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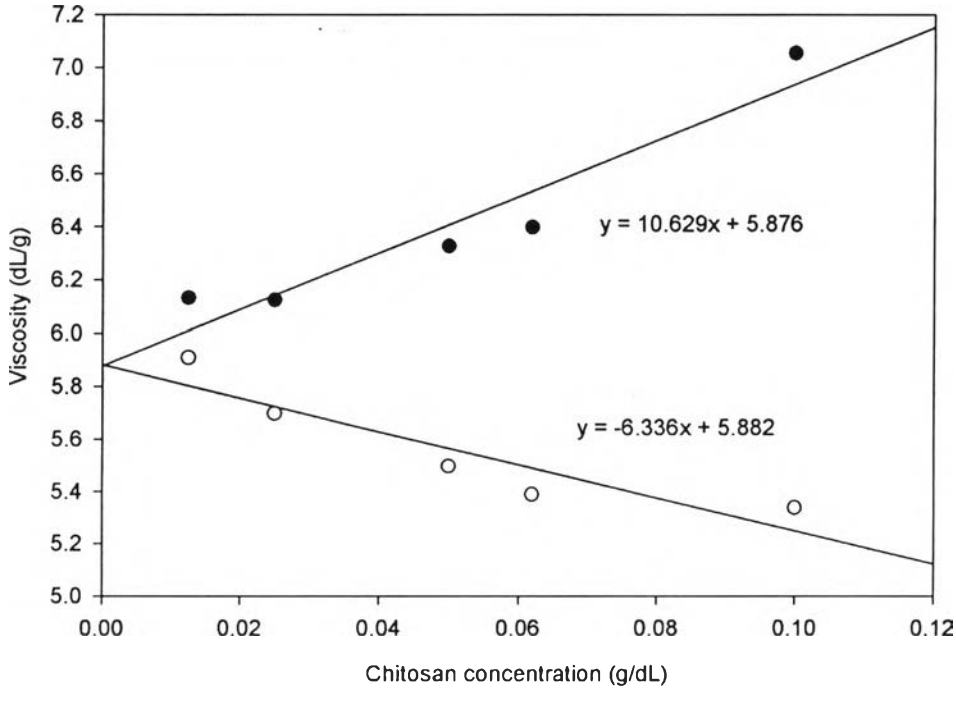
ABPENDICES

Appendix A Test Results of Chitosan

Table A1 Intrinsic viscosity measurement of chitosan

Conc. (g/dL)	Time (s)				η_{red} (dL/g)	η_{inh} (dL/g)
	1	2	3	Avg		
0.0000	98.0000	98.0100	98.0300	98.0300	-	-
0.0125	105.5000	105.5300	105.6000	105.5433	6.1315	5.9078
0.0250	113.1200	112.9300	113.0600	113.0367	6.1233	5.6975
0.0500	129.0600	129.0300	129.0300	129.0400	6.3266	5.4970
0.0620	136.8400	137.0000	136.9000	136.9133	6.3975	5.3883
0.1000	166.7200	168.0900	166.7500	167.1867	7.0546	5.3384

Figure A1 Values of reduced viscosity (•) and inherent viscosity (°) of chitosan(treat5) plotted against concentrations.

