

Enhancement of chlorine resistance in carbon nanotube-based nanocomposite reverse osmosis membranes

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ABSTRACT

Aromatic polyamide membranes, which are prepared by interfacial polymerization of m-phenylene diamine (MPDA) in water solution and trimesoyl chloride (TMC) in organic solution, have been widely used as reverse osmosis (RO) membranes for desalination of seawater. However, it has been pointed out that polyamide RO membranes have weak resistance to chlorine, causing deteriorated separation performance. In this study, nanocomposite RO membranes containing multi-walled carbon nanotube (MWCNT) were developed to enhance the chlorine resistance of polyamide membranes. The resulting membranes were analyzed and tested to see the desalination performance. Nonionic surfactant (Triton-X-100) was used in the interfacial polymerization of organic/inorganic nanocomposite RO membranes to improve the dispersion of MWCNTs in the polymer matrix. Scanning electron microscopy (SEM) images and X-ray diffraction (XRD) spectra confirmed that MWCNTs were uniformly distributed in the polymer matrix. When 0.1–1 wt% of MWCNTs were added to polyamide RO membranes, chlorine resistance was measurably improved compared to the conventional polyamide membranes.

Keywords: Desalination; Reverse osmosis membrane; Nanocomposite membrane; Multi-walled carbon nanotube; Chlorine resistance

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