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## **APPENDIX**

**APPENDIX A**  
**Experimental data of CMC measurements**

**Table A-1** CMC of supernatant solution of SDS and calcium salt of fatty acid (C<sub>8</sub>)

Concentration of SDS (M)	Surface tension (mN/m)
0 (distilled water)	71.4
0.003	40.1
0.004	38.6
0.005	36.7
0.006	36.6
0.007	36.6
0.009	36.6
0.015	36.5

**Table A-2** CMC of supernatant solution of SDS and calcium salt of fatty acid (C<sub>12</sub>)

Concentration of SDS (M)	Surface tension (mN/m)
0 (distilled water)	71.3
0.003	33.3
0.004	30.1
0.005	27.3
0.006	24.7
0.007	24.1
0.009	24.1
0.015	24.0

**Table A-3** CMC of supernatant solution of SDS and calcium salt of fatty acid  
(C<sub>14</sub>)

Concentration of SDS (M)	Surface tension (mN/m)
0 (distilled water)	71.4
0.003	35.2
0.004	33.1
0.005	31.4
0.006	29.5
0.007	28.1
0.009	28.1
0.015	28.1

**Table A-4** CMC of supernatant solution of SDS and calcium salt of fatty acid  
(C<sub>18</sub>)

Concentration of SDS (M)	Surface tension (mN/m)
0 (distilled water)	71.4
0.003	36.4
0.004	33
0.005	30.1
0.006	26.5
0.007	24.2
0.009	24.1
0.015	24.1

**Appendix B**  
**Experimental data of foam tests**

**Table B-1** The experimental data of the Ross-Miles test at Ca-SO ( $C_8$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.5	11
0.005	18	20	16
0.006	19.5	20	20.1
0.007	20	21	21
0.01	21	21	21.5
0.02	22	21	22

**Table B-2** The experimental data of the Ross-Miles test at Ca-SO ( $C_{12}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.3	5
0.005	18	20.2	12
0.006	19.5	20.5	20.4
0.007	20	20.5	21
0.01	21	21.3	21
0.02	22	22	22

**Table B-3** The experimental data of the Ross-Miles test at Ca-SO ( $C_{14}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18	3
0.005	18	19.3	9
0.006	19.5	19.8	15
0.007	20	20.6	21
0.01	21	21	21
0.02	22	22	21

**Table B-4** The experimental data of the Ross-Miles test at Ca-SO ( $C_{18}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.2	2
0.005	18	19.5	7
0.006	19.5	20	14
0.007	20	20	21
0.01	21	21.5	21
0.02	22	22	21

**Table B-5** The experimental data of the Ross-Miles test at Ca-SO ( $C_8$ ) = 0.00025 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.5	17
0.005	18	20	19
0.007	20	21	21
0.01	21	21	21.5
0.02	22	21	22

**Table B-6** The experimental data of the Ross-Miles test at Ca-SO ( $C_{12}$ ) = 0.00025 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.3	9
0.005	18	20.2	18
0.007	20	20.5	22
0.01	21	21.3	21
0.02	22	22	22

**Table B-7** The experimental data of the Ross-Miles test at Ca-SO ( $C_{14}$ ) = 0.00025 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18	4
0.005	18	19.3	9
0.007	20	20.6	21
0.01	21	21	21
0.02	22	22	21

**Table B-8** The experimental data of the Ross-Miles test at Ca-SO ( $C_{18}$ ) = 0.00025 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	17.5	18.2	3
0.005	18	19.5	9
0.007	20	20	21
0.01	21	21.5	21
0.02	22	22	21

**Table B-9** The experimental data of the Ross-Miles test at Na-SO ( $C_8$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)	
	Pure SDS	SDS + Na-SO
0.003	17.5	18
0.005	18	20
0.007	20	21
0.01	21	21
0.02	22	22

**Table B-10** The experimental data of the shake test at Ca-SO ( $C_8$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	5.5	5.5	3
0.005	10.2	8.3	4
0.007	12	11.8	8
0.01	13.5	13.6	14

**Table B-11** The experimental data of the shake test at Ca-SO ( $C_{12}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	5.5	4.4	1.1
0.0035	6	5.6	1.3
0.004	8.5	6	1.6
0.0045	9	6.5	1.7
0.005	10.2	8.5	1.9
0.006	11.5	10	2.7
0.007	12	12	7.5
0.01	13.5	13.1	14

**Table B-12** The experimental data of the shake test at Ca-SO ( $C_{14}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	5.5	4.8	0.6
0.0035	6	5.5	1
0.004	8.5	6.4	1.4
0.0045	9	7.6	1.5
0.005	10.2	8.9	2.5
0.006	11.5	9.2	3
0.007	12	11	6.6
0.01	13.5	12.5	11.5

**Table B-13** The experimental data of the shake test at Ca-SO ( $C_{18}$ ) = 0.0005 M, pH = 7, T = 30 °C

Concentration of SDS (M)	Foam height (cm)		
	Pure SDS	Supernatant solution	SDS+Ca-SO
0.003	5.5	3	0.2
0.0035	6	5	0.7
0.004	8.5	7.8	1.5
0.0045	9	8.5	2.3
0.005	10.2	9.5	3.4
0.006	11.5	10.4	4.1
0.007	12	11	8.6
0.01	13.5	12.3	13.1

## **APPENDIX C**

### **Experimental data of contact angle measurements**

**Table C-1** The experimental data of contact angle measurements at  $T=30^{\circ}\text{C}$  and contact time = 15 sec

Type of Ca-SO	Contact angle (degree)					
	Pure water	0.003 M SDS	0.005 M SDS	0.007 M SDS	0.01 M SDS	0.02 M SDS
C8	60	25	0	0	0	0
C12	68	32	8	0	0	0
C14	77	65	39	35	28	16
C18	86	77	45	42	38	36

**Table C-2** The experimental data of contact angle measurements at  $T=30^{\circ}\text{C}$  and contact time = 10 min

Type of Ca-SO	Contact angle (degree)					
	Pure water	0.003 M SDS	0.005 M SDS	0.007 M SDS	0.01 M SDS	0.02 M SDS
C8	58	10	0	0	0	0
C12	63	12	3	0	0	0
C14	68	43	24	21	19	9
C18	78	63	32	28	26	19

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