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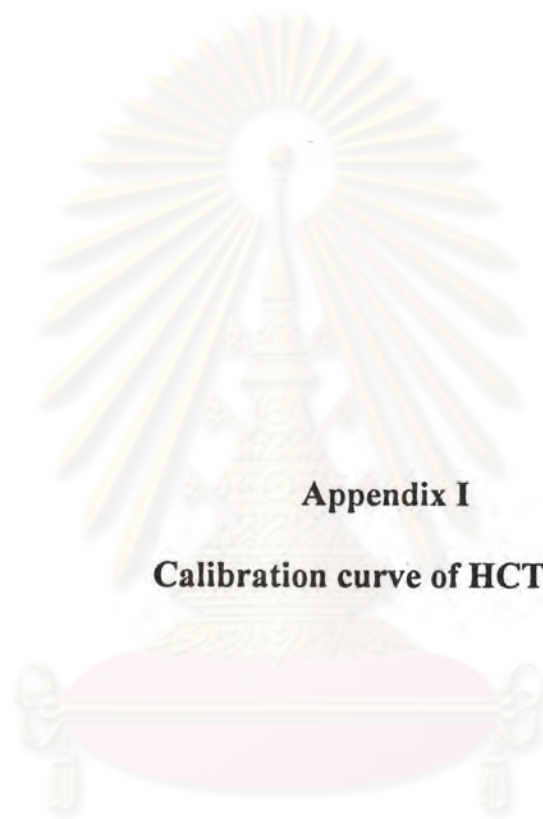
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APPENDICES

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



Appendix I

Calibration curve of HCTZ

ศูนย์วิทยุทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Table 8 Calibration data of HCTZ in 0.1 N hydrochloric acid at 272 nm

Concentration (mcg/ml)	Average Absorbance	Regression Output:	
0.10	0.01	Constant	-0.0011
1.01	0.06	Std Err of Y Est	0.0039
2.02	0.13	R Squared	0.9999
3.03	0.19	No. of Observations	11.0000
4.04	0.26	Degrees of Freedom	9.0000
5.05	0.32	X Coefficient(s)	0.0638
6.06	0.39	Std Err of Coef.	0.0003
8.09	0.52		
10.11	0.64		
12.13	0.77		
15.16	0.97		

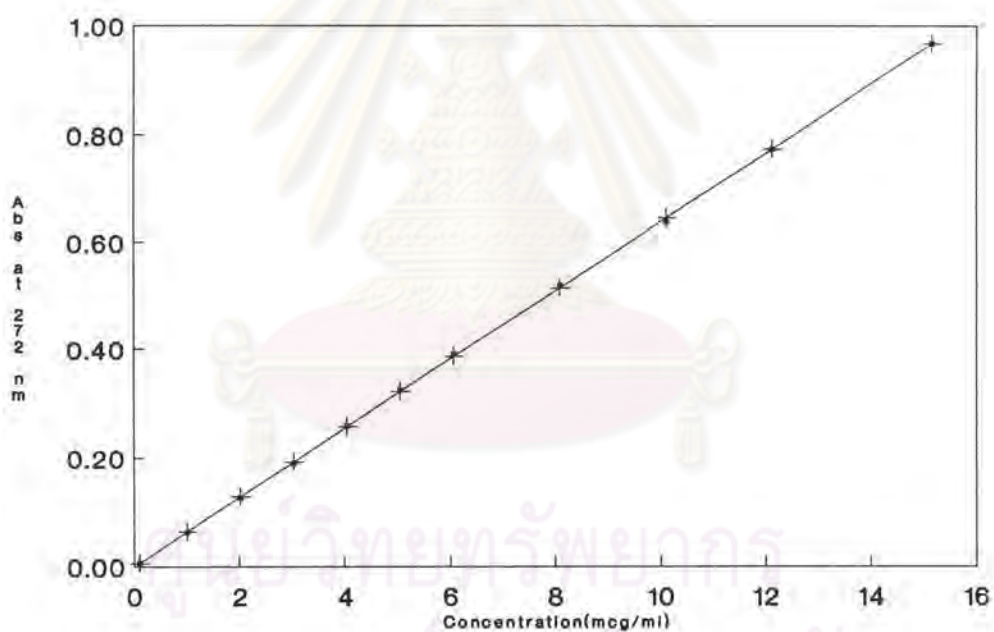
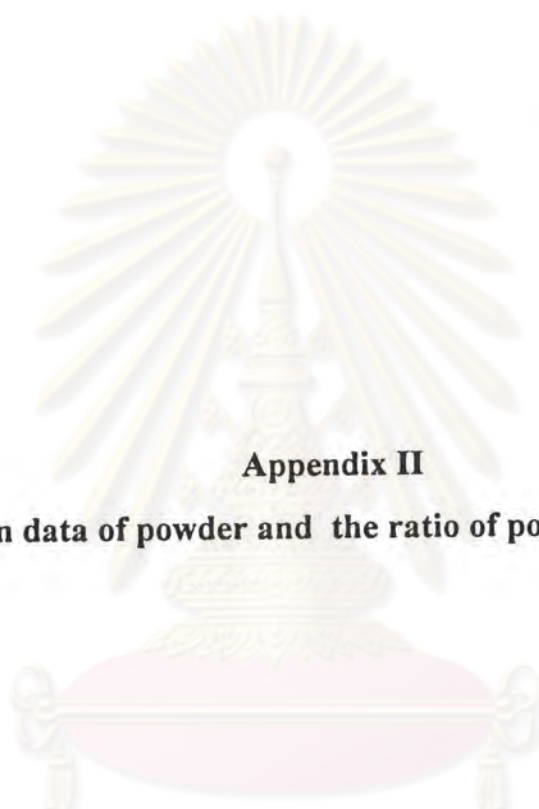


Figure 59 Calibration curve of HCTZ in 0.1 N hydrochloric acid at 272 nm



Appendix II

Dissolution data of powder and the ratio of powder preparations

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Table 9 Dissolution data of HCTZ from untreated and treated HCTZ powders and statistical test

DRUG	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
		#1	#2	#3		
HCTZ	2	19.91	21.57	23.43	21.64	1.44
	4	33.27	35.40	36.60	35.09	1.38
	6	42.77	44.55	46.34	44.55	1.46
	8	51.75	54.87	55.56	54.06	1.66
	10	57.96	60.21	62.60	60.25	1.90
	15	66.88	68.37	70.23	68.49	1.37
	20	74.57	76.72	77.77	76.35	1.33
	30	85.14	86.23	88.14	86.50	1.24
	45	92.37	92.86	93.95	93.06	0.66
	60	94.42	95.32	95.72	95.15	0.54
HCTZ PM	2	21.37	20.41	18.31	20.03	1.28
	4	34.84	32.39	28.75	31.99	2.50
	6	45.99	43.18	38.68	42.62	3.01
	8	54.39	52.22	46.71	51.11	3.23
	10	61.99	59.77	53.95	58.57	3.39
	15	70.34	69.31	66.54	68.73	1.60
	20	77.89	76.25	75.42	76.52	1.02
	30	87.16	85.88	83.23	85.42	1.64
	45	91.43	92.07	89.13	90.88	1.26
	60	94.31	95.09	93.66	94.35	0.58
HCTZ KM	2	18.07	20.49	23.48	20.68	2.21
	4	31.43	33.92	37.63	34.33	2.55
	6	40.21	42.38	45.06	42.55	1.98
	8	48.05	50.75	53.63	50.81	2.28
	10	55.08	58.73	61.56	58.46	2.65
	15	65.96	69.71	70.79	68.82	2.07
	20	75.35	77.24	80.47	77.69	2.12
	30	87.32	87.20	87.02	87.18	0.12
	45	92.87	93.14	93.04	93.02	0.11
	60	97.33	96.31	96.32	96.65	0.48
HCTZ SM	2	11.44	11.68	11.73	11.62	0.12
	4	19.26	19.47	18.70	19.15	0.32
	6	27.27	27.16	25.72	26.72	0.71
	8	33.63	33.49	31.08	32.73	1.17
	10	39.17	39.86	37.17	38.73	1.14
	15	50.95	51.32	47.53	49.93	1.71
	20	61.10	61.43	56.96	59.83	2.04
	30	74.55	74.97	70.81	73.44	1.87
	45	87.37	87.32	83.32	86.00	1.90
	60	94.33	93.56	90.69	92.86	1.57
HCTZ BM	2	37.03	34.01	34.93	35.32	1.26
	4	46.21	47.17	44.69	46.03	1.02
	6	51.65	55.19	50.85	52.57	1.89
	8	56.00	61.00	55.49	57.50	2.48
	10	58.83	64.29	59.32	60.81	2.47
	15	65.60	72.82	67.24	68.56	3.09
	20	70.87	77.17	71.97	73.34	2.75
	30	77.84	84.64	79.40	80.63	2.91
	45	89.76	92.57	91.09	91.14	1.15
	60	94.45	96.03	93.69	94.72	0.98

	HCTZ	HCTZ PM	HCTZ KM	HCTZ SM	HCTZ BM
HCTZ	-	S*	NS	S*	NS
HCTZ PM	S*	-	S	S*	NS
HCTZ KM	NS	S	-	S*	NS
HCTZ SM	S*	S*	S*	-	S*
HCTZ BM	NS	NS	NS	S*	-

