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Magnesium Chloride

$MgCl_2 \cdot 6H_2O$ 203.30

Magnesium chloride, hexahydrate CAS RN®: 7791-18-6; UNII: 02F3473H9O.

Anhydrous 95.21 CAS RN®: 7786-30-3; UNII: 59XN63C8VM.

DEFINITION

Magnesium Chloride contains NLT 98.0% and NMT 101.0% of $MgCl_2 \cdot 6H_2O$.

IDENTIFICATION

- **A. Identification Tests—General, *Magnesium*⟨191⟩**

  Sample solution: 50 mg/mL

- **B. Identification Tests—General, *Chloride*⟨191⟩**

  Sample solution: 50 mg/mL

  [Note—Acidify the *Sample solution* with diluted nitric acid before adding 6 N ammonium hydroxide.]

ASSAY

- **Procedure**

  Sample: 450 mg

  Analysis: Dissolve the *Sample* in 25 mL of water, add 5 mL of ammonia–ammonium chloride buffer TS and 0.1 mL of eriochrome black TS, and titrate with 0.05 M edetate disodium VS to a blue endpoint. Each mL of 0.05 M disodium edetate is equivalent to 10.17 mg of $MgCl_2 \cdot 6H_2O$.

  Acceptance criteria: 98.0%–101.0%

IMPURITIES

- **Insoluble Matter**

  Sample: 20 g

  Analysis: Dissolve the *Sample* in 200 mL of water, heat to boiling, and digest in a covered beaker on a steam bath for 1 h. Filter through a tared filtering crucible, wash thoroughly, dry at 115°, and determine the weight of the residue.

  Acceptance criteria: NMT 0.005%

- **Chloride and Sulfate, *Sulfate*⟨221⟩**

  Sample: 10 g

  Acceptance criteria: It shows no more sulfate than corresponds to 0.50 mL of 0.020 N sulfuric acid (0.005%).

- **Barium**

  Sample: 1 g

  Analysis: Dissolve the *Sample* in 10 mL of water, and add 1 mL of 2 N sulfuric acid.

  Acceptance criteria: No turbidity is produced within 2 h.

- **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: 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.

Standard solutions: 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. Transfer 1.0, 5.0, 10.0, and 15.0 mL of this stock solution to separate 1000-mL volumetric flasks, each containing 20 mL of *Lanthanum solution* and 40 mL of *Dilute hydrochloric acid*. Dilute with water to volume. These *Standard solutions* contain 1.0, 5.0, 10.0, and 15.0 µg/mL of calcium, respectively.

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

Sample solution: Transfer 10.0 g of Magnesium Chloride to a 200-mL volumetric flask, and add water to dissolve. Add 4 mL of *Lanthanum solution*, and dilute with water to volume.

Instrumental conditions

(See *Atomic Absorption Spectroscopy* ⟨852⟩.)

Mode: Atomic absorption spectrophotometry

Lamp: Calcium hollow-cathode

Flame: Nitrous oxide–acetylene

Analytical wavelength: Calcium emission line at 422.7 nm

Analysis

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

Determine the concentration, C, in µg/mL, of calcium in the *Sample solution* using the calibration graph.

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

$$\text{Result} = (V/W \times C \times F) \times 100$$

V = volume of the *Sample solution* (mL)

W = weight of Magnesium Chloride taken (mg)

C = as defined above

F = conversion factor from µg/mL to mg/mL, 0.001

Acceptance criteria: NMT 0.01%

• **Potassium**

Sample solution: 5 g

Analysis: Dissolve the *Sample* in 5 mL of water, and add 0.2 mL of sodium bitartrate TS.

Acceptance criteria: No turbidity is produced within 5 min.

Change to read:

• ▲**Aluminum** ⟨206⟩, *Procedure 1*▲ (CN 1-Jun-2023) (where it is labeled as intended for use in hemodialysis)

Test preparation: Prepare as directed in the chapter, using 2.0 g.

Acceptance criteria: NMT 1 ppm

SPECIFIC TESTS

• **pH** ⟨791⟩

Sample solution: 50 mg/mL in carbon dioxide-free water

Acceptance criteria: 4.5–7.0

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight containers.

• **Labeling:** Where Magnesium Chloride is intended for use in hemodialysis, it is so labeled.

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

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

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