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ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



APPENDICES

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX A

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Table A.1 Effect of the filler contents on R-PVCOPS mechanical and thermal properties

Sample No.	Mechanical and Thermal Properties				
	Tensile strength (kg / cm ²)	Tear strength (kg / cm ²)	Impact strength (kg / cm)	Heat deflection temperature (°c)	Shrinkage (%)
S1.	476	40.5	3.7	69.2	0.89
S2.	482	43.3	4.1	69.4	0.85
S3.	533	37.2	2.2	69.3	0.80
S4.	534	50.8	3.5	71.3	0.81
S5.	551	57.5	4.3	72.7	0.76
S6.	579	55.1	2.9	72.1	0.70
S7.	512	47.8	1.5	70.2	1.00
S8.	525	55.4	2.6	68.6	0.95
S9.	565	56.5	3.6	68.0	0.90
S10.	575	63.5	4.1	72.0	0.80
S11.	609	67.3	7.6	72.7	0.80
S12.	611	64.1	2.8	72.5	0.75
S13.	557	58.3	4.4	69.8	0.80
S14.	564	63.6	7.5	70.6	0.70
S15.	577	60.5	3.4	70.9	0.65
S16.	517	51.5	1.9	69.7	0.95
S17.	520	54.2	4.1	69.2	0.90
S18.	527	50.5	1.5	68.2	0.85
S19.	552	60.1	3.3	73.0	0.80
S20.	575	65.5	5.3	73.9	0.75
S21.	565	56.9	2.2	73.3	0.70
S22.	598	63.9	3.8	71.9	0.75
S23.	643	68.7	5.7	73.0	0.75
S24.	611	60.0	2.0	71.8	0.65
S25.	542	53.3	1.7	70.6	1.24
S26.	539	57.5	2.8	69.7	1.20
S27.	528	51.2	1.8	69.2	1.00
No Filler	468	42.9	1.6	68.4	1.66

Table A.2 Tensile strength of the R-PVCOPS containing several fillers

Sample No.	Filler contents (phr)			Tensile strength (Kg/cm ²)					Data	X	SD	Variation (%)
	CaCO ₃	Talc	Kaolin	1 st	2 nd	3 rd	4 th	5 th				
S1	5.0	-	-	476.10	472.20	475.30	479.30	478.50	5	476.28	2.81	0.59
S2	10.0	-	-	477.30	486.20	482.40	482.90	481.60	5	482.08	3.19	0.66
S3	20.0	-	-	531.60	531.60	529.70	538.80	534.80	5	533.30	3.58	0.67
S4	-	5.0	-	535.20	538.40	532.80	535.10	526.90	5	533.68	4.28	0.80
S5	-	10.0	-	554.60	555.60	552.40	548.20	545.30	5	551.22	4.36	0.79
S6	-	20.0	-	580.70	580.60	574.90	576.40	580.10	5	578.54	2.70	0.47
S7	-	-	5.0	507.70	515.60	509.70	511.70	513.60	5	511.66	3.11	0.61
S8	-	-	10.0	525.80	520.30	529.40	523.50	527.40	5	525.28	3.53	0.67
S9	-	-	20.0	564.70	569.10	563.40	566.20	560.10	5	564.70	3.33	0.59
S10	2.5	2.5	-	577.60	579.60	570.60	571.30	573.80	5	574.58	3.92	0.68
S11	5.0	5.0	-	609.80	611.70	604.90	607.50	609.80	5	608.74	2.61	0.43
S12	10.00	10.00	-	610.90	616.30	610.60	607.80	611.30	5	611.38	3.08	0.50
S13	2.5	-	2.5	562.30	556.70	551.10	557.30	556.80	5	556.84	3.97	0.71
S14	5.0	-	5.0	569.20	563.20	567.40	559.80	561.30	5	564.18	4.00	0.71
S15	10.0	-	10.0	580.80	570.50	573.90	576.80	583.20	5	577.04	5.12	0.89
S16	-	2.5	2.5	515.10	520.10	513.90	519.60	517.60	5	517.26	2.72	0.53
S17	-	5.0	5.0	516.40	523.80	523.40	518.70	519.00	5	520.26	3.21	0.62
S18	-	10.0	10.0	526.70	528.60	526.10	529.40	524.30	5	527.02	2.03	0.39
S19	2.5	1.5	1.0	552.10	554.30	553.10	551.80	548.80	5	552.02	2.05	0.37
S20	5.0	3.0	2.0	577.60	573.50	578.30	572.80	572.50	5	574.94	2.78	0.48
S21	10.0	6.0	4.0	560.80	568.30	564.70	568.20	561.80	5	564.76	3.49	0.62
S22	1.0	2.5	1.5	597.80	589.30	600.60	600.80	602.30	5	598.16	5.21	0.87
S23	2.0	5.0	3.0	644.10	647.20	638.40	645.90	641.80	5	643.48	3.49	0.54
S24	4.0	10.0	6.0	608.70	614.80	611.80	612.30	608.30	5	611.18	2.70	0.44
S25	1.5	1.0	2.5	545.80	544.20	538.20	543.90	539.40	5	542.30	3.30	0.61
S26	3.0	2.0	5.0	540.90	535.60	538.40	540.80	538.90	5	538.92	2.16	0.40
S27	6.0	4.0	10.0	530.80	525.70	530.50	524.40	527.80	5	527.84	2.84	0.54
No Filler	-	-	-	465.30	462.70	471.10	469.50	469.80	5	467.68	3.53	0.76

