A Study on the Equilibrium, Kinetics and Thermodynamic Variables of Tartrazine Adsorbed by Coconut Shell based Active Carbon

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Adsorption experiments of tartrazine by coconut-based activated carbon were carried out as function of the adsorbent amount, pH, initial concentration, contact time and temperature. Adsorption equilibrium data was best fitted Freundlich model with highest correlation coefficients(R^2=0.995~0.997). The adsorption of tartrazine by activated carbon from the evaluated Freundlich constant(1/n=0.254~0.269) was confirmed to be a suitable removal method. Temkin's adsorprion energy were 4.52, 5.14 and 6.22 kJ/mol at 298~318 K, repectively. It was shown that the adsorption of tatrazine by activated carbon was physical adsorption(B_T＜20 kJ/mol). The adsorption of tartrazine by activated carbon from the evaluated Freundlich constant (1/n=0.25~0.27) was confirmed to could be a suitable removal method. The experimental kinetic data were followed the pseudo-second-order equation as low error percent(6.26~6.52%) and high correlation coefficient(R^2=0.9988~0.9998). This adsorption reaction was calculated with an enthalpy of 66.99 kJ/mol and a Gibbs free energy of −1.01~−2.78 kJ/mol in the temperature range of 298~318 K. Therefore, this adsorption process was a spontaneous endothermic reaction.