.



Common Name: METHIDATHION

Synonyms: DMTP; Supracide CAS No: 950-37-8 Molecular Formula: C₆H₁₁N₂O₄PS₃ RTK Substance No: 1206 Description: Colorless, odorless, crystalline solid which is often dissolved in a flammable or combustible liquid carrier

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Solid Methidathion does not burn, however it is often dissolved in a liquid carrier which may be	Methidathion is not compatible with WATER as it may decompose.
1 - Fire	flammable or combustible.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides, Sulfur Oxides and	
DOT#: UN 2783	Phosphorus Oxides.	
ERG Guide #: 152	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	COOI.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. Moisten spilled *solid* material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Very toxic to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Methidathion**.

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation	
Inhalation:	Headache, dizziness, constriction of the pupils (miosis) with blurred vision, muscle twitching, loss of coordination, convulsions and death	
Chronic:	Nausea, vomiting and abdominal pain	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Noncombustible (solid)	
Vapor Pressure:	1 x 10 ⁻⁶ mm Hg at 68°F (20°C)	
Specific Gravity:	1. 5 (water = 1)	
Water Solubility:	Soluble (degrades)	
Freezing Point:	102° to 104°F (39° to 40°C)	
Molecular Weight:	302.3	

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>4-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Organophosphorus compounds</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: 2-METHOXYETHYL ACETATE

Synonyms: EGMEA; Methyl Cellosolve® Acetate CAS No: 110-49-6 Molecular Formula: $C_5H_{10}O_3$ RTK Substance No: 1212 Description: Colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 1189 ERG Guide #: 129 Hazard Class: 3 (Elammable)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	 2-Methoxyethyl Acetate reacts slowly with WATER to form Acetic Acid and Methyl Alcohol. 2-Methoxyethyl Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep 2-Methoxyethyl Acetate out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

2-Methoxyethyl Acetate is harmful to aquatic organisms.

EXPOSURE LIMITS

			-
OSHA:	25 ppm, 8-	hr TWA	
NIOSH:	0.1 ppm, 1	0-hr TWA	
ACGIH:	0.1 ppm, 8	-hr TWA	
IDLH:	200 ppm		
The Protective Action Criteria values are:			
PAC-1	= 0.3 ppm	PAC-3 = 200 p	opm

PAC-1 = 0.3 ppm

PAC-2 = 20 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, vomiting, dizziness, confusion, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.64 ppm
Flash Point:	120°F (49°C)
LEL:	1.5%
UEL:	12.3 %
Auto Ignition Temp:	740°F (393°C)
Vapor Density:	4.1 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Soluble
Boiling Point:	293°F (145°C)
Freezing Point:	-85°F (-65°C)
Molecular Weight:	118.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough)
Respirator:	>0.1 ppm - Supplied air >0.3 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: METHYL ALCOHOL

Synonyms: Carbinol; Methanol; Wood Alcohol CAS No: 67-56-1 Molecular Formula: CH₃OH RTK Substance No: 1222 Description: Colorless liquid with a slightly sweet, strong odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health 3 - Fire 0 - Reactivity DOT#: UN 1268 ERG Guide #: 131 Hazard Class: 3 (Flammable liquid)	 Methyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back. Methyl Alcohol may form an ignitable vapor/air mixture 	Methyl Alcohol reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKYL ALUMINUM SALTS; ACETYL BROMIDE; CHROMIC ANHYDRIDE; MIXTURES of CHLOROFORM and SODIUM HYDROXIDE; PHOSPHORUS TRIOXIDE; MIXTURES of SULFURIC ACID and HYDROGEN PEROXIDE; ISOCYANATES; METALS (such as LEAD, MAGNESIUM and POTASSIUM); and NITRIC ACID. Methyl Alcohol attacks some PLASTICS, RUBBERS and COATINGS.
	in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of **Methyl Alcohol** should be grounded and bonded.

Keep **Methyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: 200 ppm, 8-hr TWA **NIOSH:** 200 ppm, 10-hr TWA; 250 ppm Ceiling

ACGIH: 200 ppm, 8-hr TWA; 250 ppm Ceiling IDLH: 6,000 ppm

The Protective Action Criteria values are: PAC-1 = 530 ppm PAC-2 = 2,100 ppm

PAC-1 = 550 ppm PAC-2 = 2,100 ppm PAC-3 = 7,200 ppm

HEALTH EFFECTS

Eyes:	Irritation, blurred vision and blindness.
	Irritation
Skin:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Inhalation:	Headache, dizziness, drowsiness, loss of consciousness and death

PHYSICAL PROPERTIES

Odor Threshold:	100 to 1,500 ppm
Flash Point:	52°F (11°C)
LEL:	6%
UEL:	36%
Auto Ignition Temp:	867°F (464°C)
Vapor Density:	1.1 (air = 1)
Vapor Pressure:	96 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Soluble
Boiling Point:	147°F (64°C)
Melting Point:	-144°F (-97.8°C)
Ionization Potential:	10.84 eV
Molecular Weight:	32.04

PROTECTIVE EQUIPMENT		
Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough)	
Coveralls:	Tychem® SL, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard.	
Respirator:	>200 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

 $\ensuremath{\text{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: METHYL AMYL ALCOHOL

Synonyms: Methyl Isobutyl Carbinol; 4-Methyl-2-Pentanol CAS No: 108-11-2 Molecular Formula: $C_6H_{14}O$ RTK Substance No: 1228 Description: Clear, colorless liquid with a mild odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID	Methyl Amyl Alcohol reacts violently with POTASSIUM BUTOXIDE.
2 - Fire	Use dry chemical, CO_2 , water spray or alcohol- resistant foam as extinguishing agents.	Methyl Amyl Alcohol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALLMETALS (such as LITHIUM, SODILIM and POTASSILM);
DOT#: UN 2053	Use water spray to keep fire-exposed containers cool and to disperse vapors.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC): ACID CHI ORIDES: NITROGEN COMPOLINDS: and
ERG Guide #: 129	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	HALOGENATED HYDROCARBONS (such as METHYLENE CHLORIDE and 1.1.1.TRICHLOROETHANE)
Hazard Class: 3 (Flammable)	Methyl Amyl Alcohol may form an ignitable vapor/air mixture in closed tanks or containers.	Methyl Amyl Alcohol may form <i>explosive peroxides</i> when distilled, evaporated or concentrated.
		Methyl Amyl Alcohol may accumulate static electricity.

SPILL/LEAKS

Isolation Distance:

OSHA:

NIOSH:

ACGIH:

IDLH:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Amyl Alcohol**.

Keep **Methyl Amyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

	Molecular We	eight: 102
EXPOSURE LIMITS		PROTEC
25 ppm, 8-hr TWA	Gloves:	Butyl, Neopi
25 ppm, 10-hr TWA; 40 ppm, STEL		(>8-hr break
25 ppm, 8-hr TWA; 40 ppm, STEL	Coveralls:	Tychem® B

HEALTH EFFECTS

400 ppm

Irritation and burns Irritation and burns
Nose and throat irritation with coughing and wheezing
Headache, dizziness, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.07 ppm
Flash Point:	106°F (41°C)
LEL:	1%
UEL:	5.5%
Auto Ignition Temp:	858°F (459°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	3 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	266° to 271°F (130° to 133°C)
Freezing Point:	-130°F (-90°C)
Molecular Weight:	102.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Neoprene, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>25 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

April 2010



Common Name: METHYL BENZOATE

Synonyms: Methyl Benzenecarboxylate; Niobe Oil CAS No: 93-58-3 Molecular Formula: $C_8H_8O_2$ RTK Substance No: 1230 Description: Colorless, oily liquid with a pleasant, fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	COMBUSTIBLE LIQUID	Methyl Benzoate may react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
2 - Fire	agents.	HYDROXIDE) and REDUCING AGENTS (such as
0 - Reactivity	Water spray may be used to blanket fire. DO NOT	form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 2938	POISONOUS GASES ARE PRODUCED IN FIRE.	Methyl Benzoate is not compatible with OXIDIZING
ERG Guide #: 152	Use water spray to keep fire-exposed containers	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 6.1	cool.	CHLORINE, BROMINE and FLUORINE) and STRONG
(Poison)		ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
		Methyl Benzoate decomposes slowly on contact with WATER.

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Benzoate**.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 6 ppm
- PAC-2 = 40 ppm
- PAC-3 = 75 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Pleasant, fruity odor
Flash Point:	181°F (83°C)
Vapor Density:	4.7 (air = 1)
Vapor Pressure:	1 mm Hg at 102°F (39°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	302°F (150°C)
Freezing Point:	10°F (-12°C)
Ionization Potential:	9.3 +/- 2 eV
Molecular Weight:	136.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Polyvinyl Alcohol, and Viton (>8-hr breakthrough for <i>Esters</i> , <i>Carboxylic</i>)
Coveralls:	Tychem® F, BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Esters</i> , <i>Carboxylic</i>)
Respirator:	>6 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL n-BUTYL KETONE

Synonyms: Butyl Methyl Ketone; MBK; Propylacetone CAS No: 591-78-6 Molecular Formula: $C_6H_{12}O$ RTK Substance No: 1280 Description: Colorless liquid with an *Acetone*-like odor

HAZA	DAT	ΓΑ

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	Methyl n-Butyl Ketone reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and ELUORINE)
0 - Reactivity DOT#: UN 1224 ERG Guide #: 127	Water may not be effective in fighting fires and solid streams of water may spread fire. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	Methyl n-Butyl Ketone is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: 3 (Flammable)	Use water spray to keep fire-exposed containers cool. Methyl n-Butyl Ketone may form an ignitable vapor/air mixture in closed tanks or containers.	HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl n-Butyl Ketone**.

Keep **Methyl n-Butyl Ketone** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 1 ppm, 10-hr TWA

ACGIH: 5 ppm, 8-hr TWA; 10 ppm, STEL IDLH: 1,600 ppm

The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 1,500 ppm PAC-3 = 1,600 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.076 to 3 ppm
Flash Point:	$77^{\circ}F(25^{\circ}C)$
	111 (23 0)
LEL:	1.2%
UEL:	8%
Auto Ignition Temp:	795°F (423°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	3.8 mm Hg at 77°F (25°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	262°F (128°C)
Freezing Point:	-70.4 (-56.9°C)
Ionization Potential:	9.34 eV
Molecular Weight:	100.18

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Polyvinyl Alcohol, Silver Shield®/4H®, and Barrier® (>8-hr breakthrough for <i>Ketones</i>)
Coveralls:	Tychem® F, BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL CHLOROFORM

Synonyms: Methyltrichloromethane; 1,1,1-Trichloroethane CAS No: 71-55-6 Molecular Formula: $C_2H_3Cl_3$ RTK Substance No: 1237 Description: Colorless liquid with an *Ether*-like odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 2831 ERG Guide #: 160 Hazard Class: 6 (Poison)	 Methyl Chloroform is nonflammable, but Methyl Chloroform vapors in containers can explode. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> and <i>Hydrogen Chloride</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 	Methyl Chloroform reacts violently with CHEMICALLY ACTIVE METALS and their ALLOYS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); DINITROGEN TETRAOXIDE; OXYGEN; and LIQUID OXYGEN. Methyl Chloroform reacts slowly with WATER to form toxic and corrosive Hydrogen Chloride gas. Methyl Chloroform is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ACETONE.		
		Keep Methyl Chloroform away from high energy sources, open flames or are welding as extremely toxic <i>Phosgene</i> and <i>Hydrogen Chloride gases</i> may form.		

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Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Methyl Chloroform is harmful to aquatic life.

EXPOSURE LIMITS

 OSHA:
 350 ppm, 8-hr TWA

 NIOSH:
 350 ppm, 15-min Ceiling

 ACGIH:
 350 ppm, 8-hr TWA; 450 ppm, Ceiling

 IDLH:
 700 ppm

The Protective Action Criteria values are:

PAC-1 = 230 ppm PAC-2 = 600 ppm

PAC-3 = 4,200 ppm

HEALTH EFFECTS

- Eyes:Irritation and burnsSkin:Irritation and burns
- Inhalation: Nose and throat irritation, headache, dizziness, lightheadedness and passing out. Higher levels can cause coma and death.

PHYSICAL PROPERTIES

Odor Threshold:	120 ppm
Flash Point:	>200°F (93.3°C)
LEL:	7%
UEL:	16%
Auto Ignition Temp:	932°F (500°C)
Vapor Density:	4.6 (air = 1)
Vapor Pressure:	100 mm Hg at 68°F (20°C)
Specific Gravity:	1.34 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	165°F (74°C)
Freezing Point:	-22°F (-30°C)
Ionization Potential:	11.0 eV
Molecular Weight:	133.42

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® CPF3, BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>230 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.





Common Name: METHYL CHLOROSILANE

Synonym: Chloromethylsilane CAS No: 993-00-0 Molecular Formula: CH₅ClSi RTK Substance No: 1240

Description: Colorless gas with a distinctive odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health 4 - Fire 2-W - Reactivity DOT#: UN 2534 ERG Guide #: 119 Hazard Class: 2.3 (Toxic gas)	 FLAMMABLE AND REACTIVE GAS Extinguish fire only if flow can be stopped. Use dry chemical, CO₂, alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. Water may form flammable and toxic gases. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i>. CONTAINERS MAY EXPLODE IN FIRE. Vapors may travel to a source of ignition and flash 	Methyl Chlorosilane may react violently with WATER; MOIST AIR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and ORGANIC ACIDS (such as ACETIC ACID) to form flammable and toxic <i>Hydrogen Chloride</i> and <i>Hydrogen gases</i> . Methyl Chlorosilane attacks many METALS in the		
	back.	presence of WATER and MOISTURE.		

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

- Large Spill: 300 meters (1,000 feet)
- Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Chlorosilane**.

Keep **Methyl Chlorosilane** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 1.8 ppm
- PAC-2 = 22 ppm

PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath

PHYSICAL PROPERTIES

Odor Threshold:	Distinctive odor
Flash Point:	16° to 55°F (-9° to 13°C)
Vapor Pressure:	137 mm Hg at 68°F (20°C)
Water Solubility:	Insoluble/Reactive
Molecular Weight:	80.6

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Organo-Silicon compounds</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Organo-Silicon compounds</i>)
Respirator:	>1.8 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: 4,4'-METHYLENEBIS(2-CHLOROANILINE)

Synonyms: Benzenamine, 4,4'-Methylenebis[2-Chloro-; MBOCA; MOCA CAS No: 101-14-4 Molecular Formula: $C_{13}H_{12}Cl_2N_2$ RTK Substance No: 1250 Description: Colorless to light brown crystalline solid or pellet with a faint odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	4,4'-Methylenebis(2-Chloroaniline) may burn, but does not readily ignite.	4,4'-Methylenebis(2-Chloroaniline) is not compatible with CHEMICALLY ACTIVE METALS (such as
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	POTASSIUM, SODIUM, MAGNESIUM and ZINC).
0 - Reactivity	extinguishing agents.	
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Nitrogen Oxides</i> .	
ERG Guide #: 152	CONTAINERS MAY EXPLODE IN FIRE.	
Hazard Class: None	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.003 mg/m³, 10-hr TWA

ACGIH: 0.11 mg/m^3 , 8-hr TWA

The Protective Action Criteria values are:

 $PAC-1 = 12.5 \text{ mg/m}^3$

 $PAC-2 = 75 \text{ mg/m}^{3}$

PAC-3 = 500 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

()	Chronic:	Cancer	(bladder)	in	humans
	Chronic:	Cancer	(bladder)	in	humans

PHYSICAL PROPERTIES

Odor Threshold:	Faint amine-like odor
Flash Point:	Combustible
Vapor Pressure:	2.86 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Specific Gravity:	1.44 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	396°F (202°C)
Melting Point:	210° to 225°F (99° to 107°C)
Molecular Weight:	267.2

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® (>8 hr breakthrough in <i>solution</i>)
Coveralls:	Tyvek (<i>solids</i>) and Tychem® SL, BR, CSM and TK (>8-hr breakthrough in <i>solution</i>)
Respirator:	Spill: full facepiece APR with <i>P100 filters</i> for <i>solids</i> Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.	Remove
contact lenses if worn.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 4,4'-METHYLENEBIS(N,N-DIMETHYLBENZENAMINE)

Synonyms: 4,4'-Bis(Dimethylamino)Diphenylmethane; Michler's Base CAS No: 101-61-1 Molecular Formula: $C_{17}H_{22}N_2$ RTK Substance No: 1252 Description: Odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	4,4'-Methylenebis(N,N-Dimethylbenzenamine) is not compatible with OXIDIZING AGENTS (such as
1 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	including Nitrogen Oxides.	CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: None	Use water spray to keep fire-exposed containers cool.	HUDRINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID
ERG Guide #: None		CHLORIDES; and ACID ANH YDRIDES.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 30 meters (100 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

No information about affects on aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **4**,**4**'-**Methylenebis(N,N-Dimethylbenzenamine)**.

	HEALTH EFFECTS
Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation
	Headache, fatigue, dizziness and a blue color to the skin and lips (methemoglobinemia)
Chronic:	Cancer (liver and thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	411°F (211°C)
Vapor Density:	8.8 (air = 1)
Vapor Pressure:	0.000075 mm Hg at 68°F (20°C)
Water Solubility:	Insoluble
Boiling Point:	734°F (390°C)
Melting Point:	194° to 196°F (90° to 91°C)
Molecular Weight:	254.4

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	Full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

September 2008



Common Name: METHYLENE CHLORIDE

Synonyms: Dichloromethane; Methylene Dichloride CAS No: 75-09-2 Molecular Formula: CH₂Cl₂ RTK Substance No: 1255 Description: Colorless, volatile liquid with a sweet odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 1593 ERG Guide #: 160 Hazard Class: 6.1 (Poison)	Methylene Chloride may burn, but does not readily ignite.Use dry chemical, CO2, water spray or foam as extinguishing agents.POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene.Use water spray to keep fire-exposed containers cool.		Methyla AGEN PERM CHLOI ACTIV MAGN (such a HYDR Methyla OXYG	ene Chloride reacts violently with OXIDIZING TS (such as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); CHEMICALLY E METALS (such as POTASSIUM, SODIUM, ESIUM and ALUMINUM); and STRONG BASES as SODIUM HYDROXIDE and POTASSIUM OXIDE). ene Chloride is not compatible with LIQUID EN; TITANIUM; and AMINES.	
SPI	LL/LEAKS			PH۱	SICAL PROPERTIES
Isolation Distance: Small Spill: 30 meters Large Spill: 60 meters Fire: 800 meters (1/2 Absorb liquids in verm similar material and p DO NOT wash into se Methylene Chloride r environment. Specia ground water contam	s (100 feet) s (200 feet) mile) iculite, dry sand, earth, or a lace into sealed containers. wer. may be hazardous in the l attention should be given to ination.		Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Ionization Poi Molecular We	Did: Temp: y: ire: ity: ity: : tential: ight:	25 to 150 ppm Nonflammable 13% 23% 1,033°F (556°C) 2.9 (air = 1) 440 mm Hg at 77°F (25°C) 1.3 (water = 1) Very slightly soluble 104°F (40°C) -142°F (-97°C) 11.32 eV 85
EXPOSURE LIMITS PROTECTIVE EQUIPMENT		TECTIVE EQUIPMENT			
OSHA: 25 ppm, 8-1 NIOSH: Lowest feat ACGIH: 50 ppm, 8-1 IDLH: 2,300 ppm PAC: PAC-1: 200 PAC-3: 6,9	nr TWA; 125 ppm, STEL sible concentration nr TWA 9 ppm; PAC-2 560 ppm; 00 ppm	1	Gloves: Coveralls: Respirator:	Polyvin breakth Tychem TEC; ai >25 ppr	yl Alcohol and Silver Shield®/4H® (>8-hr rough) n® Responder® and TK; Zytron® 500; ONESuit® nd Trellchem® HPS and VPS (>8-hr breakthrough) m - Supplied air
HEAL	TH EFFECTS		FIRS	T AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, th coughin breathHeadacHeadac lightheaChronic:Cancer	and burns and burns proat and lung irritation with g, wheezing and shortness of he, nausea, fatigue, dizziness, dedness, and unconsciousness (liver and lung) in animals		Remove the p Flush eyes wi contact lenses Quickly remov large amounts Begin artificial Transfer prom	erson fro th large a s if worn. ve contar s of soap l respirati nptly to a	m exposure. amounts of water for at least 30 minutes. Remove Seek medical attention. ninated clothing and wash contaminated skin with and water. on if breathing has stopped and CPR if necessary. medical facility.





Common Name: METHYL ETHYL KETONE PEROXIDE

Synonyms: 2-Butanone Peroxide; MEKP; MEK Peroxide CAS No: 1338-23-4 Molecular Formula: C₈H₁₆O₄ RTK Substance No: 1259 Description: Colorless to yellow liquid with a fragrant, mint-like odor, usually sold in 60% solution (with a *Phthalate* diluent) to prevent explosions

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health 2 - Fire	Methyl Ethyl Ketone Peroxide is a COMBUSTIBLE and REACTIVE LIQUID that may burn slowly at first, and after heating can burn violently and explosively.	Methyl Ethyl Ketone Peroxide (not in solution or diluted) decomposes explosively at temperatures above 230°F (110°C) or if exposed to SHOCK or FRICTION.	
4 - Reactivity	Use dry chemical, CO_2 , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Methyl Ethyl Ketone Peroxide is a STRONG OXIDIZER that may ignite or explode on contact with other substances.	Methyl Ethyl Ketone Peroxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, DEMANGANATES, CHLORATES, NETRATES, CHLORINE	
DOT#: UN 3101 ERG Guide #: 146		PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); COMBUSTIBLES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SOULMLUNDROXIDE and	
Hazard Class: 5.2 (Organic Peroxide)		POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANICS; METALS (such as IRON, STEEL, COPPER and ALUMINUM, and their ALLOYS).	
		Methyl Ethyl Ketone Peroxide is not compatible with MINERAL ACIDS; COBALT COMPOUNDS; AMINES; and ACETONE.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquid with fly ash, cement powder or commercial sorbents and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Ethyl Ketone Peroxide**.

Keep **Methyl Ethyl Ketone Peroxide** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.2 ppm, Ceiling

ACGIH: 0.2 ppm, Ceiling

The Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-3 = 20 ppm

PAC-2 = 20 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, and burns with possible damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Fragrant, mir
Flash Point:	125° to 200°
Auto Ignition Temp:	1,051°F (566
Vapor Density:	6.7 (air = 1)
Vapor Pressure:	<0.01 mm H
Specific Gravity:	1.12 (water =
Water Solubility:	Soluble
Boiling Point:	244°F (1 18°
	(110°C)
Molecular Weight:	176.2

Fragrant, mint-like odor 125° to 200°F (52° to 93°C) 1,051°F (566°C) 6.7 (air = 1) <0.01 mm Hg at 68°F (20°C) 1.12 (water = 1) Soluble 244°F (1 18°C), violent d ecomposition at 2 30°F (110°C) 176.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene and Viton (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Peroxides</i>)
Respirator:	>0.2 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL ISOAMYL KETONE

Synonyms: Isopentyl Methyl Ketone; MIAK; 5-Methylhexan-2-one CAS No: 110-12-3 Molecular Formula: $C_7H_{14}O$ RTK Substance No: 1267 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID	Methyl Isoamyl Ketone reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	extinguishing agents, as water may not be	PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity DOT#: UN 2302	effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; ALDEHYDES; and ISOCYANATES to cause fires and evolutions
ERG Guide #: 127	Use water spray to keep fire-exposed containers cool.	Methyl Isoamyl Ketone is not compatible with REDUCING
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and NITRIDES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Isoamyl Ketone**.
- Keep **Methyl Isoamyl Ketone** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	50 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 150 ppm	PAC-3 = 1,500 ppm
-----------------	-------------------

PAC-2 = 1,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.012 ppm
Flash Point:	97°F (36°C)
LEL:	1%
UEL:	8.2%
Auto Ignition Temp:	375°F (191°C)
Vapor Density:	3.9 (air = 1)
Vapor Pressure:	5.8 mm Hg at 77°F (25°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	294°F (146°C)
Freezing Point:	-101°F (-74°C)
Ionization Potential:	9.28 eV
Molecular Weight:	114.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl (1 to 4-hrs breakthrough); Silver Shield 0 /4H 0 and Barrier 0 (>8-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)
Respirator:	>50 ppm - Full facepiece APR with Organic vapor cartridges >150 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: N-METHYL-N-NITROSOETHYLCARBAMATE

Synonyms: N-Nitroso-N-Methylurethane CAS No: 615-53-2

CAS No: 615-53-2 Molecular Formula: $C_4H_8N_2O_3$ RTK Substance No: 1297 Description: Extremely volatile, light colored, yellow to pink oil with a sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol-	N-Methyl-N-Nitrosoethylcarbamate reacts with ACTIVE METALS (such as LITHIUM, POTASSIUM and SODIUM) and NITPIDES to form flammable and explosive Hydrogen
1 - Reactivity	agents.	gas. N-Methyl-N-Nitrosoethylcarbamate is not compatible with
DOT#: UN 3082 ERG Guide #: 171	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Environmentally Hazardous Material)		
		N-Methyl-N-Nitrosoethylcarbamate is unstable and

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Bioaccumulation in aquatic life is low.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Methyl-N-Nitrosoethylcarbamate**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Cancer (esophagus, skin, and lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Specific Gravity:
Vapor Pressure:
Water Solubility:
Boiling Point:
Molecular Weight:

Sweet odor Combustible 1.1 (water = 1) 1.18 mm Hg at 77°F (25°C) Slightly soluble 144° to 147°F (62° to 64°C) 132.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Responder®, CSM and TK (>8-hr breakthrough for <i>known carcinogens</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET

Common Name: METHYL MERCAPTAN

Synonyms:	Methylthioalcohol; Methyl Sulfhydrate; Mercaptomethane
CAS Number:	74-93-1
Molecular Formula:	CH₄S
RTK Number:	1275
Description:	Gas with disagreeable odor like garlic, or white liquid

HAZARD DATA				
Hazard Rating Firefighting Reactivi		Reactivit	у	
Health:4Fire:4Reactivity:1DOT #:UN 1064ERG #:117DOT Hazard:2.1(flammable gas) 2.3 (inhalation hazard)	InterligitingReactivityMethyl Mercaptan is a HIGHLY FLAMMABLE GAS. Stop flow of gas.Since violent reactions occur, Methyl Mercaptan must be stored to avoid contact wit OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MERCURY II OXIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER or NICKEL and their ALLOYS; ALUMINUM; and BLEACHES since violent reactions occur.Use water spray to reduce vapors.SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER or NICKEL and their ALLOYS; ALUMINUM; and BLEACHES since violent reactions occur.POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides. CONTAINERS MAY EXPLODE IN FIRE.Sources of ignition, such as smoking and open flames, are prohibited where Methyl Mercaptan is used, handled, or stored. Metal containers involving the transfer of Methyl Mercaptan should be grounded and bonded.Vapors may travel to a source of ignition and flash back.Use only non-sparking tools and equipment, especially when opening and closing containers of Methyl Mercaptan.			
SPI	LLS/LEAKS			PHYSICAL PROPERTIES
Isolation Distances: Small Spill: 30 m (100 ft) Large Spill: 200 m (600 ft) Fire: 1600 m (1 mile) Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Ventilate area of leak to disperse the gas. Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Liquid Methyl Mercaptan may be absorbed in vermiculite, dry sand, earth, or a similar material and placed in an appropriate container. Keep Methyl Mercaptan out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations. Do not allow this substance to enter waterways, including the sewer		ot be n the and, iner. /er, lesigned wer	Molecular Wei Flash Point: Vapor Density Vapor Pressu Specific Gravi Water Solubili Boiling Point: Melting Point: Ionization Pot Odor Thresho LEL: UEL:	ight: 48.1 -17 °C (0 °F) for liquid Methyl Mercaptan /: 1.66 (air = 1) re: 1520 mm Hg at 26 °C (79 °F) ity: 0.892 at 6 °C (42.8 °F) ity: Soluble 5.94 °C (42.7 °F) at 760 mm Hg : -178.6 °C (-189.4 °F) : 9.44 eV old: 0.002 ppm 3.9% 21.8%
EXPO	SURE LIMITS			PROTECTIVE EQUIPMENT
The following exposure limits are for Methyl Mercaptan:OSHA:10 ppm, never to be exceededNIOSH:0.5 ppm, 15 minACGIH:0.5 ppm, 8 h averageIDLH:150 ppmPAC:PAC-1 = 0.005 ppm, PAC-2 = 23 ppm, PAC-3 = 68 ppm			Gloves: Coverall: Respirator:	 Neoprene or Butyl DuPont Tychem® 6000, Tychem® 8000FR, Tychem® and Tychem® Responder CSM or the equivalent as protective materials for clothing. < 0.5 ppm - full facepiece respirator with <i>organic vapor cartridges</i> ≥ 500 ppm - SCBA
	EALTH EFFECTS		F	IRST AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Irritation, cou edema, he muscle we consciousr	ighing, shortness of breath, pulmo adache, nausea, vomiting, dizzine akness, loss of coordination, loss ness, death	onary ess, of	Remove the per Quickly remove Immediately wa Immediately flu 15 minutes, of Contact with ga Begin rescue b stopped and Transfer promp Medical observory	erson from exposure. e contaminated clothing. ash contaminated skin with large amounts of water. ush eyes with large amounts of water for at least occasionally lifting upper and lower lids. as or <i>liquid</i> can cause frostbite type injury. oreathing (using universal precautions) if breathing has I CPR if heart action has stopped. otly to a medical facility. vation is recommended for 24 to 48 hours after breathing re, as pulmonary edema may be delayed. August 2022



Common Name: METHYL PROPYL KETONE

Synonyms: Ethyl Acetone; MPK CAS No: 107-87-9 Molecular Formula: $C_5H_{10}O$ RTK Substance No: 1292 Description: Clear, colorless, liquid with a strong fruity odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
2 - Health 3 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires.		tant foam or g agents, as g fires.	Methyl Propyl Ketone reacts explosively with BROMINE TRIFLUORIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, DEPMANCANATES, CHI OPATES, NITRATES
0 - Reactivity DOT#: UN 1249 ERG Guide #: 127 Hazard Class: 3 (Flammable)	 POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		CED IN FIRE. IRE. I containers cool. tion and flash Ivel a distance to e source.	Methyl Propyl Ketone is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMINES; ISOCYANATES; HYDROGEN PEROXIDE; ALDEHYDES; NITRIC ACID; and PERCHLORIC ACID.
SPI	LL/LEAKS		F	PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 60 meter Large Spills: 270 met Fire: 800 meters (1/2 Absorb liquids in verm similar material and d Keep Methyl Propyl I such as sewers, beca explosion. DO NOT wash into se Slowly biodegrades in	olation Distance: mall Spills: 60 meters (200 feet) irge Spills: 270 meters (900 feet) re: 800 meters (1/2 mile) psorb liquids in vermiculite, dry sand, earth, or a imilar material and deposit in sealed containers. sep Methyl Propyl Ketone out of confined spaces, uch as sewers, because of the possibility of an xplosion. O NOT wash into sewer. owly biodegrades in water and soil		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potenti Molecular Weight	11 ppm 45°F (7°C) 1.5% 8.2% 846°F (452°C) 3 (air = 1) 27 mm Hg at 68°F (20°C) 0.8 (water = 1) Slightly soluble 216°F (102°C) ial: 9.39 eV :: 86.2
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA: 200 ppm, 8-hr TWA NIOSH: 150 ppm, 10-hr TWA ACGIH: 150 ppm, STEL IDLH: 1,500 ppm			Gloves: Bu br Coveralls: Du Ka (> Respirator: >1	tyl (<5-hr breakthrough) or Silver Shield®/4H® (>8-hr eakthrough) Pont Tychem® CPF 4, BR, LV, Responder®, TK; appler® Zytron® 300; and Saint-Gobain ONESuit® TEC 8-hr breakthrough for <i>Acetone</i>) 50 ppm - Full facepiece APR with Organic vapor
			>1	,000 ppm - Supplied air
HEALTH EFFECTS			FIRST	AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation Inhalation: Nose, th coughin breath Headac and pas	n, rash, dryness and redness nroat and lung irritation with g, wheezing and shortness of he, dizziness, lightheadedness ising out		Remove the perso Immediately flush lifting upper and lo rinsing. Quickly remove co skin with large am Begin artificial resp necessary. Transfer to a med	n from exposure. with large amounts of water for at least 15 minutes, ower lids. Remove contact lenses, if worn, while ontaminated clothing. Immediately wash contaminated ounts of soap and water. piration if breathing has stopped and CPR if ical facility.



Common Name: 1-METHYL-2-PYRROLIDONE

Synonyms: N-Methyl-2-Pyrrolidone CAS No: 872-50-4 Molecular Formula: C₅H₉NO RTK Substance No: 3716 Description: Colorless liquid with a mild, fishy odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	1-Methyl-2-Pyrrolidone is a COMBUSTIBLE LIQUID.	1-Methyl-2-Pyrrolidone is not compatible with OXIDIZING AGENTS (such as PERCHLORATES.
2 - Fire	Use dry chemical, CO_2 , water spray or alcohol-resistant	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	foam as extinguishing agents.	NITRATES, CHLORINE, BROMINE and
DOT#: UN 1993	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	HYDROCHLORIC, SULFURIC and NITRIC);
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	SODIUM, ALUMINUM and their HYDRIDES); and
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	STRONG BASES (such as SODIUM HYDROXIDE
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	and POTASSIUM HYDROXIDE).

Gloves:

Coveralls:

Respirator:

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)
Large Spill: 300 meters (1,000 feet)
Fire: 800 meters (1/2 mile)
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
DO NOT wash into sewer.
Potential for bioconcentration is low.

PHYSICAL PROPERTIES

Odor Threshold:	Mild fishy or amine odor
Flash Point:	204°F (96°C)
LEL:	1%
UEL:	9.5%
Auto Ignition Temp:	518°F (270°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	0.5 mm Hg at 77°F (25°C)
Specific Gravity:	1.03 (water = 1)
Water Solubility:	Soluble
Boiling Point:	396°F (202°C)
Melting Point:	-13°F (-25°C)
Molecular Weight:	99.1

PROTECTIVE EQUIPMENT

Butyl, Neoprene over Natural Rubber, and Silver

DuPont Tychem ® fabrics; Kappler Zytron® 400; Saint-

>10 ppm - Full facepiece APR with Organic vapor filter

Gobain ONESuit® TEC for Amides (>8-hr breakthrough)

EXPOSURE LIMITS

AIHA WEEL: 10 ppm, 8-hr TWA (American Industrial Hygiene Association Workplace Environmental Exposure Level) May be absorbed through the skin.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, rash, blisters, dryness and redness
Inhalation:	Nose and throat irritation with coughing and wheezing Headache, stomach pain, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Shield®/4H®

>100 ppm - Supplied air

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: 2-METHYL VALERALDEHYDE

Synonyms: 2-Formyl Pentane; 2-Methyl Pentaldehyde; 2-Methyl Pentanal CAS No: 123-15-9 Molecular Formula: C₆H₁₂O RTK Substance No: 1299 Description: Colorless liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
Hazard Rating 2 - Health 3 - Fire 1\# - Reactivity DOT#: UN 2367 ERG Guide #: 130 Hazard Class: 3	Firefighting FLAMMABLE AND WATER REACTIVE Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. Solid streams of water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	Reactivity2-Methyl Valeraldehyde is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMINES; and WATER.
(Flammable)	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion and flashback far from the source. 2-Methyl Valeraldehyde may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of 2-Methyl Valeraldehyde.

Metal containers involving the transfer of 2-Methyl Valeraldehyde should be grounded and bonded.

Keep 2-Methyl Valeraldehyde out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for 2-Methyl Valeraldehyde.

HEALTH EFFECTS

Irritation and burns Eves: Skin: Irritation and burns Inhalation: Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache and dizziness

PHYSICAL PROPERTIES Flash Point: 50° to 68°F (10° to 20°C)

LEL:	1.6%
UEL:	6.6%
Auto Ignition Temp:	347°F (175°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	9.75 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	243° to 248°F (117° to 120°C)
Freezing Point:	-148°F (-100°C)
Molecular Weight:	100.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® F, BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METOLACHLOR

Synonyms: Codal; Dual; Milocep; Primextra CAS No: 51218-45-2 Molecular Formula: C₁₅H₂₂CINO₂ RTK Substance No: 3374 Description: Odorless, off-white to colorless liquid when pure, and a white to tan or brown, oily liquid, with a sweet smell, in formulation

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	COMBUSTIBLE LIQUID	Metolachlor is not compatible with OXIDIZING AGENTS		
1 - Fire 0 - Reactivity DOT#: None	Commercial formulations of Metolachlor may be dissolved in a liquid carrier that is flammable or combustible. Use dry chemical, CO ₂ or foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and AZO		
ERG Guide #: 171	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen</i>	COMPOUNDS (such as DINITROANILINE).		
Hazard Class: None	Chloride.			

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Metolachlor is toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for Metolachlor.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless to sweet
Flash Point:	>230°F (>110°C)
Auto Ignition Temp:	510°F (266°C)
Vapor Pressure:	1.3 x 10 ⁻⁵ mm Hg at 68°F (20°C)
Specific Gravity:	1.12 (water = 1)
Water Solubility:	Soluble
Boiling Point:	212°F (100°C)
Melting Point:	-79.8°F (-62.1°C)
Molecular Weight:	283.81

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Barrier®
Coveralls:	Tychem® F, CPF3, and TK; Trellchem® HPS and VPS (for <i>Halogen compounds, aromatic</i>)
Respirator:	Small Spill - full facepeice APR with <i>Organic vapor</i> <i>cartridge</i> Large Spill - SCBA

HFA	І ТН	FFF	FCTS

Eyes: Irritation

Skin:

Irritation Inhalation: Nose and throat irritation with coughing and shortness of breath Headache, sweating, nausea and

vomiting, diarrhea, dizziness, tremors and convulsions

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



Common Name: METOLCARB

Synonyms:	3-Tolyl-N-Methylcarbamate; Dicresyl N-Methylcarbamate
CAS Number:	1129-41-5
Molecular Formula:	C ₉ H ₁₁ NO ₂
RTK Number:	2563
Description:	Colorless, sand-like powder, also comes in liquid form
Description:	Colorless, sand-like powder, also comes in liquid form

HAZARD DATA						
Hazard Rating	Firefighting			Reactivity		
Health: 3 Fire: 1 Reactivity: 1 DOT #: UN UN UN ERG #: 151 DOT Hazard: 6.1	l 2757 l 2992 1 (poison)	Use dry chemical, CO ₂ , water spray, or foam extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		m N FIRE, ainers cool.	Metolcark (such as POTAS	 is not compatible with STRONG BASES SODIUM HYDROXIDE and SIUM HYDROXIDE).
	SPIL	LS/LEAKS	Ĩ		PHYSIC	AL PROPERTIES
Isolation Distances: Molecular Weight: 165 Liquid Spill: 50 meters (150 feet) Melting Point: 76- Solid Spill: 25 meters (75 feet) Water Solubility: Slig Fire: 800 meters (1/2 mile) Vapor Pressure: 1 x Evacuate personnel. Secure and control entrance to the area. Vapor Pressure: 1 x If it is safe to do so, remove potential ignition sources. Absorb <i>liquids</i> in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT DRY SWEEP. Do not allow this substance to enter waterways, including sewers, as it is very toxic to aquatic life with long-lasting effects. Ventilate and wash area after clean-up is complete.		165.21 76-77 °C (169-171 °F) Slightly soluble 1 x 10 ⁻⁵ mm Hg at 25 °C (77 °F)				
EXPOSURE LIMITS		[P	ROTEC	TIVE EQUIPMENT	
There are no occupa PAC: PAC-1 = 0. PAC-2 = 4. PAC-3 = 2*	ational expo .44 mg/m ³ .8 mg/m ³ 1 mg/m ³	osure limits for this substance.		Gloves: Coverall: Respirator:	Nitrile and Tychem® High expos pressure- mode	Neoprene BR, CSM and TK, or the equivalent sure – supplied-air, full facepiece, -demand or another positive-pressure
ACU	TE HE	ALTH EFFECTS	ļ	FIRST	AID AN	D DECONTAMINATION
Eyes: Blu Skin: Nor Inhalation: Hea	irred vision ne reported adache, di loss of coo	d zziness, chest tightness, twitching, rdination, convulsions, coma, death	 Immediately flush eyes with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Remove contaminated clothing. Wash contaminated skin with soap and water. Shampoo hair immediately if contaminated. Remove the person from exposure. Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped. Transfer promptly to a medical facility. Medical observation is required for several days as symptoms may be delayed. In case of severe poisoning with Metolcarb consider administratior of <i>Atropine</i> in a medical facility. 			



Common Name: MIREX

Synonyms: Dechlorane; Ferriamicide CAS No: 2385-85-5 Molecular Formula: C₁₀Cl₁₂ RTK Substance No: 1306 Description: Odorless, white, crystalline solid

ΗΔΖ	ΠΔΤΔ	

Hazard Rating	Firefighting	Reactivity			
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mirex itself does not burn.	Mirex reacts with OXIDIZING AGENTS (such as			
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE.	CHI OPATES NITRATES CHI OPINE BROMINE and			
0 - Reactivity	including Hydrogen Chloride, Chlorine, Phosgene and Carbon Tetrachloride.	FLUORINE); LITHIUM; and TERTIARY BUTYL			
DOT#: UN 2761	Use water spray to keep fire-exposed containers	ALCOHOL.			
ERG Guide #: 151	cool.				
Hazard Class: 6.1					
(Poison)					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Mirex does not degrade and will bioaccumulate.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Mirex**.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	8 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	905°F (485°C) Decomposes
Molecular Weight:	546

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield/4H® and Viton (>8-hr breakthrough for Aromatic Halogen compounds)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit®TEC (>8-hr breakthrough for <i>Aromatic Halogen compounds</i>)
Respirator:	Outside or Low Exposure - APR with Organic vapor/acid gas cartridges and High efficiency prefilters Inside or High Exposure - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, burns with rash and redness
Inhalation:	Nose and throat irritation
	Nausea, vomiting, headache, dizziness, weakness, convulsions and passing out
Chronic:	Cancer (lung and thyroid) in animals



Common Name: MOLYBDENUM

Synonyms: None CAS No: 7439-98-7 Molecular Formula: Mo RTK Substance No: 1309 Description: Silver-white metal or a dark gray or black powder

	HAZARD DATA	
Hazard Rating	Firefighting	Reactivity
1 - Health	Molybdenum powder or dust may be FLAMMABLE.	Molybdenum reacts violently with OXIDIZING AGENTS
0 - Fire (Solid)	Molybdenum powder or dust is an explosion	PERMANGANATES CHI ORATES NITRATES
3 - Fire (Powder	hazard when mixed in air.	CHLORINE, BROMINE and FLUORINE) and STRONG
or Dust)	For solid Molybdenum, extinguish fire using an	ACIDS (such as HYDROCHLORIC, SULFURIC and
0 - Reactivity	agent suitable for type of surrounding fire as Molybdenum itself does not burn.	NITRIC).
DOT#: UN 3089 (Powder)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Molybdenum Oxides</i> .	
ERG Guide #: 170	CONTAINERS MAY EXPLODE IN FIRE.	
Hazard Class: 4.1 (Flammable solids)	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Molybdenum** *powder* use only non-sparking tools and equipment,

Keep **Molybdenum** *powder* and *dust* out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer as **Molybdenum** is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

EXPOSURE LIMITS

OSHA: 15 mg/m³, 8-hr TWA (as *total dust*)

ACGIH: 3 mg/m³, 8-hr TWA (as the *respirable fraction*)

IDLH: 5,000 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

Flash Point:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Nonflammable solid, Flammable *powder* or *dust* ~0 mm Hg at 68° F (20° C) 10.28 (water = 1) Insoluble 8,717°F (4,825°C) 4,752°F (2,622°C) 95.9

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >3 mg/m³ - full facepiece APR with *High efficiency filters* >30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: MOLYBDENUM PENTACHLORIDE

Synonyms: Molybdenum Chloride CAS No: 10241-05-1 Molecular Formula: MoCl₅ RTK Substance No: 1311 Description: Green, blue, gray or black, odorless solid

	HAZARD DATA	
Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Molybdenum Pentachloride	Molybdenum Pentachloride reacts with WATER, STEAM, and MOISTURE to produce corrosive Hydrogen
0 - Fire	itself does not burn.	Chloride gas.
1 - Reactivity	DO NOT USE WATER DIRECTLY on Molybdenum Pentachloride.	Molybdenum Pentachloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 2508	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 156	including Hydrogen Chloride and Chlorine gas.	concentrated NITRIC ACID
Hazard Class: 8	Use water spray to keep fire-exposed containers	
(Corrosive)	COOL Molybdenum Pentachloride may be an explosion hazard.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Keep dry and use a HEPA-filter vacuum or collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

PHYSICAL PROPERTIESOdor Threshold:OdorlessFlash Point:NonflammableVapor Pressure:1.75 mm Hg at 77°F (25°C)Specific Gravity:2.9 (water =1)Water Solubility:ReactsBoiling Point:514°F (268°C)Melting Point:381°F (194°C)

273.2

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing.
	Headache, weakness, nausea and vomiting

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

Molecular Weight:

>0.5 mg/m³ - full facepiece APR with *P100 filter* >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: MORPHOLINE

Synonyms: Diethyleneimide Oxide; Tetrahydro-2H-1, 4-Oxazine CAS No: 110-91-8 Molecular Formula: C_4H_9NO RTK Substance No: 1315 Description: Colorless liquid with a weak *Ammonia* or fish-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 1 - Reactivity	Morpholine is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides and Ammonia	Morpholine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires. Morpholine may react with REDUCING AGENTS (such
DOT#: UN 2054 ERG Guide #: 132	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	as LITHIUM, SÓDIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen</i> gas.
Hazard Class: 8 (Corrosive)		Morpholine is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPOXIDES; PHENOLS; and NITRO COMPOUNDS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Morpholine** out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially

when opening and closing containers of **Morpholine**. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 20 ppm, 8-hr TWA

- NIOSH: 20 ppm, 10-hr TWA; 30 ppm, STEL
- ACGIH: 20 ppm, 8-hr TWA
- **IDLH:** 1,400 ppm

The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 30 ppm PAC-3 = 1,400 ppm

HEALTH EFFECTS

Eyes:	Severe irritation and burns with possible damage
Skin: Inhalation:	Severe irritation and burns Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold: 0.01 to 0.07 ppm Flash Point: $98^{\circ}F$ ($37^{\circ}C$) LEL: 1.4% UEL: 11.2% Auto Ignition Temp: $555^{\circ}F$ ($291^{\circ}C$) Vapor Density: 3 (air = 1) Vapor Pressure: 6 mm Hg at $68^{\circ}F$ ($20^{\circ}C$) Specific Gravity: 1 (water = 1) Water Solubility: Soluble Boiling Point: $262^{\circ}F$ ($128^{\circ}C$) Freezing Point: $23.2^{\circ}F$ ($-4.9^{\circ}C$) Ionization Potential: 8.88 eV Molecular Weight: 87.12		
Flash Point: $98^\circ F (37^\circ C)$ LEL: 1.4% UEL: 11.2% Auto Ignition Temp: $555^\circ F (291^\circ C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $6 mm Hg at 68^\circ F (20^\circ C)$ Specific Gravity: $1 (water = 1)$ Water Solubility:SolubleBoiling Point: $262^\circ F (128^\circ C)$ Freezing Point: $23.2^\circ F (-4.9^\circ C)$ Ionization Potential: $8.88 eV$ Molecular Weight: 87.12	Odor Threshold:	0.01 to 0.07 ppm
LEL: 1.4% UEL: 11.2% Auto Ignition Temp: $555^{\circ}F (291^{\circ}C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $6 mm Hg at 68^{\circ}F (20^{\circ}C)$ Specific Gravity: $1 (water = 1)$ Water Solubility:SolubleBoiling Point: $262^{\circ}F (128^{\circ}C)$ Freezing Point: $23.2^{\circ}F (-4.9^{\circ}C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	Flash Point:	98°F (37°C)
UEL: 11.2% Auto Ignition Temp: $555^{\circ}F (291^{\circ}C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $6 mm Hg at 68^{\circ}F (20^{\circ}C)$ Specific Gravity: $1 (water = 1)$ Water Solubility:SolubleBoiling Point: $262^{\circ}F (128^{\circ}C)$ Freezing Point: $23.2^{\circ}F (-4.9^{\circ}C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	LEL:	1.4%
Auto Ignition Temp: $555^{\circ}F (291^{\circ}C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $6 mm Hg at 68^{\circ}F (20^{\circ}C)$ Specific Gravity: $1 (water = 1)$ Water Solubility:SolubleBoiling Point: $262^{\circ}F (128^{\circ}C)$ Freezing Point: $23.2^{\circ}F (-4.9^{\circ}C)$ Ionization Potential: $8.88 eV$ Molecular Weight: 87.12	UEL:	11.2%
Vapor Density: $3 (air = 1)$ Vapor Pressure: $6 mm Hg at 68^{\circ}F (20^{\circ}C)$ Specific Gravity: $1 (water = 1)$ Water Solubility:SolubleBoiling Point: $262^{\circ}F (128^{\circ}C)$ Freezing Point: $23.2^{\circ}F (-4.9^{\circ}C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	Auto Ignition Temp:	555°F (291°C)
Vapor Pressure: $6 \text{ mm Hg at } 68^\circ F (20^\circ C)$ Specific Gravity: 1 (water = 1) Water Solubility:SolubleBoiling Point: $262^\circ F (128^\circ C)$ Freezing Point: $23.2^\circ F (-4.9^\circ C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	Vapor Density:	3 (air = 1)
Specific Gravity:1 (water = 1)Water Solubility:SolubleBoiling Point: $262^{\circ}F (128^{\circ}C)$ Freezing Point: $23.2^{\circ}F (-4.9^{\circ}C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	Vapor Pressure:	6 mm Hg at 68°F (20°C)
Water Solubility:SolubleBoiling Point: $262^{\circ}F(128^{\circ}C)$ Freezing Point: $23.2^{\circ}F(-4.9^{\circ}C)$ Ionization Potential: 8.88 eV Molecular Weight: 87.12	Specific Gravity:	1 (water = 1)
Boiling Point: 262° F (128°C)Freezing Point: 23.2° F (-4.9°C)Ionization Potential: 8.88 eV Molecular Weight: 87.12	Water Solubility:	Soluble
Freezing Point:23.2°F (-4.9°C)Ionization Potential:8.88 eVMolecular Weight:87.12	Boiling Point:	262°F (128°C)
Ionization Potential:8.88 eVMolecular Weight:87.12	Freezing Point:	23.2°F (-4.9°C)
Molecular Weight: 87.12	Ionization Potential:	8.88 eV
	Molecular Weight:	87.12

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>20 ppm - full facepiece APR with Organic vapor cartridge >200 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.


