

Modelling Biological Treatment of Dye Wastewater in SBR Systems Inoculated with Bacteria by Artificial Neural Network

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Abstract : This paper presents a systematic methodology based on the application of artificial neural networks for sequencing batch reactor (SBR). The SBR is a fill-and-draw biological wastewater technology, which is specially suited for nutrient removal. Employing reactive dye by *Sphingomonas paucimobilis* bacteria at sequence batch reactor is a novel approach of dye removal. The influent COD, MLVSS, and reaction time were selected as the process inputs and the effluent COD and BOD as the process outputs. The best possible result for the discrete pole parameter was $a = 0.44$. In order to adjust the parameters of ANN, the Levenberg-Marquardt (LM) algorithm was employed. The results predicted by the model were compared to the experimental data and showed a high correlation with $R^2 > 0.99$ and a low mean absolute error (MAE). The results from this study reveal that the developed model is accurate and efficacious in predicting COD and BOD parameters of the dye-containing wastewater treated by SBR. The proposed modeling approach can be applied to other industrial wastewater treatment systems to predict effluent characteristics. Note that SBR are normally operated with constant predefined duration of the stages, thus, resulting in low efficient operation. Data obtained from the on-line electronic sensors installed in the SBR and from the control quality laboratory analysis have been used to develop the optimal architecture of two different ANN. The results have shown that the developed models can be used as efficient and cost-effective predictive tools for the system analysed.

Keywords : artificial neural network, COD removal, SBR, *Sphingomonas paucimobilis*

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