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APPENDICES

Appendix A Adsorption Isotherm of Surfactant Solution

Table A1 Data for SDS adsorption at pH of 5 on carbon black at 30 °C

Weight of carbon black = 2.5g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,000	44.6213	1,955.3787	0.1629
3,000	66.4562	2,933.5438	0.2445
3,500	75.7124	3,424.2876	0.2854
4,000	77.4854	3,922.5146	0.3269
4,500	90.8623	4,409.1377	0.3674
5,000	92.9686	4,907.0314	0.4089
5,500	100.4422	5,399.5578	0.4500
6,000	103.5124	5,896.4876	0.4914
6,500	160.1456	6,339.8544	0.5283
7,500	350.2114	7,149.7886	0.5958
8,000	436.2889	7,563.7111	0.6303
8,500	462.4542	8,037.5458	0.6698
9,000	511.4787	8,488.5213	0.7074
9,500	623.7445	8,876.2555	0.7397
10,000	764.3252	9,235.6748	0.7696
11,000	920.4523	10,079.5477	0.8400
12,000	1,314.3562	10,685.6438	0.8905
13,000	1,498.2536	11,501.7464	0.9585
14,000	1795.2362	12,204.7638	1.0171
15,000	1,849.2110	13,150.7890	1.0959
16,000	2,315.2554	13,684.7446	1.1404
17,000	3,002.4546	13,997.5454	1.1665
18,000	3,196.2765	14,803.7235	1.2336
19,000	3,371.2325	15,628.7675	1.3024
20,000	3,462.3255	16,537.6745	1.3781
21,000	3,785.2115	17,214.7885	1.4346
22,000	3,911.1204	18,088.8796	1.5074
23,000	4278.0581	18,721.9419	1.5602
25,000	5,469.1115	19,530.8885	1.6276
26,000	5,972.4543	20,027.5457	1.6690
30,000	7,574.4520	22,425.5480	1.8688
35,000	9,013.1221	25,986.8779	2.1656
40,000	14,078.2986	25,921.7014	2.1601
50,000	24,596.8420	25,403.1580	2.1169
60,000	34,271.6350	25,728.3650	2.1440

Table A2 Data for SDS adsorption at pH of 7 on carbon black at 30 °C

Weight of carbon black = 2.5g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,000	50.1275	1,949.8725	0.1625
2,500	55.1759	2,444.8241	0.2037
3,000	55.0175	2,934.9825	0.2446
3,500	70.8345	3,429.1655	0.2858
4,000	90.3108	3,909.6892	0.3258
4,500	101.2659	4,398.7341	0.3666
5,000	124.4092	4,875.5908	0.4063
5,400	148.5002	5,251.4998	0.4376
5,500	160.6001	5,339.3999	0.4449
6,000	201.9987	5,798.0013	0.4832
6,500	243.0582	6,256.9418	0.5214
7,500	459.4812	7,040.5188	0.5867
8,000	482.2458	7,517.7542	0.6265
8,500	625.3801	7,874.6199	0.6562
9,000	674.0243	8,325.9757	0.6938
9,500	712.1359	8,787.8641	0.7323
10,000	877.1724	9,122.8276	0.7602
11,000	1,229.8132	9,770.1868	0.8142
12,000	1,642.8232	10,357.1768	0.8631
13,000	1,911.3548	11,088.6452	0.9241
14,000	2,289.7901	11,710.2099	0.9759
15,000	2,553.1278	12,446.8722	1.0372
16,000	2,907.7001	13,092.2999	1.0910
17,000	3,373.1221	13,626.8779	1.1356
18,000	3,671.1123	14,328.8877	1.1941
19,000	4,072.9901	14,927.0099	1.2439
20,000	4,344.2310	15,655.7690	1.3046
21,000	4,726.7516	16,273.2484	1.3561
22,000	5,090.2265	16,909.7735	1.4091
23,000	5,308.2310	17,691.7690	1.4743
25,000	5,919.1101	19,080.8899	1.5901
26,000	6,498.5642	19,501.4358	1.6251
30,000	8,130.9513	21,869.0487	1.8224
35,000	10,095.3210	24,904.6790	2.0754
40,000	15,082.0892	24,917.9108	2.0765
50,000	25,065.3510	24,934.6490	2.0779
60,000	34,924.3890	25,075.6110	2.0896

Table A3 Data for SDS adsorption at pH of 9 on carbon black at 30 °C

Weight of carbon black = 2.5g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,500	57.0301	2,442.9699	0.2036
3,000	64.5181	2,935.4819	0.2446
3,500	68.3972	3,431.6028	0.2860
4,000	97.0241	3,902.9759	0.3252
4,500	103.0455	4,396.9545	0.3664
5,000	140.1295	4,859.8705	0.4050
5,500	201.5783	5,298.4217	0.4415
6,000	260.8988	5,739.1012	0.4783
6,500	327.5447	6,172.4553	0.5144
7,500	484.8449	7,015.1551	0.5846
8,000	623.8987	7,376.1013	0.6147
8,500	688.5211	7,811.4789	0.6510
9,000	845.0354	8,154.9646	0.6796
9,500	969.0115	8,530.9885	0.7109
10,000	1,096.5481	8,903.4519	0.7420
11,000	1,384.3544	9,615.6456	0.8013
12,000	1,807.4561	10,192.5439	0.8494
13,000	2,117.6422	10,882.3578	0.9069
14,000	2,537.2011	11,462.7989	0.9552
15,000	2,905.6001	12,094.3999	1.0079
16,000	3,204.4035	12,795.5965	1.0663
17,000	3,558.2431	13,441.7569	1.1201
18,000	3,909.0801	14,090.9199	1.1742
19,000	4,424.3115	14,575.6885	1.2146
20,000	4,786.3225	15,213.6775	1.2678
21,000	5,198.4001	15,801.5999	1.3168
22,000	5,680.6125	16,319.3875	1.3599
23,000	5,823.3255	17,176.6745	1.4314
24,000	5,933.7315	18,066.2685	1.5055
25,000	6,144.1754	18,855.8246	1.5713
26,000	6,761.4821	19,238.5179	1.6032
28,000	7,488.0824	20,511.9176	1.7093
30,000	8,410.0765	21,589.9235	1.7992
35,000	11,290.9010	23,709.0990	1.9758
40,000	15,584.1801	24,415.8199	2.0347
50,000	25,299.9551	24,700.0449	2.0583
60,000	35,251.2654	24,748.7346	2.0624

Table A4 Data for SDS adsorption at pH of 11 on carbon black at 30 °C

Weight of carbon black = 2.5g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,000	50.1275	1,949.8725	0.1625
2,500	59.6312	2,440.3688	0.2034
3,000	65.7569	2,934.2431	0.2445
3,500	103.7154	3,396.2846	0.2830
4,000	104.2453	3,895.7547	0.3246
4,500	155.2235	4,344.7765	0.3621
5,000	197.3652	4,802.6348	0.4002
5,400	210.3600	5,189.6400	0.4325
5,500	242.1252	5,257.8748	0.4382
6,000	318.9932	5,681.0068	0.4734
6,500	412.5235	6,087.4765	0.5073
7,500	510.2314	6,989.7686	0.5825
8,000	765.4236	7,234.5764	0.6029
8,500	751.2143	7,748.7857	0.6457
9,000	1,017.3700	7,982.6348	0.6652
9,500	1,224.5400	8,275.4637	0.6896
10,000	1,315.2500	8,684.7453	0.7237
11,000	1,538.6522	9,461.3478	0.7884
12,000	1,973.2114	10,026.7886	0.8356
13,000	2,323.4177	10,676.5823	0.8897
14,000	2784.1141	11,215.8859	0.9347
15,000	3,259.4145	11,740.5855	0.9784
16,000	3,501.2455	12,498.7545	1.0416
17,000	3,743.5472	13,256.4528	1.1047
18,000	4,147.3561	13,852.6439	1.1544
19,000	4,775.6582	14,224.3418	1.1854
20,000	5,229.3541	14,770.6459	1.2309
21,000	5,671.8951	15,328.1049	1.2773
22,000	6,272.6621	15,727.3379	1.3106
23,000	6338.4012	16,661.5988	1.3885
25,000	6,371.3514	18,628.6486	1.5524
26,000	7,025.4421	18,974.5579	1.5812
30,000	8,689.2018	21,310.7982	1.7759
35,000	12,488.1323	22,511.8677	1.8760
40,000	14,588.2311	25,411.7689	2.1176
50,000	24,237.3510	25,762.6490	2.1469
60,000	34,259.6641	25,740.3359	2.1450

