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Adsorptive removal of potentially toxic heavy metals by banana peel-derived magnetic adsorbent: Single and multicomponent batch study

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Transformation of agricultural wastes into low cost adsorbent material has been considered viable and effective in wastewater treatment. Here, the efficiency of calcined banana peel derived magnetic adsorbent was evaluated to remove, copper, mercury and zinc (potentially toxic metals) from simulated wastewater. The magnetic responsive adsorbent samples were characterized before and after adsorption by Fourier Transform Infra-Red (FTIR), X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Brunauer–Emmett–Teller (BET) while the quantity of heavy metal uptake was determined using UV-Vis spectroscopy. The BET analysis confirmed that the magnetic adsorbent contained heterogeneous meso and micropores responsible for trapping the heavy metal ions and the FTIR results revealed that the carboxylic groups (1722 cm^{-1}) and amine groups (889 cm^{-1}) were responsible for the coordination and removing of the heavy metal ions. The thermodynamic results indicated that the adsorption process was endothermic and the modified isotherm demonstrated that multi-component equilibrium adsorption capacity is lower compared to a single solute system.

Biography

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