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STUDY ON THE REMOVAL CHARACTERISTIC OF ACID VIOLET DYE FROM SYNTHETIC WASTEWATER USING A NOVEL RHA/PFA/CFA SORBENT

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Abstract

A novel RHA/PFA/CFA sorbent was developed by sol-gel method using three types of ashes, *i.e.* rice husk ash (RHA), palm oil fuel ash (PFA) and coal fly ash. From surface analysis of selected RHA/PFA/CFA sorbents, the spent sorbent had more compact structures covered by irregular rough surface and the specific structure of raw RHA, PFA, and CFA were no longer visible. In addition, lower specific surface area was obtained for spent RHA/PFA/CFA sorbent. Batch studies were performed to evaluate the effect of various experimental parameters, *i.e.* initial concentration of acid violet dye, contact time and shaking speed. The results showed that the mass of dye adsorbed at time *t* increased as the initial concentration of acid violet dye increases. Shaking speed was found insignificant for high acid violet dye uptake. The removal efficiency decreased with increasing the synthetic dye solution pH. The adsorption data was analyzed by the Langmuir, Freundlich, and Temkin isotherm models. The results indicate that the Freundlich model fits the data better as compared to the Langmuir and Temkin isotherm models in terms of coefficient of determination (R^2). The maximum monolayer adsorption capacity (Q_o) of RHA/PFA/CFA sorbent was found to be 30.74 mg/g. The kinetics of acid violet dye adsorption was evaluated by the pseudo-first-order and pseudo-second-order models. The data agreed very well with the pseudo-second-order kinetic model. This study demonstrated that RHA/PFA/CFA sorbent was successfully used for the removal acid violet dye by adsorption process.

Key words: Acid violet dye, adsorption, isotherm, sol-gel, waste material

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