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MATERIAL SAFETY DATA SHEET

No. 68

PRODUCT NAME 12% Ethylene Oxide/88% Halocarbon 12	CAS # Ethylene Oxide = 75-21-8 Halocarbon 12 = 75-71-8
TRADE NAME AND SYNONYMS Ethylene Oxide and Dichlorodifluoromethane mixture (D.O.T.)	DOT I.D. No.: UN 3070 (See Note Page 4)
CHEMICAL NAME AND SYNONYMS 12% Ehtylene Oxide/88% Dichlorodifluoromethane	DOT Hazard Class: Division 2.2
ISSUE DATES AND REVISIONS Revised September 1996	Formula 12 wt. % C ₂ H ₄ O/88 wt % CCl ₂ F ₂
	Chemical Family: Epoxide halocarbon mixture

HEALTH HAZARD DATA

<p>TIME WEIGHTED AVERAGE EXPOSURE LIMIT Ethylene Oxide TWA = 1 Molar PPM with an A2 (Suspected human carcinogen) carcinogen rating Dichlorodifluoromethane TWA = 1,000 Molar PPM (Continued on Page 4)</p>
<p>SYMPTOMS OF EXPOSURE DATA IN THIS SECTION WILL RELATE TO EXPOSURE TO ETHYLENE OXIDE. LOW concentrations inhaled will cause delayed nausea. Inhalation of high concentrations results in a narcotic and possible neurotoxic effect - possibly followed by coughing, vomiting, and irritation to the respiratory passages which will eventually lead to emphysema, bronchitis and pulmonary edema. It has been reported to cause rapid olfactory fatigue. (Continued on Page 4)</p>
<p>TOXICOLOGICAL PROPERTIES DATA FOR PURE ETHYLENE. Inhalation: The neurotoxic or narcotic effect results in respiratory failure with acute pulmonary edema. Comas with metabolic acidosis and oxaluria have also been observed. It has been known to cause chronic intoxication in humans. Frostbite is a change in the color of the skin to gray or white, possibly followed by blistering. Halocarbon 12 is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen. IARC reports adequate animal evidence and inadequate human evidence evidence for ethylene oxide as a carcinogen. (Continued on Page 4)</p>
<p>RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO THIS ETHYLENE IOXIDE/HALOCARBON 12 MIXTURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING ADDARATUS. <u>Inhalation:</u> Conscious persons should be moved to an uncontaminated area, made to recline, kept warm, and given warm water in amounts adequate to purge their stomachs of the ethylene oxide contamination. In the event of severe exposure, oxygen should also be administered by a competent person. The physician should look for signs of lung congestion. Unconscious persons should be moved to an uncontaminated area, given assisted respiration and supplemental oxygen. Once respiration has been restored. treatment should be as above. (Continued on Page 4)</p>

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use.
 Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

The dilution of ethylene oxide with Halocarbon 12 has rendered this mixture nonflammable. Pure ethylene oxide is flammable over an extremely wide range in air. Its vapors also react violently with caustic soda, hydrated lime (or quicklime), magnesium chloride, ammonia, alcohols, and amines.

