SLOVENSKI STANDARD
kSIST FprEN 887:2015

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Kemikalije, ki se uporabljajo za pripravo pitne vode - Aluminijev železov (III) sulfat

Chemicals used for treatment of water intended for human consumption - Aluminium iron (III) sulfate

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Aluminium-Eisen(III)-sulfat

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Sulfate d'aluminium et de fer (III)

Ta slovenski standard je istoveten z: **FprEN 887**

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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 - Aluminium iron (III) sulfate

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

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Foreword

This document (FprEN 887:2015) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Unique Acceptance Procedure.

This document will supersede EN 887:2004.

Significant technical differences between this edition and EN 887:2004 are as follows:

a) replacement of the reference to EU Directive 80/778 of July, 15 1980 with the latest Directive in force (see[1]);

b) expansion of Annex A by addition of A.2 "Quality of commercial product".

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 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 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.

1 Scope

This document is applicable to aluminium iron (III) sulfate used for treatment of water intended for human consumption. It describes the characteristics of aluminium iron (III) sulfate and specifies the requirements for aluminium iron (III) sulfate and refers to the corresponding analytical methods. It gives information on its use in water treatment. It also determines the rules relating to safe handling and use of aluminium iron (III) sulfate (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 890:2012, *Chemicals used for treatment of water intended for human consumption — Iron (III) sulfate solution*

EN 1302, *Chemicals used for treatment of water intended for human consumption — Aluminium-based coagulants — Analytical methods*

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

ISO 6206, *Chemical products for industrial use — Sampling — Vocabulary*

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

Aluminium iron (III) sulfate.

3.1.2 Synonym or common name

Aluminium and iron sulfate.

3.1.3 Relative molecular mass

Variable (see 3.1.4).

3.1.4 Empirical formula

$(Al_x\ Fe_{1-x})_2\ (SO_4)_3$ where x is 0,70 to 0,95.

3.1.5 Chemical formula

$xAl_2(SO_4)_3$. (1 - x) $Fe_2(SO_4)_3$. n H_2O where n is variable and x varies from 0,70 to 0,95.

3.1.6 CAS Registry Number[1)]

The following is a list of CAS Registry Numbers for the components:

$Al_2(SO_4)_3$: 10043-01-3;

Al2(SO4)3 • 14 H2O: 16828-12-9.

$Al_2(SO_4)_3 \cdot 16\ H_2O$: 16828-11-8.

$Al_2(SO_4)_3 \cdot 18\ H_2O$: 7784-31-8$Fe_2(SO_4)_3$: 10028-22-5.

3.1.7 EINECS reference[2)]

The following is a list of EINECS reference numbers for the components:

$Al_2(SO_4)_3$: 233-135-0;

$Fe_2(SO_4)_3$: 233-072-9.

3.2 Commercial forms

Aluminium iron (III) sulfate is available in solid hydrated forms, with different particle sizes (slabs, kibbled, ground, granulated), and as aqueous solutions.

3.3 Physical properties

3.3.1 Appearance

The product is a yellow to brown solid or liquid.

3.3.2 Density

The density of aluminium iron (III) sulfate solution varies depending on the composition.

For example:

— 1,330 g/ml for solution containing 36 g/kg of Al and 15 g/kg of Fe at 15 °C.

The bulk density (loose) of granulated solid product is approximately 0,9 g/cm^3.

3.3.3 Solubility in water

The solubility of aluminium iron (III) sulfate varies depending on the content of iron.

For example:

— for a solid form containing 72 g/kg of aluminium and 30 g/kg of iron, at 0 °C the solubility is:

  — 36 g/kg of Al in solution;

  — 15 g/kg of Fe in solution.

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3.3.4 Vapour pressure at 20 °C

Not known.

3.3.5 Boiling point at 100 kPa[3)]

120 °C for a saturated solution.

3.3.6 Crystallization point

The crystallization point of aluminium iron (III) sulfate varies, depending on the composition.

For example:

— 13 °C for composition containing 36 g/kg of Al and 15 g/kg of Fe.

3.3.7 Specific heat

Not known.

3.3.8 Viscosity (dynamic)

The viscosity of aluminium iron (III) sulfate solution varies greatly, depending on the composition and content of insoluble matters.

For a typical commercially available solution with a composition containing 36 g/kg of Al and 15 g/kg of Fe, the viscosity is given in Table 1.

Table 1 — Viscosity

Temperature (°C)	Viscosity (mPa·s)
- 5	62
0	49
10	29

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

Aluminium iron (III) sulfate is a slightly acidic hydrated salt or solution. Very dilute solutions hydrolyze and form a precipitate of aluminium hydroxide and iron hydroxide.

[3)] 100 kPa = 1 bar.

NOTE The solubility of aluminium and the solubility of iron depend on the pH value and it is advised to use the product within an appropriate pH range.

4 Purity criteria

4.1 General

This document specifies the minimum purity requirements for aluminium iron (III) sulfate 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.

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, required dosage, contents of other impurities and additives used in the products not stated in this document.

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 concentration of active matter (aluminium and iron ion contents) in the commercial product expressed as grams per kilogram of product shall be within ± 3 % of the manufacturer's declared values.

NOTE The concentration of water-soluble aluminium and water-soluble iron in commercial products varies. Typical values for concentration of active matter depending on the forms are given here below:

	Al (g/kg of product)	Fe (g/kg of product)
Solid forms	68 to 80	35 to 12
Solution forms	26 to 40	21 to 6

4.3 Impurities and main by-products

In solid hydrated forms, the content of insoluble matter shall not exceed:

- 25 g/kg of Al + Fe for type 1 and type 2;
- 30 g/kg in commercial product for type 3.

In solutions, the content of insoluble matter shall not exceed:

- 25 g/kg of Al + Fe for type 1 and type 2;
- 15 g/kg in commercial product for type 3.

NOTE 1 The three types are defined in Table 2.

NOTE 2 Insoluble matter consist of unreacted silica (SiO_2) and/or aluminium and iron silicates, in various proportions.

4.4 Chemical parameters

The product shall conform to the requirements specified in Table 2.