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Appendix A

Determination of calibration curve and Percentage content

Standard curve plot : Absorbance 238 nm. (in pH 1.2)

Conc. (mcg/ml)	Abs 1	Abs 2	Abs 3	Mean	SD
1.50	0.15	0.127	0.127	0.135	0.013
3.00	0.213	0.211	0.225	0.216	0.008
4.50	0.327	0.292	0.289	0.303	0.021
6.00	0.374	0.382	0.372	0.376	0.005
7.50	0.459	0.454	0.467	0.46	0.007
9.00	0.573	0.547	0.539	0.553	0.018
10.50	0.641	0.625	0.623	0.63	0.010
12.00	0.703	0.705	0.708	0.705	0.003

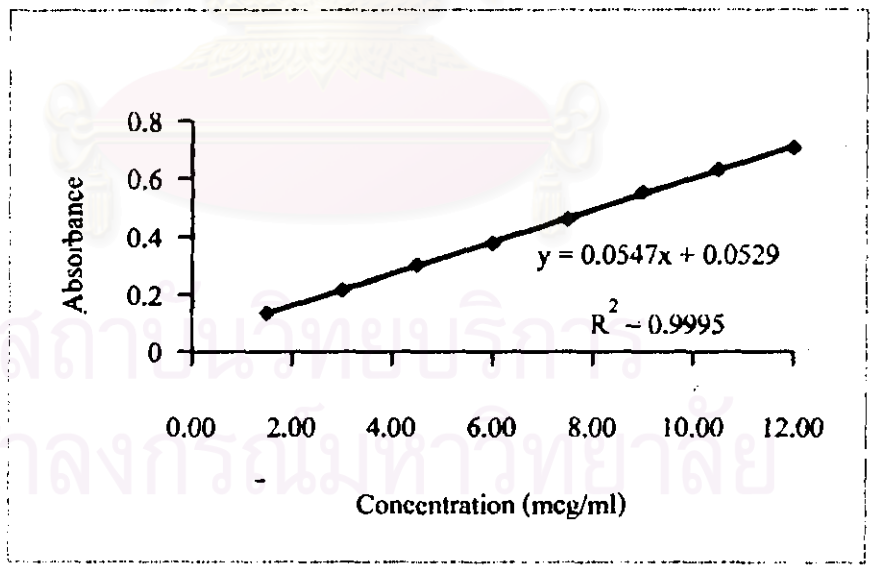

Figure 51 Calibration curve of standard solution of nifedipine at 238 nm in pH 1.2

Standard curve plot : Absorbance 238 nm (in pH 7.5)

Conc. (mcg/ml)	Abs 1	Abs 2	Abs 3	Mean	SD
1.50	0.146	0.139	0.145	0.143	0.004
3.00	0.278	0.233	0.226	0.246	0.028
4.50	0.309	0.315	0.303	0.309	0.006
6.00	0.397	0.4	0.399	0.399	0.002
7.50	0.495	0.478	0.477	0.483	0.010
9.00	0.58	0.567	0.556	0.568	0.012
10.50	0.664	0.64	0.651	0.652	0.012
12.00	0.737	0.735	0.719	0.730	0.010

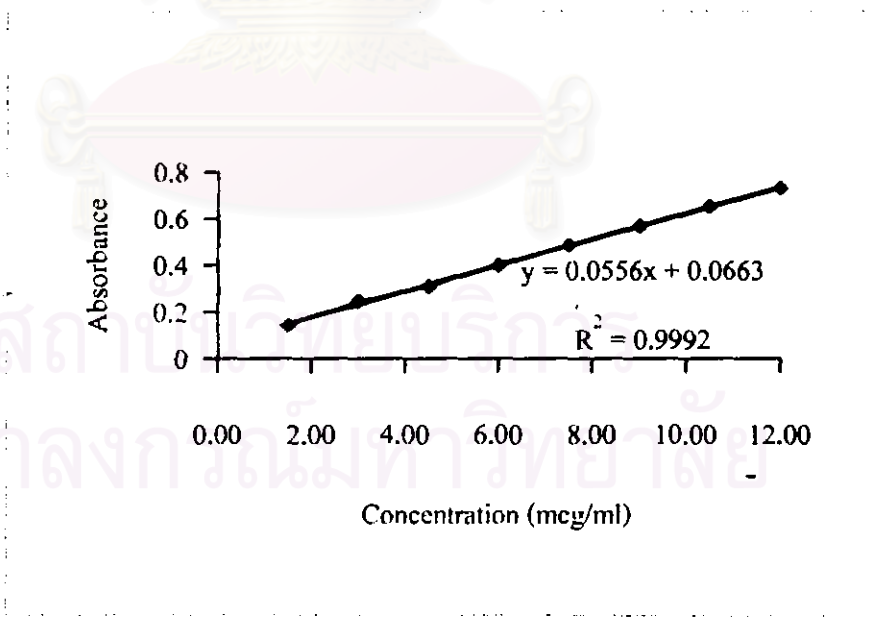

Figure 52 Calibration curve of standard solution of nifedipine at 238 nm in pH 7.5

Table 9 Percent content of nifedipine of spray dried products obtained from 5% spray solution at various inlet temperatures

Temperatures (°C)		Nifedipine content Nifedipine : Eudragit RS100 or RL100 : PVP K30									
		1:10:0		1:8:2		1:5:5		1:2:8		1:0:10	
		mg	%	mg	%	mg	%	mg	%	mg	%
55°C	#1	0.99 *0.82	98.56 82.37	1.00 0.82	100.36 82.37	0.91 0.86	91.37 85.97	0.91 0.82	91.37 82.37	0.99 0.99	98.56 98.56
	#2	0.93 *0.84	93.17 84.17	0.93 0.88	93.17 87.77	0.90 0.95	89.57 94.96	0.88 0.88	87.77 87.77	0.93 0.93	93.17 93.17
	#3	0.90 *0.88	89.57 87.77	0.97 0.93	96.76 93.17	0.95 0.91	94.96 91.37	0.86 0.93	85.97 93.17	0.91 0.91	91.37 91.37
	Average	0.94 *0.85	93.76 84.77	0.97 0.88	96.76 87.77	0.92 0.91	91.97 90.77	0.88 0.88	88.37 87.77	0.94 0.94	94.36 94.36
	SD.	0.05 *0.03	4.53 2.75	0.04 0.05	3.60 5.40	0.03 0.05	2.75 4.53	0.03 0.05	2.75 5.40	0.04 0.04	3.74 3.74
65°C	#1	0.95	94.96	0.90	89.57	0.93	93.17	1.00	100.36	0.86	85.97
	#2	0.82	82.37	0.95	94.96	0.97	96.76	0.95	94.96	0.93	93.17
	#3	0.91	91.37	0.90	89.57	0.91	91.37	0.91	91.37	0.91	91.37
	Average	0.90	89.57	0.91	91.37	0.94	93.76	0.96	95.56	0.90	90.17
	SD.	0.06	6.48	0.03	3.12	0.03	2.75	0.05	4.53	0.04	3.74
75°C	#1	0.95	94.96	0.84	84.17	0.91	91.37	0.99	98.56	0.88	87.77
	#2	0.90	89.57	0.93	93.17	0.86	85.97	0.91	91.37	0.90	89.57
	#3	0.97	96.76	0.88	87.77	0.84	84.17	0.93	93.17	0.95	94.96
	Average	0.94	93.76	0.88	88.37	0.87	87.17	0.94	94.36	0.91	90.77
	SD.	0.04	3.74	0.05	4.53	0.04	3.74	0.04	3.74	0.04	3.74

* Percentage content of nifedipine : Eudragit RL100 : PVP K30

Table 10 Percent content of nifedipine of spray dried products obtained from 10% spray solution at various inlet temperatures

Temperatures (°C)		Nifedipine content Nifedipine : Eudragit RS100 : PVP K30									
		1:10:0		1:8:2		1:5:5		1:2:8		1:0:10	
		mg	%	mg	%	mg	%	mg	%	mg	%
55°C	#1	0.93	93.17	0.91	91.37	0.93	93.17	0.88	87.77	0.88	87.77
	#2	0.84	84.17	0.86	85.97	0.86	85.97	0.93	93.17	0.97	96.76
	#3	0.88	87.77	0.93	93.17	0.91	91.37	0.90	89.57	0.95	94.96
	Average	0.88	88.37	0.90	90.17	0.90	90.17	0.90	90.17	0.93	93.17
	SD.	0.05	4.53	0.04	3.74	0.04	3.74	0.03	2.75	0.05	4.76
65°C	#1	0.84	84.17	0.86	85.97	0.95	94.96	0.93	93.17	0.95	94.96
	#2	0.91	91.37	0.95	94.96	0.86	85.97	0.88	87.77	0.90	89.57
	#3	0.88	87.77	0.90	89.57	0.88	87.77	0.95	94.96	0.93	93.17
	Average	0.88	87.77	0.90	90.17	0.90	89.57	0.92	91.97	0.93	92.57
	SD.	0.04	3.60	0.05	4.53	0.05	4.76	0.04	3.74	0.03	2.75
75°C	#1	0.91	91.37	0.86	85.97	0.93	93.17	0.93	93.17	0.97	96.76
	#2	0.84	84.17	0.86	85.97	0.93	93.17	0.93	93.17	0.97	96.76
	#3	0.88	87.77	0.90	89.57	0.91	91.37	0.88	87.77	0.93	93.17
	Average	0.88	87.77	0.87	87.17	0.93	92.57	0.91	91.37	0.96	95.56
	SD.	0.04	3.60	0.02	2.08	0.01	1.04	0.03	3.12	0.02	2.08

Appendix B

Percentage of nifedipine release

Table 11 Percent drug release of nifedipine spray dried in simulated intestinal fluid without enzyme (pH 7.5) prepared at 55°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	31.59	31.47	31.53	31.53	0.06
	10	34.98	35.04	35.12	35.05	0.07
	15	36.65	36.74	36.55	36.65	0.10
	20	38.60	38.54	38.75	38.63	0.11
	30	42.90	42.75	42.86	42.84	0.08
	45	45.42	45.35	45.32	45.36	0.05
	60	48.22	48.26	48.41	48.30	0.10
	90	55.72	55.68	55.75	55.72	0.04
	120	57.96	57.92	57.72	57.87	0.13
	180	59.94	60.23	60.34	60.17	0.21
	240	62.21	62.11	62.34	62.22	0.12
	300	66.62	66.79	66.51	66.64	0.14
	360	69.71	69.85	69.83	69.80	0.08
	420	73.64	73.42	73.56	73.54	0.11
	540	77.14	77.09	77.26	77.16	0.09
	660	80.51	80.38	80.62	80.50	0.12
	780	83.46	83.43	83.23	83.37	0.13
	1200	89.76	89.87	89.93	89.85	0.09
	1440	93.23	93.15	93.01	93.13	0.11
10 % (w/v)	5	26.71	26.65	26.54	26.63	0.09
	10	32.15	32.22	32.41	32.26	0.13
	15	33.87	34.22	34.05	34.05	0.18
	20	35.88	35.65	35.72	35.75	0.12
	30	37.61	37.42	37.76	37.60	0.17
	45	40.84	40.62	40.71	40.72	0.11
	60	44.45	44.12	44.32	44.30	0.17
	90	47.86	47.82	47.81	47.83	0.03
	120	51.23	51.08	51.18	51.16	0.08
	180	56.02	56.42	55.96	56.13	0.25
	240	59.42	59.78	59.51	59.57	0.19
	300	63.11	63.23	63.02	63.12	0.11
	360	66.41	66.38	66.26	66.35	0.08
	420	69.79	69.62	69.81	69.74	0.10
	540	73.61	73.41	73.28	73.43	0.17
	660	76.88	76.52	76.32	76.57	0.28
	780	79.72	79.82	79.91	79.82	0.10
	1200	85.20	85.36	85.42	85.33	0.11
	1440	88.63	88.71	88.81	88.72	0.09

Table 12 Percent drug release from 1:10:0 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.93	6.06	6.41	6.47	0.44
	10	7.31	6.44	6.61	6.79	0.46
	15	7.66	6.61	7.14	7.14	0.53
	20	8.01	7.31	7.66	7.66	0.35
	30	8.54	7.84	8.19	8.19	0.35
	45	9.24	8.89	8.54	8.89	0.35
	60	9.59	10.11	9.76	9.82	0.27
	90	10.29	10.64	10.46	10.46	0.18
	120	11.68	12.38	12.55	12.20	0.46
	180	15.17	14.65	14.83	14.88	0.26
	240	18.85	18.32	18.50	18.56	0.27
	300	22.17	21.65	22.52	22.11	0.44
	360	25.33	25.15	24.81	25.10	0.26
	420	26.91	26.56	26.21	26.56	0.35
	540	30.05	30.22	29.53	29.93	0.36
	660	33.03	33.55	32.50	33.03	0.53
	780	36.35	37.22	36.87	36.81	0.44
	1200	41.24	41.77	42.29	41.77	0.53
	1440	43.88	42.84	43.19	43.30	0.53
10 % (w/v)	5	6.95	7.69	7.14	7.26	0.38
	10	7.73	8.10	7.54	7.79	0.28
	15	8.10	8.29	8.47	8.29	0.19
	20	8.47	8.65	9.02	8.71	0.28
	30	9.02	8.84	9.39	9.08	0.28
	45	11.05	11.42	10.32	10.93	0.56
	60	11.98	12.17	12.71	12.29	0.38
	90	14.74	13.83	14.20	14.26	0.46
	120	15.86	16.78	16.60	16.41	0.49
	180	17.71	18.08	17.53	17.77	0.28
	240	19.38	20.30	19.74	19.81	0.46
	300	21.41	21.96	21.23	21.53	0.38
	360	23.99	23.45	24.36	23.93	0.46
	420	28.42	27.87	27.32	27.87	0.55
	540	32.31	31.94	31.20	31.82	0.57
	660	35.83	34.91	34.35	35.03	0.75
	780	39.71	39.34	38.97	39.34	0.37
	1200	45.80	44.51	44.69	45.00	0.70
	1440	49.70	48.03	48.59	48.77	0.85

Table 13 Percent drug release from 1:8:2 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prcparcd by spray drying at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.47	5.97	6.47	6.30	0.29
	10	7.01	6.17	6.84	6.67	0.44
	15	7.51	7.01	7.51	7.34	0.29
	20	7.68	7.35	7.52	7.52	0.17
	30	8.52	7.85	8.02	8.13	0.35
	45	10.36	9.86	10.02	10.08	0.26
	60	11.54	10.87	11.87	11.43	0.51
	90	12.71	13.38	13.05	13.05	0.34
	120	15.06	15.39	14.39	14.95	0.51
	180	18.07	18.58	18.40	18.35	0.26
	240	22.09	21.93	21.43	21.82	0.34
	300	25.29	24.79	25.45	25.18	0.34
	360	28.31	28.81	27.81	28.31	0.50
	420	31.16	31.83	30.99	31.33	0.44
	540	34.68	34.35	34.85	34.63	0.25
	660	37.71	38.37	37.87	37.98	0.34
	780	42.06	41.56	41.06	41.56	0.50
	1200	46.76	46.09	47.09	46.65	0.51
	1440	49.95	49.45	50.12	49.84	0.35
10 % (w/v)	5	7.42	7.06	7.60	7.36	0.27
	10	7.83	7.28	7.64	7.58	0.28
	15	8.92	8.55	8.01	8.49	0.46
	20	9.29	9.10	8.56	8.98	0.38
	30	9.29	9.65	8.92	9.29	0.37
	45	10.93	11.29	10.02	10.75	0.65
	60	13.30	12.58	12.20	12.69	0.56
	90	14.04	14.77	15.13	14.65	0.56
	120	15.68	15.32	16.23	15.74	0.46
	180	19.87	20.42	19.33	19.87	0.55
	240	23.17	23.72	22.81	23.23	0.46
	300	27.01	26.47	27.19	26.89	0.37
	360	30.30	29.94	30.85	30.36	0.46
	420	35.05	34.32	34.15	34.51	0.48
	540	38.17	38.35	38.89	38.47	0.37
	660	42.37	42.01	41.46	41.95	0.46
	780	46.21	45.12	45.66	45.66	0.55
	1200	51.51	51.14	50.60	51.08	0.46
	1440	54.08	54.81	55.35	54.75	0.64

Table 14 Percent drug release from 1:5:5 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	12.24	12.95	12.77	12.65	0.37
	10	12.84	13.38	13.20	13.14	0.27
	15	13.38	13.74	13.91	13.68	0.27
	20	14.45	14.98	15.34	14.92	0.45
	30	16.41	16.06	15.70	16.06	0.36
	45	18.02	16.95	17.66	17.54	0.54
	60	19.45	19.98	19.63	19.69	0.27
	90	20.88	21.95	21.60	21.48	0.55
	120	23.56	23.21	22.85	23.21	0.36
	180	26.42	27.31	26.59	26.77	0.47
	240	30.17	30.71	29.46	30.11	0.63
	300	34.11	33.58	34.28	33.99	0.37
	360	36.80	37.33	36.62	36.92	0.37
	420	41.44	40.91	41.26	41.20	0.27
	540	44.84	45.02	44.48	44.78	0.27
	660	47.53	48.77	48.24	48.18	0.62
	780	51.10	51.82	52.17	51.70	0.55
	1200	56.99	57.71	57.17	57.29	0.37
	1440	61.29	61.12	60.76	61.06	0.27
10 % (w/v)	5	14.33	12.15	12.88	13.12	1.11
	10	14.78	13.13	14.04	13.98	0.83
	15	15.69	14.77	15.14	15.20	0.46
	20	16.60	15.87	15.69	16.05	0.48
	30	18.06	17.33	17.87	17.75	0.38
	45	19.52	20.43	20.07	20.01	0.46
	60	22.08	21.17	22.45	21.90	0.66
	90	23.55	23.18	24.10	23.61	0.46
	120	25.01	25.55	25.20	25.25	0.27
	180	28.84	29.21	28.29	28.78	0.46
	240	32.86	32.32	33.40	32.86	0.54
	300	36.52	36.34	35.98	36.28	0.27
	360	39.45	39.81	39.27	39.51	0.27
	420	43.83	44.38	43.47	43.89	0.46
	540	49.13	49.68	48.58	49.13	0.55
	660	54.07	55.35	54.98	54.80	0.66
	780	58.46	57.56	58.10	58.04	0.45
	1200	64.49	63.39	63.76	63.88	0.56
	1440	61.25	66.88	67.25	65.13	3.36

