

APPENDIX D

Contains data from the pH source-effect experiment.

Table D.0 (corresponds to Table 5.1: Characteristics of wastewater used during pH source-effect experiment.)

Cycle	10 day TSS/VSS				10d inf sol COD		10d inf tot COD		10 day pH	10 day Inf Alkalinity	10 day Inf NH3
	Avg TSS	StDev	Avg VSS	StDev	Avg COD	StDev	Avg COD	StDev	Avg	Avg Alk	Avg NH3
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L
1	156	1	127	0	614	8	868	31	7.7	298.1	26.49
5	107	3	82	3	580	5	806	25	7.7	298.1	32.08
9	124	2	62	30	604	5	748	4	7.1	310.3	26.51
13	182	8	138	14	536	16	728	4		287.3	45.17
17					602	5	790	42	7.4	305.4	35.32
21	118	39	86	33	512	6	582	31		280.9	23.15
25	132	5	118	5	612	7	810	11	7.5	294.1	25.55
29	169	4	128	7	534	5	850	13		273.4	23.57
33	176	2	145	10	394	3	460	31	7.5	238.8	35.30
41	95	8	33	83	492	13	667	12	7.7	290.4	30.80
49	117	3	93	6	514	6	650	39		295.6	35.55
57	61	6	51	5	462	2	584	33	7.3	299.8	31.74
65	97	4	67	6	334	4	492	12	6.9	290.0	49.86
69	94	6	93	5	600	16	742	12	7.5	247.0	29.51
73					760	8	822	14	8.0		
77	74	17	71	13	548	2	714	27			
81	82	3	95	55	470	0	536	4	7.6		
85	60	0	52	2	616	5	846	17	7.4		
89	132	6	121	4	532	5	702	30			
97	101	3	70	7	536	35	658	16			
105	118	2	89	3	428	11	598	19			

Table D.1 (corresponds to Table 5.2: Characteristics of wastewater used during pH source-effect experiment.)

Cycle	2 day TSS/VSS				2 day Inf COD				2 day pH	2 day Inf Alkalinity	2 day Inf NH3
	Avg TSS	StDev	Avg VSS	StDev	Soluble		Total				
					Avg COD	StDev	Avg COD	StDev			
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Avg	Avg Alk	Avg NH3	
1	585	17	266	10	834	17	1028	15	7.7	617.6	16.58
5	297	6	125	6	750	6	890	13			7.98
9	129	2	56	8	762	14	894	38	7.7	439.3	13.03
13	198	54	29	26	302	10	776	30			14.1
17	367	108	83	34	282	2	688	44	7.3	1144.3	16.76
21	124	2	32	4	906	8	1056	23			17.24

Table D.2a Cycle/Date correlation for 10 day SRT experiment

Cycle	Date	Cycle	Date
1-4	3/22/2002	113-116	4/19/2002
5-8	3/23/2002	116-120	4/20/2002
9-12	3/24/2002	121	4/21/2002
13-16	3/25/2002		
17-20	3/26/2002		
21-24	3/27/2002		
25-28	3/28/2002		
29-32	3/29/2002		
33-36	3/30/2002		
37-40	3/31/2002		
41-44	4/1/2002		
45-48	4/2/2002		
49-52	4/3/2002		
53-56	4/4/2002		
57-60	4/5/2002		
61-64	4/6/2002		
65-68	4/7/2002		
69-72	4/8/2002		
73-76	4/9/2002		
77-80	4/10/2002		
81-84	4/11/2002		
85-88	4/12/2002		
89-92	4/13/2002		
93-96	4/14/2002		
97-100	4/15/2002		
101-104	4/16/2002		
105-108	4/17/2002		
109-112	4/18/2002		

Table D.2b Cycle/Date correlation for 10 day SRT experiment

Cycle	Date
1-4	11/22/2002
5-8	11/23/2002
9-12	11/24/2002
13-16	11/25/2002
17-20	11/26/2002
21-24	11/27/2002
25	11/28/2002

Table D.3a (corresponds to Figure 5.1: Soluble effluent COD for 10 day SRT reactors exposed to various pH levels.)

Cycle	Control			IC15			IC25			IC50		
	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L
1	50.04	50	1.53	66.89	68	11.05	61.28	62	7.24	381.45	382	5.80
2	50.04	50	5.52	65.87	66	3.54	49.02	50	2.34	356.43	358	0.00
3	50.96	52	3.53	58.09	58	2.65	45.86	56	6.66	158.98	160	6.11
4	45.86	46	2.65	59.11	60	2.34	55.03	56	5.30	108.03	110	3.18
6	52.35	52	3.22	55.64	56	3.50	53.61	54	5.74	93.57	94	4.64
8	53.61	54	3.16	54.63	56	3.03	57.15	58	3.82	81.18	82	1.07
10	49.32	50	4.66	48.81	50	3.84	47.80	48	4.40	67.12	68	7.05
12	61.02	62	3.18	70.17	70	0.88	67.63	68	4.90	90.51	92	3.84
16	32.51	32	0.88	40.63	40	3.83	41.65	42	2.33	59.43	60	4.03
20	25.77	26	2.32	28.55	30	5.36	34.36	34	0.88	42.95	44	3.03
24	37.85	38	4.01	46.94	48	1.51	41.39	42	6.12	56.03	56	0.00
28	37.23	38	3.44	37.72	38	2.27	38.22	38	5.16	47.65	48	0.86
32	30.35	30	1.52	27.31	28	1.52	33.89	34	3.16	41.48	42	3.82
36	30.09	30	0.87	32.10	32	3.13	33.61	34	3.13	37.12	38	1.50
44	41.39	42	4.01	43.41	44	7.16	43.91	44	3.50	52.49	52	2.31
52	46.78	48	6.16	44.75	46	3.18	45.76	46	1.53	45.25	46	7.52
60	32.77	34	1.75	27.73	28	3.49	28.24	28	3.49	25.71	26	0.00
68	34.73	36	5.50	35.77	36	3.11	38.88	40	0.00	40.95	42	2.38
76	38.95	40	2.41	38.42	38	0.91	42.11	42	6.38	35.26	36	0.91
84	35.84	36	3.12	41.04	42	3.92	39.48	40	3.92	34.29	36	2.70
92	19.12	20	3.80	26.16	26	6.10	31.70	32	5.23	27.67	28	4.36
100	30.09	30	0.00	27.08	28	3.01	31.60	32	2.61	28.09	28	1.74
108	44.83	46	7.45	45.83	46	1.51	46.84	48	4.62	33.24	34	16.16
120	29.49	30	3.52	32.54	34	2.33	37.12	38	2.33	38.64	40	2.33

↳ Rounded to the nearest even number

Table D.3b (corresponds to Figure 5.1: Soluble effluent COD for 10 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	16.85	11.23	331.40	17.06	NORMAL	NORMAL	+ SIGNIFICANT
2	15.83	-1.02	306.38	8.19	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
3	7.13	-5.10	108.03	11.83	NORMAL	NORMAL	+ SIGNIFICANT
4	13.25	9.17	62.17	8.37	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
6	3.29	1.26	41.22	11.04	NORMAL	NORMAL	+ SIGNIFICANT
8	1.01	3.54	27.57	7.43	NORMAL	NORMAL	+ SIGNIFICANT
10	-0.51	-1.53	17.80	12.08	NORMAL	NORMAL	+ SIGNIFICANT
12	9.15	6.61	29.49	8.28	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
16	8.13	9.14	26.92	7.17	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
20	2.78	8.59	17.18	8.34	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT
24	9.09	3.53	18.17	9.39	NORMAL	NORMAL	+ SIGNIFICANT
28	0.50	0.99	10.42	7.83	NORMAL	NORMAL	+ SIGNIFICANT
32	-3.03	3.54	11.13	6.35	NORMAL	NORMAL	+ SIGNIFICANT
36	2.01	3.51	7.02	5.59	NORMAL	NORMAL	+ SIGNIFICANT
44	2.02	2.52	11.10	10.83	NORMAL	NORMAL	+ SIGNIFICANT
52	-2.03	-1.02	-1.53	12.16	NORMAL	NORMAL	NORMAL
60	-5.04	-4.54	-7.06	6.16	NORMAL	NORMAL	- SIGNIFICANT
68	1.04	4.15	6.22	8.48	NORMAL	NORMAL	NORMAL
76	-0.53	3.16	-3.68	8.16	NORMAL	NORMAL	NORMAL
84	5.19	3.64	-1.56	8.13	NORMAL	NORMAL	NORMAL
92	7.04	12.58	8.55	11.64	NORMAL	+ SIGNIFICANT	NORMAL
100	-3.01	1.50	-2.01	5.11	NORMAL	NORMAL	NORMAL
108	1.01	2.01	-11.58	21.69	NORMAL	NORMAL	NORMAL
120	3.05	7.63	9.15	6.30	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.4a (corresponds to Figure 5.2: Soluble effluent COD for 2 day SRT reactors exposed to various pH levels.)

