

Atomic Absorption Method Guide

Cr in copper alloys

Key Words

- Copper Alloys
- Chromium
- Flame
- Atomic Absorption

Principle

The sample is digested in nitric/hydrochloric acid, and chromium is determined by flame atomic absorption spectrometry using a nitrous oxide-acetylene flame. Standard solutions matched for copper content are used to compensate for the interference of copper on chromium.

Reagents

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

Hydrochloric acid (AnalaR grade, concentrated, s.g. 1.18)

Pure copper metal (e.g. BCS reference material number 197f)

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

Chromium sub-stock standard solution (100.0mg/L)

Transfer 10.0mL of chromium master standard solution to a 100.0mL volumetric flask, dilute to volume with deionised water.

Working standards

Weigh four 1.00g portions of pure copper into four 100mL volumetric flasks. Add 20.0mL of deionised water and 10.0mL each of nitric and hydrochloric acids. Allow to stand until the copper has dissolved. Add 0, 1.0, 5.0 and 10.0mL of the chromium sub-stock standard to the flasks and dilute to volume with deionised water. The working standards will contain 0, 1.0, 5.0 and 10.0mg/L of chromium.

Sample Preparation

Weigh 1.000g of copper alloy into a 100mL volumetric flask, add 20.0mL of deionised water and 10.0mL each of nitric and hydrochloric acids. Allow the mixture to stand until the sample has dissolved and dilute to volume with deionised water. 10mg/L in solution is equivalent to 0.1% m/m of chromium in the original sample. For higher concentrations, this solution can be diluted with a 1% m/v solution of high purity copper made in the same way.

Instrument Parameters

Cr copper (Cr)

Measurement Mode: Absorption

Number of Resamples: 3

Fast Resamples

Measurement Time (s): 4.0

Wavelength (nm): 357.3

Lamp Current (%): 100

Bandpass (nm): 0.5

Optimise Spectrometer Parameters

Signal: Continuous

Transient Peak Measurement

Measure From (s): 1.00 To: 4.00

High Resolution

Background Correction: Off

Filter Rejection

Use Filter Rejection

Rejection Limit (%): 95

RSD Test

Use Test

If RSD greater than 0 %

AND signal greater than 0.1 Abs

Then: Flag and Continue

Cr copper (Cr)

Flame

Flame Type: Nitrous Oxide-Acetylene

Fuel Flow (L/min): 4.2

Optimise Fuel Flow

Auxiliary Oxidant

Stabilisation

Burner Stabilisation Time (min): 0

Nebuliser Uptake Time (s): 4

Burner Height

Burner Height (mm): 8.0

Optimise Burner Height

Figure 1 Instrument parameters

Results

Sample	BCS 181/2	BCS 182/2	BCS 216/1	BCS268
Chromium found (% m/m)	0.007	0.06	0.255	0.16
Reference value (% m/m)	0.008	0.06	0.24	0.15

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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