SLOVENSKI STANDARD
SIST EN 899:2022

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Nadomešča:
SIST EN 899:2009

Kemikalije, ki se uporabljajo za pripravo pitne vode - Žveplova kislina

Chemicals used for treatment of water intended for human consumption - Sulfuric acid

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Schwefelsäure

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

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ICS:

13.060.20	Pitna voda	Drinking water
71.100.80	Kemikalije za čiščenje vode	Chemicals for purification of water

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EUROPEAN STANDARD

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English Version

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

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European foreword

This document (EN 899:2022) 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of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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

This document supersedes EN 899:2009.

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 shall 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;

c) use of the changed classification and labelling (see [4]);

d) deletion of the reference to EU Directive 67/548/EEC of June 27, 1967 in order to take into account the latest Directive in force (see [4]).

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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 document:

a) this document provides no information as to whether the product may be used without restriction in any of 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 document 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 document is subject to regulation or control by National Authorities (see Annex A).

1 Scope

This document is applicable to sulfuric acid used for treatment of water intended for human consumption. It describes the characteristics of sulfuric acid and specifies the requirements and the corresponding test methods for sulfuric acid. 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 12846, *Water quality - Determination of mercury - Method using atomic absorption spectrometry (AAS) with and without enrichment (ISO 12846)*

ISO 17378-2, *Water quality — Determination of arsenic and antimony — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

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

EN ISO 11885, *Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885)*

ISO 910, *Sulphuric acid and oleum for industrial use — Determination of total acidity, and calculation of free sulphur trioxide content of oleum — Titrimetric method*

ISO 3423, *Sulphuric acid and oleums for industrial use — Determination of sulphur dioxide content — Iodometric method*

ISO 6332, *Water quality — Determination of iron — Spectrometric method using 1,10-phenanthroline*

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 chromium — Atomic absorption spectrometric methods*

ISO/TS 17379-2, *Water quality — Determination of selenium — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

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/ui

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

4 Description

4.1 Identification

4.1.1 Chemical name

Sulfuric acid.

4.1.2 Synonym or common name

Oil of vitriol.

4.1.3 Relative molecular mass

98.

4.1.4 Empirical formula

H_2SO_4.

4.1.5 Chemical formula

H_2SO_4.

4.1.6 CAS Registry Number [1]

7664-93-9.

4.1.7 EINECS reference [2]

231-639-5.

4.2 Commercial forms

Sulfuric acid is available as aqueous solutions.

NOTE For some water treatment applications, diluted acid can be used.

4.3 Physical properties

4.3.1 Appearance

The product is a clear or slightly turbid, colourless liquid.

4.3.2 Density

1,84 g/ml for sulfuric acid concentration of mass fraction of 96 % at 20 °C.

1,71 g/ml for sulfuric acid concentration of mass fraction of 78 % at 20 °C.

1,18 g/ml for sulfuric acid concentration of mass fraction of 25 % at 20 °C.

4.3.3 Solubility in water

At all concentrations, the product is miscible with water.

[1] Chemical Abstracts Service Registry Number.
[2] European Inventory of Existing Commercial Chemical Substances.

4.3.4 Vapour pressure

Below 0,000 01 kPa for sulfuric acid concentration of mass fraction of 96 % at 20 °C.

Below 0,1 kPa for sulfuric acid concentration of mass fraction of 78 % at 20 °C.

Below 1,9 kPa for sulfuric acid concentration of mass fraction of 25 % at 20 °C.

4.3.5 Boiling point at 100 kPa

NOTE 100 kPa = 1 bar.

+310 °C for sulfuric acid concentration of mass fraction of 96 %.

Approximately + 200 °C for sulfuric acid concentration of mass fraction of 78 %.

+106,5 °C for sulfuric acid concentration of mass fraction of 25 %.

4.3.6 Melting point

+5 °C for sulfuric acid concentration of mass fraction of 98 %.

−10 °C for sulfuric acid concentration of mass fraction of 96 %.

−11 °C for sulfuric acid concentration of mass fraction of 78 %.

−22 °C for sulfuric acid concentration of mass fraction of 25 %.

4.3.7 Specific heat

1,465 kJ/(kg.K) for sulfuric acid concentration of mass fraction of 96 % at 20 °C.

4.3.8 Viscosity (dynamic)

22 mPa·s for sulfuric acid concentration of mass fraction of 96 % at 20 °C.

16,7 mPa·s for sulfuric acid concentration of mass fraction of 78 % at 20 °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

Concentrated sulfuric acid reacts violently:

— with bases or with water (exothermic reaction);

— with reducing agents due to oxidizing properties;

— with combustible materials due to oxidizing and dehydrating properties.

The concentrated acid is a strong oxidizing agent and can cause ignition in contact with organic materials.

Sulfuric acid (of sulfuric acid content less than a mass fraction of 70 % attacks most common metals, e.g. iron, zinc, liberating the flammable gas hydrogen.

WARNING — Mixing with water produces a marked temperature rise. Therefore, ALWAYS ADD THE ACID TO THE WATER (NEVER THE REVERSE), slowly and agitating continuously.

5 Purity criteria

5.1 General

This document specifies the minimum purity requirements for sulfuric acid 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 can be present and, if so, this shall be notified to the user and, when necessary, to the 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 intended for human consumption, taking into account raw water quality, contents of other impurities and additives used in the products 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 lead 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 usual commercial concentrations of sulfuric acid available have a mass fraction of 96 % or 98 %.

Other concentrations of sulfuric acid between a mass fraction of 25 % and 80 % are also available.

If sold as concentrated acid, the mass fraction of sulfuric acid shall be in the range of 92 % to 98 %.

The concentration of sulfuric acid shall be within a mass fraction of ± 1 % of the manufacturer's declared value.

5.3 Chemical parameters and indicator parameters

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

Table 1 — Chemical parameters and indicator parameters

Parameter		Limit in H_2SO_4 mg/kg
Sulfur dioxide (SO_2)	max.	100
Iron (Fe)	max.	100
Arsenic (As)	max.	0,4
Cadmium (Cd)	max.	0,1
Chromium (Cr)	max.	4
Mercury (Hg)	max.	0,1
Nickel (Ni)	max.	4
Lead (Pb)	max.	4
Antimony (Sb)	max.	1
Selenium (Se)	max.	1
NOTE For chemical parameter values of trace metals in drinking water, see [1].		

6 Test methods

6.1 Sampling

6.1.1 General

Observe the recommendations of ISO 3165 [2] and take account of ISO 6206 [3].

NOTE The sampling is carried out at the premises of the manufacturer of the concentrated sulfuric acid unless the customer has adequate facilities to carry out this operation safely at his own premises.

6.1.2 Sampling from drums and bottles

6.1.2.1 General

6.1.2.1.1 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.

6.1.2.1.2 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 6.1.2.1.3.

6.1.2.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 6.1.2.2. Otherwise, take samples as described in 6.1.2.3.

6.1.2.2 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 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.