

Low-Risk Nuclear Waste Forms for Mo-99 Radiopharmaceutical Production

Executive Summary

CLASS: Nuclear waste immobilization process technologies.

STATUS: Demonstrated; mature technology.

MARKETS: Immobilization of waste streams derived from Molybdenum-99 (⁹⁹Mo) radiopharmaceutical production, with and without impurities

INTELLECTUAL PROPERTY: Know-how, R&D, patents, process technology.

COMMERCIALIZATION: Strategic alliances with end users and engineering contractors.

Technology Background

ANSTO, has over 25 years experience in designing low-risk, reduced-cost, tailored ceramic and glass-ceramic waste forms for the immobilization of radioactive waste.

ANSTO has produced ⁹⁹Mo for over 30 years by reactor irradiation of uranium targets. *synrocANSTO* has developed an extremely durable synroc matrix to lock up the uranium waste derived from this production. A plant to immobilize ANSTO's waste derived from Mo-99 production is currently under development.

synrocANSTO has developed a range of tailored waste forms directed towards wastes difficult to incorporate in glass.

synrocANSTO Advantages

synrocANSTO's broad and internationally recognised technical team can develop a solution for actinide-waste problems. The advantages of tailored synroc waste forms for ⁹⁹Mo production and actinide-bearing wastes include:

- High waste loadings (>35 wt%) - resulting in a reduced number of disposal canisters, substantial life-cycle cost savings, and decreased processing time;
- Easy to process using mature technology proven in the nuclear industry, including hot-isostatic pressing and sintering;
- Criticality safe – titanate ceramic readily incorporates neutron absorbers such as Hf, and Gd for criticality control where required;
- Ceramic waste form composition is flexible, can be tailored to suit the requirements of the waste and will readily accommodate process impurities;
- The synroc titanate phases incorporating the uranium and fission products are extremely durable chemically, much more so than borosilicate glass;
- Proliferation resistant.

Market Applications

DEMONSTRATED: Ceramic waste forms for uranium-rich wastes from acid dissolution of uranium targets;

DEMONSTRATED: Waste form processing from laboratory to large-scale;

DEVELOPING: Ceramic waste forms for alkaline dissolution of uranium targets from Mo-99 radiopharmaceutical production



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