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APPENDICES

APPENDIX A

Calibration Curve of Sodium Diclofenac

Calibration curve of Sodium diclofenac

The concentration versus absorbance of sodium diclofenac in 0.1 N HCl (pH 1.2), phosphate buffer saline pH 6.6 and 7.4, NaOH solution 5% (w/v), sodium tripolyphosphate 1-10% (w/v) at 276 nm. are presented in tables xxx. The standard curves of sodium diclofenac in these solution media are illustrated in Figure xxxx

Table A1 Absorbance of sodium diclofenac drug in 0.1 N HCl determined in 276 nm.

Concentration (ppm)	Absorbance
2	0.050
4	0.108
6	0.163
8	0.214
10	0.266

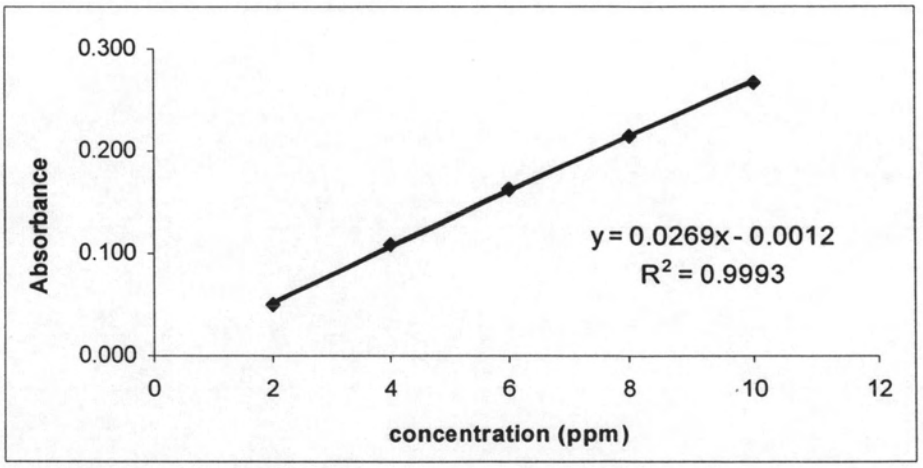

Figure A10 Calibration curve of sodium diclofenac drug in 0.1 N of HCl at 276 nm.

Table A2 Absorbance of sodium diclofenac drug in phosphate buffer saline pH 6.6 determined at 276 nm.

Concentration (ppm)	Absorbance
5	0.159
10	0.314
25	0.763
50	1.528
100	3.110

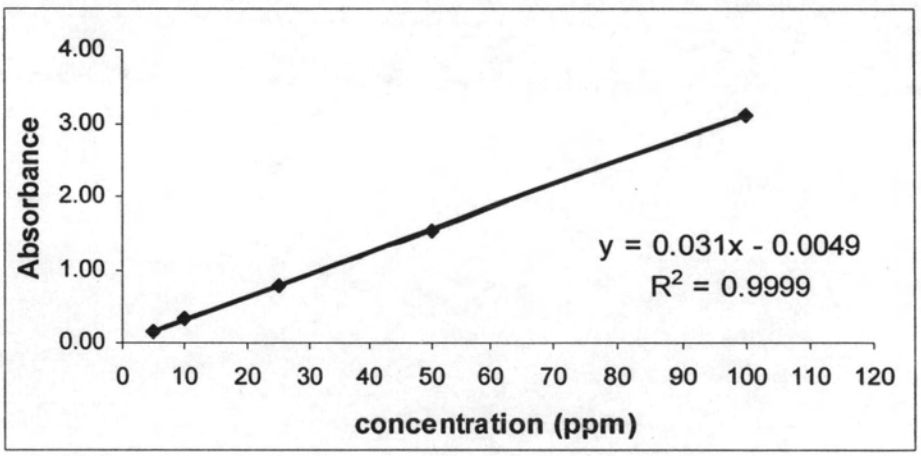

Figure A11 Calibration curve of Sodium diclofenac drug in phosphate buffer saline pH 6.6 at 276 nm.

Table A3 Absorbance of sodium diclofenac drug in phosphate buffer saline pH 7.4 determined at 276 nm.

Concentration (ppm)	Absorbance
5	0.165
10	0.329
15	0.487
20	0.638
25	0.793
30	0.958

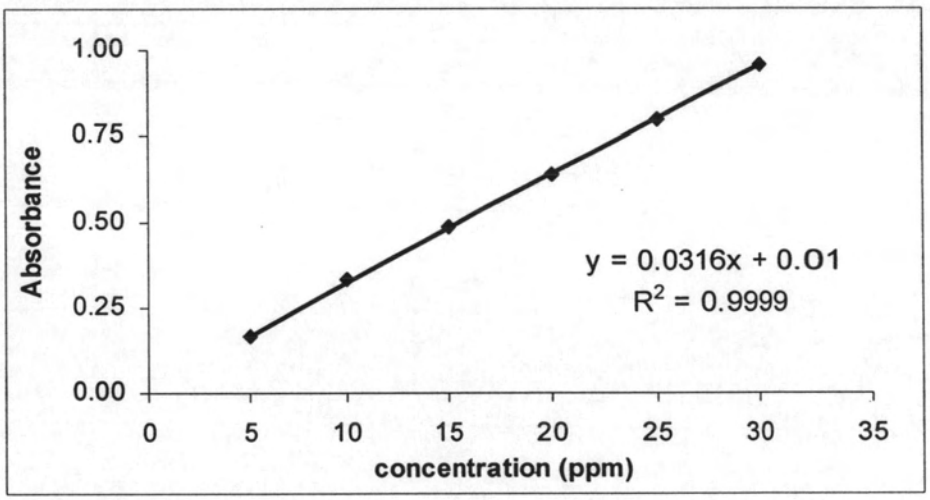

Figure A12 Calibration curve of Sodium diclofenac drug in phosphate buffer saline pH 7.4 at 276 nm.

