Soluble silicates: Human health tier II assessment

01 July 2016

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Silicic acid, sodium salt	1344-09-8
Silicic acid, potassium salt	1312-76-1
Silicic acid (H2SiO3), disodium salt	6834-92-0
Silicic acid (H2SiO3), dipotassium salt	10006-28-7
Silicic acid (H4SiO4), tetrasodium salt	13472-30-5
Silicic acid (H2Si2O5), disodium salt	13870-28-5

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

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ACRONYMS & ABBREVIATIONS

Grouping Rationale

The soluble silicates are structurally very similar. The basic structural units, silicon-oxide tetrahedra, are either monomeric or are linked with each other via Si-O-Si bonds to form dimers. The negative charge of unshared oxygen atoms is balanced by the presence of sodium or potassium cations. The extent to which balancing alkali ions are present in a given silicate is defined by the molar ratio $SiO_2 : M_2O$ (M = Na or K). The higher the molar ratio, the less sodium or potassium ions are present in the silica network and consequently the less alkaline the silicates are. The biological properties of soluble silicates are mainly governed by their intrinsic alkalinity. Based on the available data, the members of the soluble silicates category exhibit a similar toxicological profile (OECD, 2004).

Import, Manufacture and Use

Australian

The following Australian industrial uses were reported under previous mandatory and/or voluntary calls for information.

Sodium silicate (CAS No. 1344-09-8) has reported potential cosmetic uses:

- as a pH-regulating agent; and
- in cleaning/washing products.

Sodium metasilicate (CAS No. 6834-92-0) has reported potential cosmetic uses in:

- bleaching agents; and
- other personal care products.

Both of the above chemicals have reported potential domestic or commercial uses as:

- complexing agents;
- surface active agents;
- cleaning and washing agents;
- construction materials additives; and
- pH regulating agents.

Sodium metasilicate has reported commercial uses in:

- lubricants/additives;
- electroplating agents;
- solvents; and
- tanning agents.

Sodium silicate is listed on the 2006 High Volume Industrial Chemicals List (HVICL) with a total reported volume of 10,000–99,000 tonnes.

No specific Australian use, import, or manufacturing information has been identified for sodium disilicate (CAS No. 13870-28-5), sodium orthosilicate (CAS No. 13472-30-5), potassium silicate (CAS No. 1312-76-1) or dipotassium silicate CAS No. 10006-28-7).

International

The following international uses have been identified through: the European Union (EU) Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) dossiers; the Organisation for Economic Co-operation and Development (OECD) Screening Information Data Set (SIDS) International Assessment Report (SIAR); Galleria Chemica; the Substances and Preparations in Nordic countries (SPIN) database; the European Commission Cosmetic Ingredients and Substances (CosIng) database; the United States (US) Personal Care Products Council International Nomenclature of Cosmetic Ingredients (INCI) Dictionary; the OECD High Production Volume chemical program (OECD HPV); and the US National Library of Medicine's Hazardous Substances Data Bank (HSDB).

Some of the chemicals have reported cosmetic uses as anticorrosive, buffering or chelating-agents in the following products:

- bar soaps, bath soaps and bubble baths;
- depilatories;
- shaving cream;

- aftershave lotions;
- hair bleaches and lighteners;
- hair dyes and colours;
- hair straighteners;
- eye make-up;
- skin care; and
- mud packs.

The chemicals have reported domestic uses including in:

- auto products (cleaners, repairs, polish and degreasers);
- colour removers in arts and crafts;
- drain cleaners;
- mortar;
- fillers;
- cleaning products;
- dishwashing and laundry detergents;
- fabric softeners;
- oven, tile and grout cleaners;
- carpet cleaners;
- floor polish and strippers;
- stain removers;
- rust removers;
- degreasants;
- adhesives; and
- concrete cleaners.

The chemicals have reported commercial uses including in:

- auto products (cleaners, repairs, polish and degreasers);
- floor cleaners;
- carpet cleaners;
- detergents;
- laundry detergents;
- dishwasher detergents;

- water treatment for boiler feeds; and
- degreasants.

Potassium silicate has reported site-limited uses including in manufacturing glass, refractories and welding rods.

