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APPENDICES

Appendix A

Determination of Degree of substitution

Method of calculation

Sample : rice starch at theoretical 0.23

Normality of NaOH = 0.0945 N

Normality of HCL = 0.0945 N

Avg. residue on ignition (C) = 6.95%

Sample solution : Sample dissolved in NaCl (1:10) 300 ml

Sample A 0.9966 gm (on dry basis)

Sample B 0.9956 gm ----------

Sample C 0.9960 gm ----------

Method of titration : Back titration

Sample A

added NaOH-1 25.00 ml

volume of HCL used 25.00 ml

volume of NaOH-2 used for back titration 0.30 ml

NaOH-2 = HCL excess = 0.3 x 0.0945 = 0.0284 meq

HCL used = (25.00 x 0.0945) - 0.0284 = 2.3341 meq

NaOH-1 used = (25.00 x 0.0945) - 2.3341 = 0.0283 meq

meq of NaOH used to react with sample 0.9966 gm = 0.0283

meq of NaOH used to react with sample 1.0000 gm = 0.0284

Sample B

The calculation method was same as above and the data were in the table in the following page.

meq of NaOH used to react with sample 1.0000 gm = 0.0285

Sample C

meq of NaOH used to react with sample 1.0000 gm = 0.0285

Avg meq of NaOH (M) used to react with sample 1.0000 gm

$$= \frac{0.0284 + 0.0285 + 0.0285}{3} = 0.0285$$

Degree of acid carboxymethyl substitution (A) was calculated by

$$A = \frac{1150\ M}{7102 - 412M - 80C}$$

$$= \frac{1150\ (0.0285)}{7102 - 412\ (0.0285) - 80\ (6.95)} = 0.0050$$

Degree of sodium carboxymethyl substitution (S) was calculated by

$$S = \frac{(162 + 58A)\ C}{7102 - 80C}$$

$$= \frac{(162 + (58 \times 0.0050)) \times 6.95}{7102 - (80 \times 6.95)} = 0.1723$$

The degree of substitution was obtained by

$$DS = A + S = 0.0050 + 0.1723 = 0.1773$$

Table **16** Determination of degree of substitution of various modified starches

Type of starch	Method	Sample weight(gm)	NaOH1	HCl	NaOH2	meq/gm M	Avg. M	Residue C(%)*	A	S	D.S. (A+S)
Rice	1	0.9966	25.00	25.00	0.30	0.0284	0.0285	6.95	0.0050	0.1723	0.1773
		0.9956	25.00	25.00	0.30	0.0285					
		0.9960	25.00	25.00	0.30	0.0285					
	2	0.9983	25.00	25.00	0.30	0.0284	0.0300	8.52	0.0054	0.2154	0.2208
		0.9975	25.00	25.00	0.35	0.0332					
		0.9980	25.00	25.00	0.30	0.0284					
	3	1.0002	25.00	25.00	0.50	0.0472	0.0479	16.20	0.0095	0.4536	0.4631
		1.0006	25.00	25.00	0.52	0.0491					
		1.0005	25.00	25.00	0.50	0.0472					
Glutinous rice	1	1.0000	25.00	25.00	0.45	0.0425	0.0457	7.35	0.0081	0.1833	0.1914
		1.0002	25.00	25.00	0.50	0.0472					
		1.0008	25.00	25.00	0.50	0.0472					
	2	1.0007	25.00	25.00	0.50	0.0472	0.0536	12.62	0.0102	0.3368	0.3470
		0.9957	25.00	25.00	0.70	0.0664					
		0.9993	25.00	25.00	0.50	0.0473					
	3	1.0003	25.00	25.00	0.85	0.0803	0.0740	16.93	0.0149	0.4797	0.4946
		0.9996	25.00	25.00	0.75	0.0709					
		0.9998	25.00	25.00	0.75	0.0709					
Corn	1	0.9999	25.00	24.00	0.25	0.1181	0.1197	7.08	0.0212	0.1768	0.1981
		0.9995	25.00	24.00	0.35	0.1276					
		0.9999	25.00	24.00	0.20	0.1134					
	2	0.9970	25.00	25.00	0.42	0.0398	0.0385	13.91	0.0074	0.3772	0.3847
		0.9970	25.00	25.00	0.40	0.0379					
		0.9975	25.00	25.00	0.40	0.0379					
	3	0.9948	25.00	25.00	1.20	0.1140	0.1073	15.30	0.0212	0.4249	0.4460
		1.0000	25.00	25.00	1.10	0.1040					
		0.9995	25.00	25.00	1.10	0.1040					

Table **16**(cont.) Determination of degree of substitution of various modified starches

Type of starch	Method	Sample weight(gm)	NaOH1	HCl	NaOH2	meq/gm M	Avg. M	Residue C(%)	A	S	D.S. (A+S)
Tapioca	1	1.0010	25.00	25.00	0.50	0.0472	0.0536	8.98	0.0097	0.2287	0.2384
		0.9982	25.00	25.00	0.60	0.0568					
		0.9993	25.00	25.00	0.60	0.0567					
	2	0.9954	25.00	25.00	0.65	0.0617	0.0600	13.15	0.0114	0.3536	0.3650
		0.9968	25.00	25.00	0.60	0.0569					
		0.9984	25.00	25.00	0.65	0.0615					
	3	0.9996	25.00	24.00	0.40	0.1324	0.1328	13.50	0.0256	0.3665	0.3921
		0.9935	25.00	24.00	0.40	0.1332					
		0.9951	25.00	24.00	0.40	0.1330					
Potato	1	1.0016	25.00	25.00	0.50	0.0472	0.0473	8.20	0.0085	0.2067	0.2152
		0.9969	25.00	25.00	0.50	0.0474					
		0.9980	25.00	25.00	0.50	0.0473					
	2	1.0011	25.00	25.00	0.90	0.0850	0.0914	13.13	0.0175	0.3537	0.3712
		0.9986	25.00	25.00	1.10	0.1040					
		0.9995	25.00	25.00	0.90	0.0851					
	3	0.9946	25.00	25.00	0.60	0.0570	0.0570	15.59	0.0112	0.4331	0.4444
		0.9935	25.00	25.00	0.60	0.0571					
		0.9937	25.00	25.00	0.60	0.0571					

* Average from three determinations

Remark : Normality of NaOH = 0.0945

: Normality of NaOH = 0.0945

Appendix B

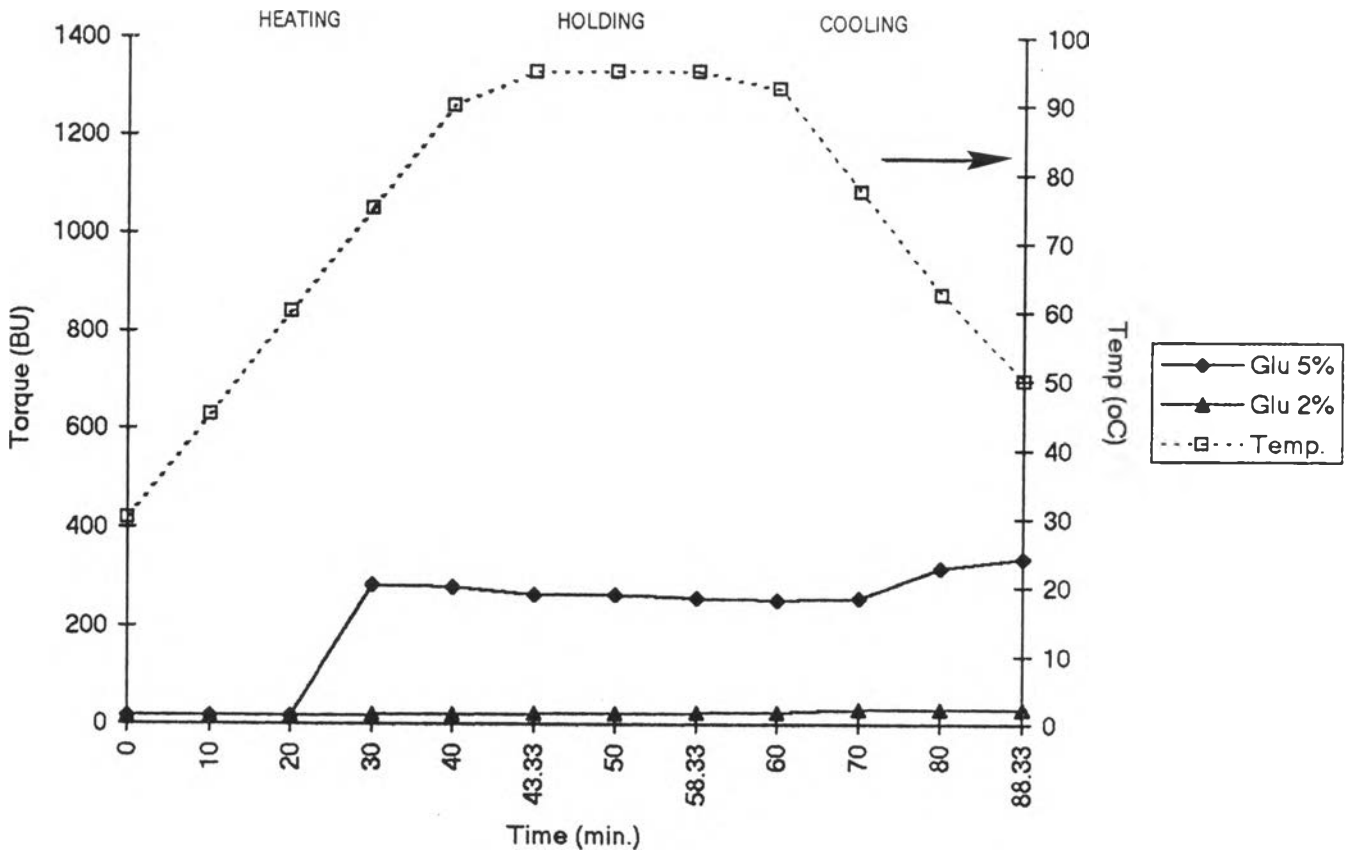


Figure 96 Brabender viscosity curves of native glutinous rice starch at 2% and 5% w/w of dry starch suspended in distilled water. The starch suspension was heated from 30 °C to 95 °C at a rate of 1.5 °C/min. It was then maintained at 95 °C for 15 min. and then cooled to 50 °C at the same rate.

Appendix C

Table **17** Particle size distribution of paracetamol granules prepared with various binders at 1% dry weight by solution incorporation method

Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
Rice	0.40	7.20	44.01	20.40	25.41	2.58
MRS1	1.00	29.08	14.14	19.92	32.67	3.19
MRS2	16.08	12.50	18.26	20.24	29.37	3.55
MRS3	0.61	29.49	11.95	20.32	33.47	4.16
Glutinous	6.90	26.56	13.19	20.28	29.53	3.54
MGS1	11.14	15.79	18.42	21.46	30.78	2.41
MGS2	0.20	5.19	35.53	21.35	33.54	4.19
MGS3	0.40	0.80	42.54	20.48	31.61	4.17
Corn	1.60	26.20	18.60	21.00	29.20	3.40
MCS1	0.79	20.79	20.20	20.79	33.47	3.96
MCS2	0.19	1.02	42.58	19.00	32.19	5.02
MCS3	0.00	6.59	38.00	18.61	31.78	5.02
Tapioca	23.57	10.30	12.48	21.19	30.10	2.36
MTS1	0.20	1.19	45.75	19.88	29.42	3.56
MTS2	18.25	11.95	12.58	21.60	32.50	3.12
MTS3	0.19	30.92	14.66	19.09	31.12	4.02
Potato	27.11	9.64	12.85	20.88	26.93	2.59
MPS1	0.00	0.61	39.29	21.43	34.52	4.15
MPS2	0.20	0.99	44.58	20.91	29.59	3.73
MPS3	0.40	2.19	46.02	20.92	27.10	3.37
PVP K30	0.39	23.74	14.17	20.95	35.14	5.61
Era-Gel	19.23	16.63	15.43	21.64	25.67	1.40

Table **18** Particle size distribution of paracetamol granules prepared with various binders at 1.5% dry weight by solution incorporation method

Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
Rice	1.99	26.75	16.77	21.96	29.75	2.78
MRS1	15.84	12.62	11.82	19.84	35.09	4.79
MRS2	0.80	25.70	18.72	20.72	30.30	3.76
MRS3	1.80	27.80	12.20	20.20	33.20	4.80
Glutinous	12.65	19.88	12.25	20.49	31.13	3.60
MGS1	2.60	22.95	14.97	21.16	33.93	4.39
MGS2	11.56	15.94	15.74	21.32	31.68	3.76
MGS3	0.41	10.95	33.46	20.51	30.09	4.58
Corn	1.22	25.74	17.11	20.53	32.00	3.40
MCS1	0.59	9.54	31.62	21.08	33.01	4.16
MCS2	0.00	1.19	44.40	19.14	30.49	4.78
MCS3	11.15	18.70	15.94	17.93	31.10	5.18
Tapioca	19.61	10.68	12.28	21.20	32.69	3.54
MTS1	0.59	0.99	42.60	20.90	30.96	3.96
MTS2	11.46	15.63	13.54	22.09	33.34	3.94
MTS3	6.35	22.27	17.50	20.28	30.24	3.36
Potato	11.43	20.62	12.62	20.06	31.28	3.99
MPS1	0.21	0.84	45.06	21.06	29.48	3.35
MPS2	0.60	0.40	43.25	21.43	30.77	3.55
MPS3	0.22	1.26	45.05	21.28	28.63	3.56
PVP K30	0.60	23.72	17.19	21.54	32.21	4.74
Era-Gel	1.59	28.07	17.33	20.92	29.51	2.57

Table 19 Particle size distribution of paracetamol granules prepared with various binders at 2% dry weight by solution incorporation method

Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
Rice	11.51	27.38	14.28	20.44	24.80	1.59
MRS1	0.81	26.03	11.82	20.24	36.27	4.83
MRS2	0.40	2.40	39.01	21.20	32.61	4.38
MRS3	0.60	29.74	11.58	20.76	32.93	4.39
Glutinous	2.37	27.02	12.82	20.19	33.94	2.94
MGS1	0.59	25.94	13.66	20.59	34.65	4.57
MGS2	4.40	22.60	15.00	21.20	32.60	4.20
MGS3	0.59	4.64	35.94	20.30	33.53	5.00
Corn	13.05	19.68	15.87	20.69	27.52	3.19
MCS1	0.00	1.01	38.45	20.71	34.85	4.98
MCS2	0.00	1.00	45.39	19.42	29.59	4.60
MCS3	0.79	25.89	17.53	18.52	31.87	5.40
Tapioca	16.17	12.38	13.18	21.56	33.74	2.97
MTS1	0.19	0.79	41.36	22.06	31.80	3.80
MTS2	9.81	11.78	19.20	21.20	34.23	3.78
MTS3	0.80	25.10	16.66	20.10	32.12	5.22
Potato	2.80	23.80	18.20	20.22	31.00	3.98
MPS1	0.00	0.80	45.73	21.56	28.74	3.17
MPS2	0.00	0.79	42.04	21.32	32.28	3.57
MPS3	0.00	0.80	40.80	20.60	32.60	5.20
PVP K30	0.40	3.17	33.86	20.59	36.04	5.94
Era-Gel	9.02	19.64	14.63	21.25	32.47	2.99

Table **20** Particle size distribution of paracetamol granules prepared with various binders at 1% dry weight by dry incorporation method

