APPENDIX E The artificial neural network database

Input			
biosorbent concentration (g)	initial pH	contact time (min)	initial heavy metals concentration (mg/L)
0.1	4.57	60	52.62
0.5	4.57	60	52.62
0.8	4.57	60	52.62
1.2	4.57	60	52.62
2.0	4.57	60	53.29
3.0	4.57	60	53.29
0.1	4.57	60	52.52
0.5	4.57	60	52.52
0.8	4.57	60	52.52
1.2	4.57	60	52.52
2.0	4.57	60	53.45
3.0	4.57	60	53.45
0.7	1	60	51.53
0.7	3	60	55.5
0.7	5	60	54.89
0.7	6	60	55.15
0.7	1	60	51.82
0.7	3	60	55.28
0.7	5	60	54.89
0.7	6	60	54.49
0.7	4.48	0.5	51.24
0.7	4.48	3	51.24
0.7	4.48	10	51.24
0.7	4.48	30	51.24
0.7	4.48	120	51.24
0.7	4.48	0.5	50.44
0.7	4.48	3	50.44
0.7	4.48	10	50.44
0.7	4.48	30	50.44
0.7	4.48	120	50.44
0.7	4.62	90	9.953
0.7	4.44	90	31.92
0.7	4.34	90	65.32
0.7	4.62	90	9.854
0.7	4.44	90	31.98
0.7	4.34	90	64.97

Figure E1 The artificial neural network training input database

Output		
removal (%)	uptake (mg/g)	final heavy metal concentration (mg/L)
12.56	3.3050	46.0100
38.45	2.0230	32.3900
51.63	1.6981	25.4500
63.74	1.3975	19.0800
74.20	0.9885	13.7500
81.23	0.7215	10.0000
12.80	3.3600	45.8000
39.20	2.0590	31.9300
51.41	1.6875	25.5200
64.36	1.4083	18.7200
74.24	0.9920	13.7700
81.23	0.7237	10.0300
2.81	0.1036	50.0800
32.85	1.3021	37.2700
47.31	1.8550	28.9200
48.07	1.8936	28.6400
2.89	0.1071	50.3200
33.19	1.3107	36.9300
47.29	1.8543	28.9300
46.50	1.8100	29.1500
37.16	1.3600	32.2000
45.94	1.6814	27.7000
45.61	1.6693	27.8700
44.59	1.6321	28.3900
43.27	1.5836	29.0700
36.52	1.3157	32.0200
43.70	1.5743	28.4000
44.71	1.6107	27.8900
44.35	1.5979	28.0700
42.41	1.5279	29.0500
68.34	0.4859	3.1510
58.33	1.3300	13.3000
44.66	2.0836	36.1500
67.08	0.4721	3.2440
58.51	1.3364	13.2700
44.13	2.0479	36.3000

Figure E2 The artificial neural network training output database

biosorbent concentration (g)	initial pH	Input contact time (min)	initial heavy metals concentration (mg/L)
0.2	4.57	60	52.62
0.3	4.57	60	52.62
0.4	4.57	60	52.62
0.6	4.57	60	52.62
1.0	4.57	60	52.62
1.5	4.57	60	53.29
0.2	4.57	60	52.52
0.3	4.57	60	52.52
0.4	4.57	60	52.52
0.6	4.57	60	52.52
1.0	4.57	60	52.52
1.5	4.57	60	53.45
0.7	2	60	54.55
0.7	4	60	54.9
0.7	5.71	60	54.78
0.7	2	60	55.37
0.7	4	60	54.81
0.7	5.71	60	54.22
0.7	4.48	1	51.24
0.7	4.48	5	51.24
0.7	4.48	15	51.24
0.7	4.48	45	51.24
0.7	4.48	60	51.24
0.7	4.48	90	51.24
0.7	4.48	1	50.44
0.7	4.48	5	50.44
0.7	4.48	15	50.44
0.7	4.48	45	50.44
0.7	4.48	60	50.44
0.7	4.48	90	50.44
0.7	4.51	90	20.92
0.7	4.43	90	42.78
0.7	4.3	90	54.41
0.7	4.51	90	21.21
0.7	4.43	90	42.9
0.7	4.3	90	54.5

Figure E3 The artificial neural network testing input database

Output		
Removal (%)	uptake (mg/g)	final heavy metals concentration (mg/L)
20.45	2.6900	41.8600
26.76	2.3467	38.5400
34.15	2.2463	34.6500
43.35	1.9008	29.8100
57.60	1.5155	22.3100
67.57	1.2003	17.2800
19.99	2.6250	42.0200
27.34	2.3933	38.1600
33.45	2.1963	34.9500
43.07	1.8850	29.9000
58.43	1.5345	21.8300
67.61	1.2047	17.3100
5.59	0.2179	51.5000
47.23	1.8521	28.9700
47.70	1.8664	28.6500
5.62	0.2221	52.2600
47.38	1.8550	28.8400
48.19	1.8664	28.0900
38.37	1.4043	31.5800
45.55	1.6671	27.9000
45.51	1.6657	27.9200
43.40	1.5886	29.0000
42.82	1.5671	29.3000
43.23	1.5821	29.0900
38.01	1.3693	31.2700
44.29	1.5957	28.1000
43.99	1.5850	28.2500
42.92	1.5464	28.7900
42.55	1.5329	28.9800
42.98	1.5486	28.7600
61.73	0.9224	8.0060
52.27	1.5971	20.4200
48.39	1.8807	28.0800
62.64	0.9490	7.9240
52.61	1.6121	20.3300
47.52	1.8500	28.6000

Figure E4 The artificial neural network testing output database