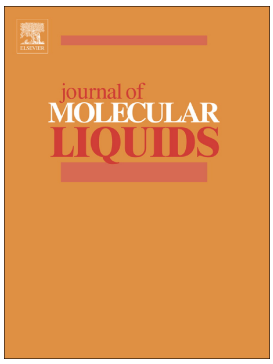

Optimization of humic acid removal by adsorption onto bentonite and montmorillonite nanoparticles

Elham Derakhshani, Ali Naghizadeh

PII: S0167-7322(18)30188-0
DOI: doi:10.1016/j.molliq.2018.03.014
Reference: MOLLIQ 8788

To appear in: *Journal of Molecular Liquids*

Received date: 11 January 2018
Revised date: 1 March 2018
Accepted date: 3 March 2018

Please cite this article as: Elham Derakhshani, Ali Naghizadeh , Optimization of humic acid removal by adsorption onto bentonite and montmorillonite nanoparticles. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2018.03.014

Optimization of humic acid removal by adsorption onto Bentonite and Montmorillonite nanoparticles

Elham Derakhshani[1], Ali Naghizadeh[2*]

[1] Department of Environmental Health Engineering, Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran

[2]Medical Toxicology and Drug Abuse Research Center (MTDRC), Birjand University of Medical Sciences (BUMS), Birjand, Iran

* Corresponding author; aliinaghizadeh@gmail.com

Tel; +985632381665

Abstract:

Nanoclays are low cost and non-toxic materials with high adsorption capacity for the removal of various contaminants from water. In this study the efficiency of two nanoclays was examined for the adsorption of humic acid under batch conditions. The effect of various parameters such as pH_{zpc}, pH, contact time, humic acid initial concentration and adsorbent dosage was studied. The adsorption data regarding compliance with pseudo first and pseudo second order kinetics was studied. The thermodynamically aspects of adsorption was also investigated. Characterization of the adsorbents was determined by the analytical methods including Field Emission-Scanning Electron Microscopy (FE-SEM), Fourier transform infrared spectroscopy (FTIR) and X-ray Diffraction (XRD).

The results of this study showed that the nanoparticles examined were proven most effective in removing humic acid from aqueous solutions at pH=3. Adsorption capacity increased by increasing the humic acid concentrations so adsorption capacity of bentonite and montmorillonite nanoparticles at humic acid concentration of 40 mg/L, reached to 58.21 and 48.20 mg/g, respectively. The results showed that adsorption process follows the Freundlich isotherm as well as pseudo-second order kinetics. The results of temperature and thermodynamic process showed that $\Delta S°$ values were positive for both absorbents and $\Delta H°$ values were negative, but the values of $\Delta G°$ became more negative with temperature decrease. The results lead to the conclusion that nanoclays are appropriate adsorbents for removing humic acid from aqueous solutions.