Effect of potassium permanganate pre-oxidation on fouling and pore size of ultrafiltration membrane for drinking water treatment

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\textbf{ABSTRACT}
Membrane fouling is one of the most significant issues limiting the utilization of ultrafiltration (UF) technology in drinking water treatment. In this paper, UF system was used as an advanced treatment following the conventional sand filter process. The performance of membrane fouling control was investigated by using potassium permanganate (KMnO\textsubscript{4}) to oxidize UF influent, i.e. sand filter effluent. The optimal dosage of KMnO\textsubscript{4} was 0.3 mg/L in terms of both permeate flux and product water quality in KMnO\textsubscript{4}/UF system. Membrane fouling was remarkably alleviated by KMnO\textsubscript{4} pre-oxidation to transform characteristics of some organic pollutants. Scanning electron microscopy showed that loose fragments were formed on the filtration cake, which was easy to be removed by hydraulic washing, during the KMnO\textsubscript{4}/UF process. The increasing rate of transmembrane pressure was slower in KMnO\textsubscript{4}/UF system than that without being subjected to KMnO\textsubscript{4} pre-oxidation. The pore sizes of the used membrane were found to be narrower than the virgin one due to the oxidation of KMnO\textsubscript{4}.

\textit{Keywords:} Ultrafiltration; Pre-oxidation; Potassium permanganate; Membrane fouling; Pore size

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