

Frequently Asked Questions

synrocANSTO's low-risk tailored waste forms are designed to lock up problematic high-level nuclear waste. They offer overall cost and processing schedule savings worth billions of dollars via higher waste loadings, better chemical durability, more processing flexibility and lower off-gas emissions.

The waste form is the key component of the immobilization process. It determines the type of nuclear waste that can be immobilized, how well the waste is locked up, and ultimately the number of disposal canisters required (waste loading).

The expertise of the synrocANSTO team lies in tailoring the design of the ceramic or glass-ceramic waste form and the associated process technology to suit the unique characteristics of the waste, which enables these cost savings to be realized.

Q1: Synroc has been around for 25 years, why hasn't it been successful?

Q2: What are the benefits of synroc technology?

Q3: If it's aimed at problematic waste streams, can it solve the really big waste issues?

Q4: Why was synroc developed in Australia?

Q5: Compared to glass, it sounds really complicated?

Q6: But it's only a small and front-end part of the bigger issue? What advantages does it really have? How would we deploy?

Q7: Who have you worked with in the US? What will they say about you when I call them?

Q8: What real advantages does synroc have? Why and for whom?

Q9: Where is the best bang for my buck if I use synroc?

Q10: Why is synrocANSTO a good partner?

Q1: Synroc has been around for 25 years, why hasn't it been successful?

A: Synroc was chosen by US Department of Energy to immobilize surplus weapons plutonium in the US and Russia (although with the change in US government this option is in suspension, highlighting the political nature of the industry). It was chosen because it had several major advantages over glass.

The original synroc formulation was designed for high-level waste (HLW) from the reprocessing of spent nuclear fuel, but many countries, including the US, don't reprocess their waste. At the time decisions on HLW waste forms were made in the early 1980s borosilicate glass was chosen because it was the most technically mature technology. Since then synroc technology has matured, its advantages over glass in many areas confirmed, and a wide range of synroc formulations developed to cope with a diverse range of radioactive waste streams. This claim was validated by selection of synroc for the plutonium immobilization program in the late 90s (as mentioned above).

Only a small proportion of HLW waste around the world has been immobilized because of ongoing debate among stakeholders. Implementation takes political will and is a slow process. More recently, tailored synroc waste forms have been developed targeting problematic tank and legacy waste streams that are difficult to incorporate in glass. In many instances the processing of these problematic wastes has often been delayed in favor of processing simpler waste streams.

Q2: What are the benefits of synroc technology?

A: synrocANSTO technology is no more expensive than glass; indeed the benefits of this technology can save billions of dollars compared with glass. In combination with our waste form design chemistry it produces waste forms with higher waste loadings and better chemical durability.

The process technology is flexible, much more so than Joule melting, and has much lower off-gas emissions, enabling it to be used for a wide range of waste streams. The technology synroc uses is

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mature and has been used at a large industrial scale and in the nuclear industry.

Q3: If it's aimed at problematic waste streams, can it solve the really big waste issues?

A: Higher waste loadings and reduced off-gas emissions enable billion dollar savings to be achieved via the use of alternative waste forms for a wide range of wastes.

synrocANSTO technology is suitable for an extremely diverse range of nuclear waste, however in view of major current investment in glass technology for HLW, most pronounced savings are for wastes difficult to incorporate in glass.

Nuclear wastes that can not be readily handled by glass are often viewed as intractable. Synroc offers a superior immobilization solution to these intractable nuclear waste issues.

Q4: Why was synroc developed in Australia?

A: The concept was invented in Australia and its superior performance and global potential was recognised by the Australian Government.

Australia is part of the nuclear fuel cycle as a major uranium exporter. Synroc offers solutions to back-end challenges of the fuel cycle and demonstrates Australia's role as a responsible member of the international nuclear community.

Q5: Compared to glass, it sounds really complicated?

A: The technology is no more complicated than glass, although it is much more flexible in terms of the types of waste it can accommodate. The processes are widely used in industry and have been demonstrated at scale in nuclear applications.

Q6: But it's only a small and front-end part of the bigger issue? What advantages does it really have? How would we deploy?

A: The waste form is the key component of the immobilization process. It determines the type of nuclear waste that can be immobilized, how well the waste is locked up, and ultimately the number of disposal canisters required (waste loading).

synrocANSTO waste forms offer overall cost and processing schedule savings worth billions of dollars via higher waste loadings, better chemical durability, more processing flexibility and lower off-gas emissions.

In partnership with an engineering contracting company, synrocANSTO technology can be implemented via either retrofitting or custom building a waste processing facility using technology proven in the nuclear industry.

Q7: Who have you worked with in the US? What will they say about you when I call them?

We have worked closely with a range of US DOE laboratories including: LLNL, SRS, PNNL, INEEL, ANL-W. ANSTO is a good partner, with a strong technical foundation.

Q8: What real advantages does synroc have? Why and for whom?

A: Significant cost and schedule savings, with a reduction in risk and off-gas emissions. These are achieved by using waste form and process technologies that give superior immobilization performance with respect to factors such as increased waste loading and chemical durability.

Q9: Where is the best bang for my buck if I use synroc?

A: Savings are most apparent for wastes difficult to immobilize in glass, such as INEEL HLW calcines & sodium bearing liquid waste, pure and impure plutonium and other actinide waste streams, as well as niche wastes, such as those containing technetium, cesium and strontium.

Q10: Why is synrocANSTO a good partner?

A: ANSTO, has over 25 years experience in the development of low-risk, reduced-cost, alternative ceramic and glass-ceramic waste forms. In the US, synrocANSTO operates through its fully-owned US subsidiary company ANSTO Inc.

synrocANSTO's unique capabilities position it as a global leader in alternative waste forms. They include:

- Extensive experience in waste form immobilization design;
- Integrated process development, and
- Waste form characterization.

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