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APPENDICES

Appendix I

Calibration curve of propranolol hydrochloride
Efflux time of deionized water and chitosan solutions
Method of calculation the molecular weight of chitosan

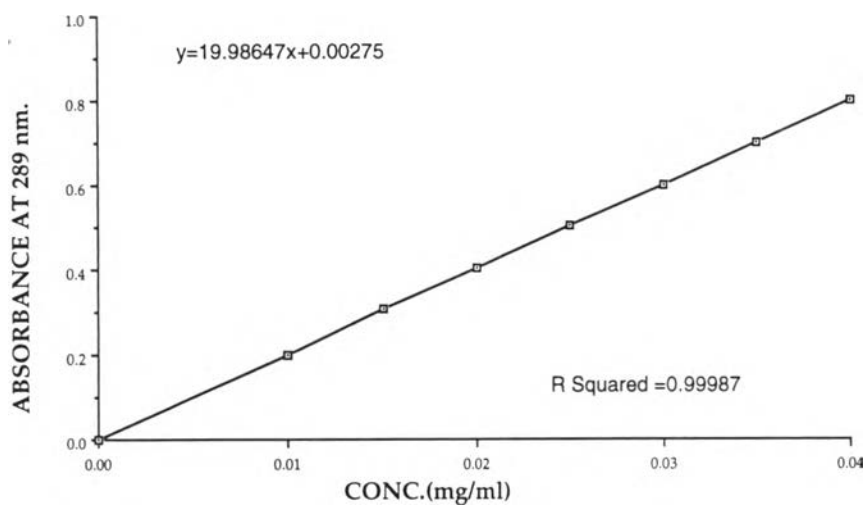


Figure 80 Calibration curve of propranolol hydrochloride in dilute HCl(1:100) solution at 289 nm.

CONC. (MG/ML)	ABSORBANCE AT 289 NM.			AVG	SD
	A	B	C		
0.0000	0.000	0.000	0.000	0.000	0.000
0.0100	0.201	0.201	0.200	0.201	0.001
0.0150	0.305	0.308	0.309	0.307	0.002
0.0200	0.400	0.403	0.409	0.404	0.005
0.0250	0.510	0.507	0.502	0.506	0.004
0.0300	0.599	0.604	0.595	0.599	0.005
0.0350	0.707	0.704	0.690	0.700	0.009
0.0400	0.807	0.795	0.803	0.802	0.006

Table 22 Calibration data of propranolol HCl in dilute (1:100) solution at 289 nm.

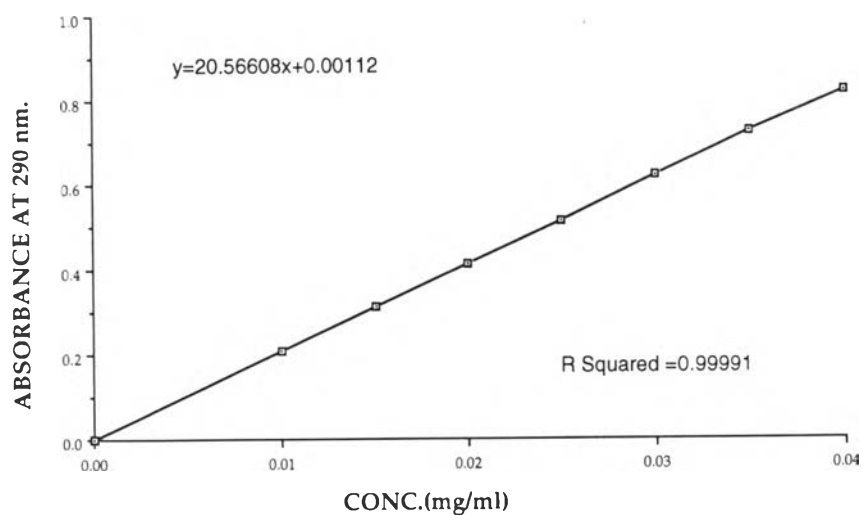


Figure81 Calibration curve of propranolol hydrochloride in absolute methanol at 290 nm.

CONC. (MG/ML)	ABSORBANCE AT 290NM.			AVG	SD
	A	B	C		
0.0000	0.000	0.000	0.000	0.000	0.000
0.0100	0.212	0.205	0.207	0.208	0.004
0.0150	0.311	0.310	0.311	0.311	0.001
0.0200	0.415	0.411	0.406	0.411	0.005
0.0250	0.515	0.517	0.509	0.514	0.004
0.0300	0.628	0.616	0.616	0.620	0.007
0.0350	0.726	0.723	0.727	0.725	0.002
0.0400	0.823	0.819	0.817	0.820	0.003

Table 23 Calibration data of propranolol HCl in absolute methanol at 290 nm.

Table 24 The data of efflux time and density of deionized water and chitosan solutions.

DEIONIZED WATER				
SAMPLE	WEIGHT(g)	VOLUME(cm^3)	DENSITY(g/cm^3)	TIME(sec.)
1	9.9941	10	0.9994	58.20
2	9.9456	10	0.9946	58.82
3	9.6367	9	0.9637	58.05
AVG(SD)			0.9859(0.0194)	58.36(0.41)
CHITOSAN L				
CHITOSAN L (0.05g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm^3)	DENSITY(g/cm^3)	TIME(sec.)
1	10.1124	10	1.0112	79.20
2	10.0464	10	1.0041	79.70
3	9.7205	9	1.0801	79.88
AVG(SD)			1.0320(0.0418)	79.59(0.35)
CHITOSAN L (0.075g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm^3)	DENSITY(g/cm^3)	TIME(sec.)
1	9.7590	9	1.0843	90.31
2	10.0542	10	1.0054	90.62
3	10.1020	10	1.0102	91.32
AVG(SD)			1.0333(0.0442)	90.75(0.52)
CHITOSAN L (0.100g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm^3)	DENSITY(g/cm^3)	TIME(sec.)
1	10.1032	10	1.0103	96.62
2	10.0560	10	1.0056	96.67
3	9.7249	9	1.0805	96.06
AVG(SD)			1.0321(0.0420)	96.45(0.34)

Table 24 The data of efflux time and density of deionized water and chitosan solutions(cont.).

CHITOSAN L (0.250g/100ml.)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	10.1073	10	1.0107	177.99
2	10.0657	10	1.0066	175.08
3	9.7377	9	1.0820	177.20
AVG(SD)			1.0331(0.0424)	176.76(1.50)
CHITOSAN L (0.500g/100ml.)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	10.1230	10	1.0123	400.98
2	10.0693	10	1.0069	401.80
3	9.7456	9	1.0828	398.50
AVG(SD)			1.034(0.0423)	400.43(1.72)
CHITOSAN M				
CHITOSAN M (0.05g/100ml.)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7248	9	1.0805	84.34
2	10.0462	10	1.0046	82.92
3	10.0369	10	1.0097	80.80
AVG(SD)			1.0316(0.0474)	82.69(1.78)
CHITOSAN M (0.075g/100ml.)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7397	9	1.0822	91.20
2	10.0472	10	1.0047	89.30
3	10.0937	10	1.0094	91.56
AVG(SD)			1.0321(0.0435)	90.69(1.21)

Table 24 The data of efflux time and density of deionized water and chitosan solutions(cont.).

CHITOSAN M (0.100g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7373	9	1.0819	104.97
2	10.0428	10	1.0043	100.58
3	10.0898	10	1.0090	103.62
AVG(SD)			1.0317(0.0435)	103.06(2.25)
CHITOSAN M (0.250g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7291	9	1.0810	189.72
2	10.0526	10	1.0053	195.48
3	10.1002	10	1.0100	190.04
AVG(SD)			1.0321(0.0424)	191.75(3.24)
CHITOSAN M (0.500g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7371	9	1.0819	700.58
2	10.0534	10	1.0053	697.20
3	10.1049	10	1.0105	675.42
AVG(SD)			1.0326(0.0428)	691.07(13.66)
CHITOSAN H				
CHITOSAN H (0.05g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7356	9	1.0817	88.72
2	10.0470	10	1.0047	88.82
3	10.0896	10	1.0090	88.26
AVG(SD)			1.0318(0.0433)	88.61(0.310)

Table 24 The data of efflux time and density of deionized water and chitosan solutions(cont.).

CHITOSAN H (0.075g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7265	9	1.0807	108.06
2	10.0559	10	1.0056	110.41
3	10.0997	10	1.0100	111.26
AVG(SD)			1.0321(0.0421)	109.91(1.66)
CHITOSAN H (0.100g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7339	9	1.0815	142.80
2	10.0559	10	1.0056	143.02
3	10.1052	10	1.0105	141.52
AVG(SD)			1.0325(0.0425)	142.45(0.81)
CHITOSAN H (0.250g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7451	9	1.0828	324.50
2	10.0699	10	1.0070	331.68
3	10.1256	10	1.0341	331.00
AVG(SD)			1.0341(0.0422)	329.06(3.96)
CHITOSAN H (0.500g/100ml)				
SAMPLE	WEIGHT(g)	VOLUME(cm ³)	DENSITY(g/ cm ³)	TIME(sec.)
1	9.7558	9	1.0840	1150.70
2	10.0634	10	1.0063	1150.80
3	10.1311	10	1.0131	1141.05
AVG(SD)			1.0345(0.0430)	1147.05(5.60)

Method of calculation the molecular weight of chitosan

Intrinsic viscosity $[\eta]$ of chitosan L, M and H was 6.83, 7.16 and 9.70 respectively obtained from the y-intercepts of the plots between $\ln \eta_{rel} / \text{conc}$ and conc (Figure 10).

$$\begin{aligned} \text{From Mark-Houwink equation } [\eta] &= K M_v^a \\ ,K &= 1.8 \times 10^{-3} \text{ cm}^3/\text{g} \\ ,a &= 0.93 \end{aligned}$$

The molecular weight of chitosan L

$$\begin{aligned} &= ((6.83 \times 10^2 \text{ cm}^3/\text{g}) / (1.8 \times 10^{-3} \text{ cm}^3/\text{g}))^{1/0.93} \\ &= 994,453.12 \end{aligned}$$

The molecular weight of chitosan M

$$= 1,046,197.21$$

The molecular weight of chitosan H

$$= 1,449,978.86$$

Appendix II
Some physical properties and dissolution data of core and coated
tablets

Table 25 The weight variation of core and coated tablets

	FORMULA						
	CORE	CORE R	CORE S	LO	LO R	LOS	MO
WEIGHT (mg)	251.4	249.6	247.9	254.8	253.3	249.3	251.4
	251.2	256.8	251.0	250.3	253.2	259.7	261.5
	251.0	251.7	253.4	251.3	258.5	251.3	258.2
	249.1	251.9	252.3	257.2	250.6	251.4	260.3
	249.7	251.3	251.3	256.2	250.4	253.1	253.9
	248.6	246.7	249.0	253.8	252.8	253.6	248.3
	245.6	256.3	256.3	248.4	251.2	256.9	255.0
	246.3	247.0	251.0	252.0	254.0	256.9	255.9
	252.6	243.7	248.3	252.3	253.2	253.5	254.6
	246.6	251.7	254.5	258.6	250.6	254.8	251.5
	248.2	254.2	254.5	257.2	258.2	253.1	259.9
	251.4	246.7	252.4	254.1	254.7	259.2	252.6
	254.3	246.4	246.6	252.1	249.1	257.1	260.0
	256.8	251.8	250.1	250.8	250.8	258.6	256.4
	253.0	255.5	253.5	255.8	254.4	253.1	251.1
	246.1	243.8	254.1	258.1	251.6	255.6	248.3
	260.5	248.5	253.6	253.3	254.6	255.4	253.8
	249.9	253.0	249.9	260.8	250.3	251.8	242.9
	244.7	243.3	247.7	252.2	253.0	252.0	254.1
	262.9	249.9	251.5	256.9	256.8	259.0	253.2
AVG	251.00	249.99	251.45	254.31	253.07	255.27	254.15
SD	4.80	4.14	2.66	3.22	2.63	3.32	4.63

	FORMULA						
	MOR	MOS	HO	HOR	HOS	LAIO	LAIOR
WEIGHT (mg)	250.6	255.2	254.5	255.4	251.7	257.5	255.7
	259.7	255.1	252.1	250.3	252.6	252.3	250.8
	246.7	256.2	254.2	248.2	255.9	256.1	257.3
	249.5	252.2	255.8	258.2	255.2	255.3	253.5
	259.6	251.1	256.7	253.3	257.9	248.9	258.1
	250.4	252.6	252.2	256.5	256.7	254.9	249.0
	251.3	252.0	243.3	250.4	257.0	257.6	247.5
	251.9	254.3	251.1	254.6	257.4	253.1	257.7
	255.2	251.8	256.4	254.1	252.8	249.9	256.1
	251.0	248.8	257.4	256.8	251.7	251.2	253.4
	258.0	251.3	257.3	257.7	256.1	253.1	255.9
	253.6	257.0	255.0	249.6	254.2	257.7	258.9
	256.2	256.6	256.1	250.7	250.8	248.4	246.8
	248.4	257.9	249.3	250.0	250.4	257.7	252.8
	251.9	251.5	252.9	252.5	257.2	256.9	256.5
	255.7	255.8	249.9	252.2	255.7	250.0	244.9
	245.4	249.3	252.9	258.3	249.4	257.2	250.6
	259.5	244.2	250.6	255.6	243.7	254.6	253.7
	252.9	250.4	255.7	249.5	253.7	253.9	254.1
	249.2	253.9	257.4	249.2	258.6	257.2	252.4
AVG	252.84	255.36	254.04	253.66	254.44	254.18	253.29
SD	4.26	4.73	3.79	3.67	3.98	3.17	3.98

Table 25 The weight variation of core and coated tablets(cont.).

	FORMULA						
	LA10S	CORE	LA20	LA30	LB10	LB20	LB30
WEIGHT (mg)	258.9	253.8	258.3	248.1	255.1	252.0	261.4
	258.0	254.7	258.1	256.2	256.8	260.4	249.0
	257.6	252.8	254.6	261.1	249.8	257.1	254.7
	256.8	248.7	260.5	259.4	253.2	249.0	255.1
	250.5	250.3	255.8	247.8	256.1	259.0	258.9
	254.4	246.7	251.5	256.7	253.4	252.3	262.2
	250.6	243.7	254.4	255.2	253.9	254.1	251.4
	254.1	253.9	252.4	256.1	260.8	256.2	255.2
	257.1	249.7	259.9	255.2	254.2	260.4	253.5
	253.5	250.4	258.7	243.9	259.7	248.2	258.9
	255.7	249.0	257.8	250.6	258.2	253.8	254.2
	256.1	259.2	256.5	255.8	246.9	257.2	257.4
	258.9	252.5	246.3	251.0	260.4	256.0	253.9
	250.5	249.4	251.2	256.7	254.8	256.9	259.5
	252.3	251.6	248.7	254.4	246.2	243.6	254.9
	257.6	240.0	249.0	251.8	259.2	257.2	247.1
	249.0	251.6	259.8	256.8	256.0	242.7	258.2
	258.3	251.6	257.7	250.7	250.6	256.1	249.3
	254.6	251.8	251.6	257.4	252.2	258.8	252.5
	250.0	247.0	255.6	256.9	253.1	248.8	245.8
AVG	254.73	250.42	254.92	254.09	254.53	253.99	254.66
SD	3.27	4.11	4.15	4.29	4.12	5.18	4.57

	FORMULA						
	LC10	LC20	LC30	CORE	MA10	MA20	CORE
WEIGHT (mg)	258.9	248.9	254.6	257.3	246.4	254.9	248.4
	258.5	259.2	246.9	246.0	258.9	259.8	257.5
	246.3	255.9	258.1	250.8	252.4	251.9	251.5
	251.9	251.6	247.3	248.7	262.8	257.7	249.8
	253.8	249.9	254.4	246.8	262.7	254.4	250.3
	254.2	242.6	255.7	253.3	256.6	262.0	248.4
	258.4	253.6	251.6	258.5	256.4	257.3	246.3
	262.7	252.9	251.7	260.2	250.7	254.9	258.4
	260.1	250.4	256.3	258.4	247.6	246.9	248.1
	249.9	258.3	251.2	254.1	249.4	257.8	249.8
	255.4	258.3	252.8	256.8	259.2	253.3	242.6
	253.3	253.4	255.7	253.6	254.4	255.8	261.6
	249.1	252.9	257.3	242.1	261.6	259.6	261.3
	251.9	258.3	252.9	251.3	262.5	249.4	248.8
	251.5	250.9	252.8	249.8	254.2	253.9	260.5
	252.5	249.3	255.7	246.7	249.3	259.3	247.8
	254.2	260.7	249.8	247.7	255.7	255.1	251.3
	264.8	249.2	252.9	251.9	250.8	256.4	243.4
	255.6	253.6	260.4	250.6	251.0	261.8	249.2
	250.7	255.9	255.7	247.2	257.1	249.6	253.3
AVG	254.69	253.29	253.69	251.59	254.99	255.59	251.42
SD	4.69	4.44	3.41	4.91	5.20	4.07	5.63

Table 25 The weight variation of core and coated tablets(cont.).

