Safety Data Sheet

Version 4.0 SDS Number 300000000121
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1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Silicon tetrafluoride
Chemical formula	:	SiF4
Synonyms	:	Silicon tetrafluoride, Tetrafluorosilane
Product Use Description	:	General Industrial
Manufacturer/Importer/Distributor	:	Versum Materials US, LLC 8555 South River Parkway Tempe, AZ 85284 Exporter EIN No.475632014 www.versummaterials.com
Telephone	:	(602)282-1000
Emergency telephone number (24h)	:	800-523-9374 USA +1 610 481 7711 International

2. HAZARDS IDENTIFICATION

GHS classification

Gases under pressure - Liquefied gas.
Acute toxicity - Inhalation Category 2
Skin corrosion - Category 1A
Serious Eye Damage - Category 1

GHS label elements

Hazard pictograms/symbols

Signal Word: Danger

Hazard Statements:

H280:Contains gas under pressure; may explode if heated.
H314:Causes severe skin burns and eye damage.
H330:Fatal if inhaled.

Precautionary Statements:

Prevention	:	P260:Do not breathe dust/fume/gas/mist/vapours/spray. P264:Wash hands thoroughly after handling. P271:Use only outdoors or in a well-ventilated area P280:Wear protective gloves/protective clothing/eye protection/face protection. P284:Wear respiratory protection.
Response	:	P301+P330+P331 :IF SWALLOWED: rinse mouth. Do NOT induce vomiting. P303+P361+P353 :IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P304+P340 :IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P305+P351+P338 :IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 :Immediately call a POISON CENTRE/doctor. P363 :Wash contaminated clothing before reuse.
Storage	:	P403+P233:Store in a well-ventilated place. Keep container tightly closed. P405:Store locked up. P410+P403:Protect from sunlight. Store in a well-ventilated place.
Disposal	:	P501:Disposal of contents/container to be specified in accordance with regulations.

Hazards not otherwise classified

Toxic by inhalation.
Use a back flow preventative device in the piping.
Use only with equipment purged with and inert gas or evacuated prior to discharge.
Use only with equipment of compatible materials of construction, rated for cylinder pressure.
Do not open valve until connected to equipment prepared for use.
When returning cylinder install valve outlet cap or plug leak tight.
Close valve after each use and when empty.
High pressure gas.
May react violently with water.
Do not breathe gas.
Corrosive to eyes, respiratory system and skin.
Wear self-contained breathing apparatus and protective suit.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)

Silicon tetrafluoride	7783-61-1	> 95%

Concentration is nominal. For the exact product composition, please refer to technical specifications.

4. FIRST AID MEASURES

General advice : The potential for hydrogen fluoride formation exists with every exposure, therefore its toxicity must also be considered. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Use chemically protective clothing.

Eye contact : Irrigate eye intermittently for 20 minutes with an aqueous calcium gluconate 1% solution, if available. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Keep eye wide open while rinsing.

Skin contact : With gloved hand apply 2.5% calcium gluconate gel to the burn area. Alternative treatment is to soak the affected areas in an iced 0.13% water solution (1:750) of Zephiran® chloride (benzalkonium chloride solution, NF). Use ice cubes, not shaved ice, to prevent frostbite. If soaking is impractical, soaks or compresses may be used. (Do not us Zephiran® for burns of the eye.) If immersion is impractical, soaked compresses of the same solution should be applied to the area. Flush with copious amounts of water until treatment is available. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and badly.

Ingestion : Ingestion is not considered a potential route of exposure.

Inhalation : As soon as possible give 2.5% to 3% calcium gluconate solution by nebulizer. Move to fresh air. In case of shortness of breath, give oxygen. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Mouth to mouth resuscitation is not recommended. Consult a doctor.

Inhalation : No data available.

Immediate Medical Attention and Special Treatment

Treatment : If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : All known extinguishing media can be used.

Specific hazards : Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Product is nonflammable and does not support combustion. Use of water may result in the formation of very toxic aqueous solutions. Move away from container and cool with water from a protected position. Do not allow run-off from fire fighting to enter drains or water courses. Keep containers and surroundings cool with water spray. If possible, stop flow of product. Most

cylinders are designed to vent contents when exposed to elevated temperatures.

Special protective equipment for fire-fighters	:	Use self-contained breathing apparatus and chemically protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures	:	Evacuate personnel to safe areas. Approach suspected leak areas with caution. Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate the area.
Environmental precautions	:	Should not be released into the environment. Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	:	Ventilate the area. Reduce vapor with fog or fine water spray.
Additional advice	:	If possible, stop flow of product. Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.

7. HANDLING AND STORAGE

Handling

Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shock. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a

compressed gas cylinder or make a cylinder a part of an electrical circuit. Keep container valve outlets clean and free from contaminates particularly oil and water. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Installation of a cross purge assembly between the cylinder and the regulator is recommended. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F).

Storage

Use a back flow preventative device in the piping. Use only with equipment purged with and inert gas or evacuated prior to discharge. Use only with equipment of compatible materials of construction, rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. When returning cylinder install valve outlet cap or plug leak tight. Close valve after each use and when empty. Read and follow the Safety Data Sheet (SDS) before use. Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Full containers should be stored so that oldest stock is used first. Observe all regulations and local requirements regarding storage of containers. Stored containers should be periodically checked for general condition and leakage. Local codes may have special requirements for toxic gas storage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Return empty containers in a timely manner.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance whit local regulations. Keep away from combustible material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

Respiratory protection	:	Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Users of breathing apparatus must be trained.
Hand protection	:	Sturdy work gloves are recommended for handling cylinders. Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Eye protection	:	Safety glasses recommended when handling cylinders. A full faceshield should be worn in addition to safety glasses when connecting,

disconnecting or opening cylinders.

