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Appendix A

Appendix A: The calibration curve of MT

Table A-1 The triplicate calibrated area of each concentration of MT by the HPLC

Concentration	Area		
	1	2	3
0.01	2,074	2,100	2,013
0.05	10,586	10,987	11,008
0.10	19,556	19,548	20,833
0.25	59,482	61,654	56,881
0.50	104,754	113,328	108,495
1.00	203,286	198,782	199,936
2.00	400,317	399,612	410,692
3.00	610,872	599,395	608,762

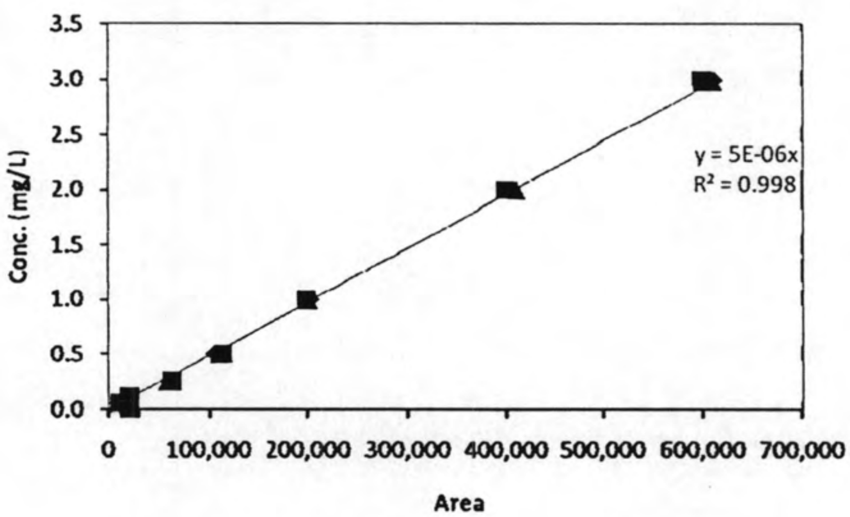

Figure A-1 The calibration curve of MT

Appendix B

Table B-1 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:1

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	1	2.08	0.56	1.52	2.08
2	1	1	1	2.08	0.39	1.69	
3	2	1	1	2.08	0.37	1.71	
4	4	1	1	2.08	0.39	1.69	
5	6	1	1	2.08	0.34	1.74	1.89
6	9	1	1	2.08	0.28	1.80	
7	12	1	1	2.08	0.22	1.86	
8	15	1	1	2.08	0.22	1.86	1.94
9	24	1	1	2.08	0.16	1.92	
10	48	1	1	2.08	0.13	1.95	
11	72	1	1	2.08	0.10	1.98	1.94

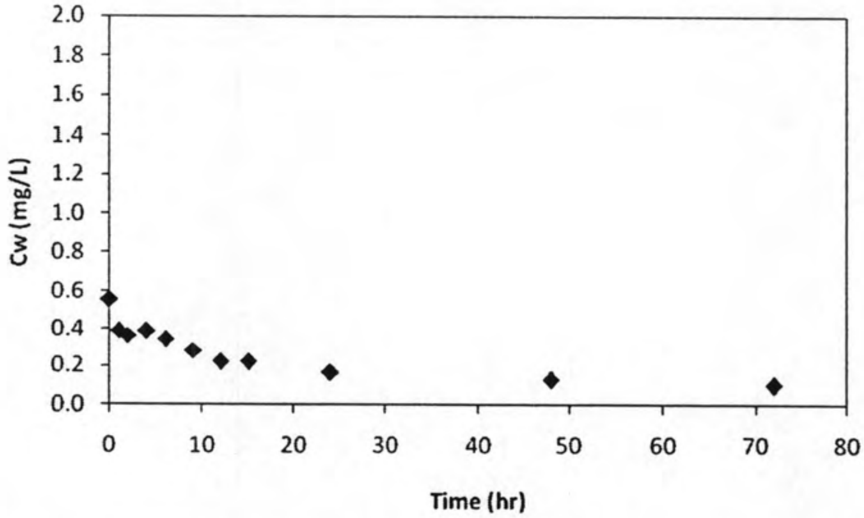

Figure B-1 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:1 test

Table B-2 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:5

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	5	2.08	1.48	3.02	2.08
2	1	1	5	2.08	1.45	3.17	
3	2	1	5	2.08	1.42	3.31	
4	4	1	5	2.08	1.34	3.68	
5	6	1	5	2.08	1.32	3.81	1.89
6	9	1	5	2.08	1.24	4.18	
7	12	1	5	2.08	1.21	4.36	
8	15	1	5	2.08	1.19	4.47	1.94
9	24	1	5	2.08	1.13	4.77	
10	48	1	5	2.08	1.07	5.08	
11	72	1	5	2.08	1.12	4.78	1.94

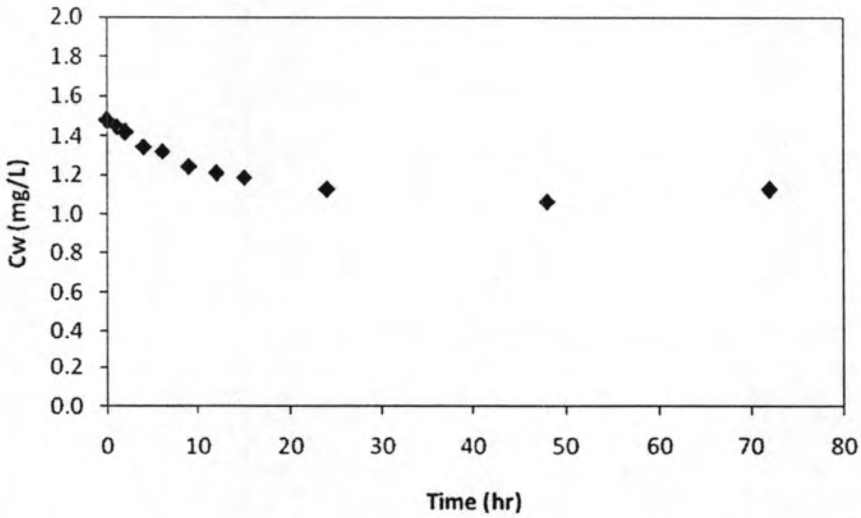

Figure B-2 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:5 test

Table B-3 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:10

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	10	2.08	1.69	3.94	2.08
2	1	1	10	2.08	1.61	4.73	
3	2	1	10	2.08	1.55	5.35	
4	4	1	10	2.08	1.46	6.16	
5	6	1	10	2.08	1.48	6.05	1.89
6	9	1	10	2.08	1.42	6.65	
7	12	1	10	2.08	1.34	7.44	
8	15	1	10	2.08	1.35	7.34	1.94
9	24	1	10	2.08	1.37	7.09	
10	48	1	10	2.08	1.21	8.67	
11	72	1	10	2.08	1.20	8.79	1.94

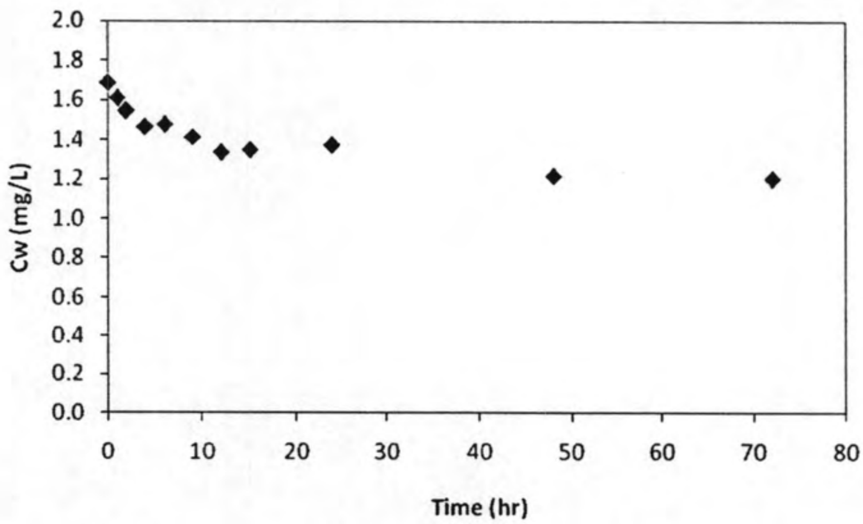

Figure B-3 Kinetic sorption of sand showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:10 test

Table B-4 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:5

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	5	2.08	0.50	7.92	2.08
2	1	1	5	2.08	0.42	8.32	
3	2	1	5	2.08	0.33	8.73	
4	4	1	5	2.08	0.18	9.52	
5	6	1	5	2.08	0.06	10.10	1.89
6	9	1	5	2.08	0.07	10.06	
7	12	1	5	2.08	0.03	10.27	
8	15	1	5	2.08	<DL	-	1.94
9	24	1	5	2.08	<DL	-	
10	48	1	5	2.08	<DL	-	
11	72	1	5	2.08	<DL	-	1.94

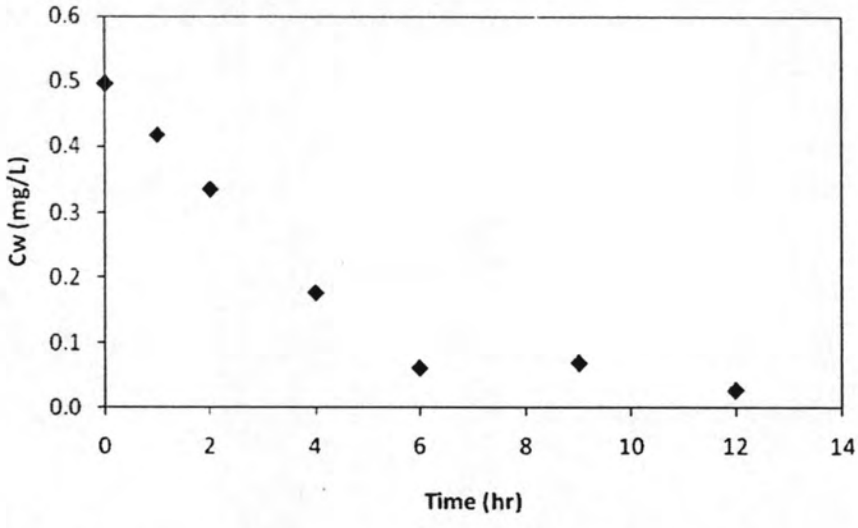

Figure B-4 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:5 test

Table B-5 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:10

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control - conc. (mg/L)
1	0	1	10	2.08	0.43	16.47	2.08
2	1	1	10	2.08	0.38	17.05	
3	2	1	10	2.08	0.35	17.29	
4	4	1	10	2.08	0.27	18.08	
5	6	1	10	2.08	0.24	18.44	1.89
6	9	1	10	2.08	0.20	18.79	
7	12	1	10	2.08	0.20	18.77	
8	15	1	10	2.08	0.20	18.83	1.94
9	24	1	10	2.08	0.20	18.85	
10	48	1	10	2.08	0.19	18.94	
11	72	1	10	2.08	0.20	18.81	1.94

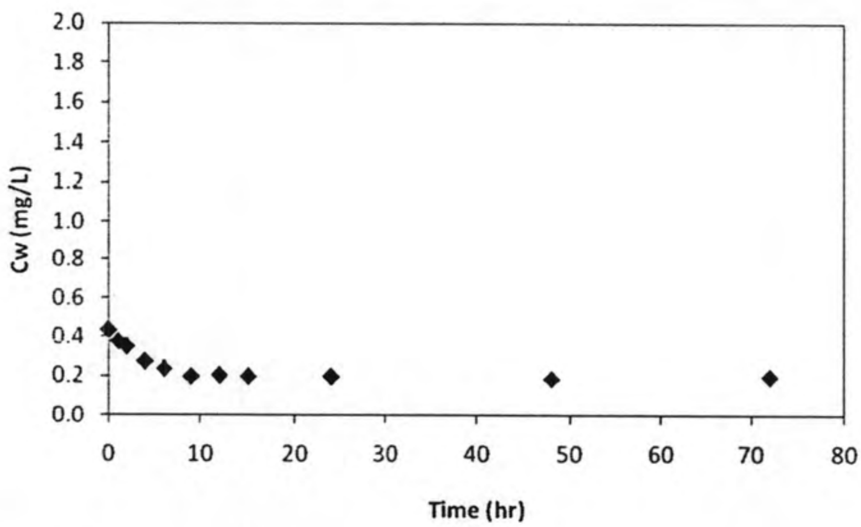

Figure B-5 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:10 test

Table B-6 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:20

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	20	2.08	0.79	25.82	2.08
2	1	1	20	2.08	0.72	27.25	
3	2	1	20	2.08	0.61	29.40	
4	4	1	20	2.08	0.45	32.57	
5	6	1	20	2.08	0.42	33.27	1.89
6	9	1	20	2.08	0.38	33.99	
7	12	1	20	2.08	0.40	33.70	
8	15	1	20	2.08	0.37	34.25	1.94
9	24	1	20	2.08	0.37	34.16	
10	48	1	20	2.08	0.37	34.26	
11	72	1	20	2.08	0.37	34.23	1.94