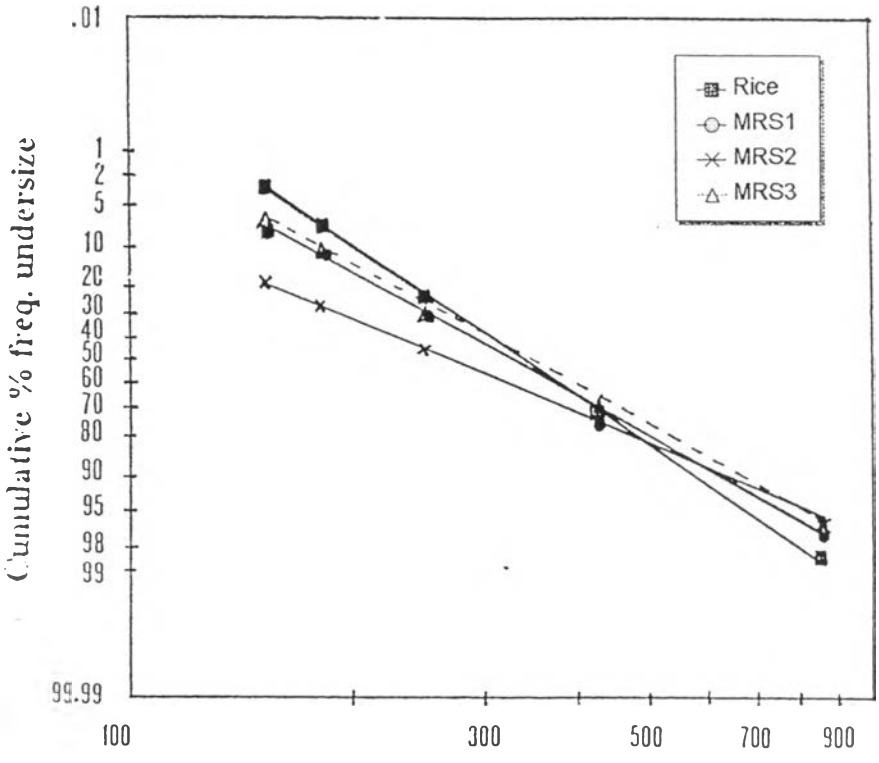
Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
MRS1	2.02	10.08	13.71	20.56	38.31	15.32
MRS2	0.21	0.42	44.45	22.32	29.99	2.61
MRS3	0.40	1.02	35.46	22.70	34.86	5.57
MGS1	0.80	1.76	37.83	20.99	34.35	4.27
MGS2	0.40	1.19	44.13	20.67	30.23	3.38
MGS3	0.40	0.62	44.29	21.04	29.46	4.19
MCS1	0.40	1.20	20.76	37.93	31.94	7.77
MCS2	0.39	1.00	49.22	18.73	27.49	3.17
MCS3	0.20	0.62	43.50	18.16	32.92	4.61
MTS1	0.39	1.02	30.00	20.80	41.39	6.40
MTS2	1.39	25.05	21.48	19.88	28.44	3.76
MTS3	4.57	19.49	28.24	25.25	20.48	1.97
MPS1	0.40	1.61	13.28	54.53	27.77	2.41
MPS2	0.20	2.00	47.40	21.00	26.60	2.80
MPS3	0.20	1.42	48.19	19.82	26.79	3.58
PVP K30	3.39	21.16	20.96	28.94	23.55	2.00
Era-Pac	0.00	0.00	2.62	65.41	29.18	2.80
Era-Gel	0.62	0.83	38.41	25.42	30.79	3.93

Table **21** Particle size distribution of paracetamol granules prepared with various binders at 1.5% dry weight by dry incorporation method

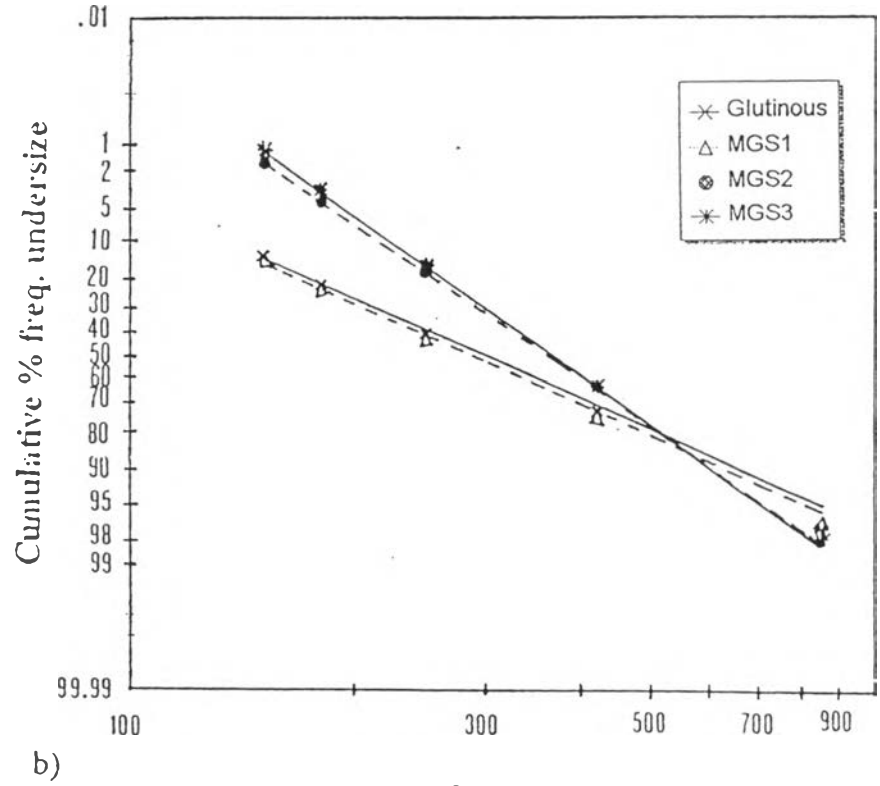
Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
MRS1	1.58	13.75	14.15	13.95	34.67	21.90
MRS2	18.04	13.42	12.42	22.46	30.66	3.00
MRS3	22.44	8.62	12.02	21.64	30.86	4.41
MGS1	0.40	1.19	31.15	23.23	37.90	6.13
MGS2	19.92	14.69	14.49	23.36	25.55	1.99
MGS3	9.91	17.66	13.49	22.44	32.73	3.77
MCS1	2.40	4.41	16.43	43.49	30.28	2.99
MCS2	0.42	0.84	10.44	43.84	39.87	4.59
MCS3	20.81	6.51	15.13	22.69	31.10	3.76
MTS1	1.39	9.58	28.35	33.94	24.16	2.58
MTS2	12.37	9.78	16.97	25.95	31.94	2.99
MTS3	7.88	10.71	21.21	30.10	27.68	2.42
MPS1	3.00	1.20	5.40	49.21	36.81	4.38
MPS2	0.40	0.80	44.02	21.12	29.88	3.78
MPS3	9.39	11.00	22.80	28.20	26.81	1.80
PVP K30	0.20	1.21	36.15	22.42	35.56	4.46
Era-Pac	0.20	1.37	31.42	30.43	33.02	3.56
Era-Gel	0.40	2.18	47.02	21.43	26.41	2.56

Table **22** Particle size distribution of paracetamol granules prepared with various binders at 2% dry weight by dry incorporation method

Binders	% Weight retained on each sieve					
	Pan	150 um	180 um	250 um	425 um	850 um
MRS1	0.80	22.53	17.19	21.34	33.00	5.14
MRS2	0.21	1.41	43.62	21.31	29.87	3.58
MRS3	0.20	1.79	36.60	20.68	34.59	6.14
MGS1	0.59	28.57	18.06	19.44	28.97	4.37
MGS2	0.20	0.80	44.21	22.00	29.21	3.58
MGS3	0.20	0.62	39.14	21.68	33.72	4.64
MCS1	0.20	0.80	42.54	20.68	31.01	4.77
MCS2	0.00	0.80	46.72	20.76	27.55	4.17
MCS3	0.20	0.62	34.87	19.12	38.84	6.35
MTS1	0.21	0.40	46.78	20.56	28.02	4.03
MTS2	0.20	0.62	42.23	21.91	30.28	4.76
MTS3	0.21	0.21	39.52	21.85	34.03	4.18
MPS1	0.19	0.62	46.82	20.44	27.78	4.15
MPS2	0.00	1.39	42.83	19.92	31.08	4.78
MPS3	0.21	0.20	45.26	20.61	29.50	4.22
PVP K30	0.38	1.78	39.26	21.11	32.16	5.31
Era-Pac	0.41	1.60	47.52	20.99	26.93	2.55
Era-Gel	0.00	0.63	44.95	22.98	28.62	2.82


Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Rice
MRS1
MRS2
MRS3
Size (micron)

a)


Cumulative % freq. undersize
.01
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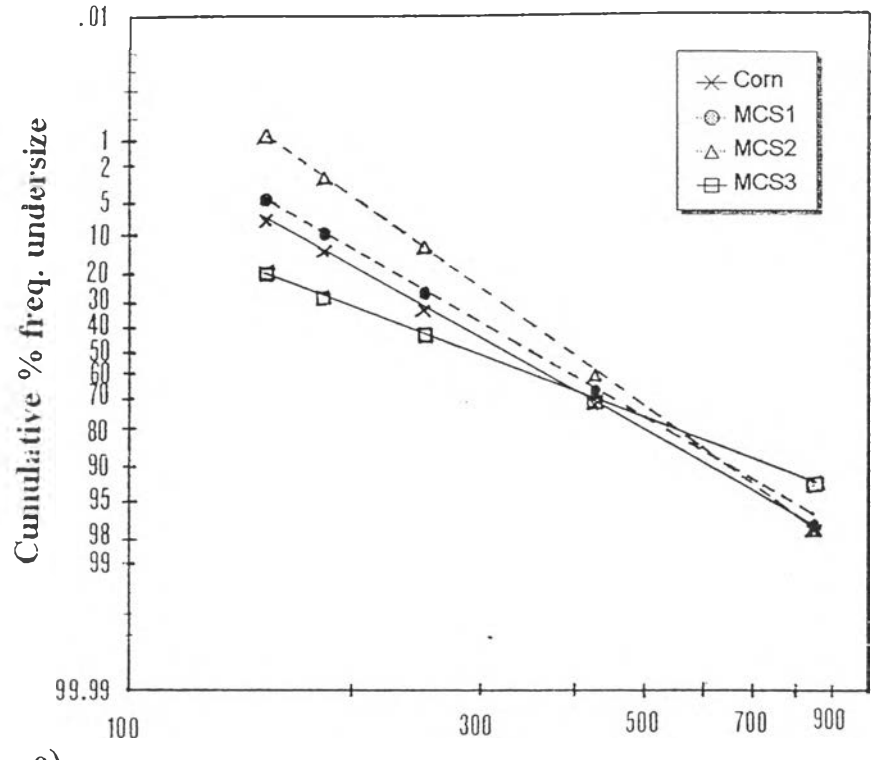
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Glutinous
MGS1
MGS2
MGS3
Size (micron)

b)


.01
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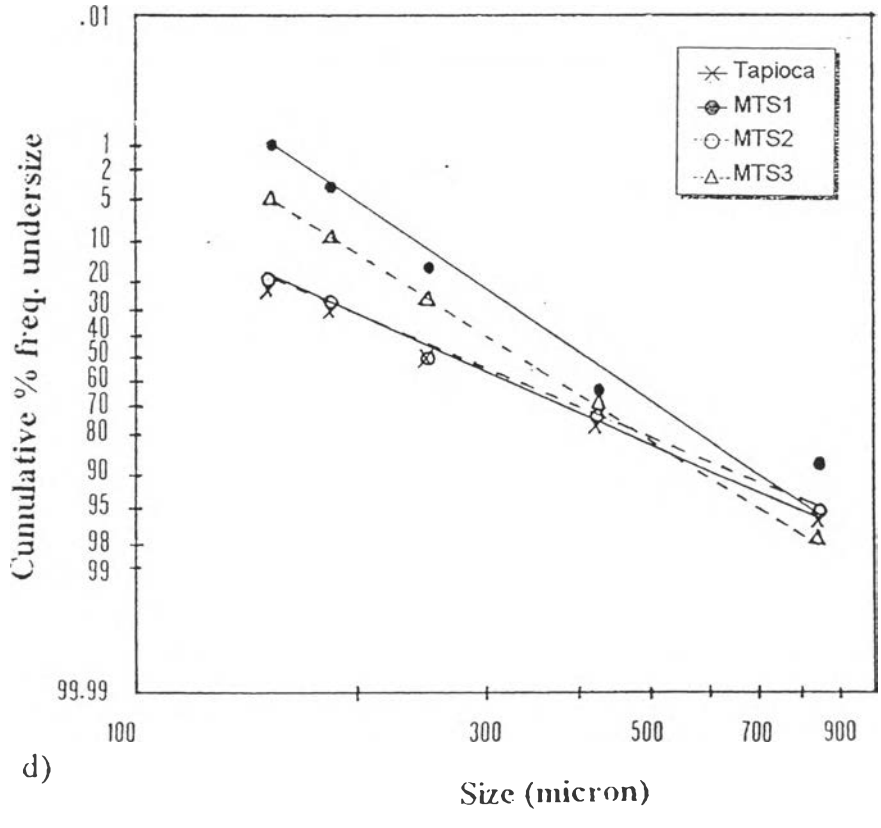
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Corn
MCS1
MCS2
MCS3
Cumulative % freq. undersize
Size (micron)

c)


.01
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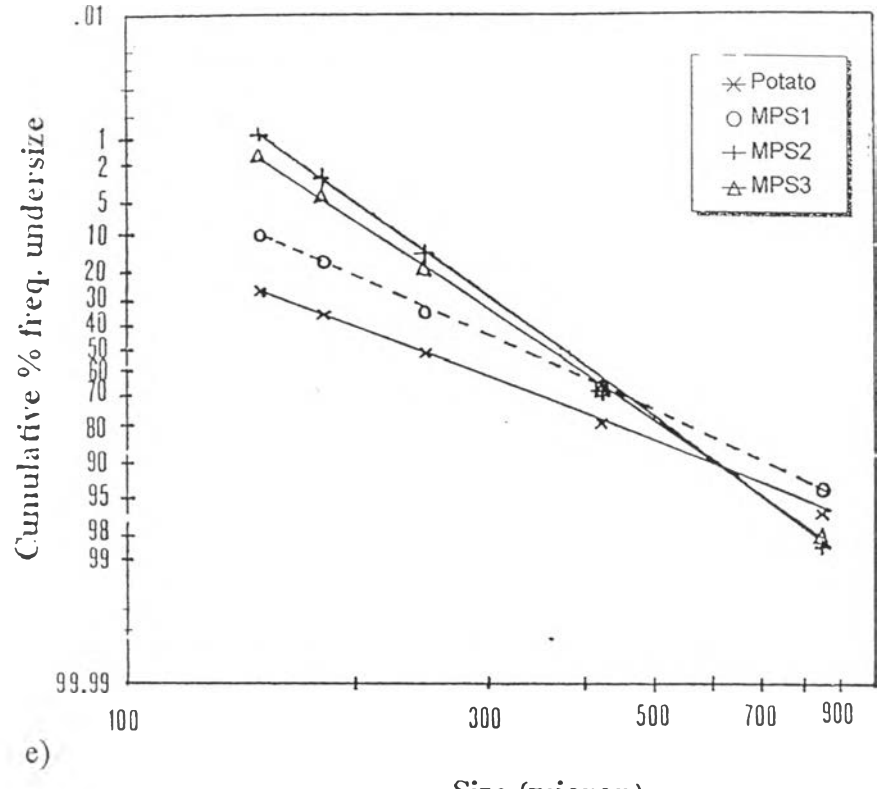
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Tapioca
MTS1
MTS2
MTS3
Cumulative % freq. undersize
Size (micron)

d)



