Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Mixture of 5 percent Fluorine, balance Helium	**Trade Names:** Not applicable.
Chemical Name: Mixture of fluorine and helium	**Synonyms:** Mixture of fluorine and helium
Chemical Family: Not applicable.	**Product Grades:** None assigned.

Telephone: **Emergencies:** 1-800-645-4633* **Company Name:** Praxair, Inc.
CHEMTREC: 1-800-424-9300* 39 Old Ridgebury Road
Routine: 1-800-PRAXAIR 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. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Toxic, oxidizing, corrosive high-pressure gas.
TOXIC IF INHALED.
MAY CAUSE OR INTENSIFY FIRE; OXIDIZER.
CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.
Can cause eye, skin, and respiratory tract burns.
May cause kidney damage.
Self-contained breathing apparatus and protective clothing must be worn by rescue workers.
Under ambient conditions, this mixture is a colorless gas with no odor.

OSHA REGULATORY STATUS: The components of this mixture are considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS:

Effects of a Single (Acute) Overexposure

Inhalation. Toxic if inhaled at high concentrations. Extremely irritating to the mucous membranes and the upper respiratory tract. May cause coughing, a choking sensation, chills, chest pain, pulmonary edema, and death.

Skin Contact. Severely irritates the skin, producing marked local redness and swelling. High concentrations may cause burns, which could result in absorption of potentially harmful amounts of material.

Swallowing. An unlikely route of exposure. This product is a gas at normal temperature and pressure.

Eye Contact. Severely irritating; causes mild excess redness and swelling of the conjunctiva. High concentrations may cause corneal burns.

Effects of Repeated (Chronic) Overexposure. Repeated overexposure may cause dryness of the nasal membranes, nosebleed, dental fluorosis (discoloration of the teeth), bronchiolitis (asthma), and pneumonitis (chemical pneumonia).

Other Effects of Overexposure. May damage the respiratory system and kidneys.

Medical Conditions Aggravated by Overexposure. Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease.

CARCINOGENICITY: The components of this mixture are not listed by NTP, OSHA, and 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
Fluorine	7782-41-4	5%
Helium	7440-59-7	95%

4. First Aid Measures

INHALATION: Immediately remove to fresh air. If not breathing, give artificial respiration. **Warning: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.** Qualified personnel should give oxygen at half-hour intervals for 3 to 4 hours. Immediately call a physician.

SKIN CONTACT: Do not breathe vapor. Immediately remove contaminated clothing and shoes, and flush skin with plenty of water for at least 15 minutes. Soak burned areas in an iced aqueous Epsom salt ($MgSO_4$) solution for at least 30 minutes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

SWALLOWING: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

EYE CONTACT: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Immediately see a physician, preferably an ophthalmologist.

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.*

Contact the Poison Control Center in your area for additional information on patient management and follow-up.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Oxidizing gas. May accelerate combustion. Avoid contact with combustible materials.

SUITABLE EXTINGUISHING MEDIA: CO_2, dry chemical, water spray, or fog

PRODUCTS OF COMBUSTION: Unknown. See section 10 for hazardous decomposition products.

PROTECTION OF FIREFIGHTERS: DANGER! Toxic, oxidizing, corrosive high-pressure gas. Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool cylinders with water spray from maximum distance; then move them away from fire if safe to do so. If cylinders are leaking, reduce toxic vapors with water spray or fog, taking care not to spray water directly on leaking gas. Shut off leak if safe to do so. Reverse flow into cylinder may cause rupture. (See section 16.) On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection..

Specific Physical and Chemical Hazards. Heat of fire can build pressure in cylinder and cause it to rupture. Cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.) No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). If venting or leaking gas catches fire, do not extinguish flames. Vapors can be irritating and may burn skin and eyes on contact. Before entering area, especially confined areas, check atmosphere with approved explosion meter.

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:

DANGER! Toxic, oxidizing, corrosive high-pressure gas.

Personal Precautions. May accelerate combustion. Avoid contact with combustible materials. Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Reduce vapors with fog or fine water spray. Reverse flow into cylinder may cause rupture. Shut off flow if safe to do so. Ventilate area or move cylinder to a well-ventilated area. Prevent runoff from contaminating surrounding environment. Toxic, corrosive vapors may spread from spill. Before entering area, especially a confined area, check atmosphere with an appropriate device.

Environmental Precautions. Prevent waste from contaminating the surrounding environment. 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 vapors. Do not get vapors in eyes, on skin, or on clothing. Keep away from combustible materials. Use only spark-proof tools and explosion-proof equipment. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Leak check system with soapy water; never use a flame. Have safety showers and eyewash fountains immediately available. Protect cylinders from damage. 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. Slowly open the valve. If valve is hard to open, discontinue use and contact your supplier. Close valve after each use; keep closed even when empty. For other precautions, see section 16.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Post “No Smoking or Open Flames”

signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g., NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure cylinders upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the cylinder is not in use. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. For other precautions in using this mixture, see section 16.

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 (2014)
Fluorine	0.1 ppm	1 ppm
Helium	Simple asphyxiant	Simple asphyxiant

IDLH = 25 ppm (Fluorine)

ENGINEERING CONTROLS:

Local Exhaust. Insufficient. See special.

Mechanical (General). Not recommended as a primary ventilation system to control worker's exposure. See special.

Special. A corrosion-resistant, closed system.

Other. See special.

