

EFFECTS OF TiO₂ CONCENTRATIONS ON ULTRAFILTRATION PVDF/TiO₂ MEMBRANE FOR DAIRY WASTEWATER TREATMENT

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ABSTRACT

Nowadays nanomaterial is becoming an important component in membrane separation and purification technology. They play a great role in improving membrane hydrophilicity and offering photo-catalytic benefits. Examining the optimum concentration loadings of the nanomaterial is very important to exploit the maximum benefits in modified membrane application. In this study, pristine polyvinylidene fluoride (PVDF) and modified membranes with various TiO₂ loadings are fabricated by phase in version and reported their performance. The hydrophilicity of the modified membrane was proven by contact angle measurements. The contact angles of the PVDF membrane at various TiO₂ loadings (0, 1, 1.5, 2, and 2.5%) were exhibited a decreasing trend from 78.1° at 0 to 66.72° at 2.5%. With increasing TiO₂ loading the filtration resistance and the flux were showing a decreasing and increasing trend respectively. All fabricated modified membranes exhibited better antifouling with lower irreversible fouling as compared to pristine PVDF. The rejection performance of all modified membranes for BSA and COD were comparable with pristine PVDF membrane (98.88% BSA and 99.83% COD). Regeneration of the fouled modified membranes by UV irradiation was possible. However 3 hours UV exposure is not enough to achieve the original flux which requires further investigation. The extents of flux restoration of all modified membranes were small and almost the same which means the effect of TiO₂ concentration on flux recovery was negligible.

Keywords: polyvinylidene fluoride, titanium oxide, photo-catalytic membrane, regeneration

Acknowledgement: The authors thank the support of the 2017-2.3.7-TÉT-IN-2017-00016 project.