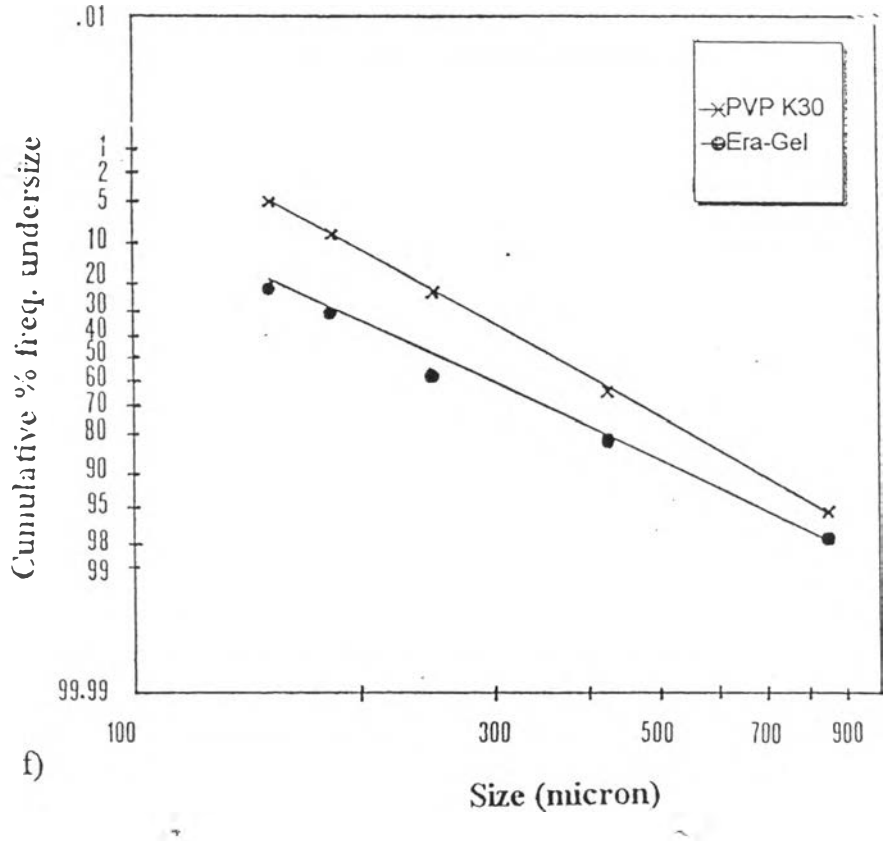
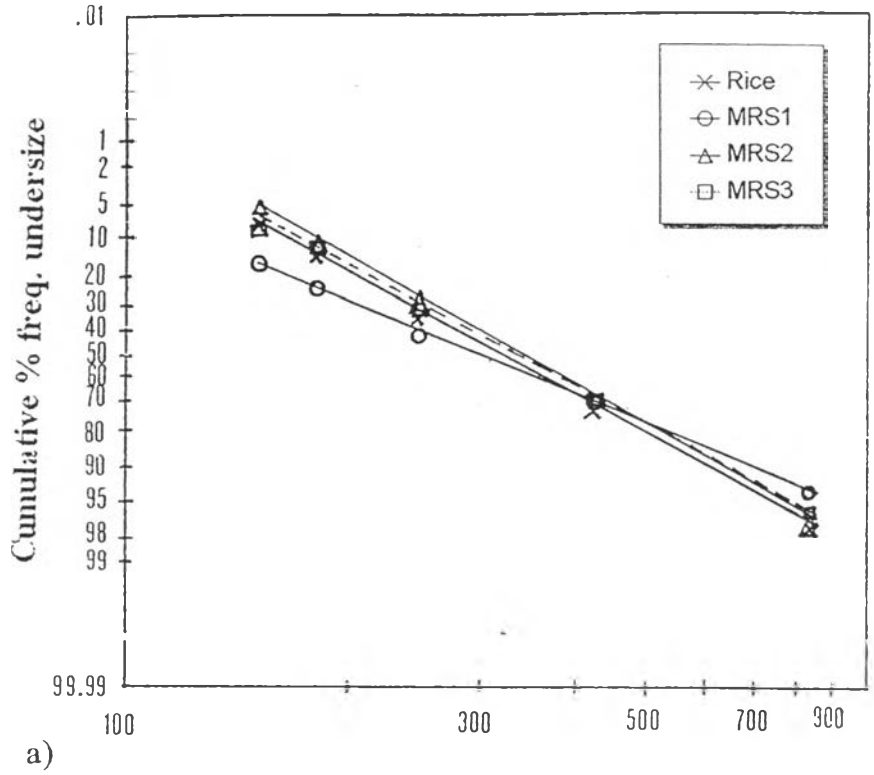


Figure 97 Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 1 % Dry Weight by Solution Incorporation Method.


.01
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20
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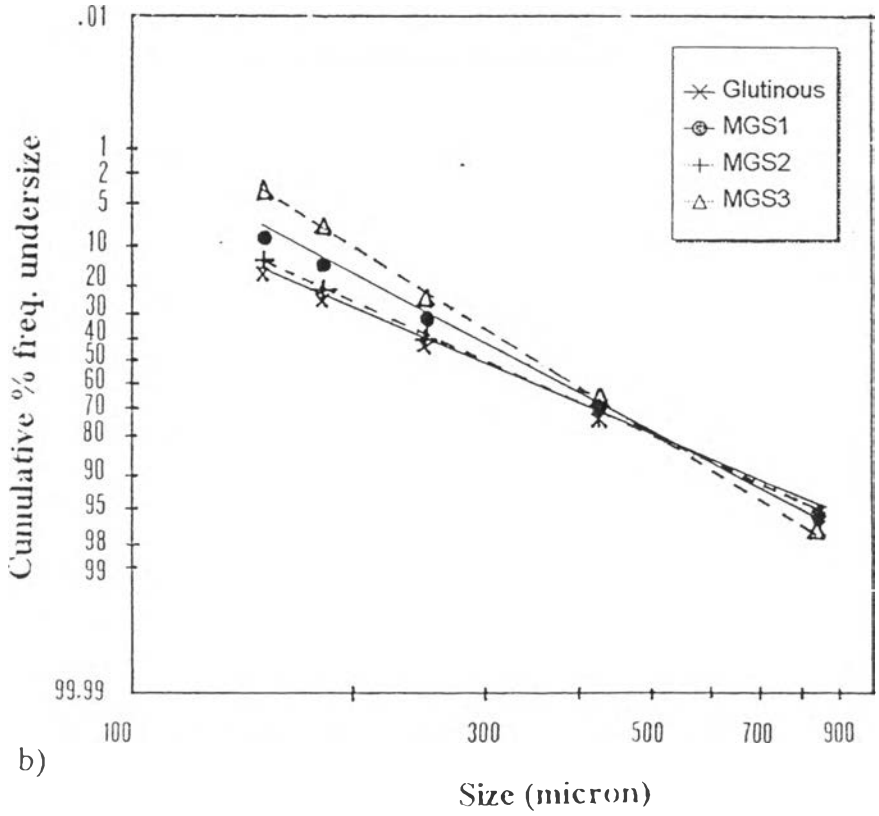
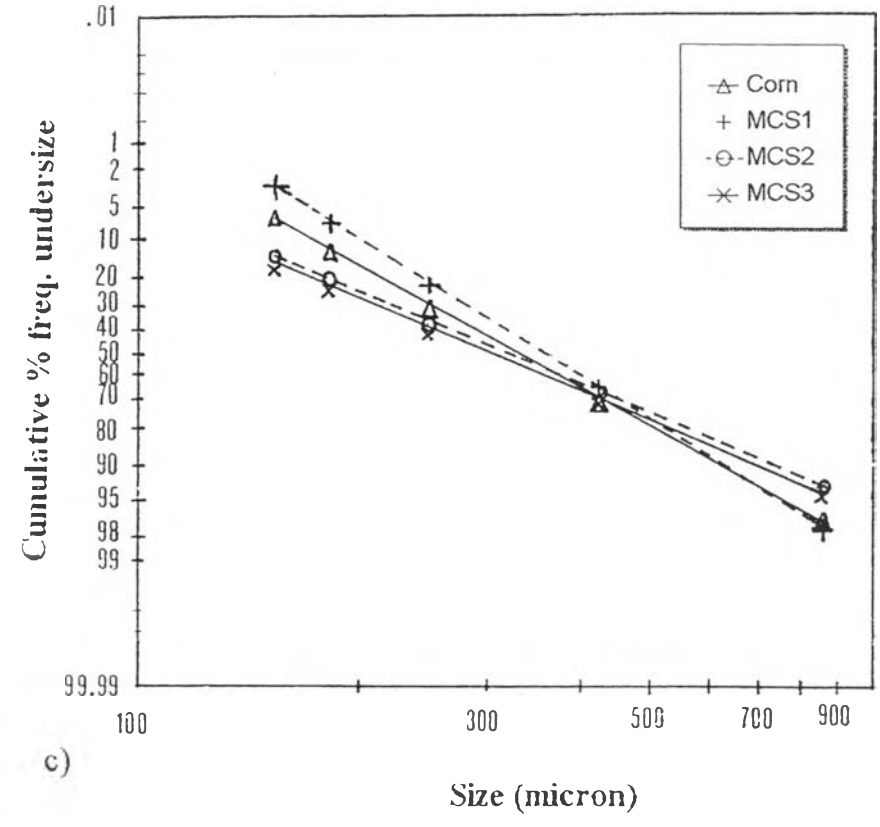
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Cumulative % freq. undersize
Rice
MRS1
MRS2
MRS3
Size (micron)

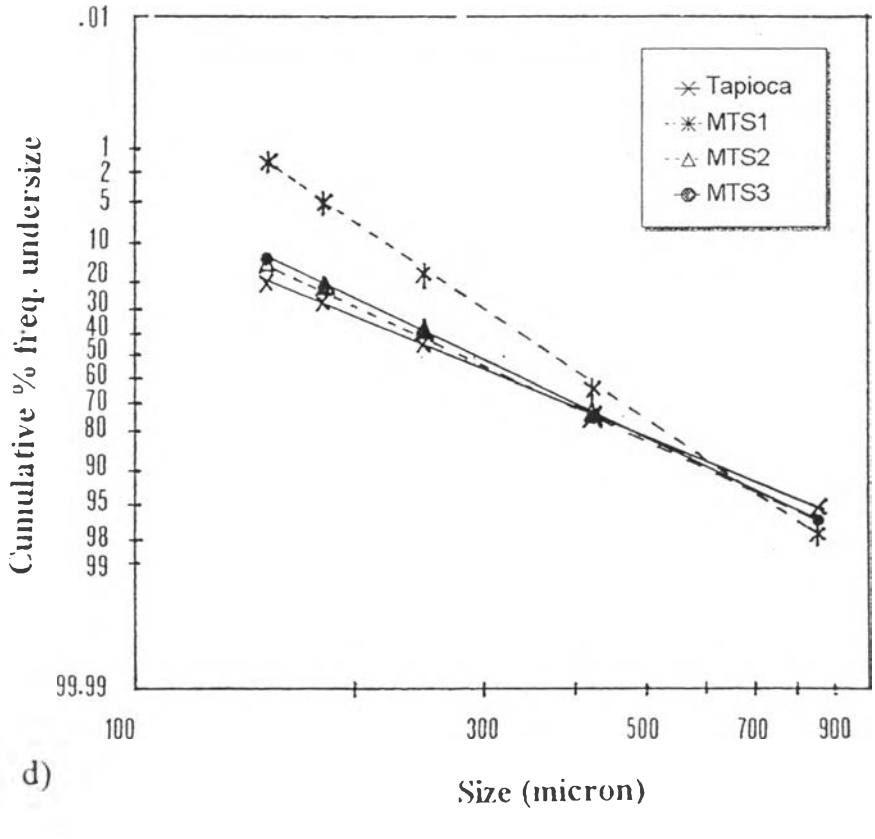
a)


.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Cumulative % freq. undersize
Glutinous
MGS1
MGS2
MGS3
Size (micron)

b)


Corn
MCS1
MCS2
MCS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

c)


Tapioca
MTS1
MTS2
MTS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

d)

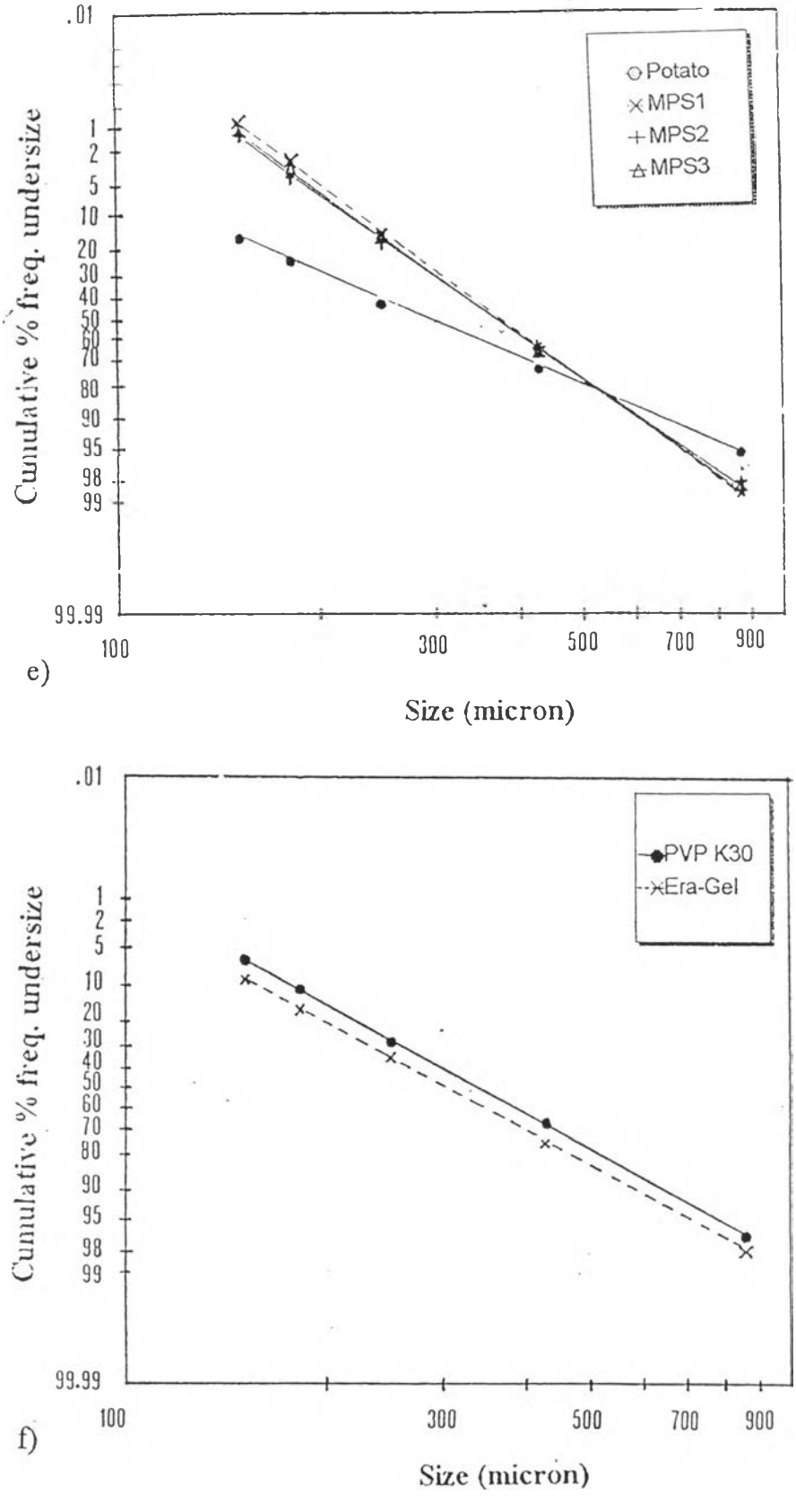
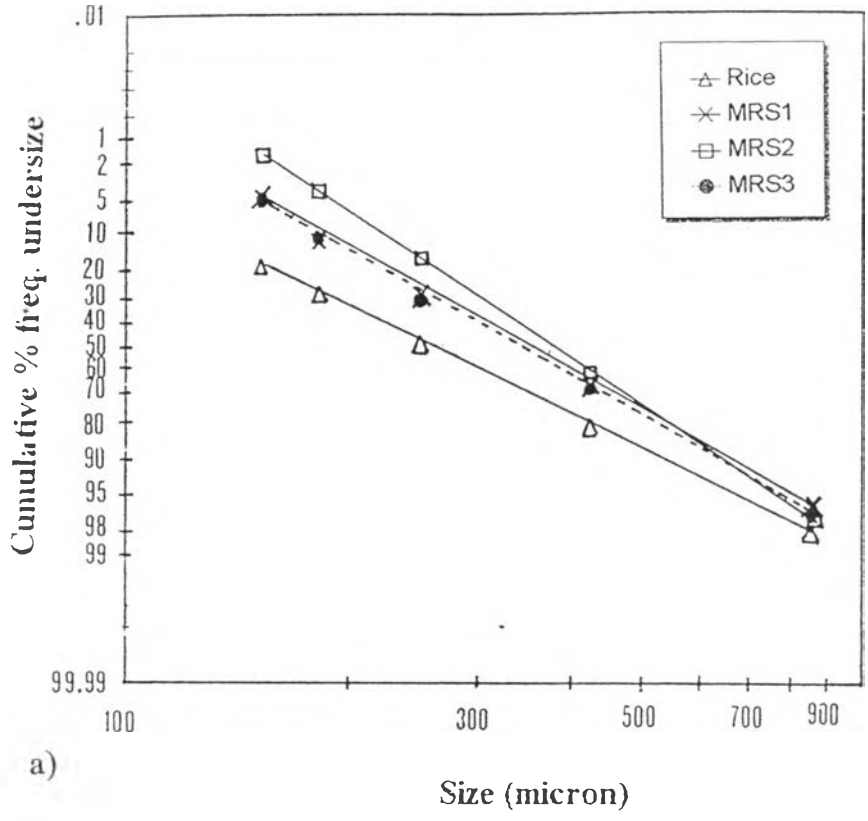
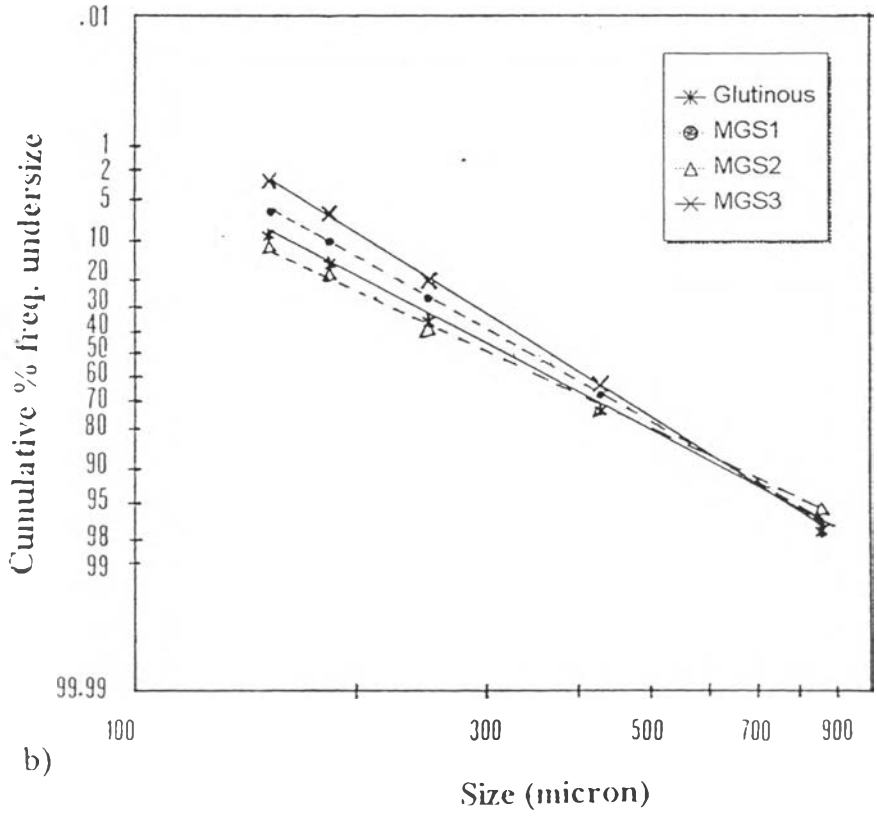