Table A5 Data for CTAB adsorption at pH of 5 on carbon black at 30 °C

Weight of carbon black = 0.5g, Volume of solution = 10 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
5,000	0.0000	5,000.0000	1.0417
10,000	0.0000	10,000.0000	2.0833
15,000	0.0000	15,000.0000	3.1250
20,000	0.0000	20,000.0000	4.1667
25,000	0.0000	25,000.0000	5.2083
26,000	0.0000	26,000.0000	5.4167
27,000	2.8542	26,997.1458	5.6244
29,000	1,921.1500	27,078.8544	5.6414
30,000	2,643.7500	27,356.2479	5.6992
32,000	4,342.4500	27,657.5468	5.7620
34,000	5,684.3200	28,315.6786	5.8991
36,000	6,641.5400	29,358.4577	6.1163
37,000	7,264.2100	29,735.7857	6.1950
38,000	7,932.7900	30,067.2135	6.2640
40,000	9,556.3200	30,443.6786	6.3424
41,000	11,086.4400	29,913.5579	6.2320
42,000	12,048.3400	29,951.6572	6.2399
43,000	13,052.7800	29,947.2158	6.2390
44,000	13,954.6547	30,045.3453	6.2594
45,000	14,920.6425	30,079.3575	6.2665
46,000	15,984.8452	30,015.1548	6.2532
47,000	16976.3152	30,023.6848	6.2549
48,000	17,984.4462	30,015.5538	6.2532
49,000	19,062.5623	29,937.4377	6.2370
50,000	19,985.1213	30,014.8787	6.2531
52,000	21,815.6547	30,184.3453	6.2884
54,000	23,852.4137	30,147.5863	6.2807
80,000	49,842.4578	30,157.5422	6.2828
90,000	59,964.4463	30,035.5537	6.2574
100,000	69,972.5541	30,027.4459	6.2557
110,000	80,654.2145	29,345.7855	6.1137

Table A6 Data for CTAB adsorption at pH of 7 on carbon black at 30 °C
 Weight of carbon black = 0.5g, Volume of solution = 10 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
5,000	0.0000	5,000.0000	1.0417
10,000	0.0000	10,000.0000	2.0833
15,000	0.0000	15,000.0000	3.1250
20,000	0.0000	20,000.0000	4.1667
25,000	0.0000	25,000.0000	5.2083
26,000	0.0000	26,000.0000	5.4167
27,000	0.0000	27,000.0000	5.6250
29,000	9.7436	28,990.2564	6.0396
30,000	4.2513	29,995.7487	6.2491
32,000	7.0432	31,992.9568	6.6652
34,000	31.7464	33,968.2536	7.0767
36,000	2024.4544	33,975.5456	7.0782
37,000	3015.5642	33,984.4358	7.0801
38,000	5306.4512	32,693.5488	6.8112
40,000	7614.6578	32,385.3422	6.7469
41,000	8852.4532	32,147.5468	6.6974
42,000	10224.6754	31,775.3246	6.6199
43,000	10936.5782	32,063.4218	6.6799
44,000	11995.2135	32,004.7865	6.6677
45,000	12946.4586	32,053.5414	6.6778
46,000	14266.2154	31,733.7846	6.6112
47,000	14935.5487	32,064.4513	6.6801
48,000	15962.4543	32,037.5457	6.6745
49,000	16923.7456	32,076.2544	6.6826
50,000	17940.5487	32,059.4513	6.6791
52,000	19956.2345	32,043.7655	6.6758
54,000	21753.4213	32,246.5787	6.7180
80,000	47915.4632	32,084.5368	6.6843
90,000	57971.7982	32,028.2018	6.6725
100,000	68543.1456	31,456.8544	6.5535
110,000	79285.1142	30,714.8858	6.3989

Table A7 Data for CTAB adsorption at pH of 9 on carbon black at 30 °C

Weight of carbon black = 0.5g, Volume of solution = 10 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
5,000	0.0000	5,000.0000	1.0417
10,000	0.0000	10,000.0000	2.0833
15,000	0.0000	15,000.0000	3.1250
20,000	0.0000	20,000.0000	4.1667
25,000	0.0000	25,000.0000	5.2083
26,000	0.0000	26,000.0000	5.4167
27,000	0.0000	27,000.0000	5.6250
29,000	0.1156	28,999.8844	6.0416
30,000	0.1853	29,999.8147	6.2500
32,000	0.2047	31,999.7953	6.6666
34,000	9.5463	33,990.4537	7.0813
36,000	1513.3216	34,486.6784	7.1847
37,000	1804.4786	35,195.5214	7.3324
38,000	3053.1236	34,946.8764	7.2806
40,000	5312.8562	34,687.1438	7.2265
41,000	6536.4483	34,463.5517	7.1799
42,000	7874.2456	34,125.7544	7.1095
43,000	8675.4132	34,324.5868	7.1510
44,000	9587.8746	34,412.1254	7.1692
45,000	10674.4562	34,325.5438	7.1512
46,000	11641.7841	34,358.2159	7.1580
47,000	12665.8841	34,334.1159	7.1529
48,000	13675.9752	34,324.0248	7.1508
49,000	14522.4862	34,477.5138	7.1828
50,000	15793.5412	34,206.4588	7.1263
52,000	17745.9543	34,254.0457	7.1363
54,000	19945.6521	34,054.3479	7.0947
80,000	45713.8743	34,286.1257	7.1429
90,000	55742.5432	34,257.4568	7.1370
100,000	65543.1456	34,456.8544	7.1785
110,000	76243.5412	33,756.4588	7.0326

Table A8 Data for CTAB adsorption at pH of 11 on carbon black at 30 °C

Weight of carbon black = 0.5g, Volume of solution = 10 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
5,000	0.0000	5,000.0000	1.0417
10,000	0.0000	10,000.0000	2.0833
15,000	0.0000	15,000.0000	3.1250
20,000	0.0000	20,000.0000	4.1667
25,000	0.0000	25,000.0000	5.2083
26,000	0.0000	26,000.0000	5.4167
27,000	0.0000	27,000.0000	5.6250
29,000	0.0000	29,000.0000	6.0417
30,000	0.0000	30,000.0000	6.2500
32,000	0.0000	32,000.0000	6.6667
34,000	9.1214	33,990.8786	7.0814
36,000	235.5478	35,764.4522	7.4509
37,000	184.5498	36,815.4502	7.6699
38,000	986.2513	37,013.7487	7.7112
40,000	3,186.4458	36,813.5542	7.6695
41,000	4,282.7882	36,717.2118	7.6494
42,000	5,212.3564	36,787.6436	7.6641
43,000	6,156.3542	36,843.6458	7.6758
44,000	7,345.5782	36,654.4218	7.6363
45,000	8,224.5472	36,775.4528	7.6616
46,000	9,197.4754	36,802.5246	7.6672
47,000	10,422.3585	36,577.6415	7.6203
48,000	11,347.6598	36,652.3402	7.6359
49,000	12,362.4873	36,637.5127	7.6328
50,000	13,275.2658	36,724.7342	7.6510
52,000	15,372.5482	36,627.4518	7.6307
54,000	17,323.2414	36,676.7586	7.6410
80,000	43,284.6547	36,715.3453	7.6490
90,000	53,356.4723	36,643.5277	7.6341
100,000	65,093.5784	34,906.4216	7.2722
110,000	75,903.4527	34,096.5473	7.1034

Table A9 Data for SDS adsorption at pH of 5 on polyester fiber(surface area of polyester fiber = $2.5 \text{ m}^2/\text{g}$) at $30 \text{ }^\circ\text{C}$

