

METHOD #: 242.1 Approved for NPDES (Editorial Revision 1974, 1978)

TITLE: Magnesium (AA, Direct Aspiration)

ANALYTE: CAS # Mg Magnesium 7439-95-4

INSTRUMENTATION: AA

STORET No. Total 00927
Dissolved 00925
Suspended 00926

Optimum Concentration Range: 0.02-0.5 mg/L using a wavelength of 285.2 nm

Sensitivity: 0.007 mg/L

Detection Limit: 0.001 mg/L

1.0 Preparation of Standard Solution

- 1.1 Stock Solution: Dissolve 0.829 g of magnesium oxide, MgO (analytical reagent grade), in 10 mL of redistilled HNO₃ and dilute to 1 liter with deionized distilled water. 1 mL = 0.50 mg Mg (500 mg/L).
- 1.2 Lanthanum chloride solution: Dissolve 29 g of La₂O₃, slowly and in small portions in 250 mL conc. HCl, (Caution: Reaction is violent), and dilute to 500 mL with deionized distilled water.
- 1.3 Prepare dilutions of the stock magnesium solution to be used as calibration standards at the time of analysis. To each 10 mL volume of calibration standard and sample alike add 1.0 mL of the lanthanum chloride solution, i.e., 20 mL of standard or sample + 2 mL LaCl₃ = 22 mL.

2.0 Sample Preservation

- 2.1 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.

3.0 Sample Preparation

- 3.1 For the analysis of total magnesium in domestic and industrial effluents, the procedures for the determination of total metals as given in parts 4.1.3 and 4.1.4 of the Atomic Absorption Methods section of this manual have been found to be satisfactory.
- 3.2 For ambient waters, a representative aliquot of a well-mixed sample may be used directly for analysis. If suspended solids are present in sufficient amounts to clog the nebulizer, the sample may be allowed to settle and the supernatant liquid analyzed directly.
- 3.3 Samples should be preserved with (1:1) nitric acid to a pH of 2 at the time of collection.

4.0 Instrumental Parameters (General)

- 4.1 Magnesium hollow cathode lamp
- 4.2 Wavelength: 285.2 nm
- 4.3 Fuel: Acetylene
- 4.4 Oxidant: Air
- 4.5 Type of flame: Oxidizing

5.0 Notes

- 5.1 The interference caused by aluminum at concentrations greater than 2 mg/L is masked by addition of lanthanum. Sodium, potassium and calcium cause no interference at concentrations less than 400 mg/L.
- 5.2 The following line may also be used: 202.5 nm Relative Sensitivity 25
- 5.3 To cover the range of magnesium values normally observed in surface waters (0.1-20 mg/L), it is suggested that either the 202.5 nm line be used or the burner head be rotated. A 90° rotation of the burner head will produce approximately one-eighth the normal sensitivity.
- 5.4 Data to be entered into STORET must be reported as mg/l
- 5.5 The gravimetric method may also be used (Standard Methods, 14th Edition, p 221).

6.0 Precision and Accuracy

- 6.1 In a single laboratory (EMSL), using distilled water spiked at concentrations of 2.1 and 8.2 mg Mg/L the standard deviations were ± 0.1 and ± 0.2 , respectively. Recoveries at both of these levels were 100%.