Common Name: NAPHTHALENE

Synonyms: Moth Flakes; Naphthalin; Tar Camphor; White Tar CAS No: 91-20-3 Molecular Formula: C₁₀H₈ RTK Substance No: 1322

Description: Colorless, white or brown solid, in flake, cake or powder form, with a mothball odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Naphthalene is a COMBUSTIBLE SOLID. It may also be transported in a "molten" or heated form. The vapor given	Naphthalene may react violently with CHROMIC ANHYDRIDE and OXIDIZING AGENTS (such as	
2 - Fire	off when Naphthalene is heated is FLAMMABLE and a DANGEROUS FIRE HAZARD.	PERCHLORATES, PEROXIDES,	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents	CHLORINE, BROMINE and FLUORINE).	
UN 2304 (molton)	POISONOUS GASES ARE PRODUCED IN FIRE.	Protect from DIRECT SUNLIGHT.	
ERG Guide #: 133	Use water spray to keep fire-exposed containers cool and to reduce vapors.		
Hazard Class: 4.1 (Flammable solid)	Molten Naphthalene may form an ignitable vapor/air mixture. Finely dispersed Naphthalene particles may form explosive mixtures in air.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten **Naphthalene** *powder* or *flake* first or use a HEPAfilter vacuum for clean-up and place into sealed containers for disposal.

Shovel *molten* **Naphthalene** into a suitable, dry container. Keep *molten* **Naphthalene** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Ground and bond containers when transferring *molten* **Naphthalene**.

Use only non-sparking tools and equipment, especially when opening and closing containers of *molten* **Naphthalene**.

Naphthalene is toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

 OSHA:
 10 ppm, 8-hr TWA

 NIOSH:
 10 ppm, 10-hr TWA; 15 ppm STEL

 ACGIH:
 2 ppm, 8-hr TWA

 IDLH:
 250 ppm

The Protective Action Criteria values are:

PAC-1 = 15 ppm PAC-2 = 15 ppm PAC-3 = 250 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing and
wheezing
Headache, fatigue, confusion, tremor, nausea
and vomitingChronic:Cancer (nasal and lung) in animals

PHYSICAL PROPERTIES Odor Threshold: 0.038 ppm Elash Beint: 174% (70%)

• • • • • • • • • • • • • • • • • • • •	
Flash Point:	174°F (79°C)
LEL:	0.9%
UEL:	5.9%
Auto Ignition Temp:	979°F (526°C)
Vapor Density:	4.42 (air = 1)
Vapor Pressure:	0.05 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	424°F (218°C)
Melting Point:	176°F (80°C)
Ionization Potential:	8.1
Molecular Weight:	128.2

	PROTECTIVE EQUIPMENT
Gloves:	Barrier®
Coveralls:	Tychem® F and CPF 3 (>8-hr breakthrough)
Respirator:	Spill: Full facepiece APR with Organic vapor/P100 cartridges
	Fire or >250 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility



Common Name: NEOHEXANE

Synonyms: 2,2-Dimethyl Butane; Ethyl Trimethyl Methane CAS No: 75-83-2 Molecular Formula: C_6H_{14} RTK Substance No: 1335 Description: Colorless liquid with a *Gasoline*-like odor

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1208 ERG Guide #: 128 Hazard Class: 3 (Flammable)	 Neohexane is a FLAMMABLE LIQUID. Use dry chemical, CO₂, alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Neohexane is lighter than water and may float and travel to a source of ignition. 		Neohexane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).	
SP	ILL/LEAKS	PH	IYSICAL PROPERTIES	
Isolation Distance: Small Spills: 60 meter Large Spills: 210 meter Fire: 800 meters (1/2 Absorb liquids in vermi similar material and do Keep Neohexane out sewers, because of th No information is avail- life.	s (200 feet) ers (900 feet) mile in all directions) iculite, dry sand, earth, or a eposit in sealed containers. of confined spaces, such as e possibility of an explosion. able about effects on aquatic	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Gasoline-like -54°F (-48°C) 1.2% 7% : 761°F (405°C) 3 (air = 1) 400 mm Hg at 86°F (30°C) 0.6 (water = 1) Insoluble 122° to 145°F (50° to 63°C) -148°F (-100°C) 86.2	
EXPO	SURE LIMITS	PR	OTECTIVE EQUIPMENT	
OSHA: None NIOSH: 100 ppm, 10 Ceiling ACGIH: 500 ppm, 8- IDLH:	0-hr TWA; 510 ppm, 15-min -hr TWA; 1,000 ppm STEL (as <i>n-Hexane</i>)	Gloves: Nitrile Coveralls: DuPo Resp Goba Respirator: >100 >1,10	e and Viton (>8-hr breakthrough) for <i>Hexane</i> ont Tychem® CPF 3, CPF 4, BR and LV, oonder® and TK; Kappler® Zytron® 300; and Saint- ain ONESuit® TEC (>8-hr breakthrough) for <i>Hexane</i>) ppm - Supplied air 00 ppm - SCBA	
HEAL	TH EFFECTS	FIRST A	ID AND DECONTAMINATION	
Eyes:IrritationSkin:IrritationInhalation:Nose an and wheHeadact and pase	, drying and cracking d throat irritation with coughing ezing ne, nausea, vomiting, dizziness sing out	Remove the person Flush eyes with larg contact lenses if wo Quickly remove cor skin with large amo Begin artificial respi necessary. Transfer to a medic	From exposure. ge amounts of water for at least 15 minutes. Remove orn. ntaminated clothing. Immediately wash contaminated ounts of soap and water. iration if breathing has stopped and CPR if cal facility.	



I

Common Name: NICKEL

Synonyms: Nickel Catalyst; Pulverized Nickel; Raney Alloy; Raney Nickel CAS No: 7440-02-0 Molecular Formula: Ni RTK Substance No: 1341 Descriptions: Nickel is an odorless, silvery, hard, metallic solid; Raney Nickel is a finely powdered, grayish metal

Hazard Ra	ating	Firefighting			Reactivity	
3 - Health 4 - Fire 1 - Reactivit DOT#: UN 2 (Nickel catal) ERG Guide Hazard Clas (Flammable	2881 yst, dry) #: 135 ss: 4.1 e Solid)	Firefighting Nickel powder and Raney Nickel are FLAMMABLE SOLIDS. Use dry sand, sodium chloride powder, graphite or an approved Class D extinguisher appropriate for extinguishing metal fires. DO NOT USE WATER directly on Nickel powder or Raney Nickel as flammable and explosive Hydrogen gas may be formed. DO NOT USE foam or CO₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Nickel Carbonyl and Nickel Oxide. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Nickel powder and dust, and Raney Nickel, may form ignitable dust/air mixtures in closed tanks or containers.		Reactivity Very fine Nickel powder and dust, and Raney Nickel, react with AIR and can spontaneously ignite or produce flammable and explosive Hydrogen gas. Nickel powder and Raney Nickel react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Nickel powder reacts violently with TITANIUM POWDER; POTASSIUM PERCHLORATE; and AMMONIUM NITRATE to cause fire and explosions. Nickel is not compatible with ALUMINUM; AMMONIA; AMMONIUM NITRATE; BROMINE PENTAFLUORIDE; DIOXANE; HYDRAZINE; METHANOL; NITRYL FLUORIDE; ORGANIC SOLVENTS; PHOSPORUS; POTASSIUM PERCHLORATE; SELENIUM; and SULFUR.		
SPILL/LEAKS				Pl	HYSICAL PROPERTIES	
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Cover with dry earth or sand and place into sealed containers for disposal. DO NOT wash into sewer. Use only non-sparking tools and equipment. Keep Nickel powder and dust, and Raney Nickel, out of confined spaces, such as sewers, because of the possibility of an explosion. EXPOSURE LIMITS OSHA: 1 mg/m ³ , 8-hr TWA NIOSH: 0.015 mg/m ³ , 10-hr TWA ACGIH: 1.5 mg/m ³ , 8-hr TWA IDLH: 10 mg/m ³ 8-hr TWA			Odor Thresh Flash Point: Vapor Presse Specific Grav Water Solubi Boiling Point Melting Point Molecular We Gloves: Coveralls:	old: ure: vity: lity: :: eight: eight: Nitr Tyv Use the	Odorless Nickel powder and Raney Nickel are Flammable 1 mm Hg at 3,290°F (1,810°C) 8.9 (water = 1) Insoluble 4,946°F (2,730°C) 2,651°F (1,455°C) 58.7 OTECTIVE EQUIPMENT ile and Neoprene ek® turn out gear or flash protection if ignition/fire is greatest hazard.	
The Protective Action Criteria values are: PAC-1 = 4.5 mg/m ³ PAC-2 = 10 mg/m ³ PAC-3 = 10 mg/m ³			Respirator:	Spil Fire	II - full facepiece APR with <i>P100 cartridges</i> e - SCBA	
HEALTH EFFECTS			FIR	ST A	ID AND DECONTAMINATION	
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, th coughing breath Headact vomiting Cancer	and burns and burns roat and lung irritation with g, wheezing and shortness of ne, dizziness, nausea and (lung) in humans and animals		Remove the p Flush eyes w contact lense Quickly remo large amount Begin artificia Transfer pror	berson f ith large s. ve cont is of soa il respira nptly to	from exposure. e amounts of water for at least 15 minutes. Remove taminated clothing and wash contaminated skin with ap and water. ation if breathing has stopped and CPR if necessary. a medical facility.
						July 2012



Chemical Name: NICKEL CARBONATE

Synonyms: Nickelous Carbonate, Nickel II Carbonate CAS No: 3333-67-3 Molecular Formula: NiCO₃ RTK Substance No: 3086 Description: Light green, odorless, solid or powder

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT ID #: UN 3086 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	 Extinguish fire using an agent suitable for type of surrounding fire. Nickel Carbonate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nickel Oxides</i> and <i>Nickel Carbonyl</i>. CONTAINERS MAY EXPLODE IN FIRE. Nickel Carbonate may ignite combustibles (wood, paper and oil). 	 Nickel Carbonate must be stored to avoid contact with ANILINE; HYDROGEN SULFIDE; FLAMMABLE SOLVENTS; HYDRAZINE; and METAL POWDERS (such as ZINC, ALUMINUM, and MAGNESIUM) since violent reactions occur. Nickel Carbonate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Nickel Carbonate decomposes on contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) or when HEATED to
		produce Carbon Dioxide.

Odor

SPILL/LEAKS

Isolation Distance: 50 meters (150 feet)

- Use a wet method or a vacuum with a HEPA filter for cleanup.
- DO NOT let this chemical enter the environment. It is toxic to aquatic organisms.

EXPOSURE LIMITS

1.0 mg/m³ 8-hr TWA (as *Nickel*) OSHA: 0.015 mg/m³ 10-hr TWA (as *Nickel*) NIOSH: 0.2 mg/m³ 8-hr TWA (as *Nickel*) ACGIH: 10 mg/m^3 IDLH LEVEL:

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Acute:	Coughing and wheezing	
Chronic:	Cancer. <i>Nickel compounds</i> may cause lung cancer in humans and animals. Skin allergy, asthma-like allergy, kidney damage	

PHYSICAL PROPERTIES		
Threshold:	No Odor	
Point:	Noncombustible	
4	$2.6 a/am^2$	

Flash Point:
Density:
Melting Point:
Solubility:

2.6 g/cm Decomposes Insoluble

PROTECTIVE EQUIPMENT		
Gloves:	No Information	
Coverall:	No Information	
Boot:	No Information	
Respirator:	>0.015 mg/m ³ N95	
	> 0.15 mg/m ³ SA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR is

necessary.

Transfer to a medical facility.



Common Name: NICKEL NITRATE

Synonyms: Nickel Dinitrate; Nickelous Nitrate CAS No: 13138-45-9 Molecular Formula: Ni(NO₃)₂ RTK Substance No: 1347 Description: Odorless, yellow to green, crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Nickel Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Nickel Nitrate may react violently with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
0 - Fire	combustion of other substances.	their HYDRIDES); MAGNESIUM; TIN II CHLORIDE;	
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	TETRAHYDRAZINE; and TETRAMINES. Nickel Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, DEDATED	
DOT#: UN 2725			
ERG Guide #: 140	including Nitrogen Oxides and Nickel Oxides.	CHLORINE BROMINE and ELLIORINE): CVANIDES:	
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool. Nickel Nitrate may ignite combustibles (wood, paper and oil).	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ESTERS; PHOSPHORUS; and BORON PHOSPHIDE.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Nickel Nitrate is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA
NIOSH: 0.015 mg/m³, 10-hr TWA
ACGIH: 0.1 mg/m³, 8-hr TWA (*inhalable fraction*)
IDLH: 10 mg/m³
(All of the above are for *Nickel*)

The Protective Action Criteria values are:

PAC-1 = 1.5 mg/m^3 PAC-2 = 12.5 mg/m^3 PAC-3 = 31.1 mg/m^3

HEALTH EFFECTS

_	
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	<i>Nickel compounds</i> cause cancer (lung, nose) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	2.05 (water = 1)
Water Solubility:	Soluble
Boiling Point:	278°F (136.7°C)
Melting Point:	134°F (56.7°C)
Molecular Weight:	182.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<1 mg/m ³ - full facepiece APR with <i>High efficiency filter</i> >1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: NICKEL OXIDE

Synonyms: Nickel Monoxide; Nickelous Oxide CAS No: 1313-99-1 Molecular Formula: NiO RTK Substance No: 3082 Description: Green to black crystalline powder that turns yellow when heated

HAZARD DATA

-		
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Nickel Oxide itself does not	Nickel Oxide reacts violently with IODINE; HYDROXGEN SULFIDE: mixtures of BARIUM OXIDE in AIR or
0 - Fire	burn.	CALCIUM OXIDE in AIR; FLUORINE GAS; and
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Nickel Carbonyl	HYDROGEN PEROXIDE to cause a fire and explosion hazard.
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Nickel Oxide is not compatible with STRONG ACIDS
ERG Guide #: 171	cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC); and ANILINIUM PERCHLORATE.
Hazard Class: 9		
(Environmentally		
Hazardous		
Substance)		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first, or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.

DO NOT wash into sewer.

Nickel Oxide is harmful to aquatic life.

EXPOSURE LIMITS

OSHA:	1 mg/m ³ , 8-hr TWA
NIOSH:	0.015 mg/m ³ , 10-hr TWA
ACGIH:	0.2 mg/m ³ , 8-hr TWA
IDLH:	10 mg/m ³
	(All of the above are for inorganic Nickel
	compounds measured as Nickel)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, itching and skin rash
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	<i>Nickel compound</i> s cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	6.67 (water = 1)
Water Solubility:	Insoluble
Melting Point:	3,603°F (1,984°C)
Ionization Potential:	9.5 +/-4 eV
Molecular Weight:	74.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough)	
Coveralls:	DuPont Tyvek®	
Respirator:	<0.015 mg/m ³ - APR with High efficiency filter >0.015 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: NICOTINE

Synonyms: 1-Methyl-2-(3-Pyridyl)Pyrrolidine CAS No: 54-11-5 Molecular Formula: $C_{10}H_{14}N_2$ RTK Substance No: 1349

Description: Oily, colorless to pale yellow liquid, with a fishy odor, that turns brown with exposure to air

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Nicotine is not compatible with OXIDIZING AGENTS			
1 - Fire	foam as extinguishing agents.	PERMANGANATES, CHI ORATES, NITRATES,			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHI ORIC.			
DOT#: UN 1654	Use water spray to keep fire-exposed containers cool.	SULFURIC and NITRIC).			
ERG Guide #: 151	Nicotine, when heated above 203°F (95°C), may form				
Hazard Class: 6 (Poison)	an ignitable vapor/air mixture in closed tanks or containers. Vapor is heavier than air and may travel a distance to				
	cause a fire or explosion far from the source.				

Flash Point:

LEL:

UEL:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meter (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Nicotine is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.5 mg/m^3 , 8-hr TWA 0.5 mg/m³, 10-hr TWA NIOSH: ACGIH: 0.5 mg/m³, 8-hr TWA 5 mg/m^3 IDLH:

The Protective Action Criteria values are: PAC-1 = 1.5 mg/m³ PAC-2 = 3.5 mg/m³ PAC-3 = 5 mg/m^3

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								U I	5

Irritation Eves: Skin: Irritation, rash, and burning feeling Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, convulsions, restlessness, confusion, and even death

PHYSICAL PROPERTIES Odor Threshold: Fishy odor 203°F (95°C) 0.7% 4%

Auto Ignition Temp: 471°F (244°C) Vapor Density: 5.6 (air = 1) Vapor Pressure: 0.08 mm Hg at 68°F (20°C) **Specific Gravity:** 1.01 (water = 1) Water Solubility: Soluble **Boiling Point:** 475°F (246°C) (Decomposes) Freezing Point: -110°F (-79°C) **Ionization Potential:** 8.01 eV Molecular Weight: 162.2

PROTECTIVE EQUIPMENT

Gloves:

Butyl and SilverShield®/4H® (>4-hr breakthrough)

Coveralls: Tychem® SL, CPF3, BR, Responder® and TK (>8-hr breakthrough)

Respirator: >0.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: NITRIC ACID

Synonyms: Aqua Fortis; Hydrogen Nitrate CAS No: 7697-37-2 Molecular Formula: HNO₃ RTK Substance No: 1356

Description: Colorless to yellow liquid, or reddish if *fuming* Nitric Acid, with a characteristic, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
4 - Health	REACTIVE LIQUID	Nitric Acid reacts with WATER to release heat.	
0 - Fire 2 - Reactivity	Nitric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Nitric Acid reacts violently or explosively with most METALS and POWDERED METALS (such as ANTIMONY, BISMUTH, MANGANESE and TITANIUM); ALKALI METALS (such as LITHIUM,	
DOT#: UN 3031	Use water only in flooding quanitities. DO NOT USE CHEMICAL or FOAM as	SODIUM and POTASSIUM); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); and METAL HYDRIDES to form flammable and explosive <i>Hydrogen gas</i> .	
ERG Guide #: 157	extinguishing agents. Use water spray to reduce vapors.	Nitric Acid may react violently or cause fires with COMBUSTIBLES; ORGANICS (such as TURPENTINE, CHARCOAL and other	
Hazard Class: 8 (Corrosive)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	CARBON CONTAINING COMPOUNDS); AMMONIA; CYANIDES; SULFIDES; CARBIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
	Use water spray to keep fire-exposed containers cool.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ALCOHOLS.	

SPILL/LEAKS

Isolation Distance:

Small Spill:	30 meters	(100 feet)
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- Large Spill: 150 meters (500 feet)
- Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar noncombustible material and place into sealed containers for disposal. Neutralize remaining liquid with *Sodium Carbonate* or mild caustic.

Nitrogen Oxides are toxic to animal life.

EXPOSURE LIMITS

 OSHA:
 2 ppm, 8-hr TWA

 NIOSH:
 2 ppm, 10-hr TWA; 4 ppm STEL

 ACGIH:
 2 ppm, 8-hr TWA; 4 ppm STEL

 IDLH:
 25 ppm

The Protective Action Criteria values are:

PAC-1 = 0.16 ppm PAC-2 = 24 ppm PAC-3 = 92 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.29 to 0.98 ppm
Flash Point:	Nonflammable
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	48 mm Hg at 68°F (20°C)
Specific Gravity:	1.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	181°F (83°C)
Freezing Point:	-44°F (-42°C)
Ionization Potential:	11.95 eV
Molecular Weight:	63.02
pH:	1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough) (only Barrier® for <i>fuming</i> Nitric Acid)
Coveralls:	Tychem® CPF3, F, BR, Responder® and TK; and Trellchem®, HPS and VPS (>8-hr breakthrough)
Respirator:	 >2 ppm - full facepiece APR with acid gas filters specific for Nitric Acid >20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: NITRIC OXIDE

Synonyms: Nitrogen Monoxide CAS No: 10102-43-9 Molecular Formula: NO RTK Substance No: 1357

Description: Colorless gas with a sharp odor that spontaneously converts to Nitrogen Dioxide in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	REACTIVE AND STRONG OXIDIZER that enhances the combustion of other	Nitric Oxide reacts with AIR, OXYGEN, WATER and MOISTURE to form toxic and corrosive <i>Nitric Acid</i> and <i>Nitrogen</i>
0 - Fire	substances.	Dioxide.
2 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire.	Nitric Oxide may react violently or explosively with HALOGENS (such as FLUORINE and CHLORINE); NITROGEN
DOT#: UN 1660	POISONOUS GASES ARE PRODUCED IN	TRICHLORIDE; OZONE; and CHLORINE MONOXIDE.
ERG Guide #: 124	FIRE, including Nitrogen Oxides.	Nitric Oxide is not compatible with OXIDIZING AGENTS (such
Hazard Class: 2.3 (Toxic gas)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Nitric Oxide may ignite combustibles (wood, paper and oil).	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); COMBUSTIBLES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); POTASSIUM; BORON; CARBON DISULFIDE; FUELS; CHLORINATED HYDROCARBONS (such as TRICHLOROETHYLENE and METHYLENE CHLORIDE); OLEFINS: METALS (such as IRON_MANGANESE and
		MAGNESIUM); and METAL SALTS.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Purge system with inert gas prior to repairs.

EXPOSURE LIMITS

 OSHA:
 25 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 8-hr TWA

 ACGIH:
 25 ppm, 8-hr TWA

 IDLH:
 100 ppm

The Protective Action Criteria values are: PAC-1 = 0.61 ppm PAC-2 = 14.7 ppm PAC-3 = 24.5 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	0.3 to 1 ppm
Flash Point:	Nonflammable
Vapor Density:	1.04 (air = 1)
Vapor Pressure:	26,000 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	-177° to -241°F (-116° to -152°C)
Freezing Point:	-198° to -263°F (-128° to -164°C)
Critical Temperature:	-135°F (-93°C)
Molecular Weight:	30.01

PROTECTIVE EQUIPMENT

Gloves:	Teflon® (>4-hr breakthrough)
Coveralls:	Tychem® TK and Zytron® 500 (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: NITROCELLULOSE

Synonyms: Collodion; Cellulose Nitrate Solution; Pyroxylin Solution CAS No: 9004-70-0 Molecular Formula: Varies RTK Substance No: 1366

Description: White, granular chip or fibrous material, which is usually in a water or alcohol solution

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire (Nitrocellulose) 4 - Fire (Collodion) 3 - Reactivity (Nitrocellulose) 0 - Reactivity (Collodion) DOT#: UN 2556 (Solid) UN 2059 (Solution) ERG Guide #: 113 (Solid) 127 (Solution) Hazard Class:	 Firefighting Nitrocellulose is a FLAMMABLE LIQUID, or an EXPLOSIVE when dry, and can be ignited or exploded with HEAT, SPARKS, or FRICTION. For Nitrocellulose in solution, use dry chemical or CO₂ as extinguishing agents. For dry Nitrocellulose, use water spray or fog. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen Cyanides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 		 Reactivity Nitrocellulose, when dry, is shock sensitive and can ignite spontaneously and explode when exposed to HEAT; FLAMES; IGNITION SOURCES; AIR; SUNLIGHT or OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Nitrocellulose is not compatible with ACETYL PEROXIDE; BROMOAZIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); METALS; METAL SALTS; METAL OXIDES; and AMINES. Nitrocellulose attacks some RUBBER, COATINGS and PLASTICS. Nitrocellulose may accumulate static electricity when being filled into properly grounded containers. 	
4.1 (Flammable solid) 3 (Flammable liquid)				
SPILL	LEAKS		PHYSICAL PROPERTIES	
Isolation Distance: Small Spill: 100 meters (330 f Large Spill: 500 meters (1/3 n Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, ear place into sealed containers f For <i>dry</i> Nitrocellulose, thorou and place into tightly closed, w Keep Nitrocellulose out of co because of the possibility of a Use only non-sparking tools a opening and closing containe	reet) nile) rth, or a similar material and or disposal. ughly wet with water, sweep-up, water tight containers. nfined spaces, such as sewers, in explosion. nd equipment, especially when rs of Nitrocellulose .	Odor Three Flash Poin LEL: UEL: Auto Ignit Vapor Den Specific C Boiling Poin Molecular	areshold:Odorless to Ether or Alcohol-likeoint: $55^{\circ}F(13^{\circ}C)(Solid) < 0^{\circ}F(<-18^{\circ}C)(Solution)$ $1.9\%(Solution)$ $48\%(Solution)$ $48\%(Solution)$ ation Temp: $338^{\circ}F(170^{\circ}C)(Solution)$ Density: $2.6(Solution)$ air = 1 $2.6(Solution)$ $0.8(Solution)$ (water = 1)Point: $95^{\circ}F(35^{\circ}C)(Solution)$ ar Weight: 459 to 594	
EXPOSU	RE LIMITS		PROTECTIVE EQUIPMENT	
The Protective Action Crite PAC-1 = 60 mg/m ³ PAC-2 = 400 mg/m ³ PAC-3 = 500 mg/m ³	ria values are:	Gloves: Coveralls: Respirator	SilverShield®/4H® and Barrier® (>8-hr breakthrough for <i>Nitro</i> <i>compounds</i> and <i>Ethyl Ether</i>) S: Tychem® Responder and Trellchem VPS (>8-hr breakthrough for <i>Nitro compounds</i> and <i>Ethyl Ether</i>) (Use safety shoes with antistatic base and flash protection at >10% of the LEL) Dr: SCBA	
HEALTH	EFFECTS	FI	FIRST AID AND DECONTAMINATION	
Eyes: Irritation Skin: Irritation Inhalation: Nose and the Headache, d breathing an	roat irritation lizziness, difficulty d loss of consciousness	Remove to Flush eye contact le Remove of and water. Begin artii Transfer p	e the person from exposure. yes with large amounts of water for at least 15 minutes. Remove lenses if worn. e contaminated clothing and wash contaminated skin with soap er. rtificial respiration if breathing has stopped and CPR if necessary. r promptly to a medical facility.	



Common Name: NITROETHANE

Synonyms: None CAS No: 79-24-3 Molecular Formula: $C_2H_5NO_2$ RTK Substance No: 1373 Description: Colorless, oily liquid with a mild, fruity odor

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
2 - Health 3 - Fire 3 - Reactivity DOT#: UN 2842 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting FLAMMABLE AND REACTIVE Use dry chemical, CO ₂ , or alcohol-resistant foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.		Nitroeth STROM POTAS LITHIU (such a and a c OXIDE Nitroeth (such a PERMA CHLOF HYDRO Explosiv HIGH T	hane forms shock-sensitive compounds with NG BASES (such as SODIUM HYDROXIDE and SSIUM HYDROXIDE); ALKALI METALS (such as M, SODIUM and POTASSIUM); STRONG ACIDS IS HYDROCHLORIC, SULFURIC and NITRIC); combination of AMINES and HEAVY METAL S. hane is not compatible with OXIDIZING AGENTS IS PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); DCARBONS; and HYDROXIDES. // decomposition may occur with SHOCK and 'EMPERATURES, especially in confined spaces.	
SPI	LL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 f Fire: 800 meters (1/2 f Absorb liquids in vermi similar material and pl disposal. Use only non-sparking when opening and clo Keep Nitroethane out sewers, because of th DO NOT wash into sev	eet) mile) iculite, dry sand, earth, or a ace into sealed containers for tools and equipment, especially sing containers of Nitroethane . of confined spaces, such as e possibility of an explosion. wer.		Odor Thresho Flash Point: LEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Freezing Point Ionization Point Molecular We	old: Temp: /: ity: ity: ity: cential: ight:	2.1 ppm 82°F (28°C) 3.4% 778°F (414°C) 2.58 (air = 1) 15.6 mm Hg at 68°F (20°C) 1.05 (water = 1) Slightly soluble 237°F (114°C) -130°F (-90°C) 10.88 eV 75.1
EXPOSURE LIMITS				PRO	FECTIVE EQUIPMENT
OSHA: 100 ppm, 8- NIOSH: 100 ppm, 10 ACGIH: 100 ppm, 8- IDLH: 1,000 ppm The Protective Action 0 PAC-1 = 100 ppm PAC-2 = 200 ppm PAC-2 = 200 ppm	hr TWA D-hr TWA hr TWA Criteria values are: PAC-3 = 1,000 ppm		Gloves: Coveralls: Respirator:	Butyl an Tychem breaktl >100 pp	nd Silver Shield®/4H® (>8-hr breakthrough) l® BR, LV, Responder® and TK (>8-hr hrough for <i>Nitromethane</i>) om - SCBA
HEALTH EFFECTS			FIRS	T AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, th coughing shortnessMethematication:Methematication	roat and lung irritation with g, wheezing and severe is of breath (pulmonary edema) oglobinemia with headache, ind blue color to the skin and lips		Remove the p Flush eyes wit contact lenses Quickly remov large amounts Begin artificial Transfer prom Medical obser	erson from th large a s if worn. ve contant s of soap respiration iptly to a n vation is	m exposure. mounts of water for at least 15 minutes. Remove ninated clothing and wash contaminated skin with and water. on if breathing has stopped and CPR if necessary. medical facility. recommended as symptoms may be delayed.



Common Name: NITROGEN MUSTARD

Synonyms: Chloramine; HN-2; MBA; Mustine CAS No: 51-75-2 Molecular Formula: $C_5H_{11}CI_{12}N$ RTK Substance No: 1377 Description: Colorless to yellow, oily liquid with a soapy or fruity odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 1 - Fire 1 - Reactivity DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	Firetighting Nitrogen Mustard may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Chlorine, Nitrogen Oxides and Hydrogen Chloride. Use water spray to keep fire-exposed containers cool.		Nitroge AGEN their H Hydrog Nitroge (Such a PERM CHLOI fire. Nitroge	en Mustard may react violently with REDUCING TS (such as LITHIUM, SODIUM, ALUMINUM and IYDRIDES) to form flammable and explosive gen gas. en Mustard is not compatible with ISOCYANATES; GENATED ORGANIC COMPOUNDS; PHENOLS; IDES; ANHYDRIDES; and ACID HALIDES. en Mustard in contact with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE) may result in a en Mustard is unstable in LIGHT and HEAT.	
SP	LL/LEAKS			PH\	SICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters Large Spill: 270 meters Fire: 800 meters (1/2 Absorb liquids in verm similar material and co Ventilate and wash ar DO NOT wash into se Bioaccumulation is no	s (200 feet) rrs (900 feet) mile) hiculite, dry sand, earth, or a leposit into sealed containers. ea after clean-up is complete. wer. t expected.) Sand, earth, or a sealed containers. an-up is complete. Odor Three Vapor Der Vapor Pre Specific G Water Solu Boiling Po Freezing F Molecular		old: re: ity: ity: : : : : ight:	Soapy (low concentration) Fruity (high concentration) May burn 5.9 (air = 1) 0.43 mm Hg at 77°F (25° C) 1.2 (water = 1) Very slightly soluble 167°F (75° C) -76°F (-60°C) -76° to -85°F (-60° to -65°C) 156.1
EXPOSURE LIMITS				PRO	TECTIVE EQUIPMENT
U.S. Military: 0.003 mg/m ³			Gloves: Silver S Coveralls: DuPon Kapple (>8-hr Respirator: <0.003 >0.003		Shield®/4H® t Tychem® BR, LV, CSM, Responder®, and TK; r® Zytron® 300; and Saint-Gobain ONESuit® TEC breakthrough) mg/m ³ - Full facepiece APR with CBRN cartridges mg/m ³ - Supplied air
HEALTH EFFECTS			FIRS	FIRST AID AND DECONTAMINATION	
Eyes:IrritationSkin:Irritation blistersInhalation:Nose and and whe Headact and paseChronic:Cancer	n and burns n, severe burns with itching and nd throat irritation with coughing eezing he, dizziness, nausea, vomiting ssing out (leukemia and skin) in humans		Remove the p Flush eyes wi contact lenses Quickly remov large amounts Begin artificial Transfer prom	erson fro th large a s if worn. ve contar s of soap respirati aptly to a	om exposure. amounts of water for at least 15 minutes. Remove Seek medical attention immediately. minated clothing and wash contaminated skin with and water. Seek medical attention . ion if breathing has stopped and CPR if necessary. medical facility.



Common Name: NITROMETHANE

Synonyms: Nitrocarbol CAS No: 75-52-5 Molecular Formula: CH₃NO₂ RTK Substance No: 1386 Description: Colorless, oily liquid with a mild disagreeable or fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	Nitromethane is a FLAMMABLE LIQUID. Use CO ₂ , water spray or alcohol-resistant foam	Nitromethane is unstable and SHOCK; FRICTION or ELEVATED TEMPERATURES can cause explosive decomposition, especially when earfined		
3 - Fire	as extinguishing agents.	When commed.		
4 - Reactivity	DO NOT use dry chemical extinguishers on a fire. Nitromethane may explosively decompose from	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and		
DOT#: UN 1261	SHOCK, FRICTION or CONCUSSION.	FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE		
ERG Guide #: 129 Hazard Class: 3 (Elammable)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	and POTASSIUM HYDROXIDE); ALKYL METAL HALIDES (such as SODIUM CHLORIDE and LITHIUM BROMIDE); DIETHYL ALUMINUM BROMIDE; METHYL ZINC IODIDE; AMMONIA HYDROXIDE; CALCIUM HYPOCHLORITE; FORMALDEHYDE,		
	cool.	and many other substances.		
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Nitromethane may ignite combustibles (wood, paper and oil).	Nitromethane forms shock-sensitive mixtures with AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACETONE; ALUMINUM POWDER; COPPER; COPPER ALLOYS; and LEAD and LEAD ALLOYS.		
SPIL	L/LEAKS	PHYSICAL PROPERTIES		

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Keep **Nitromethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Does not accumulate in aquatic life.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
ACGIH:	20 ppm, 8-hr TWA
IDLH:	750 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation with drying, cracking and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, weakness, dizziness, nausea and vomiting
Chronic:	Cancer (liver, lung, glandular) in animals

Odor Thresho	ld:	3.5 ppm
Flash Point:		95 F (35 C) 7 3%
UEL:		62%
Auto Ignition	Temp:	785°F (418°C)
Vapor Density	·: ·	2.1 (air = 1)
Vapor Pressu	re:	27.8 mm Hg at 68°F (20°C)
Specific Gravi	ty:	1.14 (water = 1)
Water Solubili	ty:	Slightly soluble
Boiling Point:		214°F (101°C)
onization Pot	ential:	11.08 eV
Molecular Wei	ight:	61
PROTECTIVE EQUIPMENT		
Gloves:	Butyl an	d Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont	Tychem® BR, LV, CSM, Responder®, and TK;
	Kappler	Zytron® 300; and Saint-Gobain ONESuit®TEC
	(>8-hr b	reakthrough)
Respirator:	>20 ppn	n - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: 1-NITROPROPANE

Synonym: 1-NP CAS No: 108-03-2 Molecular Formula: $C_3H_7NO_2$ RTK Substance No: 1394 Description: Colorless liquid with a mild, fruity odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health 3 - Fire 2 - Reactivity DOT#: UN 2608	FLAMMABLE AND REACTIVE LIQUID Use CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	1-Nitropropane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE, POTASSIUM HYDROXIDE and CALCIUM HYDROXIDE)
ERG Guide #: 129 Hazard Class: 3 (Flammable)	 Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic charges. 1-Nitropropane may form an ignitable vapor/air mixture in closed tanks or containers. 	1-Nitropropane is not compatible with METAL OXIDES; AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and HYDROCARBONS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **1-Nitropropane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Use water spray to keep containers cool and to knock down vapors.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1-Nitropropane**. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 25 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 10-hr TWA

 ACGIH:
 25 ppm, 8-hr TWA

 IDLH:
 1,000 ppm

 The Protective Action Criteria values are:
 PAC-1 = 25 ppm

 PAC-2 = 25 ppm
 PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
	Dizziness, weakness, loss of coordination and restlessness

PHYSICAL PROPERTIES

E	
Odor Threshold:	11 ppm
Flash Point:	75° to 97°F (24° to 36°C)
LEL:	2.2%
Auto Ignition Temp:	789° to 802°F (421° to 428°C)
Vapor Density:	3.1 (air = 1)
Vapor Pressure:	13 mm Hg at 68°F (20°C)
Specific Gravity:	1.003 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	269°F (132°C)
Freezing Point:	-162°F (-108°C)
Ionization Potential:	10.81 eV
Molecular Weight:	89.09

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Polyvinyl Alcohol, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSODIETHYLAMINE

Synonyms: NDEA; Diethylnitrosoamine CAS No: 55-18-5 Molecular Formula: $C_4H_{10}N_2O$

RTK Substance No: 1404

Description: Pale yellow liquid with an Amine or Aromatic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 3082 ERG Guide #: 171 Hazard Class: 9 (Environmentally hazardous)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	N-Nitrosodiethylamine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANIC ANHYDRIDES; ACRYLATES; ALCOHOLS; ALDEHYDES; CRESOLS; ISOCYANATES; KETONES; GLYCOLS; PHENOLS; and VINYL ACETATE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Bioaccumulation is low in aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosodiethylamine**.

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver, lung, gastrointestinal tract) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Amine or Aromatic odor
Flash Point:	145.4°F (63°C)
Vapor Pressure:	0.86 mm Hg at 68°F (20°C)
Specific Gravity:	0.94 (water = 1)
Water Solubility:	Soluble
Boiling Point:	351°F (177°C)
Molecular Weight:	102.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Silver Shield®/4H® (>8-hr breakthrough)	
Coveralls:	DuPont Tychem® Responder®, CPF 3, F, CPF 4, BR, LV	
	and TK; Kappler® Zytron® 300; and Saint-Gobain	
	ONESuit® TEC (>8-hr breakthrough for Diethyl Amine)	
Respirator:	Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSODIMETHYLAMINE

Synonyms: Dimethylnitrosamine; Nitrosodimethylamine CAS No: 62-75-9 Molecular Formula: $(CH_3)_2N_2O$ RTK Substance No: 1405 Description: Yellow, oily liquid with a faint odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	N-Nitrosodimethylamine is a COMBUSTIBLE LIQUID.	N-Nitrosodimethylamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	resistant foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2810	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	N-Nitrosodimethylamine is not compatible with STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 153	Use water spray to keep fire-exposed containers	SULFURIC and NITRIC) and STRONG BASES (such as
Hazard Class: 6.1	cool.	SODIOM TTDROXIDE and FOTASSION TTDROXIDE).
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill (small): 60 meters (200 feet) (large): 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

N-Nitrosodimethylamine is toxic to aquatic organisms and may cause long-term adverse effects to the aquatic environment.

EXPOSURE LIMITS

NIOSH: Lowest feasible concentration

The Protective Action Criteria values are:

PAC-1 = 10 mg/m^3

PAC-2 = 19 mg/m^3 PAC-3 = 100 mg/m^3

HEALTH EFFECTS		
Eyes:	Irritation, and possible eye damage	
Skin:	Irritation (skin absorbable)	
Inhalation:	Nausea, vomiting, diarrhea and abdominal pain	
Chronic:	Cancer (lung, liver, kidney, nasal cavity) in animals	

PHYSICAL PROPERTIES

Flash Point:Vapor Density:Vapor Pressure:Specific Gravity:Water Solubility:Boiling Point:Ionization Potential:Molecular Weight:

142°F (61°C) 2.56 (air = 1) 5 mm Hg at 68°F (20°C) 1.01 (water = 1) Soluble 307°F (153°C) 8.69 eV 74.08

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Silver Shield®/4H® (>4-hr breakthrough)
Coveralls:	Tychem® F (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: N-NITROSODIPHENYLAMINE

Synonyms: Benzenamine, N-Nitro-N-Phenyl-; Diphenylnitrosamine; Nitrous Diphenylamide CAS No: 86-30-6Molecular Formula: $C_{12}H_{10}N_2O$ RTK Substance No: 1408 Description: Yellow to brown or orange powder or flake

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. N-Nitrosodiphenylamine	N-Nitrosodiphenylamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	itself does not burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	CHLORINE, BROMINE and FLUORINE).
DOT#: None	Use water spray to keep fire-exposed containers	
ERG Guide #: 171	cool.	
Hazard Class: None		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Flash Point:	326°F (163.4°C)
Spill: 25 meters (75 feet)	Specific Gravity:	1.23 (water = 1)
Fire: 800 meters (1/2 mile)	Water Solubility:	Insoluble
Moisten spilled material first or use a HEPA-filter	Boiling Point:	514°F (268°C)
vacuum for clean-up and place into sealed containers for disposal.	Melting Point:	152°F (67°C)
DO NOT wash into sewer.	Molecular Weight:	198.2

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosodiphenylamine**.

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Spill: Full facepiece APR with <i>High efficiency filters</i> Fire: SCBA

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information
Inhalation:	Nausea, vomiting and abdominal pain
Chronic:	Cancer (bladder) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSO-N-ETHYLUREA

Synonyms: ENU; N-Ethyl-N-Nitrosourea CAS No: 759-73-9 Molecular Formula: C₃H₇N₃O₂ RTK Substance No: 1410 Description: Light yellow powder or yellow-pink crystal

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	N-Nitroso-N-Ethylurea may burn, but does not readily ignite.	N-Nitroso-N-Ethylurea is highly sensitive to MOISTURE and LIGHT.
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	N-Nitroso-N-Ethylurea may be decomposed by
1 - Reactivity	extinguishing agents.	STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	reactive <i>Diazoethane</i> .
ERG Guide #: 171		
Hazard Class: 9		
(Miscellaneous Hazardous Material)		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Water Solubility:	Soluble
Spill: 25 meters (75 feet)	Melting Point:	217° to 219°F (103° to 104°C) (Decomposes)
Fire: 800 meters (1/2 mile)	Molecular Weight:	117.1
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Wash contaminated surfaces with 5% <i>Acetic Acid</i> after clean-up is complete.		
EXPOSURE LIMITS	PRO	DTECTIVE EQUIPMENT
No occupational exposure limits have been established for N-Nitroso-N-Ethylurea .	Gloves: Nitrilo Coveralls: Tyve Respirator: Full f	e and Natural Rubber k® acepiece APR with <i>High efficiency filter</i> s or SCBA

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation Headache, dizziness, lightheadedness, and weakness
Chronic:	Cancer (liver, brain, and intestines) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: N-NITROSOPYRROLIDINE

Synonyms: NPYR; NO-PYR CAS No: 930-55-2 Molecular Formula: C₄H₈N₂O RTK Substance No: 3000 Description: Yellow liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	N-Nitrosopyrrolidine is a COMBUSTIBLE LIQUID.	N-Nitrosopyrrolidine reacts vigorously with REDUCING AGENTS (such as LITHIUM, SODIUM,
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as	ALUMINUM and their HYDRIDES) and OXIDIZING
0 - Reactivity	extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 171	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

No environmental information is available.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosopyrrolidine**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Chronic:	Cancer (liver and lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Not available
Flash Point:	181°F (83°C)
Vapor Density:	1.2 (air = 1)
Vapor Pressure:	0.06 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Miscible
Boiling Point:	417°F (214°C)
Molecular Weight:	100.1

_	PROTECTIVE EQUIPMENT
Gloves:	Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.



Common Name: OCTANE

Synonyms: n-Octane; Normal Octane; Alkane C(8) CAS No: 111-65-9 Molecular Formula: C₈H₁₈ RTK Substance No: 1434 Description: Clear, colorless liquid with a gasoline-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	FLAMMABLE LIQUID	Octane is not compatible with OXIDIZING	
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity	Water may not be effective in fighting fires.	NITRATES, CHLORINE, BROMINE and	
DOT#• UN 1262	POISONOUS GASES ARE PRODUCED IN FIRE.	MATERIALS.	
	CONTAINERS MAY EXPLODE IN FIRE.		
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.		
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		
	Flow or agitation may generate electrostatic charges.		
	Octane may form an ignitable vapor/air mixture in closed		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of Octane.

DO NOT wash into sewer.

Octane may be hazardous to the environment, especially to aquatic organisms.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA

- NIOSH: 75 ppm, 10-hr TWA; 385 ppm, 15-min Ceiling
- ACGIH: 300 ppm, 8-hr TWA
- IDLH: 1,000 ppm

The Protective Action Criteria values are:

PAC-1 = 300 ppm PAC-2 = 385 ppm PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eves: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, lightheadedness, confusion and passing out

PHYSICAL PROPERTIES			
Odor Threshold:	48 to 150 ppm		
Flash Point:	56°F (13°C)		
LEL:	1%		
UEL:	6.5%		
Auto Ignition Temp:	403°F (206°C)		
Vapor Density:	3.9 (air = 1)		
Vapor Pressure:	10 mm Hg at 68°F (20°C)		
Specific Gravity:	0.7 (water = 1)		
Water Solubility:	Insoluble		
Boiling Point:	258°F (126°C)		
Melting Point:	-70°F (-57°C)		
Critical Temperature:	563°F (295°C)		
Ionization Potential:	9.82 eV		
Molecular Weight:	114.2		

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Fluoroelastomer and Viton (4 to 8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough) >10% LEL - Use flash protection or turn-out gear
Respirator:	>75 ppm - Supplied Air >300 ppm SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water



Common Name: ORYZALIN

Synonyms: Dirimal; Surflan CAS No: 19044-88-3 Molecular Formula: $C_{12}H_{18}N_4O_6S$ RTK Substance No: 3409 Description: Odorless, bright yellow-orange, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Oryzalin may burn, but does not readily ignite, however, it is often dissolved in a liquid carrier	Oryzalin is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
1 - Fire	which may be flammable or combustible.	HYDROXIDE).
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	
DOT#: UN 2588	POISONOUS GASES ARE PRODUCED IN FIRE,	
ERG Guide #: 151	including Nitrogen Oxides and Sulfur Oxides.	
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spills (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Oryzalin is toxic to aquatic organisms and can harm birds.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Oryzalin**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Headache, dizziness, muscle weakness, nausea and vomiting
Chronic:	Cancer (thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	200°F (93°C)
Vapor Pressure:	9.8 x 10 ⁻⁹ mm Hg at 77°F (25°C)
Specific Gravity:	1.1 to 1.2 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	212°F (100°C)
Melting Point:	286° to 288°F (141° to 142°C)
Molecular Weight:	346.4

Gloves: Butyl and Silver Shield®/4H® (>4-hr breakthrough for Amides)

Coveralls: Tyvek® (for *pesticides*, *hazardous dusts*)

Respirator: Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: OXALIC ACID

Synonyms: Oxalic Acid Dihydrate; Ethanedionic Acid CAS No: 144-62-7 Molecular Formula: $C_2H_2O_4$ RTK Substance No: 1445 Description: Colorless to white, odorless powder or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3261 ERG Guide #: 154	Oxalic Acid is a COMBUSTIBLE SOLID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Formic Acid. Use water spray to keep fire-exposed containers cool.	Oxalic Acid reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); FURFURYL ALCOHOL; and CHLORITES to cause fires and explosions. Oxalic Acid will react with SILVER and SILVER COMPOUNDS to form explosive <i>Silver Oxalate</i> . Oxalic Acid is not compatible with STRONG ACIDS (such
Hazard Class: 8 (Corrosive)	Use water spray to prevent dust/air mixtures from igniting or exploding.	as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and ACID CHLORIDES.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Neutralize liquid spills with lime or soda ash.

