



Investigation of the dispersion of nanoclays into PVDF for enhancement of physical membrane properties

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Received 3 September 2010; Accepted 3 January 2011

ABSTRACT

Polymer membranes are extensively used for water treatment but they wear irreversibly over time, especially when used in treatment of waters containing abrasive substances such as in seawater pretreatment. Novel nanocomposite membranes may be a cost effective approach to improving membrane physical endurance. Various methods of dispersing commercially available Cloisite® 30B nanoparticles in 1-methyl-2-pyrrolidinone (NMP) were investigated and the respective particle sizes were measured by nanoparticle sizer. Ultrasonication dispersed the nanoparticles to the smallest size in the shortest period of time. Flat sheet poly(vinylidene fluoride) (PVDF)/nanoclay membranes with 6.25 wt.% clay loading were cast by phase inversion. The morphology and the structure of the membrane were characterized by scanning electron microscopy (SEM), combustion testing and thermogravimetric analysis (TGA). Porous membrane with fingerlike macrovoids was fabricated and 1.7 wt.% of nanoclay was incorporated into the final product as shown by TGA. The composite membrane showed greater stiffness compared to pure PVDF membrane.

Keywords: Membranes; Ultrafiltration; Nanocomposite; Dispersion; Poly(vinylidene fluoride); Nanoclay; Membrane fabrication

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