

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: 1,1,1,2-Tetrafluoroethane (MSDS No. P-6213-B)	Trade Names: Halocarbon 134A
Chemical Name: 1,1,1,2-Tetrafluoroethane	Synonyms: Dymel [®] 134a, refrigerant gas R134a
Chemical Family: Halogenated Alkane	Product Grades: 2.8
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

CAUTION! Liquid and gas under pressure.

Harmful if inhaled.

Can cause rapid suffocation.

Liquid can cause frostbite.

May cause dizziness and drowsiness.

Self-contained breathing apparatus and protective clothing

may be required by rescue workers.

Under ambient conditions, this is a colorless gas with a slight 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. High concentrations can cause headaches, dizziness, drowsiness, and loss of consciousness. Very high concentrations may cause suffocation. Lack of oxygen can kill.

Skin Contact. Vapors may irritate the skin. Liquid tetrafluoroethane may cause frostbite; harmful amounts may be absorbed if skin contact is prolonged or widespread.

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. Vapors may irritate the eyes. The liquid may cause severe corneal injury due to frostbite.

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

Other Effects of Overexposure. At high concentrations, tetrafluoroethane 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. Overexposure may aggravate preexisting disorders of the heart and central nervous system.

CARCINOGENICITY: Tetrafluoroethane 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
1,1,1,2-Tetrafluoroethane	811-97-2	>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: Wash affected area with soap and water, and rinse for 15 minutes. 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 and shoes while showering with warm water. Wash contaminated clothing before reuse; discard shoes. 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 due to the sensitizing effect of fluorocarbons 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: Tetrafluoroethane cannot catch fire.

SUITABLE EXTINGUISHING MEDIA: Tetrafluoroethane cannot catch fire. Use media appropriate for surrounding fire.

PRODUCTS OF COMBUSTION: Not applicable. Decomposition due to heating may release toxic fumes and mists of fluorides. See section 10.

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

Asphyxiant—lack of oxygen can kill. Immediately evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool; then, move them away from fire area if without risk. Self-contained breathing apparatus and protective clothing 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 cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). Tetrafluoroethane 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. Asphyxiant—lack of oxygen can kill. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus and protective clothing where needed. Shut off leak if without risk. Ventilate area of leak or move cylinder to a well-ventilated area. Before reentering area, especially confined spaces, check for sufficient oxygen with an appropriate device. Remove all sources of ignition. Soak up small spills with absorbent material. Contain large spills with a dike; pump product into recovery drums.

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 or smoking. 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 cylinder 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 tetrafluoroethane, 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)
1,1,1,2-Tetrafluoroethane	Not Established.	Not Established.

IDLH =Not available.

ENGINEERING CONTROLS:

Local Exhaust. Use a local exhaust system, if necessary, to prevent oxygen deficiency and control the worker's exposure to high concentrations of this product.

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

Special. None

Other. None

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear work gloves when handling cylinders; rubber or neoprene gloves where contact with product is possible. Metatarsal shoes for cylinder handling; protective clothing where needed. 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 and a full face shield where contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Respiratory Protection. Use a NIOSH/MHSA-approved organic vapor respirator where needed. In confined spaces or in oxygen-deficient atmospheres, use a full-face, self-contained breathing apparatus operated in the positive-pressure, demand mode. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

9. Physical and Chemical Properties

APPEARANCE:	Colorless gas	
ODOR:	Slightly ethereal	
ODOR THRESHOLD:	Not available.	
PHYSICAL STATE:	Gas at normal temperature and pressure	
pH:	Not applicable.	
FREEZING POINT at 1 atm:	-153.9°F (-103°C)	
BOILING POINT at 1 atm:	-15.7°F (-26.5°C)	
FLASH POINT (test method):	Not available.	
EVAPORATION RATE (Butyl Acetate = 1):	Not available.	
FLAMMABILITY:	Not applicable.	
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: Not applicable.	UPPER: Not applicable.

VAPOR PRESSURE at 70°F (21.1°C):	85.9 psia (592 kPa abs)
VAPOR DENSITY:	0.2697 lb/ft ³ (4.320 kg/m ³)
SPECIFIC GRAVITY (H ₂ O = 1) at 77°F (25°C) and 1 atm:	1.208
SPECIFIC GRAVITY (Air = 1) at 77°F (25°C) and 1 atm:	3.6
SOLUBILITY IN WATER , % by wt at 77°F (25°C) and 1 atm:	0.15
PARTITION COEFFICIENT: n-octanol/water:	Not available.
AUTOIGNITION TEMPERATURE:	Not applicable.
DECOMPOSITION TEMPERATURE:	Not available.
PERCENT VOLATILES BY VOLUME:	100
MOLECULAR WEIGHT:	102.03
MOLECULAR FORMULA:	C ₂ F ₄ H ₂

10. Stability and Reactivity

CHEMICAL STABILITY: Unstable Stable

CONDITIONS TO AVOID: None known.

INCOMPATIBLE MATERIALS: Aluminum, CO₂ above 1832°F (1000°C), alloys of more than 2% Mg in the presence of water

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce fluorine and carbonyl fluoride.

POSSIBILITY OF HAZARDOUS REACTIONS: May Occur Will Not Occur

Thermal decomposition or burning may produce fluorine and carbonyl fluoride.

11. Toxicological Information

ACUTE DOSE EFFECTS: LC₅₀ 1 hr = 100,000 ppmv; LC₅₀ 4 hr = 50,000 ppmv

STUDY RESULTS: None known.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: Tetrafluoroethane 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 cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME: 1,1,1,2-Tetrafluoroethane

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.2	NA*	UN3159	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: Tetrafluoroethane 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.

Tetrafluoroethane 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.

Tetrafluoroethane is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Tetrafluoroethane 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.

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

STATE REGULATIONS:

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

PENNSYLVANIA: Tetrafluoroethane 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. Use a backflow prevention device in any piping. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation.

Tetrafluoroethane is much heavier than air. It tends to accumulate near the floor of an enclosed space, displacing air and pushing it upward. This creates an oxygen-deficient atmosphere near the floor. Ventilate space before entry. Verify sufficient oxygen concentration. *Use only in a closed system. 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 tetrafluoroethane.

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 = 0
SPECIAL = None

HMIS RATINGS:

HEALTH = 2
FLAMMABILITY = 0
PHYSICAL HAZARD = 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-660
PIN-INDEXED YOKE: Not applicable.
ULTRA-HIGH-INTEGRITY CONNECTION: CGA-716

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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