

Title: Use of pristine papaya peel to remove Pb(II) from aqueous solution

Author/Authors: Sahar Abbaszadeh, Sharifah Rafidah Wan Alwi, Nahid Ghasemi, Hamid Rashidi Nodeh, Colin Webb, Ida Idayu Muhamad

Abstract: In this study, *Carica papaya* agro-waste (papaya peel) was employed for Pb(II) uptake from single-solute solutions. The papaya peel-derived (PP) adsorbent namely as raw-PP was employed in sets of batch experiments to evaluate its Pb(II) uptake capacity. To assess the surface characteristics of the adsorbents, the scanning electron microscope (SEM) coupled with energy disperse X-ray (EDX), and Fourier transform infrared spectroscopy (FT-IR) analysis were utilized. The removal amount of Pb(II) using the adsorbent was determined by atomic adsorption spectrometry (AAS). The effects of pH, contact time, initial concentration of Pb(II) and adsorbent dosage were investigated throughout batch processes. The pH value=3 for the Pb(II) adsorption process using the raw-PP was observed as optimum solution pH. The optimum initial concentration of Pb(II) in the solution for raw-PP adsorbent found to be 100 mg/L where the amount of Pb(II) removed was 33.82 mg/g. At the agitating time of 90 min, the adsorption processes using the developed adsorbent reached equilibrium utilizing dosages of 50 mg of raw-PP as an adsorbents. The experimental results obtained using the raw-PP exhibits the high capability and metal affinity of papaya peel waste with removal efficiency percentage of > 85 %. The evaluation results show that the equilibrium adsorption of Pb(II) was best expressed by Freundlich isotherm model ($R^2 > 0.99$). The experimental results confirmed that raw-PP potentially can be employed as low cost adsorbent for Pb(II) uptake from aqueous solutions. The study suggests that future chemical modification of PP may offer increasing of its metal removal capacity.