REFERENCES

Bianchi, E., Marsano, E., and Tacohino, A. (1997). Thermoreversible gels of chitin. Carbohydrate Polymers, 32, 23-26.

Chandy, T., and Sharma, C.P. (1990). Artificial Cells Artificial Organs , 18, 1-24.

Chandy, T. and Sharma, C.P. (1992). Prostaglandid E_1-Immobolized Poly (vinyl alcohol) Blend Chitosan Membranes: Blood Compatibility and Permeability properties. Journal of Applied Polymer Science, 44, 2145-2156.

Elizabeth, P. (1993). Chitin Craze. Science News, 144, 72-74.

Gudeman, L.F., and Peppas, N.A. (1995). Preparation and Characterization of pH-Sensitive Intepenetrating Networks of Poly(vinyl alcohol) and Poly(acrylic acid). Journal of Applied Polymer Science, 55, 919-928.

Hirai, T., Maruyama, H., Suzuki, T., and Hayashi, S. (1992). Shape Memorizing Properties of a Hydrogel of Poly(vinyl alcohol). Journal of Applied Polymer Science, 45, 1849-1855.

Hirano, S. (1988). Water-Soluble Glycol Chitin and Carboxymethylchitin. Methods in Enzymology: Biomass Part B Lignin, Pectin and Chitin, 161, 408-410.

Hjerde, R.J., Varum, K.M., Grasdalen, H., Tokura, S., and Smidsrod, O. (1997). Chemical composition of *O*-(carbixymethyl)-chitins in relation to lysozyme degradation rates. Carbohydrate Polymers, 34, 131-139.

Imamura, T., Ryu, K., and Murai, M. (1991). Shampoos containing carbohydrate surfactants and chitin derivatives. JP Patent, 04, 308, 524.

Kaetsu, I. (1996). Stimule Sensitive Hydrogels. New York: Marcel Dekker.

Kaneko, M, Inoue, Y., and Tokura, S. (1982). Report in Progress Polymer Physics Japan, xxv, 759.

Khor, E., Wan, A.C.A., Tee, C.F., and Hastings, G.W. (1996). Reversible Water-Swellable Chitin Gel. Journal of Polymer Science: Part A: Polymer Chemistry, 35, 2049-2053.

Kim, J.H., Kim, J.Y., Lee, Y.M., and Kim, K.Y. (1992a). Properties and Swelling Characteristics of Cross-Linked Poly(vinyl alcohol)/ Chitosan blend Membrane. Journal of Applied Polymer Science, 45, 1711-1717.

Kim, J.H., Kim, J.Y., Lee, Y.M., and Kim, K.Y. (1992b). Controlled release of riboflavin and insulin through Cross-linked Poly(vinyl alcohol)/Chitosan blend Membrane. Journal of Applied Polymer Science, 44, 1823-1828.

Kim, S.S., Kim, S.H., and Lee, Y.M. (1996). Preparation, characterization and properties of β-chitin and N-deacetylated β-chitin. Journal of Polymer Science: Part B: Polymer Physics, 34, 2367-2374.

Knorr, D. (1991). Recovery of Utilization of Chitin and Chitosan in Food Process Management. Food Technology, 114-120.

Kurita, K., Kawata, M., Koyama, Y., and Nishimura, S. (1991). Graft copolymerization of Vinyl monomers onto Chitin with Cerium (IV). Journal of Applied Polymer Science, 42, 2885-2891.

Lee, Y. (1974). University Microfilm Ann Arbor, 29, 446.

Lee, Y.M., Kim, S.H., and Kim, S.J. (1996). Preparation and Characteristics of β-chitin and Poly(vinyl alcohol) blend. Polymer, 37, 5897-5905.

Miya, M., Iwamoto, R., and Mima.S. (1984). FTIR Study of Intermolecular Interactions in Polymer Blends. Journal of Polymer Science: Polymer Physics Edition, 22, 1149-1151.

