

Biofouling control of FO membrane by non-oxidizing biocide for wastewater reclamation process

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ABSTRACT

Biofouling causes many operational problems such as a decrease in permeate water flux and membrane lifespan, reducing the solute rejection efficiency in forward osmosis (FO) membrane process. In this study, we tried to control the biofouling by injecting monochloramine (MCA) during long-term operation of the pilot-scale FO process. Results showed that the MCA injected membrane featured retarded flux decline than the control membrane. From the biofilm analysis, the decreased amount of extracellular polymeric substances (EPS) in biofilm on the fouled FO membrane surface by MCA injection was observed. Moreover, confocal laser scanning microscopy images of microbial biofilm clearly showed that the activity and density of biofilm significantly decreased on the fouled membrane with MCA injection compared to the control one. Therefore, it was concluded that the injection of MCA was effective at retarding attached biofilm growth on the FO membrane by inhibiting the microbial activity as well as the secretion of EPS. These results shed light on the effectiveness of MCA injection in a pilot-scale FO plant, improves our understanding of the formation and mitigation of biofilm in FO membrane processes.

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