

**Processkemikalier för beredning av dricksvatten –
Natriumsilikat**

**Chemicals used for treatment of water intended
for human consumption – Sodium silicate**

ICS 13.060.20; 71.100.80

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I enlighet med Statens livsmedelsverks föreskrifter om dricksvatten, SLV FS 2001:30, är natriumsilikat tillåtet som processkemikalie för beredning av dricksvatten i Sverige.

The European Standard EN 1209:2003 has the status of a Swedish Standard. This document contains the official English version of EN 1209:2003.

According to The National Food Administration's Ordinance with regulations and general advice on drinking water, SLV FS 2001:30, sodium silicate is permitted as a process chemical for treatment of water intended for human consumption in Sweden.

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English version

Chemicals used for treatment of water intended for human consumption - Sodium silicate

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Silicate de sodium

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natriumsilikat

This European Standard was approved by CEN on 10 October 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document (EN 1209:2003) has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document supersedes EN 1209:1997.

Significant technical differences between this edition and EN 1209:1997 are as follows:

- a) taking account of the new EU Directive 98/83/EC;
- b) modification of the limit value of Sb to 33 mg/kg instead of 60 mg/kg;
- c) modification of the labelling requirements in relation to the molecular ratio $\text{SiO}_2\text{:Na}_2\text{O}$;
- d) introduction of new methods for the analysis of iron, sulfate and fluoride in 5.2.2.

Annex A is informative.

Annex B is normative.

This document includes a bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

EN 1209:2003 (E)

Introduction

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this Standard:

- a) this Standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- b) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

NOTE Conformity with this standard does not confer or imply acceptance or approval of the product in any of the Member States of the EU or EFTA. The use of the product covered by this European Standard is subject to regulation or control by National Authorities.

1 Scope

This European Standard is applicable to sodium silicate used for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements and the corresponding test methods for sodium silicate. It gives information on its use in water treatment.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1483, *Water quality - Determination of mercury.*

EN 26595, *Water quality - Determination of total arsenic - Silver diethyldithiocarbamate spectrophotometric method (ISO 6595:1982).*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987).*

EN ISO 11885, *Water quality - Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy (ISO 1185:1996).*

ISO 1689, *Sodium and potassium silicates for industrial use - Calculation of the ratio: silicon dioxide/sodium oxide or silicon dioxide/potassium oxide*

ISO 1690, *Sodium and potassium silicates for industrial use - Determination of silica content - Gravimetric method by insolubilization.*

ISO 1692, *Sodium and potassium silicates for industrial use - Determination of total alkalinity - Titrimetric method.*

ISO 3165, *Sampling of chemical products for industrial use - Safety in sampling*

ISO 5961, *Water quality - Determination of cadmium by atomic absorption spectrometry.*

ISO 6206, *Chemical products for industrial use - Sampling - Vocabulary.*

ISO 6703-1, *Water quality - Determination of cyanide - Part 1: Determination of total cyanide.*

ISO 8213, *Chemical products for industrial use - Sampling techniques - Solid chemical products in the form of particles varying from powders to coarse lumps.*

ISO 8288, *Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods*

ISO 9174, *Water quality - Determination of chromium - Atomic absorption spectrometric methods.*

ISO 9965, *Water quality - Determination of selenium - Atomic absorption spectrometric method (hydride technique)*

EN 1209:2003 (E)**3 Description****3.1 Identification****3.1.1 Chemical name**

Sodium silicate.

3.1.2 Synonym or common names

Waterglass solution.

3.1.3 Relative molecular mass

Dependent on molecular ratio.

3.1.4 Empirical formula

$\text{Na}_2\text{O} \cdot n \text{SiO}_2$ with n between 1,5 and 4,0.

3.1.5 Chemical formula

$\text{Na}_2\text{O} \cdot n \text{SiO}_2$ with n between 1,5 and 4,0.

3.1.6 CAS Registry Number¹⁾

1344-09-8.

3.1.7 EINECS reference²⁾

215-687-4.

3.2 Commercial form

Sodium silicate is available as a clear to slightly opalescent colourless liquid, which can be mixed with water in any ratio, or as powder or granular material.

3.3 Physical properties**3.3.1 Appearance**

The solid form is a fine, white powder, or a white granular material.

The liquid form is clear to slightly opalescent.

