

SODIUM SESQUICARBONATE

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SYNONYMS

Sodium monohydrogendicarbonate; INS No. 500(iii)

DEFINITION

Chemical names Sodium sesquicarbonate, sodium salt of carbonic acid

C.A.S. number 533-96-0

Chemical formula $C_2HNa_3O_6 \cdot 2H_2O$
 $Na_2CO_3-NaHCO_3 \cdot 2H_2O$

Formula weight $Na_2CO_3-NaHCO_3 \cdot 2H_2O$: 226.03
 Na_2CO_3 : 105.99
 $NaHCO_3$: 84.00

Assay Between 35.0 and 38.6% of $NaHCO_3$
Between 46.4 and 50.0% of Na_2CO_3

DESCRIPTION

White flakes, crystals or crystalline powder

FUNCTIONAL USES Alkali, buffering agent

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Freely soluble in water

Test for sodium (Vol. 4) Passes test

Test for carbonate
(Vol. 4) Passes test

PURITY

Water Between 13.8 and 16.7%
Calculate the percent of water by subtracting from 100 the sum of the percents of sodium bicarbonate, sodium carbonate, and sodium chloride found in the sample.

Sodium chloride Not more than 0.5%
See description under TESTS

Iron (Vol. 4) Not more than 20 mg/kg
See description under TESTS

Lead (Vol. 4) Not more than 2 mg/kg
Determine using an atomic absorption technique appropriate to the

specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."

TESTS

PURITY TESTS

Sodium chloride

Dissolve about 10 g of the sample, accurately weighed, in 50 ml of water in a 250-ml beaker, add sufficient nitric acid to make the solution slightly acid, then add 1 ml of ferric ammonium sulfate TS, and 1.0 ml of 0.05 N ammonium thiocyanate, and titrate with 0.05 N silver nitrate, stirring constantly, until the red colour is completely discharged. Finally, back titrate with 0.05 N ammonium thiocyanate, until a faint reddish colour is obtained. Subtract the total volume of 0.05 N ammonium thiocyanate added from the volume of 0.05 N silver nitrate required. Each ml of 0.05 N silver nitrate is equivalent to 2.922 mg of NaCl. Calculate the percent of sodium chloride in the sample taken.

Iron

Dissolve 500 mg of the sample in 10 ml of dilute hydrochloric acid TS, and dilute to 50 ml with water. Add about 40 mg of ammonium persulfate crystals and 10 ml of ammonium thiocyanate TS. Any red or pink colour does not exceed that produced by 1.0 ml of Iron Standard Solution (10 µg Fe) in an equal volume of solution containing 2 ml of hydrochloric acid TS and the quantities of ammonium persulfate and ammonium thiocyanate TS used in the test.

METHOD OF ASSAY

NaHCO₃: Weigh accurately about 8.5 g of the sample in a 250-ml flask, and dissolve it in 50 ml of carbon dioxide-free water. Titrate with 1 N sodium hydroxide until a drop of the solution, when added to a drop of a 1-in-10 solution of silver nitrate TS on a spot plate, produces a dark brown colour. Each ml of 1 N sodium hydroxide is equivalent to 84.01 mg of NaHCO₃.
Na₂CO₃: Weigh accurately about 4.2 g of the sample in a 250 ml flask, and dissolve it by adding 100 ml of water. Add 3 drops of methyl orange TS and titrate with 1 N sulfuric acid, stirring vigorously near the end point to expel carbon dioxide. Each ml of 1 N sulfuric acid is equivalent to 30.99 mg of Na₂O. Calculate the percent of sodium carbonate in the sample by the formula

$$[\% \text{Na}_2\text{O} - (\% \text{NaHCO}_3 \times 0.3689)] \times 1.7099$$

where % NaHCO₃ is the percent of sodium bicarbonate determined in the Assay for sodium bicarbonate; 0.3689 is a factor converting NaHCO₃ to Na₂O and 1.7099 is a factor converting Na₂O to Na₂CO₃.