Temporal variation of foulant characteristics in membrane bioreactor

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\textbf{ABSTRACT}

Many studies have been performed to analyse the influence of compounds present in different fractions of the membrane foulants. The aim of this study was to reveal the changing chemistry of compounds present in membrane foulant with the evolution of time. Membrane fouling in a side stream membrane bioreactor (MBR) reactor was investigated. Constant flux filtration was employed in an MBR operation. Air bubbles were injected at 2 m$^3$ h$^{-1}$ m$^{-2}$ for six different durations (2, 4, 6, 9, 15 and 20 days) of MBR operation. The foulant on the membrane surface was extracted using NaOH solution (5\%) and analysed using fluorescent spectroscopy. The spectra showed the changing chemistry of foulant with the evolution of time. It showed low molecular weight substances such as amino acids and small aromatic proteins were dominant in the foulant at the beginning of the experiment but its concentration decreased with time. On the other hand BOD$_5$ type substances concentration increased with time from the beginning of the experiment up to 9 days and thereafter decreased. The concentration of larger molecular weight soluble microbial by-products increased with evolution of time. Air bubbles at two aeration rate of 1 m$^3$ h$^{-1}$ m$^{-2}$ and 2 m$^3$ h$^{-1}$ m$^{-2}$ were also injected from the bottom of the membrane tanks to produce shear stresses on the membrane surface during 5 days of MBR operation to compare the effect of aeration on fouling propensity.

\textit{Keywords:} Membrane bioreactor; Fouling; Soluble microbial by-products

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