



Characterization of hydrophilic nanofiltration and ultrafiltration membranes for groundwater treatment as potable water resources

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ABSTRACT

In this work, two hydrophilic nanofiltration (NF) membranes and a tight ultrafiltration (UF) membrane were studied for drinking water production from groundwater resources. Commercial membranes denoted as TS40, TFC-SR3, and GHSP were selected to investigate their performances. It was found that both NF membranes were hydrophilic with contact angle at 28° and 46°, respectively. The tight UF membrane was hydrophobic at contact angle of 68°. In the permeation test, both NF membranes exhibited higher permeability in pure water (4.68 and 3.99 L m⁻² h⁻¹ bar⁻¹) than UF membrane (3.15 L m⁻² h⁻¹ bar⁻¹). The order of single salt rejection by NF membranes were identified as R (Na₂SO₄) > R (MgCl₂) > R (NaCl), whereas for UF membrane was R (Na₂SO₄) > R (NaCl) > R (MgCl₂). A primary assessment of groundwater treatment for potable water showed that the highlighted components were characterized mainly by color, turbidity, and total dissolved solid (TDS) at 49 PtCo, 14 NTU, and 25 mg/L, respectively. The NF membrane, especially the TFC-SR3, was more efficient at rejecting these components, in quantities of 3 PtCo of color, 0.2 NTU of turbidity, and 10.5 mg/L of TDS, whereas the UF membrane attained 23 PtCo of color, 1.7 NTU of turbidity, and 17.6 mg/L of TDS. In conclusion, the findings on the quality of treated water verified that hydrophilic NF membrane performed well as a promising new technology for groundwater treatment in Malaysia.

Keywords: Groundwater; Membrane characterization; Hydrophilic and nanofiltration membrane

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