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Sorption of radionuclides in the environment of uranium hexafluoride

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Impurity 106RuF5, 237NpF6 and 99TcF6 in regenerated of uranium hexafluoride are the most radiation-hazardous impurity. For decrease in a dose of radiation it is expedient to carry out extraction of these elements from UF6 [1, 2].
Researches on catching of radionuclides from dividing streams raw and perfect of uranium hexafluoride are carried out on various fluoride adsorbents of I, II, III and VIII groups of the Mendeleyev's table at 25°C and 115°C. The maximum quantity 237NpF6 is absorbed on MgF2 and AlF3, 106RuF5 —AlF3, 99TcF6 —CaF2. At an increased temperature extent of extraction of some required impurity on sorbents, for example, 99TcF6 on CaF2, 237NpF6 on AlF3 rather sharply decreases [3].
The analysis of results shows that selective concentration of impurity from a gas stream of uranium hexafluoride needs to be carried out via the cascade of consistently located fluoride adsorbents in strictly certain order: FeF3 ⟶ LiF ⟶ CaF2 ⟶ AlF3 at a temperature of 25 –40°C. At such arrangement of sorbents on head FeF3 ruthenium will be occluded selectively (K(Ru/Σ) = 36 - 45), in a front layer of CaF2 catch TcF6 with small impurity of neptunium and ruthenium (K(Tc/Σ) = 4,4 —8,2). For essential catching of neptunium and ruthenium before CaF2 lithium fluoride need to place. Residual amounts of radionuclides are absorbed on AlF3. The radiation background of pure UF6 will be defined generally 237Np.
As a result of the analysis of the present data, some regularities on behavior of RuF5 is received. Taking into account all three types of periodic dependence of behavior of ruthenium pentafluoride in system of the considered fluorides, it is possible to assume that the most active adsorbent 106RuF5 in the environment of uranium hexafluoride will be BeF2.

Literature

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