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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

APPENDICES

สถาบันวิทยบริการ
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Appendix A

Calibration Curve

The concentration versus absorbance of Diltiazem HCl in various medium at 237 nm is presented in the Tables a1-a9. The calibration curves of Diltiazem HCl and a linear relationship with the correlation of determination are illustrated in Figures a2-a10.

Table a1. Absorbance of DTZ HCl in D.I. water determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.059	0.106	0.106	0.108	0.107	0.001	1.083
4.118	0.209	0.209	0.209	0.209	0.000	0.000
6.117	0.317	0.316	0.314	0.316	0.002	0.484
8.236	0.424	0.421	0.422	0.422	0.002	0.362
10.295	0.534	0.537	0.534	0.535	0.002	0.324
12.354	0.641	0.641	0.641	0.641	0.000	0.000
16.472	0.858	0.859	0.857	0.858	0.001	0.117

Table a2. Absorbance of DTZ HCl in pH 1.2 hydrochloric buffer medium determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.001	0.124	0.122	0.12	0.122	0.002	1.639
4.002	0.224	0.219	0.221	0.221	0.003	1.137
6.003	0.332	0.335	0.333	0.333	0.002	0.458
8.004	0.436	0.439	0.437	0.437	0.002	0.349
10.005	0.544	0.544	0.542	0.543	0.001	0.213
12.006	0.651	0.647	0.641	0.646	0.005	0.779
16.008	0.849	0.854	0.857	0.853	0.004	0.474

Table a3. Absorbance of DTZ HCl in pH 6.8 phosphate buffer medium determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.11	0.11	0.11	0.11	0.000	0.000
4	0.212	0.211	0.212	0.212	0.001	0.273
6	0.325	0.327	0.325	0.326	0.001	0.355
8	0.429	0.426	0.433	0.429	0.004	0.818
10	0.542	0.543	0.539	0.541	0.002	0.385
12	0.635	0.63	0.637	0.634	0.004	0.569
16	0.861	0.848	0.843	0.851	0.009	1.092

Table a4. Absorbance of DTZ HCl in 0.8 osmolal sodium chloride solution determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.112	0.113	0.114	0.113	0.001	0.885
4	0.215	0.215	0.215	0.215	0.000	0.000
6	0.322	0.32	0.322	0.321	0.001	0.359
8	0.425	0.424	0.425	0.425	0.001	0.136
10	0.565	0.567	0.564	0.565	0.002	0.270
12	0.631	0.635	0.631	0.632	0.002	0.365
16	0.837	0.831	0.835	0.834	0.003	0.366

Table a5. Absorbance of DTZ HCl in 1.0 osmolal sodium chloride solution determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.112	0.121	0.116	0.116	0.005	3.876
4	0.217	0.217	0.216	0.217	0.001	0.266
6	0.322	0.322	0.323	0.322	0.001	0.179
8	0.428	0.43	0.434	0.431	0.003	0.709
10	0.541	0.542	0.542	0.542	0.001	0.107
12	0.628	0.628	0.634	0.630	0.003	0.550
16	0.823	0.823	0.829	0.825	0.003	0.420

Table a6. Absorbance of Diltiazem HCl in 1.2 osmolal sodium chloride solution determined at 237 nm.

conc.mcg/ml	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.112	0.111	0.116	0.113	0.003	2.341
4	0.223	0.221	0.22	0.221	0.002	0.690
6	0.331	0.33	0.33	0.330	0.001	0.175
8	0.434	0.433	0.435	0.434	0.001	0.230
10	0.552	0.55	0.55	0.551	0.001	0.210
12	0.631	0.629	0.633	0.631	0.002	0.317
16	0.838	0.844	0.844	0.842	0.003	0.411

Table a7. Absorbance of Diltiazem HCl in 0.8 osmolal sodium sulphate solution determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.112	0.115	0.116	0.114	0.002	1.821
4	0.219	0.219	0.219	0.219	0.000	0.000
6	0.326	0.326	0.326	0.326	0.000	0.000
8	0.432	0.436	0.429	0.432	0.004	0.812
10	0.565	0.563	0.565	0.564	0.001	0.205
12	0.633	0.628	0.631	0.631	0.003	0.399
16	0.841	0.844	0.842	0.842	0.002	0.181

Table a8. Absorbance of Diltiazem HCl in 1.0 osmolal sodium sulphate solution determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.118	0.124	0.114	0.119	0.005	4.241
4	0.216	0.218	0.217	0.217	0.001	0.461
6	0.32	0.321	0.326	0.322	0.003	0.997
8	0.424	0.437	0.432	0.431	0.007	1.521
10	0.564	0.561	0.556	0.560	0.004	0.721
12	0.641	0.64	0.641	0.641	0.001	0.090
16	0.844	0.847	0.842	0.844	0.003	0.298

Table a9. Absorbance of Diltiazem HCl in 1.2 osmolal sodium sulphate solution determined at 237 nm.

conc.(mcg/ml)	1	2	3	av.	s.d.	% c.v.
0	0.000	0.000	0.000	0.000	0.000	0.000
2	0.12	0.119	0.116	0.118	0.002	1.759
4	0.21	0.215	0.217	0.214	0.004	1.685
6	0.316	0.315	0.32	0.317	0.003	0.835
8	0.419	0.418	0.418	0.418	0.001	0.138
10	0.532	0.532	0.527	0.530	0.003	0.544
12	0.625	0.627	0.627	0.626	0.001	0.184
16	0.833	0.833	0.833	0.833	0.000	0.000

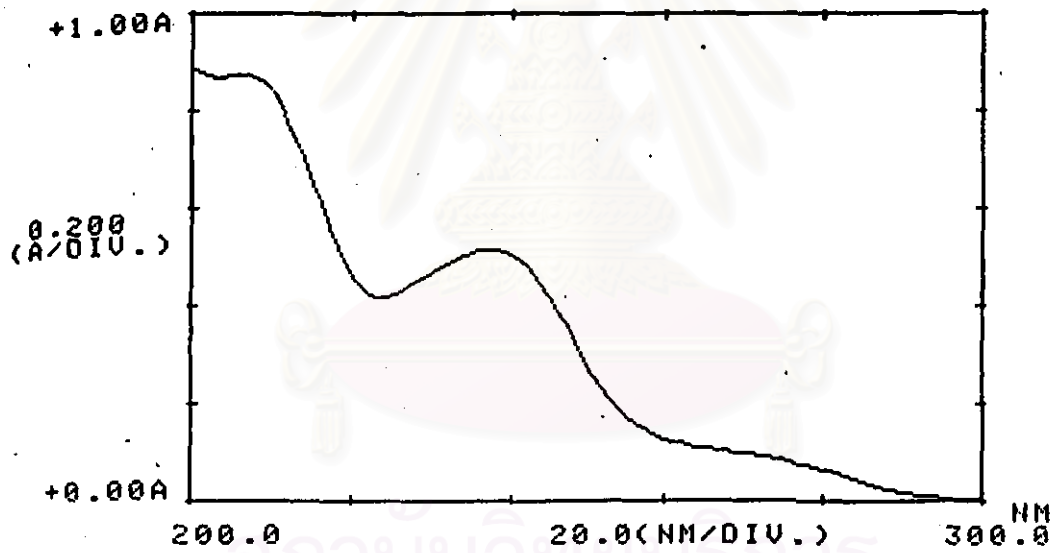

Figure a1. The UV spectrum of DTZ HCl in water.

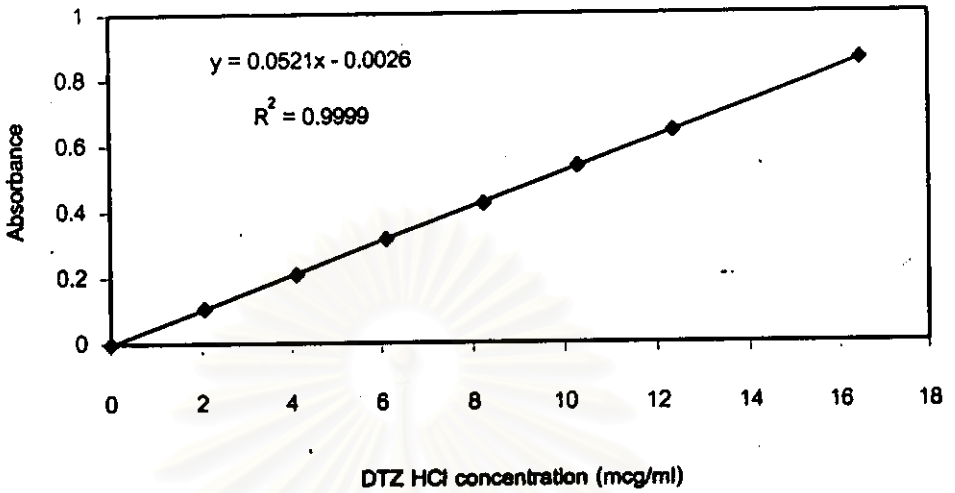

Figure a2. Calibration curve of DTZ HCl in water at 237 nm.

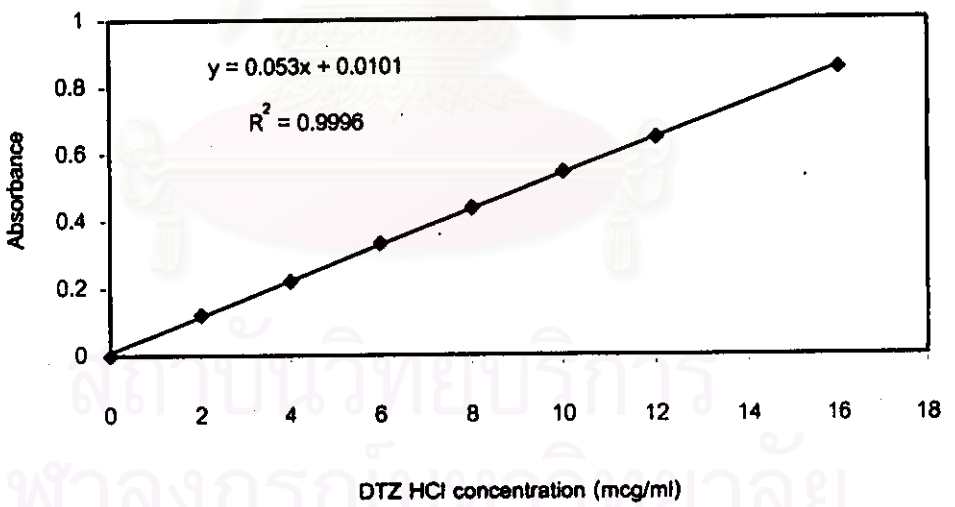

Figure a3. Calibration curve of DTZ HCl in pH 1.2 phosphate buffer medium at 237 nm.

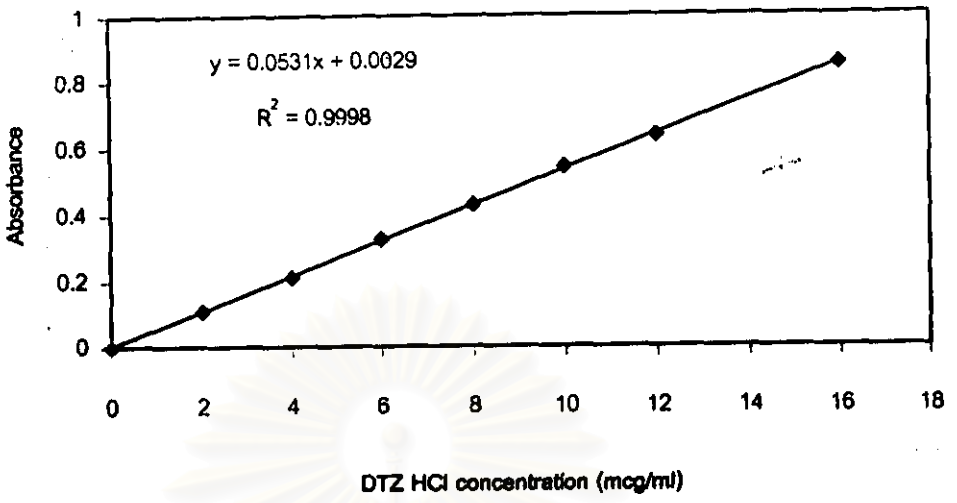

Figure a4. Calibration curve of DTZ HCl in pH6.8 phosphate buffer medium at 237 nm.

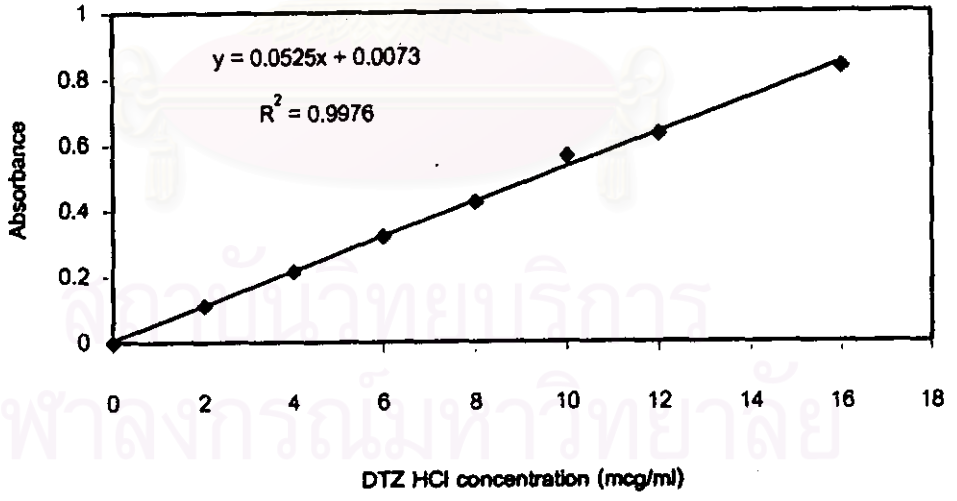

Figure a5. Calibration curve of DTZ HCl in 0.8 osmolal sodium chloride solution at 237 nm.

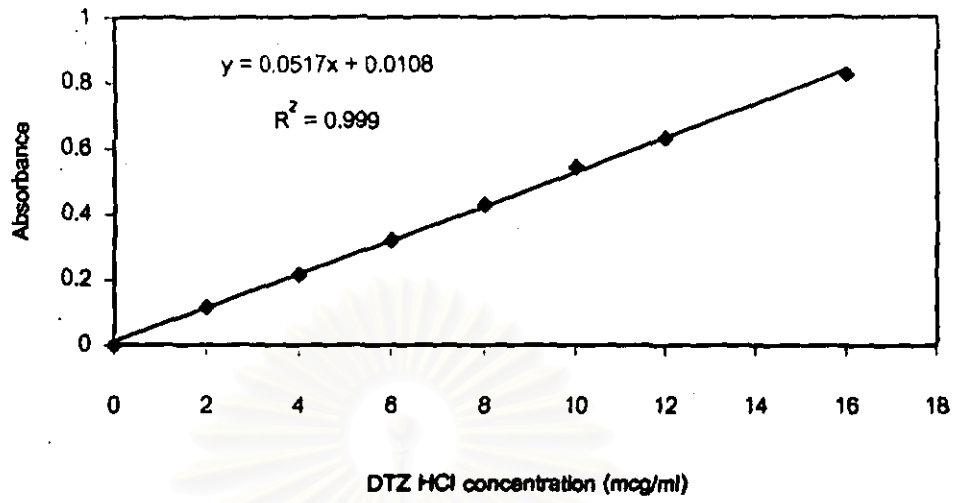

Figure a6. Calibration curve of DTZ HCl in 1.0 osmolal sodium chloride solution at 237 nm.

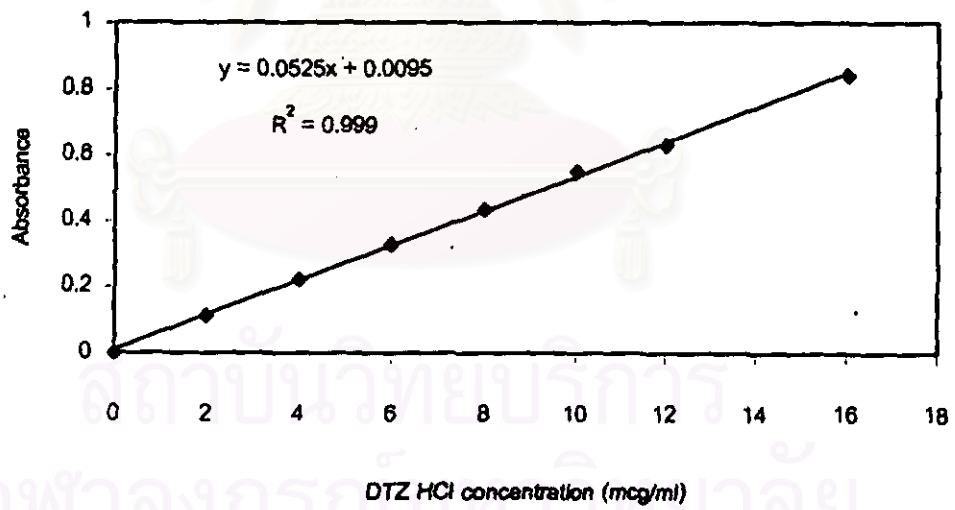

Figure a7. Calibration curve of DTZ HCl in 1.2 osmolal sodium chloride solution at 237 nm.

