

**Title:** Isotherm and Kinetic Analyses of Methylene Blue Adsorption by a Selected Biosorbent

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**Abstract:** Industrial dye related water pollution is a growing concern nowadays as it influences environmental quality significantly. Adsorption of dye molecules onto various adsorbents is a popular dye removal method. This study was set to investigate the ability of selected biosorbents, Palmyrah sprout casing, coconut kernel after milk extraction, king coconut husk, lime peel and manioc peel for the removal of toxic organic dye, methylene blue (MB). Batch adsorptive experiments were conducted under a set of experimental conditions (pH - 6; dosage - 3 g/L; temperature - 303 K; initial concentration - 100 mg/L) to identify best biosorbent with higher adsorptive performances for the removal of MB from water. MB concentration was determined by measuring the maximum absorbance at 664.5 nm using UV-Vis spectrophotometer and two replicates were used for each experiment. Among the selected biosorbents, Palmyrah sprout casing was selected as best biosorbent with higher adsorptive performance of 27.67 mg/g. Isotherm and kinetic analyses were then performed for a better understanding of the adsorption process. From isotherm analysis of Palmyrah sprout casing, monolayer adsorption was observed during the association between Palmyrah sprout casing and MB. Adsorption kinetic analysis indicated that the pseudo second order model is well suited for kinetic analysis and to understand the involvement of chemisorption process in the removal process of MB by Palmyrah sprout casing. Since the use of Palmyrah sprout casing as a biosorbent for the removal of MB is a novel concept, it could be used for the production of activated carbon with high adsorptive performance for the better removal of MB in future.