

Economical analysis and performance evaluation for municipal wastewater treatment by an aerobic biofilm reactor using recycle materials as the contact media

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Abstract

This study aimed to evaluate the contaminant removal from municipal wastewater by an aerobic biofilm system using recycle materials as the contact media. A pilot-scale biofilm system consisting of 5 channels was constructed using (1) natural gravels (size ranging between 5 and 10 cm), (2) glass bottles, (3) PET bottles, (4) construction and demolition waste (C&D waste), and (5) oyster shells as the contact media. The municipal wastewater used was collected from a drainage channel and directed into the system. The contaminant removal efficiencies at the retention times of 4, 6 and 8 h were investigated. The results showed that the increase in system retention time caused a slight removal improvement of suspended solids (SS), biological oxygen demand (BOD) and ammonium in general. Increase in aeration rate substantially enhanced the DO concentration, but no obvious improvement on contaminant removal was observed, implying that DO level was not the limiting factor for contaminant removal in the investigated system. The use of C&D waste demonstrated a better capability of removing SS, BOD and NH from municipal wastewater among the tested materials. By considering a 20-yr life span of a biofilm system, using recycling materials as the contact media might reduce the average unit treatment cost for municipal wastewater from 1.5 to 1.2 NTD t⁻¹ compared to that using gravels as the contact media.

Keyword : Municipal wastewater, biofilm, recycle materials, wastewater treatment