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APPENDIX A

Table A-1

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.15 m.

Oxygen Saturation Value Cs = 7.85 mg/l

Time, t min	D.O. Measured Cl mg/l	C.O. Deficit $C_s - C_1$ mg/l
0	1.50	6.35
2	2.15	5.70
5	2.67	5.18
10	3.60	4.25
15	4.58	3.27
20	5.07	2.78
25	5.70	2.15
30	6.04	1.81
40	6.53	1.32
50	6.9	0.95
60	7.2	0.65

Table A-2

Sample : Tap Water

Operating Condition : Tank Temperature = 29°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.15 m.

Oxygen Saturation Value Cs= 7.8 mg/l

Time, t min	C.O. Measured Cl mg/l	C.O. Deficit, $C_s - C_l$ mg/l
0	0.5	7.3
2	1.00	6.80
5	1.55	6.25
10	2.65	5.15
15	3.65	4.15
20	4.20	3.60
25	4.80	3.00
30	5.30	2.50
40	6.05	1.75
50	6.50	1.30
60	6.85	0.95

Table A-3

Sample : Tap Water

Operating Condition : Tank Temperature = 29°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.15 m.

Oxygen Saturation Value Cs= 7.8 mg/l

Time, t min.	D.O. Measured, Cl mg/l	C.O. Deficit $C_s - C_l$ mg/l
0	0.8	7.0
2	0.95	6.85
5	1.3	6.50
10	2.33	5.47
15	3.27	4.53
20	4.0	3.80
25	4.55	3.25
30	5.15	2.65
40	5.9	1.9
50	6.33	1.47
60	6.80	1.00

Table A-4

Sample : Tap Water

Operating Condition : Tank Temperature = 29.8°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.20 m.

Oxygen Saturation Value Cs- 7.64 mg/l.

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.5	7.14
2	1.35	6.29
5	1.85	5.79
10	2.77	4.87
15	3.60	4.04
20	4.45	3.19
25	5.10	2.54
30	5.53	2.11
40	6.10	1.54
50	6.5	1.14
60	6.87	0.77
70	7.10	0.54

Table A-5

Sample : Tap Water

Operating Codition : Tank Temperature = 29.2°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.20 m.

Oxygen Saturation Value Cs = 7.76 mg/l

Time, t min.	D.O. Measured, Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.65	7.11
2	1.5	6.26
5	2.1	5.66
10	2.95	4.81
15	4.0	3.76
20	4.40	3.36
25	5.00	2.76
30	5.65	2.11
40	6.15	1.61
50	6.50	1.26
60	7.00	0.76
70	7.2	0.56

Table A-6

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.20 m.

Oxygen Saturation Value C_s = 7.85 mg/l

Time, t min.	D.O. Measured, Cl mg/l	D.O. Deficit, $C_s - C_l$ mg/l
0	0.35	7.5
2	0.9	6.95
5	1.45	6.40
10	2.65	5.20
15	3.45	4.40
20	4.00	3.85
25	4.60	3.25
30	5.10	2.75
40	5.95	1.90
50	6.30	1.55
60	6.70	1.15
70	6.90	0.95

Table A-7

Sample : Tap Water

Operating Condition : Tank Temperature = 29°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.25 m.

Oxygen Sauration Value Cs = 7.80 mg/l

Time, t min.	D.O. Measured, Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	0.20	7.60
2	0.80	7.00
5	1.60	6.20
10	2.65	5.15
15	3.60	4.20
20	4.15	3.65
25	4.75	3.05
30	5.25	2.55
40	6.10	1.70
50	6.6	1.20
60	7.00	0.8

Table A-8

Sample : Tap Water

Operating Condition : Tank Temperature = 29°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.25 m.

Oxygen Saturation Value Cs= 7.8 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.2	7.6
2	0.7	7.2
5	1.45	6.35
10	2.70	5.10
15	3.60	4.20
20	4.25	3.55
25	4.90	2.90
30	5.30	2.50
40	6.0	1.8
50	6.6	1.20
60	7.0	0.8
70	7.05	0.75

Table A-9

Sample : Tap Water

Operating Condition : Tank Temperature = $28^{o}C$

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.25 m.