Table 15 Percent drug release from 1:2:8 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	26.39	26.80	26.19	26.46	0.31
	10	27.15	27.77	27.97	27.63	0.43
	15	29.00	28.59	29.21	28.93	0.32
	20	30.44	30.85	29.83	30.37	0.51
	30	31.89	32.50	31.68	32.02	0.43
	45	35.58	35.18	34.56	35.11	0.51
	60	37.65	37.04	37.44	37.38	0.31
	90	38.69	37.87	38.28	38.28	0.41
	120	40.74	41.15	40.54	40.81	0.31
	180	44.24	44.85	45.06	44.72	0.43
	240	52.86	53.89	52.46	53.07	0.74
	300	57.83	56.60	57.21	57.21	0.62
	360	61.54	62.15	60.93	61.54	0.61
	420	65.87	66.28	65.45	65.87	0.42
	540	69.78	70.40	68.96	69.71	0.72
	660	73.49	73.09	73.90	73.49	0.41
	780	77.61	78.22	77.20	77.68	0.51
	1200	87.68	88.91	88.08	88.22	0.63
	1440	94.08	94.29	93.88	94.08	0.21
10 % (w/v)	5	26.34	27.25	26.52	26.70	0.48
	10	29.03	28.31	29.21	28.85	0.48
	15	30.86	30.49	30.13	30.49	0.37
	20	32.14	33.42	32.87	32.81	0.64
	30	33.79	34.52	33.61	33.97	0.48
	45	35.80	36.71	35.98	36.16	0.48
	60	38.72	38.00	38.54	38.42	0.37
	90	41.28	40.91	41.64	41.28	0.37
	120	44.75	44.93	45.66	45.11	0.48
	180	48.59	48.96	48.41	48.65	0.28
	240	52.25	51.89	52.98	52.37	0.56
	300	56.09	57.00	55.91	56.33	0.58
	360	59.57	60.12	59.20	59.63	0.46
	420	65.59	64.86	65.95	65.47	0.56
	540	71.44	70.34	71.08	70.95	0.56
	660	76.02	76.74	77.11	76.62	0.55
	780	81.86	82.60	81.51	81.99	0.56
	1200	88.99	89.72	88.62	89.11	0.56
	1440	95.03	95.58	94.30	94.97	0.64

Table 16 Percent drug release from 1:0:10 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	37.11	36.60	37.62	37.11	0.51
	10	39.02	39.36	39.71	39.36	0.35
	15	41.08	41.42	40.40	40.97	0.52
	20	42.79	43.13	42.45	42.79	0.34
	30	44.16	44.68	44.33	44.39	0.27
	45	46.56	46.05	45.53	46.05	0.52
	60	47.93	48.44	47.59	47.99	0.43
	90	51.69	51.18	51.86	51.58	0.35
	120	54.61	53.92	54.44	54.32	0.36
	180	57.86	58.54	57.52	57.97	0.52
	240	61.46	61.12	61.96	61.51	0.42
	300	64.20	65.22	64.55	64.66	0.52
	360	67.62	68.31	67.97	67.97	0.35
	420	72.24	71.91	71.56	71.90	0.34
	540	78.74	77.89	78.40	78.34	0.43
	660	83.89	83.04	84.06	83.66	0.55
	780	88.01	88.52	88.35	88.29	0.26
	1200	97.92	97.41	97.07	97.47	0.43
	1440	102.57	102.91	102.05	102.51	0.43
10 % (w/v)	5	35.99	36.52	35.82	36.11	0.37
	10	37.41	37.94	38.11	37.82	0.37
	15	39.86	40.38	39.34	39.86	0.52
	20	42.31	41.96	41.26	41.84	0.53
	30	43.02	43.71	43.53	43.42	0.36
	45	44.41	44.59	45.11	44.70	0.36
	60	47.38	46.86	46.34	46.86	0.52
	90	49.83	50.70	50.35	50.29	0.44
	120	54.20	53.51	54.37	54.03	0.46
	180	56.83	57.35	58.05	57.41	0.61
	240	61.20	60.50	60.86	60.85	0.35
	300	64.36	64.87	64.01	64.41	0.43
	360	67.51	68.20	68.03	67.91	0.36
	420	72.40	72.75	73.10	72.75	0.35
	540	78.86	77.82	78.35	78.34	0.52
	660	83.08	83.59	82.90	83.19	0.36
	780	88.50	89.54	88.67	88.90	0.56
	1200	98.97	99.85	99.49	99.44	0.44
	1440	104.25	104.78	105.30	104.78	0.53

Table 17 Percent drug release from 1:10:0 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	7.24	6.51	7.06	6.94	0.38
	10	7.64	7.09	7.46	7.40	0.28
	15	8.19	7.64	8.01	7.95	0.28
	20	8.56	8.01	8.37	8.31	0.28
	30	9.29	8.37	8.92	8.86	0.46
	45	10.02	10.74	10.38	10.38	0.36
	60	11.66	12.39	12.02	12.02	0.37
	90	13.85	14.04	14.76	14.22	0.48
	120	15.68	15.50	16.23	15.80	0.38
	180	17.51	17.15	17.88	17.51	0.37
	240	19.52	19.70	19.16	19.46	0.27
	300	22.08	21.17	20.80	21.35	0.66
	360	23.55	22.82	23.72	23.36	0.48
	420	27.19	26.46	27.56	27.07	0.56
	540	29.58	29.03	29.76	29.46	0.38
	660	31.77	31.41	30.68	31.29	0.56
	780	33.97	33.42	32.87	33.42	0.55
	1200	38.89	38.34	37.98	38.40	0.46
	1440	41.65	41.28	42.37	41.77	0.55
10 % (w/v)	5	6.66	7.03	7.78	7.16	0.57
	10	7.26	7.63	8.19	7.69	0.47
	15	7.82	8.38	8.19	8.13	0.28
	20	8.38	9.13	8.57	8.69	0.39
	30	8.75	9.69	9.31	9.25	0.47
	45	11.17	10.44	11.55	11.05	0.56
	60	12.86	13.42	13.24	13.17	0.29
	90	13.80	14.55	14.92	14.42	0.57
	120	16.78	15.67	16.42	16.29	0.57
	180	18.10	18.66	17.92	18.23	0.39
	240	20.72	20.35	19.60	20.22	0.57
	300	22.59	22.22	22.03	22.28	0.28
	360	24.28	23.90	23.16	23.78	0.57
	420	27.08	27.45	26.88	27.14	0.29
	540	30.07	29.33	29.88	29.76	0.38
	660	31.76	31.38	31.20	31.45	0.29
	780	34.19	34.37	34.00	34.19	0.19
	1200	39.22	39.78	39.41	39.47	0.28
	1440	43.16	43.35	42.79	43.10	0.28

Table 18 Percent drug release from 1:8: 2 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 65°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.55	6.19	6.55	6.43	0.21
	10	7.12	6.76	6.94	6.94	0.18
	15	7.83	7.47	7.47	7.59	0.21
	20	8.19	7.83	8.01	8.01	0.18
	30	8.55	8.37	8.72	8.55	0.18
	45	8.91	9.26	9.08	9.08	0.18
	60	9.80	9.62	9.44	9.62	0.18
	90	10.34	10.51	9.80	10.22	0.37
	120	12.47	12.12	11.94	12.18	0.27
	180	16.22	15.51	15.86	15.86	0.36
	240	19.98	19.62	18.91	19.50	0.54
	300	22.13	22.66	23.02	22.60	0.45
	360	26.06	25.70	26.60	26.12	0.45
	420	27.86	28.57	28.93	28.45	0.54
	540	29.47	29.83	30.72	30.01	0.64
	660	32.50	31.79	32.69	32.33	0.47
	780	33.41	33.58	33.94	33.64	0.27
	1200	40.88	40.53	41.24	40.88	0.36
	1440	46.08	46.79	46.44	46.44	0.36
10 % (w/v)	5	6.51	6.15	7.42	6.69	0.65
	10	7.09	6.73	7.83	7.22	0.56
	15	7.64	7.46	8.19	7.76	0.38
	20	8.55	8.01	8.92	8.49	0.46
	30	9.10	8.92	9.47	9.16	0.28
	45	10.20	10.56	9.84	10.20	0.36
	60	12.39	11.84	12.02	12.08	0.28
	90	13.85	13.49	14.22	13.85	0.37
	120	16.05	15.68	16.41	16.05	0.37
	180	17.51	17.87	17.70	17.69	0.18
	240	20.61	20.07	19.89	20.19	0.37
	300	21.90	21.54	20.81	21.42	0.56
	360	23.36	23.73	23.00	23.36	0.37
	420	26.46	27.38	27.01	26.95	0.46
	540	28.48	29.40	29.21	29.03	0.49
	660	32.68	32.32	31.95	32.32	0.37
	780	35.79	35.97	36.88	36.21	0.58
	1200	43.08	43.81	43.27	43.39	0.38
	1440	47.85	46.77	47.13	47.25	0.55

Table 19 Percent drug release from 1:5: 5 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 65°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	8.32	8.32	8.84	8.49	0.30
	10	9.06	9.06	9.59	9.24	0.31
	15	9.76	9.76	10.29	9.94	0.31
	20	10.81	10.81	10.99	10.87	0.10
	30	12.38	12.38	12.04	12.27	0.20
	45	13.96	13.96	13.61	13.84	0.20
	60	15.88	15.88	15.71	15.82	0.10
	90	17.81	17.81	17.11	17.58	0.40
	120	20.78	20.78	20.60	20.72	0.10
	180	22.53	22.53	23.23	22.76	0.40
	240	26.55	26.55	26.38	26.49	0.10
	300	27.79	27.79	28.31	27.96	0.30
	360	30.23	30.23	30.06	30.17	0.10
	420	31.64	31.64	31.98	31.75	0.20
	540	35.30	35.30	34.95	35.18	0.20
	660	38.80	38.80	38.28	38.63	0.30
	780	41.43	41.43	42.30	41.72	0.50
	1200	52.76	52.76	51.89	52.47	0.50
	1440	57.87	57.35	56.99	57.40	0.44
10 % (w/v)	5	7.60	6.87	7.06	7.18	0.38
	10	9.28	8.37	8.73	8.79	0.46
	15	10.75	11.10	10.38	10.74	0.36
	20	11.85	12.03	12.57	12.15	0.37
	30	13.85	14.58	14.95	14.46	0.56
	45	16.59	16.41	16.05	16.35	0.27
	60	17.52	17.88	18.06	17.82	0.27
	90	19.89	18.98	19.34	19.40	0.46
	120	21.54	22.08	21.71	21.78	0.28
	180	23.54	24.09	24.27	23.97	0.38
	240	29.01	28.65	28.29	28.65	0.36
	300	30.32	31.04	31.22	30.86	0.48
	360	33.05	32.87	33.42	33.11	0.28
	420	37.07	36.52	36.89	36.83	0.28
	540	40.00	39.63	39.27	39.63	0.37
	660	42.93	43.29	43.47	43.23	0.27
	780	47.13	47.67	46.76	47.19	0.46
	1200	55.88	56.06	56.24	56.06	0.18
	1440	61.38	62.11	61.75	61.75	0.37

Table 20 Percent drug release from 1:2:8 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	15.46	15.12	15.64	15.41	0.26
	10	16.93	17.10	16.58	16.87	0.27
	15	19.00	18.66	18.48	18.71	0.26
	20	20.22	19.87	20.39	20.16	0.27
	30	22.29	21.77	21.95	22.00	0.26
	45	23.85	24.19	23.51	23.85	0.34
	60	25.41	25.76	24.89	25.35	0.44
	90	29.21	28.52	29.72	29.15	0.60
	120	32.85	33.01	32.50	32.79	0.26
	180	36.14	35.79	35.45	35.79	0.35
	240	39.43	39.25	39.77	39.48	0.26
	300	43.41	42.72	43.06	43.06	0.35
	360	46.36	47.04	46.70	46.70	0.34
	420	49.47	50.16	49.82	49.82	0.35
	540	54.83	55.18	54.66	54.89	0.27
	660	59.85	60.54	60.37	60.25	0.36
	780	65.04	65.39	64.88	65.10	0.26
	1200	76.61	76.10	76.44	76.38	0.26
	1440	82.53	83.22	82.36	82.70	0.46
10 % (w/v)	5	18.82	19.35	18.64	18.94	0.37
	10	21.41	21.06	20.70	21.06	0.36
	15	22.85	22.32	23.03	22.73	0.37
	20	24.46	24.28	24.82	24.52	0.27
	30	26.25	26.60	25.89	26.25	0.36
	45	28.57	28.04	27.68	28.10	0.45
	60	30.36	30.71	30.00	30.36	0.36
	90	33.40	34.11	33.57	33.69	0.37
	120	37.15	37.51	36.79	37.15	0.36
	180	40.19	40.55	40.90	40.55	0.36
	240	43.94	44.48	44.61	44.34	0.36
	300	48.06	47.53	48.24	47.94	0.37
	360	51.82	51.10	51.46	51.46	0.36
	420	55.04	54.50	55.21	54.92	0.37
	540	60.04	60.57	59.86	60.16	0.37
	660	65.04	65.23	65.76	65.34	0.37
	780	70.59	70.77	71.30	70.89	0.37
	1200	83.25	83.78	83.61	83.55	0.27
	1440	88.48	88.83	89.19	88.83	0.36

Table 21 Percent drug release from 1:0:10 Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	23.24	22.88	23.43	23.18	0.28
	10	25.01	25.37	25.74	25.37	0.37
	15	27.20	26.66	27.02	26.96	0.27
	20	28.30	29.03	29.40	28.91	0.56
	30	30.49	30.13	30.68	30.43	0.28
	45	31.96	32.50	32.14	32.20	0.27
	60	34.70	34.15	33.79	34.21	0.46
	90	37.99	37.62	37.80	37.80	0.19
	120	42.19	41.64	41.82	41.88	0.28
	180	45.48	45.84	45.12	45.48	0.36
	240	49.32	49.14	48.96	49.14	0.18
	300	52.80	53.16	52.98	52.98	0.18
	360	56.64	56.46	57.00	56.70	0.27
	420	61.75	62.48	61.93	62.05	0.38
	540	66.87	67.79	67.42	67.36	0.46
	660	72.54	72.91	72.36	72.60	0.28
	780	78.57	77.85	78.39	78.27	0.37
	1200	92.79	92.42	93.34	92.85	0.46
	1440	97.78	98.51	97.97	98.09	0.38
10 % (w/v)	5	22.73	23.09	22.91	22.91	0.18
	10	24.64	24.82	25.17	24.88	0.27
	15	25.89	26.07	26.43	26.13	0.27
	20	28.21	28.39	28.75	28.45	0.27
	30	29.83	30.18	30.01	30.01	0.18
	45	31.97	31.79	31.44	31.73	0.27
	60	33.94	33.40	34.11	33.82	0.37
	90	37.15	37.50	36.97	37.21	0.27
	120	41.26	40.55	40.90	40.90	0.36
	180	44.48	44.84	44.66	44.66	0.18
	240	48.59	48.06	47.88	48.18	0.37
	300	51.82	51.99	51.81	51.87	0.10
	360	55.93	55.22	55.75	55.63	0.37
	420	59.15	59.33	58.79	59.09	0.27
	540	63.44	64.15	64.50	64.03	0.54
	660	70.93	70.58	71.29	70.93	0.36
	780	76.49	76.84	76.31	76.55	0.27
	1200	90.93	90.40	90.75	90.69	0.27
	1440	97.59	98.30	98.12	98.00	0.37

Table 22 Percent drug release from 1:10:0 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 75°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	8.06	7.32	8.24	7.87	0.49
	10	8.29	7.73	8.65	8.22	0.46
	15	8.65	8.47	9.02	8.71	0.28
	20	8.84	9.21	9.58	9.21	0.37
	30	9.39	9.76	9.95	9.70	0.28
	45	9.95	10.13	10.32	10.13	0.19
	60	10.14	10.32	10.69	10.38	0.28
	90	12.71	12.16	12.53	12.47	0.28
	120	14.01	14.75	14.56	14.44	0.38
	180	16.60	16.97	16.23	16.60	0.37
	240	18.08	18.64	17.71	18.14	0.47
	300	19.56	20.12	20.29	19.99	0.38
	360	21.04	20.86	20.49	20.80	0.28
	420	22.34	21.60	21.78	21.91	0.39
	540	23.82	24.18	24.00	24.00	0.18
	660	25.66	26.22	26.03	25.97	0.28
	780	27.70	27.15	27.51	27.45	0.28
	1200	34.33	34.69	34.14	34.39	0.28
	1440	37.31	36.21	36.57	36.70	0.56
10 % (w/v)	5	7.97	7.24	7.78	7.66	0.38
	10	8.19	7.64	8.56	8.13	0.46
	15	8.56	8.01	8.92	8.50	0.46
	20	8.92	8.56	9.47	8.98	0.46
	30	9.29	9.10	9.84	9.41	0.38
	45	10.02	9.47	10.20	9.90	0.38
	60	12.57	12.02	12.21	12.27	0.28
	90	13.86	13.49	13.31	13.55	0.28
	120	14.77	14.59	14.41	14.59	0.18
	180	16.41	16.23	16.05	16.23	0.18
	240	19.33	18.97	19.33	19.21	0.21
	300	20.44	19.89	20.08	20.14	0.28
	360	21.17	21.72	22.08	21.66	0.46
	420	23.36	23.00	22.64	23.00	0.36
	540	25.74	25.55	25.01	25.43	0.38
	660	27.39	27.02	26.66	27.02	0.37
	780	29.40	29.21	28.67	29.09	0.38
	1200	34.68	34.32	34.13	34.38	0.28
	1440	37.80	37.44	38.16	37.80	0.36

