

SECTION: 1. Product and company identification

1.1. Product identifier

Product form	: Substance
Substance name	: Silane
CAS-No.	: 7803-62-5
Formula	: SiH ₄
Other means of identification	: Monosilane, silicon hydride, silicon tetrahydride, silicane

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	: Industrial and professional use
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1.3. Details of the supplier of the safety data sheet

Linde Inc.
10 Riverview Drive
Danbury, CT 06810-6268, USA
www.lindeus.com

Electronics gas products 1-800-932-0624 or 1-908-329-9700
Linde Inc. 1-844-44LINDE (1-844-445-4633)

For additional product information contact your local customer service.

1.4. Emergency telephone number

Emergency number	: Onsite Emergency: 1-800-645-4633
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CHEMTREC, 24 hr/day 7 days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-US classification

Pyr. Gas	H250
Flam. Gas 1	H220
Press. Gas (Liq.)	H280
Acute Tox. 4 (Inhalation:gas)	H332

2.2. Label elements

GHS US labelling

Hazard pictograms (GHS US)



Signal word (GHS US)

: Danger

Hazard statements (GHS US)

: H220 - EXTREMELY FLAMMABLE GAS
H250 - **CATCHES FIRE SPONTANEOUSLY IF EXPOSED TO AIR**
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H332 - HARMFUL IF INHALED
CGA-HG01 - MAY CAUSE FROSTBITE.
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR

Precautionary statements (GHS US)

: P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Heat, Open flames, Sparks, Hot surfaces
P222 - Do not allow contact with air.
P261 - Avoid breathing gas

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P262 - Do not get in eyes, on skin, or on clothing.
 P271+P403 - Use and store only outdoors or in a well-ventilated place.
 P280 - Wear protective gloves/protective clothing/eye protection/face protection.
 P304-P340-P312 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
 P377 - LEAKING GAS FIRE: Do not extinguish, unless leak can be stopped safely.
 P381 - Eliminate all ignition sources if safe to do so.
 P302, P336, P315 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.
 CGA-PG05 - Use a back flow preventive device in the piping.
 CGA-PG10 - Use only with equipment rated for cylinder pressure.
 CGA-PG17 - Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder.
 CGA-PG12 - Do not open valve until connected to equipment prepared for use.
 CGA-PG06 - Close valve after each use and when empty.
 CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug.
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).

2.3. Other hazards

Other hazards which do not result in classification : Spontaneously flammable in air.
 May ignite spontaneously in contact with air.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%
Silane (Main constituent)	(CAS-No.) 7803-62-5	100

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.
 First-aid measures after skin contact : Wash with plenty of soap and water. If irritation persists, consult a doctor.
 First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
 First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Escaping gas cannot be extinguished.
 Unsuitable extinguishing media : **Do not use halon fire extinguisher..**

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5.2. Special hazards arising from the substance or mixture

- Fire hazard : **Danger! PYROPHORIC, high pressure gas.** If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.
- Explosion hazard : MAY FORM EXPLOSIVE MIXTURES WITH AIR.
- Reactivity : **The substance may spontaneously ignite on contact with air.**

5.3. Advice for firefighters

- Firefighting instructions : **Danger! PYROPHORIC, high pressure gas.**
- Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.
- Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
- Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT [U.S.] or TC [Canada].).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : **Danger! PYROPHORIC, high pressure gas.** May ignite spontaneously in contact with air.. May form explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Try to stop release. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with container supplier/owner instructions.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling

: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect containers from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions

: Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g. NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Silane (7803-62-5)		
ACGIH	ACGIH OEL TWA [ppm]	5 ppm
USA OSHA	Not established	

8.2. Exposure controls

Appropriate engineering controls

: Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. **MECHANICAL (GENERAL): Inadequate - Use only in a closed system.** Use explosion proof equipment and lighting.

