

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Liquefied gas, n.o.s. (octafluorotetrahydrofuran), MSDS No. P-6268-A		Trade Name: Not applicable
Chemical Name: Octafluorotetrahydrofuran		Synonyms: Perfluorotetrahydrofuran
Formula: C ₄ F ₈ O		Chemical Family: Epoxide
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 (2005)
Octafluorotetrahydrofuran	773-14-8	99.5%	None currently established.	None currently established.*
Other perfluorinated species	Not available	0.5%	Not available.	Not available.

*See section 10 for TLV information on by-products of thermal decomposition.

3. Hazards Identification

EMERGENCY OVERVIEW

WARNING! Liquid and gas under pressure.
Can cause rapid suffocation.
Harmful if inhaled.
May cause frostbite.
May cause dizziness and drowsiness.
Self-contained breathing apparatus and protective clothing may be required by rescue workers.
Odor: None

THRESHOLD LIMIT VALUE: TLV-TWA, none currently established (ACGIH, 2005).

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Narcotic. May cause incoordination, blurred vision, headache, unconsciousness, and respiratory failure due to depression of the central nervous system.

SKIN CONTACT—No harm expected from gas. 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—No harm expected from gas. Liquid may cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: None known.

OTHER EFFECTS OF OVEREXPOSURE: None known.

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: Octafluorotetrahydrofuran is not listed by NTP, OSHA, or IARC.

4. First Aid Measures

INHALATION: Immediately 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: *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

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

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

SPECIAL FIRE FIGHTING PROCEDURES: WARNING! Liquid and gas under pressure.

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 may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION 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). Octafluorotetrahydrofuran cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.) Toxic fumes may be produced when octafluorotetrahydrofuran is heated. (See section 10.)

HAZARDOUS COMBUSTION PRODUCTS: Not applicable. Toxic fumes may result from heating to decomposition. (See section 10.)

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: WARNING! Liquid and gas under pressure. 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.

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. 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.

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. 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 octafluorotetrahydrofuran, see section 16.

For additional information on storage and handling, refer to Praxair safety booklet P-14-153, *Guidelines for Handling Gas Cylinders and Containers*; obtain from your local supplier.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system with sufficient air flow velocity to control the concentration of octafluorotetrahydrofuran vapors in the worker's breathing zone.

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

SPECIAL—None

OTHER—None

RESPIRATORY PROTECTION: Use air-supplied respirators for protection against high concentrations of octafluorotetrahydrofuran. In confined spaces or oxygen-deficient atmospheres, use a full facepiece, self-contained breathing apparatus operated in the pressure demand mode. 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; insulated neoprene gloves where contact with liquid may occur.

EYE PROTECTION: Wear safety glasses when handling cylinders, safety goggles or a full face shield where contact with product may occur. 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:	216.03
SPECIFIC GRAVITY (H ₂ O = 1)	1.52
VAPOR PRESSURE at 68°F (20°C):	29.5 psia (203.4 kPa abs)
PERCENT VOLATILES BY VOLUME:	100
BOILING POINT at 1 atm:	30.56°F (-0.80°C)
APPEARANCE, ODOR, AND STATE: Colorless, odorless gas.	

10. Stability and Reactivity

STABILITY: ☐ Unstable ☒ Stable

INCOMPATIBILITY (materials to avoid): None known.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide; carbon dioxide; hydrogen fluoride*; perfluoroisobutylene**; toxic vapors, gases, or particulates

HAZARDOUS POLYMERIZATION: ☐ May Occur ☒ Will Not Occur

CONDITIONS TO AVOID: Heat

* Hydrogen Fluoride: TLV 3 ppm, ceiling (ACGIH, 2001; see Praxair MSDS P-4608)

**Perfluoroisobutylene: TLV 0.01 ppm, ceiling (ACGIH, 2001)

NOTE: Ceiling values are not Time-Weighted Average.

11. Toxicological Information

See section 3.

12. Ecological Information

No adverse ecological effects expected. Octafluorotetrahydrofuran does not contain any Class I or Class II ozone-depleting chemicals. Octafluorotetrahydrofuran 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: Liquefied gas, n.o.s. (octafluorotetrahydrofuran)		
HAZARD CLASS: 2.2	IDENTIFICATION NUMBER: UN3163	PRODUCT RQ: None
SHIPPING LABEL(s): NONFLAMMABLE GAS		
PLACARD (when required): NONFLAMMABLE GAS		

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):

Threshold Planning Quantity (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.

This product 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.

Octafluorotetrahydrofuran is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: This product 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.

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

STATE REGULATIONS:

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

PENNSYLVANIA: Octafluorotetrahydrofuran 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.* Do not breathe gas. Use piping and equipment adequately designed to withstand pressures to be encountered. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. *Keep away from heat, flame, sparks, and other sources of ignition.* Extreme heat due to misuse or equipment failure can cause thermal decomposition, releasing highly irritating, toxic by-products. (See section 10.) *Do not eat, drink, or smoke in areas where octafluorotetrahydrofuran is used.* Wash hands thoroughly after handling this product or materials sprayed with it, 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 octafluorotetrahydrofuran.

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 = 1
FLAMMABILITY = 0
PHYSICAL HAZARD = 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:

Not applicable.

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 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, <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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