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Evaluation of Different Cathodes and Reaction Parameters on the Enhancement of the Electro-Fenton Process

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ABSTRACT

In this study, the degradation of pyrimethanil, a pesticide considered as a model pollutant, by electro-Fenton process was optimized. Thus, three different carbonaceous cathode configurations were selected: taffeta carbon fiber (TCF), unidirectional carbon fiber (UCF), and graphite felt (GF). Initially, the H₂O₂ production ability of these cathodes was evaluated showing results that varied from around 27 to 12 mg/L for UCF and TCF, respectively. These results are in accordance with the cyclic voltammetry study and the hydrophilic behavior of the different cathodes. The degradation of pyrimethanil by anodic oxidation shows to be significantly less efficient than electro-Fenton treatments with any cathode. However, the best results were obtained when UCF was used, achieving the total removal after 45 min. Working with the best cathode, an estimation of the treatment cost was performed based on the electric consumption and mineralization efficiency of the system working at different intensity values. After 120 min, total degradation of the selected pollutant and total organic carbon reduction between 25-45% were achieved. Furthermore, different intermediates generated during

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