Table 23 Percent drug release from 1:8:2 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 75°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.58	6.23	7.45	6.75	0.63
	10	6.96	6.79	8.19	7.31	0.76
	15	7.66	7.31	8.54	7.84	0.63
	20	8.54	8.19	9.06	8.60	0.44
	30	9.59	9.76	9.41	9.59	0.18
	45	10.11	10.29	9.76	10.05	0.27
	60	12.03	11.51	12.38	11.97	0.44
	90	12.91	13.43	13.09	13.14	0.26
	120	13.44	13.96	13.79	13.73	0.27
	180	15.70	15.53	15.36	15.53	0.17
	240	17.11	16.76	17.80	17.22	0.53
	300	19.55	18.86	19.21	19.21	0.35
	360	20.26	20.78	20.61	20.55	0.27
	420	22.36	22.01	22.53	22.30	0.27
	540	24.98	24.28	24.81	24.69	0.37
	660	26.21	26.03	26.73	26.32	0.36
	780	29.35	29.00	28.83	29.06	0.27
	1200	33.72	33.37	33.19	33.43	0.27
	1440	36.35	36.70	36.18	36.41	0.27
10 % (w/v)	5	6.59	7.14	7.32	7.02	0.38
	10	7.17	7.54	7.91	7.54	0.37
	15	7.91	7.73	8.28	7.97	0.28
	20	8.84	8.28	8.65	8.59	0.28
	30	9.58	9.39	9.02	9.33	0.28
	45	10.50	10.13	9.76	10.13	0.37
	60	11.43	11.98	11.24	11.55	0.38
	90	12.90	13.27	12.72	12.96	0.28
	120	15.12	14.38	14.75	14.75	0.37
	180	16.05	16.41	16.78	16.41	0.37
	240	17.89	18.63	18.45	18.32	0.39
	300	19.93	19.56	20.12	19.87	0.28
	360	22.15	21.41	21.96	21.84	0.38
	420	23.45	23.99	23.63	23.69	0.27
	540	26.40	25.85	25.48	25.91	0.46
	660	27.88	27.15	27.70	27.58	0.38
	780	29.55	29.73	29.36	29.55	0.19
	1200	35.63	35.08	35.44	35.38	0.28
	1440	39.71	39.15	39.34	39.40	0.28

Table 24 Percent drug release from 1:5: 5 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 75°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	12.10	12.84	12.29	12.41	0.38
	10	12.72	13.28	12.91	12.97	0.28
	15	13.28	13.65	13.46	13.46	0.19
	20	13.65	14.20	14.39	14.08	0.38
	30	15.67	16.04	16.60	16.10	0.47
	45	17.71	18.26	18.08	18.02	0.28
	60	20.11	19.75	20.30	20.05	0.28
	90	22.15	21.41	21.78	21.78	0.37
	120	23.45	24.18	23.81	23.81	0.37
	180	26.95	26.58	27.32	26.95	0.37
	240	28.62	29.36	29.18	29.05	0.39
	300	29.92	30.29	30.66	30.29	0.37
	360	33.05	33.42	32.69	33.05	0.37
	420	33.81	34.36	33.99	34.05	0.28
	540	36.39	36.94	36.57	36.63	0.28
	660	39.90	40.64	40.27	40.27	0.37
	780	41.94	42.31	42.68	42.31	0.37
	1200	49.31	49.68	49.86	49.62	0.28
	1440	53.58	53.77	53.21	53.52	0.28
10 % (w/v)	5	13.48	14.02	13.84	13.78	0.27
	10	14.45	14.63	14.81	14.63	0.18
	15	16.05	15.52	16.23	15.93	0.37
	20	16.95	17.30	17.66	17.30	0.36
	30	18.38	18.56	18.92	18.62	0.27
	45	20.52	20.88	21.06	20.82	0.27
	60	22.49	22.14	23.03	22.55	0.45
	90	24.10	24.63	24.28	24.34	0.27
	120	26.07	25.72	26.25	26.01	0.27
	180	27.68	27.50	28.21	27.80	0.37
	240	29.47	30.18	29.83	29.83	0.36
	300	31.79	31.08	31.61	31.49	0.37
	360	33.76	34.11	33.40	33.76	0.36
	420	35.19	35.37	35.55	35.37	0.18
	540	37.34	37.51	36.80	37.22	0.37
	660	40.73	40.55	40.19	40.49	0.27
	780	43.95	44.48	44.12	44.18	0.27
	1200	51.61	50.91	51.08	51.20	0.37
	1440	54.68	55.74	55.21	55.21	0.53

Table 25 Percent drug release from 1:2:8 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 75°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	14.79	15.30	14.96	15.02	0.26
	10	17.26	16.92	16.58	16.92	0.34
	15	19.15	18.46	18.80	18.80	0.35
	20	20.69	20.34	19.84	20.29	0.43
	30	22.06	21.72	22.57	22.12	0.43
	45	23.60	24.28	23.95	23.94	0.34
	60	25.48	25.83	25.15	25.49	0.34
	90	29.41	29.07	28.90	29.13	0.26
	120	32.16	32.50	31.99	32.22	0.26
	180	35.41	36.27	35.92	35.87	0.43
	240	39.35	39.02	38.84	39.07	0.26
	300	43.12	42.61	42.27	42.67	0.43
	360	45.87	46.21	46.38	46.15	0.26
	420	49.12	49.63	49.98	49.58	0.43
	540	54.76	54.42	54.94	54.71	0.26
	660	59.56	59.90	59.22	59.56	0.34
	780	64.80	65.39	64.53	64.91	0.44
	1200	75.30	74.79	74.61	74.90	0.36
	1440	80.47	80.29	79.61	80.12	0.45
10 % (w/v)	5	13.79	14.33	13.97	14.03	0.27
	10	16.41	16.05	15.68	16.05	0.37
	15	18.24	17.51	17.87	17.87	0.37
	20	19.53	19.89	20.43	19.95	0.45
	30	21.71	21.35	21.90	21.65	0.28
	45	22.82	23.36	23.55	23.24	0.38
	60	25.01	25.37	24.83	25.07	0.27
	90	29.57	28.84	29.02	29.14	0.38
	120	32.50	32.68	32.32	32.50	0.18
	180	36.88	36.34	35.97	36.40	0.46
	240	40.18	39.63	39.45	39.75	0.38
	300	43.47	42.92	43.10	43.16	0.28
	360	46.58	46.76	47.31	46.88	0.38
	420	50.78	50.97	50.42	50.72	0.28
	540	54.08	54.63	55.17	54.63	0.55
	660	58.65	57.74	58.29	58.23	0.46
	780	61.40	61.94	62.31	61.88	0.46
	1200	72.87	73.06	72.15	72.69	0.48
	1440	81.48	81.12	81.84	81.48	0.36

Table 26 Percent drug release from 1:0:10 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 75°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	13.66	14.02	14.37	14.02	0.36
	10	15.52	15.34	15.70	15.52	0.18
	15	18.37	18.02	17.66	18.02	0.36
	20	18.92	19.45	19.27	19.21	0.27
	30	21.24	20.88	20.70	20.94	0.27
	45	23.38	22.85	23.03	23.09	0.27
	60	25.00	24.82	25.35	25.06	0.27
	90	28.92	28.56	28.39	28.62	0.27
	120	31.79	31.96	32.50	32.08	0.37
	180	36.07	35.54	35.72	35.78	0.27
	240	39.30	38.76	39.12	39.06	0.27
	300	42.52	42.87	42.16	42.52	0.36
	360	45.56	45.74	46.27	45.86	0.37
	420	49.67	49.85	49.67	49.73	0.10
	540	54.67	55.38	55.03	55.03	0.36
	660	60.03	60.57	60.21	60.27	0.27
	780	65.40	65.76	66.29	65.82	0.45
	1200	79.66	79.84	80.55	80.02	0.47
	1440	88.63	88.81	89.17	88.87	0.27
10 % (w/v)	5	11.45	11.97	11.63	11.68	0.26
	10	13.61	13.78	13.26	13.55	0.27
	15	15.01	15.18	15.53	15.24	0.27
	20	17.11	17.28	16.76	17.05	0.27
	30	19.03	18.68	19.20	18.97	0.27
	45	20.43	20.95	20.26	20.55	0.36
	60	22.53	22.01	22.18	22.24	0.27
	90	26.89	27.59	27.41	27.30	0.36
	120	31.79	31.27	30.92	31.33	0.44
	180	35.13	34.25	34.60	34.66	0.44
	240	38.10	38.45	37.93	38.16	0.27
	300	41.60	41.95	41.08	41.54	0.44
	360	44.93	45.28	45.62	45.28	0.35
	420	49.12	48.78	48.08	48.66	0.53
	540	55.76	55.24	55.58	55.53	0.26
	660	64.33	63.80	63.98	64.04	0.27
	780	65.77	66.28	66.81	66.29	0.52
	1200	80.39	80.05	79.88	80.11	0.26
	1440	88.48	89.52	89.35	89.12	0.56

Table 27 Percent drug release of nifedipine spray dried in simulated gastic fluid without enzyme (pH 1.2) prepared at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	24.44	24.23	24.32	24.33	0.11
	10	26.39	26.47	26.58	26.48	0.10
	15	28.15	28.26	28.31	28.24	0.08
	20	31.41	31.62	31.50	31.51	0.11
	30	33.24	33.52	33.12	33.29	0.21
	45	36.19	36.32	36.47	36.33	0.14
	60	39.66	39.78	39.42	39.62	0.18
	90	43.21	43.05	43.18	43.15	0.09
	120	46.54	46.75	46.32	46.54	0.22
10 % (w/v)	5	20.13	20.04	20.21	20.13	0.09
	10	21.49	21.56	21.72	21.59	0.12
	15	23.54	23.62	23.38	23.51	0.12
	20	25.31	25.47	25.54	25.44	0.12
	30	27.48	27.62	27.51	27.54	0.07
	45	29.34	29.21	29.03	29.19	0.16
	60	32.39	32.08	32.11	32.19	0.17
	90	37.32	37.54	37.46	37.44	0.11
	120	42.54	42.48	42.36	42.46	0.09

Table 28 Percent drug release from 1:10:0 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	5.88	6.41	6.06	6.12	0.27
	10	6.09	6.79	6.44	6.44	0.35
	15	6.44	6.79	6.96	6.73	0.27
	20	6.79	7.14	7.31	7.08	0.27
	30	7.14	7.49	7.66	7.43	0.27
	45	7.84	8.54	8.19	8.19	0.35
	60	8.36	9.06	8.54	8.65	0.36
	90	8.89	9.41	9.06	9.12	0.27
	120	9.24	9.94	9.41	9.53	0.37
10 % (w/v)	5	6.40	6.22	6.40	19.02	0.10
	10	6.44	6.44	6.62	19.50	0.10
	15	6.62	6.44	6.81	19.87	0.19
	20	6.81	6.62	6.99	20.42	0.19
	30	7.17	6.99	7.36	21.52	0.19
	45	7.54	7.73	7.91	23.18	0.19
	60	8.10	8.47	8.10	24.67	0.21
	90	8.47	8.84	8.29	25.6	0.28
	120	9.39	9.58	9.02	27.99	0.28

Table 29 Percent drug release from1:8:2 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 and10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.47	6.31	5.97	6.25	0.26
	10	7.01	6.68	6.34	6.68	0.34
	15	7.35	7.01	7.18	7.18	0.17
	20	8.02	7.35	8.18	7.85	0.44
	30	8.69	8.35	8.86	8.63	0.26
	45	9.53	9.19	10.03	9.58	0.42
	60	10.03	9.70	10.37	10.03	0.34
	90	11.87	11.37	11.54	11.59	0.25
	120	12.88	12.38	12.71	12.66	0.25
10 % (w/v)	5	6.87	6.69	7.06	6.87	0.19
	10	7.46	7.64	7.82	7.64	0.18
	15	8.19	8.01	8.56	8.25	0.28
	20	8.92	9.10	9.47	9.16	0.28
	30	9.47	9.65	9.84	9.65	0.19
	45	10.75	10.20	10.38	10.44	0.28
	60	11.30	11.30	11.12	11.24	0.10
	90	12.58	11.85	12.03	12.15	0.38
	120	13.86	13.49	14.03	13.79	0.28

Table 30 Percent drug release from 1:5:5Nifedipine:Eudragit RS100: PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	11.70	11.53	11.88	11.70	0.18
	10	12.84	12.30	12.66	12.60	0.27
	15	13.55	13.20	13.73	13.49	0.27
	20	14.45	14.09	14.63	14.39	0.27
	30	14.99	14.81	15.34	15.05	0.27
	45	15.88	15.34	16.24	15.82	0.45
	60	16.95	17.30	17.66	17.30	0.36
	90	18.56	19.45	19.10	19.04	0.45
	120	20.70	21.06	20.35	20.70	0.36
10 % (w/v)	5	11.97	12.51	11.79	12.09	0.37
	10	12.58	12.95	12.21	12.58	0.37
	15	13.31	13.68	13.31	13.43	0.21
	20	14.95	14.77	14.41	14.71	0.27
	30	16.42	16.05	15.50	15.99	0.46
	45	18.06	17.51	18.42	18.00	0.46
	60	19.71	20.07	19.53	19.77	0.27
	90	21.72	22.08	21.35	21.72	0.37
	120	23.73	23.18	24.09	23.67	0.46

Table 31 Percent drug release from 1:2:8 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	24.14	24.55	23.73	24.14	0.41
	10	24.89	25.09	24.47	24.82	0.32
	15	25.50	25.71	26.12	25.78	0.32
	20	26.53	26.33	26.74	26.53	0.21
	30	27.77	27.97	28.38	28.04	0.31
	45	29.00	29.41	29.62	29.34	0.32
	60	30.44	30.65	31.06	30.72	0.32
	90	32.30	33.12	32.71	32.71	0.41
	120	35.38	34.77	35.18	35.11	0.31
10 % (w/v)	5	23.43	23.79	23.97	23.73	0.27
	10	23.92	24.29	24.65	24.29	0.37
	15	24.47	24.65	25.02	24.71	0.28
	20	25.02	25.20	25.56	25.26	0.27
	30	26.84	27.75	27.39	27.33	0.46
	45	28.85	29.58	29.03	29.15	0.38
	60	31.04	31.41	30.68	31.04	0.37
	90	33.05	32.33	32.69	32.69	0.36
	120	33.98	34.70	34.88	34.52	0.48

Table 32 Percent drug release from 1:0:10 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 and 10% spray solutions

% Release						
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	30.47	30.64	30.30	30.47	0.17
	10	32.34	31.66	32.17	32.06	0.35
	15	33.54	33.88	34.22	33.88	0.34
	20	35.76	35.25	35.60	35.54	0.26
	30	36.97	37.65	37.14	37.25	0.35
	45	39.36	39.19	38.85	39.13	0.26
	60	40.74	41.42	40.90	41.02	0.36
	90	43.98	43.47	44.49	43.98	0.51
	120	47.75	47.23	46.90	47.29	0.43
10 % (w/v)	5	33.38	32.86	33.04	33.09	0.26
	10	34.27	34.09	34.44	34.27	0.18
	15	34.97	35.14	35.31	35.14	0.17
	20	36.01	36.54	36.89	36.48	0.44
	30	37.41	38.11	37.76	37.76	0.35
	45	39.86	40.03	39.51	39.80	0.27
	60	41.78	42.66	42.30	42.25	0.44
	90	44.06	45.63	44.76	44.82	0.79
	120	47.03	46.52	47.21	46.92	0.36

Table 33 Percent drug release from 1:10:0 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.15	6.33	6.33	6.27	0.10
	10	6.36	6.36	6.55	6.42	0.11
	15	6.73	6.55	6.91	6.73	0.18
	20	6.91	6.73	7.28	6.97	0.28
	30	7.46	7.28	7.82	7.52	0.27
	45	7.83	7.64	8.01	7.83	0.19
	60	8.37	8.19	8.37	8.31	0.10
	90	8.92	8.56	8.74	8.74	0.18
	120	9.47	8.92	9.29	9.23	0.28
10 % (w/v)	5	6.85	6.47	6.66	6.66	0.19
	10	7.07	6.70	6.70	6.82	0.21
	15	7.44	6.88	6.88	7.07	0.32
	20	7.63	6.88	7.07	7.19	0.39
	30	7.82	7.07	7.26	7.38	0.39
	45	7.82	7.44	7.63	7.63	0.19
	60	8.01	7.82	8.01	7.95	0.11
	90	8.19	8.01	8.38	8.19	0.19
	120	8.57	8.19	8.75	8.50	0.29

Table 34 Percent drug release from 1:8: 2 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prcparcd by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.19	6.37	6.01	6.19	0.18
	10	6.40	6.58	6.22	6.40	0.18
	15	6.76	6.94	6.58	6.76	0.18
	20	6.94	7.12	6.76	6.94	0.18
	30	7.30	7.47	7.12	7.30	0.18
	45	7.83	8.01	7.83	7.89	0.10
	60	8.55	8.72	8.37	8.55	0.18
	90	9.44	9.26	9.08	9.26	0.18
	120	9.98	9.80	10.33	10.04	0.27
10 % (w/v)	5	6.51	6.69	6.33	6.51	0.18
	10	6.91	7.09	6.73	6.91	0.18
	15	7.10	7.46	6.91	7.16	0.28
	20	7.46	7.83	7.28	7.52	0.28
	30	7.83	8.19	7.64	7.89	0.28
	45	8.37	9.10	8.55	8.67	0.38
	60	9.47	9.65	9.29	9.47	0.18
	90	9.84	10.38	10.02	10.08	0.27
	120	10.57	11.30	10.93	10.93	0.37

Table 35 Percent drug release from 1:5: 5 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prcparcd by spray drying at 65°C of 5 and 10% spray solutions

% Release						
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.19	6.37	6.01	6.19	0.18
	10	6.40	6.58	6.22	6.40	0.18
	15	6.76	6.94	6.58	6.76	0.18
	20	6.94	7.12	6.76	6.94	0.18
	30	7.30	7.47	7.12	7.30	0.18
	45	7.83	8.01	7.83	7.89	0.10
	60	8.55	8.72	8.37	8.55	0.18
	90	9.44	9.26	9.08	9.26	0.18
	120	9.98	9.80	10.33	10.04	0.27
10 % (w/v)	5	7.28	7.62	7.80	7.57	0.26
	10	7.84	8.19	8.19	8.07	0.20
	15	8.54	8.89	9.06	8.83	0.27
	20	9.06	9.76	9.59	9.47	0.37
	30	10.46	11.16	10.98	10.87	0.36
	45	11.51	12.56	12.04	12.04	0.53
	60	12.56	13.44	13.09	13.03	0.44
	90	15.00	15.88	15.35	15.41	0.44
	120	17.28	16.76	17.63	17.22	0.44

Table 36 Percent drug release from 1:2: 8 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	13.05	13.91	13.23	13.40	0.45
	10	15.02	15.54	15.37	15.31	0.27
	15	17.10	17.44	16.93	17.16	0.26
	20	18.83	18.49	18.66	18.66	0.17
	30	20.05	20.22	20.56	20.28	0.26
	45	22.46	21.77	22.12	22.12	0.35
	60	24.37	24.02	23.68	24.02	0.35
	90	25.24	25.58	25.93	25.58	0.35
	120	28.86	29.21	29.38	29.15	0.27
10 % (w/v)	5	17.04	17.40	16.86	17.10	0.27
	10	19.63	19.27	18.91	19.27	0.36
	15	20.17	19.99	19.46	19.87	0.37
	20	20.71	20.35	20.17	20.41	0.27
	30	21.60	21.24	20.89	21.24	0.36
	45	23.74	23.38	23.03	23.38	0.36
	60	25.71	26.24	25.88	25.94	0.27
	90	28.21	28.39	28.75	28.45	0.27
	120	30.36	29.65	29.83	29.95	0.37

