



Sonocatalytic degradation of Direct Blue 71 azo dye at the presence Zero-Valent Iron (ZVI)

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ABSTRACT

The sonocatalytic degradation of Direct Blue 71 (DB71) azo dye has been studied in the presence of low-frequency ultrasound (20 kHz). An initial concentration of 50 mg L⁻¹ of dye, within the range of typical concentration in textile wastewaters, was used. Batch sorption studies were conducted to study the effects of various parameters such as Zero-Valent Iron (ZVI) dose, pH, and effect of different power levels (20, 55, and 95 W), on DB71 oxidation. Oxidation of DB71 with the assistance of ultrasound was enhanced with the increase in ZVI initial concentration and ultrasonic power, and with the decrease in pH. It was observed that the color removal efficiency was influenced by the solution H₂O₂ amount. Accordingly, removal of 91.2% color and 97.2% total organic carbon of dye was achieved by applying the optimal operational parameters with 0.3 g L⁻¹ of catalyst, 2.5 pH and 25°C, during 20 min. In hybrid study, the color removal yield of 100% was obtained by combination of US/ZVI/H₂O₂ at dyestuff concentration of 100 mg L⁻¹. The amount of catalyst and power levels had an important effect on the color removal yields ($p < 0.05$).

Keywords: Azo dye; Direct Blue 71; ZVI; Oxidation; Ultrasound; TOC

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