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SPECIFICATION FOR

SODIUM BICARBONATE (BAKING SODA) - FOOD GRADE

SRI LANKA STANDARDS INSTITUTION

SPECIFICATION FOR SODIUM BICARBONATE (BAKING SODA) - FOOD GRADE

SLS 929:1991

Gr. 7

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR SODIUM BICARBONATE (BAKING SODA) - FOOD GRADE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1991-09-27, after the draft, finalized by the Drafting Committee on Food Additives had been approved by the Agricultural and Food Products Divisional Committee.

Sodium bicarbonate is used as a leavening agent in the food industry. This specification is therefore formulated for the benefit of quality control exercises which are carried out to ensure the identity and purity of the product.

This specification is subject to the provisions of the Food Act No. 26 of 1980 and the regulations framed thereunder.

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 an analysis, shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

In the preparation of this specification the assistance obtained from the publications of the Bureau of Indian Standards is gratefully acknowledged.

1 SCOPE

This specification prescribes the requirements, methods of sampling and test for food grade sodium bicarbonate ($NaHCO_3$).

2 REFERENCES

CS 102 Presentation of numerical values
SLS 312 Determination of arsenic
SLS 428 Random sampling methods.

3 REQUIREMENTS

3.1 General requirements

Sodium bicarbonate shall be in the form of opaque, monoclinic crystals or as white, crystalline fine powder, free from dirt and foreign matter.

3.2 Chemical requirements

Sodium bicarbonate shall also comply with the requirements given in Table 1 when tested in accordance with the methods prescribed in Column 4 of the table.

TABLE 1 : Chemical requirements for sodium bicarbonate

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Total alkalinity (as $NaHCO_3$), percent by mass, min.	99.0	Appendix A
ii)	pH value at 27 ± 2 °C, max.	8.8	Appendix B
iii)	Chlorides (as $\overline{Cl}$), percent by mass, max.	0.06	Appendix C
iv)	Insoluble matter, percent by mass, max.	0.1	Appendix D
v)	Sulfates (as SO_4), percent by mass, max.	0.07	Appendix E
vi)	Iron (as Fe), mg/kg, max.	40	Appendix F
vii)	Lead (as Pb), mg/kg, max.	5	Appendix G
viii)	Arsenic (as As), mg/kg, max.	1.5	Appendix H
ix)	Copper (as Cu), mg/kg, max.	30	Appendix J

4 PACKAGING AND MARKING

4.1 Packaging

4.1.1 Sodium bicarbonate shall be packed in well-closed containers.

4.1.2 The containers used shall not contaminate the contents with metals or other impurities.

4.2 Marking

Each container shall be marked or labelled legibly and indelibly with the following:

a) Name of the product, including the words "Food Grade" ;
b) Brand name or trade name, if any;
c) Net mass, in grams or in kilograms;
d) Name and address of the manufacturer and distributor, including the country of origin;
e) Batch or code number;
f) Date of manufacture; and
g) Date of expiry.

NOTE

Attention is drawn to the certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this standard.

5 SAMPLING

5.1 Lot

In any consignment all the containers of same size containing sodium bicarbonate belonging to one batch of manufacture or supply shall constitute a lot.

5.2 Scale of sampling

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

5.2.2 The number of containers to be selected from a lot shall be in accordance with the following table.

TABLE 2 - Scale of sampling

Number of containers in the lot (1)	Number of containers to be selected (2)
up to 15	2
16 to 25	3
26 to 50	5
51 to 100	8
101 and above	13

5.2.3 The containers shall be selected at random. In order to ensure randomness of selection tables of random numbers as given in SLS 428 shall be used.

5.3 Number of tests

5.3.1 Each container selected as in 5.2.2 shall be inspected for packaging and marking requirements.

5.3.2 A sufficient quantity of material shall be drawn from each container selected as in 5.2.2 and mixed to form a composite sample. The composite sample thus obtained shall be tested for the requirements given in 3.2.

6 METHODS OF TEST

6.1 Tests shall be carried out as prescribed in the relevant appendices of this specification.

6.2 Unless otherwise stated, reagents of analytical grade and distilled water or water of equivalent purity shall be used.

7 CRITERIA FOR CONFORMITY

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

7.1 Each container inspected as in 5.3.1 satisfies the relevant requirements.

7.2 The test results on composite sample when tested as in 5.3.2 satisfiy the relevant requirements.

APPENDIX A
DETERMINATION OF TOTAL ALKALINITY

A.1 REAGENTS

A.1.1 *Hydrochloric acid solution*, c(HCl) = 1 mol/l.

A.1.2 *Hydrochloric acid solution*, c(HCl) = 0.1 mol/l.

A.1.3 *Methyl orange or Bromothymol blue indicator*.

A.2 PROCEDURE

Weigh, to the nearest milligram, about 4.4 g of the sample and dissolve in 100 ml of freshly boiled and cooled water in a conical flask. Add 5 drops of methyl orange or bromothymol blue indicator and 50 ml of hydrochloric acid solution (A.1.1) using a burette. Stir the contents thoroughly and titrate with hydrochloric acid solution (A.1.2) until the colour changes from yellow to pinkish orange.