Table 37 Percent drug release from 1:0: 10 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 65°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	21.43	21.79	21.24	21.49	0.28
	10	23.54	23.91	23.54	23.66	0.21
	15	25.92	25.56	25.37	25.62	0.28
	20	27.93	27.57	27.39	27.63	0.27
	30	29.58	29.03	29.40	29.34	0.28
	45	31.59	30.32	30.86	30.92	0.64
	60	32.88	32.32	33.05	32.75	0.38
	90	36.88	36.70	35.98	36.52	0.48
	120	39.82	39.27	39.45	39.51	0.28
10 % (w/v)	5	20.60	20.24	20.95	20.60	0.36
	10	23.03	23.38	23.03	23.15	0.20
	15	24.99	25.53	24.82	25.11	0.37
	20	26.96	27.14	26.78	26.96	0.18
	30	28.93	28.75	28.40	28.69	0.27
	45	30.36	30.72	30.18	30.42	0.27
	60	33.57	33.93	34.28	33.93	0.36
	90	37.50	37.86	36.98	37.45	0.44
	120	40.37	40.73	40.19	40.43	0.27

Table 38 Percent drug release from 1:10: 0 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 75°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.22	6.40	6.22	6.28	0.10
	10	6.44	6.62	6.25	6.44	0.19
	15	6.80	6.81	6.44	6.68	0.21
	20	6.99	6.99	6.62	6.87	0.21
	30	7.36	6.99	6.99	7.11	0.21
	45	7.55	7.54	7.36	7.48	0.11
	60	7.73	7.91	7.73	7.79	0.10
	90	8.10	8.28	8.47	8.28	0.19
	120	8.47	8.65	9.02	8.71	0.28
10 % (w/v)	5	6.77	6.22	6.59	6.53	0.28
	10	6.99	6.44	6.81	6.75	0.28
	15	7.18	6.44	7.17	6.93	0.42
	20	7.18	6.62	7.36	7.05	0.39
	30	7.73	6.99	7.36	7.36	0.37
	45	7.92	7.36	7.73	7.67	0.28
	60	8.28	7.73	7.73	7.91	0.32
	90	8.65	8.28	8.10	8.34	0.28
	120	9.02	9.57	8.47	9.02	0.55

Table 39 Percent drug release from 1:8: 2 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 75°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.41	6.23	6.58	6.41	0.18
	10	6.61	6.44	6.79	6.61	0.18
	15	6.96	6.79	7.14	6.96	0.18
	20	7.14	7.14	7.49	7.26	0.20
	30	7.49	7.31	7.66	7.49	0.18
	45	8.01	8.19	7.84	8.01	0.18
	60	8.71	8.89	8.54	8.71	0.18
	90	9.24	9.41	9.06	9.24	0.18
	120	9.42	9.59	9.76	9.59	0.17
10 % (w/v)	5	6.40	6.59	6.77	6.59	0.19
	10	6.62	6.81	7.17	6.87	0.28
	15	6.99	6.81	7.54	7.11	0.38
	20	7.36	7.17	7.91	7.48	0.38
	30	7.73	7.36	8.10	7.73	0.37
	45	8.10	7.73	8.47	8.10	0.37
	60	8.65	8.10	8.66	8.47	0.32
	90	9.02	9.02	8.84	8.96	0.10
	120	9.76	9.39	9.21	9.45	0.28

Table 40 Percent drug release from 1:5: 5 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prcparcd by spray drying at 75°C of 5 and10% spray solutions

	% Release					
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	7.32	7.14	7.69	7.38	0.28
	10	7.91	7.73	8.10	7.91	0.19
	15	8.47	8.28	8.65	8.47	0.19
	20	9.21	8.84	9.39	9.15	0.28
	30	9.58	9.76	10.13	9.82	0.28
	45	11.24	10.69	11.06	11.00	0.28
	60	12.72	12.16	13.08	12.65	0.46
	90	14.75	14.19	13.83	14.26	0.46
	120	15.68	15.86	15.49	15.68	0.19
10 % (w/v)	5	7.44	7.08	7.26	7.26	0.18
	10	7.83	7.65	7.65	7.71	0.10
	15	8.72	8.19	8.01	8.31	0.37
	20	9.26	8.90	8.55	8.90	0.36
	30	10.15	9.80	9.97	9.97	0.18
	45	10.87	10.51	11.05	10.81	0.27
	60	11.76	12.12	12.48	12.12	0.36
	90	14.08	14.44	13.91	14.14	0.27
	120	16.05	15.70	15.34	15.70	0.36

Table 41 Percent drug release from 1:2: 8 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 75°C of 5 and 10% spray solutions

	% Release					
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	7.80	8.14	7.63	7.86	0.26
	10	8.36	8.53	8.36	8.42	0.10
	15	9.04	8.87	9.04	8.98	0.10
	20	9.73	9.56	10.24	9.84	0.35
	30	12.12	11.61	11.78	11.84	0.26
	45	13.83	12.98	13.66	13.49	0.45
	60	15.38	14.86	14.52	14.92	0.43
	90	17.43	16.41	16.74	16.86	0.52
	120	19.83	20.33	19.99	20.05	0.26
10 % (w/v)	5	8.51	8.69	8.33	8.51	0.18
	10	9.29	9.11	8.74	9.05	0.28
	15	10.20	10.38	9.83	10.14	0.28
	20	11.30	11.12	10.75	11.06	0.28
	30	12.58	12.21	11.85	12.21	0.37
	45	13.86	14.58	14.03	14.16	0.38
	60	15.86	16.60	16.23	16.23	0.37
	90	18.42	18.06	17.70	18.06	0.36
	120	20.44	20.07	19.89	20.13	0.28

Table 42 Percent drug release from 1:0: 10 Nifedipine:Eudragit RS100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 75°C of 5 and 10% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	15.62	15.08	15.44	15.38	0.27
	10	16.42	15.88	16.59	16.30	0.37
	15	17.49	17.13	18.20	17.61	0.54
	20	19.09	19.45	19.81	19.45	0.36
	30	21.42	20.88	21.24	21.18	0.27
	45	22.67	23.03	22.49	22.73	0.27
	60	24.46	24.82	24.10	24.46	0.36
	90	27.67	28.21	28.38	28.09	0.37
	120	31.42	32.14	31.25	31.60	0.47
10 % (w/v)	5	14.93	15.46	15.28	15.22	0.27
	10	16.06	15.54	16.24	15.95	0.36
	15	17.11	16.76	17.81	17.23	0.53
	20	18.68	19.03	19.38	19.03	0.35
	30	20.95	20.43	20.78	20.72	0.27
	45	22.19	22.53	22.01	22.24	0.26
	60	23.93	24.28	23.58	23.93	0.35
	90	27.08	27.60	27.77	27.48	0.36
	120	31.79	31.27	31.97	31.68	0.36

Table 43 Percent drug release from 1:10:0 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	13.66	14.02	14.37	14.02	0.36
	10	15.52	15.34	15.70	15.52	0.18
	15	18.37	18.02	17.66	18.02	0.36
	20	18.92	19.45	19.27	19.21	0.27
	30	21.24	20.88	20.70	20.94	0.27
	45	23.38	22.85	23.03	23.09	0.27
	60	25.00	24.82	25.35	25.06	0.27
	90	28.92	28.56	28.39	28.62	0.27
	120	31.79	31.96	32.50	32.08	0.37
	180	36.07	35.54	35.72	35.78	0.27
	240	39.30	38.76	39.12	39.06	0.27
	300	42.52	42.87	42.16	42.52	0.36
	360	45.56	45.74	46.27	45.86	0.37
	420	49.67	49.85	49.67	49.73	0.10
	540	54.67	55.38	55.03	55.03	0.36
	660	60.03	60.57	60.21	60.27	0.27
	780	65.40	65.76	66.29	65.82	0.45
	1200	79.66	79.84	80.55	80.02	0.47
	1440	88.63	88.81	89.17	88.87	0.27

Table 44 Percent drug release from 1:8: 2 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	10.08	10.45	10.82	10.45	0.37
	10	10.50	11.06	11.43	11.00	0.47
	15	11.43	11.98	12.35	11.92	0.46
	20	12.35	12.72	13.28	12.78	0.47
	30	14.01	14.20	14.75	14.32	0.38
	45	15.86	16.23	16.60	16.23	0.37
	60	18.45	18.26	18.63	18.45	0.19
	90	19.93	19.75	20.48	20.05	0.38
	120	22.15	22.33	21.97	22.15	0.18
	180	25.65	25.47	26.02	25.71	0.28
	240	29.90	28.80	29.17	29.29	0.56
	300	33.24	33.60	32.68	33.17	0.46
	360	36.38	37.12	36.56	36.69	0.39
	420	40.45	40.82	41.00	40.76	0.28
	540	45.80	46.17	45.62	45.86	0.28
	660	50.98	52.09	51.35	51.47	0.57
	780	56.90	57.83	57.45	57.39	0.47
	1200	66.31	66.87	65.95	66.38	0.46
	1440	71.88	72.07	72.43	72.13	0.28

Table 45 Percent drug release from 1:5: 5 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	15.97	15.44	16.33	15.91	0.45
	10	17.31	17.66	17.13	17.37	0.27
	15	19.45	19.98	19.27	19.57	0.37
	20	20.88	21.24	21.42	21.18	0.27
	30	23.20	22.49	23.39	23.03	0.47
	45	25.00	24.46	24.82	24.76	0.27
	60	26.61	27.14	26.43	26.73	0.37
	90	28.39	29.11	28.75	28.75	0.36
	120	30.36	30.54	30.01	30.30	0.27
	180	33.57	33.93	33.04	33.51	0.45
	240	37.33	37.68	36.97	37.33	0.36
	300	41.26	40.37	40.90	40.84	0.45
	360	43.95	44.66	45.02	44.54	0.54
	420	47.88	48.59	47.53	48.00	0.54
	540	53.95	52.89	53.41	53.42	0.53
	660	58.79	59.31	58.60	58.90	0.37
	780	63.79	64.68	63.97	64.15	0.47
	1200	72.54	73.25	73.60	73.13	0.54
	1440	77.92	78.99	78.46	78.46	0.54

Table 46 Percent drug release from 1:2: 8 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	24.80	25.53	25.16	25.16	0.37
	10	27.32	28.06	27.51	27.63	0.38
	15	29.36	29.55	29.18	29.36	0.19
	20	30.84	31.21	31.76	31.27	0.46
	30	33.24	32.51	33.43	33.06	0.49
	45	35.10	35.46	34.91	35.16	0.28
	60	38.79	38.24	39.15	38.73	0.46
	90	42.30	43.03	42.67	42.67	0.37
	120	46.18	45.82	46.55	46.18	0.37
	180	50.25	49.70	49.15	49.70	0.55
	240	53.58	53.95	53.03	53.52	0.46
	300	56.73	57.10	57.28	57.04	0.28
	360	60.24	60.80	60.43	60.49	0.28
	420	66.70	66.52	65.60	66.27	0.59
	540	70.97	72.07	71.51	71.52	0.55
	660	77.43	77.62	76.88	77.31	0.38
	780	82.61	83.17	82.43	82.74	0.39
	1200	92.76	92.39	91.84	92.33	0.46
	1440	97.23	97.78	98.33	97.78	0.55

Table 47 Percent drug release from 1:0:10 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated intestinal fluid without enzyme (pH 7.5) prepared by spray drying at 55°C of 5% spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	13.66	14.02	14.37	14.02	0.36
	10	15.52	15.34	15.70	15.52	0.18
	15	18.37	18.02	17.66	18.02	0.36
	20	18.92	19.45	19.27	19.21	0.27
	30	21.24	20.88	20.70	20.94	0.27
	45	23.38	22.85	23.03	23.09	0.27
	60	25.00	24.82	25.35	25.06	0.27
	90	28.92	28.56	28.39	28.62	0.27
	120	31.79	31.96	32.50	32.08	0.37
	180	36.07	35.54	35.72	35.78	0.27
	240	39.30	38.76	39.12	39.06	0.27
	300	42.52	42.87	42.16	42.52	0.36
	360	45.56	45.74	46.27	45.86	0.37
	420	49.67	49.85	49.67	49.73	0.10
	540	54.67	55.38	55.03	55.03	0.36
	660	60.03	60.57	60.21	60.27	0.27
	780	65.40	65.76	66.29	65.82	0.45
	1200	79.66	79.84	80.55	80.02	0.47
	1440	88.63	88.81	89.17	88.87	0.27

Table 48 Percent drug release from 1:10:0 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	6.72	7.08	7.26	7.02	0.27
	10	7.65	7.30	7.83	7.59	0.27
	15	8.01	8.37	8.72	8.37	0.36
	20	9.08	9.44	9.08	9.20	0.21
	30	9.44	9.80	9.62	9.62	0.18
	45	9.98	10.51	10.16	10.22	0.27
	60	10.34	11.23	10.87	10.81	0.45
	90	12.65	12.12	12.48	12.42	0.27
	120	14.09	13.55	13.20	13.61	0.45

Table 49 Percent drug release from 1:8: 2 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	7.50	7.69	7.14	7.44	0.28
	10	7.73	8.28	7.91	7.97	0.28
	15	9.39	9.02	8.65	9.02	0.37
	20	10.13	10.50	9.94	10.19	0.28
	30	12.53	12.16	11.97	12.22	0.28
	45	14.01	14.38	13.83	14.07	0.28
	60	16.04	16.41	15.86	16.10	0.28
	90	17.71	18.63	18.26	18.20	0.46
	120	19.38	19.20	19.56	19.38	0.18

Table 50 Percent drug release from 1:5: 5 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	13.48	14.19	3.31	13.66	0.47
	10	15.16	15.34	15.87	15.46	0.37
	15	17.30	17.66	16.95	17.30	0.36
	20	18.74	19.27	18.91	18.97	0.27
	30	21.06	21.42	20.88	21.12	0.27
	45	22.67	22.32	22.85	22.61	0.27
	60	24.46	24.99	24.64	24.70	0.27
	90	25.89	26.61	26.25	26.25	0.36
	120	28.39	28.04	28.75	28.39	0.36

Table 51 Percent drug release from 1:2: 8 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	23.14	22.77	23.69	23.20	0.46
	10	25.29	25.84	25.11	25.41	0.38
	15	27.69	26.78	27.14	27.20	0.46
	20	28.44	28.81	29.18	28.81	0.37
	30	31.02	31.58	30.84	31.15	0.39
	45	32.88	32.70	32.32	32.63	0.29
	60	36.20	37.12	35.83	36.38	0.66
	90	40.81	40.08	40.26	40.38	0.38
	120	43.42	43.96	43.60	43.66	0.27

Table 52 Percent drug release from 1:0:10 Nifedipine:Eudragit RL100:PVP K30 microspheres in simulated gastic fluid without enzyme (pH 1.2) prepared by spray drying at 55°C of 5 % spray solutions

		% Release				
Spray solution (%)	Time (mins)	#1	#2	#3	Mean	SD
5 % (w/v)	5	30.47	30.64	30.30	30.47	0.17
	10	32.34	31.66	32.17	32.06	0.35
	15	33.54	33.88	34.22	33.88	0.34
	20	35.76	35.25	35.60	35.54	0.26
	30	36.97	37.65	37.14	37.25	0.35
	45	39.36	39.19	38.85	39.13	0.26
	60	40.74	41.42	40.90	41.02	0.36
	90	43.98	43.47	44.49	43.98	0.51
	120	47.75	47.23	46.90	47.29	0.43

Appendix C

Fitness of dissolution plot to Zero-order, First-order and Higuchi plots

Determination of dissolution plot for the fitness to zero-order , first-order and Higuchi plot

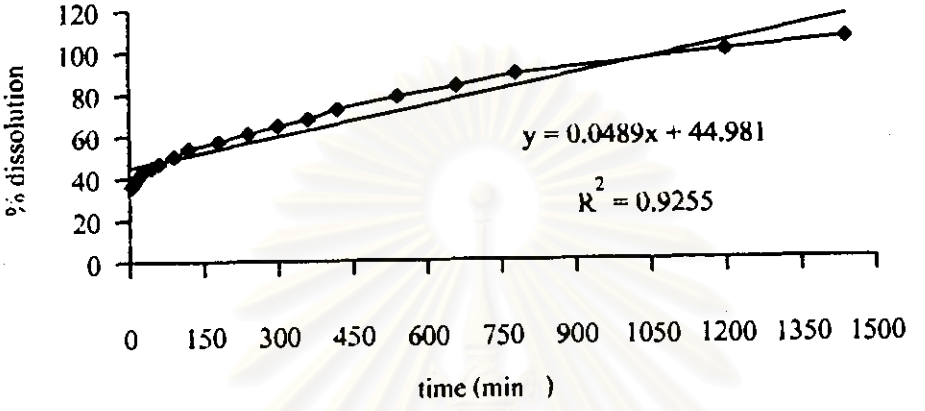

Figure 53 Zero-order plot of nifedipine release from Nifedipine:Eudragit RS100:PVP K30 (1:0:10) 10% concentration at 55°C

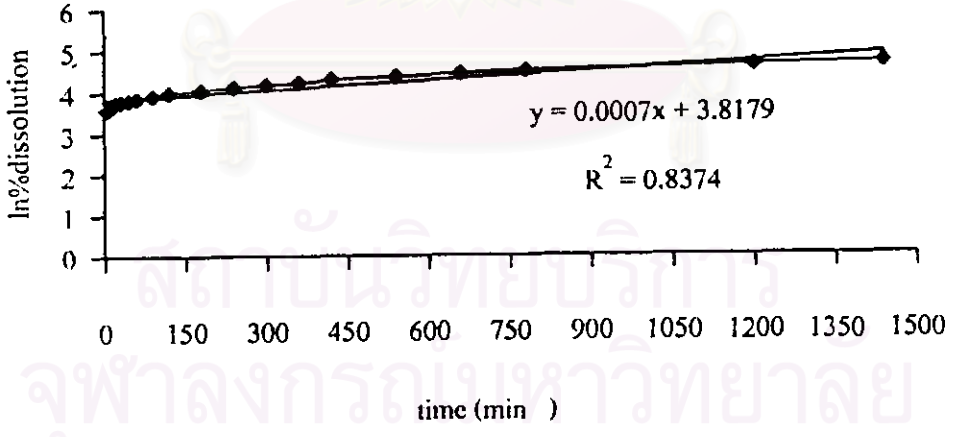

Figure 54 First order plot of nifedipine release from Nifedipine: Eudragit RS100 : PVP K30 (1:0:10) 10% concentration at 55°C

