Determination of optimum conditions for color and COD removal of Reactive Blue 19 by Fenton oxidation process

Ömür Gökkuş*, Figen Çoşkun, Merve Kocaoğlu, Yalçın Şevki Yıldız

Department of Environmental Engineering, Erciyes University, 38039 Kayseri, Turkey
Tel. +90 352 2076666/32802; Fax: +90 352 4375784; email: omurgokkus@erciyes.edu.tr

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ABSTRACT

In this study, Taguchi method was used to determine the optimum parametric conditions such as initial pH, Fe\textsuperscript{2+} and H\textsubscript{2}O\textsubscript{2} concentrations, initial dye concentration, slow mixing rate (SMR) and rapid mixing rate (RMR) for Fenton oxidation process performance. The main objective of the study is to provide maximum color and chemical oxygen demand (COD) removals by using optimal levels for Fenton reaction parameters. The orthogonal array L\textsubscript{25} was selected as experimental matrix to determine of the optimum parametric levels. It was also, the contribution ratios of each factor were determined by the analysis of variance analysis, separately. Thus, the most effective parameter manages to the process was determined in terms of color and COD removals. Consequently, the optimum color removal conditions for the initial pH, Fe\textsuperscript{2+} and H\textsubscript{2}O\textsubscript{2} concentrations, initial dye concentration, SMR and RMR are 3, 500 mg/l, 150 mg/l, 250 mg/l, 60 rpm, 90 rpm, respectively, and 3, 400 mg/l, 150 mg/l, 250 mg/l, 60 rpm and 15 rpm for the initial pH, Fe\textsuperscript{2+} and H\textsubscript{2}O\textsubscript{2} concentrations, initial dye concentration, SMR and RMR to the COD removal, respectively. Under these optimum conditions, 98.90% color and 100% COD removals were achieved by Fenton oxidation process.

Keywords: Fenton oxidation; Reactive Blue 19; COD removal; Color removal; Taguchi; Optimization

*Corresponding author.