SLOVENSKI STANDARD
oSIST prEN 896:2020

01-julij-2020

Kemikalije, ki se uporabljajo za pripravo pitne vode - Natrijev hidroksid

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natriumhydroxid

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

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ICS:

13.060.20	Pitna voda	Drinking water
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Chemicals used for treatment of water intended for human consumption - Sodium hydroxide

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 896:2020) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 896:2012.

In comparison with the previous edition, the following technical modifications have been made:

a) Modification of 7.3 on transportation regulations and labelling, adding the sentence “The user must be aware of the incompatibilities between transported products.”;

b) Modification of 7.4 on marking. The requirements of marking are also applied to the accompanying documents.

1 Scope

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696)*

EN ISO 12846:2012, *Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment (ISO 12846:2012)*

ISO 979, *Sodium hydroxide for industrial use — Method of assay*

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

ISO 3196, *Sodium hydroxide for industrial use — Determination of carbonates content — Titrimetric method*

ISO 6206, *Chemical products for industrial use — Sampling — Vocabulary*

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

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Description

4.1 Identification

4.1.1 Chemical name

Sodium hydroxide.

4.1.2 Synonym or common name

Caustic soda.

4.1.3 Relative molecular mass

40,0.

4.1.4 Empirical formula

NaOH.

4.1.5 Chemical formula

NaOH.

4.1.6 CAS Registry Number[1)]

1310-73-2.

4.1.7 EINECS reference[2)]

215-185-5.

4.2 Commercial forms

The product is available as flakes, pearls, solid, or as an aqueous solution of different concentrations. For safe handling and use and emergency procedures of sodium permanganate, refer to Annex C.

4.3 Physical properties

4.3.1 Appearance

Solid: the product is white, deliquescent.

Liquid: the product is a clear solution, slightly turbid colourless solution, slightly viscous.

4.3.2 Density

Solid : the density of this product is 2,1 g/cm^3.

The bulk density of pearls is 1,2 kg/dm^3.

Liquid : the density of solution is 1,52 g/ml for a product concentration of mass fraction of 50 % at 20 °C.

4.3.3 Solubility in water

The product is highly soluble at all temperatures above 20 °C (partial crystallization occurs above concentration of mass fraction of 55 %, (see Figure 1).

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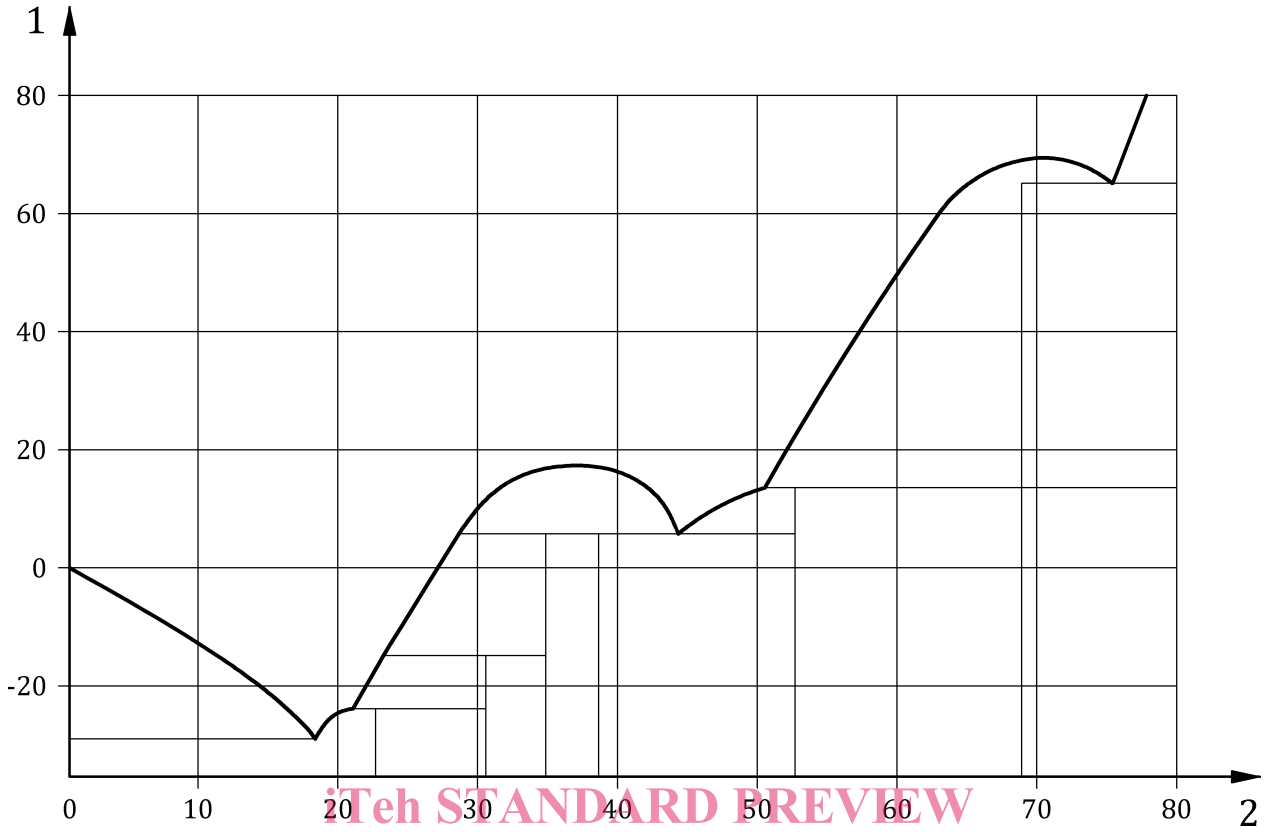
1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.



