

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Toxic, liquids, organic, n.o.s.
(octafluorocyclopentene) (MSDS No. P-6235-B)

Trade Name: Octafluorocyclopentene

Chemical Name: Octafluorocyclopentene

Synonyms: Halocarbon C-1418;
1,2,3,3,4,4,5,5-octafluorocyclopentene;
1,2,3,3,4,4,5,5-octafluoro-1-cyclopentene;
perfluorocyclopentene

Formula: C₅F₈

Chemical Family: Cyclic

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 (2002)
Octafluorocyclopentene	559-40-0	>99*	None currently established	None currently established**

* The symbol > means "greater than."

** The manufacturer recommends a TLV-TWA of 2 ppm.

3. Hazards Identification

EMERGENCY OVERVIEW



DANGER! Toxic liquid and gas under pressure.
Harmful if inhaled or absorbed through the skin.



May cause lung, liver, heart, kidney, and reproductive system damage.

Causes eye, skin, and respiratory tract irritation.

May cause dizziness and drowsiness.

Self-contained breathing apparatus may be required by rescue workers.

Odor: Slight, distinctive

THRESHOLD LIMIT VALUE: TLV- None currently established (ACGIH, 2002).

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Inhalation of vapors or mists may irritate the respiratory tract. Toxic effects may include dizziness, nausea, headaches, shortness of breath, lethargy, narcosis, unconsciousness, and cardiac arrhythmias.

SKIN CONTACT—Contact with liquid, vapors, or mists may irritate the skin and mucous membranes.

SWALLOWING—No information available. Ingested liquid and vapors should have irritating and toxic effects similar to those of inhalation. Although a liquid at normal temperature and pressure, this product boils at considerably below the normal body temperature of 98.6°F (37°C). (See section 9.)

EYE CONTACT—Liquid, vapors, or mists may irritate the eyes.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Repeated exposure may be toxic to the lungs, liver, heart, kidneys, and reproductive system. (See section 11.)

OTHER EFFECTS OF OVEREXPOSURE: At high concentrations, octafluorocyclopentene 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: None known.

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

CARCINOGENICITY: Octafluorocyclopentene 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: Remove contaminated clothing and shoes. Wipe off excess material and rinse with water. Wash skin with soap and water, and rinse for at least 15 minutes. Seek medical attention if irritation persists. Do not reuse discarded clothing until it has been thoroughly cleaned and decontaminated of any product.

SWALLOWING: Wash out mouth with plenty of water for at least 15 minutes. Do not induce vomiting. Call a physician.

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: *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

FLASH POINT (test method):	Not applicable	
AUTOIGNITION TEMPERATURE:	Not applicable	
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: Not applicable	UPPER: Not applicable
EXTINGUISHING MEDIA: This mixture cannot catch fire. Use media appropriate for surrounding fire.		

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Toxic liquid and gas under pressure. Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately deluge cylinders with water from maximum distance until cool; then move them away from fire area if without risk. If cylinders are leaking, reduce toxic vapors with water spray or fog. Shut off leak if without risk. Reverse flow into cylinder may cause rupture. (See section 16.) 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). Cylinders containing this product are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

HAZARDOUS COMBUSTION PRODUCTS: Not applicable. Decomposition due to heating may produce toxic by-products of fluorides, nitrogen oxides, CO, and CO₂. See section 10.

6. Accidental Release Measures

STEPS TO BE TAKEN: DANGER! Toxic liquid and gas under pressure. Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. If cylinders are leaking, reduce toxic vapors with water spray or fog. Reverse flow into cylinder may cause rupture. (See section 16.) Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area.

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 octafluorocyclopentene, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system, if necessary, to 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

RESPIRATORY PROTECTION: Use air-supplied respirators to protect against high concentrations of this product. 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.

SKIN PROTECTION: Wear work gloves when handling cylinders; neoprene rubber gloves and an apron where contact with product may occur.

EYE PROTECTION: Wear safety glasses when handling cylinders; safety glasses and a face shield where contact with product is possible. Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: 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.

NOTE: *The manufacturer strongly recommends the specified respiratory protection and protective equipment during gas cylinder exchange/replacement and cleaning or maintenance of dry-etching/chemical vapor deposition devices, attachments, connections, or lines.*

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	212
SPECIFIC GRAVITY (H ₂ O = 1) at 68°F (20°C):	1.58
SPECIFIC GRAVITY (Air = 1):	7.36
VAPOR PRESSURE at 80.6°F (27°C):	14.7 psia (101.35 kPa, abs)
SOLUBILITY IN WATER:	Slight
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	Greater than 1
BOILING POINT at 1 atm:	80.6°F (27°C)
APPEARANCE, ODOR, AND STATE: Clear, colorless liquid; slight, distinctive odor.	

