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Table A1 Interfacial tension of each phase in microemulsion formation at different of Alfoterra concentrations with 3 wt% NaCl and an initial oil to water ratio = 1:1

Alfoterra Conc. (wt%)	NaCl Conc. (wt%)	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.1	3	1	0.8484	1.0116	5.35	2.43	2062	0.1764
		2			5.32	2.46	2324	0.2105
		3			5.26	2.50	2580	0.2331
		4			5.19	2.52	2825	0.2531
		5			5.14	2.55	3089	0.2762
		ave			5.25	2.49	2576	0.2298
0.3	3	1	0.8456	1.0156	5.34	2.88	1844	0.0878
		2			5.32	2.89	1945	0.0942
		3			5.27	2.89	2235	0.1168
		4			5.15	2.90	2438	0.1175
		5			5.11	2.87	2605	0.1323
		ave			5.24	2.88	2213	0.1097
0.5	3	1	0.8542	1.0098	4.82	2.30	1864	0.0893
		2			4.88	3.00	2009	0.0431
		3			4.78	2.98	2198	0.0452
		4			4.81	3.01	2405	0.0542
		5			4.78	3.09	2677	0.0555
		ave			4.81	2.87	2230	0.0575

Alfoterra Conc. (wt%)	NaCl Conc. (wt%)	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.9	3	1	0.8587	1.0114	4.31	3.49	2107	0.0038
		2			4.28	3.49	2357	0.0043
		3			4.28	3.47	2721	0.0061
		4			4.29	3.45	3229	0.0096
		5			4.31	3.41	3733	0.0158
		ave			4.29	3.46	2829	0.0079
1	3	1	0.8540	1.0142	4.56	3.22	1805	0.0128
		2			4.56	3.24	2046	0.0157
		3			4.56	3.22	2273	0.0203
		4			4.52	3.20	2647	0.0263
		5			4.49	3.20	2980	0.0311
		ave			4.54	3.21	2350	0.0213
2	3	1	0.8520	1.0130	5.10	2.87	1589	0.0460
		2			5.03	2.90	1742	0.0482
		3			5.01	2.89	1891	0.0560
		4			5.03	2.91	2001	0.0627
		5			5.01	2.95	2167	0.0669
		ave			5.03	2.90	1878	0.0561
3	3	1	0.8432	1.0152	5.22	2.74	1422	0.0541
		2			5.21	2.84	1589	0.0590
		3			5.12	2.80	1712	0.0642
		4			5.13	2.84	1794	0.0678
		5			5.06	2.90	2072	0.0759
		ave			5.15	2.82	1717	0.0650

Table A2 Interfacial tension of each phase in microemulsion formation at different SDS concentration with 3 wt% NaCl concentration and an initial oil to water ratio = 1:1

SDS Conc. (wt%)	NaCl Conc. (wt%)	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.01	3	1	0.8597	0.9840	5.03	2.83	4094	0.2264
		2			5.06	2.81	4289	0.2658
		3			5.10	2.85	4548	0.3035
		ave			5.07	2.83	4487	0.2873
0.05	3	1	0.8515	0.9936	5.85	2.03	5073	0.3125
		2			5.87	1.99	4844	0.4615
		3			5.85	1.92	4489	0.2481
		ave			5.85	1.95	4642	0.3578
0.1	3	1	0.8606	0.9906	5.38	2.45	4804	0.5705
		2			5.39	2.57	4567	0.3682
		3			5.46	2.46	4889	0.5979
		ave			5.41	2.93	4753	0.4473

2.2 Mixed Surfactant System

Table A3 Interfacial tension of each phase in microemulsion formation with 1 wt% Alfoterra, 3 wt% NaCl concentration at different AOT concentrations and an initial oil to water ratio = 1:1

AOT Conc. (wt%)	Alfoterra Conc. (wt%)	NaCl Conc. (wt%)	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.1	1	3	1	0.8630	1.0200	5.05	2.25	1793	0.1131
			2			5.10	2.27	1679	0.1024
			3			5.13	2.26	1590	0.0957
			ave			5.09	2.25	1638	0.0792
0.5	1	3	1	0.8574	1.0276	5.25	2.29	974	0.0427
			2			5.25	2.32	1043	0.0475
			3			5.23	2.37	1355	0.0606
			ave			5.24	2.37	1164	0.0541
1	1	3	1	0.8570	1.0046	5.35	2.13	522	0.0137
			2			5.34	2.26	648	0.0184
			3			5.29	2.60	1075	0.0241
			ave			5.33	2.36	801	0.0233
2	1	3	1	0.8594	1.0134	4.92	2.75	670	0.0072
			2			4.9	2.85	808	0.0090
			3			4.86	2.81	924	0.0115
			ave			4.89	2.80	834	0.0099
3	1	3	1	0.8684	1.0246	5.19	2.04	745	0.0276
			2			5.17	2.21	973	0.0314
			3			5.16	2.35	1069	0.0392
			ave			5.17	2.21	955	0.0375
4	1	3	1	0.8592	1.0250	5.07	2.67	931	0.0202
			2			5.06	2.75	983	0.0223
			3			5.02	2.75	1340	0.0302
			ave			5.04	2.72	1123	0.0267
5	1	3	1	0.8606	1.0246	5.17	2.47	903	0.0268
			2			5.14	2.52	1139	0.0305
			3			5.13	2.67	1274	0.0429
			ave			5.14	2.57	1155	0.0378

