

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

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| Product Name: Difluoromethane (MSDS No. P-6205-B) | Trade Names: HFC-32 |
| Chemical Name: Difluoromethane | Synonyms: Halocarbon 32, methylene fluoride, refrigerant gas R-32 |
| Chemical Family: Halogenated Alkane | Product Grades: None assigned. |
| Telephone: | Company Name: Praxair, Inc. |
| Emergencies: 1-800-645-4633* | 39 Old Ridgebury Road |
| CHEMTREC: 1-800-424-9300* | Danbury, CT 06810-5113 |
| Routine: 1-800-PRAXAIR | |

*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

DANGER! Flammable liquid and gas under pressure.

Can form explosive mixtures with air.

May cause frostbite.

May cause dizziness and drowsiness.

Self-contained breathing apparatus and protective clothing may be worn by rescue workers.

Under ambient conditions, this is a colorless gas with a faint, ether-like 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. High concentrations can cause dizziness, nausea, vomiting, disorientation, confusion, incoordination, and narcosis. Very high concentrations may cause suffocation. Lack of oxygen can kill.

Skin Contact. An unlikely route of exposure; this product is a gas at normal temperature and pressure. Liquid difluoromethane may cause frostbite; harmful amounts may be absorbed if skin contact is prolonged or widespread.

Swallowing. An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid

Eye Contact. No harm expected from contact with the gas. Contact with the liquid may cause severe eye irritation.

Effects of Repeated (Chronic) Overexposure. None known.

Other Effects of Overexposure. At high concentrations, difluoromethane may produce cardiac arrhythmias or arrest due to sensitization of the heart to adrenaline and noradrenalin. Exposure to fluorocarbon 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 difluoromethane suggest that overexposure is unlikely to aggravate existing medical conditions.

CARCINOGENICITY: Difluoromethane is not listed by NTP, OSHA, or IARC.

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 |
|-----------------|------------|---------------|
| Difluoromethane | 75-10-5 | >99%* |

*The symbol > means "greater than."

4. First Aid Measures

INHALATION: Remove to fresh air. Give artificial respiration if not breathing. 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 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: For contact with the liquid, 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 thoroughly flushed. Immediately see a physician, preferably an ophthalmologist.

NOTES TO PHYSICIAN: *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Flammable gas; forms explosive mixtures with air and oxidizing agents.

SUITABLE EXTINGUISHING MEDIA: Use media appropriate for surrounding fire.

PRODUCTS OF COMBUSTION: See section 10.

PROTECTION OF FIREFIGHTERS: DANGER! Flammable liquid and gas under pressure. Evacuate all personnel from the danger area. Immediately spray the cylinders with water from maximum distance until cool, taking care not to extinguish the flames. Remove sources of ignition if without risk. Remove all cylinders from the fire area if without risk; continue cooling water spray while moving cylinders. Do not extinguish any flames emitted from the cylinders;

stop the flow of gas if without risk, or allow the flames to burn out. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

Specific Physical and Chemical Hazards. Heat of fire can build pressure in a cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). If venting or leaking difluoromethane catches fire, do not extinguish flames. Flammable gas may spread from leak, creating an explosive re-ignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Difluoromethane 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:

DANGER! Flammable liquid and gas under pressure.

Personal Precautions. Forms explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable vapors may spread from leak. Before entering area, especially confined areas, check atmosphere with an approved 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: Keep away from heat, sparks, and open flame. Gas can cause rapid suffocation because of oxygen deficiency. Do not smoke in areas where fluorocarbons are used. Thoroughly wash hands after handling fluorocarbons or materials sprayed with them, especially before eating or smoking. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Leak check the system with soapy water; never use a flame. 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. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. For other precautions in using this mixture, see section 16.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Separate difluoromethane cylinders from oxygen, chlorine, and other oxidizers by at least 20 ft (6.1 m) or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to prevent them from falling or being knocked over. Screw the valve protection cap

firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. 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 (2010) |
|-----------------|------------------|----------------------|
| Difluoromethane | Not Established. | Not Established. |

IDLH = Not available.

ENGINEERING CONTROLS:

Local Exhaust. Use an explosion-proof local exhaust system with sufficient air flow velocity to maintain the difluoromethane concentration below TLV levels 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. None.

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear work gloves when handling cylinders.

