GLUCONO-δ-LACTONE

Prepared at the 51st JECFA (1998), published in FNP 52 Add 6 (1998) superseding specifications prepared at the 30th JECFA (1986), published in FNP 37 (1986) and republished in FNP 52 (1992). Group ADI "not specified" for glucono-delta-lactone and gluconates, excluding ferrous gluconate, established at the 51st JECFA in 1998.

SYNONYMS Glucono-delta-lactone, gluconolactone, delta-gluconolactone, GDL; INS No. 575

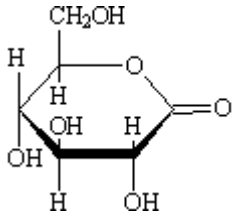
DEFINITION Glucono-delta-lactone is the cyclic 1,5-intramolecular ester of D-gluconic acid. In aqueous media it is hydrolyzed to an equilibrium mixture of D-gluconic acid (55-66%) and the delta- and gamma-lactones.

Chemical names D-Glucono-1,5-lactone, D-gluconic acid delta-lactone

C.A.S. number 90-80-2

Chemical formula $C_6H_{10}O_6$

Structural formula



Formula weight 178.14

Assay Not less than 99.0% on the dried basis

DESCRIPTION White, odourless or nearly odourless crystals or crystalline powder

FUNCTIONAL USES Acidifier, raising agent, sequestrant

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Freely soluble in water; sparingly soluble in ethanol

Colour reaction To 1 ml of a 1 in 50 solution, add 1 drop of ferric chloride TS. A deep yellow colour is produced

Test for gluconate (Vol. 4) Passes test

PURITY

Loss on drying (Vol. 4) Not more than 1% (105°, 2 h)

Sulfated ash (Vol. 4) Not more than 0.1%

Test 2 g of the sample (Method I)

Reducing substances — Not more than 0.5% (as D-glucose)
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.”
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TESTS

PURITY TESTS

Reducing substances — Weigh accurately 10 g into a 400-ml beaker, dissolve the sample in 40 ml of water, add phenolphthalein TS, and neutralize with sodium hydroxide solution (1 in 2). Dilute to 50 ml with water, and add 50 ml of alkaline cupric tartrate TS. Heat the mixture on an asbestos gauze over a Bunsen burner, regulating the flame so that boiling begins in 4 min, and continue the boiling for exactly 2 min. Filter through a Gooch crucible, wash the filter with 3 ml or more small portions of water, and place the crucible in an upright position in the original beaker. Add 5 ml of water and 3 ml of nitric acid to the crucible, mix with a stirring rod to ensure complete solution of the cuprous oxide, and wash the solution into a beaker with several ml of water. To the beaker add sufficient bromine TS (5 to 10 ml) until the colour becomes yellow, and dilute with water to about 75 ml. Add a few glass beads, boil over a Bunsen burner until the bromine is completely removed, and cool. Slowly add ammonium hydroxide until a deep blue colour appears, then adjust the pH to approximately 4 with glacial acetic acid, and dilute to about 100 ml with water. Add 4 g of potassium iodide, and titrate with 0.1 N sodium thiosulfate, adding starch TS just before the endpoint is reached. Not more than 16.1 ml is required.

METHOD OF ASSAY

Dissolve about 0.6 g of the dried sample, accurately weighed, in 50 ml of 0.1 N sodium hydroxide, and allow to stand for 20 min. Add 3 drops of phenolphthalein TS, and titrate the excess sodium hydroxide with 0.1 N sulfuric acid. Perform a blank determination, and make any necessary correction. Each ml of 0.1 N sodium hydroxide is equivalent to 17.81 mg of $C_6H_{10}O_6$.