NS not significant at $p = 0.05$

S significant at $p < 0.05$

S* significant at $p < 0.01$

Table 10 Dissolution data of HCTZ from physical mixture of CT PM and CS PM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CT PM	1:1	2	28.31	27.07	26.71	27.36	0.69
		4	46.06	47.09	41.47	44.87	2.44
		6	61.24	57.92	57.85	59.00	1.58
		8	70.44	68.24	64.77	67.82	2.33
		10	76.18	73.97	75.38	75.18	0.91
		15	81.52	79.02	80.43	80.33	1.02
		20	86.75	85.09	85.93	85.92	0.68
		30	94.68	93.16	95.39	94.41	0.93
		45	97.03	94.93	97.45	96.47	1.10
	60	98.25	97.84	99.24	98.44	0.59	
	1:2	2	24.48	29.19	27.91	27.19	1.99
		4	41.62	48.67	44.54	44.94	2.89
		6	52.40	52.60	54.65	53.22	1.02
		8	62.38	68.68	64.67	65.24	2.60
		10	67.79	72.15	73.05	71.00	2.30
		15	79.40	81.71	82.61	81.24	1.35
		20	87.43	87.23	90.10	88.25	1.31
		30	95.64	93.48	98.62	95.91	2.11
		45	99.39	97.79	102.96	100.05	2.16
	60	102.88	98.74	107.74	103.12	3.68	
	1:3	2	21.74	27.64	27.92	25.76	2.85
		4	43.30	44.41	45.40	44.37	0.86
		6	57.22	57.34	56.22	56.93	0.50
		8	72.63	71.04	68.51	70.73	1.70
		10	76.55	74.25	71.00	73.93	2.28
		15	84.87	84.10	81.39	83.45	1.49
		20	92.10	90.05	85.78	89.31	2.63
30		96.41	94.35	92.87	94.54	1.45	
45		98.34	97.39	95.48	97.07	1.19	
60	99.15	97.78	95.86	97.60	1.35		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CS PM	1:1	2	30.89	24.51	22.59	26.00	3.55
		4	48.75	41.96	35.05	41.92	5.59
		6	63.05	55.00	44.22	54.09	7.71
		8	71.96	61.22	50.63	61.27	8.71
		10	80.21	68.87	58.20	69.10	8.99
		15	88.93	79.38	68.47	78.93	8.36
		20	98.68	91.50	74.46	88.21	10.16
		30	102.02	97.77	85.38	95.06	7.06
		45	103.14	99.14	93.41	98.56	3.99
	60	103.69	101.79	94.76	100.08	3.84	
	1:2	2	28.78	26.20	24.51	26.50	1.75
		4	49.14	43.94	39.99	44.36	3.75
		6	60.50	56.57	51.33	56.13	3.75
		8	69.95	64.34	57.95	64.08	4.90
		10	76.65	70.89	64.60	70.71	4.92
		15	84.92	80.29	74.67	79.96	4.19
		20	90.29	87.76	84.36	87.47	2.43
		30	94.71	94.29	93.27	94.09	0.61
		45	97.19	99.02	97.86	98.02	0.76
	60	98.41	99.98	100.07	99.49	0.76	
	1:3	2	29.27	26.89	28.96	28.37	1.06
		4	44.48	43.36	46.12	44.65	1.13
		6	56.39	54.01	58.73	56.38	1.93
		8	66.83	63.45	66.92	65.74	1.61
		10	72.40	71.68	74.60	72.89	1.24
		15	84.61	81.08	83.01	82.90	1.44
		20	91.82	87.71	90.49	90.00	1.71
30		100.05	95.22	95.76	97.01	2.16	
45		102.56	97.28	98.10	99.32	2.32	
60	103.26	99.21	99.47	100.65	1.85		

Table 11 Dissolution data of HCTZ from physical mixture of CSU PM and LMCS PM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CSU PM	1:1	2	12.41	13.52	11.96	12.63	0.66
		4	26.41	29.48	24.81	26.90	1.94
		6	38.24	42.30	35.90	38.82	2.64
		8	47.74	52.66	44.53	48.31	3.34
		10	56.03	60.26	51.24	55.84	3.69
		15	68.44	71.14	62.76	67.44	3.49
		20	77.26	78.98	70.83	75.69	3.51
		30	85.84	85.46	82.03	84.44	1.71
		45	91.52	91.69	91.05	91.42	0.27
	60	93.42	91.76	93.93	93.04	0.93	
	1:2	2	11.14	11.41	10.42	10.99	0.42
		4	28.09	26.23	25.66	26.66	1.04
		6	42.60	39.45	38.74	40.26	1.68
		8	54.80	49.22	49.35	51.13	2.60
		10	64.40	56.94	57.50	59.61	3.39
		15	76.15	70.05	70.74	72.31	2.73
		20	85.15	79.29	79.85	81.43	2.64
		30	92.66	88.30	90.40	90.45	1.78
		45	97.38	93.70	95.39	95.49	1.51
	60	97.77	95.89	96.61	96.76	0.77	
	1:3	2	12.25	11.98	13.11	12.45	0.48
		4	29.74	28.79	31.90	30.14	1.30
		6	43.82	41.33	47.42	44.19	2.50
		8	56.01	52.67	59.79	56.16	2.91
		10	64.19	59.43	67.86	63.83	3.45
		15	77.47	70.87	79.07	75.80	3.55
		20	84.78	79.14	87.25	83.72	3.39
30		91.29	88.71	92.37	90.79	1.53	
45		94.45	95.95	96.10	95.50	0.74	
60	96.23	99.28	96.48	97.33	1.38		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
LMCS PM	1:1	2	39.37	38.06	36.30	37.91	1.26
		4	55.81	53.91	51.55	53.76	1.74
		6	67.26	65.91	61.25	64.81	2.57
		8	75.39	73.45	70.59	73.14	1.97
		10	80.45	80.20	73.51	78.05	3.22
		15	89.21	88.81	83.61	87.21	2.55
		20	93.93	95.07	89.55	92.85	2.38
		30	97.40	97.98	95.66	97.02	0.99
		45	99.34	99.07	98.15	98.85	0.51
	60	99.17	100.45	99.38	99.67	0.56	
	1:2	2	37.46	37.83	33.56	36.29	1.93
		4	57.52	56.88	50.80	55.07	3.02
		6	70.22	70.27	62.78	67.76	3.52
		8	78.77	78.53	71.16	76.15	3.53
		10	83.71	84.30	75.50	81.17	4.02
		15	91.63	92.07	84.93	89.54	3.26
		20	95.78	96.23	90.33	94.11	2.68
		30	97.57	98.15	94.91	96.88	1.41
		45	98.94	99.24	98.38	98.86	0.36
	60	99.47	99.64	99.62	99.57	0.07	
	1:3	2	34.42	35.56	33.13	34.37	0.99
		4	52.51	54.23	49.80	52.18	1.83
		6	65.35	67.09	62.47	64.97	1.90
		8	73.60	75.21	69.86	72.89	2.24
		10	79.93	82.40	76.45	79.59	2.44
		15	88.26	90.75	88.00	89.00	1.24
		20	93.53	94.91	93.83	94.09	0.59
30		97.00	98.81	97.44	97.75	0.77	
45		98.65	99.34	99.94	99.31	0.53	
60	99.60	100.16	100.19	99.98	0.27		

Table 12 Dissolution data of HCTZ from physical mixture of PVP PM and PEG PM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
PVP PM	1:1	2	13.55	13.21	12.14	12.96	0.60
		4	24.19	22.27	23.48	23.31	0.79
		6	32.07	29.69	31.07	30.94	0.98
		8	38.31	35.89	37.44	37.21	1.00
		10	44.29	40.71	42.58	42.53	1.46
		15	53.84	50.06	53.66	52.52	1.74
		20	62.58	59.17	59.59	60.45	1.52
		30	72.93	69.32	71.05	71.10	1.47
		45	83.61	78.40	83.27	81.76	2.38
	60	92.24	83.74	89.78	88.59	3.57	
	1:2	2	10.99	8.62	10.15	9.92	0.98
		4	23.71	20.65	21.60	21.98	1.28
		6	35.24	30.34	31.99	32.52	2.03
		8	43.45	39.11	39.05	40.54	2.06
		10	50.72	44.96	45.46	47.05	2.61
		15	62.96	56.63	55.84	58.47	3.19
		20	72.58	66.24	64.44	67.75	3.49
		30	83.81	77.03	74.92	78.59	3.79
		45	94.40	86.19	85.88	88.82	3.94
	60	95.75	90.46	92.96	93.06	2.16	
	1:3	2	9.58	8.60	7.48	8.55	0.86
		4	21.30	18.49	17.38	19.06	1.65
		6	31.95	28.01	27.20	29.05	2.08
		8	40.84	36.18	35.37	37.47	2.41
		10	47.96	42.71	43.03	44.57	2.40
		15	60.17	53.07	55.52	56.25	2.94
		20	70.05	61.65	64.42	65.37	3.49
30		81.12	71.13	75.89	76.05	4.08	
45		88.30	82.06	85.04	85.14	2.55	
60	92.44	88.14	89.16	89.91	1.83		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
PEG PM	1:1	2	24.11	24.11	20.93	23.05	1.50
		4	40.35	42.70	36.76	39.94	2.44
		6	51.64	53.23	46.65	50.50	2.80
		8	59.49	61.83	53.22	58.18	3.63
		10	65.69	67.67	59.83	64.40	3.33
		15	74.04	77.06	70.26	73.79	2.78
		20	81.02	84.24	77.66	80.98	2.68
		30	86.51	89.91	85.52	87.31	1.88
		45	88.94	92.09	88.79	89.94	1.52
	60	90.12	94.84	91.38	92.11	2.00	
	1:2	2	33.59	33.81	28.91	32.10	2.26
		4	56.26	53.34	44.72	51.44	4.90
		6	59.80	58.12	56.66	58.20	1.28
		8	70.24	67.56	65.15	67.65	2.08
		10	73.16	71.85	71.43	72.15	0.73
		15	79.60	77.71	75.91	77.74	1.51
		20	81.86	84.02	83.23	83.04	0.90
		30	87.08	88.55	90.73	88.78	1.50
		45	92.74	93.09	95.16	93.67	1.07
	60	94.79	95.69	98.07	96.18	1.39	
	1:3	2	30.81	31.75	25.38	29.32	2.81
		4	50.81	50.41	40.88	47.37	4.59
		6	65.44	62.53	51.53	59.83	5.99
		8	75.08	72.75	60.27	69.37	6.50
		10	80.13	80.20	67.51	75.95	5.97
		15	89.71	87.27	80.13	85.70	4.06
		20	97.51	98.04	89.73	95.09	3.80
30		101.98	105.48	93.88	100.45	4.86	
45		103.09	109.02	97.21	103.11	4.82	
60	105.90	110.03	99.14	105.02	4.49		