Oxalic Acid may be dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA

NIOSH: 1 mg/m³, 10-hr TWA; 2 mg/m³, STEL **ACGIH:** 1 mg/m³, 8-hr TWA; 2 mg/m³, STEL

IDLH: 500 mg/m³

The Protective Action Criteria values are: PAC-1 = 2 mg/m³ PAC-2 = 40 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, convulsions, coma and even death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Combustible
Vapor Density:	4.3 (air = 1)
Vapor Pressure:	<0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Sublimes (goes from a solid directly to a gas)
Melting Point:	215°F (101.5°C) (Decomposes)
Molecular Weight:	90.04
pH:	1.3 (in solution)

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Silver Shield®/4H® and Viton (>8-hr breakthrough for Oxalic Acid <i>in solution</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for Oxalic Acid <i>in solution</i>)
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters

>50 mg/m³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: 1,2-OXATHIOLANE, 2,2-DIOXIDE

Synonyms: Propane Sultone; 1,3-Propane Sultone CAS No: 1120-71-4 Molecular Formula: $C_3H_6O_3S$ RTK Substance No: 1446 Description: White, crystalline solid or colorless liquid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	1,2-Oxathiolane, 2,2-Dioxide may burn, but does not readily ignite.	1,2-Oxathiolane, 2,2-Dioxide reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
1 - Fire 0 - Reactivity DOT#: UN 2811 ERG Guide #: 154 Hazard Class: 6.1	 Extinguish fire using an agent suitable for type of surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Dioxide</i>. Use water spray to keep fire-exposed containers cool. 	their HYDRIDES) to produce toxic and flammable <i>Hydrogen Sulfide gas.</i> 1,2-Oxathiolane, 2,2-Dioxide reacts with MOIST AIR to form toxic <i>3-Propane Sulfonic Acid.</i>	
(Poison)			

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	>235° F (>113° C)
Spills (solid): 25 meters (75 feet)	Specific Gravity:	1.39 (water = 1)
(liquid): 50 meters (150 feet)	Water Solubility:	Slightly soluble
Fire: 800 meters (1/2 mile)	Boiling Point:	311° to 315° F (155° to 157° C)
Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.	Melting Point:	87° F (31° C)
Moisten spilled <i>solid</i> material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer.	Molecular Weight:	122.1

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
NIOSH: Lowest feasible	Gloves:	Nitrile and Neoprene (for <i>solid</i> 1,2-Oxathiolane, 2,2- Dioxide)
The Protective Action Criteria values are:	Coveralls:	Tyvek® (for <i>solid</i> 1,2-Oxathiolane, 2,2-Dioxide)
$PAC-1 = 0.5 \text{ mg/m}^3$	Respirator:	>0.5 mg/m ³ - SA or SCBA
PAC-2 = 3.5 mg/m^3		
PAC-3 = 250 mg/m ³		

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation	
Chronic:	Cancer (Leukemia and brain, skin and mammary gland)	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PARAFORMALDEHYDE

Synonyms: Metaformaldehyde; Paraform; Polyoxymethylene CAS No: 30525-89-4 Molecular Formula: (CH₂O)n (Polymer) RTK Substance No: 1454 Description: White, crystalline solid with an odor of *Formaldehyde*

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID	Paraformaldehyde decomposes slowly in WATER to form toxic and flammable <i>Formaldehyde</i> gas.
2 - Fire	resistant foam as extinguishing agents.	Paraformaldehyde is not compatible with OXIDIZING
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2213	including <i>Formaldehyde</i> , which is HIGHLY FLAMMABLE.	CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 133	Use water spray to keep fire-exposed containers	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC): STRONG BASES (such as SODIUM
Hazard Class: 4.1 (Flammable Solid)	cool. Paraformaldehyde may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 160°F (71°C).	HYDROXIDE and POTASSIUM HYDROXIDE); ISOCYANATES; ACID ANHYDRIDES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) and METALS (such as BRASS, COPPER, STEEL AND BRONZE).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Paraformaldehyde is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.75 ppm, 8-hr TWA; 2 ppm, STEL (as *Formaldehyde*) ACGIH: 0.3 ppm, Ceiling

IDLH: 20 ppm (as Formaldehyde)

The Protective Action Criteria values are:

PAC-1 = 12.5 mg/m³ PAC-2 = 75 mg/m³ PAC-3 = 100 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible damage
Skin:	Severe irritation and burns
Inhalation:	Nose, mouth, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Formaldehyde-like
Flash Point:	160°F (71°C)
LEL:	7%
UEL:	73%
Auto Ignition Temp:	572°F (300°C)
Vapor Density:	1.03 (air = 1)
Vapor Pressure:	1.2 mm Hg at 75°F (25°C)
Specific Gravity:	1.46 (water = 1)
Water Solubility:	Slowly dissolves
Boiling Point:	Decomposes
Melting Point:	313°F (156°C)
Molecular Weight:	600 (approx.)

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Formaldehyde</i>)
Coveralls:	Tychem® SL, CPF 3, F, BR, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Formaldehyde</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



RIGHT TO KNOW



HAZARDOUS SUBSTANCE FACT SHEET

Common Name: PARAOXON

Synonyms:	Phosphacol; Ester 25; Eticol; Fosfakol; Mintacol; Miotisal A; Soluglaucit
CAS Number:	311-45-5
Molecular Formula:	C ₁₀ H ₁₄ NO ₆ P
RTK Number:	1457
Description:	Odorless, reddish-yellow oil

HAZARD DATA			
Hazard Rating	Firefighting		Reactivity
Health: 4 Fire: 1 Reactivity: 1 DOT #: UN 3018 ERG #: 152 DOT Hazard: 6.1 (poison)	Use dry chemical, CO ₂ , alcohol o extinguishers, as water may no fighting fires. POISONOUS GASES ARE PRO including Oxides of <i>Nitrogen</i> ar CONTAINERS MAY EXPLODE Use water spray to keep fire-exp cool.	or polymer foam ot be effective in DUCED IN FIRE, and <i>Phosphorus.</i> IN FIRE. osed containers	Paraoxon is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SPILL	S/LEAKS	P	HYSICAL PROPERTIES
Isolation Distances: Liquid Spill: 50 meters (150 feet) Solid Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Absorb liquids in vermiculite, dry sand, earth or similar material and deposit in sealed containers. Do NOT allow this substance to enter waterways, including sewers, as it is very toxic to aquatic life with long-lasting effects. Ventilate and wash area after clean-up is complete.		Molecular We Specific Grav Boiling Point Water Solubil	ight: 275.22 ity 1.274 at 20° C (68° F) at 760 mm Hg 170° C (338° F) at 1mmHg ity: Slightly soluble
EXPOSURE LIMITS		PF	
There are no occupational exposure limits to this substance.		Gloves: Coverall: Respirator:	Nitrile and Neoprene Tychem® BR, CSM, and TK Supplied-air, full facepiece, pressure- demand or another positive-pressure mode
		FIRST	AID AND DECONTAMINATION
Eyes: Blurred vision Skin: No known effer Inhalation: Headache, diz tightness, two convulsions,	ects ziness, blurred vision, chest vitching, loss of coordination, coma, death	Immediately flu least 15 min Quickly remov area with lar Shampoo hair Remove the pa Begin rescue to breathing ha stopped. Transfer prom Medical observ symptoms m	ush eyes with large amounts of water for at utes. e contaminated clothing. Immediately wash ge amounts of soap and water. promptly if contaminated. erson from exposure. oreathing (using universal precautions) if is stopped and CPR if heart action has ptly to a medical facility. vation is required for several days as hay be delayed.



Common Name: PARAQUAT

Synonyms: Dimethyl Viologen; Pathclear; Sweep CAS No: 4685-14-7 Molecular Formula: C₁₂H₁₄N₂ RTK Substance No: 1458 Description: Colorless to yellow, odorless solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Paraguat itself does not burn	Paraquat is not compatible with OXIDIZING AGENTS
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	(SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES, CHI ORATES, NITRATES
0 - Reactivity	including Nitrogen Oxides.	CHLORINE, BROMINE and FLUORINE) and STRONG
DOT#: UN 2781	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
ERG Guide #: 151		
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Toxic to animals, birds and aquatic life.

EXPOSURE LIMITS

OSHA:	0.5 mg/m ³ , 8-hr TWA (as <i>respirable dust</i>)
NIOSH:	0.1 mg/m ³ , 10-hr TWA (as <i>Paraquat Dichloride</i>)
ACGIH:	0.5 mg/m ³ , 8-hr TWA (as <i>total particulate</i>) 0.1 mg/m ³ , 8-hr TWA (as the <i>respirable fraction</i>)
IDLH:	1 mg/m ³

HEALTH EFFECTS		
Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing, nose bleeds and severe shortness of breath (pulmonary edema)	
	Nausea and vomiting	
Chronic:	Cancer (skin) in animals	

PHYSICAL PROPERTIES

Odorless
Nonflammable
0 mm Hg at 68°F (20°C)
1.2 (water = 1)
Very soluble
347° to 356°F (175° to 180°C)
186

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H/®
Coveralls:	DuPont® Tyvek®
Respirator:	>0.1 mg/m ³ - full facepiece APR with Organic vapor

•	cartridges and High efficiency pre-filters
	<1 mg/m ³ - Supplied air
	>1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: PARATHION

Synonyms: Ethyl Parathion; Methyl Parathion CAS No: 56-38-2 Molecular Formula: C10H14NO5PS RTK Substance No: 1459 Description: Yellowish liquid with a garlic-like odor when pure, commercial product is usually dissolved in a hydrocarbon solvent (such as *Toluene* or *Xylene*)

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
4 - Health	Parathion is often dissolved in a liquid carrier which may be flammable or combustible.	Parathion is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
1 - Fire	Use dry chemical, CO ₂ , water spray or foam	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE) and ALKALINE MATERIALS (such as LIME, SODA ASH, and BAKING	
DOT#: UN 2783	FIRE, including Nitrogen Oxides, Sulfur Oxides,	SODA).	
ERG Guide #: 152	Phosphorus Oxides and Diethyl Sulfide.	Parathion attacks some forms of PLASTICS, RUBBER or COATINGS.	
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool and to disperse vapors.		

SPILL/LEAKS	PHYSI	CAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Treat liquid spills with an alkaline material (such as Calcium Carbonate or Soda Ash). Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. For Parathion (in a flammable solvent), use only non-sparking tools and equipment, especially when opening and closing containers of Parathion. Keep Parathion (in a flammable solvent) out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Parathion is a severe marine pollutant.	Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Molecular Weight:	0.04 ppm 248° to 320°F (120° to 160°C) 0.00004 mm Hg at 68°F (20°C) 1.26 (water = 1) Slightly soluble 707°F (375°C) 43°F (6°C) 291.2

EXPOSURE LIMITS

OSHA:	0.1 mg/m ³ , 8-hr TWA	
NIOSH:	0.05 mg/m ³ , 10-hr TWA	
ACGIH:	0.05 mg/m ³ , 8-hr TWA	
IDLH:	10 mg/m ³	
The Protective Action Criteria values are:		
PAC-1 = 0.15 mg/m^3 PAC-2 = 2 mg/m^3		
$PAC-3 = 10 mg/m^{3}$		

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)	
	Headache, sweating, nausea and vomitting, loss of coordination, and death (Organophosphate poisoning)	
Chronic:	Cancer (adrenal gland) in animals	

Gloves:	Butyl and SilverShield®/4H® (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough

- for Organophosphorus compounds) Full facepiece APR with Organic vapor cartridges and **Respirator:** P100 filters
 - >2.5 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: PENDIMETHALIN

Synonyms: Phenoxalin; Prowl®; Stomp® CAS No: 40487-42-1 Molecular Formula: C₁₃H₁₉N₃O₄ RTK Substance No: 3415 Description: Orange-yellow, crystalline solid with a fruit-like odor; the commercial products may be dark orange liquids

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Although Pendimethalin does not burn or burns with difficulty, it may be dissolved in a liquid carrier that is	Pendimethalin is not compatible with OXIDIZING AGENTS (such as
1 - Fire	flammable or combustible.	PERCHLORATES, PEROXIDES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including	FLUORINE).
ERG Guide #: None	Nitrogen Oxides.	Pendimethalin is slowly decomposed by light.
Hazard Class: None	Use water spray to keep fire-exposed containers cool.	
	Flow or agitation may generate electrostatic charges.	

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. **Pendimethalin** is toxic to aquatic life and does not biodegrade quickly.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Pendimethalin**.

PHYSICAL PROPERTIESOdor Threshold:FruityFlash Point: 92° to $>230^{\circ}$ F (33° to $>110^{\circ}$ C)Vapor Pressure: 3×10^{-5} mm Hg at 77° F (25° C)Specific Gravity:1.19 (water = 1)Water Solubility:InsolubleBoiling Point: 126° F (52° C)Melting Point: 117° to 127° F (47° to 53° C)

	PROTECTIVE EQUIPMENT
Gloves:	Viton/Butyl and Barrier® (>4-hr breakthrough for <i>Amines</i> and <i>Anilines</i>)
Coveralls:	Tyvek® for solids and aerosols
	Tychem® SL, BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for liquid mixtures containing Pendimethalin)
Respirator:	Small spill: full facepiece APR with <i>Organic vapor</i> and <i>P100 cartridges</i> Large spill or fire: SCBA

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HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Headache, dizziness, muscle weakness,
nausea and vomitingChronic:Cancer (thyroid) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: **PENTANE**

Synonyms: Amyl Hydride; Normal Pentane CAS No: 109-66-0 Molecular Formula: C_5H_{12} RTK Substance No: 1476 Description: Clear, colorless liquid with a mild gasoline-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Pentane may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
4 - Fire 0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
DOT#: UN 1265 ERG Guide #: 128	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Pentane is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODI M HYDROXIDE and
Hazard Class: 3 (Flammable)	Pentane may form an ignitable vapor/air mixture in closed tanks or containers.	POTASSIUM HYDROXIDE); and COMBUSTIBLE MATERIALS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Pentane**. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 1,000 ppm, 8-hr TWA

 NIOSH:
 120 ppm, 10-hr TWA; 610 ppm, 15-min Ceiling

 ACGIH:
 600 ppm, 8-hr TWA

 IDLH:
 1,500 ppm

The Protective Action Criteria values are:

PAC-1 = 610 ppm PAC-2 = 610 ppm PAC-3 = 1,500 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, confusion, lightheadedness, loss of balance and passing out

PHYSICAL PROPERTIES

Odor Threshold:	Gasoline-like
Flash Point:	-56°F (-49°C)
LEL:	1.5%
UEL:	7.8%
Auto Ignition Temp:	500°F (260°C)
Vapor Density:	2.48 (air = 1)
Vapor Pressure:	426 mm Hg at 68°F (20°C)
Specific Gravity:	0.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	97°F (36°C)
Freezing Point:	-202°F (-130°C)
Ionization Potential:	10.34 eV
Molecular Weight:	72.15

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic</i>)
Respirator:	>120 ppm - Supplied air >610 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PERMETHRIN

Synonyms: 3-Phenoxybenzyl (IRS)-cis-trans-3-(2,2-Dichlorovinyl)-2,2-Dimethylcyclopropanecarboxylate CAS No: 52645-53-1 Molecular Formula: C₂₁H₂₀Cl₂O₃ RTK Substance No: 3422 Description: White to pale yellow or beige granular or crystalline solid or a light brown liquid (*Pyrethroid insecticide*)

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Permethrin does not burn or burns with difficulty.	Permethrin is not compatible with OXIDIZING AGENTS
1 - Fire	However, it is often dissolved in a liquid carrier which may be flammable or combustible.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ , or foam as extinguishing	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2588	agents.	
ERG Guide #: 151	including Hydrogen Chloride.	
Hazard Class: 6.1 (Poison)	Use water spray only to keep fire-exposed containers cool.	

SPI	LL/L	.EA	KS
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Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Moisten *solid* material first or use a HEPA-filter

vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Permethrin is highly toxic to fish and aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Permethrin**.

РНү	SICAL PROPERTIES
Flash Point:	Varies (dependent on "carrier")
Vapor Pressure:	2.15 x 10 ⁻⁸ mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	392°F (200°C)
Melting Point:	93°F (34°C)
Molecular Weight:	391.3

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Coveralls:	Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Respirator:	Spill: full facepeice APR with Organic vapor cartridges and P100 prefilters Fire: SCBA

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation, burns, itching, rash and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness or breath
	Headache dizziness fatique muscle

Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PETROLEUM DISTILLATES

Synonyms: Crude Oil; Petroleum; Petroleum Oil CAS No: 8002-05-9 Molecular Formula: Varies RTK Substance No: 2648

Description: Dark yellow to brown or green-black liquids with a mild gasoline or kerosene odor

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUIDS	Petroleum Distillates may react violently with OXIDIZING AGENTS (such as NITROGEN TETROXIDE
3 - Fire	foam extinguishing agents, as water may not be effective	PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	FLUORINE) and NITRIC ACID.
DOT#: UN 1268	CONTAINERS MAY EXPLODE IN FIRE.	
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back.	
	Flow or agitation may generate electrostatic charges.	
	Petroleum Distillates may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meter	ers (150 feet)
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Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Bond and ground containers when transferring **Petroleum Distillates**.

Use only non-sparking tools and equipment.

Keep **Petroleum Distillates** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 500 ppm, 8-hr TWA

 NIOSH:
 88 ppm, 10-hr TWA; 450 ppm, Ceiling (15-minute)

 IDLH:
 1.100 ppm

The Protective Action Criteria values are:

PAC-1 = 87.5 ppm PAC-2 = 450 ppm

PAC-3 = 1,100 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, dizziness, confusion and loss of balance

PHYSICAL PROPERTIES

	.
Odor Threshold:	Mild gasoline or kerosene-like
Flash Point:	-40° to -86°F (-40° to -66°C)
LEL:	1.1%
UEL:	5.9%
Vapor Pressure:	40 mm Hg at 68°F (20°C) (approximately)
Specific Gravity:	0.78 to 0.97 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	86 ° to 460°F (30° to 238°C)
Freezing Point:	-99°F (-73°C)
Molecular Weight:	98 (approximately)

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)
Coveralls:	Tychem® BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i>)
	Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	>88 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PHENANTHRENE

combustion of wood and fossil fuels

Synonyms: Phenantrin; Coal Tar Pitch Volatiles CAS No: 85-01-8 Molecular Formula: C₁₄H₁₀ RTK Substance No: 3004 Description: Colorless to white, crystalline solid with a faint odor, also present as a by-product of incomplete

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Phenanthrene may burn, but does not readily ignite	Phenanthrene is not compatible with OXIDIZING
1 - Fire	Use dry chemical, CO_2 or water as extinguishing	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE.	
ERG Guide #: 171	cool.	
Hazard Class: 9		
(Environmentally Hazardous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Phenanthrene is an environmental hazard and very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.2 mg/m^3 , 8-hr TWANIOSH: 0.1 mg/m^3 , 10-hr TWAACGIH: 0.2 mg/m^3 , 8-hr TWAIDLH: 80 mg/m^3 (All the above are for Coal Tar Pitch Volatiles)The Protective Action Criteria values are:PAC-1 = 6 mg/m³PAC-2 = 40 mg/m³

PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

PHYSICAL PROPERTIES

Odor Threshold:	Aromatic odor
Flash Point:	340°F (171°C)
Vapor Density:	6.14 (air = 1)
Vapor Pressure:	1 mm Hg at 245°F (118.3°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	642°F (339°C)
Melting Point:	212°F (100°C)
Molecular Weight:	178.23

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Barrier® (>1-hr breakthrough for <i>Coal Tar Extract</i>)
Coveralls:	Tyvek®
Respirator:	>0.1 mg/m ³ - full facepiece APR with <i>Organic vapor</i> and <i>P100 cartridges</i>
	>1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Eves: Skin:

Inhalation:

Irritation and burns

(pulmonary edema)

out

Nose, throat and lung irritation with

Methemoglobinemia with headache,

dizziness, lightheadedness and passing

coughing and severe shortness of breath

Common Name: PHENOL

Synonyms: Carbolic Acid; Hydroxybenzene CAS No: 108-95-2 Molecular Formula: C₆H₅OH RTK Substance No: 1487

Description: Colorless or white, crystalline solid that is usually sold or used in solution

HAZARD DATA Hazard Rating Firefighting Reactivity Phenol is not compatible with OXIDIZING AGENTS (such as Phenol is a COMBUSTIBLE SOLID. 4 - Health PERCHLORATES, PEROXIDES, PERMANGANATES, Use dry chemical, CO₂, water spray or 2 - Fire CHLORATES, NITRATES, CHLORINE, BROMINE and alcohol-resistant foam as extinguishing FLUORINE); ALUMINUM CHLORIDE; CALCIUM 0 - Reactivity agents. HYPOCHLORITE; STRONG ACIDS (such as POISONOUS GASES ARE PRODUCED IN HYDROCHLORIC, SULFURIC and NITRIC); DOT#: UN 1671 FIRE. FORMALDEHYDE; ISOCYANATES; BUTADIENE; SODIUM ERG Guide #: 153 Use water spray to keep fire-exposed NITRITE; and many other materials. containers cool. Hazard Class: 6.1 Phenol is corrosive to COPPER, BRASS and STAINLESS (Poison) STEELS.

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	0.4 ppm
Spill: 25 meters (75 feet) (Solid)	Flash Point:	175°F (79.4°C)
50 meters (150 feet) (Liquid)	LEL:	1.3%
Eire: $800 \text{ meters} (1/2 \text{ mile})$	UEL:	8.6%
	Auto Ignition Temp:	1,319°F (715°C)
For Phenol in <i>solution</i> , cover with sand and place into	Vapor Density:	3.2 (air = 1)
sealed containers for disposal.	Vapor Pressure:	0.4 mm Hg at 68°F (20°C)
Collect solid material in the most convenient and	Specific Gravity:	1.1 (water = 1)
sate manner and place into sealed containers for	Water Solubility:	Soluble
disposal.	Boiling Point:	358°F (181°C)
DO NOT wash into sewer.	Melting Point:	106°F (41°C)
Neutralize water spills with dry lime or soda ash.	Ionization Potential:	8.5 eV
Phenol is harmful to aquatic life at very low	Molecular Weight:	94.1
concentrations.	pH:	6 (aqueous solution)

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 5 ppm, 8-hr TWA NIOSH: 5 ppm, 10-hr TWA; 15.6 ppm, 15-min Ceiling	Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
ACGIH: 5 ppm, 8-hr TWA IDLH: 250 ppm	Coveralls:	Tychem® BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
The Protective Action Criteria values are: PAC-1 = 15 ppm PAC-2 = 23 ppm PAC-3 = 200 ppm	Respirator:	>5 ppm - full facepiece APR with Organic vapor cartridges and High efficiency prefilters >50 ppm - SCBA
HEALTH EFFECTS	FIRS	ST AID AND DECONTAMINATION
Eyes: Irritation and burns	Remove the p	erson from exposure.

Flush eyes with large amounts of water for at least 30 minutes.	Remove
contact lenses if worn. Seek medical attention.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: PHENOTHRIN

Synonyms: 3-Phenoxybenzyl(1R)-cis-trans-Chrysanthemate; Phenothrine; Sumitrin CAS No: 26002-80-2 Molecular Formula: $C_{23}H_{26}O_3$ RTK Substance No: 3727 Description: Pale yellow to yellow-brown liquid *Pyrethroid* insecticide

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Phenothrin does not burn, however, it is often dissolved in a liquid carrier that may be	Phenothrin is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
1 - Fire	flammable or combustible.	HYDROXIDE).
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	
DOT#: UN 2902	POISONOUS GASES ARE PRODUCED IN FIRE.	
ERG Guide #: 151		
Hazard Class: 6.1 (Poison)		

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	Combustible/Flammable
Spill: 50 meters (150 feet)	Vapor Pressure:	1.43 x 10 ⁻⁷ mm Hg at 70°F (21°C)
Fire: 800 meters (1/2 mile)	Specific Gravity:	1.06 (water = 1)
Absorb liquids in dry sand, earth, or a similar material	Water Solubility:	Insoluble
and place into sealed containers for disposal.	Boiling Point:	>554°F (>290°C)
Phenothrin is very toxic to aquatic organisms.	Molecular Weight:	350.46

EXPOSURE LIMITS

No occupational exposure limits have been established for **Phenothrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H and Barrier® (>1-hr breakthrough for <i>Esters</i>)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for <i>Esters</i>)
Respirator:	Spill - full facepiece APR with <i>Organic vapor</i> and <i>P100</i> cartridges Fire - SCBA

	HEALTH EFFECTS
Eyes:	Irritation and burns
SKIII.	redness (skin absorbable)
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: m-PHENYLENEDIAMINE

Synonyms: 3-Aminoaniline; 1,3-Benzenediamine; 1,2-Phenylenediamine CAS No: 108-45-2 Molecular Formula: $C_6H_8N_2$ RTK Substance No: 1316 Description: White, crystalline solid that turns red on exposure to air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 1673 ERG Guide #: 153 Hazard Class: 6 (Toxic)	 m-Phenylenediamine may burn, but does not readily ignite. Use dry chemical or water as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. Use water spray to keep fire-exposed containers cool. 	m-Phenylenediamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID ANHYDRIDES; ACID CHLORIDES; and CHLOROFORMATES. Protect from SUNLIGHT.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

m-Phenylenediamine is very toxic to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.1 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

 $PAC-2 = 10 \text{ mg/m}^{3}$

PAC-3 = 125 mg/m^3

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Flash Point:	280° to 369°F (138° to 187°C)	
LEL:	1.3%	
UEL:	9.8%	
Auto Ignition Temp:	1,040°F (560°C)	
Vapor Density:	or Density: 3.7 (air = 1)	
Vapor Pressure:	ipor Pressure: 0.62 mm Hg at 212°F (100°C)	
Specific Gravity:	ecific Gravity: 1.1 (water = 1)	
Water Solubility:	lity: Very slightly soluble	
Boiling Point:	540° to 543°F (282° to 284°C)	
Melting Point:	Point: 145° to 147°F (63° to 64°C)	
Molecular Weight:	108.2	

PROTECTIVE EQUIPMENT

Gloves:	Butyl, SilverShield®/4H®; Barrier (>8-hr breakthrough for Amines, aromatic, primary)
Coveralls:	Tyvek® (<i>solid</i> m-Phenylenediamine); Tychem® BR and TK (>8-hr breakthrough for <i>Amines, aromatic, primary</i>)
Respirator:	 >0.1 mg/m³ - Full facepiece APR with Organic vapor cartridges and P100 prefilters >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



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Common Name: PHENYLMERCURIC ACETATE

Synonyms: Acetoxyphenylmercury; PMA CAS No: 62-38-4 Molecular Formula: C₈H₈HgO₂ **RTK Substance No: 1502** Description: Odorless, white to yellow-white, crystalline powder

HAZARD DATA							
Hazard Rati	ng Firefighting			Reactivity			
3 - Health 1 (Dry) - Fire 2 (Solution) - F 0 - Reactivity DOT#: UN 167 ERG Guide #: Hazard Class:	 <i>Dry</i> PhenyImercuric Acetate is SOLID, but it may be dissolved organic solution. Use dry chemical, CO₂, water spectringuishing agents. Water may not be effective in fig PhenyImercuric Acetate in an POISONOUS GASES ARE PRO including <i>Mercury Oxides</i>. Use water spray to keep fire-exp 	a C(in a l oray o hting orga DDU(OMBUSTIBLE FLAMMABLE or foam as g fires involving <i>anic solution</i> . CED IN FIRE, d containers cool.	PhenyImercuric Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; AMMONIA; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).			
SPILL/LEAKS				PHYSICAL PROPERTIES			
Isolation Distance:Small Spill: 30 meters (100 feet)Large Spill: 60 meters (200 feet)Fire: 800 meters (1/2 mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers.Moisten spilled dry material first or use a vacuum specific for <i>Mercury</i> for clean-up and place into sealed containers.Keep PhenyImercuric Acetate in organic solution out of confined spaces, such as sewers, because of the possibility of an explosion.DO NOT wash into sewer.PhenyImercuric Acetate is very toxic to aquatic organisms and may be bazardous to the environment			Odor Threshold Flash Point: Vapor Density: Vapor Pressure: Specific Gravity Water Solubility Melting Point: Molecular Weigh	 Odorless >100°F (38°C) 11.6 (air = 1) 6 x 10⁻⁶ mm Hg at 68°F (20°C) 0.24 (water = 1) Soluble 300°F (149°C) nt: 337 			
EXPOSURE LIMITS		1	PROTECTIVE EQUIPMENT				
OSHA: 0.1 n NIOSH: 0.05	ng/m ³ , 8-hr TWA mg/m ³ , 10-hr TWA 5 mg/m ³ 8 hr TWA		Gloves: B C b	utyl, Nitrile, Neoprene, Natural Rubber, Polyvinyl hloride, Silver Shield®/4H® and Viton (>8-hr reakthrough for <i>Mercury</i>)			
IDLH: 10 mg/m ³ (All of the above are for <i>Mercury vapor</i>)			Coveralls: T	ychem® SL, CPF 3, F, BR, LV, Responder® and TK >8-hr breakthrough for <i>Mercury</i>)			
			Respirator: < > >	0.5 mg/m ³ - APR with filter specific for <i>Mercury</i> 0.5 mg/m ³ - Supplied air 10 mg/m ³ - SCBA			
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION				
Eyes: Ir Skin: Ir a Inhalation: N c s	ritation and burns ritation and burns, skin rash, itching nd gray skin color lose, throat and lung irritation with oughing, wheezing and severe hortness of breath (pulmonary edema)		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of d water. Begin artificial respiration if breathing has stopped and CPP if percessary. 				
Chronic: Methylmercury compounds may cause cancer (kidney) in animals			Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.				


Common Name: o-PHENYLPHENOL

Synonyms: 2-Biphenylol; 2-Hydroxydiphenyl; 2-Phenylphenol CAS No: 90-43-7 Molecular Formula: $C_{12}H_{10}O$ RTK Substance No: 1439 Description: White, buff, to light lavender, crystalline solid

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
3- Health 1 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool. o-Phenylphenol in <i>powder</i> or <i>granular</i> form may form an ignitable vapor/air mixture in closed table or containers	o-Phenylphenol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Moisten spilled material with *Alcohol* first, or use a HEPA-filter vacuum for clean-up, and place into sealed containers for disposal.

Wash area with *Alcohol* and then with a strong soap and water solution.

DO NOT wash into sewer.

o-Phenylphenol is toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **o-Phenylphenol**.

The Protective Action Criteria values are:

PAC-1 = 75 mg/m³

 $PAC-2 = 500 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Flash Point:	255°F (124°C)
Auto Ignition Temp:	986°F (530°C)
Vapor Pressure:	1 mm Hg at 212°F (100°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	527° to 547°F (275° to 286°C)
Melting Point:	132° to 135°F (56° to 57°C)
pH:	11.2 to 11.6 (1% solution)
Molecular Weight:	170.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton (>8-hr breakthrough for <i>Hydroxyl</i> compounds, aromatic)
Coveralls:	Tyvek®
Respirator:	Small Spill: Full facepiece APR with <i>High efficiency filters</i> Large Spill or Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.



Common Name: PHENYTOIN

Synonyms: 5,5-Diphenylhydantoin CAS No: 57-41-0 Molecular Formula: $C_{15}H_{12}N_2O_2$ RTK Substance No: 1507

Description: Fine white or almost white, odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Phenytoin may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or foam as	Phenytoin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE) and may react with REDUCING AGENTS (such as LITHIUM, SODIUM,
DOT#: None	Use water spray to keep fire-exposed containers	ALUMINUM and their HYDRIDES).
ERG Guide #: None	cool.	
Hazard Class: None		

SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold:** Odorless **Isolation Distance:** 1.2 x 10⁻¹⁰ mm Hg at 77 °F (25 °C) Vapor Pressure: Spill: 25 meters (75 feet) **Specific Gravity:** 1.29 (water = 1) Fire: 800 meters (1/2 mile) Water Solubility: Very slightly soluble Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers **Boiling Point:** Decomposes for disposal. 563 ° to 568 °F (295 ° to 298 °C) **Melting Point:** Wash area with 60 to 70% Ethanol, followed by soap Molecular Weight: 252.28 and water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Phenytoin**.

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Spill: full facepiece APR with Organic vaporl Acid gas and P100 particulate filter cartridges Fire: SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION		
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Headache, dizziness, drowsiness, weakness, tremors and confusion Cancer (lymphatic system) in humans and (lymphatic system and liver) animals	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 		



Common Name: PHORATE

RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET

Synonyms	Synonyms: Rampart; Thimet; O-O-Diethyl-S-Ethylmercaptomethyl Dithiophosphate					
CAS Numi Molecular	CAS Number: 298-02-2					
	Pointula. 0/11/0	12F 03				
RTR Number: 1508						
Hazard Ra	ating	Eirefighting				Reactivity
	2	Use dry chemical CO ₂ foam extingu	ish	ers or water in		Phorate is not compatible with WATER and
Fire:	3	flooding quantities as fog.				ALKALIES.
Reactivity:	1	POISONOUS GASES ARE PRODUC		D IN FIRE, includ	ling	
DOT #:	UN 3018	CONTAINERS MAY EXPLODE IN F	iae IRE	tumes.		
	UN 2837	Use water spray only to keep fire-exp	oos	ed containers co	ol.	
ERG #:	152	Do not get water inside containers	•			
DOT Hazar	d: 6.1 (poison)					
	SPILLS	S/LEAKS	ľ		PH	YSICAL PROPERTIES
Isolation D	istances:			Melting Point	:	-43 °C (-45 °F)
Liquid Spil	I: 50 meters (150 fe	eet)		Flash Point:	•	160 °C (320 °F)
Solid Spill:	25 meters (75 fee	et)		Molecular We	ight:	260.39
Fire:	800 meters (1/2 r	nile)		Vapor Pressu	re:	0.0008 mm Hg at 20 °C (68 °F)
Evacuate pe	ersonnel.			Specific Grav	ity:	1.156 at 25 °C (77 °F)
Secure and	control entrance to the	e area.		Water Solubil	ity:	None
If it is safe to Absorb <i>liqui</i>	o do so, remove poten ds in vermiculite, dry s	tial ignition sources.		Boiling Point:		125-127 °C (257-261 °F) at 2 mm Hg
deposit in s	sealed containers.			Relative Dens	sity:	1.2 (water = 1)
Collect pow	dered material in the n	nost convenient and safe manner				
Do not allow	it in sealed containers.	er waterways, including sewers, as it				
is very toxi	c to aquatic life with lo	ng-lasting effects.				
Ventilate are	ea after clean-up is coi	mplete.	ľ			
	EXPOSU	RE LIMITS	-		PRO	TECTIVE EQUIPMENT
The followin	ng exposure limits are	for Phorate :		Gloves:	Nitrile	e and Neoprene
NIOSH:	0.05 mg/m ³ , 10-hour	average		Coverall:	I yche	em® BR, CSM and TK, or the equivalent.
	0.2 mg/m ³ , 15-minute	e maximum		Respirator.	>0.05 de	mg/m° – supplied-air, full facepiece, pressure-
ACGIH:	0.05 mg/m ³ . 8-hour a	average				······································
	0.2 mg/m ³ , short-tern	n exposure limit				
BAC:	PAC 1 = 0.0036 mg/s	m ³				
FAU.	$PAC-2 = 0.0030 \text{ mg/m}^3$					
	$PAC-3 = 0.12 \text{ mg/m}^3$					
	ACUTE HEALTH EFFECTS FIRST AID AND DECONTAMINATION					
Eyes:	Blurred vision			Immediately flu	ush eye	es with large amounts of water for at least
Skin:	Irritation			Quickly remov	e conta	aminated clothing Immediately wash area with
Inhalation:	Headache, dizzine	ess, chest tightness, twitching, loss of		large amour	nts of s	oap and water.
				Shampoo hair	immed	liately if contaminated.
				Remove the pe	erson f	rom exposure.
				stopped and	oreathii	ng (using universal precautions) if breathing has if heart action has stopped.
				Transfer prom	ptly to a	a medical facility.
				Medical obser	vation i	is recommended for several days as symptoms
				may be dela	iyed.	



Common Name: PHOSPHOROTHIOIC ACID, O,O-DIMETHYL-S-(2-(METHYLTHIO)

ETHYL ESTER

Synonyms: Methyl Demeton Methyl; Tinox CAS No: 2587-90-8 Molecular Formula: C₅H₁₃O₃PS₂ RTK Substance No: 2910 Description: Pale yellow, oily liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical. CO ₂ , water spray or foam as	Phosphorothioic Acid, O,O-Dimethyl-S-(2- Methylthio)Ethyl Ester may react with REDUCING
1 - Fire	extinguishing agents.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	their HYDRIDES) to produce highly toxic and flammable
DOT#: UN 3018	including <i>Phosphorus Oxides</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	DO NOT place Phosphorothioic Acid, O,O-Dimethyl-S-
ERG Guide #: 152	Use water spray to keep fire-exposed containers	(2-methylthio)Ethyl Ester into unined steel containers.
Hazard Class: 6.1	cool.	
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio)Ethyl Ester may be toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio)Ethyl Ester.

The Protective Action Criteria values are: PAC-1 = 12.5 mg/m^3 PAC-2 = 20 mg/m^3 PAC-3 = 20 mg/m^3

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Eyes:	No information available
Skin:	No information available (skin absorbable)
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Headache, sweating, nausea and vomiting, loss of coordination, and death (<i>Organophosphate poisoning</i>)
	High exposure can cause irregular heartbeat (arrhythmia)

PHYSICAL PROPERTIES

Flash Point:	243°F (117°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	446°F (230°C)
Molecular Weight:	216.25

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>4-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Respirator:	Full facepiece APR with cartridges approved for <i>Pesticides</i> >12.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately



Common Name: PHTHALIC ANHYDRIDE

Synonyms: 1,2-Benzendicarboxylic Anhydride; 1,3-Dioxophthalon; 1,3-Isobenzofurandione CAS No: 85-44-9 Molecular Formula: $C_8H_4O_3$ RTK Substance No: 1535 Description: Colorless to white, crystalline or peedle-shaped solid, or a pale liquid when in *m*

Description: Colorless to white, crystalline or needle-shaped solid, or a pale liquid when in *molten form*, with a strong, choking odor

HAZARD DATA **Hazard Rating** Firefighting Reactivity Phthallic Anhydride may burn, but does not Phthallic Anhydride reacts slowly with WATER to form Phthalic Acid 3 - Health readily ignite. and heat. The reaction may be violent. 1 - Fire Use dry chemical, CO₂, water spray or alcohol-Phthallic Anhydride reacts violently on heating with COPPER OXIDE or resistant foam as extinguishing agents. SODIUM NITRITE causing an explosion hazard. 0 - Reactivity DO NOT use solid streams of water. Phthallic Anhydride is not compatible with OXIDIZING AGENTS (such POISONOUS GASES ARE PRODUCED IN FIRE DOT#: UN 2214 as PERCHLORATES, PEROXIDES, PERMANGANATES, including Phthalic Acid. CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): ERG Guide #: 156 STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); Use water spray to keep fire-exposed containers STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM cool. Hazard Class: 8 HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, Phthallic Anhydride may form an ignitable (Corrosive) ALUMINUM and their HYDRIDES); AMINES; ALCOHOLS; and dust/air mixture in closed tanks or containers. AMMONIA. Phthallic Anhydride is corrosive to metals in the presence of WATER.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Slightly moisten spilled material first or use a HEPAfilter vacuum for clean-up and place into sealed containers for disposal.

For *molten* (*iquid*) **Phthallic Anhydride**, cover with dry lime, sand or soda ash and place into sealed containers for disposal.

Neutralize water spill with crushed limestone, soda ash or sodium bicarbonate.

EXPOSURE LIMITS

PAC-3 = 60 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

Odor Threshold:	0.053 ppm
Flash Point:	305°F (152°C)
LEL:	1.7%
UEL:	10.5%
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	5.1 (air = 1)
Vapor Pressure:	0.0002 mm Hg at 68°F (20°C)
Specific Gravity:	1.5 (flake) 1.2 (molten) (water = 1)
Water Solubility:	Slightly soluble (decomposes)
Boiling Point:	563°F (295°C)
Melting Point:	267°F (131°C)
Ionization Potential:	10 eV
Molecular Weight:	148.1

	PROTECTIVE EQUIPMENT
Gloves:	SilverShield®/4H® (>4-hr breakthrough)
Coveralls:	Tyvek® (for solid Phthallic Anhydride) and Tychem® CPF3, BR, Responder® and TK; and Trellchem HPS and VPS (>8-hr breakthrough for <i>liquid Anyhydrides, alicylic</i>)
Respirator:	>6 mg/m ³ - full facepiece APR with Organic vapor and High efficiency particulate cartridges>12 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: alpha-PINENE

Synonyms: 2-Pinene; Cyclic Dexadiene CAS No: 80-56-8 Molecular Formula: C₁₀H₁₆ **RTK Substance No: 0052** Description: Oily, colorless liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1- Health 3- Fire	alpha-Pinene is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective	alpha-Pinene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
0- Reactivity DOT#: UN 2368 ERG Guide #: 128	in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	CHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); PERCHROMATES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and OXIDIZING ACIDS (such as PEROXY(ACTIC ACID and
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back.	(such as PEROXYACETIC ACID and PEROXYBENZOIC ACID).

SPILL/LEAKS

Isolation Distance:

OSHA:

NIOSH:

ACGIH:

LEVELS:

IDLH:

PAC

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep **alpha-Pinene** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Harmful to aquatic life.

PHYSICAL PROPERTIES

Odor Threshold:	Turpentin
Flash Point:	91ºF (33º0
Auto Ignition Temp:	491ºF (25
Vapor Density:	4.7 (air =
Vapor Pressure:	4.9 mm H
Specific Gravity:	0.9 (water
Water Solubility:	Insoluble
Boiling Point:	313ºF (15
Melting Point:	-67ºF (-55
Freezing Point:	-81ºF (-63
onization Potential:	8.07 +/- 0.
Molecular Weight:	136.3

e-like C) 5°C) 1) g at 81°F (27°C) = 1) 6°C) °C) °C) 5 (eV)

PROTECTIVE EQUIPMENT EXPOSURE LIMITS 100 ppm, 8-hr TWA (as Turpentine) Gloves: Silver Shield®/4H® and Viton (>8-hr breakthrough for Turpentine) 100 ppm, 10-hr TWA (as *Turpentine*) **Coveralls:** DuPont Tychem® Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® PRO (>8-hr breakthrough 800 ppm (as Turpentine) for Turpentine) PAC-1 = 60 ppm; PAC-2 = 120 ppm;

Respirator: >20 ppm – Full facepiece APR with Organic vapor filter >200 ppm – Pressure demand supplied air >800 ppm – Pressure demand SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

PAC-3 = 1,500 ppm

20 ppm, 8-hr TWA

HEALTH EFFECTS	
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Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and wheezing Headache, dizziness, confusion, nausea and vomiting



Common Name: POLYCHLORINATED BIPHENYLS

Synonyms: Aroclor; Chlorodiphenyls; PCBs CAS No: 1336-36-3 Molecular Formula: C₁₂H_{10-n}Cl_n RTK Substance No: 1554 Description: Light yellow or colorless, thick, oily liquids

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 2315 ERG Guide #: 171 Hazard Class: 9 (Miscellancous)	 Polychlorinated Biphenyls may burn, but do not readily ignite. Use dry chemical, CO₂, water spray or alcoholresistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Polychlorinated Dibenzofurans</i> and <i>Chlorinated Dibenzo-p-dioxins</i>. Use water spray to keep fire-exposed containers and containers 	Polychlorinated Biphenyls are not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
Hazardous Materials)		

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Polychlorinated Biphenyls bioaccumulate and are hazardous to the environment.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA (42% Chlorine) and 0.5 mg/m³, 8-hr TWA (54% Chlorine)

 NIOSH:
 0.001 mg/m³, 10-hr TWA

ACGIH: 1 mg/m³, 8-hr TWA (42% *Chlorine*) and 0.5 mg/m³, 8-hr TWA (54% *Chlorine*)

IDLH: 5 mg/m³

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Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, and abdominal pain
Chronic:	Cancer (skin, brain, pancreas) in humans

PHYSICAL PROPERTIES

Flash Point:	286° to 385°F (141° to 196°C)
Auto Ignition Temp:	464°F (240°C)
Vapor Pressure:	0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	617° to 734°F (325° to 390°C)
Melting Point:	-2° to 50°F (-19° to 10°C)
Molecular Weight:	258 to 326

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>4-hr breakthrough)
Coveralls:	Tychem® CPF 2, SL, CPF 4 and Responder® (>8-hr breakthrough)
Respirator:	>0.001 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: POTASSIUM ARSENITE

Synonyms: Potassium Metaarsenite; Potassium Arsonate CAS No: 10124-50-2 Molecular Formula: $A_5H_3K_xO_4$ RTK Substance No: 1557 Description: White, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Potassium Arsenite itself does	Potassium Arsenite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form
0 - Fire	not burn.	toxic Arsine gas.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Arsine, Arsenic Oxides and Potassium	Potassium Arsenite attacks many METALS to form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 1678	Oxides.	Potassium Arsenite decomposes slowly in AIR and
ERG Guide #: 154	Use water spray to keep fire-exposed containers	CARBON DIOXIDE.
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Toxic to aquatic plants and animals.

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA NIOSH: 0.002 mg/m³, 15-min Ceiling ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 5 mg/m³ (All the above are for *inorganic Arsenic*)

HEALTH EFFECTS

Eyes:	Irritation, burns and red watery eyes
Skin:	Irritation, burns, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing and wheezing, weakness, nausea, vomiting, headache and muscle cramps
Chronic:	Inorganic Arsenic compounds cause skin, liver, and lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Water Solubility:	Soluble
Melting Point:	572°F (300°C) (decomposes slowly in air)
Molecular Weight:	254

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water.



Common Name: POTASSIUM CHROMATE

Synonyms: Chromate of Potash; Dipotassium Chromate: Potassium Bichromate CAS No: 7789-0-6 Molecular Formula: K₂CrO₄ RTK Substance No: 1561 Description: Yellow, odorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Potassium Chromate is not combustible, but it is	Potassium Chromate may react violently with REDUCING AGENTS (such as LITHUM, SODUM
0 - Fire	combustion of other substances.	ALUMINUM and their HYDRIDES) and COMBUSTIBLES
0 - Reactivity	Extinguish fire using an agent suitable for type of	(such as PAPER, WOOD and OILS).
DOT#: UN 3086	POISONOUS GASES ARE PRODUCED IN FIRE,	flammable Hydrogen gas.
ERG Guide #: 141	including Chromic Oxides and Potassium Oxides.	Potassium Chromate is not compatible with MINERAL
Hazard Class: 6.1	Use water spray to keep fire-exposed containers	NITRIC).
(Toxic)		- /

SPIL	L/LE	AKS
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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. DO NOT wash into sewer.

Potassium Chromate is very toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

- 0.005 mg/m³, 8-hr TWA OSHA:
- **NIOSH:** 0.001 mg/m³, 10-hr Ceiling
- **ACGIH:** 0.05 mg/m³, 8-hr
- 15 mg/m^3 IDLH:
- (All the above are for Chromium VI)

The Protective Action Criteria values are:

PAC-1 = 2 mg/m^3 $PAC-2 = 12.5 \text{ mg/m}^3$

 $PAC-3 = 56 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation and burns Skin: Irritation and burns Inhalation: Nose, throat and lung irritation causing coughing, wheezing and shortness of breath Cancer (lung, sinonasal cavity) in Chronic: humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68° F (20° C)
Specific Gravity:	2.73 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	1,787°F (975°C)
Molecular Weight:	194.2

Gloves:	Nitrile and Neoprene (for solid Potassium Chromate)
Coveralls:	Tyvek® (for <i>solid</i> Potassium Chromate) and Tychem® SL, BR, CSM, and TK (>8-hr breakthrough for Potassium Chromate in <i>solution</i>)
Respirator:	>0.001 mg/m ³ - full facepiece APR with <i>P100 filters</i> >2 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: POTASSIUM DICHROMATE

Synonyms: Dipotassium Dichromate; Potassium Bichromate CAS No: 7778-50-9 Molecular Formula: K₂Cr₂O₇ RTK Substance No: 1564 Description: Odorless, orange to red, crystalline solid or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Potassium Dichromate is not combustible, but it is a STRONG OXIDIZER that enhances the	Potassium Dichromate reacts violently with HYDRAZINE; ANHYDROUS HYDROXYLAMINE;
0 - Fire	combustion of other substances.	ETHYLENE GLYCOL; and mixtures of SULFURIC ACID
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂	and ACETONE.
DOT#: UN 3085	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	and SILICON, IRON or TUNGSTEN form explosive
ERG Guide #: 140	Including Potassium Oxides.	Potassium Dichromate is not compatible with
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool. Potassium Dichromate may ignite combustibles (wood, paper and oil).	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SILI EURIC and NITRIC); and METALS

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Potassium Dichromate is dangerous to aquatic life and is a hazardous air pollutant.

