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PHOSPHATE REMOVAL BY ELECTROCOAGULATION PROCESS: OPTIMIZATION BY RESPONSE SURFACE METHODOLOGY METHOD

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Abstract

In this research, response surface methodology (RSM) was applied to model the effect of main operational variables including initial pH, initial phosphate concentration, current density and reaction time on phosphate removal by electrocoagulation. It was found that the decrease of initial pH and initial phosphate concentration, and the increase of current density and reaction time are beneficial for improving phosphate removal efficiency. According to the ANOVA (analysis of variance) results, the model presented high R^2 value of 96.9% for phosphate removal efficiency which indicates that the accuracy of the polynomial model is acceptable. According to Minitab output, the initial pH of 3, initial phosphate concentration of 400mg/l, current density of 0.0166A/cm^2 and reaction time of 11.72 min obtained as optimum experimental parameter. Phosphate removal efficiency of 85.8% was observed in the experiment at optimum conditions, which was close to the model predicted result of 90%. It can be concluded that RSM is a powerful tool for evaluation and optimization of electrocoagulation process for phosphate removal.

Key words: electrocoagulation, main operational parameters, phosphate removal efficiency, response surface methodology

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