

Accepted Manuscript

Optimization of simultaneous removal of binary mixture of indigo carmine and methyl orange dyes by cobalt hydroxide nano-particles through Taguchi method

Javad Zolgharnein, Mahdiye Rastgordani



PII: S0167-7322(18)30190-9
DOI: doi:[10.1016/j.molliq.2018.04.038](https://doi.org/10.1016/j.molliq.2018.04.038)
Reference: MOLLIQ 8941
To appear in: *Journal of Molecular Liquids*
Received date: 11 January 2018
Revised date: 29 March 2018
Accepted date: 8 April 2018

Please cite this article as: Javad Zolgharnein, Mahdiye Rastgordani , Optimization of simultaneous removal of binary mixture of indigo carmine and methyl orange dyes by cobalt hydroxide nano-particles through Taguchi method. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.04.038](https://doi.org/10.1016/j.molliq.2018.04.038)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Optimization of Simultaneous Removal of Binary Mixture of Indigo Carmine and Methyl Orange Dyes by Cobalt Hydroxide Nano-particles Through Taguchi Method

Javad Zolgharnein ^{a,*}, Mahdiye Rastgordani ^a

^a Department of Chemistry, Faculty of Science, Arak University, Arak, 38156–876, Iran.

Abstract: The simultaneous removal of Indigo Carmine(IC) and Methyl Orange(MO) in binary mixtures by cobalt hydroxide nanoparticles in batch system is investigated. Taguchi optimization approach (an L₁₆ orthogonal array design) was employed for estimating the important and interactive impressions of some considered variables (such as, initial concentrations of Indigo Carmine and Methyl Orange, amount of sorbent, initial pH value, and contact time) on the adsorption process. Under the optimized conditions, the maximum removal percent (%R) was equal with 75% and 87% and also the uptake capacity was obtained to be 62.5 and 81.3 mg/g for Indigo Carmine and Methyl Orange dyes, respectively. Isotherm modeling and kinetic studies indicated that modified Langmuir and pseudo-second-order are good models for illustrating the adsorption equilibrium and kinetic behavior of process. Thermodynamic parameters proved that the adsorption process was endothermic ($\Delta H^\circ > 0$) for MO while it was exothermic ($\Delta H^\circ < 0$) for IC. Finally, the morphology and structure of the nanosorbent was characterized by using XRD, EDX, SEM, FTIR and TEM techniques.

Keywords: Adsorption; Indigo Carmine; Methyl Orange; Taguchi design; Cobalt hydroxide nanoparticles

* Correspondence to Javad Zolgharnein, Department of Chemistry, Faculty of Science, Arak University, Arak, 38156–876, Iran. E-mail: J-zolgharnein@araku.ac.ir

Download English Version:

<https://daneshyari.com/en/article/7842399>

Download Persian Version:

<https://daneshyari.com/article/7842399>

[Daneshyari.com](https://daneshyari.com)