



Contribution ID: 1221

Type: **not specified**

P3.174 New catalytic packing performance, theoretical and experimental characterization for LPCE process

Wednesday, 19 September 2018 11:00 (2 hours)

The research activity for development of catalytic package that equips water-hydrogen catalytic isotopic exchange columns was of permanent interest for the Institute's research team, mainly motivated by the integration of the Liquid Phase Catalytic Exchange (LPCE) process in most of the detritiation technologies for tritiated water generated from nuclear reactors.

In recent years, our research team has been developing an order mixed catalytic package, structured type, which makes it possible to use it in high-load isotopic exchange installations due to low pressure drops, providing a continuous isotope exchange process.

The paper presents a structured catalytic package consisting of the B7 ordered hydrophilic packing made of stainless steel developed/patented by ICSI and a PT/C/PTFE hydrophobic catalyst, having an arrangement after a geometry chosen to achieve a high isotopic transfer performance.

In order to characterize the new mixed catalytic package, a laboratory installation equipped with this type of package was designed and built.

The research has been conducted to obtain fluid flow data through mixed catalytic package and also hydrogen isotopes separation performance.

Laboratory research in order to assess the isotopic exchange performance was carried out in two stages for the transfer from water to gas of deuterium and respectively tritium.

The paper presents the experimental installation, the experimental data obtained for the deuterium transfer and the performance parameters characterizing the mixed catalytic package.

Performance parameters are determined from the gas phase concentration profile determined from the concentration measurements at 5 sampling points along the catalytic isotopic exchange column.

These performance parameters are the reference data for the catalytic package that are used in the mathematical models which represent water-hydrogen catalytic isotopic exchange for simulation and for the isotopic exchange columns sizing. These data will be compared to the values obtained at tritium transfer.

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Session Classification: P3