

Supporting Information for:

The Inter-micellar Interaction Enthalpies of DTAB/TX100

Mixed Micelles and Their Structure Transitions[†]

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Table S1 The total surfactant concentrations (c), the mixed enthalpies (ΔH), and the molar mixed enthalpies ($\frac{\Delta H}{\sum n_i}$) for DTAB micelles measured by ITC at 298.15 K and

85 kPa. The concentration of the surfactant in the ampoule before the titration c_0 is 0.0259 mol·L⁻¹.

titration number	c (mol·L ⁻¹)	ΔH (mJ)	$\beta = [\frac{\sum n_i + n_0}{\sum n_i} c_i - \frac{n_0}{\sum n_i} c_0]$ (mol·L ⁻¹)	$\frac{\Delta H}{\sum n_i}$ (kJ·mol ⁻¹)
1	0.0263	-0.425	0.0437	0.266
2	0.0268	-0.837	0.0440	0.261
3	0.0272	-1.235	0.0443	0.257
4	0.0276	-1.639	0.0446	0.256
5	0.0280	-2.035	0.0449	0.254
6	0.0284	-2.417	0.0451	0.252
7	0.0288	-2.834	0.0454	0.253
8	0.0292	-3.220	0.0457	0.251
9	0.0296	-3.557	0.0459	0.247
10	0.0300	-3.926	0.0462	0.245
11	0.0304	-4.290	0.0464	0.244
12	0.0308	-4.647	0.0467	0.242
13	0.0311	-4.987	0.0469	0.240
14	0.0315	-5.326	0.0472	0.238
15	0.0318	-5.653	0.0474	0.236
16	0.0322	-5.978	0.0477	0.233

17	0.0325	-6.297	0.0479	0.231
18	0.0329	-6.598	0.0481	0.229
19	0.0332	-6.909	0.0483	0.227
20	0.0335	-7.216	0.0486	0.225
21	0.0339	-7.520	0.0488	0.224
22	0.0342	-7.803	0.0490	0.222
23	0.0345	-8.075	0.0492	0.219
24	0.0348	-8.353	0.0494	0.217
25	0.0351	-8.648	0.0496	0.216
26	0.0354	-8.912	0.0498	0.214
27	0.0357	-9.197	0.0500	0.213
28	0.0360	-9.443	0.0502	0.211
29	0.0363	-9.678	0.0504	0.209
30	0.0366	-9.923	0.0506	0.207
31	0.0369	-10.196	0.0508	0.206
32	0.0371	-10.475	0.0510	0.205
33	0.0374	-10.762	0.0512	0.204

Table S2 The thermal power (p), the flow rates of the dilute solutions and the concentrated solutions (F_1 and F_2 , respectively), the concentrations of the dilute solutions and the concentrated solutions before mixing (C_{si1} and C_{si2} , respectively), the concentrations of the solutions after mixing (C_{sf}) and the molar mixed enthalpies ($\frac{p}{F_1}$) for DTAB/TX100 mixed micelles with various TX100 mole fractions in the total mixed surfactants (α_{TX100}) measured by flow-mixing calorimetry at 298.15 K and 85 kPa.

p	$10^{10}F_1$	10^9F_2	C_{si1}	C_{si2}	C_{sf}	$\gamma = [\frac{F_1 + F_2}{F_1} C_{sf} - \frac{F_2}{F_1} C_{si2}]$	$\frac{\Delta H}{n_{si1}} = \frac{p}{F_1}$
(μ W)	(mol·s ⁻¹)	(mol·s ⁻¹)	(mol·kg ⁻¹)	(mol·kg ⁻¹)	(mol·kg ⁻¹)	(mol·kg ⁻¹)	(kJ·mol ⁻¹)
TX100 $\alpha_{TX100} = 1$							
1.847	4.67	2.39	0.0004	0.0019	0.0011	-0.0027	-3.953
2.035	4.67	3.57	0.0004	0.0028	0.0016	-0.0077	-4.356
2.240	4.67	4.70	0.0004	0.0037	0.0020	-0.0146	-4.794
2.534	4.67	7.05	0.0004	0.0055	0.0029	-0.0358	-5.424
3.074	4.67	11.75	0.0004	0.0092	0.0048	-0.1062	-6.579
3.752	4.67	17.64	0.0004	0.0138	0.0071	-0.2456	-8.030

