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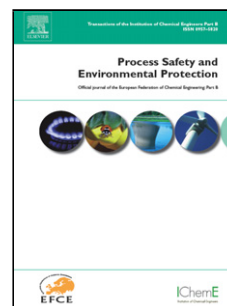
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Adsorption Performance of Packed Bed Column for the Removal of Perchlorate Using Modified Activated Carbon

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Highlights

- Perchlorate removal efficiency evaluated for a packed bed column using granular activated carbon modified with HCl.
- Adsorption behavior studied using Thomas, Yoon-Nelson and Adam-Bohart models.
- First order kinetics followed, tends towards the second order as the initial concentration and flow rate increased. It followed first order kinetics at bed heights studied.
- The chemical regeneration using HCl most effective than thermal method with good efficiency, yield and processability.

Abstract

The adsorption performance of packed bed column using coconut shell based activated carbon for the removal of perchlorate from water was investigated. The influence of parameters like inlet ion concentration, flow rate and bed height on the breakthrough curves and adsorption performance were studied. The results indicated that the adsorption efficiency increased with increase in the initial concentration and the bed height, decreased with increase in the flow rate which in turn resulted in a shorter saturation time. It also revealed that the throughput volume of the aqueous solution increased with increase in bed height owing to the availability of more adsorption sites. The adsorption kinetics was analysed using three kinetic models viz. Adam-Bohart, Thomas and Yoon-Nelson models. The maximum adsorption capacity increased with increase in flow rate and initial ion concentration but decreased with increase in bed height. The perchlorate uptake data was also analyzed for first and second order kinetics. The regeneration of spent activated carbon was systematically investigated by thermal and chemical regeneration methods under different operating conditions.

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