Removal of Terasil Red R dye by using Fenton oxidation: a statistical analysis

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Received 15 January 2013; Accepted 26 April 2013

ABSTRACT

The Fenton oxidation is one of the advanced oxidation processes (AOPs) that produce hydroxyl radicals with the aid of ferrous ions as catalyst. This treatment method was used to study the treatment efficiency of 100 mg/L synthetic dye wastewater comprises of a disperse dye commercially named as Terasil Red R. The treatment efficiency was determined in terms of percentage chemical oxygen demand (COD) removal and percentage color removal. Statistical design of experiment was employed to obtain optimal operating parameters. The optimal parameters were pH 3.5 and H$_2$O$_2$/Fe(II) molar ratio of 4. With this optimal condition, the Fenton oxidation was capable to achieve 93% of COD removal and more than 99% of color removal. The process was optimized with 3$^2$ factorial design and the interaction (dependent) between pH and molar ratio were found to be significant from the analysis of variance (ANOVA).

Keywords: COD and color removal; Factorial design; Fenton oxidation; Optimization; Terasil Red R

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