

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Methyl fluoride (MSDS No. P-4623-B)		Trade Name: Methyl Fluoride
Chemical Name: Fluoromethane		Synonyms: Halocarbon 41, monofluoromethane, refrigerant gas R41
Formula: CH ₃ F		Chemical Family: Halogenated alkane
Telephone:	Emergencies: 1-800-645-4633* CHEMTREC: 1-800-424-9300* Routine: 1-800-PRAXAIR	Company Name: Praxair, Inc. 39 Old Ridgebury Road 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. Composition/Information on Ingredients

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Fluoromethane	593-53-3	>99%*	None currently established	None currently established

*The symbol > means "greater than."

3. 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 may be required by rescue workers.
Odor: Agreeable, ether-like**

THRESHOLD LIMIT VALUE: TLV-TWA, none currently established (ACGIH, 2004).

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. If contact is prolonged or widespread, harmful amounts may be absorbed through the skin.

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

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: None known.

OTHER EFFECTS OF OVEREXPOSURE: At high concentrations, methyl fluoride 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.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None known.

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

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: 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 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

FLASH POINT (test method)	Not applicable	AUTOIGNITION TEMPERATURE	Unknown
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	Unknown (flammable)	UPPER 22.2%

EXTINGUISHING MEDIA: Dry chemicals, CO₂, water spray, or foam

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

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable gas; forms explosive mixtures with air and oxidizing agents. 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). If venting or leaking methyl fluoride 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. Methyl fluoride cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

HAZARDOUS COMBUSTION PRODUCTS: CO, CO₂, toxic and/or corrosive fluoride compounds. (See section 10.)

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Flammable liquid and gas under pressure. Forms explosive mixtures with air. (See section 5.) 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 appropriate device.

WASTE DISPOSAL METHOD: 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 STORAGE: Store and use with adequate ventilation. Separate methyl fluoride 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 keep them from falling or being knocked over. Screw 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.

PRECAUTIONS TO BE TAKEN IN HANDLING: 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 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. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using methyl fluoride, see section 16.

For further information on storage, handling, and use, see NFPA 55, *Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*, published by the National Fire Protection Association.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use an explosion-proof local exhaust system with sufficient air flow velocity to maintain an adequate supply of oxygen in the worker's breathing zone.

MECHANICAL (general)—Inadequate; see SPECIAL.

SPECIAL—Use only in a closed system.

OTHER—See SPECIAL.

RESPIRATORY PROTECTION: None required in normal use. An air-supplied respirator must be used in confined spaces. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select in accordance with 29 CFR 1910.134 and ANSI Z88.2.

SKIN PROTECTION: Wear work gloves when handling cylinders.

EYE PROTECTION: Wear safety glasses when handling cylinders. Select eye protection in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: 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.

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	34.033
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm:	1.175
VAPOR PRESSURE at 68°F (20°C):	552.7 psia (3811 kPa abs)
SOLUBILITY IN WATER , % by wt:	Unknown
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	Not applicable
BOILING POINT at 1 atm:	-108.99°F (-78.33°C)
FREEZING POINT at 1 atm:	-223.2°F (-141.8°C)

APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; agreeable, ether-like odor.

10. Stability and Reactivity**STABILITY:** Unstable Stable**INCOMPATIBILITY (materials to avoid):** Water, oxidizers. (Moisture at elevated temperatures produces corrosive fluoride fumes.)**HAZARDOUS DECOMPOSITION PRODUCTS:** Fluorine; thermal decomposition or burning may produce CO/CO₂ and highly toxic and/or corrosive fluoride compounds.**HAZARDOUS POLYMERIZATION:** May Occur Will Not Occur**CONDITIONS TO AVOID:** Sources of high temperatures such as lighted cigarettes, flames, hot spots, or welding.**11. Toxicological Information**

See section 3.

12. Ecological Information

Methyl fluoride does not contain any Class I or Class II ozone-depleting chemicals. Methyl fluoride is not listed as a marine pollutant by DOT.

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:** Methyl fluoride**HAZARD CLASS:** 2.1 **IDENTIFICATION NUMBER:** UN 2454 **PRODUCT RQ:** None**SHIPPING LABEL(s):** FLAMMABLE GAS**PLACARD (when required):** FLAMMABLE GAS**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)].

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: 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

PRESSURE: Yes

DELAYED: No

REACTIVITY: No

FIRE: Yes

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

Methyl fluoride does not require 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.

Methyl fluoride is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Methyl fluoride 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.

Methyl fluoride 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 more is covered under this regulation unless the gas is used as fuel.

STATE REGULATIONS:

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

PENNSYLVANIA: Methyl fluoride 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: *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. Keep away from heat, sparks, and open flame. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation. *Use only in a closed system.* Close valve after each use; keep closed even when empty. *Do not smoke in areas where fluorocarbons are used.* Wash hands thoroughly after handling fluorocarbons or materials sprayed with them, especially before eating or smoking. *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 methyl fluoride.*

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 = 1
FLAMMABILITY = 4
INSTABILITY = 0
SPECIAL = None

HMIS RATINGS:

HEALTH = 1
FLAMMABILITY = 4
PHYSICAL HAZARD = 3

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 about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700.

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

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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