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APPENDIX

APPENDIX A

HPLC CONDITIONS USED FOR ANALYSIS

Substance	Flow rate (ml/min.)	Wave length (nm)	Detector	Column	Mobile Phase
CPC	1.2	265	UV	C 18, reverse phase	85/15 HPLC grade methanol/triple distilled and double filtered water, and 1.0 M $NaClO_4$
SDS	1.2		RI	C 18, reverse phase	85/15 HPLC grade methanol/triple distilled and double filtered water
DADS	1.2	244	UV	Altima C18 reverse phase	85/15 HPLC grade methanol/triple distilled and double filtered water

APPENDIX B

EXPERIMENTAL DATA OF PHASE BEHAVIOR STUDY

Table B-1 Experimental Equilibrium Phase Behavior with SDS concentration 1 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.5	0	0.5
0.45	0.49	0	0.51
0.90	0.41	0.47	0.12
1.34	0.40	0.46	0.15
1.78	0.39	0.46	0.15
2.2	0.38	0.46	0.16

Table B-2 Experimental Equilibrium Phase Behavior with SDS concentration 2.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.5	0	0.5
0.45	0.49	0	0.51
0.67	0.46	0.42	0.12
0.90	0.44	0.41	0.15
1.45	0.41	0.33	0.26
1.78	0.32	0.25	0.44

Table B-3 Experimental Equilibrium Phase Behavior with SDS concentration 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.5	0.00	0.5
0.45	0.50	0.00	0.49
0.67	0.44	0.47	0.08
0.89	0.41	0.47	0.11
1.34	0.30	0.55	0.15

Table B-4 Experimental Equilibrium Phase Behavior with CPC concentration 0.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.50	0.00	0.5
0.23	0.50	0.00	0.50
0.70	0.44	0.44	0.12
1.10	0.43	0.42	0.15
1.60	0.41	0.34	0.25

Table B-5 Experimental Equilibrium Phase Behavior with CPC concentration 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.50	0.00	0.5
0.45	0.50	0.00	0.50
0.90	0.40	0.46	0.15
1.79	0.35	0.49	0.16
2.23	0.28	0.54	0.18

Table B-6 Experimental Equilibrium Phase Behavior with DADS concentration 1 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.50	0.00	0.5
0.90	0.49	0.00	0.51
2.22	0.47	0.44	0.09
3.52	0.45	0.40	0.15
9.63	0.44	0.33	0.24

Table B-7 Experimental Equilibrium Phase Behavior with DADS concentration 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.50	0.00	0.5
0.45	0.50	0.00	0.50
2.65	0.44	0.44	0.13
9.23	0.42	0.44	0.15
9.60	0.40	0.36	0.24

Table B-8 Experimental Equilibrium Phase Behavior with DADS concentration 10 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0.00	0.50	0	0.5
0.45	0.50	0	0.50
0.89	0.44	0.54	0.02
3.07	0.44	0.48	0.08
7.21	0.41	0.41	0.17
8.01	0.41	0.35	0.24

Table B-9 Experimental Equilibrium Phase Behavior of DADS and pentanol

Initial oil/water volume ratio = 1/1
Temperature = 30° C
NaCl concentration = 6 wt.%
DADS/pentanol weight ratio = 0.5

NaCl (wt.%)	Volume fraction of excess ODCB	Volume fraction of the middle phase	Volume fraction of excess water
0	0.50	0.00	0.5
1.3	0.46	0.04	0.50
2.7	0.44	0.06	0.49
5.4	0.43	0.11	0.46
13.6	0.37	0.22	0.41
17.5	0.27	0.35	0.38

APPENDIX C

EXPERIMENTAL DATA OF FROTH FLOTATION STUDY

Table C-1 Experimental froth flotation results using SDS concentration : 1 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	SDS removal (wt.%)	ODCB removal (wt.%)
0.00	8.84	1.58
0.60	5.71	4.66
1.00	5.92	5.10
1.30	6.14	5.19
1.60	6.83	5.27

Table C-2 Experimental froth flotation results using SDS concentration : 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	SDS removal (wt.%)	ODCB removal (wt.%)
0.00	9.90	2.96
0.60	6.30	5.69
1.00	7.90	8.92
1.30	8.10	9.13
1.60	8.42	9.26

Table C-3 Experimental froth flotation results using SDS concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.1
Temperature = 30° C

NaCl (wt.%)	SDS removal (wt.%)	ODCB removal (wt.%)
0.00	18.33	4.57
0.60	12.22	13.18
1.00	14.99	14.75
1.30	15.55	15.47
1.60	16.22	15.98

Table C-4 Experimental froth flotation results using SDS concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.01
Temperature = 30° C

NaCl (wt.%)	SDS removal (wt.%)	ODCB removal (wt.%)
0.00	18.40	32.09
0.60	17.66	38.31
1.00	17.16	39.96
1.30	16.97	42.15
1.60	16.51	41.78

Table C-5 Experimental froth flotation results using CPC concentration : 1 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	CPC removal (wt.%)	ODCB removal (wt.%)
0.00	12.40	4.59
1.00	5.11	5.12
1.30	5.92	6.00
1.60	7.30	7.53
1.80	8.21	8.67

Table C-6 Experimental froth flotation results using CPC concentration : 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	CPC removal (wt.%)	ODCB removal (wt.%)
0.00	16.80	8.66
1.00	10.4	11.83
1.30	12.10	12.26
1.60	13.50	14.15
1.80	14.30	14.90

Table C-7 Experimental froth flotation results using CPC concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.1
Temperature = 30° C

NaCl (wt.%)	CPC removal (wt.%)	ODCB removal (wt.%)
0.00	25.70	9.78
1.00	18.20	20.94
1.30	19.00	21.46
1.60	20.50	22.10
1.80	22.00	22.68

Table C-8 Experimental froth flotation results using CPC concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.01
Temperature = 30° C

NaCl (wt.%)	CPC removal (wt.%)	ODCB removal (wt.%)
0.00	54.10	33.04
1.00	45.31	40.16
1.30	43.00	48.61
1.60	40.40	53.00
1.80	33.55	53.73

Table C-9 Experimental froth flotation results using DADS concentration : 1 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	DADS removal (wt.%)	ODCB removal (wt.%)
0.00	11.36	4.26
1.80	6.46	6.81
3.50	9.56	8.23
7.20	11.09	13.76

Table C-10 Experimental froth flotation results using DADS concentration : 3.5 wt.%

Initial oil/water volume ratio = 1/1
Temperature = 30° C

NaCl (wt.%)	DADS removal (wt.%)	ODCB removal (wt.%)
0.00	14.80	5.28
1.80	8.80	8.45
3.50	10.70	10.36
7.20	12.40	16.13

Table C-11 Experimental froth flotation results using DADS concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.1
Temperature = 30° C

NaCl (wt.%)	DADS removal (wt.%)	ODCB removal (wt.%)
0.00	11.66	9.81
1.80	10.65	20.20
3.50	9.99	21.05
7.20	9.49	22.60

Table C-12 Experimental froth flotation results using DADS concentration : 3.5 wt.%

Initial oil/water volume ratio = 0.01
Temperature = 30° C

NaCl (wt.%)	DADS removal (wt.%)	ODCB removal (wt.%)
0.00	44.95	31.05
1.80	42.42	42.49
3.50	31.49	44.89
7.20	24.26	48.69

CURRICULUM VITATE

Name : Sangobtip Pongstabodee

Birth date : October 5, 1971

Nationality : Thai

University education :

1991-1994 B. Sc. in Chem. Eng.
Chemical Technology, Faculty of Science
Chulalongkorn University