BS EN 13194:2015

BSI Standards Publication

Chemicals used for treatment of water intended for human consumption — Acetic Acid

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National foreword

This British Standard is the UK implementation of EN 13194:2015. It supersedes BS EN 13194:2008 which is withdrawn.

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

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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English Version

Chemicals used for treatment of water intended for human consumption - Acetic Acid

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Essigsäure

This European Standard was approved by CEN on 20 December 2014.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword

This document (EN 13194:2015) 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of an identical text or by endorsement, at the latest by September 2015, and conflicting national standards shall be withdrawn at the latest by September 2015.

This document supersedes EN 13194:2008.

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

Significant technical difference between this edition and EN 13194:2008 is as follows:

a) deletion of reference to EU Directive 67/548/EEC of June 27, 1967 in order to take into account the latest Regulation in force (see [3]);

b) 6.2 – updating of risk and safety labelling according to EU Regulation [3] and its latest Adaptations to Technical Progress).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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 European Standard:

a) this European Standard 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 European Standard 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 European Standard is subject to regulation or control by National Authorities.

1 Scope

This European Standard is applicable to acetic acid used for treatment of water intended for human consumption. It describes the characteristics of acetic acid and specifies the requirements and the corresponding test methods for acetic acid. It gives information on its use in water treatment.*

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1233, *Water quality — Determination of chromium — Atomic absorption spectrometric methods*

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696)*

EN ISO 12846, *Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment (ISO 12846)*

ISO 17378-1, *Water quality — Determination of arsenic and antimony — Part 1: Method using hydride generation atomic fluorescence spectrometry (HG-AFS)*

ISO 3165, *Sampling of chemical products for industrial use — Safety in sampling*

ISO 6206, *Chemical products for industrial use — Sampling — Vocabulary*

ISO 8288:1986, *Water quality — Determination of cobalt, nickel, copper, zinc, cadmium and lead — Flame atomic absorption spectrometric methods*

ISO 9965, *Water quality — Determination of selenium — Atomic absorption spectrometric method (hydride technique)*

3 Description

3.1 Identification

3.1.1 Chemical name

Acetic acid, ethanoic acid.

3.1.2 Synonym or common name

Glacial acetic acid.

3.1.3 Relative molecular mass

60,05

3.1.4 Empirical formula

$C_2H_4O_2$

3.1.5 Chemical formula

CH_3COOH

3.1.6 CAS Registry Number [1)]

64-19-7

3.1.7 EINECS reference [2)]

200-580-7

3.2 Commercial form

The product is available as colourless liquid.

3.3 Physical properties

3.3.1 Appearance

The product is colourless liquid at 20 °C.

3.3.2 Density

The density at 20 °C is given in Table 1.

Table 1 — Density

Concentration mass fraction %	**Density** g/ml
80	1,068 to 1,072
99,85	1,049 to 1,050

3.3.3 Solubility in water

Miscible.

3.3.4 Vapour pressure (at 20 °C)

1,57 kPa (for pure acetic acid)

3.3.5 Boiling point at 100 kPa [3)]

118 °C (for pure acetic acid)

3.3.6 Melting point

16,2 °C (for pure acetic acid)

3.3.7 Specific heat

2,047 kJ/(kg K) at 20 °C (for pure acetic acid)

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3) 100 kPa = 1 bar.

3.3.8 Viscosity, dynamic

1,222 mPa.s at 20 °C (for pure acetic acid)

3.3.9 Critical temperature (for gas)

Not applicable.

3.3.10 Critical pressure (for gas)

Not applicable.

3.3.11 Physical hardness

Not applicable.

3.4 Chemical properties

Acetic acid is a weak acid.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for acetic acid 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.

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 the product standard.

Limits have been given for impurities and chemicals 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.

4.2 Composition of commercial product

The product shall contain a minimum mass fraction of 80 percent acetic acid.

NOTE The commercial product may contain up to a mass fraction of 20 % water.

4.3 Impurities and main by-products

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

Table 2 — Impurities

Impurity		Limit in mg/kg of pure acetic acid
Formic acid	max.	500
Acetaldehyde	max.	50

4.4 Chemical parameters

NOTE For the purpose of this European Standard, “chemical parameters” are those defined in the EU Directive 98/83/EC of 3 November 1998 (see [2]).

The content of chemical parameters shall conform to the requirements specified in Table 3.

