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## APPENDIX A

LDPE and LLDPE film (180-220  $\mu$ ) were prepared using a hot press at 170 °C with a force of 170 kN. The film was exposed to laser light in the FTIR sample compartment at the ambient for determination of branching content. The number of scans was five with the resolution of 4  $\text{cm}^{-1}$ , and the scanning wavenumber was from 4000 to 400  $\text{cm}^{-1}$ . The absorbance, film thickness and film density are shown in Table A. The short chain branching calculated as the methyl group of LDPE J4324 and LLDPE L2020F used in this studied were 1.66 and 1.43 group per 1000 atoms of carbon, respectively [18].

**Table A.** Values of absorbance (A), film density (D) and film thickness (T) of LDPE J4324 and LLDPE L2020F.

Material	A			D( $\text{g}/\text{cm}^3$ )			T(micron)		
	1	2	3	1	2	3	1	2	3
LDPE	0.751	0.748	0.688	0.893	0.860	0.917	204	205	188
LLDPE	0.611	0.695	0.676	0.858	0.866	0.874	205	209	215

## APPENDIX B

Experimental data of maximum torque of the crosslinking reaction of LDPE and LLDPE at 446 K measured using Brabender Plasti-Corder.

**Table B1.** Values of maximum torque of crosslinking reaction of LDPE and LLDPE at 446 K with various amount of DCP.

DCP amount (%)	Max. Torque (Nm)	
	LDPE	LLDPE
0	10.5	25.7
0.2	13.7	28.0
0.4	20.3	33.1
0.6	-	45.3
0.8	25.0	53.0
0.9	25.9	-
1.0	-	55.9
1.2	28.4	56.0
1.6	29.1	-
2.0	30.0	-
2.4	29.6	-

**Table B2-a.** Torque against time during the crosslinking reaction of LDPE at 446 K with various amount of DCP.

Time(s) DCP(%)	Torque (Nm)						
	0.2	0.4	0.8	0.9	1.2	1.6	1.96
0	10.5	10.5	10.5	10.4	10.4	10.5	10.6
6	10.6	10.7	10.6	10.6	10.8	11.5	11.6
8	10.7	10.7	11.1	11.1	11.4	12.1	12.2
10	10.7	10.9	11.4	11.4	11.9	12.4	12.5
12	10.8	11.0	11.5	11.5	12.1	12.8	13.0
14	10.8	11.1	11.8	11.8	12.5	13.5	14.0
16	10.8	11.3	12.2	12.6	13.1	14.0	14.8
18	10.9	11.4	12.6	12.9	13.6	14.8	15.7
20	10.9	11.5	13.0	13.3	14.2	15.4	16.3
30	11.2	12.2	14.8	15.6	17.1	18.9	20.3
40	11.4	12.9	16.8	18.1	19.7	21.8	23.6
50	11.7	13.6	18.7	20.1	22.2	24.4	26.3
60	11.8	14.4	20.2	22.1	24.3	25.9	28.2
70	12.1	15.3	22.0	23.9	25.4	27.1	29.1
80	12.3	16.1	23.0	24.5	26.1	28.2	30.0
90	12.4	16.8	23.9	24.9	26.6	29.0	-
100	12.5	17.4	24.3	25.3	27.2	29.1	-
120	12.8	18.8	24.7	25.4	28.4	-	-
140	13.2	19.7	24.8	25.9	-	-	-
160	13.4	20.2	25.0	-	-	-	-
180	13.6	20.3	-	-	-	-	-
200	13.6	-	-	-	-	-	-
220	13.7	-	-	-	-	-	-

**Table B2-b.** Crosslinking conversion against time of the crosslinking reaction of LDPE at 446 K with various amount of DCP.

