

Mineralization of Methyl Orange-containing wastewater by integrated anaerobic and aerobic processes using spent granular activated carbon-biofilm under sequencing batch reactor operation

Abstract

Mineralization of azo dye required combination of anaerobic and aerobic processes either in two stages or single stage of treatment. The aim of the present study was to evaluate the treatment performance in the decolorization of Methyl Orange (MO)- containing wastewater and mineralization of intermediate aromatic amines using an integrated anaerobic and aerobic processes by spent granular activated carbon-biofilm under sequencing batch reactor operation (spent GAC-biofilm-SBR). The spent GAC-biofilm-SBR was operated with FILL, REACT, DRAW, and IDLE modes in a time ratio of 2:20:1.5:0.5 for a cycle time of 24 h. The bioreactor was fed with 1 L of MO-containing wastewater daily. The high reductive condition at the bottom layer of spent GAC-biofilm-SBR was responsible for the biological reduction of azo bond and this led to decolorization. Meanwhile, low reductive conditions at the top layer of spent GAC-biofilm-SBR promote the growth of aerobic microbes and caused the mineralization of intermediate aromatic amines.

Keywords

Aromatic amines; Biofilm; Methyl Orange; SBR; Spent GAC