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RESPONSE SURFACE METHODOLOGY APPLIED FOR THE OPTIMIZATION OF REACTIVE BLACK 5 DISCOLORATION IN A FENTON-LIKE PROCESS

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Abstract

There are many treatment methods used to remove color from textile wastewater, and Fenton oxidation, a well known Advanced Oxidation Process is one of the most efficient. Apart of Fe(II), other metal ions have been used as catalysts in Fenton's Reagent, and Cu(II) proved to be a good alternative.

In this study the effect of the concentration of dye, catalyst and hydrogen peroxide were studied and optimized for the discoloration process of Reactive Black 5 using a Fenton-like process, H₂O₂/Cu(II) type. The experimental results were subjected to multiple linear regression analysis using MINITAB 16 software. The experimental data fitted to the second-order model, showing good regression prediction as the value of the coefficient of determination was high ($R^2 = 0.9843$). ANOVA showed that all three independent variables significantly affected the color removal. The significance of variables affecting the discoloration process and the possible relationships between them, whether antagonistic or synergistic, has been evaluated using the *Response Surface Methodology (RSM)*. Optimum conditions indicated by the regression model for achieving maximum decolorization were found as: dye concentration 7.8 mg/L, catalyst concentration 1.52 mM and hydrogen peroxide concentration 14.68 mM. The maximum color removal was 92.278% at optimum conditions.

Key words: discoloration, Fenton-like, Reactive Black 5, response surface optimization

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