

Adsorption Study of Malachite Green Using Activated Carbon : Equilibrium, Kinetics and Thermodynamics

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Abstract

In this study, adsorption equilibrium process was carried out using activated carbon to remove malachite green from aqueous solution. Adsorption suitability was determined by using Langmuir and Freundlich isothermal model. The adsorption equilibrium in 298, 308 and 318 K confirmed that Freundlich isothermal model ( $r=0.9654\sim0.9983$ ) was more suitable the Langmuir isothermal model ( $r=0.9448\sim0.9995$ ). As a result of the dynamic experiment, this adsorption process was more suitable with the pseudo second order model. The activation energy values indicated that this process was a physical process. The negative free energy change ( $\Delta G=-7.77\sim-13.24$  kJ/mol) and the positive enthalpy change ( $\Delta H=73.538$  kJ/mol) showed that this adsorption process is spontaneous and occurs by endothermic reaction in the temperature range of 298~318 K.

Key words : malachite green, activated carbon, adsorption, kinetic, Thermodynamic