Table 3 — Chemical parameters

Parameter		Limit in mg/kg of pure acetic acid
Arsenic (As)	max.	0,5
Cadmium (Cd)	max.	0,5
Chromium (Cr)	max.	0,5
Mercury (Hg)	max.	0,5
Nickel (Ni)	max.	0,5
Lead (Pb)	max.	0,5
Antimony (Sb)	max.	0,5
Selenium (Se)	max.	0,5
NOTE Cyanide does not exist in the acetic acid medium. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.		

5 Test methods

5.1 Sampling

5.1.1 Relevant Standards

Observe the general recommendations of ISO 3165 and take account of ISO 6206.

5.1.2 Sampling from drums and bottles

5.1.2.1 General

5.1.2.1.1 Mix the contents of the container to be sampled by shaking the container, by rolling it or by rocking it from side to side, taking care not to damage the container or spill any of the liquid.

5.1.2.1.2 If the design of the container is such (for example, a narrow-necked bottle) that it is impracticable to use a sampling implement, take a sample by pouring after the contents have been thoroughly mixed. Otherwise, proceed as described in 5.1.2.1.3.

5.1.2.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 5.1.2.2; otherwise, take samples as described in 5.1.2.3.

5.1.2.2 Surface sampling

Take a sample using a suitable ladle. Lower the ladle into the liquid until the rim is just below the surface, so that the surface layer runs into it. Withdraw the ladle just before it fills completely and allow any liquid adhering to the ladle to drain off. If necessary, repeat this operation so that, when the other selected containers have been sampled in a similar manner, the total volume of sample required for subsequent analysis is obtained.

5.1.2.3 Bottom sampling

Take a sample using an open sampling tube, or a bottom-valve sampling tube, suited to the size of container and the viscosity of the liquid.

When using an open sampling tube, close it at the top and then lower the bottom end to the bottom of the container. Open the tube and move it rapidly so that the bottom of the tube traverses the bottom of the container before the tube is filled. Close the tube, withdraw it from the container and allow any liquid adhering to the outside of the tube to drain off.

When using a bottom-valve sampling tube, close the valve before lowering the tube into the container and then proceed in a similar manner to that when using an open sampling tube.

5.1.3 Sampling from tanks and tankers

From each access point, take samples as follows:

a) from the surface of the liquid, using a ladle as described in 5.1.2.2;

b) from the bottom of the tank or tanker, using a sampling tube as described in 5.1.2.3 or using a specially designed bottom-sampling apparatus;

c) from one or more positions, depending on the overall depth, between the bottom and the surface using a weighted sampling can.

5.2 Analysis

5.2.1 Acetic acid (main product)

5.2.1.1 Principle

An accurately weighed quantity of the sample is diluted with water and then titrated with a standard volumetric sodium hydroxide solution using phenolphthalein as an indicator.

5.2.1.2 Reagents

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

5.2.1.2.1 Sodium hydroxide solution c (NaOH) = 1,0 mol/l.

5.2.1.2.2 Phenolphthalein indicator solution, 5 g/l.

5.2.1.3 Apparatus

Ordinary laboratory apparatus and glassware.

5.2.1.4 Procedure

Into a 100 ml conical flask accurately weigh 2,0 g of the sample and add 25 ml of water. Titrate with sodium hydroxide solution (5.2.1.2.1) using phenolphthalein indicator (5.2.1.2.2) to a pink colouration which persists for at least 15 s.

5.2.1.5 Expression of results

The concentration in mass fraction percent of acetic acid (C_1) is given by the following formula:

$$C_1 = \frac{V \times c \times 0{,}06005 \times 100}{m_o} \quad (1)$$

where

V is the volume, in millilitres, of sodium hydroxide solution (5.2.1.2.1) used;

c is the concentration, in moles per litre, of sodium hydroxide solution (5.2.1.2.1);

0,06005 is the mass in grams of acetic acid equivalent to 1 ml of sodium hydroxide solution c (NaOH) = 1,0 mol/l;

m_o is the mass, in grams, of the test sample.

5.2.1.6 Repeatability limit

The absolute difference between two single test results, obtained under repeatability conditions, shall not be greater than the repeatability limit value, r, as calculated from the following formula:

$$r = 0{,}05\, z \quad (2)$$

where

z is the mean of the two results, expressed in mass fraction %.