Cycle	Control			IC15			IC25			IC50		
	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L	Avg COD mg/L	Rounded Avg	StDev mg/L
1	41.67	42	3.88	70.48	70	1.78	51.45	52	6.55	475.88	476	0.00
2	40.73	40	0.89	53.62	54	6.97	39.70	40	1.79	607.35	608	17.04
3	33.00	34	3.57	44.34	44	2.36	31.45	32	1.79	544.45	544	11.15
4	48.47	48	2.71	55.24	56	2.39	51.60	52	1.56	397.13	398	2.71
5	38.08	38	1.50	48.60	48	5.21	35.07	36	1.50	98.20	98	9.66
7	56.87	56	1.06	79.16	80	0.87	66.64	66	1.50			
9	44.00	44	5.21	49.43	50	4.45	32.63	32	3.09	63.77	64	1.71
11	38.56	38	1.71	52.40	52	1.48	41.77	42	3.34	70.20	70	4.45
13	39.42	40	2.59	42.91	42	5.67	42.91	42	9.02	78.84	78	1.73
15	50.40	50		47.40	48	3.12	48.40	48	2.59	85.32	86	2.29
19	26.23	26	3.15	41.97	42	4.16	32.00	32	0.91	59.80	60	3.28
23	39.26	40	3.93	57.59	58	4.94	45.15	46	1.96	74.60	74	3.93

↳ Rounded to the nearest even number

Table D.4b (corresponds to Figure 5.2: Soluble effluent COD for 2 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	28.81	9.77	434.21	10.62	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
2	12.89	-1.03	566.62	21.77	NORMAL	NORMAL	+ SIGNIFICANT
3	11.34	-1.55	511.45	16.40	NORMAL	NORMAL	+ SIGNIFICANT
4	6.78	3.13	348.66	6.48	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
5	10.52	-3.01	60.13	13.15	NORMAL	NORMAL	+ SIGNIFICANT
7	22.30	9.77	-56.87	2.39	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
9	5.44	-11.37	19.77	9.06	NORMAL	- SIGNIFICANT	+ SIGNIFICANT
11	13.84	3.21	31.64	7.06	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
13	3.49	3.49	39.42	13.05	NORMAL	NORMAL	+ SIGNIFICANT
15	-2.99	-2.00	34.93	5.47	NORMAL	NORMAL	+ SIGNIFICANT
19	15.74	5.77	33.57	7.32	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
23	18.32	5.89	35.34	9.04	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.5a (corresponds to Figure 5.3ab: Effluent TSS for 10 day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L
1	141	3	87	1	92	3	317	14
2	53	8	334	14	29	6	329	40
3	67	2	56	4	43	1	168	3
4	78	5	66	1	68	2	195	9
6	67	4	54	1	52	1	111	4
8	43	3	53	1	57	3	100	6
10	56	3	56	1	52	1	80	14
12	35	23	42	7	35	3	57	4
16	5	2	4	2	6	2	6	1
20	56	1	51	1	36	3	32	4
24	133	5	121	6	133		103	5
28	48	3	42	1	35	3	21	1
32	35	6	37	1	27	3	27	3
36	40	3	33	1	23	3	28	3
44	35	3	29	0	26	1	30	1
52	34	1	27	1	19	4	14	2
60	39	2	32	3	28	4	22	2
68	38	3	23	1	30	1	13	1
76	35	5	30	2	35	7	10	7
84	39	1	28	2	38	2	11	3
92	29	2	26	4	32	3	10	2
100	12	5	4	1	3	3	3	3
108	15	3	23	1	17	1	21	2
120	15	2	25	0	12	1	58	5

Table D.5b (corresponds to Figure 5.3ab: Effluent TSS for 10 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-53.67	-48.33	176.00	18.71	- SIGNIFICANT	- SIGNIFICANT	+ SIGNIFICANT
2	281.00	-23.67	276.11	50.99	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
3	-11.33	-24.00	101.00	6.33	- SIGNIFICANT	- SIGNIFICANT	+ SIGNIFICANT
4	-11.67	-9.33	117.00	12.66	NORMAL	NORMAL	+ SIGNIFICANT
6	-13.83	-15.00	43.33	6.17	- SIGNIFICANT	- SIGNIFICANT	+ SIGNIFICANT
8	10.50	13.67	56.67	7.99	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
10	-0.33	-4.33	23.33	17.35	NORMAL	NORMAL	+ SIGNIFICANT
12	7.33	0.33	22.33	28.47	NORMAL	NORMAL	NORMAL
16	-1.33	0.33	1.00	3.87	NORMAL	NORMAL	NORMAL
20	-5.00	-19.67	-24.00	6.26	NORMAL	- SIGNIFICANT	- SIGNIFICANT
24	-11.17	0.33	-29.67	11.71	NORMAL	NORMAL	- SIGNIFICANT
28	-6.00	-12.67	-26.67	5.84	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
32	2.33	-7.67	-7.67	8.42	NORMAL	NORMAL	NORMAL
36	-6.17	-16.33	-11.67	5.66	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
44	-5.67	-8.33	-5.00	3.90	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
52	-6.67	-14.33	-19.33	5.39	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
60	-6.67	-11.00	-16.67	6.07	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
68	-15.00	-7.67	-25.33	4.02	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
76	-4.83	-0.67	-25.00	12.96	NORMAL	NORMAL	- SIGNIFICANT
84	-11.83	-1.33	-28.33	4.82	- SIGNIFICANT	NORMAL	- SIGNIFICANT
92	-3.17	3.00	-18.67	6.13	NORMAL	NORMAL	- SIGNIFICANT
100	-8.00	-8.67	-9.00	7.56	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
108	7.67	1.33	6.00	4.24	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
120	10.17	-2.50	43.50	6.47	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.6a (corresponds to Figure 5.4: Effluent TSS for 2 day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L	Avg TSS mg/L	StDev mg/L
1	192	6	157	25	180	5	484	41
2	169	12	134	3	172	17	350	10
3	183	13	144	11	181	10	343	31
4	218	6	167	32	220	5	230	7
5	197	7	168	18	237	13	210	30
7	212	16	172	0	217	14	187	46
9	177	8	166	8	168	4	113	9
11	137	41	148	4	142	10	48	18
13	123	23	178	39	138	15	57	2
15	130	5	162	3	132	11	29	22
19	78	16	128	17	75	12	39	5
23	96	8	148	17	107	6	103	12

Table D.6b (corresponds to Figure 5.4: Effluent TSS for 2 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-34.17	-11.67	292.78	57.16	NORMAL	NORMAL	+ SIGNIFICANT
2	-35.33	2.67	180.67	27.86	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
3	-39.00	-1.67	159.78	43.08	NORMAL	NORMAL	+ SIGNIFICANT
4	-50.83	1.67	11.67	39.36	- SIGNIFICANT	NORMAL	NORMAL
5	-29.17	40.00	13.33	44.70	NORMAL	NORMAL	NORMAL
7	-39.67	5.67	-25.00	59.64	NORMAL	NORMAL	NORMAL
9	-10.67	-8.67	-63.33	17.90	NORMAL	NORMAL	- SIGNIFICANT
11	10.83	5.00	-88.67	54.07	NORMAL	NORMAL	- SIGNIFICANT
13	54.17	15.00	-66.00	55.89	NORMAL	NORMAL	- SIGNIFICANT
15	32.00	2.00	-100.67	29.52	+ SIGNIFICANT	NORMAL	- SIGNIFICANT
19	49.67	-3.67	-39.67	31.13	+ SIGNIFICANT	NORMAL	- SIGNIFICANT
23	52.00	10.67	6.67	27.29	+ SIGNIFICANT	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.7a (corresponds to Figure 5.5: Effluent soluble K+ levels in the 2-day SRT reactors exposed to various pH levels measured by AA.)

