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Comparison on biodegradation of anionic dye orange II and cationic dye methylene blue by immobilized microorganisms on spent granular activated carbon

Abstract

Activated carbon adsorption and biological degradation are two important methods used in the treatment of industrial wastewater among others. The objective of this study is to investigate the biodegradation of anionic dye orange II and cationic dye methylene blue by anaerobic microbes immobilized on spent granular activated carbon through attachment and under packed column operation. The maximum biodegradation rate of orange II and methylene blue was 0.38 g/h and 0.56 g/h, respectively, with initial dye concentration of 1150 mg/l. Results revealed that the difference in the biodegradation rate of methylene blue and orange II was influenced by the molecular structure of the dye. Adsorption study showed that methylene blue was adsorbed more readily by biofilm than orange II and subsequently contributed to higher removal rate of methylene blue than orange II in GAC-biofilm packed column operation.

Keywords; Immobilization, Orange II, Methylene blue, Granular activated carbon, Biodegradation