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## APPENDICES



**APPENDIX A**  
**EXPERIMENTAL DATA**

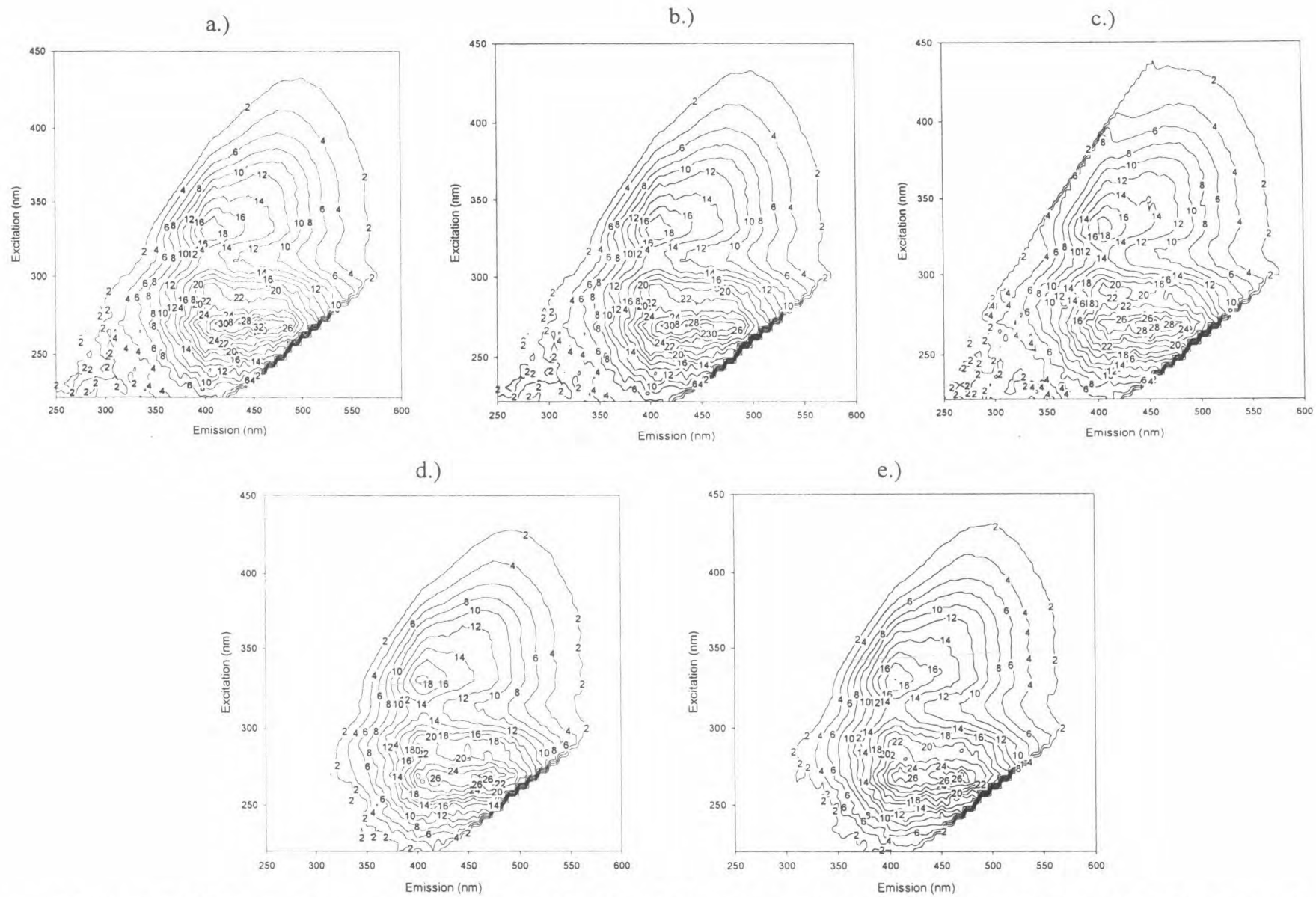


Figure A-1 FEEM of a.) Raw water, b.) JarTest with 1.5 mg/l Al, c.) JarTest with 2.0 mg/l Al, d.) JarTest with 2.5 mg/l Al, and e.) JarTest with 3.0 mg/l Al from Ping River water presented with contour interval 2QSU