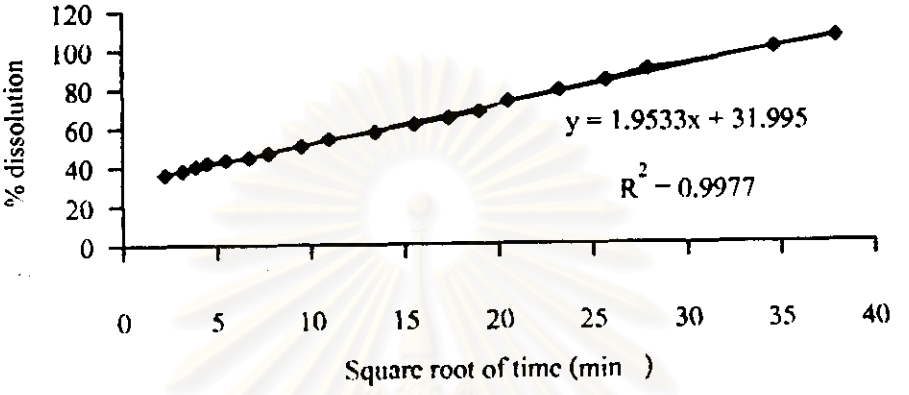

Figure 55 Higuchi plot of nifedipine release from Nifedipine : Eudragit RS100 : PVP K30 (1:0:10) 10% concentration at 55°C

Appendix D

Summary of Dissolution efficiency,

Release rate constant and Regression coefficient

Table 53 Regression coefficient (R^2) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 5% (w/v) spray solution over 24 h release in simulated intestinal fluid without enzyme (pH 7.5)

				R^2 Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order	0.9238	0.8047	0.9124	0.9008	0.8969	0.9025	0.9192
				*0.9241	0.9436	0.9339	0.9052	0.9192
	First – order	0.8263	0.6912	0.7749	0.7346	0.7669	0.7961	0.8355
				*0.7506	0.7905	0.8023	0.7837	0.8355
	Higuchi square- root time	0.9909	0.9613	0.9838	0.9897	0.9907	0.9926	0.9969
				*0.9956	0.9937	0.9953	0.9959	0.9969
65°C	Zero – order	-	-	0.9048	0.9205	0.9411	0.9308	0.9385
	First – order	-	-	0.7455	0.7733	0.7636	0.7829	0.8187
	Higuchi square- root time	-	-	0.9942	0.9853	0.9978	0.9992	0.9982
75°C	Zero – order	-	-	0.9367	0.9249	0.9046	0.9228	0.9495
	First – order	-	-	0.8029	0.7747	0.7579	0.7753	0.7896
	Higuchi square- root time	-	-	0.9965	0.9982	0.9963	0.9986	0.9973

* Regression coefficient (R^2) of Nifedipine : Eudragit RL 100 : PVP K30 microspheres

Table 54 Regression coefficient (R^2) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 10%(w/v) spray solution over 24 h release in simulated intestinal fluid without enzyme (pH 7.5)

				R^2				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order	0.9238	0.8096	0.9409	0.9055	0.8899	0.9054	0.9255
	First – order	0.8263	0.6932	0.7901	0.7508	0.7623	0.7996	0.8374
	Higuchi square- root time	0.9909	0.9662	0.9911	0.9875	0.9856	0.9938	0.9977
65°C	Zero – order	-	-	0.9115	0.9459	0.9216	0.9326	0.9480
	First – order	-	-	0.7474	0.7788	0.7182	0.7976	0.8277
	Higuchi square- root time	-	-	0.9966	0.9964	0.9977	0.9992	0.9976
75°C	Zero – order	-	-	0.9239	0.9309	0.9182	0.9148	0.9399
	First – order	-	-	0.7796	0.7780	0.7803	0.7525	0.7638
	Higuchi square- root time	-	-	0.9979	0.9989	0.9953	0.9978	0.9972

Table 55 Regression coefficient (R^2) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 5% (w/v) spray solution over 2 h release in simulated gastic fluid without enzyme (pH 1.2)

				R^2				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order	0.9675	0.9408	0.9242	0.9653	0.9668	0.9744	0.9541
				*0.9567	0.9332	0.8922	0.9652	0.9541
	First – order	0.9142	0.8931	0.8946	0.9211	0.9315	0.9554	0.9236
				*0.9091	0.8688	0.8245	0.9262	0.9236
	Higuchi square- root time	0.9966	0.9933	0.9868	0.9966	0.9946	0.9970	0.9961
				*0.9886	0.9867	0.9757	0.9961	0.9961
65°C	Zero – order	-	-	0.9411	0.9832	0.9811	0.9272	0.9436
	First – order	-	-	0.9152	0.9634	0.9382	0.8602	0.8944
	Higuchi square- root time	-	-	0.9913	0.9930	0.9949	0.9863	0.9917
75°C	Zero – order	-	-	0.9710	0.9477	0.9792	0.9774	0.9763
	First – order	-	-	0.9537	0.9253	0.9450	0.9296	0.9357
	Higuchi square- root time	-	-	0.9988	0.9897	0.9920	0.9887	0.9930

* Regression coefficient (R^2) of Nifedipine : Eudragit RL100 : PVP K30 microspheres

Table 56 Regression coefficient (R^2) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 10% (w/v) spray solution over 2 h release in simulated gastic fluid without enzyme (pH 1.2)

				R^2				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order	0.9675	0.9861	0.9730	0.9461	0.9601	0.9579	0.9673
	First – order	0.9142	0.9528	0.9581	0.8929	0.9202	0.9392	0.9496
	Higuchi square- root time	0.9966	0.9871	0.9842	0.9896	0.9941	0.9858	0.9966
65°C	Zero – order	-	-	0.9448	0.9677	0.9576	0.9606	0.9504
	First – order	-	-	0.9285	0.9418	0.8921	0.9307	0.9003
	Higuchi square- root time	-	-	0.9947	0.9940	0.9948	0.9875	0.9945
75°C	Zero – order	-	-	0.9443	0.9494	0.9861	0.9664	0.9821
	First – order	-	-	0.9251	0.9244	0.9516	0.9171	0.9467
	Higuchi square- root time	-	-	0.9934	0.9961	0.9924	0.9945	0.9874

Table 57 Release rate constant (k) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 5% (w/v) spray solution for over 24 h release in simulated intestinal fluid without enzyme (pH 7.5)

				k				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature (°C)	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order (min^{-1})	0.0392	0.0414	0.0289	0.0331	0.0362	0.0490	0.0465
				*0.0384	0.0453	0.0443	0.0514	0.0465
	First – order(min^{-1})	0.0009	0.0007	0.0014	0.0015	0.0011	0.0009	0.0007
				*0.0012	0.0013	0.0011	0.0009	0.0007
	Higuchi square- root time ($min^{-1/2}$)	1.5641	1.7443	1.1546	1.3367	1.4646	1.9800	1.8636
				*1.5349	1.7904	1.7628	2.0770	1.8636
65°C	Zero – order (min^{-1})	-	-	0.0253	0.0291	0.0340	0.0473	0.0532
	First – order (min^{-1})	-	-	0.0012	0.0014	0.0013	0.0011	0.0010
	Higuchi square- root time ($min^{-1/2}$)	-	-	1.0225	1.1578	1.3480	1.8882	2.1128
75°C	Zero – order (min^{-1})	-	-	0.0207	0.0210	0.0287	0.0459	0.0514
	First – order (min^{-1})	-	-	0.0011	0.0011	0.0010	0.0011	0.0012
	Higuchi square- root time ($min^{-1/2}$)	-	-	0.8211	0.8386	1.1601	1.8403	2.0274

* Release rate constant (k , min^{-1}) of Nifedipine : Eudragit RL 100 : PVP K30 microspheres

Table 58 Release rate constant (k) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 10% (w/v) spray solution for over 24 h release in simulated intestinal fluid without enzyme (pH 7.5)

				k				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature (°C)	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order (min^{-1})	0.0392	0.0416	0.0306	0.0362	0.0398	0.0489	0.0489
	First – order (min^{-1})	0.0009	0.0007	0.0013	0.0015	0.0011	0.0009	0.0007
	Higuchi square- root time ($min^{-1/2}$)	1.5641	1.7502	1.2111	1.4576	1.6116	1.9721	1.9533
65°C	Zero – order (min^{-1})	-	-	0.0258	0.0291	0.0370	0.0491	0.0524
	First – order (min^{-1})	-	-	0.0012	0.0013	0.0013	0.0010	0.0010
	Higuchi square- root time ($min^{-1/2}$)	-	-	1.0384	1.1496	1.4867	1.9575	2.0712
75°C	Zero – order (min^{-1})	-	-	0.0214	0.0227	0.0280	0.0457	0.0539
	First – order (min^{-1})	-	-	0.0011	0.0012	0.0009	0.0011	0.0013
	Higuchi square- root time ($min^{-1/2}$)	-	-	0.8548	0.9054	1.1218	1.8373	2.1363

Table 59 Release rate constant (k) of Zero-order , First-order and Higuchi square-root time model from different types of microspheres at 5% (w/v) spray solution for over 2 h release in simulated gastic fluid without enzyme (pH 1.2)

				k				
				Nifedipine : Eudragit RS 100 or RL 100 : PVP K30				
Temperature (°C)	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order (min^{-1})	0.1516	0.1877	0.0299	0.0551	0.0744	0.0933	0.1379
				*0.0237	0.1090	0.1200	0.1718	0.1379
	First – order (min^{-1})	0.0067	0.0053	0.0038	0.0060	0.0046	0.0032	0.0036
				*0.0053	0.0084	0.0057	0.0052	0.0036
	Higuchi square- root time ($min^{-1/2}$)	2.0568	2.5777	0.4128	0.7491	1.0085	1.2613	1.8841
				*0.7304	1.4982	1.6777	2.3334	1.8841
65°C	Zero – order (min^{-1})	-	-	0.0258	0.0335	0.0840	0.1244	0.1454
	First – order (min^{-1})	-	-	0.0033	0.0042	0.0070	0.0059	0.0048
	Higuchi square- root time ($min^{-1/2}$)	-	-	0.03541	0.4507	1.1308	1.7152	1.9921
75°C	Zero – order (min^{-1})	-	-	0.0210	0.0284	0.0733	0.1052	0.1368
	First – order (min^{-1})	-	-	0.0028	0.0035	0.0065	0.0081	0.0060
	Higuchi square- root tim ($min^{-1/2}$)	-	-	0.2845	0.3880	0.9864	1.4149	1.8448

* Release rate constant (k , min^{-1}) of Nifedipine : Eudragit RL 100 : PVP K30 microspheres

Table 60 Release rate constant (k) of Zero- order , First-order and Higuchi square-root time model from different types of microspheres at 10% (w/v) concentrated of spray solution for over 2 h release in simulated gastic fluid without enzyme (pH 1.2)

				k				
				Nifedipine : Eudragit RS 100 or RL 100: PVP K30				
Temperature (°C)	Kinetic model	Nifedipine intact	Nifedipine spray-dried	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
55°C	Zero – order (min^{-1})	0.1516	0.1872	0.0261	0.0551	0.1032	0.0985	0.1208
	First – order (min^{-1})	0.0067	0.0062	0.0034	0.0054	0.0059	0.0034	0.0030
	Higuchi square- root time ($min^{-1/2}$)	2.0568	2.5040	0.3506	0.7530	1.4032	1.3351	1.6397
65°C	Zero – order (min^{-1})	-	-	0.0155	0.0382	0.1032	0.1093	0.1633
	First – order (min^{-1})	-	-	0.0020	0.0044	0.0088	0.0046	0.0054
	Higuchi square- root time ($min^{-1/2}$)	-	-	0.2124	0.5181	1.4055	1.4821	2.2328
75°C	Zero – order (min^{-1})	-	-	0.0202	0.0239	0.0739	0.1027	0.1380
	First – order (min^{-1})	-	-	0.0027	0.0030	0.0067	0.0075	0.0061
	Higuchi square- root time ($min^{-1/2}$)	-	-	0.2774	0.3279	0.9910	1.3934	1.8492

Appendix E

Two-way ANOVA of dissolution efficiency and release rate constant

Table 61 Two way analysis of variance for dissolution effifiency (DE) of nifedipine : Eudragit RS 100 : PVP K30 microspheres of 5% spray solution (in simulated intestinal fluid without enzyme)

Temperature (°C) (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	31.28	35.86	45.36	71.32	81.05	264.87	52.97
Chamber 2	31.45	35.65	45.81	71.81	80.96	265.68	53.14
Chamber 3	31.28	35.73	45.55	71.2	80.84	264.60	52.92
Total	94.01	107.24	136.72	214.33	242.85	795.15	
Mean	31.34	35.75	45.57	71.44	80.95		159.03
65°C							
Chamber 1	30.28	30.94	38.97	58.92	71.79	230.90	46.18
Chamber 2	29.82	30.91	38.76	59.03	71.77	230.29	46.06
Chamber 3	29.86	31.3	38.82	58.86	71.91	230.75	46.15
Total	89.96	93.15	116.55	176.81	215.47	691.94	
Mean	29.99	31.05	38.85	58.94	71.82		138.39
75°C							
Chamber 1	26.00	26.13	39.07	8.27	60.06	209.53	41.91
Chamber 2	25.99	25.91	39.45	58.31	60.26	209.92	41.98
Chamber 3	25.89	25.98	39.44	58.00	60.52	209.83	41.97
Total	77.88	78.02	117.96	174.58	180.84	629.28	
Mean	25.96	26.01	39.32	58.19	60.28		125.86
Grand Total	261.85	278.41	371.23	565.72	639.16	2116.37	
Mean Total	87.28	92.80	123.74	188.57	213.05		423.27

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	935.3653	467.6826	14951.4907	3.32	YES
Between ratio	4	12961.0547	3240.2637	103588.9920	2.69	YES
Temperature-ratio interaction	8	314.7949	39.3494	1257.9718	2.27	YES
Error	30	0.9384	0.0313			
Total	44	14212.1532		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Dissolution efficiency (DE)of spray dried products in pH 7.5 obtained from 5% spray solution

LSD = 0.1686 ; df = 40

$t_{\alpha/2}$ = 2.021

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		87.28	92.80	123.74	188.57	213.05
1:10:0	87.28					
1:8:2	92.80	**5.52**				
1:5:5	123.74	**36.46**	**30.94**			
1:2:8	188.57	**101.29**	**95.77**	**64.83**		
1:0:10	213.05	**125.77**	**120.25**	**89.31**	**24.48**	

Test between temperature

LSD = 0.2438 ; df = 12

$t_{\alpha/2}$ = 2.179

		75 °C	65 °C	55 °C
		125.86	138.39	159.03
75 °C	125.86			
65 °C	138.39	**12.53**		
55 °C	159.03	**33.17**	**20.64**	

Test between formulation

LSD = 0.2950 ; df =30

$t_{\alpha/2} = 2.042$

		x11	x12	x6	x7	x1	x2	x8	x13	x3	x14	x9	x15	x4	x10	x5
		25.96	26.01	29.99	31.05	31.34	35.25	38.85	39.32	45.57	58.19	58.94	60.28	71.44	71.82	80.95
x11	25.96															
x12	26.01	0.05														
x6	29.99	4.03	3.98													
x7	31.05	5.38	5.04	1.35												
x1	31.34	5.09	5.33	1.06	0.29											
x2	35.75	9.79	9.74	5.76	4.70	4.41										
x8	38.85	12.89	12.84	8.86	7.80	7.51	3.10									
x13	39.32	13.36	13.31	9.33	8.27	7.98	3.57	0.47								
x3	45.57	19.61	19.57	15.59	14.52	14.24	9.83	6.72	6.25							
x14	58.19	32.23	32.19	28.21	27.14	26.86	22.45	19.34	18.87	12.62						
x9	58.94	32.98	32.93	28.95	27.89	27.60	23.19	20.09	19.62	13.36	0.74					
x15	60.28	34.32	34.27	30.29	29.23	28.94	24.53	21.43	20.96	14.71	2.09	1.34				
x4	71.44	45.48	45.44	41.46	40.39	40.11	35.70	32.59	32.12	25.87	13.25	12.51	11.16			
x10	71.82	45.86	45.82	41.84	40.77	40.49	36.08	32.97	32.50	26.25	13.63	12.89	11.54	0.38		
x5	80.95	54.99	54.94	50.96	49.90	49.61	45.20	42.10	41.63	35.38	22.76	22.01	20.67	9.51	9.13	

Formulations	=	Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,5% spray solution)
x11	=	1:10:0 (75 °C)
x12	=	1:8:2 (75 °C)
x6	=	1:10:0 (65°C)
x7	=	1:8:2 (65°C)
x1	=	1:10:0 (55 °C)
x2	=	1:8:2 (55 °C)
x8	=	1:5:5 (65 °C)
x13	=	1:5:5 (75 °C)
x3	=	1:5:5 (55 °C)
x14	=	1:2:8 (75°C)
x9	=	1:2:8 (65 °C)
x15	=	1:0:10 (75 °C)
x4	=	1:2:8 (55 °C)
x10	=	1:0:10 (65 °C)
x5	=	1:0:10 (55 °C)

Table 62 Two way analysis of variance for dissolution efficiency (DE)of nifedipine : Eudragit RS 100 : PVP K30 microspheres of 10% spray solution (in simulated intestinal fluid without enzyme)

Temperature (°C) (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	34.28	39.38	50.14	73.07	81.31	278.18	55.64
Chamber 2	33.71	39.09	50.35	73.41	81.78	278.34	55.67
Chamber 3	33.55	39.09	50.39	72.97	81.59	277.59	55.52
Total	101.54	117.56	150.88	219.45	244.68	834.11	
Mean	33.85	39.19	50.29	73.15	81.56		166.82
65°C							
Chamber 1	30.73	32.08	42.63	64.42	70.16	240.02	48.00
Chamber 2	30.82	32.26	42.83	64.64	70.16	240.71	48.14
Chamber 3	30.55	32.24	42.7	64.77	70.19	240.45	48.09
Total	92.10	96.58	128.16	193.83	210.51	721.18	
Mean	30.70	32.19	42.72	64.61	70.17		144.24
75°C							
Chamber 1	26.98	27.40	40.73	57.25	60.37	212.73	42.55
Chamber 2	26.71	27.18	40.77	57.28	60.37	212.31	42.46
Chamber 3	26.58	27.24	40.66	57.26	60.37	212.11	42.42
Total	80.27	81.82	122.16	171.79	181.11	637.15	
Mean	26.76	27.27	40.72	57.26	60.37		127.43
Grand Total	273.91	295.96	401.20	585.07	636.30	2192.44	
Mean Total	91.30	98.65	133.73	195.02	212.10		438.49

