Contribution ID: **1061** Type: **Poster**

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

Thursday, 19 May 2022 17:57 (7 minutes)

Isotopes of molybdenum, the fission products arising from 235U fission, represent one of the contaminants in liquid radioactive waste generated in the nuclear fuel cycle. With regard to the half-life of 93Mo, 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 99Mo for extraction studies was obtained from the 99Mo-99mTc radionuclide generator system. Liquid-liquid extraction using 8-hydroxyquinolin in [C4mim][NTf2] as the organic phase was performed to study the dependence on the equilibrium pH of aqueous phase. Various concentrations of HNO3, 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 NaI(Tl) scintillation counter.

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Session Classification: Separation & Speciation

Track Classification: Separation Methods, Speciation