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,500	2,489.2145	10.7855	0.0863
2,750	2,736.4263	13.5738	0.1086
3,000	2,986.1504	13.8496	0.1108
3,500	3,484.6235	15.3765	0.1230
4,000	3,982.6128	17.3872	0.1391
4,500	4,480.3656	19.6344	0.1571
5,000	4,977.2565	22.7435	0.1819
5,400	5,374.5458	25.4542	0.2036
5,500	5,470.6549	29.3452	0.2348
6,000	5,967.2233	32.7767	0.2622
6,500	6,457.8236	42.1764	0.3374
7,500	7,449.1545	50.8455	0.4068
8,000	7,932.0323	67.9677	0.5437
8,500	8,429.5625	70.4375	0.5635
9,000	8,207.2544	792.7456	6.3420
9,500	9,413.3544	86.6456	0.6932
10,000	9,901.8211	98.1789	0.7854
11,000	10,893.4454	106.5546	0.8524
12,000	11,988.8467	11.1533	0.0892
13,000	12,888.2547	111.7453	0.8940
14,000	13,887.8654	112.1346	0.8971
15,000	14,887.8555	112.1445	0.8972
16,000	15,887.5541	112.4459	0.8996
17,000	16,887.6547	112.3454	0.8988
18,000	17,887.9326	112.0674	0.8965
19,000	18,888.0982	111.9018	0.8952
20,000	19,887.8452	112.1548	0.8972

Table A10 Data for SDS adsorption at pH of 7 on polyester fiber(surface area of polyester fiber = 2.5 m²/g) at 30 °C

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density (μmole/m ²)
2,500	2,493.3300	6.6675	0.0533
2,750	2,740.4300	9.5674	0.0765
3,000	2,989.2800	10.7155	0.0857
3,500	3,385.2100	114.7870	0.9183
4,000	3,986.4200	13.5786	0.1086
4,500	4,485.1300	14.8674	0.1189
5,000	4,983.2600	16.7435	0.1339
5,400	5,380.6500	19.3542	0.1548
5,500	5,478.7400	21.2649	0.1701
6,000	5,972.8300	27.1746	0.2174
6,500	6,463.2100	36.7888	0.2943
7,500	7,452.3400	47.6621	0.3813
8,000	7,939.9200	60.0764	0.4806
8,500	8,435.9500	64.0523	0.5124
9,000	8,926.3500	73.6522	0.5892
9,500	9,418.9000	81.0989	0.6488
10,000	9,909.6548	90.3452	0.7228
11,000	10,906.4988	93.5012	0.7480
12,000	11,902.6654	97.3346	0.7787
13,000	12,894.4324	105.5676	0.8445
14,000	13894.2654	105.7346	0.8459
15,000	14,894.5321	105.4679	0.8437
16,000	15,894.2355	105.7645	0.8461
17,000	16,894.4231	105.5769	0.8446
18,000	17,893.8350	106.1650	0.8493
19,000	18,893.8654	106.1346	0.8491
20,000	19,894.1323	105.8678	0.8469

Table A11 Data for SDS adsorption at pH of 9 on polyester fiber(surface area of polyester fiber = $2.5 \text{ m}^2/\text{g}$) at $30 \text{ }^\circ\text{C}$

Weight of polyester fiber = 1g, Volume of solution = 20 ml.

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,500	2495.7100	4.2900	0.0343
2,750	2743.6214	6.3786	0.0510
3,000	2992.5325	7.4675	0.0597
3,500	3492.0564	7.9436	0.0635
4,000	3989.6755	10.3245	0.0826
4,500	4488.2587	11.7413	0.0939
5,000	4986.0643	13.9357	0.1115
5,400	5385.0036	14.9964	0.1200
5,500	5482.4653	17.5347	0.1403
6,000	5977.8321	22.1679	0.1773
6,500	6468.7226	31.2774	0.2502
7,500	7458.9548	41.0452	0.3284
8,000	7952.2547	47.7453	0.3820
8,500	8446.5545	53.4455	0.4276
9,000	8941.4544	58.5456	0.4684
9,500	9434.9879	65.0122	0.5201
10,000	9925.4367	74.5634	0.5965
11,000	10916.6553	83.3447	0.6668
12,000	11916.4541	83.5459	0.6684
13,000	12916.7782	83.2218	0.6658
14,000	13915.9655	84.0345	0.6723
15,000	14916.8231	83.1769	0.6654
16,000	15916.9544	83.0456	0.6644
17,000	16916.9215	83.0785	0.6646
18,000	17916.5231	83.4769	0.6678
19,000	18917.0655	82.9345	0.6635
20,000	19916.5325	83.4675	0.6677

Table A12 Data for SDS adsorption at pH of 11 on polyester fiber(surface area of polyester fiber = $2.5 \text{ m}^2/\text{g}$) at $30 \text{ }^\circ\text{C}$

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial SDS concentration (μM)	Final SDS concentration (μM)	Different SDS concentration (μM)	SDS adsorption density ($\mu\text{mole}/\text{m}^2$)
2,500	2,497.7252	2.2748	0.0182
2,750	2,747.0152	2.9848	0.0239
3,000	2,996.0033	3.9967	0.0320
3,500	3,494.8544	5.1456	0.0412
4,000	3,993.2557	6.7443	0.0540
4,500	4,492.2599	7.7401	0.0619
5,000	4,990.0422	9.9578	0.0797
5,400	5,389.3621	10.6379	0.0851
5,500	5,487.6549	12.3451	0.0988
6,000	5,832.4663	167.5337	1.3403
6,500	6,471.7984	28.2016	0.2256
7,500	7,466.3745	33.6255	0.2690
8,000	7,961.6154	38.3846	0.3071
8,500	8,457.5625	42.4375	0.3395
9,000	8,954.5935	45.4065	0.3633
9,500	9,449.2436	50.7564	0.4061
10,000	9,942.5652	57.4348	0.4595
11,000	10,929.4545	70.5455	0.5644
12,000	11,928.3754	71.6246	0.5730
13,000	12,927.6322	72.3679	0.5789
14,000	13927.7453	72.2547	0.5780
15,000	14,927.7113	72.2887	0.5783
16,000	15,927.6132	72.3868	0.5791
17,000	16,927.8516	72.1485	0.5772
18,000	17,927.9541	72.0459	0.5764
19,000	18,927.5244	72.4756	0.5798
20,000	19,927.6889	72.3111	0.5785

Table A13 Data for CTAB adsorption at pH of 5 on polyester fiber(surface area of polyester fiber = $2.5 \text{ m}^2/\text{g}$) at $30 \text{ }^\circ\text{C}$

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
50	46.8673	3.1327	0.0251
100	90.6789	9.3211	0.0746
300	271.1301	28.8699	0.2310
700	631.5006	68.4994	0.5480
900	810.4879	89.5121	0.7161
1,000	901.1711	98.8289	0.7906
1,200	1080.5669	119.4331	0.9555
1,800	1629.3744	170.6256	1.3650
2,000	1825.1152	174.8848	1.3991
2,500	2283.7546	216.2454	1.7300
3,000	2752.6808	247.3192	1.9786
3,500	3235.5482	264.4518	2.1156
4,000	3708.34421	291.6558	2.3332
4,500	4200.654	299.3460	2.3948
5,000	4700.45618	299.5438	2.3964
6,000	5701.41325	298.5868	2.3887
7,000	6,702.6351	297.3649	2.3789
8,000	7,702.1546	297.8454	2.3828

Table A14 Data for CTAB adsorption at pH of 7 on polyester fiber(surface area of polyester fiber = $2.5 \text{ m}^2/\text{g}$) at $30 \text{ }^\circ\text{C}$