Oxygen Saturation Value Cs= 7.9 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.75	7.15
2	1.10	6.80
5	1.60	6.20
10	2.60	5.20
15	3.60	4.20
20	4.15	3.65
25	4.75	3.15
30	5.25	2.65
40	5.95	1.95
50	6.60	1.3
60	6.90	1.0

Table A-10

Sample : Tap Water

Operating Condition : Tank Temperature = 28°C

Deptth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.9 mg/l

Time, t min.	D.O. Measure Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.60	7.30
2	1.40	6.50
5	1.87	6.03
10	2.90	5.00
15	4.03	3.87
20	4.60	3.30
25	5.20	2.70
30	5.70	2.20
40	6.25	1.65
50	6.80	1.10
60	7.15	0.75
70		

Table A-11

Sample : Tap Water

Operating Condition : Tank Temperature = 28°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.9 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.30	7.60
2	1.12	6.78
5	1.85	6.05
10	2.80	5.10
15	3.45	4.45
20	4.22	3.68
25	4.80	3.10
30	5.40	2.50
40	6.15	1.75
50	6.70	1.20
60	7.05	0.85
70		

Table A-12

Sample : Tap Water

Operating Condition : Tank Temperature = 27.5°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 8.0 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.50	7.50
2	1.15	8.85
5	2.00	6.00
10	2.55	5.45
15	3.47	4.53
20	4.32	3.68
25	4.80	3.20
30	5.40	2.60
40	6.10	1.90
50	6.65	1.35
60	7.00	1.00
70		

Table A-13

Sample : Tap Water

Operating Condition : Tank Temperature = 28°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.35 m.

Oxygen Saturation Value Cs= 7.9 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	0.70	7.20
2	1.80	6.10
5	2.15	5.75
10	3.13	4.77
15	3.90	4.00
20	4.47	3.43
25	4.95	2.95
30	5.65	2.25
40	6.35	1.55
50	6.93	0.97
60	7.15	0.75
70		

Table A-14

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.35 m.

Oxygen Saturation Value Cs = 7.85 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.60	7.25
2	1.53	6.32
5	1.85	6.00
10	2.85	5.00
15	3.75	4.10
20	4.45	3.40
25	5.25	2.90
30	5.45	2.40
40	6.20	1.65
50	6.65	1.20
60	7.00	0.85
70		

Table A-15

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.35 m.

Oxygen Saturation Value Cs= 7.85 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	2.05	5.80
2	2.95	4.90
5	3.15	4.70
10	3.70	4.15
15	4.35	3.32
20	4.93	2.92
25	5.50	2.35
30	5.90	1.95
40	6.40	1.45
50	6.90	0.95
60	7.23	0.62
70	7.35	0.50

Table A-16

Sample : Tap Water

Operating Condition : Tank Temperature = 29.6°C

Depth of Water = 0.30 m.

Volume of Water = 1.30 m^3.

Flow Rate = 19.7 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.68 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0	7.68
2	0.40	7.28
5	1.40	6.28
10	2.00	5.68
15	2.80	4.88
20	3.30	4.38
25	3.90	3.78
30	4.40	3.28
40	4.08	2.60
50	5.72	1.96
60	6.28	1.40
70	6.80	0.88

Table A-17

Sample : Tap Water

Operating Condition : Tank Temperature = 29.5°C

Depth of Water = 0.30 m.

Volume of Water = 1.30 m^3.

Flow Rate = 14.6 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.7 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.90	6.80
2	1.60	6.10
5	2.20	5.50
10	2.80	4.90
15	3.20	4.50
20	3.70	4.00
25	4.20	3.50
30	4.50	3.20
40	5.10	2.60
50	5.60	2.10
60	6.00	1.70
70	6.40	1.30

Table A-18

Sample : Tap Water

Operating Condition : Tank Temperature = 30°C

Depth of Water = 0.30 m.

