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Ultrasonic-assisted ozone oxidation process for sulfamethoxazole removal: impact factors and degradation process

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ABSTRACT

In this study, sulfamethoxazole (SMX) degradation was investigated using an ultrasonic-assisted ozone oxidation process (UAOOP). The influencing factors of ozone concentration, pH, initial SMX concentration, ultrasound power density, and radical scavenger were studied. It was proved that ultrasound application enhanced ozonation function for SMX degradation. Color change of the water during the oxidation process was found to be corresponding to SMX concentration decay in wastewater. The results indicated that SMX degradation followed a pseudo-first-order kinetic model under experimental operating conditions. SMX degradation rate increased with ozone concentration, pH, and ultrasound power density, and was inversely proportional to the initial SMX concentration. Although the direct and indirect oxidation of ozone simultaneously existed in the UAOOP system, the direct oxidation was the predominant way. Meanwhile, the biological toxicity of the solution was weakened and biological oxygen demand/chemical oxygen demand ratio increased from 0 to 0.54. It was indicated that the UAOOP system was efficient to treat SMX wastewater and promote biodegradability for further biological treatment.

Keywords: Sulfamethoxazole; Ozone; Ultrasound; Impact factors; Degradation process

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