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APPENDICES

APPENDIX A

PARTICLE SIZE ANALYSIS

Theoritically, log-normal distribution of particle size would have resulted in a straight line when the cumulative percent data are plotted against the log of particle size in log-probability paper. To minimize human error in determining the best straight line, regression analysis is employed. The greater weight or the median diameter by weight should be given to those points lying closest to the 50% cumulative point (Gordon, 1990). Cumulative frequency plot for 16 granule formulations shows in the following figures.

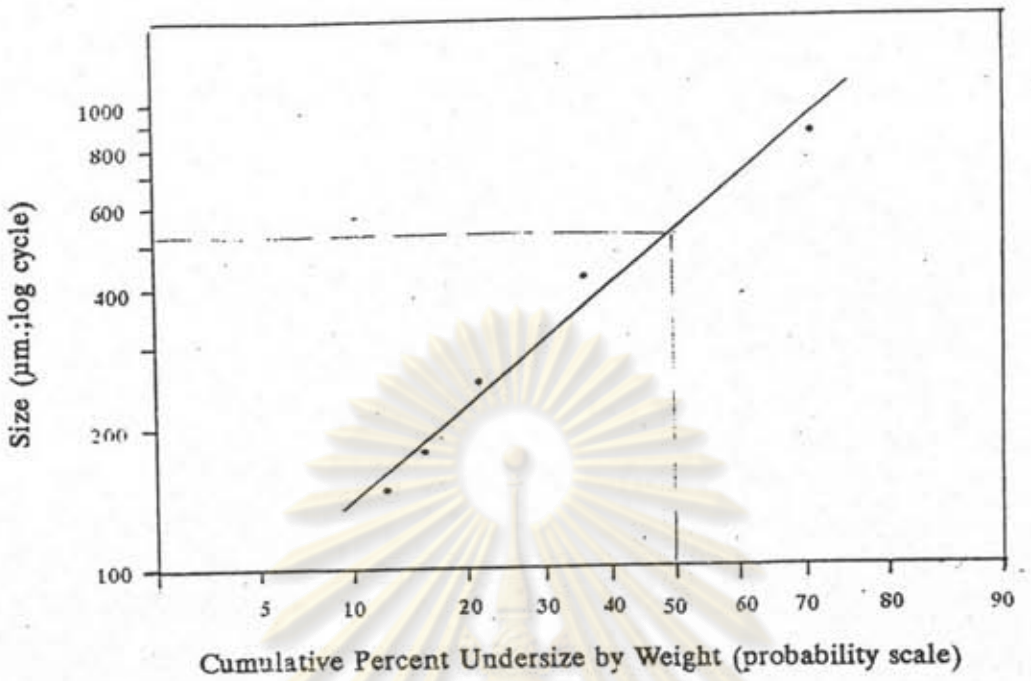

Figure A-1 Cumulative Frequency Plot for Yeast Extract Granule Formula No.1

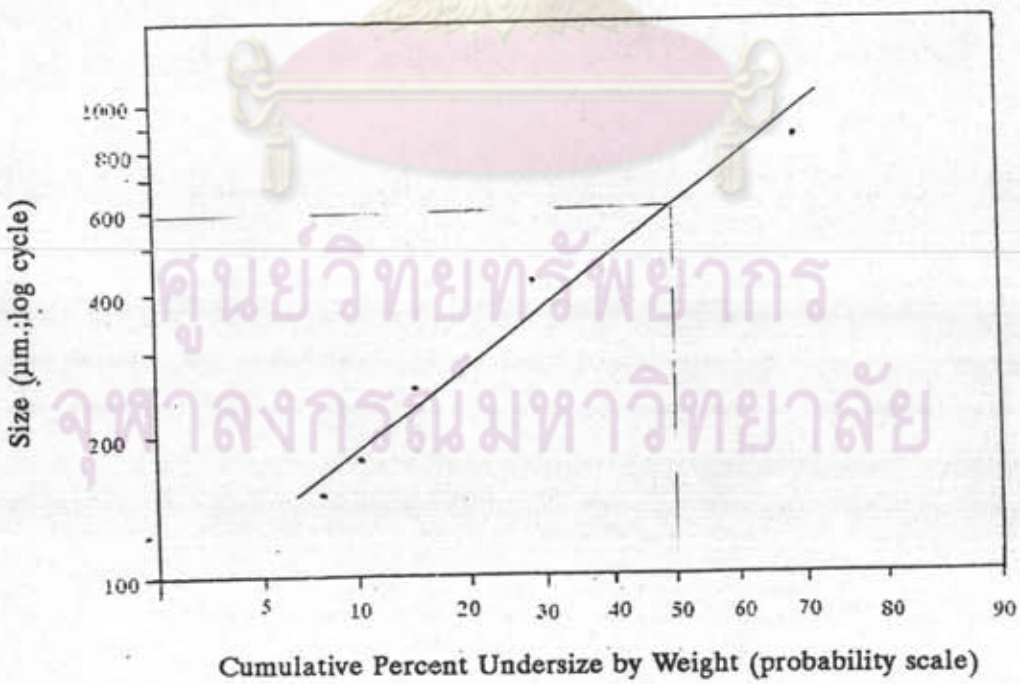

Figure A-2 Cumulative Frequency Plot for Yeast Extract Granule Formula No.2

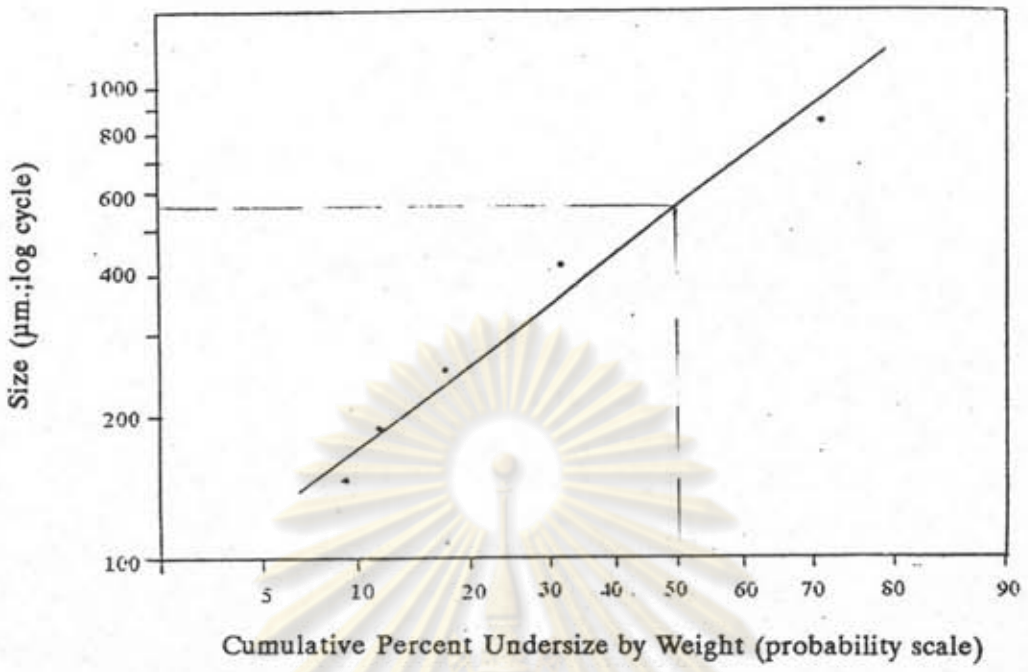

Figure A-3 Cumulative Frequency Plot for Yeast Extract Granule Formula No.3

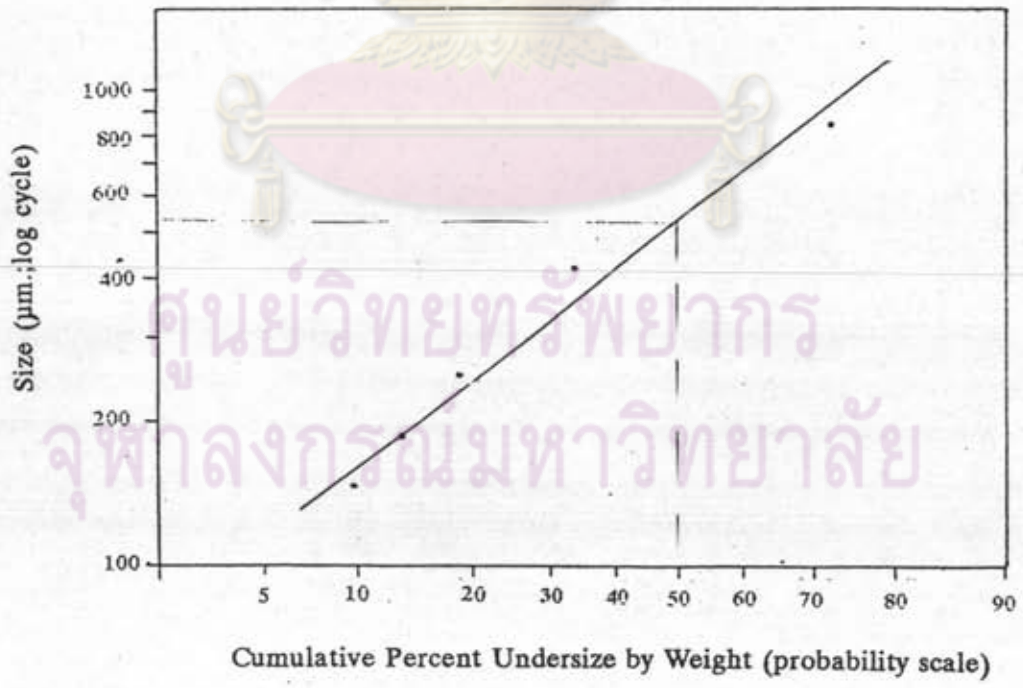

Figure A-4 Cumulative Frequency Plot for Yeast Extract Granule Formula No.4

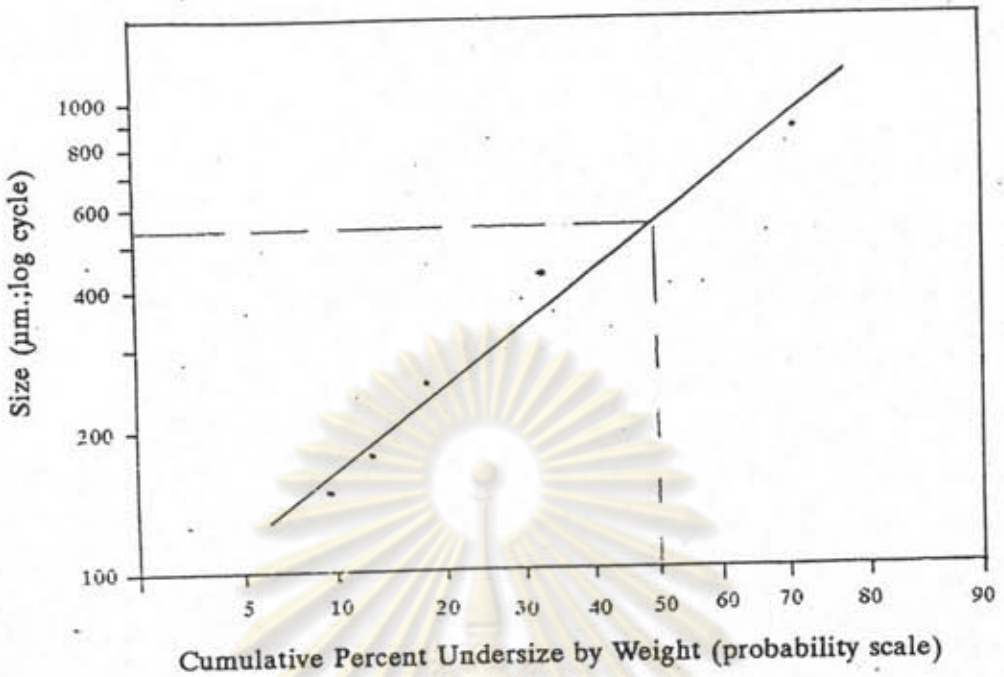

Figure A-5 Cumulative Frequency Plot for Yeast Extract Granule Formula No.5

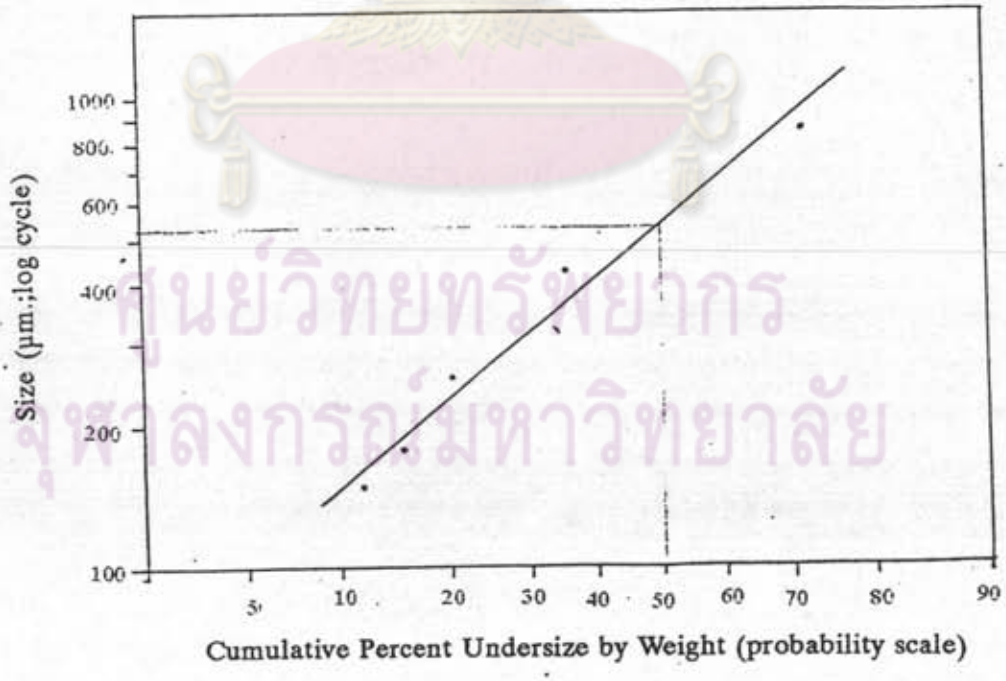

