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Degradation of chloramphenicol using a combination system of simulated solar light, Fe^{2+} and persulfate

Minghua Nie^{a,b}, Caixia Yan^a, Xiaoying Xiong^a, Xinmei Wen^a, Xue Yang^a, Zelan Lv^a, Wenbo Dong^{b,c,*}

^a School of Geography and Environment, Key Laboratory of Poyang Lake Wetland and Watershed Research, Ministry of Education, Jiangxi Normal University, 99 Ziyang Road, Nanchang 330022, China

^b Shanghai Key Laboratory of Atmospheric Particle Pollution and Prevention, Department of Environmental Science and Engineering, Fudan University, Shanghai 200433, China

^c Shanghai Institute of Pollution Control and Ecological Security, Shanghai 200092, China

Corresponding author email: wbdong@fudan.edu.cn

Abstract: Solar irradiation ($\lambda \geq 290$ nm) has been introduced into a traditional Fe^{2+} activated persulfate (PS) system (Fe^{2+}/PS). The combination system of solar light, Fe^{2+} and PS system (solar/ Fe^{2+}/PS) exhibited a rapid and continuous oxidation of chloramphenicol (CAP) in solution, and showed great advantages over the Fe^{2+}/PS process by accelerated degradation efficiency. A presumed reason is that Fe^{2+} was slowly and continuously recycled by solar light, and the reductive photolysis Fe^{3+} to Fe^{2+} was promoted concomitantly with the production of additional hydroxyl radical ($\text{HO}\cdot$). The optimal dosages of PS and Fe^{2+} were determined by batch experiments. pH significantly influenced CAP degradation, and an acidic condition favored the reaction. Both $\text{HO}\cdot$ and sulfate radical ($\text{SO}_4^{\cdot-}$) were considered to be the mainly oxidant to remove CAP, and $\text{HO}\cdot$ had a higher contribution than $\text{SO}_4^{\cdot-}$. The presence of HCO_3^- , NO_3^- , NO_2^- , H_2PO_4^- , HPO_4^{2-} demonstrated adverse effects on CAP decay in solar/ Fe^{2+}/PS process. Coexisting Cl^- ions slightly accelerated the CAP degradation rate at an appropriate concentration (0.6-6 mM) but gradually inhibited at a higher Cl^- (12-36 mM) content. The results clearly showed that CAP presented the slowest degradation rate in wastewater, and the colloids should be taken into consideration prior to the application of solar/ Fe^{2+}/PS

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