



“Gheorghe Asachi” Technical University of Iasi, Romania



TREATMENT OF PERSISTENT ORGANIC POLLUTANTS IN LED REACTOR USING FERROUS SULFATE AND IRON WASTE FOR FENTON PROCESS

Sérgio Gonzaga dos Santos Júnior¹, Rayany Magali da Rocha Santana¹,
Rayssa Kelen de Mendonça Gomes¹, Nathália Farias Santos de Moraes¹,
Pollyanna Michelle da Silva², Patrícia Maria Guedes Paiva²,
Alex Leandro Andrade de Lucena¹, Grazielle Elisandra do Nascimento¹,
Daniella Carla Napoleão^{1*}

¹Departamento de Engenharia Química, Centro de Tecnologia e Geociências,
Universidade Federal de Pernambuco, Av. dos Economistas, s/n, Recife, PE, Brasil
²Departamento de Bioquímica, Centro de Ciências Biológicas, Universidade Federal
de Pernambuco, Av. Prof. Moraes do Rego, s/n, Recife, PE, Brasil

Abstract

The treatment of persistent pollutants in water is a subject of numerous researches around the world. In the present work, the degradation of a mixture of textile dyes by the photo-Fenton process was investigated. This was conducted under LED radiation, which has a reduced cost, employing iron in salt and residue forms. For homogeneous and heterogeneous processes, in acid medium, the effects of the H₂O₂ and iron concentrations were evaluated. The tests demonstrated that the homogeneous process was better conducted using 100 mg.L⁻¹ of H₂O₂ and 2.0 mg.L⁻¹ of iron, with 98% of degradation. For the heterogeneous study, H₂O₂ and iron residue concentrations of 100 mg.L⁻¹ and 0.5 g.L⁻¹, respectively, were used, obtained 92% of degradation. The residue used was characterized by FTIR. Peaks related to the presence of Fe were observed. The kinetics of the processes were evaluated, with good adjustments to non-linear models of pseudo-first order, attaining values of linear regression greater than 0.94. Toxicity tests were carried out with seeds and bacteria. It was observed a possible formation of intermediates due to the increased toxicity for the solution treated by the heterogeneous process. Artificial neural networks were used to accurately predict the degradation of the dye mixture.

Keywords: artificial neural network, AOP, dyes, kinetic modeling, toxicity

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* Authors to whom all correspondence should be addressed: e-mail: daniella.napoleao@ufpe.br; Phone: +558121268711.