

Parametric and adsorption kinetic studies of methylene blue removal from aqueous solution using Bornean rambutan (*Nephelium lappaceum* L.) skin

ABSTRACT

In this study, methylene blue (MB) dye removal from water sample by adsorption onto rambutan skin, was examined. The adsorption studies using batch experiments were carried out under different parametric conditions of initial dye concentrations (3.0 mg/l ó 15.0 mg/l), solution pH 2 ó 12 and solution temperature 30°C ó 60°C. MB adsorption uptake was found to increase with the increase in initial dye concentration and solution temperature and was also favourable at higher pH. Langmuir, Freundlich and Temkin isotherm models were used to examine the experimental isotherms and their corresponding constants. The equilibrium data obtained were best represented by Freundlich isotherm model with a high R²value of 0.898. The adsorption kinetic rates complied with the pseudo-second-order model indicated that chemisorption might be the rate-limiting step that controlled the overall adsorption process. Thermodynamic data analysis indicated that the adsorption process was endothermic in nature. The data presented above suggest that the rambutan skin could be an alternative low-cost biosorbent for the removal of cationic dye from textile industrial effluent.

Keyword: Rambutan skin; Methylene blue; Adsorption; Isotherm; Kinetics