**Abstract**

Fixed-bed column adsorption experiment was conducted to remove lead ions from Kagara mining wastewater using unmodified Cotton Hull Adsorbent (CHA). Analysis of the wastewater [effluent](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/effluents) revealed that it contains as high as 85 mg/L lead ions. The [Fourier Transform](https://www.sciencedirect.com/topics/mathematics/fourier-transforms) Infra-red, Brauneur-Emmet-Teller and Scanning Electron Microscopy characterization of the CHA revealed the presence of O-H, CO, C = O, CO-H and CH2 functional groups, surface area of 139.8 m2/g and porous micrograph of the adsorbent. The column flow experiment indicated that the maximum adsorption capacity of the carbon is 27.65 mg/g. Analysis of the experimental data using dynamic adsorption models revealed that Thomas model had insignificant difference between the average values of the experimental and the model's data. More so, it revealed high [correlation coefficient](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/correlation-coefficient) of 0.77 to 0.96 signifying that Thomas model fitted adequately to the experimental data. This study has revealed that Kagara mining effluent which predominantly contains Pb ions can be sufficiently treated with unmodified cotton hull adsorbent before discharging it to the ecosystem.