Muzzarelli, R.A.A. (1997). Chitin. Oxford: Pergamon Press Patent.

Muzzarelli, R.A.A. (1988). Carboxymethlated chitins and chitosans. Carbohydrate Polymer, 8, 1-21.

Nakano, M., Takikawa, K., and Arita, T. (1979). Release characteristics of dibucaine dispersed in konjac gels. Journal of Biomedical Material Research, 13, 811-819.

Nakano, M., Nakamura, Y., Juni, K., and Tomitsuka, T. (1980). Evaluation of a new release theophylline formation by the measurements of salivary levels of the drug in human. Chemical Pharmacy Bullentin, 28, 2905-2908.

Nishimura, S., Ikeuchi, Y., and Tokura, S. (1984a). The Adsorption of Bovine blood proteins onto the Surface of *O*-(carboxymethyl)chitin. Carbohydrate Research, 134, 305-312.

Nishimura, K., Nishimura, S., Nishi, N., Sakai, I., Tokura, S., and Azuma, I. (1984b). Vaccine, 2, 129-135.

Okaya, T. (1992). General Properties of Poly(vinyl alcohol) in Relation to its Applications. New York: John Wiley & Sons.

Ouchi, T., Inosaka, K., Banba, T., and Ohya, Y. (1992). Advances in Chitin and Chitosan. New York: Elsevier.

Park, H., Park, K. (1996). Hydrogels in Bioapplications. Washington: American Chemical Society.

Park, T.G., and Hoffman, A.S. (1992). Synthesis and Characterization of pH- and/or Temperature-Sensitive Hydrogels. Journal of Applied Polymer Science, 46, 659-671.

Patten, R.S., and Chandler, P.T. (1975). Journal of Diary Science, 38, 397.

Sannan, T., Kurita, K., Ogura, K., and Iwakura, T. (1978). Polymer, 19, 458-462.

Shibayama, M., Yamamoto, T., Xiao, C., Sakurai, S., Hayami, A., and Nomura, S. (1991). Bulk and surface characterization of cellulose/poly(vinyl alcohol) blends by Fouier-transform infra-red spectroscopy. Polymer, 3, 1010-1016.

Shiga, T., Hirose, Y., Okada, A., and Kurauchi, T. (1993). Bending of Ionic Polymer Gel Caused by Swelling under Sinusoidally Varying Electric Fields. Journal of Applied Polymer Science, 47, 113-119.

Shimahara, K., and Takigushi, Y. (1988). Biomass part B: Ligtin, Pectin, and Chitin. New York: Academic Press.

Soi, K., Takasu. A., and Okada, M. (1997). New chitin based polymer hybrids. 2. Improved miscibility of chitin derivatives having monodisperse poly(2-methyl-2-oxazoline) side chain with poly(vinyl chloride) and poly(vinyl alcohol). Macromolecules, 30, 6134-6145.

Sugano, M., Fujikawa, T., Hiratsuji, Y., and Hasagaea, Y. (1978). Nutrition Republic International, 18, 531-537.

Sugimoto, M., Motimoto, M., Sashiwa, H., Saimoto, H., and Shigemasa, Y. (1998). Preparation and Characterization of water-soluble chitin and chitosan derivatives. Carbohydrate Polymer, 36, 49-59.

Tokura, S., Nishi, N., Tsutsumi, A., and Somorin, O. (1983a). Studies on Chitin VIII: Some Properties of Water Soluble Chitin Derivatives. Polymer Journal, 15, 485-491.

Tokura, S., Nishimura, S., and Nishi, N. (1983b). Studies on Chitin IX: Specific Binding Of Calcium Ions by Carboxymethyl-Chitin. Polymer Journal, 15, 597-602.

Tokura, S., Baba, S., Uraki, Y., Miura, Y., Nishi, N., and Hasegawa, O. (1990). Carboxymethyl-chitin as a Drug Carrier of Sustained Release. Carbohydrate Polymers, 13, 273-281.

