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Appendices

Appendix A
Calibration Curve

The concentration versus absorbance of theophylline in phosphate buffer pH 6.6 at 272 nm was presented in Table 24 and showed a linear relationship with the correlation coefficient 0.9999. The standard curve of theophylline after regression analysis was illustrated in Fiqure 73.

Table 24. Absorbance of theophylline in phosphate buffer pH 6.6 determined at 272 nm.

Concentration (μg/ml)	Absorbance
0	0.000
4	0.228
6	0.345
8	0.458
10	0.574
12	0.694
14	0.801

The Construction of Calibration Curve in HPLC Method

The concentration versus ratio between peak area of internal standard (8-Chlorotheophylline) and theophylline anhydrous with HPLC method at 272 nm was presented in Table 25 and showed a linear relationship with the correlation coefficient 0.999.

The standard curve of theophylline anhydrous after regression analysis was illustrated in Figure 74.

Table 25   Ratio between peak area of internal standard and theophylline anhydrous with HPLC method at 272 nm.

Concentration (μg/ml)	Ratio
0	0.000
20	0.272
60	0.770
100	1.256
140	1.762
180	2.262
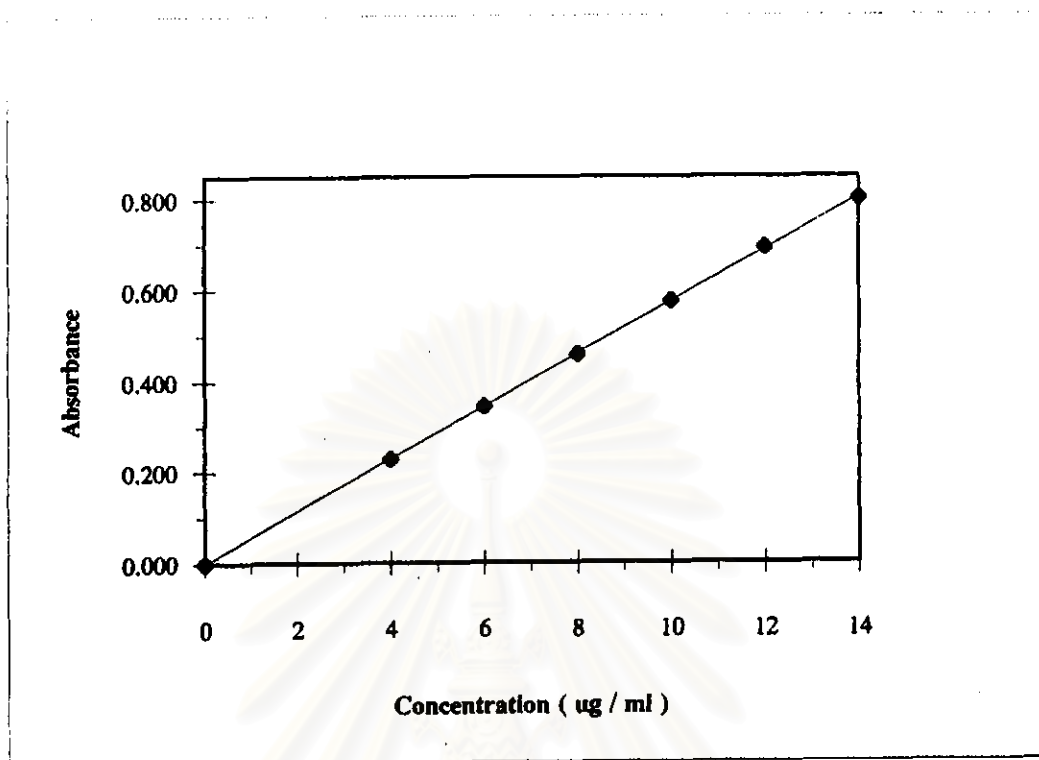
Figure 73   Calibration curve of theophylline in phosphate buffer pH 6.6.
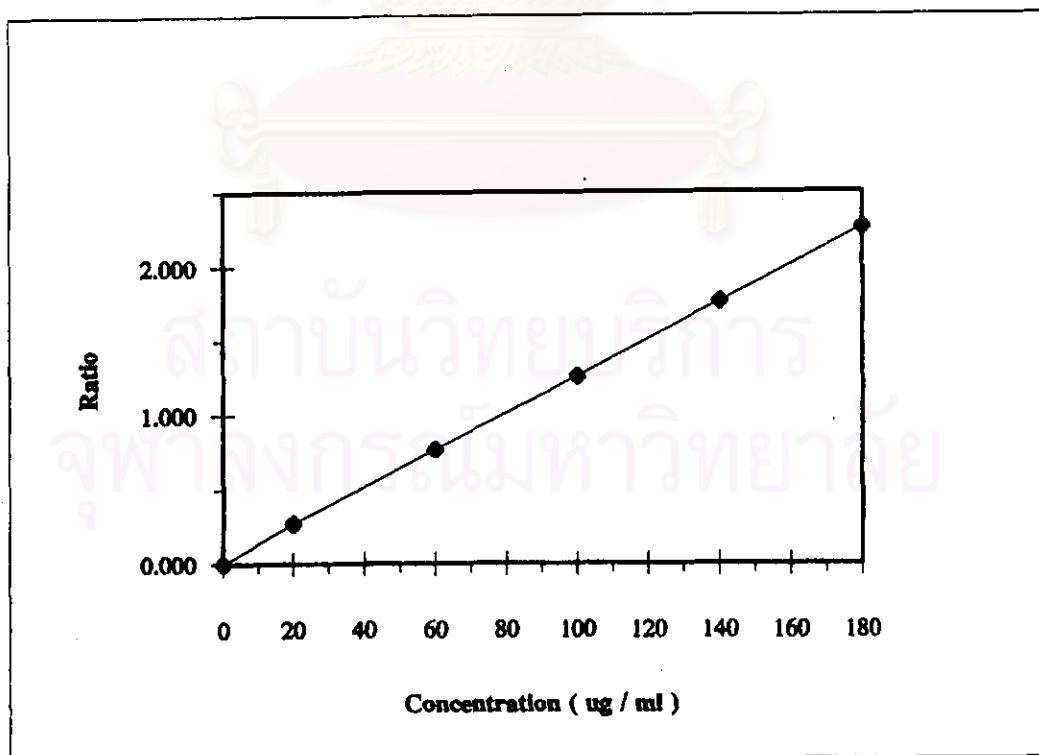
Figure 74   Calibration curve of theophylline from HPLC method.

```
CHANNEL A      INJECT  11/01/96 23:03:48  STORED TO BIN #   2

           theophylline
          5.78

                  8-chlorotheophylline        A
                     11.25

  ER 0
DATA SAVED TO BIN #   2


TUKTA                        11/01/96 23:03:48    CH= "A"  PS=  1.

FILE  1.     METHOD  0.      RUN   2    INDEX   2        BIN   2

PEAK#     AREA%     RT      AREA BC

   1      0.002    2.49        82 01
   2     23.56     5.78    774792 01
   3     76.438   11.25   2513729 01

TOTAL   100.             3288603


CHANNEL A      INJECT  11/02/96 00:38:50  STORED TO BIN #   8

        2.54                    theophylline
                               5.79

              8-chlorotheophylline        B
                 11.28

  ER 0
DATA SAVED TO BIN #   8


TUKTA                        11/02/96 00:38:50    CH= "A"  PS=  1.

FILE  1.     METHOD  0.      RUN   8    INDEX   8        BIN   8

PEAK#     AREA%     RT      AREA BC

   1      0.018    2.54      1860 01
   2     66.818    5.79   5077299 01
   3     33.165   11.28   2520086 01

TOTAL   100.             7598745
```
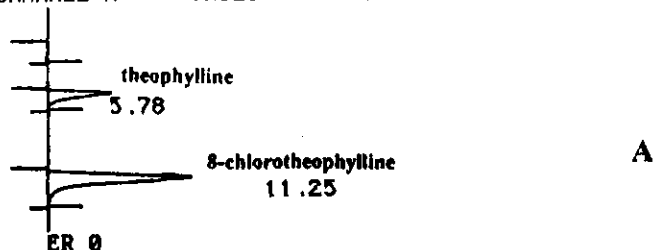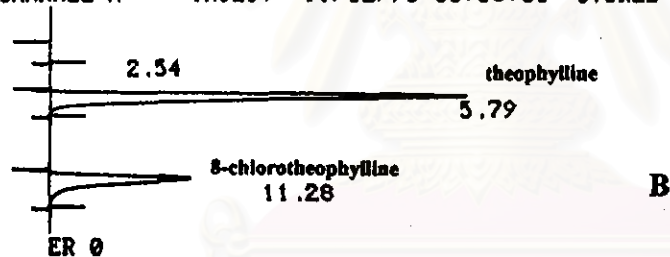
Figure 75 The representative chromatogram of the construction of calibration curve.

