

Safety Data Sheet

Version 3.0
Revision Date 08/09/2016

SDS Number 300000000156
Print Date 12/16/2017

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Trichlorosilane

Chemical formula : SiHCl₃

Synonyms : Trichlorosilane, Silicochloroform

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

Flammable liquids - Category 1
Substances and mixtures which in contact with water emit flammable gases - Category 1
Acute toxicity - Oral Category 4
Acute toxicity - Inhalation Category 3
Skin corrosion - Category 1A
Serious Eye Damage - Category 1

GHS label elements

Hazard pictograms/symbols



Signal Word: Danger

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Hazard Statements:

H224:Extremely flammable liquid and vapour.

H260:In contact with water releases flammable gases which may ignite spontaneously.

H302:Harmful if swallowed.

H314:Causes severe skin burns and eye damage.

H331:Toxic if inhaled.

Precautionary Statements:

Prevention

: P210:Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.
P223:Keep from any possible contact with water, because of violent reaction and possible flash fire.
P231+P232:Handle under inert gas, protect from moisture.
P233:Keep container tightly closed.
P240:Ground/Bond container and receiving equipment.
P241:Use explosion-proof electrical/ventilating/lighting/equipment.
P242:Use only non-sparking tools.
P243:Take precautionary measures against static discharge.
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+P312 :IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
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.
P335 + P334 :Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.
P363 :Wash contaminated clothing before reuse.
P370+P378 :In case of fire, use recommended extinguishing media for extinction.

Storage

: P402+P404:Store in a dry place. Store in a closed container .
P403+P233:Store in a well-ventilated place. Keep container tightly closed.
P403+P235:Store in a well-ventilated place. Keep cool.
P405:Store locked up.

Disposal

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

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Hazards not otherwise classified

Dangerous when wet.
May ignite on contact with air or water.
Reacts with water to form corrosive acids.
Extremely flammable.
May form explosive mixtures in air.
Vapors may spread long distances and ignite.
Immediate fire and explosion hazard exists when mixed with air at concentrations exceeding the lower flammability limit (LFL).
May react violently with water.
Do not breathe gas.
Poisonous, corrosive liquid and gas under pressure.
Corrosive to eyes, respiratory system and skin.
Direct contact with liquid can cause frostbite.
Wear self-contained breathing apparatus and protective suit.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Components | CAS Number | Concentration (Volume) |
|-----------------|------------|------------------------|
| Trichlorosilane | 10025-78-2 | 100 % |

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

4. FIRST AID MEASURES

- General advice : The potential for hydrogen chloride formation exists with every exposure, therefore its toxicity must 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 : 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 : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and badly. Flush with copious amounts of water until treatment is available.
- Ingestion : Prevent aspiration of vomit. Turn victim's head to the side.
- 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. Consult a doctor.
- Inhalation : No data available.

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Immediate Medical Attention and Special Treatment

Treatment : Treat bronchospasm and laryngeal edema if present. Observe for delayed chemical pneumonitis, pulmonary hemorrhage or edema. If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : Foam.
Carbon dioxide (CO₂).
Dry powder.
- Extinguishing media which must not be used for safety reasons. : Water.
Water spray.
- Specific hazards : Heat from a fire or reaction with water can cause ignition. Product has low autoignition temperature and is extremely easy to ignite. Gas is heavier than air and may collect in low areas or travel along the ground where there may be an ignition source present. Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Combustion by-products may be toxic. 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. If possible, shut off the source of gas and allow the fire to burn itself out. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Keep adjacent cylinders cool by spraying with large amounts of water until the fire burns itself out. Do not allow run-off from fire fighting to enter drains or water courses.
- 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. Remove all sources of ignition. 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. Never enter a confined space or other area where the flammable gas concentration is greater the 10% of its lower flammable limit. 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. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
- Methods for cleaning up : Ventilate the area. Approach suspected leak areas with caution. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost). 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

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

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. Hastelloy, platinum or gold offer good resistance to corrosion when moisture is present. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. 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 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 air from system before introducing gas. 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). Never attempt to increase liquid withdrawal rate by pressurizing the container without first checking with the supplier. Never permit liquefied gas to become trapped in parts of the system as this may result in hydraulic rupture. All piped systems and associated equipment must be grounded.

Storage

Full containers should be stored so that oldest stock is used first. Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. 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

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

to encourage corrosion. 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. Keep containers tightly closed in a cool, well-ventilated place. 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). Smoking should be prohibited within storage areas or while handling product or containers. Display "No Smoking or Open Flames" signs in the storage areas. The amounts of flammable or toxic gases in storage should be kept to a minimum. Return empty containers in a timely manner. Flammable storage areas should be separated from oxygen and other oxidizers by a minimum distance of 20 ft. (6.1 m.) or by a barrier of non-combustible material at least 5 ft. (1.5 m.) high, having a fire resistance rating of at least 1/2 hour.

