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A Photo-Fenton treatment of a Mixture of Three Cationic Dyes

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Abstract

Application of photo-Fenton process, UV/Fe³⁺/H₂O₂, to treatment for a mixture of three cationic dyes was investigated. The effect of the oxidative agent's initial concentration was investigated as well as the effect of the initial concentration of Fe³⁺ and H₂O₂ on the dyes degradation was studied. The best results were obtained using 0.6 mM of Fe³⁺ and 12 mM hydrogen peroxide. Under these experimental conditions, 90% of TOC and 100% of color removal were achieved.

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1. Introduction

In recent years, there is a great interest for so-called advanced oxidation processes (AOPs) which constitute an attractive alternative to treating wastewater containing toxic and persistent pollutants. They are based on the in situ generation of a powerful non specific oxidizing agent, the hydroxyl radical (OH[•]) which is able to oxidize a broad range of organic pollutants quickly and non-selectively [1]. There are several methods for generating OH[•], [2] such as Fenton's reagent, [3, 4] H₂O₂ photolysis, [5] Fe(III) photolysis, [6–8] anodic oxidation, [9,10] electro-Fenton, [11–14] and heterogeneous photocatalysis. [15,16]. Among them, the photo-Fenton process, combining the Fenton's reagent, a mixture of H₂O₂ and a ferrous salt, with UV irradiations is able to extensively degrading organic contaminants in a variety of wastewater, streams and soils.

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