ICS 07.030
CCS D45

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 13070-2025

Replacing GB/T 13070-1991

Determination of uranium content in uranium ores - Potentiometric titration

铀矿石中铀的测定 电位滴定法

Issued on: August 29, 2025 **Implemented on: December 1, 2025**

Issued by: State Administration for Market Regulation;
Standardization Administration of China

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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 13070-1991 "Determination of Uranium in Uranium Ore by Potentiometric Titration" and is consistent with GB/T 13070-1991. Aside from structural adjustments and editorial changes, the main technical changes are as follows:

a) The scope of application has been changed (see Chapter 1, Chapter 1 of the.1991 edition);

b) An automatic potentiometric titrator was added (see 6.2);

c) The electrodes were changed (see 6.5,

5.6 in the.1991 edition);

d) The sample particle size was changed (see 7.1,

6.1 in the.1991 edition);

e) An additional formula for calculating the titer of ammonium vanadate has been added (see Chapter 9);

f) Improved the precision of ferrous and titanate-ammonium vanadate potentiometric

titrations using an automated potentiometric titrator (see Chapter 10);

g) A comparison table of the amount of ammonium vanadate needed to prepare different concentrations and the amount of uranium required for calibration has been added (see Table A.1). 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: Beijing Research Institute of Geology, Nuclear Industry; Institute of Standardization, Nuclear Industry; 230th Research Institute, Nuclear Industry. Research Institute No. 240, National Nuclear Security Technology Center, and Beijing Research Institute of Chemical Metallurgy of Nuclear Industry. The main drafters of this document are. Huang Qiuhong, Wang Tiejian, Li Bowen, Wang Yuxue, Wang Xinyu, Zheng Jijia, Zhang Xin, Liu Jinliang, Hu Dehua, and Li Xi. Guo Guolong. The release history of this document and the document it replaces is as follows:

---First published in.1991 as GB/T 13070-1991;

---This is the first revision. Determination of uranium in uranium ore by potentiometric titration Warning

---Personnel using this document should have practical experience working in a formal laboratory. This document does not address all possible safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

1 Scope

GB/T 13070-2025 is the Chinese national standard on determination of uranium content in uranium ores - potentiometric titration, in the field of natural and applied sciences. 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 29 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 December 2025. Classification: ICS 07.030, CCS D45. 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, test procedures, and test data for the potentiometric titration method for determining the uranium content in uranium ore. This includes aspects such as processing, precision, quality assurance, and control. This document applies to the determination of uranium

content in uranium ore, and also to the determination and testing of pure uranium substances such as metallic uranium and uranium oxide. The ferrous-ammonium vanadate titration method is used for the determination of uranium content in the range of 0.01% to 15%, with values less than or equal to 10 mg molybdenum,

4.2 mg vanadium, and 3 mg cerium. 5 mg of zirconium does not interfere with the determination. The uranium content determination range using the titration method with ammonium vanadate is 0.01% to 15%, with values less than or equal to 25 mg molybdenum,

0.1 mg vanadium, and

1.5 mg cerium. 4 mg of zirconium does not interfere with the determination. Generally, the amount of impurities in uranium ore is less than the above-mentioned interference limit and does not interfere with the determination.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 6379.2 Accuracy (correctness and precision) of measurement methods and results - Part

2.Determining the repeatability of standard measurement methods Basic methods of sex and representation

GB/T 6682 Specifications and test methods for water used in analytical laboratories

3 Terms and Definitions

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

4.Principles The sample was decomposed with hydrochloric acid, hydrofluoric acid, and phosphoric acid. Uranium(VI) in the solution was reduced to uranium(VI) in phosphoric acid medium using ferrous ammonium sulfate or titanium trichloride. Uranium(IV) is oxidized with sodium nitrite to remove excess reducing agent; stable uranium(IV) is not oxidized, and excess sodium nitrite is removed with urea. Vanadic acid is used. The ammonium solution was titrated to the endpoint, and the ionic reaction equation is given in formula (1). The amount of ammonium vanadate consumed at the titration endpoint was calculated based on the sample concentration. The uranium content in the medium. U4 2VO3- 4H =UO22 2VO2 2H2O (1)

5 Reagents or materials Warning

---Hydrofluoric acid is toxic and corrosive.