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APPENDIX

APPENDIX A

A. Characterization of the NR vulcanizates

Table A-1 The scorch time of NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in the concentrated latex.

Sample	1	2	3	Average ± SD
NR	2.79	2.63	3.04	2.82 ± 0.21
NR-mix	4.46	4.46	4.63	4.52 ± 0.10
T100	3.21	3.08	3.58	3.29 ± 0.26
V5T95	3.08	3.25	4.00	3.44 ± 0.49
V10T90	3.46	3.04	3.96	3.49 ± 0.46
V20T80	3.5	3.21	3.83	3.51 ± 0.31
E20T80	4.42	4.71	3.88	4.34 ± 0.42
B20T80	4.46	4.96	4.79	4.74 ± 0.25

Table A-2 The cure time of NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in the concentrated latex.

Sample	1	2	3	Average ± SD
NR	4.58	4.21	4.50	4.43 ± 0.19
NR-mix	7.63	7.33	7.67	7.54 ± 0.19
T100	5.08	4.83	5.38	5.10 ± 0.28
V5T95	4.92	5.21	5.96	5.36 ± 0.54
V10T90	5.58	4.75	5.92	5.42 ± 0.60
V20T80	5.71	5.08	5.67	5.49 ± 0.35
E20T80	6.75	7.04	5.63	6.47 ± 0.74
B20T80	6.67	7.83	7.50	7.33 ± 0.60

Table A-3 The degree of swelling (%) of NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in concentrated latex.

Sample	1	2	3	Average ± SD
NR	301.1	300.8	304.5	302.2 ± 2.1
NR-mix	265.9	265.7	269.9	267.2 ± 2.4
T100	257.3	249.1	246.8	251.1 ± 5.5
V5T95	245.2	250.3	248.3	247.9 ± 2.6
V10T90	248.5	249.4	257.1	251.7 ± 4.7
V20T80	243.1	242.4	244.6	243.4 ± 1.1
E20T80	260.8	263.5	255.3	259.8 ± 4.2
B20T80	253.7	245.6	245.3	248.2 ± 4.8

Table A-4 The M300 of *in situ* silica-NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in the concentrated latex.

Sample	1	2	3	Average ± SD
NR	1.89 ± 0.31	1.93 ± 0.26	1.71 ± 0.29	1.84 ± 0.28
NR-mix	2.09 ± 0.19	2.35 ± 0.32	2.27 ± 0.13	2.23 ± 0.25
T100	3.19 ± 0.41	3.34 ± 0.22	3.30 ± 0.10	3.28 ± 0.24
V5T95	2.97 ± 0.17	3.04 ± 0.34	3.90 ± 0.29	3.32 ± 0.51
V10T90	2.94 ± 0.44	3.61 ± 1.15	4.36 ± 0.41	3.66 ± 0.88
V20T80	3.35 ± 0.46	3.90 ± 0.38	3.40 ± 0.21	3.90 ± 0.21
E20T80	2.44 ± 0.20	2.89 ± 0.29	2.81 ± 0.24	2.75 ± 0.28
B20T80	2.46 ± 0.11	2.36 ± 0.26	2.81 ± 0.26	2.54 ± 0.29

Table A-5 The tensile strength of NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in the concentrated latex.

Sample	1	2	3	Average ± SD
NR	9.84 ± 4.89	15.71 ± 2.80	15.10 ± 6.54	13.55 ± 5.41
NR-mix	16.40 ± 3.93	18.45 ± 1.53	17.46 ± 2.34	17.44 ± 2.75
T100	22.97 ± 2.79	20.83 ± 0.79	20.64 ± 1.23	21.57 ± 2.01
V5T95	20.96 ± 1.06	22.61 ± 0.82	2.53 ± 0.92	21.74 ± 1.12
V10T90	22.22 ± 0.43	23.53 ± 0.75	21.46 ± 0.99	22.43 ± 1.14
V20T80	24.50 ± 1.41	23.09 ± 0.56	22.23 ± 0.74	23.27 ± 1.13
E20T80	21.46 ± 0.45	18.04 ± 1.89	20.75 ± 0.91	19.95 ± 1.89
B20T80	21.26 ± 1.99	20.68 ± 1.80	20.21 ± 1.98	20.72 ± 1.86

Table A-6 The tear strength of *in situ* silica-NR vulcanizates prepared by the sol-gel process of the mixed TEOS/alkyltrietoxysilanes in the concentrated latex.

Sample	1	2	3	Average ± SD
NR	33.60 ± 3.43	33.81 ± 2.65	31.19 ± 0.53	32.87 ± 2.67
NR-mix	37.08 ± 2.47	37.37 ± 1.24	34.89 ± 1.57	36.44 ± 2.07
T100	43.87 ± 1.65	43.25 ± 1.38	36.00 ± 1.73	41.04 ± 3.97
V5T95	43.00 ± 0.91	42.55 ± 2.18	37.47 ± 0.87	41.01 ± 2.92
V10T90	49.46 ± 2.81	44.82 ± 3.69	40.76 ± 0.93	45.02 ± 4.46
V20T80	48.65 ± 1.90	44.40 ± 3.00	38.63 ± 0.57	43.90 ± 4.65
E20T80	39.54 ± 1.92	33.74 ± 1.29	35.32 ± 0.48	36.20 ± 2.83
B20T80	38.50 ± 1.43	34.97 ± 0.47	34.11 ± 1.04	35.86 ± 2.19

VITAE

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