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

GB/T 11840-2025

Replacing GB/T 11840-1989

**Determination of moisture in uranium dioxide powder and
pellets**

二氧化铀粉末和芯块水分含量测定方法

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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 for standardization documents" Drafting. This document replaces GB/T 11840-1989 "Determination of moisture content in uranium dioxide pellets" and is consistent with GB/T 11840-1989. In addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) Added test environment conditions and specified ambient temperature and relative humidity (see Chapter 5);
- b) The water content determination method has been changed to use Karl Fischer volumetric method and Karl Fischer coulometric method instead of the original standard coulometric electrolysis method. Law (see Chapters 4, 6 to 11, and Chapters 2 to 9 of the 1989 edition);
- c) According to the heating method, the tube heating is changed to the cassette furnace flask heating, the heating temperature is changed, and the heating time is reduced (see 4.1 of the 1989 edition);
- d) The accuracy of analytical balances has been changed (see 7.3, 4.2 of the 1989 edition);
- e) The calibration of instruments using moisture reference materials/standard samples has been changed (see 9.1.2, Chapter 7 of the 1989 edition);
- f) The calculation method of moisture content has been changed (see Chapter 10, Chapter 8 of the 1989 edition). Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for

identifying patents. This document was proposed and coordinated by the National Technical Committee for Nuclear Energy Standardization (SAC/TC58). This document was drafted by: China Nuclear Power Research and Design Institute, China Nuclear Jianzhong Nuclear Fuel Element Co., Ltd., China Nuclear 404 Co., Ltd., Industrial Standardization Institute. The main drafters of this document are: Yang Ping, Ning Wei, Zhang Qingyu, Guo Jinxuan, Li Bo, Zheng Na, Luo Fengyan, Lin Huixin, An Shenping, Jian Min, Deng Shiyi, Chen Huihui, Chen Changyou, Li Yanping, Chen Cheng, and Zhao Suyu. The previous versions of this document and the documents it replaces are as follows:

--- Issued as GB/T 11840-1989 in 1989;

---This is the first revision. Determination of moisture content of uranium dioxide powder and pellets

1 Scope

GB/T 11840-2025 is the Chinese national standard on determination of moisture in uranium dioxide powder and pellets, 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 1 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 February 2026. Classification: ICS 27.120.30, CCS F46. 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 the method for the determination of moisture content in uranium dioxide powder and pellets. This document applies to the determination of moisture content in uranium dioxide powder and pellets. The detection limit is 10µg.

2 Normative references

This document has no normative references.

3 Terms and Definitions

There are no terms or definitions that require definition in this document.

4 Principles of the Method

4.1 Principle of Karl Fischer Volumetry The water content in the sample is quantitatively reacted with Karl Fischer reagent (a solution consisting of iodine, sulfur dioxide, pyridine

and methanol) of known titer. The endpoint is determined by the change in the indicating potential and the water content in the sample is obtained.

4.2 Principle of Karl Fischer Coulomb Method The water in the sample enters the Karl Fischer titration cell, and the iodine generated at the anode of the titration cell reacts with the water in the sample in a

1.1 ratio. When the water in the titration cell is consumed, the titrator detects the electrical signal generated by the excess iodine to determine the titration end point. According to Magnaday's law, the amount of water titrated is proportional to the total integrated current.

5 Test environment conditions

Ambient temperature. 10°C~30°C; relative humidity. 35%~65%.

6 Reagents or materials

6.1 Volumetric Karl Fischer reagent. Commercially available standard reagent for Karl Fischer volumetric titration, or prepared as described in Appendix A.

6.2 Coulometric Karl Fischer reagent. Commercially available standard reagent for Karl Fischer coulometric titration, or prepared as described in Appendix A.

6.3 Moisture standard substances/standard samples.

7 Instruments and Equipment

7.1 Volumetric Karl Fischer titrator, equipped with a Karl Fischer heating oven.

7.2 Coulometric Karl Fischer titrator, equipped with a Karl Fischer heating oven.