1. Product and company identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>Silane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonym</td>
<td>Silicon tetrahydride</td>
</tr>
<tr>
<td>Material uses</td>
<td>Other non-specified industry: Doping agent.</td>
</tr>
<tr>
<td>CAS number</td>
<td>7803-62-5</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>REC Silicon Inc.</td>
</tr>
<tr>
<td></td>
<td>119140 Rick Jones Way</td>
</tr>
<tr>
<td></td>
<td>Silver Bow, Montana 59750</td>
</tr>
<tr>
<td></td>
<td>United State of America</td>
</tr>
<tr>
<td></td>
<td>406-496-9877</td>
</tr>
<tr>
<td></td>
<td>3322 Road North Northeast</td>
</tr>
<tr>
<td></td>
<td>Moses Lake, Washington 98837</td>
</tr>
<tr>
<td></td>
<td>United State of America</td>
</tr>
<tr>
<td></td>
<td>509-766-9299</td>
</tr>
<tr>
<td>Validation date</td>
<td>12/30/2010.</td>
</tr>
<tr>
<td>Prepared by</td>
<td>Atrion Regulatory Services, Inc.</td>
</tr>
<tr>
<td>In case of emergency</td>
<td>CHEMTREC, U.S. : 1-800-424-9300</td>
</tr>
<tr>
<td></td>
<td>International: +1-703-527-3887</td>
</tr>
</tbody>
</table>

2. Hazards identification

Physical state : Gas.
Color : Colorless.
Odor : Repulsive.

Emergency overview

Signal word : DANGER!
Hazard statements : EXTREMELY FLAMMABLE. CATCHES FIRE IF EXPOSED TO AIR. HIGH PRESSURE GAS. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Precautions : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Avoid breathing gas. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : No known significant effects or critical hazards.
Ingestion : As this product is a gas, refer to the inhalation section.
Skin : Contact with rapidly expanding gas may cause burns or frostbite.
Eyes : Contact with rapidly expanding gas may cause burns or frostbite.

Potential chronic health effects

Chronic effects : May cause target organ damage, based on animal data.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.
2. Hazards identification

**Developmental effects**: No known significant effects or critical hazards.

**Fertility effects**: No known significant effects or critical hazards.

**Target organs**: May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

**Over-exposure signs/symptoms**

**Inhalation**: No specific data.

**Ingestion**: No specific data.

**Skin**: No specific data.

**Eyes**: No specific data.

**Medical conditions aggravated by over-exposure**: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silane</td>
<td>7803-62-5</td>
<td>60-100</td>
</tr>
</tbody>
</table>

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

**Eye contact**: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

**Skin contact**: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

**Inhalation**: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Ingestion**: As this product is a gas, refer to the inhalation section.

**Protection of first-aiders**: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

**Notes to physician**: No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

**Flammability of the product**: Contains gas under pressure. Spontaneously flammable in air. May re-ignite itself after fire is extinguished. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Runoff to sewer may create fire or explosion hazard.

**Extinguishing media**

**Suitable**: In case of fire, allow gas to burn if flow cannot be shut off immediately. Cool closed containers exposed to fire with water.

**Not suitable**: Do not use water jet.
5. **Fire-fighting measures**

**Special exposure hazards**

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

**Hazardous thermal decomposition products**

Decomposition products may include the following materials:
- Metal oxide/oxides
- Hydrogen.

**Special protective equipment for fire-fighters**

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. **Accidental release measures**

**Personal precautions**

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

**Environmental precautions**

Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

**Methods for cleaning up**

**Small spill**

Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

**Large spill**

Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. **Handling and storage**

**Handling**

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. This product should be handled using appropriate techniques that avoid exposure to atmospheric oxygen and moisture. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.

**Storage**

Store in accordance with local regulations. Store in a segregated and approved area. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep under an inert atmosphere. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use.
8. Exposure controls/personal protection

**Ingredient** | **Exposure limits**
--- | ---
Silane | ACGIH TLV (United States, 2/2010). TWA: 5 ppm 8 hour(s). TWA: 6.6 mg/m³ 8 hour(s). OSHA PEL 1989 (United States, 3/1989). TWA: 5 ppm 8 hour(s). TWA: 7 mg/m³ 8 hour(s). NIOSH REL (United States, 6/2009). TWA: 5 ppm 10 hour(s). TWA: 7 mg/m³ 10 hour(s).

**Recommended monitoring procedures**
- If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

**Engineering measures**
- Engineering controls may be required to control the primary or secondary risks associated with this product. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Use explosion-proof ventilation equipment.

**Hygiene measures**
- 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. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Personal protection**

- **Respiratory**
  - Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

- **Hands**
  - 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.

