

Membrane fouling caused by soluble microbial products in an activated sludge system under starvation

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ABSTRACT

The behavior of soluble microbial products (SMP) and effects of SMP on membrane fouling under starvation of an activated sludge were studied. During a 16-day period, the experiment was investigated without nutrient addition to the closed system. Dissolved organic carbon (DOC) and molecular weight (MW) distributions of bulk solution were periodically monitored. The dead-end filtration tests were used to indicate the SMP effect on membrane fouling. Furthermore, the modified fouling index (MFI) was used to investigate the gel layer resistance of bulk solution closely related with the SMP. At last, an important increase in the concentrations of SMP with MW >10 kDa in the reactor was observed, which may be related to the cellular component degradation from endogenous metabolism. The gel layer resistance was observed to make the highest contribution to flux decline. Specially, the MFI is directly related to the concentration of high MW fraction. The SMP with MW >10 kDa was found to being strongly correlated with the MFI.

Keywords: Soluble microbial products; Membrane bioreactor; Molecular weight distributions; Modified fouling index; Gel layer resistance

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