Study of extraction rate of lanthanides with microcapsules containing extractant P507

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Abstract

Microcapsules containing extractants have been applied to extract metal ion, metallurgy, organic acid, pesticide and herbicide. Using microcapsules, the difficulties of conventional liquid–liquid extraction in phase mixing and phase separation can be overcome. Even extractants with high viscosity can be applied conveniently. In order to encounter the difficulty of liquid-liquid extraction of lanthanides, polysulphone microcapsules containing 2-ethylhexylphosphonic acid mono-2-ethylhexyl ester (P507) has been successfully prepared to decrease the resistance of mass transfer. Here, extraction rate of lanthanum, samarium and erbium into a microcapsule containing P507 was studied. The extraction kinetic model was proposed based on the interfacial reaction model accompanied by intraparticle diffusion expressed by Fick’s law. The extraction efficiency was analyzed using the kinetic model with the separately determined complex formation rate constant and the intraparticle diffusion coefficient. From the results, it was confirmed that the kinetic model could predict the experiment in microcapsule system. In future, it is really helpful for microcapsule to overcome the conventional difficulties in phase mixing and phase separation in liquid-liquid extraction.