

## Accepted Manuscript

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PII: S0141-8130(17)34790-6  
DOI: doi:[10.1016/j.ijbiomac.2018.03.003](https://doi.org/10.1016/j.ijbiomac.2018.03.003)  
Reference: BIOMAC 9225

To appear in:

Received date: 3 December 2017  
Revised date: 27 February 2018  
Accepted date: 1 March 2018

Please cite this article as: Masoud Erfani, Vahid Javanbakht , Methylene Blue removal from aqueous solution by a biocomposite synthesized from sodium alginate and wastes of oil extraction from almond peanut. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Biomac(2017), doi:[10.1016/j.ijbiomac.2018.03.003](https://doi.org/10.1016/j.ijbiomac.2018.03.003)

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**Methylene Blue removal from aqueous solution by a biocomposite synthesized from sodium alginate and wastes of oil extraction from almond peanut**

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**Abstract**

In this study, the removal of Methylene Blue dye was investigated by biocomposite beads synthesized from sodium alginate and wastes of oil extraction from almond peanut. Prepared biocomposite was characterized using X-ray diffraction, Infrared spectroscopy, scanning electron microscopy, Energy Dispersive X-Ray analysis. The adsorption capacities of Methylene Blue were investigated with respect to the effect of the adsorbent amount, pH value, and initial dye concentration. The kinetic adsorption data were analyzed by the pseudo-first-order, pseudo-second-order, Elovich, and intra-particle diffusion kinetic models. The equilibrium adsorption data were analyzed by Langmuir, Freundlich, Temkin, and Dubinin–Radushkevich isotherm models. The pseudo-second-order kinetic and Freundlich isotherm equations were found to describe the adsorption mechanism. The thermodynamic studies showed that the adsorption process is a spontaneous and exothermic process with increased entropy. The removal percentage and maximum adsorption capacity of Methylene Blue by biocomposite were equal to 90% and 22.8 mg/g, respectively. The high registered

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