## INNOVATION IN RADIOACTIVE SOLID ORGANIC WASTE TREATMENT AND CONDITIONING IN THE FRAMEWORK OF THE PREDIS PROJECT ON PREDISPOSAL WASTE MANAGEMENT

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Among the various areas covered by the PREDIS project (Pre-Disposal Management of Radioactive Waste), the treatment and the conditioning of the Radioactive Solid Organic Waste (RSOW) was addressed in the Workpackage 6. The objective was to propose innovations and solutions for the management of Low- and Intermediate-Level Waste (LILW) forms whose safe long-term storage and disposal is difficult to achieve because they are considered not sufficiently stable and / or too highly reactive in the conditions expected to prevail in many final repositories. Therefore, several thermal treatments have been used to transform the RSOW into more stable inorganic end products and to immobilize them (e.g., ashes) using conditioning matrices. Much of the work focused on the treatment of commercial Ion Exchange Resins (IERs) doped with relevant radionuclides typically found in LILW. In some case the IERs were initially mixed with other organic waste (e.g., glove, PVC,...) to simulate a mixture of RSOW. The end products of already mature technology, i.e., incineration/gasification, have been used for the development of the immobilization matrices, but less mature processes have been improved, leading to an increase of their TRL. This was the case for the Molten Salt Oxidation and Fentonlike oxidation treatments, as well as the molten glass coating for ash immobilization. Hot Isostatic Pressing technology was also studied, as it enables RSOW to be degraded and immobilized in a single step. In all thermal processes, a significant volume reduction of the waste form was achieved, at least a factor three. Once treated, the residues were immobilized using traditional cement-based materials or novel binders such as geopolymer matrices which were of greatest interest to Waste Management Organizations according to the gap analysis undertaken at the start of the project. The geopolymer formulations were optimized to obtain the highest waste loading while keeping the integrity and the stability of the immobilization matrices. Once the matrix formulations had been optimized, a selection of samples was tested to assess the stability and the long-term performance of the conditioned waste forms according to a common protocol based on the End Users recommendations and as representative as possible of the final repository conditions. This presentation will give an overview of the activities related to the treatment of RSOW in PREDIS, the processes that have been studied, some physicochemical characterizations of the treated materials before and after reconditioning and the main conclusions of the stability and durability tests, as well as the first recommendations from the value assessment.

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