Study of Equilibrium, Kinetic and Thermodynamic Parameters about Reactive Black 5 Dye Adsorbed onto Activated Carbon

김영희, 김지현[1], 이종집[1,†]

공주대학교; [1]공주대학교 화학공학부

(jjlee@kongju.ac.kr[†])

The adsorption properties of Reactive Black 5 dye were investigated through a batch experiment using activated carbon. The amount of adsorbent, initial concentration, contact time, and adsorption temperature were investigated as adsorption parameters. 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 was 6.009~8.265 kJ/mol, and the standard free energy change decreased as the temperature increased. The positive value for ΔH°, 42.13 kJ/mol, indicates that the adsorption of Reactive Black 5 dye on activated carbon is an endothermic process.