

# Kinetics study and neural network modeling of degradation of Naphtol Blue Black by electro-Fenton process: effects of anions, metal ions, and organic compound

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## ABSTRACT

In the present work, the degradation of azo dye Naphtol Blue Black (NBB) in aqueous solution by electro-Fenton process was investigated. The results indicated that the degradation of NBB by electro-Fenton process followed the second-order reaction kinetics. The experimental results were also modeled by artificial neural network (ANN) with mean squared error of  $10^{-5}$ . This model was developed in Matlab using a feed forward back propagation network; multilayered perceptron. The input variables to the feed-forward neural network were as follows: initial  $\text{Fe}^{3+}$  concentration, initial pH, concentration of  $\text{Na}_2\text{SO}_4$ , temperature, applied current, and initial dye concentration. The degradation efficiency and rate constant were chosen as the experimental responses or output variables. The findings indicated that ANN provided reasonable predictive performance ( $R^2 > 0.99$ ). Effects of additives such as anions, metal ions, and organic compound on the efficiency and on the rate constant of NBB degradation were also studied under optimum conditions.

**Keywords:** Degradation; Electro-Fenton; Naphtol Blue Black; Artificial neural network