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MATERIAL SAFETY DATA SHEET

No. 113

PRODUCT NAME Carbonyl Fluoride	CAS # 353-50-4
TRADE NAME AND SYNONYMS Carbonyl Fluoride, Compressed (D.O.T.); Fluoroformyl Fluoride	DOT I.D. No.: UN 2417; RQ 1000 (454)
CHEMICAL NAME AND SYNONYMS Carbonyl Fluoride; Carbonic Difluoride	DOT Hazard Class: Division 2.3
ISSUE DATES AND REVISIONS Revised April 1998	Formula COF₂
	Chemical Family: Carboxy Halide

HEALTH HAZARD DATA

<p>TIME WEIGHTED AVERAGE EXPOSURE LIMIT TWA = 2 Molar PPM; STEL = 5 Molar PPM (ACGIH 1997); OSHA 1995 PEL (8 Hr. TWA) = None listed.</p>
<p>SYMPTOMS OF EXPOSURE Inhalation effects may be delayed and depend on concentrations. Causes respiratory irritation to severe congestion or collapse of the lungs and cardiovascular system. Skin or eye contact causes immediate discomfort since it is rapidly hydrolyzed to hydrofluoric acid and carbon dioxide. Hydrogen fluoride burns exhibit severe pain, redness, possible swelling and early necrosis.</p>
<p>TOXICOLOGICAL PROPERTIES Carbonyl fluoride's sharp, pungent odor provides a useful warning of acutely toxic levels in the atmosphere. It is irritating and corrosive to all living tissues. Toxic level exposure to dermal tissue causes hydrofluoric acid burns and skin lesions resulting in necrosis and eventual scarring Burns are progressive while any residual active fluorides remain. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might also occur Burns of the eye result in lesions and possible loss of vision.</p> <p style="text-align: center;">(Continued on Page 4)</p>
<p>RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO CARBONYL FLUORIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.</p> <p><u>Inhalation:</u> Conscious persons should be moved to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area and given assisted respiration and supplemental oxygen. Keep the victim warm and quiet. Assure that mucous or vomited material does not obstruct the airway by use of positional drainage. Delayed pulmonary edema may occur. Keep patient under medical observation for at least 24 hours.</p> <p style="text-align: center;">(Continued on Page 4)</p>

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Carbonyl Fluoride

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Reacts with water (vapor or liquid) to form hydrogen fluoride and carbon dioxide. Hydrogen fluoride is an extremely reactive chemical liberating hydrogen when in contact with metals.

PHYSICAL DATA

BOILING POINT -118°F (-83.3°C)	LIQUID DENSITY AT BOILING POINT 71.1 lb/ft ³ (1139 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1 C) Above the critical temperature	GAS DENSITY AT 70°F, 1 atm @ 68°F (20°C) = .1726 lb/ft ³ (2.76 kg/m ³)
SOLUBILITY IN WATER Reacts to form HF and CO ₂	FREEZING POINT -173.2°F (-114°C)
EVAPORATION RATE N/A (Gas)	SPECIFIC GRAVITY (AIR=1) @ 70°F (21.1°C) = 2.3
APPEARANCE AND ODOR Colorless gas with a sharp, suffocating 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 Gas	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 Reactions of carbonyl fluoride and water with metal piping and vessels generates hydrogen creating a potential explosion hazard.		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID None
Stable	X	
INCOMPATIBILITY (Materials to avoid)	Water	
HAZARDOUS DECOMPOSITION PRODUCTS	Hydrogen fluoride on hydrolysis	
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID None
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 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.

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

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION	
DOT Shipping Name: Carbonyl Fluoride, Compressed	DOT Hazard Class: Division 2.3
DOT Shipping Labels: Toxic Gas, Corrosive	I.D. No.: UN 2417; RQ 1,000(454)
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. 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 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>For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL PACKAGING RECOMMENDATIONS	
<p>Carbon steel (without nonmetallic inclusions) is the preferred material for handling carbonyl fluoride up to approximately 150°F (65°C). For higher temperatures Monel®, Inconel®, nickel or copper should be used. Cast iron or malleable fittings should not be used. Polyethylene, copper (soft), Kel-F® or Teflon® are the preferred gasket or "packing" material. Most metals form a passive fluoride film which protects the metal from further corrosion.</p>	
OTHER RECOMMENDATIONS OR PRECAUTIONS	
<p>Equipment used in handling carbonyl fluoride should be kept scrupulously dry. 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).</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.

Carbonyl Fluoride

HEALTH HAZARD DATA

TOXICOLOGICAL PROPERTIES: (Continued)

Carbonyl fluoride is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen.

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

RECOMMENDED FIRST AID TREATMENT: (Continued)

EYE CONTACT: PERSONS WITH POTENTIAL EXPOSURE TO CARBONYL FLUORIDE 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 30 minutes.

Skin Contact: Flush affected area with copious quantities of water. Remove affected clothing as rapidly as possible. Dermal burns may be treated with a calcium gluconate gel or slurry in water or glycerine. This compound binds the active fluorides in an insoluble form and limits burn extension and relieves pain.

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.

Reporting under SARA, Title III, Section 313 not required.

NFPA 704 No. for carbonyl fluoride = 4 0 0 None