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भारतीय मानक ***मसौदा***
गम कराया, खाद्य ग्रेड — विशिष्टि
(आइ एस 12408 का पहला पुनरीक्षण)

***Draft** Indian Standard*

GUM KARAYA, FOOD GRADE — SPECIFICATION

(*First Revision of IS 12408*)

ICS No. 67.220.20

Food Additives Sectional Committee, FAD 08 **Last Date of Comments:** 23 February 2025

FOREWORD

(*Formal clauses would be added later*)

Food additives are added to improve the appearance, flavour, texture or storage properties, etc of the processed foods. As certain impurities in these substances have been found to be harmful, it is necessary to have a strict quality control of these food additives. A series of standards have, therefore, been prepared to cover purity and identification of these substances. These standards would help in checking purity, which is required to be checked at the stage of manufacture, for it is extremely difficult to detect the impurity once these substances have been added to the processed foods. Besides, these standards are intended to guide the indigenous manufacturers in making their product conform to specifications that are accepted by scientists, health authorities and national/ international bodies.

In the food industry the use of gum karaya as an emulsifier, stabilizer and thickening agent has been permitted under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011.

This standard was first published in 1988. In the formulation of this standard, considerable assistance was derived from the FAO Food and Nutrition Papers No. 28 'Specification for identity and purity of buffering agents, salts, emulsifiers, stabilizers, thickening agents, extraction solvents, flavouring agents, sweetening agents and miscellaneous food additives', published by the Joint FAO/WHO expert committee in Food Additives, Rome 1983.

In this revision, one amendment issued to the previous version of the standard has been incorporated and the following major changes have been made:

a) The requirement for heavy metals has been removed as the limit of lead (contaminant in food colours) is already covered through the standard; and
b) The marking requirements have been updated.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022. 'Rules for rounding off numerical values (*second revision*)' This number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for gum karaya, food grade.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 878 : 2008	Laboratory glassware - Graduated measuring cylinders (*second revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 1699 : 2024	Food colours - Methods of sampling and test (*third revision*)
IS 5887 (Part 3/Sec 1) : 2020/ ISO 6579-1 : 2017	Methods for detection of bacteria responsible for food poisoning: Part 3 Horizontal method for the detection, enumeration and serotyping of *Salmonella*: Section 1 Detection of *Salmonella* spp. (*third revision*)
IS 16067 (Part 3) : 2023/ ISO 16649-3 : 2015	Microbiology of the food chain Horizontal method for the enumeration of beta glucuronidase positive *Escherichia coli*: Part 3 Detection and most probable number technique using 5-bromo-4-chloro-3- indolyl-D-glucuronide

3 REQUIREMENTS

3.1 General

Gum karaya shall be a dried gummy exudation obtained from the stems and branches of *Sterculia urens Roxb* and *S. villosa Roxb* fam *Sterculiaceae.*

3.2 Description

The material shall be a white to amber colour in the form of tears of variable size or in broken irregular pieces. It shall possess a slightly acetous odour and a mucilaginous and slightly acetous taste. The gum swells in water and in 60 percent rectified spirit (*v*/*v*).

3.3 Identification

3.3.1 *Swelling Test with Water*

Add 2 g of the material to 50 ml of water and allow to stand. The material swells to form a granular, stiff, slightly opalescent gel which is acid to litmus.

3.3.2 *Swelling Test with Ethanol*

Add 2 g of the material to 50 ml of 60 percent ethanol and allow to stand. The gum swells up. This test distinguishes gum karaya from other gums.

3.3.3 Boil 1 g of the sample with 20 ml of water until a mucilage is formed. Add 5 ml of hydrochloric acid and boil the mixture for 5 min. A permanent red or pink colour develops.

3.3.4 Shake 1 g of the sample with 80 ml of water for 24 h. Boil 4 ml of the resulting mucilage with 0.5 ml of concentrated hydrochloric acid, add 1 ml of 5 M sodium hydroxide and filter. To the filtrate, add 8 ml of potassium cupritartrate solution and heat. A red precipitate is formed.