A.3 CALCULATION

$$\text{Total alkalinity (as } NaHCO_3\text{), per cent by mass} = \frac{8.4\ (V_1c_1 + V_2c_2)}{m}$$

where,

V_1 is the volume, in ml, of hydrochloric acid (A.1.1) added to the sample;
V_2 is the volume, in ml, of hydrochloric acid (A.1.2) required for the titration;
c_1 is the concentration, in mol/l, of hydrochloric acid (A.1.1) added to the sample;
c_2 is the concentration, in mol/l, of hydrochloric acid (A.1.2) used for the titration; and
m is the mass, in g, of the sample taken for the test.

APPENDIX B
DETERMINATION OF pH

B.1 PROCEDURE

Prepare a 1 per cent (m/v) solution of the sample in freshly boiled and cooled distilled water and determine the pH value using a pH meter with glass electrode at 27 $\pm$ 2°C.

APPENDIX C
DETERMINATION OF CHLORIDES

C.1 REAGENTS

C.1.1 *Nitric acid*, concentrated (rel. den. = 1.40).

C.1.2 *Silver nitrate*, 0.1 mol/l solution.

C.1.3 *Nitrobenzene*

C.1.4 *Ammonium thiocyanate solution*, c (NH_4 CNS) = 0.1 mol/l.

C.1.5 *Ferric ammonium sulfate indicator*, 5 per cent solution.

C.2 PROCEDURE

Weigh, to the nearest milligram, about 20 g of the sample and dissolve in a sufficient amount of water. Neutralize with nitric acid (C.1.1) and add about 5 ml in excess. Boil the solution to expel any dissolved carbon dioxide gas, cool and add accurately 10.00 ml of silver nitrate solution (C.1.2) using a pipette. Add 3 ml of nitrobenzene, shake vigorously and titrate with ammonium thiocyanate solution (C.1.4) using ferric ammonium sulfate (C.1.5) as an indicator.

C.3 CALCULATION

$$\text{Chlorides (as Cl), per cent by mass} = \frac{3.547\ (10\ c_1 - Vc_2)}{m} \times 100$$

where,

c is the concentration, in mol/l, of the silver nitrate solution;
V is the volume, in ml, of the ammonium thiocyanate solution required for the titration;
c is the concentration, in mol/l, of the ammonium thiocyanate solution; and
m is the mass, in g, of the sample taken for the test.

APPENDIX D
DETERMINATION OF INSOLUBLE MATTER

D.1 APPARATUS

D.1.1 *Sintered glass crucible*, G. No. 4.

D.2 PROCEDURE

Weigh, to the nearest milligram, about 10 g of the sample and transfer into a 400-ml beaker. Add about 200 ml of freshly boiled water and boil the resulting solution for 15 min. Filter any undissolved residue through a tared sintered glass crucible (D.1.1) and wash the residue with water until free from soluble salts. Dry the crucible with the residue at 105 °C to 110 °C to a constant mass.

D.3 CALCULATION

$$\text{Insoluble matter, per cent by mass} = \frac{m_1 - m_2}{m}$$

where,

m_1 is the mass, in g, of the crucible with the residue;
m_2 is the mass, in g, of the empty crucible; and
m is the mass, in g, of the sample taken for the test.

APPENDIX E
DETERMINATION OF SULFATES

E.1 APPARATUS

E.1.1 *Sintered glass crucible*, G. no. 4

E.2 REAGENTS

E.2.1 *Hydrochloric acid*, concentrated (rel. den = 1.18).

E.2.2 *Barium chloride*, 10 per cent (m/m) solution.

E.3 PROCEDURE

Weigh, to the nearest milligram, 10 g to 15 g of the sample and dissolve in about 100 ml of water. Add hydrochloric acid (**E.2.1**) carefully to make the solution acidic and boil to drive off completely the carbon dioxide formed. Cool and filter, if necessary, through a folded filter paper. Wash the filter paper thoroughly with water, collecting the filtrate and washings in a 500-ml beaker. Dilute to 250 ml, boil and add 10 ml of hot barium chloride solution (**E.2.2**) to the hot solution. Boil again for a few minutes. Allow the contents of the beaker to stand for 4 h and filter through a tared sintered glass crucible (**E.1.1**). Wash the precipitate with hot water until it is free from chlorides and dry at 105 °C to 110 °C to a constant mass.

E.3 CALCULATION

$$\text{Sulfate (as } SO_4\text{), per cent by mass} = \frac{41.15\ (m_1 - m_2)}{m_0}$$

where,

m_1 is the mass, in g, of the crucible with the contents;
m_2 is the mass, in g, of the empty crucible, and
m_0 is the mass, in g, of the sample taken for the determination.

APPENDIX F
DETERMINATION OF IRON

F.1 APPARATUS

F.1.1 *Stoppered cylinders*, 50-ml capacity.

