Frontiers in Pharmaceutical, Material, and Environmental Sciences: Innovative Approaches and Applications

Editors

Tahmeena Khan

Qazi Inamur Rahman

Nafees Ahmad

Shahla Tanveer

Department of Chemistry,

Integral University, Lucknow

BOOK RIVERS

WE CREATE READERS

Published by: - Book Rivers

Website: - **https://www.bookrivers.com**

Email: **publish@bookrivers.com**

1St Print Edition - 2026

Title: ***Frontiers in Pharmaceutical, Material, and Environmental Sciences: Innovative Approaches and Applications***

Editors: ***Tahmeena Khan, Qazi Inamur Rahman, Nafees Ahmad, Shahla Tanveer***

ISBN: 978-93-6884-630-7

MRP: 370/-INR

(Printed in India)

Contents

Chapter – 9

Removal of Orange G and Heavy Metals using Chitosan-coated Bamboo Biochar

Abdul Faiz Ansari[1], Iqbal Azad[1], Naseem Ahmad[1*]

1Department of Chemistry, Integral University, Lucknow, 226026

Corresponding email: naseem@iul.ac.in

Abstract

Bamboo is widely used as scaffolding in construction and building projects. However, over 50,000 tons of bamboo scaffolding waste are disposed of as landfill waste each year. Nevertheless, these wastes can be used as raw materials for the production of a range of high-value-added activated carbons. The bamboo cane can be heated (charred) at a high temperature in the presence of selected activation chemicals to produce activated carbons for various applications e.g. adsorbents, and catalysts. The present investigation was intended for the absorption of Heavy Metals i.e. Pb and Cu and Dyes Orange G with Bamboo activated charcoal. The bamboo charcoal was activated using $ZnCl_2$ and was coated with Chitosan. The study and graphical analysis proved that for Dyes on increasing the dose of 1:1 Beads adsorbent the adsorption capacity significantly increases whereas for 1:2 Powder adsorbent, the adsorption capacity was independent of dosage as a slight adsorption increase was visible. For the adsorption of copper metal both the adsorbent materials showed the same adsorption capacity and lead showed the best result for increased contact time of 1:2 powder.

Keywords: Bamboo, dyes, adsorption, catalysis, chitosan

[26] Sahoo, S. S., Vijay, V. K., Chandra, R., & Kumar, H. (2021). Production and characterization of biochar produced from slow pyrolysis of pigeon pea stalk and bamboo. Cleaner Engineering and Technology, 3. https://doi.org/10.1016/j.clet.2021.100101

[27] Sen, T. K., Afroze, S., & Ang, H. M. (2011). Equilibrium, kinetics and mechanism of removal of methylene blue from aqueous solution by adsorption onto pine cone biomass of Pinus radiata. Water, Air, and Soil Pollution, 218(1–4), 499–515. https://doi.org/10.1007/s11270-010-0663-y

[28] Wang, F. Y., Wang, H., & Ma, J. W. (2010). Adsorption of cadmium (II) ions from aqueous solution by a new low-cost adsorbent—Bamboo charcoal. Journal of Hazardous Materials, 177(1–3), 300–306. https://doi.org/10.1016/J.JHAZMAT.2009.12.032

[29] Wang, S. Y., Tsai, M. H., Lo, S. F., & Tsai, M. J. (2008). Effects of manufacturing conditions on the adsorption capacity of heavy metal ions by Makino bamboo charcoal. Bioresource Technology, 99(15), 7027–7033. https://doi.org/10.1016/J.BIORTECH.2008.01.014

[30] Yagub, M. T., Sen, T. K., Afroze, S., & Ang, H. M. (2014). Dye and its removal from aqueous solution by adsorption: A review. In Advances in Colloid and Interface Science (Vol. 209, pp. 172–184). Elsevier. https://doi.org/10.1016/j.cis.2014.04.002