Cycle	Control		IC15		IC25		IC50	
	Avg K mg/L	StDev mg/L	Avg K mg/L	StDev mg/L	Avg K mg/L	StDev mg/L	Avg K mg/L	StDev mg/L
1	24.66	0.03	24.64	0.23	22.99	0.18	33.78	0.00
2	21.29	0.01	25.84	2.87	25.84	0.00	29.41	0.01
3	28.33	0.11	28.38	0.64	28.38	0.11	37.47	0.21
4	28.45	0.00	28.06	0.21	28.06	0.14	29.98	0.03
6	29.55	0.68	30.24	0.10	30.24	0.14	35.56	0.25
8	34.86	0.03	22.99	0.11	22.99	0.01	34.65	0.41
10	30.18	0.10	22.56	0.06	22.56	0.01	30.07	0.07
12	31.39	0.01	27.70	0.18	27.70	0.06	29.14	0.08
14	26.00	0.00	26.10	0.00	26.10	0.03	31.39	0.16
16	27.35	0.07	27.60	0.07	27.60	0.20	34.20	0.11
20	29.38	0.01	29.56	0.54	29.56	0.08	35.11	0.07
24	29.37	0.06	30.37	0.13	30.37	0.01	30.07	0.07

Table D.7b (corresponds to Figure 5.5: Effluent soluble K⁺ levels in the 2-day SRT reactors exposed to various pH levels measured by AA.)

Cycle	Dunnett's method for multiple comparison with a control Assumption: SD is the same for all series; a pooled SD is determined				Dunnett's t value for $\alpha= 0.05$: 2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-0.02	-1.67	9.12	0.34	NORMAL	- SIGNIFICANT	+ SIGNIFICANT
2	4.55	4.55	8.12	3.35	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
3	0.05	0.05	9.14	0.81	NORMAL	NORMAL	+ SIGNIFICANT
4	-0.39	-0.39	1.53	0.30	- SIGNIFICANT	- SIGNIFICANT	+ SIGNIFICANT
6	0.69	0.69	6.01	0.87	NORMAL	NORMAL	+ SIGNIFICANT
8	-11.87	-11.87	-0.21	0.50	- SIGNIFICANT	- SIGNIFICANT	NORMAL
10	-7.62	-7.62	-0.11	0.16	- SIGNIFICANT	- SIGNIFICANT	NORMAL
12	-3.69	-3.69	-2.25	0.25	- SIGNIFICANT	- SIGNIFICANT	NORMAL
14	0.10	0.10	5.39	0.18	NORMAL	NORMAL	+ SIGNIFICANT
16	0.25	0.25	6.85	0.29	NORMAL	NORMAL	+ SIGNIFICANT
20	0.18	0.18	5.73	0.64	NORMAL	NORMAL	+ SIGNIFICANT
24	1.00	1.00	0.70	0.18	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.8a (corresponds to Figure 5.6: Effluent NH₄-N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L
1	0.00	0.00	5.76	1.14	0.00	0.00	8.19	3.08
2	2.01	2.84	2.60	0.10	0.00	0.00	14.66	3.92
3	2.35	3.32	0.72	1.02	0.58	0.82	6.72	9.51
4	16.45	2.25	1.84	2.61	0.00	0.00	0.00	
6	0.00	0.00	0.00	0.00	0.00	0.00	8.80	12.45
8	0.00		0.00	0.00	0.00			
10	0.00	0.00	0.00	0.00	0.00	0.00	21.84	3.09
12	0.00		0.00	0.00	0.00	0.00	19.37	
16	0.00	0.00	0.00	0.00	0.00	0.00	19.25	3.37
20	0.00		0.00	0.00	0.00	0.00	18.72	
24	2.95	1.14	0.00	0.00	0.00	0.00	20.75	1.96
28	1.00	1.42	0.00	0.00	0.00	0.00	23.94	4.33
32	0.00	0.00	0.00	0.00	0.00	0.00	23.38	4.21
36	0.00	0.00	0.00	0.00	0.00	0.00	16.10	0.37
44	0.00		0.00	0.00	0.00	0.00	0.00	0.00
52	0.75	1.06	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table D.8a (corresponds to Figure 5.6: Effluent NH₄-N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	5.76	0.00	8.19	3.84	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
2	0.59	-2.01	12.65	5.66	NORMAL	NORMAL	+ SIGNIFICANT
3	-1.63	-1.77	4.37	11.86	NORMAL	NORMAL	NORMAL
4	-14.61	-16.45	-16.45	4.02	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
6	0.00	0.00	8.80	14.54	NORMAL	NORMAL	NORMAL
8	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
10	0.00	0.00	21.84	3.61	NORMAL	NORMAL	+ SIGNIFICANT
12	0.00	0.00	19.37	0.00	NORMAL	NORMAL	+ SIGNIFICANT
16	0.00	0.00	19.25	3.93	NORMAL	NORMAL	+ SIGNIFICANT
20	0.00	0.00	18.72	0.00	NORMAL	NORMAL	+ SIGNIFICANT
24	-2.95	-2.95	17.80	2.64	- SIGNIFICANT	- SIGNIFICANT	+ SIGNIFICANT
28	-1.00	-1.00	22.93	5.32	NORMAL	NORMAL	+ SIGNIFICANT
32	0.00	0.00	23.38	4.91	NORMAL	NORMAL	+ SIGNIFICANT
36	0.00	0.00	16.10	0.43	NORMAL	NORMAL	+ SIGNIFICANT
44	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
52	-0.75	-0.75	-0.75	1.24	NORMAL	NORMAL	NORMAL
60	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
68	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
76	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
84	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
92	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
100	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
108	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.9a (corresponds to Figure 5.7: Effluent NO₂-N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NO ₂ mg/L	StDev mg/L	Avg NO ₂ mg/L	StDev mg/L	Avg NO ₂ mg/L	StDev mg/L	Avg NO ₂ mg/L	StDev mg/L
1		0.58	0.00	0.00	0.00	1.04	0.81	0.43
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.23
32	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00	0.00	0.00	2.85	2.72
60	0.00	0.00	0.00	0.00	0.00	0.00	2.85	2.72
68	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.89
76	0.00	0.00	0.00	0.00	0.00	0.00		
84	0.00	0.00	0.00	0.00	0.00	0.00	2.19	2.35
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table D.9b (corresponds to Figure 5.7: Effluent NO₂N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-0.29	0.23	0.33	1.03	NORMAL	NORMAL	NORMAL
2	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
3	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
4	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
6	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
8	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
10	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
12	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
16	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
20	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
24	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
28	0.00	0.00	0.19	0.07	NORMAL	NORMAL	+ SIGNIFICANT
32	0.00	0.00	0.08	0.02	NORMAL	NORMAL	+ SIGNIFICANT
36	0.00	0.00	0.16	0.27	NORMAL	NORMAL	NORMAL
44							
52	0.00	0.00	2.79	0.10	NORMAL	NORMAL	+ SIGNIFICANT
60	0.00	0.00	2.79	0.10	NORMAL	NORMAL	+ SIGNIFICANT
68	0.00	0.00	1.69	1.33	NORMAL	NORMAL	+ SIGNIFICANT
76							
84	0.00	0.00	2.27	0.13	NORMAL	NORMAL	+ SIGNIFICANT
92	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
100	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
108	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
120	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.10a (corresponds to Figure 5.8: Effluent NO₃-N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NO3 mg/L	StDev mg/L	Avg NO3 mg/L	StDev mg/L	Avg NO3 mg/L	StDev mg/L	Avg NO3 mg/L	StDev mg/L
1	20.05	1.50	15.86	1.22	20.29	5.00	18.99	6.36
2	22.17	1.92	21.40	3.96	24.32	0.35	10.00	0.23
3	13.62	3.91	19.76	4.77	14.90	3.84	6.26	1.63
4	12.76	7.57	18.76	1.68	17.91	2.30	12.47	9.95
6	1.23	0.29	1.08	0.18	1.10	0.22	0.15	0.00
8	0.83	0.16	0.95	0.01	0.85	0.23	0.53	0.68
10	0.65	0.84	0.92	0.18	0.95	0.18	0.02	0.00
12	1.09	0.10	0.96	0.19	1.05	0.08	0.00	0.00
16	0.90	0.04	0.69	0.11	0.62	0.06	0.03	0.00
20	0.78	0.11	0.63	0.17	0.48	0.08	0.01	0.01
24	0.66	0.18	0.75	0.05	0.37	0.05	0.00	0.00
28	2.18	1.29	1.68	0.66	1.66	0.58	0.00	0.00
32	7.78	0.99	11.31	2.21	9.51	1.26	1.52	0.01
36	7.11	1.79	4.88	0.71	4.60	0.27	3.12	2.41
44	10.78	2.09	8.75	2.27	7.49	4.10	7.76	0.71
52	13.95	0.64	11.63	0.05	7.32	0.12	4.93	0.16
60	24.44	0.05	15.87	5.69	15.86	0.07	12.78	0.07
68	5.77	0.79	5.00	1.20	4.40	0.55	1.88	0.86
76	4.74	0.86	5.58	0.40	7.22	0.68	10.59	0.02
84	8.06	0.04	6.13	0.02	8.36	0.00	5.80	0.26
92	7.76	1.11	6.74	0.69	6.14	0.38	8.17	1.69
100	12.46	2.78	11.21	1.20	10.12	0.38	12.54	3.15
108	10.37	2.06	8.71	1.08	4.52	4.08	12.56	1.17
120	5.96	0.65	6.29	0.19	5.57	0.93	12.96	0.13