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	1320.3882	651.1941	22672.1344	3.32	YES
Between ratio	4	12156.2682	3039.0671	105808.9109	2.69	YES
Temperature-ratio interaction	8	195.4555	24.4319	850.6285	2.27	YES
Error	30	0.8617	0.0287			
Total	44	13654.9736		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t\alpha_{/2} \sqrt{MSE\ (1/n_i + 1/n_j)}$

Dissolution efficiency (DE)of spray dried products in pH 7.5 obtained from 10% spray solution

$LSD = 0.1614$; $df = 40$

$t\ \alpha_{/2} = 2.021$

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		91.30	98.65	133.73	195.02	212.10
1:10:0	91.30					
1:8:2	98.65	7.35				
1:5:5	133.73	42.43	35.08			
1:2:8	195.02	103.72	96.37	61.29		
1:0:10	212.10	120.80	113.45	78.37	17.08	

Test between temperature

$LSD = 0.2335$; $df = 12$

$t\ \alpha_{/2} = 2.179$

		75 °C	65 °C	55 °C
		127.43	144.24	166.82
75 °C	127.43			
65 °C	144.24	16.81		
55 °C	166.82	39.39	22.59	

Test between formulation

LSD = 0.2825 ; df = 30

$t\,\alpha_{/2} = 2.042$

		x11	x12	x6	x7	x1	x2	x13	x8	x3	x14	x15	x9	x10	x4	x5
		26.76	27.27	30.70	32.19	33.85	39.19	40.72	42.72	50.29	57.26	60.37	64.61	70.17	73.15	81.56
x11	26.76															
x12	27.27	0.52														
x6	30.70	3.94	3.43													
x7	32.19	7.09	4.92	1.49												
x1	33.85	5.44	6.57	3.15	1.65											
x2	39.19	12.43	11.91	8.49	6.99	5.34										
x13	40.72	13.96	13.45	10.02	8.53	6.87	1.53									
x8	42.72	15.96	15.45	12.02	10.53	8.87	3.53	2.00								
x3	50.29	23.54	23.02	19.59	18.10	16.45	11.11	9.57	7.57							
x14	57.26	30.51	29.99	26.56	25.07	23.42	18.08	16.54	14.54	6.97						
x15	60.37	33.61	33.10	29.67	28.18	26.52	21.18	19.65	17.65	10.08	3.11					
x9	64.61	37.85	37.34	33.91	32.42	30.76	25.42	23.89	21.89	14.32	7.35	4.24				
x10	70.17	43.41	42.90	39.47	37.98	36.32	30.98	29.45	27.45	19.88	12.91	9.80	5.56			
x4	73.15	46.39	45.88	42.45	40.96	39.30	33.96	32.43	30.43	22.86	15.89	12.78	8.54	2.98		
x5	81.56	54.80	54.29	50.86	49.37	47.71	42.37	40.84	38.84	31.27	24.30	21.19	16.95	11.39	8.41	

Formulations	=	Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,10% spray solution)
x11	=	1:10:0 (75 °C)
x12	=	1:8:2 (75 °C)
x6	=	1:10:0 (65°C)
x7	=	1:8:2 (65°C)
x1	=	1:10:0 (55 °C)
x2	=	1:8:2 (55 °C)
x13	=	1:5:5 (75 °C)
x8	=	1:5:5 (65 °C)
x3	=	1:5:5 (55 °C)
x14	=	1:2:8 (75°C)
x15	=	1:0:10 (75 °C)
x9	=	1:2:8 (65 °C)
x10	=	1:0:10 (65 °C)
x4	=	1:2:8 (55 °C)
x5	=	1:0:10 (55 °C)

Table 63 Two way analysis of variance for dissolution efficiency (DE) of nifedipine : Eudragit RS 100 : PVP K30 microspheres of 5% spray solution (in simulated gastric fluid without enzyme)

Temperature (°C) (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	7.86	9.92	16.44	29.49	39.62	103.33	20.67
Chamber 2	8.42	9.52	16.62	29.75	39.57	103.88	20.78
Chamber 3	8.13	9.92	16.77	29.83	39.63	104.28	20.86
Total	24.41	29.36	49.83	89.07	118.82	311.49	
Mean	8.14	9.79	16.61	29.69	39.61		62.30
65°C	7.97	8.19	12.35	22.44	32.09	83.04	16.61
Chamber 1							
Chamber 2	7.73	8.23	12.96	22.49	31.65	83.06	16.61
Chamber 3	8.01	8.06	12.79	22.56	31.68	83.10	16.62
Total	23.71	24.48	38.10	67.49	95.42	249.20	
Mean	7.90	8.16	12.70	22.50	31.81		49.84
75°C	7.49	8.18	12	14.37	23.75	65.79	13.158
Chamber 1							
Chamber 2	7.57	8.26	11.68	13.92	24.00	65.43	13.086
Chamber 3	7.54	8.19	11.89	14.03	23.88	65.53	13.106
Total	22.60	24.63	35.57	42.32	71.63	196.75	
Mean	7.53	8.21	11.86	14.11	23.88		39.35
Grand Total	70.72	78.47	123.50	198.88	285.87	757.44	
Mean Total	23.57	26.16	41.17	66.29	95.29		151.49

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	439.9181	219.9590	6784.2064	3.32	YES
Between ratio	4	3660.3278	915.0819	28223.9118	2.69	YES
Temperature-ratio interaction	8	340.4994	42.5624	1312.7547	2.27	YES
Error	30	0.9727	0.0324			
Total	44	4441.7179		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t\,\alpha_{/2}\ \sqrt{MSE\,(1/n_{\,t} + 1/n_{\,l})}$

Dissolution efficiency (DE) of spray dried products in pH 1.2 obtained from 5% spray solution

$LSD = 0.1715$; df = 40

$t\,\alpha_{/2} = 2.021$

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		23.57	26.16	41.17	66.29	95.29
1:10:0	23.57					
1:8:2	26.16	**2.58**				
1:5:5	41.17	**17.59**	**15.01**			
1:2:8	66.29	**42.72**	**40.14**	**25.13**		
1:0:10	95.29	**71.72**	**69.13**	**54.12**	**29.00**	

Test between temperature

LSD = 0.2481 ; df = 12

$t\,\alpha_{/2} = 2.179$

		75 ° C	65 ° C	55 ° C
		39.35	49.84	62.30
75 ° C	39.35			
65 ° C	49.84	**10.49**		
55 ° C	62.30	**22.95**	**12.46**	

Test between formulation

$$LSD = 0.3001 ; df = 30$$

$$t\,\alpha_{/2} = 2.042$$

		x11	x6	x1	x7	x12	x2	x13	x8	x14	x3	x9	x15	x4	x10	x5
		7.53	7.90	8.14	8.16	8.21	9.79	11.86	12.70	14.11	16.61	22.50	23.88	29.69	31.81	39.61
x11	7.53															
x6	7.90	0.37														
x1	8.14	0.60	0.23													
x7	8.16	0.63	0.26	0.02												
x12	8.21	0.68	0.31	0.07	0.05											
x2	9.79	2.25	1.88	1.65	1.63	1.58										
x13	11.86	4.32	3.95	3.72	3.70	3.65	2.07									
x8	12.70	5.17	4.80	4.56	4.54	4.49	2.91	0.84								
x14	14.11	6.57	6.20	5.97	5.95	5.90	4.32	2.25	1.41							
x3	16.61	9.08	8.71	8.47	8.45	8.40	6.82	4.75	3.91	2.50						
x9	22.50	14.96	14.59	14.36	14.34	14.29	12.71	10.64	9.80	8.39	5.89					
x15	23.88	16.34	15.97	15.74	15.72	15.67	14.09	12.02	11.18	9.77	7.27	1.38				
x4	29.69	22.16	21.79	21.55	21.53	21.48	19.90	17.83	16.99	15.58	13.08	7.19	5.81			
x10	31.81	24.27	23.90	23.67	23.65	23.60	22.02	19.95	19.11	17.70	15.20	9.31	7.93	2.12		
x5	39.61	32.07	31.70	31.47	31.45	31.40	29.82	27.75	26.91	25.50	23.00	17.11	15.73	9.92	7.80	

Formulations	=	Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,5% spray solution)
x11	=	1:10:0 (75 °C)
x6	=	1:10:0 (65 °C)
x1	=	1:10:0 (55°C)
x7	=	1:8:2 (65°C)
x12	=	1:8:2 (75 °C)
x2	=	1:8:2 (55 °C)
x13	=	1:5:5 (75 °C)
x8	=	1:5:5 (65 °C)
x14	=	1:2:8 (75 °C)
x3	=	1:5:5 (55°C)
x9	=	1:2:8 (65 °C)

Table 64 Two way analysis of variance for dissolution efficiency (DE) of nifedipine : Eudragit RS100 : PVP K30 microspheres of 10% spray solution (in simulated gastric fluid without enzyme)

Temperature (°C) (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	7.74	10.82	18.57	29.29	40.13	106.55	21.31
Chamber 2	7.90	10.55	18.60	29.50	40.73	107.28	21.46
Chamber 3	7.74	10.74	18.38	29.43	40.48	106.77	21.35
Total	23.38	32.11	55.55	88.22	121.34	320.60	
Mean	7.79	10.70	18.52	29.41	40.45		64.12
65°C							
Chamber 1	7.78	8.60	13.28	24.55	32.07	86.28	17.26
Chamber 2	7.42	9.04	13.11	24.49	32.33	86.39	17.28
Chamber 3	7.69	8.63	13.1	24.38	31.97	85.77	17.15
Total	22.89	26.27	39.49	73.42	96.37	258.44	
Mean	7.63	8.76	13.16	24.47	32.12		155.26
75°C							
Chamber 1	7.43	8.21	11.73	15.05	23.36	65.78	13.16
Chamber 2	7.5	7.97	11.69	15.10	23.49	65.75	13.15
Chamber 3	7.52	8.28	11.64	14.73	23.54	65.71	13.14
Total	22.45	24.46	35.06	44.88	70.39	197.24	39.45
Mean	7.48	8.15	11.69	14.96	23.46		
Grand Total	68.72	82.84	130.10	206.52	288.10	776.28	
Mean Total	22.91	27.61	43.37	68.84	96.03		155.26

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	507.2666	253.6333	10237.2389	3.32	YES
Between ratio	4	3737.8785	934.4696	37717.4037	2.69	YES
Temperature-ratio interaction	8	337.2759	337.2759	1701.6567	2.27	YES
Error	30	0.7433	0.7433			
Total	44	4583.1643		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t\,\alpha_{/2}\ \sqrt{MSE\,(1/n_i + 1/n_j)}$

Dissolution efficiency (DE) of spray dried products in pH 1.2 obtained from 10% spray solution

LSD = 0.1500 ; df = 40

$t\,\alpha_{/2}$ = 2.021

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		22.91	27.61	43.37	68.84	96.03
1:10:0	22.91					
1:8:2	27.61	**4.71**				
1:5:5	43.37	**20.46**	**15.75**			
1:2:8	68.84	**45.93**	**41.23**	**25.47**		
1:0:10	96.03	**73.13**	**68.42**	**52.67**	**27.19**	

Test between temperature

LSD = 0.2170 ; df = 12

$t\,\alpha_{/2}$ = 2.179

		75 °C	65 °C	55 °C
		39.45	51.69	64.12
75 °C	39.45			
65 °C	51.69	**12.24**		
55 °C	64.12	**24.67**	**12.43**	

Test between formulation

$LSD = 0.2626$; $df = 30$

$t\,\alpha_{/2} = 2.042$

		x11	x6	x1	x12	x7	x2	x13	x8	x14	x3	x15	x9	x4	x10	x5
		7.48	7.63	7.79	8.15	8.76	10.70	11.69	13.16	14.96	18.52	23.46	24.47	29.41	32.12	40.45
x11	7.48															
x6	7.63	0.15														
x1	7.79	0.31	0.16													
x12	8.15	1.27	1.13	0.96												
x7	8.76	0.67	0.52	0.36	0.60											
x2	10.70	3.22	3.07	2.91	2.55	1.95										
x13	11.69	4.20	4.06	3.89	3.53	2.93	0.98									
x8	13.16	5.68	5.53	5.37	5.01	4.41	2.46	1.48								
x14	14.96	7.48	7.33	7.17	6.81	6.20	4.26	3.27	1.80							
x3	18.52	11.03	10.89	10.72	10.36	9.76	7.81	6.83	5.35	3.56						
x15	23.46	16.99	16.84	16.68	16.32	15.72	13.77	12.79	11.31	9.51	5.96					
x9	24.47	15.98	15.83	15.67	15.31	14.71	12.76	11.78	10.30	8.50	4.95	1.01				
x4	29.41	21.92	21.78	21.61	21.25	20.65	18.70	17.72	16.24	14.45	10.89	5.94	4.93			
x10	32.12	24.64	24.49	24.33	23.97	23.37	21.42	20.44	18.96	17.16	13.61	8.66	7.65	2.72		
x5	40.45	32.96	32.82	32.65	32.29	31.69	29.74	28.76	27.28	25.49	21.93	16.98	15.97	11.04	8.32	

Formulations	=	Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,10% spray solution)
x11	=	1:10:0 (75 °C)
x6	=	1:10:0 (65 °C)
x1	=	1:10:0 (55°C)
x12	=	1:8:2 (75°C)
x7	=	1:8:2 (65 °C)
x2	=	1:8:2 (55 °C)
x13	=	1:5:5 (75 °C)
x8	=	1:5:5 (65 °C)
x14	=	1:2:8 (75 °C)
x3	=	1:5:5 (55°C)
x15	=	1:0:10 (75 °C)
x9	=	1:2:8 (65 °C)
x4	=	1:2:8 (55 °C)
x10	=	1:0:10 (65 °C)
x5	=	1:0:10 (55 °C)

Table 65 Two way analysis of variance for release rate constant (k) of nifedipine : Eudragit RS100 : PVP K30 microspheres of 5% spray solution(in simulated intestinal fluid without enzyme)

Temperature (°C) (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	1.14	1.33	1.47	1.98	1.87	7.79	1.56
Chamber 2	1.16	1.34	1.47	1.99	1.86	7.82	1.56
Chamber 3	1.14	1.34	1.46	1.98	1.86	7.78	1.56
Total	3.44	4.01	4.4	5.95	5.59	23.39	
Mean	1.15	1.34	1.47	1.98	1.86		4.68
65°C							
Chamber 1	1.03	1.14	1.36	1.88	2.11	7.52	1.50
Chamber 2	1.02	1.16	1.35	1.9	2.12	7.55	1.51
Chamber 3	1.02	1.17	1.34	1.89	2.11	7.53	1.51
Total	3.07	3.47	4.05	5.67	6.34	22.6	
Mean	1.02	1.16	1.35	1.89	2.11		4.52
75°C							
Chamber 1	0.83	0.85	1.16	1.84	2.01	6.69	1.34
Chamber 2	0.83	0.85	1.16	1.84	2.03	6.71	1.34
Chamber 3	0.81	0.82	1.16	1.83	2.04	6.66	1.33
Total	2.47	2.52	3.48	5.51	6.08	20.06	
Mean	0.82	0.84	1.16	1.84	2.03		4.01
Grand Total	8.98	10.00	11.93	17.13	18.01	66.05	
Mean Total	2.99	3.33	3.98	5.71	6.00		13.21

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	0.4037	0.2018	2064.20	3.32	YES
Between ratio	4	7.5824	1.8956	19387.00	2.69	YES
Temperature-ratio interaction	8	0.4090	0.0511	522.82	2.27	YES
Error	30	0.0029	9.7778E-05			
Total	44	8.3980		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Release rate constant (k) of spray dried products in pH 7.5 obtained from 5% spray solution

$LSD = 0.0094$; $df = 40$

$t_{\alpha/2} = 2.021$

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		2.99	3.33	3.98	5.71	6.00
1:10:0	2.99					
1:8:2	3.33	**0.34**				
1:5:5	3.98	**0.98**	**0.64**			
1:2:8	5.71	**2.72**	**2.38**	**1.73**		
1:0:10	6.00	**3.01**	**2.67**	**2.03**	**0.29**	

Test between temperature

$LSD = 0.0079$; $df = 12$

$t_{\alpha/2} = 2.179$

		75°C	65°C	55°C
		4.01	4.52	4.68
75°C	4.01			
65°C	4.52	**0.51**		
55°C	4.68	**0.67**	**0.16**	

Test between formulation

LSD = 0.0165 ; df =30

$t_{\alpha/2} = 2.042$

		x11	x12	x6	x1	x7	x13	x2	x8	x3	x14	x5	x9	x4	x15	x10
		0.82	0.84	1.02	1.15	1.16	1.16	1.34	1.35	1.47	1.84	1.86	1.89	1.98	2.03	2.11
x11	0.82															
x12	0.84	0.02														
x6	1.02	0.20	0.18													
x1	1.15	0.32	0.31	0.12												
x7	1.16	0.33	0.32	0.13	2.30											
x13	1.16	0.34	0.32	0.14	2.31	0.00										
x2	1.34	0.51	0.50	0.31	2.48	0.18	0.18									
x8	1.35	0.53	0.51	0.33	2.50	0.19	0.19	0.01								
x3	1.47	0.64	0.63	0.44	2.61	0.31	0.31	0.13	0.12							
x14	1.84	1.01	1.00	0.81	2.98	0.68	0.68	0.50	0.49	0.37						
x5	1.86	1.04	1.02	0.84	3.01	0.71	0.70	0.53	0.51	0.40	0.03					
x9	1.89	1.07	1.05	0.87	3.04	0.73	0.73	0.55	0.54	0.42	0.05	0.03				
x4	1.98	1.16	1.14	0.96	3.13	0.83	0.82	0.65	0.63	0.52	0.15	0.12	0.09			
x15	2.03	1.20	1.19	1.00	3.17	0.87	0.87	0.69	0.68	0.56	0.19	0.16	0.14	0.04		
x10	2.11	1.29	1.27	1.09	3.26	0.96	0.95	0.78	0.76	0.65	0.28	0.25	0.22	0.13	0.09	

