BRITISH STANDARD

BS EN 13177:2010

Chemicals used for treatment of water intended for human consumption — Methanol

ICS 13.060.20; 71.100.80

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 13177:2010. It supersedes BS EN 13177:2002 which is withdrawn.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.

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Chemicals used for treatment of water intended for human consumption - Methanol

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Methanol

This European Standard was approved by CEN on 28 February 2010.

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Foreword

This document (EN 13177:2010) 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of an identical text or by endorsement, at the latest by October 2010, and conflicting national standards shall be withdrawn at the latest by October 2010.

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Differences between this edition and EN 13177:2002 are editorial to harmonize the text with other standards in this series.

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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 Standard:

a) this 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 the 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 synthetic methanol used for treatment of water intended for human consumption. It describes the characteristics of synthetic methanol and specifies the requirements and the corresponding test methods for synthetic methanol. Annex A gives information on its use in water treatment.

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 1483, *Water quality — Determination of mercury*

EN 26595, *Water quality — Determination of total arsenic — Silver diethyldithiocarbamate spectrophotometric method (ISO 6595:1982)*

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

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

ISO 3856-2, *Paints and varnishes — Determination of "soluble" metal content — Part 2: Determination of antimony content — Flame atomic absorption spectrometric method and Rhodamine B spectrophotometric method*

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

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

ISO 9174, *Water quality — Determination of chromium — 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
methanol

3.1.2
synonym or common names
methyl alcohol, carbinol

3.1.3
relative molecular mass
32,04

3.1.4
empirical formula
CH_4O

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3.1.5
chemical formula
CH_3OH

3.1.6
CAS Registry Number [1)]
67-56-1

3.1.7
EINECS reference [2)]
200-65-96

3.2 Commercial form

The product is available as colourless liquid.

3.3 Physical properties

3.3.1
appearance
the product is a colourless liquid at 20 °C

3.3.2
density
the density at 20 °C is given in Table 1 (see [3] and [4])

Table 1 — Density

Concentration % mass fraction	**Density** g/ml
90	0,8219
92	0,8163
94	0,8103
96	0,8048
98	0,7990
99,85	0,7936
100	0,7931

3.3.3
solubility in water
Miscible

3.3.4
vapour pressure
12,7 kPa at 20 °C (for pure methanol)

1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3.3.5
boiling point at 100 kPa [3)]
64,6 °C (for pure methanol)

3.3.6
melting point
- 98 °C (for pure methanol)

3.3.7
specific heat
2,53 kJ /kg.K at 25 °C (for pure methanol)

3.3.8
viscosity, dynamic
0,594 mPa.s at 20 °C (for pure methanol)

3.3.9
citical 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

Methanol is a polar and protic organic solvent.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for methanol 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 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 products 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 of 99,85 % mass fraction pure synthetic methanol.

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3) 100 kPa = 1 bar.

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4.3 Impurities and main by-products

The propan-2-one content shall be less than 30 mg/kg of 100 % mass fraction methanol.

NOTE The product contains traces of water and ethanol which do not affect its use in water treatment.

4.4 Chemical parameters

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

Table 2 — Chemical parameters

Parameter		Limit in 100 % mass fraction of methanol
		mg/kg
Arsenic (As)	max.	0,01
Cadmium (Cd)	max.	0,01
Chromium (Cr)	max.	0,01
Mercury (Hg)	max.	0,01
Nickel (Ni)	max.	0,01
Lead (Pb)	max.	0,01
Antimony (Sb)	max.	0,01
Selenium (Se)	max.	0,01
NOTE For parametric values in drinking water (see [1]).		

5 Test methods

5.1 Sampling

5.1.1 General

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 Methanol (main product)

5.2.1.1 Principle

The methanol content is determined by measuring the density using a digital density meter.

The measuring principle of the digital density meter is based on the change of the frequency of a hollow oscillator when filled with different liquids. The mass and thus the density of the liquid changes this frequency due to a gross mass change of the oscillator caused by the introduction of the liquid.

