



Preparation of an anion exchange resin/PES blend flat sheet membrane and its application in the enrichment of bromine from aqueous solution

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ABSTRACT

In this study, an anion exchange resin/polyethersulfone (PES) blend flat sheet membrane was prepared, using anion exchange resin 201×7 as function particle and PES as matrix material. The highlight of this membrane is to combine strong enrichment of bromine by resin and stable mechanical properties by PES, obtaining a new material with stronger practicability than traditional materials. The membrane adsorbents were characterized by scanning electron microscope (SEM), nitrogen adsorption (Brunauer, Emmett and Teller) and Fourier transform infrared spectroscopy. The batch adsorption experiments demonstrated that the membrane effectively enriched bromine in a wide optimal pH ranging from 3 to 9. The adsorption equilibrium could be established in 2 h, and the maximum adsorption capacity was 145.35 mg/g. The adsorption data were well described by the pseudo-second-order rate model and the Langmuir isotherm model. The adsorption process was endothermic and spontaneous. In addition, the effects of coexisting anions on the adsorption capacity declined with the following order: $\text{SO}_4^{2-} > \text{Cl}^- > \text{NO}_3^-$. The membrane saturated by bromine could be easily regenerated using trisodium citrate dehydrate (1 mol/L) with a high recovery rate of 97.77%. Compared with other adsorbents, the resin/PES membrane shows high adsorption capacity.

Keywords: Resin/PES blend membrane; Bromine; Adsorption; Enrichment

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