SLOVENSKI STANDARD
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Papir, karton, lepenka in vlaknine - Določanje prevodnosti vodnih ekstraktov

Paper, board and pulps -- Determination of conductivity of aqueous extracts

Papier, carton et pâtes -- Détermination de la conductivité des extraits aqueux

Ta slovenski standard je istoveten z: **ISO 6587:1992**

ICS:

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

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INTERNATIONAL STANDARD

ISO 6587

Second edition
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Paper, board and pulps — Determination of conductivity of aqueous extracts

Papier, carton et pâtes — Détermination de la conductivité des extraits aqueux

Reference number
ISO 6587:1992(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 6587 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Sub-Committee SC 2, *Test methods and quality specifications for paper and board*.

This second edition cancels and replaces the first edition (ISO 6587:1980), of which it constitutes a technical revision.

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Paper, board and pulps — Determination of conductivity of aqueous extracts

1 Scope

This International Standard specifies a method for the determination of the conductivity of aqueous extracts of paper, board or pulp, these extracts having been prepared by a hot or a cold method.

The method is applicable to all kinds of paper, board and pulps, except for papers used for electrical purposes. For high purity papers used for electrical purposes, the method used should be that given in IEC 554-2.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 186:1985, *Paper and board — Sampling to determine average quality.*

ISO 287:1985, *Paper and board — Determination of moisture content — Oven-drying method.*

ISO 638:1978, *Pulps — Determination of dry matter content.*

ISO 7213:1981, *Pulps — Sampling for testing.*

IEC 554-2:1977, *Specification for cellulosic papers for electrical purposes — Part 2: Methods of test.*

3 Principle

A 2 g sample is extracted for 1 h with 100 ml of boiling or cold, distilled or deionized water. Measurement of the conductivity of the extract at 25 °C by means of a conductivity meter or resistance bridge, using alternating current.

4 Reagents

4.1 Distilled or deionized water.

Distilled or deionized water shall be used throughout the test. The conductivity of the water shall not exceed 0,2 mS/m after boiling and cooling as specified in 7.2.2 (see note 2).

NOTES

1 Usually, both distillation and deionization are required. Unless great care is exercised when distilling, and with the materials employed in the condenser and subsequent surfaces with which the condensed vapour would possibly come in contact, the distillate can fail to reach the required level of conductivity.

2 When it is not possible to obtain water of the specified purity, water with a higher conductivity may be used, but the conductivity of the water used should be stated in the test report.

4.2 Potassium chloride, standard solutions.

Use potassium chloride (KCl) of recognized analytical reagent grade, powdered, or fine crystals. Dry for 2 h at 105 °C ± 2 °C and immediately prepare the following two solutions.

4.2.1 0,01 mol/l solution.

Dissolve 0,745 5 g of the potassium chloride in water having a conductivity not greater than 0,2 mS/m, and dilute to 1 000 ml.

4.2.2 0,001 mol/l solution.

Dilute 100 ml of the 0,01 mol/l solution (4.2.1) to 1 000 ml.

Store the solutions in waxed glass bottles with ground glass stoppers. The conductivity values, in

millisiemens per metre, of the two solutions are given in table 1.

Table 1 — Conductivity of potassium chloride standard solutions

Concentration mol/l	Temperature °C	Conductivity mS/m
0,01	18 20 25	122,05 127,80 140,88
0,001	25	14,693

5 Apparatus

Ordinary laboratory apparatus, and

5.1 Flasks of chemically resistant glass, with ground glass joints, stoppers and efficient water-cooled reflux condensers made of the same quality of glass. All glassware shall be carefully rinsed with boiling distilled or deionized water (4.1).

5.2 Electric heater, adjustable at least to 200 W.

5.3 Conductivity meter or **resistance bridge**, with measuring cells provided with black platinum electrodes of area approximately 1 cm^2, and capable of indicating the conductance of an aqueous extract with an error of less than $\pm$ 5 % in the frequency range of 50 Hz to 3 000 Hz.

5.4 Constant-temperature bath, capable of maintaining a temperature of 25 °C $\pm$ 0,5 °C.

6 Sampling and preparation of the sample

6.1 Sampling

Sampling of paper or board shall be carried out in accordance with ISO 186.

Sampling of pulp shall be carried out in accordance with ISO 7213.

6.2 Preparation of sample

Cut or tear the sample into pieces approximately 5 mm × 5 mm in size from portions that have not been touched by bare hands. Mix the pieces thoroughly. The sample shall not be touched at any time with bare hands. Clean protective gloves shall be worn at all times to protect the sample and the pieces prepared from it. Store the prepared samples in clean, covered containers.

