Selective adsorption and recovery of Au(Ⅲ) from a ternary metal solution using Aliquat-336-impregnated alginate capsule

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In recent years, ionic liquids (ILs) which are widely recognized as "green solvents" have been extensively applied in different fields of chemistry and engineering. Especially, many ILs exhibited good performance such as fast kinetics and high loading capacities for recovery of precious metals (PMs) in liquid-liquid extraction systems (LLE). However, the main disadvantage of LLE is the loss of vital ILs during the extraction process. In order to overcome this drawback, we developed Aliquat-336-impregnated alginate capsule (Aliquat-336-AC) using a simple method. In this study, Aliquat-336 belonging to quaternary amine ILs was used as a model extractant because it has good binding property for PMs. Among different groups of capsules prepared, 0.2 M Aliquat-336-AC showed the best selective adsorption toward Au(Ⅲ) with a maximum Au(Ⅲ) uptake of 191.9 mg/g, which was about 10 times higher than those of Pt(Ⅳ) and Pd(Ⅱ). Through a designed sorption-desorption process, high purities of Au(Ⅲ), Pt(Ⅳ) and Pd(Ⅱ) solutions could be obtained from their mixture.