Table A.3 Tear strength of the R-PVCOPS containing several fillers

Sample No.	Filler contents (phr)			Tear strength (Kg/cm)					Data	X	SD	Variation (%)
	CaCO ₃	Talc	Kaolin	1 st	2 nd	3 rd	4 th	5 th				
S1	5.0	-	-	40.47	40.90	40.10	40.30	40.50	5	40.45	0.30	0.73
S2	10.0	-	-	42.90	43.40	43.20	43.70	43.10	5	43.26	0.30	0.70
S3	20.0	-	-	37.40	37.60	37.10	37.20	36.90	5	37.24	0.27	0.73
S4	-	5.0	-	50.80	50.60	51.20	50.90	50.70	5	50.84	0.23	0.45
S5	-	10.0	-	58.10	57.50	57.20	57.40	57.10	5	57.46	0.39	0.68
S6	-	20.0	-	54.70	55.20	54.90	55.40	55.20	5	55.08	0.28	0.50
S7	-	-	5.0	48.10	47.40	47.90	48.20	47.60	5	47.84	0.34	0.70
S8	-	-	10.0	55.90	55.20	55.50	54.90	55.60	5	55.42	0.38	0.69
S9	-	-	20.0	56.70	56.90	56.10	56.80	55.90	5	56.48	0.45	0.80
S10	2.5	2.5	-	63.70	63.90	63.80	63.20	62.70	5	63.46	0.50	0.79
S11	5.0	5.0	-	67.10	67.30	67.80	67.20	66.90	5	67.26	0.34	0.50
S12	10.00	10.00	-	64.90	63.50	64.10	64.30	63.60	5	64.08	0.57	0.89
S13	2.5	-	2.5	57.80	58.10	58.60	58.70	58.20	5	58.28	0.37	0.64
S14	5.0	-	5.0	63.30	64.20	63.80	63.40	63.50	5	63.64	0.36	0.57
S15	10.0	-	10.0	60.40	61.10	60.80	60.40	59.70	5	60.48	0.53	0.87
S16	-	2.5	2.5	51.90	51.50	51.60	51.70	50.80	5	51.50	0.42	0.81
S17	-	5.0	5.0	54.00	53.80	54.60	54.40	54.10	5	54.18	0.32	0.59
S18	-	10.0	10.0	50.60	50.90	50.20	50.40	50.60	5	50.54	0.26	0.52
S19	2.5	1.5	1.0	60.20	59.80	60.40	59.90	60.10	5	60.08	0.24	0.40
S20	5.0	3.0	2.0	65.70	66.00	65.10	65.70	64.90	5	65.48	0.46	0.70
S21	10.0	6.0	4.0	57.30	56.60	56.50	56.90	57.10	5	56.88	0.33	0.59
S22	1.0	2.5	1.5	64.10	63.90	63.70	63.80	63.80	5	63.86	0.15	0.24
S23	2.0	5.0	3.0	68.70	69.10	68.60	68.20	68.90	5	68.70	0.34	0.49
S24	4.0	10.0	6.0	59.90	60.20	60.40	59.80	59.60	5	59.98	0.32	0.53
S25	1.5	1.0	2.5	53.70	53.40	53.10	53.20	52.90	5	53.26	0.30	0.57
S26	3.0	2.0	5.0	57.60	57.40	57.90	57.10	57.60	5	57.52	0.29	0.51
S27	6.0	4.0	10.0	51.40	50.90	51.30	51.60	50.70	5	51.18	0.37	0.72
No Filler	-	-	-	45.10	42.30	40.60	43.80	42.50	5	42.86	1.69	3.95

