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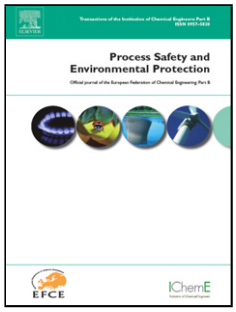

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PII: S0957-5820(14)00052-4
DOI: http://dx.doi.org/doi:10.1016/j.psep.2014.04.006
Reference: PSEP 433

To appear in: *Process Safety and Environment Protection*

Received date: 30-12-2013
Revised date: 8-4-2014
Accepted date: 16-4-2014

Please cite this article as: Bagheri, M., Mirbagheri, S.A., Ehteshami, M., Bagheri, Z.,Modeling of a sequencing batch reactor treating municipal wastewater using multi-layer perceptron and radial basis function artificial neural networks., *Process Safety and Environment Protection* (2014), http://dx.doi.org/10.1016/j.psep.2014.04.006

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Modeling of a sequencing batch reactor treating municipal wastewater using multi-layer perceptron and radial basis function artificial neural networks.

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Abstract

A sequencing batch reactor was modeled using multi-layer perceptron and radial basis function artificial neural networks (MLPANN and RBFANN). Then, the effects of influent concentration (IC), filling time (FT), reaction time (RT), aeration intensity (AI), SRT and MLVSS concentration were examined on the effluent concentrations of TSS, TP, COD and $NH_4^+ - N$. The results showed that the optimal removal efficiencies would be obtained at FT of 1 hour, RT of 6 hours, aeration intensity of 0.88 m^3/min and SRT of 30 days. In addition, COD and TSS removal efficiencies decreased and TP and $NH_4^+ - N$ removal efficiencies did not change significantly with increases of influent concentration. The TSS, TP, COD and $NH_4^+ - N$ removal efficiencies were 86%, 79% 94% and 93%, respectively. The training procedures of all contaminants were highly collaborated for both RBFANN and MLPANN models. The results of training and testing data sets showed an almost perfect match between the experimental and the simulated effluent of TSS, TP, COD and $NH_4^+ - N$. The results indicated that with low experimental values of input data to train ANNs the MLPANN models compared to RBFANN models are more precise due to their higher coefficient of determination (R^2) and lower root mean squared errors (RMSE) values.

Keywords: sequencing batch reactor; neural network modeling; multi-layer perceptron; radial basis function; municipal wastewater.

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