GPS Safety Summary
Silicic acid, potassium salt

Chemical Identity

Name: Silicic acid, potassium salt

CAS number: 1312-76-1

Molecular formula: K₂O ∙ nO₂Si

Product Uses

Potassium silicate glasses are produced as lumps by the direct fusion of pure silica sand (SiO₂) and potash (K₂CO₃) in furnaces at temperatures above 1000°C. Aqueous solutions of potassium silicate ("waterglass") are produced either by dissolving the potassium silicate lumps in water at elevated temperatures and pressure or for certain qualities also by dissolving silica sand in hot potassium hydroxide solution. Silicate powders which are readily soluble in water at ambient temperatures are made by drying aqueous solutions by means of spray or drum dryers.

By variation of the ratio of silica sand versus potash, different grades of potassium silicate, the so-called molar ratios are manufactured. Which molar ratio is used for a specific application depends on the desired properties the silicate has to impart on the products.

Potassium silicate is used in many industrial as well as consumer applications, for example in detergents (fabric, dish, hard surface and industrial cleaning), construction materials, coatings and paints, fire-proof materials, pulp and paper manufacture, adhesives and binders, civil engineering (tunnel construction, mining and drilling), textile processing and personal care products.
Benefits

Silicic acid, potassium salt has versatile properties which are used in a wide variety of industrial and consumer applications:

» Buffering capacity, suspension of soil particles (detergents)
» Adhesive and binder (paperboard and cardboard, coal dust briquettes, roofing tiles, refractory cements, plasters and mortars, foundry molds and cores, welding rods, fibreboards, fibreglass and rockwool).
» Surface coating (concrete, paper, paints for masonry and glass surfaces, spray-coating in tunnel construction and mining).
» Fire protection (fire-proof glass, fire-retardant coatings/impregnation of textiles, wood)
» Pulp and paper manufacture (deinking and bleaching).
» Sealing (civil engineering, like soil sealing and stabilisation in drilling, tunnelling, and mining, sealing of landfills, building pits, and coastline stabilisation).
» Bleach and dye stabiliser (textile processing, hair dyes).
» Liquefying agent (in porcelain slips for ceramics production).

Commercial potassium silicates are non-flammable and not explosive, show low toxicity and have benign environmental properties. They rapidly depolymerize on dilution in the environment to give molecules that are indistinguishable from natural dissolved silica originating from geochemical weathering of silicate minerals.

Health Information

Human Health Safety Assessment

Note: The information contained in the table below may be useful to someone handling the concentrated substance such as a manufacturer or transporter. Consumers are not likely to come in contact with the concentrated substance. The data, while verifiable, are not intended to be comprehensive nor replace the data found in the (M)SDS.

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Toxicity</td>
<td>Virtually nontoxic after a single ingestion. Virtually nontoxic after a single skin contact. Virtually nontoxic by inhalation.</td>
</tr>
</tbody>
</table>

Date of Issue: March 2012
Irritation

Corrosive! Damages skin and eyes. Causes temporary irritation of the respiratory tract.

Sensitization

Skin sensitizing effects were not observed in animal studies.

Mutagenicity

Mutagenicity tests revealed no genotoxic potential. The statement has been derived from products of a similar structure or composition.

Carcinogenicity

Based on the ingredients there is no suspicion of a carcinogenic effect in humans.

Toxicity after repeated exposure

The substance may lead to shifts in blood composition following repeated exposure in animal experiments. Prolonged and repeated exposure may cause effects on the liver.

Toxicity for reproduction

The results of animal studies gave no indication of a fertility impairing effect. In animal studies the substance did not cause malformations. The statements have been derived in parts from products of a similar structure or composition.

Environmental Information

Environment Safety Assessment

Note: The information in this chapter is intended to provide brief and general information of this substance’s environmental impact. The results in the table below refer to testing performed with the concentrated substance. The data contained in this section explain the relative effect of the concentrated substance on the environment, as defined by certain tests.

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Toxicity</td>
<td>With high probability not harmful to aquatic organisms.</td>
</tr>
<tr>
<td>Persistence and degradability</td>
<td>Inorganic substance, not degradable by biotic processes.</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
<td>Accumulation in organisms is not to be expected.</td>
</tr>
</tbody>
</table>
Physical/Chemical Properties

Phys/Chem Safety Assessment

- Silica acid, potassium salt is a compact solid with a translucent, blue-greenish or yellow-brownish color which does not have flammable or explosive properties.

