Decontamination of ofloxacin: optimization of removal process onto sawdust using response surface methodology

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ABSTRACT

Ofloxacin is one of the most used fluoroquinolones, a potent broad spectrum antibiotic class; it is also included in pharmaceutically active compounds that are considered as environmental pollutants. To clean the water systems sorption has been found as an effective way to remove these pollutants. Present study demonstrates the effect of different sawdust treatments on removal of ofloxacin from aqueous solutions. The sorption of ofloxacin by treated sawdust has been optimized by response surface methodology using central composite design. Set of 18 experiments was used and factors as pH, amount of sorbent, contact time, and concentration of sorbate were considered the critical factors to be studied for removal. HCl-treated sawdust was found to have maximum removal efficiency (96\%) with the sorption capacity of 47 \mu mol g\(^{-1}\) as compared to other treated sorbents. Amount of sorbent have significantly positive impact on the removal for all three treated sorbents whereas concentration of sorbate has non-significant positive effect for HCl-treated sawdust. Further, sorption isotherms, kinetics, and thermodynamics studies onto HCl-treated sawdust showed that reaction is exothermic and spontaneous in nature and psuedo-second-order is predominant route. Complex sorption mechanism with simultaneous intraparticle diffusion as well as surface adsorption phenomena is responsible for sorption of ofloxacin onto sawdust.

Keywords: Ofloxacin removal; Natural sorbent; Sawdust; Batch sorption; Biomass

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