BS EN 15076:2013

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Chemicals used for treatment of swimming pool water — Sodium hydroxide

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National foreword

This British Standard is the UK implementation of EN 15076:2013. It supersedes BS EN 15076:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CII/59, Chemicals for drinking water treatment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Chemicals used for treatment of swimming pool water - Sodium hydroxide

Produits chimiques utilisés pour le traitement de l'eau des piscines - Hydroxyde de sodium

Produkte zur Aufbereitung von Schwimm- und Badebeckenwasser - Natriumhydroxid

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Foreword

This document (EN 15076:2013) 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of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by November 2013.

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 15076:2006.

Significant technical differences between this edition and EN 15076:2006 are as follows:

— Replacement of warning and safety precautions notes by labelling according to Regulation (EC) No 1272/2008 [3].

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

Introduction

In respect of potential adverse effects on the quality of water intended for swimming pools 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 1 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.

NOTE 2 This product is a biocide and needs to comply with the relevant legislation in force. In the European Union, at the time of publication, this legislation is Directive 1998/8/EC [1].

1 Scope

This European Standard is applicable to sodium hydroxide solution used directly or for the production of formulations for treating swimming pool water. It describes the characteristics and specifies the requirements and the corresponding test methods for sodium hydroxide. It gives information on its use for treating swimming pool water and determines the rules relating to safe handling and use (see Annex B).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 896, *Chemicals used for treatment of water intended for human consumption — Sodium hydroxide*

3 Description

3.1 Identification

3.1.1 Chemical name

Sodium hydroxide.

3.1.2 Synonym or common name

Caustic soda.

3.1.3 Relative molecular mass

40,0.

3.1.4 Empirical formula

NaOH.

3.1.5 Chemical formula

NaOH.

3.1.6 CAS Registry Number [1)]

1310-73-2.

3.1.7 EINECS reference [2)]

215-185-5.

1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3.2 Commercial forms

The product is available as flakes, pearls, solid, or as an aqueous solution of different concentrations.

3.3 Physical properties

3.3.1 Appearance

Solid: the product is white, deliquescent.

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

3.3.2 Density

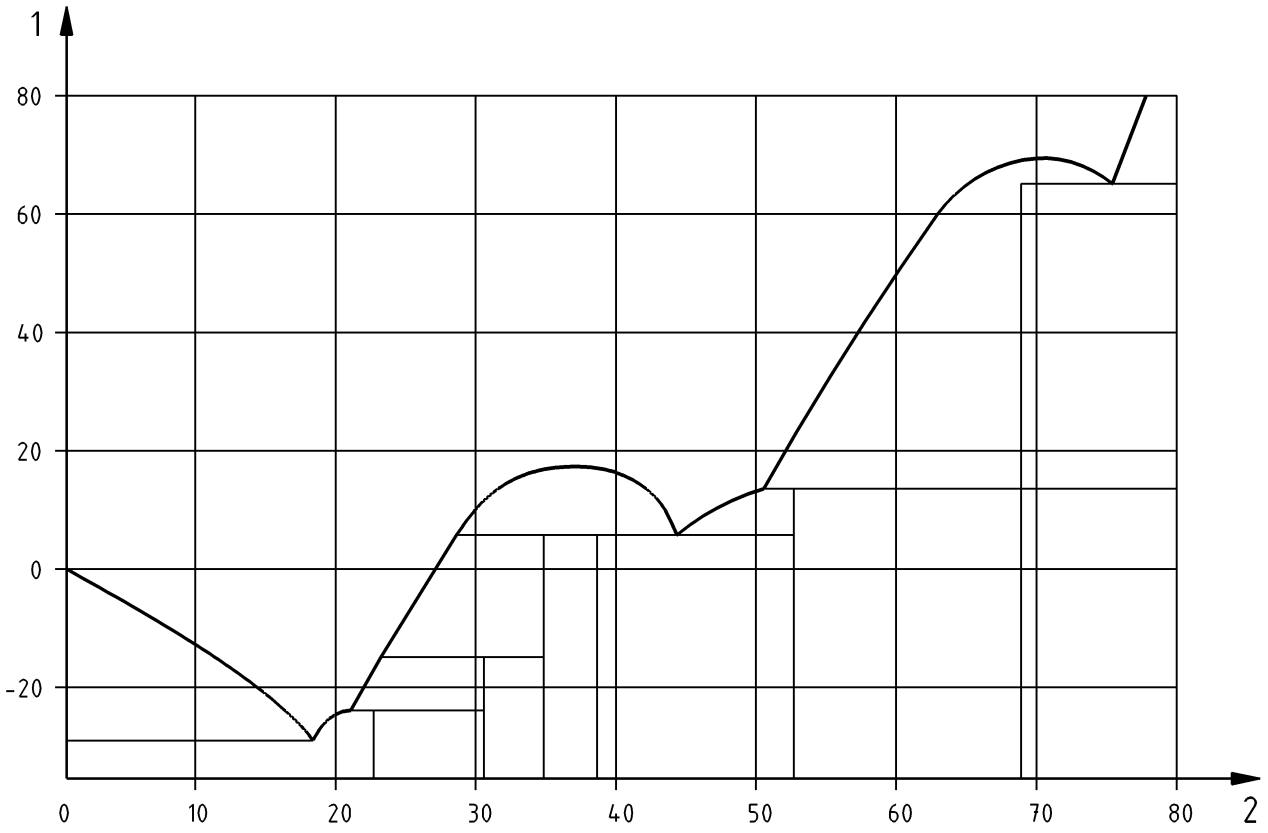
Solid: the density of this product is 2,1 g/cm^3.

