Modelling of optimum tritium storage conditions

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Abstract

Formation of the detailed hydrogen distribution structure in the depth of metals on the results of experiments and carried out analysis is modelled. The estimation of contribution of the various diffusion fluxes existing in the polycrystalline structure: diffusion through the grains, intergranular diffusion (on a surface of grains) is carried out. Requirements of formation of the tritium diffusion fluxes in internal area out of influence limits of the surface phenomena are considered. Tritium diffusion in the polycrystalline structure of metal subject to merging of fluxes through the grains and on the intergranural channel with formation of the general diffusion flux is modelled. The given conditions also define a hydrogen flux into grains, outlet from grains into the intergranural space, movement on the intergranural channel, escape of intergranural flux into the grains unsaturated by hydrogen and yield of hydrogen from metal in the environment. Results of the carried out consideration as dependence of the tritium flux escaping outwards from a closed vessel on the storage temperature for various wall thickness of a vessel, storage time and diffusion coefficients are presented. The window of the hydrogen storage in closed vessels is revealed in the range of temperatures 50°C-100°C where the escaping flux of tritium from a vessel is minimal.

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