Formulations = Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,5% spray solution)

x11 = 1:10:0 (75 °C)
x12 = 1:8:2 (75 °C)
x6 = 1:10:0 (65°C)
x1 = 1:10:0 (55°C)
x7 = 1:8:2 (65 °C)
x13 = 1:5:5 (75 °C)
x2 = 1:8:2 (55 °C)
x8 = 1:5:5 (65 °C)
x3 = 1:5:5 (55 °C)
x14 = 1:2:8 (75°C)
x5 = 1:0:10 (55 °C)
x9 = 1:2:8 (65 °C)
x4 = 1:2:8 (55 °C)
x15 = 1:0:10 (75 °C)
x10 = 1:0:10 (65 °C)

Table 66 Two way analysis of variance for release rate constant (k) of nifedipine : Eudragit RS100 : PVP K30 microspheres of 10% spray solution(in simulated intestinal fluid without enzyme)

Temperature (°C) (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	1.24	1.45	1.56	1.97	1.94	8.17	1.63
Chamber 2	1.19	1.45	1.65	1.98	1.95	8.23	1.65
Chamber 3	1.20	1.47	1.63	1.96	1.96	8.22	1.64
Total	3.63	4.37	4.83	5.92	5.86	24.62	
Mean	1.21	1.46	1.61	1.97	1.95		4.92
65°C							
Chamber 1	1.05	1.15	1.48	1.95	2.07	7.70	1.54
Chamber 2	1.04	1.16	1.50	1.95	2.07	7.73	1.55
Chamber 3	1.02	1.14	1.49	1.97	2.07	7.68	1.54
Total	3.12	3.45	4.46	5.87	6.21	23.11	
Mean	1.04	1.15	1.49	1.96	2.07		4.62
75°C							
Chamber 1	0.86	0.92	1.13	1.84	2.13	6.87	1.37
Chamber 2	0.87	0.90	1.13	1.84	2.13	6.86	1.37
Chamber 3	0.84	0.90	1.11	1.84	2.14	6.83	1.37
Total	2.56	2.72	3.37	5.51	6.41	20.57	
Mean	0.85	0.91	1.12	1.84	2.14		4.11
Grand Total	9.31	10.54	12.66	17.30	18.48	68.29	
Mean Total	3.10	3.51	4.22	5.77	6.16		13.66

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	0.5588	0.2794	949.35	3.32	YES
Between ratio	4	7.3512	1.8378	6244.80	2.69	YES
Temperature-ratio interaction	8	0.5643	0.0705	239.71	2.27	YES
Error	30	0.0088	2.9429E-04			
Total	44	8.4831		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Release rate constant (k) of spray dried products in pH 7.5 obtained from 10% spray solution

LSD = 0.0163 ; df = 40

$t_{\alpha/2}$ = 2.021

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		3.10	3.51	4.22	5.77	6.16
1:10:0	3.10					
1:8:2	3.51	**0.41**				
1:5:5	4.22	**1.12**	**0.71**			
1:2:8	5.77	**2.66**	**2.25**	**1.55**		
1:0:10	6.16	**3.06**	**2.65**	**1.94**	**0.39**	

Test between temperature

LSD = 0.0136 ; df = 12

$t_{\alpha/2}$ = 2.179

		75°C	65°C	55°C
		4.11	4.62	4.92
75°C	4.11			
65°C	4.62	**0.51**		
55°C	4.92	**0.81**	**0.30**	

Test between formulation

LSD = 0.0286 ; df =30

$t_{\alpha/2}$ =2.042

		x11	x12	x6	x13	x7	x1	x2	x8	x3	x14	x5	x9	x4	x10	x15
		0.85	0.91	1.04	1.12	1.15	1.21	1.46	1.49	1.61	1.84	1.95	1.96	1.97	2.07	2.14
x11	0.85															
x12	0.91	0.05														
x6	1.04	0.18	0.13													
x13	1.12	0.27	0.22	0.08												
x7	1.15	0.29	0.24	0.11	0.03											
x1	1.21	0.36	0.31	0.17	0.09	0.06										
x2	1.46	0.60	0.55	0.42	0.34	0.31	0.25									
x8	1.49	0.63	0.58	0.45	0.36	0.34	0.28	0.03								
x3	1.61	0.76	0.71	0.57	0.49	0.46	0.40	0.15	0.12							
x14	1.84	0.98	0.93	0.80	0.72	0.69	0.63	0.38	0.35	0.23						
x5	1.95	1.10	1.05	0.91	0.83	0.80	0.74	0.50	0.47	0.34	0.12					
x9	1.96	1.10	1.05	0.92	0.84	0.81	0.75	0.50	0.47	0.35	0.12	0.00				
x4	1.97	1.12	1.07	0.93	0.85	0.82	0.76	0.51	0.49	0.36	0.13	0.02	0.01			
x10	2.07	1.22	1.17	1.03	0.95	0.92	0.86	0.61	0.58	0.46	0.23	0.12	0.11	0.10		
x15	2.14	1.28	1.23	1.10	1.01	0.99	0.93	0.68	0.65	0.52	0.30	0.18	0.18	0.16	0.07	

Formulations = Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,10% spray solution)

x11 = 1:10:0 (75 °C)
x12 = 1:8:2 (75 °C)
x6 = 1:10:0 (65°C)
x13 = 1:5:5 (75°C)
x7 = 1:8:2 (65 °C)
x1 = 1:10:0 (55 °C)
x2 = 1:8:2 (55 °C)
x8 = 1:5:5 (65 °C)
x3 = 1:5:5 (55 °C)
x14 = 1:2:8 (75°C)
x5 = 1:0:10 (55 °C)
x9 = 1:2:8 (65 °C)
x4 = 1:2:8 (55 °C)
x10 = 1:0:10 (65 °C)
x15 = 1:0:10 (75 °C)

Table 67 Two way analysis of variance for release rate constant (k) of nifedipine : Eudragit RS100 : PVP K30 microspheres of 5% spray solution(in simulated gastric fluid without enzyme)

Temperature (°C) (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	0.41	0.74	0.96	1.26	1.94	5.32	1.06
Chamber 2	0.44	0.72	1.09	1.23	1.95	5.43	1.09
Chamber 3	0.39	0.78	0.97	1.30	1.96	5.40	1.08
Total	1.24	2.25	3.03	3.78	5.86	16.15	
Mean	0.41	0.75	1.01	1.26	1.95		3.23
65°C							
Chamber 1	0.39	0.45	1.14	1.72	2.03	5.74	1.15
Chamber 2	0.33	0.41	1.12	1.67	1.95	5.48	1.10
Chamber 3	0.34	0.49	1.13	1.75	2.00	5.70	1.14
Total	1.06	1.35	3.39	5.15	5.98	16.93	
Mean	0.35	0.45	1.13	1.72	1.99		3.39
75°C							
Chamber 1	0.25	0.38	1.02	1.45	1.80	4.90	0.98
Chamber 2	0.26	0.43	1.01	1.40	1.95	5.05	1.01
Chamber 3	0.34	0.36	0.93	1.40	1.78	4.80	0.96
Total	0.85	1.16	2.96	4.24	5.53	14.75	
Mean	0.28	0.39	0.99	1.41	1.84		2.95
Grand Total	3.15	4.76	9.38	13.17	17.37	47.84	
Mean Total	1.05	1.59	3.13	4.39	5.79		9.57

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	0.1617	0.0808	41.31	3.32	YES
Between ratio	4	15.3493	3.8373	1961.00	2.69	YES
Temperature-ratio interaction	8	0.4776	0.0597	30.51	2.27	YES
Error	30	0.0587	1.9568E-03			
Total	44	16.0473		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Release rate constant (k) of spray dried products in pH 1.2 obtained from 5 % spray solution

LSD = 0.0421 ; df = 40

$t_{\alpha/2}$ = 2.021

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		1.05	1.59	3.13	4.39	5.79
1:10:0	1.05					
1:8:2	1.59	**0.54**				
1:5:5	3.13	**2.07**	**1.54**			
1:2:8	4.39	**3.34**	**2.80**	**1.27**		
1:0:10	5.79	**4.74**	**4.20**	**2.66**	**1.40**	

Test between temperature

LSD = 0.0352 ; df = 12

$t_{\alpha/2}$ = 2.179

		75°C	55°C	65°C
		2.95	3.23	3.39
75°C	2.95			
55°C	3.23	**0.28**		
65°C	3.39	**0.43**	**0.15**	

Test between formulation

LSD = 0.0738 ; df =30

$t_{\alpha/2}$ =2.042

		x11	x6	x12	x1	x7	x2	x13	x3	x8	x4	x14	x9	x15	x5	x10
		0.28	0.35	0.39	0.41	0.45	0.75	0.99	1.01	1.13	1.26	1.41	1.72	1.84	1.95	1.99
x11	0.28															
x6	0.35	0.07														
x12	0.39	0.10	0.03													
x1	0.41	0.13	0.06	0.02												
x7	0.45	0.17	0.10	0.06	0.04											
x2	0.75	0.46	0.40	0.36	0.34	0.30										
x13	0.99	0.70	0.63	0.60	0.57	0.54	0.24									
x3	1.01	0.72	0.65	0.62	0.60	0.56	0.26	0.02								
x8	1.13	0.85	0.78	0.74	0.72	0.68	0.38	0.14	0.12							
x4	1.26	0.98	0.91	0.87	0.85	0.81	0.51	0.27	0.25	0.13						
x14	1.41	1.13	1.06	1.03	1.00	0.96	0.67	0.43	0.41	0.28	0.15					
x9	1.72	1.43	1.36	1.33	1.30	1.26	0.97	0.73	0.71	0.58	0.45	0.30				
x15	1.84	1.56	1.49	1.46	1.43	1.39	1.10	0.86	0.84	0.71	0.58	0.43	0.13			
x5	1.95	1.67	1.60	1.57	1.54	1.50	1.20	0.97	0.94	0.82	0.69	0.54	0.24	0.11		
x10	1.99	1.71	1.64	1.60	1.58	1.54	1.24	1.01	0.98	0.86	0.73	0.58	0.28	0.15	0.04	

Formulations	=	Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,5% spray solution)
x11	=	1:10:0 (75 °C)
x6	=	1:10:0 (65 °C)
x12	=	1:8:2 (75°C)
x1	=	1:10:0 (55°C)
x7	=	1:8:2 (65 °C)
x2	=	1:8:2 (55 °C)
x13	=	1:5:5 (75 °C)
x3	=	1:5:5 (55 °C)
x8	=	1:5:5 (65 °C)
x4	=	1:2:8 (55°C)
x14	=	1:2:8 (75 °C)
x9	=	1:2:8 (65 °C)
x15	=	1:0:10 (75 °C)
x5	=	1:0:10 (55 °C)
x10	=	1:0:10 (65 °C)

Table 68 Two way analysis of variance for release rate constant (k) of nifedipine : Eudragit RS100 : PVP K30 microspheres of 10% spray solution(in simulated gastric fluid without enzyme)

Temperature (°C) (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
55°C							
Chamber 1	0.35	0.80	1.41	1.36	1.60	5.52	1.10
Chamber 2	0.41	0.73	1.34	1.34	1.68	5.51	1.10
Chamber 3	0.30	0.73	1.46	1.31	1.64	5.42	1.08
Total	1.05	2.26	4.21	4.01	4.92	16.44	
Mean	0.35	0.75	1.40	1.34	1.64		3.29
65°C							
Chamber 1	0.18	0.48	1.41	1.47	2.23	5.76	1.15
Chamber 2	0.21	0.53	1.43	1.45	2.27	5.88	1.18
Chamber 3	0.26	0.54	1.38	1.53	2.20	5.90	1.18
Total	0.64	1.55	4.22	4.45	6.70	17.55	
Mean	0.21	0.52	1.41	1.48	2.23		3.51
75°C							
Chamber 1	0.27	0.38	0.97	1.40	1.86	4.88	0.98
Chamber 2	0.23	0.34	1.02	1.38	1.86	4.83	0.97
Chamber 3	0.33	0.26	0.98	1.40	1.83	4.81	0.96
Total	0.83	0.98	2.97	4.18	5.55	14.52	
Mean	0.28	0.33	0.99	1.39	1.85		2.90
Grand Total	2.52	4.80	11.40	12.63	17.16	48.51	
Mean Total	0.84	1.60	3.80	4.21	5.72		9.70

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between temperature	2	0.3146	0.1573	97.40	3.32	YES
Between ratio	4	15.8644	3.9661	2455.40	2.69	YES
Temperature-ratio interaction	8	0.9033	0.1129	69.91	2.27	YES
Error	30	0.0485	1.6152E-03			
Total	44	17.1309		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

- Release rate constant (k) of spray dried products in pH 1.2 obtained from 10% spray solution

$LSD = 0.0383$; $df = 40$

$t_{\alpha/2} = 2.021$

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		0.84	1.60	3.80	4.21	5.72
1:10:0	0.84					
1:8:2	1.60	**0.76**				
1:5:5	3.80	**2.96**	**2.20**			
1:2:8	4.21	**3.37**	**2.61**	**0.41**		
1:0:10	5.72	**4.88**	**4.12**	**1.92**	**1.51**	

Test between temperature

$LSD = 0.0320$; $df = 12$

$t_{\alpha/2} = 2.179$

		75°C	55°C	65°C
		2.90	3.29	3.51
75°C	2.90			
55°C	3.29	**0.39**		
65°C	3.51	**0.61**	**0.22**	

Test between formulation

LSD = 0.0670 ; df =30

$t_{\alpha/2} = 2.042$

		x6	x11	x12	x1	x7	x2	x13	x4	x14	x3	x8	x9	x5	x15	x10
		0.21	0.28	0.33	0.35	0.52	0.75	0.99	1.34	1.39	1.40	1.41	1.48	1.64	1.85	2.23
x6	0.21															
x11	0.28	0.06														
x12	0.33	0.12	0.05													
x1	0.35	0.14	0.07	0.02												
x7	0.52	0.31	0.24	0.19	0.17											
x2	0.75	0.54	0.48	0.43	0.40	0.23										
x13	0.99	0.78	0.71	0.66	0.64	0.47	0.24									
x4	1.34	1.12	1.06	1.01	0.98	0.82	0.58	0.34								
x14	1.39	1.18	1.12	1.07	1.04	0.88	0.64	0.40	0.06							
x3	1.40	1.19	1.13	1.08	1.05	0.89	0.65	0.41	0.07	0.01						
x8	1.41	1.19	1.13	1.08	1.05	0.89	0.65	0.41	0.07	0.01	0.00					
x9	1.48	1.27	1.20	1.15	1.13	0.96	0.73	0.49	0.15	0.09	0.08	0.08				
x5	1.64	1.43	1.36	1.31	1.29	1.12	0.89	0.65	0.30	0.25	0.24	0.23	0.16			
x15	1.85	1.64	1.57	1.52	1.50	1.33	1.10	0.86	0.51	0.46	0.45	0.44	0.37	0.21		
x10	2.23	2.02	1.96	1.90	1.88	1.71	1.48	1.24	0.90	0.84	0.83	0.83	0.75	0.59	0.38	

Formulations = Nifedipine:Eudragit RS100:PVP K30=1:10:0 (°C ,10% spray solution)

x6 = 1:10:0 (65 °C)
x11 = 1:8:2 (75 °C)
x12 = 1:5:5 (75°C)
x1 = 1:10:0 (55°C)
x7 = 1:8:2 (65 °C)
x2 = 1:8:2 (55 °C)
x13 = 1:5:5 (75 °C)
x4 = 1:2:8 (55 °C)
x14 = 1:2:8 (75 °C)
x3 = 1:5:5 (55°C)
x8 = 1:5:5 (65 °C)
x9 = 1:2:8 (65 °C)
x5 = 1:0:10 (55 °C)
x15 = 1:0:10 (75 °C)
x10 = 1:0:10 (65 °C)

Table 69 Two way analysis of variance for dissolution efficiency (DE) of nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100: PVP K30 microspheres prepared at 55°C of 5% spray solution (in simulated intestinal fluid without enzyme)

Eudragit type (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
Eudragit RS100	31.28	35.86	45.36	71.32	81.05	264.87	52.97
Chamber 1							
Chamber 2	31.45	35.65	45.81	71.81	80.96	265.68	53.14
Chamber 3	31.28	35.73	45.55	71.2	80.84	264.6	52.92
Total	94.01	107.24	136.72	214.33	242.85	795.15	
Mean	31.34	35.75	45.57	71.44	80.95		159.03
Eudragit RL100	41.18	49.52	56.68	74.61	81.05	303.04	60.61
Chamber 1							
Chamber 2	41.47	49.99	57.14	74.81	80.96	304.37	60.87
Chamber 3	41.07	49.65	56.91	74.38	80.84	302.85	60.57
Total	123.72	149.16	170.73	223.80	242.85	910.26	
Mean	41.24	49.72	56.91	74.60	80.95		182.05
Grand Total	217.73	256.40	307.45	438.13	485.70	1705.41	
Mean Total	108.87	128.20	153.73	219.07	242.85		341.08

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between Eudragit type	1	32757.49	32757.49	820300.00	4.35	YES
Between ratio	4	5983.39	1495.85	37459.00	2.87	YES
Temperature-ratio interaction	4	3197.74	799.43	20019.00	2.87	YES
Error	20	0.7987	3.9933E-02			
Total	29	41939.43		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Dissolution efficiency (DE) of spray dried products in pH 7.5 obtained from nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100:PVP K30 microspheres prepared at 55°C of 5% spray solution

$LSD = 0.2377$; $df = 25$

$t_{\alpha/2} = 2.060$

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		108.87	128.20	153.73	219.07	242.85
1:10:0	108.87					
1:8:2	128.20	**19.34**				
1:5:5	153.73	**44.86**	**25.53**			
1:2:8	219.07	**110.20**	**90.87**	**65.34**		
1:0:10	242.85	**133.99**	**114.65**	**89.13**	**23.79**	

Test between Eudragit type

$LSD = 0.1494$; $df = 28$

$t_{\alpha/2} = 2.048$

		Eudragit RS100	Eudragit RL100
		159.03	182.05
Eudragit RS100	159.03		
Eudragit RL100	182.05	**23.02**	

Test between formulation

LSD = 0.3404 ; df =20

$t_{\alpha/2} = 2.086$

		x1	x2	x6	x3	x7	x8	x4	x9	x5	x10
		31.34	35.75	41.24	45.57	49.72	56.91	71.44	74.60	80.95	80.95
x1	31.34										
x2	35.75	4.41									
x6	41.24	9.90	5.49								
x3	45.57	14.24	9.83	4.33							
x7	49.72	18.38	13.97	8.48	4.15						
x8	56.91	25.57	21.16	15.67	11.34	7.19					
x4	71.44	40.11	35.70	30.20	25.87	21.72	14.53				
x9	74.60	43.26	38.85	33.36	29.03	24.88	17.69	3.16			
x5	80.95	49.61	45.20	39.71	35.38	31.23	24.04	9.51	6.35		
x10	80.95	49.61	45.20	39.71	35.38	31.23	24.04	9.51	6.35	0.00	

