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## Experimental refutation of the deuterium permeability in vanadium, niobium and tantalum

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Unique gas retention and transport characteristics of group V elements (V, Nb, Ta) have long attracted a significant interest, in particular among the nuclear fusion community. The nominally high hydrogen isotope permeability and diffusion at the expected operational temperatures, together with the negative activation energy for the solubility present these materials as a promising choice for the fabrication of tritium recycling structures.

However, before seriously considering these materials, one should question the accuracy of the available data, given the remarkable lack of direct experimental measurements in support of the traditionally accepted transport properties of these materials. Furthermore, it must be considered that data have been mostly obtained by combining results obtained by different authors and methods.

The extensive literature review presented in this paper shows that existing experimental results not only contradict the semi-empirical values assumed for these materials but also present a broad dispersion.

In order to clarify this, deuterium permeability data for the three materials was obtained at the THERMOPERM facility at Ciemat (Madrid, Spain) in a relevant range of pressures and temperatures. Experimental difficulties together with the role of surface oxidation which may become a major issue for practical uses are also assessed.

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