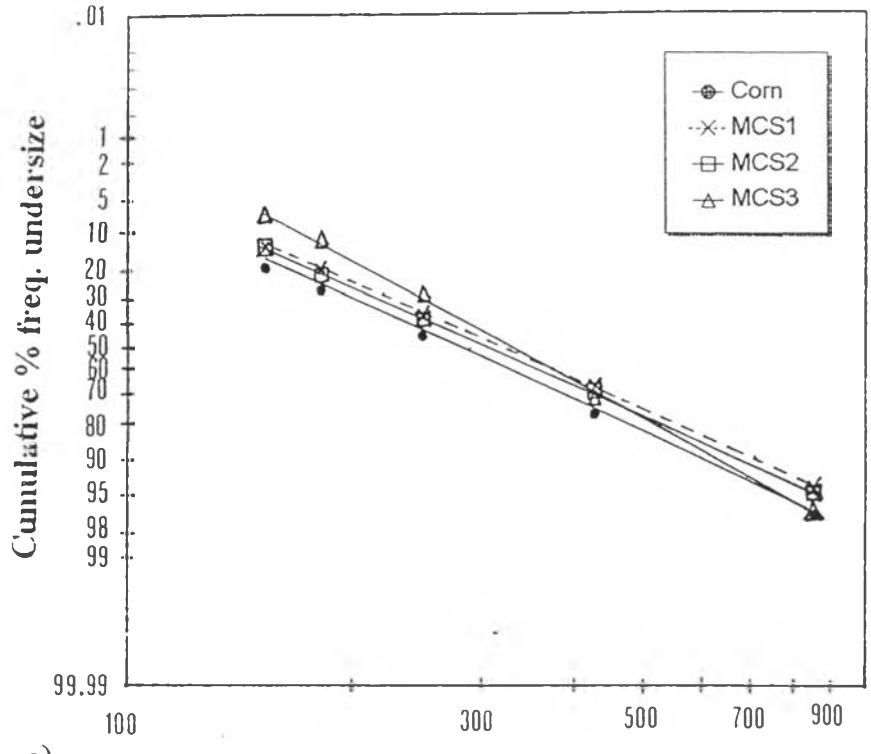
Figure 98 Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 1.5% Dry Weight by Solution Incorporation Method.


Rice
MRS1
MRS2
MRS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

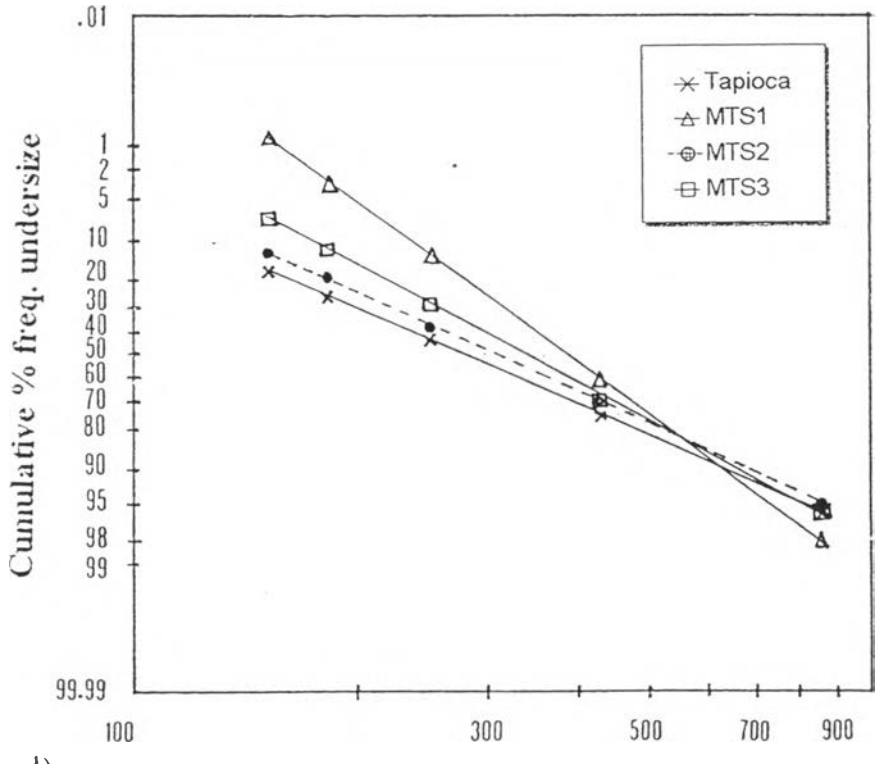
a)


Glutinous
MGS1
MGS2
MGS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

b)


Corn
MCS1
MCS2
MCS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

c)


Tapioca
MTS1
MTS2
MTS3
Cumulative % freq. undersize
.01
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
Size (micron)

d)

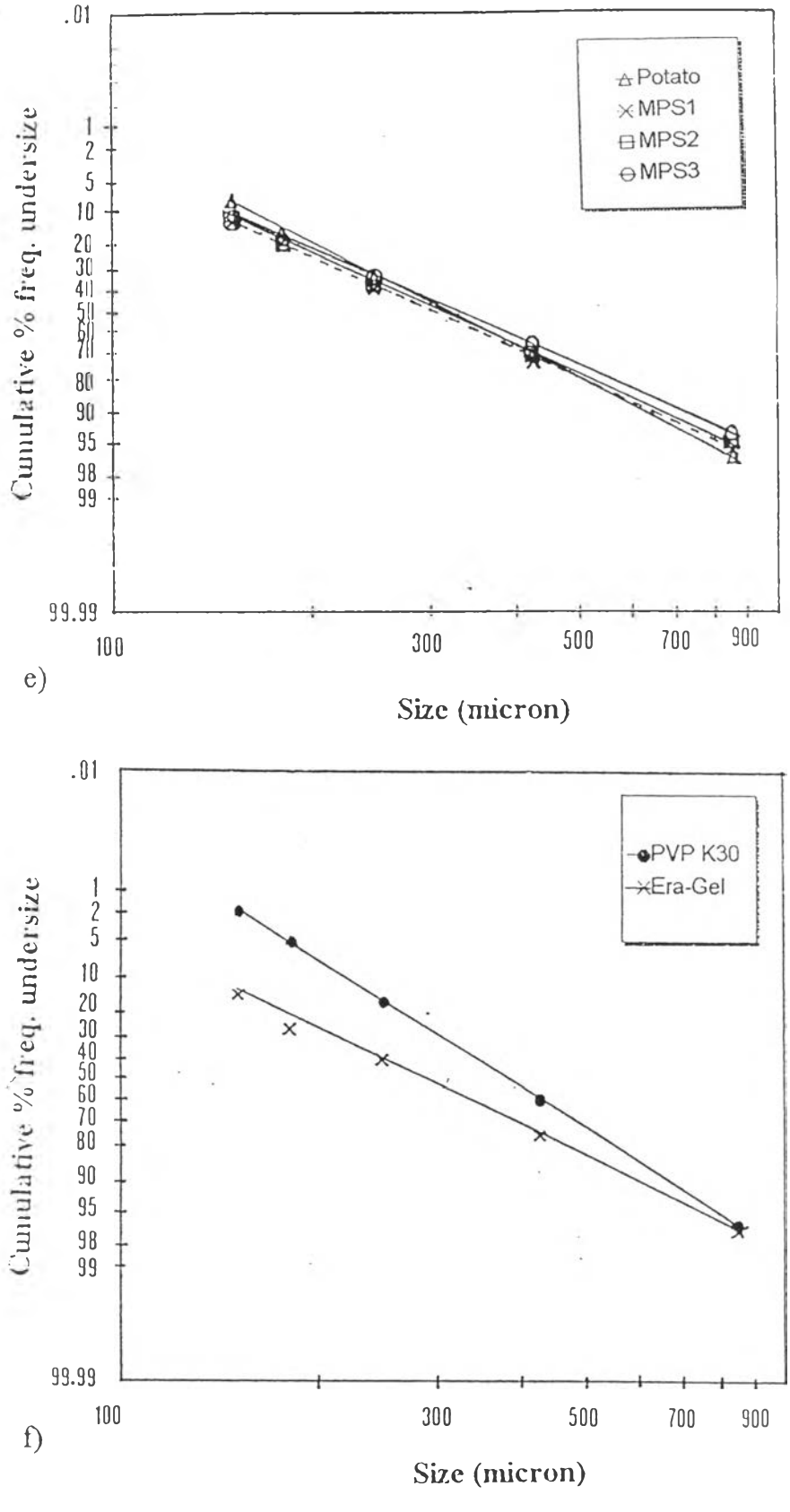
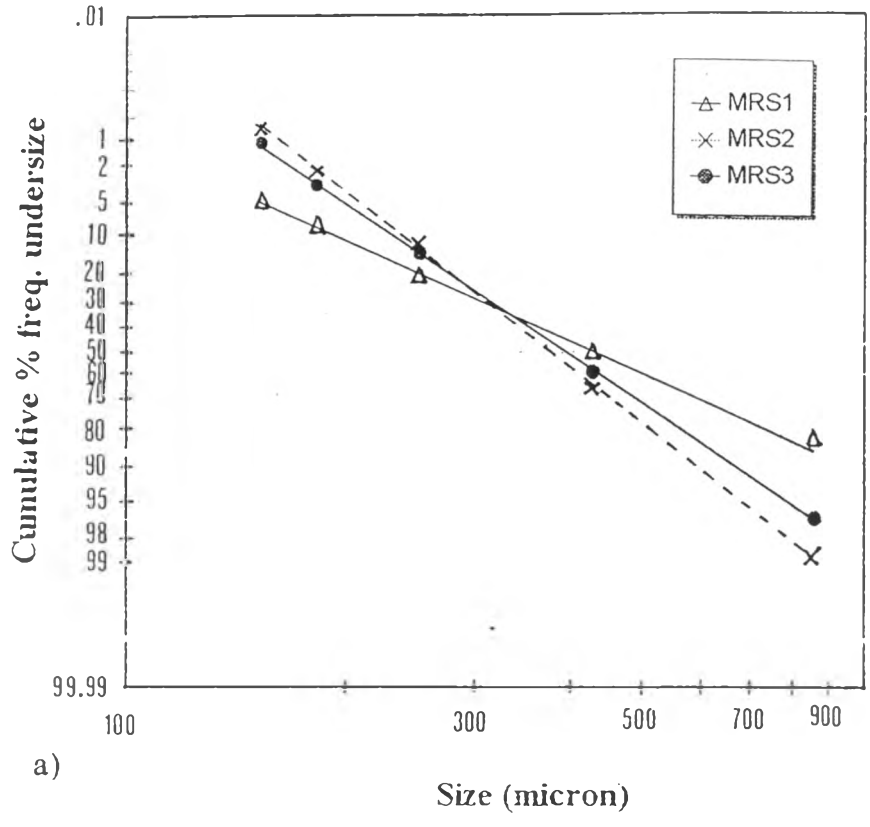


Figure 99 Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 2 % Dry Weight by Solution Incorporation Method.


.01
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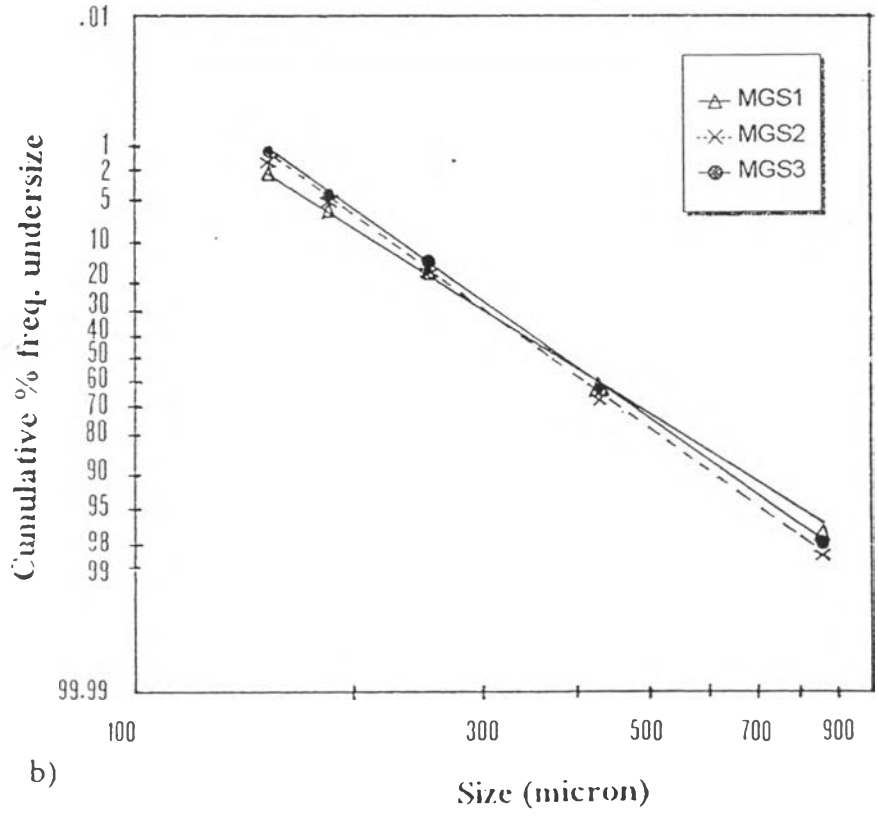
30
40
50
80
90
95
98
99
99.99
100
300
500
700
900
MRS1
MRS2
MRS3
Cumulative % freq. undersize
Size (micron)

a)