Table A4 Absorbance of sodium diclofenac drug in 1.0% sodium tripolyphosphate solution determined at 276 nm.

Concentration (ppm)	Absorbance
2.5	0.088
5	0.166
10	0.324
15	0.481
20	0.638
25	0.791
50	1.582

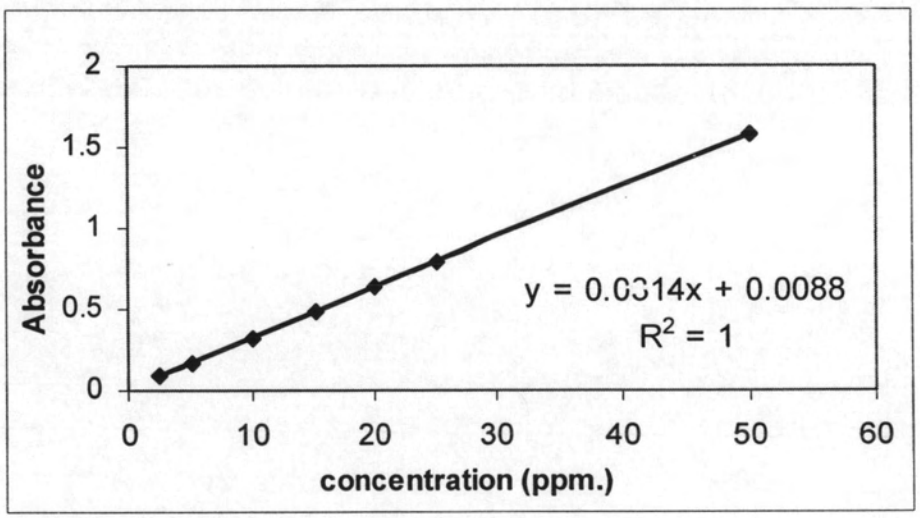

Figure A13 Calibration curve of Sodium diclofenac drug in 1.0% (w/v) sodium tripolyphosphate solution at 276 nm.

Table A5 Absorbance of sodium diclofenac drug in 5.0% sodium tripolyphosphate solution determined at 276 nm.

Concentration (ppm)	Absorbance
2.5	0.1
5	0.163
10	0.321
15	0.48
20	0.636
25	0.791
50	1.571

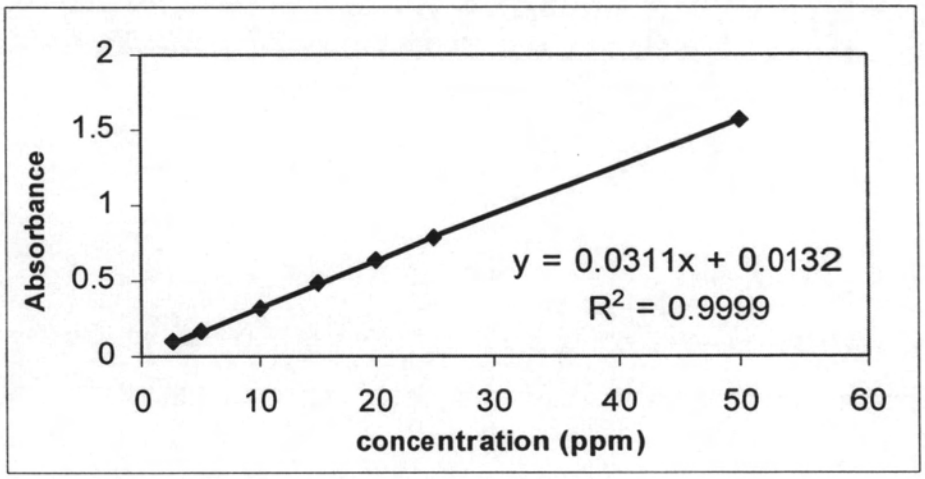

Figure A14 Calibration curve of Sodium diclofenac drug in 5.0% (w/v) sodium tripolyphosphate solution at 276 nm.

Table A6 Absorbance of sodium diclofenac drug in 10.0% sodium tripolyphosphate solution determined at 276 nm.