6.3 Determination of dry matter content

Determine the dry matter content in accordance with ISO 287 for paper or board and ISO 638 for pulp.

7 Procedure

7.1 Determination of cell constant

Wash the measuring cell (see 5.3) several times with water (4.1), and then at least twice with the potassium chloride standard solution (4.2.1 or 4.2.2) the conductivity of which is nearest to that of the extract being measured.

Measure the conductance or resistance of the cell, by means of the conductivity meter or resistance bridge (5.3), with a fresh portion of the same potassium chloride standard solution.

Calculate the cell constant using the appropriate formula

$$J = \frac{\gamma_{KCl}}{G_{KCl}}$$

or

$$J = \frac{R_{KCl} \cdot \gamma_{KCl}}{1\,000}$$

where

G_{KCl} is the conductance, in millisiemens, of the potassium chloride standard solution;

R_{KCl} is the resistance, in ohms, of the potassium chloride standard solution;

γ_{KCl} is the conductivity, in millisiemens per metre, of the potassium chloride standard solution (see table 1).

NOTE 3 The conductance G (in siemens) is equal to $1/R$, where R is the resistance (in ohms).

7.2 Preparation of the aqueous extract

7.2.1 Weighing of sample

Weigh 2 g $\pm$ 0,002 g (oven-dry basis) of the sample (6.2) into a flask of suitable size (5.1) which has been carefully washed with boiling water (4.1).

7.2.2 Hot extraction method

With the aid of a pipette, measure 100 ml of water (4.1) into a separate flask (5.1). Attach the reflux condenser (see 5.1) and heat the water to almost boiling. Remove the condenser and add the water to the flask containing the sample (7.2.1). Replace the reflux condenser then boil gently for 1 h on the

electric heater (5.2). Cool rapidly, with the condenser still fitted, to about 25 °C. Let the fibres settle and then decant the extract. Prepare the extract in duplicate.

Using the constant-temperature bath (5.4), adjust the temperature of the extract to 25 °C ± 0,5 °C, and maintain that temperature throughout the test.

7.2.3 Cold extraction method

With the aid of a pipette, measure 100 ml of water (4.1) into the flask containing the sample (7.2.1). Seal the flask with a ground glass stopper and leave to stand at room temperature (20 °C to 25 °C) for 1 h. Shake the flask at least once during this time. Decant the extract. Prepare the extract in duplicate.

Using the constant-temperature bath (5.4), adjust the temperature of the extract to 25 °C ± 0,5 °C, and maintain that temperature throughout the test.

7.3 Determination of conductivity

Rinse the measuring cell (see 5.3) carefully, several times with the water (4.1), and then twice more with the extract. Measure the conductance or resistance with fresh portions of the extract until a constant value is obtained.

Repeat the determination with the duplicate extract.

7.4 Blank test

Carry out a blank test following the same procedure as for the determination, but omitting the sample.

8 Calculation and expression of results

8.1 If the meter gives conductance

The conductivity, γ, of the extract is given, in millisiemens per metre, by the formula

$$\gamma = J(G_x - G_o)$$

where

J is the cell constant, determined as specified in 7.1;

G_x is the conductance, in millisiemens, of the extract;

G_o is the conductance, in millisiemens, corresponding to the blank test.

8.2 If the meter gives resistance

The conductivity, γ, of the extract is given, in millisiemens per metre, by the formula

$$\gamma = 1\,000 \times J\left(\frac{1}{R_x} - \frac{1}{R_o}\right)$$

where

J is the cell constant, determined as specified in 7.1;

R_x is the resistance, in ohms, of the extract;

R_o is the resistance, in ohms, corresponding to the blank test.

8.3 Expression of results

Report the conductivity of the extract, in millisiemens per metre, as the mean of two determinations to the nearest 1 mS/m. The individual results should not differ by more than 10 % or 2 mS/m, whichever is the greater; if they do, repeat the determination on two additional extracts and report the mean and range of all measurements.

9 Test report

The test report shall include the following particulars:

a) all the information necessary for complete identification of the sample;

b) reference to this International Standard;

c) the extract procedure used, i.e. hot or cold;

d) the results expressed in millisiemens per metre;

e) the conductivity of the water used, where this is greater than 0,2 mS/m;

f) any unusual features observed in the course of the test;

g) any operations not specified in this International Standard or in the International Standards to which reference is made, or are regarded as optional which might have affected the results.