ASSESSMENT OF *PHASEOLUS VULGARIS L.* BIOMASS AS LOW-COST ADSORBENT FOR THE REMOVAL OF CONGO RED DYE FROM AQUEOUS SOLUTIONS

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Abstract

This research deals with the evaluation of available waste biomass of *Phaseolus vulgaris L.*, as low cost adsorbents, in the removal of organic azo dye Congo red (CR). The effects of operational parameters on the efficiency of dye removal, including contact time, initial pollutant concentration and adsorbent dose have been investigated. The obtained results show that the amount of dye uptake was found to increase with the increase of contact time and initial dye concentration. The maximum sorption capacity was 1.291 mg g^{-1} for CR at 20°C. The removal efficiency of CR is increasing with the increase on sorbent dose, in the range of studied concentration (10 - 30 mg L^{-1}). For evaluating the mechanism involved in the sorption process, the experimental results were analyzed using pseudo-I order kinetic model, pseudo-II order kinetic model, the Ritchie second-order model and intraparticle diffusion model. The pseudo II-order kinetic model agrees very well with the dynamic behavior of the sorption of CR dye onto *Phaseolus vulgaris L.* hull. The experimental sorption results indicated that agricultural waste - bean hull could be applied as an low-cost sorbent alternative used for azo dye removal from industrial effluents, taking into account that no pretreatment on the solid is carried out.

Key words: low-cost adsorbent, Congo red, kinetic model, agricultural waste