Coconut husk adsorbent for the removal of methylene blue dye from wastewater

ABSTRACT

A study to assess the efficiency of coconut husks (CHs) in removing methylene blue (MB) dye from wastewaters in Malaysia was carried out. A fixed bed column adsorber was set up using flow rates of 40 and 80 mL/min, and the adsorbent (CH) was prepared using the base treatment method with NaOH as activating agent. Three different column bed depths (10, 20, and 25 cm) and unit weights of adsorbent (103, 213, and 260 g) were used. Two models, the bed depth service time (BDST) and Thomas models, were used to validate the adsorption capacity results and breakthrough curve. Changing the bed depth from 20 to 25 cm did not result in a significant change in adsorption capacity, therefore a 20-cm bed depth is recommended as the most efficient. Similarly, adsorption capacity increased as flow rates increased from 40 to 80 mL/min, indicating that a flow rate of 80 mL/min yielded optimum efficiency. The two models also provided predictions with good fits of the bed depth effect, the adsorption capacity, and the breakthrough curve of CH for MB removal.

Keyword: Coconut husk; Methylene blue; Adsorption; Wastewater; Models; Breakthrough curve; Malaysia