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TECHNICAL FACULTY IN BOR



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ACTIVATED POROUS CARBON MATERIALS DERIVED FROM VISCOSE FIBERS FOR CHLORPYRIFOS REMOVAL FROM WATER

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Abstract

The extensive use of the toxic organophosphate chlorpyrifos underscores the need for effective methods to eliminate it from the environment [1]. Chlorpyrifos's acute neurotoxicity stems from its irreversible inhibition of acetylcholinesterase, an enzyme crucial for signal transmission in the nervous system. This inhibition can lead to various neurological disorders [1,2]. While several methods have been explored for removing chlorpyrifos from water, adsorption is one of the most promising approaches [3]. Viscose fibers derived from cellulose are frequently investigated as a potential source for producing activated carbon materials [1]. Our study employed carbon materials derived from viscose fibers as an adsorbent for chlorpyrifos. Our findings revealed that 1 gram of these carbon materials could adsorb 171.53 mg, 169.20 mg, and 175.44 mg of chlorpyrifos at a temperature of 25°C. We also delved into the kinetics of batch adsorption to remove chlorpyrifos from water solutions. Kinetics analysis was performed using pseudo-first-order, pseudo-second-order, and Elovich kinetic models. The results indicated that the adsorption of chlorpyrifos onto the carbon materials best followed the pseudo-second-order kinetics model under the specified experimental conditions. The constant rate values were determined to be 0.217 mg g⁻¹ min⁻¹, 0.076 mg g⁻¹ min⁻¹, and 0.491 mg g⁻¹ min⁻¹ under experimental conditions.

Keywords: *Organophosphates; Carbon materials; Viscose fibers, Adsorption; Kinetics*

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