Restrictions

Australian

These chemicals are listed in the *Poisons standard—the Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP) in Schedules 5 and 6 and Appendix C (SUSMP, 2015).

Schedule 5:

'ALKALINE SALTS, being the carbonate, silicate or phosphate salts of sodium or potassium alone or in any combination:

(a) in solid orthodontic device cleaning preparations, the pH of which as an "in-use" aqueous solution is more than 11.5;

(b) in solid automatic dishwashing preparations, the pH of which in a 500 g/L aqueous solution or mixture is more than 11.5 but less than or equal to 12.5;

(c) in other solid preparations, the pH of which in a 10 g/L aqueous solution is more than 11.5; or

(d) in liquid or semi-solid preparations, the pH of which is more than 11.5, unless;

(i) in food preparations for domestic use; or

(ii) in automatic dish washing preparations for domestic use with a pH of more than 12.5, except when separately specified in these Schedules.'

Schedule 6:

‘ALKALINE SALTS, being the carbonate, silicate or phosphate salts of sodium or potassium alone or in any combination for non-domestic use:

(a) in solid automatic dishwashing preparations, the pH of which in a 500 g/L aqueous solution or mixture is more than 12.5; or

(b) in liquid or semi-solid automatic dishwashing preparations, the pH of which is more than 12.5.'

Appendix C

‘ALKALINE SALTS, being the carbonate, silicate or phosphate salts of sodium or potassium alone or in any combination for domestic use:

(a) in liquid or semi-solid food additive preparations, the pH of which is more than 11.5;

(b) in solid automatic dishwashing preparations, the pH of which in a 500 g/L aqueous solution or mixture is more than 12.5; or

(c) in liquid or semi-solid automatic dishwashing preparations, the pH of which is more than 12.5.'

Schedule 5 chemicals are described as 'Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.' Schedule 5 chemicals are labelled with 'Caution’ (SUSMP, 2015).

Schedule 6 chemicals are described as 'Substances with a moderate potential for causing harm, the extent of which can be reduced through the use of distinctive packaging with strong warnings and safety directions on the label'. Schedule 6 chemicals are labelled with 'Poison' (SUSMP, 2015).

Appendix C chemicals are described as 'Substances, other than those included in Schedule 9, of such danger to health as to warrant prohibition of sale, supply and use' (SUSMP, 2015).

International

No known restrictions have been identified.

Existing Worker Health and Safety Controls

Hazard Classification

Sodium metasilicate (CAS No. 6834-92-0) is classified as hazardous, with the following risk phrases for human health in the Hazardous Substances Information System (HSIS) (Safe Work Australia):

- C; R34 (corrosivity)
- Xi; R37 (irritation)

Exposure Standards

Australian

No specific exposure standards are available.

International

No specific exposure standards are available.

Health Hazard Information

Silicon is an essential trace element involved in the normal metabolism of mammals. It is required in bone, cartilage and connective tissue formation as well as other important metabolic processes. The majority of silicon on earth is combined with other elements including oxygen to form minerals with low bioavailability, such as silicon dioxide (sand). Most rocks and many mineral compounds are silicates, widely occurring compounds containing silicon, oxygen, and one or more metals, with or without hydrogen (Hawley, 1981). Soluble silicate anions generally only occur under alkaline conditions, forming polymeric species such as silica gel at lower pHs. The formation of insoluble silica gel at physiological pH values limits the amount of silica available systemically (OECD, 2004). Silica gel is considered to be of low toxicity (NICNAS, 2012). Absorption of orally administered silicate will largely be dose independent because of the equilibrium involving the insoluble silica gel.

Thus the critical effects are local, namely corrosivity and irritation, depending upon the molar ratio and concentration. The molar ratios for the chemicals in this group of definite stoichiometry are in the range 0.5–2.0. Results obtained with sodium silicate can be extrapolated to potassium silicates of the same molar ratio, the nature of the alkali ion having no effect on the biological properties (OECD, 2004). The observed toxicological symptoms indicate effects due to high alkalinity. Sodium metasilicate is a GRAS (generally regarded as safe) food ingredient (FDA, 2014), reflecting the low level of concern regarding its potential for long-term toxicity. The SIDS Initial Assessment Report (OECD, 2004) includes negative results from studies on repeated dose toxicity, genotoxicity, reproductive and developmental toxicity, consistent with what would be expected for silicates.

