



CHAPTER 4

RESULTS AND DISCUSSION

4.1 THE STUDY OF SHAKING TIME

The effect of shaking time on % recovery of each PAH, i.e., fluorene, anthracene, fluoranthene, and pyrene in various extracting organic solvents i.e., toluene, hexane, and methylene chloride and in each sample to solvent ratio, i.e., 10:1 and 50:1 are studied. Their results can be seen in Tables 4.1-4.4. The graphs correlated to the results of extraction using toluene, hexane and methylene chloride as solvent are shown in Figures 4.1-4.3. The equilibration times of various extracting organic solvents and sample to solvent ratios can be obtained from the graphs and they are 10 and 15 min for toluene, 15 and 20 min for hexane, and 20 and 30 min for methylene chloride for the sample to solvent ratio of 10:1 and 50:1, respectively.

4.2 MICROEXTRACTION OF SINGLE COMPONENT AQUEOUS STANDARD

SOLUTION

The various effects on % recovery of each PAH in the single component aqueous standard solutions were studied i.e., extracting solvents, sample to solvent ratios, concentrations and the salting out effect. The concentrations of each PAH in the standard aqueous solutions used in this study are 50.00 ppb and 1.00 ppm.

4.2.1 The Effect of Sample to Solvent Ratios on % Recovery

The percent recoveries of each PAH in various sample to solvent ratios i.e., 10:1 and 50:1 were studied. The results of their percent recoveries are shown in Tables 4.5-4.8 and the graphs correlated to them are displayed in Figures 4.4-4.11. The results indicate that % recoveries range from 69.58 to 108.16 with RSD 0.36 to 8.09% and 50.50 to 109.79 with RSD 0.33 to 8.14% for the sample to solvent ratio of 10:1 for 50.00 ppb and 1.00 ppm aqueous standard solutions, respectively. For the sample to

solvent ratio of 50:1, the % recoveries range from 3.14 to 93.64 with RSD 0.30 to 7.90% for 50.00 ppb aqueous standard solution and 7.08 to 103.55 with RSD 0.41 to 9.25% for 1.00 ppm aqueous standard solution. The sample to solvent ratio of 10:1 gives the percent recoveries better than the ratio of 50:1. The reason of this is that the percentage of the solute extracted into the organic solvent is inversely proportional to the sample to solvent ratio (v_w/v_o) as shown in equation 19, section 2.4. The initial concentrations of aqueous standard solutions, i.e., 50.00 ppb and 1.00 ppm, have no effect on the percent recoveries of each PAH as can be seen from the Tables 4.5-4.8. The % RSD of the 50:1 sample to solvent ratio is lower than of 10:1 and its sensitivity is higher (3.83 to 63.185 fold of initial concentration) than that of the sample to solvent ratio of 10:1. Therefore, the sample to solvent ratio of 50:1 would be considered as a suitable ratio for microextraction of PAHs.

4.2.2 The Effect of Extracting Solvents on % Recovery

The microextraction of PAHs using three different

extracting solvents i.e., toluene, hexane and methylene chloride are studied. The results of the percent recoveries of each PAH with these solvents are shown in Tables 4.9-4.12 and the graphs correlated to them are displayed in Figures 4.12-4.19. It is demonstrated that the % recoveries of PAHs using toluene as extracting solvent range from 49.86 to 108.16 with RSD 0.30 to 6.96% and from 46.23 to 109.79 with RSD 0.33 to 8.14% for 50.00 ppb and 1.00 ppm aqueous standard solutions, respectively. The % recoveries of PAHs using hexane as extracting solvent range from 36.63 to 104.07 with RSD 0.46 to 7.71% and 52.27 to 102.50 with RSD 0.44 to 8.97% for 50.00 ppb and 1.00 ppm aqueous standard solutions, respectively. For methylene chloride, the % recoveries of 50.00 ppb aqueous standard solutions of PAHs range from 3.14 to 100.91 with RSD 0.94 to 8.09% and they range from 7.08 to 102.21 with RSD 1.07 to 9.25% for 1.00 ppm aqueous standard solutions.

It can be seen from these results that toluene would be the most suitable solvent due to it gives the highest % recovery and lowest % RSD for all of the three solvents studied. The reason of this is that the molecular

structures of toluene and PAHs are similar and PAHs, therefore, tend to be more soluble in toluene than the others.

4.2.3 The Salting Out Effect on % Recovery

The effect of adding inorganic salts i.e., sodium chloride and anhydrous sodium sulfate, to the aqueous layer prior to extraction on the % recovery is investigated. Their results are shown in Tables 4.13-4.16 and The graphs correlated to these results are depicted in Figures 4.20-4.27. The % recoveries of PAHs using no salt range from 3.14 to 103.39 with RSD 0.36 to 8.09% and 7.08 to 103.61 with RSD 0.33 to 7.86% for 50.00 ppb and 1.00 ppm aqueous standard solution, respectively. The % recoveries of PAHs using sodium chloride range from 12.82 to 105.95 with RSD 0.38 to 7.87% for 50.00 ppb aqueous standard solution and 20.02 to 104.20 with RSD 0.42 to 8.14% for 1.00 ppm aqueous standard solution. The recoveries of PAHs approached a maximum when anhydrous sodium sulfate is added and they range from 19.89 to 108.36 with RSD 0.30 to 6.92% and 20.34 to 109.79 with RSD 0.41 to 9.25% for 50.00 ppb and 1.00 ppm

aqueous standard solution, respectively. These results indicate that the higher ionic strength of added inorganic salts used yields the higher extraction efficiencies and anhydrous sodium sulfate would be the appropriate salt for this application.

4.3 THE STUDY OF UV DETECTION WAVELENGTHS

The effect of UV detection wavelengths on the sensitivity of microextraction of PAHs is studied. The advantage of using UV detector is the selection of appropriate detection wavelength for each PAH. The detection wavelength of 254.0 nm is a common to all PAHs while 260.4, 254.0, 286.4 and 272.4 nm are the optimum wavelengths for fluorene, anthracene, fluoranthene and pyrene, respectively and it can be used to increase the sensitivity for the determination of PAHs in this method. Since the UV wavelength of 254.0 nm is selected for PAHs instead of various optimum wavelengths for each PAH due to the UV-Visible detector used cannot be programmed for their optimum wavelengths. Therefore, the % recoveries of PAHs range from 3.14 to 108.16 with RSD 0.30 to 8.09% for and

8.69 to 109.38 with RSD 0.33 to 8.97% for 50.00 ppb and 1.00 ppm aqueous standard solution, respectively. However, at the optimum wavelength for each PAH, the % recoveries of PAHs range from 3.14 to 108.36 with RSD 0.36 to 7.90% and 7.08 to 109.79 with RSD 0.33 to 9.25% for 50.00 ppb and 1.00 ppm aqueous standard solution, respectively. These results indicate that the UV wavelength has no effect on the % recoveries of PAHs as they have on the effect of sensitivity.

4.4 MICROEXTRACTION OF STANDARD MIXTURE

The various effects on % recovery of each PAH in the aqueous standard mixture with various extracting solvents, i.e., toluene, hexane and methylene chloride, and various sample to solvent ratios, i.e., 10:1 and 50:1, are studied. The results are shown in Tables 4.17-4.20 and the graphs correlated to these results are depicted in Figures 4.28-4.31. The % recoveries of PAHs range from 15.82 to 102.05 with RSD 0.49 to 7.95% and 46.65 to 110.66 with RSD 0.23 to 7.65% for the sample to solvent ratio of 50:1 and 10:1, respectively. The % recoveries of PAHs range from

66.92 to 110.66 with RSD 0.43 to 7.89%, 59.79 to 104.38 with RSD 0.23 to 7.31% and 15.82 to 100.74 with RSD 1.06 to 7.95% for using toluene, hexane and methylene chloride as the extracting solvents, respectively. The % recoveries of PAHs from the standard mixture aqueous solution are not significant different from the % recoveries of PAHs of the single component aqueous standard solution. This indicates that the matrix in the solutions does not have any effect on the % recoveries of PAHs and also the different concentrations of each PAH do not have any effect on the % recoveries of PAHs as can be seen from Tables 4.17-4.20. However, the trend for various effects on the % recoveries of PAHs in the aqueous standard mixture is not different from the single component aqueous standard solution of PAHs and the sensitivity of PAHs for the sample to solvent ratio of 50:1 is higher than for the ratio of 10:1. Therefore, the best combination of microextraction of PAHs would be the sample to solvent ratio of 50:1, using toluene as the extracting solvent and salting out with anhydrous sodium sulfate.

4.5 THE MINIMUM DETECTABLE LEVEL (MDL) OF PAHs

The minimum detectable level is defined as amount of the component which give a detector response equal to twice the average noise level (46). The minimum detectable level of each PAH is determined by injecting standard PAH with a concentration from 0.05 ppb to 50.00 ppb into the HPLC. The minimum detectable level of each PAH in single component solutions monitered at 254.0 nm and at each optimum wavelength are presented in Table 4.21.

The results shown that the minimum detectable level of each PAH in methanol are 10.00, 0.10, 10.00 and 0.20 ppb for fluorene, anthracene, fluoranthene and pyrene, respectively. The very low detection limit will make the microextraction of PAHs suitable for the real water samples with a very low concentration of PAHs.

4.6 THE ACCURACY OF MICROEXTRACTION METHOD

The microextraction using toluene as the extracting solvent, the sample to solvent ratio of 50:1 and salting out with anhydrous sodium sulfate are selected as the most suitable combination for analysis of PAHs in water samples. The 50:1 sample to solvent ratio yields the high concentration of component of interest in an extract resulting the good sensitivity for this technique and toluene is found to be a most desirable solvent as it yields the highest % recovery.

The accuracy of microextraction is evaluated by comparing the results of concentration of each PAH in synthetic unknown mixture. The microextraction procedure used are described in section 3.4 and the results of the concentration of each PAH and % error are shown in Table 4.22.

The high precision and high accuracy of microextraction technique is proved to be a suitable method for the determination of the very low concentration PAHs in water sample.

4.7 THE DETERMINATION OF PAHs IN REAL WATER SAMPLES

The microextraction procedure was applied to the analysis of four water samples collected from various sites i.e., a pool in front of Chulalongkorn University, at intake of Samsean Station for production of tap water, at 200 m and 500 m along Klong Prapa from intake. Details of this method are described in section 3.4 and the liquid chromatograms of these samples are shown in Figures 4.32-4.33. It was found that the liquid chromatograms of each water sample are quite similar and there is one peak in chromatograms having the retention time the same as the retention time of fluorene. Therefore, the further identification of the unknown peak was performed by using the spiking technique. The standard solution of fluorene in methanol was spiked into the extracts of each water sample and then injected into C-18 HPLC column and the resulted liquid chromatogram is shown in Figure 4.34 (A). It is found that there is another peak on the shoulder of the main peak as can be seen in Figure 4.34 (A). When using different mobile phase i.e., 85% of acetonitrile in water, these two peaks are completely separated as can be seen

from the liquid chromatogram shown in Figure 4.34 (B). This indicated that the unknown peak is not the same as the fluorene peak and therefore, there is no fluorene in the water samples.

Table 4.1 The results of the effect of shaking time on
% recovery of fluorene in various sample to
solvent ratics

(A) RATIO 10:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
2	81.79	6.00	93.27	3.02	42.50	1.76
5	93.18	1.80	96.51	0.10	63.40	1.03
10	75.31	6.67	94.97	1.97	81.26	5.40
15	81.15	1.36	95.72	0.53	85.89	4.55
20	94.60	1.05	97.18	0.37	89.56	0.92
25	75.55	0.67	99.15	0.81	98.13	0.12

(B) RATIO 50:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
5	80.48	1.07	62.75	7.26	11.55	7.03
10	86.44	1.02	84.38	6.48	15.24	1.22
15	88.36	3.39	85.23	2.39	17.63	0.90
20	94.50	2.34	85.54	0.57	21.82	0.51
30	93.64	0.62	86.25	1.53	27.72	6.94
40	92.49	3.54	83.14	4.44	23.35	4.29

Triplicate analyses

ND = Not Determine

Table 4.2 The results of the effect of shaking time on
% recovery of anthracene in various sample to
solvent ratios

(A) RATIO 10:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
2	83.45	2.78	73.33	3.29	6.86	5.96
5	83.33	3.13	80.25	1.32	20.21	5.60
10	100.13	4.21	89.72	0.53	39.52	3.88
15	101.59	0.95	88.21	0.75	40.11	3.82
20	101.07	0.52	91.90	5.43	55.36	0.70
25	100.47	0.65	84.60	1.03	64.82	1.98

(B) RATIO 50:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
5	41.40	0.46	47.97	4.78	7.89	5.98
10	48.53	2.98	61.22	8.56	12.15	5.32
15	53.11	2.22	70.74	5.64	16.87	4.59
20	55.06	1.74	80.22	2.56	21.53	1.07
30	59.53	6.30	78.51	6.22	30.80	1.30
40	59.00	3.99	81.51	1.27	34.20	3.16

Triplicate analyses
ND = Not Determine

Table 4.3 The results of the effect of shaking time on
% recovery of fluoranthene in various sample to
solvent ratios

(A) RATIO 10:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
2	87.22	0.29	92.65	0.61	18.51	2.66
5	90.57	4.35	88.53	4.35	28.44	3.96
10	99.18	0.19	89.06	2.25	46.16	6.79
15	99.69	0.19	92.98	1.76	72.64	0.68
20	101.31	0.99	86.28	1.05	83.15	0.81
25	96.80	1.28	93.87	1.97	94.22	1.26

(B) RATIO 50:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
5	51.48	1.76	76.42	4.29	3.82	2.76
10	58.61	1.63	95.23	1.29	7.15	5.24
15	63.92	1.27	99.51	5.66	9.25	5.73
20	65.00	1.15	93.63	2.59	9.50	2.76
30	67.08	0.75	112.23	5.96	6.03	2.64
40	68.06	0.37	105.59	7.72	9.59	0.67

Triplicate analyses
ND = Not Determine

Table 4.4 The results of the effect of shaking time on
% recovery of pyrene in various sample to
solvent ratios

(A) RATIO 10:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
2	72.33	0.45	41.14	3.24	13.79	5.52
5	92.34	1.29	62.09	0.72	26.57	6.61
10	106.23	0.93	69.09	4.26	50.28	6.21
15	112.80	4.75	87.13	0.60	73.79	5.14
20	117.32	0.29	88.04	0.74	91.91	0.13
25	117.32	0.28	83.22	2.19	97.59	2.29

(B) RATIO 50:1

SHAKING TIME (min)	TOLUENE		HEXANE		METHYLENE CHLORIDE	
	% E	% RSD	% E	% RSD	% E	% RSD
5	52.69	0.97	57.96	3.23	1.72	2.38
10	73.23	0.74	87.83	0.73	3.02	4.72
15	89.87	1.84	103.37	4.11	4.46	6.96
20	102.32	1.06	123.68	0.58	7.70	0.53
30	109.20	0.15	124.85	0.78	7.60	4.21
40	113.66	0.58	116.26	1.58	9.01	7.98

Triplicate analyses

ND = Not Determine

Table 4.5 The results of the effect of sample to solvent ratios on % recovery of fluorene solution

(A) 50.00 ppb standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. # (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.471	140.37	90.62	4.49
		NaCl	0.538	*	103.54	2.15
		Na ₂ SO ₄	0.559	*	107.41	1.32
	C ₆ H ₁₄	NO SALT	0.449	673.74	99.36	1.57
		NaCl	0.529	*	100.29	4.79
		Na ₂ SO ₄	0.559	*	100.73	6.27
	CH ₂ Cl ₂	NO SALT	0.524	161.14	89.19	8.09
		NaCl	0.578	239.98	98.39	4.42
		Na ₂ SO ₄	0.613	*	100.05	3.98
50:1	C ₆ H ₅ CH ₃	NO SALT	2.040	115.29	65.17	1.72
		NaCl	2.290	174.76	73.58	4.29
		Na ₂ SO ₄	2.430	243.76	79.73	3.87
	C ₆ H ₁₄	NO SALT	1.712	66.71	49.29	3.85
		NaCl	2.017	100.83	60.53	2.07
		Na ₂ SO ₄	2.155	107.84	60.33	4.12
	CH ₂ Cl ₂	NO SALT	0.175	3.57	3.14	7.90
		NaCl	0.542	12.12	12.82	7.23
		Na ₂ SO ₄	0.834	20.42	19.89	2.99

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(260.4 nm)

RATIO	SOLVENT	SALT	CONC. # (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.476	112.51	91.43	0.36
		NaCl	0.543	*	104.26	2.62
		Na ₂ SO ₄	0.560	*	107.56	1.32
	C ₆ H ₁₄	NO SALT	0.524	513.06	99.64	3.93
		NaCl	0.528	*	100.69	7.10
		Na ₂ SO ₄	0.530	*	100.67	4.06
	CH ₂ Cl ₂	NO SALT	0.542	106.05	92.36	7.53
		NaCl	0.608	*	100.01	6.14
		Na ₂ SO ₄	0.612	*	100.91	3.90
50:1	C ₆ H ₅ CH ₃	NO SALT	2.139	133.48	68.35	2.63
		NaCl	2.426	220.59	77.61	4.67
		Na ₂ SO ₄	2.592	352.63	84.91	3.19
	C ₆ H ₁₄	NO SALT	1.667	63.34	47.91	5.85
		NaCl	1.942	91.90	58.27	2.64
		Na ₂ SO ₄	2.085	99.74	58.43	4.12
	CH ₂ Cl ₂	NO SALT	0.177	3.57	3.14	7.90
		NaCl	0.744	17.68	17.68	7.87
		Na ₂ SO ₄	1.180	32.36	28.15	2.23

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. # (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	6.854	23.25	65.79	5.16
		NaCl	7.601	30.23	73.00	8.14
		Na ₂ SO ₄	7.932	34.20	76.16	3.51
	C ₆ H ₁₄	NO SALT	8.512	38.53	78.47	1.54
		NaCl	8.965	56.48	82.45	6.25
		Na ₂ SO ₄	9.180	68.88	85.58	5.43
	CH ₂ Cl ₂	NO SALT	5.948	12.16	50.52	7.86
		NaCl	8.483	30.40	72.07	1.23
		Na ₂ SO ₄	10.144	566.79	94.68	2.98
50:1	C ₆ H ₅ CH ₃	NO SALT	51.022	302.26	81.47	6.21
		NaCl	51.855	318.50	82.81	5.21
		Na ₂ SO ₄	54.166	470.45	88.65	0.79
	C ₆ H ₁₄	NO SALT	48.642	160.42	70.49	1.67
		NaCl	51.713	231.89	77.57	3.56
		Na ₂ SO ₄	53.876	458.22	88.58	8.97
	CH ₂ Cl ₂	NO SALT	26.779	34.87	24.01	1.64
		NaCl	31.734	50.32	37.93	1.34
		Na ₂ SO ₄	33.877	52.23	40.49	6.49

Triplicate analyses

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(260.4 nm)

RATIO	SOLVENT	SALT	CONC. # (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	6.990	24.27	67.15	3.11
		NaCl	7.894	34.07	75.82	4.99
		Na ₂ SO ₄	8.033	35.63	77.05	2.42
	C ₆ H ₁₄	NO SALT	8.584	40.21	79.19	1.39
		NaCl	8.974	57.80	82.78	6.12
		Na ₂ SO ₄	9.341	67.95	85.08	3.87
	CH ₂ Cl ₂	NO SALT	6.023	12.58	51.19	5.18
		NaCl	9.571	61.02	81.33	7.38
		Na ₂ SO ₄	10.213	575.81	95.33	4.27
50:1	C ₆ H ₅ CH ₃	NO SALT	51.482	323.79	82.21	6.33
		NaCl	52.814	370.88	84.34	5.72
		Na ₂ SO ₄	54.621	507.04	89.41	0.41
	C ₆ H ₁₄	NO SALT	47.435	147.60	68.30	0.96
		NaCl	48.821	204.88	75.31	4.09
		Na ₂ SO ₄	53.045	404.24	86.45	5.19
	CH ₂ Cl ₂	NO SALT	25.791	33.12	23.12	1.64
		NaCl	30.475	47.17	36.42	1.49
		Na ₂ SO ₄	32.522	52.67	38.83	6.44

Triplicate analyses

concentration in organic phase

Table 4.6 The results of the effect of sample to solvent ratios on % recovery of anthracene solution

(A) 50.00 ppb standard solution at 254.0 nm

RATIO	SOLVENT	SALT	[#] CONC. (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.443	55.46	83.76	2.49
		NaCl	0.463	69.17	86.53	2.14
		Na ₂ SO ₄	0.462	70.75	86.93	1.39
	C ₆ H ₁₄	NO SALT	0.500	243.78	97.48	1.15
		NaCl	0.512	549.98	97.99	3.53
		Na ₂ SO ₄	0.542	*	104.07	5.29
	CH ₂ Cl ₂	NO SALT	0.455	45.35	78.09	6.69
		NaCl	0.475	61.34	80.81	6.37
		Na ₂ SO ₄	0.557	142.98	95.34	4.67
50:1	C ₆ H ₅ CH ₃	NO SALT	1.545	61.45	49.86	4.78
		NaCl	1.555	63.95	51.45	5.00
		Na ₂ SO ₄	1.810	87.36	58.60	3.22
	C ₆ H ₁₄	NO SALT	1.877	87.74	56.97	5.31
		NaCl	1.985	94.13	57.88	1.54
		Na ₂ SO ₄	2.364	100.76	58.87	0.55
	CH ₂ Cl ₂	NO SALT	0.986	22.99	17.25	4.19
		NaCl	1.154	31.75	27.80	5.11
		Na ₂ SO ₄	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(254.0 nm)

RATIO	SOLVENT	SALT	CONC. # (ppm)	K_d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.443	55.46	83.76	2.49
		NaCl	0.463	69.17	86.53	2.14
		Na ₂ SO ₄	0.462	70.75	86.93	1.39
	C ₆ H ₁₄	NO SALT	0.500	243.78	97.48	1.15
		NaCl	0.512	549.98	97.99	3.53
		Na ₂ SO ₄	0.542	*	104.07	5.29
	CH ₂ Cl ₂	NO SALT	0.455	45.35	78.09	6.69
		NaCl	0.475	61.34	80.81	6.37
		Na ₂ SO ₄	0.557	142.98	95.34	4.67
50:1	C ₆ H ₅ CH ₃	NO SALT	1.545	61.45	49.86	4.78
		NaCl	1.555	63.95	51.45	5.00
		Na ₂ SO ₄	1.810	87.36	58.60	3.22
	C ₆ H ₁₄	NO SALT	1.877	87.74	56.97	5.31
		NaCl	1.985	94.13	57.88	1.54
		Na ₂ SO ₄	2.364	100.76	58.87	0.55
	CH ₂ Cl ₂	NO SALT	0.986	22.99	17.25	4.19
		NaCl	1.154	31.75	27.80	5.11
		Na ₂ SO ₄	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. # (ppm)	K_d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.601	*	100.08	0.33
		NaCl	11.045	*	104.20	0.62
		Na ₂ SO ₄	10.745	*	101.39	0.93
	C ₆ H ₁₄	NO SALT	6.576	18.03	63.12	1.45
		NaCl	7.187	23.43	68.97	2.04
		Na ₂ SO ₄	8.046	35.73	77.16	1.72
	CH ₂ Cl ₂	NO SALT	10.486	115.64	89.99	3.31
		NaCl	10.533	136.33	90.44	4.90
		Na ₂ SO ₄	10.863	371.12	93.25	5.34
50:1	C ₆ H ₅ CH ₃	NO SALT	27.916	51.99	46.23	6.91
		NaCl	28.663	51.41	46.32	1.98
		Na ₂ SO ₄	31.293	65.07	50.58	7.29
	C ₆ H ₁₄	NO SALT	44.536	128.60	64.77	6.18
		NaCl	47.333	168.06	71.72	3.09
		Na ₂ SO ₄	58.735	371.26	83.06	4.80
	CH ₂ Cl ₂	NO SALT	23.190	29.19	20.93	6.26
		NaCl	27.333	40.59	32.89	4.91
		Na ₂ SO ₄	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(254.0 nm)

RATIO	SOLVENT	SALT	CONC. # (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.601	*	100.08	0.33
		NaCl	11.045	*	104.20	0.62
		Na ₂ SO ₄	10.745	*	101.39	0.93
	C ₆ H ₁₄	NO SALT	6.576	18.03	63.12	1.45
		NaCl	7.187	23.43	68.97	2.04
		Na ₂ SO ₄	8.046	35.73	77.16	1.72
	CH ₂ Cl ₂	NO SALT	10.486	115.64	89.99	3.31
		NaCl	10.533	136.33	90.44	4.90
		Na ₂ SO ₄	10.863	371.12	93.25	5.34
50:1	C ₆ H ₅ CH ₃	NO SALT	27.916	51.99	46.23	6.91
		NaCl	28.663	51.41	46.32	1.98
		Na ₂ SO ₄	31.293	65.07	50.58	7.29
	C ₆ H ₁₄	NO SALT	44.536	128.60	64.77	6.18
		NaCl	47.333	168.06	71.72	3.09
		Na ₂ SO ₄	58.735	371.26	83.06	4.80
	CH ₂ Cl ₂	NO SALT	23.190	29.19	20.93	6.26
		NaCl	27.333	40.59	32.89	4.91
		Na ₂ SO ₄	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

Table 4.7 The results of the effect of sample to solvent ratios on % recovery of fluoranthene solution

(A) 50.00 ppb standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.558	*	100.76	1.60
		NaCl	0.568	*	104.95	1.26
		Na ₂ SO ₄	0.579	*	106.41	1.19
	C ₆ H ₁₄	NO SALT	0.423	30.39	74.09	2.97
		NaCl	0.476	54.50	82.49	5.28
		Na ₂ SO ₄	0.574	*	103.64	1.95
	CH ₂ Cl ₂	NO SALT	0.516	116.05	87.75	7.91
		NaCl	0.543	116.32	92.52	5.48
		Na ₂ SO ₄	0.555	262.87	98.02	6.29
50:1	C ₆ H ₅ CH ₃	NO SALT	2.100	131.33	67.39	6.96
		NaCl	2.199	147.29	70.43	2.63
		Na ₂ SO ₄	2.422	234.38	79.62	0.30
	C ₆ H ₁₄	NO SALT	1.289	40.32	36.98	0.69
		NaCl	2.055	107.78	61.79	3.56
		Na ₂ SO ₄	2.402	295.76	78.58	6.92
	CH ₂ Cl ₂	NO SALT	0.802	18.51	14.39	0.94
		NaCl	0.988	25.67	23.75	5.40
		Na ₂ SO ₄	1.339	39.14	32.16	6.26

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(286.4 nm)

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.560	*	102.82	3.25
		NaCl	0.570	*	105.95	0.38
		Na ₂ SO ₄	0.575	*	106.23	1.35
	C ₆ H ₁₄	NO SALT	0.423	30.56	74.11	3.59
		NaCl	0.472	67.59	83.20	7.71
		Na ₂ SO ₄	0.574	*	103.17	2.39
	CH ₂ Cl ₂	NO SALT	0.476	47.49	79.63	4.28
		NaCl	0.512	100.95	86.64	5.84
		Na ₂ SO ₄	0.556	126.11	98.55	3.90
50:1	C ₆ H ₅ CH ₃	NO SALT	2.181	148.19	69.99	6.19
		NaCl	2.222	152.52	71.14	2.53
		Na ₂ SO ₄	2.486	267.56	81.61	1.46
	C ₆ H ₁₄	NO SALT	1.272	39.57	36.63	0.69
		NaCl	2.070	108.31	62.12	3.56
		Na ₂ SO ₄	2.465	320.03	80.27	6.92
	CH ₂ Cl ₂	NO SALT	0.784	18.12	14.13	3.49
		NaCl	0.987	25.63	23.69	5.94
		Na ₂ SO ₄	1.375	40.59	32.95	1.05

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.486	2242.52	99.54	1.51
		NaCl	10.663	*	103.19	0.42
		Na ₂ SO ₄	10.926	*	106.03	0.47
	C ₆ H ₁₄	NO SALT	8.888	66.61	86.09	2.32
		NaCl	8.922	69.69	86.50	2.69
		Na ₂ SO ₄	10.011	160.19	97.05	6.53
	CH ₂ Cl ₂	NO SALT	8.519	34.65	73.90	5.66
		NaCl	9.346	50.28	81.00	1.07
		Na ₂ SO ₄	10.582	*	101.80	3.46
50:1	C ₆ H ₅ CH ₃	NO SALT	37.099	89.90	59.36	1.67
		NaCl	36.889	90.27	59.02	7.32
		Na ₂ SO ₄	41.522	128.97	68.09	3.27
	C ₆ H ₁₄	NO SALT	50.265	283.03	80.38	2.07
		NaCl	57.584	1053.56	96.11	2.93
		Na ₂ SO ₄	61.623	*	100.30	4.46
	CH ₂ Cl ₂	NO SALT	11.796	12.97	10.53	6.40
		NaCl	17.321	21.39	20.62	2.27
		Na ₂ SO ₄	17.56	21.78	20.90	6.33

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(286.4 nm)

RATIO	SOLVENT	SALT	CONC. # (ppm)	K_d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.094	285.71	95.94	1.67
		NaCl	10.315	826.14	98.60	0.49
		Na ₂ SO ₄	10.532	*	100.10	0.50
	C ₆ H ₁₄	NO SALT	8.684	57.05	84.14	2.40
		NaCl	8.875	69.75	86.00	4.07
		Na ₂ SO ₄	9.944	131.96	96.40	6.21
	CH ₂ Cl ₂	NO SALT	8.296	31.09	71.96	5.34
		NaCl	9.412	53.28	81.62	2.81
		Na ₂ SO ₄	10.494	140.58	97.95	2.25
50:1	C ₆ H ₅ CH ₃	NO SALT	38.388	97.98	61.41	1.70
		NaCl	38.462	100.57	61.54	7.27
		Na ₂ SO ₄	43.444	149.01	71.24	1.70
	C ₆ H ₁₄	NO SALT	50.097	264.36	78.71	5.54
		NaCl	55.133	564.84	89.49	1.08
		Na ₂ SO ₄	61.018	*	102.50	5.23
	CH ₂ Cl ₂	NO SALT	10.623	11.54	9.48	5.93
		NaCl	16.813	20.61	20.02	2.21
		Na ₂ SO ₄	17.122	21.11	20.34	5.65

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

Table 4.8 The results of the effect of sample to solvent ratios on % recovery of pyrene solution

(A) 50.00 ppb standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.564	*	103.39	1.69
		NaCl	0.578	*	106.71	4.65
		Na ₂ SO ₄	0.590	*	108.16	3.84
	C ₆ H ₁₄	NO SALT	0.400	30.21	72.59	2.59
		NaCl	0.430	43.59	79.91	4.46
		Na ₂ SO ₄	0.476	73.26	87.32	1.39
	CH ₂ Cl ₂	NO SALT	0.397	28.07	70.55	5.98
		NaCl	0.531	115.31	90.26	2.58
		Na ₂ SO ₄	0.558	*	100.72	5.23
50:1	C ₆ H ₅ CH ₃	NO SALT	2.351	279.87	81.53	3.38
		NaCl	2.441	308.14	83.22	1.83
		Na ₂ SO ₄	2.503	667.11	91.44	1.67
	C ₆ H ₁₄	NO SALT	2.262	221.53	75.69	5.47
		NaCl	2.325	241.30	78.25	3.67
		Na ₂ SO ₄	2.501	818.93	91.31	3.03
	CH ₂ Cl ₂	NO SALT	1.012	24.53	18.21	4.22
		NaCl	1.275	36.41	30.65	2.93
		Na ₂ SO ₄	1.552	49.04	37.23	6.03

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(272.4 nm)