A. Conc. of theophylline = 20.0 μg/ml

B. Conc. of theophylline = 140.0 μg/ml

Appendix B

Percentage of Drug Release , Release Rate
Release Rate Against Amount and Reciprocal of Amount

Table 26   Amount percent of theophylline release from uncoated granules in phosphate buffer pH 6.6.

Time	% Drug release			Mean*	SD.	Log % drug remained
(minutes)	1	2	3			
0	0.00	0.00	0.00	0.00	0.00	2.00
5	35.27	35.22	27.58	32.69	4.42	1.83
10	82.00	79.91	72.59	78.17	4.94	1.34
15	98.05	100.05	96.33	98.15	1.86	0.27
20	100.22	100.60	99.98	100.27	0.32	-
30	100.33	100.94	100.45	100.57	0.32	-
40	100.42	101.05	100.44	100.64	0.36	-
50	100.50	101.36	100.34	100.74	0.55	-
60	100.52	100.94	100.29	100.58	0.33	-

* Mean of three determinations (%)

Table 27   Amount percent of theophylline release from Theo-24® in phosphate buffer pH 6.6.

Time	% Drug release			Mean*	SD.	Log % drug remained
(hours)	1	2	3			
0	0.00	0.00	0.00	0.00	0.00	2.00
0.5	3.81	3.88	3.58	3.75	0.15	1.98
1	8.19	8.31	7.75	8.08	0.29	1.96
2	17.60	18.11	16.94	17.55	0.59	1.92
4	36.62	36.48	37.84	36.98	0.75	1.80
6	49.17	50.48	48.29	49.31	1.10	1.70
8	61.83	64.02	63.13	62.99	1.10	1.57
10	71.14	73.79	73.53	72.82	1.46	1.43
12	77.92	78.86	80.12	78.97	1.11	1.32
16	84.77	85.71	87.86	86.11	1.59	1.14
20	85.58	87.19	90.45	87.74	2.48	1.09
24	88.57	89.76	93.27	90.53	2.44	0.98

* Mean of three determinations (%)

Table 28 Amount percent of theophylline release from top-spray Eudragit®NE 30D lot A coated granules in phosphate buffer pH 6.6.

Percent coated	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
1.55	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	7.83	8.01	7.38	7.74	0.32	1.97
	1	24.11	25.32	22.52	23.99	1.41	1.88
	2	56.32	58.83	56.79	57.32	1.33	1.63
	4	83.20	85.31	85.66	84.72	1.33	1.18
	6	95.22	97.96	97.78	96.99	1.53	0.48
	8	98.77	99.79	99.61	99.39	0.55	-0.21
	10	99.07	100.33	100.37	99.92	0.73	-1.10
	12	100.46	101.73	102.20	101.46	0.90	-
	16	102.95	102.91	103.18	103.01	0.14	-
	20	103.05	102.80	103.93	103.26	0.59	-
	24	102.49	104.20	104.26	103.65	1.00	-
4.66	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	2.63	2.69	2.66	2.66	0.03	1.99
	1	6.90	6.94	6.59	6.81	0.20	1.97
	2	20.47	19.97	20.23	20.22	0.25	1.90
	4	43.74	45.08	44.64	44.49	0.68	1.74
	6	61.62	62.56	61.54	61.90	0.57	1.58
	8	73.02	75.27	74.61	74.30	1.16	1.41
	10	82.42	85.80	86.64	84.95	2.23	1.18
	12	91.04	92.50	91.84	91.79	0.73	0.91
	16	96.05	96.22	95.33	95.87	0.47	0.62
	20	99.58	99.54	98.42	99.18	0.66	-0.09
	24	100.75	100.49	99.58	100.27	0.61	-
5.40	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.95	1.73	1.66	1.78	0.15	1.99
	1	4.11	4.14	3.90	4.05	0.13	1.98
	2	11.08	11.65	11.09	11.28	0.32	1.95
	4	25.05	26.05	27.16	26.09	1.06	1.87
	6	40.85	42.21	42.02	41.70	0.74	1.77
	8	57.01	55.67	54.54	55.74	1.24	1.65
	10	67.49	66.69	65.50	66.56	1.00	1.52
	12	76.67	75.34	74.67	75.56	1.02	1.39
	16	87.82	87.73	87.31	87.62	0.27	1.09
	20	94.22	93.32	93.51	93.68	0.48	0.80
	24	97.11	96.98	96.99	97.02	0.07	0.47

* Mean of three determinations (%)

Table 28   Amount percent of theophylline release from top-spray Eudragit®NE 30D lot A coated granules in phosphate buffer pH 6.6 (cont.).

