

Modelling and optimization of dye removal process using hybrid response surface methodology and genetic algorithm approach

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In the present study, An efficient, economic, and eco-friendly green carbon adsorbent derived from the plant bio waste, Acacia Arabica Fruit, was used to treat aqueous solutions containing a basic dye, Methylene Blue (MB). The effect of various process parameters such as temperature, pH of solution, initial dye concentration and adsorbent dosage on dye removal was studied by using experimental runs designed by Central Composite Design. The optimization studies were carried out by changing the temperature in the range of 25°C - 45°C, pH between (6-11), initial dye concentration between (25-150 mg/l), and adsorbent dosage between (0.05-0.25g). Regression and ANOVA data was analysed to know the interaction effect of dye on the adsorbent. A hybrid RSM-GA based technique was successfully developed to model, simulate, and optimize the biosorption process. The performance of the RSM-GA method was found to be very impressive. Results proved that the prepared green carbon adsorbent (AAS) was highly efficient and economical for Methylene Blue removal from aqueous solutions.

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