Toxicokinetics

No reliable toxicokinetic, metabolic or metabolic studies are available for soluble silicates (OECD, 2004).

Since concentrated silicate solutions are only stable at pH values above 11.5, and lowering the pH below 11.5 leads to insoluble silica gel being formed, it can be reasonably assumed that after ingestion, gel formation will occur in the stomach's acidic conditions. Excess silicate ions can only be present under conditions of extreme alkalosis. Gastrointestinal absorption of insoluble silica will be insignificant compared with the absorption of the soluble anions (OECD, 2004).

Two groups of four male Sprague Dawley rats were fasted for 17 to 18 hours and then administered sodium silicate orally in doses of 40 or 1000 mg/kg bw. Four control animals received 10 mL of quartz-distilled water. The water contained less than 0.5 ppm of silicon and aluminium. Urine samples were collected over an eight-hour period and afterwards the remaining urine in the bladder was collected. The concentrations were measured by induction-coupled radio frequency (RF) plasma optical emission spectrometry. Silicon excretion was most rapid during the first 24 hours after dosing. After subtracting the control values, the urinary silicon excretion at 40 and 1000 mg sodium silicate/kg was 18.9 % and 2.8 %, respectively (Elmore & the Cosmetic Ingredient Review Expert Panel, 2005). The smaller percentage of silicon excreted at the higher administered dose, compared with the lower dose, most likely reflects the precipitation of silica gel in the stomach at higher concentrations of silicate and resulting in uptake saturation.

When absorbed, silicates are excreted via the urine and, to a lesser extent, via the faeces. Markedly increased and rapid urinary excretion of silica was observed when soluble sodium silicates were administered by various routes to rats, dogs, cats and guinea pigs. The urinary silicon excretion half-life after administration of sodium silicate to rats through a stomach tube was 24 hours. The excretion rate was independent of the dose applied, indicating that the limiting factor is the rate of production of soluble or absorbable silicon in the gastrointestinal tract (OECD, 2004).

Acute Toxicity

Oral

The acute oral toxicity of soluble silicates is generally inversely correlated to the molar ratio SiO_2 : Na_2O. Toxicity decreases in rats with increasing molar ratio from a median lethal dose (LD50) of 500 mg/kg bw for molar ratio 0.5 up to 8650 mg/kg bw for molar ratio 3.38. The one solitary study on potassium silicate fits well into the toxicity pattern of the sodium silicates (OECD, 2004).

A number of studies have used conditions comparable to OECD guidelines. The oral LD50 in rats was 1152–5700 mg/kg bw, depending on the molar ratio of the silicate species; that is, toxicity decreases with increasing molar SiO_2 : M_2O ratio. Clinical signs included apathy, staggering gait, tonic cramps, dyspnoea, cyanosis, piloerection and signs of abdominal discomfort (OECD, 2004).

Dermal

No data are available on the acute inhalation and dermal toxicity of soluble silicates. In view of the irritating or corrosive properties of undiluted, concentrated soluble silicates that would result in severe local effects, studies on inhalation or dermal toxicity are neither feasible nor justifiable due to animal welfare concerns (OECD, 2004).

Inhalation

No data are available.

Observation in humans

Ingesting 200 mL of sodium silicate egg-preserving solution (typically having a molar ratio of 3:2 and concentrations of 5–36 %) caused severe vomiting, diarrhoea and bleeding, elevated blood pressure, and renal damage, but was not fatal. Ingesting 500 mL of an egg-preserving solution containing sodium silicate by a 68-year-old woman intending to commit suicide caused death within one hour by suffocation. Aspiration of the vomited silicate solution caused obstruction of the lungs by precipitating amorphous silica. Sodium silicate was transformed from a liquid to solid form in the lungs by the carbon dioxide in expired air (OECD, 2004).

Corrosion / Irritation

Corrosivity

Silicic acid (H_2SiO_3), disodium salt is classified as hazardous with the risk phrase 'Causes burns' (C; R34) in the HSIS (Safe Work Australia). The available data (OECD, 2004) support extending the classification to the other chemicals in the group.