Concentration (ppm)	Absorbance
2.5	0.077
5	0.15
10	0.307
15	0.455
20	0.609
25	0.767
50	1.547

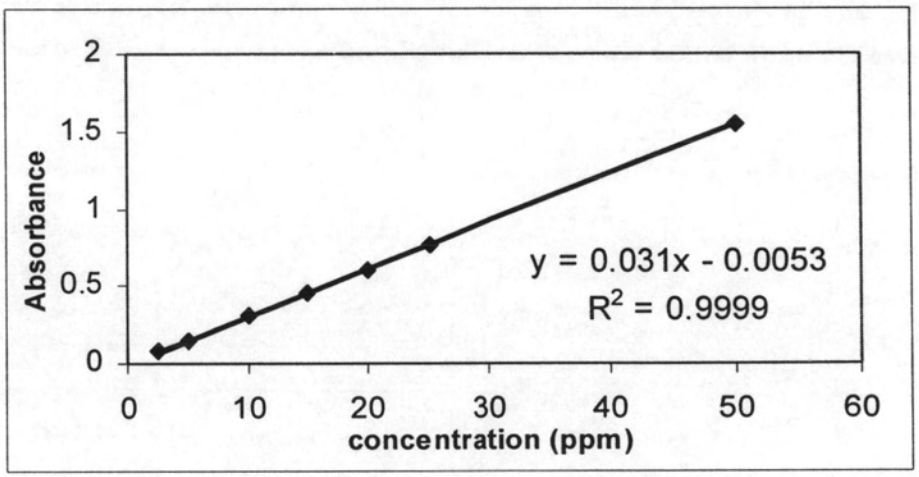

Figure A15 Calibration curve of Sodium diclofenac drug in 10.0% (w/v) sodium tripolyphosphate solution at 276 nm.

Table A7 Absorbance of sodium diclofenac drug in D.I. water determined at 276 nm.

Concentration (ppm)	Absorbance
2.5	0.084
5	0.163
10	0.317
15	0.477
20	0.63
25	0.782
50	1.552

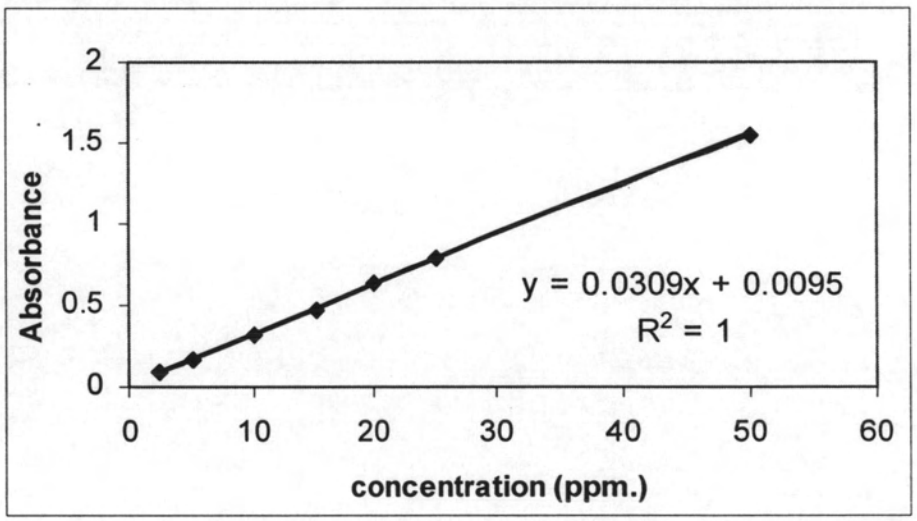

Figure A16 Calibration curve of Sodium diclofenac drug in D.I. water at 276 nm.

APPENDIX B

Swelling Ratio

Table B1 The swelling percent of chitosan bead in 0.1 N HCl (pH 1.2)

Time	Subsyde CR	Formulation A0	Formulation A1	Formulation B	Formulation C
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.13 ± 0.02	*0.79 ± 0.05	1.20 ± 0.12	1.03 ± 0.05	1.38 ± 0.05
2	1.15 ± 0.02	-	1.23 ± 0.09	1.02 ± 0.08	1.60 ± 0.08
3	1.15 ± 0.02	-	-	0.99 ± 0.07	1.65 ± 0.07
4	1.17 ± 0.02	-	-	-	1.83 ± 0.08
5	1.18 ± 0.02	-	-	-	1.94 ± 0.11
6	1.18 ± 0.01	-	-	-	2.04 ± 0.08
24	1.28 ± 0.04	-	-	-	2.11 ± 0.07

*** detected at 30 minute before beads erosions.**
- The erosion of beads was happened.

Table B1 (continued) The swelling percent of chitosan bead in 0.1 N HCl (pH 1.2)

Time	Formulation D	Formulation E	Formulation F	Formulation G	Formulation H
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.94 ± 0.12	1.35 ± 0.13	1.67 ± 0.08	1.33 ± 0.04	1.22 ± 0.12
2	2.07 ± 0.15	1.53 ± 0.12	2.03 ± 0.29	1.49 ± 0.07	1.29 ± 0.13
3	2.19 ± 0.15	1.67 ± 0.19	2.02 ± 0.05	1.64 ± 0.11	1.42 ± 0.16
4	2.23 ± 0.16	1.90 ± 0.22	2.12 ± 0.05	1.84 ± 0.09	1.56 ± 0.19
5	2.14 ± 0.17	2.04 ± 0.22	2.33 ± 0.08	2.03 ± 0.10	1.62 ± 0.21
6	2.13 ± 0.27	2.12 ± 0.21	2.41 ± 0.03	2.14 ± 0.04	1.68 ± 0.13
24	2.21 ± 0.30	2.17 ± 0.22	2.72 ± 0.27	2.18 ± 0.03	1.72 ± 0.07

*** Detected at 30 minute before beads erosions.**
- The erosion of beads was happened.

Table B1 (continued) The swelling percent of chitosan bead in 0.1 N HCl (pH 1.2)

