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APPENDICES

APPENDIX A

A. Notch-Izod Impact Strength of PP/Recycled Tire-Rubber Blends.

Table A.1 Notch-Izod Impact Strength of PP/Recycled Tire-Rubber Blends.

Composite	Notch - Izod Impact Strength (kJ / m^2)						Data	x	SD	%Variation
No.	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	6^{th}				
S1	3.1	3.0	2.9	3.1	3.1	3.2	6	3.07	0.10	3.26
S2	3.2	3.2	3.1	3.1	3.2	3.1	6	3.15	0.05	1.59
S3	4.7	5.0	4.8	4.8	4.9	4.7	6	4.82	0.12	2.49
S4	3.5	3.4	3.2	3.4	3.3	3.3	6	3.35	0.10	2.98
S5	5.6	5.6	5.5	5.4	5.4	5.5	6	5.50	0.09	1.64
S6	3.4	3.5	3.5	3.5	3.6	3.6	6	3.52	0.08	2.27
S7	6.4	6.4	6.4	6.5	6.3	6.3	6	6.38	0.08	1.25
S8	3.5	3.6	3.3	3.5	3.4	3.5	6	3.47	0.10	2.88
S9	6.1	6.1	6.2	6.2	6.1	6.1	6	6.13	0.05	0.82
S10	3.4	3.4	3.4	3.3	3.3	3.5	6	3.38	0.08	2.37
S11	6.0	5.7	5.8	5.8	5.7	5.9	6	5.82	0.12	2.06
S12	3.4	3.5	3.6	3.6	3.6	3.4	6	3.52	0.10	2.84
S13	6.5	6.5	6.6	6.7	6.7	6.7	6	6.62	0.10	1.51
S14	5.7	5.7	5.6	5.7	5.7	5.7	6	5.70	0.00	0.00
S15	8.1	8.0	8.1	8.1	8.0	8.1	6	8.07	0.05	0.62
S16	3.3	3.3	3.2	3.4	3.4	3.2	6	3.30	0.09	2.73
S17	3.9	3.8	3.7	3.6	3.7	3.8	6	3.75	0.10	2.67
S18	3.1	3.3	3.2	3.3	3.4	3.3	6	3.27	0.10	3.06
S19	3.1	3.2	3.3	3.4	3.4	3.3	6	3.28	0.12	3.66
S20	3.2	3.2	3.3	3.2	3.3	3.1	6	3.22	0.08	2.48
S21	3.2	3.2	3.2	3.2	3.3	3.4	6	3.25	0.08	2.47

APPENDIX B

B. Melt Flow Index, MFI of PP/Recycled Tire-Rubber Blends.

Table B.1 Melt Flow Index, MFI of PP/Recycled Tire-Rubber Blends.

Composite	Melt Flow Index: MFI (g/10 min)			Data	Average	SD	%Variation
No.	1st	2nd	3rd				
S1	3.16	3.15	3.14	3	3.15	0.01	0.32
S2	3.06	3.08	3.09	3	3.08	0.01	0.32
S3	2.60	2.63	2.59	3	2.61	0.02	0.77
S4	2.90	2.89	2.91	3	2.90	0.01	0.34
S5	1.97	1.96	1.95	3	1.96	0.01	0.51
S6	2.81	2.81	2.81	3	2.81	0.00	0.00
S7	1.79	1.80	1.80	3	1.80	0.01	0.56
S8	2.76	2.77	2.78	3	2.77	0.01	0.36
S9	1.74	1.76	1.76	3	1.75	0.01	0.57
S10	2.75	2.73	2.75	3	2.74	0.01	0.36
S11	1.70	1.71	1.70	3	1.70	0.01	0.59
S12	2.90	2.90	2.90	3	2.90	0.00	0.00
S13	1.74	1.74	1.72	3	1.73	0.01	0.58
S14	1.85	1.86	1.84	3	1.85	0.01	0.54
S15	1.56	1.58	1.55	3	1.56	0.02	1.28
S16	2.97	2.98	2.96	3	2.97	0.01	0.34
S17	2.77	2.78	2.78	3	2.78	0.01	0.36
S18	3.10	3.10	3.10	3	3.10	0.00	0.00
S19	2.85	2.84	2.86	3	2.85	0.01	0.35
S20	3.10	3.13	3.12	3	3.12	0.02	0.64
S21	2.88	2.90	2.88	3	2.89	0.01	0.35

APPENDIX C

C. Thermal Properties by DSC of PP/Recycled Tire-Rubber Blends.

Table C.1 Thermal Properties by DSC of PP/Recycled Tire-Rubber Blends

Composite No.	T_{onset} (°C)	T_m (°C)	$\triangle H_{composite}$ (J/g)	$\triangle H_{PP}$ (J/g)	Crystallinity (%)
S1	147.13	161.33	85.52	85.52	45.01
S2	148.60	162.67	69.15	86.44	45.49
S3	148.80	161.00	63.24	79.05	41.60
S4	148.64	163.00	63.55	84.74	44.60
S5	152.20	163.33	55.91	74.55	39.24
S6	147.80	162.34	57.29	81.85	43.08
S7	147.73	162.00	49.60	70.86	37.29
S8	151.89	162.67	49.50	82.51	43.42
S9	153.82	164.67	47.22	72.65	38.24
S10	151.76	164.67	55.38	85.20	44.84
S11	152.71	164.00	44.15	73.58	38.72
S12	147.80	162.34	57.29	81.85	43.08
S13	151.90	162.67	49.11	70.16	36.92
S14	150.30	163.34	51.40	73.43	38.65
S15	152.47	164.00	48.30	69.00	36.32

