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Degradation of ofloxacin in aqueous solution with UV/H_2O_2

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ABSTRACT

Trace levels of antibiotics in water bodies could present a public health risk. However, advanced oxidation can potentially transform trace antibiotics; therefore, this study investigates the degradation of typical pharmaceuticals such as ofloxacin (OFL) in aqueous solution by the UV/H_2O_2 advanced oxidation process. The results show that OFL could be rapidly degraded by UV/H_2O_2, and that the degradation process is dependent on the H_2O_2 concentration and on the initial concentrations of OFL. The pseudo-first-order rate constant (k) of OFL is significantly improved by ·OH generated by H_2O_2; however, with an increased OFL concentration, the k declines. In actual water bodies, the rate constant of OFL is lower than that in ultrapure water. Further analysis has indicated that the acidic and basic environments or the existence of natural organic matter and chloride ion inhibit the degradation of OFL. The experimental results indicate that the laboratory results could not be extended directly to actual water treatment without further consideration. Six degradation products of OFL were determined by ultra-performance liquid chromatography-high resolution mass spectrometry. The degradation pathways mainly encompass ring openings at both the piperazinyl substituent and the quinolone moiety.

Keywords: Degradation; Kinetics; Mechanism; Ofloxacin; UV/H_2O_2

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