



The 4-stage anoxic membrane bioreactor for simultaneous nitrogen and phosphorus removal, and its strengths and weaknesses

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ABSTRACT

In the laboratory-scale research, anoxic membrane bioreactor (MBR), in which a membrane is submerged in the second anoxic reactor, and aerobic MBR, where a membrane is installed in the aerobic reactor, were operated simultaneously to observe advantages and disadvantages of the 4-stage anoxic MBR process. The advantages observed were as follows: (1) nitrogen concentration in effluent (5.2 mg N/L) superior to that in aerobic MBR (7.1 mg N/L) and (2) efficient utilization of carbon source to remove nutrients (2.46 g SCOD_{utilized}/g [N_{denitrified} + P_{released}]). In contrast, the disadvantages of this process were as follows: (1) relatively higher phosphorus concentration in effluent (0.9 mg/L) than in aerobic MBR (0.5 mg P/L), (2) 20% lower membrane permeability, and (3) 25% lower sludge settleability.

Keywords: Anoxic membrane bioreactor; Enhanced biological phosphorus removal; Simultaneous nitrogen and phosphorus removal

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