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APPENDICES

Appendix 1

Table 21 Viscosity of corn starch in various acid-treated conditions

Time (mins)	N	Cond.1	Cond.2	Cond.3	Cond.4	Cond.5	Cond.6	Cond.7
0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
40	225	180	180	185	182	165	150	55
50	195	120	110	120	110	100	92	20
60	195	105	100	100	95	95	80	20
70	240	120	120	120	115	110	85	20
80	435	222	215	205	200	150	150	40
90	470	245	230	225	220	170	165	50
100	430	240	230	220	210	168	162	50

Cond. 1= 0.5% HCl, 35°C, 0.5 hr.
Cond. 2= 0.5% HCl, 35°C, 1 hr.
Cond. 3= 0.5% HCl, 35°C, 2 hrs.
Cond. 4= 1% HCl, 35°C, 0.5 hrs.
Cond. 5= 1% HCl, 50°C, 0.5 hrs.
Cond. 6= 2% HCl, 35°C, 0.5 hrs.
Cond. 7= 2% HCl, 50°C, 0.5 hrs.
N= Native Starch

Table 22 Viscosity of glutinous rice starch in various acid-treated conditions

Time (mins)	N	Cond.1	Cond.2	Cond.3	Cond.4	Cond.5	Cond.6	Cond.7
0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
30	585	480	475	450	432	370	368	30
40	415	300	290	285	288	225	222	20
50	365	200	180	182	180	150	145	20
60	310	175	160	165	155	138	132	20
70	310	180	160	160	158	140	132	20
80	330	200	182	180	175	168	158	22
90	375	222	190	185	182	170	170	30
100	378	220	195	190	188	185	175	35

Cond. 1= 0.5% HCl, 35°C, 0.5 hr.
Cond. 2= 0.5% HCl, 35°C, 1 hr.
Cond. 3= 0.5% HCl, 35°C, 2 hrs.
Cond. 4= 1% HCl, 35°C, 0.5 hrs.
Cond. 5= 1% HCl, 50°C, 0.5 hrs.
Cond. 6= 2% HCl, 35°C, 0.5 hrs.
Cond. 7= 2% HCl, 50°C, 0.5 hrs.
N= Native Starch

Table 23 Viscosity of tapioca starch in various acid-treated conditions

Time (mins)	N	Cond.1	Cond.2	Cond.3	Cond.4	Cond.5	Cond.6	Cond.7
0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
30	730	445	440	410	342	300	290	42
40	470	255	260	240	165	135	134	18
50	299	178	190	175	92	75	70	12
60	262	160	165	158	65	58	56	10
70	310	160	175	160	72	60	58	10
80	395	180	195	180	95	85	80	15
90	510	205	230	205	132	100	110	18
100	540	210	230	205	132	100	110	20

Cond. 1= 0.5% HCl, 35°C, 0.5 hr.
Cond. 2= 0.5% HCl, 35°C, 1 hr.
Cond. 3= 0.5% HCl, 35°C, 2 hrs.
Cond. 4= 1% HCl, 35°C, 0.5 hrs.
Cond. 5= 1% HCl, 50°C, 0.5 hrs.
Cond. 6= 2% HCl, 35°C, 0.5 hrs.
Cond. 7= 2% HCl, 50°C, 0.5 hrs.
N= Native Starch

Table 24 The selected viscosity of acid-treated corn starches after scale up

Time (mins)	N	Cond.I	Cond.7
0	0	0	0
10	0	0	0
20	0	0	0
30	0	0	0
40	225	180	55
50	195	120	20
60	195	105	20
70	240	120	20
80	435	222	40
90	470	245	50
100	430	240	50

N= Native Starch
Cond. 1= 0.5% HCl, 35°C, 0.5 hr.
Cond. 7= 2% HCl, 50°C, 0.5 hrs.

Table 25 The selected viscosity of acid-treated glutinous rice starches after scale up

Time (mins)	N	Cond.I	Cond.7
0	0	0	0
10	0	0	0
20	0	0	0
30	585	395	35
40	415	305	25
50	365	255	20
60	310	230	19
70	310	235	20
80	330	240	25
90	375	250	25
100	378	260	30

N= Native Starch
Cond. 1= 0.5% HCl, 35°C, 0.5 hr.
Cond. 7= 2% HCl, 50°C, 0.5 hrs.

Table 26 The selected viscosity of acid-treated tapioca starches after scale up

Time (mins)	N	Cond.I	Cond.7
0	0	0	0
10	0	0	0
20	0	0	0
30	730	450	45
40	470	258	18
50	299	175	12
60	262	160	10
70	310	162	10
80	395	175	15
90	510	200	18
100	540	205	20

N= Native Starch
Cond. 1= 0.5% HCl, 35oC, 0.5 hr.
Cond. 7= 2% HCl, 50oC, 0.5 hrs.

Table 27 The viscosity of acid treated corn starches after pulverizing by pin-mill

Time (mins)	CA	CB	CC
0	0	0	0
10	0	0	0
20	0	0	0
30	0	5	5
40	225	135	30
50	195	75	10
60	195	70	10
70	240	78	10
80	435	97	15
90	470	245	20
100	430	240	18

CA= Native Satrch
CB= 0.5% HCl, 35oC, 0.5 hr.
CC= 2% HCl,50oC, 0.5 hr.

Table 28 The viscosity of acid treated glutinous rice starches after pulverizing by pin-mill

Time (mins)	GA	GB	GC
0	0	0	0
10	0	0	0
20	0	0	0
30	585	395	35
40	415	305	25
50	365	255	20
60	310	230	19
70	310	235	20
80	330	240	25
90	375	250	25
100	378	260	30

GA= Native Satrch
GB= 0.5% HCl, 35oC, 0.5 hr.
GC= 2% HCl,50oC, 0.5 hr.

Table 29 The viscosity of acid treated tapioca starches after pulverizing by pin-mill

Time (mins)	TA	TB	TC
0	0	0	0
10	0	0	0
20	0	0	0
30	730	445	40
40	470	255	15
50	299	172	12
60	262	158	10
70	310	160	10
80	395	170	15
90	510	200	20
100	540	205	20

TA= Native Satrch
TB= 0.5% HCl, 35oC, 0.5 hr.
TC= 2% HCl,50oC, 0.5 hr.

Table 30 Viscosity of pregelatinized corn starches

Time (mins)	CD	CE	CF
0	20	10	2
10	20	10	5
20	25	5	5
30	40	2	2
40	125	2	2
50	140	2	1
60	140	2	1
70	150	2	2
80	220	2	1
90	230	2	5
100	240	2	5

CD= pregelatinized starch
CE= pregelatinized acid modified cond. 1 starch (0.5% HCL, 35° C, 0.5 hr.)
CF= pregelatinized acid modified cond. 2 starch (2% HCL, 50° C, 0.5 hr.)

Table 31 Viscosity of pregelatinized glutinous rice straches

Time (mins)	GD	GE	GF
0	1740	1070	400
10	1120	715	262
20	600	500	100
30	425	300	38
40	340	250	20
50	300	202	20
60	275	182	18
70	278	182	20
80	280	185	20
90	290	190	20
100	300	200	22

GD= pregelatinized starch
GE= pregelatinized acid modified cond. 1 starch (0.5% HCL, 35° C, 0.5 hr.)
GF= pregelatinized acid modified cond. 2 starch (2% HCL, 50° C, 0.5 hr.)

Table 32 Viscosity of pregelatinized tapioca starches

Time (mins)	TD	TE	TF
0	1220	5	2
10	770	2	2
20	540	1	1
30	345	2	1
40	225	1	0
50	190	1	2
60	160	0	0
70	180	0	0
80	195	0	1
90	220	2	2
100	245	2	2

TD= pregelatinized starch
TE= pregelatinized acid modified cond. 1 starch (0.5% HCL, 35° C, 0.5 hr.)
TF= pregelatinized acid modified cond. 2 starch (2% HCL, 50° C, 0.5 hr.)

Table 33 Viscosity of pregelatinized commercial pregelatinized starches

Time (mins)	Era-Gel	National 1551	Starch 1500
0	2	35	2
10	2	30	5
20	2	30	5
30	1	35	20
40	1	50	60
50	1	65	60
60	1	70	70
70	1	75	80
80	0	75	85
90	5	82	95
100	5	85	100

Appendix 2

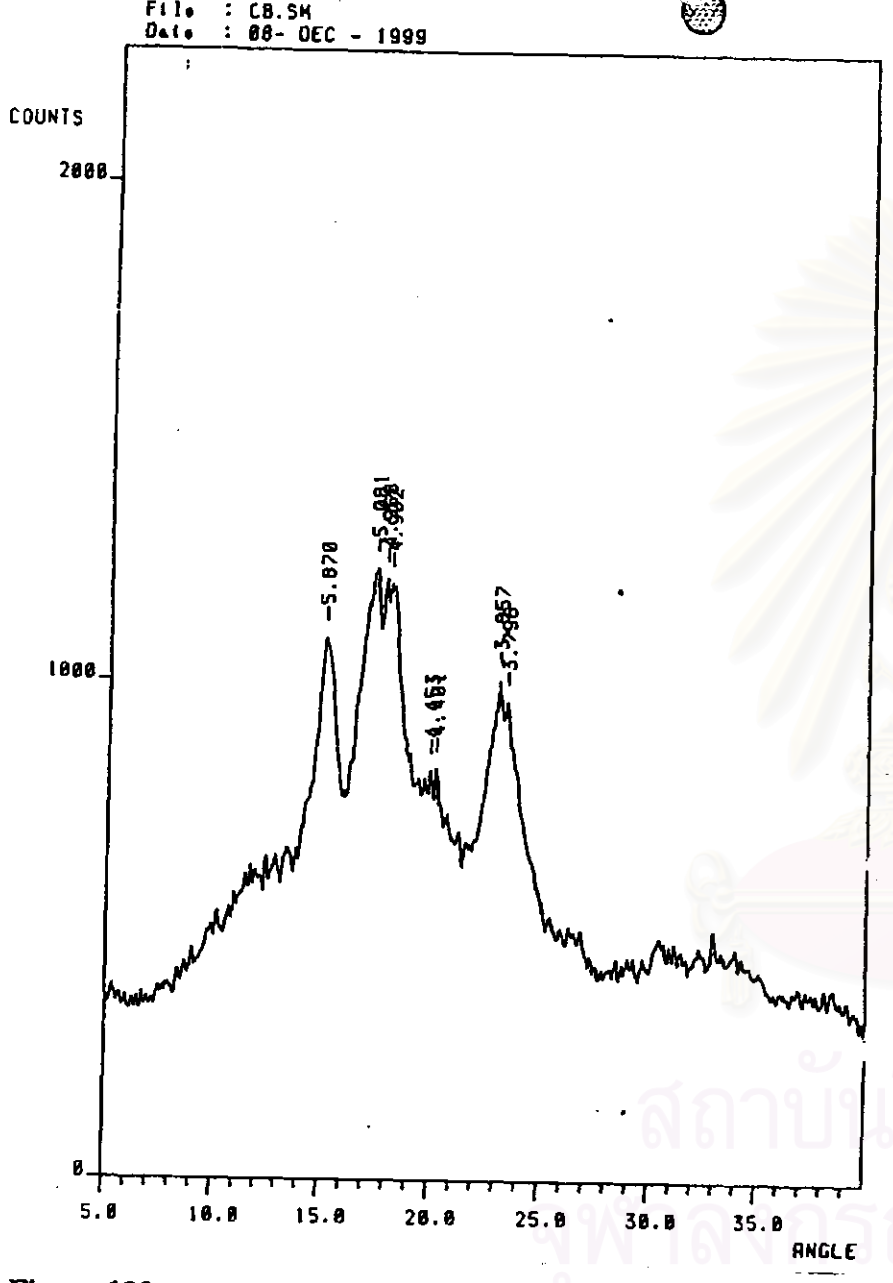


Figure 123 X-ray diffraction pattern of acid-treated corn starch (CB)

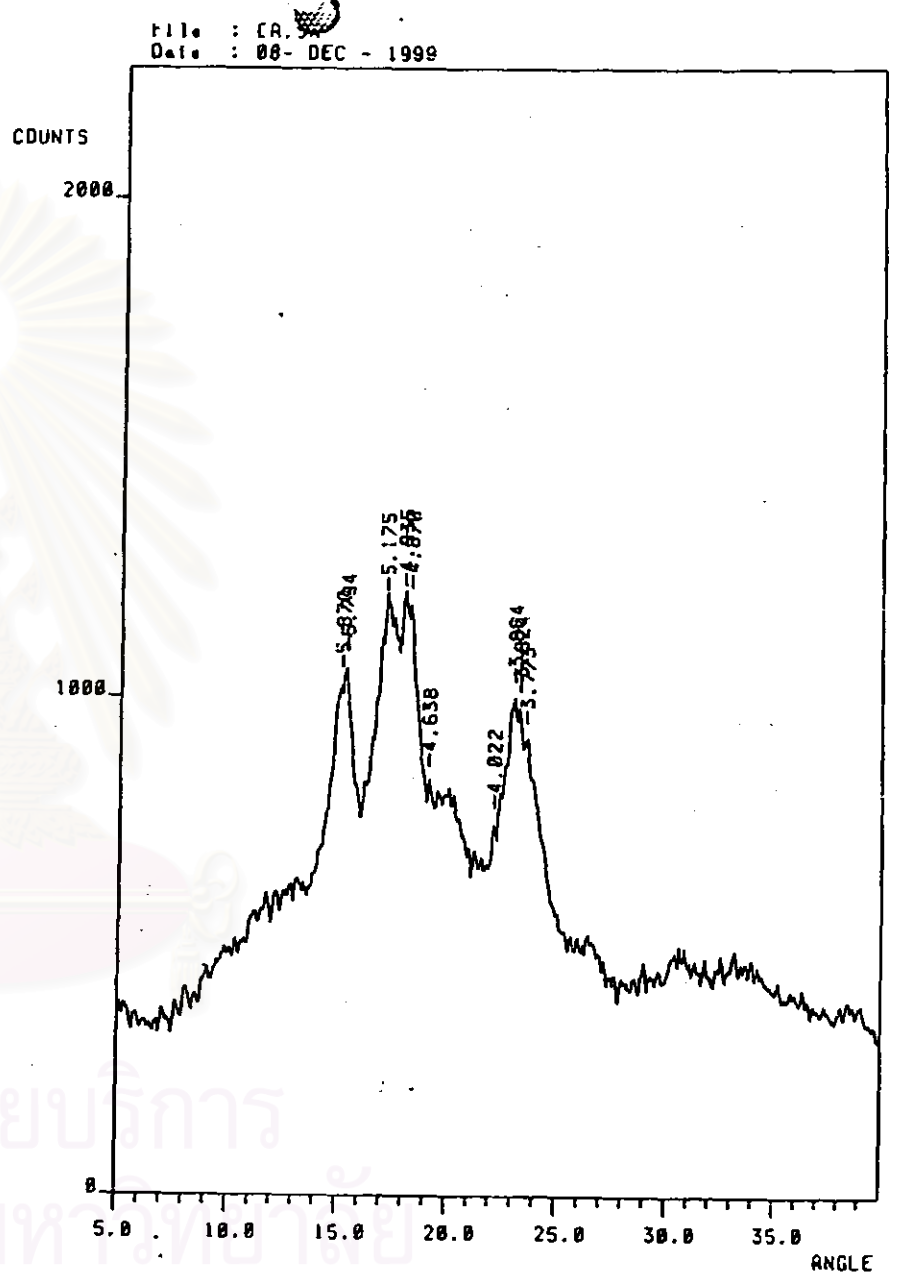


Figure 122 X-ray diffraction pattern of native corn starch (CA)

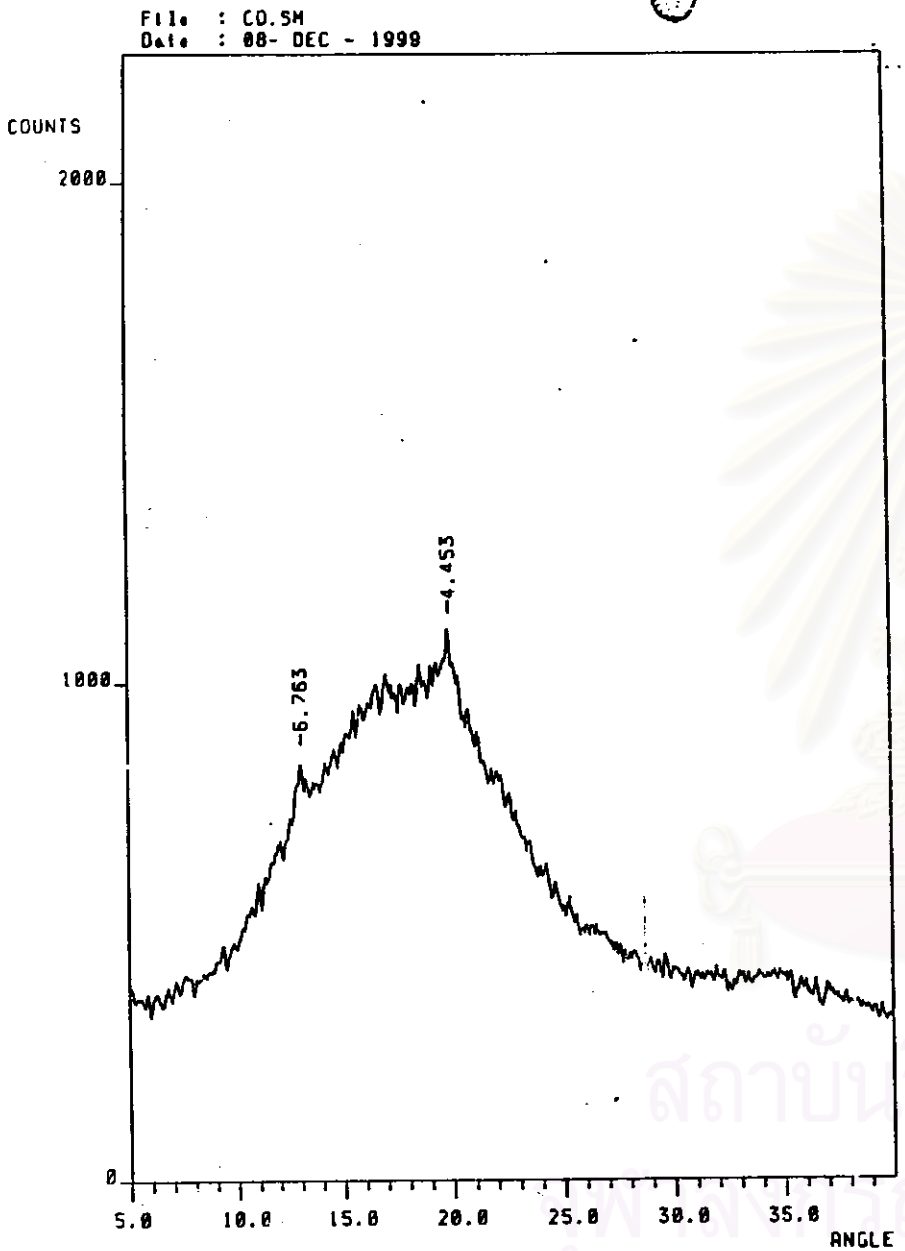


Figure 125 X-ray diffraction pattern of pregelatinized corn starch (CD).

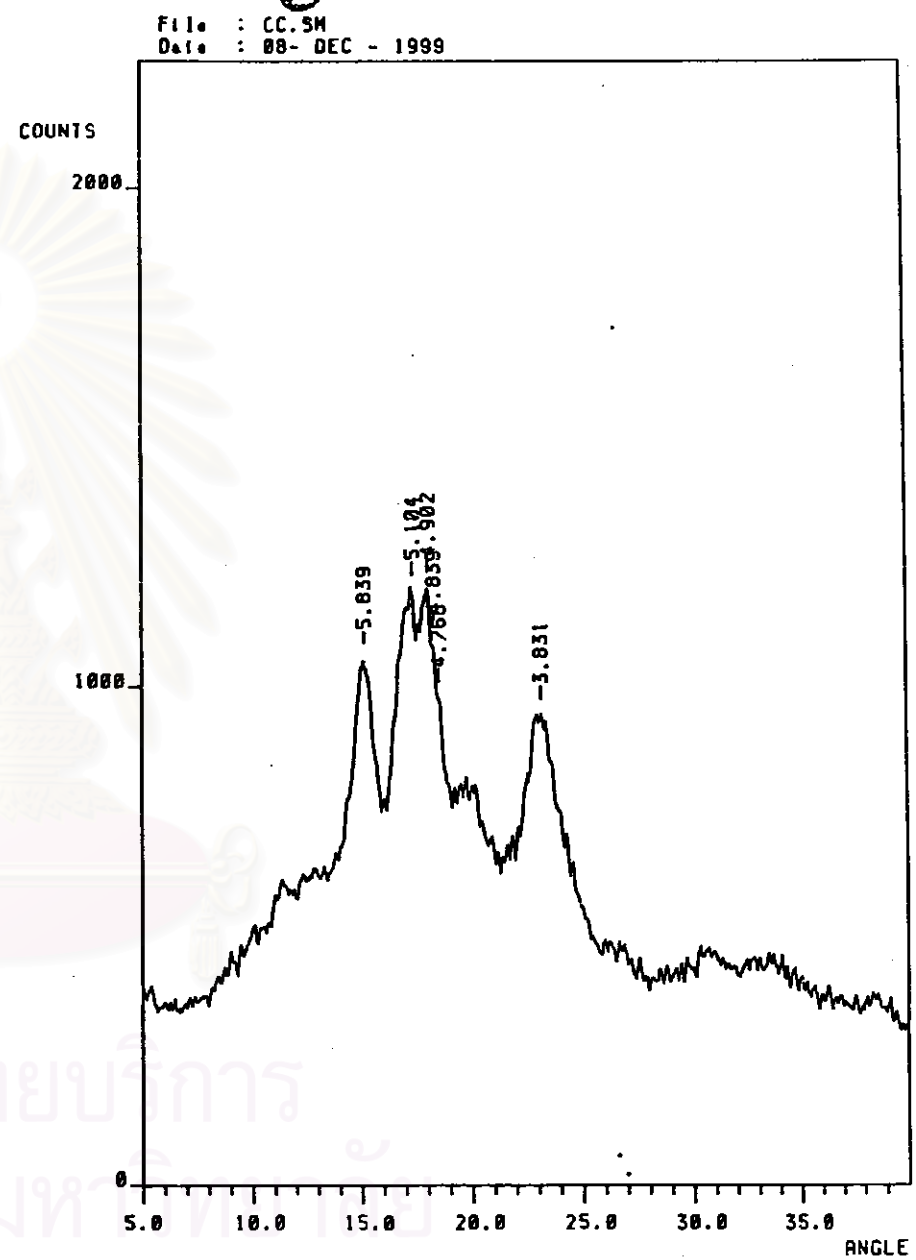


Figure 124 X-ray diffraction pattern of acid-treated corn starch (CC)

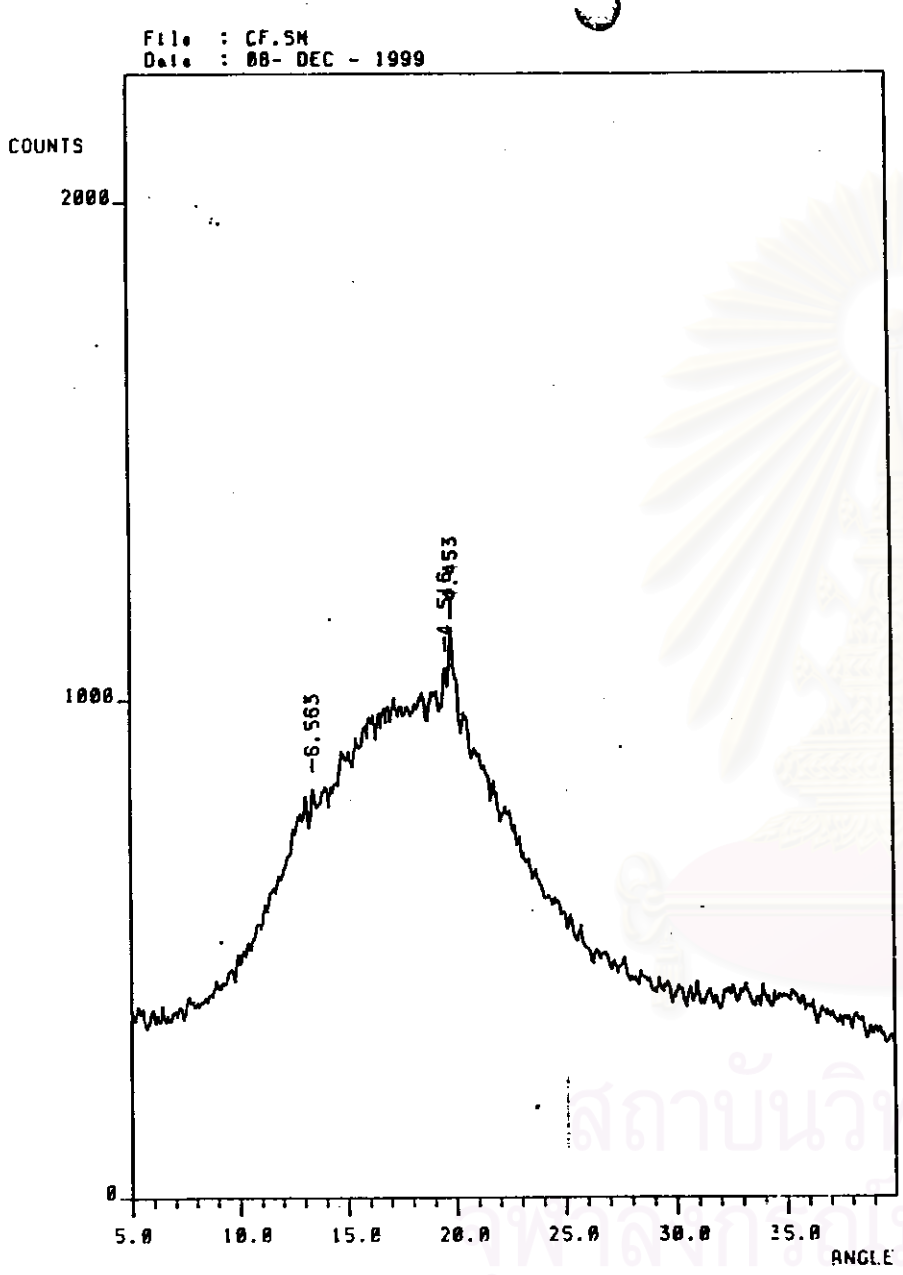


Figure 127 X-ray diffraction pattern of pregelatinized-acid treated corn starch (CF)

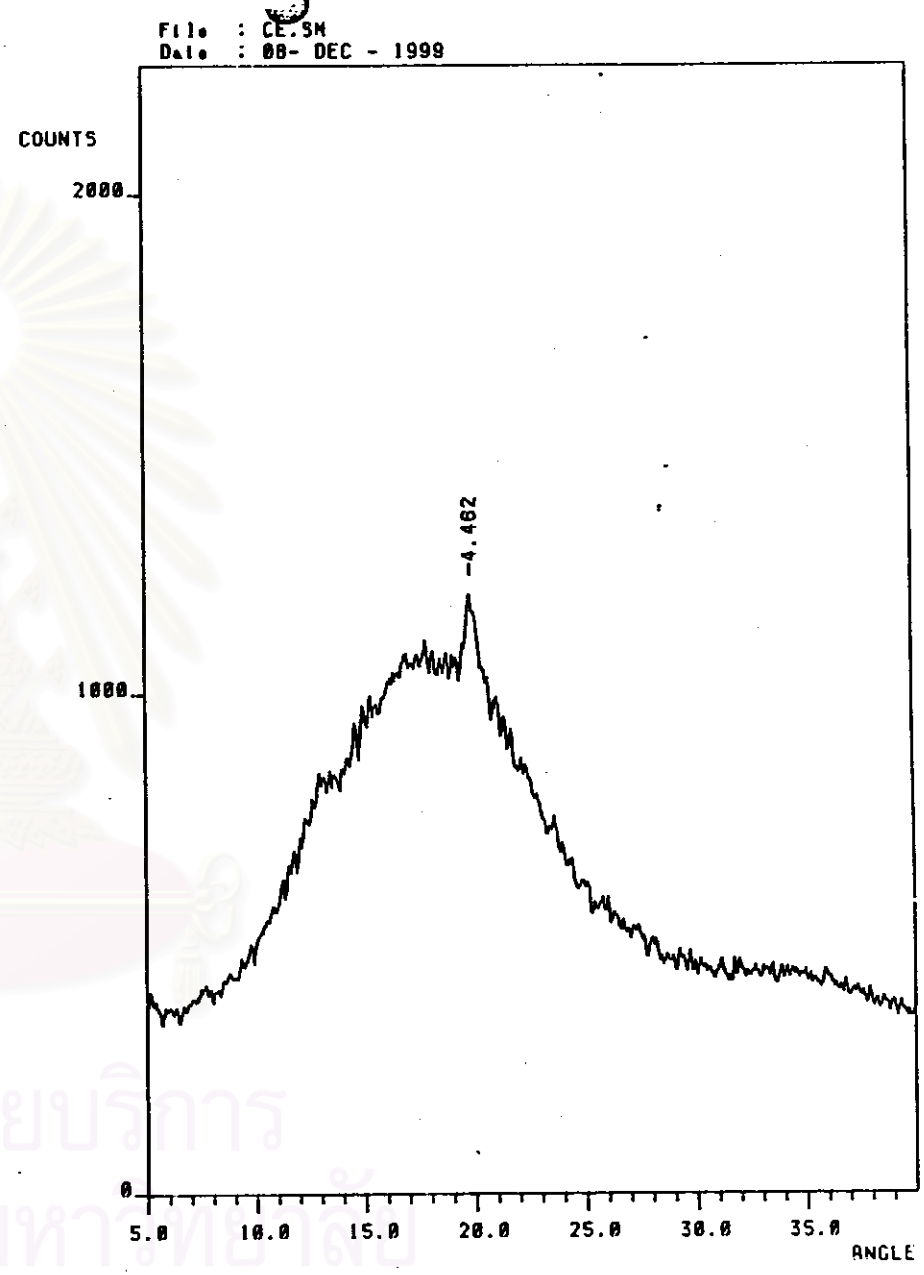


Figure 126 X-ray diffraction pattern of pregelatinized-acid treated corn starch (CE)

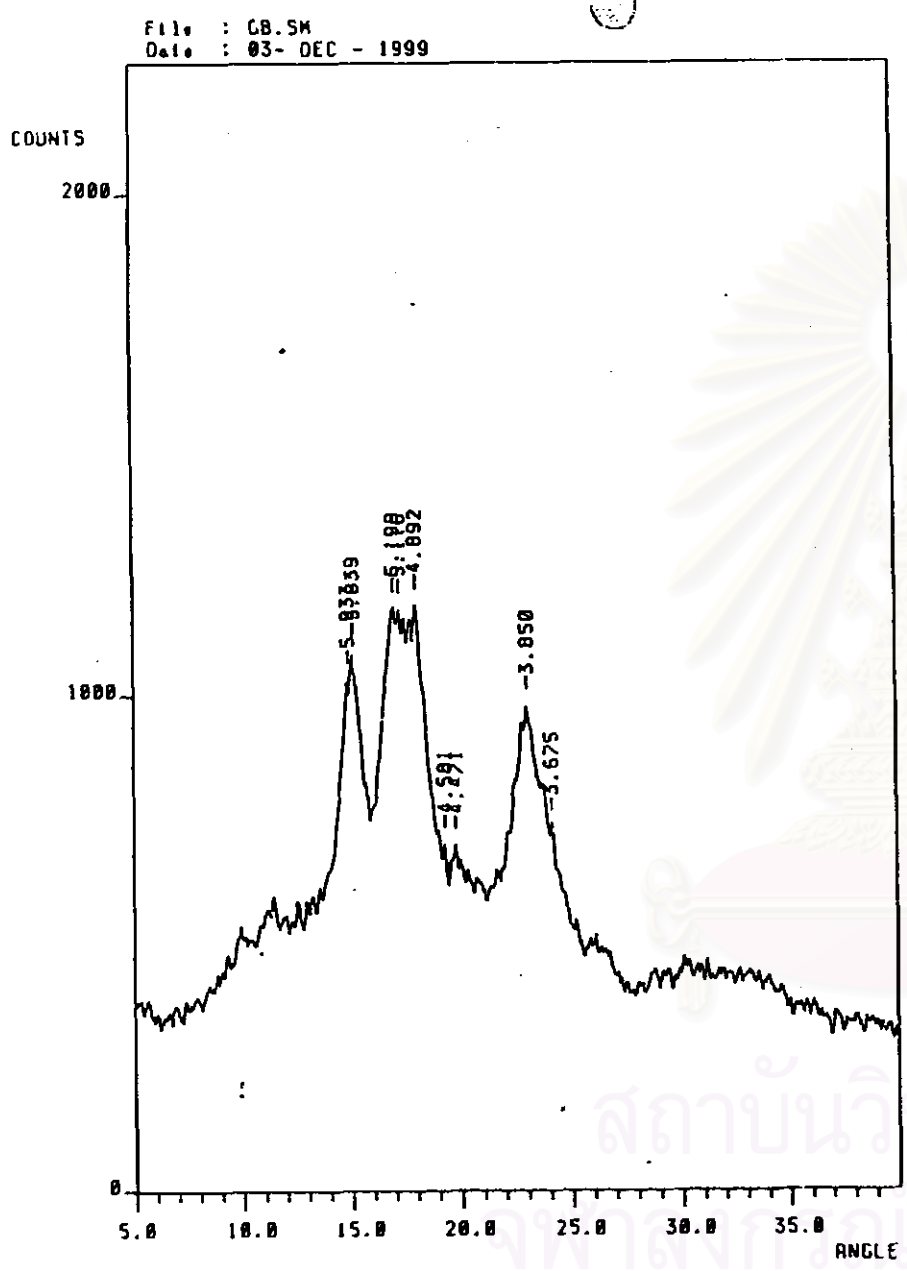


Figure 129 X-ray diffraction pattern of acid-treated glutinous rice starch (GB)

