

C-14 Recovery from Spent Resin

Carbon Stripping for Medical Isotope Production

The Carbon Stripping System (CSS) reduces disposal cost of spent resins and creates additional revenue streams.

Challenge

During operation of heavy water reactors large amounts of the unstable carbon isotope C-14 are generated. In the moderator clean-up system the radioisotope is removed by ion exchanger resin, which once saturated is considered radioactive waste.

C-14 has many uses, from pharmaceutical studies to diagnosis of various respiratory diseases. While the radioisotope is naturally occurring in the upper atmosphere, it needs to be artificially produced to obtain the quantities needed for pharmaceutical applications.

Solution

We have developed the first economically feasible way to separate C-14 from ion exchanger resins of the moderator clean-up system in heavy water reactors. With a sufficiently high quality of C-14, the separated isotopes can be sold to the pharmaceutical industry to be used for isotopic labeling in medical studies and healthcare applications.

With the radioactive C-14 removed from the spent resins, they can be incinerated, greatly reducing costs and simplifying the disposal procedure.

Customer benefits

- Lower inventory of radwaste through C-14 CSS resin treatment
- Additional revenue streams



Full scale test setup of the CSS

Technical information

The CSS consists of two separate steps:

- First an organic acid is used to release the carbonate fixed on spent moderator resins. After the water phase is stripped, the carbon dioxide (CO₂) is removed from the gas phase and fixed onto the adsorber.
- In the second step the organic acid is decomposed with the aid of ultraviolet light and leaves only CO₂ and water behind.

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