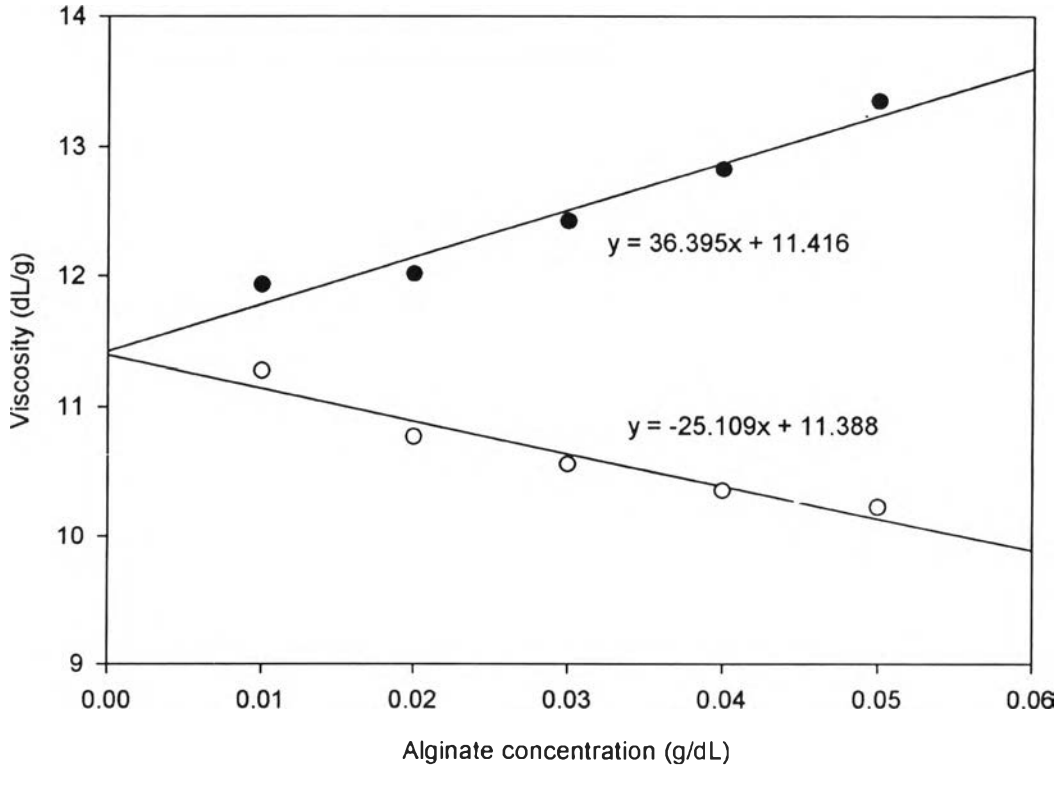


Appendix B Test Results of Alginate

Table B1 Intrinsic viscosity measurement of alginate

Conc. (g/dL)	Time (s)				η_{red} (dL/g)	η_{inh} (dL/g)
	1	2	3	Avg		
0.0000	97.9500	97.7600	97.6000	97.7700	-	-
0.0100	109.4300	109.5100	109.3700	109.4367	11.9328	11.2728
0.0200	121.1800	121.2700	121.3400	121.2633	12.0146	10.7673
0.0300	134.3100	134.0600	134.2300	134.2000	12.4203	10.5571
0.0400	148.0400	147.9200	147.8100	147.9233	12.8243	10.3519
0.0500	163.1000	162.9500	163.0100	163.0200	13.3477	10.2251

Figure B1 Values of reduced viscosity (•) and inherent viscosity (°) of alginate plotted against concentrations.



Appendix C Test Results of The Blend Fibers

Table C1 Atomic absorption spectroscopic test results of Ca content in pure alginate and O-CM chitosan/alginate blend fibers

O-CM chitosan content in alginate fiber	Weight of sample per 100-mL stock solution(g)	Ca content in final solution [a] (mg/L) [b]	Ca content in stock solution (mg/L)	Ca content in sample [c] (mg)	Ca content [d] (mg/100g fiber)
0%	0.0518	0.71	35.50	3.55	6853.28
0.5%	0.0538	0.96	19.20	1.92	3568.77
1.0%	0.0502	0.60	12.00	1.20	2390.44
1.5%	0.0527	0.56	11.20	1.12	2125.44

[a] The stock solution was diluted 20 times except 0% of O-CM chitosan content in alginate fiber (50 times).

[b] Measured using atomic absorption spectrophotometer (Varian SpectrAA 300P); wavelength = 422.7 nm; nitrous oxide-acetylene flame; a calibration curve created from 0.5, 1.0, and 2.0 ppm standard Ca solutions.

[c] Ca content in sample (mg) = Ca content in stock solution (mg/L) × 100 mL.

[d] Ca content (mg/100g fiber) = [Ca content in sample (mg)/Weight of sample (g)] × 100.