3.3.5 Warm 0.5 g of the sample with 2 ml of 5 M sodium hydroxide; a brown colour is produced.

3.4 Bark and Foreign Organic Matter

The material shall not contain more than 0.5 percent by mass (on dry basis) of bark and foreign organic matter when tested by the method of test given in **A-1**.

3.5 The material shall also comply with the requirements given in Table 1.

Table 1 Requirements of Gum karaya, Food Grade
(*Clause* 3.5)

Sl. No.	Characteristic	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Loss on drying, percent by mass, *Max*	16	Annex A (A-2)
ii)	Starch	Nil	Annex A (A-3)
iii)	Total ash, percent by mass (on dry basis), *Max*	8	Annex A (A-4)
iv)	Acid insoluble ash, percent by mass (on dry basis), *Max*	1	Annex A (A-5)
v)	Acid insoluble matter, percent by mass (on dry basis), *Max*	3	Annex A (A-6)
vi)	Chlorides	Nil	Annex A (A-7)
vii)	Sulphates	Nil	Annex A (A-8)
viii)	Volatile acid (as acetic acid), percent by mass, *Min*	10	Annex A (A-9)
ix)	Swelling property, ml, *Min*	200	Annex A (A-10)
x)	Water absorption, ml, *Min*	75	Annex A (A-11)
xi)	Arsenic (as As), mg/kg, *Max*	3	IS 1699
xii)	Lead (as Pb), mg/kg, *Max*	2	IS 1699
xiii)	Freedom from animal filth	To pass the test	Annex A (A-12)
xiv)	*Salmonella*	Negative (on 1 gram)	IS 5887 (Part 3/Sec 1)
xv)	*E. Coli*	Negative (on 1 gram)	IS 16067 (Part 3)

5 PACKING AND STORAGE

5.1 The material shall be securely packed in well-filled containers with minimum access to light and moisture. The containers shall be such as to preclude contamination of the contents with metals or other impurities.

5.2 Storage

The material shall be stored in a cool and dry place so as to avoid excessive exposure to heat.

6 MARKING

6.1 The containers shall be securely closed and shall bear legibly and indelibly the following information:

a) Name of the material including the words 'Food Grade';
b) Source of manufacture;
c) Net content when packed;
d) Batch or code number;
e) Date of manufacture; and
f) Expiry/ Best before date;
g) Any other requirements as specified under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011 and *Food Safety and Standards* (*Labelling and Display*) *Regulations*, 2020.

6.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

7 SAMPLING

Representative samples of the materials shall be drawn according to the method prescribed in IS 1699.

8 TESTS

8.1 Tests shall be carried out by the methods specified in **3.5** and co1 (4) of Table 1.

8.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE – 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

[*Table* 1]

METHOD OF TEST FOR GUM KARAYA

A-1 DETERMINATION OF BARK AND OTHER FOREIGN ORGANIC MATTER

A-1.1 Reagent

A-1.1.1 *Dilute Hydrochloric Acid* − approximately 4 N.

A-1.2 Procedure

Weigh accurately about 5 g of the material and transfer to a 250 ml conical flask. Add 25 ml of dilute hydrochloric acid and 25 ml of water. Cover the flask with a small watch-glass and boil gently until the mixture loses its viscosity. Shake the flask occasionally. After heating for 10 min, break the lumps with a glass rod. Wash the glass rod with 5 ml of water. Heat the flask for another 20 min with occasional shaking to ensure complete dispersal of the lumps. Filter through a tared filtering crucible and wash the residue with water until the washings are free from chloride ions. Remove the crucible to an air-oven maintained at (105 ± 2) °C, cool in a desiccator and weigh. Then dry to constant mass in an air-oven.

A-1.3 Calculation

$$\text{Bark and other foreign organic matter, percent by mass (on dry basis)} = \frac{10\,000\,M}{(100-M_1)\times M_2}$$

where

M = mass, in g, of the residue;
M_1 = percent volatile matter in the material [loss on drying, *see Sl No*. (i) of *Table* 1]; and
M_2 = mass, in g, of the material taken for the test.

