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

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12  
13       **Abstract**

14       In this study, the monitoring of reactive oxygen species and the regeneration of the ferrous  
15       ions catalyst were performed during electro-Fenton (EF) process to highlight the influence of  
16       operating parameters. The removal of metronidazole (MTZ) was implemented in an  
17       electrochemical mono-compartment batch reactor under various ranges of current densities,  
18       initial MTZ and ferrous ions concentrations, and pH values. It was found that under 0.07 mA  
19       cm<sup>-2</sup>, 0.1 mM of ferrous ions and pH=3, the efficiency of 100 mg L<sup>-1</sup> MTZ degradation and  
20       mineralization were 100 % within 20 min and 40% within 135 min of electrolysis,  
21       respectively. The highest hydrogen peroxide and hydroxyl radical concentrations, 1.4 mM and  
22       2.28 mM respectively, were obtained at 60 min electrolysis at 0.07 mA cm<sup>-2</sup>. Improvement of  
23       the biodegradability was reached from 60 min of electrolysis with a BOD<sub>5</sub>/COD ratio above  
24       0.4, which was reinforced by a respirometric study, that supports the feasibility of coupling  
25       electro-Fenton and biological treatment for the metronidazole removal.

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