

GUAR GUM

Prepared at the 69th JECFA (2008), published in FAO JECFA Monographs 5 (2008), superseding tentative specifications prepared at the 67th JECFA (2006) and published in FAO JECFA Monographs 3 (2006). An ADI "not specified" was established at the 19th JECFA (1975).

SYNONYMS

Gum cyamopsis, guar flour; INS No. 412

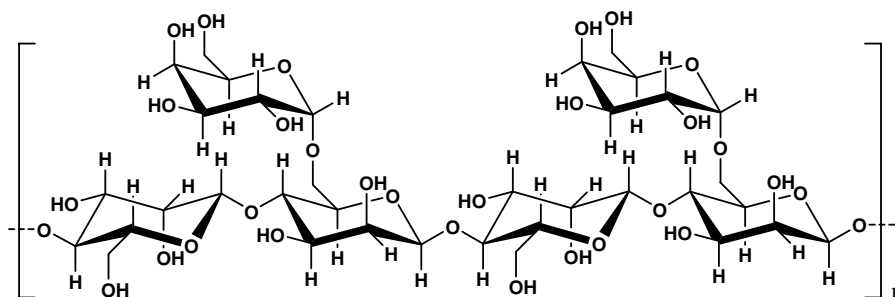
DEFINITION

Primarily the ground endosperm of the seeds from *Cyamopsis tetragonolobus* (L.) Taub. (Fam. *Leguminosae*) mainly consisting of high molecular weight (50,000-8,000,000) polysaccharides composed of galactomannans; the mannose:galactose ratio is about 2:1. The seeds are crushed to eliminate the germ, the endosperm is dehusked, milled and screened to obtain the ground endosperm (native guar gum). The gum may be washed with ethanol or isopropanol to control the microbiological load (washed guar gum).

C.A.S. number

9000-30-0

Structural formula



DESCRIPTION

White to yellowish-white, nearly odourless, free-flowing powder

FUNCTIONAL USES Thickener, stabilizer, emulsifier

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)

Insoluble in ethanol

Gel formation

Add small amounts of sodium borate TS to an aqueous dispersion of the sample; a gel is formed.

Viscosity

Transfer 2 g of the sample into a 400-ml beaker and moisten thoroughly with about 4 ml of isopropanol. Add 200 ml of water with vigorous stirring until the gum is completely and uniformly dispersed. An opalescent, viscous solution is formed. Transfer

100 ml of this solution into another 400-ml beaker, heat the mixture in a boiling water bath for about 10 min and cool to room temperature. There is no substantial increase in viscosity (differentiating guar gums from carob bean gums).

Gum constituents (Vol. 4) Proceed as directed under Gum Constituents Identification using 100 mg of the sample instead of 200 mg and 1 to 10 µl of the hydrolysate instead of 1 to 5 µl. Use galactose and mannose as reference standards. These constituents should be present.

Microscopic examination Place some ground sample in an aqueous solution containing 0.5% iodine and 1% potassium iodide on a glass slide and examine under a microscope. Guar gum shows close groups of round to pear formed cells, their contents being yellow to brown.

PURITY

Loss on drying (Vol. 4) Not more than 15.0% (105°, 5 h)

Borate Absent by the following test
Disperse 1 g of the sample in 100 ml of water. The dispersion should remain fluid and not form a gel on standing. Mix 10 ml of dilute hydrochloric acid with the dispersion, and apply one drop of the resulting mixture to turmeric paper. No brownish red colour is formed.

Total ash (Vol. 4) Not more than 1.5% (800°, 3-4 h)

Acid-insoluble matter
(Vol. 4) Not more than 7.0%

Protein (Vol. 4) Not more than 10.0%
Proceed as directed under Nitrogen Determination (Kjeldahl Method) in Volume 4 (under "General Methods, Inorganic components"). The percentage of nitrogen determined multiplied by 6.25 gives the percentage of protein in the sample.

Residual solvents Not more than 1% of ethanol or isopropanol, singly or in combination
See description under TESTS

Lead (Vol. 4) Not more than 2 mg/kg
Determine using an AAS/ICP-AES technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4 (under "General Methods, Metallic Impurities").

Microbiological criteria
(Vol. 4) Initially prepare a 10⁻¹ dilution by adding a 50 g sample to 450 ml of Butterfield's phosphate-buffered dilution water and homogenizing the mixture in a high-speed blender.

Total (aerobic) plate count : Not more than 5,000 CFU/g
E. coli: Negative in 1g
Salmonella: Negative in 25g
Yeasts and moulds: Not more than 500 CFU/g

TESTS

PURITY TESTS

Residual solvents

Determine by gas chromatography in Volume 4 (under "Analytical Techniques, Chromatography").

Chromatography conditions

Column: 25% Diphenyl-75% dimethylpolysiloxane (60 m x 0.25 mm i.d., 0.25 μ m film) [Aquatic-2 (GL-Sciences Inc.) or equivalent]

Carrier gas: Helium

Flow rate: 1.5 ml/min

Detector: Flame-ionization detector (FID)

Temperatures:

- injector: 280°

- column: Hold for 6 min at 40°, then 40-110° at 4°/min, 110-250° at 25°/min, hold for 10 min at 250°

- detector: 250°

Standard solutions

Solvent standard solution: Transfer 100 mg each of chromatography grade ethanol and isopropanol into a 100-ml volumetric flask containing about 90 ml water and dilute to 100 ml with water.

TBA standard solution: Transfer 100 mg of chromatography grade tertiary-butyl alcohol (TBA) into a 100-ml volumetric flask containing about 90 ml water and dilute to 100 ml with water.

Mixed standard solutions: Transfer 1, 2, 3, 4 and 5 ml of Solvent standard solution into each of five 100-ml volumetric flasks. Add 4 ml of TBA standard solution to each flask and dilute to volume with water.

Sample preparation

Disperse 1 ml of a suitable antifoam emulsion, such as Dow-Corning G-10 or equivalent, in 200 ml of water contained in a 1000-ml 24/40 round-bottom distilling flask. Add about 4 g of the sample, accurately weighed, and shake for 1 h on a wrist-action mechanical shaker. Connect the flask to a fractionating column, and distil about 95 ml, adjusting the heat so that foam does not enter the column. Add 4 ml of TBA standard solution to the distillate and make up to 100 ml with water to obtain the Sample solution.

Standard curves

Inject 1 μ l of each Mixed standard solution into the chromatograph. Measure the peak areas for each solvent and TBA. Construct the standard curves by plotting the ratios of the peak areas of each of the solvents/TBA against the concentrations of each solvent (mg/ml) in the Mixed standard solutions.

Procedure

Inject 1 μl of the Sample solution into the chromatograph. Measure the peak areas for each solvent and TBA. Calculate the ratios of the peak areas of each solvent/TBA, and obtain the concentration of each solvent from the standard curves.

Calculate the percentage of each solvent from:

$$\% \text{ Solvent} = (C \times 100/W \times 1000) \times 100$$

where C is the concentration of solvent (mg/ml)
W is weight of sample (g)