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Appendix A

Table 31 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 1 in 0.1 N HCl

0.1NHCl

FORMULATION	TIME (HR.)	%RELEASE	SD
1	0.00	0.00	0.00
	0.25	37.86	1.92
	0.50	47.96	2.18
	1.00	56.95	3.46
	1.50	63.22	4.20
	2.00	69.49	1.75
	4.00	85.55	2.47
	6.00	88.27	3.27
	8.00	90.50	1.94
	10.00	91.52	2.00
	12.00	92.91	3.02

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Table 32 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 2, 3 and 4 in 0.1 N HCl

0.1NHCl			
FORMULATION	TIME(HR.)	%RELEASE	SD
2	0.00	0.00	0.00
	0.25	35.13	1.19
	0.50	44.12	2.07
	1.00	52.41	2.91
	1.50	58.92	1.90
	2.00	65.42	0.98
	4.00	82.33	2.73
	6.00	86.12	3.74
	8.00	86.15	2.73
	12.00	90.89	3.29
3	0.00	0.00	0.00
	0.25	35.01	2.73
	0.50	43.30	2.91
	1.00	52.35	1.93
	1.50	58.40	4.38
	2.00	64.09	2.96
	4.00	80.27	3.89
	6.00	84.31	4.67
	8.00	85.36	2.09
	12.00	89.95	1.84
4	0.00	0.00	0.00
	0.25	34.97	2.93
	0.50	42.53	1.84
	1.00	52.28	3.92
	1.50	57.81	1.94
	2.00	63.33	3.29
	4.00	78.36	1.03
	6.00	83.55	2.01
	8.00	84.88	1.19
	12.00	88.01	1.28
	12.00	89.50	1.94

Table 33. Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 5, 6 and 7 in 0.1 N HCl

0.1NHCl			
FORMULATION	TIME(HR.)	%RELEASE	SD
5	0.00	0.00	0.00
	0.25	35.51	2.19
	0.50	44.70	1.92
	1.00	52.91	0.98
	1.50	59.42	2.30
	2.00	66.09	1.19
	4.00	82.76	1.83
	6.00	86.63	2.04
	8.00	86.94	4.39
	10.00	90.90	5.10
	12.00	91.02	2.85
6	0.00	0.00	0.00
	0.25	33.51	3.90
	0.50	44.10	2.81
	1.00	52.52	3.52
	1.50	58.69	4.39
	2.00	65.59	5.10
	4.00	81.52	6.03
	6.00	85.86	3.02
	8.00	86.37	0.79
	10.00	90.21	2.93
	12.00	90.87	3.28
7	0.00	0.00	0.00
	0.25	31.56	1.29
	0.50	43.66	2.39
	1.00	52.25	4.29
	1.50	57.75	5.39
	2.00	64.66	3.59
	4.00	80.63	2.19
	6.00	85.23	1.49
	8.00	86.04	3.92
	10.00	89.34	1.29
	12.00	90.37	2.19

Table 34 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 8, 9 and 10 in 0.1 N HCl

0.1NHCl

FORMULATION	TIME (HR.)	%RELEASE	SD
8	0.00	0.00	0.00
	0.25	38.26	2.91
	0.50	48.35	1.63
	1.00	57.43	2.95
	1.50	63.98	0.98
	2.00	69.97	1.76
	4.00	85.89	2.73
	6.00	88.85	3.78
	8.00	89.05	4.20
	10.00	91.14	5.91
9	0.00	0.00	0.00
	0.25	38.57	1.25
	0.50	48.65	1.73
	1.00	57.82	1.18
	1.50	64.25	1.27
	2.00	70.21	2.10
	4.00	86.49	2.83
	6.00	88.96	3.09
	8.00	89.43	4.27
	10.00	91.58	2.91
10	0.00	0.00	0.00
	0.25	38.75	0.93
	0.50	48.96	1.92
	1.00	58.26	2.19
	1.50	64.69	3.92
	2.00	71.01	1.90
	4.00	86.63	1.19
	6.00	89.02	1.29
	8.00	89.67	1.38
	10.00	90.84	3.29
	12.00	91.81	4.96



Table 35 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 1 in Phosphate Buffer pH 6.8

BUFFER			
FORMULATION	TIME (HR.)	%RELEASE	SD
1	0.00	0.00	0.00
	0.25	40.16	0.92
	0.50	44.88	1.27
	1.00	54.00	2.31
	1.50	61.47	4.21
	2.00	68.93	0.97
	4.00	85.11	1.45
	6.00	88.22	1.72
	8.00	90.13	2.42
	10.00	91.51	4.01
	12.00	92.06	3.64

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Table 36 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 2, 3 and 4 in Phosphate Buffer pH 6.8

BUFFER			
FORMULATION	TIME (HR.)	%RELEASE	SD
2	0.00	0.00	0.00
	0.25	35.24	1.23
	0.50	39.78	0.98
	1.00	47.60	1.12
	1.50	55.05	1.34
	2.00	62.50	2.45
	4.00	81.99	3.14
	6.00	84.23	4.12
	8.00	86.28	3.67
	12.00	87.94	2.98
3	0.00	0.00	0.00
	0.25	33.21	0.95
	0.50	39.29	0.89
	1.00	47.23	1.02
	1.50	54.74	2.20
	2.00	62.41	3.18
	4.00	80.89	1.43
	6.00	84.47	1.65
	8.00	85.50	2.38
	12.00	86.52	5.16
4	0.00	0.00	0.00
	0.25	31.20	2.12
	0.50	38.74	3.16
	1.00	46.93	1.08
	1.50	53.38	0.84
	2.00	62.07	0.13
	4.00	79.86	0.91
	6.00	82.13	1.27
	8.00	84.70	2.57
	12.00	85.62	2.31

Table 37 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 5, 6 and 7 in Phosphate Buffer pH 6.8

FORMULATION	TIME (HR.)	%RELEASE	SD
5	0.00	0.00	0.00
	0.25	31.47	1.28
	0.50	38.40	1.13
	1.00	47.71	2.15
	1.50	56.33	3.41
	2.00	64.64	2.64
	4.00	81.13	0.86
	6.00	85.69	2.31
	8.00	86.84	4.08
	10.00	88.99	1.02
12.00	89.45	1.39	
6	0.00	0.00	0.00
	0.25	29.29	1.07
	0.50	37.69	2.10
	1.00	47.53	1.94
	1.50	55.72	2.03
	2.00	64.41	1.84
	4.00	80.68	3.15
	6.00	84.54	0.92
	8.00	85.97	1.03
	10.00	87.68	2.04
12.00	88.81	4.42	
7	0.00	0.00	0.00
	0.25	27.52	1.93
	0.50	37.36	2.91
	1.00	47.04	3.21
	1.50	54.66	4.32
	2.00	64.21	2.47
	4.00	79.00	3.21
	6.00	83.59	4.03
	8.00	85.26	3.20
	10.00	86.71	5.02
12.00	87.35	2.31	

Table 38 Percent of Propranolol Hydrochloride Release from Coated

Sucrose Beads Formulation 8, 9 and 10 in Phosphate Buffer pH 6.8

BUFFER			
FORMULATION	TIME (HR.)	%RELEASE	SD
8	0.00	0.00	0.00
	0.25	34.49	1.26
	0.50	45.22	0.93
	1.00	54.35	1.10
	1.50	61.83	1.17
	2.00	69.24	2.19
	4.00	83.46	0.11
	6.00	88.56	4.30
	8.00	90.47	5.18
	12.00	92.40	3.90
9	0.00	0.00	0.00
	0.25	34.70	0.93
	0.50	45.45	0.40
	1.00	54.52	1.02
	1.50	61.94	1.26
	2.00	69.50	1.64
	4.00	83.63	2.93
	6.00	88.76	3.91
	8.00	90.67	3.28
	12.00	92.55	2.97
10	0.00	0.00	0.00
	0.25	34.91	2.01
	0.50	45.62	1.97
	1.00	54.73	3.62
	1.50	62.19	0.94
	2.00	69.66	2.79
	4.00	83.83	1.26
	6.00	88.96	1.83
	8.00	90.85	3.27
	12.00	92.22	0.76
	12.00	92.66	2.96

Table 39 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 1 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
1	0.00	0.00	0.00
	0.25	36.86	0.92
	0.50	42.31	1.19
	1.00	49.52	1.25
	1.50	58.95	2.93
	2.00	63.12	4.63
	4.00	77.52	3.74
	6.00	87.05	2.97
	8.00	88.49	2.84
	10.00	89.19	1.73
	12.00	89.91	3.28

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Table 40 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 2, 3 and 4 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
2	0.00	0.00	0.00
	0.25	28.10	1.37
	0.50	32.03	2.84
	1.00	39.58	3.28
	1.50	51.54	1.85
	2.00	52.58	2.84
	4.00	65.18	2.46
	6.00	76.88	3.19
	8.00	80.02	2.74
	10.00	81.48	2.83
	12.00	81.99	4.85
3	0.00	0.00	0.00
	0.25	26.67	1.30
	0.50	31.50	3.94
	1.00	39.32	4.31
	1.50	50.72	2.40
	2.00	51.31	1.12
	4.00	63.89	2.83
	6.00	76.53	1.29
	8.00	78.87	3.29
	10.00	80.20	1.75
	12.00	81.42	4.67
4	0.00	0.00	0.00
	0.25	25.09	0.99
	0.50	30.92	1.26
	1.00	38.87	1.19
	1.50	49.26	1.46
	2.00	49.85	3.27
	4.00	62.50	4.26
	6.00	74.99	5.01
	8.00	77.66	1.86
	10.00	79.82	3.94
	12.00	80.09	2.64

Table 41 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 5, 6 and 7 in pH Change Method

FORMULATION	TIME (HR.)	%RELEASE	SD
5	0.00	0.00	0.00
	0.25	28.63	1.29
	0.50	32.67	1.26
	1.00	40.68	2.35
	1.50	51.74	3.27
	2.00	53.38	4.10
	4.00	70.11	5.26
	6.00	77.92	4.74
	8.00	82.68	0.99
	10.00	84.78	1.63
	12.00	86.15	0.75
	6	0.00	0.00
0.25		27.13	1.10
0.50		32.31	2.83
1.00		40.25	2.15
1.50		50.61	4.28
2.00		52.56	2.81
4.00		74.92	3.12
6.00		79.54	2.74
8.00		81.54	3.81
10.00		83.69	2.78
12.00		85.25	4.92
7		0.00	0.00
	0.25	25.62	0.94
	0.50	31.56	0.86
	1.00	39.97	0.73
	1.50	49.46	1.02
	2.00	51.65	1.19
	4.00	67.43	2.93
	6.00	79.10	3.20
	8.00	80.31	4.10
	10.00	83.12	2.83
	12.00	84.25	3.42

