

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification

<b>Product Name:</b> Sulfur hexafluoride (MSDS No. P-4657-D)	<b>Trade Name:</b> Sulfur Hexafluoride
<b>Chemical Name:</b> Sulfur hexafluoride	<b>Synonyms:</b> Sulfur fluoride
<b>Formula:</b> SF <sub>6</sub>	<b>Chemical Family:</b> Sulfur bearing
<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. Composition/Information on Ingredients

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Sulfur hexafluoride	2551-62-4	>99%*	1000 ppm	1000 ppm

\* The symbol > means "greater than."

### 3. Hazards Identification

#### EMERGENCY OVERVIEW

**CAUTION! Liquid and gas under pressure.**

**Can cause rapid suffocation.**

**May cause frostbite.**

**May cause dizziness and drowsiness.**

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

**Odor: None**

**THRESHOLD LIMIT VALUE:** TLV-TWA, 1000 ppm (ACGIH, 2004). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

**EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:**

**INHALATION**—Asphyxiant. Effects are due to lack of oxygen. High concentrations can cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

**SKIN CONTACT**—No harm expected from vapor; liquid may cause frostbite.

**SWALLOWING**—An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid. This product is a gas at normal temperature and pressure.

**EYE CONTACT**—No harm expected from vapor; liquid may cause frostbite.

**EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:** No harm expected.

**OTHER EFFECTS OF OVEREXPOSURE:** Decomposition products generated at high temperatures may be irritating.

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** The toxicology and the physical and chemical properties of sulfur hexafluoride suggest that overexposure is unlikely to aggravate existing medical conditions.

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

**CARCINOGENICITY:** Sulfur hexafluoride is not listed by NTP, OSHA, or IARC.

<b>4. First Aid Measures</b>
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**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:** For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove 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:** For exposure to 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:** *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

<b>5. Fire Fighting Measures</b>
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<b>FLASH POINT</b> (test method):	Not applicable
<b>AUTOIGNITION TEMPERATURE:</b>	Not applicable
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> Not applicable   <b>UPPER:</b> Not applicable
<b>EXTINGUISHING MEDIA:</b> Sulfur hexafluoride cannot catch fire. Use media appropriate for surrounding fire.	

**SPECIAL FIRE FIGHTING PROCEDURES: 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. Shut off flow if you can do so without risk. Self-contained breathing apparatus may be required by rescue workers. (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). Sulfur hexafluoride cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

**HAZARDOUS COMBUSTION PRODUCTS:** Not applicable. Heating to decomposition may produce toxic fumes of fluorides and sulfur oxides. (See section 10.)

## 6. Accidental Release Measures

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: CAUTION! Liquid and gas under pressure.** Asphyxiant. Lack of oxygen can kill. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off flow if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.

**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 sulfur hexafluoride, 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 keep concentration of this product below the TLV 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 where the local and/or general exhaust ventilation are insufficient to keep worker's exposure below the TLV. Use a full-face, self-contained breathing apparatus in a positive pressure demand mode in confined spaces or in oxygen deficient atmospheres. Respiratory protection use must conform with OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

**SKIN PROTECTION:** Wear work gloves when handling cylinders and to prevent exposure to liquid.

**EYE PROTECTION:** Wear safety glasses when handling cylinders. Select in accordance with OSHA 29 CFR 1910.133.

**OTHER PROTECTIVE EQUIPMENT:** Metatarsal shoes for cylinder 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

<b>MOLECULAR WEIGHT:</b>	146.05
<b>SPECIFIC GRAVITY</b> (air = 1) at 68°F (20°C) and 1 atm:	5.11
<b>GAS DENSITY</b> at 70°F (21.1°C) and 1 atm:	0.3776 lb/ft <sup>3</sup> (6.049 kg/m <sup>3</sup> )
<b>VAPOR PRESSURE</b> at 70°F (21.1°C):	334.7 psia (2308 kPa abs)
<b>SOLUBILITY IN WATER:</b>	Negligible
<b>PERCENT VOLATILES BY VOLUME:</b>	100
<b>BOILING POINT</b> at 1 atm:	Sublimes at -83°F (-63.9°C)
<b>MELTING POINT</b> at 325 psia (2241 kPa abs):	-59.4°F (-50.8°C)
<b>APPEARANCE, ODOR, AND STATE:</b> Colorless gas at normal temperature and pressure.	

## 10. Stability and Reactivity

**STABILITY:**  Unstable  Stable

**INCOMPATIBILITY (materials to avoid):** Explodes violently in contact with disilane.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Thermal decomposition may produce toxic fumes of fluorides and sulfur dioxide.

**HAZARDOUS POLYMERIZATION:**  May Occur  Will Not Occur

**CONDITIONS TO AVOID:** Temperatures in excess of 1472°F (800°C).

**11. Toxicological Information**

See section 3.

**12. Ecological Information**

No adverse ecological effects expected. Sulfur hexafluoride does not contain any Class I or Class II ozone-depleting chemicals. Sulfur hexafluoride 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:** Sulfur hexafluoride

**HAZARD CLASS:** 2.2    **IDENTIFICATION NUMBER:** UN 1080    **PRODUCT RQ:** None

**SHIPPING LABEL(s):** NONFLAMMABLE GAS

**PLACARD (when required):** NONFLAMMABLE GAS

**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)].

**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:** 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.

Sulfur hexafluoride 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.

Sulfur hexafluoride is not listed as a regulated substance.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** Sulfur hexafluoride 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.

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

#### **STATE REGULATIONS:**

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

**PENNSYLVANIA:** Sulfur hexafluoride 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. *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. Be sure to read and understand all labels and all instructions supplied with all containers of this product. *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 = 1  
FLAMMABILITY = 0  
INSTABILITY = 0  
SPECIAL = None

**HMIS RATINGS:**

HEALTH = 1  
FLAMMABILITY = 0  
PHYSICAL HAZARD = 3

**STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:**

**THREADED:** CGA-590  
**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, 5<sup>th</sup> Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700 1725, <http://www.cganet.com/Publication.asp>.

AV-1 *Safe Handling and Storage of Compressed Gases*  
G-10.1 *Commodity Specification for Sulfur hexafluoride*  
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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