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APPENDICES

Appendix A Thermal Behavior of Organomodified Clay

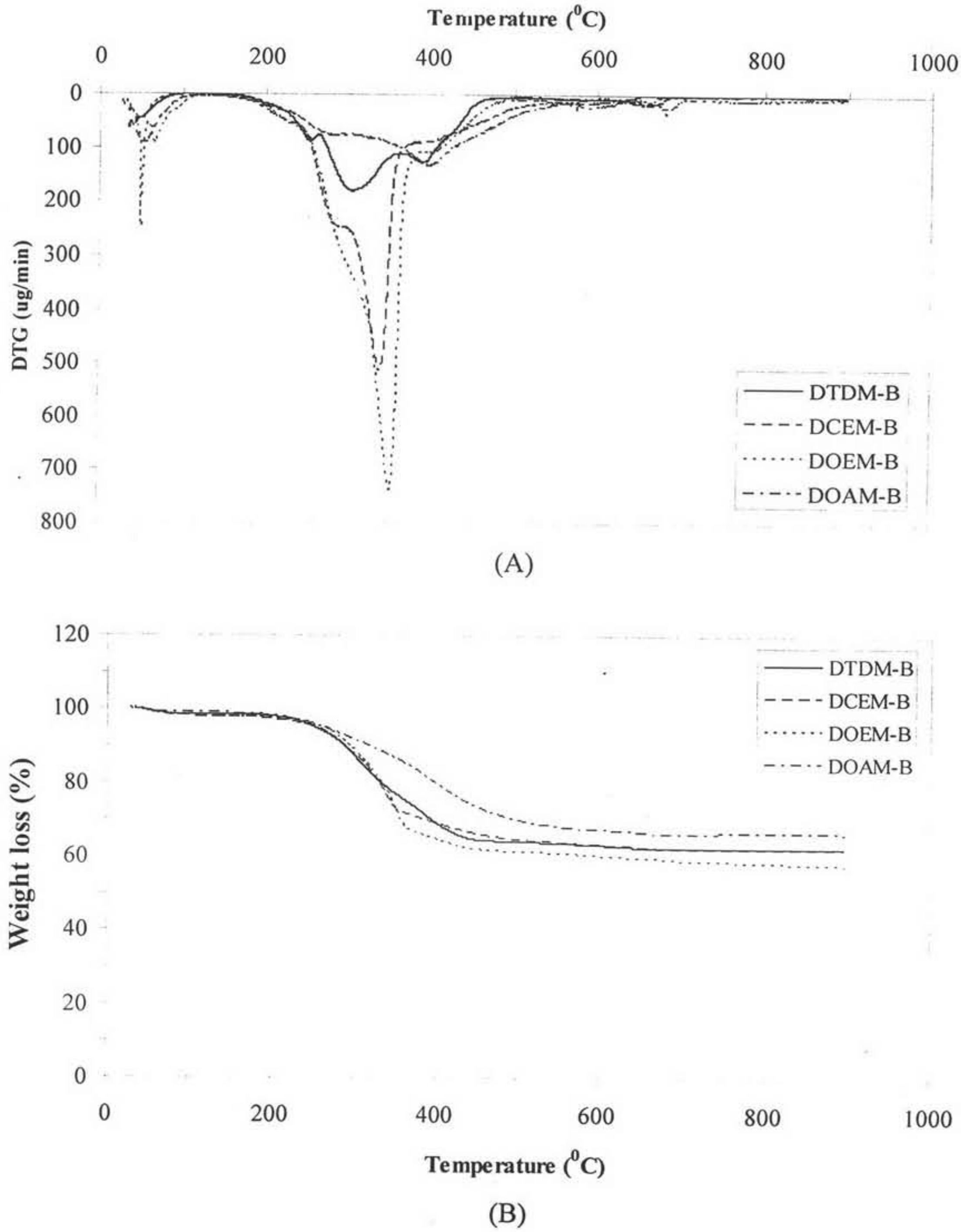
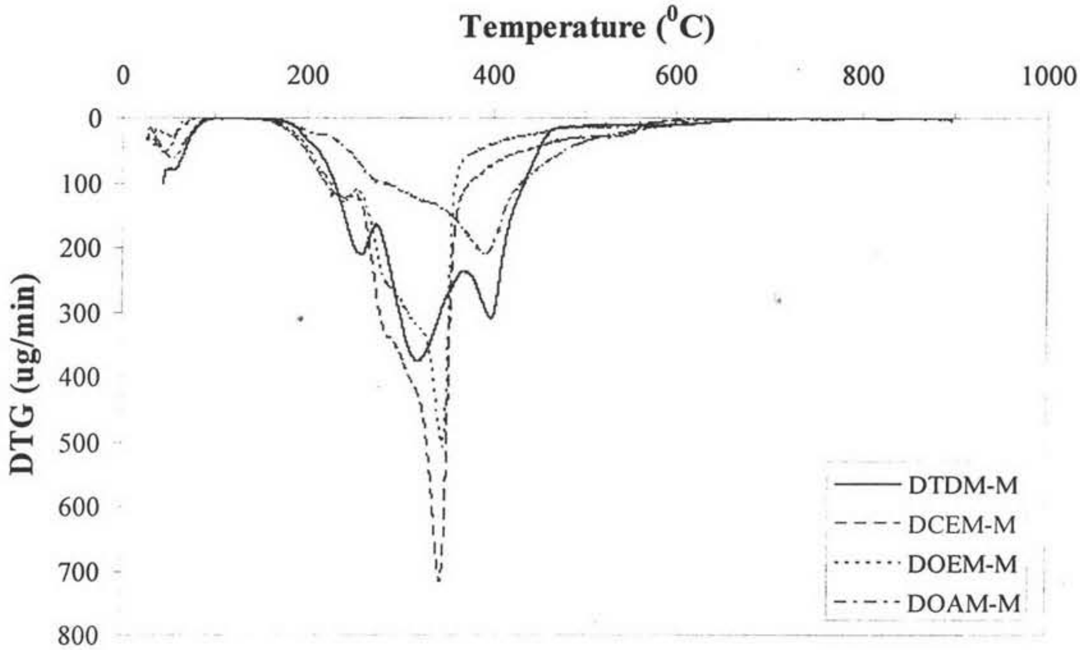
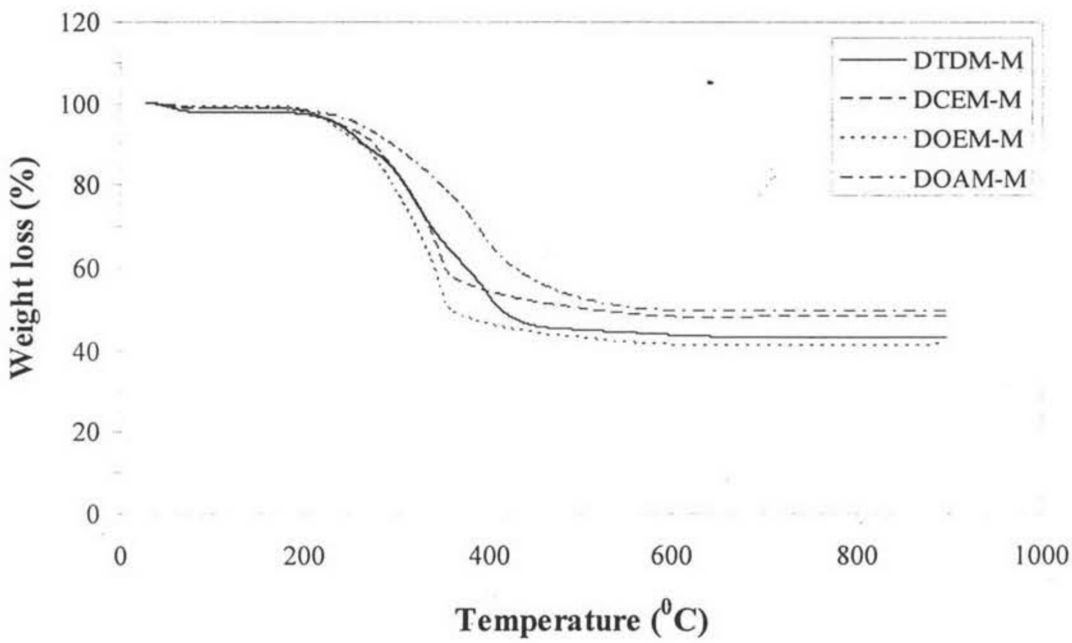


