Chemicals used for treatment of water intended for human consumption — Sodium alginate

ICS 13.060.20; 71.100.80

British Standards

National foreword

This British Standard is the UK implementation of EN 1405:2009. It supersedes BS EN 1405:1998 which is withdrawn.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.

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 - Sodium alginate

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Natrium-Alginat

This European Standard was approved by CEN on 24 July 2009.

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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 Management Centre has the same status as the official versions.

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Ref. No. EN 1405:2009: E

Contents

Foreword

This document (EN 1405:2009) 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of an identical text or by endorsement, at the latest by February 2010, and conflicting national standards shall be withdrawn at the latest by February 2010.

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.

This document supersedes EN 1405:1998.

Annex A is informative and gives some information on origin, use and handling of sodium alginate.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland 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 standard:

1) 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;

2) 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 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.

WARNING — The use of this standard may involve hazardous substances, materials, operations and equipment. This standard does not purport to address all the safety aspects associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This European standard is applicable to sodium alginate used for treatment of water intended for human consumption. It describes the characteristics of sodium alginate and specifies the requirements and the corresponding test methods for sodium alginate.

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

ISO 8213, *Chemical products for industrial use — Sampling techniques — Solid chemical products in the form of particles varying from powders to coarse lumps*

3 Description

3.1 Identification

3.1.1 Chemical name

Sodium alginate

NOTE Linear glycuronoglycan consisting mainly of (1-4) linked β-D-mannuronic acid units and (1-4) linked α-L-guluronic acid units in pyranose ring form.

3.1.2 Synonym or common name

Algin.

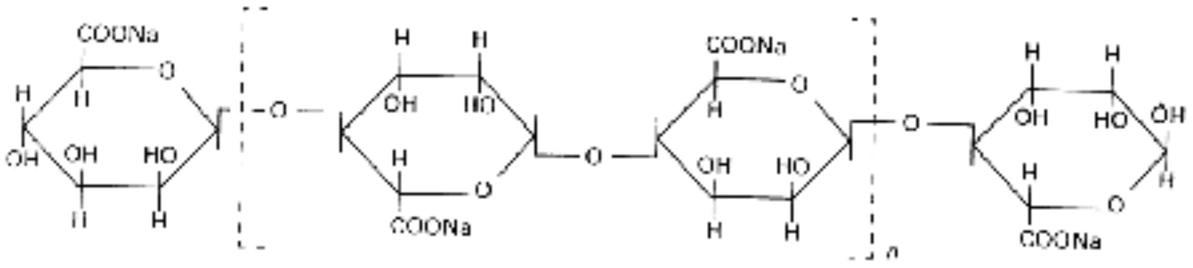
3.1.3 Relative molecular mass

10 000 to 250 000 approximately.

3.1.4 Empirical formula

$(C_6O_6H_7Na)_n$.

3.1.5 Chemical formula



Sodium alginate (with D-mannuronic acid units)

3.1.6 CAS Registry Number[1]

9005-38-3.

3.1.7 EINECS reference[2]

The EINECS inventory lists alginic acid, but does not apply numbers to the salts of alginic acid. The EINECS number for alginic acid is 232-68-01.

3.2 Commercial form

Sodium alginate as specified in this standard is available as a solid containing a small amount of residual moisture.

3.3 Physical properties

3.3.1 Appearance

The product is a white to pale yellowish-brown powder.

3.3.2 Density

The bulk density of the product is typically in the range 0,7 g/cm^3 to 1,0 g/cm^3.

3.3.3 Solubility

The product is soluble in hot or cold water. Its solubility is limited only by viscosity, with a paste being formed at concentrations of approximately 50 g/l and above.

3.3.4 Vapour pressure

Not applicable.

3.3.5 Boiling point at 100 kPa

Not applicable.

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[1] Chemical Abstracts Service Registry Number.

[2] European Inventory of Existing Commercial Chemical Substances.