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	0.558	*	101.83	0.86
		NaCl	0.569	*	105.13	2.08
		Na ₂ SO ₄	0.589	*	108.36	2.58
	C ₆ H ₁₄	NO SALT	0.401	31.65	74.31	5.57
		NaCl	0.413	42.32	79.15	5.94
		Na ₂ SO ₄	0.462	69.71	86.87	0.46
	CH ₂ Cl ₂	NO SALT	0.395	27.42	69.58	5.05
		NaCl	0.523	165.46	89.12	6.53
		Na ₂ SO ₄	0.559	*	100.79	1.88
50:1	C ₆ H ₅ CH ₃	NO SALT	2.347	246.20	79.71	2.98
		NaCl	2.432	250.62	80.27	0.71
		Na ₂ SO ₄	2.499	480.41	88.81	1.11
	C ₆ H ₁₄	NO SALT	2.251	197.31	72.57	4.84
		NaCl	2.411	481.46	85.20	5.78
		Na ₂ SO ₄	2.565	1344.70	93.64	3.53
	CH ₂ Cl ₂	NO SALT	1.156	28.83	20.73	5.94
		NaCl	1.403	42.04	33.72	6.94
		Na ₂ SO ₄	1.762	60.16	42.10	3.73

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.890	*	103.53	0.34
		NaCl	10.891	*	103.58	0.76
		Na ₂ SO ₄	11.203	*	109.38	1.23
	C ₆ H ₁₄	NO SALT	6.972	19.73	64.94	4.92
		NaCl	7.623	25.91	70.96	2.87
		Na ₂ SO ₄	8.751	46.58	81.53	1.02
	CH ₂ Cl ₂	NO SALT	10.723	1219.40	97.06	1.92
		NaCl	10.823	*	100.48	1.71
		Na ₂ SO ₄	10.882	*	102.21	1.46
50:1	C ₆ H ₅ CH ₃	NO SALT	60.212	2210.02	96.93	1.06
		NaCl	62.777	*	101.04	0.44
		Na ₂ SO ₄	63.185	*	103.55	3.30
	C ₆ H ₁₄	NO SALT	37.852	82.05	54.51	1.27
		NaCl	38.932	108.11	61.64	5.26
		Na ₂ SO ₄	59.332	824.05	91.47	2.47
	CH ₂ Cl ₂	NO SALT	9.730	10.47	8.69	3.09
		NaCl	23.431	31.89	27.90	4.48
		Na ₂ SO ₄	25.321	35.54	30.14	3.38

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(272.4 nm)

RATIO	SOLVENT	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
10:1	C ₆ H ₅ CH ₃	NO SALT	10.890	*	103.61	0.56
		NaCl	10.898	*	103.72	0.64
		Na ₂ SO ₄	11.250	*	109.79	0.35
	C ₆ H ₁₄	NO SALT	7.123	20.81	66.34	2.43
		NaCl	7.300	22.70	68.01	4.80
		Na ₂ SO ₄	8.795	47.75	81.90	0.96
	CH ₂ Cl ₂	NO SALT	10.075	75.31	85.60	3.88
		NaCl	10.546	334.88	95.56	6.58
		Na ₂ SO ₄	10.733	198.61	97.18	5.89
50:1	C ₆ H ₅ CH ₃	NO SALT	59.542	1516.25	96.29	1.32
		NaCl	61.784	*	101.24	0.69
		Na ₂ SO ₄	62.282	*	103.01	3.25
	C ₆ H ₁₄	NO SALT	36.302	74.99	52.27	1.42
		NaCl	40.095	101.51	60.13	5.71
		Na ₂ SO ₄	59.821	830.16	92.16	0.44
	CH ₂ Cl ₂	NO SALT	7.932	8.39	7.08	3.19
		NaCl	20.433	27.15	24.79	3.61
		Na ₂ SO ₄	22.795	30.79	27.08	9.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

Table 4.9 The results of the effect of extracting solvents
on % recovery of fluorene solution

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.471	140.37	90.62	4.49
		NaCl	0.538	*	103.54	2.15
		Na ₂ SO ₄	0.559	*	107.41	1.32
	50:1	NO SALT	2.040	115.29	65.17	1.72
		NaCl	2.290	174.76	73.58	4.29
		Na ₂ SO ₄	2.430	243.76	79.73	3.87
C ₆ H ₁₄	10:1	NO SALT	0.449	673.74	99.36	1.57
		NaCl	0.529	*	100.29	4.79
		Na ₂ SO ₄	0.559	*	100.73	6.27
	50:1	NO SALT	1.712	66.71	49.29	3.85
		NaCl	2.017	100.83	60.53	2.07
		Na ₂ SO ₄	2.155	107.84	60.33	4.12
CH ₂ Cl ₂	10:1	NO SALT	0.524	161.14	89.19	8.09
		NaCl	0.578	239.98	98.39	4.42
		Na ₂ SO ₄	0.613	*	100.05	3.98
	50:1	NO SALT	0.175	3.57	3.14	7.90
		NaCl	0.542	12.12	12.82	7.23
		Na ₂ SO ₄	0.834	20.42	19.89	2.99

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(260.4 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.476	112.51	91.43	0.36
		NaCl	0.543	*	104.26	2.62
		Na ₂ SO ₄	0.560	*	107.56	1.32
	50:1	NO SALT	2.139	133.48	68.35	2.63
		NaCl	2.426	220.59	77.61	4.67
		Na ₂ SO ₄	2.592	352.63	84.91	3.19
C ₆ H ₁₄	10:1	NO SALT	0.524	513.06	99.64	3.93
		NaCl	0.528	*	100.69	7.10
		Na ₂ SO ₄	0.530	*	100.67	4.06
	50:1	NO SALT	1.667	63.34	47.91	5.85
		NaCl	1.942	91.90	58.27	2.64
		Na ₂ SO ₄	2.085	99.74	58.43	4.12
CH ₂ Cl ₂	10:1	NO SALT	0.542	106.05	92.36	7.53
		NaCl	0.608	*	100.01	6.14
		Na ₂ SO ₄	0.612	*	100.91	3.90
	50:1	NO SALT	0.177	3.57	3.14	7.90
		NaCl	0.744	17.68	17.68	7.87
		Na ₂ SO ₄	1.180	32.36	28.15	2.23

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	6.854	23.25	65.79	5.16
		NaCl	7.601	30.23	73.00	8.14
		Na ₂ SO ₄	7.932	34.20	76.16	3.51
	50:1	NO SALT	51.022	302.26	81.47	6.21
		NaCl	51.855	318.50	82.81	5.21
		Na ₂ SO ₄	54.166	470.45	88.65	0.79
C ₆ H ₁₄	10:1	NO SALT	8.512	38.53	78.47	1.54
		NaCl	8.965	56.48	82.45	6.25
		Na ₂ SO ₄	9.180	68.88	85.58	5.43
	50:1	NO SALT	48.642	160.42	70.49	1.67
		NaCl	51.713	231.89	77.57	3.56
		Na ₂ SO ₄	53.876	458.22	88.58	8.97
CH ₂ Cl ₂	10:1	NO SALT	5.948	12.16	50.52	7.86
		NaCl	8.483	30.40	72.07	1.23
		Na ₂ SO ₄	10.144	566.79	94.68	2.98
	50:1	NO SALT	26.779	34.87	24.01	1.64
		NaCl	31.734	50.32	37.93	1.34
		Na ₂ SO ₄	33.877	52.23	40.49	6.49

Triplicate analyses

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(260.4 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	6.990	24.27	67.15	3.11
		NaCl	7.894	34.07	75.82	4.99
		Na ₂ SO ₄	8.033	35.63	77.05	2.42
	50:1	NO SALT	51.482	323.79	82.21	6.33
		NaCl	52.814	370.88	84.34	5.72
		Na ₂ SO ₄	54.621	507.04	89.41	0.41
C ₆ H ₁₄	10:1	NO SALT	8.584	40.21	79.19	1.39
		NaCl	8.974	57.80	82.78	6.12
		Na ₂ SO ₄	9.341	67.95	85.08	3.87
	50:1	NO SALT	47.435	147.60	68.30	0.96
		NaCl	48.821	204.88	75.31	4.09
		Na ₂ SO ₄	53.045	404.24	86.45	5.19
CH ₂ Cl ₂	10:1	NO SALT	6.023	12.58	51.19	5.18
		NaCl	9.571	61.02	81.33	7.38
		Na ₂ SO ₄	10.213	575.81	95.33	4.27
	50:1	NO SALT	25.791	33.12	23.12	1.64
		NaCl	30.475	47.17	36.42	1.49
		Na ₂ SO ₄	32.522	52.67	38.83	6.44

Triplicate analyses

concentration in organic phase

Table 4.10 The results of the effect of extracting solvents
on % recovery of anthracene solution

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. (ppm) [#]	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.443	55.46	83.76	2.49
		NaCl	0.463	69.17	86.53	2.14
		Na ₂ SO ₄	0.462	70.75	86.93	1.39
	50:1	NO SALT	1.545	61.45	49.86	4.78
		NaCl	1.555	63.95	51.45	5.00
		Na ₂ SO ₄	1.810	87.36	58.60	3.22
C ₆ H ₁₄	10:1	NO SALT	0.500	243.78	97.48	1.15
		NaCl	0.512	549.98	97.99	3.53
		Na ₂ SO ₄	0.542	*	104.07	5.29
	50:1	NO SALT	1.877	87.74	56.97	5.31
		NaCl	1.985	94.13	57.88	1.54
		Na ₂ SO ₄	2.364	100.76	58.87	0.55
CH ₂ Cl ₂	10:1	NO SALT	0.455	45.35	78.09	6.69
		NaCl	0.475	61.34	80.81	6.37
		Na ₂ SO ₄	0.557	142.98	95.34	4.67
	50:1	NO SALT	0.986	22.99	17.25	4.19
		NaCl	1.154	31.75	27.80	5.11
		Na ₂ SO ₄	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(254.0 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.443	55.46	83.76	2.49
		NaCl	0.463	69.17	86.53	2.14
		Na ₂ SO ₄	0.462	70.75	86.93	1.39
	50:1	NO SALT	1.545	61.45	49.86	4.78
		NaCl	1.555	63.95	51.45	5.00
		Na ₂ SO ₄	1.810	87.36	58.60	3.22
C ₆ H ₁₄	10:1	NO SALT	0.500	243.78	97.48	1.15
		NaCl	0.512	549.98	97.99	3.53
		Na ₂ SO ₄	0.542	*	104.07	5.29
	50:1	NO SALT	1.877	87.74	56.97	5.31
		NaCl	1.985	94.13	57.88	1.54
		Na ₂ SO ₄	2.364	100.76	58.87	0.55
CH ₂ Cl ₂	10:1	NO SALT	0.455	45.35	78.09	6.69
		NaCl	0.475	61.34	80.81	6.37
		Na ₂ SO ₄	0.557	142.98	95.34	4.67
	50:1	NO SALT	0.986	22.99	17.25	4.19
		NaCl	1.154	31.75	27.80	5.11
		Na ₂ SO ₄	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.601	*	100.08	0.33
		NaCl	11.045	*	104.20	0.62
		Na ₂ SO ₄	10.745	*	101.39	0.93
	50:1	NO SALT	27.916	51.99	46.23	6.91
		NaCl	28.663	51.41	46.32	1.98
		Na ₂ SO ₄	31.293	65.07	50.58	7.29
C ₆ H ₁₄	10:1	NO SALT	6.576	18.03	63.12	1.45
		NaCl	7.187	23.43	68.97	2.04
		Na ₂ SO ₄	8.046	35.73	77.16	1.72
	50:1	NO SALT	44.536	128.60	64.77	6.18
		NaCl	47.333	168.06	71.72	3.09
		Na ₂ SO ₄	58.735	371.26	83.06	4.80
CH ₂ Cl ₂	10:1	NO SALT	10.486	115.64	89.99	3.31
		NaCl	10.533	136.33	90.44	4.90
		Na ₂ SO ₄	10.863	371.12	93.25	5.34
	50:1	NO SALT	23.190	29.19	20.93	6.26
		NaCl	27.333	40.59	32.89	4.91
		Na ₂ SO ₄	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(254.0 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.601	*	100.08	0.33
		NaCl	11.045	*	104.20	0.62
		Na ₂ SO ₄	10.745	*	101.39	0.93
	50:1	NO SALT	27.916	51.99	46.23	6.91
		NaCl	28.663	51.41	46.32	1.98
		Na ₂ SO ₄	31.293	65.07	50.58	7.29
C ₆ H ₁₄	10:1	NO SALT	6.576	18.03	63.12	1.45
		NaCl	7.187	23.43	68.97	2.04
		Na ₂ SO ₄	8.046	35.73	77.16	1.72
	50:1	NO SALT	44.536	128.60	64.77	6.18
		NaCl	47.333	168.06	71.72	3.09
		Na ₂ SO ₄	58.735	371.26	83.06	4.80
CH ₂ Cl ₂	10:1	NO SALT	10.486	115.64	89.99	3.31
		NaCl	10.533	136.33	90.44	4.90
		Na ₂ SO ₄	10.863	371.12	93.25	5.34
	50:1	NO SALT	23.190	29.19	20.93	6.26
		NaCl	27.333	40.59	32.89	4.91
		Na ₂ SO ₄	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

Table 4.11 The results of the effect of extracting solvents
on % recovery of fluoranthene solution

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.558	*	100.76	1.60
		NaCl	0.568	*	104.95	1.26
		Na ₂ SO ₄	0.579	*	106.41	1.19
	50:1	NO SALT	2.100	131.33	67.39	6.96
		NaCl	2.199	147.29	70.43	2.63
		Na ₂ SO ₄	2.422	234.38	79.62	0.30
C ₆ H ₁₄	10:1	NO SALT	0.423	30.39	74.09	2.97
		NaCl	0.476	54.50	82.49	5.28
		Na ₂ SO ₄	0.574	*	103.64	1.95
	50:1	NO SALT	1.289	40.32	36.98	0.69
		NaCl	2.055	107.78	61.79	3.56
		Na ₂ SO ₄	2.402	295.76	78.58	6.92
CH ₂ Cl ₂	10:1	NO SALT	0.516	116.05	87.75	7.91
		NaCl	0.543	116.32	92.52	5.48
		Na ₂ SO ₄	0.555	262.87	98.02	6.29
	50:1	NO SALT	0.802	18.51	14.39	0.94
		NaCl	0.988	25.67	23.75	5.40
		Na ₂ SO ₄	1.339	39.14	32.16	6.26

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(286.4 nm)

SOLVENT	RATIO	SALT	CONC. # (ppm)	K_d	% E	% RSD	
C ₆ H ₅ CH ₃	10:1	NO SALT	0.560	*	102.82	3.25	
		NaCl	0.570	*	105.95	0.38	
		Na ₂ SO ₄	0.575	*	106.23	1.35	
	50:1	NO SALT	2.181	148.19	69.99	6.19	
		NaCl	2.222	152.52	71.14	2.53	
		Na ₂ SO ₄	2.486	267.56	81.61	1.46	
	C ₆ H ₁₄	10:1	NO SALT	0.423	30.56	74.11	3.59
			NaCl	0.472	67.59	83.20	7.71
			Na ₂ SO ₄	0.574	*	103.17	2.39
50:1		NO SALT	1.272	39.57	36.63	0.69	
		NaCl	2.070	108.31	62.12	3.56	
		Na ₂ SO ₄	2.465	320.03	80.27	6.92	
CH ₂ Cl ₂		10:1	NO SALT	0.476	47.49	79.63	4.28
			NaCl	0.512	100.95	86.64	5.84
			Na ₂ SO ₄	0.556	126.11	98.55	3.90
	50:1	NO SALT	0.784	18.12	14.13	3.49	
		NaCl	0.987	25.63	23.69	5.94	
		Na ₂ SO ₄	1.375	40.59	32.95	1.05	

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. # (ppm)	K_d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.486	2242.52	99.54	1.51
		NaCl	10.663	*	103.19	0.42
		Na ₂ SO ₄	10.926	*	106.03	0.47
	50:1	NO SALT	37.099	89.90	59.36	1.67
		NaCl	36.889	90.27	59.02	7.32
		Na ₂ SO ₄	41.522	128.97	68.09	3.27
C ₆ H ₁₄	10:1	NO SALT	8.888	66.61	86.09	2.32
		NaCl	8.922	69.69	86.50	2.69
		Na ₂ SO ₄	10.011	160.19	97.05	6.53
	50:1	NO SALT	50.265	283.03	80.38	2.07
		NaCl	57.584	1053.56	96.11	2.93
		Na ₂ SO ₄	61.623	*	100.30	4.46
CH ₂ Cl ₂	10:1	NO SALT	8.519	34.65	73.90	5.66
		NaCl	9.346	50.28	81.00	1.07
		Na ₂ SO ₄	10.582	*	101.80	3.46
	50:1	NO SALT	11.796	12.97	10.53	6.40
		NaCl	17.321	21.39	20.62	2.27
		Na ₂ SO ₄	17.56	21.78	20.90	6.33

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(286.4 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.094	285.71	95.94	1.67
		NaCl	10.315	826.14	98.60	0.49
		Na ₂ SO ₄	10.532	*	100.10	0.50
	50:1	NO SALT	38.388	97.98	61.41	1.70
		NaCl	38.462	100.57	61.54	7.27
		Na ₂ SO ₄	43.444	149.01	71.24	1.70
C ₆ H ₁₄	10:1	NO SALT	8.684	57.05	84.14	2.40
		NaCl	8.875	69.75	86.00	4.07
		Na ₂ SO ₄	9.944	131.96	96.40	6.21
	50:1	NO SALT	50.097	264.36	78.71	5.54
		NaCl	55.133	564.84	89.49	1.08
		Na ₂ SO ₄	61.018	*	102.50	5.23
CH ₂ Cl ₂	10:1	NO SALT	8.296	31.09	71.96	5.34
		NaCl	9.412	53.28	81.62	2.81
		Na ₂ SO ₄	10.494	140.58	97.95	2.25
	50:1	NO SALT	10.623	11.54	9.48	5.93
		NaCl	16.813	20.61	20.02	2.21
		Na ₂ SO ₄	17.122	21.11	20.34	5.65

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

Table 4.12 The results of the effect of extracting solvents
on % recovery of pyrene solution

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.564	*	103.39	1.69
		NaCl	0.578	*	106.71	4.65
		Na ₂ SO ₄	0.590	*	108.16	3.84
	50:1	NO SALT	2.351	279.87	81.53	3.38
		NaCl	2.441	308.14	83.22	1.83
		Na ₂ SO ₄	2.503	667.11	91.44	1.67
C ₆ H ₁₄	10:1	NO SALT	0.400	30.21	72.59	2.59
		NaCl	0.430	43.59	79.91	4.46
		Na ₂ SO ₄	0.476	73.26	87.32	1.39
	50:1	NO SALT	2.262	221.53	75.69	5.47
		NaCl	2.325	241.30	78.25	3.67
		Na ₂ SO ₄	2.501	818.93	91.31	3.03
CH ₂ Cl ₂	10:1	NO SALT	0.397	28.07	70.55	5.98
		NaCl	0.531	115.31	90.26	2.58
		Na ₂ SO ₄	0.558	*	100.72	5.23
	50:1	NO SALT	1.012	24.53	18.21	4.22
		NaCl	1.275	36.41	30.65	2.93
		Na ₂ SO ₄	1.552	49.04	37.23	6.03

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(272.4 nm)

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.558	*	101.83	0.86
		NaCl	0.569	*	105.13	2.08
		Na ₂ SO ₄	0.589	*	108.36	2.58
	50:1	NO SALT	2.347	246.20	79.71	2.98
		NaCl	2.432	250.62	80.27	0.71
		Na ₂ SO ₄	2.499	480.41	88.81	1.11
C ₆ H ₁₄	10:1	NO SALT	0.401	31.65	74.31	5.57
		NaCl	0.413	42.32	79.15	5.94
		Na ₂ SO ₄	0.462	69.71	86.87	0.46
	50:1	NO SALT	2.251	197.31	72.57	4.84
		NaCl	2.411	481.46	85.20	5.78
		Na ₂ SO ₄	2.565	1344.70	93.64	3.53
CH ₂ Cl ₂	10:1	NO SALT	0.395	27.42	69.58	5.05
		NaCl	0.523	165.46	89.12	6.53
		Na ₂ SO ₄	0.559	*	100.79	1.88
	50:1	NO SALT	1.156	28.83	20.73	5.94
		NaCl	1.403	42.04	33.72	6.94
		Na ₂ SO ₄	1.762	60.16	42.10	3.73

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.890	*	103.53	0.34
		NaCl	10.891	*	103.58	0.76
		Na ₂ SO ₄	11.203	*	109.38	1.23
	50:1	NO SALT	60.212	2210.02	96.93	1.06
		NaCl	62.777	*	101.04	0.44
		Na ₂ SO ₄	63.185	*	103.55	3.30
C ₆ H ₁₄	10:1	NO SALT	6.972	19.73	64.94	4.92
		NaCl	7.623	25.91	70.96	2.87
		Na ₂ SO ₄	8.751	46.58	81.53	1.02
	50:1	NO SALT	37.852	82.05	54.51	1.27
		NaCl	38.932	108.11	61.64	5.26
		Na ₂ SO ₄	59.332	824.05	91.47	2.47
CH ₂ Cl ₂	10:1	NO SALT	10.723	1219.40	97.06	1.92
		NaCl	10.823	*	100.48	1.71
		Na ₂ SO ₄	10.882	*	102.21	1.46
	50:1	NO SALT	9.730	10.47	8.69	3.09
		NaCl	23.431	31.89	27.90	4.48
		Na ₂ SO ₄	25.321	35.54	30.14	3.38

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(272.4 nm)

SOLVENT	RATIO	SALT	CONC. # (ppm)	K _d	% E	% RSD	
C ₆ H ₅ CH ₃	10:1	NO SALT	10.890	*	103.61	0.56	
		NaCl	10.898	*	103.72	0.64	
		Na ₂ SO ₄	11.250	*	109.79	0.35	
	50:1	NO SALT	59.542	1516.25		96.29	1.32
		NaCl	61.784		*	101.24	0.69
		Na ₂ SO ₄	62.282		*	103.01	3.25
C ₆ H ₁₄	10:1	NO SALT	7.123	20.81	66.34	2.43	
		NaCl	7.300	22.70	68.01	4.80	
		Na ₂ SO ₄	8.795	47.75	81.90	0.96	
	50:1	NO SALT	36.302	74.99		52.27	1.42
		NaCl	40.095	101.51		60.13	5.71
		Na ₂ SO ₄	59.821	830.16		92.16	0.44
CH ₂ Cl ₂	10:1	NO SALT	10.075	75.31	85.60	3.88	
		NaCl	10.546	334.88	95.56	6.58	
		Na ₂ SO ₄	10.733	198.61	97.18	5.89	
	50:1	NO SALT	7.932	8.39		7.08	3.19
		NaCl	20.433	27.15		24.79	3.61
		Na ₂ SO ₄	22.795	30.79		27.08	9.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

Table 4.13 The results of salting out effect on % recovery
of fluorene solution

(A) 50.00 ppb standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _D	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.471	140.37	90.62	4.49
		C ₆ H ₁₄	0.449	673.74	99.36	1.57
		CH ₂ Cl ₂	0.524	161.14	89.19	8.09
	50:1	C ₆ H ₅ CH ₃	2.040	115.29	65.17	1.72
		C ₆ H ₁₄	1.712	66.71	49.29	3.85
		CH ₂ Cl ₂	0.175	3.57	3.14	7.90
NaCl	10:1	C ₆ H ₅ CH ₃	0.538	*	103.54	2.15
		C ₆ H ₁₄	0.529	*	100.29	4.79
		CH ₂ Cl ₂	0.578	239.98	98.39	4.42
	50:1	C ₆ H ₅ CH ₃	2.290	174.76	73.58	4.29
		C ₆ H ₁₄	2.017	100.83	60.53	2.07
		CH ₂ Cl ₂	0.542	12.12	12.82	7.23
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.559	*	107.41	1.32
		C ₆ H ₁₄	0.530	*	100.73	6.27
		CH ₂ Cl ₂	0.613	*	100.05	3.98
	50:1	C ₆ H ₅ CH ₃	2.430	243.76	79.73	3.87
		C ₆ H ₁₄	2.155	107.84	60.33	4.12
		CH ₂ Cl ₂	0.834	20.42	19.89	2.99

Triplicate analyses

* K_D cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(260.4 nm)

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _D	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.476	112.51	91.43	0.36
		C ₆ H ₁₄	0.524	513.06	99.64	3.93
		CH ₂ Cl ₂	0.542	106.05	92.36	7.53
	50:1	C ₆ H ₅ CH ₃	2.139	133.48	68.35	2.63
		C ₆ H ₁₄	1.667	63.34	47.91	5.85
		CH ₂ Cl ₂	0.177	3.57	3.14	7.90
NaCl	10:1	C ₆ H ₅ CH ₃	0.543	*	104.26	2.62
		C ₆ H ₁₄	0.528	*	100.69	7.10
		CH ₂ Cl ₂	0.608	*	100.01	6.14
	50:1	C ₆ H ₅ CH ₃	2.426	220.59	77.61	4.67
		C ₆ H ₁₄	1.942	91.90	58.27	2.64
		CH ₂ Cl ₂	0.744	17.68	17.68	7.87
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.560	*	107.56	1.32
		C ₆ H ₁₄	0.530	*	100.67	4.06
		CH ₂ Cl ₂	0.612	*	100.91	3.90
	50:1	C ₆ H ₅ CH ₃	2.592	252.64	84.91	3.19
		C ₆ H ₁₄	2.085	99.74	58.43	4.12
		CH ₂ Cl ₂	1.180	32.36	28.15	2.23

Triplicate analyses

* K_D cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. # (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	6.854	23.25	65.79	5.16
		C ₆ H ₁₄	8.512	38.53	78.47	1.54
		CH ₂ Cl ₂	5.948	12.16	50.52	7.86
	50:1	C ₆ H ₅ CH ₃	51.022	302.26	81.47	6.21
		C ₆ H ₁₄	48.642	160.42	70.49	1.67
		CH ₂ Cl ₂	26.779	34.87	24.01	1.64
NaCl	10:1	C ₆ H ₅ CH ₃	7.601	30.23	73.00	8.14
		C ₆ H ₁₄	8.965	56.48	82.45	6.25
		CH ₂ Cl ₂	8.483	30.40	72.07	1.23
	50:1	C ₆ H ₅ CH ₃	51.855	318.50	82.81	5.21
		C ₆ H ₁₄	51.713	231.89	77.57	3.56
		CH ₂ Cl ₂	31.734	50.32	37.93	1.34
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	7.932	34.20	76.16	1.32
		C ₆ H ₁₄	9.180	68.88	85.58	5.43
		CH ₂ Cl ₂	10.144	566.79	94.68	2.98
	50:1	C ₆ H ₅ CH ₃	54.166	470.45	88.65	0.79
		C ₆ H ₁₄	53.876	458.22	88.58	8.97
		CH ₂ Cl ₂	33.877	52.23	40.49	6.49

Triplicate analyses

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(260.4 nm)

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	6.990	24.27	67.15	3.11
		C ₆ H ₁₄	8.584	40.21	79.19	1.39
		CH ₂ Cl ₂	6.023	12.58	51.19	5.18
	50:1	C ₆ H ₅ CH ₃	51.482	323.79	82.21	6.33
		C ₆ H ₁₄	47.435	147.60	68.30	0.96
		CH ₂ Cl ₂	25.791	33.12	23.12	1.64
NaCl	10:1	C ₆ H ₅ CH ₃	7.894	34.07	75.82	4.99
		C ₆ H ₁₄	8.974	57.80	82.78	6.12
		CH ₂ Cl ₂	9.571	61.02	81.33	7.38
	50:1	C ₆ H ₅ CH ₃	52.814	370.88	84.34	5.72
		C ₆ H ₁₄	48.821	204.88	75.31	4.09
		CH ₂ Cl ₂	30.475	47.17	36.42	1.49
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	8.033	35.63	77.05	2.42
		C ₆ H ₁₄	9.341	67.95	85.08	3.87
		CH ₂ Cl ₂	10.213	575.81	95.33	4.27
	50:1	C ₆ H ₅ CH ₃	54.621	507.04	89.41	0.41
		C ₆ H ₁₄	53.045	404.24	86.45	5.19
		CH ₂ Cl ₂	32.522	52.67	38.83	6.44

Triplicate analyses

concentration in organic phase

Table 4.14 The results of salting out effect on % recovery
of anthracene solution

(A) 50.00 ppb standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.443	55.46	83.76	2.49
		C ₆ H ₁₄	0.500	243.78	97.48	1.15
		CH ₂ Cl ₂	0.455	45.35	78.09	6.69
	50:1	C ₆ H ₅ CH ₃	1.545	61.45	49.86	4.78
		C ₆ H ₁₄	1.877	87.74	56.97	5.31
		CH ₂ Cl ₂	0.986	22.99	17.25	4.19
NaCl	10:1	C ₆ H ₅ CH ₃	0.463	69.17	86.53	2.14
		C ₆ H ₁₄	0.512	549.98	97.99	3.53
		CH ₂ Cl ₂	0.557	61.34	80.81	6.37
	50:1	C ₆ H ₅ CH ₃	1.555	63.95	51.45	5.00
		C ₆ H ₁₄	1.985	94.13	57.88	1.54
		CH ₂ Cl ₂	1.154	31.75	27.80	5.11
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.559	70.75	86.93	1.39
		C ₆ H ₁₄	0.542	*	104.07	5.29
		CH ₂ Cl ₂	0.557	142.98	95.34	4.67
	50:1	C ₆ H ₅ CH ₃	1.810	87.36	58.60	3.22
		C ₆ H ₁₄	2.364	100.76	58.87	0.55
		CH ₂ Cl ₂	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(254.0 nm)

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.443	55.46	83.76	2.49
		C ₆ H ₁₄	0.500	243.78	97.48	1.15
		CH ₂ Cl ₂	0.455	45.35	78.09	6.69
	50:1	C ₆ H ₅ CH ₃	1.545	61.45	49.86	4.78
		C ₆ H ₁₄	1.877	87.74	56.97	5.31
		CH ₂ Cl ₂	0.986	22.99	17.25	4.19
NaCl	10:1	C ₆ H ₅ CH ₃	0.463	69.17	86.53	2.14
		C ₆ H ₁₄	0.512	549.98	97.99	3.53
		CH ₂ Cl ₂	0.557	61.34	80.81	6.37
	50:1	C ₆ H ₅ CH ₃	1.555	63.95	51.45	5.00
		C ₆ H ₁₄	1.985	94.13	57.88	1.54
		CH ₂ Cl ₂	1.154	31.75	27.80	5.11
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.559	70.75	86.93	1.39
		C ₆ H ₁₄	0.542	*	104.07	5.29
		CH ₂ Cl ₂	0.557	142.98	95.34	4.67
	50:1	C ₆ H ₅ CH ₃	1.810	87.36	58.60	3.22
		C ₆ H ₁₄	2.364	100.76	58.87	0.55
		CH ₂ Cl ₂	1.257	35.46	30.01	4.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.601	*	100.08	0.33
		C ₆ H ₁₄	6.576	18.03	63.12	1.45
		CH ₂ Cl ₂	10.486	115.64	89.99	3.31
	50:1	C ₆ H ₅ CH ₃	27.916	51.99	46.23	6.91
		C ₆ H ₁₄	44.536	128.60	64.77	6.18
		CH ₂ Cl ₂	23.190	29.19	20.93	6.26
NaCl	10:1	C ₆ H ₅ CH ₃	11.045	*	104.20	0.62
		C ₆ H ₁₄	7.187	23.43	68.97	2.04
		CH ₂ Cl ₂	10.533	136.33	90.44	4.90
	50:1	C ₆ H ₅ CH ₃	26.663	51.41	46.32	1.98
		C ₆ H ₁₄	47.333	168.06	71.72	3.09
		CH ₂ Cl ₂	27.333	40.59	32.89	4.91
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	10.745	*	101.39	0.93
		C ₆ H ₁₄	8.046	35.73	77.16	1.72
		CH ₂ Cl ₂	10.863	371.12	93.25	5.34
	50:1	C ₆ H ₅ CH ₃	31.293	67.07	50.58	7.29
		C ₆ H ₁₄	58.735	371.26	83.06	4.80
		CH ₂ Cl ₂	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(254.0 nm)

