

Ultrafiltration of palm oil mill effluent: effects of operational pressure and stirring speed on performance and membranes fouling

ABSTRACT

Palm oil mill effluent (POME) is the largest pollutant discharged into the rivers of Malaysia. Thus UF membrane study was conducted to investigate the effect of pressure and stirring speed on performance of POME treatment and fouling of membrane. Two types of membrane polyethersulfone (PES) and regenerated cellulose (RC) with molecular weight cut-off (MWCO) 5 and 10 kDa were used in this study. Results showed that, as pressure increased, fouling increased however permeate quality improved, the best pressure was 1.0 bar, where the fouling was not too high and produce good permeate quality. As stirring speed increased, fouling reduced and permeate quality improved, however, when stirring speed increased from 600 rpm to 800 rpm, there was no significant improvement on the permeate quality. Therefore, the best condition was at 1.0 bar and 600 rpm. PES membrane with MWCO 5 kDa showed the best permeate quality, even fouling slightly higher than RC membrane. The permeate quality obtained were analyzed in term of dissolved solid, turbidity, suspended solid, biological oxygen demand (BOD5) and chemical oxygen demand (COD) were 538 mg/L, 1.02 NTU, < 25 mg/L, 27.7 mg/L and 62.8 mg/L, respectively with dominant type of fouling is cake resistance. Thus, it can be concluded water reuse standard was successfully achieved in terms of BOD5 and suspended solid.

Keyword: Permeate quality; POME; Pressure; Stirring speed; Ultrafiltration