SLOVENSKI STANDARD
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Fina keramika (sodobna keramika, sodobna tehnična keramika) - Preskusne metode za kemične analize praškov cirkonijevega oksida (ISO 23739:2021)

Fine ceramics (advanced ceramics, advanced technical ceramics) - Methods for chemical analysis of zirconium oxide powders (ISO 23739:2021)

Hochleistungskeramik - Verfahren zur chemischen Analyse von Zirconiumoxidpulvern (ISO 23739:2021)

Céramiques techniques - Méthodes pour l'analyse chimique des poudres d'oxyde de zirconium (ISO 23739:2021)

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Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of zirconium oxide powders

Céramiques techniques — Méthodes pour l'analyse chimique des poudres d'oxyde de zirconium

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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 206, *Fine ceramics*.

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.

Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of zirconium oxide powders

1 Scope

This document specifies methods for the chemical analysis of zirconium oxide powders used as the raw material for fine ceramics.

It stipulates the determination methods of the zirconium, aluminium, barium, calcium, cerium, cobalt, gadolinium, hafnium, iron, magnesium, potassium, silicon, sodium, strontium, titanium and yttrium contents in zirconium oxide powders for fine ceramics. The test sample is decomposed by acid pressure decomposition or alkali fusion. Contents of zirconium and yttrium are determined by using either a precipitation and gravimetric method or an inductively coupled plasma–optical emission spectrometry (ICP–OES) method. Contents of aluminium, barium, calcium, cerium, cobalt, gadolinium, hafnium, iron, magnesium, potassium, silicon, sodium, strontium and titanium are determined by using an ICP–OES method.

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 835, *Laboratory glassware — Graduated pipettes*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 8656-1, *Refractory products — Sampling of raw materials and unshaped products — Part 1: Sampling scheme*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology 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/

4 Analytes and ranges

— Zirconium (Zr), range of 60 % to 74 % (mass fraction).

— Aluminium (Al), range of 0,01 % to 0,5 % (mass fraction).

— Barium (Ba), range of 0,01 % to 0,5 % (mass fraction).

— Calcium (Ca), range of 0,01 % to 6 % (mass fraction).

— Cerium (Ce), range of 0,01 % to 0,5 % (mass fraction).

— Cobalt (Co), range of 0,01 % to 0,5 % (mass fraction).

— Gadolinium (Gd), range of 0,01 % to 0,5 % (mass fraction).

— Hafnium (Hf), range of 0,01 % to 2 % (mass fraction).

— Iron (Fe), range of 0,01 % to 0,5 % (mass fraction).

— Magnesium (Mg), range of 0,01 % to 6 % (mass fraction).

— Potassium (K), range of 0,01 % to 0,5 % (mass fraction).

— Sodium (Na), range of 0,01 % to 0,5 % (mass fraction).

— Silicon (Si), range of 0,01 % to 0,5 % (mass fraction).

— Strontium (Sr), range of 0,01 % to 0,5 % (mass fraction).

— Titanium (Ti), range of 0,01 % to 0,5 % (mass fraction).

— Yttrium (Y), range of 0,01 % to 15 % (mass fraction).

5 Preparation of the test sample

5.1 General

The sample preparation method shall be in accordance with ISO 8656-1, unless otherwise mutually agreed upon by the analyser and customer.

5.2 Sampling

The sample shall be collected in accordance with ISO 8656-1.

5.3 Drying

Place 10 g of the sample into a flat-type weighing bottle (60 mm × 30 mm) and spread it uniformly over the bottom of the bottle. Place the bottle in an air bath at 110 °C ± 5 °C for 2 h, uncovered, and cool in a desiccator, covered, for 1 h.

5.4 Weighing

Weigh the test sample to the nearest 0,1 mg of the required quantity using a balance.

6 Reporting the analytical values

6.1 Number of analyses

Analyse the test sample twice on different days.

6.2 Blank test

Upon analysis, perform a blank test to correct the measured values.

6.3 Evaluation of the analytical values

When the difference between the two analytical values does not exceed the tolerance value (Table 1), the average value shall be reported. When the difference between the two analytical values exceeds the tolerance value, perform two additional analyses. When the difference of these further two analyses does not exceed the tolerance value, the average value thereof shall be reported. If the difference also exceeds the tolerance value, the median of four analytical values shall be reported.

Table 1 — Tolerances for the analytical values

Units: % (mass fraction)

Component	Zr	Ca, Hf, Mg, Y	Al, Ba, Ce, Co, Gd, Fe, K, Na, Si, Sr, Ti
Tolerance	0,70	0,01 [a] 0,1 [b]	0,01
[a] Applicable to content of less than 0,1 %.			
[b] Applicable to content of not less than 0,1 %.			

6.4 Expression of analytical values

The analytical values shall be given in % (mass fraction) in dryness. The results shall be expressed to two decimal places (see Annex A).

7 Decomposition of the test sample

7.1 Classification of the sample decomposition methods

a) Acid pressure decomposition.

b) Alkali fusion, for the determination of the contents of major elements such as zirconium, calcium, hafnium, magnesium and yttrium, and also for the determination of silicon content.

7.2 Acid pressure decomposition

7.2.1 Reagents

It shall be ascertained that the reagents are of sufficiently high purity to permit their use without compromising the accuracy of the determination.

7.2.1.1 Water, grade 1 or superior as specified in ISO 3696.

7.2.1.2 Sulfuric acid (1+1).

7.2.2 Apparatus and instruments

Use ordinary laboratory apparatus and instruments together with the following:

7.2.2.1 Pressure decomposition vessel. A pressure decomposition vessel is shown in Figure 1. Use the vessel exclusively for this analysis to avoid cross-contamination.

7.2.2.2 Polytetrafluoroethylene (PTFE) bottle, with cap.