SRI LANKA STANDARD 617:1983
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SPECIFICATION FOR
GLUCOSE

BUREAU OF CEYLON STANDARDS

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SLS 617:1983

Gr. 9

BUREAU OF CEYLON STANDARDS
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Sri Lanka.

SRI LANKA STANDARD
SPECIFICATION FOR GLUCOSE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1983-11-29, after the draft, finalized by the Drafting Committee on Glucose, had been approved by the Agricultural and Food Products Divisional Committee.

This specification is subject to the restrictions imposed under the Food Act No. 26 of 1980.

All standard values given in this specification are in SI units.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value should be the same as that of the specified value in this specification.

The assistance obtained from the publications of the Indian Standards Institution and the Standards Institution of Malaysia in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This specification prescribes the requirements and methods of sampling and test for glucose monohydrate for oral use.

2 REFERENCES

CS	102	Presentation of numerical values
SLS	311	Determination of lead
SLS	312	Determination of arsenic
SLS	428	Random sampling methods
SLS	467	Labelling of prepackaged foods

3 REQUIREMENTS

3.1 Description

Glucose monohydrate shall consist of coloureless crystals or a white or cream coloured powder. It shall be odourless, free from dirt and other extraneous impurities and shall taste sweet.

The chemical formula of glucose monohydrate is as follows:

$$C_6H_{12}O_6.H_2O$$

3.2 Glucose content

The substance shall contain not less than 99.0 per cent by mass and not more than the equivalent of 101.5 per cent by mass of glucose $C_6H_{12}O_6$ calculated with reference to the substance dried to constant mass at 105 °C. The substance shall be assayed by the method prescribed in Appendix A.

3.3 Solublity

Glucose monohydrate shall be freely soluble in water, very soluble in boiling water and slightly soluble in alcohol.

3.4 Specific rotation

The specific rotation of glucose monohydrate, when tested by the method given in Appendix B, shall be not less than $+ 52.5^{o}$ and not more than $+ 53.0^{o}$.

3.5 Loss on drying

When dried to constant mass and tested by the method prescribed in Appendix C, glucose monohydrate shall loose, not less than 7.0 per cent and not more than 10.0 per cent of its mass.

3.6 Foreign sugars, soluble starch and dextrins

Glucose monohydrate when tested by the method given in 7.1 shall satisfy the requirements of the test.

3.7 Acidity

Glucose monohydrate when tested by the method given in 7.2 shall satisfy the requirements of the test.

3.8 Sulphites

Glucose monohydrate when tested by the method given in 7.3 shall satisfy the requirements of the test.

3.9 Identification tests

Glucose monohydrate when tested by the method given in Appendix D shall satisfy the requirements of the test.

3.10 Colour of solution

Glucose monohydrate when tested by the method given in Appendix E shall satisfy the requirements of the test.

3.11 Glucose monohydrate shall also comply with the limits for impurities given in Table 1.

TABLE 1 - Limits for impurities

Sl no. (1)	Impurity (2)	Tolerance limit (3)	Method of test, ref. to (4)
i	Chlorides mg/kg, max.	180	Appendix F
ii	Sulphates mg/kg, max.	240	Appendix G
iii	Sulphated ash, per cent by mass, max.	0.15	Appendix H
iv	Arsenic, mg/kg, max.	1.0	SLS 312
v	Lead (as Pb), mg/kg, max.	0.5	SLS 311

4 PACKAGING

4.1 Glucose monohydrate shall be packed in well closed moisture proof containers.

4.2 The containers shall protect the contents from adventitious contamination under conditions of handling and storage.

5 MARKING

5.1 The following shall be marked legibly and indelibly on the label of the container:

a) Name of the product;

b) Name and address of manufacturer/Importer/Packer;

c) Brand name, if any;

d) Registered Trade mark, if any;

e) Batch or code number;

f) Net mass, in grams;

g) Storage conditions; and

h) Date of packaging.

