Artificial neural network modelling for removal of chromium (VI) from wastewater using physisorption onto powdered activated carbon

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Received 3 March 2014; Accepted 7 November 2014

\textbf{ABSTRACT}

A three-layered feed-forward artificial neural network (ANN) model has been designed to predict the adsorption efficiency and adsorption capacity for the adsorptive removal of chromium (VI) from synthetic wastewater. The adsorbent dose, wastewater pH, initial pollutant concentration and contact time were used to develop the network. The data used to train and test the model were obtained from several batch experiments. Various algorithms and transfer functions for hidden layer were tested to find the most reliable network. Broyden–Fletcher–Goldfarb–Shanno (BFGS) quasi-Newton backpropagation algorithm gave the most satisfactory results for adsorption efficiency. Resilient and BFGS quasi-Newton backpropagation were the most suitable algorithm for adsorption capacity. The best combination of training algorithm and transfer function for adsorption efficiency was found to be trainrp and poslin, while poslin produced simulated results within 10% deviation for adsorption capacity. Eight to eleven neurons were found to be optimum using trial-and-error method. The ANN predicted and experimentally measured values were compared to test the accuracy of the model.

\textit{Keywords:} Wastewater treatment; Adsorbent; Adsorption; Artificial intelligence; Automation

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