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MATERIAL SAFETY DATA SHEET

No. 101

NOV 16 1994

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| PRODUCT NAME Halocarbon 22 | CAS # 75-45-6 |
| TRADE NAME AND SYNONYMS Halocarbon 22; Chlorodifluoromethane; Monochlorodifluoromethane | DOT I.D. No.: UN 1018 |
| CHEMICAL NAME AND SYNONYMS Chloro-difluoromethane | DOT Hazard Class: Division 2.2 |
| ISSUE DATE AND REVISIONS Revised March 1991 | Formula: CHClF ₂ |
| | Chemical Family: Halogenated Hydrocarbon |

HEALTH HAZARD DATA

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| TIME WEIGHTED AVERAGE EXPOSURE LIMIT 1,000 Molar PPM (ACGIH 1990-1991); OSHA (1989) TWA = 1,000 Molar PPM |
| SYMPTOMS OF EXPOSURE Inhalation of high concentrations of vapor may cause light-headedness, giddiness, disorientation, nausea, vomiting, narcosis, cardiac dysrhythmia, hypotension and death. Effects of exposure usually disappear when the oxygen deficiency has been corrected. Exposure to the liquid or concentrated vapor may cause skin or eye irritation. Contact with the rapidly evaporating liquid may cause frostbite or cryogenic "burns." |
| TOXICOLOGICAL PROPERTIES Relatively nontoxic; however, it may act as a narcotic at high concentrations. The major property is the exclusion of an adequate supply of oxygen to the body. Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering. I.A.R.C. Cancer Review has shown limited evidence for animals and inadequate evidence for humans. Neither the NTP or OSHA list Halocarbon 22 as a carcinogen or potential carcinogen. (Continued on Page 4) |
| RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HALOCARBON 22. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. <u>Inhalation:</u> Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area, given assisted respiration and supplemental oxygen. Further treatment should be symptomatic and supportive. <u>Dermal Contact or Frostbite:</u> Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. (Continued on Page 4) |

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.

Halocarbon 22

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Halocarbon 22 is a relatively inert nonreactive gas.

PHYSICAL DATA

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| BOILING POINT -41.1°F (-40.8°C) | LIQUID DENSITY AT BOILING POINT 88.2 lb/ft ³ (1413 kg/m ³) |
| VAPOR PRESSURE @ 70°F (21.1°C) = 136 psia (935 kPa) | GAS DENSITY AT 70°F, 1 atm 0.229 lb/ft ³ (3.67 kg/m ³) |
| SOLUBILITY IN WATER Slightly soluble | FREEZING POINT -256°F (-160°C) |
| EVAPORATION RATE N/A | SPECIFIC GRAVITY (AIR=1) @ 70°F (21.1°C) = 3.06 |
| APPEARANCE AND ODOR Colorless gas with slight ethereal odor | |

FIRE AND EXPLOSION HAZARD DATA

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| FLASH POINT (Method used) N/A | AUTO IGNITION TEMPERATURE N/A | FLAMMABLE LIMITS % BY VOLUME LEL N/A UEL N/A | |
| EXTINGUISHING MEDIA Nonflammable | | 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 If Halocarbon 22 is involved in a fire, it may decompose yielding toxic products. | | | |

REACTIVITY DATA

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| STABILITY Unstable | | CONDITIONS TO AVOID |
| Stable | X | Open flames and high [$>300^{\circ}\text{F}$ (149°C)] temperatures. |
| INCOMPATIBILITY (Materials to avoid) | Alkali and alkaline earth metals; powdered aluminum, zinc, magnesium, beryllium, etc. | |
| HAZARDOUS DECOMPOSITION PRODUCTS | Hydrogen fluoride, hydrogen chloride and possibly phosgene | |
| HAZARDOUS POLYMERIZATION | | CONDITIONS TO AVOID |
| May Occur | | |
| Will Not Occur | X | N/A |

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 any valve outlet plugs or caps secured and valve protection cap in place to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

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| 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. | SPECIAL | N/A |
| | MECHANICAL (Gen.) N/A | OTHER | N/A |
| PROTECTIVE GLOVES Plastic or rubber | | | |
| EYE PROTECTION Safety goggles or glasses | | | |
| OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountain" | | | |

SPECIAL PRECAUTIONS*

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| SPECIAL LABELING INFORMATION | |
| DOT Shipping Name: Chlorodifluoromethane | DOT Shipping Label: Nonflammable gas |
| DOT Shipping Class: Nonflammable gas | I.D. No.: UN 1018 |
| SPECIAL HANDLING RECOMMENDATIONS | |
| <p>Use only in well-ventilated areas. Valve protection caps and valve outlet threaded plugs must remain in place unless cylinder 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 product 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 Pamphlets P-1, P-14 and Safety Bulletin SB-2.</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 130F (54C). 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>For additional storage recommendations, consult compressed Gas Association's Pamphlets P-1, P-14 and Safety Bulletin SB-2.</p> | |
| SPECIAL PACKAGING RECOMMENDATIONS | |
| <p>Most common structural materials are compatible with Halocarbon 22. At high temperatures certain metals may act as catalysts in the decomposition of this compound.</p> | |
| OTHER RECOMMENDATIONS OR PRECAUTIONS | |
| <p>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). See Compressed Gas Association's Safety Bulletin SB-1.</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.

RECOMMENDED FIRST AID TREATMENT:

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.

Eye Contact: PERSONS WITH POTENTIAL EXPOSURE TO HALOCARBON 22 SHOULD NOT WEAR CONTACT LENSES.

Flush contaminated eye(s) with copious quantities of water. Part eyelids with fingers to assure complete flushing. Continue for minimum of 15 minutes.