Time (hour)	Formulation J	Formulation K	Formulation L	Formulation M
	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.19 ± 0.10	1.18 ± 0.07	1.23 ± 0.02	1.07 ± 0.03
2	1.27 ± 0.08	1.23 ± 0.06	1.25 ± 0.04	1.11 ± 0.04
3	1.29 ± 0.08	1.28 ± 0.04	1.23 ± 0.04	1.16 ± 0.06
4	1.38 ± 0.12	1.35 ± 0.04	1.25 ± 0.03	1.21 ± 0.03
5	1.42 ± 0.13	1.39 ± 0.05	1.2 ± 0.21	1.23 ± 0.03
6	1.47 ± 0.15	1.49 ± 0.01	1.35 ± 0.09	1.34 ± 0.08
24	2.00 ± 0.14	1.92 ± 0.12	1.74 ± 0.07	1.8 ± 0.10

Table B1 (continued) The swelling percent of chitosan bead in 0.1 N HCl (pH 1.2)

Time	Formulation N	Formulation O	Formulation P	Formulation Q
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.23 ± 0.07	1.23 ± 0.03	1.23 ± 0.02	1.07 ± 0.03
2	1.31 ± 0.07	1.30 ± 0.02	1.25 ± 0.04	1.11 ± 0.04
3	1.35 ± 0.09	1.37 ± 0.01	1.23 ± 0.04	1.16 ± 0.06
4	1.40 ± 0.09	1.40 ± 0.03	1.25 ± 0.03	1.21 ± 0.03
5	1.48 ± 0.11	1.48 ± 0.02	1.20 ± 0.21	1.23 ± 0.03
6	1.63 ± 0.24	1.65 ± 0.12	1.35 ± 0.09	1.34 ± 0.08
24	2.30 ± 0.24	2.29 ± 0.16	1.74 ± 0.07	1.80 ± 0.10

Table B1 (continued) The swelling percent of chitosan bead in 0.1 N HCl (pH 1.2)

Time	Formulation PEG2	Formulation PEG3	Formulation PEG4	Formulation PEG6	Formulation PEG7
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.29 ± 0.01	1.36 ± 0.11	1.41 ± 0.01	1.19 ± 0.04	1.05 ± 0.02
2	1.49 ± 0.02	1.50 ± 0.11	1.51 ± 0.05	1.29 ± 0.04	1.13 ± 0.04
3	1.69 ± 0.07	1.60 ± 0.16	1.62 ± 0.06	1.36 ± 0.04	1.26 ± 0.05
4	1.92 ± 0.09	1.69 ± 0.13	1.77 ± 0.09	1.44 ± 0.05	1.34 ± 0.03
5	1.90 ± 0.12	1.77 ± 0.14	1.94 ± 0.11	1.49 ± 0.04	1.40 ± 0.05
6	1.87 ± 0.15	1.80 ± 0.17	2.13 ± 0.14	1.36 ± 0.30	1.12 ± 0.08
24	-	-	-	-	-

Table B2 The swelling ratios of chitosan bead in Phosphate buffer saline (pH 7.4)

Time	Subsyde CR	Formulation A0	Formulation A1	Formulation B	Formulation C
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.13 ± 0.02	1.03 ± 0.05	1.03 ± 0.07	1.08 ± 0.03	1.08 ± 0.05
2	1.15 ± 0.02	1.03 ± 0.02	1.02 ± 0.04	1.03 ± 0.04	1.08 ± 0.08
3	1.15 ± 0.02	1.06 ± 0.01	0.99 ± 0.06	1.01 ± 0.02	1.09 ± 0.07
4	1.17 ± 0.02	1.07 ± 0.03	1.00 ± 0.04	1.01 ± 0.04	1.07 ± 0.08
5	1.18 ± 0.02	1.07 ± 0.03	1.00 ± 0.06	0.90 ± 0.03	1.08 ± 0.28
6	1.18 ± 0.01	1.08 ± 0.01	1.00 ± 0.05	0.94 ± 0.04	1.09 ± 0.05
24	1.28 ± 0.04	1.08 ± 0.04	1.01 ± 0.04	0.94 ± 0.02	1.07 ± 0.03

Table B2 (continued) The swelling ratios of chitosan bead in Phosphate buffer saline (pH 7.4)

Time (hour)	Formulation D	Formulation E	Formulation F	Formulation G	Formulation H
	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.08 ± 0.06	1.02 ± 0.01	1.07 ± 0.07	1.10 ± 4.36	1.03 ± 0.02
2	1.06 ± 0.03	1.04 ± 0.04	1.07 ± 0.05	1.10 ± 5.79	1.02 ± 0.02
3	1.08 ± 0.04	1.06 ± 0.04	1.08 ± 0.07	1.10 ± 5.43	1.02 ± 0.02
4	1.06 ± 0.04	1.05 ± 0.02	1.08 ± 0.06	1.10 ± 7.44	1.03 ± 0.02
5	1.07 ± 0.03	1.06 ± 0.02	1.07 ± 0.06	1.11 ± 7.57	1.02 ± 0.03
6	1.08 ± 0.02	1.06 ± 0.04	1.08 ± 0.06	1.11 ± 7.06	1.04 ± 0.03
24	1.06 ± 0.03	1.05 ± 0.06	1.05 ± 0.04	1.09 ± 7.38	1.03 ± 0.03

