Optimisation of reactive dye removal by sequential electrocoagulation–flocculation method: comparing ANN and RSM prediction

ABSTRACT

The removal of Reactive Black 5 dye in an aqueous solution by electrocoagulation (EC) as well as addition of flocculant was investigated. The effect of operational parameters, i.e. current density, treatment time, solution conductivity and polymer dosage, was investigated. Two models, namely the artificial neural network (ANN) and the response surface method (RSM), were used to model the effect of independent variables on percentage of dye removal. The findings of this work showed that current density, treatment time and dosage of polymer had the most significant effect on percentage of dye removal ($p<0.001$). In addition, interaction between time and current density, time and dosage of polymer, current density and dosage of polymer also significantly affected the percentage of dye removal ($p=0.034$, 0.003 and 0.024, respectively). It was shown that both the ANN and RSM models were able to predict well the experimental results ($R2>0.8$).

Keyword: Artificial neural network (ANN); Electrocoagulation (EC); Energy consumption; Flocculation; Optimisation; Response surface method (RSM)