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Multiobjective Optimization of Wastwater Treatment by Electrochemical Process

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Abstract : The aim of this study is to model and optimize the performance of a new electrocoagulation (E.C) process for the treatment of wastewater as well as the energy consumption in order to extrapolate it to the industrial scale. Through judicious application of an experimental design (DOE), it has been possible to evaluate the individual effects and interactions that have a significant influence on both objective functions (maximizing efficiency and minimizing energy consumption) by using aluminum electrodes as sacrificial anode. Preliminary experiments have shown that the pH of the medium, the applied potential and the treatment time with E.C are the main parameters. A factorial design 33 has been adopted to model performance and energy consumption. Under optimal conditions, the pollution reduction efficiency is 93%, combined with a minimum energy consumption of 2.60.10-3 kWh / mg-COD. The potential or current applied and the processing time and their interaction were the most influential parameters in the mathematical models obtained. The results of the modeling were also correlated with the experimental ones. The results offer promising opportunities to develop a clean process and inexpensive technology to eliminate or reduce wastewater,

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