SALT	RATIO	SOLVENT	CONC. # (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.601	*	100.08	0.33
		C ₆ H ₁₄	6.576	18.03	63.12	1.45
		CH ₂ Cl ₂	10.486	115.64	89.99	3.31
	50:1	C ₆ H ₅ CH ₃	27.916	51.99	46.23	6.91
		C ₆ H ₁₄	44.536	128.60	64.77	6.18
		CH ₂ Cl ₂	23.190	29.19	20.93	6.26
NaCl	10:1	C ₆ H ₅ CH ₃	11.045	*	104.20	0.62
		C ₆ H ₁₄	7.187	23.43	68.97	2.04
		CH ₂ Cl ₂	10.533	136.33	90.44	4.90
	50:1	C ₆ H ₅ CH ₃	26.663	51.41	46.32	1.98
		C ₆ H ₁₄	47.333	168.06	71.72	3.09
		CH ₂ Cl ₂	27.333	40.59	32.89	4.91
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	10.745	*	101.39	0.93
		C ₆ H ₁₄	8.046	35.73	77.16	1.72
		CH ₂ Cl ₂	10.863	371.12	93.25	5.34
	50:1	C ₆ H ₅ CH ₃	31.293	67.07	50.58	7.29
		C ₆ H ₁₄	58.735	371.26	83.06	4.80
		CH ₂ Cl ₂	37.915	69.60	45.64	6.79

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

Table 4.15 The results of salting out effect on % recovery
of fluoranthene solution

(A) 50.00 ppb standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. # (ppm)	K_d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.558	*	100.76	1.60
		C ₆ H ₁₄	0.423	30.39	74.09	2.97
		CH ₂ Cl ₂	0.516	116.05	87.75	7.91
	50:1	C ₆ H ₅ CH ₃	2.100	131.33	67.39	6.96
		C ₆ H ₁₄	1.289	40.32	36.98	0.69
		CH ₂ Cl ₂	0.802	18.51	14.39	0.94
NaCl	10:1	C ₆ H ₅ CH ₃	0.568	*	104.95	1.26
		C ₆ H ₁₄	0.476	54.50	82.49	5.28
		CH ₂ Cl ₂	0.543	116.32	92.52	5.48
	50:1	C ₆ H ₅ CH ₃	2.199	147.29	70.43	2.63
		C ₆ H ₁₄	2.055	107.79	61.79	3.56
		CH ₂ Cl ₂	0.988	25.67	23.75	5.40
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.579	*	106.41	1.19
		C ₆ H ₁₄	0.574	*	103.64	1.95
		CH ₂ Cl ₂	0.555	262.87	98.02	6.29
	50:1	C ₆ H ₅ CH ₃	2.422	243.38	79.62	0.30
		C ₆ H ₁₄	2.402	295.76	78.58	6.92
		CH ₂ Cl ₂	1.339	39.14	32.16	6.26

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(236.4 nm)

SALT	RATIO	SOLVENT	CONC. # (ppm)	K_d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.560	*	102.82	3.25
		C ₆ H ₁₄	0.423	30.56	74.11	3.59
		CH ₂ Cl ₂	0.476	47.49	79.63	4.28
	50:1	C ₆ H ₅ CH ₃	2.181	148.19	69.99	6.19
		C ₆ H ₁₄	1.272	39.57	36.63	0.69
		CH ₂ Cl ₂	0.784	18.12	14.13	3.49
NaCl	10:1	C ₆ H ₅ CH ₃	0.570	*	105.95	0.38
		C ₆ H ₁₄	0.472	67.59	83.20	7.71
		CH ₂ Cl ₂	0.512	100.95	86.64	5.84
	50:1	C ₆ H ₅ CH ₃	2.222	152.52	71.14	2.53
		C ₆ H ₁₄	2.070	108.31	62.12	3.56
		CH ₂ Cl ₂	0.987	25.63	23.69	5.94
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.575	*	106.23	1.35
		C ₆ H ₁₄	0.574	*	103.17	2.39
		CH ₂ Cl ₂	0.556	126.11	98.55	3.90
	50:1	C ₆ H ₅ CH ₃	2.486	267.56	81.61	1.46
		C ₆ H ₁₄	2.465	320.03	80.27	6.92
		CH ₂ Cl ₂	1.375	40.59	32.95	1.05

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.486	2242.52	99.54	1.51
		C ₆ H ₁₄	8.888	66.61	86.09	2.32
		CH ₂ Cl ₂	8.519	34.65	73.90	5.66
	50:1	C ₆ H ₅ CH ₃	37.099	89.90	59.36	1.67
		C ₆ H ₁₄	50.265	283.03	80.38	2.07
		CH ₂ Cl ₂	11.796	12.97	10.53	6.40
NaCl	10:1	C ₆ H ₅ CH ₃	10.663	*	103.19	0.42
		C ₆ H ₁₄	8.922	69.69	86.50	2.69
		CH ₂ Cl ₂	9.346	50.28	81.00	1.07
	50:1	C ₆ H ₅ CH ₃	36.889	90.27	59.02	7.32
		C ₆ H ₁₄	57.584	1053.65	96.11	2.93
		CH ₂ Cl ₂	17.321	21.39	20.62	2.27
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	10.926	*	106.03	0.47
		C ₆ H ₁₄	10.011	160.18	97.05	6.53
		CH ₂ Cl ₂	10.582	*	101.80	3.46
	50:1	C ₆ H ₅ CH ₃	41.522	128.97	68.09	3.27
		C ₆ H ₁₄	61.623	*	100.30	4.46
		CH ₂ Cl ₂	17.560	21.78	20.90	6.33

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(286.4 nm)

SALT	RATIO	SOLVENT	CONC. # (ppm)	K_d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.097	285.71	95.94	1.67
		C ₆ H ₁₄	8.684	57.05	84.14	2.40
		CH ₂ Cl ₂	8.296	31.09	71.96	5.34
	50:1	C ₆ H ₅ CH ₃	38.388	97.98	61.41	1.70
		C ₆ H ₁₄	50.097	264.36	78.71	5.54
		CH ₂ Cl ₂	10.623	11.54	9.48	5.93
NaCl	10:1	C ₆ H ₅ CH ₃	10.315	826.14	98.60	0.49
		C ₆ H ₁₄	8.875	69.75	86.00	4.07
		CH ₂ Cl ₂	9.412	53.28	81.62	2.81
	50:1	C ₆ H ₅ CH ₃	38.462	100.57	61.54	7.27
		C ₆ H ₁₄	55.133	564.84	89.49	1.08
		CH ₂ Cl ₂	16.813	20.61	20.02	2.21
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	10.532	*	100.10	0.50
		C ₆ H ₁₄	9.944	131.96	96.40	6.21
		CH ₂ Cl ₂	10.494	140.58	97.95	2.25
	50:1	C ₆ H ₅ CH ₃	43.444	149.01	71.24	1.70
		C ₆ H ₁₄	61.018	*	102.50	5.23
		CH ₂ Cl ₂	17.122	21.11	20.34	5.65

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

Table 4.16 The results of salting out effect on % recovery
of pyrene solution

(A) 50.00 ppb standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. # (ppm)	K_d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.564	*	103.39	1.69
		C ₆ H ₁₄	0.400	30.21	72.59	2.59
		CH ₂ Cl ₂	0.397	28.07	70.55	5.98
	50:1	C ₆ H ₅ CH ₃	2.351	279.87	81.53	3.38
		C ₆ H ₁₄	2.262	221.53	75.69	5.47
		CH ₂ Cl ₂	1.012	24.53	18.21	4.22
NaCl	10:1	C ₆ H ₅ CH ₃	0.578	*	106.71	4.65
		C ₆ H ₁₄	0.430	43.59	79.91	4.46
		CH ₂ Cl ₂	0.531	115.31	90.26	2.58
	50:1	C ₆ H ₅ CH ₃	2.441	308.14	83.22	1.83
		C ₆ H ₁₄	2.325	241.30	78.25	3.67
		CH ₂ Cl ₂	1.275	36.41	30.65	2.93
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.590	*	108.16	3.84
		C ₆ H ₁₄	0.476	73.26	87.32	1.39
		CH ₂ Cl ₂	0.558	*	100.72	5.23
	50:1	C ₆ H ₅ CH ₃	2.503	667.11	91.44	1.67
		C ₆ H ₁₄	2.501	818.93	91.31	3.03
		CH ₂ Cl ₂	1.552	49.04	37.23	6.03

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(B) 50.00 ppb standard solution at optimum wavelength
(272.4 nm)

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	0.558	*	101.83	0.86
		C ₆ H ₁₄	0.401	31.65	74.31	5.57
		CH ₂ Cl ₂	0.395	27.42	69.58	5.05
	50:1	C ₆ H ₅ CH ₃	2.347	246.20	79.71	2.98
		C ₆ H ₁₄	2.251	197.31	72.57	4.84
		CH ₂ Cl ₂	1.156	28.83	20.73	5.94
NaCl	10:1	C ₆ H ₅ CH ₃	0.569	*	105.13	2.08
		C ₆ H ₁₄	0.413	42.32	79.15	5.94
		CH ₂ Cl ₂	0.523	165.46	89.12	6.53
	50:1	C ₆ H ₅ CH ₃	2.432	250.62	80.27	0.71
		C ₆ H ₁₄	2.411	481.46	85.20	5.78
		CH ₂ Cl ₂	1.403	42.04	33.72	6.94
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	0.589	*	108.36	2.58
		C ₆ H ₁₄	0.462	69.71	86.87	0.46
		CH ₂ Cl ₂	0.559	*	100.79	1.88
	50:1	C ₆ H ₅ CH ₃	2.499	480.41	88.81	1.11
		C ₆ H ₁₄	2.565	1344.70	93.64	3.53
		CH ₂ Cl ₂	1.762	60.16	42.10	3.73

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(C) 1.00 ppm standard solution at 254.0 nm

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.890	*	103.53	0.34
		C ₆ H ₁₄	6.972	19.73	64.94	4.92
		CH ₂ Cl ₂	10.723	1219.40	97.06	1.92
	50:1	C ₆ H ₅ CH ₃	60.212	2210.02	96.93	1.06
		C ₆ H ₁₄	37.852	82.05	54.51	1.27
		CH ₂ Cl ₂	9.730	10.47	8.69	3.09
NaCl	10:1	C ₆ H ₅ CH ₃	10.891	*	103.58	0.76
		C ₆ H ₁₄	7.623	25.91	70.96	2.87
		CH ₂ Cl ₂	10.823	*	100.48	1.71
	50:1	C ₆ H ₅ CH ₃	62.777	*	101.04	0.44
		C ₆ H ₁₄	38.932	108.11	61.64	5.26
		CH ₂ Cl ₂	23.431	31.89	27.90	4.48
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	11.203	*	109.38	1.23
		C ₆ H ₁₄	8.751	46.58	81.53	1.02
		CH ₂ Cl ₂	10.882	*	102.21	1.46
	50:1	C ₆ H ₅ CH ₃	63.185	*	103.55	3.30
		C ₆ H ₁₄	59.332	824.05	91.47	2.47
		CH ₂ Cl ₂	25.321	35.54	30.14	3.38

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(D) 1.00 ppm standard solution at optimum wavelength
(272.4 nm)

SALT	RATIO	SOLVENT	CONC. [#] (ppm)	K _d	% E	% RSD
NO SALT	10:1	C ₆ H ₅ CH ₃	10.890	*	103.16	0.56
		C ₆ H ₁₄	7.123	20.81	66.34	2.43
		CH ₂ Cl ₂	10.075	75.31	85.60	3.88
	50:1	C ₆ H ₅ CH ₃	59.542	1516.25	96.29	1.32
		C ₆ H ₁₄	36.302	74.99	52.27	1.42
		CH ₂ Cl ₂	7.932	8.39	7.08	3.19
NaCl	10:1	C ₆ H ₅ CH ₃	10.898	*	103.72	0.64
		C ₆ H ₁₄	7.300	22.70	68.01	4.80
		CH ₂ Cl ₂	10.546	334.88	95.56	6.58
	50:1	C ₆ H ₅ CH ₃	61.784	*	101.24	0.69
		C ₆ H ₁₄	40.095	101.51	60.13	5.71
		CH ₂ Cl ₂	20.433	27.15	24.79	3.61
Na ₂ SO ₄	10:1	C ₆ H ₅ CH ₃	11.250	*	109.79	0.35
		C ₆ H ₁₄	8.795	47.75	81.90	0.96
		CH ₂ Cl ₂	10.733	198.61	97.18	5.89
	50:1	C ₆ H ₅ CH ₃	62.282	*	103.01	3.25
		C ₆ H ₁₄	59.821	830.16	92.16	0.44
		CH ₂ Cl ₂	22.795	30.79	27.08	9.25

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

Table 4.17 The microextraction of fluorene in mixture

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.351	21.83	66.92	6.18
		NaCl	0.427	48.15	81.24	4.71
		Na ₂ SO ₄	0.509	478.94	96.86	5.11
	50:1	NO SALT	2.120	129.90	67.85	0.94
		NaCl	2.141	143.50	70.23	3.97
		Na ₂ SO ₄	2.509	267.83	80.32	5.15
C ₆ H ₁₄	10:1	NO SALT	0.446	68.90	84.95	6.14
		NaCl	0.514	1130.85	97.79	3.83
		Na ₂ SO ₄	0.539	*	102.49	6.76
	50:1	NO SALT	1.958	87.70	59.79	2.67
		NaCl	2.001	100.53	60.04	3.97
		Na ₂ SO ₄	2.072	98.60	58.07	2.27
CH ₂ Cl ₂	10:1	NO SALT	0.373	21.31	63.58	6.30
		NaCl	0.548	205.39	93.41	3.10
		Na ₂ SO ₄	0.592	*	100.74	7.64
	50:1	NO SALT	1.100	27.24	19.81	6.26
		NaCl	1.141	31.20	27.41	7.12
		Na ₂ SO ₄	1.407	42.19	33.73	6.93

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

(B) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. # (ppm)	K_d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	9.696	154.44	92.12	3.72
		NaCl	10.534	*	100.08	0.93
		Na ₂ SO ₄	10.622	*	100.92	2.58
	50:1	NO SALT	43.057	137.49	68.89	3.74
		NaCl	45.632	168.20	73.01	3.25
		Na ₂ SO ₄	46.669	197.08	76.54	2.29
C ₆ H ₁₄	10:1	NO SALT	9.215	77.42	87.55	2.99
		NaCl	9.564	107.17	90.86	1.47
		Na ₂ SO ₄	9.426	92.45	89.56	1.66
	50:1	NO SALT	45.786	150.58	60.49	1.02
		NaCl	47.063	155.89	63.59	0.49
		Na ₂ SO ₄	45.767	150.69	60.04	2.27
CH ₂ Cl ₂	10:1	NO SALT	8.214	27.49	69.82	3.58
		NaCl	8.791	31.17	74.73	1.19
		Na ₂ SO ₄	9.022	39.75	76.69	4.12
	50:1	NO SALT	24.932	31.91	22.44	6.94
		NaCl	26.229	38.05	31.47	7.48
		Na ₂ SO ₄	27.256	40.14	32.71	6.49

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluorene is higher than its initial concentration.

concentration in organic phase

Table 4.18 The microextraction of anthracene in mixture

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.465	254.37	88.54	6.46
		NaCl	0.511	733.53	92.25	5.68
		Na ₂ SO ₄	0.527	758.88	93.15	7.11
	50:1	NO SALT	2.275	168.85	72.84	4.62
		NaCl	2.337	215.69	76.67	2.33
		Na ₂ SO ₄	2.573	534.04	94.26	1.23
C ₆ H ₁₄	10:1	NO SALT	0.519	604.82	98.49	3.30
		NaCl	0.528	*	100.87	2.00
		Na ₂ SO ₄	0.539	*	102.95	3.95
	50:1	NO SALT	2.443	162.79	70.38	0.93
		NaCl	2.423	168.62	72.69	3.10
		Na ₂ SO ₄	2.476	174.89	71.32	5.87
CH ₂ Cl ₂	10:1	NO SALT	0.455	180.77	85.68	3.13
		NaCl	0.469	476.72	89.73	5.73
		Na ₂ SO ₄	0.536	1604.38	99.47	1.26
	50:1	NO SALT	0.957	22.93	17.23	2.79
		NaCl	0.981	25.39	23.57	1.06
		Na ₂ SO ₄	1.463	44.61	35.05	3.21

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

(B) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.857	*	102.82	4.55
		NaCl	11.256	*	104.72	6.03
		Na ₂ SO ₄	11.007	*	103.15	4.96
	50:1	NO SALT	50.130	281.50	80.21	6.83
		NaCl	50.286	326.87	82.47	7.69
		Na ₂ SO ₄	59.782	*	100.30	1.74
C ₆ H ₁₄	10:1	NO SALT	9.100	67.82	86.45	1.38
		NaCl	9.380	87.93	89.11	1.67
		Na ₂ SO ₄	9.364	102.04	88.96	4.54
	50:1	NO SALT	43.202	114.25	62.21	5.76
		NaCl	47.623	234.02	77.67	3.75
		Na ₂ SO ₄	58.240	1309.08	97.38	7.31
CH ₂ Cl ₂	10:1	NO SALT	6.931	17.00	58.92	4.75
		NaCl	7.637	21.81	64.92	1.87
		Na ₂ SO ₄	8.236	27.70	70.01	3.19
	50:1	NO SALT	18.942	22.64	17.05	3.82
		NaCl	25.671	36.78	30.80	7.43
		Na ₂ SO ₄	27.649	40.94	33.18	4.49

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of anthracene is higher than its initial concentration.

concentration in organic phase

Table 4.19 The microextraction of fluoranthene in mixture

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.562	*	102.55	4.73
		NaCl	0.569	*	105.15	0.75
		Na ₂ SO ₄	0.585	*	108.23	0.43
	50:1	NO SALT	2.194	153.86	70.23	5.03
		NaCl	2.307	585.91	85.41	1.49
		Na ₂ SO ₄	2.582	763.42	93.27	0.91
C ₆ H ₁₄	10:1	NO SALT	0.482	512.02	82.98	1.27
		NaCl	0.559	1723.55	99.21	0.97
		Na ₂ SO ₄	0.565	*	103.52	0.23
	50:1	NO SALT	2.189	158.07	69.11	6.92
		NaCl	2.228	179.12	72.85	3.92
		Na ₂ SO ₄	2.326	203.25	74.78	1.16
CH ₂ Cl ₂	10:1	NO SALT	0.497	521.08	84.58	3.11
		NaCl	0.547	886.42	95.50	2.77
		Na ₂ SO ₄	0.561	*	100.37	1.26
	50:1	NO SALT	1.239	31.66	22.32	4.74
		NaCl	1.300	37.56	31.22	6.57
		Na ₂ SO ₄	1.585	51.05	37.97	7.95

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

(B) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.586	*	101.92	7.46
		NaCl	10.614	*	102.84	6.07
		Na ₂ SO ₄	10.862	*	105.33	4.22
	50:1	NO SALT	47.429	199.12	75.89	4.47
		NaCl	47.636	185.00	76.22	3.26
		Na ₂ SO ₄	48.020	231.66	78.75	5.12
C ₆ H ₁₄	10:1	NO SALT	10.641	*	101.09	2.46
		NaCl	10.986	*	103.37	2.18
		Na ₂ SO ₄	11.302	*	104.38	2.60
	50:1	NO SALT	57.894	384.87	90.32	1.19
		NaCl	61.865	*	100.69	2.49
		Na ₂ SO ₄	63.894	*	102.05	2.09
CH ₂ Cl ₂	10:1	NO SALT	5.488	10.30	46.65	2.75
		NaCl	9.096	40.19	77.32	1.08
		Na ₂ SO ₄	9.713	59.35	82.57	4.51
	50:1	NO SALT	20.974	25.64	18.88	5.65
		NaCl	20.554	27.05	24.66	4.98
		Na ₂ SO ₄	26.871	39.41	32.25	7.14

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of fluoranthene is higher than its initial concentration.

concentration in organic phase

Table 4.20 The microextraction of pyrene in mixture

(A) 50.00 ppb standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. [#] (ppm)	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	0.560	*	100.45	1.45
		NaCl	0.572	*	106.50	3.98
		Na ₂ SO ₄	0.608	*	110.66	0.78
	50:1	NO SALT	2.265	173.86	72.50	7.89
		NaCl	2.578	702.80	92.68	1.02
		Na ₂ SO ₄	2.637	2011.12	99.32	1.02
C ₆ H ₁₄	10:1	NO SALT	0.451	71.75	83.16	3.53
		NaCl	0.535	200.19	93.05	7.12
		Na ₂ SO ₄	0.560	*	103.10	1.02
	50:1	NO SALT	2.268	216.33	75.93	1.22
		NaCl	2.328	253.72	78.94	4.30
		Na ₂ SO ₄	2.544	*	100.72	2.09
CH ₂ Cl ₂	10:1	NO SALT	0.506	97.88	86.25	7.44
		NaCl	0.540	358.68	94.77	2.69
		Na ₂ SO ₄	0.551	*	100.05	4.94
	50:1	NO SALT	1.244	31.80	22.40	2.16
		NaCl	1.316	38.24	31.60	6.52
		Na ₂ SO ₄	1.655	54.46	39.66	5.37

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

(B) 1.00 ppm standard solution at 254.0 nm

SOLVENT	RATIO	SALT	CONC. (ppm) [#]	K _d	% E	% RSD
C ₆ H ₅ CH ₃	10:1	NO SALT	10.779	*	100.59	0.78
		NaCl	10.892	*	103.63	5.73
		Na ₂ SO ₄	11.173	*	107.38	0.78
	50:1	NO SALT	48.224	216.09	77.16	4.84
		NaCl	49.955	223.01	78.07	3.46
		Na ₂ SO ₄	52.653	412.16	86.35	3.82
C ₆ H ₁₄	10:1	NO SALT	8.768	54.74	83.30	3.55
		NaCl	9.405	91.15	89.35	2.02
		Na ₂ SO ₄	9.499	107.54	90.25	2.98
	50:1	NO SALT	54.963	414.48	86.34	3.81
		NaCl	58.507	771.93	90.76	6.50
		Na ₂ SO ₄	60.566	843.50	91.79	2.39
CH ₂ Cl ₂	10:1	NO SALT	8.329	28.74	70.80	2.99
		NaCl	9.249	47.19	78.62	7.65
		Na ₂ SO ₄	9.295	48.88	79.01	5.23
	50:1	NO SALT	17.579	20.72	15.82	7.46
		NaCl	19.539	25.32	23.51	3.87
		Na ₂ SO ₄	26.176	37.72	31.41	1.74

Triplicate analyses

* K_d cannot be calculated due to the experimental concentration of pyrene is higher than its initial concentration.

concentration in organic phase

Table 4.21 The minimum detectable level of PAHs detected at 254.0 nm and at optimum wavelength

STANDARD	MINIMUM DETECTABLE LEVEL (ppb)	
	254.0 nm	optimum wavelength
FLUORENE	20.00	10.00
ANTHRACENE	0.10	0.10
FLUORANTHENE	40.00	10.00
PYRENE	50.00	0.20

Triplicate analyses

Table 4.22 The results of the analysis of synthetic unknown solutions

STANDARD	CONCENTRATION (ppb)		% ERROR
	TRUE	EXPERIMENT	
FLUORENE	40.24	40.50	0.65
ANTHRACENE	10.06	9.79	3.28
FLUORANTHENE	30.00	29.90	0.33
PYRENE	20.00	20.10	0.50

Triplicate analyses

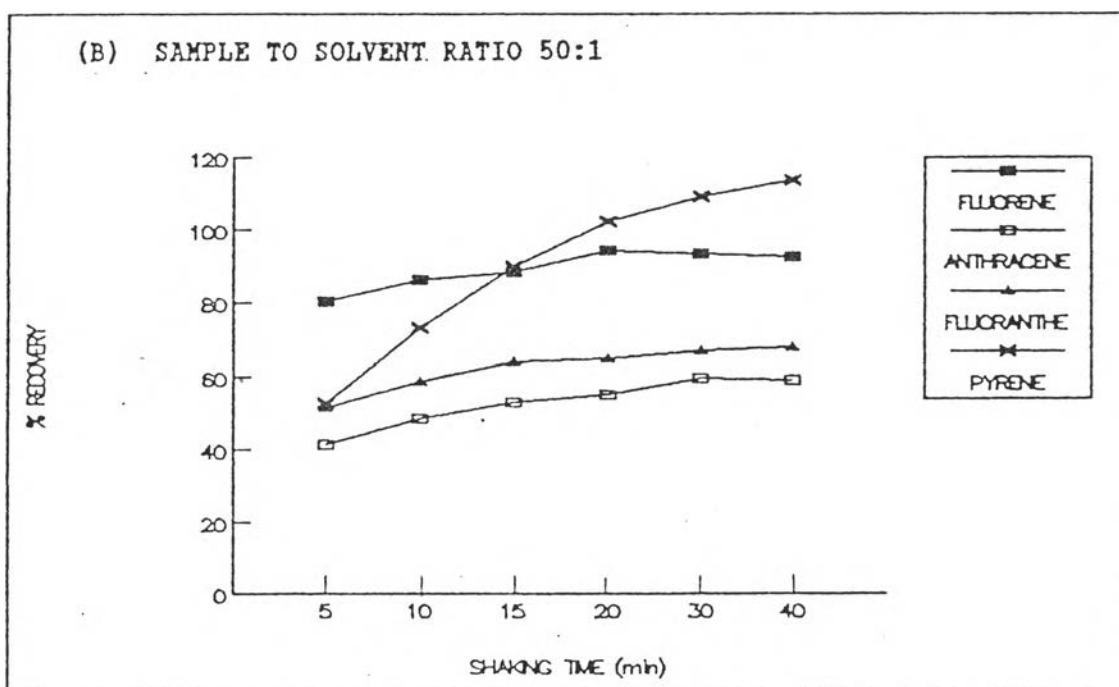
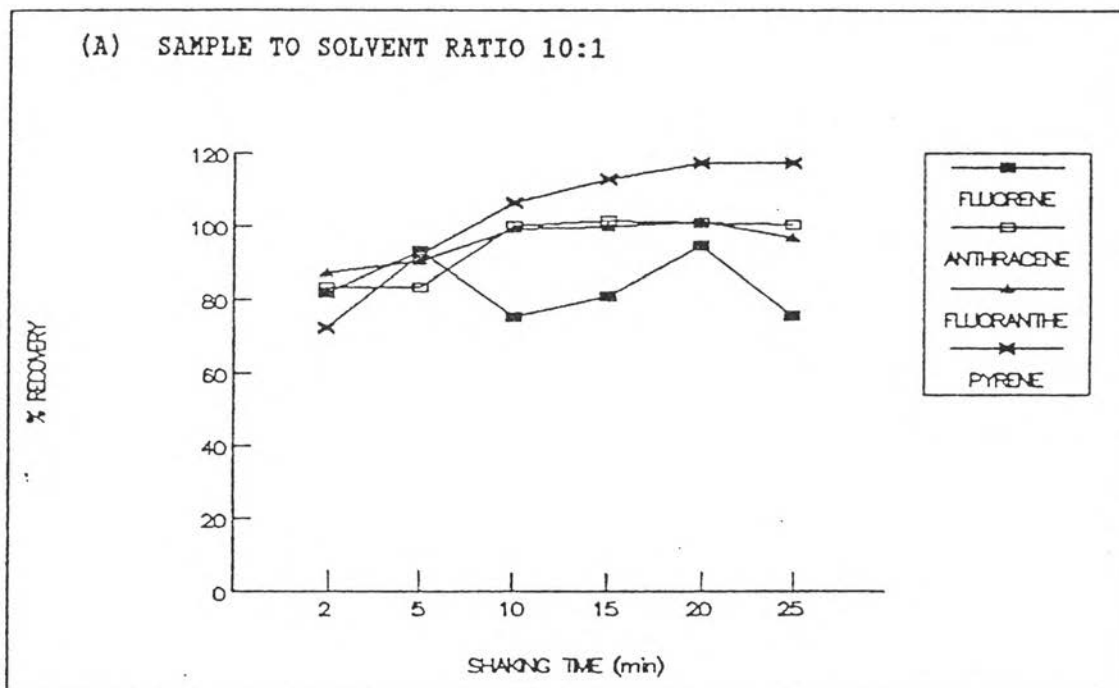


Figure 4.1 The effect of shaking time on % recovery of each PAH with toluene as solvent

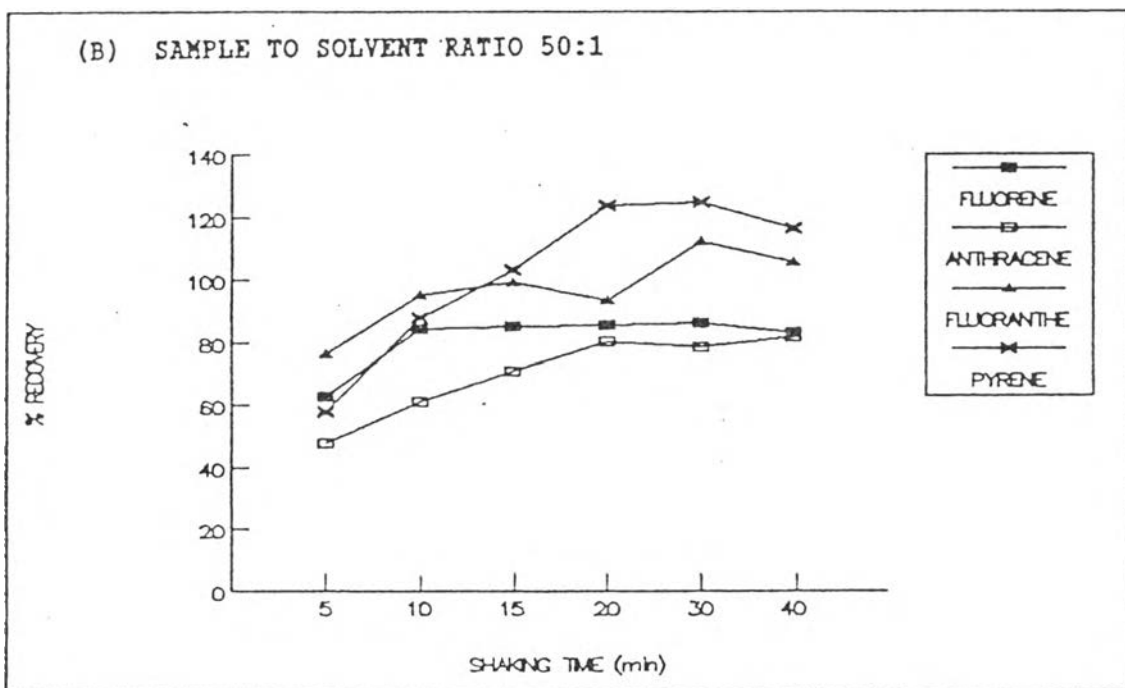
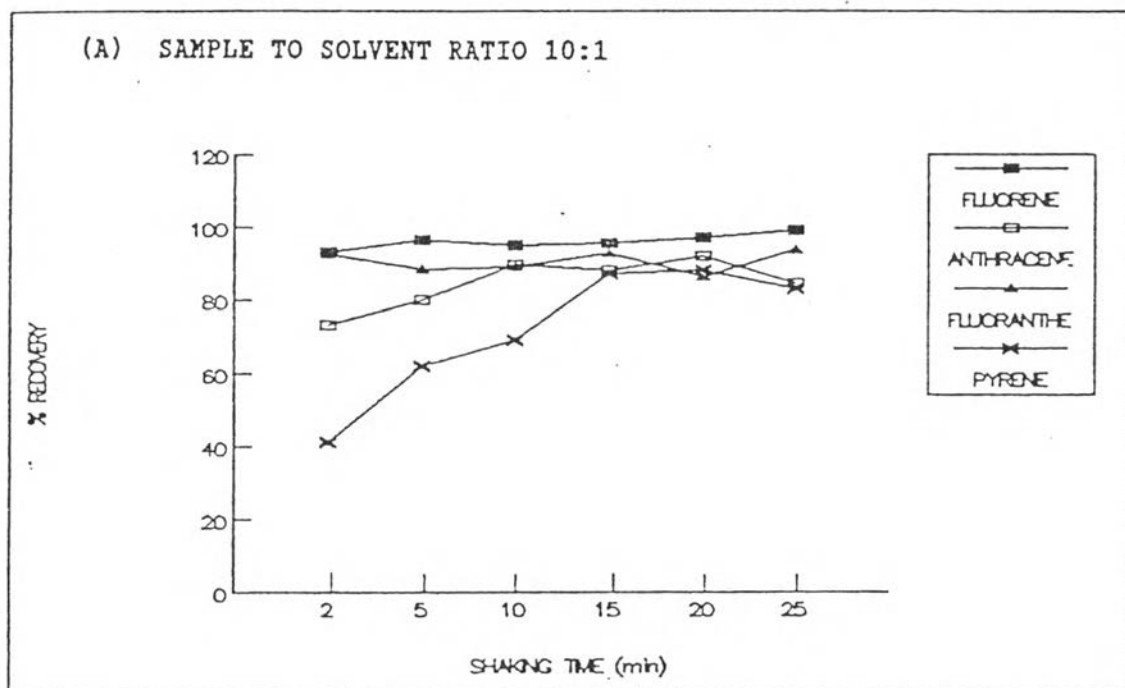


