



SLOVENSKI STANDARD
SIST EN 974:1999

01-april-1999

Kemikalije, ki se uporabljajo za pripravo pitne vode – Fosforna 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 à la consommation humaine - Acide phosphorique (standards.iteh.ai)

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EUROPEAN STANDARD

EN 974

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EUROPÄISCHE NORM

July 1997

ICS 71.100.81

Descriptors: potable water, water treatment, chemical compounds, phosphoric acid, description, physical properties, chemical properties, impurities, toxic substances, tests, labelling, storage

English version

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

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

Produkte zur Aufbereitung von Wasser für den
menschlichen Gebrauch - Phosphorsäure

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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.

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CEN

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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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of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

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.

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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 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 the characteristics of this product remain in force.

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.

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 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 6353-1	Reagents for chemical analysis - Part 1 : General test methods
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

H₃PO₄.

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3.1.5 Chemical formula

H₃PO₄.

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3.1.6 CAS Registry Number ¹⁾

7664-38-2.

3.1.7 EINECS reference ²⁾

231-633-2.

3.2 Commercial forms

Phosphoric acid is supplied as a concentrated solution, the usual concentrations being 75 % (m/m) , 80 % (m/m) or 85 % (m/m) of phosphoric acid.

3.3 Physical properties

3.3.1 Appearance

The product is a clear syrupy liquid.

¹⁾ Chemical Abstracts Service Registry Number.

²⁾ European Inventory of Existing Commercial Chemical Substances.

3.3.2 Density

1,57 g/ml at 20 °C for phosphoric acid concentration of 75 % (*m/m*).

1,69 g/ml at 20 °C for phosphoric acid concentration of 85 % (*m/m*).

3.3.3 Solubility in water

Miscible at all concentrations.

3.3.4 Vapour pressure

Below 3 Pa³⁾ at 20 °C.

3.3.5 Boiling point at 100 kPa ³⁾

135 °C for phosphoric acid concentration of 75 % (*m/m*).

158 °C for phosphoric acid concentration of 85 % (*m/m*).

3.3.6 Melting point

- 20 °C for phosphoric acid concentration of 75 % (*m/m*).

+ 21 °C for phosphoric acid concentration of 85 % (*m/m*).

3.3.7 Specific heat

2,27 kJ/(kg.K) at 20 °C for phosphoric acid concentration of 75 % (*m/m*).

2,07 kJ/(kg.K) at 20 °C for phosphoric acid concentration of 85 % (*m/m*).

3.3.8 Viscosity, dynamic

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

The viscosity of a 75 % (*m/m*) solution of phosphoric acid at 20 °C is 22 mPa.s.

The viscosity of a 85 % (*m/m*) solution of phosphoric acid at 20 °C is 48 mPa.s.

³⁾ 100 Pa = 1 mbar.
100 kPa = 1 bar.

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

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.

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4.1 Composition of commercial product

The following requirements shall apply to phosphoric acid :

- appearance : clear, no sediment ;
- if sold as concentrated acid, the phosphoric acid content shall not be less than 75 % (m/m) ;
- the product shall contain the stated concentration of phosphoric acid within ± 1 % (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 H ₃ PO ₄ (mg/kg)
Sulfuric acid (H ₂ SO ₄)	max.	500
Iron (Fe)	max.	20

4.3 Toxic substances

NOTE : For the purpose of this standard, "Toxic substances" are those defined in the EU Directive 80/778/EEC of July 15, 1980 (see C.1).

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

Table 2 : Toxic substances

Parameter		Limit in H ₃ PO ₄ (mg/kg)
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 : Pesticides and polycyclic aromatic hydrocarbons -as listed in EEC Directive 80/778/EEC are not relevant in phosphoric acid. Cyanide (CN⁻) is not relevant due to the acidity of phosphoric acid.

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5 Test methods

5.1 Sampling [SIST EN 974:1999](https://standards.iteh.ai/catalog/standards/sist/0b08bc00-4f53-48f8-b83b-eda601d5f839/sist-en-974-1999)

Observe the general recommendation in ISO 3165 and ISO 4285 and take account of ISO 6206.

5.1.1 Sampling from drums and bottles

5.1.1.1 General

5.1.1.1.1 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.

5.1.1.1.2 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 5.1.1.1.3.

5.1.1.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.1.2 ; otherwise, take samples as described in 5.1.1.3.

5.1.1.2 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 just 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.

5.1.1.3 Bottom sampling

Take a sample using an open sampling tube, or a bottom-valve sampling tube, suited to the size of container and the viscosity of the liquid.

When using an open sampling tube, close it at the top and then lower the bottom end to the bottom of the container. Open the tube and move it rapidly so that the bottom of the tube traverses the bottom of the container before the tube is filled. Close the tube, withdraw it from the container and allow any liquid adhering to the outside of the tube to drain off.

When using a bottom-valve sampling tube, close the valve before lowering the tube into the container and then proceed in a similar manner to that when using an open sampling tube.

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5.1.2 Sampling from tanks and tankers

From each access point, take samples as follows :

- a) from the surface of the liquid, using a ladle as described in 5.1.1.2 ;
- b) from the bottom of the tank or tanker, using a sampling tube as described in 5.1.1.3 or using a specially designed bottom-sampling apparatus ;
- c) from one or more positions, depending on the overall depth, between the bottom and the surface using a weighted sampling can.

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

Phosphoric acid (H₃PO₄) analyses : in accordance with ISO 3706.

(ratio H₃PO₄ / $\frac{1}{2}$ (P₂O₅) = 1,381 by mass).

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