



Optimization of Fenton–SBR treatment process for the treatment of aqueous dye solution

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ABSTRACT

The degradation of dye C.I.Reactive brilliant blue 4 (RB4) was evaluated by using a combined process of Fenton's reagent and sequencing batch reactor (SBR). Fenton treatment was confirmed effective to enhance biodegradability and reduce acute toxicity of RB4 solution by Zahn–Wellens test (ZWT) and Microtox™ bacterial bioluminescence assay. As for the initial RB4 concentration of 100 mg/L, the optimum doses for Fenton oxidation were found out to be 0.52 mmol/L of Fe²⁺ and 5.2 mmol/L of H₂O₂ dose at pH 3. Under these conditions, the obtained total organic carbon (TOC) and color removal were 44.2 and 100%, respectively. To fully exert the potential of biotreatment of SBR and save the costs of chemical reagents, the dose of Fenton reagent was reduced to Fe²⁺ 0.39 mmol/L and H₂O₂ 3.9 mmol/L. Thus, the polish step for Fenton's effluent was conducted by SBR, and the overall TOC removal percent can be achieved at 73.5%.

Keywords: Reactive brilliant blue 4; Fenton; Bacterial bioluminescence assay; Zahn–Wellens test; Sequencing batch reactor

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