Tokura, S., Miura, Y., Johmen, M., Nishi, N., and Nishimura, S. (1994). Induction of Drug specific Antibody and the Controlled Release of Drug by 6-*O*-Carboxymethyl-chitin. Journal of Controlled Release, 28, 235-241.

Tokura, S., and Nishi, N. (1995). Novel drug delivery system by chitin derivative. Macromolecular Symposium, 99, 201-208.

Tsukada, M., Freddi, G., and Crighton, J.S. (1996). Structure and Compatibility of Poly(vinyl alohol) Silk Fibroin (PVA/SF) Blend Films. Journal of Polymer Science: Part B: Polymer Physics, 32, 243-248.

Uraki, Y., and Tokura, S. (1988). Calcium-mediated adsorption of neutral amino acids to carboxymethylated chitin. Journal of Macromolecule Sci-Chemistry, A25, 1427-1441.

Vazques-Torres, H., Cauich-Rodriguez, J.V., and Cruz-Ramos, C.A. (1993). Poly(vinyl alcohol)/Poly(acrylic acid) Blends: Miscibility Studied by DSC and Characterization of Their Thermally Induced Hydrogels. Journal of Applied Polymer Science, 50, 777-792.

Wang, H., Li, H., Lu, Y., and Wang, Z. (1996). Studied on chitosan and poly (acrylic acid) interpolymer complex. I. Preparation. Structure, pH-sensitivity, and salt sensitivity of complex-forming poly(acrylic acid): chitosan semi-interpenetrating polymer network. Journal of Applied Polymer Science, 71, 1145-1150.

Watanabe, K., Saiki, I., Matsumoto, Y., and Azuma, I. (1992). Antimetastatic activity of neocarzinostatin incorporated into controlled release gels of CM-chitin. Carbohydrate Polymer, 17, 29-37.

Windholz, M., Budavari, S., Stroumtsos, L.Y., and Fertig, M.N. (1976). The Merck Index. New Jersey: Merck.

Williamson, S.L., Armentrout, S., Poster, R.S., and McCormick, C.L. (1998). Microstructural examination of semi-interpenetrating network of poly (N,N-dimethylacrylamide) with cellulose or chitin synthesized in Lithium chloride/N,N-dimethylacetamide. Macromolecules, 31, 8134-8141.

Yang, Y.C., and Zall, R.R. (1984). Absorption of metals by natural polymers generated from seafood processing waste. Industrial and Engineering Chemistry Product Research and Development, 23, 168-172.

Yoshimizu, H., and Asakara, T. (1990). The Structure of *Bombyx mori* silk fibroin membrane swollen by water studied with ESR, 13C-NMR, and FT-IR spectroscopies. Journal of Applied Polymer Science, 40, 1745-1756.

APPENDIX A

Table A1 Effect of time on equilibrium content (EWC) of blend films at 15 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	130.54	135.67	132.89	133.03	2.57
20	141.43	140.38	142.15	141.32	0.89
40	151.92	153.82	154.06	153.27	1.17
50	176.39	179.66	177.23	177.76	1.70
60	183.14	180.29	184.03	182.49	1.95
80	295.02	293.81	197.22	295.35	1.73
100	338.57	338.87	335.23	335.89	2.42

Table A2 Effect of time on equilibrium content (EWC) of blend films at 30 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	143.57	141.82	144.18	143.19	1.23
20	150.18	152.46	149.83	150.82	1.43
40	163.81	161.42	162.97	162.73	1.21
50	182.77	181.35	184.28	182.80	1.47
60	189.27	188.52	187.66	188.48	0.81
80	307.21	305.29	308.45	306.98	1.59
100	349.23	345.89	342.87	346.00	3.18