Time(s)	Conversion							
	DCP (%)	0.20	0.40	0.8	0.9	1.2	1.57	1.96
0		0.000	0.000	0.000	0.000	0.000	0.000	0.000
6		0.005	0.008	0.005	0.011	0.021	0.053	0.053
8		0.008	0.013	0.032	0.037	0.050	0.085	0.089
10		0.011	0.021	0.047	0.050	0.080	0.100	0.100
12		0.016	0.024	0.053	0.060	0.089	0.121	0.126
14		0.016	0.030	0.069	0.071	0.111	0.158	0.179
16		0.018	0.040	0.087	0.116	0.142	0.184	0.221
18		0.021	0.047	0.111	0.132	0.168	0.226	0.268
20		0.021	0.053	0.132	0.153	0.200	0.258	0.300
30		0.037	0.089	0.226	0.274	0.353	0.442	0.511
40		0.047	0.126	0.332	0.405	0.489	0.595	0.684
50		0.063	0.163	0.432	0.511	0.621	0.732	0.826
60		0.068	0.205	0.511	0.616	0.732	0.811	0.926
70		0.084	0.253	0.605	0.711	0.789	0.874	0.974
80		0.095	0.295	0.658	0.742	0.826	0.932	1
90		0.100	0.332	0.705	0.763	0.853	0.974	-
100		0.105	0.363	0.726	0.784	0.884	0.979	-
120		0.121	0.437	0.747	0.789	0.947	-	-
140		0.142	0.484	0.753	0.816	-	-	-
160		0.153	0.511	0.763	-	-	-	-
180		0.163	0.516	-	-	-	-	-
200		0.163	-	-	-	-	-	-
220		0.168	-	-	-	-	-	-

**Table B3-a.** Torque against time during the crosslinking reaction of LLDPE at 446 K with various amount of DCP.

Time(s) DCP (%)	Torque (Nm)					
	0.2	0.4	0.6	0.8	1.0	1.2
0	25.5	25.5	25.4	25.7	25.5	25.5
8	25.7	26.7	26.5	26.7	26.7	26.4
10	25.8	26.5	26.8	27.2	27.1	27.45
12	25.8	26.5	27.0	27.5	28.1	28.3
14	25.9	26.6	27.3	28.0	28.8	29.2
16	26.0	26.7	27.7	28.1	29.4	29.8
18	26.1	26.8	28.0	28.9	30.0	30.4
20	26.3	27.1	28.4	29.4	30.5	31.0
30	26.4	27.9	30.0	30.8	32.8	33.9
40	26.6	28.8	31.4	33.3	35.4	36.8
50	26.8	29.3	33.0	35.3	38.2	40.2
60	27.1	29.9	34.2	37.6	41.2	43.6
70	27.4	30.6	35.5	40.0	41.0	46.7
80	27.6	31.1	37.0	42.5	46.6	49.0
90	27.6	31.6	38.2	44.6	48.7	51.3
100	27.9	32.1	39.6	46.5	50.0	52.5
110	28.0	32.4	40.6	48.2	51.9	53.9
120	28.0	32.9	41.8	49.6	52.8	54.4
130	28.0	33.1	42.5	50.7	53.1	55.2
140	27.9	33.1	43.4	51.3	54.4	54.8
150	27.9	33.2	44	52.1	54.3	55.5
160	27.8	33.1	44.9	52.6	54.4	56.0
170	27.6	33.2	44.8	52.7	54.7	54.2
180	27.6	33.0	45.3	52.8	55.2	54.6
210	-	-	45.1	53.0	55.9	53.2
240	-	-	44.9	52.9	-	-



**Table B3-b.** Crosslinking conversion against time of the crosslinking reaction of LLDPE at 446 K with various amount of DCP.

Time(s) DCP (%)	Conversion					
	0.2	0.4	0.6	0.8	1.0	1.2
0	0.000	0.000	0.000	0.000	0.000	0.000
8	0.007	0.036	0.036	0.033	0.040	0.030
10	0.010	0.036	0.046	0.050	0.051	0.064
12	0.010	0.036	0.052	0.059	0.085	0.092
14	0.013	0.036	0.062	0.075	0.108	0.121
16	0.016	0.036	0.075	0.080	0.128	0.141
18	0.020	0.036	0.085	0.106	0.148	0.161
20	0.026	0.052	0.098	0.122	0.164	0.180
30	0.030	0.079	0.150	0.168	0.239	0.275
40	0.036	0.108	0.196	0.251	0.325	0.370
50	0.043	0.125	0.248	0.317	0.416	0.482
60	0.052	0.144	0.288	0.43	0.515	0.593
70	0.062	0.167	0.330	0.472	0.508	0.695
80	0.069	0.184	0.379	0.554	0.692	0.770
90	0.069	0.200	0.418	0.624	0.761	0.846
100	0.079	0.216	0.464	0.686	0.803	0.885
110	0.082	0.226	0.497	0.743	0.866	0.931
120	0.082	0.243	0.536	0.789	0.895	0.948
130	0.082	0.249	0.559	0.825	0.905	0.974
140	0.079	0.249	0.68	0.845	0.948	0.961
150	0.079	0.252	0.608	0.871	0.944	0.984
160	0.075	0.249	0.637	0.888	0.948	0.941
170	0.069	0.252	0.634	0.891	0.957	0.954
180	0.069	0.246	0.650	0.894	0.974	0.908
210	-	-	0.644	0.901	-	-
240	-	-	0.637	0.898	-	-

