HYDROGEN ISOTOPE STORAGE SYSTEM FOR DEMO-FNS FUEL CYCLE: MATERIALS, MODES, SAFETY [[1]](#footnote-1)\*)

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1Ivanov B.V., 2Anfimova T.A., 1Ananyev S.S.

1NRC Kurchatov Institute, Moscow, Russia, [kapjicohh@gmail.com](mailto:kapjicohh@gmail.com)  
2D. Mendeleev University, Moscow, Russia

The report presents the results of the conceptual design of a hydrogen isotope storage system in the DEMO-FNS fuel cycle. This system is designed for short-term storage and fuel (tritium and deuterium) delivery in tokamak injection systems, as well as for long-term storage of hydrogen isotopes. In addition, the system functions are: preparation of a hydrogen isotopes fuel mixture and its purification from the tritium decay product (3He); measuring the tritium amount; ensuring safe work with tritium.

Depleted uranium and intermetallic compounds based on Zr and Ti are considered as hydride-forming materials. The advantages and disadvantages of these materials are analyzed. For the calculations, we used both literature data and the results experimentally obtained by the authors.

The report presents an analysis of the system operating modes. In particular, the influence of temperature and pressure in the system on the hydrogen isotopes delivery rate, the tritium loss as a result of diffusion and capture in the system materials were considered. For analysis, the flows and quantities of hydrogen isotopes calculated in the FC-FNS code [1] were used.

The paper compares various system configurations in terms of ensuring the tritium safety.

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References

1. Ananyev S.S., Spitsyn A.V., Kuteev B.V. «Electronic model «FC-FNS» of the fusion neutron source DEMO-FNS fuel cycle and modeling hydrogen isotopes flows and inventories in fueling systems» — Fusion Engineering and Design 138 (2019) 289–293, <https://doi.org/10.1016/j.fusengdes.2018.12.003>

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Mu/ru/BG-Ivanov.docx) [↑](#footnote-ref-1)