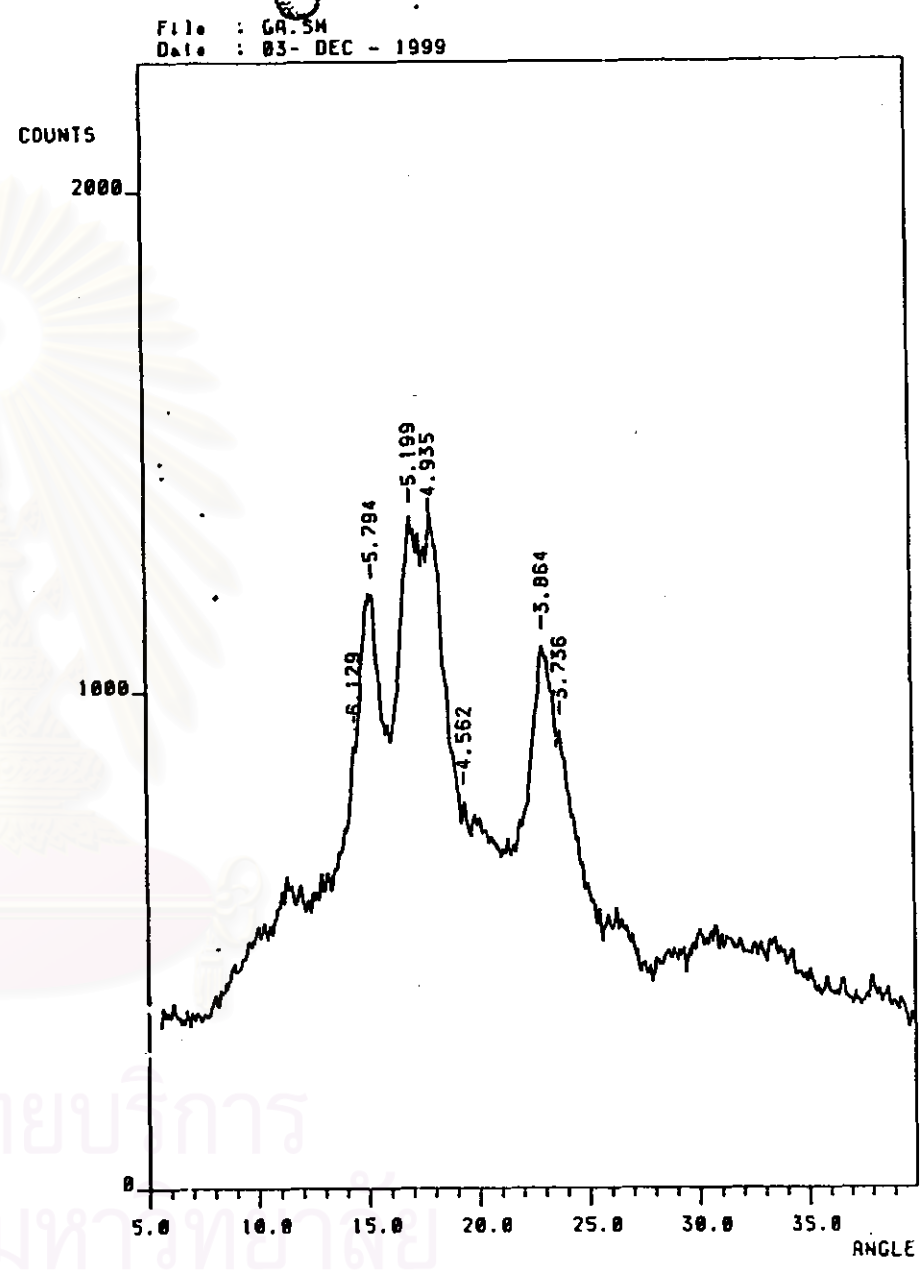


Figure 128 X-ray diffraction pattern of native glutinous rice starch (GA)

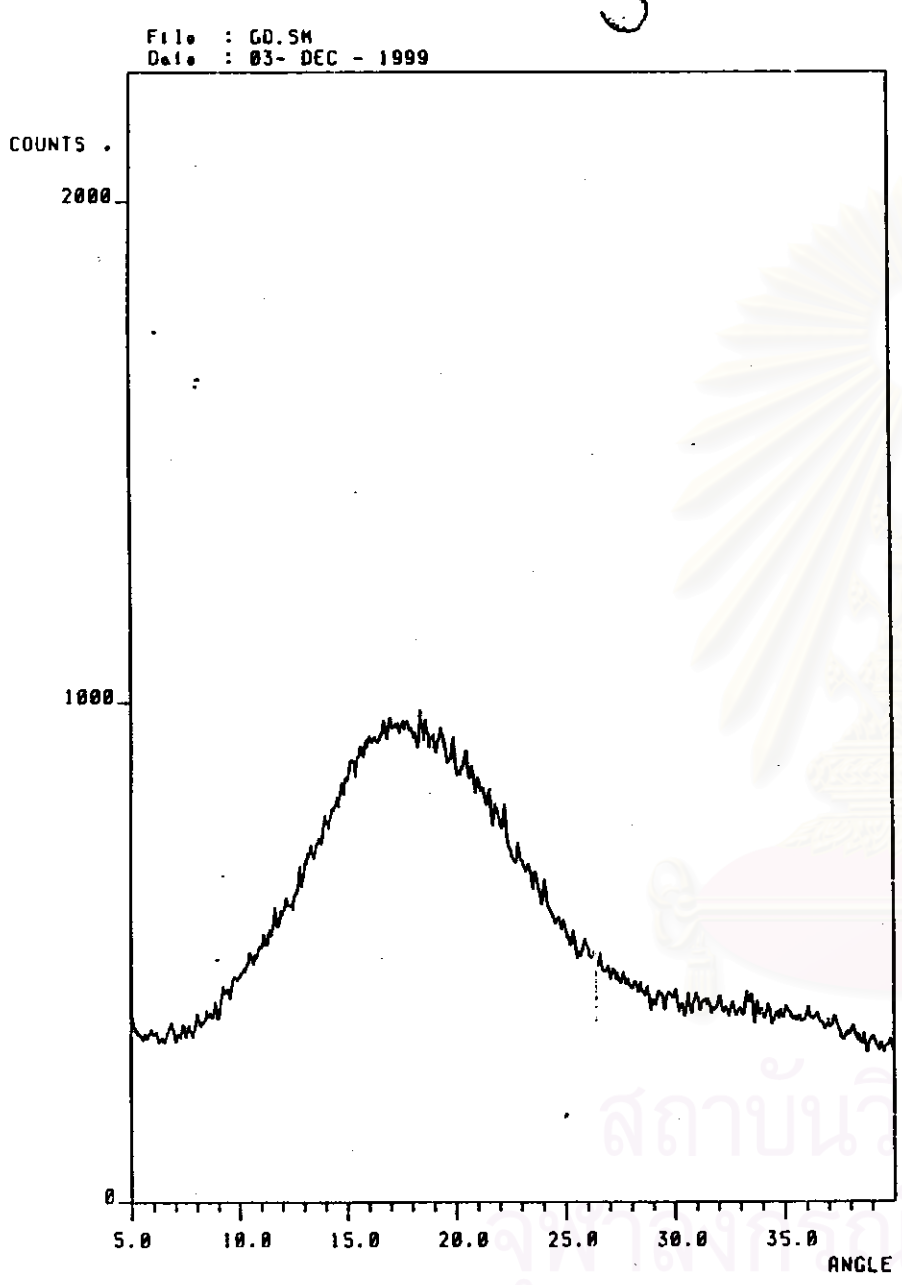


Figure 131 X-ray diffraction pattern of pregelatinized glutinous rice starch (GD)

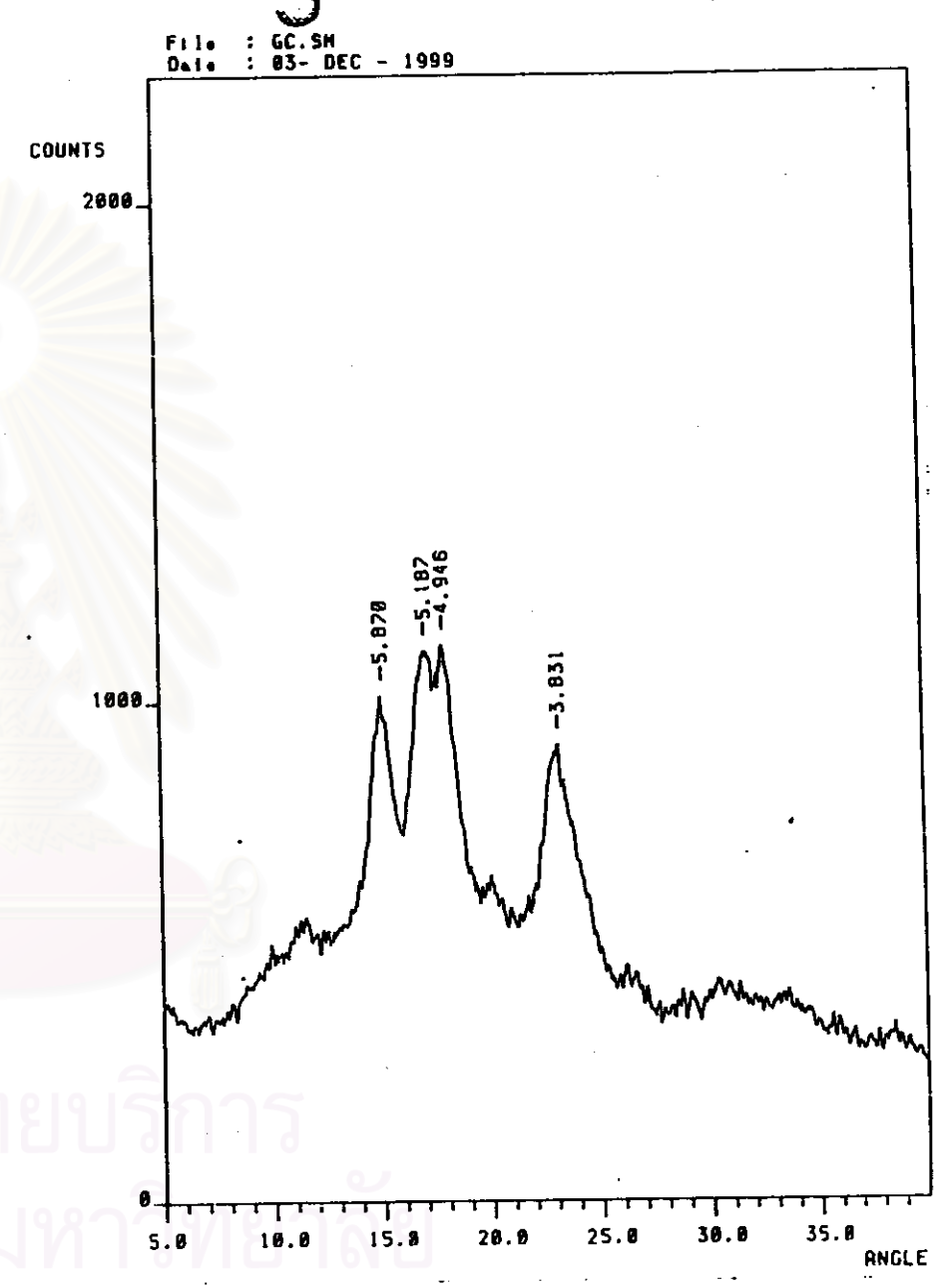


Figure 130 X-ray diffraction pattern of acid-treated glutinous rice starch (GC)

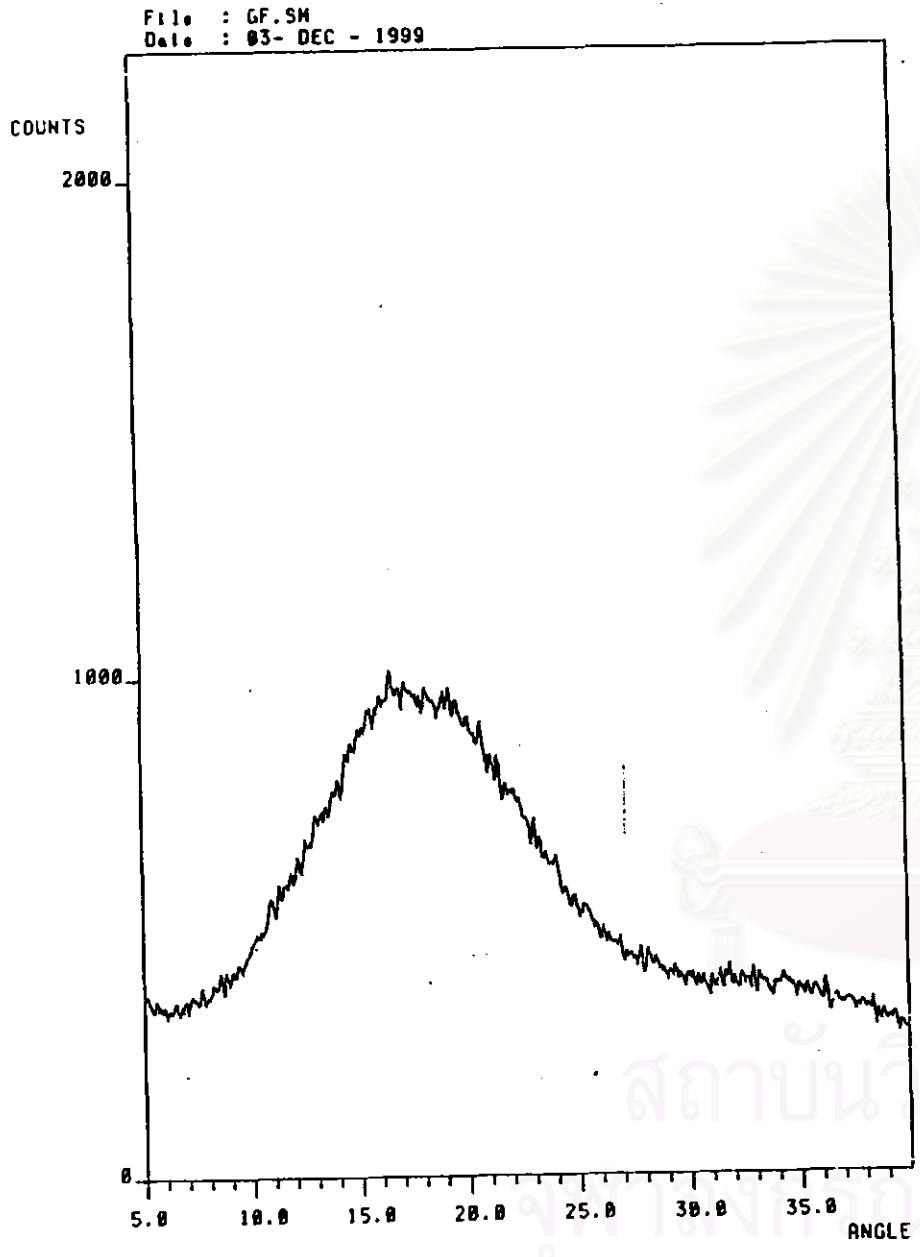


Figure 133 X-ray diffraction pattern of pregelatinized-acid treated glutinous rice starch (GF)

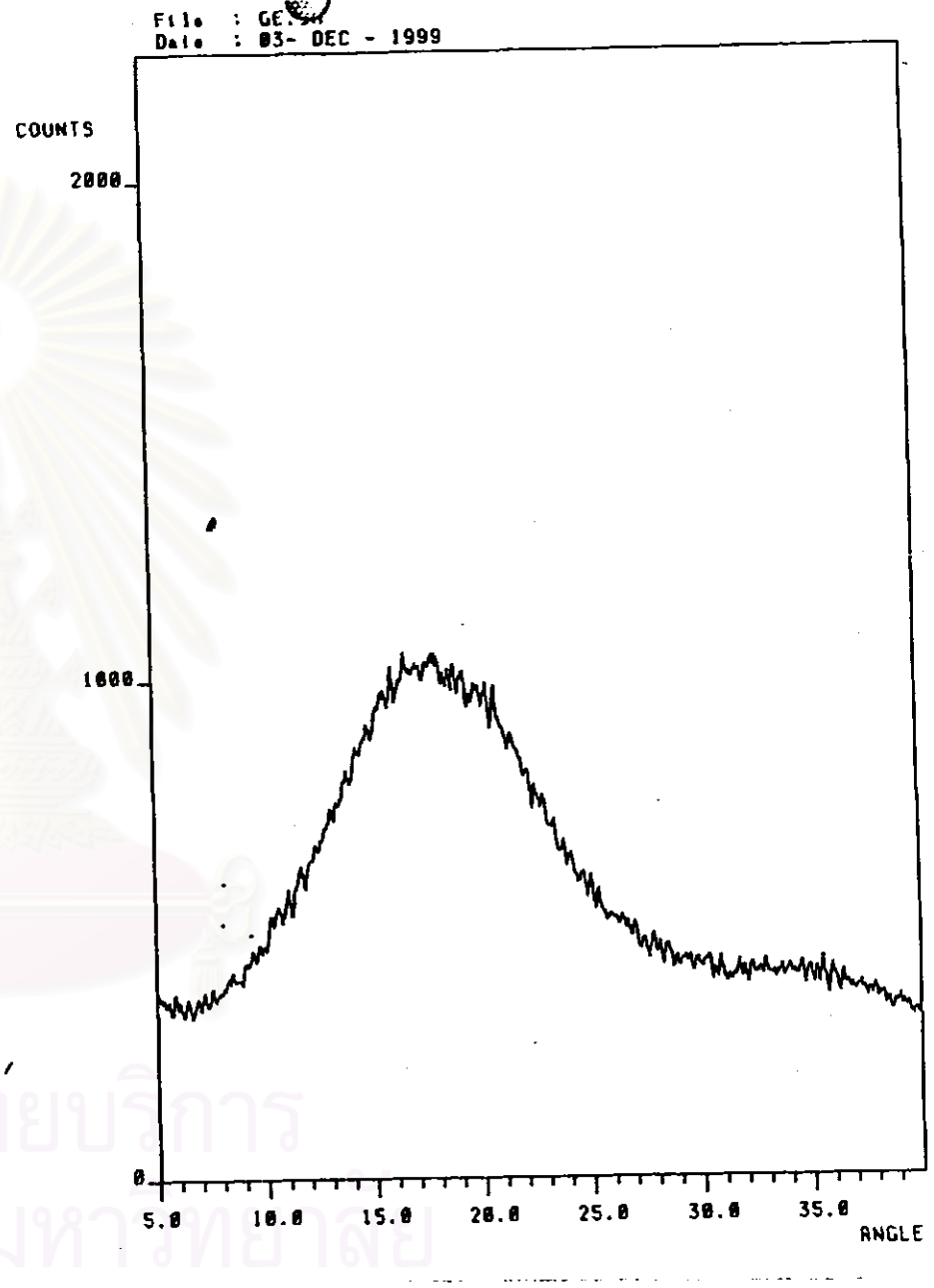


Figure 132 X-ray diffraction pattern of pregelatinized-acid treated glutinous rice starch (GE)

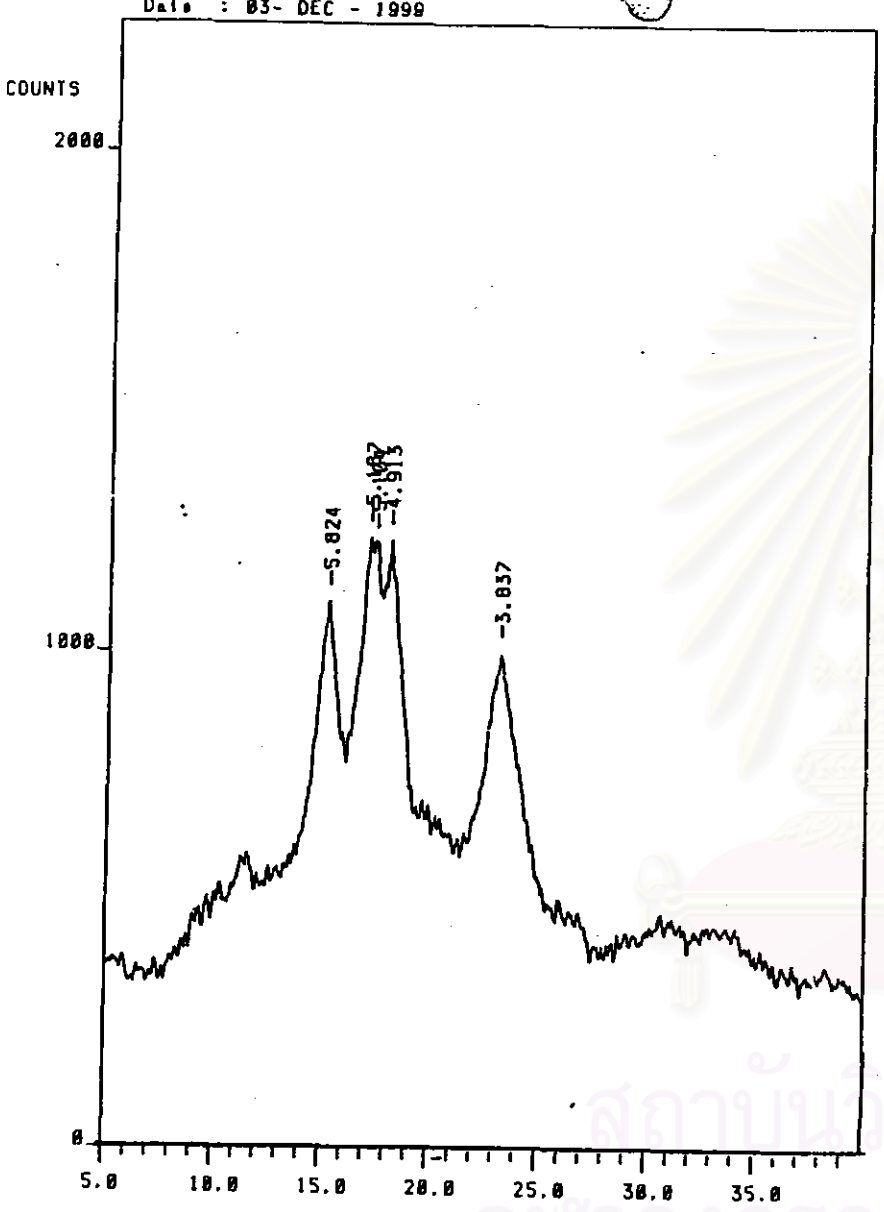


Figure 135 X-ray diffraction pattern of acid-treated tapioca starch (TB)

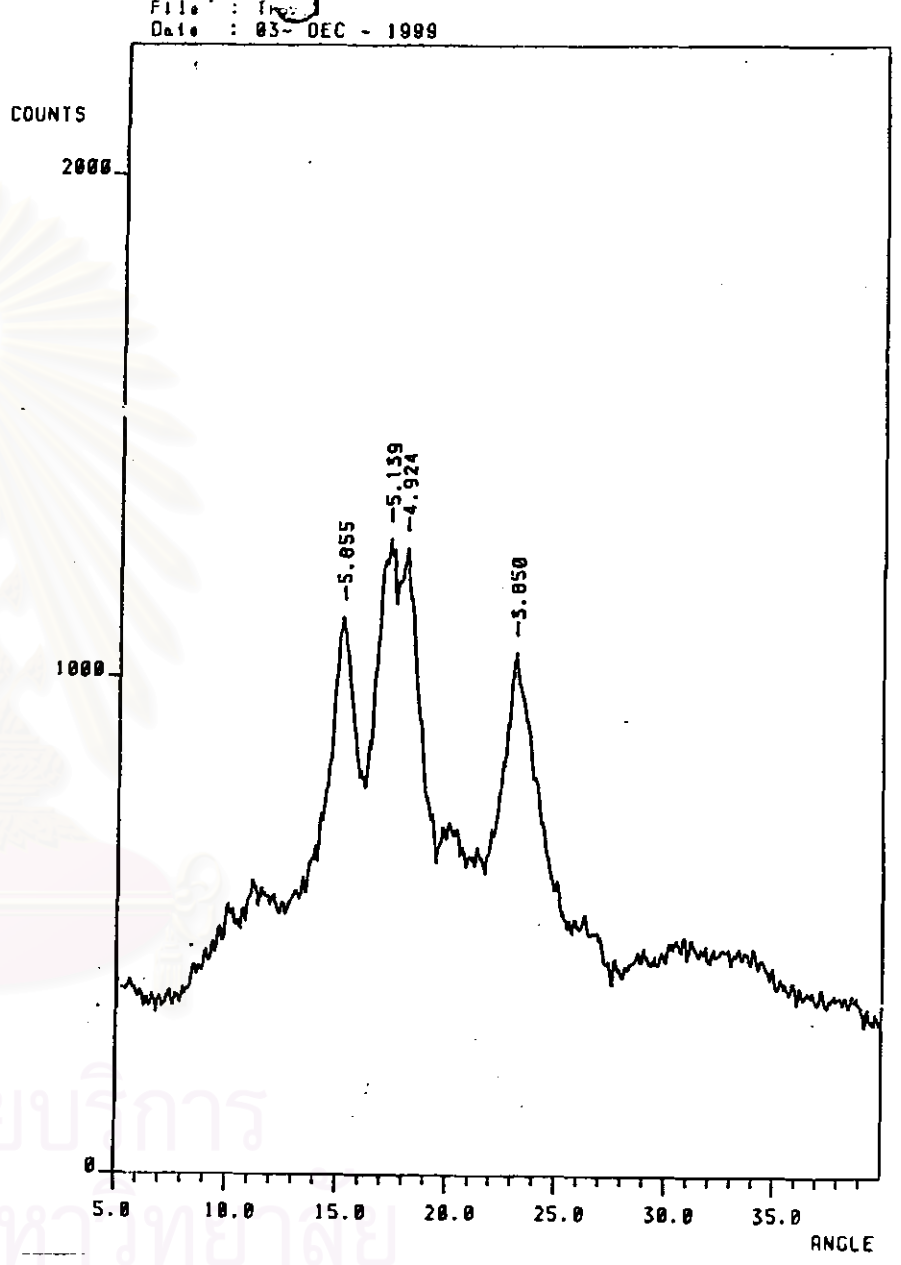


Figure 134 X-ray diffraction pattern of native tapioca starch (TA)

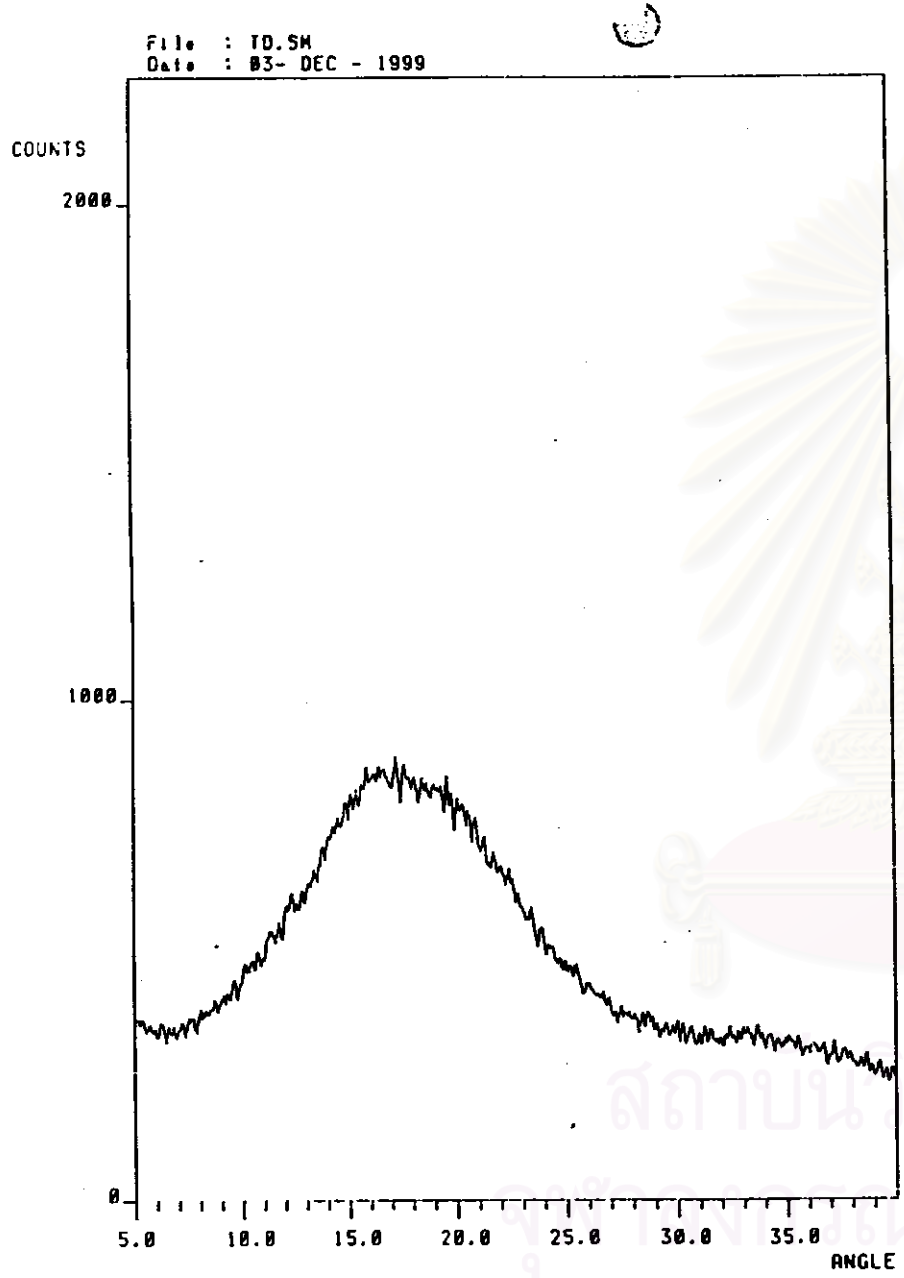


Figure 137 X-ray diffraction pattern of pregelatinized tapioca starch (TD)

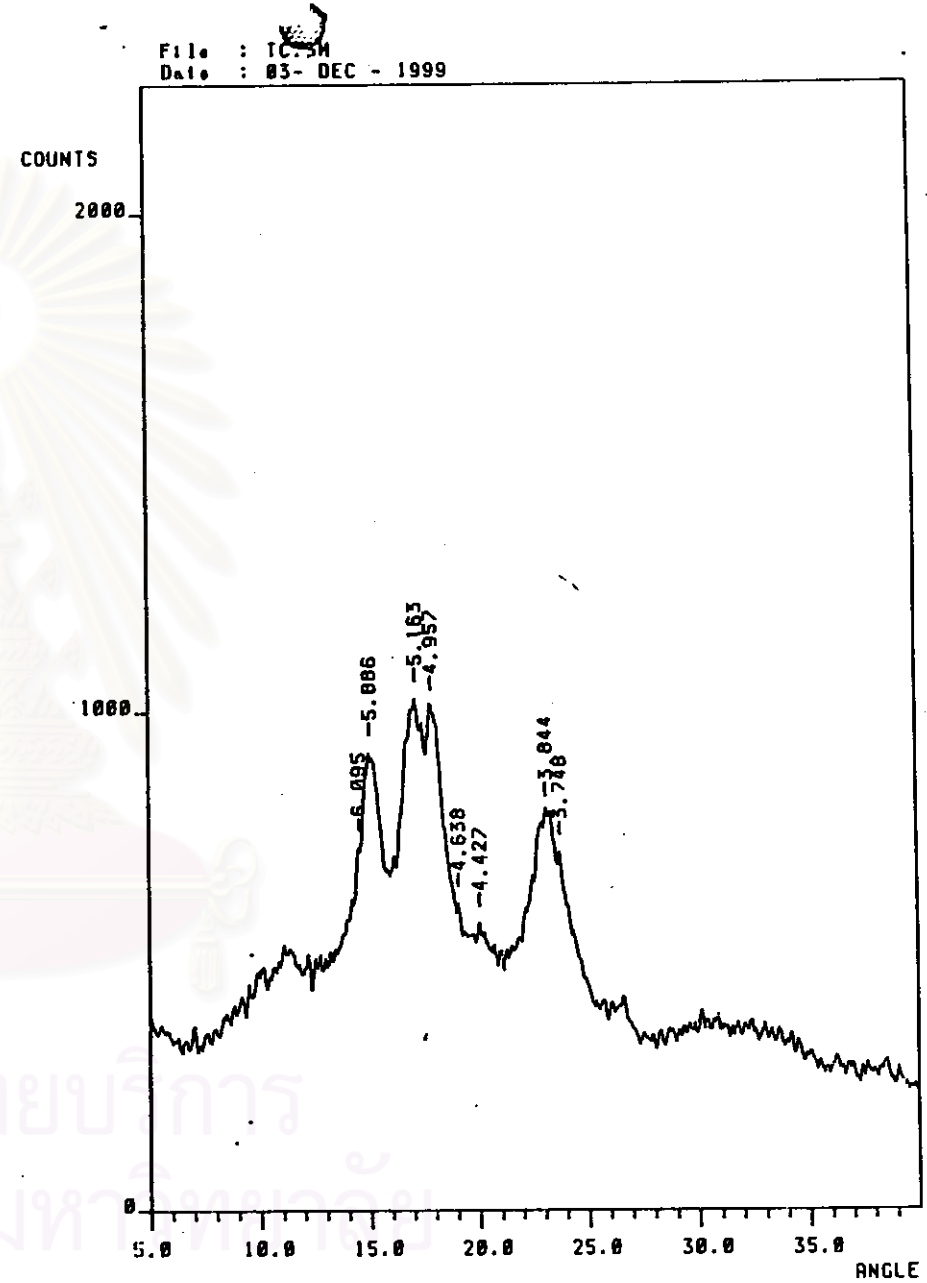


Figure 136 X-ray diffraction pattern of acid-treated tapioca starch (TC)

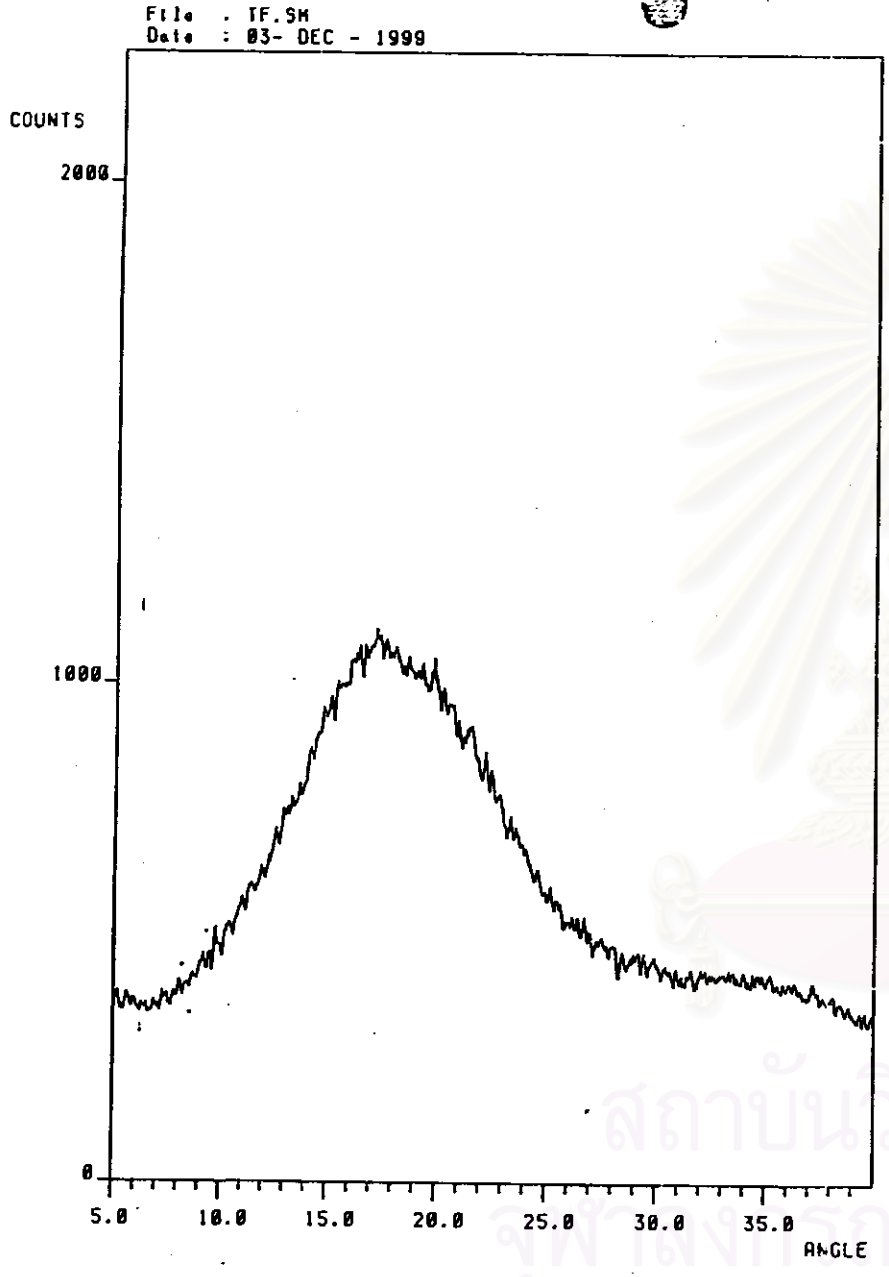


Figure 139 X-ray diffraction pattern of pregelatinized-acid treated tapioca starch(TF)

