

Investigation of Melia azedarach core and fruit adsorbent to remove Methylene blue from synthetic wastewater

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Abstract

Background & Aim: Dyes are one of the most important pollutants in textile wastewater that are toxic, carcinogenic, mutagenic and non-biodegradable. Melia azedarach core and fruit are among the inexpensive natural absorbents that have important place in the treatment of textile wastewater. This study was conducted to determine the efficiency of Melia azedarach core and fruit in removal of Methylene blue from synthetic wastewater.

Methods: In this study, structural characteristics of adsorbent were analyzed using Fourier transform infrared spectroscopy (FTIR) and Scanning electron microscope (SEM). Also the effect of various parameters such as initial dye concentrations (10-100 mg/l), adsorbent dosage (0.1-1.1 g/l), contact time (0-60 min) and solution pH (4-10) on the removal of dye was investigated and at the end, kinetics and adsorption isotherm were also determined. Dye concentration was analyzed by UV/VIS spectrophotometer at wavelength of 665 nm.

Results: Maximum removal of dye (85%) was observed in dye concentration of 32.5 mg/l, adsorbent dose of 0.85 g/l, detention time of 45 min and pH=8.5. Initial concentration had the greatest impact on color removal (P=0.0001). The results showed that data were explained acceptably by pseudo second-order model ($R^2=0.95-0.99$) and Langmuir isotherm model ($R^2=0.98$).

Conclusion: Melia azedarach core and fruit have the ability to remove methylene blue. Since in this study, the optimum pH was obtained in alkaline range and most textile wastewaters are in this range, it is an appropriate and cost-effective adsorbent to remove dye from the wastewater of textile industries.

Keywords: Adsorption; Melia azedarach; Methylene blue; Wastewater textile