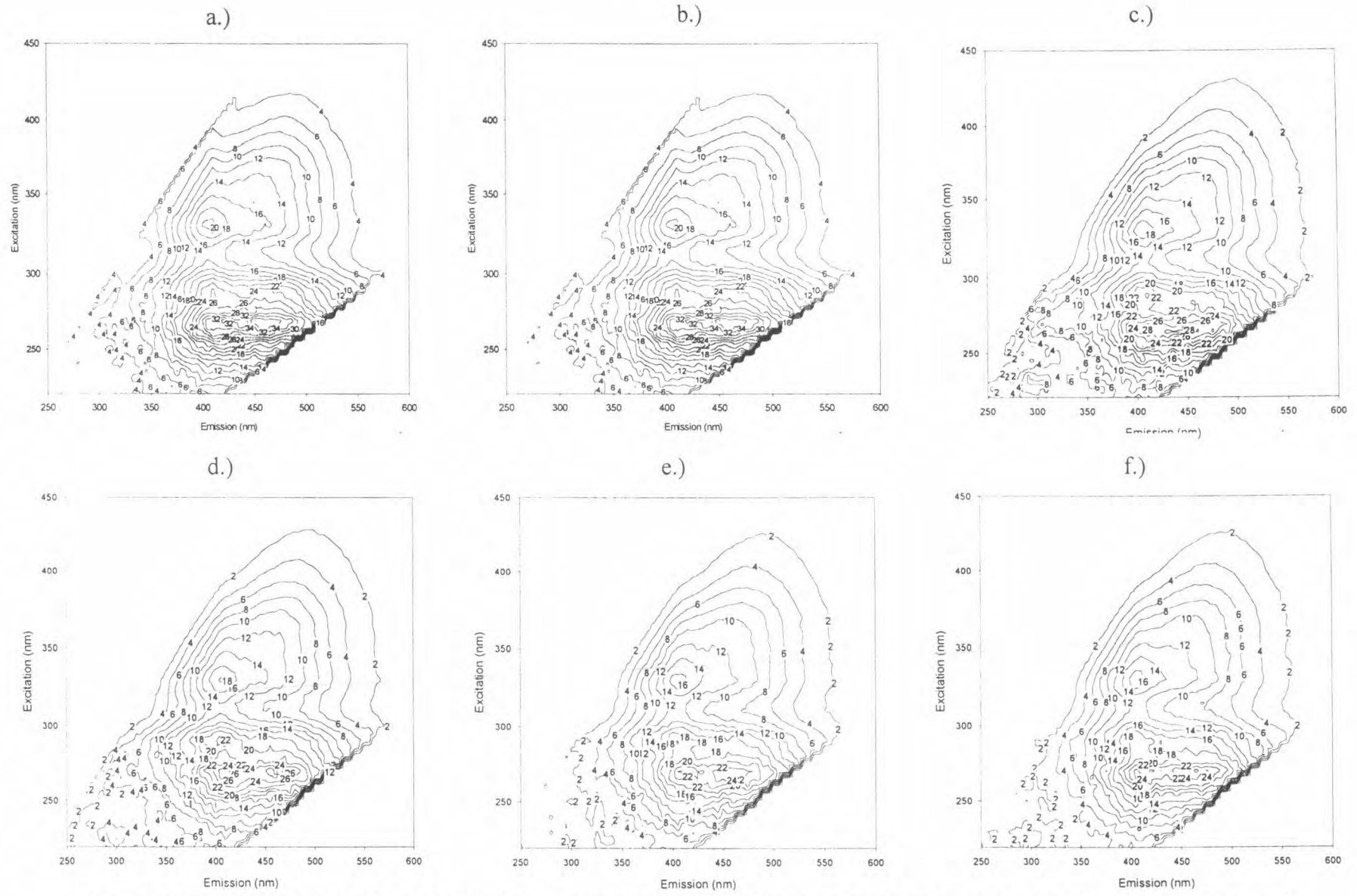
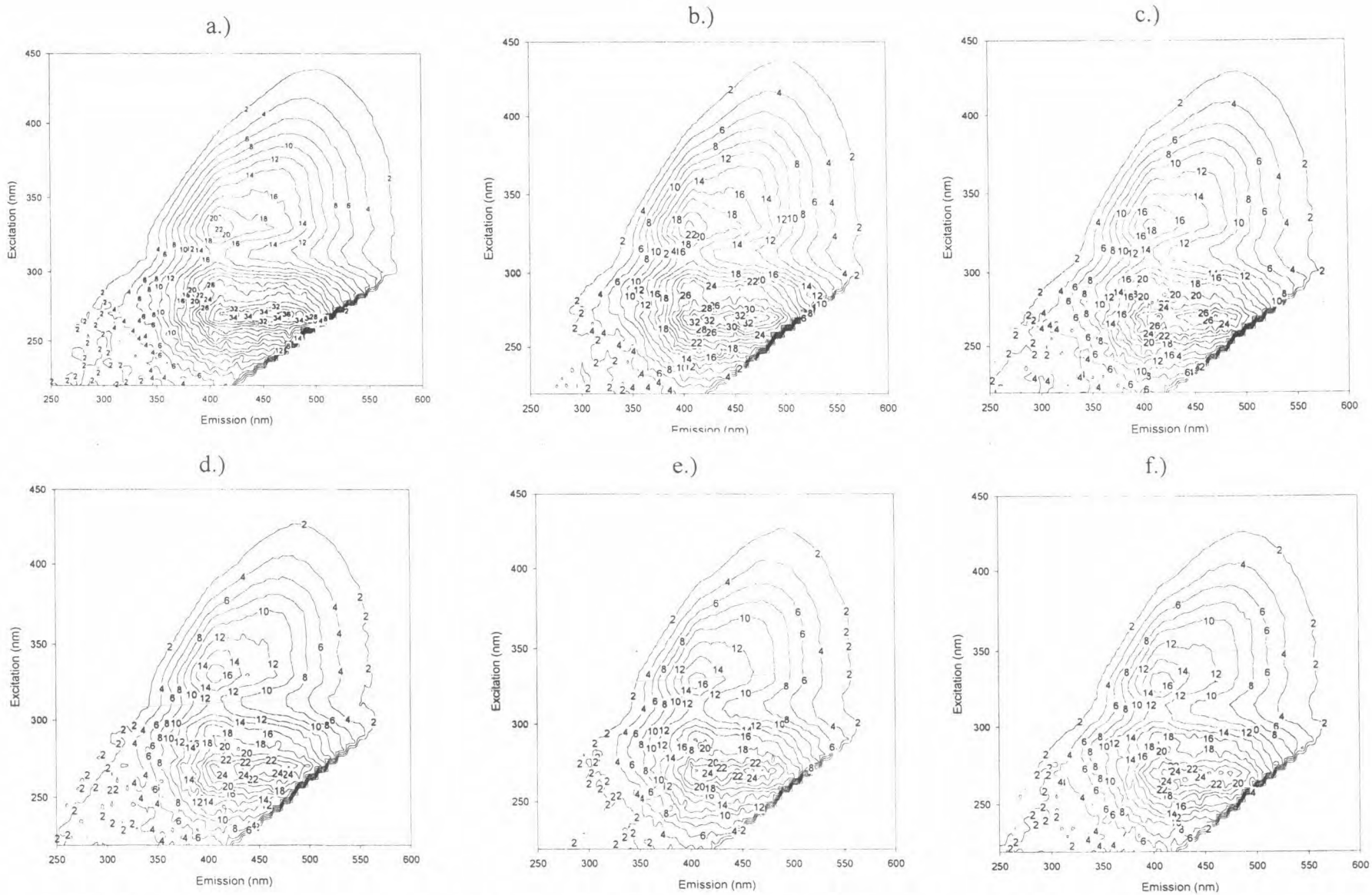
