



Anion-exchange membranes in lithium extraction by means of capacitive deionization system

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ABSTRACT

In this paper, we evaluate extraction of lithium chloride by membrane capacitive deionization system composed of two electrodes: one prepared from lithium-selective adsorbent and one obtained from activated carbon and coated with anion-exchange membrane. Lithium-selective sorbent was prepared by solid-state reaction of lithium carbonate, manganese carbonates and titanium dioxide. The anion-exchange membranes were prepared by modifying poly(vinyl chloride) films with ethylenediamine. The chemical structure of membranes was investigated by Fourier transform infrared spectroscopy. The following membrane properties were determined: water regain, ion-exchange capacity, chloride and nitrogen contents. Taking into account the criteria of lithium sorption and desorption, the most efficient selective separation system was selected. It was found that salt adsorption capacity reached the average value of $34.2 \text{ mg/g}_{\text{electrode}}$ for LiCl, while for KCl and NaCl $8.6 \text{ mg/g}_{\text{electrode}}$ and $9.8 \text{ mg/g}_{\text{electrode}}$ respectively.

Keywords: Lithium adsorbent; Anion-exchange membrane; Selective capacitive deionization

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