Figure 4.2 The effect of shaking time on % recovery of each PAH with hexane as solvent

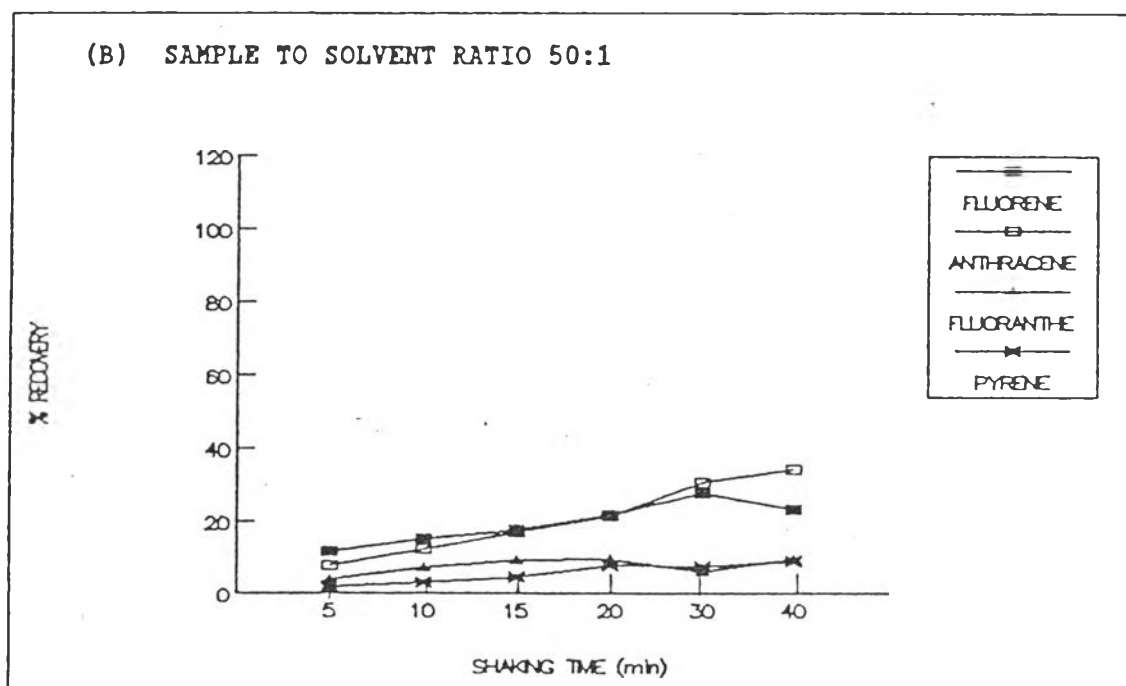
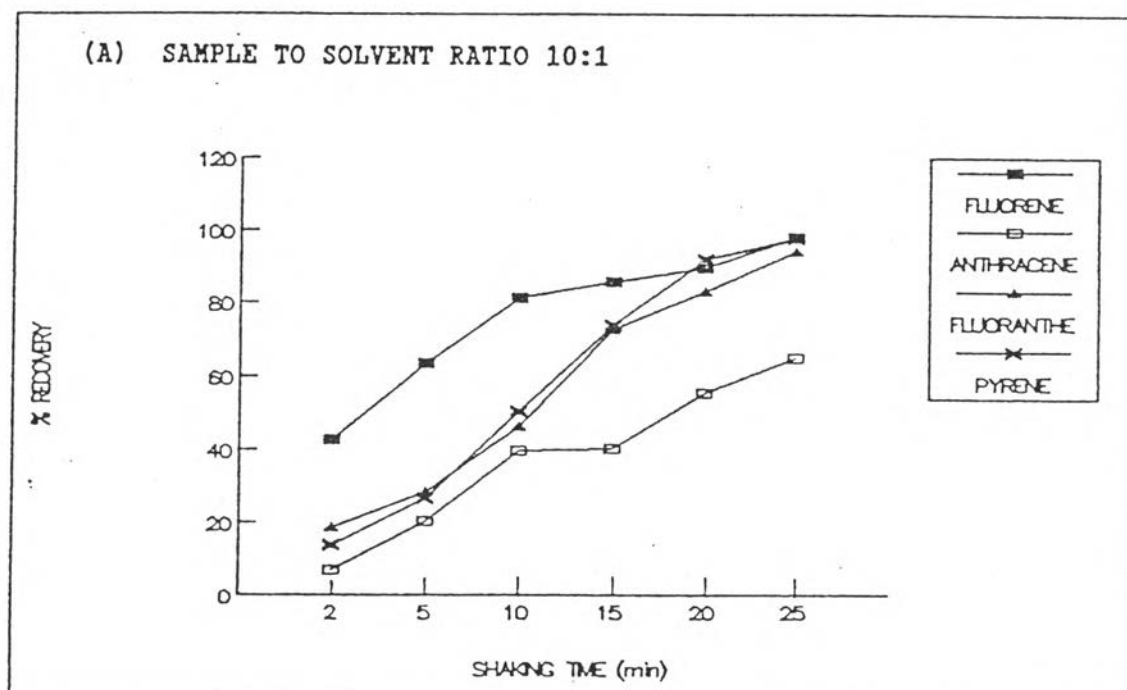


Figure 4.3 The effect of shaking time on % recovery of each PAH with methylene chloride as solvent

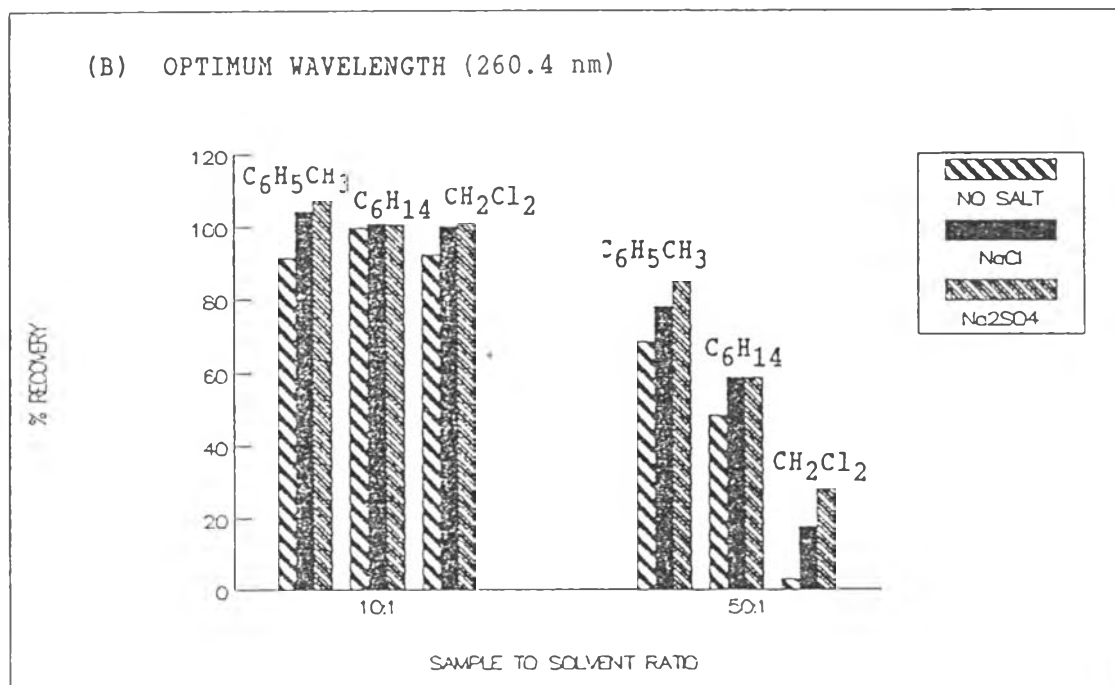
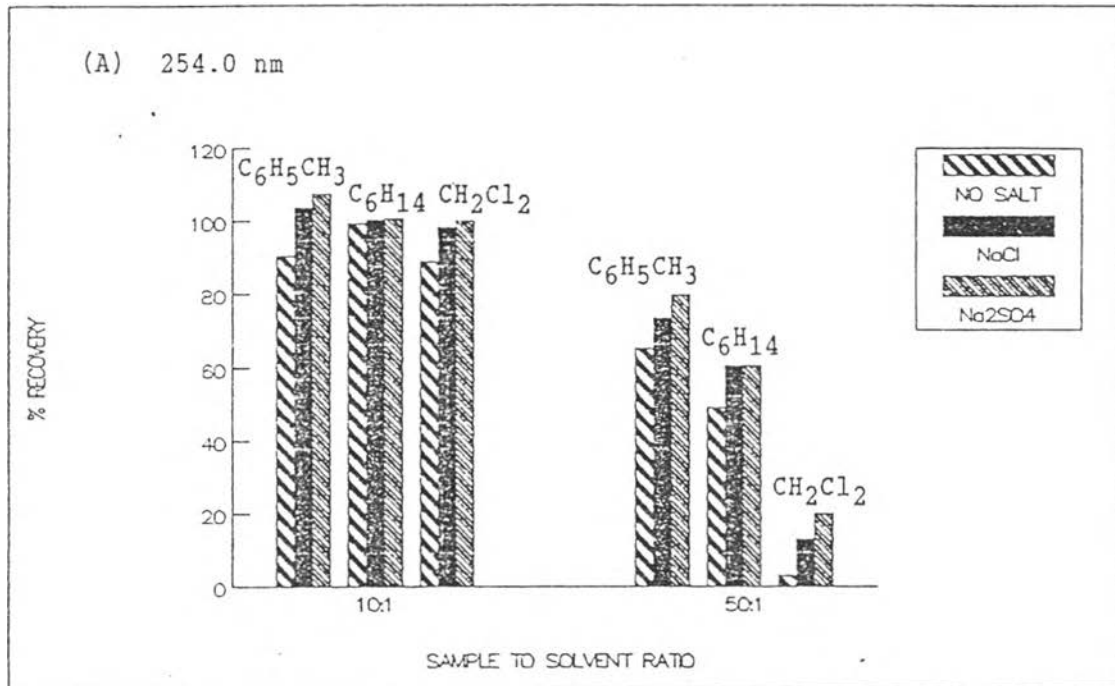


Figure 4.4 The results of the effect of sample to solvent ratios on % recovery of 50.00 ppb fluorene solution

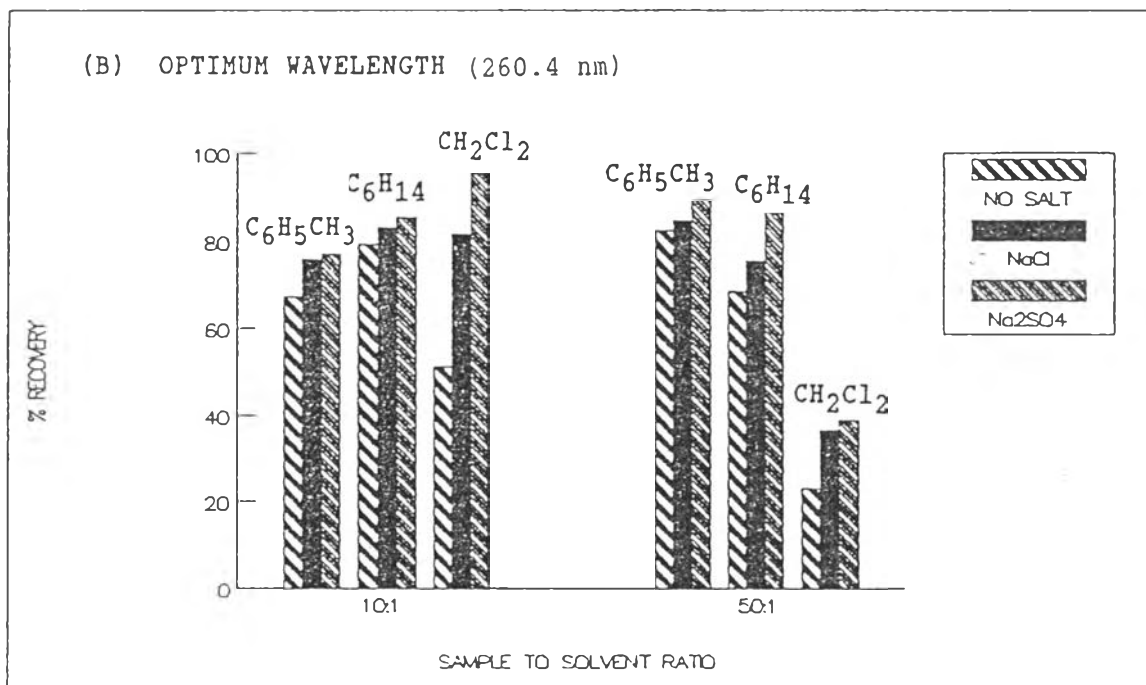
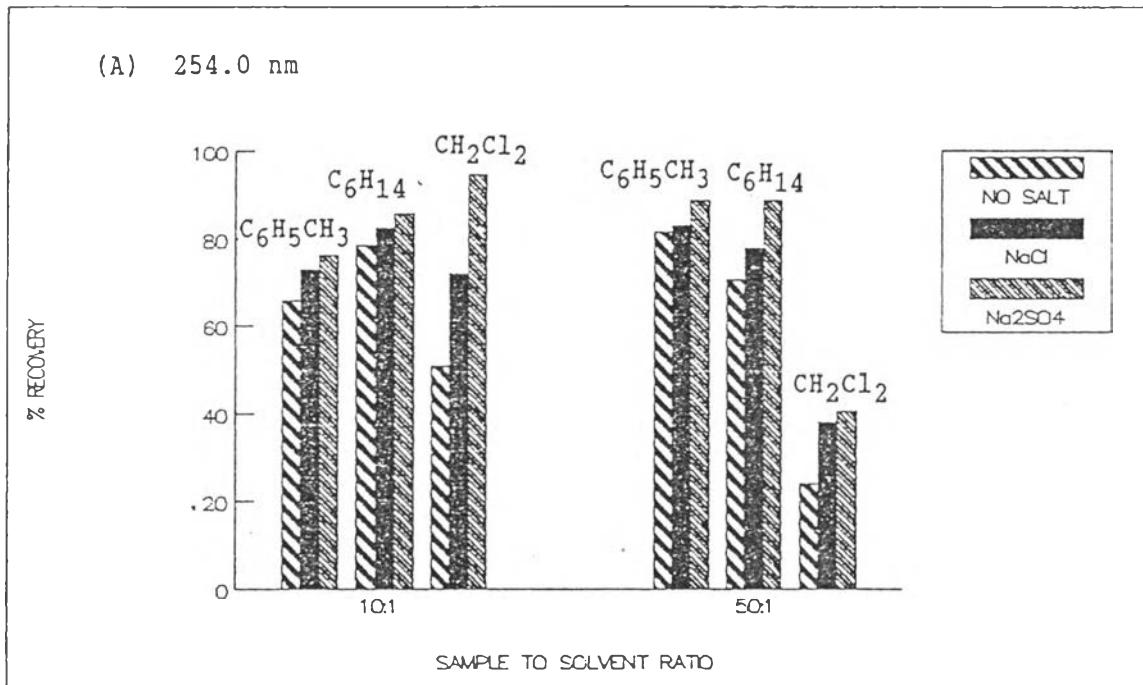


Figure 4.5 The results of the effect of sample to solvent ratios on % recovery of 1.00 ppm fluorene solution

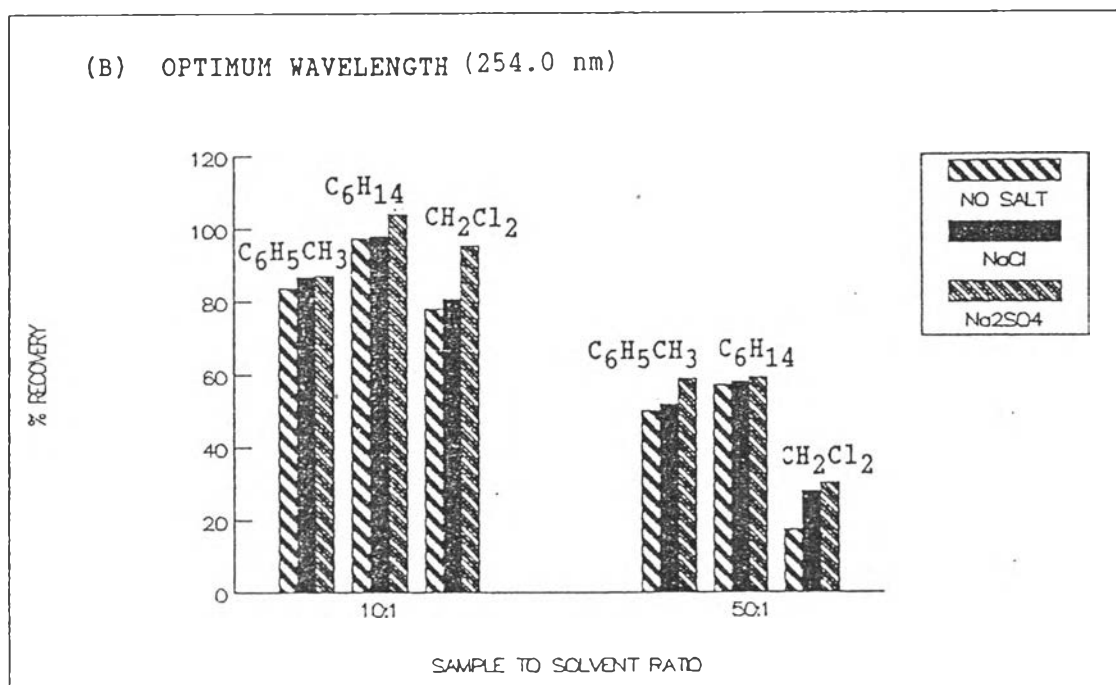
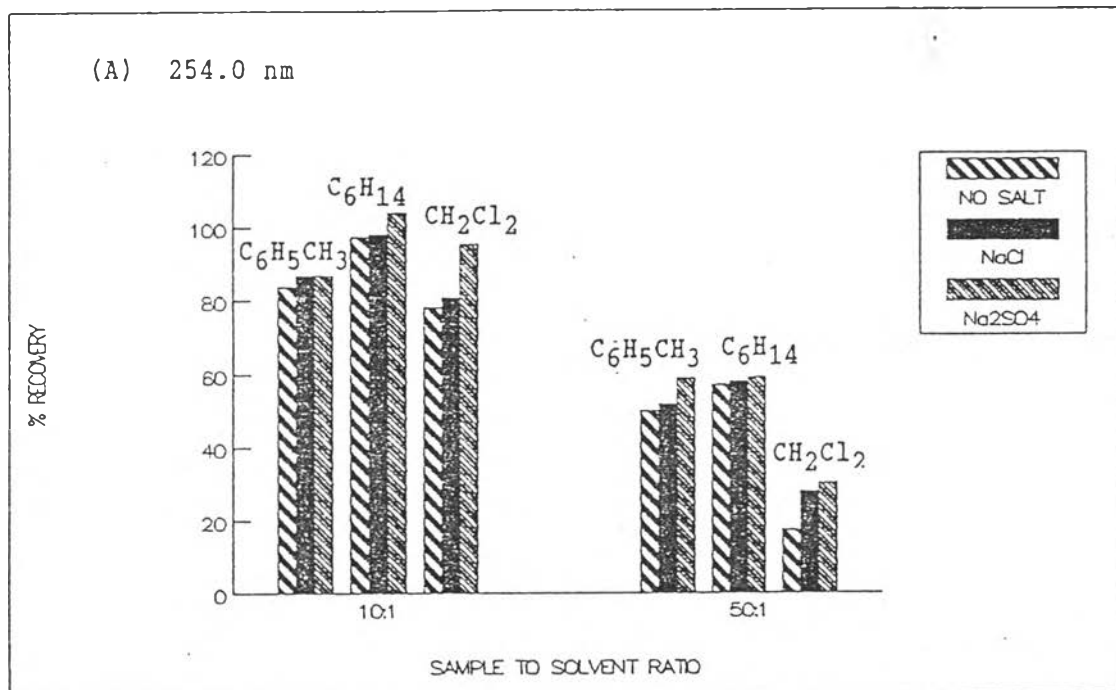


Figure 4.6 The results of the effect of sample to solvent ratios on % recovery of 50.00 ppb anthracene solution

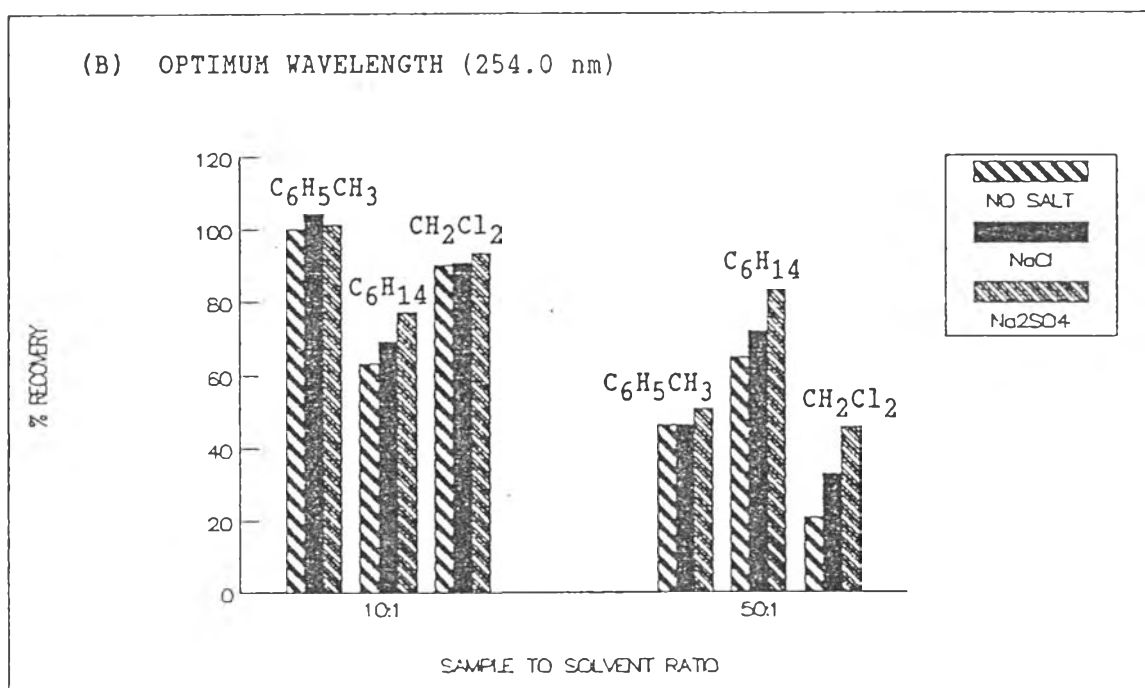
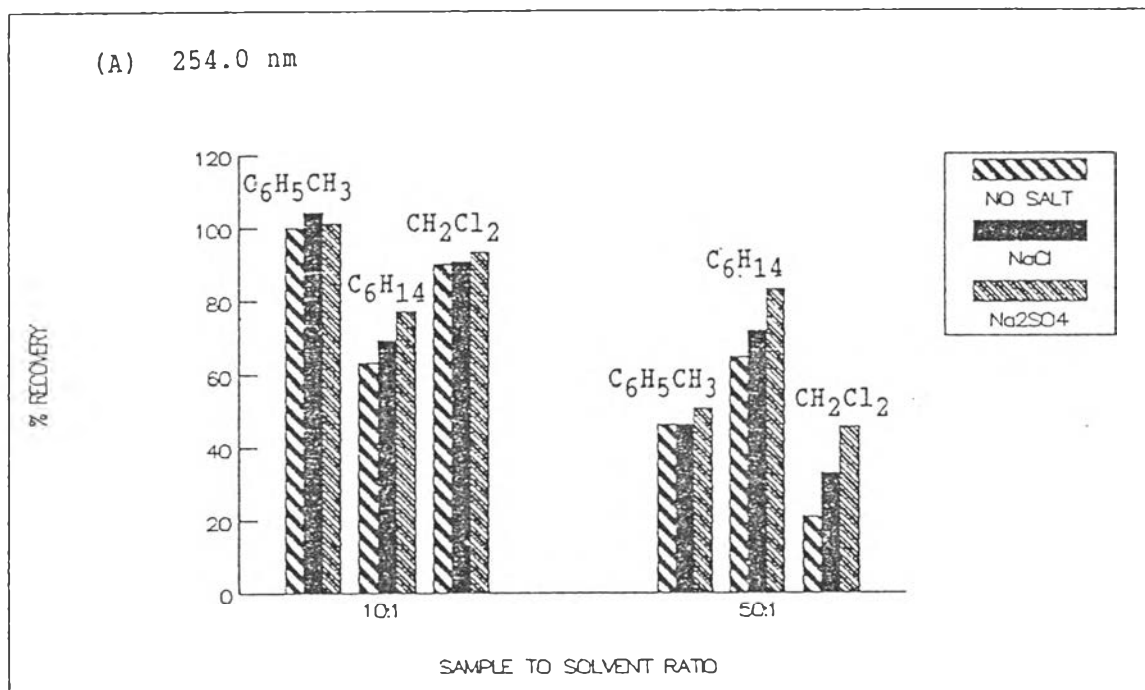


Figure 4.7 The results of the effect of sample to solvent ratios on % recovery of 1.00 ppm anthracene solution

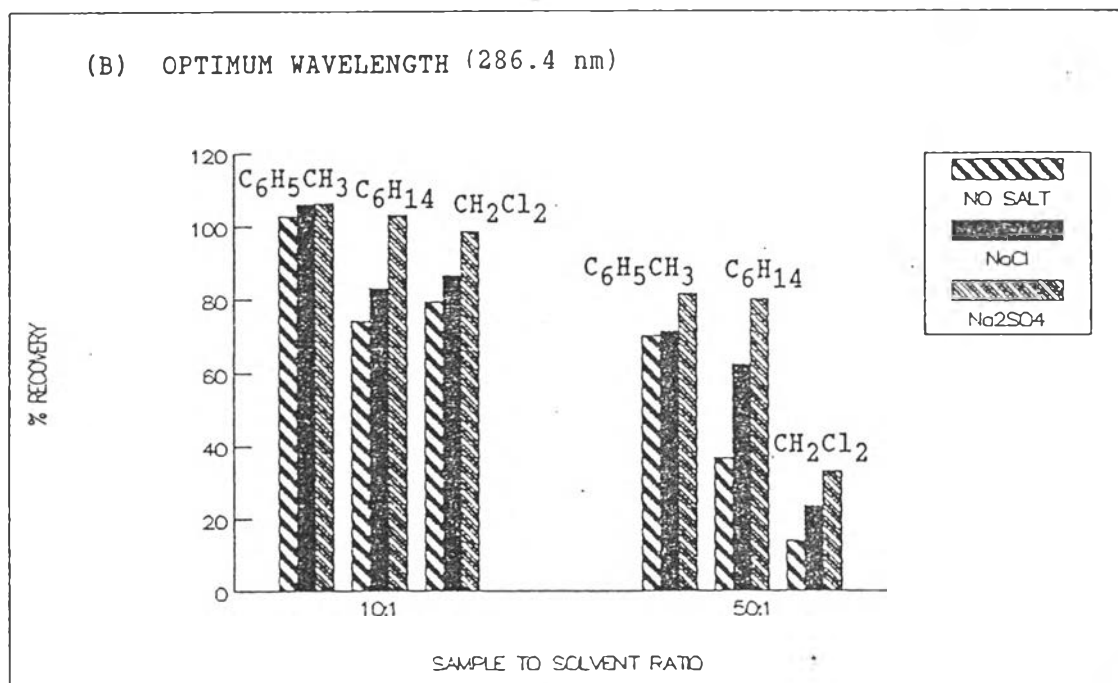
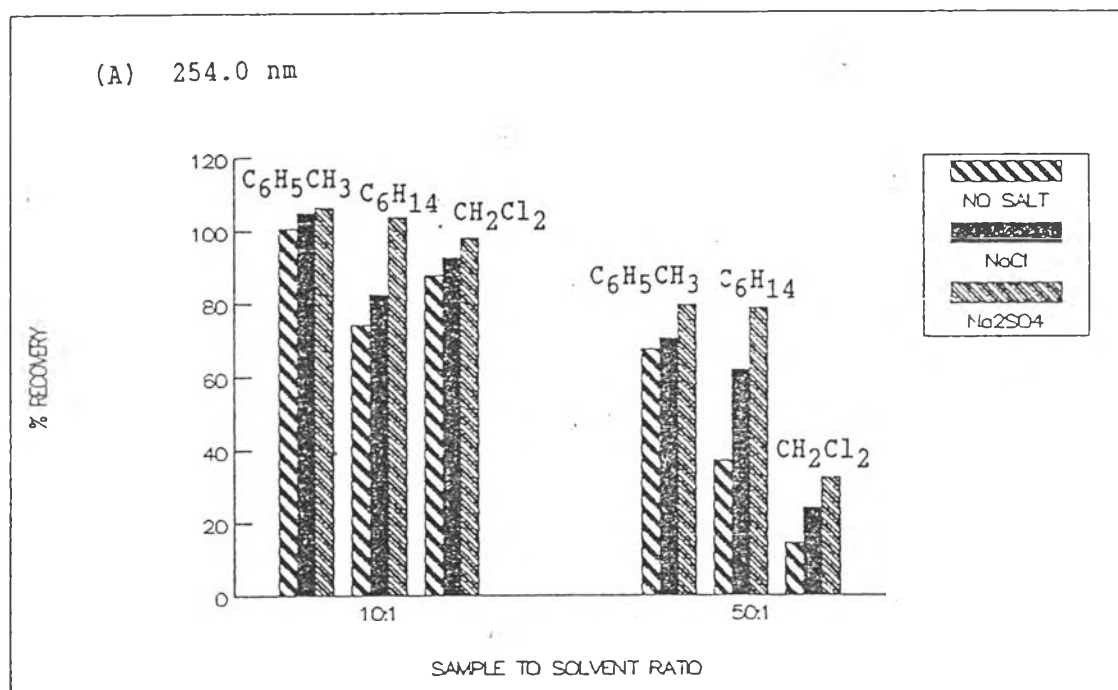


