

Assessment of polysulfone membranes embedded with carbon nanotubes and polyester non-woven fabric support for the treatment of oil and gas produced wastewater. / O.-A. Kwame, D. B. Nkazi, J. Mulopo, S. E. Iyuke, S. D. Mhlanga. / Nano Studies. – 2015. – # 12. – pp. 87-98. – eng.

This paper considers the use of modified polysulfone membranes for the treatment of wastewater produced in the oil and gas industry. The micro-porous anisotropic membranes were prepared using the Phase Inversion (PI) method and embedded with carbon nanotubes (CNTs) and / or not supported on a polyester non-woven fabric. The membranes were characterized using the Scanning Electron Microscopy (SEM), atomic force microscopy (AFM), Fourier Transform Infrared Spectroscopy (FTIR), and tensile strength analysis. The pore sizes ranged from 1.598 μ m for the membranes with the fabric support to 0.191 mm for the CNT imbedded membranes without a fabric support. The results showed that the functionalized CNTs interacted with the hydrophobic membranes to enhance its physical, chemical and mechanical properties. The addition of a fabric support decreased the pore sizes of the PI membranes. The membranes were tested for performance and it was shown that increasing pressure increased permeates flux and CNTs increased permeate flux while controlling fouling via pore blockage. The fabric influenced the flux decline by providing further resistance to the flow of permeates through the membrane. Permeates were collected and tested for oil concentrations. The results showed oil rejections ranging between 78 and 90 % with the mixed matrix phase inversion membrane supported on a polyester non-woven fabric having the highest oil rejections. Fig. 8, Tab. 3, Ref. 17.

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