Table A.4 Izod impact strength of the R-PVCOPS containing several fillers

Sample No.	Filler contents (phr)			Izod impact strength (Kg/cm)					Data	X	SD	Variation (%)
	CaCO ₃	Talc	Kaolin	1 st	2 nd	3 rd	4 th	5 th				
S1	5.0	-	-	3.75	3.71	3.70	3.72	3.75	5	3.73	0.02	0.62
S2	10.0	-	-	4.06	4.07	4.10	4.08	4.07	5	4.08	0.02	0.37
S3	20.0	-	-	2.23	2.22	2.26	2.24	2.22	5	2.23	0.02	0.75
S4	-	5.0	-	3.51	3.55	3.54	3.59	3.52	5	3.54	0.03	0.88
S5	-	10.0	-	4.30	4.28	4.25	4.21	4.26	5	4.26	0.03	0.80
S6	-	20.0	-	2.93	2.95	2.91	2.90	2.93	5	2.92	0.02	0.67
S7	-	-	5.0	1.54	1.52	1.55	1.53	1.55	5	1.54	0.01	0.85
S8	-	-	10.0	2.63	2.60	2.58	2.63	2.62	5	2.61	0.02	0.83
S9	-	-	20.0	3.67	3.65	3.62	3.67	3.61	5	3.64	0.03	0.77
S10	2.5	2.5	-	4.11	4.12	4.09	4.07	4.10	5	4.10	0.02	0.47
S11	5.0	5.0	-	7.62	7.65	7.59	7.53	7.65	5	7.61	0.05	0.66
S12	10.00	10.00	-	2.85	2.83	2.86	2.84	2.81	5	2.84	0.02	0.68
S13	2.5	-	2.5	4.43	4.44	4.41	4.50	4.45	5	4.45	0.03	0.76
S14	5.0	-	5.0	7.50	7.48	7.53	7.49	7.46	5	7.49	0.03	0.35
S15	10.0	-	10.0	3.45	3.40	3.43	3.42	3.45	5	3.44	0.02	0.44
S16	-	2.5	2.5	1.87	1.88	1.85	1.89	1.86	5	1.87	0.02	0.85
S17	-	5.0	5.0	4.11	4.12	4.09	4.07	4.10	5	4.10	0.02	0.47
S18	-	10.0	10.0	1.53	1.55	1.52	1.54	1.52	5	1.53	0.01	0.85
S19	2.5	1.5	1.0	3.34	3.32	3.36	3.30	3.31	5	3.33	0.02	0.72
S20	5.0	3.0	2.0	5.36	5.34	5.30	5.39	5.32	5	5.34	0.03	0.65
S21	10.0	6.0	4.0	2.23	2.25	2.23	2.25	2.24	5	2.24	0.01	0.45
S22	1.0	2.5	1.5	3.83	3.84	3.80	3.81	3.82	5	3.82	0.02	0.41
S23	2.0	5.0	3.0	5.74	5.70	5.68	5.65	5.67	5	5.69	0.03	0.60
S24	4.0	10.0	6.0	1.96	1.94	1.95	1.95	1.97	5	1.95	0.01	0.58
S25	1.5	1.0	2.5	1.68	1.66	1.67	1.69	1.68	5	1.68	0.01	0.68
S26	3.0	2.0	5.0	2.78	2.76	2.75	2.73	2.77	5	2.76	0.02	0.70
S27	6.0	4.0	10.0	1.83	1.84	1.81	1.82	1.81	5	1.82	0.01	0.72
No Filler	-	-	-	1.66	1.61	1.63	1.68	1.62	5	1.64	0.03	1.78