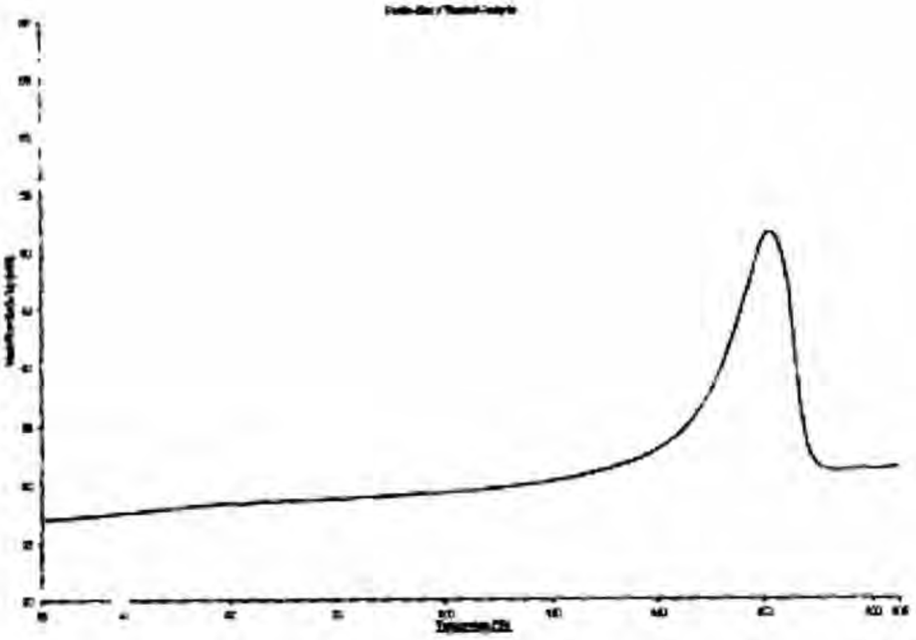

Figure C.1 DSC thermogram on heating curve of polypropylene

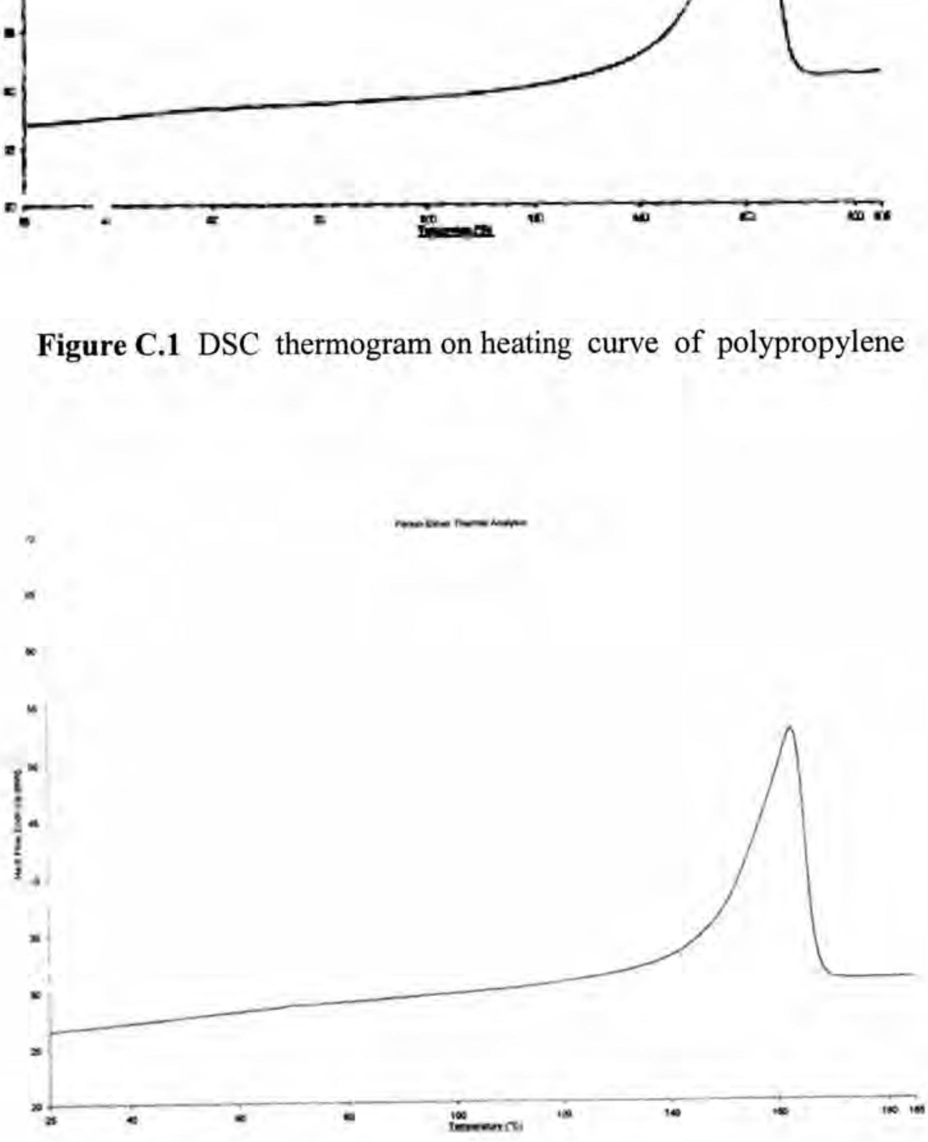

Figure C.2 DSC thermogram on heating curve of vulcanized 80/20 PP/RTR using sulfur crosslinking agent.