1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3.3.2 Density

Solution:

- depending on the molecular ratio of SiO_2 : Na_2O and the concentration. The density at 20 °C can vary from 1,2 g/ml to 1,7 g/ml.

Powder:

- depending on the grain size: 300 g/dm³ to 1 000 g/dm³.

3.3.3 Solubility in water

Solution:

- miscible in any proportions.

Powder:

- miscible; maximum solubility dependent on grade.

3.3.4 Vapour pressure

Not applicable.

3.3.5 Boiling point at 100 kPa³⁾

More than 100 °C and depending on molecular ratio SiO_2 : Na_2O .

3.3.6 Melting point

- Generally > 800 °C.

3.3.7 Crystallisation point

An accurate crystallisation point of a sodium silicate solution can not be measured. By reducing the temperature of the solution the viscosity increases. A precipitate of variable composition will form, depending on the molecular ratio and concentration of the sodium silicate.

3.3.8 Specific heat

Not known.

3.3.9 Viscosity (dynamic)

Solution:

- 70 mPa. s to 90 000 mPa. s at 20 °C depending on molecular ratio SiO_2 : Na_2O and concentration.

Powder:

3) 100 kPa = 1 bar.

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— not applicable.

3.3.10 Critical temperature

Not applicable.

3.3.11 Critical pressure

Not applicable.

3.3.12 Physical hardness

Not applicable.

3.4 Chemical properties

Sodium silicate reacts as follows:

- with acids by exothermic reaction, to form a gel;
- with 2- or 3-valent ions, to form insoluble silicates;
- with carbon dioxide (CO₂), to form a gel or precipitate.

4 Purity criteria**4.1 General**

This European Standard specifies the minimum purity requirements for sodium silicate used for the treatment of water intended for human consumption. Limits are given for impurities commonly present in the product. Depending on the raw material and the manufacturing process other impurities may be present and, if so, this shall be notified to the user and when necessary to relevant authorities.

NOTE Users of this product should satisfy themselves that it is of appropriate purity for treatment of water intended for human consumption, taking into account raw water quality, required dosage, contents of other impurities and additives used in the products not stated in the product standard, and other relevant factors.

Limits have been given for impurities and chemical parameters where these are likely to be present in significant quantities from the current production process and raw materials. If the production process or raw materials lead to significant quantities of other impurities by-products or additives being present, this shall be notified to the user.

4.2 Composition of commercial product

The commercial product varies in composition according to 3.1.4. The active matter content expressed as silica in percent by mass % (*m/m*) shall be within ± 3 % of the manufacturer's declared values.

NOTE The active matter content in commercial products varies in the range of 20 % per cent by mass % (*m/m*) to 65 % (*m/m*).

The sodium content expressed as Na₂O varies from 5 % by mass % (*m/m*) to 30 % (*m/m*).

4.3 Chemical parameters and indicator parameters

The product shall conform to the requirements specified in Table 1.

Table 1 — Chemical parameters and indicator parameters

Parameters		Limit mg/kg of SiO ₂
Sulfate (SO ₄ ²⁻)	max.	750
Iron (Fe)	max.	300
Fluoride (F ⁻)	max.	150
Antimony (Sb)	max.	33
Arsenic (As)	max.	9
Cadmium (Cd)	max.	15
Chromium (Cr)	max.	9
Cyanide (CN ⁻)	max.	15
Lead (Pb)	max.	30
Mercury (Hg)	max.	3
Nickel (Ni)	max.	9
Selenium (Se)	max.	60
NOTE Other chemical parameters and indicator parameters (see [1]) are not relevant in sodium silicate.		

5 Test methods

5.1 Sampling

Observe the recommendations of ISO 3165 and take account of ISO 6206.

5.1.1 Solid

Prepare the laboratory sample(s) required by the relevant procedure described in ISO 8213.

5.1.2 Liquid

5.1.2.1 Sampling from drums and bottles

5.1.2.1.1 General

5.1.2.1.1.1 Mix the contents of each container to be sampled by shaking the container, by rolling it or by rocking it from side to side, taking care not to damage the container or spill any of the liquid.

5.1.2.1.1.2 If the design of the container is such (for example, a narrow-necked bottle) that it is impracticable to use a sampling implement, take a sample by pouring after the contents have been thoroughly mixed. Otherwise, proceed as described in 5.1.2.1.1.3.

5.1.2.1.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.2.1.2. Otherwise, take samples as described in 5.1.2.1.3.