



BSI Standards Publication

<http://www.china-gauges.com/>

## Chemicals used for treatment of water intended for human consumption — Ammonium sulfate

---

## National foreword

This British Standard is the UK implementation of EN 12123:2022. It supersedes BS EN 12123:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CII/59, Chemicals and filtering media for water treatment.

A list of organizations represented on this committee can be obtained on request to its committee manager.

### Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2022  
Published by BSI Standards Limited 2022

ISBN 978 0 539 06958 7

ICS 13.060.20; 71.100.80

### Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2022.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

EUROPEAN STANDARD

EN 12123

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2022

ICS 71.100.80

Supersedes EN 12123:2012

English Version

## Chemicals used for treatment of water intended for human consumption - Ammonium sulfate

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Sulfate d'ammonium

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Ammoniumsulfat

This European Standard was approved by CEN on 13 March 2022.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

## Contents

European foreword .....	4
Introduction .....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions .....	6
4 Description.....	6
4.1 Identification.....	6
4.1.1 Chemical name.....	6
4.1.2 Synonym or common name.....	6
4.1.3 Relative molecular mass .....	6
4.1.4 Empirical formula.....	7
4.1.5 Chemical formula.....	7
4.1.6 CAS-Registry Number .....	7
4.1.7 EINECS reference .....	7
4.2 Commercial form .....	7
4.3 Physical properties .....	7
4.3.1 Appearance .....	7
4.3.2 Density.....	7
4.3.3 Solubility in water .....	7
4.3.4 Vapour pressure.....	7
4.3.5 Boiling point at 100 kPa .....	7
4.3.6 Crystallization point .....	7
4.3.7 Specific heat.....	7
4.3.8 Viscosity dynamic .....	7
4.3.9 Critical temperature .....	7
4.3.10 Critical pressure.....	8
4.3.11 Physical hardness.....	8
4.4 Chemical properties.....	8
5 Purity criteria.....	8
5.1 General.....	8
5.2 Composition of commercial product .....	8
5.3 Impurities and main by-products .....	9
5.4 Chemical parameters.....	9
6 Test methods .....	9
6.1 Sampling.....	9
6.2 Analyses.....	10
6.2.1 Main product .....	10
6.2.2 Impurities .....	10
6.2.3 Chemical parameters.....	10
7 Labelling, transportation, storage .....	15
7.1 Means of delivery .....	15
7.2 Labelling according to the EU legislation .....	15
7.3 Transportation regulations and labelling .....	15
7.4 Marking .....	15

<b>7.5</b>	<b>Storage</b> .....	<b>15</b>
<b>7.5.1</b>	<b>Long term stability</b> .....	<b>15</b>
<b>7.5.2</b>	<b>Storage incompatibilities</b> .....	<b>15</b>
<b>Annex A (informative) General information on ammonium sulfate</b> .....		<b>16</b>
<b>A.1</b>	<b>Origin</b> .....	<b>16</b>
<b>A.1.1</b>	<b>Raw materials</b> .....	<b>16</b>
<b>A.1.2</b>	<b>Manufacturing process</b> .....	<b>16</b>
<b>A.2</b>	<b>Use</b> .....	<b>16</b>
<b>A.2.1</b>	<b>Function</b> .....	<b>16</b>
<b>A.2.2</b>	<b>Form in which it is used</b> .....	<b>16</b>
<b>A.2.3</b>	<b>Treatment dose</b> .....	<b>16</b>
<b>A.2.4</b>	<b>Means of application</b> .....	<b>16</b>
<b>A.2.5</b>	<b>Secondary effects</b> .....	<b>16</b>
<b>A.2.6</b>	<b>Removal of excess product</b> .....	<b>16</b>
<b>Annex B (normative) General rules relating to safety</b> .....		<b>17</b>
<b>B.1</b>	<b>Rules for safe handling and use</b> .....	<b>17</b>
<b>B.2</b>	<b>Emergency procedures</b> .....	<b>17</b>
<b>B.2.1</b>	<b>First aid</b> .....	<b>17</b>
<b>B.2.2</b>	<b>Spillage</b> .....	<b>17</b>
<b>B.2.3</b>	<b>Fire</b> .....	<b>17</b>
<b>Bibliography</b> .....		<b>18</b>

## European foreword

This document (EN 12123:2022) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12123:2012.

In comparison with the previous edition EN 12123:2012, the following technical modifications have been made:

- a) modification of 7.3 on transportation regulations and labelling, adding the sentence “The user shall 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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 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 (see Annex A).

