
**Reactor technology — Power reactor
analyses and measurements —
Determination of heavy water isotopic
purity by Fourier transform infrared
spectroscopy**

*Technologie du réacteur — Analyses et mesurages relatifs aux
réacteurs de puissance — Détermination de la pureté isotopique de
l'eau lourde par spectroscopie infrarouge à transformée de Fourier*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 6, *Reactor technology*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Reactor technology — Power reactor analyses and measurements — Determination of heavy water isotopic purity by Fourier transform infrared spectroscopy

1 Scope

This document specifies an analytical method for determining heavy water isotopic purity by Fourier transform infrared spectroscopy (FTIR). It is applicable to the determination of the whole range of heavy water concentration. The method is devoted to process controls at the different steps of the process systems in heavy water reactor power plant or any other related areas.

The method can be applied for heavy water isotopic purity measurements in a heavy water reactor power plant or research reactor, heavy water production factory and heavy water related areas.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions are applied.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

heavy water

water which contains a higher than normal proportion of the heavy isotopes of hydrogen in combination with oxygen

Note 1 to entry: HDO exists whenever there is water with hydrogen-1 and deuterium in the mix. HDO is formed when hydrogen and deuterium atoms are rapidly exchanged between light water and heavy water molecules.

Note 2 to entry: Heavy water here does not mean “heavy water” which is enriched in the heavier oxygen isotopes ^{17}O and ^{18}O .

Note 3 to entry: The ice point of heavy water is as high as 3,8 °C, care should be taken to avoid heavy water from freezing.

[SOURCE: ISO 6107:2021, 3.272, modified — Notes 1 to 3 to entry were added.]

3.2

light water

water that contains natural abundance of protium and deuterium