Percent coated	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
8.75	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.00	1.01	1.06	1.02	0.03	2.00
	1	1.78	1.77	1.83	1.79	0.03	1.99
	2	4.43	4.11	4.54	4.36	0.22	1.98
	4	10.99	9.80	11.53	10.78	0.89	1.95
	6	18.60	16.74	19.23	18.19	1.29	1.91
	8	25.29	23.48	26.89	25.22	1.71	1.87
	10	33.15	31.49	35.13	33.26	1.82	1.82
	12	41.28	39.69	43.45	41.47	1.89	1.77
	16	57.40	55.64	59.22	57.42	1.79	1.63
	20	71.58	71.95	73.55	72.36	1.05	1.44
	24	88.29	87.20	88.41	87.97	0.67	1.08
10.83	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.34	1.30	1.72	1.45	0.23	1.99
	1	1.43	1.90	1.59	1.64	0.24	1.99
	2	3.85	4.38	4.50	4.24	0.34	1.98
	4	9.82	10.19	11.03	10.35	0.62	1.95
	6	17.05	16.65	17.91	17.21	0.65	1.92
	8	24.30	24.06	25.26	24.54	0.63	1.88
	10	31.72	31.17	32.88	31.92	0.87	1.83
	12	38.88	37.90	39.35	38.71	0.74	1.79
	16	52.66	51.12	52.16	51.98	0.79	1.68
	20	65.75	63.91	64.12	64.59	1.01	1.55
	24	80.07	75.42	73.82	76.44	3.25	1.37
13.25	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.36	1.41	1.32	1.36	0.05	1.99
	1	1.43	1.60	1.43	1.49	0.09	1.99
	2	1.49	1.75	1.54	1.60	0.14	1.99
	4	3.65	4.26	3.77	3.90	0.32	1.98
	6	6.15	7.49	6.49	6.71	0.70	1.97
	8	9.25	11.11	9.84	10.06	0.95	1.95
	10	12.76	14.64	13.47	13.62	0.95	1.94
	12	16.25	18.10	17.06	17.14	0.93	1.92
	16	23.75	25.29	24.84	24.62	0.79	1.88
	20	31.94	32.97	33.97	32.96	1.01	1.83
	24	40.09	39.92	40.54	40.18	0.32	1.78

* Mean of three determinations (%)

Table 29 Amount percent of theophylline release from top-spray Eudragit®NE 30D lot B coated granules in phosphate buffer pH 6.6.

Percent coated	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
4.28	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	15.36	14.69	14.55	14.87	0.43	1.93
	1	34.49	33.78	32.72	33.66	0.89	1.82
	2	73.94	74.69	69.10	72.58	3.04	1.44
	4	93.58	98.86	90.63	94.36	4.17	0.75
	6	100.15	99.40	97.60	99.05	1.31	-0.02
	8	101.13	100.81	99.65	100.53	0.78	-
	10	101.90	101.57	100.39	101.29	0.79	-
	12	102.01	102.76	101.58	102.11	0.60	-
	16	102.76	103.52	102.54	102.94	0.51	-
	20	103.29	104.06	103.07	103.47	0.52	-
	24	103.82	104.59	103.39	103.93	0.61	-
7.18	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	6.76	6.14	6.17	6.36	0.35	1.97
	1	14.50	13.30	13.47	13.75	0.65	1.94
	2	38.32	36.34	36.11	36.92	1.21	1.80
	4	86.71	85.56	83.97	85.41	1.37	1.16
	6	99.81	98.89	99.04	99.25	0.49	-0.12
	8	100.79	99.65	99.80	100.80	0.62	-
	10	102.21	99.09	102.30	101.20	1.83	-
	12	103.20	100.27	103.51	102.33	1.79	-
	16	104.40	101.22	104.29	103.30	1.80	-
	20	104.96	101.97	104.62	103.85	1.64	-
	24	103.32	102.48	105.38	103.73	1.49	-
7.85	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	5.28	5.22	5.37	5.29	0.08	1.98
	1	13.25	13.43	13.05	13.24	0.19	1.94
	2	32.85	31.09	30.99	31.64	1.05	1.83
	4	73.68	67.37	69.80	70.28	3.18	1.47
	6	93.14	90.83	91.85	91.94	1.15	0.91
	8	101.24	99.98	100.17	100.46	0.68	-
	10	102.02	100.96	100.93	101.30	0.62	-
	12	102.57	101.29	102.35	102.07	0.68	-
	16	103.12	101.61	102.46	102.40	0.76	-
	20	103.44	102.36	102.56	102.79	0.58	-
	24	103.98	102.45	102.65	103.03	0.83	-
8.75	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	5.00	4.61	4.80	4.80	0.19	1.98
	1	10.00	10.00	9.96	9.99	0.03	1.95
	2	24.62	23.52	23.59	23.91	0.61	1.88
	4	64.95	62.32	60.54	62.60	2.22	1.57
	6	90.36	86.17	86.35	87.62	2.37	1.09
	8	96.34	94.10	94.72	95.05	1.16	0.69
	10	100.38	99.00	100.29	99.89	0.77	-0.96
	12	101.79	100.18	103.04	101.67	1.43	-
	16	102.55	100.93	104.25	102.58	1.66	-
	20	103.75	101.45	104.14	103.11	1.45	-
	24	104.07	102.41	104.68	103.72	1.18	-

* Mean of three determinations (%)

Table 29 Amount percent of theophylline release from top-spray Eudragit®NE 30D lot B coated granules in phosphate buffer pH 6.6 (cont.).

Percent coated	Time (hours)	% Drug release			Mean[*]	SD.	Log % drug remained
		1	2	3			
10.60	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	2.93	3.15	3.23	3.10	0.15	1.99
	1	6.38	6.17	6.41	6.32	0.13	1.97
	2	16.52	15.83	16.54	16.29	0.40	1.92
	4	42.14	40.32	44.96	42.48	2.34	1.76
	6	75.05	70.60	72.53	72.73	1.23	1.44
	8	91.68	89.88	91.85	91.14	1.09	0.95
	10	99.96	97.21	100.41	99.19	1.73	-0.09
	12	101.80	99.90	102.47	101.39	1.34	-
	16	102.57	101.08	103.46	102.37	1.20	-
	20	103.12	101.61	103.80	102.85	1.12	-
	24	104.09	102.14	105.00	103.75	1.46	-
13.51	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	2.30	2.39	2.42	2.37	0.06	1.99
	1	5.04	5.26	5.34	5.21	0.16	1.98
	2	12.89	12.04	12.04	12.32	0.49	1.94
	4	28.60	29.96	29.53	29.36	0.69	1.85
	6	49.56	47.63	46.65	47.95	1.48	1.72
	8	68.38	67.42	66.50	67.53	0.95	1.51
	10	85.61	81.48	80.41	82.50	2.75	1.24
	12	95.60	92.74	91.64	93.33	2.04	0.82
	16	99.36	100.19	99.49	99.68	0.44	-0.49
	20	99.88	101.37	100.45	100.57	0.75	-
	24	100.40	101.91	100.98	101.10	0.76	-
21.20	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.71	1.81	1.69	1.74	0.06	1.99
	1	4.34	4.21	4.15	4.23	0.10	1.98
	2	10.40	10.31	10.20	10.30	0.10	1.95
	4	24.79	23.75	23.51	24.02	0.68	1.88
	6	39.80	38.97	38.60	39.12	0.62	1.78
	8	59.68	57.44	56.46	57.86	1.65	1.62
	10	78.73	78.63	77.46	78.27	0.71	1.34
	12	96.23	98.28	96.92	97.15	1.05	0.45
	16	102.38	102.5	104.18	103.02	1.01	-
	20	103.37	103.28	104.97	103.88	0.95	-
	24	104.15	103.84	105.77	104.58	1.04	-

* Mean of three determinations (%)

Table 30 Amount percent of theophylline release from bottom-spray Eudragit$^{\circledR}$ NE 30D lot B coated granules in phosphate buffer pH 6.6.

