

# 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 (1000mg/L, Spectrosol or equivalent)

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

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

### Working standards

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

### 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 50.0mL volumetric flask and dilute to volume with deionised water. The total digestion time will be 1-1.5 hours. 0.5mg/L in solution is equivalent to 125µg/g of copper in the original sample.

### Instrument Parameters

The screenshot displays two panels of the instrument software interface for 'Cu plants (Cu)'. The top panel is titled 'Measurement Mode' and includes settings for 'Absorption', 'Number of Resamples' (3), 'Fast Resamples' (checked), 'Measurement Time' (4.0 s), 'Wavelength' (324.8 nm), 'Lamp Current' (75%), and 'Bandpass' (0.5 nm). It also features checkboxes for 'Optimise Spectrometer Parameters' (unchecked), 'High Resolution' (unchecked), and 'Background Correction' (OFF). A 'Flier Rejection' section includes 'Use Flier Rejection' (unchecked) and 'Rejection Limit' (95%). An 'RSD Test' section includes 'Use Test' (unchecked), 'If RSD greater than' (0%), and 'AND signal greater than' (0.1 Abs). The 'Then' action is set to 'Flag and Continue'. A 'Transient Peak Measurement' section shows 'Measure From' (0.00) and 'Tg' (4.00). The bottom panel is titled 'Flame' and includes 'Flame Type' (Air-Acetylene), 'Fuel Flow' (1.1 L/min), and checkboxes for 'Optimise Fuel Flow' (unchecked) and 'Auxiliary Oxidant' (unchecked). A 'Stabilisation' section includes 'Burner Stabilisation Time' (0 min) and 'Nebuliser Uptake Time' (4 s). A 'Burner Height' section includes 'Burner Height' (7.0 mm) and a checked 'Optimise Burner Height' checkbox.

Figure 1 Instrument parameters

## Results

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

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*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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