The oscillator consists of a hollow elastic glass tube which is electronically excited in an undamped harmonic fashion. The density meter gives a direct read-out of the density result.

5.2.1.2 Apparatus

5.2.1.2.1 Digital density meter capable of measuring at (20 ± 0,1) °C.

5.2.1.2.2 Glass syringe, 2 ml capacity.

5.2.1.3 Procedure

5.2.1.3.1 Determination

Introduce the required volume of methanol into the oscillator cell temperature regulated at (20 ± 0,1) °C. Record the density measurement from the digital density meter.

5.2.1.4 Expression of results

Obtain the value of the methanol concentration (c_1), as a percentage mass fraction from the measured density using Table 1.

5.2.1.5 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 equation :

$$r = 0{,}0001\ z \quad (1)$$

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 Propan-2-one content (CH_3COCH_3)

5.2.2.1.1 Principle

A sample of methanol is introduced into a gas chromatograph containing a fused silica column maintained at 80 °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 Carrier gas

Helium, gas chromatography grade

5.2.2.1.2.2 Hydrogen

Gas chromatography grade

5.2.2.1.2.3 Air

Suitable for gas chromatography

5.2.2.1.2.4 Methanol

5.2.2.1.2.5 Butan-2-one

5.2.2.1.2.6 Propan-2-one

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 80 °C.

5.2.2.1.3.3 Gas controls

Carrier gas (He) at a flow rate of 2,5 ml/min at 131,7 kPa.

Hydrogen at a flow rate of 35 ml/min.

Air at a flow rate of 850 ml/min.

5.2.2.1.3.4 Injections

1 μl sample with a injection ratio of 20/1. Injection temperature of 250 °C.

5.2.2.1.3.5 Column

A fused silica column of 60 m nominal length and an internal diameter of 0,32 mm with a film thickness of 1,8 μm. The stationary phase is for example a DB 624[4)] bonded 86% methyl/14 % phenylpolysiloxane. Maintain the temperature of the column at 50 °C over 8 min and then increase up to 250 °C at a rate of 20 °C/min. Retention times are about 7,7 min for the propan-2-one and about 11,1 min for the butan-2-one.

5.2.2.1.3.6 Flame ionisation detector, operating at 250 °C

5.2.2.1.4 Procedure

5.2.2.1.4.1 Calibration

Prepare accurately four synthetic mixtures, with propan-2-one (5.2.2.1.2.6) in the range of 5 mg/kg to 2 000 mg/kg in methanol (5.2.2.1.2.4).

Add 5,0 μl of butan-2-one (5.2.2.1.2.5) to 100 ml of each mixture contained in a 100 ml volumetric flask.

Inject 1μl of sample into the chromatograph. Calculate the area ratio of the propan-2-one peak relative to those of the butan-2-one peak and plot on linear/linear graph paper the concentration of propan-2-one in milligrams per kilogram on the y-axis and the area ratio on the x-axis.

The slope of the graph (p) gives the propan-2-one response factor.

5.2.2.1.4.2 Determination

Take a 100 ml sample of the methanol to be analysed and add 5,0 μl of butan-2-one. Shake the flask to ensure thorough mixing of the components and inject 1 μl into the column.

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4) DB 624 is the trade name of a product supplied by J & W Scientific (91 Blue Ravine Road, Folsom, CA 95630-4714). This information is given for the convenience of users of this European Standard and does not constitue an endorsement by CEN of the product named. Equivalent products may be used if they can be shown to lead to the same results.

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5.2.2.1.5 Expression of results

The propan-2-one content (c_2) in the sample expressed in milligrams per kilogram of 100 % (*m/m*) methanol is given by the following equation:

$$c_2 = \frac{A_x \times p \times 100}{A_s \times c_1} \quad (2)$$

where

A_x is the peak area of propan-2-one ;

p is the slope of the calibration curve ;

A_s is the peak area of butan-2-one ;

c_1 is the concentration, expressed in percent mass fraction (%), of methanol (see 5.2.1.4).