Percent coated	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
4.16	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	22.40	21.28	19.87	21.18	1.27	1.90
	1	46.75	44.54	40.40	43.90	3.22	1.75
	2	81.13	78.05	76.37	78.52	2.42	1.33
	4	98.35	98.40	96.61	97.79	1.02	0.34
	6	102.18	99.98	99.81	100.66	1.32	-
	8	104.40	102.39	101.19	102.66	1.62	-
	10	104.19	103.18	102.79	103.38	0.72	-
	12	104.98	103.35	103.36	103.90	0.94	-
6.61	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	13.32	13.79	13.94	13.68	0.33	1.94
	1	26.76	27.72	28.01	27.50	0.66	1.86
	2	49.02	48.88	50.41	49.44	0.85	1.70
	4	78.80	80.15	80.82	79.92	1.03	1.30
	6	95.20	95.57	95.59	95.45	0.22	0.66
	8	100.26	101.53	101.33	101.04	0.68	-
	10	101.46	102.73	102.76	102.32	0.74	-
	12	101.57	102.85	102.88	102.43	0.75	-
7.97	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	12.45	10.14	9.38	10.65	1.60	1.95
	1	25.02	20.37	18.85	21.41	3.21	1.90
	2	45.95	41.70	37.89	41.85	4.03	1.76
	4	76.90	74.41	68.50	73.27	1.32	1.43
	6	92.74	90.54	87.16	90.15	2.81	0.99
	8	98.83	98.58	96.48	97.96	1.29	0.31
	10	100.22	100.84	98.50	99.85	1.21	-0.82
	12	100.97	101.60	99.67	100.75	0.98	-
8.78	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	7.10	7.55	6.45	7.03	0.55	1.97
	1	16.13	17.29	14.55	15.99	1.38	1.92
	2	35.20	39.68	31.04	35.30	4.32	1.81
	4	68.65	71.79	65.16	68.53	3.31	1.50
	6	89.88	90.29	88.28	89.48	1.06	1.02
	8	100.18	99.75	100.71	100.21	0.48	-
	10	101.16	100.51	101.27	100.98	0.41	-
	12	102.36	101.27	102.90	102.17	0.83	-
11.49	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	5.44	5.76	5.50	5.57	0.17	1.98
	1	12.48	13.14	12.60	12.74	0.36	1.94
	2	26.27	27.89	26.23	26.80	0.95	1.86
	4	55.95	58.37	55.41	56.58	1.58	1.64
	6	82.16	82.15	81.12	81.81	060	1.26
	8	95.61	94.90	94.95	95.15	0.40	0.69
	10	101.64	101.57	101.84	101.68	0.14	-
	12	103.30	102.12	103.49	102.97	0.74	-

* Mean of three determinations (%)

Table 31 Amount percent of theophylline release from granules coated with 10 % Eudragit®NE 30D lot A using different atomizing air pressure in phosphate buffer pH 6.6.

Atomizing air pressure	Time (hours)	% Drug release			Mean	SD.	Log % drug remained
		1	2	3			
1 bar	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.34	1.30	1.72	1.45	0.23	1.99
	1	1.43	1.90	1.59	1.64	0.24	1.99
	2	3.85	4.38	4.50	4.24	0.34	1.98
	4	9.82	10.19	11.03	10.35	0.62	1.95
	6	17.05	16.65	17.91	17.21	0.65	1.92
	8	24.30	24.06	25.26	24.54	0.63	1.88
	10	31.72	31.17	32.88	31.92	0.87	1.83
	12	38.88	37.90	39.35	38.71	0.74	1.79
	16	52.66	51.12	52.16	51.98	0.79	1.68
	20	65.75	63.91	64.12	64.59	1.01	1.55
	24	80.07	75.42	73.82	76.44	3.25	1.37
2 bar	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	1.35	1.30	1.43	1.36	0.06	1.99
	1	2.94	3.22	2.84	3.00	0.19	1.99
	2	5.81	6.00	5.72	5.84	0.14	1.97
	4	16.02	17.02	16.52	16.52	0.50	1.92
	6	24.49	26.93	25.61	25.68	1.22	1.87
	8	39.27	41.73	39.77	40.26	1.30	1.78
	10	52.08	54.77	51.36	52.74	1.79	1.67
	12	66.62	68.73	66.40	67.25	1.29	1.52
	16	84.03	86.77	85.61	85.47	1.37	1.16
	20	94.14	94.28	95.12	94.51	0.53	0.74
	24	96.27	96.80	98.27	97.11	1.04	0.46
3 bar	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	4.82	4.43	4.83	4.69	0.23	1.98
	1	9.91	10.09	11.80	10.60	1.04	1.95
	2	25.64	23.41	25.40	24.82	1.22	1.88
	4	51.12	57.50	56.27	54.96	3.38	1.65
	6	74.53	76.58	76.23	75.78	1.09	1.38
	8	92.78	92.41	95.47	93.55	1.67	0.81
	10	99.99	98.09	101.19	99.76	1.56	-0.62
	12	103.36	100.79	103.48	102.54	1.52	-
	16	105.23	101.76	106.22	104.40	2.34	-
	20	105.15	102.30	105.28	104.24	1.69	-
	24	104.41	102.40	106.71	104.50	2.16	-

* Mean of three determinations (%)

Table 32 Amount percent of theophylline release from granules coated with 10%
of polymer blends containing various ratios of Eudragit®NE 30D/HPMC
in phosphate buffer pH 6.6.

Ratio of Eudragit®/ HPMC	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
3 : 2	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	87.39	80.88	84.92	84.40	3.29	1.19
	1	99.30	98.69	101.76	99.92	1.62	-1.10
	2	102.02	103.32	103.85	103.06	0.94	-
	4	102.15	102.62	104.22	103.00	1.08	-
	6	102.50	103.18	103.72	103.13	0.61	-
	8	102.83	102.89	103.42	103.05	0.33	-
	10	102.08	102.79	103.76	102.88	0.84	-
	12	102.40	102.04	102.58	102.34	0.27	-
3 : 1.5	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	78.29	81.51	81.85	80.55	1.97	1.29
	1	97.07	99.14	101.33	99.18	2.13	-0.09
	2	98.73	102.23	103.26	101.41	2.38	-
	4	101.34	103.23	104.28	102.95	1.49	-
	6	100.92	104.24	103.89	103.02	1.82	-
	8	100.26	105.47	105.13	103.62	2.92	-
	10	100.41	105.31	105.43	103.05	4.02	-
	12	100.27	104.91	106.19	103.79	3.12	-
3 : 1	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	77.40	76.50	78.94	77.61	1.24	1.35
	1	96.06	97.86	98.05	97.32	1.10	0.43
	2	98.37	99.28	100.16	99.27	0.89	-0.14
	4	100.01	100.48	100.91	100.47	0.45	-
	6	100.08	100.33	100.31	100.24	0.14	-
	8	100.14	101.07	100.60	100.60	0.46	-
	10	100.64	100.00	99.97	100.20	0.38	-
	12	100.91	100.71	100.24	100.62	0.35	-
3 : 0.5	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	72.57	64.05	62.40	66.34	5.46	1.53
	1	96.47	96.44	93.13	95.36	1.92	0.67
	2	101.33	101.55	100.60	101.16	0.50	-
	4	101.67	103.64	101.37	102.23	1.23	-
	6	102.02	103.34	102.14	102.50	0.73	-
	8	102.56	103.90	102.91	103.12	0.69	-
	10	103.54	102.27	103.89	103.24	0.85	-
	12	102.36	103.02	104.44	103.27	1.06	-
12.5 : 1	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	57.76	55064	46.39	53.26	6.05	1.67
	1	84.92	84.70	79.00	82.87	3.36	1.23
	2	95.85	94.51	93.10	94.49	1.38	0.74
	4	97.02	96.59	94.70	96.11	1.23	0.59
	6	98.20	95.69	94.25	96.05	2.00	0.60
	8	98.23	97.54	95.85	97.21	1.22	0.45
	10	100.55	98.70	98.38	99.21	1.17	-0.10
	12	101.73	98.95	98.62	99.77	1.71	-0.64

* Mean of three determinations (%)

Table 32 Amount percent of theophylline release from granules coated with 10% of polymer blends containing various ratios of Eudragit[®]NE 30D/HPMC in phosphate buffer pH 6.6 (cont.).

