

Atomic Absorption Method Guide

Cu in Plant Materials

Key Words

- Plant Materials
- Copper
- Flame
- Atomic Absorption

Principle

The sample is digested in mixed nitric/sulphuric/perchloric acids and copper is determined by flame atomic absorption spectrometry.

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 %)

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

Copper sub-stock standard solution (5.0 mg/L)

Transfer 0.5 mL of copper master standard solution to a 100.0 mL volumetric flask, dilute to volume with deionised water.

Working standards

Transfer 0, 5.0 and 10.0 mL of the copper sub-stock standard solution into a series of 100 mL volumetric flasks containing 20 mL of deionised water. Add 1.0 mL of sulphuric acid to each flask and dilute to volume with deionised water. The working standards will contain 0, 0.25 and 0.5 mg/L of copper.

Sample Preparation

Weigh 0.200 g of dry plant material into a 100 mL long necked Kjeldahl flask, add 1.0 mL of sulphuric acid, 5.0 mL of nitric acid and 1.0 mL 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 50.0 mL volumetric flask and dilute to volume with deionised water. The total digestion time will be 1 - 1.5 hours. 0.5 mg/L in solution is equivalent to 125 µg/g of copper in the original sample.

Instrument Parameters

The image shows two screenshots of the instrument software interface. The top screenshot displays the 'Measurement Mode' section, which includes settings for 'Absorption' mode, 'Number of Resamples' (3), 'Fast Resample' (checked), 'Measurement Time' (4.0 s), 'Wavelength' (324.8 nm), 'Lamp Current' (75%), and 'Bandpass' (0.5 nm). It also shows options for 'High Resolution', 'Background Correction' (Off), 'Flame Rejection' (Use Flame Rejection), 'Rejection Limit' (25%), and 'RSD Test' (Use Test). The bottom screenshot displays the 'Flame' section, which includes settings for 'Flame Type' (Air-Acetylene), 'Fuel Flow' (1.1 L/min), 'Burner Stabilisation Time' (0 min), 'Nebuliser Uptake Time' (4 s), 'Burner Height' (7.0 mm), and 'Optimize Burner Height' (checked). Both screenshots also show a 'Transient Peak Measurement' section with 'Measure From' (0.00) and 'To' (1.00) settings.

Figure 1: Instrument parameters

Results

Sample	Heather (1)	Heather (2)	Oak leaves	Peat
Copper found ($\mu\text{g/g}$)	25.5	44	34	17
Reference Value ($\mu\text{g/g}$)	21 - 24	38 - 45	31 - 40	14 - 18

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FM 09032

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AN40146_E 03/08C

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