

Investigation on polyethersulfone membranes modified with Fe₃O₄-trisodium citrate nanoparticles

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ABSTRACT

Polyethersulfone (PES) ultrafiltration (UF) membranes modified with nanocomposite Fe₃O₄-trisodium citrate (C₆H₅Na₃O₇·2H₂O) nanoparticles (FeTCNPs) were prepared via the wet phase inversion method. The casting solution contained 15 wt% of PES and 1, 2, or 4 wt% of FeTCNPs in relation to polymer. *N,N*-Dimethylformamide was applied as a solvent. The investigations were focused on the influence of the nanomaterial concentration in the membrane matrix on the physicochemical and transport properties of the fabricated membranes as well as their proneness to fouling. Membranes were characterized using scanning electron microscopy and atomic force microscopy. The influence of the modification on membranes hydrophilicity was determined based on water contact angle values. It was found that the pure water flux in case of the membrane containing 2 wt% of FeTCNPs was higher for ca. 12% compared with that measured for the unmodified membrane. Moreover, the permeate flux decline during UF of bovine serum albumin solution was less severe in case of the membranes modified with 1 and 2 wt% of FeTCNPs than in the absence of NPs in membrane matrix.

Keywords: Modified membrane; Polyethersulfone; Fouling; Nanoparticles; Fe₃O₄-trisodium citrate

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