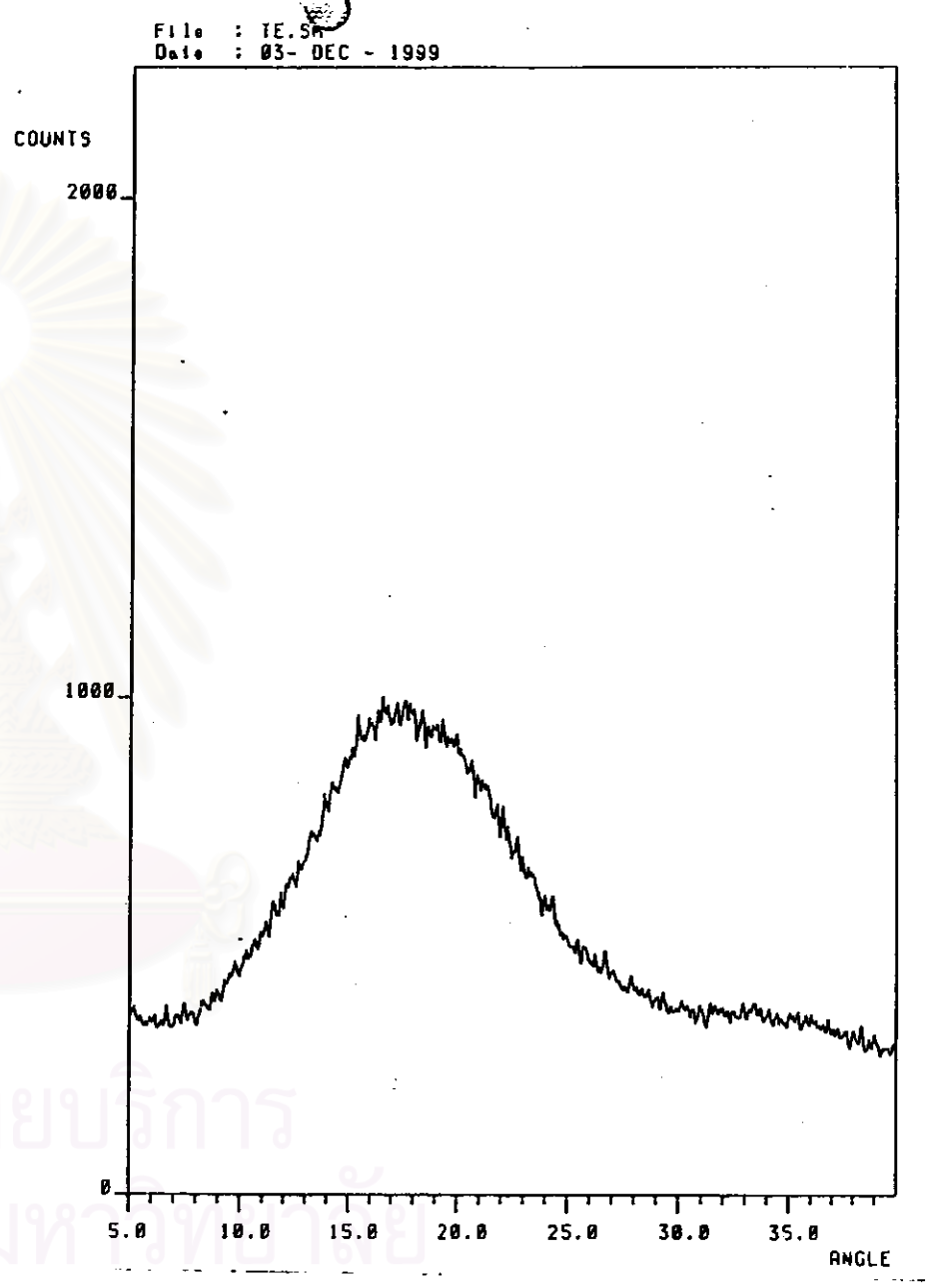


Figure 138 X-ray diffraction pattern of pregelatinized-acid treated tapioca starch(TE)

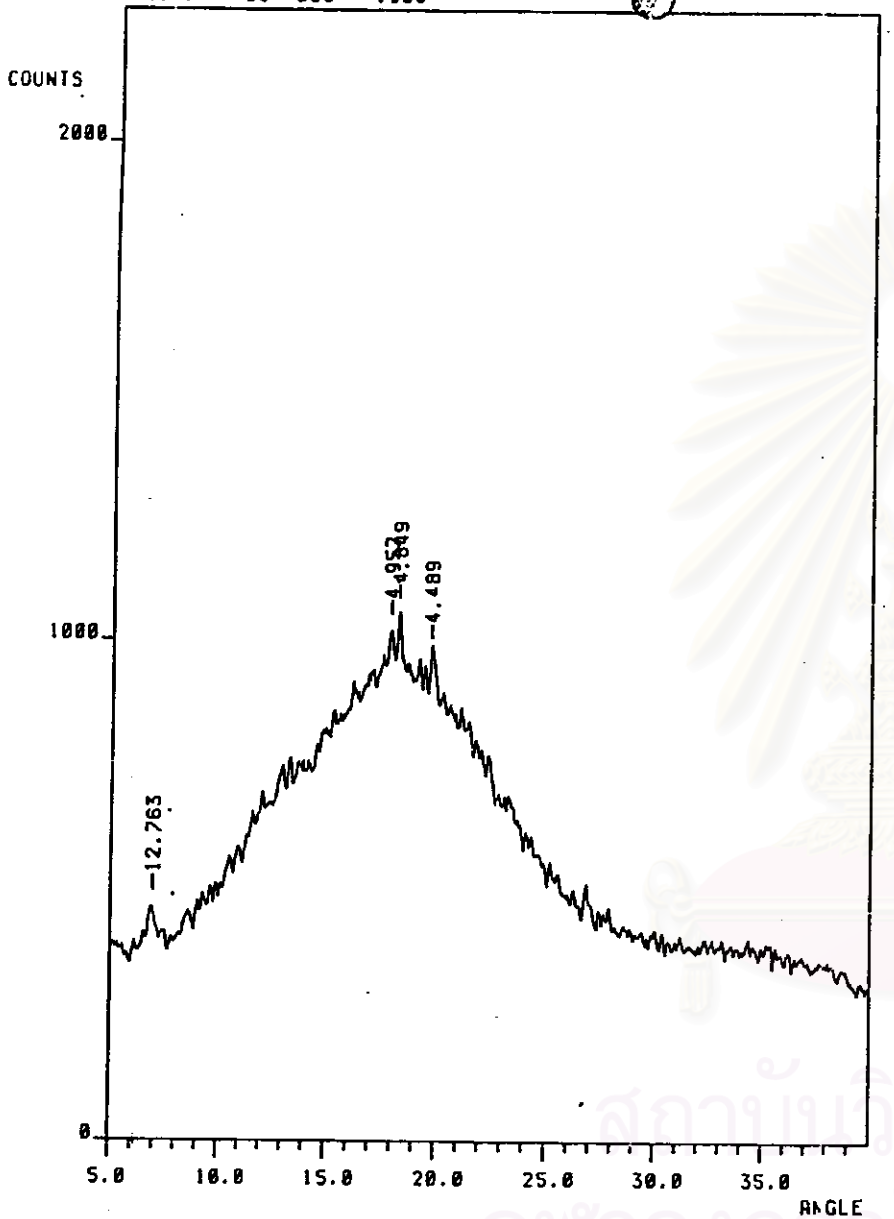


Figure 141 X-ray diffraction pattern of National 1551 (N)

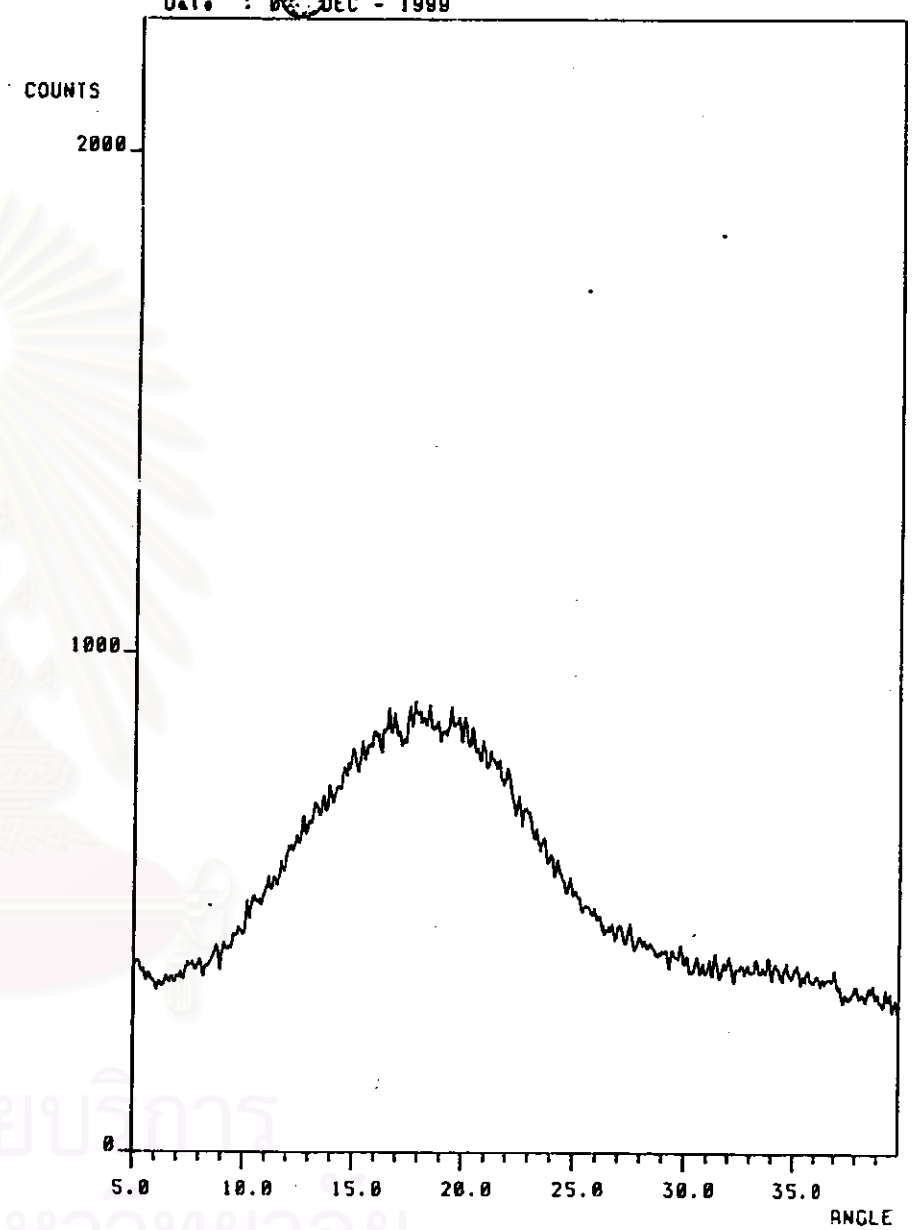


Figure 140 X-ray diffraction pattern of Era-Gel (E)

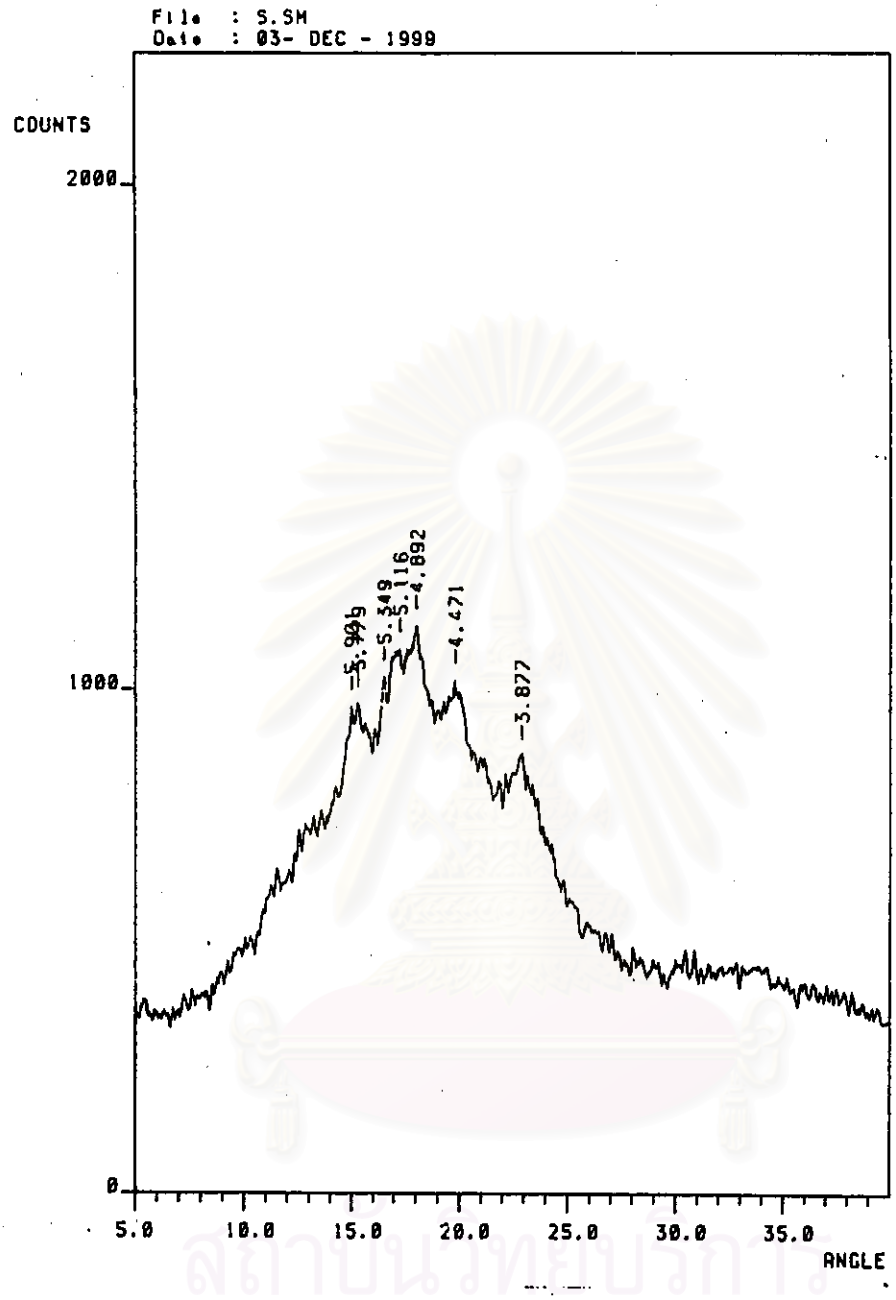


Figure 142 X-ray diffraction pattern of Starch 1500 (S)

Appendix 3

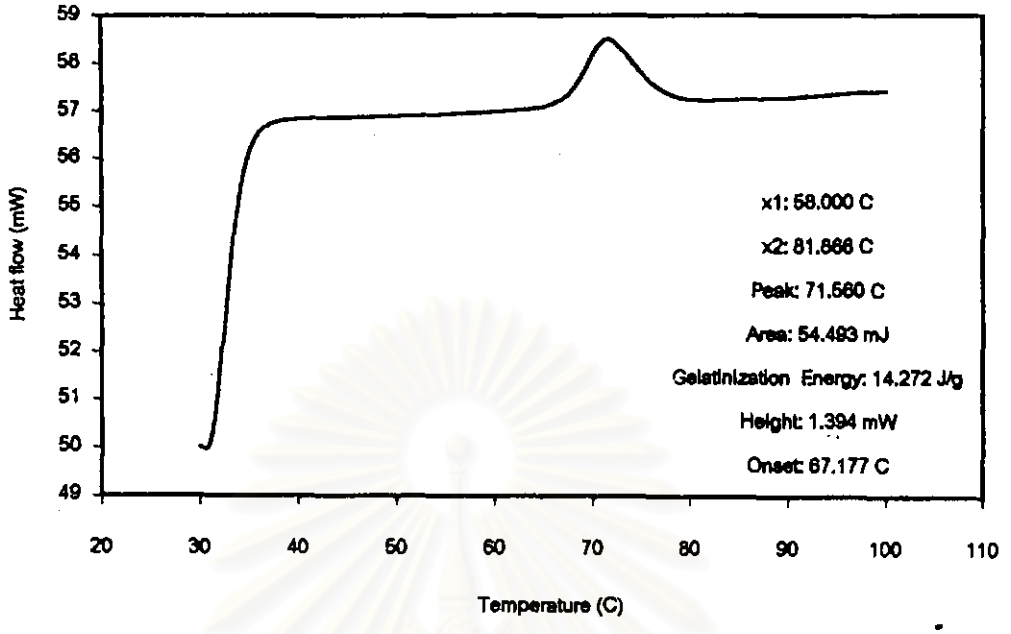


Figure 143 The DSC thermogram of native corn starch (CA)

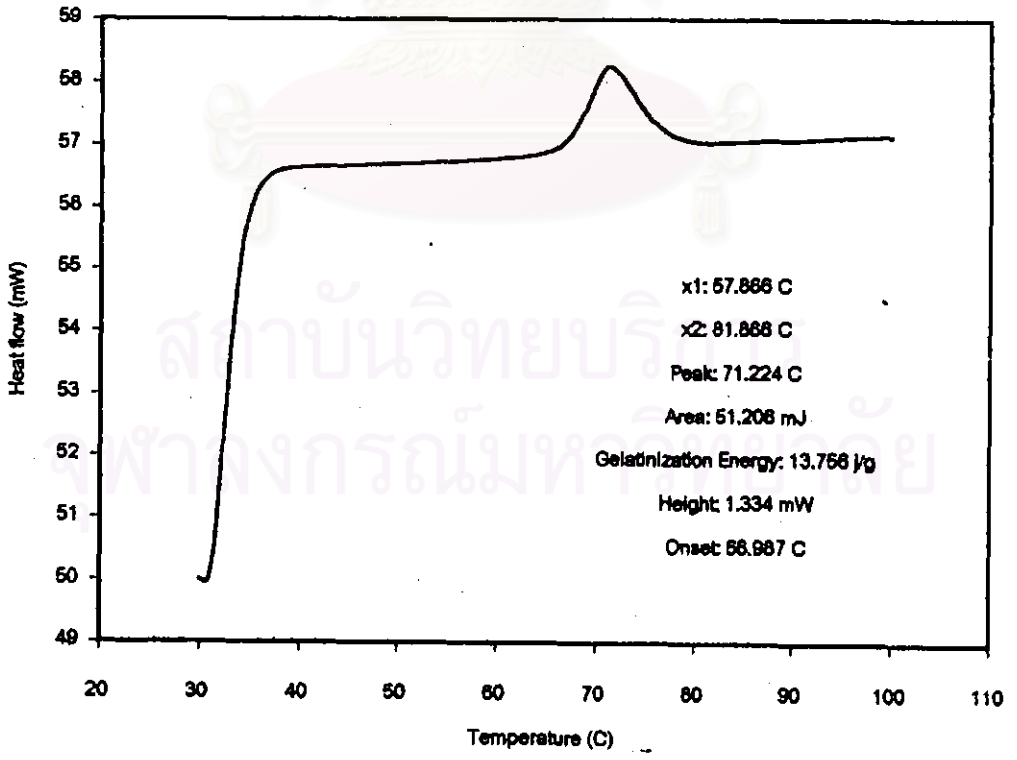


Figure 144 The DSC thermogram of acid-treated corn starch (CB)

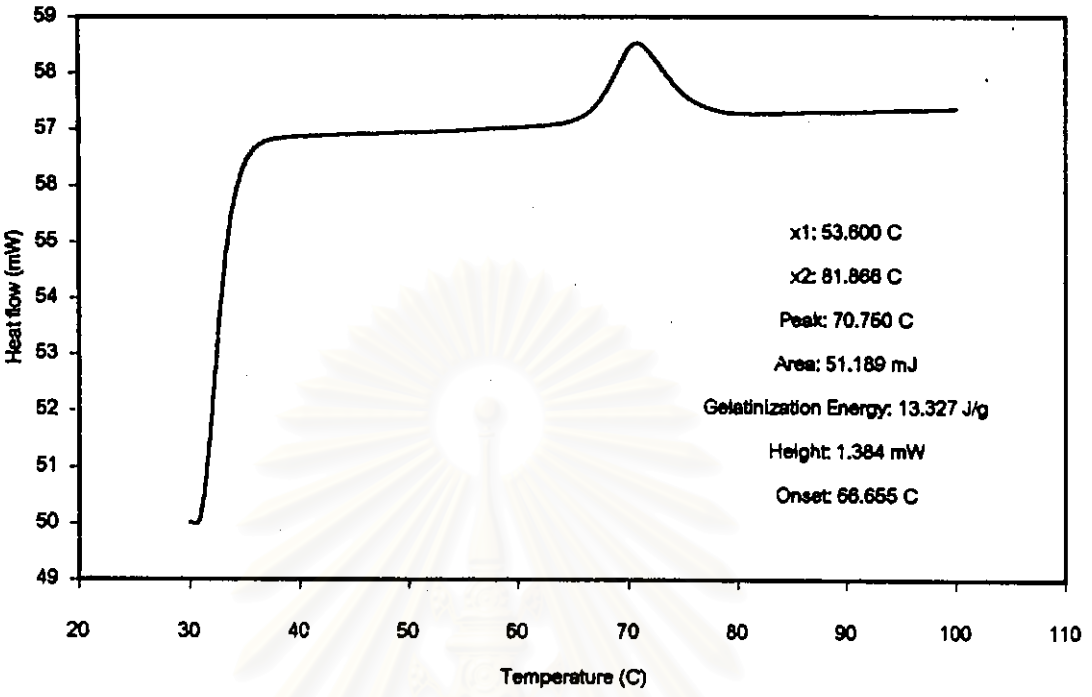


Figure 145 The DSC thermogram of acid-treated corn starch (CC)

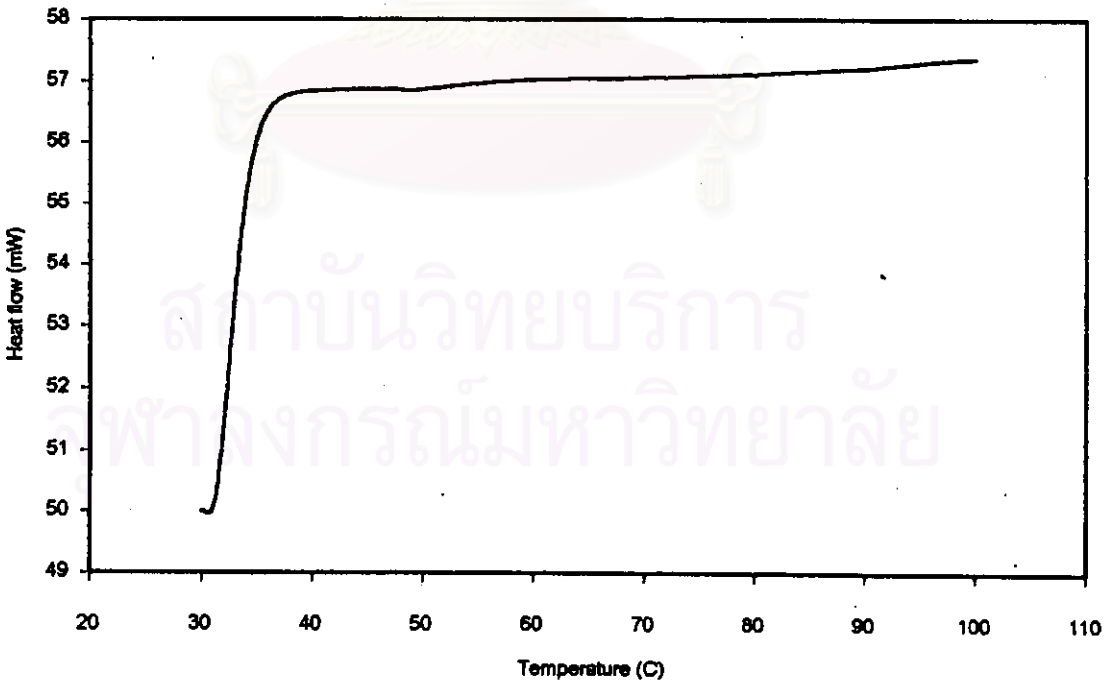


Figure 146 The DSC thermogram of pregelatinized corn starch (CD)

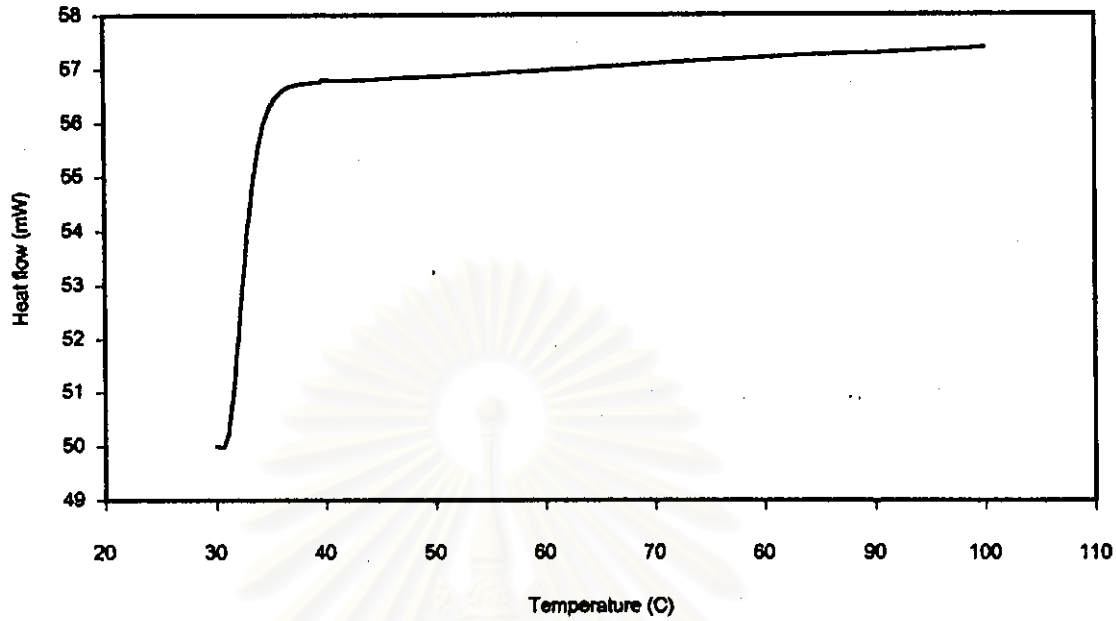


Figure 147 The DSC thermogram of pregelatinized-acid treated corn starch (CE)

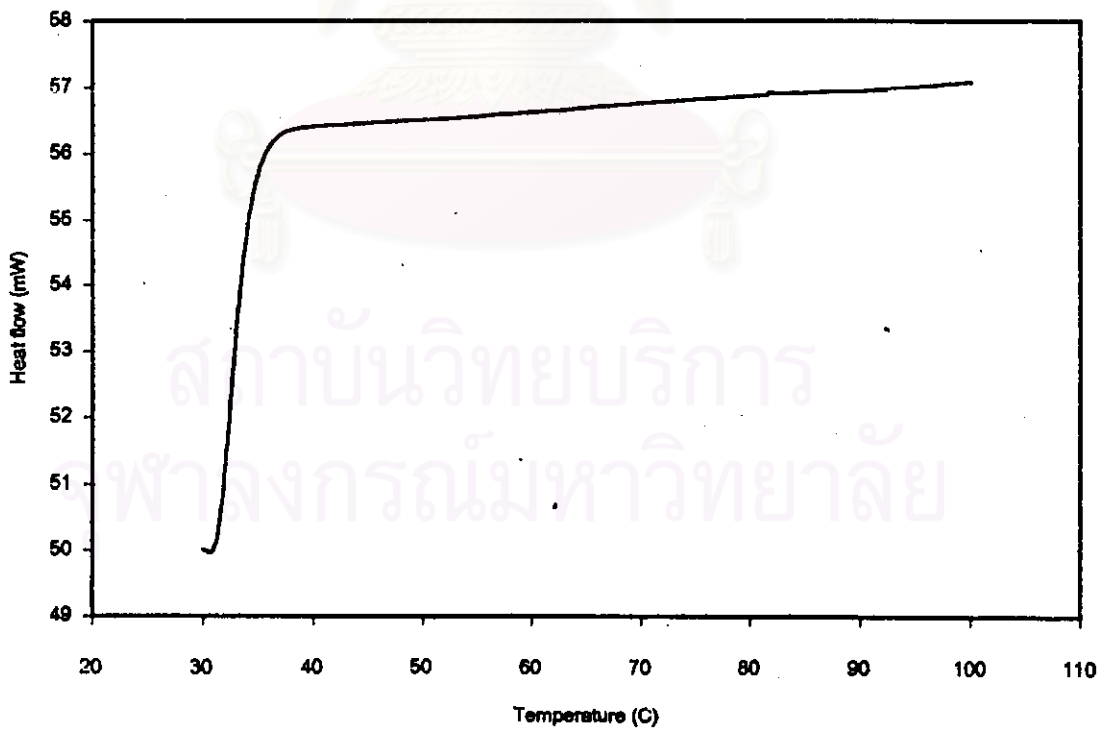


Figure 148 The DSC thermogram of pregelatinized-acid treated corn starch (CF)

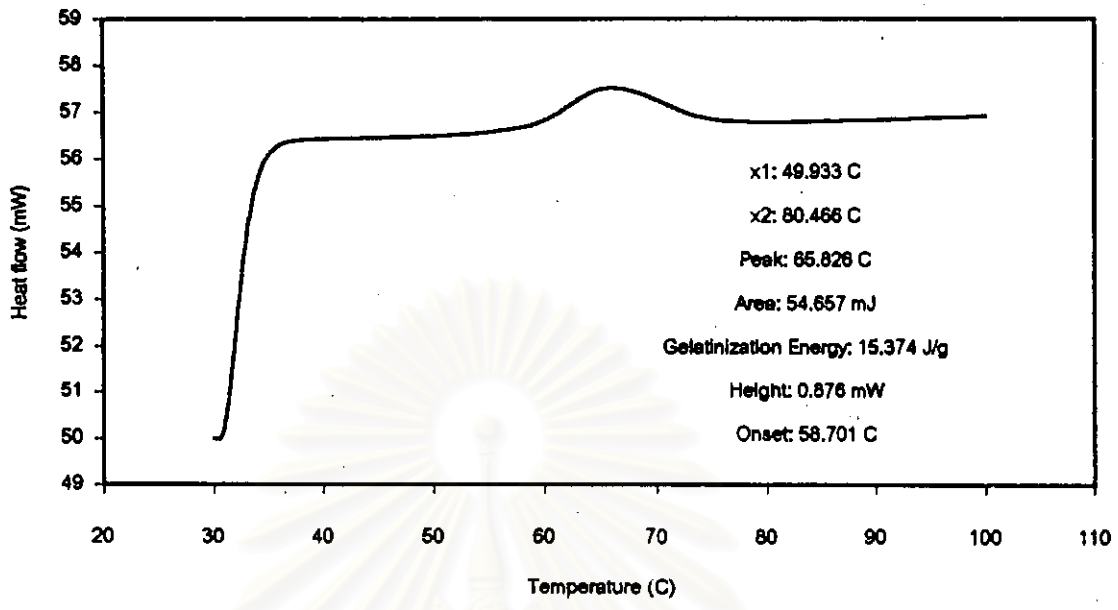


Figure 149 The DSC thermogram of native glutinous rice starch (GA)

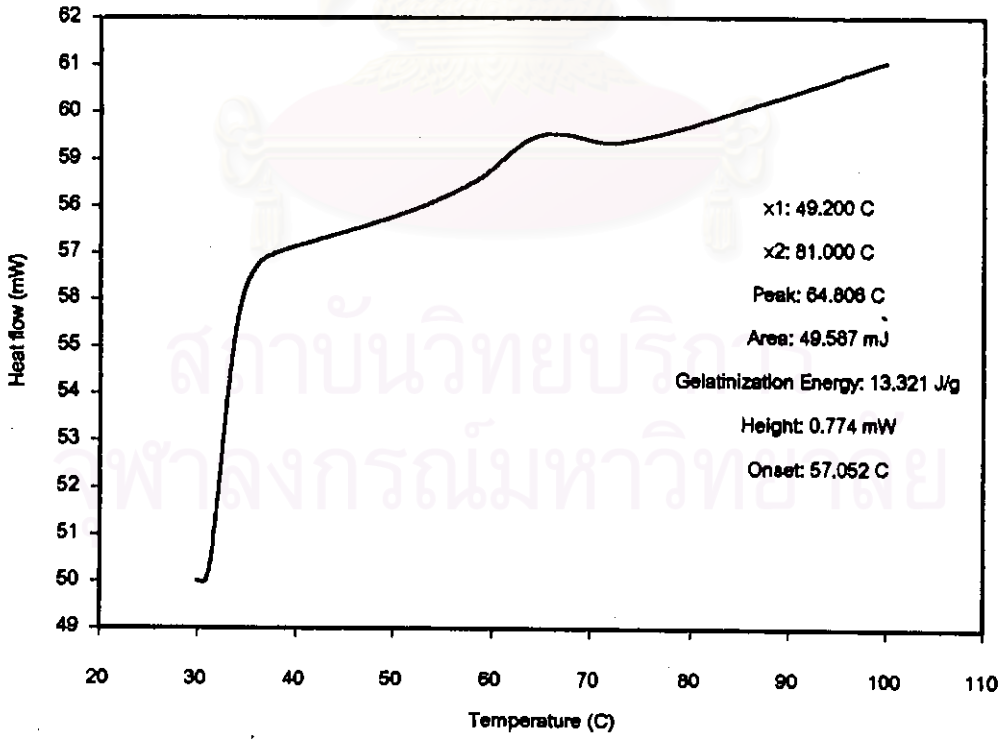


Figure 150 The DSC thermogram of acid-treated glutinous rice starch (GB)