Table 42. Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 8, 9 and 10 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
8	0.00	0.00	0.00
	0.25	38.21	1.90
	0.50	47.97	2.93
	1.00	57.30	4.39
	1.50	67.63	2.70
	2.00	69.82	3.94
	4.00	85.90	3.03
	6.00	88.65	2.91
	8.00	90.88	4.85
	12.00	92.89	5.01
9	0.00	0.00	0.00
	0.25	38.61	1.17
	0.50	48.67	2.91
	1.00	57.68	1.93
	1.50	67.96	2.95
	2.00	70.19	2.84
	4.00	86.29	5.03
	6.00	88.99	2.84
	8.00	91.21	3.85
	12.00	93.21	1.93
10	0.00	0.00	0.00
	0.25	38.99	1.14
	0.50	48.96	2.19
	1.00	58.13	2.37
	1.50	68.24	2.85
	2.00	71.14	1.94
	4.00	86.45	3.85
	6.00	89.67	4.92
	8.00	92.08	1.95
	12.00	93.52	4.02
		93.70	3.94

Table 43 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 11, 12 and 13 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
11	0.00	0.00	0.00
	0.25	70.59	0.96
	0.50	82.17	0.89
	1.00	85.40	1.03
	1.50	85.73	2.93
	2.00	86.46	3.05
	4.00	87.58	0.95
	6.00	87.92	4.02
	8.00	88.27	3.29
	12.00	88.27	2.78
12	0.00	0.00	0.00
	0.25	8.62	0.78
	0.50	16.58	1.36
	1.00	24.32	1.34
	1.50	37.68	1.54
	2.00	45.37	1.27
	4.00	58.69	2.04
	6.00	63.32	3.04
	8.00	63.82	3.96
	12.00	66.29	2.87
13	0.00	0.00	0.00
	0.25	14.34	0.49
	0.50	24.67	1.14
	1.00	38.86	1.34
	1.50	52.08	1.27
	2.00	60.77	2.95
	4.00	67.55	4.03
	6.00	67.83	3.85
	8.00	67.89	2.46
	12.00	68.58	3.94
	12.00	69.92	2.17

Table 44 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 14, 15 and 16 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	% RELEASE	SD
14	0.00	0.00	0.00
	0.25	45.61	1.95
	0.50	67.59	2.75
	1.00	81.42	3.91
	1.50	88.11	2.92
	2.00	89.81	1.94
	4.00	92.24	0.99
	6.00	92.69	2.81
	8.00	92.76	1.37
	10.00	92.99	3.72
	12.00	93.05	1.85
15	0.00	0.00	0.00
	0.25	56.61	0.91
	0.50	76.14	1.05
	1.00	85.0	1.00
	1.50	87.03	1.84
	2.00	87.41	3.00
	4.00	88.02	2.04
	6.00	88.33	4.03
	8.00	88.34	5.02
	10.00	88.41	1.93
	12.00	88.44	2.04
16	0.00	0.00	0.00
	0.25	5.29	1.10
	0.50	15.17	1.02
	1.00	31.63	1.35
	1.50	46.42	1.28
	2.00	58.21	2.37
	4.00	76.15	3.29
	6.00	81.47	1.93
	8.00	82.28	3.29
	10.00	82.69	2.30
	12.00	82.92	3.01

Table 45 Percent of Propranolol Hydrochloride Release from Coated
 Sucrose Beads Formulation 17 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
17	0.00	0.00	0.00
	0.25	38.73	0.95
	0.50	59.16	1.03
	1.00	74.53	2.93
	1.50	76.69	2.94
	2.00	78.21	3.85
	4.00	79.10	4.28
	6.00	79.91	2.83
	8.00	80.46	3.95
	10.00	80.55	3.68
	12.00	80.96	2.87

Table 46 Percent of Propranolol Hydrochloride Release from Coated
 Sucrose Beads Formulation 18 in pH Change Method

FORMULATION	TIME (HR.)	%RELEASE	SD
18	0.00	0.00	0.00
	0.25	8.38	0.95
	0.50	22.66	0.89
	1.00	36.40	0.99
	1.50	44.61	1.03
	2.00	51.25	2.92
	4.00	58.95	1.93
	6.00	64.65	1.76
	8.00	70.33	4.93
	10.00	75.70	2.98
	12.00	79.99	4.91
	14.00	81.26	5.01
	16.00	82.78	2.86
	18.00	83.02	3.01
	20.00	83.45	2.74
	22.00	83.60	4.83
	24.00	83.98	2.97

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Table 47 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 19 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
19	0.00	0.00	0.00
	0.25	41.78	0.65
	0.50	47.31	1.03
	1.00	53.25	1.34
	1.50	57.26	1.26
	2.00	60.94	1.95
	4.00	65.35	2.07
	6.00	69.69	2.84
	8.00	72.99	3.83
	10.00	76.83	2.95
	12.00	80.28	1.74
	14.00	81.36	4.93
	16.00	81.85	5.82
	18.00	82.05	4.91
	20.00	82.43	3.86
	22.00	82.62	5.91
	24.00	82.90	4.82

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Table 48 Percent of Propranolol Hydrochloride Release from Coated
 Sacrose Beads Formulation 20 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
20	0.00	0.00	0.00
	0.25	56.65	0.93
	0.50	62.70	0.72
	1.00	66.50	1.03
	1.50	68.21	1.28
	2.00	69.75	1.83
	4.00	72.53	2.03
	6.00	75.25	2.94
	8.00	77.98	1.93
	10.00	80.35	4.39
	12.00	82.18	5.90
	14.00	82.86	6.01
	16.00	83.32	2.83
	18.00	83.52	2.93
20.00	83.81	2.85	
22.00	84.09	3.91	
24.00	84.47	3.29	

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Table 49 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 21 and 22 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
21	0.00	0.00	0.00
	0.25	26.44	0.83
	0.50	27.83	1.02
	1.00	34.15	1.26
	1.50	37.68	1.37
	2.00	40.39	1.28
	4.00	45.62	2.83
	6.00	49.00	3.01
	8.00	51.47	4.92
	10.00	53.88	6.93
	12.00	55.89	3.92
	14.00	57.79	3.94
	16.00	59.39	2.83
22	0.00	0.00	0.00
	0.25	31.21	1.92
	0.50	48.61	2.93
	1.00	56.13	3.02
	1.50	63.23	2.91
	2.00	70.12	0.91
	4.00	77.99	2.94
	6.00	81.12	3.94
	8.00	83.40	3.28
	10.00	85.69	3.75
	12.00	86.75	5.48
	14.00	87.04	4.73
	16.00	87.10	2.85
18.00	87.33	1.94	
20.00	87.45	6.02	
22.00	87.50	1.84	
24.00	87.50	3.92	

Table 50 Percent of Propranolol Hydrochloride Release from Coated Sucrose Beads Formulation 23 and 24 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
23	0.00	0.00	0.00
	0.25	11.84	0.84
	0.50	18.07	1.18
	1.00	25.36	1.27
	1.50	33.04	2.83
	2.00	41.58	2.95
	4.00	60.39	3.29
	6.00	70.31	4.21
	8.00	74.75	2.64
	10.00	76.20	2.87
	12.00	78.04	1.37
	14.00	78.91	3.75
	16.00	79.77	2.60
24	0.00	0.00	0.00
	0.25	19.51	1.10
	0.50	28.21	1.75
	1.00	35.23	2.94
	1.50	41.03	3.92
	2.00	47.06	3.86
	4.00	57.47	1.95
	6.00	65.68	0.09
	8.00	70.88	2.84
	10.00	72.91	3.85
12.00	75.16	4.90	
14.00	76.09	5.02	
16.00	76.67	3.72	
18.00	77.30	2.95	
20.00	77.48	2.59	
22.00	77.48	1.95	
24.00	77.50	3.29	

Table 51 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 25 and 26 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
25	0.00	0.00	0.00
	0.25	19.87	1.21
	0.50	27.02	1.84
	1.00	32.61	2.94
	1.50	36.30	2.40
	2.00	39.78	2.84
	4.00	49.68	3.50
	6.00	56.92	0.49
	8.00	62.02	2.85
	10.00	65.50	6.03
	12.00	69.38	5.47
	14.00	71.23	3.05
	16.00	72.56	2.86
26	0.00	0.00	0.00
	0.25	29.07	0.93
	0.50	38.21	1.19
	1.00	44.56	1.37
	1.50	48.24	1.83
	2.00	50.48	1.92
	4.00	59.44	3.20
	6.00	65.22	2.84
	8.00	68.28	2.68
	10.00	69.67	3.96
	12.00	71.17	4.39
	14.00	72.61	6.10
	16.00	72.84	3.29
18.00	73.02	3.75	
20.00	73.07	2.85	
22.00	73.21	1.98	
24.00	73.32	3.92	

Table 52 Percent of Propranolol Hydrochloride Release from Coated
 Sucrose Beads Formulation 27 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
27	0.00	0.00	0.00
	0.25	20.86	0.89
	0.50	29.39	1.10
	1.00	35.08	1.73
	1.50	38.82	2.94
	2.00	41.70	3.94
	4.00	48.36	5.02
	6.00	52.93	4.92
	8.00	55.99	1.84
	10.00	58.19	2.94
	12.00	60.27	4.39
	14.00	62.30	5.93
	16.00	63.86	2.96
	18.00	65.42	4.06
	20.00	66.17	3.00
	22.00	67.10	4.86
	24.00	67.97	2.85

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Table 53 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 28 and 29 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
28	0.00	0.00	0.00
	0.25	12.62	1.32
	0.50	18.37	0.98
	1.00	29.16	1.84
	1.50	39.66	1.43
	2.00	50.75	2.94
	4.00	68.72	2.85
	6.00	72.02	3.96
	8.00	74.10	2.89
	10.00	77.51	3.95
	12.00	78.18	1.96
	14.00	78.60	3.05
	16.00	78.89	4.96
18.00	78.94	4.86	
20.00	79.01	5.02	
22.00	79.08	6.03	
24.00	79.20	2.97	
29	0.00	0.00	0.00
	0.25	12.48	0.68
	0.50	18.92	2.94
	1.00	29.81	1.48
	1.50	41.95	2.94
	2.00	53.63	3.85
	4.00	68.47	2.95
	6.00	72.91	4.93
	8.00	75.91	3.68
	10.00	78.63	2.75
	12.00	79.19	1.98
	14.00	79.55	4.06
	16.00	79.89	3.05
18.00	79.95	4.03	
20.00	80.19	2.69	
22.00	80.27	3.05	
24.00	80.27	3.96	

Table 54 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 30 and 31 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
30	0.00	0.00	0.00
	0.25	13.48	0.95
	0.50	20.01	1.02
	1.00	30.38	2.84
	1.50	41.25	1.27
	2.00	52.91	3.84
	4.00	68.98	3.94
	6.00	73.25	3.95
	8.00	75.19	5.04
	10.00	78.71	4.95
	12.00	79.38	3.96
	14.00	79.74	5.03
	16.00	80.02	2.95
18.00	80.09	4.75	
20.00	80.12	2.58	
22.00	80.29	3.75	
24.00	80.40	3.78	
31	0.00	0.00	0.00
	0.25	8.93	1.24
	0.50	14.35	0.94
	1.00	23.36	3.92
	1.50	38.70	4.80
	2.00	51.15	5.09
	4.00	68.02	2.59
	6.00	73.07	2.85
	8.00	74.92	1.84
	10.00	78.50	3.75
	12.00	79.18	2.68
	14.00	79.48	3.75
	16.00	79.86	2.64
18.00	79.99	3.48	
20.00	80.19	2.74	
22.00	80.31	4.25	
24.00	80.55	3.17	



