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

GB/T 44647-2024

**Determination of heavy water isotopic purity - Fourier transform
infrared spectroscopy**

重水同位素纯度的测定 傅里叶变换红外光谱法

(English Translation)

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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 is equivalent to ISO 23468:2021 Reactor technology - Power reactor analysis and measurement - Fourier transform infrared spectroscopy Determination of the isotopic purity of heavy water.

The following minimal editorial changes were made to this document.

--- In order to coordinate with the existing standard, the name of the standard is changed to "Determination of Isotopic Purity of Heavy Water - Fourier Transform Infrared Spectrometry";

--- In 6.4, add "Note. According to laboratory practice, polyethylene or polypropylene is used, and the nominal volume is 5mL~30mL." understand;

--- In 6.9, add "Note. According to laboratory practice, use a drying oven with temperature and humidity display inside the oven." for easier understanding.

1 Scope

This document describes a method for determining the isotopic purity of heavy water over the full range using Fourier transform infrared spectroscopy.

This document is applicable to the determination of heavy water isotope purity in heavy water reactor nuclear power plants, research reactors, heavy water manufacturers and heavy water related fields.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date

applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

and test methods)

Note: GB/T 6682-2008 Specifications and test methods for water used in analytical laboratories (ISO 3696:1987, MOD)

3 Terms and definitions

The following terms and definitions apply to this document.

The terminology databases used for standardization maintained by ISO and IEC are located at.

Heavy water

Water with heavy hydrogen isotopes combined with oxygen in amounts exceeding its natural abundance.

Note 1: HDO exists in heavy water and is formed by the rapid exchange of protium (H) atoms and deuterium (D) atoms between light water and heavy water molecules.

Note 2: The heavy water described in this document does not refer to heavy water enriched in the heavy oxygen isotopes ^{17}O or ^{18}O .

Note 3: The freezing point of heavy water is 3.8°C . Measures should be taken to prevent heavy water from freezing.

[Source. ISO 6107:2021, 3.272, modified] 3.2 Light water the protium and deuterium isotopes combined with oxygen are present in the natural abundance of water.

The molecular bonds of the sample are excited by broadband pulsed infrared radiation, and the absorption spectrum is obtained by Fourier transform.

[Source. GB/T 30544.6-2016, 4.8] 3.4 Deuterium Oxide D_2O it is composed of two deuterium atoms and one oxygen atom.