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*भारतीय मानक मसौदा*

**सोर्बिटॉल पाउडर, खाद्य ग्रेड – विशिष्टि**

*(आइ एस 4750 का दूसरा पुनरीक्षण )*

*Draft Indian Standard*

**SORBITOL POWDER, FOOD GRADE — SPECIFICATION**

*(Second Revision of IS 4750)*

**ICS No. 67.220.20**

Food Additives Committee, FAD 08

**Last Date of Comments: 20 June 2024**

**FOREWORD**

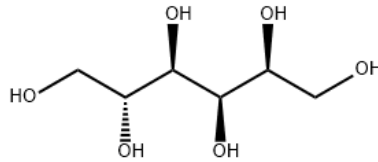
*(Formal clauses would be added later)*

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 requires 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.

Sorbitol powder, food grade used as a food additive is permitted under *Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011*.

Chemical Names and Formula - The recognized chemical names are *d*-sorbitol, *d*-glucitol, *d*-sorbite, *d*-sorbol and hexane-1,2,3,4,5,6-hexol. Empirical formula is C<sub>6</sub>H<sub>14</sub>O<sub>6</sub>. Its molecular weight is 182.17.

**Structural Formula –**



This standard was first published in 1968. In formulation of the standard, considerable amount of assistance was derived from Food chemical codex (FCC) issued by the National Academy of Sciences, National Research Council, Washington.

It was first revised in 1996 to upgrade the standard by reducing the moisture content and specifying the limit of nickel and to replace the requirements of non-reducing sugar by total sugar.

In this revision, 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.
- 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 the method of sampling and tests for sorbitol powder, 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:

<i>IS No.</i>	<i>Title</i>
IS 266 : 1993	Sulphuric acid – Specification ( <i>third revision</i> )
IS 1070 : 2023	Reagent grade water – Specification ( <i>fourth revision</i> )
IS 1699 : 202X	Methods of sampling and test for food colours ( <i>third revision</i> ) [ <i>Under preparation Doc: FAD 08 (23204)F</i> ]
IS 4818 : 202X	Sorbic acid, food grade – Specification ( <i>second revision</i> ) [ <i>Under preparation Doc: FAD 08 (25100)WC</i> ]

## 3 DESCRIPTION

Sorbitol is white hygroscopic powder having a sweet taste. Its solution in water is clear, colourless, odourless, syrupy liquid having a pleasant sweet taste. Sorbitol is very soluble in water and slightly soluble in ethanol.

NOTE — The solubility is intended only as information regarding approximate solubility and is not to be considered as a quality requirement and is of minor significance as a means of identification or determination of purity.

## 4 REQUIREMENTS

### 4.1 Identification Tests

Dissolve about 5 g of the material in 6 ml of water, add 7 ml of methanol, 1 ml of benzaldehyde, and 1 ml of hydrochloric acid, and shake in a mechanical shaker until crystals appear. Filter with aid of suction, dissolve the crystals in 20 ml of boiling water containing 1 g of sodium carbonate, filter while hot, cool the titrate, filter with suction, wash with 5 ml of methanol-water mixture (1 in 2), and dry in air. The sorbitol monobenzylidene so obtained shall melt between 173°C and 177°C when determined by the method given in Annex A of IS 4818.

4.2 The material shall also conform to the requirements given in Table 1.

**Table 1 Requirements for Sorbitol Powder, Food Grade**  
(*Clause 4.2*)

<b>Sl. No.</b>	<b>Characteristic</b>	<b>Requirements</b>	<b>Method of Test, Ref to</b>
(1)	(2)	(3)	(4)

i)	Purity as <i>d</i> -sorbitol expressed as C <sub>6</sub> H <sub>14</sub> O <sub>6</sub> , percent by mass, on dry basis, <i>Min</i>	91	Annex A
ii)	Moisture, percent by mass, <i>Max</i>	1.0	Annex B
iii)	Melting range in °C	88-102	IS 4818
iv)	Reducing sugars, percent by mass, <i>Max</i>	0.3	Annex C
v)	Sulphated ash, percent by mass, <i>Max</i>	0.1	Annex D
vi)	Sulphates (as SO <sub>4</sub> ), percent by mass, <i>Max</i>	0.01	Annex E
vii)	Chlorides (as Cl), percent by mass, <i>Max</i>	0.005	Annex F
viii)	Arsenic (as As), mg/kg, <i>Max</i>	3	IS 1699
ix)	Total sugar, percent by mass as dextrose, <i>Max</i>	1	Annex G
x)	Nickel, mg/kg, <i>Max</i>	2	Annex H
xi)	Lead (as Pb), mg/kg, <i>Max</i>	1	IS 1699

