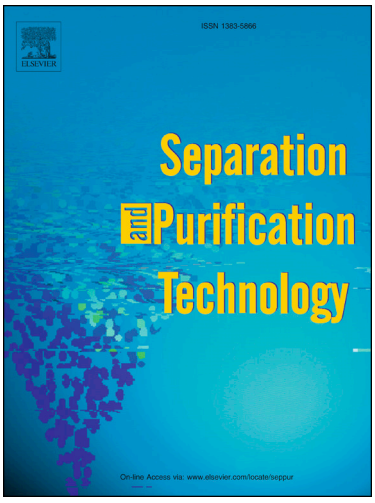

Selective zinc recovery from electroplating wastewaters by electrodialysis enhanced with complex formation

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Selective zinc recovery from electroplating wastewaters by electrodialysis enhanced with complex formation

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Abstract

The novel feasible and sustainable methods for heavy metal recovery are the key interest of environmental friendly industrial technologies because of the increasing metal-containing waste emission. In this work, we used electrodialysis enhanced with complex formation method to investigate the possibility of selective zinc recovery from simulated electroplating industry wastes. The effects of the chelating agent (lactic, malic, and citric acid), and ion-exchange membrane (hetero- and homogeneous) type on zinc and iron molar fluxes were evaluated and selectivity coefficients of zinc ions were determined. The optimum process conditions for electrodialytic zinc sulfate recovery and its purification from iron were selected. Citric acid was found to be the best complexing agent. Moreover, the heterogeneous ion-exchange membranes allowed for the most selective recovery of zinc. The effectiveness of the proposed method was validated in a laboratory batch experiment. Electrodialysis enhanced with complex formation allowed for an efficient zinc ion separation from iron. High iron retention coefficient, that is, equal to 92.36% was observed. Simultaneously, the method, in the range of investigated parameters, allowed for 86.6% zinc recovery at 84.95% current efficiency.

Keywords: electrodialysis, desalination, zinc recovery, electroplating baths, effluent treatment

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