SLOVENSKI STANDARD
SIST EN 938:2009

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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 cnosommation humaine - Chlorite de sodium

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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

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 938:2009) 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of an identical text or by endorsement, at the latest by July 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 938:1999.

The significant technical differences between this edition and EN 938:1999 are as follows:

a) Deletion of reference to EU Directive 80/778/EEC of July 15, 1980 in order to take into account the latest Directive in force (see [1]).

b) Replacement of ISO 5666-1 by EN 1483.

Annex A is informative.

Annexes B and C are normative.

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

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.

NOTE Conformity with the 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 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

The following referenced documents are indispensable for the application 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 1483, *Water quality - Determination of mercury - Method using atomic absorption spectrometry*

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

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

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

ISO 8288:1986, *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 % (mass fraction)	**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.

[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 % (mass fraction)	**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 % (mass fraction)	**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

4.1 General

This European Standard specifies the minimum purity requirements for Sodium chlorite 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 the relevant authorities.

NOTE Users of this product should check the national regulations in order to clarify whether 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 product not stated in the product standard.

Limits have been given for impurities and chemicals 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.

4.2 Composition of commercial product

The sodium chlorite is available as an aqueous solution with sodium chlorite content of 24,5 percent by mass fraction to 35 percent by mass fraction.

Solutions of 25 percent by mass fraction and 31 percent by mass fraction of sodium chlorite are the most commonly used.

The content of sodium chlorite shall be equal to or greater than the manufacturer's declared value.

4.3 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 % mass fraction
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.	

4.4 Chemical parameters

NOTE For the purpose of this standard, "chemical parameters" are those defined in the EU Directive 98/83/EC of November 13,1998 (see [1]).

The content of chemical parameters shall conform to the requirements specified in Table 6.

Table 6 — chemical parameters

Parameter		Limit in mg/kg of sodium chlorite 100 % of mass fraction	
		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 chemical parameter. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.			

5 Test methods

5.1 Sampling

5.1.1 General

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

5.1.2 Sampling from drums and bottles

5.1.2.1 General

5.1.2.1.1 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.

5.1.2.1.2 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 5.1.2.3.

5.1.2.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.2.2; otherwise, take samples as described in 5.1.2.3.

5.1.2.2 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.

5.1.2.3 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.

5.1.3 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 5.1.2.2;

b) from the bottom of the tank or tanker, using a sampling tube as described in 5.1.2.3 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

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

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

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