INTERNATIONAL STANDARD 1812

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Copper alloys — Determination of iron content — 1,10-Phenanthroline spectrophotometric method

Alliages de cuivre — Dosage du fer — Méthode spectrophotométrique à la phénanthroline-1,10

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the technical committees were published as ISO Recommendations; these documents are in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 26, *Copper and copper alloys,* has reviewed ISO Recommendation R 1812-1971 and found it technically suitable for transformation. International Standard ISO 1812 therefore replaces ISO Recommendation R 1812-1971, to which it is technically identical.

ISO Recommendation R 1812 had been approved by the member bodies of the following countries :

Australia	Greece	Peru
Belgium	Hungary	Poland
Brazil	India	South Africa, Rep. of
Canada	Iran	Spain
Chile	Israel	Sweden
Czechoslovakia	Italy	Switzerland
Egypt, Arab Rep. of	Japan	Turkey
Finland	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Norway	Yugoslavia

No member body had expressed disapproval of the Recommendation.

The member bodies of the following countries disapproved the transformation of the Recommendation into an International Standard :

Hungary
Italy

Copper alloys — Determination of iron content — 1,10-Phenanthroline spectrophotometric method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a 1,10-phenanthroline spectrophotometric method for the determination of the iron content of copper alloys.

The method is applicable to the determination of iron contents up to 0,4 % (*m/m*) in any of the copper alloys listed in ISO publications.

2 REFERENCE

ISO/R 1811, *Chemical analysis of copper and copper alloys — Sampling of copper refinery shapes.*

3 PRINCIPLE

Extraction of the iron from a test portion as the iron(III)-chloro-complex with methyl isobutyl ketone, and spectrophotometric measurement of the iron(II)-1,10-phenanthroline complex at a wavelength corresponding to maximum absorption.

4 REAGENTS

During the analysis, use only reagents of recognized analytical grade and only distilled or deionized water. For the determination of iron contents lower than 0,01 % (*m/m*), use double-distilled water.

4.1 Methyl isobutyl ketone.

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

4.3 Hydrochloric acid, 7 + 3 (*V* + *V*) solution.

Mix 70 ml of hydrochloric acid, ρ approximately 1,19 g/ml, with 30 ml of water.

4.4 Hydrochloric acid, 1 + 1 (*V* + *V*) solution.

Mix 50 ml of hydrochloric acid, ρ approximately 1,19 g/ml, with 50 ml of water.

4.5 Ascorbic acid, 10 g/l solution.

Dissolve 5 g of ascorbic acid in water and dilute to 500 ml.

This solution is stable for 3 or 4 days.

4.6 1,10-Phenanthroline, buffered solution.

Mix 1 g of 1,10-phenanthroline hydrochloride monohydrate ($C_{12}H_8N_2 \cdot HCl \cdot H_2O$) with 215 ml of glacial acetic acid in a 500 ml one-mark volumetric flask and add, while cooling, 265 ml of ammonia solution, ρ 0,91 g/ml. This mixture should have a pH of 6,5 ± 0,1. Adjust, if necessary, by adding either ammonia solution or glacial acetic acid, then dilute to 500 ml.

This solution is stable.

4.7 Iron, stock solution (1 ml $\hat{=}$ 0,1 mg of Fe).

Dissolve 0,1 ± 0,01 g of high purity iron in 20 ml of hydrochloric acid, ρ 1,19 g/ml, and dilute to 1 l.

4.8 Iron, standard solution (1 ml $\hat{=}$ 10 μg of Fe).

Dilute 50 ml of the iron stock solution (4.7) to 500 ml.

5 APPARATUS

Ordinary laboratory apparatus and

5.1 Spectrophotometer, fitted with cells of optical path length 2 cm.

NOTE — All glassware shall be rinsed with hot hydrochloric acid solution (4.4) until the surface is free from iron.

6 SAMPLING

Sampling shall be carried out in accordance with the procedure given in ISO/R 1811.

7 PROCEDURE

7.1 Test portion

Weigh, to the nearest 0,001 g, 5 g of the test sample.

7.2 Blank test

In parallel with the determination, carry out a blank test following the same procedure and using the same quantities of all the reagents as used in the determination but omitting the test portion.