Pretreatment to enhance flux of ultrafiltration

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ABSTRACT

This study is aimed at examining pretreatment effect of coagulation and powdered activated carbon (PAC) on UF membrane flux. The experiments of pretreatment-filtration processes were compared in order to understand the membrane fouling by dissolved organic matter (DOM). DOM was isolated into hydrophobic (HPO), transphilic (TPI) and hydrophilic (HPI) fractions. Size exclusion chromatography (SEC) was applied to determine molecular weight (MW) distribution of DOM fractions before and after pretreatment-filtration procedures. It is found that HPO fraction around 2,600 Da contains the most problematic foulants of UF membrane. Coagulation pretreatment which effectively enhanced membrane flux was primarily due to removal of DOM with these characters. It is also found that not all the large, hydrophobic molecules are associated with membrane fouling. Only 20% of these molecules which contains saturated groups could lead to serious flux reduction. In addition, these problematic foulants could be successfully removed by coagulation but remained in water after PAC pretreatment. Therefore, serious flux reduction still exists after PAC pretreatment, although it could reduce more DOM than coagulation.

Keywords: Pretreatment; Ultrafiltration; Dissolved organic matter; Molecular weight; Hydrophobicity

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