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APPENDICES

Appendix A Thermal Behavior of Clay Mineral

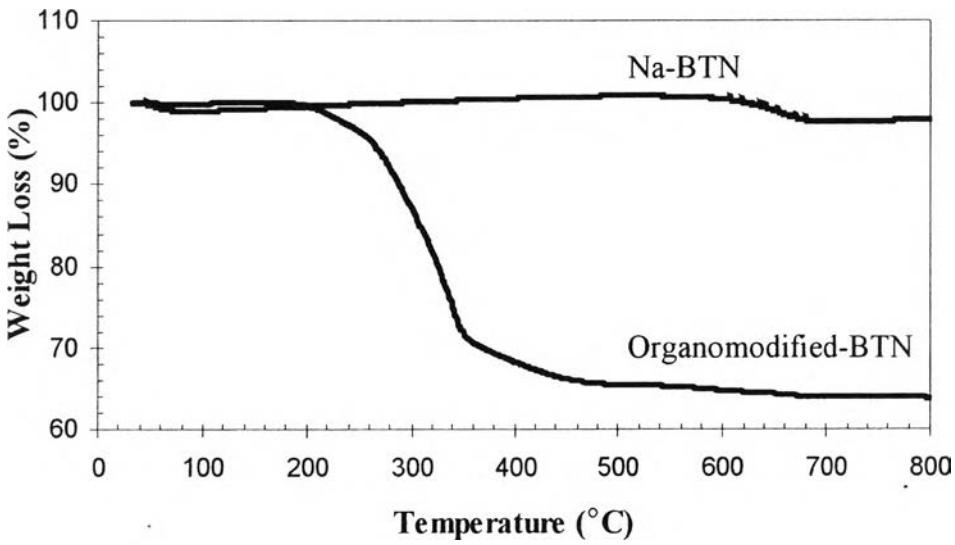

Figure A1 TG curves of Na-bentonite and organomodified bentonite.

Appendix B Data of Mechanical Properties of PP/Organomodified Bentonite Nanocomposite Films

Table B1 Young's modulus (MPa) of PP/organomodified bentonite nanocomposite films

Sample	PP	PP/Surlyn	PP/1%Clay	PP/3%Clay	PP/5%Clay
1	539.11	522.56	600.38	558.54	573.29
2	483.12	527.96	600.77	514.71	516.38
3	547.32	584.46	596.32	565.12	537.41
4	484.66	623.88	606.21	522.23	498.95
5	511.92	622.37	577.75	585.27	538.70
Average	513.23	576.25	596.29	549.18	532.95
SD	29.82	49.19	10.94	29.83	27.89

Table B2 Stress at break (MPa) of PP/organomodified bentonite nanocomposite films

Sample	PP	PP/Surlyn	PP/1%Clay	PP/3%Clay	PP/5%Clay
1	32.79	25.98	26.05	25.95	26.39
2	28.64	26.56	24.72	23.75	23.05
3	31.65	26.32	25.30	22.01	23.00
4	29.27	23.86	26.50	22.69	23.59
5	30.38	26.28	26.61	25.59	19.29
Average	30.55	25.80	25.84	24.00	23.06
SD	1.70	1.11	0.81	1.74	2.53

Table B3 Elongation at break (%) of PP/organomodified bentonite nanocomposite films

Sample	PP	PP/Surlyn	PP/1%Clay	PP/3%Clay	PP/5%Clay
1	15.07	9.40	12.10	12.03	10.01
2	13.44	10.05	13.59	16.42	12.36
3	17.14	8.92	14.61	7.56	14.30
4	21.24	11.64	10.94	9.44	12.24
5	12.91	12.31	11.40	13.14	7.48
Average	15.96	10.46	12.53	11.72	11.28
SD	3.38	1.46	1.54	3.42	2.61

Appendix C Data of Mechanical Properties of Ethylene or Carbon Dioixde PP/Organomodified Bentonite Nanocomposite Films

Table C1 Young's modulus (MPa) of (a) ethylene and (b) carbon dioxide /PP/organomodified bentonite nanocomposite films

(a)

