

## APPENDICES

### Appendix A

#### *Data from dynamic light scattering measurement*

(1) 0.02 % wt HPC/ HTAB in sterile water at 30° C

$C_{\text{HTAB}}$ (% wt)	$\tau_q$ ( $\mu\text{s}$ )	$D$ ( $\text{m}^2/\text{s}$ )	$R_{\text{h,app}}$ (nm)
0.002	258.94	7.2837E-12	38.03
0.004	333.29	5.6588E-12	48.95
0.006	336.42	5.6062E-12	49.41
0.008	351.81	5.3609E-12	51.67
0.01	426.63	4.4207E-12	62.66
0.015	554.64	3.4004E-12	81.46
0.02	669.50	2.8170E-12	98.33
0.025	749.84	2.5152E-12	110.13
0.03	517.39	3.6452E-12	75.99
0.04	324.71	5.8084E-12	47.69
0.06	309.52	6.0933E-12	45.46
0.08	281.74	6.6941E-12	41.38
0.1	269.69	6.9932E-12	39.61

(2) 0.02 % wt HPC/ HTAB/ 0.02 % wt NaCl at 30° C

$C_{\text{HTAB}}$ (% wt)	$\tau_q$ ( $\mu\text{s}$ )	$D$ ( $\text{m}^2/\text{s}$ )	$R_{\text{h,app}}$ (nm)
0.002	254.31	7.4163E-12	37.35
0.004	346.84	5.4378E-12	50.94
0.006	344.66	5.4722E-12	50.62
0.008	335.26	5.6255E-12	49.24
0.01	316.47	5.9596E-12	46.48
0.015	362.84	5.1978E-12	53.29
0.02	442.23	4.2648E-12	64.95
0.025	647.71	2.9118E-12	95.13
0.03	320.49	5.8849E-12	47.07
0.04	266.77	7.0699E-12	39.18

(3) 0.02 % wt HPC/ HTAB/ 0.10 % wt NaCl at 30° C

$C_{\text{HTAB}}$ (% wt)	$\tau_q$ ( $\mu\text{s}$ )	$D$ ( $\text{m}^2/\text{s}$ )	$R_{\text{h,app}}$ (nm)
0.002	297.06	6.0283E-12	43.63
0.004	312.86	5.8096E-12	45.95
0.006	324.64	5.7962E-12	47.68
0.008	325.39	5.7946E-12	47.79
0.01	237.35	7.9461E-12	34.86
0.015	204.26	9.2333E-12	30.00
0.02	306.39	6.1556E-12	45.00
0.025	320.01	5.8936E-12	47.00
0.03	182.95	1.0309E-11	26.87
0.04	181.32	1.0402E-11	26.63

(4) 0.02 % wt HPC/ 0.025 % wt HTAB at various  $C_{NaCl}$  and at 30° C

$C_{NaCl}$ (% wt)	$\tau_q$ ( $\mu$ s)	D ( $m^2/s$ )	$R_{h,app}$ (nm)
0	749.84	2.5152E-12	110.13
0.02	544.83	3.4616E-12	80.02
0.04	314.22	6.0022E-12	46.15
0.06	311.63	6.0521E-12	45.77
0.08	291.28	6.4750E-12	42.78
0.10	297.54	6.3387E-12	43.70
0.14	220.53	8.5520E-12	32.39

(5) 0.005 % wt HPC/ HTAB at various ratios of  $C_{HTAB}/C_{HPC}$  and at 30° C

$C_{HTAB}/C_{HPC}$	$\tau_q$ ( $\mu$ s)	D ( $m^2/s$ )	$R_{h,app}$ (nm)
0.50	359.70	5.2432E-12	52.38
0.75	355.21	5.3096E-12	52.17
1.00	343.70	5.4873E-12	50.48
1.25	340.50	5.5389E-12	50.01
1.50	346.22	5.4474E-12	50.85
2.00	343.57	5.4895E-12	50.46

(6) 0.01 % wt HPC/ HTAB at various ratios of  $C_{HTAB}/C_{HPC}$  and at 30° C

$C_{HTAB}/C_{HPC}$	$\tau_q(\mu s)$	$D(m^2/s)$	$R_{h,app}(nm)$
0.50	363.18	5.19E-12	52.83
0.75	366.58	5.14E-12	52.17
1.00	399.60	4.72E-12	50.48
1.25	498.94	3.78E-12	50.01
1.50	333.97	5.65E-12	50.85
2.00	331.58	5.69E-12	50.46

