Decolorization and mineralization of azo dye Acid Blue 113 by the UV/Oxone process and optimization of operating parameters

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ABSTRACT

A UV/Oxone advanced oxidation process was proposed to degrade and mineralize a synthesized Acid Blue 113 (AB113) dyeing wastewater. Various operating parameters which affected the removal efficiencies of AB113 and total organic carbon (TOC) such as reaction time, Oxone dosage, initial AB113 concentration, initial pH, and UV intensity were studied. Results presented effective removal of AB113 azo dye by UV/Oxone process based on both AB113 and TOC indicators. The reaction kinetics was shown to be pseudo-second-order reaction. In UV/Oxone process, the higher the Oxone dosage applied, the higher the AB113 and TOC removal efficiencies can be obtained up to 6.3 mM Oxone concentration. The AB113 removal efficiency and pseudo-second-order rate constant decreased with increase in the initial dye concentration. However, the proposed UV/Oxone process was proved to be able to degrade high AB113 concentration up to 400 mg l\(^{-1}\). The initial pH showed no significant effect on AB113 removal efficiency. UV intensity affected TOC mineralization efficiency significantly. In contrast, UV intensity presented less important factors on degradation of AB113.

Keywords: Azo dye; Peroxymonosulfate; Oxone; UV irradiation; Sulfate radicals; Decolorization; Mineralization

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