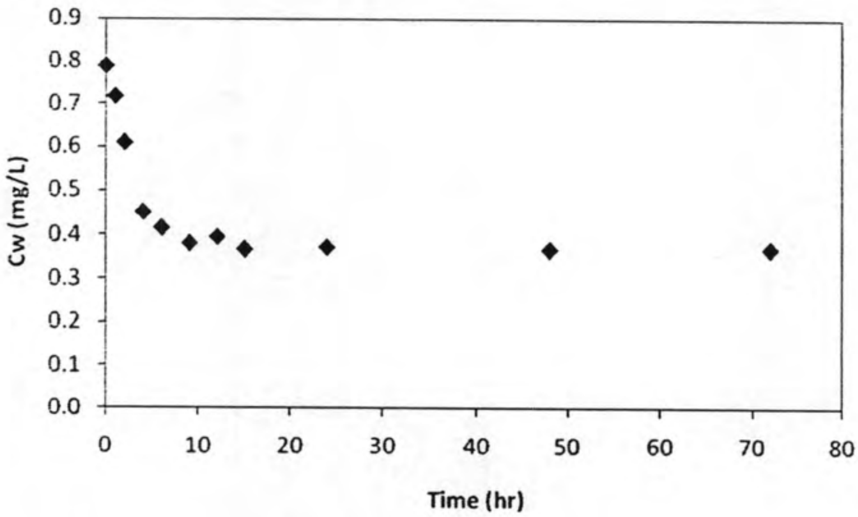

Figure B-6 Kinetic sorption of garden soil-1 showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:20 test

Table B-7 Kinetic sorption of sediment showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:10

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	10	2.08	0.14	19.44	2.08
2	1	1	10	2.08	0.06	20.16	
3	2	1	10	2.08	0.04	20.39	
4	4	1	10	2.08	0.04	20.38	
5	6	1	10	2.08	0.03	20.47	1.89
6	9	1	10	2.08	0.03	20.53	
7	12	1	10	2.08	<DL	-	
8	15	1	10	2.08	<DL	-	1.94
9	24	1	10	2.08	<DL	-	
10	48	1	10	2.08	<DL	-	
11	72	1	10	2.08	<DL	-	1.94

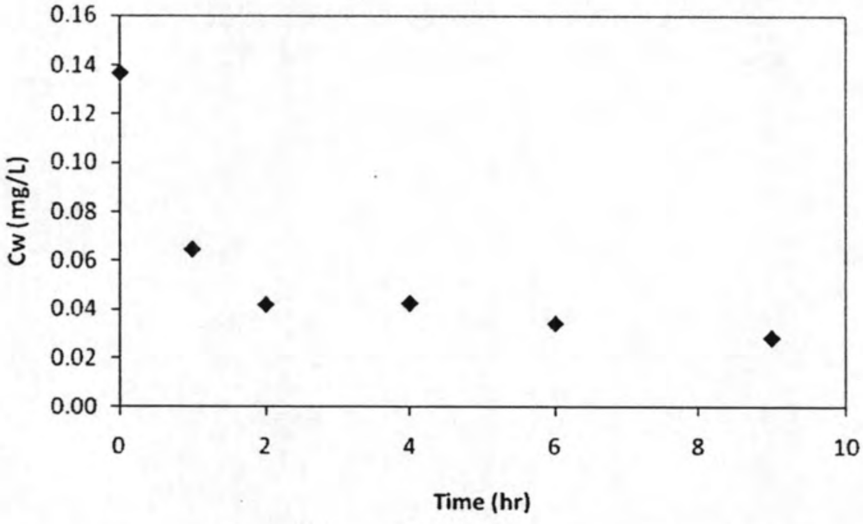

Figure B-7 Kinetic sorption of sediment showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:10 test

Table B-8 Kinetic sorption of sediment showing aqueous concentration of 17 alpha-methyltestosterone at soil/solution ratios of 1:20

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	20	2.08	0.14	38.87	2.08
2	1	1	20	2.08	0.11	39.37	
3	2	1	20	2.08	0.09	39.89	
4	4	1	20	2.08	0.08	39.96	
5	6	1	20	2.08	0.07	40.13	1.89
6	9	1	20	2.08	0.06	40.33	
7	12	1	20	2.08	0.05	40.66	
8	15	1	20	2.08	0.04	40.78	1.94
9	24	1	20	2.08	0.04	40.82	
10	48	1	20	2.08	0.04	40.85	
11	72	1	20	2.08	0.04	40.84	1.94

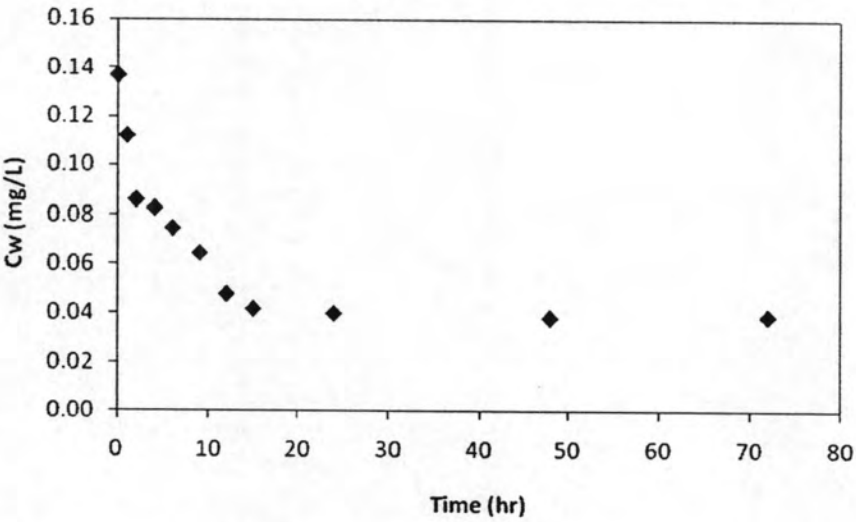

Figure B-8 Kinetic sorption of sediment showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:20 test

Table B-9 Kinetic sorption of sediment showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:30

No.	collection time	Mass soil (g)	Sol vol. (ml)	init conc. (mg/L)	Cw (mg/L)	Cs (mg/Kg)	control conc. (mg/L)
1	0	1	30	2.08	0.50	47.51	2.08
2	1	1	30	2.08	0.39	50.80	
3	2	1	30	2.08	0.34	52.17	
4	4	1	30	2.08	0.30	53.37	
5	6	1	30	2.08	0.28	53.97	1.89
6	9	1	30	2.08	0.27	54.43	
7	12	1	30	2.08	0.25	54.99	
8	15	1	30	2.08	0.26	54.71	1.94
9	24	1	30	2.08	0.24	55.10	
10	48	1	30	2.08	0.24	55.37	
11	72	1	30	2.08	0.25	54.83	1.94

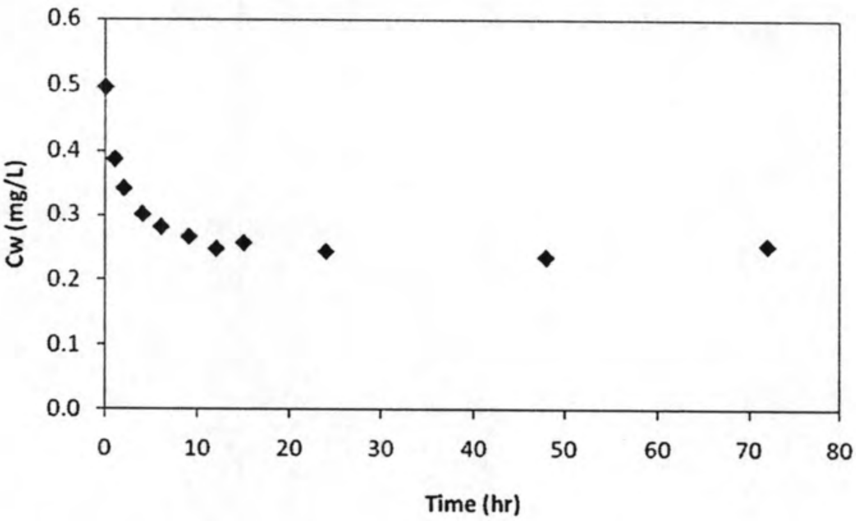

Figure B-9 Kinetic sorption of sediment showing aqueous concentration of 17 alpha- methyltestosterone at soil/solution ratios of 1:30 test

Appendix C

Appendix C: The raw experimental data of effect of organic content study under the original condition

The raw data include the concentration of MT in water (C_w) and that which sorped into soil (C_s), C_w and C_s were applied for linear isotherm. Moreover, the data were then calculated for log C_w and log C_s which applied for Freundlich isotherm and C_w and C_w/C_s which were applied for Langmuir isotherm.

K_d can be derived directly as the slope of the linear isotherm.

Freundlich isotherm is in form of;

$$\log C_s = n \times \log C_w + \log K_f$$

Thus, the K_f can be derived from the Y interception of this equation.

Langmuir isotherm is in form of;

$$\frac{1}{C_s} = \frac{1}{C_{s,m}} + \frac{1}{KC_{s,m}C_w}$$

Thus, the K_l can be calculated from the Y interception of this equation.

The sand experiments were carried out using 1 g of sand and 10 mL of MT solution, the samples were taken at 14 and 16 hour. The results are showed in table C-1. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in FigureC-1, C-2 and C-3, respectively.

Table C-1 The experimental results of sorption of methyltestosterone in sand

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.40	0.22	0.25	0.21	0.14	1.75	1.48	1.87	2.61	-0.69	0.28	0.05	0.03
2	0.58	0.41	0.36	0.36	0.36	1.71	2.21	2.22	2.23	-0.43	0.32	0.03	0.01
3	0.79	0.53	0.49	0.59	0.51	2.59	2.96	1.98	2.79	-0.28	0.41	0.04	0.02
4	1.02	0.73	0.64	0.72	0.70	2.85	3.74	3.02	3.15	-0.16	0.50	0.04	0.01
5	1.74	1.15	1.04	1.01	1.11	5.85	7.00	7.28	6.26	0.03	0.82	0.07	0.01
6	1.97	1.38	1.40	1.45	1.23	5.85	5.67	5.20	7.41	0.13	0.78	0.10	0.02
7	2.29	1.40	1.55	1.48	1.89	8.92	7.42	8.09	3.94	0.20	0.85	0.22	0.03
8	2.40	1.73	1.66	1.79	1.58	6.69	7.45	6.16	8.26	0.23	0.85	0.09	0.01
9	2.52	1.79	1.71	1.73	1.75	7.38	8.16	7.96	7.78	0.24	0.89	0.03	0.00

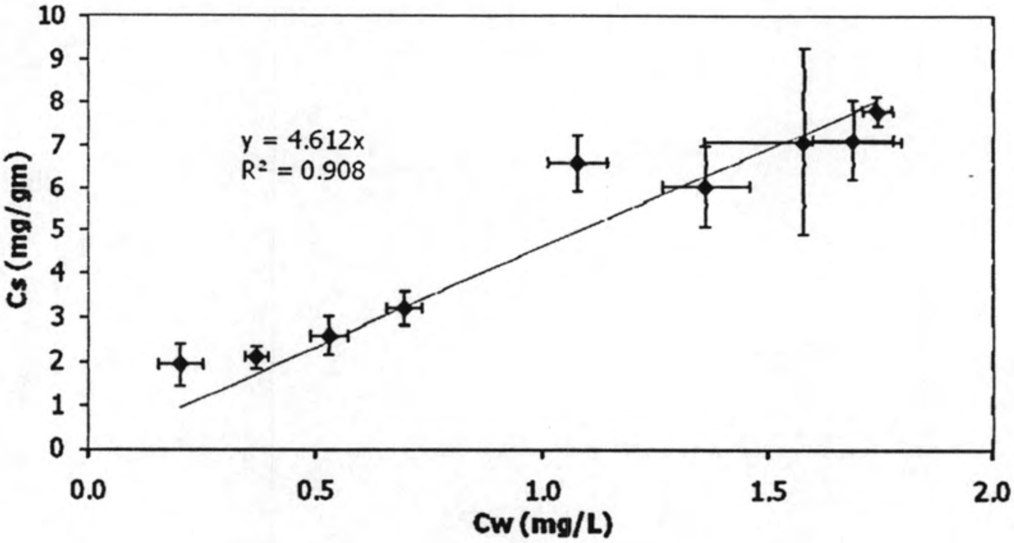

Figure C-1 The Linear isotherm of sorption of MT in water onto sand

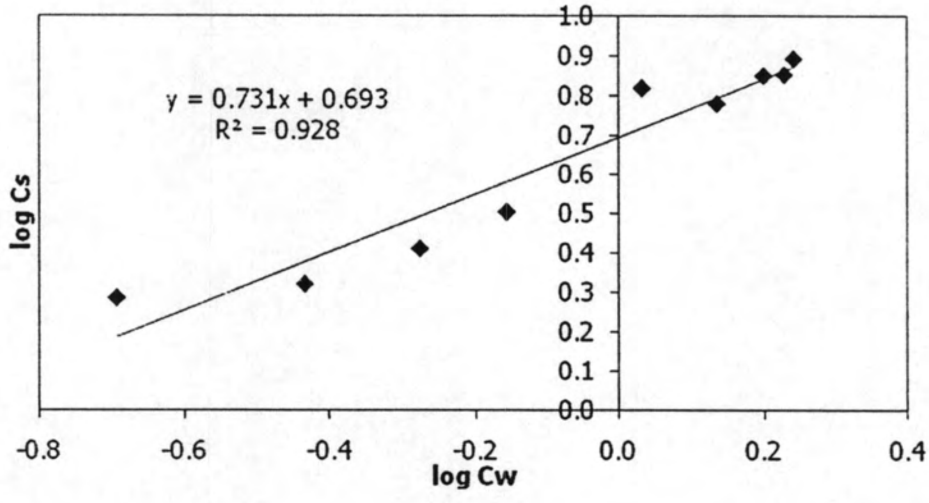

Figure C-2 The Freundlich isotherm of sorption of MT in water onto sand

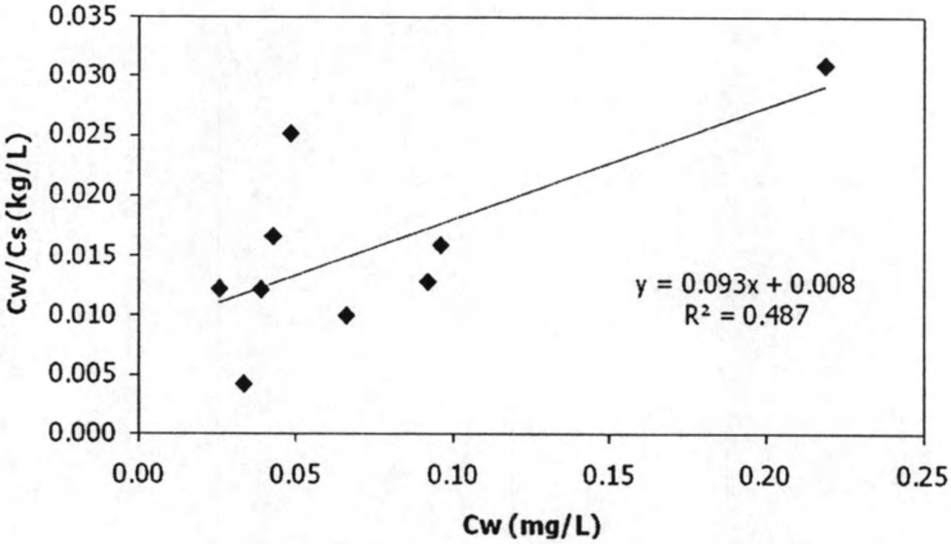

Figure C-3 The Langmuir isotherm of sorption of MT in water onto sand

From figure C-1, K_d was 4.612

From figure C-2, K_f was 4.932 and n was 0.731.

