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APPENDICES

A. Preparation of Chitin

The conditions of production of chitin from various kinds of crustacean shell are summarized in Table A.1.

Table A.1 Production conditions of chitin from various sources.

Raw material	Demineralization		Deproteinization		Reference
	Condition	S:L*	Condition	S:L*	
shell of crab, prawn and lobster	a) Immersing in 2 *N* HCl for 2 days at room temperature b) Immersing in 0.1 *M* EDTA solution at pH 7.5 for 6 days at room temperature	20:1 10:1	a) Boiling in 1*N* NaOH for 36 hours b) Cultivation in *P. maltophilia* for 1-4 hours	20:1 8:1	Shimahara and Takigushi, 1988
Shrimp shell	Stirring in 4 *M* HCl for 1 hour at room temperature	100:1	Stirring in 2 *M* NaOH for 2 hours at 55°C	100:1	Waiprib, 1991
Squid pen	Immersing in 1 *M* HCl overnight at room temperature	100:1	Immersing in 2 *M* NaOH overnight at room temperature and then boiling in 2 *M* NaOH for 4 hours at 100°C	100:1	Kurita *et al.*, 1993
Crab shell	Immersing in 5% HCl for 90 minutes at room temperature	100:1	Boiling in 3% NaOH for 100 minutes at 100°C	100:1	Kim and Song, 1997

* Ratio of dried shell:liquid (g:l)

B. Physical Properties of Thai-zex 7000F.

Melt flow rate (190°C, 2.16 kg)	0.04 g/10 min
Density	0.956 g/cm^3
Tensile stength at yield	280 kg/cm^2
Tensile stength at break	390 kg/cm^2
Elongation at break	> 500%
Izod impact strength (with notch)	30 kg.cm/cm^2
Melting point	131°C

C1. Data for tensile yield strength of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Tensile yield strength (MPa)				
	x1	x2	x3	x4	x5
0	25.49	25.44	25.87	25.41	25.64
5	25.20	24.90	25.74	25.07	24.37
10	25.19	24.16	24.38	24.53	24.71
20	22.09	21.86	21.14	21.33	21.59
30	20.39	21.31	19.97	20.46	20.72

Starch content (%)	Tensile yield strength (MPa)				
	x1	x2	x3	x4	x5
0	25.49	25.44	25.87	25.41	25.64
5	24.46	24.91	24.40	23.66	24.89
10	23.68	23.73	23.59	23.62	23.53
20	20.27	21.28	21.60	21.05	21.05
30	19.62	19.32	19.36	19.62	20.21

C2. Data for percent strain at yield of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Strain at yield (%)				
	x1	x2	x3	x4	x5
0	9.32	9.37	9.28	9.36	9.13
5	8.23	7.92	8.20	8.04	8.00
10	8.05	7.26	7.20	8.48	7.05
20	6.05	5.10	5.26	5.80	6.78
30	4.79	5.44	4.83	4.67	5.71

Starch content (%)	Strain at yield (%)				
	x1	x2	x3	x4	x5
0	9.32	9.37	9.28	9.36	9.13
5	8.23	8.32	8.38	8.60	8.58
10	8.90	8.26	7.61	7.57	8.40
20	7.40	7.65	7.60	7.32	9.32
30	5.77	6.66	6.28	5.91	6.43

C3. Data for tensile moduli of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Tensile modulus (MPa)				
	x1	x2	x3	x4	x5
0	1034	1099	1039	1061	1148
5	1296	1256	1102	1224	1454
10	1274	1419	1194	1016	1589
20	1457	1710	1627	1282	1095
30	1260	1397	1510	1685	1462

Starch content (%)	Tensile modulus (MPa)				
	x1	x2	x3	x4	x5
0	1034	1099	1039	1061	1148
5	1129	1281	1145	1233	1277
10	1542	1168	1228	1167	1157
20	1243	1417	1403	1217	1250
30	1535	1309	1336	1461	1281

C4. Data for flexural yield strength of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Flexural yield strength (MPa)				
	x1	x2	x3	x4	x5
0	30.11	30.20	31.43	31.56	30.28
5	30.19	29.06	28.74	30.79	29.01
10	27.23	29.36	29.83	29.73	29.56
20	29.28	29.03	29.05	28.40	29.03
30	28.05	29.06	29.06	28.02	29.46

Starch content (%)	Flexural yield strength (MPa)				
	x1	x2	x3	x4	x5
0	30.11	30.20	31.43	31.56	30.28
5	28.26	29.13	29.22	29.30	29.32
10	28.06	29.18	28.19	29.23	29.14
20	28.65	28.99	27.56	28.79	28.56
30	29.31	27.49	28.49	28.70	27.43

C5. Data for flexural moduli of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Flexural modulus (MPa)				
	x1	x2	x3	x4	x5
0	1156	1045	1088	1071	1076
5	1208	1117	1154	1288	1114
10	1411	1398	1403	1202	1432
20	1562	1448	1517	1320	1376
30	1544	1419	1589	1592	1416

Starch content (%)	Flexural modulus (MPa)				
	x1	x2	x3	x4	x5
0	1156	1045	1088	1071	1076
5	1115	1096	1075	1154	1122
10	1062	1253	1081	1151	1081
20	1330	1318	1311	1151	1177
30	1434	1341	1503	1710	1342

C6. Data for impact resistance of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Impact resistance (kJ/m^2)				
	x1	x2	x3	x4	x5
0	19.2	20.1	19.7	20.3	19.9
5	10.4	10.5	11.7	11.8	12.9
10	10.1	11.3	11.1	9.8	9.9
20	8.8	8.6	9.4	8.5	8.7
30	8.5	7.6	8.3	7.7	8.2

Starch content (%)	Impact resistance (kJ/m^2)				
	x1	x2	x3	x4	x5
0	19.2	20.1	19.7	20.3	19.9
5	11.1	10.3	12.6	13.5	12.4
10	10.2	10.0	11.6	11.0	11.7
20	9.0	9.7	12.9	10.2	10.3
30	8.4	8.7	10.3	7.6	8.8

C7. Data for hardness of chitin-filled and rice starch-filled HDPE blends

Chitin content (%)	Hardness (Shore D)				
	x1	x2	x3	x4	x5
0	68	69	68	68	68
5	70	70	68	68	68
10	68	68	70	68	70
20	70	69	68	70	69
30	69	68	69	67	68

Starch content (%)	Hardness (Shore D)				
	x1	x2	x3	x4	x5
0	68	69	68	68	68
5	65	67	67	66	65
10	65	66	68	67	66
20	66	68	65	65	67
30	64	65	64	67	65

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