

Effects of SRT and HRT on treatment performance of MBR and membrane fouling

ABSTRACT

40L of hollow fiber membrane bioreactor with solids retention times (SRT) of 30, 15 and 4 days were setup for treating synthetic wastewater at hydraulic retention times (HRT) of 12, 8 and 4 hours. The objectives of the study were to investigate the effects of SRT and HRT on membrane fouling. A comparative analysis was carried out for physiochemical quality parameters (turbidity, suspended solids, COD, NH₃-N and PO₄³⁻). Scanning electron microscopy (SEM), energy diffusive X-ray (EDX) analyzer and particle size distribution (PSD) were used to characterize the membrane fouling properties. The influence of SRT on the quality of effluent, activated sludge quality, and membrane fouling were also correlated. Lower membrane fouling and slower rise in trans-membrane pressure (TMP) were noticed at the longest SRT and HRT of 30d and 12h, respectively. Increasing SRT results in noticeable reduction of dissolved organic matters. The best removal efficiencies of COD, TSS, NH₃-N and PO₄³⁻ were 93%, 98%, 80% and 30% respectively. The high HRT with shorter SRT induced faster fouling rate. The main fouling resistance was cake layer. The most severe membrane fouling was observed at SRT and HRT of 4 and 12, respectively with thickness cake layer of 17mm as reflected by higher TMP, lower effluent removal and thick sludge cake layer.

Keyword: Membrane bioreactor; SRT; HRT; Membrane fouling