

Equilibrium, Kinetics and Thermodynamic Parameters Studies on Adsorption of a mixed solution of two dyes(Biebrich Scarlet, Thiazole Yellow G) by Granular Activated Carbon

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Adsorption equilibrium was studied on a mixture solution of a 1:1 ratio of a Biebrich Scarlet dye and Thiazole Yellow G dye using granular activated carbon as an adsorbent. In this study, the amount of activated carbon, the initial concentration and temperature according to the adsorption time were taken as adsorption variables in the adsorption equilibrium experiment on the two dyes in a mixed state. In each adsorption rate experiment, the pseudo first order models and the pseudo second order models were used to evaluate the kinetic model and the pseudo second order models were better matched. For the isothermal adsorption experiment, Langmuir and Freundlich isotherms were applied, and Freundlich isotherms were well applied to the adsorption equilibrium relationship. The thermodynamic analysis showed that the Gibbs free energy change ( $\Delta G$ ) was BS +4.61 to +3.13 kJ/mol and TYG +4.61 to +2.50 kJ/mol, resulting in decreased involatility as both mixed dyes rose to temperature. The value of enthalpy change ( $\Delta H$ ) was -58.04 J/mol and TYG -83.32 J/mol, indicating that the adsorption process was involuntary and exothermic in the mixed state of the two dyes.