3.3.6 Melting point

The product decomposes at approximately 200 °C.

3.3.7 Specific heat

Not applicable.

3.3.8 Viscosity, dynamic

Not applicable.

3.3.9 Critical temperature

Not applicable.

3.3.10 Critical pressure

Not applicable.

3.3.11 Physical hardness

Not applicable.

3.4 Chemical properties

Sodium alginate is a non-hazardous material and not intrinsically reactive. However, in common with many other organic compounds, a strong exothermic reaction will occur if it is brought into contact in the dry state with a strong oxidizing agent or strong acid.

NOTE In dilute solution there can be a reaction with, or destruction by, some of the disinfection and oxidizing agents used in water treatment.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for sodium alginate 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 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 consists of sodium alginate, moisture and minor levels of inorganic salts (i.e. sodium chloride and sodium sulfate).

The following requirements shall apply to sodium alginate:

a) sodium alginate content: minimum 80 % mass fraction calculated with reference to the dried substance;

b) moisture content: less than 15 % mass fraction;

c) ash: 18 % mass fraction to 32 % mass fraction on a dry basis;

d) pH: 4,8 to 8,8 as 1 % mass fraction solution at 20 °C;

e) extraneous matter: there shall be no visible extraneous matter.

4.3 Impurities and main by-products

Based on the raw materials and manufacturing process (see A.1) there are no significant concentration of additional reactants or by-products which are relevant to the application of this product in drinking water treatment.

4.4 Chemical Parameters

NOTE For the purpose of this standard, “chemical parameters” are those defined in the EU Directive 98/83/EC of 3 November 1998 [1].

Chemical parameters as defined above are not relevant at a reference dose of 0,5 mg/l.

5 Test methods

5.1 Sampling

Sampling shall be in accordance with ISO 8213 and the recommendations given in ISO 3165 and ISO 6206 shall be followed.

A representative sample of the solid product, of sufficient mass, shall be obtained immediately after manufacture or from a newly opened package(s). The sample shall be clearly labelled with product name/code, batch number, type of container(s) sampled and date sampled. Reference samples shall be retained for the storage life of the product as claimed by the manufacturer/supplier.

5.2 Analyses

5.2.1 General

Unless otherwise specified, all reagents shall be of recognised analytical grade. The water used shall conform to grade 2 specified in EN ISO 3696.

5.2.2 Main product

If additional requirements are agreed between the customer and manufacturer/ supplier, the latter shall provide the necessary methods if requested, so that the customer can carry out his own quality check.

A certificate of analysis shall be provided by the manufactured/supplier if requested.

5.2.2.1 Sodium alginate content

5.2.2.1.1 General

This method is applicable to sodium alginates with alginate content in the range 50 % mass fraction to 100 % mass fraction.

5.2.2.1.2 Principle

The sodium alginate ($\mathrm{Na\overline{Alg}}$) is converted to alginic acid by the action of dilute hydrochloric acid in the presence of propan-2-ol. The alginic acid formed is washed with a propan-2-ol/water mixture to remove excess hydrochloric acid. The alginic acid is then titrated with standard volumetric solution alkali. Propan-2-ol is present to prevent solubilisation of low molecular weight fractions of the sodium alginate.

