SILICON TETRAFLUORIDE

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	SILICON TETRAFLUORIDE
Product Code(s)	G-77, 1042
UN-No	UN1859
Recommended Use	Compressed gas.
Synonyms	Tetrafluorosilane; Silane, tetrafluoro-; Perfluorosilane; Silicon Fluoride
Supplier Address	Linde LLC 575 Mountain Ave. Murray Hill, NJ 07974 Phone: 908-464-8100 www.lindeus.com Linde Gas Puerto Rico, Inc. Las Palmas Village Road No. 869, Street No. 7 Catano, Puerto Rico 00962 Phone: 787-641-7445 www.pr.lindegas.com Linde Canada Limited 5860 Chedworth Way Mississauga, Ontario L5R 0A2 Phone: 905-501-1700 www.lindecanada.com For additional product information contact your local customer service.
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Corrosive
Fatal if inhaled.
The product causes burns of eyes, skin and mucous membranes
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless **Physical State** Compressed gas. **Odor** Sharp, Irritating

OSHA Regulatory Status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Eye contact. Skin contact. Inhalation.
Acute Toxicity	
Inhalation	Fatal if inhaled. Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might occur.
Eyes	Corrosive to the eyes and may cause severe damage including blindness.
Skin	Contact causes severe skin irritation and possible burns. Symptoms may be delayed.
Skin Absorption Hazard	No known hazard by skin absorption.
Ingestion	Not an expected route of exposure. Ingestion causes burns of the upper digestive and respiratory tract.
Chronic Effects	Extended low level systemic absorption of fluorides may cause fluorosis, an abnormal calcification patter of the skeletal system.
Aggravated Medical Conditions	Bone. Respiratory disorders. Skin disorders. Pre-existing eye disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Silicon Tetrafluoride	7783-61-1	>99	SiF_4

4. FIRST AID MEASURES

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye Contact	Immediate medical attention is required. In case of contact with substance, immediately flush eyes with running water for at least 30 minutes.
Skin Contact	Immediate medical attention is required. Wash off immediately with soap and plenty of water for at least 30 minutes while removing all contaminated clothing and shoes. Dermal burns may be treated with calcium gluconate gel or slurry in water or glycerine. This compound binds the active fluorides in an insoluble form and limits burn extension and pain.
Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
Ingestion	Not an expected route of exposure. Immediate medical attention is required. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or Poison Control Center immediately.
Notes to Physician	For dermal exposure, the use of 2.5-33% calcium gluconate or carbonate gel or slurry has been recommended. The gel is either placed into a surgical glove into which the affected extremity is then placed or applied directly on the burn. This compound binds with the active fluorides in an insoluble form and limits burn extension and pain. Calcium chloride should not be used.

Protection of First-aiders	Use personal protective equipment. Avoid contact with skin, eyes and clothing.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not flammable.
Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable Extinguishing Media	May react violently with water.
Hazardous Combustion Products	Fluoride compounds.
Explosion Data	
Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	Will react with water to form hydrogen fluoride and silicic acid. The product causes burns of eyes, skin and mucous membranes. In the event of fire and/or explosion do not breathe fumes. Do not allow run-off from fire fighting to enter drains or water courses. Runoff may pollute waterways. Contact with water will cause hydrolysis to Hydrofluoric acid. Cylinders may rupture under extreme heat. Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Additional chemical protective clothing may be required to protect from toxic decomposition products.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
Environmental Precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas. Do not allow material to contaminate ground water system. Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde or an authorized distributor.

7. HANDLING AND STORAGE

Handling

Keep equipment scrupulously dry. Many of the metal fluorides are water soluble so that the passive film corrosion protection may be destroyed if wetted with water. Gasketing materials should be Teflon® or Kel-F®. Wetted surfaces should be passivated with an "active" fluorine compound to establish a metal fluoride coating for additional protection. Many metal fluorides are water soluble so that the passive film corrosion protection may be destroyed if wetted with water.

Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar,etc.) into valve cap openings. Doing so may damage valve, causing leak to occur.

Use an adjustable strap wrench to remove over-tight or rusted caps. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Storage

Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregrated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Silicon Tetrafluoride 7783-61-1	TWA: 2.5 mg/m^3 F	TWA: 2.5 mg/m^3 F	-

Other Exposure Guidelines

Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Engineering Measures

Showers. Eyewash stations. Ventilation systems. Exhaust gas should be vented to a gas treatment system.