<http://www.china-gauges.com/>

## 1 Scope

This document is applicable to ammonium sulfate used for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements of ammonium sulfate and refers to the corresponding analytical methods. It gives information on its use in water treatment.

## 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 760, *Determination of water — Karl Fischer method (General method)*

ISO 2992, *Ammonium sulphate for industrial use — Determination of iron content — 2,2'-Bipyridyl photometric method*

ISO 2993, *Ammonium sulphate for industrial use — Determination of free acidity — Titrimetric method*

ISO 3332, *Ammonium sulphate for industrial use — Determination of ammoniacal nitrogen content — Titrimetric method after distillation*

ISO 5993, *Sodium hydroxide for industrial use — Determination of mercury content — Flameless atomic absorption spectrometric method*

ISO 6353-1, *Reagents for chemical analysis — Part 1: General test methods*

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/ui>

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

## 4 Description

### 4.1 Identification

#### 4.1.1 Chemical name

Ammonium sulfate.

#### 4.1.2 Synonym or common name

Ammonium sulfate.

#### 4.1.3 Relative molecular mass

132,14.



#### 4.1.4 Empirical formula

$(\text{NH}_4)_2\text{SO}_4$ .

#### 4.1.5 Chemical formula

$(\text{NH}_4)_2\text{SO}_4$ .

#### 4.1.6 CAS-Registry Number <sup>1</sup>

7783-20-2.

#### 4.1.7 EINECS reference <sup>2</sup>

213-984-1.

#### 4.2 Commercial form

The product is a powder.

#### 4.3 Physical properties

##### 4.3.1 Appearance

The product is a white, fine crystalline powder.

##### 4.3.2 Density

The density of the product is 1,8 g/cm<sup>3</sup> at 20 °C.

##### 4.3.3 Solubility in water

The solubility of the product in water is 767 g/l at 25 °C.

##### 4.3.4 Vapour pressure

Not applicable.

##### 4.3.5 Boiling point at 100 kPa <sup>3</sup>

Not applicable.

##### 4.3.6 Crystallization point

The product decomposes above 235 °C.

##### 4.3.7 Specific heat

Not known.

##### 4.3.8 Viscosity dynamic

Not applicable.

##### 4.3.9 Critical temperature

Not applicable.

---

<sup>1</sup> Chemical Abstracts Service Registry Number.

<sup>2</sup> European Inventory of Existing Commercial Chemical Substances.

<sup>3</sup> 100 kPa = 1 bar.

#### 4.3.10 Critical pressure

Not applicable.

#### 4.3.11 Physical hardness

Not applicable.

### 4.4 Chemical properties

Ammonium sulfate easily dissolves in water. A saturated solution (266 g/l at 0 °C) has a pH value of approximately 6.

Upon heating with chlorates, nitrates or nitrites it reacts violently.

Above 235 °C the product decomposes with formation of ammonia vapour, sulfur oxides.

## 5 Purity criteria

### 5.1 General

This document specifies the minimum purity requirements for ammonium 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 can 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 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 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

The content of ammonium sulfate shall not be less than a mass fraction of 99 % corresponding to a mass fraction of 21 % of ammoniacal nitrogen.

### 5.3 Impurities and main by-products

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

**Table 1 — Impurities**

Impurity	Limit in mg/kg of the product
Sulfuric acid (free) (H <sub>2</sub> SO <sub>4</sub> ) max.	10
Water (H <sub>2</sub> O) max.	300
Iron (Fe) max.	10

### 5.4 Chemical parameters

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

**Table 2 — Chemical parameters**

Parameter	Limit mg/kg of commercial product
Antimony (Sb) max.	1
Arsenic (As) max.	5
Cadmium (Cd) max.	0,5
Chromium (Cr) max.	5
Lead (Pb) max.	5
Mercury (Hg) max.	0,1
Nickel (Ni) max.	5
Selenium (Se) max.	2

NOTE Pesticides and polycyclic aromatic hydrocarbons and cyanides (CN<sup>-</sup>) are not relevant in ammonium sulfate because the raw materials used in the manufacturing are free of them. For parametric values of ammonium sulfate on trace metal content in drinking water, see [1].

## 6 Test methods

### 6.1 Sampling

Observe the general recommendations of ISO 3165 [2] and take account of ISO 6206 [3]. Prepare the laboratory sample(s) required by the relevant procedure described in ISO 8213.

