



## Performance of an innovative step-feed An-M(A/O)-MBR process for nutrients removal

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### ABSTRACT

An innovative process step-feed Anaerobic-multiple Anoxic/Oxic-Membrane Bioreactor [An-M(A/O)-MBR] was developed for biological phosphorus and nitrogen removal from synthetic domestic wastewater. This process was composed of an anaerobic reactor, a multiple phases of aerobic and anoxic zones (multiple A/O zone) in sequence followed by a continuous aerated MBR. Performance of the laboratory-scale system was investigated at different organic compounds in the influent. The results showed that, under the conditions imposed, although the Chemical Oxygen Demand (COD) concentration fluctuated in the range of 120–1,200 mg/L, high performance on COD removal was achieved in the system and more than 95% removal efficiency was obtained throughout the operation, the COD concentrations in the effluent were lower than 50 mg/L throughout the operation. However, COD levels in the influent had great influence on nitrogen and phosphorus removal. When COD level was low (120–200 mg/L), poor performance of nitrogen and phosphorus removal were obtained because of carbon source deficiency. Good performance on total nitrogen (TN) and total phosphorus (TP) removal were achieved when COD level was in the range of 350–710 mg/L, and the average removal efficiency of TN and TP was above 85 and 84%, respectively. But when COD increased to a high level (1,110–1,200 mg/L), the performance of nitrogen and phosphorus removal also deteriorated possibly because of the shift of the composition of the microbial communities.

*Keywords:* Nitrogen and phosphorus removal; Step-feed; Organic compounds; Nitrification/denitrification; Membrane bioreactor

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