Parametric and adsorption kinetic studies of methylene blue removal from simulated textile water using durian (Durio zibethinus murray) skin

Abstrak

In this study, durian (Durio zibethinus Murray) skin was examined for its ability to remove methylene blue (MB) dye from simulated textile wastewater. Adsorption equilibrium and kinetics of MB removal from aqueous solutions at different parametric conditions such as different initial concentrations (2-10 mg/L), biosorbent dosages (0.3-0.7 g) and pH solution (4-9) onto durian skin were studied using batch adsorption. The amount of MB adsorbed increased from 3.45 to 17.31 mg/g with the increase in initial concentration of MB dye; whereas biosorbent dosage increased from 1.08 to 2.47 mg/g. Maximum dye adsorption capacity of the durian skin was found to increase from 3.78 to 6.40 mg/g, with increasing solution pH. Equilibrium isotherm data were analyzed according to Langmuir and Freundlich isotherm models. The sorption equilibrium was best described by the Freundlich isotherm model with maximum adsorption capacity of 7.23 mg/g and this was due to the heterogeneous nature of the durian skin surface. Kinetic studies indicated that the sorption of MB dye tended to follow the pseudo second-order kinetic model with promising correlation of $0.9836 < R2 < 0.9918$.