**Table B4-a** Torque against time during the crosslinking reaction of LDPE at various temperature ; DCP 0.2 %.

Time(s) Temp.(K)	Torque (Nm)			
	446	455	464	474
0	10.5	9.50	8.60	7.70
2	-	-	-	7.93
4	-	-	-	8.23
6	10.6	9.70	9.10	8.50
8	10.7	9.71	9.27	8.77
10	10.7	9.90	9.60	9.03
12	10.8	10.0	9.82	9.27
14	10.8	10.1	10.0	9.63
16	10.9	10.2	10.3	9.81
18	10.9	10.4	10.3	9.83
20	10.9	10.6	10.4	10.0
30	11.2	11.3	11.2	10.7
40	11.4	11.9	12	11.2
50	11.7	12.5	12.7	11.3
60	11.8	13.1	13.3	11.3
70	12.1	13.6	13.6	11.3
80	12.3	13.9	13.8	11.1
90	12.4	14.8	13.9	11.1
100	12.5	14.7	13.9	-
120	12.8	15.1	13.8	-
140	13.2	15.2	13.3	-
160	13.4	15.1	-	-
180	13.6	-	-	-
200	13.6	-	-	-
220	13.7	-	-	-

**Table B4-b** Crosslinking conversion against time of the crosslinking reaction of LDPE at various temperature ; DCP 0.2 %.

Time(s)	Conversion				
	Temp.(K)	446	455	464	473
0		0	0	0	0
2		-	-	-	0.011
4		-	-	-	0.024
6		0.005	0.010	0.024	0.037
8		0.008	0.010	0.032	0.049
10		0.011	0.020	0.048	0.061
12		0.016	0.023	0.058	0.072
14		0.016	0.030	0.068	0.087
16		0.018	0.036	0.081	0.095
18		0.021	0.047	0.081	0.097
20		0.021	0.055	0.086	0.106
30		0.037	0.090	0.124	0.137
40		0.047	0.119	0.162	0.160
50		0.063	0.149	0.195	0.164
60		0.068	0.179	0.224	0.164
70		0.084	0.204	0.238	0.164
80		0.095	0.219	0.248	0.155
90		0.100	0.264	0.252	0.155
100		0.105	0.259	0.252	-
120		0.121	0.279	0.248	-
140		0.142	0.284	0.224	-
160		0.153	0.279	-	-
180		0.163	-	-	-
200		0.163	-	-	-
220		0.168	-	-	-

**Table B5-a** Torque against time during the crosslinking reaction of LLDPE at various temperature ; DCP 0.2 %.

Time(s)	Torque (Nm)				
	Temp.(K)	446	455	464	474
0		25.5	24.9	23.6	21.9
2		-	-	-	22.0
4		-	-	24.3	22.6
6		-	25.6	24.5	23.2
8		25.7	25.7	24.7	23.4
10		25.8	25.8	25.1	24.0
12		25.8	26.0	25.3	24.5
14		25.9	26.1	25.8	25.0
16		26.0	26.3	26.0	25.7
18		26.1	26.4	26.4	25.9
20		26.3	26.7	26.5	26.2
30		26.4	27.5	27.8	26.6
40		26.6	28.1	28.2	26.5
50		26.8	28.4	28.4	26.7
60		27.1	28.7	28.3	26.6
70		27.4	28.7	28.3	26.6
80		27.6	28.7	28.1	26.7
90		27.6	-	-	-
100		27.9	-	-	-
110		28.0	-	-	-
120		28.0	-	-	-
130		28.0	-	-	-
140		27.9	-	-	-
150		27.9	-	-	-
160		27.8	-	-	-
170		27.6	-	-	-
180		27.6	-	-	-

**Table B5-b** Crosslinking conversion against time of the crosslinking reaction of LLDPE at various temperature ; DCP 0.2 %.

