

Safety Data Sheet

Version 4.0

Revision Date 12/08/2016

SDS Number 300000000150

Print Date 12/16/2017

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Silicon Tetrachloride

Chemical formula : SiCl_4

Synonyms : Silicon tetrachloride, Tetrachlorosilane, Silicon Chloride

Product Use Description : General Industrial

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc
7201 Hamilton Blvd.
Allentown, PA 18195-1501
GST No. 123600835 RT0001
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate
1-800-345-3148 Chemicals Cust Serv
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA
+1 610 481 7711 International

2. HAZARDS IDENTIFICATION

GHS classification

Acute toxicity - Oral Category 3
Acute toxicity - Inhalation Category 3
Skin corrosion - Category 1B
Serious Eye Damage - Category 1
Specific target organ toxicity - single exposure - Inhalation Category 3

GHS label elements

Hazard pictograms/symbols



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Signal Word: Danger

Hazard Statements:

H301+H331: Toxic if swallowed or if inhaled

H314: Causes severe skin burns and eye damage.

H335: May cause respiratory irritation.

Precautionary Statements:

Prevention

: P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
P264: Wash hands thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area
P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response

: P301+P310 :IF SWALLOWED: Immediately call a POISON CENTER/doctor.
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.

Disposal

: P501: Disposal of contents/container to be specified in accordance with regulations.

Hazards not otherwise classified

Reacts with water to form corrosive acids.

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 tetrachloride	10026-04-7	100 %

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

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4. FIRST AID MEASURES

- General advice : 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 : 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 : 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 : Drink plenty of water. Do not induce vomiting. Never give anything by mouth to an unconscious person.
- Inhalation : 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.
- Most important symptoms/effects - acute and delayed : Irritating to eyes and respiratory system. Gum bleeding. Cough. Discoloration of teeth. Acute or chronic respiratory conditions.

Immediate Medical Attention and Special Treatment

- Treatment : Liberation of hydrogen chloride may cause corrosive effects to the mucous membranes. Swallowed, it may produce ulceration and possibly perforation in the upper alimentary tract. Mediastinitis or peritonitis and the complications thereof may develop. Massive overexposure to the vapor may cause delayed-onset pulmonary edema. Secondary infection may develop in the inflamed respiratory tract. Patients should be kept under observation. Aspirated material may produce lung injury. Emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, this should be undertaken by means least likely to result in aspiration (e.g. in the presence of airway intubation). Caution should be taken to avoid perforation of an acutely inflamed or ulcerated area of the alimentary tract. 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

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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

Carbon steel, stainless steel, Monel or copper are suitable materials of construction when no moisture is present. 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

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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 contaminants 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

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 with 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 | : Wear working gloves when handling gas containers. 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. Wear goggles and a face shield when transfilling or breaking transfer connections. |
| Skin and body protection | : Acid resistant gloves (e.g. butyl rubber, neoprene, polyethylene) and splash suit when connecting, disconnecting or opening cylinders. |

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Encapsulated chemical protective suit in emergency situations.
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.

Exposure limit(s)

Silicon tetrachloride	Ceiling Limit Value: WEEL	1 ppm	-
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9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Liquid. Colorless.
Odor	: Pungent.
Odor threshold	: No data available.
pH	: No data available.
Melting point/range	: -94 °F (-70 °C)
Boiling point/range	: 136 °F (57.6 °C)
Flash point	: Does not flash.
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Upper/lower explosion/flammability limit	: Not applicable.
Vapor pressure	: 195.49 mmHg at 68 °F (20 °C)
Water solubility	: Hydrolyses.
Relative vapor density	: 5.86 (air = 1)
Relative density	: No data available.
Partition coefficient (n-octanol/water)	: No data available.
Auto-ignition temperature	: No data available.

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Decomposition temperature	: No data available.
Viscosity	: No data available.
Molecular Weight	: 169.9 g/mol
Density	: 91.769 lb/ft3 (1.47 g/cm3) at 70 °F (21 °C)
Specific Volume	: 1.70 ft3/lb (0.1059 m3/kg) at 70 °F (21 °C)

10. STABILITY AND REACTIVITY

Chemical Stability	: Stable under normal conditions.
Conditions to avoid	: Exposure to moisture.
Materials to avoid	: Strong bases.
Hazardous decomposition products	: Hydrogen chloride, oxides of silicon and chlorine compounds.
Possibility of hazardous Reactions/Reactivity	: No data available.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye	: Causes eye burns. May cause blindness. Irritating to eyes. Causes severe eye burns. May cause permanent eye injury.
Effects on Skin	: Causes skin burns. Causes skin irritation. Causes skin burns.
Inhalation Effects	: Toxic by inhalation. Can cause severe eye, skin and respiratory tract burns. Risk of serious damage to the lungs (by inhalation). Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system. Irritating to respiratory system. Prolonged exposure to small concentrations may result in pulmonary edema. Delayed adverse effects possible.
Ingestion Effects	: Causes severe digestive tract burns. Harmful if swallowed.
Symptoms	: Irritating to eyes and respiratory system. Gum bleeding. Cough. Discoloration of teeth. Acute or chronic respiratory conditions.

Acute toxicity

Acute Oral Toxicity	: LD50 : 238 mg/kg Species : Rat.
Inhalation	: LC50 (1 h) : 1312 ppm Species : Rat.

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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) : May cause respiratory irritation.

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

Acute or chronic respiratory conditions.
Asthma.

Pregnant rats exposed for one hour to 300 ppm hydrochloric acid had a five-fold higher incidence of fetal death than control rats. In addition, the surviving rat pups showed disturbances in kidney function., This material has been evaluated in a battery of tests and has not caused mutations or chromosomal damage.

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.

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

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Return unused product in original cylinder to supplier. Contact supplier if guidance is required.

Contaminated packaging : Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

UN/ID No. : UN1818
Proper shipping name : Silicon tetrachloride
Class or Division : 8
Packing group : II
Label(s) : 8
Marine Pollutant : No

IATA

This material is forbidden from air transport in accordance with Air Products internal company safety policy.

IMDG

UN/ID No. : UN1818
Proper shipping name : SILICON TETRACHLORIDE
Class or Division : 8
Packing group : II
Label(s) : 8
Marine Pollutant : No

TDG

UN/ID No. : UN1818
Proper shipping name : SILICON TETRACHLORIDE
Class or Division : 8
Packing group : II
Label(s) : 8
Marine Pollutant : No

Further Information

The transportation information is not intended to convey all specific regulatory data relating to this

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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 EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
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

EPA SARA Title III Section 313 (40 CFR 372) Component(s) above 'de minimus' level

None.

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 : 3
Fire : 0
Instability : 1

HMIS Rating

Health : 3
Flammability : 0
Physical hazard : 2

Prepared by : Air Products and Chemicals, Inc. Global EH&S Department

Telephone : 1-610-481-4911 Corporate

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1-800-345-3148 Chemicals Cust Serv
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Preparation Date : 12/16/2017

For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>
