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Influence of EPS and MLSS concentrations on mixed liquor physical parameters of two membrane bioreactors

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ABSTRACT

This work focuses on the comparison of two bench-scale membrane bioreactors (MBRs) using different flat sheet membranes (microfiltration [MF-MBR] and ultrafiltration [UF-MBR]) working for 170 days, without sludge extraction, with the aim of studying the influence of the concentration of extracellular polymeric substances (EPS) and mixed liquor suspended solids (MLSS) on settleability, viscosity, particle size and filterability. A statistical study was performed to identify the strength and direction of the correlation between MLSS, EPS and the sludge properties were studied. Sludge settleability behaved worse when the concentrations of MLSS and bound EPS increased. Nevertheless, this parameter improved with an increase in soluble EPS in the MF-MBR, and no influence was found with respect to soluble EPS in the UF-MBR. While viscosity increased when MLSS and bound EPS increased, being more evident in the MF-MBR, soluble EPS behaved in the opposite way. The mean particle size increased in the two MBRs until the concentration of MLSS reached approximately 6 g/L. Afterwards, the mean particle size remained steady for the MF-MBR and decreased for the UF-MBR. A suitable filterability was obtained for both MBRs and decreased as MLSS increased. No correlation between filterability and EPS was found.

Keywords: Extracellular polymeric substances; Membrane bioreactor; Microfiltration; Mixed liquor suspended solids; Ultrafiltration

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