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Pyrolysis and High Performance Plasma Treatment applied for the treatment of Spent Ion Exchange Resins

Spent ion exchange resins (IERS) represent an important waste stream that is generated during the operation of nuclear power reactors and research facilities reactors. Over the past 70 years of nuclear activity, Argentina has accumulated near 400 m³ of spent IERS that remains storage for an adequate conditioning before disposal. An optimal processing option must involve volume reduction, production of a stable waste form and low radiological and environmental impact.

Many technological options that fulfill these requirements were developed and applied in the nuclear industry worldwide, however, due to the size of the current inventory of our country is challenging to choose a favourable economic solution.

In the last few years, our research group has been working on a novel two-step process involving initial low-temperature pyrolysis (< 350°C) of the IERS followed by a high performance plasma treatment (HPPT) of the produced off-gases.

A bench scale arrangement that combines both technologies was assembled in our laboratory. The system works at sub atmospheric conditions and water steam is added to the gas stream as reagent.

It has been observed that the presence of water in the medium results in the improvement of the properties of the solid product obtained, as well as participating as an oxidizing agent in plasma chemistry, contributing to the high performance of the off-gas treatment.

The test results achieved using this arrangement were successful and demonstrate the feasibility of the proposed treatment concept. Also it is possible to take it to a reasonable scale implementation in a simple way, ensuring compliance of the requirements in terms of safety profile and minimum environmental and radiological impact.

The present work will provide an overview of the overall process under development, paying particular attention to the obtained solid waste form characteristics and the efficiency of the off-gas treatment system.

Do you wish to participate as a Young Professional?

Yes

Speaker's title

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Do you wish to be considered for a Young Professional grant?

Yes

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