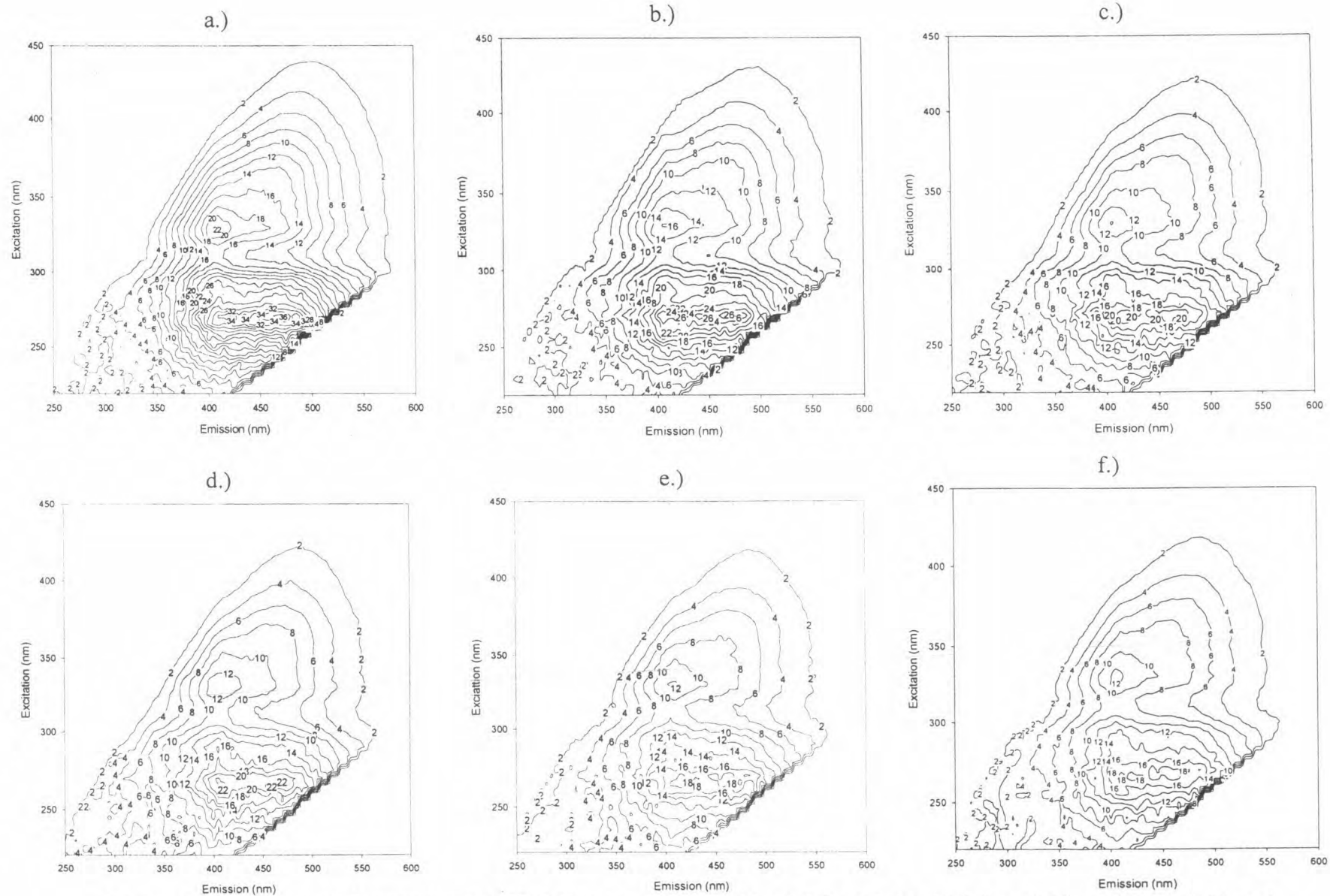


