Application of ANN and ANFIS to predict the effect of fatty acids on the performance of CA composite membranes in removal of pesticides from water

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ABSTRACT

Modeling of the membrane separation processes in removal of hazardous components like pesticides from water would be beneficial to predict the membrane performance in treatment of the polluted water sources. In this paper, the computational intelligence (CI) methods such as artificial neural network (ANN) and adaptive neuro-fuzzy inference system (ANFIS) are used to model and predict the effect of fatty acids on the performance of cellulose acetate composite membrane in treatment of aqueous solutions containing nitrophenols as an important class of pesticides. For this purpose, membrane, feed and solution pH are selected as the inputs, and the membrane efficiency is selected as the output of the proposed CI models. Comparison between the proposed ANN and ANFIS models and the experimental data shows that the proposed CI models are very efficient and fast tools, and there is a good agreement between the experimental and our models with a minimum error. The overall mean relative error percentages obtained for the ANN and ANFIS models are less than 2.05% and 1.12% for flux (less than 1.49% and 0.47% for rejection), respectively, which declare the high reliability of the proposed models.

Keywords: Artificial neural network; Adaptive neuro-fuzzy inference system; Modeling; Composite membrane; Nitrophenol pesticides; Water treatment

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