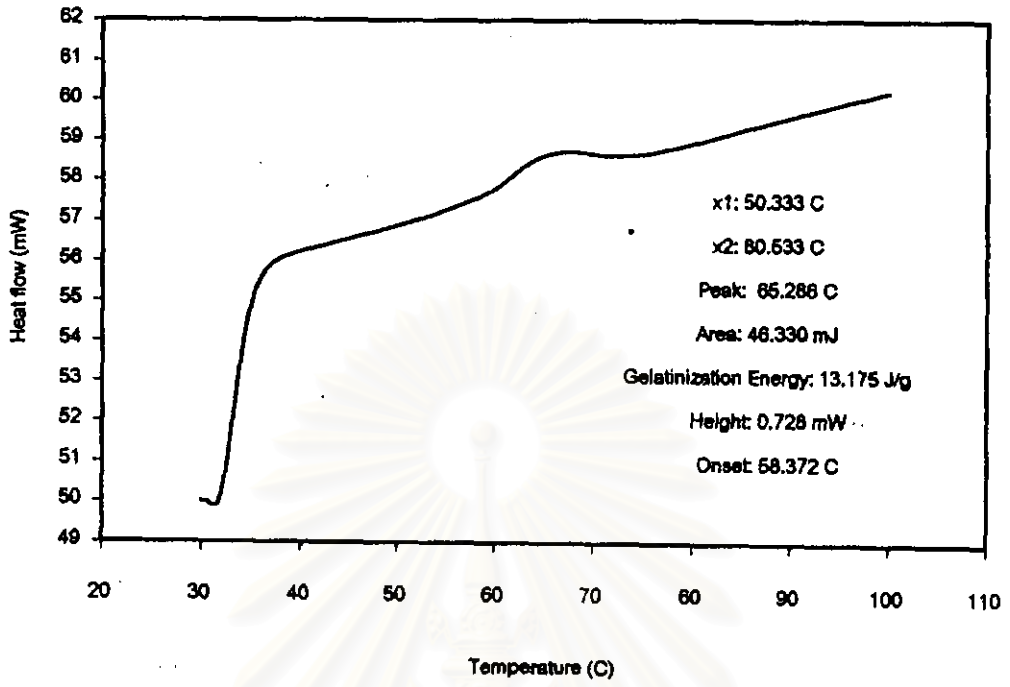


Figure 151 The DSC thermogram of acid-treated glutinous rice starch (GC)

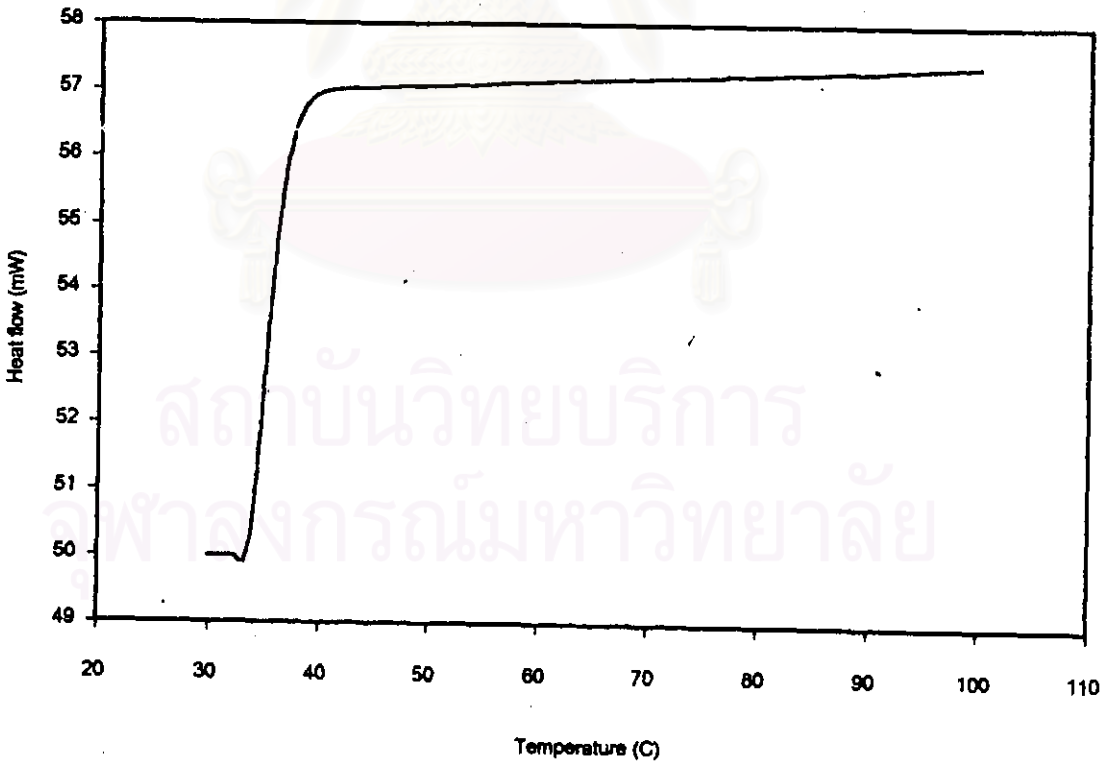


Figure 152 The DSC thermogram of pregelatinized glutinous rice starch (GD)

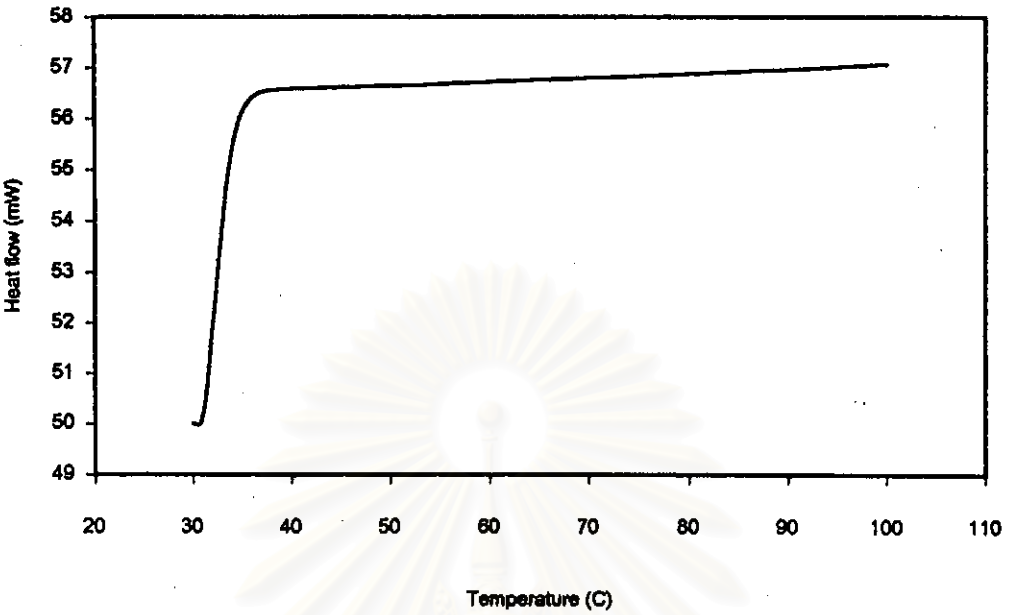


Figure 153 The DSC thermogram of pregelatinized-acid treated glutinous rice starch (GE)

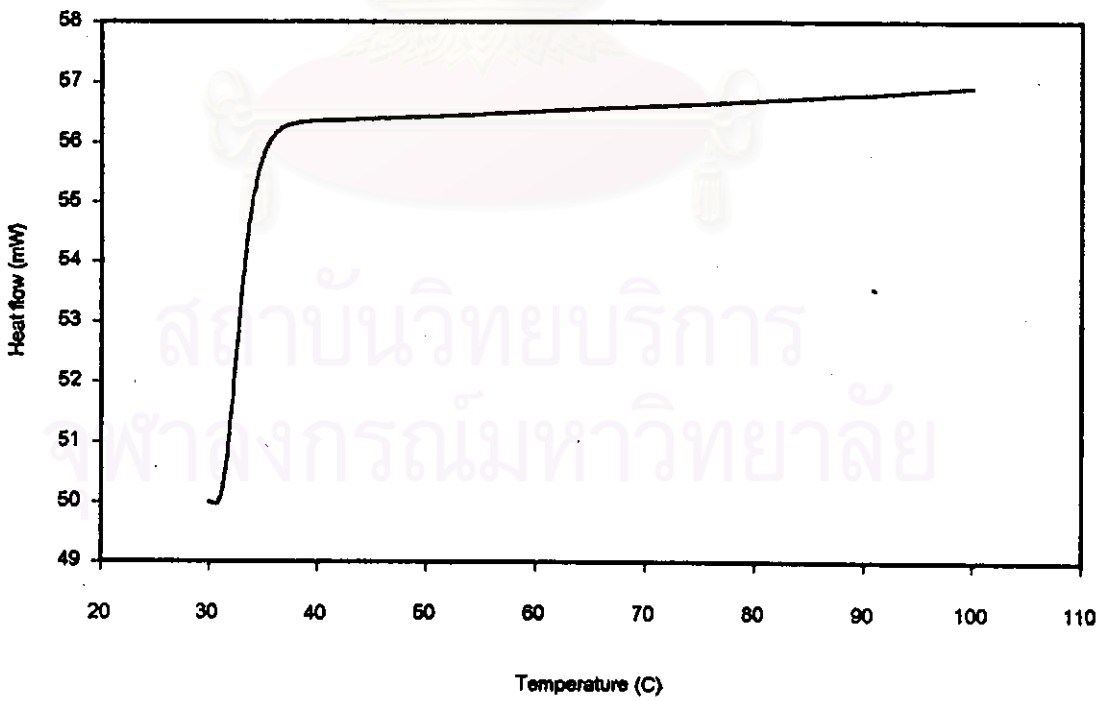


Figure 154 The DSC thermogram of pregelatinized-acid treated glutinous rice starch (GF)

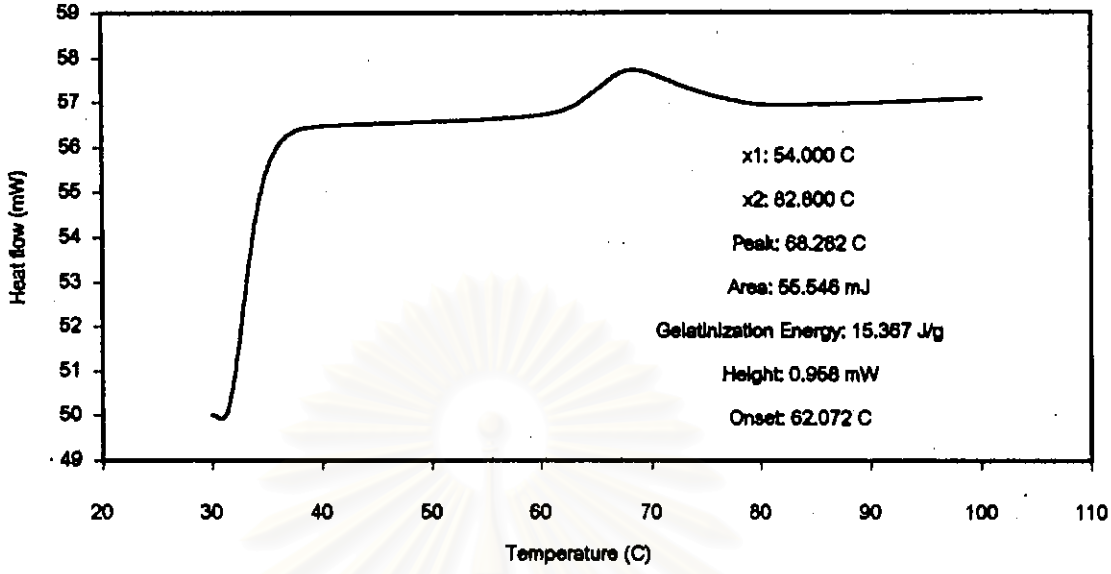


Figure 155 The DSC thermogram of native tapioca starch (TA)

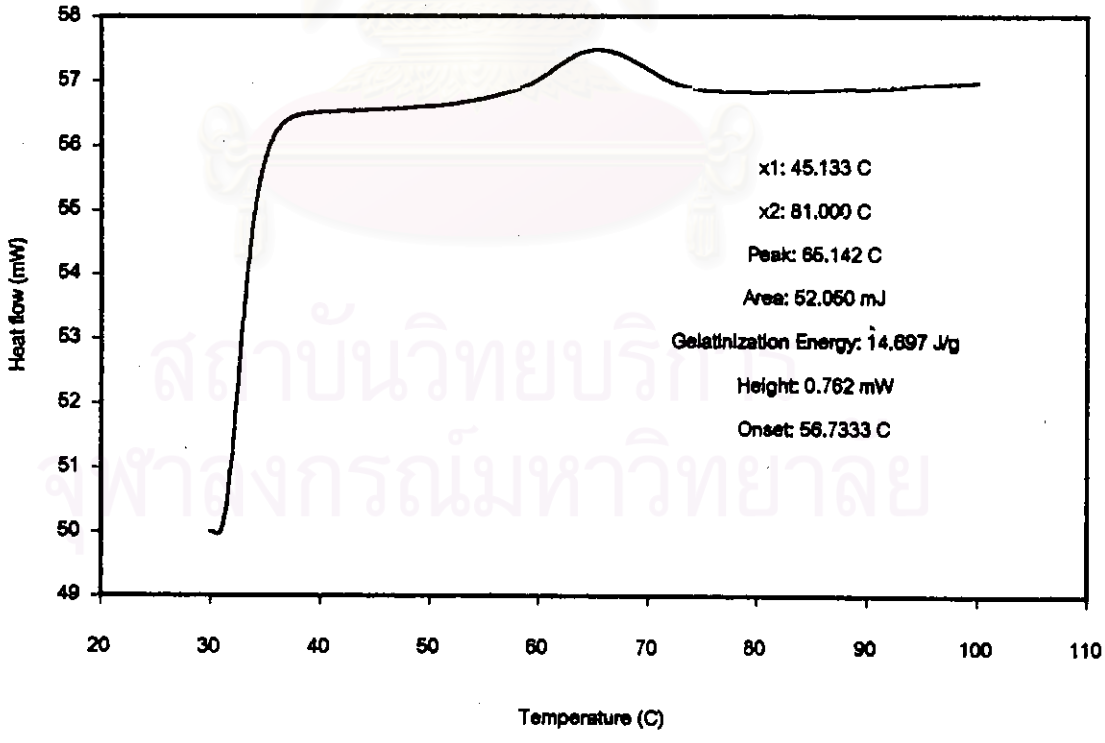


Figure 156 The DSC thermogram of acid-treated tapioca starch (TB)

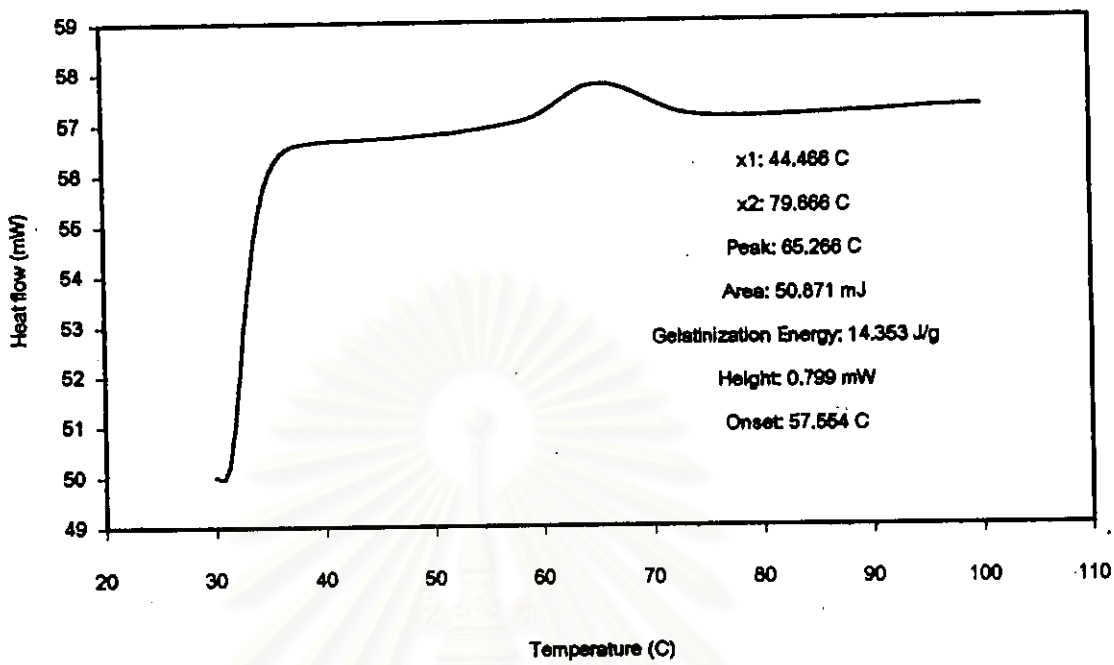


Figure 157 The DSC thermogram of acid-treated tapioca starch (TC)

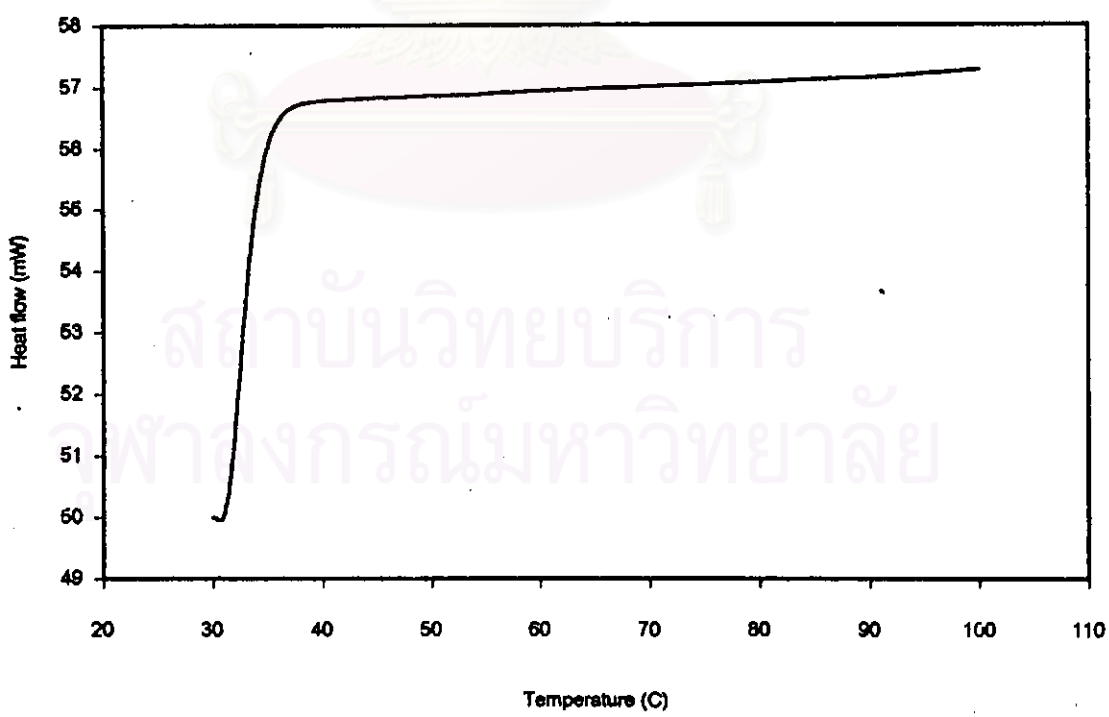


Figure 158 The DSC thermogram of pregelatinized tapioca starch (TD)

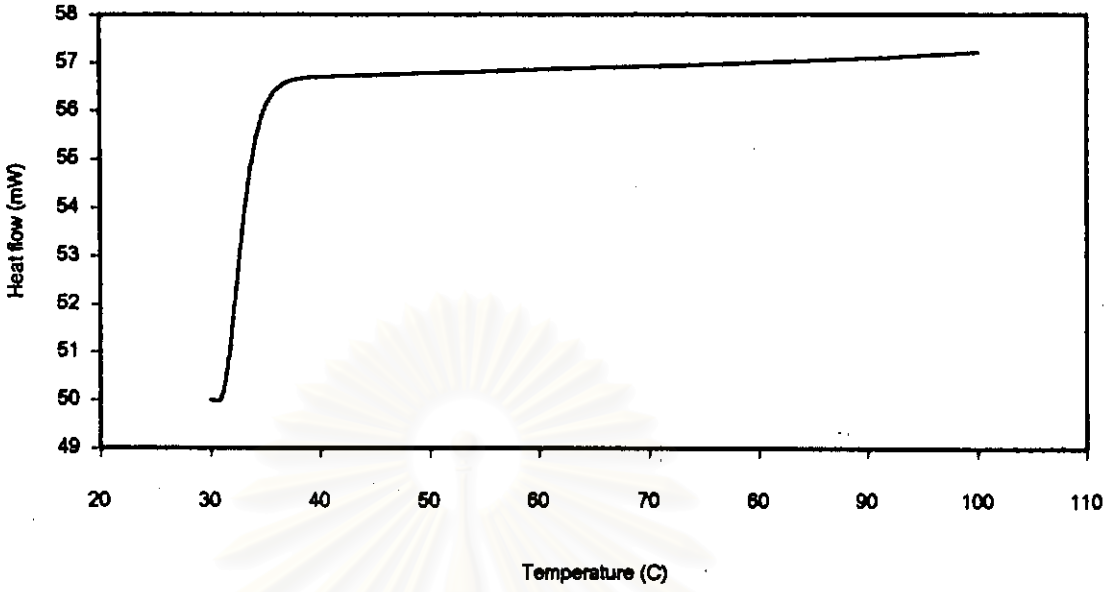


Figure 159 The DSC thermogram of pregelatinized-acid treated tapioca starch(TE)

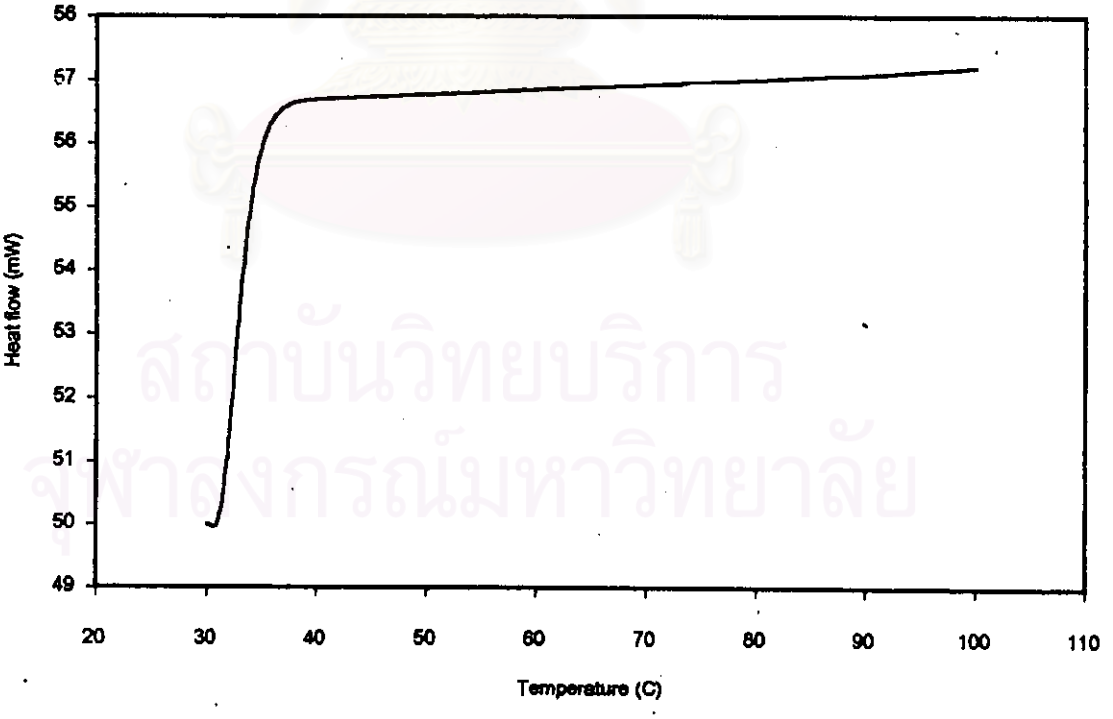


Figure 160 The DSC thermogram of pregelatinized-acid treated tapioca starch(TF)

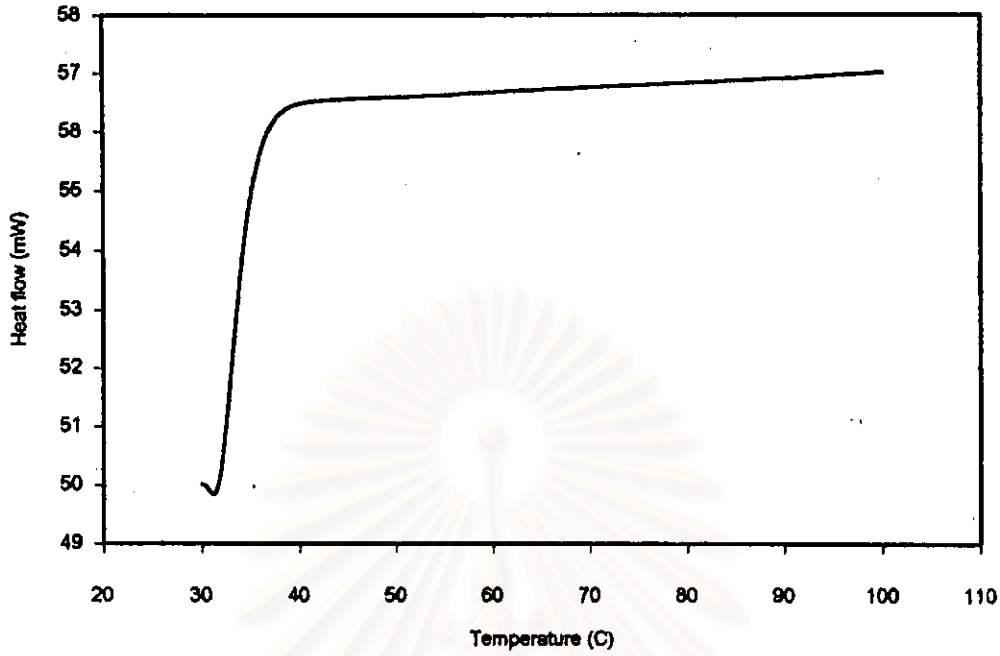


Figure 161 The DSC thermogram of Era-Gel (E)

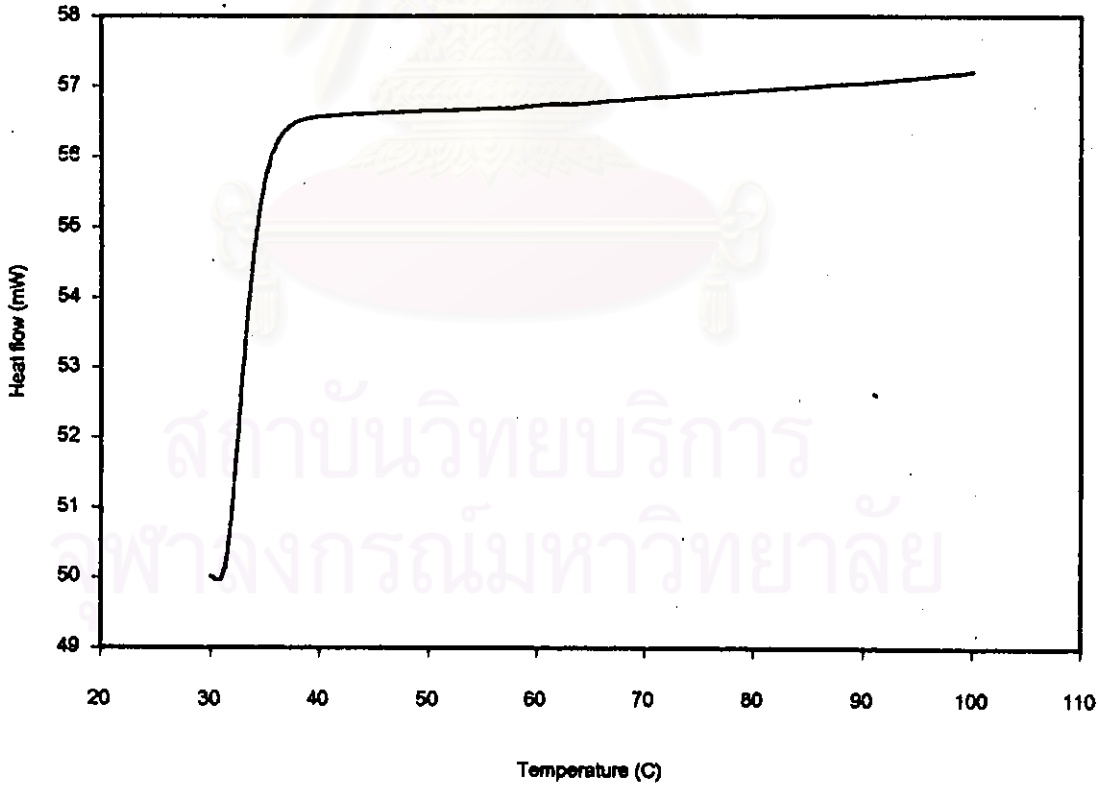


Figure 162 The DSC thermogram of National 1551 (N)

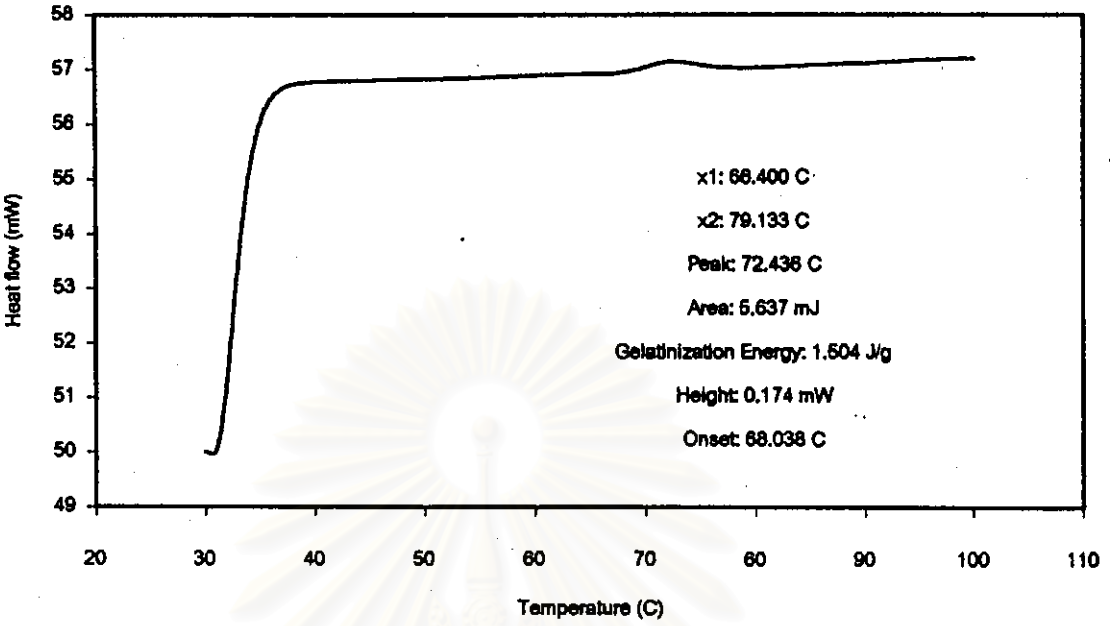


Figure 163 The DSC thermogram of Starch 1500 (S)

Appendix 4

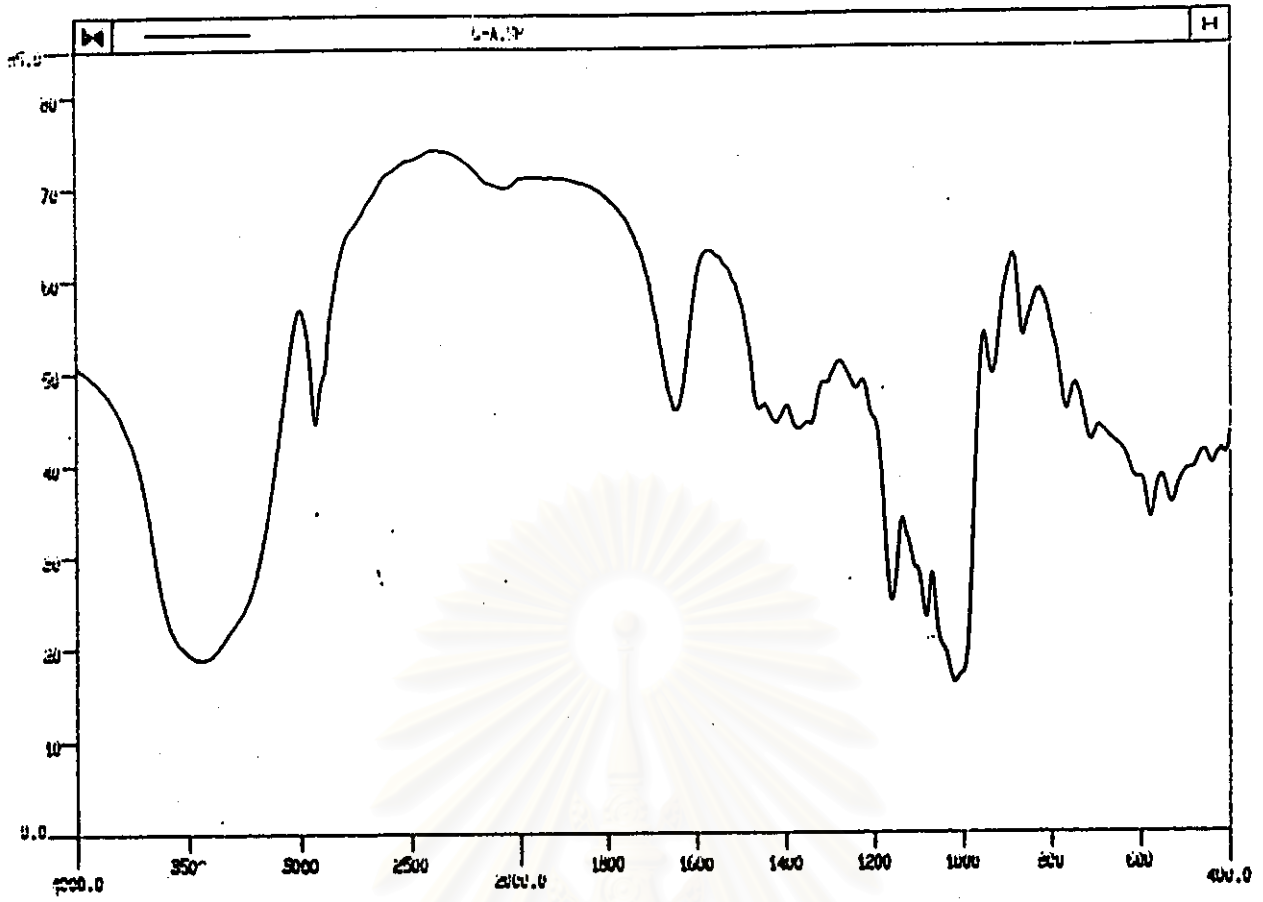


Figure 164 Infrared spectrum of native corn starch (CA)