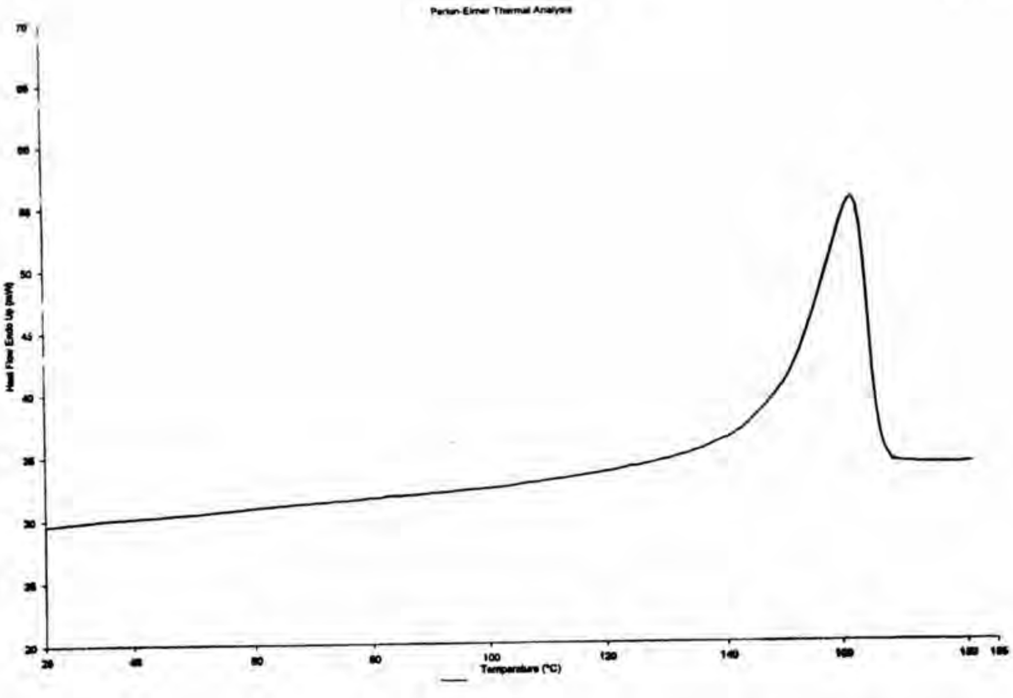

Figure C.3 DSC thermogram on heating curve of vulcanized 75/25 PP/RTR using sulfur crosslinking agent.

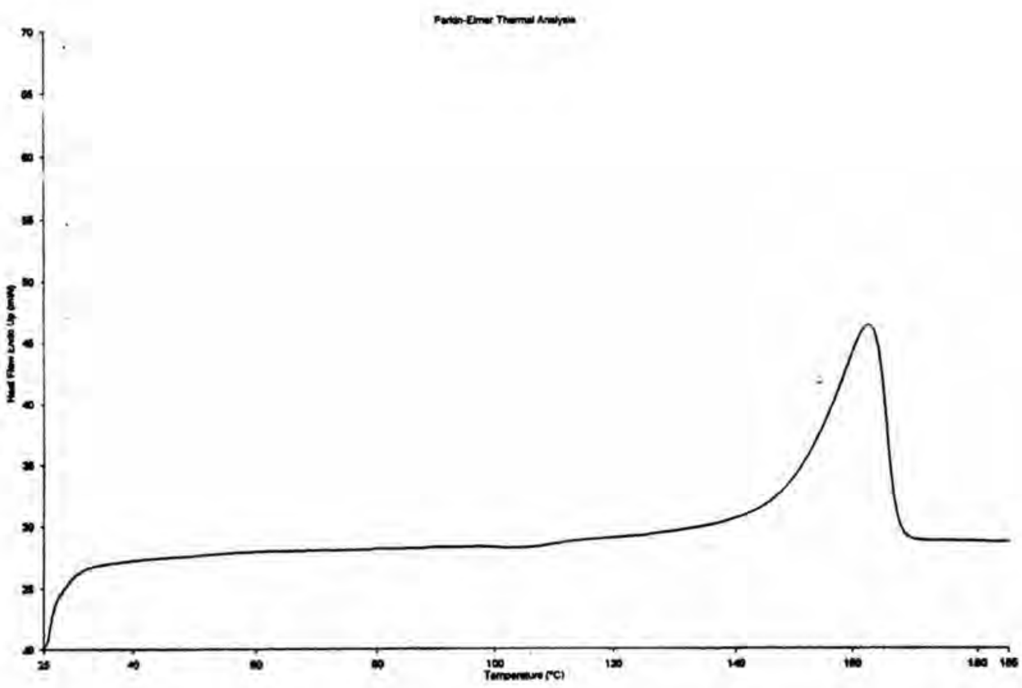

Figure C.4 DSC thermogram on heating curve of vulcanized 70/30 PP/RTR using sulfur crosslinking agent.