Figure 4.8 The results of the effect of sample to solvent ratios on % recovery of 50.00 ppb fluoranthene solution

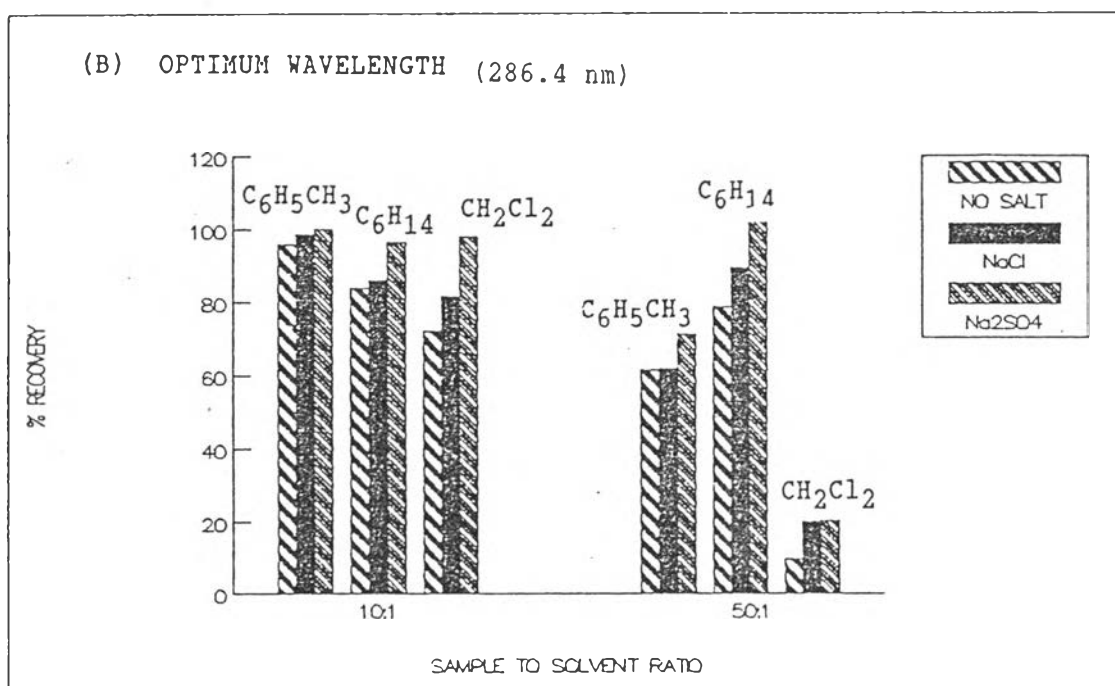
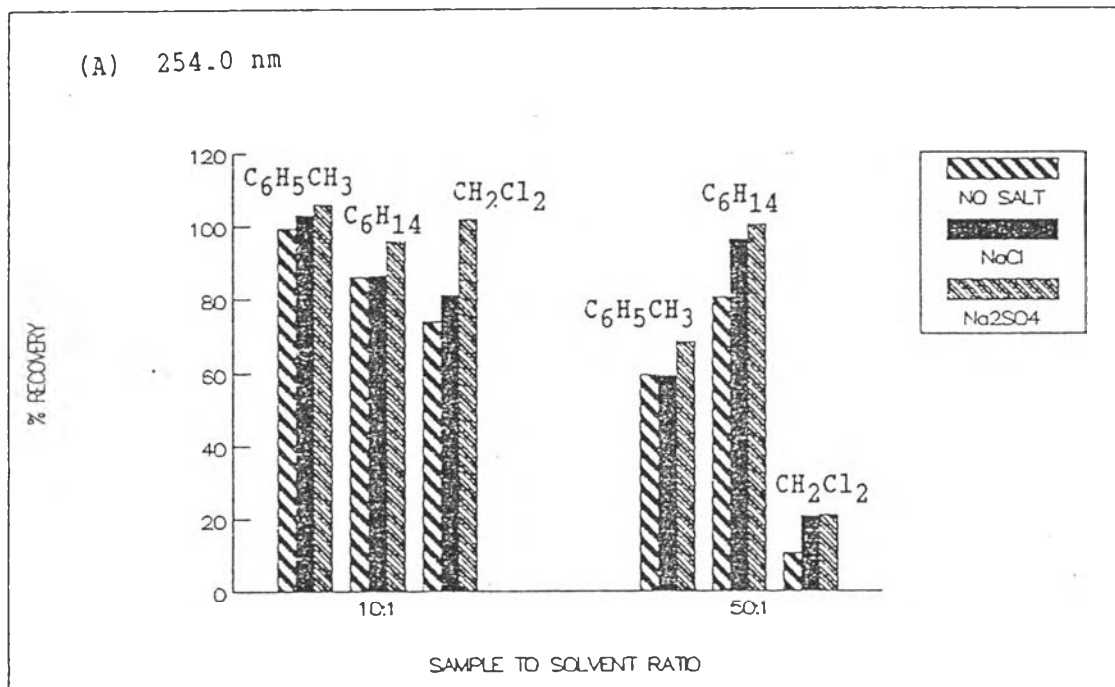


Figure 4.9 The results of the effect of sample to solvent ratios on % recovery of 1.00 ppm fluoranthene solution

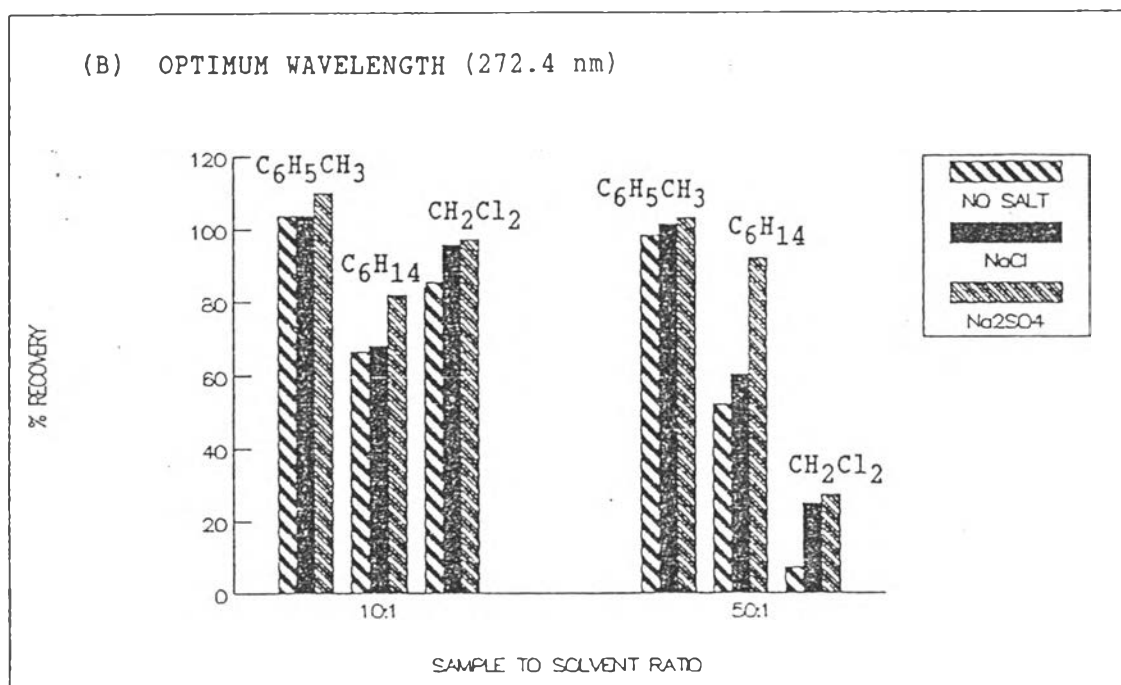
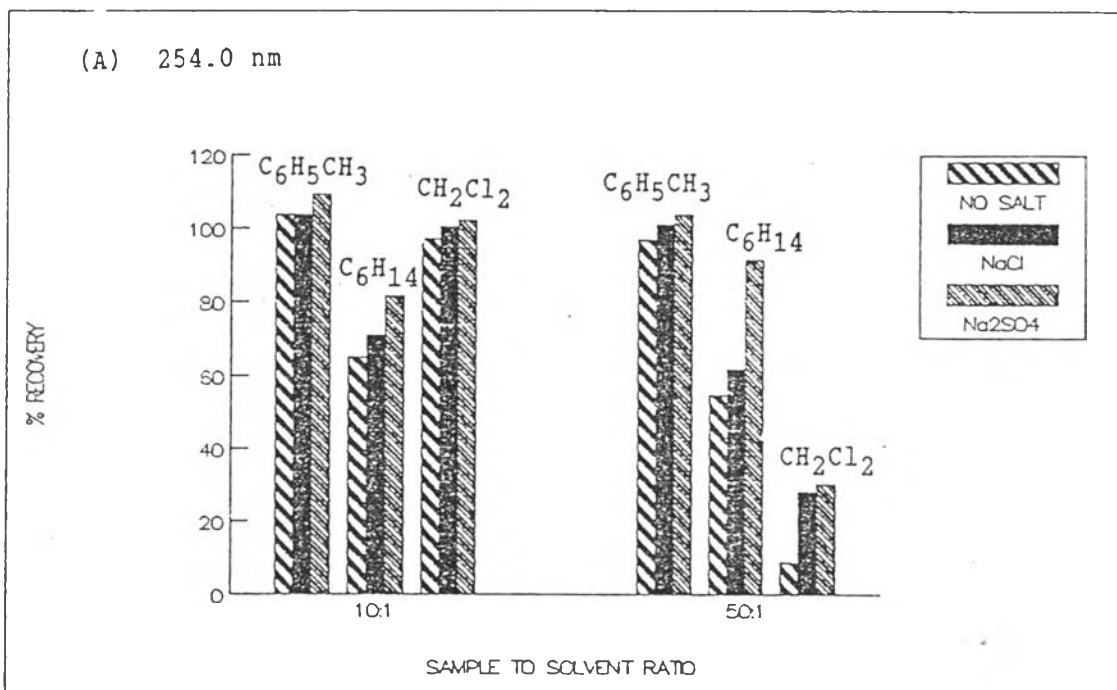


Figure 4.10 The results of the effect of sample to solvent ratios on % recovery of 50.00 ppb pyrene solution

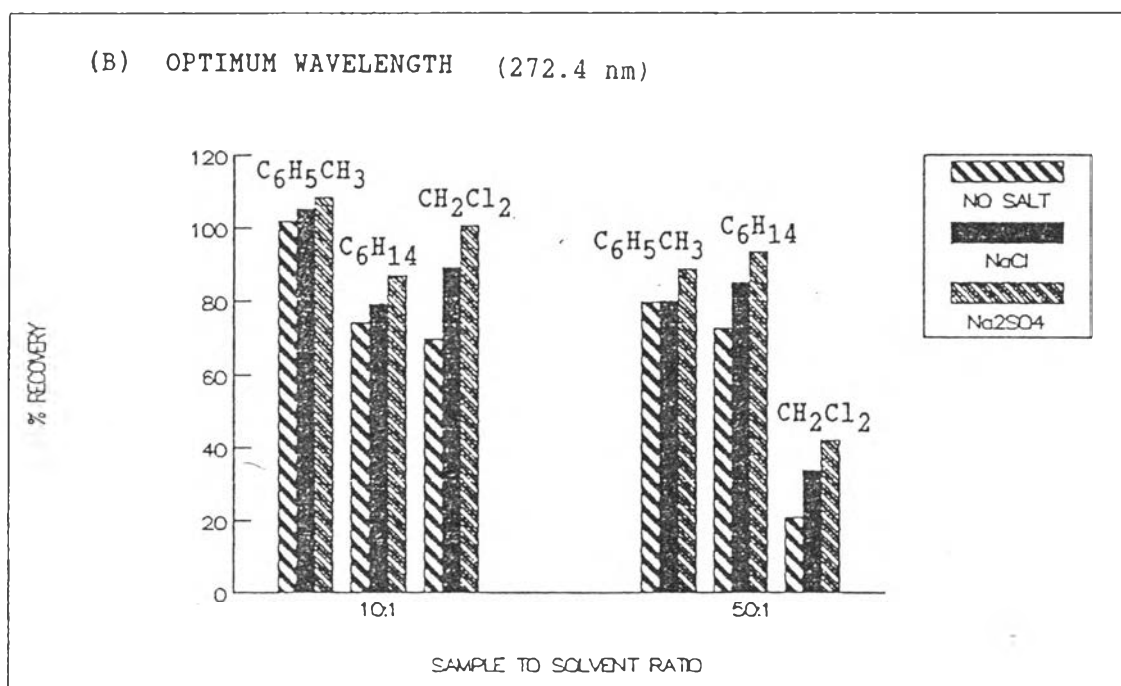
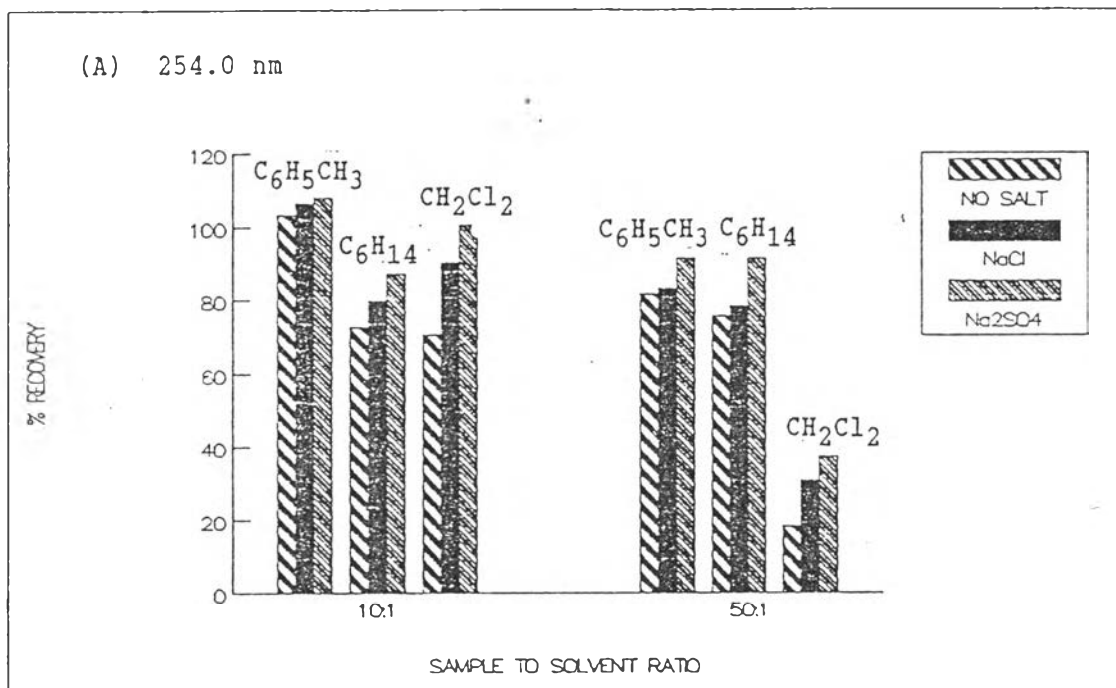


Figure 4.11 The results of the effect of sample to solvent ratios on % recovery of 1.00 ppm pyrene solution

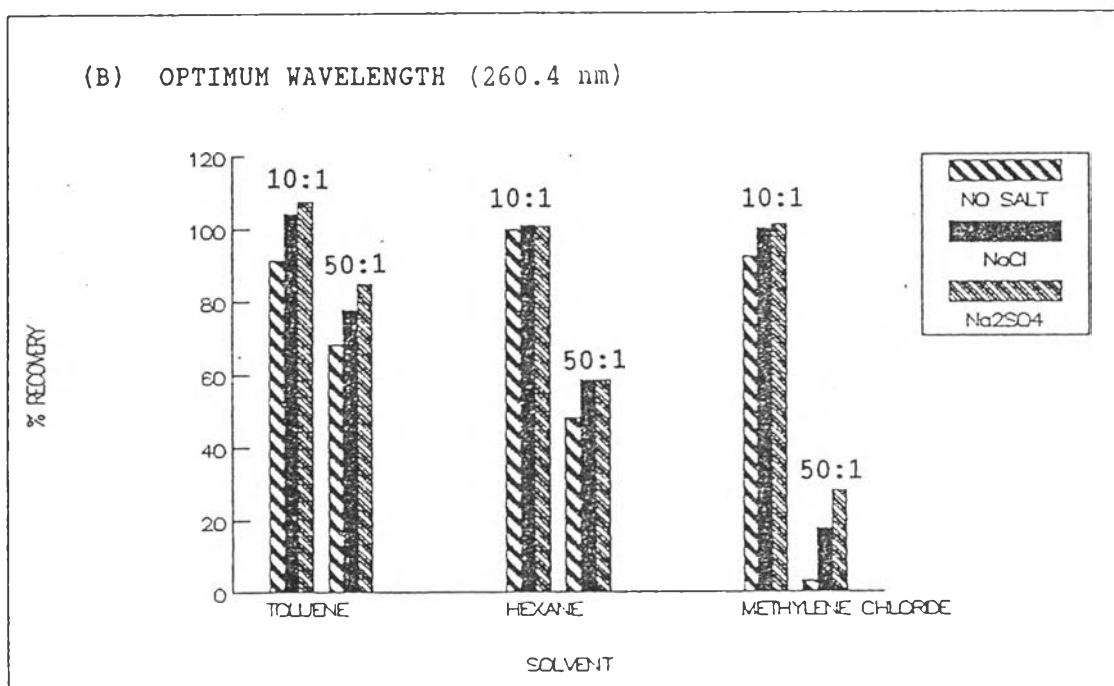
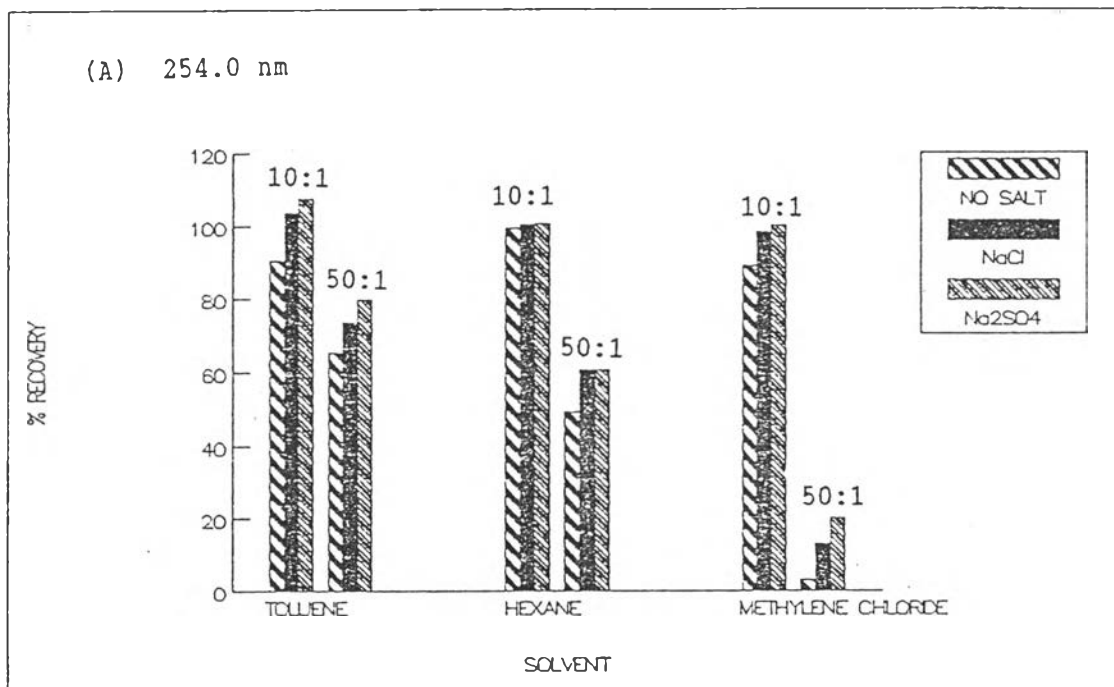


Figure 4.12 The results of the effect of extracting solvents on % recovery of 50.00 ppb fluorene solution

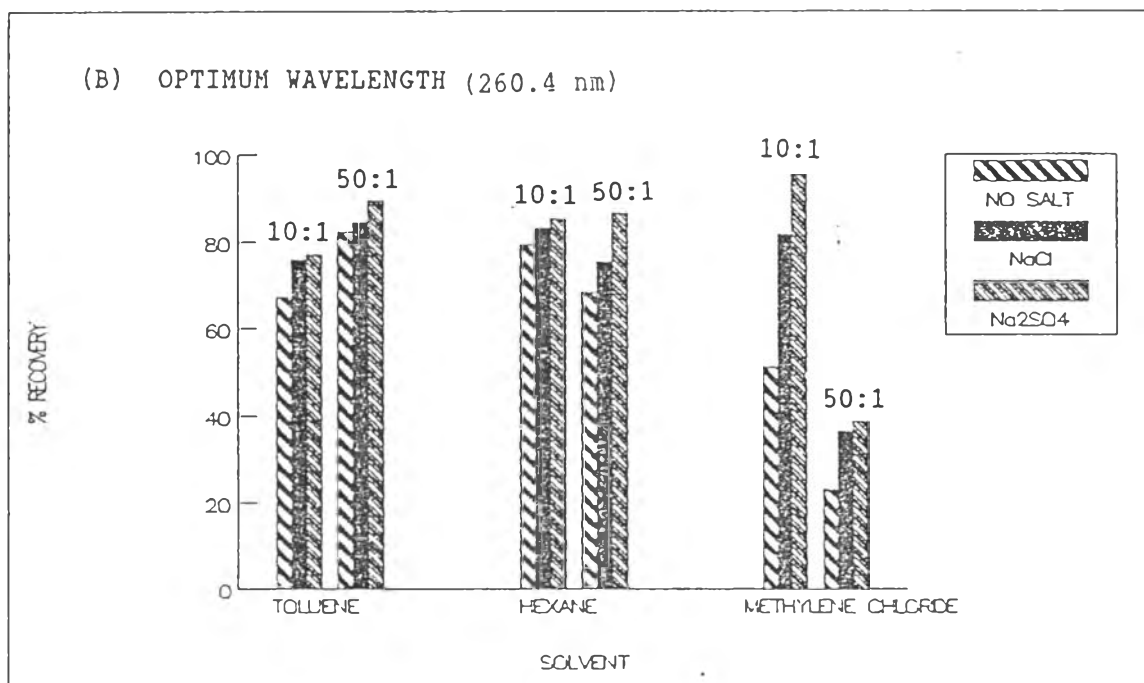
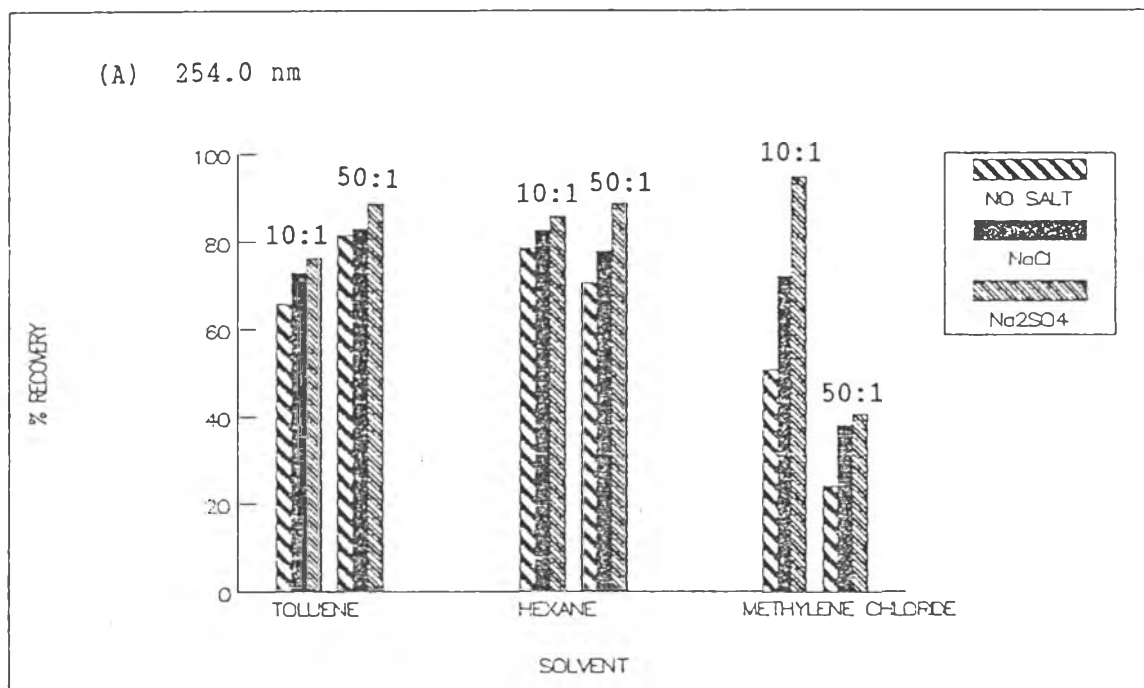


Figure 4.13 The results of the effect of extracting solvents on % recovery of 1.00 ppm fluorene solution

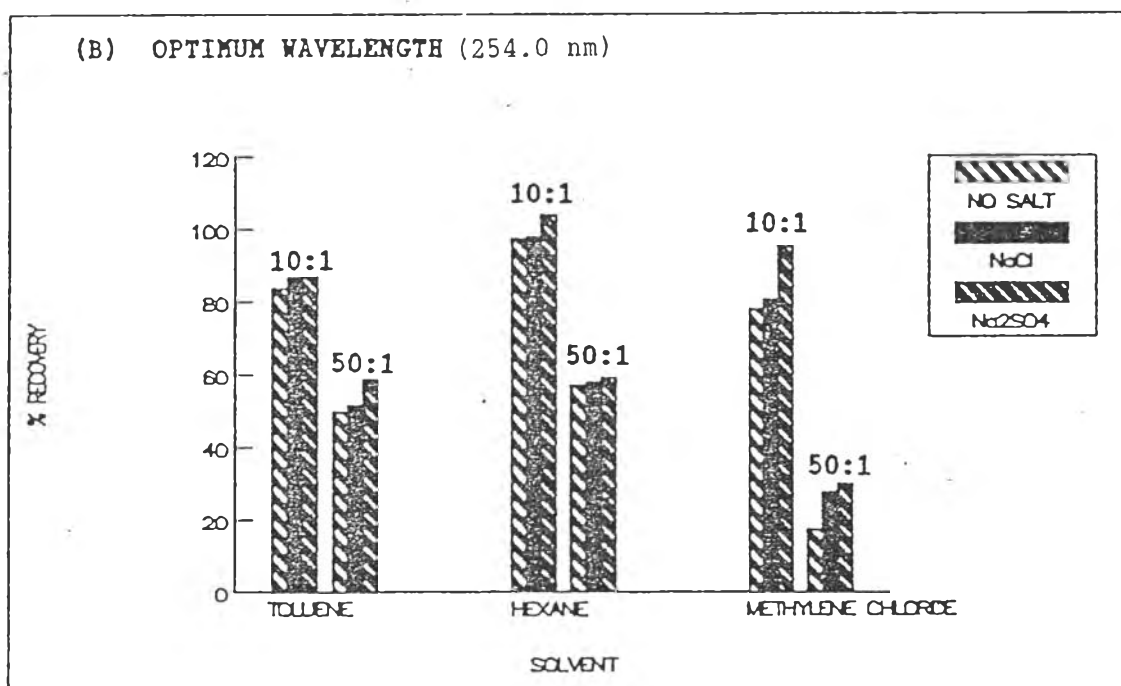
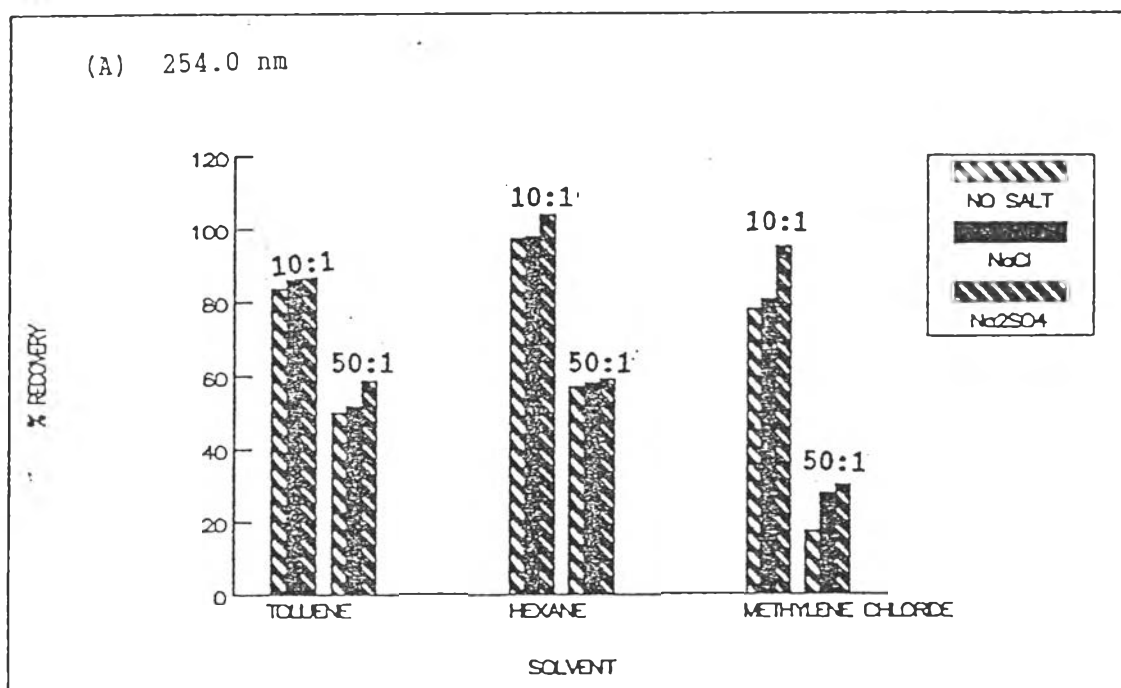


Figure 4.14 The results of the effect of extracting solvents on % recovery of 50.00 ppb anthracene solution

