

CEST02_112

EQUILIBRIUM, KINETICS, AND THERMODYNAMICS OF ANIONIC DYE CONGO RED ABSORPTION BY PINE TREE LEAVES

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ABSTRACT

The implementation of low cost adsorbents which is Pine Leaves obtained from an agricultural by product was used to remove Congo Red Dye from wastewater. Congo red dye comes from many industry processes and the common industry produces the Congo red dye is textile industries during the processes of rinsing and dyeing. Congo red dye affects negatively on the environment because it is a carcinogenic. The effect of various operating parameters has been studied like pH, dye initial concentration, adsorbent dose, temperature, ionic strength, speed, and contact time. The kinetic experimental data were fitted to pseudo second order model and the maximum adsorption capacity of CR was found to be 25.84 mg/g (77.53%) at 303 K and pH 3.03. Thermodynamic parameters such as free energy, enthalpy and entropy change were calculated at three different temperatures 303, 323 and 333 K. The type of reaction is found endothermic reaction due to positive enthalpy change with decrease in Gibbs free energy with increase of temperature. The Congo red adsorption data were fitted to various isotherm Models. They were analysed by Freundlich and Langmuir Isotherms. Freundlich isotherm was fitted with high correlation coefficients. This adsorbent was found to be both effective and economically viable.

Keywords. Congo red – Pine leaves powder – Kinetic model – Isotherm