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear Neoprene gloves and metatarsal shoes for cylinder handling, and protective clothing where needed. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Eye/Face Protection. Wear safety glasses when handling cylinders. Select per OSHA 29 CFR 1910.133.

Respiratory Protection. A respiratory protection program that meets 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 that 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.

9. Physical and Chemical Properties

APPEARANCE:	Colorless gas
ODOR:	Odorless
ODOR THRESHOLD:	Not available.
PHYSICAL STATE:	Gas at normal temperature and pressure

pH:	Not applicable.			
MELTING POINT at 1 atm**:**	Not available.			
BOILING POINT at 1 atm**:**	Not available.			
FLASH POINT (test method)**:**	Not available.			
EVAPORATION RATE (Butyl Acetate = 1)**:**	Not available.			
FLAMMABILITY:	Nonflammable			
FLAMMABLE LIMITS IN AIR, % by volume**:**	**LOWER:**	Not applicable.	**UPPER:**	Not applicable.
VAPOR PRESSURE at 68°F (20°C)**:**	Not available.			
VAPOR DENSITY at 70°F (21.1°C) and 1 atm**:**	Not available.			
SPECIFIC GRAVITY (H_2O = 1) at 19.4°F (-7°C)**:**	Not available.			
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm**:**	Not available.			
SOLUBILITY IN WATER 68°F (20°C)**:**	Not available.			
PARTITION COEFFICIENT: n-octanol/water:	Not available.			
AUTOIGNITION TEMPERATURE:	Not available.			
DECOMPOSITION TEMPERATURE:	Not available.			
PERCENT VOLATILES BY VOLUME:	100			
MOLECULAR WEIGHT:	Not available.			
MOLECULAR FORMULA:	Mixture of He & F_2			

10. Stability and Reactivity

CHEMICAL STABILITY: ☐ Unstable ☒ Stable

CONDITIONS TO AVOID: None known.

INCOMPATIBLE MATERIALS: Combustible materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce hydrofluoric acid and oxygen difluoride.

POSSIBILITY OF HAZARDOUS REACTIONS: ☒ May Occur ☐ Will Not Occur

Thermal decomposition may produce hydrofluoric acid and oxygen difluoride.

11. Toxicological Information

ACUTE DOSE EFFECTS: LC_{50} for F_2, 1 hr, rat = 185 ppm. Helium is a simple asphyxiant.

STUDY RESULTS: None known about this mixture.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: No adverse ecological effects expected. The components of this mixture do 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: Compressed gas, toxic, oxidizing, corrosive, n.o.s. (helium, fluorine)

HAZARD CLASS: 2.3	**PACKING GROUP/Zone:** D	**IDENTIFICATION NUMBER:** UN3306	**PRODUCT RQ:** 10 lb*
SHIPPING LABEL(s):	TOXIC GAS, OXIDIZER, CORROSIVE**		
PLACARD (when required):	TOXIC GAS, OXIDIZER, CORROSIVE**		

**For Fluorine (F)*

***The words in the POISON GAS diamond are INHALATION HAZARD.*

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.

Additional Marking Requirement: INHALATION HAZARD

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(e)].

MARINE POLLUTANTS: The components of this mixture are not listed as marine pollutants 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): 10 lb (4.54 kg) for F_2

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: 500 lb (226.8 kg) for F_2
EHS RQ (40 CFR 355): 10 lb (4.54 kg) for F_2

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: Yes
PRESSURE: Yes
REACTIVITY: No
FIRE: Yes

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

Fluorine is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

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.

Fluorine is listed as a regulated substance in quantities of 1000 lb (454 kg) or greater.

TSCA: TOXIC SUBSTANCES CONTROL ACT: The components of this mixture are 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.

Fluorine is listed in Appendix A as a highly hazardous chemical in quantities of 1000 lb (454 kg) or greater.

STATE REGULATIONS:

CALIFORNIA: The components of this mixture are not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

PENNSYLVANIA: The components of this mixture are subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

16. Other Information

Read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: ***Toxic, oxidizing, corrosive high-pressure gas***. Use only in a corrosion-resistant, closed system. 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 at all times. Use only in a closed system constructed of corrosion-resistant materials and kept scrupulously dry. Purge system with a dry, inert gas before and after use. Prevent reverse flow. Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. 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. Follow safe practices when returning cylinder to supplier. Ensure that the valve is closed; then install valve outlet cap or plug, leak-tight. 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:		**HMIS RATINGS:**	
HEALTH	= 3	HEALTH	= 4
FLAMMABILITY	= 0	FLAMMABILITY	= 0
INSTABILITY	= 2	PHYSICAL HAZARD	= 0
SPECIAL	= OX		

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-670 (Low Pressure.)
PIN-INDEXED YOKE:	Not applicable.
ULTRA-HIGH-INTEGRITY CONNECTION:	Not applicable.

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), www.cganet.com.

AV-1	*Safe Handling and Storage of Compressed Gases*
P-1	*Safe Handling of Compressed Gases in Containers*
P-2	*Characteristics and Safe Handling of Medical Gases*
P-9	*Inert Gases—Neon, Nitrogen, and Helium*
SB-2	*Oxygen-Deficient Atmospheres*
V-1	*Compressed Gas Cylinder Valve Inlet and Outlet Connections*
—	*Handbook of Compressed Gases*

Praxair asks users of this product to study this SDS 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 SDS 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 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 SDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Praxair sales representative or local distributor or supplier, or download from www.praxair.com. If you have questions regarding Praxair SDSs, would like the form number and date of the latest SDS, 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).

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