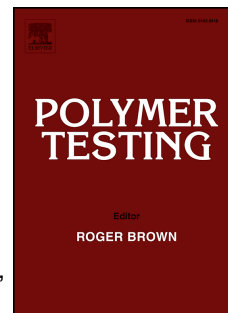


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Stability Study of Extruded Dual Layer Hollow Fibre Membranes in a Long Operation Photocatalysis Process

Hazlini Dzinun^{a,b}, Mohd Hafiz Dzarfan Othman^{*a}, Ahmad Fauzi Ismail^a, Takeshi Matsuura^c,
Mohd Hafiz Puteh^d, Mukhlis A Rahman^a, Juhana Jaafar^a

^a*Advanced Membrane Technology Research Centre (AMTEC), Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

^b*Centre for Diploma Studies (CeDS), Universiti Tun Hussein Onn Malaysia, 84600 Muar, Johor, Malaysia.*

^c*Department of Chemical and Biological Engineering, University of Ottawa, Ottawa, Ontario, K1N 6N5, Canada.*

^d*Department of Environmental Engineering, Faculty of Civil Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

Abstract To date, the stability of the dual layer hollow fiber (DLHF) membranes at the heart of a photocatalytic membrane reactor has not been extensively studied. The lifespan of membranes should be evaluated in order to implement this technology for long-term operation. In this paper, the stability of titanium dioxide/polyvinylidene fluoride (TiO₂/PVDF) DLHF membranes was evaluated by irradiating DLHFs for 30 days with a UV lamp in a photocatalytic membrane reactor, where the degradation of nonylphenol in the aqueous solution was taking place. In order to know the effect of TiO₂ loading, DLHFs of three different ratios (0, 0.2, and 1) were spun using a triple orifice spinneret. The results revealed that the degree of degradation increased with increasing exposure time. A cracked layer of white color formed at the outer surface and as a result, the surface roughness of irradiated membranes increased. The tensile strength of irradiated membranes was in the order of TiO₂/PVDF ratios 0.0 > 0.2 > 1.0, indicating that TiO₂ nanoparticles enhanced the stability of the DLHF membranes, by reducing embrittlement. Overall, the findings of this work led us to the conclusion that UV irradiation has some effect on the stability of the TiO₂/PVDF membrane within 30 days' exposure.

Keywords: TiO₂/PVDF DLHF membranes, Photocatalytic degradation; UV irradiation, Chalking, Dehydrofluorination

* To whom correspondence should be addressed:

Tel.: +6075536373; Fax: +6075535925. E-mail address: dzarfan@utm.my

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