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COMPARISON OF DIFFERENT DURATION OF ANAEROBIC AND AEROBIC PHASES ON ACID RED 18 REMOVAL IN SEQUENCING BATCH REACTORS

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Abstract

In this work, the effect of cyclic anaerobic/aerobic conditions on the biodegradative capability of the mixed microbial culture for the azo dye Acid Red 18 was investigated in the sequencing batch reactors. For this purpose, five anaerobic/aerobic sequencing batch reactors were operated under the same operation conditions at different anaerobic/aerobic reaction times. The whole reaction time was 22-h with anaerobic/aerobic periods of 6/16, 10/12, 14/8, 18/4 and 22/0 (h/h) in An/ASBR1 to 5, respectively. The results of this study indicated that the increase in the duration of the anaerobic phase had no significant effect on COD removal and sludge characteristics in all reactors except full anaerobic conditions. Increase in duration of anaerobic phases (6 to 22 hour) caused increase in the averages of dye removal efficiencies (36 to 96%) and decrease in oxidation-reduction potential (40 to -188 mV). The kinetics data of dye removal showed that the increase in duration of anaerobic phases caused increase in first-order kinetic rate constants (2.4×10^{-2} to $25 \times 10^{-2} \text{ h}^{-1}$). HPLC analysis indicated that metabolites formed during anaerobic phases were metabolized aerobically and formed less aromatic, more polar compounds. In addition, decrease in duration of aeration phases caused decrease the removal of metabolites during these phases.

Key words: anaerobic phase duration, aromatic amines, azo dye, kinetic study, oxidation-reduction potential

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