



Removal of Malachite Green Dye from Aqueous Solutions onto Microwave Assisted Zinc Chloride Chemical Activated Epicarp of *Ricinus communis*

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ABSTRACT

Competitive adsorption of malachite green (MG) in single and binary system on microwave activated epicarp of *Ricinus communis* (MRC) and microwave assisted zinc chloride activated epicarp of *Ricinus communis* (ZRC) were analyzed. The preparation of ZRC from *Ricinus communis* was investigated in this paper. Orthogonal array experimental design method was used to optimize the preparation of ZRC. Optimized parameters were radiation power of 100 W, radiation time of 4 min, concentration of zinc chloride of 30% by volume and impregnation time of 16 h, respectively. The MRC and ZRC were characterized by pHzpc, SEM-EDAX and FTIR analysis. The effect of the presence of one dye solution on the adsorption of the other dye solution was investigated in terms of equilibrium isotherm and adsorption yield. Experimental results indicated that the uptake capacities of one dye were reduced by the presence of the other dye. The adsorption equilibrium data fits the Langmuir model well and follows pseudo second-order kinetics for the bio-sorption process. Among MRC and ZRC, ZRC shows most adsorption ability than MRC in single and binary system.

KEYWORDS

Epicarp of *Ricinus communis*; Microwave Heating; Zinc Chloride; Binary System; Equilibrium Isotherm

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