Calcium carbonate (Calcii carbonas)

Molecular formula. $CaCO_3$

Relative molecular mass. 100.1

Chemical name. Calcium carbonate (1:1); CAS Reg. No. 471-34-1.

Description. A white, fine, microcrystalline powder; odourless.

Solubility. Practically insoluble in water and ethanol (~750 g/l) TS. It dissolves with effervescence in acetic acid (~60 g/l) TS, hydrochloric acid (~70 g/l) TS, and nitric acid (~130 g/l) TS.

Category. Antacid.

Storage. Calcium carbonate should be kept in a well-closed container.

Requirements

Definition. Calcium carbonate contains not less than 98.0% and not more than 100.5% of $CaCO_3$, calculated with reference to the dried substance.

Identity tests

A. Dissolve 20 mg in 0.3 mL of hydrochloric acid (~70 g/l) TS and 2 mL of water, and filter. The filtrate yields the reactions described under 2.1 General identification tests as characteristic of calcium.

B. To 0.10 g add 1.0 mL of acetic acid (~300 g/l) TS; a gas evolves that is colourless and odourless. Pass the evolved gas into calcium hydroxide TS; a white precipitate is produced immediately.

Heavy metals. Dissolve 5 g in 80 mL of acetic acid (~60 g/l) TS; when effervescence ceases, boil the solution for 2 minutes, allow to cool, dilute to 100 mL with acetic acid (~60 g/l) TS and, if necessary, filter through a sintered glass filter (retain the filter for the test of substances insoluble in acetic acid). Determine the heavy metals content in 20 mL of the filtrate (keep the remaining filtrate for the limit test for barium), as described under 2.2.3 Limit test for heavy metals, according to Method A; not more than 30 µg/g.

Arsenic. Use a solution of 3.3 g in 35 mL of hydrochloric acid (~70 g/l) TS and proceed as described under 2.2.5 Limit test for arsenic; the arsenic content is not more than 3 µg/g.

Barium. To 10 mL of the filtrate retained from the limit test for heavy metals add 10 mL of calcium sulfate TS (solution A). Mix a further 10 mL of the filtrate with 10 mL of water (solution B). After not less than 15 minutes, solution A is not more opalescent than solution B.

Iron. Dissolve 0.20 g in 10 mL of hydrochloric acid (~70 g/l) TS and dilute to 40 mL with water. Proceed with the 2.2.4 Limit test for iron; not more than 200 µg/g.

Magnesium and alkali metals. Dissolve 1.0 g in 10 mL of hydrochloric acid (~70 g/l) TS, boil for 2 minutes and add 20 mL of water, 1 g of ammonium chloride R, and 0.1 mL of methyl red/ethanol TS. Add ammonia (~100 g/l) TS drop by drop until the solution changes colour, and then add a further 2 mL. Heat to boiling and add 40 mL of hot ammonium oxalate (50 g/l) TS. Allow to stand for 4 hours, dilute to 100 mL with water and filter. To 50 mL of the filtrate add 0.25 mL of sulfuric acid (~100 g/l) TS and evaporate to dryness on a water-bath. Ignite the residue to constant weight at 600 °C; not more than 5 mg.

Substances insoluble in acetic acid. Wash the filter retained from the test for heavy metals with 4 successive quantities, each of 5 mL of hot water, and dry at 105 °C for 1 hour; the residue weighs not more than 10 mg.

Loss on drying. Dry to constant weight at 200 °C; it loses not more than 20 mg/g.

Assay. Dissolve about 0.15 g, accurately weighed, in a mixture of 3 mL of hydrochloric acid (~70 g/l) TS and 20 mL of water, boil for 2 minutes, allow to cool, and dilute to 50 mL with water. Proceed with the titration as described under 2.5 Complexometric titrations for calcium. Each mL of disodium edetate (0.05 mol/l) VS is equivalent to 5.004 mg of $CaCO_3$.