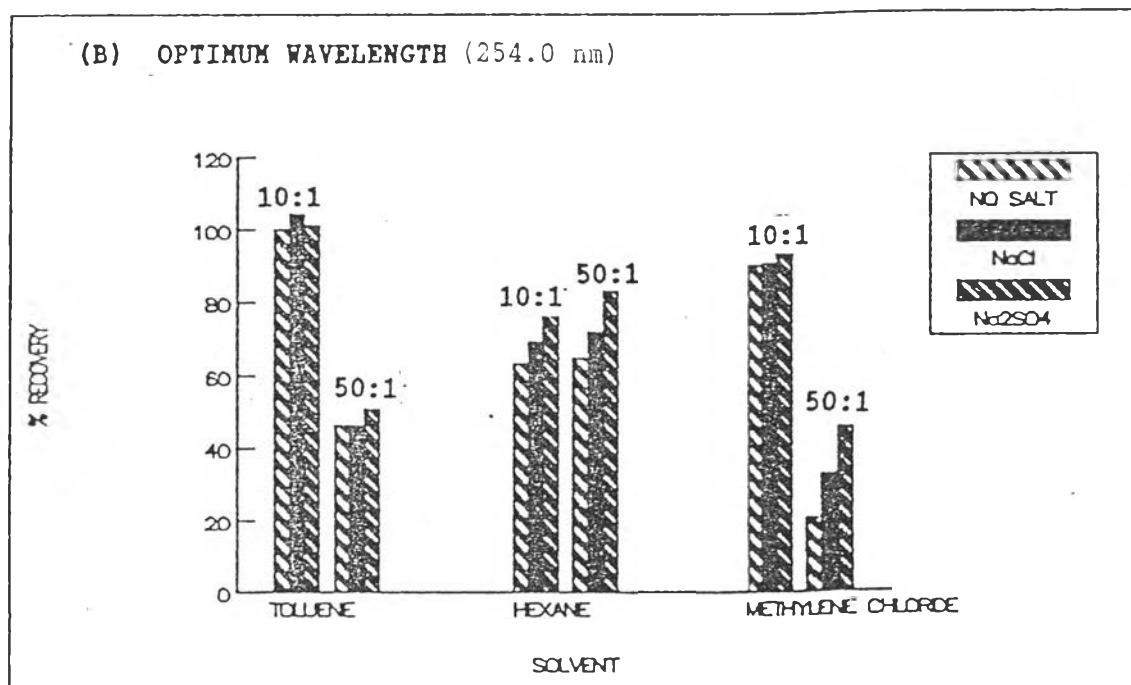
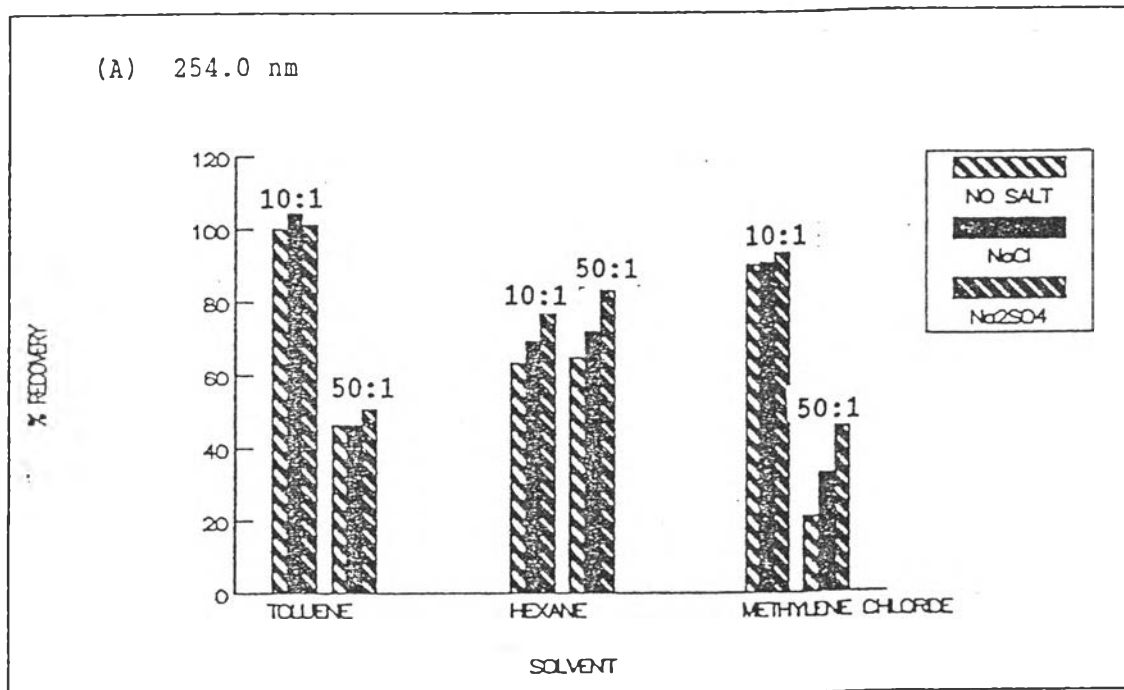


Figure 4.15 The results of the effect of extracting solvents on % recovery of 1.00 ppm anthracene solution

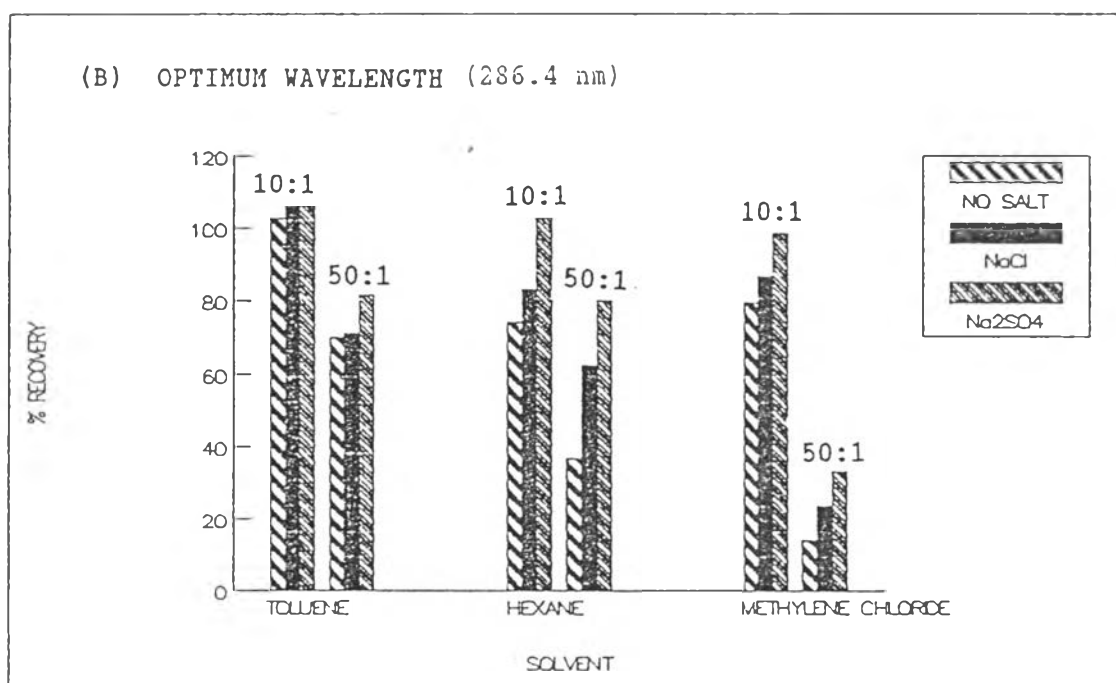
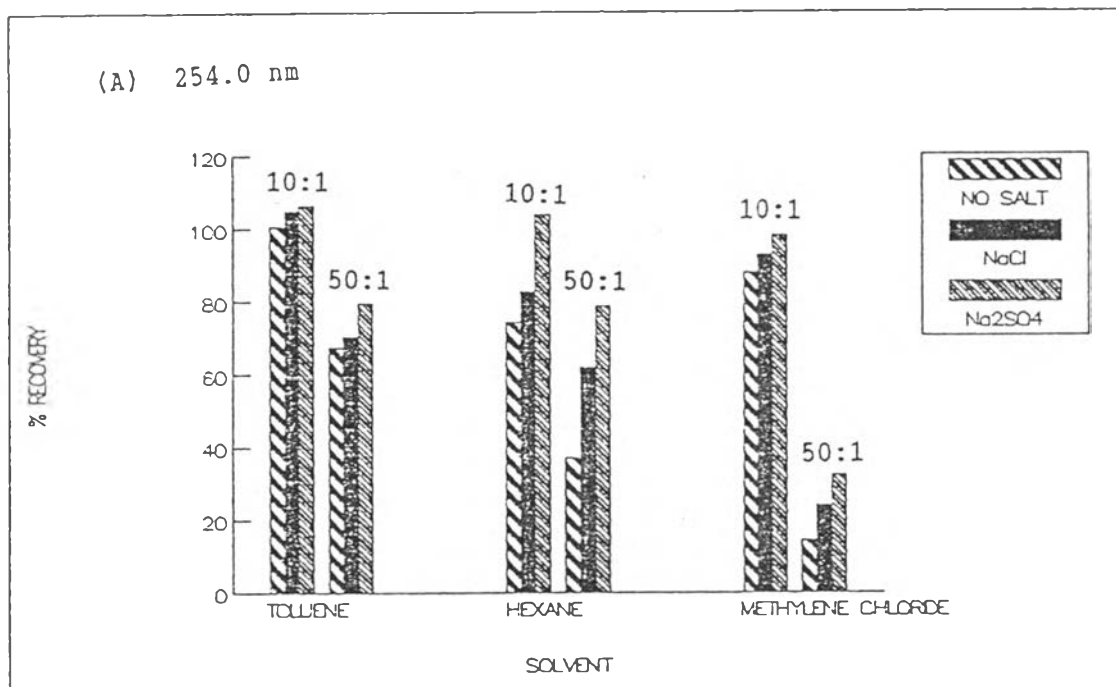


Figure 4.16 The results of the effect of extracting solvents on % recovery of 50.00 ppb fluoranthene solution

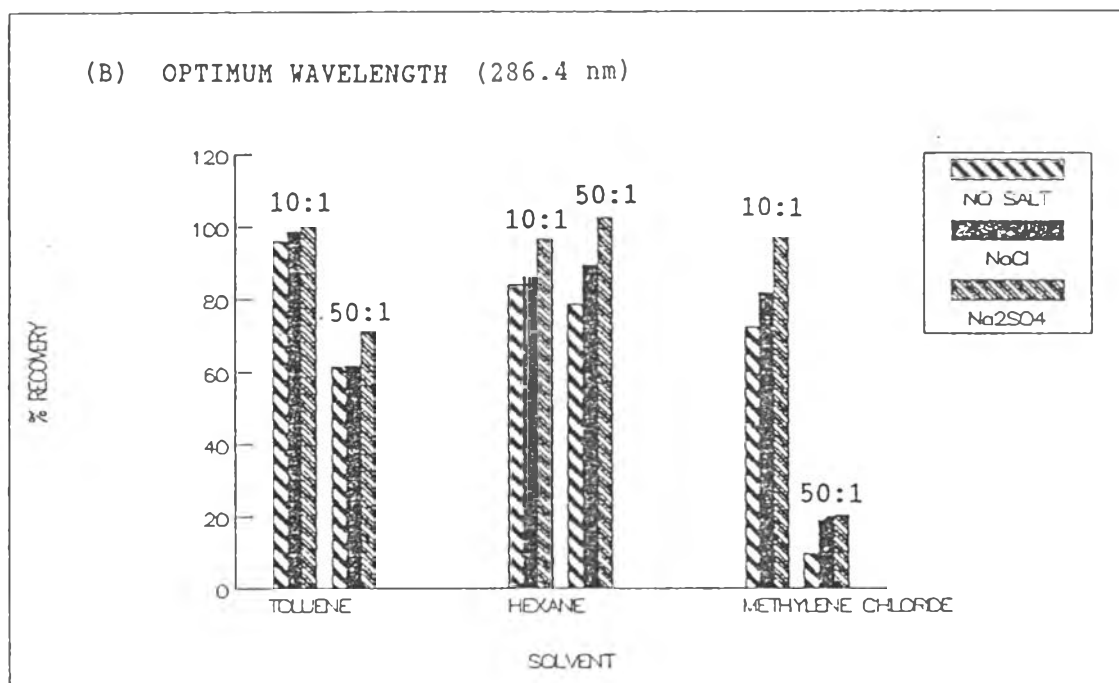
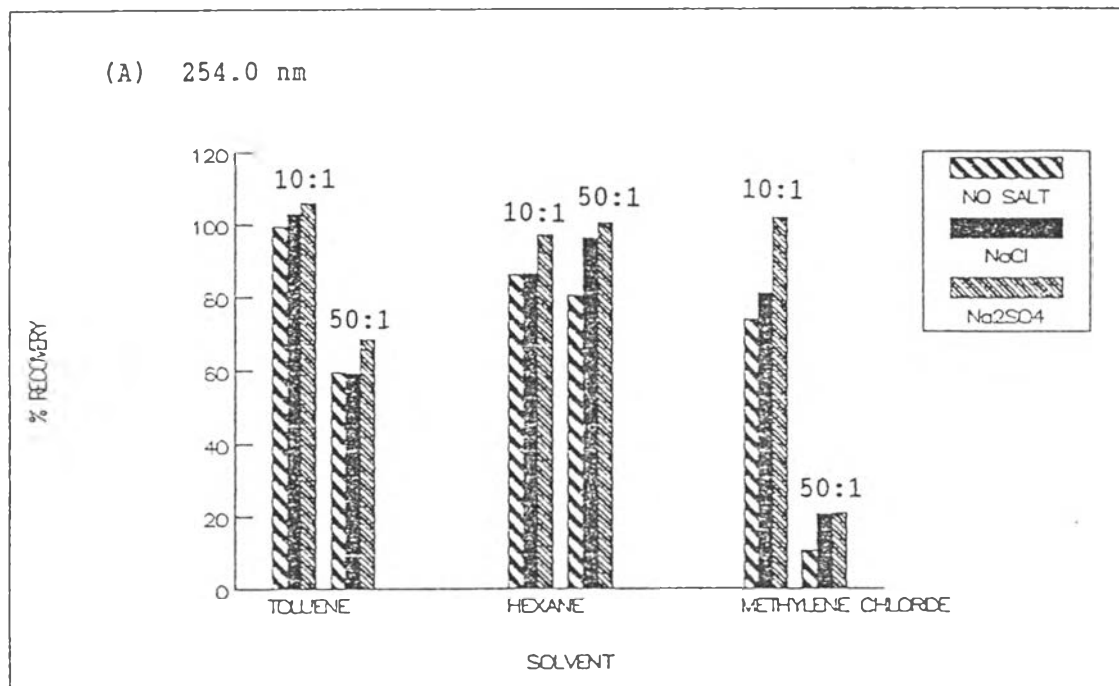


Figure 4.17 The results of the effect of extracting solvents on % recovery of 1.00 ppm fluoranthene solution

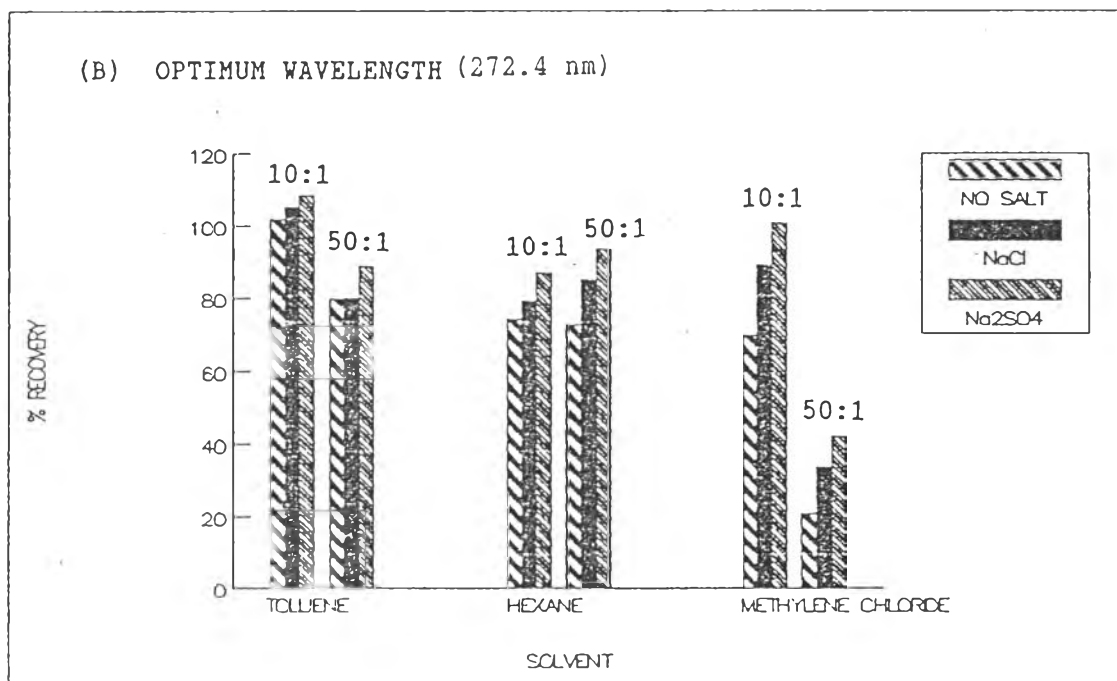
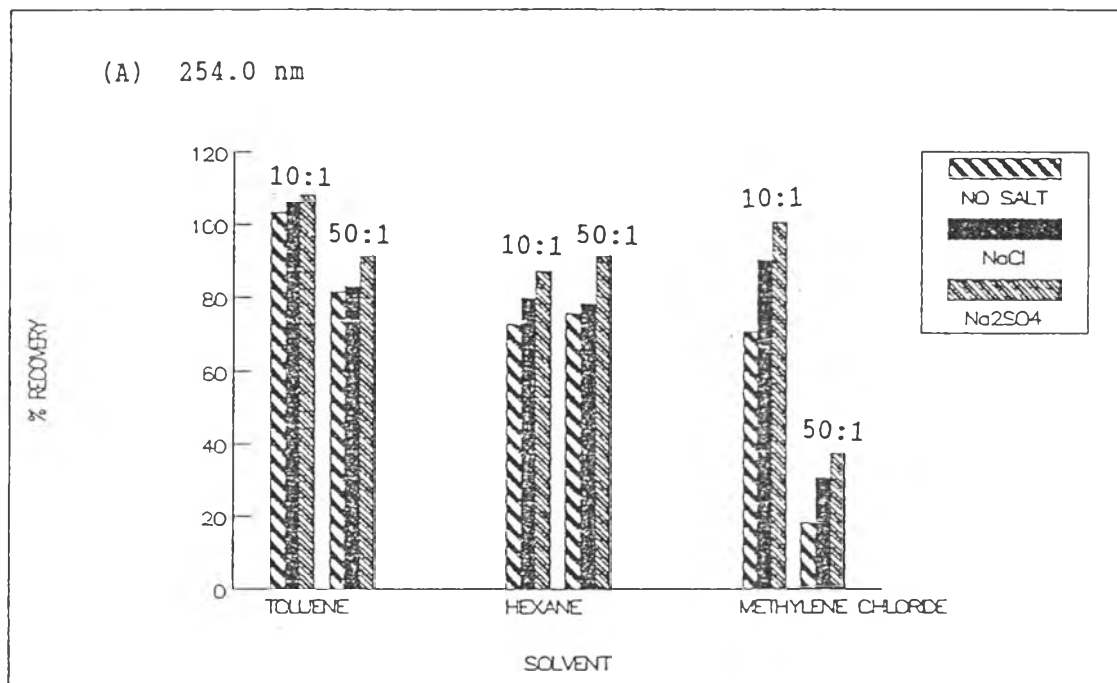


Figure 4.18 The results of the effect of extracting solvents on % recovery of 50.00 ppb pyrene solution

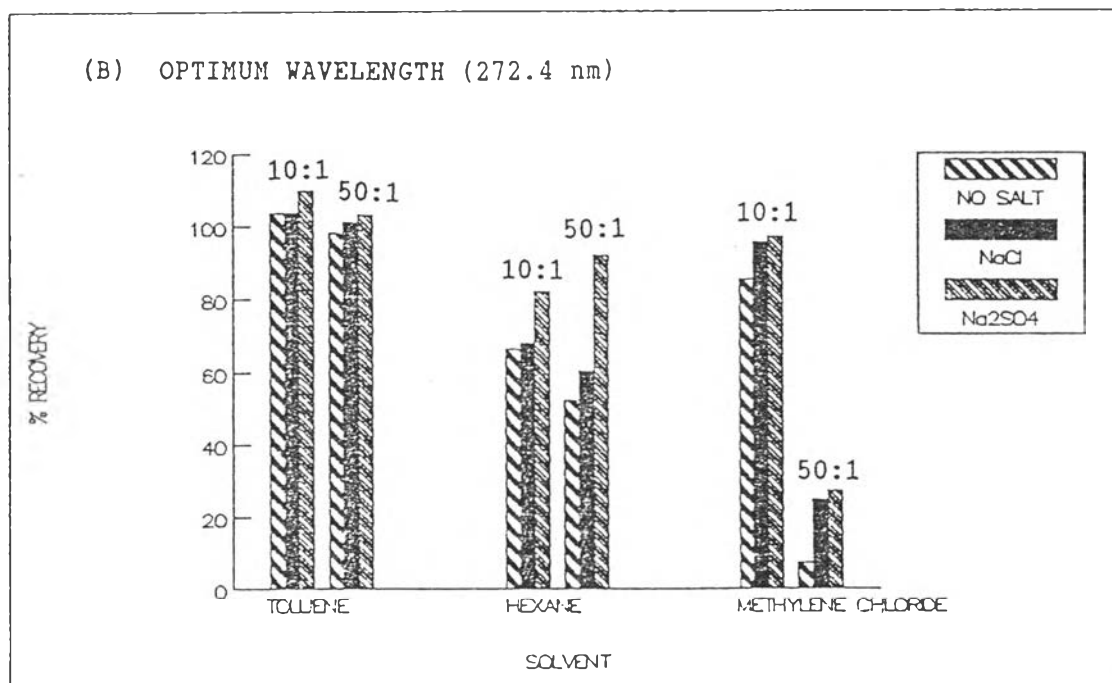
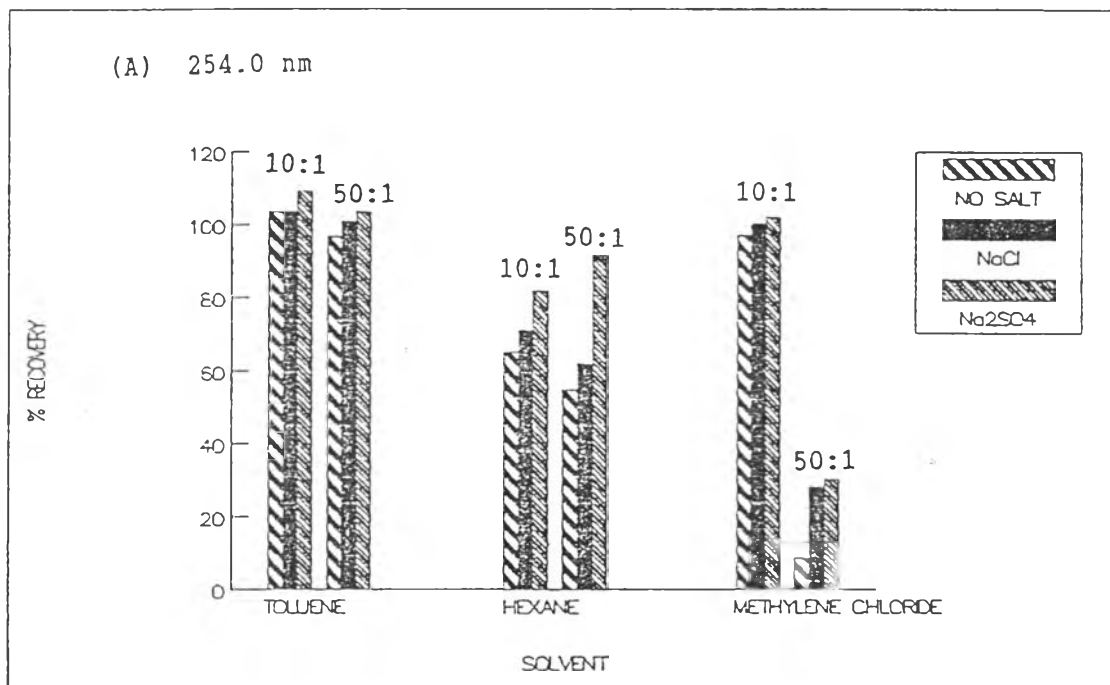


Figure 4.19 The results of the effect of extracting solvents on % recovery of 1.00 ppm pyrene solution

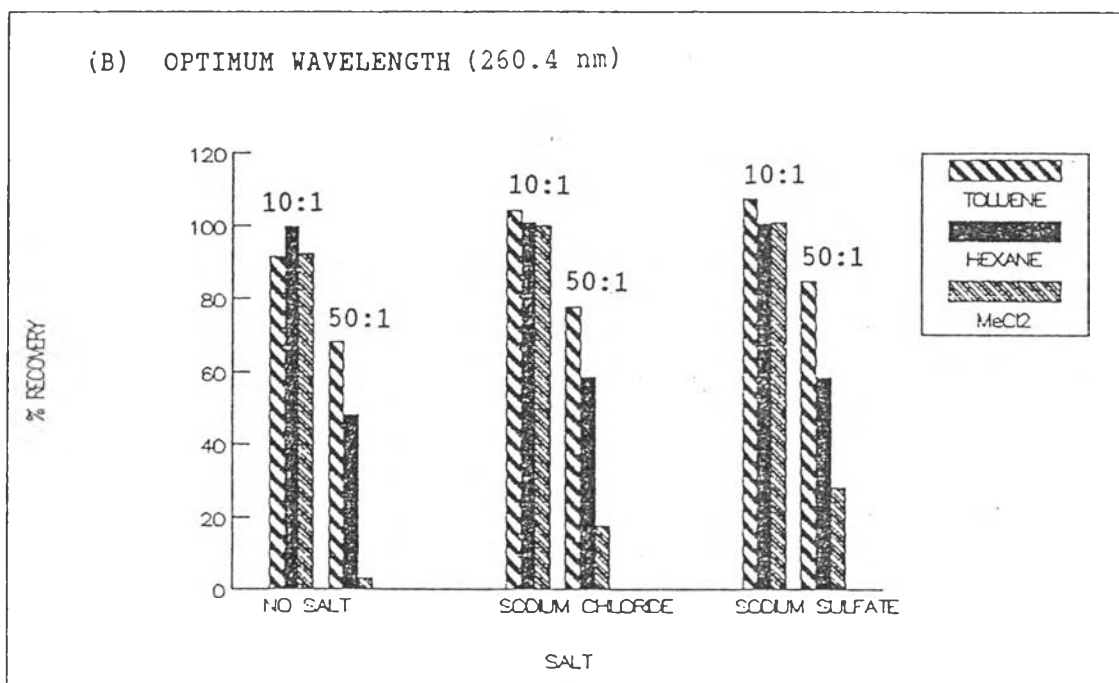
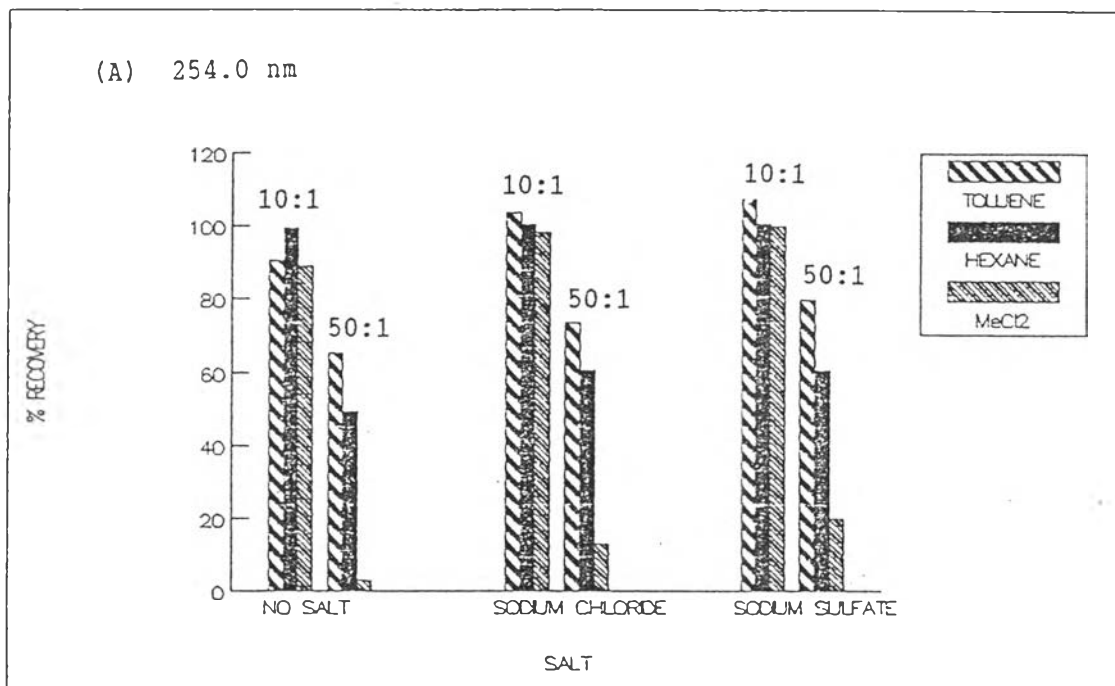


Figure 4.20 The results of the salting out effect on % recovery of 50.00 ppb fluorene solution

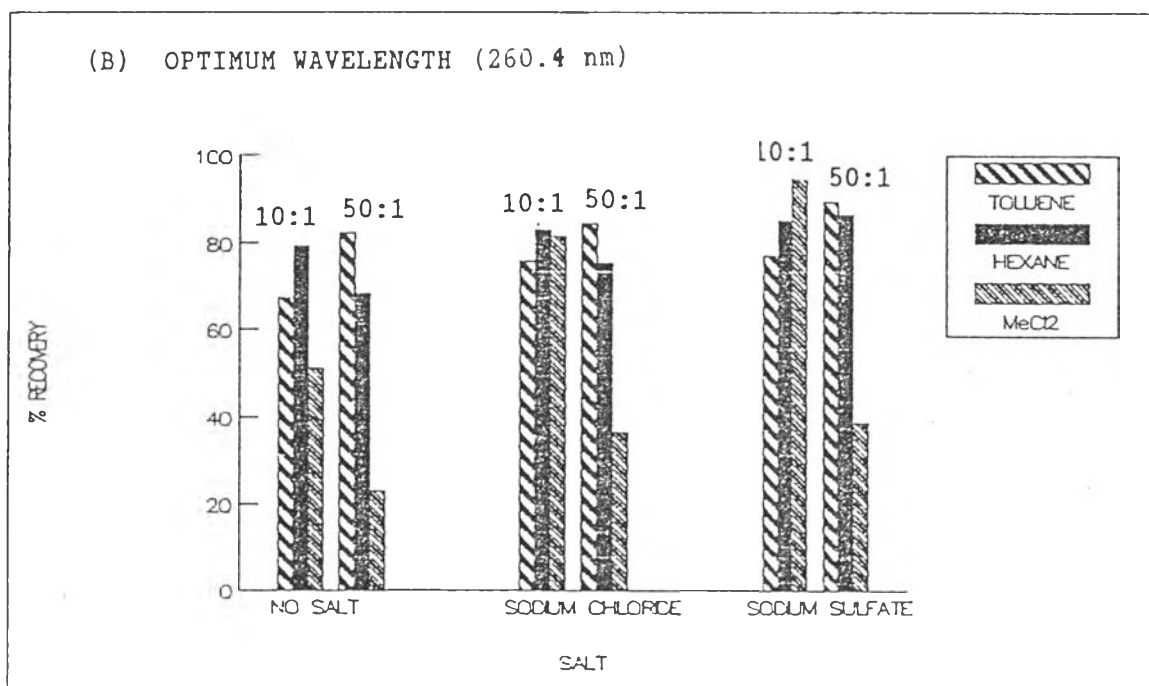
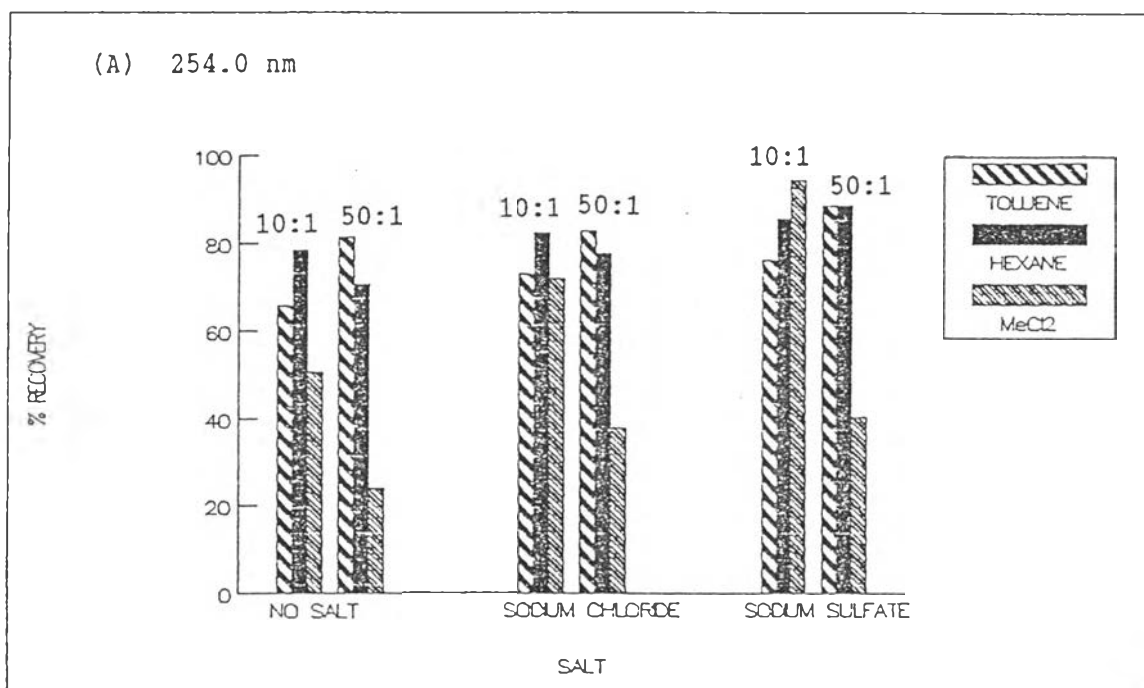


