**Abstract**

Exploring the use of novel agricultural based adsorbents in controlling Cr(VI) pollution in waste water is one of the main areas of research on pollution control due to its high toxicity, posing threat to the human and environment. Adsorption has attracted attention as a cost-effective tool for the removal of such heavy metal ions. This paper presents the experimental results carried out for the sorption of Cr(VI) ions from aqueous solutions employing modified *Terminalia catappa* nut shell (TTCNS). The characterization of TTCNS is investigated using BET, BJH, FTIR, SEM and EDAX analysis. The effect of variable parameters viz., particle size, contact time, initial concentration, sorbent dose and pH were studied. The system has been optimized to achieve suitable parameters for maximum removal of Cr(VI) which are: 0.18mm particle size and 200 mg adsorbent dose of selected sorbent material,11 mg/L initial concentration of adsorbate species, 30 minutes contact time and pH 2 for the solution medium. Adsorption equilibrium and kinetics were verified by Langmuir, Freundlich isotherms and Lagergren first order, Pseudo second order models. The applicability of the methodology developed is also tested with real effluent sample collected from chrome plating industry.