EXPOSURE LIMITS

OSHA: 0.005 mg/m³, 8-hr TWA **NIOSH:** 0.001 mg/m³, 10-hr TWA ACGIH: 0.05 mg/m³, 8-hr TWA 15 mg/m^3 IDLH: (all of the above are for Chromium VI) The Protective Action Criteria values are:

PAC-1 = 1.5 mg/m³ PAC-2 = 10 mg/m³ PAC-3 = 42.4 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers
Inhalation:	Nose and throat irritation with coughing wheezing
Chronic:	Hexavalent Chromium or Chromium VI Compounds cause lung cancer in

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Noncombustible	
Specific Gravity:	2.7 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	Decomposes at 932°F (500°C)	
Melting Point:	748°F (398°C)	
Molecular Weight:	294.2	
pH:	4 (1% solution)	

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Polyvinyl Chloride (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Potassium Dichromate</i> , (<i>saturated</i>))
Respirator:	 >0.001 mg/m³ - full facepiece APR with <i>High efficiency</i> <i>filters</i> >1 mg/m³ - Supplied air >15 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: POTASSIUM HYDROGEN FLUORIDE

Synonyms: Potassium Bifluoride CAS No: 7789-29-9 Molecular Formula: F₂HK **RTK Substance No: 1568** Description: Colorless to white, crystalline substance

HAZARD DATA					
Hazard Rating	Firefighting				Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1811 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	Firefighting Extinguish fire using an agent su surrounding fire. Potassium Hy itself does not burn. Use WATER with care as heat w POISONOUS GASES ARE PRO including Hydrogen Fluoride, Potassium Fluoride. Use water spray to keep fire-exp DO NOT get water inside contain Potassium Hydrogen Fluoride combustibles (wood, paper and		ble for type of rogen Fluoride be released. JCED IN FIRE, ssium Hydroxide ed containers co s. ay ignite).	ool.	 Potassium Hydrogen Fluoride may be corrosive to METALS in the presence of WATER, MOISTURE or HIGH HUMIDITY and may release flammable and explosive Hydrogen gas. Potassium Hydrogen Fluoride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Do not allow Potassium Hydrogen Fluoride to contact SILICA-CONTAINING MATERIALS (such as GLASS, CEMENT and PORCELAIN).
SPI	LL/LEAKS			Р	HYSICAL PROPERTIES
Isolation Distance:Spills: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Collect powdered material in the most convenient and safe manner and deposit in sealed containers.DO NOT wash into sewer.May affect aquatic life.			Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:		Slightly pungent Nonflammable 1 mm Hg at 1,625°F (885°C) 2.37 (water = 1) Soluble Decomposes 437°F (225°C) 78.1
EXPOS	SURE LIMITS			PR	OTECTIVE EQUIPMENT
OSHA: 2.5 mg/m ³ , NIOSH: 2.5 mg/m ³ , 15 ACGIH: 0.4 mg/m ³ , 1.7 mg/m ³ , IDLH: 25 mg/m ³	8-hr TWA 10-hr TWA; 5-min Ceiling 8-hr TWA; 15-min STEL bove are for <i>Hydrogen Fluoride</i>)		Gloves: Coveralls: Respirator:	Neop Hydr Fluor DuPo solid Resp ULTF For s APR efficie Use s expo	oright for the second state of the second stat
HEAL	TH EFFECTS	Ļ	FIRS	ST A	AID AND DECONTAMINATION
Eyes:Severe iSkin:Severe iInhalation:Nose, th coughing (pulmon Headact)	irritation and burns irritation and burns iroat and lung irritation with g and shortness of breath ary edema) he, nausea and vomiting		Remove the p Flush eyes wit contact lenses Immediately fi removing clott Seek medical Begin artificial necessary. Transfer to a m Medical obser	erson th larg s if wo lush w hing. assist respin medica	from exposure. le amounts of water for at least 30 minutes. Remove rn. Seek medical attention immediately. <i>vi</i> th large amounts of water. Continue flushing while Apply 2.5% <i>Calcium Gluconate</i> gel to the affected skin. tance immediately. ration if breathing has stopped and CPR if al facility. h is recommended as symptoms may be delayed.



Common Name: POTASSIUM HYDROXIDE

Synonyms: Caustic Potash; Lye; Potassium Hydrate CAS No: 1310-58-3 Molecular Formula: KOH RTK Substance No: 1571 Description: Odorless, white or slightly yellow, flakey or lumpy solid which is often in a water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Potassium Hydroxide itself	Potassium Hydroxide reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).		
0 - Fire	does not burn.	Potassium Hydroxide is CORROSIVE in MOIST AIR to		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	METALS (such as ALUMINUM, ZINC, TIN and LEAD) and forms flammable and explosive <i>Hydrogen gas</i> . Potassium Hydroxide is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES):		
DOT#: UN 1813	DO NOT get water inside containers as contact			
ERG Guide #: 154	with moisture or water may generate enough	WATER; HALOGENATED HYDROCARBONS (such as		
Hazard Class: 8 (Corrosive)	oil).	METHYLENE CHLORIDE and TRICHLOROETHYLENE); ORGANICS; NITROCARBONS; and AMMONIUM SALTS.		

SPILL/LEAKS	PHYS	ICAL PROPERTIES
Isolation Distance: Solid Spills: 25 meters (75 feet) Liquid Spills: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal. For Potassium Hydroxide in solution absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.	Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Poiling Point:	Odorless Noncombustible 1 mm Hg at $1,317^{\circ}F(714^{\circ}C)$ 2.04 (water = 1) Soluble
DO NOT wash into sewer. For water spills, neutralize with dilute acid (such as Acetic Acid). Potassium Hydroxide is harmful to aquatic life in very low concentrations	Melting Point: Melcular Weight:	2,408 F (1,320 C) 761°F (405°C) 56.1

EXPOSURE LIMITS

NIOSH: 2 mg/m³, Ceiling ACGIH: 2 mg/m³, Ceiling

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

- $PAC-2 = 2 mg/m^3$
- PAC-3 = 125 mg/m³

	HEALTH EFFECTS
Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea and vomiting

PROTECTIVE EQUIPMENT

Butyl, Nitrile, Neoprene, Polyvinyl Chloride, Viton and Barrier® (>8-hr breakthrough for **Potassium Hydroxide** in *solution*)

Coveralls: Tychem® BR, Responder® and TK (>8-hr breakthrough for Potassium Hydroxide in *solution*)

Respirator:

Gloves:

or: >2 mg/m³ - full facepiece APR with High efficiency filters >20 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with amounts of soap and water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: POTASSIUM OXIDE

Synonyms: Potassium Monoxide; Dipotassium Oxide CAS No: 12136-45-7 Molecular Formula: K_2O RTK Substance No: 1576 Description: Yellowish white to gray, crystalline powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	DOES NOT BURN Use dry chemical, CO ₂ , alcohol-resistant foam or	Potassium Oxide may react violently with WATER to release heat and <i>Potassium Hydroxide</i> .	
0 - Fire 2 - Reactivity	other foam as extinguishing agents. DO NOT USE WATER as violent reaction may occur.	Potassium Oxide is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	
DOT#: UN 2033	POISONOUS GASES ARE PRODUCED IN FIRE. Potassium Oxide may ignite combustibles (wood,		
ERG Guide #: 154 Hazard Class: 8 (Corrosive)	paper and oil).		

SPILL/LEAKS	
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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Use a HEPA-filter vacuum for clean-up.

DO NOT wash into sewer.

No information about environmental impact.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Potassium Oxide**.

PHYSICAL PROPERTIES

Odor Threshold:	No information
Flash Point:	Noncombustible
Water Solubility:	Reactive and Soluble
Melting Point:	662°F (350°C)
Molecular Weight:	94.2

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>8-hr breakthrough for <i>Potassium Hydroxide</i>)
Coveralls:	DuPont Tychem® Polycoat, CPF 1, QC, CPF 2, and SL; Kappler Zytron® 200; and Saint-Gobain ONESuit® TEC for <i>hazardous dry powders</i> and <i>solids</i>
Respirator:	Supplied air

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Severe irritation and burns Severe irritation and burns Nose, throat and lung irritation with coughing, wheezing and shortness of breath	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.

April 2008



Common Name: **PROPANE**

Synonyms: Dimethylmethane; Propyl Hydride CAS No: 74-98-6 Molecular Formula: C_3H_8 RTK Substance No: 1594

Description: Colorless, odorless gas when pure, or may have a faint petroleum-like odor, and is usually shipped as a liquefied gas with a foul-smelling odorant added

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	FLAMMABLE GAS	Propane may react violently with CHLORINE DIOXIDE and other OXIDIZING AGENTS (such as	
4 - Fire	POISONOUS GASES ARE PRODU	ED IN FIRE. PERCHLORATES, PEROXIDES,	
0 - Reactivity	CONTAINERS MAY EXPLODE IN F	RE. PERMANGANATES, CHLORATES, NITRATES,	
DOT#: UN 1978	Use water spray to keep fire-expose Vapor is heavier than air and may tra fire or explosion far from the source	containers cool. rel a distance to cause a r flash back	
Lenged Clease 0.4	Flow, agitation, low humidity and oth	r factors may generate	
(Flammable o	electrostatic charges resulting in fire	and/or explosion.	
	tanks or containers.	air mixture in closed	
9	SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distanc	e:	Odor Threshold: 20,000 ppm	
Spill: 100 meters (3	30 feet) Fire: 1,600 meters (1 mile)	Flash Point: -155°F (-104°C)	
Stop flow of gas. If	source of leak is a cylinder and the leak	LEL: 2.1%	
safe place in the op	en air, and repair leak or allow cylinder to a	UEL: 9.5%	
empty.		Auto Ignition Temp: $842^{\circ}F(450^{\circ}C)$	
Conduct air monitori	ng to determine that <i>Oxygen</i> levels are	Vapor Density. 1.0 (all -1) Vapor Pressure: >760 mm Hg at 68°E (20°C)	
being exceeded.		Specific Gravity: 0.58 (water = 1)	
Use only non-sparking	ng tools and equipment, especially when	Water Solubility: Slightly soluble	
opening and closing	g containers of Propane .	Boiling Point: -44°F (-42°C)	
in a fixed location for a long period of time.		Freezing Point: -305.9°F (-187.7°C)	
Keep Propane out of confined spaces, such as sewers,		Critical Temperature: 207°F (97°C)	
because of the possibility of an explosion.		Ionization Potential: 11.07 eV	
Turn leaking cylinder with leak up to prevent escape of gas in liquid state.		Molecular Weight: 44.09	
Propane is not harmful to aquatic life.			
EXF	POSURE LIMITS	PROTECTIVE EQUIPMENT	
OSHA: 1,000 ppn	n, 8-hr TWA	Gloves: Insulated Nitrile or Neoprene (>8-hr breakthrough)	
ACCIH: 1,000 ppn	n, 10-nr I WA	Coveralls: Use turn out gear or flash protection if ignition/fire	is
IDI H 2 100 ppn	n, o-ni TwoA	the greatest hazard!	ľ
The Protective Actio	n Criteria values are:	Tychem® Responder® (>8-hr breakthrough)	
PAC-1 = 5,500 p	pm PAC-2 = 17,000 ppm	Respirator: >1,000 ppm or <19.5% Oxygen - SCBA	ľ
PAC-3 = 33,00 ppm			
HEALTH EFFECTS		FIRST AID AND DECONTAMINATION	
Eyes: Con	tact with liquefied gas may cause	Remove the person from exposure.	
fros	tbite	Flush eyes with large amounts of water for at least 15 minutes. Remove	e
Skin: Con	itact with liquefied gas may cause	contact lenses if worn. Seek medical attention.	ľ
Tros	IDILE	Begin artificial respiration if breathing has stopped and CDP if personant	N.
pass	sing out, and death	Transfer promptly to a medical facility.	у.



Common Name: 1-PROPANETHIOL

Synonyms: n-Propyl Mercaptan; 1-Mercaptopropane CAS No: 107-03-9 Molecular Formula: C_3H_8S RTK Substance No: 1595 Description: Colorless liquid with a skunk or cabbage-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical. CO ₂ , water spray, alcohol-resistant	 Propanethiol may react violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES,
3 - Fire	foam or other foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	Water may not be effective in fighting fires.	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2402	including Hydrogen Sulfide and Sulfur Oxides.	SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
ERG Guide #: 130	CONTAINERS MAY EXPLODE IN FIRE.	HYDROXIDE); ALKALI METALS (such as LITHIUM. SODIUM and POTASSIUM); and
Hazard Class: 3 Vapors may travel to a source of ignition and flash back.		CALCIUM HYPOCHLORITE.
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic discharges.	1-Propanethiol is not compatible with AMINES; ETHYLENE OXIDE; and ISOCYANATES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1-Propanethiol**.

Keep **1-Propanethiol** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.5 ppm, 15-min Ceiling

The Protective Action Criteria values are:

PAC-1 = 0.075 ppm

PAC-2 = 0.5 ppm

PAC-3 = 750 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath

Headache, dizziness, convulsions and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	0.00075 to 0.0016 ppm
Flash Point:	-6°F (-21°C)
Vapor Density:	2.6 (air = 1)
Vapor Pressure:	155 mm Hg at 77°F (25°C)
Specific Gravity:	0.84 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	154°F (68°C)
Freezing Point:	-172°F (-113.3°C)
Ionization Potential:	9.2 eV
Molecular Weight:	76.2

Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough for Sulfur compounds)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Sulfur compound</i> s)
Respirator:	<5 ppm - Full facepiece APR with <i>Organic vapor</i> cartridges >5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PROPIONIC ACID

Synonyms: Ethylformic Acid; Methylacetic Acid; Propanoic Acid CAS No: 79-09-4 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 1599 Description: Colorless, oily liquid with a strong, unpleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	Propionic Acid reacts violently and explosively with
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PHOSPHORUS TRICHLORIDE.
DOT#: UN 1848	Use water spray to keep fire-exposed containers cool.	Propionic Acid may react violently with STRONG
ERG Guide #: 132	Flow or agitation may generate electrostatic	POTASSIUM HYDROXIDE); REDUCING AGENTS (such
Hazard Class: 8	charges.	as LITHIUM, SODIUM, ALUMINUM and their
(Corrosive)	mixture in closed tanks or containers.	Propionic Acid reacts with POWDERED METALS (such as ALUMINUM and ZINC) to produce flammable and explosive <i>Hydrogen gas</i> .

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Propionic Acid** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Neutralize water spills with lime or soda ash.

Propionic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 10 ppm, 10-hr TWA; 15 ppm STEL

ACGIH: 10 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 ppm PAC-2 = 15 ppm PAC-3 = 350 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, nausea and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	0.026 to 0.17 ppm
Flash Point:	126°F (52°C)
LEL:	2.9%
UEL:	12.1%
Auto Ignition Temp:	869° to 955°F (465° to 513°C)
Vapor Density:	2.6 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	286°F (141°C)
Freezing Point:	-60°F (-21°C)
Ionization Potential:	10.24 eV
Molecular Weight:	74.08

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Teflon ${ m I\!R}$ (>4-hr breakthrough)
Coveralls:	Tychem® Responder® (>8-hr breakthrough)
Respirator:	>10 ppm - full facepiece APR with <i>Organic Vapor filters</i> >100 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: n-PROPYL ACETATE

Synonyms: 1-Acetoxypropane; Propyl Ethanoate CAS No: 109-60-4 Molecular Formula: $C_5H_{10}O_2$ RTK Substance No: 1419

Description: Clear, colorless liquid with a pleasant, fruity odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID	n-Propyl Acetate may react with OXIDIZING
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	AGENTS (SUCH AS PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Solid streams of water may be ineffective in fighting fire.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 1276	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRIC); and STRONG BASES (such as SODIUM
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	cause fires and explosions.
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back.	n-Propyl Acetate is not compatible with ALKALI METAL HYDROXIDES (such as LITHIUM HYDROXIDE) and HYDRAZINES.
	n-Propyl Acetate may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **n-Propyl Acetate**.

Metal containers involving the transfer of **n-Propyl Acetate** should be grounded and bonded.

Keep **n-Propyl Acetate** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: 200 ppm, 8-hr TWA
NIOSH: 200 ppm, 10-hr TWA; 250 ppm, STEL
ACGIH: 200 ppm, 8-hr TWA; 250 ppm, STEL
IDLH: 1,700 ppm
The Protective Action Criteria values are:

PAC-1 = 250 ppm PAC-2 = 250 ppm PAC-3 = 1,700 ppm

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation

Inhalation: Nose and throat irritation with coughing and wheezing Headache, dizziness, nausea and vomiting, confusion, lightheadedness and loss of consciousness

PHYSICAL PROPERTIES

Odor Threshold: 0.18 to 0.67 ppm Flash Point: 55°F (13°C) LEL: 1.7% UEL: 8% Auto Ignition Temp: 842°F (450°C) Vapor Density: 3.5 (air = 1) Vapor Pressure: 36 mm Hg at 77°F (25°C) **Specific Gravity:** 0.83 (water = 1) Slightly soluble Water Solubility: **Boiling Point:** 215°F (102°C) **Freezing Point:** -134°F (-92°C) **Ionization Potential:** 10.04 eV Molecular Weight: 102.13

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®4/H® (>8-hr breakthrough)
Coveralls:	Tychem® F, BR and TK; Trellchem® HPS and VPS (>8- hr breakthrough for <i>Esters</i> , <i>carboxylic</i> , <i>acetate</i>)
Respirator:	>200 ppm - full facepiece APR with <i>Organic vapor filters</i> >250 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PROPYLENE

Synonyms: Propene; 1-Propylene; Methylethylene CAS No: 115-07-1 Molecular Formula: C_3H_6 RTK Substance No: 1609 Description: Colorless gas with a slight odor or a liquid under pressure

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE GAS Stop flow of gas and use water spray to disperse	Propylene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
4 - Fire	vapors. POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): STRONG ACIDS (such as HYDROCHLORIC.
1 - Reactivity	CONTAINERS MAY EXPLODE IN FIRE.	SULFURIC and NITRIC); SULFUR DIOXIDE; NITROGEN
DOT#: UN 1077	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to	OXIDE; and TRIFLUOROMETHYL HYPOFLUORITE.
ERG Guide #: 115	cause a fire or explosion far from the source or flash back.	
Hazard Class: 2.1	Flow, agitation, low humidity and other factors may	
(Flammable Gas)	generate electrostatic charges resulting in fire and/or explosion.	
	Propylene may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (330 feet)

- Large Spill: 800 meters (1/2 mile)
- Fire: 1,600 meters (1 mile)
- Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- Conduct air monitoring to determine that Oxygen levels are above 19.5% and the Lower Explosive Limit (LEL) is not being exceeded.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Propylene**.
- **Propylene** may "pool" or "settle" in low areas and may remain in a fixed location for a long period of time.
- Keep **Propylene** out of confined spaces, such as sewers, because of the possibility of an explosion.
- Turn leaking cylinder with leak up to prevent escape of gas in liquid state. **Propylene** is not harmful to aquatic life.

EXPOSURE LIMITS

- ACGIH: 500 ppm, 8-hr TWA
- PAC

LEVELS: PAC-1: 1,500 ppm; PAC-2: 2,800 ppm PAC-3: 17,000 ppm

HEALTH EFFECTS

Eyes: Contact with liquefied gas may cause frostbite

Skin: Contact with liquefied gas may cause frostbite

Inhalation: Headache, dizziness, lightheadedness, passing out, and death

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Critical Temp: Critical Pressure: Molecular Weight:

23 ppm -162°F (-108°C) 2% 11.1% 851°F (455°C) 1.46 (air = 1) 760 mm Hg at -53.9°F (-47.7°C) 0.609 at -52.6°F (-47°C) (liquid) Slightly soluble -53.9°F (-47.7°C) -301.4°F (-185°C) 197.5°F (92°C) 666.3 psia 42.08

PROTECTIVE EQUIPMENT

Insulated Nitrile or Neoprene (>8-hr breakthrough)

Gloves: Coveralls:

IIs: Use turn out gear or flash protection if ignition/fire is the greatest hazard! Tychem® 10000® (>8-hr breakthrough) Trellchem® Super® (4-hr breakthrough)

Respirator: >500 ppm or <19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PROPYLENE GLYCOL

Synonyms: 1,2-Dihydroxypropane; Methyl Ethylene Glycol; 1,2-Propanediol CAS No: 57-55-6 Molecular Formula: $C_3H_8O_2$ RTK Substance No: 3595 Description: Colorless, odorless, thick liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 2 - Fire	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	Propylene Glycol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, SURVICE)
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE); ACID
DOT#: None	CONTAINERS MAY EXPLODE IN FIRE.	ANHYDRIDES (such as ACETIC ANHYDRIDE);
ERG Guide #: 153	Use water spray to keep fire-exposed containers	CHLOROFORMATES; and REDUCING AGENTS (such
Hazard Class: None	cool.	HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	210°F (99°C)
LEL:	2.6%
UEL:	12.5%
Auto Ignition Temp:	700°F (371°C)
Vapor Density:	2.62 (air = 1)
Vapor Pressure:	<0.1 mm Hg at 68°F (20°C)
Specific Gravity:	1.04 (water = 1)
Water Solubility:	Miscible
Boiling Point:	370°F (188°C)
Freezing Point:	-74°F (-59°C)
Molecular Weight:	76.09

EXPOSURE LIMITS

No occupational exposure limits have been established for **Propylene Glycol**.

The Protective Action Criteria values are: PAC-1 = 10 mg/m³ (3.2 ppm) PAC-2 = 10 mg/m³ (3.2 ppm)

 $PAC-3 = 500 \text{ mg/m}^3 (160.6 \text{ ppm})$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Exposure can cause headache, nausea and vomiting, dizziness, lightheadedness, and passing out

PROTECTIVE EQUIPMENT

Gloves: Butyl, Nitrile and Neoprene (>8-hr breakthrough)

Coveralls: Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for *Hydroxyl compounds*)

Respirator: >10 mg/m³ (3 ppm) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: PROPYLENE GLYCOL MONOMETHYL ETHER

Synonyms: Dowanol®; 1-Methoxy-2-Propanol; PGME CAS No: 107-98-2 Molecular Formula: $C_4H_{10}O_2$ RTK Substance No: 1613 Description: Colorless liquid with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health	FLAMMABLE LIQUID	Propylene Glycol Monomethyl Ether may form explosive <i>Peroxides</i> during prolonged storage.		
3 - Fire	foam as extinguishing agents.	Propylene Glycol Monomethyl Ether is not		
0 - Reactivity	Water may not be effective in fighting fires.	compatible with OXIDIZING AGENTS (such as		
DOT#: UN 3092	POISONOUS GASES ARE PRODUCED IN FIRE.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
ERG Guide #: 129	Vapors may travel to a source of ignition and flash	ACIDS (such as HYDROCHI ORIC, SUI FURIC and		
Hazard Class: 3	back.	NITRIC); ACID CHLORIDES; ACID ANHYDRIDES;		
(Flammable)	Propylene Glycol Monomethyl Ether may form an ignitable vapor/air mixture in closed tanks or containers.	ALUMINUM; COPPER; and ISOCYANATES.		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Propylene Glycol Monoethyl Ether**.

PHYSICAL PROPERTIES **Odor Threshold:** 10 ppm Flash Point: 90°F (32°C) LEL: 1.6% UEL: 18.8% 518°F (270°C) Auto Ignition Temp: Vapor Density: 3.1 (air = 1) Vapor Pressure: 11.8 mm Hg at 77°F (25°C) **Specific Gravity:** 0.92 (water = 1) Water Solubility: Soluble **Boiling Point:** 248°F (120°C) Freezing Point: -139°F (-95°C) Molecular Weight: 90.12

EXPOSURE LIMITS

NIOSH: 100 ppm, 10-hr TWA; 150 ppm, STEL **ACGIH:** 100 ppm, 8-hr TWA; 150 ppm, STEL

The Protective Action Criteria values are: PAC-1 = 150 ppm PAC-2 = 300 ppm PAC-3 = 750 ppm

HEALTH EFFECTS

Irritation
Irritation
Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Headache, dizziness, lightheadedness, and passing out

VPS (>8-hr breathrough for Dipropylene Glycol)

Butyl, Nitrile and Neoprene (>8-hr breakthrough)

Tychem® BR, Responder® and TK; Trellchem® HPS and

PROTECTIVE EQUIPMENT

Respirator: >100 ppm - SCBA

Gloves:

Coveralls:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: PROPYLENE OXIDE

Synonyms: Epoxypropane; Methyl Ethylene Oxide CAS No: 75-56-9 Molecular Formula: C_3H_6O RTK Substance No: 1615 Description: Clear, colorless liquid with an *Ether*-like odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 4 - Fire 2 - Reactivity DOT#: UN 1280 ERG Guide #: 127P Hazard Class: 3 (Flammable)	FILAMMABLE and REACTIVE Use dry chemical, CO2, water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and reduce vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Propylene Oxide may polymerize (self-react) due to high heat or contamination resulting in container ruptures and explosions.		Propylene Oxide may polymerize (self react) when exposed to HEAT; OXYGEN; AIR or FLAMES resulting in an explosion hazard. Propylene Oxide reacts violently with METALS (such as IRON, TIN, ALUMINUM and COPPER); METAL ALLOYS; METAL PEROXIDES; METAL CHLORIDES; METAL HYDROXIDES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and OLEUM. Propylene Oxide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; ACIDIC ALCOHOLS; ETHYLENE OXIDE; EPOXY RESIN; and CLAY-BASED ABSORBENTS.		
SP	ILL/LEAKS				PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.			Odor Three Flash Poin LEL: UEL: Auto Igniti Vapor Den Vapor Pres Specific Gi Water Solu Boiling Po Freezing P Ionization	shold: t: on Temp sity: ssure: ravity: ibility: int: oint: Potentia Weight:	35 to 200 ppm -35°F (-37°C) 2% 37% p: 869°F (465°C) 2 (air = 1) 445 mm Hg at 68°F (20°C) 0.83 (water = 1) Soluble 94°F (34°C) -170°F (-112°C) 9.8 58
EXPO	SURE LIMITS		moleoului	P	
OSHA: 100 ppm, NIOSH: Lowest fe ACGIH: 2 ppm, 8- IDLH: 400 ppm ERPG-1 = ERPG-3 =	8-hr TWA asible concentration hr TWA = 50 ppm; ERPG-2 = 250 ppm; = 750 ppm		Gloves: Coveralls Respirato	La : Ty br pr: >2	aminate Film and Barrier® (>8-hr breakthrough) ychem® CPF 4, BR, LV, Responder® and TK (>8-hr reakthrough) 2 ppm - Supplied air or SCBA
HEALTH EFFECTS			FI	FIRST AID AND DECONTAMINATION	
Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, dizziness, incoordination and passing outChronic:Cancer (nose and stomach) in animals			Remove to Flush eye contact le Quickly re large amo Begin arti Transfer p Medical o	he pers s with la enses if emove of ounts of ficial res promptly bservat	on from exposure. arge amounts of water for at least 30 minutes. Remove worn. Seek medical attention. contaminated clothing and wash contaminated skin with water. spiration if breathing has stopped and CPR if necessary. y to a medical facility. ion is recommended as symptoms may be delayed.



RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET



Common Name: PROTHOATE

Synonyms:	Tri
CAS Number:	22
Molecular Formula:	C9
RTK Number:	27
Description:	Сс

Trimethoate; Telefos; Fostion 2275-18-5 C₉H₂₀NO₃PS₂ 2715 Colorless, sand-like solid with a *Camphor*-like odor; commercial products may be mixed with organic solvents for liquid application

HAZARD DATA					
Hazard Rating	Firefighting	Firefighting			Reactivity
Health: 3 Fire: 1 Reactivity: 1 DOT #: UN 2783/UN 3018 ERG #: 152 DOT Hazard: 6.1 (poison)	 Prothoate may burn but does not readily ignite. Use dry chemical, CO₂, water spray, or foam extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides, Sulfur Oxides and Phosphorus Oxide fumes. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 		hers. oorus	Prothoate is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
SPILLS/I	LEAKS	ΪÍ		РНҮ	SICAL PROPERTIES
Isolation Distances: Liquid Spill: 50 meters (150 feet) Solid Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Evacuate personnel. Secure and control entrance to the arrol of it is safe to do so, remove potential Collect powdered material in the most deposit in sealed containers. DO N Absorb <i>liquids</i> in vermiculite, dry sand deposit in sealed containers. Ventilate and wash area after clean-u) ea. ignition sources. convenient and safe manner and OT DRY SWEEP. I, earth, or a similar material and p is complete.		Molecular We Specific Grav Vapor Pressu Water Solubil Melting Point	ight: ity: re: ity:	285.4 1.151 at 32 °C (89.6 °F) 0.0001 mm Hg at 40 °C (104 °F) Slightly soluble 28.5 °C (83.3 °F)
EXPOSUR	E LIMITS		P	RO	FECTIVE EQUIPMENT
There are no occupational exposure I PAC: PAC-1 = 0.15 mg/m ³ PAC-2 = 1.7 mg/m ³ PAC-3 = 10 mg/m ³	imits for this substance.		Gloves: Coverall: Respirator:	Nitrile Tych High ar	e and Neoprene em® BR, CSM and TK, or the equivalent exposure – full facepiece, pressure-demand or nother positive-pressure mode
ACUTE HEALT	'H EFFECTS	ĺ	FIRST	AID	AND DECONTAMINATION
Eyes: Blurred vision Skin: Sensitization Inhalation: Headache, dizziness, coordination, convulsion	chest tightness, twitching, loss of sions, coma, death		Immediately flus 15 minutes. Quickly remove large amounts Shampoo hair p Remove the per Begin rescue br stopped and C Transfer prompt Medical observa delaved	sh with contai of soa rompti son fro eathin PR if h ly to a ation is	large amounts of water for at least minated clothing. Immediately wash area with p and water. y if contaminated. om exposure. g (using universal precautions) if breathing has heart action has stopped. medical facility. s required for several days as symptoms may be

June 2023



Common Name: PSEUDOCUMENE

Synonyms: 1,2,4-Trimethylbenzene; Psicumene; Pseudocumol CAS No: 95-63-6 Molecular Formula: C_9H_{12} RTK Substance No: 2716 Description: Clear, colorless liquid with a distinctive, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Pseudocumene is a COMBUSTIBLE LIQUID.	Pseudocumene may react violently with
2 - Fire	I use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	FI UORINE) and NITRIC ACID to cause fires and
DOT#: UN 2325	Use water spray to keep fire-exposed containers cool.	explosions.
ERG Guide #: 129	cause a fire or explosion far from the source	
Hazard Class: 3		
(Flammable)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

This substance is toxic to aquatic organisms and may bioaccumulate in fish.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	25 ppm, 10-hr TWA
ACGIH:	25 ppm, 8-hr TWA
IDI H:	None

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, nausea, vomiting, dizziness, lack of coordination and confusion	

PHYSICAL PROPERTIES

Odor Threshold:	0.4 ppm
Flash Point:	112°F (44°C)
LEL:	0.9%
UEL:	6.4%
Vapor Density:	4.15 (air = 1)
Vapor Pressure:	2.1 mm Hg at 77°F (25°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	329°F (165°C)
Ionization Potential:	8.27 eV
Molecular Weight:	120.2

PROTECTIVE EQUIPMENT

Gloves:	NITRI-SOLVE® (<6-hr breakthrough)
Coveralls:	DuPont Tychem® Polycoat and Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC for <i>Aromatic Hydrocarbons</i> (>8-hr breakthrough)
Respirator:	<25 ppm - Full facepiece APR with Organic vapor cartridge >250 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: QUINOLINE

Synonyms: Benzo(b)Pyridine; Chinoline; Leukol CAS No: 91-22-5 Molecular Formula: C₉H₇N RTK Substance No: 1628

Description: Colorless liquid with a strong, characteristic odor, which turns brown when exposed to light

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam	Quinoline may explode and/or react violently with HYDROGEN PEROXIDE; PERCHROMATES; DINITROGEN TETROXIDE; and MALEIC ANHYDRIDE
0 - Reactivity DOT#: UN 2656	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Reactions with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) may be violent. Quinoline is not compatible with ORGANIC ANHYDRIDES; ALKYLENE OXIDES; EPICHLOROHYDRIN; ALDEHYDES; ALCOHOLS; GLYCOLS; PHENOLS; CRESOLS; CAPROLACTAM SOLUTION; and mixtures of LINSEED OIL and THIONYL CHLORIDE. Quinoline is hygroscopic.
ERG Guide #: 154		
Hazard Class: 6.1 (Poisonous material)		

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fires: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Quinoline is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

AIHA: 0.001 ppm, 8-hr TWA WEEL

The Protective Action Criteria values are:

PAC-1 = 0.6 ppm

- PAC-2 = 5 ppm
- PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, fever, fatigue and dizziness
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.015 to 71 ppm
Flash Point:	138° to 214°F (59° to 101°C)
LEL:	1.2%
Auto Ignition Temp:	896°F (480°C)
Vapor Density:	4.5 (air = 1)
Vapor Pressure:	5 mm Hg at 194°F (90°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	460°F (238°C)
Melting Point:	5°F (-15°C)
Molecular Weight:	129

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>4-hr breakthrough for <i>Heterocyclic compounds</i> , <i>Nitrogen</i>)
Respirator:	<0.01 -Full facepiece APR with Organic vapor cartridge>0.01 - Supplied air>0.6 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: QUINTOZENE

Synonyms: Avicol®; Pentachloronitrobenzene; PCNB; Terraclor® CAS No: 82-68-8 Molecular Formula: C₆Cl₅NO₂ RTK Substance No: 1630 Description: Colorless, crystalline solid when pure, or a yellow to cream-colored powder, with a musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Quintozene can burn, and may also be dissolved in a liquid carrier that is flammable or	Quintozene is not compatible with OXIDIZING AGENTS
1 - Fire	combustible.	(SUCH AS PERCHLORATES, PEROXIDES, DEPMANGANATES, CHI ORATES, NITRATES
0 - Reactivity	Use dry chemical, CO ₂ , water fog or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRIC): and STRONG BASES (such as SODIUM
ERG Guide #: 171	including Hydrogen Chloride and Nitrogen Oxides.	HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 9	Use water spray to keep fire-exposed containers	
(Environmentally		
Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Quintozene is very toxic to aquatic organisms and bioaccumulation may occur.

EXPOSURE LIMITS

ACGIH: 0.5 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

 $PAC-1 = 1.5 \text{ mg/m}^3$

 $PAC-2 = 300 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

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Eyes:	Irritation and corneal injury
Skin:	Irritation
Inhalation:	Dizziness, convulsions, nausea and vomiting
	Headache, fatigue and blue color to the skin and lips (<i>Methemoglobinemia</i>)

PHYSICAL PROPERTIES

Odor Threshold:	Musty odor
Vapor Density:	10.2 (air = 1)
Vapor Pressure:	0.013 mm Hg at 77°F (25°C)
Specific Gravity:	1.72 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	622°F (328°C)
Melting Point:	291°F (144°C)
Molecular Weight:	295.3

	PROTECTIVE EQUIPMENT
Gloves:	Viton or Barrier® (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Coveralls:	Tyvek®
Respirator:	>0.5 mg/m ³ - Full facepiece APR with Organic vapor/Acid gas cartridges and High efficiency particulate prefilters >1.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: RESMETHRIN

Synonyms: Benzofuroline; Chryson; Vectrin CAS No: 10453-86-8 Molecular Formula: $C_{22}H_{26}O_3$ RTK Substance No: 3450

Description: Waxy, white to tan solid or colorless crystal, Pyrethroid insecticide

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Resmethrin does not burn, however, it is often dissolved in a liquid carrier which may be	Resmethrin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE, POTASSIUM
DOT#: UN 2902	POISONOUS GASES ARE PRODUCED IN FIRE	HYDROXIDE and LIME).
ERG Guide #: 151	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Chrysanthemum-like
Spill (solid): 25 meters (75 feet)	Flash Point:	Flammable/Combustible
(liquid): 50 meters (150 feet) Fire: 800 meters (1/2 mile)	Vapor Pressure:	1.13 x 10 ⁻⁸ mm Hg at 86°F (30°C)
Absorb Resmethrin in <i>solution</i> in dry sand, earth, or a	Water Solubility:	Insoluble
similar material	Melting Point:	43° to 48°F (6° to 9°C)
Moisten <i>solid</i> spilled material first or use a HEPA-filter	Molecular Weight:	338.4

Description is complexing to be a sub-second restantially
for disposal.
vacuum for clean-up and place into sealed containers
Moisten solid spilled material first or use a HEPA-filter

Resmethrin is very toxic to honeybees and potentially toxic to fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Resmethrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile (for <i>solid</i> Resmethrin) Silver Shield®/4H® and Barrier® (>8-hr breakthrough for Resmethrin in <i>solution</i>)
Coveralls:	Tyvek® (for so <i>lid</i> Resmethrin) Tychem® BR, CSM and TK (>8-hr breakthrough for Resmethrin in <i>solution</i>)
Respirator:	Spill: full facepiece APR with <i>Organic vapor</i> and <i>P100</i> cartridges Fire: SCBA

HEALTH EFFECTS

- Eyes:Irritation and burnsSkin:Irritation, burns, itching, rash and
redness (skin absorbable)
- Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: RESORCINOL

Synonyms: 1,3-Dihydroxybenzene; 3-Hydroxyphenol; 1,3-Benzenediol CAS No: 108-46-3 Molecular Formula: $C_6H_4(OH)_2$ RTK Substance No: 1634 Description: White, crystalline solid that turns pink on exposure to light and air

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 2876 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		Resord (such : PERM CHLO as HY CHLO SALTS MENT Resord	cinol may react explosively with NITRIC ACID. cinol is not compatible with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); ACIDS (such DROCHLORIC, SULFURIC and ACETIC); ACID RIDES; ACID ANHYDRIDES; IRON and IRON S; ALBUMIN; CAMPHOR; URETHANE; HOL; ACETANILIDE; and ANTIPYRINE. cinol absorbs moisture from the air.	
SPI	LL/LEAKS	Π		PHY	SICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Cover <i>liquid</i> spills with dry lime, sand or soda ash and place into sealed containers for disposal. DO NOT wash into sewer. Resorcinol is harmful to aquatic life at very low concentrations. 			Flash Point: LEL: Auto Ignition T Vapor Density: Vapor Pressure Specific Gravit Water Solubility Boiling Point: Melting Point: Ionization Pote Molecular Weig pH:	emp: e: y: y: ntial: ght:	261°F (127°C) 1.4% 1,125°F (607°C) 3.79 (air = 1) 1 mm Hg at 227°F (108°C) 1.2 (water = 1) Soluble 531° to 536°F (277° to 280°C) 228° to 232°F (109° to 111°C) 8.63 eV 110.18 5.2
EXPOSORE LINITSNIOSH:45 mg/m³ (10 ppm), 10-hr TWA; 90 mg/m³ (20 ppm), STELACGIH:45 mg/m³ (10 ppm), 8-hr TWA; 90 mg/m³ (20 ppm), STELThe Protective Action Criteria values are: PAC-1 = 75 mg/m³PAC-1 = 75 mg/m³PAC-2 = 75 mg/m³			Gloves: Coveralls: Respirator:	Nitrile a Tyvek® >45 mg >75 mg	and Natural Rubber g/m ³ - full facepiece APR with <i>Organic vapor</i> <i>cartridges</i> and <i>P100 prefilters</i> g/m ³ - SCBA
HEALTH EFFECTS			FIRS	T AID	AND DECONTAMINATION
Eyes:IrritationSkin:IrritationInhalation:Nose, th coughing breath Headach skin and	and burns and burns roat and lung irritation, with g, wheezing and shortness of ne, fatigue and blue color to the lips (methemoglobinemia)	-	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 		



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		HAZARDOUJ JUE	JUNE P	
Common Name	e: RONNEI	-		
Synonyms:	Fenchloro Ectoral	phos; Dimethyl Trichlorophenyl Thi	iophosphate; Tro	olene; Etrolene; Nankor; Korlan; Viozene;
CAS Number:	299-84-3			
Molecular Formul	a: (CH ₃ O) ₂ P	(S)OC ₆ H ₂ Cl ₃		
RTK Number:	1637			
Description:	White to ta	an powder or waxy solid, commerci	ial preparations	included liquid and granular forms
		HAZARD	DATA	
Hazard Rating		Firefighting	Reactivity	
Health: 3 Fire: 1 Reactivity: 1 DOT #: UN ERG #: 152 DOT Hazard: 6.1	2783/UN3018 2 (toxic)	Use dry chemical, CO ₂ , water spray, or a foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides, Dimethyl Sulfide, Trichlorophenol, Phosphorous Oxides and Chlorine.	Ronnel is not co PERCHLORA CHLORATES and ALKALIN	ompatible with OXIDIZING AGENTS (such as TES, PEROXIDES, PERMANGANATES, , NITRATES, CHLORINE, BROMINE and FLUORINE) E PESTICIDES.
	SPILLS/	LEAKS		PHYSICAL PROPERTIES
SPILLS/LEAKS Isolation Distances: Liquid Spill: 50 meters (150 feet) Solid Spill: 25 meters (75 feet) Fire: 800 meters (1/2 miles) Evacuate personnel. Secure and control entrance to the area. If it is safe to do so, remove potential ignition sources. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT DRY SWEEP. Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Do not allow this substance to enter waterways, including sewers, as it is very hazardous to aquatic life with long-lasting effects. Ventilate and wash area after clean-up is complete.		Melting Point: Specific Grav Molecular We Vapor Pressu Water Solubil	41 °C (106 °F) ity: 1.49 at 25 °C (77 ° F) ight: 321.6 re: 0.0008 mm Hg at 25 °C (77 °F) ity: Insoluble	
	EXPOSUR	E LIMITS	Р	ROTECTIVE EQUIPMENT
The following exposu	ire limits are for F	Ronnel:	Gloves:	Nitrile and Neoprene
			Coverall:	Tychem® BR, CSM and TK, or the equivalent
OSHA: 15 mg/m ³ – 8-hour average			Respirator:	>5 mg/m ³ - full facepiece respirator, organic vapor
NIOSH: 10 mg/m ³ – 10-hour average				cartridge, particulate prefilters >15 mg/m ³ - supplied-air respirator, full facepiece

- ACGIH: 5 mg/m³ (inhalable fraction) 8-hour average
- IDLH: 300 mg/m³

ACUTE HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Irritation, headache, dizziness, blurred vision, chest tightness, twitching, loss of coordination, convulsions, coma, death

FIRST AID AND DECONTAMINATION Immediately flush eyes with large amounts of water for at least 15 minutes.

pressure-demand or other positive-pressure

≥300 mg/m³ - SCBA, full facepiece, pressuredemand or another positive-pressure mode

Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water.

Shampoo hair promptly if contaminated.

. mode

Remove the person from exposure.

- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Medical observation is recommended for several days following exposure as symptoms may be delayed.

Transfer promptly to a medical facility.

Jume 2023



Common Name: SAFROLE

Synonyms: 5-Allyl-1,3-Benzodioxole; 1,2-Methylenedioxy-4-Allylbenzene CAS No: 94-59-7 Molecular Formula: $C_{10}H_{10}O_2$ RTK Substance No: 1642 Description: Clear, colorless or slightly yellow liquid with a sassafras odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID	Safrole is not compatible with OXIDIZING AGENTS (such
1 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3082	cool.	
ERG Guide #: 171		
Hazard Class: 9		
(Miscellaneous Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Wash spill area with 60 to 70% *Ethanol* followed by a soap and water solution.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Safrole**.

The Protective Action Criteria values are:

PAC-1 = 15 mg/m³ PAC-2 = 100 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION		
Eyes:	Irritation	Remove the person from exposure.		
Skin:	Irritation	Flush eyes with large amounts of water for at least 15 minutes. Remove		
Inhalation:	Headache, dizziness, convulsions, excitement and even unconsciousness	Remove contaminated clothing and wash contaminated skin with soap ar		
Chronic:	Cancer (liver) in animals	Begin artificial respiration if breathing has stopped and CPR if necessary		
		Transfer promptly to a medical facility.		

PHYSICAL PROPERTIES		
Odor Threshold:	Sassafras odor	
Flash Point:	207° to 212°F (97° to 100°C)	

Flash Point:	207° to 212°F (97° to 100°C)
Vapor Pressure:	1 mm Hg at 147°F (64°C)
Specific Gravity:	1.09 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	450° to 453°F (232° to 234°C)
Freezing Point:	52.2°F (11.2°C)
Molecular Weight:	162.12

	PROTECTIVE EQUIPMENT
Gloves:	SilverShield®/4H® and Viton (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, unsaturated</i>)
Coveralls:	Tychem® F, BR, Responder® and TK, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic, unsaturated</i>)
Respirator:	<15 mg/m ³ - full facepiece APR with <i>Organic vapor/Acid</i> gas cartridges and <i>High efficiency prefilters</i> >15 mg/m ³ - SCBA



Common Name: SILICA, CRISTOBALITE

Synonyms: Calcined Diatomaceous Earth; Crystalline Silicon Dioxide, Crystabolite CAS No: 14464-46-1 Molecular Formula: SiO₂ RTK Substance No: 1657 Description: Colorless, odorless, crystalline solid

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Hazard Rating	Firefighting	Reactivity		
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silica, Cristobalite itself does	Silica, Cristobalite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity		CHLORINE, BROMINE and FLUORINE); ACETYLENE; and AMMONIA.		
DOT#: None				
ERG Guide #: None				
Hazard Class: None				

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible	
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Vapor Pressure:	0 mm Hg at 68°F (20°C)	
	Specific Gravity:	2.32 (water = 1)	
	Water Solubility:	Insoluble	
	Boiling Point:	4,046°F (2,230°C)	
	Melting Point:	3,133°F (1,723°C)	
	Molecular Weight:	60.08	

NIOSH: 0.05 mg/m³, 10-hr TWA

ACGIH: 0.025 mg/m³, 8-hr TWA

IDLH: 25 mg/m³

The Protective Action Criteria values are: PAC-1 = 0.075 mg/m^3 PAC-2 = 25 mg/m^3 PAC-3 = 25 mg/m^3

	HEALTH EFFECTS	
Eyes: Skin:	Irritation Irritation	
Inhalation:	Nose and lung irritation with cough and shortness of breath (Silicosis)	
Chronic:	<i>Crystalline Silica</i> causes cancer (lung) in humans.	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with <i>High efficiency filter</i> >0.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Inhalation:

Chronic:

Nose and lung irritation with cough, and

Crystalline Silica causes cancer (lung) in

shortness of breath (Silicosis)

humans.

Common Name: SILICA, QUARTZ

Synonyms: Silica, Crystalline; Crystallized Silicon Dioxide CAS No: 14808-60-7 Molecular Formula: SiO₂ RTK Substance No: 1660 Description: Odorless, colorless, white or reddish crystalline solid

HAZARD DATA Hazard Rating Firefighting Reactivity Silica, Quartz is not compatible with OXIDIZING Extinguish fire using an agent suitable for type of 4 - Health surrounding fire. Silica, Quartz itself does not AGENTS (such as PERCHLORATES, PEROXIDES, 0 - Fire PERMANGANATES, CHLORATES, NITRATES, burn. CHLORINE, BROMINE and FLUORINE); ACETYLENE; 0 - Reactivity AMMONIA; HYDROGEN FLUORIDE; and CATECHOL. DOT#: None ERG Guide #: None Hazard Class: None

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Moisten spilled material first or use a HEPA-filter	Vapor Pressure:	0 mm Hg at 68ºF (20ºC)
vacuum for clean-up and place into sealed containers	Specific Gravity:	2.6 (water = 1)
for disposal.	Water Solubility:	Insoluble
	Boiling Point:	4,046°F (2,230°C)
	Melting Point:	3,110°F (1,719°C)
	Molecular Weight:	60.09

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT
NIOSH: 0.1 mg/m ³ , 10-hr TWA	Gloves: Nitrile and Natural Rubber
ACGIH: 0.025 mg/m ³ , 8-hr TWA	Coveralls: Tyvek®
The Protective Action Criteria values are: PAC-1 = 0.075 mg/m ³ PAC-2 = 33 mg/m ³ PAC-3 = 200 mg/m ³	Respirator: <1 mg/m ³ - Full facepiece APR with High efficiency filter >1 mg/m ³ - SCBA
HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation	Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove

contact lenses if worn.
Remove contaminated clothing and wash contaminated skin with soap and water.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.