Table D.11a (corresponds to Figure 5.9: Actual SRT of the 2-day SRT reactors exposed various pH levels.)

Day	Control SRT (days)	pH 5 SRT (days)	pH 9 SRT (days)	pH 11 SRT (days)
1	1.521341	1.482358	1.527976	1.144625
2	1.565642	1.560814	1.58868	1.433757
3	1.633433	1.63115	1.637157	1.552884
4	1.607701	1.572175	1.620276	1.535246
5	1.585836	1.582278	1.607018	1.49925
6	1.618177	1.606309	1.637321	1.627694

Table D.10b (corresponds to Figure 5.8: Effluent NO₃-N for 10 day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-4.18	-18.83	0.24	9.72	NORMAL	- SIGNIFICANT	NORMAL
2	-0.76	-18.21	2.15	5.16	NORMAL	- SIGNIFICANT	NORMAL
3	6.14	-8.85	1.28	8.69	NORMAL	- SIGNIFICANT	NORMAL
4	6.00	-11.08	5.16	14.97	NORMAL	NORMAL	NORMAL
6	-0.15	-1.06	-0.14	0.47	NORMAL	- SIGNIFICANT	NORMAL
8	0.12	-0.82	0.02	0.86	NORMAL	NORMAL	NORMAL
10	0.26	-0.48	0.30	1.03	NORMAL	NORMAL	NORMAL
12	-0.12	-0.90	-0.04	0.27	NORMAL	- SIGNIFICANT	NORMAL
16	-0.21	-0.79	-0.27	0.15	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
20	-0.14	-0.61	-0.30	0.25	NORMAL	- SIGNIFICANT	- SIGNIFICANT
24	0.09	-0.61	-0.29	0.23	NORMAL	- SIGNIFICANT	- SIGNIFICANT
28	-0.50	-1.51	-0.52	1.82	NORMAL	NORMAL	NORMAL
32	3.54	-5.57	1.73	3.18	+ SIGNIFICANT	- SIGNIFICANT	NORMAL
36	-2.23	-6.40	-2.51	3.62	NORMAL	- SIGNIFICANT	NORMAL
44	-2.03	-8.51	-3.29	6.04	NORMAL	- SIGNIFICANT	NORMAL
52	-2.32	-13.90	-6.63	0.79	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
60	-8.58	-18.75	-8.58	6.65	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
68	-0.77	-4.57	-1.37	2.06	NORMAL	- SIGNIFICANT	NORMAL
76	0.83	-4.34	2.47	1.37	NORMAL	- SIGNIFICANT	+ SIGNIFICANT
84	-1.93	-8.04	0.30	0.31	- SIGNIFICANT	- SIGNIFICANT	NORMAL
92	-1.02	-7.06	-1.61	2.53	NORMAL	- SIGNIFICANT	NORMAL
100	-1.26	-11.27	-2.34	5.12	NORMAL	- SIGNIFICANT	NORMAL
108	-1.66	-9.29	-5.85	5.65	NORMAL	- SIGNIFICANT	- SIGNIFICANT
120	0.33	-5.77	-0.39	1.35	NORMAL	- SIGNIFICANT	NORMAL

Boldface denotes statistical recovery

Table D.12a (corresponds to Figure 5.10: Effluent ammonia-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L	Avg NH3 mg/L	StDev mg/L
1	0.00	0.00	6.01	0.02	3.52	0.03	0.00	0.00
2	0.00	0.00	4.08	0.21	0.00	0.00	9.88	0.57
3	0.00	0.00	3.27	0.69	0.00	0.00	11.76	0.76
4	0.00	0.00	3.81	0.17	0.00	0.00	11.81	0.04
6	2.69	0.00	4.62	0.02	2.93	0.00	0.00	0.00
8	4.35	0.58	5.56	0.58	4.71	0.02	0.00	0.00
10	0.00	0.00	1.88	2.66	2.81	0.02	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	7.31	0.16
16	0.00	0.00	0.00	0.00	0.00	0.00	7.10	0.35
20	2.93	0.04	2.72	0.02	3.02	0.03	8.81	0.15
24	0.00	0.00	0.00	0.00	0.00	0.00	5.79	0.49

Table D.12b (corresponds to Figure 5.10: Effluent ammonia-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	6.01	3.52	0.00	0.04	+ SIGNIFICANT	+ SIGNIFICANT	NORMAL
2	4.08	0.00	9.88	0.71	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
3	3.27	0.00	11.76	1.20	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
4	3.81	0.00	11.81	0.20	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT
6	1.93	0.25	-2.69	0.03	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
8	1.21	0.35	-4.35	0.95	+ SIGNIFICANT	NORMAL	- SIGNIFICANT
10	1.88	2.81	0.00	3.10	NORMAL	NORMAL	NORMAL
12	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
14	0.00	0.00	7.31	0.19	NORMAL	NORMAL	+ SIGNIFICANT
16	0.00	0.00	7.10	0.41	NORMAL	NORMAL	+ SIGNIFICANT
20	-0.21	0.10	5.88	0.19	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
24	0.00	0.00	5.79	0.57	NORMAL	NORMAL	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.13a (corresponds to Figure 5.11: Effluent nitrite-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L
1	0.81	0.06	0.00	0.00	1.03	0.04	0.00	0.00
2	0.84	0.04	0.40	0.57	0.86	0.13	0.00	0.00
3	0.39	0.55	0.00	0.00	0.83	0.04	0.00	0.00
4	0.23	0.33	0.00	0.00	0.39	0.55	0.39	0.55
6	0.50	0.70	0.00	0.00	0.00	0.00	0.00	0.00
8	0.59	0.83	0.97	0.13	1.03	0.09	0.93	0.56
10	0.89	0.00	0.71	0.18	0.79	0.79	0.00	0.00
12	0.82	0.30	0.99	0.02	1.02	0.03	0.00	0.00
14	0.45	0.03	0.53	0.07	0.58	0.01	0.29	0.41
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	1.16	0.07	0.85	0.07	1.13	0.03	0.23	0.32
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table D.14a (corresponds to Figure 5.12: Effluent nitrate-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L	Avg NO2 mg/L	StDev mg/L
1	1.40	0.01	0.63	0.89	1.37	0.00	0.60	0.85
2	3.40	0.19	2.29	1.39	1.44	0.02	0.00	0.00
3	0.73	1.04	1.35	0.04	1.49	0.05	0.61	0.86
4	0.65	0.92	1.36	0.04	1.47	0.20	1.40	0.29
6	0.78	1.10	1.41	0.02	1.29	0.02	0.65	0.92
8	0.83	1.18	1.52	0.01	1.69	0.22	1.65	0.31
10	1.59	0.04	1.52	0.13	1.62	0.50	1.21	0.01
12	1.70	0.21	1.56	0.00	2.41	0.01	1.24	0.02
14	1.88	0.01	1.70	0.27	2.43	0.00	1.22	1.72
16	1.32	0.02	1.20	0.00	0.91	1.28	1.65	0.15
20	1.89	0.10	1.40	0.04	2.03	0.00	1.35	0.18
24	1.41	0.00	1.23	0.01	1.43	0.29	1.66	0.03