$$\mathrm{Na\overline{Alg} + HCl \longrightarrow H\overline{Alg} + NaCl}$$

$$\mathrm{H\overline{Alg} + NaOH \longrightarrow Na\overline{Alg} + H_2O}$$

5.2.2.1.3 Reagents

5.2.2.1.3.1 Propan-2-ol (isopropanol).

5.2.2.1.3.2 Hydrochloric acid, c(HCl) = 2 mol/l.

5.2.2.1.3.3 Propan-2-ol diluted solution (50 + 50) ($V_1 + V_2$) of propan-2-ol with HCl (5.2.2.1.3.2).

5.2.2.1.3.4 Propan-2-ol diluted solution (75 + 25) ($V_1 + V_2$) of propan-2-ol with water.

5.2.2.1.3.5 Sodium hydroxide solution, c(NaOH) = 0,5 mol/l.

5.2.2.1.3.6 Phenolphthalein indicator solution

5.2.2.1.4 Apparatus

5.2.2.1.4.1 Ordinary laboratory apparatus and glassware together with the following :

5.2.2.1.4.2 Filter crucible, pore size index P16 (diameter of pores 10 µm to 16 µm), 35 ml capacity, clean and dry.

5.2.2.1.4.3 Vacuum pump or water vacuum pump.

5.2.2.1.4.4 Filter flask, 250 ml, fitted with rubber cone.

5.2.2.1.4.5 Stirrer, variable speed, with propeller paddle.

5.2.2.1.4.6 Burette, 25 ml, graduated in 0,1 ml divisions.

5.2.2.1.5 Procedure

WARNING — Concentrated HCl: causes severe burns. Produces harmful vapours and irritates eyes, respiratory tract and skin. Avoid contact with skin, eyes and clothing. Wear rubber gloves and eye protection when handling.

Hydrochloric acid is not combustible, but can produce corrosive vapours when heated. Hydrochloric acid reacts with many metals to form hydrogen, which forms an explosive mixture with air.

Propan-2-ol is highly flammable. Vapours are potentially explosive with low temperature flash point. Propan-2-ol irritates the eyes; vapours can cause drowsiness and dizziness. Liquid and vapour are toxic. Avoid breathing vapour and any contact particularly with eyes and mouth. Use only where fume extraction is provided. Do not use near a naked light or other exposed heat house.

5.2.2.1.5.1 Test portion

Weigh, to the nearest 0,01 g, 3 g of a test sample into the filter crucible (5.2.2.1.4.2).

5.2.2.1.5.2 Determination

Attach the filter crucible to the filter flask with rubber cone (5.2.2.1.4.4) and connect to the water vacuum pump (5.2.2.1.4.3). Add approximately 30 ml to 35 ml of the mixed solution of propan-2-ol with HCl (5.2.2.1.3.3) and mix using a glass rod. Let the mixture sit for 5 min and then turn on the water vacuum pump and filter product to dryness. Repeat these operations of leaching and filtering until a total of six crucible volumes have been used.

Add 30 ml to 35 ml of the mixed solution of propan-2-ol with water (5.2.2.1.3.4) to the leached product and stir using a glass rod. Let the mixture sit for a few minutes and then turn on the water vacuum pump and filter to dryness. Repeat these operations of washing and filtering until no acid is detectable in the washings using pH paper. At least five crucible volumes should be required.

Transfer quantitatively the leached and washed product to a tared 400 ml beaker washing the filter crucible with water. Add a few drops of phenolphthalein indicator (5.2.2.1.3.6) and stir using the variable speed stirrer (5.2.2.1.4.5). Titrate using the sodium hydroxide solution (5.2.2.1.3.5) to a permanent pink end-point. Note the volume V.

5.2.2.1.6 Expression of results

5.2.2.1.6.1 Method of calculation

NOTE The equivalent molecular mass of sodium alginate is taken as 222.

The sodium alginate content (C_1) expressed as a percentage by mass, is given by the following equation:

$$C_1 = \frac{V \times 0{,}222 \times c}{m \times (100 - C_2)} \times 10000$$

where

V is the volume, in millilitres, of the sodium hydroxide solution used (5.2.2.1.3.5);

c is the concentration, in moles per litre, of the sodium hydroxide solution (5.2.2.1.3.5);

m is the mass, in grams, of the test portion.

C_2 is the moisture content, as percentage by mass, of the test portion (see 5.2.2.2.).

Report the result to one decimal place.

5.2.2.1.6.2 Precision

The absolute difference between two single test results, obtained under repeatability conditions (see note), shall not be greater than the repeatability value, r, as calculated from the following equation:

$$r = 0{,}049\, z$$

where

z is the mean of the two results, expressed as % 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.