	FORMULA						
	MAS0	MB10	MB20	MB30	CORE	MC10	MC20
WEIGHT	260.7	262.4	260.3	262.6	249.3	265.7	249.5
(mg)	248.9	266.9	261.2	248.5	267.2	264.1	262.0
	263.0	260.6	263.3	261.3	246.3	246.6	264.6
	260.6	262.4	261.7	248.9	267.2	267.6	249.6
	265.1	242.9	269.6	267.6	263.6	247.7	265.7
	262.4	261.6	249.0	260.6	246.6	260.6	260.6
	265.4	261.1	261.4	260.4	249.8	267.1	261.2
	268.2	262.7	260.9	266.6	261.1	247.2	264.6
	260.4	263.8	246.1	268.1	263.9	249.9	262.8
	263.7	260.6	264.0	260.1	244.4	264.3	266.6
	262.3	269.4	266.4	267.3	260.1	266.1	264.7
	249.9	261.6	266.1	262.8	240.0	260.6	262.6
	249.0	260.9	261.0	246.7	241.7	260.4	249.3
	266.6	263.4	266.2	260.7	246.7	268.4	266.9
	260.2	268.8	263.2	246.6	262.0	266.4	266.8
	268.4	263.6	266.6	266.9	264.2	263.6	262.8
	266.6	268.7	260.6	266.7	247.6	261.7	266.0
	266.7	248.6	268.8	247.6	242.2	263.0	260.8
	264.3	249.7	261.70	267.4	263.7	264.3	249.8
	261.6	269.6	262.80	260.3	249.8	269.1	247.4
AVG	266.69	264.96	264.89	264.68	249.32	263.12	263.11
SD	3.98	6.33	4.36	6.31	4.97	3.88	3.27

	FORMULA						
	CORE	MC30	HC10	HC20	CORE	HA10	HA20
WEIGHT	249.2	261.0	266.8	263.9	260.1	269.9	267.0
(mg)	248.2	266.7	248.7	263.0	262.1	261.6	268.0
	248.0	268.8	260.8	266.3	248.2	268.4	264.6
	263.4	261.4	260.8	262.2	261.4	264.8	262.9
	246.2	268.0	266.8	266.7	262.1	261.2	260.6
	264.7	249.9	260.8	261.3	260.3	266.3	266.4
	267.9	260.9	266.8	268.6	264.4	266.6	249.7
	263.9	264.1	267.0	262.2	247.1	261.2	264.1
	267.2	269.7	268.6	266.0	249.3	264.6	266.2
	249.0	264.6	249.0	268.4	247.4	267.6	266.2
	263.4	260.6	266.0	260.6	261.4	261.9	267.7
	264.2	266.3	263.9	260.4	248.8	263.6	249.4
	264.7	261.8	262.8	266.2	247.6	260.1	269.2
	247.7	264.0	247.1	260.6	261.2	267.1	248.0
	246.9	261.7	268.8	266.8	264.7	262.4	264.7
	264.4	260.4	261.4	243.3	260.0	266.7	260.1
	246.3	266.8	266.4	268.7	263.8	260.2	263.2
	269.3	264.4	263.1	266.4	263.8	266.9	266.8
	246.4	264.6	246.6	267.2	260.9	261.7	262.2
	246.6	266.8	246.4	268.3	263.8	261.1	266.0
AVG	261.28	266.41	264.73	266.70	260.92	264.69	264.66
SD	4.47	3.66	6.37	4.27	2.40	3.17	3.39

Table 25 The weight variation of core and coated tablets(cont.).

	FORMULA						
	HA90	HC90	CORE	HB10	CORE	HB20	HB90
WEIGHT (mg)	252.7	254.4	251.0	260.4	251.5	254.7	252.8
	253.7	253.8	253.9	258.3	249.5	253.6	256.0
	252.5	255.3	250.4	250.5	248.3	256.0	254.3
	256.5	251.3	250.9	256.1	257.2	253.6	256.1
	252.3	249.6	247.0	255.4	248.9	253.4	255.9
	256.6	256.6	252.5	250.9	251.2	257.1	257.9
	261.0	257.2	251.6	256.8	251.9	258.1	252.4
	252.3	258.4	246.9	254.3	250.6	257.2	249.7
	258.2	256.6	250.6	254.1	244.0	256.0	253.3
	260.1	258.6	247.5	253.7	249.5	259.6	256.9
	255.1	255.9	248.6	255.5	249.6	251.1	252.9
	255.1	254.1	249.1	250.4	253.3	253.3	255.9
	253.7	259.9	248.9	260.9	253.8	253.6	255.5
	253.5	257.1	247.4	255.0	249.7	255.5	253.4
	250.6	253.3	248.4	256.1	246.7	254.8	258.6
	257.6	253.4	255.2	255.5	256.3	254.4	247.0
	253.5	252.4	257.3	253.8	254.9	252.7	251.2
	255.4	252.0	252.5	254.9	247.1	254.1	254.5
	250.9	253.8	252.6	249.6	252.6	254.7	260.0
	253.6	249.6	253.1	253.4	252.8	257.1	256.9
AVG	254.75	254.67	250.77	254.83	250.92	255.03	254.56
SD	2.85	2.89	2.86	3.05	3.36	2.05	3.10

	FORMULA							
	CORE	LHG	LHGR	LHGS	LHA10	CORE	LHA20	LHA90
WEIGHT (mg)	246.5	258.7	255.8	258.4	249.0	249.7	257.8	248.7
	255.3	248.8	250.8	258.0	252.3	252.6	258.3	255.3
	247.3	256.0	254.7	248.9	255.6	251.9	253.3	255.6
	242.0	260.3	257.2	261.3	261.6	247.9	254.9	255.4
	255.0	251.5	255.8	257.1	259.0	248.5	253.3	251.0
	257.9	243.7	257.7	248.2	259.9	250.4	247.3	249.3
	251.0	259.4	248.8	257.0	252.0	252.7	258.2	254.2
	244.0	252.1	251.9	248.8	259.1	251.3	258.6	252.7
	251.1	256.9	253.3	256.6	259.1	247.2	248.9	250.9
	254.8	256.2	256.9	255.0	251.2	254.5	253.9	261.8
	245.8	253.1	252.3	253.0	249.6	251.6	251.7	255.9
	247.7	253.9	249.1	255.2	251.3	252.3	251.1	250.7
	246.5	259.3	259.0	256.2	251.1	253.2	253.7	250.6
	257.1	247.5	257.1	259.4	255.6	247.9	257.9	258.7
	253.0	259.4	247.8	257.0	261.1	249.5	253.9	252.5
	247.7	256.6	253.9	254.4	247.3	249.1	249.9	250.5
	253.0	250.3	258.0	255.5	252.2	246.5	248.0	252.9
	253.3	254.1	257.7	257.2	254.5	248.9	253.1	254.5
	248.1	251.6	250.6	259.2	252.5	250.7	252.3	257.8
	253.9	257.9	255.0	259.7	257.0	246.9	255.2	252.8
AVG	250.55	254.37	254.17	255.81	254.55	250.12	253.57	253.59
SD	4.55	4.53	3.43	3.66	4.31	2.40	3.46	3.36

Table 26 The thickness of core and coated tablets.

	FORMULA						
	CORE	CORE R	CORE S	L0	L0 R	L0 S	M0
THICKNESS (mcm)	4.369	4.562	4.419	4.534	4.518	4.523	4.470
	4.391	4.483	4.538	4.482	4.538	4.492	4.527
	4.459	4.414	4.454	4.500	4.463	4.561	4.536
	4.489	4.393	4.483	4.551	4.537	4.546	4.541
	4.568	4.424	4.498	4.482	4.511	4.533	4.541
	4.500	4.518	4.438	4.491	4.500	4.549	4.492
	4.527	4.458	4.438	4.557	4.510	4.512	4.503
	4.422	4.469	4.497	4.542	4.545	4.492	4.517
	4.434	4.404	4.428	4.473	4.463	4.494	4.473
	4.453	4.449	4.536	4.533	4.473	4.491	4.473
AVERAGE	4.460	4.457	4.473	4.515	4.506	4.520	4.507
SD	0.063	0.053	0.044	0.032	0.031	0.027	0.029

	FORMULA						
	M0 R	M0 S	H0	H0 R	H0 S	LA10	LA10 R
THICKNESS (mcm)	4.541	4.578	4.350	4.533	4.482	4.575	4.568
	4.495	4.547	4.472	4.607	4.578	4.558	4.602
	4.531	4.423	4.489	4.582	4.515	4.562	4.558
	4.530	4.482	4.612	4.439	4.462	4.572	4.627
	4.519	4.480	4.542	4.537	4.530	4.501	4.610
	4.475	4.562	4.555	4.413	4.608	4.522	4.486
	4.489	4.607	4.556	4.625	4.618	4.566	4.497
	4.506	4.589	4.544	4.586	4.638	4.405	4.588
	4.478	4.421	4.554	4.614	4.572	4.572	4.497
	4.468	4.470	4.548	4.488	4.522	4.511	4.515
AVERAGE	4.503	4.516	4.522	4.542	4.553	4.534	4.555
SD	0.026	0.069	0.072	0.075	0.059	0.053	0.052

Table 26 The thickness of core and coated tablets(cont.).

	FORMULA						
	LA10 S	LA20	LA30	LB10	LB20	LB30	LC10
THICKNESS	4.580	4.469	4.468	4.482	4.436	4.493	4.524
(mcm)	4.469	4.381	4.617	4.445	4.532	4.519	4.602
	4.642	4.635	4.675	4.500	4.611	4.521	4.528
	4.635	4.463	4.456	4.433	4.468	4.545	4.563
	4.632	4.439	4.533	4.574	4.483	4.497	4.642
	4.648	4.596	4.487	4.548	4.632	4.486	4.522
	4.558	4.639	4.464	4.690	4.550	4.597	4.538
	4.574	4.535	4.588	4.471	4.500	4.477	4.403
	4.594	4.474	4.462	4.503	4.507	4.512	4.507
	4.608	4.506	4.432	4.563	4.457	4.493	4.409
AVERAGE	4.594	4.514	4.517	4.521	4.518	4.514	4.524
SD	0.054	0.086	0.083	0.076	0.065	0.035	0.074

	FORMULA						
	LC20	LC30	CORE	MA10	MA20	CORE	MA30
THICKNESS	4.458	4.559	4.603	4.617	4.600	4.419	4.555
(mcm)	4.564	4.545	4.584	4.653	4.578	4.575	4.564
	4.589	4.518	4.613	4.638	4.575	4.444	4.554
	4.430	4.413	4.469	4.629	4.642	4.439	4.532
	4.565	4.437	4.578	4.572	4.612	4.583	4.503
	4.488	4.554	4.538	4.613	4.588	4.509	4.608
	4.589	4.506	4.655	4.625	4.578	4.520	4.518
	4.600	4.511	4.563	4.595	4.625	4.447	4.533
	4.516	4.604	4.475	4.558	4.678	4.535	4.607
	4.568	4.545	4.537	4.619	4.557	4.532	4.557
AVERAGE	4.537	4.519	4.562	4.612	4.603	4.500	4.553
SD	0.060	0.057	0.059	0.029	0.037	0.059	0.034

Table 26 The thickness of core and coated tablets(cont.).

	FORMULA						
	MB10	MB20	MB30	CORE	MC10	MC20	CORE
THICKNESS	4.543	4.493	4.568	4.330	4.545	4.499	4.484
(mcm)	4.450	4.602	4.552	4.558	4.462	4.462	4.442
	4.522	4.601	4.415	4.448	4.488	4.512	4.498
	4.498	4.632	4.675	4.437	4.529	4.487	4.548
	4.521	4.675	4.488	4.427	4.533	4.495	4.504
	4.604	4.490	4.563	4.498	4.538	4.542	4.518
	4.534	4.582	4.495	4.508	4.557	4.564	4.510
	4.595	4.533	4.596	4.394	4.489	4.448	4.447
	4.562	4.607	4.596	4.502	4.486	4.463	4.482
	4.608	4.502	4.602	4.489	4.577	4.538	4.477
AVERAGE	4.544	4.572	4.555	4.459	4.520	4.501	4.491
SD	0.050	0.064	0.073	0.066	0.037	0.038	0.032

	FORMULA						
	MC30	HC10	HC20	CORE	HA10	HA20	HA30
THICKNESS	4.488	4.519	4.515	4.447	4.559	4.472	4.462
(mcm)	4.631	4.491	4.527	4.489	4.560	4.520	4.578
	4.539	4.513	4.434	4.518	4.512	4.628	4.506
	4.486	4.539	4.468	4.434	4.572	4.442	4.567
	4.643	4.533	4.618	4.413	4.483	4.475	4.512
	4.521	4.553	4.523	4.448	4.529	4.528	4.512
	4.566	4.517	4.573	4.462	4.619	4.475	4.579
	4.548	4.598	4.549	4.479	4.468	4.458	4.455
	4.575	4.437	4.621	4.460	4.468	4.532	4.474
	4.423	4.585	4.385	4.548	4.435	4.545	4.448
AVERAGE	4.542	4.529	4.521	4.470	4.521	4.508	4.509
SD	0.067	0.046	0.076	0.040	0.058	0.055	0.051

Table 26 The thickness of core and coated tablets(cont.).

	FORMULAR						
	HC30	CORE	HB10	CORE	HB20	HB30	CORE
THICKNESS	4.458	4.558	4.518	4.535	4.597	4.569	4.410
(mcm)	4.572	4.478	4.482	4.483	4.608	4.580	4.372
	4.492	4.465	4.521	4.487	4.564	4.563	4.497
	4.522	4.472	4.528	4.500	4.557	4.573	4.448
	4.482	4.431	4.485	4.575	4.457	4.563	4.515
	4.538	4.478	4.508	4.535	4.538	4.563	4.518
	4.522	4.496	4.494	4.489	4.577	4.520	4.413
	4.509	4.441	4.491	4.543	4.580	4.592	4.453
	4.521	4.422	4.518	4.453	4.576	4.522	4.468
	4.532	4.472	4.494	4.487	4.446	4.575	4.483
AVERAGE	4.515	4.471	4.504	4.509	4.550	4.562	4.458
SD	0.032	0.038	0.017	0.037	0.056	0.023	0.048

	FORMULA						
	LH0	LH0 R	LH0 S	LHA10	OGRE	LHA20	LHA30
THICKNESS	4.506	4.562	4.515	4.526	4.562	4.605	4.550
(mcm)	4.520	4.485	4.495	4.604	4.542	4.503	4.598
	4.502	4.645	4.554	4.462	4.448	4.604	4.602
	4.608	4.468	4.578	4.440	4.521	4.524	4.608
	4.493	4.523	4.526	4.472	4.442	4.573	4.609
	4.532	4.483	4.518	4.488	4.466	4.588	4.537
	4.508	4.572	4.542	4.601	4.556	4.547	4.555
	4.449	4.468	4.472	4.561	4.520	4.534	4.568
	4.511	4.481	4.499	4.491	4.523	4.566	4.576
	4.512	4.495	4.468	4.403	4.546	4.567	4.468
AVERAGE	4.514	4.518	4.517	4.505	4.513	4.561	4.567
SD	0.040	0.058	0.035	0.067	0.045	0.034	0.043

Table 27 The percentage of friability of core and coated tablets.