Table 55 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 32 and 33 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
32	0.00	0.00	0.00
	0.25	39.09	1.17
	0.50	43.15	2.93
	1.00	50.09	0.98
	1.50	56.62	3.82
	2.00	62.28	0.97
	4.00	71.50	1.18
	6.00	76.72	2.17
	8.00	78.23	2.19
	10.00	79.16	3.29
	12.00	79.74	4.39
	14.00	80.32	5.19
	16.00	80.26	3.82
	18.00	80.32	3.84
20.00	80.26	2.74	
22.00	81.01	2.94	
24.00	80.32	3.85	
33	0.00	0.00	0.00
	0.25	37.18	1.12
	0.50	41.91	1.36
	1.00	47.43	0.95
	1.50	52.15	2.93
	2.00	58.78	3.95
	4.00	66.36	4.91
	6.00	70.23	3.76
	8.00	72.43	2.90
	10.00	74.05	3.86
	12.00	75.38	2.85
	14.00	76.70	1.84
	16.00	76.69	3.85
	18.00	76.70	5.86
20.00	76.70	2.64	
22.00	77.86	5.93	
24.00	78.12	2.86	

Table 56 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 34 and 35 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
34	0.00	0.00	0.00
	0.25	32.99	0.99
	0.50	37.24	2.93
	1.00	45.02	1.84
	1.50	50.21	3.75
	2.00	52.93	2.84
	4.00	58.91	1.83
	6.00	62.49	2.64
	8.00	65.32	2.94
	10.00	66.94	2.84
	12.00	68.33	3.80
	14.00	69.72	4.96
	16.00	69.95	2.84
	18.00	70.18	3.28
35	0.00	0.00	0.00
	0.25	28.96	2.19
	0.50	34.78	3.92
	1.00	43.59	0.95
	1.50	47.44	1.80
	2.00	50.75	1.74
	4.00	58.30	2.84
	6.00	61.12	3.76
	8.00	63.37	1.83
	10.00	64.76	2.94
	12.00	66.06	1.73
	14.00	67.35	2.54
	16.00	67.77	3.92
	18.00	68.20	2.85
20.00	69.62	4.84	
22.00	70.99	3.91	
24.00	71.26	2.68	

Table 57 Percent of Propranolol Hydrochloride Release from Coated
 Sacrose Beads Formulation 36 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
36	0.00	0.00	0.00
	0.25	25.98	0.96
	0.50	29.92	1.17
	1.00	34.95	2.73
	1.50	38.47	2.19
	2.00	41.39	1.36
	4.00	47.35	1.28
	6.00	50.53	2.90
	8.00	53.30	3.85
	10.00	55.04	4.90
	12.00	56.98	3.87
	14.00	58.91	5.02
	16.00	61.22	1.94
	18.00	61.53	3.85
	20.00	62.84	2.94
	22.00	63.89	4.95
	24.00	64.10	3.28

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Table 58 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 37 and 38 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
37	0.00	0.00	0.00
	0.25	2.89	0.69
	0.50	9.04	1.18
	1.00	26.81	1.26
	1.50	45.08	3.92
	2.00	56.72	2.75
	4.00	67.15	2.58
	6.00	75.82	1.37
	8.00	80.03	2.85
	10.00	82.89	3.85
	12.00	83.04	4.02
	14.00	84.02	5.90
	16.00	84.96	1.93
	18.00	84.99	2.95
20.00	85.11	3.95	
22.00	85.29	2.85	
24.00	85.41	4.03	
38	0.00	0.00	0.00
	0.25	0.61	0.93
	0.50	0.94	1.19
	1.00	8.41	2.94
	1.50	20.30	1.40
	2.00	35.68	2.93
	4.00	60.66	4.92
	6.00	72.98	3.85
	8.00	77.61	3.91
	10.00	79.82	3.95
	12.00	80.99	4.80
	14.00	81.22	2.74
	16.00	81.97	2.74
	18.00	81.97	3.81
20.00	82.03	0.91	
22.00	82.09	1.82	
24.00	82.23	1.36	

Table 59 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 39 and 40 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
39	0.00	0.00	0.00
	0.25	1.11	1.17
	0.50	1.17	1.72
	1.00	5.26	1.73
	1.50	12.43	1.84
	2.00	18.93	1.63
	4.00	35.48	2.75
	6.00	45.36	3.84
	8.00	53.45	3.90
	10.00	60.05	2.84
	12.00	66.51	2.01
	14.00	68.30	1.85
	16.00	68.89	4.03
	18.00	68.89	1.63
20.00	69.06	2.19	
22.00	69.47	1.94	
24.00	71.10	2.84	
40	0.00	0.00	0.00
	0.25	0.83	1.28
	0.50	0.89	0.99
	1.00	2.39	1.18
	1.50	7.58	1.36
	2.00	13.98	2.84
	4.00	29.07	4.83
	6.00	36.82	2.84
	8.00	40.41	0.86
	10.00	44.51	3.95
	12.00	47.05	5.03
	14.00	49.03	2.86
	16.00	52.03	4.93
	18.00	54.35	6.02
20.00	57.42	4.38	
22.00	61.11	1.94	
24.00	63.54	2.89	

Table 60 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 41 lot1 and 42 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
41 lot 1	0.00	0.00	0.00
	0.25	0.72	1.12
	0.50	0.88	1.73
	1.00	6.07	2.94
	1.50	16.11	3.50
	2.00	30.05	1.83
	4.00	52.03	0.94
	6.00	66.42	2.84
	8.00	73.30	1.53
	10.00	77.09	3.85
	12.00	80.44	4.05
	14.00	80.85	6.02
	16.00	81.14	1.85
18.00	81.14	4.93	
20.00	81.20	0.90	
22.00	81.37	2.94	
24.00	81.43	4.01	
42	0.00	0.00	0.00
	0.25	0.66	0.97
	0.50	1.27	1.27
	1.00	5.29	1.93
	1.50	14.49	2.84
	2.00	28.55	3.85
	4.00	51.56	3.94
	6.00	63.81	2.85
	8.00	71.90	1.97
	10.00	76.12	3.97
	12.00	77.83	2.84
	14.00	78.33	4.93
	16.00	78.33	3.85
18.00	78.85	2.03	
20.00	79.95	5.04	
22.00	80.12	4.02	
24.00	80.24	3.98	

Table 61 Percent of Propranolol Hydrochloride Release from Coated
Sucrose Beads Formulation 43 and 44 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
43	0.00	0.00	0.00
	0.25	0.67	1.84
	0.50	1.00	2.93
	1.00	7.39	2.95
	1.50	16.35	3.97
	2.00	28.11	3.91
	4.00	45.54	2.84
	6.00	57.22	4.93
	8.00	68.73	5.28
	10.00	74.10	6.10
	12.00	77.34	2.95
	14.00	77.46	2.47
	16.00	77.51	3.95
44	0.00	0.00	0.00
	0.25	0.49	0.96
	0.50	0.55	1.29
	1.00	3.95	3.84
	1.50	11.19	2.84
	2.00	22.47	3.27
	4.00	41.88	3.95
	6.00	52.80	1.95
	8.00	60.60	3.85
	10.00	69.01	4.92
	12.00	74.41	1.79
	14.00	75.28	0.49
	16.00	75.51	3.28
18.00	75.68	4.60	
20.00	75.91	3.74	
22.00	76.03	2.17	
24.00	77.02	1.29	

Table 62 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 55, 56 and 57 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
55	0.00	0.00	0.00
	0.25	28.60	0.92
	0.50	42.32	1.17
	1.00	53.59	1.20
	1.50	59.54	1.32
	2.00	62.72	1.41
	4.00	67.33	1.28
	6.00	68.71	1.64
	8.00	69.28	2.84
	12.00	69.46	3.92
56	0.00	0.00	0.00
	0.25	38.92	1.73
	0.50	59.45	2.74
	1.00	70.90	1.18
	1.50	77.62	2.46
	2.00	79.56	1.18
	4.00	83.79	2.19
	6.00	85.30	0.97
	8.00	85.53	3.74
	12.00	85.88	2.18
57	0.00	0.00	0.00
	0.25	41.56	2.84
	0.50	61.71	0.96
	1.00	76.99	1.18
	1.50	84.64	1.28
	2.00	87.54	1.73
	4.00	92.17	1.73
	6.00	92.47	2.98
	8.00	92.63	3.86
	12.00	92.64	4.01

Table 63 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 58 and 59 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
58	0.00	0.00	0.00
	0.25	4.20	0.65
	0.50	11.23	1.09
	1.00	26.31	1.12
	1.50	32.56	1.24
	2.00	44.35	2.34
	4.00	63.99	2.13
	6.00	79.54	2.13
	8.00	87.13	1.31
	10.00	89.46	2.45
	12.00	90.21	1.32
	14.00	90.35	2.13
	16.00	90.38	3.12
18.00	90.42	4.10	
20.00	90.58	2.50	
22.00	90.98	3.41	
24.00	91.09	1.54	
59	0.00	0.00	0.00
	0.25	2.99	1.02
	0.50	10.36	2.18
	1.00	23.26	1.43
	1.50	33.19	2.43
	2.00	43.00	1.78
	4.00	63.73	3.29
	6.00	78.28	3.21
	8.00	86.09	2.99
	10.00	88.69	2.35
	12.00	89.43	1.46
	14.00	89.99	1.54
	16.00	90.07	2.43
18.00	90.15	2.45	
20.00	90.47	1.42	
22.00	90.79	1.32	
24.00	90.88	2.31	

Table 64 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 60 and 61 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
60	0.00	0.00	0.00
	0.25	2.99	0.92
	0.50	9.44	1.17
	1.00	24.81	1.25
	1.50	33.05	1.27
	2.00	42.21	1.53
	4.00	58.46	1.27
	6.00	68.34	3.20
	8.00	78.35	2.78
	10.00	82.31	3.10
	12.00	84.24	2.84
	14.00	84.39	3.85
	16.00	84.99	3.82
18.00	85.23	2.85	
20.00	85.58	4.03	
22.00	85.89	5.02	
24.00	86.03	1.94	
61	0.00	0.00	0.00
	0.25	2.69	1.19
	0.50	9.36	2.90
	1.00	21.19	3.92
	1.50	31.99	2.85
	2.00	40.92	1.84
	4.00	56.93	3.85
	6.00	66.88	2.90
	8.00	76.59	4.01
	10.00	80.20	1.27
	12.00	82.39	1.37
	14.00	83.17	2.18
	16.00	83.56	2.83
18.00	83.79	1.84	
20.00	83.87	2.18	
22.00	83.95	2.19	
24.00	83.95	2.09	

