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P3.169 Provisions for a cryogenic distillation process linked to a CECE process at ICSI Rm. Valcea

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Nuclear reactors whether they are based on fusion (JET, ITER, DEMO), fission (e.g. CANDU type), or cooled using molted salts (MSR's) generate significant amounts of wastes in the form of low level tritiated light water or heavy water, for which there is an increasing interest to process and recover tritium (in gas form) and deuterium (as heavy water). Current water treatment systems allow the recovery of heavy water above 1% D2O which leads to a considerable loss of heavy water from a CANDU type reactor.
Provisions are being made in ICSI to design and build an experimental facility based on CECE process coupled with a CD system to process low level tritiated heavy/light water for reactors that generate these wastes in view of increasing the recovery factor of tritium, material which is of great interest for the commissioning and start-up of fusion nuclear reactors.
This paper aims to make some provisions as to design and mathematically simulate the CD process which is to be connected to a CECE process and provide with some results based on the design and simulation model in support for the development of such detritiation technology.
Based on the input data (e.g. the flow rates, the composition of the gas supplied into the cryogenic distillation cascade, temperature and pressure drop along the column, liquid inventory) the design and simulation model will provide the distribution of all the molecular species involved along each cryogenic distillation column, the temperature, pressure, vapor and liquid enthalpies profiles along the columns and products of each column.

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