# Silane

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 05/23/2017 Version: 1.0

## SECTION 1: Identification

### 1.1. Product identifier

Product form : Substance

Substance name : Silane

CAS-No. : 7803-62-5

Product code : CA-1001-07374

Formula : $SiH_4$

Synonyms : Silane, compressed / Silicon tetrahydride / Silicon hydride / Monosilane / Hydrogen silicide

### 1.2. Recommended use and restrictions on use

Recommended uses and restrictions : Semiconductor

### 1.3. Supplier

Air Liquide Canada Inc.
1250, René Lévesque West Blvd. Suite 1700
H3B 5E6 Montreal, QC - Canada
T 1-800-817-7697
www.airliquide.ca

### 1.4. Emergency telephone number

Emergency number : 514-878-1667

## SECTION 2: Hazard identification

### 2.1. Classification of the substance or mixture

**Classification (GHS-CA)**

| | |
|---|---|
| Pyrophoric Gas | H250 |
| Flammable gases, Category 1 | H220 |
| Gases under pressure : Liquefied gas | H280 |
| Acute toxicity (inhalation:gas) Category 4 | H332 |

Full text of H statements : see section 16

### 2.2. GHS Label elements, including precautionary statements

**GHS-CA labelling**

Hazard pictograms (GHS-CA) :

GHS02 GHS04 GHS07

Signal word (GHS-CA) : Danger

Hazard statements (GHS-CA) : H280 - Contains gas under pressure; may explode if heated
H250 - Catches fire spontaneously if exposed to air
H220 - Extremely flammable gas
H332 - Harmful if inhaled
CGA-HG01 - May cause frostbite
CGA-HG04 - May form explosive mixtures with air

Precautionary statements (GHS-CA) : P381 - In case of leakage, eliminate all ignition sources
P377 - Leaking gas fire: Do not extinguish unless leak can be stopped safely
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.
P403 - Store in a well-ventilated place
P410+P403 - Protect from sunlight. Store in a well-ventilated place
P222 - Do not allow contact with air
P261 - Avoid breathing dust/fume/gas/mist/vapours/spray
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
P312 - Call a POISON CENTER or doctor if you feel unwell
P308+P313 - IF exposed or concerned: Get medical advice/attention
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove

contact lenses, if present and easy to do. Continue rinsing
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P271 - Use only outdoors or in a well-ventilated area
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P302 - IF ON SKIN:
P336+P315 - Thaw frosted parts with lukewarm water. Do not rub affected area
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52 °C/125 °F
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-PG12 - Do not open valve until connected to equipment prepared for use.
CGA-PG14 - Approach suspected leak area with caution
CGA-PG17 - Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug
CGA-PG21 - Open valve slowly

### 2.3. Other hazards

Other hazards not contributing to the classification : Spontaneously flammable in air.

### 2.4. Unknown acute toxicity (GHS-CA)

No data available

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

| Name | Chemical name/Synonyms | Product identifier | % | Classification (GHS-CA) |
|---|---|---|---|---|
| Silane<br>(Main constituent) | Silane, compressed / Silicon tetrahydride / Silicon hydride / Monosilane / Hydrogen silicide | (CAS-No.) 7803-62-5 | > 99 | Pyr. Gas, H250<br>Flam. Gas 1, H220<br>Press. Gas (Liq.), H280<br>Acute Tox. 4 (Inhalation:gas), H332 |

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration with bag and mask if breathing stopped. Get immediate medical advice/attention.

First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : Harmful if inhaled.

Symptoms/effects after skin contact : May cause frostbite.

Symptoms/effects after eye contact : Contact with the product may cause cold burns or frostbite.

Symptoms/effects after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/effects upon intravenous administration : Not known.

Chronic symptoms : Adverse effects not expected from this product.

Most important symptoms and effects, both acute and delayed : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. May cause headache, nausea and irritation of respiratory tract.

### 4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

### 5.2. Unsuitable extinguishing media

Unsuitable extinguishing media : Do not use water jet to extinguish. Carbon dioxide.

### 5.3. Specific hazards arising from the hazardous product

Fire hazard : This product is flammable.

Explosion hazard : Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. May form flammable/explosive vapour-air mixture. In use may form pyrophoric vapor-air mixture.

Hazardous combustion products : Silica dust (inert - but may irritate respiratory tract and eyes).

### 5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Exposure to fire may cause containers to rupture/explode.

Protection during firefighting : Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures : Ensure adequate ventilation.

Personal Precautions, Protective Equipment and Emergency Procedures : EVACUATE ALL PERSONNEL FROM AFFECTED AREA. Use appropriate protective equipment. If leak is on user's equipment, be certain to purge piping before attempting repairs. If leak is on a container or container valve contact the closest Air Liquide Canada location.

### 6.2. Methods and materials for containment and cleaning up

For containment : Try to stop release if without risk.

Methods for cleaning up : Dispose of contents/container in accordance with local/regional/national/international regulations.