From figure C-3, K_l was 1344.09 and q_{max} was 125.

The laterite soil experiments were carried out using 1 g of laterite soil and 10 mL of MT solution, the samples were taken at 14 and 16 hr. The results are showed in table C-2. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure C-4, C-5, and C-6, respectively.

Table C-2 The experimental results of sorption of methyltestosterone in laterite soil

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.58	0.52	0.51	-	-	0.55	0.66	-	-	-0.29	-0.22	0.01	0.01
2	0.79	0.72	0.64	0.75	-	0.66	1.47	0.33	-	-0.15	-0.09	0.06	0.07
3	1.02	-	0.95	0.88	0.92	-	0.70	1.34	0.94	-0.04	0.00	0.03	0.03
4	1.31	1.15	1.10	1.25	1.18	1.60	2.06	0.61	1.32	0.07	0.14	0.06	0.04
5	1.74	1.50	1.57	1.55	1.60	2.33	1.69	1.90	1.36	0.19	0.26	0.04	0.02
6	1.97	1.76	1.92	1.80	1.54	2.07	0.50	1.65	4.23	0.24	0.32	0.16	0.07
7	2.29	2.15	2.06	2.01	2.04	1.37	2.29	2.82	2.46	0.31	0.35	0.06	0.03
8	2.52	2.41	2.20	2.32	2.08	1.11	3.28	2.04	4.45	0.35	0.43	0.15	0.05
9	0.58	0.52	0.51	-	-	0.55	0.66	-	-	-0.29	-0.22	0.01	0.01

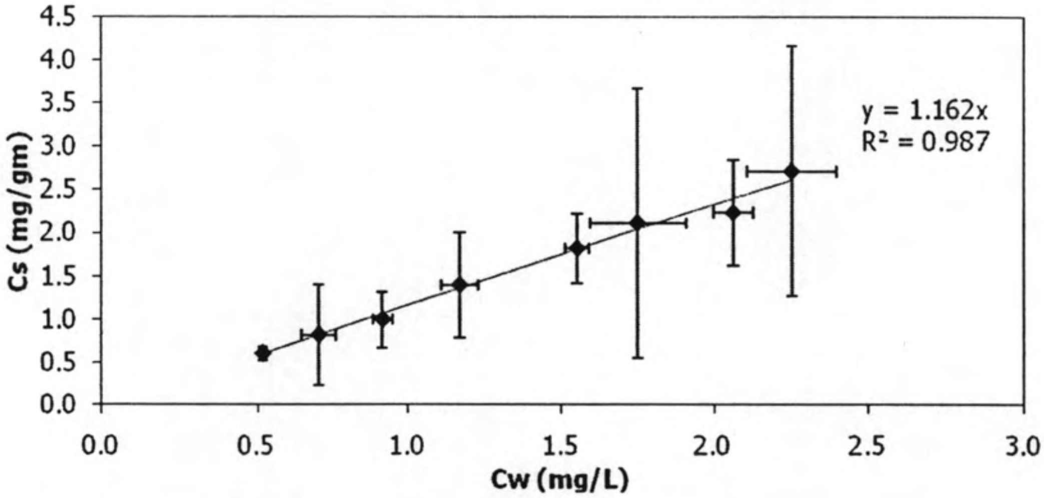

Figure C-4 The Linear isotherm of sorption of MT in water onto laterite soil

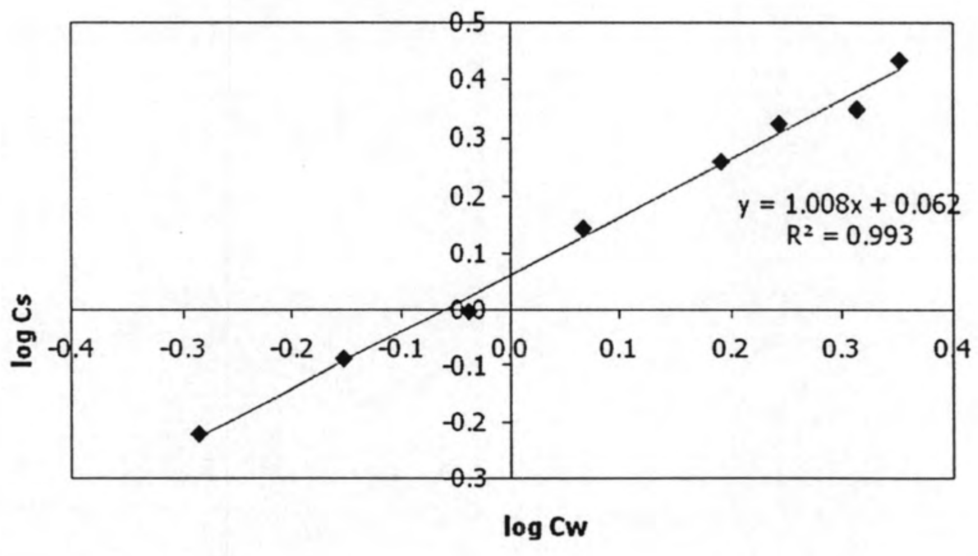

Figure C-5 The Freundlich isotherm of sorption of MT in water onto laterite soil

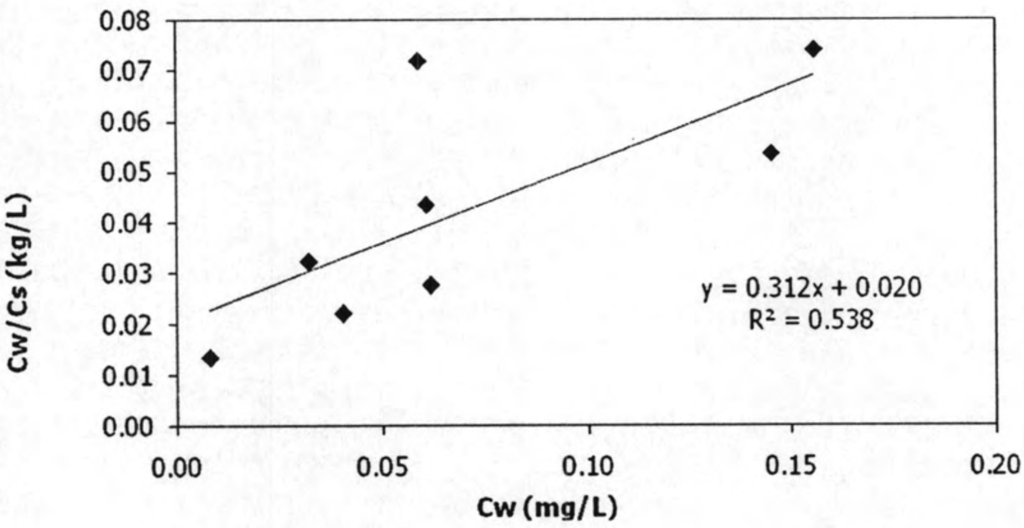

Figure C-6 The Langmuir isotherm of sorption of MT in water onto laterite soil

From figure C-4, K_d was 1.162

From figure C-5, K_f was 1.153 and n was 1.008.

From figure C-6, K_l was 160.26 and q_{max} was 50.

The garden soil-1 experiments were carried out using 1 g of garden soil-1 and 10 mL of MT solution, the samples were taken at 14 and 16 hr. The results are showed in table C-3. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure C-7, C-8, and C-9, respectively.

Table C-3 The experimental results of sorption of methyltestosterone in garden soil-1

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.02	0.16	0.12	0.18	0.15	8.63	8.97	8.39	8.66	-0.81	0.94	0.02	0.00
2	1.37	0.22	0.23	0.19	0.22	11.59	11.40	11.81	11.58	-0.67	1.06	0.02	0.00
3	1.66	0.27	0.34	0.38	0.29	13.98	13.22	12.80	13.75	-0.50	1.13	0.05	0.00
4	2.14	0.36	0.42	0.45	0.13	17.85	17.21	16.98	20.13	-0.47	1.26	0.14	0.01
5	2.45	0.43	0.39	0.44	0.41	20.27	20.64	20.13	20.43	-0.38	1.31	0.02	0.00
6	1.02	0.16	0.12	0.18	0.15	8.63	8.97	8.39	8.66	-0.81	0.94	0.02	0.00
7	1.37	0.22	0.23	0.19	0.22	11.59	11.40	11.81	11.58	-0.67	1.06	0.02	0.00
8	1.66	0.27	0.34	0.38	0.29	13.98	13.22	12.80	13.75	-0.50	1.13	0.05	0.00
9	2.14	0.36	0.42	0.45	0.13	17.85	17.21	16.98	20.13	-0.47	1.26	0.14	0.01

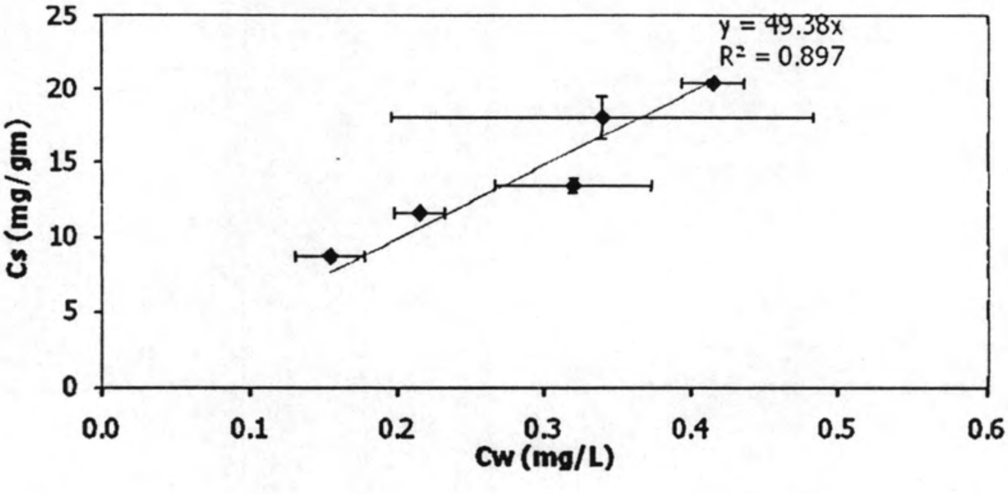

Figure C-7 The Linear isotherm of sorption of MT in water onto garden soil-1

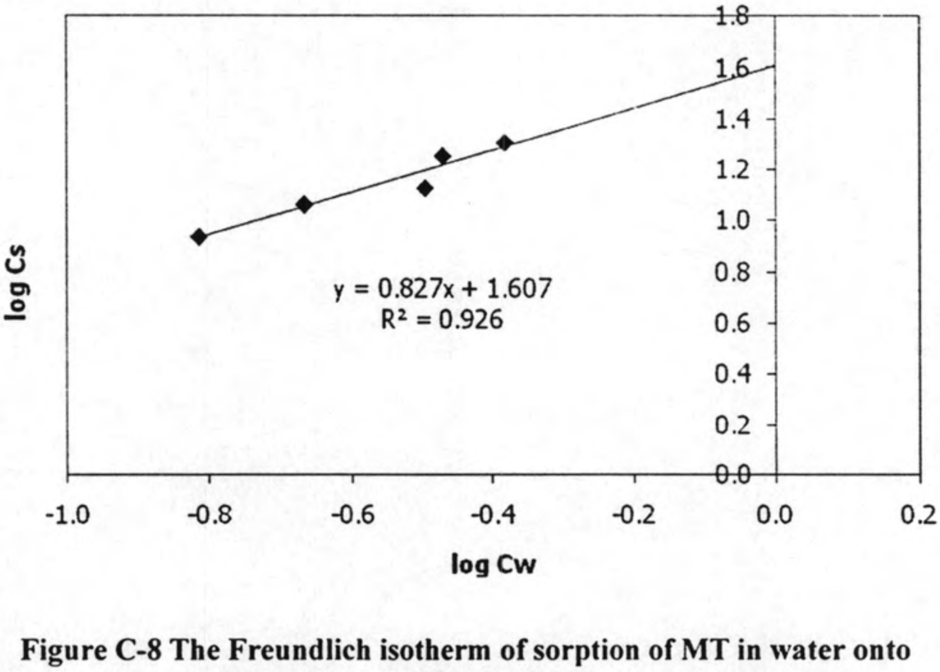

Figure C-8 The Freundlich isotherm of sorption of MT in water onto garden soil-1

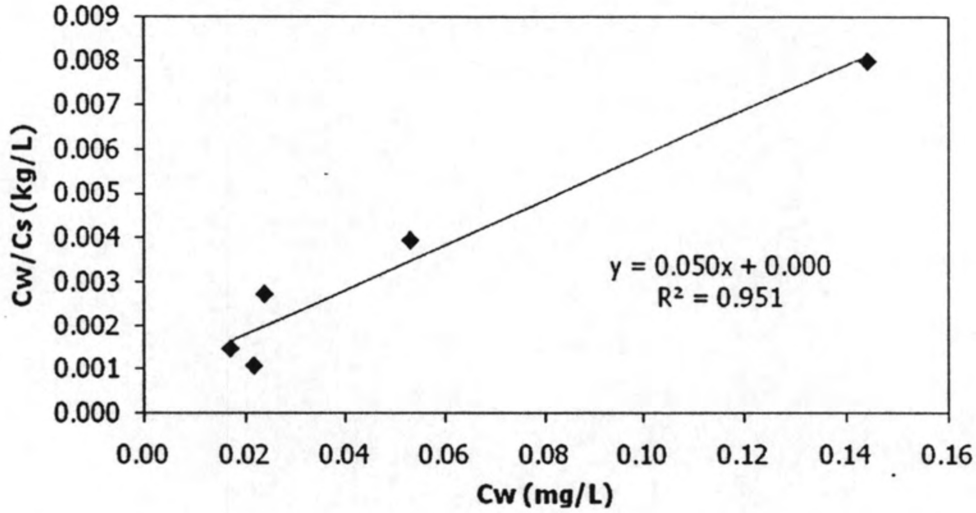

Figure C-9 The Langmuir isotherm of sorption of MT in water onto garden soil-1

From figure C-7, K_d was 49.38

From figure C-8, K_f was 40.458 and n was 0.827.

