



Treatment of landfill leachate using modified anaerobic baffled reactor

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ABSTRACT

Landfill leachate is a highly concentrated organic wastewater with complex compositions. It is a major source of pollution potentially threatening the quality of groundwater, surface water, and life forms. The treatment of landfill leachate consists of various combination processes such as biological, chemical and physical methods. In this study, raw leachate was subjected to an anaerobic treatment using a modified anaerobic baffled reactor (MABR). Initially, the start-up of the MABR system was accomplished using meat extract as synthetic feed. The start-up of the reactor was carried out by maintaining a low chemical oxygen demand (COD) of 350 mg/L at an organic loading rate (OLR) of 0.0875 kg COD/m³/d. Once the reactor attained 99% COD removal, real wastewater (landfill leachate) was gradually fed into the MABR. The OLR was increased to 0.175, 0.375, 0.75 and 1.40 kg COD/m³/d, respectively. The process performance of the reactor was evaluated in terms of pH, COD, color, volatile acid (VA), biogas production and heavy metal removal. Results showed that an average COD removal efficiency of 79.3% was observed when the OLR was 1.4 kg COD/m³/d. The VA concentration showed a stable profile with a very little value (38.9 mg/L of HOAc) in the effluent of the reactor for all the OLR studied. The color removal was 32%, 46%, 45.1% and 78.2% when the OLR was increased to 0.175, 0.375, 0.75 and 1.40 kg COD/m³/d, respectively. As, Cr and Fe removal was 87.5%, 88.8%, and 87.8%, respectively, when the reactor was operated at an OLR of 1.4 kg COD/m³/d. The heavy metals removal efficiency provides further evidence that heavy metals can be degraded in anaerobic environments.

Keywords: Landfill leachate; Modified anaerobic baffled reactor (MABR); Heavy metals; Anaerobic granular sludge

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