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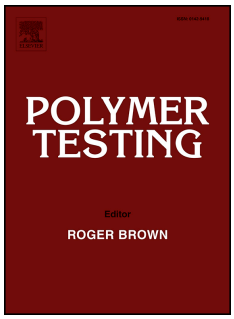

Stability study of extruded dual layer hollow fibre membranes in a long operation photocatalysis process

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

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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 flouride (TiO_2/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 TiO_2 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 TiO_2/PVDF ratios 0.0> 0.2 >1.0, indicating that TiO_2 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 TiO_2/PVDF membrane within 30 days' exposure.

Keywords: TiO_2/PVDF DLHF membranes, Photocatalytic degradation; UV irradiation, Chalking, Dehydrofluorination

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