COD and color removal from textile effluent using granular sludge biomass: effect of substrate and riboflavin

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ABSTRACT

Factorial design and response surface methodology were employed to investigate the effects of substrate (500–3,000 mg/L) and riboflavin (1–150 \mu M) concentrations on the chemical oxygen demand (COD) and color removal with biogranules in the treatment of textile effluent using sequential anaerobic-aerobic batch experiment. Both variables, except for the concentration of riboflavin under anaerobic conditions, and the interaction between both variables show significant effects on COD removal. The substrate and riboflavin concentrations also significantly affect on the decolorization of Synozol Red K-4B and Sumifix Navy Blue EXF. In addition, the effect of substrate on color removal was found to be time dependent. The highest COD removal was 85.5\%, which corresponds to substrate and riboflavin concentrations of 2,634 mg/L and 23 \mu M, respectively. The highest color removal for Synozol Red K-4B and Sumifix Navy Blue EXF was achieved after 12 h of treatment, with more than 80\% color removal at substrate and riboflavin concentrations of 866 mg/L and 128 \mu M, respectively. Based on the result obtained, it shows that the magnitude and direction effects on COD and color removal are very much dependent on the type and duration of react phases and as well as the complexity of dye structural involved in the experiment. Both of the variables (substrate and riboflavin) showed significant interaction effect for both COD and color removal. The best statistical model equations correlating the concentrations of the substrate and redox mediators to COD and color removal for both types of dyes were determined.

Keywords: Biogranules; Color; Riboflavin; Substrate; Textile wastewater

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