

ABSTRACT

The understanding is on the rise that accumulations of heavy metal pollutants in the environment, being added by industrial effluents, have not only altered geochemistry of water and soil but also adversely affected the inhabiting fauna and flora. Simultaneously, an urgent need has emerged to develop effective technologies for mitigation of these hazardous heavy metal pollutants. Recently, biomass from numerous organisms has been tested for the removal of such pollutants by biosorption. In the present study, the biosorptive potential of shell biomass from cylindrical paper shell mussel (*Anodontooides ferussacianus*) was investigated for the removal of toxic heavy metals, such as Pb (II) and Ni (II) ions. Maximum removal was 180 mg/L (36%) and 200 mg/L (40%) for Pb (II) and Ni (II) ions respectively whereas, the values of q_{eq} was found 210 and 240 mg/g respectively. Influence of various physico-chemical factors have also been optimized for biosorption. Optimum pH was 6 and 4 for Pb (II) and Ni (II) respectively, whereas optimum biomass concentration was 15 g/L and optimum temperature was 30°C for both of these metal ions. Various adsorption models, such as Langmuir, Freundlich and Temkin, were elucidated to data. Langmuir's q_{max} was 11.7 and 13.6 mg/g for Pb (II) and Ni (II) respectively and regression coefficient (R^2) as 0.94 & 0.97 respectively, whereas Freundlich model's R^2 was 0.98 & 0.99. Both these models explained monolayer and multilayer sorption on sorbent surface. Various parameters of Pseudo-second order kinetic model were calculated to explain the data, whereas its R^2 was 0.96 and 0.97 for Pb (II) and Ni (II) respectively. Additionally, Fourier Transform Infra-red (FTIR) spectroscopic studies evidenced the presence of various electronegative functional groups, such as $-COO^-$, $-OH^-$, $-CN$, $-NH$, $-CO^-$, etc. on the surface of *A. ferussacianus* shell which offered the binding sites for Pb (II) and Ni (II). The present investigations declared *A. ferussacianus* shell, a potential biosorbent for removal of Pb (II) and Ni (II),

Key words: heavy metals, biosorption, mussel shell, wastewater treatment, FTIR.