
Kemikalije, ki se uporabljajo za pripravo pitne vode - Železov (III) sulfat, v trdnem stanju

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

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

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

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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 14664:2020) 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 14664:2004.

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

- removal of the analytical methods from this standard and referred to EN 17215 as analytical method standard;
- harmonization of the table for elements (Table 2, 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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prEN 14664:2020 (E)**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 solid used for treatment of water intended for human consumption. It describes the characteristics of iron (III) sulfate solid and specifies the requirements and the corresponding analytical methods for iron (III) sulfate solid and gives information on its use in water treatment. It also determines the rules relating to safe handling and use of iron (III) sulfate solid.

2 Normative references

The following referenced documents are indispensable for the application 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

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4.1 Identification

4.1.1 Chemical name

Iron (III) sulfate.

4.1.2 Synonym or common names

Ferric sulfate, solid.

4.1.3 Relative molecular mass

399,9.

4.1.4 Empirical formula

$\text{Fe}_2(\text{SO}_4)_3 \cdot x \text{H}_2\text{O}$ where x is approximately 5,5.

4.1.5 Chemical formula

$\text{Fe}_2(\text{SO}_4)_3 \cdot x \text{H}_2\text{O}$ where x is approximately 5,5.

4.1.6 CAS Registry Number ¹⁾

10028-22-5.

¹⁾ Chemical Abstract Service Registry Number.

prEN 14664:2020 (E)**4.1.7 EINECS reference ²⁾**

233-072-9.

4.2 Commercial form

The iron (III) sulfate solid is available as free flowing granules or powder, with a particle size range from 0,1 mm to 10 mm and 0,055 mm to 0,060 mm respectively and the angle of repose is approximately 37.

4.3 Physical properties**4.3.1 Appearance**

The iron (III) sulfate solid consists of greyish or yellowish granules.

4.3.2 Density

The bulk density is approximately equal to 1 300 kg/m³ for granules and 1 000 kg/m³ for powders at 20 °C.

4.3.3 Solubility (in water)

Iron (III) sulfate solid dissolves rapidly in water. The solubility is approximately 550 g/dm³, corresponding to approximately mass fraction 11 % of Fe at 20 °C (see A.3.2).

4.3.4 Vapour pressure

Not known.

4.3.5 Boiling point at 100 kPa ³⁾

Not applicable.

4.3.6 Melting point

Iron (III) sulfate solid decomposes when heated.

4.3.7 Specific heat

Not known.

4.3.8 Viscosity (dynamic)

Not applicable.

4.3.9 Critical temperature

Not applicable.

4.3.10 Critical pressure

Not applicable.

4.3.11 Physical hardness

The granule strength is higher than 50 N.

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²⁾ European Inventory of Existing Commercial Chemical Substances.

³⁾ 100 kPa = 1 bar.

4.4 Chemical properties

Iron (III) sulfate solid is slightly hygroscopic at relative humidity higher than 50 %.

Iron (III) sulfate solutions are acidic.

5 Purity criteria

5.1 General

This document specifies the minimum purity requirements for iron (III) sulfate solid 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 mass fraction of 64 % of $\text{Fe}_2(\text{SO}_4)_3$ or not less than a mass fraction of 18 % of Fe and shall be within ± 3 % of the manufacturer's declared values.

5.3 Impurities and main by-products

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

The concentration limits refer to Fe (III).

Table 1 — Impurities

Impurity	Limit	Mass fraction in % of Fe (III) content		
		Grade 1	Grade 2	Grade 3
Manganese max.	0,5	1	2	
Iron(II) ^a max.	3,5	3,5	3,5	
H ₂ SO ₄ free max.	8	8	8	
Insoluble matters ^b max.	10	10	10	

^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. Iron is a component of the product will usually be removed in the treatment process.

prEN 14664:2020 (E)**5.4 Chemical parameters**

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

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

Table 2 — Chemical parameters

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⁻) is usually not relevant because of the acidity of the product. 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.

6 Test methods**6.1 Sampling**

Use the relevant method described in the EN 17215.

6.2 Analyses

Use the relevant methods described in EN 17215.

7 Labelling - Transportation - Storage**7.1 Means of delivery**

The product shall be delivered in suitable packages, paper or plastics bags, or by rubber-lined or plastics-lined bulk truck.

In order that the purity of the product is not affected, the means of delivery shall not have been used previously for any different product or it shall have been specially cleaned and prepared before use.