Malathion Removal through Peroxi-Electrocoagulation and Photocatalytic Treatments. Optimization by Statistical Analysis

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The use of Malathion as an insecticide is widespread in Mexico for pests control in agriculture. Malathion biodegradation is not possible due to its high toxicity. In the present work the Malathion degradation by an Electrocoagulation process was investigated. Studies were conducted to evaluate the efficiency of pesticide removal in the presence of H₂O₂ and ZnO. A Latin-square design was used to investigate the contribution of independent variables as applied voltage, electrode material and type of treatment applied on Malathion concentration, removal time and kinetic rate constant. Results demonstrated that the pollutant degradation follows a pseudo-first order kinetic with a maximum value of 0.0171 min⁻¹. ANOVA tests showed that the presence of H₂O₂ and ZnO improve the removal of Malathion. On the other hand, all the independent variables had a significant influence on the rate of the oxidation process. During optimization process was found that the electrocoagulation with aluminum electrodes in a range of 20-30 V with the addition of H₂O₂ the kinetic removal rate increases to 0.0447 min⁻¹.

Keywords: Electrochemical process, Degradation kinetics, Malathion, Latin-square design, Statistical analysis

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