NOTE Repeatability conditions are conditions where mutually independent test results are obtained with the same method on identical test material in the same laboratory by the same operator using the same equipment within short intervals of time.

5.2.2 Impurities

5.2.2.1 Formic acid content (HCOOH)

5.2.2.1.1 Principle

A sample of acetic acid is introduced into a gas chromatograph containing a packed column and maintained at 135 °C. Butan-2-one is used as internal standard.

5.2.2.1.2 Reagents

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

5.2.2.1.2.1 Acetic acid.

5.2.2.1.2.2 Carrier gas.

Helium, gas chromatography grade.

5.2.2.1.2.3 Butan-2-one.

5.2.2.1.2.4 Formic acid.

5.2.2.1.3 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

5.2.2.1.3.1 Chromatograph

Use a gas chromatographic apparatus with typical set up described in the following subclauses.

NOTE Different instrumental parameters can be required for specific chromatographic apparatus.

5.2.2.1.3.2 Column oven

Air oven at 135 °C.

5.2.2.1.3.3 Gas controls

Carrier gas at 28 ml/min.

5.2.2.1.3.4 Injections

Direct on-column injector at 150 °C, 1 µl sample.

5.2.2.1.3.5 Column

A glass column of 2 m nominal length and an internal diameter of 3 mm. Packing Chromosorb 101® (90/100 mesh) [4)] or equivalent.

Other columns may be used if they give similar results.

5.2.2.1.3.6 Flame ionization detector, operating at 200 °C.

5.2.2.1.4 Procedure

5.2.2.1.4.1 Calibration

Prepare accurately four synthetic mixtures with formic acid (5.2.2.1.2.4) in the range of 10 mg/kg to 1 000 mg/kg in acetic acid (5.2.2.1.2.1).

Add accurately by weighting, butan-2-one (5.2.2.1.2.3) to give a final concentration of 500 mg/kg. Using the purity of each component correct the mass of each mixture. Inject the samples into the gas chromatograph.

From the area and corrected masses calculate the area ratio and mass ratio of each component relative to butan-2-one and plot on linear/linear graph paper the mass ratio on the y-axis and the area ratio on the x-axis.

4) Chromosorb 101® is the trade-name of a product supplied by Johns Manville. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of the product named. Equivalent products may be used if they can be shown to lead to the same results.

The slope of the graph gives the response factor for the component relative to butan-2-one.

5.2.2.1.4.2 Determination

Inject 1 µl of the test sample and adjust the amplification so that each peak obtained remains on the scale.

5.2.2.1.5 Expression of results

The formic acid content (C_2) expressed in milligrams per kilogram of pure acetic acid is given by the following formula:

$$C_2 = \frac{(A_x \times F_x)}{A_F} \times \frac{100}{C_1} \quad (3)$$

where

A_x is the peak area of formic acid;

F_x is the relative response factor of formic acid;

A_F is the sum of the peak areas multiplied by their relative response factors;

C_1 is the concentration expressed in mass fraction percent of acetic acid (5.2.1.5).

5.2.2.1.6 Repeatability limit

The absolute difference between two single test results, obtained under repeatability conditions, shall not be greater than the repeatability limit value, r, as calculated from the following formula:

$$r = 0{,}03\ z \quad (4)$$

where

z is the mean of the two results, expressed in milligrams per kilogram.

NOTE Repeatability conditions are conditions where mutually independent test results are obtained with the same method on identical test material in the same laboratory by the same operator using the same equipment within short intervals of time.

5.2.2.2 Aldehydes content (as CH_3CHO)

5.2.2.2.1 Principle

A sample of acetic acid is heated with an excess of sodium hydrogen sulfite solution, and the aldehydes react to form addition compounds. The unreacted sodium hydrogen sulfite is titrated with a standard volumetric iodine solution. The volume of disulfite used in the reaction is used to calculate the total aldehyde content of the sample.

5.2.2.2.2 Reagents

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

5.2.2.2.2.1 Iodine solution c (I_2) = 0,05 mol/l.

5.2.2.2.2.2 Sodium hydrogen sulfite solution, mass fraction 1,25 %.

5.2.2.2.2.3 Starch solution.

Make a slurry with 1 g starch and 5 ml water. Add 90 ml boiling water to the slurry. Stir to dissolve it and cool the solution. Keep the solution at 4 °C and keep in the dark to avoid the decomposition of the starch which results in a vague end point. Keep the solution cool and use it within one week.

