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Continuous Adsorption of Methylene Blue Dye from Aqueous Solution onto Guava Leaf Powder in Fixed Bed

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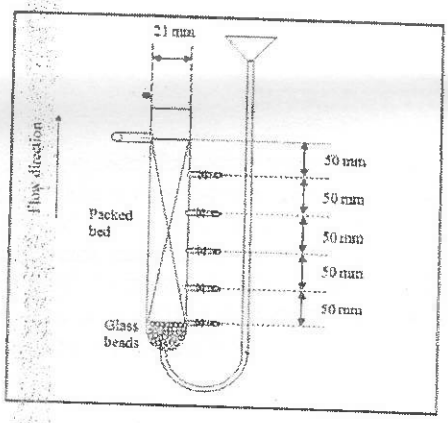
ABSTRACT

In the present study, bulk removal of methylene blue from aqueous solution using fixed bed of guava leaf powder was investigated. Fourier-transform infrared spectroscopy, surface area and particle size were employed to analyze surface morphology of guava leaf powder. Effect of solution pH (5 to 9), initial dye concentration (30 to 70 mg L^{-1}), feed flow rate (5 to 15 mL min^{-1}) and bed height (5 to 20 cm) were exerted. Thomas model and BDST predicted the breakthrough curve with high R^2 values (>96%). Methylene blue adsorption efficiency increased with increase in initial methylene blue concentration, solution pH and bed height. On the otherhand, adsorption efficiency decreases with increase in flow rate. Highest efficiency of bed was achieved at pH 7, initial concentration 70 mg L^{-1}, flow rate 10 mL min^{-1}.

Graphical Abstract



Schematic diagram of fixed bed column used in adsorption study of MB onto GLP.

Keywords: Fixed bed, Adsorption, Break through curves, Methylene Blue, Guava leaf powder.