Potential of Red Algae *Gracilaria* for Biosorption of Cadmium: Isotherm, Kinetic and Response Surface Methodology Study

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Abstract

The objective of the present work was to investigate the removal of cadmium by red algae *Gracilaria* as biomass. The effect of independent variables on biosorption of cadmium ion by the red algae *Gracilaria* as biomass was evaluated. The experimental data were analyzed via two custom isotherm models, i.e., Langmuir and Freundlich. The experimental design was developed for evaluating the interactions of pH, contact time, temperature, biomass dosage and initial metal concentration. The Box-Behnken model in response surface modeling was used for the optimization of the experimental data in Minitab 18 software. The five parameters were fitted into second order polynomial equation and a mathematical function was developed. Statistical significance of coefficients in the second order polynomial equation was evaluated by t-test and p-value. The optimum conditions were determined at pH of 8, initial cadmium concentration of 50 mg/L, temperature of 30 ℃, the biomass dosage of 5 mg, and of contact time of 40 minutes. In these conditions, the calculated value (68.878 mg/g) was matched very well to the experimental value (68.256 mg/g). The modified equation can be used for the prediction of biosorption in any conditions.

Keywords: *Biosorption, Red algae Gracilaria, Response surface methodology, Isotherm model.*