Stability of emulsion liquid membrane and membrane phase reaction spectrum study of NH₃·H₂O system

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ABSTRACT

This paper presents a study on the stability of emulsion liquid membrane (ELM) and membrane phase reaction spectrum in NH₃·H₂O system. ELM was made up of kerosene, Span 80, tributyl phosphate (TBP), liquid paraffin, and ammonia (NH₃·H₂O). Effect of Span 80, TBP and NH₃·H₂O concentrations, stirring speed and oil phase volume fraction on the emulsion stability were investigated by the conductivity method, respectively. Microscopic photographic technology was used to study emulsion droplets size and distribution. The membrane internal phase reaction was explored with Raman spectra of the primary emulsion and emulsion after extraction. The stable emulsion was obtained at Span 80 concentration of 5–7%, TBP concentration of 3–4%, oil phase volume fraction of 50%, and stirring speed of 4,000–5,000 rpm. A moderate Raman peak was observed for complex [Ni (TBP)₃]²⁺ at 510 cm⁻¹, which indicates occurrence of membrane phase reaction. The reuse of oil phase after demulsification was tested, and its extraction efficiency for Ni²⁺ almost kept constant.

Keywords: Emulsion liquid membrane; Stability; Conductivity; Raman spectrum; Membrane phase reaction

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