Figure 4.21 The results of the salting out effect on % recovery of 1.00 ppm fluorene solution

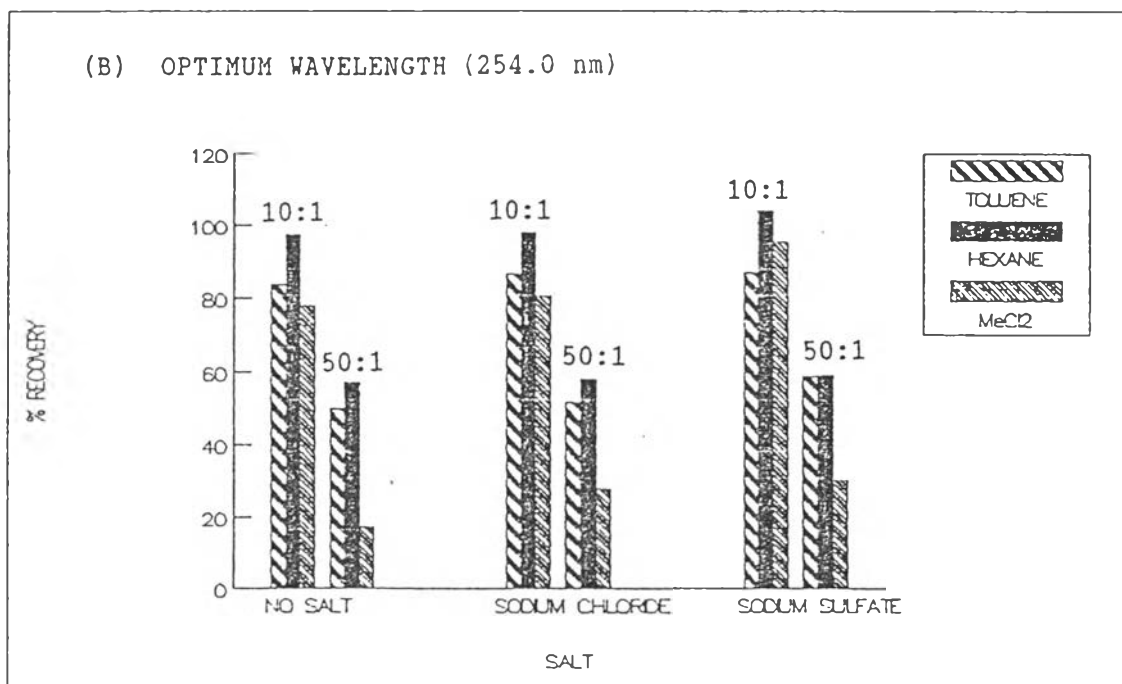
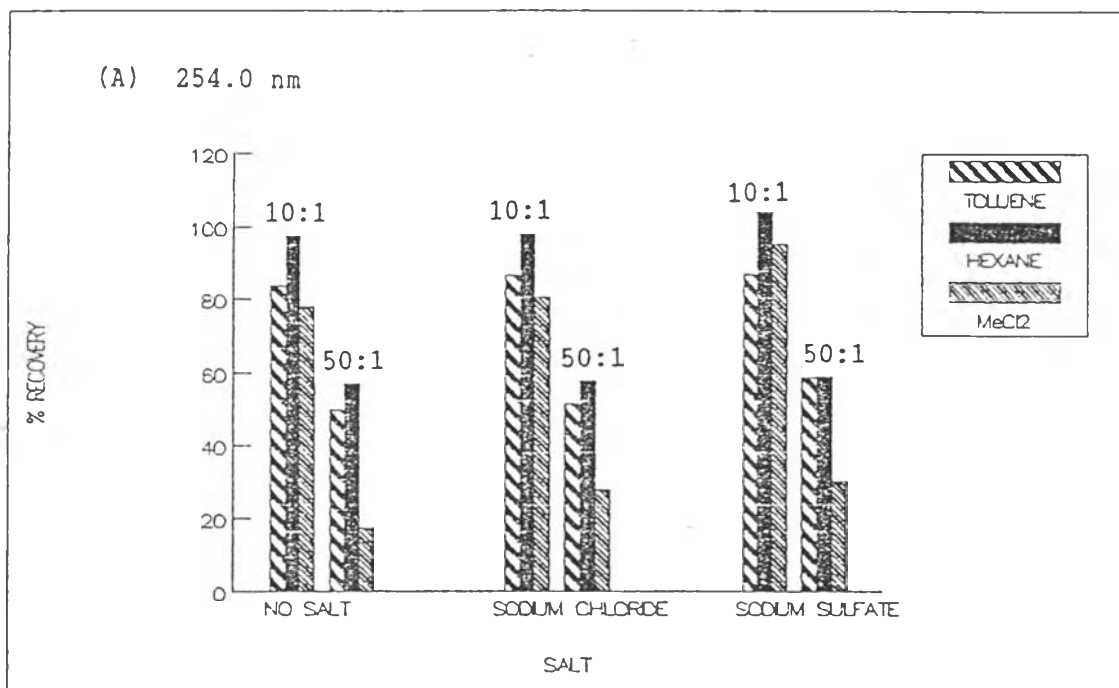


Figure 4.22 The results of the salting out effect on % recovery of 50.00 ppb anthracene solution

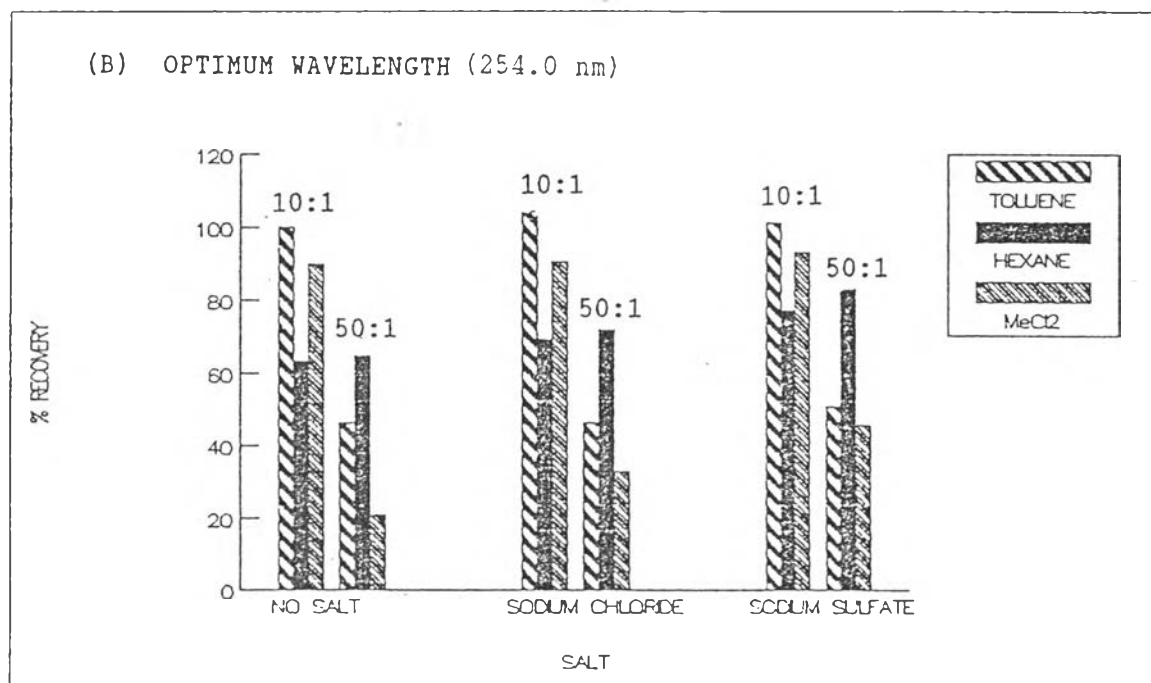
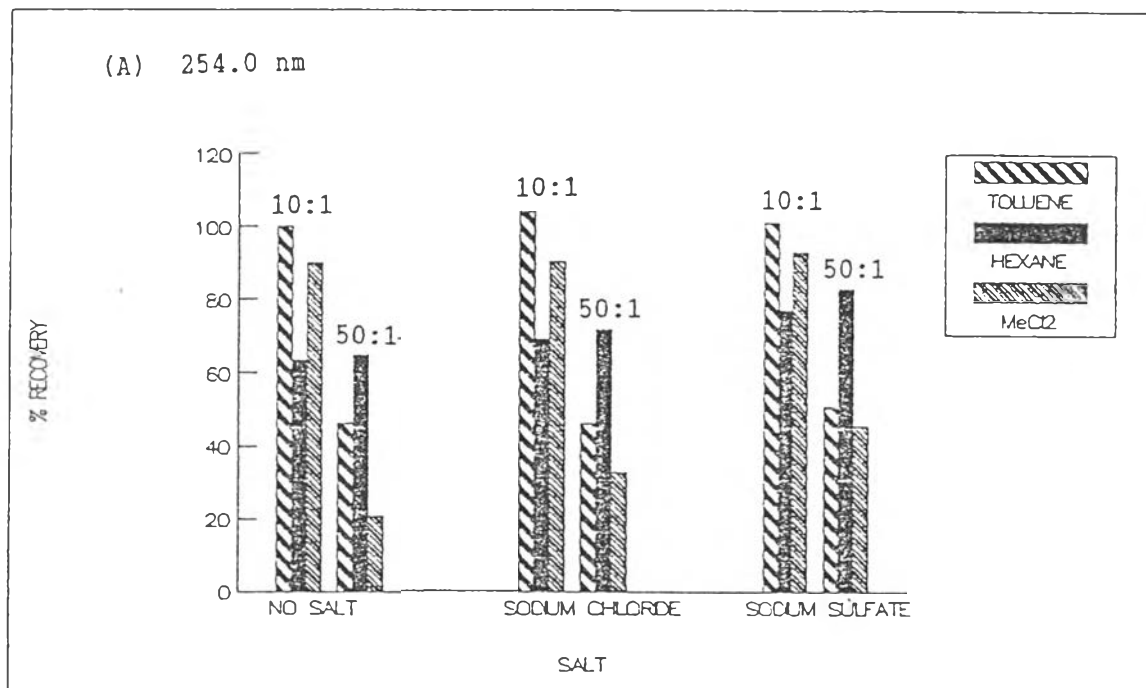


Figure 4.23 The results of the salting out effect on % recovery of 1.00 ppm anthracene solution

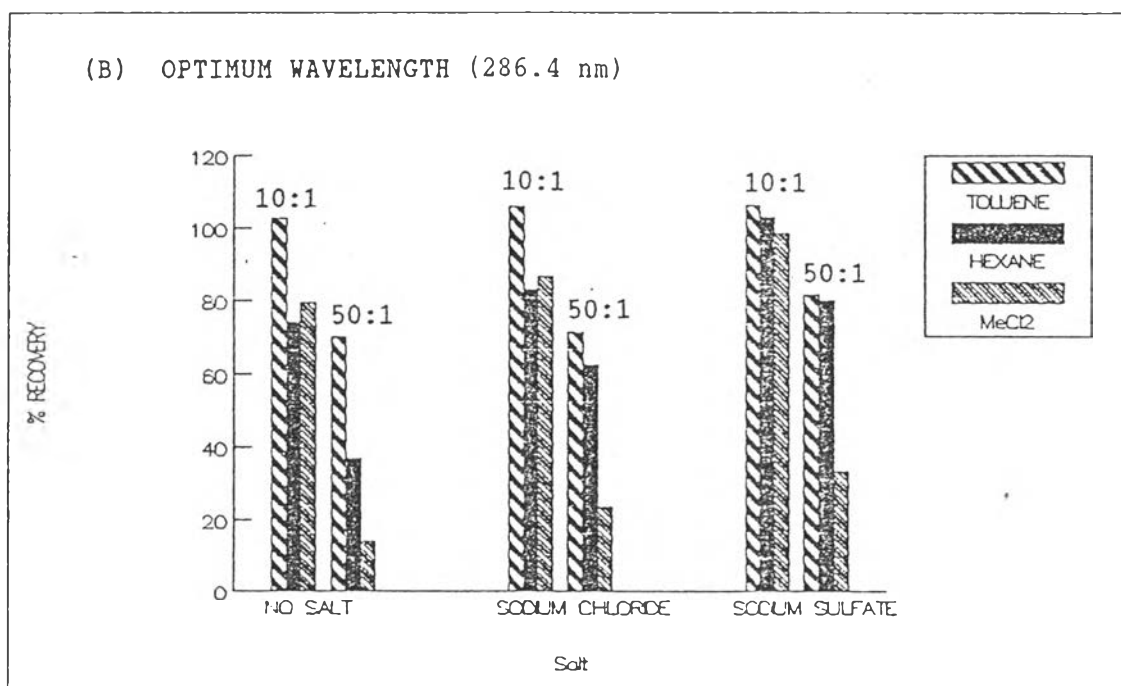
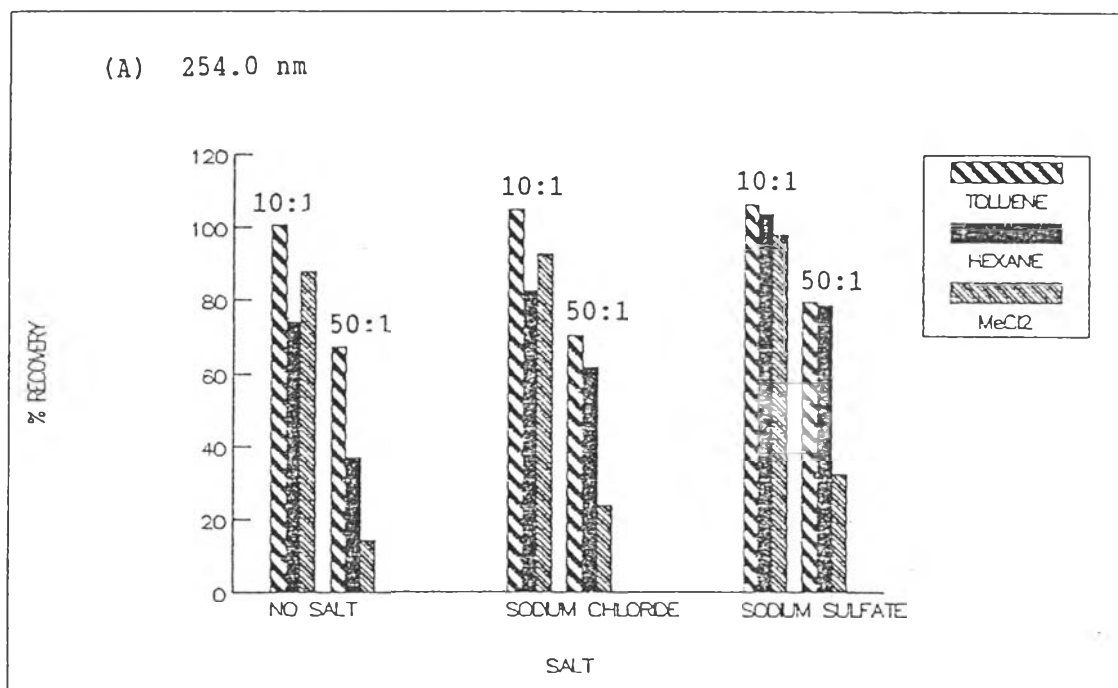


Figure 4.24 The results of the salting out effect on % recovery of 50.00 ppb fluoranthene solution

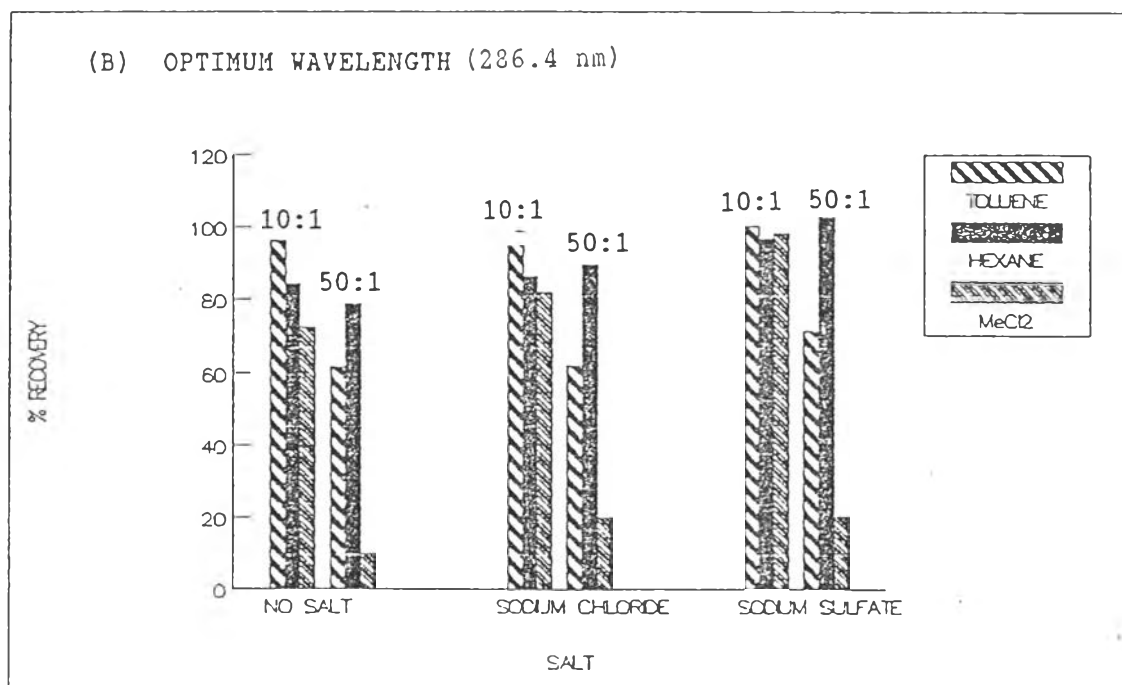
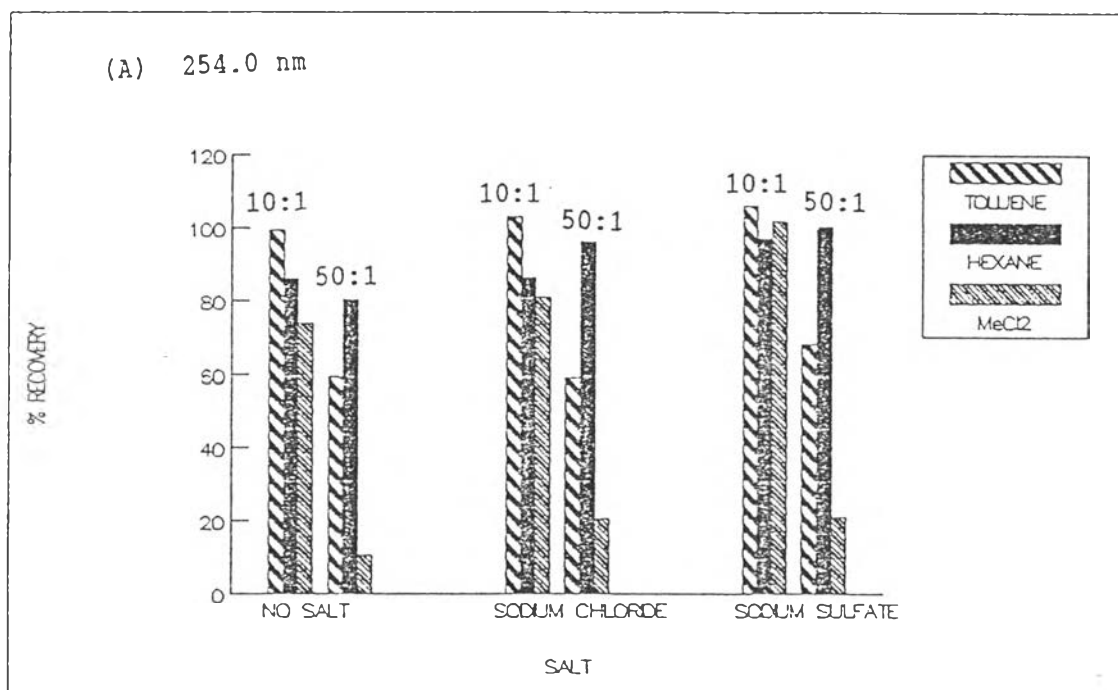


Figure 4.25 The results of the salting out effect on % recovery of 1.00 ppm fluoranthene solution

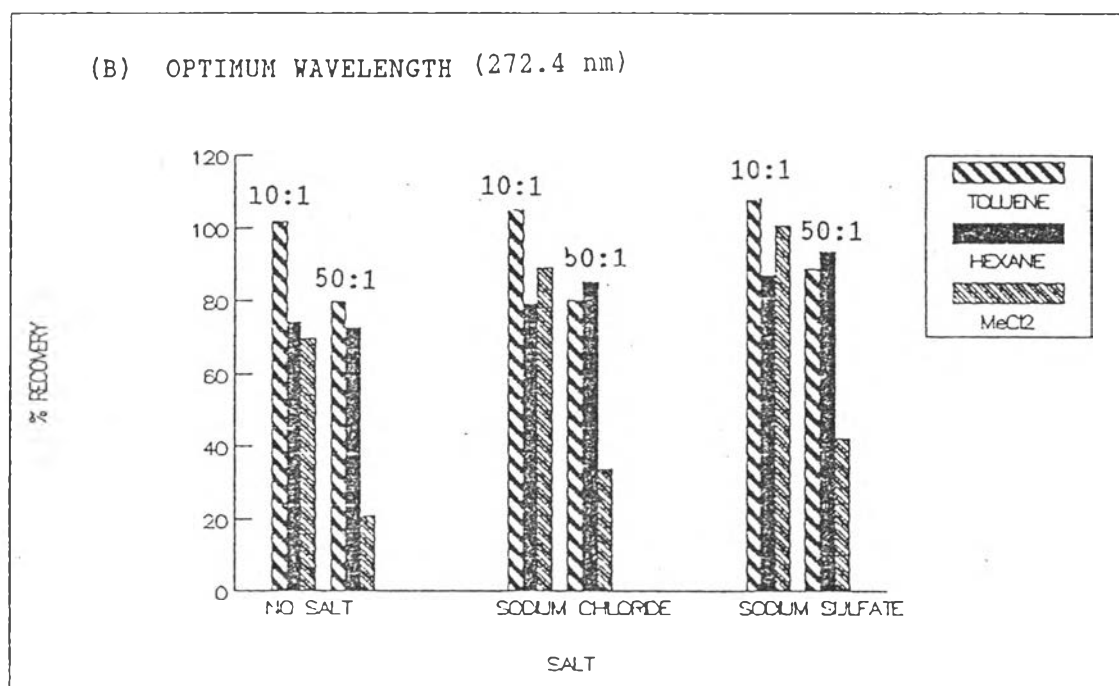
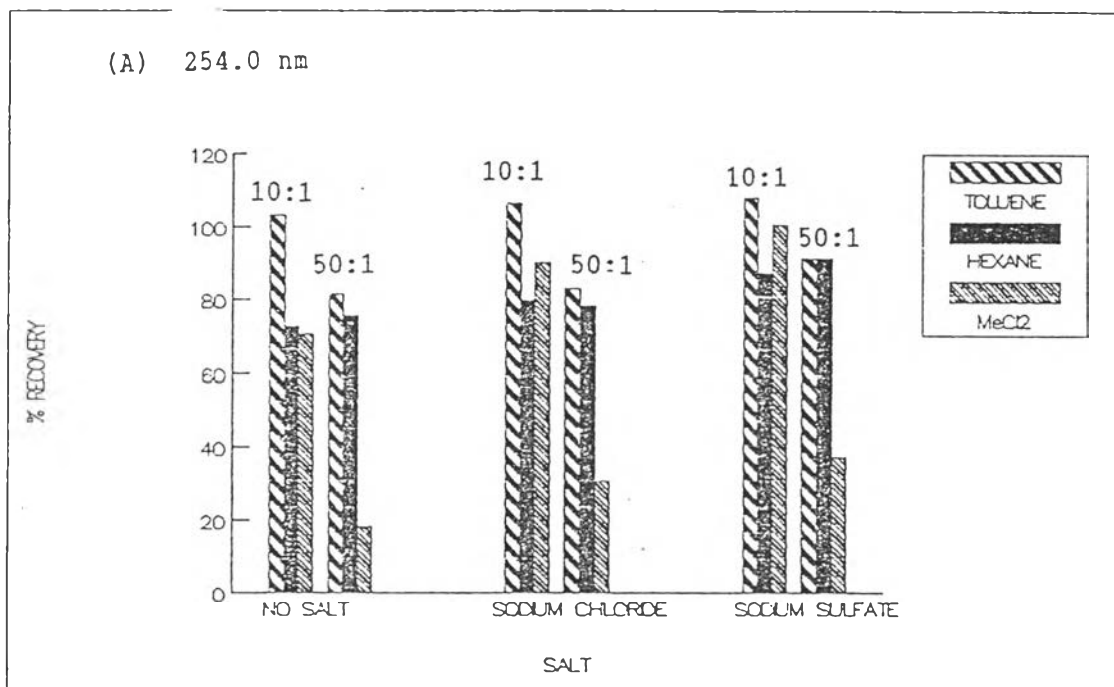


Figure 4.26 The results of the salting out effect on % recovery of 50.00 ppb pyrene solution

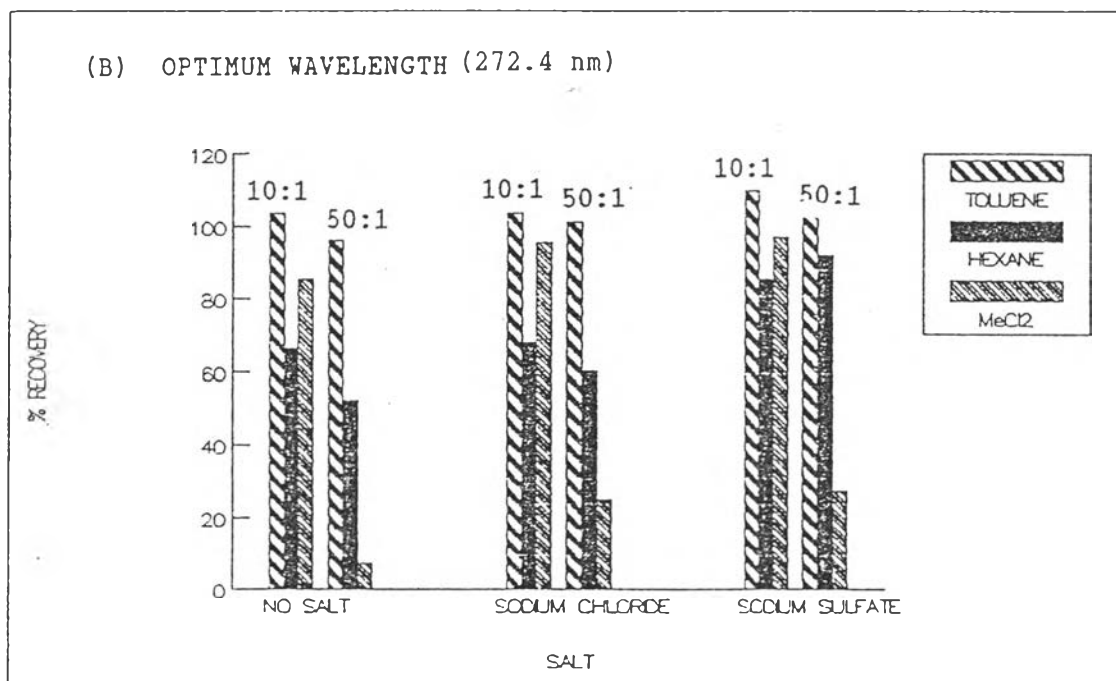
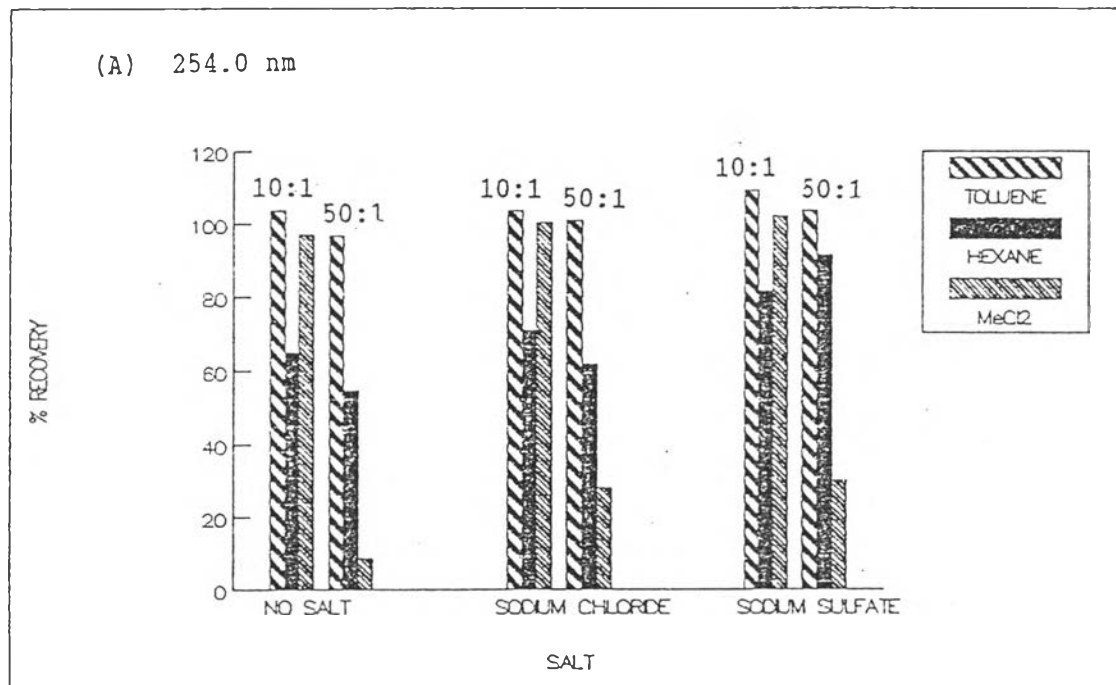