Table D.13b (corresponds to Figure 5.11: Effluent nitrite-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-0.81	0.22	-0.81	0.09	- SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
2	-0.44	0.02	-0.84	0.68	NORMAL	NORMAL	- SIGNIFICANT
3	-0.39	0.44	-0.39	0.65	NORMAL	NORMAL	NORMAL
4	-0.23	0.15	0.15	0.98	NORMAL	NORMAL	NORMAL
6	-0.50	-0.50	-0.50	0.82	NORMAL	NORMAL	NORMAL
8	0.38	0.44	0.34	1.18	NORMAL	NORMAL	NORMAL
10	-0.17	-0.10	-0.89	0.94	NORMAL	NORMAL	NORMAL
12	0.17	0.20	-0.82	0.35	NORMAL	NORMAL	- SIGNIFICANT
14	0.08	0.13	-0.16	0.49	NORMAL	NORMAL	NORMAL
16	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL
20	-0.31	-0.04	-0.93	0.39	NORMAL	NORMAL	- SIGNIFICANT
24	0.00	0.00	0.00	0.00	NORMAL	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.14b (corresponds to Figure 5.12: Effluent nitrate-N in the 2-day SRT reactors exposed various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-0.78	-0.03	-0.80	1.43	NORMAL	NORMAL	NORMAL
2	-1.11	-1.96	-3.40	1.63	NORMAL	- SIGNIFICANT	- SIGNIFICANT
3	0.61	0.76	-0.12	1.58	NORMAL	NORMAL	NORMAL
4	0.71	0.82	0.75	1.15	NORMAL	NORMAL	NORMAL
6	0.63	0.51	-0.13	1.67	NORMAL	NORMAL	NORMAL
8	0.69	0.86	0.82	1.45	NORMAL	NORMAL	NORMAL
10	-0.07	0.03	-0.38	0.60	NORMAL	NORMAL	NORMAL
12	-0.14	0.72	-0.45	0.24	NORMAL	+ SIGNIFICANT	- SIGNIFICANT
14	-0.18	0.54	-0.67	2.03	NORMAL	NORMAL	NORMAL
16	-0.12	-0.41	0.32	1.51	NORMAL	NORMAL	NORMAL
20	-0.50	0.13	-0.55	0.25	- SIGNIFICANT	NORMAL	- SIGNIFICANT
24	-0.18	0.02	0.25	0.34	NORMAL	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.15a (corresponds to Figure 5.13: Effluent alkalinity for 10-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg Alk mg/L CaCO3	StDev mg/L CaCO3	Avg Alk mg/L CaCO3	StDev mg/L CaCO3	Avg Alk mg/L CaCO3	StDev mg/L CaCO3	Avg Alk mg/L CaCO3	StDev mg/L CaCO3
1	189.4	1.6	21.3	0.8	261.7	2.7	523.5	26.6
2	179.3	2.1	32.4	2.1	234.2	3.2	559.6	2.1
4	177.4	2.7	81.7	1.6	204.5	1.6	437.6	1.1
8	82.1	0.0	51.6	1.6	97.2	0.0	275.3	4.8
12	109.6	0.5	106.2	0.0	126.2	0.5	299.0	1.1
20	164.2	2.1	168.3	0.5	181.1	1.6	299.4	1.6
28	162.7	1.1	166.5	0.0	184.9	0.5	322.7	1.6
36	205.2	0.5	218.8	0.5	219.9	2.1	308.8	0.0
44	195.8	0.0	207.1	0.0	212.8	1.6	200.0	0.5
60	124.3	1.1	132.2	2.7	148.4	1.1	151.4	1.1
76	135.2	4.8	149.9	0.0	166.8	0.5	157.6	15.7
92	192.1	0.0	203.7	0.5	205.6	0.0	193.2	0.5
108	152.5	2.7	171.4	2.7	176.6	1.6	175.1	8.0
120	195.8	1.1	206.8	0.5	212.0	1.6	192.4	0.5

Table D.15a (corresponds to Figure 5.13: Effluent alkalinity for 10-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-168.15	72.31	334.04	31.32	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
2	-146.87	54.98	380.37	5.70	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
4	-95.66	27.12	260.23	4.26	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
8	-30.50	15.06	193.20	5.90	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
12	-3.39	16.57	189.43	1.52	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
20	4.14	16.95	135.20	3.68	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
28	3.77	22.22	160.06	2.33	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
36	13.56	14.69	103.57	2.64	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
44	11.30	16.95	4.14	1.97	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
60	7.91	24.10	27.12	3.78	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
76	14.69	31.63	22.41	19.19	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT
92	11.67	13.56	1.13	0.88	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
108	18.83	24.10	22.60	10.48	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
120	10.92	16.19	-3.39	2.41	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT

Boldface denotes statistical recovery

Table D.16a (corresponds to Figure 5.14: Effluent pH for 10-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg pH	StDev	Avg pH	StDev	Avg pH	StDev	Avg pH	StDev
1	7.9	0.0	6.6	0.0	8.1	0.0	9.8	0.0
2	8.0	0.0	6.7	0.0	8.1	0.0	8.8	0.0
3	8.0		7.2		8.1		8.3	
4	8.0	0.0	7.5	0.0	8.1	0.0	8.5	0.0
6	7.7		7.4		7.8		8.4	
8	7.8	0.0	7.5	0.1	7.9	0.0	8.3	0.0
10	7.4		7.4		7.5		8.2	
12	7.8	0.1	7.7	0.0	7.7	0.0	8.2	0.0
16	7.8		7.8		7.8		8.2	
20	7.9	0.0	7.9	0.0	7.9	0.0	8.2	0.0
24	8.0		7.9		7.9		8.1	
28	8.1	0.1	8.1	0.0	8.2	0.0	8.2	0.0
32	7.9		7.9		7.9		7.9	
36	8.1	0.0	8.2	0.0	8.1	0.0	8.1	0.0
44	8.1	0.0	8.1	0.0	8.1	0.0	8.1	0.0
60	7.9	0.0	7.7	0.3	7.8	0.0	8.0	0.1
68	8.0		7.9		7.8		8.0	
76	8.0	0.0	8.0	0.0	8.0	0.0	8.0	0.0
84	7.8		7.8		7.8		7.8	
92	7.9	0.1	8.0	0.0	8.3	0.2	8.1	0.0
100	8.0		7.9		7.9		7.9	
108	8.2	0.0	8.1	0.0	8.1	0.0	8.0	0.0
120	8.1	0.0	8.0	0.0	8.1	0.0	8.1	0.0

Table D.16b (corresponds to Figure 5.14: Effluent pH for 10-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha=0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-1.34	0.22	1.93	0.02	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
2	-1.31	0.10	0.77	0.02	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
3							
4	-0.43	0.12	0.58	0.07	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
6							
8	-0.26	0.11	0.51	0.11	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
10							
12	-0.14	-0.05	0.42	0.09	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
16							
20	-0.03	0.02	0.31	0.06	NORMAL	NORMAL	+ SIGNIFICANT
24							
28	0.00	0.13	0.10	0.07	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT
32							
36	0.05	0.01	-0.02	0.04	+ SIGNIFICANT	NORMAL	NORMAL
44							
60	-0.16	-0.07	0.14	0.34	NORMAL	NORMAL	NORMAL
68							
76	0.00	0.00	0.01	0.08	NORMAL	NORMAL	NORMAL
84							
92	0.10	0.36	0.23	0.24	NORMAL	+ SIGNIFICANT	NORMAL
100							
108	-0.05	-0.07	-0.15	0.05	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
120	-0.07	0.05	0.03	0.05	- SIGNIFICANT	+ SIGNIFICANT	NORMAL

