

ALGINIC ACID

Prepared at the 49th JECFA (1997), published in FNP 52 Add 5 (1997) superseding specifications prepared at the 44th JECFA (1995), published in FNP 52 Add 3 (1995). Metals and arsenic specifications revised at the 49th JECFA (1997). An ADI 'not specified' was established at the 39th JECFA (1992)

SYNONYMS

INS No. 400

DEFINITION

Alginic acid is a naturally occurring hydrophilic colloidal polysaccharide obtained from the various species of brown seaweed (*Phaeophyceae*). It is a linear copolymer consisting mainly of residues of β -1,4-linked D-mannuronic acid and α -1,4-linked L-glucuronic acid. These monomers are often arranged in homopolymeric blocks separated by regions approximating an alternating sequence of the two acid monomers.

C.A.S. number

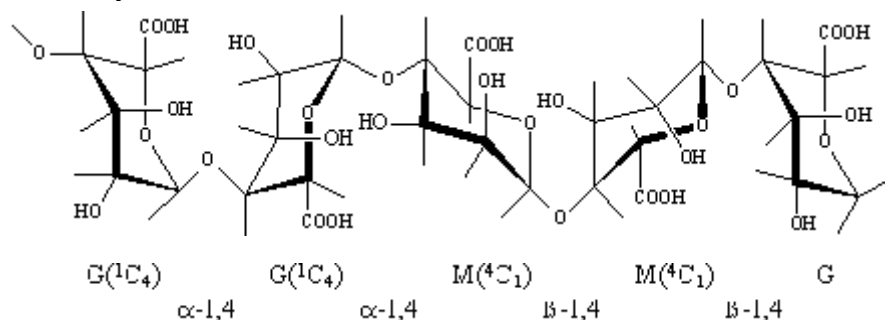
9005-32-7

Chemical formula

$(C_6H_8O_6)_n$

Structural formula

Structural formula from Phillips, Wedlock and Williams: Gums and Stabilizers for the Food Industry 5 (1990) by permission of Oxford University Press.



The number and sequence of the Mannuronate and Glucuronate residues shown above vary in the naturally occurring alginate. The associated water molecules are not shown.

Formula weight

Structural unit: 176.13 (theoretical), 200 (actual average)
Macromolecule : 10,000 - 600,000 (typical average)

Assay

Yields, on the dried basis not less than 20.0% and not more than 23.0% of carbon dioxide (CO_2), equivalent to not less than 91.0% and not more than 104.5% of alginic acid $(C_6H_8O_6)_n$.

DESCRIPTION

White to yellowish brown filamentous, grainy, granular or powdered forms

FUNCTIONAL USES

Stabilizer, thickener, gelling agent, emulsifier

CHARACTERISTICS

IDENTIFICATION

pH (Vol. 4) 2.0-3.5 (0.3 in 10 suspension)

Precipitate formation with ammonium sulfate To a 0.5% solution of the sample in sodium hydroxide TS add one-half of its volume of a saturated solution of ammonium sulfate. No precipitate is formed. This test distinguishes alginic acid from agar, sodium carboxymethyl cellulose, carrageenan, de-esterified pectin, gelatin, carob bean gum, methyl cellulose and starch.

Test for alginate Passes test
Dissolve as completely as possible 0.1 g of sample by shaking with 0.15 ml of 0.1 N sodium hydroxide and add 1 ml of acid ferric sulfate TS. Within 5 min, a cherry-red colour develops that finally becomes deep purple.

PURITY

Loss on drying (Vol. 4) Not more than 15% (105°, 4 h)

Sulfated ash (Vol. 4) Not more than 8% on the dried basis

Sodium hydroxide insoluble matter (Vol. 4) Not more than 2% on the dried basis
Weigh accurately about 1 g of the sample and dissolve in 100 ml of sodium hydroxide TS, centrifuge and decant. Wash the residue five times with water by mixing, centrifuging and decanting. Transfer the residue by means of water to a tared fine glass filter, dry for 1 h at 105°, cool and weigh. Calculate as percentage of the dry weight.

Arsenic (Vol. 4) Not more than 3 mg/kg (Method II)

Lead (Vol. 4) Not more than 5 mg/kg
Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."

Microbiological criteria (Vol. 4) Total plate count: Not more than 5,000 colonies per gram.
Initially prepare a 10⁻¹ dilution by adding a 50 g sample to 450 ml of Butterfield's phosphate buffered dilution water and homogenizing in a high speed blender.
Yeasts and moulds: Not more than 500 colonies per gram
Coliforms: Negative by test
Salmonella: Negative by test

METHOD OF ASSAY

Proceed as directed under Carbon Dioxide Determination by Decarboxylation in the *General Methods*, Volume 4. Each ml of 0.25 N sodium hydroxide consumed is equivalent to 5.5 mg of carbon dioxide (CO₂) or 25 mg of alginic acid (equivalent weight 200).