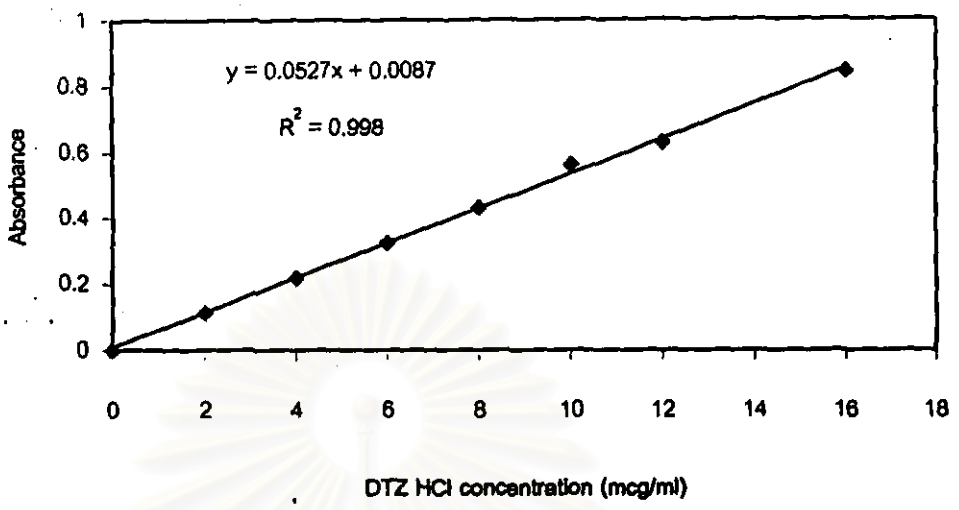

Figure a8. Calibration curve of DTZ HCl in 0.8 osmolal sodum sulphate solution at 237 nm.

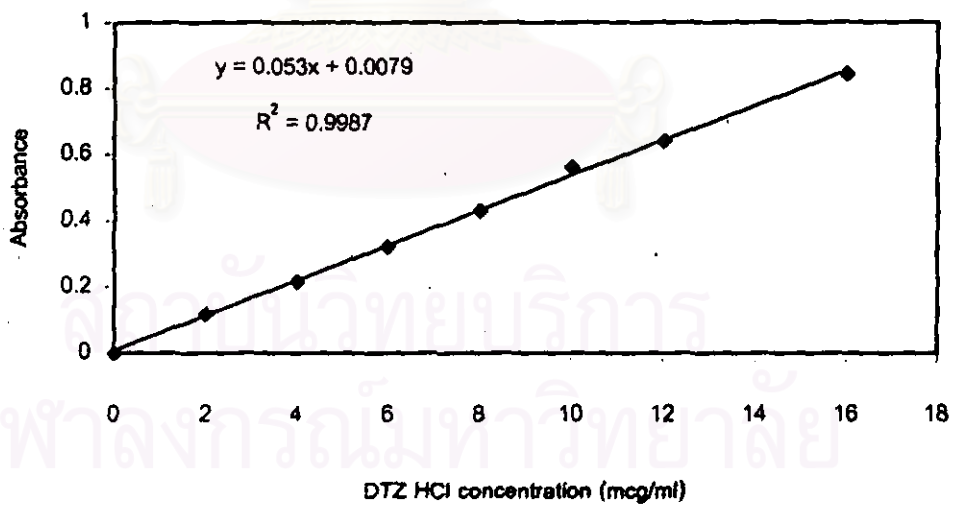

Figure a9. Calibration curve of DTZ HCl in 1.0 osmolal sodium sulphate solution at 237 nm.

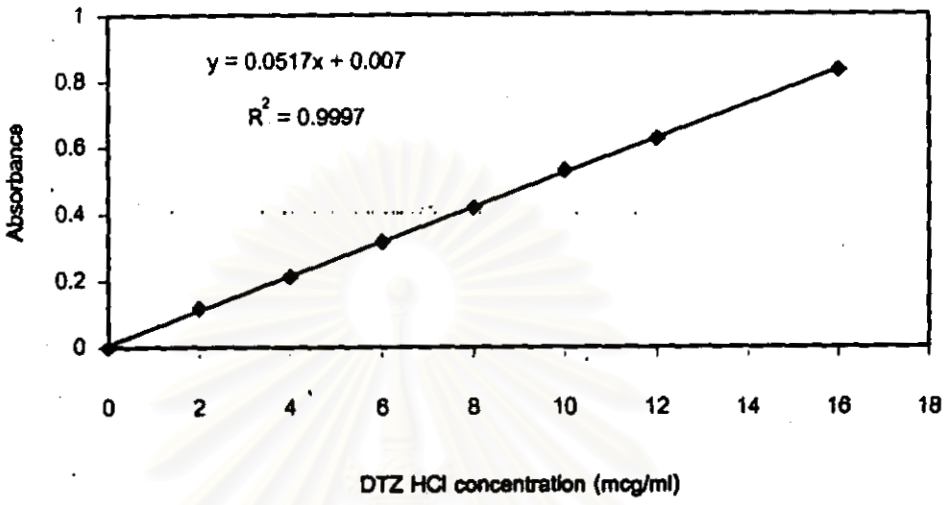

Figure a10. Calibration curve of DTZ HCl in 1.2 osmolal sodium sulphate solution at 237 nm.

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APPENDIX B

Image Analysis

Table B1. Data from image analyzer.

DTZ90MG.2.0%BINDER					
NO.	PERIMETER (mm)	AREA(mm.^2)	FERETMIN (mm)	FERETMAX (mm)	FERETRATIO
1	3.26	0.74	0.94	1.05	0.89
2	3.3	0.78	0.96	1.06	0.9
3	3.32	0.78	0.98	1.04	0.94
4	3.38	0.78	0.92	1.1	0.84
5	3.55	0.88	0.94	1.19	0.79
6	3.39	0.81	0.99	1.07	0.92
7	3.66	0.94	1.01	1.21	0.84
8	4.14	1.18	1.16	1.32	0.88
9	3.75	0.95	0.99	1.23	0.8
10	3.71	0.97	1.05	1.2	0.87
11	3.8	1.02	1.05	1.24	0.85
12	3.76	0.95	0.98	1.22	0.81
13	3.44	0.83	0.99	1.13	0.88
14	3.73	0.98	1.08	1.19	0.91
15	3.73	0.98	1.08	1.18	0.91
16	3.38	0.8	0.96	1.08	0.89
17	3.55	0.87	0.98	1.16	0.84
18	3.39	0.81	1	1.08	0.92
19	3.41	0.81	0.95	1.11	0.85
20	3.41	0.83	0.97	1.11	0.87
21	3.72	0.96	0.98	1.25	0.78
22	3.32	0.79	0.94	1.09	0.86
23	3.13	0.69	0.9	0.99	0.91

Table B1. (Cont.)

24	4.13	1.16	1.05	1.4	0.75
25	3.77	0.96	0.95	1.26	0.75
26	3.39	0.8	0.95	1.1	0.87
27	3.66	0.95	1.05	1.18	0.9
28	3.68	0.93	0.97	1.22	0.79
29	3.35	0.79	0.94	1.11	0.85
30	3.35	0.78	0.98	1.07	0.92
31	3.7	0.93	1.02	1.21	0.85
32	3.72	0.96	1.06	1.19	0.89
33	3.74	0.98	1.09	1.19	0.92
34	3.42	0.82	0.97	1.11	0.87
35	3.15	0.69	0.92	1.02	0.9
36	3.31	0.78	0.98	1.05	0.93
37	3.43	0.83	0.98	1.13	0.87
38	4.08	1.18	1.15	1.32	0.87
39	3.39	0.82	1	1.08	0.92
40	3.77	0.98	0.99	1.26	0.78
41	3.23	0.74	0.93	1.04	0.89
42	3.41	0.81	0.99	1.07	0.93
43	3.77	1	1.03	1.23	0.84
44	3.38	0.8	0.96	1.08	0.88
45	3.76	0.98	1.01	1.25	0.81
46	3.28	0.77	0.94	1.06	0.88
47	3.62	0.92	1.01	1.18	0.86
48	3.72	0.91	0.94	1.21	0.77
49	3.46	0.85	0.97	1.14	0.85
50	4.06	1.11	1.02	1.36	0.75
51	3.69	0.92	0.92	1.24	0.74

Table B1. (Cont.)

52	3.05	0.65	0.88	0.98	0.9
53	3.3	0.75	0.94	1.07	0.88
54	3.45	0.83	0.94	1.13	0.83
55	3.43	0.81	0.97	1.1	0.88
56	3.3	0.77	0.92	1.07	0.86
57	3.34	0.79	0.98	1.07	0.92
58	3.36	0.78	0.94	1.08	0.87
59	3.37	0.8	0.96	1.11	0.86
60	3.72	0.9	0.95	1.19	0.8
61	3.66	0.94	1.07	1.18	0.91
62	3.69	0.94	1.06	1.17	0.91
63	3.72	0.97	1.02	1.21	0.84
64	3.61	0.9	0.98	1.18	0.83
65	3.61	0.91	1.02	1.16	0.88
66	3.33	0.77	0.97	1.04	0.93
67	4.03	1.15	1.13	1.31	0.86
68	3.62	0.89	0.96	1.19	0.81
69	3.2	0.73	0.92	1.02	0.91
70	3.21	0.74	0.96	1.03	0.93
71	3.52	0.85	0.94	1.17	0.8
72	3.22	0.72	0.88	1.07	0.83
73	3.11	0.68	0.91	1	0.91
74	3.45	0.82	0.97	1.11	0.87
75	3.17	0.71	0.88	1.04	0.85
76	3.06	0.88	0.91	1.19	0.77
77	3.54	0.88	0.99	1.16	0.85
78	7.72	2.12	1.19	2.55	0.47
79	3.35	0.78	0.94	1.06	0.89

Table B1. (Cont.)

80	3.18	0.71	0.91	1.04	0.87
81	3.71	0.97	1.02	1.23	0.83
82	3.33	0.79	0.99	1.05	0.94
83	3.73	0.95	0.95	1.25	0.77
84	3.34	0.79	0.99	1.06	0.94
85	3.34	0.79	0.96	1.1	0.87
86	4.04	1.15	1.13	1.31	0.86
87	3.26	0.76	0.97	1.04	0.94
88	3.02	0.65	0.89	0.96	0.93
89	3.36	0.79	0.96	1.09	0.88
90	3.64	0.93	1.06	1.17	0.91
91	3.64	0.92	1.04	1.16	0.9
92	3.56	0.89	1	1.16	0.86
93	3.23	0.73	0.94	1.03	0.92
94	3.26	0.73	0.9	1.06	0.85
95	3.61	0.89	0.96	1.19	0.81
96	3.62	0.91	1.03	1.16	0.89
97	3.27	0.75	0.92	1.06	0.87
98	3.34	0.79	0.92	1.08	0.85
99	3.41	0.8	0.97	1.13	0.86
100	3.54	0.87	1	1.14	0.88
AV.	3.548	0.873	0.983	1.152	0.861
s.d.	0.486	0.171	0.061	0.166	0.063
%CV	13.708	19.572	6.238	14.446	7.297
DTZ90MG.1.5%BINDER					
NO.	**PERIMETER (mm)**	**AREA(mm.^2)**	**FERETMIN (mm)**	**FERETMAX (mm)**	**FERETRATIO**
1	3.94	1.08	1.13	1.25	0.9
2	3.8	0.96	1.05	1.2	0.88

Table B1. (Cont.)

3	3.77	0.97	1.02	1.21	0.85
4	3.82	0.99	1.02	1.26	0.81
5	4.05	1.14	1.18	1.3	0.91
6	4.11	1.16	1.14	1.35	0.85
7	3.47	0.85	0.98	1.14	0.86
8	3.56	0.89	1.03	1.15	0.9
9	3.92	1.09	1.12	1.26	0.89
10	3.91	1.08	1.13	1.26	0.90
11	3.49	0.86	0.98	1.17	0.84
12	3.71	0.93	1.02	1.21	0.84
13	3.35	0.79	0.94	1.13	0.84
14	3.99	1.1	1.11	1.29	0.86
15	3.93	1.08	1.11	1.29	0.86
16	3.24	0.74	0.96	1.02	0.94
17	3.94	1.07	1.13	1.25	0.9
18	4.46	1.38	1.22	1.47	0.83
19	3.55	0.87	1.03	1.12	0.92
20	3.84	1.03	1.13	1.2	0.95
21	3.07	0.64	0.8	1.02	0.78
22	3.38	0.78	0.88	1.11	0.79
23	3.24	0.74	0.95	1.03	0.92
24	3.22	0.73	0.92	1.08	0.85
25	3.41	0.8	0.94	1.11	0.85
26	3.13	0.66	0.84	1	0.84
27	3.3	0.75	0.96	1.05	0.91
28	3.52	0.87	0.97	1.19	0.82
29	3.75	0.97	1.03	1.22	0.84
30	4.11	1.16	1.18	1.33	0.89

Table B1. (Cont.)

31	3.41	0.8	0.91	1.11	0.82
32	4	1.13	1.17	1.27	0.92
33	3.94	1.09	1.12	1.27	0.88
34	3.67	0.92	1.01	1.2	0.84
35	3.91	1.08	1.13	1.25	0.9
36	3.84	1.01	1.12	1.21	0.92
37	3.45	0.82	0.94	1.14	0.82
38	3.94	1.07	1.09	1.3	0.84
39	3.86	1.05	1.12	1.26	0.88
40	4.48	1.38	1.22	1.46	0.84
41	4.01	1.12	1.18	1.26	0.93
42	3.3	0.76	0.94	1.04	0.9
43	3.49	0.85	1.03	1.13	0.91
44	3.91	1.08	1.1	1.28	0.86
45	3.88	1.05	1.14	1.21	0.94
46	3.7	0.92	0.96	1.24	0.78
47	3.38	0.77	0.96	1.07	0.89
48	3.27	0.74	0.94	1.07	0.88
49	3.27	0.74	0.91	1.09	0.83
50	3.55	0.85	1.03	1.1	0.94
51	3.38	0.78	0.94	1.12	0.84
52	3.57	0.9	1.05	1.13	0.93
53	3.41	0.81	1	1.1	0.91
54	3.42	0.82	0.97	1.1	0.89
55	3.78	0.96	0.99	1.28	0.77
56	3.88	1.05	1.14	1.21	0.95
57	3.37	0.79	0.96	1.07	0.9
58	3.47	0.86	1	1.12	0.89

Table B1. (Cont.)

59	3.97	1.11	1.11	1.29	0.86
60	4.05	1.11	1.15	1.26	0.91
61	4.46	1.36	1.21	1.45	0.84
62	3.42	0.81	0.92	1.14	0.81
63	3.86	1.05	1.12	1.24	0.9
64	3.93	1.08	1.11	1.3	0.85
65	3.83	0.99	1.11	1.21	0.91
66	3.91	1.07	1.13	1.24	0.91
67	3.64	0.91	1.01	1.2	0.84
68	3.4	0.78	0.9	1.1	0.82
69	3.86	1.03	1.08	1.24	0.87
70	3.93	1.08	1.13	1.25	0.9
71	3.71	0.92	0.99	1.21	0.82
72	3.42	0.78	0.92	1.14	0.8
73	3.17	0.7	0.92	1.01	0.91
74	3.94	1.06	1.1	1.31	0.84
75	2.99	0.61	0.81	0.97	0.84
76	3.39	0.79	0.94	1.12	0.84
77	3.45	0.84	0.96	1.14	0.84
78	3.37	0.8	0.99	1.07	0.93
79	3.43	0.8	0.89	1.12	0.8
80	3.17	0.68	0.82	1.04	0.79
81	3.62	0.9	1.03	1.14	0.91
82	3.92	1.08	1.17	1.22	0.96
83	4.49	1.39	1.22	1.48	0.83
84	3.93	1.09	1.15	1.26	0.91
85	3.36	0.78	0.98	1.06	0.93
86	3.98	1.09	1.11	1.32	0.84

Table B1. (Cont.)

