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Mass Transport Properties of a Flow-Through Electrolytic Reactor Using Zinc Reduction System

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Abstract

An electrolytic process for the removal of Zn(II) from aqueous solution using a parallel amalgamated copper screens cathode operated in the flow through mode is proposed. The current-potential curves recorded at a rotating amalgamated copper disc electrode were used to determine diffusion coefficient of Zn(II). The performance of electrolytic reactor was investigated by using different flow rates at initial zinc ion concentration(48 mg/L). Taking into account the residential Zn(II) concentration, the best results were obtained for cathode potential of (-1.35 V vs. SCE) at flow rate (320 L/h). Zinc ion concentration was found to decrease from 48 mg/L to 1 mg/L during 120 min. of electrolysis. The experimental data are well correlated in term of Sherwood and Reynolds numbers based on the wire diameter of woven screen for characteristic length .Empirical correlation characterized the mass transport properties of the reactor is: $Sh = 8.077\ \mathrm{Re}^{0.363}$.

KEYWORDS: porous electrodes, electrolytic reactor, flow-through cell

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