In eye irritation studies conducted in accordance with OECD Test Guideline (TG) 405 using concentrations of 35 % and 29 % (highest tested concentrations), potassium silicates with molar ratios of 3.4 and 3.9 were only slightly irritating, and not irritating to the eyes of rabbits, respectively. Results from non-validated in vitro assays indicated that the severity of eye effects is inversely correlated with the molar ratio, with corrosive effects found in the enucleated rabbit eye test after exposure to disodium silicate powder with a molar ratio of 1.0 (OECD, 2004).

Sodium and potassium silicates can be irritating and corrosive to the skin of rabbits, depending on the molar ratio and concentration of the solutions. Several primary skin irritation studies using these chemicals have been performed in rabbits in accordance with, or under similar conditions to, the relevant OECD test guidelines (OECD, 2004).

The degree of irritation in the studies indicate that the irritation response is inversely correlated with the molar ratio of the silicates; a lower molar ratio of SiO_2 : Na_2O leads to a higher irritation score and vice versa. Lower concentrations will exhibit lower irritancy than higher concentrations of the same molar ratio. The SIDS Initial Assessment Report for soluble silicates includes studies that demonstrate the inverse correlation with molar ratio (OECD, 2004), where sodium silicates of comparable concentrations (38–41 %), but different molar ratios, were tested. Whereas ratios of 2.0 and 2.4 exhibited irritating properties, ratios of 2.8 and 3.3 were not irritating. The concentration effect becomes evident when the irritancy of identical molar ratios, but different concentrations, are compared. A sodium silicate solution of a molar ratio 2.4 is irritating at 40 % and corrosive at 82 %; sodium metasilicate is irritating at 10 % and corrosive at 50 %. Sodium silicate solutions of molar ratios 1.6 and below and concentrations greater than 50 % are corrosive. Sodium metasilicate, when tested as an anhydrous powder was not irritating to the skin; when moistened with water it was found to be corrosive (OECD, 2004).

The data from the limited studies available for potassium silicates are consistent with the inverse correlation of skin effects and molar ratio that is observed for sodium silicates. Likewise, higher concentrations of the same molar ratio are expected to exhibit higher irritating potential. As observed with sodium silicates, potassium silicates of comparable concentrations and different molar ratios show the same inverse correlation to irritancy. Molar ratios of 2.0 and 3.0 and 33–36 % concentrations were irritating to the skin, whereas solutions of molar ratios 3.4 and 3.9 and 29–35% concentrations caused no irritation. The results indicate that the counter ions of soluble silicates have no influence on skin irritation (OECD, 2004).

Respiratory Irritation

Silicic acid (H_2SiO_3), disodium salt is classified as hazardous with the risk phrase 'Irritating to respiratory system' (Xi; R37) in the HSIS (Safe Work Australia).

Observation in humans

In an open epicutaneous test performed according to a European Cosmetic, Toiletry and Perfumery Association (COLIPA) guideline, volunteers were exposed to 5, 10 or 50 % aqueous solutions or undiluted sodium silicate (molar ratio 3.45) for 30 minutes. The light redness experienced by 2–3 of the 20 volunteers in each group tested with an aqueous solution disappeared within 20 minutes. The wax-like undiluted substance did not cause adverse effects. Under semi-occlusive (but otherwise identical) conditions, both a 50 % aqueous solution and the undiluted substance resulted in peeling skin in a third of the subjects after four hours of exposure. The study corresponded to OECD TG 404, with adjustments for human subjects. Both studies were performed in accordance with the Good Clinical Practice (GCP) standard (OECD, 2004).

Sensitisation

Skin Sensitisation

Based on the negative results of a study using sodium silicate in a local lymph node assay conducted in accordance with OECD TG 429, the chemical is not considered to be a skin sensitiser (OECD, 2004).

Data are not available for other chemicals in this group.

Observation in humans

A 57-year-old worker suffered recurrent ulcerative lesions on his left hand for two years after repeated occupational exposure to 20 % aqueous sodium silicate. In a 24-hour patch test with 20 % sodium silicate (MR unspecified) ulcer formation was elicited in the patient, but not in 30 healthy volunteers. Immediate wheal formation was observed in the patient 15 minutes after a scratch test was performed with 20 % metasilicate, whereas 30 control subjects did not show wheal formation (OECD, 2004).

