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Appendices

Appendix A

A. PRODUCT DISTRIBUTION OF ALL CONDITION OF HYDROCRACKING OF MIXED POLYPROPYLENE AND POLYSTYRENE BY USING IRON ON ACTIVATED CARBON FROM PALM OIL SHELL.

DATA FROM REACTION BETWEEN MIXED PLASTICS PP / PS

BATCH NO.	MATERIAL				H2 (BAR)	CATALYST Fe/Ac	TIME (MIN)	TEMP. (°C)	WEIGHT, BEFORE (g)										WEIGHT, AFTER (g)					%YIELD
	MIXED PLASTICS(g)			CATALYST Fe/Ac					REACTOR (R)	MATERIAL(MAT.)			FLASK (F1)	กรวยกรอง (F2)	BEAKER / W (B2)	แท่งแก้ว (G)	กระดาษกรอง (F3)	TOTAL (R+MAT.)	EQUIP.+RESIDUE (g)	EQUIPMENT (g)	FLASK+OIL (F1 + OIL), g	PRODUCT(g)		
	PE	PP	PS							M1	M2	CAT.										TS	OIL	
1	-	-	15	5% / 1.0 mm	30	0.45	60	370	743.91	0	15	0.45	91.68	116.44	65.93	14.97	0.22	759.36	941.98	941.47	103.47	0.51	13.49	89.93
2	-	15	-	5% / 1.0 mm	30	0.45	60	410	745.11	15	0	0.45	73.89	121.08	50.76	17.82	0.22	760.56	936.03	934.99	83.29	1.04	9.94	66.27
3	-	7.5	7.5	5% / 1.0 mm	30	0.45	60	390	743.92	7.5	7.5	0.45	91.68	116.44	65.93	14.97	0.22	759.37	943.16	941.48	100.18	1.68	10.47	69.80
4	-	7.5	7.5	5% / 1.0 mm	30	0.45	60	405	745.38	7.5	7.5	0.45	91.68	121.08	65.94	14.97	0.22	760.83	948.51	947.59	99.12	0.92	7.80	52.00
5	-	7.5	7.5	5% / 1.0 mm	30	0.45	60	415	745.23	7.5	7.5	0.45	73.89	121.09	50.76	17.78	0.23	760.68	935.85	935.09	82.06	0.76	8.53	56.87
6	-	7.5	7.5	5% / 1.0 mm	30	0.45	60	425	928.26	7.5	7.5	0.45	73.9	121.08	82.37	22.37	0.23	92.87	1157.07	1154.31	82.42	2.76	8.52	56.80
7	-	7.5	7.5	5% / 1.0 mm	30	0.45	60	435	745.38	7.5	7.5	0.45	73.89	116.44	67.66	14.97	0.23	760.83	947.60	944.68	76.35	2.92	8.50	56.67
8		7.5	7.5	5% / 1.0 mm	15	0.45	60	415	926.25	7.5	7.5	0.45	91.67	121.08	82.4	17.78	0.22	941.70	1148.69	1147.73	98.31	0.96	7.39	49.27
9	-	7.5	7.5	5% / 1.0 mm	20	0.45	60	415	926.00	7.5	7.5	0.45	91.67	121.14	66.45	17.78	0.22	941.45	1133.11	1131.59	102.24	1.52	10.77	71.80
10	-	7.5	7.5	5% / 1.0 mm	25	0.45	60	415	926.05	7.5	7.5	0.45	91.67	121.07	66.46	17.78	0.22	941.50	1132.70	1131.58	102.35	1.12	11.10	74.00
11	-	7.5	7.5	5% / 1.0 mm	35	0.45	60	415	925.01	7.5	7.5	0.45	73.87	116.43	69.33	14.97	0.23	940.46	1127.31	1125.97	79.28	1.34	6.13	40.87
12	-	7.5	7.5	5% / 1.0 mm	40	0.45	60	415	925.04	7.5	7.5	0.45	73.88	116.43	83.73	14.97	0.22	940.49	1142.25	1140.39	80.41	1.86	7.22	48.13
13	-	7.5	7.5	5% / 1.0 mm	25	0.45	30	415	925.12	7.5	7.5	0.45	73.89	116.45	66.46	14.97	0.23	940.57	1123.83	1123.23	83.94	0.60	10.50	70.00
14	-	7.5	7.5	5% / 1.0 mm	25	0.45	45	415	925.01	7.5	7.5	0.45	73.89	116.45	69.95	17.78	0.23	940.46	1130.43	1129.42	83.65	1.01	10.75	71.67
15	-	7.5	7.5	5% / 1.0 mm	25	0.45	75	415	925.10	7.5	7.5	0.45	91.68	116.45	65.93	14.39	0.22	940.55	1122.57	1122.09	100.80	0.48	9.53	63.53
16	-	7.5	7.5	5% / 1.0 mm	25	0.30	45	415	924.98	7.5	7.5	0.30	91.67	116.44	65.93	14.9	0.22	940.28	1123.11	1122.47	100.09	0.64	8.86	59.07
17	-	7.5	7.5	5% / 1.0 mm	25	1.00	45	415	925.10	7.5	7.5	1.00	91.69	121.09	65.55	17.77	0.22	941.10	1131.94	1129.73	101.57	2.21	10.37	69.13
18	-	7.5	7.5	1% / 1.0 mm	25	0.45	45	415	926.03	7.5	7.5	0.45	73.88	121.09	66.47	14.39	0.22	941.48	1128.95	1128.2	84.31	0.75	10.90	72.67
19	-	7.5	7.5	10% / 1.0 mm	25	0.45	45	415	926.03	7.5	7.5	0.45	73.89	121.09	66.47	14.39	0.22	941.48	1129.00	1128.2	83.48	0.80	10.72	71.47
20		7.5	7.5		25	0	45	415	924.98	7.5	7.5	0	91.68	116.45	65.94	14.91	0.23	939.98	1123.61	1122.51	101.34	1.10	8.45	56.33
21	-	0	15	5% / 1.0 mm	25	0.45	60	415	919.54	0	15.0	0.45	91.68	121.09	66.47	14.39	0.23	934.99	1123.31	1122.35	103.72	0.96	12.26	81.73