Sample	PP	PP/1%Clay		PP/3%Clay		PP/5%Clay	
		0.023Al	0.046Al	0.069Al	0.138Al	0.115Al	0.230Al
1	539.11	609.92	610.12	555.11	572.3	479.75	480.49
2	483.12	554.11	560.4	595.08	568.31	532.12	548.78
3	547.32	567.19	593.71	560.78	566.46	550.19	515.12
4	484.66	565.65	608.76	553.63	558.22	478.8	474.26
5	511.92	586.86	558.92	588.83	537.10	495.02	545.73
Av	513.23	576.75	586.39	570.69	560.48	507.18	512.88
SD	29.82	21.96	25.24	19.72	14.04	32.32	35.05

(b)

Sample	PP	PP/3%Clay	
		0.069Ca	0.138Ca
1	539.11	655.11	565.76
2	483.12	584.75	585.60
3	547.32	618.60	610.31
4	484.66	639.14	556.91
5	511.92	654.75	608.92
Av	513.23	630.47	585.50
SD	29.82	29.60	24.35

Table C2 Stress at break (MPa) of (a) ethylene and (b) carbon dioxide /PP/organomodified bentonite nanocomposite films

(a)

Sample	PP	PP/1%Clay		PP/3%Clay		PP/5%Clay	
		0.023Al	0.046Al	0.069Al	0.138Al	0.115Al	0.230Al
1	32.79	25.62	27.88	21.13	24.01	20.12	21.79
2	28.64	29.34	27.99	20.37	26.88	23.29	23.20
3	31.65	27.85	25.12	26.24	24.22	22.75	21.61
4	29.27	28.45	30.23	21.57	22.99	25.65	22.69
5	30.38	25.49	26.85	28.26	25.47	21.05	25.20
Av	30.55	27.35	27.61	23.55	24.72	22.57	2.10
SD	1.70	1.72	1.86	3.51	1.5	2.14	1.44

(b)

Sample	PP	PP/3%Clay	
		0.069Ca	0.138Ca
1	32.79	25.90	26.00
2	28.64	25.93	30.27
3	31.65	28.32	25.57
4	29.27	26.30	28.76
5	30.38	30.11	28.40
Av	30.55	27.31	27.80
SD	1.70	1.85	1.97

Table C3 Elongation at break (%) of (a) ethylene and (b) carbon dioxide /PP/organomodified bentonite nanocomposites films

(a)

Sample	PP	PP/1%Clay		PP/3%Clay		PP/5%Clay	
		0.023Al	0.046Al	0.069Al	0.138Al	0.115Al	0.230Al
1	15.07	13.26	13.95	12.47	8.22	7.23	7.04
2	13.44	11.85	12.14	12.22	9.18	8.31	9.06
3	17.14	9.44	8.38	11.92	8.9	6.35	9.19
4	21.24	14.21	12.82	9.04	9.96	10.32	5.66
5	12.91	10.2	10.35	8.60	12.6	10.58	10.19
Av	15.96	11.79	11.53	10.85	9.77	8.56	8.23
SD	3.38	2.00	2.19	1.87	1.70	1.86	1.84

(b)

Sample	PP	PP/3%Clay	
		0.069CA	0.138Ca
1	15.07	13.26	13.95
2	13.44	11.85	12.14
3	17.14	9.44	8.38
4	21.24	14.21	12.82
5	12.91	10.2	10.35
Av	15.96	11.79	11.53
SD	3.38	2.00	2.19

Appendix D Oxygen Permeability

Table D1 Oxygen transmission rate, OTR ($cc/m^2/day$) of PP/organoclay nanocomposites

Sample	Oxygen Gas Permeability ($cc/m^2/day$)
PP	3580 ± 84
PP/6%Surlyn	1649 ± 139
PP/6%Surlyn/1%Clay	634 ± 19
PP/6%Surlyn/3%Clay	627 ± 16
PP/6%Surlyn/5%Clay	615 ± 40

Appendix E Calibration Curve of Ethylene Concentration from Gas Chroma - tography