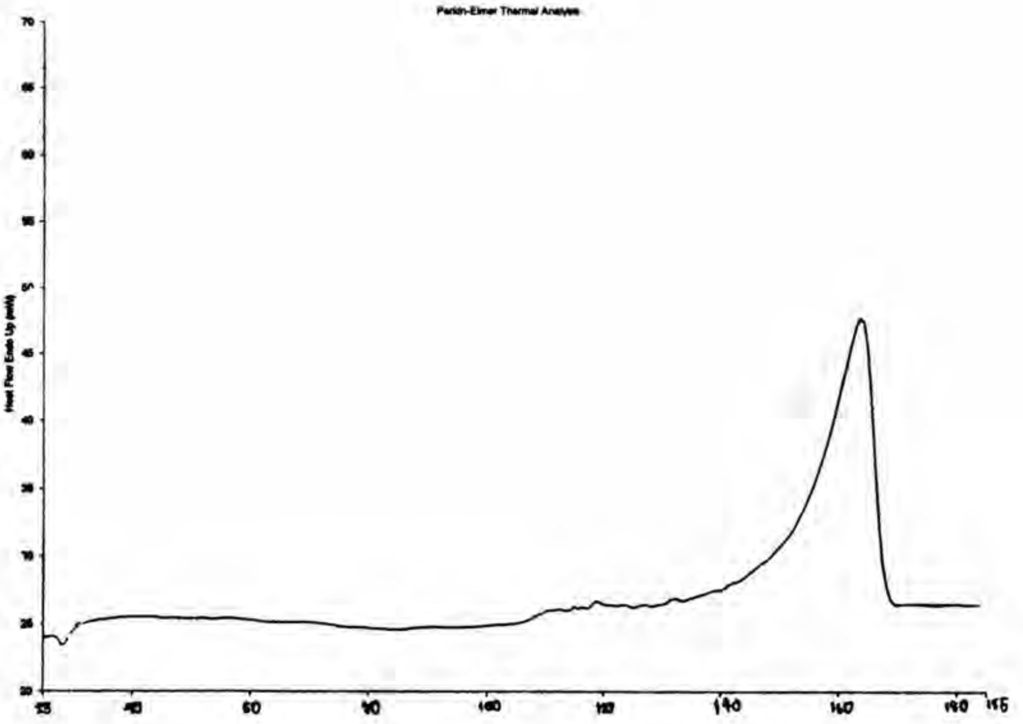

Figure C.5 DSC thermogram on heating curve of vulcanized 65/35 PP/RTR using sulfur crosslinking agent.

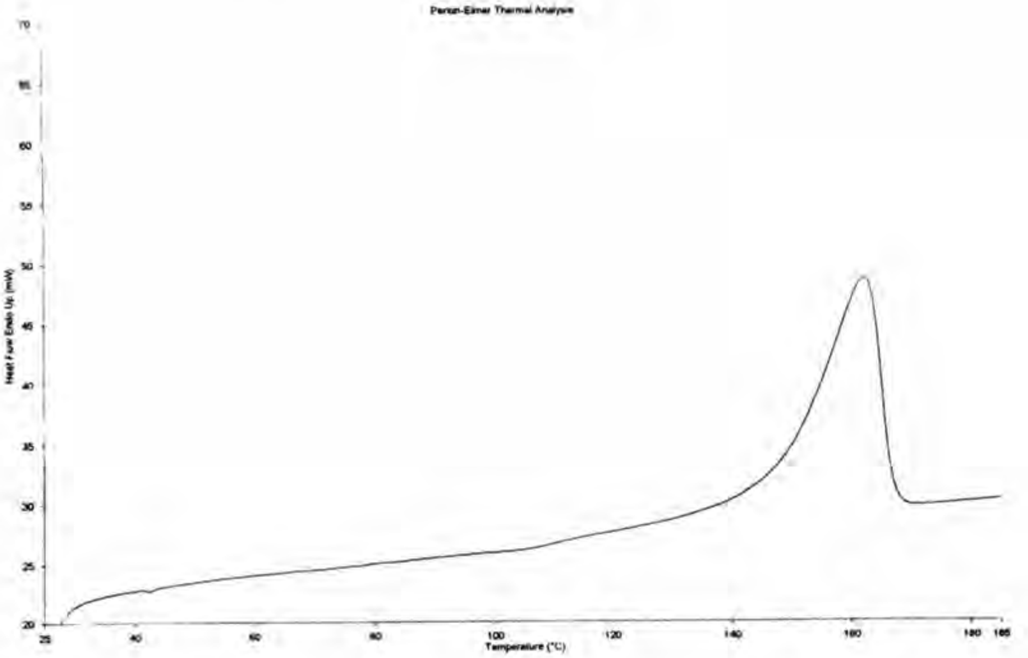

Figure C.6 DSC thermogram on heating curve of vulcanized 60/40 PP/RTR using sulfur crosslinking agent.

