INTERNATIONAL STANDARD

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Second edition
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Nuclear fuel technology — Determination of uranium in solutions, uranium hexafluoride and solids —

Part 2: Iron(II) reduction/cerium(IV) oxidation titrimetric method

Technologie du combustible nucléaire — Dosage de l'uranium dans des solutions, l'hexafluorure d'uranium et des solides —

Partie 2: Méthode titrimétrique par réduction au fer(II) et oxydation au cérium(IV)

Reference number
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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 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 7097-2:2004), which has been technically revised.

The main changes are as follows:

— the Scope was updated (see Clause 1);

— information on interferences was updated (see 5.2);

— requirements for standardisation of ceric titrant were updated (see 6.16);

— Annex A was divided into two annexes (Annex A and Annex B).

A list of all parts in the ISO 7097 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.

Introduction

This document describes procedures for the determination of uranium in solutions, uranium hexafluoride, and solids. The procedures described in the two independent parts of this International Standard are similar: this document uses a titration with cerium(IV) and ISO 7097-1 uses a titration with potassium dichromate.

Nuclear fuel technology — Determination of uranium in solutions, uranium hexafluoride and solids —

Part 2: Iron(II) reduction/cerium(IV) oxidation titrimetric method

1 Scope

This document describes an analytical method for the determination of uranium in samples from pure product materials such as U metal, UO_2, UO_3, U_3O_8, uranyl nitrate hexahydrate and uranium hexafluoride from the nuclear fuel cycle. This procedure is sufficiently accurate and precise to be used for nuclear materials accountability. This method can be used directly for the analysis of most uranium and uranium oxide nuclear reactor fuels, either irradiated or un-irradiated, and of uranium nitrate product solutions. Fission products equivalent to up to 10 % burn-up of heavy atoms do not interfere, and other elements which could cause interference are not normally present in sufficient quantity to affect the result significantly. The method recommends that an aliquot of sample is weighed and that a mass titration is used, in order to obtain improved precision and accuracy. This does not preclude the use of alternative techniques which could give equivalent performance. The use of automatic device(s) in the performance of some critical steps of the method has some advantages, mainly in the case of routine analysis.

This method does not generate a toxic mixed waste as does the potassium dichromate titration in ISO 7097-1.

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 9894, *Subsampling of uranium hexafluoride in the liquid phase*

ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

3 Terms and definitions

For purposes of this document, the terms and definitions given in ISO 5725-1 apply.

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/