**Abstract**

The present work emphasizes the efficiency of acid treated Terminalia catappa seed shell (TTCSS), an agricultural waste for the adsorption of Cu (II) from aqueous solutions. TTCSS is characterized by Fourier Transform Infrared (FTIR), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX) analyses. The presence of carboxylic, amino, phenolic and hydroxyl groups, the surface morphology and elements present in the adsorbent material are evident from the corresponding analysis. Batch equilibration method experiments pertaining to the influence of operating factors viz., particle sizes and doses of the adsorbent material, agitation time between the sorbent and the sorbate species, temperature and pH of the medium for Cu(II)- TTCSS system have been carried out. Conditions have been optimized for the maximum removal of Cu2+ ions (92%) from8 mg/L initial concentration as: 0.18mm particle size, 50 mg adsorbent dose, 60 min contact time and pH 7. The maximum adsorption capacity (Ce) of Cu(II) (7.122 mg/g) is found to be greater than the range between 2.1 – 5.2 mg/g as reported by other researchers for varied sorbent materials. This confirms the enhanced sorption efficiency of Terminalia catappa in preference to various studied materials.