

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or ~~utilised~~ 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

Fax: +41 22 749 09 47

Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: Bold

Formatted: HeaderCentered, Left, Space After: 0 pt, Line spacing: single

Formatted: Left: 1.5 cm, Right: 1.5 cm, Header distance from edge: 1.27 cm, Footer distance from

Commented [eXtyles1]: The reference "ISO 2024" is to a withdrawn standard

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

Formatted: Indent: Left: 0 cm, Right: 0 cm, Space Before: 0 pt, Don't suppress line numbers, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Formatted: French (France)

Formatted: French (France)

Formatted: French (France)

Formatted: zzCopyright address, Indent: Left: 0 cm, First line: 0 cm, Right: 0 cm, Don't suppress line numbers, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/FDIS 24181-1

<https://standards.iteh.ai/catalog/standards/iso/e5a1ac24-721a-49b5-acb1-df68c2bd2a96/iso-fdis-24181-1>

Formatted: Font: 11 pt

Formatted: FooterPageRomanNumber, Line spacing: single

Contents

Foreword..... v

Introduction..... vi

1 Scope..... 1

2 Normative references..... 1

3 Terms and definitions..... 2

4 Principle..... 4

5 Reagent..... 5

6 Apparatus..... 5

6.1 Volumetric glassware..... 5

6.2 Inductively coupled plasma atomic emission spectrometer..... 5

6.2.1 General..... 5

6.2.2 Line spectra selection..... 5

7 Procedure..... 7

7.1 Weighing the test portion..... 7

7.2 Sample preparation..... 7

7.3 Preparation of calibration solutions..... 7

7.4 Measurements..... 8

7.4.1 Instrument set-up..... 8

7.4.2 Measurement of the calibration solution and calibration curve construction..... 8

7.4.3 Measurement of the test solution..... 8

8 Calculation and expression of results..... 8

8.1 Method of calculation..... 8

8.2 Precision..... 9

8.2.1 Interlaboratory test..... 9

8.2.2 Statistical analysis..... 9

9 Test report..... 9

Annex A (informative) Interlaboratory test results..... 10

Annex B (informative) Regression formulae of precision..... 12

Bibliography..... 13

Foreword..... iv

Introduction..... v

1 Scope..... 1

2 Normative references..... 1

3 Terms and definitions..... 2

4 Principle..... 3

5 Reagent..... 3

5.1 Nitric acid..... 4

5.2 Hydrogen peroxide..... 4

6 Apparatus..... 4

6.1 Volumetric glassware..... 4

6.2 Inductively coupled plasma atomic emission spectrometer..... 4

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: Bold

Formatted: HeaderCentered, Left, Space After: 0 pt, Line spacing: single

Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: FooterCentered, Left, Line spacing: single

Formatted: Font: 11 pt

Formatted: FooterPageRomanNumber, Left, Space After: 0 pt, Line spacing: single

ISO/FDIS 24181-1:2023/2024(en)

7	Procedure	5
7.1	Weighing the test portion	5
7.2	Sample preparation	5
7.3	Preparation of calibration solutions	5
7.4	Measurements	6
8	Calculation and expression of results	7
8.1	Method of calculation	7
8.2	Precision	7
9	Test report	7
	Bibliography	11

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: Bold

Formatted: HeaderCentered, Left, Space After: 0 pt,
Line spacing: single

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/FDIS 24181-1

<https://standards.iteh.ai/catalog/standards/iso/e5a1ac24-721a-49b5-acb1-df68c2bd2a96/iso-fdis-24181-1>

Formatted: Font: 11 pt

Formatted: FooterPageRomanNumber, Line spacing:
single

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 298, *Rare earth*.

A list of all parts in the ISO 24181 series can be found on the ISO website.

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.

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: Bold

Formatted: HeaderCentered, Left, Space After: 0 pt, Line spacing: single

Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Formatted: English (United Kingdom)

Commented [eXtyles2]: Invalid reference: "ISO 24181 series"

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: FooterCentered, Left, Line spacing: single

Formatted: Font: 11 pt

Formatted: FooterPageRomanNumber, Left, Space After: 0 pt, Line spacing: single

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: 11 pt, Bold, English (United Kingdom)

Formatted: Font: Bold

Formatted: HeaderCentered, Left, Space After: 0 pt, Line spacing: single

Introduction

Atomic spectroscopy has been recognised as the most common technique for trace elemental determinations. Although atomic absorption spectroscopy is limited to determination of one element at a time, many elements are analysed routinely at the same time by inductively coupled plasma atomic emission spectroscopy (ICP-AES), which utilises the inductively coupled plasma (ICP) as an excitation source for atomic emission spectrometry (AES). Several thousands of these instruments are in routine use throughout the world.

ICP-AES is the most common technique for trace elemental determinations, particularly for the analysis of impurities. This method has been demonstrated to feature a linear response over a wide dynamic range, a low chemical interference/matrix effect, good stability and good reproducibility. It demonstrates a low detection limit and various sample introduction techniques are available for different sample analysis demands.

In rare earth metals and oxides, during processing ores of rare earth elements, Aluminum(Al), calcium(Ca), magnesium(Mg), iron(Fe) and silicon(Si) are contained as impurities. ICP-AES is well-suited for the quantification of non-rare earth impurities in a matrix containing rare earth elements. Additionally, the ICP-AES technique also offers high resolution for rare earth elements as rare earth elements exhibits line-rich emission spectra.

This document provides a guide for chemical analysis of materials for producers, consumers, and traders in the field of rare-earth metals and their oxides. This document is anticipated to reduce discrepancies caused by inconsistencies in the analytical procedures used when working with rare earth metals and their oxides.

ITEH Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/FDIS 24181-1

<https://standards.iteh.ai/catalog/standards/iso/e5a1ac24-721a-49b5-acb1-df68c2bd2a96/iso-fdis-24181-1>

Formatted: Font: 11 pt

Formatted: FooterPageRomanNumber, Line spacing: single