

A step-feed hybrid membrane bioreactor process for advanced wastewater treatment

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ABSTRACT

A step-feed anaerobic-(oxic/anoxic)ⁿ-membrane bioreactor [An-(O/A)ⁿ-MBR] process was developed to treat synthetic domestic wastewater. Characteristics of nutrient removal and membrane fouling at three hydraulic retention time (HRT) settings were investigated on a lab-scale system. Results showed that COD removal in the An-(O/A)ⁿ-MBR process was high and stable (up to 98%) throughout the operation. At the constant sludge retention time condition, MLSS concentration increased with the decrease of HRT. Removal efficiencies of the total nitrogen (TN) and the total phosphorus (TP) demonstrated the same trend. When the HRT was at 8.70, 6.96 and 4.97 h, the average removal efficiencies of TN and the TP were 73.15%, 79.76%, 81.98% and 67.79%, 80.99%, 92.16%, respectively. However, analysis of membrane fouling showed that the short HRT obtained by high flux operation resulted in the acceleration of membrane fouling.

Keywords: Hydraulic retention time; Membrane bioreactor; Membrane fouling; Nitrogen and phosphorus removal; Step-feed

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