5.2.2.2.3 Apparatus

5.2.2.2.3.1 Ordinary laboratory apparatus and glassware

5.2.2.2.4 Procedure

5.2.2.2.4.1 Test portion

To 30 ml of water, add by pipette, 25 ml of the sample (m) and 10,0 ml of the sodium hydrogen sulfite solution (5.2.2.2.2.2). Mix well and allow to stand for 30 min.

5.2.2.2.4.2 Determination

Titrate the excess sodium hydrogen sulfite with iodine solution (5.2.2.2.2.1), adding starch indicator solution (5.2.2.2.2.3) as the blue end-point is approached, until the blue colour persists for more than 1 s.

5.2.2.2.4.3 Carry out a blank determination using all the reagents but omitting the sample.

5.2.2.2.5 Expression of results

The total aldehyde content (C_3) in the sample, in milligrams per kilogram of pure acetic acid expressed as acetaldehyde, is given by the following formula:

$$C_3 = \frac{(V_1 - V_2) \times c \times 0{,}044 \times 100}{V_o \times \rho} \times \frac{10^3}{C_1} \quad (5)$$

where

V_1 is the volume, in millilitres, of iodine solution (5.2.2.2.2.1) used for the blank determination;

V_2 is the volume, in millilitres, of iodine solution (5.2.2.2.2.1) used for sample;

c is the concentration, in moles per litre, of the iodine solution;

V_o is the volume, in millilitres, of sample taken;

ρ is the density, in grams per millilitre, of the sample;

C_1 is the concentration in percent by mass of the acetic acid (see 5.2.1.5);

0,044 is the mass in grams of acetaldehyde corresponding to 1,00 ml of iodine solution c (I_2) = 1,000 mol/l.

5.2.2.2.6 Repeatability limit

The absolute difference between two single test results, obtained under repeatability conditions, shall not be greater than the repeatability limit value, r, as calculated from the following formula:

$$r = 0{,}05\, z \quad (6)$$

where

z is the mean of the two results, expressed in milligrams per kilogram.

NOTE Repeatability conditions are conditions where mutually independent test results are obtained with the same method on identical test material in the same laboratory by the same operator using the same equipment within short intervals of time.

5.2.3 Chemical parameters

5.2.3.1 Determination of antimony (Sb), arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and selenium (Se)

5.2.3.1.1 Principle

The elements antimony, cadmium, chromium, lead, nickel and selenium are determined by atomic absorption spectrometry. Arsenic is determined by molecular absorption spectrometry.

5.2.3.1.2 Reagents

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

5.2.3.1.2.1 Nitric acid, concentrated ρ = 1,42 g/ml.

5.2.3.1.3 Procedure

5.2.3.1.3.1 Test portion

Weigh, to the nearest 0,001 g, 20 g (m) from the laboratory sample into a glass beaker.

5.2.3.1.3.2 Test solution

Evaporate until a wet residue is obtained, cool, add 1 ml of nitric acid (5.2.3.1.2.1); dilute with a few millilitres of water, transfer quantitatively to a 100 ml one-mark volumetric flask, make up to the mark with water and mix.

Carry out the evaporation carefully and not to dryness in order to avoid possible losses of arsenic and selenium.

5.2.3.1.3.3 Determination

Determine the content of chemical parameters in the test solution (5.2.3.1.3.2) in accordance with the following methods :

— Cd, Ni and Pb **:** In accordance with ISO 8288:1986, Method A;

— Cr **:** In accordance with EN 1233;

— As **:** In accordance with ISO 17378-1;

— Se **:** In accordance with ISO 9965;

— Sb **:** In accordance with ISO 17378-1.

These methods will provide an interim result (y) expressed in milligrams per litre which needs to be corrected to give the final concentration according to the formula in 5.2.3.1.3.4.

5.2.3.1.3.4 Expression of results

From the interim results (y) determined (see 5.2.3.1.3.3), the content, (C_3) of each chemical parameter in the laboratory sample, expressed in milligrams per kilogram of pure acetic acid is given by the following formula:

$$C_3 = y \times \frac{V \times 100}{m \times C_1} \quad (7)$$

where

y is the interim result (5.2.3.1.3.3);

V is the volume, expressed in millilitres, of the test solution (5.2.3.1.3.2) (= 100 ml);

m is the mass, expressed in grams, of the test portion;

C_1 is the concentration, expressed in percent by mass, of acetic acid (see 5.2.1.5).