FORMULA	WEIGHT BEFORE(G)	WEIGHT AFTER(G)	FRIABILITY (%)
CORE	5.0062	4.9938	0.2477
CORE R	4.9982	4.9953	0.0580
CORE S	4.9986	4.9926	0.1200
L0	5.0484	5.0512	-0.0555
L0 R	5.0667	5.0710	-0.0849
L0 S	5.0926	5.1001	-0.1473
M0	5.0337	5.0352	-0.0298
M0 R	5.0222	5.0259	-0.0737
M0 S	5.1063	5.1115	-0.1018
H0	5.0442	5.0464	-0.0436
H0 R	5.0576	5.0596	-0.0395
H0 S	5.0954	5.0958	-0.0079
LA10	5.0594	5.0622	-0.0553
LA10 R	5.0607	5.0663	-0.1107
LA10 S	5.1071	5.1051	0.0392
LA20	5.0902	5.0941	-0.0766
LA30	5.0399	5.0415	-0.0317
LB10	5.0776	5.0802	-0.0512
LB20	5.0943	5.0983	-0.0785
LB30	5.0403	5.0595	-0.3809
LC10	5.0572	5.0663	-0.1799
LC20	5.0543	5.0623	-0.1583
LC30	5.0361	5.0419	-0.1152
MA10	5.1408	5.1454	-0.0895
MA20	5.0851	5.0895	-0.0865
MA30	5.0929	5.0995	-0.1296
MB10	5.0900	5.0956	-0.1100
MB20	5.1048	5.1115	-0.1312
MB30	5.1003	5.1043	-0.0784
MC10	5.0417	5.0500	-0.1646
MC20	5.0804	5.0852	-0.0945
MC30	5.1275	5.1346	-0.1385
HA10	5.1000	5.1029	-0.0569
HA20	5.0943	5.0962	-0.0373
HA30	5.0790	5.0825	-0.0689
HB10	5.0940	5.0953	-0.0255
HB20	5.0719	5.0740	-0.0414
HB30	5.1010	5.1039	-0.0569
HC10	5.1188	5.1215	-0.0527
HC20	5.0933	5.0957	-0.0471
HC30	5.0971	5.1007	-0.0706
LH0	5.1136	5.1163	-0.0528
LH0 R	5.1003	5.1049	-0.0902
LH0 S	5.1217	5.1234	-0.0332
LHA10	5.0916	5.0988	-0.1414
LHA20	5.0820	5.0893	-0.1436
LHA30	5.0669	5.0738	-0.1362

Table 28 The hardness of core and coated tablets(cont.).

HARDNESS(KP)								
SAMPLE	FORMULA							
	CORE	CORE R	CORE S	LO	LO R	LO S	MO	MO R
1	7.00	11.80	6.20	10.23	12.98	4.60	11.42	14.70
2	6.58	11.80	5.50	11.20	11.82	4.00	10.62	13.95
3	8.16	13.40	6.60	10.58	11.15	3.78	13.20	11.89
4	6.63	12.51	7.60	10.80	14.41	6.07	12.63	11.00
5	7.16	12.59	6.92	10.83	9.63	5.04	12.64	11.15
6	8.23	11.20	6.97	10.73	12.21	5.33	12.23	12.79
7	7.48	11.42	6.70	13.10	12.42	4.62	10.38	11.24
8	7.70	12.58	7.42	10.50	10.68	4.11	10.44	12.19
9	7.63	11.83	6.72	13.18	11.62	4.90	13.31	11.70
10	6.32	10.40	7.00	12.23	13.24	5.78	11.42	13.40
AVG	7.29	11.95	6.76	11.34	12.02	4.82	11.83	12.40
SD	0.66	0.85	0.60	1.09	1.37	0.76	1.12	1.27

SAMPLE	FORMULA							
	MOS	HO	HO R	HO S	LA10	LA10 R	LA10 S	LA20
1	4.45	11.78	13.82	6.78	11.40	10.62	6.60	10.70
2	5.74	12.40	13.21	5.14	9.73	8.80	5.26	12.56
3	5.02	9.00	11.02	5.48	9.61	13.90	6.41	12.23
4	4.41	10.40	11.77	5.79	11.38	12.60	7.22	10.04
5	6.18	10.81	13.30	5.06	9.90	11.60	6.98	13.00
6	5.17	10.60	11.98	4.20	10.32	14.04	6.00	11.98
7	7.00	11.23	10.89	5.03	10.42	10.59	6.43	9.40
8	6.00	12.61	12.32	6.36	10.19	9.21	5.81	13.30
9	5.59	9.50	9.88	6.97	12.38	13.91	7.80	12.97
10	6.58	9.80	11.17	6.80	11.28	12.61	7.43	12.20
AVG	5.61	10.81	11.94	5.76	10.67	11.79	6.59	11.84
SD	0.86	1.21	1.25	0.93	0.90	1.94	0.78	1.34

Table 28 The hardness of core and coated tablets(cont.).

SAMPLE	FORMULA.							
	LA30	LB10	LB20	LB30	LC10	LC20	LC30	MA10
1	11.02	11.78	10.99	9.72	11.32	10.93	9.97	9.40
2	8.40	11.00	9.38	11.64	9.78	9.00	10.52	10.24
3	13.80	9.79	10.82	10.80	10.98	11.60	8.98	10.43
4	10.00	14.20	13.40	12.43	11.10	11.18	11.59	10.79
5	12.42	12.00	12.68	9.51	14.18	10.64	9.98	12.00
6	13.84	10.54	8.57	13.32	9.78	14.03	9.43	10.83
7	9.30	9.39	11.97	10.83	11.50	8.40	9.45	9.80
8	9.92	13.62	9.94	11.02	12.99	10.80	10.15	10.48
9	13.00	14.20	9.34	11.82	8.57	10.13	11.24	10.49
10	12.03	11.02	11.66	11.40	10.26	9.56	9.70	11.40
AVG	11.37	11.75	10.88	11.25	11.05	10.56	10.10	10.59
SD	1.93	1.75	1.57	1.15	1.63	1.56	0.82	0.74

SAMPLE	FORMULA							
	MA20	MA30	MB10	MB20	MB30	MC10	MC20	MC30
1	11.30	11.40	8.42	10.92	8.96	10.74	10.28	9.00
2	11.40	12.41	9.61	11.60	9.04	11.97	9.88	9.74
3	8.53	8.28	10.04	9.60	13.60	12.38	10.08	7.82
4	9.99	10.43	11.41	12.50	9.61	9.98	11.44	8.83
5	11.16	8.42	11.68	13.23	12.05	10.80	13.52	8.53
6	9.63	9.24	11.18	10.02	9.04	9.20	9.54	9.14
7	10.96	10.90	9.15	9.12	10.19	9.60	11.89	8.20
8	10.88	13.38	10.80	10.90	10.20	12.63	9.98	8.04
9	9.73	13.13	11.70	12.42	10.42	9.23	12.63	8.78
10	10.20	10.78	11.62	12.78	10.80	9.32	9.38	8.69
AVG	10.38	10.84	10.56	11.31	10.39	10.59	10.86	8.68
SD	0.92	1.72	1.12	1.35	1.40	1.27	1.35	0.54

Table 28 The hardness of core and coated tablets.

SAMPLE	FORMULA							
	HA10	HA20	HA30	HB10	HB20	HB30	HC10	HC20
1	10.40	11.80	12.00	11.00	10.34	11.39	11.78	9.71
2	9.96	10.00	9.59	11.42	10.41	11.22	9.73	9.68
3	9.41	10.56	9.78	10.20	9.57	11.24	9.82	10.20
4	9.83	10.34	9.00	12.39	12.23	10.42	10.74	10.20
5	10.30	11.61	9.60	11.40	10.42	11.78	10.63	10.78
6	9.12	9.56	9.40	11.20	11.02	11.60	10.44	11.38
7	9.11	9.23	11.80	11.60	12.01	10.32	12.02	11.18
8	11.80	9.40	11.42	10.96	10.68	11.32	9.62	11.23
9	10.22	9.99	9.40	12.70	11.50	11.42	10.42	10.20
10	11.22	9.62	10.50	11.38	11.90	12.30	9.57	9.92
AVG	10.14	10.21	10.25	11.43	11.01	11.30	10.48	10.45
SD	0.87	0.89	1.10	0.71	0.87	0.59	0.86	0.64

SAMPLE	FORMULA						
	HC30	LH0	LH0 R	LH0 S	LHA10	LHA20	LHA30
1	9.44	11.83	12.80	4.60	9.74	11.24	9.73
2	11.78	9.78	11.18	3.64	11.08	11.18	9.31
3	9.97	10.83	10.97	4.60	10.89	8.98	11.09
4	10.96	11.40	11.40	4.62	11.40	9.57	10.40
5	11.21	10.26	12.68	4.47	10.21	10.62	9.01
6	10.53	10.58	11.03	5.62	10.12	9.18	11.27
7	9.98	11.21	10.04	5.14	11.92	9.62	9.23
8	10.20	9.80	10.18	4.40	9.70	9.64	10.32
9	11.73	11.58	11.38	5.56	11.69	10.96	11.03
10	10.76	10.17	11.08	3.82	10.64	9.21	9.00
AVG	10.66	10.74	11.27	4.65	10.74	10.02	10.04
SD	0.78	0.74	0.90	0.65	0.79	0.88	0.90

Table 29 The disintegration time of core and coated tablets

SAMPLE	DISINTEGRATION TIME (SEC)						AVERAGE	SD
	1	2	3	4	5	6		
CORE	95	110	112	120	123	123	113.83	10.76
CORE R	128	121	113	124	127	128	123.50	5.82
CORE S	55	63	75	90	96	104	80.50	19.34
LO	155	160	170	180	180	185	171.67	12.11
LO R	482	492	496	582	642	663	559.50	80.77
LO S	127	147	149	153	156	190	153.67	20.51
MO	203	169	186	193	194	277	203.67	37.68
MO R	290	315	332	374	375	389	345.83	39.41
MO S	178	192	194	204	205	209	197.00	11.42
HO	145	175	202	214	250	262	208.00	44.29
HO R	280	365	185	236	185	427	279.67	98.81
HO S	154	164	167	110	108	142	140.83	26.17
LA10	195	360	375	330	375	403	339.67	74.76
LA10 R	257	311	478	172	178	220	269.33	114.61
LA10 S	136	225	144	244	336	352	239.50	91.69
LA20	294	310	340	235	264	248	281.83	39.95
LA30	214	253	175	238	224	245	224.83	28.20
LB10	250	224	243	280	295	325	269.50	37.40
LB20	193	200	234	280	320	339	261.00	61.64
LB30	235	245	248	249	273	180	238.33	31.20
LC10	119	160	154	164	228	204	171.50	38.73
LC20	150	174	270	187	196	218	199.17	41.43
LC30	332	240	196	254	276	293	265.17	46.69
MA10	190	167	182	197	211	155	183.67	20.33
MA20	146	149	190	202	209	211	184.50	29.60
MA30	155	187	204	214	239	252	208.50	35.21
MB10	162	193	215	256	222	231	213.17	32.43
MB20	155	146	180	197	228	286	198.67	52.00

Table 29 The disintegration time of core and coated tablets(cont.).

SAMPLE	DISINTEGRATION TIME (SEC)						AVERAGE	SD
	1	2	3	4	5	6		
CORE	125	134	134	113	130	110	124.33	10.52
CORE R	112	142	166	131	139	172	143.67	22.31
CORE S	65	70	74	90	97	98	82.33	14.43
L0								
L0 R	156	162	168	179	182	209	176.00	18.94
L0 S	148	152	154	157	164	172	157.83	8.77
M0								
M0 R	139	163	204	194	246	274	203.33	50.33
M0 S	176	182	195	182	219	240	199.00	25.31
H0	115	125	132	135	137	139	130.50	9.03
H0 R	182	227	236	178	197	211	205.17	23.68
H0 S	126	137	139	134	138	142	136.00	5.55
LA10	242	263	268	272	280	283	268.00	14.74
LA10 R	204	213	242	146	190	198	198.83	31.50
LA10 S	137	189	257	158	160	173	179.00	41.92
LA20	172	178	236	280	284	256	234.33	49.16
LA30	125	148	247	280	190	298	214.67	71.21
LB10	189	255	293	310	243	270	260.00	42.53
LB20	276	222	209	290	325	267	264.83	43.21
LB30	280	350	372	390	255	386	338.83	57.54
LC10	320	335	348	368	374	380	354.17	23.77
LC20	285	300	390	403	418	422	369.67	61.03
LC30	330	390	420	430	454	469	415.50	50.07

Table 29 The disintegration time of core and coated tablets(cont.)

SAMPLE	DISINTEGRATION TIME (SEC)						AVERAGE	SD
	1	2	3	4	5	6		
MA10	294	305	321	330	350	230	305.00	41.60
MA20	276	315	264	252	375	241	287.17	50.04
MA30	220	243	287	289	335	386	293.33	60.49
MB10	165	286	311	371	265	362	293.33	75.35
MB20	239	213	238	260	315	333	266.33	47.43
MB30	245	257	277	342	363	348	305.33	51.52
MC10	230	341	344	220	235	290	276.67	56.52
MC20	345	353	362	397	355	377	364.83	19.08
MC30	148	243	262	132	152	173	185.00	54.23
HA10	185	221	242	254	175	186	210.50	33.18
HA20	158	175	185	165	172	200	175.83	14.96
HA30	140	152	163	152	162	204	162.17	22.13
HB10	210	215	260	220	260	200	227.50	26.03
HB20	245	246	272	280	272	315	271.67	25.76
HB30	282	304	315	280	276	295	292.00	15.38
HC10	182	184	185	211	180	199	190.17	12.22
HC20	210	211	222	223	195	223	214.00	11.06
HC30	140	152	165	180	190	232	176.50	32.68
LH0	180	187	205	244	260	179	209.17	34.83
LH0 R	144	156	196	142	174	187	166.50	22.64
LH0 S	70	92	110	117	131	115	105.80	21.61
LHA10	142	156	204	221	150	150	170.50	33.27
LHA20	150	165	172	186	218	237	188.00	33.27
LHA30	109	118	136	138	148	156	134.17	17.78

Table 30 Dissolution data of propranolol HCl from core and coated tablets.

CORE										
TIME(M)	1	2	3	4	5	6	AVG	SD		
3	58.95	45.81	51.94	35.93	43.44	54.94	48.50	8.41		
6	81.13	88.57	91.23	80.39	84.18	90.12	85.94	4.68		
9	92.29	96.64	96.56	92.42	94.98	97.95	95.14	2.35		
12	93.50	97.50	92.79	94.88	97.08	98.93	95.78	2.43		
17	93.59	98.23	98.12	95.35	97.31	99.05	96.94	2.07		
22	93.80	97.84	97.73	94.95	97.04	99.66	96.84	2.13		
27	94.51	97.94	98.21	95.16	97.39	100.40	97.27	2.15		
32	94.72	98.29	98.94	95.38	97.74	99.38	97.41	1.92		
CORE R										
TIME(M)	1	2	3	4	5	6	AVG	SD		
3	44.06	52.19	42.81	51.19	42.69	42.94	45.98	4.46		
6	91.31	90.48	86.93	93.85	82.68	85.43	88.45	4.15		
9	97.15	96.56	96.37	98.57	93.85	95.61	96.35	1.58		
12	98.01	97.04	97.22	98.69	95.56	96.59	97.19	1.09		
17	98.24	97.02	97.70	98.92	95.16	96.81	97.31	1.31		
22	98.35	97.12	97.31	99.03	95.06	96.91	97.30	1.36		
27	98.33	96.97	97.28	98.89	95.22	97.14	97.31	1.27		
32	98.31	97.44	98.01	99.37	95.43	99.49	98.01	1.49		
CORE S										
TIME(M)	1	2	3	4	5	6	AVG	SD		
3	79.59	72.21	78.33	46.31	41.06	40.18	59.61	19.01		
6	92.74	94.58	92.11	91.45	82.92	87.92	90.29	4.22		
9	94.20	98.43	93.19	96.28	93.46	96.86	95.40	2.11		
14	94.55	98.42	93.66	96.39	94.68	97.84	95.92	1.93		
19	94.64	98.65	93.62	96.49	95.52	98.08	96.17	1.96		
24	94.48	98.64	93.70	96.71	94.74	98.43	96.12	2.12		
29	94.94	98.74	93.91	96.68	94.83	98.11	96.20	1.95		
34	94.27	98.85	93.36	96.90	94.92	98.14	96.07	2.22		
TIME(M)	LO					LO R				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	21.67	5.91	6.41	11.33	8.96	3.91	5.41	4.53	4.62	0.75
6	47.92	55.60	62.98	55.50	7.53	10.06	10.32	11.44	10.61	0.73
9	83.31	86.65	89.94	86.63	3.32	20.87	32.76	37.14	30.26	8.42
12	94.11	92.71	95.52	94.11	1.41	54.37	48.93	62.34	55.21	6.74
15	95.45	94.04	96.36	95.28	1.17	71.52	70.94	85.79	76.08	8.41
18	95.29	94.51	96.21	95.34	0.85	91.89	92.93	97.10	93.97	2.76
21	95.14	94.60	96.06	95.27	0.74	92.85	96.14	99.58	96.19	3.37
24	94.85	94.18	95.78	94.94	0.80	93.56	95.62	99.19	96.12	2.85
27	94.56	93.89	96.37	94.94	1.28	93.52	95.46	98.30	95.76	2.40
30	95.90	94.47	96.84	95.74	1.19	94.10	96.68	95.91	95.56	1.32

Table 30 Dissolution data of propranolol HCl from core and coated tablets(cont.).