#### 4 PACKING

The material shall be filled in amber coloured glass containers, or any other well-closed containers, or suitable bag with inner lining of food grade material, with as little air space as possible. The containers shall be such as to preclude contamination of the contents with metals or other impurities.

#### 5 MARKING

5.1 Each container shall be legibly and indelibly marked with the following information:

- a) Name of the material, including the words 'Food Grade';
- b) Name of the manufacturer or registered trade-mark, if any;
- c) Net quantity when packed;
- d) Lot/batch No.;
- e) Month and year of manufacture;
- f) Expiry date; and
- g) Any other requirements as specified under the *Legal Metrology (Packaged Commodities) Rules, 2011* and *Food Safety and Standards (Labelling and Display) Regulations, 2020*.

#### 5.2 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.

#### 6 SAMPLING

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

#### 7 TESTS

Tests shall be carried out by the methods as specified in col (4) of Table 1.

## 8 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 experimental results.

**ANNEX A**  
[Table 1, Sl No. (i)]  
**DETERMINATION OF PURITY**

**A-1 GENERAL**

The purity of *d*-sorbitol is determined by using column chromatographic method.

**A-2 PRINCIPLE**

Sorbitol is first isolated chromatographically and then oxidized with a known excess of potassium periodate. The excess of potassium periodate is determined by titration iodometrically.

**A-3 APPARATUS**

**A-3.1 Chromatographic Column**

Place a pledge of slightly tapered chromatographic tube, 38 mm × 230 mm, which is inserted in a 500 ml suction flask. Add with full vacuum 80 g of a mixture of 5 parts of very fine chromatographic fullers earth and 1 part of chromatographic siliceous earth in portion of 2 to 3 g tapping the tube gently after each addition Apply suction gently to compress the adsorbent, add an additional 10 g of adsorbent to the column to a height of about 200 mm. Level the top with the spatula and cover it with a disc of filter paper.

**A-4 REAGENTS**

**A-4.1 Isopropyl Alcohol Solvent**

Prepare by mixing 60 ml of water and 340 ml of isopropyl alcohol

**A-4.2 Alkaline Potassium Permanganate Solution**

Dissolve 109 of sodium hydroxide and 1 g of potassium permanganate in 100 ml of water

**A-4.3 Potassium Periodate Reagent**

Prepare by mixing 40 ml of dilute sulphuric acid (1 in 20) and 60 ml of potassium periodate solution (1 in 1 000).

**A-4.4 Potassium Iodide**

**A-4.5 Standard Sodium Thiosulphate Solution – 0.02 N**

**A-4.6 Starch Solution**

**A-4.7 Sulphuric Acid**

**A-5 PROCEDURE**

**A-5.1** To about 450 mg of the material, accurately weighed, add 1 ml of water and 5 ml of isopropyl alcohol solvent. Mix and pour the solution on the prepared chromatographic column. Complete the addition with the aid of three 10 ml portions of the solvent waiting after each addition until the solvent has practically disappeared on the column. Attach a separating funnel containing 325 ml of the solvent by means of a rubber stopper inserted to a point 16 mm above the top of the column. Admit enough solvent to make a 1 cm layer and adjust the separating funnel so that its tip is just below the solvent surface. As soon as the even front of the liquid

has advanced about 1.3 to 2.0 cm down the tube apply full suction and open the separator stopcock to admit solvent so that the effluent collects initially at a rate of approximately 3 ml per minute and continues until all the solvent has been added taking precaution to avoid letting the column run dry.

