

Effect of Slow Sand Filtration of Treated Domestic Wastewater as Pre-treatment to UF

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Abstract

Ultrafiltration (UF) of treated municipal wastewater has been used to produce high-quality reuse water for different applications. However, without pre-treatment, secondary treated wastewater effluent shows high fouling potential and reduces the performance of UF membrane filtration significantly. To remove foulants prior to UF, slow sand filtration (SSF) was investigated in the present work. Two pilot-scale slow sand filters were operated in tandem with UF. The performance of the UF plant was improved to a large extent by delivering slow sand filtrate compared to direct secondary effluent filtration. Removal of common organic fouling indicators (i.e., proteins, carbohydrates, and biopolymers) by SSF was significantly higher at 0.25 m/h versus 0.5 m/h filter loading rate. Results of a comparative analysis of SSF effluent characteristics and UF performance showed that the biopolymer content detected by size exclusion chromatography displayed a good correlation with the filterability of corresponding water sample by UF, while photo-metrically detected proteins and polysaccharides did not present any relationship with UF performance.

Key words: Secondary effluent; Slow sand filtration; Ultrafiltration; Biopolymer; Protein; Polysaccharide; Fouling; Filterability

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