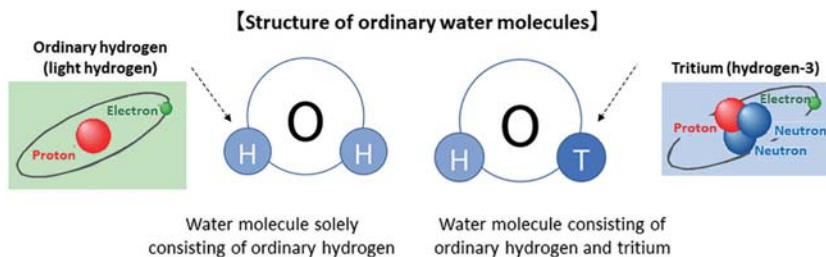


Characteristics of Tritium

Tritium is a radioisotope of hydrogen, called "hydrogen-3," and exists around us mostly being contained in water molecules. β -particles emitted from tritium only have low energy (18.6 keV at the largest) and can be shielded with a sheet of paper.



Source: Prepared based on the "Important Stories on Decommissioning 2018" by the Agency for Natural Resources and Energy, METI, the "Tritiated Water Task Force Report" by the Tritiated Water Task Force (2016), and the "Scientific Characteristics of Tritium (draft)" by the Subcommittee on Handling of the ALPS Treated Water



The water processed with the multi-nuclide removal equipment, also called the Advanced Liquid Processing System (ALPS), or other equipment, at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, still contains tritium, which is a radioactive material.

Tritium is a radioisotope of hydrogen, called "hydrogen-3." As tritium combines with oxygen to form water molecules just as ordinary hydrogen does, it exists around us contained in water molecules, and is also found in water vapor in the air, rainwater, seawater, and tap water. It is difficult to remove tritium by ALPS as it exists as part of water molecules. Tritium is generated in nature by cosmic rays in addition to being artificially generated through operations of nuclear power plants.

Tritium emits β -particles, a type of radiation, but β -particles emitted from tritium have low energy and can be shielded with a sheet of paper. Therefore, external exposure to tritium is unlikely to exert any influence on the human body. A biological half-life for water containing tritium is ten days, and even if it is ingested, it will be eliminated from the body promptly and will not accumulate in any specific organs (p.31 of Vol. 1, "Radioactive Materials Derived from Nuclear Accidents"). The committed effective dose coefficient when orally ingesting tritium is 0.000018 $\mu\text{Sv/Bq}$, a smaller value compared with other radionuclides (p.57 of Vol. 1, "Conversion Factors to Effective Doses").

In April 2021, the Government of Japan announced the Basic Policy on the handling of the ALPS treated water purified by the Advanced Liquid Processing System (ALPS), etc. to be discharged into the sea after a preparation period of about two years, on the premise that safety will be ensured, and that the government will take all necessary measures to prevent adverse impacts on reputation.

[Reference materials]

Basic knowledge on tritium:

- Contaminated water management in Fukushima: Top priority on safety and security; Measure (ii) What is "tritium"? <https://www.enecho.meti.go.jp/about/special/johoteikyo/osensuitaisaku02.html> (in Japanese)
- Top priority on safety and security; Measure (iii) Explanation of tritium and radiation exposure <https://www.enecho.meti.go.jp/about/special/johoteikyo/osensuitaisaku03.html> (in Japanese)
- Portal Site for Decommissioning and Countermeasures for Contaminated Water and Treated water:
- ALPS Treated Water <https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/atw.html>

Included in this reference material on March 31, 2019

Updated on March 31, 2022