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## **APPENDICES**



## Appendix A

### Calibration Curve

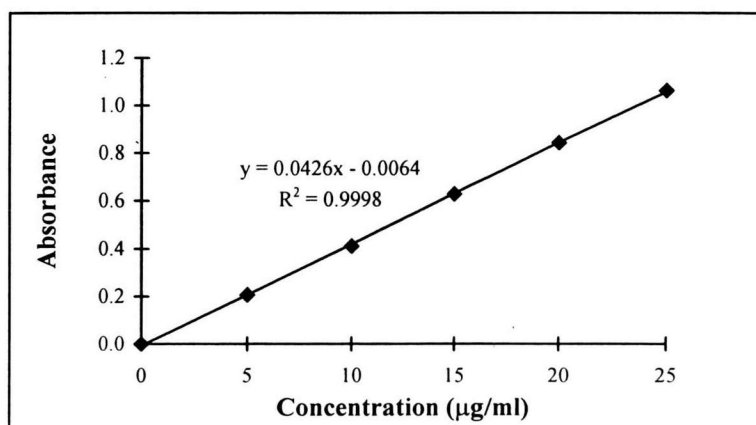
The concentration versus absorbance of diclofenac sodium in methanol at 283 nm, 0.1 N. HCl acid at 274 nm and in phosphate buffer pH 6.8 at 276 nm are presented in Tables 14-16. The standard curve of diclofenac sodium in these mediums are illustrated in Figures 68-70.

**Table 14** Absorbance of diclofenac sodium in methanol determined at 283 nm.

Concentration (mcg/ml)	Absorbance (SD)*
0	0
5	0.206 (0.003)
10	0.411 (0.003)
15	0.629 (0.001)
20	0.844 (0.002)
25	1.063 (0.005)

\* Standard deviation from three determinations.

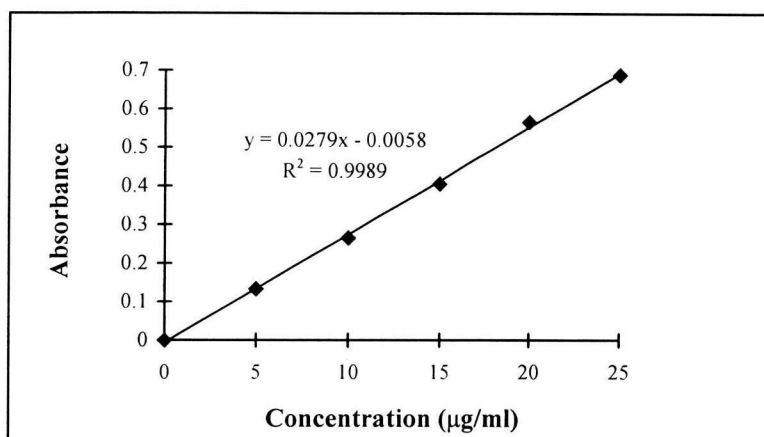
**Figure 68** Calibration curve of diclofenac sodium in methanol at 283 nm.



**Table 15** Absorbance of diclofenac sodium in 0.1 N. HCl acid determined at 274 nm.

Concentration (mcg/ml)	Absorbance (SD)*
0	0
5	0.133 (0.001)
10	0.265 (0.002)
15	0.406 (0.003)
20	0.567 (0.004)
25	0.689 (0.003)

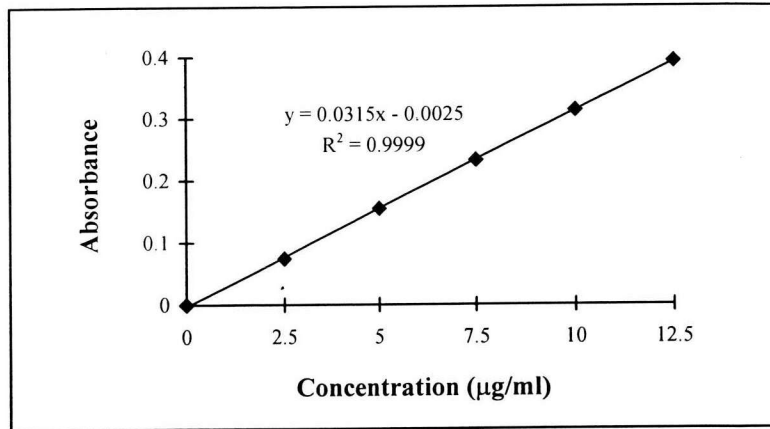
\* Standard deviation from three determinations.

**Figure 69** Calibration curve of diclofenac sodium in 0.1 N. HCl at 274 nm.**Table 16** Absorbance of diclofenac sodium in phosphate buffer pH 6.8 determined at 276 nm.

Concentration (mcg/ml)	Absorbance (SD)*
0	0
2.5	0.074 (0.003)
5	0.155 (0.004)
7.5	0.233 (0.001)
10	0.313 (0.001)
12.5	0.393 (0.001)

\* Standard deviation from three determinations.