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. Provide sufficient air exchange and/or exhaust in work rooms. Keep away from combustible material. All electrical equipment in the storage areas should be compatible with flammable materials stored. Containers containing flammable gases should be stored away from other combustible materials. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits. Handle product only in closed system or provide appropriate exhaust ventilation at machinery.

Personal protective equipment

- Respiratory protection : Keep self contained breathing apparatus readily available for emergency use. 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 : Acid resistant gloves.
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 : Acid resistant gloves (e.g. butyl rubber, neoprene, polyethylene) and splash suit when connecting, disconnecting or opening cylinders.
Cold temperatures may cause embrittlement of protective material resulting in breakage and exposure.
Contact with cold evaporating liquid on gloves or suit may cause cryogenic burns or frostbite.
Safety shoes are recommended when handling cylinders.
Wear as appropriate:

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Flame retardant protective clothing.
Encapsulated chemical protective suit in emergency situations.

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)

| | | | |
|-----------------|---------------------------|---------|-----------------------|
| Trichlorosilane | Ceiling Limit Value: WEEL | 0.5 ppm | 2.7 mg/m ³ |
|-----------------|---------------------------|---------|-----------------------|

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid. Colorless.

Odor : Pungent.

Odor threshold : No data available.

pH : Not applicable., Energetically reacts with water.

Melting point/range : -196 °F (-126.6 °C)

Boiling point/range : 89 °F (31.9 °C)

Flash point : -18 °F (-27.7 °C)

Evaporation rate : No data available.

Flammability (solid, gas) : Not applicable.

Upper/lower explosion/flammability limit : 80 %(V) / 6.9 %(V)

Vapor pressure : 9.75 psia (0.67 bara) at 68 °F (20 °C)

Water solubility : Reacts violently with water.

Relative vapor density : 4.7 (air = 1)

Relative density : 1.3 (water = 1)

Partition coefficient (n-octanol/water) : No data available.

Auto-ignition temperature : 93 - 104 °C

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Decomposition temperature : No data available.

Viscosity : No data available.

Molecular Weight : 135.45 g/mol

10. STABILITY AND REACTIVITY

Chemical Stability : Stable under normal conditions.

Conditions to avoid : Heat, flames and sparks.

Materials to avoid : Water.
Aluminium.
Strong bases.
Brass.
Alcohols.
Reacts energetically with water.
Reaction with water or contaminants or excessive heat may result in sufficient pressure to burst container.
Oxygen.
Oxidizing agents.

Hazardous decomposition products : Hydrolyzes to form hydrogen chloride.

Possibility of hazardous Reactions/Reactivity : Energetically reacts with water.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye : Causes severe eye burns. May cause permanent eye injury.

Effects on Skin : Contact with liquid may cause cold burns/frostbite. Causes skin burns. May cause burns or external ulcers.

Inhalation Effects : Irritating to respiratory system. Delayed adverse effects possible. Can cause severe lung damage. May be fatal if inhaled. Prolonged exposure to small concentrations may result in pulmonary edema. Delayed fatal pulmonary edema possible.

Ingestion Effects : Harmful if swallowed. If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach.

Symptoms : No data available.

Acute toxicity

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

Acute Oral Toxicity : LD50 : 1,030 mg/kg Species : Rat.
Inhalation : LC50 (1 h) : 15.329 mg/l 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

This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Asthma.

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.

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

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. Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Must not be discharged to atmosphere.

Contaminated packaging : Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

UN/ID No. : UN1295
Proper shipping name : Trichlorosilane
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (3, 8)
Marine Pollutant : No

IATA

Transport Forbidden

IMDG

UN/ID No. : UN1295
Proper shipping name : TRICHLOROSILANE
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (8, 3)
Marine Pollutant : No

TDG

UN/ID No. : UN1295
Proper shipping name : TRICHLOROSILANE
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (3, 8)
Marine Pollutant : No

Further Information

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

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

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
No SARA Hazards

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 : 4
Instability : 2
Special : W 2

HMIS Rating

Health : 3
Flammability : 4
Physical hazard : 2

Prepared by : Versum Materials, Product Regulatory Department

Telephone : (602)282-1000

Preparation Date : 12/16/2017

Safety Data Sheet

Version 3.0

Revision Date 08/09/2016

SDS Number 300000000156

Print Date 12/16/2017

For additional information, please visit Versum Materials' Product Stewardship web site.
<http://www.versummaterials.com/productstewardship/>
