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# Reactive oxygen and iron species monitoring to investigate the electro-Fenton performances. Impact of the electrochemical process on the biodegradability of metronidazole and its by-products.

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## Abstract

In this study, the monitoring of reactive oxygen species and the regeneration of the ferrous ions catalyst were performed during electro-Fenton (EF) process to highlight the influence of operating parameters. The removal of metronidazole (MTZ) was implemented in an electrochemical mono-compartment batch reactor under various ranges of current densities, initial MTZ and ferrous ions concentrations, and pH values. It was found that under 0.07 mA $cm^{-2}$, 0.1 mM of ferrous ions and pH=3, the efficiency of 100 mg $L^{-1}$ MTZ degradation and mineralization were 100 % within 20 min and 40% within 135 min of electrolysis, respectively. The highest hydrogen peroxide and hydroxyl radical concentrations, 1.4 mM and 2.28 mM respectively, were obtained at 60 min electrolysis at 0.07 mA $cm^{-2}$. Improvement of the biodegradability was reached from 60 min of electrolysis with a $BOD_5$/COD ratio above 0.4, which was reinforced by a respirometric study, that supports the feasibility of coupling electro-Fenton and biological treatment for the metronidazole removal.