Methods and material for containment and cleaning up : Ventilate area. Dust deposited may be vacuum cleaned or the area hosed down with water.

### 6.3. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection"

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use only non-sparking tools.

Hygiene measures : Do not eat, drink or smoke when using this product.

Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. Handle empty containers with care because residual vapours are flammable. In use may form flammable vapour-air mixture. In use may form pyrophoric vapor-air mixture.

### 7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations. Proper grounding procedures to avoid static electricity should be followed.

Storage conditions : Do not expose to temperatures exceeding 52 °C/ 125 °F. Keep container closed when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well ventilated area.

Incompatible products : None known.

Incompatible materials : Oxidizing materials. Air. Water.

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

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| **Silane (7803-62-5)** | | |
|---|---|---|
| USA - ACGIH | ACGIH TWA (ppm) | 5 ppm |
| Canada (Quebec) | VEMP (mg/m³) | 6.6 mg/m³ |
| Canada (Quebec) | VEMP (ppm) | 5 ppm |
| Alberta | OEL TWA (mg/m³) | 6.6 mg/m³ |
| Alberta | OEL TWA (ppm) | 5 ppm |
| British Columbia | OEL STEL (ppm) | 1 ppm |
| British Columbia | OEL TWA (ppm) | 0.5 ppm |
| Manitoba | OEL TWA (ppm) | 5 ppm |
| New Brunswick | OEL TWA (mg/m³) | 6.6 mg/m³ |
| New Brunswick | OEL TWA (ppm) | 5 ppm |
| New Foundland & Labrador | OEL TWA (ppm) | 5 ppm |
| Nova Scotia | OEL TWA (ppm) | 5 ppm |
| Nunavut | OEL STEL (ppm) | 10 ppm |
| Nunavut | OEL TWA (ppm) | 5 ppm |
| Northwest Territories | OEL STEL (ppm) | 10 ppm |
| Northwest Territories | OEL TWA (ppm) | 5 ppm |
| Ontario | OEL TWA (ppm) | 5 ppm |
| Prince Edward Island | OEL TWA (ppm) | 5 ppm |
| Saskatchewan | OEL STEL (ppm) | 10 ppm |
| Saskatchewan | OEL TWA (ppm) | 5 ppm |
| Yukon | OEL STEL (mg/m³) | 1.5 mg/m³ |
| Yukon | OEL STEL (ppm) | 1 ppm |
| Yukon | OEL TWA (mg/m³) | 0.7 mg/m³ |
| Yukon | OEL TWA (ppm) | 0.5 ppm |

### 8.2. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available). Oxygen detectors should be used when asphyxiating gases may be released. Consider the use of a work permit system e.g. for maintenance activities. Preferably use permanent leak-tight installations (e.g. welded pipes). Product to be handled in a closed system and under strictly controlled conditions.

Environmental exposure controls : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

### 8.3. Individual protection measures/Personal protective equipment

**Personal protective equipment:**

Gloves. Safety glasses. Protective clothing. Safety shoes.

**Hand protection:**

Wear working gloves when handling gas containers. Wear chemically resistant protective gloves. Wear leather safety gloves.

**Eye protection:**

Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections.

**Skin and body protection:**

Wear suitable protective clothing, e.g. lab coats, coveralls or flame resistant clothing.

**Respiratory protection:**

None necessary during routine operations. See Sections 5 & 6

**Thermal hazard protection:**

None necessary during routine operations.

**Other information:**

Wear safety shoes while handling containers.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | Gas |
| Appearance | : | Clear, colorless gas. |
| Colour | : | Colourless. |
| Odour | : | strong Extremely disagreeable. |
| Odour threshold | : | No data available |
| pH | : | No data available |
| Relative evaporation rate (butylacetate=1) | : | No data available |
| Relative evaporation rate (ether=1) | : | No data available |
| Molecular mass | : | 32.11 g/mol |
| Melting point | : | -186 °C |
| Freezing point | : | -186 °C |
| Boiling point | : | -111.15 °C |
| Flash point | : | Not applicable for gases and gas mixtures. |
| Critical temperature | : | -2.45 °C |
| Auto-ignition temperature | : | 20 °C |
| Decomposition temperature | : | No data available |
| Flammability (solid, gas) | : | See Section 2.1 and 2.2 |
| Vapour pressure | : | 6894 bar |
| Vapour pressure at 50 °C | : | No data available |
| Critical pressure | : | 4840 kPa |
| Relative vapour density at 20 °C | : | 1.1 |
| Relative density | : | 0.55 |
| Relative gas density | : | Heavier than air |
| Solubility | : | Water: No data available |
| Log Pow | : | Not applicable for inorganic gases. |
| Viscosity, kinematic | : | Not applicable. |
| Viscosity, dynamic | : | Not applicable. |
| Explosive properties | : | Not applicable. |
| Oxidising 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

Reactivity : Catches fire spontaneously if exposed to air.

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions : May react violently with oxidants. Can ignite spontaneously in air (fire cannot be put out). Can form spontaneous, violently explosive mixture in air.

