Direct measurement of cake fouling potentials by powdered activated carbon during microfiltration of surface water

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ABSTRACT

Powdered activated carbon (PAC) addition is one of the promising options to improve the natural organic matter removal efficiency in microfiltration system. However, there have been controversial research results with impacts of PAC addition on membrane fouling. Direct observation technique through membranes was applied in this study to quantitatively analyze membrane fouling by PAC. Particle deposition rates and fouling potential were measured at various PAC concentrations. Membrane filtration tests revealed that the formation of PAC cake layers on the membrane surfaces could increase membrane permeate flux due to the increased porosity of the cake layers. Increased concentrations of PAC in feed water could increase the thickness of cake layers, yet no significant decline of permeate flux was observed. The proposed direct observation technique, which showed good agreement with filtration resistance measurement, could be applied for the monitoring of activated carbon deposition on membrane surface as well as selecting proper chemical cleaning agents for fouled membranes in a relatively short time.

Keywords: Membrane filtration; Fouling; Direct observation; Powdered activated carbon; Microfiltration