Table A.5 % Shrinkage of the R-PVCOPS containing several fillers

Sample No.	Filler contents (phr)			% Shrinkage (Kg/cm ²)					Data	X	SD	Variation (%)
	CaCO ₃	Talc	Kaolin	1 st	2 nd	3 rd	4 th	5 th				
S1	5.0	-	-	0.90	0.86	0.89	0.87	0.91	5	0.89	0.02	1.71
S2	10.0	-	-	0.85	0.84	0.85	0.85	0.84	5	0.85	0.01	0.65
S3	20.0	-	-	0.80	0.79	0.80	0.79	0.80	5	0.80	0.01	0.69
S4	-	5.0	-	0.81	0.81	0.82	0.81	0.80	5	0.81	0.01	0.87
S5	-	10.0	-	0.77	0.76	0.76	0.76	0.77	5	0.76	0.01	0.72
S6	-	20.0	-	0.70	0.69	0.70	0.69	0.70	5	0.70	0.01	0.79
S7	-	-	5.0	1.00	0.99	1.01	1.00	0.99	5	1.00	0.01	0.84
S8	-	-	10.0	0.95	0.96	0.96	0.94	0.95	5	0.95	0.01	0.88
S9	-	-	20.0	0.90	0.91	0.90	0.90	0.91	5	0.90	0.01	0.61
S10	2.5	2.5	-	0.80	0.79	0.81	0.80	0.80	5	0.80	0.01	0.88
S11	5.0	5.0	-	0.80	0.79	0.80	0.79	0.80	5	0.80	0.01	0.69
S12	10.00	10.00	-	0.75	0.74	0.75	0.74	0.75	5	0.75	0.01	0.73
S13	2.5	-	2.5	0.79	0.80	0.81	0.80	0.80	5	0.80	0.01	0.88
S14	5.0	-	5.0	0.69	0.70	0.69	0.70	0.70	5	0.70	0.01	0.79
S15	10.0	-	10.0	0.65	0.66	0.65	0.66	0.65	5	0.65	0.01	0.84
S16	-	2.5	2.5	0.94	0.96	0.95	0.95	0.96	5	0.95	0.01	0.88
S17	-	5.0	5.0	0.90	0.89	0.89	0.90	0.90	5	0.90	0.01	0.61
S18	-	10.0	10.0	0.86	0.85	0.86	0.85	0.85	5	0.85	0.01	0.64
S19	2.5	1.5	1.0	0.80	0.79	0.80	0.79	0.80	5	0.80	0.01	0.69
S20	5.0	3.0	2.0	0.75	0.74	0.75	0.74	0.75	5	0.75	0.01	0.73
S21	10.0	6.0	4.0	0.70	0.71	0.71	0.70	0.70	5	0.70	0.01	0.78
S22	1.0	2.5	1.5	0.75	0.74	0.75	0.74	0.75	5	0.75	0.01	0.73
S23	2.0	5.0	3.0	0.75	0.74	0.74	0.75	0.75	5	0.75	0.01	0.73
S24	4.0	10.0	6.0	0.66	0.65	0.66	0.65	0.65	5	0.65	0.01	0.84
S25	1.5	1.0	2.5	1.25	1.24	1.22	1.23	1.24	5	1.24	0.01	0.92
S26	3.0	2.0	5.0	1.20	1.20	1.22	1.20	1.20	5	1.20	0.01	0.74
S27	6.0	4.0	10.0	1.01	1.00	1.01	0.99	1.01	5	1.00	0.01	0.89
No Filler	-	-	-	1.70	1.60	1.60	1.70	1.70	5	1.66	0.05	3.30