Ventilation

Use ventilation adequate to keep exposures below recommended exposure limits.

Personal Protective Equipment

Eye/Face Protection

Tightly fitting safety goggles. Face-shield.

Skin and Body Protection

Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction consult protective clothing manufacturer's specifications.

Respiratory Protection

General Use

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Emergency Use	Use positive pressure air line respirator or self-contained breathing apparatus for exposure over exposure limits or emergency use.
Hygiene Measures	Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing before re-use. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	Odor	Sharp, Irritating.
Odor Threshold	No information available.	Physical State	Compressed gas
Flash Point	No information available.	Autoignition Temperature	No information available
Decomposition Temperature	No information available	Boiling Point/Range	(Sublimes) -95.1°C / -139°F
Freezing Point	-90°C / -130°F	Molecular Weight	104.08
Water Solubility	Hydrolyzes	Evaporation Rate	No information available
Vapor Pressure	Above critical temp.	Vapor Density	3.55 (air = 1)
VOC Content (%)	Not applicable	Flammability Limits in Air	
		Upper	Not applicable
		Lower	Not applicable

10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions.
Incompatible Products	Alkaline earth metals.
Conditions to Avoid	Will react with water to form hydrogen fluoride and silicic acid. Mixtures of sodium and silicon tetrachloride are shock sensitive explosives.
Hazardous Decomposition Products	Hydrogen fluoride. Silicic acid.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral:	No information available.
LD50 Dermal:	No information available.
LC50 Inhalation:	Per CGA P-20:450 ppm/ 1 hr. (Rat)
Inhalation	Toxic effects observed in the respiratory system and kidneys of rats exposed at 300 ppm for 5 hours.
Repeated Dose Toxicity	No information available.

Chronic Toxicity

Chronic Toxicity	Extended low level systemic absorption of fluorides may cause fluorosis, an abnormal calcification patter of the skeletal system.

Carcinogenicity	Contains no ingredient listed as a carcinogen.
Irritation	No information available.
Sensitization	No information available.
Reproductive Toxicity	No information available.
Developmental Toxicity	No information available.
Synergistic Materials	None known.
Target Organ Effects	Respiratory system. Eyes. Skin. Bone.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods	Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.
Contaminated Packaging	Do not re-use empty containers.

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1859
Description	UN1859,Silicon tetrafluoride,2.3,(8)
Additional Description:	"Toxic-Inhalation Hazard Zone B".
Additional Marking Requirements:	"Inhalation Hazard".
Emergency Response Guide Number	125

TDG

Proper Shipping Name	Silicon tetrafluoride, compressed
Hazard Class	2.3
Subsidiary Class	(8)
UN-No	UN1859
Description	UN1859,SILICON TETRAFLUORIDE, COMPRESSED,2.3(8)

MEX

Proper Shipping Name	Silicon tetrafluoride, compressed
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1859
Description	UN1859 Silicon tetrafluoride, compressed,2.3(8)

IATA

UN-No	UN1859
Proper Shipping Name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary Class	8
ERG Code	2CP
Description	UN1859,Silicon tetrafluoride,2.3(8)
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	No information available.

IMDG/IMO

Proper Shipping Name	Silicon tetrafluoride, compressed
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1859
EmS No.	F-C, S-U
Description	UN1859, Silicon tetrafluoride, compressed,2.3(8)

ADR

Proper Shipping Name	Silicon tetrafluoride
Hazard Class	2.3
UN-No	UN1859
Classification Code	2TC
Description	UN1859 Silicon tetrafluoride,2.3,(8)
ADR/RID-Labels	8

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	Yes

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs
This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.
This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Silicon Tetrafluoride		X			X

International Regulations

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
A Compressed gases
E Corrosive material
D1A Very toxic materials

16. OTHER INFORMATION

Prepared By	Product Stewardship 23 British American Blvd. Latham, NY 12110 1-800-572-6501
Issuing Date	01-Jul-2010
Revision Date	
Revision Number	0
Revision Note	Initial Release.

NFPA	**Health Hazard** 3	**Flammability** 0	**Stability** 0	**Physical and Chemical Hazards** W1**
HMIS	**Health Hazard** 2*	**Flammability** 0	**Physical Hazard** 3	**Personal Protection** -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

End of Safety Data Sheet