Boldface denotes statistical recovery

Table D.17a (corresponds to Figure 5.15: Effluent alkalinity for 2-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg Alk	StDev	Avg Alk	StDev	Avg Alk	StDev	Avg Alk	StDev
	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3	mg/L CaCO3
1	523.3	1.6	52.9	3.3	613.0	4.9	1076.4	3.3
2	497.3	0.7	153.2	2.0	561.7	0.7	888.7	
4	540.5	3.3	316.3	1.6	560.1	1.6	738.3	0.0
7	558.9	6.5	456.6	11.4	560.1	8.1	650.9	3.3
11	476.6	6.5	432.4	6.5	454.9	16.3	501.9	0.7
15	479.3	0.0	465.3	6.8	490.4	15.6	510.1	9.8
24	450.8	6.5	465.1	0.7	454.0	3.3	483.0	0.0

Table D.18a (corresponds to Figure 5.16: Effluent pH for 2-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg pH	StDev	Avg pH	StDev	Avg pH	StDev	Avg pH	StDev
1	8.2	0.1	7.0	0.0	8.3	0.0	10.3	0.0
2	8.2	0.0	8.0	0.0	8.5	0.1	9.5	0.0
3	8.2		7.9		8.3		8.7	
4	8.3	0.0	8.2	0.0	8.4	0.0	8.3	0.0
5	8.3		8.1		8.3		8.4	
7	8.2	0.0	8.3	0.0	8.4	0.1	8.5	0.0
9	8.2		8.2		8.2		8.4	
11	8.4	0.0	8.4	0.0	8.6	0.0	8.6	0.0
13	8.3		8.3		8.3		8.2	
15	8.2	0.0	8.3	0.0	8.3	0.0	8.3	0.1
19	8.3		8.2		8.3		8.2	
23	8.3	0.0	8.2	0.0	8.3	0.0	8.1	0.0

Table D.17b (corresponds to Figure 5.15: Effluent alkalinity for 2-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-470.35	89.70	553.15	8.06	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
2	-344.08	64.40	391.46	2.52	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
4	-224.25	19.55	197.80	4.65	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
7	-102.35	1.15	92.00	18.41	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
11	-44.16	-21.62	25.30	21.83	- SIGNIFICANT	NORMAL	+ SIGNIFICANT
15	-14.03	11.04	30.82	22.93	NORMAL	NORMAL	+ SIGNIFICANT
24	14.26	3.22	32.20	8.53	+ SIGNIFICANT	NORMAL	+ SIGNIFICANT

Boldface denotes statistical recovery

Table D.18b (corresponds to Figure 5.16: Effluent pH for 2-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-1.18	0.13	2.10	0.11	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
2	-0.23	0.23	1.24	0.08	- SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
3							
4	-0.15	0.09	-0.04	0.07	- SIGNIFICANT	+ SIGNIFICANT	NORMAL
5							
7	0.10	0.18	0.24	0.09	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
9							
11	0.00	0.14	0.15	0.09	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT
13							
15	0.07	0.08	0.08	0.09	NORMAL	NORMAL	NORMAL
19							
23	-0.09	-0.01	-0.19	0.03	- SIGNIFICANT	NORMAL	- SIGNIFICANT

Boldface denotes statistical recovery

Table D.19 (corresponds to Figure 5.17: SVI values for the 10-day SRT reactors exposed to various pH levels.)

Cycle	Control SVI (ml/g)	IC15 SVI (ml/g)	IC25 SVI (ml/g)	IC50 SVI (ml/g)
2	51.7	55.9	54.5	44.9
5	57.3	64.3	62.1	46.6
9	71.3	79.9	75.1	57.5
13	80.4	76.8	73.7	61.4
17	89.6	83.1	87.4	85.2
21	72.4	69.3	69.2	66.2
25	99.7	98.8	104.7	104.9
29	61.5	62.5	47.8	48.5
33	82.8	85.5	87.9	87.4
37	91.5	91.5	96.1	113.3
45	95.0	92.8	111.7	126.3
53	88.0	90.7	105.8	135.6
61	78.2	82.2	79.9	127.4
69	75.0	76.2	83.4	151.1
77	73.9	64.9	67.9	191.7
85	76.6	73.5	72.4	170.7
93	66.7	70.6	72.6	162.1
101	66.1	64.6	87.1	98.5
121	79.5	86.3	111.6	79.9

Table D.20 (corresponds to Figure 5.18: SVI values for the 2-day SRT reactors exposed to various pH levels.)

Cycle	Control SVI (ml/g)	IC15 SVI (ml/g)	IC25 SVI (ml/g)	IC50 SVI (ml/g)
2	135.3	192.4	134.4	85.8
3	123.6	151.9	118.8	72.0
5	121.1	138.2	116.5	70.3
8	189.9	223.3	188.3	85.0
12	212.1	233.8	230.0	98.6
16	135.1	129.7	121.1	54.2
20	111.5	103.2	109.8	46.8
24	170.7	149.4	162.3	51.7

Table D.21a (corresponds to Figure 5.19: MLSS concentration in the 10-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L
2	1393	13	1431	10	1469	21	1247	9
5	1536	14	1492	12	1675	44	1374	48
9	1347	12	1302	28	1384	37	1113	19
13	1293	13	1353	12	1411	37	1173	28
17	1249	72	1251	10	1236	25	1033	0
21	1657	59	1731	32	1733	37	1570	5
25	1284	21	1336	11	1376	7	1296	23
29	1560	35	1664	38	1673	13	1650	24
33	1740	35	1778	47	1820	31	1830	80
37	1749	23	1924	38	1916	34	1907	0
45	1684	8	1896	60	1791	45	1900	19
53	1909	39	2118	50	2042	20	2123	14
61	2149	54	2433	35	2404	4	2387	9
69	1920	20	2204	27	2207	40	2330	5
77	1896	42	2220	93	2240	42	2420	19
85	1776	32	2067	37	2100	12	2250	14
93	1920	53	2380	37	2316	21	2517	5
101	1938	47	2104	17	2391	45	2600	19
121	2213	20	2409	27	2509	28	2303	71

Table D.22a (corresponds to Figure 5.20: MLSS concentration in the 2-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L	Avg MLSS mg/L	StDev mg/L
1	2070	61	1580	30	2143	32	1865	64
3	2007	74	1580	62	2020	10	1555	49
5	1850	17	1447	38	1923	35	1480	28
8	1053	29	896	15	1062	8	847	28
12	773	7	684	20	800	18	487	9
16	1007	21	863	12	1057	31	590	14
20	1077	40	930	26	1093	15	855	21
24	1120	26	960	0	1080	35	770	28

Table D.21b (corresponds to Figure 5.19: MLSS concentration in the 10-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
2	37.78	75.56	-146.67	32.38	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
5	-44.00	138.67	-162.00	76.17	NORMAL	+ SIGNIFICANT	- SIGNIFICANT
9	-44.44	37.78	-233.33	57.41	NORMAL	NORMAL	- SIGNIFICANT
13	60.00	117.78	-120.00	55.76	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
17	1.78	-13.78	-216.00	86.55	NORMAL	NORMAL	- SIGNIFICANT
21	74.22	76.44	-86.89	85.88	NORMAL	NORMAL	- SIGNIFICANT
25	52.00	92.00	12.00	37.63	+ SIGNIFICANT	+ SIGNIFICANT	NORMAL
29	104.44	113.33	90.00	65.70	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
33	37.78	80.00	90.00	116.80	NORMAL	NORMAL	NORMAL
37	175.56	166.67	157.78	62.71	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
45	211.11	106.67	215.56	88.05	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
53	208.89	133.33	214.44	76.62	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
61	284.44	255.56	237.78	72.93	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
69	284.44	286.67	410.00	58.94	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
77	324.44	344.44	524.44	125.50	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
85	291.11	324.44	474.44	58.46	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
93	460.00	395.56	596.67	76.74	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
101	166.67	453.33	662.22	78.97	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
121	195.56	295.56	90.00	93.37	+ SIGNIFICANT	+ SIGNIFICANT	NORMAL

