



## Using *Eichhornia crassipes* to adsorb Eriochrome Black T: equilibrium and thermodynamic

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The biosorption of Eriochrome Black T from aqueous solutions was investigated. *Eichhornia crassipes*, commonly known as water hyacinth, as low-cost and natural was investigated. The study was carried out under various parameters, such as average biosorbent particle size, contact time, pH, biosorbent dosage, initial dye concentration and temperature. The experimental results show that the percentage of biosorption increases with an increase in the biosorbent dosage and the decrease of particle size. The maximum biosorption occurred at the pH value of 10. The equilibrium uptake was increased with an increase in the initial dye concentration in solution. The experimental isotherms data were analyzed using Langmuir, Freundlich and Tempkin isotherm equations. The best fit was obtained by the Freundlich model with high correlation coefficients ( $r^2 > 0.99$ ). The Langmuir model yielded a moderate fit to experimental data ( $r^2$  around 0.88) with a maximum monolayer adsorption capacity of 12.59 mg/g. The adsorption of the dyes was exothermic in nature ( $\Delta H^\circ = - 8.82$  kJ/mol). The reaction was accompanied by an increase in entropy ( $\Delta S^\circ = 249$  J/mol). The Gibbs energy ( $\Delta G^\circ$ ) decreased from -0.51 to -10.33 kJ/mol when the temperature was increased from 20 to 60 °C.

**Keywords:** *Eichhornia crassipes*; Adsorb; Equilibrium; Thermodynamics