



BSI Standards Publication

Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of calcium-phosphate-based powders for non-biomedical applications

National foreword

This British Standard is the UK implementation of ISO 3180:2023.

The UK participation in its preparation was entrusted to Technical Committee RPI/13, Advanced technical ceramics.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 12675 4

ICS 81.060.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2023.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

INTERNATIONAL STANDARD

ISO
3180

First edition
2023-07-14

Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of calcium-phosphate-based powders for non-biomedical applications

*Céramiques techniques — Méthodes d'analyse chimique des poudres à
base de phosphate de calcium pour applications non biomédicales*



Reference number
ISO 3180:2023(E)
Documents
Document Sharing Hub
© ISO 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Analytical ranges	2
5 Preparation of test sample	2
5.1 General	2
5.2 Sampling	2
5.3 Drying	2
5.4 Weighing	2
6 Reporting analytical values	2
6.1 Number of analyses	2
6.2 Blank test	2
6.3 Evaluation of analytical results	2
6.4 Expression of analytical results	3
7 Decomposition of test sample	3
7.1 Reagents	3
7.2 Apparatus	3
7.3 Procedure	3
7.3.1 Decomposition	3
7.3.2 Dilution	3
7.4 Blank test	3
8 Determination of phosphorus and calcium contents	4
8.1 Classification of determination methods	4
8.2 Precipitation and gravimetric method (for phosphorus)	4
8.2.1 Principle	4
8.2.2 Reagents	4
8.2.3 Apparatus	4
8.2.4 Procedure	5
8.2.5 Blank test	5
8.2.6 Calculation	5
8.3 Titration method (for calcium)	5
8.3.1 Principle	5
8.3.2 Reagents	5
8.3.3 Apparatus	6
8.3.4 Procedure	6
8.3.5 Blank test	7
8.3.6 Calculation	7
8.4 ICP-OES method (for calcium and phosphorus)	7
8.4.1 Principle	7
8.4.2 Reagents	7
8.4.3 Apparatus	8
8.4.4 Procedure	8
8.4.5 Measurement	9
8.4.6 Drawing of calibration curve	9
8.4.7 Calculation	10
9 Determination of impurity elements	11
9.1 Principle	11
9.2 Reagents	11
9.3 Apparatus	12
9.4 Procedure	12

9.4.1	Preparation of sample test solutions.....	12
9.4.2	Preparation of calibration standard solutions.....	12
9.4.3	Preparation of blank test solution.....	12
9.5	Measurement.....	12
9.5.1	Set up of the instrument.....	12
9.5.2	Measurement of sample test solution and calibration standard solutions.....	13
9.5.3	Measurement of blank test solution	13
9.6	Drawing of the calibration curve.....	13
9.7	Calculation	13
10	Test report.....	14
Annex A (informative)	Decomposition of insoluble precipitate using alkali fusion method	15
Annex B (informative)	Interlaboratory chemical analysis of calcium-phosphate-based powder	17

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.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This page deliberately left blank

Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of calcium-phosphate-based powders for non-biomedical applications

1 Scope

This document specifies wet chemical and inductively coupled plasma–optical emission spectrometry (ICP–OES)-based methods for the chemical analysis of calcium-phosphate-based powders for non-biomedical applications, such as those in the chemical industry, the treatment of air, water and soil contamination.

It stipulates the methods used for the determination of major elements of calcium-phosphate-based powders and their impurities. Calcium-phosphate-based powders are decomposed by acid decomposition. The calcium content is determined using a titration method or an ICP–OES method. The phosphorus content is determined using a precipitation and gravimetric method or an ICP–OES method. Certain impurities, such as aluminium, barium, chromium, copper, iron, magnesium, manganese, nickel, potassium, selenium, silicon, sodium, strontium, titanium and zinc contents, are determined by an ICP–OES method.

This document does not include calcium-phosphate-based powders for biomedical applications. The ISO 13779 series characterizes hydroxyapatite powders for biomedical applications using various methods, such as atomic absorption spectrometry (AAS), inductively coupled plasma–mass spectrometry (ICP–MS) and flame atomic absorption spectrometry (FAAS).

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

ISO 6353-2, *Reagents for chemical analysis — Part 2: Specifications — First series*

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

3 Terms and definitions

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

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 <https://www.electropedia.org/>

3.1

calcium-phosphate-based powder

calcium phosphate powder with a small amount (not more than 1,0 % mass fraction) of each inorganic element or impurity except calcium, phosphorous, oxygen and hydrogen

Note 1 to entry: Examples of calcium phosphate powders include tricalcium phosphate, octacalcium phosphate and hydroxyapatite.