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2ⁿᵈ World Conference on

Industrial Chemistry and Water Treatment

May 22-23, 2017   Las Vegas, USA

Continuous fixed-bed column study for the removal of nitrate from water using chitosan/alumina composite

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A continuous adsorption study in a fixed-bed column was conducted for the removal of nitrate from water by using chitosan/alumina composite as an adsorbent. The effects of influent nitrate concentration, flow rate, and bed depth on the adsorption characteristics of adsorbent and column performances were evaluated at room temperature and original pH of the solution. The results revealed that the breakthrough curves are significantly affected by the variation of flow rate, initial concentration and bed depth. The nitrate removal efficiency increased with increase in bed height and decreased with increase in influent nitrate concentration and flow rate. The breakthrough time increased with increase in bed height. Thomas and Yoon-Nelson kinetic models were applied for the analysis of adsorption kinetics. The model data confirmed that both models are fitted well with the experimental results of continues fixed-bed column adsorption study. Bed-depth service time (BDST) model was used to study the effect of bed depth on breakthrough curves and to predict the time required for breakthrough. The model data revealed the applicability of the BDST model for the present system. The results show that chitosan/alumina composite can be used in fixed bed column for the removal of nitrate from water.

Biography

Wondalem Misganaw Golie has completed his BTech in 2007 in Chemical Engineering and MTech in 2010. Currently, he is a PhD Research Scholar in the Department of Chemical Engineering at Indian Institute of Technology Delhi, India.

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Ind Chem
ISSN: 2469-9764, ICO an open access journa

Industrial Chemistry 2017
May 22-23, 2017

Volume 3, Issue 2 (Suppl)

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