TIME(M)	LO S					MO				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	0.31	0.36	0.41	0.36	0.05	12.92	12.41	8.04	11.12	2.68
6	1.11	2.67	2.77	2.18	0.93	48.25	46.88	60.74	51.96	7.64
9	3.02	3.38	3.28	3.23	0.19	85.14	85.39	81.68	84.07	2.07
12	3.94	2.80	4.20	3.65	0.74	93.20	93.19	90.34	92.24	1.65
15	3.56	3.61	3.57	3.58	0.03	94.29	94.28	95.54	94.70	0.72
18	4.12	4.58	4.39	4.36	0.23	93.88	93.99	94.89	94.25	0.55
21	4.90	5.50	5.36	5.25	0.31	93.96	93.58	99.61	95.72	3.38
24	5.62	6.23	6.04	5.96	0.31	94.17	93.91	95.09	94.39	0.62
27	6.35	6.86	6.67	6.63	0.26	93.75	93.74	95.30	94.26	0.90
30	7.08	7.59	7.45	7.37	0.26	94.96	94.70	96.39	95.35	0.91
TIME(M)	MO R					MO S				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	8.66	5.28	6.04	6.66	1.77	1.66	1.78	2.16	1.87	0.26
6	23.22	19.07	13.20	18.50	5.03	2.17	3.29	2.79	2.75	0.56
9	40.47	35.55	24.89	33.64	7.96	4.55	5.31	5.06	4.97	0.39
12	53.93	51.74	37.65	47.77	8.84	6.83	7.59	7.21	7.21	0.38
15	65.08	60.63	54.22	59.98	5.46	9.36	8.75	9.12	9.08	0.31
18	76.66	71.31	67.00	71.66	4.84	11.54	10.92	10.79	11.08	0.40
21	85.17	91.93	73.46	83.52	9.34	14.97	14.98	15.23	15.06	0.15
24	90.21	97.13	80.96	89.43	8.11	17.80	16.05	17.05	16.97	0.88
27	94.28	97.36	87.11	92.92	5.26	19.64	15.88	18.89	18.14	1.99
30	94.37	97.46	91.54	94.46	2.96	21.36	18.71	19.73	19.93	1.34
TIME(M)	HO					HOR				
	1	2	3	AVG	SD	1	2	3	AVG	1.00
3	32.30	32.93	37.68	34.30	2.94	9.79	13.67	15.54	13.00	2.93
6	76.49	79.37	78.90	78.25	1.55	24.10	24.37	23.75	24.07	0.31
9	92.89	92.28	92.18	92.45	0.38	35.97	34.87	33.88	34.91	1.05
12	94.22	92.99	95.26	94.16	1.14	45.41	45.80	41.92	44.38	2.14
15	95.19	95.07	95.73	95.33	0.35	54.14	57.04	54.89	55.36	1.51
18	94.41	95.29	95.70	95.13	0.66	78.80	65.57	63.79	69.39	8.20
21	96.62	96.51	97.17	96.77	0.35	95.33	78.91	91.38	88.54	8.57
24	97.59	96.60	99.40	97.86	1.42	99.17	77.17	95.70	90.68	11.83
27	97.57	97.07	98.75	97.80	0.86	97.54	91.05	101.55	96.71	5.30
30	96.79	97.42	98.85	97.69	1.06	103.02	92.63	97.05	97.57	5.21
TIME(M)	HO S					LA10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	5.03	2.28	2.03	3.11	1.66	26.17	25.92	35.93	29.34	5.71
6	7.94	5.05	4.17	5.72	1.97	82.34	81.34	81.02	81.57	0.69
9	7.73	11.83	10.57	10.04	2.10	95.64	99.01	95.30	96.65	2.05
12	10.39	13.26	12.37	12.01	1.47	98.74	101.00	98.66	99.47	1.33
15	13.07	15.33	14.31	14.24	1.13	97.85	101.75	97.89	99.16	2.24
18	15.89	17.78	16.38	16.68	0.98	96.08	100.00	98.75	98.28	2.00
21	18.22	19.37	18.09	18.56	0.70	95.55	100.12	96.98	97.55	2.34
24	20.81	21.09	19.81	20.57	0.67	97.27	100.23	97.70	98.40	1.60
27	23.79	22.82	21.40	22.67	1.20	97.74	100.22	98.68	98.88	1.25
30	27.41	24.43	22.88	24.91	2.30	96.84	100.95	99.28	99.02	2.07

Table 30 Dissolution data of propranolol HCl from core and coated tablets(cont.).

TIME(M)	LA10 R					LA10 S				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	4.03	6.79	5.79	5.54	1.40	3.66	3.78	3.78	3.74	0.07
6	27.32	27.33	24.70	26.45	1.52	4.55	4.68	5.05	4.76	0.26
9	64.86	55.36	52.84	57.69	6.34	6.70	6.45	6.83	6.66	0.19
12	83.82	80.91	74.00	79.58	5.04	9.49	8.49	8.74	8.91	0.52
15	92.49	90.82	97.76	93.69	3.62	11.16	10.15	10.53	10.61	0.51
18	94.07	94.14	99.99	96.07	3.40	13.34	12.08	12.59	12.67	0.63
21	97.66	97.48	101.36	98.83	2.19	15.41	13.77	14.28	14.49	0.84
24	97.52	93.08	100.98	97.19	3.96	16.97	12.96	16.10	15.34	2.11
27	93.62	94.04	100.23	95.96	3.70	18.95	17.02	17.93	17.97	0.97
30	94.20	94.25	100.96	96.47	3.89	20.54	18.86	16.39	18.60	2.09
TIME(M)	LA20					LA30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	24.05	38.31	32.43	31.60	7.17	23.80	27.93	51.69	34.47	15.05
6	78.08	83.53	84.25	81.95	3.37	85.33	81.73	87.97	85.01	3.13
9	91.60	97.58	98.31	95.83	3.68	96.39	96.52	95.04	95.98	0.82
12	94.94	98.19	99.79	97.64	2.47	96.75	98.75	95.26	96.92	1.75
15	95.91	98.05	99.91	97.96	2.00	97.60	97.61	96.36	97.19	0.72
20	96.50	99.16	98.53	98.06	1.39	97.70	97.34	97.46	97.50	0.18
25	96.48	99.14	98.26	97.96	1.36	98.68	97.82	97.69	98.06	0.54
30	97.45	99.00	98.61	98.35	0.81	98.91	99.55	96.79	98.42	1.44
TIME(M)	LB10					LB20				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	3.91	3.16	0.91	2.66	1.56	2.66	1.53	2.28	2.16	0.58
6	28.57	54.58	39.56	40.90	13.06	41.20	40.82	45.70	42.57	2.71
9	73.24	80.75	76.41	76.80	3.77	82.56	88.55	89.46	86.86	3.75
12	90.37	92.78	88.80	90.65	2.00	93.10	96.75	98.16	96.00	2.61
15	99.70	95.87	95.12	96.90	2.46	95.56	98.36	99.02	97.65	1.84
20	99.68	96.97	99.09	98.58	1.43	95.54	97.47	98.13	97.05	1.35
25	99.67	98.20	98.70	98.86	0.75	95.13	99.07	97.24	97.15	1.97
30	100.41	98.93	99.31	99.55	0.77	95.85	99.68	97.09	97.54	1.95
TIME(M)	LB30					LC10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	3.78	0.53	0.16	1.49	1.99	1.78	11.04	8.04	6.95	4.72
6	43.58	42.31	28.05	37.98	8.62	63.58	67.88	53.61	61.69	7.32
9	84.95	87.18	82.98	85.04	2.10	90.04	90.49	92.40	90.98	1.25
12	91.38	95.12	90.77	92.42	2.36	95.62	94.06	96.87	95.52	1.41
15	91.58	95.09	92.47	93.05	1.82	95.47	94.53	97.97	95.99	1.78
20	91.53	95.19	92.56	93.09	1.89	96.32	94.37	97.45	96.05	1.56
25	92.48	95.65	93.89	94.01	1.59	95.66	94.58	97.05	95.76	1.24
30	91.49	95.25	92.60	93.11	1.93	95.51	94.17	97.40	95.69	1.62

Table 30 Dissolution data of propranolol HCl from core and coated tablets(cont.).

TIME(M)	LC20					LC30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	0.66	6.66	4.53	3.95	3.04	1.28	0.03	0.03	0.45	0.72
6	67.30	68.11	70.10	68.50	1.44	70.18	41.18	32.68	48.01	19.66
9	91.15	92.34	92.97	92.15	0.92	86.41	86.42	56.61	76.48	17.21
12	94.98	98.93	96.81	96.91	1.98	95.72	95.11	91.41	94.08	2.33
15	93.33	93.42	97.41	94.72	2.33	96.70	94.45	92.24	94.46	2.23
20	94.54	93.75	97.39	95.23	1.91	97.05	94.92	92.45	94.81	2.30
25	93.62	93.84	97.50	94.99	2.18	97.03	95.64	92.66	95.11	2.23
30	95.08	94.55	97.22	95.62	1.41	97.37	95.48	93.99	95.61	1.69
TIME(M)	MA10					MA20				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	1.41	6.79	1.28	3.16	3.14	7.66	2.28	0.03	3.32	3.92
6	13.39	47.22	12.67	24.43	19.74	72.93	53.95	54.44	60.44	10.82
9	71.99	73.60	50.51	65.37	12.89	96.18	94.88	91.49	94.18	2.42
12	96.12	99.36	74.28	89.92	13.64	98.91	100.35	94.20	97.82	3.22
15	99.35	100.60	92.04	97.33	4.62	99.53	98.85	97.17	98.52	1.21
20	99.84	100.35	102.50	100.90	1.41	99.52	99.09	97.27	98.63	1.19
25	100.46	97.84	100.38	99.56	1.49	99.63	101.58	95.12	98.78	3.31
30	100.20	97.57	100.25	99.34	1.53	99.62	99.32	97.59	98.84	1.10
TIME(M)	MA30					MB10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	14.79	6.16	27.31	16.09	10.63	9.91	3.03	5.28	6.07	3.51
6	51.29	62.60	69.09	60.99	9.01	39.28	52.58	51.34	47.73	7.35
9	84.19	87.56	95.08	88.94	5.58	85.76	92.12	91.50	89.79	3.51
12	95.87	97.13	97.93	96.98	1.04	98.94	98.33	101.21	99.49	1.52
15	97.34	98.61	98.16	98.04	0.64	99.69	98.70	101.59	99.99	1.47
20	96.32	99.97	97.02	97.77	1.94	98.43	99.44	101.47	99.78	1.55
25	96.17	99.96	96.99	97.71	1.99	98.66	98.80	101.47	99.64	1.58
30	96.52	100.45	96.97	97.98	2.15	98.89	98.16	101.96	99.67	2.02
TIME(M)	MB20					MB30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	2.78	12.29	3.16	6.08	5.38	1.78	2.03	2.91	2.24	0.59
6	23.52	44.75	21.69	29.99	12.82	26.27	12.05	16.93	18.42	7.23
9	74.67	74.24	72.08	73.66	1.39	86.07	81.53	49.04	72.21	20.20
12	94.18	98.38	91.83	94.80	3.32	99.26	94.57	73.93	89.25	13.48
15	99.78	100.99	100.66	100.48	0.63	100.37	94.79	93.68	96.28	3.59
20	98.65	101.49	101.79	100.64	1.73	100.62	93.14	100.03	97.93	4.16
25	99.26	101.24	102.29	100.93	1.54	100.86	94.60	99.77	98.41	3.34
30	99.49	101.74	102.67	101.30	1.64	100.73	94.18	99.51	98.14	3.48
TIME(M)	MC10					MC20				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	23.17	32.18	19.04	24.80	6.72	0.03	0.00	0.00	0.01	0.02
6	80.93	76.74	74.18	77.28	3.41	29.27	35.55	19.67	28.16	8.00
9	89.97	93.14	92.18	91.76	1.63	82.71	83.52	61.80	76.01	12.31
12	92.42	94.73	94.64	93.93	1.31	92.87	91.69	88.37	90.98	2.33
15	92.12	92.44	94.61	93.06	1.35	93.96	92.27	91.19	92.47	1.40
20	92.33	94.77	93.83	93.64	1.23	94.30	92.72	91.39	92.80	1.46
25	92.28	95.24	93.79	93.77	1.48	94.01	92.43	91.09	92.51	1.46
30	92.85	94.08	94.24	93.72	0.76	94.22	93.26	91.79	93.09	1.22

Table 30 Dissolution data of propranolol HCl from core and coated tablets(cont.).

TIME(M)	MC30					HA10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	11.29	17.67	11.04	13.33	3.76	4.53	4.53	2.53	3.86	1.15
6	63.76	40.52	38.86	47.71	13.92	15.94	19.82	7.17	14.31	6.48
9	90.97	90.63	98.35	93.32	4.36	31.28	38.43	24.85	31.52	6.79
12	99.18	93.71	100.21	97.70	3.49	50.70	65.39	43.98	53.36	10.95
15	100.42	100.31	103.84	101.52	2.01	69.34	87.60	74.85	77.26	9.37
20	100.79	103.05	104.35	102.73	1.80	88.07	94.42	95.61	92.70	4.05
25	101.16	104.18	104.11	103.15	1.72	96.76	95.26	97.71	96.58	1.24
30	103.65	99.82	104.12	102.53	2.36	97.36	96.23	100.19	97.93	2.04

TIME(M)	HA20					HA30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	6.91	11.54	7.66	8.70	2.49	12.54	11.79	17.67	14.00	3.20
6	38.59	42.62	45.23	42.15	3.35	36.24	39.62	57.16	44.34	11.23
9	81.94	87.36	80.10	83.13	3.77	70.20	90.10	89.72	83.34	11.38
12	94.23	95.55	95.51	95.10	0.75	95.69	99.55	94.54	96.59	2.62
15	95.95	96.03	97.48	96.49	0.86	99.04	98.42	94.26	97.24	2.60
20	96.30	96.75	96.97	96.67	0.34	98.16	98.41	94.10	96.89	2.42
25	95.90	98.23	98.82	97.65	1.54	98.26	98.52	95.81	97.53	1.50
30	97.24	96.96	96.93	97.04	0.17	98.12	98.25	95.40	97.26	1.61

TIME(M)	HB10					HB20				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	7.29	5.03	6.16	6.16	1.13	0.00	0.00	0.00	0.00	0.00
6	5.20	7.31	6.44	6.32	1.06	0.00	0.00	0.00	0.00	0.00
9	7.22	23.36	14.48	15.02	8.08	1.40	1.65	1.53	1.53	0.13
12	28.27	39.74	24.81	30.94	7.81	6.29	5.54	6.67	6.17	0.58
15	37.92	55.82	40.44	44.73	9.69	12.57	10.95	11.95	11.82	0.82
20	55.25	85.74	58.03	66.34	16.86	24.40	22.76	21.27	22.81	1.57
25	84.54	93.05	74.83	84.14	9.12	45.28	41.01	34.88	40.39	5.23
30	97.97	96.26	87.71	93.98	5.50	84.53	66.23	84.84	78.53	10.66

TIME(M)	HB30					HC10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	1.03	2.16	1.28	1.49	0.59	18.29	17.92	12.41	16.21	3.29
6	2.91	5.42	4.04	4.12	1.26	39.52	43.15	30.49	37.72	6.52
9	5.55	8.07	8.56	7.39	1.62	64.24	71.51	53.91	63.22	8.84
12	10.84	12.24	15.24	12.77	2.25	82.82	91.00	85.95	86.59	4.13
15	22.65	17.81	24.19	21.55	3.33	103.75	99.71	101.88	101.78	2.02
20	40.52	46.04	42.58	43.05	2.79	104.01	106.46	101.39	103.95	2.54
25	81.63	71.79	91.07	81.50	9.64	103.52	107.61	100.14	103.76	3.74
30	93.54	92.78	96.40	94.24	1.91	101.15	108.39	100.63	103.39	4.34

Table 30 Dissolution data of propranolol HCl from coated tablets(cont.).

