

CHEMICAL TREATMENT OF SPENT RESIN

Decomposition of Organic Matter and Waste Volume Reduction

The chemical treatment of spent resin reduces storage volume, disposal costs and facilitates safe, long-term storage.

Challenge

The limited storage space combined with various challenges regarding the disposal of spent resins (e.g., bead swelling, combustible organic content, etc.) led Framatome to develop and offer a new process that allows you to safely treat radioactive waste from spent resins and dispose of them in a long-term, stable form.

Solution

Framatome's process involves chemical treatment and consists of two or, optionally, three consecutive and modular process steps.

In the first step, the spent resins are subjected to a mild oxidation process which can be followed by an electrochemical treatment. This results in an aqueous solution without any residual resin beads. The solution contains the radioactive elements previously bound to the resins. The resins themselves decompose to CO₂ and are released as gas which consists almost entirely of CO₂ and O₂.

Evaporation is usually the second step. The total volume of waste is reduced in this step, and the water content can be adjusted according to the customer's requirements. Existing plant equipment can be used. Classification as an evaporator concentrate is possible, depending on specific country regulations.

The concentrate produced can be immobilized in a third step by solidification or drying, resulting in a volume reduction factor of 3–20 compared to direct solidification.



Set-up of the test facility at Framatome site in Karlstein am Main, Germany

Technical information

- Organic free waste (TOC < 100 g/m³ spent resin possible).
- Mild conditions: temperature 60 – 85 °C, atmospheric pressure.
- Cheap and environment friendly reagents
- Advanced oxidation processes (Fenton-like wet oxidation / Boron doped diamond electrode)
- Scalable process to reflect customers needs (Envisaged batch size: 200 l/day)
- Mobile equipment (skid mounted)
- Remote controlled (ALARA principles)

Customer benefits

- Suitable for a wide range of spent resins e.g., from Decontamination
- Decomposition of spent resins, leading to reduced storage volume and disposal cost.
- Organic-free waste facilitates safe, long-term storage.
- Scalable process allowing fit-for-purpose solutions.

- **1 Conversion into long term stable waste form**

- **Volume reduction factor: 3 up to 20**

Depending on selected conditioning method

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