Table 65 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 62 lot1 and 63 in pH Change Method

pH CHANGE

FORMULATION	TIME(HR.)	%RELEASE	SD
62 lot 1	0.00	0.00	0.00
	0.25	2.53	1.18
	0.50	9.02	2.93
	1.00	18.54	3.30
	1.50	27.07	3.22
	2.00	35.85	1.84
	4.00	54.01	4.92
	6.00	65.72	2.27
	8.00	73.21	3.92
	10.00	77.73	1.94
	12.00	79.29	3.98
	14.00	80.09	3.30
	16.00	80.33	2.84
	18.00	80.73	4.38
20.00	80.95	1.36	
22.00	81.09	2.81	
24.00	81.15	3.29	
63	0.00	0.00	0.00
	0.25	2.54	1.92
	0.50	8.64	2.94
	1.00	15.21	0.94
	1.50	24.40	3.94
	2.00	33.27	1.95
	4.00	50.61	3.73
	6.00	59.75	2.95
	8.00	68.75	5.80
	10.00	75.48	3.90
	12.00	78.40	1.94
	14.00	78.47	4.83
	16.00	78.70	7.02
	18.00	78.93	3.94
20.00	79.01	1.85	
22.00	79.32	4.27	
24.00	79.90	3.19	

Table 66 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 64 and 65 in pH Change Method

pH CHANGE

FORMULATION	TIME (HR.)	%RELEASE	SD
64	0.00	0.00	0.00
	0.25	2.43	1.18
	0.50	7.99	1.83
	1.00	14.59	2.93
	1.50	24.98	2.84
	2.00	31.09	3.91
	4.00	44.84	3.30
	6.00	58.03	3.91
	8.00	64.33	3.29
	10.00	71.20	4.05
	12.00	73.26	5.92
	14.00	73.42	4.91
	16.00	73.65	3.95
18.00	73.96	2.85	
20.00	74.19	4.78	
22.00	74.27	3.75	
24.00	74.66	2.74	
65	0.00	0.00	0.00
	0.25	2.39	1.18
	0.50	7.58	1.36
	1.00	13.37	2.40
	1.50	21.19	3.08
	2.00	29.85	1.94
	4.00	41.61	1.83
	6.00	54.58	2.95
	8.00	61.06	3.29
	10.00	63.21	1.94
	12.00	65.86	2.94
	14.00	66.79	3.20
	16.00	66.96	2.94
18.00	67.30	1.03	
20.00	67.55	2.90	
22.00	67.98	3.29	
24.00	68.10	2.93	

Table 67 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 45 in 0.1 N HCl

0.1HCl

FORMULATION	TIME (HR.)	%RELEASE	SD
45	0.00	0.00	0.00
	0.25	36.35	1.20
	0.50	46.32	1.09
	1.00	55.42	2.90
	1.50	62.60	3.75
	2.00	68.99	5.02
	4.00	84.02	6.20
	6.00	88.36	2.93
	8.00	90.75	1.83
	10.00	92.75	3.14
	12.00	92.95	1.78

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Table 69 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 49, 50 and 51 in 0.1 N HCl

0.1N HCl			
FORMULATION	TIME (HR.)	%RELEASE	SD
49	0.00	0.00	0.00
	0.25	34.79	1.62
	0.50	43.99	2.91
	1.00	51.32	1.98
	1.50	58.70	2.83
	2.00	65.40	3.92
	4.00	81.90	2.97
	6.00	85.89	3.82
	8.00	88.16	1.27
	10.00	91.19	2.19
	12.00	91.41	1.80
50	0.00	0.00	0.00
	0.25	32.83	1.53
	0.50	43.32	2.28
	1.00	51.80	1.86
	1.50	57.99	2.91
	2.00	64.19	3.29
	4.00	80.80	4.90
	6.00	84.17	5.30
	8.00	87.33	2.94
	10.00	90.15	1.97
	12.00	91.22	3.09
51	0.00	0.00	0.00
	0.25	30.86	1.98
	0.50	42.68	2.19
	1.00	51.55	3.02
	1.50	56.99	2.46
	2.00	64.89	3.87
	4.00	79.89	2.76
	6.00	83.53	1.53
	8.00	86.24	1.82
	10.00	89.45	1.20
	12.00	90.72	2.43

Table 70 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 52, 53 and 54 in 0.1 N HCl

0.1NHCl

FORMULATION	TIME (HR.)	%RELEASE	SD
52	0.00	0.00	0.00
	0.25	37.33	1.23
	0.50	47.47	2.71
	1.00	56.54	3.28
	1.50	62.99	1.86
	2.00	68.69	1.57
	4.00	84.68	2.56
	6.00	88.24	1.63
	8.00	88.92	2.90
	10.00	91.70	2.00
	12.00	92.02	6.04
53	0.00	0.00	0.00
	0.25	37.69	2.01
	0.50	47.76	1.96
	1.00	56.93	2.86
	1.50	63.36	1.46
	2.00	69.31	2.37
	4.00	85.59	3.92
	6.00	88.96	4.18
	8.00	89.43	4.17
	10.00	91.85	5.03
	12.00	92.10	2.85
54	0.00	0.00	0.00
	0.25	37.84	1.16
	0.50	47.98	1.82
	1.00	57.15	1.53
	1.50	63.32	2.91
	2.00	70.78	2.35
	4.00	85.13	2.86
	6.00	88.77	3.64
	8.00	89.78	4.29
	10.00	91.89	3.86
	12.00	92.15	4.29

Table 71 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 45 in Phosphate Buffer pH 6.8

BUFFER			
FORMULATION	TIME (HR.)	%RELEASE	SD
45	0.00	0.00	0.00
	0.25	37.25	0.92
	0.50	42.58	1.24
	1.00	52.31	0.15
	1.50	59.21	2.15
	2.00	69.90	1.69
	4.00	85.24	1.16
	6.00	88.97	3.26
	8.00	90.48	5.67
	10.00	91.62	3.24
	12.00	92.32	1.57

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Table 72 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 46, 47 and 48 in Phosphate Buffer pH 6.8

FORMULATION	TIME (HR.)	% RELEASE	SD
46	0.00	0.00	0.00
	0.25	33.85	1.23
	0.50	38.21	1.43
	1.00	47.29	2.34
	1.50	54.52	5.32
	2.00	62.76	0.98
	4.00	79.89	1.42
	6.00	83.80	2.16
	8.00	85.57	4.32
	10.00	87.64	2.67
	12.00	87.99	3.56
47	0.00	0.00	0.00
	0.25	32.01	2.13
	0.50	38.13	1.78
	1.00	46.89	1.37
	1.50	54.01	2.34
	2.00	61.95	1.67
	4.00	78.89	4.32
	6.00	83.01	3.68
	8.00	85.62	5.09
	10.00	86.14	4.09
	12.00	86.32	3.57
48	0.00	0.00	0.00
	0.25	30.30	1.67
	0.50	37.08	2.56
	1.00	45.86	3.28
	1.50	53.38	4.20
	2.00	61.89	3.19
	4.00	77.10	2.78
	6.00	81.67	1.18
	8.00	84.72	4.39
	10.00	85.15	2.76
	12.00	85.43	3.27

Table 73 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 49, 50 and 51 in Phosphate Buffer pH 6.8

BUFFER			
FORMULATION	TIME (HR.)	%RELEASE	SD
49	0.00	0.00	0.00
	0.25	30.99	1.27
	0.50	36.93	2.19
	1.00	46.21	2.35
	1.50	55.80	1.11
	2.00	64.13	0.97
	4.00	83.62	1.39
	6.00	85.52	1.64
	8.00	86.85	2.98
	12.00	88.51	3.29
50	0.00	0.00	0.00
	0.25	28.38	2.96
	0.50	36.20	2.01
	1.00	46.09	1.16
	1.50	54.23	1.28
	2.00	63.93	1.28
	4.00	82.12	2.09
	6.00	84.01	3.92
	8.00	85.37	2.47
	12.00	87.95	4.03
51	0.00	0.00	0.00
	0.25	26.69	1.12
	0.50	35.85	1.34
	1.00	45.49	2.87
	1.50	53.19	1.98
	2.00	62.34	3.72
	4.00	80.79	1.96
	6.00	83.59	0.90
	8.00	84.71	2.65
	12.00	87.71	3.87
		87.95	4.98



Table 74 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 52, 53 and 54 in Phosphate Buffer pH 6.8

RUFFER

FORMULATION	TIME (HR.)	%RELEASE	SD
52	0.00	0.00	0.00
	0.25	31.90	1.32
	0.50	43.57	2.98
	1.00	52.41	3.82
	1.50	59.79	3.74
	2.00	66.44	2.97
	4.00	83.46	2.30
	6.00	88.01	1.29
	8.00	89.60	1.35
	10.00	91.23	2.08
	12.00	91.40	1.86
53	0.00	0.00	0.00
	0.25	33.20	0.97
	0.50	44.05	0.78
	1.00	53.02	1.25
	1.50	60.32	1.35
	2.00	67.05	1.19
	4.00	84.14	2.98
	6.00	88.69	2.76
	8.00	90.40	1.78
	10.00	92.01	1.92
	12.00	92.30	2.34
54	0.00	0.00	0.00
	0.25	33.47	1.19
	0.50	44.31	2.09
	1.00	53.43	3.10
	1.50	61.70	0.90
	2.00	68.12	2.97
	4.00	85.36	1.97
	6.00	89.54	3.29
	8.00	91.39	2.98
	10.00	92.42	2.75
	12.00	92.67	3.96

Table 75 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 45 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
45	0.00	0.00	0.00
	0.25	34.69	0.96
	0.50	41.07	0.78
	1.00	48.35	0.92
	1.50	55.65	1.28
	2.00	58.97	2.93
	4.00	76.23	3.04
	6.00	86.57	3.85
	8.00	87.98	3.10
	10.00	88.75	2.83
	12.00	88.80	1.97

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Table 76 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 46, 47 and 48 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
46	0.00	0.00	0.00
	0.25	27.25	0.79
	0.50	31.99	1.92
	1.00	38.13	2.93
	1.50	50.05	2.49
	2.00	51.98	3.09
	4.00	64.89	4.01
	6.00	75.86	1.18
	8.00	78.94	2.84
	10.00	80.99	3.67
	12.00	81.21	3.25
47	0.00	0.00	0.00
	0.25	25.55	1.09
	0.50	30.16	2.01
	1.00	38.42	3.01
	1.50	49.24	2.93
	2.00	50.37	1.19
	4.00	62.10	1.34
	6.00	75.05	1.78
	8.00	77.84	2.04
	10.00	79.49	3.92
	12.00	79.59	3.47
48	0.00	0.00	0.00
	0.25	24.96	0.93
	0.50	29.36	1.03
	1.00	37.66	2.30
	1.50	48.55	3.01
	2.00	48.79	2.19
	4.00	61.50	1.18
	6.00	74.17	1.12
	8.00	76.28	1.28
	10.00	77.55	1.53
	12.00	77.56	2.63

