
**Nuclear fuel technology —
Determination of plutonium content
in plutonium dioxide of nuclear grade
quality — Gravimetric method**

*Technologie du combustible nucléaire — Détermination de la teneur
en plutonium dans du dioxyde de plutonium de qualité nucléaire —
Méthode gravimétrique*



This document is a preview generated by EMS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

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
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Principle	1
3 Interferences	1
4 Apparatus	1
5 Procedure	2
5.1 Handling of the sample at the sampling station.....	2
5.2 Tarring of crucibles.....	2
5.3 Sub-sampling.....	2
5.4 Heating.....	2
5.5 Additional measurements.....	2
6 Expression of result	3
6.1 Calculation of the gravimetric conversion factor.....	3
6.2 Calculation of impurity correction factor.....	3
6.3 Calculation of plutonium concentration.....	3
6.4 Repeatability.....	4
6.5 Systematic errors.....	4
7 Test report	4
Annex A (informative) Gravimetric conversion factor for the non-volatile impurities	5

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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 5, *Nuclear fuel cycle*.

This second edition cancels and replaces the first edition (ISO 8300:1987), of which it constitutes a minor revision.

Introduction

The method specified in this International Standard is based on an oxidation of the plutonium followed by weighing. If the content of impurities is measured, a correction is made to allow for them.

Respecting certain conditions, the overall standard deviation on a single determination (gravimetric determination and impurities correction) can be below 0,1 %.

Nuclear fuel technology — Determination of plutonium content in plutonium dioxide of nuclear grade quality — Gravimetric method

1 Scope

This International Standard specifies a precise and accurate gravimetric method for determining the plutonium content in plutonium dioxide (PuO_2) of nuclear grade quality, containing a mass fraction of less than 0,65 % of non-volatile impurities.

The method is used to cross-check accountancy analyses of plutonium dioxide.

2 Principle

The method specified in this International Standard consists of the following:

- a) sampling and weighing of the sample in dry atmosphere;
- b) heating in air between 1 200 °C and 1 250 °C to constant mass in order to obtain a stoichiometric plutonium dioxide, which is stable and non-hygroscopic;
- c) weighing of the plutonium dioxide;
- d) impurity analysis and correction for non-volatile impurities;
- e) calculation of plutonium concentration;
- f) calculation of the plutonium content using a gravimetric conversion factor which depends slightly on the isotopic composition of the plutonium.

If the latter is not known, it shall be measured, usually by mass spectrometry.

3 Interferences

All impurities which are not volatile at 1 200 °C cause a positive bias in the analysis. Their actual content shall be measured with appropriate techniques, including, for example, atomic emission or absorption spectroscopy.

If the total non-volatile impurities content is of a mass fraction of up to 0,1 %, the overall uncertainty of the measurement will depend on the precision of the impurities determination.

4 Apparatus

4.1 Sub-sampling station, comprising a glove box under dry atmosphere (dew point less than or equal to -40 °C) equipped with an analytical balance accurate to $\pm 0,1$ mg.

4.2 Heating box, supplied with ambient air and equipped with a temperature-regulated muffle furnace capable of operating at 1 200 °C to 1 250 °C.

4.3 Stainless steel sampling vials.

4.4 Platinum crucibles.