Preparation and characterization of polyphenylsulfone nanofibrous membranes for the potential use in liquid filtration

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Received 14 March 2015; Accepted 28 July 2015

ABSTRACT

In the present study, polyphenylsulfone (PPSU) nanofibrous membranes were prepared and their potential use in liquid filtration was investigated. The optimum polymer concentration and solvent system for producing beadless fibers were found as 24 wt.% PPSU in N-methyl-2-pyrrolidone/dimethylformamide binary solvent system at a 30:70 volume ratio. The nanofibrous membrane was then heat treated in an oven which resulted in fusion of the fibers at their junction points and also along their length. The untreated and heat-treated membranes were characterized by water contact angle measurement, porosity determination, and tensile tests. Furthermore, performance of the untreated and heat-treated membranes was evaluated by determination of pure water flux and filtration of canned beans production wastewater. The remarkable pure water flux of 7323 L/m² h was observed for the heat-treated membrane as a result of high porosity, improved mechanical stability, and low compaction imposed by the applied heat treatment. The untreated and heat-treated membranes showed 100\% turbidity rejection, while chemical oxygen demand and total dissolved solids rejections were 30 and 29\% for the untreated membrane and 27 and 25\% for the heat-treated one, respectively.

Keywords: Electrospinning; Nanofiber; Filtration; Heat treatment; Polyphenylsulfone

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