Table A3 Effect of time on equilibrium content (EWC) of blend films at 60 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	149.32	147.56	151.23	149.37	1.84
20	163.86	165.92	164.88	164.89	1.03
40	175.65	173.12	172.86	173.88	1.54
50	189.43	192.49	190.53	190.81	1.55
60	198.28	197.38	199.21	198.29	0.91
80	313.13	315.53	317.2	315.29	2.05
100	352.58	353.13	354.14	353.28	0.79

Table A4 Effect of time on equilibrium content (EWC) of blend films at 90 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	152.11	150.85	153.48	152.15	1.31
20	170.25	169.13	171.55	170.31	1.21
40	183.11	180.25	182.12	181.83	1.45
50	194.86	195.08	198.33	196.09	1.94
60	202.56	200.2	202.81	201.86	1.44
80	325.28	326.89	328.27	326.81	1.50
100	360.88	361.98	360.75	361.20	0.68

Table A5 Effect of time on equilibrium content (EWC) of blend films at 120 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	153.35	152.46	154.05	153.29	0.80
20	172.18	171.56	171.83	171.86	0.31
40	182.86	181.08	182.1	182.01	0.89
50	195.47	195.61	200.2	197.09	2.69
60	202.92	201.12	203.08	202.37	1.09
80	326.29	328.12	329.06	327.82	1.40
100	361.91	362.83	360.44	361.73	1.21

Table A6 Effect of time on equilibrium content (EWC) of blend films at 180 min.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	154.91	153.72	155.25	154.63	0.80
20	173.05	172.88	172.01	172.65	0.56
40	183.03	181.12	182.11	182.09	0.95
50	196.86	196.38	200.68	197.97	2.36
60	202.95	201.52	203.1	202.52	0.87
80	327.33	329.55	329.33	328.74	1.22
100	362.11	363.35	360.58	362.01	1.39

Table A7 Effect of time on equilibrium content (EWC) of blend films at 24 h.

CM-chitin content (%)	EWC (%)			Average	Standard deviation
	X1	X2	X3		
0	153.85	150.96	159.56	154.79	4.38
20	178.75	174.84	170.93	174.84	3.91
40	180.48	185.56	183.02	183.02	2.54
50	198.77	192.68	199.93	197.13	3.89
60	210.17	204.24	195.45	203.29	7.40
80	322.97	334.87	332.62	330.15	6.32
100	369.17	360.34	357.89	362.47	5.93

APPENDIX B

Table B1 Degree of swelling of blend films in pH buffer solution pH = 3.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	149.84	157.65	153.2	153.56	3.92
20	202.61	225.13	206.11	211.28	12.12
40	216.25	208.71	223.63	216.20	7.46
50	262.54	253.66	262.94	259.71	5.25
60	292.54	280.87	297.30	290.24	8.45
80	505.27	483.05	501.88	496.73	11.97
100	499.24	521.04	510.75	510.34	10.91

Table B2 Degree of swelling of blend films in pH buffer solution pH = 4.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	150.55	157.26	149.28	152.36	4.29
20	200.00	214.29	217.65	210.65	9.37
40	215.33	225.21	208.48	216.34	8.41
50	255.56	258.90	251.25	255.24	3.83
60	296.43	285.00	289.21	290.21	5.78
80	489.74	488.35	489.05	489.05	0.69
100	497.33	508.95	524.53	510.27	13.65

Table B3 Degree of swelling of blend films in pH buffer solution pH = 5.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	155.00	168.83	146.25	156.69	11.39
20	200.00	202.86	203.87	202.24	2.01
40	207.93	208.20	210.24	208.79	1.26
50	248.48	247.47	267.65	254.53	11.37
60	273.72	298.22	286.91	286.28	12.26
80	486.23	462.72	479.81	476.25	12.15
100	502.76	512.50	494.40	503.22	9.06

