Optimization of lead removal by electrocoagulation from aqueous solution using response surface methodology

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ABSTRACT

Lead removal from aqueous media continues to be an important environmental issue. In this study, a batch system for lead removal from polluted water via electrocoagulation (EC) using an aluminum electrode was evaluated. Box–Behnken design for response surface methodology was applied for modeling and optimizing the effects of main operational variables such as current density, initial pH, and initial lead concentration. According to the ANOVA results, current density and lead concentration have a linear effect, while the pH has a quadratic effect on lead removal efficiency. The high R^2 value of 94.12% obtained showed that the experimental data and model predictions agreed well. A removal efficiency of 94% was predicted by the model using the following optimal parameter values: current density of 33 A/m^2, pH of 7.25, and lead concentration of 5 mg/L. The results showed that EC is an efficient method for lead removal from aqueous solution.

Keyword: Electrocoagulation; Lead removal; Response surface methodology; Aluminum electrode

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