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Mechanism of biofouling mitigation on nanofiltration membrane by non-oxidizing biocide

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ABSTRACT

In the present study, the impact of non-oxidizing biocide (NOB) on the structure of biofilm formed on a nanofiltration (NF) membrane was investigated during an accelerated biofouling test. The results showed that although minimal toxic effect of NOB on suspended microbial growth was observed, NOB hindered attached biofilm growth on the membrane surface, thereby, retarded flux decline. This result was correlated with the decreased amount of extracellular polymeric substances (EPSs) in biofilm on the NF membrane surface in the presence of 5 mg/L of NOB. In addition, images taken by confocal laser scanning microscopy clearly showed that the number and density of microorganisms and the biofilm thickness significantly decreased on the fouled NF membrane with 5 mg/L of NOB compared with the control NF membrane. Therefore, it was concluded that the addition of NOB was effective at retarding attached biofilm growth on the NF membrane surfaces by suppressing the microbial activity as well as the secretion of EPS.

Keywords: Biofilm formation; Biofouling; Extracellular polymeric substances; Nanofiltration membrane; Non-oxidizing biocide

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