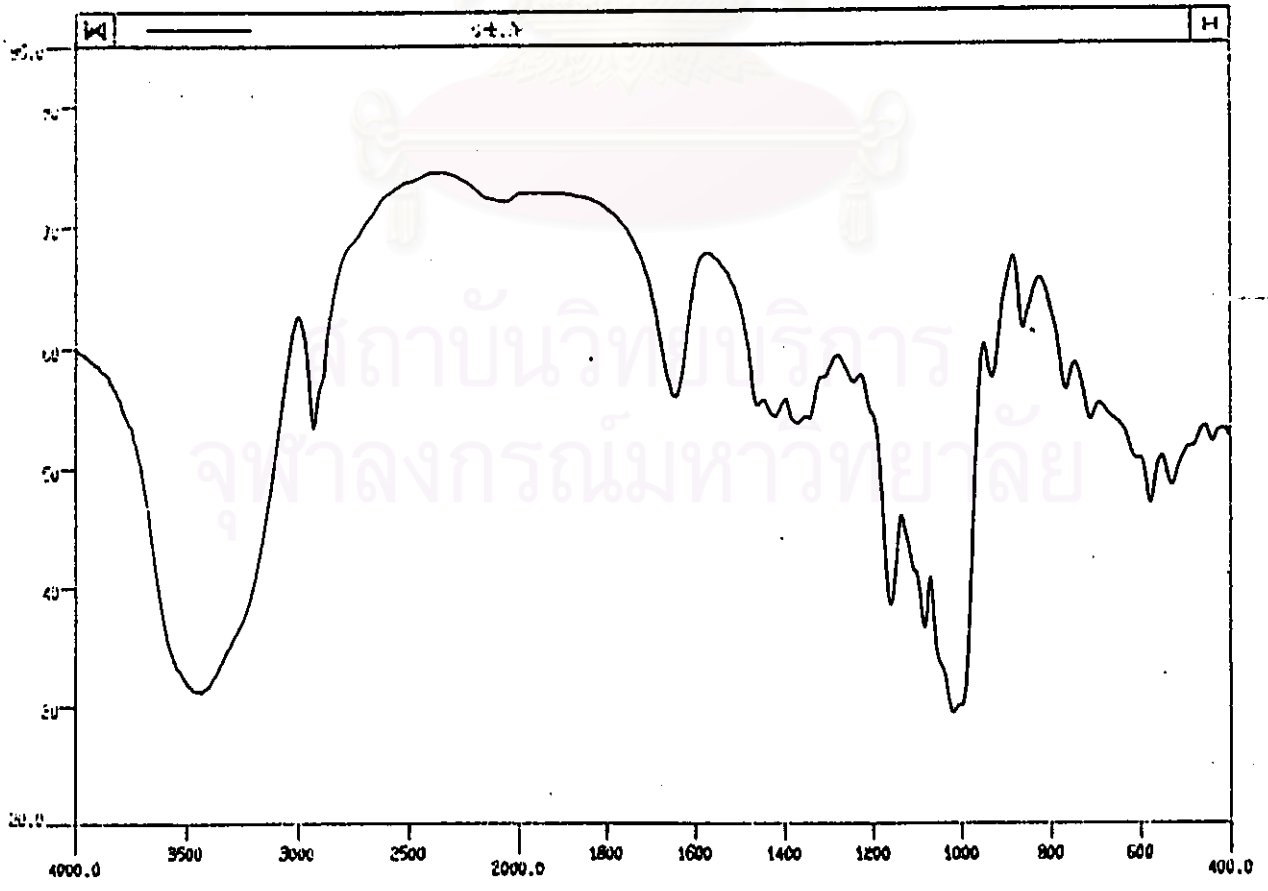


Figure 165 Infrared spectrum of acid-treated corn starch (CB)

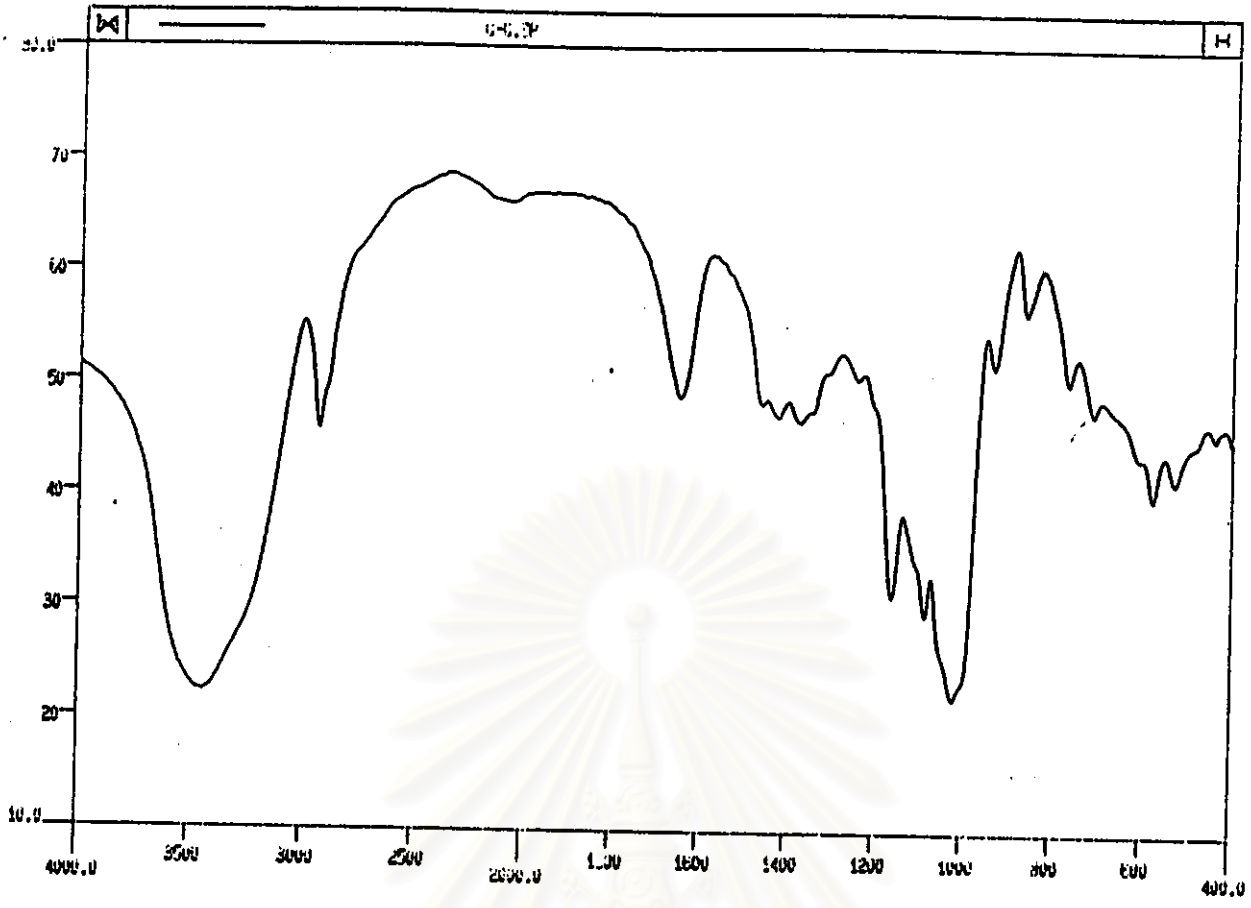


Figure 166 Infrared spectrum of acid-treated corn starch (CC)

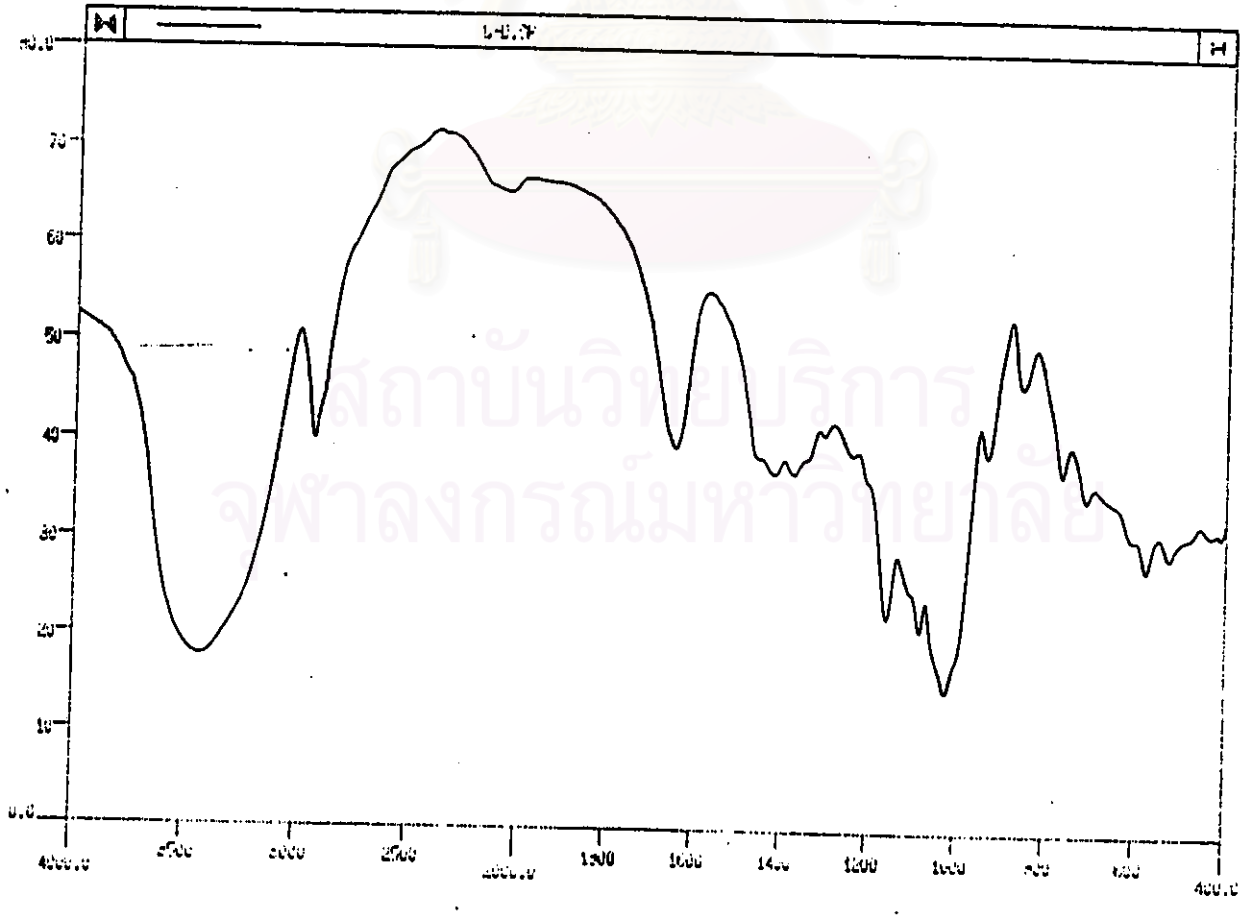


Figure 167 Infrared spectrum of pregelatinized corn starch (CD)

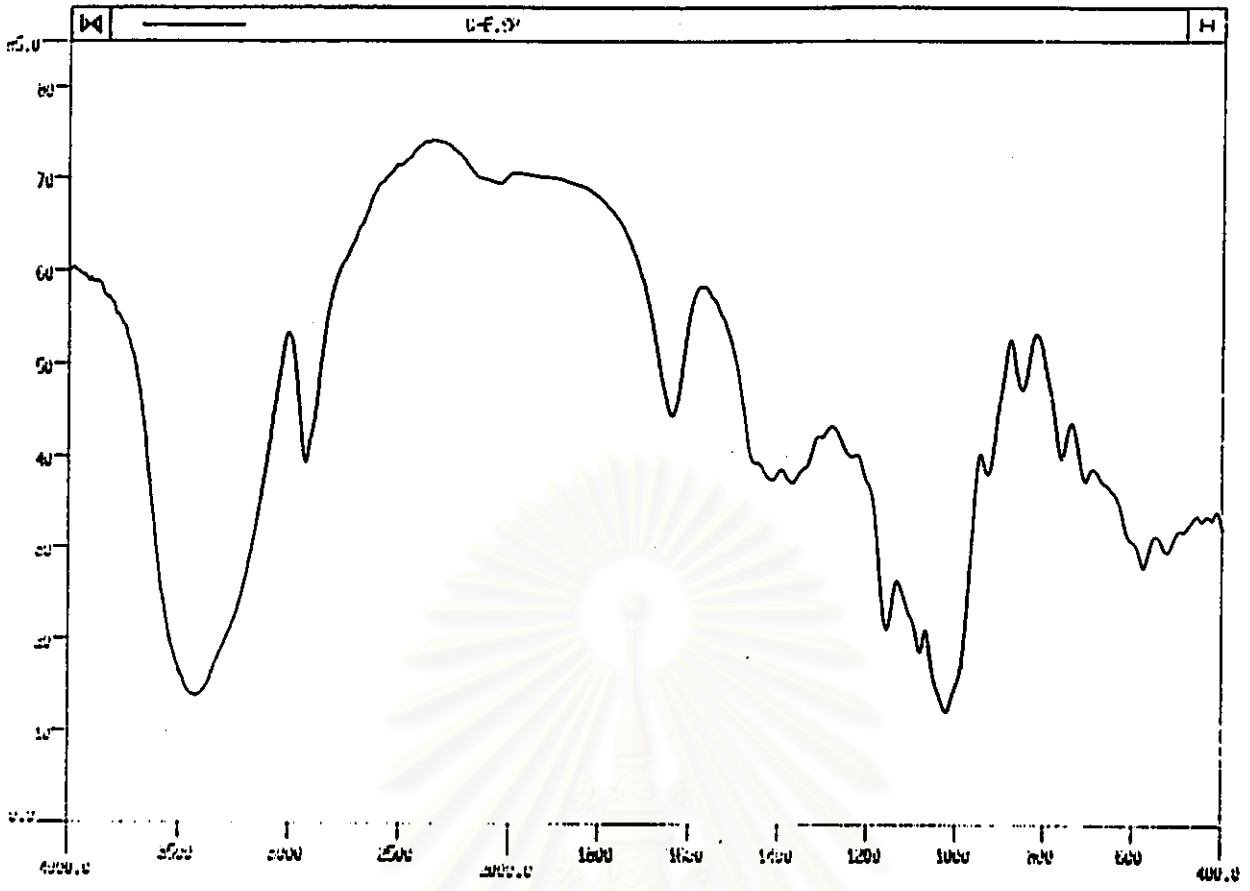


Figure 168 Infrared spectrum of pregelatinized-acid treated corn starch (CE)

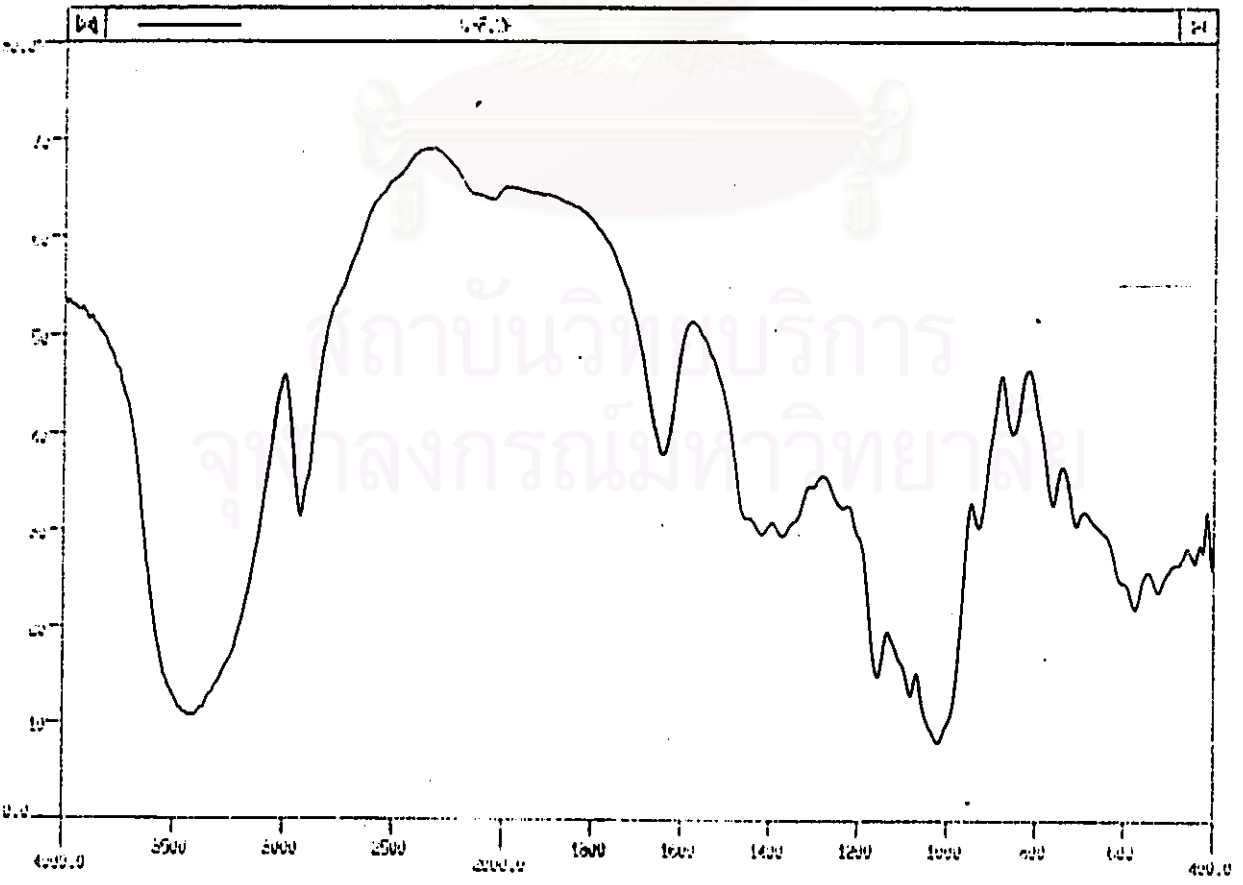


Figure 169 Infrared spectrum of pregelatinized-acid treated corn starch (CF)

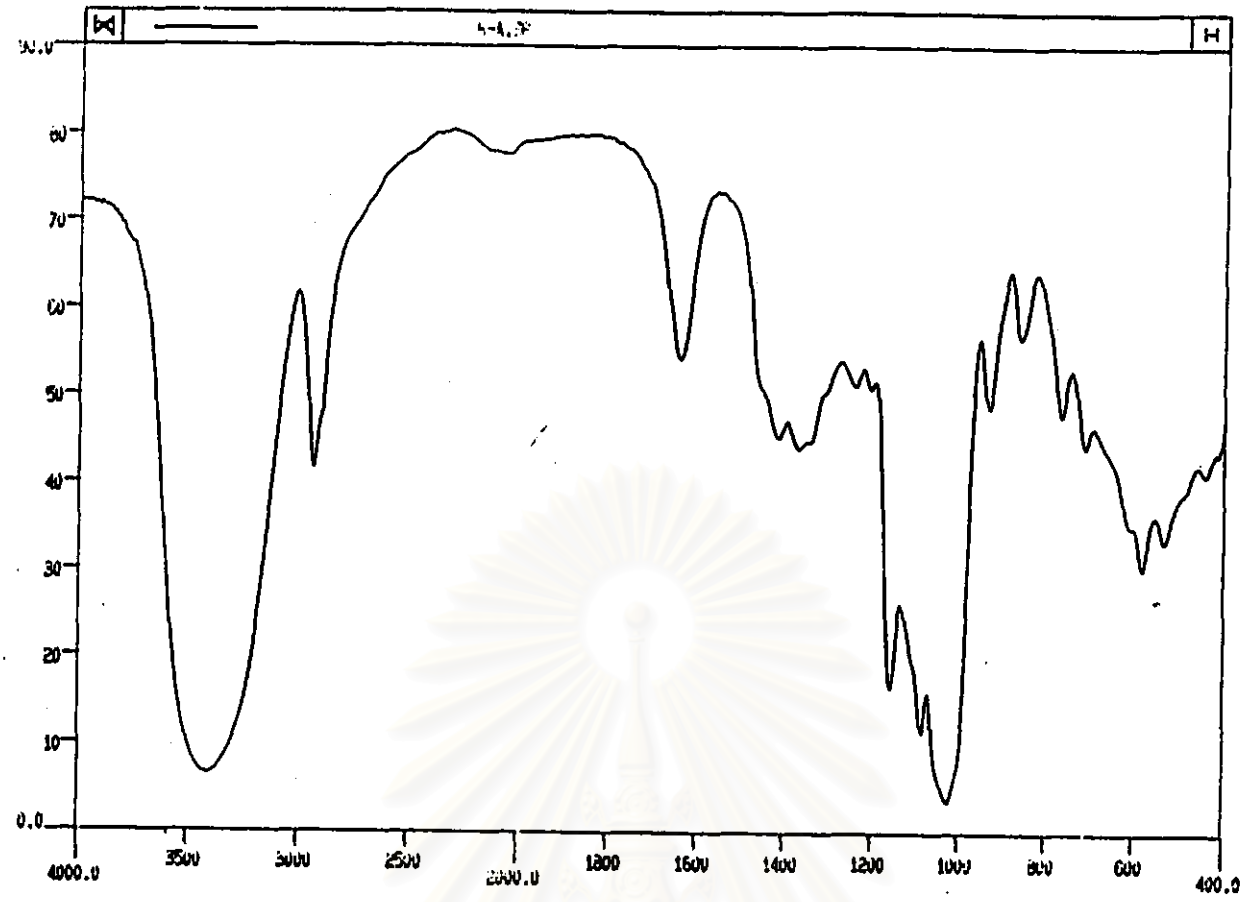


Figure 170 Infrared spectrum of native glutinous rice starch (GA)

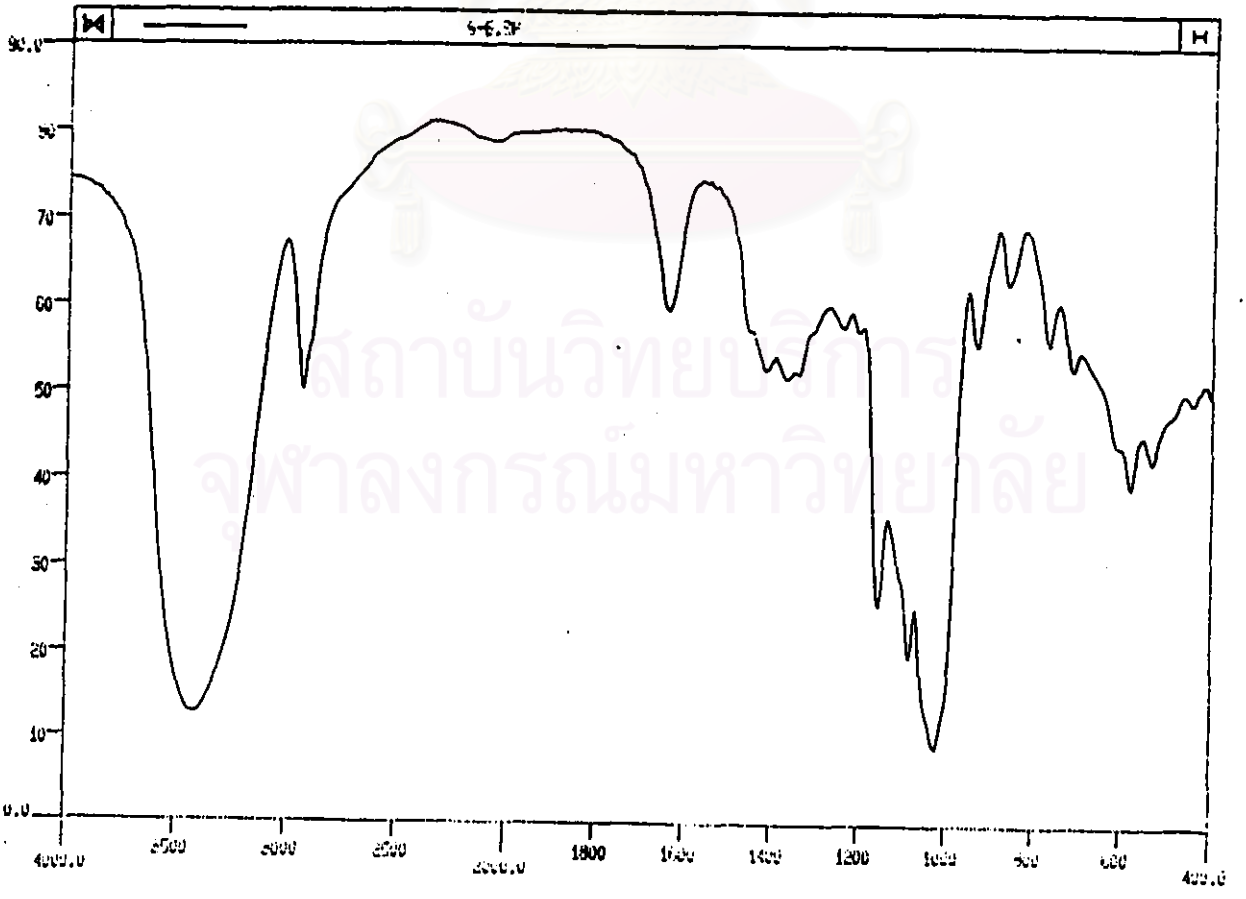


Figure 171 Infrared spectrum of acid-treated glutinous rice starch (GB)

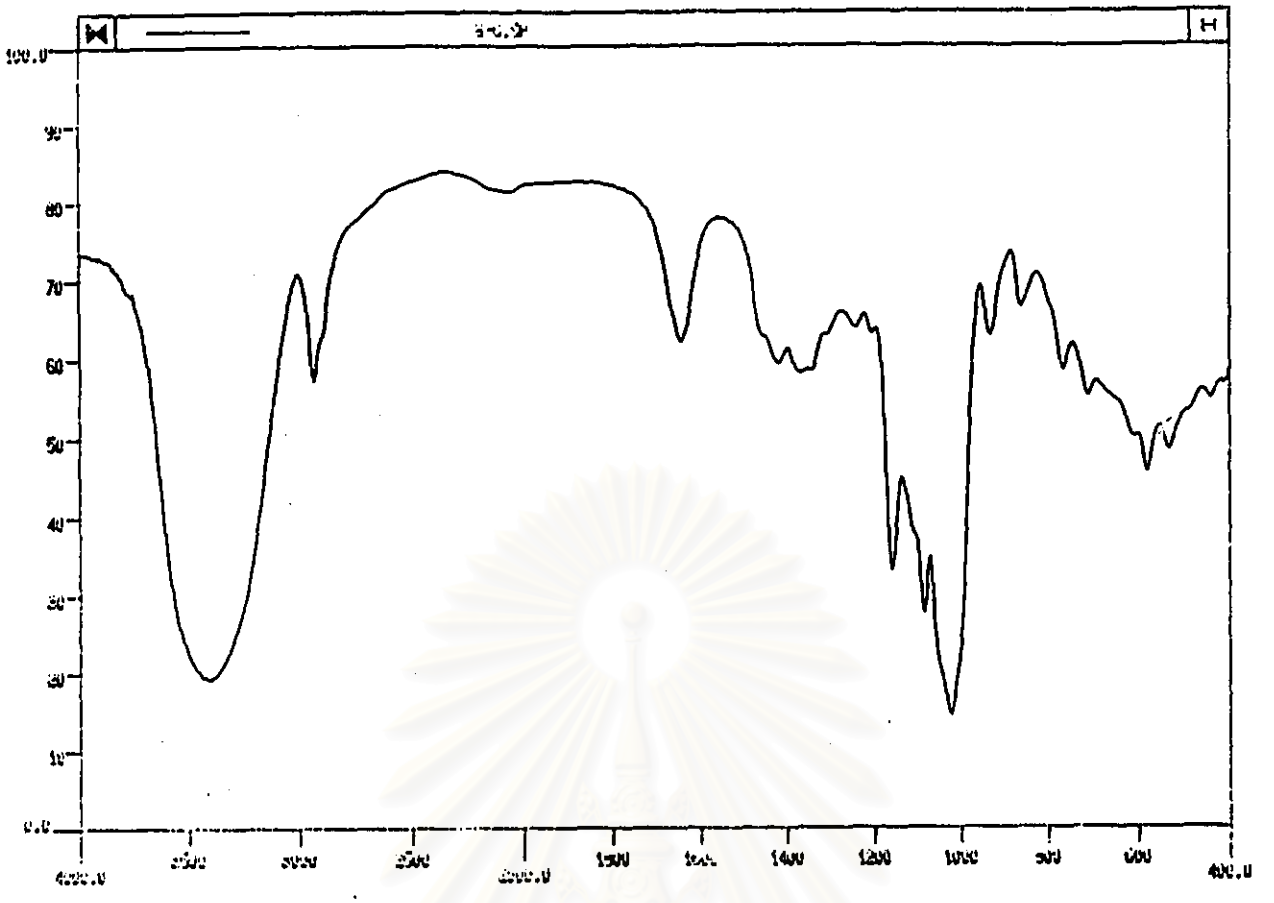


Figure 172 Infrared spectrum of acid-treated glutinous rice starch (GC)

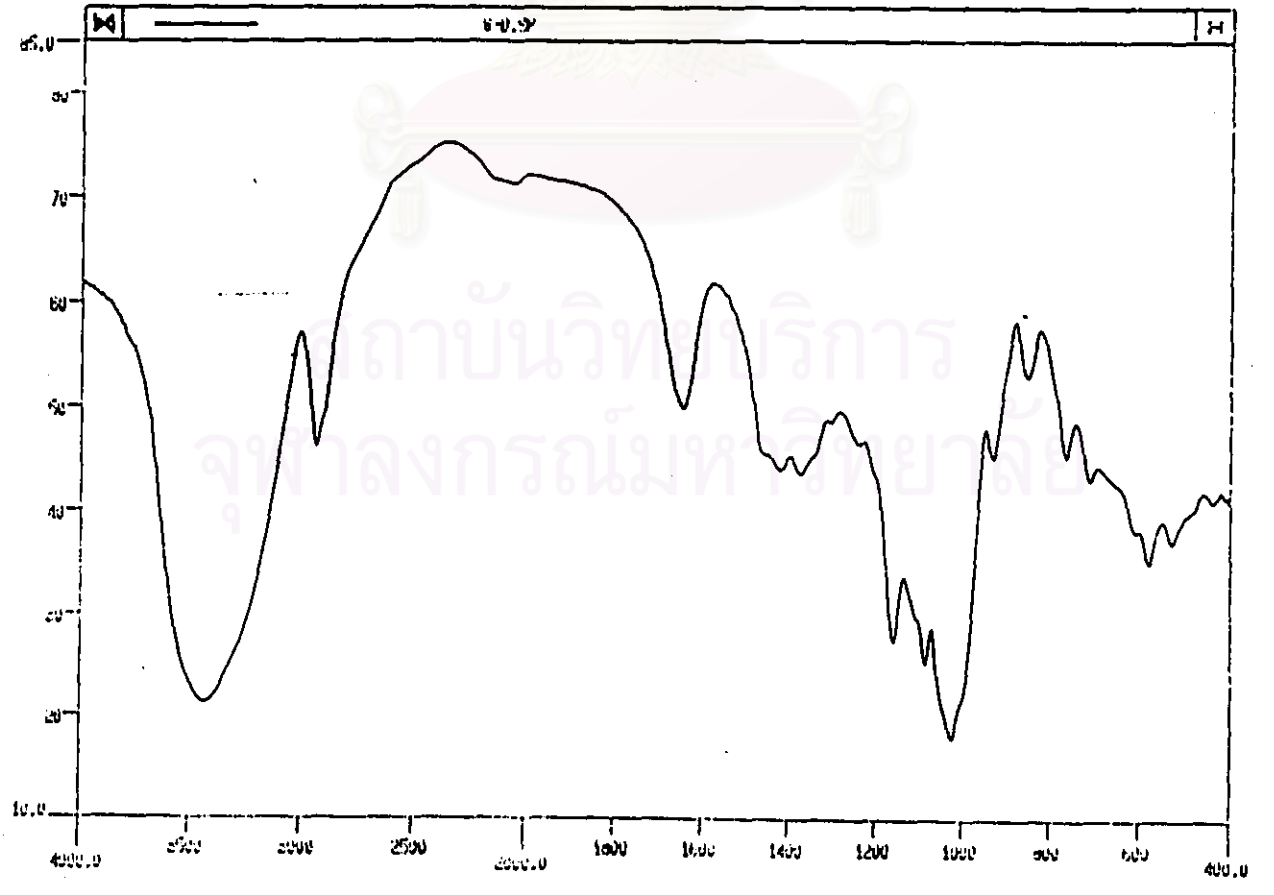


Figure 173 Infrared spectrum of pregelatinized glutinous rice starch (GD)

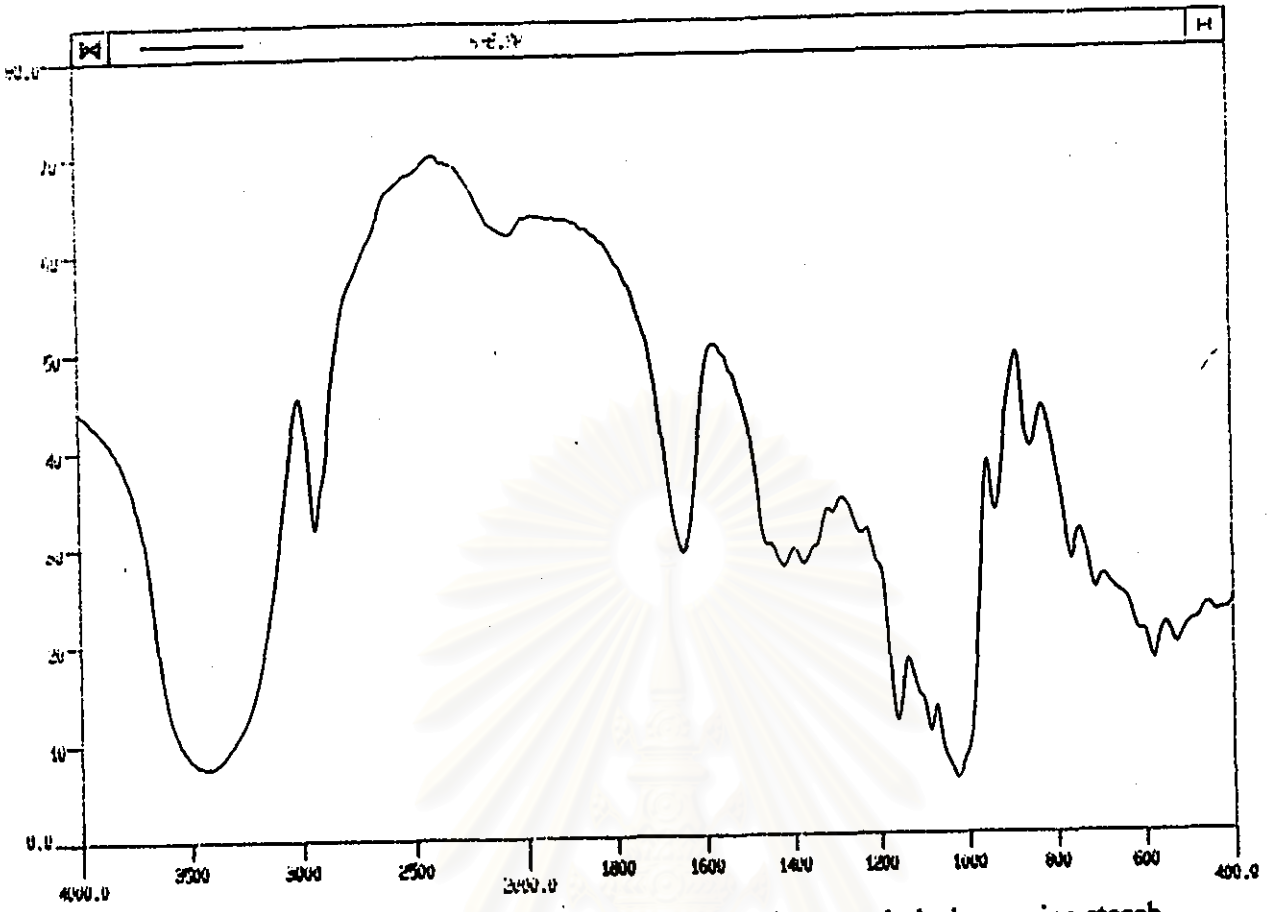


Figure 174 Infrared spectrum of pregelatinized-acid treated glutinous rice starch (GE)

