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Bentonite-loaded carboxy methylcellulose membrane for pervaporative desalination

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ABSTRACT

In this study, bentonite clay incorporated carboxy methylcellulose (CMC) membrane was prepared and used for pervaporative desalination of a NaCl–water solution at different operation conditions. The morphological properties of the mixed matrix membrane and inorganic–organic interfacial properties were determined using scanning electron microscopy. Thermal degradation behaviors and the effect of bentonite addition on the thermal durability of the membranes were observed. Effect of bentonite concentration in CMC range from 2.5 to 10 wt%, feed temperature (30°C–60°C) and NaCl concentration (1–4 wt%) in the feed water solution were experimented to determine the pervaporative desalination performance at the constant upstream (1 bar) and downstream pressure (5 mbar). All membranes exhibited greater than 99% of salt retention with reasonable water flux values at a given temperature. A higher water flux of 2.6 kg/m^2 h was achieved with a salt retention of 99.8% when the feed temperature was 60°C and the NaCl concentration was 3 wt% by using 7.5 wt% bentonite-loaded membrane. The highest salt retention of 99.9% was achieved with a flux of 1.9 kg/m^2 h using 10 wt% bentonite-loaded membrane at a feed temperature of 40°C.

Keywords: Pervaporative desalination; Carboxy methylcellulose; Bentonite

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