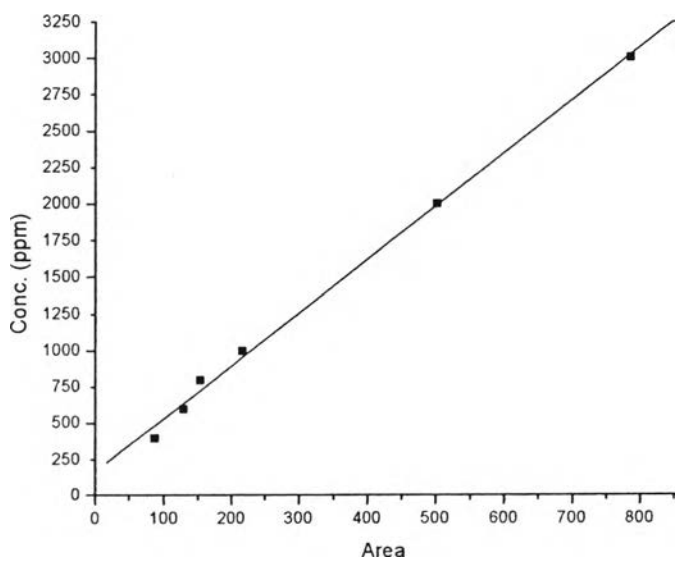

Figure E1 Calibration curve of ethylene concentration from GC

Appendix F Bentonite Clay, Max-Gel® GRADE SAC

Table F1 Typical chemical analysis of bentonite on dry basis at 105°C

Element	Percentage
SiO_2	65-70
Al_2O_3	13-17
Fe_2O_3	1.0-2.0
Na_2O	1.5-2.5
LOI	10-12
MgO	2.0-3.0
CaO	1.5-2.5
K_2O	0.4-0.8
TiO_2	0.2-0.3

Table F2 Physical properties of bentonite

Physical properties	
Moisture content, %	8-12
5% suspension, pH	9.5-11.0
Swelling index, ml per 2 g of clay	15
Viscosity dial reading at 600 rpm	12-20
Dry particle size (pass 200 meshes), %	80 min
Wet particle size (pass 325 meshes),	98 min
Specific gravity	2.3-2.4
CEC, meq/100g of clay	50

Appendix G SEM Images of Organomodified-BTN PP/Nanocomposite Films

Figure G1 PP/6%Surlyn/Organoclay1%

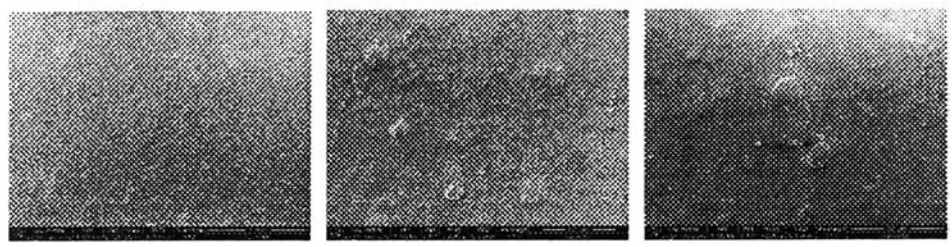

Figure G2 PP/6%Surlyn/Organoclay3%

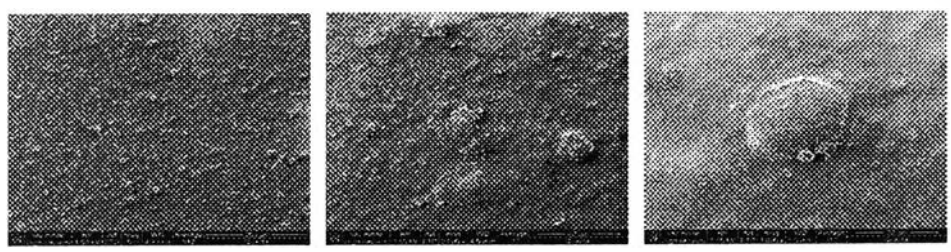

Figure G3 PP/6%Surlyn/Organoclay5%

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2. Aksonnum, T., Magaraphan, R., Nithitanakul, M., and Manuspiya, H. (2008, April 6-10) Nanoclay-Polypropylene Composite for Ethylene Scavenging Films. Poster presented at the 235th ACS National Meeting & Exposition, New Orleans, USA.