Table 13 Dissolution data of HCTZ from kneading mixture of CT KM and CS KM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CT KM	1:1	2	53.75	51.78	46.33	50.62	3.14
		4	71.82	73.36	67.50	70.90	2.48
		6	78.85	82.51	75.87	79.08	2.72
		8	84.08	87.48	80.92	84.16	2.68
		10	87.22	91.35	84.31	87.63	2.89
		15	91.79	94.10	88.14	91.34	2.45
		20	93.41	96.87	90.30	93.53	2.68
		30	93.92	98.38	93.74	95.34	2.15
		45	94.85	99.61	94.38	96.28	2.37
	60	96.76	100.43	95.31	97.50	2.16	
	1:2	2	49.32	49.85	48.23	49.13	0.67
		4	71.85	72.08	70.43	71.45	0.73
		6	80.55	78.53	78.27	79.12	1.02
		8	83.53	81.92	82.92	82.79	0.66
		10	88.07	84.20	86.33	86.20	1.58
		15	92.50	87.76	90.73	90.33	1.96
		20	94.55	89.50	94.18	92.74	2.30
		30	97.03	90.55	97.64	95.07	3.21
		45	98.54	94.83	98.31	97.23	1.70
	60	98.79	95.76	99.11	97.89	1.51	
	1:3	2	45.13	51.92	55.20	50.75	4.19
		4	69.06	74.78	76.62	73.48	3.22
		6	81.00	81.96	84.22	82.39	1.35
		8	91.04	88.19	88.90	89.38	1.21
		10	93.79	90.65	92.07	92.17	1.28
		15	97.55	93.54	94.26	95.12	1.74
		20	99.20	95.88	97.02	97.37	1.38
30		101.29	97.11	97.69	98.70	1.85	
45		101.13	98.48	97.93	99.18	1.40	
60	101.39	98.86	98.45	99.57	1.30		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CS KM	1:1	2	56.07	58.46	61.85	58.79	2.37
		4	74.64	79.01	80.13	77.93	2.37
		6	79.83	85.77	86.89	84.16	3.10
		8	84.34	91.58	91.15	89.02	3.31
		10	88.46	94.19	93.19	91.95	2.50
		15	92.03	95.69	95.52	94.41	1.69
		20	95.34	99.15	98.00	97.50	1.60
		30	96.14	100.67	100.07	98.96	2.01
		45	97.36	101.35	101.87	100.19	2.02
	60	97.46	101.47	102.84	100.59	2.28	
	1:2	2	61.89	61.73	61.91	61.84	0.08
		4	79.15	78.24	77.02	78.14	0.87
		6	83.96	84.57	81.67	83.40	1.25
		8	86.53	87.43	86.34	86.77	0.47
		10	91.24	90.58	87.38	89.73	1.69
		15	93.85	93.04	90.66	92.52	1.35
		20	94.64	94.39	92.42	93.82	0.99
		30	95.85	95.04	94.05	94.98	0.74
		45	96.79	95.83	95.25	95.96	0.63
	60	97.17	96.20	97.03	96.80	0.43	
	1:3	2	55.59	54.83	52.32	54.25	1.40
		4	73.95	74.44	70.09	72.82	1.94
		6	82.96	83.44	79.08	81.83	1.96
		8	90.05	87.99	84.59	87.54	2.25
		10	94.49	90.87	89.98	91.78	1.95
		15	96.70	93.62	97.38	95.90	1.64
		20	97.51	95.39	98.33	97.08	1.24
30		100.01	97.60	99.01	98.87	0.99	
45		101.39	98.54	100.10	100.01	1.16	
60	101.09	99.07	99.93	100.03	0.83		

Table 14 Dissolution data of HCTZ from kneading mixture of CSU KM and LMCS KM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CSU KM	1:1	2	31.27	24.11	28.31	27.90	2.94
		4	59.73	51.72	57.32	56.26	3.36
		6	74.28	68.49	71.15	71.31	2.37
		8	82.29	77.18	79.99	79.82	2.09
		10	87.53	82.96	84.23	84.91	1.92
		15	93.22	87.50	91.31	90.68	2.37
		20	96.96	89.67	95.32	93.98	3.12
		30	99.32	91.42	97.95	96.23	3.44
		45	99.99	92.76	99.47	97.41	3.29
	60	100.81	94.53	100.85	98.73	2.97	
	1:2	2	20.84	21.56	21.13	21.18	0.29
		4	52.32	53.49	49.96	51.92	1.46
		6	76.10	73.49	71.78	73.79	1.78
		8	87.92	83.61	86.11	85.88	1.77
		10	92.34	89.56	90.24	90.71	1.18
		15	96.50	93.28	95.24	95.01	1.32
		20	98.86	94.92	97.87	97.21	1.67
		30	100.38	97.97	99.11	99.15	0.98
		45	102.18	99.76	101.61	101.19	1.03
	60	102.59	100.44	101.74	101.59	0.89	
	1:3	2	25.23	20.31	23.15	22.90	2.02
		4	54.80	46.21	51.06	50.69	3.52
		6	75.52	66.33	71.09	70.98	3.75
		8	85.09	78.95	82.34	82.13	2.51
		10	90.63	86.29	91.40	89.44	2.25
		15	95.35	94.09	100.64	96.70	2.84
		20	97.84	98.55	103.31	99.90	2.43
30		99.08	99.79	105.70	101.52	2.97	
45		99.61	100.75	108.39	102.92	3.90	
60	99.87	101.57	109.26	103.57	4.08		

	RATIO	TIME (min)	% DRUG DISSOLVE			MEAN	S.D.
			#1	#2	#3		
LMCS KM	1:1	2	92.02	89.59	86.22	89.28	2.38
		4	97.47	96.56	95.13	96.39	0.96
		6	98.99	97.09	97.63	97.90	0.80
		8	99.25	97.91	98.45	98.54	0.55
		10	99.09	99.29	99.26	99.21	0.09
		15	98.93	99.12	98.40	98.82	0.31
		20	98.33	98.95	97.67	98.32	0.53
		30	98.72	98.78	98.05	98.52	0.33
		45	98.69	98.61	97.45	98.25	0.57
	60	98.08	98.99	97.40	98.16	0.65	
	1:2	2	86.69	84.64	80.76	84.03	2.46
		4	97.15	95.41	92.88	95.15	1.75
		6	98.53	97.35	96.63	97.50	0.78
		8	98.79	98.02	97.02	97.94	0.72
		10	98.63	98.28	98.68	98.53	0.18
		15	98.88	98.67	98.23	98.59	0.27
		20	99.00	98.50	98.62	98.71	0.21
		30	99.11	98.60	98.59	98.77	0.24
		45	98.51	98.29	99.26	98.69	0.42
	60	98.61	98.10	98.94	98.55	0.35	
	1:3	2	84.63	83.39	83.08	83.70	0.67
		4	95.08	95.12	94.93	95.04	0.08
		6	97.01	98.74	97.14	97.63	0.79
		8	97.68	98.44	97.39	97.84	0.44
		10	98.22	98.70	98.49	98.47	0.20
		15	98.33	98.25	98.32	98.30	0.04
		20	98.58	97.65	97.73	97.99	0.42
30		98.55	98.32	97.97	98.28	0.24	
45		98.51	98.42	98.21	98.38	0.12	
60	98.61	98.80	98.46	98.63	0.14		

Table 15 Dissolution data of HCTZ from kneading mixture of PVP KM and PEG KM at three ratios

RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.	
		#1	#2	#3			
PVP KM	1:1	2	52.08	75.67	46.10	57.95	12.77
		4	70.90	66.81	64.75	67.49	2.55
		6	82.24	75.62	73.82	77.22	3.62
		8	87.60	81.66	80.69	83.32	3.06
		10	90.75	85.06	84.50	86.77	2.82
		15	97.00	92.55	91.29	93.61	2.45
		20	99.63	96.71	94.45	96.93	2.12
		30	99.47	100.89	97.77	99.38	1.27
		45	100.14	101.71	100.27	100.71	0.71
	60	99.83	102.68	99.68	100.73	1.38	
	1:2	2	51.25	47.91	47.88	49.01	1.59
		4	70.82	66.63	68.27	68.57	1.73
		6	83.18	74.74	77.94	78.62	3.48
		8	88.00	79.38	84.56	83.98	3.54
		10	92.85	84.32	88.97	88.71	3.49
		15	98.56	89.85	94.10	94.17	3.56
		20	100.79	94.14	98.83	97.92	2.79
		30	101.61	96.91	101.05	99.86	2.10
		45	101.88	99.12	100.61	100.54	1.13
	60	101.86	100.35	101.58	101.26	0.65	
	1:3	2	55.48	50.93	53.02	53.14	1.86
		4	78.02	70.54	72.07	73.54	3.23
		6	88.17	79.39	80.78	82.78	3.85
		8	94.00	83.78	84.89	87.56	4.58
		10	96.35	86.21	86.20	89.59	4.78
		15	100.25	90.63	90.62	93.83	4.54
		20	101.50	95.35	96.61	97.82	2.65
30		102.19	99.54	99.53	100.42	1.25	
45		102.60	102.61	101.47	102.23	0.53	
60	102.30	103.02	102.30	102.54	0.34		

RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.	
		#1	#2	#3			
PEG KM	1:1	2	39.47	37.50	35.31	37.43	1.70
		4	54.62	52.36	49.85	52.28	1.95
		6	66.48	64.77	61.24	64.16	2.18
		8	71.50	68.79	68.04	69.44	1.48
		10	77.38	75.36	74.18	75.64	1.32
		15	84.29	82.54	80.92	82.58	1.38
		20	89.82	89.19	87.68	88.90	0.90
		30	95.38	94.04	91.82	93.74	1.47
		45	96.46	95.67	94.42	95.52	0.84
	60	99.51	98.30	96.62	98.14	1.19	
	1:2	2	37.79	38.28	38.61	38.23	0.34
		4	54.77	55.93	57.56	56.09	1.14
		6	66.21	67.08	68.72	67.34	1.04
		8	72.92	74.90	76.85	74.89	1.60
		10	77.27	81.36	83.33	80.65	2.52
		15	86.29	88.70	88.57	87.85	1.11
		20	91.41	92.56	94.41	92.79	1.24
		30	94.02	95.45	95.90	95.12	0.80
		45	96.36	98.07	97.55	97.33	0.72
	60	98.42	99.16	98.35	98.65	0.37	
	1:3	2	41.42	39.47	35.60	38.83	2.42
		4	64.61	58.43	54.35	59.13	4.22
		6	74.82	69.46	65.90	70.06	3.67
		8	83.12	77.03	74.56	78.24	3.60
		10	89.77	82.95	79.33	84.02	4.33
		15	93.36	91.29	88.77	91.14	1.88
		20	95.84	94.75	95.16	95.25	0.45
30		96.50	98.50	98.20	97.74	0.88	
45		97.58	98.61	100.28	98.82	1.11	
60	97.97	99.14	101.10	99.40	1.29		

Table 16 Dissolution data of HCTZ from solvent deposition mixture of CT CMD and CS SMD at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CT SMD	1:1	2	40.10	42.01	38.34	40.15	1.50
		4	59.72	61.97	58.00	59.90	1.62
		6	72.29	73.44	69.31	71.68	1.74
		8	80.28	81.45	78.01	79.91	1.43
		10	83.39	88.38	85.34	85.70	2.05
		15	90.46	93.80	89.33	91.19	1.90
		20	94.04	95.86	92.21	94.04	1.49
		30	95.68	97.64	96.09	96.47	0.85
		45	96.75	98.73	96.75	97.41	0.93
	60	98.12	99.12	96.99	98.07	0.87	
	1:2	2	56.40	52.38	55.02	54.60	1.67
		4	72.35	72.80	73.75	72.97	0.58
		6	79.80	81.37	82.88	81.35	1.26
		8	84.05	85.76	87.13	85.65	1.26
		10	86.48	88.06	90.57	88.37	1.68
		15	89.77	92.05	93.03	91.62	1.37
		20	92.51	94.10	95.36	93.99	1.17
		30	95.13	96.30	96.58	96.00	0.63
		45	96.77	97.10	97.38	97.08	0.25
	60	97.14	97.20	97.48	97.27	0.15	
	1:3	2	56.63	55.87	54.66	55.72	0.81
		4	74.13	71.27	69.61	71.67	1.87
		6	79.89	78.29	76.90	78.36	1.22
		8	84.83	82.39	81.54	82.92	1.40
		10	87.55	84.54	83.54	85.21	1.71
		15	90.57	89.51	87.23	89.10	1.39
		20	90.63	91.55	89.26	90.48	0.94
30		93.38	94.16	91.71	93.08	1.02	
45		97.68	95.51	93.33	95.51	1.78	
60	98.63	97.15	95.66	97.14	1.21		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CS SMD	1:1	2	44.22	47.60	46.99	46.27	1.47
		4	59.10	61.23	55.71	58.68	2.27
		6	66.89	69.45	66.31	67.55	1.36
		8	72.89	74.34	71.33	72.85	1.23
		10	78.21	77.28	76.09	77.20	0.87
		15	80.47	80.80	79.33	80.20	0.63
		20	84.14	85.74	82.44	84.11	1.35
		30	89.67	91.41	87.26	89.45	1.70
		45	92.68	94.16	94.50	93.78	0.79
	60	96.56	97.06	97.55	97.05	0.40	
	1:2	2	50.20	49.74	47.35	49.09	1.25
		4	62.60	61.00	59.58	61.06	1.23
		6	70.55	67.40	69.35	69.10	1.30
		8	74.61	71.71	73.53	73.28	1.19
		10	78.96	75.48	74.78	76.41	1.83
		15	83.34	79.70	78.99	80.68	1.90
		20	87.03	85.34	82.80	85.06	1.74
		30	91.03	88.90	86.77	88.90	1.74
		45	94.76	93.04	91.60	93.14	1.29
	60	97.38	95.52	95.19	96.03	0.96	
	1:3	2	56.13	53.14	50.09	53.12	2.46
		4	66.70	62.73	59.67	63.04	2.88
		6	74.10	69.84	68.18	70.71	2.49
		8	78.59	76.00	74.34	76.31	1.75
		10	83.80	80.93	78.70	81.14	2.09
		15	89.34	87.73	86.63	87.90	1.11
		20	91.09	89.48	88.51	89.69	1.06
30		92.56	90.95	91.24	91.58	0.70	
45		94.61	93.97	94.70	94.43	0.32	
60	97.65	98.28	96.76	97.56	0.62		

Table 17 Dissolution data of HCTZ from solvent deposition mixture of CSU SMD and LMCS SMD at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CSU SMD	1:1	2	43.23	40.84	40.42	41.50	1.24
		4	60.36	57.25	57.39	58.34	1.43
		6	70.97	66.30	68.83	68.70	1.91
		8	76.43	72.43	73.57	74.14	1.68
		10	80.65	76.77	77.07	78.16	1.76
		15	86.02	81.98	83.12	83.70	1.70
		20	89.44	85.80	85.69	86.98	1.74
		30	94.01	89.92	90.37	91.43	1.83
		45	95.50	92.66	92.83	93.66	1.30
	60	96.01	95.55	95.58	95.71	0.21	
	1:2	2	49.77	48.93	49.29	49.33	0.35
		4	67.95	66.11	68.52	67.53	1.03
		6	78.19	75.36	76.34	76.63	1.17
		8	82.85	79.44	81.67	81.32	1.42
		10	85.56	82.41	84.37	84.11	1.30
		15	89.27	85.96	88.34	87.85	1.39
		20	90.46	87.98	89.66	89.36	1.03
		30	92.36	90.43	92.11	91.63	0.86
		45	93.56	92.46	93.87	93.30	0.60
	60	95.18	93.66	94.23	94.36	0.63	
	1:3	2	43.99	44.08	44.52	44.20	0.23
		4	62.92	62.34	63.78	63.01	0.59
		6	75.20	73.66	73.99	74.29	0.66
		8	81.94	81.25	79.61	80.93	0.98
		10	87.03	85.63	89.06	87.24	1.41
		15	98.74	91.03	89.54	93.10	4.03
		20	97.87	94.06	91.30	94.41	2.70
30		100.65	97.24	95.31	97.73	2.21	
45		102.74	98.89	96.53	99.39	2.56	
60	103.85	99.14	97.05	100.01	2.84		

