ABSTRACT

Accumulation of toxic heavy metal pollutants in the environment is on rise and is becoming a serious threat to various life forms. The current study has been designed to understand the mechanistic aspect of removal of toxic heavy metals, lead [Pb (II)] and mercury [Hg (II)] by using powdered bivalve mollusk shell (*Anodontoides ferrussacianus*). Effect of various physico-chemical factors were studied for the biosorption of Pb (II) and Hg (II) ions; optimum pH was 6 and 4 respectively, whereas recorded optimum temperature was 30°C, contact time was 90 min and the biomass concentration was 15 g/L for both. Equilibrium concentration (q_{eq}) values were 215 and 205 mg/L for lead and mercury respectively. Various sorption isotherms, such as Langmuir, Freundlich, and Temkin were applied to experimental data; for Pb (II) and Hg (II), Langmuir's q_{max} was 83.6 and 76.20, Freundlich's K_f was 0.0348 and 0.027 respectively; regression coefficient (R_2) of Langmuir isotherm was 0.99, for Freundlich isotherm, 0.98 and 0.97 respectively and for Temkin isotherm it was also 0.98 and 0.97, respectively. Hence, *A. ferrussacianus* shell biomass show monolayer and multilayer sorption for the studied metal species. The pseudo-second order kinetic model was found to fit well with K_2 and R_2 values of of 17 and 1 respectively for Pb (II) and 15 and 0.99 respectively for Hg (II). FTIR spectroscopy revealed the presence of many electronegative groups on the surface of biosorbent for the attachment of cations, such as Hg (II) and Pb (II). Hence, bivalve mollusk shell biomass may be a potential biosorbent for the removal of Pb (II) and Hg (II) from waste water.

Key words: biosorption, heavy metals, mollusk shell, FTIR, wastewater.