

## ABSTRACT

Wide-ranging procedures of contaminating water bodies with heavy metals pollutants on part of the industrial activities in recent decades have posed serious threat to all life forms inhabiting aquatic and terrestrial ecosystems. The development of effective technology for the removal of such pollutants is needed immediately. The present study was planned to optimize the uptake of heavy metals, such as chromium [Cr (VI)] and cadmium [Cd (II)] by using bivalve mollusk (*A. ferussacianus*) shell through biosorption. Effect of various physico-chemical parameters was determined. Optimum pH was 4, temperature was 30°C, biosorbent concentration was 15 g/L and sorbate-sorbent contact time was 90 min with equilibrium concentration ( $q_{eq}$ ) of 300mg/g and 280 mg/g for Cr (VI) and Cd (II) respectively. Various adsorption isotherm models were employed, such as Langmuir, Freundlich, and Temkin. Values for regression coefficient ( $R^2$ ) for Cr (VI) and Cd (II) were 0.99 & 0.97 for Langmuir, 1 & 0.99 for Freundlich, 0.99 & 0.97 for Temkin respectively. Various parameters of these models were also determined for Cr (VI) and Cd (II) with Langmuir's  $q_{max}$ = 12.6 and 14.4 mg/g respectively and Freundlich's  $K_F$ = 1.6 and 1.18 respectively. This shows multilayer sorption by *A. ferussacianus* shell for Cr (VI) and Cd (II). Pseudo-second order kinetic model was also elucidated to explain the kinetics of the process [ $K_2$ = 0.19 & 2.4 and  $R^2$ =0.96 & 0.93 for Cr (VI) and Cd (II) respectively]. Additionally, shifts in FTIR (Fourier Transform Infra-red Spectroscopy) spectra indicated the binding sites of specific functional groups (-OH, -NH, C=O and S=O) for Cr (VI) and Cd (II) on biosorbent surface. Our data provides substantial evidence that *A. ferussacianus* shell may be employed in wastewater treatment processes for removal of toxic metal ions.

**Key words:** biosorption, mollusk shell, heavy metal, wastewater treatment, functional group