

Tritium transfer in porous concrete materials coated with hydrophobic paints

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Experimental study on tritium transfer in porous concrete materials for tertiary tritium safety containment is performed to investigate how fast tritium is transferred through porous concrete walls, how well contaminated concrete walls are decontaminated and how well hydrophobic coating works as a protective film against tritium permeating through pores. The experiment is comparatively carried out using cement paste pellets of W(water)/C(cement) weight ratio of 1:0.6 with or without hydrophobic paints, and mortar pellets of W/C/sand ratio of 1:0.6:2 with or without the paints. After specified time of contact (from 1 day to 79 days) with HTO vapor in a glove-box, the HTO amount adsorbed on the samples is determined by a liquid scintillation counter with a technique of H₂O dissolution after specified contact time (from 1 day to 45 days). The paints used in the present study are an epoxy-resin paint and a silicon-acryl resin one. The results determined are that (1) the tritium transfer in porous concrete can be correlated in terms of the effective T diffusivity, (2) its value is in an order of 10⁻¹¹ m²/s, (3) HTO vapor is transferred through pores in cement, (4) no transfer occurs in non-porous sand, (5) the epoxy-resin paint works more effectively as an anti-tritium diffusion coating, and the tritium reduction factor is around one-tenth, (6) the reduction factor is deteriorated with elongating the contact time with H₂O, (7) the HTO uptake inside the epoxy paint is comparatively larger than that of the silicon paint, (8) silicon paint does not work as a tritium-protecting paint and so on. The details will be presented in the tritium conference in Nara.

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