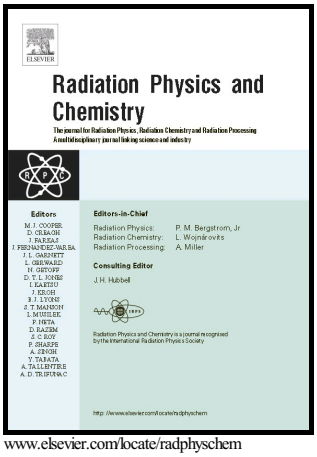
Author's Accepted Manuscript



www.elsevier.com/locate/radphyschem

A KINETIC AND MECHANISTIC STUDY OF ADSORPTIVE REMOVAL OF METAL IONS BY IMIDAZOLE-FUNCTIONALIZED POLYMER GRAFT BANANA FIBER

Sarala Selambakkannu, Nor Azillah Fatimah Othman, Khomsaton Abu Bakar, Shakirah Abdul Shukor, Zulhairun Abdul Karim

PII: S0969-806X(18)30440-7
DOI: https://doi.org/10.1016/j.radphyschem.2018.09.012
Reference: RPC8002

To appear in: *Radiation Physics and Chemistry*

Received date: 17 May 2018
Revised date: 8 August 2018
Accepted date: 6 September 2018

Cite this article as: Sarala Selambakkannu, Nor Azillah Fatimah Othman, Khomsaton Abu Bakar, Shakirah Abdul Shukor and Zulhairun Abdul Karim, A KINETIC AND MECHANISTIC STUDY OF ADSORPTIVE REMOVAL OF METAL IONS BY IMIDAZOLE-FUNCTIONALIZED POLYMER GRAFT BANANA FIBER, *Radiation Physics and Chemistry,* https://doi.org/10.1016/j.radphyschem.2018.09.012

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 galley proof before it is published in its final citable 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.

ACCEPTED MANUSCRIPT

A KINETIC AND MECHANISTIC STUDY OF ADSORPTIVE REMOVAL OF METAL IONS BY IMIDAZOLE-FUNCTIONALIZED POLYMER GRAFT BANANA FIBER

Sarala Selambakkannu[1,*], Nor Azillah Fatimah Othman[1],
Khomsaton Abu Bakar[2], Shakirah Abdul Shukor[2], Zulhairun Abdul Karim[3]

[1] Radiation Processing Technology, Malaysian Nuclear Agency, Bangi, 43000, Kajang, Malaysia
[2] Analytical Chemistry Application, Malaysian Nuclear Agency, Bangi, 43000, Kajang, Malaysia
[3] Advanced Membrane Technology Research Centre (AMTEC), School of Chemical and Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor.

*Corresponding author: sarala@nuclearmalaysia.gov.my

Accepted manuscript

Abstract

Chemically modified fibrous bio-adsorbent extracted from banana trunk was synthesized for potential application in adsorption of heavy metal from wastewater. Glycidyl methacrylate (GMA) polymer graft was first introduced onto the fiber through electron beam irradiation technique. GMA-grafted fiber was subsequently functionalized with imidazole (IMI) group through epoxide ring-opening reaction where amine density of 2.00 mmol/g was achieved. The adsorbent was characterized with Scanning Electron Microscopy (SEM), Fourier Transformed Infrared Spectroscopy (ATR-FTIR), and Thermogravimetric Analyzer (TGA). An extensive kinetic and mechanistic study on the adsorptive removal of metal ions (Cu^{2+}, Pb^{2+} and Zn^{2+}) by IMI-functionalized GMA-grafted banana fiber is presented. The effects of pH and initial concentration on adsorption capacity were investigated. The adsorption data were correlated with pseudo-first and second order model and the isotherms were analysed with Langmuir and Freundlich model in order to explain the kinetics and adsorption mechanisms of different metal ions. The thermodynamic studies revealed that the adsorption process for metal ions was exothermic. We also demonstrated that the IMI-GMA-grafted fiber can be regenerated using dilute HNO_3 solution, and can be recycled up to 10 times while maintaining satisfactory adsorption performance. Lastly, the chemically modified bio-sorbent was used to treat a local domestic sewage water.

Keywords: Banana trunk; radiation induced graft polymerization; amine functionalization; heavy metal adsorption; kinetic study.

Download English Version:

https://daneshyari.com/en/article/10148091

Download Persian Version:

https://daneshyari.com/article/10148091

Daneshyari.com