87	3.39	0.81	0.96	1.13	0.85
88	3.97	1.1	1.11	1.28	0.87
89	3.68	0.92	1.03	1.19	0.86
90	3.47	0.82	0.94	1.18	0.8
91	3.9	1.06	1.11	1.26	0.88
92	3.47	0.82	0.99	1.1	0.9
93	3.52	0.86	1.03	1.11	0.93
94	3.91	1.06	1.09	1.25	0.87
95	4.06	1.12	1.13	1.35	0.84
96	4.01	1.11	1.15	1.27	0.91
97	3.85	1	1.03	1.27	0.81
98	3.76	0.97	1.07	1.21	0.88
99	3.68	0.93	1	1.23	0.82
100	3.9	1.05	1.11	1.24	0.89
AV.	3.687	0.947	1.037	1.194	0.869
s.d.	0.320	0.166	0.099	0.104	0.044
%CV	8.685	17.537	9.546	8.752	5.115
DTZ90MG.1.0%BINDER					
NO.	PERIMETER (mm)	AREA(mm.^2)	FERETMIN (mm)	FERETMAX (mm)	FERETRATIO
1	3.3	0.77	0.94	1.1	0.85
2	3.27	0.76	0.96	1.03	0.93
3	3.31	0.76	0.9	1.08	0.83
4	3.31	0.76	0.94	1.04	0.9
5	3.15	0.7	0.85	1.04	0.82
6	3.85	1.03	1.11	1.22	0.91
7	3.54	0.9	1.05	1.12	0.94
8	3.51	0.85	1.02	1.11	0.91
9	3.31	0.76	0.98	1.07	0.92

Table B1. (Cont.)

10	3.32	0.78	0.95	1.04	0.92
11	2.93	0.61	0.86	0.94	0.92
12	3.3	0.77	0.98	1.04	0.94
13	3.1	0.67	0.83	1.02	0.81
14	3.94	1.07	1.07	1.29	0.83
15	3.25	0.74	0.88	1.06	0.83
16	3.37	0.79	0.89	1.15	0.77
17	3.15	0.7	0.87	1.04	0.84
18	3.3	0.77	0.96	1.04	0.92
19	3.31	0.76	0.9	1.07	0.84
20	3.9	1.07	1.13	1.24	0.91
21	3.44	0.82	0.96	1.12	0.86
22	3.22	0.74	0.96	1.02	0.94
23	3.34	0.79	0.93	1.1	0.85
24	3.91	1.09	1.11	1.26	0.88
25	3.57	0.9	1.06	1.11	0.95
26	3.28	0.74	0.92	1.07	0.85
27	3.23	0.74	0.96	1.03	0.94
28	3.52	0.88	1.03	1.12	0.92
29	3.3	0.76	0.97	1.04	0.93
30	3.3	0.77	0.98	1.04	0.94
31	3.36	0.76	0.89	1.09	0.82
32	3.82	1.03	1.12	1.22	0.92
33	3.86	1.05	1.08	1.26	0.86
34	3.92	1.08	1.13	1.24	0.91
35	3.98	1.13	1.16	1.27	0.91
36	3.24	0.72	0.85	1.08	0.79
37	3.51	0.87	1.02	1.15	0.88

Table B1. (Cont.)

38	3.16	0.69	0.85	1.04	0.82
39	3.62	0.93	1.08	1.12	0.96
40	3.32	0.77	0.9	1.07	0.84
41	3.38	0.79	1	1.05	0.95
42	3.33	0.77	0.96	1.05	0.92
43	3.28	0.74	0.87	1.08	0.81
44	3.17	0.7	0.88	1.04	0.85
45	3.36	0.8	0.92	1.11	0.83
46	3.24	0.75	0.96	1.03	0.93
47	2.88	0.59	0.83	0.93	0.89
48	3.24	0.74	0.96	1.04	0.92
49	3.38	0.77	0.88	1.13	0.78
50	3.43	0.82	0.95	1.12	0.86
51	3.3	0.76	0.96	1.03	0.93
52	3.32	0.76	0.94	1.11	0.85
53	3.35	0.76	0.94	1.04	0.9
54	3.31	0.76	0.9	1.08	0.83
55	3.16	0.7	0.85	1.03	0.82
56	3.82	1.03	1.11	1.22	0.91
57	3.59	0.89	1.05	1.12	0.94
58	3.47	0.85	1.02	1.11	0.91
59	3.27	0.76	0.96	1.06	0.9
60	3.36	0.77	0.95	1.05	0.91
61	2.92	0.61	0.86	0.93	0.93
62	3.09	0.67	0.83	1.02	0.81
63	3.27	0.76	0.98	1.04	0.94
64	3.94	1.06	1.06	1.29	0.83
65	3.24	0.73	0.88	1.06	0.83

Table B1. (Cont.)

66	3.42	0.78	0.88	1.14	0.77
67	3.15	0.69	0.87	1.03	0.84
68	3.26	0.77	0.96	1.04	0.92
69	3.33	0.76	0.9	1.07	0.84
70	3.88	1.07	1.13	1.23	0.91
71	3.44	0.82	0.95	1.12	0.85
72	3.37	0.79	0.93	1.1	0.84
73	3.23	0.73	0.96	1.02	0.94
74	3.9	1.08	1.11	1.25	0.88
75	3.55	0.9	1.06	1.11	0.95
76	3.59	0.91	1.05	1.13	0.93
77	3.95	1.08	1.11	1.27	0.87
78	3.38	0.78	0.92	1.09	0.84
79	3.24	0.72	0.94	1.02	0.92
80	3.49	0.85	0.97	1.13	0.86
81	3.32	0.76	0.9	1.06	0.85
82	3.16	0.7	0.87	1.04	0.84
83	3.36	0.77	0.98	1.04	0.94
84	3.94	1.08	1.15	1.24	0.93
85	3.41	0.79	0.89	1.15	0.77
86	3.08	0.66	0.83	1.01	0.82
87	3.28	0.74	0.88	1.06	0.83
88	2.95	0.62	0.87	0.95	0.92
89	3.29	0.75	0.96	1.02	0.94
90	3.86	1.04	1.05	1.26	0.84
91	3.3	0.76	0.95	1.03	0.92
92	3.29	0.76	0.98	1.05	0.93
93	3.52	0.86	1.03	1.14	0.91

Table B1. (Cont.)

94	3.59	0.9	1.05	1.11	0.95
95	3.85	1.04	1.12	1.22	0.92
96	3.36	0.79	0.98	1.06	0.92
97	3.19	0.71	0.84	1.07	0.79
98	3.31	0.77	0.98	1.04	0.95
99	3.29	0.76	0.93	1.09	0.85
100	3.3	0.75	0.88	1.08	0.82
AV.	3.403	0.814	0.964	1.094	0.881
s.d.	0.256	0.127	0.087	0.081	0.051
%CV	7.528	15.585	8.994	7.413	5.836
DTZ90MG.0.5%BINDER					
NO.	**PERIMETER (mm)**	**AREA(mm.^2)**	**FERETMIN (mm)**	**FERETMAX (mm)**	**FERETRATIO**
1	3.26	0.75	0.94	1.04	0.9
2	3.39	0.81	0.98	1.07	0.91
3	3.42	0.8	0.98	1.06	0.92
4	3.35	0.79	0.96	1.07	0.9
5	3.23	0.73	0.96	1.02	0.94
6	3.46	0.85	1.02	1.1	0.92
7	3.35	0.78	1	1.04	0.95
8	3.45	0.84	1.01	1.11	0.91
9	3.29	0.77	0.98	1.03	0.95
10	3.32	0.76	0.97	1.04	0.93
11	3.29	0.75	0.98	1.02	0.96
12	3.69	0.96	1.09	1.18	0.93
13	3.5	0.87	1.03	1.11	0.94
14	3.23	0.73	0.96	1.01	0.95
15	3.16	0.69	0.92	1	0.92
16	3.1	0.69	0.9	1	0.9

Table B1. (Cont.)

17	2.91	0.6	0.85	0.94	0.91
18	3.24	0.75	0.96	1.03	0.93
19	3.1	0.68	0.92	0.98	0.94
20	3.26	0.74	0.93	1.03	0.9
21	3.08	0.66	0.9	0.97	0.92
22	3.22	0.72	0.96	0.99	0.97
23	3.31	0.77	0.98	1.03	0.95
24	3.2	0.72	0.96	0.99	0.97
25	3.48	0.85	1	1.1	0.91
26	3.29	0.78	0.96	1.05	0.91
27	3.37	0.8	1	1.05	0.95
28	3.3	0.75	0.94	1.04	0.91
29	3.14	0.69	0.91	1	0.91
30	3.3	0.76	0.96	1.04	0.92
31	3.5	0.87	1.04	1.12	0.93
32	3.29	0.75	0.98	1.01	0.96
33	3.11	0.68	0.9	0.99	0.92
34	3.4	0.82	0.98	1.09	0.9
35	3.29	0.77	0.96	1.05	0.92
36	2.85	0.58	0.84	0.92	0.91
37	3.39	0.81	1.02	1.07	0.95
38	3.19	0.71	0.95	1	0.95
39	3.63	0.94	1.07	1.16	0.92
40	2.99	0.62	0.87	0.93	0.94
41	3.16	0.71	0.92	1.01	0.91
42	3.28	0.76	0.97	1.06	0.92
43	3.38	0.81	1	1.06	0.94
44	3.11	0.69	0.9	0.99	0.91

Table B1. (Cont.)

45	3.37	0.79	1	1.04	0.95
46	3.26	0.75	0.96	1.02	0.94
47	3.3	0.77	0.97	1.04	0.94
48	3.43	0.83	1.02	1.06	0.95
49	3.69	0.96	1.09	1.17	0.93
50	3.28	0.76	0.96	1.04	0.92
51	3.33	0.78	0.99	1.04	0.95
52	3.48	0.86	1.01	1.1	0.92
53	3.22	0.72	0.95	1.02	0.93
54	3.39	0.81	1.02	1.06	0.96
55	3.31	0.78	0.98	1.04	0.94
56	3.25	0.75	0.96	1.03	0.93
57	3.41	0.83	1	1.08	0.92
58	3.07	0.66	0.89	0.97	0.92
59	3.22	0.73	0.96	1.01	0.95
60	3.13	0.68	0.92	0.98	0.95
61	3.19	0.72	0.96	1	0.95
62	3.65	0.95	1.07	1.16	0.92
63	3.43	0.83	1.02	1.07	0.95
64	3.31	0.76	0.96	1.04	0.92
65	3.09	0.68	0.9	1	0.9
66	3.23	0.75	0.96	1.02	0.94
67	3.4	0.83	0.98	1.09	0.9
68	3.3	0.77	0.97	1.04	0.93
69	3.11	0.68	0.91	0.98	0.93
70	3.5	0.88	1.04	1.11	0.93
71	3.33	0.77	0.95	1.04	0.91
72	3.34	0.8	1	1.05	0.95

Table B1. (Cont.)

73	3.37	0.79	0.98	1.06	0.93
74	3.18	0.72	0.94	1	0.94
75	3.15	0.7	0.94	0.98	0.96
76	3.31	0.77	1	1.03	0.97
77	3.45	0.84	1.02	1.08	0.94
78	3.25	0.75	0.94	1.04	0.91
79	3.45	0.84	1.02	1.09	0.93
80	3.07	0.67	0.9	0.97	0.93
81	3.24	0.73	0.97	1	0.97
82	2.92	0.61	0.86	0.94	0.92
83	3.2	0.73	0.96	1.01	0.95
84	3.71	0.96	1.09	1.17	0.93
85	3.22	0.73	0.96	1	0.96
86	3.49	0.84	1.02	1.08	0.94
87	3.1	0.68	0.9	1	0.9
88	3.31	0.77	0.94	1.05	0.89
89	3.28	0.76	0.98	1.02	0.96
90	3.41	0.83	0.98	1.1	0.89
91	3.33	0.78	0.96	1.05	0.91
92	3.15	0.69	0.9	0.99	0.92
93	3.56	0.88	1.04	1.12	0.93
94	3.37	0.77	0.96	1.05	0.91
95	3.36	0.8	1	1.06	0.94
96	3.35	0.8	0.99	1.06	0.94
97	3.2	0.72	0.94	1	0.94
98	3.17	0.71	0.94	0.99	0.95
99	3.3	0.78	0.98	1.03	0.94
100	3.48	0.86	1.03	1.09	0.95

Table B1. (Cont.)

AV.	3.297	0.768	0.969	1.040	0.931
s.d.	0.161	0.076	0.050	0.051	0.020
%CV	4.897	9.872	5.152	4.950	2.111
DTZ90MG.0%BINDER					
NO.	PERIMETER (mm)	AREA(mm.^2)	FERETMIN (mm)	FERETMAX (mm)	FERETRATIO
1	2.92	0.59	0.85	0.92	0.92
2	2.97	0.63	0.88	0.94	0.93
3	3.21	0.71	0.95	0.99	0.96
4	2.98	0.62	0.84	0.95	0.88
5	2.66	0.49	0.79	0.84	0.94
6	2.91	0.6	0.86	0.94	0.92
7	2.99	0.64	0.9	0.94	0.95
8	2.88	0.59	0.86	0.9	0.96
9	3.2	0.73	0.95	1.02	0.94
10	3.02	0.63	0.85	0.95	0.89
11	3.09	0.68	0.92	0.97	0.95
12	3.12	0.69	0.93	0.99	0.94
13	2.87	0.59	0.85	0.93	0.91
14	2.9	0.6	0.85	0.94	0.9
15	3.32	0.77	0.96	1.06	0.91
16	3.19	0.7	0.94	0.98	0.96
17	2.65	0.48	0.77	0.83	0.93
18	3.2	0.72	0.94	1	0.94
19	3.33	0.76	0.93	1.07	0.87
20	3.45	0.81	1	1.09	0.91
21	2.72	0.53	0.8	0.88	0.9
22	3.03	0.65	0.9	0.95	0.95
23	3.13	0.69	0.9	0.98	0.92

Table B1. (Cont.)

24	3.07	0.67	0.88	0.98	0.9
25	2.95	0.62	0.86	0.96	0.9
26	2.56	0.46	0.77	0.8	0.96
27	2.98	0.62	0.86	0.96	0.9
28	3.22	0.74	0.92	1.03	0.89
29	2.91	0.6	0.85	0.92	0.92
30	3.24	0.74	0.94	1.03	0.91
31	2.95	0.6	0.84	0.94	0.89
32	3.09	0.68	0.88	0.99	0.89
33	3.23	0.74	0.97	1.01	0.96
34	2.84	0.57	0.85	0.89	0.95
35	2.89	0.59	0.85	0.92	0.92
36	3.17	0.7	0.94	0.98	0.95
37	3.16	0.71	0.92	1	0.92
38	2.9	0.59	0.86	0.92	0.93
39	3.18	0.72	0.94	1.01	0.93
40	3	0.63	0.88	0.94	0.94
41	2.75	0.54	0.81	0.88	0.91
42	3.08	0.68	0.92	0.98	0.94
43	2.98	0.63	0.88	0.94	0.94
44	3.03	0.66	0.9	0.94	0.96
45	2.54	0.47	0.75	0.82	0.92
46	3.08	0.66	0.92	0.96	0.96
47	3.08	0.66	0.91	0.96	0.95
48	2.88	0.58	0.85	0.9	0.94
49	2.95	0.6	0.86	0.92	0.94
50	3.08	0.67	0.92	0.98	0.94
51	3.06	0.67	0.9	0.97	0.93

Table B1. (Cont.)

52	3.33	0.78	0.94	1.08	0.88
53	3.02	0.64	0.88	0.94	0.94
54	3.03	0.65	0.9	0.95	0.95
55	3.09	0.67	0.92	0.97	0.95
56	3.21	0.71	0.94	1.01	0.93
57	2.79	0.54	0.81	0.89	0.91
58	3.02	0.64	0.89	0.94	0.94
59	3.22	0.73	0.94	1.02	0.92
60	2.89	0.59	0.86	0.92	0.94
61	3.12	0.7	0.92	0.99	0.93
62	3.15	0.7	0.93	1	0.93
63	3.19	0.72	0.96	0.99	0.97
64	2.88	0.59	0.86	0.9	0.96
65	2.88	0.58	0.84	0.93	0.9
66	3.21	0.72	0.96	0.99	0.96
67	3.07	0.67	0.88	0.98	0.9
68	2.92	0.61	0.84	0.95	0.88
69	2.92	0.6	0.84	0.93	0.9
70	3.24	0.74	0.94	1.03	0.91
71	3.2	0.72	0.94	1	0.94
72	2.96	0.61	0.85	0.95	0.89
73	2.6	0.47	0.77	0.83	0.93
74	3.15	0.68	0.92	0.98	0.94
75	3.23	0.71	0.94	1.01	0.94
76	2.8	0.55	0.83	0.88	0.94
77	3.01	0.62	0.87	0.96	0.91
78	3.08	0.67	0.88	0.98	0.9
79	2.69	0.51	0.81	0.85	0.95

Table B1. (Cont.)

