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

GB/T 11843-2025

Replacing GB/T 11843-1989

**Determination of nitrogen in uranium dioxide powder and
pellets - Spectrophotometry**

二氧化铀粉末和芯块中氮的测定 分光光度法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document supersedes GB/T 11843-1989 "Determination of Nitrogen in Uranium Dioxide Powder and Chips - Spectrophotometric Method", and is consistent with GB/T 11843- Compared to 1989, aside from structural adjustments and editorial changes, the main technical changes are as follows:

---The requirements for nitrogen distillation apparatus have been amended (see 6.3, 4.4 of the 1989 edition);

---Added instruments and requirements (see 6.5~6.7);

---The working curve was changed to the standard curve (see 8.1, 6.4 of the 1989 edition);

---Increased cleanliness requirements for the distillation system (see 8.2);

---The calculation formula has been changed (see Chapter 9, Chapter 7 of the 1989 edition);

---The method precision has been modified (see Chapter 10, Chapter 8 of the 1989 edition);

---A test report has been added (see Chapter 11). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Nuclear Energy Standardization Technical Committee (SAC/TC58). This document was drafted by: China Nuclear Jianzhong Nuclear Fuel Element Co., Ltd., China Nuclear Power Research and Design Institute, and China Nuclear Northern Nuclear Fuel Element Co., Ltd. Limited Liability Company, Sichuan Honghua Industrial Co., Ltd. The main drafters of this document are: Chen Huihui, Zhao Bing, Chen Changyou, Wang Kun, Huang Yi, Li Bo, Yu Xueli, Zhao Shenglu, Yang Guangyu, Wang Xiaowei, and Gong Lei. Fang Yu. The release history of this document and the document it replaces is as follows:

---First published in 1989 as GB/T 11843-1989;

---This is the first revision. Determination of nitrogen in uranium dioxide powder and pellets Spectrophotometry

1 Scope

GB/T 11843-2025 is the Chinese national standard on determination of nitrogen in uranium dioxide powder and pellets - spectrophotometry, 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 5 October 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 5 October 2025. Classification: ICS 27.120, 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 reagents or materials, instruments, equipment, samples, and experimental procedures for the spectrophotometric determination of nitrogen in uranium dioxide powder and pellets. This includes test data processing, precision, and test reports. This document applies to the determination of nitrogen in uranium dioxide powder and pellets. When the sample weight is

0.5 g, the nitrogen content in uranium dioxide powder and pellets is... Measurement range. 20 µg/g ~.200 µg/g.

2 Normative references

This document has no normative references.

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4.Principles The sample was dissolved in hydrochloric acid and hydrogen peroxide to convert the nitrogen in the sample into ammonium salt. Sodium hydroxide solution was then added to make it alkaline before proceeding with the aqueous solution treatment. Steam distillation separates ammonia from the matrix and impurity elements. The ammonia-containing distillate reacts with Nessler's reagent to form a yellow, stable... Complex. Using a 3cm cuvette and water as a reference solution, the absorbance was measured at a wavelength of 420nm using a spectrophotometer.

5.Reagents or materials Unless otherwise stated, all reagents used in this document are of superior purity and conform to national or industry standards, and the water used is of high conductivity. Deionized water with a strength of $\leq$

0.10 mS/m at 25°C.

5.1 Sodium hydroxide.

5.2 Hydrochloric acid, $\rho=1.19\text{g/mL}$.

5.3 Hydrogen peroxide, $\omega\geq 30\%$.

5.4 Sodium hydroxide solution, 500 g/L. Weigh 250g of sodium hydroxide (5.1) into a 500mL beaker, and slowly add deionized water to 500mL while stirring. Wait until the solution is completely dissolved. After cooling, transfer to a plastic bottle for storage.

5.5 Nessler's reagent. Weigh 18g of potassium iodide (analytical grade) and dissolve it in 50mL of water. Separately weigh 9g of mercuric chloride (analytical grade) and dissolve it in 150mL of hot water. Mercuric iodide solution was slowly added to potassium iodide solution while stirring thoroughly. A red precipitate of mercuric iodide was formed. Then, 300 mL of hydrogen sulfide was added. Mix potassium oxide solution (200g/L), let stand in the dark for more than 72 hours, and use the supernatant; or purchase commercially available reagents.

5.6 Nitrogen standard stock solution, $\rho=1000\mu\text{g/mL}$. Weigh 3.8190 g of ammonium chloride that has been pre-dried at 105°C~110°C for 2 hours, dissolve it completely in water, and transfer it to a 1000 mL volumetric flask.