F.2 REAGENTS

F.2.1 *Hydrochloric acid*, concentrated (rel. den = 1.18).

F.2.2 *Ammonium persulfate*

F.2.3 *Butanolic potassium thiocyanate solution*

Dissolve 10 g of potassium thiocyanate in 10 ml of water. Add a sufficient amount of n-butanol and make up the volume to 100 ml. Shake vigorously until the solution is clear.

F.2.4 *Standard iron solution*, containing 0.01 mg of iron (as Fe) in 1 ml of solution.

Dissolve 0.702 g of ferrous ammonium sulfate ($FeSO_4.(NH_4)_2SO_4.6H_2O$) in 10 ml of dilute sulfuric acid (10 per cent V/V) and dilute with water to 1000 ml. Dilute 10 ml of this solution, accurately measured, to 100 ml.

F.3 **PROCEDURE**

Weigh, to the nearest milligram, about 1 g of the sample. Dissolve it in 25 ml of water and neutralize with 5 ml of hydrochloric acid (F.2.1). Add 30 mg of ammonium persulfate and boil. Cool and transfer completely into a stoppered cylinder (F.1.1). Add 15 ml of butanolic potassium thiocyanate solution (F.2.3) and shake vigorously for 30 seconds and allow it to separate. Carry out a control test in another stoppered cylinder using 4 ml of the standard iron solution, in place of the sample and the same quantities of other reagents in the same total volume of the reaction mixture. Compare the colour produced.

The sample solution should not have a deeper colour than the control solution.

APPENDIX G
DETERMINATION OF LEAD

G.1 **APPARATUS**

G.1.1 *Nessler cylinders*, 50-ml capacity.

G.2 **REAGENTS**

G.2.1 *Hydrochloric acid*, concentrated (rel. den = 1.18).

G.2.2 *Standard lead solution*, containing 0.01 mg of lead (as Pb) in 1 ml of solution.

Dissolve 1.60 g of lead nitrate in water and make up the volume to 1000 ml. Transfer 10 ml of the solution, accurately measured, into a volumetric flask and dilute with water to 1000 ml.

G.2.3 *Acetic acid*, approximately 1 mol/l solution.

G.2.4 *Hydrogen sulfide solution*, saturated.

G.3 **PROCEDURE**

Weigh, to the nearest milligram, about 4 g of the sample and add 15 ml of water. Add 6 ml of hydrochloric acid (G.2.1) and evaporate to dryness on a water bath. Dissolve the residue in water and transfer this solution into a nessler cylinder. Dilute with water to 30 ml and add 1 ml of acetic acid (G.2.3) and 10 ml of hydrogen sulfide solution (G.2.4).

Carry out a control test in another nessler cylinder using 2 ml of standard lead solution (G.2.2) instead of the sample and the same quantities of other reagents.

Dilute the contents of each tube to 50 ml, shake well and compare the colour.

The colour of the sample solution should be not darker than that of the control.

APPENDIX H
DETERMINATION OF ARSENIC

H.1 **PROCEDURE**

Dissolve 1.000 g of the material in 10 ml of water and carry out the test for arsenic as prescribed in SLS 312, **Method 2.1 (Gutzeit method).**

APPENDIX J
DETERMINATION OF COPPER

J.1 **APPARATUS**

J.1.1 *Nessler cylinders*, 50-ml capacity.

J.2 **REAGENTS**

J.2.1 *Hydrochloric acid*, concentrated (rel. den. = 1.18).

J.2.2 *Nitric acid*, concentrated (rel. den. = 1.40).

J.2.3 *Citric acid*,

J.2.4 *Ammonium hydroxide*, dilute, approximately 5 mol/l solution.

J.2.5 *Sodium diethyldithiocarbamate solution*

Dissolve 1.0 g of sodium diethyldithiocarbamate in 1000 ml of copper free water. Filter and keep in an amber bottle to protect from light.

J.2.6 *Standard copper solution*, containing 0.01 mg of copper (Cu) in 1 ml of solution.

Dissolve 0.3928 g of copper sulfate pentahydrate in copper-free water and make up the volume to 1000 ml. Dilute 100 ml of this solution, accurately measured, with water to 1000 ml.

J.2.7 *Chloroform*

J.3 PROCEDURE

Weigh, to the nearest milligram, about 1 g of the sample and dissolve it in about 50 ml of water. Neutralize with hydrochloric acid (J.2.1) and add 4 to 5 drops of nitric acid (J.2.2). Boil and cool. Add 1 g of citric acid (J.2.3) and adjust the pH to 9 by adding ammonium hydroxide (J.2.4). Add 10 ml of sodium diethyldithiocarbamate solution (J.2.5) and extract four times with 2.5 ml portions of chloroform. Collect the chloroform extracts and filter through a dry filter into a nessler cylinder.

Carry out a control test using 3 ml of standard copper solution (J.2.6) in place of the sample.

The colour intensity of the sample solution should be not more than that of the control solution.

SRI LANKA STANDARDS INSTITUTION

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