(7) 0.015 % wt HPC/ HTAB at various ratios of  $C_{HTAB}/C_{HPC}$  and at 30° C

$C_{HTAB}/C_{HPC}$	$\tau_q(\mu s)$	$D(m^2/s)$	$R_{h,app}(nm)$
0.50	353.78	5.3310	51.96
0.75	636.27	2.9642	93.45
1.00	733.09	2.5727	107.67
1.25	584.26	3.2281	85.81
1.50	355.96	5.2984	52.28
2.00	325.80	5.7890	47.85

(8) 0.02 % wt HPC/ HTAB at various ratios of  $C_{HTAB}/C_{HPC}$  and at 30° C

$C_{HTAB}/C_{HPC}$	$\tau_q(\mu s)$	$D(m^2/s)$	$R_{h,app}(nm)$
0.50	426.63	4.42E-12	62.66
0.75	571.25	3.30E-12	83.9
1.00	669.50	2.82E-12	98.33
1.25	749.84	2.52E-12	110.13
1.50	517.39	3.65E-12	75.99
2.00	324.71	5.81E-12	47.69

(9) 0.025 % wt HPC/ HTAB at various ratios of  $C_{HTAB} / C_{HPC}$  and at 30° C

$C_{HTAB} / C_{HPC}$	$\tau_q (\mu s)$	$D (m^2/s)$	$R_{h,app} (nm)$
0.5	306.60	6.15E-12	45.03
0.75	319.46	5.90E-12	46.92
1.00	290.05	6.50E-12	42.6
1.25	333.42	5.66E-12	48.97
1.50	326.82	5.77E-12	48.00
2.00	253.56	7.44E-12	37.24

(10) 0.03 % wt HPC/ HTAB at various ratios of  $C_{HTAB} / C_{HPC}$  and at 30° C

$C_{HTAB} / C_{HPC}$	$\tau_q (\mu s)$	$D (m^2/s)$	$R_{h,app} (nm)$
0.5	284.54	6.63E-12	41.79
0.75	306.73	6.15E-12	45.05
1.00	228.84	8.24E-12	33.61
1.25	204.33	9.23E-12	30.01
1.50	237.01	7.96E-12	34.81
2.00	228.09	8.27E-12	33.5

(11) 0.04 % wt HPC/ HTAB at various ratios of  $C_{HTAB} / C_{HPC}$  and at 30° C

$C_{HTAB} / C_{HPC}$	$\tau_q (\mu s)$	$D (m^2/s)$	$R_{h,app} (nm)$
0.5	340.44	5.54E-12	50.0
0.75	292.98	6.44E-12	43.03
1.00	295.70	3.38E-12	43.43
1.25	296.18	6.37E-12	43.5
1.50	298.22	6.32E-12	43.8
2.00	311.43	6.06E-12	45.74

## APPENDIX B

### *Data from viscosity measurement*

(1) 0.02 % wt HPC/ HTAB in sterile water at 30° C

$C_{HTAB}$ (% wt)	Viscosity( $\eta$ ) (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.002	0.8544	0.0680
0.004	0.8542	0.0678
0.006	0.8569	0.0711
0.008	0.8577	0.0721
0.01	0.8832	0.1040
0.015	0.8869	0.1086
0.02	0.8764	0.0955
0.025	0.8759	0.0949
0.03	0.8973	0.1216
0.04	0.9188	0.1485
0.06	0.9181	0.1476
0.08	0.9123	0.1404
0.1	0.9102	0.1378
0.12	0.9071	0.1339

(2) 0.02 % wt HPC/ HTAB / 0.02 % wt NaCl at 30° C

$C_{HTAB}$ (% wt)	Viscosity ( $\eta$ ) (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.002	0.8586	0.0733
0.004	0.8599	0.0749
0.006	0.8550	0.0688
0.008	0.8505	0.0631
0.01	0.8834	0.1043
0.015	0.8841	0.1051
0.02	0.8703	0.0879
0.025	0.8621	0.0776
0.03	0.8926	0.1158
0.04	0.8958	0.1198

(3) 0.02 % wt HPC/ HTAB / 0.10 % wt NaCl at 30° C

$C_{HTAB}$ (% wt)	Viscosity ( $\eta$ ) (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.002	0.8560	0.0700
0.004	0.8562	0.0703
0.006	0.8547	0.0684
0.008	0.8262	0.0328
0.01	0.8259	0.0324
0.015	0.8315	0.0394
0.02	0.8395	0.0494
0.025	0.8326	0.0408
0.03	0.8324	0.0405
0.04	0.8315	0.0394

