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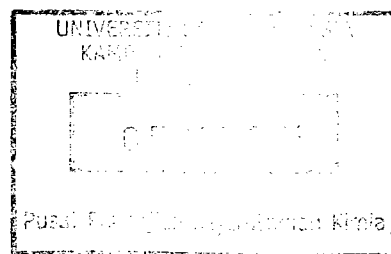
**ADSORPTION OF 4-NITROPHENOL AND 4-CHLOROPHENOL
ONTO BIOMASS-BASED ACTIVATED CARBON:
KINETIC AND EQUILIBRIUM STUDIES**

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ABSTRACT

The adsorption studies of 4-nitrophenol and 4-chlorophenol from aqueous solution on activated carbon previously prepared in laboratory from rattan saw dust by physiochemical process at 850°C have been studied. Various experimental parameters like solution pH (pH 1-pH 13), contact time, initial concentration (25-200 mg L⁻¹) and temperature (28°C, 38°C and 48°C) on the adsorption of 4-nitrophenol and 4-chlorophenol were evaluated. Langmuir, Freundlich, Redlich-Peterson, Temkin and Dubinin-Radushkevich isotherm models were used to describe the experimental isotherms and isotherms constants. Equilibrium data for 4-nitrophenol adsorption fitted very well with the Freundlich and Redlich-Peterson isotherms model while 4-chlorophenol adsorption fitted well with Langmuir isotherm model. The rates of adsorption were found to obey the rules to pseudo-second-order kinetics with good correlation for both 4-nitrophenol and 4-chlorophenol adsorption process. The thermodynamics parameters such as Gibbs free energy changes (ΔG°), standard enthalpy change (ΔH°) and standard entropy change (ΔS°) had been determined for 4-nitrophenol. The negative value of Gibbs free energy changes (ΔG°) (-9.54 kJ mol⁻¹) at 28°C indicates the possible and spontaneous adsorption of 4-nitrophenol on activated carbon. The standard entropy change (ΔS°) and standard enthalpy change (ΔH°) were found as 2.891 J mol⁻¹ K⁻¹ and -0.834 kJ mol⁻¹, respectively. The positive value of standard entropy change (ΔS°) showed the increased randomness at the solid/solution interface during the 4-nitrophenol adsorption and negative value of standard enthalpy change (ΔH°) show that adsorption of 4-nitrophenol on activated carbon is an exothermic in nature.

Keywords: Activated carbon; 4-nitrophenol; 4-chlorophenol; Adsorption isotherms; Kinetics