5.2 The marking and labelling shall be in accordance with SLS 467.

5.3 The containers may also be marked with the Certification Mark of the Bureau of Ceylon Standards illustrated below on permission being granted for such marking by the Bureau of Ceylon Standards.

NOTE – The use of the Bureau of Ceylon Standards Certification Mark (SLS mark) is governed by the provisions of the Bureau of Ceylon Standards Act and the regulations framed thereunder. The SLS mark on products covered by a Sri Lanka Standard is an assurance that these have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control, which is devised and supervised by the Bureau and operated by the producer. SLS marked products are also continuously checked by the Bureau for conformity to the relevant standards as a further safeguard. Details of conditions under which a permit for the use of the Certification Mark is granted to manufacturers or processors may be obtained from the Bureau of Ceylon Standards.

6 SAMPLING

6.1 General requirements for sampling

In drawing, preparing, storing, and handling samples the following precautions and directions shall be observed.

6.1.1 Sampling instruments shall be clean and dry when used.

6.1.2 All precautions shall be taken to prevent the samples from contamination, deterioration and adulteration.

6.1.3 The samples shall be placed in clean and dry glass containers.

6.1.4 Each sample container shall be sealed air-tight after filling and marked with the following details.

a) Date of sampling;

b) Name of manufacturer/Importer/Packer;

c) Date of manufacture;

d) Name of officer drawing sample;

e) Other relevant particulars.

6.1.5 Samples shall be stored in such a manner that the conditions of storage do not affect the quality of the material.

6.2 Lot

All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot.

6.3 Scale of sampling

6.3.1 Samples shall be tested from each lot for ascertaining the conformity of the material to the requirements of this specification.

6.3.2 *Sampling from bulk containers*

6.3.2.1 Preparation of individual sample

6.3.2.1.(a) Small but equal quantity of material shall be drawn from top, middle, and bottom portions of container using an appropriate sampling instrument to form an individual sample weighing not less than 100 g.

6.3.2.1.(b) Individual sample shall be obtained from each container in the lot and shall be kept in separate containers.

6.3.2.2 Preparation of composite sample

Small but equal quantities of material shall be drawn from top, middle and bottom portions of each container in the lot using an appropriate sampling instrument. The material thus obtained shall be mixed together so as to form composite sample weighing not less than 200 g.

6.3.3 *Sampling from retail containers*

The number of retail containers to be selected from a lot shall be in accordance with Table 2.

TABLE 2 - Scale of sampling

Number of retail containers in the lot	Number of retail containers to be selected
6 to 40	6
41 to 65	7
65 to 110	8
over 110	10

6.3.3.1 Preparation of individual samples

About 50 g of material shall be drawn from each container according to the method given in 6.3.3.1(a) or 6.3.3.1(b) so as to form individual samples and samples thus obtained shall be kept in separate containers.

6.3.3.1(a) The contents of containers shall be emptied out on a sheet of paper and mixed thoroughly. Coning and quartering shall be done till a quantity of the material not less than 50 g is left.

6.3.3.1(b) The material shall be obtained according to the method given in 6.3.2.1(a).

6.3.3.2 Preparation of composite sample

Equal quantities of material shall be taken from each container according to the method given in 6.3.3.1(a) or 6.3.3.1(b) and mixed together so as to form a composite sample weighing not less than 150 g.

6.4 Reference sample

6.4.1 If a reference sample is required, a set of individual samples and a composite sample for reference shall be obtained in the following way.

6.4.1.1 Mass of an individual sample obtained from a container shall be not less than 150 g and individual sample so obtained shall be divided into three parts. Each part shall be transferred to separate containers.

6.4.1.2 One set of individual samples shall be marked for the purchaser, one for the vendor and the third for the referee.

6.4.2 Mass of the composite sample shall be not less than 450 g and composite sample shall be divided into three equal parts and each part shall be transferred into separate containers. One of these shall be for the purchaser, one for the vendor and third for the refree.