## 6.2 Analyses

### 6.2.1 Main product

The content of ammoniacal nitrogen ( $w_1$ ), expressed as mass fraction in %, shall be determined in accordance with ISO 3332 (titrimetric method after distillation). The content of ammonium sulfate  $((\text{NH}_4)_2\text{SO}_4)$  ( $w_2$ ), expressed as mass fraction in %, is calculated from the formula:

$$w_2 = w_1 \times 4,72 \quad (1)$$

### 6.2.2 Impurities

#### 6.2.2.1 Water

The content of water ( $\text{H}_2\text{O}$ ) shall be determined in accordance with ISO 760 (Karl Fischer method).

#### 6.2.2.2 Sulfuric acid

The content of free sulfuric acid ( $\text{H}_2\text{SO}_4$ ) shall be determined in accordance with ISO 2993.

#### 6.2.2.3 Iron (Fe)

The content of iron (Fe) shall be determined in accordance with ISO 2992.

### 6.2.3 Chemical parameters

#### 6.2.3.1 General

The content of chemical parameters shall be determined using the procedures specified in Table 3:

**Table 3 — Procedures for the determination of chemical parameters**

Element	Reference	Method	Wavelength (nm)	Flame
As	see 6.2.3.3	Hydride AAS	193,7	n.a.
Sb	see 6.2.3.3	Hydride AAS	217,6	n.a.
Cd	ISO 6353-1 GM 29 see 6.2.3.2	AAS	228,8	air-acetylene
Cr	ISO 6353-1 GM 29 see 6.2.3.2	AAS	357,8	air-acetylene
Pb	ISO 6353-1 GM 29 see 6.2.3.2	AAS	217,0 or 283,3	air-acetylene
Ni	ISO 6353-1 GM 29 see 6.2.3.2	AAS	232,0	oxidising acetylene-air
Se	see 6.2.3.3	Hydride AAS	196,0	n.a.
Hg	in accordance with ISO 5993	Flameless AAS	253,6	n.a.

AAS = Atomic Absorption Spectroscopy.  
n.a. = not applicable.

### 6.2.3.2 Determination of cadmium (Cd), chromium (Cr), lead (Pb) and nickel (Ni)

#### 6.2.3.2.1 Principle

The elements cadmium (Cd), chromium (Cr), lead (Pb) and nickel (Ni) are determined using atomic absorption spectrometry with the standard additions technique.

#### 6.2.3.2.2 Reagents

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

##### 6.2.3.2.2.1 Standard solution (100 µg/l Cd, Cr, Pb or Ni)

The standard solution shall be freshly prepared on the day of use by individual dilution of a stock solution. This stock solution with a Cd, Cr, Pb or Ni content of at least 1 mg/l shall be made by dilution of standard solutions of Cd, Cr, Pb and Ni which are available from all major suppliers of laboratory chemicals. This stock solution shall be kept in containers of tetrafluoroethylene-hexafluoropropylene copolymer (FEP), polytetrafluoroethylene (PTFE) or polyethylene (PE).

The stock solution should not be kept for longer than four weeks.

#### 6.2.3.2.3 Apparatus

Ordinary laboratory apparatus and the following:

6.2.3.2.3.1 Atomic absorption spectrometer with the measurement parameters specified in Table 3.

#### 6.2.3.2.4 Procedure

##### 6.2.3.2.4.1 Test portion

Weigh 1 g (*m*) to the nearest 0,01 mg of the laboratory sample into a 100 ml one-mark volumetric flask and make up to the mark at 20 °C with water.

##### 6.2.3.2.4.2 Determination

The reference solutions shall be made by spiking the sample with the standard solutions, which contain stepwise increasing contents of the elements to be determined.

NOTE The amount of internal standard to be added can be estimated from a preliminary investigation, determining roughly the element content of the test sample from simple calibration.

The steps in which internal standards have to be added shall be at least as high as the estimated content of the test sample. With the spectrometer (6.2.3.2.3.1), carry out the measurement with the parameters specified in Table 3 in accordance with the manufacturer's instructions.

Repeat the procedure with all reagents and the same volume of standard solution to be added using water in place of the sample as a blank determination.