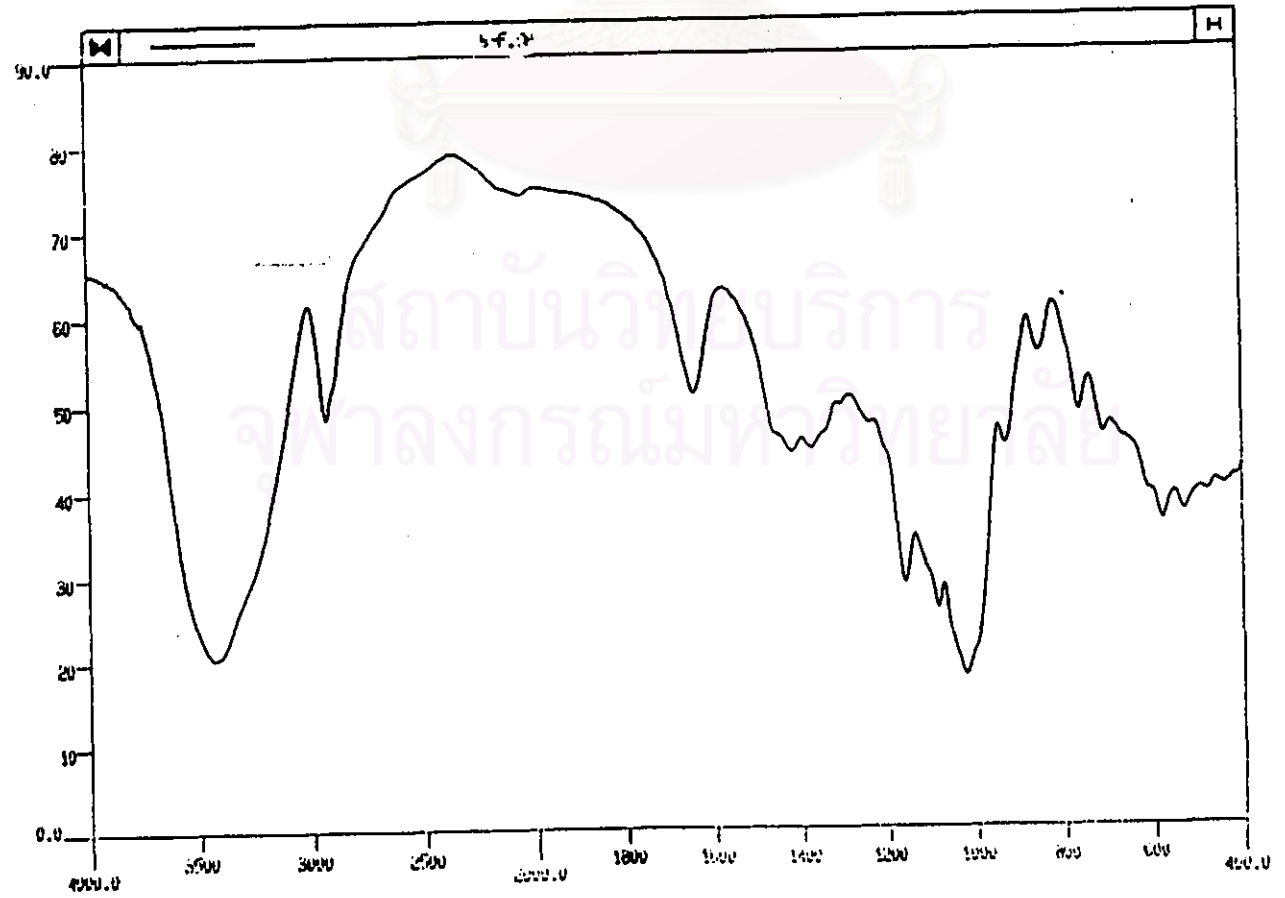


Figure 175 Infrared spectrum of pregelatinized-acid treated glutinous rice starch (GF)

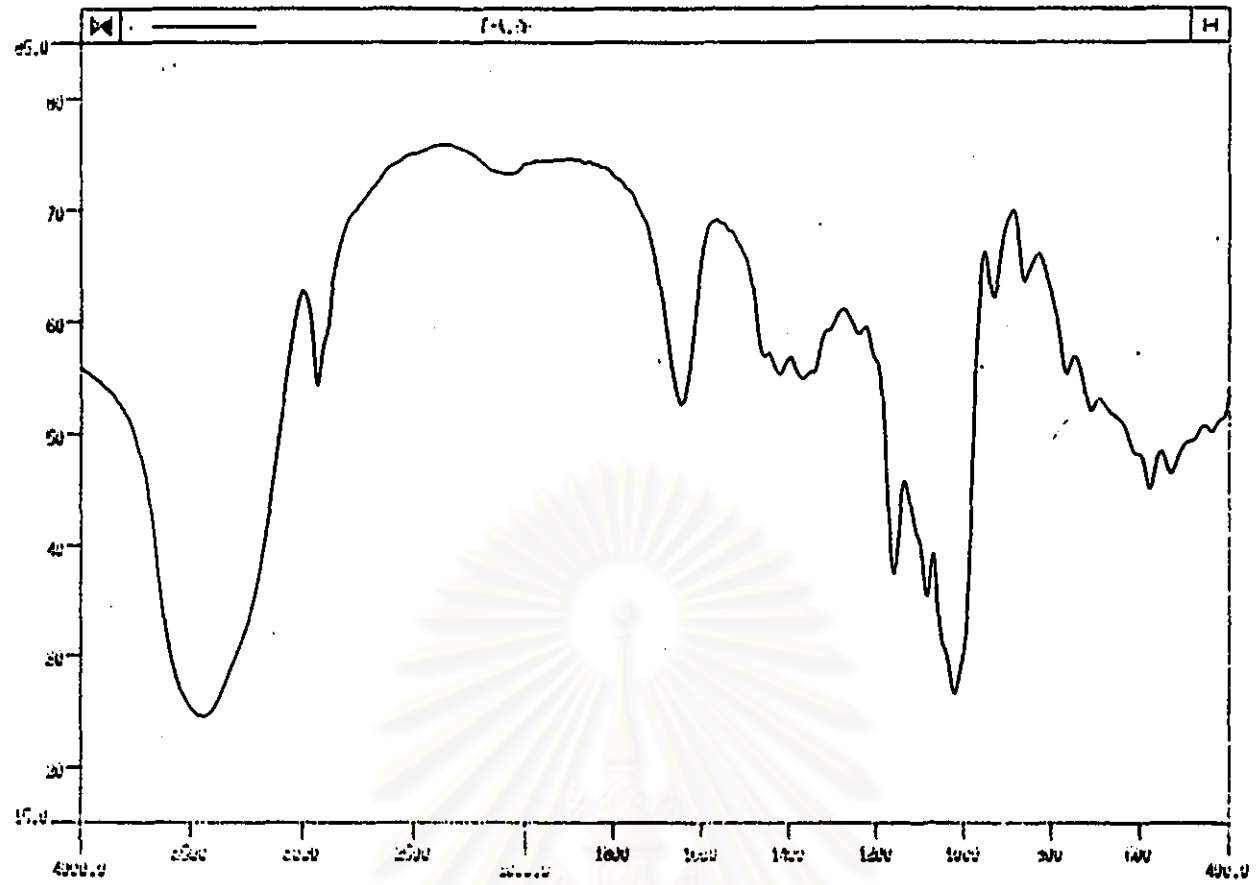


Figure 176 Infrared spectrum of native tapioca starch (TA)

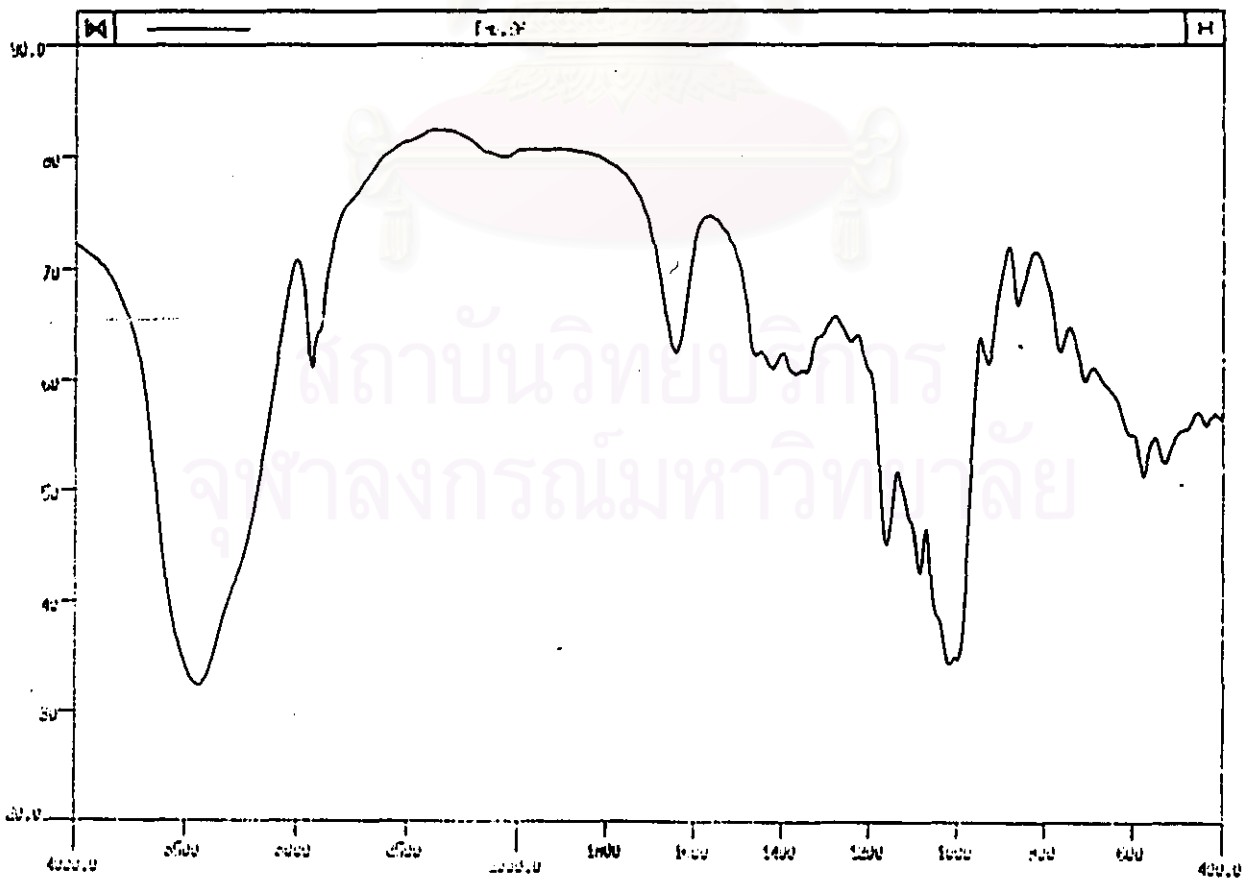


Figure 177 Infrared spectrum of acid-treated tapioca starch (TB)

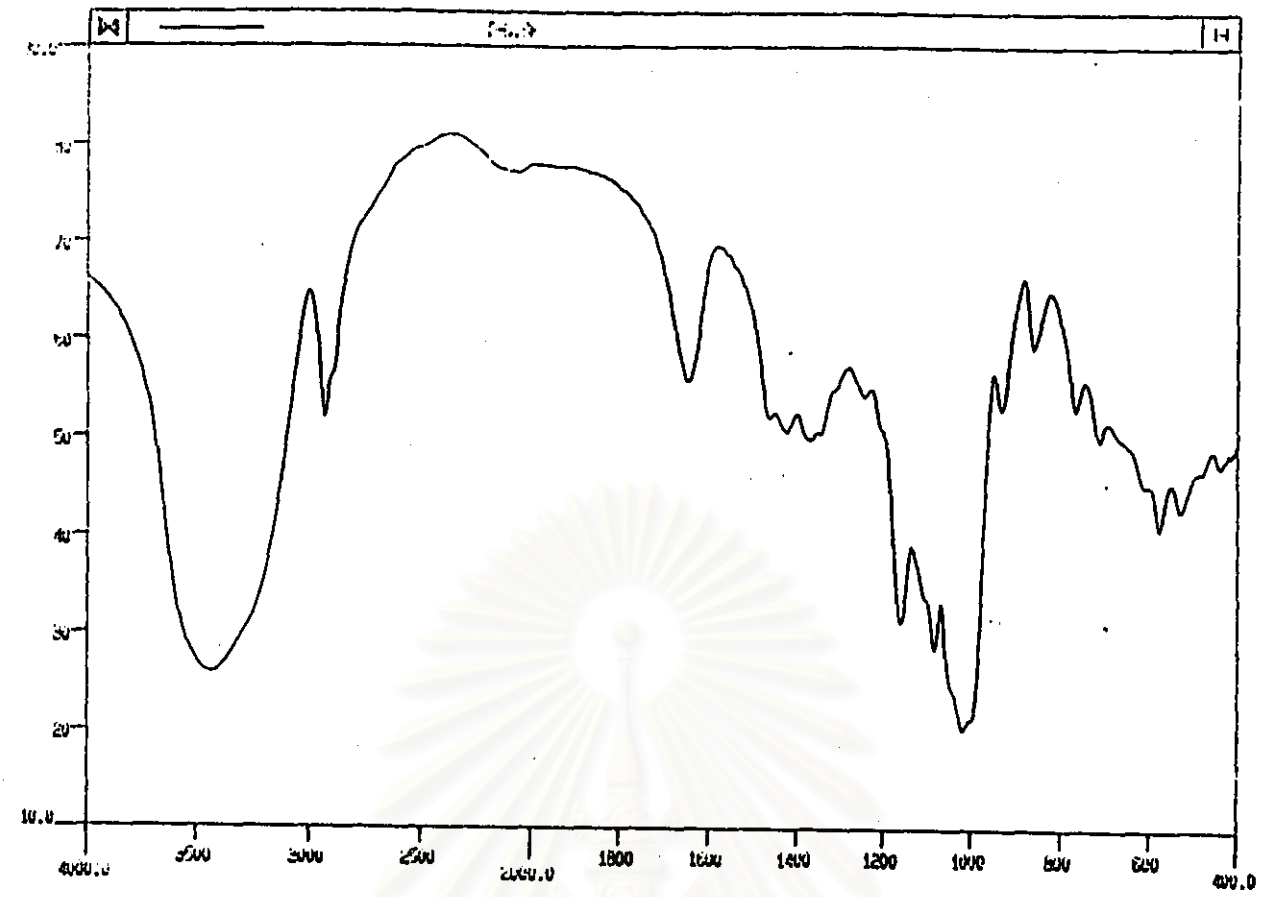


Figure 178 Infrared spectrum of acid-treated tapioca starch (TC)

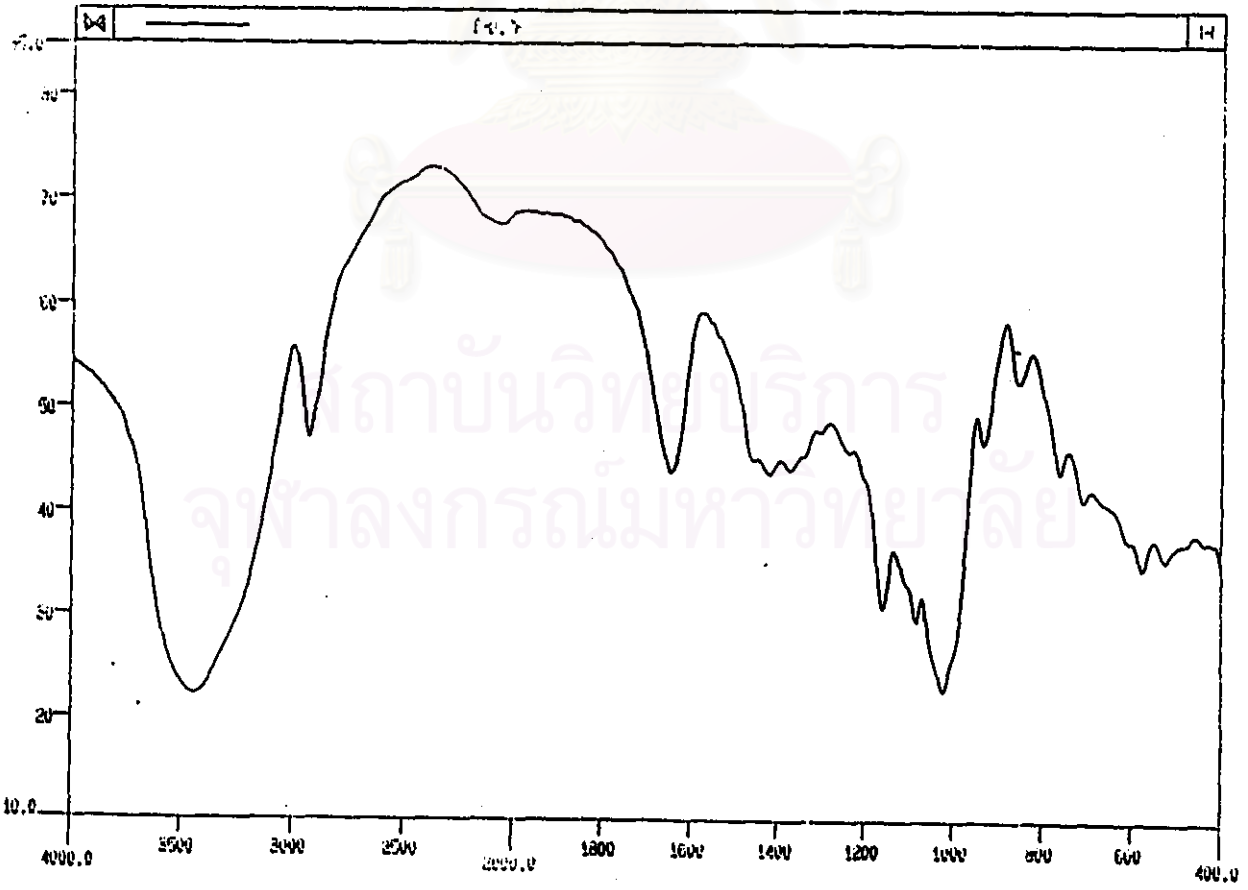


Figure 179 Infrared spectrum of pregelatinized tapioca starch (TD)

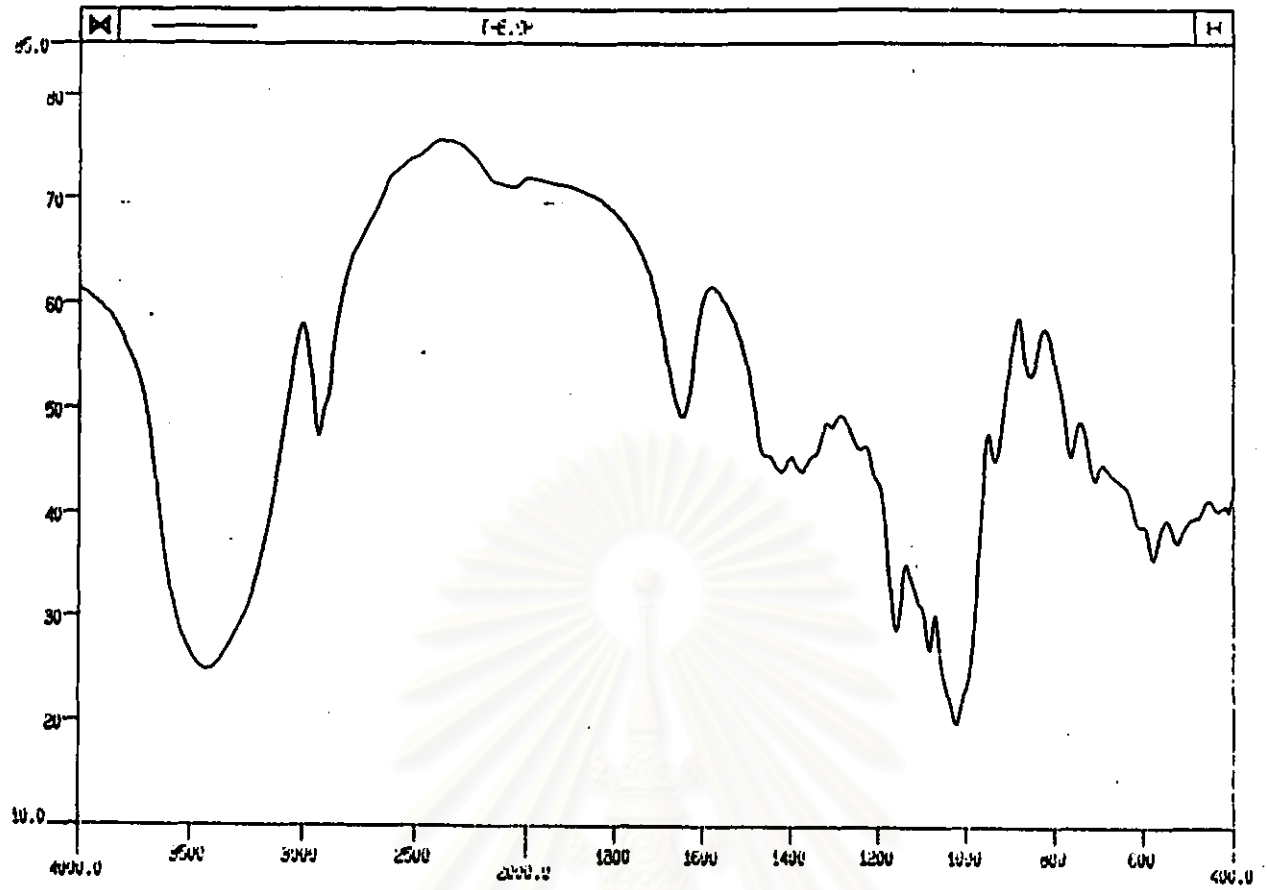


Figure 180 Infrared spectrum of pregelatinized-acid treated tapioca starch (TE)

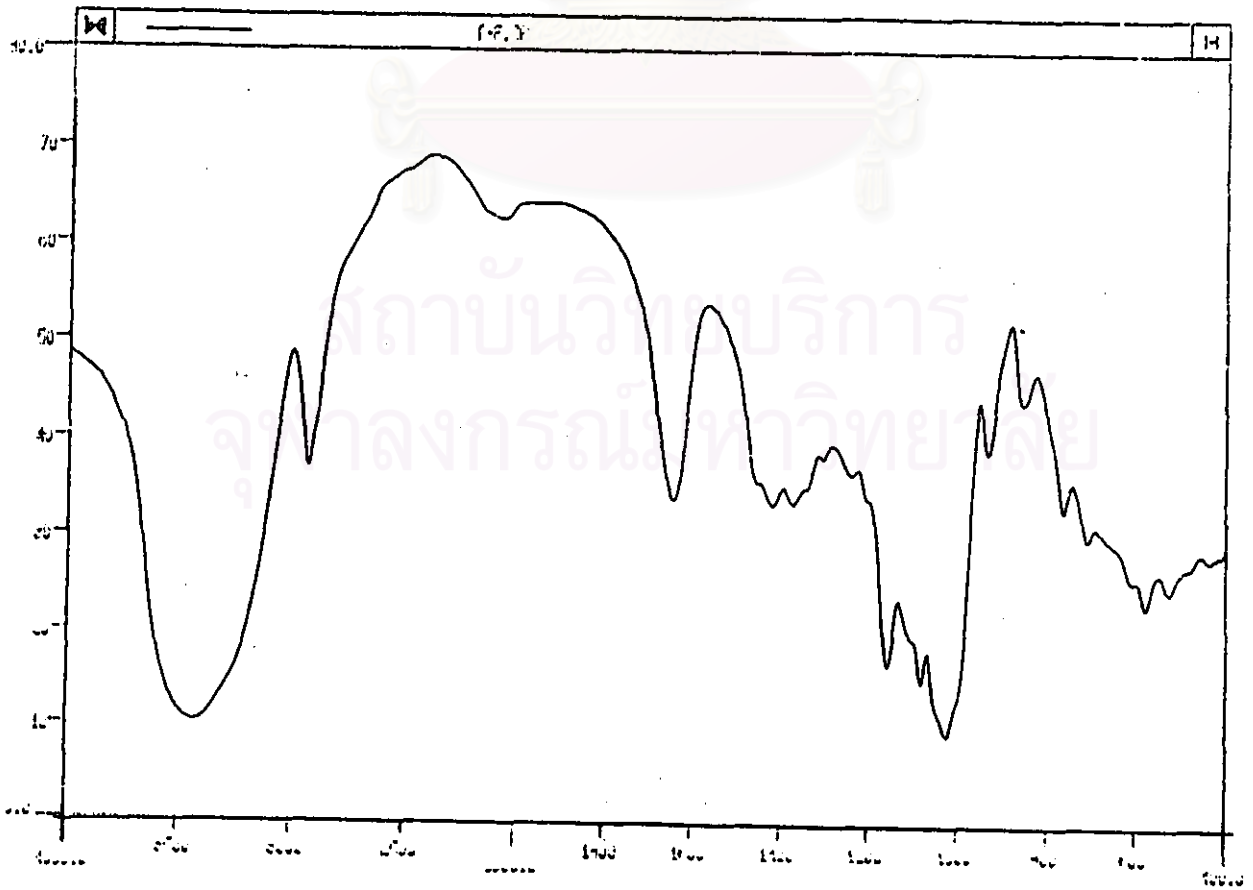


Figure 181 Infrared spectrum of pregelatinized-acid treated tapioca starch (TF)

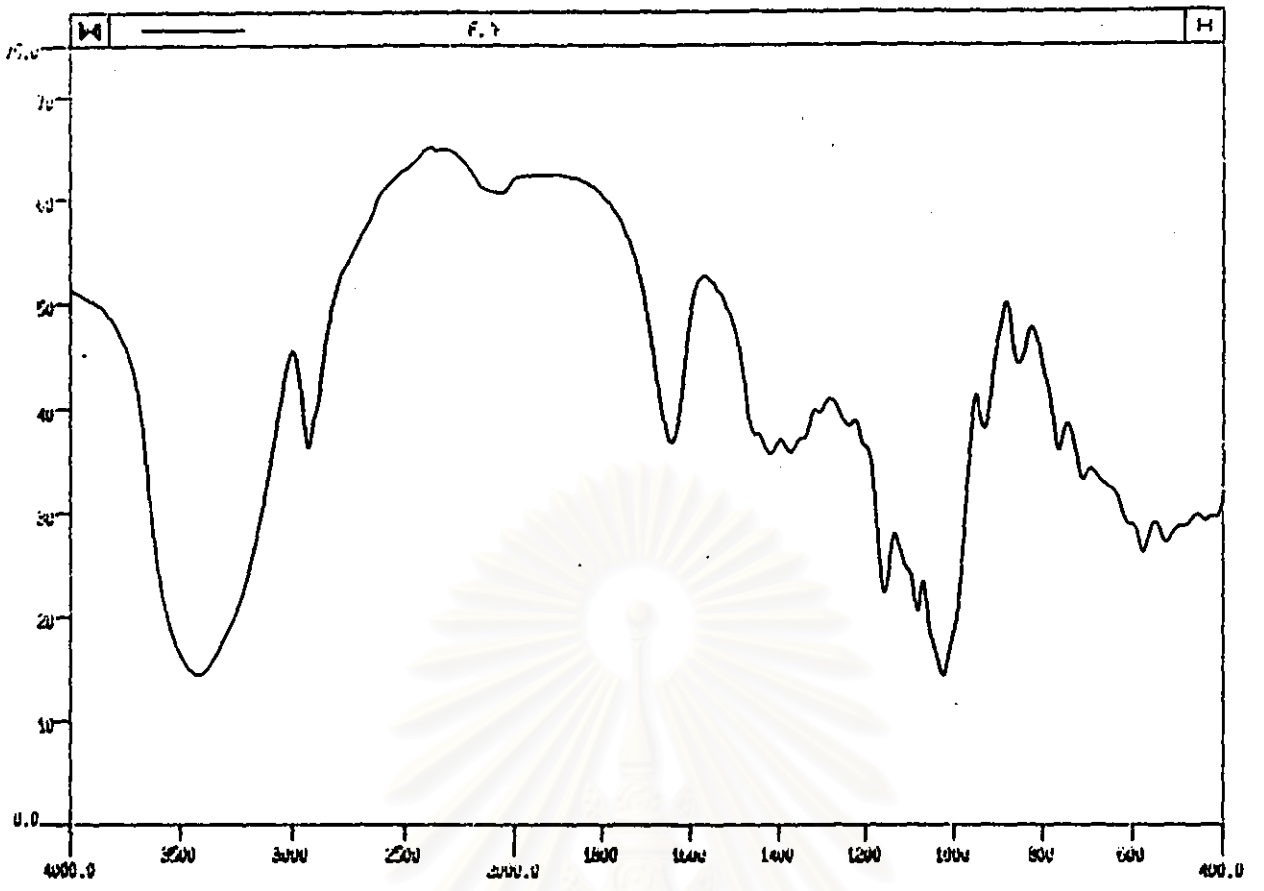


Figure 182 Infrared spectrum of Era-Gel (E)

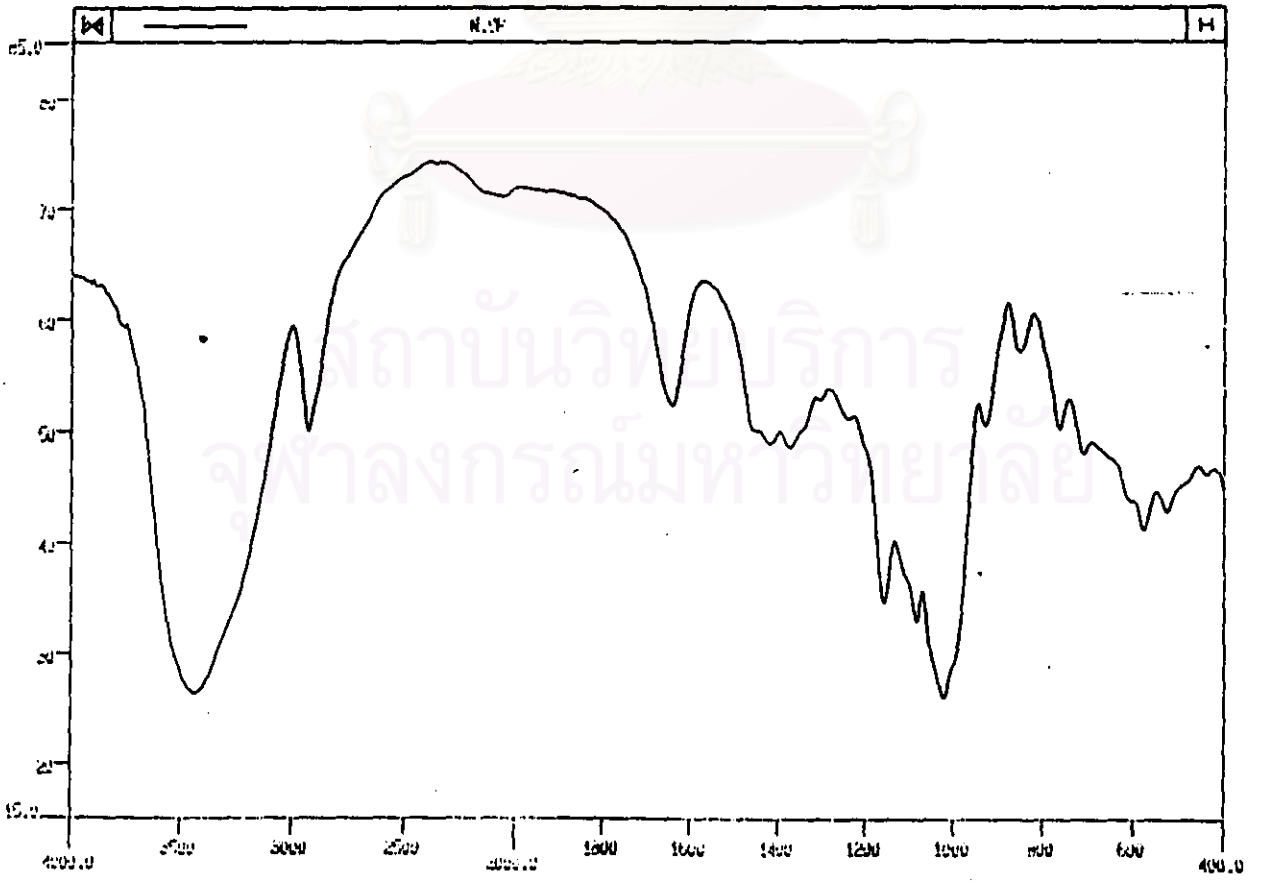


Figure 183 Infrared spectrum of National 1551 (N)

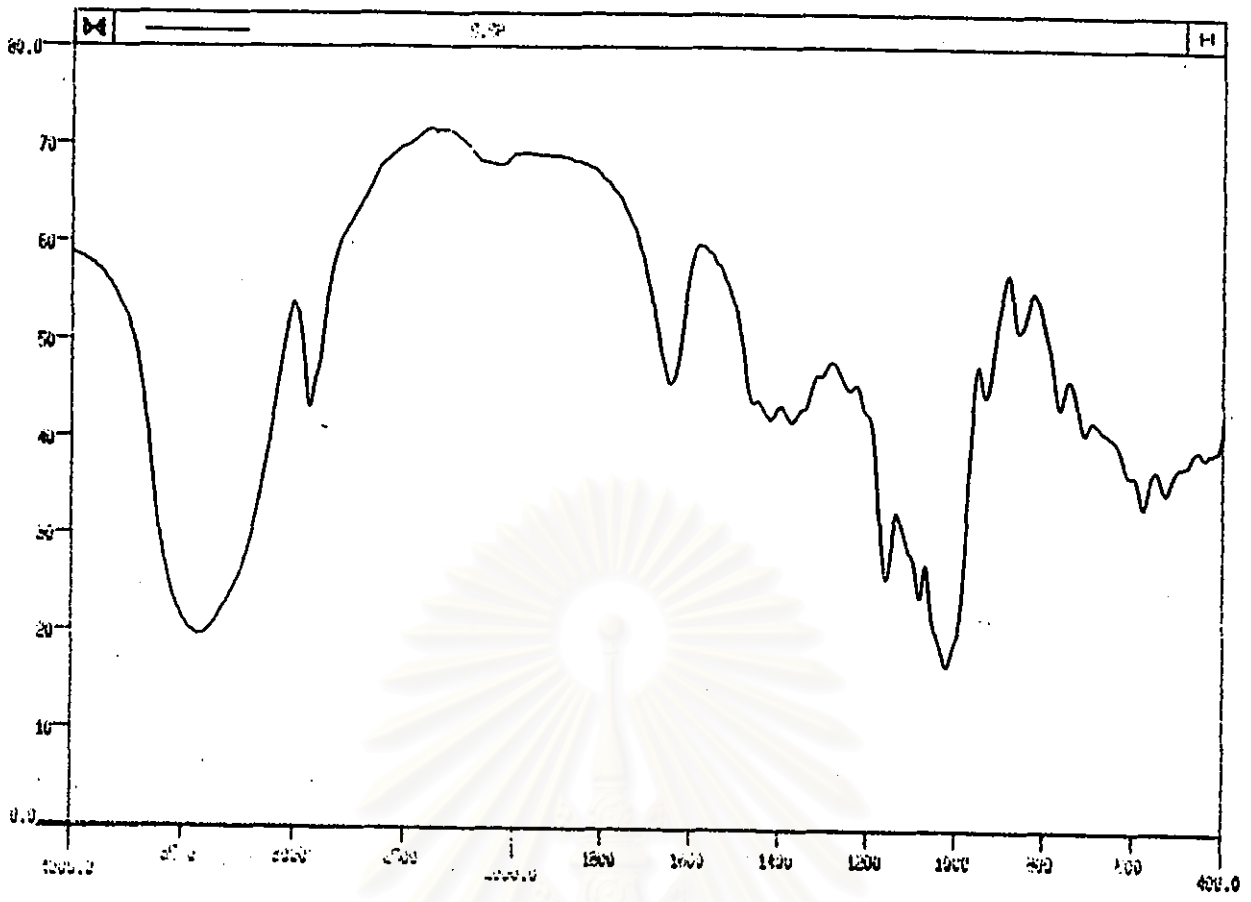


Figure 184 Infrared spectrum of Starch 1500 (S)

