

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Chlorodifluoromethane (MSDS No. P-4667-F)

Trade Names: Halocarbon 22

Chemical Name: Chlorodifluoromethane

Synonyms: Difluorochloromethane, fluorocarbon 22, halon 121, monochlorodifluoromethane, refrigerant gas R22

Chemical Family: Halogenated alkane

Product Grades: None assigned.

Telephone: **Emergencies:** 1-800-645-4633*

Company Name: Praxair, Inc.

CHEMTREC: 1-800-424-9300*

39 Old Ridgebury Road

Routine: 1-800-PRAXAIR

Danbury, CT 06810-5113

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

2. Hazards Identification

EMERGENCY OVERVIEW

CAUTION! Liquid and gas under pressure.

Can cause rapid suffocation.

May cause frostbite.

May cause dizziness and drowsiness.

Self-contained breathing apparatus may be required by rescue workers.

Under ambient conditions, this is a colorless gas with a slightly ethereal odor.

OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS:

Effects of a Single (Acute) Overexposure

Inhalation. Asphyxiant. Effects are due to lack of oxygen. High concentrations may cause dizziness, nausea, vomiting, disorientation, confusion, incoordination, and narcosis. Effects of very high concentrations are due to suffocation. Lack of oxygen can kill.

Skin Contact. An unlikely route of exposure; this product is a gas at normal temperature and pressure. Liquid may cause frostbite.

Swallowing. An unlikely route of exposure; this product is a gas at normal temperature and pressure. But frostbite of the lips and mouth may result from contact with the liquid.

Eye Contact. An unlikely route of exposure; this product is a gas at normal temperature and pressure. Liquid may cause severe corneal injury.

Effects of Repeated (Chronic) Overexposure. No harm expected.

Other Effects of Overexposure. At very high concentrations, chlorodifluoromethane may produce cardiac arrhythmias or arrest due to sensitization of the heart to adrenaline and noradrenalin. Exposure to halocarbon thermal decomposition products may produce flu-like symptoms including chills, fever, weakness, muscular aches, headache, chest discomfort, sore throat, and dry cough. Complete recovery usually occurs within 24 hours after exposure.

Medical Conditions Aggravated by Overexposure. The toxicology and the physical and chemical properties of this product suggest that overexposure is unlikely to aggravate existing medical conditions.

CARCINOGENICITY: Chlorodifluoromethane is not listed by NTP or OSHA. The IARC lists it as Group 3, unclassifiable as to carcinogenicity to humans.

POTENTIAL ENVIRONMENTAL EFFECTS: None known. For further information, see section 12, Ecological Information.

3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
Chlorodifluoromethane	75-45-6	>99%*
*The symbol > means "greater than."		

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

SWALLOWING: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

EYE CONTACT: Immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: Do not administer adrenaline; fluorocarbons have a sensitizing effect on the myocardium. Treatment of overexposure should be directed at the control of symptoms and the clinical condition. Exposure to fluorocarbon pyrolysis products should be considered in the diagnostic evaluation of occupationally related fever of short duration and unknown origin. Signs of exposure include tachycardia, hyperpnea, and pharyngeal congestion; investigation may reveal pulmonary edema and leucocytosis.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Chlorodifluoromethane is nonflammable in air under normal conditions of temperature and pressure.

SUITABLE EXTINGUISHING MEDIA: Chlorodifluoromethane is nonflammable in air under normal conditions of temperature and pressure. Use media appropriate for surrounding fire.

PRODUCTS OF COMBUSTION: Not applicable. Decomposition due to heating may produce toxic fumes. (See section 10.)

PROTECTION OF FIREFIGHTERS: CAUTION! Liquid and gas under pressure.

Asphyxiant—lack of oxygen can kill. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Immediately deluge cylinders with water from maximum distance until cool; then move them away from fire area if without risk. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

Specific Physical and Chemical Hazards. Heat of fire can build pressure in cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). Chlorodifluoromethane cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

Protective Equipment and Precautions for Firefighters. Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

CAUTION! Liquid and gas under pressure.

Personal Precautions. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Before entering area, especially confined areas, check for sufficient oxygen with an appropriate device.

Environmental Precautions. Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN HANDLING: Do not get liquid in eyes, on skin, or clothing. Do not smoke in areas where fluorocarbons are used. Wash hands thoroughly after handling fluorocarbons or materials sprayed with them, especially before eating, smoking, or using the toilet. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. Close valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using halocarbon 22, see section 16.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

RECOMMENDED PUBLICATIONS: For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

8. Exposure Controls/Personal Protection

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2007)
Chlorodifluoromethane	N.E.*	1000 ppm
*N.E.—Not Established.		

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = Not available.

ENGINEERING CONTROLS:

Local Exhaust. Preferred. Use a local exhaust system with sufficient air flow velocity to maintain the concentration of chlorodifluoromethane vapors below the exposure limits in the worker's breathing zone.

Mechanical (General). General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.

Special. Use only in a closed system.

Other. Not applicable. See SPECIAL.

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear work gloves when handling cylinders; neoprene gloves where contact with product may occur. Metatarsal shoes for container handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

Eye/Face Protection. Wear safety glasses when handling cylinders, safety goggles or a full face shield when changing them out. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Respiratory Protection. Use an air-supplied respirator or a full-face, positive-pressure, self-contained breathing apparatus. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select in accordance with OSHA 29 CFR 1910.134 and ANSI Z88.2.