5.2.2.2 Moisture content

5.2.2.2.1 General

This method applies to products where the loss on drying is within the range 0 % (*m/m*) to 30 % (*m/m*).

5.2.2.2.2 Principle

A test portion is dried in an oven and the loss in mass determined gravimetrically.

5.2.2.2.3 Apparatus

5.2.2.2.3.1 Ordinary laboratory apparatus and glassware together with the following :

5.2.2.2.3.2 Drying oven, capable of being controlled at (105 ± 1) °C.

5.2.2.2.3.3 Desiccator containing dried silica gel.

5.2.2.2.3.4 Watch glass, approximately 60 mm diameter.

5.2.2.2.4 Procedure

5.2.2.2.4.1 Test portion

Weigh, to the nearest 0,1 mg, 5 g of a test sample into the tared watch glass (5.2.2.2.3.4), which has been pre-dried in an oven (5.2.2.2.3.2) at 105 °C for 4 h.

5.2.2.2.4.2 Determination

Place the watch glass (5.2.2.2.3.4) containing the test portion in the drying oven (5.2.2.2.3.2) at (105 ± 1) °C for 4 h. After this time, transfer the watch glass directly from the oven to the desiccator (5.2.2.2.3.3) and allow to cool to room temperature. Weigh the watch glass and dried product to the nearest 0,1 mg.

5.2.2.2.5 Expression of results

5.2.2.2.5.1 Method of calculation

The moisture content (C_2) expressed as a percentage by mass, is given by the following equation:

$$C_2 = \frac{(m_2 - m_3)}{(m_2 - m_1)} \times 100$$

where

m_1 is the mass, in grams, of the pre-dried watch glass (5.2.2.2.3.4);

m_2 is the mass, in grams, of the test portion and watch glass before drying;

m_3 is the mass, in grams, of the test portion and watch glass after drying.

5.2.2.2.5.2 Precision

The absolute difference between two single test results, obtained under repeatability conditions (see note), shall not be greater than the repeatability value, r, as calculated from the following equation:

$r = 0{,}1\ z$

where

z is the mean of the two results, expressed as % 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.

5.2.2.3 Ash

5.2.2.3.1 General

This method applies to products with ash in the range 10 % mass fraction to 40 % mass fraction.

5.2.2.3.2 Principle

The organic fraction of the alginate molecule is removed as carbon dioxide and water by heating. The inorganic fraction remains behind as the metal oxide or carbonate, which is weighed as the direct ash. The result is expressed as a percentage by mass calculated with reference to the dried substance (see 5.2.2.2).

5.2.2.3.3 Apparatus

5.2.2.3.3.1 Ordinary laboratory apparatus and glassware together with the following :

5.2.2.3.3.2 Furnace with temperature controller in the range 0 °C to 1 000 °C.

5.2.2.3.3.3 Platinum crucibles with lids, 40 ml capacity.

5.2.2.3.3.4 Platinum tipped tongs.

5.2.2.3.3.5 Desiccator containing silica gel as desiccant.

NOTE The silica gel desiccant should be blue: when pink it requires redrying at 105 °C overnight.

5.2.2.3.4 Procedure

5.2.2.3.4.1 Test portion

Weigh, to the nearest 0,1 mg, 0,5 g of a test sample into a pre-dried, tared platinum crucible (5.2.2.3.3.3).

5.2.2.3.4.2 Determination

Place the lid on the crucible and char the test portion on a hotplate. Place the crucible with charred contents into a furnace (5.2.2.3.3.2) at (650 ± 25) °C and leave for 4 h (or until all the carbon has been burned off, as indicated by the absence of black residue).

Remove the crucible from the furnace and transfer with platinum tipped tongs (5.2.2.3.3.4) to a desiccator (5.2.2.3.3.5) to cool to ambient temperature. Re-weigh the crucible plus contents.

