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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 13697-2021

Replacing GB/T 13697-1992

**Determination of carbon in uranium oxide powder and pellets -
High-frequency inductive furnace combustion-infrared
detection method**

二氧化铀粉末和芯块中碳的测定 高频感应炉燃烧-红外检测法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part

1. Structure and Drafting Rules of Standardization Documents" drafted. This document replaces GB/T 13697-1992 "Determination of Carbon in Uranium Dioxide Pellets", except for structural adjustments and editorial changes, the main technical The changes are as follows:

- Increase the determination of carbon in uranium dioxide powder (see Chapter 1);
- Increased the requirements for uranium dioxide powder in the sample (see Chapter 7);
- Modified the type and amount of flux (see 5.2, 3.7 of the.1992 edition);
- Modify the single-point calibration to two-point calibration, and increase the calibration verification content (see 8.1, 6.2 of the.1992 edition);
- Added sample heating plate flow and recommended heating time parameters (see Appendix A);
- Increased the requirements for the test report (see Chapter 11). This document is proposed and managed by the National Nuclear Energy Standardization Technical Committee (SAC/TC58). This document is drafted by: CNNC Jianzhong Nuclear Fuel Components Co., Ltd., China Nuclear Power Research and Design Institute. The main drafters of this document. Chen Changyou, Chen Lan, Zhang Jian, Dong Yi, Tang Yugang, Huang Xinshu. The previous versions of this document and its superseded documents are as follows:

---First published in 1992 as GB/T 13697-1992;

---This is the first revision. Determination of carbon in uranium dioxide powder and pellets
High Frequency Induction Furnace Combustion-Infrared Detection Method

1 Scope

GB/T 13697-2021 is the Chinese national standard on determination of carbon in uranium oxide powder and pellets - high-frequency inductive furnace combustion-infrared detection method, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 11 October 2021 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 May 2022. Classification: ICS 27.120.30, CCS F48. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes methods for the determination of carbon in uranium dioxide powders and pellets, including principles, reagents or materials, instrumentation, samples, tests Procedure, test data processing, precision and test report. This document is applicable to the determination of carbon in uranium dioxide powder and pellets. When the sampling amount is 0.5g, the measurement range of carbon content is (10~1000) µg/g.

2 Normative references

There are no normative references in this document.

3 Terms and Definitions

There are no terms and definitions that need to be defined in this document.

4 Principles

In the presence of flux, the sample is heated to above 1500 °C in the oxygen flow of the high-frequency induction furnace, and the generated carbon dioxide is composed of Oxygen is carried to the infrared absorption cell, and carbon dioxide absorbs infrared rays of a certain wavelength, and its absorption energy is proportional to the concentration of carbon, according to the detector. The measured value of the carbon content can be measured.

5 Reagents or materials

5.1 Oxygen, with a purity of not less than 99.99%.

5.2 Flux. 1g copper particles (or 0.4g tin particles and 1.5g tungsten powder mixture, or other equivalent flux), the carbon content is less than 5 μ g/g.

5.3 Carbon standard material 1, certified carbon steel standard sample, carbon standard content (10~100) μ g/g, the content should be close to 10 μ g/g.

5.4 Carbon standard material 2, certified carbon steel standard sample, carbon standard content (100~1500) μ g/g, the content should be close to the carbon content in the sample.

5.5 The ceramic crucible should be sintered at a temperature above 1000 °C with a crucible pre-sintering furnace before use until the carbon blank is stable.

5.6 Agate mortar.

6 Instruments and equipment

6.1 The infrared carbon measuring instrument consists of a high-frequency induction furnace, an infrared detector, an auxiliary purification system and a control system, etc. The heating temperature of the high-frequency induction furnace is The temperature can reach above 1600°C.

6.2 Balance, the division value is 1mg.

6.3 Crucible pre-sintering furnace, the maximum operating temperature is not lower than 1200 °C.

7 Samples

Grind the pellet sample into powder in an agate mortar, pass through a sieve with an aperture of

0.15 mm, take the under-sieve as a sample, and store it in a clean and dry place. in a dry glass bottle. Powder samples can be directly weighed.