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Paper, board, pulps and cellulose nanomaterials — Determination of residue (ash content) on ignition at 525 °C

Papier, carton et pâtes et nanomatériaux à base de cellulose — Détermination du résidu (cendres) après incinération à 525 °C

Reference number
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 1762:2015), which has been technically revised. The main changes compared to the previous edition are as follows:

— Scope revised to cover cellulose nanomaterials instead of only paper, board and pulps;

— A definition of cellulose nanomaterial, along with additional instructions for sampling, sample preparation, and incineration for cellulose nanomaterials have been incorporated;

— Additional instructions are given on how to express results when a sample has low ash content.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Paper, board, pulps and cellulose nanomaterials — Determination of residue (ash content) on ignition at 525 °C

1 Scope

This document describes the determination of the residue (ash content) on ignition of paper, board, pulps and cellulose nanomaterials at 525 °C. It is applicable to all types of paper, board, pulp and cellulose nanomaterial samples.

This document provides measurement procedures to obtain a measurement precision of 0,01 % or better for residue (ash content) on ignition at 525 °C.

Determination of residue (ash content) on ignition at 900 °C of paper, board, pulps and cellulose nanomaterials is described in ISO 2144.

In the context of this document, the term "cellulose nanomaterial" refers specifically to cellulose nano-object (see 3.2 to 3.4). Owing to their nanoscale dimensions, these cellulose nano-objects can have intrinsic properties, behaviours or functionalities that are distinct from those associated with paper, board and pulps.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 of a lot — Oven-drying method*

ISO 638, *Paper, board and pulps — Determination of dry matter content — Oven-drying method*

ISO 7213, *Pulps — Sampling for testing*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
residue on ignition
ash content
ratio of the mass of the residue remaining after a test specimen of paper, board, pulp or *cellulose nanomaterial* (3.2) is ignited at 525 °C ± 25 °C to the oven-dry mass of the test specimen before ignition

Note 1 to entry: This property has been referred to as either "residue on ignition" or "ash content" in earlier editions of this document.

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3.2
cellulose nanomaterial
material composed predominantly of cellulose, with any external dimension between approximately 1 nm and 100 nm, or a material having internal structure or surface structure in the nanoscale, with the internal structure or surface structure composed predominantly of cellulose

Note 1 to entry: The terms nanocellulose and cellulosic nanomaterial are synonymous with cellulose nanomaterial.

Note 2 to entry: Some cellulose nanomaterials can be composed of chemically modified cellulose.

Note 3 to entry: This generic term is inclusive of cellulose nano-object and cellulose nanostructured material.

Note 4 to entry: See also definitions of cellulose, nanoscale, cellulose nano-object and cellulose nanostructured material in ISO/TS 20477:2017.

[SOURCE: ISO/TS 20477:2017, 3.3.1, modified — "1 nm to 100 nm" changed to "1 nm and 100 nm"; abbreviations deleted from Note 1 to entry; Note 4 to entry added.]

3.3
nano-object
discrete piece of material with one, two or three external dimensions in the nanoscale

Note 1 to entry: The second and third external dimensions are orthogonal to the first dimension and to each other.

[SOURCE: ISO/TS 80004-1:2015, 2.5]

3.4
cellulose nano-object
nano-object composed predominantly of cellulose

[SOURCE: ISO/TS 20477:2017, 5.2]

3.5
nanoscale
length range approximately from 1 nm to 100 nm

Note 1 to entry: Properties that are not extrapolations from larger sizes are predominantly exhibited in this length range.

[SOURCE: ISO/TS 80004-1:2015, 2.1]

4 Principle

The test specimen is weighed in a heat-resistant crucible and ignited in a muffle furnace at 525 °C ± 25 °C. The moisture or dry matter content of a separate test specimen is also measured. The percentage ash is then determined, on a dry (moisture-free) basis, from the mass of residue after ignition and the moisture or dry matter content of the sample.

The ash may consist of

a) mineral matter in the paper, board, pulp and cellulose nanomaterial and various residues from chemicals used in its manufacture;

b) metallic matter from piping and machinery;

c) fillers, pigments, coatings or residues from various additives.

In samples containing calcium carbonate, there is practically no decomposition of carbonate by ashing at 525 °C. Other fillers and pigments such as clay and titanium dioxide are also unaffected by ashing at 525 °C. Accordingly, the residue on ignition provides a good estimate of the total inorganic matter in the sample, provided that the sample does not contain other minerals which decompose at or below this

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