

Performance of hydrophobic ultrafiltration membranes in the treatment and protein recovery from palm oil mill effluent (POME)

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ABSTRACT

An attempt was made to investigate the effect of molecular weight cut-off (MWCO) and applied pressure on the treatment and protein recovery from palm oil mill effluent (POME). Hydrophobic ultrafiltration (UF) membranes, namely polyethersulphone and polysulphone membranes were used in this study although hydrophilic membranes are generally used in the wastewater treatment and protein recovery. In order to reduce significantly the total suspended solids from POME before proceeding with the dead-end UF process, the raw effluent was first subjected to physical pretreatment processes (depth and surface filtrations) and microfiltration process. Then, a polysulphone UF membrane (20,000 MWCO) as well as polyethersulphone UF membranes (10,000 MWCO and 2,000 MWCO) were used in the study at different applied pressures, ranging from 1 to 10 bar. This study indicated that MWCO and applied pressure imposed a direct effect on permeate flux, POME treatment and protein recovery. In general, the hydrophobic UF membrane with the highest MWCO (20,000 MWCO) and operated at the highest applied pressure (10 bar) gave the best performance of POME treatment and protein recovery, in which case the highest reduction of total suspended solids, turbidity, chemical oxygen demand, total dissolved solids and protein recovery could be obtained up to 98.3%, 96.2%, 82.0%, 41.2% and 78.0%, respectively.

Keywords: Hydrophobic membrane; Palm oil mill effluent (POME); Protein recovery; Ultrafiltration; Wastewater treatment

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