Performance of membrane bioreactor (MBR) in high phosphate wastewater

ABSTRACT

This study presents the performance of membrane bioreactor in treating high phosphate wastewater. The laboratory scale MBR was operated at permeate flux of 25 L/m2.h with a hollow fiber membrane (polypropylene, approx. pore size 0.01 - 0.2 μm) at hydraulic retention time (HRT) of 12 hrs. Scanning electron microscopy (SEM) and energy diffusive X-ray (EDX) analyzer were used to characterize the membrane foulants. Results showed that the removal efficiencies of COD, TSS, NH3-N and PO4 3- were 93, 98, 80 and 30% respectively. On average 91% of influent soluble microbial products (SMP) were eliminated, with the eliminations of polysaccharides mostly above 80%. The main fouling resistance was cake resistance. It should be noted that SMP were found in major portions of mixed liquor that played a relatively significant role in membrane fouling. SEM and EDX analyses indicated that the foulants covering the membrane surfaces comprises not only organic substances but also inorganic elements including Mg, Ca, Al, K and P.

Keyword: Membrane bioreactor (MBR); Membrane fouling; Phosphates; Soluble microbial products (SMP)