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Agricultural wastes used to address health hazards: Banana peels turned adsorbent for Heavy metal removal from irrigation waters along Nakivubo channel in Kampala, Uganda

Edgar Tumwesigye^{*a}, John Wasswa^b, Betty Naziriwo^c

^{*a, b, c} Makerere University, College of natural Sciences, Department of chemistry, Uganda.

Abstract: *Herein, we report, the utilization of a Banana plant waste for treating wastewaters to avail contaminant free water for agricultural irrigation as a mitigation against food contamination with heavy metals, as they are a major public health concern, which affect human population worldwide. In this paper, equilibrium adsorption uptake of two selected heavy metals i.e. copper, Cu(II) and Lead, Pb(II), both in laboratory prepared synthetic and real wastewater effluents, by locally prepared Uganda Banana peel powder (BP) was studied in a batch system. BP was characterized using Fourier Transform Infrared Spectroscopy (FTIR). Adsorption isotherms were developed for laboratory prepared synthetic wastewater systems and expressed by mono – component Freundlich and Langmuir models. The model parameters were estimated by non- linear regression method. To understand the action of metal uptake, factors influencing the adsorption of heavy metals including pH, mass of the biosorbent, contact time and initial metal ion concentration were investigated. It was found that the mono- component adsorption equilibrium data fitted well to the Freundlich model with high coefficient of determination (R^2). For both metals the maximum adsorption capacity (q_{max}) occurred at pH 6 and metal adsorption improved as bioadsorbent dosage increased. Adsorption data were modeled using the pseudo – second – order and pseudo – first – order kinetics. It was seen that the pseudo – second – order kinetic equation could best describe the adsorption kinetics. FTIR analysis indicated that carbonyl(C=O), carboxyl (COO⁻) and hydroxyl (-OH) groups are present in the BPP. In conclusion BPP was found to act as a suitable bioadsorbent for removal of selected Heavy metal ions from wastewater effluents using laboratory experimental studies without any modification.*

Keywords: Food contamination; Heavy metals; Banana peel powder; Isotherms; kinetics.