Table A-1 Product distribution of all conditions. (PCL/PS : PP+PS)

No.	Raw Material	Catalyst	H_2 (kg/cm^2)	Temp. (^oC)	Time (min)	Solid (g)	% Solid	Oil Yield (g)	% Yield	Gas (g)	% Gas	% Naphtha 65-200 ^oC	% Kerosene 200-250 ^oC	% Light Gas Oil 250-300 ^oC	% Heavy Gas Oil 300-350 ^oC	% Long Residues > 350 ^oC
PCL/PS001	PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	370	60	0.51	**3.40%**	13.49	**89.93%**	1.00	**6.67%**	23.83%	1.80%	17.99%	7.19%	39.12%
PCL/PS002	PP = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	410	60	1.04	**6.93%**	9.94	**66.27%**	4.02	**26.80%**	17.56%	1.33%	13.58%	4.97%	28.83%
PCL/PS003	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	390	60											
PCL/PS004	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	405	60	0.92	**6.13%**	7.80	**52.00%**	6.28	**41.87%**	13.78%	1.04%	10.40%	4.16%	22.62%
PCL/PS005	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	415	60	0.76	**5.07%**	8.53	**56.87%**	5.71	**38.07%**	15.07%	1.14%	11.37%	4.55%	24.74%
PCL/PS006	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	425	60	2.76	**18.40%**	8.52	**56.80%**	3.72	**24.80%**	15.05%	1.14%	11.64%	4.26%	24.71%
PCL/PS007	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	435	60	2.92	**19.47%**	8.50	**56.67%**	3.58	**23.87%**	15.02%	1.13%	11.33%	4.53%	24.65%
PCL/PS008	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	15	415	60											
PCL/PS009	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	20	415	60	1.52	**10.13%**	10.77	**71.80%**	2.71	**18.07%**	19.03%	1.44%	14.72%	5.39%	31.23%
PCL/PS010	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	25	415	60	1.12	**7.47%**	11.10	**74.00%**	2.78	**18.53%**	19.61%	1.48%	15.17%	5.55%	32.19%
PCL/PS011	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	35	415	60	1.34	**8.93%**	6.13	**40.87%**	7.53	**50.20%**	10.83%	0.82%	8.17%	3.27%	17.78%
PCL/PS012	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	40	415	60											
PCL/PS013	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	25	415	30	0.60	**4.00%**	10.50	**70.00%**	3.90	**26.00%**	18.55%	1.40%	14.35%	5.25%	30.45%

Table A-1 (Continues).

