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Extraction of molybdenum from the nuclear cycle waste streams using ionic liquids

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Isotopes of molybdenum, the fission products arising from ^{235}U fission, represent one of the contaminants in liquid radioactive waste generated in the nuclear fuel cycle. With regard to the half-life of ^{93}Mo , this isotope becomes important for safety assessment for disposal sites in long term of deposition of radioactive wastes. Conventional processes for its separation are mostly based on liquid-liquid extraction using common organic solvents such as chloroform. In this work, ionic liquids were used for the extraction studies of molybdenum. Due to their unique properties, ionic liquids provide number of advantages, including the possibility of radionuclides re-extraction and ionic liquid reusing.

Radionuclide ^{99}Mo for extraction studies was obtained from the ^{99}Mo - $^{99\text{m}}\text{Tc}$ radionuclide generator system. Liquid-liquid extraction using 8-hydroxyquinolin in $[\text{C4mim}][\text{NTf}_2]$ as the organic phase was performed to study the dependence on the equilibrium pH of aqueous phase. Various concentrations of HNO_3 , NaOH and phosphate or borate buffers were used for the pH adjustment. Solution with oxalic or citric acid or their mixtures were used to test the possibility of extraction from the organic complexing agents environment. For the comparison with traditional organic solvent, chloroform was used as the organic phase under the same conditions. The samples were measured using the $\text{NaI}(\text{Tl})$ scintillation counter.

Primary authors: ČUBOVÁ, Kateřina (CTU FNSPE, katedra jaderné chemie); FICEL, Michal (CTU in Prague, FNSPE, Department of Nuclear Chemistry); SEMELOVÁ, Miroslava

Presenter: ČUBOVÁ, Kateřina (CTU FNSPE, katedra jaderné chemie)

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