In semiconductor process gas and other suitable applications, Linde recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylinder changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

Eye protection

: Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection	: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets or exceeds the requirements of the appropriate Health and Safety Regulations. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA). None necessary.
Thermal hazard protection	: Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Molecular mass	: 32 g/mol
Colour	: Colourless.
Odour	: choking
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
pH	: Not applicable.
Relative evaporation rate (butylacetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -186 °C
Freezing point	: No data available
Boiling point	: -111.5 °C
Flash point	: Not applicable.
Critical temperature	: -3.4 °C
Auto-ignition temperature	: 20 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: 1.4 – 96 vol %
Vapour pressure	: Not applicable.
Critical pressure	: 4840 kPa
Relative vapour density at 20°C	: No data available
Relative density	: 0.55
Relative gas density	: 1.1
Solubility	: Water: No data available
Partition coefficient n-octanol/water (Log Pow)	: Not applicable.
Partition coefficient n-octanol/water (Log Kow)	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: MAY FORM EXPLOSIVE MIXTURES WITH AIR.
Oxidizing properties	: None.
Explosive limits	: 1 – 100 vol % Pyrophoric.

9.2. Other information

Gas group	: Press. Gas (Liq.)
Additional 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

The substance may spontaneously ignite on contact with air.

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10.2. Chemical stability

Stable under recommended handling and storage conditions (see section 7).

10.3. Possibility of hazardous reactions

May occur.

10.4. Conditions to avoid

Air contact. Moisture. Temperatures in excess of 400°C (752°F).

10.5. Incompatible materials

Air. Water, humidity. Bases. Oxidizing agents. Halogens. Chlorine. Halocarbons.

10.6. Hazardous decomposition products

Hydrogen. Silica dust. Silicon dioxide. **Powder produced in the absence of air may be flammable..**

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified
 Acute toxicity (dermal) : Not classified
 Acute toxicity (inhalation) : HARMFUL IF INHALED.

Silane (f)7803-62-5	
LC50 Inhalation - Rat [ppm]	9600 ppm/4h
ATE US (gases)	9600 ppmv/4h

Skin corrosion/irritation : Not classified
 pH: Not applicable.
 Serious eye damage/irritation : Not classified
 pH: Not applicable.
 Respiratory or skin sensitisation : Not classified
 Germ cell mutagenicity : Not classified
 Carcinogenicity : Not classified
 Reproductive toxicity : Not classified
 STOT-single exposure : Not classified
 STOT-repeated exposure : Not classified
 Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

12.2. Persistence and degradability

Silane (7803-62-5)	
Persistence and degradability	Not applicable for inorganic products.

12.3. Bioaccumulative potential

Silane (7803-62-5)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable.
Partition coefficient n-octanol/water (Log Kow)	Not applicable.

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Silane (7803-62-5)	
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Silane (7803-62-5)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Effect on the ozone layer : None.

Effect on global warming : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT) : UN2203 Silane, 2.1

UN-No.(DOT) : UN2203

Proper Shipping Name (DOT) : Silane

Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas



Additional information

Emergency Response Guide (ERG) Number : 116

Other information : No supplementary information available.

Special transport precautions : 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. Before transporting product containers:
 - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

UN-No. (IMDG) : 2203

Proper Shipping Name (IMDG) : SILANE

Class (IMDG) : 2 - Gases

Division (IMDG) : 2.1 - Flammable gases

EmS-No. (1) : F-D

MFAG-No : 116

EmS-No. (2) : S-U

Air transport

UN-No. (IATA) : 2203

Proper Shipping Name (IATA) : Silane

Class (IATA) : 2 - Gases

Civil Aeronautics Law

: Gases under pressure/Gases flammable under pressure(Hazardous materials notice Appended Table 1 Article 194 of the Enforcement Regulations)

SECTION 15: Regulatory information

15.1. US Federal regulations

Silane (7803-62-5)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

15.2. International regulations

CANADA

Silane (7803-62-5)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Silane (7803-62-5)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Silane (7803-62-5)

Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on KECL/KECI (Korean Existing Chemicals Inventory)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

Silane(7803-62-5)

U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Linde asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Inc, it is the user's obligation to determine the conditions of safe use of the product.

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NFPA health hazard

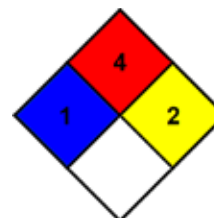
: 1 - Materials that, under emergency conditions, can cause significant irritation.

NFPA fire hazard

: 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.

NFPA instability

: 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.



SDS US (GHS HazCom 2012) - Linde 2022

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.