From figure C-9, K_l and q_{max} could not be calculated.

The garden soil-2 experiments were carried out using 1 g of garden soil-2 and 10 mL of MT solution, the samples were taken at 14 and 16 hr. The results are showed in table C-4. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure C-10, C-11, and C-12, respectively.

Table C-4 The experimental results of sorption of methyltestosterone in garden soil-2

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.02	0.10	0.03	0.05	0.09	9.23	9.91	9.68	9.34	-1.18	0.98	0.03	0.00
2	1.37	0.08	0.08	0.07	0.10	12.92	12.93	13.01	12.74	-1.07	1.11	0.01	0.00
3	1.66	0.13	0.12	0.12	0.13	15.37	15.46	15.43	15.32	-0.91	1.19	0.01	0.00
4	2.14	0.20	0.15	0.20	0.18	19.41	19.95	19.41	19.65	-0.74	1.29	0.03	0.00
5	2.45	0.17	0.14	0.27	0.18	22.79	23.17	21.79	22.76	-0.72	1.35	0.06	0.00
6	1.02	0.10	0.03	0.05	0.09	9.23	9.91	9.68	9.34	-1.18	0.98	0.03	0.00
7	1.37	0.08	0.08	0.07	0.10	12.92	12.93	13.01	12.74	-1.07	1.11	0.01	0.00
8	1.66	0.13	0.12	0.12	0.13	15.37	15.46	15.43	15.32	-0.91	1.19	0.01	0.00
9	2.14	0.20	0.15	0.20	0.18	19.41	19.95	19.41	19.65	-0.74	1.29	0.03	0.00

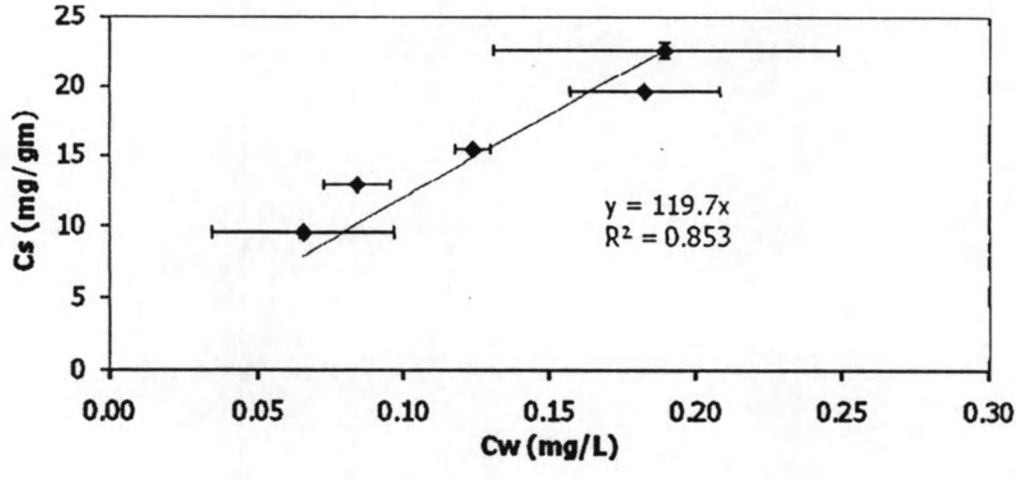

Figure C-10 The Linear isotherm of sorption of MT in water onto garden soil-2

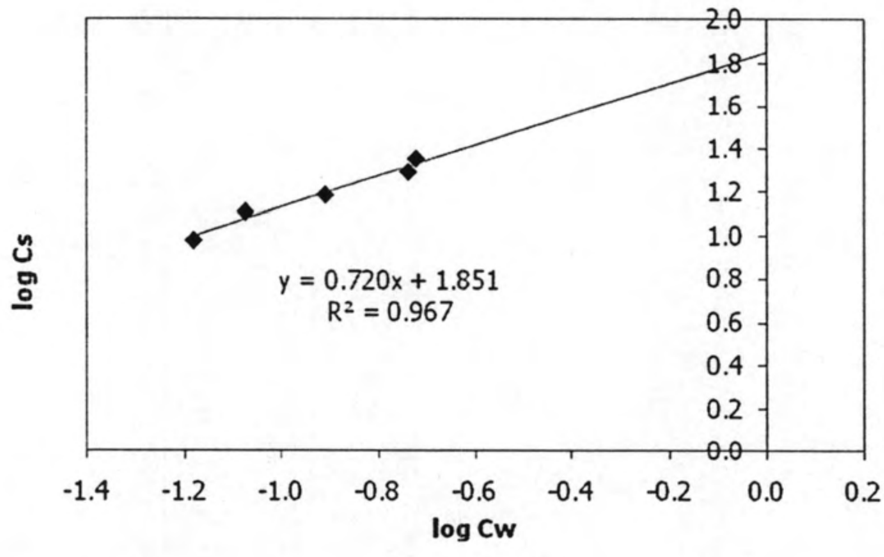

Figure C-11 The Freundlich isotherm of sorption of MT in water onto garden soil-2

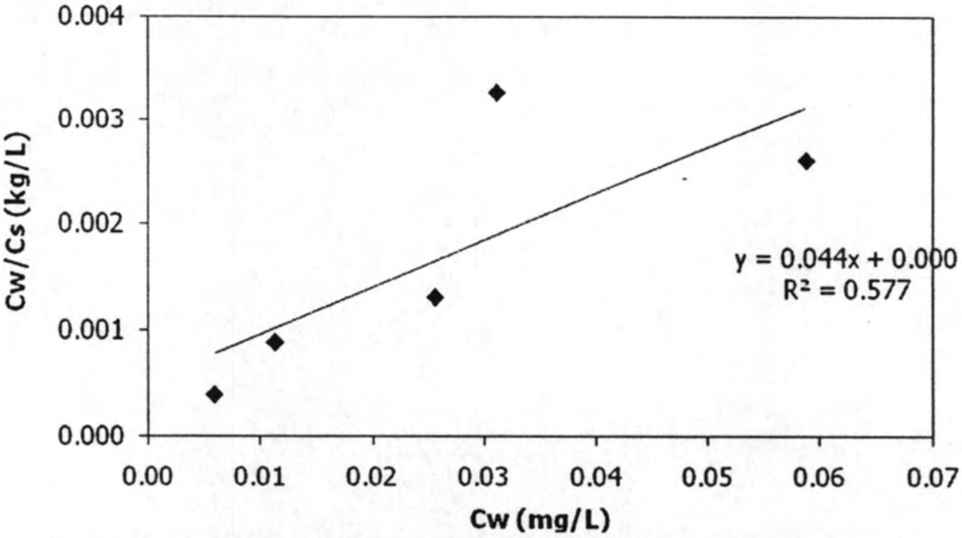

Figure C-12 The Langmuir isotherm of sorption of MT in water onto garden soil-2

From figure C-10, K_d was 119.7
From figure C-11, K_f was 70.958 and n was 0.720.
From figure C-12, K_l and q_{max} could not be calculated.

The garden soil-3 experiments were carried out using 1 g of garden soil-3 and 10 mL of MT solution, the samples were taken at 14 and 16 hr. The results are showed in table C-5. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure C-13, C-14, and C-15, respectively.

Table C-5 The experimental results of sorption of methyltestosterone in garden soil-3

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.81	0.12	0.08	0.09	0.09	6.86	7.29	7.24	7.18	-1.02	0.85	0.02	0.00
2	0.99	0.09	0.09	0.10	0.09	9.03	8.97	8.94	9.00	-1.04	0.95	0.00	0.00
3	1.83	0.14	0.17	0.12	0.14	16.85	16.59	17.07	16.87	-0.84	1.23	0.02	0.00
4	2.67	0.15	0.35	0.14	0.18	25.22	23.18	25.28	24.94	-0.69	1.39	0.10	0.00
5	3.27	0.28	0.16	0.20	0.22	29.93	31.10	30.68	30.50	-0.66	1.49	0.05	0.00
6	0.81	0.12	0.08	0.09	0.09	6.86	7.29	7.24	7.18	-1.02	0.85	0.02	0.00
7	0.99	0.09	0.09	0.10	0.09	9.03	8.97	8.94	9.00	-1.04	0.95	0.00	0.00
8	1.83	0.14	0.17	0.12	0.14	16.85	16.59	17.07	16.87	-0.84	1.23	0.02	0.00
9	2.67	0.15	0.35	0.14	0.18	25.22	23.18	25.28	24.94	-0.69	1.39	0.10	0.00

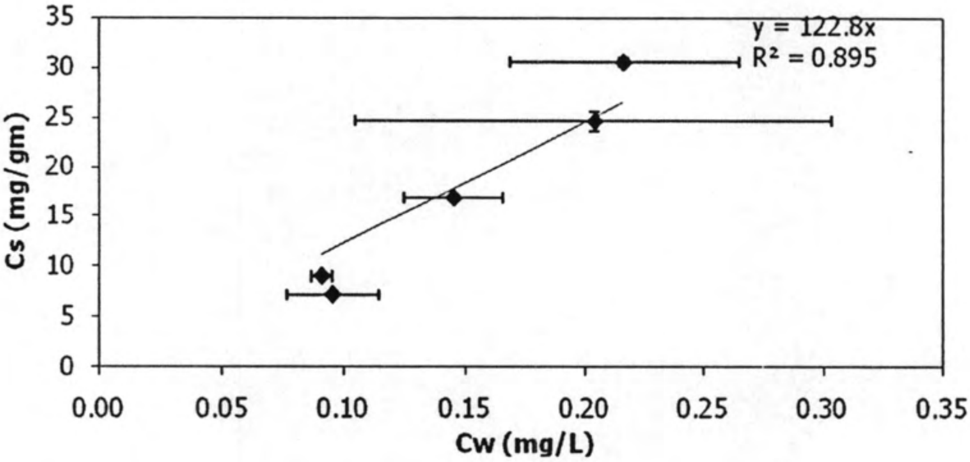

Figure C-13 The Linear isotherm of sorption of MT in water onto garden soil-3

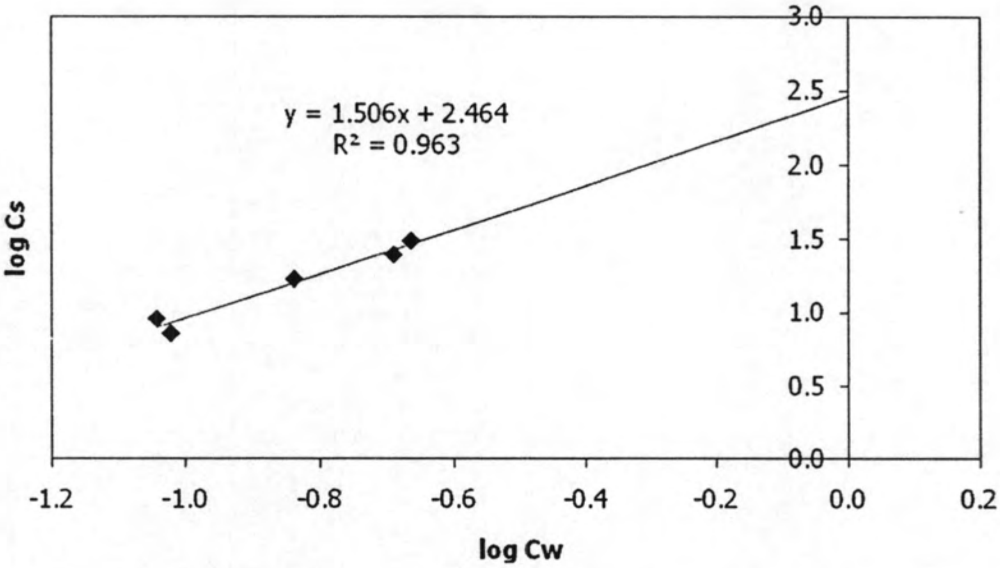

Figure C-14 The Freundlich isotherm of sorption of MT in water onto garden soil-3

