SLOVENSKI STANDARD
SIST EN 12386:2000

01-november-2000

Kemikalije, ki se uporabljajo za pripravo pitne vode - Bakrov sulfat

Chemicals used for treatment of water intended for human consumption - Copper sulfate

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Kupfersulfat

Produits chimiques utilisés pour le traitement de l'eau destinée a la consommation humaine - Sulfate de cuivre

Ta slovenski standard je istoveten z: **EN 12386:1998**

ICS:

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

SIST EN 12386:2000 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12386

October 1998

ICS 71.100.80

Descriptors: potable water, water treatment, chemical products, copper sulfates, description, physical properties, chemical properties, impurities, toxic substances, tests, conditioning, labelling, storage, marking

English version

Chemicals used for treatment of water intended for human consumption - Copper sulfate

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Kupfersulfat

This European Standard was approved by CEN on 26 September 1998.

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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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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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of an identical text or by endorsement, at the latest by April 1999, and conflicting national standards shall be withdrawn at the latest by April 1999.

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.

Introduction

In respect of potential adverese 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 characteristics of this product remain in force.

1 Scope

This European standard is applicable to copper (II) sulfate pentahydrate used for treatment of water intended for human consumption. It describes the characteristics of copper (II) sulfate pentahydrate and specifies the requirements and the corresponding test methods for copper (II) sulfate pentahydrate. 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 - Specification and test methods (ISO 3696:1987)
ISO 3165	Sampling of chemical products for industrial use - Safety in sampling
ISO 4793	Laboratory sintered (fritted) filters - Porosity grading, classification and designation
ISO 5993	Sodium hydroxide for industrial use - Determination of mercury content - flameless atomic absorption spectrometric method
ISO 6206	Chemical products for industrial use - Sampling - Vocabulary
ISO 6332	Water quality - Determination of iron - Spectrometric method using 1,10-phenanthroline
ISO 6353-1	Reagents for chemical analysis - Part 1: General test methods
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

Copper (II)sulfate pentahydrate.

3.1.2 Synonym or commons names

Copper vitriol, blue vitriol, cupric sulfate.

3.1.3 Relative molecular mass

pentahydrate: 249,69.

3.1.4 Empirical formula

$CuSO_4.5H_2O$.

3.1.5 Chemical formula

$CuSO_4.5H_2O$.

3.1.6 CAS-Registry Number[1)]

anhydrous form:7758-98-7.

pentahydrate: 7758-99-7.

3.1.7 EINECS reference[2)]

231-847-6 (anhydrous form).

3.2 Commercial form

The product is a powder or crystals.

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1) Chemical Abstracts Service Registry Number
2) European Inventory of Existing Commercial Chemical Substances

3.3 Physical properties

3.3.1 Appearance and odour

The product is a powder or crystals, with a deep blue colour and no odour.

3.3.2 Density

The density of the pentahydrate is 2,28 g/cm³ at 20 °C.

3.3.3 Solubility in water

The solubility of the pentahydrate is 266 g/l at 20 °C.

3.3.4 Vapour pressure

Not applicable.

3.3.5 Boiling point at 100 kPa[3)]

Not applicable.

3.3.6 Melting point

The product decomposes above 300 °C.

3.3.7 Specific heat

Not known.

3.3.8 Viscosity, dynamic

Not applicable.

3.3.9 Critical temperature

Not applicable.

3.3.10 Critical pressure

Not applicable.

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3) 100 kPa = 1 bar

3.3.11 Physical hardness

Not applicable.

3.4 Chemical properties

If thermal decomposition occurs, SO_2 is released. Copper sulfate pentahydrate dehydrates partially at 29 °C and entirely at 250 °C. The pH-value of an aqueous solution with a concentration of 10 g/l $CuSO_4$ is in the range 3,5 to 4.

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 content of copper sulfate pentahydrate shall not be less than 98% by mass (%(*m/m*)).

4.2 Impurities and main by-products

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

Table 1 : Impurities

Impurity		Limit in product (pentahydrate)
Insoluble matter	max.	0,5 % (*m/m*)
Moisture	max.	0,5 % (*m/m*)
Free sulfuric acid	max.	0,2 % (*m/m*)
Iron (Fe)	max.	200 mg/kg

4.3 Toxic substances

NOTE : For the purposes of this standard "toxic substances" are those defined in the EU Directive 80/778/EEC of 15 July 1980 (see D.1).

The content of toxic substances shall conform to the requirements specified in table 2.

Table 2 : Toxic substances

Parameter		Limit mg/kg of product (pentahydrate)
Antimony (Sb)	max.	1
Arsenic (As)	max.	5
Cadmium (Cd)	max.	10
Chromium (Cr)	max.	5
Lead (Pb)	max.	70
Mercury (Hg)	max.	0,1
Nickel (Ni)	max.	100
Selenium (Se)	max.	1
NOTE : Cyanides (CN^-), pesticides and polycyclic aromatic hydrocarbons -as listed in EU Directive 80/778/EEC - are not relevant because the raw materials used in the manufacturing process are free of them.		

5 Test methods

5.1 Sampling

Observe the general recommendations of ISO 3165 and take account of ISO 6206. Prepare the laboratory sample(s) required by the relevant procedure described in ISO 8213.

5.2 Analyses

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

5.2.1 Main product

NOTE : For routine method see annex C.

5.2.1.1 Principle

The copper content is determined electrolytically.

5.2.1.2 Reagents

5.2.1.2.1 Nitric acid concentrated, ρ = 1,40 g/ml.

5.2.1.2.2 Sulfuric acid concentrated, $\rho = 1,84$ g/ml.

5.2.1.2.3 Ethanol, solution 95 % (*V/V*).

5.2.1.3 Apparatus

Ordinary laboratory apparatus and glassware, together the following :

5.2.1.3.1 Direct current supply.

5.2.1.3.2 Tared, perforated platinum cylinder cathode.

5.2.1.3.3 Platinum wire anode.

5.2.1.4 Test sample

Mix a 500 g sample thoroughly and place approximately 100 g of this material in a properly stoppered glass container.

5.2.1.5 Procedure

Weigh out a test portion of approximately 5 g of copper sulfate pentahydrate as rapidly as possible and transfer quantitatively. To a tall-form 400 ml beaker, dissolve the test portion in 350 ml water and then add 10 ml H_2SO_4 (5.2.1.2.2). Allow the solution to cool to room temperature.

Deposit the copper electrolytically on a tared, perforated, platinum cylinder cathode (5.2.1.3.2), with a platinum wire (5.2.1.3.3) for the anode. Cover the beaker carefully with a split watch glass to prevent loss by spraying.

Apply a current density of 0,5 A/dm² of cathode area until deposition is complete. The cathode area equals gross area of inside of cylinder, including perforations. It is customary to conduct this operation overnight. When the solution is colourless, wash down the cover glass, electrodes and sides of beaker, raising the level of the liquid slightly, and continue the electrolysis for about 15 min, noting whether or not copper is deposited on the newly exposed surface of the platinum. If copper appears, raise the level of the liquid and continue the electrolysis until none appears on the electrode. The completion of electrolysis can be determined by testing a few drops of the solution on a spot plate with saturated hydrogen sulfide solution. Electrolysis is complete when no copper sulfide colouration is observed.

When electrolysis is complete, remove the cathode quickly while washing with water from a wash bottle and then rinse the cathode in two successive baths of ethanol 95 % (V/V) (5.2.1.2.3). Dry in oven at 110 °C for 3 min, cool and weigh as metallic copper.