9. Physical and Chemical Properties

APPEARANCE:	Colorless gas
ODOR:	Slightly ethereal odor in concentrations above 20%.
ODOR THRESHOLD:	Not available.
PHYSICAL STATE:	Gas at normal temperature and pressure
pH:	Not applicable.
FREEEZING POINT at 1 atm:	-256°F (-160°C)
BOILING POINT at 1 atm:	-41.49°F (-40.83°C)
FLASH POINT (test method):	-109°F (-78.3°C)
EVAPORATION RATE (Butyl Acetate = 1):	High
FLAMMABILITY:	Not applicable.

FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: Not applicable.	UPPER: Not applicable.
VAPOR PRESSURE at 68°F (20°C):	130.2 psia (897 kPa abs)	
VAPOR DENSITY at 70°F (21.1°C) and 1 atm:	0.2236 lb/ft ³ (3.581 kg/m ³)	
SPECIFIC GRAVITY (H ₂ O = 1) at 32°F (0°C):	3.87	
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm:	2.986	
SOLUBILITY IN WATER 68°F (20°C):	Slight	
PARTITION COEFFICIENT: n-octanol/water:	Not available.	
AUTOIGNITION TEMPERATURE:	1170°F (632.2°C)	
DECOMPOSITION TEMPERATURE:	>500°F (>260°C)	
PERCENT VOLATILES BY VOLUME:	100	
MOLECULAR WEIGHT:	86.468	
MOLECULAR FORMULA:	CHClF ₂	

10. Stability and Reactivity

CHEMICAL STABILITY: ☐ Unstable ☒ Stable

CONDITIONS TO AVOID: Elevated temperatures. The presence of certain metals may promote catalytic decomposition of the gas.

INCOMPATIBLE MATERIALS: Zinc, polystyrene, magnesium and its alloys containing greater than 2% magnesium in the presence of water, natural rubber

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce toxic fumes of fluorides and chlorides.

POSSIBILITY OF HAZARDOUS REACTIONS: ☒ May Occur ☐ Will Not Occur

Thermal decomposition may produce toxic fumes of fluorides and chlorides.

11. Toxicological Information

ACUTE DOSE EFFECTS: LC₅₀, 1 hr, rat = 175,000 ppmv

STUDY RESULTS: Chlorodifluoromethane has been shown to produce a low incidence of teratogenic effects in rats at very high concentrations in the atmosphere (50,000 ppm). In chronic inhalation studies, chlorodifluoromethane produced a small increase in tumor incidence in male rats but not in female rats or in male and female mice at a high concentration (50,000 ppm). No effects were observed at 10,000 ppm.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: Chlorodifluoromethane is listed by the EPA as a Class II ozone-depleting chemical.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME: Chlorodifluoromethane

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.2	NA/NA*	UN1018	None

SHIPPING LABEL(s): NONFLAMMABLE GAS

PLACARD (when required): NONFLAMMABLE GAS

*NA= Not available.

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

MARINE POLLUTANTS: Chlorodifluoromethane is not listed as a marine pollutant by DOT.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:

SECTIONS 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

TPQ: None

EHS RQ (40 CFR 355): None

SECTIONS 311/312: Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

IMMEDIATE: Yes

DELAYED: No

PRESSURE: Yes

REACTIVITY: No

FIRE: No

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Chlorodifluoromethane is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Chlorodifluoromethane is not listed as a regulated substance

TSCA: TOXIC SUBSTANCES CONTROL ACT: Chlorodifluoromethane is listed on the TSCA inventory.

OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Chlorodifluoromethane is not listed in Appendix A as a highly hazardous chemical.

STATE REGULATIONS:

CALIFORNIA: Chlorodifluoromethane is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

PENNSYLVANIA: Chlorodifluoromethane is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

16. Other Information

Be sure to read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Liquid and gas under pressure.* Use piping and equipment adequately designed to withstand pressures to be encountered. *Prevent reverse flow.* Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. *Gas can cause rapid suffocation due to oxygen deficiency.* Use only in a closed system. Store and use with adequate ventilation. *Never work on a pressurized system.* If there is a leak, close the cylinder valve. Blow the system down in an environmentally safe manner in compliance with all federal, state, and local laws; then repair the leak. *Never place a compressed gas cylinder where it may become part of an electrical circuit.*

NOTE: Prior to using any plastics, confirm their compatibility with chlorodifluoromethane.

Mixtures. When you mix two or more gases or liquefied gases, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:**NFPA RATINGS:**

HEALTH = 2
FLAMMABILITY = 0
INSTABILITY = 1
SPECIAL = None

HMIS RATINGS:

HEALTH = 1
FLAMMABILITY = 0
PHYSICAL HAZARD = 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:**THREADED:**

CGA-660, CGA-165, CGA-182 (Limited standard)

PIN-INDEXED YOKE:

Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION:

Not applicable.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

AV-1 *Safe Handling and Storage of Compressed Gases*
P-1 *Safe Handling of Compressed Gases in Containers*
SB-2 *Oxygen-Deficient Atmospheres*
V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
— *Handbook of Compressed Gases, Fourth Edition*

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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