

CAROB BEAN GUM (CLARIFIED)

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 25th JECFA (1981) for carob bean gum.

SYNONYMS

Locust bean gum clarified, INS No. 410

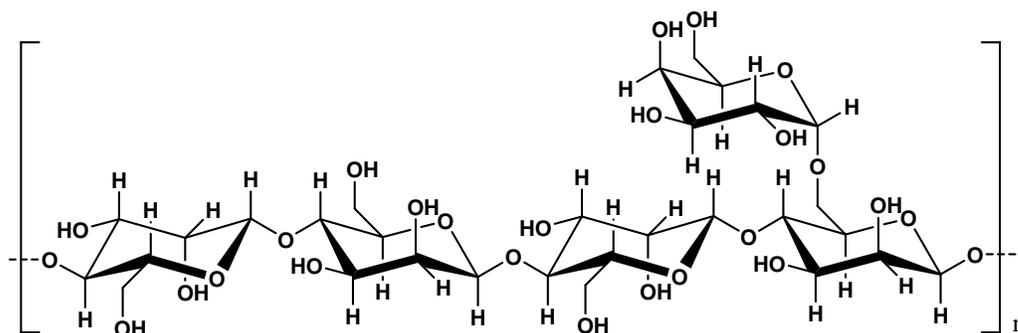
DEFINITION

Primarily the ground endosperm of the seeds from *Ceratonia siliqua* (L.) Taub. (Fam. *Leguminosae*) mainly consisting of high molecular weight (approximately 50,000-3,000,000) polysaccharides composed of galactomannans; the mannose:galactose ratio is about 4:1. The seeds are dehusked by treating the kernels with dilute sulfuric acid or with thermal mechanical treatments, elimination of the germ, followed by milling and screening of the endosperm to obtain native carob bean gum. The gum is clarified by dispersing in hot water, filtration and precipitation with ethanol or isopropanol, filtering, drying and milling. The clarified carob bean gum does not contain cell wall materials. Clarified carob bean gum in the market is normally standardized with sugars for viscosity and reactivity.

C.A.S. number

9000-40-2

Structural formula



DESCRIPTION

White to yellowish white, nearly odourless powder

FUNCTIONAL USES

Stabilizer, thickener, emulsifier, gelling agent

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.

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| <u>Viscosity</u> | 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 dissolved. An opalescent, slightly 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 an appreciable increase in viscosity (differentiating carob bean gums from guar gums). |
| <u>Gum constituents</u> (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. |
| PURITY | |
| <u>Loss on drying</u> (Vol. 4) | Not more than 14% (105°, 5 h) |
| <u>Total ash</u> (Vol. 4) | Not more than 1.2% (800°, 3-4 h) |
| <u>Acid-insoluble matter</u> (Vol. 4) | Not more than 3.5% |
| <u>Protein</u> (Vol. 4) | Not more than 1.0% 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. |
| <u>Starch</u> | To a 1 in 10 solution of the sample add a few drops of iodine TS; no blue colour is produced |
| <u>Residual solvents</u> | Not more than 1% of ethanol or isopropanol, singly or in combination See description under TESTS |
| <u>Lead</u> (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"). |
| <u>Microbiological criteria</u> (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 homogenising the mixture in a high-speed blender. Total (aerobic) plate count: Not more than 5,000 CFU/g <i>E. coli</i> : Negative in 1 g <i>Salmonella</i> : Negative in 25 g 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 μm 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 μl 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)