

# Atomic Absorption Method Guide

## Mg in plant materials

### Key Words

- Plant Materials
- Magnesium
- Flame
- Atomic Absorption

### Principle

The sample is digested in mixed nitric/sulphuric/perchloric acids, and magnesium is determined by flame atomic absorption spectrometry using an air-acetylene flame. Lanthanum is added to all solutions to overcome potential phosphate interference.

### Reagents

Nitric acid (AnalaR grade, concentrated, s.g. 1.42)

Sulphuric acid (AnalaR grade, concentrated, s.g. 1.84)

Perchloric acid (AnalaR grade, concentrated, 72%)

Lanthanum chloride (Spectrosol grade, 10% m/v La<sup>3+</sup>)

Magnesium master standard (1000mg/L, Spectrosol or equivalent)

Magnesium sub-stock standard solution (50.0mg/L)

Transfer 5.0mL of magnesium master standard to a 100.0mL volumetric flask, dilute to volume with deionised water.

### Working standards

Transfer 0, 0.5 and 1.0mL of the magnesium sub-stock standard solution into a series of 100mL volumetric flasks containing 20mL of deionised water. Add 1.0mL of sulphuric acid and 0.5mL of lanthanum chloride solution to each flask and dilute to volume with deionised water. The working standards will contain 0, 0.25 and 0.50mg/L of magnesium.

### Sample Preparation

Weigh 0.200g of dry plant material into a 100mL long necked Kjeldahl flask, add 1.0mL of sulphuric acid, 5.0mL of nitric acid and 1.0mL of perchloric acid. Heat gently until the initial reaction subsides, then heat more strongly until white fumes of sulphuric acid appear. Continue to heat for 15 minutes, then cool and transfer to a 100.0mL volumetric flask and dilute to volume with deionised water. The total digestion time will be 1-1.5 hours. Transfer 10.0mL of this solution to a 100mL flask, add 1.0mL of sulphuric acid and 0.5mL of lanthanum chloride

solution and dilute to volume with deionised water. 0.5mg/L in solution is equivalent to 0.25% m/m of magnesium in the original sample.

### Instrument Parameters

The screenshot displays two panels of the instrument software interface. The top panel, titled 'Mg plants (Mg)', contains the following settings: Measurement Mode: Absorption; Number of Resamples: 3; Fast Resamples: checked; Measurement Time: 4.0 s; Wavelength: 285.2 nm; Lamp Current: 75%; Bandpass: 0.5 nm; Optimise Spectrometer Parameters: unchecked; Signal: Continuous; Transient Peak Measurement: Measure From: 0.00, To: 1.00; High Resolution: unchecked; Background Correction: D2 Quadline; Flier Rejection: Use Flier Rejection: unchecked, Rejection Limit: 35; RSD Test: Use Test: unchecked, If RSD greater than: 0%, AND signal greater than: 0.1 Abs, Then: Flag and Continue. The bottom panel, also titled 'Mg plants (Mg)', contains the following settings: Flame Type: Air-Acetylene; Fuel Flow: 1.1 L/min; Optimise Fuel Flow: unchecked; Auxiliary Oxidant: unchecked; Stabilisation: Burner Stabilisation Time: 0 min, Nebuliser Uptake Time: 4 s; Burner Height: Burner Height: 7.0 mm, Optimise Burner Height: checked.

Figure 1 Instrument parameters

## Results

Sample	Heather (1)	Heather (2)	Oak leaves	Peat
Magnesium found (%m/m)	0.069	0.12	0.19	0.076
Reference value (%m/m)	0.067 - 0.075	0.12 - 0.13	0.17 - 0.19	0.065 - 0.078

The method of sample treatment described in this publication should be performed only by a competent chemist or technician trained in the use of safe techniques in analytical chemistry. Users should acquaint themselves with particular hazards which may be incurred when toxic materials are being analysed and handled in the instruments, and the instrument must be used in accordance with the operating and safety instructions given in the Operators manual.

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