5.2.3.2 Determination of mercury content (Hg)

5.2.3.2.1 Principle

The element mercury is determined by flameless atomic absorption spectrometry in accordance with EN ISO 12846.

5.2.3.2.2 Reagents

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

5.2.3.2.2.1 Potassium permanganate solution, c ($KMnO_4$) = 50 g/l.

5.2.3.2.2.2 Sulfuric acid, concentrated, ρ = 1,84 g/ml.

5.2.3.2.2.3 Hydroxylammonium chloride solution, c ($NH_2OH \times HCl$) = 100 g/l.

5.2.3.2.2.4 Potassium dichromate solution, c ($K_2Cr_2O_7$) = 4 g/l in 50 % by volume nitric acid solution.

5.2.3.2.3 Procedure

5.2.3.2.3.1 Test portion

Weigh, to the nearest 0,01 g, 10 g (m) from the laboratory sample, into a glass beaker.

5.2.3.2.3.2 Test solution

Quantitatively transfer the test portion to a 100 ml (V) volumetric flask. Dilute with water to the mark and mix (solution A).

Pipette, accurately 10 ml (V_1) of the solution A. Transfer to a 250 ml conical flask and add 60 ml of water, 20 ml of a potassium permanganate solution (5.2.3.2.2.1) and five 1 ml portions of sulfuric acid (5.2.3.2.2.2). Bring to the boil and maintain boiling for 10 min. Allow to cool. Just dissolve the precipitate (MnO_2) with hydroxylammonium chloride (5.2.3.2.2.3), add 5 ml of a potassium dichromate solution (5.2.3.2.2.4) and transfer to a 100 ml (V_2) volumetric flask. Dilute to the mark with water and mix.

5.2.3.2.3.3 Determination

Proceed as described in EN ISO 12846.

5.2.3.2.3.4 Expression of results

The interim result for mercury content (y) expressed in milligrams per litre is given by the following formula:

$$y = y_A \times \frac{V_2}{V_1} \tag{8}$$

where

y_A is the result obtained in 5.2.3.2.3.3, for the concentration of mercury in the test solution, expressed in milligrams per litre;

V_2 is the volume, in millilitres, of the test solution;

V_1 is the volume, in millilitres, of the sample taken from solution A.

The mercury content, C_4, in milligrams per kilogram of pure acetic acid is given by the following formula:

$$C_4 = y \times \frac{V}{m} \times \frac{100}{C_1} \tag{9}$$

where

y is the previously determined interim result for mercury content;

V is the volume, in millilitres, of the solution A (see 5.2.3.2.3.2);

m is the mass, expressed in grams, of the test portion (5.2.3.2.3.1);

C_1 is the concentration expressed in mass fraction percent of acetic acid (see 5.2.1.5).

6 Labelling - Transportation - Storage

6.1 Means of delivery

Acetic acid shall be delivered in drums, containers or tankers up to 25 t capacity.

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.

6.2 Labelling according to the EU legislation [5)]

The following labelling requirements shall apply to acetic acid.

Table 4 — Labelling requirements

Solutions of acetic acid concentration	
C ≥ 25 %	H226, H314
10 % ≤ C < 25 %	H226, H315, H319

5) See [3].

Hazard pictogram	
 **Figure 1 – GHS02**	
 **Figure 2 – GHS05**	— Signal word: **Danger** — Hazard statements: H226: Flammable liquid and vapour H314: Cause severe skin burns and eye damage H315: Causes skin irritation H319: Causes serious eye irritation Precautionary statements ('P statements') should be provided by the company being responsible for the marketing of the substance. They should be indicated on the packaging label and in the extended safety data sheet (eSDS) of the substance.

The legislation [3], 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.

6.3 Transportation regulations and labelling

Acetic acid is listed as UN Number [6] 2 786:

— RID [7] / ADR [8]: class 8;

— IMDG [9]: class 8, packing group II;

6) United Nations Number.
7) Regulations concerning international carriage of dangerous goods by rail.
8) European Agreement concerning the international carriage of dangerous goods by road.

— IATA [10]: class 8, packing group II.