Table B4 Degree of swelling of blend films in pH buffer solution pH = 6.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	150.12	163.89	159.25	157.75	7.01
20	195.83	196.84	205.38	199.35	5.25
40	203.85	231.17	219.30	218.11	13.70
50	256.92	252.31	258.33	255.85	3.15
60	277.16	294.29	280.00	283.82	9.18
80	471.83	484.25	475.79	477.29	6.34
100	500.55	499.58	497.92	499.35	1.33

Table B5 Degree of swelling of blend films in pH buffer solution pH = 7.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	160.89	157.83	159.88	159.53	1.56
20	223.25	200.00	210.25	211.17	11.65
40	235.00	238.82	253.33	242.38	9.67
50	285.16	301.47	280.14	288.92	11.15
60	308.92	299.09	311.54	306.52	6.56
80	504.94	498.44	488.46	497.28	8.30
100	510.53	501.77	517.47	509.92	7.87

Table B6 Degree of swelling of blend films in pH buffer solution pH = 8.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	162.65	165.88	157.33	161.95	4.32
20	229.09	233.33	221.21	227.88	6.15
40	245.59	248.10	243.42	245.70	2.34
50	296.55	283.33	305.97	295.28	11.37
60	309.64	309.82	314.44	311.30	2.72
80	512.29	512.88	511.7	512.29	0.59
100	524.21	525.88	526.84	525.64	1.33

Table B7 Degree of swelling of blend films in pH buffer solution pH = 9.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	154.88	162.53	157.68	158.36	3.87
20	270.27	289.80	278.38	279.48	9.81
40	294.55	284.03	277.09	285.22	8.79
50	311.84	321.27	319.77	317.63	5.07
60	356.67	344.55	338.37	346.53	9.31
80	533.49	541.20	533.67	536.12	4.40
100	544.19	551.49	535.15	543.61	8.19

Table B8 Degree of swelling of blend films in pH buffer solution pH = 10.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	153.87	159.65	162.38	158.63	4.35
20	285.61	270.00	270.41	275.34	8.90
40	270.00	272.31	297.65	279.99	15.34
50	319.32	321.14	308.81	316.42	6.66
60	352.00	344.91	348.09	348.33	3.55
80	541.25	529.96	542.72	537.98	6.98
100	558.83	547.71	538.81	548.45	10.03

Table B9 Degree of swelling of blend films in pH buffer solution pH = 11.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	155.55	150.18	161.93	155.89	5.88
20	277.33	278.38	283.93	279.88	3.55
40	270.93	278.33	277.32	275.53	4.01
50	316.10	313.81	311.54	313.82	2.28
60	360.31	348.23	346.38	351.64	7.57
80	541.22	536.00	539.12	538.78	2.63
100	555.96	542.22	539.03	545.74	9.00

Table B10 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 3.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	519.38	507.27	481.25	502.63	19.48
0.01	262.54	253.66	262.94	259.71	5.25
0.05	182.5	167.5	163.33	171.11	10.08

Table B11 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 4.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	477.50	510.26	504.44	497.40	17.48
0.01	255.56	258.90	251.25	255.24	3.83
0.05	171.02	170.00	154.90	165.31	9.03

Table B12 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 5.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	505.08	507.41	474.42	495.64	18.41
0.01	248.48	247.47	267.65	254.53	11.37
0.05	174.52	150.96	162.86	162.78	11.78

Table B13 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 6.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	475.71	507.22	485.38	489.44	16.14
0.01	256.92	252.31	258.33	255.85	3.15
0.05	153.18	159.79	162.27	158.41	4.70

Table B14 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 7.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	509.82	518.42	490.70	506.31	14.19
0.01	285.16	301.47	280.14	288.92	11.15
0.05	173.96	160.00	172.78	168.91	7.74

Table B15 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 8.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	532.04	508.57	525.56	522.06	12.12
0.01	296.55	283.33	305.97	295.28	11.37
0.05	161.36	172.5	184.81	172.89	11.73

Table B16 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 9.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	577.10	552.07	551.00	560.06	14.77
0.01	311.84	321.27	319.77	317.63	5.07
0.05	232.67	233.33	248.39	238.13	8.89

Table B17 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 10.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	563.82	582.67	571.57	572.69	9.47
0.01	319.32	321.14	308.81	316.42	6.65
0.05	246.23	246.09	238.46	243.59	4.45

Table B18 Degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 11.