Volume of Water = 1.30 m^3.

Flow Rate = 12.0 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.6 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.70	6.90
2	1.10	6.50
5	1.60	6.00
10	2.00	5.60
15	2.70	4.90
20	3.00	4.60
25	3.50	4.10
30	4.20	3.40
40	4.70	2.90
50	5.30	2.30
60	5.80	1.80
70	6.10	1.50

Table A-19

Sample : Tap Water

Operating Condition : Tank Temperature = 30°C

Depth of Water = 0.30 m.

Volume of Water = 1.30 m^3.

Flow Rate = 9.6 Lt/min.

Tray Spacing = 0.30 m.

Oxygen Saturating Value Cs= 7.6 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.60	7.00
2	0.80	6.80
5	1.60	6.00
10	2.00	5.60
15	2.50	5.10
20	3.00	4.60
25	3.30	4.30
30	3.80	3.80
40	4.40	3.20
50	4.80	2.80
60	5.30	2.30
70	5.90	1.70

Table A-20

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of water = 0.25 m.

Volume of Water = 1.10 m^3.

Flow Rate = 23.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs=7.85 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	0.90	6.95
2	2.00	5.85
5	2.85	5.00
10	3.75	4.10
15	4.30	3.55
20	4.90	2.95
25	5.35	2.50
30	5.75	2.10
40	6.35	1.50
50	6.85	1.00
60	7.05	0.80
70		

Table A-21

Sample : Tap Water

Operating Condition : Tank Temperature = 27°C

Depth of Water = 0.25 m.

Volume of Water = 1.10 m^3.

Flow Rate = 19.7 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 8.1 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	1.10	7.00
2	1.75	6.35
5	2.35	5.75
10	3.35	4.75
15	3.95	4.15
20	4.30	3.80
25	4.95	3.15
30	5.30	2.80
40	6.13	1.97
50	6.77	1.33
60	7.00	1.10
70		

Table A-22

Sample : Tap Water

Oxperaing Condition : Tank Temperature = 27.8°C

Depth of Water = 0.25 m.

Volume of Water = 1.10 m^3.

Flow Rate = 14.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.94 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	0.80	7.14
2	1.48	6.47
5	2.17	5.77
10	2.55	5.39
15	3.45	4.49
20	4.00	3.94
25	4.45	3.49
30	4.75	2.89
40	5.50	2.44
50	6.10	1.84
60	6.55	1.39
70	6.80	1.14

Table A-23

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Deoth of Water = 0.25 m.

Volume of Water = 1.10 m^3.

Flow Rate = 12.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation balue Cs = 7.85 mg/l

Time, t min	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.30	7.55
2	0.75	7.10
5	1.75	6.60
10	1.68	6.17
15	2.25	5.60
20	3.05	4.80
25	3.50	4.35
30	4.05	3.80
40	5.20	2.65
50	5.60	2.25
60	6.20	1.65
70	6.60	1.25

Table A-24

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.25 m.

Volume of Water = 1.10 m^3.

Flow Rate = 9.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.85 mg/l

Time, t min	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	0.90	6.95
2	1.85	6.00
5	2.35	5.50
10	2.75	5.10
15	3.70	4.15
20	4.25	3.60
25	4.60	3.25
30	5.25	2.60
40	5.95	1.90
50	6.40	1.45
60	6.75	1.10
70	7.10	0.75

Table A-25

Sample : Tap Water

Operating Condition : Tank Temperature = $27^{o}C$

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 23.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 8.1 mg/l

Time, t min	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	1.60	6.50
2	2.55	5.55
5	3.60	4.50
10	4.20	3.90
15	4.92	3.18
20	5.68	2.42
25	6.10	2.00
30	6.59	1.51
40	6.95	1.15
50	7.40	0.70
60	7.60	0.50
70	7.80	0.30

Table A-26

Sample : Tap Water

Operating Condition : Tank Temperature = 28.2°C

Depth of Water = 0.20 m.

Volume of Water = 0.90 m^3.

