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PII: S1385-8947(18)31071-4
DOI: https://doi.org/10.1016/j.cej.2018.06.033
Reference: CEJ 19244

To appear in: *Chemical Engineering Journal*

Received Date: 20 March 2018
Revised Date: 30 May 2018
Accepted Date: 7 June 2018

Please cite this article as: G. Wang, D. Zhao, F. Kou, Q. Ouyang, J. Chen, Z. Fang, Removal of norfloxacin by surface Fenton system ($MnFe_2O_4/H_2O_2$): Kinetics, mechanism and degradation pathway, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.06.033

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Abstract

Magnetic $MnFe_2O_4$ particles were prepared by sol-gel method and used to activate H_2O_2 for norfloxacin removal from water. The results of hydrodynamic particle size distribution and Zeta potential analyses show that the particle size ranged from 100 nm to 500 nm, and Zeta potential from -76 mV to -25 mV at pH_{intial} = 7.0. The $MnFe_2O_4/H_2O_2$ system was able to remove 90.6% of norfloxacin at neutral pH, and the spent material can be reused in multiple cycles of operations. Fluorescence detection and DMPO capture analyses indicated that ·OH was the main free radicals, which played a primary role in degradation of norfloxacin. The valence variations of Mn and Fe were analyzed by XPS, and the results showed that coupled transformations of Mn^{2+}/Mn^{3+} and Fe^{2+}/Fe^{3+} were involved in generation of ·OH. Moreover, the removal rate in the $MnFe_2O_4/H_2O_2$ system showed a positive correlation with the adsorption efficiency of NOR by $MnFe_2O_4$. Eight degradation intermediates were detected by LC-QToF-MS/MS, and consequently, three degradation pathways were proposed, including