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Investigating the relationship between model organic compounds and ultrafiltration membrane fouling

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ABSTRACT

The aims of this study were to investigate the fouling mechanisms of model organic compounds (MOCs) on two ultrafiltration membranes [composite regenerated cellulose (YM100) and polyethersulfone (PES)] and the relationship between fouling and membrane characteristics, flux decline, and the streaming potential (SP). Two alginic acids (polymer and dimmer, AA), abietic acid (AbA), colominic acid (CA), and N-acetylneuraminic acid (NA) were selected as MOCs to test their membrane fouling potential through flux decline and SP. The fouling caused by the two AAs, which contained many polysaccharides, was the highest among MOCs, but this fouling was external (solute deposition on the membrane surface) and reversible as polysaccharides did not strongly adsorb onto the YM100 and PES membranes. CA also caused external fouling of the two membranes; however, AbA caused internal (solute adsorption on the pores wall of membrane) and irreversible fouling of the PES membrane. NA, which contained amino sugars, exhibited very low fouling of both membranes. The hydrophilic YM100 membrane experienced less fouling than the hydrophobic PES membrane with all MOCs. The measurement of the SP using a modified dead-end filtration cell was employed to evaluate the flux decline due to MOCs.

Keywords: Fouling; Organic matter; Mechanism; Streaming potential; Ultrafiltration

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