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CONSIDERING THE ION TYPES WHILE EVALUATING THE PERFORMANCE CRITERIA IN ELECTRODIALYSIS SYSTEMS

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Abstract

The removal/recovery of heavy metals has been conducted through a number of processes. Electrodialysis is one of the most important ones among others in diluting and concentrating the ionic pollutants. In this study, the performance criteria of the electrodialysis system such as removal efficiency, current efficiency, amount of ion removal and specific electrical energy consumption have been investigated in the presence of more than one pollutant species in wastewater. With constant operating parameters of, 200 mL/min flow rate, natural pH of water which is $\text{pH} \approx 6$ and 0.05 M electrolyte concentration prepared by NaCl, 30, 45 and 60 V of potentials has been applied to the wastewater containing 6 mg/L lead, nickel and copper ions. Experimental results indicated that removal efficiencies of different ion types with an equal concentration in a solution could be different depending on hydration shells, hydration bonds, hydration energies and ionic mobilities of the ions. The percent of current used by each ion type from total current transferred in the system has been calculated by transference number. Different ions had different current efficiencies and specific electrical energy consumptions depending on the transference number of the ion.

Keywords: current efficiency, electrodialysis, hydration shells, ionic mobilities, specific electrical energy consumptions

Received: February, 2020; Revised final: July, 2020; Accepted: July, 2020

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