



Adsorptive removal of hazardous organic water pollutants by humic acid–carbon hybrid materials: kinetics and isotherm study

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ABSTRACT

The adsorption characteristics of phenol, 2,4,6-trichlorophenol (2,4,6-TCP) and atrazine onto humic acid–carbon hybrid materials were investigated under different experimental conditions (ionic strength, pH, adsorbent dose, agitation time and initial concentration). It was found that ionic strength has insignificant effect on the adsorption process which peaked at acidic pH. The kinetic data were fitted to Elovich equation and intra-particle diffusion models. Kinetics results showed that the adsorption can be represented by two steps: a rapid step dominating the first 5 min followed by a slower uptake to the final steady-state value. On the other hand, equilibrium data were examined by Freundlich and Langmuir equations. Langmuir was the best model fit for the adsorption of 2,4,6-TCP onto the studied materials, phenol adsorption on carbon-coated insolubilized humic acid and atrazine adsorption onto insolubilized humic acid and carbon-coated insolubilized humic acid. The study proved that humic acid–carbon hybrid material has higher adsorption capacity than the pure materials.

Keywords: Phenol; 2,4,6-Trichlorophenol; Atrazine; Porous carbon; Insolubilized humic acid; Carbon-coated insolubilized humic acid; Insolubilized humic acid mounted on porous carbon

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