	RATIO	TIME (min)	% DRUG DISSOLVE			MEAN	S.D.
			#1	#2	#3		
LMCS SMD	1:1	2	33.70	30.48	30.31	31.50	1.56
		4	53.81	50.54	50.77	51.71	1.49
		6	67.16	63.23	65.14	65.18	1.61
		8	77.36	71.05	74.52	74.31	2.58
		10	82.27	76.80	79.86	79.65	2.24
		15	89.18	84.42	87.34	86.98	1.96
		20	91.91	88.26	91.20	90.46	1.58
		30	93.67	91.14	94.09	92.97	1.30
		45	95.30	93.75	96.00	95.02	0.94
	60	95.25	94.39	96.94	95.53	1.06	
	1:2	2	32.56	30.82	29.21	30.86	1.36
		4	47.67	45.20	42.78	45.21	2.00
		6	57.09	53.19	52.32	54.20	2.07
		8	64.58	61.22	58.96	61.59	2.31
		10	69.59	64.93	63.93	66.15	2.46
		15	79.12	74.15	71.76	75.01	3.07
		20	85.05	79.47	78.50	81.01	2.89
		30	91.71	85.95	85.27	87.64	2.89
		45	95.58	91.34	91.37	92.77	1.99
	60	96.52	94.93	94.83	95.43	0.77	
	1:3	2	35.70	33.25	33.54	34.16	1.09
		4	48.54	44.99	45.27	46.27	1.61
		6	57.24	52.98	54.96	55.06	1.74
		8	63.59	58.62	60.89	61.04	2.03
		10	69.14	63.17	65.59	65.97	2.45
		15	77.53	71.40	73.84	74.25	2.52
		20	82.44	77.85	79.87	80.05	1.88
30		87.39	84.33	86.36	86.02	1.27	
45		91.51	89.99	91.33	90.95	0.68	
60	94.53	93.01	93.80	93.78	0.62		

Table 18 Dissolution data of HCTZ from solvent mixture of LMCS SM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVE			MEAN	S.D.
			#1	#2	#3		
LMCS SM	1:1	2	66.38	70.75	64.20	67.11	2.72
		4	84.22	86.61	80.89	83.91	2.35
		6	90.89	92.29	88.37	90.52	1.62
		8	94.21	94.49	91.11	93.27	1.53
		10	96.55	98.38	94.71	96.55	1.50
		15	97.78	99.48	96.49	97.92	1.22
		20	98.03	99.74	97.30	98.35	1.02
		30	98.14	99.57	98.10	98.60	0.68
		45	98.24	99.82	98.07	98.71	0.79
	60	98.62	100.49	97.46	98.86	1.25	
	1:2	2	89.92	84.56	86.08	86.85	2.26
		4	96.89	94.59	91.35	94.27	2.27
		6	97.98	96.10	93.68	95.92	1.76
		8	98.80	97.47	96.31	97.53	1.02
		10	98.92	98.57	97.96	98.48	0.40
		15	98.33	98.82	99.20	98.79	0.35
		20	97.88	99.08	98.89	98.62	0.52
		30	97.71	98.34	97.59	97.88	0.33
		45	97.11	98.59	98.26	97.98	0.64
	60	97.06	99.11	98.78	98.32	0.90	
	1:3	2	79.69	84.42	85.50	83.20	2.52
		4	89.14	90.94	89.92	90.00	0.74
		6	91.88	93.42	94.22	93.17	0.97
		8	93.37	95.62	96.29	95.09	1.25
		10	94.87	96.85	99.07	96.93	1.71
		15	96.23	98.65	98.34	97.74	1.07
		20	97.46	100.03	98.31	98.60	1.07
30		96.57	98.87	97.85	97.76	0.94	
45		97.23	99.12	97.95	98.10	0.78	
60	97.89	99.23	98.61	98.58	0.55		

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Table 19 Dissolution data of HCTZ from solvent mixture of PVP SM and PEG SM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
PVP SM	1:1	2	37.91	28.71	31.58	32.73	3.85
		4	58.75	46.72	51.90	52.46	4.93
		6	62.16	58.93	64.87	61.99	2.43
		8	71.07	66.71	73.97	70.58	2.98
		10	74.68	72.98	80.29	75.99	3.12
		15	80.42	79.29	84.67	81.46	2.32
		20	83.53	82.39	89.22	85.05	2.99
		30	88.33	87.90	90.13	88.79	0.96
		45	92.88	92.31	94.56	93.25	0.95
	60	95.06	94.78	96.19	95.34	0.61	
	1:2	2	46.70	39.83	38.66	41.73	3.55
		4	63.32	53.83	53.55	56.90	4.54
		6	72.84	63.27	64.28	66.80	4.29
		8	79.17	70.37	71.83	73.79	3.85
		10	82.84	74.56	76.03	77.81	3.61
		15	88.80	82.70	83.92	85.14	2.63
		20	91.68	88.08	91.99	90.58	1.78
		30	95.56	90.24	92.35	92.72	2.19
		45	96.21	94.67	95.39	95.42	0.63
	60	97.29	97.85	96.61	97.25	0.51	
	1:3	2	64.58	61.34	61.37	62.43	1.52
		4	76.22	76.76	78.78	77.25	1.10
		6	81.43	81.70	83.73	82.29	1.02
		8	84.28	82.85	85.32	84.15	1.01
		10	85.16	84.86	86.91	85.64	0.90
		15	88.30	87.29	89.78	88.46	1.02
		20	92.02	90.45	92.67	91.71	0.93
30		97.60	93.47	94.44	95.17	1.76	
45		97.98	97.22	96.07	97.09	0.78	
60	98.79	98.44	98.14	98.45	0.27		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
PEG SM	1:1	2	34.54	44.78	36.33	38.55	4.46
		4	56.85	68.11	58.49	61.15	4.97
		6	74.64	84.11	76.13	78.29	4.16
		8	85.05	91.76	85.70	87.50	3.02
		10	90.17	96.34	92.36	92.96	2.55
		15	98.41	100.53	98.22	99.05	1.05
		20	100.22	101.07	99.88	100.39	0.50
		30	101.04	101.76	101.97	101.59	0.40
		45	101.87	103.15	102.10	102.37	0.56
	60	102.27	102.16	102.50	102.31	0.14	
	1:2	2	59.88	59.62	63.35	60.95	1.70
		4	76.27	73.17	78.51	75.98	2.19
		6	85.71	81.02	86.27	84.33	2.35
		8	91.95	85.40	92.11	89.82	3.13
		10	94.99	89.38	96.00	93.46	2.91
		15	100.30	95.35	99.91	98.52	2.24
		20	100.99	99.25	101.44	100.56	0.94
		30	101.67	100.63	100.86	101.05	0.45
		45	103.06	101.31	101.12	101.83	0.88
	60	102.49	102.13	101.37	102.00	0.46	
	1:3	2	76.88	74.13	74.34	75.12	1.25
		4	90.29	89.90	88.97	89.72	0.55
		6	96.15	95.75	95.51	95.80	0.26
		8	98.65	96.98	97.59	97.74	0.69
		10	98.34	98.78	98.82	98.65	0.22
		15	98.88	97.35	99.08	98.44	0.77
		20	99.55	98.02	98.77	98.78	0.63
30		99.24	98.40	99.16	98.94	0.38	
45		99.49	98.79	99.41	99.23	0.32	
60	99.74	99.17	99.24	99.38	0.25		

Table 20 Dissolution data of HCTZ from ball milling mixture of CT BM and CS BM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CT BM	1:1	2	82.67	83.02	81.04	82.24	0.86
		4	92.15	91.89	91.77	91.94	0.16
		6	95.48	94.92	95.52	95.31	0.27
		8	97.14	96.14	96.61	96.63	0.41
		10	97.81	97.93	97.28	97.67	0.28
		15	97.78	98.60	97.67	98.02	0.42
		20	98.16	98.44	98.05	98.22	0.16
		30	98.55	98.97	98.44	98.65	0.23
		45	98.94	99.22	98.83	98.99	0.16
	60	98.76	98.90	99.21	98.96	0.19	
	1:2	2	91.01	90.38	88.41	89.94	1.11
		4	97.68	96.38	95.94	96.67	0.74
		6	98.22	97.75	97.04	97.67	0.49
		8	98.76	98.01	98.13	98.30	0.33
		10	98.74	98.40	98.25	98.46	0.21
		15	99.28	98.66	98.64	98.86	0.30
		20	99.67	99.19	99.03	99.30	0.27
		30	99.93	98.88	99.00	99.27	0.47
		45	100.04	99.27	99.53	99.61	0.32
	60	100.15	99.66	99.50	99.77	0.28	
	1:3	2	91.70	91.84	90.20	91.25	0.74
		4	98.54	98.96	98.72	98.74	0.17
		6	99.65	98.80	99.97	99.47	0.49
		8	99.35	98.93	99.96	99.41	0.42
		10	99.76	99.04	100.22	99.67	0.48
		15	99.74	99.30	100.48	99.84	0.49
		20	100.42	99.84	100.75	100.33	0.37
30		100.25	99.67	100.44	100.12	0.33	
45		100.22	99.64	100.84	100.24	0.49	
60	100.62	100.31	100.25	100.39	0.16		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CS BM	1:1	2	77.09	73.84	80.59	77.17	2.76
		4	92.17	89.82	91.87	91.29	1.04
		6	94.37	94.53	93.78	94.23	0.32
		8	96.58	95.05	94.58	95.40	0.86
		10	95.84	95.71	94.39	95.32	0.65
		15	95.94	95.67	94.77	95.46	0.50
		20	95.90	95.91	95.00	95.60	0.43
		30	96.41	95.44	95.23	95.69	0.52
		45	96.93	95.25	95.31	95.83	0.78
	60	95.75	95.48	95.26	95.50	0.20	
	1:2	2	88.84	89.76	88.70	89.10	0.47
		4	94.82	95.61	96.09	95.50	0.52
		6	97.45	97.26	97.32	97.34	0.08
		8	96.16	97.09	97.29	96.85	0.49
		10	95.84	96.50	97.54	96.63	0.70
		15	96.08	96.88	96.81	96.59	0.36
		20	96.32	96.98	97.05	96.78	0.33
		30	96.84	97.08	97.43	97.12	0.24
		45	97.07	97.88	97.67	97.54	0.34
	60	96.32	97.56	97.06	96.98	0.51	
	1:3	2	90.01	88.41	90.57	89.66	0.92
		4	95.86	95.95	96.00	95.94	0.06
		6	97.37	96.48	96.96	96.94	0.37
		8	96.36	96.02	96.93	96.44	0.37
		10	96.75	96.40	97.46	96.87	0.44
		15	96.57	96.65	97.28	96.83	0.32
		20	96.95	96.46	97.24	96.89	0.32
30		96.06	95.71	97.63	96.47	0.83	
45		96.72	96.65	97.58	96.98	0.43	
60	96.67	96.46	97.26	96.79	0.34		



