**ABSTRACT**

Utilization of tea plant stems. Camellia sinensis (CSS), discarded as litter, collected from Ooty was employed for phosphate removal. The material was broken into small pieces, washed, dried, pulverized into different mesh sizes using scientific test molecular sieves, labelled as raw Camellia sinensis dust (RCSSD). Sorption efficiency of the categorized sizes was tested by applying the batch verification technique, where 85 BSS exhibits better sorptive nature. The particle size of 85 BSS was determined (0.18 mm) using binocular microscope (Optika make), treated with 0.1 N H2SO4, washed, dried, named as treated Camellia sinensis dust (TCSSD). Characterization studies are supported by FTIR, SEM and EDAX methods. Sorption efficiency of TCSSD was experimentally verified under varying adsorption parameters. Absorbance values were recorded using UV/VIS spectrophotometer (LABINDIA®-UV3000+) by molybdenum blue complexation method for phosphate ions. Maximum removal was registered as 48.3% and 99.7% for RCSSD and TCSSD, respectively under optimized conditions of 0.18 mm particle size, 10 mg/L initial concentration, 9 min agitation time interval, 0.25 g dose, pH 5 at room temperature. Experimental data were validated using Langmuir and Freundlich isotherms wherein Freundlich plots recorded a better linear fit. Results imply that the selected material possesses excellent anion removal capability from aqueous media.