Table B2 (continued) The swelling ratios of chitosan bead in Phosphate buffer saline (pH 7.4)

Time	Formulation J	Formulation K	Formulation L	Formulation M
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	0.97 ± 0.01	0.85 ± 0.05	1.02 ± 0.02	0.88 ± 0.03
2	0.96 ± 0.04	0.85 ± 0.06	1.00 ± 0.04	0.88 ± 0.04
3	0.91 ± 0.04	0.84 ± 0.04	1.00 ± 0.04	0.89 ± 0.03
4	0.94 ± 0.06	0.79 ± 0.04	0.99 ± 0.03	0.90 ± 0.03
5	0.94 ± 0.01	0.79 ± 0.05	1.02 ± 0.02	0.90 ± 0.03
6	0.94 ± 0.01	0.79 ± 0.02	1.00 ± 0.05	0.90 ± 0.04
24	0.94 ± 0.03	0.79 ± 0.02	0.96 ± 0.06	0.88 ± 0.03

Table B2 (continued) The swelling ratios of chitosan bead in Phosphate buffer saline (pH 7.4)

Time	Formulation N	Formulation O	Formulation P	Formulation Q
(hour)	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.01 ± 0.03	1.01 ± 0.03	1.00 ± 0.02	1.04 ± 0.02
2	1.01 ± 0.04	1.02 ± 0.04	1.01 ± 0.03	1.04 ± 0.03
3	1.00 ± 0.03	1.02 ± 0.01	1.01 ± 0.02	1.03 ± 0.02
4	0.99 ± 0.01	0.99 ± 0.02	1.01 ± 0.03	1.03 ± 0.03
5	0.99 ± 0.02	0.99 ± 0.01	1.01 ± 0.02	1.02 ± 0.02
6	0.99 ± 0.03	0.97 ± 0.02	1.01 ± 0.03	1.02 ± 0.03
24	0.98 ± 0.04	0.96 ± 0.04	1.01 ± 0.03	1.03 ± 0.04

Table B2 (continued) The swelling ratios of chitosan bead in Phosphate buffer saline (pH 7.4)

Time (hour)	Formulation PEG2	Formulation PEG3	Formulation PEG4	Formulation PEG6	Formulation PEG7
	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.	Swelling ratio ± S.D.
0	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
1	1.01 ± 0.01	1.01 ± 0.03	1.01 ± 0.02	1.01 ± 0.02	1.03 ± 0.02
2	1.01 ± 0.02	0.99 ± 0.01	1.01 ± 0.01	1.02 ± 0.03	1.04 ± 0.01
3	0.99 ± 0.01	0.99 ± 0.02	0.99 ± 0.01	1.01 ± 0.03	1.02 ± 0.02
4	0.99 ± 0.01	0.99 ± 0.02	0.99 ± 0.03	0.99 ± 0.02	1.02 ± 0.03
5	0.98 ± 0.02	0.98 ± 0.04	0.97 ± 0.01	0.98 ± 0.02	1.01 ± 0.01
6	0.98 ± 0.02	0.97 ± 0.02	0.96 ± 0.01	0.97 ± 0.03	1.03 ± 0.04
24	0.98 ± 0.02	0.96 ± 0.02	0.97 ± 0.03	0.97 ± 0.03	1.01 ± 0.02

APPENDIX C

Percentage of Drug release

Table C1 Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Subsyde® CR capsule	Voltaren tablet	Voltaren SR tablet
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	0.55 ± 0.34	0.16 ± 0.13	0.18 ± 0.02
1:20	0.69 ± 0.30	0.16 ± 0.15	0.19 ± 0.02
2:00	0.75 ± 0.06	0.08 ± 0.06	0.25 ± 0.06
2:15	1.78 ± 0.25	0.27 ± 0.11	0.99 ± 0.11
2:30	4.75 ± 0.52	0.31 ± 0.36	1.03 ± 0.16
2:45	11.05 ± 0.56	0.34 ± 0.23	1.10 ± 0.13
3:00	15.20 ± 0.75	0.38 ± 0.34	1.61 ± 0.15
3:15	23.60 ± 0.84	5.22 ± 0.81	6.91 ± 0.22
3:30	32.84 ± 0.61	39.09 ± 0.53	7.72 ± 0.45
3:45	40.98 ± 0.72	97.32 ± 0.88	8.97 ± 0.11
4:00	47.69 ± 0.91	93.63 ± 0.62	10.69 ± 0.42
4:30	67.31 ± 1.68	94.96 ± 1.33	22.41 ± 0.76
5:00	77.55 ± 1.44	97.26 ± 1.12	28.54 ± 1.02
5:30	85.89 ± 0.88	97.80 ± 0.55	35.30 ± 0.76
6:00	89.36 ± 1.35	98.51 ± 1.41	45.33 ± 0.37
6:30	91.06 ± 1.19	99.37 ± 1.21	52.68 ± 1.58
7:00	92.14 ± 1.71	99.44 ± 1.44	61.21 ± 2.14
7:30	95.52 ± 1.46	98.54 ± 1.51	62.57 ± 1.33
8:00	93.40 ± 1.11	98.92 ± 1.11	62.81 ± 1.79
24:00	94.97 ± 1.03	98.98 ± 1.25	85.56 ± 1.36

