SLOVENSKI STANDARD
oSIST prEN 15031:2020

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Kemikalije, ki se uporabljajo za pripravo bazenske vode - Strjevanje na osnovi aluminija

Chemicals used for treatment of swimming pool water - Aluminium based coagulants

Produkte zur Aufbereitung von Schwimm- und Badebeckenwasser - Flockungsmittel auf Aluminiumbasis

Produits chimiques utilisés pour le traitement de l'eau des piscines - Coagulants à base d'aluminium

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Chemicals used for treatment of swimming pool water - Aluminium based coagulants

Produits chimiques utilisés pour le traitement de l'eau des piscines - Coagulants à base d'aluminium

Produkte zur Aufbereitung von Schwimm- und Badebeckenwasser - Flockungsmittel auf Aluminiumbasis

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

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 15031:2020) 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 15031:2013.

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

— modification of 7.3 on transportation regulations and labelling, adding the sentence “The user must be aware of the incompatibilities between transported products.”;

— modification of 7.4 on marking. The requirements of marking are also applied to the accompanying documents.

Introduction

In respect of potential adverse effects on the quality of water for swimming pools, caused by the products covered by this document:

a) this document provides no information as to whether the products 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 these products remain in force.

NOTE Conformity with this document does not confer or imply acceptance or approval of the products in any of the Member States of the EU or EFTA. The use of the products covered by this document is subject to regulation or control by National Authorities.

1 Scope

This document is applicable to aluminium based coagulants (aluminium sulfate, aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric), aluminium chloride hydroxide sulfate (monomeric), sodium aluminate and polyaluminium chloride hydroxide and polyaluminium chloride hydroxide sulfate) used directly or for the production of formulations for treatment of water for swimming pools.

It describes the characteristics of aluminium based coagulants and specifies the requirements and the corresponding test methods for aluminium based coagulants. It gives information on their use in swimming pool water treatment. It also determines the rules relating to safe handling and use (see Annex B).

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 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 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 https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Description

4.1 Aluminium sulfate

4.1.1 Identification

4.1.1.1 Chemical name

Aluminium sulfate.

4.1.1.2 Synonym or common names

Aluminium sulfate, cake alum, alum.

NOTE In English the generic term “alum” is imprecise and is deprecated and in German the term “Alaun” is misleading.

4.1.1.3 Relative molecular mass

342,14 for $Al_2(SO_4)_3$.

4.1.1.4 Empirical formula

$Al_2(SO_4)_3$.

4.1.1.5 Chemical formula

$Al_2(SO_4)_3.nH_2O$.

4.1.1.6 CAS Registry Number [1]

$Al_2(SO_4)_3$: 10043–01–3.

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

$Al_2(SO_4)_3 \cdot 18\ H_2O$: 7784–31–8.

4.1.1.7 EINECS reference [2]

$Al_2(SO_4)_3$: 233–135–0.

4.1.2 Commercial forms

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

4.1.3 Physical properties

4.1.3.1 Appearance

The product is a white solid or colourless to yellow, clear liquid.

4.1.3.2 Density

The density of a typical aluminium sulfate solution is given in Table 1 and varies depending on the concentration of the active matter (aluminium content), expressed in grams per kilogram of solution (Al g/kg).

Table 1 — Density of solution

Al g/kg of solution	**Density at 15 °C** g/ml
40,8	1,310
41,6	1,315
42,5	1,320
43,3	1,325
44,2	1,330
45,0	1,335

[1] Chemical Abstracts Service Registry Number.
[2] European Inventory of Existing Commercial Chemical Substances.

4.1.3.3 Solubility

The theoretical limit of active matter content for a typical solution is given in Table 2.

Table 2 — Solubility

Temperature °C	Active matter in Al g/kg of solution
- 1	44,7
24	44,8

The practical limit of solubility depends on the temperature and the device used for solubilisation of the solid form (slabs, kibbled, ground or granulated).

An indication of practical limits is given in Table 3.

Table 3 — Indication of practical limits of solubility

Temperature °C	Active matter Al g/kg of solution	Solubility in grams solid form (containing Al 90 g/kg of solid) per kilogram of solution
15	37	410

4.1.3.4 Vapour pressure at 20 °C

Not known.

4.1.3.5 Boiling point at 100 kPa [3]

Not known.

4.1.3.6 Crystallization point

The crystallization point of aluminium sulfate varies, depending on the concentration of the active matter.

For example:

— – 7 °C for a typical solution of aluminium content of 42,4 g/kg of solution.

4.1.3.7 Specific heat

Not known.

4.1.3.8 Viscosity (dynamic)

The viscosity of aluminium sulfate solution varies greatly, depending on the concentration of the active matter.

For a typical solution of aluminium content of 42,4 g/kg of solution, the viscosity is given in Table 4.

[3] 100 kPa = 1 bar.

Table 4 — Viscosity

Temperature °C	Viscosity mPa.s
0	40,0
10	26,5
20	18,6
30	13,2
40	8,8

4.1.3.9 Critical temperature

Not applicable.

4.1.3.10 Critical pressure

Not applicable.

4.1.3.11 Physical hardness

Not applicable.

4.1.4 Chemical properties

Aluminium sulfate is an acidic hydrated salt or solution. Very dilute solutions hydrolyse and form a precipitate of aluminium hydroxide.

Since aluminium compounds are amphoteric in nature, the solubility of aluminium depends on the pH value and the product should be used within an appropriate pH range.

4.2 Aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulfate (monomeric)

4.2.1 Identification

4.2.1.1 Chemical name

a) aluminium chloride (monomeric);

b) aluminium chloride hydroxide (monomeric);

c) aluminium chloride hydroxide sulfate (monomeric).

4.2.1.2 Synonym or common names

a) aluminium chloride;

b) aluminium chloride hydroxide;

c) aluminium chloride hydroxide sulfate.

4.2.1.3 Relative molecular mass

133,3 for $AlCl_3$.

4.2.1.4 Empirical formula

a) $AlCl_3$;

b) $Al(OH)_aCl_b$ with $(a + b) = 3$ and a less than or equal to 1,05;

c) $Al(OH)_aCl_b(SO_4)_c$ with $(a + b + 2c) = 3$ and a less than or equal to 1,05.

4.2.1.5 Chemical formula

Variable (see 4.1.4).

4.2.1.6 CAS Registry Number [4]

a) 7446-70-0;

b)

1) a and b variable: 1327-41-9 with a less than or equal to 1,05;

2) $a = 1$, $b = 2$: 14215-15-7;

c) a, b and c variable: 39290-78-3 with a less than or equal to 1,05.

4.2.1.7 EINECS reference [5]

a) 231-208-1;

b)

1) 215-477-2;

2) 238-071-7;

c) 254-400-7.

4.2.2 Commercial forms

Aluminium chloride in the form of hexahydrate is available as crystals.

Liquid forms of aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) are available as solutions or suspensions.

4.2.3 Physical properties

4.2.3.1 Appearance

The product is colourless to yellow.

4.2.3.2 Density

The density depends on the particular composition, especially the aluminium ion content, expressed as mass fraction of aluminium (Al) in %.

Typical values for solutions:

[4] Chemical Abstracts Service Registry Number.
[5] European Inventory of Existing Commercial Chemical Substances.

a) aluminium chloride: 1,3 g/ml for 5,8 % Al;

b) aluminium chloride hydroxide: 1,35 g/ml to 1,40 g/ml for 9,5 % Al;

c) aluminium chloride hydroxide sulfate:

— 1,18 g/ml to 1,22 g/ml for 5,3 % Al;

— 1,18 g/ml for 4,2 % Al.

4.2.3.3 Solubility

Aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) are fully miscible with water.

NOTE Depending on the particular product, dilute solutions can hydrolyze and form a precipitate.

4.2.3.4 Vapour pressure

Not known.

4.2.3.5 Boiling point at 100 kPa [6]

Not known.

4.2.3.6 Crystallization point

Typical values for solutions:

a) aluminium chloride: – 20 °C for 5,8 % Al;

b) aluminium chloride hydroxide:

— ≤ – 20 °C for 9,5 % Al;

— approximately – 20 °C for 12,4 % Al;

c) aluminium chloride hydroxide sulfate:

— 10 °C to – 15 °C for 5,3 % Al;

— 5 °C for 4,2 % Al.

4.2.3.7 Specific heat

Not known.

4.2.3.8 Viscosity (dynamic)

Typical values for solutions at 20 °C:

a) aluminium chloride solution: approximately 10 mPa.s for 5,8 % Al;

b) aluminium chloride hydroxide:

— 10 mPa.s to 50 mPa.s for 9,5 % Al;

[6] 100 kPa = 1 bar.