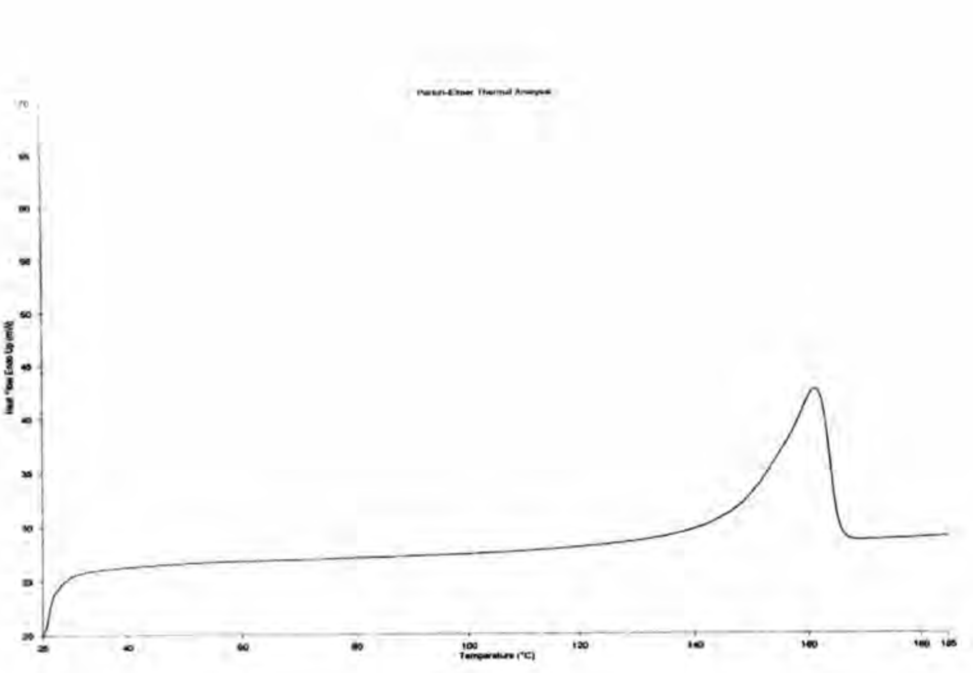

Figure C.7 DSC thermogram on heating curve of non-vulcanized 80/20 PP/RTR using sulfur crosslinking agent.

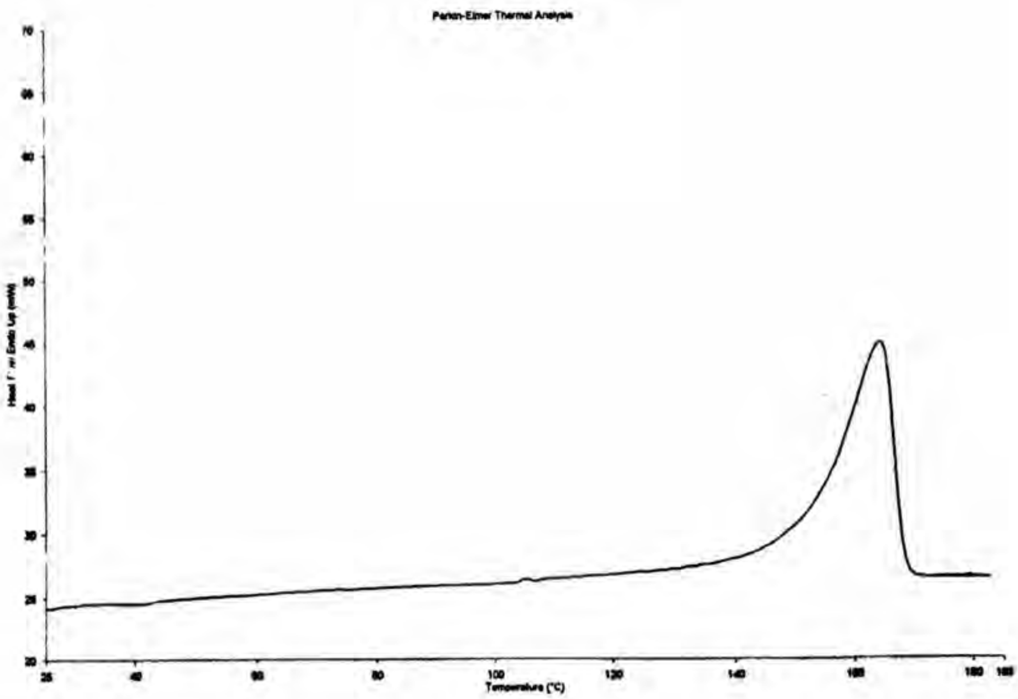

Figure C.8 DSC thermogram on heating curve of non-vulcanized 75/25 PP/RTR using sulfur crosslinking agent.

