

Treatment of synthetic dye wastewater by using Fe/CuO particles prepared by co-precipitation: parametric and kinetic studies

Yeliz Asci*, Merve Cam

Eskisehir Osmangazi University, Faculty of Engineering and Architecture, Department of Chemical Engineering, Meselik Campus, Eskisehir, Turkey, Tel. +90 222 2393750;3644, email: yelizbal@ogu.edu.tr, yelizbal26@gmail.com (Y. Asci), merveecam@gmail.com (M. Cam)

Received 27 June 2016; Accepted 16 November 2016

ABSTRACT

In this study, decolorization of the synthetic wastewater containing Reactive Yellow 15 (RY15) by means of the heterogeneous Fenton process was investigated. Primarily, the Fe/CuO catalyst was prepared by co-precipitation method and characterized by BET and SEM-EDX analyses. The prepared catalyst was used in the Fenton tests. The effects of the amount of the catalyst, pH of the solution, hydrogen peroxide (H₂O₂) concentration, dye concentration, temperature and reaction time on the process were studied and the optimum conditions were determined. The decolorization efficiency of 98% was obtained under the optimum conditions (pH = 2, amount of catalyst = 4.0 g/L, temperature = 30°C, H₂O₂ concentration = 50 mM, time = 60 min). The decolorization kinetics of RY15 was also investigated. It was determined that the decolorization of RY15 obeyed the zero-order kinetics. Finally, reusability of the catalyst was investigated. The results show that the Fe/CuO catalyst is useful for the heterogeneous Fenton systems.

Keywords: Wastewater treatment; Reactive Yellow 15; Fe/CuO catalyst; Heterogeneous Fenton; Oxidation; Kinetics

*Corresponding author.

Presented at Desalination for the Environment: Clean Water and Energy, Rome, Italy, 22–26 May 2016