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

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**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 (HO•). 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 HO• and sulfate radical ($SO_4^{\bullet-}$) were considered to be the mainly oxidant to remove CAP, and HO• had a higher contribution than $SO_4^{\bullet-}$. 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