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.

3.3.3 Solubility in water

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



Key

1 temperature in ° C.
2 NaOH concentration in mass fraction in %

Figure 1 — Solubility of sodium hydroxide

3.3.4 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.

3.3.5 Boiling point at 100 kPa [3)]

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

3.3.6 Crystallisation point

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

3) 100 kPa = 1 bar.

3.3.7 Specific heat

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

3.3.8 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.

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

The solutions of sodium hydroxide are strongly alkaline.

Dilution of sodium hydroxide is very exothermic.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for sodium hydroxide used for the treatment of water for swimming pools. 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.

Users of this product should check the national regulations in order to clarify whether it is of appropriate purity for treatment of water for swimming pools, taking into account raw water quality, required dosage, contents of other impurities and additives used in the products 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 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 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.

4.3 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 oxidising agent in sodium hydroxide is to be avoided.		

4.4 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 [2].			

5 Test methods

The sampling and the analytical methods shall be those described in EN 896.

6 Labelling – Transportation – Storage

6.1 Means of delivery

Sodium hydroxide may be delivered in containers, drums, cans or bottles.

To ensure the purity of the product, the means of delivery shall not have been previously used for any different product or it shall have been specially cleaned and prepared before use.

6.2 Labelling according to EU legislation[4)]

The following labelling requirements shall apply to sodium hydroxide at the date of publication of this European Standard.

— Signal word:

Danger

— Classification and hazard statement:

H 314 Causes severe skin burns and eye damage

Figure 2 — GHS 05

The regulation [3] contains a list of substances classified by the EU. Substances not listed in this regulation should be classified on the basis of their intrinsic properties according to the criteria in the regulation by the person responsible for the marketing of the substance.

4) See [3].

6.3 Transportation regulations and labelling

Sodium hydroxide solution is listed as UN Number [5]: 1824.

The labelling requirements are the following at the date of publication of this European Standard:

— RID [6] /ADR [7] : class 8, classification code C5, packing group II.

— IMDG [8]: class 8, packing group II.

— IATA[9]: class 8, packing group II.

6.4 Marking

The marking shall include the following information:

— name "sodium hydroxide", trade name and type;

— net mass;

— name and the address of the supplier and/or manufacturer;

— statement "this product conforms to EN 15076".

6.5 Storage

6.5.1 Material

Avoid contact with aluminium, zinc or galvanised steel material. Mild steel, polyester or polypropylene are suitable materials. To avoid any iron contamination in the product, a suitable lining of the steel tank may be used.

6.5.2 Long term stability

Absorption of carbon dioxide from the ambient air leads to formation of sodium carbonate.

6.5.3 Storage incompatibilities

Avoid contact with some metals such as zinc, aluminium, copper, tin or their alloys, which produce hydrogen. A violent reaction is to be expected when sodium hydroxide comes in contact with concentrated acids and organic chemicals, particularly chlorinated hydrocarbons.

5) United Nations Number.

6) Regulations concerning International carriage of Dangerous goods by rail.

7) European Agreement concerning the international carriage of Dangerous goods by Road.

8) International Maritime transport of Dangerous Goods.

9) International Air Transport Association.

Annex A
(informative)

General information on sodium hydroxide

A.1 Origin

A.1.1 Raw materials

Sodium chloride solution. For an alternative production route: sodium carbonate and calcium hydroxide.

A.1.2 Manufacturing process

Electrolysis of sodium chloride solution (brine) in a mercury cell, a membrane cell or a diaphragm cell. Sodium hydroxide can also be produced by caustification of sodium carbonate with calcium hydroxide.

A.2 Use

A.2.1 Function

Sodium hydroxide is mainly used as a neutralising agent, for adjusting the pH value, as a softening agent and for alkalinity adjustment.

A.2.2 Form in which it is used

For safety reasons, sodium hydroxide is only used in liquid form.

A.2.3 Treatment dose

The treatment dose depends on the application or initial pH and the buffer capacity of the water and the type of the water treatment.

A.2.4 Means of application

The product is usually applied using a metering pump or a dissolving tank.

A.2.5 Secondary effects

Temperature rise at the injection point.

Corrosion of equipment and piping can occur if sodium hydroxide is added in excess.

A.2.6 Removal of excess product

The excess product is removed by neutralisation.

Annex B
(normative)

General rules relating to safety

B.1 Rules for safe handling and use

The supplier shall provide current safety instructions.

B.2 Emergency procedures

B.2.1 General

See also 6.2.

B.2.2 First aid

In case of contact with the skin, rinse with water. If swallowed and the victim is conscious, rinse the mouth with water, let the victim drink fresh water or with water slightly acidified with acetic acid (vinegar). Consult a doctor in all cases immediately. In the event of eye contact, rinse immediately with copious amounts of water for at least 15 min and consult a doctor.

B.2.3 Spillage

Collect as much as possible in suitable containers, neutralise with acids and rinse small spillages with water.

B.2.4 Fire

Sodium hydroxide is not combustible.

Bibliography

[1] Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market

[2] 98/83/EC: Council Directive of 3rd November 1998 on the quality of water intended for human consumption

[3] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH)

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