Safety data sheet
Silicon tetrachloride

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product name
Silicon tetrachloride

EC No (from EINECS): 233-054-0
CAS No: 10026-04-7
Index-Nr. 014-002-00-4
Chemical formula $SiCl_4$
REACH Registration number:
Not available.

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.
Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
BOC, Priestley Road, Worsley, Manchester M28 2UT
E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 0800 111 333

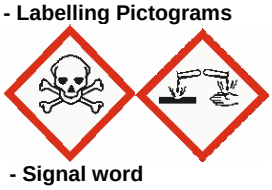
SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Acute Tox. 3 - Toxic if swallowed.
Acute Tox. 3 - Toxic if inhaled.
Skin Corr. 1A - Causes severe skin burns and eye damage.
Eye Dam. 1 - Causes serious eye damage.

Classification acc. to Directive 67/548/EEC & 1999/45/EC
Proposed by the industry
Xn; R20/22 **|** R14 **|** C; R35 **|** Xi; R37
Harmful by inhalation and if swallowed
Reacts violently with water
Causes severe burns.
Irritating to respiratory system

2.2. Label elements
- Labelling Pictograms



- Signal word

Danger

- Hazard Statements

H301	Toxic if swallowed.
H331	Toxic if inhaled.
H314	Causes severe skin burns and eye damage.
EUH014	Reacts violently with water.
EUH071	Corrosive to the respiratory tract.

- Precautionary Statements

Precautionary Statement Prevention

P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
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.

Precautionary Statement Response

P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P304+P340+P315	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338+P315	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Precautionary Statement Storage

P403 + P233	Store in a well-ventilated place. Keep container tightly closed.

Precautionary Statement Disposal
None

2.3. Other hazards
None.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Silicon tetrachloride
CAS No: 10026-04-7
Index-Nr.: 014-002-00-4
EC No (from EINECS): 233-054-0
REACH Registration number:
Not available.

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures
First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Skin / Eye:

For liquid spillage - flush with water for at least 15 minutes.
Immediately flush eyes thoroughly with water for at least 15 minutes. Obtain medical assistance.
First Aid Ingestion:
Do not give victim anything to drink if they are unconscious. Do not induce vomiting.
Rinse mouth with water, call a doctor.

4.2. Most important symptoms and effects, both acute and delayed
Causes serious irritation to cornea (with temporary disturbance to vision). Irritating to eyes, respiratory system, mucous membranes and skin. Symptoms include: shortness of breath, headache and nausea.

4.3. Indication of any immediate medical attention and special treatment needed
Obtain medical assistance. Treat with a corticosteroid spray as soon as possible after inhalation.

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Alcohol-resistant foam. Dry Powder. Carbon dioxide. Water fog. Use water spray or fog to control fire fumes

Unsuitable extinguishing media
Do not use a solid water stream.

5.2. Special hazards arising from the substance or mixture
Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products
If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:
Hydrogen chloride gas, Silicon oxides.

5.3. Advice for fire-fighters
If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
Special protective equipment for fire fighters
Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.
EN 943-2:2002: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate area. Use self-contained breathing apparatus and chemically protective clothing. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Environmental precautions
Try to stop release.

6.3. Methods and material for containment and cleaning up
Ventilate area. Absorb excess liquid spillage on inorganic adsorbent material such as fine sand, brick dust etc. Place spent adsorbent in sealed packages and contact specialist waste disposal contractor. Dispose of waste according to national legislation.

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Only experienced and properly instructed persons should handle the product. The substance must be handled in accordance with good industrial hygiene and safety procedures. Avoid contact with skin. Avoid exposure, obtain special instructions before use. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your supplier if in doubt. Do not smoke while handling product. Ensure the complete system has been (or is regularly) checked for leaks before use. Refer to supplier's handling instructions. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Protect cylinders from physical damage; do not drag, roll, slide or drop. 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. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminates particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer products from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.

7.2. Conditions for safe storage, including any incompatibilities
Observe all regulations and local requirements regarding storage of containers. Segregate from other oxidants in store. Keep container below 50°C in a well ventilated place. Containers should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Containers should not be stored in conditions likely to encourage corrosion.

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No occupational exposure limit.

PNEC not available.

Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Long term dermal	12,1 mg/kg bw/day	Workers	Systemic
DNEL	Long term inhalation	85 mg/m3	Workers	Systemic
DNEL	Long term inhalation	9,3 mg/m3	Workers	Local

8.2. Exposure controls
Personal protective equipment
Appropriate engineering controls
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:
Gas detectors should be used when toxic quantities may be released.
Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation.

Personal protective equipment
Eye and face protection
Protect eyes, face and skin from liquid splashes. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wear a face -shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes.

Skin protection
Hand protection
Advice: Wear working gloves and safety shoes while handling containers. Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary
Material: Nitrile
Wear gloves for short periods only ie. < 10 mins.

Body protection
Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.
Guideline:
EN 943: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles.

Other protection
Wear working gloves and safety shoes when handling cylinders.
EN ISO 20345 Personal protective equipment - Safety footwear.

Respiratory protection
Keep self contained breathing apparatus readily available for emergency use. Use SCBA in the event of high concentrations. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used.

Guideline:
EN 136: Respiratory protective devices. Full face masks. Requirements, testing, marking.