Ratio of Eudragit[®]/ HPMC	Time (hours)	% Drug release			Mean[*]	SD.	Log % drug remained
		1	2	3			
12.5 : 0.5	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	18.78	18.96	21.50	19.75	1.52	1.90
	1	49.79	51.51	58.47	53.26	4.59	1.67
	2	82.97	81.37	88.40	84.25	3.68	1.20
	4	97.93	95.59	97.37	96.96	1.22	0.48
	6	95.8C	97.68	97.40	96.99	0.97	0.48
	8	97.74	97.71	99.27	98.24	0.89	0.25
	10	100.77	98.42	98.61	99.27	1.31	-0.14
	12	101.97	98.67	98.86	99.83	1.85	-0.77
100 : 1	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	13.51	14.33	12.74	13.53	0.80	1.94
	1	34.60	36.73	35.01	35.45	1.13	1.81
	2	73.10	75.23	75.29	74.54	1.25	1.41
	4	94.53	92.52	94.43	93.83	1.13	0.79
	6	97.98	95.94	98.79	97.57	1.47	0.39
	8	98.25	97.11	98.84	98.07	0.88	0.29
	10	99.20	96.91	99.34	98.48	1.37	0.18
	12	100.38	97.15	99.61	99.05	1.69	-0.02
100 : 0	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	2.93	3.15	3.23	3.10	0.15	1.99
	1	6.38	6.17	6.41	6.32	0.13	1.97
	2	16.52	15.83	16.54	16.29	0.40	1.92
	4	42.14	40.32	44.96	42.48	2.34	1.76
	6	75.05	70.60	72.53	72.73	1.23	1.44
	8	91.68	89.88	91.85	91.14	1.09	0.95
	10	99.96	97.21	100.41	99.19	1.73	-0.09
	12	101.80	99.90	102.47	101.39	1.34	-

* Mean of three determinations (%)

Table 33 Amount percent of theophylline release from granules coated with 10 % of polymer blends containing various ratios of Eudragit®NE 30D/RL 30D in phosphate buffer pH 6.6.

Ratio of NE30D/ RL30D	Time (hours)	% Drug release			Mean*	SD.	Log % drug remained
		1	2	3			
50 : 50	0	0.00	0.00	0.00	0.00	0.00	.2.00
	0.5	54.65	56.73	51.62	54.34	2.57	1.66
	1	85.95	87.98	83.91	85.95	2.04	1.15
	2	101.62	102.10	101.07	101.60	0.52	-
	4	101.96	102.24	102.08	102.09	0.14	-
	6	102 18	103.10	102.72	102.67	0.46	-
	8	102.30	103.45	103.51	103.08	0.68	-
	10	104.48	102.12	104.38	103.66	1.34	-
	12	105.69	101.76	104.27	103.91	1.99	-
80 : 20	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	44.94	43.13	46.02	44.70	1.46	1.74
	1	77.08	74.44	77.31	76.27	1.60	1.38
	2	100.20	97.60	100.21	99.34	1.50	-0.18
	4	102.93	100.95	103.59	102.49	1.37	-
	6	103.07	100.86	103.96	102.63	1.60	-
	8	103.78	101.96	104.24	103.33	1.21	-
	10	103.68	102.71	104.79	103.73	1.04	-
	12	106.24	103.14	105.40	104.92	1.60	-
90 : 10	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	99.74	98.09	98.01	98.61	0.98	0.14
	1	101.54	100.08	100.40	100.67	0.77	-
	2	102.34	101.68	102.80	102.28	0.57	-
	4	103.35	101.86	102.41	102.54	0.76	-
	6	103.34	100.42	104.40	102.72	2.06	-
	8	103.11	102.94	103.14	103.02	0.17	-
	10	103.28	102.94	103.14	103.12	0.17	-
	12	104.15	102.88	104.42	103.82	0.82	-
95 : 5	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	100.31	100.40	99.97	100.22	0.23	-
	1	100.70	100.18	100.15	100.34	0.31	-
	2	100.51	101.00	99.77	100.43	0.62	-
	4	100.85	100.52	100.69	100.69	0.16	-
	6	101.47	100.96	100.72	101.05	0.39	-
	8	101.11	101.20	101.17	101.16	0.04	-
	10	102.00	103.08	103.24	102.78	0.67	-
	12	102.57	103.05	103.02	102.88	0.27	-
100 : 0	0	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	2.93	3.15	3.23	3.10	0.15	1.99
	1	6.38	6.17	6.41	6.32	0.13	1.97
	2	16.52	15.83	16.54	16.29	0.40	1.92
	4	42.14	40.32	44.96	42.48	2.34	1.76
	6	75.05	70.60	72.53	72.73	1.23	1.44
	8	91.68	89.88	91.85	91.14	1.09	0.95
	10	99.96	97.21	100.41	99.19	1.73	-0.09
	12	101.80	99.90	102.47	101.39	1.34	-

* Mean of three determinations (%)

Table 34 The release rate of theophylline from uncoated granules and Theo-24® in phosphate buffer pH 6.6.

Uncoated granules			Theo-24®	
Mean time (mins)	Release rate (% / min)		Mean time (hours)	Release rate (% / hour)
2.50	6.54		0.25	7.51
7.50	9.10		0.75	8.66
12.50	4.00		1.50	9.46
17.50	0.42		3.00	9.72
25.00	0.03		5.00	6.16
35.00	0.01		7.00	6.84
45.00	0.01		9.00	4.91
55.00	-0.02		11.00	3.07
			14.00	1.79
			18.00	0.41
			22.00	0.70

Table 35 The release rate of theophylline from top-spray Eudragit®NE 30D lot A coated granules in phosphate buffer pH 6.6.

Mean time (hours)	Release rate (% / hour)					
	Percent coated					
	1.55%	4.66%	5.40%	8.75%	10.83%	13.25%
0.25	15.48	5.32	3.56	2.04	2.90	2.72
0.75	32.50	8.30	4.54	1.54	0.38	0.26
1.50	33.33	13.41	7.23	2.57	2.60	0.11
3.00	13.70	12.14	7.41	3.21	3.06	1.15
5.00	6.14	8.71	7.81	3.71	3.43	1.41
7.00	1.20	6.20	7.02	3.52	3.67	1.68
9.00	0.27	5.33	5.41	4.02	3.69	1.78
11.00	0.77	3.42	4.50	4.11	3.40	1.76
14.00	0.39	1.02	3.02	3.99	3.32	1.87
18.00	0.06	0.83	1.52	3.74	3.15	2.09
22.00	0.10	0.27	0.83	3.90	2.96	1.81

Table 36 The release rate of theophylline from top-spray Eudragit®NE 30D lot B coated granules in phosphate buffer pH 6.6.

