

Effect of organic loading on the performance of MBR for advanced treatment and water reuse

Yoon-Ho Cho, Mark L. Sibag, Ramon Christian Eusebio, Han-Seung Kim*

*Department of Environmental Engineering and Biotechnology, Myongji University, San 38-2, Namdong, Cheongju, Yongin, Kyonggido 449-728, Korea
Tel. +82 (31) 330-6695; Fax +82 (31)336-6336; email: sarago@mju.ac.kr, marksibag@yahoo.com.au, rceusebio@gmail.com, kimhs210@mju.ac.kr*

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ABSTRACT

The study investigated the effect of organic loading on nutrient and organic matter removal in a lab-scale membrane bioreactor (MBR). The effect of powdered activated carbon (PAC) addition on the performance of MBR was also considered. The results showed that the organic loading changes greatly affected the removal of total phosphorus (TP). At the end of the step increase in chemical oxygen demand (COD) from 300 mg/L to 2400 mg/L, the TP removal was completely removed. The COD and total nitrogen (TN) removals were 90% and 80%, respectively. When the COD was reduced to 1200 mg COD/L and 600 mg COD/L, the TP removal was 10% for MBR without PAC and 19% for MBR with PAC. The addition of PAC had no effect on nutrient and organic matter removal of the MBR. It only reduced membrane fouling; hence extending the operation time for MBR before membrane cleaning. The study demonstrated that MBR could maintain high effluent quality at high organic loading changes. Under low organic loading changes, TP removal deteriorated more than did the COD and TN removals. It was suggested that the dynamics of organic loading also be considered for the MBR process to sustain high effluent quality especially during start-up.

Keywords: MBR; Nitrogen removal; Organic loading; PAC; PAO

* Corresponding author.