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Nuclear energy — Determination of chlorine and fluorine in uranium dioxide powder and sintered pellets

Énergie nucléaire — Détermination du chlore et du fluor dans les poudres de dioxyde d'uranium et les pastilles frittées

Reference number
ISO 22875:2008(E)

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 22875 was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 5, *Nuclear fuel technology*.

Introduction

This International Standard describes a method for determining the chlorine and fluorine concentrations in uranium dioxide and in sintered fuel pellets by pyrohydrolysis of samples, followed either by liquid ion-exchange chromatography or by selective electrode measurement of chlorine and fluorine ions.

Many ion-exchange chromatography systems and ion-selective electrode measurement systems are available; the equipment and operating procedure are, therefore, not described in detail.

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1 Scope

This International Standard describes a method for determining chlorine and fluorine in uranium dioxide powder and sintered pellets. It is applicable for the analysis of samples with a mass fraction of chlorine from 5 µg/g to 500 µg/g and with a mass fraction of fluorine from 2 µg/g to 500 µg/g.

2 Normative references

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

ISO 9892:1992, *Uranium metal, uranium dioxide powder and pellets, and uranyl nitrate solutions — Determination of fluorine content — Fluoride ion selective electrode method*

3 Principle

The samples are pyrohydrolysed at 900 °C to 1 000 °C in a tubular furnace with wet air or steam heated to the same temperature. Chlorine and fluorine are trapped as halogenated acids and entrained in an aqueous solution.

Two measurement methods may be used to measure the chlorine and fluorine ions:

a) liquid ion-exchange chromatography;

b) selective electrode measurement.

4 Reagents

Use reagents of recognized analytical grade.

4.1 Water, complying with at least grade 1 in accordance with ISO 3696.

4.2 Anhydrous sodium chloride ($NaCl$).

4.3 Anhydrous sodium fluoride (NaF).

4.4 Sodium carbonate (Na_2CO_3).

4.5 Anhydrous sodium bicarbonate ($NaHCO_3$).

4.6 Glacial acetic acid (CH_3COOH), $\rho(CH_3COOH) = 1{,}06$ g/ml.

4.7 Potassium acetate (CH_3COOK).