Time(s) Temp.(K)	Conversion			
	446	455	464	474
0	0	0	0	0
2	-	-	-	0.003
4	-	-	0.022	0.021
6	-	0.021	0.028	0.038
8	0.007	0.025	0.034	0.044
10	0.010	0.029	0.046	0.062
12	0.010	0.035	0.052	0.075
14	0.013	0.038	0.068	0.091
16	0.016	0.045	0.075	0.111
18	0.020	0.048	0.086	0.117
20	0.026	0.058	0.090	0.126
30	0.030	0.084	0.130	0.138
40	0.036	0.103	0.142	0.135
50	0.043	0.113	0.148	0.141
60	0.052	0.122	0.145	0.138
70	0.062	0.122	0.145	0.138
80	0.069	0.122	0.139	0.141
90	0.069	-	-	-
100	0.079	-	-	-
120	0.082	-	-	-
140	0.082	-	-	-
160	0.082	-	-	-
180	0.079	-	-	-
200	0.079	-	-	-

**Table B6-a** Torque against time during the crosslinking reaction of LDPE at 446 K. DCP was 2.0 % and Irganox 1010 varied from 0-0.6%.

Time(s) Irg(%)	Torque(Nm)				
	0	0.1	0.2	0.4	0.6
0	10.6	10.3	10.3	10.2	10.2
8	12.2	11.2	11.1	10.8	10.8
10	12.5	11.4	11.5	11.2	11.1
12	13.0	12.0	12.0	11.5	11.4
14	14.0	12.7	12.8	12.1	12.0
16	14.8	13.4	13.3	12.6	12.5
18	15.7	14.1	14.0	13.1	12.8
20	16.3	15.0	14.7	13.8	13.4
30	20.3	18.1	18.7	17.1	16.2
40	23.6	21.8	21.7	20.0	19.2
50	26.3	25.0	25.0	22.9	21.7
60	28.2	26.7	26.9	25.5	24.1
70	29.1	28.4	28.4	27.0	25.9
80	28.9	29.0	28.9	28.2	27.1
90	28.1	28.3	28.2	28.6	28.5
100	-	-	27.1	27.7	28.0

**Table B6-b.** Crosslinking conversion against time during crosslinking reaction of LDPE at 446 K. DCP was 2.0 % and Irganox1010 varied from 0-0.6%.

Time(s) Irg (%)	Conversion				
	0	0.1	0.2	0.4	0.6
0	0	0	0	0	0
8	0.089	0.045	0.040	0.030	0.029
10	0.100	0.058	0.054	0.050	0.046
12	0.126	0.090	0.087	0.067	0.060
14	0.179	0.126	0.128	0.098	0.094
16	0.221	0.161	0.157	0.125	0.117
18	0.268	0.197	0.193	0.149	0.136
20	0.300	0.244	0.226	0.186	0.165
30	0.511	0.403	0.435	0.356	0.308
40	0.684	0.597	0.591	0.507	0.464
50	0.826	0.763	0.763	0.653	0.593
60	0.926	0.851	0.862	0.789	0.718
70	0.974	0.939	0.939	0.864	0.809
80	0.963	0.970	0.964	0.928	0.873
90	0.921	0.934	0.926	0.950	0.943
100	-	-	0.869	0.901	0.916

**Table B7-a** Torque against time during the crosslinking reaction of LLDPE at 446 K. DCP was 1.2 % and Irganox 1010 varied from 0-0.6%.

