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APPENDICES

Appendix A

Protocol for concentrated latex production

1: Fresh field latex was determined for DRC, TSC, Mg^{++}, and VFA.

2: + 2% water soluble chitosan for final concentration 0.1% w/w

3: + 15% NH_4OH for final concentration 0.3% w/w

4: + Diammonium hydrogen phosphate for 100% Mg^{++} precipitation

5: + ammonium laurate for final concentration 0.05% w/w

6: The whole mixture of latex was kept standing over night.

7: The precipitate was discarded.

8: The supernatant latex was determined for DRC, TSC, Mg^{++}, and VFA again.

9: + 2% alginate for final concentration 0.01 phr

10: + 40% KOH for final concentration 0.1% w/w

11: The latex was determined for DRC and % DRC was adjusted to 25 by adding 0.3% NH_3OH.

12: The latex was centrifuged using a factory scale centrifuge machine at 7,000 x g to produce the concentrated latex.

13: The concentrated latex was determined for DRC, TSC, NH_3 and then it was adjusted for the requirement of % DRC = 60 and $\%NH_3 = 0.6$

Appendix B

Testing of concentrated latex specification (ISO-2004-1979 (E))

1. Determination of total solid content (TSC)

Weight the empty petridish and record the empty pretidish weight. An aliquot of 5 g of latex was pipetted into a pretidish and dried in an oven at 60 °C for 10-12 hours. Dried rubber in pretidish was weighted and calculated TSC content by the equation below.

$$\%TSC = W_1 / W_O \times 100$$

Where W_1 = weight of the dry rubber in pretidish (g)

W_O = weight of the latex after subtraction the weight of pretidish (g)

2. Determination of dry rubber content (DRC)

An aliquot of 5 ml of latex was pipetted into a pretidish and coagulated with 5 % acetic acid in ethyl alcohol. After complete coagulation occurred, the coagulum was then removed, washed with water, creped and dried in an oven at 60 °C for 10-12 hours. Dried coagulum was weight and calculated DRC content by the equation below.

$$\%DRC = W_1 / W_O \times 100$$

Where W_1 = weight of the dry rubber (g)

W_O = weight of the latex taken (g)

3. Determination of non-rubber content (NR)

Non-rubber content was calculated by the equation below.

$$TSC\text{-}DRC = (\%)\ NR$$

4. Determination of volatile fatty acid (VFA)

Weighed 50 g of latex in a stainless breaker and added 50 ml of 30% $(NH_4)_2SO_4$. Heat on water bath at the temperature of 100 °C and squeeze for the

serum. Filtrated the serum through Whatman number 1 filter paper. Pipette 25 ml of serum into a flask containing 5 ml of 50% $(NH_4)_2SO_4$. Passed steam through the stream jacketed distillation apparatus for at least 15 minutes with steam outlet open, introduce into the inner tube 10 ml of acidified serum by pipette. Place a 100 ml graduated cylinder under the tip of condenser to obtain 100 ml of distilled serum. Degassed for 3 minutes and titrated with standard 0.01N $Ba(OH)_2$ using phenolphthalene as indicator. The % VFA was calculated by the equation below.

Valatile fatty acid,VFA (%)

= ((67.32xNxV) x50/mxTSC) + m (100- DRC)/100xP

Where

N: Normality of $Ba(OH)_2$

V: Volume (ml) of $Ba(OH)_2$ used in titration

P: Serum density = 1.02 megagram/m^3

M: Weight of latex (g)

TSC: % TSC of latex

DRC: % DRC of latex

5. Determination of alkalinity (NH_3)

Weight 10 g of latex into the breaker diluted with 200 ml distilled water and added non-ionic stabilizer such as Teric 16A. Titrated with standard 0.1 N $(NH_4)_2SO_4$ with methyl red indicated. Calculated in g NH_3 per 100 g latex.

6. **Determination of Mg^{++} content (%Mg^{++})**

Weighed 10 g of latex into the breaker, added 10 ml of distilled

water and 5 ml of 25% (v/v) acetic acid. Squeezed for the serum and poured on to the 80 mesh filter. Pipetted filtrated 10 ml serum into 50 ml breaker adjusted pH to 10.5 by NH_4Cl or NH_4OH then pipetted 4 ml of 4%KCN into the serum. Added 0.1 g of Erichchrome Black T into the serum and the serum will turn violet. Titrated with 0.05 M EDTA. End point was the violet color turned blue.

Calculation: The Mg content was expressed in percent (w/w)

Percentage Mg = (24.32xBxD)/100xC

Where

B = EDTA facture = burette reading/(V) x Molar EDTA/(M)

C = Value of solid in 10 g of latex (g) = AxTSC/100

A: Weight of latex in grams

D = Total volume of serum in sample (ml); = (A-C)+15

7. Determination of mechanical stability time (MST: second)

Adjusted % DRC of concentrated latex to 55% TSC with NH_3. Weighed 80 g of latex, warmed to 35°C and spun with Klaxon machine at 14,000 rpm. Determined clotting time (second) of rubber particles by dipping stirring rod into latex and dropped in water.

8. **Determination of potassium hydroxide (KOH) number**

Added formaldehyde solution into 50% TSC latex and diluted to 30 % TSC with water and titrated with standard KOH indicated end point by pH meter. The end point of the titration is the point inflexion of the titration curve of the pH-value against the volume, in cubic centimeters, of potassium hydroxide solution. At the endpoint, the slope of the curve, i.e. the first differential, reaches a maximum and the second differential changes from a positive to a negative value. The end point

shall be calculated from the second differential on the assumption that the change from a positive to a negative value bears a linear relation to the addition of potassium hydroxide during the 1 cm^{-1} interval involved.

Appendix C

The table shows the tensile strength (MPa) of vulcanized rubber sheet when natural latex was preserved at 4^0 C before mixing with *n*-BA.

No of sample	Irradiation dose (kGy)						
	12	13	14	15	16	17	18
1	0.98	0.77	1.51	1.22	1.32	1.75	1.69
2	0.85	0.87	1.38	1.41	1.38	1.69	1.74
3	0.99	0.85	1.27	1.19	1.33	1.48	1.64
4	0.95	0.88	1.34	1.43	1.28	1.84	1.62
5	1.08	0.84	1.35	1.37	1.46	1.67	1.42
Mean	0.97	0.84	1.37	1.32	1.35	1.69	1.57
SD.	0.08	0.04	0.09	1.11	0.07	0.13	0.12

Appendix D

The table shows the tensile strength (MPa) of vulcanized rubber when natural latex was mixed with *n*-BA at 25 °C.

No of sample	Radiation dose (kGy)						
	12	13	14	15	16	17	18
1	2.79	2.99	2.94	2.67	2.89	2.67	2.74
2	2.53	2.74	3.12	2.89	2.74	2.89	2.85
3	2.81	2.68	3.2	3.14	2.93	3.15	2.97
4	2.80	3.14	2.91	3.09	3.28	2.94	2.84
5	2.86	3.10	2.87	3.05	3.10	2.74	2.07
Mean	2.75	2.93	3.01	2.96	2.98	2.87	2.82
SD.	0.13	0.21	0.14	0.19	0.21	0.18	0.11

Appendix E

The table shows the tensile strength (MPa) of vulcanized rubber when natural latex was mixed with *n*-BA at 20 °C.