**Figure 70** Calibration curve of diclofenac sodium in phosphate buffer pH 6.8 at 276 nm.



## Appendix B

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

**Table 17** Percentage amount of diclofenac sodium release from blank capsules and commercial products.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system					
			1	2	3	Mean	SD	Log % Drug Remained	1	2	3	Mean	SD	Log % Drug Remained
Blank (DS)	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	3.36	3.09	3.21	3.22	0.13	1.99	98.60	97.02	101.25	98.96	2.14	0.02
	1	1.00	3.24	3.16	3.40	3.27	0.12	1.99	101.79	101.15	101.79	101.58	0.37	
	2	1.41	3.34	3.39	3.47	3.40	0.07	1.98	102.79	102.62	102.64	102.68	0.09	
	3	1.73	25.83	24.71	26.80	25.78	1.05	1.87						
	4	2.00	41.29	44.05	47.01	44.12	2.86	1.75						
	6	2.45	66.21	68.75	77.73	70.90	6.05	1.46						
	8	2.83	80.43	88.75	97.46	88.88	8.52	1.05						
	10	3.16	90.38	102.80	98.90	97.36	6.35	0.42						
	12	3.46	98.99	104.76	102.23	101.99	2.89							
Abitren® SR	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.25	1.51	0.54	1.10	0.50	2.00	6.55	10.13	8.86	8.51	1.82	1.96
	1	1.00	0.09	0.88	0.61	0.53	0.40	2.00	14.19	19.49	16.27	16.65	2.67	1.92
	2	1.41	1.02	1.05	0.55	0.87	0.28	2.00	26.60	36.52	28.48	30.53	5.27	1.84
	3	1.73	7.53	7.25	5.27	6.68	1.23	1.97	39.07	49.62	39.67	42.79	5.93	1.76
	4	2.00	12.93	13.18	11.28	12.46	1.03	1.94	50.46	59.07	52.84	54.12	4.45	1.66
	6	2.45	22.86	24.09	23.15	23.37	0.64	1.88	66.01	69.07	69.27	68.12	1.83	1.50
	8	2.83	30.66	32.03	31.72	31.47	0.72	1.84	75.72	74.28	77.97	75.99	1.86	1.38
	10	3.16	36.57	38.31	37.42	37.43	0.87	1.80	81.76	77.70	83.01	80.82	2.78	1.28
	12	3.46	41.53	42.93	43.50	42.65	1.01	1.76	86.35	79.72	85.71	83.93	3.66	1.21
Voltaren® SR	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	0.57	0.54	0.61	0.57	0.03	2.00	14.85	15.90	14.98	15.24	0.57	1.93
	1	1.00	0.64	0.64	0.81	0.70	0.09	2.00	22.45	24.27	22.67	23.13	0.99	1.89
	2	1.41	0.59	0.62	0.59	0.60	0.02	2.00	33.58	36.05	33.74	34.46	1.38	1.82
	3	1.73	5.84	6.15	5.43	5.81	0.36	1.97	41.30	44.74	42.06	42.70	1.81	1.76
	4	2.00	10.05	12.56	11.19	11.26	1.26	1.95	47.86	52.04	49.33	49.74	2.12	1.70
	6	2.45	25.16	26.73	24.33	25.41	1.22	1.87	59.99	63.33	59.45	60.92	2.10	1.59
	8	2.83	37.87	40.97	37.76	38.87	1.82	1.79	68.18	71.49	67.25	68.98	2.23	1.49
	10	3.16	46.55	50.67	46.53	47.92	2.38	1.72	73.69	76.85	72.44	74.33	2.27	1.41
	12	3.46	53.83	59.16	53.58	55.52	3.15	1.65	77.16	80.13	76.05	77.78	2.11	1.35
14	3.74	58.73	64.43	58.70	60.62	3.30	1.60	81.07	83.59	79.63	81.43	2.01	1.27	
18	4.24	67.13	74.02	67.96	69.70	3.76	1.48	84.85	86.76	83.55	85.05	1.62	1.17	
24	4.90	78.08	83.36	78.38	79.94	2.97	1.30	88.02	89.33	87.35	88.23	1.01	1.07	

**Table 18** Percentage amount of diclofenac sodium release from Formulations 1-3.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system						
			1	2	3	Mean	SD	Log % Drug	1	2	3	Mean	SD	Log % Drug	
			Remained									Remained			
1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.67	1.54	1.55	1.59	0.08	1.99	41.82	52.53	42.18	45.51	6.08	1.74	
	1	1.00	1.34	1.36	1.59	1.43	0.14	1.99	65.57	82.29	57.96	68.60	12.45	1.50	
	2	1.41	1.51	1.51	1.68	1.57	0.10	1.99	75.74	90.53	69.93	78.73	10.62	1.33	
	3	1.73	8.20	4.85	6.97	6.67	1.69	1.97	79.03	92.69	74.57	82.10	9.44	1.25	
	4	2.00	11.77	8.29	11.13	10.40	1.86	1.95	83.93	93.79	77.36	85.03	8.27	1.18	
	6	2.45	17.74	16.38	18.43	17.52	1.04	1.92	84.29	96.42	80.62	87.11	8.27	1.11	
	8	2.83	24.08	23.39	24.94	24.14	0.78	1.88	85.57	96.71	83.60	88.63	7.07	1.06	
	10	3.16	28.32	30.12	30.82	29.75	1.29	1.85	88.12	98.26	86.60	91.00	6.34	0.95	
	12	3.46	32.79	36.18	36.53	35.16	2.07	1.81	90.05	99.03	88.05	92.38	5.85	0.88	
	14	3.74	37.17	41.79	41.97	40.31	2.72	1.78							
	18	4.24	44.90	53.03	51.98	49.97	4.42	1.70							
	24	4.90	55.91	66.00	65.20	62.37	5.61	1.58							
2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.25	2.31	2.38	2.31	0.06	1.99	56.56	75.60	64.08	65.41	9.59	1.54	
	1	1.00	1.60	1.53	1.96	1.70	0.23	1.99	90.04	93.33	90.60	91.32	1.76	0.94	
	2	1.41	1.75	1.68	1.98	1.80	0.16	1.99	94.25	96.48	92.61	94.45	1.94	0.74	
	3	1.73	10.43	10.20	10.56	10.40	0.18	1.95	94.71	97.58	96.70	96.33	1.47	0.56	
	4	2.00	16.00	16.94	16.98	16.64	0.56	1.92	96.74	97.42	96.53	96.90	0.47	0.49	
	6	2.45	27.46	27.93	31.20	28.86	2.04	1.85	97.99	99.17	98.73	98.63	0.60	0.14	
	8	2.83	35.67	36.82	41.50	38.00	3.09	1.79	99.24	99.80	99.20	99.41	0.34	-0.23	
	10	3.16	44.54	45.25	52.13	47.30	4.19	1.72	100.18	99.81	99.98	99.99	0.19	-1.95	
	12	3.46	51.32	51.80	60.45	54.52	5.13	1.66	100.49	100.43	100.44	100.45	0.03		
	14	3.74	58.65	58.54	67.60	61.60	5.20	1.58							
	18	4.24	70.49	69.39	78.25	72.71	4.83	1.44							
	24	4.90	84.51	82.08	89.00	85.20	3.51	1.17							
3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.28	2.54	2.82	2.54	0.27	1.99	67.03	55.51	73.42	65.32	9.08	1.54	
	1	1.00	2.36	2.63	2.82	2.60	0.23	1.99	90.44	86.85	89.33	88.87	1.84	1.05	
	2	1.41	2.49	2.82	2.95	2.75	0.24	1.99	93.23	92.77	92.43	92.81	0.41	0.86	
	3	1.73	14.22	16.94	16.12	15.76	1.39	1.93	94.63	94.47	93.49	94.20	0.62	0.76	
	4	2.00	22.17	24.10	22.57	22.95	1.02	1.89	95.23	94.79	94.72	94.91	0.28	0.71	
	6	2.45	35.54	37.75	34.03	35.78	1.87	1.81	96.91	95.84	96.22	96.32	0.54	0.57	
	8	2.83	47.02	48.59	44.10	46.57	2.28	1.73	98.30	96.92	96.66	97.29	0.88	0.43	
	10	3.16	56.43	56.20	52.58	55.07	2.16	1.65							
	12	3.46	64.47	63.72	59.95	62.72	2.42	1.57							
	14	3.74	71.74	70.81	66.75	69.77	2.65	1.48							
	18	4.24	82.87	82.69	82.49	82.68	0.19	1.24							
	24	4.90	90.78	93.15	93.39	92.44	1.45	0.88							