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 equation:

$$r = 0{,}03\ z \quad (3)$$

where

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

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 grade 3 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, Method A ;

Cr : In accordance with ISO 9174 ;

As : In accordance with EN 26595 ;

Se : In accordance with ISO 9965 ;

Sb : In accordance with ISO 3856-2.

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 equation 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 metal in the laboratory sample, expressed in milligrams per kilogram of 100 % mass fraction of methanol is given by the following equation:

$$c_3 = y \times \frac{V}{m} \times \frac{100}{c_1} \qquad (4)$$

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 mass fraction (%), of methanol (see 5.2.1.4).

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 1483.

5.2.3.2.2 Reagents

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

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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, $c(NH_2OH.HCl)$ = 100 g/l.

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

5.2.3.2.3 Procedure

5.2.3.2.3.1 Test portion

Weigh, to the nearest 0,001 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 1483.

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 equation:

$$y = y_A \times \frac{V_2}{V_1} \tag{5}$$

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 portion taken from solution A.

The mercury content, c_4,in milligrams per kilogram of 100 % mass fraction of methanol is given by the following equation :

$$c_4 = y \frac{V}{m} \times \frac{100}{c_1} \tag{6}$$

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 percent mass fraction, of methanol (see 5.2.1.4).

6 Labelling - Transportation - Storage

6.1 Means of delivery

Methanol 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 Risk and safety labelling according to the EU Directives [5)]

The following labelling requirements apply to methanol at the date of the publication of this standard.

NOTE Annex I of the Directive 67/548/EEC on Classification, packaging and labelling of dangerous substances and its amendments and adaptations in the European Union contains a list of substances classified by the EU. Substances not in this annex I should be classified on the basis of their intrinsic properties according to the criteria in the Directive by the person responsible for the marketing of the substance.

a) Symbols and indications of danger:

T : Toxic ;

F : Highly flammable.

b) Nature of special risks attributed to dangerous substances:

R 11 : Highly flammable ;

R 39/23/24/25 : Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

c) Safety advice concerning dangerous substances:

S 1/2 : Keep locked up and out of the reach of children ;

S 7 : Keep container tightly closed ;

S 16 : Keep away from sources of ignition - no smoking ;

S 36/37 : wear suitable protective clothing and gloves ;

S 45 : In case of accident or if you feel unwell, seek medical advice immediately (show label if possible).

5) See [2].

6.3 Transportation regulations and labelling

At the date of the publication of this standard, methanol is listed as UN Number [6] 1230.

RID [7]/ADR [8] : class 3.

IMDG [9] : class 3.2, packing group II.

IATA [10] : class 3.2, packing group II.

6.4 Marking

The marking shall include the following:

a) the name "methanol", trade name and grade ;

b) the net mass ;

c) the name and the address of supplier and/or manufacturer ;

d) the statement "this product conforms to EN 13177".

6.5 Storage

6.5.1 General

The storage area shall be cool (10 °C to 20 °C) and well ventilated. Store away from sources of heat or ignition. Storage and transfer equipment shall be adequately earthed to prevent the accumulation of static charges. Storage tanks shall be positioned in a bunded area. Suitable storage materials are: mild steel, stainless steel.

Do not store in aluminium and its alloys, lead, zinc, certain rubbers, polystyrene.

For gaskets and seals use n-butyl rubber or polytetrafluoroethylene.

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

NOTE To avoid moisture contamination, it is recommended to store under a nitrogen blanket or to fit a desiccant unit in the tank vent line.

6.5.2 Long term stability

The product is stable but hygroscopic.

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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.

9) International Maritime Transport of Dangerous Goods.

10) International Air Transport Association.

Annex A
(informative)

General information on synthetic methanol

A.1 Origin

A.1.1 Raw materials

Synthetic methanol is manufactured from carbon monoxide (CO) and hydrogen (H_2).

A.1.2 Manufacturing process

It is produced by hydrogenation of carbon monoxide.

$$CO + 2H_2 \rightarrow CH_3OH. \quad (7)$$

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 liquid form.