6.5 Number of tests

6.5.1 Each container shall be examined for marking and packing.

6.5.2 Tests for requirements given in 3.1, 3.2 and 3.4 shall be conducted on each of the individual samples.

6.5.3 Tests for remaining characteristics shall be conducted on the composite sample.

7 METHODS OF TEST

The tests shall be carried out in accordance with the methods prescribed in 7.1, 7.2, 7.3, Appendices A to H, SLS 311 and SLS 312.

7.1 Foreign sugars, soluble starch and dextrins

Boil approximately 1 g of the substance with 30 ml of ethanol (96 per cent V/V) and cool; The solution, before and after cooling shall not be more opalescent than 30 ml of ethanol (96 per cent V/V).

7.2 Acidity

Dissolve 6 g of the substance in 25 ml of carbon dioxide free water and add 5 drops of phenolphthalein indicator. The solution should be colourless. Titrate with 0.1 N sodium hydroxide to produce a pink colour: not more than 0.15 ml is required for neutralization.

7.3 Sulphite

To 20 ml of a 10.0 per cent *m/V* solution, add 0.05 ml of 0.05 N iodine and 0.05 ml of starch solution : a blue colour shall develop.

8 CONFORMITY TO STANDARD

The lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied.

8.1 Each container satisfies the packing and marking requirements.

8.2 Test results on each individual sample satisfy the relevant requirements.

8.3 Test results on composite sample satisfy the relevant requirements.

APPENDIX A

DETERMINATION OF GLUCOSE CONTENT

A.1 REAGENTS

A.1.1 *Iodine solution,* 0.1 N standard volumetric solution.

A.1.2 *Sodium carbonate solution,* a 14.3 per cent (*m/V*) solution of sodium carbonate in water.

A.1.3 *Dilute hydrochloric acid.* Mix 26 ml of hydrochloric acid, relative density 1.19 at 20 °C, with sufficient water to produce 100 ml.

A.1.4 *Sodium thiosulphate solution,* 0.1 N standard volumetric solution.

A.1.5 *Starch solution,* triturate 0.5 g of corn or potato or soluble starch with 5 ml of water and add this with constant stirring, to sufficient water to produce about 100 ml. Boil for a few minutes, cool and filter. This solution should be freshly prepared.

A.2 PROCEDURE

Weigh, to the nearest milligram, about 0.1 g of the substance, dried in accordance with the method prescribed in Appendix C, and dissolve in 50 ml of water. Add 30 ml of 0.1 N iodine solution, 10 ml of sodium carbonate solution and allow to stand for 20 minutes. Add 15 ml of dilute hydrochloric acid and titrate excess of iodine with 0.1 N sodium thiosulphate solution using starch solution as indicator.

Perform a blank determination by repeating the operation without the substance. The difference between the titration represents the amount of 0.1 N iodine required by the substance.

A.3 CALCULATION

$$\text{Glucose, per cent, by mass} = \frac{9.000VN}{m}$$

where,

V = volume, in ml, of 0.1 N iodine solution required for the titration,

N = normality of the iodine solution, and

m = mass, in g, of the substance taken for the determination.

APPENDIX B

DETERMINATION OF SPECIFIC ROTATION

B.1 REAGENTS

B.1.1 *Ammonium hydroxide solution*, relative density=0.90.

B.2 PROCEDURE

B.2.1 *Preparation of solution of the material*

Dry a sufficient quantity of the material at 105 °C for 6 hours in an air-oven and cool it in a desiccator. Weigh, to the nearest milligram, about 10 g of dried material into a 100-ml volumetric flask, dissolve in a small quantity of water, add 2 ml of ammonium hydroxide solution, make up to the volume with water at 20 °C, mix well and allow to stand for 30 minutes.

B.2.2 Determine the optical rotation of the solution at 20 °C using a suitable type of polarimeter and sodium light for all observations.