Table 78 Percent of Propranolol Hydrochloride Release from Coated Pellets Formulation 52, 53 and 54 in pH Change Method

pH CHANGE			
FORMULATION	TIME (HR.)	%RELEASE	SD
52	0.00	0.00	0.00
	0.25	37.02	0.83
	0.50	45.10	1.03
	1.00	55.19	2.94
	1.50	65.05	4.03
	2.00	68.31	5.21
	4.00	84.42	1.36
	6.00	87.05	2.73
	8.00	89.06	3.02
	12.00	92.30	3.95
53	0.00	0.00	0.00
	0.25	37.34	1.03
	0.50	46.32	1.19
	1.00	56.52	2.28
	1.50	66.32	1.57
	2.00	69.70	1.94
	4.00	85.98	2.94
	6.00	87.23	3.02
	8.00	89.93	3.19
	12.00	92.56	3.82
54	0.00	0.00	0.00
	0.25	37.52	0.59
	0.50	47.46	1.92
	1.00	57.79	1.47
	1.50	67.73	2.83
	2.00	70.99	1.73
	4.00	86.29	2.01
	6.00	87.69	1.17
	8.00	90.58	1.74
	12.00	92.60	3.20

Appendix B

Calibration Curve

The concentration versus absorbance of propranolol HCl in methanol at 289.8 nm, in 0.1 N HCl acid at 288.6 nm and in phosphate buffer pH 6.8 at 286.7 nm were presented in Table 79-81 and showed a linear relationship with the correlation coefficient = 0.9996, 0.9838 and 0.9923 , respectively. The standard curve of propranolol hydrochloride after regression analysis was illustrated in Figure 100-102.

Table 79 Absorbance of propranolol hydrochloride in methanol determined at 289.8 nm.

Concentration ($\mu\text{g/ml.}$)	Absorbance
0	0.0000
2	0.0219
4	0.0649
6	0.1078
8	0.1508
10	0.1937
12	0.2366

Table 80 Absorbance of propranolol hydrochloride in 0.1 N HCl acid determined at 288.6 nm.

Concentration ($\mu\text{g/ml.}$)	Absorbance
0	0.0000
2	0.0415
4	0.0818
6	0.1222
8	0.1625
10	0.2028
12	0.2432

Table 81 Absorbance of propranolol hydrochloride in phosphate buffer pH 6.8 determined at 286.7 nm.

Concentration ($\mu\text{g/ml.}$)	Absorbance
0	0.0000
2	0.0397
4	0.0786
6	0.1175
8	0.1564
10	0.1953
12	0.2342

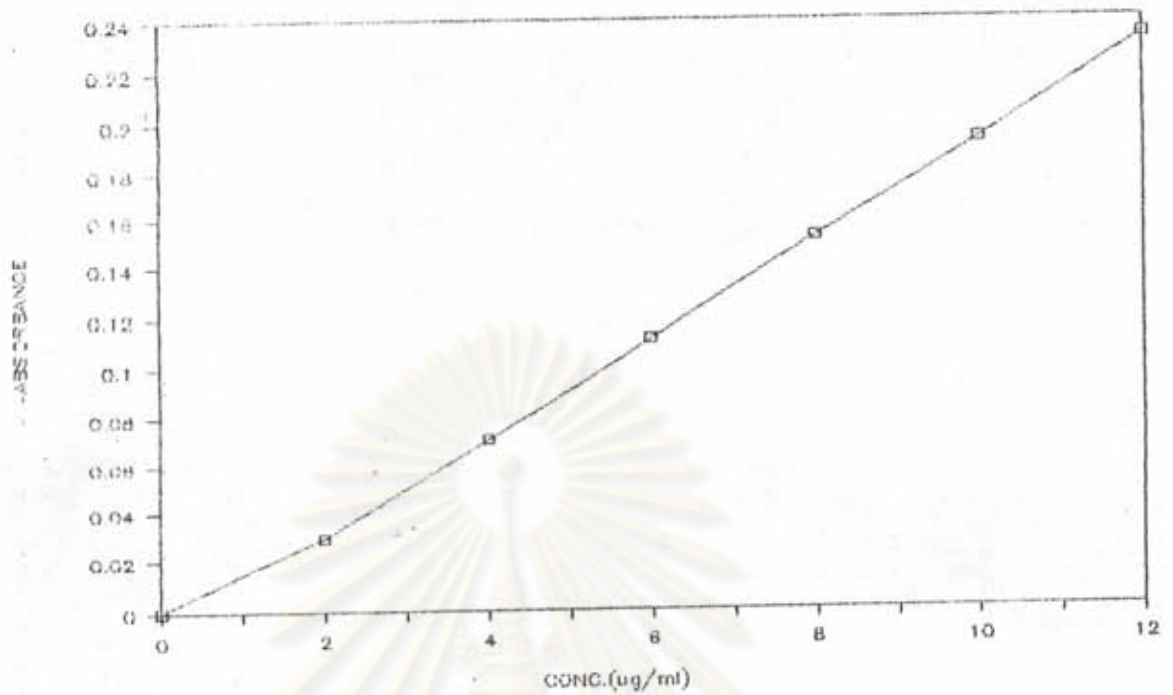


Figure 100 Calibration curve of propranolol hydrochloride in methanol

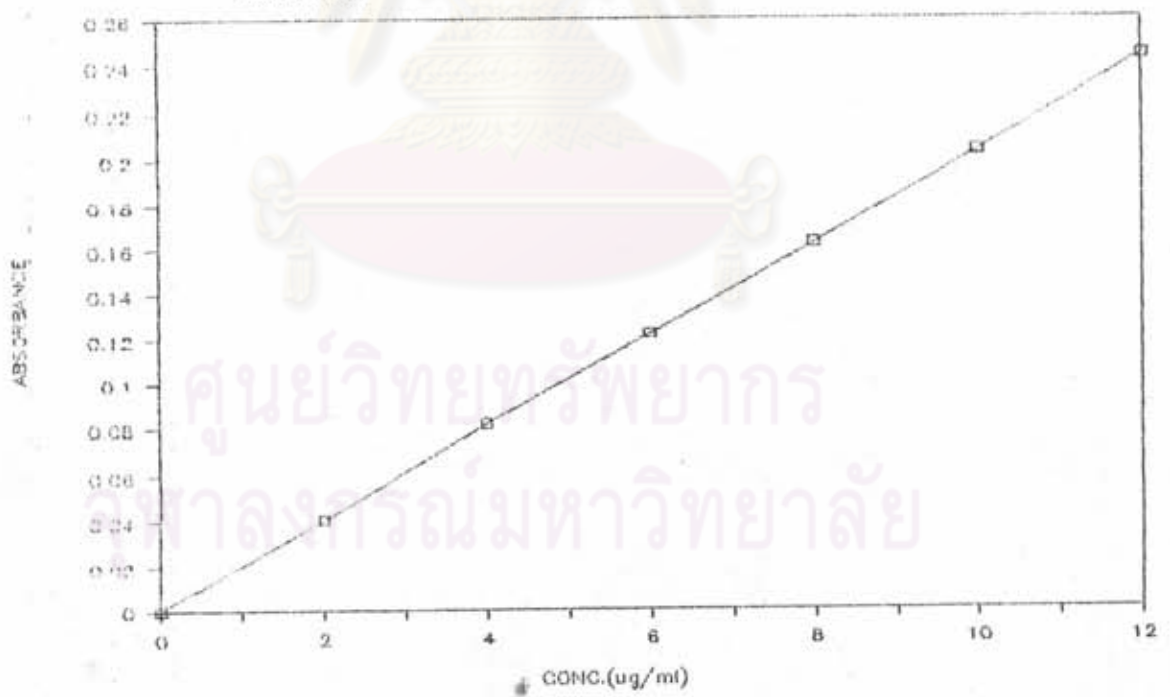


Figure 101 Calibration curve of propranolol hydrochloride in 0.1 N HCl

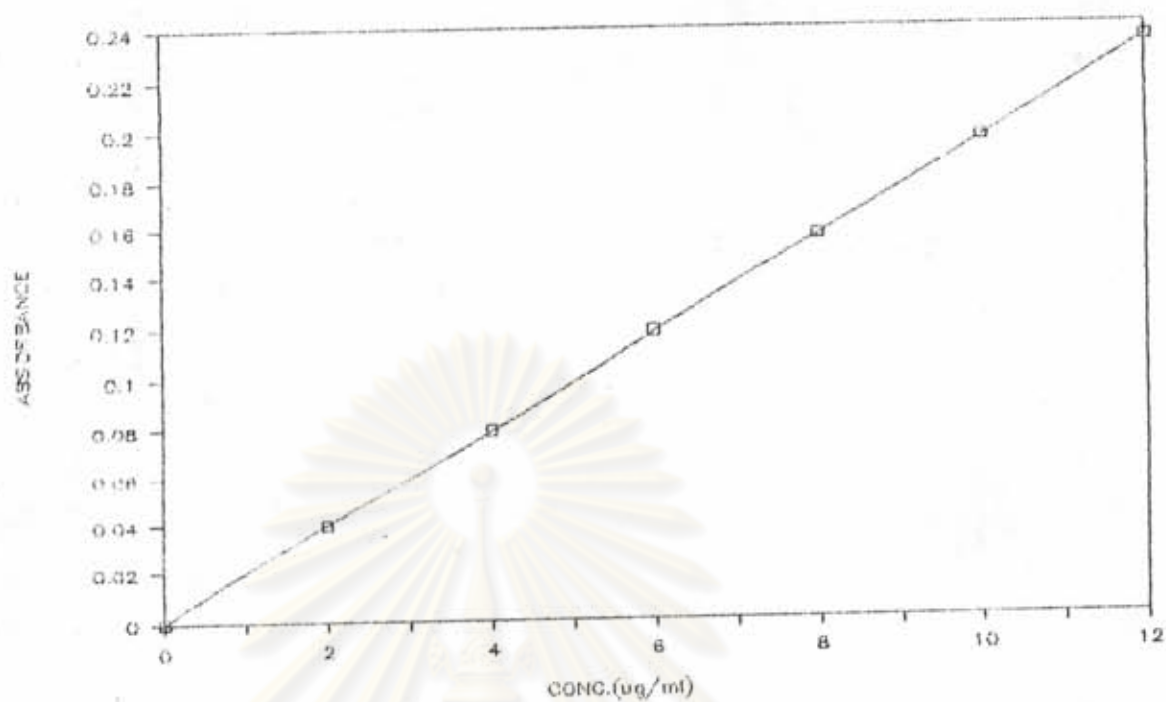


Figure 102 Calibration curve of propranolol hydrochloride in phosphate buffer pH 6.8