Figure A-2 FEEM of a.) Raw water, b.) 1.0µm, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with 1.0 µm from Ping River water presented with contour interval 2QSU



**Figure A-3** FEEM of a.) Raw water, b.) MF, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with MF from Ping River water presented with contour interval 2QSU



**Figure A-4** FEEM of a.) Raw water, b.) UF, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with UF from Ping River water presented with contour interval 2QSU

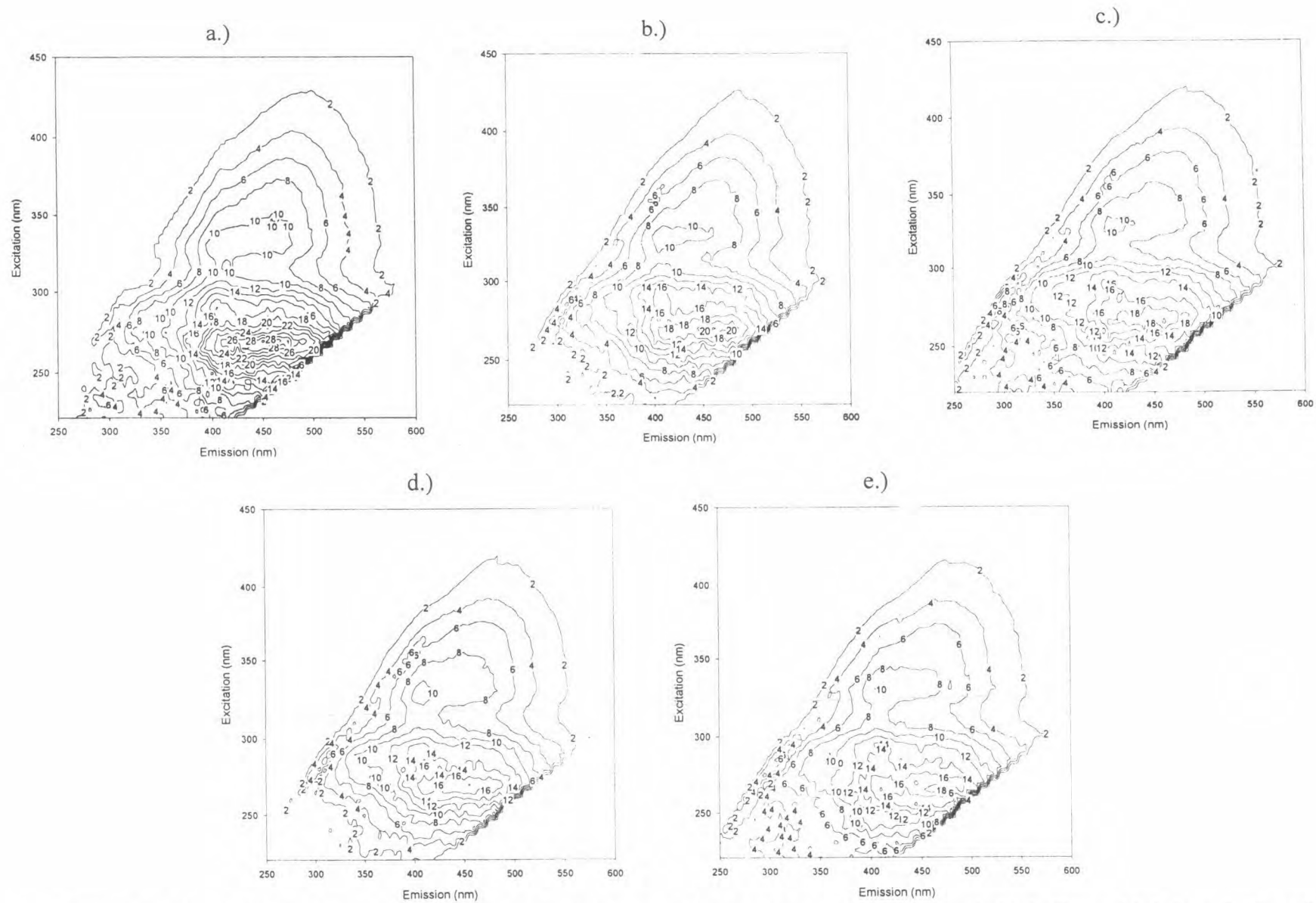


Figure A-5 FEEM of a.) Raw water, b.) JarTest with 1.5 mg/l Al, c.) JarTest with 2.0 mg/l Al, d.) JarTest with 2.5 mg/l Al, and e.) JarTest with 3.0 mg/l Al from Ang Keaw Reservoir water presented with contour interval 2QSU



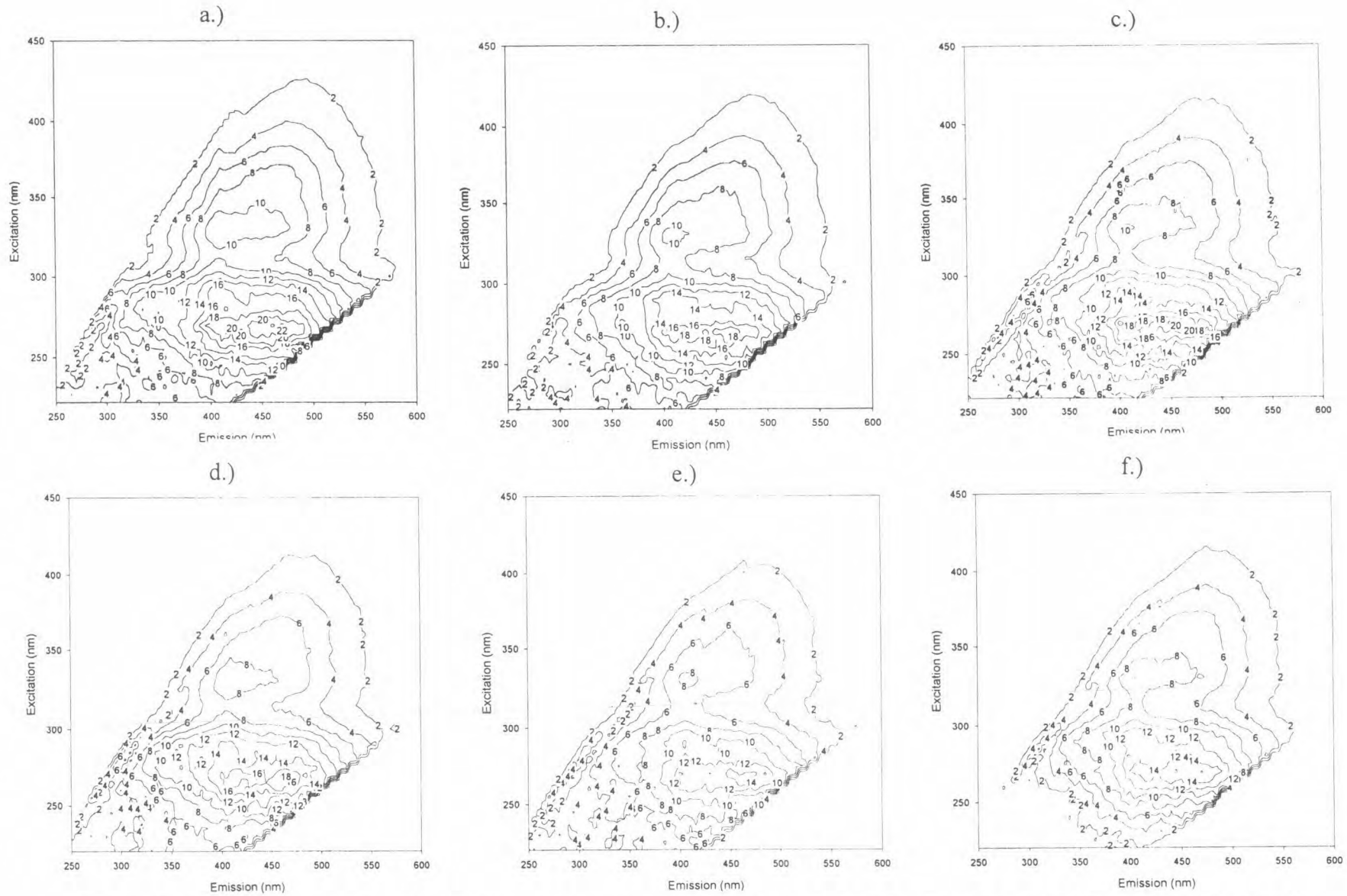


Figure A-6 FEEM of a.) Raw water, b.) 1.0µm, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with 1.0 µm from Ang Keaw Reservoir water presented with contour interval 2QSU

