

Material Safety Data Sheet

Prepared according to US OSHA, CMA, ANSI and Canadian WHMIS Standards.

SULFUR HEXAFLUORIDE



Section 1. Chemical product and company identification

Commercial name(s).	: SULFUR HEXAFLUORIDE
Synonym	: Sulfur fluoride
MSDS no.	: 20153
Product use	: Gaseous dielectric; plasma etching, leak detection; limited medical uses.
Manufactured/supplied Address	: 2700 Post Oak Drive Houston, TX 77056-8229
Emergency telephone number	: CHEMTREC: 1-800-424-9300
Telephone no.	
GENERAL MSDS INFORMATION	: 1-(713)-896-2896
Fax on Demand	: 1-(800)-231-1366

Section 2. Hazards identification

Physical state	: Gas.
OSHA/HCS status	: This material is classified hazardous under OSHA regulations in the United States and the WHMIS Controlled Product Regulation in Canada.
Emergency overview	: WARNING! HIGH PRESSURE GAS. GAS REDUCES OXYGEN AVAILABLE FOR BREATHING. Keep away from heat (<52°C/125°F). Use only with adequate ventilation. Extremely hazardous gas under pressure. Keep cylinder valve closed when the product is not used. Gas may accumulate in confined areas.
Routes of entry	: Inhalation. Dermal contact. Eye contact.
Potential acute health effects	
Inhalation	: Inhalation of this product may cause dizziness, an irregular heartbeat, narcosis, nausea or asphyxiation.
Skin	: No known significant effects or critical hazards.
Eyes	: No known significant effects or critical hazards.
Ingestion	: Since the product is a gas, it will probably be inhaled rather than ingested. See above.
Potential chronic health effects	: Carcinogenic effects: Not classified or listed by IARC, NTP, OSHA, EU and ACGIH. Mutagenic effects: Not available. Teratogenic effects: Not available.
Over-exposure signs/symptoms	
Inhalation	: No specific data.
Ingestion	: No specific data.
Skin	: No specific data.
Eyes	: No specific data.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

	CAS number	mole %
Canada Sulfur hexafluoride	2551-62-4	> 99.8

United States

Chemical name	CAS #	mole %	Occupational exposure limits	IDLH
Sulfur hexafluoride	2551-62-4	> 99.8	ACGIH TLV (United States, 1/2005). TWA: 5970 mg/m ³ 8 hour(s). Form: All forms. TWA: 1000 ppm 8 hour(s). Form: All forms. NIOSH REL (United States, 12/2001). TWA: 6000 mg/m ³ 10 hour(s). Form: All forms. TWA: 1000 ppm 10 hour(s). Form: All forms. OSHA PEL (United States, 8/1997). TWA: 6000 mg/m ³ 8 hour(s). Form: All forms. TWA: 1000 ppm 8 hour(s). Form: All forms.	NE

NE: Not Established

C: Ceiling Limit

See Section 16 for possible acronym definitions

See Sections 8, 11, 14 and 15 for details.

Section 4. First aid measures

Prompt medical attention is mandatory in all cases of overexposure to this gas. Rescue personnel should wear a self-contained breathing apparatus.

Inhalation : In case of inhalation, conscious persons should be assisted to an uncontaminated area and inhale fresh air. The person should be kept warmed and calm. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

Skin contact : Not applicable.

Eye contact : Not applicable.

Ingestion : Since the product is a gas, it will probably be inhaled rather than ingested. See above.

Notes to physician : The medical doctor must be warned that the person may suffer from anoxia.

Section 5. Fire fighting measures

Flammability of the product : Non-flammable.

Products of combustion : Decomposition products may include the following materials:
sulfur oxides
halogenated compounds

Explosion hazards in the presence of various substances : Container explosion may occur under fire conditions or when heated.

Fire-fighting media and instructions : Use an extinguishing agent suitable for the surrounding fire.

Apply water from a safe distance to cool container and protect surrounding area.

Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : EVACUATE ALL PERSONNEL FROM AFFECTED AREA.
Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is on cylinder or cylinder valve, contact the closest Air Liquide location.
- Environmental precautions** : In case of a leak, clear the affected area, protect people, eliminate sources of ignition and respond with trained personnel.
- If leaking incidentally from the cylinder or its valve, contact your supplier. Use non-sparking tools and equipment during the response.
- Methods for cleaning up** : Contact your local Air Liquide Gas supplier for details.

Section 7. Handling and storage

- Handling** : Valve protection caps must remain in place unless cylinder is secured with valve outlet piped to usage point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow to the cylinder. Do not tamper with (valve) safety device. Close valve after each use and when empty.
- Storage** : Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non combustible construction away from heavy traffic areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 52°C/125°F. Cylinders must be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no source of ignition in the storage or use area.

Section 8. Exposure controls/personal protection

- Engineering controls** : Use only in well-ventilated areas. Gas may accumulate in confined areas. Gas is heavier than air and will therefore accumulate in low lying areas.
- Personal protection**
- Respiratory** : Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% (air purifying respirators will not function) or during emergency response to a release of this gas. During an emergency situation, before entering the area, check for oxygen-deficient atmospheres. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standard.
- Hands** : Wear leather gloves when handling cylinders of this gas. Otherwise, wear glove protection appropriate to the specific operation for which this gas is used.
- Eyes** : Safety glasses with side shields.
- Skin/Body** : Use body protection appropriate for task. Cotton clothing is recommended for use to prevent static electric build-up. Pressurized product may require use of fire retardant clothing.
Metal cap, safety shoes are recommended when handling cylinders.



Some applications of this product may require additional or other specific protective clothings. Please consult your supervisor.

Personal protection in case of a major leak : Safety glasses with side shields, goggles or face shield. Impervious gloves. Protective clothing. Metal cap, safety shoes. Wear MSHA/NIOSH-approved self-contained breathing apparatus or equivalent and full protective gear.

Product name**Canada**

Sulfur hexafluoride

Exposure limits**ACGIH TLV (United States, 1/2006).**TWA: 5970 mg/m³ 8 hour(s). Form: All forms.**United States**

Sulfur hexafluoride

ACGIH TLV (United States, 1/2006).TWA: 5970 mg/m³ 8 hour(s). Form: All forms.**NIOSH REL (United States, 12/2001).**TWA: 6000 mg/m³ 10 hour(s). Form: All forms.**OSHA PEL (United States, 11/2006).**TWA: 6000 mg/m³ 8 hour(s). Form: All forms.

NE: Not Established

Section 9. Physical and chemical properties

Physical state	: Gas.
Color	: Colorless.
Odor	: Odorless.
Molecular weight	: 146.06 g/mole
Molecular formula	: SF ₆
pH	: 1 to 4 [Conc. (% w/w): 1%]
Melting/freezing point	: Sublimation temperature: -64.15°C (-83.5°F)
Specific gravity	: 1.56 (Air = 1)
Vapor density	: 5.1 [Air = 1]

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information**Acute Effects**

Inhalation	: Inhalation of this product may cause dizziness, an irregular heartbeat, narcosis, nausea or asphyxiation.
Skin	: No known significant effects or critical hazards.
Eyes	: No known significant effects or critical hazards.
Ingestion	: Since the product is a gas, it will probably be inhaled rather than ingested. See above.
Potential chronic health effects	: Carcinogenic effects: Not classified or listed by IARC, NTP, OSHA, EU and ACGIH. Mutagenic effects: Not available. Teratogenic effects: Not available.

Section 12. Ecological information




Products of degradation : These gases are released as is in the atmosphere.

Section 13. Disposal considerations

Disposal : Residual materials contained in customer-owned cylinders should be disposed of in accordance with Federal, State and Local regulations on waste management. For residual materials contained in cylinders owned by Air Liquide, contact Sales or Customer Service to determine appropriate disposal. Do not return cylinders without authorization from Air Liquide.