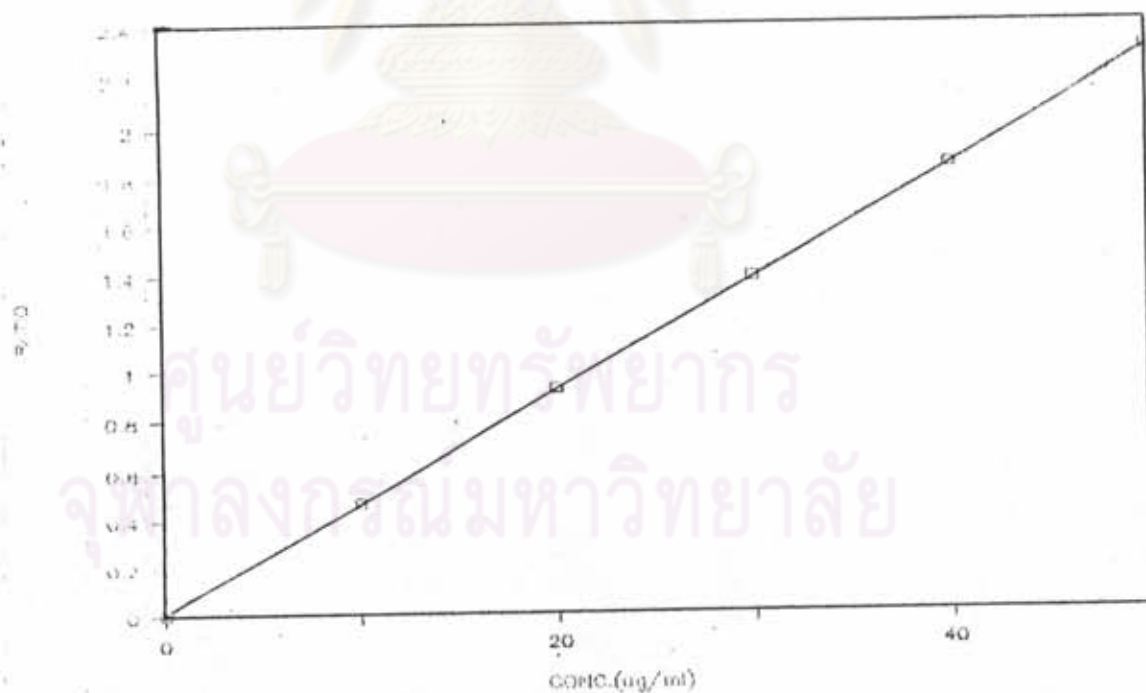


Figure 103 Calibration curve of HPLC method

The Construction of Calibration Curve in HPLC Method

The concentration versus ratio between peak area of internal standard (pindolol) and propranolol hydrochloride with HPLC method at 272 nm. were presented in Table 82 and showed a linear relationship with the correlation coefficient = 0.999

The standard curve of propranolol hydrochloride after regression analysis was illustrated in Figure 103 .

Table 82 Ratio between peak area of internal standard and propranolol hydrochloride with HPLC method at 272 nm.

Concentration ($\mu\text{g/ml}$)	Ratio
0	0.000
10	0.466
20	0.923
30	1.379
40	1.836
50	2.292

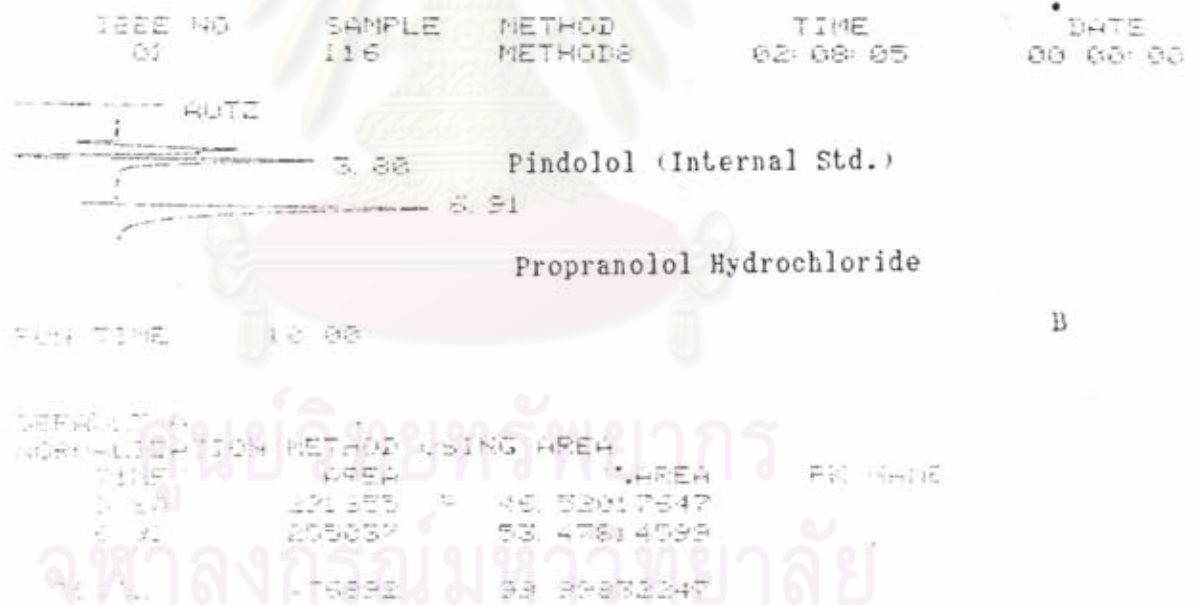
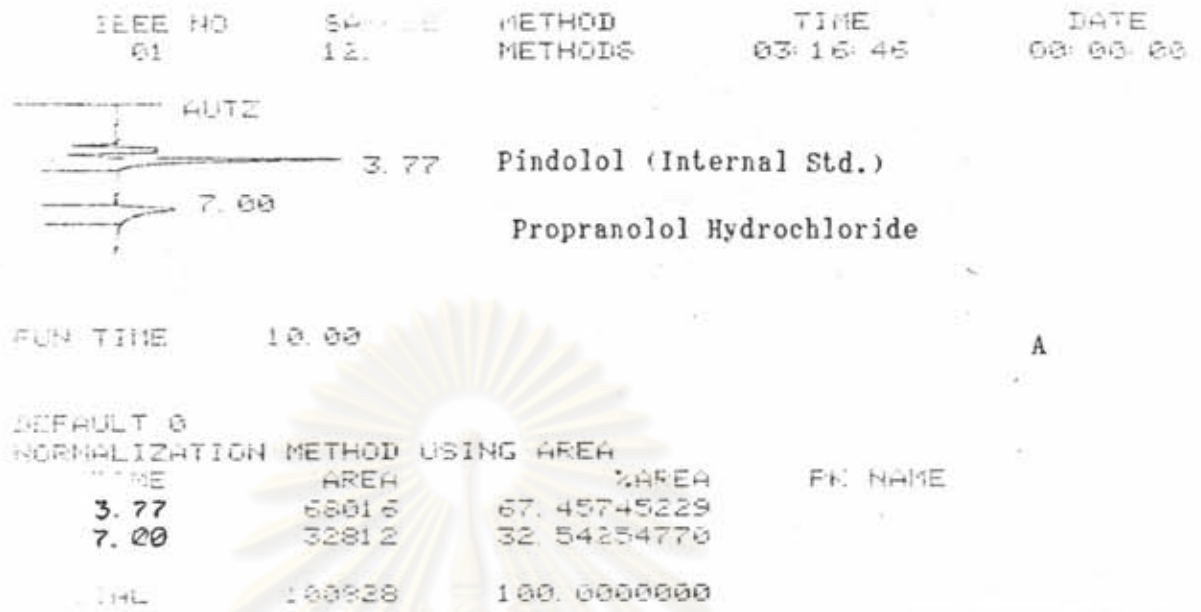


Figure 104 The representative chromatogram of the construction of calibration curve

Key : A Conc. of propranolol hydrochloride = 10 $\mu\text{g}/\text{ml}$

B Conc. of propranolol hydrochloride = 50 $\mu\text{g}/\text{ml}$

The Chromatographic Conditions

<u>Mobile phase</u>	0.0499 M Monobasic potassium phosphate buffer solution - Acetonitrile (13 : 7)
<u>Diluting agent</u>	Distilled water - Acetonitrile (13 : 7)
<u>Flow rate</u>	5 ml/min
<u>Detector</u>	UV at 272 nm.
<u>Column</u>	C ₁₈ (10 μ m , 8 mm x 25 cm)
<u>Volume inject</u>	50 μ l
<u>Retention time</u>	Propranolol Hydrochloride 7 minutes Pindolol (Internal Standard) 4 minutes

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Appendix C

The stability of propranolol hydrochloride coating solution

Normally, the coating process was finished within 4 hr. Thus, the stability of coating solution was obtained with HPLC method. The stability data was shown in Table 83 and illustrated in Figure 105. The representative chromatogram was shown in Figure 107.

Table 83 The stability data of propranolol hydrochloride coating solution

Time (hr.)	Ratio (Average)	Conc. ($\mu\text{g/ml.}$)	Wt. (g/100ml.)
0	1.036106700	22.48	5.62
1	0.941887535	20.42	5.11
2	0.940633960	20.31	5.08
3	0.894563761	19.38	4.85
4	0.881081460	19.09	4.77

The stability of propranolol hydrochloride coating beads

The stability of propranolol hydrochloride in coated beads were obtained with HPLC method. The stability data was shown in Table 84 and illustrated in Figure 106. The representative chromatogram was shown in Figure 108.

Table 84 The stability data of propranolol hydrochloride coating beads

		SUCROSE		PELLETS	
Month	Conc. ($\mu\text{g/ml}$)	Wt. (g/100ml)	Conc. ($\mu\text{g/ml}$)	Wt. (g/100ml)	
0	13.86	3.46	14.43	3.61	
1	13.65	3.41	14.35	3.59	
2	13.41	3.35	14.23	3.56	
3	13.35	3.34	14.19	3.55	

