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# Removal and Recovery of Phosphorus from Wastewater Using Graphene as an Adsorbent

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**Abstract:**The aim of this study is to investigate the possibility of graphene adsorbent as an alternative adsorbent for phosphorus removal from wastewater. Adsorption properties of graphene were investigated, including initial concentration, adsorbent dose, pH effect and contact time. The adsorption amount of phosphorus decreased with increasing pH. The experimental data were evaluated by Langmuir, Freundlich and Temkin models to describe the equilibrium isotherms. Equilibrium data fitted well to the Langmuir model. The kinetic parameters achieved at different concentrations were analyzed using a pseudo-first order, pseudo-second order kinetic equation and intra-particle diffusion model. The experimental data fitted very well the kinetic model. Thermodynamic parameters like free energy change, enthalpy change and entropy change showed that the adsorption of phosphorus on graphene was endothermic and spontaneous. The study showed that graphene could be used as an efficient adsorbent material for the adsorption of phosphorus from wastewater.
**Keywords:**Graphene,Wastewater, Adsorption, Phosphorus removal, Equilibrium Isotherm.

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