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density ($\mu\text{mole}/\text{m}^2$)
50	47.13812	2.8619	0.0229
100	90.45623	9.5438	0.0764
300	210.8132	89.1868	0.7135
700	630.61434	69.3857	0.5551
900	813.4338	86.5662	0.6925
1,000	901.16813	98.8319	0.7907
1,200	1089.58982	110.4102	0.8833
1,800	1631.71481	168.2852	1.3463
2,000	1818.63893	181.3611	1.4509
2,500	2279.22584	220.7742	1.7662
3,000	2729.22582	270.7742	2.1662
3,500	3207.6776	292.3224	2.3386
4,000	3369.32463	630.6754	5.0454
4,500	4140.06367	359.9363	2.8795
5,000	4641.6321	358.3679	2.8669
6,000	5640.54475	359.4553	2.8756
7,000	6,645.6351	354.3649	2.8349
8,000	7,639.1546	360.8454	2.8868

Table A15 Data for CTAB adsorption at pH of 9 on polyester fiber(surface area of polyester fiber = 2.5 m²/g) at 30 °C

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density (μmole/m ²)
50	47.35425	2.6458	0.0212
100	90.56754	9.4325	0.0755
300	270.82036	29.1796	0.2334
700	630.60001	69.4000	0.5552
900	813.03214	86.9679	0.6957
1,000	900.94365	99.0564	0.7925
1,200	1089.05412	110.9459	0.8876
1,800	1630.84563	169.1544	1.3532
2,000	1817.56543	182.4346	1.4595
2,500	2277.83142	222.1686	1.7773
3,000	2727.46532	272.5347	2.1803
3,500	3191.29601	308.7040	2.4696
4,000	3648.21354	351.7865	2.8143
4,500	4124.56367	375.4363	3.0035
5,000	4601.644573	398.3554	3.1868
6,000	5601.84657	398.1534	3.1852
7,000	6,601.3466	398.6534	3.1892
8,000	7,600.3488	399.6512	3.1972

Table A16 Data for CTAB adsorption at pH of 11 on polyester fiber(surface area of polyester fiber = 2.5 m²/g) at 30 °C

Weight of polyester fiber = 1g, Volume of solution = 20 ml

Initial CTAB concentration (μM)	Final CTAB concentration (μM)	Different CTAB concentration (μM)	CTAB adsorption density (μmole/m ²)
50	47.24681	2.7532	0.0220
100	90.4357	9.5643	0.0765
300	270.76546	29.2345	0.2339
700	630.51423	69.4858	0.5559
900	812.84563	87.1544	0.6972
1,000	900.91354	99.0865	0.7927
1,200	1088.84513	111.1549	0.8892
1,800	1629.75442	170.2456	1.3620
2,000	1817.02314	182.9769	1.4638
2,500	2276.54698	223.4530	1.7876
3,000	2726.85641	273.1436	2.1851
3,500	3176.85648	323.1435	2.5851
4,000	3624.83621	375.1638	3.0013
4,500	4098.64787	401.3521	3.2108
5,000	4587.04573	412.9543	3.3036
6,000	5580.26532	419.7347	3.3579
7,000	6,580.3647	419.6353	3.3571
8,000	7,580.0477	419.9523	3.3596

Appendix B Zeta Potential Measurement

Table B1 Data for zeta potential measurement of carbon black at pH of 5 and variable SDS at 30°C
 Weight of carbon black = 1.5 mg, Volume of suspension = 40 ml

SDS Concentration (μM)	1,000	2,000	4,000	8,000	12,000	14,000	16,000	18,000	20,000	
(-) Zeta potential (mV)	1	20.3	21.7	23.4	25.2	31.3	32.8	33.2	34.1	34.2
	2	20.2	21.9	23.6	25.4	31.2	32.7	33.4	33.9	34.1
	3	20.4	21.6	23.1	25.6	31.4	32.6	33.3	33.8	34.2
	4	20.5	21.4	23.7	25.3	31.2	32.8	33.3	34.2	34.6
	5	19.9	21.5	23.4	25.1	31.1	32.4	33.6	33.9	33.8
	6	20.1	21.6	23.2	25.1	30.9	32.6	33.7	33.8	33.9
	7	20.6	21.8	23.5	24.9	31.6	32.4	33.5	34.4	34.3
	8	19.9	21.8	23.8	25.3	31.2	32.9	33.2	33.6	34.2
	9	20.1	20.8	22.9	25.7	31.4	33.2	32.9	33.4	34.1
	10	20.2	21.3	24.0	24.8	31.7	33.1	33.9	33.9	33.9
	11	20.4	20.6	23.4	25.1	31.2	32.6	33.2	34.1	34.3
	12	20.0	21.6	23.6	25.2	31.3	32.4	33.4	33.8	34.4
	13	19.8	21.7	23.5	25.3	31.0	32.8	33.5	33.7	34
	14	20.5	21.8	23.6	25.4	31.4	33.2	33.6	34.2	33.8
	15	20.3	21.6	23.4	25.1	31.1	32.8	33.2	33.7	34.2
	16	20.1	21.4	23.7	25.7	31.1	32.9	33.2	34.3	34.1
	17	20.6	21.7	22.9	25.2	31.2	32.7	33.7	33.9	34.2
	18	19.7	20.9	23.5	20.7	31.6	32.7	33.1	33.9	34.0
	19	20.1	21.9	23.4	25.1	30.9	33.0	33.3	34.0	34.2
	20	20.2	21.7	23.1	25.2	30.8	32.6	33.6	34.1	34.5
Average zeta potential (mV)		20.20	21.52	23.44	25.02	31.23	32.76	33.39	33.94	34.15

Table B2 Data for zeta potential measurement of carbon black at pH of 7 and variable SDS at 30°C
 Weight of carbon black = 1.5 mg, Volume of suspension = 40 ml

SDS Concentration (μM)	1,000	2,000	4,000	8,000	12,000	14,000	16,000	18,000	20,000	24,000	
(-) Zeta potential (mV)	1	22.5	25.6	26.5	29.9	35.3	38.7	38.9	39.7	39.7	41.2
	2	23.6	25.2	27.3	30.6	35.4	38.9	39.1	39.6	38.9	39.9
	3	22.7	25.3	27.6	28.7	35.2	38.5	37.8	39.9	40.1	41.8
	4	24.1	25.5	26.9	29.5	35.6	38.1	38.6	39.8	39.5	41.6
	5	23.3	26.1	28.2	29.4	35.7	39.2	38.9	40.1	39.7	39.6
	6	22.4	24.9	27.5	28.9	35.1	37.9	39.1	40.1	39.6	40.7
	7	22.6	25.4	26.9	29.7	36.1	37.7	38.2	39.9	40.6	38.7
	8	22.9	24.8	26.4	29.3	35.3	38.5	38.8	40.2	38.8	40.1
	9	23.6	24.7	27.6	29.6	33.9	38.1	39.2	39.8	40.2	41.1
	10	23.1	25.2	26.9	29.1	37.6	38.5	39.3	37.8	37.9	40.2
	11	22.8	25.6	27.1	30.0	35.2	38.4	38.4	40.2	37.8	39.9
	12	24.0	24.9	27.3	28.9	35.4	38.1	38.9	38.7	41.3	38.9
	13	23.2	25.4	27.5	29.4	37.1	39.1	38.8	38.9	39.7	39.5
	14	23.5	26.1	26.8	29.5	37.4	38.9	38.9	37.09	39.8	40.6
	15	22.7	26.0	27.5	28.9	35.3	38.6	39	39.7	38.9	40.3
	16	22.6	25.6	28.1	29.3	35.1	39.2	37.9	40.3	39.4	39.6
	17	24.2	25.5	25.6	29.1	34.8	38.4	38.8	38.8	39.4	38.9
	18	23.2	24.9	27.3	29.1	35.2	38.5	37.9	39.9	39.8	40.1
	19	23.5	25.2	27.4	29.3	34.9	39.0	38.7	39.4	39.9	40.3
	20	22.7	24.9	26.8	28.7	35.6	38.5	37.8	39.5	39.5	40.2
Average zeta potential (mV)		23.16	25.34	27.16	29.35	35.56	38.54	38.65	39.47	39.53	40.16

Table B3 Data for zeta potential measurement of carbon black at pH of 9 and variable SDS at 30°C
 Weight of carbon black = 1.5 mg, Volume of suspension = 40 ml

SDS Concentration (μM)		1,000	2,000	4,000	8,000	12,000	14,000	16,000	18,000	20,000	24,000
(-) Zeta potential (mV)	1	27.0	27.6	28.7	31.9	38.5	39.7	40.5	41.3	39	40
	2	26.8	27.1	29.2	31.2	36.8	40.2	36.9	40.6	40.8	39.8
	3	27.6	27.3	28.6	32.8	37.2	39.5	40.5	40.2	38.9	40.6
	4	26.3	28.4	30.1	33.1	37.3	37.8	40.6	40.8	39.7	40.1
	5	27.2	29.0	28.2	31.5	38.5	41.1	39.5	39.9	39.8	38.9
	6	26.5	26.8	27.8	31.5	37.8	40.6	41.5	40.7	40.5	40.6
	7	26.3	27.4	28.6	33.4	37.6	39.7	42.1	40.3	38.9	40.1
	8	26.4	27.6	29.5	32.5	38.2	37.8	38.1	40.8	39.4	39.5
	9	26.8	28.2	28.7	30.8	37.6	41.1	40.1	41.5	40.3	38.9
	10	26.1	28.3	28.9	31.1	37.5	40.1	38.8	40.7	39.4	40.1
	11	27.3	27.6	27.8	32.7	37.4	39.6	41.5	40.8	38.5	40.3
	12	26.4	27.5	28.5	30.9	39.5	39.1	42	41.7	38.7	40.2
	13	26.8	27.5	29.7	32.2	36.8	39.4	39.9	39.8	40.3	39.6
	14	27.1	28.1	28.6	31.8	37.6	39.5	40.4	40.6	41.2	41.2
	15	26.5	27.3	29.5	30.3	36.5	39.5	40.8	40.8	41.3	40.6
	16	27.1	28.1	28.6	31.5	38.1	39.7	40.7	41.3	38.6	40.1
	17	26.5	26.5	28.7	31.8	38.4	39.2	39.8	40.2	39.5	38.9
	18	26.9	27.9	29.8	32.8	37.6	38.8	40.4	39.8	40.1	39.8
	19	26.7	27.6	28.4	31.8	38.1	40.2	40.8	40.4	38.7	40.1
	20	27.0	28.1	29.3	32.8	37.4	39.7	41.2	40.8	39.5	40.3
Average zeta potential (mV)		26.77	27.70	28.9	31.92	37.72	39.62	40.31	40.65	39.65	40

Table B4 Data for zeta potential measurement of carbon black at pH of 11 and variable SDS at 30°C
 Weight of carbon black = 1.5 mg, Volume of suspension = 40 ml

SDS Concentration (μM)		1,000	2,000	4,000	8,000	12,000	14,000	16,000	18,000	20,000	24,000
(-)Zeta potential (mV)	1	28.7	29.5	30.3	32.7	39.2	40.7	41.4	41.6	41.9	41.6
	2	28.6	29.4	30.4	32.6	39.3	40.6	41.3	41.7	41.8	41.7
	3	28.9	29.7	30.3	32.7	39.1	40.8	41.5	41.6	41.6	41.6
	4	28.5	29.4	30.1	32.8	39.2	40.5	41.6	41.6	41.7	41.5
	5	28.6	29.3	30.2	32.5	39.4	40.1	41.3	41.8	41.9	41.7
	6	28.7	29.4	30.3	32.6	39.2	40.9	41.5	41.7	41.8	41.3
	7	28.3	29.5	30.4	32.7	39.3	40.6	41.3	41.6	41.8	41.5
	8	28.9	29.6	30.3	32.4	39.2	40.3	41.2	41.8	41.7	41.6
	9	29.1	29.7	30.2	32.5	39.5	40.8	41.4	41.6	41.8	41.6
	10	28.7	28.9	30.5	32.6	39.6	40.6	39.9	41.7	49.1	41.5
	11	28.6	29.2	30.1	32.4	39.4	40.7	41.4	41.8	49.2	41.7
	12	28.9	29.4	30.0	32.8	39.1	40.2	41.3	41.7	41.9	41.6
	13	28.6	29.1	29.9	32.7	39.6	40.3	41.5	41.6	41.8	41.7
	14	28.7	29.3	30.4	32.1	39.4	40.2	41.1	41.5	41.9	41.3
	15	28.7	29.4	30.2	32.4	39.5	40.6	41.2	41.7	41.8	41.0
	16	28.9	29.5	30.3	32.6	39.2	41.0	41.3	41.5	41.9	41.8
	17	28.9	29.3	30.2	32.7	39.6	40.6	41.0	41.6	41.7	41.7
	18	30.1	29.4	30.4	32.4	39.1	40.7	41.5	41.3	41.9	41.3
	19	28.6	29.2	30.6	32.6	39.0	39.9	41.3	41.7	42.0	41.9
	20	28.4	29.4	30.2	32.5	39.0	40.5	41.4	41.6	41.7	41.2
Average zeta potential (mV)		28.8	29.4	30.3	32.6	39.3	40.5	41.3	41.6	42.5	41.5

Appendix C Detergency Experiment, Detergency = $[(A-B)/(C_0-B)] \times 100$

Table C1 %Detergency from pure polyester by using SDS surfactant at different surfactant concentration at pH 5

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing (C ₀)	Refractance of the soiled swatched before washing (B)	Refractance of the soiled swatched after washing (A)	% Detergency	Average %Detergency
0.0866	1	80.48	72.15	72.67	6.24	6.48
	2	80.51	72.18	73.32	6.74	
	3	80.44	72.23	72.76	6.45	
0.1444	1	80.52	72.16	73.35	14.23	14.20
	2	80.43	72.21	73.36	13.99	
	3	80.42	72.19	73.38	14.37	
0.2020	1	80.53	72.24	73.77	18.45	18.84
	2	80.49	72.27	73.78	18.37	
	3	80.46	72.18	73.81	19.69	
0.2599	1	80.47	72.17	73.94	21.32	21.41
	2	80.51	72.2	73.98	21.42	
	3	80.47	72.18	73.96	21.47	
0.2888	1	80.43	72.21	74.23	24.48	24.58
	2	80.45	72.18	74.25	25.03	
	3	80.49	72.24	74.24	24.24	
0.4332	1	80.42	72.20	74.71	30.53	30.53
	2	80.46	72.17	74.70	30.52	
	3	80.44	72.22	74.73	30.53	
0.5776	1	80.45	72.23	75.22	36.37	36.78
	2	80.42	72.19	75.19	36.45	
	3	80.47	72.13	75.26	37.53	
0.7220	1	80.50	72.20	75.71	42.29	42.42
	2	80.44	72.19	75.69	42.42	
	3	80.46	72.14	75.68	42.55	

Table C1(Continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.8664	1	80.47	72.16	75.97	46.24	46.00
	2	80.50	72.22	75.92	45.05	
	3	80.48	72.26	76.1	46.72	
1.0108	1	80.49	72.23	76.47	51.33	51.44
	2	80.44	72.26	76.48	51.59	
	3	80.47	72.28	76.49	51.4	
1.1552	1	80.46	72.21	76.52	52.24	52.40
	2	80.44	72.23	76.55	52.62	
	3	80.48	72.17	76.52	52.35	
1.4440	1	80.50	72.19	76.57	52.71	52.46
	2	80.42	72.16	76.49	52.42	
	3	80.47	72.22	76.53	52.24	
1.7328	1	80.46	72.23	76.54	52.37	52.28
	2	80.51	72.20	76.55	52.35	
	3	80.47	72.24	76.53	52.13	

Table C2 %Detergency from pure polyester by using SDS surfactant at different surfactant concentration at pH 7

