



A sustainable material for removal of heavy metals from water: adsorption of Cd(II), Pb(II), and Cu(II) using kinetic mechanism

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ABSTRACT

This study evaluated the potential of using avocado seed powder to remove the heavy metal ions in water as an adsorbent. The presence of permeable structure was identified using scanning electron microscopy and Fourier transform infrared analysis which is required for any material to remove heavy metal using adsorption technique. The effect of seed powder on pH, metal ion concentration, temperature, and contact time were assessed using the batch technique. The maximum adsorption was achieved at optimum conditions of 40 min to adsorb Cd²⁺, Cu²⁺, and Pb²⁺ heavy metals at an efficiency of 98.23%, 99.12%, and 99.29%, respectively. Meanwhile, the adsorption capacity of Cu²⁺, and Pb²⁺ were found to be 178.21 and 79.3 mg/g, respectively. However, the adsorption capacity of avocado seed fibers was less dependent on temperature. The voids in seed powder surface had been incredibly decreased after adsorption of metal ions which may have happened because of the bond arrangement with the groups present on the adsorbent. The avocado seed fibers act as a sustainable adsorbent material to remove heavy metal ions and the potential effects of the seed fibers had been explored in this study.

Keywords: Sustainable low-cost material; Avocado seed powder; Heavy metals; Adsorption capacity

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