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Waste Forms for the Immobilization of Enriched Uranium Waste Streams from Mo-99 Production

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ABSTRACT

Tc-99m, the most commonly used radioisotope in nuclear medicine is produced from the decay of Mo-99 which is predominantly produced in reactors by irradiation of enriched uranium targets. This results in a uranium filter cake containing fission products. This filter cake could itself be treated as a waste stream, or processed to retrieve the enriched uranium for further use, thus producing additional waste streams during reprocessing. Here we consider glass, glass-ceramic, ceramic and geopolymer waste form options for the various waste streams formed in uranium reprocessing as well as for the filter cake itself. All waste forms have been characterized by XRD and SEM and their compressive strength and aqueous durability determined by standard methods. Consideration has been given to the most suitable and practical solutions for the immobilization of wastes.