**Abstract**

Water pollution due to noxious heavy metals such as Hg(II), Cr(VI), Cd(II) and Pb(II) ions etc., has been tremendously focused gaining attention towards social benefit. Increasing concentrations of these metals into the ecosystem constitute a severe health hazard due to their toxicity, accumulation and bio-magnification throughout the food chain. Lead contamination of drinking water is a great threat through varied sources viz., lead pipes, plating units etc. Pistachio vera shell (PVS) is a hard layer that surrounds the delicious kernel of the nut. The current work evaluates the feasibility of powdered Pistachio vera shell (PVSP) - a biowaste for sequestering Pb (II) ions is treated with 0.1N HCl and 0.1N NaOH to enhance its sorption efficacy (TPVSP). SEM, FTIR and microscopic analyses are recorded for characterizing the chosen sorbent. Batch experimental studies are performed to assess the equilibration between the sorbate and the sorbent. The competence of the sorbent material is experimentally verified through various operating factors viz., particle size and dosage of TPVSP, agitation time interval between TPVSP and Pb(II) ions, initial concentrations of Pb(II) ions, pH of the adsorption medium, effects of cations, anions, co-ions and influence of temperatures on Pb(II) – TPVSP system. The residual concentrations of Pb (II) ions from aqueous solutions are analyzed using Atomic Absorption Spectrophotometer (Shimadzu-AA-6200). Langmuir and Freundlich models are applied to describe the adsorption capacity. Column studies are conducted to ensure the quantitative estimation of TPVSP in trapping 99% of sorbate species at a dose of 40 mg the flow rate being, 100 ml/10 min. assuring the bulkiness of the material.