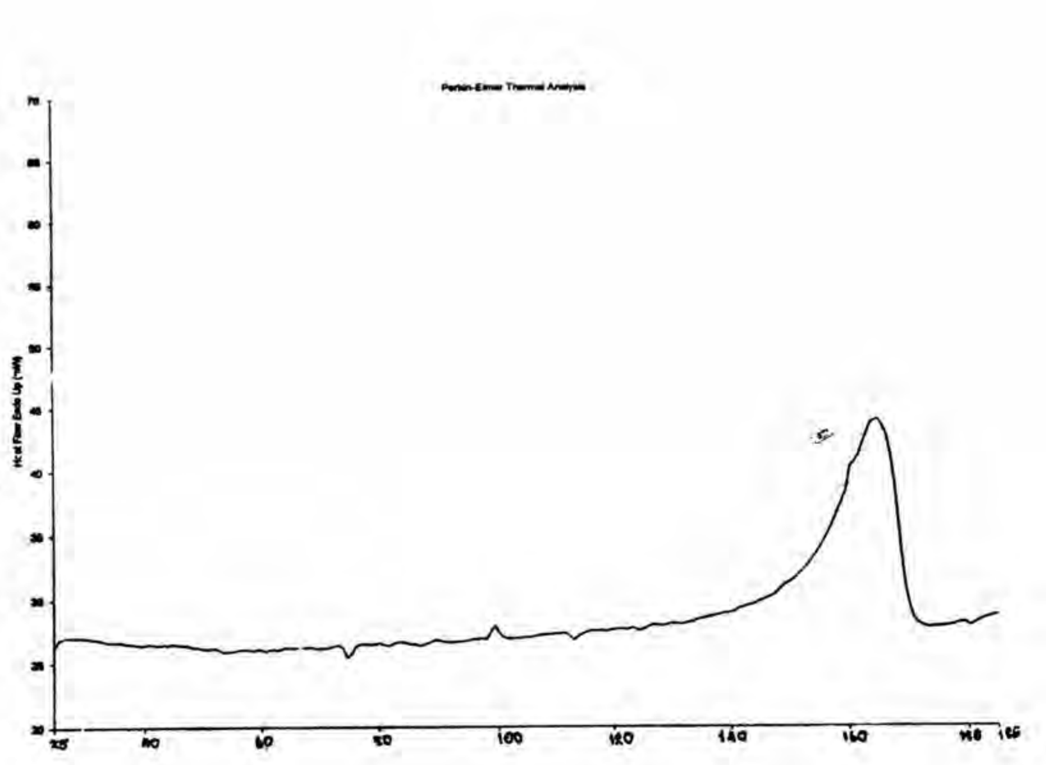

Figure C.9 DSC thermogram on heating curve of non-vulcanized 70/30 PP/RTR using sulfur crosslinking agent.

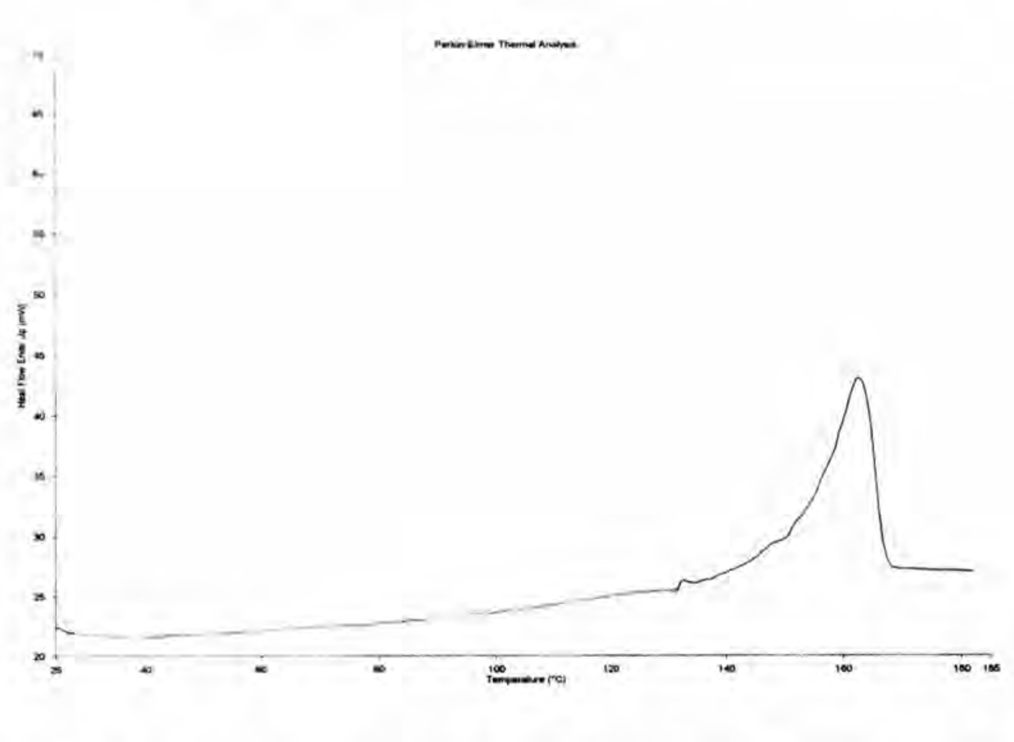

Figure C.10 DSC thermogram on heating curve of non-vulcanized 65/35 PP/RTR using sulfur crosslinking agent.