For short term use:
Material:
Combination filter: B - P2 or B - P3
Guideline:
EN 14387: Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking

For long term use:, When allowed by a risk assessment a supplied air respirator may be used.
Guideline:
EN 137 Respiratory protective devices — Self-contained opencircuit compressed air breathing apparatus with full face mask — Requirements, testing, marking

Environmental Exposure Controls
Specific risk management measures are not required beyond good industrial hygiene and safety procedures.
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste product treatment. Provide adequate general or local ventilation.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
Appearance/Colour: Colourless/light yellow liquid.
Odour: Pungent. Extremely disagreeable.
Odour threshold: Odour threshold is subjective and inadequate to warn for over exposure.
Melting point: -70°C
Boiling point: 57.6°C
Flash point: Not applicable
Vapour Pressure 20 °C: 0,26 bar(a)
Relative density, gas (air=1): 5,9
Solubility in water: Hydrolyses.
Partition coefficient: n-octanol/water: No data available.
Molecular weight: 169.9 g/mol
Relative density, liquid (water=1): 1,5

9.2. Other information
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity
Unreactive under normal conditions.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
Reacts with water.

10.4. Conditions to avoid
Avoid moisture in installation systems.

10.5. Incompatible materials
May react violently with alkalis. Potassium. Strong acids.
Sodium/sodium oxides. Alcohols. Hydrolyzes to hydrogen chloride in contact with moisture.Metals.
For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products

If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Hydrogen chloride gas, Silicon oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute inhalation toxicity
Value type: LC50
Value: 1312 ppm
Exposure time: I h

Skin irritation
Species: Rabbit
Exposure time: 24h
Result: Severe skin irritation

Eye irritation
Species: Rabbit
Exposure time: 24h
Result: Moderate eye irritation

Sensitization
No data available.

Germ cell mutagenicity
Result: Negative.
Guideline**:** OECD Guideline 471 (Bacterial Reverse Mutation Assay)

Carcinogenicity
No evidence of carcinogenic effects.

Reproductive toxicity
Value type: NOAEL
Value: 10 mg/kg bw/day
Sex:Male

Value type: NOAEL
Value: 50 mg/kg bw/day
Sex:Female

Remarks: No known effects from this product.

STOT-single exposure
May cause respiratory irritation.

STOT-repeated exposure
No data available.

Aspiration hazard
No data available.

SECTION 12: Ecological information

12.1. Toxicity
Acute and prolonged toxicity fish
Species: Zebra fish (Danio rerio)
Exposure time:96 h
Value type: NOEC
Value in standard unit: > 245 mg/L

Acute toxicity aquatic invertebrates
Species: Water flea (Daphnia magna)
Exposure time:48 h
Value type: NOEC
Value in standard unit: ≥ 844 mg/L

Toxicity aquatic plants
Species: Algae
Exposure time: 72 h
Guideline: OECD Guideline 201 (Alga, Growth Inhibition Test)
Value type: NOEC
Value in standard unit: ≥ 100 mg/L

12.2. Persistence and degradability
The substance hydrolyses rapidly to HCl and silicon tetrahydroxide. HCl and silicon tetrahydroxide are inorganic, therefore in accordance with Column 2 of REACH Annex VII, there is no need to conduct the ready biodegradation study.

12.3. Bioaccumulative potential
The substance hydrolyses rapidly to HCl and silicon tetrahydroxide. Silicon tetrahydroxide has a low log Kow value and thus has low potential for bioaccumulation

12.4. Mobility in soil
No data available.

12.5. Results of PBT and vPvB assessment
No data available.

12.6. Other adverse effects
No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Must not be discharged to atmosphere. Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Refer to the EIGA code of practice (Doc.30 “Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods.
Contact supplier if guidance is required. Dispose of container via gas supplier only.

SECTION 14: Transport information

ADR/RID

14.1. UN number
1818

14.2. UN proper shipping name
Silicon tetrachloride

14.3. Transport hazard class(es)
Class: 8
Classification Code: C1
Labels: 8
Hazard number: X80

14.4. Packing group (Packing Instruction)
II

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
1818

14.2. UN proper shipping name
Silicon tetrachloride

14.3. Transport hazard class(es)
Class: 8
Classification Code: C1
Labels: 8
Hazard number: X80

14.4. Packing group (Packing Instruction)
II

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.1. UN number
1818

14.2. UN proper shipping name
Silicon tetrachloride

14.3. Transport hazard class(es)
Class: 8
Classification Code: C1
Labels: 8
Hazard number: X80

14.4. Packing group (Packing Instruction)
II

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

Other transport information
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. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Covered

15.2. Chemical safety assessment
Other regulations
Management of Health and Safety at Work Regulations (1999 No. 3242)
The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541)
Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677)
Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306)
Personal Protective Equipment Regulations (1992 No. 2966)
Control of Major Accident Hazards Regulations (COMAH, 1999 No. 743)
Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247)
Pressure Systems Safety Regulations (PER, 2000 No. 128)

15.2. Chemical safety assessment
CSA has not been carried out.

SECTION 16: Other information
Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Advice
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.
Further information
Note:
When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.
As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).
References
Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/)
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169/11 Classification and Labelling guide.
ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
International Programme on Chemical Safety (http://www.inchem.org/)
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69
The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
Substance specific information from suppliers.
EH40 (as amended) Workplace exposure limits.

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