**Table 19** Percentage amount of diclofenac sodium release from Formulations 4-5.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system					
			1	2	3	Mean	SD	Log % Drug Remained	1	2	3	Mean	SD	Log % Drug Remained
4	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.47	1.64	1.60	1.57	0.09	1.99	34.97	32.73	29.25	32.32	2.88	1.83
	1	1.00	1.59	1.69	1.69	1.65	0.06	1.99	52.00	53.29	56.50	53.93	2.32	1.66
	2	1.41	1.93	1.87	2.06	1.95	0.10	1.99	68.07	67.73	72.38	69.39	2.59	1.49
	3	1.73	9.25	9.24	9.83	9.44	0.34	1.96	74.44	73.48	76.71	74.88	1.66	1.40
	4	2.00	13.67	14.06	14.59	14.11	0.46	1.93	78.56	76.56	80.32	78.48	1.88	1.33
	6	2.45	20.89	22.13	22.28	21.76	0.76	1.89	82.27	82.71	85.00	83.32	1.47	1.22
	8	2.83	27.46	29.73	29.82	29.00	1.34	1.85	86.07	85.90	88.35	86.77	1.37	1.12
	10	3.16	33.90	35.42	36.22	35.18	1.18	1.81	89.10	89.74	92.05	90.30	1.55	0.99
	12	3.46	39.83	42.04	42.50	41.46	1.43	1.77	90.74	92.03	93.40	92.06	1.33	0.90
	14	3.74	44.90	47.84	48.15	46.96	1.79	1.72	92.70	94.33	94.91	93.98	1.15	0.78
	18	4.24	55.24	58.68	58.62	57.51	1.97	1.63	97.05	97.13	96.11	96.76	0.56	0.51
	24	4.90	67.86	71.07	68.92	69.28	1.64	1.49	98.26	99.30	100.49	99.35	1.11	-0.19
5	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.67	1.55	1.48	1.56	0.10	1.99	41.28	48.24	49.71	46.41	4.50	1.73
	1	1.00	1.75	1.60	1.52	1.62	0.12	1.99	63.32	68.23	69.39	66.98	3.22	1.52
	2	1.41	2.26	2.03	1.77	2.02	0.25	1.99	73.85	80.51	79.38	77.91	3.57	1.34
	3	1.73	10.99	9.71	8.75	9.82	1.12	1.96	77.42	84.34	82.80	81.52	3.63	1.27
	4	2.00	16.34	14.04	13.25	14.54	1.61	1.93	80.07	87.09	85.74	84.30	3.72	1.20
	6	2.45	23.89	20.89	20.64	21.81	1.81	1.89	82.75	90.00	88.31	87.02	3.79	1.11
	8	2.83	30.16	27.27	28.20	28.54	1.47	1.85	85.60	92.13	91.23	89.65	3.54	1.01
	10	3.16	35.78	33.52	34.81	34.70	1.14	1.81	87.84	93.65	93.05	91.51	3.20	0.93
	12	3.46	41.75	39.32	41.50	40.85	1.34	1.77	89.61	94.54	94.40	92.85	2.81	0.85
	14	3.74	47.29	44.95	48.40	46.88	1.76	1.73	91.08	96.07	96.71	94.62	3.08	0.73
	18	4.24	56.82	54.70	59.33	56.95	2.32	1.63	93.19	97.28	98.24	96.24	2.68	0.58
	24	4.90	70.13	67.80	73.31	70.41	2.77	1.47	95.47	98.81	99.94	98.07	2.32	0.28



**Table 21** Percentage amount of diclofenac sodium release from Formulations 9-11.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system							
			1	2	3	Mean	SD	Log % Drug Remained	1	2	3	Mean	SD	Log % Drug Remained		
9	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.21	1.58	2.31	2.03	0.40	1.99	1.99	71.46	56.53	77.61	68.54	10.84	1.50	1.50
	1	1.00	2.17	1.72	2.44	2.11	0.36	1.99	1.99	84.68	79.08	87.74	83.83	4.39	1.21	1.21
	2	1.41	2.36	1.94	2.63	2.31	0.35	1.99	1.99	90.27	85.40	92.10	89.26	3.46	1.03	1.03
	3	1.73	10.72	10.91	13.07	11.56	1.31	1.95	1.95	92.74	88.14	93.32	91.40	2.84	0.93	0.93
	4	2.00	16.64	16.50	19.51	17.55	1.70	1.92	1.92	93.64	89.56	95.02	92.74	2.84	0.86	0.86
	6	2.45	26.23	25.49	30.61	27.44	2.77	1.86	1.86	95.76	91.63	96.85	94.75	2.76	0.72	0.72
	8	2.83	35.16	33.53	40.74	36.48	3.78	1.80	1.80							
	10	3.16	43.57	41.07	50.81	45.15	5.06	1.74	1.74							
	12	3.46	51.65	48.40	59.08	53.04	5.48	1.67	1.67							
	14	3.74	61.01	54.40	65.77	60.39	5.71	1.60	1.60							
	18	4.24	71.65	65.50	73.61	70.26	4.23	1.47	1.47							
	24	4.90	83.57	77.10	82.88	81.18	3.56	1.27	1.27							
10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	3.23	2.13	3.41	2.92	0.70	1.99	1.99	70.07	83.62	61.23	71.64	11.28	1.45	1.45
	1	1.00	2.76	1.50	2.77	2.35	0.73	1.99	1.99	80.92	95.98	81.16	86.02	8.62	1.15	1.15
	2	1.41	2.85	1.71	2.93	2.50	0.68	1.99	1.99	86.65	98.52	87.04	90.73	6.74	0.97	0.97
	3	1.73	13.40	10.57	15.67	13.21	2.56	1.94	1.94	89.72	99.08	89.32	92.71	5.52	0.86	0.86
	4	2.00	20.07	15.94	23.70	19.90	3.88	1.90	1.90	90.43	97.42	90.83	92.89	3.93	0.85	0.85
	6	2.45	32.39	26.53	38.66	32.53	6.07	1.83	1.83	92.42	98.84	92.81	94.69	3.60	0.73	0.73
	8	2.83	41.93	34.20	48.94	41.69	7.37	1.77	1.77	94.25	99.64	94.65	96.18	3.00	0.58	0.58
	10	3.16	51.34	41.82	60.37	51.18	9.28	1.69	1.69	95.94	100.59	96.02	97.51	2.66	0.40	0.40
	12	3.46	58.78	48.46	69.95	59.06	10.74	1.61	1.61	97.16	100.58	97.08	98.27	2.00	0.24	0.24
	14	3.74	66.24	55.04	77.93	66.40	11.44	1.53	1.53							
	18	4.24	77.77	67.66	89.63	78.35	11.00	1.34	1.34							
	24	4.90	90.35	82.46	100.01	90.94	8.79	0.96	0.96							
11	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.06	1.64	1.38	1.69	0.35	1.99	1.99	81.96	85.45	71.12	79.51	7.47	1.31	1.31
	1	1.00	2.05	1.82	1.55	1.81	0.25	1.99	1.99	95.33	95.19	92.56	94.36	1.56	0.75	0.75
	2	1.41	2.14	2.09	1.73	1.99	0.22	1.99	1.99	96.28	96.13	94.74	95.72	0.85	0.63	0.63
	3	1.73	13.11	10.43	14.32	12.62	1.99	1.94	1.94	97.70	96.92	96.62	97.08	0.56	0.47	0.47
	4	2.00	20.16	16.01	22.28	19.48	3.19	1.91	1.91	97.70	96.12	96.46	96.76	0.83	0.51	0.51
	6	2.45	32.18	25.48	35.02	30.89	4.90	1.84	1.84	98.64	96.24	97.36	97.41	1.20	0.41	0.41
	8	2.83	43.52	34.70	45.04	41.08	5.58	1.77	1.77							
	10	3.16	53.86	42.29	54.08	50.08	6.74	1.70	1.70							
	12	3.46	62.65	49.55	62.42	58.20	7.50	1.62	1.62							
	14	3.74	69.80	56.05	70.17	65.34	8.05	1.54	1.54							
	18	4.24	81.18	69.80	82.45	77.81	6.96	1.35	1.35							
	24	4.90	91.97	84.10	95.41	90.49	5.80	0.98	0.98							