5.2.2.3.5 Expression of results

5.2.2.3.5.1 Method of calculation

The ash content (C_3) of the test portion, expressed as a percentage by mass, is given by the following equation:

$$C_3 = \frac{(m_3 - m_1) \times 10000}{(m_2 - m_1)(100 - C_2)}$$

where

m_1 is the mass, in grams, of the pre-dried platinum crucible;

m_2 is the mass, in grams, of platinum crucible and test portion before ashing;

m_3 is the mass, in grams, of platinum crucible and test portion after ashing;

C_2 is the moisture content, as percentage by mass, of the test portion (see 5.2.2.2).

Report results to the nearest 0,1 %.

5.2.2.3.5.2 Precision

The absolute difference between two single test results, obtained under repeatability conditions (see note), shall not be greater than the repeatability value, r, as calculated from the following equation:

$r = 0{,}06\ z$

where

z is the mean of the two results, expressed as % 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.

5.2.2.4 pH measurement

5.2.2.4.1 General

This method applies to sodium alginate giving solutions of pH value within the range 4,0 to 9,5.

5.2.2.4.2 Principle

The sodium alginate is dissolved in water to give a 1 % mass fraction solution. The pH of the solution is measured.

5.2.2.4.3 Apparatus

5.2.2.4.3.1 Ordinary laboratory apparatus and glassware together with the following:

5.2.2.4.3.2 pH meter, capable of measuring pH values in the range of 0 to 12.

5.2.2.4.3.3 Electric stirrer, fitted with a propeller type metal paddle.

5.2.2.4.4 Procedure

5.2.2.4.4.1 Test portion

Weigh, to the nearest 0,01 g, 5 g of a test sample into a weighing boat.

5.2.2.4.4.2 Determination

Prepare a 1 % mass fraction solution of sodium alginate by dispersing the sample into 495 g of water, whilst stirring with an electric stirrer (5.2.2.4.3.3). Stir for 2 h at approximately 800 min^{-1} (rotational frequency of 13 s^{-1}) until the sodium alginate is completely dissolved, and the solution is lump-free. Avoid excessive entrapment of air bubbles.

Calibrate the pH meter (5.2.2.4.3.2) in accordance with the manufacturer's instructions. Immerse the electrodes in the solution of sodium alginate. Note the pH meter reading once it has stabilised.

5.2.2.4.5 Expression of results

Express the results as pH units, to the nearest 0,1 unit, at 20 °C.

5.2.3 Impurities

Not applicable.

6 Labelling - Transportation - Storage

6.1 Means of delivery

The product shall be delivered in suitable containers, e.g. bulk containers, sacks, drums, cans or bottles. Drums and sacks shall have a moisture barrier, e.g. an internal polyethylene liner.

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 in accordance with the EU Directives

At the date of the present document, sodium alginate is not classified as a dangerous substance according to EU Directive 67/548/EEC [2].

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.

6.3 Transportation regulations and labelling

At the date of the present document, sodium alginate is not classified as hazardous for transport and does not therefore have a UN number [3], hazard class, packaging group or require UN-certified containers.

6.4 Marking

Each container shall be marked with at least the following information :

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[3] United Nations Number.

a) the name "sodium alginate", trade name and grade ;

b) the net mass ;

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

d) the statement "This product conforms to EN 1405".

6.5 Storage

6.5.1 Long term stability

Due to its slight hygroscopic nature, product is best stored in a cool dry place with low humidity and away from high temperatures. The product is typically stable for at least 12 months. Follow supplier's advice.

6.5.2 Storage incompatibilities

Store away from strong acids (e.g. sulfuric acid) and strong oxidizing agents (e.g. sodium hypochlorite).

Annex A
(informative)

General information on sodium alginate

A.1 Origin

A.1.1 Raw materials

Sodium alginate is manufactured from various species of brown seaweeds (*Phaeophyceae*).

