

Searching for a universal fouling indicator for membrane bioreactors

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ABSTRACT

Numerous papers have been published studying the causes of fouling in membrane bioreactors (MBRs) and searching for a universal fouling indicator. Unfortunately, as these studies were performed using various set-ups and operating conditions (different membranes, sludge retention time (SRT), hydraulic conditions and diverse feed wastewaters, etc.), the results in terms of fouling rates and the influence of individual parameters rarely match up. In order to obtain a significant database of comparable results from different plants, an intensive monitoring campaign of four MBR systems started in 2007 in Berlin. In these units, 14 parameters were monitored on a weekly basis over 10 months to characterise the mixed liquor and the corresponding permeability, including the novel parameter transparent exopolymer particles (TEP), which represent a specially sticky fraction of the extracellular polymeric substances (EPS). By performing statistical analyses it was demonstrated that there is no unique fouling indicator, and origins of fouling must be searched in the combination of several parameters using multivariable analysis. Applying a multiple regression the critical flux values could be correlated with four parameters (temperature, nitrate, bound and soluble TEP) measured in the activated sludge for 95% of the data.

Keywords: Extracellular polymeric substances (EPS); Fouling; MBR; Statistical analysis, Transparent exopolymer particles (TEP)

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