**Table 22** Percentage amount of diclofenac sodium release from Formulations 12-14.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system					
			1	2	3	Mean	SD	Log % Drug Remained	1	2	3	Mean	SD	Log % Drug Remained
12	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.54	1.67	1.61	1.61	0.07	1.99	73.82	76.78	67.19	72.60	4.91	1.44
	1	1.00	1.78	2.01	1.66	1.82	0.18	1.99	82.80	82.45	79.26	81.50	1.95	1.27
	2	1.41	2.16	2.36	1.94	2.15	0.21	1.99	87.58	86.27	84.64	86.16	1.48	1.14
	3	1.73	11.29	9.72	9.22	10.08	1.08	1.95	90.35	88.38	87.05	88.59	1.66	1.06
	4	2.00	16.98	14.54	14.53	15.35	1.41	1.93	92.18	89.17	89.01	90.12	1.79	0.99
	6	2.45	25.55	23.12	23.44	24.04	1.32	1.88	94.65	91.94	91.29	92.63	1.78	0.87
	8	2.83	33.94	32.30	32.69	32.98	0.86	1.83	96.51	93.61	92.95	94.36	1.89	0.75
	10	3.16	40.93	40.48	41.28	40.90	0.40	1.77	97.58	94.83	94.47	95.62	1.70	0.64
	12	3.46	47.67	48.01	49.88	48.52	1.19	1.71	99.45	94.62	95.99	96.68	2.49	0.52
	14	3.74	53.42	54.98	57.10	55.17	1.85	1.65						
	18	4.24	63.86	68.52	70.77	67.72	3.53	1.51						
	24	4.90	76.51	80.44	82.64	79.87	3.11	1.30						
13	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.64	1.48	1.35	1.49	0.15	1.99	73.47	56.70	57.97	62.72	9.34	1.57
	1	1.00	1.79	1.63	1.75	1.72	0.08	1.99	90.18	79.57	91.54	87.10	6.55	1.11
	2	1.41	2.22	2.00	2.09	2.10	0.11	1.99	93.45	88.27	96.10	92.61	3.98	0.87
	3	1.73	13.31	10.02	10.42	11.25	1.79	1.95	93.73	91.51	98.00	94.42	3.30	0.75
	4	2.00	19.75	14.95	15.94	16.88	2.54	1.92	94.33	91.99	98.64	94.98	3.37	0.70
	6	2.45	29.91	23.17	24.41	25.83	3.59	1.87	96.34	93.84	99.75	96.64	2.97	0.53
	8	2.83	38.99	31.03	33.47	34.50	4.08	1.82	97.26	94.74	100.07	97.36	2.66	0.42
	10	3.16	48.10	38.32	41.89	42.77	4.95	1.76	97.71	95.18	101.33	98.07	3.09	0.29
	12	3.46	53.96	44.52	49.06	49.18	4.73	1.71	100.84	95.60	98.16	98.20	2.62	0.26
	14	3.74	60.74	51.43	56.11	56.09	4.65	1.64						
	18	4.24	70.94	63.15	69.18	67.76	4.08	1.51						
	24	4.90	84.47	78.22	84.60	82.43	3.64	1.24						
14	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.42	2.29	1.51	2.07	0.49	1.99	79.31	81.95	60.57	73.94	11.66	1.42
	1	1.00	2.41	2.57	1.82	2.27	0.40	1.99	90.61	89.42	80.34	86.79	5.62	1.12
	2	1.41	2.63	2.63	2.09	2.45	0.31	1.99	94.05	94.26	88.26	92.19	3.41	0.89
	3	1.73	15.55	13.23	11.61	13.46	1.98	1.94	95.93	95.51	91.82	94.42	2.26	0.75
	4	2.00	23.78	20.32	17.18	20.43	3.30	1.90	96.38	96.59	93.82	95.60	1.54	0.64
	6	2.45	39.34	35.02	28.07	34.14	5.68	1.82	96.84	97.84	96.63	97.10	0.65	0.46
	8	2.83	53.08	46.43	36.37	45.29	8.41	1.74	98.55	99.25	99.46	99.09	0.47	-0.04
	10	3.16	65.77	57.53	44.39	55.90	10.78	1.64						
	12	3.46	76.91	69.77	53.89	66.86	11.78	1.52						
	14	3.74	81.47	79.89	59.94	73.77	12.00	1.42						
	18	4.24	88.52	95.23	74.72	86.16	10.46	1.14						
	24	4.90	94.30	100.76	90.34	95.13	5.26	0.69						

