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Removal of diazinon pesticide from water using a polyacrylamide - *Strychnos potatorum* (Ingini) seeds derived activated carbon composite

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Water is one of the essential resources on earth and it is very important to protect water for the survival of all living beings. Modern agricultural activities are highly chemically intensive and can be considered as one of the major polluters of drinking water. Therefore, removing pesticide contaminants from water sources that are used in agriculture is an essential requirement. Among pesticides, diazinon has been identified as one of the major organophosphorous pesticides (OPPs) which are used in Sri Lankan agricultural fields. However, pesticide removal from water by means of low cost and efficient technologies is still a major challenge. In this study, a novel adsorbent material was synthesized using polyacrylamide (PAM) and activated carbon (AC) from *Strychnos potatorum* seeds. Polyacrylamide-activated carbon composite (PAAC) were successfully prepared through aqueous solution polymerization. The synthesized PAAC composite was characterized by FTIR and SEM. The adsorption of aqueous pesticide samples on PAAC composite was studied. High Performance Liquid Chromatography (HPLC) technique was used to determine the diazinon concentration in the medium. Batch adsorption experiments were conducted by varying contact time, initial diazinon concentration and adsorbent dosage at pH 5 and at 25°C. Adsorption isotherm and kinetics studies were also performed. Batch adsorption results showed that the optimized parameters for the adsorption of diazinon onto PAAC sample were contact time of 60 min, initial concentration of 10 mg/L and adsorbent dosage of 0.25 g. Under these optimized conditions, diazinon reduction percentage of 62% and maximum adsorption capacity (q_{max}) of 1.48 mg/g were achieved for diazinon at pH 5 and at 25 °C. The obtained results are satisfactory since diazinon is present in water in mild concentrations. Adsorption data were found well behaved with the Freundlich adsorption isotherm. Therefore, adsorption on a heterogeneous surface can be predicted. Diazinon adsorption has shown pseudo first order kinetics. Based on the results observed, it can be concluded that the novel adsorbent material could be used as an economical and highly efficient adsorbent for diazinon removal from water.

Keywords: Adsorption, Diazinon, Pesticides, Polyacrylamide, *Strychnos potatorum*