No.	Raw Material	Catalyst	H_2 (kg/cm^2)	Temp. (^oC)	Time (min)	Solid (g)	% Solid	Oil Yield (g)	% Yield	Gas (g)	% Gas	% Naphtha 65-200 ^oC	% Kerosene 200-250 ^oC	% Light Gas Oil 250-300 ^oC	% Heavy Gas Oil 300-350 ^oC	% Long Residues > 350 ^oC
PCL/PS014	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	25	415	45	1.01	**6.73%**	10.75	**71.67%**	3.24	**21.60%**	18.99%	1.43%	12.54%	7.53%	31.18%
PCL/PS015	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	25	415	75	0.48	**3.20%**	9.53	**63.53%**	4.99	**33.27%**	16.84%	1.27%	12.71%	5.08%	27.64%
PCL/PS016	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 0.30 g.	25	415	45	0.64	**4.27%**	8.86	**59.07%**	5.50	**36.67%**	15.65%	1.18%	11.81%	4.73%	25.69%
PCL/PS017	PP+PS = 15.00 g.	5% Fe/Ac (1 mm.) = 1.00 g.	25	415	45	2.21	**14.73%**	10.37	**69.13%**	2.42	**16.13%**	18.32%	1.38%	13.83%	5.53%	30.07%
PCL/PS018	PP+PS = 15.00 g.	1% Fe/Ac (1 mm.) = 0.45 g.	25	415	45	0.75	**5.00%**	10.90	**72.67%**	3.35	**22.33%**	19.26%	1.45%	14.90%	4.72%	32.34%
PCL/PS019	PP+PS = 15.00 g.	10% Fe/Ac (1 mm.) = 0.45 g.	25	415	45	0.80	**5.33%**	10.72	**71.47%**	3.48	**23.20%**	18.94%	1.43%	14.65%	5.00%	31.45%
PCL/PS020	PP+PS = 15.00 g.	Blank	25	415	45	1.10	**7.33%**	8.45	**56.33%**	5.45	**36.33%**	14.93%	1.13%	11.27%	4.51%	24.51%

Appendix B

B. PRODUCT DISTRIBUTION OF ALL CONDITION OF HYDROCRACKING OF MIXED POLYPROPYLENE AND POLYETHYLENE BY USING IRON ON ACTIVATED CARBON FROM PALM OIL SHELL

DATA FROM REACTION BETWEEN MIXED PLASTICS PP / PE (LDPE)

