Decolorization of Textile Wastewater by The Hybrid UV/TiO2/Ultrasound System

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ABSTRACT

This study combined ultrasonic bath (USB) and/or ultrasonic probe (USP) with UV/TiO2 to evaluate the decolorization efficiency for textile wastewater. The parent compound was selected as C.I. Reactive Red 2 (RR2). The effects of dye concentration, TiO2 dose, pH, wavelength of light and the combination of USB/USP were determined in this research. The experimental data indicated that the decolorization efficiency increased with the dye concentration and pH declining. The optima TiO2 dosage was found as 2 g/L. This work found that the decolorization rate fitted with the pseudo-first-order kinetics. The decolorization rate of 254 nm irradiation was higher than that of 365 nm. Additionally, the addition of NaCl promoted the decolorization rate. This study demonstrated the decolorization rate constants followed the order UV/TiO2/USB/USP > UV/TiO2/USB > UV/TiO2/USP > UV/TiO2. The experimental data indicated that the combination of USB/USP with UV/TiO2 accelerated the decolorization significantly; however, the influence of the combination of USB/USP with UV/TiO2 was insignificantly. The addition of C2H5OH inhibited the decolorization rate of UV/TiO2-related systems; hence, this research suggested that the hydroxyl radicals were the main oxidation reagents. However, the addition of C2H5OH did not terminate the decolorization; accordingly, the oxidation of electron holes could not be ignored in UV/TiO2-related systems.

Keywords : UV ; TiO2 ; dye ; ultrasonic

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