

Removal of Pb (II) from aqueous solution by pineapple plant stem

ABSTRACT

The excessive release of lead (Pb) ions into water stream and large production of agricultural wastes cause water and land pollution. Adsorption is useful in eliminating Pb(II) from water environment. The potential use of agricultural waste, pineapple plant stem as adsorbent to reduce the amount of Pb(II) in aqueous solutions was investigated. The material was modified with oxalic acid (OA) to improve the adsorption efficiency of Pb(II). Adsorption isotherms and kinetics were determined for the adsorption of Pb(II) on natural pineapple plant stem (NPPS) and OA modified pineapple plant stem (OAPPS) from aqueous solution in batch studies. The adsorption capacity of Pb(II) on pineapple plant stem depends considerably on the solution pH, in which the amount of Pb(II) adsorbed increased with increasing solution pH, reached its maximal with 14.25 mg/g at pH 5 and 30.47 mg/g at pH 4 for NPPS and OAPPS, respectively. The adsorption performance of the adsorbents was also studied at different initial Pb(II) concentrations (50–150 mg/L), it was observed to be less affected at higher initial Pb(II) concentration. The adsorption isotherm was then investigated and the equilibrium data were well fitted with the Langmuir isotherm model with 13.30 and 27.70 mg/g as the calculated maximum capacities for NPPS and OAPPS, respectively. The adsorption of Pb(II) onto NPPS and OAPPS reached equilibrium after 60 minutes at all concentrations studied. The kinetics data were found to follow the pseudo-second order model.

Keyword: Adsorption; Lead; Oxalic acid; Pineapple plant stem