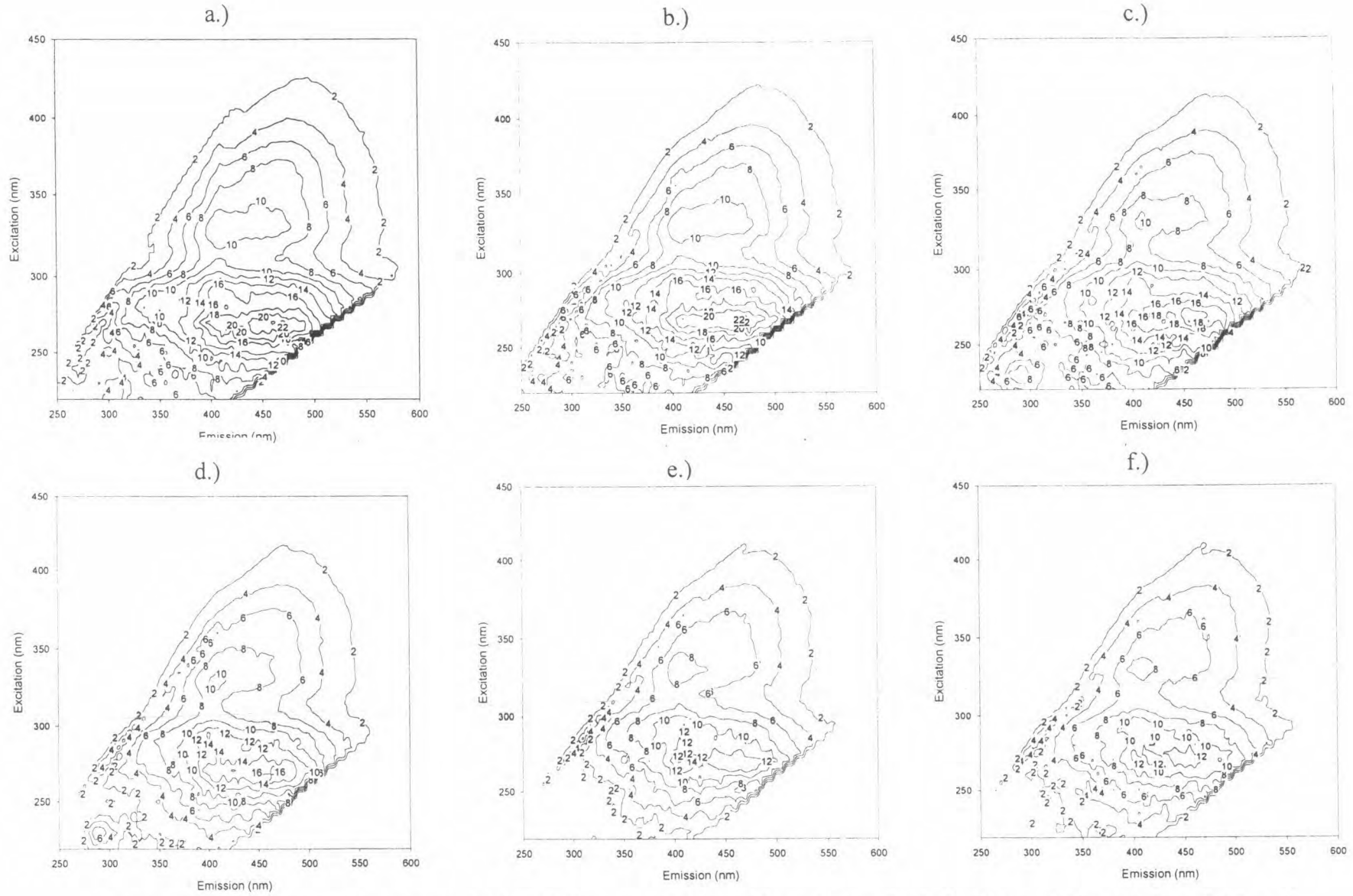
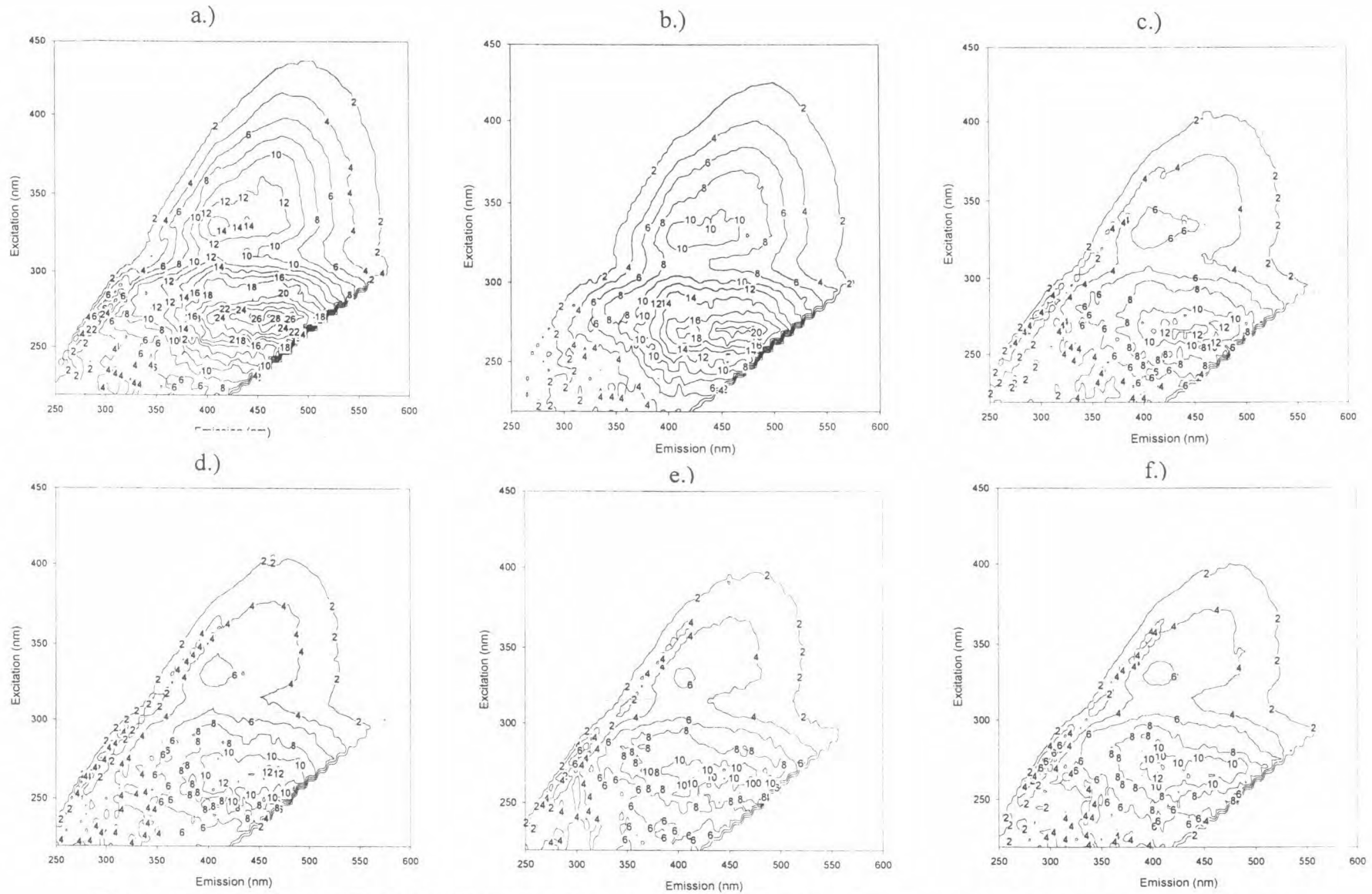


