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Bamboo-Derived Activated Carbon for the removal of tetracycline from wastewater

Adsorption is a very popular and efficient technique for the removal of various pollutants from water. Researchers have identified multiple adsorbents and among them biowaste activated carbon is reported to be highly efficient. In the present study carbon is prepared from bamboo scraps (BAC) and is activated by zinc chloride. Zinc chloride activation improves the property of the carbon and will aid in the adsorption process. The main aim of the study is to prepare activate carbon from bamboo culms and use it as an adsorbent for the removal of tetracycline from wastewater. The activated carbon prepared is characterised by different methods. The different methods include: Scanning Electron Microscopy (SEM), Xray diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Brunauer-Emmett-Teller (BET) and Zeta potential. The porous nature of the BAC was evident from the SEM analysis, the semi crystalline nature was observed by XRD, the presence of various functional groups was implicated by the FTIR results, the BET results discovered a surface area of 790 m2/g and negative surface charge was indicated by the zeta potential results. All the above results indicate that the BAC is a potential adsorbent and can be utilized for removal of various pollutants from water. The batch study was conducted considering the following factors: adsorbent dosage, contact time, pH, pollutant concentration and temperature. Based on the ideal conditions a pollutant removal efficiency of nearly 80% was achieved by BAC. The adsorption capacity of BAC was found to be 85mg/g. The study results were the best fits for Langmuir isotherm and pseudo-second-order kinetics indicating monolayer adsorption and chemisorption. The adsorbent is equally effective even while treated for real time sample.
Keywords: bamboo clums, activated carbon, biowaste, characterization, removal efficiency

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