80	3.22	0.73	0.95	1.01	0.94
81	3.22	0.73	0.96	1.01	0.95
82	3.28	0.75	0.98	1.02	0.96
83	3.21	0.73	0.96	1.01	0.95
84	3.16	0.7	0.94	0.99	0.95
85	3.11	0.68	0.93	0.99	0.94
86	2.91	0.6	0.86	0.94	0.92
87	2.91	0.6	0.85	0.93	0.92
88	3.31	0.77	0.96	1.04	0.92
89	3.11	0.68	0.92	0.99	0.93
90	3.08	0.65	0.9	0.97	0.93
91	3.24	0.74	0.96	1.03	0.93
92	2.88	0.59	0.86	0.9	0.97
93	2.96	0.61	0.85	0.93	0.91
94	2.94	0.61	0.88	0.92	0.96
95	2.98	0.63	0.88	0.95	0.92
96	2.59	0.47	0.75	0.83	0.91
97	2.95	0.61	0.84	0.95	0.88
98	3.15	0.71	0.94	0.99	0.95
99	3.59	0.91	1.02	1.15	0.88
100	3.3	0.75	0.93	1.05	0.88
AV.	3.036	0.651	0.890	0.960	0.927
s.d.	0.193	0.081	0.056	0.060	0.024
%CV	6.367	12.401	6.239	6.261	2.639
DTZ60MG.					
NO.	PERIMETER (mm)	AREA(mm.^2)	FERETMIN (mm)	FERETMAX (mm)	FERETRATIO
1	3.09	0.67	0.9	0.98	0.93
2	3.12	0.68	0.86	1.01	0.85

Table B1. (Cont.)

3	3.03	0.66	0.9	0.96	0.94
4	3.17	0.7	0.94	0.99	0.95
5	3.39	0.81	0.96	1.08	0.88
6	3.11	0.67	0.92	0.97	0.94
7	3.19	0.72	0.94	1.01	0.93
8	3.57	0.88	1.05	1.11	0.95
9	3.31	0.77	0.95	1.08	0.88
10	3.27	0.75	0.94	1.04	0.91
11	3.6	0.91	1.07	1.12	0.96
12	3.09	0.67	0.9	0.98	0.92
13	3.16	0.69	0.89	1.01	0.89
14	3.11	0.67	0.9	0.97	0.93
15	3.15	0.69	0.94	0.99	0.95
16	3.36	0.75	0.96	1.03	0.93
17	3.45	0.8	1	1.09	0.91
18	3.55	0.88	1	1.13	0.88
19	3.41	0.81	1	1.06	0.94
20	3.11	0.68	0.92	0.97	0.95
21	2.95	0.6	0.85	0.93	0.91
22	3.32	0.79	0.98	1.04	0.94
23	3.12	0.69	0.92	1	0.93
24	3.07	0.67	0.9	0.97	0.93
25	2.92	0.58	0.86	0.9	0.96
26	3.23	0.73	0.9	1.04	0.86
27	3.15	0.69	0.93	0.97	0.95
28	3.3	0.75	0.96	1.03	0.93
29	3.61	0.91	1.06	1.13	0.94
30	3.14	0.68	0.93	0.99	0.94

Table B1. (Cont.)

31	3.18	0.72	0.94	1.01	0.93
32	3.37	0.81	0.98	1.08	0.91
33	3.07	0.66	0.88	0.98	0.9
34	3.43	0.83	1.01	1.08	0.94
35	3.65	0.91	1.08	1.12	0.96
36	3.27	0.75	0.94	1.07	0.89
37	3.14	0.69	0.92	0.98	0.94
38	3.28	0.74	0.95	1.02	0.94
39	3.14	0.69	0.92	1.01	0.91
40	3.55	0.89	1.01	1.14	0.89
41	3.33	0.77	0.95	1.07	0.9
42	3.19	0.72	0.94	1.01	0.93
43	3.2	0.69	0.93	0.99	0.94
44	3.12	0.69	0.94	0.99	0.94
45	3.37	0.81	1.01	1.06	0.95
46	3.25	0.73	0.93	1.02	0.91
47	3.32	0.78	0.93	1.07	0.87
48	3.04	0.65	0.9	0.95	0.95
49	2.82	0.56	0.85	0.88	0.96
50	3.09	0.66	0.92	0.96	0.96
51	2.88	0.58	0.86	0.9	0.95
52	3.09	0.68	0.9	0.98	0.93
53	3.24	0.72	0.93	1	0.92
54	3.43	0.82	1.01	1.07	0.95
55	3.15	0.69	0.92	1.01	0.91
56	3.11	0.68	0.92	0.97	0.95
57	3.39	0.82	1.01	1.07	0.95
58	3.59	0.89	1.01	1.14	0.89

Table B1. (Cont.)

59	3.4	0.82	0.98	1.08	0.91
60	3.36	0.79	1	1.04	0.96
61	3.16	0.7	0.93	0.99	0.94
62	3.09	0.67	0.9	0.97	0.93
63	3.17	0.71	0.92	1.02	0.9
64	3.07	0.67	0.92	0.97	0.94
65	3.62	0.92	1.07	1.14	0.94
66	3.24	0.74	0.94	1.03	0.92
67	3.29	0.76	0.94	1.05	0.89
68	3.19	0.72	0.92	1.03	0.89
69	3.55	0.89	1.05	1.12	0.94
70	3.11	0.68	0.92	0.97	0.95
71	3.3	0.77	0.93	1.07	0.87
72	3.16	0.69	0.92	0.98	0.94
73	3.1	0.67	0.93	0.96	0.97
74	3.16	0.69	0.86	1.02	0.84
75	3.16	0.69	0.92	1	0.93
76	3.4	0.79	0.96	1.08	0.88
77	3.09	0.68	0.92	0.98	0.94
78	3.08	0.67	0.9	0.96	0.94
79	2.96	0.61	0.88	0.92	0.96
80	3.25	0.74	0.94	1.04	0.91
81	3.2	0.73	0.96	1	0.95
82	3.15	0.69	0.94	0.98	0.96
83	3.48	0.83	1.01	1.12	0.9
84	3.25	0.75	0.94	1.04	0.9
85	3.15	0.7	0.94	0.99	0.95
86	3.11	0.68	0.93	0.97	0.95

Table B1. (Cont.)

87	3.57	0.88	1	1.14	0.87
88	3.12	0.69	0.92	1	0.92
89	3.23	0.71	0.92	1.05	0.87
90	3.21	0.72	0.94	1	0.94
91	3.13	0.67	0.92	0.97	0.95
92	3.01	0.65	0.86	0.96	0.9
93	3.51	0.87	1.04	1.1	0.95
94	3.35	0.78	0.97	1.06	0.92
95	3.37	0.8	1	1.05	0.94
96	2.94	0.61	0.86	0.92	0.94
97	3.03	0.62	0.83	0.97	0.86
98	3	0.63	0.9	0.94	0.95
99	3.44	0.83	1.02	1.08	0.94
100	3.14	0.69	0.92	1	0.92
AV.	3.230	0.732	0.942	1.020	0.925
s.d.	0.180	0.082	0.053	0.059	0.029
%CV	5.580	11.188	5.591	5.832	3.133
DTZ45MG.					
NO.	**PERIMETER (mm)**	**AREA(mm.^2)**	**FERETMIN (mm)**	**FERETMAX (mm)**	**FERETRATIO**
1	2.48	0.42	0.71	0.79	0.9
2	2.94	0.59	0.86	0.91	0.95
3	2.65	0.49	0.79	0.82	0.96
4	2.82	0.53	0.79	0.89	0.88
5	2.76	0.52	0.81	0.86	0.95
6	2.55	0.45	0.73	0.81	0.9
7	2.54	0.44	0.75	0.79	0.96
8	2.55	0.45	0.74	0.79	0.94
9	2.57	0.47	0.73	0.83	0.87

Table B1. (Cont.)

10	2.72	0.51	0.77	0.87	0.88
11	2.51	0.44	0.74	0.78	0.95
12	2.43	0.42	0.71	0.79	0.9
13	2.44	0.42	0.7	0.79	0.89
14	2.88	0.58	0.82	0.94	0.88
15	2.45	0.43	0.7	0.8	0.88
16	2.75	0.52	0.79	0.87	0.9
17	2.7	0.51	0.78	0.89	0.87
18	2.92	0.6	0.86	0.93	0.93
19	2.61	0.48	0.77	0.83	0.93
20	2.93	0.6	0.88	0.92	0.96
21	2.82	0.55	0.81	0.9	0.91
22	2.55	0.44	0.71	0.82	0.88
23	2.9	0.58	0.83	0.92	0.9
24	2.69	0.5	0.79	0.85	0.93
25	2.63	0.48	0.76	0.83	0.91
26	2.48	0.43	0.71	0.79	0.9
27	2.55	0.46	0.75	0.81	0.92
28	2.79	0.54	0.81	0.87	0.93
29	2.66	0.48	0.77	0.83	0.93
30	3.02	0.63	0.88	0.94	0.93
31	2.8	0.56	0.84	0.88	0.95
32	2.44	0.42	0.7	0.78	0.9
33	2.8	0.54	0.82	0.87	0.94
34	2.59	0.47	0.73	0.85	0.86
35	2.37	0.39	0.68	0.78	0.87
36	2.69	0.49	0.75	0.86	0.87
37	2.46	0.41	0.71	0.76	0.94

Table B1. (Cont.)

38	2.52	0.45	0.73	0.8	0.91
39	2.81	0.54	0.82	0.88	0.93
40	2.8	0.56	0.83	0.88	0.94
41	2.81	0.55	0.84	0.89	0.94
42	2.64	0.5	0.77	0.84	0.91
43	2.76	0.53	0.81	0.87	0.93
44	2.57	0.47	0.75	0.81	0.93
45	3.1	0.66	0.89	0.96	0.93
46	2.59	0.46	0.74	0.81	0.92
47	2.68	0.49	0.78	0.85	0.92
48	2.87	0.57	0.82	0.92	0.89
49	2.6	0.46	0.73	0.83	0.88
50	2.78	0.55	0.81	0.89	0.91
51	2.95	0.59	0.87	0.9	0.97
52	2.85	0.58	0.85	0.9	0.94
53	2.68	0.5	0.76	0.88	0.86
54	2.41	0.42	0.69	0.8	0.87
55	2.66	0.51	0.77	0.87	0.89
56	2.85	0.57	0.82	0.93	0.89
57	2.49	0.43	0.7	0.8	0.87
58	2.41	0.39	0.7	0.75	0.93
59	2.68	0.5	0.77	0.87	0.88
60	2.53	0.45	0.72	0.81	0.88
61	2.52	0.45	0.74	0.79	0.93
62	2.55	0.44	0.75	0.79	0.95
63	2.55	0.45	0.72	0.82	0.88
64	2.68	0.5	0.75	0.86	0.87
65	2.68	0.5	0.8	0.83	0.96

Table B1. (Cont.)

66	2.46	0.42	0.7	0.79	0.87
67	2.57	0.47	0.77	0.81	0.95
68	2.45	0.42	0.7	0.79	0.88
69	2.85	0.58	0.85	0.9	0.94
70	2.58	0.47	0.73	0.82	0.89
71	2.5	0.43	0.71	0.79	0.91
72	2.91	0.59	0.85	0.92	0.93
73	2.57	0.45	0.73	0.84	0.87
74	2.47	0.41	0.71	0.78	0.92
75	2.63	0.49	0.77	0.86	0.9
76	2.58	0.47	0.74	0.83	0.89
77	2.89	0.59	0.83	0.94	0.89
78	2.61	0.48	0.75	0.84	0.89
79	2.76	0.55	0.81	0.89	0.91
80	2.67	0.49	0.76	0.85	0.89
81	2.71	0.52	0.8	0.86	0.93
82	2.53	0.45	0.74	0.79	0.94
83	2.72	0.52	0.81	0.87	0.93
84	2.81	0.53	0.81	0.88	0.92
85	2.91	0.59	0.88	0.9	0.97
86	2.54	0.45	0.73	0.82	0.9
87	2.57	0.46	0.73	0.83	0.88
88	2.41	0.42	0.69	0.8	0.86
89	2.64	0.5	0.77	0.85	0.91
90	2.78	0.54	0.82	0.87	0.95
91	2.56	0.46	0.75	0.81	0.93
92	2.68	0.51	0.8	0.85	0.94
93	2.61	0.48	0.77	0.85	0.91

Table B1. (Cont.)

94	2.39	0.4	0.7	0.75	0.93
95	2.82	0.55	0.81	0.9	0.9
96	2.71	0.51	0.79	0.86	0.92
97	2.35	0.37	0.69	0.73	0.95
98	2.79	0.54	0.8	0.9	0.89
99	2.45	0.41	0.7	0.78	0.9
100	2.31	0.37	0.66	0.74	0.89
AV.	2.653	0.492	0.769	0.844	0.911
s.d.	0.166	0.062	0.054	0.051	0.029
%CV	6.275	12.599	7.025	6.034	3.169
DTZ30MG.					
NO.	PERIMETER (mm)	AREA(mm.^2)	FERETMIN (mm)	FERETMAX (mm)	FERETRATIO
1	2.27	0.36	0.68	0.72	0.95
2	2.34	0.39	0.7	0.74	0.94
3	2.51	0.44	0.73	0.79	0.93
4	2.39	0.4	0.7	0.78	0.9
5	2.37	0.4	0.68	0.77	0.88
6	2.3	0.38	0.68	0.76	0.89
7	2.46	0.43	0.71	0.79	0.9
8	2.31	0.38	0.69	0.74	0.93
9	2.47	0.43	0.73	0.78	0.94
10	2.31	0.38	0.68	0.74	0.92
11	2.46	0.43	0.71	0.79	0.9
12	2.33	0.38	0.69	0.73	0.94
13	2.31	0.38	0.68	0.74	0.91
14	2.6	0.48	0.76	0.83	0.91
15	2.57	0.46	0.76	0.81	0.94
16	2.32	0.38	0.68	0.74	0.91

Table B1. (Cont.)

17	2.22	0.36	0.66	0.72	0.92
18	2.45	0.43	0.73	0.77	0.94
19	2.41	0.42	0.7	0.78	0.9
20	2.53	0.45	0.74	0.82	0.9
21	2.14	0.33	0.63	0.68	0.93
22	2.22	0.35	0.66	0.7	0.93
23	2.36	0.38	0.7	0.73	0.95
24	2.47	0.42	0.73	0.77	0.95
25	2.39	0.39	0.7	0.75	0.92
26	2.31	0.38	0.68	0.74	0.91
27	2.26	0.36	0.67	0.72	0.94
28	2.35	0.39	0.7	0.75	0.93
29	2.42	0.4	0.71	0.76	0.94
30	2.47	0.42	0.73	0.78	0.94
31	2.32	0.38	0.7	0.74	0.95
32	2.39	0.4	0.72	0.75	0.95
33	2.56	0.46	0.75	0.83	0.9
34	2.46	0.41	0.73	0.77	0.95
35	2.37	0.39	0.7	0.73	0.95
36	2.28	0.36	0.68	0.71	0.95
37	2.63	0.49	0.77	0.84	0.92
38	2.41	0.42	0.71	0.77	0.93
39	2.37	0.4	0.71	0.76	0.94
40	2.33	0.39	0.68	0.76	0.89
41	2.45	0.43	0.73	0.77	0.95
42	2.53	0.45	0.75	0.8	0.94
43	2.43	0.41	0.71	0.77	0.93
44	2.31	0.38	0.7	0.73	0.95
45	2.31	0.38	0.69	0.73	0.95

Table B1. (Cont.)

46	2.14	0.33	0.64	0.69	0.92
47	2.23	0.35	0.66	0.71	0.93
48	2.47	0.43	0.71	0.79	0.91
49	2.47	0.43	0.71	0.79	0.9
50	2.51	0.44	0.73	0.8	0.92
51	2.31	0.39	0.68	0.74	0.91
52	2.31	0.37	0.68	0.73	0.92
53	2.26	0.36	0.68	0.71	0.95
54	2.21	0.35	0.64	0.71	0.9
55	2.48	0.43	0.74	0.78	0.95
56	2.51	0.45	0.73	0.83	0.88
57	2.45	0.42	0.71	0.77	0.92
58	2.44	0.42	0.71	0.77	0.92
59	2.21	0.35	0.65	0.71	0.91
60	2.33	0.38	0.69	0.74	0.94
61	2.27	0.36	0.66	0.73	0.91
62	2.54	0.46	0.75	0.81	0.92
63	2.62	0.48	0.75	0.83	0.9
64	2.27	0.37	0.68	0.72	0.94
65	2.49	0.44	0.71	0.8	0.89
66	2.3	0.37	0.68	0.72	0.94
67	2.36	0.39	0.69	0.76	0.92
68	2.26	0.36	0.67	0.72	0.93
69	2.45	0.43	0.7	0.81	0.86
70	2.27	0.37	0.66	0.73	0.9
71	2.28	0.35	0.66	0.7	0.94
72	2.3	0.37	0.68	0.75	0.9
73	2.32	0.37	0.68	0.74	0.92
74	2.25	0.36	0.66	0.71	0.92
75	2.52	0.45	0.74	0.79	0.94

Table B1. (Cont.)