Time(s)	Torque (Nm)					
	Irg (%)	0	0.1	0.2	0.4	0.6
0		25.5	25.6	25.5	25.8	25.6
8		26.4	26.7	26.3	26.5	26.2
10		27.4	27.0	26.4	26.6	26.5
12		28.3	27.3	26.8	26.9	26.6
14		29.2	28.9	28.2	27.2	26.7
16		30.2	29.8	29.2	28.7	27.0
18		30.7	30.4	30.4	29.7	27.5
20		31.4	31.0	30.9	30.2	28.8
30		34.3	33.9	33.4	32.2	31.5
40		37.6	36.8	36.1	34.7	33.4
50		41.2	40.2	39.4	37.4	35.7
60		44.6	43.6	43.4	40.5	38.4
70		48.1	46.7	47.2	44.9	41.3
80		50.6	49	50.2	48.0	44.5
90		52.3	51.3	52.8	50.6	46.9
100		53.5	52.5	54.0	53.2	49.8
110		53.9	53.4	54.3	54.9	52
120		54.4	53.9	55.1	55.3	53.5
130		55.2	54.2	54.7	55	54
140		54.8	53.7	53.6	54.7	53.9
150		55.5	54.1	53.7	54.2	53.9
160		54.2	52.5	52.4	53.3	54.7
170		54.6	51.8	52.3	52	54.1
180		53.2	51.7	51.6	51.7	52.8



**Table B7-b.** Crosslinking conversion against time during crosslinking reaction of LLDPE at 446 K. DCP was 1.2 % and Irganox1010 varied from 0-0.6%.

Time(s) Irg (%)	Conversion				
	0	0.1	0.2	0.39	0.58
0	0	0	0	0	0
8	0.030	0.036	0.026	0.023	0.020
10	0.062	0.046	0.030	0.026	0.030
12	0.092	0.056	0.043	0.036	0.033
14	0.121	0.109	0.089	0.046	0.036
16	0.154	0.138	0.121	0.096	0.046
18	0.170	0.158	0.161	0.129	0.063
20	0.193	0.178	0.177	0.146	0.105
30	0.289	0.273	0.259	0.212	0.194
40	0.397	0.395	0.348	0.295	0.257
50	0.515	0.513	0.456	0.384	0.332
60	0.626	0.625	0.587	0.487	0.421
70	0.741	0.740	0.711	0.632	0.516
80	0.823	0.822	0.810	0.735	0.622
90	0.879	0.878	0.895	0.821	0.701
100	0.918	0.918	0.934	0.907	0.796
110	0.931	0.914	0.944	0.964	0.868
120	0.948	0.931	0.970	0.977	0.918
130	0.974	0.941	0.957	0.967	0.934
140	0.961	0.924	0.921	0.957	0.931
150	0.984	0.938	0.925	0.940	0.931
160	0.941	0.885	0.882	0.911	0.957
170	0.954	0.862	0.879	0.868	0.938
180	0.908	0.859	0.856	0.858	0.895

## APPENDIX C

Experimental data of crosslink conversion of LDPE and LLDPE crosslinking reactions as measured by Differential Scanning Calorimeter.

**Table C1-a.** Crosslink conversion of the crosslinking reaction of LDPE at 413 K with various amount of DCP.

Time(s) \ DCP(%)	Conversion			
	2.0	1.6	1.2	0.8
0	0	0	0	0
5	0.0177	0.0110	0.0109	0.00793
10	0.103	0.060	0.043	0.0145
20	0.178	0.118	0.105	0.0759
30	0.264	0.226	0.213	0.163
45	0.404	0.29	0.269	0.182
60	0.546	0.466	0.315	0.27
90	0.617	0.545	0.474	0.46
180	0.842	0.749	0.717	0.64

**Table C1-b.** Crosslink conversion of the crosslinking reaction of LLDPE at 413 K with various amount of DCP.

Time(s) \ DCP(%)	Conversion			
	2.0	1.6	1.2	0.8
0	0	0	0	0
5	0.0227	0.0176	0.0121	0.00962
10	0.11	0.0606	0.0462	0.030
20	0.22	0.178	0.164	0.108
30	0.355	0.228	0.195	0.142
60	0.496	0.4	0.326	0.244
90	0.638	0.533	0.505	0.46
180	0.842	0.801	0.768	0.63

**Table C2-a.** Crosslink conversion of the crosslinking reaction of LDPE at various temperature using DCP 2.0%.

Time(s)	Conversion				
	Temp.(K)	393	403	413	423
0		0	0	0	0
5		0	0.003	0.0177	0.196
10		0.0008	0.0442	0.103	0.335
20		0.0112	0.0548	0.178	0.69
30		0.0291	0.0747	0.264	0.678
45		0.0316	0.12	0.404	0.816
60		0.041	0.159	0.546	0.918
90		0.159	0.272	0.617	0.978
120		0.262	0.404	0.788	-
180		0.429	0.522	0.842	-
480		0.688	0.887	-	-
600		0.76	-	-	-