BATCH NO.	MATERIAL				H2 (BAR)	CATALYST Fe/Ac	TIME (MIN)	TEMP. (°C)	WEIGHT, BEFORE (g)							WEIGHT, AFTER (g)					%YIELD
	MIXED PLASTICS			CATALYST					REACTOR	FLASK	กระดาษกรอง	BEAKER / W	แท่งแก้ว	กระดาษกรอง	TOTAL	EQUIP.+RESIDUE	EQUIPMENT+TS	FLASK+OIL	PRODUCT(g)		
	PP	PE	PS	Fe/Ac					(R)	(B1)	(F1)	(B2)	(G)	(F2)	(MAT.+CAT.)	(g)	(g)	(B1 + OIL), g	TS	OIL	
1	7.5	7.5		5% / 1.0 mm	30	0.45	60	415	925.24	73.87	121.08	67.63	22.37	0.22	15.45	-	-	-	-	-	-
2	7.5	7.5	-	5% / 1.0 mm	30	0.45	60	425	926.08	91.65	116.45	67.63	17.77	0.22	15.45	1130.01	1129.85	96.72	1.70	5.23	34.87
3	7.5	7.5	-	5% / 1.0 mm	30	0.45	60	435	925.05	73.87	121.08	82.35	17.77	0.23	15.45	1148.08	1147.88	80.46	1.40	6.79	45.27
4	7.5	7.5	-	5% / 1.0 mm	30	0.45	60	445	926.08	91.68	116.45	66.47	17.76	0.23	15.45	1128.42	1128.22	99.14	1.23	7.66	51.07
5	7.5	7.5	-	5% / 1.0 mm	30	0.45	60	455	926.08	73.89	121.09	82.38	17.76	0.22	15.45	1149.01	1148.81	79.05	1.28	5.36	35.73
6	7.5	7.5	-	5% / 1.0 mm	30	0.45	60	465	925.15	91.68	116.45	66.48	17.76	0.22	15.45	1129.84	1129.24	95.80	3.18	4.72	31.47
7	7.5	7.5	-	5% / 1.0 mm	35	0.45	60	445	925.80	91.68	116.45	66.45	14.40	0.22	15.45	1124.91	1124.24	95.79	0.92	4.78	31.87
8	7.5	7.5	-	5% / 1.0 mm	40	0.45	60	445	925.13	73.87	121.08	67.64	17.77	0.22	15.45	1133.43	1133.25	77.46	1.41	3.77	25.13
9	7.5	7.5	-	5% / 1.0 mm	25	0.45	60	445	925.13	73.87	121.08	67.64	17.75	0.23	15.45	1133.96	1133.42	79.81	1.59	6.48	43.20
10	7.5	7.5	-	5% / 1.0 mm	30	0.45	30	445	925.72	91.65	121.08	66.45	14.40	0.22	15.45	1130.46	1129.20	97.84	1.33	7.45	49.67
11	7.5	7.5	-	5% / 1.0 mm	30	0.45	40	445	925.72	73.89	116.45	56.20	17.77	0.23	15.45	1118.01	1117.99	81.34	1.62	7.47	49.80
12	7.5	7.5	-	5% / 1.0 mm	30	0.45	50	445	925.98	91.66	121.09	67.66	17.77	0.23	15.45	1134.25	1133.51	99.02	0.78	8.10	54.00
13	7.5	7.5	-	5% / 1.0 mm	30	0.45	75	445	925.98	91.68	121.09	67.66	17.76	0.22	15.45	1134.09	1133.57	97.93	0.86	6.77	45.13
14	7.5	7.5	-	5% / 1.0 mm	30	0.30	50	445	924.97	73.90	121.08	50.76	14.39	0.23	15.30	1113.92	1112.80	81.35	1.37	8.57	57.13
15	7.5	7.5	-	5% / 1.0 mm	30	1.00	50	445	919.55	91.66	116.46	67.66	17.65	0.23	16.00	1124.03	1123.70	98.80	2.15	7.47	49.80
16	7.5	7.5	-	1% / 1.0 mm	30	0.45	50	445	924.97	73.90	121.09	51.26	14.39	0.22	15.45	1113.63	1112.89	81.15	0.96	7.99	53.27
17	7.5	7.5	-	10% / 1.0 mm	30	0.45	50	445	925.47	91.68	116.44	67.66	17.76	0.23	15.45	1128.95	1128.25	98.87	0.69	7.89	52.60
18	7.5	7.5	-	-	30	0.00	50	445	925.27	92.20	116.45	67.66	17.76	0.22	15.00	1128.59	1128.88	99.74	1.52	7.25	48.33
19	15	0		5% / 1.0 mm	30	0.45	50	445	924.51	91.68	121.09	66.49	14.39	0.22	15.45	1127.93	1127.35	98.44	0.65	7.34	48.93
20	0	15	-	5% / 1.0 mm	30	0.45	50	445	919.51	73.90	121.09	67.66	14.39	0.23	15.45	1124.29	1123.62	82.27	0.74	9.04	60.27

Table A-2 Product distribution of all conditions. (PCL/PE : PP+PE)

