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Self-Made Anion-Exchange Membrane with Polyaniline as an Additive for Sulfuric Acid Enrichment

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Abstract:

Electrodialysis was widely used to separate and concentrate sulfuric acid from industrial wastewater. Nevertheless, owing to the proton leakage during electrodialysis processes, the concentration of recycled sulfuric acid was less than 30 wt.%. In this work, a self-made polyaniline (PANI)/polyvinylidene fluoride (PVDF) membrane was used to enrich sulfuric acid through electrodialysis to achieve a concentration as high as 63 wt.% (about 9.7 mol/L). The membrane structure was half-dense and half-porous, corresponding to a glossy and lusterless surface, respectively. The migration of HSO_4^- through membrane could be directed owing to the different structure. Leakage of HSO_4^- was inhibited by glossy surface of membrane facing concentrate chamber. Proton leakage was also inhibited due to the dense structure and hydrophobic nature of the PANI/PVDF membrane. The mechanism of sulfate ion migration in PANI/PVDF membranes was investigated. In electrodialysis systems, anions in sulfuric acid solution migrate mainly through the

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