Flow Rate = 12.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.88 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	1.92	5.96
2	3.10	4.78
5	3.93	3.95
10	4.28	3.60
15	4.87	3.01
20	5.47	2.41
25	5.72	2.16
30	6.20	1.68
40	6.65	1.23
50	6.93	0.95
60	7.23	0.65
70		

Table A-27

Sample : Tap Water

Operating Condition : Tank Temperature = 27.5°C

Depth of Water = 0.15 m.

Volume of Water = 0.70 m^3.

Flow Rate = 23.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 8.0 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	1.40	6.60
2	2.40	5.60
5	3.58	4.42
10	4.90	3.10
15	5.52	2.48
20	6.05	1.95
25	6.40	1.60
30	6.95	1.10
40	7.40	0.60
50	7.70	0.30
60	7.90	0.10
70		

Table A-28

Sample : Tap Water

Operating Condition : Tank Temperature = 29.8°C

Depth of Water = 0.15 m.

Volume of Water = 0.70 m^3.

Flow Rate = 19.7 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.64 ng/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	2.90	4.74
2	3.90	3.74
5	4.60	3.04
10	5.30	2.34
15	5.80	1.84
20	6.30	1.34
25	6.60	1.04
30	7.00	0.64
40	7.20	0.44
50	7.30	0.34
60		
70		

Table A-29

Sample : Tap Water

Operating Condition : Tank Temperature = 29.8°C

Depth of Water = 0.15 m.

Volume of Water = 0.70 m^3.

Flow Rate = 14.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.64 mg/l

Time , t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	1.10	6.54
2	1.40	6.24
5	3.00	6.40
10	4.50	3.14
15	5.00	2.64
20	5.70	1.94
25	6.10	1.54
30	6.40	1.24
40	7.00	0.64
50	7.25	0.39
60		
70		

Table A-30

Sample : Tap Water

Operating Condition : Tank Temperature = 29.5°C

Depth of Water = 0.15 m.

Volume of Water = 0.70 m^3.

Flow Rate = 12.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.7 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_1$ mg/l
0	1.40	6.30
2	2.40	5.30
5	3.10	4.60
10	4.20	3.50
15	5.10	2.60
20	5.50	2.20
25	6.20	1.50
30	6.50	1.20
40	6.95	0.75
50	7.27	0.43
60	7.43	0.27
70		

Table A-31

Sample : Tap Water

Operating Condition : Tank Temperature = $28^{o}C$

Depth of Water = 0.15 m.

Volume of Water = 0.70 m^{3}.

Flow Rate = 9.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs = 7.9 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	1.60	6.30
2	2.40	5.50
5	3.40	4.50
10	4.10	3.80
15	5.03	2.87
20	5.42	2.48
25	5.95	1.95
30	6.50	1.40
40	6.85	1.05
50	7.30	0.60
60	7.55	0.35
70		

Table A-32

Sample : Tap Water

Operating Condition : Tank Temperature = 29°C

Depth of Water = 0.10 m.

Volume of Water = 0.50 m^3.

Flow Rate = 19.7 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.8 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.20	7.60
2	0.30	7.50
5	1.78	6.02
10	3.55	4.25
15	5.20	2.60
20	6.00	1.80
25	6.50	1.30
30	6.80	1.00
40	7.30	0.50
50	7.55	0.25
60		
70		

Table A-33

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.10 m.

Volume of Water = 0.5 m^3.

Flow Rate = 14.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.85 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.80	7.05
2	1.75	6.10
5	3.28	4.57
10	4.10	3.75
15	5.43	2.42
20	6.05	1.80
25	6.50	1.35
30	6.85	1.00
40	7.25	0.60
50	7.55	0.30
60		
70		

Table A-34

Sample : Tap Water

Operating Condition : Tank Temperature = 28.5°C

Depth of Water = 0.10 m.

Volume of Water = 0.50 m^3.

