
Kemikalije, ki se uporabljajo za pripravo pitne vode - Železov (III) sulfat, raztopina

Chemicals used for treatment of water intended for human consumption - Iron (III) sulfate solution

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

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

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Chemicals used for treatment of water intended for human consumption - Iron (III) sulfate solution

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 164.

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European foreword

This document (prEN 890:2020) 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 CEN Enquiry.

This document will supersede EN 890:2012.

In comparison with the previous edition, the following technical modifications have been made:

- removal of the analytical methods from this document and referred to EN 17215 as analytical method standard;
- harmonization of the table for elements (Table 3, section 5.4) for all iron product standards;
- update of the information of risk and safety labelling of the product to comply with the new regulations (see 7.2 and [2]).

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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 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.

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1 Scope

This document is applicable to iron (III) sulfate solution of various iron and/or acid contents (see 4.2) used for treatment of water intended for human consumption. It describes the characteristics of iron (III) sulfate solution and specifies the requirements and the corresponding analytical methods for iron (III) sulfate solution and gives information on its use in water treatment. It also determines the rules relating to safe handling and use of iron (III) sulfate solution.

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 17215, *Chemicals used for treatment of water intended for human consumption — Iron-based coagulants — Analytical methods*

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 <http://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Description

4.1 Identification

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4.1.1 Chemical name

Iron (III) sulfate, solution.

4.1.2 Synonym or common names

Ferric sulfate liquor, red iron liquor.

4.1.3 Relative molecular mass

399,87.

4.1.4 Empirical formula

$\text{Fe}_2(\text{SO}_4)_3$.

4.1.5 Chemical formula

$\text{Fe}_2(\text{SO}_4)_3$.

4.1.6 CAS Registry Number ¹⁾

10028-22-5.

1) Chemical Abstract Service Registry Number.

prEN 890:2020 (E)

4.1.7 EINECS reference ²⁾

233-072-9.

4.2 Commercial forms

Different classes of solution exist varying in iron content and acidity. Examples are given in Table 1.

Table 1 — Different classes

Classes	Fe (III) Mass fraction in %	Fe ₂ (SO ₄) ₃ Mass fraction ^c in %	Free H ₂ SO ₄ Mass fraction in %	Density at 15 °C g/ml
Class A	11,20 to 11,80	40,00 to 42,14	< 1,00	1,49 to 1,53
Class B	11,20 to 11,80	36,10 to 39,24	0 a	1,45 to 1,47
Class C	8,40 to 8,80	30,00 to 31,43	10,00 to 11,00	1,46 to 1,48
Class D	12,50 to 12,80	44,60 to 45,70	< 1,00	1,57 to 1,60
Class E	12,50 to 12,80	40,70 to 42,80	0 a	1,52 to 1,56
Class F	13,50 to 14,00	44,78 to 47,55	0 b	1,58 to 1,63

^a Deficiency of SO₄²⁻, expressed as H₂SO₄, is a mass fraction of 3 % to 4 % of the product.

^b Deficiency of SO₄²⁻, expressed as H₂SO₄, is a mass fraction of 2,5 % to 3,5 % of the product.

^c Fe₂(SO₄)₃ by direct stoichiometry with subtraction of calculated SO₄²⁻ deficiency where appropriate on classes B, E and F.

4.3 Physical properties

4.3.1 Appearance

The iron (III) sulfate solution is a red/brown solution.

4.3.2 Density

See Table 1.

4.3.3 Solubility (in water)

The iron (III) sulfate solution is dilutable (see A.3.2).

4.3.4 Vapour pressure

Not known.

4.3.5 Boiling point at 100 kPa ³⁾

Higher than 100 °C.

4.3.6 Freezing point

Lower than - 15 °C.

²⁾ European Inventory of Existing Commercial Chemical Substances.

³⁾ 100 kPa = 1 bar.

4.3.7 Specific heat

Not known.

4.3.8 Viscosity (dynamic)

The viscosity of the commonly used solution varies in the range of 5 mPa.s to 130 mPa.s at 10 °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

The solutions of iron (III) sulfate are acidic and corrosive.

5 Purity criteria

5.1 General

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This document specifies the minimum purity requirements for iron (III) sulfate solution 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 can 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 product not stated in this product standard.

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.

5.2 Composition of commercial product

The product shall contain not less than a mass fraction of 30 % of $\text{Fe}_2(\text{SO}_4)_3$ and shall be within ± 3 % of the manufacturer's declared values.

5.3 The grade of the product

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

The concentration limits refer to Fe (III).

Table 2 — The limit values for the grades 1, 2 and 3

Parametre		Limit		
		Mass fraction of Fe (III) content %		
		Grade 1	Grade 2	Grade 3
Manganese	max.	0,5	1	2
Iron (II) ^a	max.	2,5	2,5	2,5
Insoluble matters ^b	max.	0,5	0,5	0,5

^a Fe (II) has a lower coagulant efficiency compared to Fe (III). Also hydrolysis of Fe (II) starts at pH value 8, and therefore Fe (II) can remain into the water at lower pH values.

^b An excess of insoluble matters indicates the presence of foreign matter (see A.2). Iron is a component of the product that will usually be removed in the treatment process.

5.4 The type of the products

The product shall conform to the requirements specified in Table 3.

The concentration limits are specified in milligrams per kilogram of Fe (III).

Table 3 — The limit values for the types 1, 2 and 3

Parameter		Limit in mg/kg of Fe (III)		
		Type 1	Type 2	Type 3
Arsenic (As)	max.	7	20	50
Cadmium (Cd)	max.	1,5	25	50
Chromium (Cr)	max.	100	350	500
Mercury (Hg)	max.	2	5	10
Nickel (Ni)	max.	300	350	500
Lead (Pb)	max.	20	100	400
Antimony (Sb)	max.	10	20	60
Selenium (Se)	max.	10	20	60

NOTE Cyanide (CN⁻), pesticides and polycyclic aromatic hydrocarbons are not relevant since the raw materials used in the manufacturing process are free of them. For maximum impact of iron (III) sulfate on trace metal content in drinking water see A.2.