Fixed bed adsorption studies of Rhodamine b dye using oil palm empty fruits bunch activated carbon

Abstract

Global environmental pollution challenges can be alleviated if proper disposal and conversion of wastes is promoted. An attempt of converting waste to wealth was made in this study by converting oil palm empty fruits bunch to activated carbon through chemical activation with potassium hydroxide which was used for adsorption of Rhodamine B dye from waste water. Fixed-bed column adsorption system was implored in the dye removal studies. The effect of operating parameters such as influent concentration (50-200 mg/L), bed depth (5-10 cm) and solution flow rate (10-20 ml/min) on breakthrough curve was investigated. The maximum adsorption capacity of oil palm empty fruit bunch activated carbon for Rhodamine B dye adsorption (69.86 mg/g) was obtained at the highest influent initial dye concentration 200 mg/L, highest bed depth 10 cm, and solution flow rate of 15 ml/min. The experimental data was modeled using Thomas model to predict the column performance and breakthrough curves. The result of the model was found to be in good agreement with the experimental data. The result of the study revealed that oil palm empty fruits bunch activated carbon is a suitable adsorbent for removal of this harmful substance, Rhodamine B dye from waste waters.