Figure A-6 Cumulative Frequency Plot for Yeast Extract Granule Formula No.6

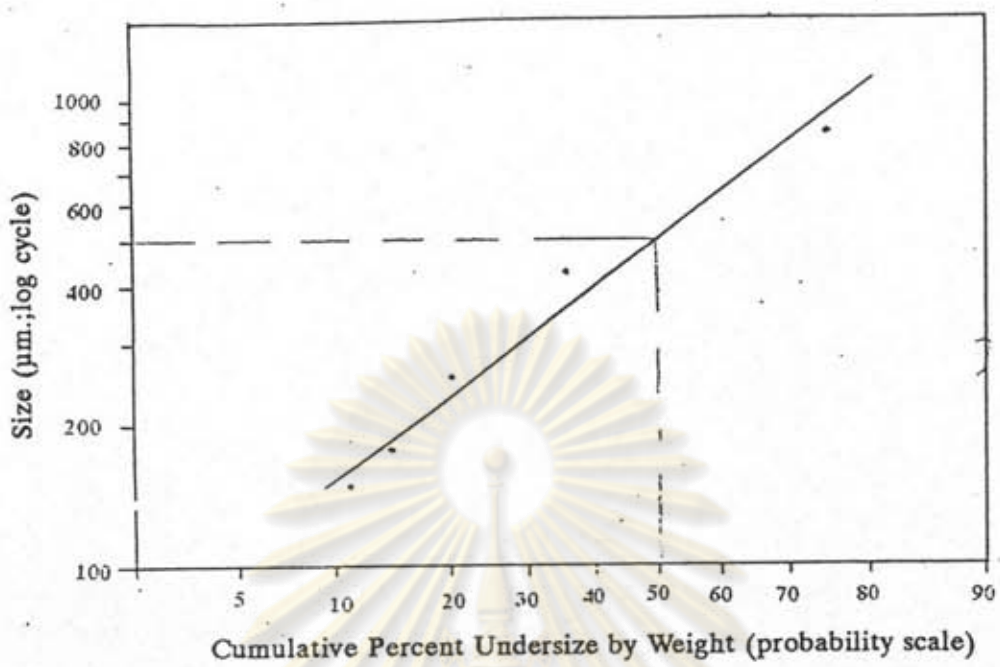

Figure A-7 Cumulative Frequency Plot for Yeast Extract Granule Formula No.7

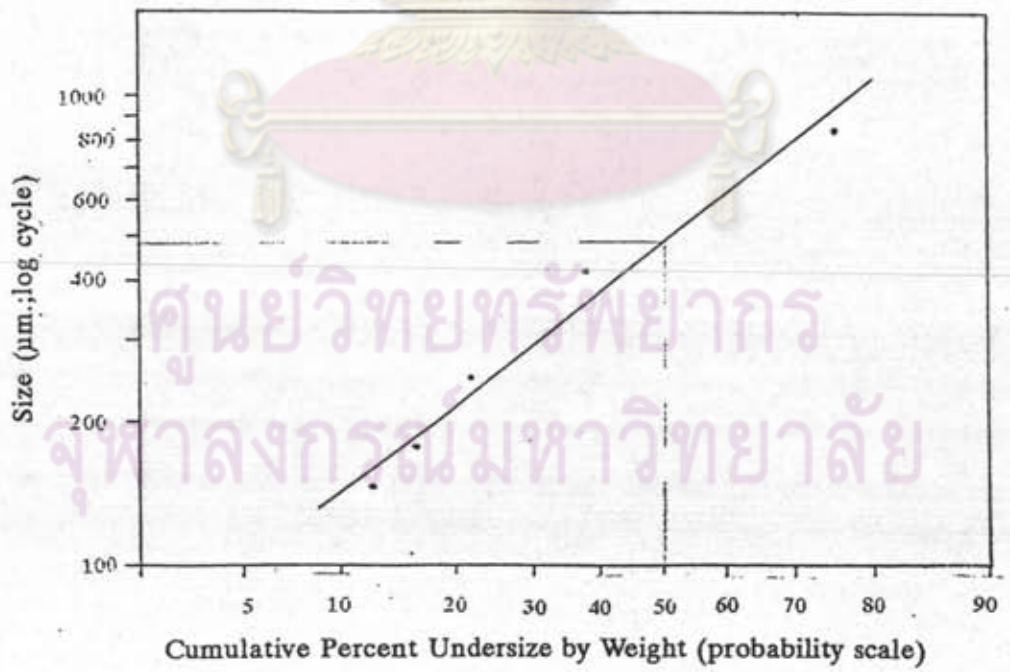

Figure A-8 Cumulative Frequency Plot for Yeast Extract Granule Formula No.8

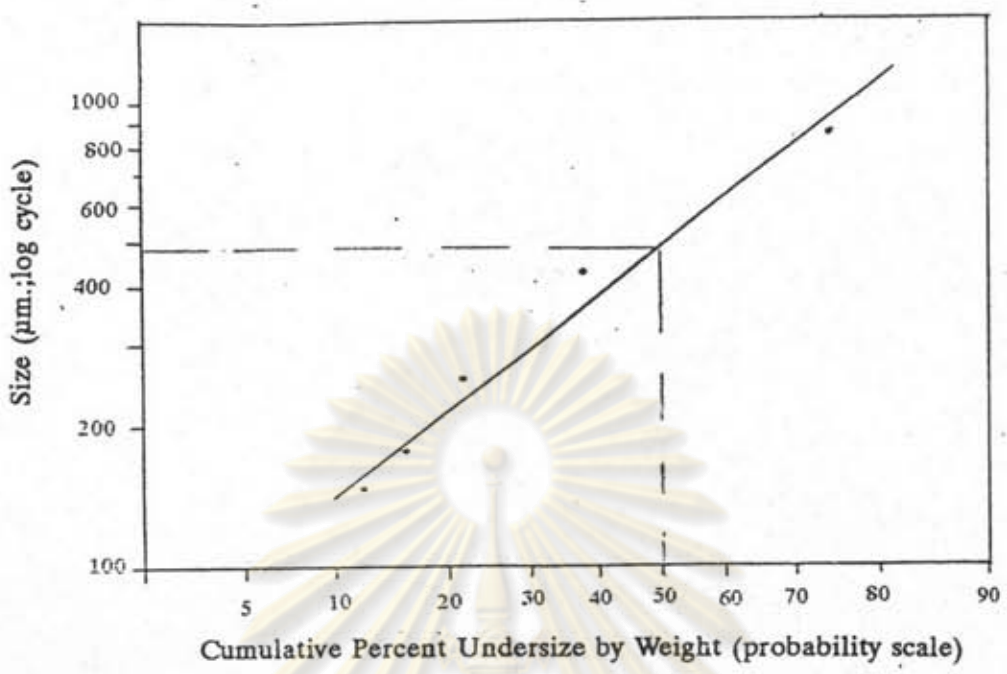

Figure A-9 Cumulative Frequency Plot for Yeast Extract Granule Formula No.9

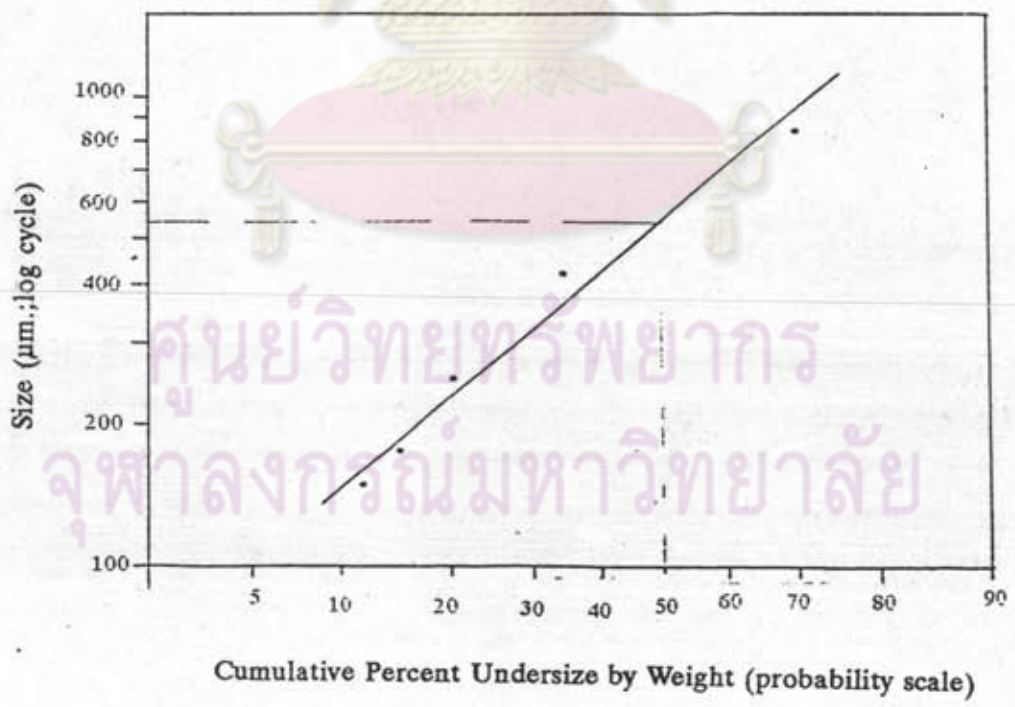

Figure A-10 Cumulative Frequency Plot for Yeast Extract Granule Formula No.10

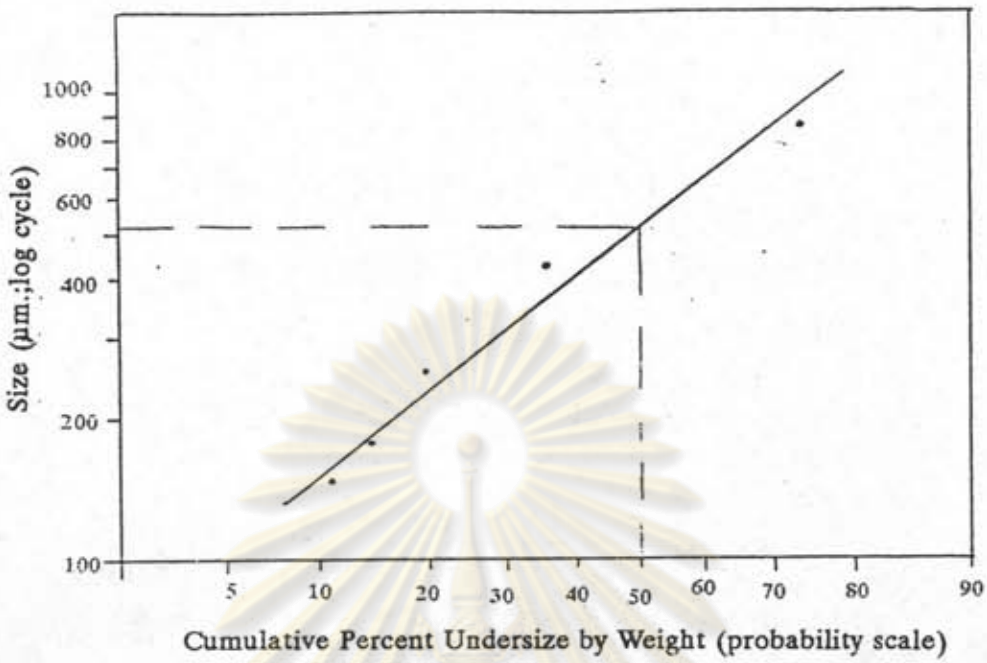

Figure A-11 Cumulative Frequency Plot for Yeast Extract Granule Formula No.11

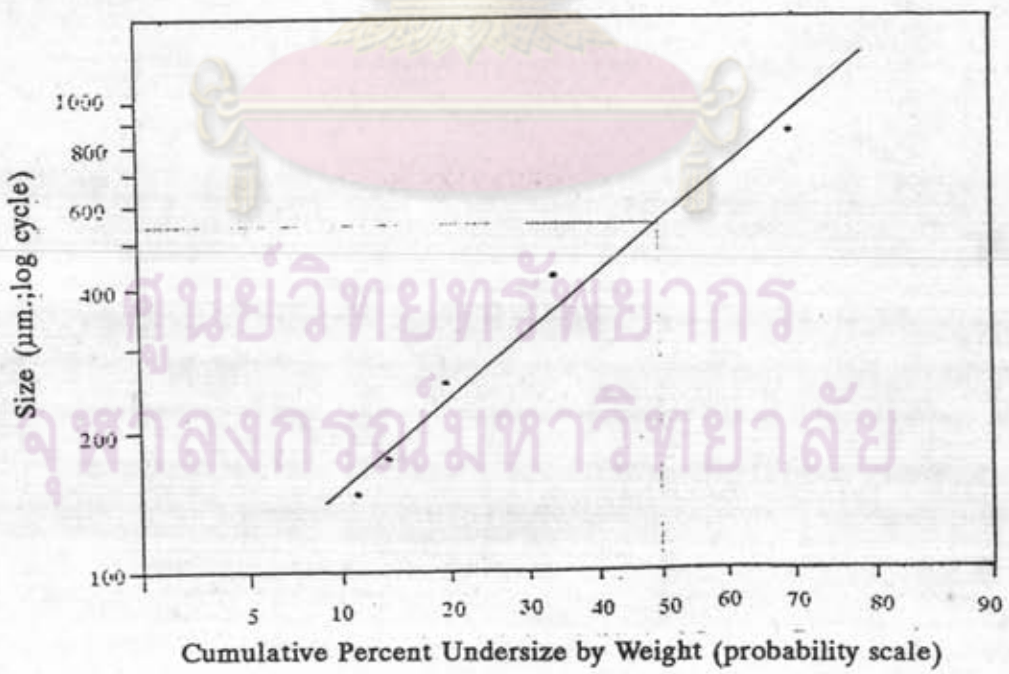

Figure A-12 Cumulative Frequency Plot for Yeast Extract Granule Formula No.12

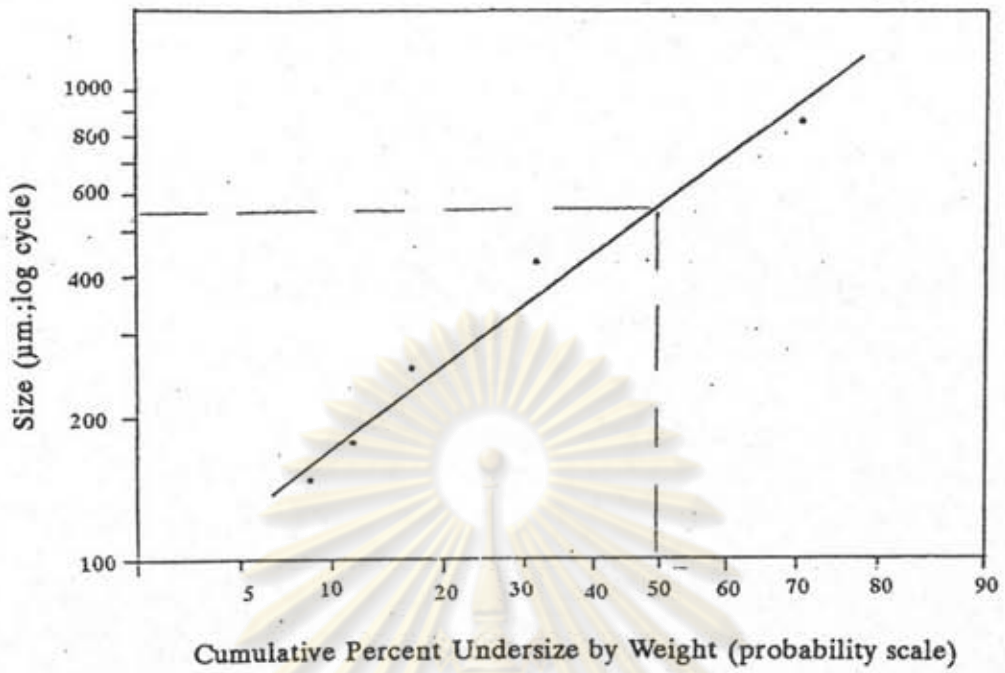

Figure A-13 Cumulative Frequency Plot for Yeast Extract Granule Formula No.13

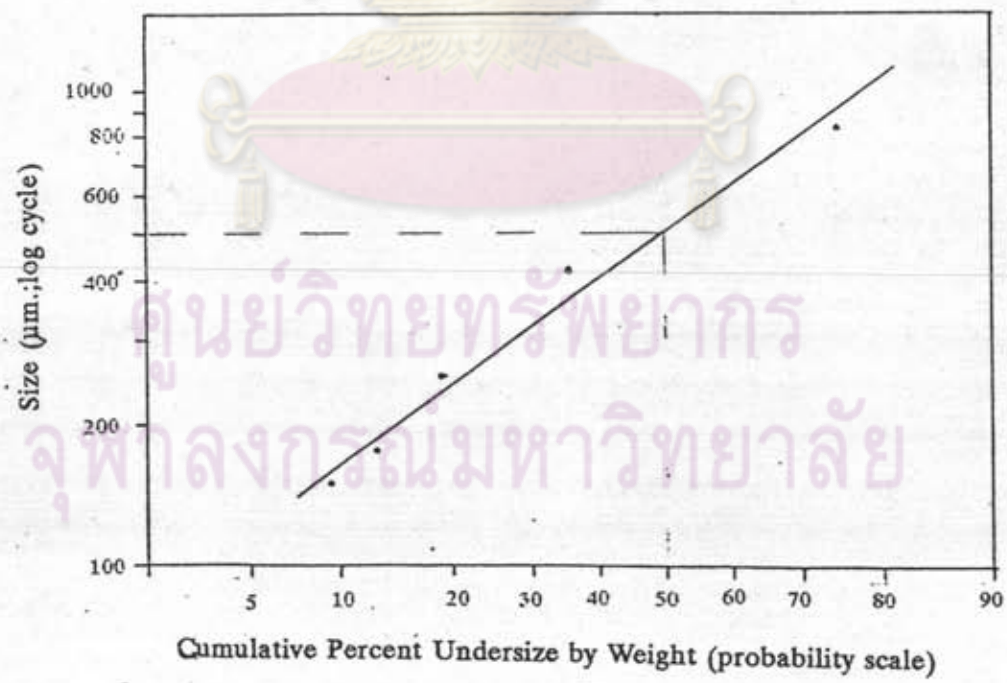

Figure A-14 Cumulative Frequency Plot for Yeast Extract Granule Formula No.14

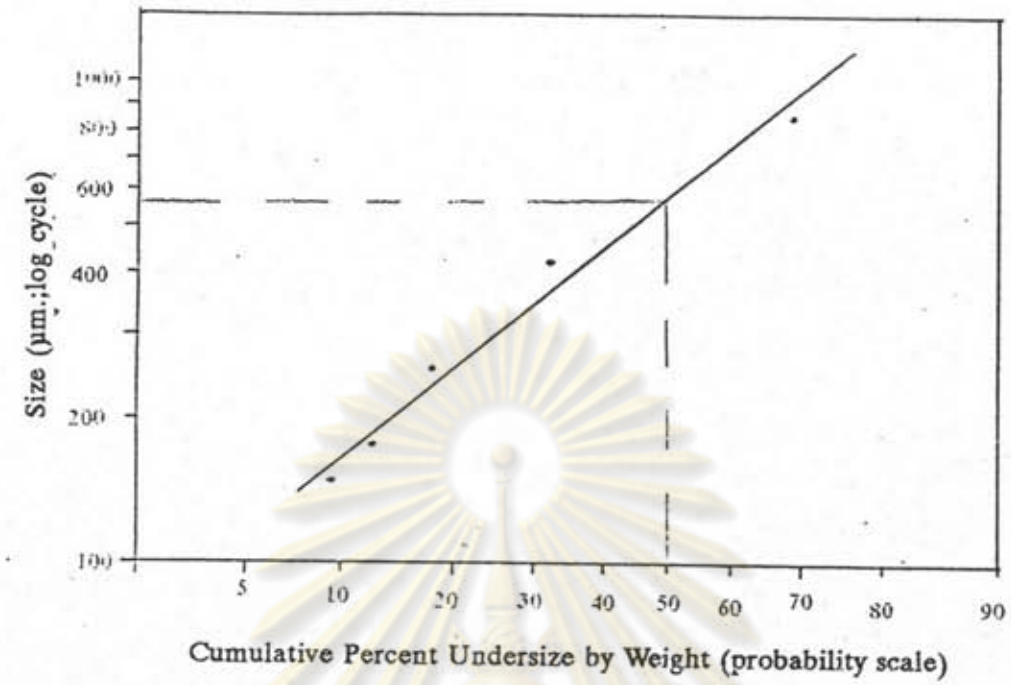

Figure A-15 Cumulative Frequency Plot for Yeast Extract Granule Formula No.15

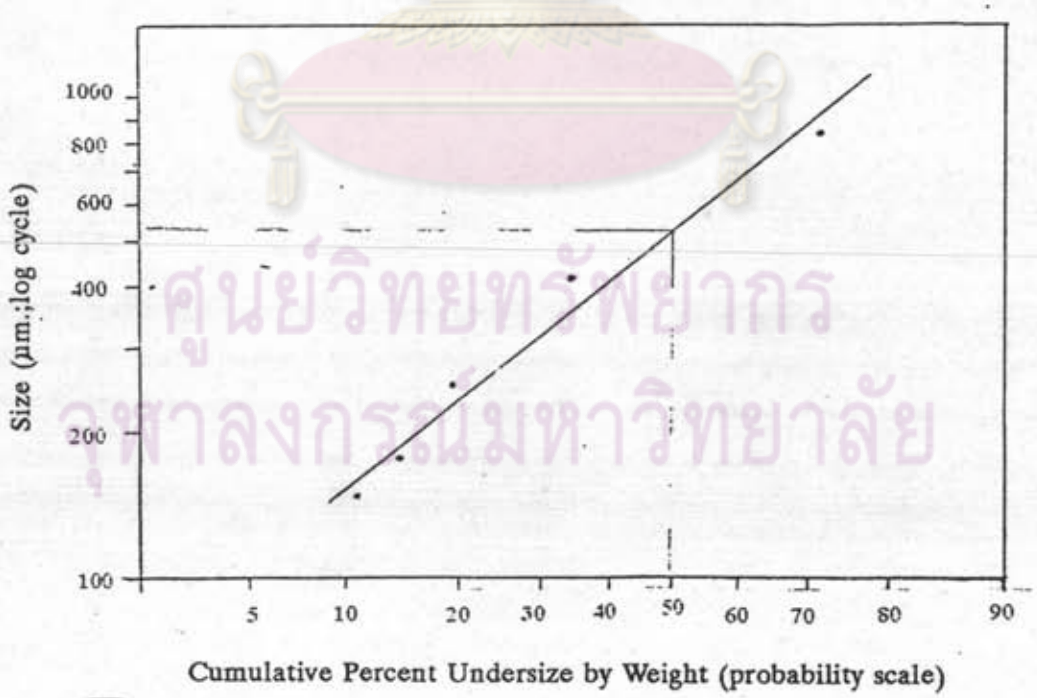