14 . Transport information

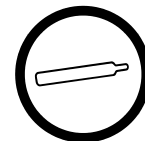
AERG : 126

Regulatory information	Proper shipping name	Class	UN number	PG	Label
UN / IMDG / IATA Classification	SULFUR HEXAFLUORIDE	2.2	UN1080	-	
DOT Classification	SULFUR HEXAFLUORIDE	2.2	UN1080	-	
TDG Classification	SULFUR HEXAFLUORIDE; OR SULPHUR HEXAFLUORIDE	2.2	UN1080	-	
Additional information	UN	IMDG	IATA	DOT	TDG
	-	-	Passenger and Cargo Aircraft Quantity limitation: 75 kg	Limited quantity Yes.	-
			Cargo Aircraft Only Quantity limitation: 150 kg	Packaging instruction Passenger aircraft Quantity limitation: 75 kg Cargo aircraft Quantity limitation: 150 kg	

Cylinders should be transported in a secure position, in a well ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

Section 15. Regulatory information

Canada
WHMIS (Canada) : Class A: Compressed gas.



Canada inventory: This material is listed or exempted.
CEPA DSL: All components listed.

United States
OSHA HAZARD COMMUNICATION STANDARD (29CFR PART 1910.1200).

Compressed gas

SARA 302/304 emergency planning and notification: No products were found.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Sulfur hexafluoride: Sudden release of pressure

CERCLA: Hazardous substances.: No products were found.

US INVENTORY (TSCA)

TSCA 8(b) inventory: All components listed.

State regulations

California prop. 65: No products were found.

Connecticut Carcinogen Reporting: This material is not listed.

Connecticut Hazardous Material Survey: This material is not listed.

Florida substances: This material is not listed.

Illinois Chemical Safety Act: This material is not listed.

Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.

Louisiana Reporting: This material is not listed.

Louisiana Spill: This material is not listed.

Massachusetts Spill: This material is not listed.

Massachusetts Substances: This material is listed.

Michigan Critical Material: This material is not listed.

Minnesota Hazardous Substances: This material is not listed.

New Jersey Hazardous Substances: This material is listed.

New Jersey Spill: This material is not listed.

New Jersey Toxic Catastrophe Prevention Act: This material is not listed.

New York Acutely Hazardous Substances: This material is not listed.

New York Toxic Chemical Release Reporting: This material is not listed.

Pennsylvania RTK Hazardous Substances: This material is listed.

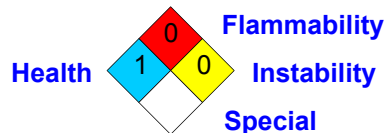
Rhode Island Hazardous Substances: This material is not listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.) :

Health	1
Fire hazard	0
Reactivity	0
Personal protection	G

National Fire Protection Association (U.S.A.) :



Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about gas mixtures can be found in pamphlets published by: Compressed Gas Association Inc (CGA), 4221 Walney Road, 5th floor, Chantilly, VA 20151-2923 Telephone: (703) 788-2700.

Acronyms

- : ACGIH: American Conference of Governmental Industrial Hygiene.
- IARC: International Agency for Research on Cancer.
- NIOSH: National Institute of Occupational Safety and Health.
- OSHA: Occupational Safety and Health Administration
- NTP: National Toxicology program.
- OECD: Organisation for Economic Co-operation and Development.
- PEL: Permissible Exposure Limit.
- IDLH: Immediately Dangerous to Life and Health.
- NE: Not established.
- C: Ceiling Limit.
- DSL: Domestic Substance List.
- NDSL: Non-Domestic Substance List.
- CFR: Code of Federal Regulations.
- TSCA: Toxic Substance Control Act.

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Notice to reader

This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200, American National Standard Institute Z400.1, 2004, the Canadian Workplace Hazardous Material Information Systems (WHMIS). Other government regulations must be reviewed for applicability to this gas mixture. To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.