



Removal kinetics and pathways of oxytetracycline by UV/PDS

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ABSTRACT

The large influx of antibiotics in the environment may pose a threat to humans. Therefore, the fate of antibiotics in the environment has attracted a great deal of attention. In this work, the degradation of oxytetracycline (OTC), a type of tetracycline antibiotic, by UV-activated peroxydisulfate (PDS) advanced oxidation process was investigated. The results showed that OTC could be efficiently degraded by UV/PDS, with the degradation process following the pseudo-first-order kinetics equation. The degradation rate was dependent on the initial concentration of PDS. Neither acidic nor alkaline conditions facilitated the degradation of OTC. The existence of Cl⁻ promoted the degradation of OTC, whereas other inorganic ions (NO₃⁻, CO₃²⁻, and HCO₃⁻) slightly inhibited the degradation of OTC. Meanwhile, humic acid and fulvic acid strongly inhibited the removal of OTC. In a natural water matrix, OTC degradation was slowed down compared with that in ultrapure water. Ultra-high-performance liquid chromatography time-of-flight mass spectrometry yielded five products of OTC degradation. The degradation pathways were primarily decarbonylation, dehydration, hydroxylation, and secondary alcohol oxidation.

Keywords: Degradation; Kinetics; Mechanism; Oxytetracycline; UV/peroxydisulfate

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