Mean time (hours)	Release rate (% / hour)						
	Percent coated						
	4.28%	7.18%	7.85%	8.75%	10.60%	13.51%	21.20%
0.25	29.74	12.72	10.58	9.60	6.20	4.74	3.48
0.75	37.58	14.78	15.90	10.38	6.44	5.68	4.98
1.50	38.92	23.17	18.40	13.92	9.97	7.11	6.07
3.00	10.89	24.25	19.32	19.35	13.10	8.52	6.86
5.00	2.35	6.92	10.83	12.51	15.13	9.30	7.55
7.00	0.74	0.77	4.26	3.72	9.21	9.79	9.37
9.00	0.38	0.20	0.42	2.42	4.03	7.49	10.21
11.00	0.41	0.56	0.38	0.89	1.10	5.42	9.44
14.00	0.21	0.24	0.08	0.23	0.25	1.59	1.47
18.00	0.13	0.14	0.10	0.13	0.12	0.22	0.22
22.00	0.12	-0.03	0.06	0.15	0.23	0.13	0.18

Table 37 The release rate of theophylline from bottom-spray Eudragit®NE 30D lot B coated granules in phosphate buffer pH 6.6.

| Mean time (hours) | Release rate (% / hour) | | | | |
| | Percent coated | | | | |
	4.16 %	6.61 %	7.97 %	8.78 %	11.49 %
0.25	42.36	27.36	21.30	14.06	11.14
0.75	45.44	27.64	21.52	17.92	14.34
1.50	34.62	21.94	20.44	19.31	14.06
3.00	9.64	15.24	15.71	16.62	14.89
5.00	1.44	7.77	8.44	10.48	12.62
7.00	1.00	2.80	3.90	5.36	6.67
9.00	0.36	0.64	0.95	0.39	3.27
11.00	0.26	0.06	0.45	0.59	0.64

Table 38 The release rate of theophylline from granules coated with 10% Eudragit NE30D using different atomizing air pressure in phosphate buffer pH 6.6.

| Mean time (hours) | Release rate (% / hour) | | |
| | Atomizing air pressure (bar) | | |
	1	2	3
0.25	2.90	2.72	9.38
0.75	0.38	3.28	11.82
1.50	2.60	2.84	14.22
3.00	3.06	5.34	15.07
5.00	3.43	4.58	10.41
7.00	3.67	7.29	8.89
9.00	3.69	6.24	3.11
11.00	3.40	7.26	1.39
14.00	3.32	4.56	0.47
18.00	3.15	2.26	-0.04
22.00	2.96	0.65	0.07

Table 39 The release rate of theophylline from granules coated with 10% of polymer blends containing various ratios of Eudragit®NE 30D/HPMC in phosphate buffer pH 6.6.

| Mean time (hours) | Release rate (% / hour) | | | | | | | |
| | Ratio of Eudragit®NE 30D : HPMC | | | | | | | |
	3:2	3:1.5	3:1	3:0.5	12.5:1	12.5:0.5	100:1	100:0
0.25	168.80	161.10	155.22	132.68	106.52	39.50	27.06	6.20
0.75	31.04	37.26	39.42	58.04	59.22	67.02	43.84	6.44
1.50	3.08	2.23	1.95	5.80	11.62	30.99	39.09	9.97
3.00	0.03	0.77	0.60	0.54	0.81	6.36	9.65	13.10
5.00	0.03	0.03	-0.12	0.13	-0.03	0.02	1.87	15.13
7.00	-0.04	0.30	0.18	0.31	0.58	0.63	0.25	9.21
9.00	-0.09	-0.29	-0.20	0.06	1.00	0.52	0.21	4.03
11.00	-0.27	0.37	0.21	0.02	0.28	0.28	0.28	1.10

Table 40 The release rate of theophylline from granules coated with 10% of polymer blends containing various ratios of Eudragit®NE 30D/RL 30D in phosphate buffer pH 6.6.

Mean time (hours)	Release rate (% / hour)				
	Ratio of Eudragit®NE 30D : RL 30D				
	50:50	80:20	90:10	95:5	100:0
0.25	108.67	89.39	197.23	200.45	6.20
0.75	63.22	63.16	4.12	0.24	6.44
1.50	15.65	23.07	1.60	0.08	9.97
3.00	0.25	1.58	0.13	0.13	13.10
5.00	0.29	0.07	0.09	0.18	15.13
7.00	0.21	0.35	0.15	0.05	9.21
9.00	0.29	0.20	0.05	0.81	4.03
11.00	0.12	0.60	0.35	0.05	1.10

Table 41 Values of rate, amount released and the corresponding reciprocal of uncoated theophylline granules and Theo-24®.

Formulation	dQ/dt	Q	1/Q
uncoated	6.54	32.69	0.031
granules	9.10	78.17	0.013
	4.00	98.15	0.010
	0.42	100.27	0.010
	0.03	100.57	0.010
	0.01	100.64	0.010
	0.01	100.74	0.010
	-0.02	100.58	0.010
Theo-24®	7.51	3.75	0.267
	8.66	8.08	0.124
	9.46	17.55	0.057
	9.72	36.98	0.027
	6.16	49.31	0.020
	6.84	62.99	0.016
	4.91	72.82	0.014
	3.07	78.97	0.013
	1.79	86.11	0.012
	0.41	87.74	0.011
	0.70	90.53	0.011

Table 42 Values of rate, amount released and the corresponding reciprocal of top-spray Eudragit[®]NE 30D lot A coated granules.

Percent coated	dQ/dt	Q	1/Q	Percent coated	dQ/dt	Q	1/Q
1.55	15.48	7.74	0.129	8.75	2.04	1.02	0.980
	32.50	23.99	0.042		1.54	1.79	0.559
	33.33	57.32	0.017		2.57	4.36	0.229
	13.70	84.72	0.012		3.21	10.78	0.093
	6.14	96.99	0.010		3.71	18.19	0.055
	1.20	99.39	0.010		3.52	25.22	0.040
	0.27	99.92	0.010		4.02	33.26	0.030
	0.77	101.46	0.010		4.11	41.47	0.024
	0.39	103.01	0.010		3.99	57.42	0.017
	0.06	103.26	0.010		3.74	72.36	0.014
	0.10	103.65	0.010		3.90	87.97	0.011
4.66	5.32	2.66	0.376	10.83	2.90	1.45	0.690
	8.30	6.81	0.147		0.38	1.64	0.610
	13.41	20.22	0.049		2.60	4.24	0.236
	12.14	44.49	0.022		3.06	10.35	0.097
	8.71	61.90	0.016		3.43	17.21	0.058
	6.20	74.30	0.013		3.67	24.54	0.041
	5.33	84.95	0.012		3.69	31.92	0.031
	3.42	91.79	0.011		3.40	38.71	0.026
	1.02	95.87	0.010		3.32	51.98	0.019
	0.83	99.18	0.010		3.15	64.59	0.015
	0.27	100.27	0.010		2.96	76.44	0.013
5.40	3.56	1.78	0.562	13.25	2.72	1.36	0.735
	4.54	4.05	0.247		0.26	1.49	0.671
	7.23	11.28	0.089		0.11	1.60	0.625
	7.41	26.09	0.038		1.15	3.90	0.256
	7.81	41.70	0.024		1.41	6.71	0.149
	7.02	55.74	0.018		1.68	10.16	0.099
	5.41	66.56	0.015		1.78	13.62	0.073
	4.50	75.56	0.013		1.76	17.14	0.058
	3.02	87.62	0.011		1.87	24.62	0.041
	1.52	93.68	0.011		2.09	32.96	0.030
	0.83	97.02	0.010		1.81	40.18	0.025

Table 43 Values of rate, amount released and the corresponding reciprocal of top-spray Eudragit®NE 30D lot B coated granules.