Figure A-16 Cumulative Frequency Plot for Yeast Extract Granule Formula No.16

APPENDIX B

THE 2^2 FACTORIAL DESIGN

Experimental arrangement for this 2^2 factorial design are as follows:

		Factor B	
		High	Low
Factor A	High	Y_{11n}	Y_{12n}
	Low	Y_{21n}	Y_{22n}

Factor A is magnesium carbonate light. Factor B is corn starch paste. n is replicate. The observed data, Y, in the table are physical property data of yeast extract granule shown in Table 3-3. The analysis of variance for physical property data of yeast extract granule are shown in Table B-1 to B-5. Then compare the calculated F value with the critical F value obtained from table.

$$F_{(0.05,1,12)} = 4.75$$

Table B-1 Analysis of Variance for Bulk Density of Yeast Extract Granules

SOV	df	SS	MS	F-value
Factor A	1	3.056×10^{-4}	3.056×10^{-4}	1.12
Factor B	1	5.531×10^{-5}	5.531×10^{-5}	0.20
A x B	1	5.674×10^{-5}	5.674×10^{-5}	0.21
Error	12	3.275×10^{-3}	2.730×10^{-4}	

Table B-2 Analysis of Variance for Tapped Density of Yeast Extract Granules

SOV	df	SS	MS	F-value
Factor A	1	9.918×10^{-5}	9.918×10^{-5}	0.34
Factor B	1	4.001×10^{-4}	4.001×10^{-4}	1.39
A x B	1	2.255×10^{-4}	2.255×10^{-4}	0.78
Error	12	3.449×10^{-3}	2.874×10^{-4}	

Table B-3 Analysis of Variance for True Density of Yeast Extract Granules

