Adsorptive removal of vinyl polymer/ZnO nanocomposite from aqueous solution by activated sludge biomass

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\textbf{ABSTRACT}

In this study, the removal potential of vinyl polymer/ZnO nanocomposite (PDM/ZnO) by activated sludge (AS) biomass was investigated. PDM/ZnO was effectively removed by AS adsorption (90.3% of total PDM/ZnO removed). The effects of contact time, temperature, pH of the solution, PDM/ZnO production method, initial adsorbate concentration, and properties of the adsorbent were studied. The experimental results are fitted with the Langmuir and Freundlich equations. The adsorption kinetics closely followed the pseudo-second-order model. Thermodynamic parameters ($\Delta H^\circ$, $\Delta S^\circ$, $\Delta G^\circ$) indicate that the adsorption of PDM/ZnO onto AS was feasible, spontaneous, and endothermic. The effects of PDM/ZnO production method and pH value both indicate that electrostatic force may be the main mechanism in PDM/ZnO adsorption process. The decrease in the adsorption capacity of inactivated sludge suggests that the increase of adsorbent surface area also plays a significant role in the removal process.

\textit{Keywords:} Adsorption; Vinyl polymer/ZnO nanocomposite; Activated sludge