Table C2 Atomic absorption spectroscopic test results of Ca content in pure alginate and *N*-(carboxyacyl) chitosan/alginate blend fibers

N-carboxyacyl chitosan content in alginate fiber	Weight of sample per 100-mL stock solution(g)	Ca content in final solution [a] (mg/L) [b]	Ca content in stock solution (mg/L)	Ca content in sample [c] (mg)	Ca content [d] (mg/100g fiber)
0%	0.0518	0.71	35.50	3.55	6853.28
0.25%	0.0535	0.50	10.00	1.00	1869.16
0.50%	0.0533	0.40	8.00	0.80	1500.94
0.75%	0.0538	0.37	7.40	0.74	1375.46

[a] The stock solution was diluted 20 times except 0% of O-CM chitosan content in alginate fiber (50 times).

[b] Measured using atomic absorption spectrophotometer (Varian SpectrAA 300P); wavelength = 422.7 nm; nitrous oxide-acetylene flame; a calibration curve created from 0.5, 1.0, and 2.0 ppm standard Ca solutions.

[c] Ca content in sample (mg) = Ca content in stock solution (mg/L) × 100 mL.

[d] Ca content (mg/100g fiber) = [Ca content in sample (mg)/Weight of sample (g)] × 100.

Table C3 Tenacity and elongation at break of pure alginate fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity[b] (cN/tex)	Elongation at break (%)
1	0.00447	29.80	4.013	13.47	17.53
2	0.00451	30.07	3.510	11.67	18.92
3	0.00399	26.60	3.456	12.99	16.48
4	0.00468	31.20	3.258	10.44	15.26
5	0.00395	26.33	3.525	13.38	16.48
6	0.00417	27.80	3.632	13.06	17.09
7	0.00431	28.73	3.395	11.82	14.65
8	0.00393	26.33	3.670	13.94	16.48
9	0.00419	27.93	3.998	14.31	18.92
10	0.00415	27.67	3.334	12.05	16.48
11	0.00433	28.87	3.469	12.02	12..21
12	0.00418	27.87	3.609	12.95	17.09
13	0.00429	28.60	3.914	13.69	16.48
14	0.00450	30.00	3.342	11.14	14.65
15	0.00414	27.60	3.708	13.43	13.43
16	0.00447	29.80	3.555	11.93	13.43
17	0.00443	29.53	3.189	10.80	12.21
18	0.00432	28.80	3.822	13.27	16.48
19	0.00411	27.4	3.273	11.95	15.87
20	0.00464	30.93	3.790	12.25	12.82
Avg				12.53	15.65
SD				1.05	1.96

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C4 Tenacity and elongation at break of 0.5% O-CM chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity [b] (cN/tex)	Elongation at break (%)
1	0.00324	21.60	2.518	11.65	9.41
2	0.00339	22.60	2.998	13.27	10.38
3	0.00368	24.53	2.602	10.61	7.32
4	0.00314	20.93	2.480	11.85	7.93
5	0.00383	25.53	2.724	10.67	10.38
6	0.00330	22.00	2.731	12.41	8.54
7	0.00377	25.13	2.574	10.24	7.72
8	0.00356	23.73	2.640	11.13	9.06
9	0.00349	23.27	2.769	11.90	8.54
10	0.00330	22.00	2.739	12.45	7.94
11	0.00332	22.13	2.823	12.76	9.16
12	0.00333	22.20	2.876	12.95	9.77
13	0.00336	22.40	2.563	11.44	7.32
14	0.00338	22.53	2.884	12.80	8.54
15	0.00330	22.00	2.815	12.80	9.77
16	0.00336	22.40	2.869	12.81	7.93
17	0.00352	23.47	2.945	12.55	10.36
18	0.00346	23.06	2.945	12.77	12.20
19	0.00345	23.00	2.914	12.67	9.16
20	0.00319	21.27	2.869	13.49	9.16
Avg				12.16	9.03
SD				0.91	1.20

