

Accepted Manuscript

Title: Equilibrium and Kinetic Models on the Adsorption of Reactive Black 5 from Aqueous Solution using Eichhornia Crassipes/Chitosan Composite

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PII: S0144-8617(15)00936-4
DOI: <http://dx.doi.org/doi:10.1016/j.carbpol.2015.09.071>
Reference: CARP 10373

To appear in:

Received date: 17-6-2015
Revised date: 6-9-2015
Accepted date: 22-9-2015

Please cite this article as: El-Zawahry, M. M., Abdelghaffar, F., Abdelghaffar, R. A., and Hassabo, A. G., Equilibrium and Kinetic Models on the Adsorption of Reactive Black 5 from Aqueous Solution using Eichhornia Crassipes/Chitosan Composite, *Carbohydrate Polymers* (2015), <http://dx.doi.org/10.1016/j.carbpol.2015.09.071>

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1 Highlights

2 New natural biopolymer composite was prepared using Eichhornia Crassipes and chitosan
3 Surface characterization of Eichhornia crassipes/chitosan composite was examined
4 Sorption experiments were carried out as a function of pH, dye conc. and time
5 EC/Cs have high ability to remove Reactive Black 5 from its dyebath effluent
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8 Equilibrium and Kinetic Models on the Adsorption of Reactive Black 5 from Aqueous Solution
9 using Eichhornia Crassipes/Chitosan Composite

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18

19 Abstract

20 New natural biopolymer composite was prepared using extracted cellulose from an
21 environmentally problematic water hyacinth Eichhornia Crassipes (EC). The extracted cellulose
22 was functionalized by chitosan and TiO₂ Nanoparticles to form EC/Chitosan (EC/Cs) composite
23 network. Surface characterization of EC/Cs natural biopolymer composite was examined by
24 spectrum analysis FT-IR, specific surface area, micropore volume, pore width and SEM.
25 Furthermore, the sorption experiments were carried out as a function of pH, various initial dye
26 concentration and contact time. Experiment results showed that the EC/Cs composite have high
27 ability to remove C.I. Reactive Black 5 from its dye-bath effluent.

28 The equilibrium sorption evaluation of RB5 conformed and fitted well to Langmuir
29 adsorption isotherm models and the maximum sorption capacity was 0.606 mg/g. The kinetic
30 adsorption models followed pseudo- second order model and the dye intra-particle diffusion may
31 suggesting a chemical reaction mechanism. Further, it was obvious from the investigation that
32 this composite could be applied as a promising low cost adsorbent for anionic dye removal from
33 aqueous solutions.
34

35 Keywords

36 Eichhornia Crassipes, chitosan, biopolymer composite, Reactive Black 5, adsorption isotherm,
37 kinetics
38

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