**A-5.2** When all of the solvent has been added from the separator and the liquid layer just disappeared into the column, continue full vacuum for 1 to 3 minutes, then disconnect the system promptly and extrude the column on to a glazed paper. Paint several streaks length of the column with alkaline potassium permanganate solution. Note and mark the zones where the streaks are decolourized. Cut out the second zone, which usually starts about 45 mm to 50 mm from the top of the column and extends 125 mm to 150 mm with a sharp blade. Return this portion of the column to the tube in which a fresh pledget of cotton has been placed on the porous plate. Replace the separating tunnel and, with the aid of a gentle suction, draw the column down the chromatographic tube snugly on the cotton. Elute the absorbed sorbitol with 200 ml of water applying full vacuum when water has advanced about 13 mm down the column. Transfer the eluate to the 500 ml volumetric flask and make up the volume with water and mix.

**A-5.3** Pipette 5 ml of the dilute eluate into a 250 ml conical flask. Add 50 ml of potassium periodate reagent which has been acidified with 5 drops of sulphuric acid. Heat the solution on a steam bath for 15 minutes and cool to a room temperature. Add 1 g of potassium iodide, and allow to stand for 5 minutes and titrate with thiosulphate solution using starch indicator near the end point. Perform a blank using water in place of the material.

## **A-6 CALCULATION**

$$d\text{-sorbitol, percent by mass} = \frac{100 \times (B-S) \times 1.822 \times N}{W}$$

where,

$B$  = volume in ml of standard sodium thiosulphate solution used in the blank titration;

$S$  = volume in ml of standard sodium thiosulphate solution used in the material titration;

$N$  = normality of standard sodium thiosulphate solution; and

$W$  = mass in g of the material taken for the test.

## **ANNEX B**

[Table 1, Sl No. (ii)]

### **DETERMINATION OF MOISTURE**

#### **B-1 APPARATUS**

**B-1.1 Oven** – maintained at  $80 \pm 1^\circ\text{C}$  and pressure 5 mm of mercury.

**B-1.2 Weighing Bottle** – glass-stoppered, shallow

#### **B-2 PROCEDURE**

**B-2.1** Weigh accurately about 2 g of the powdered sample in the tared weighing bottle. Distribute the sample as evenly as practicable to a depth of about 5 mm. Place the bottle containing the sample (uncovered) in the oven maintained at  $80 \pm 1^\circ\text{C}$  and 5 mm pressure of

mercury. Remove the bottle from the oven after six hours, close the bottle promptly and allow it to come to room temperature in a desiccator, weigh it.

**B-2.2** Calculate the loss on drying percent by weight.

## ANNEX C

[Table 1, Sl No. (iv)]

### TEST FOR REDUCING SUGARS

#### C-1 PRINCIPLE

Reducing sugars are determined through treatment with Fehling's solution, the reduced copper oxide is weighed.

#### C-2 REAGENTS

##### C-2.1 Alkaline Cupric Tartrate Solution (Fehling's Solution)

(a) *Copper solution (A)* - Dissolve 36.44 g of carefully selected small crystals of cupric sulphate showing no trace of efflorescence or adhering moisture, in sufficient water and make it to 500 ml. Store this solution in small tight containers.

b) *Alkaline tartrate solution (B)* - Dissolve 173 g of crystallized potassium sodium tartrate and 50 g of sodium hydroxide in sufficient water and make it to 500 ml. Store this solution in small alkali-resistant containers

Mix exactly equal volumes of solutions A and B at the time of conducting the test.

##### C-2.2 Diethyl Ether

##### C-2.3 Ethyl Alcohol – 95 percent (v/v)

#### C-3 PROCEDURE

Transfer 7 g of the material, accurately weighed, to a 500 ml beaker with the aid of 35 ml of water and mix. Add 50 ml of alkaline cupric tartrate solution. Cover the beaker with a watch-glass and heat the mixture at such a rate that it comes to boil in approximately 4 minutes. Boil for exactly 2 minutes. At once add 100 ml of cold, recently boiled water and immediately collect the precipitated cuprous oxide in a tared gooch crucible which has been previously washed with hot water, alcohol and ether and dried at 105 °C for 30 minute. Thoroughly, wash the collected cuprous oxide on the filter with hot water, then with 10 ml of alcohol and finally with 10 ml of ether. Dry at 105°C for 30 minutes.