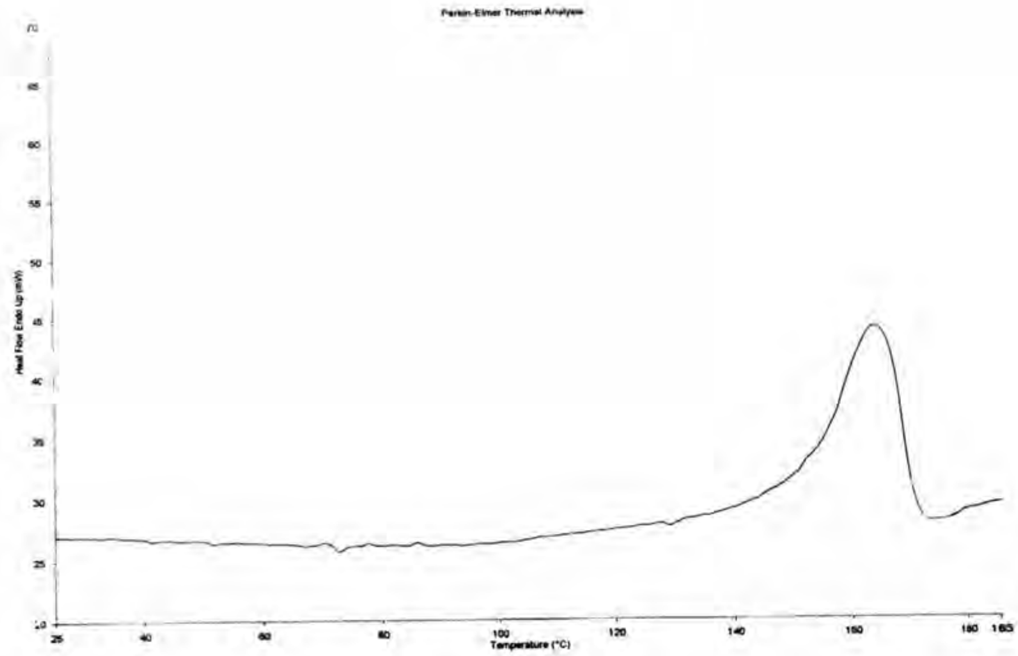

Figure C.11 DSC thermogram on heating curve of non-vulcanized 60/40 PP/RTR using sulfur crosslinking agent.

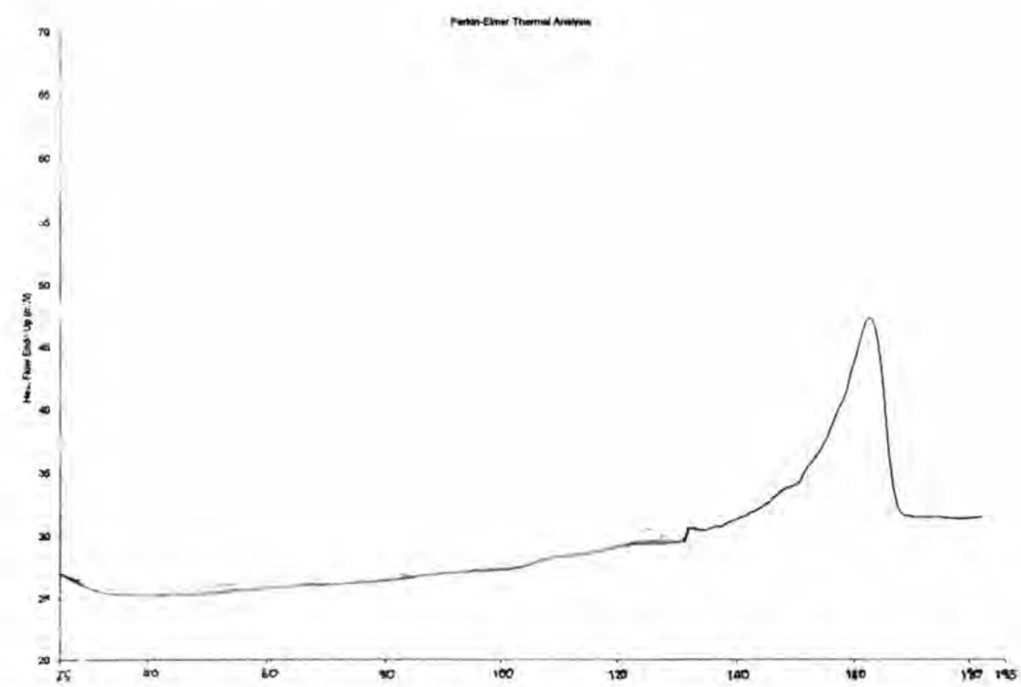

Figure C.12 DSC thermogram on heating curve of 70/30 PP/RTR blend using MA.