Percent coated	dQ/dt	Q	1/Q	Percent coated	dQ/dt	Q	1/Q
4.28	29.74	14.87	0.067	10.60	6.20	3.10	0.323
	37.58	33.66	0.030		6.44	6.32	0.158
	38.92	72.58	0.014		9.97	16.29	0.061
	10.89	94.36	0.011		13.10	42.48	0.024
	2.35	99.05	0.010		15.13	72.73	0.014
	0.74	100.53	0.010		9.21	91.14	0.011
	0.38	101.29	0.010		4.03	99.19	0.010
	0.41	102.11	0.010		1.10	101.39	0.010
	0.21	102.94	0.010		0.25	102.37	0.010
	0.13	103.47	0.010		0.12	102.85	0.010
	0.12	103.93	0.010		0.23	103.75	0.010
7.18	12.72	6.36	0.157	13.51	4.74	2.37	0.422
	14.78	13.75	0.073		5.68	5.21	0.192
	23.17	36.92	0.027		7.11	12.32	0.081
	24.25	85.41	0.012		8.52	29.36	0.034
	6.92	99.25	0.010		9.30	47.95	0.021
	0.77	100.8	0.010		9.79	67.53	0.015
	0.20	101.2	0.010		7.79	82.50	0.012
	0.56	102.33	0.010		5.42	93.33	0.011
	0.24	103.3	0.010		1.59	99.68	0.010
	0.14	103.85	0.010		0.22	100.57	0.010
	-0.03	103.73	0.010		0.13	101.10	0.010
7.85	10.58	5.29	0.189	21.20	3.48	1.74	0.575
	15.90	13.24	0.076		4.98	4.23	0.236
	18.40	31.64	0.032		6.07	10.30	0.097
	19.32	70.28	0.014		6.86	24.02	0.042
	10.83	91.94	0.011		7.55	39.12	0.026
	4.26	100.46	0.010		9.37	57.86	0.017
	0.42	101.30	0.010		10.21	78.27	0.013
	0.38	102.07	0.010		9.44	97.15	0.010
	0.08	102.40	0.010		1.47	103.02	0.010
	0.10	102.79	0.010		0.22	103.88	0.010
	0.06	103.03	0.010		0.18	104.58	0.010
8.75	9.60	4.80	0.208				
	10.38	9.99	0.100				
	13.92	23.91	0.042				
	19.35	62.60	0.016				
	12.51	87.62	0.011				
	3.72	95.05	0.011				
	2.42	99.89	0.010				
	0.89	101.67	0.010				
	0.23	102.58	0.010				
	0.13	103.11	0.010				
	0.15	103.72	0.010				

Table 44   Values of rate, amount released and the corresponding reciprocal of bottom-spray Eudragit®NE 30D lot B coated granules.

Percent coated	dQ/dt	Q	1/Q
4.16	42.36	21.18	0.047
	45.44	43.90	0.023
	34.62	78.52	0.013
	9.64	97.79	0.010
	1.44	100.66	0.010
	1.00	102.66	0.010
	0.36	103.38	0.010
	0.26	103.90	0.010
6.61	27.36	13.68	0.073
	27.64	27.50	0.036
	21.94	49.44	0.020
	15.24	79.92	0.013
	7.77	95.45	0.010
	2.80	101.04	0.010
	0.64	102.32	0.010
	0.06	102.43	0.010
7.97	21.30	10.65	0.094
	21.52	21.41	0.047
	20.44	41.85	0.024
	15.71	73.27	0.014
	8.44	90.15	0.011
	3.90	97.96	0.010
	0.95	99.85	0.010
	0.45	100.75	0.010
8.78	14.06	7.03	0.142
	17.92	15.99	0.063
	19.31	35.30	0.028
	16.62	68.53	0.015
	10.48	89.48	0.011
	5.36	100.21	0.010
	0.39	100.98	0.010
	0.59	102.17	0.010
11.49	11.14	5.57	0.180
	14.34	12.74	0.078
	14.06	26.80	0.037
	14.89	56.58	0.018
	12.62	81.81	0.012
	6.67	95.15	0.011
	3.27	101.68	0.010
	0.64	102.97	0.010

Table 45 Values of rate, amount released and the corresponding reciprocal of granules coated with 10 % Eudragit®NE 30D using different atomizing air pressure.

atomizing air pressure	dQ/dt	Q	1/Q	atomizing air pressure	dQ/dt	Q	1/Q
1 bar	2.90	1.45	0.690	3 bar	9.38	4.69	0.213
	0.38	1.64	0.610		11.82	10.60	0.094
	2.60	4.24	0.236		14.22	24.82	0.040
	3.06	10.35	0.097		15.07	54.96	0.018
	3.43	17.21	0.058		10.41	75.78	0.013
	3.67	24.54	0.041		8.89	93.55	0.011
	3.69	31.92	0.031		3.11	99.76	0.010
	3.40	38.71	0.026		1.39	102.54	0.010
	3.32	51.98	0.019		0.47	104.40	0.010
	3.15	64.59	0.015		-0.04	104.24	0.010
	2.96	76.44	0.013		0.07	104.50	0.010
2 bar	2.72	1.36	0.735				
	3.28	3.00	0.333				
	2.84	5.84	0.171				
	5.34	16.52	0.061				
	4.58	25.68	0.039				
	7.29	40.26	0.025				
	6.24	52.74	0.019				
	7.26	67.25	0.015				
	4.56	85.47	0.012				
	2.26	94.51	0.011				
	0.65	97.11	0.010				

Table 46 Values of rate, amount released and the corresponding reciprocal of granules coated with 10 % of polymer blends containing various ratios of Eudragit®NE 30D/RL 30D.

ratio	dQ/dt	Q	1/Q	ratio	dQ/dt	Q	1/Q
50 : 50	108.67	54.34	0.018	90 : 10	98.61	98.61	0.010
	63.22	85.95	0.012		100.67	100.67	0.010
	15.65	101.60	0.010		102.28	102.28	0.010
	0.25	102.09	0.010		102.54	102.54	0.010
	0.29	102.67	0.010		102.72	102.72	0.010
	0.21	103.08	0.010		103.02	103.02	0.010
	0.29	103.66	0.010		103.12	103.12	0.010
	0.12	103.91	0.010		103.82	103.82	0.010
80 : 20	89.39	44.70	0.022	95 : 5	100.22	100.22	0.010
	63.16	76.27	0.013		100.34	100.34	0.010
	23.07	99.34	0.010		100.43	100.43	0.010
	1.58	102.49	0.010		100.69	100.69	0.010
	0.07	102.63	0.010		101.05	101.05	0.010
	0.35	103.33	0.010		101.16	101.16	0.010
	0.20	103.73	0.010		102.78	102.78	0.010
	0.60	104.92	0.010		102.88	102.88	0.010