SOV	df	SS	MS	F-value
Factor A	1	3.296×10^{-3}	3.296×10^{-3}	1.91
Factor B	1	7.629×10^{-6}	7.629×10^{-6}	0.004
A x B	1	3.090×10^{-3}	3.090×10^{-3}	1.79
Error	12	2.068×10^{-2}	1.723×10^{-3}	

Table B-4 Analysis of Variance for Percent Compressibility of Yeast Extract Granules

SOV	df	SS	MS	F-value
Factor A	1	1.035	1.035	0.43
Factor B	1	3.303	3.303	1.38
A x B	1	0.736	0.736	0.31
Error	12	28.708	2.392	

Table B-5 Analysis of Variance for Flow Rate of Yeast Extract Granules

SOV	df	SS	MS	F-value
Factor A	1	3.031	3.031	0.63
Factor B	1	3.906×10^{-3}	3.906×10^{-3}	8.11×10^{-4}
A x B	1	1.379	1.379	0.29
Error	12	57.806	4.817	

APPENDIX C

THE 2^4 FACTORIAL DESIGN

Analyze the data by Yate's method (Box, Hunter, and Hunter, 1978; Montgomery, 1991) to obtain contrast means or estimated factor effects. Then plot the estimated effects on the normal probability paper. To observe for any deviation from straight line. The large effects will be off the straight line whereas all of the effects that lie along the line are consequence of normal distribution error. The diagnostic checks (Box, Hunter, and Hunter, 1978) should be applied to to the residual and the residuals are plotted on normal probability paper. If the points on this plot lie reasonably close to a straight line, the large effects would be concluded to be significant.

