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Magnesium Carbonate

Carbonic acid, magnesium salt, basic; or, Carbonic acid, magnesium salt (1:1), hydrate;
 Magnesium carbonate, basic; or, Magnesium carbonate (1:1) hydrate CAS RN®: 23389-33-5.
 Anhydrous

84.31 CAS RN®: 546-93-0; UNII: 0IHC698356.

DEFINITION

Magnesium Carbonate is a basic hydrated magnesium carbonate or a normal hydrated magnesium carbonate. It contains the equivalent of NLT 40.0% and NMT 43.5% of magnesium oxide (MgO).

IDENTIFICATION

- **A. IDENTIFICATION TESTS—GENERAL (191), [Chemical Identification Tests, Magnesium](#)**

Sample solution: When treated with 3 N [hydrochloric acid](#), it dissolves with effervescence.

Acceptance criteria: Meets the requirements

- **B. IDENTIFICATION TESTS—GENERAL (191), [Chemical Identification Tests, Carbonate](#)**

Analysis: Proceed as directed in test A.

Acceptance criteria: Meets the requirements

ASSAY

- **PROCEDURE**

Sample: 1 g of Magnesium Carbonate

Titrimetric system

Mode: Residual titration

Titrant: [1 N sodium hydroxide VS](#)

Endpoint detection: Visual

Analysis: Dissolve the *Sample* in 30.0 mL of [1 N sulfuric acid VS](#), add [methyl orange TS](#), and titrate the excess acid with *Titrant*. Perform the blank determination. Calculate the volume, V_B , of [1 N sulfuric acid VS](#), in mL, consumed by the *Sample*:

$$\text{Result} = (V_B - V_A) \times N_{\text{NaOH}}$$

V_B = volume of *Titrant* consumed by the blank determination (mL)

V_A = volume of *Titrant* consumed by the *Sample* (mL)

N_{NaOH} = actual normality of the sodium hydroxide solution

Calculate the volume of [1 N sulfuric acid VS](#), V_{Ca} , in mL, consumed by calcium, which is present in the portion of Magnesium Carbonate taken for the Assay:

$$\text{Result} = (W \times L_{Ca}) / (F_{Ca} \times 100)$$

W = weight of Magnesium Carbonate taken (mg)

L_{Ca} = content of calcium as determined in the test for *Limit of Calcium* (%)

F_{Ca} = weight of Ca that is equivalent to each mL of [1 N sulfuric acid VS](#), 20.04 mg

Calculate the percentage of magnesium oxide (MgO) in the portion of Magnesium Carbonate taken:

$$\text{Result} = (V_S - V_{Ca}) \times F_{\text{MgO}} / W \times 100$$

V_S = volume of [1 N sulfuric acid VS](#) consumed by the *Sample*, as calculated above (mL)

V_{Ca} = volume of [1 N sulfuric acid VS](#) consumed by calcium, as calculated above (mL)

F_{MgO} = weight of MgO that is equivalent to each mL of [1 N sulfuric acid VS](#), 20.15 mg

W = weight of Magnesium Carbonate taken (mg)

Acceptance criteria: 40.0%–43.5% of magnesium oxide (MgO)

IMPURITIES

• SOLUBLE SALTS

Sample: 2.0 g of Magnesium Carbonate

Analysis: Mix the *Sample* with 100 mL of a mixture of equal volumes of [n-propyl alcohol](#) and [water](#). Heat the mixture to the boiling point with constant stirring, cool to room temperature, dilute with [water](#) to 100 mL, and filter. Evaporate 50 mL of the filtrate on a steam bath to dryness, and dry at 105° for 1 h.

Acceptance criteria: The weight of the residue does not exceed 10 mg (NMT 1.0%).

• ACID-INSOLUBLE SUBSTANCES

Sample: 5.0 g of Magnesium Carbonate

Analysis: Mix the *Sample* with 75 mL of [water](#), add [hydrochloric acid](#) in small portions, with agitation, until no more of the magnesium carbonate dissolves, and boil for 5 min. If an insoluble residue remains, filter, wash well with [water](#) until the last washing is free from chloride, and ignite.

Acceptance criteria: The weight of the ignited residue does not exceed 2.5 mg (NMT 0.05%).

Change to read:

- [▲ ARSENIC \(211\), Procedures, Procedure 1 ▲](#) (CN 1-JUN-2023)

Test preparation: 750 mg of Magnesium Carbonate in 25 mL of 3 N [hydrochloric acid](#)

Acceptance criteria: NMT 4 ppm

• LIMIT OF CALCIUM

[NOTE—A commercially available atomic absorption standard solution for calcium may be used where preparation of a calcium standard stock solution is described below. Concentrations of the *Standard solutions* and the *Sample solution* may be modified to fit the linear or working range of the instrument.]