Table A4 Interfacial tension of each phase in microemulsion formation with 1 wt% Alfoterra, 2 wt% AOT and 3 wt% NaCl at different SDS concentrations and initial oil to water ratio = 1:1.

SDS Conc. (wt%)	AOT Conc. (wt%)	Alf Conc. (wt%)	NaCl Conc. (wt%)	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.01	2	1	3	0.8572	1.0224	4.91	2.61	502	0.0052
						4.88	2.65	535	0.0054
						4.81	2.73	551	0.0046
						4.78	2.79	591	0.0046
						4.73	2.84	643	0.0047
						4.82	2.72	564	0.0049
0.02	2	1	3	0.8595	1.0217	4.58	2.99	878	0.0051
						4.68	2.93	642	0.0037
						4.68	2.82	556	0.0033
						4.67	2.99	626	0.0031
						4.58	2.97	664	0.0030
						4.63	2.94	673	0.0036
0.03	2	1	3	0.8426	1.0174	5.21	3.36	562	0.0036
						5.20	3.37	575	0.0036
						5.18	3.36	598	0.0038
						5.17	3.37	610	0.0039
						5.00	3.37	650	0.0033
						5.15	3.36	599	0.0036
0.04	2	1	3	0.8502	1.0190	5.30	3.50	500	0.0025
						5.31	3.61	523	0.0023
						5.29	3.64	565	0.0025
						5.29	3.70	589	0.0024
						5.27	3.75	604	0.0022
						5.29	3.64	556	0.0024
0.05	2	1	3	0.8594	1.0134	4.92	2.75	890	0.0127
						4.90	2.75	981	0.0150
						4.90	2.81	1005	0.0145
						4.90	2.85	1152	0.0180
						4.86	2.86	1207	0.0183
						4.89	2.80	1047	0.0157
0.06	2	1	3	0.8592	1.0250	5.07	2.67	931	0.0201
						5.06	2.67	983	0.0221
						5.05	2.71	1125	0.0272
						5.02	2.75	1235	0.0299
						5.00	2.78	1340	0.0329
						5.04	2.71	1122	0.0265

SDS Conc. (wt%)	AOT Conc. (wt%)	Alfoterra Conc. (wt%)	NaCl Conc. (wt%)	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
0.07	2	1	3	0.8606	1.0246	5.17	2.47	903	0.0256
						5.15	2.52	1001	0.0291
						5.14	2.58	1139	0.0347
						5.13	2.62	1274	0.0409
						5.12	2.67	1456	0.0497
						5.14	2.57	1154	0.0361
0.08	2	1	3	0.8684	1.0246	5.19	2.04	745	0.0294
						5.17	2.14	841	0.0333
						5.17	2.21	973	0.0416
						5.17	2.3	1069	0.0457
						5.16	2.35	1147	0.0494
						5.17	2.21	955	0.0399
0.09	2	1	3	0.8574	1.0276	5.63	2.80	978	0.0359
						5.65	2.98	1077	0.0366
						5.58	2.99	1191	0.0408
						5.61	3.01	1245	0.0451
						5.57	3.05	1375	0.0501
						5.61	2.97	1173	0.0417
0.10	2	1	3	0.8564	1.0222	5.25	2.34	870	0.0333
						5.25	2.32	970	0.0422
						5.23	2.37	1109	0.0513
						5.20	2.43	1197	0.0543
						5.18	2.46	1275	0.0584
						5.22	2.38	1084	0.0479

Table A5 Interfacial tension of each phase in microemulsion formation with 1 wt% of Alfoterra and 2 wt% of AOT at different NaCl concentrations and initial oil to water ratio = 1:1.