Skin and body protection	:	Safety shoes are recommended when handling cylinders.
Special instructions for protection and hygiene	:	Ensure adequate ventilation, especially in confined areas. Provide good ventilation and/or local exhaust to prevent accumulation of concentrations above exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Compressed gas. Gives off white fumes in moist air
Odor	:	Pungent.
Odor threshold	:	No data available.
pH	:	Not applicable.
Melting point/range	:	-124 °F (-86.8 °C)
Boiling point/range	:	-139 °F (-95.2 °C)
Flash point	:	Not applicable.
Evaporation rate	:	Not applicable.
Flammability (solid, gas)	:	Refer to product classification in Section 2
Upper/lower explosion/flammability limit	:	No data available.
Vapor pressure	:	Not applicable.
Water solubility	:	Hydrolyses.
Relative vapor density	:	3.6 (air = 1)
Relative density	:	No data available.
Partition coefficient (n-octanol/water)	:	Not applicable.
Auto-ignition temperature	:	No data available.
Decomposition temperature	:	No data available.
Viscosity	:	Not applicable.

Molecular Weight	:	104 g/mol
Density	:	0.268 lb/ft3 (0.0043 g/cm3) at 70 °F (21 °C) Note: (as vapor)
Specific Volume	:	3.69 ft3/lb (0.2304 m3/kg) at 70 °F (21 °C)

10. STABILITY AND REACTIVITY

Chemical Stability	:	Stable under normal conditions.
Conditions to avoid	:	No data available.
Materials to avoid	:	No data available.
Hazardous decomposition products	:	No data available.
Possibility of hazardous Reactions/Reactivity	:	No data available.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye	:	Irritating to eyes. Causes severe eye burns. May cause permanent eye injury.
Effects on Skin	:	Causes skin irritation. Causes skin burns.
Inhalation Effects	:	Irritating to respiratory system. Can cause severe lung damage. Delayed adverse effects possible. Prolonged exposure to small concentrations may result in pulmonary edema. Delayed fatal pulmonary edema possible.
Ingestion Effects	:	Ingestion is not considered a potential route of exposure.
Symptoms	:	No data available.

Acute toxicity

Acute Oral Toxicity	:	No data is available on the product itself.
Inhalation	:	LC50 (1 h) : 922 ppm Species : Rat.
Acute Dermal Toxicity	:	No data is available on the product itself.
Skin corrosion/irritation	:	Causes skin burns.
Serious eye damage/eye irritation	:	Risk of serious damage to eyes.

Sensitization. : No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.

Reproductive toxicity : No data is available on the product itself.

Germ cell mutagenicity : No data is available on the product itself.

Specific target organ systemic toxicity (single exposure) : No data available.

Specific target organ systemic toxicity (repeated exposure) : No data available.

Aspiration hazard : No data available.

Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure

Asthma.

Animals exposed to hydrogen fluoride have exhibited kidney, lung, heart and liver damage., Direct toxicity of this material may be accompanied by fluoride absorption and systemic depletion of calcium ion, an essential electrolyte. Chronic exposure may cause abnormal calcification in the bone structure (fluorosis) due to low level systemic absorption offluoride. Fluoride toxicity from acute inhalation exposure to this product is unlikely due to the noxious and corrosive nature of this gas. Death from respiratory tract damage would likely occur before significant amounts of fluoride are absorbed., The potential for hydrogen fluoride formation exists with every exposure; therefore, its toxicity must also be considered.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : May cause pH changes in aqueous ecological systems.

Toxicity to other organisms : No data available.

Persistence and degradability

Biodegradability : No data is available on the product itself.

Mobility : Because of its high volatility, the product is unlikely to cause ground pollution.

Bioaccumulation : Refer to Section 9 "Partition Coefficient (n-octanol/water)".

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	:	In accordance with local and national regulations. Return unused product in original cylinder to supplier. Contact supplier if guidance is required. Must not be discharged to atmosphere.
Contaminated packaging	:	Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

UN/ID No.	:	UN1859
Proper shipping name	:	Silicon tetrafluoride
Class or Division	:	2.3
Label(s)	:	2.3 (8)
PIH Zone	:	B
Marine Pollutant	:	No

IATA

Transport Forbidden

IMDG

UN/ID No.	:	UN1859
Proper shipping name	:	SILICON TETRAFLUORIDE
Class or Division	:	2.3
Label(s)	:	2.3 (8)
Marine Pollutant	:	No

TDG

UN/ID No.	:	UN1859
Proper shipping name	:	SILICON TETRAFLUORIDE, COMPRESSED
Class or Division	:	2.3
Label(s)	:	2.3 (8)
Marine Pollutant	:	No

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

15. REGULATORY INFORMATION

Toxic Substance Control Act (TSCA) 12(b) Component(s):

None.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification
Acute Health Hazard

Sudden Release of Pressure Hazard.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

NFPA Rating

Health : 4
Fire : 0
Instability : 0
Special :

HMIS Rating

Health : 2
Flammability : 0
Physical hazard : 3

Prepared by : Versum Materials, Product Regulatory Department

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Preparation Date : 12/16/2017

For additional information, please visit Versum Materials' Product Stewardship web site.

http://www.versummaterials.com/productstewardship/