No of sample	Radiation dose (kGy)						
	12	13	14	15	16	17	18
1	2.64	2.67	2.91	2.63	2.63	2.81	2.29
2	2.57	2.81	2.85	2.89	2.74	2.95	2.53
3	2.42	2.55	2.77	2.92	2.95	2.76	2.61
4	2.41	2.77	2.63	2.72	2.87	2.69	2.36
5	2.51	2.85	2.99	2.68	2.96	2.89	2.39
Mean	2.51	2.73	2.83	2.768	2.83	2.82	2.43
SD.	0.09	0.12	0.13	0.12	0.14	0.10	0.13

Appendix F

The table shows the tensile strength (MPa) of vulcanized rubber when natural latex was mixed with *n*-BA at 15 °C.

No of sample	Radiation dose (kGy)						
	12	13	14	15	16	17	18
1	1.18	1.97	2.32	2.40	2.34	2.28	2.70
2	1.61	2.10	2.81	2.54	2.68	2.57	2.40
3	1.10	2.04	2.77	2.68	2.55	2.64	2.55
4	1.09	2.12	3.01	2.62	2.76	2.70	2.42
5	1.34	2.12	2.49	2.40	2.82	2.61	2.48
Mean	1.26	2.07	2.68	2.528	2.63	2.56	2.51
SD.	0.21	0.06	0.27	0.12	0.19	0.16	0.12

Appendix G

The table shows the tensile strength (MPa) of vulcanized rubber when natural latex was mixed with *n*-BA at 10 °C.

No of sample	Radiation dose (kGy)						
	12	13	14	15	16	17	18
1	0.80	1.27	1.16	1.44	1.68	2.10	1.80
2	0.92	1.20	1.27	1.19	1.63	2.00	1.73
3	1.01	1.42	1.45	1.29	1.50	1.92	1.70
4	0.92	1.38	1.53	1.33	1.47	1.54	1.69
5	0.74	1.32	1.38	1.15	1.51	1.78	1.78
Mean	0.87	1.31	1.35	1.28	1.55	1.86	1.74
SD.	0.11	0.08	0.14	0.12	0.09	0.22	0.05

Appendix H

The table shows the surface hardness of Coe Supersoft® at the interval of immersion times in distilled water.

No of sample	Surface hardness (shore A)						
	initial	30 min	1h	1 d	2 d	3 d	4 d
1	75	75	74	58	53	55	54
2	75	75	73	58	54	55	54
3	76	76	74	58	53	54	53
4	75	74	74	59	54	54	55
5	75	75	74	57	54	55	54
6	74	75	75	58	56	54	53
7	75	76	73	58	54	55	54
8	76	75	75	58	54	56	55
9	75	74	75	57	54	55	56
10	75	75	74	58	56	56	54
Mean	75.1	75	74.1	57.9	54.2	54.9	54.2
SD.	0.56	0.66	0.73	0.56	1.03	0.73	0.91

The table shows the surface hardness of Coe Supersoft® at the interval of immersion times in distilled water. (continued)

No of sample	Surface hardness (shore A)						
	5 d	6 d	1 w	2 w	3 w	1 m	2 m
1	55	55	55	53	55	55	55
2	55	55	55	54	55	55	54
3	55	55	53	53	54	55	54
4	56	56	56	53	56	56	56
5	56	57	54	52	55	56	55
6	55	56	56	53	54	54	55
7	53	56	57	53	54	57	55
8	54	53	56	52	54	55	56
9	56	54	55	56	56	55	54
10	55	53	55	53	55	55	56
Mean	55	55	55.2	53.2	54.8	55.3	55
SD.	0.94	1.33	1.13	1.13	0.78	0.82	0.81

The table shows the surface hardness of Coe Supersoft® at the interval of immersion times in distilled water. (continued)

No of sample	Surface hardness (shore A)				
	3 m	4 m	5 m	6 m	10 m
1	65	66	65	65	66
2	66	66	65	64	66
3	66	66	66	65	67
4	65	67	67	64	65
5	63	65	64	66	65
6	66	64	64	66	67
7	64	65	65	64	67
8	63	67	64	65	66
9	67	66	65	67	65
10	67	66	66	66	64
Mean	65.2	65.8	65.1	65.2	65.8
SD.	1.48	0.92	0.99	1.03	1.03

Appendix I

The table shows the surface hardness of graft copolymer at the interval of immersion times in distilled water.

No of sample	Surface hardness (shore A)						
	initial	30 min	1h	1 d	2 d	3 d	4 d
1	77	76	75	60	58	59	57
2	77	76	75	58	60	59	57
3	76	76	76	60	57	59	58
4	78	77	76	60	58	58	56
5	77	77	77	62	58	59	56
6	77	76	74	60	60	58	56
7	76	78	74	60	57	58	57
8	77	75	75	60	58	59	58
9	77	76	75	62	58	59	59
10	77	76	75	61	57	58	56
Mean	76.9	76.3	75.2	60.3	58.1	58.6	57
SD.	0.56	0.82	0.91	1.15	1.10	0.51	1.05

The table shows the surface hardness of graft copolymer at the interval of immersion times in distilled water. (continued)

No of sample	Surface hardness (shore A)						
	5 d	6 d	1 w	2 w	3 w	1 m	2 m
1	55	55	55	55	55	55	55
2	55	55	56	54	55	55	54
3	54	55	56	57	56	56	56
4	54	55	56	54	58	56	56
5	56	54	55	56	56	57	54
6	57	54	54	55	54	58	54
7	56	56	53	54	53	54	56
8	56	54	54	56	53	54	57
9	56	56	56	57	56	55	56
10	54	56	55	54	56	53	55
Mean	55.3	55	55	55.2	55.2	55.3	55.3
SD.	1.05	0.81	1.05	1.22	1.54	1.49	1.05

The table shows the surface hardness of graft copolymer at the interval of immersion times in distilled water (continued)

No of sample	Surface hardness (shore A)				
	3 m	4 m	5 m	6 m	10 m
1	66	66	66	65	65
2	67	66	67	65	66
3	66	67	67	67	64
4	67	67	65	67	66
5	68	68	65	64	65
6	65	65	64	65	65
7	67	65	66	64	65
8	65	64	67	63	64
9	65	66	68	65	66
10	67	66	67	64	66
Mean	66.3	66	66.2	64.9	65.2
SD.	1.05	1.15	1.22	1.28	0.78

Appendix J

The table shows the tensile properties of graft copolymer.

No of sample	100% Modulus (MPa)	Tensile strength (MPa)	Extension at break (mm)	% Elongation
1	1.36	14.77	330	1000
2	1.24	11.37	300	900
3	1.21	10.7	320	967
4	1.15	7.03	250	733
5	1.35	14.37	277	823
6	1.64	14.69	311	936
7	1.38	13.23	298	893
8	1.63	12.5	291	870
9	1.82	15.03	307	923
10	1.33	13.37	262	733
11	1.59	14.78	287	857
12	1.34	13.28	285	850
13	1.57	12.47	299	897
14	1.28	10.97	267	790
15	1.67	14.69	287	863
16	1.5	14.68	294	880
17	1.24	10.02	297	890
18	1.33	13.74	268	793
19	1.53	12.24	242	706
20	1.42	14.41	277	823
mean	1.43	12.92	287.45	856.35
SD.	0.18	2.07	22.35	77.53

Appendix K

The table shows the tensile properties of Coe Suppersoft®.