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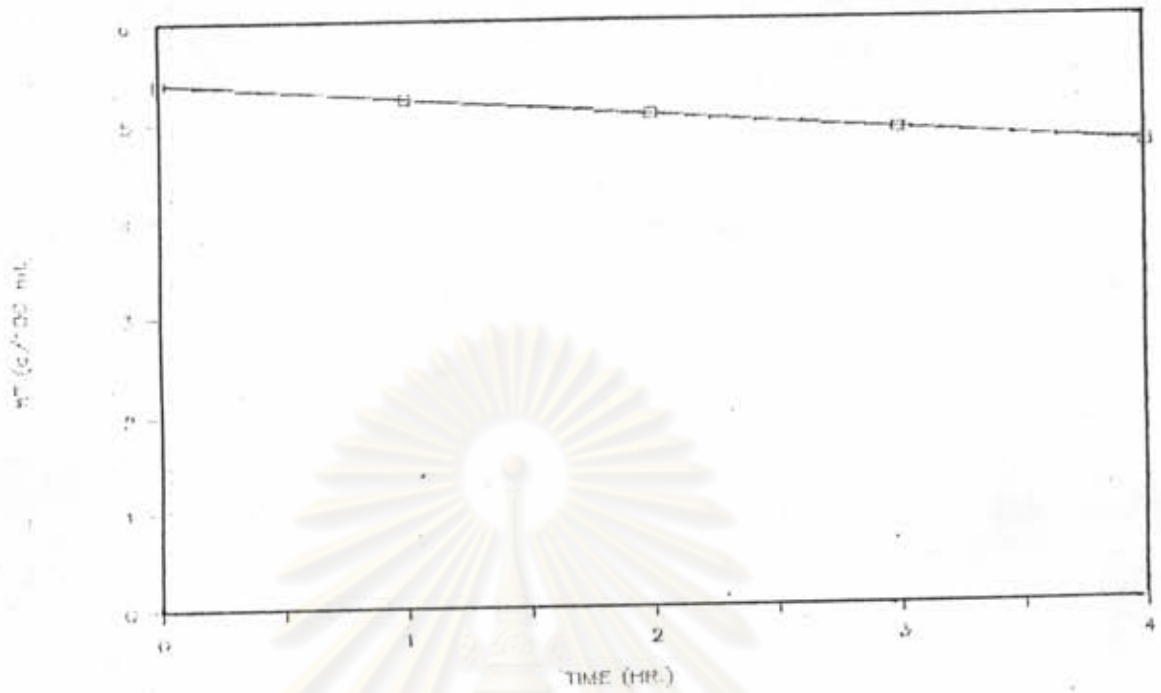


Figure 105 Stability of propranolol hydrochloride coating solution

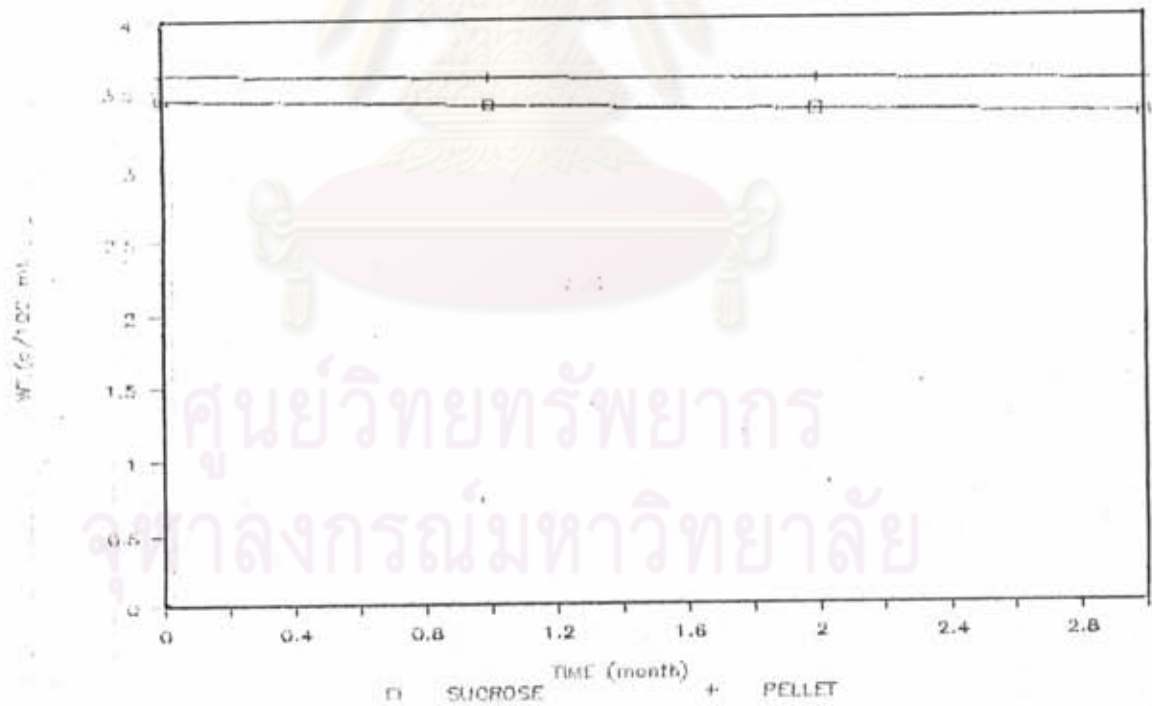


Figure 106 Stability of propranolol hydrochloride coated beads

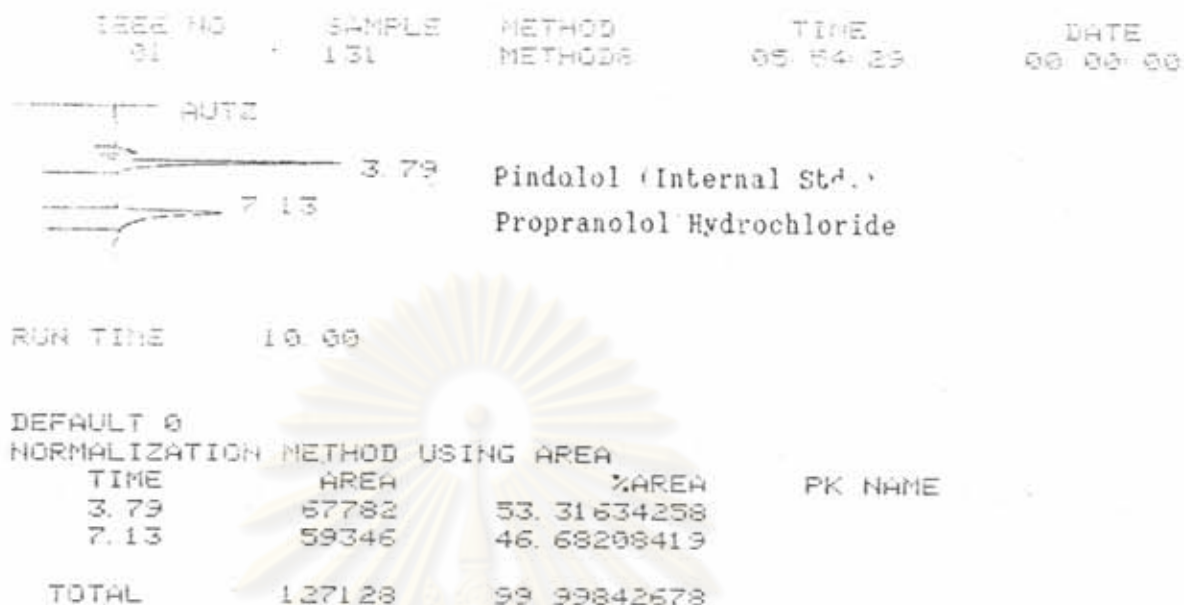


Figure 107 The representative chromatogram of the stability test of coating solution (at 4 hrs.)

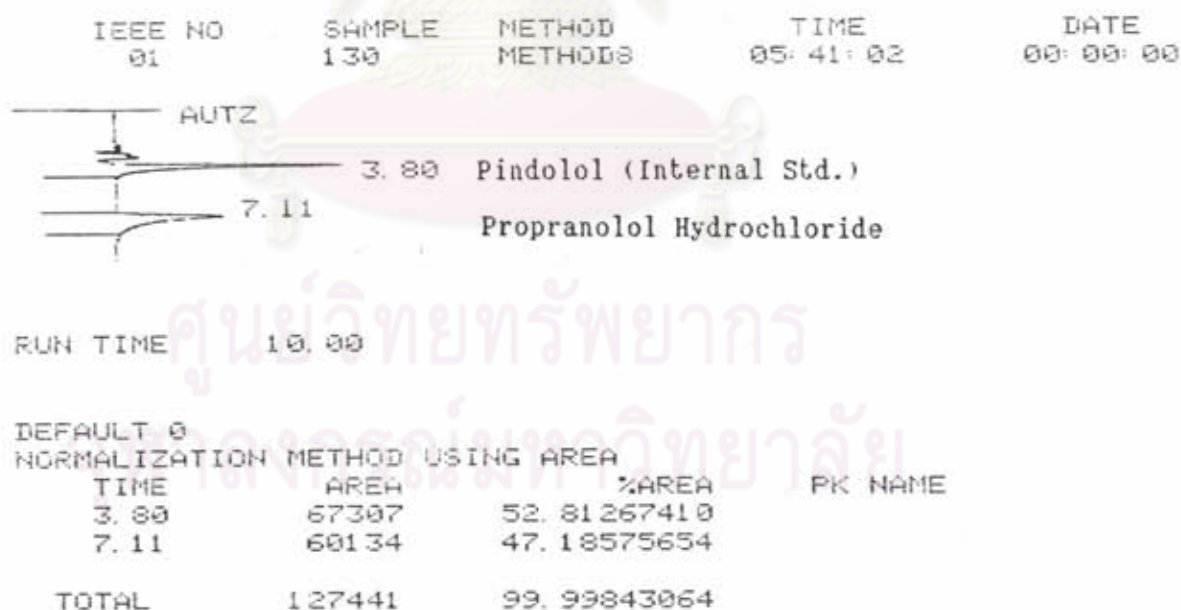


Figure 108 The representative chromatogram of the stability test of coating beads (at 3 month)

Appendix D

The Classification of Sucrose Crystal

One kilogram of sucrose crystal was classified with sieve size analysis. The average percentages by weight of sucrose crystal which retained on each sieve size were shown in Table 85.

Table 85 The percentages by weight of classified sucrose

Sieve Size (mesh)	% W/W (average)
<20	38.21
20/40	61.61
40/60	0.49
60/80	0.10
>80	0.04

Appendix E

The Commercial Product Release Data

Commercial product of propranolol hydrochloride 80 mg is Inderal LA 80 which duplicated dissolution in 3 medium as 0.1 N HCl, phosphate buffer pH 6.8 and pH change method. The release data was shown in Table 86 and release profile was shown in Figure 109-111, respectively.

