A comparative study on fouling behaviors of hollow fiber membranes in pressure-driven and temperature-driven operations

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ABSTRACT

Hydrophobic hollow fiber membranes have been used for pressure-driven separation processes such as microfiltration (MF) and ultrafiltration. Recently, they are also applied for membrane distillation (MD) that uses thermal energy as its driving force. In this study, the fouling characteristics of the MD process were compared with those of the MF process using the same hollow fibre membranes. Colloidal silica and alginate were used as model foulants for both cases. Submerged MF and direct contact MD were implemented using laboratory-scale equipments. Results showed that MD fouling due to the colloidal silica or alginate could not be correlated with silt density index or modified fouling index. Moreover, the fouling behaviors and foulant layers were also different between MF and MD although same membranes and feedwaters were used. This is attributed to the effect of applied hydraulic pressure that only exists in MF process.

Keywords: Hollow fiber; Membrane distillation; Microfiltration; Membrane fouling; Fouling index