**Table 23** Percentage amount of diclofenac sodium release from Formulations 15-17.

Formulation	Time	Time <sup>1/2</sup>	pH-change system						Phosphate buffer pH 6.8 system					
			1	2	3	Mean	SD	Log % Drug Remained	1	2	3	Mean	SD	Log % Drug Remained
15	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	1.22	1.09	1.73	1.35	0.34	1.99	51.59	48.33	58.18	52.70	5.02	1.67
	1	1.00	1.33	1.46	1.91	1.56	0.31	1.99	78.66	72.58	84.17	78.47	5.80	1.33
	2	1.41	1.53	1.64	2.03	1.73	0.26	1.99	91.35	84.13	97.65	91.04	6.76	0.95
	3	1.73	12.68	10.19	13.25	12.04	1.63	1.94	95.74	89.72	101.46	95.64	5.87	0.64
	4	2.00	19.77	15.45	19.08	18.10	2.32	1.91	97.94	91.78	103.09	97.60	5.66	0.38
	6	2.45	30.81	24.72	27.31	27.61	3.06	1.86						
	8	2.83	40.23	33.85	34.35	36.14	3.55	1.81						
	10	3.16	49.29	40.85	41.43	43.85	4.71	1.75						
	12	3.46	58.03	48.86	48.23	51.71	5.48	1.68						
	14	3.74	64.73	54.64	53.86	57.74	6.06	1.63						
	18	4.24	77.78	66.47	64.29	69.51	7.25	1.48						
	24	4.90	82.80	75.42	72.09	76.77	5.48	1.37						
16	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.65	3.66	3.83	3.38	0.64	1.99	77.62	68.34	81.41	75.79	6.73	1.38
	1	1.00	2.78	3.67	3.87	3.44	0.58	1.98	95.48	93.09	95.99	94.86	1.55	0.71
	2	1.41	2.87	3.75	3.85	3.49	0.53	1.98	102.13	99.65	100.11	100.63	1.32	
	3	1.73	15.19	19.93	18.01	17.71	2.38	1.92						
	4	2.00	21.22	28.59	26.74	25.52	3.83	1.87						
	6	2.45	30.84	37.90	40.56	36.43	5.02	1.80						
	8	2.83	41.03	46.19	52.11	46.44	5.54	1.73						
	10	3.16	52.69	51.55	62.28	55.51	5.89	1.65						
	12	3.46	62.94	57.12	70.05	63.37	6.47	1.56						
	14	3.74	69.83	61.95	76.17	69.32	7.13	1.49						
	18	4.24	83.43	73.00	89.26	81.90	8.24	1.26						
	24	4.90	94.92	84.47	100.57	93.32	8.17	0.82						
17	0	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	0.5	0.71	2.48	3.48	2.03	2.66	0.74	1.99	76.86	71.96	80.39	76.41	4.23	1.37
	1	1.00	2.47	2.52	2.15	2.38	0.20	1.99	87.97	90.14	92.28	90.13	2.16	0.99
	2	1.41	2.56	3.62	2.30	2.83	0.70	1.99	93.61	94.52	94.78	94.30	0.62	0.76
	3	1.73	14.56	16.56	12.06	14.39	2.25	1.93	95.32	95.93	95.87	95.71	0.33	0.63
	4	2.00	22.15	22.78	18.50	21.15	2.31	1.90	95.94	96.86	96.96	96.59	0.56	0.53
	6	2.45	34.77	32.25	28.15	31.73	3.34	1.83	97.33	98.27	98.21	97.94	0.52	0.31
	8	2.83	44.69	40.13	35.36	40.06	4.67	1.78	98.10	99.05	99.62	98.93	0.77	0.03
	10	3.16	53.31	46.78	41.10	47.07	6.11	1.72	98.24	99.83	101.04	99.70	1.40	-0.52
	12	3.46	61.54	53.79	46.81	54.04	7.37	1.66	99.95	100.61	101.03	100.53	0.55	
	14	3.74	67.11	59.52	51.49	59.37	7.81	1.61						
	18	4.24	77.27	70.19	59.45	68.97	8.97	1.49						
	24	4.90	85.31	81.19	68.28	78.26	8.88	1.34						

**Table 24** The release rate of blank diclofenac sodium and commercial products in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%/hour)					
	Blank (DS)		Voltaren®SR		Abitren®SR	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	6.44	197.91	1.15	30.49	2.20	17.02
0.75	0.09	5.24	-1.01	15.78	-1.15	16.28
1.5	0.13		0.53	11.33	0.35	13.88
2.5	22.38		5.21	8.25	5.81	12.26
3.5	18.34		6.12	7.04	5.78	11.33
5	13.39		6.74	5.59	5.45	7.00
7	8.99		6.73	4.03	4.05	3.94
9	4.24		4.52	2.68	2.98	2.42
11	2.32		3.80	1.73	2.61	1.55
13			2.55	1.82	2.24	1.04
16			2.27	0.91	1.73	0.71
21			1.71	0.53	1.53	0.47

**Table 25** The release rate of diclofenac sodium from Formulations 1-3 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%/hour)					
	Formulation 1		Formulation 2		Formulation 3	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	1.59	91.02	4.63	130.82	5.09	130.64
0.75	1.43	46.19	-1.24	51.82	0.12	47.11
1.5	1.57	10.13	0.11	3.13	0.15	3.94
2.5	6.67	3.36	8.60	1.88	13.01	1.39
3.5	10.40	2.93	6.24	0.57	7.19	0.72
5	17.52	1.04	6.11	0.86	6.41	0.71
7	24.14	0.76	4.57	0.39	5.40	0.48
9	29.75	1.18	4.65	0.29	4.25	
11	35.16	0.69	3.61	0.23	3.82	
13	40.31		3.54		3.53	
16	49.97		2.78		3.23	
21	62.37		2.08		1.63	

**Table 26** The release rate of diclofenac sodium from Formulations 4-5 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%hour)			
	Formulation 4		Formulation 5	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	3.14	64.63	3.13	92.82
0.75	0.16	43.25	0.12	41.14
1.5	0.30	15.45	0.40	10.93
2.5	7.49	5.48	7.80	3.61
3.5	4.67	3.60	4.72	2.78
5	3.83	2.42	3.63	1.36
7	3.62	1.72	3.37	1.32
9	3.09	1.76	3.08	0.93
11	3.14	0.88	3.07	0.67
13	2.75	0.96	3.01	0.88
16	2.64	0.70	2.52	0.40
21	1.96	0.43	2.24	0.31

**Table 27** The release rate of diclofenac sodium from Formulations 6-8 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%hour)					
	Formulation 6		Formulation 7		Formulation 8	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	3.38	157.96	6.35	115.52	5.83	161.33
0.75	0.10	38.48	-0.98	45.33	-0.37	32.02
1.5	0.12	2.35	0.03	7.04	-0.05	2.81
2.5	7.53		8.59	2.34	10.72	0.77
3.5	5.66		6.90	1.24	7.77	
5	4.67		6.42	0.99	6.85	
7	4.07		5.83	0.76	5.76	
9	3.48		5.12	0.53	5.10	
11	3.47		4.62	0.45	4.03	
13	3.10		3.67		3.08	
16	2.74		2.73		2.18	
21	2.26		1.72		1.96	