A.1.2 Manufacturing process

Sodium alginate is extracted from brown seaweeds by treatment with dilute alkali. The crude polysaccharide produced is purified by a solid/liquid separation technique, then precipitated as calcium alginate and converted to alginic acid in an acid medium. Alternatively the alginate can be precipitated directly as alginic acid in an acid medium. The alginic acid is neutralised to sodium alginate using an appropriate alkali, then dried and ground.

A.2 Use

A.2.1 Function

Sodium alginate is used in drinking water treatment to facilitate the removal of colloidal and fine suspended particles. It is effective when used in conjunction with metal salts in the removal of turbidity and colour.

A.2.2 Form in which it is used

Usually sodium alginate is supplied in powder form and has to be dissolved in water prior to use. Typically a solution of concentration 0,5 % mass fraction would be prepared, but further dilution to 0,05 % mass fraction prior to dosing can be appropriate.

A.2.3 Treatment dose

The treatment dose will vary depending on the quality of the raw water to be treated and can be subject to local regulations. Typically a level of between 0,1 mg/l and 0,4 mg/l will give best results.

It is normal practice to allow a delay time between addition of metal salt coagulant and sodium alginate in order to minimize dosage requirement of the latter.

A.2.4 Means of application

Sodium alginate is usually applied using a metering pump. Sufficient mixing action at the point of addition should occur to ensure adequate dispersion of the sodium alginate solution in the water being treated.

A.2.5 Secondary effects

The product has no secondary effects.

A.2.6 Removal of excess product

Not applicable.

A.3 Rules for safe handling and use

Good chemical handling practice should be followed at all times. Creation of dust should be avoided and the working environment should be kept clean and dry.

Sodium alginate does not present a significant health hazard when correctly handled.

Appropriate special risks should be entered on the safety data sheet to the effect that the product is slippery when wet:

a) in case of spillage, it should be swept up dry. The addition of water will render the floor very slippery and dangerous;

b) eye and hand protection is not normally warranted unless exposure is prolonged and in dusty conditions. Mild eye and skin irritation can result from extended contact;

c) protective clothing is not required on safety grounds, but overalls are recommended as cleaning can be problematic;

d) respiratory protection is not required providing ventilation is adequate and dust is controlled.

A.4 Emergency procedures

A.4.1 Accident - First aid

If sodium alginate is in contact with the skin, the contaminated area should be washed with copious amounts of soap and water.

If sodium alginate is in contact with the eyes, they should be rinsed with water for at least 15 min. If irritation persists, medical advice should be sought.

If sodium alginate is ingested, the mouth should be washed out with water but the affected person should not be allowed to swallow the wash water. Then water should be given to drink. An emetic should not be given. The affected person should be allowed to rest and medical advice should be sought immediately.

In addition to the above, any further advice on the supplier's safety data sheet should be followed.

A.4.2 Spillage

If spillage is dry, it should be shovelled, vacuumed or swept up.

Sodium alginate is readily biodegradable and could therefore contribute to BOD and COD4).

BOD_5: approximately 300 mg of oxygen per gram of product.

COD: approximately 660 mg of oxygen per gram of product.

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4) The terms BOD and COD relate to Biological Oxygen Demand and Chemical Oxygen Demand respectively and indicate that if the material is flushed into a watercourse it could cause oxygen depletion.

If a large spillage becomes wet, it should be contained with an inert material, such as sand or earth, to prevent it reaching the drains, and it should then be removed for disposal. Residues or small spillages can be flushed away with water. Spillages should not be disposed in watercourses

A.4.3 Fire

Low fire and explosion risk. Product will burn when in contact with flame, self-extinguishes when ignition source is removed, but tends to smoulder. Autoignition temperature is above 200 °C. In common with most organic materials, sodium alginate should be treated as a combustible dust when in the finely-divided and air-suspended state. Water spray and foam extinguishing agents should be used.

Bibliography

[1] COUNCIL DIRECTIVE 98/83/EC of 3 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 aministrative provisions relating to the classification, packaging and labelling of dangerous substances and its amendments and adaptations

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Revisions

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