

Enhanced biological phosphorus removal in a novel sequencing membrane bioreactor with gravitational filtration (GFS-MBR)

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ABSTRACT

A novel sequencing membrane bioreactor with gravitational filtration (GFS-MBR) was developed and its performance of biological phosphorus and nitrogen removal of the urban sewage was also studied in this paper. The GFS-MBR was operated in a 12-h cycle—anaerobic fill (0.5 h), anaerobic mixing (4.5 h), aerobic phase (5 h), settle (1 h) and decant (1 h). As the averaged COD, $\text{NH}_4^+\text{-N}$, TP and TN in the influent were 284 mg/L, 13.9 mg/L, 1.92 mg/L and 18.63 mg/L, respectively, the averaged removal efficiencies were 95.2%, 95%, 96.4% and 50.5%, respectively. The results indicate that the ratio of influent COD/TP is the key factor for achieving enhanced biological phosphorus removal (EBPR) with full sludge age in long-term operation (92 days, 184 cycles) in the GFS-MBR, and as the influent COD/TP was 148, the effluent TP was 70 $\mu\text{g/L}$. In addition, the membrane fouling was caused mainly by inorganic matters.

Keywords: Batch processing; Enhanced biological phosphorus removal (EBPR); Gravitational filtration; Hollow fibres; Membrane bioreactors (MBR); Wastewater treatment

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