The material shall be taken to have satisfied the requirement in Table 1 if the weight of cuprous oxide does not exceed 50 mg.

## ANNEX D

[Table 1, Sl No. (v)]

### DETERMINATION OF SULPHATED ASH

#### D-1 REAGENT

##### D-1.1 Concentrated Sulphuric Acid – (see IS 266)



## D-2 PROCEDURE

Weigh accurately about 2 g of the material in a tared crucible. Ignite, gently at first, until the material is thoroughly charred, cool, moisten the residue with 1 ml of sulphuric acid and ignite gently till the carbon is completely consumed. Cool the crucible in a desiccator and weigh

NOTE - Carry out the ignition in a place protected from air currents and use as low a temperature as possible to effect the combustion of carbon weighed.

## D-3 CALCULATION

$$\text{Sulphated Ash, percent by mass} = \frac{W_1}{W_2} \times 100$$

where,

$W_1$  = mass in g of the residue; and

$W_2$  = mass in g of the material taken for the test.

## ANNEX E

[Table 1, Sl No. (vi)]

### SULPHATE TEST

#### E-1 STANDARD SULPHATE SOLUTION

Dissolve 148 mg of anhydrous sodium sulphate in water and dilute to 100 ml. Transfer 10 ml of this solution to a 1 000 ml volumetric flask, dilute to volume with water, and mix. Each ml of the final solution contains 10 mg of sulphate (SO<sub>4</sub>).

#### E-2 PROCEDURE

Dissolve 2 g of the test sample in 30 to 40 ml of water, neutralize to litmus external indicator with dilute hydrochloric acid, if necessary. Then add 1 ml of dilute hydrochloric acid. To the clear solution or filtrate add 3 ml of barium chloride, dilute to 50 ml with water and mix. Allow it to stand for 10 minutes. Compare the turbidity, if any, with that produced in a control solution containing 20 ml (equivalent to 200 mg) of sulphate solution and the same quantities of the reagents used for the sample.

Any turbidity produced by the sample shall not exceed the turbidity shown in the control solution.

## ANNEX F

[Table 1, Sl No. (vii)]

### CHLORIDE TEST

#### F-1 STANDARD CHLORIDE SOLUTION

Dissolve 165 mg of sodium chloride in water and dilute to 100 ml. Transfer 10 ml of this solution to a 1 000 ml volumetric flask. Dilute to volume with water, and mix. Each ml of the final solution contains 10 mg of chloride.

#### F-2 PROCEDURE

Dissolve 400 g of the test sample in 30 to 40 ml of water, neutralize to litmus external indicator with nitric acid, if necessary, then add 1 ml of silver nitrate, dilute to 50 ml with water. and mix. Allow to stand for 5 minutes protecting from direct sunlight. Compare the turbidity, if any, with that produced in a control solution containing 2 ml of the standard chloride solution (equivalent to 20 mg) and the reagents in the same quantities which are used for the sample.

The turbidity produced, if any, by the sample shall not exceed that produced by the control solution.

#### **ANNEX G**

[Table 1, Sl No. (ix)]

#### **DETERMINATION OF TOTAL SUGAR**

Transfer 2.1 g of material into a 250 ml flask fitted with a ground-glass joint, add 40 ml of approximately 0.1 N hydrochloric acid, attach a reflux condenser, and reflux for 4 h. Transfer the solution to a 400 ml beaker, rinsing the flask with about 10 ml of water, neutralize with 6 N sodium hydroxide. and continue as directed under reducing sugars, beginning with 'Add 50 ml of alkaline cupric tartrate' till the weight of the cuprous oxide docs not exceed 50 mg.

#### **ANNEX H**

[Table 1, Sl No. (x)]

#### **DETERMINATION OF NICKEL**

Dissolve 10 g of the sample in sufficient water to produce 20 ml, add 3 ml of bromine water and 2 ml of a 20 percent of mass/volume solution of citric acid, mix and add 10 ml of 6 N ammonia and 1 ml of a 1 percent (*m/v*) solution of dimethylglyoxime in alcohol. Mix, dilute to 50 ml with water and allow to stand for 5 minutes; any colour produced is not more intense than that produced by similarly treating 1 ml of standard nickel solution (equivalent to 2 ppm) in place of sample.