**Abstract**

 The present study aims at examining the potentiality of the identified no- cost sorbent i.e. Bivalves shells to remove Cu(II) and Zn(II) ions from the aqueous solutions. These shells are collected from seashores, washed with double distilled water, dried, crushed and treated using 0.1N HCl. The characteristics and functional groups present in the treated shells are supported by SEM, EDAX and Physio-chemical parameter analyses. Various operating factors influencing the adsorption of divalent ions onto the treated shells are experimentally verified by Batch Equilibration method. The experimental results derived the following optimized conditions : 0.18mm size, 1g dosage, 10 min agitation time, pH 7 environment for the trapping of Cu(II) ions (98.1% removal) and 0.18mm size, 1g dosage, 60 min agitation time, pH 5.5 environment for that of Zn(II) ions (97% removal) at an initial concentration of 1000 mg/L in both the cases. Statistical analysis using SPSS software is carried out to assess the correlation of experimental values for both the systems with the theoretical approach to justify the trapping ability of TMSP.