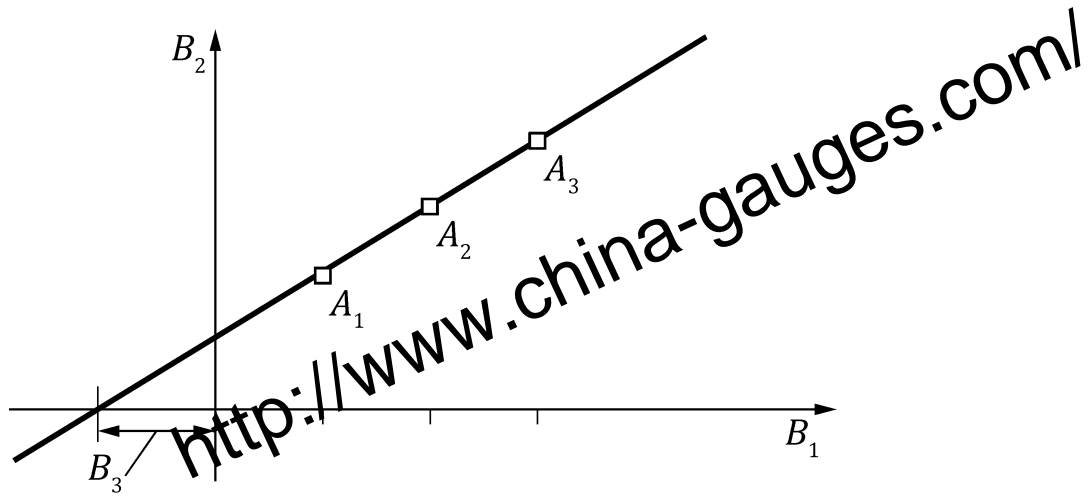
##### 6.2.3.2.5 Expression of results

Prepare a calibration curve using the measured absorbencies of the spiked measurement solutions.

Read the concentration of each element in the test solution by extrapolation of the correlation line to absorbance  $A = 0$  (see Figure 1). Similarly determine the element concentration of the blank solution (see Figure 2) and subtract from the result obtained for the test solution.

Alternatively, the evaluation can be carried out by linear regression. Additional dilution steps shall be compensated in the calculation.

The interim result ( $y$ ) expressed in micrograms per litre is converted to give the final concentration according to 6.2.3.2.6.



**Key**

- $B_1$  concentration of added standard in micrograms per litre
- $B_2$  absorbance A
- $B_3$  concentration in the test solution in micrograms per litre
- $A_1; A_2; A_3$  spiking

**Figure 1 — Calculation of the element concentration in the test solution**

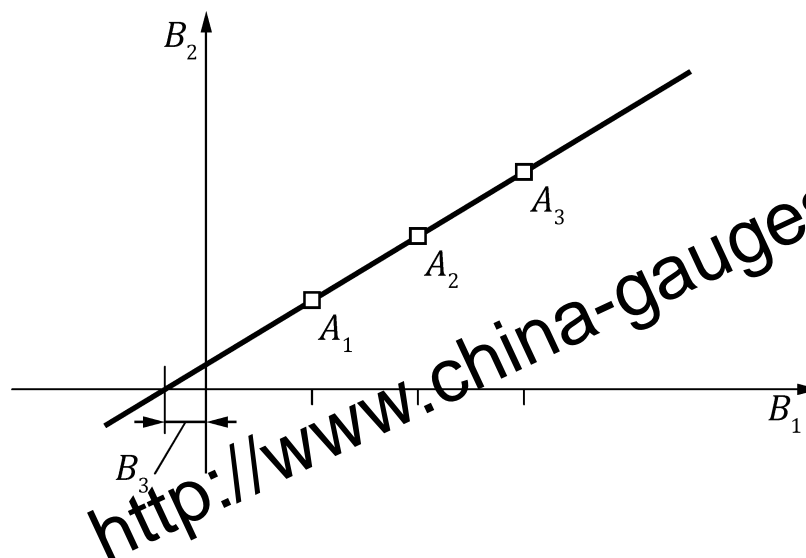
**6.2.3.2.6 Calculation**

From the interim result ( $y$ ) (see 6.2.3.2.5), the content,  $w_3$ , of each element in the laboratory sample, expressed in milligram per kilogram of a mass fraction of 100 % ammonium sulfate is given by the following formula:

$$w_3 = \frac{y \times V \times 100 \times 1000}{m \times w_2} \tag{2}$$

where

- $y$  is the interim result (6.2.3.2.5);
- $V$  is the volume, expressed in millilitres, of the test solution;
- $m$  is the mass, expressed in grams, of the test portion;
- $w_2$  is the concentration, expressed in mass fraction in %, of ammonium sulfate (see 6.2.1).

