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Hydrodynamic cavitation and activated persulfate oxidation for degradation of bisphenol A: Kinetics and mechanism

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ABSTRACT

Bisphenol A (BPA) is an endocrine disruptor and is toxic at low concentrations. Furthermore, in order to oxidize BPA at the water treatment, an economical treatment method is required. This study was the first study to apply hydrodynamic cavitation/persulfate (HC/PS) processes to degrade BPA and investigated the effects of important operating parameters, such as HC inlet pressure, PS loading, pH, temperature and other anions. The results showed that the optimal pressure of HC was 0.5 MPa and the rate constant increased as the PS load concentration increased. The contribution of •OH and $SO_4^{-\bullet}$ to BPA oxidation using HC/PS processes was 10.3% and 89.7%, respectively. The reaction rate constant decreased with increasing pH and the reaction rate constant increased with increasing temperature. The activation energy was 69.62 kJ mol^{-1}. The effects of other anions on BPA degradation were in the following order: Cl^-> NO_3^-> HCO_3^-. Five major intermediates were formed in the HC/PS processes and they were obtained during 120 minutes of operation. Based on this, this study described the decomposition pathway of BPA. The kinetic study and economic evaluation of the HC/PS processes can be used as basic data for the real wastewater treatment process in the future.

***Keywords*:** Hydrodynamic cavitation/Persulfate process; Sulfate radical; Hydroxyl radical; Bisphenol A; Activation energy; Mechanism

1. Introduction