

Advanced technical ceramics — Methods of test for ceramic powders —

Part 12: Chemical analysis of zirconia

The European Standard EN 725-12:2001 has the status of a
British Standard

ICS 81.060.30

National foreword

This British Standard is the official English language version of EN 725-12:2001.

The UK participation in its preparation was entrusted to Technical Committee RPI/13, Advanced technical ceramics, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee and comes into effect on 15 June 2001

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Pulver - Teil 12: Chemische Analyse von Zirkoniumoxid

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 184 "Advanced technical ceramics", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

EN 725 'Methods of test for ceramic powders' consists of 12 Parts:

- Part 1: Determination of impurities in alumina
- Part 2: Determination of impurities in barium titanate (ENV)
- Part 3: Determination of the oxygen content of non-oxides by thermal extraction with a carrier gas
- Part 4: Determination of oxygen content in aluminium nitride by XRF analysis (ENV)
- Part 5: Determination of the particle size distribution
- Part 6: Determination of the specific surface area
- Part 7: Determination of the absolute density
- Part 8: Determination of tapped bulk density
- Part 9: Determination of untamped bulk density
- Part 10: Determination of compaction properties
- Part 11: Determination of densification on natural sintering (ENV)
- Part 12: Chemical analysis of zirconia

This standard includes a bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This part of EN 725 specifies methods for the determination of the levels of silicon, aluminium, titanium, iron, calcium, magnesium, potassium, sodium, yttrium, hafnium, cerium and strontium using flame atomic absorption spectrometry (FAAS) and inductively coupled plasma atomic emission spectrometry (ICP - AES). These methods are applicable to the concentration ranges given in clause 3, expressed as oxides.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 3696	<i>Water for analytical laboratory use - Specification and test methods</i>
ECSC/CI 9	<i>Chemical analysis of ferrous materials – Operational guidelines for the application of flame atomic absorption spectrometry in standard methods for the chemical analysis of iron and steel</i>

3 Concentration ranges

The FAAS and ICP-AES methods shall be applicable to the concentration ranges for each oxide as follows:

Silicon oxide	10	µg/g to 5 000 µg/g;
Aluminium oxide	10	µg/g to 5 000 µg/g;
Titanium oxide	5	µg/g to 2 000 µg/g;
Iron oxide	5	µg/g to 2 000 µg/g;
Calcium oxide	5	µg/g to 5 000 µg/g;
Magnesium oxide	5	µg/g to 5 000 µg/g;
Potassium oxide	5	µg/g to 2 000 µg/g;
Sodium oxide	5	µg/g to 2 000 µg/g;
Yttrium oxide	5	µg/g to 5 000 µg/g;
Hafnium oxide	100	µg/g to 5 000 µg/g;
Cerium oxide	5	µg/g to 5 000 µg/g;
Strontium oxide	10	µg/g to 5 000 µg/g.

NOTE For concentrations above 5 000 µg/g, the X-ray fluorescence (XRF) method, in prEN ISO 12677:1998, should be used.

4 Principle

The test sample is decomposed by using either a fusion method or an acid microwave dissolution method. The solution is transferred to a volumetric flask and diluted to a known volume. The determination is made using FAAS or ICP-AES

5 Reagents

5.1 General

Reagents of at least 99,99 % purity or better, calibration solutions of ultra high purity and distilled water or water of purity 2 (according to ISO 3696) or equivalent, shall be used.

5.2 Reagents for fusion

5.2.1 Lithium tetraborate, $Li_2B_4O_7$

5.2.2 Nitric acid, density at 20 °C approximately 1,33 gml⁻¹, HNO_3

5.3 Reagents for acid microwave dissolution

5.3.1 Sulfuric acid (96 %), H_2SO_4

5.3.2 Ammonium fluoride, NH_4F

5.3.3 Hydrofluoric acid (40 %), HF

5.3.4 Hydrochloric acid (30 %), HCl

5.3.5 Nitric acid (65 %), HNO_3

5.4 Reagents for calibration

5.4.1 Pure zirconia of very low and known impurity levels ¹⁾

5.4.2 General

Commercial solutions or solutions obtained by dissolution of pure chemical product at a concentration level of 0,1 g/l of the following shall be used.

5.4.2.1 Silicon, Si

5.4.2.2 Aluminium, Al

5.4.2.3 Titanium, Ti

5.4.2.4 Iron, Fe

5.4.2.5 Calcium, Ca

5.4.2.6 Magnesium, Mg

5.4.2.7 Potassium, K

5.4.2.8 Sodium, Na

5.4.2.9 Yttrium, Y

5.4.2.10 Hafnium, Hf

5.4.2.11 Cerium, Ce

¹⁾ Johnson Matthey specpure, total impurities < 50 µg/g for 30 impurities, is an example of a suitable product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of this product.