

Study of equilibrium, kinetic and thermodynamic parameters about mixed solution of Auramine O and Reactive Black 5 using activated carbon

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Using activated carbon as an adsorbent, the adsorption equilibrium of a mixed solution of RB5 dye and AO dye in a 1:1 ratio was studied. The adsorption equilibrium relationship was evaluated for the suitability of the Freundlich and Langmuir adsorption isothermal equations in the temperature range of 298 K to 318 K. The adsorption equilibrium was better fitted to the Freundlich adsorption isotherm equation. The pseudo first order and pseudo second order models were used to evaluate the kinetic data and the pseudo second order kinetic model was the best with good correlation. The properties of the adsorption process were evaluated using thermodynamic parameters such as activation energy, standard enthalpy, standard entropy, and standard free energy. The standard free energy change of the AO dye was +27.21~-7.08 kJ/mol, and the standard free energy change of the RB5 dye was -0.6496 ~ +0.4581 kJ/mol, and the Gibbs free energy change decreases as the temperature increased. The enthalpy change of the adsorption reaction of AO by activated carbon was 92.44kJ/mol and RB5 was +16.857 kJ/mol, indicated that the adsorption of the mixed solution on activated carbon was an endothermic process.