Flow Rate = 12.0 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.85 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0.85	7.00
2	2.10	5.75
5	3.20	4.65
10	4.12	3.73
15	5.40	2.45
20	6.00	1.85
25	6.50	1.35
30	6.80	1.05
40	7.20	0.60
50	7.50	0.35
60		
70		

Table A-35

Sample : Tap Water

Operating Condition : Tank Temperature = 28°C

Depth of Water = 0.10 m.

Volume of Water = 0.50 m^3.

Flow Rate = 9.6 l/min.

Tray Spacing = 0.30 m.

Oxygen Saturation Value Cs= 7.9 mg/l

Time, t min.	D.O. Measured Cl mg/l	D.O. Deficit $C_s - C_l$ mg/l
0	0	7.90
2	0.40	7.50
5	0.90	7.00
10	2.30	5.60
15	4.00	3.90
20	5.50	2.40
25	6.00	1.90
30	6.50	1.40
40	6.90	1.00
50	7.20	0.70
60	7.40	0.50
70		

APPENDIX B

SAMPLE OF CALCULATION

The determination of $K_{La(T)}$, $K_{L(20^{o}C)}$ and Pearson (r) by the method of least squares for Table A-1

x = time (min)	$C_s - C_l$ mg/l	$y = \log (C_s - C_l)$	y^2
0	6.35	0.80277	0.644439
2	5.70	0.75587	0.571339
5	5.18	0.71433	0.510267
10	4.25	0.62839	0.394874
15	3.27	0.51455	0.264762
20	2.78	0.44404	0.197172
25	2.15	0.33244	0.110516
30	1.81	0.25768	0.066399
40	1.32	0.12057	0.014537
50	0.95	1.97770	0.000497

$n = 10$
$x = 197$
$x^2 = 6379$
$y = 4.54834$
$y^2 = 2.774802$
$xy = 47.71554$

$n.\ xy = 477.1554$
$x.\ y = 896.02298$
$n.\ x^2 = 63,790.0$
$(x)^2 = 38809.0$
$n.\ y^2 = 27.74802$
$(y)^2 = 20.68739$

From $n.A + x.B = y$

$x.A + x^2.B = xy$

Substitute $10A + 197B = 4.54834$ ----------(1)

$197A + 6379B = 47.71554$ ----------(2)

$B = -0.016767$

Therefore $K_{La(T)} = \frac{-0.016767}{0.4343}$

$= -0.0386 \quad min^{-1}$

From $K_{La(20^oC)} = K_{La(T)} \cdot \theta^{(20-T)}$

$T(average) = 28.5^oC$

$\theta = 1.024$

Therefore $K \quad K_{La(20^oC)} = -0.0386 \times 1.024^{-8.5}$

$= -0.0321 \quad min^{-1}$

$= -1.926 \quad hr^{-1}$

From Paarson (r) $= \frac{n.\ xy - (x)(y)}{n.\ x^2 - (x)^2 \quad n.\ y^2 - (y)^2}$

Substitute $r = \frac{477.155 - 896.02298}{(63,790 - 38.809)(27.748 - 20.68}$

$= \frac{418.86}{176,381.6}$

$= \pm 0.9973$

Sample of computation table A-1
by Graphical Method
DISSOLVED OXYGEN DEFICIT ($c_s - c_l$) mg/l
time in minutes
10
9
8
7
6
5
4
3
2
1
.9
.8
.7
.6
.5
.4
.3
.2
0
10
20
30
40
50
60
$K_{La} = \frac{\log \frac{6.0}{0.45} \times 2.3}{70-0}$
$= 0.0369 \quad min^{-1}$
$= 2.216 \quad hr^{-1}$
$K_{La(20)} = 0.0369 \times 1.024^{(20-28.5)}$
$= 0.0307 \quad min^{-1}$
$= 1.845 \quad hr^{-1}$

APPENDIX C

TABLE OF RESULTS

It is during to make a summary of all necessary results in one complete table, the following notes have been set up:-

Nt	=	number of Tabl A in Appendix A
Fr	=	flow rate of water (l/min)
S	=	tray spacing (cm)
V	=	volume of water (l)
H	=	hourse power consumption (hp)
K_{La}	=	overall oxygen transfer coefficient at $20^{o}C$ (hr^{-1X}
r	=	Pearson value

Table A-1 to Table A-15, the volume of water in the ditch is kept constant at 900 litres, tray spacing is varied from 15 cm to 35 cm centre to centre.

