



SLOVENSKI STANDARD
oSIST ISO 778:2011

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Papir, karton, lepenka in vlaknina - Določevanje bakra, topnega v kislini

Paper, board and pulp -- Determination of acid-soluble copper

Papier, carton et pâte -- Détermination de la teneur en cuivre soluble dans l'acide

Ta slovenski standard je istoveten z: ISO 778:2005

ICS:

85.040	Vlaknine	Pulps
85.060	Papir, karton in lepenka	Paper and board

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en

INTERNATIONAL
STANDARD

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Third edition
2005-05-01

**Paper, board and pulp — Determination
of acid-soluble copper**

*Papier, carton et pâte — Détermination de la teneur en cuivre soluble
dans l'acide*



Reference number
ISO 778:2005(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 778 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

This third edition cancels and replaces the second edition (ISO 778:2001), of which it constitutes a minor revision. Apart from minor editorial modifications, only the title has been changed, to be consistent with ISO 1830:2005, and to make a distinction with ISO 17812 (to be published) which specifies the method to determine the total mass fraction of calcium, manganese, iron and copper.

The first edition of this International Standard included the photometric procedure as well as the procedure based on atomic absorption spectroscopy. In the second edition, the photometric procedure was deleted, as it is now seldom used, and the scope was enlarged to include paper and board in addition to pulp.

Introduction

This International Standard corresponds to ISO 777 ^[1] and ISO 779 ^[2] in order to make it possible to perform the final measurement of all three elements on the same solution.

Paper, board and pulp — Determination of acid-soluble copper

WARNING — The method specified in this International Standard involves the use of some hazardous chemicals and of gases that can form explosive mixtures with air. Care must be taken to ensure that the relevant precautions are observed.

1 Scope

This International Standard specifies the procedure for the determination of acid-soluble copper by atomic absorption spectrometry or by plasma emission spectrometry.

It is applicable to all types of paper, board and pulp.

It specifies a method to determine the acid-soluble part of the incineration residue, i.e. that part of the ignition residue obtained after incineration which is soluble in hydrochloric acid. If the residue is completely soluble, the result obtained by the procedure specified in this International Standard is taken as the total amount of copper in the sample. The limit of determination is normally 0,1 mg/kg of paper, board or pulp, but it depends on the spectrometer used.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 287, *Paper and board — Determination of moisture content — Oven-drying method*

ISO 638, *Pulps — Determination of dry matter content*

ISO 1762, *Paper, board and pulps — Determination of residue (ash) on ignition at 525 °C*

ISO 7213, *Pulps — Sampling for testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

mass fraction of copper

amount of the element copper in the solution obtained after incineration of the specimen at 525 °C and treating the residue with 6 mol/l hydrochloric acid, as specified in this International Standard

ISO 778:2005(E)

4 Principle

A test portion is incinerated at 525 °C and the residue is treated with 6 mol/l hydrochloric acid. The test solution is aspirated into an acetylene/dinitrogen monoxide or acetylene/air flame and the mass fraction of copper is determined by one of the following procedures:

- measurement of the absorption of the 324,7 nm line emitted by a copper hollow-cathode lamp, or
- measurement of the absorption of the 324,7 nm line emitted by plasma emission spectrometry.

5 Reagents and materials

Use only chemicals of recognized analytical grade and only distilled or deionized water.

5.1 Hydrochloric acid, about 6 mol/l.

Dilute 500 ml of hydrochloric acid (density 1,19 g/ml) in 500 ml of water.

5.2 Nitric acid, density 1,4 g/ml.

5.3 Copper stock solution, 100 mg/l of Cu.

Dissolve 100 mg of pure electrolytic copper in the smallest quantity possible of nitric acid (density 1,4 g/ml). Boil in order to expel nitrous fumes and allow to cool. Transfer the solution completely to a 1 000 ml volumetric flask. Dilute with water to the mark and mix.

1 ml of this stock solution contains 0,10 mg of Cu.

5.4 Copper standard solution, 10 mg/l of Cu.

Transfer 100 ml of the copper stock solution (5.3) to a 1 000 ml volumetric flask and add 200 ml of hydrochloric acid (5.1). Dilute with water to the mark and mix.

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

Commercially available, certified standard solutions may be used.

5.5 Acetylene gas and/or dinitrogen monoxide gas, of a grade suitable for atomic absorption spectrometry.

WARNING — Acetylene gas forms explosive mixtures with air.

5.6 Appropriate gas for the plasma spectrometer (6.4). Argon is usually recommended as a carrier gas.

6 Apparatus and equipment

Ordinary laboratory equipment. Clean all equipment in 0,1 mol/l hydrochloric acid.

6.1 Filter paper, ash free, particle retention 20 µm to 25 µm.

6.2 Dishes, of platinum or quartz.

6.3 Atomic absorption spectrometer, with a burner for dinitrogen monoxide/acetylene or air/acetylene and with a hollow-cathode lamp for copper.

NOTE A multi-element lamp may be used.

6.4 Inductively coupled plasma spectrometer.