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Liquid-liquid extraction of radiostrontium into ionic liquids using crown ethers

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Chemical decontamination of nuclear facilities generates large volumes of low-level radioactive waste. Following worldwide efforts to reduce spent chemical reagents and radioactive waste volumes, new methods of regeneration and reuse of spent decontamination solutions are studied. This work focuses on the usage of ionic liquids (ILs) as an organic phase in solvent extraction of strontium from solutions containing complexing agents. ^{85}Sr or ^{89}Sr were used as radioactive tracers and the extraction efficiency was evaluated by distribution ratio calculated from count rates of the respective phases.

Extractions from HNO_3 solutions into $[\text{C}_4\text{mim}][\text{NTf}_2]$ using various extraction agents were performed. The best results were achieved with dicyclohexano-18-crown-6 (DCH18C6), which has then been used as an extractant in the detailed study of strontium extraction into ILs. High dependence of the extraction efficiency of strontium on the presence of other cations was found. The highest decrease of distribution coefficient was observed in the presence of K^+ ions. The kinetics of the extraction and the dependence of the distribution ratio on the time of extraction was studied. Experiments carried out from solutions containing complexing agents indicate that DCH18C6 could be used to effectively extract radiostrontium from these solutions.

Primary authors: HOUZAR, Jan (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, 115 19 Prague, Czech Republic); ČUBOVÁ, Kateřina (CTU FNSPE, katedra jaderné chemie); SEMELOVÁ, Miroslava; NĚMEC, Mojmir (CTU FNSPE)

Presenter: HOUZAR, Jan (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, 115 19 Prague, Czech Republic)

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