

## عنوان مقاله:

Adsorption studies of Iodine removal by low-cost Bioinspired Mushuma and Mupane bark derived adsorbents for urban and rural wastewater reuse

## محل انتشار:

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## خلاصه مقاله:

**BACKGROUND AND OBJECTIVES:** Water pollution and scarcity are becoming a serious challenge worldwide and methods of treating or recycling the wastewater are becoming expensive, especially in rural areas of least developed countries. An affordable wastewater recycling approach is imminent and should be cost-effective, using local materials to alleviate the water shortage and pollution challenges. The use of adsorbents from different biomass has been on the highway and tree barks are no exception for that matter. This research, therefore, intends to test the use of novel material's capacity to remove Iodine from an aqueous solution under set conditions and use Bayesian statistics to validate the results as compared to the Frequentist approach. **METHODS:** This study is qualitative and developmental research where Bayesian and Conventional statistics were applied to complimentarily validate the results. Kinetic models, Field Emission Scanning Electron Microscopy, and Energy Dispersive X-ray Spectroscopy were used to characterize the novel adsorbent to check for its potential and capability in removing Iodine from water. Akaike Information Criterion (AICc) was then used to select the best model. **FINDINGS:** The findings demonstrated that the Bayesian approach was simultaneously applied with classical methods to compare their parameter estimation. Mupane biochar performed better than Mushuma, Pseudo-Second-Order model described both materials better with lower AICc values of ۳۷.۷۶ and ۳۸.۰۳ than other kinetic models respectively, indicating a chemisorption mechanism. Bayesian approach remarkably revealed slightly higher qt estimations of ۴۰.۷۱۲ and ۴۱.۶۳۹ mmol/g than conventional statistics with ۴۰.۰۱ and ۴۰.۲۹ mmol/g for Mushuma and Mupane biochar. Elovich model subsequently fit the data, henceforth demonstrating a heterogenous surface property with chemisorption phenomena. Field Emission Scanning Electron Microscopy and Energy Dispersive X-ray Spectroscopy exhibited C (۸۱.۹۳ mol% and ۸۶.۹۱ mol %) and O (۱۶.۱۲ mol% and ۱۱.۴۹ mol%) for Mushuma and Mupane respectively. **CONCLUSIONS:** Material performances were

insignificant however, Mupane marginally outperformed Mushuma bark. However, further examination is required in determining the surface area, adsorption isotherms, and functional groups available. This African tree-bark biochar promised to be good adsorbents of wastewater contaminants and their kinetic mechanisms can be a benchmark to suggest their applications as potential candidates for environmental-ecosystem-protection and water re-use strategy, ... especially in ru

### کلمات کلیدی:

Bayesian analysis, Frequentist analysis: Iodine, Kinetic adsorption, Mupani biochar, Mushuma biochar, Water Reuse

### لینک ثابت مقاله در پایگاه سیویلیکا:

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