**Table 28** The release rate of diclofenac sodium from Formulations 9-11 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%hour)					
	Formulation 9		Formulation 10		Formulation 11	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	4.07	137.07	5.85	143.27	3.38	159.01
0.75	0.15	30.60	-1.16	28.77	0.23	29.71
1.5	0.20	5.42	0.15	4.71	0.18	1.36
2.5	9.26	2.14	10.71	1.95	10.64	1.36
3.5	5.99	1.34	6.69	0.21	6.86	-0.32
5	4.95	1.00	6.31	0.90	5.71	0.33
7	4.52		4.58	0.74	5.10	
9	4.34		4.74	0.67	4.50	
11	3.95		3.94	0.38	4.06	
13	3.68		3.69		3.57	
16	2.47		2.98		3.12	
21	1.82		2.10		2.11	

**Table 29** The release rate of diclofenac sodium from Formulations 12-14 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%hour)					
	Formulation 12		Formulation 13		Formulation 14	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	3.21	145.19	2.98	91.54	4.14	147.89
0.75	0.42	17.81	0.46	40.50	0.39	25.69
1.5	0.33	4.66	0.39	8.44	0.19	5.40
2.5	7.93	2.43	9.14	3.66	11.01	2.12
3.5	5.27	1.53	5.63	2.39	6.96	1.29
5	4.34	1.25	4.48	1.89	6.86	0.75
7	4.47	0.87	4.33	1.17	5.58	0.99
9	3.96	0.63	4.14	0.97	5.31	
11	3.81	0.53	3.20	0.84	5.48	
13	3.32		3.46	1.03	3.45	
16	3.14		2.92	0.69	3.10	
21	2.03		2.45	0.52	1.50	

**Table 30** The release rate of diclofenac sodium from Formulations 15-17 in pH-change and phosphate buffer pH 6.8 systems.

Mean Time	Release Rate (%hour)					
	Formulation 15		Formulation 16		Formulation 17	
	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8	pH-change	buffer pH 6.8
0.25	2.69	105.40	6.76	151.58	5.32	152.81
0.75	0.44	51.54	0.12	38.14	-0.56	27.45
1.5	0.17	12.58	0.05	5.77	0.45	4.18
2.5	10.31	4.59	14.22		11.56	1.40
3.5	6.06	1.96	7.81		6.76	0.88
5	4.76		5.46		5.29	0.68
7	4.26		5.01		4.17	0.49
9	3.86		4.54		3.50	0.39
11	3.93		3.93		3.49	0.41
13	3.02		2.98		2.66	
16	2.94		3.15		2.40	
21	1.21		1.90		1.55	

**Table 31** Values for rate, amount released and the corresponding reciprocal for the release of blank diclofenac sodium.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
Blank (DS)	6.44	3.22	0.311	197.91	98.96	0.010
	0.09	3.27	0.306	5.24	101.58	0.010
	0.13	3.40	0.294			
	22.38	25.78	0.039			
	18.34	44.12	0.023			
	13.39	70.90	0.014			
	8.99	88.88	0.011			
	4.24	97.36	0.010			
	2.32	101.99	0.010			

**Table 32** Values for rate, amount released and the corresponding reciprocal for the release of commercial products.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
Voltaren®SR	1.15	0.57	1.742	30.49	15.24	0.066
	-1.01	0.70	1.428	15.78	23.13	0.043
	0.53	0.60	1.672	11.33	34.46	0.029
	5.21	5.81	0.172	8.25	42.70	0.023
	6.12	11.93	0.084	7.04	49.74	0.020
	6.74	25.41	0.039	5.59	60.92	0.016
	6.73	38.87	0.026	4.03	68.98	0.014
	4.52	47.92	0.021	2.68	74.33	0.013
	3.80	55.52	0.018	1.73	77.78	0.013
	2.55	60.62	0.016	1.82	81.43	0.012
	2.27	69.70	0.014	0.91	85.05	0.012
	1.71	79.94	0.013	0.53	88.23	0.011
Abitren®SR	2.20	1.10	0.909	17.02	8.51	0.117
	-1.15	0.53	1.901	16.28	16.65	0.060
	0.35	0.87	1.144	13.88	30.53	0.033
	5.81	6.68	0.150	12.26	42.79	0.023
	5.78	12.46	0.080	11.33	54.12	0.018
	5.45	23.37	0.043	7.00	68.12	0.015
	4.05	31.47	0.032	3.94	75.99	0.013
	2.98	37.43	0.027	2.42	80.82	0.012
	2.61	42.65	0.023	1.55	83.93	0.012
	2.24	47.13	0.021	1.04	86.00	0.012
	1.73	54.05	0.019	0.71	88.82	0.011
	1.53	63.23	0.016	0.47	91.97	0.011

**Table 33** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 1-3.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
1	3.17	1.59	0.631	91.02	45.51	0.022
	-0.31	1.43	0.699	46.19	68.60	0.015
	0.13	1.57	0.639	10.13	78.73	0.013
	5.11	6.67	0.150	3.36	82.10	0.012
	3.73	10.40	0.096	2.93	85.03	0.012
	3.56	17.52	0.057	1.04	87.11	0.011
	3.31	24.14	0.041	0.76	88.63	0.011
	2.81	29.75	0.034	1.18	91.00	0.011
	2.71	35.16	0.028	0.69	92.38	0.011
	2.57	40.31	0.025			
	2.42	49.97	0.020			
2.07	62.37	0.016				
2	4.63	2.31	0.432	130.82	65.41	0.015
	-1.24	1.70	0.590	51.82	91.32	0.011
	0.11	1.80	0.556	3.13	94.45	0.011
	8.60	10.40	0.096	1.88	96.33	0.010
	6.24	16.64	0.060	0.57	96.90	0.010
	6.11	28.86	0.035	0.86	98.63	0.010
	4.57	38.00	0.026	0.39	99.41	0.010
	4.65	47.30	0.021	0.29	99.99	0.010
	3.61	54.52	0.018	0.23	100.45	0.010
	3.54	61.60	0.016			
	2.78	72.71	0.014			
2.08	85.20	0.012				
3	5.09	2.54	0.393	130.64	65.32	0.015
	0.12	2.61	0.384	47.11	88.87	0.011
	0.15	2.75	0.364	3.94	92.81	0.011
	13.01	15.76	0.063	1.39	94.20	0.011
	7.19	22.95	0.044	0.72	94.91	0.011
	6.41	35.78	0.028	0.71	96.33	0.010
	5.40	46.57	0.021	0.48	97.29	0.010
	4.25	55.07	0.018			
	3.82	62.72	0.016			
	3.53	69.77	0.014			
	3.23	82.68	0.012			
1.63	92.44	0.011				