Table 21 Dissolution data of HCTZ from ball milling mixture of CSU BM and LMCS BM(SW) at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
CSU BM	1:1	2	9.61	9.32	12.66	10.53	1.51
		4	17.00	16.70	26.36	20.02	4.49
		6	27.81	25.24	41.11	31.39	6.96
		8	39.11	32.99	51.03	41.04	7.49
		10	51.03	41.20	59.88	50.71	7.63
		15	69.22	59.47	75.52	68.07	6.61
		20	81.59	71.63	86.05	79.76	6.03
		30	90.78	84.28	93.13	89.39	3.74
		45	94.80	91.50	96.02	94.11	1.91
	60	95.88	94.82	96.12	95.60	0.57	
	1:2	2	15.38	17.34	16.37	16.37	0.80
		4	32.24	38.15	33.37	34.59	2.56
		6	50.18	60.89	53.85	54.97	4.45
		8	64.83	72.78	66.13	67.91	3.48
		10	75.62	79.24	75.80	76.88	1.66
		15	87.87	89.11	85.94	87.64	1.30
		20	92.86	94.38	91.62	92.96	1.13
		30	96.75	96.87	95.65	96.42	0.55
		45	95.44	97.25	95.88	96.19	0.77
	60	95.68	96.37	96.12	96.05	0.29	
	1:3	2	20.16	22.96	22.40	21.84	1.21
		4	35.48	41.67	39.56	38.90	2.57
		6	49.48	56.54	53.01	53.01	2.88
		8	58.62	67.97	63.57	63.39	3.82
		10	67.39	76.51	71.10	71.67	3.74
		15	78.61	85.80	82.75	82.38	2.95
		20	85.94	90.91	88.83	88.56	2.04
30		91.47	93.80	94.67	93.31	1.35	
45		94.79	95.71	96.73	95.74	0.79	
60	96.14	96.51	97.53	96.73	0.59		

	RATIO	TIME (min)	% DRUG DISSOLVE			MEAN	S.D.
			#1	#2	#3		
LMCS BM(SW)	1:1	2	85.46	86.78	83.01	85.08	1.56
		4	94.38	95.14	93.90	94.47	0.51
		6	98.84	102.41	99.63	100.29	1.53
		8	98.40	102.41	98.91	99.91	1.78
		10	98.66	102.69	98.04	99.80	2.06
		15	98.77	99.31	98.01	98.70	0.53
		20	98.60	99.43	98.12	98.71	0.54
		30	98.29	99.54	98.22	98.68	0.61
		45	98.67	98.95	98.61	98.74	0.15
	60	99.20	99.05	99.13	99.13	0.06	
	1:2	2	59.80	64.57	67.12	63.83	3.03
		4	83.06	78.04	80.97	80.69	2.06
		6	88.16	87.21	90.12	88.50	1.21
		8	92.16	90.23	92.30	91.56	0.95
		10	94.92	94.52	97.16	95.54	1.16
		15	97.41	96.03	97.97	97.14	0.82
		20	97.51	97.39	97.80	97.57	0.17
		30	97.90	96.93	97.77	97.53	0.43
		45	98.00	96.75	97.73	97.49	0.54
	60	98.10	96.84	97.27	97.40	0.52	
	1:3	2	61.67	64.70	67.34	64.57	2.32
		4	87.07	81.80	84.72	84.53	2.16
		6	92.62	89.84	91.80	91.42	1.16
		8	95.66	95.12	94.13	94.97	0.63
		10	97.03	98.03	95.49	96.85	1.05
		15	98.82	101.66	99.24	99.91	1.25
		20	98.66	100.80	100.06	99.84	0.89
30		98.63	100.36	99.89	99.63	0.73	
45		98.17	99.07	98.60	98.61	0.37	
60	98.97	99.32	98.85	99.05	0.20		

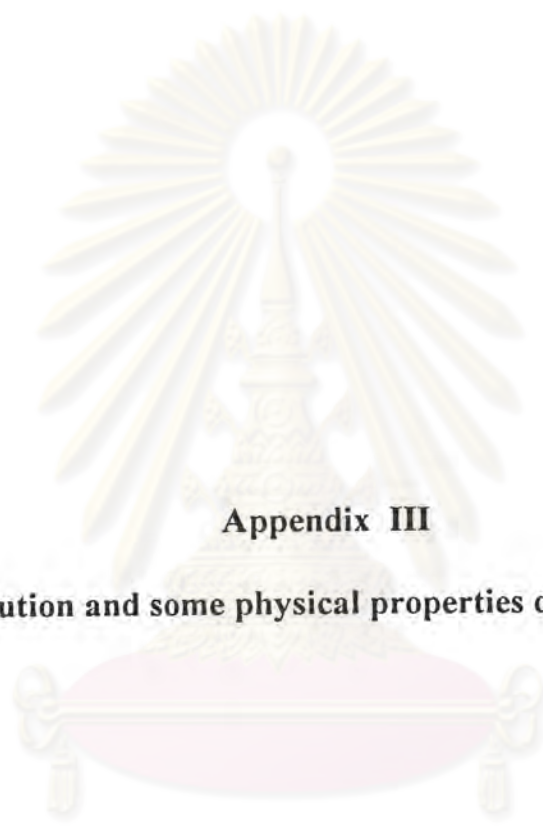
Table 22 Dissolution data of HCTZ from ball milling mixture of LMCS BM (VB) and PVP BM at three ratios

	RATIO	TIME (min)	% DRUG DISSOLVE			MEAN	S.D.
			#1	#2	#3		
LMCS BM(VB)	1:1	2	83.80	78.39	79.71	80.63	2.30
		4	93.99	90.74	92.48	92.40	1.33
		6	94.79	95.31	96.07	95.39	0.52
		8	97.01	95.69	94.78	95.83	0.91
		10	97.26	97.06	96.84	97.05	0.17
		15	98.07	97.17	96.25	97.16	0.74
		20	98.32	97.41	96.49	97.40	0.75
		30	98.42	96.95	97.29	97.55	0.63
		45	98.38	97.05	97.11	97.51	0.62
	60	98.48	97.71	97.76	97.99	0.35	
	1:2	2	65.28	60.83	74.63	66.91	5.75
		4	84.95	82.98	91.40	86.44	3.60
		6	93.17	92.59	94.73	93.50	0.90
		8	96.36	93.66	95.11	95.04	1.10
		10	97.03	103.18	96.62	98.94	3.00
		15	95.87	99.67	96.01	97.18	1.76
		20	95.96	97.81	96.39	96.72	0.79
		30	96.20	95.52	96.49	96.07	0.40
		45	96.71	95.19	96.58	96.16	0.69
	60	96.95	95.42	96.39	96.25	0.63	
	1:3	2	64.63	70.82	72.79	69.41	3.48
		4	88.63	86.27	87.02	87.31	0.98
		6	94.61	92.94	93.99	93.85	0.69
		8	96.82	96.97	95.92	96.57	0.47
		10	97.77	97.22	95.31	96.77	1.05
		15	97.74	97.05	95.27	96.69	1.04
		20	97.43	96.73	95.50	96.55	0.80
30		96.69	96.13	95.45	96.09	0.50	
45		96.08	96.08	95.82	95.99	0.12	
60	96.17	96.59	96.47	96.41	0.18		

