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Employing electro coagulation for the removal of Acid Red 182 in aqueous environment using Box-Behenken design method

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ABSTRACT

No study has been performed on the treatment of Acid red 182 (AR182) in aqueous environment up to this time. Therefore, in this research, the removal of AR182, Azo dye, was investigated by electro coagulation (EC) process in an electrochemical batch reactor. A Box–Behnken design (BBD) was employed for optimization of the influencing factors such as current density, time of electrolysis and initial pH in the dye removal efficiency. The graphical counter plots and response surfaces were used to determine the optimum conditions. The Analysis of variance (ANOVA) was presented a high determination coefficient value (R^2 = 0.9817, R^2_{adj} = 0.9487 and R^2_{pred} = 0.7070) and satisfactory prediction second-order regression model. The optimum amounts of current density, time of electrolysis and initial pH of the dye solution were found to be at 16 m A/cm^2, 14.2 min and 8, respectively. The production rate of coagulant was improved with an increase in the current density. The dye removal efficiency was very low either at acidic or very alkaline pH. At optimum conditions, the removal efficiency for Acid red 182 and chemical oxygen demand (COD) were 98.7 and 88.3%, respectively.

Keywords: Electro coagulation (EC); Acid red 182 (AR 182); Analysis of variance (ANOVA); Current density; Box–Behnken design (BBD)

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