**Table 34** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 4-5.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
4	3.14	1.57	0.637	64.63	32.32	0.031
	0.16	1.65	0.605	43.25	53.94	0.019
	0.30	1.95	0.513	15.45	69.39	0.014
	7.49	9.44	0.106	5.48	74.88	0.013
	4.67	14.11	0.071	3.60	78.48	0.013
	3.83	21.76	0.046	2.42	83.32	0.012
	3.62	29.00	0.034	1.72	86.77	0.012
	3.09	35.18	0.028	1.76	90.30	0.011
	3.14	41.46	0.024	0.88	92.06	0.011
	2.75	46.96	0.021	00.96	93.98	0.011
	2.64	57.51	0.017	0.70	96.76	0.010
	1.96	69.28	0.014	0.43	99.35	0.010
5	3.13	1.57	0.638	92.82	46.41	0.022
	0.12	1.62	0.606	41.14	66.98	0.015
	0.40	2.02	0.495	10.93	77.91	0.013
	7.80	9.82	0.102	3.61	81.52	0.012
	4.72	14.54	0.069	2.78	84.30	0.012
	3.63	21.81	0.046	1.36	87.02	0.011
	3.37	28.54	0.035	1.32	89.65	0.011
	3.08	34.70	0.029	0.93	91.51	0.011
	3.07	40.85	0.024	0.67	92.85	0.011
	3.01	46.88	0.021	0.88	94.62	0.011
	2.52	56.95	0.018	0.40	96.24	0.010
	2.24	70.41	0.014	0.31	98.07	0.010

**Table 35** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 6-8.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
6	3.38	1.69	0.592	157.96	78.98	0.013
	0.10	1.74	0.575	38.48	98.22	0.010
	0.12	1.86	0.539	2.35	100.57	0.010
	7.53	9.39	0.107			
	5.66	15.05	0.066			
	4.67	24.38	0.041			
	4.07	32.52	0.031			
	3.48	39.48	0.025			
	3.47	46.41	0.022			
	3.10	52.61	0.019			
	2.74	63.55	0.016			
	2.26	77.10	0.013			
7	6.35	3.18	0.315	115.52	57.76	0.017
	-0.98	2.69	0.372	45.33	80.43	0.012
	0.03	2.72	0.368	7.04	87.47	0.011
	8.59	11.31	0.088	2.34	89.81	0.011
	6.90	18.21	0.055	1.24	91.05	0.011
	6.42	31.05	0.032	0.99	93.04	0.011
	5.83	42.71	0.023	0.76	94.56	0.011
	5.12	52.94	0.019	0.53	95.61	0.010
	4.62	62.18	0.016	0.45	96.52	0.010
	3.67	69.52	0.014			
	2.73	80.42	0.012			
	1.72	90.75	0.011			
8	5.83	2.92	0.343	161.33	80.66	0.012
	-0.37	2.73	0.366	32.02	96.67	0.010
	-0.05	2.69	0.372	2.81	99.48	0.010
	10.72	13.41	0.075	0.77	100.25	0.010
	7.77	21.18	0.047			
	6.85	34.87	0.029			
	5.76	46.39	0.022			
	5.10	56.600	0.018			
	4.03	64.67	0.015			
	3.08	70.83	0.014			
	2.18	79.57	0.013			
	1.96	91.32	0.011			

**Table 36** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 9-11.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
9	4.07	2.03	0.492	137.07	68.54	0.015
	0.15	2.11	0.474	30.60	83.83	0.012
	0.20	2.31	0.434	5.42	89.26	0.011
	9.26	11.56	0.086	2.14	91.40	0.011
	5.99	17.55	0.057	1.34	92.74	0.011
	4.95	27.44	0.036	1.00	94.75	0.011
	4.52	36.48	0.027			
	4.34	45.15	0.022			
	3.95	53.04	0.019			
	3.68	60.39	0.017			
	2.47	70.26	0.014			
1.82	81.18	0.012				
10	5.85	2.93	0.342	143.27	71.64	0.014
	-1.16	2.35	0.426	28.77	86.02	0.012
	0.15	2.50	0.400	4.71	90.73	0.011
	10.71	13.21	0.076	1.95	92.68	0.011
	6.69	19.90	0.050	0.21	92.89	0.011
	6.31	32.53	0.031	0.90	94.69	0.011
	4.58	41.69	0.024	0.74	96.18	0.010
	4.74	51.18	0.020	0.67	97.51	0.010
	3.94	59.66	0.017	0.38	98.27	0.010
	3.69	66.44	0.015			
	2.98	78.35	0.013			
2.10	90.94	0.011				
11	3.38	1.69	0.592	159.01	79.51	0.013
	0.23	1.81	0.554	29.71	94.36	0.011
	0.18	1.99	0.504	1.36	95.72	0.010
	10.64	12.62	0.079	1.36	97.08	0.010
	6.86	19.48	0.051	-0.32	96.76	0.010
	5.71	30.89	0.032	0.33	97.41	0.010
	5.10	41.09	0.024			
	4.50	50.08	0.020			
	4.06	58.20	0.017			
	3.57	65.34	0.015			
	3.12	77.81	0.013			
2.11	90.49	0.011				

**Table 37** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 12-14.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
12	3.21	1.61	0.623	145.19	72.60	0.014
	0.42	1.82	0.550	17.81	81.50	0.012
	0.33	2.15	0.465	4.66	86.16	0.012
	7.93	10.08	0.099	2.43	88.59	0.011
	5.27	15.35	0.065	1.53	90.12	0.011
	4.34	24.04	0.042	1.25	92.63	0.011
	4.47	32.98	0.030	0.87	94.36	0.011
	3.96	40.90	0.024	0.63	95.63	0.010
	3.81	48.52	0.021	0.53	96.68	0.010
	3.32	55.17	0.018			
	3.14	67.72	0.015			
	2.03	79.87	0.013			
13	2.98	1.49	0.672	91.54	45.77	0.022
	0.46	1.72	0.581	40.50	66.02	0.015
	0.39	2.11	0.475	8.44	74.46	0.013
	9.14	11.25	0.089	3.66	78.11	0.013
	5.63	16.88	0.059	2.39	80.51	0.013
	4.48	25.83	0.039	1.89	84.30	0.012
	4.33	34.50	0.029	1.17	86.64	0.012
	4.14	42.77	0.023	0.97	88.57	0.012
	3.20	49.18	0.020	0.84	90.25	0.011
	3.46	56.09	0.018	1.03	92.31	0.011
	2.92	67.76	0.015	0.69	95.07	0.011
	2.45	82.43	0.012	0.52	98.16	0.010
14	4.14	2.07	0.483	147.89	73.94	0.014
	0.39	2.27	0.441	25.89	86.79	0.012
	0.19	2.45	0.408	5.40	92.19	0.011
	11.01	13.46	0.074	2.12	94.31	0.011
	6.96	20.43	0.049	1.29	95.60	0.010
	6.86	34.14	0.029	0.75	97.10	0.010
	5.58	45.29	0.022	0.99	99.09	0.010
	5.31	55.90	0.018			
	5.48	66.86	0.015			
	3.45	73.77	0.014			
	3.10	86.15	0.012			
	1.50	95.13	0.011			

