EFFICIENCY STUDY OF ABR-ANAEROBIC FILTER COMBINE MODEL AS GREY WATER TREATMENT PAKAGE

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Abstract

Grey water is the biggest part of domestic wastewater in surface water. Although the organic matter contained in grey water is relatively low, it could decrease water quality significantly if entered and accumulated in surface water flow. Reactors used in this study were combination of Anaerobic Baffled Reactor (ABR) and Anaerobic Filter (AF). Reactor hydraulic loading rate (HLR) and organic loading rate (OLR) were observed to find actual hydraulic retention time and efficiency of treatment package.

Two reactors were used in this study; Reactor I and Reactor II. Reactor I consisted of 4 compartments ABR and 1 compartment AF, while Reactor II consisted of 3 compartments ABR and 1 compartment AF. HLR test was conducted using Reactor II, while OLR test was conducted using both reactors with different organic loading variations. Flowrate variations in HLR test were 64.8 L/day, 51.84 L/day, and 34.56 L/day. In OLR test, the reactors were loaded with several grey water organic concentrations. Those organic concentrations were 20, 30, and 35 mg/L for Reactor I, and 50, 100, and 150 mg COD/L for Reactor II.

HLR test showed that actual time detentions increased 9.5%, 42.8%, and 57.3% from its calculations, for HRT of 64.8
L/day, 51.84 L/day, and 34.56 L/day, respectively. OLR test showed that increase of organic loading in reactor was resulting in increase of reactor removal efficiency, for both Reactor I and II. In Reactor I, OLR increase from 0.018 to 0.033 kg/m$^3$.day was resulting in increase of average organic PV removal from 24.95% to 40.47%. And for Reactor II, PV and COD removal were increased from 21.65% to 52.60% and 18.94% to 57.75%, respectively, in consequence of OLR increasing from 0.044 kg COD/m$^3$.day to 0.123 kg COD/m$^3$.day. ABR-AF combine model treatment package is not quite appropriate to be applied as grey water treatment, because the organic loading of grey water is so low that makes reactor efficiency is less optimum.

**Key words:** grey water, anaerobic baffled reactor, anaerobic filter, hydraulic loading rate, organic loading rate.