Tables of estimated effects of 2^4 factorial experiment, with magnesium carbonate light, corn starch paste, dried corn starch, and magnesium stearate as variables, on weight variation, percent friability, thickness variation, and disintegration time of yeast extract tablets are shown in Table C-1 to C-5, respectively. Normal plot for those estimated effects are illustrated in Figure C-1a to C-5a and normal plot for their residuals are shown in Figure C-1b to Figure C-5b, respectively.

Table C-1 Estimated Effects of 2^4 Factorial Design on Percent Coefficient of Variation of Weight of Yeast Extract Tablets

Treatment Combination	Estimated Effects	Treatment Combination	Ranked Estimated Effects
1	2.18	c	-0.3
a	0.56	bc	-0.15
b	0.33	ad	-0.09
ab	0.22	ac	-0.08
c	-0.30	abcd	0.08
ac	-0.08	bd	0.22
bc	-0.15	ab	0.22
abc	0.32	bcd	0.23
d	0.53	acd	0.28
ad	-0.09	cd	0.29
bd	0.22	abc	0.32
abd	0.82	b	0.33
cd	0.29	d	0.53
acd	0.28	a	0.56
bcd	0.23	abd	0.82
abcd	0.08		

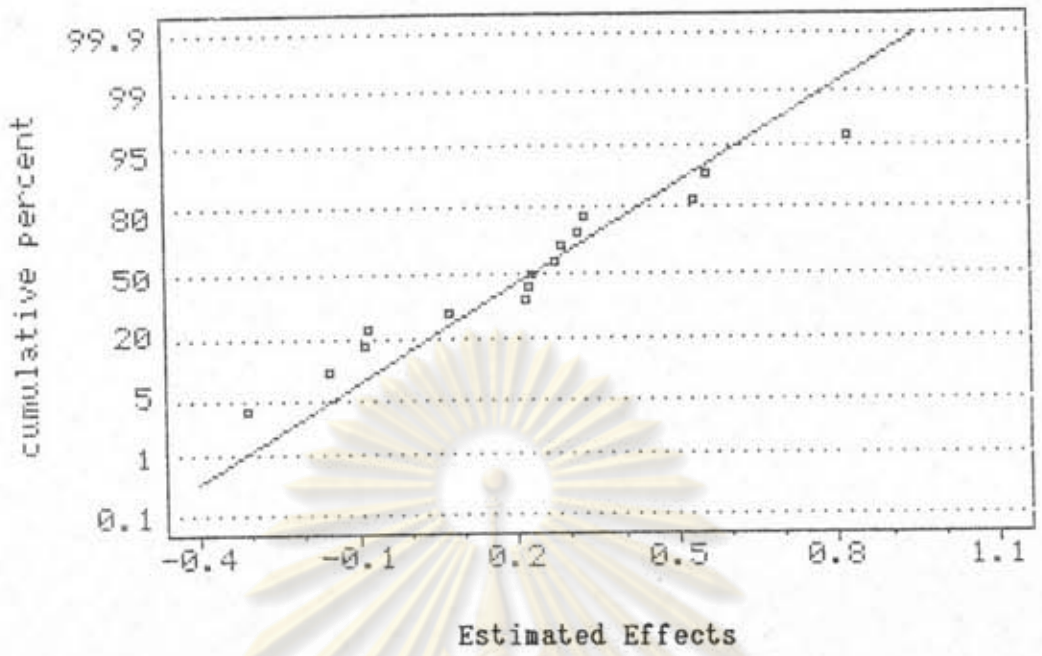

Figure C-1a Normal Probability Plot for Estimated Effects of Coefficient of Variation of Weight of Yeast Extract Tablets