No of sample	100% Modulus (MPa)	Tensile strength (MPa)	Extension at break (mm)	% Elongation
1	3.32	4.49	73.5	145
2	3.22	4.02	68.16	127
3	3.28	4.47	76.05	156
4	2.87	3.31	73.48	145
5	5.68	7.49	75.22	151
6	2.56	4.55	75.03	150
7	3.15	4.11	69.91	133
8	3.46	4.24	70.48	135
9	2.89	3.9	68.98	130
10	3.56	4.64	76.01	153
11	3.78	4.47	72.33	141
12	3.17	4.36	70.85	136
13	3.75	4.21	69.97	133
14	3.29	4.32	70.57	135
15	3.66	4.36	71.22	137
16	3.48	4.53	72.48	142
17	3.09	4.46	72.05	140
18	3.56	4.75	75.77	153
19	3.68	4.26	75.39	151
20	3.18	4.37	76.00	153
mean	3.43	4.47	72.67	142.30
SD.	0.62	0.77	2.59	8.87

Appendix L

Table shows the tear strength of Coe Supersoft® and Graft copolymer

No of sample	Tear strength (KN/m)	
	Coe supersoft	Graft copolymer
1	31.74	59.13
2	40.92	60.08
3	49.22	61.24
4	42.19	51.37
5	35.42	47.38
6	44.38	56.92
7	33.51	34.93
8	38.49	90.94
9	44.87	63.08
10	46.22	57.87
11	37.47	60.33
12	38.51	61.24
13	36.72	62.57
14	38.44	60.47
15	36.73	60.98
16	40.11	59.77
17	38.64	62.03
18	41.31	62.57
19	39.94	64.02
20	40.17	59.97
mean	31.74	59.13
SD.	4.23	9.95

Appendix M

Table shows the tensile bond strength of Coe Supersoft ®and Graft copolymer.

No of sample	Tensile bond strength (MPa)	
	Coe Supersoft®	Graft copolymer
1	13	7.4
2	8.6	5.47
3	9.43	6.49
4	6.19	7.57
5	8.4	7.25
6	8.64	8.18
7	8.91	8.45
8	7.39	7.38
9	7.82	7.45
10	8.51	8.03
11	8.78	7.33
12	6.71	8.24
13	6.67	7.81
14	7.56	8.65
15	7.34	7.99
Mean	8.26	7.58
SD.	1.61	0.80

Appendix N

Table shows the % of water absorption of graft copolymer.

No of sample	% of weight increasing at difference of immersion times			
	30 min	1 h	24h	2 d
1	0	0.346687	3.004622	3.389831
2	0.107604	0.8967	2.474892	2.797704
3	0.07533	0.979284	1.996234	2.297552
4	0.034819	0.31337	0.800836	1.218663
5	0.034819	0.383008	1.149025	1.706128
6	0.102354	0.409417	4.264756	4.19652
7	0.03885	0.582751	3.341103	4.623155
8	0.123355	1.110197	3.659539	4.276316
9	0.044944	0.224719	3.370787	3.685393
10	0.124224	0.248447	0.538302	0.662526
11	0.113852	0.303605	2.239089	5.502846
12	0.068446	0.273785	3.661875	4.072553
13	0.121261	0.525465	2.263541	2.789006
14	0.09058	0.317029	3.442029	4.574275
15	0.079745	0.398724	2.432217	3.30941
Mean	0.077345	0.487546	2.575923	3.273459
SD.	0.039199	0.282509	1.110782	1.364706

Table shows the % of water absorption of graft copolymer (continued)

No of sample	% of weight increasing at difference of immersion times			
	3d	4 d	5 d	6 d
1	2.927581	5.238829	5.315871	5.315871
2	3.04878	3.120516	2.941176	0.143472
3	2.749529	1.544256	2.937853	2.975518
4	1.392758	1.079387	1.218663	0.243733
5	2.158774	2.576602	2.95961	2.95961
6	5.390652	6.107131	6.277721	6.380075
7	4.856255	4.895105	5.283605	4.856255
8	5.304276	5.592105	5.304276	5.263158
9	3.820225	4.089888	4.134831	2.47191
10	0.993789	1.242236	1.449275	0.828157
11	5.768501	6.451613	6.717268	4.933586
12	4.414784	4.483231	5.852156	4.825462
13	3.071948	3.435732	3.799515	1.899757
14	4.619565	4.619565	4.710145	3.07971
15	3.508772	3.508772	4.226475	3.748006
Mean	3.601746	3.865664	4.208563	3.328285
SD.	1.455316	1.715498	1.660842	1.951948

Table shows the % of water absorption of graft copolymer (continued)

No of sample	% of weight increasing at difference of immersion times			
	7 d	8 d	9 d	10 d
1	4.622496	4.083205	4.237288	3.235747
2	4.232425	4.447633	4.519369	4.626973
3	2.900188	2.711864	2.711864	2.59887
4	1.810585	2.089136	2.263231	1.253482
5	2.402507	2.541783	2.681058	2.64624
6	4.947117	4.912999	5.049471	5.493006
7	5.788656	5.089355	5.400155	4.351204
8	4.6875	5.016447	5.263158	4.6875
9	3.05618	4.179775	4.539326	3.595506
10	0.828157	1.697723	1.904762	1.614907
11	5.844402	6.148008	6.148008	5.6926
12	6.091718	6.228611	6.262834	5.886379
13	1.414713	3.112369	3.31447	2.789006
14	4.438406	5.298913	5.570652	5.570652
15	4.425837	3.987241	4.346093	4.186603
Mean	3.832726	4.103004	4.280783	3.881912
SD.	1.667582	1.412377	1.406314	1.492269

Table shows the % of water absorption of graft copolymer (continued)

No of sample	% of weight increasing at difference of immersion times			
	11 d	12 d	13d	14 d
1	3.043143	3.775039	3.582435	3.197227
2	4.447633	4.734577	4.770445	4.698709
3	2.222222	2.184557	1.996234	2.222222
4	1.149025	1.532033	1.63649	0.940111
5	2.576602	2.681058	4.178273	2.576602
6	5.800068	5.288298	5.185943	4.844763
7	7.342657	3.962704	4.817405	4.156954
8	5.386513	4.893092	5.098684	4.194079
9	4.224719	4.764045	4.719101	4.58427
10	2.236025	2.236025	3.519669	2.277433
11	5.616698	5.275142	5.351044	5.12334
12	6.297057	6.023272	5.509925	5.509925
13	2.748585	3.112369	3.516572	1.738076
14	6.20471	5.525362	4.936594	4.574275
15	4.385965	4.744817	4.385965	4.027113
Mean	4.245442	4.048826	4.213652	3.64434
SD.	1.841797	1.394474	1.168359	1.385069

Table shows the % of water absorption of graft copolymer (continued)

No of sample	% of weight increasing at difference of immersion times			
	3 w	4 w	2 m	3 m
1	2.88906	2.88906	3.813559	3.697997
2	4.483501	4.519369	5.308465	4.985653
3	2.259887	2.372881	3.352166	3.314501
4	0.522284	1.357939	3.133705	3.029248
5	2.715877	2.855153	4.665738	4.805014
6	4.571818	4.605937	6.414193	6.175367
7	4.312354	3.807304	5.400155	5.361305
8	4.070724	4.194079	5.962171	5.345395
9	4.674157	4.089888	5.483146	5.88764
10	2.484472	1.780538	3.602484	3.602484
11	5.16129	4.895636	5.654649	5.806452
12	5.509925	5.065024	5.920602	5.989049
13	1.495554	2.101859	3.920776	4.042037
14	4.211957	3.985507	6.20471	6.567029
15	4.226475	4.066986	4.984051	5.582137
Mean	3.572622	3.505811	4.921371	4.946087
SD.	1.43122	1.186212	1.09821	1.137906