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0866	1	80.53	72.16	73.03	10.39	10.37
	2	80.49	72.20	73.08	10.62	
	3	80.46	72.18	73.12	11.10	
0.1444	1	80.47	72.23	73.91	20.39	20.66
	2	80.52	72.17	73.95	21.32	
	3	80.49	72.25	73.92	20.27	
0.2020	1	80.46	72.20	74.05	22.40	22.69
	2	80.52	72.18	74.12	23.26	
	3	80.48	72.14	74.01	22.42	
0.2599	1	80.44	72.19	74.38	26.55	26.14
	2	80.49	72.24	74.42	26.42	
	3	80.47	72.26	74.35	25.46	
0.2888	1	80.42	72.17	74.59	29.33	29.38
	2	80.47	72.23	74.64	29.25	
	3	80.45	72.3	74.71	29.57	
0.4332	1	80.53	72.19	75.05	34.29	34.41
	2	80.48	72.22	75.06	34.38	
	3	80.46	72.24	75.08	34.55	
0.5776	1	80.44	72.23	75.63	41.41	41.45
	2	80.50	72.20	75.62	41.20	
	3	80.52	72.18	75.66	41.73	
0.7220	1	80.48	72.16	75.93	45.31	45.16
	2	80.46	72.28	75.95	44.87	
	3	80.51	72.30	76.02	45.31	

Table C2 (Continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.8664	1	80.52	72.19	76.41	50.66	50.58
	2	80.51	72.20	76.39	50.42	
	3	80.47	72.24	76.41	50.66	
1.0108	1	80.44	72.30	76.81	55.40	55.35
	2	80.52	72.21	76.83	55.60	
	3	80.49	72.26	76.79	55.04	
1.1552	1	80.44	72.18	76.83	56.29	56.38
	2	80.53	72.20	76.91	56.54	
	3	80.50	72.24	76.89	56.2954	
1.4440	1	80.49	72.25	76.97	57.2815	57.4002
	2	80.47	72.40	77.03	57.3730	
	3	80.42	72.27	76.96	57.5460	
1.7328	1	80.43	72.29	76.92	57.1428	57.4498
	2	80.46	72.20	76.96	57.6271	
	3	80.49	72.31	77.02	57.5795	

Table C3 %Detergency from pure polyester by using SDS surfactant at different surfactant concentration at pH 9

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0866	1	80.52	72.20	73.48	15.38	15.42
	2	80.47	72.17	73.44	15.30	
	3	80.49	72.22	73.51	15.59	
0.1444	1	80.43	72.16	74.16	24.18	24.33
	2	80.47	72.22	74.22	24.24	
	3	80.52	72.18	74.23	24.58	
0.2020	1	80.49	72.15	74.43	27.33	27.40
	2	80.47	72.18	74.46	27.50	
	3	80.51	72.25	74.51	27.36	
0.2599	1	80.39	72.20	74.78	31.50	31.07
	2	80.42	72.19	74.76	31.22	
	3	80.44	72.24	74.74	30.48	
0.2888	1	80.36	72.30	75.01	33.62	33.67
	2	80.41	72.16	74.92	33.45	
	3	80.48	72.23	75.03	33.93	
0.4332	1	80.47	72.24	75.47	39.24	39.56
	2	80.43	72.17	75.42	39.34	
	3	80.41	72.18	75.48	40.09	
0.5776	1	80.52	72.15	76.04	46.47	46.59
	2	80.48	72.18	76.02	46.26	
	3	80.50	72.23	76.12	47.03	
0.7220	1	80.47	72.20	76.29	49.45	49.21
	2	80.39	72.26	76.27	49.32	
	3	80.51	72.18	76.25	48.85	

Table C3 (Continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.8664	1	80.42	72.17	76.65	54.30	54.25
	2	80.53	72.24	76.73	54.15	
	3	80.44	72.28	76.71	54.28	
1.0108	1	80.52	72.22	77.41	62.53	62.58
	2	80.49	72.23	77.44	63.07	
	3	80.43	72.32	77.36	62.14	
1.1552	1	80.44	72.18	77.42	63.43	63.39
	2	80.42	72.22	77.41	63.29	
	3	80.51	72.19	77.47	63.46	
1.4440	1	80.46	72.30	77.48	63.48	63.40
	2	80.53	72.18	77.45	63.11	
	3	80.46	72.24	77.47	63.62	
1.7328	1	80.44	72.17	77.52	64.69	64.40
	2	80.41	72.24	77.49	64.25	
	3	80.52	72.29	77.58	64.27	

Table C4 %Detergency from pure polyester by using SDS surfactant at different surfactant concentration at pH 11

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0866	1	80.47	72.21	73.65	17.55	17.39
	2	80.45	72.19	73.63	17.43	
	3	80.49	72.23	73.65	17.19	
0.1444	1	80.44	72.15	74.58	29.31	29.39
	2	80.47	72.24	74.65	29.28	
	3	80.50	72.18	74.64	29.56	
0.2020	1	80.42	72.26	74.89	32.23	32.26
	2	80.35	72.18	74.83	32.43	
	3	80.46	72.30	74.92	32.10	
0.2599	1	80.37	72.18	75.01	34.55	34.39
	2	80.45	72.24	75.05	34.22	
	3	80.41	72.15	74.99	34.38	
0.2888	1	80.43	72.20	75.12	35.47	35.47
	2	80.47	72.17	75.11	35.42	
	3	80.37	72.23	75.12	35.50	
0.4332	1	80.33	72.14	75.67	43.10	43.27
	2	80.44	72.23	75.79	43.36	
	3	80.39	72.20	75.75	43.35	
0.5776	1	80.43	72.25	76.36	50.24	50.34
	2	80.51	72.19	76.37	50.24	
	3	80.48	72.27	76.42	50.55	
0.7220	1	80.52	72.20	76.66	53.61	53.38
	2	80.44	72.18	76.59	53.39	
	3	80.47	72.23	76.61	53.15	

Table C4 (Continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.8664	1	80.49	72.17	77.02	58.29	58.44
	2	80.51	72.31	77.10	58.41	
	3	80.43	72.24	77.04	58.60	
1.0108	1	80.46	72.20	77.69	66.46	66.33
	2	80.41	72.17	77.63	66.26	
	3	80.53	72.23	77.73	66.26	
1.1552	1	80.52	72.19	77.81	67.47	67.38
	2	80.43	72.26	77.77	67.44	
	3	80.48	72.18	77.76	67.23	
1.4440	1	80.53	72.21	77.91	68.51	68.40
	2	80.47	72.19	77.86	68.48	
	3	80.43	72.25	77.83	68.22	
1.7328	1	80.45	72.16	77.83	68.40	68.51
	2	80.42	72.22	77.87	68.90	
	3	80.50	72.25	77.88	68.2424	

Table C5 %Detergency from pure polyester by using CTAB surfactant at different surfactant concentration at pH 5

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0364	1	80.53	72.16	72.61	5.38	5.31
	2	80.47	72.23	72.66	5.22	
	3	80.44	72.19	72.63	5.33	
0.1093	1	80.51	72.20	72.98	9.39	9.36
	2	80.46	72.18	72.97	9.54	
	3	80.55	72.15	72.92	9.17	
0.1822	1	80.49	72.25	73.34	13.23	13.39
	2	80.52	72.13	73.25	13.35	
	3	80.44	72.28	73.39	13.60	
0.2551	1	80.41	72.22	73.41	14.50	14.46
	2	80.52	72.17	73.36	14.25	
	3	80.47	72.19	73.4	14.61	
0.3645	1	80.43	72.15	73.42	15.34	15.47
	2	80.51	72.20	73.51	15.76	
	3	80.47	72.18	73.45	15.32	
0.5467	1	80.42	72.18	73.61	17.35	17.50
	2	80.46	72.16	73.6	17.35	
	3	80.51	72.14	73.63	17.80	
0.7289	1	80.46	72.18	74.03	22.34	22.34
	2	80.50	72.20	74.07	22.53	
	3	80.44	72.13	73.97	22.14	
0.9111	1	80.48	72.17	74.26	25.15	25.29
	2	80.55	72.22	74.34	25.45	
	3	80.43	72.16	74.25	25.27	
0.9476	1	80.44	72.15	74.32	26.18	26.26
	2	80.50	72.19	74.39	26.47	
	3	80.42	72.23	74.37	26.13	
0.984	1	80.44	72.19	74.38	26.55	26.37
	2	80.51	72.23	74.41	26.33	
	3	80.48	72.25	74.41	26.25	
1.0934	1	80.49	72.19	74.56	28.55	28.38
	2	80.53	72.22	74.58	28.40	
	3	80.50	72.16	74.51	28.18	

