
Glass design for the vitrification of high active deposits coming from the Dismantling and Decommissioning of nuclear plant.

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Abstract

Decommissioning and dismantling of nuclear plants such as UP1, the French reprocessing plant in Marcoule, has revealed the presence of significant amount of high active deposits and sludge in storage tanks. This waste is mainly contaminated by Cs-137 (1 to 10 GBq/g) and contains significant amount of zirconium, phosphorus and molybdenum. Regarding to their high activity level, vitrification of these HL Waste by an In-Can Melting process is a worth conditioning route that minimizes both the waste package volume and the environmental impact in storage conditions. This paper presents the glass formulation studies that have been performed to condition this waste. After selected a reference surrogate waste, borosilicate glass formulations have been proposed that meet both material and process technical requirements. Glass materials, with a simulated waste loading of 10 wt %, have been elaborated in simplified conditions and characterized. Elsewhere, incorporation of higher amount of Zr, P and Mo has been investigated to assess the flexibility of these glass formulations regarding to waste composition variation and uncertainties. By the end, some tests in more representative conditions have been performed to evaluate (i) the reactivity between glass additives and waste surrogate and (ii) the corrosion behavior of the glass canister. The most significant results from these studies are presented.

Keywords: vitrification, glass design, nuclear waste

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