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PII: S1385-8947(17)31302-5
DOI: http://dx.doi.org/10.1016/j.cej.2017.07.155
Reference: CEJ 17421

To appear in: *Chemical Engineering Journal*

Received Date: 14 March 2017
Revised Date: 17 June 2017
Accepted Date: 26 July 2017

Please cite this article as: J. Yao, X. Zeng, Z. Wang, Enhanced degradation performance of sulfisoxazole using peroxymonosulfate activated by copper-cobalt oxides in aqueous solution: Kinetic study and products identification, *Chemical Engineering Journal* (2017), doi: http://dx.doi.org/10.1016/j.cej.2017.07.155

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 $SO_4^{\bullet -}$ based advanced oxidation processes (AOPs) on eliminating contaminants. In this study, an efficacious heterogeneous copper-cobalt catalyst ($Cu_{0.39}Co_{1.01}O_{4.57}$) 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, pH = 7 and by 1.87 mM PMS and 0.1 g L^{-1} $Cu_{0.39}Co_{1.01}O_{4.57}$. The addition of this catalyst also enhanced the degradation of other 5 sulfonamides (SAs). The possible catalytic mechanism was discussed that $\equiv Co^{2+}$ first formed $\equiv Co(OH)^{+}$, then it activated PMS to produce sulfate radicals, and $\equiv Cu^{2+}$ on the surface may participate in reducing $\equiv Co^{3+}$. Twelve transformation products of SIX by PMS were identified by HPLC-MS/MS

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