Table C1 Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Formulation A1	Formulation C	Formulation D
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	5.03 ± 0.49	3.31 ± 0.48	1.63 ± 0.17
1:20	5.49 ± 0.52	3.70 ± 0.58	1.60 ± 0.31
2:00	5.45 ± 0.69	4.56 ± 0.69	2.28 ± 0.15
2:15	18.04 ± 4.73	7.51 ± 1.06	4.18 ± 0.11
2:30	18.52 ± 7.67	7.91 ± 1.12	4.26 ± 0.18
2:45	20.81 ± 7.66	7.91 ± 1.20	4.33 ± 0.19
3:00	22.05 ± 7.18	8.12 ± 1.26	4.45 ± 0.12
3:15	33.55 ± 5.13	25.01 ± 2.78	17.56 ± 0.31
3:30	34.42 ± 4.03	33.54 ± 2.54	26.80 ± 0.58
3:45	34.67 ± 3.98	37.20 ± 1.05	33.01 ± 1.90
4:00	35.14 ± 4.01	40.83 ± 2.87	36.41 ± 0.75
4:30	35.40 ± 4.18	42.64 ± 4.84	40.55 ± 0.47
5:00	36.40 ± 3.34	44.02 ± 5.93	43.01 ± 0.07
5:30	37.16 ± 4.30	44.30 ± 6.26	44.74 ± 0.01
6:00	36.78 ± 3.08	45.02 ± 6.59	46.09 ± 1.43
6:30	35.25 ± 3.29	45.33 ± 6.61	47.73 ± 2.26
7:00	35.32 ± 3.39	45.77 ± 6.85	48.50 ± 2.30
7:30	35.51 ± 3.67	46.00 ± 7.37	49.20 ± 3.17
8:00	35.86 ± 4.18	46.77 ± 7.47	49.97 ± 3.14
24:00	34.93 ± 3.24	46.83 ± 7.74	50.72 ± 4.23

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Formulation E	Formulation F	Formulation G	Formulation H
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	2.51 ± 0.49	1.60 ± 0.46	1.58 ± 0.13	1.27 ± 0.00
1:20	2.71 ± 0.53	1.66 ± 0.63	1.88 ± 0.10	1.13 ± 0.22
2:00	3.14 ± 0.60	2.11 ± 0.46	2.09 ± 0.17	1.60 ± 0.03
2:15	5.13 ± 0.98	3.48 ± 0.44	3.51 ± 0.27	2.97 ± 0.16
2:30	5.25 ± 0.99	3.53 ± 0.51	3.51 ± 0.19	3.12 ± 0.32
2:45	5.35 ± 1.07	3.56 ± 0.54	3.56 ± 0.18	3.17 ± 0.32
3:00	5.40 ± 1.12	3.65 ± 0.62	3.63 ± 0.15	3.27 ± 0.30
3:15	18.62 ± 7.18	15.21 ± 0.87	11.19 ± 2.94	11.36 ± 2.20
3:30	27.80 ± 6.94	21.52 ± 1.38	15.89 ± 3.96	14.80 ± 1.84
3:45	32.25 ± 8.41	24.54 ± 4.03	19.97 ± 4.30	17.82 ± 1.29
4:00	34.56 ± 8.56	27.18 ± 5.03	22.53 ± 4.42	19.48 ± 1.71
4:30	38.79 ± 10.37	29.75 ± 2.72	26.30 ± 5.06	23.04 ± 0.90
5:00	41.06 ± 11.65	30.82 ± 7.19	29.31 ± 5.45	25.51 ± 0.08
5:30	42.62 ± 12.27	31.46 ± 7.56	30.99 ± 5.88	27.24 ± 0.70
6:00	43.53 ± 12.87	31.89 ± 7.87	33.33 ± 6.70	28.85 ± 0.32
6:30	43.87 ± 13.19	32.38 ± 7.92	34.45 ± 6.67	29.95 ± 0.11
7:00	44.54 ± 13.47	31.97 ± 7.02	35.29 ± 6.91	31.28 ± 0.11
7:30	45.02 ± 13.75	32.94 ± 8.56	36.35 ± 7.41	32.25 ± 0.45
8:00	45.34 ± 14.02	33.15 ± 8.68	37.31 ± 7.75	32.70 ± 0.69
24:00	45.48 ± 13.69	32.80 ± 8.58	42.12 ± 10.54	36.51 ± 2.66

