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Adsorbents/ion exchangers-PVA blend membranes: Preparation, characterization and performance for the removal of Zn²⁺ by electrodialysis

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ABSTRACT

The present paper was aimed at studying the possibility of zinc (Zn) removal from the wastewater discharged from zinc electroplating processes. In order to save industrial and environmental resources, the concentrated solution could be reused after electrodialysis process. A mini-electrodialysis system with three cylindrical compartments and different membranes containing various resins (Purolite A500 and Hypersol-Macronet MN500) was employed, which can be further applied for the treatment of synthetic effluent which contained zinc ions. The electrodialysis system was operated at constant voltage using different concentrations of synthetic solutions of zinc ions, without and with electrolyte recirculation for 1.5 h. The pH and conductivity of solutions were measured before and after the electrodialysis process occurs. Also the removal ratio (R_r) and mass flow (J) of zinc ions, energy consumption (EC) and current efficiency (CE) were determined. It was found that electrodialysis treatment generated a very low conductivity solution, enabling its reuse as rinse water. According to the obtained results when using a membrane pair with higher ion exchange capacity (IEC) the removal ratio is improved (over 80%). The physico-chemical, structural and mechanical properties of prepared membranes were registered, before and after electrodialysis process takes place, by means of

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