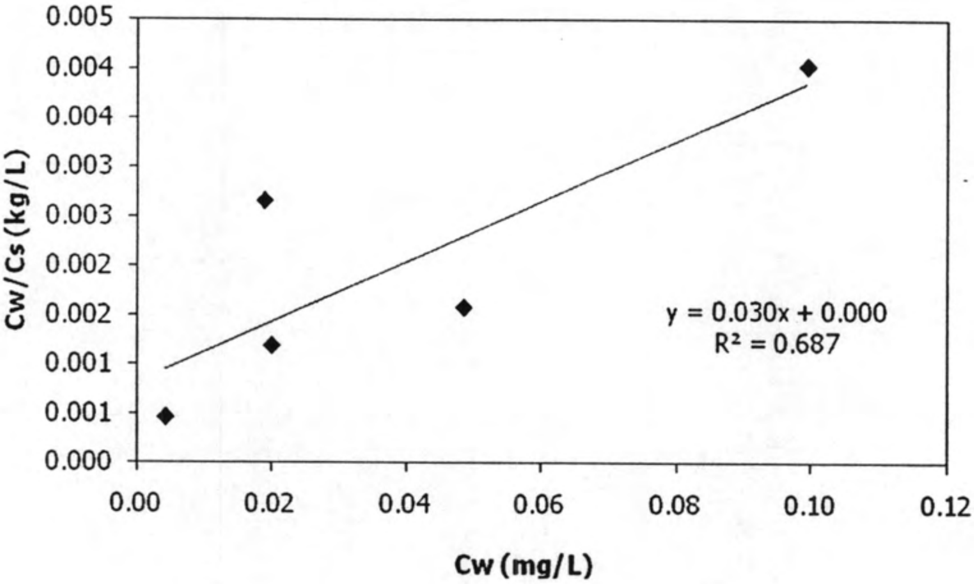

Figure C-15 The Langmuir isotherm of sorption of MT in water onto garden soil-3

From figure C-13, K_d was 122.8.
From figure C-14, K_f was 291.072 and n was 1.506.
From figure C-15, K_l and q_{max} could not be calculated.

The sediment experiments were carried out using 1 g of sediment and 30 mL of MT solution, the samples were taken at 14 and 16 hr. The results are showed in table C-6. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure C-16, C-17, and C-18, respectively.

Table C-6 The experimental results of sorption of methyltestosterone in sediment

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.69	0.17	0.15	0.17	0.19	45.69	46.21	45.65	45.09	-0.78	1.66	0.02	0.00
2	2.08	0.24	0.20	0.23	-	55.11	56.20	55.36	-	-0.65	1.74	0.02	0.00
3	2.51	0.24	0.25	0.32	0.27	68.31	67.79	65.86	67.18	-0.57	1.83	0.04	0.00
4	3.01	0.36	0.34	0.32	0.31	79.73	80.26	80.87	80.98	-0.48	1.91	0.02	0.00
5	3.48	0.35	0.36	0.32	-	93.96	93.57	94.71	-	-0.47	1.97	0.02	0.00
6	1.69	0.17	0.15	0.17	0.19	45.69	46.21	45.65	45.09	-0.78	1.66	0.02	0.00
7	2.08	0.24	0.20	0.23	-	55.11	56.20	55.36	-	-0.65	1.74	0.02	0.00
8	2.51	0.24	0.25	0.32	0.27	68.31	67.79	65.86	67.18	-0.57	1.83	0.04	0.00
9	3.01	0.36	0.34	0.32	0.31	79.73	80.26	80.87	80.98	-0.48	1.91	0.02	0.00

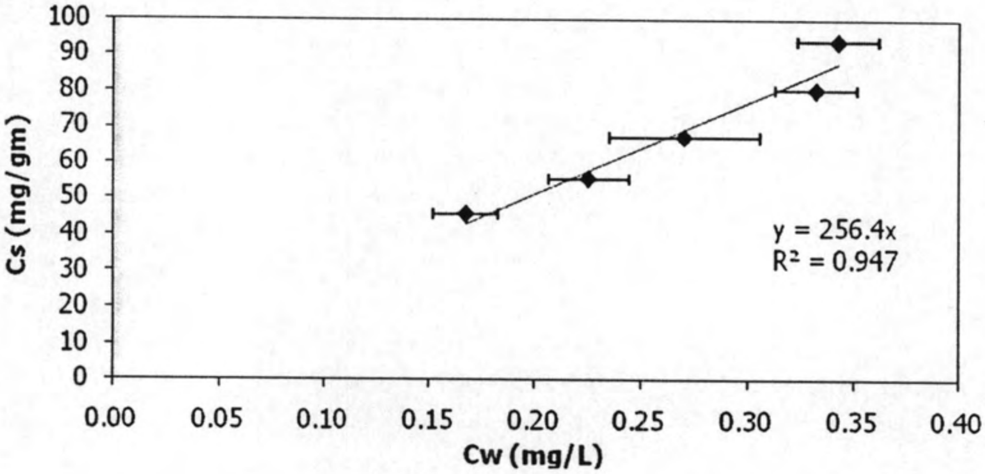

Figure C-16 The Linear isotherm of sorption of MT in water onto sediment

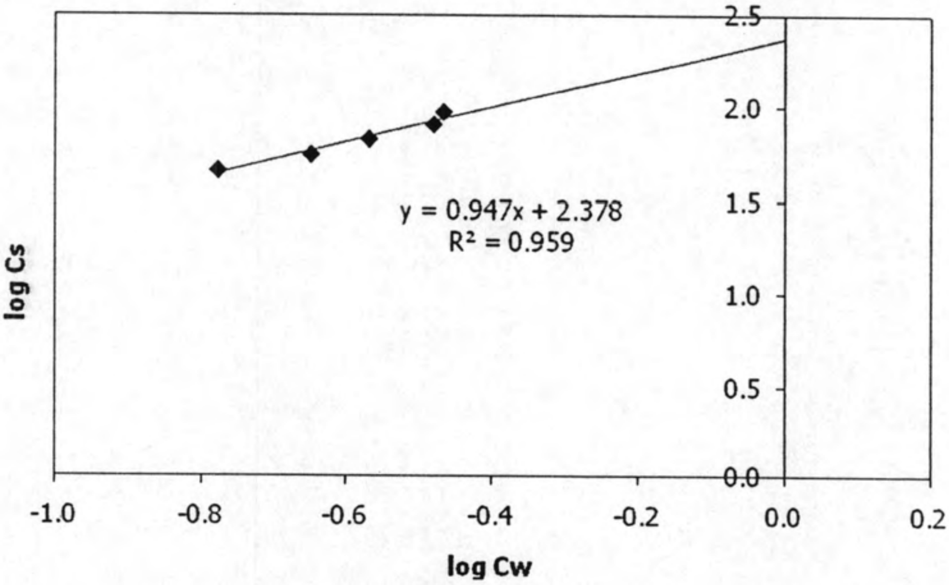

Figure C-17 The Freundlich isotherm of sorption of MT in water onto sediment

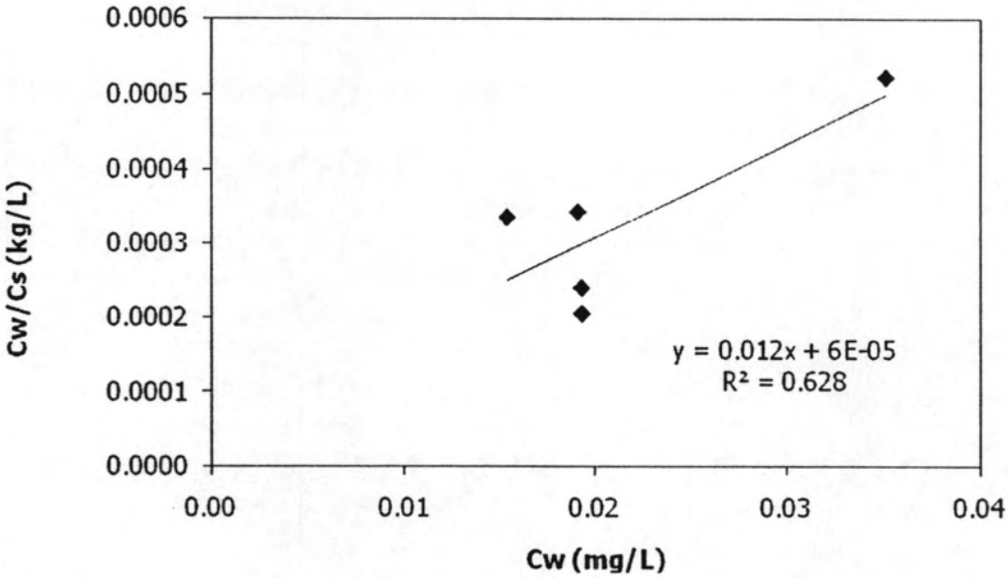

Figure C-18 The Langmuir isotherm of sorption of MT in water onto sediment

From figure C-16, K_d was 256.4.
From figure C-17, K_f was 238.781 and n was 0.947.
From figure C-18, K_l and q_{max} could not be calculated.

Appendix D

Appendix D: The raw experimental data of effect of pH on sorption

The sand experiment was carried out using 1 g of sand and 10 mL of MT solution, the samples were taken at 14 and 16 hour. The experiment was done at pH 6.6, 7.1, and 7.6. The results are showed in table D-1, D-2, and D-3. The Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure D-1, D-2, D-3, D-4, D-5, D-6, D-7, D-8, and D-9, respectively.

Table D-1 The experimental results of sorption of MT in sand at pH 6.6

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.72	1.17	1.49	1.55	1.27	5.48	2.29	1.67	4.53	0.14	0.54	0.18	0.05
2	2.02	1.81	1.72	1.85	1.74	2.09	2.95	1.64	2.75	0.25	0.37	0.06	0.03
3	2.88	2.33	2.41	2.43	2.26	5.43	4.66	4.47	6.14	0.37	0.71	0.08	0.02
4	3.30	2.49	2.82	2.69	2.70	8.12	4.82	6.14	5.99	0.43	0.80	0.14	0.02
5	3.87	3.08	2.88	3.07	2.97	7.87	9.91	8.01	9.03	0.48	0.94	0.10	0.01

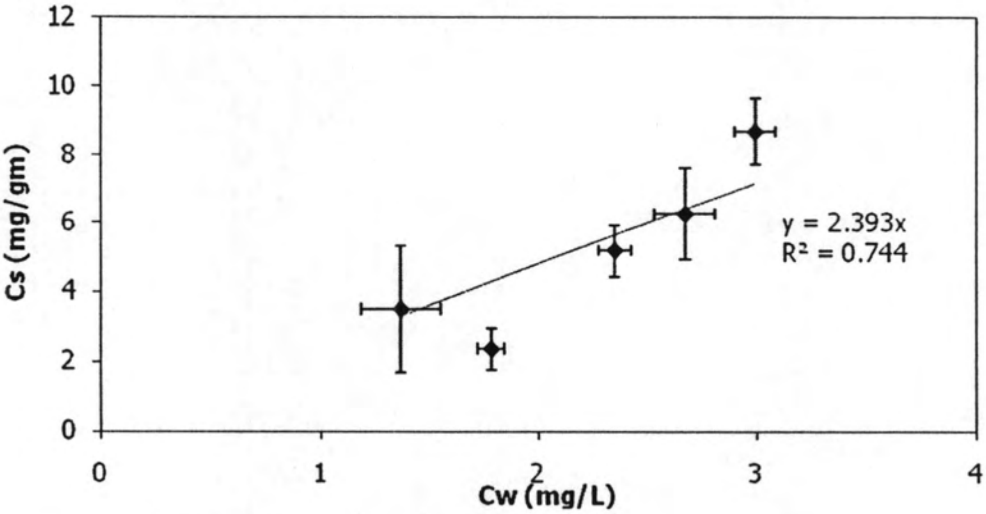

Figure D-1 The Linear isotherm of sorption of MT in water onto sand at pH 6.6

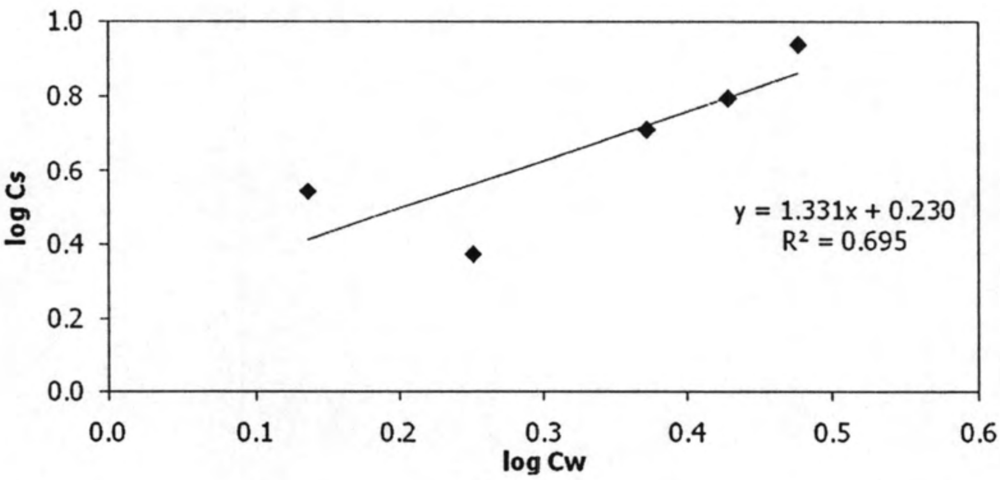

Figure D-2 The Freundlich isotherm of sorption of MT in water onto sand at pH 6.6

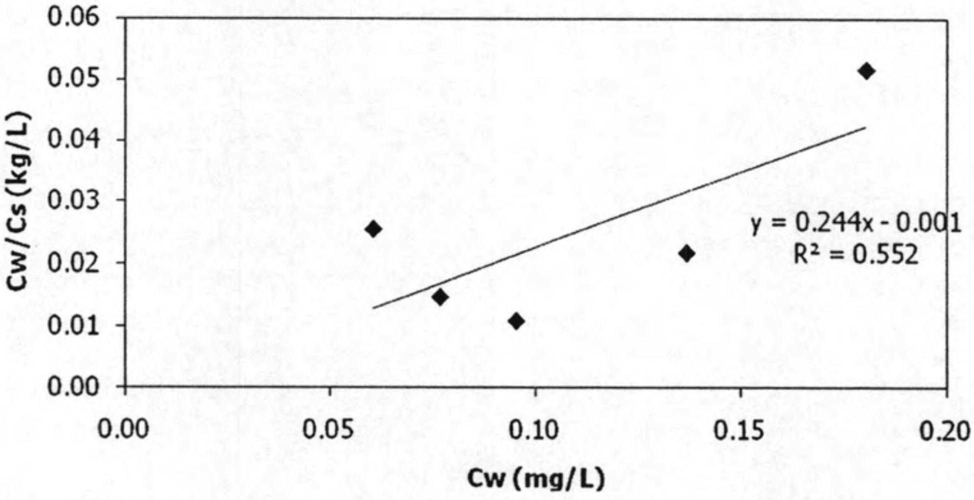

Figure D-3 The Langmuir isotherm of sorption of MT in water onto sand at pH 6.6

From figure D-1, K_d was 2.393

From figure D-2, K_f was 1.698 and n was 1.33.