Common Name: SILICA, TRIDYMITE

Synonyms: Crystalline Silica, Tridymite; Crystalline Silicon Dioxide, Tridymite CAS No: 15468-32-3 Molecular Formula: SiO₂ RTK Substance No: 1663 Description: White or colorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of	Silica, Tridymite is not compatible with OXIDIZING
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity		CHLORINE, BROMINE and FLUORINE); ACETYLENE; AMMONIA; HYDROGEN FLUORIDE; and CATECHOL.
DOT#: None		
ERG Guide #: None		
Hazard Class: None		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Vapor Pressure:	0 mm Hg at 68°F (20°C)
	Specific Gravity:	2.3 (water = 1)
	Water Solubility:	Insoluble
	Boiling Point:	4,046°F (2,230°C)
	Melting Point:	3,097°F (1,703°C)
	Molecular Weight:	60.09

NIOSH: 0.05 mg/m³; 10-hr TWA **IDLH:** 25 mg/m³

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - full facepiece APR with <i>High efficiency filter</i> >0.05 mg/m ³ - SCBA

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose and lung irritation with cough and shortness of breath (<i>Silicosis</i>) <i>Crystalline Silica</i> causes cancer (lung) in humans.	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SILICA, TRIPOLI

Synonyms: Silica, Crystalline-Tripoli; alpha-Quartz CAS No: 1317-95-9 Molecular Formula: SiO₂ RTK Substance No: 1664 Description: Colorless, odorless mineral solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silica. Tripoli itself does not	Silica, Tripoli reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Fire	burn.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity		
DOT#: None		(such as HYDROCHLORIC, SULFURIC and NITRIC);
ERG Guide #: None		ACETYLENE; and AMMONIA.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.2 to 2.65 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,046°F (2,230°C)
Melting Point:	2,984° to 3,105°F (1,640° to 1,707°C)
Molecular Weight:	60.1
Water Solubility: Boiling Point: Melting Point: Molecular Weight:	2.2 to 2.65 (water = 1) Insoluble 4,046°F (2,230°C) 2,984° to 3,105°F (1,640° to 1,707°C) 60.1

EXPOSURE LIMITS

ACGIH: 0.025 mg/m³ (as the *respirable fraction*)

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

 $PAC-2 = 0.3 \text{ mg/m}^3$

PAC-3 = 50 mg/m³

(All of the above as Silica, Crystalline-Quartz)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information
Inhalation:	Nose and lung irritation with cough, and shortness of breath (<i>Silicosis</i>)
Chronic:	<i>Crystalline Silica</i> causes cancer (lung) in humans

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

APR with high *efficiency filters* >25 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: SILICOFLUORIC ACID

Synonyms: Fluorosilicic Acid; Hydrofluorosilicic Acid; Sand Acid CAS No: 16961-83-4 Molecular Formula: H_2SiF_6 RTK Substance No: 1665 Description: Fuming, colorless to pale, straw-colored liquid with a sharp, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silicofluoric Acid itself does not	Silicofluoric Acid may react with WATER and MOIST AIR to form toxic and/or flammable <i>Hydrogen Fluoride</i> and <i>Hydrogen</i>
0 - Fire	burn.	gases, especially in confined spaces.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Silicon</i>	Silicofluoric Acid reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);
DOT#: UN 1778	Tetrafluoride.	AMINES; ACTIVE METALS (such as POTASSIUM, SODIUM,
ERG Guide #: 154	CONTAINERS MAY EXPLODE IN FIRE.	flammable and explosive <i>Hydrogen gas</i> , toxic gases (such as
Hazard Class: 8 (Corrosive)	cool.	Silicofluoric Acid is not compatible with COMBUSTIBLE MATERIALS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
		Anhydrous Silicofluoric Acid will separate quickly in AIR to form Silicon Tetrafluoride and Hydrogen Fluoride

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep **Silicofluoric Acid** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

May be hazardous to the environment and aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm Ceiling (for Hydrogen Fluoride)

IDLH: 30 ppm (for Hydrogen Fluoride)

The Protective Action Criteria values are: PAC-1 = 12 ppm PAC-3 = 60 ppm PAC-2 = 16 ppm

HEALTH EFFECTS

Eyes: Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, nausea and vomiting, weakness, convulsions and collapse

PHYSICAL PROPERTIES old: Sharp, irritating odor

Odor Threshold:	Sharp, irritating odor
Flash Point:	Noncombustible
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble (releases Heat)
Boiling Point:	Decomposes
Freezing Point:	4°F (-15.5°C)
Molecular Weight:	144.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrogen Fluoride</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough) $% \label{eq:trel}$
Respirator:	 >0.5 ppm - Full facepiece APR with acid gas cartridges specific for <i>Hydrogen Fluoride</i> >5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Continue flushing while removing clothing. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SILICON TETRACHLORIDE

Synonyms: Silicon Chloride; Tetrachlorosilicon CAS No: 10026-04-7 Molecular Formula: SiCl₄ RTK Substance No: 1666

Description: Clear, colorless, fuming liquid with an irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	CORROSIVE AND WATER REACTIVE Extinguish fire using an agent suitable for type of surrounding fire. Silicon Tetrachloride itself does not	Silicon Tetrachloride reacts violently with WATER and MOIST AIR to form heat, and toxic and corrosive Hydrogen Chloride gas. Contact between Hydrogen Chloride gas and METALS
2₩ - Reactivity DOT#: UN 1818 ERG Guide #: 157 Hazard Class: 8 (Corrosive)	burn. Silicon Tetrachloride may react with WATER and FOAM to release toxic and corrosive gases. When using Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) use at medium expansion and carefully float onto spill to form a continuous layer. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Silicon Oxide</i> .	may release flammable and explosive <i>Hydrogen gas.</i> Silicon Tetrachloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); KETONES; and ALDEHYDES.
	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool but DO NOT get water into containers.	Prevent contact with LIGH I, HEAT and AIR.

SPILL/LEAKS

Isolation Distance:

Spill (small): 30 meters (100 feet) (large): 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

AR-AFF Foam can be used to suppress vapors and blanket release

Silicon Tetrachloride spilled in water produces large amounts of Hydrogen Chloride.

Neutralize spills using Sodium Hydroxide with a 1 to 1 ratio of Sodium Hydroxide to Chlorosilane or use a 2 to 1 ratio of Sodium Bicarbonate to Chlorosilane.

Keep Silicon Tetrachloride out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA/NIOSH: 5 ppm, Ceiling (as Hydrogen Chloride) ACGIH: 2 ppm, Ceiling (as Hydrogen Chloride)

- IDLH: 50 ppm (as Hydrogen Chloride)
- The Protective Action Criteria values are:

PAC-1 = 0.45 ppm PAC-2 = 5.5 ppm

PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	1 to 5 ppm
Flash Point:	Nonflammable
Vapor Density:	5.8 (air = 1)
Vapor Pressure:	194 mm Hg at 68°F (20°C)
Specific Gravity:	1.48 (water = 1)
Water Solubility:	Reactive (Decomposes)
Boiling Point:	136°F (58°C)
Freezing Point:	-57°F (-70°C)
Ionization Potential:	12.74 eV (as Hydrogen Chloride)
Molecular Weight:	169.9

PROTECTIVE EQUIPMENT

Gloves:	Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SILVER NITRATE

Synonyms: Argerol; Lunar Caustic CAS No: 7761-88-8 Molecular Formula: AgNO₃ RTK Substance No: 1672 Description: Odorless, colorless or white, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Silver Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Silver Nitrate reacts with ACETYLENE, in the presence of AMMONIA, to form <i>Silver Acetylide</i> , a sensitive and powerful detonator.
0 - Reactivity DOT#: UN 1493 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Use large quantities of water as an extinguishing agent or extinguish fire using an agent suitable for type of surrounding fire. Silver Nitrate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Silver Oxides</i> and <i>Nitrogen</i> <i>Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Silver Nitrate may ignite combustibles (wood, paper and oil)	Silver Nitrate reacts violently with COMBUSTIBLES; CHLOROSULFONIC ACID and other ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METALS; METAL CARBIDES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Silver Nitrate is not compatible with ETHYLENE OXIDE; CHARCOAL; AMMONIUM HYDROXIDE; ETHANOL; AZIRIDINE; ARSENIC; SULFUR; and many other compounds.

SPILL/LEAKS	PH	YSICAL PROPERTIES	
Isolation Distance:Spills: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.DO NOT wash into sewer.Silver Nitrate is very toxic to aquatic organisms.	Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Odorless Noncombustible 4.35 to 5.35 (water = 1) Soluble 831°F (444°C) (Decomposes) 413.6°F (212°C) 169.9	

Gloves:

Coveralls:

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA (as *Silver*) **IDLH:** 10 mg/m³ (as *Silver*)

The Protective Action Criteria values are:

PAC-1 = 0.4 mg/m^3

PAC-2 = 3 mg/m^3

 $PAC-3 = 15.7 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, rash and blisters
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

Tyvek®

PROTECTIVE EQUIPMENT

Nitrile and Natural Rubber

Respirator: >0.01 mg/m³ - full facepiece APR with High efficiency filters >0.4 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.


Common Name: SODIUM

Synonyms: Natrium CAS No: 7440-23-5 Molecular Formula: Na RTK Substance No: 1674 Description: Odorless, soft, silvery-white metal

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Sodium is a FLAMMABLE SOLID which will ignite spontaneously in AIR or MOIST AIR and	Sodium reacts violently with WATER, STEAM, AIR and MOIST AIR to	
3 - Fire	reacts violently with WATER or STEAM to produce flammable and explosive <i>Hydrogen</i> gas.	<i>Hydrogen gas.</i> Sodium can react explosively or violently with a broad range of chemicals including METALS (such as ALUMINUM, ARSENIC and ZINC); METAL COMPOUNDS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and MITRIC); OXIDIZING ACENTS (such as PEDCIL ORATES	
2 - Reactivity			
DOT#: UN 1428	Use dry chemicals appropriate for extinguishing metal fires such as graphite, soda ash or		
ERG Guide #: 138	powdered sodium chloride. DO NOT USE	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
Hazard Class: 4.3	WATER, CO ₂ or halogenated extinguishing	CHLORINE, BROMINE and FLUORINE); CHLORINATED	
(Dangerous when wet)	POISONOUS GASES ARE PRODUCED IN FIRE, including (<i>Sodium Oxides</i>).	HYDROCARBONS (such as METHYLENE CHLORIDE and TRICHLOROETHYLENE); CARBON DIOXIDE; AZIDES; and MALEIC ANHYDRIDE.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

DO NOT sweep up dry material, keep dry, cover with dry sand, limestone or clay, and place quickly into a container of Kerosene, Naphtha, Light Oil or similar material.

Use only non-sparking tools and equipment, especially when opening and closing containers of Sodium.

DO NOT wash into sewer.

Keep Sodium out of confined spaces, such as sewers, because of the possibility of an explosion.

Sodium is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for Sodium.

The Protective Action Criteria values are: $PAC-1 = 0.5 \text{ mg/m}^3$ $PAC-2 = 5 mg/m^3$ $PAC-3 = 50 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea and vomiting

PHYSICAL PROPERTIES

at 752°F (400°C)

Odor Threshold:	Odorless
Flash Point:	Flammable solid
Auto Ignition Temp:	>239°F (115°C)
Vapor Density:	0.003 (air = 1)
Vapor Pressure:	1.2 mm Hg at 752°F (40
Specific Gravity:	0.97 (water = 1)
Water Solubility:	Decomposes (violently)
Boiling Point:	1,619°F (882°C)
Melting Point:	208°F (98°C)
Molecular Weight:	22.49

PROTECTIVE EQUIPMENT

Gloves:	Nitrile (>8-hr breakthrough for Kerosene and Naphtha)
Coveralls:	Turn out gear or flash protection
Respirator:	>0.5 mg/m ³ -full facepiece APR with High efficiency filters
	>5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with large amounts of water for at least 30 minutes. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SODIUM AZIDE

Synonyms: Azide; Azium; Smite® CAS No: 26628-22-8 Molecular Formula: NaN₃ RTK Substance No: 1684 Description: Colorless to white, odorless

Description: Colorless to white, odorless solid which is highly soluble in water which may result in the formation of *Hydrazoic Acid*

HAZARD DATA						
Hazard Rat	ting	Firefighting		Reactivit	ty	
3 - Health 1 - Fire 3 - Reactivity DOT#: UN 16 ERG Guide #: Hazard Class (Po	687 : 153 : 6.1 pison)	REACTIVE and SEVERE EXPLOSION HAZARD. Use dry sand or special powder as extinguishing agents. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Sodium</i> <i>Oxide</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT get water inside containers as Sodium Azide reacts with WATER to form <i>Hydrazoic Acid</i> .		Reacts with CARBON DISULFIDE and METALS (such as LEAD, BRASS, COPPER, SILVER and MERCURY) to form shock-sensitive compounds. Reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic and explosive <i>Hydrazoic Acid.</i> Sodium Azide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BARIUM CARBONATE; DIMETHYL SULFATE; HALOGENATED SOLVENTS; and DIBROMOMALONONITRILE. Sodium Azide is not compatible with CAUSTICS; METAL OXIDES; METAL SULFIDES; METAL AZIDES; and PHOSGENE. Protect from HEAT, SHOCK and FRICTION.		
	SPI	LL/LEAKS			PH	SICAL PROPERTIES
Isolation Dist Liquids: 50 me Solid: 25 mete Fire: 800 mete Collect powder safe manner a DO NOT FLUS explosions ma Harmful to aqu	Isolation Distance: Liquids: 50 meters (150 feet) Solid: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT FLUSH into <i>Copper</i> or <i>Lead</i> pipes, as violent explosions may occur. Harmful to aquatic life			Odor Three Flash Poin Specific O Water Sol Melting Po Ionization Molecular	eshold: nt: Gravity: Jubility: oint: Potential: Weight:	Odorless Not flammable but decomposes explosively when heated 2.2 (air = 1) 1.8 (water = 1) Soluble/Decomposes 527°F (275°C) (decomposes and may explode) 11.7 eV 65
EXPOSURE LIMITS		SURE LIMITS			PRO	TECTIVE EQUIPMENT
NIOSH: 0.3 0.1 ACGIH: 0.29 0.1	mg/m ³ , ppm, C 9 mg/m ³ 1 ppm, (Ceiling (as Sodium Azide) eiling (as <i>Hydrazoic Acid</i>), ³ , Ceiling (as Sodium Azide) Ceiling (as <i>Hydrazoic Acid</i>)		Gloves: Coveralls Respirato	Rubl : DuP DuP for /	ber ont Tyvek® for Sodium Azide ont Responder® and St. Gobain ONESuit® TEC <i>Hydrazoic Acid</i> plied air
HEALTH EFFECTS			FI	RST AID	AND DECONTAMINATION	
Eyes: Skin: Inhalation:	Irritation Irritation Nose ar and/or s edema) Headac dizzines Muscle tremor,	a, burns, possible loss of vision a, burns, redness, blisters and throat irritation, coughing shortness of breath (pulmonary he, nausea, vomiting and as weakness, dizziness, anxiety, collapse and even death		Remove the Flush eye Remove Quickly re- with large Begin artifinecessary Transfer to Medical of	he person fro s with large a contact lense emove contar amounts of ficial respirati y. o a medical f bservation is	om exposure. amounts of water for at least 15 minutes. es if worn. Seek medical attention immediately. minated clothing and wash contaminated skin soap and water. ion if breathing has stopped and CPR if facility. recommended as symptoms may be delayed.



Common Name: SODIUM BISULFITE

Synonym: Sodium Hydrogen Sulfite CAS No: 7631-90-5 Molecular Formula: NaHSO₃ RTK Substance No: 1685 Description: White, crystalline solid which is corrosive when in a liquid solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Bisulfite itself does not	Sodium Bisulfite reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
U - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sodium Oxides and Sulfur Oxides	ACIDS (such as HYDROCHLORIC. SULFURIC and
DOT#: UN 2693	Use water spray to keep fire-exposed containers	NITRIC) to release Sulfur Dioxide gas.
(Solution)	cool.	Sodium Bisulfite decomposes in HEAT and is corrosive
ERG Guide #: 154		to ALUMINUM.
Hazard Class: 8		
(Corrosive)		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer.

Dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA: None NIOSH: 5 mg/m³, 10-hr TWA ACGIH: 5 mg/m³, 8-hr TWA

IDLH: None

Eves:

HEALTH EFFECTS Severe irritation and burns

Skin:	Severe irritation, burns, itching and skin rash
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Odor of rotten eggsFlash Point:Not combustibleSpecific Gravity:1.48 (water =1)Water Solubility:SolubleBoiling Point:DecomposesMelting Point:DecomposesMolecular Weight:104.1

PROTECTIVE EQUIPMENT

Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tyvek® or equivalent
Respirator:	>5 mg/m 3 - Full facepiece APR with High efficiency filters >50 mg/m 3 - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 60 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. DO NOT INTERRUPT FLUSHING. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of water for at least 60 minutes. DO NOT INTERRUPT WASHING. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: SODIUM BROMATE

Synonyms: None CAS No: 7789-38-0 Molecular Formula: NaBrO₃ RTK Substance No: 1686 Description: Colorless to white, crystalline or granular, odorless powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health 0 - Fire	Sodium Bromate is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances	Sodium Bromate reacts violently with REDUCING AGENTS (such as LITHIUM, SODIUM, POTASSIUM and their HYDRIDES): COMBUSTIBLE MATERIALS:		
0 - Reactivity	Use water only. DO NOT USE DRY CHEMICAL or CO_2 extinguishing agents.	ORGANICS (such as OIL, FAT, GREASE and FUELS); METAL POWDERS (such as ALUMINUM, ARSENIC and COPPER); POTASSIUM; METAL SULFIDES; CARBON; SUGAR; and AMMONIUM SALTS. Sodium Bromate will become shock sensitive if		
DOT#: UN 1494 ERG Guide #: 141	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.			
Hazard Class: 5.1 (Oxidizer)		contaminated with ORGANIC MATERIALS, METALS or CARBON.		
	Sodium Bromate may ignite combustibles (wood, paper and oil).			
	Contamination may cause containers to explode.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT use combustible absorbents. DO NOT wash into sewer.

PHYSICAL PROPERTIES

Nitrile and Natural Rubber

Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Molecular Weight:

Gloves:

Coveralls:

Respirator:

Odorless Noncombustible 3.34 (water = 1) Soluble 718°F (381°C) (Decomposes) 150.9

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 1.5 mg/m^3
- PAC-2 = 12.5 mg/m³
- $PAC-3 = 60 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation

Skin:IrritationInhalation:Nose, throat and lung irritation with
coughing, wheezing and severe
shortness of breath (pulmonary edema)
Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

>1.5 mg/m³ - SCBA

PROTECTIVE EQUIPMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tyvek®

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: SODIUM CACODYLATE

Synonyms: Cacodylic Acid, Sodium Salt CAS No: 124-65-2 Molecular Formula: $C_2H_6AsO_2Na$ RTK Substance No: 1687 Description: Colorless to light vellow, crystalline solid o

Description: Colorless to light yellow, crystalline solid or powder with a slight garlic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Sodium Cacodylate may burn, but does not readily ignite.	Sodium Cacodylate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	Use dry chemical, CO ₂ , water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1688	including Arsenic Oxide and Arsenic fumes.	POTASSIUM HYDROXIDE); and SODIUM
ERG Guide #: 152	Use water spray to keep fire-exposed containers	BOROHYDRIDE.
Hazard Class: 6.1 (Poison)	cool.	Sodium Cacodylate reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Dimethylarsine gas</i> .

Odor Threshold:

Specific Gravity:

Water Solubility:

Molecular Weight:

Boiling Point:

Melting Point:

pH:

Flash Point:

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and desposit in sealed containers.

DO NOT wash into sewer.

Harmful to aquatic life.

EXPOSURE LIMITS

OSHA: 0.5 mg/m³, 8-hr TWA NIOSH: None ACGIH: None IDLH: None

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.5 mg/m ³ - full facepiece APR with High efficiency filter >0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

	HEALTH EFFECTS
Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing and wheezing, weakness, nausea, vomiting, headache and muscle cramps
Chronic:	Arsenic and Arsenic compounds cause skin and lung cancer in humans

PHYSICAL PROPERTIES

Slight garlic odor

Nonflammable

>1 (water = 1)

Decomposes

140°F (60°C)

Soluble

160

8 to 9



Common Name: SODIUM CHLORATE

Synonyms: Atlacide; Chlorate of Soda; Oxycil CAS No: 7775-09-9 Molecular Formula: NaClO₃ RTK Substance No: 1688 Description: Odorless, pale yellow to white, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Sodium Chlorate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Sodium Chlorate reacts with ARSENIC TRIOXIDE; STRONG ACIDS (such as HYDROCHLORIC.
0 - Fire		SULFURIC and NITRIC); REDUCING AGENTS (such as
0 - Reactivity	Flood with water.	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANIC MATERIALS (such as PEAT, SUGAR and
DOT#: UN 1495 UN 2428 (solution)	including <i>Chlorides</i> and <i>Sodium Oxides</i> . Use water spray to keep fire-exposed containers	WOOD); COMBUSTIBLES; and FINELY POWDEREE METALS (such as ALUMINUM) to cause fires and
ERG Guide #: 140	cool.	Explosions.
Hazard Class: 5.1 (Oxidizer)	Sodium Chlorate may ignite combustibles (wood, paper and oil).	COMPOUNDS; CYANIDES; and HYDROGEN PEROXIDE.

SPILL/	LEAKS
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Isolation Distance:

Spill (solid): 25 meters (75 feet) (solution): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Sodium Chlorate is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sodium Chlorate**.

The Protective Action Criteria values are:

 $PAC-1 = 0.4 \text{ mg/m}^3$

PAC-2 = 3 mg/m^3

 $PAC-3 = 75 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	478°F (248°C)
Molecular Weight:	106.44

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	Tyvek® (<i>solid</i>); Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough for Sodium Chlorate <i>in solution</i>)
Respirator:	Spill (solid): full facepiece APR with High efficiency filters >0.4 mg/m 3 or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: SODIUM CHROMATE

Synonyms: Disodium Chromate; Chromate of Soda CAS No: 7775-11-3 Molecular Formula: Na₂CrO₄ RTK Substance No: 1692 Description: Odorless, yellow, crystalline solid

HAZARD	DATA
IIALAND	DAIA

Hazard Rating	Firefighting	Reactivity
4 - Health	Sodium Chromate is not combustible but is a STRONG OXIDIZER which enhances the	Sodium Chromate is a powerful OXIDIZER. Contact with REDUCING AGENTS (such as LITHIUM, SODIUM,
0 - Fire	combustion of other substances.	ALUMINUM and their HYDRIDES); COMBUSTIBLE
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chromium Oxide</i> and <i>Sodium Monoxide</i> .	and ORGANIC MATERIALS (such as PAPER, WOOD and PLASTICS); and STRONG ACIDS (such as
DOT#: UN 3288	Use water spray to keep fire-exposed containers	HYDROCHLORIC, SULFURIC and NITRIC) may result in
ERG Guide #: 151	cool.	
Hazard Class: 6.1	Sodium Chromate may ignite combustibles (wood, paper and oil).	
(Poison)	(,	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Sodium Chromate is very toxic to aquatic organisms.

EXPOSURE LIMITS

- **OSHA:** 0.005 mg/m³, 8-hr TWA (as *Chromium VI*)
- **NIOSH:** 0.001 mg/m³, 10-hr TWA (as *Chromium*)
- **ACGIH:** 0.05 mg/m³, 8-hr TWA (as *Chromium*)
- **IDLH:** 15 mg/m³ (as *Chromium VI*)

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers.
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Hexavalent Chromium or Chromium VI compounds cause cancer (lung) in humans.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Density:	2.7 (air = 1)
Specific Gravity:	1.48 (water = 1)
Water Solubility:	Soluble
Melting Point:	1,458°F (792°C)
Molecular Weight:	162

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.005 mg/m ³ - Full facepiece APR with High efficiency filters >0.05 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility



Common Name: SODIUM DICHROMATE

Synonyms: Sodium Bichromate; Chromic Acid, Disodium Salt CAS No: 10588-01-9 Molecular Formula: Na₂Cr₂O₇ RTK Substance No: 1695 Description: Odorless, red or red-orange, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Sodium Dichromate is not combustible, but it is a STRONG OXIDIZER that enhances the	Sodium Dichromate reacts violently with HYDRAZINE; ACETIC ANHYDRIDE: ETHANOL: and SULFURIC
0 - Fire	combustion of other substances.	ACID.
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents	Sodium Dichromate is not compatible with OXIDIZING AGENTS (such as PERCHI ORATES, PEROXIDES)
DOT#: UN 1479	POISONOUS GASES ARE PRODUCED IN FIRE,	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 140	including Sodium Oxides.	CHLORINE, BROMINE and FLUORINE) and
Hazard Class: 6	Use water spray to keep fire-exposed containers cool.	COMBUSTIBLES.
(FOISOIT)	Sodium Dichromate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Liquid spills can be neutralized with *Sodium Carbonate*. DO NOT wash into sewer.

Sodium Dichromate is very toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

- **NIOSH:** 0.001 mg/m³, 10-hr TWA
- ACGIH: 0.05 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³

(All the above are for Chromium VI)

The Protective Action Criteria values are:

PAC-1 = 20 mg/m³ PAC-2 = 37.8 mg/m³ PAC-3 = 37.8 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and ulcers
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans.

PHYSICAL PROPERTIES

Odorless
Nonflammable
2.35 (water = 1)
Soluble
752°F (400°C)
675°F (357°C)
262
4 (1% solution)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.001 mg/m ³ - full facepiece APR with <i>High efficiency filters</i>
	>1 mg/m [°] - Supplied air >15 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility



Common Name: SODIUM DITHIONITE

Synonyms: Sodium Hydrosulfite CAS No: 7775-14-6 Molecular Formula: Na₂S₂O₄ RTK Substance No: 1697

Description: White to gravish, crystalline powder with a slight rotten egg odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Sodium Dithionite is REACTIVE and contact with MOIST AIR, MOISTURE, WATER or HEAT can cause Sodium	Exposure to MOISTURE, MOIST AIR, WATER or elevated TEMPERATURES (over 140°F (60°C)) causes Sodium
1 - Fire	Dithionite to decompose, producing enough heat to ignite	Dithionite to decompose. Decomposition produces enough
2 - Reactivity	combustible materials.	heat to ignite combustibles.
DOT#: UN 1384 ERG Guide #: 135	Use CO ₂ or dry sand for small fires. Use water in flooding quantities for large fires. If flooding quantities are not available, let burn. Monitor container temperature for at least 48-hours to make	Sodium Dithionite may react violently or explosively with SODIUM CHLORITE and other OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
Hazard Class: 4.2	sure decomposition is not occurring.	FLUORINE).
(Spontaneously Combustible)	POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Dioxide.	Sodium Dithionite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic gases.
	Use water spray to keep fire-exposed containers cool. Sodium Dithionite may form an ignitable dust/air mixture in closed tanks or containers.	Sodium Dithionite, in combination with a mixture of ALUMINUM POWDER, POTASSIUM CARBONATE, and BENZALDEHYDE, resulted in an explosion.
	Sodium Dithionite may be ignited by static discharge.	

Isolation Distance:

Dry Spill: 25 meters (75 feet) Water Spill: 30 meters (100 feet)

Fire: 800 meters (1/2 mile)

Cover and mix in with dry sand, earth or other noncombustible material and place into sealed, dry containers for disposal. Use only non-sparking tools and equipment, especially when opening and

SPILL/LEAKS

closing containers of Sodium Dithionite.

IDE LINUTS

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Sodium Dithionite is harmful to the aquatic environment

PHYSICAL PROPERTIES

Rotten egg odor
212°F (100°C)
3.6 (air = 1)
1.4 (water = 1)
Soluble (Decomposes)
158° to 266°F (70° to 130°C)
174.1

DDOTECTIVE EQUIDMENT

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
No occupational exposure limits have been	Gloves:	Neoprene, Natural Rubber and Polyvinyl Chloride
established for Sodium Dithionite.	Coveralls:	Tyvek®
The Protective Action Criteria values are: $PAC_1 = 20 \text{ mg/m}^3$ $PAC_2 = 50 \text{ mg/m}^3$	Respirator:	SCBA

$PAC-1 = 30 \text{ mg/m}^3$ PAC-2 = 50 mg/m PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eves: Irritation and burns Skin: Irritation and burns Nose, throat and lung irritation, with coughing, Inhalation: wheezing and shortness of breath Headache, dizziness, lightheadedness, and convulsions.

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SODIUM FLUORIDE

Synonyms: Natrium Fluoride; Sodium Monofluoride CAS No: 7681-49-4 Molecular Formula: NaF RTK Substance No: 1699 Description: Colorless or white, odorless crystal or powder that also may be dyed blue or green when used as a pesticide

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Fluoride itself does not burn.	Sodium Fluoride reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Hydrogen Fluoride gas</i> .
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	Sodium Fluoride is not compatible with OXIDIZING
DOT# : UN 1690	including <i>Hydrogen Fluoride</i> gas.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 154	cool.	CHLORINE, BROMINE and FLUORINE); STRONG
Hazard Class: 6.1 (Poison)		BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and METALS.

ILL/	LEA	KS
	ILL/	ILL/LEA

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Sodium Fluoride** *in solution*, cover with dry lime, sand or soda ash and place into sealed containers for disposal.

For water spills, neutralize with agricultural lime, crushed limestone or sodium bicarborate.

DO NOT wash into sewer.

Sodium Fluoride is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA: 2.5 mg/m³, 8-hr TWA NIOSH: 2.5 mg/m³, 10-hr TWA ACGIH: 2.5 mg/m³, 8-hr TWA IDLH: 250 mg/m³ (All of the above are for *inorganic Fluoride*) The Protective Action Criteria values are:

PAC-1 = 5.5 mg/m³ PAC-2 = 5.5 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless Nonflammable 0 mm Hg at 68°F (20°C) (approx) 2.56 (water = 1) Very slightly soluble 3,083°F (1,695°C) 1,819°F (993°C) 42

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough for <i>inorganic salt solutions</i>)
Coveralls:	Tychem® Responder® (>8-hr breakthrough for Sodium Fluoride in <i>water solution</i>)
Respirator:	>2.5 mg/m ³ - full facepiece APR with <i>High efficiency filters</i> >25 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: SODIUM HYDROGEN FLUORIDE

Synonyms: Sodium Bifluoride; Sodium Difluoride CAS No: 1333-83-1 Molecular Formula: Na(HF₂) RTK Substance No: 1703

Description: Colorless to white, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Hydrogen Fluoride	Sodium Hydrogen Fluoride will react with WATER and MOIST AIR to form flammable and corrosive gases.
0 - Fire	itself does not burn.	Sodium Hydrogen Fluoride is not compatible with
1 - Reactivity	Sodium Hydrogen Fluoride may react with	METALS; STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2439	POISONOUS GASES ARE PRODUCED IN FIRE,	MATERIALS.
ERG Guide #: 154	including Hydrogen Fluoride and Sodium Fluoride.	Water-based solutions of Sodium Hydrogen Fluoride
Hazard Class: 8 (Corrosive)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	can corrode GLASS, CONCRETE and certain METALS, and will attack RUBBER, LEATHER and many ORGANIC MATERIALS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Sodium Hydrogen Fluoride is harmful to fish and other aquatic organisms.

EXPOSURE LIMITS

OSHA:2.5 mg/m³, 8-hr TWA (as Fluorides)ACGIH:2.5 mg/m³, 8-hr TWA (as Fluorides);
0.5 ppm, 8-hr TWA (as Hydrogen Fluoride)IDLH:250 mg/m³ (as Fluorine)

The Protective Action Criteria values are:

 $PAC-1 = 2.5 \text{ mg/m}^3$

 $PAC-2 = 2.5 \text{ mg/m}^{3}$

PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, severe burns and possible eye damage
Skin:	Irritation, severe burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, and nausea

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
Specific Gravity:	2.08 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Molecular Weight:	61.99

PROTECTIVE EQUIPMENT

Gloves: Nitrile or Natural Rubber

Coveralls: Tyvek®

Respirator:<2.5 mg/m³ - full facepiece APR with High efficiency filters</td>>2.5 mg/m³ (as Fluorides) - SCBA>0.5 ppm (as Hydrogen Fluoride) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: SODIUM HYDROSULFIDE

Synonyms: Sodium Bisulfide; Sodium Hydrogen Sulfide; Sodium Mercaptan; Sodium Sulfide CAS No: 16721-80-5 Molecular Formula: NaHS RTK Substance No: 1705

Description: Colorless to lemon-colored, crystalline solid with a rotten egg odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health *2 - Fire 1 - Reactivity DOT#: UN 2318 (less than 25% water of crystallization) ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously Combustible)	 Sodium Hydrosulfide, when not solution, may be SPONTANEOUSLY COMBUSTIBLE. FLAMMABLE Hydrogen Sulfide gas may form with heating. Use dry chemical, CO₂, water spray or foam as extinguishing agents. DO NOT apply directly on Sodium Hydrosulfide itself as splattering may occur. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides and Hydrogen Sulfide. Use water spray to keep fire-exposed containers cool. Sodium Hydrosulfide may form an ignitable vapor/air mixture in closed tanks or containers. 	Sodium Hydrosulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); MOIST AIR and MOISTURE to release flammable and toxic <i>Hydrogen Sulfide gas</i> . Sodium Hydrosulfide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and METALS (such as ZINC, ALUMINUM and COPPER, and their ALLOYS).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Sodium Hydrosulfide** in *solution*, cover with dry sand or earth and place into sealed containers for disposal.

Keep **Sodium Hydrosulfide** out of confined spaces, such as sewers, because of the possibility of an explosion due to *Hydrogen Sulfide* gas *formation*.

DO NOT wash into sewer.

For water spills, add Sodium Carbonate (Na₂CO₃).

Sodium Hydrosulfide is very toxic to aquatic life.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 5 ppm STEL (as *Hydrogen Sulfide*)

IDLH: 100 ppm (as Hydrogen Sulfide)

The Protective Action Criteria values are:

PAC-1 = 0.51 ppm PAC-2 = 27 ppm PAC-3 = 50 ppm (as *Hydrogen Sulfide*)

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, disorientation, and passing out
	Higher levels can cause seizures and death

PHYSICAL PROPERTIES

Odor Threshold:	Rotten egg odor
Flash Point:	194°F (90°C) (Hydrate form)
LEL:	4.3% (as Hydrogen Sulfide)
UEL:	46% (as Hydrogen Sulfide)
Vapor Density:	1.17 (air = 1)
Specific Gravity:	1.79 (water = 1)
Water Solubility:	Soluble
Boiling Point:	212°F (100°C)
Melting Point:	662°F (350°C)
Molecular Weight:	56.06

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>8-hr breakthrough)
Coveralls:	Tychem® Responder (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.
- Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: SODIUM HYDROXIDE

Synonyms: Caustic Soda; Lye; Sodium Hydrate CAS No: 1310-73-2 Molecular Formula: NaOH RTK Substance No: 1706

Description: Odorless, white solid that absorbs moisture from the air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Hydroxide itself does not burn.	Sodium Hydroxide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); WATER; and MOISTURE to rapidly release heat.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Sodium Hydroxide reacts with METALS (such as ALUMINUM, LEAD, TIN and ZINC) to form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 1823 (solid)	cool. DO NOT get water inside containers. Sodium Hydroxide in contact with water or	Sodium Hydroxide can form shock sensitive salts on contact with NITROGEN CONTAINING COMPOUNDS (such as NITROMETHANE).
UN 1824 (solution)	moisture may generate enough heat to ignite compustibles	Sodium Hydroxide is not compatible with OXIDIZING AGENTS (such as PERCHI ORATES, PEROXIDES, PERMANGANATES
ERG Guide #: 154		CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 8		CHLORINATED SOLVENTS; AMMONIA; and ORGANIC MATERIALS.
(Corrosive)		and COATINGS.

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet): Spill (liquid): 50 meters (150 feet) Fire: 800 meters (1/2 mile)

For **Sodium Hydroxide** in *solution* absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect *solid* material in the most convenient and safe manner

and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Neutralize water spills with a dilute acid.

Sodium Hydroxide is hazardous to the environment, especially water organisms.

EXPOSURE LIMITS

OSHA: 2 mg/m^3 , 8-hr TWANIOSH: 2 mg/m^3 , CeilingACGIH: 2 mg/m^3 , CeilingIDLH: 10 mg/m^3 The Protective Action Criteria values are:PAC-1 = 0.5 mg/m^3 PAC-2 = 5 mg/m^3PAC-3 = 50 mg/m^3

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	0 mm Hg at 68ºF (20ºC)
Specific Gravity:	2.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	2,534°F (1,390°C)
Melting Point:	604°F (318°C)
Molecular Weight:	40

PROTECTIVE EQUIPMENT

Coveralls:

Gloves:

Butyl, Nitrile, Neoprene, PVC, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough for **Sodium Hydroxide** in *solution*)

Tychem® SL and Responder®, and Trellchem® HPS and VPS (>8-hr breakthrough for **Sodium Hydroxide** solid or solution)

Respirator:

<10 mg/m³ - Full facepiece APR with *High efficiency filters* >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with large amounts of water for at least 30 minutes. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: SODIUM HYPOCHLORITE

Synonyms: Clorox; Liquid Bleach; Sodium Oxychloride CAS No: 7681-52-9 Molecular Formula: NaOCI RTK Substance No: 1707 Description: Clear, slightly yellow or green liquid with a strong Chlorine odor

HAZARD DATA						
Hazard Rat	ting	Firefighting	R	eactivity		
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 17 ERG Guide # Hazard Class (Corro	791 : 154 : 8 osive)	 Sodium Hypochlorite is not combustible but is a STRONG OXIDIZER which enhances the combustion of other substances. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sodium Oxide</i> and <i>Chlorine</i>. Use water spray to keep fire-exposed containers cool. Sodium Hypochlorite may ignite combustibles (wood, paper and oil). 	Social A A C A C A A C A A Social A C C A A C C A A C A C A C A C A C A	Keactivity Sodium Hypochlorite may react violently or explosively with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID COMPOUNDS (such as ALUMINUM CHLORIDE, FERRIC CHLORIDE and ALUM); ACID-BASED CLEANING COMPOUNDS (such as BRICK and CONCRETE CLEANERS); and AMMONIA COMPOUNDS (such as AMMONIUM HYDROXIDE, AMMONIUM CHLORIDE and QUATERNARY AMMONIUM SALTS) to release Chlorine and other toxic gases. Sodium Hypochlorite may react violently with ORGANIC MATERIALS (such as SOLVENTS, FUELS, ALCOHOLS, GLYCOLS and INSECTICIDES); AMINES; and ORGANIC POLYMERS to form Chlorinated Organic compounds, explosive compounds and Chlorine gas. Sodium Hypochlorite is not compatible with HYDROGEN PEROXIDE and METALS (such as COPPER, NICKEL, COBALT and IRON), and should not be handled in equipment or piping containing STAINLESS STEEL, ALUMINUM, CARBON STEEL or OTHER COMMON METALS. The reaction may release Oxygen gas and can cause container rupture. The reaction of Sodium Hypochlorite and REDUCING AGENTS (such as SODIUM BISULFITE and SODIUM THIOSULFATE) gives off heat.		
	S	SPILL/LEAKS			PHYS	SICAL PROPERTIES
Isolation Dista Small Spill: 30 Large Spill: 100 Fire: 800 meter Neutralize with covered contain DO NOT wash i Sodium Hypoc NIOSH: AIHA: IDLH:	nce: meters (0 meters rs (1/2 m Sodium ners for o into sewe chlorite it EXF 0.5 p 2 mg 30 p	100 feet) (300 feet) ile) <i>Bisulfite,</i> cover with <i>Soda Ash</i> and place into disposal or wash with plenty of water. er. s toxic to aquatic organisms. POSURE LIMITS opm, 15-min Ceiling (as <i>Chlorine</i>) g/m ³ , 15-min WEEL pm (as <i>Chlorine</i>)		Odor Thres Flash Point Specific Gra Water Solul Boiling Poin Molecular V pH: Gloves: Coveralls: Respirator:	hold: avity: bility: ht: Veight: PROTI Butyl, Nit breakthro Tychem@ ONESuit solutions >2 mg/m	Chlorine-like Noncombustible 1.1, 5% solution (water = 1) Soluble Decomposes 74.4 10.8 to 11.4 (5.25% solution in water) ECTIVE EOUIPMENT rile, Neoprene, Natural Rubber and Viton (>8-hr ough for 30 to 70% solutions) SL, CPF 3, Responder®; Zytron® 300; and TEC (>8-hr breakthrough for 30 to 70%) 3 - full facepiece APR with Acid gas cartridge and
					N100 pre >20 mg/n	filters n ³ or >5 ppm <i>Chlorine</i> - Supplied air
HEALTH EFFECTS			FIRS	T AID	AND DECONTAMINATION	
Eyes: Skin: Inhalation:	Irritation Severe Nose, t and sev edema Headad	n, burns and possible eye damage irritation, burns, rash and blisters hroat and lung irritation, with coughing vere shortness of breath (Pulmonary) che, dizziness, nausea and vomiting		Remove the Flush eyes Remove co immediately Quickly rem with large a Begin artific necessary. Transfer pro Medical obs delayed.	person fro with large ntact lense nove conta mounts of ial respirat omptly to a ervation is	om exposure. amounts of water for at least 30 minutes. es if worn. Seek medical attention minated clothing and wash contaminated skin water. Seek medical attention. tion if breathing has stopped and CPR if a medical facility. s recommended as symptoms may be





Common Name: SODIUM NITRITE

Synonyms: Anti-Rust; Diazoting Salts; Erinitrit CAS No: 7632-00-0 Molecular Formula: NaNO₂ RTK Substance No: 2258

Description: Odorless, yellowish white, crystalline granule, rod or powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 1 - Reactivity DOT#: UN 1500 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Sodium Nitrite is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances. Use water only. DO NOT USE dry chemical, Halon® or CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed	 Sodium Nitrite may explode on heating above 986°F (530°C) or on contact with CYANIDES; PHOSPHORUS; TIN (II) CHLORIDE; COMBUSTIBLES; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES). Sodium Nitrite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form <i>Nitrogen</i> <i>Dioxide</i> and reacts with <i>liquid</i> AMMONIA and other AMMONIUM COMPOUNDS to form reactive and explosive substances. Sodium Nitrite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): CELLULOSE: AMINES: CHEMICALLY ACTIVE
containers cool. Sodium Nitrite may ignite (wood, paper and oil).	containers cooi. Sodium Nitrite may ignite combustibles (wood, paper and oil).	METALS (such as POTASSIUM, MAGNESIUM and ZINC); METALS, METAL SALTS; and many other chemicals.

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:Spill: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.DO NOT wash into sewer.For water spills add Soda Ash and Calcium Hypochlorite to adjust pH to 7.Sodium Nitrite is toxic to aquatic life.	Odor Threshold: Flash Point: Auto Ignition Temp: Vapor Density: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight: pH:	Odorless Nonflammable 1,000°F (538°C) <1 (air = 1) 2.2 (water = 1) Soluble 608°F (320°C) (Decomposes) 520°F (271°C) 69 9 (in solution)	

EXPOSURE LIMITS

The Protective Action Criteria values are: $PAC-1 = 6.4 \text{ mg/m}^3$ $PAC-2 = 71 \text{ mg/m}^3$ PAC-3 = 240 mg/m³

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coverall	s: Tyvek®
Respirat	or: >0.15 mg/m ³ - full facepiece APR with High efficiency filters
	>1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

lips

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Methemoglobinemia with headache, fatigue and blue color to the skin and lip

HEALTH EFFECTS



Common Name: SODIUM SULFIDE

Synonyms: Sodium Monosulfide CAS No: 1313-82-2 Molecular Formula: Na₂S RTK Substance No: 1728 Description: White, yellow to red or pink, crystalline solid or flake which discolors on exposure to air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Finely divided Sodium Sulfide can explode spontaneously in air.	ELEVATED TEMPERATURES (1,688°F, 920°C) or FRICTION can cause explosive decomposition.
1 - Fire 1 - Reactivity DOT#: UN 1385 ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously Combustible)	Use flooding quantities of water, foam or dry powder as extinguishing agents. DO NOT use CO ₂ fire extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Sulfide</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Sodium Sulfide reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALUMINUM POWDER; CARBON; and DIAZONIUM SALTS. Sodium Sulfide reacts with WATER to form <i>Hydrogen</i> <i>Sulfide gas</i> . DO NOT ALLOW Sodium Sulfide to become completely dry as it may ignite spontaneously.

SPILL/LEAKS

Isolation Distance:

Spills	25 meter (75 feet)
Fire:	800 meters (1/2 mile)

Keep finely divided Sodium Sulfide out of confined

spaces, such as sewers, because of the possibility of an explosion.

May be hazardous to the environment and harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin allergy with itching and rash
Inhalation.	Nose throat and lung irritation with

coughing, and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Rotten eggs
Flash Point:	Spontaneously combustible when heated
Auto Ignition Temp:	>896°F (>480°C)
Specific Gravity:	1.86 (water = 1)
Water Solubility:	Slightly soluble
Melting Point:	1,688° to 1,742°F (920° to 950°C)
Molecular Weight:	78.05

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® CPF 1, QC, CPF 2 and SL for <i>dry</i> Sodium Sulfide and DuPont Tychem®, CSM, Responder® and TK for Sodium Sulfide <i>solution</i>
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. **Begin** artificial respiration if breathing has stopped and CPR if

Transfer to a medical facility.

necessary.



Common Name: STANNOUS CHLORIDE

Synonyms: Tin Chloride; Tin Dichloride CAS No: 7772-99-8 Molecular Formula: SnCl₂ RTK Substance No: 1733 Description: White to off-white flake or crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire Stannous Chloride itself does	Stannous Chloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Tin Oxide fumes</i> . Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE); ETHYLENE OXIDE; HYDRAZINE HYDRATE; and CALCIUM	
DOT#: UN 1759		CARBIDE.	
ERG Guide #: 154		Stannous Chloride is not compatible with METALS (such as POTASSIUM. SODIUM. MAGNESIUM and ZINC):	
Hazard Class: 8		METAL CARBIDES; and COMBUSTIBLE MATERIALS.	
(Corrosive)		Stannous Chloride is MOISTURE and AIR sensitive.	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	Noncombustible
Spill: 25 meters (75 feet)	Vapor Pressure:	0 mm Hg at 68°F (20°C)
Fire: 800 meters (1/2 mile)	Specific Gravity:	3.95 (water = 1)
	Water Solubility:	Soluble
Collect powdered material in the most convenient and safe manner and place into sealed containers for	Boiling Point:	1,206°F (652°C)
disposal.	Melting Point:	475°F (246°C)
DO NOT wash into sewer.	Molecular Weight:	189.6

EXPOSURE LIMITS

OSHA:	2 mg/m³, 8-hr TWA		
NIOSH:	2 mg/m ³ , 10-hr TWA		
ACGIH:	2 mg/m ³ , 8-hr TWA		
IDLH:	100 mg/m ³		
(All of the above are for Tin)			
The Protective Action Criteria values are:			
PAC-1 = 9.6 mg/m ³			
PAC-2 = 50 mg/m ³			
$PAC-3 = 160 \text{ mg/m}^3$			

PROTECTIVE EQUIPMENT		
Gloves:	Nitrile and Natural Rubber	
Coveralls:	Tyvek®	
Respirator:	>2 mg/m ³ - full facepiece APR with High efficiency filters >10 mg/m ³ - SCBA	

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose and throat irritation with coughing and wheezing Headache, nausea and vomiting.	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

January 2010



Common Name: STODDARD SOLVENT

Synonyms: White Spirits, Varsol, Mineral Spirits CAS No: 8052-41-3 Molecular Formula: Mixture RTK Substance No: 1736 Description: Clear colorless liquid with a Kerosene-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	COMBUSTIBLE LIQUID	Stoddard Solvent reacts with OXIDIZING	
2 - Fire	Use dry chemical, CO ₂ , or foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity DOT#: UN 1268	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.	
	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to		
ERG Guide #: 128	cause a fire or explosion far from the source.		
Hazard Class: 3			
(Flammable)			

Gloves:

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. If released into water, shoreline fouling may occur.