Figure A1 TG-DTA curves of organomodified bentonite (A) differential weight loss curves (DTG) (B) weight losses of the samples.



(A)



(B)

Figure A2 TG-DTA curves of organomodified montmorillonite (A) differential weight loss curves (DTG) (B) weight losses of the samples.

Appendix B Experimental Data

Table B1 Young' s modulus (MPa) of PP, PP/ Surlyn and nanocomposites

Composition	1	2	3	4	5	Avg.	S.D.
PP	1523.37	1565.25	1906.74	1421.61	1720.11	1627.41	189.51
PP/Surlyn	1569.81	1451.38	1642.56	2183.33	1510.70	1671.56	294.73
PP/Surlyn/ DTDM-B	2075.86	1566.82	1792.36	1731.74	2076.26	1848.63	223.46
PP/Surlyn/DCEM-B	1630.62	1458.95	1980.04	2030.98	1733.04	1764.73	239.65
PP/Surlyn/DOEM-B	2073.88	2069.87	1874.56	1564.83	1912.79	1899.19	207.51
PP/Surlyn/DOAM-B	1554.73	1659.16	1922.32	1560.24	1727.91	1684.87	151.13
PP/Surlyn/DTDM-M	2116.77	1912.70	1488.82	2053.11	1697.21	1853.72	259.85
PP/Surlyn/DCEM-M	1897.96	1454.90	1573.08	2144.19	2055.16	1825.06	300.26
PP/Surlyn/DOEM-M	2205.61	1900.45	1964.39	1949.79	2045.24	2013.10	119.54
PP/Surlyn/DOAM-M	1905.25	1548.57	2004.76	1729.75	1301.86	1698.04	281.65

Table B2 Tensile strength (MPa) of PP, PP/ Surlyn and nanocomposites

Composition	1	2	3	4	5	Avg.	S.D.
PP	33.64	33.21	33.23	33.07	33.24	33.22	0.10
PP/Surlyn	32.44	33.01	32.03	32.15	32.43	32.41	0.37
PP/Surlyn/ DTDM-B	33.43	33.55	33.33	33.39	33.73	33.49	0.16
PP/Surlyn/DCEM-B	31.51	31.48	31.55	31.79	31.74	31.62	0.14
PP/Surlyn/DOEM-B	32.37	32.42	32.30	32.37	31.99	32.29	0.17
PP/Surlyn/DOAM-B	31.27	31.40	31.42	31.25	31.21	31.31	0.09
PP/Surlyn/DTDM-M	32.39	32.09	32.66	32.89	32.43	32.49	0.30
PP/Surlyn/DCEM-M	31.97	32.17	31.72	32.28	32.37	32.10	0.26
PP/Surlyn/DOEM-M	32.21	32.32	32.44	32.12	32.18	32.25	0.13
PP/Surlyn/DOAM-M	32.12	32.23	31.92	32.49	32.41	32.23	0.23

Table B3 Strain at break (%) of PP, PP/ Surlyn and nanocomposites

Composition	1	2	3	4	5	Avg.	S.D.
PP	113.18	135.18	118.36	135.27	152.00	130.80	15.44
PP/Surlyn	242.55	185.55	240.09	200.09	322.64	238.18	53.33
PP/Surlyn/ DTDM-B	56.83	69.76	67.86	15.30	104.09	62.77	31.90
PP/Surlyn/DCEM-B	100.36	189.73	137.91	35.78	215.34	135.82	71.59
PP/Surlyn/DOEM-B	18.52	66.01	30.16	79.37	71.93	53.19	27.08
PP/Surlyn/DOAM-B	319.18	161.00	223.73	305.82	242.46	250.44	64.36
PP/Surlyn/DTDM-M	92.27	42.71	95.00	92.18	100.27	84.49	23.58
PP/Surlyn/DCEM-M	118.10	192.73	152.46	139.82	136.27	147.87	27.93
PP/Surlyn/DOEM-M	74.38	133.91	76.83	87.41	103.34	94.57	24.26
PP/Surlyn/DOAM-M	91.51	89.56	118.52	87.83	88.05	95.09	13.18

Table B4 Yield strength (MPa) of PP, PP/ Surlyn and nanocomposites

Composition	1	2	3	4	5	Avg.	S.D.
PP	10.50	10.68	9.06	11.32	9.67	10.25	0.89
PP/Surlyn	10.82	11.55	9.38	10.09	10.30	10.43	0.81
PP/Surlyn/ DTDM-B	9.72	10.48	10.56	10.86	9.45	10.21	0.60
PP/Surlyn/DCEM-B	10.22	11.41	9.33	9.51	9.97	10.09	0.82
PP/Surlyn/DOEM-B	9.29	9.27	10.54	12.24	10.92	10.45	1.24
PP/Surlyn/DOAM-B	10.51	9.87	8.61	10.44	10.40	9.97	0.80
PP/Surlyn/DTDM-M	10.35	8.44	12.25	9.90	10.24	10.25	1.37
PP/Surlyn/DCEM-M	8.39	13.23	10.63	9.61	9.76	10.32	1.81
PP/Surlyn/DOEM-M	9.04	8.40	8.94	9.40	9.45	9.05	0.42
PP/Surlyn/DOAM-M	9.43	12.44	9.26	10.29	16.10	11.50	2.87

