



## Adsorption of the herbicide 2,4-dichlorophenoxyacetic acid by Fe-crosslinked chitosan complex in batch mode

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### ABSTRACT

It is essential to remove herbicide from solution. In this research, composite of Fe-crosslinked chitosan complex (Ch-Fe) was synthesized and characterized by scanning electron microscopy, X-ray fluorescence analysis and was used as adsorbent for removal of 2,4-dichlorophenoxyacetic acid (2,4-D) from solution. Batch experiments were performed to evaluate the effects of several experimental parameters, such as solid–liquid ratio, pH value, coexisting ions, contact time and concentration of 2,4-D. There was slight change of adsorption quantity at various solution pH from 4.0 to 11.0. The kinetic process was better described by the pseudo-second-order kinetic model. The adsorption equilibrium data were better fitted by Langmuir model and Koble–Corrigan model with higher determined coefficients ( $R^2$ ) and low value of error and this suggested that adsorption be monolayer adsorption and the active sites be all energetically equivalent. The adsorption quantity was  $473 \text{ mg g}^{-1}$  from experiments at 293 K. Solution of  $0.1 \text{ mol L}^{-1}$  hydrochloric acid was the best to regenerate spent Ch-Fe and only 9% of adsorption capacity lost after three cycles. The mechanism between 2,4-D and Ch-Fe was discussed. High adsorption capacity and good cycling performance showed the potential application in removal of herbicide from aqueous solutions.

*Keywords:* Fe-crosslinked chitosan complex; 2,4-Dichlorophenoxyacetic acid; Adsorption; Regeneration

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