

# MATERIAL SAFETY DATA SHEET

## SECTION 1. PRODUCT IDENTIFICATION

**PRODUCT NAME:** Sulfur Hexafluoride

**CHEMICAL NAME:** Sulfur Hexafluoride

**FORMULA:** SF<sub>6</sub>

**MANUFACTURER:** Air Products and Chemicals, Inc.

7201 Hamilton Boulevard

Allentown, PA 18195-1501

**PRODUCT INFORMATION:** (800) 752-1597

**MSDS NUMBER:** 1014 **REVISION:** 5

**REVIEW DATE:** May 1999 **REVISION DATE:** May 1999

## SECTION 2. HAZARDOUS COMPONENTS

Sulfur Hexafluoride is sold as pure product >99%

**CAS NUMBER:** 2551-62-4

**EXPOSURE LIMITS:**

**OSHA:** PEL-TWA = 1000 ppm **ACGIH:** TLV-TWA = 1000 ppm **NIOSH:** None established

## SECTION 3. HAZARD IDENTIFICATION

### EMERGENCY OVERVIEW

Sulfur Hexafluoride is a nonflammable, liquefied compressed gas packaged in cylinders under its own vapor pressure of 310.2 psia at 70°F (21.1°C). It can cause rapid suffocation when concentrations are sufficient to reduce oxygen levels below 19.5%. Contact with liquid may cause frostbite. Avoid breathing gas. Self contained breathing apparatus (SCBA) may be required by rescue workers.

### EMERGENCY TELEPHONE NUMBERS

(800) 523-9374 Continental U.S., Canada, and Puerto Rico

1. 481-7711 other locations

**ACUTE POTENTIAL HEALTH EFFECTS:**

**ROUTES OF EXPOSURE:**

**EYE CONTACT:** Contact with liquid or cold vapor can cause freezing of tissue.

**INGESTION:** Ingestion is not a likely route of exposure for Sulfur Hexafluoride.

**INHALATION:** Sulfur Hexafluoride is an asphyxiant. Exposure to an oxygen deficient atmosphere (less than 19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing less than 12% oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help themselves.

**SKIN CONTACT:** Contact with liquid or cold vapor can cause frostbite.

**TARGET ORGANS:** None

**POTENTIAL HEALTH EFFECTS OF REPEATED EXPOSURE:**

**ROUTE OF ENTRY:** None

**SYMPTOMS:** None

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** None

**CARCINOGENICITY:** Sulfur Hexafluoride is not listed as a carcinogen or potential carcinogen by NPT, IARC, or OSHA Subpart Z.

## SECTION 4. FIRST AID MEASURES

**EYE CONTACT:** Flush eyes with plenty of lukewarm water for several minutes. Seek medical attention immediately.

**INGESTION:** Ingestion is not a likely route of exposure for Sulfur Hexafluoride.

**INHALATION:** Remove person to fresh air. If not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.

**SKIN CONTACT:** If liquid Sulfur Hexafluoride comes in contact with skin, remove contaminated clothing and flush with plenty of lukewarm water for several minutes. Seek medical attention immediately.

**NOTES TO PHYSICIAN:** There is no specific antidote. Treatment for overexposure should be directed at the control of symptoms and the clinical condition.

## SECTION 5. FIRE FIGHTING MEASURES

**FLASH POINT : AUTOIGNITION: FLAMMABLE RANGE:**

Not applicable Nonflammable Nonflammable

**EXTINGUISHING MEDIA:** Sulfur Hexafluoride is nonflammable and does not support combustion. Use extinguishing media appropriate for the surrounding fire.

**SPECIAL FIRE FIGHTING INSTRUCTIONS:** Evacuate all personnel from area. If possible, remove cylinders from fire area or cool with water. Self-contained breathing apparatus (SCBA) may be required.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Most cylinders are designed to vent contents when exposed to elevated temperatures. Pressure in a cylinder can build up due to heat and it may rupture if pressure relief devices should fail to function.