Risk Characterisation

Critical Health Effects

Soluble silicates are corrosive or irritating to the skin, eyes, gastrointestinal and respiratory tracts, depending on the molar ratios and concentrations (OECD, 2004).

Public Risk Characterisation

Soluble silicates have uses in domestic products where high pH is important for product functionality, such as dishwashing and laundry detergents. Generally, the average particle size in powder detergents is far larger than that which can be inhaled, since the silicates in powder form used in consumer products are sieved to retain only non-respirable particles.

They are also used in moderate concentrations in cosmetics, such as hair products, which are formulated to avoid extremes of pH or irritancy. The main route of public exposure is expected to be contact with eyes and skin.

Labelling for silicate formulations is controlled by the Poisons Standard (SUSMP, 2015).

Provided that the appropriate precautions are taken to avoid skin and eye contact or inhaling aerosols, the risk from the use of domestic and cosmetic products is not considered to be unreasonable.

Occupational Risk Characterisation

During product formulation, dermal, ocular and inhalation exposure might occur, particularly where manual or open processes are used. These could include transfer and blending activities, quality control analysis, and cleaning and maintaining equipment. Worker exposure to the chemicals at lower concentrations could also occur while using formulated products containing the chemicals. The level and route of exposure will vary depending on the method of application and work practices employed.

Given the critical health effects, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise dermal, ocular and inhalation exposure are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine the appropriate controls.

The data available support an amendment to the hazard classification in the HSIS (Safe Work Australia) (refer to **Recommendation** section.

NICNAS Recommendation

Assessment of these chemical are considered to be sufficient, provided that the recommended amendment to the classification is adopted, and labelling and all other requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Regulatory Control

Public Health

Products containing the chemicals should be labelled in accordance with state and territory legislation (SUSMP, 2015).

Work Health and Safety

Sodium metasilicate (CAS No. 6834-92-0) is the only chemical in this group currently classified as hazardous under the HSIS. The other chemicals in this group are recommended for classification and labelling under the current approved criteria for corrosivity (C, R34) only and adopted GHS classification (see below GHS). Should empirical data become available for any member of the group indicating that a lower (or higher) classification is appropriate for the specific chemical, this may be used to amend the default classification for that chemical. This assessment does not consider classification of physical and environmental hazards.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Irritation / Corrosivity	Irritating to respiratory system (Xi; R37)* Causes burns (C; R34)	May cause respiratory irritation - Specific target organ tox, single exp Cat. 3 (H335) Causes severe skin burns and eye damage - Cat. 1 (H314)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for consumers

Products containing the chemicals should be used according to the instructions on the label.

Advice for industry

Control measures

Control measures to minimise the risk from dermal, ocular and inhalation exposure to the chemicals should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate, or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemicals are used. Examples of control measures which could minimise the risk include, but are not limited to:

- using local exhaust ventilation to prevent the chemicals from entering the breathing zone of any worker;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemicals.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to help meet obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((M)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemicals are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (M)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals—Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of these chemicals has not been undertaken as part of this assessment.

