

Atomic Absorption Method Guide

Ti in copper alloys

Key Words

- Copper Alloys
- Titanium
- Flame
- Atomic Absorption

Principle

The sample is digested in nitric/hydrochloric acid, and titanium 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 titanium.

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)

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

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, 0.5, 2.5 and 5.0mL of the titanium master standard to the flasks and dilute to volume with deionised water. The working standards will contain 0, 5.0, 25.0 and 50.0mg/L of titanium.

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. 50mg/L in solution is equivalent to 0.5% m/m of titanium 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

The screenshot shows the instrument parameter software interface for Ti copper (Ti). The interface is divided into two main sections. The top section contains parameters for Measurement Mode (Absorption), Number of Resamples (3), Fast Resamples (checked), Measurement Time (4.0 s), Wavelength (365.4 nm), Lamp Current (75%), Bandpass (0.5 nm), Signal (Continuous), and Transient Peak Measurement (Measure From: 0.00, To: 4.00). The bottom section contains parameters for Flame (Nitrous Oxide-Acetylene, Fuel Flow: 4.5 L/min), Optimise Fuel Flow (unchecked), Auxiliary Oxidant (unchecked), Stabilisation (Burner Stabilisation Time: 0 min, Nebuliser Uptake Time: 4 s), Burner Height (11.0 mm), and Optimise Burner Height (checked). Other options include High Resolution (unchecked), Background Correction (Off), Flier Rejection (Use Flier Rejection unchecked, Rejection Limit: 95%), and RSD Test (Use Test unchecked, If RSD greater than 0%, AND signal greater than 0.1 Abs, Then Flag and Continue).

Figure 1 Instrument parameters

Results

Sample	BCS 181/2	BCS 182/2	BCS 216/1	BCS 262	BCS 263/1	BCS 268
Titanium found (% m/m)	0.02	0.10	0.095	0.095	0.04	0.015
Reference value (% m/m)	0.019	0.11	0.107	0.1	0.04	<0.02

Thermo Electron Corporation has direct subsidiary offices in North America, Europe and Japan. To complement these direct subsidiaries, we maintain a network of representative organizations throughout the world. Use this reference list or visit our Web site to locate the representative nearest you.

Australia

Tel: +61 (0)2 9898 1244
analyze.au@thermo.com

Austria

Tel: +43 (0)1 333 50340
analyze.at@thermo.com

Belgium

Tel: +32 2 482 30 30
analyze.be@thermo.com

Canada

Tel: +1 800 532 4752
analyze.ca@thermo.com

China

Tel: +86 10 5850 3588
analyze.cn@thermo.com

France

Tel: +33 (0)1 60 92 48 00
analyze.fr@thermo.com

Germany

Tel: +49 (0)6103 4080
analyze.de@thermo.com

Italy

Tel: +39 02 950 591
analyze.it@thermo.com

Japan

Tel: +81 45 453 9100
analyze.jp@thermo.com

Netherlands

Tel: +31 76 587 98 88
analyze.nl@thermo.com

Nordic

Tel: +46 8 556 468 00
analyze.se@thermo.com

South Africa

Tel: +27 (0)11 570 1840
analyze.sa@thermo.com

Spain

Tel: +34 (91) 657 4930
analyze.es@thermo.com

Switzerland

Tel: +41 (0)61 48784 00
analyze.ch@thermo.com

UK

Tel: +44 (0)8704 100888
analyze.uk@thermo.com

USA

Tel: +1 800 532 4752
analyze@thermo.com

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.

Although the contents have been checked and tested, this document is supplied for guidance on the strict understanding that neither Thermo Electron Corporation, nor any other person, firm, or company shall be responsible for the accuracy or reliability of the contents thereof, nor shall they be liable for any loss or damage to property or any injury to persons whatsoever arising out of the use or application of this method.



Thermo Electron Spectroscopy Ltd, Cambridge, UK is ISO certified.

©2003 Thermo Electron Corp. All rights reserved worldwide. We make no warranties, expressed or implied, in this product summary, and information is subject to change without notice. All product and company names are property of their respective owners.

AN40157_E 10/03C