**HAZARDOUS COMBUSTION PRODUCTS:** Sulfur Hexafluoride will not burn, however when exposed to high temperatures (greater than 400 °F) or open flame it can decompose and possibly form other compounds that may be highly toxic. These include sulfur dioxide, hydrogen fluoride, hydrogen sulfide, sulfur tetrafluoride and other sulfur fluoride compounds.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:** Evacuate immediate area. Increase ventilation to release area and monitor oxygen level. Use appropriate protective equipment (SCBA). Shut off source of leak if possible. Isolate any leaking cylinder. If leak is from container, pressure relief device or its valve, contact your supplier. If leak is in user's system, close cylinder valve and vent pressure before attempting repairs.

## SECTION 7. HANDLING AND STORAGE

**STORAGE:** Store cylinders in a well-ventilated, secure area, protected from the weather. Cylinders should be stored upright with valve outlet seals and valve protection caps in place. Do not allow storage temperature to exceed 125 ° F (52 ° C). Storage should be away from heavily traveled areas and emergency exits. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

**HANDLING:** Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a separate pressure reducing regulator to safely discharge gas from cylinder. Use a check valve to prevent

reverse flow into cylinder. Use piping and equipment adequately designed to withstand pressures to be encountered. If liquid product is being used, ensure steps have been taken to prevent entrapment of liquid in closed systems. The use of pressure relief devices may be necessary. Never apply flame or localized heat directly to any part of the cylinder. Do not allow any part of the cylinder to exceed 125 ° F (52 ° C). Once cylinder has been connected to process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings. Doing so may damage valve causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps. Sulfur Hexafluoride is compatible with all common materials of construction.

**SPECIAL REQUIREMENTS:** Always store and handle compressed gases in accordance with Compressed Gas Association, Inc. (telephone 703-412-0900) pamphlet CGA P-1, *Safe Handling of Compressed Gases in Containers*. Local regulations may require specific equipment for storage or use.

**CAUTION:** Users of this product must be aware of the hazards caused by the accumulation of high concentrations, especially in confined spaces. Compliance with OSHA regulations, especially 29 CFR 1910.146 (confined space entry), is essential.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**ENGINEERING CONTROLS:**

**VENTILATION:** Provide adequate ventilation and / or local exhaust to prevent accumulation of Sulfur Hexafluoride concentrations above 1000 ppm.

**RESPIRATORY PROTECTION:**

**Emergency Use:** Self Contained Breathing Apparatus (SCBA) or positive pressure air line with full-face mask and escape pack are to be used in oxygen deficient atmosphere. Air purifying respirators will not provide protection.

**EYE PROTECTION:** Safety glasses are recommended when handling, connecting, disconnecting cylinders, and when pressurizing systems

**SKIN PROTECTION:** Leather work gloves when handling cylinders.

**OTHER PROTECTIVE EQUIPMENT:** Safety shoes when handling cylinders.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE, ODOR, AND STATE:** Colorless and odorless gas.

**MOLECULAR WEIGHT:** 146.05

**BOILING POINT** (1 atm): -83 ° F (-63.9 ° C) [Sublimation point]

**SPECIFIC GRAVITY** (Air = 1): 5.11

**FREEZING POINT / MELTING POINT:** -58.9 ° F (-50.5 ° C)

**VAPOR PRESSURE** (At 70 ° F (21.1 ° C)): 310.2 psia

**GAS DENSITY** (At 70 ° F (21.1 ° C) and 1 atm): 0.383 lb/ft<sup>3</sup> (6.15 kg/m<sup>3</sup>)

**SOLUBILITY IN WATER** (Vol./Vol. at 77 ° F (25 ° C)): 0.55cc/100cc

## SECTION 10. STABILITY AND REACTIVITY

**CHEMICAL STABILITY:** Stable

**CONDITIONS TO AVOID:** Cylinders should not be exposed to temperatures in excess of 125 ° F (52 ° C).

**INCOMPATIBILITY (Materials to Avoid):** Avoid contact of a liquefied gas, such as Sulfur Hexafluoride, with water or hot reactive metals.

