INTERNATIONAL STANDARD

ISO 2144

Fourth edition
1997-12-15

Paper, board and pulps — Determination of residue (ash) on ignition at 900 °C

Papiers, cartons et pâtes — Détermination du résidu (cendres) après incinération à 900 °C

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Reference number
ISO 2144:1997(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 2144 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This fourth edition cancels and replaces the third edition (ISO 2144:1987), of which it constitutes a technical revision.

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

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Introduction

This International Standard, the fourth edition of ISO 2144, differs from the third edition (ISO 2144:1987) in several respects. The title has been changed from "Paper and board — Determination of ash" to "Paper, board and pulps — Determination of residue (ash) on ignition at 900 °C". The scope has been widened from "paper and board" to include pulp as well. Although the wording has been revised, the principle of determination has not been changed.

The magnitude of the residue on ignition is related to, but not equal to, the content of mineral constituents in the sample. For coated and filled products, the amount of added mineral constituents can only be calculated from the result if the loss on ignition of the particular pigment used is known. This value varies from one pigment to another, and also between different batches of the same pigment. For china clay the residue on ignition at 900 °C varies from 89 % to 86 % and for calcium carbonate it is about 56 %. If lower ignition temperatures are used, the corresponding figures will increase but there is no guarantee that they will become exactly 100 % at any temperature.

For pulps and other materials without any added minerals, the residue on ignition is a measure of the amount of unwanted mineral constituents, such as silica, silicates, particles of minerals, etc. Some soluble inorganic constituents, such as sodium chloride, will escape the determination whereas sulfates normally will be retained.

The determination is mainly used as a screening test for checking the overall quality of a product, in many cases against specifications. The ignition procedure described can be used as a preliminary step when determining particular mineral constituents.

NOTE — Determination of residue on ignition at 575 °C of pulps is described in ISO 1762:1974, *Pulps — Determination of ash*.

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1 Scope

This International Standard describes the determination of the residue on ignition of pulps, papers and boards. The standard is applicable to all types of pulp, paper and board. The lower limit of the determination is about 0,2 %.

NOTE — The procedure (clause 7) requires that at least 10 mg of residue is weighed. The limit stated above corresponds to a 5 g sample. If the sample size is increased, this limit can be lowered.

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 186:1994, *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*.

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 residue on ignition: The mass of the residue left after incineration of a sample of pulp, paper and board in a furnace at 900 °C ± 25 °C by the procedure specified in this International Standard.

NOTE — This property has been referred to as "ash content", for example in earlier editions of this International Standard.

4 Principle

The sample is weighed in a heat-resistant dish and incinerated at 900 °C ± 25 °C in a muffle furnace. The mass of the residue is determined by weighing the dish after the incineration of the sample.

5 Apparatus

Ordinary laboratory equipment, including:

5.1 Dishes of platinum, ceramics or silica, of capacity to accommodate about 10 g of sample. (Normally a capacity of 50 ml is sufficient.) The dishes shall not lose or gain mass on ignition or react chemically with the sample or its ignition residue.

5.2 Muffle furnace, capable of maintaining a temperature of 900 °C ± 25 °C. The furnace is preferably placed in a hood or it is provided with means for evacuating smoke and fumes.

5.3 Analytical balance, accurate to 0,1 mg.

6 Sampling and preparation of sample

If possible, take the sample as described in ISO 186 or ISO 7213, as relevant.

7 Procedure

Carry out the procedure in duplicate. Record all weighings to the nearest 0,1 mg.

Allow wet samples to dry under dust-free conditions in the laboratory air.

Determine the moisture content on a separate sample (air-dry) by the procedure described in ISO 287 or ISO 638, as relevant. Weigh this sample at the same time as the sample (air-dry) used for incineration.

The portions to be incinerated shall consist of a number of small pieces, of size no larger than 1 cm^2, of a total mass of not less than 1 g or sufficient to give a residue on ignition of not less than 10 mg, taken from various parts of the sample in such a manner as to be thoroughly representative of it.

If the sample has a very low residue on ignition (for example in the case of so-called ash-less qualities) take a sample portion of sufficient mass to yield at least 2 mg of residue. In these cases, it may be necessary to divide the sample into two or several smaller portions which are incinerated consecutively in the same dish.

Heat the dish (5.1) without any sample, for 30 min to 60 min in the muffle furnace (5.2) at 900 °C ± 25 °C. Allow it to cool to room temperature in a desiccator.

Weigh the empty dish. Add the appropriate amount of sample and weigh immediately again.

Heat the dish slowly, preferably in such a manner that the sample burns without bursting into flames. Check that no material is lost in the form of flying particles.

NOTE 1 The procedure for this step depends on the equipment available. Some muffle furnaces have a door that, when open, forms a horizontal platform in front of the entrance. This platform and similar devices can be used when burning off the organic material in the sample.

When the combustion is complete or nearly complete, so that only small amounts of carbon are visible, expose the dish to the full heat (900 °C ± 25 °C) of the furnace for 1 h.

NOTE 2 Do not prolong the heating period and do not attempt to reach "constant mass". Some constituents may lose mass slowly over a long period of time.

Remove the dish from the furnace and allow it to attain room temperature in a desiccator. Weigh the dish as before.

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