Ehsan International Gases

Silane

1. Product and company identification

1.1. Product identifier

Product form	: Substance
Name	: Silane
CAS No	: 7803-62-5
Formula	: SiH4
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 use. Use as directed.

Manufacturer / Distributor:

Ehsan International Gases
40/9, Aurangabad, Nazimabad #3, Karachi 74600, Pakistan.
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info@ehsan.com.pk
www.ehsan.com.pk

2: Hazards identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Flam. Gas 1 H220
Liquefied gas H280 Acute Tox. 4 (Inhalation:gas) H332

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
Precautionary statements (GHS-US)	: P202 - Do not handle until all safety precautions have been read and understood

2.2 Label elements

GHSUS labeling

Hazard pictograms (GHS-US) :

GHS02 GHS04 GHS07

P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking P222 - Do not allow contact with air.
P261 - Avoid breathing gas
P271+P403 - Use and store only outdoors or in a well-ventilated place.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
CGA-PG05 - Use a back flow preventive device in the piping.
CGA-PG06 - Close valve after each use and when empty.
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-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 not contributing to the classification : Spontaneously flammable in air

May ignite spontaneously in contact with air.

2.4. Unknown acute toxicity (GHS US)

No data available

3: Composition/information on ingredients

3.1. Substance

3.2. Mixture

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

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Not applicable

4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may 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 None. Obtain medical assistance.

5.1. Extinguishing media

5: Firefighting measures

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

5.2. Special hazards arising from the substance or mixture

Fire hazard : **DANGER! Pyrophoric, Flammable, 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, Flammable, 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.).

6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **DANGER! Pyrophoric, Flammable, 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 local/regional/national/international regulations. Contact supplier for any special requirements.

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.

7.1. Precautions for safe handling

7: Handling and storage

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 cylinders 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

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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 or 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

7.3. Specific end use(s)

an electrical circuit.

None.

8: Exposure controls/personal protection

8.1. Control parameters

8.2. Exposure controls

Silane (7803-62-5)		
ACGIH	ACGIH TLV-TWA (ppm)	5 ppm
USA OSHA	Not established	

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, Praxair recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylider 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 (e.g. neoprene, nitrile, etc.) during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). 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 (e.g., an organic vapor cartridge). 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.

9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas

Molecular mass : 32 g/mol

Color Colorless.

Odor : choking

Odor threshold : Odor threshold is subjective and inadequate to warn for overexposure.

pH : Not applicable.

Relative evaporation rate (butyl acetate=1) : No data available

Relative evaporation rate (ether=1) : Not applicable.

Melting point : -186 °C

Freezing point : No data available

Boiling point : -111.5

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Flash point : Not applicable.

Critical temperature : -3.4 °C
Auto-ignition temperature : No data available

Decomposition temperature : No data available

Flammability (solid, gas) : 1.4 - 96 vol %

Vapor pressure : Not applicable.

Critical pressure : 4840 kPa
Relative vapor density at 20 °C : No data available

Relative density : 0.55

Relative gas density : 1.1
Solubility : Water: No data available

Log Pow : Not applicable.

Log Kow : Not applicable.

Viscosity, kinematic : Not applicable.

Viscosity, dynamic : Not applicable.

Explosive properties : MAY FORM EXPLOSIVE MIXTURES WITH AIR.

Oxidizing properties : None.

9.2. Other information

Explosion limits : 1 - 100 vol % Pyrophoric.

Gas group : Liquefied gas
Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

10: Stability and reactivity

10.1. Reactivity

The substance may spontaneously ignite on contact with air.

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

10.6. Hazardous decomposition products

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

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

11.1. Information on toxicological effects

11: Toxicological information

Acute toxicity Inhalation:gas: HARMFUL IF INHALED.

Silane (\f)7803-62-5	
LC50 inhalation rat (ppm)	9500 ppm/4h
ATE US (gases)	9500.000 ppmV/4h

Skin corrosion/irritation : Not classified pH: Not applicable.

Serious eye damage/irritation : Not classified pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

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12: Ecological information

12.1. Toxicity

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

12.2. Persistence and degradability

12.3. Bioaccumulative potential

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

Silane (7803-62-5)	
Log Pow	Not applicable.
Log Kow	Not applicable.
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 ozone layer : None.

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

13.1. Waste treatment methods

13: Disposal considerations

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

14: Transport information

In accordance with DOT
Transport document description : UN2203 Silane, 2.1
UN-No.(DOT) : UN2203
Proper Shipping Name (DOT) : Silane
Department of Transportation (DOT) Hazard Classes : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
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 cylinder 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
MFAG-No : 116

Air transport

UN-No.(IATA) : 2203
Proper Shipping Name (IATA) : Silane
Class (IATA) : 2
Civil Aeronautics Law : Gases under pressure/Gases flammable under pressure
Hazard labels (DOT) 2.1 - Flammable gas

15.1 US Federal regulations

Additional information

Emergency Response Guide (ERG) Number : 116

15.2 International regulations

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15: Regulatory information

Silane (7803-62-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Reactive hazard Sudden release of pressure hazard

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 on the AICS (Australian Inventory of Chemical Substances) 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 Korean ECL (Existing Chemicals List) 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)

16: Other information

Revision date : 3/19/2015 12:00:00 AM

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.

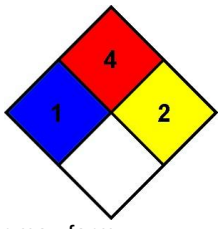
Silane

Ehsan International 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.

NFPA health hazard 1 - Exposure could cause irritation but only minor residual injury even if no treatment is given.

NFPA fire hazard : 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

NFPA reactivity : 2 - Normally unstable and readily undergo violent decomposition but do not detonate. Also: may react violently with water or may form potentially explosive mixtures with water.



HMIS III Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 4 Severe Hazard

Physical : 3 Serious Hazard