



THERMODYNAMICS AND RATE LIMITING FACTOR ANALYSIS OF METHYLENE BLUE ADSORPTION BY SELECTED BIOSORBENTS

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Water pollution by industrial dyes is a growing concern nowadays. Methylene blue (MB) is a commonly used industrial dye, polluting the water significantly. However, currently used MB removal methods are costly and complex. The use of biosorbents for the removal of industrial dyes is an emerging concept and needs proper scientific explanations for understanding the removal mechanism. A research was therefore performed with selected biosorbents, palmyrah sprout casing, king coconut husk, coconut kernel, lime peel and manioc peel for the removal of MB from the aqueous phase. Results revealed that the biosorbent, palmyrah sprout casing, exhibited a better removal performance of 27.673 mg/g and it was selected for detailed thermodynamics and rate limiting factor analysis to explain the adsorptive mechanism. Outcomes of thermodynamics and rate limiting factor analysis stated that adsorption of MB by palmyrah sprout casing is exothermic and spontaneous. The initial stages of adsorption are influenced by mass diffusion followed by intraparticle diffusion. The information obtained in this study is highly useful for understanding the adsorption mechanism of palmyrah sprout casing to develop activated carbon with an improved adsorptive performance from this novel biosorbent.

Keywords: Methylene blue; Biosorbents; Rate limiting factor; Analysis; Thermodynamics