**REACTIVITY:**

**A) HAZARDOUS DECOMPOSITION PRODUCTS:** Upon exposure to high temperature or electric arcing, Sulfur Hexafluoride will form a number of sulfur fluoride compounds (SF<sub>4</sub>, S<sub>2</sub>F<sub>2</sub>, S<sub>2</sub>F<sub>10</sub>), with sulfur tetrafluoride (SF<sub>4</sub>) predominating. If moisture is present, other compounds, including hydrogen sulfide and hydrogen fluoride, may form. If contained in aluminum, stainless steel, copper, brass or silver, it will remain stable at elevated temperatures (less than 400 °F).

**B) HAZARDOUS POLYMERIZATION:** Will not occur.

## SECTION 11. TOXICOLOGICAL INFORMATION

**LC<sub>50</sub> (Inhalation):** Not applicable. Simple asphyxiant.

**LD<sub>50</sub> (Oral):** Not applicable

**LD<sub>50</sub> (Dermal):** Not applicable

**SKIN CORROSIVITY:** Sulfur Hexafluoride is not corrosive to the skin.

**ADDITIONAL NOTES:** None

## SECTION 12. ECOLOGICAL INFORMATION

**AQUATIC TOXICITY:** Not available

**MOBILITY:** Not available

**PERSISTENCE AND BIODEGRADABILITY:** Not available

**POTENTIAL TO BIOACCUMULATE:** High

**REMARKS:** Sulfur Hexafluoride does not contain any Class I or Class II ozone depleting chemicals.

Sulfur Hexafluoride has been identified as having the potential to contribute to global warming. Emissions could potentially contribute to long-term global warming due to its long atmospheric life. A 1993 study estimated the expected global temperature rise based on Sulfur Hexafluoride emissions to be 0.004 °C by the year 2010. However, the same study projects that atmospheric carbon dioxide will contribute to a temperature rise of 0.8 °C in the same time period.

## SECTION 13. DISPOSAL

**UNUSED PRODUCT / EMPTY CYLINDER:** Return cylinder and unused product to supplier. Do not attempt to dispose of unused product.

**WASTE DISPOSAL METHODS:** For emergency disposal, secure the cylinder and slowly discharge gas to the atmosphere in a well ventilated area or outdoors.

## SECTION 14. TRANSPORTATION INFORMATION

**DOT SHIPPING NAME:** Sulfur Hexafluoride

**HAZARD CLASS:** 2.2

**IDENTIFICATION NUMBER:** UN1080

**SHIPPING LABEL(s):** Nonflammable gas

**PLACARD (When required):** Nonflammable gas

**SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure upright position in a well-ventilated truck. Never transport in passenger compartment of a vehicle. Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.

**CAUTION:** Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner's written consent is a violation of federal law (49 CFR 173.301).

**NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (NAERG #):** 126

## SECTION 15. REGULATORY INFORMATION

### 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): Not established

**SARA TITLE III:** Superfund Amendment and Reauthorization Act

**SECTIONS 302/304:** Emergency Planning and Notification (40 CFR Part 355)

Extremely Hazardous Substances: Not applicable

Threshold Planning Quantity (TPQ): Not applicable

Reportable Quantity (RQ): Not applicable

**SECTIONS 311/312:** Hazardous Chemical Reporting (40 CFR Part 370)

IMMEDIATE HEALTH: Yes PRESSURE: Yes

DELAYED HEALTH: No REACTIVITY: No

FLAMMABLE: No

**SECTION 313:** Toxic Chemical Release Reporting (40 CFR Part 372)

This product does not require reporting under Section 313.

### CLEAN AIR ACT:

**SECTION 112 (r):** Risk Management Programs for Chemical Accidental Release

(40 CFR Part 68)

This product does not contain any substances regulated by this section.

Threshold Planning Quantity (TPQ): Not applicable

**TSCA:** Toxic Substance 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

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

Threshold Planning Quantity (RQ): Not applicable

**STATE REGULATIONS:**

**CALIFORNIA:**

Proposition 65: This product is not a listed substances which the State of California requires warning under this statute.

#### **SECTION 16. OTHER INFORMATION**

**HAZARD RATINGS:**

**NFPA RATINGS: HMIS RATINGS:**

HEALTH: 1 HEALTH: 0

FLAMMABILITY : 0 FLAMMABILITY: 0

REACTIVITY: 0 REACTIVITY: 0

SPECIAL: SA\*

\*Compressed Gas Association recommendation to designate simple asphyxiant.