No.	Raw Material	Catalyst	H_2 (kg/cm^2)	Temp. (^oC)	Time (min)	Solid (g)	% Solid	Oil Yield (g)	% Yield	Gas (g)	% Gas	% Naphtha 65-200 ^oC	% Kerosene 200-250 ^oC	% Light Gas Oil 250-300 ^oC	% Heavy Gas Oil 300-350 ^oC	% Long Residues > 350 ^oC
PCL/PE001	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	415	60											
PCL/PE002	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	425	60	1.70	**11.33%**	5.23	**34.87%**	8.07	**53.80%**					
PCL/PE003	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	435	60	1.40	**9.33%**	6.79	**45.27%**	6.81	**45.40%**	12.00%	7.47%	6.56%	5.66%	13.58%
PCL/PE004	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	60	1.23	**8.20%**	7.66	**51.07%**	6.11	**40.73%**	13.53%	8.43%	7.40%	6.38%	15.32%
PCL/PE005	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	455	60	1.28	**8.53%**	5.36	**35.73%**	8.36	**55.73%**	9.47%	5.90%	5.18%	4.47%	10.72%
PCL/PE006	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	465	60	3.18	**21.20%**	4.72	**31.47%**	7.10	**47.33%**	8.34%	5.19%	4.56%	3.93%	9.44%
PCL/PE007	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	35	445	60	0.92	**6.13%**	4.78	**31.87%**	9.30	**62.00%**	8.44%	5.26%	4.62%	3.98%	9.56%
PCL/PE008	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	40	445	60	1.41	**9.40%**	3.77	**25.13%**	9.82	**65.47%**	6.66%	4.15%	3.64%	3.14%	7.54%
PCL/PE009	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	25	445	60	1.59	**10.60%**	6.48	**43.20%**	6.93	**46.20%**	11.45%	7.13%	6.26%	5.40%	12.96%
PCL/PE010	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	30	1.33	**8.87%**	7.45	**49.67%**	6.22	**41.47%**	13.16%	8.20%	7.20%	6.21%	14.90%
PCL/PE011	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	40	1.62	**10.80%**	7.47	**49.80%**	5.91	**39.40%**	13.20%	8.22%	6.97%	6.47%	14.94%
PCL/PE012	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	50	0.78	**5.20%**	8.1	**54.00%**	6.12	**40.80%**	14.31%	8.91%	7.56%	7.02%	16.20%
PCL/PE013	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	75	0.86	**5.73%**	6.77	**45.13%**	7.37	**49.13%**					

Table A-2 (Continued).

No.	Raw Material	Catalyst	H_2 (kg/cm^2)	Temp. (^oC)	Time (min)	Solid (g)	% Solid	Oil Yield (g)	% Yield	Gas (g)	% Gas	% Naphtha 65-200 ^oC	% Kerosene 200-250 ^oC	% Light Gas Oil 250-300 ^oC	% Heavy Gas Oil 300-350 ^oC	% Long Residues > 350 ^oC
PCL/PE014	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.30 g.	30	445	50	1.37	**9.13%**	8.57	**57.13%**	5.06	**33.73%**					
PCL/PE015	PP+PE = 15.00 g.	5% Fe/Ac (1 mm.) = 1.00 g.	30	445	50	2.15	**14.33%**	7.47	**49.80%**	5.38	**35.87%**					
PCL/PE016	PP+PE = 15.00 g.	1% Fe/Ac (1 mm.) = 0.45 g.	30	445	50	0.96	**6.40%**	7.99	**53.27%**	6.05	**40.33%**					
PCL/PE017	PP+PE = 15.00 g.	10% Fe/Ac (1 mm.) = 0.45 g.	30	445	50	0.69	**4.60%**	7.89	**52.60%**	6.42	**42.80%**					
PCL/PE018	PP+PE = 15.00 g.	blank	30	445	50	1.52	**10.13%**	7.25	**48.33%**	6.23	**41.53%**	12.81%	7.98%	6.77%	6.28%	14.50%
PCL/PE019	PP = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	60	0.65	**4.33%**	7.34	**48.93%**	7.01	**46.73%**	12.97%	8.07%	7.10%	6.12%	14.68%
PCL/PE020	PE = 15.00 g.	5% Fe/Ac (1 mm.) = 0.45 g.	30	445	60	0.74	**4.93%**	9.04	**60.27%**	5.22	**34.80%**	15.97%	9.94%	8.74%	7.53%	18.08%

