Selective removal of zinc using tri-ethanolamine-based supported liquid membrane

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ABSTRACT

This work is a comprehensive study on the selective removal of Zn (II) from aqueous solution using a flat-sheet polypropylene-supported liquid membrane system. Tri-ethanolamine (TEA) dissolved in cyclohexanone was used as a carrier for extraction of zinc ions through supported liquid membrane. Different parameters affecting the zinc ion transport were studied. The experiments were performed at various operating conditions such as metal and acid concentration in feed phase, strip phase concentration, and carrier concentration, to find the best set of parameters that would yield the maximum extraction. The extraction time, flux value, the stoichiometry of the complex formed, and membrane stability was also investigated. The experiments were performed in co-transport mode. The optimized conditions obtained for zinc ion transport are as follows: $2.30 \times 10^{-4}$ mol/dm$^3$ of Zn$^{2+}$ ions and 1 M of HCl in feed solution, 50% TEA in cyclohexanone in membrane phase, and 0.7 M of NaOH in stripping phase. Under these optimum conditions, the membrane is stable for about 10 consecutive experiments. The extraction efficiency was found to be 87% in 120 min.

Keyword: Supported liquid membrane; Extraction; Zinc ion; Tri-ethanolamine; Membrane stability, and Extraction efficiency

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