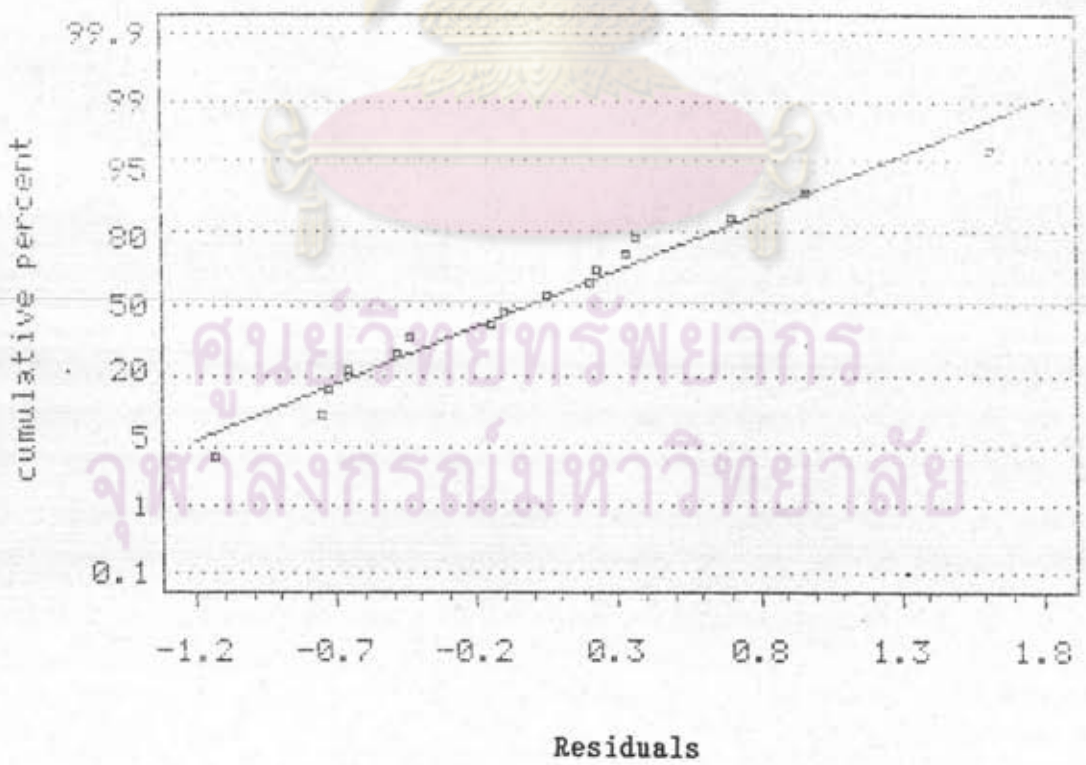

Figure C-1b Normal Probability Plot for Residuals of Coefficient of Variation of Weight

Table C-2 Estimated Effects of 2^4 Factorial Design on Hardness of Yeast Extract Tablet

Treatment Combination	Estimated Effects	Treatment Combination	Ranked Estimated Effects
1	6.94	c	-1.39
a	0.34	abcd	-0.44
b	-0.39	a	-0.34
ab	0.01	acd	-0.31
c	-1.39	d	-0.14
ac	-0.04	ad	-0.09
bc	0.79	cd	-0.06
abc	0.59	ac	-0.04
d	-0.14	ab	0.01
ad	-0.09	abd	0.14
bd	0.44	bcd	0.26
abd	0.14	a	0.34
cd	-0.06	bd	0.44
acd	-0.31	abc	0.59
bcd	0.26	bc	0.79
abcd	-0.44		

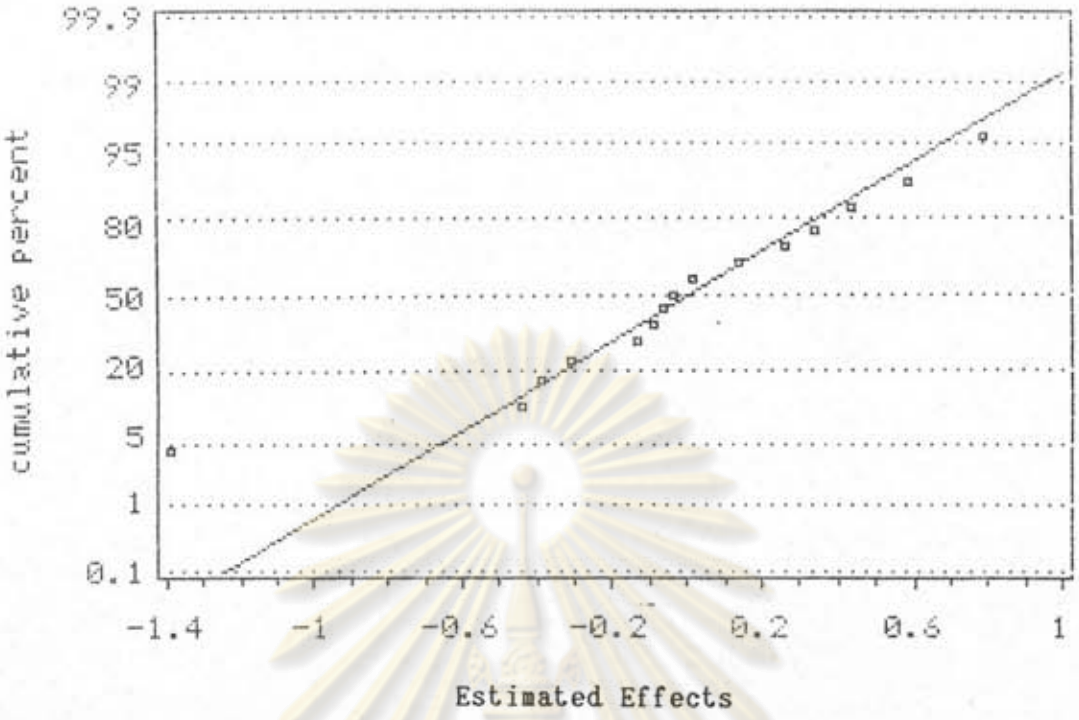

Figure C-2a Normal Probability Plot for Estimated Effects of Hardness of Yeast Extract Tablets

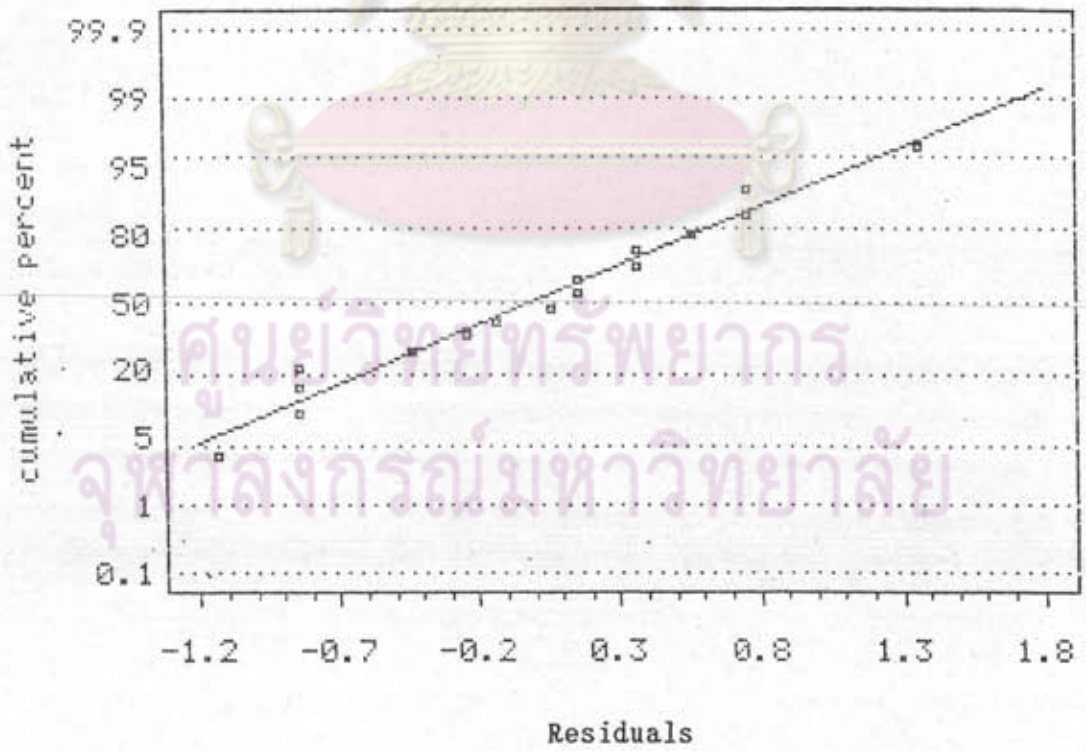

Figure C-2b Normal Probability Plot for Residuals of Hardness

Table C-3 Estimated Effects of 2^4 Factorial Design on Percent Friability of Yeast Extract Tablet

Treatment Combination	Estimated Effects	Treatment Combination	Ranked Estimated Effects
1	0.07	cd	-0.16
a	0.18	abd	-0.1
b	0.16	abcd	-0.1
ab	0.12	abc	0.01
c	0.07	bc	0.01
ac	0.09	ad	0.02
bc	0.01	bd	0.05
abc	0.01	c	0.07
d	0.08	d	0.08
ad	0.02	acd	0.09
bd	0.05	ac	0.09
abd	-0.10	ab	0.12
cd	-0.16	b	0.16
acd	0.09	a	0.18
bcd	0.24	bcd	0.24
abcd	-0.10		