.01
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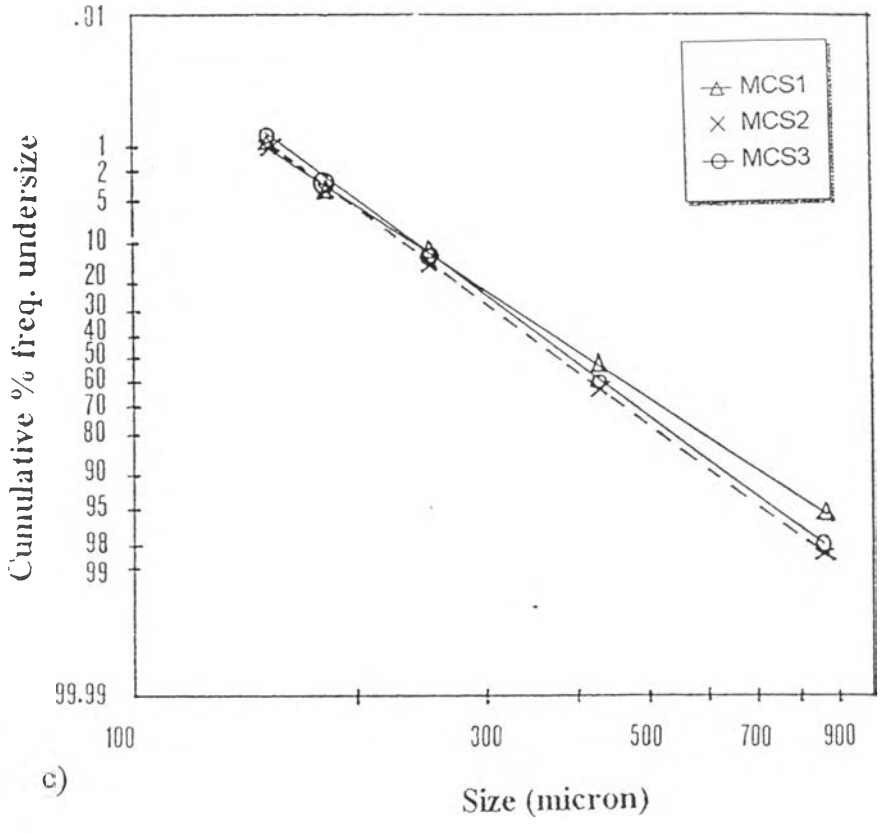
90
95
98
99
99.99
100
300
500
700
900
MGS1
MGS2
MGS3
Cumulative % freq. undersize
Size (micron)

b)


.01
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50
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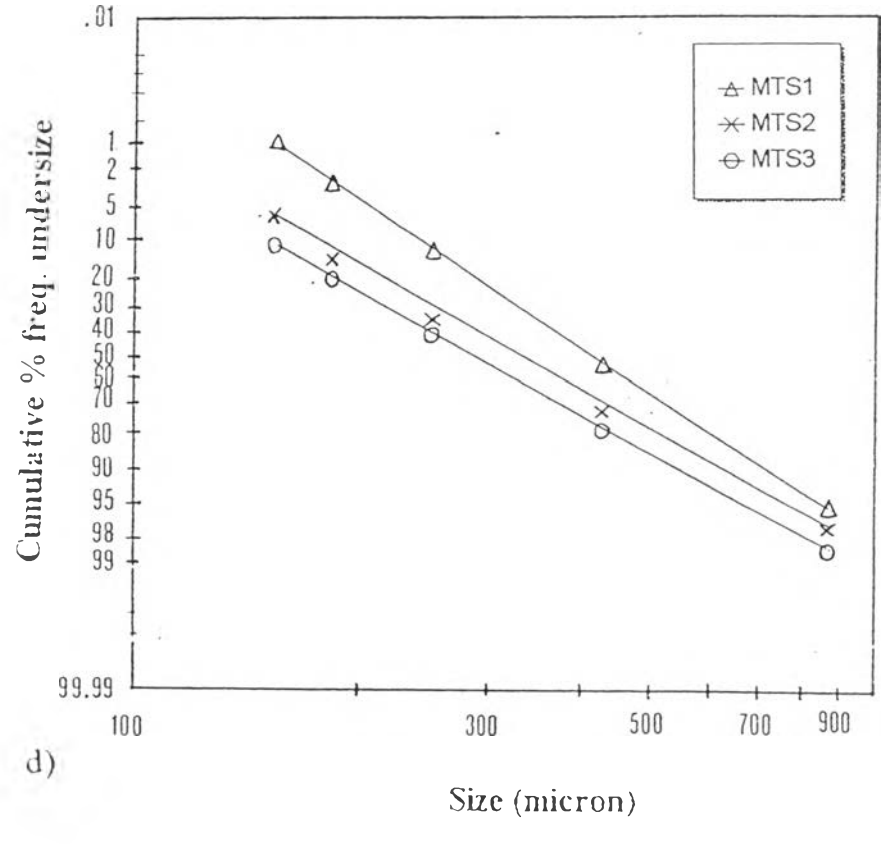
70
80
90
95
98
99
99.99
100
300
500
700
900
MCS1
MCS2
MCS3
Cumulative % freq. undersize
Size (micron)

c)


.01
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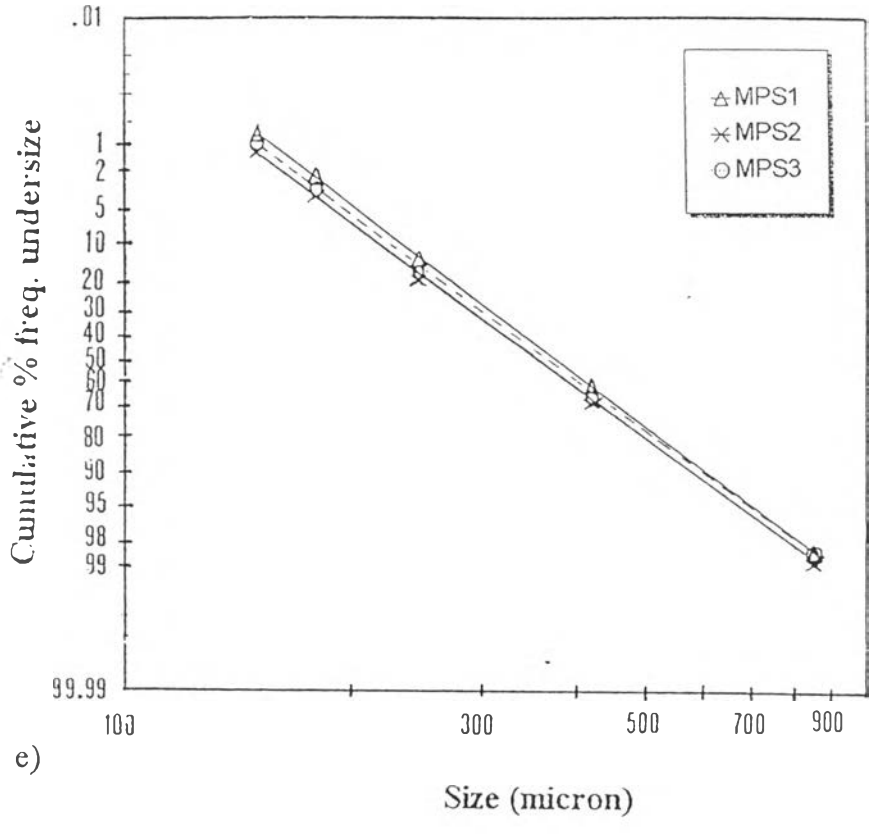
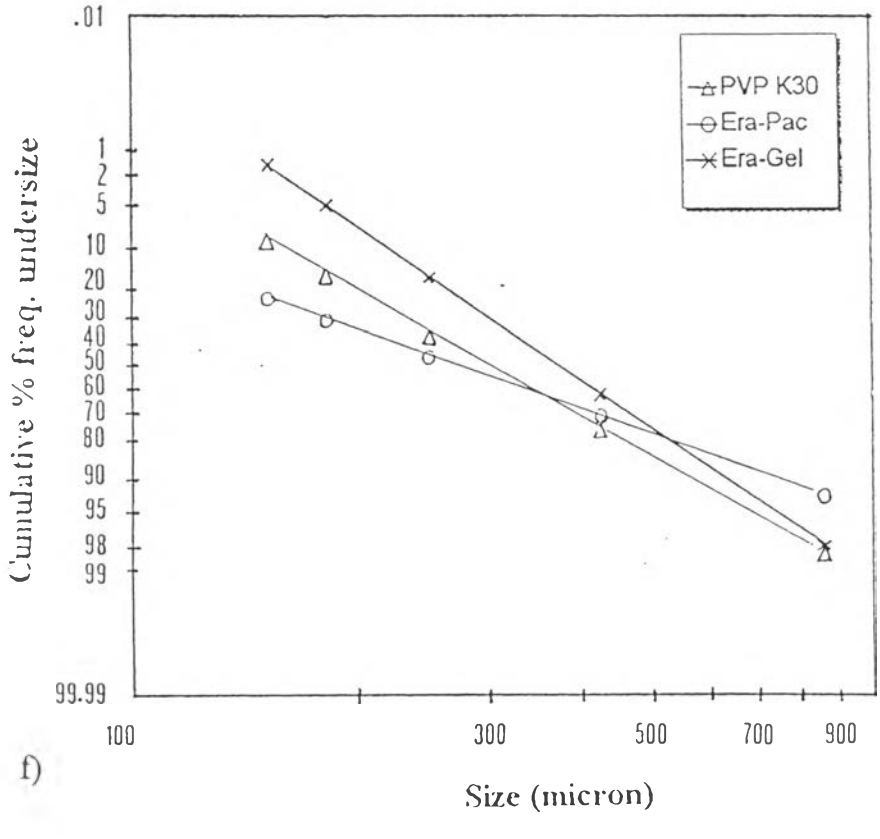
70
80
90
95
98
99
99.99
100
300
500
700
900
MTS1
MTS2
MTS3
Cumulative % freq. undersize
Size (micron)

d)

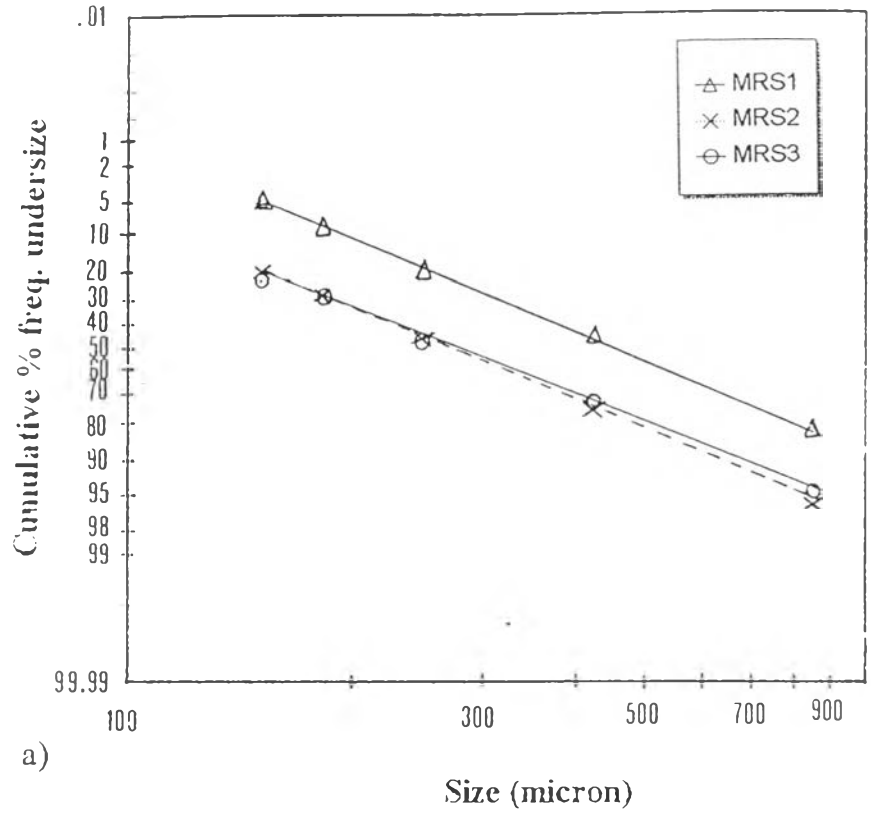


e)



f)

Figure 100 Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 1 % Dry Weight by Dry Incorporation Method.


.01
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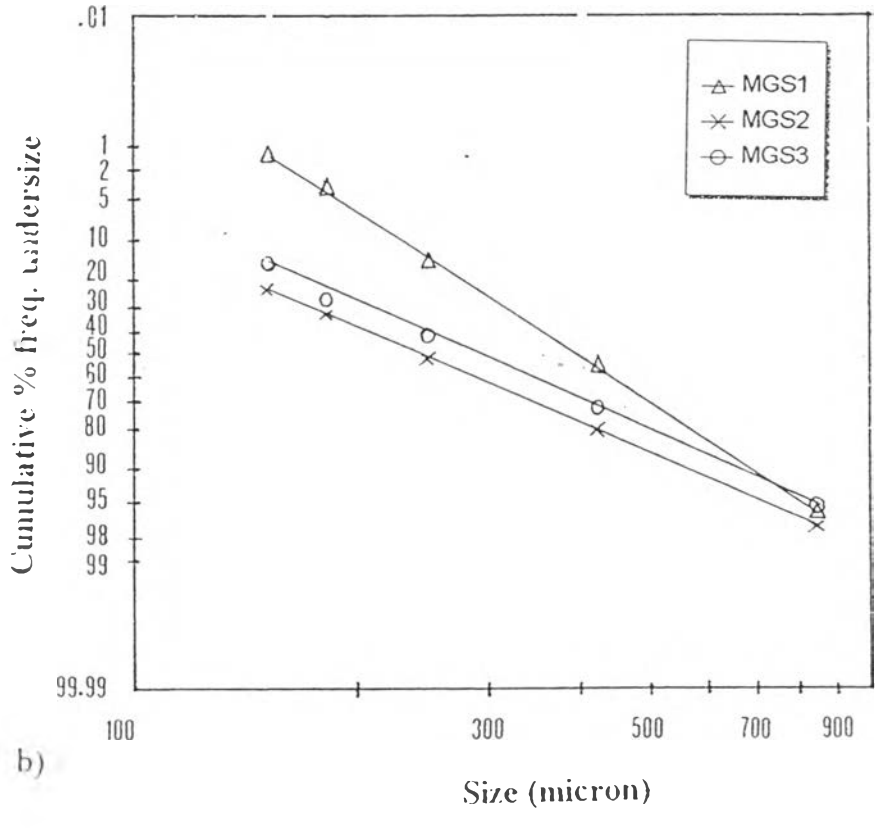
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
MRS1
MRS2
MRS3
Cumulative % freq. undersize
Size (micron)

a)


.01
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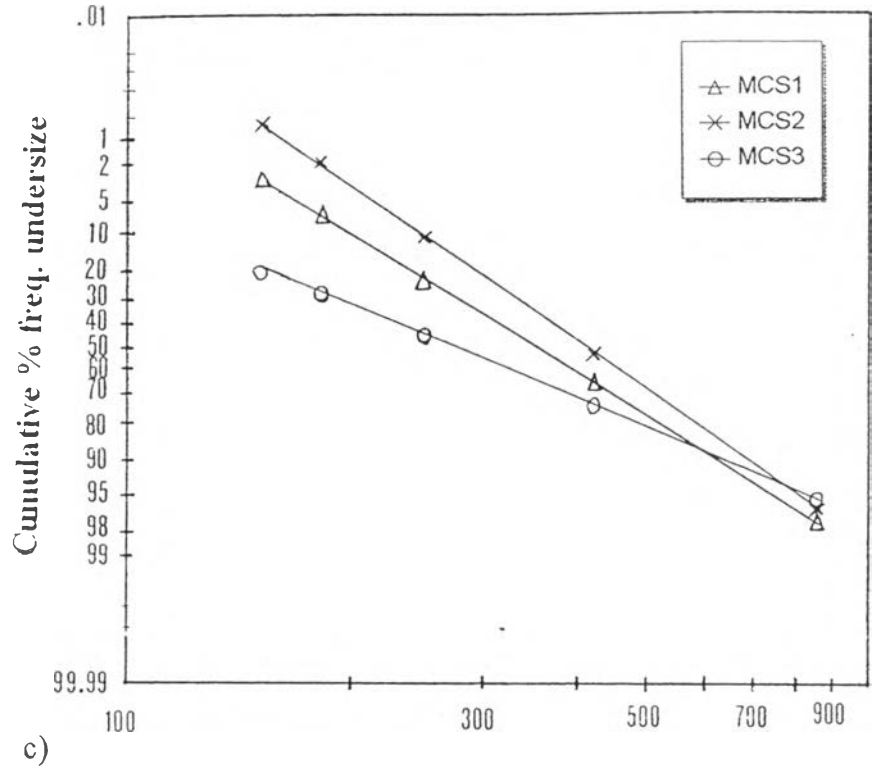
70
80
90
95
98
99
99.99
100
300
500
700
900
MGS1
MGS2
MGS3
Cumulative % freq. undersize
Size (micron)

b)