**Key**

$B_1$	concentration of added standard in micrograms per litre
$B_2$	absorbance A
$B_3$	concentration in the blank solution in micrograms per litre
$A_1; A_2; A_3$	spiking

**Figure 2 — Calculation of the element concentration in the blank solution**

### 6.2.3.3 Determination of arsenic (As), antimony (Sb) and selenium (Se)

#### 6.2.3.3.1 Principle

The elements arsenic, antimony, and selenium are determined by hydride-atomic absorption spectrometry. The elements are reduced by reducing agents (sodium borohydride ( $\text{NaBH}_4$ )) to form the hydrides. These volatile compounds flow through the heated measuring cuvette of an atomic absorption spectrometer where the content of the individual element is determined.

#### 6.2.3.3.2 Reagents

**6.2.3.3.2.1 Hydrochloric acid**, high purity analytical grade, mass fraction of 30 %, density  $\rho = 1,15 \text{ g/ml}$ .

#### 6.2.3.3.2.2 Preliminary reduction agent

Dissolve 10 g sodium iodide and 100 g *L*-ascorbic acid in 1 000 ml of water.

#### 6.2.3.3.2.3 Reduction agent

Dissolve with water  $\text{NaBH}_4$  and  $\text{NaOH}$  in concentrations specified in the manufacturer's handbook for the spectrometer.

#### 6.2.3.3.2.4 Standard solution (100 $\mu\text{g/l}$ As, Sb or Se)

The standard solution shall be freshly prepared on the day of use by individual dilution of a stock solution. This stock solution with an As, Sb or Se content of at least 1 mg/l shall be made by dilution of standard solutions of Se, As and Sb which are available from all major suppliers of laboratory chemicals. This stock solution shall be kept in containers of tetrafluoroethylene-hexafluoropropylene copolymer (FEP), polytetrafluoroethylene (PTFE) or polyethylene (PE).

The stock solution should not be kept for longer than four weeks.

**6.2.3.3.3 Apparatus**

- 6.2.3.3.3.1 One one-mark volumetric flask, 100 ml.
- 6.2.3.3.3.2 Nine one-mark volumetric flasks, 10 ml.
- 6.2.3.3.3.3 Pipettes, 5 ml, 10 ml and 20 ml.
- 6.2.3.3.3.4 Three one-mark volumetric flasks, 50 ml.
- 6.2.3.3.3.5 Micropipettes, volume adjustable to a maximum 500 µl.
- 6.2.3.3.3.6 Atomic absorption spectrometer with the measurement parameters specified in Table 3.

The width of the slit, the measuring time, rinsing with argon before and after the measurement and the reaction time shall be adjusted in accordance with the manufacturer's instructions. The background compensation shall be activated for the measurement of As and Sb, but not for the measurement of Se.

**6.2.3.3.4 Procedure**

For As (procedure for Sb and Se in parentheses if different from As procedure): weigh a test portion of 1 g to the nearest 0,01 mg and transfer it to a 100 ml one-mark volumetric flask (6.2.3.3.3.1) and make up to the mark at 20 °C with water. Pipette 10 ml (Sb: 10 ml; Se: 30 ml) of this solution into a 50 ml one-mark volumetric flask (6.2.3.3.3.4) and add 10 ml HCl (6.2.3.3.2.1) and 5 ml preliminary reduction agent (6.2.3.3.2.3). Do not add preliminary reduction agent to the flasks for Sb and Se determination. Allow 3 h for reaction to occur and fill to the mark with water. Pipette 5 ml of this solution into three 10 ml one-mark volumetric flasks (6.2.3.3.3.2) labelled A, B, C. For the purpose of internal calibration, add those quantities of standard solutions (6.2.3.3.2.4) as given in Table 4 to the flasks B and C. With the spectrometer (6.2.3.3.3.6), carry out the measurement with the addition of the reduction agent (6.2.3.3.2.3) and the parameters of measurement in accordance with the manufacturer's instructions for the spectrometer.

Repeat the procedure with all reagents and the same volume of standard solution to be added using water in place of the sample as a blank determination.

**Table 4 — Standard solution**

	Volume of standard solution to be added		
	As	Sb	Se
Flask B	50 µl	100 µl	200 µl
Flask C	100 µl	200 µl	500 µl

**6.2.3.3.5 Expression of results**

See 6.2.3.2.5.

**6.2.3.3.6 Calculation**

See 6.2.3.2.6.



## 7 Labelling, transportation, storage <sup>4</sup>

### 7.1 Means of delivery

Ammonium sulfate shall be delivered in plastics bags or in bulk.

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.