Boldface denotes statistical recovery

Table D.22b (corresponds to Figure 5.20: MLSS concentration in the 2-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-490.00	73.33	-205.00	110.64	- SIGNIFICANT	NORMAL	- SIGNIFICANT
3	-426.67	13.33	-451.67	122.56	- SIGNIFICANT	NORMAL	- SIGNIFICANT
5	-403.33	73.33	-370.00	69.00	- SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
8	-157.78	8.89	-206.67	49.53	- SIGNIFICANT	NORMAL	- SIGNIFICANT
12	-88.89	26.67	-286.67	32.96	- SIGNIFICANT	NORMAL	- SIGNIFICANT
16	-143.33	50.00	-416.67	46.36	- SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
20	-146.67	16.67	-221.67	61.75	- SIGNIFICANT	NORMAL	- SIGNIFICANT
24	-160.00	-40.00	-350.00	58.42	- SIGNIFICANT	NORMAL	- SIGNIFICANT

Boldface denotes statistical recovery

Table D.23a (corresponds to Figure 5.21: MLVSS concentration in the 10-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L
2	1202	30	1253	47	1209	48	887	27
5	1219	15	1209	13	1303	41	982	22
9	1147	12	1144	25	1171	25	887	8
13	1093	12	1144	10	1191	25	947	38
17	992	79	993	12	973	7	747	17
21	1337	32	1400	23	1387	35	1227	9
25	1116	12	1159	5	1185	14	1084	13
29	1300	50	1396	50	1338	27	1260	20
33	1482	25	1516	54	1540	35	1537	45
37	1496	28	1642	39	1624	44	1600	13
45	1453	7	1649	62	1549	30	1600	34
53	1660	13	1873	31	1769	33	1837	7
61	1811	40	2040	24	2013	20	1977	33
69	1662	17	1900	31	1893	24	1940	20
77	1682	62	1927	96	1938	65	2083	33
85	1569	17	1796	17	1811	10	1927	17
93	1682	50	2076	38	2024	21	2170	25
101	1616	37	1747	23	1967	50	2140	18
121	1893	18	2044	43	2138	19	1943	48

Table D.24a (corresponds to Figure 5.22: MLVSS concentration in the 2-day SRT reactors exposed to various pH levels.)

Cycle	Control		IC15		IC25		IC50	
	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L	Avg MLVSS mg/L	StDev mg/L
1	1357	57	1260	26	1373	21	920	20
3	1370	44	1267	6	1350	26	820	12
5	1240	0	1123	23	1267	25	825	15
8	713	18	702	17	727	7	543	18
12	533	7	513	37	551	8	350	24
16	743	42	687	21	760	26	390	23
20	747	42	697	31	770	10	530	32
24	813	31	763	15	770	10	530	10

Table D.23b (corresponds to Figure 5.21: MLVSS concentration in the 10-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
2	51.11	6.67	-315.56	88.05	NORMAL	NORMAL	- SIGNIFICANT
5	-9.33	84.00	-236.67	56.95	NORMAL	+ SIGNIFICANT	- SIGNIFICANT
9	-2.22	24.44	-260.00	43.06	NORMAL	NORMAL	- SIGNIFICANT
13	51.11	97.78	-146.67	53.88	NORMAL	+ SIGNIFICANT	- SIGNIFICANT
17	1.33	-18.67	-245.33	91.69	NORMAL	NORMAL	- SIGNIFICANT
21	63.11	49.78	-110.22	60.45	+ SIGNIFICANT	NORMAL	- SIGNIFICANT
25	42.67	69.33	-32.00	25.83	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
29	95.56	37.78	-40.00	88.69	+ SIGNIFICANT	NORMAL	NORMAL
33	33.33	57.78	54.44	93.02	NORMAL	NORMAL	NORMAL
37	146.67	128.89	104.44	74.95	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
45	195.56	95.56	146.67	86.44	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
53	213.33	108.89	176.67	53.18	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
61	228.89	202.22	165.56	68.42	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
69	237.78	231.11	277.78	52.82	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
77	244.44	255.56	401.11	152.69	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
85	226.67	242.22	357.78	34.62	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
93	393.33	342.22	487.78	80.15	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
101	131.11	351.11	524.44	77.29	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
121	151.11	244.44	50.00	78.25	+ SIGNIFICANT	+ SIGNIFICANT	NORMAL

Boldface denotes statistical recovery

Table D.24b (corresponds to Figure 5.22: MLVSS concentration in the 2-day SRT reactors exposed to various pH levels.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
1	-96.67	16.67	-436.67	77.62	- SIGNIFICANT	NORMAL	- SIGNIFICANT
3	-103.33	-20.00	-550.00	59.14	- SIGNIFICANT	NORMAL	- SIGNIFICANT
5	-116.67	26.67	-415.00	42.07	- SIGNIFICANT	NORMAL	- SIGNIFICANT
8	-11.11	13.33	-170.00	34.62	NORMAL	NORMAL	- SIGNIFICANT
12	-20.00	17.78	-183.33	51.02	NORMAL	NORMAL	- SIGNIFICANT
16	-56.67	16.67	-353.33	65.56	NORMAL	NORMAL	- SIGNIFICANT
20	-50.00	23.33	-216.67	69.31	NORMAL	NORMAL	- SIGNIFICANT
24	-50.00	-43.33	-283.33	41.56	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT

Boldface denotes statistical recovery

Table D.25 (corresponds to Figure 5.23ab: Mixed liquor pH in the 10-day SRT reactors.)

Cycle	Control	pH 5	pH 9	pH 11
1	7.7	7.1	7.8	9.1
2	7.6	7.0	7.7	8.4
3	7.6	7.3	7.7	8.0
5	7.5	7.3	7.6	8.0
6	7.5	7.3	7.5	8.0
9	7.4	7.1	7.4	8.1
10	7.4	7.3	7.4	7.7
13	7.5	7.6	7.5	8.1
17	7.6	7.6	7.6	8.0
21	7.7	7.7	7.7	8.0
25	7.7	7.7	7.7	7.9
29	7.7	7.7	7.7	7.9
33	7.7	7.6	7.6	7.8
37	7.8	7.8	7.7	8.0
45	7.9	8.0	8.0	8.2
61	7.5	7.5	7.5	7.5
69	7.6	7.5	7.5	7.7
77	7.4	7.4	7.4	7.5
85	7.3	7.3	7.3	7.5
93	7.3	7.9	7.7	7.9
101	7.6	7.4	7.5	7.7
121	7.8	7.6	7.5	7.7

Table D.26 (corresponds to Figure 5.24: Mixed liquor pH in the 2-day SRT reactors.)

Cycle	Control	pH 5	pH 9	pH 11
0	8.1	5.0	9.0	11.1
1	8.1	7.7	8.3	10.0
2	8.3	8.0	8.3	9.3
3	8.2	8.0	8.3	8.5
5	8.3	8.2	8.3	8.3
6	8.5	8.4	8.5	8.2
8	8.3	8.2	8.3	8.3
10	8.3	8.3	8.4	8.5
12	8.3	8.3	8.3	8.3
13	8.3	8.3	8.3	8.1
16	8.1	8.1	8.2	8.3
20	8.3	8.3	8.3	8.3
24	8.1	8.1	8.2	8.3

Table D.27a (corresponds to Figure 5.25: SOUR results for 10-day SRT biomass exposed to various pHs.)

Cycle	Control		IC15		IC25		IC50	
	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev
2	62.39	6.04	40.60	2.13	22.80	0.05	6.95	0.16
5	34.07	1.00	54.94	1.87	46.18	1.47	30.74	0.37
9	63.47	3.47	57.42	0.79	64.47	2.70	63.26	2.09
13	91.08	15.98	89.30	9.93	89.65	3.11	73.86	2.99
21	79.19	21.89	73.26	1.68	75.02	4.15	72.30	0.91
29	78.16	0.22	83.05	2.93	88.47	5.56	97.04	9.00
37	73.46	2.13	98.74	1.81	95.89	2.55	108.22	1.71
53	34.58	1.21			107.31	19.63	139.69	23.19
69	84.65	7.29	73.37	1.11	77.61	6.36	24.27	1.57
85	75.53	5.41	64.13	6.92	104.23	6.33	21.92	1.33
101	91.79	0.71	103.46	2.08	88.33	4.25	70.72	3.05

Associated average MLVSS measurements found in Table D.23a

Table D.28a (corresponds to Figure 5.26: SOUR results for 2-day SRT biomass exposed to various pHs.)