76	2.21	0.34	0.65	0.7	0.92
77	2.31	0.37	0.66	0.74	0.89
78	2.45	0.43	0.7	0.78	0.89
79	2.45	0.43	0.71	0.8	0.89
80	2.56	0.47	0.75	0.83	0.91
81	2.47	0.42	0.73	0.77	0.95
82	2.32	0.39	0.7	0.73	0.95
83	2.48	0.43	0.73	0.77	0.96
84	2.57	0.46	0.77	0.81	0.95
85	2.37	0.39	0.71	0.74	0.95
86	2.41	0.41	0.71	0.78	0.92
87	2.23	0.35	0.66	0.71	0.93
88	2.3	0.38	0.68	0.76	0.9
89	2.64	0.48	0.77	0.83	0.92
90	2.39	0.4	0.71	0.75	0.95
91	2.31	0.38	0.68	0.74	0.92
92	2.31	0.38	0.68	0.74	0.92
93	2.52	0.45	0.73	0.82	0.89
94	2.33	0.38	0.68	0.73	0.94
95	2.39	0.4	0.71	0.77	0.93
96	2.24	0.35	0.68	0.71	0.96
97	2.17	0.34	0.65	0.7	0.93
98	2.4	0.4	0.7	0.76	0.92
99	2.28	0.36	0.66	0.72	0.92
100	2.31	0.38	0.7	0.74	0.94
AV.	2.38	0.40	0.70	0.76	0.924
s.d.	0.114	0.038	0.032	0.038	0.021
%CV	4.795	9.440	4.503	4.973	2.297

APPENDIX C

Stress-Strain Curve and Mechanical Properties of EC Film

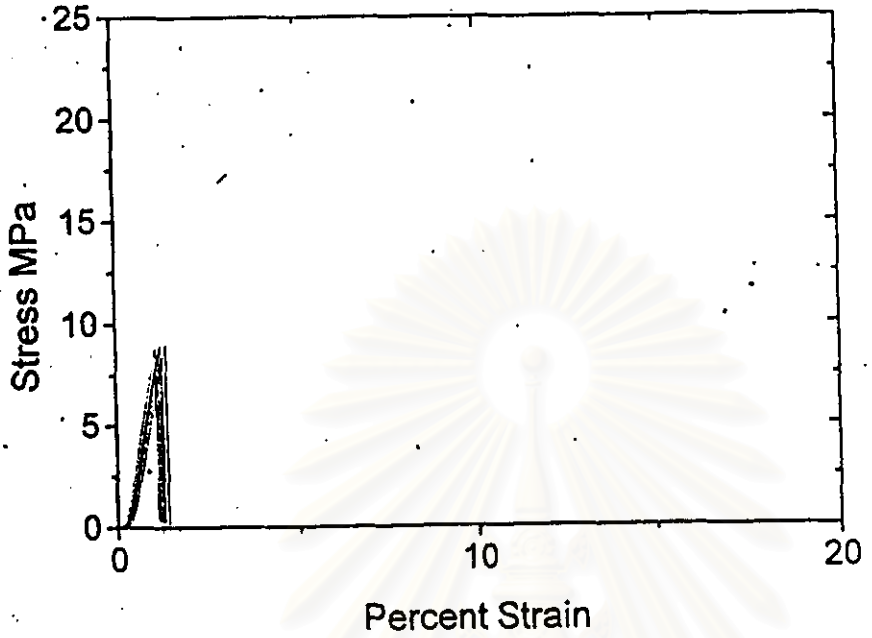

Figure c1. Stress-strain curves of non-plasticized EC film.

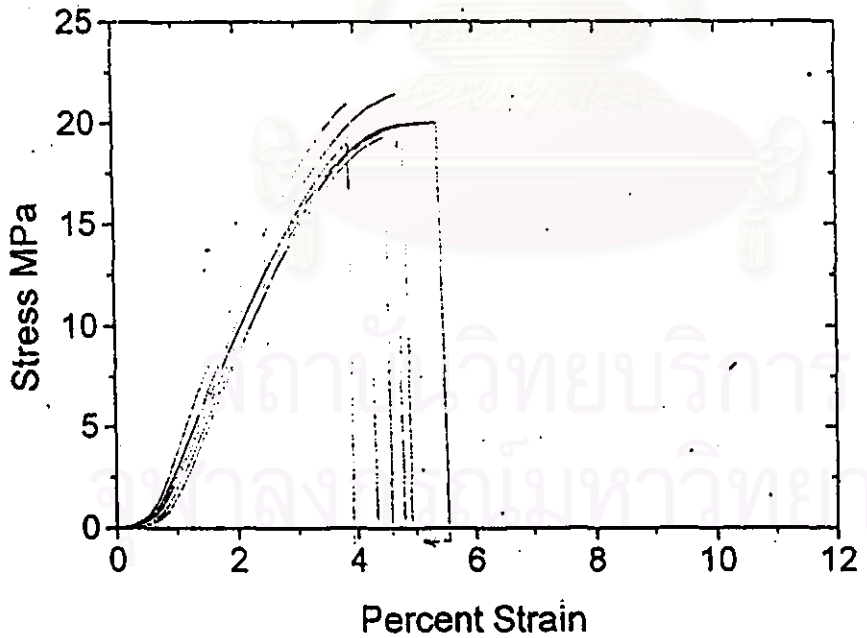

Figure c2. Stress-strain curves of EC film plasticized with TEC 10 % on polymer weight.

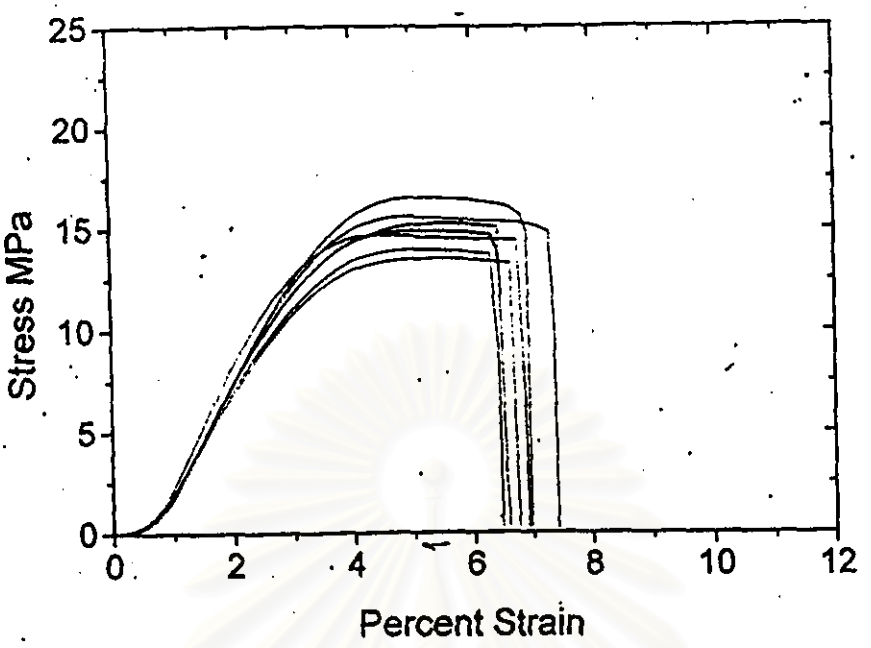

Figure c3. Stress-strain curves of EC film plasticized with TEC 20 % on polymer weight.

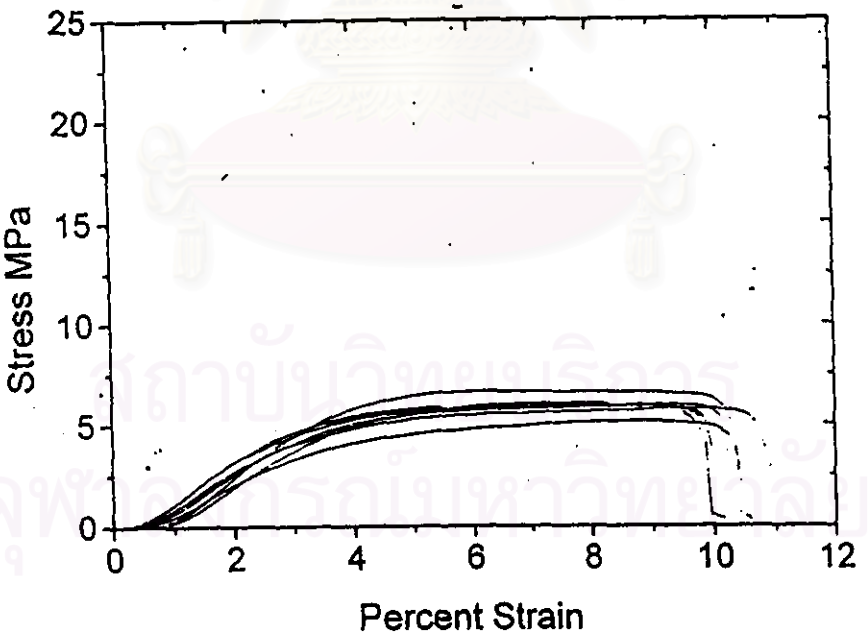

Figure c4. Stress-strain curves of EC film plasticized with TEC 30 % on polymer weight.

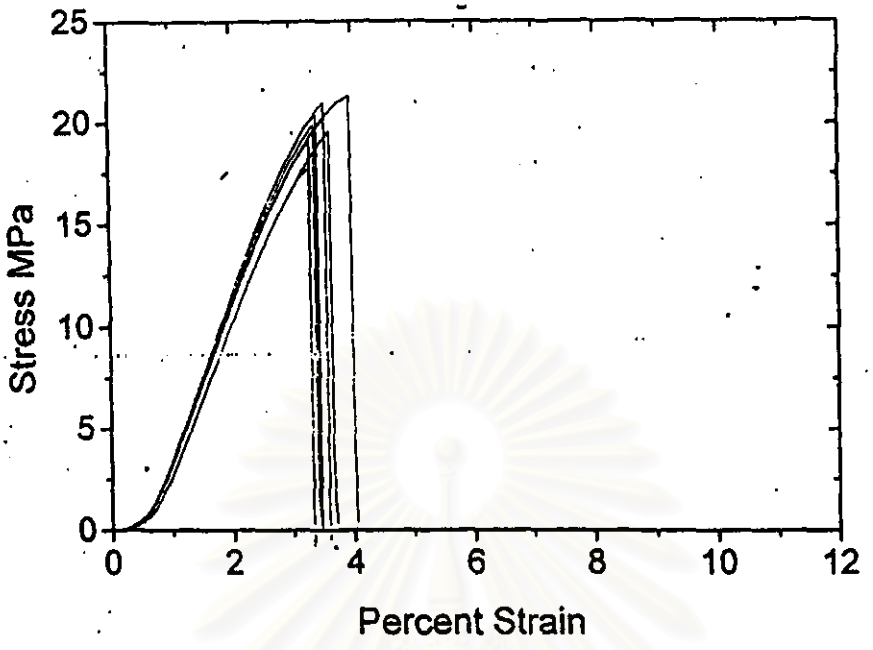

Figure c5. Stress-strain curves of EC film plasticized with DEP 10 % on polymer weight.

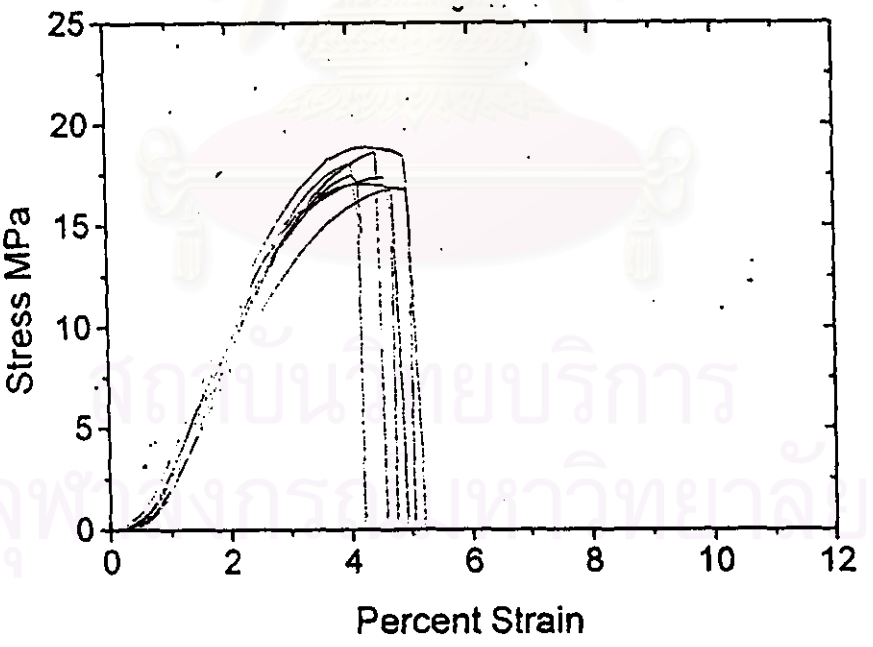

Figure c6. Stress-strain curves of EC film plasticized with DEP 20 % on polymer weight.

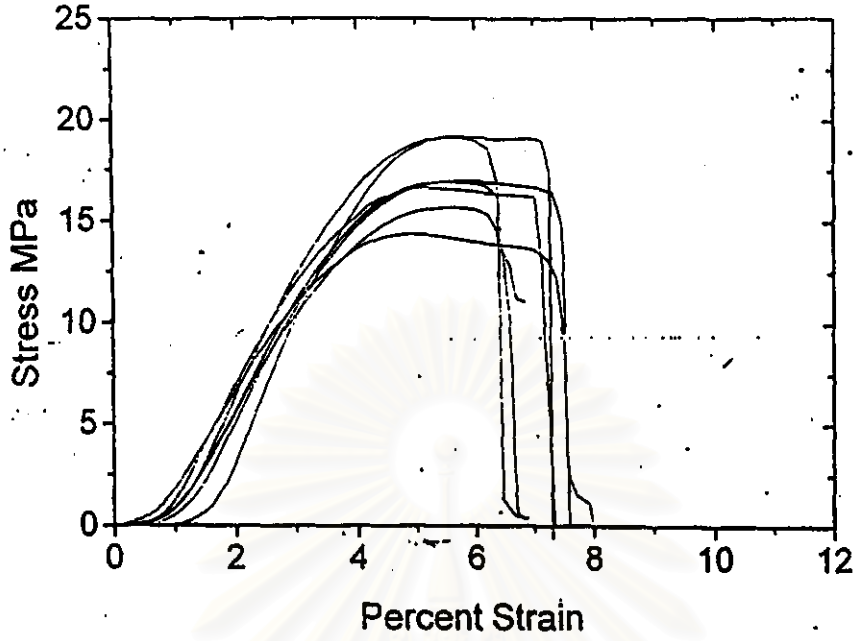

Figure c7. Stress-strain curves of EC film plasticized with DEP 30 % on polymer weight.

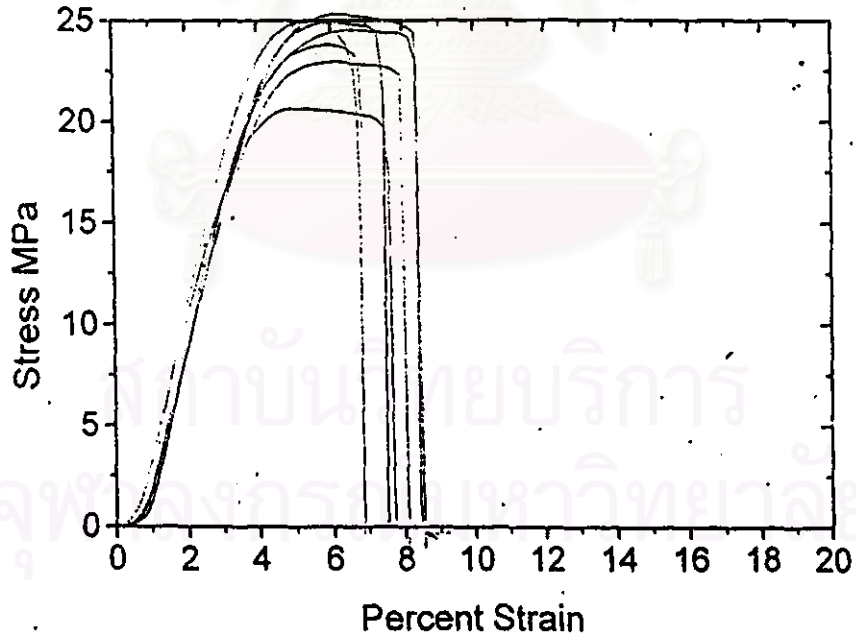

Figure c8. Stress-strain curves of EC film plasticized with CO 10 % on polymer weight.