Table B5 Notch Izod impact strength (kJ/m^2)of PP, PP/ Surlyn and nanocomposites

Composition	1	2	3	4	5	Avg.	S.D.
PP	3.0	2.8	2.8	2.9	3.1	2.92	0.13
PP/Surlyn	2.8	2.8	3.2	3.0	3.1	2.98	0.18
PP/Surlyn/ DTDM-B	3.0	3.2	3.2	2.7	2.9	3.00	0.20
PP/Surlyn/DCEM-B	2.3	2.4	2.3	2.0	2.4	2.28	0.16
PP/Surlyn/DOEM-B	2.0	2.3	2.2	2.5	2.5	2.30	0.20
PP/Surlyn/DOAM-B	2.5	2.6	2.7	2.6	2.4	2.56	0.11
PP/Surlyn/DTDM-M	2.7	2.7	2.6	2.8	2.9	2.74	0.11
PP/Surlyn/DCEM-M	2.5	2.7	2.2	2.2	2.5	2.42	0.20
PP/Surlyn/DOEM-M	2.6	2.6	2.3	2.3	2.5	2.46	0.15
PP/Surlyn/DOAM-M	2.7	2.8	2.5	2.5	2.6	2.62	0.13

Table B6 The degradation temperature (°C) of nanocomposites

Composition	1	2	3	mean
PP/Surlyn/ DTDM-B	460.1	459.3	458.7	459.4
PP/Surlyn/DCEM-B	461.3	461.9	460.1	461.1
PP/Surlyn/DOEM-B	460.7	461.1	459.0	460.3
PP/Surlyn/DOAM-B	459.1	460.3	458.2	459.2
PP/Surlyn/DTDM-M	456.6	454.8	455.1	455.5
PP/Surlyn/DCEM-M	457.8	459.3	458.6	458.6
PP/Surlyn/DOEM-M	458.0	457.2	458.5	457.9
PP/Surlyn/DOAM-M	458.6	456.7	457.4	457.5

Appendix C Interlayer Structure of Alkylammonium Layered Silicates

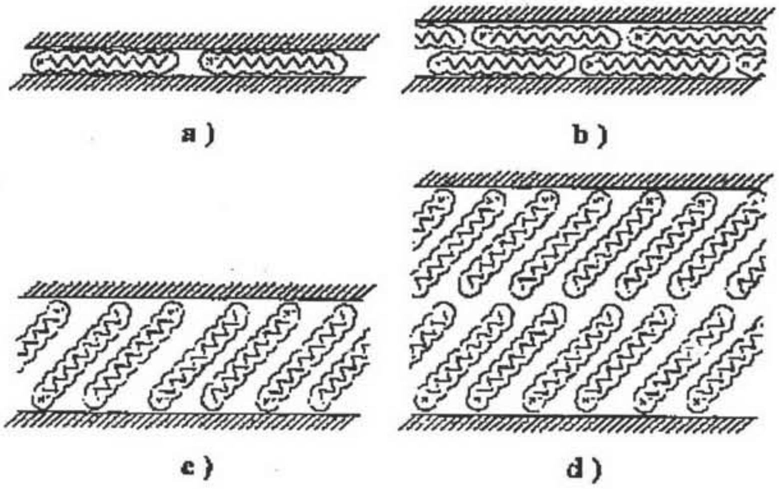


Figure C1 Alkyl chain aggregation in mica-type silicates: (a) lateral monolayer, (b) lateral bilayer, (c) paraffin-type monolayer, (d) paraffin-type bilayer (Richard *et al.*, 1994).

Appendix D Cation Exchange Capacities (CEC) Values of Clay Minerals

Cation exchange capacities (CEC) of clay minerals as shown in Table D1 are determined by exchanging their surface cation with methylene blue. Dried clay minerals 2.0 g were dispersed in distilled water 300 ml and stirred until a uniform dispersion was obtained. The suspension was adjusted pH value in a range of 2.5-3.8 by sulfuric acid and stirred for 15 min. Methylene blue solution (0.01 normal) was added slowly by buret into the clay slurry, while it was maintained a constant stirring. A drop of the suspended solution was placed on a filter paper to determine the end point. The end point was indicated by a formation of light blue halo around the drop. After the end point was reached, the suspension was stirred for 2 min and retested for the end point.

Methylene blue index (MBI)

$$MBI = \frac{E * V * 100}{W}$$

where:

MBI = methylene blue index for the clay (meq/100g of clay),

E = concentration of methylene blue (meq/ml),

V = amount of methylene blue required for titration (ml), and

W = weight of dried nanoclay (g)

Table D1 Cation exchange capacity (CEC) values of clay minerals

Clay minerals	Na-MMT (Kunipia F®)	Na-BN (Mac-Gel® wn-02)
CEC (meq/100g)	115.50	52.55

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