Figure A-7 FEEM of a.) Raw water, b.) MF, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with MF from Ang Keaw Reservoir water presented with contour interval 2QSU



**Figure A-8** FEEM of a.) Raw water, b.) UF, Inline coagulation with c.) 1.5 mg/l Al, d.) 2.0 mg/l Al, e.) 2.5 mg/l Al, and f.) 3.0 mg/l Al combined with UF from Ang Keaw Reservoir water presented with contour interval 2QSU

**Table A-1** pH, EC, Turbidity, Flux, and In-line coagulation detention time of water samples

Water Samples	Ping River water					Ang Keaw Reservoir water				
	pH	EC ( $\mu\text{s}/\text{cm}$ )	Turbidity (NTU)	Flux ( $\text{cm}/\text{s}$ )	In-line coagulation detention time (s)	pH	EC ( $\mu\text{s}/\text{cm}$ )	Turbidity (NTU)	Flux ( $\text{cm}/\text{s}$ )	In-line coagulation detention time (s)
Raw water	7.68	218	94.54	-	-	7.25	69.5	20.9	-	-
JarTest with 1.5 mg/l Al	7.55	220.2	0.78	-	-	7.15	67.2	14.17	-	-
JarTest with 2.0 mg/l Al	7.55	221.5	0.71	-	-	7.09	68.7	10.64	-	-
JarTest with 2.5 mg/l Al	7.45	222	0.58	-	-	6.91	69.6	8.57	-	-
JarTest with 3.0 mg/l Al	7.34	222.4	0.48	-	-	6.9	71.5	3.16	-	-
Raw water	7.72	188	87.26	-	-	7.68	69.1	18.4	-	-
Raw water-1.0 $\mu\text{m}$	7.72	187.2	2.14	31.14	22.48	7.67	52	1.13	30.55	22.91
In-line(with 1.5 mg/l Al)+1.0 $\mu\text{m}$	7.6	194.1	0.41	30.03	23.31	7.48	54.9	0.19	29.94	23.38
In-line(with 2.0 mg/l Al)+1.0 $\mu\text{m}$	7.51	194.6	0.2	29.69	23.58	7.22	55.8	0.17	28.96	24.17
In-line(with 2.5 mg/l Al)+1.0 $\mu\text{m}$	7.42	195	0.15	29.91	23.40	7.2	56.9	0.23	28.54	24.53
In-line(with 3.0 mg/l Al)+1.0 $\mu\text{m}$	7.35	195.5	0.17	29.00	24.14	7.15	57.2	0.23	27.98	25.02
Raw water	7.77	220	83.87	-	-	7.68	69.1	18.4	-	-
Raw water-MF	7.77	227	0.27	22.97	30.47	7.68	65.5	0.27	23.77	29.44
In-line(with 1.5 mg/l Al)+MF	7.69	224	0.19	22.60	30.98	7.48	69.7	0.15	24.91	28.11
In-line(with 2.0 mg/l Al)+MF	7.62	226	0.15	22.97	30.48	7.47	71.5	0.15	24.41	28.68
In-line(with 2.5 mg/l Al)+MF	7.6	227	0.14	22.97	30.47	7.3	74.7	0.2	24.57	28.49
In-line(with 3.0 mg/l Al)+MF	7.57	231	0.18	23.67	29.58	7.12	73.8	0.17	24.39	28.70
Raw water	7.77	220	83.87	-	-	7.75	73	18.9	-	-
Raw water-UF	7.77	212	ND.	18.68	37.47	7.76	70.7	ND.	19.57	35.76
In-line(with 1.5 mg/l Al)+UF	7.48	225	ND.	18.42	38.01	7.48	71.5	ND.	20.07	34.88
In-line(with 2.0 mg/l Al)+UF	7.41	224	ND.	17.99	38.90	7.41	72.2	ND.	19.46	35.97
In-line(with 2.5 mg/l Al)+UF	7.22	220	ND.	18.06	38.77	7.22	73.9	ND.	19.26	36.34
In-line(with 3.0 mg/l Al)+UF	7.21	218	ND.	19.07	36.72	7.21	75.1	ND.	20.29	34.50

