Thermodynamic and kinetic behaviors for 2,4,6-trinitrotoluene(TNT) adsorption on powdered activated carbons

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The removal of trinitrotoluene (TNT) from wastewater have steadily become more stringent and required a fast, inexpensive, and efficient treatment. This study focuses on the adsorption equilibrium and kinetics of TNT on powered activated carbons (PAC). Three types of PACs (i.e., wood based, coal based, and coconut-shell based) were studied as functions of temperature and pH. Thermodynamic properties including Gibbs free energy, enthalpy, and entropy, were evaluated by applying the Van't Hoff equation. In addition, the adsorption energy distribution functions which describe heterogeneous characteristics of porous solid sorbents were calculated by using the generalized nonlinear regularization method. Adsorption kinetic were examined in batch adsorber under important conditions such as PAC types, temperature, pH, and concentration. We found that the fast and efficient removal of TNT dissolved in water can be successfully achieved by the PAC adsorption.