



Fast artificial neural network (FANN) modeling of Cd(II) ions removal by valonia resin

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ABSTRACT

In the existing research, firstly, Cd adsorption properties and kinetics were studied on valonia tannin resin (VTR) from aqueous solutions at optimized process parameters such as temperature, pH of solution, initial ion concentration, and contact time. Then, a four-layer fast artificial neural network was constructed and tested to model the equilibrium data of Cd metal ions onto VTR. The properties of the VTR and the experimental conditions were used as inputs to predict the corresponding cadmium uptake at equilibrium conditions. The constructed ANN was also found to be precise in modeling the cadmium adsorption isotherms and kinetics for all inputs during the training process. ANN models were setup with varying numbers of hidden layers and different neuron numbers at each hidden layer as input parameters, mean squared error values were calculated for the train, test, and overtraining caution system status and the proper model according to these values was determined. The obtained simulation results showed that the applied technique of ANN has better adjusted the equilibrium data of the Cd adsorption when compared with the conventional isotherm models.

Keywords: Fast artificial neural networks; Removal; Modeling; Valonia tannin resin; Cd(II) ions

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