6.4 Marking

The marking shall include the following:

— the name “acetic acid”, trade name;

— the net mass;

— the name and the address of supplier and/or manufacturer;

— the statement “this product conforms to EN 13194”.

6.5 Storage

6.5.1 General

Wherever practicable, the product shall be contained in a closed system. Exposure to the vapour shall be minimised by good industrial hygiene practice and by the provision of adequate ventilation.

Because of its corrosive nature, extreme care shall be exercised in the choice of materials for pumps, gaskets and lines.

For gaskets and seals use n-butyl rubber and polytetrafluoroethylene. Note that the vapour might condense and solidify causing blockage of flame arrestors and pressure-vacuum valves. Storage temperature shall be controlled to between 20 °C and 30 °C. Pipes shall be heated or adequately lagged to prevent cooling and solidification in the lines. For other areas where product spillage is likely to occur, ridged acid resistant tiles will provide better resistance to attack than concrete.

Do not store in mild steel.

NOTE Diluted solutions might support the growth of certain bacteria.

6.5.2 Long term stability

The product is stable for at least one year.

6.5.3 Storage incompatibilities

Avoid surface ignition.

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9) International Maritime Transport of Dangerous Goods.

10) International Air Transport Association.

Annex A
(informative)

General information on acetic acid

A.1 Origin

A.1.1 Raw materials

Acetic acid is manufactured from:

a) Methanol (CH_3OH), carbon monoxide (CO);

b) Naphtha, (C_5 - C_7 hydrocarbon fraction), oxygen (O_2);

c) Ethylene (C_2H_4), hydrogen (H_2), oxygen (O_2).

A.1.2 Manufacturing process

It is produced following these processes:

a) Methanol carbonylation:

— $CH_3OH + CO \rightarrow CH_3COOH$;

b) Naphtha oxidation:

— Naphtha + $O_2 \rightarrow CH_3COOH$;

c) Acetaldehyde oxidation:

— $1/2\ O_2 + C_2\ H_4 \rightarrow CH_3CHO$;

— $CH_3CHO + 1/2\ O_2 \rightarrow CH_3COOH$.

A.2 Use

A.2.1 Function

Its function in water treatment is as a source of carbon for biological denitrification processes.

A.2.2 Form in which it is used

It is used in the form of an aqueous solution.

A.2.3 Treatment dose

Sufficient acetic acid should be added to achieve reduction of dissolved oxygen and reduction of nitrates.

Depending of the initial water composition, carbon source requirements (as C) for dissolved oxygen (DO) are 1,2 mg/mg DO and for nitrates 3,5 mg/mg NO_3/N.

A.2.4 Means of application

It is applied using a metering pump.

A.2.5 Secondary effects

Secondary effects are avoided by correct operation of the process.

A.2.6 Removal of excess product

The process is operated so as to minimize the residual acetic acid concentration.

Annex B
(normative)

General rules relating to safety

B.1 Rules for safe handling and use

The supplier shall provide current safety instructions.

B.2 Emergency procedures

B.2.1 First aid

Eyes - Immediately rinse the eye with plenty of water for at least 15 min, holding the eye open.

Skin - Immediately rinse the skin with large quantities of water, preferably under a shower. Remove contaminated clothing as washing proceeds. Continue washing for at least 10 min. Obtain medical attention if blistering occurs or redness persists.

Ingestion - Wash out mouth with water. Give sips of cold water or milk to soothe the affected parts. Do not induce vomiting. Obtain medical attention urgently.

NOTE Treatment might be needed for shock.

Inhalation - Remove from exposure. If there is difficulty in breathing, give oxygen. If breathing stops or shows signs of failing, give artificial respiration. Do not use mouth to mouth ventilation. If heartbeat is absent, give external cardiac compressions. Obtain medical attention.

B.2.2 Spillage

Contain and absorb the product using earth, sand, or other inert material. Transfer to suitable containers for recovery or disposal. Neutralize with sodium carbonate or bicarbonate. Finally flush area with plenty of water.

B.2.3 Fire

Extinguishing media - Use water spray, alcohol resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing medial - None.

Special hazards of product - None.

Protective equipment for fire-fighting - Wear full protective clothing and self-contained breathing apparatus.

Bibliography

[1] REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products

[2] 98/83/EC, *Council Directive of 3 November 1998 on the quality of water intended for human consumption.*

[3] 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).

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