Table shows the % of water absorption of graft copolymer (continued)

No of sample	% of weight increasing at difference of immersion times			
	4 m	5m	6m	10 m
1	3.620955	3.813559	3.890601	4.506933744
2	4.806313	4.662841	4.842181	4.842180775
3	3.879473	3.615819	3.691149	3.615819209
4	2.681058	2.611421	2.576602	2.78551532
5	4.874652	4.94429	5.153203	5.292479109
6	6.277721	6.141249	6.653019	6.618901399
7	5.128205	5.205905	5.400155	5.322455322
8	5.550987	5.550987	5.263158	5.46875
9	5.213483	5.393258	5.303371	5.258426966
10	3.89234	4.223602	4.26501	4.057971014
11	5.540797	5.654649	5.426945	5.351043643
12	5.954825	6.057495	5.78371	5.920602327
13	4.244139	3.718674	3.839935	3.354890865
14	6.476449	6.612319	5.978261	5.842391304
15	5.741627	5.901116	5.821372	5.741626794
Mean	4.925535	4.940479	4.925911	4.931999186
SD.	1.076879	1.136997	1.074069	1.067025541

Appendix O

Table shows the % of water absorption of Coe Supersoft®.

No of sample	% of weight increasing at difference of immersion times			
	30 min	1 h	24 h	2 d
1	0.3417343	0.612273957	0.954008	0.783141
2	0.263596	0.499445061	0.790788	0.776915
3	0.37947784	0.51608986	0.971463	0.941105
4	0.2962336	0.225701792	0.691212	0.733531
5	0.93352192	0.353606789	0.905233	0.693069
6	0.79284994	0.302724521	0.821681	1.081159
7	0.58720838	0.222186954	1.253769	0.9681
8	0.55410691	0.244458931	1.303781	0.863755
9	0.58577406	0.209205021	1.464435	0.962343
10	0.53851907	0.523560209	1.660434	1.017203
11	0.30265511	0.261383959	0.949236	0.976751
12	0.45260916	0.532481363	1.171459	1.078275
13	0.54596429	0.708277999	1.342777	1.283754
14	0.36823567	0.288184438	1.056676	1.024656
15	0.42234332	0.286103542	1.06267	1.049046
Mean	0.49098864	0.385712293	1.093308	0.948853
SD.	0.18813659	0.163032767	0.269576	0.156824

Table shows the % of water absorption of Coe Supersoft® (continued)

No of sample	% of weight increasing at difference of immersion times			
	3 d	4 d	5 d	6 d
1	1.096398	1.580521	1.59476	2.249751
2	0.943396	0.846282	0.860155	1.026637
3	1.183971	1.214329	1.290225	1.214329
4	2.200592	0.987445	0.888701	1.015658
5	0.777935	0.763791	0.792079	1.046676
6	0.79285	1.26856	1.499207	1.282975
7	1.031582	1.237899	1.444215	1.110935
8	1.026728	1.287484	1.450456	1.303781
9	1.143654	1.701534	1.520223	1.53417
10	0.972326	1.645475	2.049364	1.600598
11	1.114321	1.499519	1.595818	1.54079
12	1.184771	1.597444	1.477636	1.584132
13	1.549358	2.006788	1.933009	2.065811
14	1.440922	3.426193	1.633045	1.617035
15	1.40327	1.743869	1.730245	1.525886
Mean	1.190805	1.520475	1.450609	1.447944
SD.	0.354869	0.631274	0.36609	0.364374

Table shows the % of water absorption of Coe Supersoft® (continued)

No of sample	% of weight increasing at difference of immersion times			
	7 d	8 d	9 d	10 d
1	1.608999	1.694433	1.423893	1.395415
2	1.31798	1.442841	1.137625	1.415094
3	1.654523	2.094718	1.457195	1.730419
4	1.424743	1.410636	1.537593	1.199041
5	1.089109	1.414427	1.35785	1.131542
6	1.528038	2.046994	1.686608	1.484792
7	1.745755	2.491668	1.634661	1.523568
8	1.629726	2.297914	1.760104	1.515645
9	1.95258	2.524407	1.827057	1.631799
10	2.333583	2.812266	2.064323	1.735228
11	2.448755	2.049801	2.104829	2.132343
12	2.076677	2.089989	1.916933	1.996805
13	3.08396	2.346171	2.434706	2.213369
14	2.321486	2.209414	2.033301	2.145373
15	2.19346	2.070845	2.057221	1.961853
Mean	1.893958	2.066435	1.76226	1.680819
SD.	0.520329	0.421187	0.346732	0.344991

Table shows the % of water absorption of Coe Supersoft® (continued)

No of sample	% of weight increasing at difference of immersion times			
	11 d	12 d	13 d	14 d
1	2.078884	1.651716	2.007689	1.608999
2	1.63707	1.401221	1.817425	1.345727
3	1.851852	1.54827	1.71524	2.200971
4	2.003103	1.509381	1.833827	1.424743
5	1.513437	1.117397	1.584158	1.06082
6	2.090241	1.628946	1.672193	1.686608
7	2.063165	1.682273	1.967942	1.60292
8	2.037158	1.646023	2.216428	1.72751
9	2.161785	2.036262	2.998605	1.966527
10	2.183994	2.243829	2.647719	1.899776
11	2.462512	2.1461	2.28367	2.104829
12	2.382854	2.116613	2.249734	2.010117
13	3.039693	2.641287	2.729821	2.537996
14	2.465578	2.641691	2.57765	2.62568
15	3.024523	2.39782	2.629428	1.907357
Mean	2.199723	1.893922	2.195435	1.847372
SD.	0.429261	0.461033	0.440739	0.424835

Table shows the % of water absorption of Coe Supersoft® (continued)

No of sample	% of weight increasing at difference of immersion times			
	3 w	4 w	2 m	3 m
1	2.107362	2.036167	2.363662	2.748113
2	1.512209	1.581576	2.081021	2.663707
3	1.745598	1.517911	2.155434	2.580449
4	1.819721	1.650444	2.849485	2.835379
5	1.329562	1.202263	2.107496	2.206506
6	1.643362	1.715439	2.191149	2.335303
7	1.634661	1.840978	2.174258	2.586891
8	1.841591	1.841591	2.265319	2.607562
9	2.133891	2.273361	2.7894	3.389121
10	2.169035	2.243829	2.872102	3.545251
11	2.393727	2.75141	2.820195	3.397991
12	2.316294	2.302982	2.689031	3.194888
13	2.862624	2.906891	3.246274	3.423344
14	2.673711	2.865834	2.945885	3.778418
15	2.615804	2.73842	3.133515	3.93733
Mean	2.053277	2.09794	2.578949	3.01535
SD.	0.456551	0.538704	0.402642	0.539913

Table shows the % of water absorption of Coe Supersoft® (continued)

No of sample	% of weight increasing at difference of immersion times			
	4 m	5 m	6 m	10 m
1	3.175281	3.132564	3.317671	6.763491
2	3.482242	3.537736	4.370144	6.54828
3	2.625987	3.126897	3.187614	6.405586
4	2.821272	3.41374	4.909014	7.137819
5	2.305516	2.630835	3.281471	7.18529
6	2.681274	2.811013	4.295805	6.443708
7	3.348675	3.872401	3.078876	7.316299
8	2.770535	3.047588	3.406128	7.121904
9	3.974895	4.309623	4.253835	6.37378
10	3.694839	4.367988	4.4727	6.821242
11	3.576833	4.1959	4.512313	6.548356
12	3.767306	3.980298	4.605964	6.269968
13	3.954552	4.603807	4.8399	7.407407
14	3.986551	3.730387	4.498879	6.708293
15	4.059946	4.305177	4.768392	6.144414
Mean	3.34838	3.671064	4.119914	6.746389
SD.	0.581584	0.624573	0.662268	0.402702

Appendix P

Table shows the % of water absorption of vulcanized rubber.

