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Effect of Thermal Treatment on Chemical Stability of Resorcinol-Formaldehyde Resins and Their Cs-137 Uptake Properties

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Here we present the results of study of interrelations between thermal solidification and selective sorption properties of resorcinol-formaldehyde resins of resol type in highly mineralized alkaline media. Using thermal analysis we have observed a series of exo- and endothermal effects, determined the maximum temperature of thermal treatment, and revealed features of resin solidification in Na- and K-forms.
Investigations of Cs-137 sorption under static conditions have shown that resorcinol-formaldehyde resins heated at 100-130℃ have low chemical stability in 0.1M NaOH solutions, which has a negative impact on Cs uptake. The increase of temperature during thermal treatment stage results in the increased chemical stability and the selectivity of cesium sorption in highly mineralized alkaline media. We believe that this process is related to the decomposition of methylol groups of resitols under elevated temperature and to the formation of new reaction centers, which finally leads to formation of resitols with highly cross-linked polymer network. Such structure determines high selectivity of the resin to cesium and its stability in alkalines.

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