Dilute hydrochloric acid: Dilute 100 mL of [hydrochloric acid](#) with [water](#) to 1000 mL.

Lanthanum solution: 50 mg/mL of lanthanum prepared as follows. To 58.65 g of [lanthanum oxide](#) add 400 mL of [water](#), and add, gradually with stirring, 250 mL of [hydrochloric acid](#). Stir until dissolved, and dilute with [water](#) to 1000 mL.

Blank solution: Transfer 4 mL of the *Lanthanum solution* and 10 mL of *Dilute hydrochloric acid* to a 200-mL volumetric flask, and dilute with [water](#) to volume.

Standard stock solution: 1.0 mg/mL of calcium prepared as follows. Transfer 249.7 mg of calcium carbonate, previously dried at 300° for 3 h and cooled in a desiccator for 2 h, to a 100-mL volumetric flask. Dissolve in a minimum amount of [hydrochloric acid](#), and dilute with [water](#) to volume.

Standard solution 1: 1.0 µg/mL of calcium prepared as follows. Transfer 1.0 mL of *Standard stock solution* to a 1000-mL volumetric flask containing 20 mL of the *Lanthanum solution* and 40 mL of *Dilute hydrochloric acid*, and dilute with [water](#) to volume.

Standard solution 2: 5.0 µg/mL of calcium prepared as follows. Transfer 5.0 mL of *Standard stock solution* to a 1000-mL volumetric flask containing 20 mL of the *Lanthanum solution* and 40 mL of *Dilute hydrochloric acid*, and dilute with [water](#) to volume.

Standard solution 3: 10.0 µg/mL of calcium prepared as follows. Transfer 10.0 mL of *Standard stock solution* to a 1000-mL volumetric flask containing 20 mL of the *Lanthanum solution* and 40 mL of *Dilute hydrochloric acid*, and dilute with [water](#) to volume.

Standard solution 4: 15.0 µg/mL of calcium prepared as follows. Transfer 15.0 mL of *Standard stock solution* to a 1000-mL volumetric flask containing 20 mL of the *Lanthanum solution* and 40 mL of *Dilute hydrochloric acid*, and dilute with [water](#) to volume.

Sample solution: 1.25 mg/mL of Magnesium Carbonate prepared as follows. Transfer 250 mg of Magnesium Carbonate to a beaker, add 30 mL of *Dilute hydrochloric acid*, and stir until dissolved, heating if necessary. Transfer the solution so obtained to a 200-mL volumetric flask containing 4 mL of *Lanthanum solution*, and dilute with [water](#) to volume.

Instrumental conditions

(See [Atomic Absorption Spectroscopy \(852\)](#).)

Mode: Atomic absorption spectrophotometry

Analytical wavelength: 422.7 nm

Lamp: Calcium hollow-cathode

Flame: Nitrous oxide-acetylene

Analysis

Samples: *Blank solution*, *Standard solutions*, and *Sample solution*

Using the *Blank solution* as blank, determine the concentration, C_s , in µg/mL, of calcium in the *Sample solution* using the calibration graph.

Calculate the percentage of calcium in the portion of Magnesium Carbonate taken:

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

C_s = concentration of calcium in the *Sample solution* determined (µg/mL)

F = unit conversion factor, 0.001 mg/µg

C_U = concentration of Magnesium Carbonate in the *Sample solution* (mg/mL)

Acceptance criteria: NMT 0.45%

Change to read:

- ▲ [IRON \(241\), Procedures, Procedure 1](#) ▲ (CN 1-JUN-2023)

Test preparation: Boil 50 mg of Magnesium Carbonate with 5 mL of 2 N [nitric acid](#) for 1 min. Cool, dilute with [water](#) to 45 mL, add 2 mL of [hydrochloric acid](#), and mix.

Acceptance criteria: NMT 200 ppm

SPECIFIC TESTS

- [MICROBIAL ENUMERATION TESTS \(61\)](#) and [TESTS FOR SPECIFIED MICROORGANISMS \(62\)](#): It meets the requirements of the test for absence of *Escherichia coli*.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers.

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
MAGNESIUM CARBONATE	Documentary Standards Support	SM32020 Small Molecules 3
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM32020 Small Molecules 3

Chromatographic Database Information: [Chromatographic Database](#)

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