No of sample	% of weight increasing at difference of immersion times			
	30 min	1 h	24 h	2d
1	1.691963	1.741727	4.055735	4.727544
2	1.615436	1.727619	3.634732	4.218084
3	2.031542	2.352312	4.2502	4.276931
4	1.547922	1.675148	3.180662	3.371501
5	2.128806	2.155753	4.257613	4.634869
6	1.525501	1.571038	3.688525	4.872495
7	1.606426	1.767068	3.935743	4.76573
8	1.876676	2.010724	4.477212	4.530831
9	1.644661	1.528839	2.918694	3.150336
10	1.667563	1.721356	4.464766	4.276493
11	1.715634	1.393952	4.246193	4.31053
12	1.092311	1.349325	3.362604	3.319769
13	1.507024	1.226054	4.648787	4.189017
14	1.052189	1.199495	3.619529	3.556397
15	1.333704	1.41706	4.973604	3.973326
Mean	1.602491	1.655831	3.980973	4.144924
SD.	0.294795	0.330188	0.574826	0.557848

Table shows the % of water absorption of vulcanized rubber (continued)

No of sample	% of weight increasing at difference of immersion times			
	3 d	4 d	5 d	6 d
1	6.966907	7.439662	7.588952	9.455088
2	5.721337	6.641239	7.56114	8.144492
3	5.827319	8.045977	8.500401	9.248864
4	4.961832	6.552163	7.400339	7.54877
5	5.901374	6.952304	9.620049	8.919429
6	5.760474	7.081056	7.468124	8.925319
7	6.746988	6.827309	8.139224	8.728246
8	6.032172	8.391421	10.16086	9.356568
9	5.026639	6.115358	7.088256	7.760019
10	6.293706	7.880581	8.956428	9.252286
11	5.940382	6.755308	8.363714	9.521767
12	5.461555	5.932748	6.725209	9.01692
13	6.51341	7.739464	8.454662	9.323116
14	5.218855	6.565657	7.049663	8.017677
15	6.612948	7.918866	8.14115	10.14171
Mean	5.932393	7.122607	8.081211	8.890684
SD.	0.612629	0.741743	0.967395	0.72641

Table shows the % of water absorption of vulcanized rubber (continued)

No of sample	% of weight increasing at difference of immersion times			
	7 d	8 d	9 d	10 d
1	8.733516	8.857925	9.828316	9.952725
2	8.862464	8.436168	9.580435	10.16379
3	9.970596	9.730019	11.20021	11.25368
4	8.057676	8.121289	8.863444	9.372349
5	9.566155	10.10509	10.75182	10.85961
6	9.198543	9.084699	9.904372	10.1776
7	11.78046	9.933066	10.33467	10.76305
8	10.58981	10.29491	11.01877	11.60858
9	8.014825	7.968497	9.103544	9.8448
10	9.870898	9.57504	10.46261	10.83916
11	9.822003	9.371649	10.78705	10.44392
12	8.866995	8.11737	8.974084	9.231099
13	10.93231	10.16603	10.70243	10.60026
14	9.027778	8.417508	9.048822	9.385522
15	10.39178	11.33648	10.47513	10.55849
Mean	9.579054	9.301049	10.06905	10.33697
SD.	1.055694	0.983049	0.797497	0.696831

Table shows the % of water absorption of vulcanized rubber. (continued)

No of sample	% of weight increasing at difference of immersion times			
	11 d	12 d	13 d	14 d
1	12.8639	12.5902	12.96342	12.34138
2	12.58694	12.47476	12.78887	12.3177
3	14.03368	14.03368	15.02272	13.68618
4	11.78965	11.62002	11.5352	11.17472
5	11.56023	11.80275	12.44947	11.72191
6	12.88707	12.29508	12.36339	11.99909
7	13.54752	13.03882	13.60107	12.74431
8	14.66488	13.86059	14.02145	13.59249
9	12.23072	11.83692	12.23072	11.65161
10	13.74395	13.55568	14.12049	13.25982
11	12.58846	12.11666	12.93159	12.03088
12	11.15871	10.70893	11.60848	10.81602
13	12.97573	12.54151	13.53768	12.49042
14	11.63721	11.27946	11.70034	11.04798
15	13.28147	12.69797	13.72604	12.72576
Mean	12.77001	12.4302	12.9734	12.24002
SD.	0.990254	0.932414	1.023963	0.879523

Table shows the % of water absorption of vulcanized rubber. (continued)

No of sample	% of weight increasing at difference of immersion times			
	3 w	4 w	2 m	3 m
1	14.5061	16.49664	18.66136	23.21473
2	14.40431	16.73772	18.33072	24.20911
3	15.87811	17.90965	20.42235	25.74178
4	13.27396	15.05513	16.73028	21.45886
5	14.57828	17.16518	19.2401	25.62652
6	14.00273	15.96084	17.85064	22.88251
7	15.12718	17.08166	19.19679	24.23025
8	15.8445	18.0429	20.29491	25.76408
9	13.6669	15.68219	17.65115	23.99815
10	15.5191	17.32114	19.76869	25.79344
11	14.32554	16.21274	17.69247	22.77504
12	12.93639	14.45706	15.89205	20.36839
13	14.45722	17.01149	18.41635	23.60153
14	13.08923	15.13047	16.09848	21.08586
15	14.83745	16.78244	19.44985	24.78466
Mean	14.4298	16.46982	18.37974	23.70233
SD.	0.9299	1.048327	1.4092	1.753649

Table shows the % of water absorption of vulcanized rubber. (continued)

No of sample	% of weight increasing at difference of immersion times			
	4 m	5 m	6 m	10 m
1	29.38542	34.08808	35.35705	42.94601
2	29.05542	33.2735	34.88894	42.53982
3	31.78295	37.71719	39.10719	44.74739
4	26.12383	30.53435	32.31552	33.99067
5	31.23147	36.6478	40.28564	46.07922
6	27.48179	32.67304	34.24408	40.89253
7	28.83534	35.31459	35.95716	44.17671
8	31.17962	36.00536	38.28418	45.71046
9	28.16771	29.99768	34.65369	39.65717
10	29.96235	43.27595	48.17106	53.5503
11	28.43663	32.48981	34.05533	40.89642
12	26.38681	31.03448	31.24866	37.01007
13	29.553	33.92082	35.7599	43.3461
14	26.78872	29.86111	32.32323	38.88889
15	32.92581	33.92609	35.89886	43.2898
Mean	29.15312	34.05066	36.17003	42.51477
SD.	2.022232	3.496177	4.149046	4.499613

Appendix Q

Table shows the mean and standard deviation of contact angle of graft copolymer and Coe Supersoft®.

No	Graft copolymer	Coe Supersoft®
1	70	92
2	71	90
3	69	90
4	68	91
5	71	91
6	70	91
7	72	92
8	72	90
9	71	90
10	71	90
11	70	91
12	70	89
13	70	87
14	72	90
15	71	89
mean	70.53	90.2
SD.	1.13	1.26

Appendix R

Table shows the △E of graft copolymer after immersion in coffee solution.

No of sample	Graft copolymer-coffee-30 minutes	Graft copolymer-coffee-60 minutes	Graft copolymer-coffee-1day	Graft copolymer-coffee-2days	Graft copolymer-coffee-3days
1	0.184	0.740	1.834	1.673	2.02
2	0.192	0.744	1.885	1.85	2.021
3	0.189	0.690	1.79	1.661	2.014
4	0.199	0.830	1.89	1.722	2.012
5	0.189	0.765	1.756	1.742	1.997
6	0.186	0.952	1.767	1.55	2.011
7	0.195	0.659	1.889	1.549	1.979
8	0.188	0.749	1.853	1.64	2.021
9	0.186	0.687	1.997	1.652	1.968
10	0.184	0.663	1.95	1.479	2.082
Mean	0.189	0.747	1.861	1.651	2.012
SD.	0.004	0.088	0.077	0.107	0.030

Table shows the △E of graft copolymer after immersion in coffee solution (continued)

No of sample	Graft copolymer-coffee-4days	Graft copolymer-coffee-5days	Graft copolymer-coffee-6days	Graft copolymer-coffee-7days	Graft copolymer-coffee-2 weeks
1	2.851	4.401	5.697	6.432	8.139
2	2.654	4.404	5.882	6.456	8.131
3	3.041	4.221	5.741	6.341	8.003
4	2.875	4.335	6.012	6.451	8.139
5	2.846	4.082	6.231	6.372	7.998
6	2.708	4.371	5.561	6.461	7.943
7	2.829	3.899	5.872	6.589	8.114
8	2.843	3.996	5.907	6.448	8.212
9	2.800	4.369	5.678	6.263	8.211
10	2.872	4.078	6.263	6.386	8.478
Mean	2.831	4.215	5.884	6.419	8.136
SD.	0.103	0.187	0.231	0.086	0.150

Table shows the △E of graft copolymer after immersion in coffee solution (continued)

No of sample	Graft copolymer-coffee-3 weeks	Graft copolymer-coffee-4 weeks	Graft copolymer-coffee-5 weeks	Graft copolymer-coffee 6 weeks	Graft copolymer-coffee-7 weeks	Graft copolymer-coffee-8 weeks
1	13.861	10.052	12.081	13.361	13.787	14.130
2	13.960	11.002	12.163	12.987	13.778	13.568
3	14.560	10.037	11.987	12.889	13.799	14.098
4	13.457	10.118	12.406	13.500	13.668	14.113
5	13.789	10.203	13.003	13.640	13.768	14.176
6	13.697	10.064	12.129	13.352	13.977	14.667
7	13.783	10.306	12.126	13.452	13.681	14.142
8	13.881	10.202	12.123	13.411	13.809	14.210
9	13.601	9.987	11.101	13.561	13.742	14.211
10	13.509	10.105	12.007	13.342	13.764	14.004
Mean	13.809	10.207	12.112	13.349	13.777	14.132
SD.	0.310	0.294	0.463	0.237	0.084	0.265

Appendix S

Table shows the △E of graft copolymer after immersion in tea solution

No of sample	Graft copolymer-tea-30 minutes	Graft copolymer-tea-60 minutes	Graft copolymer-tea-1day	Graft copolymer-tea-2 days	Graft copolymer-tea-3 days
1	0.07	0.103	0.534	0.659	1.143
2	0.087	0.12	0.497	0.601	1.165
3	0.088	0.109	0.542	0.653	1.113
4	0.069	0.112	0.601	0.599	1.137
5	0.089	0.151	0.576	0.621	1.016
6	0.076	0.099	0.486	0.662	1.087
7	0.09	0.117	0.513	0.665	1.113
8	0.065	0.097	0.575	0.684	1.208
9	0.072	0.121	0.505	0.648	1.115
10	0.077	0.092	0.512	0.652	1.427
Mean	0.078	0.112	0.534	0.644	1.152
SD.	0.009	0.016	0.038	0.028	0.108

Table shows the △E of graft copolymer after immersion in tea solution (continued)

No of sample	Graft copolymer-tea-4 days	Graft copolymer-tea-5 days	Graft copolymer-tea-6 days	Graft copolymer-tea-7 days	Graft copolymer-tea-2 weeks
1	1.489	1.997	2.021	2.003	2.12
2	1.702	1.889	1.875	2.008	2.216
3	1.499	2.301	1.996	2.126	2.299
4	1.785	1.765	1.786	2.225	2.218
5	1.491	1.905	1.957	2.119	2.214
6	1.381	1.9	1.665	1.998	2.195
7	1.394	1.874	1.986	2.076	2.299
8	1.363	1.676	1.973	2.246	2.231
9	1.334	1.663	1.909	2.301	2.197
10	1.497	1.859	1.87	2.001	2.238
Mean	1.493	1.882	1.903	2.110	2.222
SD.	0.146	0.180	0.110	0.113	0.051

Table shows the △E of graft copolymer after immersion in tea solution (continued)

No of sample	Graft copolymer-tea-3 weeks	Graft copolymer-tea-4 weeks	Graft copolymer-tea-5 weeks	Graft copolymer-tea-6 weeks	Graft copolymer-tea-7 weeks	Graft copolymer-tea-8 weeks
1	2.331	2.502	2.556	2.712	2.767	2.830
2	2.312	2.491	2.891	2.664	2.787	2.821
3	2.307	2.37	2.532	2.715	2.775	2.798
4	2.367	2.354	2.397	2.691	2.987	2.875
5	2.217	2.401	2.476	2.791	2.781	2.798
6	2.328	2.334	2.542	2.603	2.751	2.795
7	2.377	2.318	2.461	2.718	2.702	2.828
8	2.289	2.446	2.571	2.777	2.703	2.852
9	2.207	2.402	2.445	2.731	2.799	2.897
10	2.367	2.321	2.542	2.702	2.678	2.764
Mean	2.310	2.393	2.541	2.710	2.773	2.825
SD.	0.059	0.067	0.135	0.053	0.085	0.040

Appendix T

Table shows the △E of graft copolymer after immersion in capsaicin-oil

No of sample	Graft copolymer-oil- 30 minutes	Graft copolymer-oil- 60 minutes	Graft copolymer-oil- 1 day	Graft copolymer-oil- 2 days	Graft copolymer-oil- 3 days
1	0.378	1.710	11.550	18.160	25.840
2	0.390	1.640	11.678	18.027	24.980
3	0.320	1.530	11.651	17.872	25.782
4	0.430	1.720	11.46	18.272	25.785
5	0.450	1.620	11.761	18.220	24.587
6	0.350	1.590	11.760	18.070	25.371
7	0.370	1.520	11.749	18.215	25.872
8	0.357	1.670	11.542	18.204	24.876
9	0.358	1.641	11.813	18.102	25.328
10	0.400	1.567	11.741	17.970	25.382
Mean	0.380	1.621	11.671	18.111	25.380
SD.	0.038	0.069	0.117	0.127	0.450

Table shows the △E of graft copolymer after immersion in capsaicin in oil . (continued)

No of sample	Graft copolymer-oil-4 days	Graft copolymer-oil-5 days	Graft copolymer-oil-6 days	Graft copolymer-oil-7 days	Graft copolymer-oil-2 weeks
1	30.906	39.091	43.112	50.196	58.320
2	30.773	37.827	44.785	50.053	57.124
3	31.096	38.901	42.987	52.11	59.098
4	30.997	42.004	42.657	50.113	60.759
5	32.342	35.423	42.098	52.218	57.876
6	32.097	40.113	41.289	49.679	57.452
7	30.772	39.672	42.653	49.953	58.61
8	32.112	38.553	45.097	50.253	56.978
9	33.853	38.481	43.221	50.171	56.987
10	30.327	39.454	44.164	49.967	57.903
Mean	31.527	38.951	43.206	50.471	58.110
SD.	1.063	1.685	1.181	0.907	1.170

Table shows the △E of graft copolymer after immersion in capsaicin-oil. (continued)

No of sample	Graft copolymer-oil-3 weeks	Graft copolymer-oil-4 weeks	Graft copolymer-oil-5 weeks	Graft copolymer-oil-6 weeks	Graft copolymer-oil-7 weeks	Graft copolymer-oil-8 weeks
1	66.450	68.902	77.034	82.867	88.554	90.087
2	67.891	69.994	76.102	82.889	89.010	90.123
3	65.443	71.963	76.987	82.763	88.497	92.003
4	66.902	71.548	76.482	82.589	88.652	90.023
5	64.778	70.527	77.701	82.552	87.906	89.776
6	66.431	72.778	76.889	82.787	86.977	88.796
7	66.522	70.671	77.305	82.792	88.462	90.047
8	67.045	69.972	76.891	82.886	89.002	90.012
9	63.765	71.775	77.904	83.197	87.889	90.032
10	65.587	70.997	77.021	82.431	89.564	89.876
Mean	66.081	70.913	77.032	82.775	88.451	90.077
SD.	1.204	1.141	0.526	0.215	0.722	0.781

Appendix 21

Table shows the △E of Coe Supersoft ®after immersion in coffee solution.

No of sample	Coe Supersoft®-coffee-30 minutes	Coe Supersoft®-coffee-60 minutes	Coe Supersoft®-coffee-1day	Coe Supersoft®-coffee-2days	Coe Supersoft®-coffee-3days
1	0.220	0.840	1.590	2.811	5.472
2	0.199	0.764	1.606	2.963	5.634
3	0.240	0.738	1.633	2.721	5.552
4	0.200	0.967	1.554	2.849	5.39
5	0.195	0.832	1.576	2.845	5.286
6	0.240	0.864	1.577	2.783	4.994
7	0.197	0.902	1.781	2.761	5.391
8	0.198	0.774	1.369	2.941	5.700
9	0.230	0.970	1.547	2.894	5.193
10	0.220	0.673	1.506	2.832	5.218
Mean	0.214	0.832	1.574	2.840	5.383
SD.	0.018	0.097	0.103	0.076	0.217

Table shows the △E of Coe Supersoft ®after immersion in coffee solution. (continued)

No of sample	Coe Supersoft®-coffee-4days	Coe Supersoft®-coffee-5days	Coe Supersoft®-coffee-6days	Coe Supersoft®-coffee-7days	Coe Supersoft®-coffee-2 weeks
1	6.091	10.167	10.877	10.997	13.010
2	5.983	10.181	11.051	11.696	12.900
3	5.672	10.658	10.886	11.24	12.987
4	5.996	10.213	10.892	11.19	13.065
5	6.136	10.185	10.568	11.223	13.056
6	6.071	9.974	10.876	11.032	12.697
7	5.849	10.004	10.796	11.209	13.001
8	5.831	9.891	10.845	12.064	12.656
9	5.745	10.223	10.987	11.476	13.053
10	6.011	10.399	10.864	11.39	14.002
Mean	5.938	10.189	10.864	11.352	13.042
SD.	0.156	0.220	0.126	0.324	0.367

Table shows the △E of Coe Supersoft ®after immersion in coffee solution.

(continued)

No of sample	Coe Supersoft®-coffee-3 weeks	Coe Supersoft®-coffee-4 weeks	Coe Supersoft®-coffee-5 weeks	Coe Supersoft®-coffee-6 weeks	Coe Supersoft®-coffee-7 weeks	Coe Supersoft®-coffee-8 weeks
1	13.861	14.142	15.667	15.870	16.990	16.902
2	13.960	14.193	15.987	15.889	16.875	17.042
3	14.560	13.987	14.785	15.842	16.987	17.015
4	13.457	13.756	15.927	15.891	16.993	16.987
5	13.789	14.007	14.982	15.763	16.987	17.112
6	13.697	14.118	15.371	16.107	16.698	16.998
7	13.783	14.113	15.004	15.764	16.998	17.001
8	13.881	13.959	14.432	15.859	16.964	17.032
9	13.601	14.031	14.701	15.789	16.99	17.103
10	13.509	14.023	15.667	15.879	16.965	17.021
Mean	13.809	14.032	15.252	15.865	16.944	17.021
SD.	0.310	0.123	0.545	0.098	0.093	0.059

Appendix U

Table shows the △E of Coe Supersoft ®after immersion in tea solution.

No of sample	Coe Supersoft®-tea-30 minutes	Coe Supersoft®-tea-60 minutes	Coe Supersoft®-tea-1day	Coe Supersoft®-tea-2 days	Coe Supersoft®-tea-3 days
1	0.071	0.150	0.481	0.671	1.640
2	0.060	0.135	0.521	0.682	1.199
3	0.054	0.119	0.465	0.664	1.262
4	0.081	0.165	0.521	0.595	1.193
5	0.055	0.170	0.497	0.662	1.256
6	0.064	0.139	0.478	0.682	1.213
7	0.072	0.124	0.477	0.701	1.230
8	0.066	0.113	0.467	0.669	1.227
9	0.058	0.132	0.495	0.647	1.282
10	0.050	0.176	0.507	0.658	1.198
Mean	0.063	0.142	0.491	0.663	1.270
SD.	0.010	0.022	0.020	0.028	0.133

Table shows the △E of Coe Supersoft ®after immersion in tea solution. (continued)

No of sample	Coe Supersoft®-tea-4 days	Coe Supersoft®-tea-5 days	Coe Supersoft®-tea-6 days	Coe Supersoft®-tea-7days	Coe Supersoft®-tea-2 weeks
1	1.337	1.742	1.990	2.218	2.250
2	1.382	1.546	1.769	2.503	2.297
3	1.418	1.729	1.905	2.094	2.301
4	1.432	1.739	1.924	2.139	2.224
5	1.402	1.783	1.998	2.210	2.216
6	1.321	1.651	1.754	2.221	2.267
7	1.442	1.797	1.909	2.126	2.199
8	1.346	1.654	2.013	2.194	2.278
9	1.398	1.903	1.897	2.196	2.189
10	1.339	1.654	1.947	2.211	2.197
Mean	1.381	1.719	1.911	2.211	2.242
SD.	0.043	0.098	0.088	0.112	0.042

Table shows the △E of Coe Supersoft ®after immersion in tea solution. (continued)

No of sample	Coe Supersoft®-tea-3 weeks	Coe Supersoft®-tea-4 weeks	Coe Supersoft®-tea-5 weeks	Coe Supersoft®-tea-6 weeks	Coe Supersoft®-tea-7 weeks	Coe Supersoft®-tea-8 weeks
1	2.310	2.451	2.561	2.740	2.876	2.820
2	2.225	2.368	2.549	2.731	2.798	2.880
3	2.381	2.445	2.689	2.787	2.789	2.794
4	2.234	2.321	2.501	2.757	2.765	2.759
5	2.309	2.349	2.542	2.755	2.801	2.852
6	2.281	2.547	2.469	2.743	2.768	2.709
7	2.227	2.298	2.582	2.689	2.742	2.862
8	2.361	2.289	2.537	2.722	2.794	2.857
9	2.216	2.275	2.559	2.698	2.759	2.899
10	2.298	2.271	2.507	2.777	2.756	2.768
Mean	2.284	2.361	2.549	2.739	2.784	2.820
SD.	0.058	0.092	0.059	0.032	0.037	0.061

Appendix V

Table shows the △E of Coe Supersoft ®after immersion in capsaicin-oil.

No of sample	Coe Supersoft®-oil-30 minutes	Coe Supersoft®-oil-60 minutes	Coe Supersoft®-oil-1 day	Coe Supersof®-oil-2 days	Coe Supersoft®-oil-3 days
1	0.098	0.123	0.265	0.511	0.795
2	0.103	0.128	0.269	0.532	0.889
3	0.17	0.121	0.270	0.498	0.896
4	0.104	0.109	0.285	0.531	0.902
5	0.090	0.142	0.247	0.590	0.891
6	0.105	0.119	0.238	0.483	0.884
7	0.120	0.134	0.289	0.504	0.883
8	0.098	0.151	0.238	0.528	0.904
9	0.089	0.109	0.271	0.525	0.899
10	0.130	0.152	0.264	0.520	0.885
Mean	0.111	0.129	0.264	0.522	0.882
SD.	0.024	0.016	0.017	0.028	0.032

Table shows the △E of Coe Supersoft ®after immersion in capsaicin-oil.

(continued)

No of sample	Coe Supersoft®-oil-4 days	Coe Supersoft®-oil-5 days	Coe Supersoft®-oil 6 days	Coe Supersoft®-oil-7 days	Coe Supersoft®-oil-2 weeks
1	0.851	0.791	1.701	2.353	2.280
2	0.855	0.707	1.767	2.001	2.298
3	0.867	0.886	1.743	2.001	2.289
4	0.890	0.806	1.798	1.997	2.276
5	0.867	1.002	1.700	2.227	2.245
6	0.893	1.069	1.567	2.095	2.296
7	0.796	0.876	1.618	1.965	2.297
8	0.821	0.807	1.784	2.313	2.310
9	0.839	0.895	1.785	2.019	2.297
10	0.860	1.102	1.741	2.128	2.284
Mean	0.853	0.894	1.720	2.109	2.287
SD.	0.029	0.127	0.076	0.141	0.017

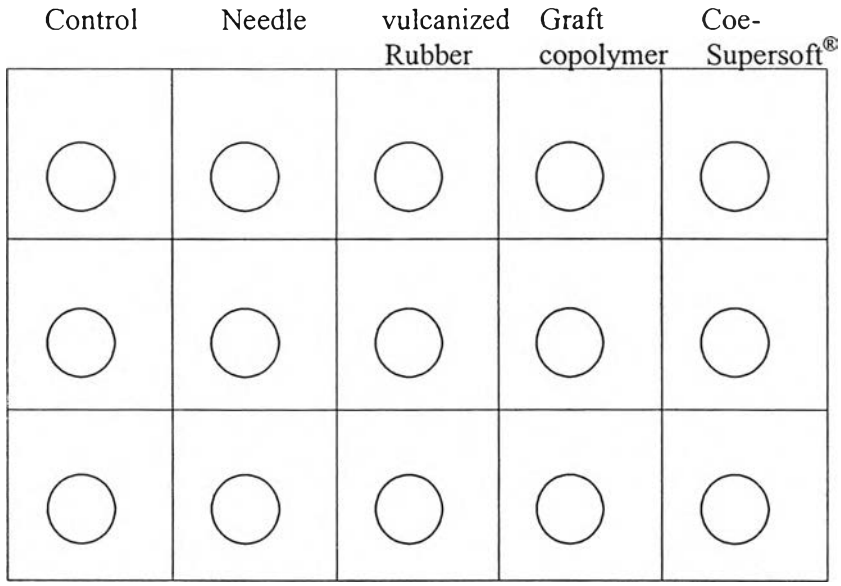
Table shows the △E of Coe Supersoft ®after immersion in capsaicin-oil.

(continued)

No of sample	Coe Supersoft®-oil-3 weeks	Coe Supersoft®-oil-4 weeks	Coe Supersoft®-oil-5 weeks	Coe Supersoft®-oil-6 weeks	Coe Supersoft®-oil-7 weeks	Coe Supersoft®-oil-8 weeks
1	2.341	2.436	2.421	2.431	2.362	2.39
2	2.265	2.367	2.461	2.331	2.354	2.401
3	2.241	2.531	2.397	2.453	2.309	2.444
4	2.101	2.339	2.417	2.421	2.404	2.399
5	2.094	2.361	2.406	2.440	2.401	2.39
6	2.238	2.391	2.411	2.39	2.398	2.442
7	2.272	2.331	2.4013	2.308	2.451	2.421
8	2.301	2.257	2.403	2.341	2.411	2.498
9	2.218	2.376	2.405	2.452	2.467	2.3889
10	2.252	2.223	2.433	2.342	2.409	2.424
Mean	2.232	2.361	2.415	2.390	2.396	2.419
SD.	0.079	0.086	0.019	0.055	0.046	0.034

Appendix V

The diagram shows well plate with the different sample placing.



Appendix W

Tables show the optical density in the MTT assay.

Sample	OD 1	OD2	OD3	Mean	% Control	SD.
Control	0.849	0.846	0.847	0.847	100	0.002
Needle	0.848	0.847	0.844	0.846	99.88	0.002
Graft copolymer	0.845	0.842	0.846	0.844	99.64	0.002
Coe Supersoft®	0.102	0.096	0.21	0.136	16.05	0.064

Sample	OD 1	OD2	OD3	Mean	% Control	SD.
Control	1.233	1.134	1.18	1.182	100	0.040
Needle	1.201	1.176	1.207	1.194	101.04	0.013
Graft copolymer	1.211	0.997	1.242	1.150	97.26	0.109
Coe Supersoft®	0.286	0.155	0.163	0.201	17.02	0.059

Sample	OD 1	OD2	OD3	Mean	% Control	SD.
Control	0.9	0.918	0.917	0.911667	100	0.008
Needle	0.918	0.907	0.912	0.912333	100	0.004
Graft copolymer	0.905	0.903	0.911	0.906333	99.41	0.003
Coe Supersoft®	0.204	0.112	0.104	0.140	15.35	0.045

CURRICULUM VITAE

Mr. Niyom Thamrongananskul was born in Buriram Province in May 13, 1964. He began his elementary and high school education from Trikam School, Buriram Province and Samsen Witayalai School, Bangkok, respectively. He received the Degree of Dental Surgery from Chiangmai University in 1991. He worked as dentist at Ban Moh Hospital, Saraburi Province from 1991-1993. In 1994 He received the Graduate Diploma in Clinical Science (Prosthodontics) from Chulalongkorn University. Then he went to work at Saraburi Health Office again for one year. In 1995 he moved to work as a staff of the Maxillofacial Prosthetic Unit of the Dental Hospital and was appointed to be a faculty member of the Department of Prosthodontic, Faculty of Dentistry, Chulalongkorn University. In 2000 he received the Master of Science Degree in Prosthodontics from Chulalongkorn University. At present he continues his work as the assistant professor in the Department of Prosthodontic, Faculty of Dentistry Chulalongkorn University, Thailand.