Appendix 5

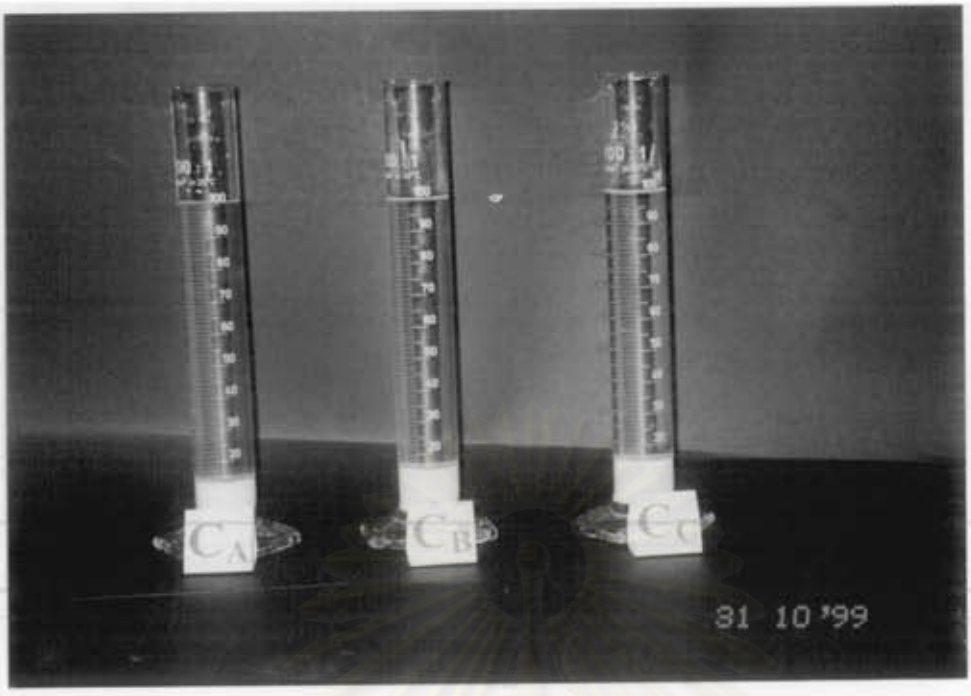


Figure 185 Swelling capacity of native and acid treated corn starches

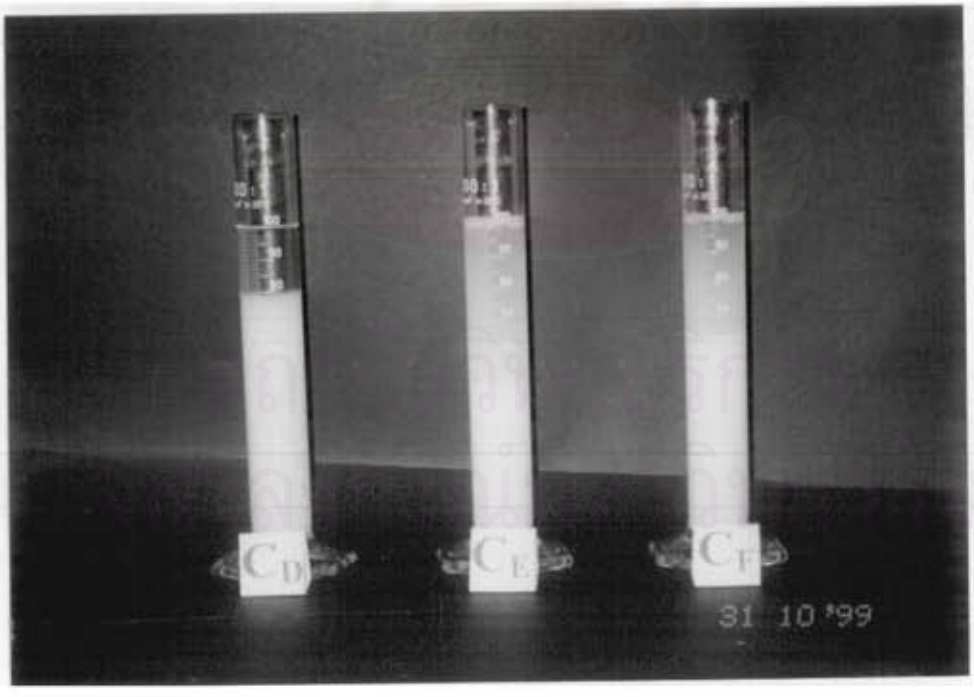


Figure 186 Swelling capacity of pregelatinized corn starches

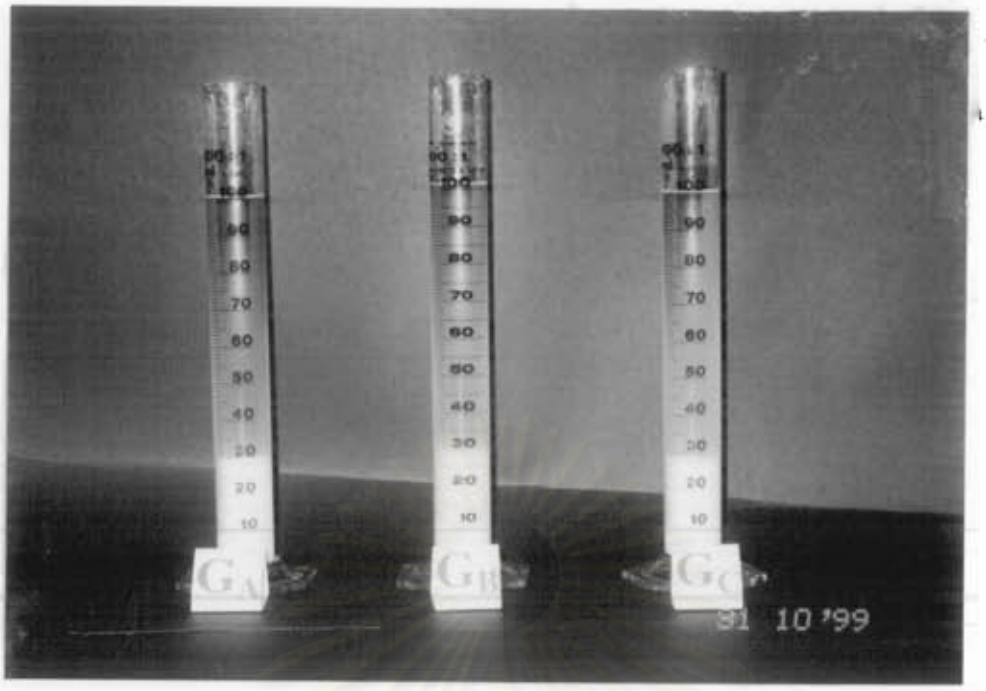


Figure 187 Swelling capacity of native and acid treated glutinous rice starches

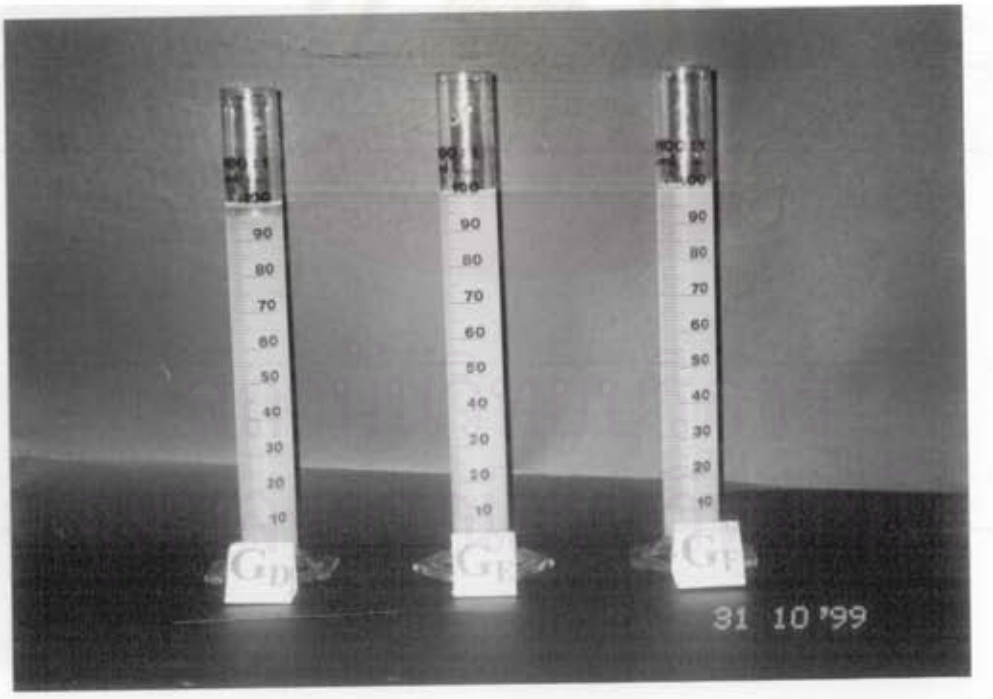


Figure 188 Swelling capacity of pregelatinized glutinous rice starches

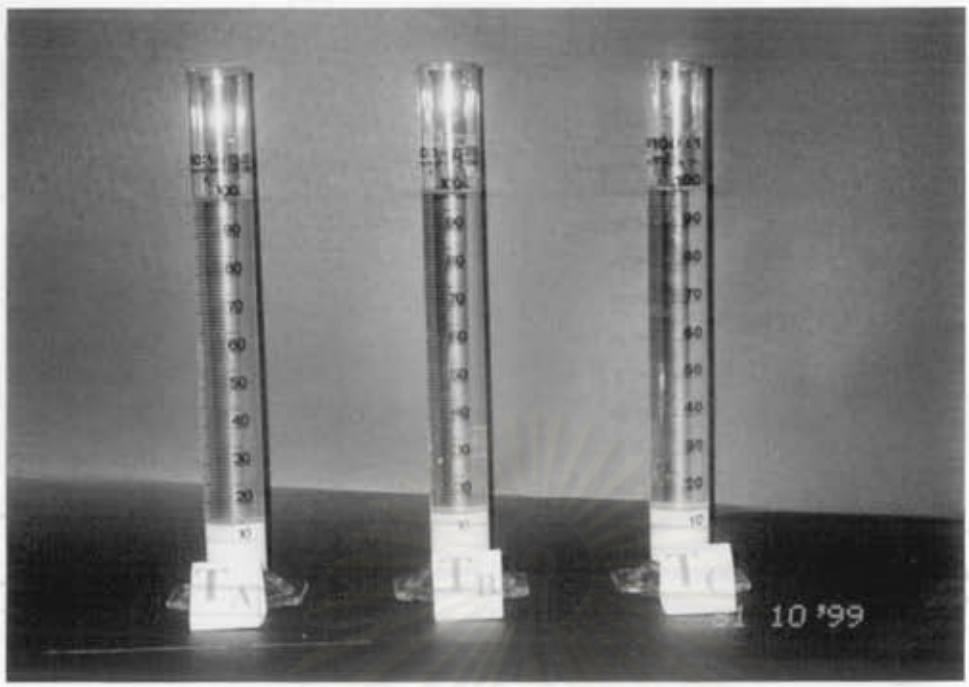


Figure 189 Swelling capacity of native and acid treated tapioca starches

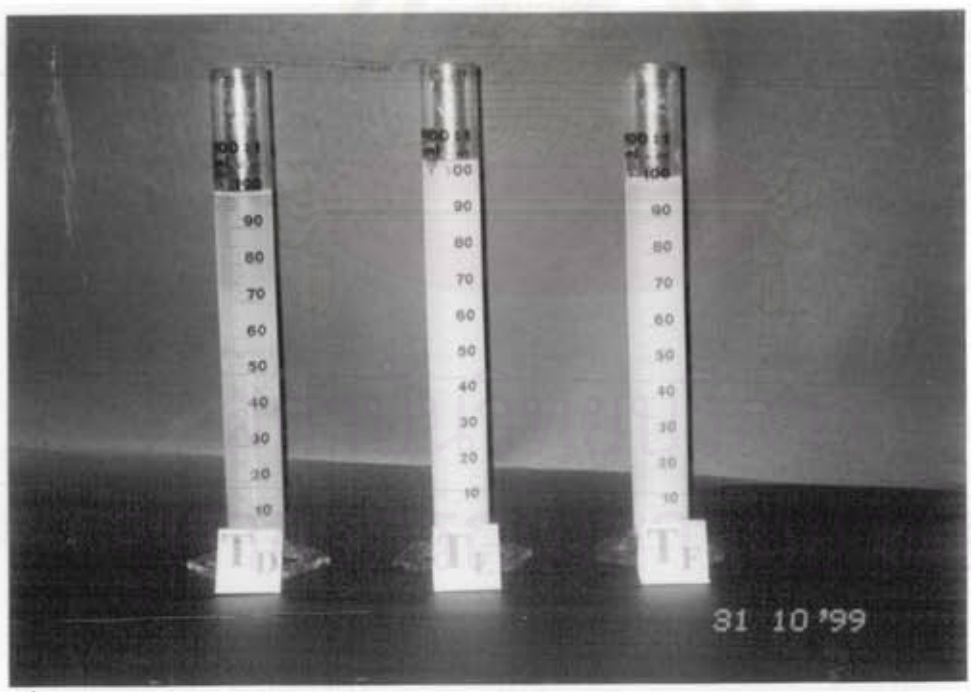


Figure 190 Swelling capacity of pregelatinized tapioca starches

Appendix 6

Table 34 Cumulative percent frequency undersize and Z value of acetaminophen granule containing various pregelatinized starch

Size Range (μm)	CD		CE		CF		GD		GE		GF	
	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value
0-250	19.82	-0.8521	23.94	-0.7115	19.45	-0.8582	20.43	-0.8341	18.33	-0.8961	19.78	-0.8504
250-500	39.57	-0.2589	43.66	-0.16.1	37.86	-0.3102	39.31	-0.2697	34.31	-0.3983	37.68	-0.3200
500-710	59.59	0.2393	60.18	0.2605	55.26	0.1297	57.57	0.1898	51.12	0.0300	55.51	-0.1402
710-1000	85.64	1.0527	85.08	1.0400	82.80	0.9550	85.92	1.0854	81.26	0.8933	84.56	1.0233
> 1000	99.84	2.9500	99.36	2.4900	99.84	2.9500	99.71	2.7600	99.92	2.4750	99.98	3.0900

Table 34 (cont.) Cumulative percent frequency undersize and Z value of acetaminophen granule containing various pregelatinized starch

Size Range (μm)	TD		TE		TF		E		N		S	
	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value	CUM %	Z value
0-250	14.86	-1.0358	26.56	-0.6331	23.54	-0.7188	19.67	-0.8457	13.85	-1.0947	18.34	-0.8966
250-500	28.96	-0.5637	47.45	-0.6598	42.19	-0.2006	35.40	-0.3682	26.75	-0.6122	33.10	-0.4413
500-710	44.44	-0.1400	64.29	0.3577	57.02	0.1805	47.95	-0.0499	39.97	-0.2490	46.11	-0.1002
710-1000	74.60	0.6584	88.76	1.2025	81.31	0.8910	72.72	0.6143	67.22	0.4519	72.92	0.6098
> 1000	99.87	3.000	99.98	3.0900	99.98	3.0900	99.54	2.5447	99.87	3.0000	99.76	2.8200

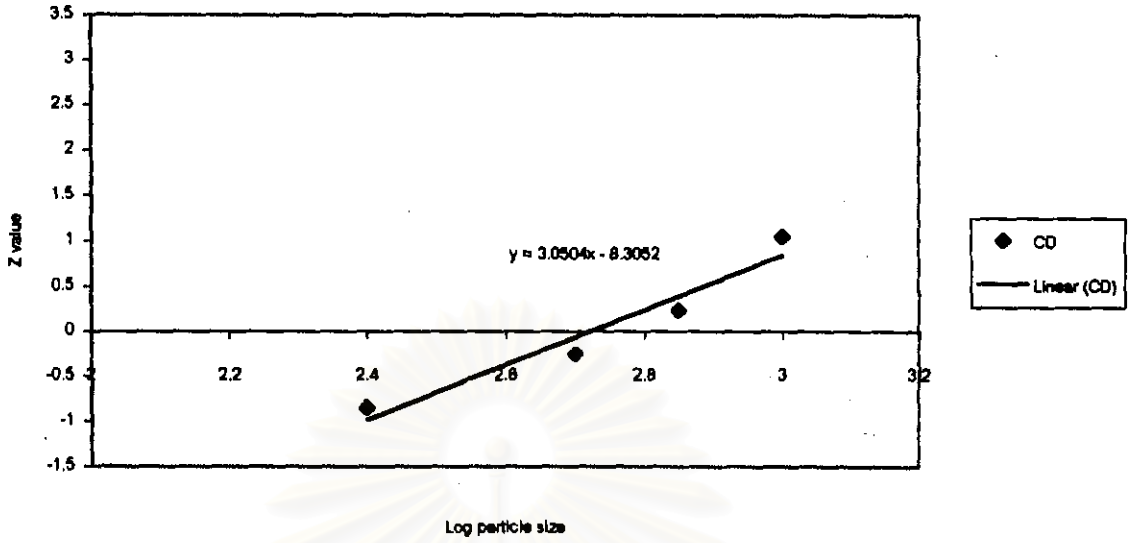


Figure 191 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized of native corn starch (CD)

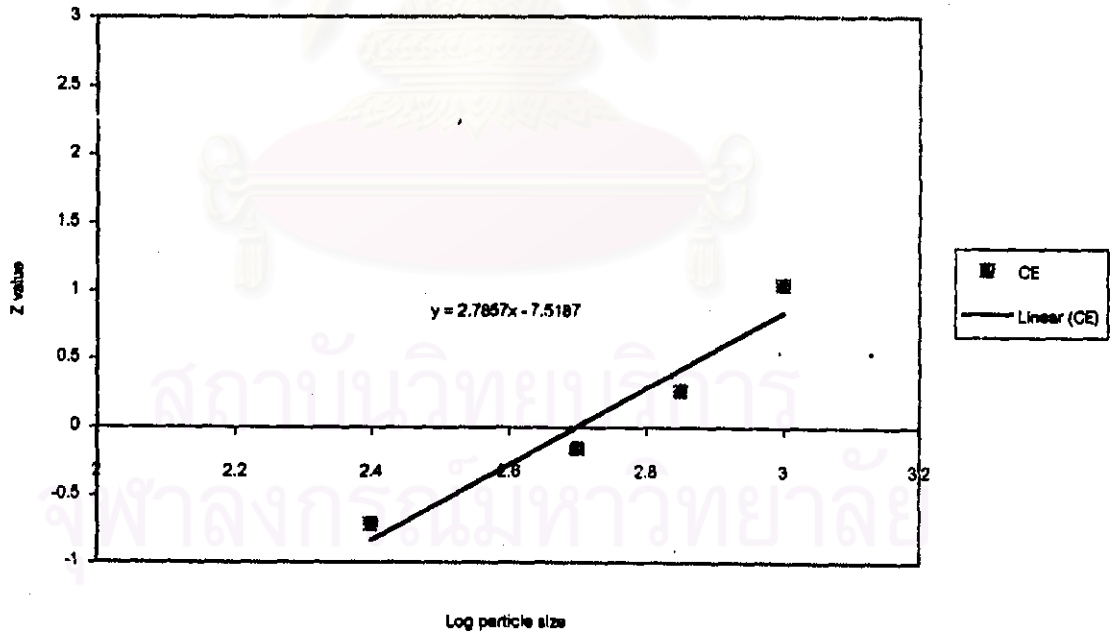


Figure 192 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated corn starch (CE)

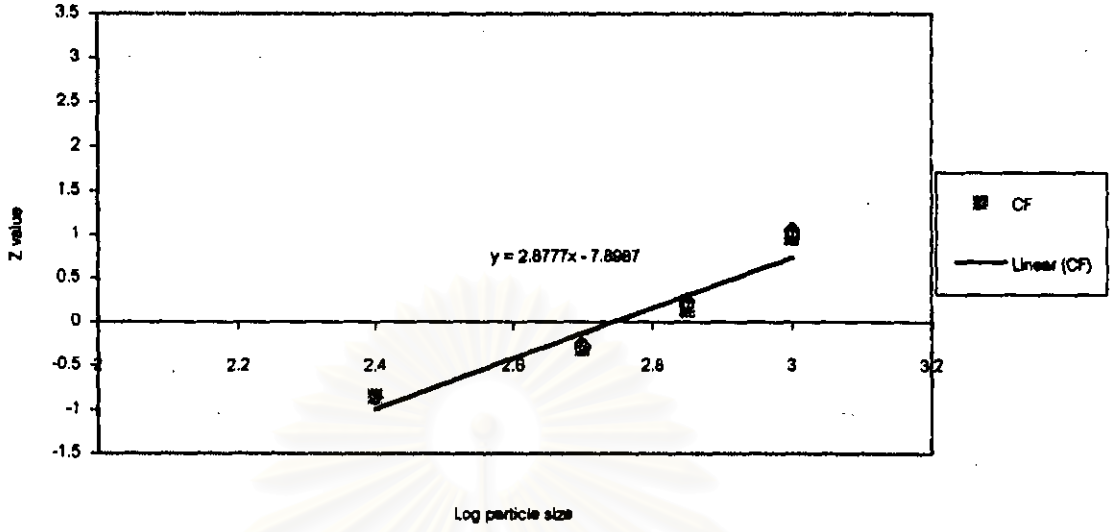


Figure 193 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated corn starch (CF)

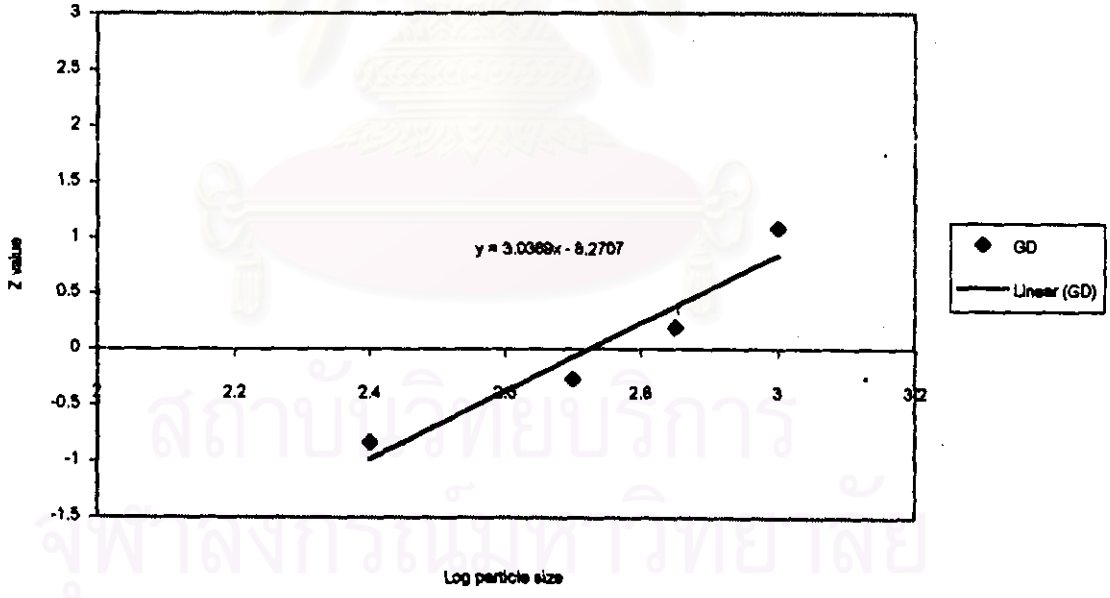


Figure 194 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinixed of native glutinous rice starch (GD)

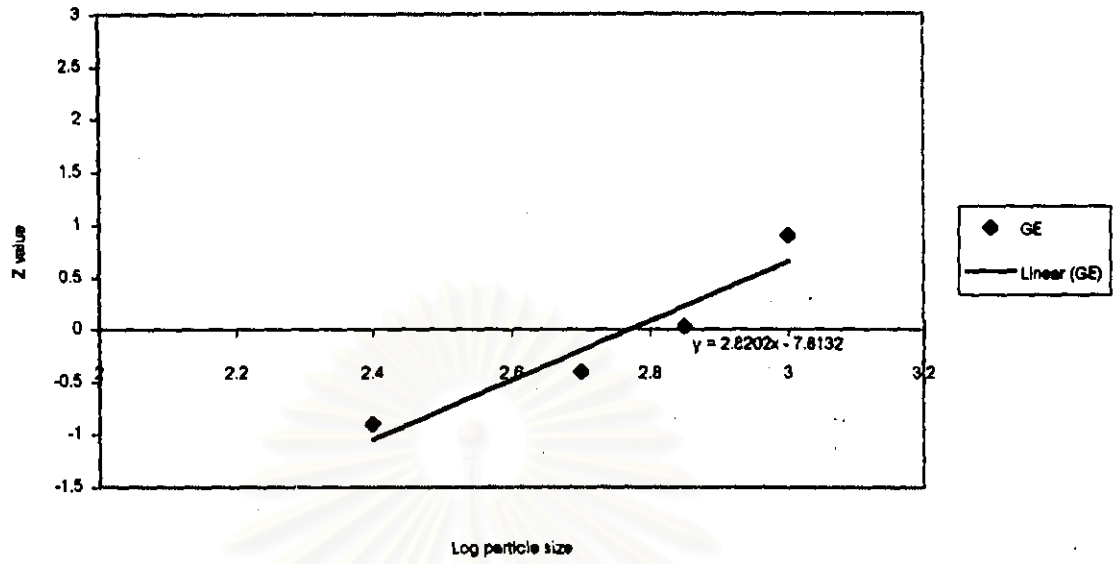


Figure 195 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated glutinous rice starch (GE)

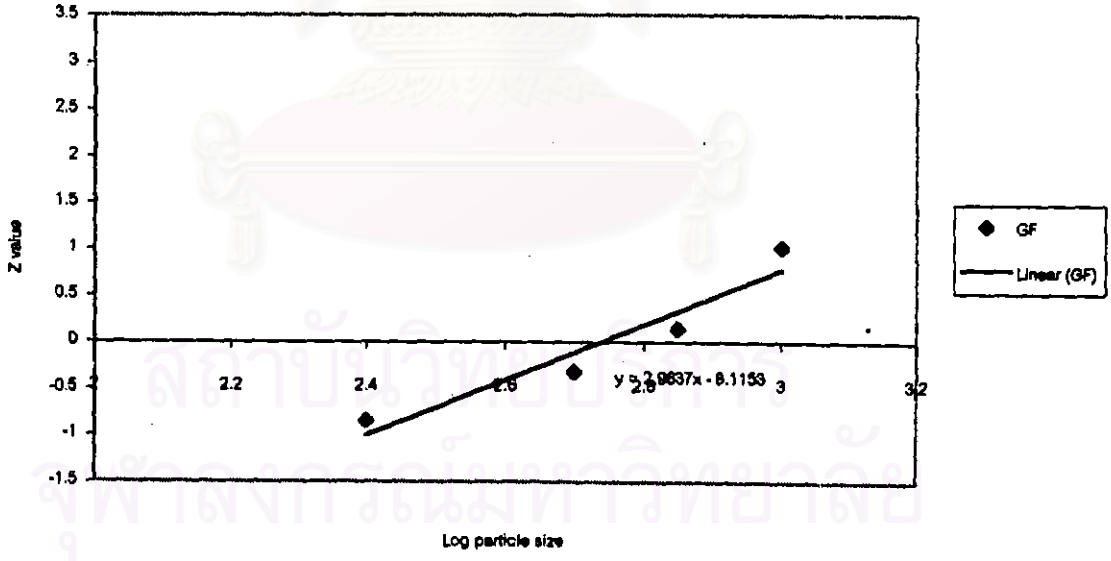


Figure 196 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated glutinous rice starch (GF)

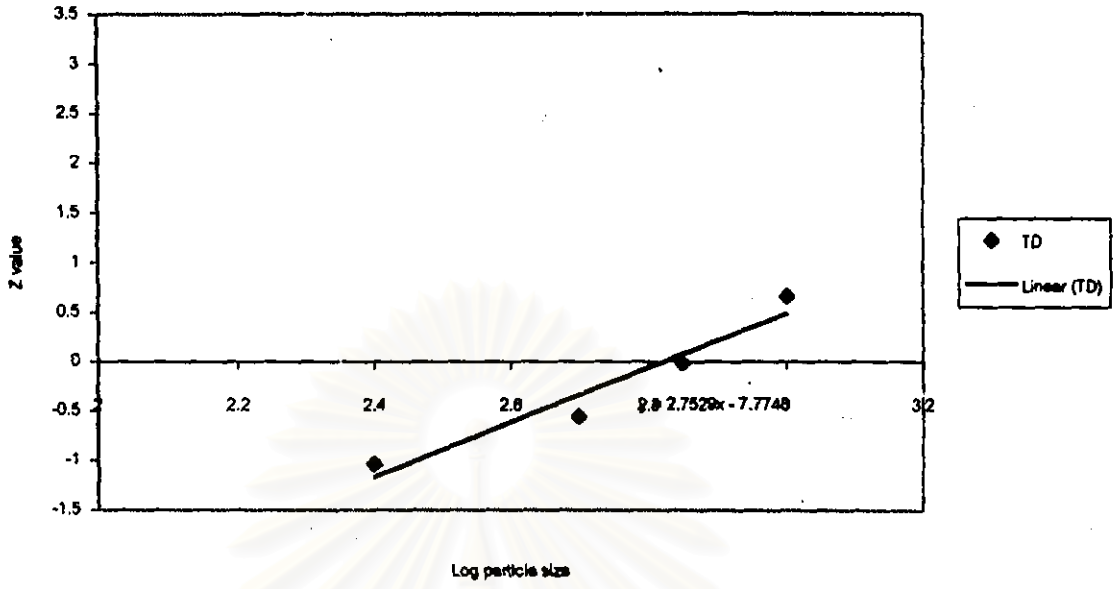


Figure 197 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinixed of native tapioca starch (TD)

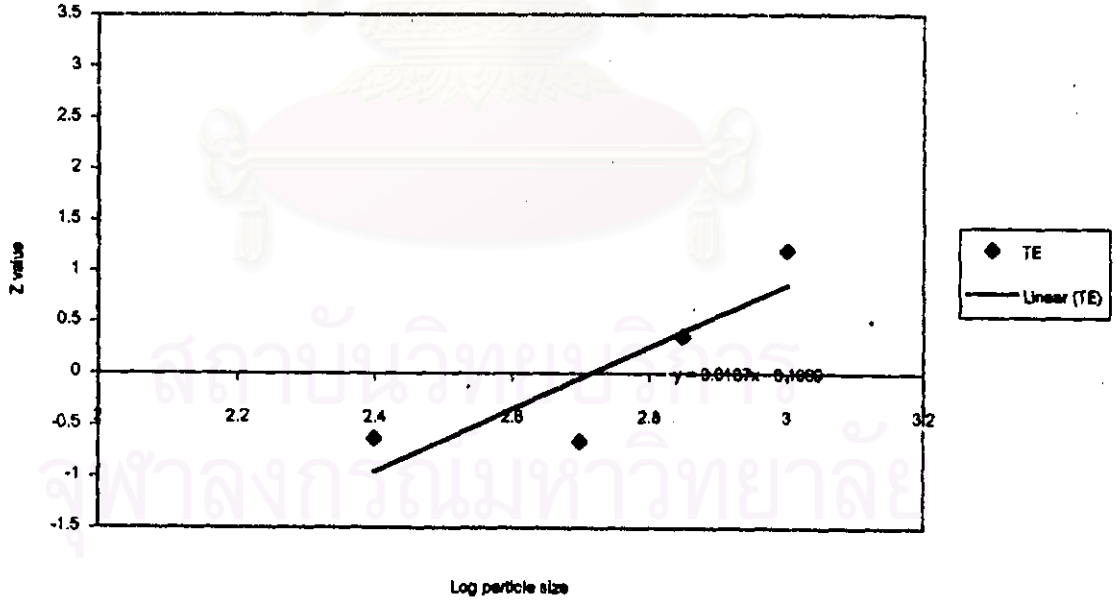


Figure 198 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated tapioca starch (TE)

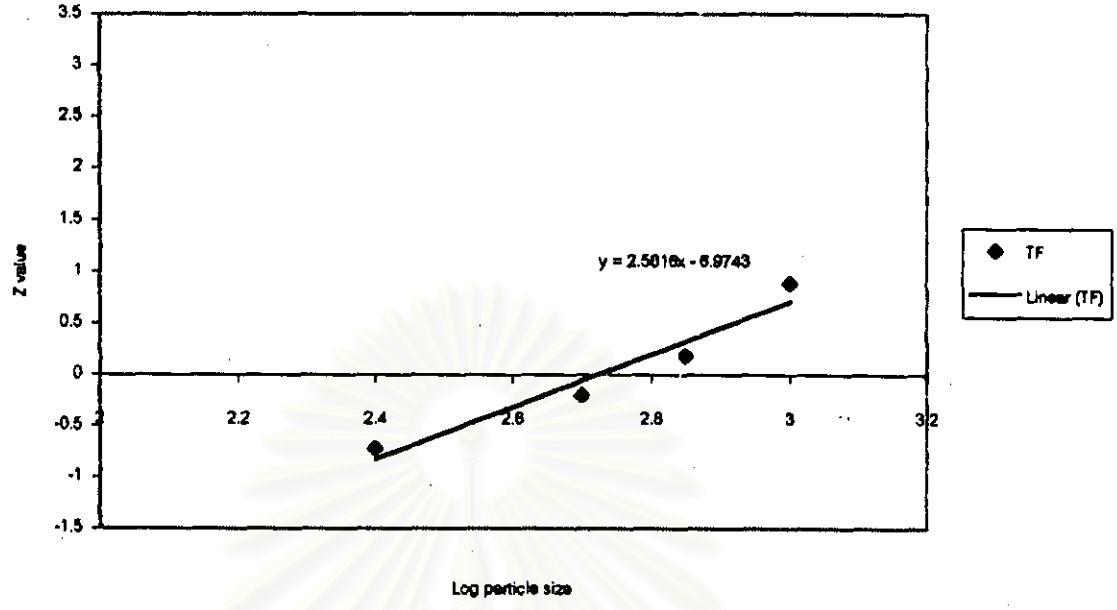


Figure 199 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing pregelatinized –acid treated tapioca starch (TF)

