SLOVENSKI STANDARD
SIST EN 974:2004

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Nadomešča:
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Kemikalije za pripravo pitne vode - Fosforjeva kislina

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Phosphorsäure

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

Ta slovenski standard je istoveten z: **EN 974:2003**

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13.060.20	Pitna voda	Drinking water
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English version

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

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Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Phosphorsäure

This European Standard was approved by CEN on 12 September 2003.

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document EN 974:2003 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of an identical text or by endorsement, at the latest by April 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.

This document supersedes EN 974:1997.

Significant technical differences between this standard an EN 974:1997 are as follows:

a) reference to ISO 4285 for sampling and ISO 2997 for determination of content of sulfuric acid;

b) taking into account of new EU Directive 98/83/EC;

c) inclusion of more reliable data in table C.1.

Annexes A and C are informative.

Annex B is normative.

This document includes a Bibliography.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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:

a) 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;

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 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 phosphoric acid used for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements and the corresponding test methods for phosphoric acid. It gives information on its use in water treatment. It also determines the rules relating to safe handling and use (see annex B).

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 (including amendments).

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

ISO 2997, *Phosphoric acid for industrial use - Determination of sulfate content - Method by reduction and titrimetry.*

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

ISO 3706, *Phosphoric acid for industrial use (including foodstuffs) - Determination of total phosphorus (V) oxide content - Quinoline phosphomolybdate gravimetric method.*

ISO 4285, *Phosphoric acid for industrial use - Guide to sampling techniques.*

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 6353-2, *Reagents for chemical analysis - Part 2: Specifications - First series.*

3 Description

3.1 Identification

3.1.1 Chemical name

Phosphoric acid.

3.1.2 Synonym or common name

Orthophosphoric acid.

3.1.3 Relative molecular mass

98.

3.1.4 Empirical formula

H_3PO_4

3.1.5 Chemical formula

H_3PO_4

3.1.6 CAS Registry Number [1)]

7664-38-2.

3.1.7 EINECS reference [2)]

231-633-2.

3.2 Commercial form

Phosphoric acid is supplied as a concentrated solution.

3.3 Physical properties

3.3.1 Appearance

The product is a clear syrupy liquid.

3.3.2 Density

1,57 g/ml at 20 °C for phosphoric acid concentration of mass fraction of 75 %.

1,69 g/ml at 20 °C for phosphoric acid concentration of mass fraction of 85 %.

3.3.3 Solubility in water

The product is miscible at all concentrations.

3.3.4 Vapour pressure

Below 3 Pa at 20 °C.

3.3.5 Boiling point at 100 kPa [3)]

135 °C for phosphoric acid concentration of mass fraction of 75 %.

158 °C for phosphoric acid concentration of mass fraction of 85 %.

3.3.6 Melting point

- 20 °C for phosphoric acid concentration of mass fraction of 75 %.

+ 21 °C for phosphoric acid concentration of mass fraction of 85 %.

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3) 100 kPa = 1 bar.

3.3.7 Specific heat

2,27 kJ/kg.K at 20 °C for phosphoric acid concentration of mass fraction of 75 %.

2,07 kJ/kg.K at 20 °C for phosphoric acid concentration of mass fraction of 85 %.

3.3.8 Viscosity dynamic

At room temperature phosphoric acid is a syrupy liquid. Its viscosity depends on temperature.

The viscosity of a mass fraction of 75 % solution of phosphoric acid at 20 °C is 22 mPa.s.

The viscosity of a mass fraction of 85 % solution of phosphoric acid at 20 °C is 48 mPa.s.

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

Phosphoric acid is a strong acid. A solution of 1 g/l phosphoric acid has a pH value of 1. Concentrated phosphoric acid reacts violently with bases, nitrates, chlorates, sulfites.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for phosphoric 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 may be present and, if so, this shall be notified to the user and when necessary to relevant authorities.

NOTE Users of this product should satisfy themselves that 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 products not stated in the product standard, and other relevant factors.

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.

4.2 Composition of commercial product

The usual commercial concentrations of phosphoric acid have a mass fraction of 75 %, 80 % or 85 %.

If sold as concentrated acid, the phosphoric acid content shall not be less than a mass fraction of 75 %.

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

4.3 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_3PO_4 (mg/kg)
Sulfuric acid (H_2SO_4)	max	500
Iron (Fe)	max	20
Antimony (Sb)	max	4
Arsenic (As)	max	2
Cadmium (Cd)	max	0,5
Chromium (Cr)	max	4
Lead (Pb)	max	4
Mercury (Hg)	max	0,5
Nickel (Ni)	max	4
Selenium (Se)	max	1
NOTE For parametric values of phosphoric acid on trace metal content in drinking water, see [1].		

5 Test methods

5.1 Sampling

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

Prepare the laboratory sample required by the relevant procedure in accordance with ISO 4285.

5.2 Analyses

5.2.1 General

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

5.2.2 Phosphoric acid (main product)

The concentration of phosphoric acid (H_3PO_4) shall be determined in accordance with ISO 3706.

NOTE 1 The ratio $H_3PO_4 / \frac{1}{2} (P_2O_5) = 1{,}381$ by mass.

NOTE 2 For routine purposes the phosphoric acid concentration can be determined from measurement of the density, as described in annex C.

5.2.3 Chemical parameters and indicator parameters

5.2.3.1 Determination of iron (Fe)

The contents of iron shall be determined in accordance with ISO 6353-2, R 22 (AAS).

5.2.3.2 Determination of metals

5.2.3.2.1 General

The content of metals shall be determined using the procedures specified in Table 2.

Table 2 — Procedures for the determination of metals

Element	Reference	Method	Wavelength nm	Flame
As	see 5.2.3.2.3	Hydride AAS	193,7	n.a.
Sb	see 5.2.3.2.3	Hydride AAS	217,6	n.a.
Cd	see 5.2.3.2.2	AAS	228,8	air-acetylene
Cr	see 5.2.3.2.2	AAS	357,8	air-acetylene
Pb	see 5.2.3.2.2	AAS	217,0 or 283,3	air-acetylene
Ni	see 5.2.3.2.2	AAS	232,0	Oxidizing air-acetylene
Se	see 5.2.3.2.3	Hydride AAS	196,0	n.a.
Hg	in accordance with ISO 5993	flameless AAS	253,6	n.a.

AAS = atomic absorption spectrometry.

n.a. = not applicable.

5.2.3.2.2 Determination of cadmium (Cd), chromium (Cr), lead (Pb) and nickel (Ni)

5.2.3.2.2.1 Principle

The elements cadmium (Cd), chromium (Cr), lead (Pb) and nickel (Ni) are determined using atomic absorption spectrometry with the standard additions technique.

5.2.3.2.2.2 Reagents

5.2.3.2.2.2.1 Standard solution (100 µg/l Cd, Cr or Ni)

The standard solution shall be freshly prepared on the day of use by individual dilution of a stock solution. This stock solution with an Cd, Cr or Ni content of at least 1 mg/l shall be made by dilution of standard solutions of Cd, Cr and Ni which are available from all major suppliers of laboratory chemicals. This stock solution shall be kept in containers of tetrafluoroethylene-hexafluoropropylene copolymer (FEP), polytetrafluoroethylene (PTFE) or polyethylene (PE).

NOTE The stock solution should not be kept for longer than four weeks.

5.2.3.2.2.3 Apparatus

Ordinary laboratory apparatus and the following:

5.2.3.2.2.3.1 Atomic absorption spectrometer with the measurement parameters specified in Table 2.