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APPLICATION OF NEURAL NETWORK MODEL IN STUDIES ON ANTIBIOTICS REMOVAL BY ACTIVATED CARBON

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Abstract

Activated carbon (AC) is proven to be an effective material for controlling organic contaminants in water. However, systematic research has seldom been conducted to investigate the interactions of multiple factors on antibiotic sorption by AC. In this study, central composite design (CCD) with four factors combined with a BP-artificial neural network (BP-ANN) model were applied to study the removal of norfloxacin (NOR) and tetracycline (TC) by AC. The results showed that 24 hours was sufficient to reach sorption equilibrium, and the sorption isotherms could be fitted well by the Langmuir model. Q_{max} was 48.92±18.98 and 45.31±2.68 mg/g for NOR and TC, respectively, indicating that AC is an effective sorbent for antibiotic pollution control. The BP-ANN model was able to reasonably predict the removal of antibiotics by AC under the interaction of pH, Ca^{2+}, K^+ and Na^+. The results showed that the pH exerted a significant influence on the removal efficiency of both antibiotics, and the observed pH dependent sorption was depended on the AC pH_{pzc} and the antibiotic speciation. The removal of both antibiotics was inhibited by increasing concentrations of Ca^{2+} and K^+, while the effect of Na^+ was not significant.

Key words: adsorption, activated carbon, antibiotics, BP-artificial neural network, influencing factors

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