Table A-16 to Table A-35, tray spacing is kept constant at 30 cm, the volume of water is varied from 500 litres to 1300 litres.

Nt	Fr	S	V	H	K_{La}	Oxygen transfer rate		r
						lb O_2/hr/hp	Kg O_2/hr/Kw	
1	19.7	15	900	0.013161	1.896	2.201	1.338	0.9974
2	14.6	15	900	0.009754	1.698	3.005	1.827	0.9994
3	9.6	15	900	0.006413	1.596	4.147	2.521	0.9983
4	19.7	20	900	0.013161	1.776	2.321	1.411	0.9976
5	14.6	20	900	0.009754	1.698	2.953	1.795	0.9960
6	9.6	20	900	0.066413	1.590	4.353	2.647	0.9982
7	19.7	25	900	0.013161	1.776	2.409	1.464	0.9996
8	14.6	25	900	0.009754	1.776	3.251	1.976	0.9993
9	9.6	25	900	0.006413	1.674	4.376	2.660	0.9992
10	19.7	30	900	0.013161	1.866	2.419	1.470	0.9987
11	14.6	30	900	0.009754	1.794	3.247	1.974	0.9994
12	9.6	30	900	0.006413	1.710	4.602	2.798	0.9992
13	19.7	35	900	0.013161	1.902	2.437	1.482	0.9993
14	14.6	35	900	0.009754	1.758	3.075	1.870	0.9994
15	9.6	35	900	0.006413	1.716	3.796	2.308	0.9980
16	19.7	30	1300	0.013161	1.284	2.572	1.564	0.9988
17	14.6	30	1300	0.009754	1.080	2.634	1.601	0.9967
18	12.0	30	1300	0.008017	1.026	3.117	1.895	0.9976
19	9.6	30	1300	0.006413	0.876	3.366	2.046	0.9964

Nt	Fr	S	V	H	K_{La}	Oxygen Transfer Rate		r
						lb/O_2/hr/hp	kg O_2/hr/hp	
20	23.0	30	1100	0.015365	1.800	2.443	1.485	0.9973
21	19.7	30	1100	0.013161	1.608	2.400	1.450	0.9975
22	14.6	30	1100	0.009754	1.314	2.744	1.668	0.9968
23	12.0	30	1100	0.008017	1.212	3.262	1.883	0.9949
24	9.6	30	1100	0.006413	1.506	4.726	2.873	0.9978
25	23.0	30	900	0.015365	2.190	2.149	1.307	0.9971
26	12.0	30	900	0.008017	1.746	3.154	1.917	0.9971
27	23.0	30	700	0.015365	2.976	2.331	1.417	0.9977
28	19.7	30	700	0.013161	2.574	1.901	1.156	0.9912
29	14.6	30	700	0.009754	2.676	3.429	2.085	0.9975
30	12.0	30	700	0.008017	2.532	3.800	2.310	0.9990
31	9.6	30	700	0.006413	2.262	4.136	2.515	0.9977
32	19.7	30	500	0.013161	3.396	2.560	1.556	0.9985
33	14.6	30	500	0.009754	3.042	2.887	1.755	0.9984
34	12.0	30	500	0.008017	2.904	3.334	2.027	0.9981
35	9.6	30	500	0.006413	2.180	3.447	2.096	0.984

VITA

The suthor graduated from Chulalongkorn University in 1966 with a Bachelor Degree in Civil Engineering. After graduation he joined the Telephone Organization of Thailand as a professional civil engineer for two years and then was admitted to the Graduated School, Chulalongkorn University to pursue his Diploma course in Sanitary Engineering. After finishing his two - years Diploma course he candidated for the Degree of Master of Engineering in Senitary Engineering.