10. Stability and Reactivity**STABILITY:**☐ Unstable☒ Stable

INCOMPATIBILITY (materials to avoid): Alkali or alkaline earth metals, e.g., powdered aluminum, zinc, beryllium.

HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO₂, hydrofluoric acid, carbonyl fluoride, and oxides of nitrogen generated during thermal decomposition or combustion.

HAZARDOUS POLYMERIZATION: ☐ May Occur ☒ Will Not Occur

CONDITIONS TO AVOID: Overheating, open flames

11. Toxicological Information**Acute inhalation:**LC₅₀ = 1124 ppm, 1 hr, rat**Acute eye irritation (rabbit):**

Slowly reversible irritation of the conjunctiva, slight corneal opacification in 2/6; inflammation of iris in 1/6. Reversible in 21 days except mild conjunctival redness in 1/6 animals at 21 days.

Acute skin irritation (rabbit):

Not irritating

Rat repeated-dose inhalation:

Increased lung and liver weights at 7.5 ppm or more, 6 hr/day, 7 days/week for 13 weeks, accompanied by microscopic lung lesions (no liver lesions), increased lung and kidney weights at 50 ppm, 6 hr/day for 14 days; effects regressed completely after 4 weeks of withdrawal.

Rat inhalation teratology study: Inhalation of 1,2,3,3,4,4,5,5-octafluorocyclopentene by the pregnant rat for 6 hours a day between days 6 and 19 *post coitum* produced evidence of maternal toxicity at 100 ppm and a marginal effect on lung and body weight at 10 and 30 ppm. The *conceptus* had a slight reduction in mean fetal weight at 100 ppm accompanied by a slightly increased incidence of major cardiovascular malformations of equivocal biological significance but showed no other evidence of disturbance to development. A dose level of 30 ppm is regarded as a no-effect level for any embryotoxic potential of 1,2,3,3,4,4,5,5-octafluorocyclopentene.

Genotoxicity studies:

Not mutagenic in Ames assay. No chromosome aberrations in vitro micronucleus assay. No indication of a genotoxic risk to humans.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. This product 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:** Toxic, liquids, organic, n.o.s. (octafluorocyclopentene)

HAZARD	PACKING	IDENTIFICATION	PRODUCT
CLASS: 6.1	GROUP: II	NUMBER: UN 2810	RQ: None

SHIPPING LABEL(s): POISON**PLACARD (when required):** POISON

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure, upright 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):

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

PRESSURE: Yes

DELAYED: Yes

REACTIVITY: No

FIRE: No

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

Octafluorocyclopentene 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.

Octafluorocyclopentene is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: The EPA has proposed a SNUR (Significant New Use Rule) that limits the use of octafluorocyclopentene to that described in the PMN (P99-184). The proposed SNUR allows no consumer use and no domestic manufacture.

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.

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

STATE REGULATIONS:

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

PENNSYLVANIA: Octafluorocyclopentene 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: **Toxic liquid and gas under pressure.** Irritant; do not breathe vapor. *Use in a closed system when possible.* Use only with adequate ventilation or respiratory protection. (See section 8.) *Do not get liquid or vapor in eyes, on skin, or on clothing. (See section 3.)* Have safety showers and eyewash fountains immediately available. *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 a safe and environmentally sound 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.*

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	= 3
FLAMMABILITY	= 1
INSTABILITY	= 0
SPECIAL	= None

HMIS RATINGS:

HEALTH	= 1
FLAMMABILITY	= 1
PHYSICAL HAZARD	= 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	Not assigned
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.

AV-1	<i>Safe Handling and Storage of Compressed Gases</i>
P-1	<i>Safe Handling of Compressed Gases in Containers</i>
P-14	<i>Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres</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, Third 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.

Praxair MSDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current Praxair MSDSs for these products, contact your Praxair sales representative or local distributor or supplier. If you have questions regarding Praxair MSDSs, would like the form number and date of the latest MSDS, or would like the names of the Praxair suppliers in your area, phone or write the Praxair Call Center (**Phone:** 1-800-PRAXAIR; **Address:** Praxair Call Center, Praxair, Inc., PO Box 44, Tonawanda, NY 14151-0044).

Praxair and the *Flowing Airstream* design are trademarks or registered trademarks of Praxair Technology, Inc. in the United States and other countries.



Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113