A-2 DETERMINATION OF LOSS ON DRYING

A-2.1 Procedure

Weigh accurately about 5 g of the material in a tared weighing bottle, place the bottle containing the sample (uncovered) in an oven maintained at (110 ± 1) °C for 4 h. Remove the bottle from the oven, close it and allow it to come to room temperature in a desiccator and weigh. Calculate the loss on drying as percent by mass.

A-3 DETECTION OF STARCH

A-3.1 Reagents

A-3.1.1 *Iodine Solution* − Dissolve 2.6 g of iodine and 3 g of potassium iodide in 100 ml of water.

A-3.2 Procedure

Heat 1 g of the material along with 100 ml of water to boiling until the material is dispersed. Cool the solution and add a few drops of iodine solution. The material shall be taken to contain starch if blue colour is produced.

A-4 DETERMINATION OF TOTAL ASH

A-4.1 Procedure

Weigh accurately about 3 g of the material in a tared crucible, ignite at about 550 °C not exceeding very dull redness until free from carbon; cool in a desiccator and weigh. If a carbon-free ash is not obtained, wet the charred mass with hot water, collect the insoluble residue on an ashless filter paper, and ignite the residue and filter paper until the ash is white or nearly so. Finally, add the filtrate, evaporate it to dryness, and heat the whole to a dull redness. If a carbon-free ash is still not obtained, cool the crucible, add 15 ml of alcohol, break up the ash with a glass rod, then burn off the alcohol, again heat the whole to a dull redness, cool and weigh. Calculate the percentage of ash from the mass of sample taken.

A-5 DETERMINATION OF ACID INSOLUBLE ASH

A-5.1 Procedure

Boil the ash obtained in **A-4.1** with 25 ml of dilute hydrochloric acid for 5 min, collect the insoluble matter on a tared Gooch crucible or ashless filter paper, wash with hot water; ignite, cool and weigh. Calculate the percentage of acid insoluble ash from the mass of sample taken.

A-6 DETERMINATION OF ACID INSOLUBLE MATTER

A-6.1 Reagents

A-6.1.1 *Hydrochloric Acid* − 5 percent (*m*/*v*).

A-6.2 Procedure

Weigh about 5 g of the sample to the nearest 0.1 mg and transfer it into a 250 ml beaker or Erlenmeyer flask containing 100 ml of 5 percent (*m*/*v*) hydrochloric acid. Cover with a watch glass or attach the flask to a condenser having cold water running through it. Boil gently for about 3 h until the gum is completely dissolved. Filter the solution through a tared porcelain or glass fritted crucible of 10 µ to 20 µ porosity. Wash the residue several times with hot water until the washings are free from acid (*p*H paper). Dry the crucible at 105 °C to a constant mass. Cool to room temperature in a desiccator and weigh. Calculate as percentage.

A-7 TEST FOR CHLORIDES

A-7.1 Apparatus

A-7.1.1 *Nessler Tubes* – 50 ml capacity.

A-7.2 Reagents

A-7.2.1 *Dilute Nitric Acid* − approximately 4 N.

A-7.2.2 *Silver Nitrate Solution* − 4 percent.

A-7.2.3 *Standard Hydrochloric Acid* − exactly 0.02 N.

A-7.3 Procedure

A-7.3.1 Weigh 2 g of the material and transfer to a beaker containing 50 ml of a mixture of equal volumes of dilute nitric acid and water loses its viscosity (about 30 min). Cover with a watch-glass and boil gently until the mixture. Filter through a filter paper, wash the residue with water till sulphates and chlorides are washed out, and make up the volume of the combined filtrate and washings to 100 ml. Use this solution for tests of chlorides and sulphates (*see* **A-8**).

A-7.3.2 Transfer 25 ml of the solution (*see* **A-7.3.1**) to a Nessler tube, add 1 ml each of dilute nitric acid and silver nitrate solution, dilute to 50 ml and mix well. Allow to stand for 5 min protected from direct sunlight. Carry out simultaneously a control test in another Nessler tube using 0.2 ml of standard hydrochloric acid and compare the turbidity in the two Nessler tubes.

A-7.3.3 The material shall be taken to have passed the test if the turbidity with the material is not greater than that produced in the control test.

