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Abstract

Heavy metals and trace organics are two common contaminants in wastewaters that require proper treatment due to their poor biodegradability and high toxicity. Electro-driven membrane processes are feasible for the separation of ionic contaminants but are useless with neutral organics. In this paper, a novel process called Complexation Electrodialysis (CPED) is proposed for simultaneous electro-driven removal of metal ions and neutral organics from wastewaters. The method was exemplified by mixing Cr^{3+} (electroplating waste) and acetylacetone (acac, pharmaceutical waste) in an agitated reactor to create positively charged $Cr(acac)_n^{(3-n)+}$ complexes. These were then treated in a CPED system specifically designed for them. The results demonstrate removal efficiency of metal ions and organics that reach about 99.4–99.5 % and 97.8–99.9 %, respectively. Membranes with porous structures that allow transport of metal complexes are preferred for the CPED process. This method is feasible for the removal of trace organic contaminants, and shows potential for the removal of neutral organics.

Keywords: membrane separations; environmental engineering; electrodialysis; complexation; neutral organics

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