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Supplementary information

CONSTRUCTION OF NITRIFICATION MODEL WITH NITRIFYING COAL ASH IN AEROBIC TREATMENT OF HIGH STRENGTH WASTEWATER

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S1

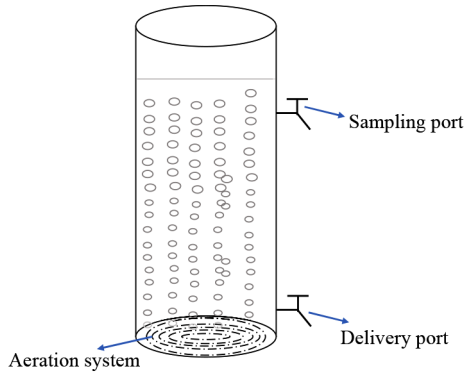

Figure S1. A diagram of the reactor

S2

Table S2. Mathematical equations about environmental parameters

Environmental parameter	Mathematical model	R-square
pH	$y_1 = 7619.61 - 3241.38x_1 + 452.66{x_1}^2 - 20.59{x_1}^3$	0.995
DO	$y_2 = 2.81 + 6.57x_2 + 7.64{x_2}^2 - 0.9{x_2}^3$	0.997
T	$y_3 = 150.67 - 46.08x_3 + 4.96{x_3}^2 - 0.17{x_3}^3 + 0.002{x_3}^4$	0.999

x_1, x_2 and x_3 represent for the parameter of pH, DO concentration and temperature, respectively. y_1, y_2 and y_3 represent for the NH_4^+-N removal rate decided by pH, DO concentration and temperature, respectively.

S3

Table S3. Analysis of variance of NH_4^+-N removal rate in optimization test of response surface method

Source	Sum of Squares	df	Mean Square	F-value	p-value
A-pH	7891.99	1	7891.99	130.87	< 0.0001
B-DO	6373.89	1	6373.89	105.70	< 0.0001
C-temperature	2120.56	1	2120.56	35.17	0.0006
AB	316.36	1	316.36	5.25	0.0558

End of Table S3

Source	Sum of Squares	df	Mean Square	F-value	p-value
AC	115.45	1	115.45	1.91	0.2090
BC	130.54	1	130.54	2.16	0.1847
A^2	10 034.47	1	10 034.47	166.40	<0.0001
B^2	499.61	1	499.61	8.29	0.0237
C^2	106.03	1	106.03	1.76	0.2265
Residual	422.11	7	60.30	–	–
Lack of Fit	422.11	3	140.70	–	–

p-values less than 0.05 indicate model terms are significant, and values greater than 0.1 indicate the model terms are not significant.

S4

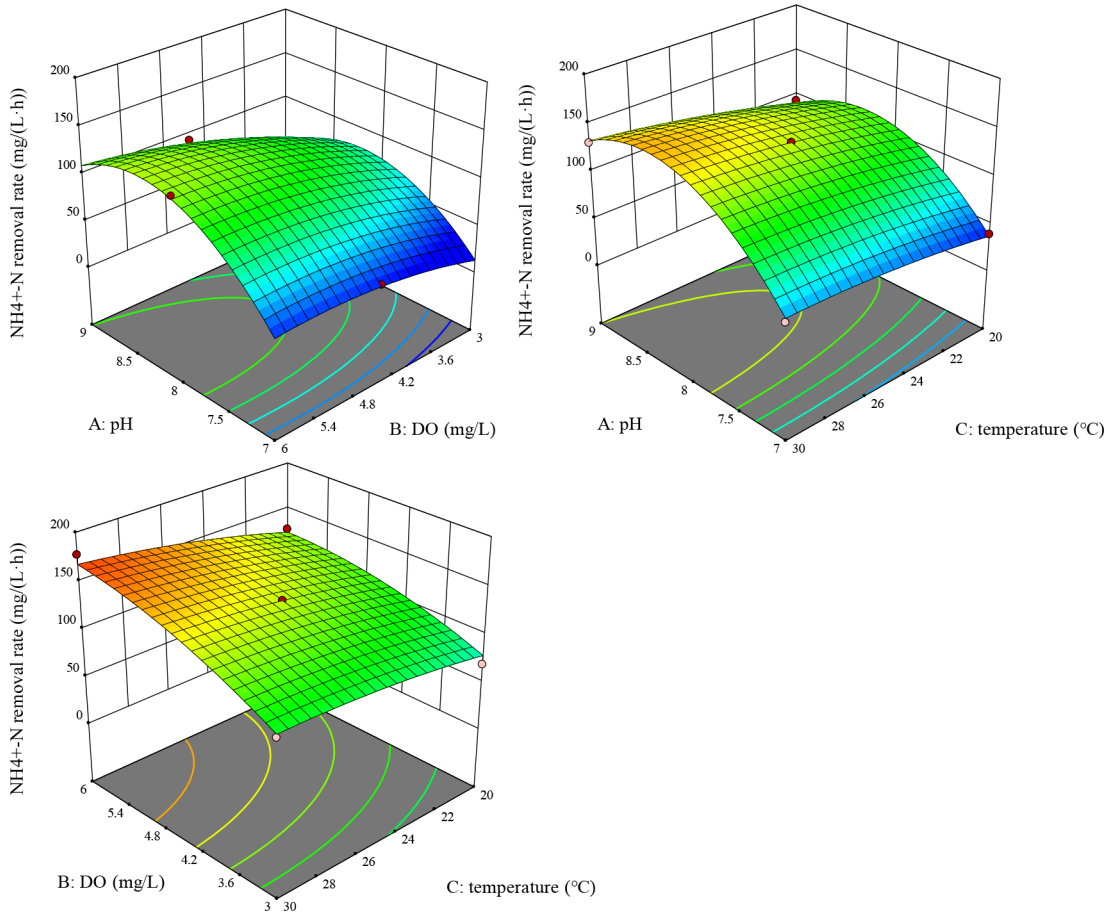

Figure S4. Surface response graph of pH, DO and T on NH_4^+-N removal rate

S5

Table S5. NH_4^+-N removal rate under different operating conditions

pH	DO mg/L	Temperature °C	NH_4^+-N removal rate mg N/(L·h)
8	4.5	25	127.89
8	6	20	121.85
9	4.5	20	89.87
7	6	25	54.55
9	4.5	30	125.82
8	6	30	170.06
7	4.5	20	38.34
8	3	20	66.95
9	3	25	69.84
7	4.5	30	52.83
9	6	25	128.86
7	3	25	29.8
8	3	30	93.88

S6

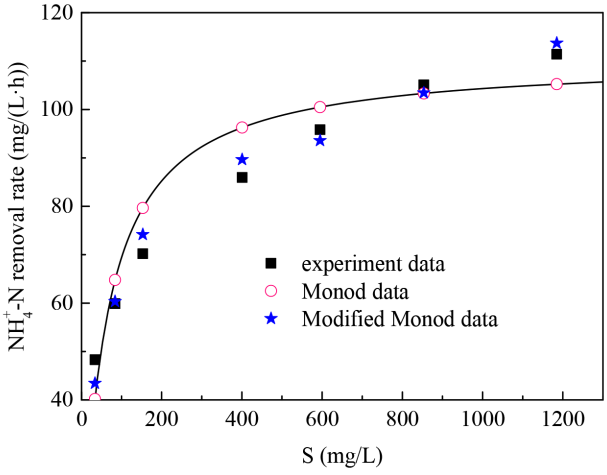

Figure S6. NH_4^+-N removal rate of experiment, Monod and modified Monod