*Desalination and Water Treatment*
www.deswater.com

doi:10.5004/dwt.2017.20873

83 (2017) 294–305
July

# Calcium alginate-organobentonite-activated carbon composite beads as a highly effective adsorbent for bisphenol A and 2,4,5-trichlorophenol: kinetics and equilibrium studies

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Received 18 April 2017; Accepted 27 April 2017

**ABSTRACT**

Today toxic phenolic compounds are a major source of pollution and are mainly the result of various industrial wastes such as plastics, polymers, insecticides, etc. In this context, the originality of our study is a first as we used a new composite material assembled by mixing activated carbon (*AC*), organo activated bentonite (*OAB*), and alginate (*A*).The prepared adsorbent materials were characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), and point of zero charge ($pH_{PZC}$). The influence of various factors such as contact time, pH, adsorbate concentration, and temperature on the adsorption of bisphenol A (BPA) and 2,4,5-trichlorophenol (TCP) has been investigated. The equilibrium data were fitted well by Freundlich isothermal model and the maximum adsorptions of BPA and TCP onto alginate/organo activated bentonite/activated carbon beads (*A-OAB-AC*), were 368.2 and 385.1 $mg \cdot g^{-1}$, respectively. The adsorption of BPA and TCP was observed to follow pseudo-second order mechanism as well as the thermodynamic parameters confirm also endothermic spontaneous and physiosorption processes. In addition, the resulting adsorbent reusability was demonstrated by at least six cycles, indicating that the *A-OAB-AC* can be used as a promising adsorbent for removal of toxic pollutants from aqueous solutions.

*Keywords:* Removal; Alginate; Organobentonite; Activated carbon; Composite; Toxic pollutants

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*Presented at the First International Symposium on Materials, Electrochemistry and Environment (CIMEE 2016), 22–24 September 2016, Tripoli, Lebanon*