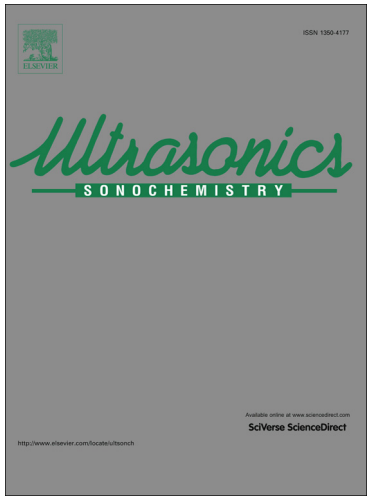

Degradation of organic wastewater by hydrodynamic cavitation combined with acoustic cavitation

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Degradation of organic wastewater by hydrodynamic cavitation combined with acoustic cavitation

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ABSTRCT: In this paper, the decomposition of Rhodamine B (RhB) by hydrodynamic cavitation (HC), acoustic cavitation (AC) and the combination of these individual methods (HAC) have been investigated. The degradation of 20 L RhB aqueous solution was carried out in a self-designed HAC reactor, where hydrodynamic cavitation and acoustic cavitation could take place in the same space simultaneously. The effects of initial concentration, inlet pressure, solution temperature and ultrasonic power were studied and discussed. Obvious synergies were found in the HAC process. The combined method achieved the best conversion, and the synergistic effect in HAC was even up to 119% with the ultrasonic power of 220 W in a treatment time of 30 min. The time-independent synergistic factor based on rate constant was introduced and the maximum value reached 40% in the HAC system. Besides, the hybrid HAC method showed great superiority in energy efficiency at lower ultrasonic power (88-176 W). Therefore, HAC technology can be visualized as a promising method for wastewater treatment with good scale-up possibilities.

Keywords: *Hydrodynamic cavitation; Acoustic cavitation; Hybrid method; Degradation; Rhodamine B.*

1. Introduction

With the increasing industrialization in the worldwide scale, large quantities of wastewater with high organic contents have been produced, which imposes severe environmental problems. With complex pollutant composition, the organic wastewater is carcinogenic and poisonous to living organisms generally. Therefore, it must be treated thoroughly before being discharged into the environment [1-3]. At present, the common organic wastewater treating methods mainly include biological and chemical methods, carbon bed adsorption, membrane processes and advanced oxidation processes (AOPs) [1, 3, 4]. Conventional wastewater treatment methods like adsorption on activated carbon, extraction, and chemical oxidation have certain weaknesses, such as limited

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