PHYSICAL PROPERTIES

Odor Threshold:	1 to 30 ppm
Flash Point:	100° to 140°F (38° to 60°C)
LEL:	0.9%
UEL:	6%
Auto Ignition Temp:	450°F (232°C)
Vapor Density:	4.8 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	309° to 399°F (154° to 204°C)
Molecular Weight:	approximately 140

EXPOSURE LIMITS

OSHA:	2,900 mg/m ³ (500 ppm), 8-hr TWA
NIOSH:	350 mg/m ³ (61 ppm), 10-hr TWA; 1,800 mg/m ³ (314 ppm), 15-min Ceiling
ACGIH:	525 mg/m ³ (100 ppm), 8-hr TWA
IDLH:	20,000 mg/m ³ (3,493 ppm)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, rash, redness and skin ulcers
Inhalation:	Nose and throat irritation, headache, dizziness and passing out

Neoprene, Silver Shield®/4H®, Viton and Nitrile

PROTECTIVE EQUIPMENT

	(>8-nr breakthrough)
Coveralls:	DuPont Tychem® CPF 4, BR, LV, Responder®, CSM,
	and TK; Kappler Zytron® 300; and Saint-Gobain
	ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	>350 mg/m ³ - APR with an Organic vapor cartridge >3 500 mg/m ³ - Supplied air
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FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: STRONTIUM NITRATE

Synonyms: Strontium Dinitrate CAS No: 10042-76-9 Molecular Formula: Sr(NO₃)₂ RTK Substance No: 1743 Description: Odorless, colorless or white, crystalline powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Strontium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of	Strontium Nitrate and ALKYL ESTERS may form explosive Alkyl Nitrates.		
0 - Fire	other substances.	Strontium Nitrate may react violently with		
0 - Reactivity	Use water only. DO NOT USE CHEMICAL, FOAM or CO_2 as extinguishing agents.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).		
DOT#: UN 1507	POISONOUS GASES ARE PRODUCED IN FIRE,	Strontium Nitrate is not compatible with COMBUSTIBLE MATERIALS; ORGANIC		
ERG Guide #: 140	including Nitrogen Oxides.			
Hazard Class: 5.1	CONTAINERS MAY EXPLODE IN FIRE.	MATERIALS; HALOGENS; METALS; METAL		
(Oxidizer)	Use water spray to keep fire-exposed containers cool.	HYDROCHLORIC SULFURIC and NITRIC)		
(0.1.1.1.1.1)	Strontium Nitrate may ignite combustibles (wood, paper and oil).			
	Prolonged exposure to heat, shock or friction may cause Strontium Nitrate to explode.			

SPILL/LEAKS

Isolation Distance:

Spill:	25	meters	(75 feet)
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Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Strontium Nitrate can persist indefinitely in water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Strontium Nitrate**.

The Protective Action Criteria values are:

 $PAC-1 = 30 \text{ mg/m}^{3}$

 $PAC-2 = 250 \text{ mg/m}^3$

PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES				
Odor Threshold:	Odorless			
Flash Point:	Nonflammable			
Specific Gravity:	2.98 (water = 1)			
Water Solubility:	Soluble			
Boiling Point:	1,193°F (645°C)			
Melting Point:	1,058°F (570°C)			
Molecular Weight:	211.6			

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural	Rubber

Coveralls: Tyvek®

Respirator:

: Full facepiece APR with High efficiency filters >30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: STYRENE MONOMER

Synonyms: Cinnamene; Ethenylbenzene; Phenylethylene; Vinyl Benzene CAS No: 100-42-5 Molecular Formula: C_8H_8 RTK Substance No: 1748

Description: Clear, colorless to yellow, oily liquid, with a sweet odor at low concentrations

ΗΔΖΑΡΟ ΝΑΤΑ				
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire 2- Reactivity DOT#: UN 2055 ERG Guide #: 128P Hazard Class: 3 (Flammable)	Firefighting Styrene Monomer is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back. Styrene Monomer can POLYMERIZE resulting in uncontrolled reactions. These reactions may be explosive.		Unstabilized Styrene Monomer can POLYMERIZE VIOLENTLY on exposure to HEAT; LIGHT; OXIDIZING AGENTS (such as PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); OXYGEN; PEROXIDES (such as <i>Dibenzoyl</i> <i>Peroxide</i>) or when CONTAMINATED. Styrene Monomer can form unstable <i>Peroxides</i> in AIR that may explode spontaneously. Styrene Monomer reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC, NITRIC and OLEUM) and METAL SALTS (such as IRON CHLORIDE and ALUMINUM CHLORIDE). Styrene Monomer attacks RUBBER, COPPER and COPPER ALLOYS.	
SPI	LL/LEAKS		PHISICAL PROPERTIES	
Isolation Distance: Spill: 50 meters (150 fer Fire: 800 meters (1/2 mi Absorb liquids in vermicu material and place into s Use only non-sparking to opening and closing con Ground and bond contain Monomer. Keep Styrene Monomer sewers, because of the DO NOT wash into sewe Styrene Monomer is tox	et) lile) ulite, dry sand, earth, or a similar sealed containers for disposal. hols and equipment, especially when itainers of Styrene Monomer . hers when transferring Styrene rout of confined spaces, such as possibility of an explosion. r. dic to aquatic organisms.	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Tel Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Poten Molecular Weigh	 0.04 to 0.32 ppm 88°F (31°C) 1% 7% mp: 914°F (490°C) 3.6 (air = 1) 5 mm Hg at 68°F (20°C) 0.91 (water = 1) Very slightly soluble 293°F (145°C) -23°F (-31°C) tial: 8.4 eV ht: 104.2 	
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA: 100 ppm, 8-hr 600 ppm, 5-m NIOSH: 50 ppm, 10-hr ACGIH: 20 ppm, 8-hr IDLH: 700 ppm The Protective Action Cri PAC-1 = 20 ppm PAC-3 = 1,10	TWA; 200 ppm Ceiling; in peak ; 100 ppm Ceiling FWA; 40 ppm Ceiling iteria values are: AC-2 = 130 ppm 20 ppm	Gloves: Coveralls: Respirator:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough) Tychem® F, CPF3, BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough) >20 ppm - full facepiece APR with <i>Organic vapor</i> cartridges >200 ppm - SCBA	
HEAL	TH EFFECTS	FIRS	T AID AND DECONTAMINATION	
Eyes:Irritation, feeling ofSkin:IrritationInhalation:Nose and Headach passing of	rash, dryness, redness and burning n contact d throat irritation le, dizziness, lightheadedness, and put	Remove the pers Flush eyes with la lenses. Quickly remove of amounts of soap Begin artificial res	on from exposure. arge amounts of water for at least 15 minutes. Remove contact contaminated clothing and wash contaminated skin with large and water. spiration if breathing has stopped and CPR if necessary.	
Chronic: Cancer (lung) in animals			



Common Name: STYRENE OXIDE

Synonyms: (Epoxyethyl)Benzene; Epoxy Styrene; Phenyl Oxirane CAS No: 96-09-3 Molecular Formula: C₈H₈O RTK Substance No: 1749 Description: Colorless to pale, straw-colored liquid with a pleasant, sweet odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
3 - Health 2 - Fire 0 - Reactivity DOT#: UN 3082 ERG Guide #: 171 Hazard Class: 9 (Miscellaneous Hazardous Material)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		alcohol- nguishing CED IN IRE.	Styrene Oxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Styrene Oxide may polymerize violently and release heat with compounds which easily release <i>Hydrogen</i> (such as WATER) when ACIDS, BASES, and some SALTS are also present.
SP	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 60 mete Large Spills: 270 met Fire: 800 meters (1/2 Absorb liquids in verm similar material and o DO NOT wash into se Degrades in water. B be significant.	rs (200 feet) ers (900 feet) mile) niculite, dry sand, earth, or a leposit in sealed containers. wer. ioconcentration should not		Odor Thr Flash Po LEL: UEL: Auto Igni Vapor De Vapor Pr Specific Water So Boiling P Melting F Molecula	reshold: 0.06 to 0.4 ppm int: 165°F (74°C) 1.1% 22% ition: 929°F (498°C) ensity: 4.3 (air = 1) essure: 0.3 mm Hg at 68°F (20°C) Gravity: 1.1 (water = 1) blubility: Slightly soluble Point: 382°F (194°C) Point: -34°F (-37°C) ur Weight: 120.2
EXPOSURE LIMITS PROTECTIVE EQUIPM		PROTECTIVE EQUIPMENT		
OSHA: 100 ppm, 100 ppm ACGIH: 20 ppm, 800 ppm, 100 ppm	8-hr TWA; 200 ppm, Ceiling; and for 5-mins in any 3-hour period 0-hr TWA, 100 ppm STEL -hr TWA, 40 ppm STEL above are for <i>Styrene</i>)		Gloves: Coveralls Respirato	 Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Styrene</i>) BuPont Tyvek® CPF 3, CPF 4, F, BR, LV, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Aromatic Hydrocarbons</i>) >20 ppm - Full facepiece APR with Organic vapor cartridge >200 ppm - Supplied air
HEALTH EFFECTS FIRST AID AND DECONTAMINATIO		IRST AID AND DECONTAMINATION		
Eyes:IrritatioSkin:IrritatioInhalation:Nose, fcoughibreathHeadaChronic:Cancel	n n, itching and rash throat and lung irritation with ng, wheezing and shortness of che, dizziness and passing out r (liver) in animals		Remove Flush eye contact le Quickly r large am Begin art necessar Transfer	the person from exposure. es with large amounts of water for at least 15 minutes. Remove enses if worn. emove contaminated clothing and wash contaminated skin with ounts of soap and water. ificial respiration if breathing has stopped and CPR if 'y. to a medical facility.



Common Name: SULFUR

Synonyms: Brimstone; Colloidal Sulfur; Molten Sulfur CAS No: 7704-34-9 Molecular Formula: S, S₈ (Molten) RTK Substance No: 1757 Description: Pale yellow, crystalline solid (odorless when pure or faint "rotten egg" odor) or an amber-colored liquid when *molten*

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Molten Sulfur is a FLAMMABLE SOLID and a fire and explosion risk above 450 °F (232 °C).	Sulfur reacts explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,		
1 - Fire	Sulfur is a COMBUSTIBLE SOLID.	CHLORATES, NITRATES, CHLORINE, BROMINE and		
0 - Reactivity DOT#: UN 1350 UN 2448 (Molten) ERG Guide #: 133	 Use water spray to fight fires and to keep fire-exposed containers cool. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Sulfide, Sulfur Dioxide</i> and <i>Sulfur Trioxide</i>. CONTAINERS MAY EXPLODE IN FIRE. Flow or agitation may generate electrostatic charges. Sulfur may form an ignitable vapor/air mixture in closed tanks or containers. 	FLUORINE). Sulfur is not compatible with METALS and METAL POWDERS (such as ZINC and TIN); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); PHOSPHORUS; AMMONIA; CHARCOAL; and HYDROGEN.		
Hazard Class: 4.1 (Flammable Solid)		Molten Sulfur reacts with HYDROCARBONS to form toxic and flammable gases such as <i>Carbon Disulfide</i> and <i>Hydrogen Sulfide</i>). Molten Sulfur can reach temperatures of 320 °F (160 °C), resulting in the formation of flammable and toxic <i>Hydrogen Sulfide</i> , <i>Sulfur Dioxide</i> and <i>Sulfur Trioxide gases</i> . These gases can accumulate in the vapor space of tankers and enclosed spaces		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet) (Solid) 50 meters (150 feet) (Molten)

Fire: 800 meters (1/2 mile)

Cover *molten* **Sulfur** with dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Keep *molten* **Sulfur** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Sulfur is dangerous to aquatic life in high concentrations

EXPOSURE LIMITS

NIOSH: 10 ppm, 10-min Ceiling for Hydrogen Sulfide

ACGIH: 1 ppm, 8-hr TWA; 5 ppm, STEL for *Hydrogen* Sulfide

The Protective Action Criteria values for **Sulfur** are: PAC-1 = 4 mg/m³ PAC-2 = 30 mg/m³

PAC-3 = 150 mg/m^3

HEALTH EFFECTS

 Eyes:
 Irritation and burns

 Skin:
 Irritation and burns

 Inhalation:
 Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless to rotten egg odor
Flash Point:	405°F (207°C)
LEL:	3.3% (as Hydrogen Sulfide)
UEL:	46% (as Hydrogen Sulfide)
Auto Ignition Temp:	450°F (232°C)
Vapor Pressure:	1 mm Hg at 363°F (184°C)
Specific Gravity:	1.8 to 2.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	832°F (445°C)
Melting Point:	239°F (115°C)
Molecular Weight:	32.07(S), 256.81 (S ₈) (<i>molten</i>)

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Neoprene and Natural Rubber (for solid Sulfur) and Insulated materials (for molten Sulfur)
Coveralls:	Tyvek® for <i>solid</i> Sulfur ; use Turn out gear or heat/flame protection for <i>molten</i> Sulfur
Respirator:	Spill: full facepiece APR with N, R or P100 filters for <i>solid</i> Sulfur and SA or SCBA for <i>molten</i> Sulfur
	Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: SULFUR DIOXIDE

Synonyms: Sulfurous Oxide; Sulfur Oxide CAS No: 7446-09-5 Molecular Formula: SO₂ RTK Substance No: 1759

Description: Colorless gas with a strong, irritating odor, that is often shipped as a liquid under pressure

30 ppm

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of	Sulfur Dioxide reacts violently with OXIDIZING AGENTS
0 - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE); SODIUM HYDRIDE: and OTHER REDUCING AGENTS (such as
DOT#: UN 1079	CONTAINERS MAY EXPLODE IN FIRE	LITHIUM, ZINC, ALUMINUM and their HYDRIDES).
ERG Guide #: 125	Use water spray to keep fire-exposed containers	Sulfur Dioxide is not compatible with AMMONIA; BRASS; and COPPER.
Hazard Class: 2.3 (Toxic gas)	cool and to dilute and disperse vapors.	Sulfur Dioxide reacts with WATER or MOISTURE to form Sulfuric Acid.

SPILL/LEAKS

Isolation Distance:

Spill (small): 60 meters (200 feet)

Spill (large): 400 meters (1,250 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Cover liquid spills with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT wash into sewer.

Sulfur Dioxide is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	5 ppm, 8-hr TWA
NIOSH:	2 ppm, 10-hr TWA, 5 ppm, STEL
ACGIH:	0.25 ppm, 8-hr TWA
IDLH:	100 ppm
The Prot	ective Action Criteria values are:
PAC-1 =	0.2 ppm PAC-2 = 0.75 ppm PAC-3 =

HEALTH EFFECTS

Eyes:	Irritation and burns, contact with liquid may cause frostbite
Skin:	Irritation and burns, contact with liquid may cause frostbite
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.3 to 5 ppm
Flash Point:	Nonflammable
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	2,432 mm Hg at 68°F (20°C)
Specific Gravity:	1.46 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	14°F (-10°C)
Melting Point:	-104°F (-76°C)
Critical Temp:	315°F (157°C)
Ionization Potential:	12.3 eV
Molecular Weight:	64.07

	PROTECTIVE EQUIPMENT
Gloves:	Insulated Butyl and Neoprene (>4-hr breakthrough)
Coveralls:	Tychem® SL, BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>0.25 ppm - full facepiece APR with cartridges specific for Sulfur Dioxide
	>20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SULFURIC ACID

Synonyms: Battery Acid; Hydrogen Sulfate; Oil of Vitriol CAS No: 7664-93-9 Molecular Formula: H₂SO₄ RTK Substance No: 1761 Description: Clear, colorless to brown, odorless liquid

HAZ	ARD	DAT	Ά

Hazard Rating	Firefighting	Reactivity
3 - Health	Sulfuric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the	Sulfuric Acid reacts violently with ALCOHOL and WATER to release
0 - Fire	combustion of other substances.	MATERIALS; COMBUSTIBLES; STRONG BASES (such as SODIUM
2 -W - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire. Sulfuric Acid itself does	HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and
DOT#: UN 1830	not burn.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 137	DO NOT USE WATER directly on Sulfuric Acid.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
Hazard Class: 8	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> .	Sulfuric Acid reacts with MOST METALS to produce flammable and explosive <i>Hydrogen gas</i>
	CONTAINERS MAY EXPLODE IN FIRE. Sulfuric Acid may ignite combustibles (wood, paper and oil).	Sulfuric Acid is not compatible with STRONG ACIDS (such as HYDROCHLORIC and NITRIC); MOISTURE; AMINES; and many OTHER SUBSTANCES.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large St	nill· 300) meters	(1 000	feet)
Large Of	pm. 000	meters	(1,000	icci

Fire: 800 meters (1/2 mile)

Neutralize spill with crushed limestone, soda ash or lime and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Sulfuric Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA

 NIOSH:
 1 mg/m³, 10-hr TWA

 ACGIH:
 0.2 mg/m³, 8-hr TWA

 IDLH:
 15 mg/m³

 ERPG-1 = 2 mg/m³, ERPG-2 = 10 mg/m³

 ERPG-3 = 120 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, nausea and vomiting
Chronic:	Strong <i>inorganic acid mists</i> containing Sulfuric Acid cause cancer of the larynx in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.8 (water = 1)
Water Solubility:	Soluble (mixes)
Boiling Point:	554° to 640°F (290° to 338°C)
Melting Point:	51°F (10°C)
Molecular Weight:	98.1
pH:	0.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics; Zytron® 300; ONESuit®TEC; and Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	<2 mg/m ³ - full facepiece APR with Acid gas cartridge and R or P100 prefilter

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

 $\ensuremath{\textbf{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: SULFUR TRIXOIDE

Synonyms: Sulfuric Anhydride; Sulfuric Oxide CAS No: 7446-11-9 Molecular Formula: SO₃ RTK Substance No: 1767 Description: Colorless to white, crystalline solid or a colorless gas or liquid

HAZARD DATA						
Hazard R	zard Rating Firefighting			Reactivity		livity
3 - Health 0 - Fire 2* - React DOT#: UN ERG Guide Hazard Cla (Corrosive)	ivity 1829 #: 137 ss: 8	 Firefighting Sulfur Trioxide is not combustible but is a STR OXIDIZER which enhances the combustion of substances. Use dry chemical or CO₂ as extinguishing agent DO NOT USE WATER directly on Sulfur Trioxi as an explosion may result. POISONOUS GASES ARE PRODUCED IN FIF CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed container cool. DO NOT get water inside containers. Sulfur Trioxide may ignite combustibles (wood paper and oil) 		a STRONG ion of other agents. Trioxide IN FIRE. IN FIRE. itainers rs. (wood,	Sulfur Trioxide reacts explosively with WATER to form toxic Sulfuric Acid. Sulfur Trioxide reacts violently with ORGANIC MATERIALS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); TETRAFLUOROETHYLENE; OXYGEN DIFLUORIDE; ANHYDROUS PERCHLORIC ACID; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to release heat and cause fires, and form toxic gases Sulfur Trioxide is AIR SENSITIVE.	
	SPI	LL/LEAKS			PH	SICAL PROPERTIES
Isolation Distance:Small Spill: 60 meters (200 feet)Large Spill: 300 meters (1,000 feet)Fire: 800 meters (1/2 mile)Cover spilled material with crushed limestone, sodaash, or lime.Cover with a plastic sheet to protect from rain andwater.Collect material in the most convenient and safemanner and deposit into sealed containers.DO NOT wash into sewer.Keep Sulfur Trioxide out of confined spaces, such assewers, because of the possibility of an explosion.			Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potential: Molecular Weight:		1 ppm Noncombustible 2.8 (air = 1) 73 mm Hg at 77°F (25°C) 1.9 (water = 1) Reacts 113°F (45°C) 12.8 +/- 0.04 (liquid) 80	
	EXPOS	SURE LIMITS			PRO	TECTIVE EQUIPMENT
ERPG-1: 2 mg/m ³ ERPG-2: 10 mg/m ³ ERPG-3: 30 mg/m ³			Gloves: Coveralls: Respirator:	Silver S breakth DuPont and Sa <i>Oleum</i>) < 2 mg. > 2 mg.	Shield®/4H® and Fluoroelastomer (>8-hr nrough for <i>Oleum</i>) t Tychem® CPF 4 and TK; Kappler® Zytron® 300; int-Gobain ONESuit® TEC (>8-hr breakthrough for) /m ³ - Supplied air /m ³ - SCBA	
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION		O AND DECONTAMINATION	
Eyes: Severe irritation and burns Skin: Severe irritation and burns Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, dizziness, nausea and vomiting Chronic: Strong inorganic acid mists containing <i>Sulfuric Acid</i> cause cancer of the lung and larynx in humans			 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 			



Common Name: SULFURYL CHLORIDE

Synonyms: Chlorosulfuric Acid; Sulfuric Dichloride; Sulfur Oxychloride CAS No: 7791-25-5 Molecular Formula: SO₂Cl₂ RTK Substance No: 1768 Description: Colorless liquid with a strong, irritating odor

HAZARD DATA						
Hazard Rating	Firefighting	Reactivity				
3 - Health	CORROSIVE AND WATER REACTIVE Extinguish fire using an agent suitable	Sulfuryl Chloride reacts with WATER or MOIST AIR to form toxic and corrosive gases such as <i>Hydrogen Chloride</i> and <i>Sulfuric Acid</i> .				
0 - Fire 2 W - Reactivity	for type of surrounding fire. Sulfuryl Chloride itself does not burn.	Sulfuryl Chloride can react explosively with LEAD DIOXIDE and ETHERS (when in the presence of METAL SALTS).				
DOT#: UN 1834	DO NOT USE WATER. POISONOUS GASES ARE	Sulfuryl Chloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,				
ERG Guide #: 137	PRODUCED IN FIRE, including Chlorine, Hydrogen Chloride, and Sulfur Oxides. Sulfuryl Chloride may ignite	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and				
Hazard Class: 8 (Corrosive)		NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALCOHOLS; and AMINES.				
	combustibles (wood, paper and oil).	Sulfuryl Chloride attacks many METALS in the presence of WATER.				

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Sulfuryl Chloride may be hazardous to the environment, especially water systems.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sulfuryl Chloride**.

The Protective Action Criteria values are:

PAC-1 = 0.3 ppm PAC-2 = 3.7 ppm PAC-3 = 11ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Strong, irritating odor
Flash Point:	Nonflammable
Vapor Density:	4.6 (air = 1)
Vapor Pressure:	105 mm Hg at 68°F (20°C)
Specific Gravity:	1.67 (water = 1)
Water Solubility:	Decomposes/Reacts
Boiling Point:	156°F (69°C)
Freezing Point:	-65°F (-54°C)
Molecular Weight:	134.96

PROTECTIVE EQUIPMENT

Gloves:	Barrier® (>8-hr breakthrough for Inorganic Halides)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: SULPHAMIC ACID

Synonyms: Amidosulfonic Acid; Sulfamidic Acid CAS No: 5329-14-6 Molecular Formula: NH₂SO₃H RTK Substance No: 1770 Description: Odorless, white, crystalline solid

HAZARD DATA						
Hazard Rating	Firefighting	Reactivity				
3 - Health	Sulphamic Acid may burn, but does not readily ignite.	Sulphamic Acid reacts violently with CHLORINE, NITRIC ACID, and STRONG BASES (such as SODIUM				
0 - Fire	Use dry chemical, CO ₂ , water spray or foam as	HYDROXIDE and POTASSIUM HYDROXIDE).				
0 - Reactivity	extinguishing agents.	Sulphamic Acid is not compatible with OXIDIZING				
DOT#: UN 2967	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> and <i>Ammonia</i> .	PERMANGANATES, CHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, PROMINE and ELUCRINE: AMMONIA: AMINES: and				
ERG Guide #: 154	Use water spray to keep fire-exposed containers	ISOCYANATES				
Hazard Class: 8 (Corrosive)	cool.	Sulphamic Acid reacts with WATER to release heat and form Ammonium Bisulfate.				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sulphamic Acid**.

The Protective Action Criteria values are:

PAC-1 = 40 mg/m³ PAC-2 = 250 mg/m³

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Severe irritation and burnsSkin:Severe irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, and severe shortness of
breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Specific Gravity:	2.15 (water = 1)
Water Solubility:	Moderately soluble
Melting Point:	392°F (200°C) (Decomposes)
Molecular Weight:	97.1
pH:	1.18 (1% solution)

PROTECTIVE EQUIPMENT

Gloves	5:	Buty	I, N	eoprer	ne an	d N	atura	I R	ubb	er	

- Coveralls: Tyvek® (for *solids*); Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (for *solutions*)
- **Respirator:** Full facepiece APR with High *efficiency filters* >40 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TALC (NOT CONTAINING ASBESTOS FIBERS)

Synonyms: Hydrous Magnesium Silicate; Steatite Talc CAS No: 14807-96-6 Molecular Formula: $Mg_3H_2(SiO_3)_4$ RTK Substance No: 1773 Description: Odorless white to grayish-white, crystalline powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire Talc itself does not burn	No incompatibilities or reactivities reported.		
0 - Fire	surrounding inc. The list does not burn.			
0 - Reactivity				
DOT#: None				
ERG Guide #: None				
Hazard Class: None				

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

OSHA: 20 mppcf, 8-hr TWA NIOSH: 2 mg/m³, 10-hr TWA (*respirable dust*) ACGIH: 2 mg/m³, 8-hr TWA (*respirable fraction*) IDLH: 1,000 mg/m³ The Protective Action Criteria values are: PAC-1 = 2 mg/m³ PAC-2 = 10 mg/m³ PAC-3 = 500 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.7 to 2.8 (water = 1)
Water Solubility:	Insoluble
Melting Point:	1,652°F (900°C) to 1,832°F (1,000°C)
Molecular Weight:	379.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with <i>High efficiency filters</i> >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TELLURIUM

Synonyms: Aurum Paradoxum; Telloy CAS No: 13494-80-9 Molecular Formula: Te RTK Substance No: 1777 Description: Odorless, silvery-white crystalline solid or a dark gray to brown powder

НΔ	7Δ	RD	DΔ	ТΔ	

Hazard Rating	Firefighting	Reactivity		
3 - Health	<i>Finely divided</i> Tellurium is a FLAMMABLE SOLID and can form explosive mixtures in air.	Tellurium may react violently with OXIDIZING AGENTS and HALOGENS (such as PERCHLORATES,		
3 - Fire	Use dry chemical powder, sand, graphite or other	PEROXIDES, PERMANGANATES, CHLORATES,		
0 - Reactivity	extinguishing agents appropriate for metal fires.	NITRATES, CHLORINE, BROMINE and FLUORINE) and SILICIDES.		
DOT#: UN 7325	including <i>Tellurium Oxide</i> and <i>Hydrogen Telluride</i> .	Tellurium is not compatible with STRONG ACIDS (such		
ERG Guide #: 133	Use water spray to keep fire-exposed containers	AS HYDRUCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and		
Hazard Class: 5.1	cool.	POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE		
(Flammable solid)		METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); and METAL SALTS.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep *finely divided* **Tellurium** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.1 mg/m³, 8-hr TWA **NIOSH:** 0.1 mg/m³, 10-hr TWA **IDLH:** 25 mg/m³

The Protective Action Criteria values are: PAC-1 = 0.3 mg/m^3 PAC-3 = 25 mg/m³ PAC-2 = 20 mg/m³

HEALTH EFFECT	S
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Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, fatigue, dizziness, drowsiness and weakness

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Auto Ignition Temp:	944°F (340°C)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	6.1 to 6.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,814°F (990°C)
Melting Point:	842°F (450°C)
Molecular Weight:	127.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.3 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



RIGHT TO KNOW



HAZARDOUS SUBSTANCE FACT SHEET

Common Name: TEMEPHOS		PHOS				
Synonyms:		Abate; I	Difenthos; Nimitex; Biothion			
CAS Number:		3383-96	5-8			
Molecular Formula:		C ₁₆ H ₁₂ C	D ₆ P ₂ S ₃			
RTK Num	ber:	1780				
Descriptio	n:	White, o	crystalline, sand-like solid or thick brow	vn liquid		
			HAZAR	D DATA		
Hazard R	ating		Firefighting		Re	activity
Health:	3		Temephos may burn but does not readil	y ignite.	Ter	nephos is susceptible to formation of highly toxic and
Fire:	1				TI re	ammable Phosphine gas in the presence of strong
Reactivity:	: 1		including Sulfur Oxides and Phosphoru	N FIRE, S Oxide fumes		
DOT #:	UN 2783		CONTAINERS MAY EXPLODE IN FIRE	s oxide fames.		
	UN 3018		Use water spray to keep fire-exposed co	ntainers cool.		
ERG #:	152					
DOT Hazar	r d: 6.1 (poise	on)				
		SPIL	LS/LEAKS			PHYSICAL PROPERTIES
Isolation D)istances:			Molecula	ar Wei	iaht: 466.5
Liquid Spil	II: 50 me	ters (150 f	feet)	Melting I	Point:	31 °C (87 °F)
 Solid Spill:	: 25 me	ters (75 fe	eet)	Water So	olubili	itv: Insoluble
Fire:	800 m	eters (1/2	miles)	Vapor P	ressu	re: 7 x 10 ⁻⁸ mm Hg at 25 °C (77 °F)
		,	,	Specific	Gravi	ity: 1.32
Evacuate p	ersonnel.					
Secure and	l control entra	ance to the	e area.			
If it is safe t	to do so, rem	ove poten	tial ignition sources.			
deposit ir	n sealed cont	ainers D0	ONOT DRY SWEEP			
Absorb <i>liqu</i> deposit ir	<i>ids</i> in vermic	ulite, dry s ainers	and, earth, or a similar material and			
Do not allow	w this substan	nce to ente	er waterways, including sewers, as it is			
,	F	XPOS			P	
The followi		limite are f	for Tomonhos:	Gloves	-	Nitrile and Neoprene
	15 mg/m^3 (ninits are i	8-bour average	Gioves.		Tychem® BR_CSM and TK_or the equivalent
OONA.	5 mg/m^3 (re	snirable c	dust) 8-hour average	Coverali		Tycheme Br, com and Tr, of the equivalent
NIOSH:	10 mg/m ³ (i	otal dust)	10-hour average	Respirat	or:	>1 mg/m ³ - full facepiece respirator, pesticide
	5 mg/m ³ /re.	spirable d	ust) 10-hour average			cartridge, particulate prefilters
ACGIH:	10 mg/m^3 (f	otal dust)	– 8-hour average			>10 mg/m ³ - supplied-air respirator, full facepiece
	1 mg/m ³ (re	spirable d	<i>dust</i>) – 8-hour average			mode
		-	·			
	ACU	E HE	ALTH EFFECTS	FI	RST	AID AND DECONTAMINATION
Eyes:	Irritatior	n		Immediate	ely flus	sh eyes with large amounts of water for at least
Skin:	Irritatior	ı		Quickly re	move	contaminated clothing. Immediately wash area with
Inhalation:	Headac twitchi	he, dizzin ng, loss of	ess, blurred vision, chest tightness, f coordination, convulsions, coma, death	large an immedia	nounts ately.	s of soap and water. Seek medical attention
				Shampoo	hair p	promptly if contaminated.
				Remove t	he per	rson from exposure.
				Begin reso stopped	cue br and (eathing (using universal precautions) if breathing has CPR if heart action has stopped
				Medical o exposur	bserva e as s	ation is recommended for several days following symptoms may be delayed.
				Transfer p	prompt	tly to a medical facility.
						lune 2023



Common Name: TERPHENYLS (mixed isomers)

Synonyms: Diphenylbenzenes CAS No: 26140-60-3 Molecular Formula: $C_6H_5C_6H_4C_6H_5$ RTK Substance No: 3650 Description: Colorless or light-yellow solids

Hazard Rating	Firefighting	Reactivity
1 - Health 1 - Fire 0 - Reactivity DOT#: N/A ERG Guide #: N/A	 May burn, but do not readily ignite. Use dry chemical, CO₂, water spray, an alcoholresistant foam or other foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 	- Incompatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
Hazard Class: N/A		

SPILL/LEAKS

Isolation Distance: 25 meters (75 feet)

- Vacuum or sweep spilled material into containers.
- This chemical can bioaccumulate in fish.

EXPOSURE LIMITS

OSHA PEL:	9 mg/m ³ Ceiling
NIOSH REL:	5 mg/m ³ Ceiling
ACGIH TLV:	5 mg/m ³ Ceiling
IDLH LEVEL:	500 mg/m ³

Eyes:	Irritation, burning
Skin:	Irritation, burning
Acute:	Nose, throat, and lung irritation with coughing, and shortness of breath
Chronic:	Cancer – Not Tested
	Can affect the liver and kidneys

PHYSICAL PROPERTIES

Odor Threshold:	No Information
Flash Point:	325°F – 405°F (163°C – 207°C)
LEL:	N/A
UEL:	N/A
Vapor Density:	7.9 (air = 1)
Vapor Pressure:	0.01 mm Hg at 68 [°] F (20 [°] C)
Water Solubility:	Insoluble
Boiling Point:	630°F (332°C)
Melting Point:	133°F – 415°F (56°C – 213°C)

	PROTECTIVE EQUIPMENT
Gloves:	Rubber
Coverall:	No Information
Boot:	No Information
Respirator:	>5 mg/m ³ N95 (If heat is involved use an Organic Vapor Cartridge along with an N95) >50 mg/m ³ SA

FIRST AID AND DECONTAMINATION

- Flush eyes with cool water for at least 15 minutes.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Remove person from exposure.
- Transfer to a medical facility.



Common Name: 1,1,1,2-TETRACHLORO-2,2-DIFLUOROETHANE

Synonyms: CFC112a; Halocarbon 112a; Refrigerant 112a CAS No: 76-11-9 Molecular Formula: C₂Cl₄F₂ RTK Substance No: 1807 Description: Colorless, crystalline solid with an *Ether*-like odor at room temperature, or a liquid above 105°F (41°C)

HAZARD DATA						
Hazard Rating	Firefighting	Reactivity				
2 - Health	Extinguish fire using an agent suitable for type of	1,1,1,2-Tetrachloro-2,2-Difluoroethane reacts with				
0 - Fire	Difluoroethane itself does not burn.	SODIUM, MAGNESIUM and ZINC).				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	1,1,1,2-Tetrachloro-2,2-Difluoroethane may react with				
DOT#: None	Fluoride and Phosgene.	SULFURIC and NITRIC) and ACID FUMES to release				
ERG Guide #: None	Use water spray to keep fire-exposed containers	toxic Fluoride fumes.				
Hazard Class: None	COOI.					
Hazard Class: None	cool.					

SPILL/LEAKS

Isolation Distance:

Solid Spill: 25 meters (75 feet)

Liquid Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. Absorb liquids in vermiculite, dry sand, earth, or a

similar material and place into sealed containers for disposal.

1,1,1,2-Tetrachloro-2,2-Difluoroethane does not degrade in the atmosphere.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA

NIOSH: 500 ppm, 10-hr TWA

ACGIH: 100 ppm, 8-hr TWA

IDLH: 2,000 ppm

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Eyes:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Exposure can cause headache, dizziness, confusion, tremors, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ether</i> -like odor
Flash Point:	Noncombustible
Vapor Pressure:	40 mm Hg at 68°F (20°C)
Specific Gravity:	1.65 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	197°F (91.7°C)
Melting Point:	105°F (41°C)
Ionization Potential:	11.30 eV
Molecular Weight:	203.83

	PROTECTIVE EQUIPMENT
Gloves:	Viton and Barrier® (>4-hr breakthrough for <i>liquid Hydrocarbons, aliphatic</i>)
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>liquid Hydrocarbons</i> , <i>aliphatic</i>)
Respirator:	>100 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 1,1,1,2-TETRACHLOROETHANE

Synonyms: None CAS No: 630-20-6 Molecular Formula: $C_2H_2Cl_4$ RTK Substance No: 2992 Description: Colorless to yellowish-red liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 0 - Reactivity DOT#: UN 1702 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	DOES NOT BURN. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride gas</i> . Use water spray to keep fire-exposed containers cool.	1,1,1,2-Tetrachloroethane reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); DINITROGEN TETRAOXIDE; 2,4-DINITROPHENYL DISULFIDE; SODIUM TETRAOXIDE; and SODIUM POTASSIUM ALLOY. Prevent contact with HOT SUBEACES

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

1,1,1,2-Tetrachloroethane is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA: None

NIOSH:	Lowest feasible concentration
ACGIH:	1 ppm, 8-hr TWA (as <i>1,1,2,2,-</i>
IDLH:	None

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation and drying and cracking with redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, dizziness, seizures and passing out.
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	Nonflammable
Vapor Density:	1.5 (air = 1)
Vapor Pressure:	14 mm Hg at 77°F (25°C)
Specific Gravity:	1.54 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	267°F (130°C)
Freezing Point:	-94°F (-70°C)
Ionization Potential:	11 +/- 0.2 eV
Molecular Weight:	167.8

PROTECTIVE EQUIPMENT

Gloves:	Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>1,1,2,2-Tetrachloroethane</i>)
Respirator:	 >1 ppm - full facepiece APR with Organic vapor cartridge >10 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 1,1,2,2-TETRACHLOROETHANE

Synonyms: Acetylene Tetrachloride; Tetrachloroethane CAS No: 79-34-5 Molecular Formula: C₂H₂Cl₄ RTK Substance No: 1809 Description: Clear, colorless to pale yellow liquid with a sweet odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. 1,1,2,2-Tetrachloro-ethane itself does not burn.	1,1,2,2-Tetrachloroethane is decomposed by HEAT, AIR, ULTRAVIOLET LIGHT and MOISTURE to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .
0 - Reactivity DOT#: UN 1702 ERG Guide #: 151 Hazard Class: 6.1	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> and <i>Hydrogen</i> <i>Chloride</i> . Use water spray to keep fire-exposed containers cool.	 1,1,2,2-Tetrachloroethane reacts violently with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) and their ALLOYS to produce <i>Chloroacetylene</i> and <i>Dichloroacetylene gases</i> that can ignite or explode in AIR. 1,1,2,2-Tetrachloroethane reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM)
(Poison)		HYDROXIDE) and POWDERED METALS. 1,1,2,2-Tetrachloroethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); FUMING SULFURIC ACID; and AMINES.

SPILL/LEAKS

Isolation Distance:

Spill:	50	meters	(150 feet)
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Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

1,1,2,2-Tetrachloroethane is a marine pollutant.

EXPOSURE LIMITS

OSHA:5 ppm, 8-hr TWANIOSH:1 ppm, 10-hr TWAACGIH:1 ppm, 8-hr TWAIDLH:100 ppmThe Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-2 = 30 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

0.5 to 1.5 ppm

5.79 (air = 1)

Noncombustible

Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential: Molecular Weight:

5 mm Hg at 65°F (20°C) 1.6 (water = 1) Very slightly soluble 295°F (146°C) -33°F (-44°C) 11.1 eV 167.86

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TETRACHLOROETHYLENE

Synonyms: Ethene, Tetrachloro-; Ethylene Tetrachloride; Perchloroethylene CAS No: 127-18-4 Molecular Formula: Cl₂C=CCl₂ RTK Substance No: 1810 Description: Clear, colorless liquid with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire.	Tetrachloroethylene reacts violently with <i>finely dispersed</i> or <i>finely divided</i> METALS (such as ALUMINUM, BARIUM, LITHIUM, BERYLLIUM and ZINC).
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i>	Tetrachloroethylene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
DOT#: UN 1897 ERG Guide #: 160	and <i>Phosgene</i> . Use water spray to keep fire-exposed	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM HYDROXIDE; and POTASSIUM HYDROXIDE.
Hazard Class: 6.1 (Toxic)	containers cool.	Tetrachloroethylene slowly decomposes in WATER to form acids such as <i>Hydrogen Chloride</i> .
		Tetrachloroethylene decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .

SPILL/LEAKS	PH	SICAL PROPERTIES
Isolation Distance:	Odor Threshold:	5 to 50 ppm
Smills E0 motors (1E0 foot)	Flash Point:	Noncombustible
	Vapor Density:	5.8 (air = 1)
Fire: 800 meters (1/2 mile)	Vapor Pressure:	14 mm Hg at 68°F (20°C)
Absorb liquids in dry sand, earth, or a similar material	Specific Gravity:	1.62 (water = 1)
and place into sealed containers for disposal.	Water Solubility:	Very slightly soluble
DO NOT wash into sewer.	Boiling Point:	250°F (121°C)
Tetrachloroethylene is toxic to aquatic organisms and	Freezing Point:	-2°F (-19°C)
may cause long term effects on the aquatic	Ionization Potential:	9.32 eV
environment.	Molecular Weight:	165.8

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 100 ppm, 8-hr TWA; 200 ppm, Ceiling; 300 ppm, Peak NIOSH: Lowest feasible concentration ACGIH: 25 ppm, 8-hr TWA; 100 ppm, STEL IDLH: 150 ppm		Gloves:	Polyvinyl Alcohol, Silver Shield $(4H)$, Viton, Viton/Butyl and Barrier $(>8$ (>8-hr breakthrough)
		Coveralls:	Tychem® F, CPF3, BR and CSM; Trellchem® HPS and VPS (>8-hr breakthrough)
The Protective Action Criteria values are: PAC-1 = 35 ppm PAC-2 = 230 ppm PAC-3 = 1,200 ppm		Respirator	<25 ppm - full facepiece APR with Organic vapor filters Spills or Fire - SCBA
		i	
	HEALTH EFFECTS	FI	RST AID AND DECONTAMINATION
Eyes:	HEALTH EFFECTS	FI Remove the	RST AID AND DECONTAMINATION person from exposure.
Eyes: Skin:	HEALTH EFFECTS Irritation and burns Irritation and burns (skin absorbable)	FI Remove the Flush eyes w contact lense	RST AID AND DECONTAMINATION person from exposure. vith large amounts of water for at least 15 minutes. Remove es if worn.
Eyes: Skin: Inhalation:	HEALTH EFFECTS Irritation and burns Irritation and burns (skin absorbable) Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)	FI Remove the Flush eyes w contact lense Quickly remo large amoun	RST AID AND DECONTAMINATION person from exposure. with large amounts of water for at least 15 minutes. Remove es if worn. ove contaminated clothing and wash contaminated skin with ts of soap and water.
Eyes: Skin: Inhalation:	HEALTH EFFECTS Irritation and burns Irritation and burns (skin absorbable) Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, dizziness, lightheadedness, and passing out	Final Remove the Flush eyes we contact lense Quickly remove large amoun Begin artificia Transfer pro	RST AID AND DECONTAMINATION person from exposure. with large amounts of water for at least 15 minutes. Remove es if worn. ove contaminated clothing and wash contaminated skin with ts of soap and water. al respiration if breathing has stopped and CPR if necessary. mptly to a medical facility.



Common Name: TETRAETHYLENEPENTAMINE

Synonyms: TEP; Tetraethylpentylamine CAS No: 112-57-2 Molecular Formula: C₈H₂₃N₅ RTK Substance No: 1816 Description: Thick, yellow liquid with an Ammonia-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Tetraethylenepentamine may burn, but does not readily ignite.	Tetraethylenepentamine reacts with WATER to release heat and may result in the violent formation of steam.
1 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	Tetraethylenepentamine reacts with OXIDIZING
0 - Reactivity	resistant foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2320	Water or foam may cause frothing and solid streams of water may be ineffective in fighting fire.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 153	POISONOUS GASES ARE PRODUCED IN FIRE,	
Hazard Class: 8 (Corrosive)	including Ammonia, Amines, and Nitrogen Oxides. Use water spray to keep fire-exposed containers	HYDROCARBONS (such as METHYLENE CHLORIDE); ACRYLATES: ALDEHYDES: ALCOHOLS, and
()	cool.	KETONES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Tetraethylenepentamine is toxic to aquatic organisms and may cause long-term damage to the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for Tetraethylenepentamine.

The Protective Action Criteria values are:

 $PAC-1 = 6.5 \text{ ppm} (50 \text{ mg/m}^3)$

 $PAC-2 = 45 \text{ ppm} (350 \text{ mg/m}^3)$

 $PAC-3 = 65 \text{ ppm} (500 \text{ mg/m}^3)$

HEALTH EFFECTS

Irritation and burns Eyes: Skin: Irritation and burns (skin absorbable) Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, nausea and vomiting

PHYSICAL PROPERTIES		
Odor Threshold:	0.1 ppm	
Flash Point:	325°F (163°C)	
LEL:	0.8%	
UEL:	4.6%	
Auto Ignition Temp:	610°F (321°C)	
Vapor Density:	6.53 (air = 1)	
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)	
Specific Gravity:	0.99 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	631° to 644°F (333° to 340°C)	
Freezing Point:	-40°F (-40°C)	
Molecular Weight:	189.3	

	PROTECTIVE EQUIPIVIEINT
Gloves:	Butyl, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR. CSM and TK (>8-hr breakthrough for

Ethylene Diamine) **Respirator:** SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.


Common Name: TETRAETHYL LEAD

Synonyms: Tetraethylplumbane; TEL CAS No: 78-00-2 Molecular Formula: $C_8H_{20}Pb$ RTK Substance No: 1817 Description: Colorless, oily liquid with a sweet, musty odor

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
3 - Health 2 - Fire 2-\	 Firefighting Tetraethyl Lead is a COMBUSTIBLE LIQUID. Use dry chemical, CO₂, alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		E LIQUID. tant foam or other nts, as water may CED IN FIRE, RE. d containers cool. tion and flash vel a distance to a source.	Tetraethyl Lead will react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions. Tetraethyl Lead is not compatible with RUST; SULFURYL CHLORIDE; POTASSIUM PERMANGANATE; METALS; METAL OXIDES; and COMBUSTIBLES. Tetraethyl Lead will attack RUBBER, some PLASTICS, and COATINGS. Forms explosive mixtures in air above 200°F (93°C).	
SPILL/LEAKS			PHYSICAL PROPERTIES		
Isolation Distance:Small spills: 60 meters (200 feet)Large spills: 270 meters (900 feet)Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.Toxic to aquatic organisms.Hazardous to the environment and persists in the environment.			Odor: Flash Point: LEL: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potent Molecular Weigh	Sweet 200°F (93°C) 1.8% 8.6 (air = 1) 0.2 mm Hg at 68°F (20°C) 1.66 (water = 1) Insoluble 228°F (109°C) tial: 11.1 eV ht: 323.5	
EXPOSURE LIMITS			P	ROTECTIVE EQUIPMENT	
OSHA: 0.075 NIOSH: 0.075 ACGIH: 0.1 m IDLH LEVEL: 40 m	5 mg/m ³ , 8-hr TWA (as <i>Lead</i>) 5 mg/m ³ , 10-hr TWA (as <i>Lead</i>) ng/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ (as <i>Lead</i>)		Gloves: No Coveralls: Do (2 Boots: No Respirator: >(o information uPont Tychem® CPF-3, BR and LV, and TK >8-hr breakthrough) o information 0.075 mg/m ³ - Supplied air	
HEALT	H EFFECTS		FIRST	AID AND DECONTAMINATION	

	HEALTH EFFECTS
Eyes:	Irritation, possible loss of vision
Skin:	Irritation
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	<i>Lead compounds</i> may cause lung cancer in humans
	Limited evidence of damage to male reproductive system
	Metallic taste, colic, muscle cramps Damage to the nervous system

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- **Begin** rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.

Transfer to a medical facility.



Common Name: TETRAMETHRIN

Synonyms: Duracide®; TTM CAS No: 7696-12-0 Molecular Formula: C₁₉H₂₅NO₄ RTK Substance No: 3745

Description: Colorless to white, crystalline powder, Pyrethroid insecticide with a faint odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Tetramethrin does not burn, however, it is often	Tetramethrin is not compatible with OXIDIZING AGENTS		
1 - Fire	dissolved in a liquid carrier that may be flammable or combustible.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE); STRONG		
DOT#: UN 2588	extinguishing agents.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM		
ERG Guide #: 151	including Nitrogen Oxides.	HYDROXIDE and POTASSIUM HYDROXIDE).		
Hazard Class: 9 (Environmentally Hazardous Material)	Use water spray to keep fire-exposed containers cool.			

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten solid spilled material first or use

a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Tetramethrin is very toxic to aquatic life and bees.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Tetramethrin**.