**Table C2-b.** Crosslink conversion of the crosslinking reaction of LLDPE at various temperature using DCP 2.0%.

Time(s)	Conversion				
	Temp.(K)	393	403	413	423
0		0	0	0	0
5		0	0	0.0227	0.198
10		0	0.027	0.11	0.375
20		0.0112	0.0756	0.22	0.477
30		0.0213	0.108	0.355	0.531
60		0.056	0.168	0.496	0.821
90		0.099	0.287	0.638	0.86
120		0.121	0.386	0.725	0.941
180		0.421	0.562	0.842	-

**Table C3-a.** Crosslink conversion of LDPE at 413 K using DCP 2.0% and Irganox 1010 varied from 0-0.6 %.

Time(s) Irg(%)	Conversion				
	0	0.1	0.2	0.4	0.6
0	0	0	0	0	0
5	0.0177	0.015	0.010	0.015	0.004
10	0.103	0.100	0.087	0.079	0.065
20	0.178	0.137	0.134	0.128	0.112
30	0.264	0.228	0.190	0.184	0.164
60	0.546	0.334	0.320	0.291	0.258
90	0.617	0.595	0.502	0.462	0.426
180	0.842	0.775	0.726	0.712	0.696

**Table C3-b.** Crosslink conversion of LLDPE at 413 K using DCP 2.0% and Irganox 1010 varied from 0-0.6 %.

Time(s) Irg(%)	Conversion				
	0	0.1	0.2	0.4	0.6
0	0	0	0	0	0
5	0.023	0.023	0.025	0.019	0.013
10	0.11	0.095	0.076	0.072	0.050
20	0.22	0.19	0.177	0.133	0.108
30	0.355	0.321	0.282	0.2	0.156
60	0.496	0.46	0.42	0.34	0.25
90	0.638	0.607	0.68	0.522	0.403
180	0.842	0.821	0.812	0.752	0.721

## APPENDIX D

Graphically values of  $dx/dt$  (see Table D1-D7), labeled as G) in this study were determined from the slope of the linear relationship of the plot of conversion against time, where the conversion was less than 10 %. In contrast to the above mentioned technique to determined  $dx/dt$ , at the particular conversion reaction time,  $\Delta x/\Delta t = (x_t - x_0)/(t_t - t_0)$  can be calculated, where  $(x_0, t_0) = (0, 0)$ . This is rather direct method but the values obtained at each conversion -time will not the average one within the 10 % conversion. Values  $\Delta x/\Delta t$  are also given in Table D1-D7, labeled as P).

**Table D1.** Values of  $dx/dt$  of LDPE crosslinking reaction (RHE) at 446 K.

Time sec.	$dx/dt (x 10^{-3})$ at various DCP amount (%)													
	0.2		0.4		0.8		0.9		1.2		1.6		2.0	
	G	P	G	P	G	P	G	P	G	P	G	P	G	P
0	1.10	-	2.11	-	4.74	-	4.79	-	7.01	-	10.0	-	10.0	-
6	-	1.00	-	1.33	-	0.83	-	1.83	-	3.50	-	8.83	-	8.83
8	-	1.38	-	1.62	-	4.00	-	4.62	-	6.25	-	10.6	-	11.1
10	-	1.10	-	2.10	-	4.70	-	5.00	-	8.00	-	10.0	-	10.0
12	-	1.33	-	2.00	-	4.42	-	5.00	-	7.49	-	-	-	-
14	-	1.14	-	2.14	-	4.93	-	5.07	-	-	-	-	-	-
16	-	1.12	-	2.50	-	5.44	-	-	-	-	-	-	-	-