Table A.6 Heat deflection temperature of the R-PVCOPS containing several fillers

Sample No.	Filler contents (phr)			HDT (°C)					Data	X	SD	Variation (%)
	CaCO ₃	Talc	Kaolin	1 st	2 nd	3 rd	4 th	5 th				
S1	5.0	-	-	69.50	69.00	69.50	69.00	69.00	5	69.20	0.27	0.40
S2	10.0	-	-	69.00	69.50	69.50	69.50	69.50	5	69.40	0.22	0.32
S3	20.0	-	-	69.00	69.00	69.50	69.50	69.50	5	69.30	0.27	0.40
S4	-	5.0	-	71.50	71.50	71.00	71.00	71.50	5	71.30	0.27	0.38
S5	-	10.0	-	73.00	73.00	72.50	72.50	72.50	5	72.70	0.27	0.38
S6	-	20.0	-	72.00	72.00	72.00	72.50	72.00	5	72.10	0.22	0.31
S7	-	-	5.0	70.00	70.00	70.50	70.50	70.00	5	70.20	0.27	0.39
S8	-	-	10.0	68.50	69.00	68.50	68.50	68.50	5	68.60	0.22	0.33
S9	-	-	20.0	68.50	68.00	68.00	68.00	67.50	5	68.00	0.35	0.52
S10	2.5	2.5	-	72.00	72.50	72.00	71.50	72.00	5	72.00	0.35	0.49
S11	5.0	5.0	-	72.50	72.50	73.00	72.50	73.00	5	72.70	0.27	0.38
S12	10.00	10.00	-	72.50	73.00	72.00	72.50	72.50	5	72.50	0.35	0.49
S13	2.5	-	2.5	70.00	70.00	69.00	70.00	70.00	5	69.80	0.45	0.64
S14	5.0	-	5.0	70.50	70.50	71.00	71.00	70.00	5	70.60	0.42	0.59
S15	10.0	-	10.0	71.00	71.00	71.50	70.50	70.50	5	70.90	0.42	0.59
S16	-	2.5	2.5	69.50	69.50	70.00	70.00	69.50	5	69.70	0.27	0.39
S17	-	5.0	5.0	69.00	69.50	69.00	69.50	69.00	5	69.20	0.27	0.40
S18	-	10.0	10.0	68.50	68.50	68.00	68.00	68.00	5	68.20	0.27	0.40
S19	2.5	1.5	1.0	73.50	73.00	73.00	72.50	73.00	5	73.00	0.35	0.48
S20	5.0	3.0	2.0	73.50	73.50	74.00	74.50	74.00	5	73.90	0.42	0.57
S21	10.0	6.0	4.0	73.50	73.00	73.50	73.00	73.50	5	73.30	0.27	0.37
S22	1.0	2.5	1.5	72.00	71.50	72.00	71.50	72.50	5	71.90	0.42	0.58
S23	2.0	5.0	3.0	73.00	73.50	73.00	72.50	73.00	5	73.00	0.35	0.48
S24	4.0	10.0	6.0	72.00	72.00	71.50	72.00	71.50	5	71.80	0.27	0.38
S25	1.5	1.0	2.5	70.50	70.50	71.00	71.00	70.00	5	70.60	0.42	0.59
S26	3.0	2.0	5.0	69.50	69.50	70.00	69.50	70.00	5	69.70	0.27	0.39
S27	6.0	4.0	10.0	69.00	69.50	69.00	69.50	69.00	5	69.20	0.27	0.40
No Filler	-	-	-	68.00	68.50	69.00	68.00	68.50	5	68.40	0.42	0.61



APPENDIX B

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Table B.1 Technical data of PVC grade SG - 610

Item	Unit	Value	Test Method
K-value	-	61	DIN-53726
Corresponding Polymerization Degree	-	810	JIS-K 6721
Apparent Bulk Density	g/ml	0.53	ISO-1269
Volatile Matter	%	<0.3	
Sieve Analysis			
- Retained on 60 mesh	%	0	
- Retained on 270 mesh	%	>98	
Ash as Sulfates	%	<0.1	ISO-1270
Impurities and Foreign Matter	point	<5	ISO/R-1265

Table B.2 Specification of tin stabilizer grade JF-50R

Item	Specification
Composition	Butyltin containing sulfur complex
Appearance	Amber yellow oily liquid
Specific Gravity (25 °C)	1.09-1.50
Refractive Index (25 °C)	1.49-1.50

Table B.3 Specification of internal lubricant grade G-161

Item	Specification
Description	Oleochemical derivative
Appearance	Liquid
Acid value	5 max.
Iodine value	78-90
Specific gravity at 30 °C	0.920-0.930

Table B.4 Specification of processing aid grade PA-20

Item	Unit	Value
Appellant specific gravity	g/cc	0.5
Particle size	D50 (μm)	175
Transparency	T2 (%)	77.8
	Haze (%)	14.5
Color	b value	12.2
Fish eye	p/5000 cm^2	93

Table B.5 Specification of external lubricant grade G 70S

Description	Solid, high molecular weight, multi-functional fatty acid ester (complex ester)	
Appearance	Pale yellow color, practically odourless	
Item	Value	
Drop point	55 - 58 °C	
Acid value	0 - 15	
Saponification value	270 - 280	
Lavibond	1"	
Yellow	0 - 15	
Red	0 - 3	

Table B.6 Specification of impact modifier grade B-51

Description	Methyl methacrylate butadiene styrene copolymer		
Appearance	White powder		
Item	Unit	Value	Method
Volatile Matter	%	0.3 or less	105 °C x 60min
Apparent Specific Gravity	g/cc	0.37 - 0.47	JIS K6721
Particle Sie Distribution	%	1.0 or less	Wet Sieve Method
Foreign Material	pieces/20g	0 (>500µm) or less (<500µm)	Sedimentation Method