PHYSICAL DATA

BOILING POINT Halocarbon 12: -21.6°F (-29.8°C) Ethylene Oxide: 50.8°F (10.45°C)	LIQUID DENSITY AT BOILING POINT See Page 4
VAPOR PRESSURE @ 70°F (21.1°C) = 645 psia (4450 kPa)	GAS DENSITY AT 70°F, 1 atm .293 lb/ft ³ (3.81 kg/m ³)
SOLUBILITY IN WATER Soluble; reacts slowly to form ethylene glycol	FREEZING POINT See Page 4
EVAPORATION RATE Unknown	SPECIFIC GRAVITY (AIR=1) @ 70°F = 3.91
APPEARANCE AND ODOR Colorless gas with a sweet odor	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LEL N/A UEL N/A
EXTINGUISHING MEDIA Nonflammable mixture		ELECTRICAL CLASSIFICATION Nonhazardous
SPECIAL FIRE FIGHTING PROCEDURES If cylinders are involved in a fire, safely relocate or keep cool with water spray.		
UNUSUAL FIRE AND EXPLOSION HAZARDS None		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID This mixture will only remain constant in its ethylene oxide and Halocarbon 12 concentrations if the product is withdrawn while the container is upright.
Stable	X	
INCOMPATIBILITY (Materials to avoid) Most metals other than stainless steel or nickel will cause polymerization or decomposition of the ethylene oxide in the mixture.		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID Ethylene oxide will polymerize with high temperature and the use of materials other than stainless steel or nickel.
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with an Y valve outlet plugs or cans secured and valve protect10n cap in place to your supplier. For emergency dispose, assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.	
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the TWA for ethylene oxide	SPECIAL	N/A
	MECHANICAL (Gen.)		N/A
PROTECTIVE GLOVES Ethylene oxide softens most plastics and produces surface blisters on most rubber-based compounds			
EYE PROTECTION Safety goggles or glasses and transparent face shield			
OTHER PROTECTIVE EQUIPMENT Safety shoes eyewash "fountain"			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION	
DOT Shipping Name: Ethylene oxide and Dichlorodifluoromethane mixture DOT Shipping Label: Nonflammable Gas	DOT Hazard Class: Division 2.2 I.D. No.: UN 3070
SPECIAL HANDLING RECOMMENDATIONS	
<p>Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<200 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of products from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.</p> <p>For additional handling recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL STORAGE RECOMMENDATIONS	
<p>Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C)*. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in - first out" inventory system to prevent full cylinders being stored for excessive periods of time.</p> <p>*CGA Recommendation: To prevent polymerization, store at temperatures less than 54F (12C).</p> <p>For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL PACKAGING RECOMMENDATIONS	
<p>Metals acting as catalysts for the decomposition of ethylene oxide include copper, silver, mercury, magnesium and their alloys. Potassium, tin, zinc, aluminum and iron oxides tend to accelerate the polymerization of ethylene oxide.</p>	
OTHER RECOMMENDATIONS OR PRECAUTIONS	
<p>This mixture has a shelf life of 60 days from the date of filling. Be certain to use this product prior to its expiration date (end of shelf life period). Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). (Continued on Page 4)</p>	

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

12% ETHYLENE OXIDE/88% HALOCARBON 12

NOTE RE: DOT I.D. NO.: RQ for Ehtylene Oxide = 10 (4.54); RQ for Halocarbon 12 = 5,000 (2270)

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT - Continued

(ACGIH 1995-1996). OSHA (1995), par 1310.1047 PEL (8 Hr. TWA) for Ethylene Oxide = 1 Molar PPM with an excursion limit of 5 Molar PPM as averaged over a sampling period of fifteen, (15) minutes and it is considered a cancer hazard and a reproductive hazard; Dichlorodifluoromethane PEL = 1,000 Molar PPM.

SYMPTOMS OF EXPOSURE - Continued

The vapor is irritating to the eyes and the liquid can cause delayed burns if it contacts the skin or eyes. Aqueous solutions of this mixture are also irritating.

It is also reported that rapid evaporation of the liquid on contact with the skin can cause a type of frostbite.

TOXICOLOGICAL PROPERTIES - Continued

Persons in ill health where such illness would be aggravated by exposure to this mixture should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT - Continued

Eye Contact: PERSONS WITH POTENTIAL EXPOSURE TO THIS MIXTURE SHOULD NOT WEAR CONTACT LENSES.

Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 15 minutes. Repeat for subsequent 15-minute periods if irritation returns.

Dermal Contact or Frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

PHYSICAL DATA

LIQUID DENSITY AT BOILING POINT: Halocarbon 12: 92.77 lb/ft³ (1488 kg/m³)
Ethyl ene Oxide: 55.41 b/ft³ (887 kg/m³)

VAPOR PRESSURE @ 70°F (21.1°C): Halocarbon 12: 84.1 psia (580 kPa)
Ethyl ene Oxide: 20.7 psia (143 kPa)

FREEZING POINT: Halocarbon 12: -170.7°F (-112.6°C)
Ethylene Oxide: -252°F (-157.8°C)

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS - Continued

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

NFPA 704 NO for this mixture = 2 0 1 NONE

Both ethylene oxide and halocarbon 12 are considered toxic chemicals and are subject to the reporting requirements of SARA, Title III, Section 313.