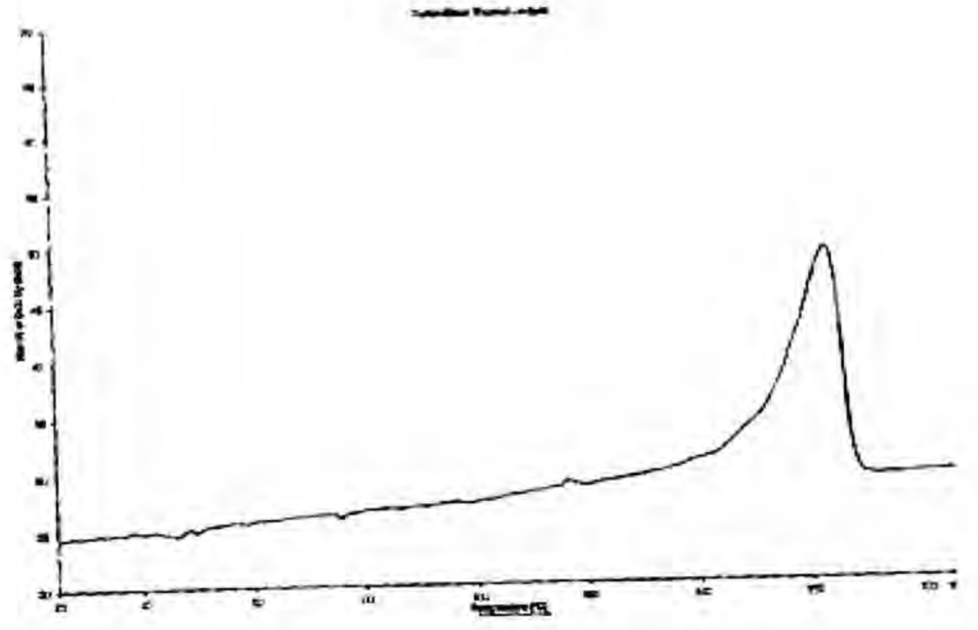

Figure C.13 DSC thermogram on heating curve of 70/30 PP/RTR blend using DCP.

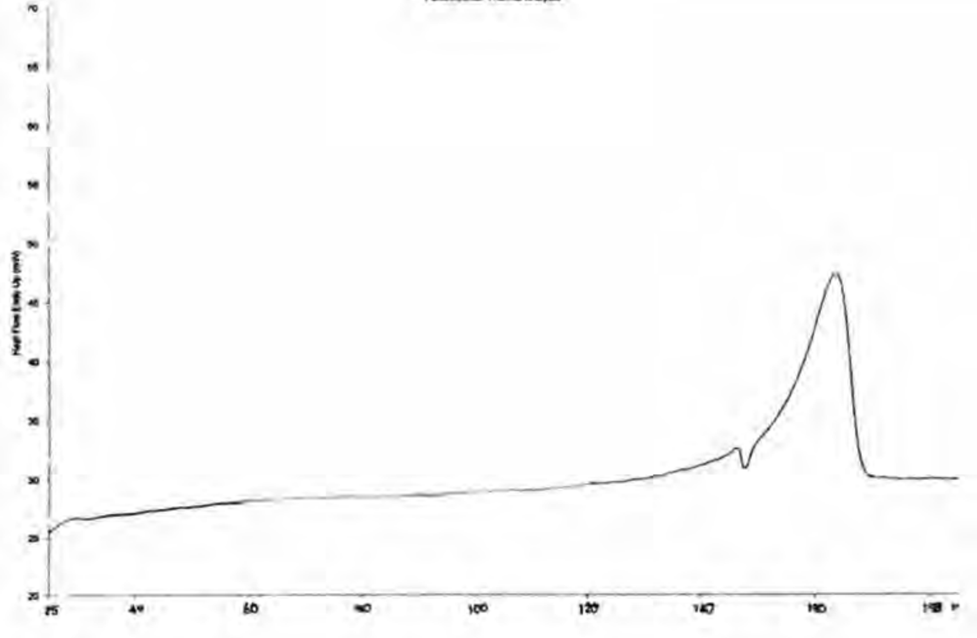

Figure C.14 DSC thermogram on heating curve of 70/30 PP/RTR blend using MA and DCP.

APPENDIX D

D. Statistic of Data

The standard deviation (SD), mean value (X) and percent variation were calculated according to equation D.1, D.2 and D.3, respectively.

$$SD = \sqrt{\{\Sigma X^2 - ((\Sigma X)^2 / n)\} / n-1} \quad (D.1)$$

$$\bar{X} = \Sigma X / n \quad (D.2)$$

$$\% \text{ Variation} = (SD / \bar{X}) \times 100 \quad (D.3)$$

X is the value of properties of each sample and n is the number of samples in each batch.

APPENDIX E

E. Calculation of Percentage Crystallinity of PP

The percentage crystallinity of PP can be calculated with the heat of fusion (H_f) of 100 pbw PP in composite blend divide by H_f of fully crystallinity of PP and multiplies by 100 according to equation E.1. The fully crystallinity of PP had 190 J/g.

$$\% \text{ Crystallinity} = \frac{H_f \text{ of PP in composite blend}}{H_f \text{ of fully crystallinity of PP}} \times 100 \qquad (E.1)$$

Because of the composite blends compose of PP and various RTR loading, thus, it must be calculated H_f of 100 pbw PP. For example, H_f of 70/30 PP/RTR blend with sulfur crosslinking agents had 49.60 J/g , H_f of 100 pbw PP in this composite blend can be calculated from equation E.2.

$$\begin{aligned} H_f \text{ of 100 pbw PP} &= (H_f \text{ of 70 pbw PP} \times 100) / 70 \qquad (E.2) \\ &= (49.60 \times 100)/70 \\ &= 70.86 \text{ J/g} \end{aligned}$$

VITA

Miss. Sukunya Juikham was born on April 25, 1976 in Pitsanuloke. She graduated with a Bachelor Degree of Science (Industrial Chemistry) from Chiang Mai University in 1996. In 1998, she was accepted as a graduate student in the Program of Petrochemistry and Polymer Science, Faculty of Science, Chulalongkorn University. She received a Master's degree of Science in Polymer Science, in March 2001.