$\alpha_{TX100} = 0.8$							
0.193	8.52	2.66	0.0007	0.0020	0.0014	-0.0007	-0.226
0.273	8.52	3.90	0.0007	0.0030	0.0019	-0.0034	-0.320
1.171	8.52	8.61	0.0007	0.0067	0.0037	-0.0264	-1.374
1.744	8.52	13.09	0.0007	0.0101	0.0055	-0.0655	-2.046
2.253	8.52	17.22	0.0007	0.0135	0.0072	-0.1206	-2.644
2.803	8.52	21.34	0.0007	0.0168	0.0088	-0.1909	-3.289
$\alpha_{TX100} = 0.6$							
0.726	5.65	3.16	0.0005	0.0022	0.0014	-0.0033	-1.285
1.454	5.65	6.89	0.0005	0.0049	0.0028	-0.0228	-2.573
2.110	5.65	10.60	0.0005	0.0076	0.0042	-0.0586	-3.734
2.738	5.65	14.37	0.0005	0.0102	0.0056	-0.1118	-4.845
3.297	5.65	18.06	0.0005	0.0129	0.0070	-0.1801	-5.834
3.761	5.65	21.77	0.0005	0.0155	0.0084	-0.2661	-6.655
$\alpha_{TX100} = 0.5$							
0.266	11.09	3.41	0.0009	0.0026	0.0018	-0.0009	-0.240
0.977	11.09	7.20	0.0009	0.0057	0.0033	-0.0122	-0.881
1.770	11.09	11.31	0.0009	0.0088	0.0049	-0.0351	-1.596
2.366	11.09	15.19	0.0009	0.0118	0.0064	-0.0675	-2.134
2.890	11.09	19.06	0.0009	0.0149	0.0079	-0.1109	-2.607
3.063	11.09	22.95	0.0009	0.0179	0.0095	-0.1644	-2.763
2.971	11.09	26.86	0.0009	0.0209	0.0110	-0.2290	-2.680
2.713	11.09	30.43	0.0009	0.0239	0.0125	-0.3013	-2.447
2.102	11.09	34.29	0.0009	0.0270	0.0140	-0.3868	-1.896
$\alpha_{TX100} = 0.4$							
0.379	13.53	4.60	0.0011	0.0036	0.0023	-0.0020	-0.280
1.293	13.53	9.91	0.0011	0.0078	0.0044	-0.0201	-0.955
2.177	13.53	15.13	0.0011	0.0119	0.0065	-0.0541	-1.608
2.435	13.53	20.53	0.0011	0.0161	0.0086	-0.1051	-1.799
1.981	13.53	26.07	0.0011	0.0202	0.0107	-0.1719	-1.464
0.931	13.53	30.81	0.0011	0.0243	0.0127	-0.2522	-0.688
-0.624	13.53	36.48	0.0011	0.0284	0.0148	-0.3520	0.461
$\alpha_{TX100} = 0.33$							
1.046	8.68	4.67	0.0008	0.0033	0.0020	-0.0048	-1.205
1.946	8.68	9.33	0.0008	0.0066	0.0037	-0.0270	-2.241
2.805	8.68	14.01	0.0008	0.0099	0.0054	-0.0660	-3.231
3.238	8.68	18.53	0.0008	0.0131	0.0071	-0.1211	-3.729
3.086	8.68	23.20	0.0008	0.0164	0.0088	-0.1942	-3.554
2.351	8.68	27.77	0.0008	0.0196	0.0105	-0.2821	-2.708
$\alpha_{TX100} = 0.26$							
0.145	18.77	3.79	0.0015	0.0030	0.0022	0.0007	-0.077
0.551	18.77	7.54	0.0015	0.0060	0.0037	-0.0052	-0.294
1.381	18.77	12.59	0.0015	0.0099	0.0057	-0.0223	-0.736
1.538	18.77	18.87	0.0015	0.0149	0.0082	-0.0587	-0.820

