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Enhanced degradation performance of sulfisoxazole using peroxymonosulfate activated by copper-cobalt oxides in aqueous solution: Kinetic study and products identification

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Abstract

In recent years, numerous studies have been concentrated on enhancing the efficiency of $\text{SO}_4^{\bullet-}$ based advanced oxidation processes (AOPs) on eliminating contaminants. In this study, an efficacious heterogeneous copper-cobalt catalyst ($\text{Cu}_{0.39}\text{Co}_{1.01}\text{O}_{4.57}$) was synthesized by a simple coprecipitation method to activate peroxymonosulfate (PMS) to degrade sulfisoxazole (SIX). On the surface of this catalyst, active sites like Co^{2+} , Co^{3+} and Cu^{2+} were found. In the optimal condition, SIX could be completely degraded in 30 minutes at ambient temperature, $\text{pH} = 7$ and by 1.87 mM PMS and $0.1 \text{ g L}^{-1} \text{ Cu}_{0.39}\text{Co}_{1.01}\text{O}_{4.57}$. The addition of this catalyst also enhanced the degradation of other 5 sulfonamides (SAs). The possible catalytic mechanism was discussed that $\equiv\text{Co}^{2+}$ first formed $\equiv\text{Co}(\text{OH})^+$, then it activated PMS to produce sulfate radicals, and $\equiv\text{Cu}^{2+}$ on the surface may participate in reducing $\equiv\text{Co}^{3+}$.

Twelve transformation products of SIX by PMS were identified by HPLC-MS/MS

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