- **Eyes**
  - Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

- **Skin**
  - Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

- **Environmental exposure controls**
  - Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

**Physical state**
- Gas.

**Flammable limits**
- Lower: 1.4%
- Upper: 96%

**Color**
- Colorless.

**Odor**
- Repulsive.

**Molecular weight**
- 32.13 g/mole
9. Physical and chemical properties

Molecular formula: H4-Si
Boiling/condensation point: -111.7°C (-169.1°F)
Melting/freezing point: -185.2°C (-301.4°F)
Relative density: 0.68 at -185°C
Density: 1.114 g/cm³
Vapor density: 1.3 [Air = 1]
Viscosity: Not available.
Solubility: Insoluble in the following materials: cold water and hot water.

10. Stability and reactivity

Chemical stability: The product is stable.
Conditions to avoid: Do not allow contact with air.
Incompatible materials: Reactive or incompatible with the following materials: oxidizing materials, alkalis, moisture, water, air, halogenated compounds, Chlorine.
Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Possibility of hazardous reactions: Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with air. Reactions may include the following: spontaneous flammability. Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
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<tbody>
<tr>
<td>Silane</td>
<td>LC50 Inhalation Gas.</td>
<td>Rat</td>
<td>9600 ppm</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

Chronic toxicity
Not available.

Irritation/Corrosion
Not available.

Sensitizer
Not available.

Carcinogenicity
Classification
Not available.

Mutagenicity
Not available.

Teratogenicity
Not available.

Reproductive toxicity
Not available.

12/30/2010. United States

United States/English (US)
12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity
Not available.

Persistence/degradability
Not available.

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Do not puncture or incinerate container. Empty pressure vessels should be returned to the supplier.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Classes</th>
<th>PG*</th>
<th>Label</th>
<th>Additional information</th>
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<tr>
<td>DOT Classification</td>
<td>UN2203</td>
<td>Silane</td>
<td>2.1</td>
<td>-</td>
<td></td>
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<tr>
<td></td>
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<td>Packaging instruction</td>
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<td>Passenger aircraft</td>
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<td>Cargo aircraft</td>
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<td>IMDG Class</td>
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<td>Emergency schedules (EmS)</td>
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<td>IATA-DGR Class</td>
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<td>Silane</td>
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<td>-</td>
<td></td>
<td>Passenger and Cargo</td>
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<td>Aircraft Quantity limitation:</td>
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<td>Packaging instructions:</td>
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<td>Packaging instructions:</td>
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<td>Forbidden.</td>
</tr>
</tbody>
</table>

12/30/2010. United States United States/English (US)
14. Transport information

PG*: Packing group

15. Regulatory information

HCS Classification: Compressed gas
Pyrophoric
Target organ effects

U.S. Federal regulations

- TSCA 8(a) IUR: Partial exemption
- United States inventory (TSCA 8b): This material is listed or exempted.
- SARA 302/304/311/312 extremely hazardous substances: No products were found.
- SARA 302/304 emergency planning and notification: No products were found.
- SARA 302/304/311/312 hazardous chemicals: Silane
- SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Silane: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard

- Clean Air Act (CAA) 112 accidental release prevention: No products were found.
- Clean Air Act (CAA) 112 regulated flammable substances: Silane

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs): Not listed

Clean Air Act Section 602 Class I Substances: Not listed

Clean Air Act Section 602 Class II Substances: Not listed

DEA List I Chemicals (Precursor Chemicals): Not listed

DEA List II Chemicals (Essential Chemicals): Not listed

SARA 313

Form R - Reporting requirements: Not applicable.
Supplier notification: Not applicable.

State regulations

- Massachusetts: This material is listed.
- New York: This material is not listed.
- New Jersey: This material is listed.
- Pennsylvania: This material is listed.
- United States inventory (TSCA 8b): This material is listed or exempted.

Canada inventory: This material is listed or exempted.

International regulations

International lists: Australia inventory (AICS): This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
15. Regulatory information

<table>
<thead>
<tr>
<th>Chemical Weapons Convention List Schedule I Chemicals</th>
<th>Not listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Weapons Convention List Schedule II Chemicals</td>
<td>Not listed</td>
</tr>
<tr>
<td>Chemical Weapons Convention List Schedule III Chemicals</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

16. Other information

Label requirements: EXREMELY FLAMMABLE. CATCHES FIRE IF EXPOSED TO AIR. HIGH PRESSURE GAS. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.):

- **Health**: 1
- **Flammability**: 4
- **Physical hazards**: 3
- **Instability**: Not indicated
- **Special**: Not indicated

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.):

- **Flammability**: 4
- **Health**: 1
- **Instability**: Not indicated
- **Special**: Not indicated

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Date of issue: 12/30/2010.
Date of previous issue: No previous validation.
Version: 1

Indicates information that has changed from previously issued version.

Notice to reader
16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.