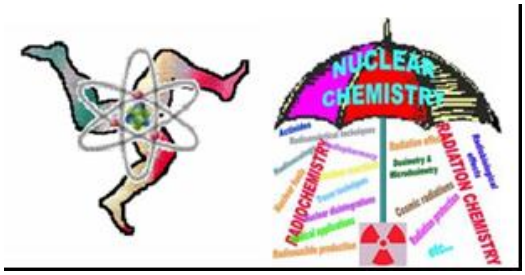

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Aging effects on kinetic properties in palladium–tritium system during tritium storage

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Palladium powders had been aged at room temperature for 6.6 years. The 3He content was estimated from the initial tritium stoichiometry and the aging time by applying the radioactive decay law, which shows the helium-palladium atomic ratio (He/Pd) is 0.204. Tritium absorption of aged palladium powder has been measured in the initial pressure of 284 kPa and as a comparation, fresh palladium powder (He/Pd = 0) has been also tested in the initial pressure of 354 kPa at the same temperature of 20℃. The correspondence and difference on the kinetics of tritium absorption are analyzed between the aged and fresh palladium powder because of the presence of helium. The overall tritium absorption process is determined by two steps: (1) the chemisorption reaction on the surface of palladium tritide at the beginning of absorption; (2) diffusion of tritium atoms through tritide in the middle of tritium absorption. There is a better agreement on kinetic properties for fresh palladium powder than aged one. The absorption pressure-time isotherms and other ones show that the presence of helium in the palladium decreases the absorption rate of tritium by influencing the initial absorption process (<5s). The maximum of the tritium absorption rate of aged palladium powder exists in the α area and the absorption rate does not change so largely as the fresh palladium powder.

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