**Table D2.** Values of  $dx/dt$  of LLDPE crosslinking reaction (RHE) at 446 K.

Time sec.	$dx/dt (x 10^{-3})$ at various DCP amount (%)											
	0.2		0.4		0.6		0.8		1.0		1.2	
	G	P	G	P	G	P	G	P	G	P	G	P
0	0.98	-	2.57	-	4.56	-	4.94	-	6.04	-	6.41	-
6	-	-	-	-	-	-	-	-	-	-	-	-
8	-	0.88	-	4.50	-	4.50	-	4.12	-	5.00	-	3.75
10	-	1.00	-	3.60	-	4.60	-	5.00	-	5.10	-	6.40
12	-	0.83	-	3.00	-	4.33	-	4.92	-	7.08	-	7.67
14	-	0.93	-	2.57	-	4.43	-	5.36	-	-	-	-
16	-	1.00	-	2.25	-	4.69	-	5.00	-	-	-	-
18	-	1.11	-	2.00	-	4.72	-	-	-	-	-	-

**Table D3.** Values of  $dx/dt$  of LDPE and LLDPE crosslinking reaction (RHE) at various temperature using DCP 0.2%.

Time sec.	$dx/dt (x 10^3)$ for LDPE								$dx/dt (x 10^3)$ for LLDPE							
	446 K		455 K		464 K		473 K		446 K		455 K		446 K		473 K	
	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
0	1.10	-	2.01	-	4.80	-	6.10	-	1.00	-	2.90	-	4.60	-	6.20	-
6	-	0.83	-	1.67	-	4.00	-	6.17	-	-	-	3.50	-	4.67	-	6.33
8	-	1.00	-	1.25	-	4.00	-	6.13	-	0.88	-	3.12	-	4.25	-	5.50
10	-	1.10	-	2.00	-	4.80	-	6.10	-	1.00	-	2.90	-	4.60	-	6.20
12	-	1.33	-	1.92	-	4.83	-	6.00	-	0.83	-	2.92	-	4.33	-	6.25
14	-	1.14	-	2.14	-	4.86	-	6.21	-	0.93	-	2.71	-	4.86	-	6.50
16	-	1.12	-	2.25	-	5.06	-	5.94	-	1.00	-	2.81	-	4.69	-	-

**Table D4.** Values of  $dx/dt$  of LDPE and LLDPE crosslinking reaction (RHE) at 446 K with various amount of Irganox 1010.

Time sec.	$dx/dt (x 10^3)$ for LDPE with Irganox amount, %								$dx/dt (x 10^3)$ for LLDPE with Irganox amount, %							
	0.10		0.20		0.4		0.6		0.10		0.20		0.4		0.6	
	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
0	6.58	-	6.22	-	5.00	-	4.64	-	4.60	-	3.26	-	3.05	-	2.74	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	6.25	-	5.00	-	3.75	-	3.62	-	4.50	-	3.12	-	2.75	-	2.50
10	-	5.80	-	5.40	-	5.00	-	4.60	-	4.60	-	3.00	-	2.80	-	2.80
12	-	7.50	-	7.25	-	5.58	-	5.00	-	4.67	-	3.50	-	3.08	-	2.67
14	-	-	-	-	-	-	-	-	-	-	-	-	-	3.29	-	2.57
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.88

**Table D5.** Values of  $dx/dt$  of LDPE and LLDPE crosslinking reaction (DSC) at 413 K.

Time sec.	$dx/dt (x 10^3)$ for LDPE at the DCP amount, %								$dx/dt (x 10^3)$ for LLDPE at the DCP amount, %							
	0.8		1.2		1.6		2.0		0.8		1.2		1.6		2.0	
	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
0	5.41	-	6.46	-	7.16	-	14.9	-	4.64	-	6.97	-	9.25	-	16.2	-
300	-	2.67	-	3.64	-	5.20	-	5.90	-	3.21	-	4.03	-	5.87	-	7.57
600	-	2.43	-	7.17	-	7.65	-	17.1	-	3.58	-	7.70	-	10.1	-	18.3
1200	-	6.33	-	8.75	-	9.83	-	-	-	5.00	-	13.7	-	14.8	-	-



## VITA

Mr. Chaiwat Kongnoi was born on February 27, 1972 in Samutsongkram. He graduated with a bachelor degree of Science (Chemistry) with the second class honor from Silpakorn University in 1993. Since then he has joined the Research and Development Department, Thai Petrochemical Industry (Public) Co., Ltd.. In 1998, he was accepted as graduate student in the program for M.Sc. in Petrochemistry and Polymer Science, Chulalongkorn University. He received a Master's degree of Science in 1998.