Appendix C

C.1 EXAMPLE OF ANALYSIS REPORT FROM GAS CHROMATOGRAPHY (GC SIMULATED DISTILLATION)

PTT RESEARCH AND TECHNOLOGY INSTITUTE

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Analytical and Petrochemical Research Department

71 Moo 2 Phahonyothin Rd.,Wangnoi, Ayutthaya, 13170 Thailand. Tel. 537-3000 Ext. 2402-3 Fax. 537-3000 Ext. 2401

CERTIFICATE OF ANALYSIS

CERT NO. : 9/1/2544 [PAGE 1/1] **REF NO.** : 93/44

SAMPLE NAME : PCL/PE003 **SAMPLING DATE** : -

SAMPLE TYPE : Oil **SAMPLING CONDITION** : -

SAMPLE ID. : FU017/44 **SAMPLE LOCATION:** -

RECEIVED DATE : 13/03/44 **ANALYSIS DATE** : 14-15/03/44

SAMPLE FROM : K. Parichat, Chulalongkorn University, Tel. 01-578-4252

Test Item	Method	Unit	Result
Boiling Range Distribution	ASTM D2887-93 (Modified Method)	°F	
% Recovered			
IBP			179
5			260
10			286
15			324
20			351
25			383
30			411
35			439
40			465
45			494
50			524
55			557
60			590

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CERTIFICATE OF ANALYSIS

CERT NO. : 9/1/2544 [Page :2/2]

Test Item	Method	Unit	Result
% Recovered (Cont.)			
65			626
70			663
75			702
80			746
85			794
90			850
95			917
FBP			999

REMARK : IBP (Initial Boiling Point) - the temperature at which a cumulative corrected area count equal to 0.5% of the total sample area

FBP (Final Boiling Point) - the temperature at which a cumulative corrected area count equal to 99.5% of the total sample area

APPROVED BY : C. Tonkunakorn

(Mr. Chatree Tonkunakorn)

POSITION : **Division Manager**

DATE OF ISSUE : 31/03/44

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CERTIFICATE OF ANALYSIS

CERT NO. : 9/14/2544 [PAGE 1/1] **REF NO.** : 106/44

SAMPLE NAME : PCL/PS020 **SAMPLING DATE** : -

SAMPLE TYPE : Oil **SAMPLING CONDITION** : -

SAMPLE ID. : FU030/44 **SAMPLE LOCATION:** -

RECEIVED DATE : 13/03/44 **ANALYSIS DATE** : 19-20/03/44

SAMPLE FROM : K. Parichat, Chulalongkorn University, Tel. 01-578-4252

Test Item	Method	Unit	Result
Boiling Range Distribution	ASTM D2887-93 (Modified Method)	°F	
% Recovered			
IBP			169
5			192
10			228
15			229
20			230
25			231
30			273
35			274
40			275
45			276
50			276
55			277
60			304

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CERTIFICATE OF ANALYSIS

CERT NO. : 9/14/2544 [Page :2/2]

Test Item	Method	Unit	Result
% Recovered (Cont.)			
65			306
70			331
75			512
80			627
85			670
90			773
95			813
FBP			836

REMARK : IBP (Initial Boiling Point) - the temperature at which a cumulative corrected area count equal to 0.5% of the total sample area

FBP (Final Boiling Point) - the temperature at which a cumulative corrected area count equal to 99.5% of the total sample area

APPROVED BY : C. Tonkunakorn

(Mr. Chatree Tonkunakorn)