Note: The results in the table below refer to testing performed with the concentrated substance. It is not intended to be comprehensive or to replace information found in the (M)SDS.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Melting / freezing point</td>
<td>905 °C (flow point)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>The determination of a boiling point is not practical for solid anhydrous silicates as they are glasses with high melting points. The boiling point of silicate solutions will be primarily determined by the water present and thus will not differ significantly from the boiling point of water.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non flammable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Non explosive</td>
</tr>
<tr>
<td>Self-ignition temperature</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Exposure Potential

- **Workplace exposure:** During manufacture and processing (formulation, packaging etc.) workers may be exposed to potassium silicate by the dermal and respiratory routes. The fusion of sand and potash takes place in a closed furnace. After the fusion process the silicate lumps pass through alternative processing steps. They are either ground to powders or granules in a grinder, dissolved in rotating dissolvers or the solutions may be converted to powder or granules by spray-drying or spray granulation. In a sieving process particles (too large or too small) are recycled back into the system. This process is under containment. All operations during preparation and packaging of solutions and solids are performed in closed systems or with local exhaust ventilation systems in place.

Date of Issue: March 2012
Therefore, exposure of workers during these processes is assumed to be rather low. Local exhaust ventilation should always be used where solid potassium silicate is handled. In addition, whenever silicic acid, sodium salt as a substance on its own (powder/granules or liquid) or in a preparation is handled outside closed systems, suitable personal protective equipment (gloves, goggles, dust masks or respirators) is the preferred measure of control and workers should additionally follow the recommended safety measures in the extended Safety Data Sheet (eSDS).

- **Consumer exposure**: Consumers may come into contact with potassium silicate when using detergents and household cleaners, paints, plasters and mortars or hair colours and dyes. Depending on the molar ratio, the effects of potassium silicate on skin and eyes range from not irritating to corrosive. By keeping the concentration in consumer products below the irritating threshold and/or using molar ratios of sodium silicate that are not irritating, the hazard is minimized. The inhalation risk of solid products is minimized by appropriate formulation, e.g. granules, pearls or tablets. When handling powdery products with the potential of dust formation, dust masks should be used and sufficient ventilation ensured. To guarantee the safe use, carefully read and follow the instructions given on product labels.

- **Environmental exposure**: Due to its inorganic nature, potassium silicate is not degraded by biological processes. However, on dilution it rapidly depolymerises to give molecules that are indistinguishable from natural dissolved silica originating from geochemical weathering of silicate minerals. Compared to the total amount of silica generated through weathering of rocks, the contribution of potassium silicate is negligible. In addition, the silica is continuously removed from water by biochemical processes: diatoms, radiolarians, silicoflagellates, and certain sponges incorporate it into their shells and skeletons as amorphous biogenic silica.

- Silicic acid, potassium salt is with high probability not harmful to aquatic organisms in the range of its water solubility. Furthermore, the substance does not accumulate in the food chain. Conclusively, all identified uses are safe for the environment based on the scientific facts summarized above and when carried out in compliance with recommended risk management measures and applicable regulations.

**Recommended Handling Measures**

The recommended safety measures generally apply in contact with the concentrated substance. It is NOT intended to replace the comprehensive guidance found in the (M)SDS, only supplement it. Please refer to the (M)SDS for specific safety and first aid measures.

When using concentrated chemicals always make sure that there is adequate ventilation. Always use appropriate chemical resistant gloves to protect your hands and skin and always
wear eye protection such as chemical goggles. Do not eat, drink, or smoke where chemicals are handled, processed, or stored. Wash hands and skin following contact. If the substance gets into your eyes, rinse eyes thoroughly for at least 15 minutes with tap water and seek medical attention. For specific advice please consult the corresponding (Material) Safety Data Sheet of the substance.

In view of the alkalinity all effluent releases that may include the substance must be directed to a (municipal) waste water treatment plant to safeguard appropriate dilution and/or neutralization before final release to the receiving water.

**Regulatory Information / Classification and Labeling**

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (M)SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

_Note: The hazard statements and symbols presented here refer to the hazard properties of the concentrated substance and are meant to provide a brief overview of the substance’s labeling. It is not intended to be comprehensive or to replace information found in the (M)SDS._

**Labeling according to UN GHS**

UN GHS is the basis for country specific GHS labeling

**Classification for molar ratios of SiO₂ : K₂O ≤ 1.6:**

**Signal word:**

Danger

**Hazard statements:**

H290: May be corrosive to metals.
H314: Causes severe skin burns and eye damage.
H335: May cause respiratory irritation. (only powdered substance)
Additional information


Most commonly used synonyms

» Potassium waterglass
» Potassium silicate

Disclaimer

This Product Safety Summary is intended to provide a general overview of the chemical substance. It contains basic information and is not intended to provide emergency response information, medical information or treatment information. The summary cannot be relied on to provide in-depth safety and health information. In-depth safety and health information must be obtained from the Material Safety Data Sheet ((M)SDS) for the chemical substance.

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Contact

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