Conditions to avoid : Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

Incompatible materials : Air, Oxidisers. For additional information on compatibility refer to ISO 11114.

Hazardous decomposition products : Under normal conditions of storage and use hazardous decomposition products should not be produced.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Inhalation:gas: Harmful if inhaled.

| **Silane ( \f )7803-62-5** | |
|---|---|
| LC50 inhalation rat (ppm) | 9500 ppm/4h |
| ATE CA (gases) | 9500.00000000 ppmv/4h |

Skin corrosion/irritation : Not classified

Serious eye damage/irritation : Not classified

Respiratory or skin sensitization : 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 data available.

### 12.2. Persistence and degradability

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

### 12.3. Bioaccumulative potential

| **Silane (7803-62-5)** | |
|---|---|
| Log Pow | Not applicable for inorganic gases. |
| Bioaccumulative potential | No data available. |

### 12.4. Mobility in soil

| **Silane (7803-62-5)** | |
|---|---|
| Log Pow | Not applicable for inorganic gases. |
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |

### 12.5. Other adverse effects

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

Effect on ozone layer : None.

## SECTION 13: Disposal considerations

### 13.1. Disposal methods

Waste treatment methods : Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Do not discharge into any place where its accumulation could be dangerous. Gases formed by combustion should be washed with water to remove silica. Ensure that the emission levels from local regulations or operating permits are not exceeded.

Product/Packaging disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

## SECTION 14: Transport information

### 14.1. Basic shipping description

In accordance with TDG

**Transportation of Dangerous Goods**

UN-No. (TDG) : UN2203

TDG Primary Hazard Classes : 2.1 - Class 2.1 - Flammable Gas.

Transport Document Description : UN2203 Silane, 2.1

Proper Shipping Name : Silane

Hazard labels (TDG) : 2.1 - Flammable gases


TDG Special Provisions : 38 - A person must not handle, offer for transport or transport these dangerous goods in a large means of containment if they are in direct contact with the large means of containment. SOR/2014-306

ERAP Index : 25

Explosive Limit and Limited Quantity Index : 0

Passenger Carrying Ship Index : Forbidden

Excepted quantities (TDG) : E0

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : Forbidden

### 14.2. Transport information/DOT - USA

**Department of Transport**

DOT NA no. : UN2203

UN-No.(DOT) : 2203

Transport Document Description : UN2203 Silane, 2.1

Proper Shipping Name (DOT) : Silane

Contains Statement Field Selection (DOT) : DOT_TECHNICAL - Proper Shipping Name - Technical (DOT)

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

Division (DOT) : 2.1

Hazard labels (DOT) : 2.1 - Flammable gas


Dangerous for the environment : No

DOT Packaging Exceptions (49 CFR 173.xxx) : None

| | | |
|---|---|---|
| DOT Packaging Non Bulk (49 CFR 173.xxx) | : | 302 |
| DOT Packaging Bulk (49 CFR 173.xxx) | : | None |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : | Forbidden |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) | : | Forbidden |
| DOT Vessel Stowage Location | : | E - The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length, but is prohibited from carriage on passenger vessels in which the limiting number of passengers is exceeded. |
| DOT Vessel Stowage Other | : | 40 - Stow ''clear of living quarters'',57 - Stow ''separated from'' chlorine,104 - Stow ''separated from'' bromine |
| Emergency Response Guide (ERG) Number | : | 116 |
| 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. |
| Other information | : | No supplementary information available. |

### 14.3. Air and sea transport

**IMDG**

| | | |
|---|---|---|
| UN-No. (IMDG) | : | 2203 |
| Proper Shipping Name (IMDG) | : | Silane |
| Transport Document Description (IMDG) | : | UN 2203 Silane, 2 |
| Class (IMDG) | : | 2 - Gases |
| MFAG-No | : | 116 |
| Ship Safety Act | : | Gases under pressure/Gases flammable under pressure(Dangerous Goods Notification Schedule first second and third Article Dangerous Goods Regulations) |
| Port Regulation Law | : | Hazardous materials/High pressure gas (Article 21, Paragraph 2 of Law, Article 12 rule, notice attached table that defines the type of dangerous goods) |

**IATA**

| | | |
|---|---|---|
| Proper Shipping Name (IATA) | : | Forbidden |
| 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. National regulations

| **Silane (7803-62-5)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

### 15.2. International regulations

| **Silane (7803-62-5)** |
|---|
| Listed on the AICS (Australian Inventory of Chemical Substances)<br>Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)<br>Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)<br>Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory<br>Listed on the Korean ECL (Existing Chemicals List)<br>Listed on NZIoC (New Zealand Inventory of Chemicals)<br>Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)<br>Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Listed on INSQ (Mexican National Inventory of Chemical Substances) |

## SECTION 16: Other information

| | | |
|---|---|---|
| Date of issue | : | 05/23/2017 |

Full text of H-statements:

| | |
|---|---|
| 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 |

SDS Canada (GHS)