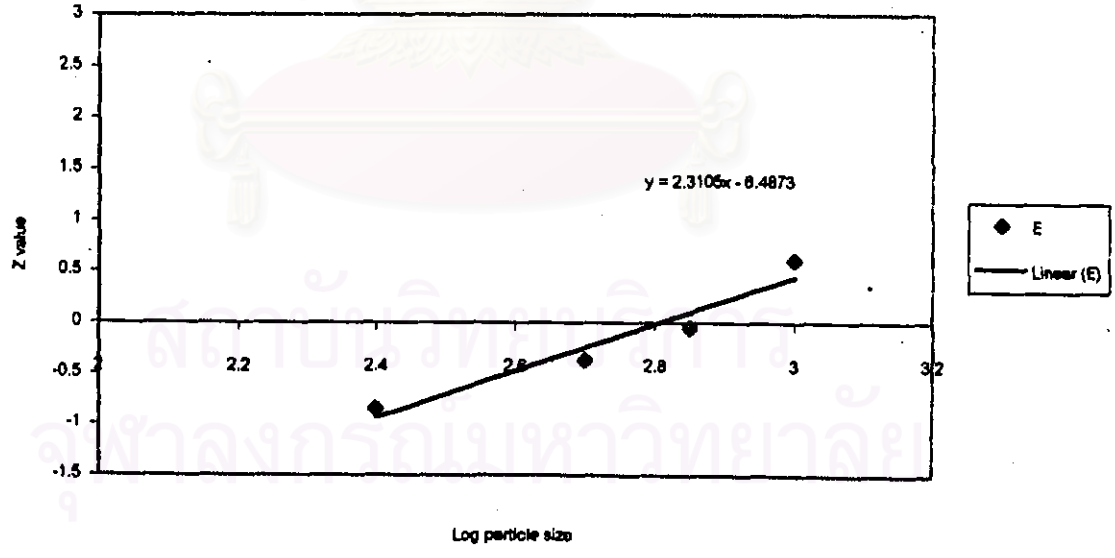


Figure 200 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing Era-Gel (E)

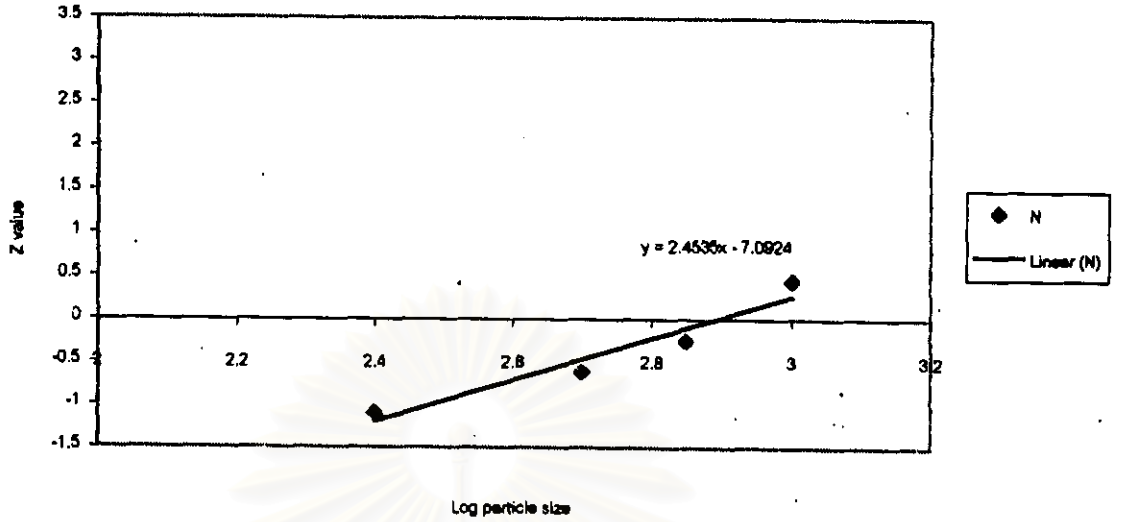


Figure 201 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing National 1551 (N)

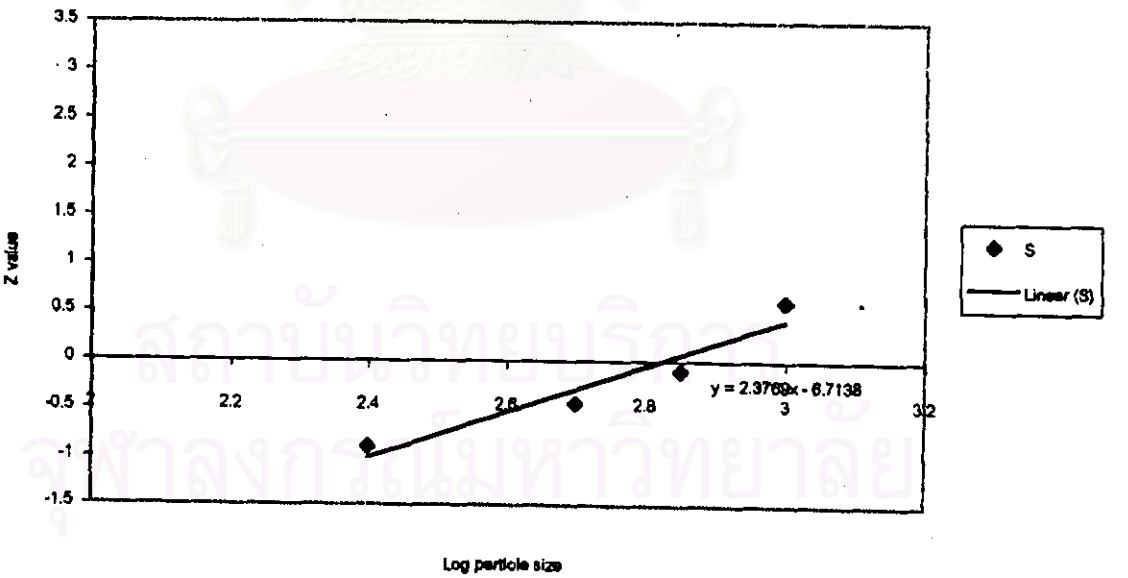


Figure 202 The plot of cumulative % frequency under size (Z value) versus log particle of acetaminophen granules containing Starch 1500 (S)

Appendix 7

Table 35 The calibration data between the number of units on the chart paper and applied forces.

force (Kg)	No. of scales (range 1 volt)					No. of scales (range 0.5 volt)				
	1 st		2 nd		mean of	1 st		2 nd		mean of
	data	cum.	data	cum.	cum.	data	cum.	data	cum.	cum.
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	c	0.0	0.0
200	2.8	2.8	2.4	2.4	2.6	5.1	5.1	5.9	5.9	5.5
400	2.3	5.1	2.6	5.0	5.1	4.4	9.5	4.1	10.0	9.8
600	3.0	8.1	2.8	7.8	8.0	5.7	15.2	6.0	16.0	15.6
800	2.2	10.3	2.2	10.0	10.2	5.8	21.0	5.0	21.0	21.0
1,000	1.9	12.2	2.8	12.8	12.5	4.4	25.4	5.0	26.0	25.7
1,200	3.1	15.3	2.3	15.1	15.2	4.9	30.3	5.4	31.4	30.9
1,400	2.8	18.1	2.8	17.9	18.0	5.0	35.3	4.9	36.3	35.8
1,600	2.5	20.6	1.7	19.6	20.1	5.0	40.3	5.1	41.4	40.9
1,800	2.5	23.1	3.0	22.8	22.9	5.0	45.3	5.0	46.4	45.9
2,000	2.1	25.2	2.2	24.8	25.0	4.2	49.5	5.0	51.4	50.5

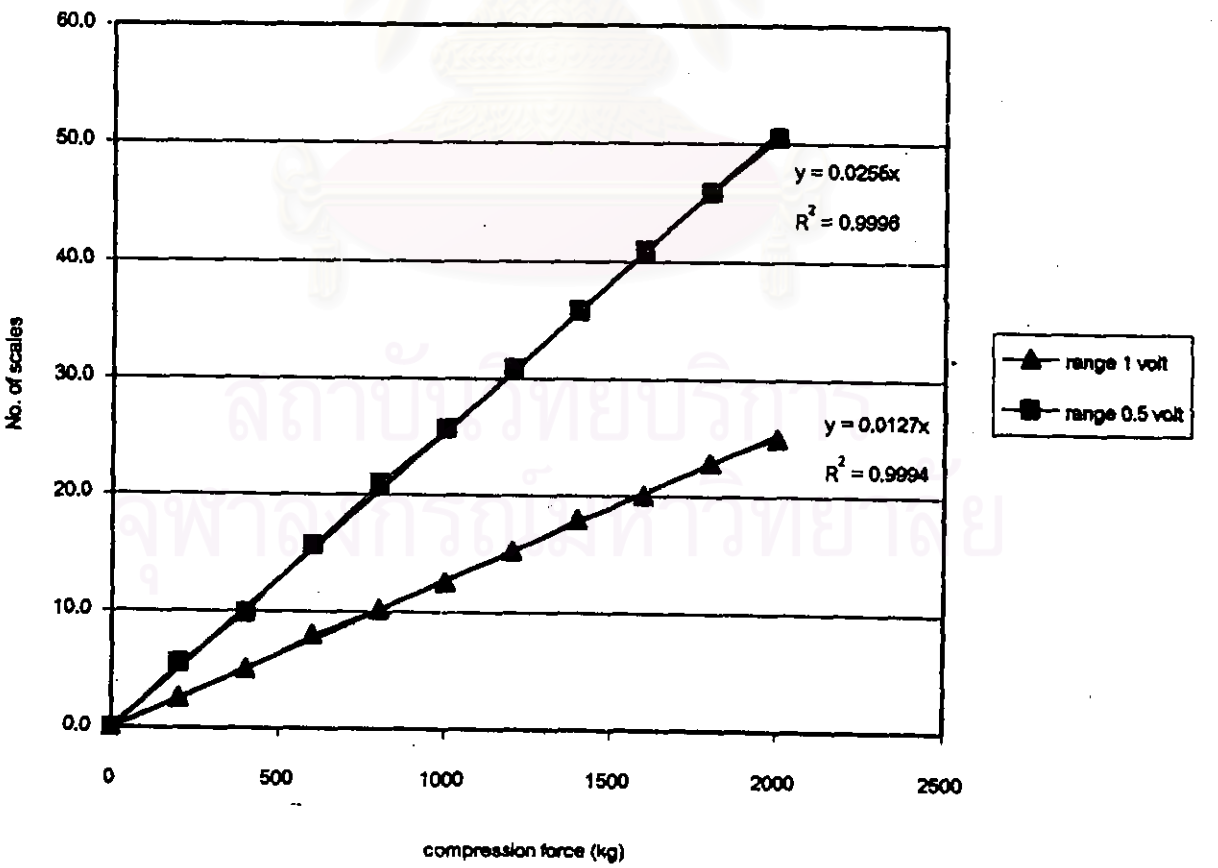


Figure 203 The calibration curve of compression force

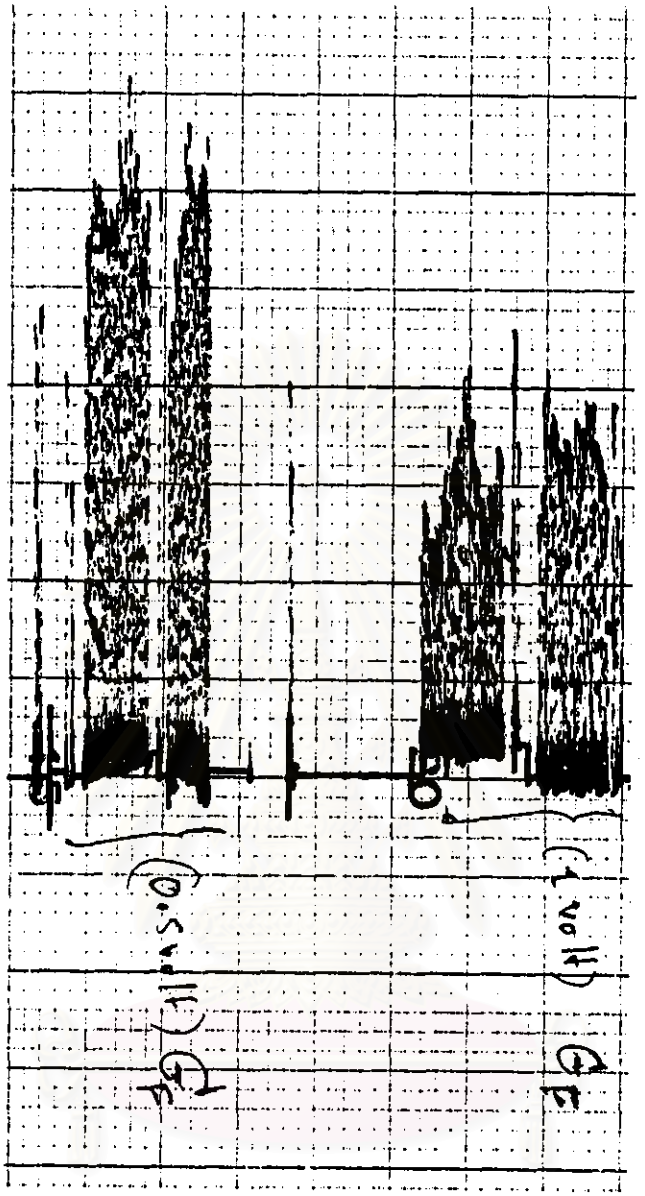
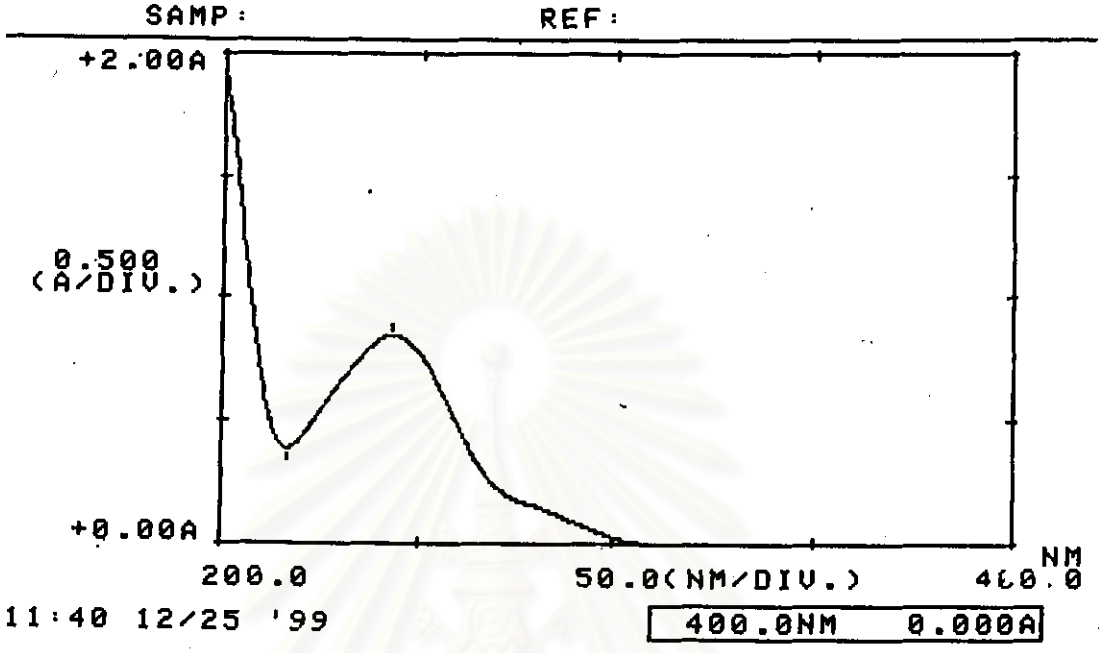


Figure 204 The tracing of compression force

Appendix 8



*** PEAK-PICK ***

-- PEAK --		-- VALLEY --	
λ	ABS	λ	ABS
243.0	0.846	216.6	0.392

Figure 205 UV Scanning for maximum absorbance wavelength of acetaminophen

Table 36 The absorbance of acetaminophen in phosphate buffer pH 5.8 at 243 nm

standard no.	concentration (mcg/ml)	absorbance
1	0.000	0.000
2	2.042	0.132
3	4.084	0.265
4	6.126	0.396
5	8.168	0.534
6	10.210	0.669
7	12.252	0.841

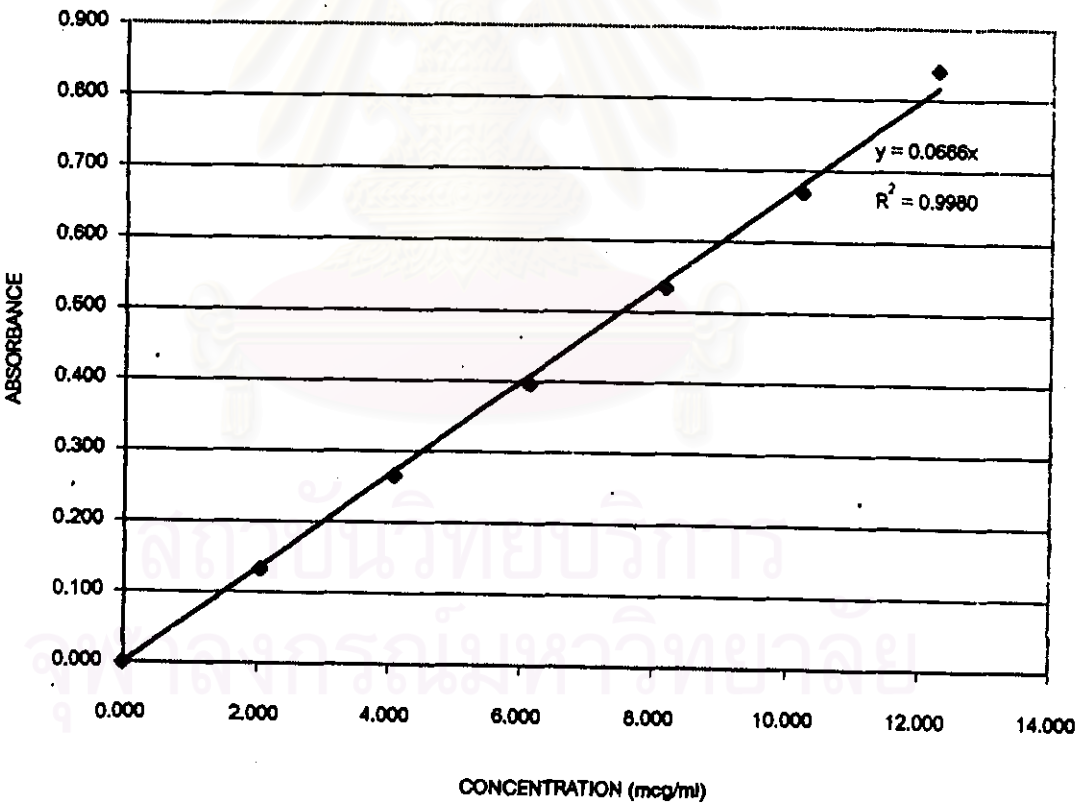


Figure 206 The standard curve of acetaminophen

Table 37 Dissolution of acetaminophen from acetaminophen tablets containing pregelatinized of native corn starch (CD) as filler/binder.

Code CD	sample 1						sample 2						sample 3								
wt/tab (g)	0.6053						0.5850						0.5760								
drug/tab (g)	0.5044						0.4875						0.4800								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.296	4.512	2.256	203.058	205.314	40.70	0.221	3.405	1.703	153.226	154.928	31.78	0.222	3.420	1.710	153.890	155.600	32.42	34.97	4.98	14.24
5	0.554	8.322	4.161	374.480	380.897	75.51	0.485	7.303	3.651	328.634	333.988	68.51	0.445	6.712	3.356	302.057	307.123	63.98	69.34	5.81	8.38
10	0.668	10.005	5.002	450.224	461.644	91.52	0.647	9.695	4.847	436.271	446.473	91.58	0.607	9.104	4.552	409.694	419.312	87.36	90.15	2.42	2.69
15	0.681	10.197	5.098	458.862	475.380	94.24	0.666	9.975	4.988	448.895	464.084	95.20	0.643	9.636	4.818	433.613	448.050	93.34	94.26	0.93	0.98
30	0.683	10.226	5.113	460.190	481.822	95.52	0.664	9.946	4.973	447.566	467.729	95.94	0.652	9.769	4.884	439.593	458.914	95.61	95.69	0.22	0.23
45	0.682	10.212	5.106	459.526	486.263	96.40	0.668	10.005	5.002	450.224	475.389	97.52	0.653	9.784	4.892	440.258	464.470	96.76	96.89	0.57	0.59
60	0.675	10.108	5.054	454.875	486.666	96.48	0.660	9.887	4.943	444.909	475.017	97.44	0.648	9.710	4.855	436.936	466.003	97.08	97.00	0.48	0.50

Table 38 Dissolution of acetaminophen from acetaminophen tablets containing pregelatinized of acid-treated corn starch (CE) as filler/binder.

Code CE	sample 1						sample 2						sample 3								
wt/tab (g)	0.5901						0.6084						0.5962								
drug/tab (g)	0.4918						0.5070						0.4968								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.477	7.185	3.592	323.319	326.911	66.48	0.451	6.801	3.400	306.044	309.444	61.03	0.456	6.875	3.437	309.366	312.803	62.96	63.49	2.76	4.35
5	0.637	9.547	4.774	429.627	437.993	89.07	0.642	9.621	4.811	432.949	441.160	87.01	0.631	9.459	4.729	425.640	433.807	87.31	87.80	1.11	1.26
10	0.686	10.271	5.135	462.184	475.685	96.73	0.744	11.127	5.564	500.720	514.495	101.48	0.667	9.990	4.995	449.560	462.722	93.13	97.12	4.19	4.31
15	0.670	10.035	5.017	451.553	470.072	95.59	0.694	10.389	5.194	467.499	486.468	95.95	0.682	10.212	5.106	459.526	477.794	96.17	95.90	0.29	0.30
30	0.674	10.094	5.047	454.211	477.776	97.16	0.686	10.271	5.135	462.184	486.288	95.91	0.674	10.094	5.047	454.211	477.525	96.11	96.40	0.67	0.69
45	0.670	10.035	5.017	451.553	480.136	97.64	0.687	10.286	5.143	462.848	492.095	97.06	0.675	10.108	5.054	454.875	483.244	97.26	97.32	0.29	0.30
60	0.656	9.828	4.914	442.251	475.748	96.75	0.679	10.167	5.084	457.533	491.864	97.01	0.668	10.005	5.002	450.224	483.595	97.34	97.03	0.30	0.30

Table 39 Dissolution of acetaminophen from acetaminophen tablets containing pregelatinized-acid treated corn starch (CF) as filler/binder.

Code CF				sample 1					sample 2						sample 3								
wt/tab (g)				0.5916					0.6021						0.6001								
drug/tab (g)				0.4930					0.5018						0.5001								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.492	7.406	3.703	333.285	336.988	68.35	0.495	7.451	3.725	335.278	339.004	67.56	0.544	8.174	4.087	367.835	371.922	74.37	70.10	3.72	5.31
5	0.668	10.005	5.002	450.224	458.930	93.09	0.644	9.651	4.825	434.278	442.829	88.26	0.658	9.857	4.929	443.580	452.596	90.50	90.62	2.42	2.67
10	0.676	10.123	5.062	455.540	469.307	95.19	0.702	10.507	5.253	472.815	486.619	96.98	0.694	10.389	5.194	467.499	481.709	96.33	96.17	0.91	0.94
15	0.690	10.330	5.165	464.841	483.774	98.13	0.711	10.640	5.320	478.794	497.918	99.24	0.685	10.256	5.128	461.519	480.857	96.16	97.84	1.56	1.60
30	0.681	10.197	5.098	458.862	482.892	97.95	0.688	10.300	5.150	463.513	487.787	97.22	0.686	10.271	5.135	462.184	486.657	97.32	97.49	0.40	0.41
45	0.671	10.049	5.025	452.217	481.273	97.62	0.678	10.153	5.076	456.868	486.219	96.90	0.676	10.123	5.062	455.540	485.075	97.00	97.17	0.39	0.40
60	0.656	9.828	4.914	442.251	476.220	96.60	0.665	9.961	4.980	448.231	482.562	96.18	0.669	10.020	5.010	450.889	485.433	97.07	96.61	0.45	0.46

Table 40 Dissolution of actaminophen from acetaminophen tablets containing pregelatinized acid treated tapioca starch (TE) as filler/binder.

Code TE	sample 1						sample 2						sample 3								
wt/tab (g)	0.6061						0.6018						0.6041								
drug/tab (g)	0.5051						0.5015						0.5034								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.264	4.040	2.020	181.796	183.816	36.39	0.294	4.483	2.241	201.729	203.970	40.67	0.383	5.797	2.898	260.863	263.761	52.39	43.15	8.28	19.20
5	0.485	7.303	3.651	328.634	334.306	66.19	0.518	7.790	3.895	350.560	356.697	71.13	0.603	9.045	4.523	407.036	414.458	82.33	73.21	8.27	11.30
10	0.618	9.267	4.633	417.003	427.308	84.60	0.664	9.946	4.973	447.566	458.676	91.46	0.694	10.389	5.194	467.499	480.115	95.37	90.48	5.45	6.03
15	0.685	10.256	5.128	461.519	476.952	94.43	0.700	10.477	5.239	471.486	487.834	97.27	0.698	10.448	5.224	470.157	487.996	96.94	96.21	1.55	1.62
30	0.690	10.330	5.165	464.841	485.439	96.11	0.689	10.315	5.158	464.177	485.683	96.85	0.682	10.212	5.106	459.526	482.471	95.84	96.27	0.52	0.54
45	0.690	10.330	5.165	464.841	490.604	97.13	0.689	10.315	5.158	464.177	490.840	97.87	0.686	10.271	5.135	462.184	490.264	97.39	97.47	0.38	0.39
60	0.677	10.138	5.069	456.204	487.035	96.43	0.676	10.123	5.062	455.540	487.264	97.16	0.671	10.049	5.025	452.217	485.323	96.41	96.66	0.43	0.45

Table 41 Dissolution of acetaminophen from acetaminophen tablets containing pregelatinized acid treated tapioca starch (TF) as filler/binder.

Code TF	sample 1						sample 2						sample 3								
wt/tab (g)	0.5898						0.5878						0.6043								
drug/tab (g)	0.4915						0.4898						0.5036								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.402	6.077	3.039	273.487	276.526	56.26	0.223	3.435	1.717	154.555	156.272	31.90	0.548	8.233	4.117	370.493	374.610	74.39	54.18	21.32	39.34
5	0.665	9.961	4.980	448.231	456.250	92.83	0.449	6.771	3.386	304.715	309.818	63.25	0.702	10.507	5.253	472.815	482.185	95.75	83.94	17.98	21.42
10	0.700	10.477	5.239	471.486	484.744	98.63	0.643	9.636	4.818	433.613	443.534	90.55	0.722	10.802	5.401	486.103	500.874	99.46	96.21	4.92	5.12
15	0.692	10.359	5.180	466.170	484.608	98.60	0.688	10.300	5.150	463.513	478.584	97.70	0.696	10.418	5.209	468.828	488.808	97.07	97.79	0.77	0.79
30	0.684	10.241	5.121	460.855	484.413	98.56	0.692	10.359	5.180	466.170	486.421	99.30	0.693	10.374	5.187	466.835	492.002	97.70	98.52	0.80	0.81
45	0.675	10.108	5.054	454.875	483.487	98.37	0.679	10.167	5.084	457.533	482.867	98.58	0.688	10.300	5.150	463.513	493.830	98.06	98.34	0.26	0.26
60	0.670	10.035	5.017	451.553	485.182	98.71	0.670	10.035	5.017	451.553	481.905	98.38	0.681	10.197	5.098	458.862	494.278	98.15	98.42	0.28	0.29

Table 42 Dissolution of acetaminophen from acetaminophen tablets containing Era-Gel (E) as filler/binder.

Code E	sample 1						sample 2						sample 3								
wt/tab (g)	0.6077						0.5988						0.6052								
drug/tab (g)	0.5064						0.4990						0.5043								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.452	6.816	3.408	306.708	310.116	61.24	0.490	7.377	3.688	331.956	335.645	67.26	0.521	7.835	3.917	352.554	356.471	70.68	66.39	4.78	7.20
5	0.642	9.621	4.811	432.949	441.167	87.12	0.656	9.828	4.914	442.251	450.853	90.35	0.653	9.784	4.892	440.258	449.067	89.04	88.84	1.63	1.83
10	0.693	10.374	5.187	466.835	480.240	94.83	0.693	10.374	5.187	466.835	480.624	96.32	0.691	10.345	5.172	465.506	479.487	95.07	95.41	0.80	0.84
15	0.699	10.463	5.231	470.821	489.458	96.65	0.701	10.492	5.246	472.150	491.186	98.43	0.702	10.507	5.253	472.815	492.049	97.56	97.55	0.89	0.91
30	0.703	10.522	5.261	473.479	497.377	98.21	0.690	10.330	5.165	464.841	489.042	98.00	0.694	10.389	5.194	467.499	491.928	97.54	97.92	0.35	0.35
45	0.689	10.315	5.158	464.177	493.232	97.40	0.682	10.212	5.106	459.526	488.832	97.96	0.690	10.330	5.165	464.841	494.436	98.04	97.80	0.35	0.36
60	0.687	10.286	5.143	462.848	497.046	98.15	0.673	10.079	5.039	453.546	487.892	97.77	0.681	10.197	5.098	458.862	493.554	97.86	97.93	0.20	0.20

Table 43 Dissolution of acetaminophen from acetaminophen tablets containing National 1551 (N) as filler/binder.

Code N	sample 1						sample 2						sample 3								
wt/tab (g)	0.5934						0.5903						0.6048								
drug/tab (g)	0.4945						0.4919						0.5040								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.356	5.398	2.699	242.923	245.622	49.67	0.360	5.457	2.729	245.581	248.310	50.48	0.410	6.196	3.098	278.802	281.900	55.93	52.03	3.41	6.55
5	0.542	8.145	4.072	366.506	373.278	75.49	0.540	8.115	4.058	365.178	371.964	75.62	0.587	8.809	4.405	396.406	403.908	80.14	77.08	2.65	3.44
10	0.673	10.079	5.039	453.546	465.357	94.11	0.642	9.621	4.811	432.949	444.546	90.37	0.717	10.728	5.364	482.781	495.648	98.34	94.27	3.99	4.23
15	0.698	10.448	5.224	470.157	487.192	98.52	0.660	9.887	4.943	444.909	461.449	93.81	0.744	11.127	5.564	500.720	519.151	103.01	98.44	4.60	4.67
30	0.694	10.389	5.194	467.499	489.728	99.04	0.679	10.167	5.084	457.533	479.157	97.41	0.716	10.714	5.357	482.117	505.903	100.38	98.94	1.49	1.50
45	0.682	10.212	5.106	459.526	486.861	98.46	0.675	10.108	5.054	454.875	481.553	97.89	0.700	10.477	5.239	471.486	500.511	99.31	98.55	0.71	0.72
60	0.674	10.094	5.047	454.211	486.593	98.40	0.668	10.005	5.002	450.224	481.905	97.96	0.688	10.300	5.150	463.513	497.688	98.75	98.37	0.39	0.40

Table 44 Dissolution of acetaminophen from acetaminophen tablets containing Starch 1500 (S) as filler/binder.

Code S		sample 1						sample 2						sample 3								
wt/tab (g)		0.5917						0.6029						0.5915								
drug/tab (g)		0.4931						0.5024						0.4929								
Time (min)	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	ABS at 243 nm	Drug Conc. (mcg/ml)	Drug Content in 10 ml (mg)	Drug Content in 900 ml (mg)	Cumerative of Drug in 900 ml (mg)	% Drug Disolved	Mean of % Drug Dissolved	SD	%CV
2	0.358	5.428	2.714	244.252	246.966	50.09	0.489	7.362	3.681	331.292	334.973	66.67	0.525	7.894	3.947	355.211	359.158	72.86	63.21	11.78	18.63
5	0.592	8.883	4.441	399.728	406.883	82.52	0.621	9.311	4.656	418.996	427.333	85.06	0.631	9.459	4.729	425.640	434.316	88.11	85.23	2.80	3.29
10	0.679	10.167	5.084	457.533	469.772	95.27	0.662	9.916	4.958	446.238	459.532	91.46	0.686	10.271	5.135	462.184	475.995	96.57	94.43	2.65	2.81
15	0.702	10.507	5.253	472.815	490.307	99.44	0.694	10.389	5.194	467.499	485.988	96.73	0.691	10.345	5.172	465.506	484.490	98.29	98.15	1.36	1.38
30	0.699	10.463	5.231	470.821	493.545	100.09	0.694	10.389	5.194	467.499	491.183	97.76	0.690	10.330	5.165	464.841	488.990	99.20	99.02	1.18	1.19
45	0.688	10.300	5.150	463.513	491.387	99.66	0.678	10.153	5.076	456.868	485.628	96.66	0.674	10.094	5.047	454.211	483.406	98.07	98.13	1.50	1.53
60	0.687	10.286	5.143	462.848	495.865	100.56	0.671	10.049	5.025	452.217	486.002	96.73	0.668	10.005	5.002	450.224	484.422	98.28	98.52	1.93	1.96

Appendix 9

Table 45 Dependent comparison (Student-Newman-Keuls Test) for disintegration time of acetaminophen tablets containing various pregelatinized starches

Filler/ binder	CD	CE	CF	TE	TF	E	N	S
CD	-	S	S	S	S	S	S	S
CE		-	S			S	S	S
CF			-			NS		NS
TE		S	S	-	S	S	S	S
TF		NS	S		-	S	S	S
E						-		
N			NS			NS	-	NS
S						NS		-

S : Significant ($P < 0.05$)
NS : Non-significant

Table 46 Dependent comparison (Student-Newman-Keuls Test) for $T_{80\%}$ of acetaminophen tablets containing various pregelatinized starches

Filler/ binder	CD	CE	CF	TE	TF	E	N	S
CD	-	S	S	NS	S	S	NS	S
CE		-	NS			NS		
CF			-					
TE		S	S	-	S	S	NS	S
TF		NS	NS		-	NS		NS
E			NS			-		
N		S	S		NS	S	-	S
S		NS	NS			NS		-

S : Significant ($P < 0.05$)
NS : Non-significant

BIOGRAPHY

Miss Neeranard Jinachai was born on January 20, 1972 in Nan, Thailand. She got her Bachelor degree in Pharmacy, Mahidol University in 1995. After graduated, she worked as a hospital pharmacist in Weingsa Hospital, Nan province for two years. She used to be a research and development pharmacist at Sang Thai Company, Pharmaceutical Laboratories, Bangkok before further her study in the department of manufacturing Pharmacy at the Chaulalongkorn University.