TIME(M)	HC20					HC30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	9.41	4.16	6.04	6.54	2.66	16.29	15.17	13.29	14.92	1.52
6	29.72	19.94	20.70	23.45	5.44	14.87	23.50	23.74	20.70	5.05
9	53.14	43.31	40.19	45.55	6.76	40.34	33.37	35.36	36.36	3.59
12	74.04	74.79	55.65	68.16	10.84	64.31	43.67	49.05	52.34	10.71
15	86.04	91.18	75.69	84.30	7.89	82.26	51.89	62.30	65.48	15.43
20	98.48	100.51	94.71	97.90	2.94	91.80	84.04	73.24	83.03	9.32
25	99.46	101.26	99.43	100.05	1.05	93.01	89.21	90.24	90.82	1.97
30	103.20	98.75	101.79	101.25	2.27	94.09	93.41	92.19	93.23	0.96

TIME(M)	LH0					LH0 R				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	5.91	10.66	7.41	7.99	2.43	9.16	11.04	5.54	8.58	2.80
6	48.22	63.88	59.11	57.07	8.03	11.33	11.09	10.82	11.08	0.26
9	82.36	88.84	89.80	87.00	4.05	11.02	9.02	15.37	11.80	3.25
12	97.40	96.66	98.38	97.48	0.86	16.82	13.95	21.33	17.37	3.72
15	101.89	98.39	100.87	100.38	1.80	23.41	19.89	27.69	23.66	3.91
20	102.02	101.63	101.74	101.80	0.20	38.41	34.50	31.20	34.70	3.61
25	102.27	99.56	102.11	101.31	1.52	49.24	46.18	40.99	45.47	4.17
30	102.02	95.73	98.49	98.75	3.15	61.61	58.79	52.32	57.57	4.76

TIME(M)	LH0 S					LHA10				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	5.03	2.41	5.54	4.33	1.68	25.55	21.30	19.17	22.01	3.25
6	3.43	7.30	4.06	4.93	2.08	52.44	52.92	48.66	51.34	2.33
9	9.20	7.46	10.46	9.04	1.51	85.98	91.59	84.80	87.46	3.63
12	8.63	13.00	9.64	10.42	2.29	96.54	100.80	94.73	97.36	3.12
15	13.92	11.69	14.94	13.52	1.66	100.39	99.67	93.32	97.79	3.89
20	14.37	19.50	15.14	16.34	2.77	100.89	100.17	94.29	98.45	3.62
25	20.94	19.22	21.97	20.71	1.39	100.01	103.16	97.50	100.22	2.84
30	19.79	25.57	21.20	22.19	3.01	99.50	103.66	97.60	100.25	3.10

TIME(M)	LHA20					LHA30				
	1	2	3	AVG	SD	1	2	3	AVG	SD
3	6.79	10.91	8.29	8.66	2.09	10.54	20.04	11.41	14.00	5.25
6	24.21	32.36	22.71	26.43	5.19	41.24	47.54	43.12	43.97	3.23
9	45.47	51.53	38.84	45.28	6.35	67.96	74.92	65.22	69.37	5.00
12	75.46	68.05	52.54	65.35	11.70	81.68	92.18	83.94	85.93	5.53
15	88.47	86.53	72.69	82.56	8.61	94.97	97.26	94.98	95.74	1.32
20	94.79	98.46	91.19	94.81	3.64	95.82	97.99	96.58	96.80	1.10
25	102.51	94.19	95.89	97.53	4.40	96.54	98.23	96.55	97.11	0.97
30	96.14	101.04	95.86	97.68	2.91	96.14	98.21	96.90	97.08	1.05

Table 30 Dissolution data of propranolol HCl from core and coated tablets(cont.).

INDERAL								
TIME(M)	1	2	3	4	5	6	AVG	SD
3	23.80	23.80	26.17	38.93	31.55	33.05	29.55	6.03
6	79.20	80.20	76.84	80.53	80.49	68.87	77.69	4.54
9	95.36	96.99	94.98	94.94	95.78	89.85	94.65	2.47
12	97.34	98.72	96.33	96.54	99.01	93.55	96.92	1.98
15	97.69	98.34	96.56	95.89	99.12	94.64	97.04	1.66
20	97.80	97.70	97.29	96.74	100.11	95.85	97.58	1.43
25	99.15	98.17	97.51	96.84	99.35	94.70	97.62	1.72
30	98.01	98.03	96.24	95.68	98.83	94.28	96.85	1.73

Appendix III
Physical properties data of free films

Table 31 The data of film swelling in deionized water (swelling index (w)).

WEIGHT(g)	L0			M0			H0		
	1	2	3	1	2	3	1	2	3
W(0)	0.0525	0.0647	0.0583	0.0665	0.0583	0.0516	0.0579	0.0615	0.0697
W(1)	0.1773	0.2590	0.2827	1.3849	1.1548	1.1735	0.7030	0.8157	1.0162
INDEX(W)	2.38	3.00	3.85	19.83	18.64	21.74	11.40	12.26	13.58
AVG(SD)	3.08(0.74)			20.07(1.56)			12.33(1.22)		

WEIGHT(g)	LA10			LA20			LA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0567	0.0600	0.0580	0.0552	0.0504	0.0538	0.0642	0.0637	0.0569
W(1)	0.1003	0.1247	0.1190	0.0837	0.0717	0.0943	0.0708	0.0838	0.0818
INDEX(W)	0.77	1.08	1.05	0.52	0.42	0.75	0.10	0.77	0.44
AVG(SD)	0.97(0.17)			0.56(0.17)			0.44(0.34)		

WEIGHT(g)	LB10			LB20			LB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0563	0.0647	0.0676	0.0497	0.0546	0.0651	0.0670	0.0668	0.0607
W(1)	0.1980	0.2009	0.2047	0.1643	0.1767	0.2206	0.1206	0.1673	0.1483
INDEX(W)	2.03	2.11	2.03	2.31	2.24	2.39	0.80	1.50	1.44
AVG(SD)	2.06(0.05)			2.31(0.08)			1.25(0.39)		

WEIGHT(g)	LC10			LC20			LC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0575	0.0546	0.0533	0.0552	0.0579	0.0573	0.0684	0.0654	0.0645
W(1)	0.0976	0.1072	0.1069	0.1165	0.1434	0.1603	0.1229	0.1226	0.1349
INDEX(W)	0.70	0.96	1.01	1.11	1.48	1.80	0.80	0.87	1.09
AVG(SD)	0.89(0.17)			1.46(0.35)			0.92(0.15)		

Table 31 The data of film swelling in deionized water (swelling index (w))(cont.).

WEIGHT(g)	MA10			MA20			MA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0540	0.0549	0.0585	0.0686	0.0692	0.0635	0.0602	0.0560	0.0564
W(1)	0.2837	0.3535	0.3954	0.3468	0.4011	0.3128	0.2306	0.2553	0.2489
INDEX(W)	4.25	5.44	5.76	4.06	4.80	3.93	2.83	3.56	3.41
AVG(SD)	5.15(0.80)			4.26(0.47)			3.27(0.39)		

WEIGHT(g)	MB10			MB20			MB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0591	0.0678	0.0684	0.0602	0.0619	0.0715	0.0630	0.0597	0.0643
W(1)	0.4836	0.5760	0.5243	0.3892	0.4284	0.5282	0.3396	0.4358	0.4359
INDEX(W)	7.18	7.50	6.67	5.47	5.92	6.39	4.39	6.30	5.78
AVG(SD)	7.12(0.42)			5.93(0.46)			5.49(0.99)		

WEIGHT(g)	MC10			MC20			MC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0673	0.0669	0.0656	0.0574	0.0614	0.0659	0.0701	0.0627	0.0741
W(1)	2.7975	2.8419	3.2449	0.8405	1.1140	1.5165	0.2694	0.2580	0.2978
INDEX(W)	40.57	41.48	48.46	13.64	17.14	22.01	2.84	3.11	3.02
AVG(SD)	43.50(4.32)			17.60(4.20)			2.99(0.14)		

WEIGHT(g)	HA10			HA20			HA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0619	0.0694	0.0713	0.0609	0.0669	0.0656	0.0645	0.0619	0.0670
W(1)	0.1464	0.1657	0.1788	0.1327	0.1820	0.1882	0.1808	0.2013	0.2004
INDEX(W)	1.37	1.39	1.51	1.18	1.23	1.48	1.80	2.25	1.99
AVG(SD)	1.42(0.08)			1.30(0.16)			2.01(0.23)		

Table 31 The data of film swelling in deionized water (swelling index (w))(cont.).

WEIGHT(g)	HB10			HB20			HB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0605	0.0586	0.0540	0.0616	0.0593	0.0579	0.0545	0.0583	0.0612
W(1)	0.2015	0.3277	0.2229	0.2239	0.2740	0.2490	0.1084	0.0923	0.1453
INDEX(W)	2.33	2.22	3.13	2.63	3.62	3.30	0.99	0.58	1.37
AVG(SD)	2.56(0.50)			3.18(0.51)			0.98(0.400)		

WEIGHT(g)	HC10			HC20			HC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0657	0.0590	0.0646	0.0580	0.0545	0.5650	0.0761	0.0676	0.0655
W(1)	0.1802	0.1544	0.2063	0.2618	0.2566	0.2806	0.2457	0.1946	0.2115
INDEX(W)	1.74	1.62	2.19	3.51	3.71	3.97	2.23	1.88	2.23
AVG(SD)	1.85(0.30)			3.73(0.23)			2.11(0.20)		

WEIGHT(g)	LH0			LHA10			LHA20		
	1	2	3	1	2	3	1	2	3
W(0)	0.0624	0.0650	0.0628	0.0639	0.0679	0.0696	0.0587	0.0649	0.0678
W(1)	0.1281	0.1417	0.1494	0.1881	0.2011	0.2154	0.1071	0.1319	0.1352
INDEX(W)	1.05	1.18	1.38	1.94	1.96	2.09	0.82	1.03	0.99
AVG(SD)	1.20(0.17)			2.00(0.08)			0.95(0.11)		

WEIGHT(g)	LHA30		
	1	2	3
W(0)	0.0702	0.0744	0.0647
W(1)	0.1691	0.1963	0.1495
INDEX(W)	1.41	1.64	1.31
AVG(SD)	1.45(0.17)		

Table 32 The data of film swelling in dilute HCl solution (swelling index (w)).

WEIGHT(g)	L0			M0			H0		
	1	2	3	1	2	3	1	2	3
W(0)	0.0537	0.0563	0.0525	0.0531	0.0487	0.0485	0.0591	0.0626	0.0552
W(1)	0.2383	0.2312	0.2248	1.2366	1.2623	1.2392	2.9511	2.8023	2.8776
INDEX(W)	3.44	3.11	3.28	22.29	24.92	24.55	57.21	56.42	51.13
AVG(SD)	3.28(0.17)			23.92(1.42)			54.92(3.31)		

WEIGHT(g)	LA10			LA20			LA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0545	0.0614	0.0599	0.0639	0.0637	0.0583	0.0513	0.0489	0.0484
W(1)	0.1540	0.1483	0.1586	0.1505	0.1521	0.1506	0.1204	0.1108	0.1038
INDEX(W)	1.83	1.42	1.65	1.36	1.39	1.58	1.35	1.27	1.14
AVG(SD)	1.63(0.21)			1.42(0.09)			1.25(0.11)		

WEIGHT(g)	LB10			LB20			LB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0580	0.0471	0.0609	0.0523	0.0524	0.0535	0.0519	0.0448	0.0528
W(1)	0.1714	0.1150	0.2073	0.2344	0.2429	0.2688	0.2773	0.2601	0.2808
INDEX(W)	1.96	1.44	2.40	3.48	3.64	4.02	4.34	4.81	4.32
AVG(SD)	1.93(0.48)			3.71(0.28)			4.49(0.28)		

WEIGHT(g)	LC10			LC20			LC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0573	0.0587	0.0593	0.0489	0.0555	0.0551	0.0633	0.0744	0.0733
W(1)	0.1763	0.1746	0.2055	0.2524	0.3594	0.3549	0.2651	0.3254	0.3396
INDEX(W)	2.08	1.97	2.47	4.16	5.48	5.44	3.19	3.37	3.70
AVG(SD)	2.17(0.26)			5.03(0.75)			3.42(0.26)		

Table 32 The data of film swelling in dilute HCl solution (swelling index (w))(cont.).

WEIGHT(g)	MA10			MA20			MA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0492	0.0492	0.0545	0.0611	0.0629	0.0637	0.0456	0.0504	0.0489
W(1)	0.8130	0.8763	0.9568	0.8367	0.7528	0.8063	0.6374	0.6170	0.6888
INDEX(W)	15.52	16.81	16.56	12.69	10.97	11.66	12.98	11.14	13.09
AVG(SD)	16.30(0.68)			11.77(0.87)			12.40(1.10)		

WEIGHT(g)	MB10			MB20			MB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0541	0.0518	0.0544	0.0550	0.0562	0.0579	0.0567	0.0569	0.0593
W(1)	1.1339	0.9667	1.2152	0.9267	0.9342	0.9741	0.5385	0.5827	0.6541
INDEX(W)	19.96	17.66	21.34	15.85	15.62	15.82	8.50	9.24	10.03
AVG(SD)	19.65(1.86)			15.76(0.13)			9.26(0.77)		

WEIGHT(g)	MC10			MC20			MC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0607	0.0581	0.0581	0.0412	0.0453	0.0376	0.0607	0.0622	0.0573
W(1)	1.6822	1.7548	1.6693	0.8887	0.8881	1.0160	0.3365	0.3375	0.3568
INDEX(W)	26.71	29.20	27.73	20.57	19.51	26.02	4.54	4.43	5.23
AVG(SD)	27.88(1.25)			22.03(3.49)			4.73(0.43)		

WEIGHT(g)	HA10			HA20			HA30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0607	0.0691	0.0662	0.0593	0.0541	0.0588	0.0515	0.0633	0.0605
W(1)	0.1992	0.1930	0.1968	0.2460	0.2399	0.2491	0.2385	0.2252	0.1985
INDEX(W)	2.28	1.79	1.97	3.15	3.43	3.24	3.63	2.56	2.28
AVG(SD)	2.01(0.25)			3.27(0.14)			2.82(0.71)		

Table 32 The data of film swelling in dilute HCl solution (swelling index (w))(cont.).

WEIGHT(g)	HB10			HB20			HB30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0452	0.0519	0.0481	0.0599	0.0595	0.0596	0.0588	0.0612	0.0662
W(1)	0.4874	0.5475	0.5411	0.3700	0.3681	0.4375	0.2568	0.3390	0.3018
INDEX(W)	9.78	9.55	11.25	5.18	5.19	6.34	3.37	4.54	3.56
AVG(SD)	10.19(0.92)			5.57(0.67)			3.82(0.63)		

WEIGHT(g)	HC10			HC20			HC30		
	1	2	3	1	2	3	1	2	3
W(0)	0.0859	0.0767	0.0822	0.0749	0.0659	0.8730	0.0444	0.0499	0.0516
W(1)	0.3926	0.3433	0.3714	2.3363	2.1848	2.6039	0.2136	0.2770	0.2033
INDEX(W)	3.57	3.48	3.52	30.19	32.15	28.83	3.81	4.55	2.94
AVG(SD)	3.52(0.05)			30.39(1.67)			3.77(0.81)		

WEIGHT(g)	LH0			LHA10			LHA20		
	1	2	3	1	2	3	1	2	3
W(0)	0.0582	0.0615	0.0644	0.0677	0.0595	0.0669	0.0552	0.0571	0.0635
W(1)	0.4217	0.4914	0.4349	0.2162	0.2086	0.2124	0.1840	0.1952	0.1998
INDEX(W)	6.25	6.99	5.75	2.19	2.51	2.17	2.33	2.42	2.15
AVG(SD)	6.33(0.62)			2.29(0.19)			2.30(0.14)		

WEIGHT(g)	LHA30		
	1	2	3
W(0)	0.0674	0.0702	0.0578
W(1)	0.1553	0.1816	0.1646
INDEX(W)	1.30	1.59	1.85
AVG(SD)	1.58(0.28)		

Table 33 The data of film swelling in deionized water (swelling index(v)).