From figure D-3, K_l was 4,098.36 and q_{max} was 1,000.

Table D-2 The experimental results of sorption of MT in sand at pH 7.1

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.72	1.38	1.46	1.32	1.34	3.43	2.58	4.00	3.75	0.14	0.54	0.06	0.02
2	2.02	1.66	1.42	1.63	1.66	3.54	5.96	3.85	3.57	0.20	0.63	0.12	0.03
3	2.88	2.32	2.37	2.37	2.28	5.53	5.06	5.03	5.98	0.37	0.73	0.05	0.01
4	3.30	2.54	2.65	2.63	2.72	7.69	6.53	6.73	5.82	0.42	0.83	0.08	0.01
5	3.87	3.17	3.15	3.18	3.08	7.01	7.22	6.90	7.90	0.50	0.86	0.05	0.01

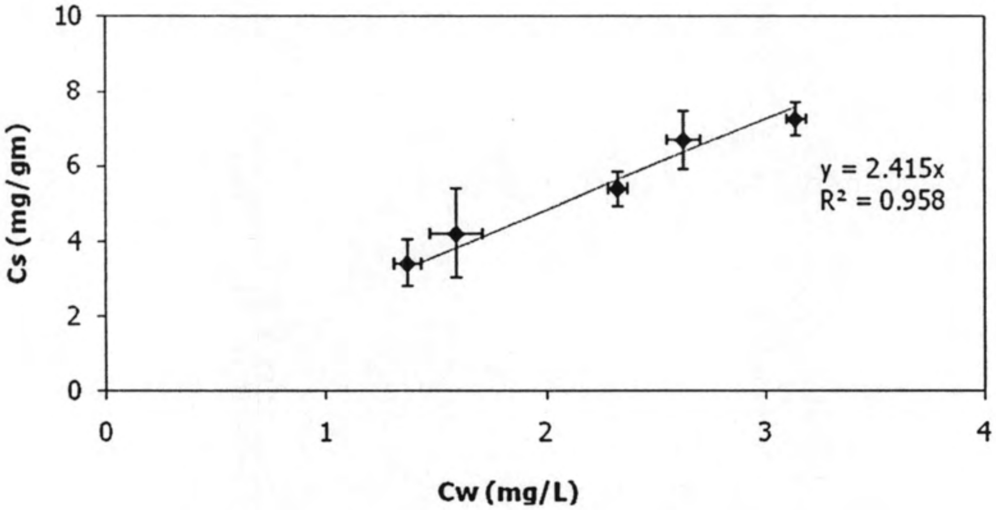

Figure D-4 The Linear isotherm of sorption of MT in water onto sand at pH 7.1

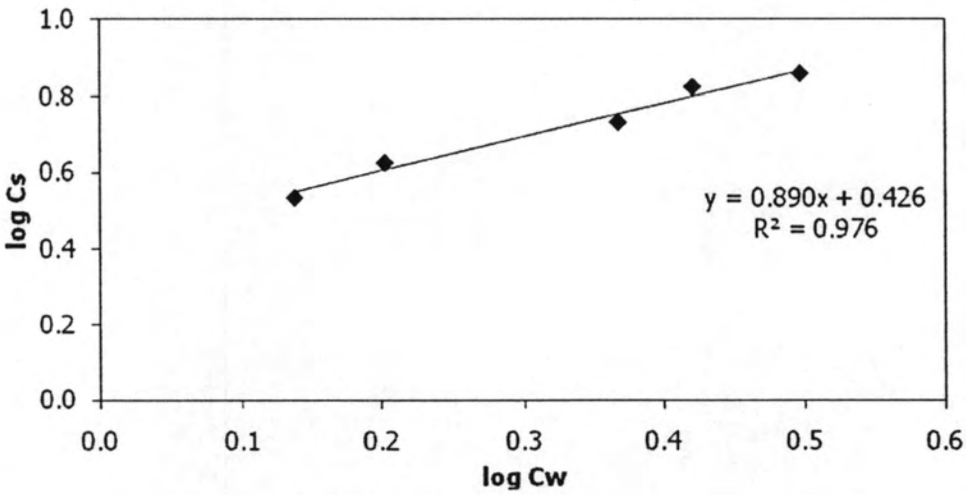

Figure D-5 The Freundlich isotherm of sorption of MT in water onto sand at pH 7.1

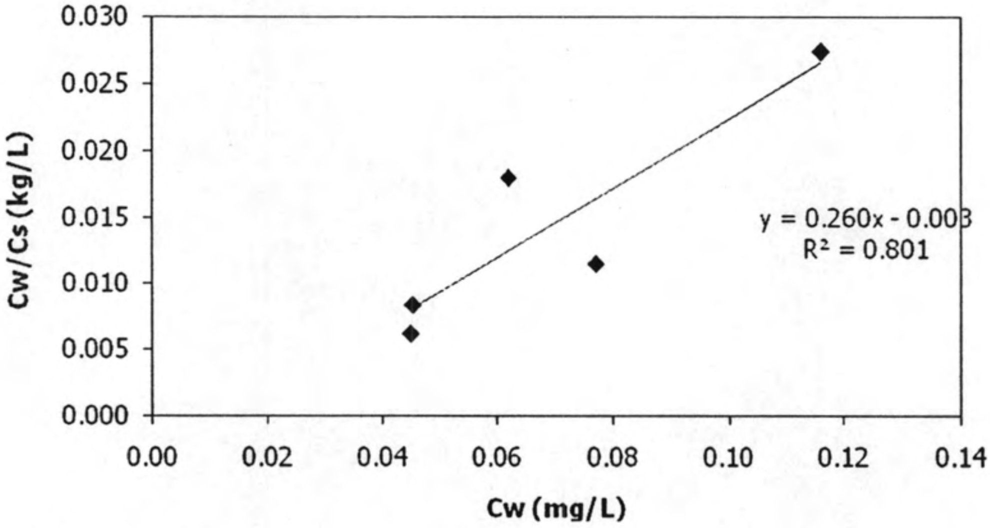

Figure D-6 The Langmuir isotherm of sorption of MT in water onto sand at pH 7.1

From figure D-4, K_d was 2.415
From figure D-5, K_f was 2.667 and n was 0.89.
From figure D-6, K_l was 1282.05 and q_{max} was 333.33.

Table D-3 The experimental results of sorption of MT in sand at pH 7.6

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	1.72	1.46	1.63	1.49	1.53	2.58	0.84	2.31	1.93	0.18	0.28	0.08	0.04
2	2.02	1.80	1.86	1.81	1.76	2.14	1.57	2.10	2.61	0.26	0.32	0.04	0.02
3	2.88	2.32	2.43	2.31	2.45	5.51	4.41	5.69	4.26	0.38	0.70	0.07	0.02
4	3.30	2.77	2.67	2.74	2.68	5.36	6.39	5.59	6.25	0.43	0.77	0.05	0.01
5	3.87	3.02	2.91	3.05	3.11	8.49	9.63	8.14	7.53	0.48	0.93	0.09	0.01

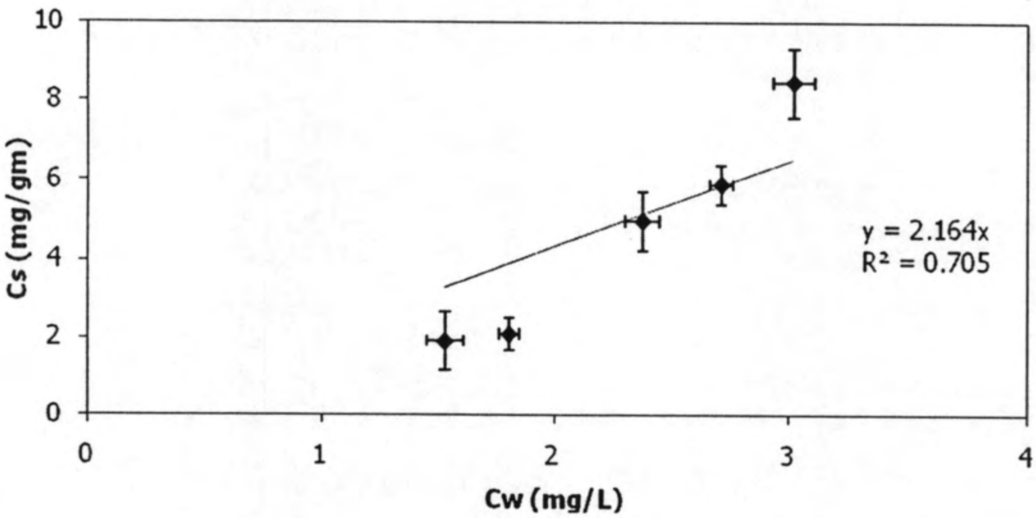

Figure D-7 The Linear isotherm of sorption of MT in water onto s and at pH 7.6

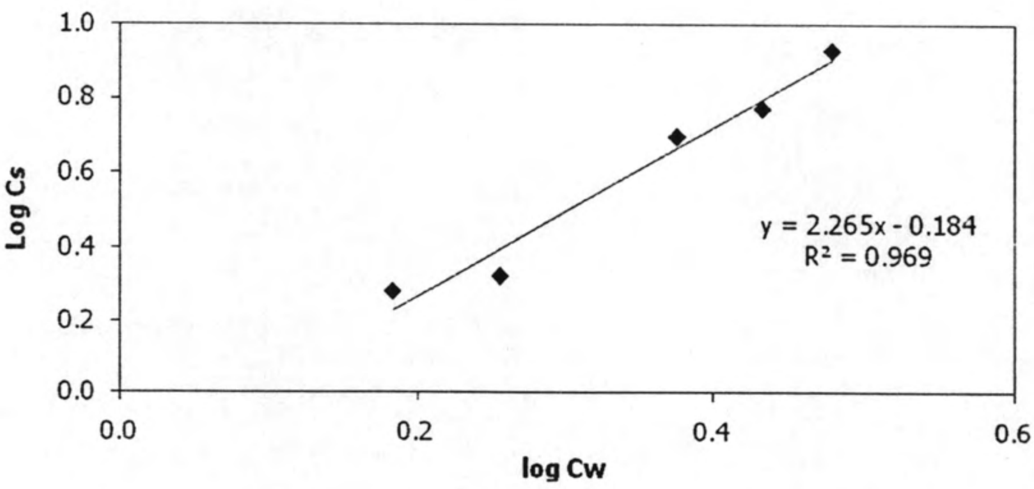

Figure D-8 The Freundlich isotherm of sorption of MT in water onto sand at pH 7.6

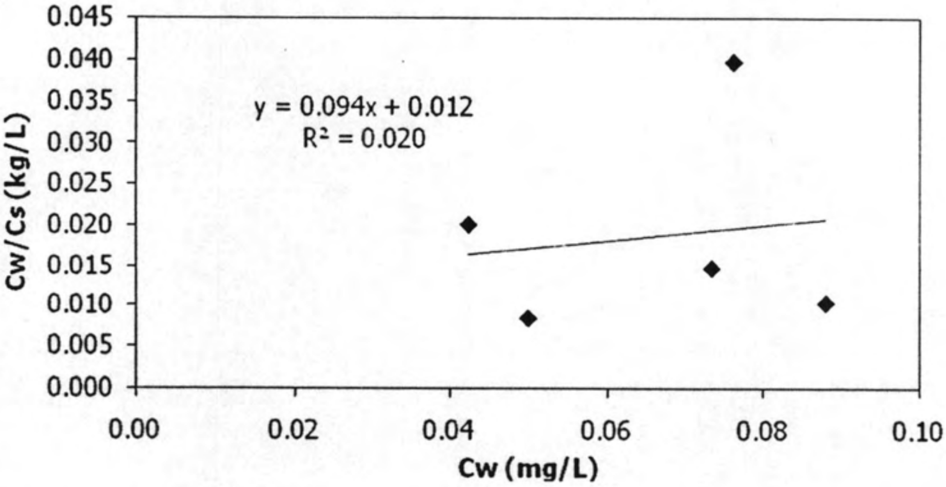

Figure D-9 The Langmuir isotherm of sorption of MT in water onto sand at pH 7.6

From figure D-7, K_d was 2.164
From figure D-8, K_f was 1.528 and n was 2.27.
From figure D-9, K_l was 886.52 and q_{max} was 83.33.

