



Activation of persulfate by Fe^{2+} for saline recalcitrant petrochemical wastewater treatment: Intermediates identification and kinetic study

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ABSTRACT

Saline waste waters would be re-mediated via various physical, chemical and biological techniques. In recent years, the application of advanced oxidation processes, based on the production of radical per-sulfate instead of radical hydroxyl, has been favored, due to increasing potential for oxidation of per-sulfate (EO = 2.01 V), compared to hydroxyl (EO = 2.8 V). In this study, the efficiency of Fe^{2+} /per-sulfate process in COD removal from wastewater as well as improvement of wastewater biodegradability were studied. Result indicated that organic matter was rapidly degraded at pH = 3 which shows that lower pH values will be favorable for COD removal. The maximum removal efficiencies for COD were obtained 67 and 69% after 30 min and 120 min time intervals, respectively. With increasing per-sulfate/ Fe^{2+} ratio from 0.5:1 to 6:1, the efficiencies of COD removal were increased from 35 to 67% and with a further increase of up to 10:1 ratio, the removal efficiency was declined. In this study, the AOS values before and after process optimization (pH = 3, PS: 10 mM and reaction time 30 min) were obtained +3.27 and +2.23, respectively. So, AOS indices showed an increasing trend of mineralization. The main products of the wastewater degradation were oxime-, 2-propanone, pentanamide, propanenitrile, benzenamine, 1, 4-dichloro-2-(methylthio) benzene, 4-cyclopentene-1,3-dione, 4-chloro-2e(chloromethyl)-1-butene, 4,5-bromm acetyl benzo cyclobutene, p-benzoquinone, niceke-6, hydroquinone.

Keywords: Saline petrochemical wastewater; Advanced oxidation process; Persulfate; Fe^{2+}

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