B.3 CALCULATION

Specific rotation of the material $= \frac{100\alpha}{lc}$

where,

α = angular rotation in degrees,

l = length in decimetres of the polarimeter tube used.

c = mass, in g, of the substance contained in 100 ml of solution at 20 °C.

APPENDIX C

DETERMINATION OF LOSS ON DRYING

C.1 APPARATUS

C.1.1 *Dish*, any suitable dish with a lid.

C.2 PROCEDURE

Weigh, to the nearest milligram, about 5 g of the substance into a dish with cover. With the cover removed, dry the substance in an oven at 105 °C for 6 hours. Replace the cover, cool the dish in a desiccator and weigh. Repeat the process of drying, cooling and weighing until the loss in mass between two successive weighings is not more than 1 milligram per gram of the substance. Record the lowest mass.

C.3 CALCULATION

$$\text{Loss on drying, per cent by mass} = \frac{(m_1 - m_2)}{(m_1 - m_o)} \times 100$$

where,

m_o = mass, in g, of empty dish,

m_1 = mass, in g, of dish and substance before drying, and

m_2 = mass, in g, of dish and substance after drying.

APPENDIX D

IDENTIFICATION TESTS

D.1 EXPLANATION

The tests described under this appendix are provided as an aid to identification and are not necessarily sufficient to establish proof of identity.

D.2 REAGENTS

D.2.1 Fehlings solution

Solution A. Dissolve 34.64 g of copper sulphate crystals in a mixture of 0.50 ml of sulphuric acid (relative density=1.84) and sufficient water to produce 500 ml.

Solution B. Dissolve 176 g of sodium potassium tartrate and 77 g of sodium hydroxide in sufficient water to produce 500 ml.

Mix equal volumes of solutions *A* and *B*, immediately before use.

D.2.2 *Sodium acetate*, anhydrous.

D.3.2 *Acetic anhydride.*

D.3 TESTS

D.3.1 The substance on heating shall melt, swell up and burn, evolving an odour of burnt sugar.

D.3.2 Heat the substance with Fehlings solution (mixture of *a* and *b*). A copious red precipitate of cuprous oxide shall be produced.

D.3.3 Heat 0.2 g of the substance with 0.2 g of anhydrous sodium acetate and 1 ml of acetic anhydride at the boiling temperature for 10 minutes. Cool and add 10 ml of water. A precipitate of penta acetate is formed and it shall have a melting point of 132 °C.

APPENDIX E

DETERMINATION OF COLOUR OF SOLUTION

E.1 REAGENTS

E.1.1 *Reagent solution*. Prepare this solution (about 200 ml) by mixing concentrated hydrochloric acid and water in the ratio of 1:39 by volume.

E.1.2 *Cobalt chloride solution*. Dissolve 2.35 g of cobalt chloride in 40 ml of the reagent solution, E.1.1.

E.1.3 *Ferric chloride solution*. Dissolve 1.0 g of ferric chloride in 40 ml of the reagent solution, E.1.1.

E.1.4 *Copper sulphate solution*. Dissolve 2.5 g of copper sulphate crystals in 40 ml of the reagent solution, E.1.1.

E.2 PROCEDURE

Dissolve 25 g of the substance in water and make up to 50 ml (Solution *X*). Prepare a comparison solution by mixing 1.0 ml of cobalt chloride solution E.1.2, 3.0 ml of ferric chloride solution, E.1.3, 2.0 ml of copper sulphate solution, E.1.4 and add water to make 10 ml. Dilute 5 ml of this solution with water to 50 ml (Solution *Y*). Compare the two solutions *X* and *Y* in matched Nessler cylinders down the vertical axis against a white surface.

E.3 REQUIREMENT OF THIS TEST

The colour of Solution *X* shall not be deeper than that of Solution *Y*.

APPENDIX F

DETERMINATION OF CHLORIDE

F.1 REAGENTS

F.1.1 *Dilute nitric acid.* Mix 10.6 ml of concentrated nitric acid (relative density 1.42) with water to produce 100 ml.