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C5 Tenacity and elongation at break of 1.0% O-CM chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity[b] (cN/tex)	Elongation at break (%)
1	0.00324	21.60	2.518	11.65	9.41
2	0.00339	22.60	2.998	13.27	10.38
3	0.00368	24.53	2.602	10.61	7.32
4	0.00314	20.93	2.480	11.85	7.93
5	0.00383	25.53	2.724	10.67	10.38
6	0.00330	22.00	2.731	12.41	8.54
7	0.00377	25.13	2.574	10.24	7.72
8	0.00356	23.73	2.640	11.13	9.06
9	0.00349	23.27	2.769	11.90	8.54
10	0.00330	22.00	2.739	12.45	7.94
11	0.00332	22.13	2.823	12.76	9.16
12	0.00333	22.20	2.876	12.95	9.77
13	0.00336	22.40	2.563	11.44	7.32
14	0.00338	22.53	2.884	12.80	8.54
15	0.00330	22.00	2.815	12.80	9.77
16	0.00336	22.40	2.869	12.81	7.93
17	0.00352	23.47	2.945	12.55	10.36
18	0.00346	23.06	2.945	12.77	12.20
19	0.00345	23.00	2.914	12.67	9.16
20	0.00319	21.27	2.869	13.49	9.16
Avg				12.16	9.03
SD				0.91	1.20

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C6 Tenacity and elongation at break of 1.5% O-CM chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity [b] (cN/tex)	Elongation at break (%)
1	0.00401	26.73	3.105	11.62	11.60
2	0.00410	27.33	3.296	12.06	12.80
3	0.00394	26.27	2.708	10.31	9.77
4	0.00398	26.53	2.953	11.13	9.77
5	0.00402	26.80	3.136	11.70	9.16
6	0.00398	26.53	3.319	12.51	12.81
7	0.00390	26.00	3.235	12.44	12.21
8	0.00400	26.67	3.357	12.59	10.38
9	0.00320	21.33	2.861	13.41	9.16
10	0.00392	26.13	3.471	13.28	11.60
11	0.00397	26.47	3.555	13.43	12.81
12	0.00412	27.47	3.067	11.16	11.60
13	0.00415	27.67	2.708	9.79	8.54
14	0.00415	27.67	3.716	13.43	12.81
15	0.00388	25.87	3.014	11.65	9.77
16	0.00394	26.27	3.250	12.37	11.60
17	0.00358	23.87	2.373	9.94	9.77
18	0.00403	26.87	3.479	12.95	12.20
19	0.00388	25.87	2.892	11.18	11.00
20	0.00396	26.40	3.319	12.57	12.20
Avg				11.98	11.08
SD				1.10	1.38

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C7 Tenacity and elongation at break of 0.25% *N*-carboxyacyl chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity [b] (cN/tex)	Elongation at break (%)
1	0.00376	25.07	2.625	10.47	9.77
2	0.00408	27.20	2.579	9.48	10.38
3	0.00416	27.73	2.548	9.19	10.38
4	0.00393	26.20	2.640	10.08	11.60
5	0.00391	26.07	2.922	11.21	12.21
6	0.00422	28.13	2.543	9.04	9.77
7	0.00406	27.07	2.357	8.71	8.54
8	0.00395	26.33	2.512	9.54	9.16
9	0.00426	28.40	2.892	10.18	12.21
10	0.00396	26.40	2.518	9.54	9.77
11	0.00407	27.13	2.548	9.39	10.99
12	0.00396	26.40	2.869	10.87	12.21
13	0.00419	27.93	2.815	10.08	8.55
14	0.00395	26.33	2.792	10.60	10.38
15	0.00394	26.27	2.892	11.01	10.99
16	0.00377	25.13	2.686	10.69	9.77
17	0.00387	25.80	3.288	12.74	10.99
18	0.00409	27.27	3.319	12.17	12.82
19	0.00342	22.80	3.075	13.49	10.99
20	0.00383	25.53	2.525	9.89	10.99
Avg				10.42	10.63
SD				1.22	0.86

