

ABSTRACT

The indiscriminate use of Organophosphorous pesticides (OPPs) in agricultural sector has caused several environmental problems. Investigation of adsorption phenomenon of OPPs is of great importance in the environmental point of view. In the present study, sulphuric acid activated carbon is prepared from agricultural “Waste” Jute Fiber. Chemically activated “Waste” Jute Fiber is effectively used for the removal of five selected OPPs such as methylparathion, malathion, monocrotophos, phosphamidon and dimethoate from aqueous solution. The “Waste” Jute Fiber is an inexpensive material obtained as agricultural byproduct. The prepared activated Jute Fiber Carbon (JFC) has been characterized by using elemental analyzer and proximate analysis methods. Batch adsorption study is carried out to investigate the adsorption equilibrium, kinetics and thermodynamics as a function of agitation time, initial concentration of pesticides, initial pH, temperature and carbon dose. Adsorption data are used to perform the first and second kinetic models. The adsorption of methylparathion, malathion and monocrotophos follow the first order kinetics and phosphamidon and dimethoate follow the pseudo second order kinetics. The adsorption data for all the five OPPs are found to obey Langmuir adsorption isotherm. The adsorption capacity (Q^0) are found to be 225.73, 71.68, 124.07, 154.80 and 136.99 mg/g for methylparathion, malathion, monocrotophos, phosphamidon and dimethoate, respectively. Thermodynamic parameters such as ΔG , ΔS and

ΔH are calculated and the negative value indicates the exothermic and spontaneous nature of the adsorption process. The free energy change during the adsorption process is in the range of 1.335 to 4.722 kJ/mol. The diffusion of the pesticide molecules onto carbon is confirmed by using Weber – Morris model. The single stage batch adsorber model is designed by using Langmuir adsorption isotherm data for the removal of pesticides. Further, in continuation of batch studies results, column studies will be carried out in future.