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Sorption of radionuclides in the environment of uranium hexafluoride

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Impurity $^{106}\text{RuF}_5$, $^{237}\text{NpF}_6$ and $^{99}\text{TcF}_6$ 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 UF_6 [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 $^{237}\text{NpF}_6$ is absorbed on MgF_2 and AlF_3 , $^{106}\text{RuF}_5$ — AlF_3 , $^{99}\text{TcF}_6$ — CaF_2 . At an increased temperature extent of extraction of some required impurity on sorbents, for example, $^{99}\text{TcF}_6$ on CaF_2 , $^{237}\text{NpF}_6$ on AlF_3 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: $\text{FeF}_3 \rightarrow \text{LiF} \rightarrow \text{CaF}_2 \rightarrow \text{AlF}_3$ at a temperature of 25–40°C. At such arrangement of sorbents on head FeF_3 ruthenium will be occluded selectively ($K(\text{Ru}/\Sigma) = 36 - 45$), in a front layer of CaF_2 catch TcF_6 with small impurity of neptunium and ruthenium ($K(\text{Tc}/\Sigma) = 4,4 - 8,2$). For essential catching of neptunium and ruthenium before CaF_2 lithium fluoride need to place. Residual amounts of radionuclides are absorbed on AlF_3 . The radiation background of pure UF_6 will be defined generally ^{237}Np .

As a result of the analysis of the present data, some regularities on behavior of RuF_5 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 $^{106}\text{RuF}_5$ in the environment of uranium hexafluoride will be BeF_2 .

Literature

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