-0.016	18.77	25.11	0.0015	0.0198	0.0107	-0.1112	0.009
-2.957	18.77	31.25	0.0015	0.0248	0.0132	-0.1798	1.576
-6.541	18.77	37.52	0.0015	0.0296	0.0156	-0.2643	3.486
$\alpha_{TX100} = 0.2$							
0.948	12.90	7.42	0.0012	0.0053	0.0033	-0.0078	-0.735
2.020	12.90	14.82	0.0012	0.0104	0.0061	-0.0433	-1.566
1.536	12.90	22.25	0.0012	0.0157	0.0089	-0.1072	-1.191
-1.541	12.90	29.64	0.0012	0.0208	0.0117	-0.1978	1.195
-6.143	12.90	36.75	0.0012	0.0260	0.0145	-0.3139	4.763
-11.089	12.90	44.17	0.0012	0.0311	0.0173	-0.4580	8.598
$\alpha_{TX100} = 0.16$							
0.297	38.52	7.71	0.0030	0.0060	0.0045	0.0015	-0.077
0.854	38.52	12.86	0.0030	0.0100	0.0065	-0.0051	-0.222
0.171	38.52	20.55	0.0030	0.0159	0.0095	-0.0248	-0.044
-3.926	38.52	28.25	0.0030	0.0218	0.0124	-0.0564	1.019
-9.676	38.52	35.77	0.0030	0.0277	0.0154	-0.0991	2.512
-15.499	38.52	43.27	0.0030	0.0336	0.0183	-0.1531	4.023
-20.829	38.52	50.62	0.0030	0.0394	0.0212	-0.2186	5.407
-25.800	38.52	58.45	0.0030	0.0452	0.0241	-0.2948	6.697
-30.176	38.52	65.63	0.0030	0.0510	0.0270	-0.3823	7.833
$\alpha_{TX100} = 0.14$							
1.201	23.41	12.12	0.0018	0.0091	0.0055	-0.0130	-0.513
0.331	23.41	21.85	0.0018	0.0163	0.0092	-0.0574	-0.141
-6.099	23.41	31.60	0.0018	0.0236	0.0129	-0.1313	2.605
-14.645	23.41	41.03	0.0018	0.0307	0.0165	-0.2329	6.256
-22.239	23.41	50.37	0.0018	0.0377	0.0201	-0.3601	9.500
-25.407	23.41	54.98	0.0018	0.0411	0.0218	-0.4317	10.853
$\alpha_{TX100} = 0.11$							
0.787	40.16	11.92	0.0033	0.0099	0.0066	-0.0032	-0.196
-0.529	40.16	19.95	0.0033	0.0165	0.0099	-0.0229	0.132
-6.369	40.16	27.20	0.0033	0.0230	0.0131	-0.0546	1.586
-13.776	40.16	35.25	0.0033	0.0296	0.0163	-0.0996	3.431
-20.365	40.16	42.83	0.0033	0.0360	0.0195	-0.1563	5.072
-25.982	40.16	50.88	0.0033	0.0425	0.0228	-0.2270	6.470
$\alpha_{TX100} = 0.08$							
0.122	74.44	15.61	0.0059	0.0118	0.0089	0.0029	-0.016
-2.597	74.44	23.29	0.0059	0.0176	0.0119	-0.0060	0.349
-9.038	74.44	30.99	0.0059	0.0235	0.0149	-0.0209	1.214
-15.580	74.44	38.63	0.0059	0.0293	0.0179	-0.0413	2.093
-21.233	74.44	46.44	0.0059	0.0351	0.0209	-0.0680	2.852
-25.700	74.44	53.77	0.0059	0.0408	0.0238	-0.0994	3.452
$\alpha_{TX100} = 0.07$							
-0.887	147.06	20.07	0.0117	0.0159	0.0138	0.0109	0.060
-3.141	147.06	25.21	0.0117	0.0200	0.0158	0.0087	0.214

