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Treatment of pharmaceutical contaminated water by electrochemical processes

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ABSTRACT

This study examines the effectiveness of two electrochemical processes—Electro-Fenton and Electrocoagulation—in the degradation of pharmaceutical contaminants Nystatin and Atenolol. Batch-mode experiments were conducted using iron and aluminium electrodes for the electrocoagulation process to assess their performance. The findings revealed that Electrocoagulation (EC) was highly efficient for Nystatin degradation, achieving a removal rate of approximately 99% under optimal conditions: neutral pH and an initial concentration of 2.69×10^{-5} mol/L with aluminium electrodes. Conversely, the EC process proved ineffective for Atenolol degradation, showing low removal efficiency with both iron and aluminium electrodes. To address this limitation, the Electro-Fenton process was implemented, resulting in a maximum degradation rate of 90% under optimal conditions: an initial pH of 3, a hydrogen peroxide (H_2O_2) concentration of 8 mM, a current intensity of 0.25 A, and an initial solution concentration of 1.87×10^{-5} mol/L (5 mg/L).

Keywords: Electrocoagulation; Electro-Fenton; Nystatin; Atenolol

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