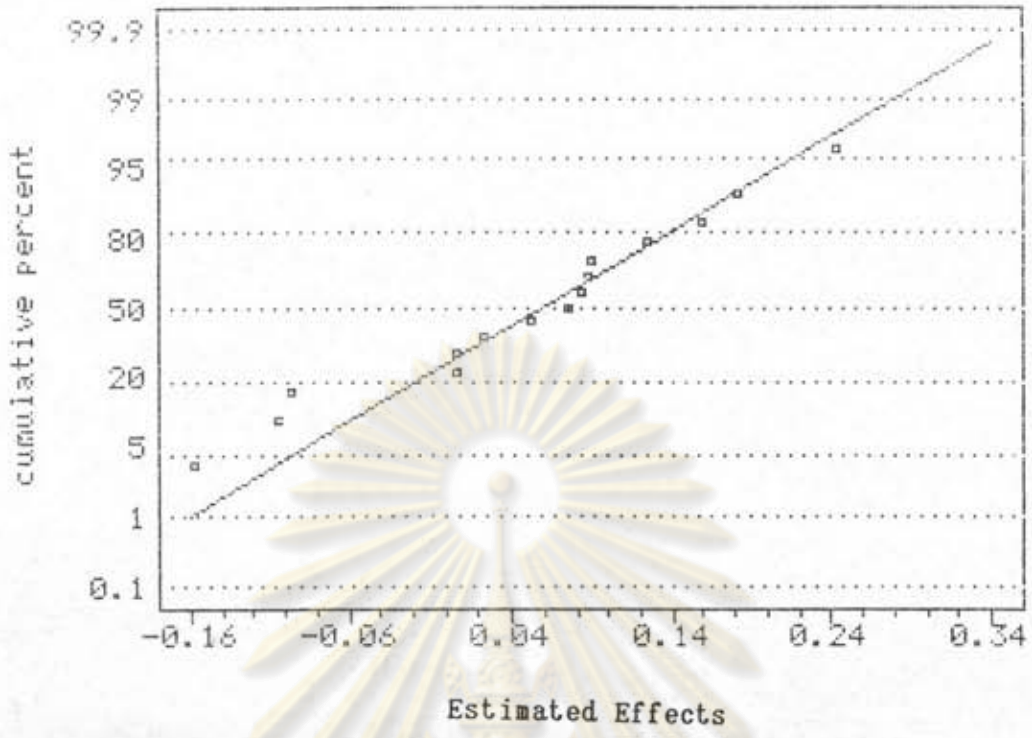

Figure C-3a Normal Probability Plot for Estimated Effects of Friability of Yeast Extract Tablets

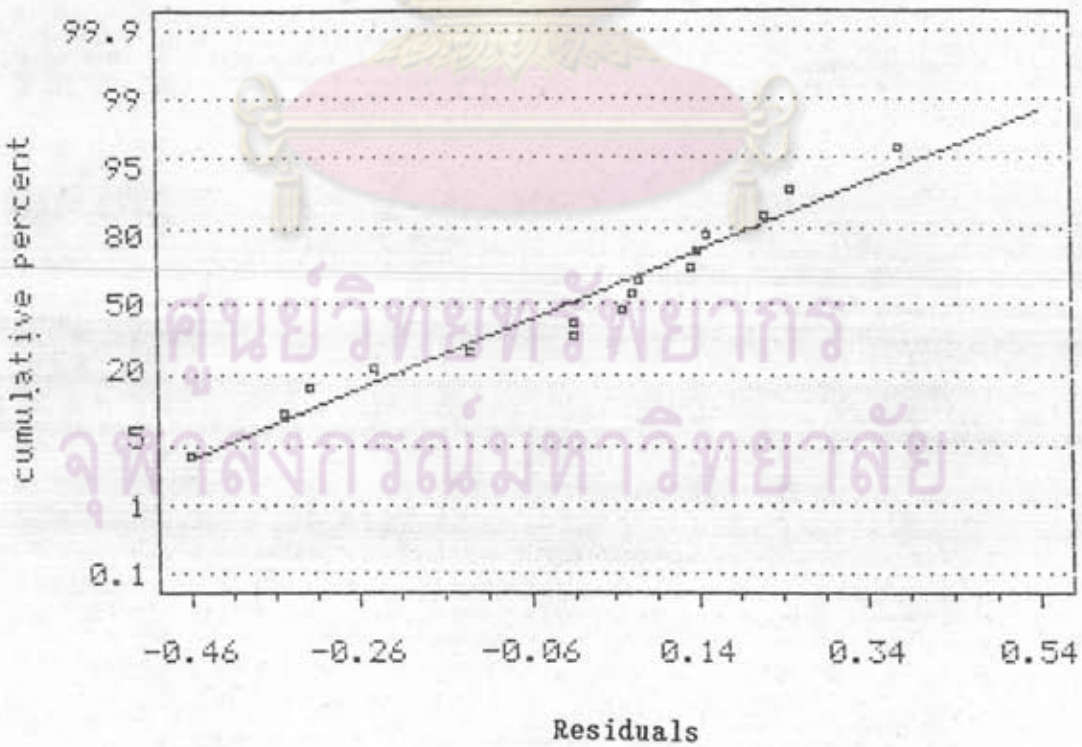

Figure C-3b Normal Probability Plot for Residuals of Friability

Table C-4 Estimated Effects of 2^4 Factorial Design on Percent Coefficient of Variation of Thickness of Yeast Extract Tablet

Treatment Combination	Estimated Effects	Treatment Combination	Ranked Estimated Effects
1	2.18	bc	-1.38
a	-0.29	ac	-0.90
b	-0.15	abcd	-0.74
ab	0.96	cd	-0.36
c	-0.05	a	-0.29
ac	-0.90	b	-0.15
bc	-1.38	c	-0.05
abc	0.12	abd	0.06
d	0.20	abc	0.12
ad	0.51	d	0.20
bd	0.31	bd	0.31
abd	0.06	acd	0.38
cd	-0.36	ad	0.51
acd	0.38	bcd	0.75
bcd	0.75	ab	0.96
abcd	-0.74		

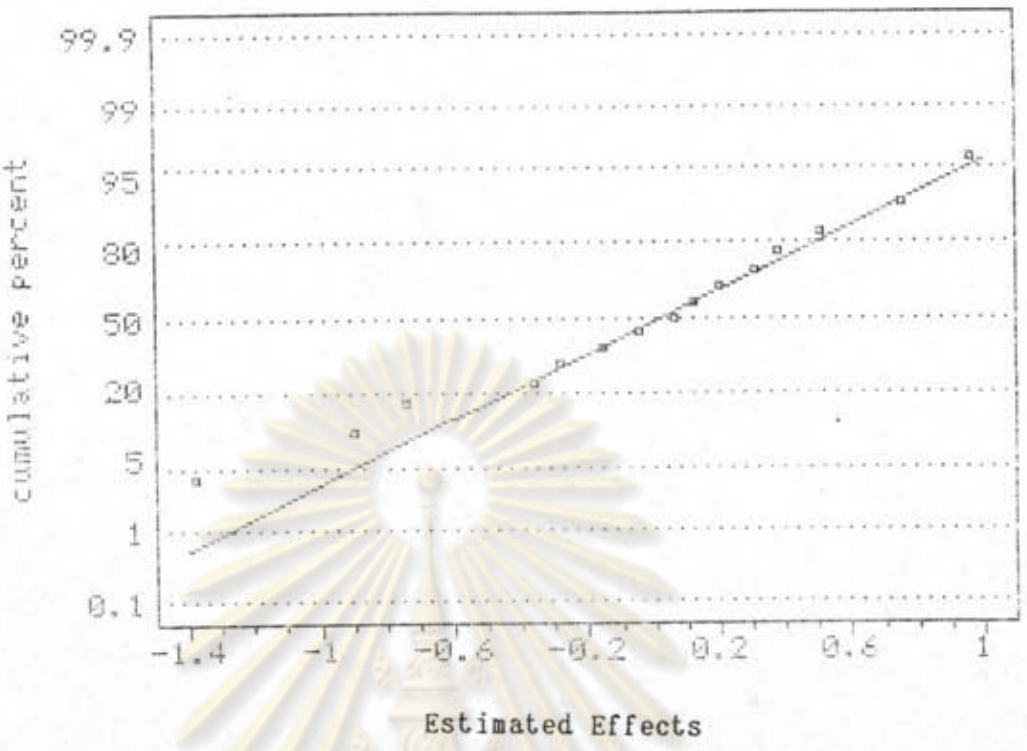

Figure C-4a Normal Probability Plot for Estimated Effects of Coefficient of Variation Thickness of Yeast Extract Tablets