A-8 TEST FOR SULPHATES

A-8.1 Apparatus

A-8.1.1 *Nessler Tubes* – 50 ml capacity.

A-8.2 Reagents

A-8.2.1 *Dilute Hydrochloric Acid* − approximately 4 N.

A-8.2.2 *Barium Chloride Solution* − 10 percent.

A-8.3 Procedure

Transfer 25 ml of the solution prepared in **A-7.3.1** to a Nessler tube. Add 1 ml of dilute hydrochloric acid and 2 ml of barium chloride solution. Dilute to 50 ml and mix well. Allow to stand for 10 min. The material shall be taken to have passed the test if no precipitate or turbidity is produced.

A-9 DETERMINATION OF VOLATILE ACID

A-9.1 Reagents

A-9.1.1 *Orthophosphoric Acid*

A-9.1.2 *Sodium Hydroxide* – 0.1 M.

A-9.1.3 *Phenolphthalein Test Solution* − Dissolve 1 g of phenolphthalein in 100 ml of alcohol.

A-9.2 Procedure

To 1 g of sample contained in a 700 ml long-necked flask, add 100 ml of water and 5 ml of syrupy orthophosphoric acid. Allow to stand for several hours or until the gum is completely swollen and boil gently for 2 h under a reflux condenser. Steam distil until 800 ml of distillate is obtained and the acid residue measures about 20 ml. Titrate the distillate with 0.1 M sodium hydroxide using phenolphthalein test solution as indicator. Repeat the procedure without the gum. The difference between the titrations represents the amount of alkali required to neutralize the volatile acid. Each ml of 0.1 M sodium hydroxide is equivalent to 0.006 g of volatile acid calculated as acetic acid.

A-10 DETERMINATION OF SWELLING PROPERTY

A-10.1 Apparatus

A-10.1.1 *Graduated Cylinder* − 500 ml capacity conforming to IS 878.

A-10.2 Procedure

Collect by means of screening, the portion of the material larger than 600 µ and smaller than 2 mm. Weigh 2.00 g of the sieved material and transfer it to the graduated cylinder containing

500 ml of water. Stir any particles rising to the top and allow to stand for 18 h. Read the volume to which the gum swells up. Keep the cylinder with contents aside for test in **A-11**.

A-11 DETERMINATION OF WATER ABSORPTION

A-11.1 Apparatus

A-11.1.1 *Graduated Cylinder* − 500 ml capacity, conforming to IS 878.

A-11.2 Procedure

Pour the contents of the graduated cylinder (*see* **A-10.2**) through a bed of moistened glass wool and allow the water to drain into 500 ml graduated cylinder. Read the volume of water collected in graduated cylinder and calculate, by deducting that volume from 500, the number of ml of water retained by the gum.

A-12 TEST FOR FREEDOM FROM ANIMAL FILTH

A-12.1 Apparatus

A-12.1.1 *Microscope* − with magnification 40 or more.

A-12.2 Reagents

A-12.2.1 *Dilute Hydrochloric Acid* − 1:19 (*v*/*v*).

A-12.2.2 *Petroleum Ether*

A-12.3 Procedure

A-12.3.1 *Microscopic Examination for Insect and Animal Filth*

Take about 100 g of coarse unground gum and examine a small amount at a time in good light and against a white background. Observe if there is embedded insect or animal filth in the pieces of gum. If the gum is finely ground, sieve through an appropriate size sieve to separate filth from gum and examine for the presence of filth.

A-12.3.2 *Microscopic Examination for Animal Filth*

Take 1 g of the sample which has been finely powdered in a 500 ml beaker and add 200 ml of dilute hydrochloric acid, boil for 15 min. Cool the beaker and allow the suspension to settle down. Decant off the liquid so that no solid particles escape. Wash it with additional quantity of water and again pour off the liquid. Observe the residue in the beaker under microscope for rodent excreta and other particles. To confirm further, add 100 ml of petroleum ether to the residue and shake vigorously. Allow it to settle and filter off the petroleum ether layer on a fluted filter paper. taking care that no water drop comes on the filter paper. Observe the filter paper under the microscope for the presence of animal hair.