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Improved Membrane Pretreatment of High Hydrophobic Natural Organic Matter (NOM) Waters by Floatation

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Abstract

Pretreatment by coagulation/flocculation/sedimentation is often used to alleviate membrane fouling; however there has been limited research on floatation as the pretreatment separation process. The main objective of this study is to compare sedimentation with floatation as part of the pretreatment for ultrafiltration (UF) of river water with relatively high hydrophobic natural organic matter (NOM) content. Water samples pretreated at full-scale plants were subjected to multiple-day UF membrane fouling tests (constant flux with backwash and chemical cleaning) using an automated bench-scale UF hollow fiber membrane system. Based on the samples tested, coagulation/floatation pretreatment resulted in less fouling than coagulation/sedimentation during both summer and winter testing. The improved performance appears to be linked to greater hydrophobic (HPO) NOM removal by the pretreatment. Most fouling could be reversed by hydraulic backwashing and chemical cleaning. Enhanced chemical backwash with 100 mg L⁻¹ chlorine and chemical clean with 0.1N NaOH & 200 mg L⁻¹ chlorine were found to be very effective at reducing fouling for pretreated water. As expected, longer filtration cycles resulted in greater fouling.

Abbreviation

AF, Ottawa River water coagulated with alum+ a polymer, flocculated and floated collected in Aylmer Water Plant;
AS, Ottawa River water coagulated with alum+ a polymer, flocculated collected in Aylmer Water Plant and settled at

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