BEFORE	L0			M0			H0		
THICKNESS	1	2	3	1	2	3	1	2	3
(mm)	53	67	54	67	68	57	57	66	75
	50	67	59	64	66	54	58	64	73
	48	66	59	68	62	53	62	72	71
	58	64	54	72	63	57	67	67	72
	54	65	57	68	62	55	62	62	52
AVG	52.60	65.80	55.60	67.80	64.20	55.20	61.20	66.20	74.60
SD	3.85	1.30	2.51	2.86	2.68	1.79	3.96	3.77	4.39
VOL(mm ³)	32.88	41.13	35.38	42.38	40.13	34.50	38.25	41.38	46.63
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	131	156	143	453	472	520	322	329	418
(mm)	135	151	164	354	454	480	330	338	362
	151	168	152	448	432	512	320	324	431
	124	171	148	432	510	520	290	368	322
	127	172	150	352	508	496	304	338	405
AVG	133.60	163.60	151.40	407.80	475.20	505.60	323.20	339.40	387.60
SD	10.57	9.50	7.80	50.63	33.96	17.34	16.04	17.08	44.91
mm*mm	39.5*39.9	38.2*39.0	39.1*40.8	58.2*60.2	65.4*65.0	60.2*62.0	52.0*51.0	51.2*49.4	50.2*51.3
VOL(mm ³)	210.56	243.73	241.53	1428.78	2020.08	1887.10	830.61	858.44	998.17
INDEX(V)	5.40	4.92	5.83	32.71	49.34	53.70	20.72	19.75	20.41
AVG(SD)	5.39(0.45)			45.25(11.07)			20.29(0.50)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	LA10			LA20			LA30		
	1	2	3	1	2	3	1	2	3
THICKNESS									
(mcm)	56	61	51	58	52	57	63	71	60
	61	64	66	57	48	54	61	65	64
	63	66	66	54	50	52	66	65	61
	54	55	52	56	51	54	71	69	53
	58	58	64	54	48	58	66	67	60
AVG	58.40	58.00	59.80	55.80	49.80	55.00	65.40	67.40	59.60
SD	3.65	4.44	7.63	1.79	1.79	2.19	3.78	2.61	4.04
VOL(mm ³)	36.50	36.25	35.38	34.88	31.13	34.38	40.83	42.13	37.25
AFTER									
THICKNESS	100	106	106	107	93	112	120	111	106
(mcm)	104	117	121	111	94	108	109	120	101
	121	132	118	105	101	103	103	102	100
	126	122	109	110	98	105	117	111	84
	115	116	115	104	99	107	115	106	97
AVG	113.20	115.90	113.80	107.40	97.00	107.00	112.80	110.00	97.60
SD	11.03	10.10	6.22	3.05	3.39	3.39	6.80	6.75	8.26
mm*mm	32.3*31.2	32.5*33.2	30.0*31.2	30.9*31	29.1*29.5	32.8*30	33.0*33.1	31.5*30.4	30.2*31.2
VOL(mm ³)	114.08	125.06	106.52	102.88	83.27	105.29	123.21	105.34	91.96
INDEX(V)	2.13	2.45	1.85	1.95	1.67	2.06	2.01	1.50	1.47
AVG(SD)	2.14(0.30)			1.90(0.20)			1.66(0.31)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFOFE	LB10			LB20			LB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(microm)	72	78	80	65	65	73	64	64	67
	62	81	81	60	63	72	76	68	61
	74	83	85	60	70	80	62	72	63
	78	78	88	64	73	84	61	71	64
	75	81	84	60	76	81	66	70	63
AVG	72.2	80.2	83.6	61.8	69.4	78	65.8	69	63.6
SD	6.10	2.17	3.21	2.49	5.41	5.24	6.02	3.16	2.19
VOL(mm ³)	45.13	50.13	52.25	38.63	43.38	48.75	41.13	43.13	39.75
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	142	137	135	100	120	133	148	161	135
(microm)	151	142	150	98	121	126	150	153	155
	137	150	136	100	114	148	146	168	156
	145	136	140	100	120	133	138	170	139
	147	142	147	102	120	140	143	177	146
AVG	144.40	141.40	141.60	100.00	119.00	136.00	145.00	165.80	146.20
SD	5.27	5.55	6.66	1.41	2.83	8.34	4.69	3.00	9.36
mm*mm	35.0*34.8	35.2*35.0	35.8*35.8	35.1*36.0	36.8*37.0	37.2*37.2	31.5*32.5	32.8*34.2	33.0*32.9
VOL(mm ³)	179.90	174.20	181.48	126.36	162.03	188.20	148.44	185.99	158.73
INDEX(v)	2.99	2.47	2.47	2.27	2.74	2.86	2.61	3.31	2.99
AVG(SD)	2.64(0.30)			2.62(0.31)			2.97(35.22)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	LC10			LC20			LC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	48	50	53	54	55	66	71	68	70
	51	57	56	53	56	67	71	70	70
	58	55	48	53	58	58	74	71	69
	61	49	51	55	55	57	76	71	68
	55	57	51	55	55	57	74	69	68
AVG	54.60	53.60	51.80	54.00	55.80	61.00	73.20	69.80	69.00
SD	5.22	3.85	2.95	1.00	1.30	5.05	2.17	1.30	1.00
VOL(mm ³)	34.13	33.50	32.38	33.75	34.88	38.13	45.75	43.63	43.13
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	103	114	112	131	135	134	135	135	122
(mcm)	133	112	110	128	132	132	145	128	128
	127	119	104	126	128	133	144	124	134
	114	113	99	130	128	132	139	129	131
	125	117	101	129	139	131	139	126	129
AVG	1220.40	115.00	105.20	128.80	132.40	132.40	140.40	128.40	128.80
SD	11.91	2.92	5.63	1.92	4.72	1.14	4.10	4.16	4.44
mm*mm	34.9*34.1	35.8*33.2	31.9*32.0	35.9*36.6	37.0*37.0	35.8*36.3	35.3*35.4	34.0*32.3	35.0*35.2
VOL(mm ³)	143.20	136.68	107.39	169.24	181.26	172.06	175.45	141.01	158.68
INDEX(V)	3.20	3.08	2.32	4.01	4.20	3.51	2.84	2.23	2.68
AVG(SD)	2.86(0.48)			3.91(0.35)			2.58(0.31)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	MA10			MA20			MA30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	59	64	75	75	79	72	64	77	60
	63	61	68	76	77	70	68	71	61
	61	60	61	76	81	73	70	64	63
	60	59	64	75	77	77	68	61	63
	60	61	70	75	78	75	68	68	62
AVG	60.60	61.00	67.60	75.40	78.40	73.40	67.60	68.20	61.80
SD	1.52	1.87	5.41	0.55	1.67	2.70	2.19	6.22	1.30
VOL(mm ³)	37.88	38.13	42.25	47.13	49.00	45.88	42.25	42.63	38.63
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	205	230	233	228	241	200	199	215	197
(mcm)	214	214	220	245	226	207	165	218	191
	205	210	210	228	223	209	190	220	182
	205	215	235	228	254	215	197	219	188
	205	213	221	220	244	199	193	167	187
AVG	206.80	216.40	228.20	229.80	237.60	206.00	192.80	207.80	189.00
SD	4.02	7.83	7.12	9.18	12.93	6.63	5.59	22.88	5.52
mm*mm	41.3*41.0	44.8*42.0	42.3*44.0	41.2*41.2	44.2*43.0	41.3*41.7	38.2*39.0	38.5*40.6	38.0*38.8
VOL(mm ³)	350.17	407.18	424.73	390.07	451.58	354.78	287.23	324.81	278.66
INDEX(v)	8.24	9.68	9.05	7.28	8.22	6.73	5.80	6.62	2.68
AVG(SD)	8.99(0.72)			7.41(0.75)			6.21(0.41)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	MB10			MB20			MB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	77	77	79	72	71	82	76	70	82
	75	82	81	72	72	81	81	75	82
	73	80	74	72	71	83	77	76	81
	78	77	77	68	69	88	95	79	76
	76	81	80	72	72	83	70	80	80
AVG	75.8	79.4	78.2	71.2	71	83.4	79.8	76	80.2
SD	1.92	2.30	2.77	1.79	1.22	2.70	9.36	3.94	2.49
VOL(mm ³)	47.38	49.63	48.88	44.50	44.38	52.13	49.88	47.50	50.13
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	274	293	251	235	254	290	217	229	239
(mcm)	218	320	271	220	268	308	224	220	230
	233	298	292	249	262	281	214	221	231
	252	272	273	252	240	278	230	209	230
	243	290	275	251	254	283	222	227	234
AVG	244.00	294.60	272.40	241.40	255.60	288.00	221.40	221.20	232.80
SD	20.99	17.26	14.59	13.79	10.53	12.02	6.23	7.82	3.83
mm*mm	45.0*44.8	44.9*43.8	45.6*44.8	45.0*44.7	44.6*44.0	43.6*43.6	45.4*45.6	45.8*46.8	46*44.8
VOL(mm ³)	491.90	579.37	556.48	485.58	501.59	547.48	458.35	474.13	479.75
INDEX(V)	9.38	10.67	10.38	9.91	10.30	9.50	8.19	8.98	8.57
AVG(SD)	10.15(0.68)			9.91(0.40)			8.58(0.40)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	MC10			MC20			MC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcn)	77	74	75	68	72	73	63	78	87
	76	74	72	75	67	80	82	72	88
	76	75	71	76	65	73	80	71	92
	76	75	79	75	65	72	85	76	87
	74	75	74	71	68	76	81	75	92
AVG	75.80	74.60	74.20	73.00	67.40	75.80	82.20	74.40	89.20
SD	1.10	0.55	3.11	3.39	2.88	3.35	1.92	2.88	2.59
VOL(mm ³)	47.38	46.63	46.38	45.63	42.13	47.38	51.38	46.50	55.75
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	430	492	492	341	418	440	202	189	222
(mcn)	458	488	502	227	360	382	221	199	225
	428	482	456	333	365	425	212	193	223
	432	480	452	321	370	462	204	188	222
	440	468	462	327	362	416	210	190	223
AVG	437.60	482.00	472.80	309.80	375.00	425.00	209.80	191.80	223.00
SD	12.28	9.17	22.65	46.87	24.33	29.68	7.50	4.44	1.22
mm*mm	74.0*71.2	74.0*74.8	73.2*71.1	54.2*53.6	55.2*53.1	56.8*56.2	35.0*36.2	36.4*36.0	36.0*36.0
VOL(mm ³)	2305.53	2667.97	2460.70	900.01	1099.17	1356.67	265.82	251.33	289.01
INDEX(V)	47.66(4.28)	56.22	52.06	18.72	25.09	27.63	4.17	4.40	4.18
AVG(SD)	51.98(4.28)			23.82(4.59)			4.25(13.06)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	HA10			HA20			HA30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	72	82	80	60	59	56	70	68	73
	77	84	87	69	63	64	74	61	77
	72	77	86	75	60	61	71	69	79
	74	72	85	63	65	58	78	75	72
	77	83	75	71	65	59	75	69	78
AVG	74.40	79.60	82.60	67.60	62.40	59.60	73.60	68.40	75.80
SD	2.51	5.03	5.03	6.07	2.79	3.05	3.21	4.98	3.11
VOL(mm ³)	46.50	49.75	51.63	42.25	39.00	37.25	46.00	42.75	47.38
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	129	173	153	151	125	137	172	170	163
(mcm)	155	153	155	151	136	138	169	171	175
	144	159	178	128	132	121	174	160	168
	145	164	182	139	135	116	165	171	170
	156	158	173	138	133	121	173	171	174
AVG	145.80	161.40	168.20	141.40	132.20	126.60	170.60	168.60	170.00
SD	10.89	7.57	13.37	9.76	4.32	10.16	3.65	4.83	4.85
mm*mm	31.8*32.8	32.9*30.9	33.1*31.9	31.3*31.8	31.2*32.0	32.1*30.9	33.5*34.7	34.8*36.1	34.1*34.3
VOL(mm ³)	152.08	164.08	177.60	140.74	131.99	125.57	198.31	211.81	198.84
INDEX(v)	2.27	2.30	2.44	2.33	2.38	2.37	3.31	3.95	3.20
AVG(SD)	2.34(0.09)			2.36(0.03)			3.49(0.41)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	HB10			HB20			HB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	69	72	68	72	77	61	56	72	70
	71	77	61	72	67	59	61	54	72
	70	78	64	75	67	77	71	60	80
	69	61	71	71	75	73	72	75	71
	82	71	65	71	79	72	67	65	75
AVG	72.20	71.80	65.80	72.20	73.00	68.40	65.40	65.20	73.60
SD	5.54	6.76	3.83	1.64	5.66	7.92	6.80	8.58	4.04
VOL(mm ³)	45.13	44.88	41.13	45.13	45.63	42.75	40.88	40.75	46.00
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	160	170	170	194	210	153	150	85	153
(mcm)	165	183	155	191	214	192	131	114	142
	152	170	142	191	192	135	104	142	145
	160	170	163	188	143	190	122	120	163
	168	178	155	187	144	184	143	122	154
AVG	161.00	174.20	157.00	190.20	180.60	170.80	130.00	116.60	151.40
SD	6.08	6.02	10.46	2.77	34.87	25.45	18.10	20.56	8.26
mm*mm	41.2*42.3	41.2*40.0	41.4*40	38*38.3	38.3*39.1	37.4*37.2	31.8*32.0	31.2*31.2	32.0*31.5
VOL(mm ³)	280.58	287.08	259.99	276.82	270.45	237.63	132.29	113.50	152.61
INDEX(V)	5.22	5.40	5.32	5.14	4.93	4.56	2.24	1.79	2.32
AVG(SD)	5.31(0.09)			4.87(0.29)			2.11(0.29)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	HC10			HC20			HC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	81	74	74	75	75	84	88	83	92
	87	71	79	67	73	75	82	79	65
	88	65	87	73	64	65	97	81	68
	82	61	81	70	78	78	100	90	93
	83	67	82	68	81	73	94	83	78
AVG	84.20	67.60	80.60	70.60	74.20	75.00	92.20	83.20	79.20
SD	3.11	5.08	4.72	3.36	6.46	6.96	7.22	4.15	13.07
VOL(mm ³)	52.63	42.25	50.38	44.13	46.38	46.88	57.63	52.00	49.50
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	166	146	178	174	155	170	177	171	211
(mcm)	179	146	169	166	171	150	187	200	193
	161	133	157	193	195	200	244	167	171
	152	158	158	186	199	220	219	161	142
	158	140	177	173	175	200	223	171	189
AVG	161.20	144.60	167.80	176.40	179.00	188.00	210.00	174.00	181.10
SD	10.47	9.21	10.03	14.15	18.11	27.75	27.50	15.10	26.12
mm*mm	35.2*36.3	35.2*34.8	34.2*35.3	42.4*41.8	41.0*41.0	40.0*42.0	35.9*37.8	33.8*34.0	34.0*35.2
VOL(mm ³)	205.97	177.13	202.58	312.64	300.90	315.84	284.97	199.96	216.86
INDEX(V)	2.91	3.19	3.02	6.08	5.49	5.74	3.94	2.85	3.38
AVG(SD)	3.04(0.14)			5.77(0.30)			3.39(0.55)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	LH0			LHA10			LHA20		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	67	73	70	69	81	72	62	61	73
	67	74	73	70	88	76	65	81	70
	74	77	72	71	75	81	68	88	75
	71	76	76	73	70	78	55	72	85
	75	80	77	71	81	78	63	71	79
AVG	70.80	76.00	73.60	70.80	79.00	77.00	62.60	74.60	76.40
SD	3.77	2.74	2.88	1.48	6.82	3.32	4.83	10.31	5.81
VOL(mm ³)	44.25	47.50	46.00	44.25	49.38	48.13	39.13	46.63	47.75
AFTER	1	2	3	2	2	3	1	2	3
THICKNESS	137	149	133	160	180	170	149	131	131
(mcm)	120	146	141	164	199	183	139	157	128
	120	132	142	160	151	183	112	1	156
	138	152	151	155	146	158	115	50	143
	138	143	148	163	180	154	117	120	141
AVG	130.60	144.40	143.00	160.40	171.20	169.60	126.40	141.00	139.80
SD	9.69	7.70	6.96	3.51	22.20	13.58	16.55	139.80	11.08
mm*mm	32.2*33.0	32.0*33.0	34.0*31.8	35.4*37.0	37.0*36.8	37.0*35.8	30.8*30.4	31.8*30.4	30.3*30.2
VOL(mm ³)	138.78	152.49	154.61	210.09	233.11	224.65	118.35	135.15	127.92
INDEX(V)	2.14	2.21	2.36	3.75	3.72	3.67	2.02	1.90	1.68
AVG(SD)	2.24(0.11)			3.71(0.04)			1.87(0.17)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	LHA30		
	1	2	3
THICKNESS			
(mcm)	88	88	67
	80	88	68
	78	77	77
	82	72	76
	79	84	76
AVG	81.40	81.80	72.80
SD	3.97	7.09	4.87
VOL(mm ³)	50.88	51.13	45.50
AFTER	1	2	3
THICKNESS	180	144	123
(mcm)	173	156	152
	167	183	151
	153	182	133
	165	171	148
AVG	167.60	167.20	141.40
SD	10.04	16.93	12.82
mm*mm	32.3*33.3	33.6*34.0	32.5*33.3
VOL(mm ³)	180.27	190.01	153.03
INDEX(V)	2.54	2.74	2.36
AVG(SD)	2.55(0.19)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))