Eye/Face Protection. Wear safety glasses when handling cylinders. Select in accordance with OSHA 29 CFR 1910.133.

Respiratory Protection. A respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus.

9. Physical and Chemical Properties

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|--------------------------------|---|
| APPEARANCE: | Gas |
| ODOR: | Faint, ether-like. |
| ODOR THRESHOLD: | Not available. |
| PHYSICAL STATE: | Colorless gas at normal temperature and pressure. |
| pH: | Not applicable. |
| MELTING POINT at 1 atm: | -212.8°F (-136°C) |
| BOILING POINT at 1 atm: | -61°F (-51.7°C) |

| | |
|--|---|
| FLASH POINT (test method): | Not available. |
| EVAPORATION RATE (Butyl Acetate = 1): | Not available. |
| FLAMMABILITY: | Flammable |
| FLAMMABLE LIMITS IN AIR , % by volume: | LOWER: 12.7% UPPER: 33.4% |
| VAPOR PRESSURE at 68°F (20°C): | 220.3 psia (1518.92 kPa abs) |
| VAPOR DENSITY at 70°F (21.1°C) and 1 atm: | 0.135 lb/ft ³ (2.163 kg/m ³) |
| SPECIFIC GRAVITY (H ₂ O = 1) at 19.4°F (-7°C): | Not available. |
| SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm: | 1.8 |
| SOLUBILITY IN WATER 68°F (20°C): | Not available. |
| PARTITION COEFFICIENT: n-octanol/water: | Not available. |
| AUTOIGNITION TEMPERATURE: | 1198°F (647.77°C) |
| DECOMPOSITION TEMPERATURE: | Not available. |
| PERCENT VOLATILES BY VOLUME: | 100 |
| MOLECULAR WEIGHT: | 52.02 |
| MOLECULAR FORMULA: | CH ₂ F ₂ |

10. Stability and Reactivity

CHEMICAL STABILITY: Unstable Stable

CONDITIONS TO AVOID: Sources of high temperatures such as lighted cigarettes, flames, hot spots, and welding.

INCOMPATIBLE MATERIALS: Aluminum; chemically active metals: sodium, potassium, calcium, magnesium; zinc.

HAZARDOUS DECOMPOSITION PRODUCTS: Halogens, halogen acids, and possibly carbonyl halides such as phosgene.

POSSIBILITY OF HAZARDOUS REACTIONS: May Occur Will Not Occur

Thermal decomposition may produce halogens, halogen acids, and possibly carbonyl halides such as phosgene.

11. Toxicological Information

ACUTE DOSE EFFECTS: LC₅₀, 1 hour, rat = 100,000 ppm.

STUDY RESULTS: None known.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: Difluoromethane does not contain any Class I or Class II ozone-depleting chemicals.

13. Disposal Considerations

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

14. Transport Information

DOT/IMO SHIPPING NAME: Difluoromethane

| HAZARD CLASS: | PACKING GROUP/Zone: | IDENTIFICATION NUMBER: | PRODUCT RQ: |
|---------------|---------------------|------------------------|-------------|
| 2.1 | NA* | UN3252 | None |

SHIPPING LABEL(s): FLAMMABLE GAS

PLACARD (when required): FLAMMABLE GAS

*NA - Not applicable.

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: Difluoromethane 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: Yes

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

Difluoromethane is not subject to reporting under Section 313.

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.

Difluoromethane is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Difluoromethane 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.

Difluoromethane is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location in quantities of 10,000 lb (4536 kg) or greater is covered under this regulation unless the liquid is used as a fuel.

STATE REGULATIONS:

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

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

16. Other Information

Read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: Flammable liquid and gas under pressure. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation. Close cylinder valve after each use; keep closed even when empty. Use only in a closed system. Close cylinder valve when not in use, even when empty. Never work on a pressurized system. If there is a leak, close the cylinder valve. Blow down the system 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: Before using any plastics, confirm their compatibility with difluoromethane.

Mixtures. When you mix two or more chemicals, 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. Chemicals have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:

NFPA RATINGS:

HEALTH = 2
FLAMMABILITY = 4
INSTABILITY = 1
SPECIAL = None

HMIS RATINGS:

HEALTH = 1
FLAMMABILITY = 4
PHYSICAL HAZARD = 1

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-350.

PIN-INDEXED YOKE:

Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION:

CGA-724.

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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