	RATIO	TIME (min)	% DRUG DISSOLVED			MEAN	S.D.
			#1	#2	#3		
PVP BM	1:1	2	46.47	46.05	45.35	45.96	0.46
		4	75.83	73.05	70.51	73.13	2.17
		6	90.80	87.95	83.91	87.56	2.83
		8	94.24	95.47	93.05	94.26	0.99
		10	96.86	96.14	96.36	96.45	0.30
		15	98.23	97.93	97.73	97.96	0.21
		20	98.76	98.88	98.68	98.77	0.08
		30	99.01	97.87	98.51	98.46	0.47
		45	98.43	98.67	98.62	98.57	0.11
	60	98.95	99.06	98.87	98.96	0.08	
	1:2	2	47.55	49.61	47.39	48.18	1.01
		4	70.52	73.34	73.94	72.60	1.49
		6	86.00	87.23	88.69	87.31	1.10
		8	92.26	93.47	94.66	93.46	0.98
		10	94.17	95.11	96.44	95.24	0.93
		15	96.66	97.18	96.97	96.94	0.21
		20	96.48	96.86	99.61	97.65	1.39
		30	96.58	96.96	98.46	97.33	0.81
		45	96.96	96.36	98.42	97.25	0.87
	60	97.05	96.45	98.81	97.44	1.00	
	1:3	2	48.68	47.64	52.41	49.58	2.05
		4	79.55	73.13	78.33	77.00	2.79
		6	91.84	88.89	91.86	90.86	1.40
		8	95.03	92.76	95.18	94.32	1.11
		10	95.83	95.38	95.70	95.64	0.19
		15	95.65	95.90	96.23	95.93	0.24
		20	97.58	95.44	96.61	96.54	0.87
30		95.99	95.39	96.56	95.98	0.48	
45		96.36	96.18	96.94	96.50	0.32	
60	95.18	95.15	96.33	95.55	0.55		

Table 23 The ratios of HCTZ : Carrier used in the preparations

Method	Ratio Carrier	DRUG : CARRIER (gm)		
		1:1	1:2	1:3
PM	CT	10 : 10	10 : 20	10 : 30
	CS	10 : 10	10 : 20	10 : 30
	CSU	10 : 10	10 : 20	10 : 30
	LMCS	0.5 : 0.5	0.5 : 1.0	0.5 : 1.5
	PVP	10 : 10	10 : 20	10 : 30
	PEG	10 : 10	10 : 20	10 : 30
KM	CT	10 : 10	10 : 20	10 : 30
	CS	10 : 10	10 : 20	10 : 30
	CSU	10 : 10	10 : 20	10 : 30
	LMCS	2 : 2	0.5 : 1.0	0.5 : 1.5
	PVP	10 : 10	10 : 20	10 : 30
	PEG	10 : 10	10 : 20	10 : 30
SM	PVP (SM)	1 : 1	1 : 2	1 : 3
	PEG (SM)	1 : 1	1 : 2	1 : 3
	LMCS (SM)	2 : 2	0.5 : 1.0	0.5 : 1.5
	CT (SMD)	1 : 1	1 : 2	1 : 3
	CS (SMD)	1 : 1	1 : 2	1 : 3
	CSU (SMD)	1 : 1	1 : 2	1 : 3
	LMCS (SMD)	0.5 : 0.5	0.5 : 1.0	0.5 : 1.5
BM	CT	15 : 15	15 : 30	15 : 45
	CS	15 : 15	15 : 30	15 : 45
	CSU	15 : 15	15 : 30	15 : 45
	LMCS SW	2 : 2	0.5 : 1.0	0.5 : 1.5
	LMCS VB	2 : 2	0.5 : 1.0	0.5 : 1.5
	PVP	15 : 15	15 : 30	15 : 45



Appendix III

Dissolution and some physical properties data of tablets

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Table 24 Dissolution data of HCTZ from HCTZ tablets ; blank ,CSU KM and LMCS KM tablets

BLANK TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	23.17	21.99	19.40	23.03	21.87	22.81	22.05	1.28
4	38.97	37.75	34.54	37.13	37.92	37.86	37.36	1.37
6	51.04	48.10	45.82	46.80	48.70	49.04	48.25	1.67
8	59.23	56.67	54.50	55.53	58.14	59.02	57.18	1.76
10	66.76	63.60	59.44	61.62	64.66	63.99	63.34	2.31
15	77.99	74.09	71.00	73.25	75.16	77.71	74.87	2.45
20	84.77	82.24	77.71	80.28	83.61	85.31	82.32	2.65
30	92.29	89.87	86.56	89.62	91.11	94.78	90.70	2.53
45	97.73	96.27	94.33	95.04	97.53	100.92	96.97	2.15
60	98.68	99.33	98.77	98.80	99.04	102.03	99.44	1.18

CSU KM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	3.96	4.57	4.67	3.62	5.59	4.29	4.45	0.62
4	6.41	7.81	7.39	5.96	9.00	6.22	7.13	1.06
6	8.20	9.88	9.57	7.57	11.25	7.78	9.04	1.31
8	9.20	11.23	11.03	8.63	12.56	9.68	10.39	1.34
10	10.21	12.47	12.49	9.47	14.37	11.53	11.76	1.61
15	11.96	14.57	14.53	11.10	16.54	12.78	13.58	1.83
20	13.89	16.68	16.40	12.57	19.00	14.31	15.48	2.12
30	17.30	20.71	19.75	14.73	22.82	18.44	18.96	2.57
45	21.80	27.42	25.64	20.34	29.09	23.72	24.67	3.05
60	26.77	34.33	31.51	25.65	35.45	29.93	30.61	3.60

LMCS KM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	24.44	22.13	23.76	25.57	26.10	21.27	23.88	1.73
4	53.66	47.61	49.31	50.98	52.47	47.84	50.31	2.26
6	75.84	71.95	74.44	74.84	75.45	73.57	74.35	1.29
8	86.98	87.14	89.74	86.41	87.57	88.33	87.70	1.09
10	92.26	94.24	93.46	92.39	91.86	95.29	93.25	1.21
15	95.45	97.57	100.44	96.56	95.46	100.60	97.68	2.13
20	96.96	100.36	101.97	97.65	97.25	101.85	99.34	2.13
30	98.47	99.35	102.80	98.18	97.92	103.25	100.00	2.19
45	99.29	99.61	103.78	98.29	99.15	102.11	100.37	1.93
60	98.97	99.86	102.37	98.53	98.13	101.82	99.95	1.61

Table 25 Dissolution data of HCTZ from HCTZ tablets ; PEG SM, LMCS SM and PVP BM tablets

PEG SM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	16.75	13.49	11.40	21.54	13.33	14.51	15.17	3.26
4	43.41	41.21	36.34	46.27	40.03	35.56	40.47	3.75
6	62.63	64.59	54.66	66.36	63.65	55.17	61.18	4.57
8	74.64	77.58	69.16	76.43	73.53	70.54	73.65	3.00
10	81.52	83.90	80.22	80.93	82.34	80.21	81.52	1.30
15	87.87	92.21	93.59	86.29	89.66	90.64	90.05	2.47
20	91.16	93.56	96.77	89.16	92.25	94.37	92.88	2.42
30	92.36	94.77	98.28	92.03	93.88	95.87	94.53	2.13
45	93.85	96.54	100.64	94.78	93.96	95.83	95.93	2.31
60	95.19	96.36	100.62	95.15	94.33	95.08	96.12	2.10

LMCS SM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	25.75	24.01	23.06	30.40	27.90	23.80	25.82	2.59
4	58.78	52.21	50.31	61.65	56.93	49.12	54.83	4.59
6	81.74	77.06	76.30	82.67	79.66	74.16	78.60	3.03
8	90.77	90.67	88.53	93.11	90.89	89.20	90.53	1.45
10	96.75	94.54	94.50	95.45	95.59	94.19	95.17	0.87
15	98.13	97.86	97.26	97.10	97.52	98.09	97.66	0.39
20	98.94	99.38	99.20	98.75	98.61	98.76	98.94	0.27
30	99.34	99.64	98.75	98.58	98.58	98.03	98.82	0.53
45	99.17	98.91	98.16	99.39	97.99	97.86	98.58	0.60
60	99.42	98.32	97.98	99.64	98.66	98.38	98.73	0.60

PVP BM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	4.24	4.37	3.53	5.08	5.62	9.59	5.41	1.98
4	9.04	9.45	7.77	9.33	10.56	10.77	9.49	1.00
6	14.57	14.55	12.59	14.73	15.80	14.34	14.43	0.95
8	20.00	19.82	18.42	19.73	21.64	18.64	19.71	1.05
10	26.15	26.67	23.72	25.04	26.66	24.80	25.51	1.08
15	38.81	38.74	36.50	36.57	38.02	37.18	37.63	0.95
20	50.41	51.72	48.50	47.60	49.29	48.21	49.29	1.40
30	69.52	71.51	66.61	67.41	68.76	67.90	68.62	1.59
45	91.83	94.49	87.21	89.02	88.90	88.39	89.97	2.45
60	99.22	98.10	97.53	98.93	97.65	97.04	98.08	0.78

Table 26 Dissolution data of HCTZ from HCTZ tablets ; CT BM, CS BM, and LMCS BM(SW) tablets

CT BM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	54.56	53.76	53.42	48.12	56.21	54.19	53.38	2.51
4	74.13	72.72	70.57	74.69	73.62	73.49	73.20	1.32
6	83.53	83.51	81.22	84.24	82.71	82.62	82.97	0.96
8	88.91	88.46	87.01	89.91	87.51	89.97	88.63	1.11
10	90.81	90.35	90.01	90.69	91.49	93.00	91.06	0.98
15	93.83	93.09	93.18	93.71	92.69	94.49	93.50	0.59
20	94.34	92.89	94.10	94.36	93.76	95.99	94.24	0.93
30	95.56	94.93	94.33	94.73	93.84	95.66	94.84	0.64
45	95.79	94.04	94.42	94.96	95.47	95.33	95.00	0.61
60	95.31	94.96	94.64	94.90	95.42	95.56	95.13	0.32