**Table A-2** THMFP for all water samples from Ping River water and their THMFP species

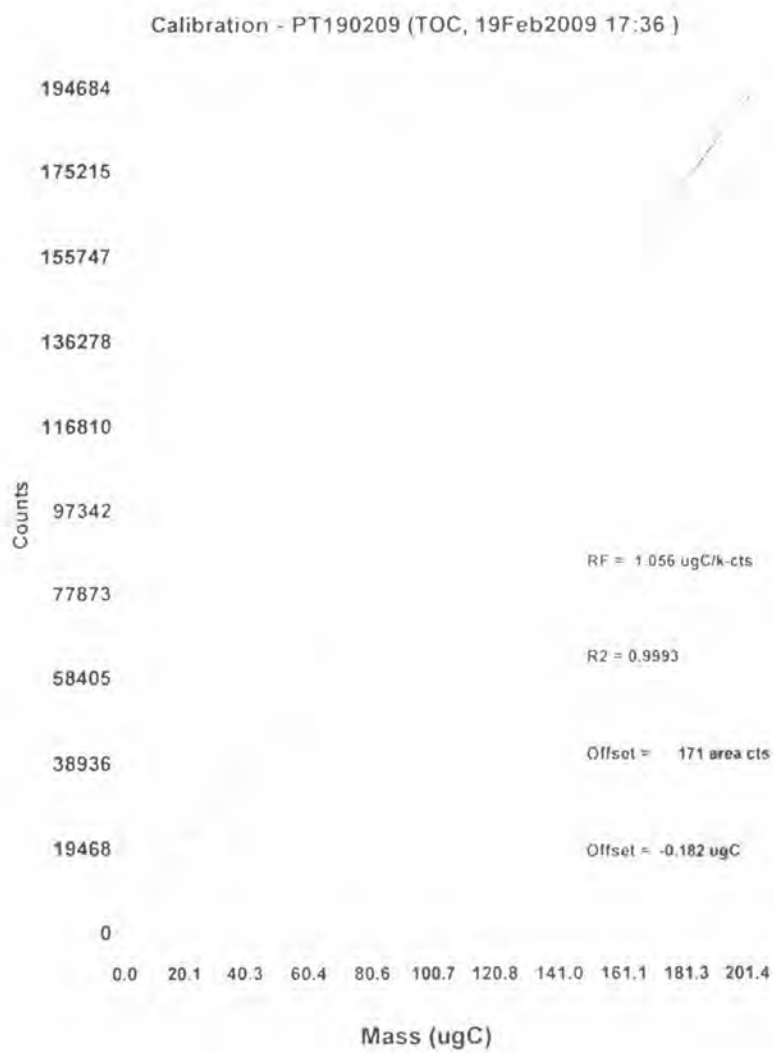
Water Samples	Cl <sub>2</sub> demand (mg/l Cl <sub>2</sub> )	THMFP species			Total THMFP
		Chloroform	Dichlorobromoform	Dibromochloroform	
Raw water	3.536	222.7	14.1	2.0	238.8
Jartest with 1.5 mg/l Al	2.236	208.6	8.2	0.5	217.3
Jartest with 2.0 mg/l Al	1.676	165.0	13.1	1.3	179.4
Jartest with 2.5 mg/l Al	1.124	127.1	12.6	1.3	141.0
Jartest with 3.0 mg/l Al	1.355	137.0	9.7	0.0	146.7
Raw water	3.654	232.2	14.2	2.5	248.9
1.0µm	1.335	230.0	8.0	1.0	239.0
In-line(with 1.5 mg/l Al)+1.0µm	1.244	168.2	11.6	1.2	181.0
In-line(with 2.0 mg/l Al)+1.0µm	1.164	139.8	9.0	0.6	149.4
In-line(with 2.5 mg/l Al)+1.0µm	0.955	124.7	11.6	0.0	136.3
In-line(with 3.0 mg/l Al)+1.0µm	1.135	132.4	11.8	0.0	144.2
Raw water	3.926	249.8	19.7	2.1	271.6
MF	3.536	229.4	10.1	0.8	240.3
In-line(with 1.5 mg/l Al)+MF	2.435	139.6	10.1	1.2	150.9
In-line(with 2.0 mg/l Al)+MF	2.345	111.8	12.2	1.2	125.2
In-line(with 2.5 mg/l Al)+MF	2.085	97.7	9.2	0.7	107.6
In-line(with 3.0 mg/l Al)+MF	1.755	109.6	9.0	0.7	119.3
Raw water	3.926	249.8	19.7	2.1	271.6
UF	3.017	188.6	8.9	1.6	199.1
In-line(with 1.5 mg/l Al)+UF	2.366	162.6	9.3	1.3	173.2
In-line(with 2.0 mg/l Al)+UF	2.075	99.8	10.3	1.2	111.3
In-line(with 2.5 mg/l Al)+UF	1.366	70.4	7.2	1.1	78.7
In-line(with 3.0 mg/l Al)+UF	1.535	90.0	8.3	1.1	99.4

**Table A-3** THMFP for all water samples from Ang Keaw Reservoir water and their THMFP species

Water Samples	Cl <sub>2</sub> demand (mg/l Cl <sub>2</sub> )	THMFP species			Total THMFP
		Chloroform	Dichlorobromoform	Dibromochloroform	
Raw water	4.547	233.9	6.8	1.6	242.3
Jartest with 1.5 mg/l Al	3.456	203.5	6.1	0.0	210.3
Jartest with 2.0 mg/l Al	1.805	180.6	5.1	0.0	185.7
Jartest with 2.5 mg/l Al	1.284	143.7	6.0	0.0	149.7
Jartest with 3.0 mg/l Al	1.155	124.6	6.6	0.0	131.2
Raw water	4.607	239.8	8.5	1.0	249.3
1.0µm	4.257	214.2	6.8	1.0	222.0
In-line(with 1.5 mg/l Al)+1.0µm	1.965	172.5	6.4	0.0	178.9
In-line(with 2.0 mg/l Al)+1.0µm	2.465	173.7	5.1	0.0	178.8
In-line(with 2.5 mg/l Al)+1.0µm	2.097	140.4	5.7	0.0	146.1
In-line(with 3.0 mg/l Al)+1.0µm	1.687	133.1	4.6	0.0	137.7
Raw water	4.607	239.8	8.5	1.0	249.3
MF	2.537	197.5	7.0	0.7	205.2
In-line(with 1.5 mg/l Al)+MF	1.966	117.6	7.6	0.0	125.2
In-line(with 2.0 mg/l Al)+MF	1.594	114.4	6.5	0.0	120.9
In-line(with 2.5 mg/l Al)+MF	0.765	88.6	5.3	0.0	93.9
In-line(with 3.0 mg/l Al)+MF	0.614	78.8	4.8	0.0	83.6
Raw water	4.507	219.2	6.2	1.7	227.1
UF	3.946	180.1	5.9	0.1	186.1
In-line(with 1.5 mg/l Al)+UF	1.504	95.0	5.9	0.0	98.5
In-line(with 2.0 mg/l Al)+UF	0.894	80.5	4.4	0.0	84.9
In-line(with 2.5 mg/l Al)+UF	0.744	65.0	3.5	0.0	70.9
In-line(with 3.0 mg/l Al)+UF	0.474	58.0	4.8	0.0	62.8



**APPENDIX B**  
**CALIBRATION DATA AND CURVES**



**Figure B-1:** Calibration curve of TOC

Table B-2: Calibration data of THMs

Method C:\APPCHEM\1\METHODS\TANSI\_R4.M

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=====
                        Calibration Table
=====

```

```

Calib. Data Modified :      Monday, April 20, 2009 3:06:54 PM

Calculate           :      External Standard
Based on           :      Peak Area

Rel. Reference Window :      10.000 %
Abs. Reference Window :      0.000 min
Rel. Non-ref. Window :      10.000 %
Abs. Non-ref. Window :      0.000 min
Uncalibrated Peaks  :      not reported
Partial Calibration :      Yes, identified peaks are recalibrated
Correct All Ret. Times:      No, only for identified peaks

