



Kinetic & Thermodynamic Studies of Adsorption of Congo Red Dye by using Polyalthialongifolia Seeds as a Natural Adsorbent

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Abstract:The mechanism of adsorption depends on physical and chemical characteristics of the adsorbent as well as the mass transfer process. In order to determine the mechanism and rate constants of dye adsorbed on the biosorbents adsorption kinetic models are employed. The rate constant k , for a reaction is simply a numerical measure of how fast a reaction can occur if reactants are brought together at unit concentration. Adsorption Study of removal of Congo red from aqueous solution at 500 nm wavelength has been investigated through a batch study. Solutions of Congo red having concentrations 10, 20, 30 & 40 ppm were used. Maximum removal of dye was found to be 91%. Kinetic and Thermodynamic study of Congo red dye was carried out for 50 ml volume of dye solution for time period 120 min with amount of adsorbent 200 mg/50 ml. The adsorption followed Lagergren pseudo-first order kinetics. The values of free energy change (ΔG°), enthalpy change (ΔH°), and entropy change (ΔS°) indicated the process to be spontaneous. The diffusion studies indicated that adsorption initially takes place by external mass transfer and later by intraparticle diffusion. Result suggests that it is a non conventional and efficient biosorbent for the removal of Congo red from aqueous solution and can be used for the development of clean and cheap technology for effluent treatment.

Keywords: Congo red, PolyalthiaLongifolia, Lagergren 1st order, Pseudo 2nd order, Kinetic and thermodynamic, Clean & Cheap, Biosorbent.