

ADSORPTION OF Pb(II) BY *HYDRILLA VERTICILLATA* BIOSORBENT COLUMN

D.M.R.E.A. Dissanayake^{1,2}, P.K.D. Chathuranga^{1,2}, P.I. Perera¹ and M.C.M. Iqbal^{1*}

¹Plant Biology Laboratory, Institute of Fundamental Studies, Kandy, Sri Lanka

²Postgraduate Institute of Science, University of Peradeniya, Sri Lanka

*mcmif2003@yahoo.com

Pb(II) is a heavy metal used in many industries such as paint, battery manufacture and plumbing. Pb(II) toxification can occur by inhalation, oral or skin contamination. Since Pb(II) is carcinogenic to humans, it is essential to remove Pb(II) from the contaminated environment. Removal of heavy metals from aqueous systems could be done through conventional, physico-chemical methods, such as ion-exchange, membrane filtration, chemical precipitation, etc. However, these techniques are expensive and are not environmental friendly. Biosorption is an alternative method which uses non-living biological materials to remove heavy metals. Objectives of this study were to investigate the capacity of dried *Hydrilla verticillata* biomass to remove Pb(II) from a contaminated aqueous system using the fixed-bed column method and a suitable desorbent to recover the adsorbed Pb(II) ions from the biosorbent.

Hydrilla verticillata was dried at 60 °C for 24 h, ground with a mortar and pestle and sieved. A glass column with inner diameter of 1.0 cm and length of 50 cm was used for the experiments. Fixed-bed column studies were carried out as a function of influent flow rate and bed height at room temperature. Eluent samples were collected at 15 min intervals and analyzed using the atomic absorption spectrophotometer. Na₂CO₃ was used as the desorbent and a fixed-bed column packed with metal loaded *H. verticillata* was eluted with 0.50 mol L⁻¹ Na₂CO₃. Biosorbent surface was characterized by Fourier transform infrared (FTIR) spectroscopy.

Hydrilla verticillata removed 66.70% of Pb(II) in the influent aqueous solution after 750 min at a flow rate of 3.0 mL min⁻¹ at 10.0 cm bed height. The breakthrough time was decreased with increasing flow rates, where the lowest adsorption percentage of 47.71% was observed for 10.0 mL min⁻¹ influent flow rate. With increasing bed height, the breakthrough time was increased. The percentage removal also increased with increasing bed height at 7.0 mL min⁻¹ influent flow rate. Percentage desorption was 100% at a bed height of 10.0 cm and flow rate of 3.0 mL min⁻¹.

These findings suggest that the *H. verticillata* can be used as an efficient biosorbent to remove Pb(II) from aqueous systems using a fixed-bed column and the adsorbed Pb(II) can be recovered using Na₂CO₃.