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Lithium Carbonate

Li_2CO_3 73.89

Carbonic acid, dilithium salt;

Dilithium carbonate CAS RN[®]: 554-13-2; UNII: 2BMD2GNA4V.

DEFINITION

Change to read:

Lithium Carbonate contains[▲]NLT 98.0% and NMT 102.0%[▲] (USP 1-Aug-2020) of lithium carbonate (Li_2CO_3), calculated on the dried basis.

IDENTIFICATION

• **A.** It effervesces upon the addition of an acid, yielding a colorless gas that, when passed into calcium hydroxide TS, immediately forms a white precipitate.

Change to read:

• **B.** [▲]The retention time of the lithium peak of the *Sample solution* corresponds to that of the lithium peak of the *Standard solution*, as obtained in the Assay. [▲](USP 1-Aug-2020)

ASSAY

Change to read:

• PROCEDURE

[▲]Polymeric containers, such as containers made of polymethylpentene (PMP), are used in the preparation of the *Standard solution* and *Sample solution*. Use water with a resistivity of NLT 18 megohm-cm to prepare the solutions.

Mobile phase: 35 mM [methanesulfonic acid](#) in [water](#). [NOTE—It is recommended to use a suitable cation trapping technique to ensure that the *Mobile phase* is sufficiently free of cationic impurities.]

Diluent: [0.01 N hydrochloric acid](#)

Standard solution: 100 µg/mL of [USP Lithium Carbonate RS](#) in *Diluent*

Sample solution: 100 µg/mL of Lithium Carbonate in *Diluent*

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: Conductivity with suppression

Columns

Guard: 5-mm × 5-cm; 5.5-µm packing [L84](#)

Analytical: 5-mm × 25-cm; 5.5-µm packing [L84](#)

Column temperature: 50°

Flow rate: 1 mL/min

Injection volume: 10 µL

Run time: NLT 5 times the retention time of lithium

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 1.2

Relative standard deviation: NMT 1.5%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of lithium carbonate (Li_2CO_3) in the portion of Lithium Carbonate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response of lithium from the *Sample solution*

r_S = peak response of lithium from the *Standard solution*

C_s = concentration of [USP Lithium Carbonate RS](#) in the *Standard solution* (µg/mL)

C_u = concentration of Lithium Carbonate in the *Sample solution* (µg/mL) ▲ (USP 1-Aug-2020)

Acceptance criteria: ▲98.0%–102.0%▲ (USP 1-Aug-2020) on the dried basis

IMPURITIES

• ALUMINUM AND IRON

Sample solution: Dissolve 500 mg of Lithium Carbonate in 10 mL of [water](#) by the dropwise addition, with agitation, of [hydrochloric acid](#).

Analysis: Boil the *Sample solution*, then cool it. To 5 mL of the solution add [6 N ammonium hydroxide](#) until the reaction is alkaline.

Acceptance criteria: No turbidity or precipitate is observed.

Delete the following:

▲• CALCIUM

Sample solution: Suspend 5.0 g of Lithium Carbonate in 50 mL of water, and add a slight excess of 3 N hydrochloric acid. Boil the clear solution to expel carbon dioxide, add 5 mL of ammonium oxalate TS, render alkaline with 6 N ammonium hydroxide, and allow to stand for 4 h. Pass through a filtering crucible, and wash with warm water until the last washing yields no turbidity with calcium chloride TS. Place the crucible in a beaker, cover the crucible with water, add 3 mL of sulfuric acid, and heat to 70°.

Analysis: Titrate the *Sample solution* with 0.10 N potassium permanganate to a pale pink color that persists for 30 s.

Acceptance criteria: NMT 3.8 mL of 0.10 N potassium permanganate is consumed (0.15%).▲ (USP 1-Aug-2020)

Delete the following:

▲• SODIUM

Standard stock solution: 500 µg/mL of sodium prepared as follows. Dissolve 1.271 g of sodium chloride, previously dried at 130° to constant weight, in water in a 1000-mL volumetric flask. Dilute with water to volume.

Sample stock solution: 100 mg/mL of Lithium Carbonate prepared as follows. Suspend 20.0 g of Lithium Carbonate in 100 mL of water, cautiously add 50.0 mL of hydrochloric acid, transfer to a 200-mL volumetric flask, and dilute with water to volume.

Standard solution: Transfer 1 mL of *Standard stock solution* and 5 mL of *Sample stock solution* to a 100-mL volumetric flask, and dilute with water.

Sample solution: 5 mg/mL of Lithium Carbonate from *Sample stock solution* diluted with water

Instrumental conditions

Mode: Flame photometry

Analytical wavelengths: 580 and 589 nm

Analysis

Samples: *Standard solution* and *Sample solution*

Set the flame photometer for maximum emission at 589 nm, using the *Standard solution*. Measure the emission intensities of the *Sample solution* at 580 and 589 nm.

Acceptance criteria: The difference between the intensities observed at 580 and 589 nm for the *Sample solution* does not exceed the difference between the intensities observed at 589 nm for the *Sample solution* and the *Standard solution*, respectively (0.1%).▲ (USP 1-Aug-2020)

Add the following:

▲• CALCIUM AND SODIUM

Mobile phase, Diluent, Sample solution, and Chromatographic system: Proceed as directed in the Assay.

System suitability solution: 100 µg/mL of [USP Lithium Carbonate RS](#), 0.1 µg/mL of sodium ions, and 0.15 µg/mL of calcium ions (from commercially available NIST-traceable ion chromatography sodium and calcium ion standard solutions) in *Diluent*

Standard solution: 0.1 µg/mL of sodium ions and 0.15 µg/mL of calcium ions (from commercially available NIST-traceable ion chromatography sodium and calcium ion standard solutions) in *Diluent*

System suitability

Samples: *System suitability solution* and *Standard solution*

[NOTE—The relative retention times for lithium, sodium, and calcium are 1.0, 1.3, and 3.5, respectively.]

Suitability requirements

Resolution: NLT 4.0 between lithium and sodium ions, *System suitability solution*

Tailing factor: NMT 1.5 for sodium and calcium ions, *System suitability solution*

Relative standard deviation: NMT 5.0% for sodium and calcium ions, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of sodium or calcium in the portion of Lithium Carbonate taken:

$$\text{Result} = (r_u/r_s) \times (C_s/C_u) \times 100$$

r_u = peak response of sodium or calcium from the *Sample solution*

r_s = peak response of sodium or calcium from the *Standard solution*