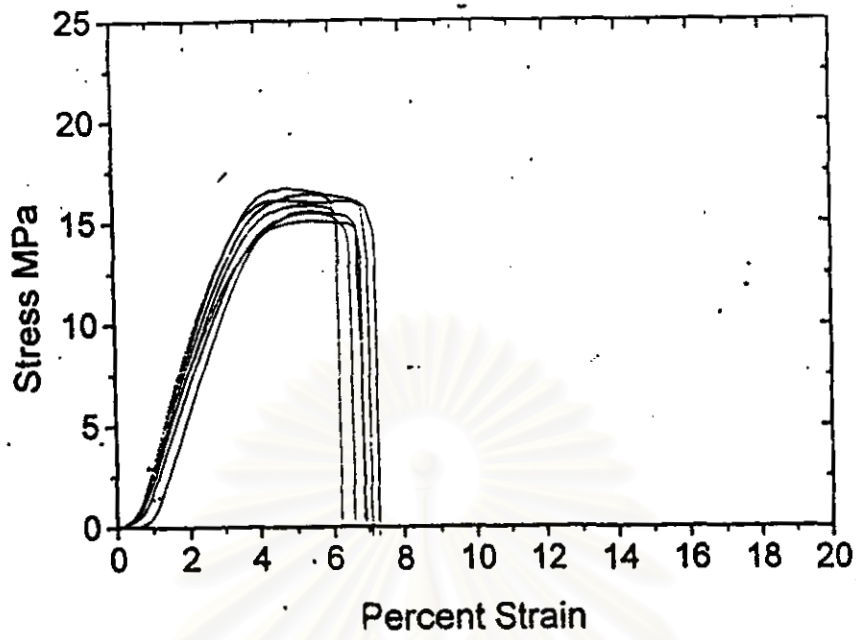

Figure c9. Stress-strain curves of EC film plasticized with CO 20 % on polymer weight.

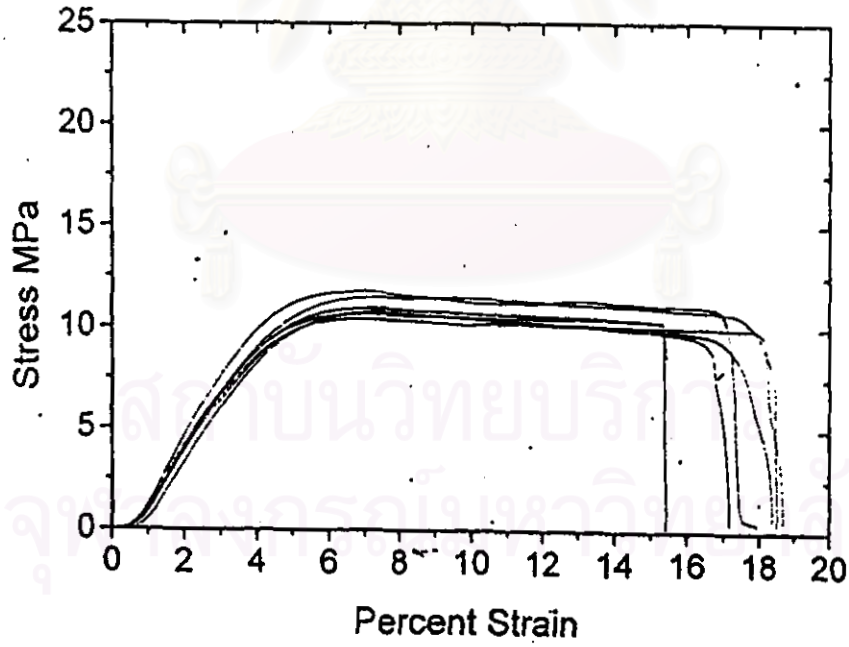

Figure c10. Stress-strain curves of EC film plasticized with C0 30 % on polymer weight.

Table c1. Thickness of free films from various formulations.

Formula	Thickness (mm)								
	1	2	3	4	5	6	av.	s.d.	%cv
F1	0.06	0.047	0.053	0.057	0.051	0.047	0.053	0.0053	10.061
F2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F3	0.059	0.058	0.061	0.065	0.056	0.061	0.060	0.0031	5.164
F4	0.059	0.054	0.057	0.056	0.05	0.052	0.055	0.0033	6.085
F5	0.057	0.061	0.057	0.06	0.054	0.053	0.057	0.0032	5.548
F6	0.05	0.048	0.047	0.051	0.058	0.055	0.052	0.0042	8.215
F7	0.051	0.048	0.045	0.052	0.05	0.053	0.050	0.0029	5.873
F8	0.052	0.052	0.046	0.05	0.056	0.058	0.052	0.0043	8.167
F9	0.065	0.07	0.075	0.072	0.069	0.06	0.069	0.0053	7.766
F10	0.069	0.07	0.072	0.078	0.071	0.071	0.072	0.0032	4.439
F11	0.067	0.078	0.078	0.073	0.068	0.073	0.073	0.0047	6.464

Table c2. Ultimate tensile strength of free films from various formulations.

Formula	Ultimate tensile strength (Mpa)								
	1	2	3	4	5	6	av.	s.d.	%cv
F1	9.047	8.914	8.84	8.458	9.028	8.512	8.800	0.256	2.908
F2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F3	21.414	20.962	19.289	19.912	19.987	19.239	20.134	0.884	4.392
F4	13.765	14.412	16.181	13.382	15.22	15.171	14.689	1.037	7.061
F5	4.924	5.074	5.982	3.879	5.968	6.486	5.386	0.947	17.588
F6	19.902	21.33	20.38	20.981	17.795	19.591	19.997	1.258	6.292
F7	17.332	16.918	18.04	18.463	16.742	18.587	17.680	0.793	4.487
F8	16.601	16.64	19.061	19.032	15.616	14.328	16.880	1.878	11.126
F9	23.783	22.685	24.825	24.679	24.349	20.244	23.428	1.742	7.438
F10	14.95	16.01	15.397	15.362	16.381	16.126	15.704	0.550	3.499
F11	9.654	9.402	10.34	9.006	9.706	10.777	9.814	0.642	6.546

Table c3. % elongation at break of free films from various formulations.

Formula	% Elongation at break								
	1	2	3	4	5	6	av.	s.d.	%cv
F1	0.981	0.946	0.876	0.925	0.912	0.824	0.911	0.055	6.038
F2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F3	4.098	3.324	3.765	4.11	4.209	3.381	3.815	0.388	10.182
F4	5.493	5.914	5.689	5.608	6.151	5.318	5.696	0.299	5.246
F5	9.233	8.734	8.337	10.403	8.45	8.631	8.965	0.770	8.589
F6	2.791	3.368	2.823	2.964	2.651	2.951	2.925	0.246	8.401
F7	3.83	3.942	3.464	4.02	4.058	3.793	3.851	0.216	5.609
F8	5.912	5.214	4.741	5.753	4.871	6.122	5.436	0.574	10.566
F9	5.678	6.749	7.054	6.234	7.122	6.509	6.558	0.544	8.303
F10	5.765	5.923	7.344	6.095	5.294	6.03	6.075	0.684	11.265
F11	16.222	17.297	14.28	17.546	16.629	16.09	16.344	1.164	7.121

Table c4. Young's modulus of free films from various formulations.

Formula	Young's modulus (MPa)								
	1	2	3	4	5	6	av.	s.d.	%cv
F1	948.648	968.54	1031.019	929.809	1015.408	1068.913	993.723	53.415	5.375
F2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F3	737.688	832.341	691.789	698.689	696.448	724.586	730.257	53.156	7.279
F4	500.512	621.966	580.174	497.751	612.177	574.185	564.461	53.786	9.529
F5	200.221	175.402	211.719	191.883	222.887	231.368	205.580	20.636	10.038
F6	810.235	802.313	832.152	833.036	760.902	777.808	802.741	29.022	3.615
F7	708.143	718.908	688.658	699.791	596.109	681.865	682.246	44.234	6.484
F8	593.562	584.468	695.364	642.765	520.826	501.351	589.723	72.900	12.362
F9	936.5	728.815	764.923	783.81	757.346	735.946	784.557	77.050	9.821
F10	527.05	645.035	527.569	555.943	587.935	617.111	576.774	48.454	8.401
F11	308.064	299.27	311.173	295.535	348.751	312.838	312.605	18.966	6.067

Table c5. Toughness of free films from various formulations.

Formula	Toughness (Mpa)								
	1	2	3	4	5	6	av.	s.d.	%cv
F1	0.046	0.044	0.04	0.04	0.043	0.036	0.042	0.004	8.587
F2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F3	0.54	0.405	0.435	0.525	0.627	0.379	0.485	0.095	19.537
F4	0.556	0.675	0.687	0.556	0.732	0.582	0.631	0.076	12.047
F5	0.439	0.344	0.399	0.479	0.4	0.464	0.421	0.050	11.829
F6	0.305	0.419	0.319	0.347	0.258	0.32	0.328	0.053	16.257
F7	0.436	0.453	0.376	0.487	0.424	0.432	0.435	0.036	8.383
F8	0.792	0.709	0.534	0.822	0.506	0.653	0.669	0.131	19.501
F9	1.024	1.146	1.321	1.117	1.303	1.019	1.155	0.132	11.397
F10	0.629	0.727	0.736	0.585	0.867	0.753	0.716	0.099	13.882
F11	1.444	1.549	1.299	1.598	1.675	1.581	1.524	0.134	8.761

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APPENDIX D

DRUG CONTENTS

Table d1. Amount (mg) of drug content

Formulations		content of DTZ HCl(mg) in 150 mg pellets			av.	s.d.
		1	2	3		
DTZ90mg	uncoated	90.50	90.31	89.54	90.11	0.51
	2.5%(TEC)	85.13	84.17	84.74	84.68	0.48
	2.5%(DEP)	85.89	84.36	85.70	85.32	0.84
	2.5%(CO)	86.47	85.51	87.81	86.60	1.16
	3%(TEC)	83.78	84.36	81.48	83.21	1.52
	5%(TEC)	80.14	81.48	82.06	81.22	0.98
	5%(DEP)	83.78	82.06	82.82	82.89	0.87
	5%(CO)	82.44	81.86	81.29	81.86	0.58
	7.5%(TEC)	80.33	80.14	79.75	80.07	0.29
	12%(TEC)	75.15	76.68	75.91	75.91	0.77
DTZ60mg	uncoated	54.27	56.00	55.23	55.16	0.87
	7.5%(TEC)	50.53	50.14	50.72	50.46	0.29
DTZ45mg	uncoated	40.84	40.45	40.93	40.74	0.25
	7.5%(TEC)	37.57	37.77	38.15	37.83	0.29
DTZ30mg	uncoated	27.21	26.16	27.79	27.05	0.83
	3%(TEC)	26.44	25.87	24.53	25.61	0.98
	7.5%(TEC)	24.05	23.76	23.37	23.73	0.34
	12%(TEC)	21.17	21.55	21.93	21.55	0.38

Table d2. Percentage of drug content.

Formulations		content of DTZ HCl(%) in 150 mg pellets			av.	s.d.
		1	2	3		
DTZ90mg	uncoated	100.55	100.34	99.49	100.13	0.56
	2.5%(TEC)	94.58	93.52	94.16	94.09	0.54
	2.5%(DEP)	95.44	93.73	95.22	94.80	0.93
	2.5%(CO)	96.08	95.01	97.57	96.22	1.29
	3%(TEC)	93.09	93.73	90.53	92.45	1.69
	5%(TEC)	89.04	90.53	91.17	90.25	1.09
	5%(DEP)	93.09	91.17	92.03	92.10	0.96
	5%(CO)	91.60	90.96	90.32	90.96	0.64
	7.5%(TEC)	89.25	89.04	88.61	88.97	0.33
	12%(TEC)	83.50	85.20	84.35	84.35	0.85
DTZ60mg	uncoated	90.45	93.33	92.05	91.94	1.44
	7.5%(TEC)	84.21	83.57	84.53	84.10	0.49
DTZ45mg	uncoated	90.75	89.89	90.96	90.53	0.56
	7.5%(TEC)	83.50	83.92	84.78	84.07	0.65
DTZ30mg	uncoated	90.71	87.19	92.62	90.17	2.76
	3%(TEC)	88.15	86.23	81.75	85.38	3.28
	7.5%(TEC)	80.15	79.19	77.91	79.09	1.12
	12%(TEC)	70.56	71.84	73.12	71.84	1.28

APPENDIX E

Drug Release from DTZ HCl pellets

Table e1. Cumulative released of uncoated DTZ HCl pellets.

Time (Hours)	%Release (30 mg/dose)			Av.	±SD	%Release (90 mg/dose)			Av.	±SD
	1	2	3			1	2	3		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	93.62	91.33	99.33	94.76	4.12	93.67	95.73	93.87	94.42	1.14
0.5	98.72	96.92	100.44	98.69	1.76	97.60	98.45	96.98	97.68	0.74
0.75	99.30	98.75	98.92	98.99	0.28	99.50	100.56	99.91	99.99	0.54
1	99.87	100.58	100.78	100.41	0.48	98.72	99.59	99.34	99.22	0.45
2	101.96	99.89	101.87	101.24	1.17	99.99	99.63	99.58	99.73	0.22
3	101.78	100.19	101.90	101.29	0.96	99.19	100.28	100.23	99.90	0.61
4	101.32	100.48	101.93	101.24	0.73	99.62	100.09	100.05	99.92	0.26
6	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-

Table e2. Cumulative released of DTZ HCl coated pellets CP1*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.340	1.513	1.444	1.433	0.087	1.489	1.681	1.605	1.592	0.097
0.5	2.392	3.188	2.445	2.675	0.445	2.657	3.542	2.716	2.972	0.495
0.75	4.335	5.935	5.114	5.128	0.800	4.817	6.594	5.682	5.698	0.889
1	7.405	9.713	9.090	8.736	1.194	8.228	10.792	10.101	9.707	1.327
1.5	14.990	17.634	17.609	16.744	1.520	16.655	19.593	19.566	18.605	1.688
2	21.631	25.772	25.660	24.354	2.359	24.034	28.635	28.512	27.060	2.622
3	33.179	36.933	37.253	35.788	2.265	36.866	41.037	41.392	39.765	2.517
4	41.399	45.560	46.294	44.418	2.640	45.999	50.622	51.438	49.353	2.933
6	56.528	59.073	59.922	58.508	1.766	62.809	65.636	66.580	65.008	1.962
8	65.085	67.828	68.773	67.229	1.916	72.317	75.365	76.415	74.699	2.129
10	70.824	71.471	74.136	72.144	1.756	78.693	79.412	82.374	80.160	1.951
12	75.760	77.741	78.536	77.346	1.430	84.178	86.379	87.263	85.940	1.588

* CP1 represents for DTZ HCl (90 mg/dose) pellets coated with 5% w/w of ethylcellulose and used TEC 20% as plasticizer

Table e3. Cumulative released of DTZ HCl coated pellets CP2*

Time (Hours)	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.4787	1.3578	1.4959	1.444	0.075	1.643	1.509	1.662	1.605	0.084
0.5	2.5486	3.0998	2.9287	2.859	0.282	2.832	3.444	3.254	3.177	0.314
0.75	5.0981	5.5519	5.3616	5.337	0.228	5.665	6.169	5.957	5.930	0.253
1	8.0211	8.9462	8.8573	8.608	0.510	8.912	9.940	9.841	9.565	0.567
1.5	14.337	16.015	15.528	15.293	0.863	15.930	17.794	17.253	16.992	0.959
2	22.419	24.184	23.053	23.218	0.894	24.910	26.871	25.614	25.798	0.994
3	34.062	36.365	35.135	35.187	1.152	37.847	40.405	39.038	39.097	1.280
4	43.328	46.285	44.326	44.646	1.504	48.142	51.428	49.251	49.607	1.672
6	57.615	60.925	58.796	59.112	1.678	64.016	67.694	65.328	65.680	1.864
8	66.386	70.146	67.216	67.916	1.975	73.762	77.940	74.685	75.462	2.195
10	71.66	74.89	72.309	72.953	1.709	79.622	83.211	80.343	81.059	1.899
12	75.844	78.729	76.5	77.024	1.512	84.272	87.476	85.000	85.583	1.680

* CP2 represents for DTZ HCl (90 mg/dose) pellets coated with 5% w/w of ethylcellulose and used DEP 20% as plasticizer.

