



## Laponite/PVA pervaporation membrane for desalinating simulated RO high-salinity by-product

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### ABSTRACT

In this study, pervaporation (PV) was used as a great promise for freshwater production from high-salinity water. Laponite nanodisc/poly (vinyl alcohol) (PVA) membranes were produced by simple exfoliation method of the nanoclay in the polymer solution using glutaraldehyde (GA). The surface morphology of the produced membrane and the influence of the addition of the nanoclay were investigated using a scanning electron microscope. The effect of the laponite addition on thermal stability and membranes properties as well as swelling measurements was discussed. The pervaporation desalination water flux and salts rejection characteristics of the prepared membranes were observed at different laponite concentration up to 10 wt%, under operating temperature of 30°C–70°C and salt solution concentration (0–10 wt%) in the feed were determined at constant feed and permeate pressure of 1 and –8 mbar, respectively. The salt rejection for all membranes was more than 99.9% with significant-high flux. The highest water flux of 49.25 kg/m<sup>2</sup> h was obtained using the membrane with 2 wt% loaded-laponite with a rejection of 99.94% when desalinating 5 wt.% NaCl solution at 70°C. Overall, the salinity of the feed solutions varied from 0% NaCl to 10 wt.% NaCl (0 to 100 g/L) solutions while the salinity of the permeate was from 0.01 to 0.2 g/L.

*Keywords:* Nanoclay; Mixed matrix membranes; Pervaporation; Desalination; Poly (vinyl alcohol)

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