Formulations	=	Nifedipine:Eudragit RS or RL100:PVP K30
x1	=	1:10:0 (Eudragit RS100)
x2	=	1:8:2 (Eudragit RS100)
x6	=	1:10:0 (Eudragit RL100)
x3	=	1:5:5 (Eudragit RS100)
x7	=	1:8:2 (Eudragit RL100)
x8	=	1:5:5 (Eudragit RL100)
x4	=	1:2:8 (Eudragit RS100)
x9	=	1:2:8 (Eudragit RL100)
x5	=	1:0:10 (Eudragit RS100)
x10	=	1:0:10 (Eudragit RL100)

Table 70 Two way analysis of variance for dissolution efficiency (DE) of nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100: PVP K30 microspheres prepared at 55°C of 5% spray solution (in simulated gastric fluid without enzyme)

Eudragit type (A)	Dissolution efficiency (DE)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
Eudragit RS100	7.86	9.92	16.44	29.49	39.62	103.33	20.67
Chamber 1							
Chamber 2	8.42	9.52	16.62	29.75	39.57	103.88	20.78
Chamber 3	8.13	9.92	16.77	29.83	39.63	104.28	20.86
Total	24.41	29.36	49.83	89.07	118.82	311.49	
Mean	8.14	9.79	16.61	29.69	39.61		62.30
Eudragit RL100	10.59	14.57	22.72	34.71	39.62	122.21	24.44
Chamber 1							
Chamber 2	10.70	14.90	23.03	34.79	39.57	122.99	24.60
Chamber 3	10.64	14.57	22.91	34.47	39.63	122.22	24.44
Total	31.93	44.04	68.66	103.97	118.82	367.42	
Mean	10.64	14.68	22.89	34.66	39.61		73.48
Grand Total	56.34	73.40	118.49	193.04	237.64	678.91	
Mean Total	28.17	36.70	59.25	96.52	118.82		135.78

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between Eudragit type	1	5225.59	5225.59	183850.00	4.35	YES
Between ratio	4	2683.90	670.97	23606.00	2.87	YES
Temperature-ratio interaction	4	1379.11	344.78	12130.00	2.87	YES
Error	20	0.5685	2.8423E-02			
Total	29	9289.17		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\ (1/n_i + 1/n_j)}$

Dissolution efficiency (DE) of spray dried products in pH 1.2 obtained from nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100:PVP K30 microspheres prepared at 55°C of 5% spray solution

LSD = 0.2005 ; df = 25

$t_{\alpha/2}$ = 2.060

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		28.17	36.70	59.25	96.52	118.82
1:10:0	28.17					
1:8:2	36.70	**8.53**				
1:5:5	59.25	**31.08**	**22.55**			
1:2:8	96.52	**68.35**	**59.82**	**37.28**		
1:0:10	118.82	**90.65**	**82.12**	**59.58**	**22.30**	

Test between Eudragit type

LSD = 0.1261 ; df = 28

$t_{\alpha/2}$ = 2.048

		Eudragit RS100	Eudragit RL100
		62.30	73.48
Eudragit RS100	62.30		
Eudragit RL100	73.48	**11.19**	

Test between formulation

LSD = 0.2871 ; df =20

$t_{\alpha/2} = 2.086$

		x1	x2	x6	x7	x3	x8	x4	x9	x5	x10
		8.14	9.79	10.64	14.68	16.61	22.89	29.69	34.66	39.61	39.61
x1	8.14										
x2	9.79	1.65									
x6	10.64	2.51	0.86								
x7	14.68	8.47	6.82	4.04							
x3	16.61	6.54	4.89	5.97	1.93						
x8	22.89	14.75	13.10	12.24	8.21	6.28					
x4	29.69	21.55	19.90	19.05	15.01	13.08	6.80				
x9	34.66	26.52	24.87	24.01	19.98	18.05	11.77	4.97			
x5	39.61	31.47	29.82	28.96	24.93	23.00	16.72	9.92	4.95		
x10	39.61	31.47	29.82	28.96	24.93	23.00	16.72	9.92	4.95	0.00	

Formulations	=	Nifedipine:Eudragit RS or RL100:PVP K30
x1	=	1:10:0 (Eudragit RS100)
x2	=	1:8:2 (Eudragit RS100)
x6	=	1:10:0 (Eudragit RL100)
x7	=	1:8:2 (Eudragit RL100)
x3	=	1:5:5 (Eudragit RS100)
x8	=	1:5:5 (Eudragit RL100)
x4	=	1:2:8 (Eudragit RS100)
x9	=	1:2:8 (Eudragit RL100)
x5	=	1:0:10 (Eudragit RS100)
x10	=	1:0:10 (Eudragit RL100)

Table 71 Two way analysis of variance for release rate constant (k) of nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100: PVP K30 microspheres prepared at 55°C of 5% spray solution (in simulated intestinal fluid without enzyme)

Eudragit type (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
Eudragit RS100	1.14	1.33	1.47	1.98	1.87	7.79	1.56
Chamber 1							
Chamber 2	1.16	1.34	1.47	1.99	1.86	7.82	1.56
Chamber 3	1.14	1.34	1.46	1.98	1.86	7.78	1.56
Total	3.44	4.01	4.40	5.95	5.59	23.39	
Mean	1.15	1.34	1.47	1.98	1.86		4.68
Eudragit RL100	1.41	1.79	1.75	2.08	1.87	8.90	1.78
Chamber 1							
Chamber 2	1.42	1.80	1.77	2.08	1.86	8.94	1.79
Chamber 3	1.42	1.77	1.76	2.07	1.86	8.89	1.78
Total	4.25	5.37	5.29	6.23	5.59	26.73	
Mean	1.42	1.79	1.76	2.08	1.86		5.35
Grand Total	7.69	9.38	9.69	12.18	11.18	50.12	
Mean Total	3.85	4.69	4.84	6.09	5.59		10.02

ANOVA table :

Source	df	SS	Mean Square	F cal	F critical value	Significance
Between Eudragit type	1	28.2850	28.2850	376040.00	4.35	YES
Between ratio	4	1.3289	0.3322	4416.90	2.87	YES
Temperature-ratio interaction	4	0.8554	0.2138	2843.00	2.87	YES
Error	20	0.0015	7.5217E-05			
Total	29	30.4708		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\ (1/n_i + 1/n_j)}$

Release rate constant (k) of spray dried products in pH 7.5 obtained from nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100:PVP K30 microspheres prepared at 55°C of 5% spray solution

$LSD = 0.0103$; $df = 25$

$t_{\alpha/2} = 2.060$

		1:10:0	1:8:2	1:5:5	1:0:10	1:2:8
		3.85	4.69	4.84	5.59	6.09
1:10:0	3.85					
1:8:2	4.69	**0.85**				
1:5:5	4.84	**1.00**	**0.15**			
1:0:10	5.59	**1.74**	**0.90**	**0.75**		
1:2:8	6.09	**2.25**	**1.40**	**1.25**	**0.50**	

Test between Eudragit type

$LSD = 0.0065$; $df = 28$

$t_{\alpha/2} = 2.048$

		Eudragit RS100	Eudragit RL100
		4.68	5.35
Eudragit RS100	4.68		
Eudragit RL100	5.35	**0.67**	

Test between formulation

LSD = 0.0148 ; df =20

$t_{\alpha/2} = 2.086$

		x1	x2	x6	x3	x8	x7	x10	x5	x4	x9
	1.15	1.15	1.34	1.42	1.47	1.76	1.79	1.86	1.86	1.98	2.08
x1	1.15										
x2	1.34	0.19									
x6	1.42	0.27	0.08								
x3	1.47	0.32	0.13	0.05							
x8	1.76	0.62	0.43	0.35	0.30						
x7	1.79	0.64	0.45	0.37	0.32	0.03					
x10	1.86	0.72	0.53	0.45	0.40	0.10	0.07				
x5	1.86	0.72	0.53	0.45	0.40	0.10	0.07	0.00			
x4	1.98	0.84	0.65	0.57	0.52	0.22	0.19	0.12	0.12		
x9	2.08	0.93	0.74	0.66	0.61	0.31	0.29	0.21	0.21	0.09	

Formulations	=	Nifedipine:Eudragit RS or RL100:PVP K30
x1	=	1:10:0 (Eudragit RS100)
x2	=	1:8:2 (Eudragit RS100)
x6	=	1:10:0 (Eudragit RL100)
x3	=	1:5:5 (Eudragit RS100)
x8	=	1:5:5 (Eudragit RL100)
x7	=	1:8:2 (Eudragit RL100)
x10	=	1:0:10 (Eudragit RL100)
x5	=	1:0:10 (Eudragit RS100)
x4	=	1:2:8 (Eudragit RS100)
x9	=	1:2:8 (Eudragit RL100)

Table 72 Two way analysis of variance for release rate constant (k) of nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100: PVP K30 microspheres prepared at 55°C of 5% spray solution (in simulated gastric fluid without enzyme)

Eudragit type (A)	Release rate constant (k)						
	Ratio (B)					Grand Total	Mean Total
	1:10:0	1:8:2	1:5:5	1:2:8	1:0:10		
Eudragit RS100	0.41	0.74	0.96	1.26	1.91	5.29	1.06
Chamber 1							
Chamber 2	0.44	0.72	1.09	1.23	1.88	5.35	1.07
Chamber 3	0.39	0.78	0.97	1.30	1.87	5.31	1.06
Total	1.24	2.25	3.03	3.78	5.65	15.95	
Mean	0.41	0.75	1.01	1.26	1.88		3.19
Eudragit RL100	0.79	1.47	1.68	2.08	1.91	7.92	1.58
Chamber 1							
Chamber 2	0.73	1.49	1.63	2.08	1.88	7.80	1.56
Chamber 3	0.67	1.54	1.72	2.07	1.87	7.88	1.58
Total	2.19	4.49	5.03	6.23	5.65	23.60	
Mean	0.73	1.50	1.68	2.08	1.88		4.72
Grand Total	3.43	6.74	8.06	10.01	11.30	39.55	
Mean Total	1.71	3.37	4.03	5.01	5.65		7.91

ANOVA table :

Source	df	SS	Mean Square	F cal.	F critical value	Significance
Between Eudragit type	1	19.3336	19.3336	12452.00	4.35	YES
Between ratio	4	4.1572	1.0393	669.38	2.87	YES
Temperature-ratio interaction	4	26.2791	0.6971	448.97	2.87	YES
Error	20	0.0311	1.5526E-03			
Total	29	26.3101		$\alpha = 0.05$		

Test between ratio

LSD test $LSD = t_{\alpha/2} \sqrt{MSE\,(1/n_i + 1/n_j)}$

Release rate constant (k) of spray dried products in pH 1.2 obtained from nifedipine:Eudragit RS100:PVP K30 and nifedipine:Eudragit RL100:PVP K30 microspheres prepared at 55°C of 5% spray solution

LSD = 0.0469 ; df = 25

$t_{\alpha/2}$ = 2.060

		1:10:0	1:8:2	1:5:5	1:2:8	1:0:10
		1.71	3.37	4.03	5.01	5.65
1:10:0	1.71					
1:8:2	3.37	**1.66**				
1:5:5	4.03	**2.31**	**0.66**			
1:2:8	5.01	**3.29**	**1.64**	**0.98**		
1:0:10	5.65	**3.94**	**2.28**	**1.62**	**0.64**	

Test between Eudragit type

LSD = 0.0295 ; df = 28

$t_{\alpha/2}$ = 2.048

		Eudragit RS100	Eudragit RL100
		3.19	4.72
Eudragit RS100	3.19		
Eudragit RL100	4.72	**1.53**	

Test between formulation

LSD = 0.0671 ; df =20

$t_{\alpha/2} = 2.086$

		x1	x6	x2	x3	x4	x7	x8	x5	x10	x9
		0.41	0.73	0.75	1.01	1.26	1.50	1.68	1.88	1.88	2.08
x1	0.41										
x6	0.73	**0.32**									
x2	0.75	**0.34**	0.02								
x3	1.01	**0.60**	**0.28**	**0.26**							
x4	1.26	**0.85**	**0.53**	**0.51**	**0.25**						
x7	1.50	**1.09**	**0.77**	**0.75**	**0.49**	**0.24**					
x8	1.68	**1.26**	**0.95**	**0.93**	**0.67**	**0.42**	**0.18**				
x10	1.88	**1.47**	**1.15**	**1.14**	**0.88**	**0.62**	**0.39**	**0.21**			
x5	1.88	**1.47**	**1.15**	**1.14**	**0.88**	**0.62**	**0.39**	**0.21**	0.00		
x9	2.08	**1.66**	**1.35**	**1.33**	**1.07**	**0.82**	**0.58**	**0.40**	**0.19**	**0.19**	

Formulations	=	Nifedipine:Eudragit RS or RL100:PVP K30
x1	=	1:10:0 (Eudragit RS100)
x6	=	1:10:0 (Eudragit RL100)
x2	=	1:8:2 (Eudragit RS100)
x3	=	1:5:5 (Eudragit RS100)
x4	=	1:2:8 (Eudragit RS100)
x7	=	1:8:2 (Eudragit RL100)
x8	=	1:5:5 (Eudragit RL100)
x10	=	1:0:10 (Eudragit RL100)
x5	=	1:0:10 (Eudragit RS100)
x9	=	1:2:8 (Eudragit RL100)

Appendix F

% Frequency distribution plots

Size_Low (um)	In %	Size_High (um)	Under%
0.05	0.00	0.06	0.00
0.06	0.00	0.07	0.00
0.07	0.00	0.08	0.00
0.08	0.00	0.09	0.00
0.09	0.00	0.11	0.00
0.11	0.00	0.13	0.00
0.13	0.00	0.15	0.00
0.15	0.01	0.17	0.01
0.17	0.03	0.20	0.05
0.20	0.15	0.23	0.20
0.23	0.55	0.27	0.75
0.27	1.16	0.31	1.92
0.31	1.32	0.36	3.24
0.36	1.11	0.42	4.35
0.42	1.12	0.49	5.48
0.49	1.28	0.58	6.75
0.58	1.13	0.67	7.89
0.67	1.17	0.78	9.06
0.78	1.07	0.91	10.13
0.91	1.07	1.06	11.20
1.06	1.05	1.24	12.26
1.24	1.01	1.44	13.27
1.44	0.91	1.68	14.18
1.68	0.81	1.95	14.99
1.95	0.78	2.28	15.76
2.28	0.79	2.65	16.54
2.65	0.96	3.09	17.50
3.09	1.31	3.60	18.81
3.60	1.89	4.19	20.70
4.19	2.74	4.88	23.44
4.88	3.87	5.69	27.32
5.69	5.22	6.63	32.54

Size_Low (um)	In %	Size_High (um)	Under%
6.63	5.66	7.72	39.20
7.72	7.97	9.00	47.17
9.00	8.90	10.48	56.07
10.48	9.30	12.21	65.37
12.21	9.24	14.22	74.61
14.22	7.80	16.57	82.42
16.57	6.05	19.31	88.47
19.31	4.29	22.49	92.75
22.49	2.75	26.20	95.50
26.20	1.54	30.53	97.04
30.53	0.68	35.56	97.72
35.56	0.16	41.43	97.88
41.43	0.00	48.27	97.88
48.27	0.00	56.23	97.88
56.23	0.06	65.51	97.94
65.51	0.23	76.32	98.16
76.32	0.37	88.91	98.53
88.91	0.45	103.58	98.98
103.58	0.43	120.67	99.41
120.67	0.34	140.58	99.75
140.58	0.19	163.77	99.94
163.77	0.05	190.80	100.00
190.80	0.00	222.28	100.00
222.28	0.00	258.95	100.00
258.95	0.00	301.68	100.00
301.68	0.00	351.46	100.00
351.46	0.00	409.45	100.00
409.45	0.00	477.01	100.00
477.01	0.00	555.71	100.00
555.71	0.00	647.41	100.00
647.41	0.00	754.23	100.00
754.23	0.00	878.67	100.00

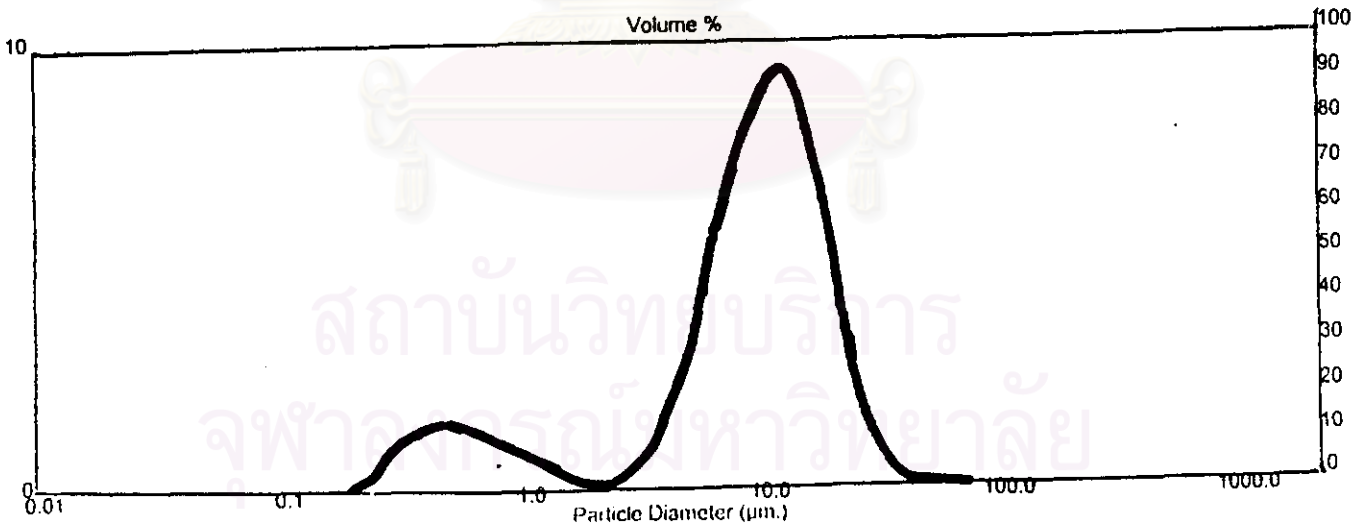

Figure 50 % Frequency plot of nifedipine : Eudragit RS100 : PVP K30 (1:10:0)

Prepared by spray drying at 55°C of 5% spray solution

VITA

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