Cycle	Control		IC15		IC25		IC50	
	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev	Avg SOUR mg O ₂ /g-MLVSS-hr	StDev
2	60.67	6.31	66.65	1.22	63.58	8.41	0.71	0.78
4	74.35	5.96	78.87	2.13	73.79	2.94	19.70	0.61
8	67.94	16.51	91.20	15.26	63.45	4.73	72.46	3.14
11	110.86	16.38	142.99	10.65	110.01	7.34	95.66	3.27
15	145.30	9.22	151.66	10.19	127.16	6.86	98.28	3.79
24	105.89	1.33	116.07	5.73	96.11	4.40	102.56	4.90

Associated average MLVSS measurements found in Table D.24a

Table D.27b (corresponds to Figure 5.25: SOUR results for 10-day SRT biomass exposed to various pHs.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
2	-21.79	-39.59	-55.44	7.48	- SIGNIFICANT	- SIGNIFICANT	- SIGNIFICANT
5	20.87	12.10	-3.33	3.04	+ SIGNIFICANT	+ SIGNIFICANT	- SIGNIFICANT
9	-6.05	1.00	-0.20	5.75	- SIGNIFICANT	NORMAL	NORMAL
13	-1.79	-1.43	-17.23	22.54	NORMAL	NORMAL	NORMAL
21	-5.93	-4.17	-6.89	26.11	NORMAL	NORMAL	NORMAL
29	4.89	10.31	18.88	12.82	NORMAL	NORMAL	+ SIGNIFICANT
37	25.28	22.43	34.76	4.85	+ SIGNIFICANT	+ SIGNIFICANT	+ SIGNIFICANT
53	-34.58	72.73	105.11	35.51	NORMAL	+ SIGNIFICANT	+ SIGNIFICANT
69	-11.28	-7.04	-60.38	11.52	NORMAL	NORMAL	- SIGNIFICANT
85	-11.40	28.70	-53.61	12.74	NORMAL	+ SIGNIFICANT	- SIGNIFICANT
101	11.67	-3.46	-21.07	6.63	+ SIGNIFICANT	NORMAL	- SIGNIFICANT

Boldface denotes statistical recovery

Table D.28b (corresponds to Figure 5.26: SOUR results for 2-day SRT biomass exposed to various pHs.)

Cycle	Dunnett's method for multiple comparison with a control				Dunnett's t value for $\alpha= 0.05$:		
	Assumption: SD is the same for all series; a pooled SD is determined				2.88, 3.62		
	IC15 - Control	IC25 - Control	IC50 - Control	Sp*...*t	IC15	IC25	IC50
2	5.98	2.90	-59.96	12.39	NORMAL	NORMAL	- SIGNIFICANT
4	4.52	-0.56	-54.65	8.18	NORMAL	NORMAL	- SIGNIFICANT
8	23.27	-4.48	4.53	27.08	NORMAL	NORMAL	NORMAL
11	32.12	-0.85	-15.20	24.67	+ SIGNIFICANT	NORMAL	NORMAL
15	6.37	-18.14	-47.02	18.47	NORMAL	NORMAL	- SIGNIFICANT
24	10.18	-9.77	-3.32	10.31	NORMAL	NORMAL	NORMAL

Boldface denotes statistical recovery

Table D.29a (corresponds to Figure 5.27: NGR results for 10 day SRT biomass exposed to various pHs.)

Cycle	Control NGR 1 (mg N-NO ₃ -/g VSS.hr)	IC15 NGR (mg N-NO ₃ -/g VSS.hr)	IC25 NGR 1 (mg N-NO ₃ -/g VSS.hr)	IC50 NGR 1 (mg N-NO ₃ -/g VSS.hr)
2	2.77	2.19	1.34	0.00
5	2.25	2.65	2.47	0.00
9	3.41	5.07	1.92	1.82
13	1.71	2.53	2.26	0.00
21	0.12	0.11	0.08	0.00
30	0.44	0.37	0.10	0.00
37	0.55	0.82	0.62	0.04
53	2.39	2.03	1.53	0.00
69	1.01	0.00	0.03	1.69
85	0.00	0.00	1.30	0.02
101	1.25	0.47	1.17	2.46
113	1.01	0.97	1.58	2.80

Associated average MLVSS measurements found in Table D.23a

Table D.30 Potassium AA Analysis to verify validity of 1:20 dilutions

Sample	Potassium (mg/L)		
	Repeat 1	Repeat 2	Repeat 3
2 day SRT Pilot Plant Biomass Sample #1	1.074	1.073	1.071
2 day SRT Pilot Plant Biomass Sample #2	1.158	1.14	1.141
2 day SRT Pilot Plant Biomass Sample #3	1.101	1.107	1.106
10 day SRT Pilot Plant Biomass Sample #1	1.67	1.674	1.671
10 day SRT Pilot Plant Biomass Sample #2	1.675	1.684	1.68
10 day SRT Pilot Plant Biomass Sample #3	1.693	1.679	1.693

Each repeat value is an average of three AA injections.

The excellent correlation between the three repeats for the three samples for each SRT biomass illustrates that the dilution volume or procedure is not responsible for variations seen in any potassium data.

Table D.31 Free Ammonia Calculations using Anthonisen et al. (1976)

Cycle	pH				Cycle	Total Ammonia Conc. (mg/L as N)				Free Ammonia Conc. (mg/L as NH3)			
	Control	pH 5	pH 9	pH 11		Control	pH 5	pH 9	pH 11	Control	pH 5	pH 9	pH11
1	7.7	7.1	7.8	9.1	1	0.00	5.76	0.00	8.19	0.00	0.04	0.00	3.10
2	7.6	7.0	7.7	8.4	2	2.01	2.60	0.00	14.66	0.04	0.01	0.00	1.54
3	7.6	7.3	7.7	8.0	3	2.35	0.72	0.58	6.72	0.04	0.01	0.01	0.32
4	7.6	7.3	7.6	8.0	4	16.45	1.84	0.00	0.00	0.28	0.02	0.00	0.00
5	7.5	7.3	7.6	8.0	6	0.00	0.00	0.00	8.80	0.00	0.00	0.00	0.42
6	7.5	7.3	7.5	8.0	8	0.00	0.00	0.00		0.00	0.00	0.00	0.00
9	7.4	7.1	7.4	8.1	10	0.00	0.00	0.00	21.84	0.00	0.00	0.00	1.18
10	7.4	7.3	7.4	7.7	12	0.00	0.00	0.00	19.37	0.00	0.00	0.00	0.42
13	7.5	7.6	7.5	8.1	16	0.00	0.00	0.00	19.25	0.00	0.00	0.00	1.11
17	7.6	7.6	7.6	8.0	20	0.00	0.00	0.00	18.72	0.00	0.00	0.00	0.86
21	7.7	7.7	7.7	8.0	24	2.95	0.00	0.00	20.75	0.06	0.00	0.00	0.94
25	7.7	7.7	7.7	7.9	28	1.00	0.00	0.00	23.94	0.03	0.00	0.00	0.95
29	7.7	7.7	7.7	7.9	32	0.00	0.00	0.00	23.38	0.00	0.00	0.00	0.77
33	7.7	7.6	7.6	7.8	36	0.00	0.00	0.00	16.10	0.00	0.00	0.00	0.51
37	7.8	7.8	7.7	8.0	44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	7.9	8.0	8.0	8.2	52	0.75	0.00	0.00	0.00	0.03	0.00	0.00	0.00
61	7.5	7.5	7.5	7.5	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	7.6	7.5	7.5	7.7	68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	7.4	7.4	7.4	7.5	76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	7.3	7.3	7.3	7.5	84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	7.3	7.9	7.7	7.9	92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	7.6	7.4	7.5	7.7	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	7.8	7.6	7.5	7.7	108	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Free Ammonia (FA) Calculation Equation:

$$FA \text{ as } NH_3 \text{ (mg/L)} = (17/14) * ((\text{Total Ammonia as N (mg/L)} * 10^{\text{pH}}) / ((K_b/K_w) + (10^{\text{pH}})))$$

where K_b is the ionization constant of the ammonia equilibrium equation and K_w is the ionization constant of water. Both constants vary with temperature. The ratio of $K_b:K_w$ may be related to temperature: $K_b : K_w = e^{(6344/(273 + \text{temp (deg C))})}$

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