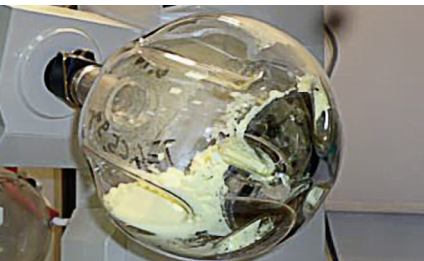


D-CINNABAR

A dry process to stabilize contaminated metallic mercury



Bottle containing legacy metallic mercury



Stabilization process of metallic mercury by sulphur



Stabilized mercury
HgS

Scope

Treatment of mercury without any available treatment route

- Recovery of both legacy or operational metallic mercury stocks
- Separation of aqueous supernatants associated with metallic mercury
- Final form of mercury after treatment: stable, insoluble and acceptable in a repository site

Risk management related to metallic mercury

- Risks related to mercury vapours are suppressed through its stabilization as mercury sulphide (HgS)
- Skin contact toxicity and risk of dissemination are limited by the solidification of a high mobile liquid into an inert powder

Principle

- Process based on the following chemical reaction: $\text{Hg} + \text{S} \rightarrow \text{HgS}$
- Intimate mixture between metallic mercury and sulphur carried out in a specific equipment and under controlled Pressure and Temperature conditions

+ Advantages

- **SIMPLICITY:**
A single, space-saving and mobile equipment for separating supernatants and stabilizing mercury
- **EFFECTIVENESS:**
Reaction rate close to 100% proven by chemical analyzes and polluting potential tests
- **PERFORMANCE:**
Once stabilized, the waste is insoluble in water, chemically stable and accepted by the French national radioactive waste management agency (Andra)
- **SAFETY / SECURITY / RADIATION PROTECTION:**
The toxicity risks on operators and on the environment, due to mercury vapours, are under control

Key data

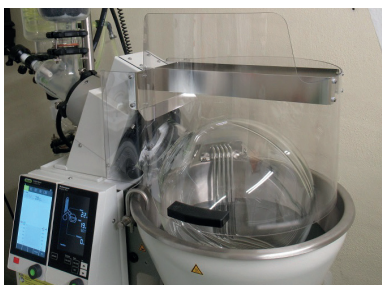
- The pilot-scale equipment fits on a laboratory bench. It can process a batch of 1 kg of metallic mercury in approximately 7 hours*. The stabilization reaction takes approximately 5 hours
- The industrial-scale solution consists of a reactor that can process 6 kg of metallic mercury in approximately 7,5 hours (i.e., 1 batch per work shift). The reaction time is approximately 5 hours
- The reactor is sealed and operates at low pressure (of the order of a few tens of mbar) and at moderate temperature (< 90°C)
- The reaction is carried out with a slight excess of sulphur (S/Hg molar ratio > 1)

*Duration including all upstream and downstream operations

A solution developed by Orano DS for the treatment of contaminated metallic mercury from nuclear facilities

Our services may include

- Support for the implementation of D-CINNABAR for international markets
- Definition and installation of a working environment suitable for the handling and treatment of metallic mercury
- Support for the shipment of metallic mercury to processing facilities



Pilot-scale (up) and industrial-scale (bottom) processes for the treatment of contaminated mercury



D-CINNABAR is a patent protected solution (EP 1751775 B1)

Our references

Orano DS Triade - pilot-scale process:

5,3 kg of uranium-contaminated metallic mercury were stabilized. The contaminated mercury sulphide HgS and the resulting waste from the site were accepted and evacuated to CIRES Andra in 2016.



Orano DS Triade - industrial-scale process:

The industrial process was qualified in October 2021 to stabilize 6 kg unit batches of metallic mercury.



Gains

Elimination of a waste difficult to process until now

Toxicity risk reduced

Contact us to discover our D-CINNABAR offer.

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Communication Orano DS
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