BEFORE	L0			M0			H0		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	78	75	71	74	65	71	78	81	79
	75	83	72	73	71	70	78	83	81
	78	83	78	73	71	70	76	85	75
	76	77	75	76	69	69	69	90	73
	75	82	75	74	71	69	78	80	71
AVG	76.40	80.00	74.20	74.00	69.40	69.80	75.80	83.80	75.80
SD	1.52	3.74	2.77	1.22	2.61	0.84	3.90	3.96	4.15
VOL(mm ³)	47.75	50.00	46.38	46.25	43.38	43.63	47.38	52.38	47.38
AFTER		2	3	1	2	3	1	2	3
THICKNESS	168	156	157						
(mcm)	175	151	168						
	172	168	164						
	173	171	156						
	164	172	164						
AVG	170.40	163.60	161.80						
SD	4.39	9.50	5.12						
mm*mm	43.1*42.1	38.2*39.0	42.9*41.0						
VOL(mm ³)	309.19	243.73	284.59						
INDEX(V)	5.48	4.92	5.14						
AVG(SD)	5.20(0.26)			#			#		

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Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	LA10			LA20			LA30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	83	65	61	81	82	77	71	65	61
	82	60	61	84	87	80	69	60	61
	62	59	79	86	86	71	62	59	79
	66	63	81	85	78	70	65	63	81
	68	59	66	83	85	75	63	59	66
AVG	72.20	61.20	69.60	83.80	83.60	74.60	67.20	61.20	69.60
SD	9.65	2.68	9.74	1.92	3.65	4.16	3.42	2.68	9.74
VOL(mm ³)	45.13	38.25	43.50	52.38	52.25	46.63	42.00	38.25	43.50
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	136	150	143	150	137	140	113	111	112
(mcm)	146	143	131	143	140	132	123	101	102
	154	146	134	142	152	123	107	111	120
	150	154	150	142	147	126	115	104	113
	151	151	143	142	152	126	113	107	101
AVG	147.40	148.80	140.20	143.80	145.60	129.40	114.20	106.80	109.60
SD	6.99	4.32	7.66	3.49	6.88	6.77	5.76	4.38	8.02
mm*mm	31.4*30.8	32.1*31.8	32.3*32.7	30.0*31.7	31.2*30.8	33.0*32.1	31.2*31.2	31.2*31.7	31.1*30.9
VOL(mm ³)	142.55	151.89	148.08	140.86	139.92	137.07	111.17	105.63	105.32
INDEX(v)	2.16	2.97	2.40	1.69	1.68	1.94	1.65	1.76	1.42
AVG(SD)	2.51(0.42)			1.77(0.15)			1.61(0.17)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	LB10			LB20			LB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	78	71	71	62	62	70	62	52	51
	71	75	75	64	61	63	65	55	54
	68	64	81	67	63	62	64	51	61
	75	59	77	63	62	64	68	51	62
	71	61	76	63	61	62	63	51	59
AVG	72.6	66	76	63.8	61.8	64.2	64.4	52	57.4
SD	6.10	6.78	3.61	1.92	0.84	3.35	2.30	1.73	4.72
VOL(mm ³)	45.38	41.25	47.50	39.88	38.63	40.13	40.25	32.50	35.88
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	157	118	164	175	170	172	216	179	183
(mcm)	153	126	162	163	166	181	207	182	181
	136	121	175	165	156	169	190	180	208
	142	111	163	177	162	167	192	169	189
	148	118	165	169	160	163	198	173	182
AVG	147.20	118.80	165.80	169.80	162.80	170.40	200.60	176.60	188.60
SD	8.41	5.45	5.26	6.10	5.40	6.77	10.85	5.41	11.28
mm*mm	33.8*32.8	31.1*32.1	32.1*34.1	37.4*38.0	39.0*39.0	39.8*38.2	40.0*39.2	40.1*39.2	40.4*40.0
VOL(mm ³)	163.19	118.60	181.49	241.32	247.62	259.07	314.54	277.60	304.78
INDEX(V)	2.60	1.88	2.82	5.05	5.41	5.46	6.81	7.54	7.49
AVG(SD)	2.43(0.49)			5.31(0.22)			7.28(0.41)		

Table 34 The data of film swelling in dilute HCl(1:100) solution (swelling index(v)).

BEFORE	LC10			LC20			LC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	64	61	76	53	70	57	71	85	85
	67	63	71	60	71	65	71	85	85
	64	68	66	53	66	70	74	87	80
	65	65	62	52	56	62	73	88	81
	68	68	68	60	63	63	72	90	84
AVG	65.60	65.00	67.60	55.60	65.20	63.40	72.20	87.00	83.00
SD	1.82	3.08	3.78	4.04	6.06	4.72	1.30	2.12	2.35
VOL(mm ³)	41.00	40.63	42.25	34.75	40.75	39.63	45.13	54.38	51.88
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	149	133	130	175	195	200	162	202	193
(mcm)	153	150	134	165	171	175	176	205	205
	151	150	150	140	181	163	183	218	218
	149	155	144	155	173	195	168	201	201
	154	154	151	142	170	165	173	202	202
AVG	151.20	148.40	141.80	155.40	178.00	179.60	172.40	208.20	203.80
SD	2.28	8.91	9.44	14.94	10.44	17.05	7.96	8.14	9.09
mm*mm	32.8*34.1	33.0*32.8	34.1*35.3	42.8*40.0	44.1*43.0	42.0*44.1	39.3*40.3	40.5*40.0	40.3*41.0
VOL(mm ³)	169.11	160.63	170.69	266.04	337.54	332.66	273.05	337.28	336.74
INDEX(V)	3.12	2.95	3.04	6.66	7.28	7.39	5.05	5.20	5.49
AVG(SD)	3.04(0.09)			7.11(0.39)			5.25(0.22)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	MA10			MA20			MA30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	72	57	71	72	73	73	60	59	58
	61	55	65	68	72	73	58	55	55
	64	54	62	73	72	72	56	61	58
	58	56	74	77	71	78	58	61	59
	61	53	63	71	72	75	58	63	56
AVG	63.20	55.00	67.00	72.20	72.00	74.20	58.00	59.80	57.20
SD	5.36	1.58	5.24	3.27	0.71	2.39	1.41	3.03	1.64
VOL(mm ³)	39.50	34.38	41.88	45.13	45.00	46.38	36.25	37.38	35.75
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	262	256	316	331	305	317	250	262	260
(mcm)	251	248	324	327	300	314	241	262	254
	260	237	285	311	297	324	237	254	265
	251	234	282	309	281	295	238	244	268
	252	248	282	323	283	309	230	253	262
AVG	255.20	244.60	297.80	320.20	293.20	312.50	239.20	255.00	261.80
SD	5.36	8.99	20.50	9.76	10.64	12.40	7.26	7.48	5.31
mm*mm	54.6*55.2	55.2*56.0	54.2*54.4	49.2*50.0	50.0*50.0	49.5*50	53.4*52.4	54.0*53.2	50.0*50.0
VOL(mm ³)	769.15	756.11	878.06	787.69	733.00	773.44	669.32	732.56	654.50
INDEX(V)	18.47	20.99	19.97	16.45	15.29	15.68	17.46	18.60	17.31
AVG(SD)	19.81(1.27)			15.81(0.59)			17.79(0.71)		

Table 34 The data of film swelling in dilute HCl(1:100) solution (swelling index(v))(cont.).

BEFORE	MB10			MB20			MB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	67	71	71	66	68	68	75	75	78
	70	72	71	66	71	71	72	80	78
	69	72	72	68	70	70	78	77	78
	71	66	74	66	71	67	73	74	78
	72	68	71	64	68	68	72	73	75
AVG	69.80	69.80	71.80	66.00	69.60	68.80	74.00	75.80	77.40
SD	1.92	2.68	1.30	1.41	1.52	1.64	2.55	2.77	1.34
VOL(mm ³)	43.63	43.63	44.88	41.25	43.50	43.00	46.25	47.38	48.38
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	232	252	271	265	288	280	230	261	268
(mcm)	242	253	291	243	282	286	235	263	278
	251	241	259	235	296	263	252	268	254
	227	262	261	242	261	280	252	262	248
	236	254	258	251	264	275	230	257	252
AVG	237.60	252.40	268.00	247.20	278.20	276.80	239.80	262.20	260.00
SD	9.29	7.50	13.86	11.45	15.21	8.64	11.32	3.96	12.57
mm*mm	55.6*55.8	53.2*54.3	55.6*55.1	57.0*55.0	55.0*53.2	53.8*56.8	49.0*47.2	48.1*49.3	49.9*49.5
VOL(mm ³)	737.15	729.12	821.03	774.97	614.01	845.86	554.61	621.76	642.21
INDEX(V)	15.90	15.71	17.29	17.79	17.71	18.67	10.99	12.12	12.27
AVG(SD)	16.30(0.86)			18.06(0.53)			11.79(0.70)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	MC10			MC20			MC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	71	72	72	65	43	52	77	72	78
	71	72	73	63	50	51	76	67	73
	70	71	72	61	46	53	78	74	74
	71	71	71	54	44	52	84	74	76
	72	71	72	53	48	51	77	70	76
AVG	71.00	71.40	72.00	59.20	46.20	51.80	78.40	71.40	75.40
SD	0.71	0.55	0.71	5.40	2.86	0.89	3.21	2.97	1.95
VOL(mm ³)	44.38	44.63	45.00	37.00	28.88	32.38	49.00	44.63	47.13
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS				252	239	255	390	362	302
(mcm)				252	203	272	372	371	303
				252	213	246	418	368	270
				260	203	251	406	350	281
				262	221	262	412	353	275
AVG				255.60	215.80	257.20	399.60	360.80	286.20
SD				4.98	15.01	10.13	18.62	9.15	15.39
mm*mm				55.5*56.0	57.1*55.8	55.6*54.4	36.0*36.0	36.2*34.0	35.8*35.2
VOL(mm ³)				794.40	687.58	777.94	517.88	444.07	360.66
INDEX(V)				20.47	22.81	23.03	7.16	8.95	6.65
AVG(SD)	#			22.10(1.42)			7.59(1.21)		

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Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	HA10			HA20			HA30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	68	73	81	72	61	71	59	70	69
	70	81	73	71	63	68	61	72	78
	75	87	74	78	63	74	61	74	67
	73	86	83	71	74	80	59	78	72
	72	83	80	72	63	75	59	75	71
AVG	71.60	82.00	78.20	72.80	64.80	73.60	59.80	73.80	71.40
SD	2.70	5.57	4.44	2.95	5.22	4.51	1.10	3.03	4.16
VOL(mm ³)	44.75	51.25	48.88	45.50	40.50	46.00	37.38	46.13	44.63
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	198	199	197	192	182	200	174	190	170
(mcm)	201	182	179	204	180	195	185	186	164
	204	197	175	203	176	195	191	188	160
	197	206	179	204	174	197	175	190	164
	200	185	194	201	174	195	181	189	173
AVG	200.00	193.80	184.80	200.80	177.20	196.40	181.20	188.60	166.00
SD	2.74	10.03	9.96	5.07	3.63	2.19	7.09	1.67	4.90
mm*mm	33.6*32.0	32.2*31.9	33.1*32.0	36.0*36.0	36.0*36.0	34.5*35.2	34.2*36.0	35.2*36.1	34.9*34.9
VOL(mm ³)	215.04	199.07	195.74	260.24	229.65	238.51	223.09	239.66	202.19
INDEX(V)	3.81	2.88	3.00	4.72	4.67	4.19	4.97	4.20	3.53
AVG(SD)	3.23(0.51)			4.53(0.29)			4.23(0.72)		

Table 33 The data of film swelling in deionized water (swelling index(v))(cont.).

BEFORE	HB10			HB20			HB30		
THICKNESS	1	2	3	1	2	3	1	2	3
(μcm)	53	61	62	75	77	72	70	73	72
	57	67	65	76	82	76	84	75	81
	53	61	55	83	76	78	78	83	82
	52	63	51	75	72	76	72	78	83
	53	59	55	78	74	75	73	77	79
AVG	53.40	62.20	57.60	77.40	76.20	75.40	75.40	77.20	79.40
SD	2.07	3.03	5.73	3.36	3.77	2.19	5.64	3.77	4.39
VOL(mm^3)	33.38	38.88	36.00	48.38	47.63	47.13	47.13	48.25	49.63
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	201	227	218	230	234	243	182	207	236
(μcm)	184	224	203	243	227	250	180	211	220
	188	186	206	245	245	231	201	215	218
	175	192	211	235	245	250	200	224	223
	190	204	200	239	231	241	176	201	211
AVG	187.60	206.60	207.60	238.40	236.40	243.00	187.80	211.60	221.60
SD	9.45	18.46	7.09	6.07	8.23	7.84	11.80	8.65	9.18
mm*mm	5.20*5.18	50.0*48.0	48.0*49.2	41.0*41.5	42.6*41.7	42.0*42.1	36.0*36.0	36.2*36.0	36.1*36.2
VOL(mm^3)	505.32	495.84	490.27	405.64	419.95	429.67	243.39	275.76	289.59
INDEX(V)	14.14	11.75	12.62	7.38	7.82	8.12	4.16	4.72	4.83
AVG(SD)	12.84(1.21)			7.77(0.37)			4.57(0.36)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	HC10			HC20			HC30		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	97	88	107	86	82	104	71	71	68
	101	94	110	90	77	104	51	68	65
	107	94	14	89	78	106	57	58	63
	103	89	100	89	80	103	63	71	65
	105	90	112	88	79	111	68	62	65
AVG	102.60	91.00	108.60	88.40	79.20	105.60	62.00	66.00	65.20
SD	3.85	2.83	5.46	1.52	1.92	3.21	8.12	5.79	1.79
VOL(mm ³)	63.75	56.88	67.88	55.25	49.50	65.63	38.75	41.25	40.75
AFTER	1	2	3	1	2	3	1	2	3
THICKNESS	261	245	272	300	328	348	180	166	171
(mcm)	290	265	283	298	340	361	159	193	179
	263	228	275	281	333	341	150	208	171
	280	235	212	236	352	374	185	168	163
	282	252	276	224	326	341	163	156	168
AVG	275.20	245.00	273.60	267.80	335.80	353.00	167.40	178.20	170.40
SD	12.64	14.47	7.64	35.54	10.55	14.30	14.67	21.52	5.81
mm*mm	36.8*36.7	36.7*37.0	35.8*36.2	65.0*67.8	64.2*63.8	66.0*64.1	41.2*39.1	38.0*41.0	35.0*36.0
VOL(mm ³)	371.67	332.69	354.57	1180.19	1375.42	1493.40	268.36	277.64	214.70
INDEX(v)	4.83	4.85	4.22	20.36	26.79	21.75	5.93	5.73	4.27
AVG(SD)	4.63(0.36)			22.97(3.38)			5.31(0.91)		

Table 34 The data of film swelling in dilute HCl(1:100) solution
(swelling index(v))(cont.).

