

THE VARIOUS SODIUM PURIFICATION TECHNIQUES

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РАЗЛИЧНЫЕ МЕТОДЫ ОЧИСТКИ НАТРИЯ

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In the framework of sodium waste treatment, the sodium purification phase plays an essential role in the chain of operations leading to the transformation of the active sodium, considered as waste, into a stable sodium salt.

The objectives of the purification operations are :

- To keep a low impurity level, particularly a low concentration in oxygen and hydrogen, in order to allow its transfer to a processing plant, and in order to avoid risks of plugging and/or corrosion in sodium facilities.
- To reduce the sodium activity in order to limit the dose rate close to the facilities, and in order to reduce the activity of the liquid and gaseous effluents.

After a recall of the different kind of impurities that can be present in sodium, and of the different purification methods that could be associated with, the following points are highlighted:

- Oxygen and hydrogen purification needs, and presentation of some selection criteria for a purification unit adapted to a sodium processing plant, as well as 2 cold trap concepts that are in accordance with these criteria: PSICHOS and PIRAMIDE.
- Tritium reduction in a bulk of liquid sodium by swamping, isotopic exchange, or permeation throughout a membrane.
- Caesium trapping on carbonaceous matrix. The main matrices used at present are R.V.C. (Reticulated Vitreous Carbon) and Actitex/Pica products. Tests in the laboratory and on an experimental device have demonstrated the performances of these materials, which are able to reduce sodium activity in ^{134}Cs and ^{137}Cs to very low values.

The sodium purification processes as regards to the hydrogen, oxygen and caesium, that are aimed at facilitating the subsequent treatment of sodium, are therefore mastered operations. Regarding the operations associated with the reduction of the tritium activity, the methods are in the process of being qualified, or to be qualified.

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