



Photocatalytic decolorization kinetics and adsorption isotherms of a mixture of two anionic azo dyes: Reactive Red 120 and Reactive Black 5

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ABSTRACT

Industrial effluents contain a number of dyes. In order to understand photocatalytic treatment in such conditions, there is a need to study a mixture of dyes. Present paper compares the adsorption isotherms, and photocatalytic decolorization of two anionic dyes Reactive Red 120 (RR120) and Reactive Black 5 (RB5) in single dye solution to that of in their mixture. Both dyes show adherence to Langmuir adsorption isotherms in single dye solution. Adsorption characteristics of RB5 dye are strongly affected in presence of RR120 in mixture studies. There seems to be competition for adsorption sites on catalyst surface between RR120 and RB5. RR120 shows higher affinity towards catalyst surface during adsorption studies. Subsequent photocatalytic degradation studies shows desorption and decolorization of individual dye components. RR120 shows desorption during photocatalysis. Pseudo first order decolorization characteristics of RR120 was found to be affected for catalyst load higher than 0.25 g l^{-1} . In dye mixture, decolorization rate constant (k_{app}) for RR120 with 0.25 g l^{-1} catalyst load was found to be 0.0109 min^{-1} while for RB5 it was 0.005 min^{-1} . For dye mixture k_{app} was found to be the average of k_{app} for single dye solutions.

Keywords: Reactive red 120; Reactive black 5; Dye mixture; Photocatalysis; TiO_2 ; Adsorption isotherms

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