-6.268	147.06	29.89	0.0117	0.0238	0.0177	0.0054	0.426
-8.853	147.06	34.67	0.0117	0.0277	0.0197	0.0007	0.602
-11.431	147.06	39.68	0.0117	0.0317	0.0216	-0.0055	0.777
-13.811	147.06	44.43	0.0117	0.0355	0.0235	-0.0127	0.939
-16.152	147.06	49.50	0.0117	0.0395	0.0255	-0.0215	1.098
$\alpha_{\text{TX100}} = 0.05$							
-5.723	144.51	30.28	0.0114	0.0226	0.0171	0.0056	0.396
-9.970	144.51	37.86	0.0114	0.0282	0.0200	-0.0014	0.690
-12.897	144.51	44.02	0.0114	0.0327	0.0223	-0.0093	0.892
-15.411	144.51	50.05	0.0114	0.0372	0.0246	-0.0188	1.066
-17.799	144.51	56.15	0.0114	0.0416	0.0269	-0.0300	1.232
-20.167	144.51	61.74	0.0114	0.0460	0.0291	-0.0430	1.396
$\alpha_{\text{TX100}} = 0.03$							
-0.397	197.84	22.84	0.0155	0.0179	0.0167	0.0154	0.020
-1.941	197.84	27.86	0.0155	0.0218	0.0187	0.0143	0.098
-3.689	197.84	32.88	0.0155	0.0258	0.0207	0.0122	0.186
-5.318	197.84	37.84	0.0155	0.0297	0.0226	0.0091	0.269
-6.901	197.84	42.44	0.0155	0.0337	0.0246	0.0050	0.349
-8.451	197.84	47.69	0.0155	0.0375	0.0265	0.0000	0.427
-9.845	197.84	52.47	0.0155	0.0415	0.0285	-0.0060	0.498
DTAB $\alpha_{\text{TX100}} = 0$							
-1.123	301.69	40.76	0.0209	0.0309	0.0257	0.0186	0.037
-3.370	301.69	53.46	0.0209	0.0406	0.0303	0.0120	0.112
-6.483	301.69	66.11	0.0209	0.0503	0.0349	0.0011	0.216
-10.029	301.69	78.60	0.0209	0.0597	0.0394	-0.0136	0.338
-14.585	301.69	90.59	0.0209	0.0694	0.0439	-0.0326	0.484

Table S3 The total surfactant concentrations (c), the mixed enthalpies (ΔH), and the molar mixed enthalpies ($\frac{\Delta H}{\sum n_i}$) for DTAB/TX100 mixed micelles (the TX100 mole fraction in the total mixed surfactants α_{TX100} is 0.6) measured by ITC at 298.15 K and 85 kPa. The concentration of the surfactant in the ampoule before the titration c_0 is 0.0010 mol·L⁻¹.

titration number	c (mol·L ⁻¹)	ΔH (mJ)	$\beta = [\frac{\sum n_i + n_0}{\sum n_i} c_i - \frac{n_0}{\sum n_i} c_0]$ (mol·L ⁻¹)	$\frac{\Delta H}{\sum n_i}$ (kJ·mol ⁻¹)
1	0.0021	0.376	0.0031	-0.157
2	0.0031	0.566	0.0041	-0.118
3	0.0040	0.539	0.0050	-0.075