Table B.7 Specification of impact modifier grade ABS

Item	Unit	Method	Value
Rubber	%	-	50
Appearance	-	Visual Judgement	White powder
Bulk Density	g/cm ³	TPI's method	>0.34
Volatile Matter	%	105°C x 60 min	<0.50
Particle Size	%	Sieve method	<=45

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Table B.8 Specification of impact modifier gade Tyrin CPE

Item	Unit	Value
Bulk Density	g/cm ³	0.43
Melt Viscosity	poises/1000	26.5
Chlorine Content	%	36
Heat of Fusion	cal/gram	0.2
Residual Crystallinity	%	2
Volatiles	% max	0.2
Typical Screen Analysis	% Retained on 20 mesh	0
Tensile Strength	kg/cm ²	105.6
Ultimate Elongation	%	800
100% Modulus	kg/cm ²	10.8
Hardness	shore A	60
Specific Gravity	g/cm ³	1.2

Table B.9 Specification of Calcium Carbonate grade PR-89C**Typical Physical Properties**

Items	Unit	PR 89C
Specific Surface Area	cm ² /g	20,000 ± 500
Top Cut (d98%)	µm	13.0
Average Particle Size (d98%)	µm	1.40
Whiteness	%	94
True Specific Gravity	g/cm ³	2.6
DOP Absorption Value	cc/100g	18.5
Moisture	%	0.15

Typical Chemical Content

Chemical Analysis	Percentage (%)
Calcium Carbonate	98 min.
Silicon Dioxide	0.2 max.
Ferric Oxide	0.02 max.
Magnesium Oxide	0.16 max.
Aluminum Oxide	0.2 max.
HCl Non-Soluble in Hydrochloric Acid	0.2 max.
Ignition Loss	43 min
Drying Decrement	0.16
pH Value	8 ± 1

Table B.10 Specification of Talc grade Micro talc 1500

Physical Analysis	Value
Residue on a 325 mesh sieve	<0.1%
Specific surface area	9500 cm ² /g
Average particle size	12 μm
Apparent bulk density	0.20-0.26 g/cm ³
Specific gravity	2.8 g/cm ³
pH value	8 -10
Oil absorption	65-75 cm ³ /100g
Moisture	<0.7 %
Whiteness	>94 %

Table B.10 (Continue)

Chemical Analysis	Value
SiO ₂	61.00% min.
MgO	31.00% min.
CaO	0.80% max.
Fe ₂ O ₃	1.00% max.
Na ₂ O	0.06% max.
Al ₂ O ₃	0.50% max.
K ₂ O	0.01% max.
TiO ₂	0.01% max.
P ₂ O ₅	0.03% max.
MnO	0.01% max.
Cr ₂ O ₃	0.01% max.
LOI (Loss on Ignition)	0.72% (800°C)
Whiteness	94.30% uP
Acid Soluble	1.50% uP
Water Soluble	0.10%

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Table B.11 Specification of Kaolin grade Calcined Santintone 5HB

Items of Anlysis		Value
Product Designation		ASP 072
Physical Form		Highly Pulverized Powder
Special Modification		Dehydroxylated by controlled heat treatment
Average Particle Size (μm) (Equivalent Spherical Diameter)		14
Hegman Grind, Min		N/A
Oil	Rubout (D-281)**	85-95
Absorption	Gardner - Coleman	105-120
Residue, +325 Mesh (44 Micron) wet Screen, % Max		0.015
Brightness (G.E.)		92-94
pH		5-7
Refractive Index		1.62
Specific gravity		2.63
Free Moisture , % Max		0.5
Bulking value	lbs.per gal./ kgs. per liter	21.9 / 2.63
	gal. per lb./liter per kg	0.046 / 0.38
Bulk Dessity (lbs per ft. ³ / kgs. per m ³)	Loose	13 / 210
	Temed	18 / 290

VITA

Mr. Suwivat Keawwiriyauchai was born on October 26, 1972 in Nakornpathom. He graduated with a Bachelor Degree of Science (Industrial Chemistry) from Rajamangala Institute of Technology at Bangkok Technical Campus in 1996. He worked in the Production Control, Thai Petrochemical Industry (Public) Co., Ltd. in 1996-1997. He has been Production Deputy Section Manager at Apex Plastics Co., Ltd. since 1997. In 1998, he was accepted as a graduate student in the Program of Petrochemistry and Polymer Science, Faculty of Science, Chulalongkorn University. He received his Master's degree of Science in Polymer Science, in 2002.



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