Table 47 Values of rate, amount released and the corresponding reciprocal of granules coated with 10 % of polymer blends containing various ratios of Eudragit®NE 30D/HPMC.

ratio	dQ/dt	Q	1/Q	ratio	dQ/dt	Q	1/Q
3 : 2	168.80	84.40	0.012	12.5 : 1	106.52	53.26	0.019
	31.04	99.92	0.010		59.22	82.87	0.012
	3.08	103.00	0.010		11.62	94.49	0.011
	0.03	103.06	0.010		0.81	96.11	0.010
	0.03	103.13	0.010		-0.03	96.05	0.010
	-0.04	103.05	0.010		0.58	97.21	0.010
	-0.09	102.88	0.010		1.00	99.21	0.010
	-0.27	102.34	0.010		0.28	99.77	0.010
3 : 1.5	161.10	80.55	0.012	12.5 : 0.5	39.50	19.75	0.051
	37.26	99.18	0.010		67.02	53.26	0.019
	2.23	101.41	0.010		30.99	84.25	0.012
	0.77	102.95	0.010		6.36	96.96	0.010
	0.03	103.02	0.010		0.02	96.99	0.010
	0.30	103.62	0.010		0.63	98.24	0.010
	-0.29	103.05	0.010		0.52	99.27	0.010
	0.37	103.79	0.010		0.28	99.83	0.010
3 : 1	155.22	77.61	0.013	100 : 1	27.06	0.074	0.074
	39.42	97.32	0.010		43.84	0.028	0.028
	1.95	99.27	0.010		39.09	0.013	0.013
	0.60	100.47	0.010		9.65	0.011	0.010
	-0.12	100.24	0.010		1.87	0.010	0.010
	0.18	100.60	0.010		0.25	0.010	0.010
	-0.20	100.20	0.010		0.21	0.010	0.010
	-0.21	100.62	0.010		0.28	0.010	0.010
3 : 0.5	132.68	66.34	0.015				
	58.04	95.36	0.010				
	5.80	101.16	0.010				
	0.54	102.23	0.010				
	0.13	102.50	0.010				
	0.31	103.12	0.010				
	0.06	103.24	0.010				
	0.02	103.27	0.010				

Table 48 The release rate of theophylline in a period of constant release rate from top-spray Eudragit®NE 30D lot B coated granules in phosphate buffer pH 6.6.

Percent coated	Release rate (% / hour)
4.28	24.05
7.18	18.01
7.85	16.15
8.75	13.12
10.60	12.01
13.51	8.23
21.20	8.11

Table 49 Comparion of the release rate of theophylline in a period of constant release rate from top-spray Eudragit®NE 30D lot B coated granules between that calculated from the equation 8 and that from the dissolution test in phosphate buffer pH 6.6.

Percent coated	Release rate (% / hour)	
	from the equation 8	from the dissolution test
6.08	19.72	18.06
7.22	17.25	17.39
7.53	16.62	16.44

Table 50 Comparion of the percent of theophylline release in a period of constant release rate from top-spray Eudragit® NE 30D lot B coated granules between that calculated from the equation 8 and that from the dissolution test in phosphate buffer pH 6.6.

Percent coated	Time (hours)	Amount percent of theophylline release					
		From calculation	From the dissolution test				
			1	2	3	Mean	SD.
6.08	0	0.00	0.00	0.00	0.00	0.00	0.00
	0.5	9.86	11.03	10.27	9.78	10.36	0.63
	1	19.72	20.27	20.34	20.85	20.48	0.32
	2	39.45	46.07	45.99	46.14	46.07	0.07
	4	78.90	93.15	94.96	91.35	93.15	1.81
	6	118.34	101.63	102.15	98.30	100.69	2.09
7.22	0	0.00	0.00	0.00	0.00	0.00	0.00
	0.5	8.63	10.48	9.41	7.89	9.26	1.30
	1	17.25	21.75	20.01	18.98	20.25	1.40
	2	34.50	50.47	46.54	44.59	47.20	3.00
	4	69.01	83.24	81.98	80.20	81.81	1.53
	6	103.51	102.80	100.10	99.05	100.65	1.93
7.53	0	0.00	0.00	0.00	0.00	0.00	0.00
	0.5	8.31	4.81	4.84	5.17	4.94	0.20
	1	16.63	12.84	12.54	13.20	12.86	0.33
	2	33.25	31.50	31.30	32.91	31.90	0.88
	4	66.50	69.05	69.08	73.30	70.48	2.45
	6	99.75	93.63	92.17	95.25	93.68	1.54

Appendix C

Data in Statistical Processes

Table 51 The t-values of percentage drug release between granules coated with Eudragit®NE 30D lot A and lot B using top-spray method.
(degree of freedom = 22 , data from Tables 28-29)

Eudragit®NE 30D lot A coated granules	Eudragit®NE 30D lot B coated granules	t-value*	Results**
4.66 %	4.28 %	-1.28	NS
8.75 %	8.75 %	-2.39	S
10.83 %	10.60 %	-2.33	S

*   If $\alpha = 0.05$ and degree of freedom = 22   then critical values of t are ± 2.074
** S = Significance , NS = Non-significance

Table 52 The t-values of percentage drug release between top-spray and bottom-spray Eudragit®NE 30D lot B coated granules.
(degree of freedom = 16 , data from Tables 29-30)

Top-spray coated granules	Bottom-spray coated granules	t-value*	Results**
4.28 %	4.16 %	-0.19	NS
7.85 %	7.97 %	-0.11	NS
8.75 %	8.78 %	-0.18	NS

*   If $\alpha = 0.05$ and degree of freedom = 16   then critical values of t are ± 2.120.
** S = Significance , NS = Non-significance

Table 53   The t-values of percentage drug release between selected top-spray Eudragit®NE 30D coated granules and Theo-24®.
(degree of freedom = 22 , data from Tables 27-29)

Product I	Product II	t-value*	Results**
4.66 % Eudragit®NE 30D lot A coated granules	Theo-24®	-0.49	NS
4.66 % Eudragit®NE 30D lot A coated granules	Theo-24®	-0.27	NS

*   If α = 0.05 and degree of freedom = 22   then critical values of t are ± 2.074
** S = Significance , NS = Non-significance

Table 54   The t-values of percent of theophylline release in a period of constant release rate from top-spray Eudragit®NE 30D lot B coated granules between that calculated from the equation 8 and that from the dissolution test in phosphate buffer pH 6.6.
(degree of freedom = 10 , data from Table 50)

Products	t-value*	Results**
6.08 % coated granules	-0.19	NS
7.22 % coated granules	-0.11	NS
7.53 % coated granules	-0.18	NS

*   If α = 0.05 and degree of freedom = 10   then critical values of t are ± 2.228
** S = Significance , NS = Non-significance

VITAE

Miss Uraiwan Petcharunpaisan was born on March 16, 1971. She got her degree in Bachelor of Science in Pharmacy in 1993 from Faculty of Pharmaceutical Science, Chulalongkorn University, Bangkok, Thailand.