4	0.0050	0.342	0.0060	-0.036
5	0.0060	0.028	0.0069	-0.002
6	0.0069	-0.379	0.0079	0.026
7	0.0078	-0.884	0.0088	0.053
8	0.0087	-1.449	0.0097	0.075
9	0.0096	-2.060	0.0106	0.095
10	0.0105	-2.731	0.0114	0.114
11	0.0113	-3.427	0.0123	0.130
12	0.0122	-4.155	0.0131	0.144
13	0.0130	-4.873	0.0140	0.156
14	0.0139	-5.617	0.0148	0.167
15	0.0147	-6.370	0.0156	0.177
16	0.0155	-7.122	0.0164	0.185
17	0.0162	-7.901	0.0171	0.194
18	0.0170	-8.655	0.0179	0.200
19	0.0178	-9.395	0.0187	0.206
20	0.0185	-10.151	0.0194	0.211
21	0.0193	-10.901	0.0201	0.216
22	0.0200	-11.630	0.0209	0.220
23	0.0207	-12.371	0.0216	0.224
24	0.0214	-13.099	0.0223	0.227
25	0.0221	-13.823	0.0230	0.230
26	0.0228	-14.542	0.0237	0.233
27	0.0235	-15.277	0.0243	0.236
28	0.0242	-15.999	0.0250	0.238
29	0.0248	-16.746	0.0257	0.241
30	0.0255	-17.420	0.0263	0.242
31	0.0261	-18.130	0.0269	0.244
32	0.0268	-18.807	0.0276	0.245
33	0.0274	-19.474	0.0282	0.246
34	0.0280	-20.130	0.0288	0.247
35	0.0286	-20.725	0.0294	0.247
36	0.0292	-21.245	0.0300	0.246
37	0.0298	-22.081	0.0306	0.249
38	0.0304	-22.618	0.0312	0.248
39	0.0310	-22.802	0.0317	0.244
40	0.0315	-23.434	0.0323	0.244
41	0.0321	-23.973	0.0329	0.244
42	0.0327	-24.423	0.0334	0.242
43	0.0332	-24.949	0.0340	0.242
44	0.0338	-25.505	0.0345	0.241
45	0.0343	-25.759	0.0350	0.238
46	0.0348	-25.732	0.0356	0.233

Table S4 The total surfactant concentrations (c), the mixed enthalpies (ΔH), and the molar mixed enthalpies ($\frac{\Delta H}{\sum n_i}$) for DTAB/TX100 mixed micelles (the TX100 mole fraction in the total mixed surfactants α_{TX100} is 0.33) measured by ITC at 298.15 K and 85 kPa. The concentration of the surfactant in the ampoule before the titration c_0 is 0.0021 mol·L⁻¹.

titration number	c (mol·L ⁻¹)	ΔH (mJ)	$\beta = [\frac{\sum n_i + n_0}{\sum n_i} c_i - \frac{n_0}{\sum n_i} c_0]$ (mol·L ⁻¹)	$\frac{\Delta H}{\sum n_i}$ (kJ·mol ⁻¹)
1	0.0031	-1.209	0.0051	0.504
2	0.0040	-2.848	0.0060	0.593
3	0.0050	-4.700	0.0070	0.653
4	0.0060	-6.698	0.0079	0.698
5	0.0069	-8.798	0.0088	0.733
6	0.0078	-10.985	0.0097	0.763
7	0.0087	-13.202	0.0106	0.786
8	0.0096	-15.476	0.0115	0.806
9	0.0105	-17.747	0.0124	0.822
10	0.0113	-20.034	0.0132	0.835
11	0.0122	-22.273	0.0140	0.844
12	0.0130	-24.442	0.0149	0.849
13	0.0139	-26.582	0.0157	0.852
14	0.0147	-28.680	0.0165	0.853
15	0.0155	-30.763	0.0172	0.854
16	0.0162	-32.758	0.0180	0.853
17	0.0170	-34.722	0.0188	0.851
18	0.0178	-36.622	0.0195	0.848
19	0.0185	-38.471	0.0203	0.844
20	0.0193	-40.251	0.0210	0.838
21	0.0200	-41.986	0.0217	0.833
22	0.0207	-43.631	0.0224	0.826
23	0.0214	-45.246	0.0231	0.820
24	0.0221	-46.821	0.0238	0.813
25	0.0228	-48.321	0.0245	0.805
26	0.0235	-49.806	0.0252	0.798
27	0.0242	-51.229	0.0258	0.790
28	0.0248	-52.581	0.0265	0.782
29	0.0255	-53.933	0.0271	0.775
30	0.0261	-55.220	0.0277	0.767
31	0.0268	-56.498	0.0284	0.759
32	0.0274	-57.722	0.0290	0.751