Figure 4.27 The results of the salting out effect on % recovery of 1.00 ppm pyrene solution

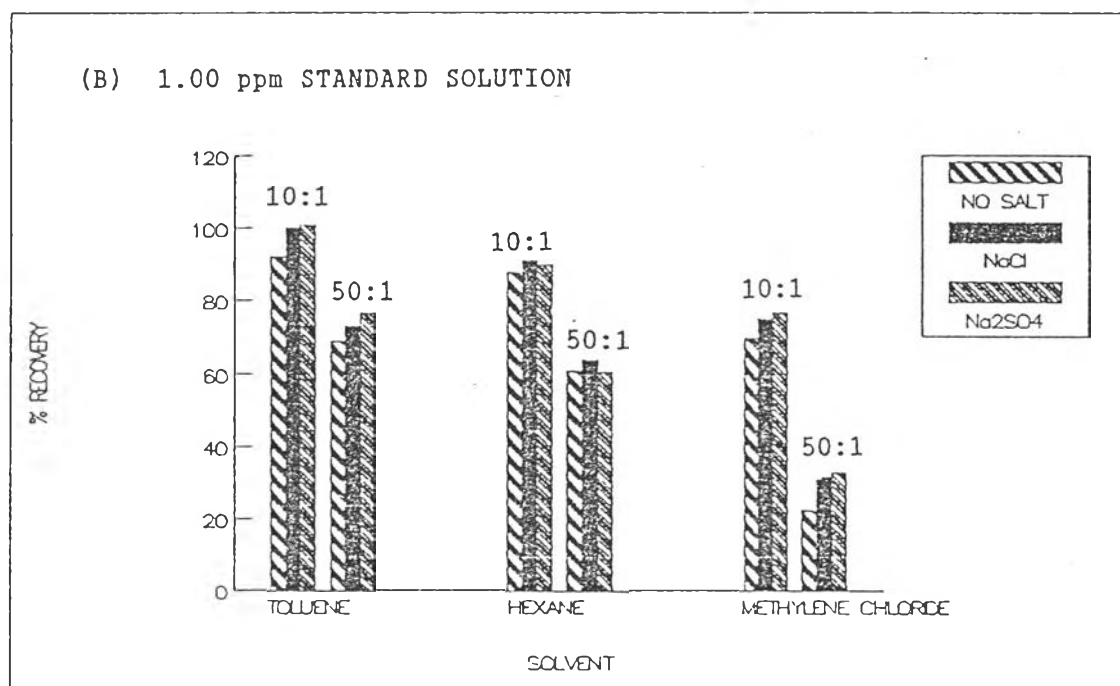
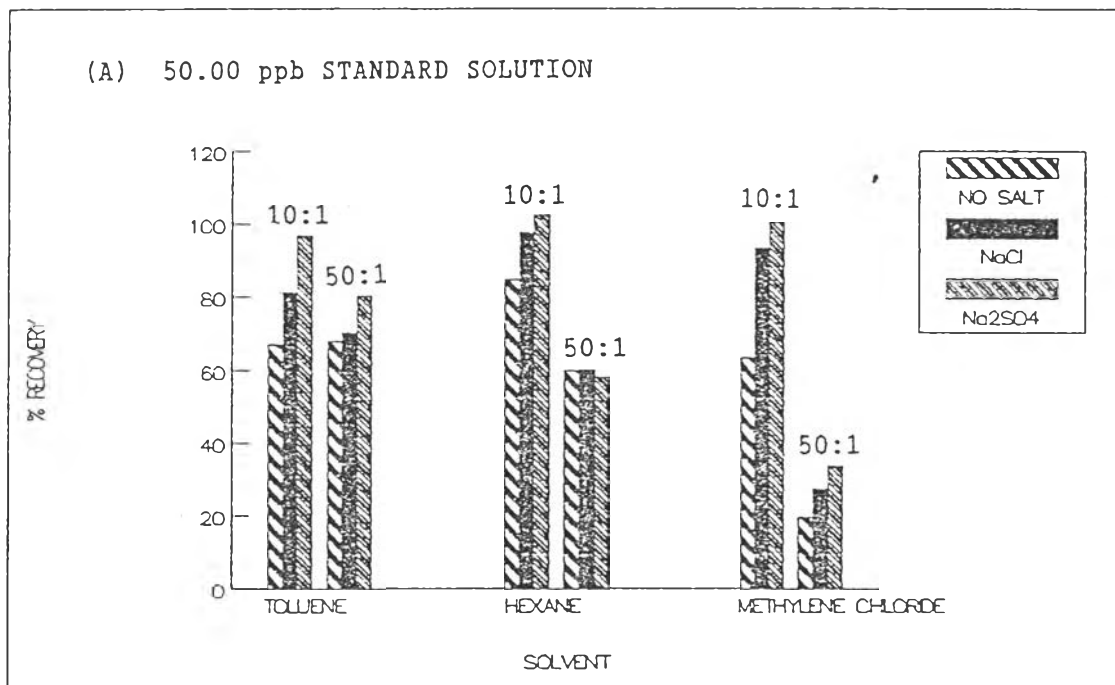


Figure 4.28 The microextraction of fluorene in mixture

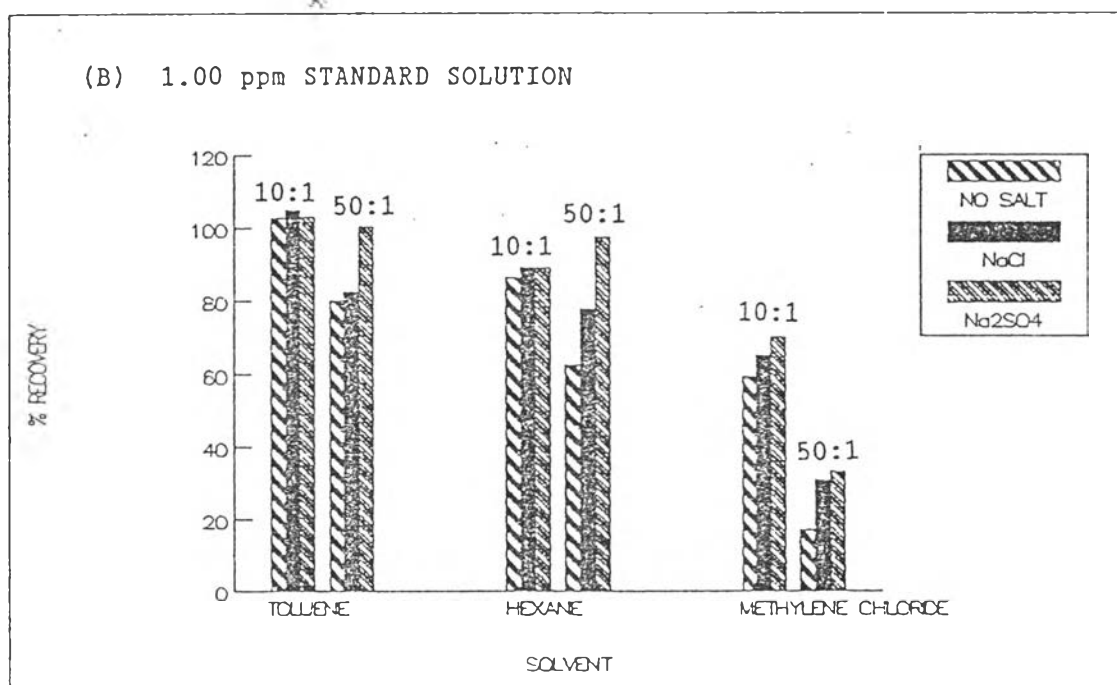
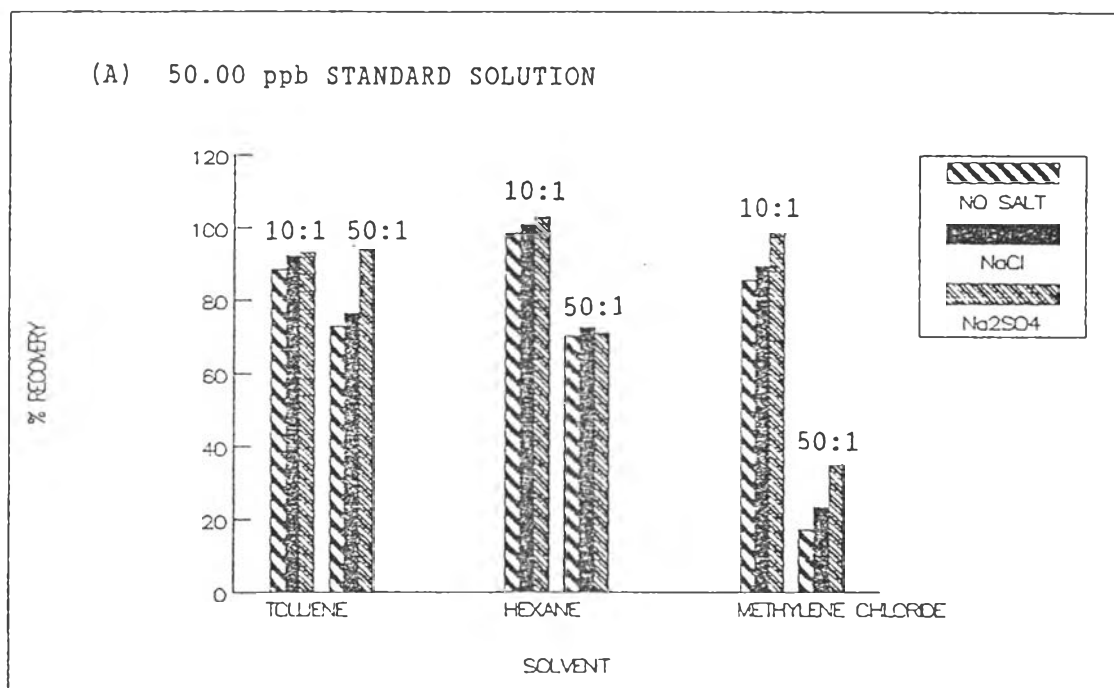


Figure 4.29 The microextraction of anthracene in mixture

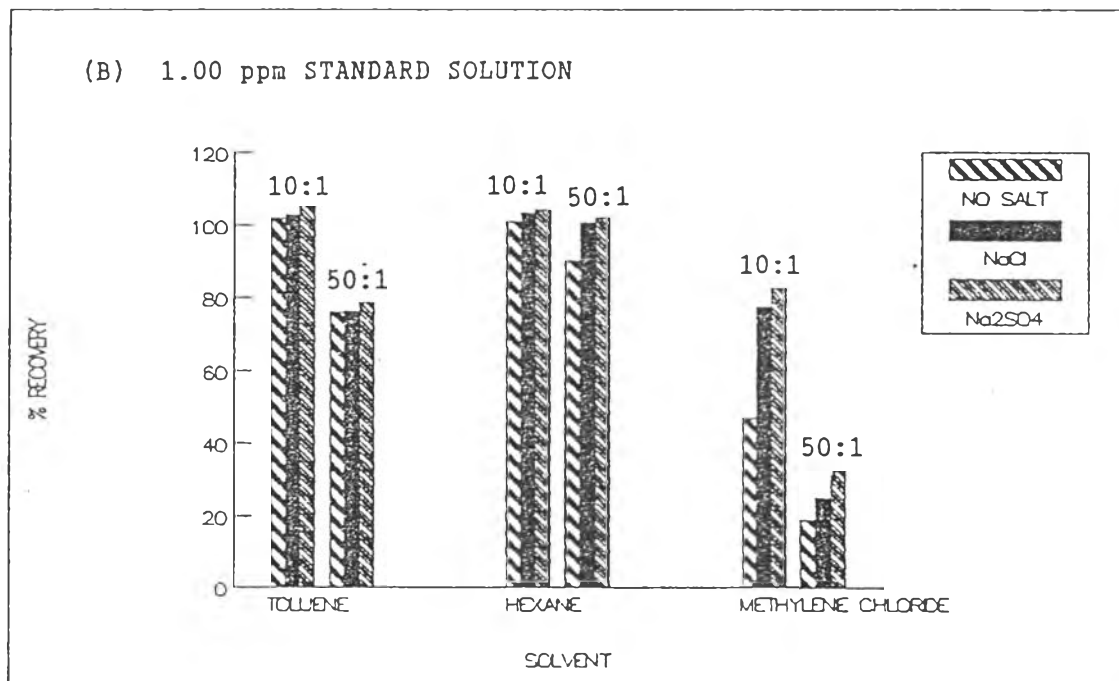
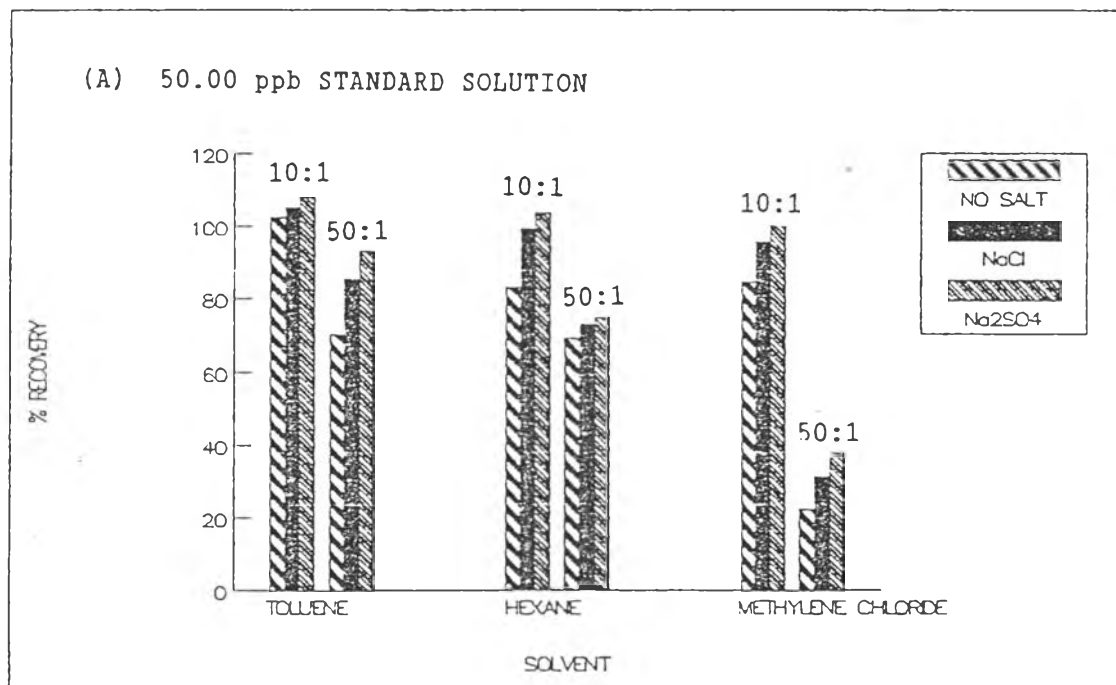


Figure 4.30 The microextraction of fluoranthene in mixture

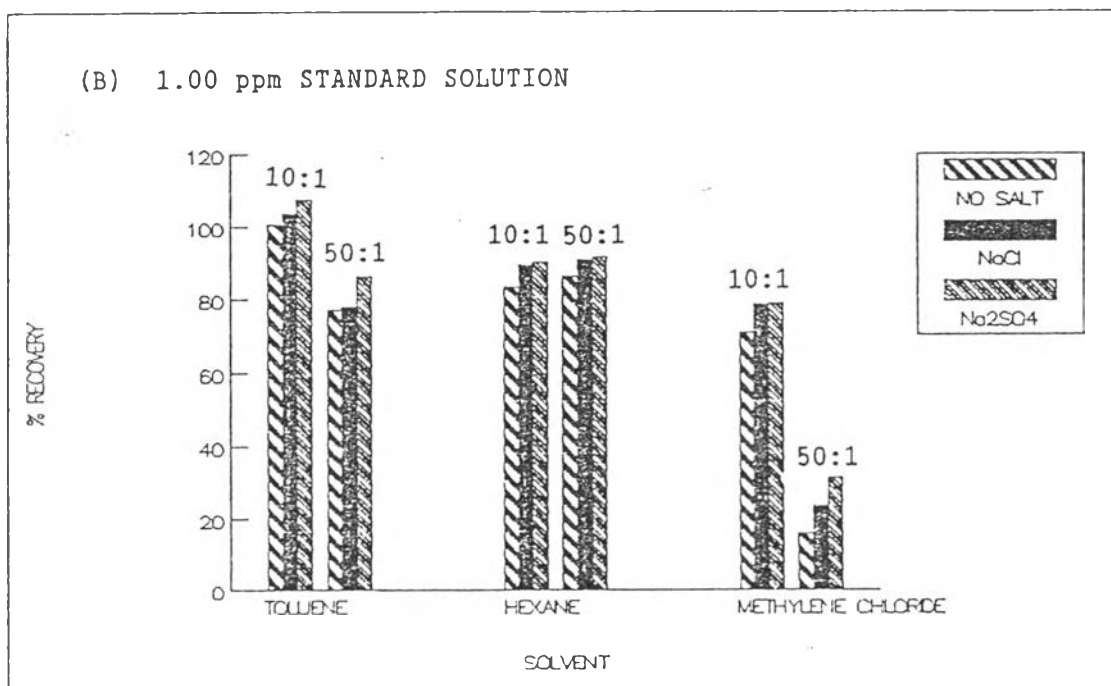
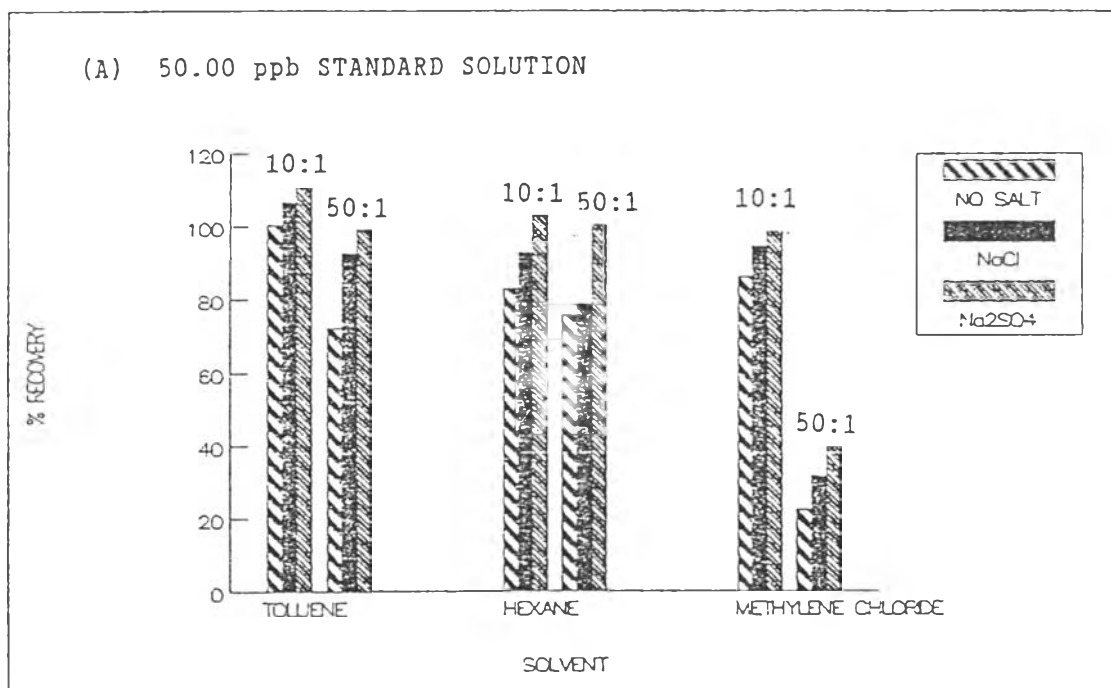


Figure 4.31 The microextraction of pyrene in mixture

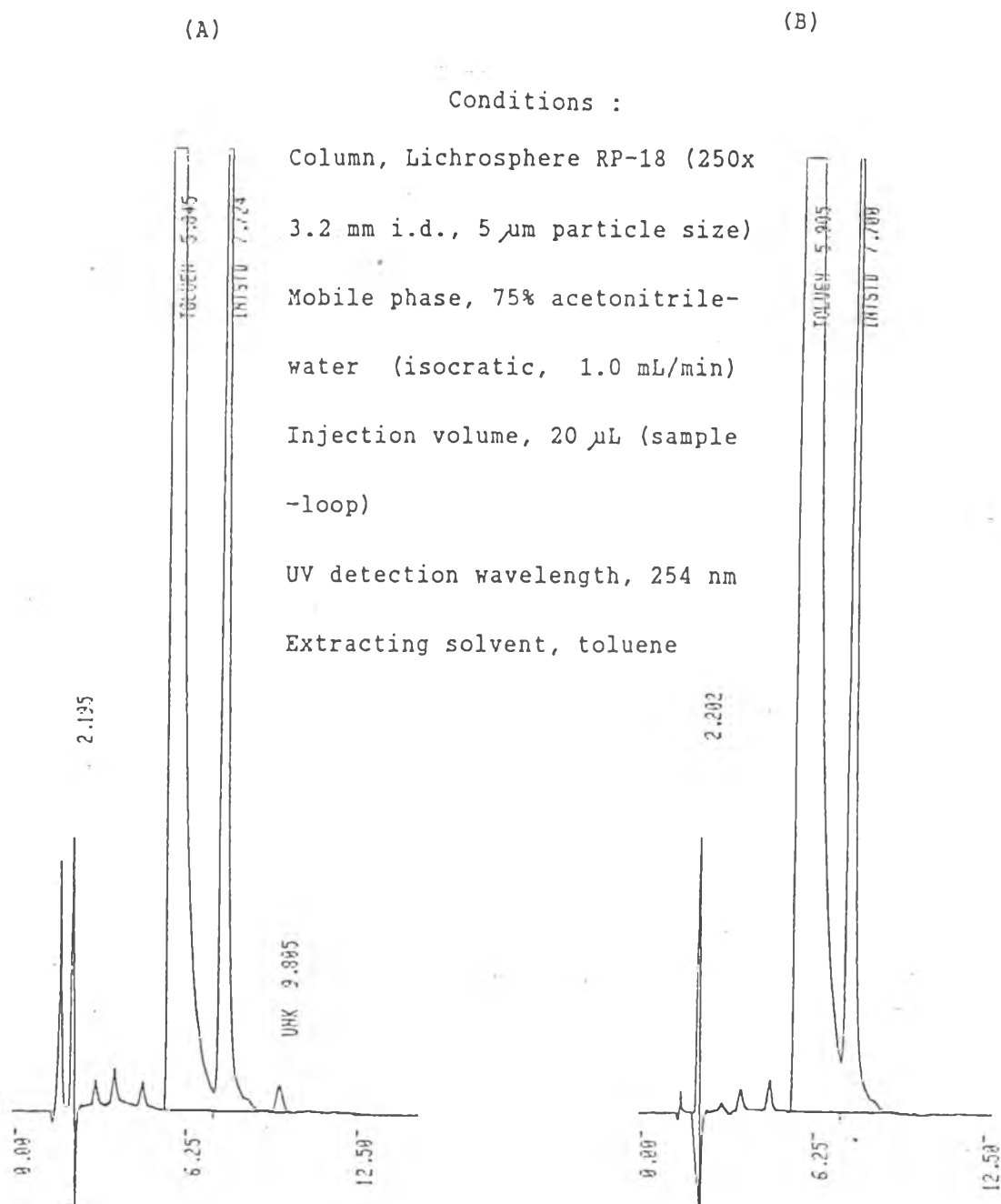


Figure 4.32 Liquid chromatograms of microextractions of a real sample collected from a pool in front of Chulalongkorn University (A) and a blank solution (B)

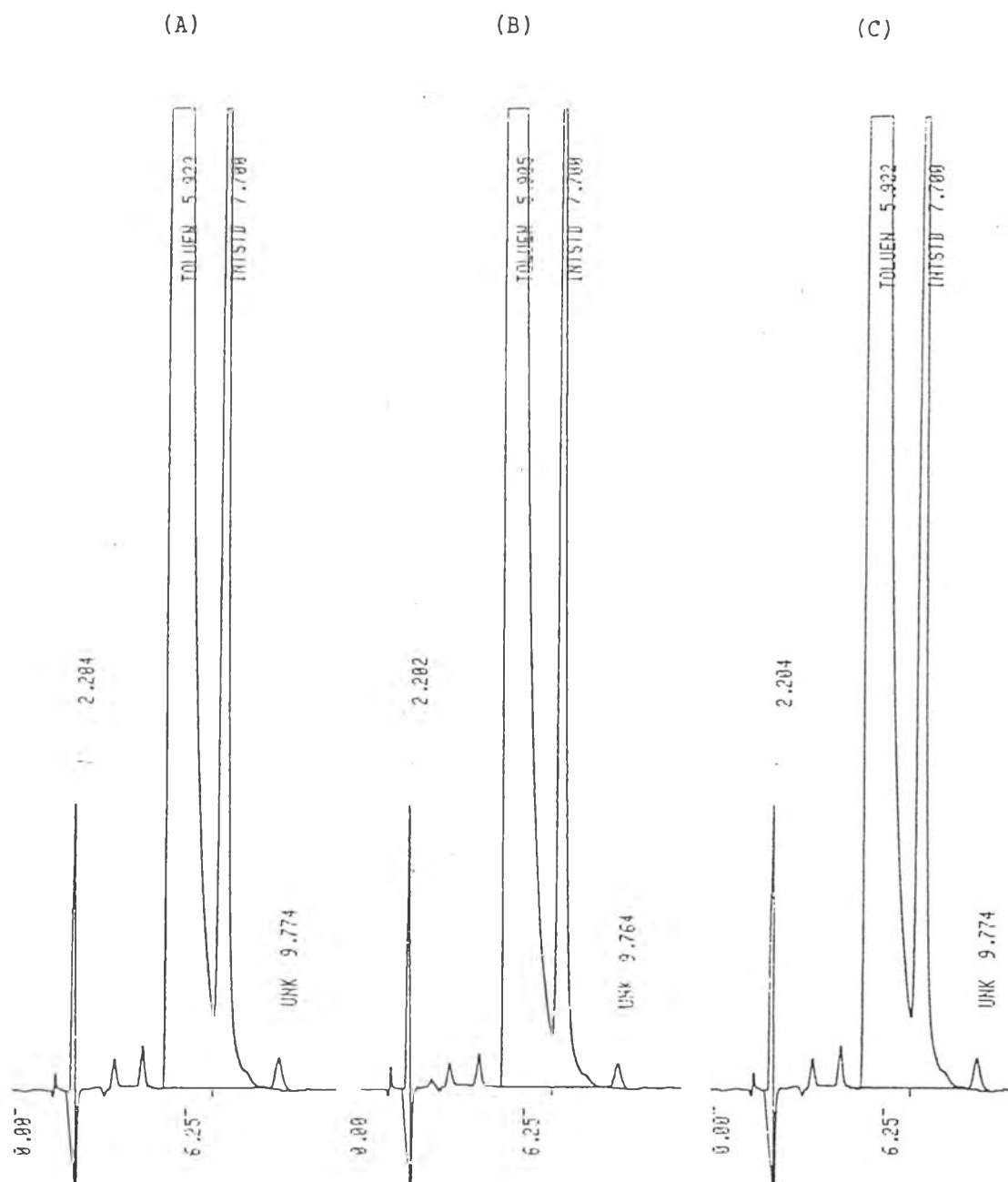


Figure 4.33 Liquid chromatograms of microextractions of real samples collected from intake of Samsean Station (A) , at 200 m from intake (Soi Satsana) (B) and at 500 m from intake (Soi Aree) (C). The conditions are shown as in figure 4.32

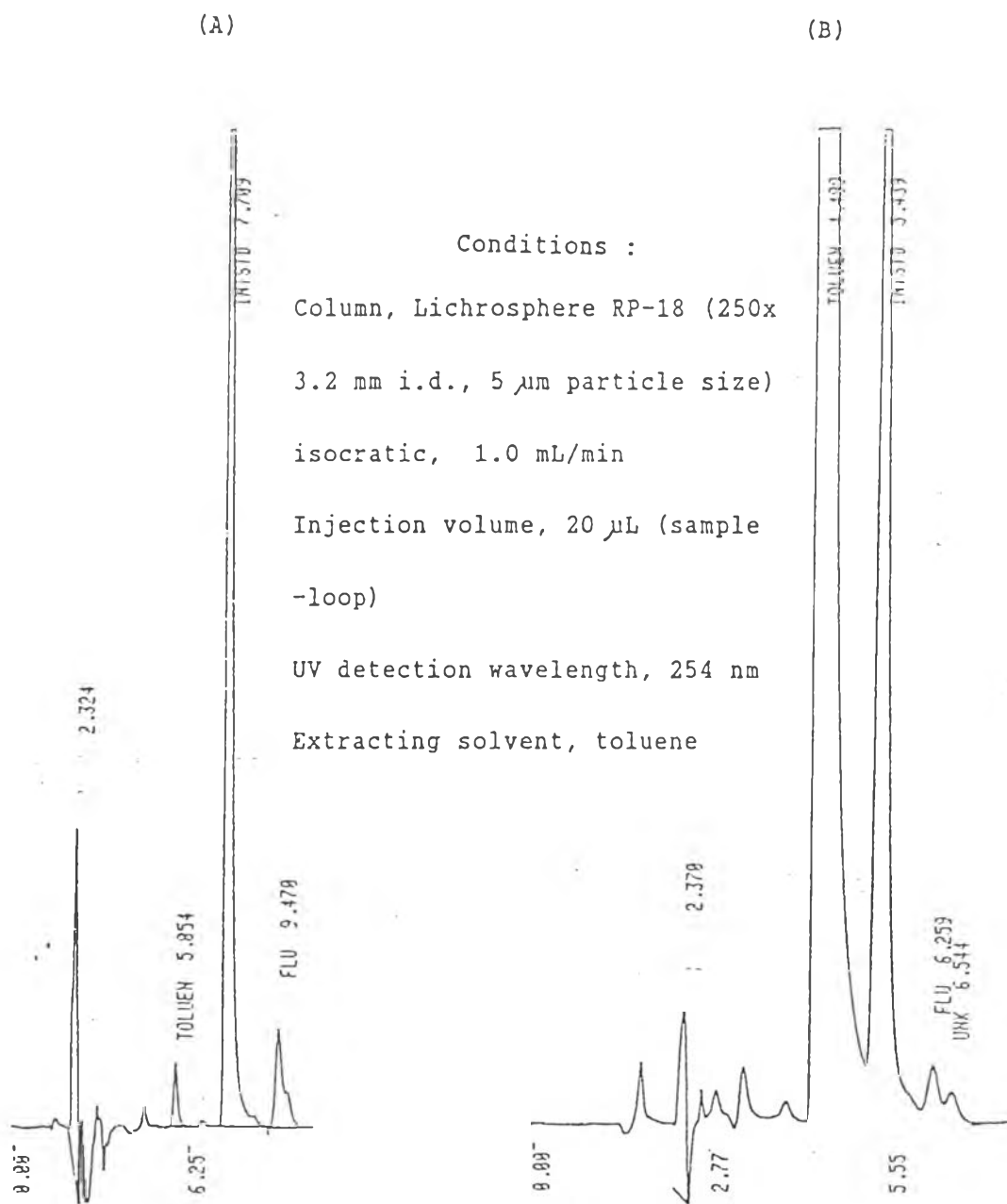


Figure 4.34 Liquid chromatograms of microextractions of a real sample spiked with fluorene for qualification analysis used different mobile phases, 75% (A) and 85% (B) acetonitrile-water