

**Processkemikalier för beredning av dricksvatten –
Natriumklorat**

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

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

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natriumchlorat

This European Standard was approved by CEN on 3 February 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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EN 15028:2006 (E)

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Foreword

This European Standard (EN 15028:2006) 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of an identical text or by endorsement, at the latest by September 2006, and conflicting national standards shall be withdrawn at the latest by September 2006.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 United Kingdom.

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Introduction

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

- a) this European 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 European 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 chlorate used for treatment of water intended for human consumption. It describes the characteristics of sodium chlorate and specifies the requirements and the corresponding test methods for sodium chlorate. It gives information on its use in water treatment. It also determines the rules relating to safe handling and use of sodium chlorate (see Annex B) and gives the environmental, health and safety precautions within chemical laboratory (see Annex C).

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. 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*

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 11885:1996)*

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

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 Description

3.1 Identification

3.1.1 Chemical name

Sodium chlorate

3.1.2 Synonym or common names

None (for the processes related to treatment of drinking water)

NOTE Commercial names of formulations may exist, purity needs to be checked in case of use for treatment of water.

3.1.3 Relative molecular mass

106,45

3.1.4 Empirical formula

NaClO₃

3.1.5 Chemical formula

NaClO₃

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3.1.6 CAS Registry Number ¹⁾

7775-09-9

3.1.7 EINECS reference ²⁾

231-887-4

3.2 Commercial form

Sodium chlorate is commercially available in crystalline form or as a powder and as an aqueous solution.

3.3 Physical properties

3.3.1 Appearance and odour

The product is a colourless solid as a powder or the product is a faint blue to colourless solution.

3.3.2 Density

The density of an aqueous solution of sodium chlorate is given in Table 1.

Table 1 — Density of sodium chlorate solution

Concentration of aqueous solution of sodium chlorate solution (Mass fraction in %)	Density (g/ml at 20 °C)
30	1,24
40	1,33
50	1,44

3.3.3 Solubility in water

The solubility of sodium chlorate in water is given in Table 2.

Table 2 — Solubility of sodium chlorate

Temperature (°C)	Solubility (g/l)
10	650
20	700
40	780
60	880

¹⁾ Chemical Abstracts Service Registry Number.

²⁾ European Inventory of Existing Commercial Chemical Substances.

3.3.4 Vapour pressure

Not applicable (thermal decomposition occurs at ≥ 400 °C)

3.3.5 Boiling point at 100 kPa ³⁾

The boiling point of aqueous solutions of sodium chlorate is given in Table 3.

Table 3 — Boiling point at 100 kPa of aqueous solutions of sodium chlorate

Concentration of aqueous solution of sodium chlorate (g NaClO₃ /kg of saturated solution)	400	450	500	550	600	650	700
Boiling point (°C)	106	107	109	110	111	113	116

3.3.6 Crystallization

The crystallization point of aqueous solutions of sodium chlorate depending on concentration in water is given in Table 4.

Table 4 – Crystallization point of sodium chlorate aqueous solutions

Concentration of aqueous solution of sodium chlorate (mass fraction in %)	Crystallization point (°C)
40	-20
45	0
50	20
55	32
60	55

3.3.7 Melting point

The melting point (of the solid) is 248 °C; and the thermal decomposition is at ≥ 400 °C.

3.3.8 Viscosity (dynamic)

The relative viscosity of aqueous solutions of mass fraction of 40 % of sodium chlorate compared with water at the same temperature between 25 °C and 35 °C is 2,07.

3.3.9 Critical temperature in aqueous solution

Not applicable

3.3.10 Critical pressure

Not applicable

³⁾ 100 kPa = 1 bar.

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3.3.11 Physical hardness

Not applicable

3.4 Chemical properties

The sodium chlorate is a strong oxidizing agent.

NOTE 1 When an acidic sodium chlorate solution is treated with a reducing agent (e.g. hydrogen peroxide (EN 902) or oxalic acid), chlorine dioxide can be formed.

NOTE 2 The formation of chlorine dioxide can also be obtained by acidification only if the acid applied is capable of acting as a reducing agent in the current environment.

For the purpose of drinking water treatment one should use acids of quality in accordance with existing standards for the purpose: hydrochloric acid (EN 939); sulfuric acid (EN 899); phosphoric acid (EN 974).

NOTE 3 By itself, sodium chlorate can be used as an oxidant-algicide for temporary maintenance of water premises, the water being not directly distributed during the operations.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for sodium chlorate 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 be user and when necessary to 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 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 in the production process or raw materials lead 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 chlorate is commercially available as solid forms usually with a minimum dry mass fraction of 99 % of NaClO_3 .

Commercial solutions if used for water treatment shall be certified to be made-up on the basis of the product with a dry mass fraction of 99 %. No additional substances like colorants shall be added to the basic product or to the solutions.

The content of sodium chlorate in commercially available solutions shall be within 3 % of the manufacturer's declared value.

4.3 Impurities and main by-products

NOTE Sodium chlorate in crystalline form contains normally a maximum mass fraction of 0,1 % of sodium chloride (as NaCl).

4.4 Chemical parameters

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

Table 5 – Chemical parameters

Parameter		Limit in sodium chlorate (mass fraction 100 %)
		(mg/kg)
Arsenic (As)	max.	1
Cadmium (Cd)	max.	1
Chromium (Cr)	max.	5
Mercury (Hg)	max.	1
Nickel (Ni)	max.	1
Lead (Pb)	max.	1
Antimony (Sb)	max.	1
Selenium (Se)	max.	1

NOTE Cyanide which does not exist in a strong oxidizing medium such as sodium chlorate is not a relevant chemical parameter. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process. For parametric values of sodium chlorate on trace metal content in drinking water, see [1].

5 Test methods

5.1 Sampling

5.1.1 General

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

5.1.2 Solid

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

5.1.3 Liquid

5.1.3.1 Sampling from drums and bottles

5.1.3.1.1 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 5.1.3.1.1.3.

5.1.3.1.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.3.1.2. Otherwise, take samples as described in 5.1.3.1.3.