PHYS	PROP	ERTIES

Odor Threshold:	Faint odor
Flash Point:	Flammable/Combustible in solution
Vapor Pressure:	7 x 10 ⁻⁶ mm Hg at 86°F (30°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	356° to 374°F (180° to 190°C)
Melting Point:	140° to 176°F (60° to 90°C)
Molecular Weight:	331.4

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile (for solid Tetramethrin) Silver Shield®/4H® and Barrier® (>8-hr breakthrough for Tetramethrin in solution)
Coveralls:	Tyvek® (for solid Tetramethrin) Tychem® BR, CSM and TK (>8-hr breakthrough for Tetramethrin in <i>solution</i>)
Respirator:	Spill: full facepiece APR with <i>Organic vapor</i> and <i>P100</i> cartridges Fire: SCBA

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Eyes:	Irritation and burns
Skin:	Irritation, burns, itching, rash and redness (skin absorbable)

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, fatigue, muscle

Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TETRAMETHYL LEAD

Synonyms: Lead Tetramethyl; TML CAS No: 75-74-1 Molecular Formula: Pb(CH₃)₄ RTK Substance No: 1831 Description: Colorless liquid with a slightly fruity or musty odor.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agent.	Tetramethyl Lead decomposes in WATER to produce heat and may explode.
 3 - Fire 3 ₩ - Reactivity DOT#: UN 1649 	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Tetramethyl Lead reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); TETRACHLOROTRIELLOROMETHYL
ERG Guide #: 131 Hazard Class: 6.1 (Poison)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	PHOSPHORANE; SULFURYL CHLORIDE and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions.
		Tetramethyl Lead is not compatible with COMBUSTIBLES; RUBBER; METALS; and METAL

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Absorb liquid in sand or inert absorbent.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH:

IDLH LEVEL:

0.075 mg/m [°] , 8-hr TWA
0.075 mg/m ³ , 10-hr TWA
0.15 mg/m ³ , 8-hr TWA
40 mg/m ³ (as <i>Lead</i>)

HEALTH E	EFFECTS
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Eyes:	Irritation, possible loss of vision
Skin:	Irritation
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	<i>Lead compounds</i> may cause lung cancer in humans Metallic taste, colic and muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES					
Boiling Point:	230°F (110°C)				
Flash Point:	100 [°] F (37.8 [°] C)				
LEL:	1.8%				
UEL:	No information				
Specific Gravity:	1.9 (water = 1)				
Relative Vapor Density:	6.5 (air =1)				
Vapor Pressure:	23 mm Hg at 68 [°] F (20 [°] C)				
Solubility:	Insoluble				
Melting Point:	-17.5°F (-27.5°C)				

PROTECTIVE EQUIPMENT				
Gloves: Coveralls:	No information DuPont Tychem® Responder®, CSM, and TK for heavy <i>liquid toxics</i> and <i>corrosives</i>			
Boots: Respirator:	No information >0.075 mg/m³ - Supplied air			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: TETRASODIUM PYROPHOSPHATE

Synonyms: Sodium Pyrophosphate; Tetron CAS No: 7722-88-5 Molecular Formula: Na₄O₇P₂ RTK Substance No: 1837 Description: Odorless, white powder or granular solid

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Tetrasodium Pyrophosphate	Tetrasodium Pyrophosphate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, PROMINE and			
0 - Fire	itself does not burn.				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE including Phosphorus Oxides and Sodium				
DOT#: None	Oxides.	FLUORINE); ETHYL ALCOHOL; ALUMINUM; and			
ERG Guide #: 154		MAGNESIUM.			
Hazard Class: None					

SPILL/LEAKS	PH	SICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible	
Fire: 800 meters (1/2 mile)	Vapor Pressure:	0 mm Hg at 68°F (20°C)	
Moisten spilled material first or use a HEPA-filter	Specific Gravity:	2.5 (water = 1)	
vacuum for clean-up and place into sealed containers for disposal.	Water Solubility:	Soluble	
Thoroughly wash area after clean-up with water and	Boiling Point:	Decomposes	
detergent.	Melting Point:	1,810°F (993°C)	
	Molecular Weight:	265.9	
	pH:	10.2 (1% solution)	

EXPOSURE LIMITS

NIOSH: 5 mg/m³, 10-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 mg/m^3

 $PAC-2 = 25 \text{ mg/m}^{3}$

 $PAC-3 = 500 \text{ mg/m}^3$

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing.

PROTECTIVE EQUIPMENT

Gloves: Nitrile, Neoprene and Natural Rubber

Coveralls: Tyvek®

Respirator:

>5 mg/m³ - Full facepiece APR with *High efficiency filters* >25 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: THIRAM

Synonyms: Bis(Dimethylthiocarbamoyl)Disulfide; TMTD; Tetramethylthiuram Disulfide CAS No: 137-26-8 Molecular Formula: $C_6H_{12}N_2S_4$ RTK Substance No: 1854 Description: White to light yellow, odorless powder or the commercial product may be dyed blue

HAZARD DATA Hazard Rating Firefighting Reactivity COMBUSTIBLE SOLID Thiram will react with STRONG ACIDS (such as 2 - Health HYDROCHLORIC, SULFURIC and NITRIC) to form toxic Use dry chemical, CO₂, water spray or foam as 2 - Fire Carbon Disulfide and Hydrogen Sulfide gases. extinguishing agents. Thiram is not compatible with OXIDIZING AGENTS (such POISONOUS GASES ARE PRODUCED IN FIRE, 0 - Reactivity as PERCHLORATES, PEROXIDES, including Nitrogen Oxides and Sulfur Oxides. DOT#: UN 2771 PERMANGANATES, CHLORATES, NITRATES, Use water spray to keep fire-exposed containers CHLORINE, BROMINE and FLUORINE); REDUCING ERG Guide #: 151 cool. AGENTS (such as LITHIUM, SODIUM, ALUMINUM and Hazard Class: 6.1 their HYDRIDES); COPPER; and NITRATING AGENTS. (Toxic)

SPILI	/I F	AKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb **Thiram** in *solution* in dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten spilled *solid* material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Thiram is toxic to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA: 5 mg/m^3 , 8-hr TWA NIOSH: 5 mg/m^3 , 10-hr TWA ACGIH: 0.05 mg/m^3 , 8-hr TWA IDLH: 100 mg/m^3 The Protective Action Criteria values are: PAC-1 = 10 mg/m^3 PAC-2 = 75 mg/m^3 PAC-3 = 100 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, confusion, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless			
Flash Point:	280°F (138°C)			
Vapor Pressure:	0 mm Hg at 68°F (20°C)			
Specific Gravity:	1.29 (water = 1)			
Water Solubility:	Insoluble			
Boiling Point:	264°F (129°C) Decomposes			
Melting Point:	311°F (155°C) (Pure)			
Molecular Weight:	240.4			

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile and Viton (>4-hr breakthrough for <i>Carbamates</i>)
Coveralls:	Tyvek® (solid Thiram); Tychem® BR, Responder® and TK (>8-hr breakthrough for Thiram in <i>solution</i>)
Respirator:	>0.05 mg/m ³ - full facepiece APR with <i>Organic vapor</i> <i>cartridge</i> and <i>P100 prefilter</i> >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TIN TETRACHLORIDE

Synonyms: Stannic Chloride; Tin Perchloride CAS No: 7646-78-8 Molecular Formula: SnCl₄ RTK Substance No: 1859 Description: Colorless or slightly yellow liquid which fumes in moist air

HAZARD DATA						
Hazard Rating	g	Firefighting		R	eactivity	
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1827 ERG Guide #: 13 Hazard Class: 8 (Corrosi	37 ve)	 Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Tin Tetrachloride itself does not burn. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Tin Oxides</i>. Use water spray only to keep fire-exposed containers cool. Tin Tetrachloride may ignite organic materials (wood, paper and oil). 		Ti M 9 V Ti ((ز ر ب F C F A A fi Ti C	n Tetrachloride reacts vigorously with WATER or IOIST AIR to produce corrosive <i>Hydrogen Chloride</i> <i>as</i> , and contact with ETHYLENE OXIDE may cause iolent polymerization (self-reaction). n Tetrachloride reacts violently with STRONG BASES such as SODIUM HYDROXIDE and POTASSIUM IYDROXIDE); OXIDIZING AGENTS (such as 'ERCHLORATES, PEROXIDES, PERMANGANATES, 'HLORATES, NITRATES, CHLORINE, BROMINE and LUORINE); ORGANIC MATTER; TURPENTINE; 'LKYL NITRATES; ALCOHOLS; and AMINES to cause res and explosions. in Tetrachloride attacks METALS, PLASTIC COATINGS, and RUBBER.	
S	SPIL	L/LEAKS			F	HYSICAL PROPERTIES
Isolation Distance: Liquid Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand or earth, or cover with dry lime or soda ash and place in covered containers for disposal. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer.			Flash Point: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei	/: re: ity: ity: ight	Not combustible 9 (air = 1) 18 mm at 68°F (20°C) 2.2 (water = 1) Soluble - water reactive 237°F (114°C) -27.4°F (-33°C) : 260.5	
EXP	POSL	JRE LIMITS	ĺ		PF	
OSHA: NIOSH: ACGIH: IDLH LEVEL:	2 mg/ 2 mg/ 2 mg/ 100 m All of <i>Tin co</i> <i>Tin</i>)	m ³ , 8-hr TWA m ³ , 10-hr TWA m ³ , 8-hr TWA ng/m ³ the above are for <i>inorganic</i> <i>ompounds</i> . (measured as		Gloves: Coveralls: Respirator:	Vi D Z (2 (2 fi >2	ton and Silver Shield®/4H® (for <i>Carbon Tetrachloride</i>) uPont Tychem® Responder®, CSM and TK; Kappler ytron® 300, 400, and 500; Saint-Gobain NESuit®TEC or equivalent for <i>corrosive liquids</i> >8-hr breakthrough) 2 mg/m ³ - full facepiece APR with High efficiency Iters 20 mg/m ³ - Supplied air
HEALTH EFFECTS		ļ	FIRS	Т /	AID AND DECONTAMINATION	
Eyes:Irritation, burnsSkin:Irritation, burnsInhalation:Nose and throat irritation Coughing and shortness of breath (pulmonary edema) Headache, nausea and vomiting			Remove the per Flush eyes with contact lenses Quickly remove large amounts Begin artificial necessary. Transfer to a m Medical observe	erso h lai if w re co of v resp medi vatio	n from exposure. ge amounts of water for at least 30 minutes. Remove orn. Seek medical attention immediately. ontaminated clothing and wash contaminated skin with vater. Seek medical attention immediately. piration if breathing has stopped and CPR if ical facility. on is recommended as symptoms may be delayed.	



Common Name: TITANIUM

Synonyms: Titanium Powder CAS No: 7440-32-6 Molecular Formula: Ti RTK Substance No: 1860 Description: Silvery solid or a dark gray powder

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
1 - Health	Titanium <i>powder</i> is FLAMMABLE and SPONTANEOUSLY COMBUSTIBLE.	Titanium <i>powder</i> is WATER REACTIVE at 1,292°F (700°C), or when molten, and an explosion can result.			
3 - Fire	Use dry chemical, sand or lime as extinguishing	Titanium powder reacts violently or explosively with CUPRIC OXIDE,			
1 - Reactivity	agents.	LEAD OXIDE and inorganic POTASSIUM COMPOUNDS when heated.			
DOT#: UN 2546	DO NOT USE WATER on MOLTEN or BURNING TITANIUM as an explosion may occur.	Titanium powder reacts with NITRIC ACID or LIQUID OXYGEN resulting in an explosion on exposure to FRICTION or HEAT.			
(Powder, dry)	POISONOUS GASES ARE PRODUCED IN FIRE,	Titanium powder is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); METAL SALTS; METAL OXIDES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as			
ERG Guide #: 135	including <i>Titanium Oxides</i> .				
	CONTAINERS MAY EXPLODE IN FIRE.				
Hazard Class: 4.2	Use water spray to keep fire-exposed containers cool. But DO NOT get water inside containers.				
(Spontaneously		PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and HALOCARBONS (such as TRICHLOROETHYLENE).			
Combustible)	atmospheres of Carbon Dioxide, Nitrogen or Air.				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Titanium**.

Keep **Titanium** out of confined spaces, such as

sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Titanium**.

The Protective Action Criteria values are:

PAC-1 = 2 mg/m³ PAC-2 = 12.5 mg/m³ PAC-3 = 60 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable (Spontaneously Combustible Powder)
Auto Ignition Temp:	482°F (250°C) (<i>Powder</i>)
Specific Gravity:	4.5 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	5,908° to 5,945°F (3,260° to 3,285°C)
Melting Point:	3,033° to 3,047°F (1,667° to 1,675°C)
Molecular Weight:	47.9

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with <i>P95 filter</i> >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: TITANIUM DIOXIDE

Synonyms: Rutile; Titanium Oxide; Anatase; Brookite CAS No: 13463-67-7; 1317-70-0 (powder form); 1317-80-2 (powder form) Molecular Formula: TiO₂ RTK Substance No: 1861 Description: Odorless, white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Titanium Dioxide itself does	Titanium Dioxide <i>powders</i> or <i>dusts</i> may react violently with CHEMICALLY ACTIVE METALS (such as	
0 - Fire	not burn.	POTASSIUM, SODIUM, MAGNESIUM and ZINC).	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	Titanium Dioxide <i>powders</i> or <i>dusts</i> are not compatible with OXIDIZING AGENTS (such as PERCHLORATES.	
DOT#: None		PEROXIDES, PERMANGANATES, CHLORATES,	
ERG Guide #: None Hazard Class: None		NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	

SPILL/LEAKS	PH	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible	
Fire: 800 meters (1/2 mile)	Vapor Pressure:	0 mm Hg at 68ºF (20ºC)	
Moisten spilled material first or use a HEPA-filter	Specific Gravity:	3.9 to 4.2 (water = 1)	
vacuum for clean-up and place into sealed containers for disposal.	Water Solubility:	Insoluble	
	Boiling Point:	4,532° to 5,432°F (2,500° to 3,000°C)	
	Melting Point:	3,326° to 3,362°F (1,830° to 1,850°C)	
	Molecular Weight:	79.9	

EXPOSURE LIMITS

OSHA:	15 mg/m³, 8-hr TWA
NIOSH:	2.4 mg/m ³ (fine) and 0.3 mg/m ³ (ultrafine)
	10-hr TWA

- ACGIH: 10 mg/m³, 8-hr TWA
- IDLH: 5,000 mg/m³

The Protective Action Criteria values are: PAC-1 = 30 mg/m³ PAC-2 = 330 mg/m³ PAC-3 = 2,000 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information available
Inhalation:	Nose and throat irritation
Chronic:	Cancer (lung) in animals

Gloves: Nitrile, Neoprene and Natural Rubber Coveralls: Tyvek® Respirator: Spill - Full facepiece APR with P100 filters

PROTECTIVE EQUIPMENT

>0.3 mg/m³ (ultrafine) or Fire – SCBA
 >2.4 mg/m³ (fine) or Fire - SCBA
 >10 mg/m³ or Fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: TOLUENE

Synonyms: Toluol; Methyl Benzene; Phenyl Methane CAS No: 108-88-3 Molecular Formula: C_7H_8 RTK Substance No: 1866 Description: A colorless liquid with a sweet, strong odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1294 ERG Guide #: 130 Hazard Class: 3 (Flammable)	Firefighting Toluene is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Use water spray to reduce vapors.		stant foam or g agents, as g fires. CED IN FIRE. IRE. d containers cool. ition and flash avel a distance the source.	Toluene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); METAL SALTS; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Toluene may accumulate static electricity.
SPIL	L/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters Large Spill: 270 meter Absorb liquids in verm similar material and d DO NOT wash into se aquatic organisms. Liquid floats on water is source and spread fire	s (200 feet) rs (900 feet) iculite, dry sand, earth, or a eposit in sealed containers. wer. Toluene is toxic to and may travel to ignition e.		Odor Threshold: Flash Point: LEL: UEL: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Poten Molecular Weigh	2.5 ppm 40°F (4°C) 1.1% 7.1% 3.1 (air = 1) 21 mm Hg at 68°F (20°C) 0.87 (water = 1) Very slightly soluble 232°F (111°C) tial: 8.82 eV ht: 92.1
EXPOS	URE LIMITS		P	ROTECTIVE EQUIPMENT
OSHA: 200 ppm, 8- 500 ppm, 10 NIOSH: 100 ppm, 10 ACGIH: 20 ppm, 8-h IDLH: 500 ppm ERPGs: ERPG-1 = 5	-hr TWA; 300 ppm, STEL; and 0-min peak per 8-hr workshift 0-hr TWA; 150 ppm, STEL hr TWA 50 ppm; ERPG-2 = 300 ppm;		Gloves: V (Coveralls: D R (Boots: N Respirator: >	iton, 4-H®/Silver Shield® and Polyvinyl Alcohol >4-hr breakthrough) uPont Tychem® CPF-3, CPF-4, BR and LV, esponder®, TK and Kappler Zytron® 300 and 500 >8-hr breakthrough) o information 20 ppm - full facepiece APR with Organic Vapor
				200 ppm - Supplied air
HEALT	HEFFECIS		FIRST Remove the pers	AID AND DECON I AMINATION
Skin: Irritation, Acute: Nose and and whee Headache Chronic: Cancer (N May be a	drying, cracking and rash I throat irritation with coughing ezing e, dizziness and passing out Not Classifiable) teratogen in humans		Flush eyes with l contact lenses if Quickly remove of large amounts of Begin artificial re- necessary. Transfer to a me	arge amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with soap and water. spiration if breathing has stopped and CPR if dical facility.



Common Name: TOLUENE DIISOCYANATE (mixed isomers)

Synonyms: Diisocyanatotoluene; Methylphenylene Isocyanate; TDI CAS No: 26471-62-5 Molecular Formula: $C_9H_6N_2O_2$ RTK Substance No: 3132 Description: Clear, colorless to pale yellow liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Toluene Diisocyanate is a COMBUSTIBLE LIQUID which may explode when exposed to HEAT and FLAMES.	Toluene Diisocyanate reacts with WATER to form <i>Polyurea</i> and <i>Carbon Dioxide</i> . The reaction produces HEAT, resulting in container rupture.
3-W - Reactivity DOT#: UN 2078	Use dry chemical, CO ₂ , water spray (as fog, not in solid streams) or alcohol-resistant foam as extinguishing agents.	Toluene Diisocyanate can polymerize (self react) uncontrollably when in contact with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACYL
ERG Guide #: 156	DANGEROUS EXPLOSION HAZARD.	CHLORIDES; and AMINES. Toluene Diisocyanate is not compatible with ANILINE; ALCOHOLS: STRONG ACIDS (such as HYDROCHLORIC
Hazard Class: 6.1 (Poison)	including <i>Nitrogen Oxides</i> and <i>Cyanides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	SULFURIC and NITRIC); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers.

Containers of *unreacted* **Toluene Diisocyanate** and WATER should be left with the bung open or the lid slightly ajar to prevent pressure build-up.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.02 ppm, Ceiling

ACGIH: 0.001 ppm, 8-hr TWA; 0.003 ppm, 15-min STEL IDLH: 2.5 ppm The Protective Action Criteria values are:

The Protective Action Uniteria values are:

PAC-1 = 0.75 ppm, PAC-2 = 2 ppm

PAC-2 = 2 ppmPAC-3 = 2 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, nausea and vomiting
Chronic:	Cancer (pancreas, liver, mammary glands) in animals

PHYSICAL PROPERTIES

Odor Threshold:	2.1 ppm
Flash Point:	250°F (121°C)
LEL:	0.9%
UEL:	9.5%
Auto Ignition Temp:	>300°F (>149°C)
Vapor Density:	6 (air = 1)
Vapor Pressure:	0.025 mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reacts
Boiling Point:	484°F (251°C)
Melting Point:	67° to 71°F (19° to 22°C)
Molecular Weight:	174.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield $^{0}/4H^{0}$, Viton and Barrier 0 (>8-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough)
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility

Medical observation is recommended as symptoms may be delayed.



Common Name: o-TOLUIDINE

Synonyms: 2-Aminotoluene; 2-Methylaniline; 2-Methylbenzenamine CAS No: 95-53-4 Molecular Formula: $C_6H_4CH_3NH_2$ RTK Substance No: 1442 Description: Colorless to pale yellow liquid that turns dark on exposure to air or light

HAZARD DATA Hazard Rating Firefighting Reactivity o-Toluidine is not compatible with OXIDIZING AGENTS COMBUSTIBLE 3 - Health (such as PERCHLORATES, PEROXIDES, Use dry chemical, CO₂, water spray or foam as 2 - Fire PERMANGANATES, CHLORATES, NITRATES, extinguishing agents. CHLORINE, BROMINE and FLUORINE); STRONG 0 - Reactivity POISONOUS GASES ARE PRODUCED IN FIRE, ACIDS (such as HYDROCHLORIC, SULFURIC and including Nitrogen Oxides. NITRIC); and STRONG BASES (such as SODIUM DOT#: UN 1708 CONTAINERS MAY EXPLODE IN FIRE. HYDROXIDE and POTASSIUM HYDROXIDE). ERG Guide #: 153 Use water spray to keep fire-exposed containers Protect from AIR and LIGHT. cool Hazard Class: 6.1 Flow or agitation may generate electrostatic (Poison) charges.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. DO NOT wash into sewer.

o-Toluidine is very toxic to aquatic organisms. DO NOT allow **o-Toluidine** to enter the environment.

EXPOSURE LIMITS

OSHA:5 ppm, 8-hr TWANIOSH:Lowest feasible concentrationACGIH:2 ppm, 8-hr TWAIDLH:50 ppmThe Protective Action Criteria values are:

PAC-1 = 5 ppm PAC-2 = 5 ppm PAC-3 = 50 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with tightness in the chest and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
Chronic:	Cancer (bladder and liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.25 to 6.6 ppm
Flash Point:	185°F (85°C)
LEL:	1.5%
Auto Ignition Temp:	900°F (482°C)
Vapor Density:	3.7 (air = 1)
Vapor Pressure:	0.3 mm Hg at 68°F (20°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	391°F (200°C)
Melting Point:	-3°F (-16°C)
Critical Temperature:	790°F (421°C)
Ionization Potential:	7.44 eV
Molecular Weight:	107.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Viton/Butyl (>8-hr breakthrough)
Coveralls:	Tychem® F, BR, CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: TRICHLORFON

Synonyms: Dylox®; Proxol®; Trichlorohydroxyethyldimethylphosphonate CAS No: 52-68-6 Molecular Formula: $C_4H_8CI_3O_4P$ RTK Substance No: 1882 Description: White, crystalline solid when pure

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	Trichlorfon may burn, but does not readily ignite. However, it is often dissolved in a liquid carrier	Trichlorfon is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
0 - Fire	that may be flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG		
DOT#: UN 2783 ERG Guide #: 152	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).		
Hazard Class: 6.1 (Poison)				

	h	
SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:Spill (solid): 25 meters (75 feet)Spill (liquid): 50 meters (150 feet)Fire: 800 meters (1/2 mile)Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.Moisten solid material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.DO NOT wash into sewer.	Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	242°F (117°C) (Solution) 7.8 x 10 ⁻⁶ mm Hg at 68°F (20°C) 1.73 (water = 1) Slightly soluble 212°F (100°C) 181° to 183°F (83° to 84°C) 257.4
Trichlorton is very toxic to aquatic organisms		

EXPOSURE LIMITS

ACGIH: 1 mg/m³; 8-hr TWA

PROTECTIVE EQUIPMENT	
Gloves:	Nitrile and Neoprene (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Organophosphorus compounds)
Respirator:	>1 mg/m ³ - full facepiece APR with Organic vapor cartridges and High efficiency prefilters
	>10 mg/m ³ - SCBA

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Eyes:IrritationSkin:Irritation (skin absorbable)

Inhalation: Headache, sweating, nausea and vomiting, loss of coordination, and death (*Organophosphate poisoning*)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.



Common Name: 1,1,2-TRICHLOROETHANE

Synonyms: Ethane Trichloride; Vinyl Trichloride CAS No: 79-00-5 Molecular Formula: C₂H₃Cl₃ RTK Substance No: 1889 Description: Colorless liquid with a sweet, pleasant odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	1,1,2-Trichloroethane may burn, but does not readily ignite.	1,1,2-Trichloroethane may react violently with CHEMICALLY ACTIVE METALS (such as ALUMINUM, POTASSIUM, SODIUM,		
1 - Fire	Use dry chemical, CO ₂ , water spray or foam	MAGNESIUM and ZINC).		
0 - Reactivity	as extinguishing agents.	1,1,2-Trichloroethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,		
DOT#: UN 3082	FIRE, including <i>Hydrogen Chloride</i> and	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORIN STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
ERG Guide #: 171	Phosgene.	NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE		
Hazard Class: 9 (Environmentally Hazardous Substance)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	and POTASSIUM HYDROXIDE). 1,1,2-Trichloroethane will decompose on contact with HOT SURFACES or FLAMES to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .		

SPILL/LEAKS	S	ΡΙ	LL	./L	E	A	Κ	S
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Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

1,1,2-Trichloroethane is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA:	10 ppm, 8-hr TWA
NIOSH:	10 ppm, 10-hr TWA
ACGIH:	10 ppm, 8-hr TWA

IDLH: 100 ppm

The Protective Action Criteria values are:

PAC-1 = 10 ppm PAC-2 = 15 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing outChronic:Cancer (liver, adrenal gland) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Sweet, pleasant odor
Flash Point:	Nonflammable
LEL:	6%
UEL:	15.5%
Vapor Density:	4.63 (air = 1)
Vapor Pressure:	19 mm Hg at 68°F (20°C)
Specific Gravity:	1.44 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	237°F (114°C)
Melting Point:	-34°F (-37°C)
Ionization Potential:	11 eV
Molecular Weight:	133.4

PROTECTIVE EQUIPMENT

Viton (>8-hr breakthrough)

Coveralls: Tychem® CSM, BR and TK (>8-hr breakthrough)

Respirator: >10 ppm - SCBA

Gloves:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRICHLOROETHYLENE

Synonyms: Ethylene Trichloride; TCE; Trichloroethene CAS No: 79-01-6 Molecular Formula: C₂HCl₃ RTK Substance No: 1890 Description: Clear, colorless liquid with a sweet, Chloroform-like odor

HAZARD DATA Hazard Rating Firefighting Reactivity Trichloroethylene will react explosively with *finely divided* or Trichloroethylene may burn, but does not 3 - Health powdered BARIUM, BERYLLIUM, and MAGNESIUM. readily ignite. 1 - Fire Trichloroethylene reacts with ACTIVE METALS (such as Use dry chemical, CO₂, water spray or LITHIUM, SODIUM and TITANIUM) to cause flashing and alcohol-resistant foam as extinguishing 0 - Reactivity sparks. agents. DOT#: UN 1710 Trichloroethylene will react with STRONG BASES (such as POISONOUS GASES ARE PRODUCED SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and IN FIRE, including Hydrogen Chloride ERG Guide #: 160 EPOXIDES to form spontanously flammable and Phosgene. Hazard Class: 6.1 Dichloroacetylene. CONTAINERS MAY EXPLODE IN FIRE. (Poison) Trichloroethylene is not compatible with STRONG ACIDS Use water spray to keep fire-exposed (such as HYDROCHLORIC, SULFURIC and NITRIC); containers cool. ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and Use water spray to reduce vapors. GLYCOLS. Trichloroethylene accumulates static charge. SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold:** 1.4 ppm **Isolation Distance:** Flash Point: >200°F (93°C) Spill: 50 meters (150 feet) LEL: 8% Fire: 800 meters (1/2 mile) UEL: 10.5% Absorb liquids in vermiculite, dry sand, earth, fly ash or 788°F (420°C) Auto Ignition Temp: cement powder and place into sealed containers for Vapor Density: 4.5 (air = 1) disposal. Vapor Pressure: 58 mm Hg at 68°F (20°C) DO NOT wash into sewer. **Specific Gravity:** 1.5 (water = 1)Use only non-sparking tools and equipment, especially Water Solubility: Slightly soluble when opening and closing containers of Trichloroethylene. **Boiling Point:** 189°F (87°C) Metal containers should be grounded and bonded **Melting Point:** -99°F (-73°C) as Trichloroethylene accumulates static charge. 9.5 eV **Ionization Potential:** Trichloroethylene is slightly toxic to aquatic life. Molecular Weight: 131.4 **PROTECTIVE EQUIPMENT** EXPOSURE LIMITS ACGIH: 10 ppm, 8-hr TWA; 25 ppm, 15-min STEL Gloves: Silver Shield®/4H®. Viton and Barrier® (>8-hr IDLH: 1,000 ppm breakthrough) The Protective Action Criteria values are: Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; Coveralls: ONESuit® TEC; and Trellchem® HPS and VPS (>8-hr PAC-1 = 130 ppm breakthrough) PAC-2 = 450 ppm PAC-3 = 3,800 ppm **Respirator:** >10 ppm - Supplied air or SCBA HEALTH EFFECTS FIRST AID AND DECONTAMINATION Remove the person from exposure. Eyes: Irritation and burns Flush eyes with large amounts of water for at least 15 minutes. Remove Skin: Irritation and burns contact lenses if worn. Seek medical attention. Inhalation: Headache, dizziness, lightheadedness, Quickly remove contaminated clothing and wash contaminated skin with visual disturbances, nausea and large amounts of soap and water. Seek medical attention. vomiting, and passing out Begin artificial respiration if breathing has stopped and CPR if necessary. **Chronic:** Cancer (liver, kidney, and lung) in Transfer promptly to a medical facility. animals



Common Name: TRICHLOROISOCYANURIC ACID

Synonyms: Symclosene; TCCA; Trichloro-s-Triazinetrione CAS No: 87-90-1 Molecular Formula: $C_3CI_3N_3O_3$ RTK Substance No: 1892 Description: White, crystalline powder with a *Chlorino* like of

Description: White, crystalline powder with a Chlorine-like odor, often used in granular or powder form

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	REACTIVE SOLID	Trichloroisocyanuric Acid may explode on HEATING		
0 - Fire	Trichloroisocyanuric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	and reacts violently with COMBUSTIBLES. Trichloroisocyanuric Acid reacts slowly with WATER to release toxic <i>Chlorine gas</i> , <i>Cyanuric Acid</i> , and highly		
	Use water in flooding guantities only. DO NOT	reactive Nitrogen Trichloride.		
DOT#: UN 2468	USE CHEMICAL or CO ₂ extinguishing agents.	Trichloroisocyanuric Acid reacts violently with		
ERG Guide #: 140	POISONOUS GASES ARE PRODUCED IN FIRE,	HYPOCHLORITE: HYDROGEN PEROXIDE: SODIUM		
Hazard Class: 5.1 (Oxidizer)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	CARBONATE; COMBUSTIBLE MATERIALS; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINIUM and their HYDRIDES) to cause fires and		
	cool.	explosions.		
	Trichloroisocyanuric Acid may ignite combustibles (wood, paper and oil).	Trichloroisocyanuric Acid reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic Chlorine gas		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed dry containers for disposal. Keep **Trichloroisocyanuric Acid** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Trichloroisocyanuric Acid is very toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Trichloroisocyanuric Acid**.

The Protective Action Criteria values are: PAC-1 = 75 mg/m³ PAC-2 = 500 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

Ρ	HYSICAL PR	OPERTIES
old.	Chlorine-like	

Odor Threshold:	Chlorine-like
Flash Point:	Noncombustible
Vapor Density:	2.07 (air = 1)
Vapor Pressure:	Negligible
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reacts slowly
Melting Point:	437°F (225°C) (Decomposes)
Molecular Weight:	232.4

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Neoprene, Viton and Barrier® (>8-hr breakthrough for <i>Hydrogen Chloride</i>)
Coveralls:	Tychem® SL, CPF3, BR, Responder® and TK, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrogen Chloride</i>)
Respirator:	Small Spill: full facepiece APR with <i>Acid gas</i> cartridges and <i>P100 filters</i> >75 mg/m ³ - SCBA
FIRS	T AID AND DECONTAMINATION
FIRS Remove the pe	T AID AND DECONTAMINATION rson from exposure.
FIRS Remove the pe Flush eyes with contact lenses	T AID AND DECONTAMINATION rson from exposure. a large amounts of water for at least 15 minutes. Remove if worn. Seek medical attention.
FIRS Remove the per Flush eyes with contact lenses Quickly remove large amounts	T AID AND DECONTAMINATION rson from exposure. In large amounts of water for at least 15 minutes. Remove if worn. Seek medical attention. It contaminated clothing and wash contaminated skin with of soap and water.
FIRS Remove the pe Flush eyes with contact lenses Quickly remove large amounts Begin artificial r	T AID AND DECONTAMINATION rson from exposure. large amounts of water for at least 15 minutes. Remove if worn. Seek medical attention. e contaminated clothing and wash contaminated skin with of soap and water. respiration if breathing has stopped and CPR if necessary.



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Common Name: 1,2,3-TRICHLOROPROPANE

Synonyms: Allyl Trichloride; Trichlorohydrin CAS No: 96-18-4 Molecular Formula: $C_3H_5CI_3$ RTK Substance No: 1902 Description: Colorless to straw-colored liquid with a Chloroform-like odor

HAZARD DATA

HAZARD DATA					
Hazard Rating	g Firefighting		Reactivity		tivity
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 2810 ERG Guide #: 15 Hazard Class: 6. (Poiso	Firefighting 1,2,3-Trichloropropane is a COMBUSTIBL LIQUID. Use dry chemical, CO2, or alcohol-resistant is a extinguishing agents. Fine water spray may be used to blanket the POISONOUS GASES ARE PRODUCED IN including Hydrogen Chloride and Phosgenee CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed contait cool.		JSTIBLE sistant foam nket the fire. CED IN FIRE, <i>osgene.</i> IRE. I containers	1,2,3-T POWE 1,2,3-T OXIDI PERO NITRA STRO SULFU META and ZI HYDR and W	richloropropane reacts violently with DERED METALS. richloropropane is not compatible with ZING AGENTS (such as PERCHLORATES, XIDES, PERMANGANATES, CHLORATES, ATES, CHLORINE, BROMINE and FLUORINE); NG ACIDS (such as HYDROCHLORIC, JRIC and NITRIC); CHEMICALLY ACTIVE LS (such as POTASSIUM, SODIUM, MAGNESIUM NC); STRONG BASES (such as SODIUM OXIDE and POTASSIUM HYDROXIDE); RESINS; AXES.
S	PILL/LEAKS			PH	YSICAL PROPERTIES
 Isolation Distance: Small Spill: 60 meters (200 feet) Large Spill: 330 meters (1,200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer. 1,2,3-Trichloropropane is a marine pollutant and may be hazardous to the environment. 			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Tem Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Molecular Weight;		Chloroform odor $160^{\circ}F (71^{\circ}C)$ 3.2% 12.6% $579^{\circ}F (304^{\circ}C)$ 5.1 (air = 1) $3 mm Hg at 68^{\circ}F (20^{\circ}C)$ 1.4 (water = 1) Very slightly soluble $313^{\circ}F (156^{\circ}C)$ 147.4
EXP	OSURE LIMITS			PRO	TECTIVE EQUIPMENT
OSHA: 50 ppm NIOSH: 10 ppm ACGIH: 10 ppm IDLH: 100 ppr	, 8-hr TWA , 10-hr TWA , 8-hr TWA n		Gloves: Coveralls: Respirator:	Butyl, F DuPon Kapple (>8-hr l >10 pp	Polyvinyl Alcohol and Viton t Tychem® BR, LV, Responder®, and TK; r® Zytron® 300; and Saint-Gobain ONESuit® TEC, breakthrough for <i>Aliphatic Halogens</i>) m - Supplied air
HE	ALTH EFFECTS		FIRS	ST AIE	D AND DECONTAMINATION
Eyes: Irrita Skin: Irrita and Inhalation: Nose coug brea Hea light Chronic: Can	ation and burns ation and burns with redness, drying cracking. e, throat and lung irritation with ghing, wheezing and shortness of tth dache, dizziness and headedness cer (liver, mouth and stomach) in		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 		
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Common Name: TRICHLOROSILANE

Synonyms: Silicochloroform; Trichloromonosilane CAS No: 10025-78-2 Molecular Formula: SiHCl₃ RTK Substance No: 1903

Headache, nausea, vomiting, diarrhea and

abdominal pain

Description: Colorless liquid with a sharp, choking odor						
HAZARD DATA						
Hazard Ra	ting	Firefighting			Reactivity	
3 - Health 4 - Fire 2 W - Reactiv DOT#: UN 1 ERG Guide # Hazard Class (Water Reactiv Dangerous Wh	ity 295 f: 139 s: 4.3 e/ en Wet)	FirefightingReactivityFLAMMABLE and REACTIVE LIQUIDTrichlorosilane reacts violently with WATER; SOLUTIUse only Alcohol-Resistant Aqueous Film Forming Foam (AR-AFFF) at medium expansion.Trichlorosilane reacts violently with WATER; SOLUTI CONTAINING WATER; STEAM; and MOISTURE IN A release heat and flammable and corrosive gases such Hydrogen Chloride.Apply foam carefully by floating it onto the spill to form a continuous layer.Trichlorosilane reacts violently with ALCOHOLS; ACE ORGANIC ACIDS (such as ACETIC ACID); OXIDIZIN AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLU BROMINE and FLUORINE); STRONG ACIDS (such a HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES.Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back.Name travel a distance to cause a fire or explosion far from the source or flash back.		ne reacts violently with WATER; SOLUTIONS WATER; STEAM; and MOISTURE IN AIR to and flammable and corrosive gases such as d <i>Hydrogen Chloride</i> . ne reacts violently with ALCOHOLS; ACETONE; CIDS (such as ACETIC ACID); OXIDIZING ch as PERCHLORATES, PEROXIDES, NATES, CHLORATES, NITRATES, CHLORINE, nd FLUORINE); STRONG ACIDS (such as DRIC, SULFURIC and NITRIC); STRONG BASES DIUM HYDROXIDE and POTASSIUM ⁽²⁾ ; and AMINES. ne is incompatible with COMBUSTIBLES and		
	SF	PILL/LEAKS			PHYS	ICAL PROPERTIES
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) For small spills, absorb liquids in vermiculite, dry sand or earth. DO NOT stack or heap contaminated sorbents as the heat generated may cause auto ignition. Apply AR-AFF Foam on small spills to suppress vapors and blanket release. Carefully float foam onto spill and reapply as necessary. For large spills vapor ignition is possible. Use only non-sparking tools and equipment, and ground and bond all containers when transferring liquid. Neutralize spills using Sodium Hydroxide with a 1 to 1 ratio of Sodium Hydroxide to Chlorosilane or use a 2 to 1 ratio of Sodium Bicarbonate to Chlorosilane. Keep Trichlorosilane out of confined spaces, such as sewers, because of the possibility of an explosion.			Odor Three Flash Poin LEL: UEL: Auto Ignitie Vapor Den Vapor Pres Specific Gi Water Solu Boiling Poi Freezing P Critical Ter Molecular	shold: t: on Temp: sity: ssure: savity: bility: bility: nt: oint: np: Weight:	Sharp, choking odor -18° to $7^{\circ}F$ (-28° to $-14^{\circ}C$) 1.2% 90.5% $220^{\circ}F$ ($104^{\circ}C$) 4.7 (air = 1) 20.4 mm Hg at $70^{\circ}F$ ($21^{\circ}C$) 1.34 (water = 1) Reacts (Violent decomposition) $90^{\circ}F$ ($32^{\circ}C$) $-196^{\circ}F$ ($-127^{\circ}C$) $403^{\circ}F$ ($206^{\circ}C$) 135.5	
	EXPC	SURE LIMITS			PROTE	
OSHA/NIOSH: ACGIH: IDLH: The Protective PAC-1 = 0.6	5 ppm, 2 ppm, 50 ppm Action Cr ppm PA	Ceiling (as <i>Hydrogen Chloride</i>) Ceiling (as <i>Hydrogen Chloride</i>) (as <i>Hydrogen Chloride</i>) iteria values are: C-2 = 7.3 ppm PAC-3 = 33 ppm		Gloves: Coveralls: Respirator:	Viton and B compound Tychem® >10% of th SCBA	3arrier® (>8-hr breakthrough for <i>Organo-Silicon</i> ds) BR and TK (>8-hr breakthrough) he LEL use flash protection or turn out gear
	HEA	LTH EFFECTS		FIR	ST AID A	ND DECONTAMINATION
Eyes: Skin: Inhalation:	Severe in Severe in Nose, thr wheezing (pulmona	itation, burns and possible eye damage itation, burns and blisters pat and lung irritation with coughing, and severe shortness of breath ry edema)		Remove the Flush eyes v contact lens Quickly remo amounts of s	person from ex with large amount es if worn. See hove contaminate soap and water.	posure. nts of water for at least 30 minutes. Remove k medical attention immediately. ed clothing and wash contaminated skin with large . Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

Synonyms: Freon®113; Genetron®113 CAS No: 76-13-1 Molecular Formula: C₂Cl₃F₃ RTK Substance No: 1904

Description: Colorless liquid with a faint, sweet or Ether-like odor at high concentrations

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. 1,1,2-Trichloro-	1,1,2-Trichloro-1,2,2-Trifluoroethane may react violently with CHEMICALLY ACTIVE METALS (such as POTASSIUM,
0 - Fire	1,2,2-Trifluoroethane itself does not burn.	SODIUM, MAGNESIUM and ZINC) and their ALLOYS.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> ,	Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) releases toxic <i>Chlorine gas</i> .
DOT#: None	Hydrogen Fluoride, and Phosgene.	1,1,2-Trichloro-1,2,2-Trifluoroethane is not compatible with
ERG Guide #: 171	Use water spray to keep fire-exposed	FINELY POWDERED METALS and OXIDIZING AGENTS
Hazard Class: None	containers cool.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and ELLIORINE)

SPILL/LEAKS	PHYSICAL PROPERTIES			
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Wash all contaminated surfaces with <i>alcohol</i> followed by washing with a strong soap and water solution. DO NOT wash into sewer. 1,1,2-Trichloro-1,2,2-Trifluoroethane is toxic to aquatic life and impacts the ozone layer. 	Odor Threshold: Flash Point: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential:	45 ppm Noncombustible 1,256°F (680°C) 6.5 (air = 1) 285 mm Hg at 68°F (20°C) 1.57 (water = 1) Insoluble 118°F (48°C) -31°F (-35°C) 11.99 eV 187.4		
		107.4		

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT		
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 1,000 ppm, 10-hr TWA; 1,250 ppm STEL ACGIH: 1,000 ppm, 8-hr TWA; 1,250 ppm STEL IDLH: 2,000 ppm	Gloves: Coveralls:	Insulated Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK (>8-hr breakthrough)		
The Protective Action Criteria values are: PAC-1 = 1,250 ppm PAC-2 = 1,500 ppm PAC-3 = 2,000 ppm	Respirator:	>1,000 ppm - SCBA		
HEALTH EFFECTS	FIRS	T AID AND DECONTAMINATION		

Eves: Irritation Skin: Irritation, frostbite, burns, rash and redness Inhalation: Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, confusion, recent memory loss, convulsions, and passing out. Very high levels can cause trouble breathing, irregular heart rhythms collapse and even death.

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Immerse affected part in warm water. Seek medical attention.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.





Common Name: TRICRESYL PHOSPHATE

Synonyms: Cresyl Phosphate; Tritolyl Phosphate CAS No: 1330-78-5 Molecular Formula: $C_{21}H_{21}O_4P$ RTK Substance No: 3130 Description: Colorless, odorless liquid that is a mixture of three different isomers

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 1 - Fire 0 - Reactivity	Tricresyl Phosphate may burn, but does not readily ignite. Extinguish fire using an agent suitable for type of surrounding fire.	Tricresyl Phosphate reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form highly toxic and flammable <i>Phosphine gas.</i>
DOT#: UN 2574 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosphorus Oxides</i> and <i>Phosphine</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Tricresyl Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), especially when heated.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

Tricresyl Phosphate is expected to be very toxic to aquatic life.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	437°F (225°C)
Auto Ignition Temp:	770°F (410°C)
Vapor Density:	2.7 (air = 1)
Vapor Pressure:	1.7 x 10 ⁻⁶ mm Hg at 77ºF (25ºC)
Specific Gravity:	1.16 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	770°F (410°C)
Freezing Point:	-27°F (-33°C)
Molecular Weight:	368

OSHA: 0.1 mg/m³ (0.0066 ppm), 8-hr TWA

- NIOSH: 0.1 mg/m³ (0.0066 ppm), 10-hr TWA
- **ACGIH:** 0.1 mg/m³ (0.0066 ppm), 8-hr TWA
- **IDLH:** 40 mg/m³ (2.65 ppm)

(All of the above are for Tri-o-Cresyl Phosphate)

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Polyvinyl Alcohol, Polyvinyl Chloride and Viton (>8- hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Organophosphorus compounds)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRIETHANOLAMINE DODECYLBENZENE-SULFONATE

Synonyms: Dodecylbenzenesulfonic Acid. Triethanolamine Salt CAS No: 27323-41-7 Molecular Formula: C₁₈H₂₀O₃S•C₆H₁₅NO₃ RTK Substance No: 1905 Description: White colored, waxy solid that is often in a liquid solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Triethanolamine	Triethanolamine Dodecylbenzene-Sulfonate is not compatible with OXIDIZING AGENTS (such as				
1 - Fire	Dodecylbenzene-Sulfonate itself does not	PERCHLORATES, PEROXIDES, PERMANGANATES,				
0 - Reactivity	burn, or burns with difficulty.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM,				
DOT#: None	FIRE, including <i>Nitrogen Oxides</i> and <i>Sulfur</i>	SODIUM, ALUMINUM and their HYDRIDES),				
ERG Guide #: 171 Hazard Class: None	Oxides. Use water spray to keep fire-exposed containers	ISOCYANATES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).				

SPILL/LEAKS

Isolation Distance:

Spill (Solid): 25 meters (75 feet)

Spill (Liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. DO NOT wash into sewer.

Triethanolamine Dodecylbenzene-Sulfonate is hazardous to waterfowl and most fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for Triethanolamine Dodecylbenzene-Sulfonate.

HEALTH EFFECTS

Eves:	Irritation and burns

Irritation and burns

Skin:

Inhalation: Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Flash Point:	>200°F (93°C)
Vapor Pressure:	Negligible
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	>507°F (264°C)
Molecular Weight:	475.6 (Solution)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber (<i>solid</i>) Butyl, Viton and SilverShield®/4H (<i>solutions</i>)
Coveralls:	Tyvek® (so <i>lid</i>) Tychem® BR, Responder® and TK (<i>solutions</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRIETHYLAMINE

Synonyms: (Diethylamino)Ethane; TEA CAS No: 121-44-8 Molecular Formula: $C_6H_{15}N$ RTK Substance No: 1907 Description: Clear, colorless liquid with an *Ammonia* or fish-like odor

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Hazard Rating	Firefighting	Reactivity
3 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Triethylamine is a strong base which may react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and
3 - Fire	resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES CHI ORATES NITRATES CHI ORINE BROMINE
0 - Reactivity	FIRE, including <i>Nitrogen Oxides</i> .	and FLUORINE).
DOT#: UN 1296	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Triethylamine may form an ignitable vapor/air mixture in closed tanks or containers.	Triethylamine reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen gas</i> .
Hazard Class: 3		Triethylamine is not compatible with ISOCYANATES; EPOXIDES; PHENOLS; and ACID HALIDES (such as TRICHLOROACETIC ACID).
(Flammable)		Triethylamine can form toxic <i>N-Ntrosoamines</i> when in contact with NITRIC ACID, NITRATES or atmospheres with high NITROUS OXIDE concentrations.
		Triethylamine is CORROSIVE to ALUMINUM, COPPER and ZINC and their ALLOYS in the presence of MOISTURE.

SPILL/LEAKS

Isolation Distance:

Spill:

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Triethylamine**.

