Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information (SI)

Experimental investigation of sulfite oxidation enhancement in a micro-pore aeration system

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Contents: 4 Pages, 1 Definition Section, 1 Graph and 2 Tables.

S1. Definition of mean square error (MSE) and mean impact value (MIV)

In this study, MSE and MIV are defined as:

$$MSE = \frac{1}{N}\sum_{i=1}^{N}(T_i - T_j)^2$$

$$MIV = \frac{1}{N}\sum_{i=1}^{N}|A_i - B_i|$$

where N is the total number of the experimental samples used in the artificial neural network (ANN) model. T_i, and Y_i refer to the target output data (experimental data) and actual output data (simulation data). A_i and B_i refer to the simulate result of the samples that one of the independent variables has been increased and decreased by 10%, respectively.

S2. Different combinations of transfer functions

Table S1. Comparison of 6 combinations of transfer functions with a hidden layer of 10 neurons.

Activation function		MSE
Hidden layer	Output layer	
Hiberbolic tangent	Identity	0.0113
Hiberbolic tangent	Hiberbolic tangent	0.0050
Hiberbolic tangent	Sigmoid	0.0047
Sigmoid	Identity	0.0083
Sigmoid	Hiberbolic tangent	0.0277
Sigmoid	Sigmoid	0.0065

S3. Optimization of neuron number in hidden layer

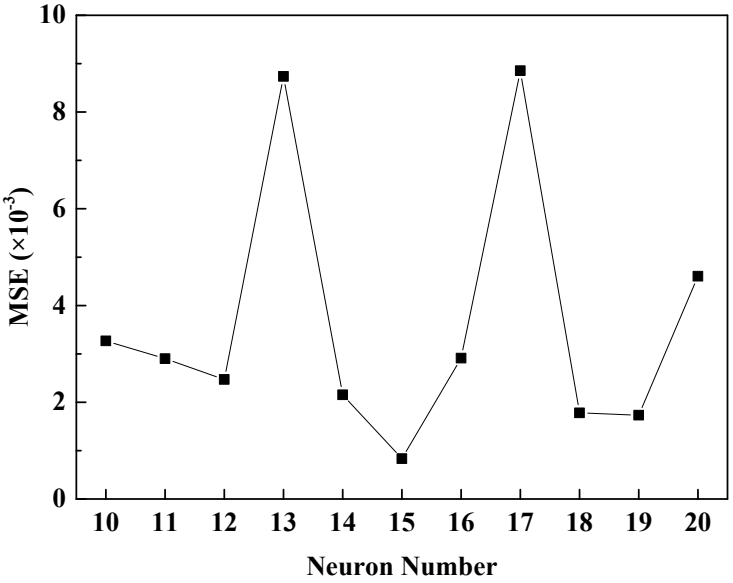

Fig. S1. MSE as a function of neuron number for the MLP neuron network.

S4. Weight matrices

Table S2. Weight matrices W1 (weights between the input and hidden layers) and W2 (weights between the hidden and output layer).

Neuron number	W1						W2
	Initial pH value	Temperature	Flow rate	Alkalinity	Aeration depth	Salinity	Sulfite oxidation performance index
1	0.2907	0.6150	0.4853	-0.0734	0.6362	-0.3374	-1.1340
2	0.8167	-0.4032	0.4313	-0.0639	0.2159	-0.1200	-1.0583
3	-0.0409	-0.0949	0.1669	0.4402	0.3387	-0.1972	0.4981
4	-0.9192	0.6146	-0.2119	0.0317	-0.2287	0.3310	1.1013
5	0.1280	0.5835	0.0751	0.1633	-0.0307	0.2336	-0.5291
6	-0.0999	-0.2358	-0.3418	-0.6154	0.3877	-0.4297	0.9553
7	-0.5744	0.6797	-0.0100	0.3145	0.2527	0.5006	0.3730
8	-0.2594	-0.5697	0.1412	-0.3545	0.0184	-0.0145	0.6508
9	0.7793	-0.2426	-0.0700	0.2116	0.1250	0.0347	-0.8801
10	-0.1581	-0.3737	0.3428	0.4129	-0.4161	0.5080	0.3236
11	-0.0161	0.0525	0.3662	0.0023	-0.4094	0.3758	0.4674
12	-1.5691	-0.3503	0.1903	-0.0007	-0.2152	0.4063	-1.5011
13	0.0170	-0.8703	0.2014	0.5391	0.1367	-0.0232	0.7025
14	0.0026	0.3601	-0.3915	0.4048	0.3661	0.1809	-0.0540
15	1.5768	0.1691	0.5378	-0.2322	0.0164	-0.0949	1.7206