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Formulation J	Formulation K	Formulation L	Formulation M
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	2.64 ± 0.51	4.12 ± 0.59	1.30 ± 0.75	2.49 ± 1.04
1:20	3.28 ± 0.67	4.27 ± 0.62	2.41 ± 1.09	3.00 ± 1.29
2:00	4.67 ± 1.17	4.98 ± 0.26	3.30 ± 1.30	3.80 ± 0.97
2:15	6.94 ± 1.38	8.16 ± 0.30	5.09 ± 1.75	4.49 ± 1.10
2:30	7.21 ± 1.36	8.54 ± 0.33	6.15 ± 1.57	4.77 ± 1.09
2:45	7.31 ± 1.12	9.03 ± 0.44	6.41 ± 1.76	5.04 ± 1.10
3:00	7.29 ± 1.29	9.57 ± 0.63	7.18 ± 1.89	5.14 ± 1.08
3:15	45.52 ± 8.54	41.08 ± 9.56	36.91 ± 4.92	5.22 ± 1.16
3:30	58.23 ± 5.45	65.86 ± 10.54	49.97 ± 5.47	7.72 ± 1.59
3:45	65.75 ± 2.33	75.00 ± 3.97	60.82 ± 2.69	10.79 ± 2.30
4:00	69.81 ± 4.32	81.62 ± 1.88	65.15 ± 5.78	13.70 ± 3.16
4:30	72.86 ± 3.12	86.26 ± 4.87	71.11 ± 4.81	18.13 ± 5.42
5:00	72.97 ± 2.69	91.10 ± 4.20	80.27 ± 3.58	24.11 ± 6.19
5:30	73.98 ± 3.35	92.49 ± 3.84	81.94 ± 3.05	30.05 ± 6.86
6:00	74.79 ± 3.38	94.87 ± 4.29	85.12 ± 2.08	34.85 ± 8.30
6:30	74.89 ± 3.24	94.82 ± 4.36	86.57 ± 1.88	39.38 ± 10.42
7:00	75.85 ± 2.99	96.02 ± 4.31	87.86 ± 1.12	42.37 ± 10.70
7:30	75.99 ± 2.98	96.27 ± 4.44	90.38 ± 0.94	45.75 ± 10.95
8:00	76.48 ± 3.76	96.89 ± 5.19	91.69 ± 1.13	50.38 ± 11.89
24:00	76.40 ± 3.49	97.08 ± 4.52	95.52 ± 3.23	73.28 ± 10.40

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Formulation N	Formulation O	Formulation P	Formulation Q
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	1.14 ± 0.28	1.49 ± 0.57	0.75 ± 0.14	2.35 ± 0.36
1:20	1.47 ± 0.55	1.88 ± 0.58	1.32 ± 0.33	2.51 ± 0.36
2:00	2.16 ± 0.16	3.14 ± 0.57	1.85 ± 0.45	2.75 ± 0.24
2:15	3.25 ± 0.37	4.15 ± 0.69	3.16 ± 1.39	3.69 ± 0.46
2:30	4.00 ± 0.43	4.68 ± 0.60	3.24 ± 1.27	4.01 ± 0.34
2:45	4.40 ± 0.37	5.00 ± 0.63	3.61 ± 1.25	4.31 ± 0.41
3:00	4.83 ± 0.25	5.51 ± 0.60	3.82 ± 1.29	4.51 ± 0.41
3:15	49.61 ± 12.06	37.49 ± 15.74	29.68 ± 6.64	36.63 ± 5.08
3:30	59.91 ± 11.94	45.95 ± 11.45	46.07 ± 6.18	38.28 ± 1.95
3:45	67.17 ± 13.11	55.38 ± 12.73	55.74 ± 4.98	42.42 ± 0.72
4:00	72.95 ± 10.17	66.48 ± 13.77	61.90 ± 6.44	44.15 ± 0.38
4:30	76.38 ± 7.76	75.10 ± 10.40	69.99 ± 5.96	44.94 ± 0.90
5:00	81.58 ± 5.25	80.40 ± 9.20	75.80 ± 6.14	46.27 ± 1.71
5:30	83.46 ± 5.09	84.84 ± 9.00	79.21 ± 4.45	46.17 ± 1.27
6:00	85.47 ± 4.71	87.08 ± 8.86	80.94 ± 4.25	45.80 ± 1.49
6:30	87.85 ± 4.41	89.61 ± 8.01	83.66 ± 3.66	46.23 ± 1.04
7:00	90.01 ± 5.03	91.93 ± 7.93	84.89 ± 4.43	45.54 ± 1.56
7:30	89.77 ± 3.30	95.02 ± 6.13	83.60 ± 5.14	45.37 ± 1.64
8:00	91.53 ± 2.07	96.62 ± 7.55	85.34 ± 6.13	46.26 ± 2.31
24:00	93.41 ± 0.79	99.79 ± 6.05	88.39 ± 8.26	45.40 ± 1.12

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time	Formulation PEG1	Formulation PEG2	Formulation PEG3	Formulation PEG4
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	1.42 ± 0.21	0.04 ± 0.08	0.43 ± 0.28	2.44 ± 1.38
1:20	2.40 ± 0.38	0.13 ± 0.23	1.21 ± 0.36	3.69 ± 2.05
2:00	2.22 ± 0.11	0.45 ± 0.28	1.11 ± 0.46	3.97 ± 2.74
2:15	3.35 ± 0.11	0.03 ± 0.10	1.85 ± 0.68	6.08 ± 3.18
2:30	3.69 ± 0.17	0.29 ± 0.12	2.22 ± 0.81	6.54 ± 3.19
2:45	3.82 ± 0.12	0.60 ± 0.08	2.62 ± 0.65	6.65 ± 3.15
3:00	3.94 ± 0.14	1.46 ± 0.08	2.99 ± 0.91	7.01 ± 3.20
3:15	14.58 ± 3.04	21.96 ± 4.88	18.91 ± 7.67	29.88 ± 8.17
3:30	20.64 ± 2.22	37.67 ± 7.29	31.68 ± 9.73	31.08 ± 9.23
3:45	31.38 ± 4.75	46.15 ± 9.48	42.13 ± 8.89	34.17 ± 9.15
4:00	38.21 ± 2.73	50.96 ± 8.25	48.32 ± 10.67	35.82 ± 9.89
4:30	42.25 ± 1.13	59.56 ± 5.46	51.95 ± 6.72	35.21 ± 11.66
5:00	50.92 ± 1.83	66.56 ± 4.19	57.22 ± 8.31	35.63 ± 11.61
5:30	55.58 ± 0.90	73.08 ± 2.57	61.38 ± 7.37	36.01 ± 11.25
6:00	61.48 ± 2.17	75.20 ± 2.71	64.69 ± 4.46	36.67 ± 11.56
6:30	60.38 ± 2.47	78.12 ± 5.40	73.25 ± 3.83	35.72 ± 11.72
7:00	63.22 ± 2.27	80.07 ± 3.94	77.14 ± 3.55	35.60 ± 12.15
7:30	64.74 ± 1.85	80.68 ± 3.40	77.86 ± 3.28	35.56 ± 11.91
8:00	66.66 ± 2.21	84.57 ± 7.19	79.64 ± 2.74	35.10 ± 12.05
24:00	74.19 ± 10.87	92.66 ± 0.62	83.35 ± 5.36	35.10 ± 12.39