CS BM TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	44.24	41.02	48.57	45.67	48.72	40.91	44.86	3.16
4	74.07	67.40	70.31	69.74	70.65	67.46	69.94	2.25
6	85.88	78.65	79.40	83.79	80.81	79.29	81.31	2.65
8	90.30	87.15	83.76	89.61	88.19	87.51	87.75	2.10
10	92.77	90.03	87.87	91.65	91.22	92.66	91.03	1.69
15	93.98	94.48	93.12	93.70	93.13	94.73	93.86	0.61
20	95.19	94.71	93.91	93.65	94.35	95.10	94.48	0.57
30	94.58	94.94	94.28	93.59	94.43	95.19	94.50	0.51
45	94.67	94.18	93.66	93.25	94.37	95.28	94.23	0.66
60	94.47	94.54	93.74	94.03	95.16	95.22	94.53	0.54

LMCS BM(SW) TIME (min)	% DRUG DISSOLVED						AVG % R	STD % R
	#1	#2	#3	#4	#5	#6		
2	20.27	19.16	22.65	23.06	21.23	17.14	20.59	2.04
4	44.29	42.62	45.41	45.96	42.69	37.02	43.00	2.95
6	63.67	62.70	61.97	64.62	62.59	58.41	62.33	1.95
8	78.22	79.08	77.21	79.03	75.86	73.47	77.15	1.98
10	89.20	92.89	87.34	89.30	88.22	85.10	88.67	2.35
15	94.33	95.51	95.97	95.13	91.65	94.41	94.50	1.40
20	95.27	97.01	95.09	95.08	94.82	95.34	95.44	0.72
30	96.07	96.27	96.45	95.88	94.91	94.88	95.74	0.63
45	95.04	96.09	95.57	95.27	94.02	94.41	95.07	0.69
60	95.97	94.92	95.80	94.80	93.82	94.36	94.95	0.75

Table 27 Dissolution data of HCTZ from HCTZ tablets ; LMCS BM(VW)
Brand A, and Brand B tablets

LMCS BM(VB)	% DRUG DISSOLVED						AVG % R	STD % R
	TIME (min)	#1	#2	#3	#4	#5		
2	20.98	21.27	20.54	22.78	21.51	20.09	21.19	0.85
4	43.45	42.91	42.73	38.79	43.40	40.40	41.95	1.75
6	62.68	62.15	61.94	63.73	63.30	61.53	62.56	0.77
8	79.06	75.30	77.75	77.72	73.34	75.49	76.44	1.92
10	90.05	89.92	88.44	89.24	88.77	87.55	89.00	0.86
15	95.60	95.06	93.14	94.09	93.75	93.92	94.26	0.83
20	95.84	97.83	95.48	96.43	96.23	96.12	96.32	0.74
30	95.80	95.69	96.14	96.67	95.49	94.68	95.74	0.61
45	96.18	95.78	96.38	94.24	96.15	94.49	95.54	0.85
60	96.70	96.72	96.89	94.47	96.52	95.84	96.19	0.84

BRAND A	% DRUG DISSOLVED						AVG % R	STD % R
	TIME (min)	#1	#2	#3	#4	#5		
2	1.57	1.01	1.14	0.87	1.58	1.15	1.22	0.27
4	2.99	2.29	2.13	2.28	2.86	2.57	2.52	0.32
6	5.40	3.71	3.97	3.98	5.57	4.85	4.58	0.73
8	8.81	6.28	6.09	6.54	8.29	7.85	7.31	1.05
10	12.38	9.71	8.37	9.54	11.73	11.43	10.53	1.41
15	28.36	20.79	16.14	18.75	26.23	21.40	21.94	4.19
20	47.53	35.46	28.29	31.96	42.23	33.83	36.55	6.46
30	70.04	63.79	52.30	58.34	63.42	61.46	61.56	5.42
45	87.05	84.50	74.76	78.11	81.46	85.01	81.81	4.25
60	94.85	94.15	85.42	88.54	89.98	94.67	91.27	3.56

BRAND B	% DRUG DISSOLVED						AVG % R	STD % R
	TIME (min)	#1	#2	#3	#4	#5		
2	2.55	2.42	2.41	1.99	2.43	2.57	2.39	0.19
4	4.26	4.98	5.22	4.82	5.84	5.98	5.18	0.59
6	7.38	8.97	8.76	8.65	9.98	9.26	8.83	0.78
8	11.65	13.26	13.16	12.08	13.99	12.85	12.83	0.78
10	17.06	19.83	18.28	16.52	19.17	17.73	18.10	1.15
15	36.31	40.02	33.96	31.12	36.54	29.86	34.64	3.44
20	54.40	58.62	50.00	47.07	53.31	43.61	51.17	4.93
30	77.51	78.73	72.17	69.17	75.40	66.77	73.29	4.33
45	89.21	91.32	86.32	85.05	88.98	82.99	87.31	2.81
60	92.66	96.06	92.12	91.72	94.99	89.53	92.85	2.15

Table 28 The weight variation of prepared HCTZ and commercial tablets

Sample	Weight of Tablet (mg)										Average	S.D.	
	1	2	3	4	5	6	7	8	9	10			
Prepared Tablet (1:1)													
Blank	214.80	214.40	214.60	214.30	214.80	215.80	215.30	214.90	214.60	214.30	214.78	0.45	
CSU KM	217.90	217.30	217.40	217.50	217.90	217.40	218.00	217.30	217.50	218.80	217.70	0.44	
LMCS KM	216.60	216.50	216.50	217.30	216.00	216.50	216.60	216.40	216.80	216.60	216.58	0.31	
LMCS SM	215.70	215.90	216.00	215.90	216.00	214.40	214.80	215.20	215.20	214.90	215.40	0.55	
PEG SM	215.70	216.10	215.80	215.60	215.90	216.40	215.50	216.10	215.80	215.20	215.81	0.32	
CT BM	216.30	215.90	215.60	215.30	215.60	215.60	216.40	215.60	215.40	216.30	215.80	0.38	
CS BM	215.30	216.10	215.20	214.50	214.30	215.80	215.00	214.60	215.80	216.00	215.26	0.62	
LMCS BM (SW)	215.50	215.90	216.20	215.70	216.20	215.50	215.80	215.80	214.80	215.10	215.65	0.42	
LMCS BM (VB)	215.70	215.40	215.40	215.00	215.60	215.30	215.40	206.50	214.50	215.30	214.41	2.66	
PVP BM	217.40	218.00	217.90	217.70	217.20	217.90	218.00	217.40	217.80	217.40	217.67	0.28	
Commercial Tablet													
Brand A	212.60	215.60	209.40	209.90	212.00	213.60	207.30	207.00	207.20	212.90	210.75	2.87	
Brand B	209.40	208.00	206.30	206.60	205.00	213.20	211.40	206.80	207.60	218.80	209.31	3.94	

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Table 29 The disintegration time of HCTZ and commercial tablets

Sample	Disintegration time of Tablet (min)						Average	S.D.
	1	2	3	4	5	6		
Prepared Tablet								
Blank	0.18	0.20	0.19	0.18	0.19	0.17	0.19	0.01
CSU KM	0.14	0.17	0.16	0.17	0.15	0.14	0.16	0.01
LMCS KM	2.07	2.06	2.30	2.08	2.26	2.27	2.17	0.10
LMCS SM	1.55	1.54	2.01	2.00	1.52	2.27	1.82	0.29
PEG SM	5.05	3.54	3.58	4.23	4.27	5.06	4.29	0.61
CT BM	0.10	0.08	0.07	0.08	0.11	0.11	0.09	0.02
CS BM	0.06	0.07	0.10	0.09	0.11	0.13	0.09	0.02
LMCS BM (SW)	5.04	4.46	4.36	4.55	4.28	4.36	4.51	0.25
LMCS BM (VB)	5.14	5.01	4.48	4.30	4.56	4.29	4.63	0.33
PVP BM	16.05	13.59	12.47	13.45	13.23	15.45	14.04	1.27
Commercial Tablet								
Brand A	2.02	2.13	2.16	2.30	2.09	2.12	2.14	0.08
Brand B	14.22	12.56	13.30	14.02	15.17	15.24	14.09	0.96

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Table 30 The hardness of prepared HCTZ and commercial tablets

Sample	Hardness(Kp)			Average	S.D.
	1	2	3		
Prepared Tablet					
Blank	1.80	2.90	2.50	2.40	0.45
CSU KM	5.60	5.20	5.40	5.40	0.16
LMCS KM	5.40	4.60	6.20	5.40	0.65
LMCS SM	4.80	4.80	4.40	4.67	0.19
PEG SM	6.00	8.00	6.00	6.67	0.94
CT BM	5.90	6.40	6.00	6.10	0.22
CS BM	6.60	7.40	7.20	7.07	0.34
LMCS BM (SW)	7.60	8.50	6.70	7.60	0.73
LMCS BM (VB)	6.70	9.20	8.30	8.07	1.03
PVP BM	11.80	10.60	10.40	10.93	0.62
Commercial Tablet					
Brand A	4.70	5.80	6.40	5.63	0.70
Brand B	4.20	5.20	6.20	5.20	0.82

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