Glutaraldehyde content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0.005	591.03	578.87	562.94	577.61	14.09
0.01	316.10	313.81	311.54	313.82	2.28
0.05	237.12	243.93	236.91	239.32	3.99

Table B19 Effect of time on degree of swelling of CM-chitin/PVA: 50/50 in pH buffer solution pH = 6 and pH = 10.

pH	Time (min)	Degree of swelling (%)			Average	Standard deviation
		X1	X2	X3		
6	30	251.63	249.86	261.25	254.25	6.13
	60	256.28	256.90	266.25	259.81	5.59
	90	257.44	256.90	266.25	260.20	5.25
10	120	303.25	303.94	315.00	307.40	6.59
	150	307.91	310.99	315.00	311.30	3.55
	180	317.21	320.85	325.25	321.10	4.03
6	210	263.95	256.90	255.00	258.62	4.71
	240	256.74	251.27	251.25	253.09	3.16
	270	254.05	245.92	239.44	246.47	7.3205
10	300	294.87	287.96	292.25	291.69	3.4885
	330	302.16	295.1	299.3	298.85	3.5511
	360	303.51	299.18	300.7	301.13	2.1968
6	390	263.51	255.71	253.8	257.67	5.1441
	420	254.59	250.82	245.07	250.16	4.7942

APPENDIX C

Table C1 Degree of swelling of blend films in 0.25 M LiCl.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	172.88	167.59	168.36	169.61	2.86
20	182.53	180.00	184.44	182.32	2.23
40	193.75	195.24	183.87	190.95	6.18
50	204.65	212.90	213.46	210.34	4.93
60	244.52	240.91	236.67	240.70	3.93
80	388.96	394.81	380.56	388.11	7.16
100	489.54	488.41	490.67	489.54	1.13

Table C2 Degree of swelling of blend films in 0.25 M NaCl.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	174.56	169.38	168.44	170.79	3.30
20	179.63	184.85	178.16	180.88	3.51
40	184.09	178.75	185.71	182.85	3.64
50	205.00	214.12	205.91	208.34	5.02
60	244.86	225.00	232.56	234.14	10.02
80	395.51	404.71	396.05	398.76	5.16
100	494.81	494.44	502.22	497.16	4.39

Table C3 Degree of swelling of blend films in 0.25 M $CaCl_2$.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	164.51	169.89	174.35	169.58	4.93
20	178.93	174.51	184.13	179.19	4.81
40	196.94	195.71	198.78	197.14	1.54
50	214.03	221.74	213.11	216.29	4.74
60	245.50	243.55	248.68	245.91	2.59
80	356.32	348.10	347.73	350.72	4.86
100	413.33	418.36	421.84	417.84	4.28

Table C4 Degree of swelling of blend films in 0.25 M $FeCl_3$.

CM-chitin content (%)	Degree of swelling (%)			Average	Standard deviation
	X1	X2	X3		
0	175.87	168.73	170.34	171.65	3.75
20	186.10	182.35	189.85	186.10	3.75
40	201.11	189.21	190.71	193.68	6.48
50	222.22	223.81	211.85	219.29	6.49
60	248.06	250.00	250.73	249.6	1.38
80	336.95	347.37	350.42	344.91	7.06
100	383.77	384.62	382.91	383.77	0.85

CURRICULUM VITAE

Name: Ms. Kamonrat Kuratchatchaval

Date of Birth: September 25, 1978

Nationality: Thai

University Education:

1995-1998 Bachelor Degree of Science in Industrial Chemistry, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.