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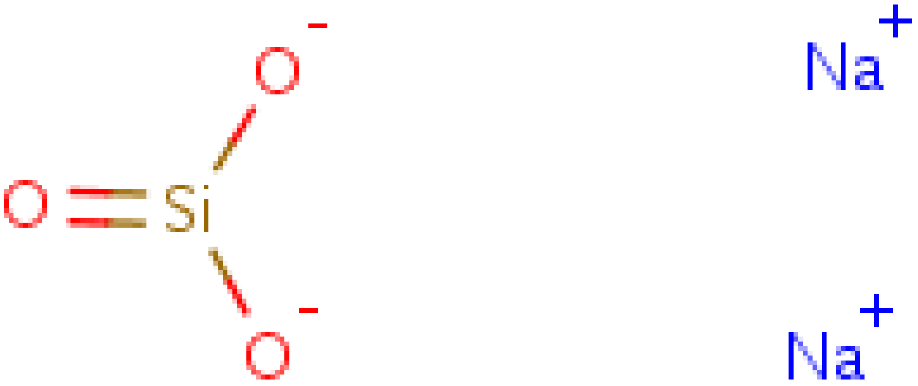
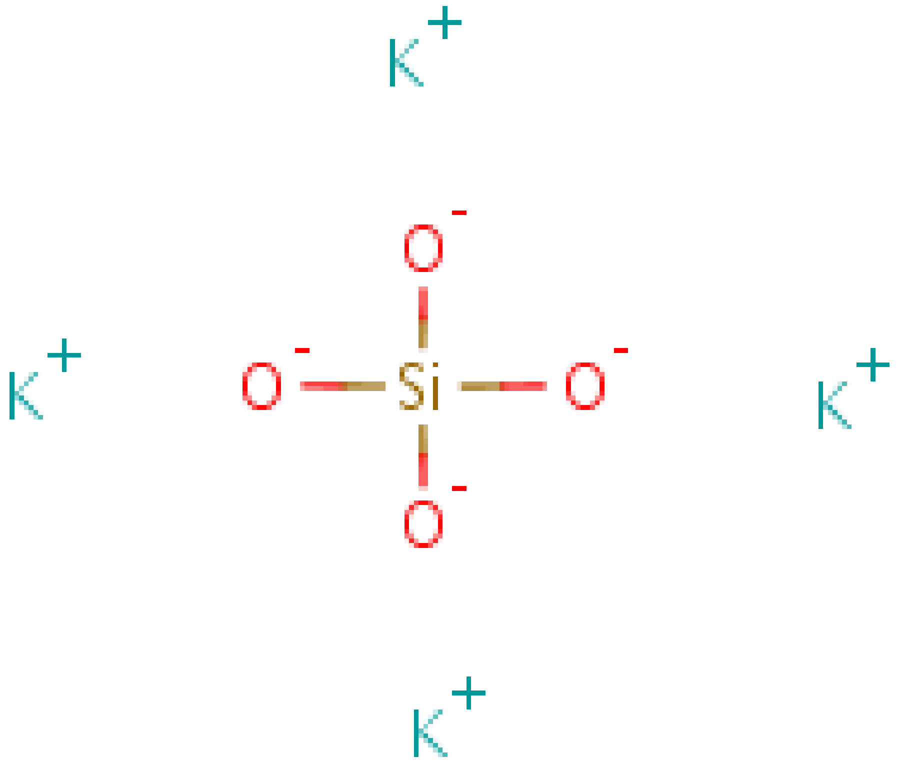
Last Update 01 July 2016

Chemical Identities

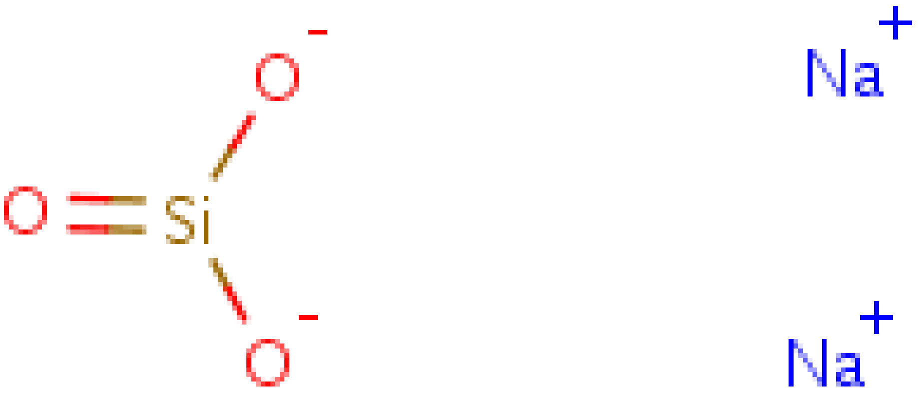
Chemical Name in the Inventory and Synonyms	**Silicic acid, sodium salt** sodium silicate sodium sesquisilicate sodium .beta.-silicate sodium silicate, glass sodium siliconate
CAS Number	1344-09-8
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	122.06