Table 86 Release data of commercial product in several medium

TIME (hr.)	% Drugs release		
	0.1 N HCl	buffer pH 6.8	pH change method
0	0	0	0
0.25	4.37	6.05	4.37
0.5	7.52	7.84	5.30
1	14.02	14.50	9.94
1.5	19.94	21.19	14.14
2	26.25	27.70	19.04
4	40.57	45.67	33.68
6	51.61	57.58	44.06
8	59.29	65.91	51.49
10	66.41	72.60	57.76
12	73.07	78.77	64.06
14	76.27	81.97	67.63
16	79.86	84.97	70.98
18	82.66	87.27	73.77
20	84.64	88.94	75.93
22	86.63	90.62	78.09
24	87.38	91.84	79.97

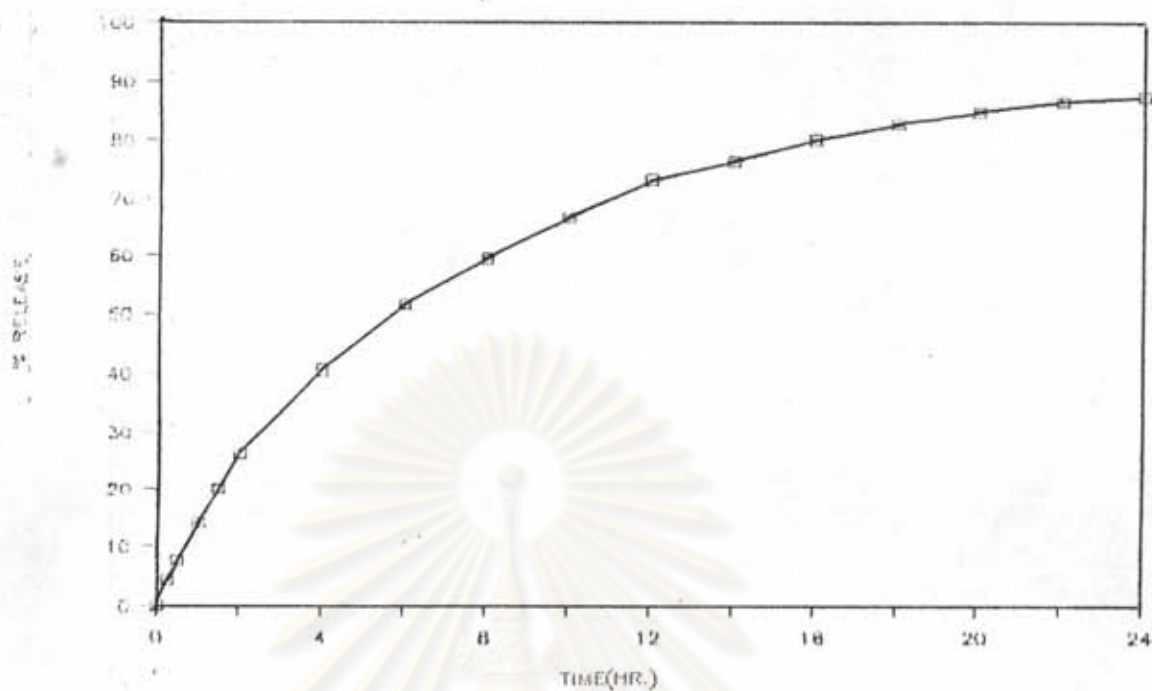


Figure 109 Release profiles of commercial product (Inderal LA80)

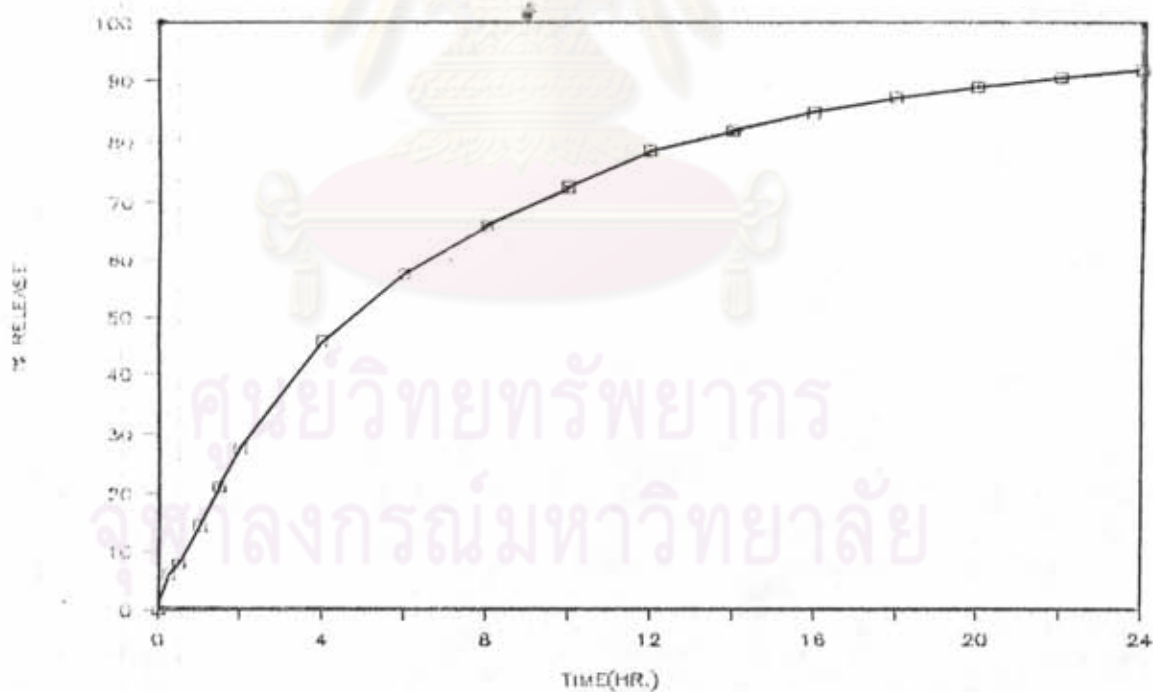


Figure 110 Release profiles of commercial product (Inderal LA 80)
in phosphate buffer pH 6.8

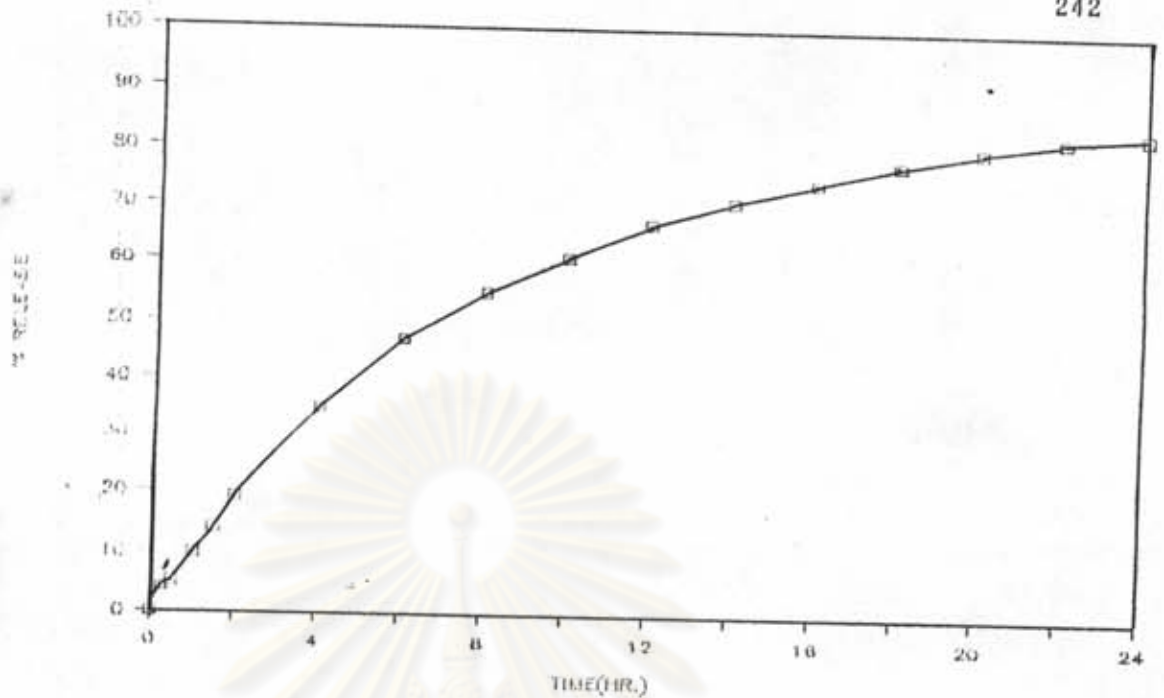


Figure 111 Release profiles of commercial product. (Inderal LABO)
in pH change method

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Table 87 The Content of Propranolol Hydrochloride in Coated Beads and Commercial Product

FORMULATION	PROPRANOLOL HCL CONTENT*(mg)	SD	WT. OF BEADS IN ONE CAPSULE (mg)
INDUSTRIAL LABO	76.94	0.63	146.59
1	82.45	0.58	389.54
2	81.31	0.98	379.64
3	82.38	0.35	396.13
4	83.67	0.69	368.47
5	84.02	0.72	361.35
6	82.67	0.46	359.64
7	81.99	0.97	397.56
8	83.05	0.51	393.26
9	82.76	0.76	385.71
10	84.12	0.79	390.53
11	79.65	0.53	413.63
12	79.84	0.95	416.37
13	78.64	0.89	428.35
14	79.03	0.32	437.28
15	78.94	0.26	442.76
16	81.23	0.75	451.45
17	86.09	0.74	314.25
18	76.03	0.37	531.26
19	75.03	0.49	548.75
20	76.14	0.72	559.51
21	75.28	0.31	415.32
22	75.86	0.26	428.45
23	74.01	0.59	380.24
24	74.25	0.41	365.17
25	74.44	0.75	352.96

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Table 87 (cont.)

FORMULATION	PROPRANOLOL HCl CONTENT (mg)	SD	WT. OF BEADS IN ONE CAPSULE (mg)
26	75.37	0.84	339.52
27	76.84	0.54	317.42
28	73.89	0.91	418.23
29	74.86	0.72	433.50
30	75.93	0.57	442.52
31	76.43	0.39	448.61
32	75.98	0.32	356.42
33	76.02	0.76	343.96
34	75.89	0.45	332.16
35	75.83	0.91	321.42
36	75.76	1.02	310.02
37	75.36	0.96	412.82
38	76.49	0.83	492.63
39	76.94	0.26	502.41
40	77.01	0.57	512.35
41 100 1	76.98	0.48	448.57
41 100 2	77.12	0.38	439.02
41 100 3	77.04	0.96	431.25
42	76.02	0.47	456.28
43	76.13	0.37	468.31
44	76.36	0.28	478.95
45	82.42	0.37	326.74
46	81.98	0.86	314.75
47	83.24	0.94	332.64
48	82.79	0.48	338.64
49	82.71	0.39	321.64
50	81.79	0.26	329.65

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Table 87 (cont.)

FORBILATION	PROPRANOLOL HCl CONTENT (mg)	SD	WT. OF BEADS IN ONE CAPSULE (mg)
51	82.53	0.85	314.75
52	83.57	0.28	324.53
53	83.69	0.41	319.42
54	84.26	0.91	327.64
55	82.37	0.84	428.16
56	82.18	0.74	435.72
57	81.99	0.86	447.84
58	79.54	0.64	402.61
59	79.63	0.83	412.04
60	79.28	0.55	425.62
61	79.75	0.79	431.89
62 LOT 1	78.97	0.77	404.61
62 LOT 2	79.04	0.64	406.81
62 LOT 3	78.85	0.83	409.75
63	77.89	0.33	418.68
64	77.39	0.88	423.56
65	77.64	0.86	431.24

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BIOGRAPHY



Mr. Anuchit Sanprasert was born on July 2, 1969 he got his degree in Bachelor of Sciences in Pharmacy with the first honors in 1992 from Faculty of Pharmacy, Chiang Mai University, Chiang Mai, Thailand. At the present moment, he works in Faculty of Pharmaceutical Science, Chulalongkorn University, Bangkok, Thailand.



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