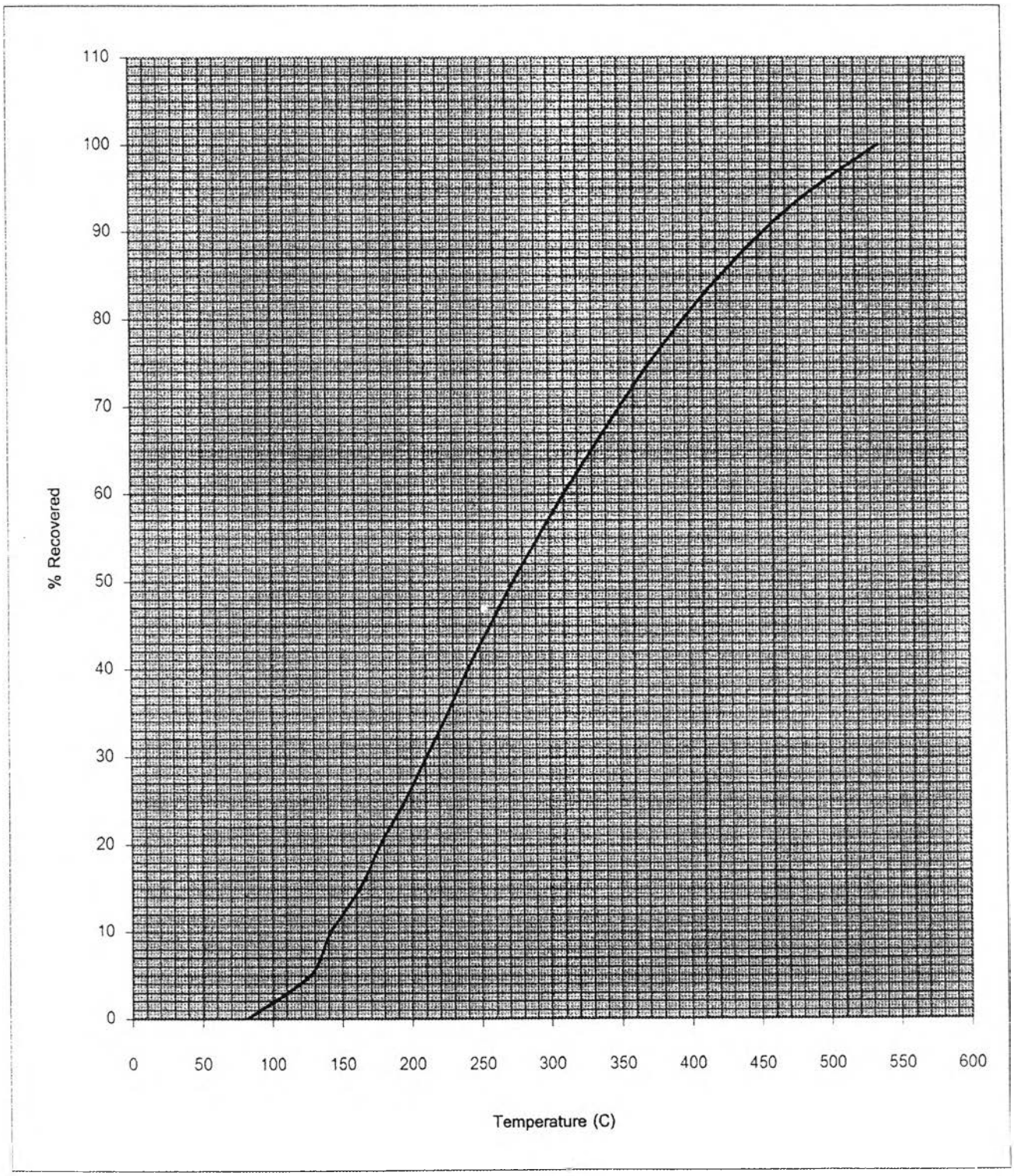
POSITION : **Division Manager**

DATE OF ISSUE : 21 / 03 / 44

C.2 BOILING RANGE DISTRIBUTION GRAPH OF SAMPLE IN DEGREE CIECIUS.

Sample Name : PCL/PE003

Unit	Boiling Range Distribution																				
°F	179	260	286	324	351	383	411	439	465	494	524	557	590	626	663	702	746	794	850	917	999
°C	82	127	141	162	177	195	211	226	241	257	273	292	310	330	351	372	397	423	454	492	537
% Recovered	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100



VITA

Parichart Leelaburanapong was born on April 27, 1971 in Krabi, Thailand. She received Bachelor Degree of Science of Chemistry at Prince of Songkla University in 1992. She continued her Master of Science in Petrochemistry and Polymer Science, Faculty of Science, Chulalongkorn University in 1998 and completed the program in 2000.