

Nuclear energy - Determination of Gd₂O₃ content in gadolinium fuel blends and gadolinium fuel pellets by atomic emission spectrometry using an inductively coupled plasma source (ICP-AES) (ISO 16796:2022)

EESTI STANDARDI EESSÕNA

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See Eesti standard EVS-EN ISO 16796:2023 sisaldab Euroopa standardi EN ISO 16796:2023 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 16796:2023 consists of the English text of the European standard EN ISO 16796:2023.
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English Version

Nuclear energy - Determination of Gd₂O₃ content in gadolinium fuel blends and gadolinium fuel pellets by atomic emission spectrometry using an inductively coupled plasma source (ICP-AES) (ISO 16796:2022)

Énergie nucléaire - Dosage de Gd₂O₃ dans des mélanges de poudres et dans des pastilles combustibles au gadolinium par spectrométrie par émission atomique à plasma à couplage inductif (ICP-AES) (ISO 16796:2022)

Kerntechnik - Bestimmung des Gadoliniumoxidgehalts in Gadolinium-Brennstoffgemischen und Gadolinium-Brennstofftabletten mittels Atomemissionsspektrometrie mit induktiv gekoppeltem Plasma (ISO 16796:2022)

This European Standard was approved by CEN on 16 July 2023.

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of ISO 16796:2022 has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 16796:2023 by Technical Committee CEN/TC 430 "Nuclear energy, nuclear technologies, and radiological protection" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 16796:2022 has been approved by CEN as EN ISO 16796:2023 without any modification.

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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 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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ISO 16796 was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 5, *Nuclear installations, processes and technologies*.

This second edition cancels and replaces the first edition (ISO 16796:2004), which has been technically revised.

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Nuclear energy — Determination of Gd_2O_3 content in gadolinium fuel blends and gadolinium fuel pellets by atomic emission spectrometry using an inductively coupled plasma source (ICP-AES)

1 Scope

This document is applicable to the determination of gadolinium as Gd_2O_3 in powder blends and sintered pellets of $\text{Gd}_2\text{O}_3 + \text{UO}_2$ and $((\text{U}, \text{Gd}) \text{O}_2)$ from mass fraction 10 g/kg to 100 g/kg (i.e. 1 % to 10 %), using a suitable ICP-AES instrument.

This methodology is capable of demonstrating compliance with agreed upon fuel specifications and associated data quality objectives provided the user has performed qualification measurements under their established measurement control program to demonstrate that measurement uncertainty requirements will be met with the desired level of confidence at the specification.

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*

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 Principle

The test sample is weighed and dissolved in nitric acid. The test sample solutions are aspirated into an inductively coupled plasma using argon as a carrier. The emitted light from the test sample in the plasma is dispersed, and the gadolinium line at 335,0 nm is measured by a spectrometer.

The intensity of the gadolinium line is proportional to the concentration of gadolinium present.

Impurity interferences have not been observed for the usual test samples of the nuclear grade material.

5 Apparatus

5.1 Inductively coupled plasma atomic emission spectrometer (ICP-AES). A typical value for resolution is 0,555 nm/mm in the first order.

5.2 Analytical balance; sensitivity $\pm 0,1$ mg.