Table e4. Cumulative released of DTZ HCl coated pellets CP3*

Time (Hours)	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.891	0.909	0.857	0.886	0.026	0.991	1.010	0.952	0.984	0.029
0.5	1.057	0.988	1.074	1.039	0.045	1.174	1.098	1.193	1.155	0.050
0.75	1.172	1.137	1.327	1.212	0.101	1.302	1.263	1.475	1.347	0.113
1	1.392	1.374	1.566	1.444	0.106	1.547	1.527	1.740	1.605	0.118
1.5	2.029	2.062	2.412	2.168	0.212	2.254	2.291	2.680	2.409	0.236
2	3.260	3.380	3.768	3.469	0.266	3.622	3.755	4.187	3.855	0.295
3	7.129	7.302	7.522	7.318	0.197	7.921	8.114	8.358	8.131	0.219
4	10.368	10.651	10.834	10.618	0.235	11.520	11.835	12.038	11.797	0.261
6	17.26	18.407	17.374	17.680	0.632	19.177	20.452	19.305	19.645	0.702
8	26.509	26.62	24.982	26.037	0.915	29.454	29.578	27.758	28.930	1.017
10	34.309	34.939	31.729	33.659	1.701	38.121	38.822	35.254	37.399	1.890
12	41.664	42.733	38.451	40.950	2.228	46.294	47.481	42.724	45.500	2.476

* CP3 represents for DTZ HCl (90 mg/dose) pellets coated with 5% w/w of ethylcellulose and used CO 20% as plasticizer.

Table e5. Cumulative released of DTZ HCl coated pellets CP4*

Time (Hours)	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.548	1.599	1.616	1.588	0.035	5.160	5.331	5.387	5.293	0.118
0.5	1.020	0.936	0.970	0.975	0.043	3.401	3.119	3.233	3.251	0.142
0.75	1.389	1.474	1.560	1.474	0.085	4.630	4.913	5.199	4.914	0.284
1	2.085	2.188	2.428	2.234	0.176	6.951	7.294	8.094	7.446	0.586
1.5	3.998	4.170	4.464	4.211	0.235	13.328	13.901	14.880	14.037	0.785
2	6.256	6.208	6.625	6.363	0.228	20.853	20.695	22.082	21.210	0.759
3	9.577	9.614	10.154	9.782	0.323	31.923	32.047	33.846	32.605	1.076
4	11.503	11.491	11.610	11.535	0.065	38.345	38.303	38.699	38.449	0.218
6	15.560	15.734	16.025	15.773	0.235	51.868	52.447	53.418	52.578	0.783
8	18.419	18.663	19.230	18.771	0.416	61.398	62.210	64.100	62.569	1.386
10	20.934	20.908	21.685	21.175	0.441	69.779	69.692	72.282	70.585	1.471
12	23.372	23.345	24.028	23.582	0.387	77.905	77.817	80.094	78.606	1.290

* CP4 represents for DTZ HCl (30mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 10% as plasticizer.

Table e6. Cumulative released of DTZ HCl coated pellets CP5*

Time (Hours)	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.799	0.969	1.514	1.094	0.374	2.663	3.230	5.047	3.647	1.245
0.5	0.910	0.724	1.054	0.896	0.165	3.033	2.415	3.513	2.987	0.551
0.75	1.635	1.345	1.679	1.553	0.181	5.450	4.485	5.595	5.177	0.604
1	2.675	2.246	2.651	2.524	0.241	8.916	7.486	8.835	8.412	0.804
1.5	4.577	4.178	4.434	4.396	0.203	15.258	13.925	14.779	14.654	0.675
2	6.518	6.063	6.457	6.346	0.247	21.726	20.209	21.525	21.153	0.824
3	9.910	9.398	10.070	9.793	0.351	33.032	31.328	33.567	32.642	1.169
4	12.674	12.500	12.717	12.631	0.115	42.248	41.668	42.390	42.102	0.382
6	16.983	16.924	16.481	16.796	0.274	56.609	56.414	54.936	55.986	0.915
8	19.823	19.866	19.622	19.771	0.130	66.077	66.221	65.407	65.902	0.434
10	22.216	22.158	21.945	22.106	0.143	74.054	73.860	73.150	73.688	0.476
12	23.612	23.690	23.610	23.637	0.045	78.706	78.965	78.700	78.791	0.152

* CP5 represents for DTZ HCl (30mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 20% as plasticizer.

Table e7. Cumulative released of DTZ HCl coated pellets CP6*

Time	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
(Hours)	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.054	1.310	0.629	0.997	0.3441	3.514	4.366	2.095	3.325	1.147
0.5	0.623	0.728	0.550	0.634	0.0894	2.077	2.427	1.834	2.113	0.298
0.75	0.954	0.958	0.965	0.959	0.0059	3.179	3.192	3.217	3.196	0.020
1	1.611	1.649	1.453	1.571	0.1043	5.370	5.497	4.842	5.236	0.348
1.5	3.485	3.489	3.086	3.353	0.2314	11.616	11.631	10.287	11.178	0.771
2	5.516	5.469	5.351	5.445	0.0848	18.385	18.229	17.836	18.150	0.283
3	9.016	8.713	8.236	8.655	0.3929	30.053	29.044	27.455	28.850	1.310
4	11.090	10.978	10.557	10.875	0.2807	36.966	36.592	35.191	36.250	0.936
6	15.074	15.040	14.434	14.849	0.3601	50.248	50.132	48.114	49.498	1.200
8	18.644	18.983	17.895	18.507	0.5571	62.146	63.278	59.648	61.691	1.857
10	22.217	21.504	21.119	21.614	0.5570	74.057	71.681	70.397	72.045	1.857
12	23.682	23.677	22.640	23.333	0.5998	78.940	78.922	75.468	77.777	1.999

* CP6 represents for DTZ HCl (30mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 30% as plasticizer.

Table e8. Cumulative released of DTZ HCl coated pellets CP7*

Time	Amount release (mg)			Av.	+SD	%Release			Av.	+SD
(Hours)	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.782	0.697	0.850	0.776	0.077	1.737	1.548	1.889	1.725	0.171
0.5	0.365	0.415	0.400	0.393	0.026	0.811	0.922	0.888	0.873	0.057
0.75	0.641	0.539	0.710	0.630	0.086	1.425	1.197	1.579	1.400	0.192
1	1.125	1.004	1.212	1.114	0.104	2.500	2.232	2.693	2.475	0.232
1.5	2.517	2.190	2.707	2.471	0.261	5.593	4.867	6.015	5.492	0.581
2	4.230	3.764	4.746	4.247	0.491	9.400	8.364	10.547	9.437	1.092
3	8.432	8.063	9.771	8.755	0.899	18.737	17.917	21.713	19.456	1.997
4	13.275	12.931	14.851	13.686	1.024	29.501	28.735	33.001	30.412	2.275
6	21.027	20.412	22.687	21.375	1.177	46.726	45.359	50.416	47.500	2.616
8	26.536	26.595	27.873	27.001	0.756	58.968	59.100	61.941	60.003	1.680
10	30.060	30.886	31.667	30.871	0.804	66.799	68.637	70.371	68.602	1.786
12	32.428	32.412	33.967	32.936	0.893	72.062	72.028	75.482	73.190	1.985

* CP7 represents for DTZ HCl (45mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 10% as plasticizer.

Table e9. Cumulative released of DTZ HCl coated pellets CP8*

Time	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
(Hours)	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.020	1.037	0.799	0.952	0.133	2.267	2.305	1.775	2.116	0.296
0.5	0.878	0.793	0.535	0.736	0.179	1.952	1.763	1.189	1.635	0.397
0.75	1.399	1.074	0.677	1.050	0.361	3.108	2.388	1.505	2.334	0.803
1	1.840	1.665	1.059	1.521	0.410	4.089	3.700	2.354	3.381	0.910
1.5	3.086	3.250	2.382	2.906	0.461	6.858	7.222	5.294	6.458	1.025
2	4.482	5.142	3.805	4.476	0.669	9.960	11.426	8.455	9.947	1.486
3	8.328	9.694	8.104	8.709	0.861	18.508	21.542	18.008	19.352	1.912
4	12.047	13.484	11.786	12.439	0.914	26.770	29.964	26.191	27.642	2.032
6	20.278	23.037	20.491	21.269	1.535	45.062	51.192	45.536	47.263	3.411
8	25.012	27.035	25.484	25.843	1.058	55.582	60.077	56.630	57.430	2.352
10	28.689	30.053	29.252	29.331	0.685	63.754	66.783	65.004	65.180	1.522
12	30.446	32.079	30.845	31.123	0.851	67.658	71.287	68.544	69.163	1.892

* CP8 represents for DTZ HCl (45mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 20% as plasticizer.

Table e10. Cumulative released of DTZ HCl coated pellets CP9*

Time	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
(Hours)	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.122	1.020	0.611	0.918	0.270	2.494	2.267	1.359	2.040	0.601
0.5	0.948	0.963	0.737	0.883	0.126	2.106	2.141	1.639	1.962	0.280
0.75	1.009	0.889	0.780	0.892	0.115	2.242	1.975	1.733	1.983	0.255
1	1.616	1.443	1.435	1.498	0.102	3.591	3.208	3.190	3.329	0.227
1.5	2.826	2.464	2.592	2.627	0.182	6.279	5.475	5.760	5.838	0.408
2	4.423	3.904	4.068	4.132	0.265	9.829	8.676	9.040	9.182	0.590
3	9.069	8.545	8.557	8.724	0.299	20.154	18.988	19.016	19.386	0.665
4	13.590	13.220	12.715	13.175	0.440	30.200	29.379	28.255	29.278	0.977
6	22.934	22.741	22.305	22.660	0.322	50.966	50.535	49.567	50.356	0.717
8	27.953	27.758	27.573	27.761	0.190	62.119	61.684	61.273	61.692	0.423
10	30.811	29.848	29.150	29.936	0.834	68.470	66.328	64.777	66.525	1.854
12	31.825	31.106	30.826	31.252	0.515	70.721	69.124	68.502	69.449	1.145

* CP9 represents for DTZ HCl (45mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 30% as plasticizer.

Table e11. Cumulative released of DTZ HCl coated pellets CP10*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.361	1.276	0.867	1.168	0.2640	2.268	2.126	1.445	1.946	0.440
0.5	0.558	0.370	0.332	0.420	0.1214	0.931	0.617	0.553	0.700	0.202
0.75	0.462	0.323	0.301	0.362	0.0874	0.771	0.538	0.502	0.604	0.146
1	0.552	0.616	0.458	0.542	0.0797	0.921	1.027	0.763	0.903	0.133
1.5	1.222	1.474	1.297	1.331	0.1293	2.037	2.457	2.162	2.219	0.215
2	2.734	3.380	2.963	3.026	0.3276	4.557	5.634	4.938	5.043	0.546
3	7.056	8.577	7.781	7.805	0.7612	11.759	14.296	12.968	13.008	1.269
4	11.970	14.016	13.197	13.061	1.0299	19.949	23.360	21.995	21.768	1.716
6	22.500	24.078	22.940	23.172	0.8144	37.499	40.130	38.233	38.621	1.357
8	28.281	30.132	29.407	29.273	0.9326	47.135	50.220	49.012	48.789	1.554
10	32.421	34.206	33.730	33.452	0.9245	54.035	57.011	56.217	55.754	1.541
12	36.689	38.067	37.671	37.476	0.7098	61.148	63.446	62.786	62.460	1.183

* CP10 represents for DTZ HCl (60mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 10% as plasticizer.

Table e12. Cumulative released of DTZ HCl coated pellets CP11*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.969	0.850	1.003	0.941	0.080	1.615	1.416	1.672	1.568	0.134
0.5	0.571	0.468	0.827	0.622	0.185	0.952	0.779	1.378	1.037	0.308
0.75	0.816	0.967	1.057	0.947	0.122	1.360	1.611	1.762	1.578	0.203
1	1.302	1.471	1.682	1.485	0.191	2.169	2.452	2.803	2.475	0.318
1.5	2.303	2.543	2.433	2.426	0.120	3.839	4.238	4.054	4.044	0.200
2	3.674	4.154	3.753	3.861	0.258	6.123	6.924	6.256	6.434	0.429
3	7.631	7.572	7.456	7.553	0.089	12.718	12.620	12.426	12.588	0.149
4	11.597	11.918	11.318	11.611	0.301	19.329	19.864	18.863	19.352	0.501
6	22.276	22.628	21.772	22.225	0.431	37.126	37.714	36.286	37.042	0.718
8	28.140	28.496	27.545	28.060	0.481	46.899	47.493	45.908	46.767	0.801
10	33.640	33.830	32.528	33.333	0.703	56.067	56.383	54.213	55.554	1.172
12	36.814	38.283	36.030	37.042	1.144	61.357	63.805	60.050	61.737	1.906

* CP11 represents for DTZ HCl (60mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 20% as plasticizer.

Table e13. Cumulative released of DTZ HCl coated pellets CP12*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.935	1.071	0.816	0.941	0.128	1.558	1.785	1.360	1.568	0.213
0.5	0.741	0.436	0.467	0.548	0.168	1.235	0.727	0.779	0.914	0.280
0.75	0.613	0.526	0.711	0.617	0.092	1.022	0.877	1.185	1.028	0.154
1	1.028	0.889	1.025	0.981	0.079	1.714	1.482	1.708	1.635	0.132
1.5	2.351	1.733	2.058	2.047	0.309	3.918	2.889	3.430	3.412	0.515
2	3.586	2.927	3.256	3.256	0.329	5.976	4.879	5.426	5.427	0.549
3	7.388	6.467	7.259	7.038	0.499	12.314	10.779	12.098	11.730	0.831
4	11.658	10.858	11.613	11.377	0.450	19.431	18.097	19.355	18.961	0.749
6	20.567	19.423	20.044	20.011	0.573	34.278	32.372	33.407	33.352	0.954
8	26.497	25.766	25.969	26.077	0.377	44.161	42.944	43.281	43.462	0.629
10	31.383	30.645	30.594	30.874	0.442	52.306	51.076	50.990	51.457	0.736
12	37.172	36.342	36.034	36.516	0.589	61.954	60.569	60.056	60.860	0.982

* CP12 represents for DTZ HCl (60mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 30% as plasticizer.

Table e14. Cumulative released of DTZ HCl coated pellets CP13*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.646	0.765	1.020	0.810	0.191	0.717	0.850	1.134	0.900	0.213
0.5	0.448	0.484	0.810	0.581	0.199	0.498	0.537	0.900	0.645	0.222
0.75	0.862	0.915	1.262	1.013	0.217	0.958	1.016	1.402	1.125	0.241
1	1.331	1.521	1.769	1.540	0.220	1.479	1.690	1.966	1.712	0.244
1.5	2.453	2.747	2.810	2.670	0.191	2.725	3.052	3.123	2.967	0.212
2	4.114	4.292	4.357	4.254	0.126	4.572	4.769	4.841	4.727	0.139
3	8.178	7.983	8.542	8.235	0.284	9.087	8.871	9.492	9.150	0.315
4	14.433	12.880	15.260	14.191	1.208	16.036	14.311	16.956	15.768	1.343
6	25.041	23.839	25.417	24.766	0.825	27.823	26.487	28.242	27.517	0.916
8	35.533	34.999	35.998	35.510	0.500	39.481	38.887	39.998	39.455	0.556
10	43.839	44.492	44.395	44.242	0.352	48.710	49.435	49.328	49.158	0.391
12	49.254	49.232	48.793	49.093	0.260	54.726	54.703	54.215	54.548	0.289

* CP13 represents for DTZ HCl (90mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 10% as plasticizer.

