
Kemikalije, ki se uporabljajo za pripravo pitne vode - Salmiak

Chemicals used for treatment of water intended for human consumption - Liquefied ammonia

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Ammoniak, flüssig

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Ammoniac liquéfié

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EUROPEAN STANDARD
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Chemicals used for treatment of water intended for human consumption - Liquefied ammonia

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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.

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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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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 12126:2020) 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 12126:2012.

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

- a) modification of 7.3 on transportation regulations and labelling, adding the sentence “The user must be aware of the incompatibilities between transported products.”;
- b) modification of 7.4 on marking. The requirements of marking are also applied to the accompanying documents;
- c) use of the changed classification and labelling (see [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 liquefied ammonia used for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements of liquefied ammonia and refers to the corresponding analytical methods. It gives information for its use in water treatment. It also determines the rules relating to the safe handling and use of liquefied ammonia (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 ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696)*

ISO 7103, *Liquefied anhydrous ammonia for industrial use — Sampling — Taking a laboratory sample*

ISO 7105, *Liquefied anhydrous ammonia for industrial use — Determination of water content — Karl Fischer method*

ISO 7106, *Liquefied anhydrous ammonia for industrial use — Determination of oil content — Gravimetric and infra-red spectrometric 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 <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Description

4.1 Identification

4.1.1 Chemical name

Ammonia liquefied, anhydrous.

4.1.2 Synonym or common name

Ammonia.

4.1.3 Relative molecular mass

17,03.

4.1.4 Empirical formula

NH₃.

4.1.5 Chemical formula

NH₃.

prEN 12126:2020 (E)**4.1.6 CAS Registry Number ¹**

7664-41-7.

4.1.7 EINECS reference ²

231-635-3.

4.2 Commercial form

The product is available as liquefied gas.

4.3 Physical properties**4.3.1 Appearance and odour**

The product is colourless liquid with a characteristic pungent odour.

4.3.2 Density

The density of the gas is 0,771 g/l at 101,3 kPa ³ and 0 °C.

The density of the liquid is 0,682 g/ml at 101,3 kPa and -34 °C, and 0,61 g/ml at 850 kPa and 20 °C.

4.3.3 Solubility (in water)

The solubility of the product in water is 900 g/l at 0 °C, 520 g/l at 20 °C, and 407 g/l at 30 °C.

4.3.4 Vapour pressure

The vapour pressure of the product is 400 kPa at 0 °C, 850 kPa at 20 °C and 2 035 kPa at 50 °C.

4.3.5 Boiling point at 100 kPa ³

The boiling point of the product is -33,4 °C at 101,3 kPa.

4.3.6 Melting point

The melting point of the product is -77,7 °C at 101,3 kPa.

4.3.7 Specific heat

The specific heat of the product is 4,61 kJ/(kg K) at 0 °C and 4,86 kJ/(kg K) at 40 °C.

4.3.8 Viscosity, dynamic

The viscosity of the product is 0,254 mPa.s at 33 °C and 101,3 kPa.

4.3.9 Critical temperature

132,4 °C.

4.3.10 Critical pressure

11 450 kPa.

4.3.11 Physical hardness

Not applicable.

¹ Chemical Abstracts Service Registry Number.

² European Inventory of Existing Commercial Chemical Substances.

³ 100 kPa = 1 bar.

4.4 Chemical properties

Ammonia reacts violently with halogens, acids, acid halides, acid anhydrides and oxidising agents. It reacts with zinc, copper, tin and their alloys. Mixtures of volume fraction of 15 % to 30 % of ammonia with air are explosive. For additional information on liquefied ammonia, see Annex A.

5 Purity criteria

5.1 General

This document specifies the minimum purity requirements for liquefied ammonia 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.

The national regulations allow users to clarify whether it is of appropriate purity for the 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 and 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 leads to significant quantities of impurities, by-products or additives being present, this shall be notified to the user.

5.2 Composition of commercial product

Liquefied ammonia shall not contain less than a mass fraction of 99,8 % of NH₃.

5.3 Impurities and main by-products

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

Table 1 – Impurities

Impurity		Limit
Water	max	Mass fraction 0,1 %
Permanent gases and methane	max	Volume fraction 0,1 %
Oil	max	5 mg/kg

5.4 Chemical parameters

The chemicals parameters defined in the EU Water Directive (see [1]) are not found in liquefied ammonia. Cyanides, pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.

6 Test methods

6.1 Sampling

Follow the sampling method according to ISO 7103.

prEN 12126:2020 (E)**6.2 Analyses****6.2.1 Main product**

The ammonia concentration is calculated by subtracting the contents of the main impurities from mass fraction 100 %.

6.2.2 Impurities**6.2.2.1 Water**

The water content shall be determined in accordance with ISO 7105.

6.2.2.2 Oil content

The oil content shall be determined in accordance with ISO 7106.

6.2.3 Permanent gases and methane**6.2.3.1 Principle**

The method is a gas chromatographic determination of inert gases and methane in liquid ammonia, determined as a volume fraction.

The content of trace contaminants is determined by gas chromatography according to an external standard method. Metering from the gas pipette is carried out by means of pressure-controlled feed via a fixed-volume sampling valve.

Liquefied ammonia is evaporated prior to the gas chromatographic test in a special steel gas pipette.

6.2.3.2 Reagents and materials**6.2.3.2.1 Reagents**

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All reagents shall be of a recognized analytical grade and the water used shall conform to the grade 3 specified in EN ISO 3696.

6.2.3.2.2 Carrier gas

Helium, minimum purity volume fraction 99,9 %.

6.2.3.2.3 Calibration gas mixture of the following composition

- Hydrogen volume fraction 91 %;
- nitrogen volume fraction 5 %;
- methane volume fraction 3 %;
- sum of oxygen and argon volume fraction 1 %.

6.2.3.2.4 Material for preparation of the column

Molecular sieve 13 X of particle size 250 µm to 360 µm, or any other equivalent suitable material.

6.2.3.3 Apparatus

6.2.3.3.1 Gas chromatographic apparatus

6.2.3.3.1.1 General

Any suitable gas chromatograph, fitted with a thermal conductivity detector, may be used.

6.2.3.3.1.2 Characteristics of the gas chromatographic apparatus

- Column temperature: typically 40 °C isothermal conditions;
- detector temperature: typically 130 °C;
- filament temperature: typically 200 °C.

6.2.3.3.1.3 Carrier gas flow rate

The carrier gas flow rate shall be approximately 25 ml/min. It is usually measured at column outlet and at ambient temperature.

6.2.3.3.2 Injection equipment

Stainless steel gas sample valve with a loop of 2 ml capacity, operating under the following conditions:

- temperature: ambient to 50 °C;
- pressure: atmospheric

6.2.3.3.3 Column

6.2.3.3.3.1 Construction

The column may be made of any suitable material that does not react with the test portion, for example stainless steel. Typical dimensions are as follows:

- a) length: according to the test method used but typically 4 m;
- b) diameter: internal diameter approximately 3,2 mm; external diameter approximately 6 mm;
- c) shape: adapted to the oven geometry. If coiled, the coil diameter shall be at least ten times the outer diameter of the tube.

6.2.3.3.3.2 Packing

Composition

Molecular sieve (see 6.2.3.2.4).

Method of packing

Use a standardized procedure to give a packed column capable of separating the permanent gas and methane.

6.2.3.3.3.3 Thermal conductivity detector, of such sensitivity that the height of the permanent gas and methane peaks to be measured at the limit of detection is not less than twice the peak-to-noise level.

6.2.3.3.3.4 Recorder

The development of the retention time shall be approximately 10 min.