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ENHANCING THE FENTON PROCESS BY UV LIGHT APPLIED IN TEXTILE WASTEWATER TREATMENT

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Abstract

Nowadays, an efficient wastewater management involves the use of advanced treatment technologies able to decompose hardly biodegradable compounds with reasonable costs at the lowest possible environmental impact. In our work we used one of the most efficient advanced wastewater treatment, the Fenton reaction and its photo-assisted version. The hydrogen peroxide was the oxidizer; despite its relatively high cost, its high activity in oxidizing of a large variety of organic persistent pollutants in the presence of Fe³⁺ ions as catalyst, makes it an alternative which is worth to be considered even in practical medium scale systems. The Fenton and photo-Fenton oxidation were performed using a model dye, the xanthene-type Rhodamine 6G, widely used in a series of biotechnology applications, but having major drawbacks when released in natural water flows, mainly mutagen and carcinogen effects. Therefore, a parametric case study was performed in order to define the optimal operating parameters (the pH value, the hydrogen peroxide concentration and the iron catalyst concentration). The oxidative degradation of Rhodamine 6G by Fenton reaction was more effective when combined with UV irradiation. Each parameter of the oxidative treatment is essential for the color and TOC removal. The optimal values found for the total color degradation and mineralization of the dye were as follows: 16 ppm Fe³⁺, 100 ppm H₂O₂ and pH of 4.5.

Key words: advanced wastewater treatment, advanced oxidation process, photo-Fenton, Rhodamine 6G, UV irradiation

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