

عنوان مقاله:

Application of artificial neural network (ANN) approach in the modeling of Hg (II) adsorption from aqueous solution by two walnut shell activated carbons

محل انتشار:

دومین کنفرانس بین المللی یافته های نوین پژوهشی در شیمی و مهندسی شیمی (سال: 1395)

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خلاصه مقاله:

A three-layer Artificial Neural Network (ANN) code was developed to predict the Hg (II) ions removal from aqueous solution by two activated carbons prepared from the local walnut shell which was reported previously. The three-layer back propagation (BP) ANN is configured of tangent sigmoid transfer function (tansig) at hidden layer with 16 neurons for activated carbon A and 18 neurons for activated carbon B, and linear transfer function (purelin) at output layer. To determine the best training algorithm, 11 BP algorithms were evaluated with different neuron numbers ranges from 1 to 20. For each training algorithm, the value of mean square error (MSE) of each neuron was calculated based on 100 epochs. According to the calculated MSEs, Levenberg–Marquardt algorithm (LMA) was the best training algorithm among others for both activated carbons. For determining optimal neurons number for LMA training algorithm, the MSE values for each neuron number was calculated for 300 epochs and the maximum MSE was selected to compare with other neurons number. In this paper, maximum MSEs were considered to obtain minimum amount of error in our calculations; this makes sure that even at maximum amount of MSEs, the selected one has minimum error value. Consequently, the optimum neurons number for carbons A and B were 16 and 18, respectively. The data obtained from our experimental study (38 experimental data for each activated carbon) were divided into two matrices, one as input [P] and the other as target [T] to study the effect of different variables such as initial pH, operating temperature, initial concentration of Hg (II) ions, and contact time. The linear regressions between the model predictions and the experimental targets were proven to be satisfactory with a correlation coefficient of about 0.972 (for Carbon A) and 0.970 (for Carbon B) for four model variables used in this study.

کلمات کلیدی:

Modeling, Adsorption, Mercury Removal, Walnut shell, Artificial neural networks

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