Curve Type         :      Linear
Origin            :      Forced
Weight           :      Equal

Recalibration Settings:
Average Response   :      Average all calibrations
Average Retention Time:      Floating Average New 75%

```

```

Calibration Report Options :
  Printout of recalibrations within a sequence:
    Calibration Table after Recalibration
    Normal Report after Recalibration
  If the sequence is done with bracketing:
    Results of first cycle (ending previous bracket)

```

Signal 1: ECCL A.

RetTime (min)	Lvl Sig	Amount [ug/l]	Area	Amt/Area	Ref Grp Name
2.034	1	25.00000	239.59000	1.04345e-1	1 Chloroform
	2	50.00000	255.01210	1.96069e-1	
	3	100.00000	691.03680	1.44710e-1	
	4	150.00000	1058.88904	1.41658e-1	
	5	300.00000	2485.18164	1.20716e-1	
	6	500.00000	3613.46484	1.38371e-1	
2.840	1	25.00000	1082.33752	2.30982e-2	1 Dichlorobromoform
	2	50.00000	1350.12292	3.70337e-2	
	3	100.00000	3513.52661	2.84614e-2	
	4	150.00000	5776.57422	2.59669e-2	
	5	300.00000	1.21531e4	2.46850e-2	
	6	500.00000	1.60802e4	2.76546e-2	
4.101	1	25.00000	990.55780	2.52383e-2	1 Dibromoform
	2	50.00000	1391.50232	3.59324e-2	
	3	100.00000	3240.25930	3.08617e-2	
	4	150.00000	5625.33154	2.66651e-2	
	5	300.00000	1.03594e4	2.89593e-2	
	6	500.00000	1.59100e4	3.14267e-2	
5.571	1	25.00000	434.30295	5.75635e-2	1 Bromoform
	2	50.00000	658.30200	7.59530e-2	
	3	100.00000	1425.56787	7.01475e-2	
	4	150.00000	2538.39844	5.90924e-2	
	5	300.00000	4135.02686	7.25509e-2	
	6	500.00000	6439.77344	7.76425e-2	
5.950	1	200.00000	38.26922	5.22613	11 Bromofluorobenzene
	2	200.00000	38.23727	5.23050	
	3	200.00000	39.03510	5.12358	
	4	200.00000	39.94700	5.00663	
	5	200.00000	38.26500	5.22613	

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RetTime [min]	Lvl Sig	Amount [ug/l]	Area	Amt/Area	Ref Grp Name
6	200.00000	46.93356	4.26134		

1 Warnings or Errors :

Warning : Overlapping peak time windows at 5.571 min. signal: 1

Peak Sum Table

\*\*\*No Entries in table\*\*\*

Calibration Curves

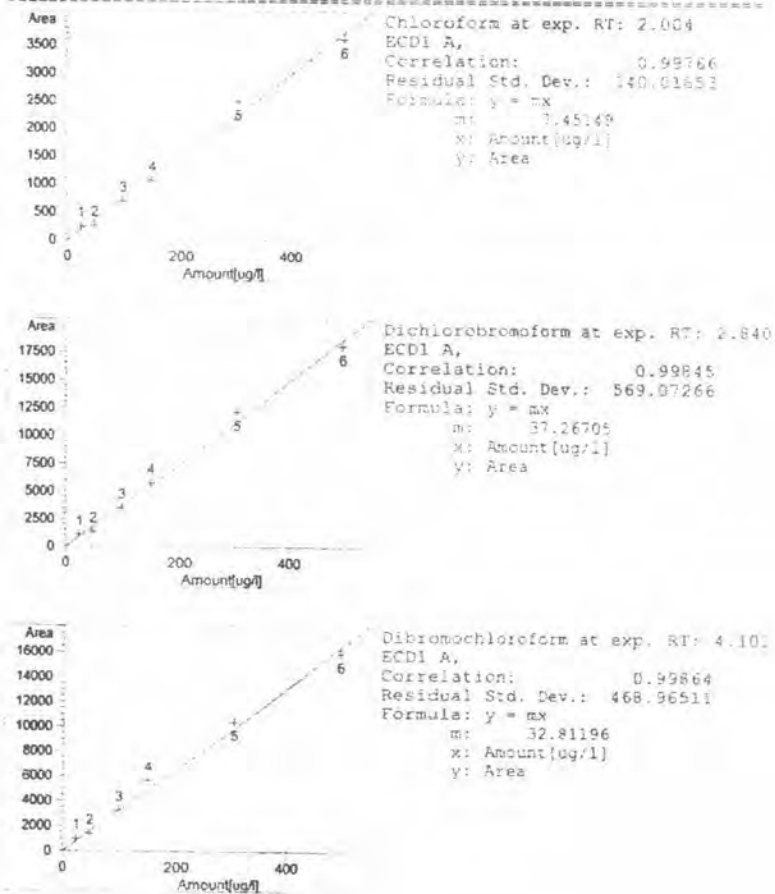
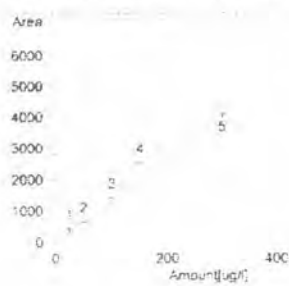
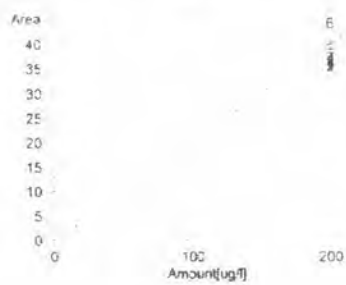


Figure B-2: Calibration data of THMs

Method C:\BP\CHEM\1\METHODS\TANS1\_04.M



Bromoform at exp. RT: 6.571  
 FID: A,  
 Correlation: 0.99721  
 Residual Std. Dev.: 274.72344  
 Formula:  $y = mx$   
 m: 13.28459  
 x: Amount (ug/l)  
 y: Area



Bromofluorobenzene at exp. RT: 5.950  
 FID: A,  
 Correlation: 0.99701  
 Residual Std. Dev.: 3.40712  
 Formula:  $y = mx$   
 m: 2.00573e-01  
 x: Amount (ug/l)  
 y: Area

Figure B-2 cont.: Calibration data of THMs

## BIOGRAPHY

Name	Phantipa Chaimongkol
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