
INTERNATIONAL STANDARD



3980

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Aluminium and aluminium alloys — Determination of copper — Atomic absorption spectrophotometric method

Aluminium et alliages d'aluminium — Dosage du cuivre — Méthode par spectrophotométrie d'absorption atomique

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FOREWORD

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International Standard ISO 3980 was drawn up by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in November 1975.

It has been approved by the member bodies of the following countries :

Austria	Japan	Spain
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The member body of the following country expressed disapproval of the document on technical grounds :

Australia

Aluminium and aluminium alloys — Determination of copper — Atomic absorption spectrophotometric method

1 SCOPE

This International Standard specifies a method for the determination of copper in aluminium and its alloys by atomic absorption spectrophotometry.

2 FIELD OF APPLICATION

This method is applicable to copper (Cu) contents between 0,005 and 5 % (*m/m*).

3 PRINCIPLE

Dissolution of a test portion with hydrochloric acid and hydrogen peroxide. Atomization of this solution into an air-acetylene (or nitrous oxide-acetylene) flame of the atomic absorption apparatus. Comparison of the absorption of the resonance energy of copper (wavelength normally 324,7 nm) with that of calibration solutions.

4 REAGENTS

During the analysis use only reagents of analytical grade and only distilled or de-ionized water.

4.1 Hydrochloric acid, ρ about 1,1 g/ml, solution about 20 % (*m/m*).

Dilute 500 ml of hydrochloric acid, ρ about 1,19 g/ml, solution about 33 % (*m/m*), with 500 ml of water.

4.2 Hydrogen peroxide, about 30 % (*m/m*) solution.

4.3 Sulphuric acid, ρ about 1,48 g/ml, solution about 58 % (*m/m*).

While stirring and cooling, add 50 ml of sulphuric acid, ρ about 1,84 g/ml, solution about 96 % (*m/m*), to 40 ml of water. Cool again; then make up to volume in a 100 ml volumetric flask and mix.

4.4 Hydrofluoric acid, ρ about 1,13 g/ml, solution about 40 % (*m/m*).

4.5 Nitric acid, ρ about 1,4 g/ml, solution about 68 % (*m/m*).

4.6 Aluminium, 20 g/l base solution.

Weigh, to the nearest 0,01 g, 20 g of aluminium free from

copper (purity $\geq 99,99$ %) previously pickled; transfer it to a 1 000 ml beaker (for example) and cover. Add, in small portions, 600 ml of the hydrochloric acid solution (4.1) and if necessary a drop of metallic mercury to facilitate the attack. If necessary, warm gently to assist the dissolution; then add some drops of the hydrogen peroxide solution (4.2), and boil some minutes to remove the excess of hydrogen peroxide.

After cooling, transfer the solution thus obtained quantitatively to a 1 000 ml volumetric flask; make up to volume and mix.

50 ml of this solution contains 1 g of aluminium and 30 ml of hydrochloric acid solution (4.1).

5 ml of this solution contains 0,1 g of aluminium and 3 ml of hydrochloric acid solution (4.1).

2 ml of this solution contains 0,04 g of aluminium and 1,2 ml of hydrochloric acid solution (4.1).

4.7 Copper, standard solution corresponding to 0,1 g of Cu per litre.

Transfer $1 \pm 0,001$ g of electrolytic copper (purity $\geq 99,95$ %) to a 250 ml beaker (for example) and cover. Add 5 ml of water and 5 ml of the nitric acid solution (4.5) and warm gently until the dissolution is complete and crystallization begins. Take up with water, and heat, if necessary, to complete the dissolution of the salts. Cool, transfer quantitatively to a 1 000 ml volumetric flask; make up to volume and mix.

Transfer 100,0 ml of this solution to a 1 000 ml volumetric flask; make up to volume with water and mix.

1 ml of this standard solution contains 0,1 mg of Cu.

4.8 Copper, standard solution corresponding to 0,01 g of Cu per litre.

Transfer 10,0 ml of the standard copper solution (4.7) to a 100 ml volumetric flask; make up to volume and mix.

1 ml of this standard solution contains 0,01 mg of copper.

5 APPARATUS

Usual laboratory equipment and :

5.1 Burette graduated in 0,05 ml.