(4) 0.02 % wt HPC/ 0.025 % wt HTAB at various  $C_{\text{NaCl}}$  and at 30° C

$C_{\text{NaCl}}$ (% wt)	Viscosity( $\eta$ ) (CSt)	Specific Viscosity ( $\eta_{\text{sp}}$ )
0	0.8759	0.0949
0.02	0.8621	0.0776
0.04	0.8380	0.0475
0.06	0.8386	0.0482
0.08	0.8318	0.0398
0.10	0.8326	0.0407
0.14	0.8318	0.0398

(5) HPC/ HTAB in sterile water at  $C_{\text{HTAB}}/C_{\text{HPC}} = 1$  and at 30° C

$C_{\text{HPC}}$ (% wt)	Viscosity( $\eta$ ), (CSt)	Specific Viscosity ( $\eta_{\text{sp}}$ )
0.005	0.8335	0.0419
0.01	0.8511	0.0638
0.015	0.8641	0.0801
0.02	0.8764	0.0955
0.025	0.8659	0.0823
0.03	0.8885	0.1107
0.04	0.9645	0.0206



(6) HPC/ HTAB in sterile water at  $C_{HTAB} / C_{HPC} = 1.25$  and at  $30^{\circ}C$

$C_{HPC}$ (% wt)	Viscosity( $\eta$ ), (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.005	0.8330	0.0413
0.01	0.8514	0.0642
0.015	0.8680	0.0850
0.02	0.8759	0.0949
0.025	0.8774	0.0968
0.03	0.9089	0.1361
0.04	0.9741	0.2176

(7) HPC/ HTAB in sterile water at  $C_{HTAB} / C_{HPC} = 1.5$  and at  $30^{\circ}C$

$C_{HPC}$ (% wt)	Viscosity( $\eta$ ), (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.005	0.8339	0.0423
0.01	0.8506	0.0632
0.015	0.8643	0.0804
0.02	0.8973	0.1216
0.025	0.8951	0.1189
0.03	0.9306	0.1633
0.04	0.9920	0.2399

(8) HPC/ HTAB in sterile water at  $C_{HTAB} / C_{HPC} = 2$  and at 30° C

$C_{HPC}$ (% wt)	Viscosity( $\eta$ ), (CSt)	Specific Viscosity ( $\eta_{sp}$ )
0.005	0.8338	0.0423
0.010	0.8508	0.0636
0.015	0.8833	0.1042
0.020	0.9188	0.1485
0.025	0.9110	0.1387
0.030	0.9390	0.1738
0.040	0.9879	0.2349

**APPENDIX C***Determination of cac*

(1) 0.02 % wt HPC/HTAB in sterile water at 30 °C by conductivity measurement

$C_{\text{HTAB}}$ (% wt)	Conductance ( $\mu\text{s}$ )
0.002	7.56
0.003	9.49
0.004	12.57
0.005	15.12
0.006	17.64
0.008	23.90
0.01	27.80
0.015	40.40
0.02	52.00
0.025	63.70
0.03	73.60
0.04	89.60

(2) 0.02 % wt HPC/HTAB/ 0.1 % wt NaCl at 30° C , by surface tension measurement

$C_{HTAB}$ (% wt)	Surface Tension (mN/m)
0.001	43.7
0.002	42.1
0.003	40.8
0.004	40.4
0.006	38.5
0.008	38.7
0.01	38.6
0.015	38.2
0.02	38.5
0.025	38.4
0.03	38.2
0.035	38.0
0.04	38.2
0.045	37.9
0.05	38.3

