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Borosilicate glass HLW stability during long term interim storage

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France has chosen a recycling strategy to manage nuclear spent fuels. This strategy relies on high level waste immobilization into a borosilicate glass waste form in order to meet both interim storage and final geological disposal safety requirements. Interim storage facilities at La Hague recycling plant have been designed to last more than an hundred years (concrete structure) factoring the need for a glass waste form durability using for instance natural or forced convection principles. This period of time during interim storage contributes to the final disposal cost optimization by allowing the radioactive decay of the main contributors to thermal power dissipated in the early years after glass production.
In parallel to the thermal design of the interim storage, lots of studies have been carried out on the glass thermal and irradiation stabilities. Thermal treatment experiments consolidated by modeling show that the glassy state is expected to be stable during the interim storage period, with no crystallization induced by the glass thermal history. Moreover, the impact of the radiations (beta and alpha decays) expected in interim storage has been studied by external irradiation, glass actinide doping technique and molecular dynamic simulation. The results have demonstrated that the glassy state will not be modified during the interim storage period and the glass will fully preserved its role of conditioning material.

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