.01
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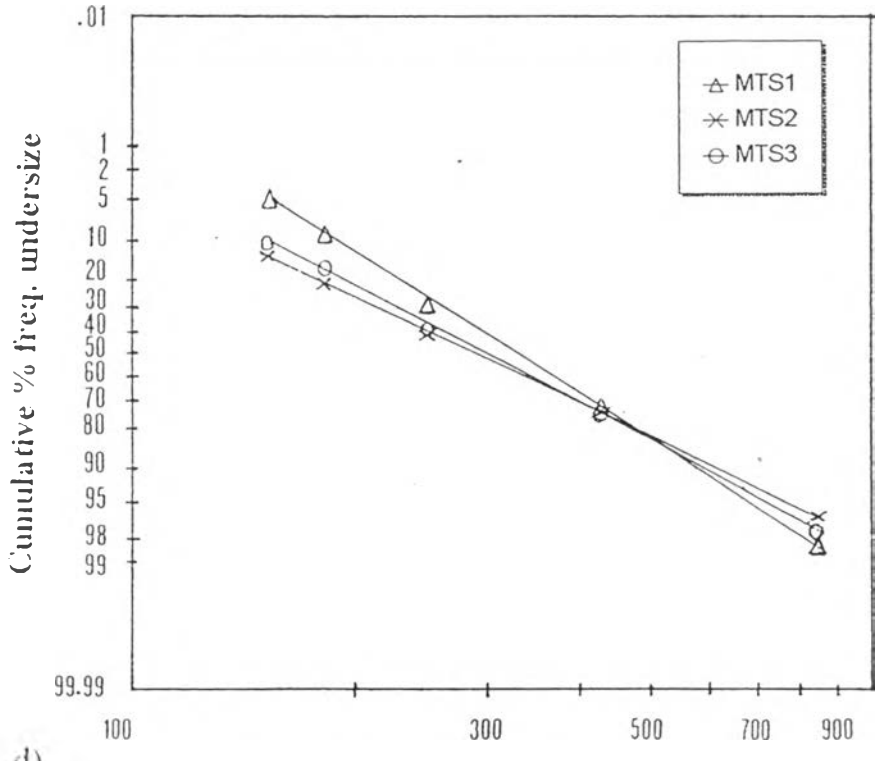
95
98
99
99.99
100
300
500
700
900
MCS1
MCS2
MCS3
Cumulative % freq. undersize
Size (micron)

c)


.01
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90
95
98
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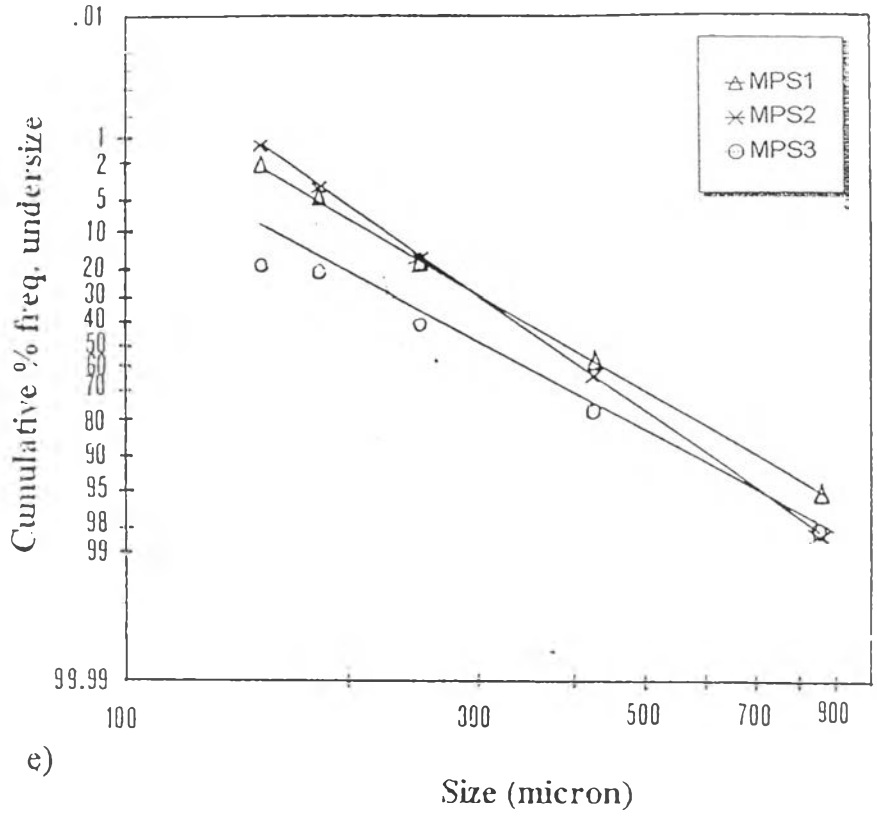
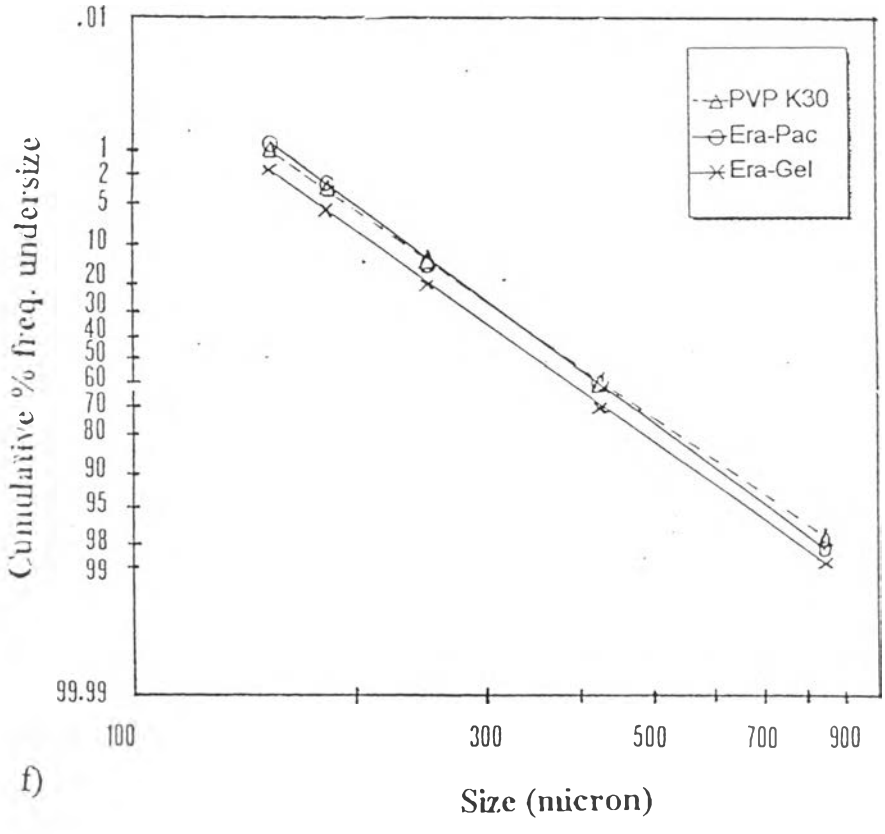
99.99
100
300
500
700
900
MTS1
MTS2
MTS3
Cumulative % freq. undersize
Size (micron)

d)

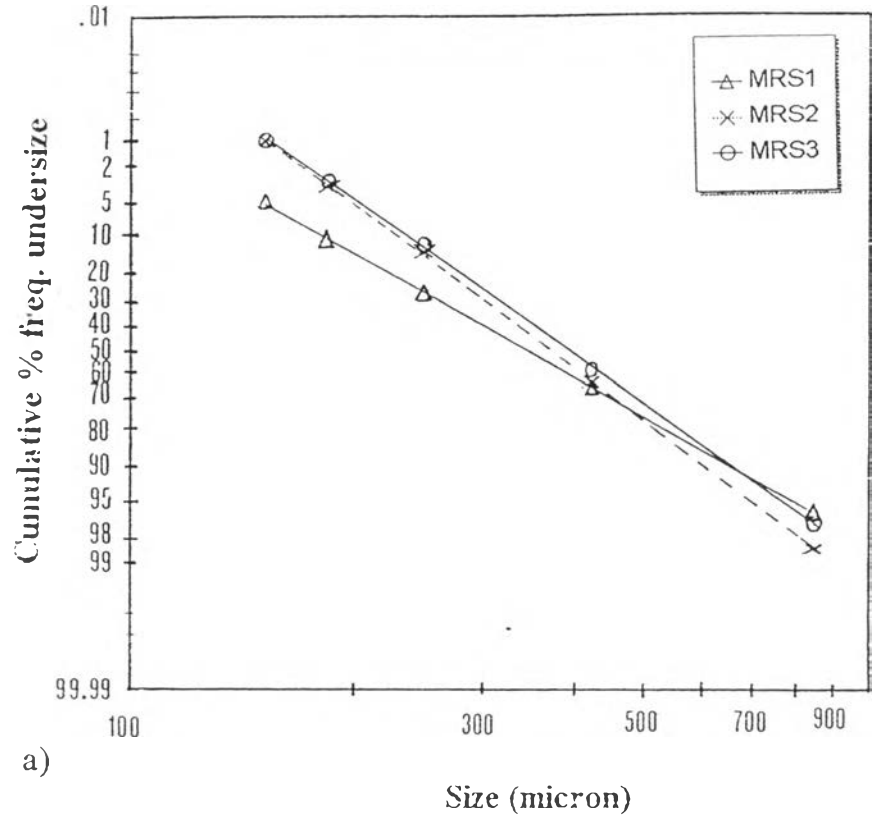


e)



f)

Figure **101** Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 1.5 % Dry Weight by Dry Incorporation Method.


.01
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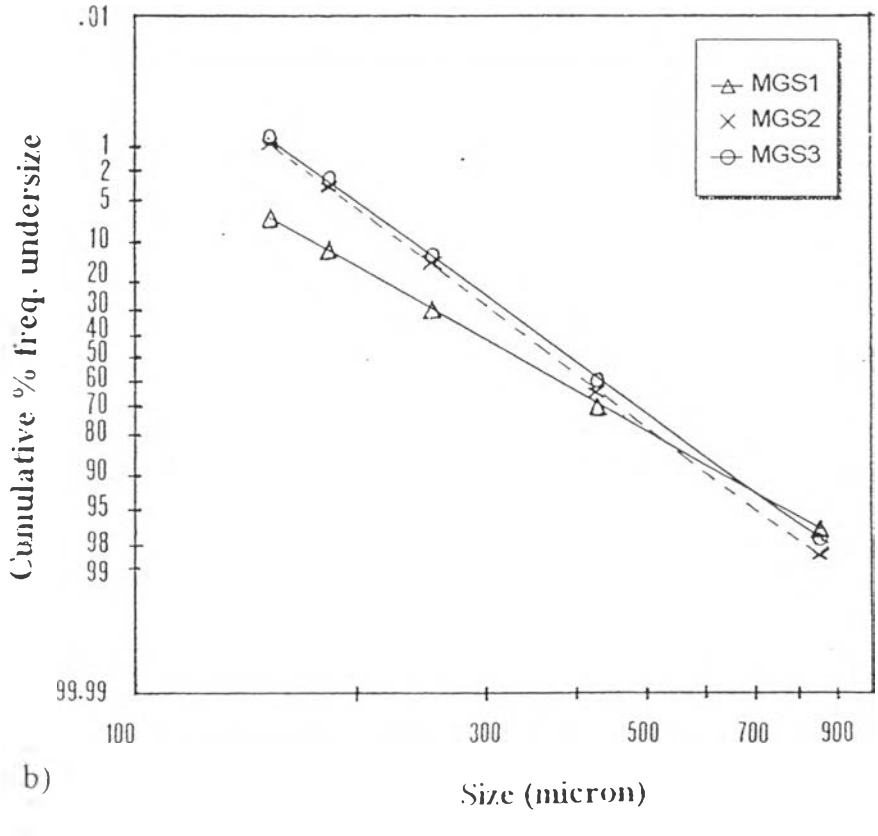
60
70
80
90
95
98
99
99.99
100
300
500
700
900
MRS1
MRS2
MRS3
Cumulative % freq. undersize
Size (micron)

a)


.01
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30
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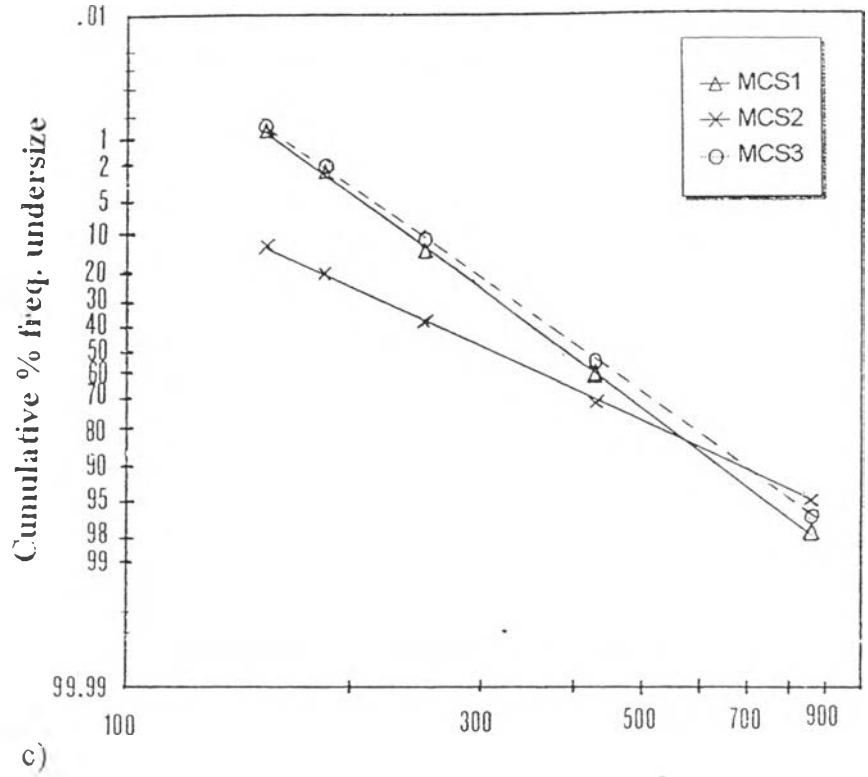
50
60
70
80
90
95
98
99
99.99
100
300
500
700
900
MGS1
MGS2
MGS3
Cumulative % freq. undersize
Size (micron)

b)


.01
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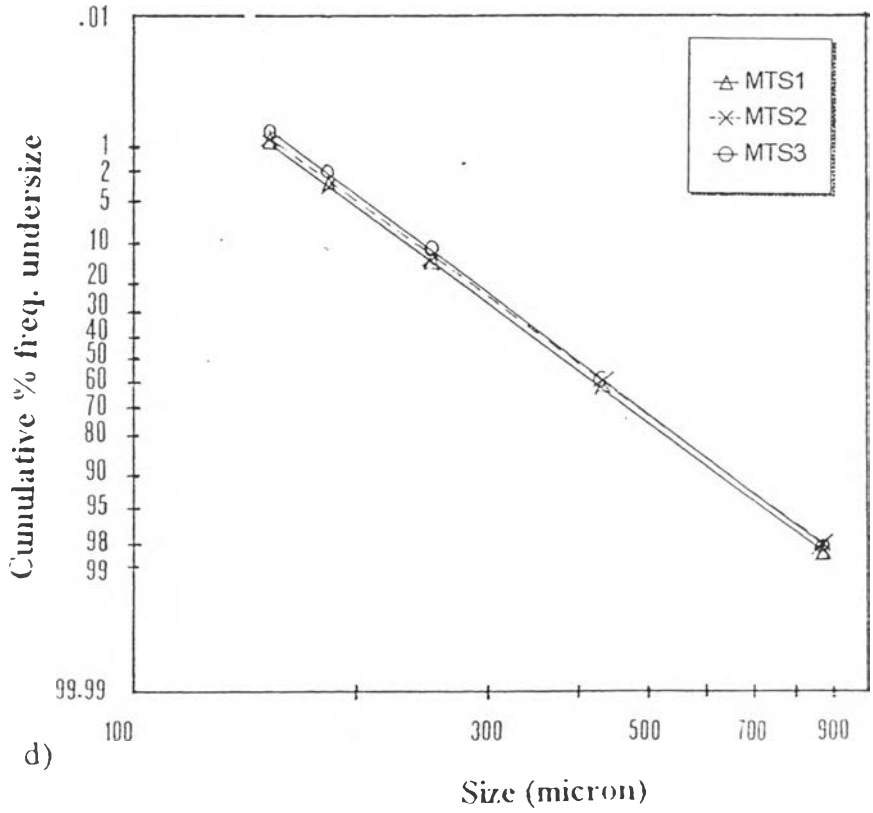
60
70
80
90
95
98
99
99.99
100
300
500
700
900
MCS1
MCS2
MCS3
Cumulative % freq. undersize
Size (micron)

c)


.01
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60
70
80
90
95
98
99
99.99
100
300
500
700
900
MTS1
MTS2
MTS3
Cumulative % freq. undersize
Size (micron)

d)

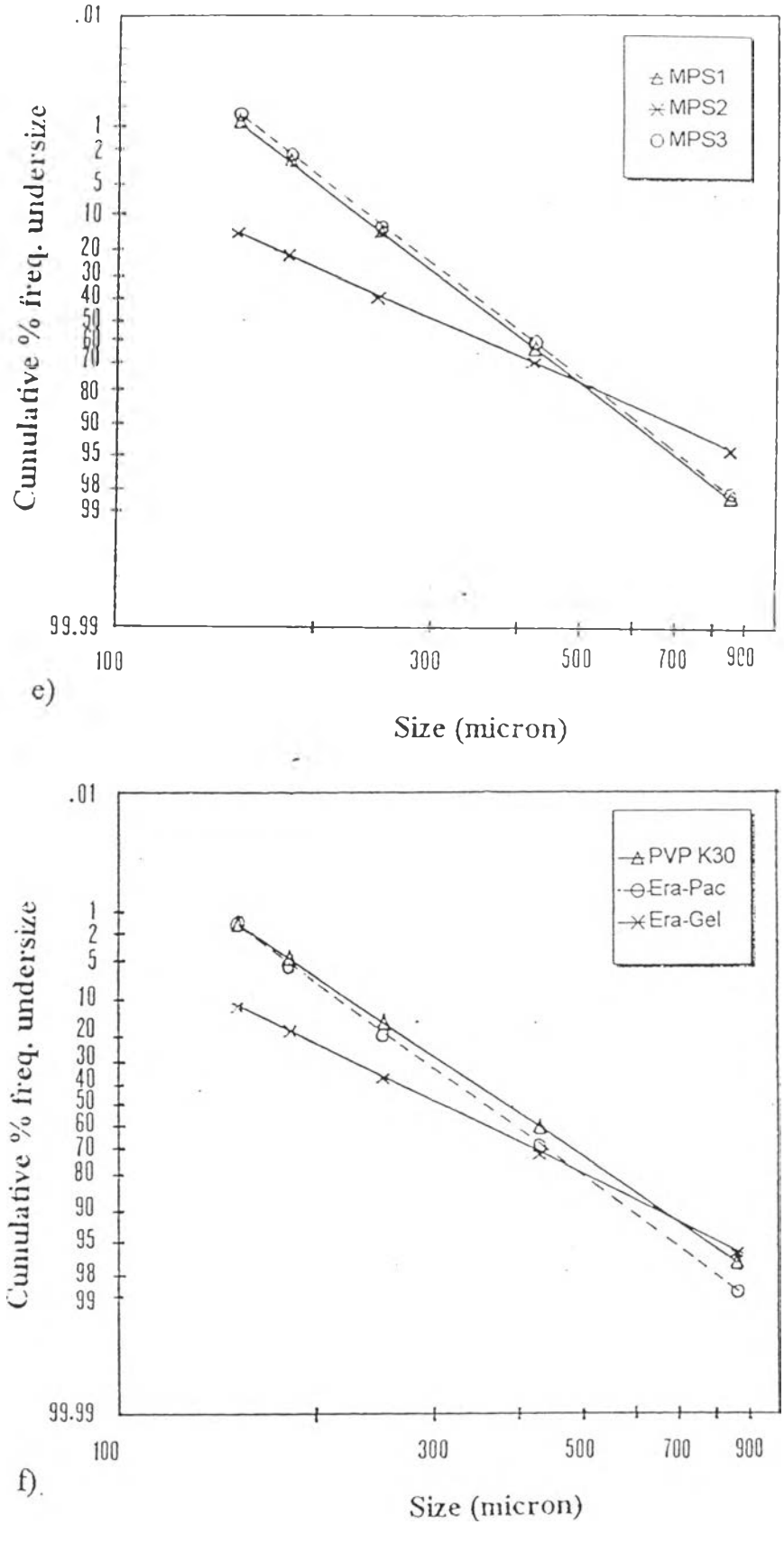

Figure **102** Log - Probability Plots of Paracetamol Granules Prepared with Various Binders (a) Rice; b) Glutinous; c) Corn; d) Tapioca; e) Potato and f) others) at 2 % Dry Weight by Dry Incorporation Method.

Appendix D

Table 23 Hardness of paracetamol tablets prepared with various binders and concentrations by solution incorporation method.

Binders	Hardness of paracetamol tablets (kp.)		
	1%	1.5%	2%
Rice	4.18 (0.27)*	3.66(0.25)	4.25(0.39)
MRS1	5.61(0.37)	5.77(0.53)	7.40(0.88)
MRS2	5.11(0.52)	4.58(0.34)	4.72(0.71)
MRS3	6.60(0.41)	7.19(0.44)	6.10(0.35)
Glutinous	5.61(0.61)	4.39(0.63)	3.05(0.21)
MGS1	5.84(0.47)	5.12(0.58)	5.52(0.58)
MGS2	7.77(0.66)	8.20(0.55)	8.98(1.04)
MGS3	4.48(0.37)	6.03(0.51)	10.33(0.76)
Corn	5.28(0.32)	4.85(0.63)	4.89(0.47)
MCS1	4.06(0.38)	4.27(0.56)	5.35(0.47)
MCS2	5.81(0.17)	5.67(0.35)	6.50(0.83)
MCS3	6.81(0.46)	7.83(1.56)	7.71(0.56)
Tapioca	3.42(0.41)	3.45(0.74)	4.43(0.45)
MTS1	3.94(0.40)	3.98(0.61)	4.66(0.70)
MTS2	4.24(0.36)	3.69(0.69)	4.42(0.65)
MTS3	4.93(0.30)	4.49(0.57)	4.85(0.54)
Potato	3.52(0.29)	4.22(0.66)	5.81(0.49)
MPS1	3.99(0.39)	4.94(0.78)	4.91(0.50)
MPS2	3.52(0.28)	3.49(0.30)	3.12(0.79)
MPS3	7.31(0.65)	5.06(0.78)	4.69(0.74)
PVP K30	9.54(0.63)	8.30(0.59)	8.82(0.42)
Era-Gel®	2.77(0.47)	4.29(0.67)	4.39(0.33)

* = Standard deviation

Table 24 Hardness of paracetamol tablets prepared with various binders and concentrations by dry incorporation method.

Binders	Hardness of paracetamol tablets (kp.)		
	1%	1.5%	2%
MRS1	3.24(0.40)*	4.13(0.41)	5.28(0.41)
MRS2	3.46(0.44)	3.56(0.34)	2.79(0.19)
MRS3	3.67(0.35)	4.11(0.32)	4.24(0.52)
MGS1	3.41(0.29)	3.58(0.52)	5.00(0.58)
MGS2	3.73(0.34)	3.13(0.37)	5.79(0.61)
MGS3	3.13(0.35)	3.89(0.35)	4.87(0.45)
MCS1	3.36(0.41)	3.57(0.37)	4.26(0.44)
MCS2	3.07(0.37)	4.05(0.41)	3.80(0.50)
MCS3	3.16(0.40)	3.43(0.48)	6.00(0.44)
MTS1	2.82(0.34)	2.99(0.33)	4.60(0.52)
MTS2	2.91(0.67)	2.87(0.53)	4.93(0.44)
MTS3	2.83(0.29)	3.19(0.50)	4.82(0.49)
MPS1	2.79(0.38)	3.11(0.30)	4.75(0.48)
MPS2	3.47(0.40)	3.96(0.43)	4.28(0.67)
MPS3	2.90(0.36)	3.11(0.35)	4.77(0.33)
PVP K30	5.10(0.54)	6.11(0.60)	6.98(0.68)
Era-Pac®	2.15(0.12)	2.74(0.43)	3.06(0.26)
Era-Gel®	2.57(0.24)	2.57(0.18)	3.40(0.35)

* = Standard deviation

Table 25 Analysis of variance for hardness of tablet prepared with various binders at 1% dry weight by solution incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	19	322.6526	16.9817	94.7587
Within gr.	180	32.2570	0.1792	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.371	9	0.436	16	0.456
3	0.391	10	0.440	17	0.459
4	0.404	11	0.447	18	0.461
5	0.414	12	0.450	19	0.463
6	0.422	13	0.451	20	0.465
7	0.427	14	0.452		
8	0.432	15	0.454		

Table 26 Analysis of variance for hardness of tablet prepared with various binders at 1.5% dry weight by solution incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	19	363.3768	19.1251	44.3326
Within gr.	180	77.6560	0.4314	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.576	9	0.678	16	0.709
3	0.607	10	0.684	17	0.712
4	0.628	11	0.695	18	0.716
5	0.643	12	0.699	19	0.719
6	0.655	13	0.701	20	0.722
7	0.664	14	0.703		
8	0.672	15	0.706		

Table 27 Analysis of variance for hardness of tablet prepared with various binders at 2% dry weight by solution incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	19	638.9466	33.6288	83.1778
Within gr.	180	72.7690	0.4043	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.557	9	0.656	16	0.686
3	0.587	10	0.662	17	0.689
4	0.607	11	0.672	18	0.692
5	0.621	12	0.676	19	0.695
6	0.633	13	0.678	20	0.698
7	0.642	14	0.680		
8	0.650	15	0.683		

Table 28 Analysis of variance for hardness of tablet prepared with various binders at 1% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	13.6033	0.9717	6.2390
Within gr.	135	21.0250	0.1557	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.346	7	0.398	12	0.419
3	0.364	8	0.403	13	0.421
4	0.377	9	0.407	14	0.422
5	0.386	10	0.411	15	0.424
6	0.393	11	0.417		

Table 29 Analysis of variance for hardness of tablet prepared with various binders at 1.5% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	26.4704	1.8907	11.4318
Within gr.	135	22.3280	0.1654	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.356	7	0.410	12	0.432
3	0.376	8	0.415	13	0.433
4	0.388	9	0.419	14	0.435
5	0.397	10	0.423	15	0.437
6	0.405	11	0.430		

Table 30 Analysis of variance for hardness of tablet prepared with various binders at 2% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	84.5097	6.0364	25.9345
Within gr.	135	31.4220	0.2328	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.423	7	0.487	12	0.513
3	0.446	8	0.493	13	0.514
4	0.461	9	0.497	14	0.516
5	0.471	10	0 502	15	0.518
6	0.481	11	0 510		

Table **31** Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 1% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	S	S	S	S	S	NS	S	NS	S	S	S	NS	NS	S	S	NS	S	S
MRS1		-	S	S	NS	NS	S	S	NS	S	NS	S	S	S	S	S	S	S	S	S
MRS2			-	S	S	S	S	S	NS	S	S	S	S	S	S	NS	S	S	S	S
MRS3				-	S	S	S	S	S	S	S	NS	S	S	S	S	S	S	S	S
Glu.					-	NS	S	S	NS	S	NS	S	S	S	S	S	S	S	S	S
MGS1						-	S	S	S	S	NS	S	S	S	S	S	S	S	S	S
MGS2							-	S	S	S	S	S	S	S	S	S	S	S	S	S
MGS3								-	S	S	S	S	S	S	NS	S	S	S	S	S
Corn									-	S	S	S	S	S	S	NS	S	S	S	S
MCS1										-	S	S	S	NS	NS	S	S	NS	S	S
MCS2											-	S	S	S	S	S	S	S	S	S
MCS3												-	S	S	S	S	S	S	S	S
Tap.													-	S	S	S	NS	S	NS	S
MTS1														-	NS	S	S	S	S	S
MTS2															-	S	S	NS	S	S
MTS3																-	S	S	S	S
Pot.																	-	S	NS	S
MPS1																		-	S	S
MPS2																			-	S
MPS3																				-

Table **32** Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 1.5% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	S	S	S	S	S	S	S	NS	S	S	NS	NS	NS	S	S	S	NS	S
MRS1		-	S	S	S	S	S	NS	S	S	NS	S	S	S	S	S	S	S	S	S
MRS2			-	S	NS	NS	S	S	NS	NS	S	S	S	NS	S	NS	NS	NS	S	NS
MRS3				-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Glu.					-	S	S	S	NS	NS	S	S	S	NS	S	NS	NS	NS	S	S
MGS1						-	S	S	NS	S	NS	S	S	S	S	NS	S	NS	S	NS
MGS2							-	S	S	S	S	NS	S	S	S	S	S	S	S	S
MGS3								-	S	S	NS	S	S	S	S	S	S	S	S	S
Corn									-	NS	S	S	S	S	S	NS	NS	NS	S	NS
MCS1										-	S	S	S	NS	NS	NS	NS	S	S	S
MCS2											-	S	S	S	S	S	S	S	S	NS
MCS3												-	S	S	S	S	S	S	S	S
Tap.													-	NS	NS	S	S	S	NS	S
MTS1														-	NS	NS	NS	S	NS	S
MTS2															-	S	NS	S	NS	S
MTS3																-	NS	NS	S	NS
Pot.																	-	S	S	S
MPS1																		-	S	NS
MPS2																			-	S
MPS3																				-

Table 33 Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 2% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	NS	S	S	S	S	S	NS	S	S	S	NS	NS	NS	NS	S	NS	NS	S
MRS1		-	S	S	S	S	S	S	S	S	S	NS	S	S	S	S	S	S	S	S
MRS2			-	S	S	S	S	S	NS	S	S	S	NS	NS	NS	NS	S	NS	S	NS
MRS3				-	S	NS	S	S	S	S	NS	S	S	S	S	S	NS	S	S	S
Glu.					-	S	S	S	S	S	S	S	S	S	S	S	S	S	NS	S
MGS1						-	S	S	S	NS	S	S	S	S	S	S	NS	S	S	S
MGS2							-	S	S	S	S	S	S	S	S	S	S	S	S	S
MGS3								-	S	S	S	S	S	S	S	S	S	S	S	S
Corn									-	NS	S	S	NS	NS	NS	NS	S	NS	S	NS
MCS1										-	S	S	S	S	S	NS	NS	NS	S	S
MCS2											-	S	S	S	S	S	S	S	S	S
MCS3												-	S	S	S	S	S	S	S	S
Tap.													-	NS	NS	NS	S	NS	S	NS
MTS1														-	NS	NS	S	NS	S	NS
MTS2															-	NS	S	NS	S	NS
MTS3																-	S	NS	S	NS
Pot.																	-	S	S	S
MPS1																		-	S	NS
MPS2																			-	S
MPS3																				-

Table **34** Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 1% binder weigh by dry incorporation method

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	NS	S	NS	S	NS	NS	NS	NS	S	NS	S	S	NS	NS
MRS2		-	NS	NS	NS	NS	NS	NS	NS	S	S	S	S	NS	S
MRS3			-	NS	NS	S	NS	S	S	S	S	S	S	NS	S
MGS1				-	NS	NS	NS	NS	NS	S	S	S	S	NS	S
MGS2					-	S	NS	S	S	S	S	S	S	NS	S
MGS3						-	NS	NS	NS	NS	NS	NS	NS	NS	NS
MCS1							-	NS	NS	S	S	S	S	NS	S
MCS2								-	S	NS	NS	NS	NS	NS	NS
MCS3									-	NS	NS	NS	NS	NS	NS
MTS1										-	NS	NS	NS	S	NS
MTS2											-	NS	NS	S	NS
MTS3												-	NS	S	NS
MPS1													-	S	NS
MPS2														-	S
MPS3															-

Table **35** Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 1.5% binder weigh by dry incorporation method

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	S	NS	S	S	NS	S	NS	S	S	S	S	S	NS	S
MRS2		-	S	NS	S	NS	NS	S	NS	S	S	NS	S	NS	S
MRS3			-	S	S	NS	S	NS	S	S	S	S	S	NS	S
MGS1				-	S	NS	NS	S	NS	S	S	NS	S	NS	S
MGS2					-	S	S	S	NS	NS	NS	NS	NS	S	NS
MGS3						-	NS	NS	S	S	S	S	S	NS	S
MCS1							-	S	NS	S	S	NS	S	NS	S
MCS2								-	S	S	S	S	S	NS	S
MCS3									-	S	S	NS	NS	S	NS
MTS1										-	NS	NS	NS	S	NS
MTS2											-	NS	NS	S	NS
MTS3												-	NS	S	NS
MPS1													-	S	NS
MPS2														-	S
MPS3															-

Table 36 Dunacn's new multiple range test for paracetamol tablet hardness prepared with various binders at 2% binder weigh by dry incorporation method

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	S	S	NS	S	NS	S	S	S	S	NS	NS	S	S	S
MRS2		-	S	S	S	S	S	S	S	S	S	S	S	S	S
MRS3			-	S	S	S	NS	S	S	NS	S	S	S	NS	S
MGS1				-	S	NS	S	S	S	NS	NS	NS	NS	S	NS
MGS2					-	S	S	S	NS	S	S	S	S	S	S
MGS3						-	S	S	S	NS	NS	NS	NS	S	NS
MCS1							-	S	S	NS	S	S	S	NS	S
MCS2								-	S	S	S	S	S	S	S
MCS3									-	S	S	S	S	S	S
MTS1										-	NS	NS	NS	NS	NS
MTS2											-	NS	NS	S	NS
MTS3												-	NS	S	NS
MPS1													-	S	NS
MPS2														-	S
MPS3															-

Table **37** Disintegration time of paracetamol tablets prepared with various binders and concentrations by solution incorporation method.

