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Chemically Modified Coconut Shell Biochar for Removal of Losartan Potassium in Aqueous Solutions

Perera W.P.A.[1]*, Pathirana C.D.K.[1]., Kannan N.[2]

[1]Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
[2]Department of Agricultural Engineering, University of Jaffna, Jaffna, Sri Lanka
pubudiama100@gmail.com

Abstract

Emerging contaminants (EC) are newly recognized significant water pollutants and conventional wastewater treatment facilities are not sufficient at removing these trace contaminants. Biochar is well-known effective adsorbent for the removal of complex inorganic contaminants and organic contaminants from water. The present study, comprehensively investigates the sorption removal of Losartan potassium (LOS) through chemically modified biochar (CMBC) developed from green coconut (*Cocous nucifera*) shell. Effect of pyrolysis temperature (400^{o} C, 500^{o} C and 600^{o} C), initial concentration of LOS (20−150 mg L^{-1}), pH (3–11), temperature (20−40^{o} C), dose of adsorbent (1.0–5.0 g L^{-1}) and contact time (15−1620 mins) on the adsorption of LOS onto CMBC has been analyzed using a successive batch study. Biochar treated with 5% H_3PO_4 and pyrolyzed at 600^{o} C shows the optimum result which is 60.72% removal of LOS with initial LOS concentration of 20 mg L^{-1}, pH∼6, temperature 20^{o} C, dose of adsorbent 5 mg L^{-1}, agitation speed 150 rpm and contact time 24 h. The kinetic data of the adsorption study was best fitted into pseudo-2nd-order kinetics model. The Langmuir, Temkin and Freundlich isotherm models were studied and the experimental data were best represented by the Freundlich model. The thermodynamic study reveals the LOS adsorption was non-spontaneous, exothermic nature on CMBC.

***Keywords**:* Biochar, Emerging Contaminant, Isotherm, Kinetics, Thermodynamics, Losartan Potassium, Pyrolysis