Grafting of low cost ultrafiltration ceramic membrane by Tunisian olive oil molecules and application to air gap membrane distillation

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ABSTRACT

Grafting is probably one of the most important means to be considered in order to change the hydrophilic character of ceramic membranes into hydrophobic ones. In this context, the surface properties of a composite ultrafiltration membrane elaborated from the mud of hydrocyclone laundries of phosphates, having an average pore diameter of 11 nm and a layer thickness of around 9 µm, were chemically modified by grafting Tunisian olive oil molecules. Grafting process efficiency was characterized by contact angle measurements, Fourier transform infrared spectroscopy, nitrogen adsorption/desorption method and membrane permeability. It was found that the contact angle value increases from 16° before grafting to 121° after grafting showing that grafting leads to high membrane hydrophobicity. The determination of water permeability shows a high decrease from 90 L/hm^2 bar to 7 L/hm^2 bar, before and after grafting, respectively. The new hydrophobic ceramic membrane seems to be promising in the field of membrane distillation using seawater desalination. The salt rejection obtained using grafted UF membrane was 99%.

Keywords: Ultrafiltration membrane; Grafting; Olive oil; Membrane distillation

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