A.2.3 Treatment dose

Dissolved oxygen (DO) is reduced in preference to nitrate. Sufficient methanol should be dosed to achieve complete reduction of DO as well as the desired nitrate reduction.

Depending of the initial water composition, carbon source requirements (as C) for dissolved oxygen (DO) are 1,0 mg/mg DO and for nitrates 2,5 mg/mg NO_3/N.

When the dose is below the maximum, the residual methanol concentration should be within an acceptable limit of 0,25 mg/l which is achievable using current practice. National regulations can require on-line monitoring of residual methanol concentration in water.

A.2.4 Means of application

It is applied using a metering pump, explosion free type.

A.2.5 Secondary effects

Secondary effects are avoided by correct operation of the process.

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A.2.6 Removal of excess product

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

A.3 Toxicological aspects

a) The ADI value (Average Daily Intake value) for methanol is estimated at 8,3 mg per person. This value is for all sources (water, food and air) ;

b) The value for the ADI is below the TLV (Threshold Limit Value) at which toxic effects might occur ;

c) The major part of the intake of methanol is due to the metabolism of foodstuffs ;

d) The lowest observed toxic level by oral administration is 0,32 mg per kg of body mass per day ;

e) The United States Environmental Protection Agency (USEPA) has not defined a MCL (Maximum Concentration Level) or a MCGL (Maximum Concentration Guidance Level) for methanol in drinking water ;

f) The World Health Organization (WHO) recommendations (see [6]) do not mention methanol as a potential hazard in drinking water ;

g) A limit for methanol in drinking water of 0,001 ml/kg (0,8 mg/l) has been recommended [5] ;

h) Methanol dosing has been authorized by the Flemish region of Belgium (in 1990) at the level of 45 mg/l dosed, with a residual concentration in the distribution water lower than 0,25 mg/l. The authorization included a risk evaluation.

Considering these data, the conclusion is that the use of methanol for denitrification is possible with reliable technologies able to achieve residual concentrations of methanol below 0,25 mg/l, which constitutes an intake much lower than the toxic limits. Appropriate continuous analytical methods are available for the control of residual methanol.

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

In case of contact with eyes, immediately rinse the eye with plenty of water, preferably warm, for at least 15 min, holding the eye open. Obtain medical attention urgently.

In case of contact with 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 20 min. Obtain medical attention urgently. Wash or dry clean contaminated clothing before re-use.

In case of ingestion, do not induce vomiting. Have the victim drink 240 ml to 300 ml of water to dilute stomach contents. If vomiting occurs naturally, lean victim forward to reduce risk of choking. Repeat administration of water. Keep warm and at rest.

In case of inhalation, if there is difficulty in breathing, give oxygen. If breathing stops or shows signs of failing, apply artificial respiration. Do not use mouth to mouth ventilation. If heartbeat absent, give external cardiac compression. 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.

NOTE Contaminated absorbent material can pose the same hazard as the spilled product.

B.2.3 Fire

Do not extinguish fire unless flow/leak can be stopped. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Keep containers and surroundings cool with water spray. Do not use water jet. As methanol burns with an almost invisible flame, use a "paper on rod" detector or salt water spray to detect the flame boundary if necessary. Wear full protective clothing and self-contained breathing apparatus.

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Bibliography

[1] 98/83/EC : Council Directive of 3rd November 1998 on the Quality of Water intended for Human Consumption.

[2] 67/548/EEC : Council Directive of 27th June 1967 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances and its amendments and adaptations.

[3] CRC Handbook of Chemistry and Physics, CRC, Boca Raton, Florida.

[4] Industrial Solvents Handbook, Third Edition (1985), E. W. Flick, Published by Noyes Data Corporation, ISBN 0-8155-1010-1.

[5] Sax, N.I. (Ed.) Dangerous properties of industrial materials report, **5**(5), September/October 1985. Van Nostrand Reinhold. ISSN 1270-3777.

[6] World Health Organization (WHO) (2004) Guidelines for drinking water quality. Volume 1 : Recommendations, third edition

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