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Electrochemical treatment of metal working emulsions using Box-Behnken design

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ABSTRACT

In this study an experimental design was employed to investigate the effects of different operating conditions on the removal of oil by electrocoagulation with aluminum electrodes. Box-Behnken design was then used to optimize the electrocoagulation process and to evaluate the effects and interactions of variables: current density, initial pH and treatment time on the turbidity removal. A sample of metal working emulsion (5% in wt.) with a high turbidity was used in the experimental study. The test results indicated that electrocoagulation was very efficient and able to achieve 99% turbidity removal. Analysis of variance (ANOVA) showed a high coefficient of determination (R^2) value of 0.993, thus ensuring a satisfactory adjustment of the second-order regression model with the experimental data.

Keywords: Metal working emulsion; Turbidity; Electrocoagulation; Box-Behnken design; Optimization

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