

# Praxair Material Safety Data Sheet

## 1. Chemical Product and Company Identification

<b>Product Name:</b> Liquefied gas, n.o.s. (octafluorotetrahydrofuran), (MSDS P-6268-B)	<b>Trade Names:</b> Not applicable.
<b>Chemical Name:</b> Octafluorotetrahydrofuran	<b>Synonyms:</b> Perfluorotetrahydrofuran
<b>Chemical Family:</b> Epoxide	<b>Product Grades:</b> None assigned.
<b>Telephone:</b>	<b>Company Name:</b> Praxair, Inc.
<b>Emergencies:</b> 1-800-645-4633*	39 Old Ridgebury Road
<b>CHEMTREC:</b> 1-800-424-9300*	Danbury, CT 06810-5113
<b>Routine:</b> 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

**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.  
Under ambient conditions, this is a colorless, odorless gas.**

**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. 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.

**CARCINOGENICITY:** Octafluorotetrahydrofuran 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
Octafluorotetrahydrofuran	773-14-8	99.5%
Other perfluor-onated species	Not available	0.5%

### 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

**FLAMMABLE PROPERTIES:** Octafluorotetrahydrofuran cannot catch fire.

**SUITABLE EXTINGUISHING MEDIA:** Use media appropriate for surrounding fire.

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

**PROTECTION OF FIREFIGHTERS: 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.

**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). 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.)

**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:

**WARNING!** 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 breathe gas. *Gas can cause rapid suffocation due to oxygen deficiency. Keep away from heat, flame, sparks, and other sources of ignition. 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. 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.

**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 (2008)
Octafluorotetra-hydrofuran	Not Established.	Not Established.*
Other perfluor-onated species	Not available.	Not available.**
* Hydrogen Fluoride: TLV 0.5 ppm		
**Perfluoroisobutylene: TLV 0.01 ppm STEL, ceiling		

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.** 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

**PERSONAL PROTECTIVE EQUIPMENT:**

**Skin Protection.** Wear work gloves when handling cylinders; insulated neoprene gloves where contact with liquid 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 where contact with product may occur. Select eye protection in accordance with OSHA 29 CFR 1910.133.

**Respiratory Protection.** A respiratory protection program that meet 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 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.

<b>9. Physical and Chemical Properties</b>
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<b>APPEARANCE:</b>	Colorless gas		
<b>ODOR:</b>	Odorless		
<b>ODOR THRESHOLD:</b>	Not available.		
<b>PHYSICAL STATE:</b>	Gas at normal temperature and pressure		
<b>pH:</b>	Not applicable.		
<b>MELTING POINT</b> at 1 atm:	Not available.		
<b>BOILING POINT</b> at 1 atm:	30.56°F (-0.80°C)		
<b>FLASH POINT</b> (test method):	Not available.		
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	Not available.		
<b>FLAMMABILITY:</b>	Nonflammable		
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b>	Not applicable.	<b>UPPER:</b> Not applicable.
<b>VAPOR PRESSURE</b> at 68°F (20°C):	29.5 psia (203.4 kPa abs)		
<b>VAPOR DENSITY</b> at 70°F (21.1°C) and 1 atm:	Not available.		
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1):	1.52		

<b>SPECIFIC GRAVITY</b> (Air = 1) at 70°F (21.1°C) and 1 atm:	Not available.
<b>SOLUBILITY IN WATER</b> 68°F (20°C):	Not available.
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.
<b>AUTOIGNITION TEMPERATURE:</b>	Not applicable.
<b>DECOMPOSITION TEMPERATURE:</b>	Not available
<b>PERCENT VOLATILES BY VOLUME:</b>	100
<b>MOLECULAR WEIGHT:</b>	216.03
<b>MOLECULAR FORMULA:</b>	C <sub>4</sub> F <sub>8</sub> O

**10. Stability and Reactivity**

**CHEMICAL STABILITY:**  Unstable  Stable

**CONDITIONS TO AVOID:** Heat

**INCOMPATIBLE MATERIALS:** None known.

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

**POSSIBILITY OF HAZARDOUS REACTIONS:**  May Occur  Will Not Occur

Decomposition products include carbon monoxide, carbon dioxide, hydrogen fluoride, perfluoroisobutylene, toxic vapors, gases, or particulates.

**11. Toxicological Information**

**ACUTE DOSE EFFECTS:** None known.

**STUDY RESULTS:** None known.

**12. Ecological Information**

**ECOTOXICITY:** No known effects.

**OTHER ADVERSE EFFECTS:** Octafluorotetrahydrofuran 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**

<b>DOT/IMO SHIPPING NAME:</b> Liquefied gas, n.o.s. (octafluorotetrahydrofuran)			
<b>HAZARD CLASS:</b> 2.2	<b>PACKING GROUP/Zone:</b> NA/NA*	<b>IDENTIFICATION NUMBER:</b> UN3163	<b>PRODUCT RQ:</b> None
<b>SHIPPING LABEL(s):</b> NONFLAMMABLE GAS			
<b>PLACARD (when required):</b> NONFLAMMABLE 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:** Octafluorotetrahydrofuran 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

**PRESSURE:** Yes

**DELAYED:** No

**REACTIVITY:** No

**FIRE:** No

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

Octafluorotetrahydrofuran 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.

Octafluorotetrahydrofuran is not listed as a regulated substance.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** Octafluorotetrahydrofuran 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.* Use piping and equipment adequately designed to withstand pressures to be encountered. Use a backflow prevention device in any piping. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. Extreme heat due to misuse or equipment failure can cause thermal decomposition, releasing highly irritating, toxic by-products. **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 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. Remember, chemicals 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 can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5<sup>th</sup> 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.

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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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