**Table 38** Values for rate, amount released and the corresponding reciprocal for the release of Formulations 15-17.

Formulation	pH-change system			Buffer pH 6.8 system		
	dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
15	2.69	1.35	0.743	105.40	52.70	0.019
	0.44	1.56	0.639	51.54	78.47	0.013
	0.17	1.73	0.577	12.58	91.05	0.011
	10.31	12.04	0.083	4.59	95.64	0.010
	6.06	18.10	0.055	1.96	97.60	0.010
	4.76	27.61	0.036			
	4.26	36.14	0.028			
	3.86	43.85	0.023			
	3.93	51.71	0.019			
	3.02	57.74	0.017			
	2.94	69.51	0.014			
	1.21	76.77	0.013			
16	6.76	3.38	0.296	151.58	75.79	0.013
	0.12	3.44	0.291	38.14	94.86	0.011
	0.05	3.49	0.287	5.77	100.63	0.010
	14.22	17.71	0.056			
	7.81	25.52	0.039			
	5.46	36.43	0.027			
	5.01	46.44	0.022			
	4.54	55.51	0.018			
	3.93	63.37	0.016			
	2.98	69.32	0.014			
	3.15	81.90	0.012			
	1.90	93.32	0.011			
17	5.32	2.66	0.376	152.81	76.41	0.013
	-0.56	2.38	0.420	27.45	90.13	0.011
	0.45	2.83	0.354	4.18	94.30	0.011
	11.56	14.39	0.069	1.40	95.71	0.010
	6.76	21.15	0.047	0.88	96.58	0.010
	5.29	31.73	0.032	0.68	97.94	0.010
	4.17	40.06	0.025	0.49	98.93	0.010
	3.50	47.07	0.021	0.39	99.70	0.010
	3.49	54.04	0.019	0.41	100.53	0.010
	2.66	59.37	0.017			
	2.40	68.97	0.004			
	1.55	78.26	0.013			

## Appendix C

### Data In Statistical Processes

**Table 39** The t-values of percentage drug release from spray-dried microparticles prepared at the same inlet air temperature.  
(degree of freedom = 24, data from Tables 17-23)

Inlet Air Temperature (°C)	Product I	Product II	t-value*	Result**
170	Formulation 4 NE:DS 1: 4	Formulation 5 NE:DS 1: 6	0.00	NS
170	Formulation 7 NE:DS 1:11	Formulation 8 NE:DS 1:15	-0.12	NS
190	Formulation 10 NE:DS 1:11	Formulation 11 NE:DS 1:15	0.06	NS
210	Formulation 12 NE:DS 1: 9	Formulation 13 NE:DS 1:11	-0.08	NS
210	Formulation 13 NE:DS 1:11	Formulation 15 RS:DS 1:11	-0.04	NS

\* If  $\alpha = 0.05$ , degree of freedom = 24  
then critical values of t are  $\pm 2.064$

\*\* NS = Non-significance

**Table 40** The t-values of percentage drug release of spray-dried diclofenac sodium with Eudragit®NE 30D prepared at various inlet air temperatures in pH-change system.

Polymer to Drug Ratio	Product I	Product II	t-value*	Result**
NE : DS 1 : 9	Formulation 1 150°C	Formulation 6 170°C	-0.97	NS
	Formulation 1 150°C	Formulation 9 190°C	-1.27	NS
	Formulation 1 150°C	Formulation 12 210°C	-1.06	NS
	Formulation 6 170°C	Formulation 9 190°C	-0.31	NS
	Formulation 6 170°C	Formulation 12 210°C	-0.11	NS
	Formulation 9 190°C	Formulation 12 210°C	0.21	NS
NE : DS 1 : 11	Formulation 1 150°C	Formulation 6 170°C	0.96	NS
	Formulation 1 150°C	Formulation 9 190°C	0.96	NS
	Formulation 1 150°C	Formulation 12 210°C	1.07	NS
	Formulation 6 170°C	Formulation 9 190°C	0.03	NS
	Formulation 6 170°C	Formulation 12 210°C	0.48	NS
	Formulation 9 190°C	Formulation 12 210°C	0.46	NS
NE : DS 1 : 15	Formulation 1 150°C	Formulation 6 170°C	1.03	NS
	Formulation 1 150°C	Formulation 9 190°C	1.09	NS
	Formulation 1 150°C	Formulation 12 210°C	1.002	NS
	Formulation 6 170°C	Formulation 9 190°C	0.22	NS
	Formulation 6 170°C	Formulation 12 210°C	-0.06	NS
	Formulation 9 190°C	Formulation 12 210°C	-0.28	NS

\* If  $\alpha = 0.05$ , degree of freedom = 24  
then critical values of t are  $\pm 2.064$

\*\* NS = Non-significance

**Table 41** Comparison of linearity between plots of rate of release against reciprocal and amount of diclofenac sodium released from the microparticles in pH-change system.

Formulation	Microparticle	Correlation Coefficient of rate	
		versus Q	versus 1/Q
1	1	0.9452	0.9285
	2	0.9298	0.8843
	3	0.8782	0.9770
11	1	0.9860	0.9889
	2	0.9948	0.9956
	3	0.9842	0.9631

**Table 42** The t-values of linearity between rate of release against reciprocal amount and amount.

(degree of freedom = 4, data from Table 41)

Formulation	t-value*	Result**
1	-0.36	NS
11	0.14	NS

\* If  $\alpha = 0.05$ , degree of freedom = 4  
then critical values of t are  $\pm 2.776$

\*\* NS = Non-significance



## **VITAE**

Miss Anothai Tangsumranjit was born on October 10, 1971, in Chiangmai, Thailand. She got her degree in Bachelor of Science in Pharmacy with second class honors in 1994 from Faculty of Pharmacy, Chiangmai University, Chiangmai, Thailand.