## REFERENCES

- Alli, D. ; Bolton, S. ; and Gaylord, N. S, *J. Appl. Sci.* , vol. 42, 947 (1991).
- Arai, H. and Horin, . S., *J. Colloid Interface Sci.* , vol. 30, 372 (1969).
- Brackman, J.C. and Engberts, J.B.F.N . , *Langmuir*, vol. 7, 2097 (1991).
- Breuer, M. M. and Robb, I. D. , *Chem. Ind.*, 530 (1972).
- Brown, W.; Fundin, J.; and Miguel, M. *Macromolecule*, vol. 25, 6805 (1992).
- Cabane, B. and Duplessix, R. , *J.Phys. (Paris)*, vol.43, 1529 (1982).
- Carlsson, A.; Karlstrom, G.; and Lindman, B. , *J. Phys. Chem.*, vol. 91, 594 (1987).
- Carlsson, A.; Karlstrom, G.; and Lindman, B. , *Colloid Surf*, vol. 47, 147, (1990).
- Chari, K. and Lenhart, W. C. , *J. Colloid Interface Sci.*, vol. 137, 137 (1990).
- De Schryver, F. C. ; Reekman. ; and Gehlen, M. , *Macromolecules*, vol. 26, 687 (1993).
- Dubin, P. L. ; Gruber, J. H. ; and Zhang, H. , *J. Colloid Interface Sci.*, vol. 148, 35 (1992).
- Francois, J. ; Dayantis, J. ; and Sabbadin, J. ; *J. Eur. Polym.*, vol. 21, 165 (1985).
- Gilanyi, T. and Wolfram, E., *Microdomains in Solutions*; Dubin, P. L., Ed.; Plenum: New York, 383 (1985).
- Goddard, E. D., *Colloids Surf.*, vol. 19, 255 (1986).
- Goddard, E. D. and Ananthapadmanabhan, K. P. Eds. , *Interactions of Surfactants with Polymers and Proteins*, CRC Press: Boca Raton, (1993).
- Goddard, E. D. ; Leung, P. S. ; and Ananthapadmanabhan, K. P. , *J. Soc. Cosmet. Chem.*, vol. 42, 19 (1991).

- Greener, J. ; Constestable, B. A. ; and M. D. , *Macromolecules*, vol. 20, 2490 (1987).
- Holmberg, C. ; Nilsson, S. ; Singh, S. K. ; and Sundelof, L. O. , *J. Phys. Chem.* , vol. 96, 872 (1992).
- Jones, M. N. , *J. Colloid Interface Sci.* , vol. 23, 36 (1967).
- Kiefer, J. , Somasudaran, P. , and Ananthapadthamanabhan, K. P. , *Interactions of Surfactants with Polymers and Proteins*, CRC Press: Boca Raton, Chapter 8, 324 (1993).
- Lange, H. and Kolloid, Z. Z. , *Polymer.* , vol. 243, 101 (1971).
- Leung, P. S. and Goddard, E. D. , *Langmuir*, vol. 7, 608 (1991).
- Lindman, B. and Thalberg, K. , *Interactions of Surfactants with Polymers and Proteins*, CRC Press: Boca Raton, Chapter 5 (1993).
- Mandel, M. , *Encyclopedia of Polymer Science and Engineering*, Wiley Interscience, New York, vol. 3, 100 (1985).
- Moroi, Y. ; Akisida, H. ; Saito, M. ; and Murata, R. , *J. Colloid Interface Sci.*, vol. 61, 233 (1977).
- Murata, M. and Arai, H. , *J. Colloid Interface Sci.* , vol. 44, 475 (1973).
- Nagarajan, R. , *J. Chem. Phys.* , vol. 90, (1989).
- Nilsson, S. , *Macromolecules*, vol. 28, 7843 (1995).
- Ruckenstein, E. ; Huber, G. ; and Hoffmann, H. , *J. Langmuir*, vol. 3, 382 (1987).
- Saito, S. J., *Colloid Interface Sci.* , vol. 24, 227 (1967).
- Schwuger, M. J. and Bartnik, F. G., *Interactions of Surfactants with polymers and Proteins* ; CRC Press: Boca Raton, Chapter 8, 323 (1993).
- Shirahama, K. ; Himuro, A.; and Takisawa, N. , *Colloid Polym. Sci.* , vol. 265, 96 (1987).
- Tadros, Th. F. , *J. Colloid Interface Sci.* , vol. 46, 528 (1974).
- Treiner, C. and Hguyen, D. , *J. Phys. Chem.* , vol. 94, 2021 (1990).
- Witte, F. M. and Engberts, J. B. F. N. , *J. Org. Chem.* , vol. 52, 4767 (1987).

Witte, F. M. and Engberts, J. B. F. N. , *J. Colloids Surf.* , vol. 38, 417 (1989).

## CURRICULUM VITAE

**Name** : Ms. Sucheera Rujithumkul

**Birth Date** : December 1, 1973

**Nationality** : Thai

**University Education**

1990-1994 : B.Sc.(Chemistry)

Faculty of Science

Chulalongkorn University