
International Standard



4192

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Aluminium and aluminium alloys — Determination of lead content — Flame atomic absorption spectrometric method

Aluminium et alliages d'aluminium — Dosage du plomb — Méthode par spectrométrie d'absorption atomique dans la flamme

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Foreword

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

Austria	Hungary	South Africa, Rep. of
Brazil	India	Spain
Canada	Iraq	Sweden
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
Italy

Aluminium and aluminium alloys — Determination of lead content — Flame atomic absorption spectrometric method

1 Scope and field of application

This International Standard specifies a flame atomic absorption spectrometric method for the determination of the lead content of aluminium and its alloys.

The method is applicable to products having lead (Pb) contents between 0,01 and 1,5 % (*m/m*).

2 Principle

Dissolution of a test portion in a mixture of hydrochloric acid and nitric acid. Aspiration of the solution into an air-acetylene flame and comparison of the absorbance of resonance energy of lead by the test solution (wavelength of 217,0 or 283,3 nm normally) with that of standard solutions.

3 Reagents

During the analysis, use only reagents of recognized analytical grade and distilled or deionized water.

3.1 Aluminium, extra pure (purity 99,99 %), free from lead.

3.2 Nitric acid, ρ approximately 1,4 g/ml, 68 % (*m/m*) or approximately 15 mol/l solution.

3.3 Hydrochloric acid/nitric acid mixture.

Cautiously mix together 500 ml of water, 375 ml of the hydrochloric acid solution, [ρ approximately 1,19 g/ml, 38 % (*m/m*)], and 125 ml of the nitric acid solution (3.2).

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

3.5 Aluminium, 20 g/l solution.

Weigh, to the nearest 0,01 g, 10 g of previously pickled, extra pure aluminium (3.1), place it in a 1 000 ml beaker and cover with a watch glass. Add, in small portions, 200 ml of the hydrochloric acid/nitric acid mixture (3.3) and, if necessary, a

drop of metallic mercury to assist the attack. If necessary, warm gently to aid the dissolution and, when the aluminium has dissolved, boil until brown fumes have been expelled and the volume of the solution has been reduced to about 100 ml. After cooling, quantitatively transfer the solution to a 500 ml volumetric flask, dilute to the mark and mix.

3.6 Lead, standard solution corresponding to 1 g of Pb per litre.

Weigh, to the nearest 0,001 g, 1 g of lead (purity $\geq 99,99$ %), transfer it to a 250 ml beaker and cover with a watch glass. Add the minimum amount (10 ml, for instance) of the nitric acid solution (3.2) and warm gently until all the lead has dissolved. Then boil for a few minutes to remove nitrous fumes and, after cooling, transfer to a 1 000 ml volumetric flask, dilute to the mark and mix.

1 ml of this solution contains 1 mg of lead.

3.7 Lead, standard solution corresponding to 0,1 g of Pb per litre.

Transfer 100,0 ml of the standard lead solution (3.6) to a 1 000 ml volumetric flask, dilute to the mark and mix.

1 ml of this solution contains 0,1 mg of lead.

4 Apparatus

Normal laboratory apparatus and

4.1 Burette, graduated in 0,05 ml.

4.2 Atomic absorption spectrometer, fitted with an air-acetylene burner.

4.3 Compressed air (laboratory installation or gas cylinders).

4.4 Acetylene, in gas cylinders.

4.5 Lead hollow cathode lamp.