Key

1 temperature in °C

2 NaOH concentration in mass fraction in %

Figure 1 — Solubility of sodium hydroxide

4.3.4 Vapour pressure

Solution of concentration of mass fraction of 50 %

— 120 Pa at 20 °C;

— 450 Pa at 40 °C;

— 5 000 Pa at 80 °C.

4.3.5 Boiling point at 100 kPa[3)]

145 °C for a solution of concentration of mass fraction of 50 %.

4.3.6 Crystallization point

+ 12 °C for a solution of concentration of mass fraction of 50 % (see Figure 1).

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3) 100 kPa = 1 bar.

4.3.7 Specific heat

3 220 J/(kg K) at 20 °C for a solution of concentration of mass fraction of 50 %.

4.3.8 Viscosity (dynamic)

For a solution of concentration of mass fraction of 50 %:

— 100 Pa.s at 20 °C;

— 25 Pa.s at 40 °C;

— 5 Pa.s at 80 °C.

4.3.9 Critical temperature

Not applicable.

4.3.10 Critical pressure

Not applicable.

4.3.11 Physical hardness

Not applicable.

4.4 Chemical properties

The solutions of sodium hydroxide are strongly alkaline.

Dilution of sodium hydroxide is very exothermic. For additional information on sodium hydroxide see Annex A.

5 Purity criteria

5.1 General

This document specifies the minimum purity requirements for sodium hydroxide 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.

The national regulations allow to users to clarify whether the product is of appropriate purity for the treatment of water intended for human consumption, taking into account raw water quality, required dosage, contents of other impurities and additives used in the product and not stated in this product standard.

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 leads to significant quantities of impurities, by-products or additives being present, this shall be notified to the user.

5.2 Composition of commercial product

The product shall contain not less than a mass fraction of 96 % of NaOH for the solid form. Typical concentration for solutions of sodium hydroxide is either a mass fraction of 50 % or 30 % , and shall be in any case within the manufacturer's stated tolerance.

5.3 Impurities and main by-products

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

The concentration limits refer to pure NaOH mass fraction of 100 %.

Table 1 — Impurities

Impurity		Limit in mass fraction in % of NaOH
Sodium chloride (NaCl)[a]	max.	2,4
Sodium carbonate (Na_2CO_3)[b]	max.	0,4
Sodium chlorate ($NaClO_3$)[c]	max.	0,7

[a] Too high concentrations can cause problems with some ion exchange resins.

[b] Sodium carbonate is formed in contact with atmospheric carbon dioxide.

[c] The presence of any oxidizing agent in sodium hydroxide is to be avoided.

5.4 Chemical parameters

The product shall conform to the requirements specified in Table 2.

Table 2 — Chemical parameters

Parameter		Limit in mg/kg of NaOH	
		Type 1	Type 2
Arsenic (As)	max.	2	10
Cadmium (Cd)	max.	1	5
Chromium (Cr)	max.	1	10
Mercury (Hg)	max.	0,1	1
Nickel (Ni)	max.	2	10
Lead (Pb)	max.	5	20
Antimony (Sb)	max.	5	5
Selenium (Se)	max.	5	5

NOTE Cyanides, pesticides and polycyclic aromatic hydrocarbons are not relevant in sodium hydroxide. For parametric values of sodium hydroxide on trace metal content in drinking water, see [1].

6 Test methods

6.1 Sampling

Prepare the laboratory sample(s) required by the relevant procedure described in ISO 8213, observe the recommendations of ISO 3165 and also take into account ISO 6206. The nature of caustic alkalis requires special care at all points of sampling and preparation for analysis. Sampling techniques shall be such as to limit or prevent atmospheric exposure since sodium hydroxides, either as aqueous solutions or as anhydrous products, rapidly absorb moisture and carbon dioxide (and other acid gases) from the atmosphere. Additional precautions are necessary if trace constituents are to be determined.

NOTE For sampling liquids see [2].

6.2 Analyses

6.2.1 Main product

6.2.1.1 Total alkalinity

The total alkalinity shall be determined by titration with an acid standard volumetric solution in accordance with ISO 979.

6.2.1.2 Caustic alkalinity

The caustic alkalinity equals the total alkalinity as NaOH (see 6.2.1.1) minus the alkalinity as Na_2CO_3 multiplied by 0,755 determined in accordance with ISO 3196.

6.2.2 Impurities

6.2.2.1 Sodium chloride

The sodium chloride content shall be determined by potentiometric titration with silver nitrate solution (see B.1).

6.2.2.2 Sodium carbonate

The sodium carbonate content shall be determined by the titrimetric method, in accordance with ISO 3196.

6.2.2.3 Sodium chlorate

The sodium chlorate content shall be determined by ionic chromatography (see B.2).

6.2.3 Chemical parameters

6.2.3.1 Principle

The elements antimony, arsenic, cadmium, chromium, lead, nickel and selenium are determined by inductively coupled plasma optical emission spectrometry. Mercury is determined by cold vapour atomic absorption spectrometry.

6.2.3.2 Arsenic

The arsenic content shall be determined by inductively coupled plasma optical emission spectrometry (ICP/OES) (see B.3).