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REMOVAL OF METHYLENE BLUE BY ADSORPTION ONTO *RETAMA RAETAM* PLANT: KINETICS AND EQUILIBRIUM STUDY

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Abstract. The feasibility of using medicinal plants species *Retama raetam* as a low cost and an eco-friendly adsorbent for the adsorption of cationic dye methylene blue from simulated aqueous solution has been investigated. Adsorption kinetics of methylene blue onto *Retama raetam* plants was studied in a batch system. The effects of pH and contact time were examined. The methylene blue maximum adsorption occurred at pH 8 and the lowest adsorption occurred at pH 2. The apparent equilibrium was reached after 120 min. Optimal experimental conditions were determined. Adsorption modelling parameters for Freundlich and Langmuir isotherms were determined and, based on R^2, various error distribution functions were evaluated as well. Adsorption isotherm was best described by linear Freundlich isotherm model. Thermodynamic studies show that adsorption was spontaneous and exothermic. For determining the best-fit-kinetic adsorption model, the experimental data were analyzed by using pseudo-first-order, pseudo-second-order, pseudo-third-order, Esquivel, and Elovich models. Linear regressive and non-linear regressive method was used to obtain the relative parameters. The statistical functions were estimated to find the suitable method that fit better the experimental data. Both methods were appropriate for obtaining the parameters. The linear pseudo-second-order (type 9 and type 10) models were the best to fit the equilibrium data. The present work showed that plant *Retama raetam* can be used as a low cost adsorbent for the removal of methylene blue from water.

Keywords: *Retama raetam*, methylene blue, removal, modelling, adsorption.

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