NaCl Conc. (wt%)	AOT Conc. (wt%)	Alfoterra Conc. (wt%)	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
1	2	1	1	0.8590	1.0094	5.14	2.41	2386	0.1778
			2			5.13	2.43	2441	0.1801
			3			5.03	2.49	2682	0.1810
			4			5.00	2.49	2839	0.1957
			5			4.94	2.57	3136	0.2010
			ave			5.05	2.48	2697	0.1964
2	2	1	1	0.8632	1.0074	5.02	2.50	2665	0.1673
			2			5.00	2.44	2511	0.1557
			3			5.01	2.64	2841	0.1582
			4			4.98	2.72	2974	0.1503
			5			4.99	2.74	3012	0.1521
			ave			5.00	2.61	2800	0.1539
3	2	1	1	0.8605	1.0249	4.94	2.73	1072	0.0208
			2			4.81	2.83	1116	0.0162
			3			4.77	2.87	1186	0.0161
			4			4.84	2.82	1141	0.0180
			5			4.90	2.77	1201	0.0234
			ave			4.85	2.80	1143	0.0100
4	2	1	1	0.8695	1.0313	4.96	2.70	1199	0.0274
			2			4.94	2.77	1308	0.0288
			3			4.91	2.80	1383	0.0296
			4			4.88	2.84	1475	0.0305
			5			4.83	2.88	1547	0.0293
			ave			4.93	2.79	1380	0.0299
5	2	1	1	0.8775	1.0362	5.27	2.21	1267	0.0745
			2			5.21	2.35	1412	0.0755
			3			5.13	2.49	1606	0.0768
			4			5.08	2.57	1712	0.0751
			5			5.02	2.65	1918	0.0793
			ave			5.14	2.45	1583	0.0760
6	2	1	1	0.8731	1.0429	4.87	2.50	2373	0.1299
			2			4.86	2.57	2563	0.1367
			3			4.83	2.58	2660	0.1397
			4			4.84	2.65	2752	0.1379
			5			4.89	2.71	2837	0.1445
			ave			4.86	2.60	2637	0.1396
7	2	1	1	0.8729	1.0497	5.06	2.38	2464	0.2109
			2			5.27	2.23	2024	0.2077
			3			5.43	2.05	1816	0.2298
			4			5.40	2.07	1870	0.2331
			5			5.31	2.18	2096	0.2432
			ave			5.29	2.18	2054	0.2272

Table A8 Interfacial tension of each phase in microemulsion formation with 1 wt% of Alfoterra, 2 wt% of AOT, and 3 wt% of NaCl concentration at different oil:water ratio.

Oil : Water ratio	No.	Upper density (g/mL)	Lower density (g/mL)	Upper level	Lower level	Speed (rpm)	IFT (mN/m)
1 : 1	1	0.8605	1.0249	4.94	2.73	1072	0.0208
	2			4.81	2.83	1116	0.0162
	3			4.77	2.87	1186	0.0162
	4			4.84	2.82	1141	0.0180
	ave			4.84	2.81	1129	0.0182
1 : 4	1	0.8637	1.0217	5.02	2.68	1219	0.0289
	2			4.90	2.85	1289	0.0217
	3			4.97	2.69	1134	0.0231
	4			5.04	2.53	1075	0.0277
	ave			4.98	2.69	1179	0.0253
1 : 9	1	0.8650	1.0201	5.18	2.34	1027	0.0383
	2			5.04	2.56	1118	0.0352
	3			5.11	2.42	1068	0.0303
	4			5.02	2.55	1128	0.0304
	ave			5.09	2.47	1085	0.0323
1 : 19	1	0.8575	1.0193	4.97	2.79	1308	0.0293
	2			5.15	2.46	1077	0.0336
	3			5.13	2.49	1170	0.0375
	4			5.15	2.48	1065	0.0321
	ave			5.10	2.56	1155	0.0324

APPENDIX

Experimental data of microemulsion formation

1. Interfacial Tension (IFT)

The interfacial tension of each phase of microemulsion is interpreted by the following formulation:

$$\text{IFT} = e(Vd)^3 n^2 \Delta\rho$$

where

σ = interfacial tension or IFT (mN/m, dyne/cm)

e = unity factor ($3.427 \cdot 10^{-7}$ mN cm³ min² /m g mm³)

V = enlargement factor (0.31 mm/sdv)

d = measured drop diameter (sdv)

n = number of revolution (1/min)

$\Delta\rho$ = density difference of two liquids (g/cm³)

2. Experimental Data of Interfacial Tension (IFT)

2.1 Single Surfactant System

CURRICULUM VITAE

Name: Ms. Alweeya Lapee-e

Date of Birth: February 6, 1982

Nationality: Thai

University Education:

2000-2004 Bachelor Degree of Engineering in Chemical Engineering,
Faculty of Engineering, Mahidol University, Bangkok, Thailand.