Binders	Disintegration time of paracetamol tablets (min.)		
	1%	1.5%	2%
Rice	0.56(0.06)*	0.68(0.02)	0.38(0.02)
MRS1	2.44(0.34)	7.39(0.72)	11.97(1.99)
MRS2	1.09(0.14)	1.69(0.17)	3.56(0.77)
MRS3	3.38(0.67)	7.36(0.94)	8.38(0.82)
Glutinous	0.98(0.20)	0.95(0.10)	1.21(0.30)
MGS1	3.05(0.47)	10.88(0.75)	8.37(0.82)
MGS2	1.98(0.15)	3.87(0.67)	3.32(0.27)
MGS3	2.85(0.58)	8.77(0.57)	10.53(1.12)
Corn	0.67(0.15)	0.79(0.08)	0.62(0.04)
MCS1	1.10(0.25)	2.43(0.48)	7.02(0.83)
MCS2	1.41(0.10)	4.15(0.61)	8.54(0.67)
MCS3	2.59(0.44)	3.66(0.63)	8.84(0.58)
Tapioca	0.61(0.03)	0.64(0.03)	0.60(0.04)
MTS1	3.54(0.76)	6.84(1.37)	11.14(1.62)
MTS2	1.74(0.26)	2.94(0.13)	5.38(0.92)
MTS3	1.84(0.14)	4.72(0.55)	8.54(0.32)
Potato	0.62(0.11)	0.76(0.04)	1.05(0.12)
MPS1	8.72(0.87)	12.66(1.92)	18.88(3.55)
MPS2	4.64(0.79)	12.88(2.10)	23.22(2.59)
MPS3	2.74(0.19)	4.86(1.09)	7.46(1.70)
PVP K30	1.48(0.23)	1.40(0.24)	1.67(0.12)
Era-Gel®	0.43(0.01)	0.64(0.05)	0.67(0.06)

* = Standard deviation

Table 38 Disintegration time of paracetamol tablets prepared with various binders and concentrations by dry incorporation method.

Binders	Disintegration time of paracetamol tablets (min.)		
	1%	1.5%	2%
MRS1	4.62(0.48)*	8.68(1.60)	28.85(5.94)
MRS2	0.94(0.09)	1.94(0.20)	1.58(0.19)
MRS3	2.17(0.44)	3.71(0.82)	11.65(0.51)
MGS1	2.93(0.56)	9.84(1.30)	18.72(0.36)
MGS2	1.17(0.16)	2.06(0.31)	6.54(0.55)
MGS3	1.50(0.22)	4.21(0.56)	10.14(0.33)
MCS1	5.34(0.80)	6.31(1.49)	10.45(0.52)
MCS2	0.92(0.06)	3.60(0.28)	7.67(0.64)
MCS3	1.01(0.09)	1.94(0.30)	8.92(0.69)
MTS1	3.00(0.30)	2.78(0.23)	16.52(1.79)
MTS2	1.40(0.16)	2.39(0.30)	7.35(0.41)
MTS3	1.92(0.23)	4.87(1.67)	12.19(1.10)
MPS1	1.81(0.30)	8.92(0.79)	21.22(3.17)
MPS2	3.12(0.31)	7.31(0.57)	26.55(1.89)
MPS3	1.95(0.31)	2.74(0.30)	6.39(1.45)
PVP K30	1.07(0.16)	1.22(0.17)	2.38(0.44)
Era-Pac ^{R}	0.48(0.03)	0.49(0.03)	0.51(0.02)
Era-Gel ^{R}	0.59(0.05)	0.67(0.06)	0.68(0.05)

* = Standard deviation

Table 39 Analysis of variance for disintegration time of tablet prepared with various binders at 1% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	19	407.8419	21.4654	119.3413
Within gr.	100	17.9865	0.1799	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.485	9	0.570	16	0.592
3	0.511	10	0.575	17	0.596
4	0.528	11	0.582	18	0.597
5	0.540	12	0.585	19	0.599
6	0.551	13	0.587	20	0.601
7	0.558	14	0.589		
8	0.564	15	0.590		

Table 40 Analysis of variance for disintegration time of tablet prepared with various binders at 1.5% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	19	1,796.4529	94.5502	123.7650
Within gr.	100	76.3949	0.7639	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.999	9	1.174	16	1.220
3	1.053	10	1.185	17	1.227
4	1.088	11	1.199	18	1.231
5	1.113	12	1 206	19	1.235
6	1.135	13	1 210	20	1 238
7	1.149	14	1 213		
8	1.163	15	1 217		

Table 41 Analysis of variance for disintegration time of tablet prepared with various binders at 2% dry weight by solution incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	19	4,133.5579	217.5557	125.8021
Within gr.	100	172.9349	1.7293	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	1.503	9	1.766	16	1.836
3	1.584	10	1.782	17	1.847
4	1.637	11	1.804	18	1.852
5	1.675	12	1.815	19	1.858
6	1.707	13	1.820	20	1.863
7	1.729	14	1.825		
8	1.750	15	1.831		

Table 42 Analysis of variance for disintegration time of tablet prepared with various binders at 1% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	148.7157	10.6225	83.4268
Within gr.	75	9.5496	0.1273	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	0.408	7	0.469	12	0.492
3	0.430	8	0.475	13	0.494
4	0.444	9	0.479	14	0.495
5	0.455	10	0.484	15	0.497
6	0.463	11	0.489		

Table 43 Analysis of variance for disintegration time of tablet prepared with various binders at 1.5% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	641.4645	45.8189	58.7018
Within gr.	75	58.5402	0.7805	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	1.010	7	1.161	12	1.219
3	1.064	8	1.176	13	1.223
4	1.100	9	1.187	14	1.226
5	1.125	10	1.197	15	1.230
6	1.147	11	1.212		

Table 44 Analysis of variance for disintegration time of tablet prepared with various binders at 2% dry weight by dry incorporation method.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	V.R.
Among gr.	14	5,145.8172	367.5584	95.7207
Within gr.	75	287.9928	3.8399	

F-ratio for 0.05 Level of Significance = 1.75

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR	GAP ORDER	LSR
2	2.240	7	2.576	12	2.704
3	2.360	8	2.608	13	2.712
4	2.440	9	2.632	14	2.720
5	2.496	10	2.656	15	2.728
6	2.544	11	2.688		

Table **45** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with various binders at 1% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	NS	S	NS	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S
MRS1		-	S	S	S	S	NS	NS	S	S	S	NS	S	S	S	S	S	S	S	NS
MRS2			-	S	NS	S	S	S	NS	NS	NS	S	NS	S	S	S	NS	S	S	S
MRS3				-	S	NS	S	S	S	S	S	S	S	NS	S	S	S	S	S	S
Glu.					-	S	S	S	NS	NS	NS	S	NS	S	S	S	NS	S	S	S
MGS1						-	S	NS	S	S	S	NS	S	NS	S	S	S	S	S	NS
MGS2							-	S	S	S	S	S	S	S	NS	NS	S	S	S	S
MGS3								-	S	S	S	NS	S	S	S	S	S	S	S	NS
Corn									-	NS	S	S	NS	S	S	S	NS	S	S	S
MCS1										-	NS	S	NS	S	S	S	NS	S	S	S
MCS2											-	S	S	S	NS	NS	S	S	S	S
MCS3												-	S	S	S	S	S	S	S	NS
Tap.													-	S	S	S	NS	S	S	S
MTS1														-	S	S	S	S	S	S
MTS2															-	NS	S	S	S	S
MTS3																-	S	S	S	S
Pot.																	-	S	S	S
MPS1																		-	S	S
MPS2																			-	S
MPS3																				-

Table **46** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with various binders at 1.5% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	NS	S	NS	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S
MRS1		-	S	NS	S	S	S	S	S	S	S	S	S	NS	S	S	S	S	S	S
MRS2			-	S	NS	S	S	S	NS	NS	S	S	NS	S	S	S	NS	S	S	S
MRS3				-	S	S	S	S	S	S	S	S	S	NS	S	S	S	S	S	S
Glu.					-	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S
MGS1						-	S	S	S	S	S	S	S	S	S	S	S	S	S	S
MGS2							-	S	S	S	NS	NS	S	S	NS	NS	S	S	S	NS
MGS3								-	S	S	S	S	S	S	S	S	S	S	S	S
Corn									-	S	S	S	NS	S	S	S	NS	S	S	S
MCS1										-	S	S	S	S	NS	S	S	S	S	S
MCS2											-	NS	S	S	S	NS	NS	S	S	NS
MCS3												-	S	S	NS	NS	S	S	NS	S
Tap.													-	S	S	S	NS	S	S	S
MTS1														-	S	S	S	S	S	S
MTS2															-	S	S	S	S	S
MTS3																-	S	S	S	NS
Pot.																	-	S	S	S
MPS1																		-	NS	S
MPS2																			-	S
MPS3																				-

Table 47 Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with various binders at 2% binder weight by solution incorporation method

	Rice	MRS1	MRS2	MRS3	Glu.	MGS1	MGS2	MGS3	Corn	MCS1	MCS2	MCS3	Tap.	MTS1	MTS2	MTS3	Pot.	MPS1	MPS2	MPS3
Rice	-	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S
MRS1		-	S	S	S	S	S	NS	S	S	S	S	S	NS	S	S	S	S	S	S
MRS2			-	S	S	S	NS	S	S	S	S	S	S	S	S	S	S	S	S	S
MRS3				-	S	NS	S	S	S	NS	NS	NS	S	S	S	NS	S	S	S	NS
Glu.					-	S	S	S	NS	S	S	S	NS	S	S	S	NS	S	S	S
MGS1						-	S	S	S	NS	NS	NS	S	S	S	NS	S	S	S	NS
MGS2							-	S	S	S	S	S	S	S	S	S	S	S	S	S
MGS3								-	S	S	S	S	S	NS	S	S	S	S	S	S
Corn									-	S	S	S	NS	S	S	S	NS	S	S	S
MCS1										-	NS	S	S	S	S	NS	S	S	S	NS
MCS2											-	NS	S	S	S	NS	S	S	S	NS
MCS3												-	S	S	S	NS	S	S	S	NS
Tap.													-	S	S	S	NS	S	S	S
MTS1														-	S	S	S	S	S	S
MTS2															-	S	S	S	S	S
MTS3																-	S	S	S	NS
Pot.																	-	S	S	S
MPS1																		-	S	S
MPS2																			-	S
MPS3																				-

Table 48 Duncan's new multiple range test for disintegration time of paracatamol tablet prepared with various binders at 1% binder weight by dry incorporation method.

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S
MRS2		-	S	S	NS	S	S	NS	NS	S	S	S	S	S	S
MRS3			-	S	S	S	S	S	S	S	S	NS	NS	S	NS
MGS1				-	S	S	S	S	S	NS	S	S	S	NS	S
MGS2					-	NS	S	NS	NS	S	NS	S	S	S	S
MGS3						-	S	S	S	S	NS	NS	NS	S	S
MCS1							-	S	S	S	S	S	S	S	S
MCS2								-	NS	S	S	S	S	S	S
MCS3									-	S	NS	S	S	S	S
MTS1										-	S	S	S	NS	S
MTS2											-	S	NS	S	S
MTS3												-	NS	S	NS
MPS1													-	S	NS
MPS2														-	S
MPS3															-

Table **49** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with various binders at 1.5% binder weight by dry incorporation method

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	S	S	S	S	S	S	S	S	S	S	S	NS	S	S
MRS2		-	S	S	NS	S	S	S	NS	NS	NS	S	S	S	NS
MRS3			-	S	S	NS	S	NS	S	NS	S	S	S	S	NS
MGS1				-	S	S	S	S	S	S	S	S	S	S	S
MGS2					-	S	S	S	NS	NS	NS	S	S	S	NS
MGS3						-	S	NS	S	S	S	NS	S	S	S
MCS1							-	S	S	S	S	S	S	NS	S
MCS2								-	S	NS	S	S	S	S	NS
MCS3									-	NS	NS	S	S	S	NS
MTS1										-	NS	S	S	S	NS
MTS2											-	S	S	S	NS
MTS3												-	S	S	S
MPS1													-	S	S
MPS2														-	S
MPS3															-

Table **50** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with various binders at 2% binder weight by dry incorporation method

	MRS1	MRS2	MRS3	MGS1	MGS2	MGS3	MCS1	MCS2	MCS3	MTS1	MTS2	MTS3	MPS1	MPS2	MPS3
MRS1	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S
MRS2		-	S	S	S	S	S	S	S	S	S	S	S	S	S
MRS3			-	S	S	NS	NS	S	S	S	S	NS	S	S	S
MGS1				-	S	S	S	S	S	NS	S	S	S	S	S
MGS2					-	S	S	NS	NS	S	NS	S	S	S	NS
MGS3						-	NS	S	NS	S	S	NS	S	S	S
MCS1							-	S	NS	S	S	NS	S	S	S
MCS2								-	NS	S	NS	S	S	S	NS
MCS3									-	S	NS	S	S	S	S
MTS1										-	S	S	S	S	S
MTS2											-	S	S	S	S
MTS3												-	S	S	S
MPS1													-	S	S
MPS2														-	S
MPS3															-

Table 51 Analysis of variance for hardness of tablet prepared with MGS2, PVP K30 or Era-Gel^R at 1% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	246.5527	123.2763	352.3672
Within gr.	27	9.466	0.3498	

F-ratio for 0.05 Level of Significance = 3.38

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.543	3	0.570

Table 52 Analysis of variance for hardness of tablet prepared with MGS2, PVP K30 or Era-Gel^R at 1.5% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	104.5940	52.2970	143.0762
Within gr.	27	9.8690	0.3655	

F-ratio for 0.05 Level of Significance = 3.38

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.555	3	0.583

Table 53 Analysis of variance for hardness of tablet prepared with MGS2, PVP K30 or Era-Gel^{R} at 2% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	135.7287	67.8643	148.2353
Within gr.	27	12.3610	0.4578	

F-ratio for 0.05 Level of Significance = 3.38

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.622	3	0.652

Table **54** Duncan's new multiple range test for paracetamol tablet hardness prepared with MGS2, PVP K30 and Era-Gel^{R} at 1% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	S
PVP K30			-

Table **55** Duncan's new multiple range test for paracetamol tablet hardness prepared with MGS2, PVP K30 and Era-Gel^{R} at 1.5% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	NS
PVP K30			-

Table **56** Duncan's new multiple range test for paracetamol tablet hardness prepared with MGS2, PVP K30 and Era-Gel^{R} at 2% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	NS
PVP K30			-

Table **57** Analysis of variance for disintegration time of tablet prepared with MGS2, PVP K30 or Era-Gel^{R} at 1% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	7.5039	3.7520	154.8777
Within gr.	15	0.3634	0.0242	

F-ratio for 0.05 Level of Significance = 3.68

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.191	3	0.201

Table **58** Analysis of variance for disintegration time of tablet prepared with MGS2, PVP K30 or Era-Gel^{R} at 1.5% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	34.1393	17.0696	101.5474
Within gr.	15	2.5214	0.1681	

F-ratio for 0.05 Level of Significance = 3.68

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.504	3	0.529

Table 59 Analysis of variance for disintegration time of tablet prepared with MGS2, PVP K30 or Era-Gel^{R} at 2% dry weight by solution incorporation method.

SOURCE	DF	SUM SQUARE	MEAN SQUARE	V.R.
Among gr.	2	21.5306	10.7653	356.7510
Within gr.	15	0.4526	0.0302	

F-ratio for 0.05 Level of Significance = 3.68

DUNCAN MULTIPLE RANGE TESTS

ORDERED MEAN DIFFER AT ALPHA = 0.05

GAP ORDER	LSR	GAP ORDER	LSR
2	0.213	3	0.224

Table **60** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with MGS2, PVP K30 and Era-Gel^{R} at 1% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	S
PVP K30			-

Table **61** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with MGS2, PVP K30 and Era-Gel^{R} at 1.5% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	S
PVP K30			-

Table **62** Duncan's new multiple range test for disintegration time of paracetamol tablet prepared with MGS2, PVP K30 and Era-Gel^{R} at 2% dry weight by solution incorporation method.

	Era-Gel	MGS2	PVP K30
Era-Gel	-	S	S
MGS2		-	S
PVP K30			-

VITAE

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