Table e15. Cumulative released of DTZ HCl coated pellets CP14*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	1.259	1.173	1.122	1.185	0.069	1.398	1.304	1.247	1.316	0.076
0.5	1.034	0.744	0.896	0.891	0.145	1.149	0.826	0.996	0.990	0.161
0.75	1.590	1.126	1.570	1.429	0.262	1.767	1.252	1.745	1.588	0.291
1	2.119	1.667	2.150	1.978	0.270	2.354	1.852	2.388	2.198	0.300
1.5	3.504	3.303	3.621	3.476	0.161	3.894	3.670	4.023	3.862	0.179
2	5.858	5.536	5.789	5.728	0.170	6.509	6.151	6.432	6.364	0.189
3	11.542	11.301	11.523	11.455	0.134	12.825	12.557	12.803	12.728	0.149
4	17.912	17.026	17.654	17.531	0.456	19.902	18.918	19.616	19.479	0.506
6	28.922	27.698	28.320	28.313	0.612	32.135	30.775	31.467	31.459	0.680
8	38.263	38.133	34.845	37.080	1.937	42.515	42.370	38.717	41.201	2.152
10	46.257	45.786	45.952	45.999	0.239	51.397	50.873	51.058	51.109	0.266
12	53.059	52.838	52.325	52.741	0.376	58.954	58.709	58.139	58.601	0.418

* CP14 represents for DTZ HCl (90mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 20% as plasticizer.

Table e16. Cumulative released of DTZ HCl coated pellets CP15*

Time (Hours)	Amount release (mg)			Av.	±SD	%Release			Av.	±SD
	1	2	3			1	2	3		
0	0	0	0	0	0	0	0	0	0	0
0.25	0.935	1.480	1.208	1.208	0.272	1.039	1.644	1.342	1.342	0.303
0.5	0.503	1.275	1.119	0.965	0.408	0.559	1.417	1.243	1.073	0.454
0.75	0.695	1.715	1.301	1.237	0.513	0.773	1.905	1.446	1.375	0.570
1	1.010	2.023	1.690	1.574	0.517	1.122	2.248	1.878	1.749	0.574
1.5	2.230	3.220	2.560	2.670	0.504	2.477	3.578	2.844	2.966	0.560
2	4.434	4.873	4.444	4.584	0.251	4.926	5.414	4.938	5.093	0.278
3	9.387	9.319	8.682	9.129	0.389	10.430	10.355	9.646	10.144	0.432
4	15.144	14.648	13.664	14.485	0.753	16.826	16.275	15.182	16.095	0.837
6	27.786	26.042	25.660	26.496	1.133	30.873	28.936	28.511	29.440	1.259
8	37.287	36.545	35.733	36.521	0.777	41.430	40.605	39.703	40.579	0.864
10	45.612	44.436	43.700	44.583	0.964	50.680	49.373	48.556	49.537	1.071
12	51.216	50.708	49.964	50.629	0.629	56.906	56.342	55.516	56.255	0.699

* CP15 represents for DTZ HCl (90mg/dose) pellets coated with 7.5% w/w of ethylcellulose and used TEC 30% as plasticizer.

Table e17. Cumulative released of various coated levels of DTZ HCl 30 mg/150 mg dose pellets.

Time	%Release*			Av.	±SD	%Release**			Av.	±SD
(Hours)	1	2	3			1	2	3		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	1.19	1.58	1.64	1.47	0.25	0.96	2.27	2.83	2.02	0.96
0.5	2.56	2.74	1.94	2.41	0.42	1.03	0.93	0.76	0.91	0.13
0.75	12.18	12.30	10.93	11.81	0.76	1.10	0.99	0.77	0.95	0.17
1	21.17	21.18	20.48	20.94	0.40	1.73	1.18	1.06	1.32	0.36
1.5	37.64	37.14	37.05	37.28	0.32	3.23	2.27	2.15	2.55	0.59
2	47.48	47.08	46.65	47.07	0.41	4.74	3.54	3.77	4.01	0.64
3	55.53	57.23	56.06	56.27	0.87	8.25	6.30	7.38	7.31	0.98
4	62.09	64.52	63.19	63.27	1.22	11.75	9.37	10.93	10.68	1.21
6	73.26	75.29	75.51	74.69	1.24	20.05	17.43	19.33	18.94	1.35
8	83.96	85.46	85.97	85.14	1.04	28.22	24.89	28.63	27.24	2.05
10	87.99	89.21	90.58	89.26	1.29	36.02	32.03	36.38	34.81	2.41
12	91.20	91.57	92.95	91.91	0.93	42.42	38.73	42.73	41.30	2.23

* Ethylcellulose 3.0% w/w , ** Ethylcellulose 12.0% w/w.

Table e18. Cumulative released of various coated levels of DTZ HCl 90 mg/150 mg dose pellets.

Time	%Release*			Av.	±SD	%Release**			Av.	±SD	%Release***			Av.	±SD
(Hours)	1	2	3			1	2	3			1	2	3		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	3.45	3.98	3.75	3.73	0.27	1.61	1.28	0.60	1.17	0.51	1.15	0.94	1.08	1.06	0.11
0.5	14.35	16.12	14.91	15.12	0.91	2.51	1.49	1.93	1.98	0.51	0.90	0.35	0.82	0.69	0.30
0.75	28.08	30.03	28.86	28.99	0.98	5.70	4.59	5.14	5.14	0.56	1.21	0.39	1.50	1.03	0.57
1	39.14	42.64	40.40	40.72	1.77	9.87	8.35	9.07	9.10	0.76	1.64	0.51	1.51	1.22	0.62
1.5	55.40	60.57	58.40	58.12	2.60	18.49	16.46	17.38	17.45	1.02	2.66	0.97	0.98	1.54	0.98
2	67.03	71.11	70.07	69.41	2.12	27.94	25.51	26.10	26.52	1.27	3.56	1.47	3.09	2.71	1.10
3	76.69	81.96	82.83	80.49	3.32	41.21	39.60	40.10	40.31	0.82	6.25	2.89	5.39	4.84	1.75
4	79.64	83.14	83.18	81.98	2.03	51.31	49.92	50.38	50.54	0.71	8.80	4.37	7.55	6.91	2.28
6	86.61	90.69	90.40	89.23	2.28	63.88	63.19	62.76	63.28	0.57	14.19	8.02	12.10	11.44	3.14
8	95.55	97.77	97.27	96.86	1.17	70.82	70.88	70.15	70.62	0.40	23.52	17.33	21.93	20.93	3.21
10	97.61	101.97	99.77	99.78	2.18	74.14	73.80	74.04	73.99	0.17	30.68	22.82	27.47	26.99	3.95
12	100.53	103.24	102.92	102.23	1.48	77.22	78.34	76.07	77.21	1.13	37.35	29.31	32.78	33.15	4.03

* Ethylcellulose 2.5% w/w , ** Ethylcellulose 3.0% w/w, ***Ethylcellulose 12.0% w/w.

Table e19. Cumulative released in D.I. water (U.S.P.XXIII) of Herbesser® 90 SR. and 4:1 w/w mixed DTZ HCl 90 mg/dose coated pellets (CP14) and uncoated DTZ HCl 90 mg/dose pellets.

Time	%Release(Her.)			Av.	±SD	%Release (mixed Pellets)			Av.	±SD
(Hours)	1	2	3			1	2	3		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	16.26	16.02	16.26	15.49	0.85	18.63	18.47	18.30	18.47	0.16
0.5	16.98	17.05	17.17	16.93	0.45	19.84	19.45	18.88	19.39	0.48
0.75	19.39	18.96	19.16	18.70	0.71	22.17	21.39	20.33	21.30	0.92
1	20.75	20.48	21.06	20.36	0.71	23.94	22.59	20.94	22.49	1.51
1.5	23.98	23.40	24.08	23.58	0.70	28.14	25.23	24.04	25.80	2.11
2	28.27	27.58	27.99	26.92	1.53	33.14	28.76	27.85	29.92	2.83
3	37.50	37.38	37.02	36.00	1.80	41.36	36.55	35.72	37.88	3.04
4	44.23	44.19	44.80	43.47	1.68	49.29	43.71	43.40	45.47	3.31
6	58.04	58.11	59.67	58.57	1.71	63.53	58.04	58.35	59.97	3.09
8	68.63	69.67	73.51	70.51	2.12	72.27	67.87	68.47	69.54	2.39
10	75.70	77.80	81.47	79.71	2.94	80.32	76.20	77.19	77.91	2.15
12	81.14	82.63	87.61	84.67	3.44	84.76	81.44	82.44	82.88	1.70

Table e20. Cumulative released in pH changed medium from 1.2 (for 2 hours) to 6.8 of Herbesser® 90 SR. and 4:1 w/w mixed DTZ HCl 90 mg/dose coated pellets (CP14) and uncoated DTZ HCl 90 mg/dose pellets.

Time	%Release(Her.)			Av.	±SD	%Release (mixed Pellets)			Av.	±SD
(Hours)	1	2	3			1	2	3		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	15.88	16.12	15.33	15.78	0.41	23.05	21.00	21.00	22.03	1.18
0.5	17.45	17.42	17.22	17.36	0.13	23.14	22.40	22.40	22.77	0.42
0.75	19.49	19.27	19.59	19.45	0.17	23.72	23.11	23.11	23.42	0.35
1	21.70	21.02	21.58	21.43	0.36	24.96	24.79	24.79	24.88	0.10
1.5	24.76	24.00	24.60	24.46	0.40	28.22	26.11	26.11	27.16	1.22
2	29.25	27.84	29.09	28.73	0.77	31.05	30.01	30.01	30.53	0.60
3	38.04	36.12	37.65	37.27	1.01	40.00	35.55	35.55	37.78	2.57
4	43.62	42.63	43.32	43.19	0.51	46.38	41.79	41.79	44.09	2.65
6	55.76	54.85	55.46	55.36	0.46	55.04	50.38	50.38	52.71	2.69
8	65.58	63.81	65.09	64.83	0.91	62.30	60.09	60.09	61.20	1.28
10	72.37	70.62	71.92	71.64	0.91	70.02	68.08	68.08	69.05	1.12
12	76.65	75.51	76.62	76.26	0.65	76.22	74.48	74.48	75.35	1.01

Table e21. Cumulative released of Diltiazem HCl pellets in various osmolal medium

osmolal	Time(hs)	%Release in sod.chloride solution			Av.	±SD	%Release in sod.sulphate solution			Av.	±SD
		1	2	3			1	2	3		
0.8	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.25	0.70	0.47	0.71	0.63	0.14	0.68	0.78	0.74	0.73	0.05
	0.5	0.89	0.91	1.39	1.06	0.28	1.31	1.39	1.60	1.43	0.15
	0.75	1.57	1.62	2.24	1.81	0.37	2.29	2.35	2.68	2.44	0.21
	1	2.25	2.38	3.15	2.59	0.49	3.21	3.31	3.61	3.38	0.21
	1.5	3.87	4.10	5.14	4.37	0.68	5.00	5.27	5.72	5.33	0.36
	2	5.85	6.17	7.16	6.39	0.68	7.44	7.79	8.20	7.81	0.38
	3	9.48	9.98	10.99	10.15	0.77	11.67	12.13	12.58	12.13	0.46
	4	13.02	13.85	14.68	13.85	0.83	15.82	16.41	16.75	16.33	0.47
	6	20.22	21.19	21.54	20.98	0.68	23.32	24.10	24.60	24.01	0.64
	8	26.89	28.44	28.79	28.04	1.01	30.86	32.02	31.68	31.52	0.60
	10	33.35	35.20	35.18	34.58	1.06	38.19	39.28	39.02	38.83	0.57
	12	38.65	40.80	40.87	40.11	1.27	43.81	45.09	44.65	44.52	0.65
1.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.25	0.77	0.71	0.26	0.58	0.38	1.14	0.39	0.67	0.73	0.38
	0.5	1.24	0.75	0.65	0.88	0.28	1.16	0.71	1.23	1.03	0.28
	0.75	2.34	1.23	1.12	1.53	0.41	1.89	1.23	1.98	1.70	0.41
	1	3.17	1.92	1.75	2.28	0.59	2.75	1.75	2.81	2.44	0.59
	1.5	5.20	3.33	2.95	3.83	0.95	4.75	3.11	4.78	4.21	0.95
	2	6.96	4.60	4.07	5.21	1.31	6.89	4.62	6.89	6.13	1.31
	3	10.75	7.59	7.59	8.64	1.99	11.40	7.70	10.85	9.98	1.99
	4	15.12	11.16	9.98	12.09	2.47	15.96	11.30	15.06	14.11	2.47
	6	21.34	17.56	15.62	18.17	3.41	24.42	17.87	22.80	21.69	3.41
	8	28.44	23.12	22.00	24.52	3.66	32.70	25.77	31.25	29.91	3.66
	10	35.71	30.52	27.94	31.39	4.52	40.41	31.71	38.19	36.77	4.52
	12	42.47	36.08	32.40	36.98	4.56	46.13	37.24	43.41	42.26	4.56
1.2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.25	0.25	0.36	0.40	0.33	0.08	0.62	0.50	0.72	0.61	0.11
	0.5	0.59	0.52	1.01	0.71	0.27	1.73	0.82	0.82	1.12	0.52
	0.75	1.03	0.98	1.57	1.20	0.33	2.79	1.47	1.49	1.91	0.76
	1	1.58	1.50	2.31	1.80	0.45	4.19	2.20	2.06	2.82	1.19
	1.5	2.60	2.41	3.69	2.90	0.69	6.27	3.40	3.46	4.37	1.64
	2	3.72	3.60	5.14	4.15	0.86	8.75	5.00	4.87	6.21	2.20
	3	5.73	5.60	7.70	6.35	1.18	12.88	8.44	8.24	9.85	2.63
	4	7.98	8.02	10.89	8.96	1.67	16.95	11.70	11.37	13.34	3.13
	6	12.18	12.92	16.50	13.87	2.31	23.59	18.05	16.98	19.54	3.55
	8	16.64	17.31	22.30	18.75	3.09	30.12	25.88	23.93	26.65	3.17
	10	21.20	21.97	27.59	23.58	3.49	35.38	30.61	28.34	31.44	3.59
	12	25.23	25.63	30.26	27.04	2.80	40.10	35.96	34.16	36.74	3.05

Table e22. Kinetic data of DTZ HCl pellets.

Formulation variables	Equation	r^2	K(mg/hr)	Lag time(hr)	time range
DTZ 30 mg 20%TEC					
Coated3%w/w.	y=9.0259x-3.2088	0.9850	9.0259	0.3555	0.5-2 h
Coated7.5%w/w.	y=3.440x-0.8163	0.9966	3.440	0.2373	0.75-4 h
Coated12%w/w.	y=1.138x-1.10816	0.9986	1.1380	0.9738	1.5-12 h
DTZ 90 mg 20%TEC					
Coated3%w/w.	y=14.208x-4.5054	0.9919	14.208	0.3173	0.5-4 h
Coated7.5%w/w.	y=4.772x-2.3648	0.9955	4.772	0.4955	0.5-12 h
Coated12%w/w.	y=2.0571x-1.0386	0.9951	2.057	0.5049	0.5-12 h
DTZ 30-90 mg 7.5% w/w 20%TEC					
30 mg/150 mg dose	y=3.440x-0.8163	0.9966	3.440	0.2373	0.75-4 h
45 mg/150 mg dose	y=3.889x-2.6584	0.9943	3.889	0.6835	0.5-6 h
60 mg/150 mg dose	y=3.741x-2.6780	0.9861	3.741	0.7159	0.5-10 h
90 mg/150 mg dose	y=4.772x-2.3648	0.9955	4.772	0.4955	0.5-12 h

Table e23. The relationship between 1/Thickness and release rate data of DTZ HCl 30 and 90 mg/150 mg dose pellets.

Coating level	Thickness* (μm)	1/Thickness	Release rate (mg/hr)	
			DTZ HCl 30 mg/150mg	DTZ HCl 90 mg/150mg
12% w/w	25.48± 1.76	0.039	1.138	2.057
7.50% w/w	14.19± 1.31	0.07	3.440	4.772
3% w/w	9± 1.08	0.111	9.026	14.208

* average from 6 determinations.

APPENDIX F

Calculation of Osmolarity and Osmolality

The amount of osmotically active particles in a solution is expressed in terms of osmoles or milliosmoles and these particles may be molecules or ions.

Osmolarity is the number of osmoles per litre of solution. The osmolar concentration is calculated by using the following equation:

$$\frac{(moles;solute)\times i}{(litre;solution)} = \frac{Osmol}{litre} \qquad (1a)$$

where i is number of ions per molecule for strong electrolytes and equal to 1 for nonelectrolyte. For example, sodium chloride has 2 ions per molecule and sodium sulphate has 3 ions per molecule etc.

Osmolality is the number of osmoles per kilogram of water. The osmolal concentration is calculated by using the following equation:

$$\frac{(moles;solute)\times i}{(kg;solvent)} = \frac{Osmol}{kg} \qquad (2a)$$

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

VITA

Mr. Surachet Wattana was born on March 22, 1973. He got his degree in Bachelor of Science in Pharmacy in 1994 from faculty of Pharmaceutical Science, Chulalunkorn University, Thailand. After graduation, he worked as a production supervisor at Thai Nakorn Patana Co., Ltd. for two years before entering the Master's degree program in manufacturing pharmacy at Chulalonkorn University.

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย