SLOVENSKI STANDARD
SIST EN 938:2000

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

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natriumchlorit

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

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13.060.20	Pitna voda	Drinking water
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EUROPEAN STANDARD

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English version

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

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natriumchlorit

This European Standard was approved by CEN on 5 September 1999.

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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 Central Secretariat has the same status as the official versions.

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

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Contents

Foreword

This European Standard 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of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A is informative.

The Annexes B and C are normative.

Introduction

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

1) 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 ;

2) 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.

1 Scope

This European Standard is applicable to sodium chlorite used for treatment of water intended for human consumption. It describes the characteristics of sodium chlorite and specifies the requirements and the corresponding test methods for sodium chlorite. 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.

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

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

ISO 5666-1:1983, *Water quality - Determination of total mercury by flameless atomic absorption spectrometry - Part1: Method after digestion with permanganate- peroxodisulfate.*

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

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

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

3 Description

3.1 Identification

3.1.1 Chemical name

Sodium chlorite.

3.1.2 Synonym or common name

None.

3.1.3 Relative molecular mass

90,44.

3.1.4 Empirical formula

$NaClO_2$.

3.1.5 Chemical formula

$NaClO_2$.

3.1.6 CAS Registry Number [1)]

7758-19-2.

3.1.7 EINECS reference [2)]

231-836-6.

3.2 Commercial form

The product is supplied as an aqueous solution of sodium chlorite

3.3 Physical properties

3.3.1 Appearance

The products are greenish-yellow aqueous solution.

3.3.2 Density

The density of sodium chlorite is given in Table 1.

Table 1 – Density of sodium chlorite

Aqueous solution concentration % (*m/m*)	Density g/ml at 20 °C
25	1,210
31	1,270

3.3.3 Solubility in water

The solubility of sodium chlorite depending on temperature is given in Table 2

Table 2 – Solubility of sodium chlorite

Temperature °C	Solubility g/l
5	340
17	390
30	460
45	530
60	550

3.3.4 Vapour pressure

Not applicable.

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1) Chemical Abstracts Service Registry Number

2) European Inventory of Existing Commercial Chemical Substances

3.3.5 Boiling point at 100 kPa [3)]

Not applicable.

3.3.6 Crystallization point

The crystallization point of sodium chlorite depending on concentration is given in Table 3.

Table 3 – Crystallization point of sodium chlorite

Aqueous solution concentration % (*m/m*)	Crystallization point °C
25	- 14,5
31	3

3.3.7 Specific heat

Not known.

3.3.8 Viscosity (dynamic)

The viscosity of sodium chlorite depending on concentration is given in Table 4.

Table 4 – Viscosity of sodium chlorite

Aqueous solution concentration % (*m/m*)	Viscosity mPa.s at 20 °C
25	2,33
31	3,26

3.3.9 Critical temperature

Not applicable.

3.3.10 Critical pressure

Not applicable.

3.3.11 Physical hardness

Not applicable.

3.4 Chemical properties

Sodium chlorite is a strong oxidizing agent. It generates chlorine dioxide with acidic solutions or chlorine and reacts with organic compounds.

[3)] 100 kPa = 1 bar

4 Purity criteria

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

4.1 Composition of commercial product

The sodium chlorite is available as an aqueous solution with sodium chlorite content of 24,5 percent by mass % (*m/m*) to 35 % (*m/m*).

Solutions of 25 % (*m/m*) and 31 % (*m/m*) of sodium chlorite are the most commonly used.

4.2 Impurities and main by-products

The product shall conform to the requirements specified in Table 5.

Table 5 – Impurities

Impurity	Limit g/kg sodium chlorite 100 % (*m/m*)
Sodium chlorate ($NaClO_3$) max.	40
Sodium nitrate ($NaNO_3$) max.	1
NOTE Sodium chlorate can be a by-product of the manufacturing process. Sodium nitrate is used as a corrosion inhibitor in the sodium chlorite special grade for the textile industry.	

4.3 Toxic substances

NOTE For the purpose of this standard, "toxic substances" are those defined in the EU Directive 80/778/EU of July 15, 1980 (see [1]).

The content of toxic substances shall conform to the requirements specified in Table 6.

Table 6 - Toxic substances

Parameter		Limit in mg/kg of sodium chlorite 100 % (*m/m*)	
		Type 1	Type 2
Arsenic (As)	max.	1,1	7,5
Cadmium (Cd)	max.	1,5	7,5
Chromium (Cr)	max.	1,1	7,5
Mercury (Hg)	max.	1,1	3,7
Nickel (Ni)	max.	1,1	7,5
Lead (Pb)	max.	1,1	7,5
Antimony (Sb)	max.	1,1	7,5
Selenium (Se)	max.	1,1	7,5
NOTE Cyanide which does not exist in a strong oxidizing medium such as sodium chlorite is not a relevant toxic substance. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.			

5 Test methods

5.1 Sampling

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

5.1.1 Sampling from drums and bottles

5.1.1.1 General

5.1.1.1.1 Mix the contents of the 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.

5.1.1.1.2 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 5.1.1.3.

5.1.1.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.1.2 ; otherwise, take samples as described in 5.1.1.3.

5.1.1.2 Surface sampling

Take a sample using a suitable ladle. Lower the ladle into the liquid until the rim is just below the surface, so that the surface layer runs into it. Withdraw the ladle just before it fills completely and allow any liquid adhering to the ladle to drain off. If necessary, repeat this operation so that, when the other selected containers have been sampled in a similar manner, the total volume of sample required for subsequent analysis is obtained.

5.1.1.3 Bottom sampling

Take a sample using an open sampling tube, or a bottom-valve sampling tube, suited to the size of container and the viscosity of the liquid.

When using an open sampling tube, close it at the top and then lower the bottom end to the bottom of the container. Open the tube and move it rapidly so that the bottom of the tube traverses the bottom of the container before the tube is filled. Close the tube, withdraw it from the container and allow any liquid adhering to the outside of the tube to drain off.

When using a bottom-valve sampling tube, close the valve before lowering the tube into the container and then proceed in a similar manner to that when using an open sampling tube.

5.1.2 Sampling from tanks and tankers

From each access point, take samples as follows :

a) from the surface of the liquid, using a ladle as described in 5.1.1.2 ;

b) from the bottom of the tank or tanker, using a sampling tube as described in 5.1.1.3 or using a specially designed bottom-sampling apparatus ;

c) from one or more positions, depending on the overall depth, between the bottom and the surface using a weighted sampling can.

5.2 Analysis

5.2.1 Determination of sodium chlorite (main product)

5.2.1.1 General

This method applies to the measurements of sodium chlorite content in commercial sodium chlorite solutions and is specific for these species.

5.2.1.2 Principle

Automated iodometric titration with an excess of sulfuric acid. This method is based on the reducing action of the iodide ion on the chlorite species and on the subsequent determination of iodine formed, by redox titration against sodium thiosulfate ; the potential step is located around 230 mV.

5.2.1.3 Reagents

All reagents shall be of a recognized analytical grade and the water used shall conform to grade 3 in accordance with EN ISO 3696 .

5.2.1.3.1 Sulfuric acid solution, $c(H_2SO_4)$ = 0,5 mol/l.

5.2.1.3.2 Sodium thiosulfate standard volumetric solution, $c(Na_2S_2O_3.5H_2O)$ = 0,1 mol/l.

Dissolve 24,8 g of $Na_2S_2O_3.5H_2O$ in water. Add 0,5 ml of chloroform as preservative, dilute to volume with water in a 1 000 ml one-mark volumetric flask and mix thoroughly.

To standardize : Weigh, to the nearest 0,1 mg, (160 ± 10) mg (*m*) of primary standard potassium dichromate into a tared glass beaker. Place the contents of the beaker in a 500 ml stoppered conical flask, add 100 ml of water and (2 ± 0,5) g of potassium iodide and stir to dissolve. Add (15 ± 1) ml of hydrochloric acid solution (diluted 1 + 1 by volume), swirl, and allow to stand for 5 min. Titrate with the sodium thiosulfate solution until the solution is pale yellow. Add (5 ± 1) ml of starch solution 1%(*m/m*) and titrate to the end point, i.e. to the disappearance of the blue-black colour. Record the volume *(V)* used.

The concentration, *c*, of the sodium thiosulfate standard volumetric solution ($Na_2S_2O_3.5H_2O$), expressed in moles per litre is given by the following equation :

$$c = \frac{m}{V \times 49{,}0317}$$

where

m is the mass, in milligrams, of potassium dichromate ($K_2Cr_2O_7$) weighed ;

V is the volume, in millilitres, of the sodium thiosulfate standard volumetric solution used.

5.2.1.3.3 Potassium iodid

5.2.1.4 Apparatus

Ordinary laboratory apparatus and glassware with together the following :

5.2.1.4.1 Automatic potentiometric titrimeter.

5.2.1.4.2 Automatic burette, 10 ml, equipped with an injection tip.

5.2.1.4.3 Electromechanical stirrer.

5.2.1.4.4 Glass titration beaker, 400 ml.