Triethylamine is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 3 ppm STEL IDLH: 200 ppm

The Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-2 = 3 ppm PAC-3 = 200 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burns

Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.1 to 0.48 ppm
Flash Point:	16°F (-9°C)
LEL:	1.2%
UEL:	8%
Auto Ignition Temp:	480°F (249°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	54 mm Hg at 68°F (20°C)
Specific Gravity:	0.73 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	193°F (89°C)
Freezing Point:	-175°F (-115°C)
Ionization Potential:	7.5 eV
Molecular Weight:	101.2

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Polyvinyl Alcohol, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: TRIETHYLENE TETRAMINE

Synonyms: 1,4,7,10-Tetrazadecane; Trientine CAS No: 112-24-3 Molecular Formula: $C_6H_{18}N_4$ RTK Substance No: 1908 Description: Colorless to yellow liquid with an *Ammonia* odor

HAZARD DATA					
Hazard Rating Firefighting		Reactivity			
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 2259 ERG Guide #: 15 Hazard Class: 8 (Corrosiv	CORROSIVE and COMBUSTIBL LIQUID, but it does not readily ig Use dry chemical, CO ₂ , water spr alcohol-resistant foam as extingu agents. POISONOUS GASES ARE PROI IN FIRE, including <i>Nitrogen Oxid</i> Use water spray to keep fire-expo containers cool.	Firefighting CORROSIVE and COMBUSTIBLE LIQUID, but it does not readily ignite. Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.		Reactivity Triethylene Tetramine is a STRONG BASE that reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CHLORIDES; ACID ANHYDRIDES; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Triethylene Tetramine is not compatible with METALS (such as COPPER, COPPER ALLOYS, NICKEL, COBALT, ALUMINUM and ZINC); CYANIDES; NITRILES; EPOXIDES; CHLOROFORMATES; KETONES; and CHLORINATED HYDROCARBONS (such as METHYLENE CHLORIDE and TETRACHLOROETHANES).	
	PILL/LEAKS			PH	SICAL PROPERTIES
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer. Triethylene Tetramine may cause long-term adverse effects in the aquatic environment.			Odor Flast LEL: UEL: Auto Vapo Vapo Spec Wate Boili Melti pH: Mole	Threshold: Point: Ignition Temp: or Density: or Pressure: ific Gravity: or Solubility: ng Point: ng Point: ng Point:	Ammonia odor $275^{\circ}F (135^{\circ}C)$ 1% 6.5% $640^{\circ}F (338^{\circ}C)$ 5.04 (air = 1) $<0.01 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 0.98 (water = 1) Soluble $511^{\circ}F (266^{\circ}C)$ $54^{\circ}F (12^{\circ}C)$ 10 (1% aqueous solution) 146.3
EXPOSURE LIMITS				PRO	TECTIVE EQUIPMENT
AIHA: 1 ppm, 8-hr WEEL The Protective Action Criteria values are: PAC-1 = 7.5 ppm PAC-2 = 60 ppm PAC-3 = 150 ppm			Glov Cove Resp	Gloves: Butyl, Nitrile and Neoprene (>8-hr breakthrough) Coveralls: Tychem® BR, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for Amines, aliphatic tertiary and Polyamines) Respirator: SCBA	
HEALTH EFFECTS			FIRST AID	O AND DECONTAMINATION	
Eyes: Sev Skin: Irrita Inhalation: Nos cou brea Exp and	ere irritation and burns ation and burns e, throat and lung irritation with ghing, wheezing and shortness of ath osure to hot vapors can cause itching swelling of the face		Rem Flusi conta Quic large Begi Tran	ove the person from n eyes with large a act lenses if worn. kly remove containe amounts of wate n artificial respirat sfer promptly to a	om exposure. amounts of water for at least 30 minutes. Remove Seek medical attention. minated clothing and wash contaminated skin with r. Seek medical attention. ion if breathing has stopped and CPR if necessary. medical facility.



Common Name: TRIFLURALIN

Synonyms: Crisalin; Treflan CAS No: 1582-09-8 Molecular Formula: $C_{13}H_{16}F_3N_3O_4$ RTK Substance No: 1918 Description: Odorless, yellow or bright orange, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE SOLID	Trifluralin reacts violently with OXIDIZING AGENTS
1 - Fire	extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Trifluralin may be dissolved in a liquid carrier that	CHLORINE, BROMINE and FLUORINE).
DOT#: NA 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	
ERG Guide #: 171	including Nitrogen Oxides and Hydrogen Fluoride.	
Hazard Class: 9	Use water spray to keep fire-exposed containers	
(Environmentally		
mazaruous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Dampen spill with 60% to 70% *Ethyl Alcohol* and place into sealed containers for disposal.

Wash spill area with 60% to 70% Ethyl Alcohol.

DO NOT wash into sewer.

Trifluralin is toxic to honeybees, fish, and other aquatic organisms, and can bioaccumulate.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Trifluralin**.

The Protective Action Criteria values are: PAC-1 = 0.075 mg/m^3 PAC-2 = 0.6 mg/m^3

 $PAC-3 = 300 \text{ mg/m}^3$

0

HEALTH EFFECTS

Irritation
Irritation and rash
Nose and throat irritation with coughing and wheezing.
Cancer (urinary tract, thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	>185°F (>85°C)	
Vapor Pressure:	1.9 x 10 ⁻⁴ mm Hg at 85°F (29°C)	
Specific Gravity:	1.3 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	282° to 284°F (139° to 140°C) (Decomposes)	
Melting Point:	115° to 117°F (46° to 47°C)	
Molecular Weight:	335.3	

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>P100 filter</i> >300 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 2,4,6-TRINITROPHENOL

Synonyms: Picric Acid; Carbazotic Acid; Phenol Trinitrate CAS No: 88-89-1 Molecular Formula: C₆H₃N₃O₇ RTK Substance No: 1946 Description: Odorless, yellow-orange, crystalline solid when dry, or a bright yellow liquid when dissolved in water or an organic solvent

HAZARD DATA				
Hazard Pating	Firefighting		Post	vity
Hazard Rating 3 - Health 4 - Fire 4 - Reactivity DOT#: UN 0154 ERG Guide #: 112 Hazard Class: 1.1D (Explosive)	Firefighting FLAMMABLE and REACTIVE SOLID WHEN DRY and a DANGEROUS FIRE and EXPLOSION HAZARD. 2,4,6-Trinitrophenol may explosively decompose with heat, shock, friction or concussion. <i>Water solutions</i> of 2,4,6-Trinitrophenol are <i>not</i> combustible. Use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Flow or agitation may generate electrostatic charges. 2,4,6-Trinitrophenol may form an ignitable vapor/air mixture in closed tanks or containers		Reactivity 2,4,6-Trinitrophenol must be kept wet or in solution at all times as dry or crystallized 2,4,6-Trinitrophenol can be detonated by HEAT, SHOCK, FRICTION, STATIC ELECTRICITY or CONCUSSION. 2,4,6-Trinitrophenol will react with METALS (such as COPPER, IRON, LEAD, MERCURY and ZINC) to form metal picrates that are extremely shock sensitive and can be detonated by the slightest movement or vibration. 2,4,6-Trinitrophenol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMMONIA; CONCRETE; PLASTER; GELATIN; and NITROGEN CONTAINING COMPOUNDS.	
SPI	LL/LEAKS		PH\	SICAL PROPERTIES
Isolation Distance: Spills: 800 meters (1/2 m Fire: 1,600 meters (1 mil DO NOT OPERATE trans- feet). For <i>dry</i> 2,4,6-Trinitrophe trained in the clean-up of Absorb liquids in dry sand- place into sealed contain Use only non-sparking to opening and closing con Keep spill wet at all times DO NOT wash into sewe 2,4,6-Trinitrophenol is h EXPOS OSHA: 0.1 mg/m ³ , 8-h	hile) le) smitters within 100 meters (330 enol, consult a Specialist specifically f explosive materials. d, earth, or a similar material and hers for disposal. ols and equipment, especially when tainers of 2,4,6-Trinitrophenol. s. r. harmful to aquatic organisms. SURE LIMITS hr TWA hr TWA	Odor Thresh Flash Point: Auto Ignitior Vapor Densi Vapor Press Specific Gra Water Solub Boiling Poin Melting Poin Molecular W	old: Temp: ty: ure: vity: ility: t: eight: PRO Nitrile a	Odorless 302°F (150°C) 572°F (300°C) 7.9 (air = 1) <1 mm Hg at 68°F (20°C) 1.8 (water = 1) Slightly soluble Explodes above 572°F (300°C) 252°F (122°C) 229.1 TECTIVE EQUIPMENT
NIOSH: 0.1 mg/m ³ , 10-hr TWA; 0.3 mg/m ³ , STEL ACGIH: 0.1 mg/m ³ , 8-hr TWA IDLH: 75 mg/m ³ The Protective Action Criteria values are: PAC-1 = 0.3 mg/m ³ PAC-2 = 15 mg/m ³ PAC-3 = 75 mg/m ³		Coveralls: Respirator:	Coveralls: Tychem® Responder® (>8-hr breakthrough for solutions) Respirator: >0.1 mg/m³ - full facepiece APR with P100 filters >1 mg/m³ - SCBA	
Eyes: Irritation a Skin: Irritation a Inhalation: Nose and Headach	and burns and burns d throat irritation e, dizziness, nausea and vomiting	FIRST AID AND DECONTAVINATION Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.		



Common Name: 2,4,6-TRINITROTOLUENE

Synonyms: 1-Methyl-2,4,6-Trinitrobenzene; TNT CAS No: 118-96-7 Molecular Formula: C₇H₅N₃O₆ RTK Substance No: 1948

Description: Odorless, colorless to pale yellow, crystalline solid that may be transported in a slurry

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	2,4,6-Trinitrotoluene is an EXPLOSIVE that can be detonated by HEAT, LIGHT, FRICTION or	2,4,6-Trinitrotoluene, especially <i>hot liquid</i> 2,4,6-Trinitrotoluene may explosively decompose with
4 - Fire	SHOCK.	SHOCK, FRICTION, IMPACT or HEAT (above 464°F
4 - Reactivity	2,4,6-Trinitrotoluene is a FLAMMABLE and REACTIVE SOLID.	(240°C)). 2,4,6-Trinitrotoluene reacts violently or explosively with
DOT#: UN 0209	Use water or dirt for small fires. DO NOT attempt	OXIDIZING AGENTS (such as PERCHLORATES,
ERG Guide #: 112	to extinguish large fires. POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 1	including Nitrogen Oxides.	SODIUM ALLIMINUM and their HYDRIDES): STRONG
(Explosive)	CONTAINERS MAY EXPLODE IN FIRE.	BASES (such as SODIUM HYDROXIDE and
	Use water spray to keep fire-exposed containers cool.	POTASSIUM HYDROXIDE); NITRIDES; NITRIC ACID; LEAD; IRON; and ORGANIC SOLVENTS.

SPILL/LEAKS

Isolation Distance:

Spill: 500 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

DO NOT CLEAN-UP or DISPOSE of unless supervised by a specialist in explosives.

Keep spilled 2,4,6-Trinitrotoluene WET!

Use only non-sparking tools and equipment, especially when opening and closing containers of 2,4,6-Trinitrotoluene. Metal containers involving the transfer of

2,4,6-Trinitrotoluene should be grounded and bonded. DO NOT wash into sewer.

DO NOT OPERATE RADIO TRANSMITTORS within 100 meters (330 feet) of ELECTRICAL DETONATORS.

2,4,6-Trinitrotoluene is toxic to aquatic organisms and may cause long-term effects.

EXPOSURE LIMITS

OSHA: 1.5 mg/m³, 8-hr TWA NIOSH: 0.5 mg/m³, 10-hr TWA ACGIH: 0.1 mg/m³, 8-hr TWA IDLH: 500 mg/m³

The Protective Action Criteria values are: PAC-1 =1.25 mg/m³ PAC-2 = 7.5 mg/m³

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
Chronic:	Cancer (bladder) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point: Flammable Solid (Explodes)	
Auto Ignition Temp: 887°F (474°C)	
Vapor Pressure:	0.0002 mm Hg at 68°F (20°C)
Specific Gravity:	1.65 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	464°F (240°C) (Explodes)
Melting Point:	176°F (80°C)
Ionization Potential:	10.59 eV
Molecular Weight:	227.15

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough for liquid Nitro compounds)
Coveralls:	Tychem® CSM (>2-hr breakthrough for <i>liquid Nitro compounds</i>) Flash protection or Turn-Out gear
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 2,3,5-TRIS(1-AZIRIDINYL)-p-BENZOQUINONE

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	2,3,5-Tris(1-Aziridinyl)-p-Benzoquinone may	2,3,5-Tris(1-Aziridinyl)-p-Benzoquinone may react with OXIDIZING AGENTS (such as PERCHI ORATES)	
1 - Fire	Use dry chemical CO_2 water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC	
DOT#: None	FIRE.	SULFURIC and NITRIC); ISOCYANATES; and	
ERG Guide #: None	Use water spray to keep fire-exposed containers	ANNT DRIDES.	
Hazard Class: None	cool.	2,3,3-1 гіз(1-Аzігіаілуі)-р-велгодиілопе may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to produce flammable <i>Hydrogen gas</i> .	

SPILL/LEAKS PHYSICAL PROPERTIES **Isolation Distance:** Flash Point: May be combustible Spill: 25 meters (75 feet) Water Solubility: Slightly soluble Fire: 800 meters (1/2 mile) **Melting Point:** 324°F (180°C) Moisten spilled material first or use a HEPA-filter **Molecular Weight:** 231.25 vacuum for clean-up and place into sealed containers for disposal. Clean spill area with Acetone, followed by washing with soap and water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **2,3,5-Tris(1-AziridinyI)-p-Benzoquinone**.

PROTECTIVE EQUIPMENT

Gloves: Nitrile, Neoprene and Natural Rubber

Coveralls: Tyve

Respirator:

Tyvek®

ttor: Spill: full facepiece APR with *P100 filters* Fire: SCBA

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Headache, nausea, vomiting, and dizziness

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: URETHANE

Synonyms: Ethyl Carbamate; Ethylurethane; Carbamic Acid, Ethyl Ester CAS No: 51-79-6Molecular Formula: C₃H₇NO₂ RTK Substance No: 1986 Description: Odorless, colorless, crystalline solid or a white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Urethane is a COMBUSTIBLE SOLID. Use dry chemical, CO ₂ , water spray or alcohol-	Urethane reacts with PHOSPHORUS PENTACHLORIDE to form an explosive product.	
2 - Fire	resistant foam as extinguishing agents.	Urethane is not compatible with OXIDIZING AGENTS	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	(such as PERCHLORATES, PEROXIDES,	
DOT# : UN 3077	including <i>Nitrogen Oxides.</i> Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG	
ERG Guide #: 171	cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and	
Hazard Class: 9 (Miscellaneous		NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHLORAL HYRATE; CAMPHOR; MENTHOL; GALLIUM;	
Hazardous Substance)		2-NAPHTHOL; and THYMOL.	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold: Elash Point:	Odorless
Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile)	Vapor Density:	3.07 (air = 1)
Moisten spilled material first or use a HEPA-filter	Vapor Pressure: Specific Gravity:	5 mm Hg at 150.4°F (66°C) 0.98 (water = 1)
for disposal.	Water Solubility:	Slightly soluble
DO NOT Wash into sewer.	Boiling Point: Melting Point:	360° to 363°F (182° to 184°C) 118° to 122°F (48° to 50°C)
	Molecular Weight:	89.09

EXPOSURE LIMITS

No occupational exposure limits have been established for **Urethane**.

The Protective Action Criteria values are:

- PAC-1 = 500 mg/m³
- $PAC-2 = 500 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation (skin absorbable)
Inhalation:	Nose and throat irritation
	Headache, dizziness, lightheadedness and passing out
Chronic:	Cancer (lung, liver, and blood) in animals

PROTECTIVE EQUIPMENT

Gloves:	Nitrile or Natural	Rubbe
010703.	Nume of Natural	1 CODDCI

Coveralls: Tyvek®

Respirator:

Full facepiece APR with *P100 filters* >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: VANADIUM PENTOXIDE

Synonyms: Vanadic Anhydride; Vanadium Oxide CAS No: 1314-62-1 Molecular Formula: V_2O_5 RTK Substance No: 1993 Description: Odorless, yellow to rust-brown crystalline solid or fume

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Vanadium Pentoxide itself does	Vanadium Pentoxide may react violently with CHLORINE TRIFLUORIDE; LITHIUM; and PEROXYFORMIC ACID
0 - Fire	not burn.	Vanadium Bentexide is not compatible with ALLIMINIUM
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Vanadium Oxide fumes.	POWDER; STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2862	Use water spray to keep fire-exposed containers	SULFURIC and NITRIC); HALOGENS; and ALKALI
ERG Guide #: 151	cool.	POTASSIUM).
Hazard Class: 6.1 (Poison)		Mixtures of Vanadium Pentoxide with CALCIUM, SULFUR and WATER may ignite spontaneously.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Vanadium Pentoxide is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

EXPOSURE LIMITS

NIOSH: 0.05 mg/m³, 15-min Ceiling

ACGIH: 0.05 mg/m³, 8-hr TWA

IDLH: 35 mg/m³ (as Vanadium)

The Protective Action Criteria values are:

- PAC-1 = 1 mg/m^3
- PAC-2 = 1 mg/m^3
- PAC-3 = 35 mg/m³

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Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea and vomiting
Chronic:	Cancer (lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C) (approx.)
Specific Gravity:	3.56 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	3,182°F (1,750°C)
Melting Point:	1,274°F (690°C)
Molecular Weight:	181.9

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.05 mg/m ³ - Full facepiece APR with <i>High efficiency filters</i> >1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: VINYL CHLORIDE

Synonyms: Chloroethylene; Monochloroethylene; VCM CAS No: 75-01-4 Molecular Formula: CH₂ = CHCl RTK Substance No: 2001

Description: Colorless gas, with a sweet odor at high concentrations, that is usually handled as a liquid under pressure

HAZARD DATA							
Hazard Rating	Rating Firefighting					Reactivity	
4 - Health 4 - Fire 2 - Reactivity DOT#: UN 1086 ERG Guide #: 116P Hazard Class: 2.1 (Flammable Gas)	Firefighting FLAMMABLE AND REACTIVE GAS that can EXPLOSIVELY POLYMERIZE if not inhibited. DO NOT attempt to extinguish fire unless flow can be stopped. Shut off supply or let burn. Use dry chemical or CO2 for small fires. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to reduce vapors and to keep containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charges. Vinyl Chloride may form an ignitable vapor/air mixture in closed tanks or containers.			n be ;, ntainers xe to ash ges. ixture in	Vinyl Chlorid when expose (52°C)), or wh presence of a Vinyl Chlorid (such as PER PERMANGAI CHLORINE, I Vinyl Chlorid (such as COF METAL CARI explosions ma Phenol should polymerizatio Vinyl Chlorid	e can polymerize rapidly or explosively d to elevated temperatures (over 125°F hen exposed to AIR or LIGHT in the a CATALYST. e reacts violently with OXIDIZING AGENTS RCHLORATES, PEROXIDES, NATES, CHLORATES, NITRATES, BROMINE and FLUORINE). e is not compatible with WATER; METALS PPER, ALUMINUM, IRON and STEEL); BIDES; and METAL ALLOYS as fires and/or ay occur. I be used as an inhibitor to prevent violent n of Vinyl Chloride. e may accumulate static electricity.	
	SPILL/LEAKS					PHYS	ICAL PROPERTIES
Isolation Distance: Spill: 100 meters (330 feet) Fire: 800 meters (1/2 mile) Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Keep Vinyl Chloride out of confined spaces, such as sewers, because of the possibility of an explosion. Turn leaking cylinder with leak up to prevent escape of gas in liquid state. Use nonsparkling tools and ground and bond containers when transferring Vinyl Chloride. Vinyl Chloride is hazardous to the environment.					Odor Th Flash Po LEL: UEL: Auto Igr Vapor D Vapor P Specific Water S Boiling Freezing Ionizatio Critical Molecul	reshold: pint: nition Temp: ensity: ressure: Gravity: olubility: Point: g Point: g Point: on Potential: Temperature: ar Weight:	>3,000 ppm -108°F (-78°C) 3.6% 33% 882°F (472°C) 2.2 (air = 1) 2,524 mm Hg at 68°F (20°C) 0.9 (water = 1) Very slightly soluble 17°F (-8.3°C) -245° to -256°F (-154° to -160°C) 9.99 eV 306° to 317.3°F (152° to 158.5°C) 62.5
EXPO	SURE LIMITS	╽╽				PROTECT	
OSHA: 1 ppm, 8-hr TWA; 5 ppm, Ceiling NIOSH: Lowest feasible concentration ACGIH: 1 ppm, 8-hr TWA The Protective Action Criteria values are: PAC-1 = 250 ppm PAC-2 = 1,200 ppm PAC-3 = 4,800 ppm			Gloves: Insulated Viton, Viton/Butyl, Silver Shield®/4H® and Barr (>8-hr breakthrough) Coveralls: Tychem® BR, CSM and TK; Trellchem HPS and VPS (8-breakthrough) >10% of the LEL wear flash protection or turnout gear Respirator: SCBA		Viton/Butyl, Silver Shield®/4H® and Barrier® bugh) CSM and TK; Trellchem HPS and VPS (8-hr L wear flash protection or turnout gear		
HEALTH EFFECTS					FIRS	T AID ANI	D DECONTAMINATION
Eyes: Irritation may cau Skin: Irritation may cau Inhalation: Nose, th wheezin Headach passing	and burns, contact with <i>liquid</i> or <i>gas</i> se frostbite and burns, contact with <i>liquid</i> or <i>gas</i> se frostbite roat and lung irritation with coughing, g and shortness of breath ne, dizziness, lightheadedness and out	Remove the person from exposure. Flush eyes with large amounts of wa contact lenses if worn. Seek medica Immerse affected part in warm wate Begin artificial respiration if breathin Transfer promptly to a medical facili		on from exposure arge amounts of w worn. Seek medie part in warm wat spiration if breathin to a medical faci	, vater for at least 30 minutes. Remove cal attention. er. Seek medical attention. ng has stopped and CPR if necessary. lity.		



Common Name: VINYLIDENE CHLORIDE

Synonyms: 1-1-DCE;1,1-Dichloroethene; 1,1-Dichloroethylene CAS No: 75-35-4 Molecular Formula: $CH_2 = CCI_2$ RTK Substance No: 2006 Description: Clear colorless liquid or a gas above 89°E (32°C) with

Description: Clear, colorless liquid, or a gas above 89°F (32°C), with a mild, sweet odor HAZARD DATA Hazard Rating Firefighting Reactivity Vinylidene Chloride, when not inhibited, can violently FLAMMABLE AND REACTIVE 4 - Health polyermize (self-react), in the presence of HEAT, Vinylidene Chloride is a *peroxide forming* chemical that can 4 - Fire LIGHT, AIR and OXYGEN, to form a peroxide spontaneously decompose and become explosive with exposure to Compound that is shock-sensitive at very low air 2 - Reactivity temperatures (-40°F (-40°C)). Use dry chemical, CO₂, water spray or foam as extinguishing DOT#: UN 1303 agents. Vinylidene Chloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, POISONOUS GASES ARE PRODUCED IN FIRE, including ERG Guide #: 130P PERMANGANATES, CHLORATES, NITRATES, Hydrogen Chloride and Phosgene. Hazard Class: 3 CHLORINE, BROMINE and FLUORINE); OZONE; CONTAINERS MAY EXPLODE IN FIRE. ALUMINUM; ALUMINUM ALLOYS; COPPER; (Flammable) Use water spray to keep fire-exposed containers cool. COPPER ALLOYS; CHLOROSULFONIC ACID; Vapors may travel to a source of ignition and flash back. OLEUM; and NITRIC ACID. Vapor is heavier than air and may travel a distance to cause a Vinylidene Chloride may contain Monomethyl Ether of fire or explosion far from the source. Hydroquinone as an inhibitor. Vinylidene Chloride may form an ignitable vapor/air mixture in closed tanks or containers.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in cement powder, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Vinylidene Chloride**. Keep **Vinylidene Chloride** out of confined spaces, such as

sewers, because of the possibility of an explosion. DO NOT wash into sewer.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 5 ppm, 8-hr TWA The Protective Action Criteria values are: PAC-1 = 75 ppm PAC-2 = 500 ppm PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, dizziness, drowsiness, depression and a "drunken" feeling that can lead to unconsciousness	
Chronic:	Cancer (kidney) in animals	

PHYSICAL PROPERTIES

Flash Point: 0°F (-18°C)	
LEL: 5.6%	
UEL: 16%	
Auto Ignition Temp: 1,058°F (570°C)	
Vapor Density: 3.25 (air = 1)	
Vapor Pressure: 500 mm Hg at 68°F (20°C)	
Specific Gravity: 1.2 (water = 1)	
Water Solubility: Very slightly soluble	
Boiling Point: 89°F (32°C)	
Freezing Point: -188°F (-122°C)	
Ionization Potential: 10 eV	
Molecular Weight: 96.9	

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention .



Common Name: VINYL TOLUENE

Synonyms: Methyl Styrene; Tolyethylene CAS No: 25013-15-4 Molecular Formula: C_9H_{10} RTK Substance No: 2010 Description: Clear, colorless liquid with a strong, disagreeable odor

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
2 - Health 2 - Fire 2 - Reactivity DOT#: UN 2618 ERG Guide #: 3 Hazard Class: (Flammable)	 Vinyl Toluene is a COMBUSTIBLE LIQUID. Use dry chemical, CO₂, water spray or foam as extinguishing agents. Vinyl Toluene polymerizes (self-reacts) at elevated temperatures when not stabilized. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vinyl Toluene may form an ignitable vapor/air mixture in closed tanks or containers. 	Vinyl Toluene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and ALUMINUM CHLORIDE. Vinyl Toluene is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and IRON SALTS.			

Ionization Potential:

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

For liquid spills use oil-skimming equipment and sorbent foams.

Keep **Vinyl Toluene** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA; 100 ppm STEL
IDLH:	400 ppm

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES		
Odor Threshold:	50 ppm	
Flash Point:	127°F (53°C)	
LEL:	0.8%	
UEL:	11%	
Auto Ignition Temp:	1,000°F (538°C)	
Vapor Density:	4.1 (air = 1)	
Vapor Pressure:	1 mm Hg at 68°F (20°C)	
Specific Gravity:	0.9 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	334°F (168°C)	
Freezing Point:	-94° to -103°F (-70° to -75°C)	

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aromatic</i>)
Respirator:	>50 ppm - full facepiece APR with Organic Vapor filters >400 ppm - SCBA

8.2 eV

118.18

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: VM & P NAPHTHA

Synonyms: Varnish Makers' and Painters' Naphtha; Light Naphtha; Benzine CAS No: 8032-32-4 Molecular Formula: (Blend of petroleum fractions) RTK Substance No: 0206 Description: A colorless to yellow, liquid petroleum product with an odor like gasoline

HAZARD DATA					
Hazard Rating	Firefighting		React	ivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1268 ERG Guide #: 128 Hazard Class: 3 (Flammable)	Firefighting FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance		VM & P AGENT PERM/ CHLOF	Naphtha is not compatible with OXIDIZING TS (such as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE).	
	Use a vapor suppressing foam	to red	luce vapors.		
SPIL	L/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters Large Spill: 270 meter Absorb liquids in verm similar material and de Keep VM & P Naphtha as sewers, because o explosion. Severe marine pollutar	e (200 feet) rs (900 feet) iculite, dry sand, earth, or a eposit in sealed containers. a out of confined spaces, such f the possibility of an nt.	Odor Threshold Flash Point: LEL: UEL: Auto Ignition Temperature: Vapor Density: Vapor Pressure Specific Gravit Water Solubilit Boiling Point:		old: y: ire: ity: ity: ight:	0.86 ppm 28° to 85°F (-2° to 29°C) 0.9% 6.7% $450^{\circ}F (232^{\circ}C)$ 4.1 - 4.3 (air = 1) 2 to 20 mm Hg at 68°F (20°C) <1 (water = 1) Insoluble 212° to 350°F (100° to 177°C) 114
EXPOSURE LIMITS				PROT	ECTIVE EQUIPMENT
OSHA: None NIOSH: 350 r 1,800 ACGIH: 1,370 IDLH LEVEL: N/A	ng/m ³ , 10-hr TWA) mg/m ³ , 15-min STEL) mg/m ³ , 8-hr TWA	ſ	Gloves and Coveralls: Boots: Respirator:	Nitrile, N DuPont (>8-hr I Neopret 350 mg cartridg	Neoprene, and Viton (>8-hr breakthrough) Tychem® BR and LV, Responder® and TK breakthrough) ne /m ³ - full facepiece APR with Organic Vapor ges
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION		AND DECONTAMINATION
Eyes: Irritation Skin: Irritation, Acute: Irritation coughing Headache Chronic: Cancer (N	drying and cracking of the skin of the nose and throat with and wheezing e, dizziness and passing out. Not Classifiable)	ſ	Remove the p Flush eyes wit contact lenses Quickly remov large amounts Begin artificial necessary. Transfer to a p	erson fro th large a s if worn. ve contan s of soap l respiration medical fa	m exposure. mounts of water for at least 15 minutes. Remove ninated clothing and wash contaminated skin with and water. on if breathing has stopped and CPR if acility.



Common Name: XYLENES

Synonyms: Dimethylbenzene; Methyl Toluene (mixed isomers); Xylol CAS No: 1330-20-7 Molecular Formula: $C_6H_4(CH_3)_2$ RTK Substance No: 2014 Description: Colorless liquids with a faint, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1307 ERG Guide #: 130 Hazard Class: 3 (Flammable)	 FLAMMABLE LIQUIDS Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors are heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back. Flow or agitation may generate electrostatic charges. Xylenes may form an ignitable vapor/air mixture in closed tanks or 	Xylenes react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb *liquids* in dry sand, earth, or a similar material and place into sealed containers for disposal. Ground and bond containers when transferring **Xylenes**.

Use only non-sparking tools and equipment.

Keep **Xylenes** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Xylenes are toxic to aquatic organisms.

EXPOSURE LIMITS

- **OSHA:** 100 ppm, 8-hr TWA **NIOSH:** 100 ppm, 10-hr TWA; 150 ppm, STEL
- **ACGIH:** 100 ppm, 8-hr TWA; 150 ppm, STEL **IDLH:** 900 ppm

The Protective Action Criteria values are:

PAC-1 = 130 ppm PAC-2 = 920 ppm PAC-3 = 2,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

 Odor Threshold:
 0.07 to 40 ppm

 Flash Point:
 63° to 77°F (17)

 LEL:
 0.9 to 1.1%

 UEL:
 6.7 to 7%

 Auto Ignition Temp:
 867° to 984°F

 Vapor Density:
 3.7 (air = 1)

 Vapor Pressure:
 7 to 9 mm Hg s

 Specific Gravity:
 0.86 (water = 2)

 Water Solubility:
 Insoluble

 Boiling Point:
 279° to 291°F

 Freezing Point:
 -53°F (-47°C) t

 Ionization Potential:
 8.44 to 8.56 e

 Molecular Weight:
 106.2

0.07 to 40 ppm
63° to 77°F (17° to 25°C)
0.9 to 1.1%
6.7 to 7%
867° to 984°F (464° to 529°C)
3.7 (air = 1)
7 to 9 mm Hg at 68°F (20°C)
0.86 (water = 1)
Insoluble
279° to 291°F (137° to 144°C)
-53°F (-47°C) to 55.4°F (13°C)
8.44 to 8.56 eV
106.2

	PROTECTIVE EQUIPMENT
Gloves:	Vinton/Butyl, Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
	Use turnout gear or flash protection if ignition/fire is the greatest hazard
Respirator:	>100 ppm - full facepiece APR with Organic vapor cartridge >900 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: XYLENOL (This Quick Reference can be used for all six isomers of Xylenol)

Synonyms: Cresylic Acid; Hydroxydimethylbenzene CAS No: 1300-71-6 Molecular Formula: C₈H₁₀O RTK Substance No: 2015

Description: White to yellowish-brown, crystalline solid or liquid with a sweet, tarry odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	COMBUSTIBLE SOLID OR LIQUID	Xylenol is not compatible with OXIDIZING AGENTS		
2 - Fire	extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); ACID		
DOT#: UN 2261	Use water spray to keep fire-exposed containers	(such as SODIUM HYDROXIDE and POTASSIUM		
ERG Guide #: 153		HYDROXIDE); and IRON.		
Hazard Class: 6				
(Toxic)				

SPILL/LEAKS

Isolation Distance:

Spill (liquid): 50 meters (150 feet) (solid): 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb *liquids* in dry sand, earth, or a similar material and place into sealed containers for disposal. Collect *solid* material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Xylenol**.

The Protective Action Criteria values are: (Liquid) PAC-1 = 1 mg/m³ PAC-2 = 6 mg/m³ PAC-3 = 500 mg/m³ (Solid) PAC-1 = 2 mg/m³ PAC-2 = 15 mg/m³

 $PAC-3 = 125 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath
Headache, dizziness, nausea and
vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Sweet, tarry odor
Flash Point:	142° to 203°F (61° to 95°C)
LEL:	1.4%
Auto Ignition Temp:	1,110°F (599°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	0.102 to 0.274 mm Hg at 77°F (25°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	397° to 437°F (203° to 225°C)
Melting Point:	77° to 167°F (25° to 75°C)
Molecular Weight:	122.18

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, SilverShield®4/H®, Viton and Barrier® (>8-hr breakthrough for <i>Xylene</i>)
Coveralls:	Tychem® BR and TK (>8-hr breakthrough for Xylene)
Respirator:	>1 mg/m ³ - Full facepiece APR with <i>Organic vapor filters</i> >125 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention..



Common Name: ZINC

Synonyms: Blue Powder; Granular Zinc CAS No: 7440-66-6 Molecular Formula: Zn RTK Substance No: 2021 Description: Odorless, bluish-white, shiny metal or a gray to blue powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health 3 - Fire 1 W - Reactivity	Zinc is a FLAMMABLE POWDER. Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE WATER or FOAM. POISONOUS FUMES ARE PRODUCED IN FIRE,	Zinc <i>powder</i> reacts with WATER; MOIST AIR; STRONG ACID (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to form flammable and explosive <i>Hydrogen gas.</i> The heat released may be sufficient to ignite t	
DOT#: UN 1436 ERG Guide #: 138 Hazard Class: 4.3 (Water Reactive)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT get water into containers. Flow or agitation may generate electrostatic charges. Zinc powder or dust may form an ignitable dust/air mixture in closed tanks or containers.	Hydrogen formed. Zinc powder reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; CARBON DISULFIDE; AMMONIUM NITRATE; HYDROXYLAMINE; and many other substances. The reactions may lead to fires and explosions.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover spill with dry sand, earth, or a similar material and place into sealed containers for disposal. Metal containers involving the transfer of **Zinc** *powder* should be grounded and bonded. Use only non-sparking tools and equipment. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Zinc**.

The Protective Action Criteria values are: PAC-1 = 3 mg/m³ PAC-2 = 20 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, fever and chills, aches, chest tightness and cough ("metal fume fever")	
	Symptoms may be delayed	

PHYSICAL PROPERTIES

Odor Threshold:
Auto Ignition Temp:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless
860°F (460°C)
7.14 (air = 1)
1 mm Hg at 909°F (487°C)
77.14 (water = 1)
Reacts
1,665°F (907°C)
786°F (419°C)
65.41

PROTECTIVE	EQUIPMENT	
		7

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek® Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	Full facepiece APR with P100 filters >30 mg/m ³ or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ZINC CHLORIDE

Synonyms: Butter of Zinc; Tinning Flux; Zinc Dichloride CAS No: 7646-85-7 Molecular Formula: ZnCl₂ RTK Substance No: 2030 Description: Odorless, white, crystalline granule or powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Zinc Chloride itself does not	Zinc Chloride may react violently or explosively with POTASSIUM.
0 - Fire	burn.	Zinc Chloride is not compatible with CYANIDES;
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	SULFIDES; OXIDIZING AGENTS (such as
DOT#: UN 2331	fumes.	CHLORATES, NITRATES, CHLORINE, BROMINE and
ERG Guide #: 154		FLUORINE) and STRONG BASES (such as SODIUM
Hazard Class: 8 (Corrosive)		Zinc Chloride is corrosive to METALS.

CDI	 /I E	Л	10
SPI	LC	A	NJ.

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Zinc Chloride is a severe marine pollutant that may cause long term adverse effects to the aquatic environment.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA NIOSH: 1 mg/m³, 10-hr TWA; 2 mg/m³, STEL ACGIH: 1 mg/m³, 8-hr TWA; 2 mg/m³, STEL IDLH: 50 mg/m³ (All the above are for **Zinc Chloride** *fume*)

The Protective Action Criteria values are:

PAC-1 = 2 mg/m³ PAC-2 = 50 mg/m³ PAC-3 = 50 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin: Inhalation:	Irritation and burns Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Density:	4.7 (air = 1)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,349.6°F (732°C)
Melting Point:	554°F (290°C)
Molecular Weight:	136.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters >10 mg/m ³ - Supplied Air or SCBA >50 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.


Common Name: ZINC NITRATE

Synonyms: Zinc Dinitrate CAS No: 7779-88-6 Molecular Formula: Zn(NO₃)₂ RTK Substance No: 2036 Description: Colorless or white, odorless, crystalline solid or flake

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Zinc Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Zinc Nitrate may react violently with COMBUSTIBLES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM
0 - Fire	combustion of other substances.	and their HYDRIDES); CARBONS; COPPER; METAL
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents.	Zinc Nitrate is not compatible with OXIDIZING AGENTS (such
DOT#: UN 1514	POISONOUS GASES ARE PRODUCED IN	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
ERG Guide #: 140	FIRE, including <i>Nitrogen Oxides</i> and <i>Zinc</i>	FLUORINE); CYANIDES; METAL POWDERS; AMINES;
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	METAL SALTS (such as TIN CHLORIDE); and ACETIC ANHYDRIDES.
	Zinc Nitrate may ignite combustibles (wood, paper and oil).	Keep away from all COMBUSTIBLES and ORGANICS.

SPILL/LEAKS

Isolation Distance:

Spill:	25 meters (75 feet)	
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Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Zinc Nitrate is harmful to aquatic life in low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for $\ensuremath{\textbf{Zinc Nitrate}}$.

The Protective Action Criteria values are:

- $PAC-1 = 15 \text{ mg/m}^{3}$
- $PAC-2 = 125 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, burns and rashInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, fatigue and blue
color to the skin and lips
(methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	60 mm Hg at 1,292°F (700°C)
Specific Gravity:	2.07 (water = 1)
Water Solubility:	Soluble
Boiling Point:	221°F (105°C)
Melting Point:	97° to 108.5°F (36° to 42.5°C)
Molecular Weight:	189.39

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

- Respirator:
- >15 mg/m³ Full facepiece APR with *High efficiency filters* >125 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ZINC POTASSIUM CHROMATE

Synonyms: Buttercup Yellow; Citron Yellow; Zinc Yellow CAS No: 11103-86-9 Molecular Formula: KZn₂ (CrO₄)₂(OH) RTK Substance No: 2042 Description: Green-yellow, odorless solid or powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire Zinc Potassium Chromate itself	Zinc Chromates are oxidizers which may react with
0 - Fire	does not burn.	ALUMINUM and their HYDRIDES): ALCOHOLS:
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	COMBUSTIBLES; ORGANIC MATERIALS; ETHERS;
DOT#: None	Use water spray to keep fire-exposed containers	HYDRAZINES; and METAL POWDERS.
ERG Guide #: None	cool.	
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Fires: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

This substance is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	0.001 mg/m ³ , 10-hr TWA
ACGIH:	0.01 mg/m ³ , 8-hr TWA
IDLH LEVEL:	15 mg/m ³ (as <i>Chromates</i>)
	All the above are for hexavalent Chromium (Cr VI)

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation, itching, rash and skin ulcers	
Inhalation:	Nose, throat and lung irritation with cough, phlegm and/or shortness of breath	
Chronic:	Hexavalent Chromium (or Chromium VI) compounds cause lung cancer in humans and animals	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
Auto Ignition:	752°F (400°C)
Specific Gravity:	3.4 (water = 1) (as basic <i>Zinc Chromate</i>)
Water Solubility:	Insoluble
Boiling Point:	482°F (250°C) (as Chromates)
Melting Point:	600°F (316°C) (as basic <i>Zinc Chromate</i>)
Molecular Weight:	418

PROTECTIVE EQUIPMENT

Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tychem® Polycoat, CPF 1, QC, CPF 2 and SL, or equivalent
Respirator:	>0.001 mg/m ³ - APR with High efficiency filters >0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ZINC SULFATE

Synonyms: White Vitriol; Zinc Vitriol CAS No: 7733-02-0 Molecular Formula: ZnSO₄ RTK Substance No: 2044 Description: Colorless, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Zinc Sulfate itself does not burn.	Zinc Sulfate reacts violently with PHOSPHORUS and FINELY DIVIDED ALUMINUM or MAGNESIUM.
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	Zinc Sulfate is not compatible with STRONG BASES
0 - Reactivity	including Sulfur Oxides and Zinc Oxide.	(such as SODIUM HYDROXIDE and POTASSIUM
DOT#: UN 3077	Use water spray to keep fire-exposed containers cool.	HYDROXIDE).
ERG Guide #: 171		
Hazard Class: 9		
(Environmentally Hazardous)		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer.

Zinc may be accumulated by some organisms and may be harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	1.95 (air = 1)
Vapor Pressure:	60 mm Hg at 1,292°F (700°C)
Specific Gravity:	3.54 (water = 1)
Water Solubility:	Soluble
Boiling Point:	>932°F (>500°C)
Molecular Weight:	161.5
pH:	4.5

PROTECTIVE EQUIPMENT		
Gloves:	Rubber	
Coveralls:	DuPont Tyvek® or equivalent	
Respirator:	Full facepiece APR with High efficiency filters or Supplied air for unknown exposure levels	

HEALTH EFFECTS		
Eyes:	Irritation and burns with possible eye damage	
Skin:	Irritation and burns with rash, dryness and redness	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, dizziness, nausea and vomiting	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

New Jersey Department of Health

Common Name: ZINEB

Synonyms: Zinc Ethylenebis(dithiocarbamate); Parzate; Lodacol CAS No: 12122-67-7 Molecular Formula: $C_4H_6N_2S_4Zn$ RTK Substance No: 2045 Description: Odorless, light-colored powder

НΔ	ZARD	-Δ

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Hazard Rating	Firefighting	Reactivity		
2 - Health	Zineb is a COMBUSTIBLE SOLID. Use dry chemical, CO ₂ , water spray or foam as	Zineb is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE)		
2 - Fire	extinguishing agents.	and MERCURY COMPOUNDS.		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	Zineb is unstable with exposure to HEAT, MOISTURE and		
DOT# : UN 2771	FIRE, including <i>Nitrogen Oxides, Zinc Oxides</i> and <i>Sulfur Oxides</i> .	LIGHT and may form toxic <i>Ethylenethiourea</i> .		
ERG Guide #: 151	Use water spray to keep fire-exposed containers			
Hazard Class: 6.1	cool.			
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material with a vacuum or a wet method and deposit in sealed containers.

DO NOT wash into sewer.

Zineb is moderately toxic to fish and degrades in soil in 16-23 days.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Zineb**.

HEALTH EFFECTS

Irritation		
Irritation, redness and rash		
Nose and throat irritation with coughing and wheezing		
Headache, dizziness, nausea and vomiting		

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	194°F (90°C)
Auto Ignition Temp:	300°F (149°C)
Vapor Pressure:	1 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Specific Gravity:	1.74 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	Decomposes
Melting Point:	315°F (157°C)
Molecular Weight:	275.7

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tyvek®
Respirator:	Low exposure or outdoors - full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name:

ZINOPHOS

RIGHT TO KNOW HAZARDOUS SUBSTANCE FACT SHEET

Synonyms:	Synonyms: Thionazin; Cynem; Nemafos				
CAS Number:	297-97-2				
Molecular Formula	1: C8H13N2O3PS				
RTK Number:	2046				
Description:	Amber liquid, was also available in granular	tormulations.			
	HAZA	RD DATA			
Hazard Rating Firefighting			Reactivity		
Health: 3	POISONOUS FUMES ARE PRODUCED IN	FIRE,	Zinophos is susceptible to formation of phosphine gas in the		
Fire: 1	Including Sulfur Oxides, Nitrogen Oxides a	nd Phosphorus	horus presence of strong reducing agents such as hydrides. Partial oxidation by OXIDIZING AGENTS may result in the		
Reactivity: 1	CONTAINERS MAY EXPLODE IN FIRE.		release of toxic phosphorus oxides.		
DOT #: UN 3	3018 Use water spray to keep fire-exposed conta	iners cool.			
UN 2	2783 Carrier solvents used in commercial formula	ations may			
ERG #: 152					
DOT Hazard: 6.1 ()	poison)				
	SPILLS/LEAKS		PHYSICAL PROPERTIES		
Isolation Distances:		Melting P	oint: -1.7 °C (29 °F)		
Liquid Spill: 50 me	eters (150 feet)	Vapor Pre	essure: 0.003 mm Hg at 30 °C (86 °F)		
Solid Spill: 25 me	eters (75 feet)	Water Sol	Water Solubility:Slightly solubleMolecular Weight:248.2Boiling Point:80 °C (176 °F)		
Fire: 800 m	neters (½ mile)	Molecular			
Evacuate personnel		Boiling Po			
Secure and control ent	trance to the area.				
If it is safe to do so, rer	move potential ignition sources.				
Collect powdered mate	erial in the most convenient and safe manner and				
Absorb <i>liquids</i> in vermi	ntainers. icculite, dry sand, earth, or a similar material and				
deposit in sealed cor	ntainers.				
Do not allow this subst	tance to enter waterways, including sewers, as it is				
very toxic to aquatic	life with long-lasting effects.				
I	EXPOSURE LIMITS	<u> </u>	PROTECTIVE EQUIPMENT		
There are no occupation	onal exposure limits to Zinophos .	Gloves:	Nitrile or Neoprene		
PAC: PAC-1 = 0.32	2 mg/m³	Coverall:	Tychem® BR, CSM and TK, or the equivalent		
PAC-2 = 3.5 r	mg/m ³	Respirato	Supplied-air, full facepiece, pressure-demand or another		
PAC-3 = 21 m	ng/m ³		positive-pressure mode		
ACU	TE HEALTH EFFECTS	F	FIRST AID AND DECONTAMINATION		
Eyes: Blurre	red vision	Immediately	y flush with large amounts of water for at least 15 minutes.		
Skin: Skin	irritation	Quickly rem	nove contaminated clothing. Immediately wash area with large		
Inhalation: Head	dache, dizziness, blurred vision, chest tightness,	Shampoo h	or scap and water.		
twite dea	coning, loss of coordination, convulsions, coma, ath	Remove the	e person from exposure.		
uea	AN 1	Begin rescu	ue breathing (using universal precautions) if breathing has		
		stopped a	and CPR if heart action has stopped.		
		Transfer pro	Transfer promptly to a medical facility.		
		Medical obs be delaye	servation is recommended for several days as symptoms may ed.		

June 2023



Common Name: ZIRCONIUM

Synonyms: None CAS No: 7440-67-7 Molecular Formula: Zr RTK Substance No: 2047 Description: Soft, gray to gold solid, bluish-black powder, or grayish-white platelet or flake

HAZARD DATA

Hazard Rating	zard Rating Firefighting		Reactivity		
2 - Health 4 - Fire 1 - Reactivity DOT#: UN 1358 UN 2008 ERG Guide #: 170/135 Hazard Class: 4.1/4.2 (Flammable solid/ spontaneously combustible)	Zirconium powder, dust or granu FLAMMABLE and can EXPLOD SPONTANEOUSLY IN AIR. Use dry chemicals appropriate for metal fires (such as dry lime, soo graphite). USE WATER with care as Zircor in the presence of WATER and violently. DO NOT USE CO ₂ or HALOGEN agents. POISONOUS GASES ARE PRO CONTAINERS MAY EXPLODE I	nule is HIGHLY DE for extinguishing oda ash and onium re-ignites d burns more EN extinguishing ODUCED IN FIRE. E IN FIRE. posed containers e containers.		Zirconium reacts violently or explosively with BORAX; CARBON TETRACHLORIDE and ALKALI METAL HYDROXIDES (such as POTASSIUM HYDROXIDE and SODIUM HYDROXIDE) when heated, and also reacts violently with COPPER OXIDE and LEAD OXIDE. Dusts of pure Zirconium will ignite or explode when in contact with WATER. Forms explosive mixtures with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); PHOSPHORUS; OXYGEN; LEAD; POTASSIUM NITRATE; POTASSIUM CHLORATE; SODIUM BORATE; SULFATES; MOLYBDATES; CHROMATES; and DICHROMATES. Zirconium is incompatible with ROPON: CAPBON:	
	cool. DO NOT get water inside			NITROGEN; and PLATINUM.	
SPILL/LEAKS				PHYSICAL PROPERTIES	
Isolation Distance: Solids: 25 meters (75 feet)			Odor Thresho Flash Point:	old: Odorless Spontaneously combustible powder, dust or granule	

Large Spill: 50 meters (160 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Use only non-sparking tools and equipment, especially when opening and closing containers of Zirconium .		Auto Ignition Ten Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potent Molecular Weight	np: ial: t:	granule 392°F (200°C) 0 mm Hg at 68°F (20°C) 6.5 (water = 1) Insoluble 6,471°F (3,577°C) 3,375°F (1,857°C) 6.6 eV 91.2
EXPOSURE LIMITS		Р	ROT	ECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH: IDLH LEVEL	5 mg/m ³ , 8-hr TWA 5 mg/m ³ , 10-hr TWA; 10 mg/m ³ , STEL 5 mg/ m ³ , 8-hr TWA; 10 mg/m ³ , STEL : 25 mg/m ³	Gloves: Coveralls: Boots: Respirator:	No info DuPon No info >5 mg/ <25 mg	nrmation It Tyvek® or equivalent Irmation /m ³ - full facepiece APR with High efficiency filter g/m ³ - Supplied air
I	HEALTH EFFECTS	FIRST	AID	AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation Skin allergy with small nodules with repeated contact Lung irritation with coughing and/or shortness of breath	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 		