BEFORE	LH0			LHA10			LHA20		
THICKNESS	1	2	3	1	2	3	1	2	3
(mcm)	70	72	71	85	77	89	65	75	74
	70	72	76	84	77	75	61	75	79
	72	73	78	82	74	76	66	61	83
	69	80	74	81	72	87	74	76	74
	68	72	78	83	74	80	65	66	81
AVG	69.80	73.80	75.40	83.00	74.80	81.40	66.20	70.60	78.20
SD	1.48	3.49	2.97	1.58	2.17	6.35	4.75	6.73	4.09
VOL(mm ³)	43.63	46.13	47.13	51.88	46.75	50.88	41.33	44.13	48.88
AFTER	1	2	3	2	2	3	1	2	3
THICKNESS	223	247	221	194	173	221	143	181	178
(mcm)	238	250	245	205	178	225	153	154	185
	215	265	236	198	180	194	152	156	168
	200	240	204	188	174	186	161	161	174
	199	245	210	192	176	190	149	178	161
AVG	215.00	249.40	223.20	195.40	176.20	203.20	151.60	166.00	173.20
SD	16.39	9.45	17.22	6.47	2.86	18.35	6.54	12.63	9.20
mm*mm	48.0*48.1	46.2*4.71	47.0*46.8	34.2*35.0	36.1*34.8	37.0*36.4	34.1*34.2	33.0*34.5	34.3*32.2
VOL(mm ³)	496.39	542.70	490.95	233.89	221.36	273.67	176.80	188.99	191.29
INDEX(V)	10.38	10.76	9.42	3.51	3.73	4.38	3.27	3.28	2.91
AVG(SD)	10.19(0.69)			3.87(0.45)			3.15(0.21)		

Table 34 The data of film swelling in dilute HCl(1:100) solution (swelling index(v))(cont.).

BEFORE	LHA30		
THICKNESS	1	2	3
(mcm)	86	83	77
	86	88	72
	85	88	76
	89	90	74
	88	87	73
AVG	86.80	87.20	74.40
SD	1.64	2.59	2.07
VOL(mm ³)	54.25	54.50	46.50
AFTER	1	2	3
THICKNESS	175	182	163
(mcm)	178	185	163
	180	190	163
	171	180	162
	175	186	155
AVG	175.80	184.60	157.20
SD	3.42	3.85	4.92
mm*mm	32.0*30.2	31.1*31.3	30.4*30.6
VOL(mm ³)	169.89	179.70	146.23
INDEX(V)	2.13	2.30	2.14
AVG(SD)	2.19(0.10)		

Table 35 The ultimate tensile strength and percentage of elongation of free films.

	L0			M0			H0		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	72	68	66	63	66	66	86	82	73
	74	64	69	61	65	66	83	84	74
	75	67	71	63	63	67	84	82	77
	69	61	73	63	63	63	86	81	73
	71	71	68	66	61	61	87	81	71
AVG	72.20	66.20	69.40	63.20	63.60	64.60	85.20	82.00	73.60
SD	2.39	3.83	2.70	1.79	1.96	2.51	1.64	1.22	2.19
BREAKING FORCE(kg)	0.5643	0.546	0.6977	0.9004	0.927	0.9874	1.683	1.514	1.159
kg/(mmxmm)	1.95	2.06	2.51	3.56	3.64	3.82	4.94	4.62	3.94
AVG	2.18			3.68			4.50		
SD	0.30			0.13			0.51		
L-L0	0.35	0.32	0.7	0.32	0.43	0.34	0.09	0.08	0.1
ELONGATION(%)	17.50	16.00	35.00	16.00	21.50	17.00	4.50	4.00	5.00
AVG	22.83			18.17			4.50		
SD	10.56			2.93			0.50		

	LA10			LA20			LA30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	51	68	51	73	62	73	67	62	52
	51	68	51	72	67	77	62	62	53
	52	72	51	77	68	78	68	65	55
	52	67	50	73	63	76	64	58	53
	51	66	49	74	64	73	61	58	51
AVG	51.40	68.20	50.40	73.80	64.80	75.40	64.40	61.00	52.80
SD	0.55	2.28	0.89	1.92	2.59	2.30	3.05	3.00	1.48
BREAKING FORCE(kg)	0.2161	0.4623	0.1844	0.7965	0.7777	1.052	0.9009	1.169	0.6921
kg/(mmxmm)	1.05	1.69	0.91	2.70	3.00	3.49	3.50	4.79	3.28
AVG	1.22			3.06			3.86		
SD	0.42			0.40			0.82		
L-L0	0.81	0.92	1.20	0.98	0.81	0.72	0.5	0.72	0.2
ELONGATION(%)	40.50	46.00	60.00	49.00	40.50	36.00	25.00	36.00	10.00
AVG	48.83			41.83			23.67		
SD	10.05			6.60			13.05		

Table 35 The ultimate tensile strength and percentage of elongation of free films(cont.).

	LB10			LB20			LB30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	85	81	81	76	78	78	63	84	81
	81	78	75	72	80	72	61	82	73
	78	75	77	70	81	68	61	80	68
	84	77	76	77	81	72	63	81	67
	82	71	78	72	76	72	61	79	74
AVG	82.00	76.40	77.40	73.40	79.20	72.40	61.80	81.20	72.60
SD	2.74	3.71	2.30	2.97	2.17	3.58	1.10	1.92	5.59
BREAKING FORCE(kg)	1.181	0.9664	0.6969	0.571	0.6403	0.6617	0.8325	0.852	0.855
kg/(mmxmm)	3.60	3.16	2.25	1.94	2.02	2.28	3.37	2.62	2.94
AVG		3.00			2.08			2.98	
SD		0.69			0.18			0.37	
L-L0	1.10	1.20	1.10	0.57	0.4	0.68	1.09	1.1	1.13
ELONGATION(%)	55.00	60.00	55.00	28.50	20.00	34.00	54.50	55.00	56.50
AVG		56.67			27.50			55.33	
SD		2.89			7.05			1.04	

	LC10			LC20			LC30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	62	61	89	52	62	78	61	77	70
	63	62	86	55	57	83	62	81	70
	71	58	86	59	54	82	64	83	72
	72	61	82	53	56	78	56	75	71
	68	58	81	53	53	76	60	82	71
AVG	67.20	60.00	84.80	54.40	56.40	79.40	60.60	79.60	70.80
SD	4.55	1.87	3.27	2.79	3.51	2.97	2.97	3.44	0.84
BREAKING FORCE(kg)	0.644	0.723	0.6464	0.4239	0.3692	0.3809	1.013	0.9082	1.158
kg/(mmxmm)	2.40	3.01	1.91	1.95	1.59	1.20	4.18	2.85	4.09
AVG		2.44			1.58			3.71	
SD		0.55			0.37			0.74	
L-L0	0.76	0.99	0.96	0.7	0.72	0.68	0.7	0.94	0.72
ELONGATION(%)	38.00	49.50	48.00	35.00	36.00	34.00	35.00	17.00	36.00
AVG		45.17			35.00			29.33	
SD		6.25			1.00			10.69	

Table 35 The ultimate tensile strength and percentage of elongation of free films(cont.).

	MA10			MA20			MA30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	64	66	63	59	56	78	78	79	72
	66	72	66	63	58	73	76	85	72
	66	70	70	62	61	67	82	88	74
	68	67	68	62	61	75	73	87	74
	64	70	67	61	59	74	73	82	78
AVG	65.60	69.00	66.80	61.40	59.00	73.40	76.40	84.20	74.00
SD	1.67	2.45	2.59	1.52	2.12	4.04	3.78	3.70	2.45
BREAKING FORCE(kg)	0.7348	0.6494	0.5071	0.8199	0.5855	0.9702	1.022	1.174	1.241
kg/(mmxmm)	2.80	2.35	1.90	3.34	2.48	3.30	3.34	3.49	4.19
AVG		2.35			3.04			3.67	
SD		0.45			0.49			0.45	
L-L0	1.02	1.00	0.85	1.02	0.8	0.72	1.1	0.8	0.77
ELONGATION(%)	51.00	50.00	42.50	51.00	40.00	36.00	55.00	40.00	38.50
AVG		47.83			42.33			44.50	
SD		4.65			7.77			9.12	

	MB10			MB20			MB30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	77	75	67	94	78	85	93	96	92
	75	72	67	89	74	86	96	97	94
	77	72	66	93	77	83	95	97	92
	80	73	67	92	76	85	96	98	89
	77	71	65	93	77	85	94	98	93
AVG	77.20	72.60	66.40	92.20	76.40	84.80	94.80	97.20	92.00
SD	1.79	1.52	0.89	1.92	1.52	1.10	1.30	0.84	1.87
BREAKING FORCE(kg)	0.5936	0.7447	0.6555	1.722	1.463	1.548	1.313	1.454	1.432
kg/(mmxmm)	1.92	2.56	2.47	4.67	4.79	4.56	3.46	3.74	3.89
AVG		2.32			4.67			3.70	
SD		0.35			0.11			0.22	
L-L0	1.30	1.10	1.20	0.25	0.15	0.15	0.4	0.42	0.4
ELONGATION(%)	65.00	55.00	60.00	12.50	7.50	7.50	20.00	21.00	20.00
AVG		60.00			9.17			20.33	
SD		5.00			2.89			0.58	

Table 35 The ultimate tensile strength and percentage of elongation of free films(cont.).

	MC10			MC20			MC30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	72	89	78	77	55	68	82	92	96
	72	88	76	78	58	68	82	96	94
	73	84	79	80	58	68	83	95	93
	74	83	76	78	61	67	83	97	92
	76	82	81	75	61	68	83	97	92
AVG	73.40	85.20	78.00	77.60	58.60	67.80	82.60	95.20	93.40
SD	1.67	3.11	2.12	1.82	2.51	0.45	0.55	2.05	1.67
BREAKING FORCE(kg)	1.876	2.075	1.866	1.59	1.256	1.461	1.616	1.628	1.554
kg/(mmxmm)	6.39	6.09	5.98	5.12	5.36	5.39	4.89	4.28	4.16
AVG		6.15			5.29			4.44	
SD		0.21			0.15			0.39	
L-L0	0.02	0.02	0.02	0.27	0.20	0.24	0.43	0.48	0.40
ELONGATION(%)	1.00	1.00	1.00	13.50	10.00	12.00	21.50	24.00	20.00
AVG		1.00			11.83			21.83	
SD		0.00			1.76			2.02	

	HA10			HA20			HA30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mcm)	63	72	67	52	61	61	62	66	65
	62	68	62	57	60	59	64	68	63
	63	66	62	62	58	56	66	77	66
	63	67	63	61	56	53	68	72	71
	63	66	66	61	53	55	68	73	70
AVG	62.80	67.80	64.00	58.60	57.60	56.80	65.60	71.20	67.00
SD	0.45	2.49	2.35	4.16	3.21	3.19	2.61	4.32	3.39
BREAKING FORCE(kg)	1.029	1.067	1.055	1.386	1.42	1.06	1.026	1.181	1.209
kg/(mmxmm)	4.10	3.93	4.12	5.91	6.16	4.67	3.91	4.15	4.51
AVG		4.05			5.58			4.19	
SD		0.10			0.80			0.30	
L-L0	0.60	0.53	0.65	0.03	0.03	0.02	0.70	0.77	0.63
ELONGATION(%)	30.00	26.50	32.50	1.50	1.50	1.00	35.00	38.50	31.50
AVG		29.67			1.33			35.00	
SD		3.01			0.29			3.50	

Table 35 The ultimate tensile strength and percentage of elongation of free films(cont.).

	HB10			HB20			HB30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mm)	62	82	62	62	68	72	62	63	82
	63	78	62	62	68	72	63	78	82
	62	73	62	60	68	69	64	66	78
	62	72	63	61	70	74	63	68	77
	59	72	67	63	69	74	65	68	77
AVG	61.60	75.40	63.20	61.60	68.60	72.20	63.40	68.60	79.20
SD	1.52	4.45	2.17	1.14	0.89	2.05	1.14	5.64	2.59
BREAKING FORCE(kg)	0.8583	1.19	1.234	1.075	1.137	1.212	1.041	1.074	1.22
kg/(mmxmm)	3.48	3.95	4.88	4.36	4.14	4.20	4.10	3.91	3.85
AVG		4.10			4.23			3.96	
SD		0.71			0.11			0.13	
L-L0	0.47	0.44	0.54	0.20	0.28	0.22	0.20	0.52	0.22
ELONGATION(%)	23.50	22.00	27.00	10.00	14.00	11.00	10.00	26.00	11.00
AVG		24.17			11.67			15.67	
SD		2.57			2.08			8.96	

	HC10			HC20			HC30		
	1	2	3	1	2	3	1	2	3
THICKNESS (mm)	65	71	75	86	94	95	102	91	89
	63	77	76	87	99	102	102	91	86
	66	81	78	86	98	103	100	84	81
	73	82	82	85	97	99	96	83	81
	64	81	84	85	92	98	92	80	79
AVG	66.20	78.40	79.00	85.80	96.00	99.40	98.40	85.80	83.20
SD	3.96	4.56	3.87	0.84	2.92	3.21	4.34	4.97	4.15
BREAKING FORCE(kg)	1.323	1.574	1.617	2.055	2.23	2.179	2.071	1.844	1.988
kg/(mmxmm)	5.00	5.02	5.12	5.99	5.81	5.48	5.26	5.37	5.97
AVG		5.04			5.76			5.54	
SD		0.06			0.26			0.38	
L-L0	0.54	0.63	0.60	0.65	0.50	0.53	0.20	0.23	0.24
ELONGATION(%)	27.00	31.50	30.00	32.50	25.00	26.50	10.00	11.50	12.00
AVG		29.50			28.00			11.17	
SD		2.29			3.97			1.04	

Table 35 The ultimate tensile strength and percentage of elongation of free films(cont.).

	LH0			LHA10			LHA20		
	1	2	3	1	2	3	1	2	3
THICKNESS	57	64	49	77	78	62	81	83	80
(mcm)	57	61	49	75	72	65	82	81	77
	57	61	48	69	70	70	82	80	75
	54	61	51	67	68	73	81	78	72
	55	61	51	69	62	71	86	77	72
AVG	56.00	61.60	49.60	71.40	70.00	68.20	82.40	79.80	75.20
SD	1.41	1.34	1.34	4.34	5.83	4.55	2.07	2.39	3.42
BREAKING FORCE(kg)	1.317	0.9321	0.8333	0.9017	0.9232	0.7925	0.7256	0.7493	0.6848
kg/(mmxmm)	5.88	3.78	4.20	3.16	3.30	2.91	2.20	2.35	2.28
AVG		4.62			3.12			2.28	
SD		1.11			0.20			0.07	
L-L0	0.65	0.50	0.53	0.62	0.54	0.51	0.64	0.63	0.57
ELONGATION(%)	32.50	25.00	26.50	31.00	27.00	25.50	32.00	31.50	28.50
AVG		28.00			27.83			30.67	
SD		3.97			2.84			1.89	

	LHA30		
	1	2	3
THICKNESS	80	90	97
(mcm)	85	88	95
	84	89	92
	84	87	91
	84	85	88
AVG	83.40	87.80	92.60
SD	1.95	1.92	3.51
BREAKING FORCE(kg)	0.4499	0.4145	0.5348
kg/(mmxmm)	1.35	1.18	1.44
AVG		1.32	
SD		0.13	
L-L0	0.92	1.14	1.04
ELONGATION(%)	46.00	57.00	52.00
AVG		51.67	
SD		5.51	

VITAE

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