

## Effect of organic loading rate (OLR) on the performance of modified anaerobic baffled reactor (MABR) supported by slanted baffles

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### ABSTRACT

The performance of a modified anaerobic baffled reactor (MABR) treating synthetic wastewater at different organic loading rates (OLRs) was investigated. The MABR was seeded with anaerobic sludge taken from a local municipal wastewater treatment plant and fed continuously with glucose at OLRs of 0.258, 0.787 and 2.471 kgCOD/m<sup>3</sup>·d at hydraulic retention time (HRT) of 4 d. Results showed that 99.7% chemical oxygen demand (COD) removal was achieved during the OLR of 0.258 kg COD/m<sup>3</sup>·d. However, when the OLR was increased to 0.787 kgCOD/m<sup>3</sup>·d, a minor decrease in the COD removal efficiency (95%) was noted. Further increase of the OLR to 2.471 kgCOD/m<sup>3</sup>·d caused the reactor performance to deteriorate dramatically in a COD removal efficiency of 39.5%. Biogas yield was evaluated for the reactor system and followed the similar decreasing trend (0.542, 0.524 and 0.214 L/g COD<sub>removed</sub> for the different OLRs respectively). There were no significant different in the pH profiles (6.71–7.01) during the first two OLRs (0.258 and 0.787 kgCOD/m<sup>3</sup>·d). However, during the final OLR (2.471 kg COD/m<sup>3</sup>·d) the pH profile in MABR significantly dropped as low as 4.01. A similar trend was also observed in the volatile fatty acids (VFAs) profile where higher value (2880 mg/l) was found at the highest OLR. The poor performance of the MABR at high OLR signifies that the microorganisms could not metabolise the organic substance and probably need more time for digestion.

**Keywords:** Modified anaerobic baffled reactor; Organic loading rate; Synthetic wastewater; Biogas yield; Hydraulic retention time

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