Table C5 (Continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
1.1663	1	80.42	72.18	74.61	29.49	29.42
	2	80.48	72.17	74.62	29.48	
	3	80.52	72.22	74.65	29.28	
1.2392	1	80.46	72.26	74.66	29.27	29.28
	2	80.43	72.18	74.59	29.21	
	3	80.51	72.20	74.64	29.36	
1.3121	1	80.42	72.19	74.68	30.26	30.47
	2	80.47	72.24	74.74	30.38	
	3	80.45	72.16	74.71	30.76	
1.3849	1	80.5	72.15	74.79	31.62	31.10
	2	80.44	72.21	74.82	31.71	
	3	80.41	72.18	74.77	31.47	
1.4578	1	80.46	72.24	74.81	31.27	31.42
	2	80.54	72.18	74.8	31.34	
	3	80.50	72.19	74.82	31.65	
1.5307	1	80.52	72.25	74.86	31.56	31.44
	2	80.46	72.20	74.78	31.23	
	3	80.53	72.22	74.84	31.53	
1.6036	1	80.49	72.15	74.84	32.25	32.22
	2	80.51	72.20	74.86	32.01	
	3	80.44	72.17	74.85	32.41	
1.7494	1	80.41	72.23	74.86	32.15	32.43
	2	80.39	72.19	74.84	32.31	
	3	80.44	72.16	74.88	32.85	
1.8223	1	80.45	72.17	74.85	32.36	32.22
	2	80.42	72.24	74.83	31.66	
	3	80.48	72.15	74.87	32.65	
1.8451	1	80.41	72.23	74.86	32.15	32.08
	2	80.43	72.17	74.84	32.32	
	3	80.46	72.25	74.86	31.79	
2.041	1	80.42	72.16	74.93	33.53	33.56
	2	80.47	72.19	74.96	33.45	
	3	80.50	72.22	75.01	33.69	

Table C6 %Detergency from pure polyester by using CTAB surfactant at different surfactant concentration at pH 7

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0364	1	80.48	72.15	72.78	7.56	7.47
	2	80.44	72.19	72.81	7.52	
	3	80.51	72.20	72.81	7.34	
0.1093	1	80.48	72.17	73.04	10.47	10.34
	2	80.43	72.20	73.01	9.84	
	3	80.51	72.22	73.11	10.74	
0.1822	1	80.43	72.18	73.36	14.30	14.27
	2	80.53	72.23	73.42	14.34	
	3	80.51	72.19	73.37	14.18	
0.2551	1	80.47	72.21	73.64	17.31	17.46
	2	80.49	72.24	73.69	17.58	
	3	80.53	72.19	73.65	17.51	
0.3645	1	80.47	72.23	74.15	23.30	23.28
	2	80.44	72.16	74.08	23.19	
	3	80.56	72.25	74.19	23.35	
0.5467	1	80.51	72.15	74.19	24.40	24.46
	2	80.48	72.22	74.24	24.46	
	3	80.42	72.19	74.21	24.54	
0.7289	1	80.44	72.22	74.31	25.43	25.22
	2	80.51	72.18	74.28	24.97	
	3	80.47	72.16	74.26	25.27	
0.9111	1	80.42	72.15	74.32	26.24	26.24
	2	80.49	72.2	74.37	26.18	
	3	80.47	72.18	74.36	26.30	
0.9476	1	80.45	72.22	74.47	27.34	27.40
	2	80.48	72.16	74.44	27.40	
	3	80.42	72.19	74.45	27.46	
0.984	1	80.44	72.17	74.52	28.42	28.530
	2	80.46	72.18	74.53	28.38	
	3	80.5	72.13	74.54	28.79	
1.0934	1	80.44	72.26	74.68	29.58	29.658
	2	80.48	72.15	74.63	29.77	
	3	80.52	72.18	74.65	29.62	

Table C-6 (continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
1.7494	1	80.52	72.24	75.14	35.02	35.292
	2	80.44	72.16	75.1	35.51	
	3	80.47	72.18	75.11	35.34	
1.8223	1	80.42	72.23	75.16	35.78	35.580
	2	80.51	72.18	75.12	35.29	
	3	70.46	72.19	75.14	35.67	
1.8451	1	80.48	72.22	75.22	36.32	36.466
	2	80.51	72.25	75.26	36.44	
	3	80.46	72.19	75.22	36.64	
2.0410	1	80.53	72.17	75.12	35.29	35.351
	2	80.52	72.23	75.15	35.22	
	3	80.49	72.19	75.14	35.54	

Table C7 %Detergency from pure polyester by using CTAB surfactant at different surfactant concentration at pH 9

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0364	1	80.43	72.18	72.94	9.21	9.28
	2	80.52	72.20	72.97	9.25	
	3	80.48	72.16	72.94	9.38	
0.1093	1	80.51	72.25	73.19	11.38	11.49
	2	80.46	72.16	73.11	11.45	
	3	80.44	72.19	73.15	11.64	
0.1822	1	80.49	72.18	73.63	17.45	17.40
	2	80.44	72.15	73.98	17.25	
	3	80.51	72.17	73.63	17.51	
0.2551	1	80.42	72.22	74.29	25.24	25.43
	2	80.47	72.19	74.31	25.60	
	3	80.53	72.16	74.29	25.45	
0.3645	1	80.48	72.20	74.46	27.29	27.40
	2	80.44	72.16	74.44	27.54	
	3	80.51	72.14	74.43	27.36	
0.5467	1	80.43	72.23	74.57	28.36	28.35
	2	80.50	72.25	74.59	28.36	
	3	80.46	72.20	74.54	28.33	
0.7289	1	80.41	72.16	74.58	29.33	29.41
	2	80.50	72.22	74.65	29.35	
	3	80.45	72.26	74.68	29.55	
0.9111	1	80.42	72.19	74.7	30.50	30.43
	2	80.51	72.23	74.74	30.31	
	3	80.44	72.17	74.69	30.47	
0.9476	1	80.52	72.15	74.77	31.30	31.44
	2	80.44	72.20	74.79	31.43	
	3	80.47	72.24	74.84	31.59	
0.984	1	80.42	72.18	74.86	32.52	32.47
	2	80.51	72.21	74.91	32.53	
	3	80.47	72.25	74.91	32.36	
1.0934	1	80.46	72.23	74.99	33.54	33.36
	2	80.41	72.25	74.98	33.46	
	3	80.49	72.18	74.93	33.09	

Table C-7 (continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
1.1663	1	80.43	72.19	75.03	34.47	34.97
	2	80.50	72.24	75.11	34.75	
	3	80.47	72.27	75.10	34.51	
1.2392	1	80.42	72.26	75.13	35.17	35.32
	2	80.48	72.19	75.12	35.34	
	3	80.53	72.15	75.12	35.44	
1.3121	1	80.44	72.20	75.21	36.53	36.36
	2	80.50	72.19	75.21	36.34	
	3	80.47	72.16	75.17	36.22	
1.3849	1	80.44	72.19	75.27	37.33	37.32
	2	80.50	72.15	75.28	37.49	
	3	80.47	72.23	75.29	37.14	
1.4578	1	80.42	72.20	75.36	38.44	38.38
	2	80.51	72.17	75.36	38.25	
	3	80.53	72.26	75.44	38.45	
1.5307	1	80.48	72.18	75.38	38.55	38.36
	2	80.52	72.24	75.37	37.80	
	3	80.44	72.20	75.39	38.71	
1.6036	1	80.44	72.25	75.38	38.22	38.30
	2	80.49	72.20	75.37	38.24	
	3	80.39	72.17	75.33	38.44	
1.7494	1	80.47	72.21	75.37	38.26	38.00
	2	80.50	72.28	75.38	37.71	
	3	80.42	72.24	75.35	38.02	
1.8223	1	80.49	72.17	75.41	38.94	38.50
	2	80.52	72.23	75.40	38.24	
	3	80.47	72.20	75.37	38.33	
1.8451	1	80.44	72.20	75.39	38.71	38.35
	2	80.49	72.26	75.38	37.91	
	3	80.42	72.22	75.37	38.41	
2.0410	1	80.40	72.20	75.38	38.78	38.61
	2	80.47	72.18	75.39	38.72	
	3	80.42	72.23	75.37	38.34	