### 7.2 Labelling according to the EU legislation <sup>5</sup>

At the date of the publication of this document no labelling requirements apply to ammonium sulfate.

The legislation [4], and its amendments for the purposes of its adaptation to technical and scientific progress, contains a list of substances classified by the EU. Substances not listed in this regulation should be classified on the basis of their intrinsic properties according to the criteria in the regulation by the person responsible for the marketing of the substance.

### 7.3 Transportation regulations and labelling

Ammonium sulfate is not classified as a dangerous product for road, rail, sea and air transportation. The user shall be aware of the incompatibilities between transported products.

### 7.4 Marking

The marking and the accompanying documents shall include the following:

- name “ammonium sulfate”, trade name and grade;
- net mass;
- name and the address of supplier and/or manufacturer;
- statement “this product conforms to EN 12123”.

### 7.5 Storage

#### 7.5.1 Long term stability

The product is stable indefinitely when stored under dry, cool conditions.

#### 7.5.2 Storage incompatibilities

The product shall be kept away from alkalis, hypochlorites, chlorates, nitrates and high temperature sources.

---

<sup>4</sup> See Annex B.

<sup>5</sup> See [4].

## Annex A (informative)

### General information on ammonium sulfate

#### A.1 Origin

##### A.1.1 Raw materials

Ammonium sulfate is manufactured from aqueous ammonia solution and sulfuric acid.

##### A.1.2 Manufacturing process

The production of ammonium sulfate is in many cases related to other production processes where sulfuric acid waste streams are produced. By mixing these waste streams with aqueous ammonia solutions followed by subsequent evaporation and crystallization, solid ammonium sulfate is recovered as a co-product.

#### A.2 Use

##### A.2.1 Function

Ammonium sulfate is used for *in situ* bacteriostatic treatment by formation of chloramines using the reaction of chlorine and ammonium sulfate.

##### A.2.2 Form in which it is used

Ammonium sulfate is used as an aqueous solution.

##### A.2.3 Treatment dose

A typical treatment dose is 0,5 mg/l - calculated as concentration of  $\text{NH}_3$  (= 3,85 mg/l of ammonium sulfate).

Maximum admissible concentration should not be exceeded.

##### A.2.4 Means of application

It is usually applied using a metering pump.

##### A.2.5 Secondary effects

There are no secondary effects under normal conditions.

##### A.2.6 Removal of excess product

Not applicable.

**Annex B**  
(normative)

**General rules relating to safety**

**B.1 Rules for safe handling and use**

The supplier will provide current safety instructions.

**B.2 Emergency procedures**

**B.2.1 First aid**

In case of any contact, it is recommended to rinse with water.

**B.2.2 Spillage**

It is recommended to collect spillage and to rinse any residue with water.

**B.2.3 Fire**

There are no restrictions on extinguishing media in fire situations.

<http://www.china-gauges.com/>

## Bibliography

- [1] 98/83/EC: Council Directive of 3 November 1998 on the quality of water intended for human consumption
- [2] ISO 3165, *Sampling of chemical products for industrial use — Safety in sampling*
- [3] ISO 6206, *Chemical products for industrial use — Sampling — Vocabulary*
- [4] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH)

<http://www.china-gauges.com/>

# British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

## About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

## Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at [bsigroup.com/standards](http://bsigroup.com/standards) or contacting our Customer Services team or Knowledge Centre.

## Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at [bsigroup.com/shop](http://bsigroup.com/shop), where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

## Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

## Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than one device provided that it is accessible by the sole named user only and that only one copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than one copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

## Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright and Licensing team.

## Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to [bsigroup.com/subscriptions](http://bsigroup.com/subscriptions).

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

**PLUS** is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit [bsigroup.com/shop](http://bsigroup.com/shop).

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email [cservices@bsigroup.com](mailto:cservices@bsigroup.com).

## Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

## Useful Contacts

### Customer Services

**Tel:** +44 345 086 9001

**Email:** [cservices@bsigroup.com](mailto:cservices@bsigroup.com)

### Subscriptions

**Tel:** +44 345 086 9001

**Email:** [subscriptions@bsigroup.com](mailto:subscriptions@bsigroup.com)

### Knowledge Centre

**Tel:** +44 20 8996 7004

**Email:** [knowledgecentre@bsigroup.com](mailto:knowledgecentre@bsigroup.com)

### Copyright & Licensing

**Tel:** +44 20 8996 7070

**Email:** [copyright@bsigroup.com](mailto:copyright@bsigroup.com)

## BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK