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APPENDICES

Appendix A Carbon and Nitrogen Content

Table A1 Carbon and nitrogen content of CHNS analyzer of CM-chitin

CM-Chitin	%C	%N
1)	39.17	5.35
2)	39.59	5.58
3)	39.68	5.71
Average	39.48	5.55

Appendix B Molecular Weight of CM-Chitin

Table B1 Time of flow of CM-chitin solution with different concentration of NaCl

Concentration of NaCl	Time	T/T_0	Average
0 %w/w (T_0)	104.10		
	104.02		
	103.80		
0.05 %w/w	147.33	1.42	1.41
	146.33	1.41	
	145.63	1.40	
0.1 %w/w	198.51	1.91	1.90
	197.33	1.90	
	197.46	1.90	
0.15 %w/w	278.91	2.68	2.69
	280.09	2.69	
	278.95	2.68	
0.2 %w/w	374.62	3.60	3.60
	373.59	3.59	
	374.70	3.60	
0.3 %w/w	679.50	6.54	6.55
	680.15	6.54	
	682.05	6.56	

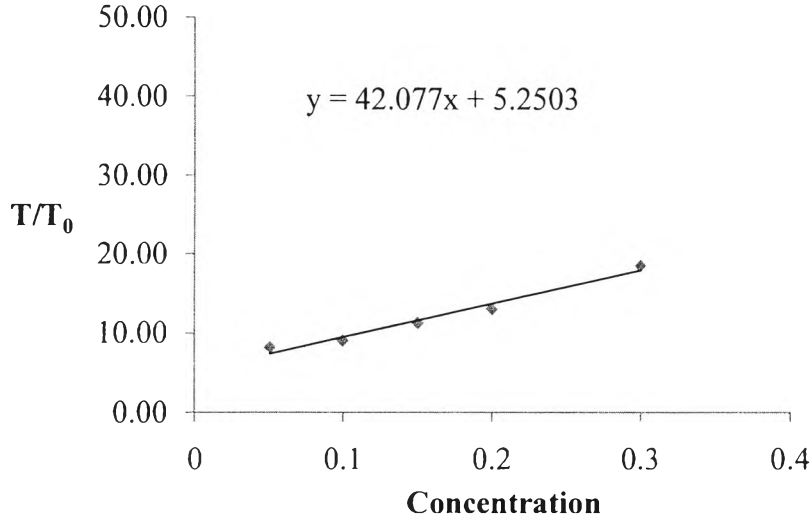

Figure B1 Time of flow and concentration curve of CM-chitin solution

Appendix C Protein Content Analysis of Natural Rubber Latex

Table C1 Protein content of standard samples

Concentration (ug/ml)	Absorbance
0	0.2276
1	0.2278
5	0.2370
25	0.2553
125	0.3555
250	0.4512
500	0.6764
750	0.8401
1000	1.0982
1500	1.3848

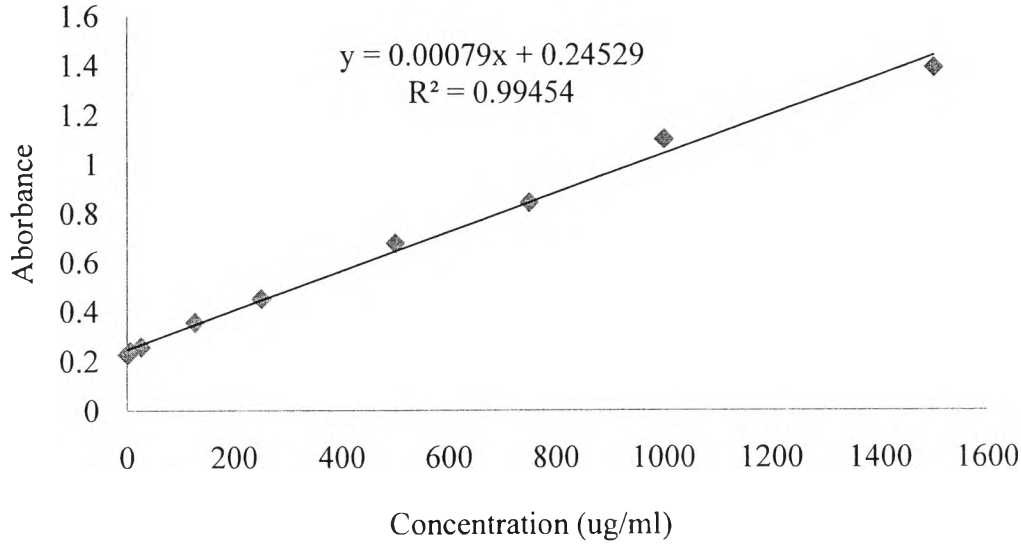

Figure C1 Calibration curve of protein content.

Appendix D Average Diameter of Natural Rubber Phase in Blend Films

Table D1 Average diameter of natural rubber phase in blend films

Composition CM-Chitin/Natural Rubber	Size (μm)	Amount	Average	SD
90/10	1	52	1.13	0.34
	2	8		
80/20	1	141	1.15	0.32
	2	19		
70/30	2	12	2.77	0.86
	3	9		
	4	4		
	5	1		
60/40	2	4	4.17	1.48
	3	13		
	4	11		
	5	7		
	6	5		
	7	3		
	8	1		

Appendix E The Mechanical Testing of the CM-Chitin/Natural Rubber Blend Films

Table E1 Tensile strength of the CM-chitin/natural rubber blend films

Composition CM-Chitin/Natural Rubber	Tensile Strength (MPa)	Average (MPa)	SD
100/0, (pure CM-chitin)	74.09	69.86	3.31
	65.52		
	68.28		
	71.96		
	69.47		
90/10	65.34	66.44	1.41
	68.08		
	66.60		
	64.72		
	67.45		
80/20	46.62	46.47	3.43
	49.20		
	40.85		
	49.29		
	46.37		
70/30	46.66	40.97	3.52
	39.91		
	41.80		
	37.66		
	38.83		

Composition CM-Chitin/Natural Rubber	Tensile Strength (MPa)	Average (MPa)	SD
60/40	29.69	30.10	2.34
	27.77		
	30.59		
	33.82		
	28.62		
0/100, (pure natural rubber)	0.81	0.83	0.09
	0.80		
	0.82		
	0.98		
	0.76		

Table E2 Elongation at break of the CM-chitin/natural rubber blend films

Composition CM-Chitin/Natural Rubber	Elongation at Break (%)	Average (%)	SD
100/0, (pure CM-chitin)	6.33	6.32	0.57
	6.71		
	6.73		
	5.35		
	6.48		
90/10	8.93	9.48	0.36
	9.70		
	9.68		
	9.79		
	9.30		
80/20	11.66	10.85	0.53
	10.48		
	10.38		
	10.61		
	11.11		
70/30	7.51	7.53	0.67
	7.03		
	6.74		
	7.99		
	8.37		

Composition CM-Chitin/Natural Rubber	Elongation at Break (%)	Average (%)	SD
60/40	7.43	7.52	0.30
	7.86		
	7.64		
	7.62		
	7.05		
0/100, (pure natural rubber)	541.05	572.35	35.55
	568.00		
	616.64		
	600.12		
	535.96		

Appendix F The Mechanical Testing of the CM-Chitin/Natural Rubber /Glycerol Blend Films

Table F1 Tensile strength of the CM-chitin/natural rubber/glycerol blend films

Composition CM-Chitin/Natural Rubber/Glycerol	Tensile Strength (MPa)	Average (MPa)	SD
80/20/0	46.62	46.47	3.43
	49.20		
	40.85		
	49.29		
	46.37		
80/20/10	61.07	57.90	2.06
	58.33		
	56.19		
	55.93		
	57.96		
80/20/20	45.31	43.79	1.69
	42.17		
	42.85		
	42.71		
	45.92		
80/20/30	34.83	34.39	1.51
	32.98		
	34.33		
	36.70		
	33.11		

Table F2 Elongation at break of the CM-chitin/natural rubber/glycerol blend films

Composition CM-Chitin/Natural Rubber/Glycerol	Elongation at Break (%)	Average (%)	SD
80/20/0	11.66	10.85	0.53
	10.48		
	10.38		
	10.61		
	11.11		
80/20/10	29.08	28.05	1.93
	26.34		
	27.04		
	26.83		
	30.94		
80/20/20	36.25	37.28	1.17
	36.45		
	37.59		
	36.94		
	39.15		
80/20/30	48.05	50.10	1.44
	51.11		
	51.21		
	49.10		
	51.03		

Appendix G The Mechanical Testing of the Crosslinked CM-Chitin/Natural Rubber /Glycerol Blend Films

Table G1 Tensile strength of the crosslinked CM-chitin/natural rubber/glycerol blend films

Crosslinking Time (min)	Tensile Strength (MPa)	Average (MPa)	SD
0	41.01	41.89	2.84
	40.14		
	41.42		
	40.02		
	46.87		
15	44.38	43.85	2.21
	41.34		
	44.75		
	46.80		
	42.00		
30	45.44	44.85	2.49
	40.84		
	46.16		
	47.40		
	44.40		
45	53.19	48.31	3.20
	49.43		
	46.10		
	45.04		
	47.78		

Crosslinking Time (min)	Tensile Strength (MPa)	Average (MPa)	SD
60	67.18	71.64	6.90
	64.12		
	81.91		
	74.37		
	70.61		

Table G2 Elongation at break of the crosslinked CM-chitin/natural rubber/glycerol blend films

Crosslinking Time (min)	Elongation at Break (%)	Average (%)	SD
0	49.66	44.26	3.40
	41.37		
	41.85		
	45.43		
	42.99		
15	38.42	37.17	1.00
	37.73		
	36.91		
	35.73		
	37.06		
30	29.26	29.56	1.04
	27.95		
	29.72		
	30.67		
	30.18		
45	23.41	22.13	2.10
	20.07		
	21.96		
	20.22		
	24.98		

Crosslinking Time (min)	Elongation at Break (%)	Average (%)	SD
60	6.77	6.87	1.02
	8.00		
	6.16		
	5.64		
	7.79		

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3. Udom, S.; Tokura, S.; and Rujiravanit, R. (2012) Preparation and Characterization of CM-Chitin/Natural Rubber Blends. Paper presented at the 3rd Research Symposium on Petrochemical, and Material Technology and The 18th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.