USE OF ACTIVATED CARBON FROM SAPINDUS FOR THE ADSORPTION OF METHYLENE BLUE

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ABSTRACT

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Activated carbon was produced from Sapindus fruit residue and **was** used for the adsorption of methylene blue dye from simulated aqueous solution. Adsorption kinetics of methylene blue onto actived carbon were studied in a batch system. The effects of pH and contact time were examined. The goal of the present study was the determination of the optimal experimental conditions. The maximum adsorption of methylene blue occurred at pH 6.0 (4.83 mg/g) and the lowest adsorption occurred at pH 2.0 (4.35 mg/g). 120 min was the time needed for apparent equilibrium. Adsorption modelling was determined by using the Freundlich and Langmuir isotherms. Data were interpreted based on R^2 and various error distribution functions. Adsorption isotherm was best described by non linear Freundlich isotherm model. In order to determine the best-fit-adsorption kinetics, the experimental data were analyzed using pseudo-first-order, pseudo-second-order, pseudo-third-order, Esquivel, and Elovich models. The needed relative parameters were determined **by** linear and non-linear regressive methods. The statistical functions were estimated to find the suitable method which fit the experimental data. Both methods were suitable to obtain the required parameters. The model that best fit the present equilibrium data was the linear Elovich model (type 1 and 2). The present work showed that activated carbon can be used as a low cost adsorbent for the methylene blue removal from aqueous solutions.

Keywords: Activated carbon (AC), methylene blue (MB), modelling, linear regression, non-linear regression.

INTRODUCTION

In coloring paper, dyeing cottons, wools, silk, leather and coating for paper stock, methylene blue (MB) is used. The treatment of effluents containing such dyes is of great interest due to its harmful impacts on receiving water (Kushwaha *et al.*, 2014). The best efficient method used for the quick removal of dyes from aqueous solutions was physical adsorption (Allen *et al.*, 2005). A slightly better adsorption was shown by aromatic solutes compared to aliphatic solutes, due to the potential to form π-π bonds with the basal planes of activated carbon. No significant influence of solute charge or size was observed (De Ridder, 2012).

Adsorption process was used for the elimination of pollutant from simulated aqueous solution and is extremely influenced by the medium of the solution, which affects the adsorption rate, the nature of the adsorbent surface charge, the aqueous adsorbate species speciation and the ionization extent. Functional dissociation groups on the adsorbate and adsorbent were affected by a pH change during the adsorptive process (Khattria et al. 2009).

In this study, the potential of activated carbon (AC) was evaluated to remove MB dye from simulated aqueous solutions in batch mode.