Appendix E

Appendix E: The raw experimental data of effect of salinity on sorption

The sand experiment was carried out using 1 g of sand and 10 mL of MT solution, the samples were taken at 14 and 16 hour. The experiment was done at original salinity (<0.5), 5, 10, and 20 g/L. The results are showed in Table E-1, D-2, D-3, and D-4. the Linear isotherm, Freundlich isotherm, and Langmuir isotherm are showed in Figure E-1, D-2, D-3, D-4, D-5, D-6, D-7, D-8, D-9, D-10, D-11, and D-12, respectively.

Table E-1 The experimental results of sorption of MT in sand at original salinity

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.40	0.22	0.25	0.21	0.14	1.75	1.48	1.87	2.61	-0.70	0.29	0.20	0.11
2	0.58	0.41	0.36	0.36	0.36	1.71	2.21	2.22	2.23	-0.43	0.32	0.37	0.18
3	0.79	0.53	0.49	0.59	0.51	2.59	2.96	1.98	2.79	-0.28	0.41	0.53	0.21
4	1.02	0.73	0.64	0.72	0.70	2.85	3.74	3.02	3.15	-0.16	0.50	0.70	0.22
5	1.22	0.83	0.86	0.79	0.88	3.87	3.59	4.28	3.36	-0.08	0.58	0.84	0.22
6	1.52	1.10	0.91	1.01	1.00	4.17	6.06	5.07	5.18	0.00	0.71	1.00	0.20
7	1.97	1.38	1.40	1.45	1.23	5.85	5.67	5.20	7.41	0.14	0.78	1.36	0.23
8	2.09	1.46	1.25	1.45	1.43	6.37	8.43	6.44	6.61	0.15	0.84	1.40	0.20
9	2.28	1.55	1.63	1.65	1.54	7.23	6.47	6.23	7.33	0.20	0.83	1.59	0.23
10	2.29	1.40	1.55	1.48	1.89	8.92	7.42	8.09	3.94	0.20	0.85	1.58	0.22
11	2.40	1.23	1.66	1.79	1.58	11.69	7.45	6.16	8.26	0.20	0.92	1.56	0.19
12	2.52	1.79	1.71	1.73	1.75	7.38	8.16	7.96	7.78	0.24	0.89	1.74	0.22
13	2.72	2.08	1.71	1.77	1.80	6.37	10.10	9.46	9.16	0.27	0.94	1.84	0.21

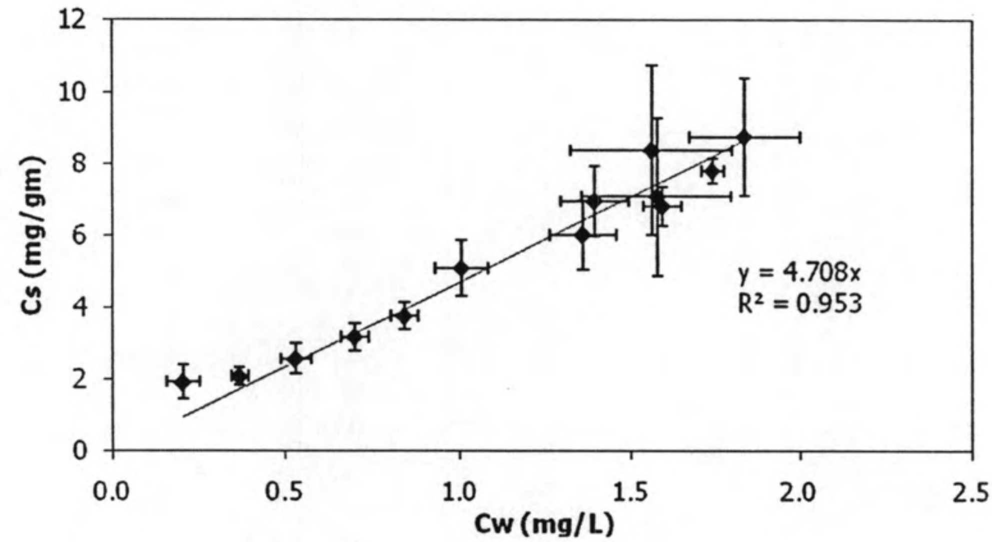

Figure E-1 The Linear isotherm of sorption of MT in water onto sand at original salinity

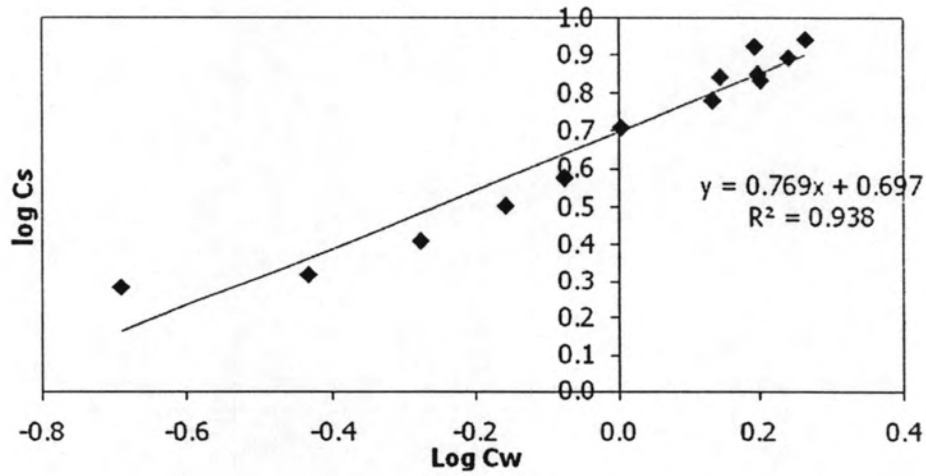

Figure E-2 The Freundlich isotherm of sorption of MT in water onto sand at original salinity

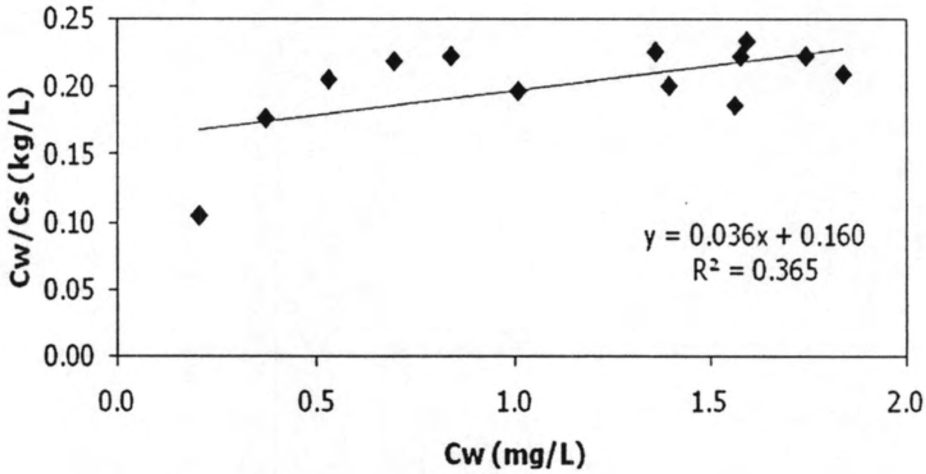

Figure E-3 The Langmuir isotherm of sorption of MT in water onto sand at original salinity

From Figure E-1, K_d was 4.708.
From Figure E-2, K_f was 4.977 and n was 0.769.
From Figure E-3, K_l was 173.611 and q_{max} was 6.25.

Table E-2 The experimental results of sorption of MT in sand at salinity of 5 g/L.

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.29	0.22	0.23	0.17	0.21	0.73	0.66	1.24	0.80	-0.68	-0.07	0.21	0.24
2	0.56	0.34	0.42	0.28	0.36	2.17	1.37	2.77	2.02	-0.45	0.32	0.35	0.17
3	0.73	0.53	0.56	0.37	0.51	2.01	1.77	3.61	2.22	-0.31	0.38	0.49	0.22
4	1.19	0.86	0.86	0.82	0.70	3.33	3.39	3.72	4.90	-0.09	0.58	0.81	0.21
5	1.46	0.97	0.89	0.99	0.95	4.91	5.75	4.70	5.09	-0.02	0.71	0.95	0.19
6	2.02	1.43	1.36	1.26	1.35	5.96	6.68	7.66	6.77	0.13	0.83	1.35	0.20
7	2.22	1.66	1.66	1.58	1.73	5.67	5.68	6.46	4.96	0.22	0.76	1.66	0.29
8	2.81	1.79	2.00	1.83	1.66	10.17	8.14	9.76	11.46	0.26	1.00	1.82	0.18

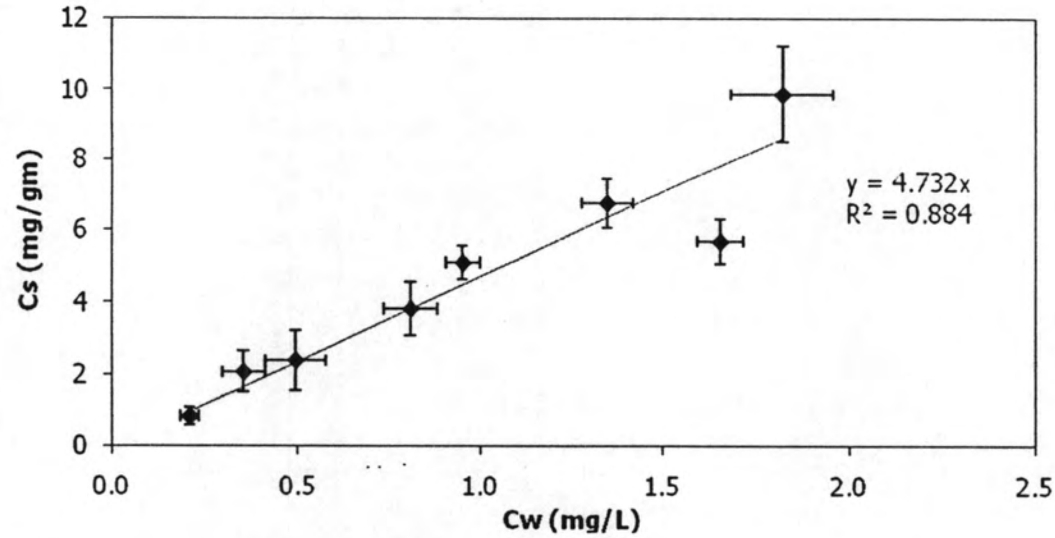

Figure E-4 The Linear isotherm of sorption of MT in water onto sand at salinity of 5 g/L

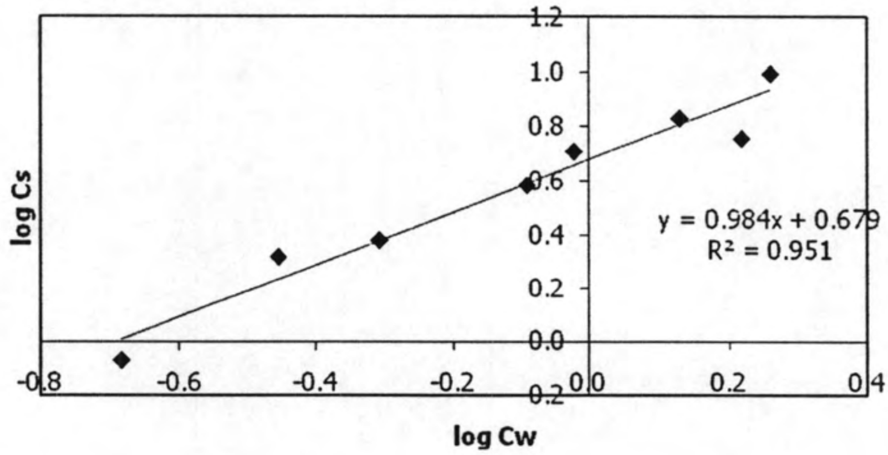

Figure E-5 The Freundlich isotherm of sorption of MT in water onto sand at salinity of 5 g/L

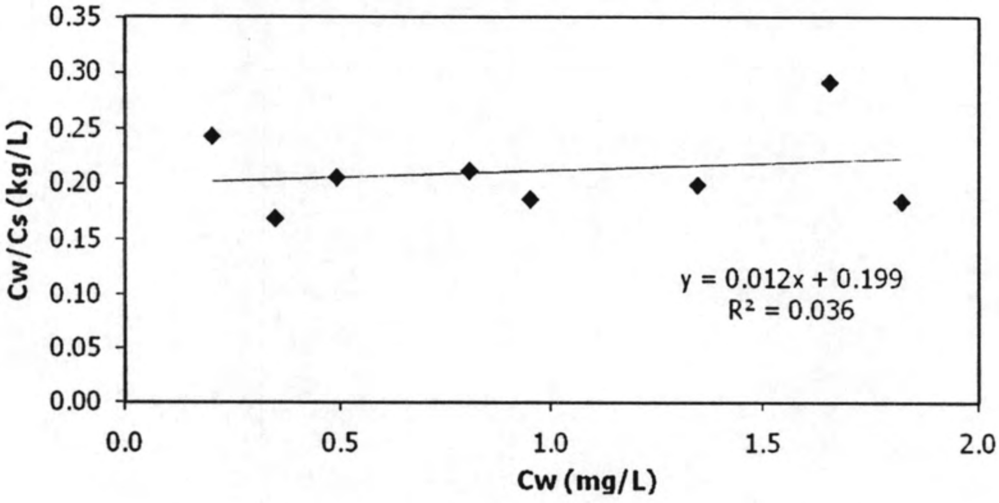

Figure E-6 The Langmuir isotherm of sorption of MT in water onto sand at salinity of 5 g/L

From Figure E-4, K_d was 4.732
From Figure E-5, K_f was 4.775 and n was 0.984.
From Figure E-6, K_l was 418.760 and q_{max} was 5.025.

Table E-3 The experimental results of sorption of MT in sand at salinity of 10 g/L

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.26	0.19	0.20	0.18	-	0.73	0.69	0.81	-	-0.72	-0.13	0.19	0.26
2	0.52	0.36	0.25	0.18	0.31	1.64	2.69	3.37	2.13	-0.56	0.39	0.28	0.11
3	0.80	0.58	0.43	0.56	0.54	2.20	3.72	2.41	2.59	-0.28	0.44	0.53	0.19
4	1.11	0.84	0.63	0.71	0.61	2.65	4.84	4.00	4.97	-0.16	0.61	0.70	0.17
5	1.37	0.78	0.84	0.88	0.95	5.89	5.26	4.87	4.15	-0.07	0.70	0.86	0.17
6	1.51	0.96	0.82	0.86	1.00	5.43	6.83	6.44	5.11	-0.04	0.78	0.91	0.15
7	2.02	1.12	1.12	1.07	0.92	8.98	9.01	9.51	11.03	0.02	0.98	1.06	0.11
8	2.55	1.59	1.57	1.51	1.60	9.52	9.80	10.39	9.47	0.20	0.99	1.57	0.16
9	2.80	1.84	1.68	1.86	1.89	9.56	11.22	9.42	9.10	0.26	0.99	1.82	0.19
10	3.11	1.94	2.38	2.10	2.27	11.66	7.25	10.05	8.42	0.34	0.97	2.18	0.23

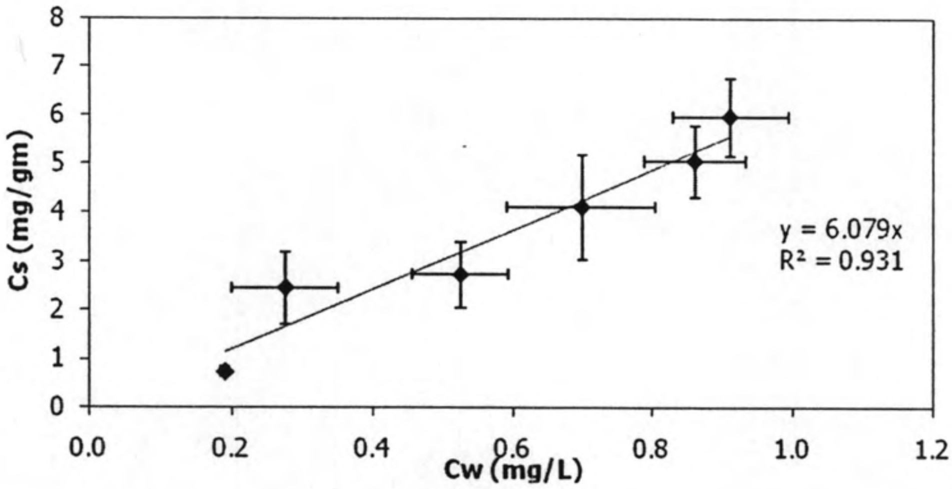

Figure E-7 The Linear isotherm of sorption of MT in water onto sand at salinity of 10 g/L

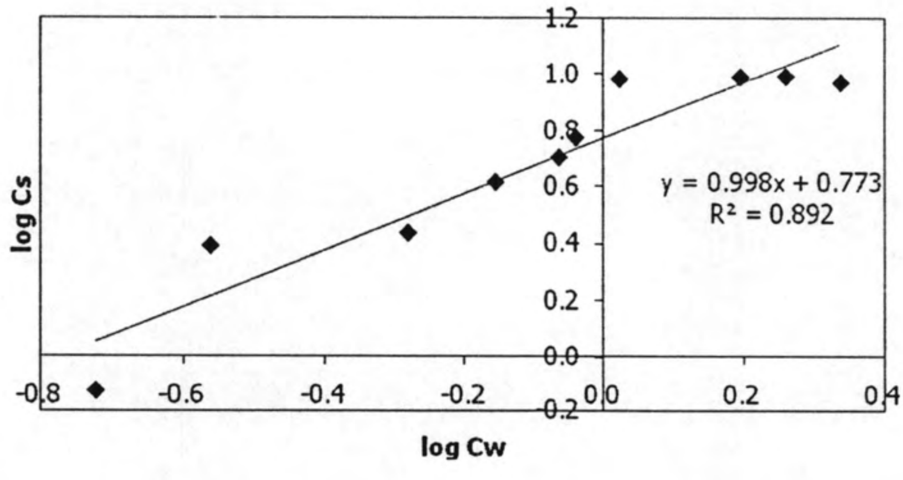

Figure E-8 The Freundlich isotherm of sorption of MT in water onto sand at salinity of 10 g/L

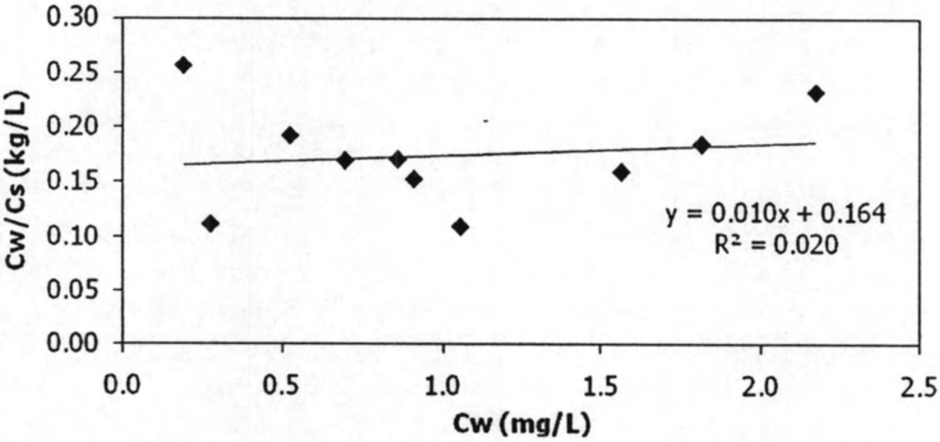

Figure E-9 The Langmuir isotherm of sorption of MT in water onto sand at salinity of 10 g/L

From Figure E-7, K_d was 6.079.
From Figure E-8, K_f was 5.929 and n was 0.998.
From Figure E-9, K_l was 609.756 and q_{max} was 6.098.

Table E-4 The experimental results of sorption of MT in sand at salinity of 20 g/L

No.	Init conc. (mg/L)	Cw (mg/L)				Cs (mg/kg)				log Cw	log Cs	Cw	Cw/Cs
		12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)	12 hr (1)	12 hr (2)	14 hr (1)	14 hr (2)				
1	0.36	0.20	0.19	0.13	0.18	1.60	1.73	2.31	1.81	-0.75	0.27	0.18	0.10
2	0.55	0.39	0.28	0.35	0.27	1.52	2.65	1.99	2.73	-0.49	0.35	0.32	0.15
3	0.98	0.53	0.55	0.68	0.63	4.55	4.31	3.03	3.47	-0.23	0.58	0.60	0.16
4	1.08	0.78	0.71	0.69	0.63	2.99	3.71	3.93	4.48	-0.15	0.58	0.70	0.19
5	1.24	0.99	0.91	0.91	0.92	2.55	3.34	3.32	3.25	-0.03	0.49	0.93	0.30
6	1.65	1.04	1.12	1.00	1.22	6.12	5.31	6.49	4.25	0.04	0.74	1.09	0.20
7	2.20	1.34	1.48	1.48	1.54	8.60	7.24	7.24	6.63	0.16	0.87	1.46	0.20
8	2.70	1.61	2.07	1.78	1.51	10.90	6.26	9.20	11.91	0.24	0.98	1.74	0.18
9	3.12	2.15	2.34	2.27	2.25	9.69	7.85	8.56	8.76	0.35	0.94	2.25	0.26
10	3.87	2.81	2.48	2.75	3.35	10.61	13.86	11.15	5.19	0.46	1.01	2.85	0.28

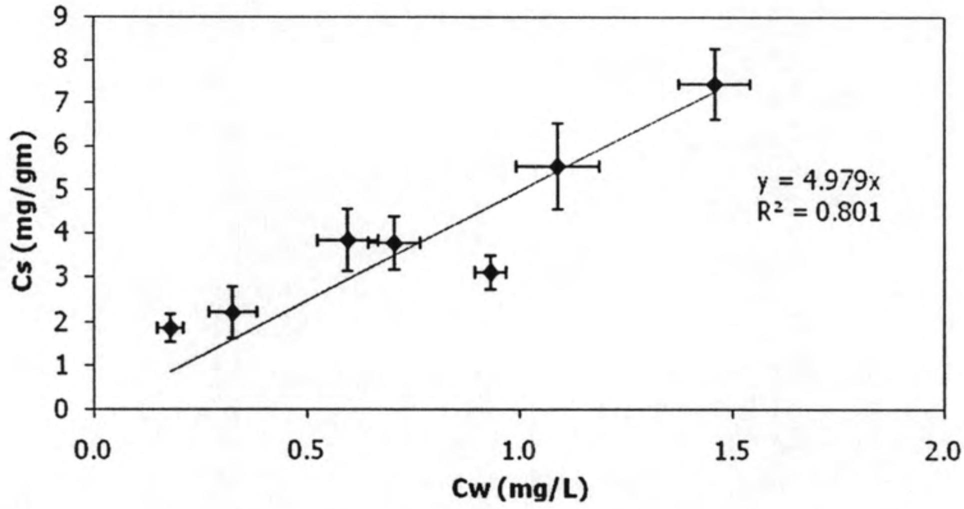

Figure E-10 The Linear isotherm of sorption of MT in water onto sand at salinity of 20 g/L

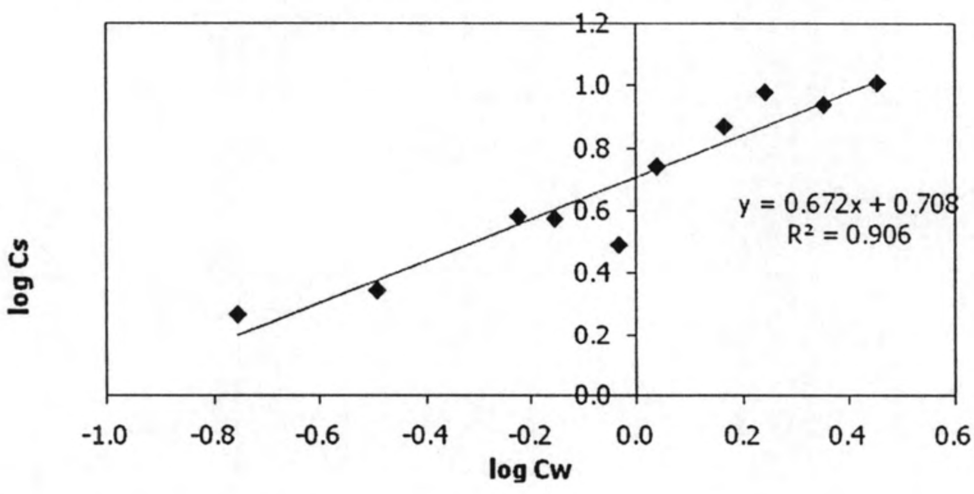

Figure E-11 The Freundlich isotherm of sorption of MT in water onto sand at salinity of 20 g/L

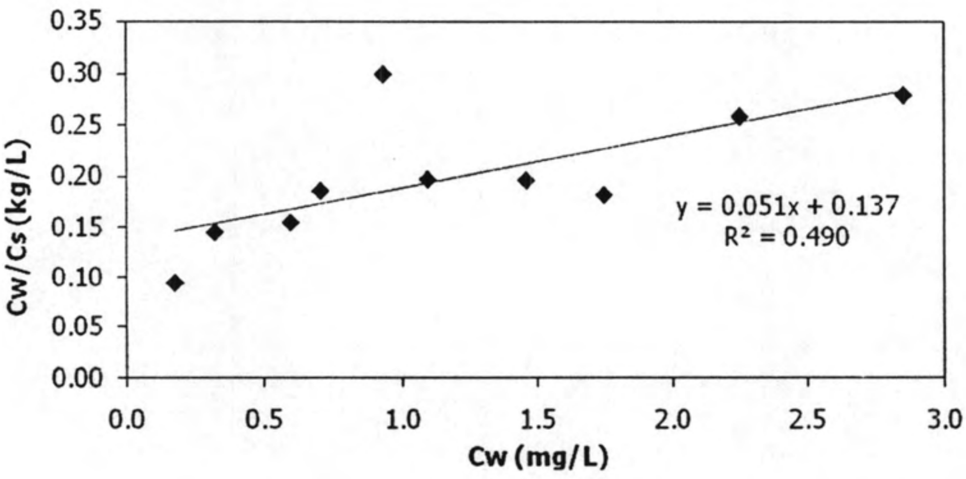

Figure E-12 The Langmuir isotherm of sorption of MT in water onto sand at salinity of 20 g/L

From Figure E-10, K_d was 4.979.
From Figure E-11, K_f was 5.105 and n was 0.692.
From Figure E-12, K_l was 143.123 and q_{max} was 7.299.

BIOGRAPHY

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Presentation:

- Pawittra Chotisukarn, Say Kee Ong, and Tawan Limpiyakorn. *Sorption of Methyltestosterone to Soils and Sediments*. 1st The Proceedings of Pure and Applied Chemistry International Conference (PACCON) 2008, Bangkok, Thailand, January 30 - February 1, 2008. Organized by Kasetsart University, Chemical Society of Thailand, and The Thailand Research Fund.