



Effect of alkaline and ozone pretreatment on sludge reduction potential of a membrane bioreactor treating high-strength domestic wastewater

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ABSTRACT

The wide application and utilization of the activated sludge process has resulted in the production of excess sludge, posing a serious disposal problem. Many efforts have been dedicated to reduce the excess sludge by treatments such as digestion and dewatering. In this study, an aerobic submerged membrane bioreactor (MBR) was used to study the effect of alkaline and ozone pretreatment on the efficiency of sludge reduction. For this purpose, two MBRs were fabricated. Among the two MBRs, one acted as a control reactor (CMBR) and the other acted as an experimental reactor (EMBR). The MBRs were operated with mixed liquor suspended solids (MLSS) concentrations in the range of 7,000–7,200 mg/L for a period of 120 d. In the EMBR, part of the MLSS was withdrawn at a ratio of 1.5% of Q and was pretreated by alkali-ozone. The sludge pretreatment was carried out at pH 11 and an ozone dosage of 0.09 gO₃/g MLSS. During the pretreatment, 40% COD solubilization and 30% suspended solid reduction were observed. The pretreated sludge was returned to the reactor for further degradation, where it was found to be 37% degraded. During the 120 d of reactor operation, both of the MBRs maintained a relatively constant transmembrane pressure. The sludge digestion does not have any impact on the COD removal efficiency of the reactor.

Keywords: Membrane bioreactor; Pretreatment; Sludge reduction; Domestic wastewater; COD removal

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