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C8 Tenacity and elongation at break of 0.50% *N*-carboxyacyl chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity [b] (cN/tex)	Elongation at break (%)
1	0.00405	27.00	2.788	10.33	9.16
2	0.00418	27.87	2.495	8.95	10.99
3	0.00403	26.87	2.609	9.71	9.77
4	0.00434	28.93	2.724	9.42	9.77
5	0.00315	21.00	2.380	11.33	9.77
6	0.00409	27.27	2.792	10.24	11.60
7	0.00367	24.47	2.441	9.98	10.99
8	0.00391	26.07	2.655	10.18	11.60
9	0.00410	27.33	2.792	10.22	13.43
10	0.00398	26.53	2.594	9.78	9.77
11	0.00406	27.07	2.884	10.66	11.60
12	0.00408	27.20	2.609	9.60	8.55
13	0.00395	26.33	2.571	9.76	9.77
14	0.00398	26.53	2.466	9.30	9.77
15	0.00417	27.80	2.739	9.85	12.82
16	0.00404	26.93	2.518	9.35	8.55
17	0.00426	28.40	2.998	10.56	8.55
18	0.00419	27.93	2.571	9.21	8.55
19	0.00410	27.33	2.556	9.35	10.38
20	0.00392	26.13	2.655	10.16	11.60
Avg				9.90	10.35
SD				0.56	1.19

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C9 Tenacity and elongation at break of 0.75% *N*-carboxyacyl chitosan/ alginate blend fiber

Sample No.	Weight (g/15cm.)	Linear density[a] (tex)	Max load (N)	Tenacity[b] (cN/tex)	Elongation at break (%)
1	0.00292	19.47	1.840	9.45	12.21
2	0.00276	18.40	2.151	11.70	15.26
3 •	0.00307	20.47	1.871	9.14	11.71
4	0.00310	20.67	1.817	8.79	11.60
5	0.00300	20.00	2.083	10.42	14.03
6	0.00311	20.73	2.045	9.86	14.03
7	0.00283	18.87	1.793	9.50	14.56
8	0.00281	18.73	1.831	9.78	14.65
9	0.00268	17.87	1.877	10.50	15.87
10	0.00310	20.67	2.258	10.92	16.48
11	0.00271	18.07	1.846	10.22	12.82
12	0.00281	18.73	1.886	10.07	12.21
13	0.00300	20.00	1.808	9.04	10.99
14	0.00297	19.80	1.907	9.63	15.87
15	0.00305	20.33	1.786	8.79	10.38
16	0.00354	23.60	1.968	8.34	10.99
17	0.00288	19.20	1.832	9.54	10.38
18	0.00320	21.33	2.045	9.59	14.04
19	0.00304	20.27	1.831	9.03	11.60
20	0.00335	22.33	1.808	8.10	13.43
Avg				9.62	13.16
SD				0.85	1.88

[a]Linear density (tex) = (weight of fiber in gram per 15-cm length * 1000) / 0.15

[b] Tenacity (cN/tex) = (Max. load in Newton * 100) / Linear density

Table C10 Antimicrobial test against bacteria and fungi of *O*-CM chitosan/alginate blend fibers

Bacteria and fungi	Clear zone width (mm)		
	0.5% O-CM chitosan	1.0% O-CM chitosan	1.5% O-CM chitosan
E. coli	*	• 0.83 ± 0.03	1.67 ± 0.11
P. aureginosa	*	0.83 ± 0.03	0.83 ± 0.03
S. aureus	*	1.67 ± 0.03	2.33 ± 0.03
S. mutans	*	0.83 ± 0.03	1.33 ± 0.03
Candida al.	-	-	-
S. cerevisiac	1.33 ± 0.03	1.33 ± 0.03	1.83 ± 0.03

Table C11 Antimicrobial test against bacteria and fungi of *N*-(carboxyacyl) chitosan /alginate blend fibers

Bacteria and fungi	Clear zone width (mm)		
	0.25% *N*-CA chitosan	0.50% *N*-CA chitosan	0.75% *N*-CA chitosan
E. coli	0.83 ± 0.03	1.67 ± 0.03	2.33 ± 0.11
P. aureginosa	*	1.17 ± 0.03	1.67 ± 0.11
S. aureus	0.83 ± 0.03	1.67 ± 0.03	1.67 ± 0.03
S. mutans	*	2.33 ± 0.03	2.83 ± 0.03
Candida al.	1.33 ± 0.03	-	-
S. cerevisiac	2.67 ± 0.03	2.67 ± 0.11	2.83 ± 0.03

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