F.1.2 *Hydrochloric acid,* 0.01 N standard volumeteric solution.

F.1.3 *Silver nitrate solution.* Dissolve 5.0 g of the silver nitrate crystals in water and make up to 100 ml.

F.2 APPARATUS

F.2.1 *Standardized 50-ml Nessler tubes.*

F.3 PROCEDURE

Weigh, to the nearest milligram, about 2 g of the substance, dissolve in water in a beaker and transfer into a Nessler tube. Add 10 ml of dilute nitric acid and dilute to 50 ml with water. Add 1 ml of silver nitrate solution and stir immediately with a glass rod. Allow to stand for five minutes. Compare the opalescence with the standard opalescence **(F.4)** produced at the same time.

F.4 STANDARD OPALESCENCE

Mix 1 ml of 0.01 N hydrochloric acid with 10 ml of dilute nitric acid in a Nessler tube. Dilute to 50 ml with water. Add 1 ml of silver nitrate solution and stir immediately with a glass rod. Allow to stand for five minutes.

F.5 REQUIREMENTS OF THE TEST

If the opalescence of the solution of the substance is less than that of the standard opalescence (equivalent to 180 mg/kg chloride), the substance shall be deemed to comply with this test.

APPENDIX G

DETERMINATION OF SULPHATE

G.1 REAGENTS

G.1.1 *Dilute hydrochloric acid.* Prepare by mixing 23.6 ml of concentrated hydrochloric acid (relative density 1.18) with sufficient water to produce 100 ml.

G.1.2 *Barium chloride solution*, 10.0 per cent m/V solution of barium chloride crystals in water.

G.1.3 *Sulphuric acid*, 0.01 N standard volumetric solution.

G.2 APPARATUS

G.2.1 *Standardized 50-ml Nessler tubes.*

G.3 PROCEDURE

Weigh, to the nearest milligram, about 2.5 g of the substance and transfer into a Nessler tube. Add 2 ml of dilute hydrochloric acid, 40 ml of water and 5 ml of barium chloride solution, stir immediately with a glass rod and make up to 50 ml with water. Allow to stand for five minutes. Compare the turbidity produced, if any, with the standard turbidity (G.4) produced at the same time.

G.4 STANDARD TURBIDITY

Mix 1.25 ml of 0.01 N sulphuric acid and 2 ml of dilute hydrochloric acid in a Nessler tube. Add sufficient water to produce 45 ml. Introduce 5 ml of barium chloride solution and stir immediately with a glass rod. Allow to stand for five minutes.

G.5 REQUIREMENT OF THIS TEST

If the turbidity of the solution of the substance is less than the standard turbidity (equivalent to 240 mg/kg sulphate), the substance shall be deemed to comply with this test.

APPENDIX H

DETERMINATION OF SULPHATED ASH

H.1 REAGENTS

H.1.1 *Concentrated sulphuric acid*, relative density≈1.84.

H.2 PROCEDURE

Weigh, to the nearest milligram, about 5 g to 9 g of the sample into a platinum or silica basin. Add a few drops (about 1.5 ml) of concentrated sulphuric acid to the material in the dish. Gently heat the dish on a naked flame until the material is well carbonized, and then increase the heat until the evolution of sulphuric acid fumes cease. Ash the carbonized matter in a muffle furnace at 600 ± 20 °C. Cool the ash and moisten it with a few drops of concentrated sulphuric acid, heat strongly until sulphuric acid fumes cease to be evolved and finally ash in a muffle furnace at 600 ± 20 °C for 2 hours. Cool in a desiccator and weigh.

H.3 CALCULATION

H.3.1 Sulphated ash, per cent by mass $= \dfrac{100\, m_1}{m_2}$

where,

m_1 = mass, in g, of ash, and

m_2 = mass, in g, of the sample taken for the test.

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