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Effect of functionalized multi-walled carbon nanotubes on a polysulfone ultrafiltration membrane

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ABSTRACT

Polysulfone (PSF) membranes were produced by the phase inversion method using three different solvents: N, N-dimethylformamide (DMF), chloroform (CHCL3), and tetrahydrofurane (THF). The produced membranes were used for treatments of oil – water samples supplied by Oil skip/ South Africa. Furthermore Polysulfone (PSF) was blended to different composition of functionalized multi–walled carbon nanotubes MWCNTs by the classical phase inversion method. Multi–walled carbon nanotubes (MWCNTs) functionalized by acid treatment were synthesized using chemical vapour deposition. Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) were used to view the morphology of the blended membrane and MWCNTs. The Raman spectroscope was used to confirm the functionalization of the MWCNTs by comparing the defects on the MWCNTS introduced by acid treatment. It was found that the chemical, physical and mechanical properties improve with the content of functionalized MWCNTs composition in the polymeric membrane. The membrane with the MWCNTs composition of 0.4% w/w demonstrated the highest flux of 117 L/m^2.h and solute (oil) rejection. The selectivity and permeate flux were increased with functionalized MWCNTs content for the membranes produced with the three different solvents.