

Optimizing Solidification Cement Recipe for Long-term Stabilization of Liquefied Spent Ion Exchange Resins

During the dismantling and decommissioning of nuclear power plants, various waste streams are generated that require treatment and conditioning for long-term disposal. Spent ion exchange resins are among these waste streams. The conditioning process aims to ensure a safe final matrix and minimize waste volume. A common technique involves mixing radioactive waste with cement to form a stable matrix for final storage.

Framatome developed a liquefaction process for treating spent ion exchange resins, which are then solidified for long-term storage via cementation. Liquefaction allows for both homogenization and waste volume reduction through concentration. This study focuses on optimizing the cementation recipe to maximize waste proportion while maintaining required properties such as compressive strength, leaching resistance, and resistance to water and temperature.

In this project, you will have the opportunity to gain hands-on experience in both experimental and computational methods according to your knowledge and wishes, as well as engage in communication and learning with Framatome experts.

For this task, the following is envisioned:

- Literature review on cement composition and properties.
- Laboratory-scale testing of mechanical properties of various cement matrices (using non-radioactive liquefied spent resins).
- Computational simulations to assist in understanding and optimizing cement matrix properties.
- Analysis, discussion of results, and report elaboration.



Ion exchange resins



Liquefied Ion exchange resins



Samples preparation



Leaching tests



Compressive strength tests



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