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5in pH-alternating method

Time	Formulation PEG5	Formulation PEG6	Formulation PEG7
(hr:min)	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	2.61 ± 0.47	0.26 ± 0.54	1.25 ± 0.21
1:20	4.35 ± 0.26	0.70 ± 0.40	1.51 ± 0.20
2:00	3.10 ± 0.22	0.83 ± 0.43	1.24 ± 0.30
2:15	7.64 ± 0.96	1.17 ± 0.77	2.29 ± 0.37
2:30	7.73 ± 0.97	1.37 ± 0.79	2.46 ± 0.34
2:45	8.08 ± 0.52	1.55 ± 0.78	2.55 ± 0.33
3:00	8.31 ± 0.55	1.99 ± 0.78	2.54 ± 0.32
3:15	28.30 ± 4.77	25.11 ± 5.74	20.99 ± 3.78
3:30	45.40 ± 4.34	32.61 ± 3.80	31.58 ± 3.79
3:45	50.01 ± 3.17	40.39 ± 3.71	36.22 ± 4.38
4:00	55.99 ± 9.61	44.71 ± 1.83	42.78 ± 3.81
4:30	58.12 ± 5.90	51.46 ± 4.60	49.64 ± 4.14
5:00	62.11 ± 2.40	58.54 ± 2.02	57.10 ± 3.11
5:30	63.33 ± 3.01	60.82 ± 2.93	59.67 ± 2.96
6:00	65.91 ± 2.51	64.26 ± 3.57	61.90 ± 2.98
6:30	64.79 ± 3.46	66.70 ± 3.22	63.91 ± 3.30
7:00	64.17 ± 3.23	69.15 ± 3.85	66.26 ± 2.03
7:30	66.07 ± 6.92	68.28 ± 7.04	68.08 ± 2.20
8:00	62.42 ± 3.83	69.97 ± 7.97	68.10 ± 2.18
24:00	63.30 ± 4.49	80.79 ± 4.38	75.45 ± 3.26

Table C1 (continued) Percentage of DFNa release from commercial products and the beads from formulation A-GD7.5 in pH-alternating method

Time (hr:min)	Formulation GD2.5%	Formulation GD5	Formulation GD7.5
	% drug release ± S.D.	% drug release ± S.D.	% drug release ± S.D.
0:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
0:40	4.10 ± 1.49	4.71 ± 0.46	3.49 ± 0.66
1:20	5.15 ± 1.45	6.03 ± 1.09	4.49 ± 0.61
2:00	5.57 ± 1.40	6.61 ± 0.30	4.67 ± 0.60
2:15	6.78 ± 1.66	7.90 ± 0.15	5.72 ± 0.76
2:30	7.01 ± 1.80	8.30 ± 0.60	9.47 ± 3.39
2:45	7.32 ± 1.94	8.43 ± 0.55	6.33 ± 1.07
3:00	7.63 ± 1.90	8.73 ± 0.45	6.68 ± 0.93
3:15	16.38 ± 3.96	13.21 ± 0.73	12.72 ± 0.17
3:30	29.67 ± 3.04	24.75 ± 1.93	26.17 ± 2.08
3:45	38.82 ± 2.52	32.36 ± 2.01	32.85 ± 3.48
4:00	46.67 ± 2.90	41.04 ± 2.80	39.77 ± 3.89
4:30	55.69 ± 2.27	48.92 ± 1.75	47.26 ± 3.62
5:00	60.28 ± 1.17	50.76 ± 2.65	51.97 ± 1.76
5:30	68.59 ± 2.27	61.61 ± 2.07	61.02 ± 2.83
6:00	76.75 ± 1.03	69.57 ± 2.68	69.46 ± 2.33
6:30	83.42 ± 1.05	73.68 ± 1.36	74.69 ± 1.43
7:00	86.29 ± 1.17	78.76 ± 2.86	77.77 ± 1.61
7:30	89.27 ± 1.42	81.75 ± 1.32	81.94 ± 1.62
8:00	91.31 ± 0.33	83.61 ± 1.47	82.78 ± 0.37
24:00	99.83 ± 1.10	99.61 ± 0.60	97.14 ± 0.97

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