

Enhancement of heavy metals sorption via nanocomposites of rice straw and Fe₃O₄ nanoparticles using artificial neural network (ANN)

ABSTRACT

The artificial neural network (ANN) modeling of adsorption of Pb(II) and Cu(II) was carried out for determination of the optimum values of the variables to get the maximum removal efficiency. The input variables were initial ion concentration, adsorbent dosage, and removal time, while the removal efficiency was considered as output. The performed experiments were designed into two data sets including training, and testing sets. To acquire the optimum topologies, ANN was trained by quick propagation (QP), Batch Back Propagation (BBP), Incremental Back Propagation (IBP), genetic algorithm (GA) and Levenberg-Marquardt (LM) algorithms for testing data set. The topologies were defined by the indicator of minimized root mean squared error (RMSE) for each algorithm. According to the indicator, the IBP-3-9-2 was selected as the optimized topologies for heavy metal removal, due to the minimum RMSE and maximum R-squared.

Keyword: Artificial neural network (ANN); Adsorption; Removal efficiency; Heavy metal; Topologies