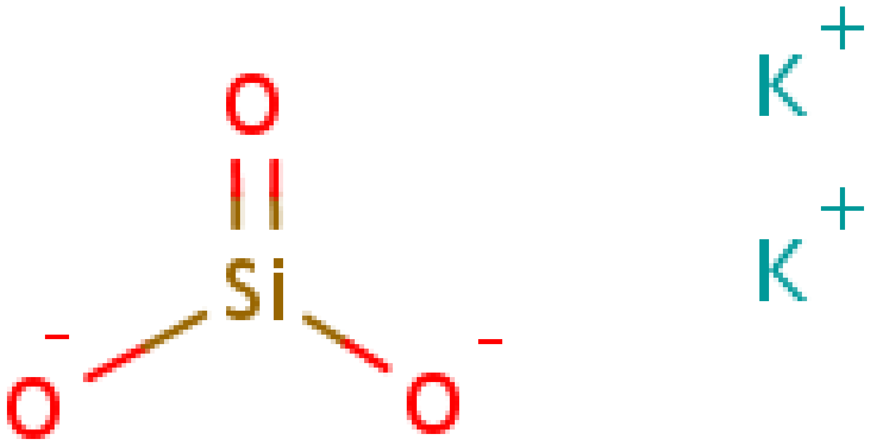
Chemical Name in the Inventory and Synonyms	**Silicic acid, potassium salt** potassium silicate
CAS Number	1312-76-1
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	248.47

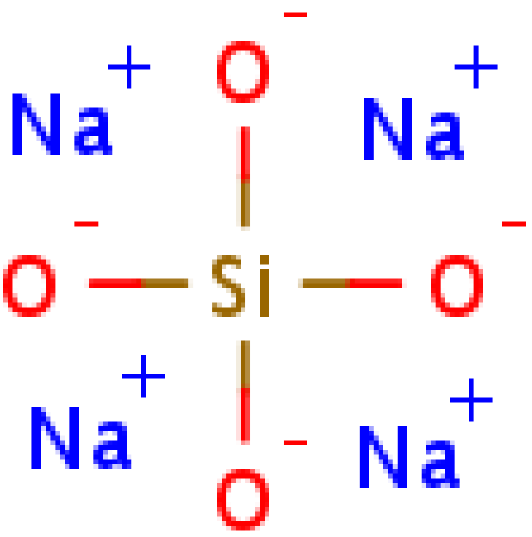
Chemical Name in the Inventory and Synonyms	**Silicic acid (H2SiO3), disodium salt** sodium metasilicate sodium-m-silicate sodium silicate (Na2SiO3) disodium metasilicate
CAS Number	6834-92-0
Structural Formula	

	
Molecular Formula	H2O3Si.2Na
Molecular Weight	122.06

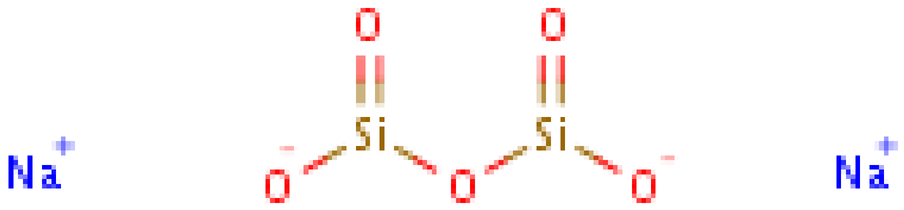
Chemical Name in the Inventory and Synonyms	**Silicic acid (H2SiO3), dipotassium salt** dipotassium silicate
CAS Number	10006-28-7
Structural Formula	

	
Molecular Formula	H2O3Si.2K
Molecular Weight	154.28

Chemical Name in the Inventory and Synonyms	**Silicic acid (H4SiO4), tetrasodium salt** sodium orthosilicate
CAS Number	13472-30-5
Structural Formula	

	
Molecular Formula	H4O4Si.4Na
Molecular Weight	184.04

Chemical Name in the Inventory and Synonyms	**Silicic acid (H2Si2O5), disodium salt** sodium disilicate sodium silicate disodium disilicate
CAS Number	13870-28-5
Structural Formula	

	
Molecular Formula	H2O5Si2.2Na
Molecular Weight	182.15

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