Table C8 %Detergency from pure polyester by using CTAB surfactant at different surfactant concentration at pH 11

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
0.0364	1	80.41	72.17	73.18	12.26	12.37
	2	80.46	72.23	73.24	12.27	
	3	80.51	72.16	73.21	12.57	
0.1093	1	80.43	72.18	73.52	16.24	16.21
	2	80.47	72.15	73.52	16.47	
	3	80.51	72.22	73.54	15.92	
0.1822	1	80.44	72.20	73.71	18.32	18.40
	2	80.52	72.16	73.70	18.42	
	3	80.48	72.13	73.67	18.44	
0.2551	1	80.53	72.14	74.43	27.29	19.21
	2	80.49	72.25	74.52	27.55	
	3	80.51	72.20	74.51	27.80	
0.3645	1	80.42	72.16	74.66	30.27	30.33
	2	80.56	72.23	74.77	30.49	
	3	80.48	72.24	74.73	30.21	
0.5467	1	80.51	72.19	74.79	31.25	31.50
	2	80.53	72.17	74.81	31.58	
	3	80.47	72.20	74.82	31.68	
0.7289	1	80.51	72.18	74.88	32.41	32.45
	2	80.44	72.21	74.89	32.56	
	3	80.53	72.25	74.93	32.37	
0.9111	1	80.42	72.23	74.97	33.45	33.60
	2	80.49	72.20	74.98	33.53	
	3	80.43	72.24	75.01	33.82	
0.9476	1	80.42	72.18	75.02	34.46	34.54
	2	80.48	72.25	75.08	34.54	
	3	80.53	72.21	75.09	34.61	
0.984	1	0.44	72.20	75.09	35.07	35.27
	2	80.50	72.17	75.13	35.53	
	3	80.47	72.26	75.15	35.20	
1.0934	1	80.43	72.15	75.15	36.23	36.44
	2	80.52	72.20	75.25	36.66	
	3	80.50	72.24	75.25	36.44	

Table C-8 (continue)

surfactant concentration (%w/v)	Sample No	Refractance of the unsoiled swatched before washing(Co)	Refractance of the soiled swatched before washing(B)	Refractance of the soiled swatched after washing(A)	% Detergency	Average %Detergency
1.1663	1	80.38	72.20	75.27	37.53	37.50
	2	80.42	72.17	75.25	37.33	
	3	80.51	72.14	75.29	37.63	
1.2392	1	80.43	72.25	75.38	38.26	38.27
	2	80.46	72.23	75.37	38.15	
	3	80.51	72.20	75.39	38.39	
1.3121	1	80.44	72.19	75.43	39.27	39.36
	2	80.48	72.17	75.45	39.47	
	3	80.44	72.23	75.46	39.34	
1.3849	1	80.41	72.16	75.48	40.24	40.32
	2	80.52	72.24	75.58	40.34	
	3	80.47	72.20	75.54	40.39	
1.4578	1	80.56	72.25	75.69	41.40	41.49
	2	80.49	72.20	75.64	41.50	
	3	80.53	72.23	75.68	41.57	
1.5307	1	80.51	72.19	75.64	41.47	41.45
	2	80.54	72.24	75.69	41.57	
	3	80.48	72.18	75.61	41.32	
1.6036	1	80.44	72.20	75.63	41.63	41.45
	2	80.52	72.21	75.64	41.28	
	3	80.56	72.26	75.7	41.45	
1.7494	1	80.45	72.23	75.57	40.63	40.36
	2	80.53	72.19	75.54	40.17	
	3	80.46	72.24	75.55	40.27	
1.8223	1	80.44	72.23	75.64	41.53	41.80
	2	80.49	72.18	75.68	42.12	
	3	80.51	72.20	75.67	41.76	
1.8451	1	80.44	72.19	75.68	42.30	42.27
	2	80.52	72.23	75.75	42.46	
	3	80.48	72.25	75.71	42.04	
2.0410	1	80.44	72.17	75.69	42.56	42.40
	2	80.52	72.21	75.72	42.23	
	3	80.54	72.24	75.76	42.41	

Appendix D Experimental data for Contact Angle Measurement

Table D-1 Data for contact angle of SDS on carbon black
Weight of carbon black = 0.5g

SDS concentration (μM)	pH 5	pH 7	pH 9	pH 11
100	56.0	59.7	62.4	63.1
200	55.9	59.7	62.2	62.6
300	55.7	59.6	62.1	62.3
400	55.5	59.4	62.0	62.2
500	54.2	58.2	60.9	61.3
600	53.8	57.9	60.3	61
700	53.2	57.1	59.4	60.8
800	52.3	56.3	58.9	60.3
900	50.2	54.2	56.5	58.0
1,000	49.3	52.1	58.5	60.0
1,200	47.4	51.3	53.4	54.8
1,400	45.4	49.3	51.4	52.8
1,600	44.2	48.2	50.6	52.0
1,800	43.1	47.1	49.6	51.0
2,000	42.4	46.3	48.7	50.1
2,500	42.1	44.2	46.7	48.2
3,000	38.0	42.1	44.4	45.7
3,500	36.3	40.3	42.7	44.1
4,000	35.2	39.1	41.5	42.9
4,500	33.1	37.2	39.5	41.0
5,000	32.5	36.4	38.9	40.4
5,500	28.4	32.3	34.8	36.3
6,000	26.0	30.1	32.4	33.7
6,500	25.2	29.3	31.6	33.1
7,000	25.0	29.1	31.2	32.7
7,500	25.0	28.4	30.8	26.2
8,000	25.0	28.0	30.3	26.2
8,500	25.0	25.9	26.0	26.1
9,000	25.0	25.8	26.0	26.1
9,500	25.0	25.8	26.0	26.0
10,000	24.9	25.8	26.0	26.0
15,000	24.9	25.8	26.0	26.0
20,000	24.9	25.8	26.0	26.1
25,000	24.8	25.8	26.0	26.1
30,000	24.8	25.8	26.0	26.0
40,000	24.8	25.8	26.0	26.1
50,000	24.8	25.8	26.0	26.0

Table D-2 Data for contact angle of CTAB on carbon black at 30 °C
Weight of carbon black = 0.5g

CTAB concentration (μM)	pH 5	pH 7	pH 9	pH 11
10	57.5	55.2	52.1	51.5
100	57.5	55.2	53	51.3
150	57.4	55.1	53.1	51
200	57.3	55.1	53.1	51
250	57.2	55	53.1	* 51
300	57.1	54.9	52.8	50.7
350	57.0	54.7	52.5	44.6
400	53.6	51.3	49.2	43
450	49.8	47.5	45.3	41.1
500	46.5	44.2	42.2	37.3
550	43.5	41.3	39.2	34.1
600	42.6	40.2	38.2	32.2
650	39.9	37.6	35.6	25.2
700	34.7	32.3	30.4	19.5
750	32.6	30	28.2	19.4
800	26.9	24.4	22.7	16.2
850	24.0	21.6	19.5	12.1
900	21.8	19.3	17.3	12.1
950	19.4	17.1	15	12.1
1,000	19.3	16.9	14.8	12.1
1,500	19.3	16.8	14.8	12.1
2,000	19.3	16.8	14.8	12.1
2,500	19.3	16.8	14.8	12.1
3,000	19.3	16.8	14.8	12.1
4,000	19.2	16.8	14.8	12.1
5,000	18.4	16.8	14.7	12.1
6,000	18.1	16.8	14.7	12.1
7,000	18.9	16.8	14.7	12.1
8,000	18.2	16.8	14.7	12.1
9,000	19.3	16.8	14.7	12.1
10,000	19.3	16.8	14.7	12.1

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