33	0.0280	-58.946	0.0296	0.744
34	0.0286	-60.085	0.0302	0.736
35	0.0292	-61.176	0.0308	0.728
36	0.0298	-62.629	0.0314	0.725
37	0.0304	-63.550	0.0319	0.716
38	0.0310	-64.681	0.0325	0.709
39	0.0315	-65.559	0.0331	0.700
40	0.0321	-66.564	0.0336	0.693
41	0.0327	-67.543	0.0342	0.686
42	0.0332	-68.632	0.0347	0.681
43	0.0338	-69.709	0.0352	0.675
44	0.0343	-70.398	0.0358	0.667
45	0.0348	-70.383	0.0363	0.652

Table S5 The total surfactant concentrations (c), the mixed enthalpies (ΔH), and the molar mixed enthalpies ($\frac{\Delta H}{\sum n_i}$) for DTAB/TX100 mixed micelles (the TX100 mole fraction in the total mixed surfactants is 0.2) measured by ITC at 298.15 K and 85 kPa. The concentration of the surfactant in the ampoule before the titration c_0 is 0.0021 mol·L⁻¹.

titration number	c	ΔH	$\beta = [\frac{\sum n_i + n_0}{\sum n_i} c_i - \frac{n_0}{\sum n_i} c_0]$	$\frac{\Delta H}{\sum n_i}$
	(mol·L ⁻¹)	(mJ)	(mol·L ⁻¹)	(kJ·mol ⁻¹)
1	0.0032	-2.720	0.0053	1.088
2	0.0042	-5.799	0.0063	1.160
3	0.0052	-8.928	0.0073	1.190
4	0.0062	-12.196	0.0082	1.219
5	0.0072	-15.954	0.0092	1.276
6	0.0081	-19.549	0.0101	1.303
7	0.0091	-23.252	0.0111	1.328
8	0.0100	-27.170	0.0120	1.358
9	0.0109	-30.874	0.0129	1.372
10	0.0118	-34.419	0.0138	1.377
11	0.0127	-38.127	0.0146	1.386
12	0.0136	-41.503	0.0155	1.383
13	0.0144	-44.778	0.0163	1.378
14	0.0153	-47.707	0.0172	1.363
15	0.0161	-50.808	0.0180	1.355
16	0.0169	-53.912	0.0188	1.348
17	0.0177	-56.744	0.0196	1.335
18	0.0185	-59.479	0.0203	1.322

19	0.0193	-62.094	0.0211	1.307
20	0.0201	-64.625	0.0219	1.292
21	0.0208	-67.030	0.0226	1.277
22	0.0216	-69.248	0.0234	1.259
23	0.0223	-71.476	0.0241	1.243
24	0.0231	-73.648	0.0248	1.227
25	0.0238	-75.606	0.0255	1.210
26	0.0245	-77.547	0.0262	1.193
27	0.0252	-79.400	0.0269	1.176
28	0.0259	-81.306	0.0276	1.161
29	0.0265	-83.036	0.0282	1.145
30	0.0272	-84.793	0.0289	1.130
31	0.0279	-86.489	0.0295	1.116
32	0.0285	-88.055	0.0302	1.101
33	0.0292	-89.676	0.0308	1.087
34	0.0298	-91.185	0.0314	1.073
35	0.0304	-92.529	0.0321	1.057
36	0.0311	-93.920	0.0327	1.043
37	0.0317	-95.288	0.0333	1.030
38	0.0323	-96.768	0.0339	1.018
39	0.0329	-98.362	0.0344	1.009
40	0.0334	-99.253	0.0350	0.992
41	0.0340	-100.738	0.0356	0.983
42	0.0346	-102.360	0.0361	0.975
43	0.0352	-104.827	0.0367	0.975
44	0.0357	-105.027	0.0372	0.955
45	0.0363	-105.033	0.0378	0.933