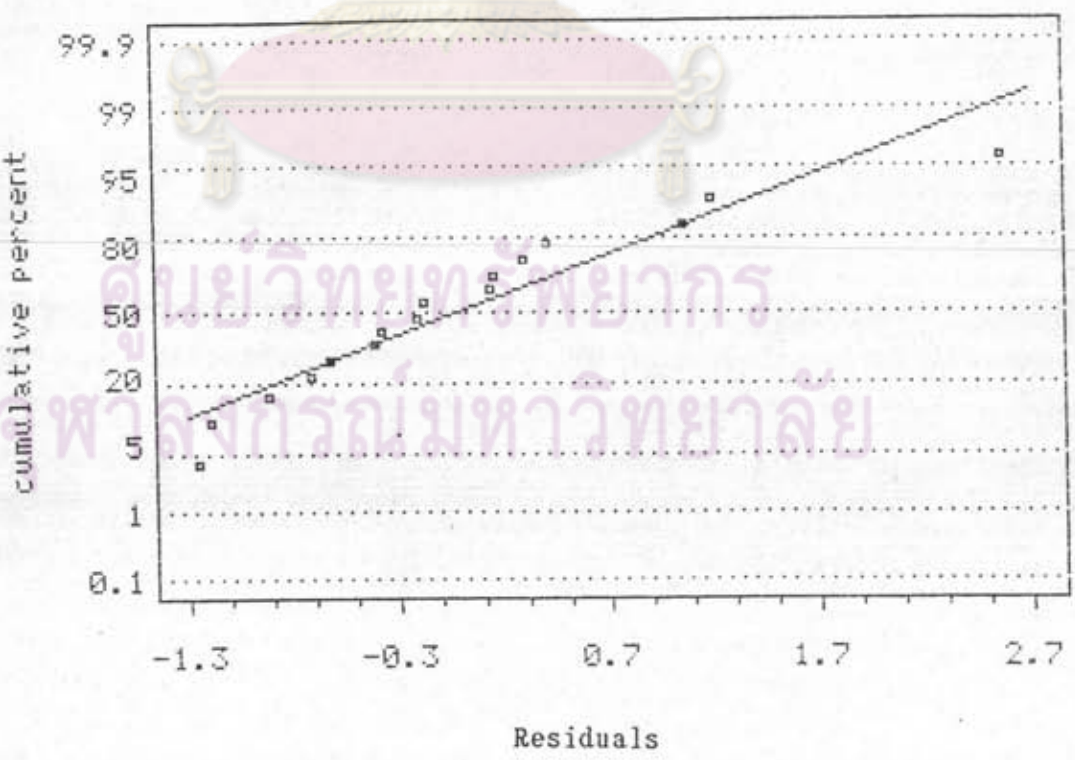

Figure C-4b Normal Probability Plot for Residuals of Coefficient of Variation of Thickness

Table C-5 Estimated Effects of 2^4 Factorial Design on Disintegration Time of Yeast Extract Tablet

Treatment Combination	Estimated Effects	Treatment Combination	Ranked Estimated Effects
1	16.69	cd	-2.17
a	1.28	acd	-0.57
b	0.99	ad	-0.29
ab	-0.21	ab	-0.21
c	0.81	ac	0.03
ac	0.30	bcd	0.45
bc	1.00	abc	0.71
abc	0.71	abd	0.80
d	2.53	c	0.81
ad	-0.29	abcd	0.93
bd	1.05	b	0.99
abd	0.80	bc	1.00
cd	-2.17	bd	1.05
acd	-0.57	a	1.28
bcd	0.45	d	2.58
abcd	0.93		

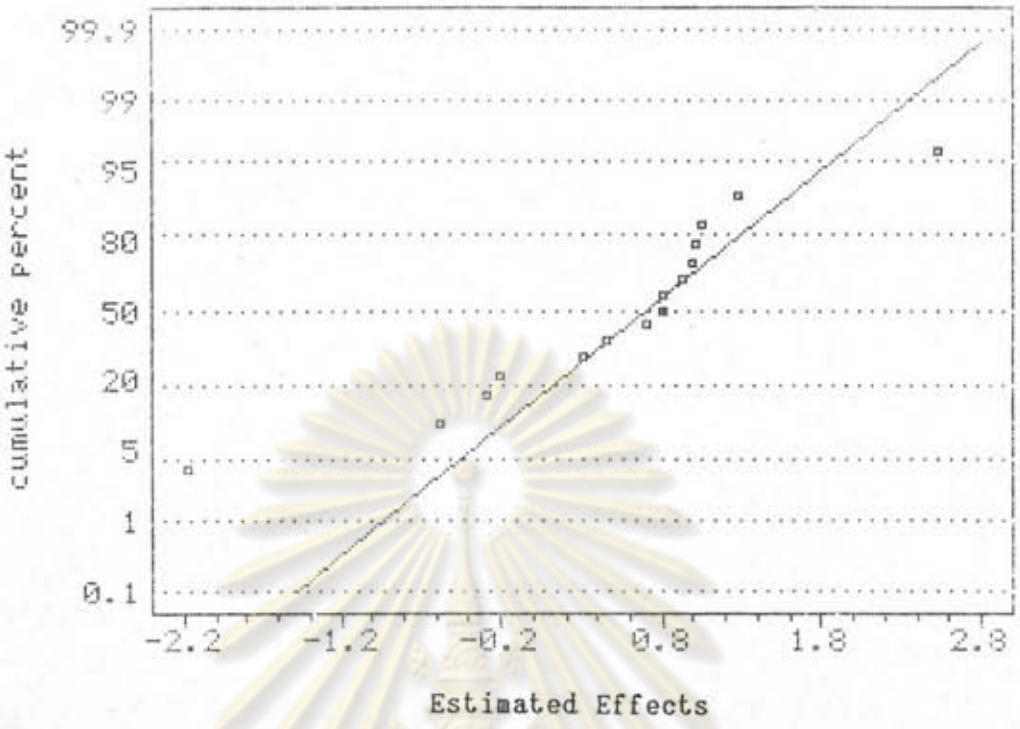

Figure C-5a Normal Probability Plot for Estimated Effects of Disintegration Time of Yeast Extract Tablets

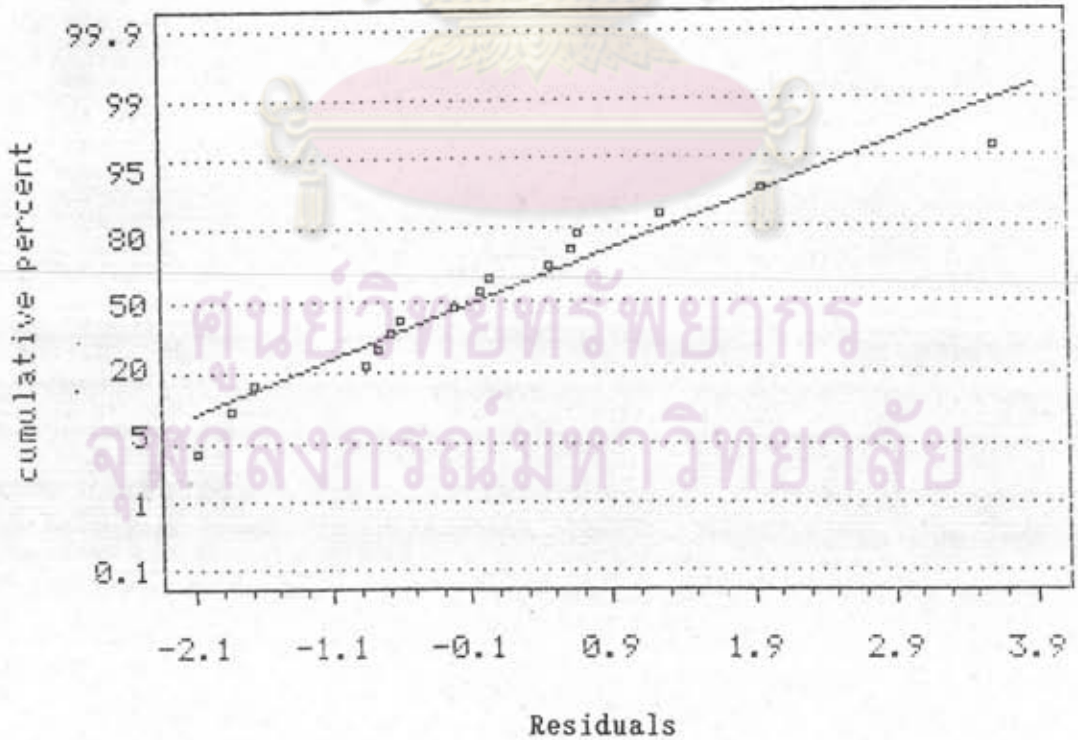

Figure C-5b Normal Probability Plot for Residuals of Disintegration Time

APPENDIX D

RESULTS OF AGING STUDY IN CLOSED CONTAINER

Evaluating results of weight, hardness, thickness, and disintegration time of each yeast extract formulation after stored in closed container under various conditions are plotted against aging periods and they are shown in Figure D-1 to D-4. The statistical results from analysis of variance of single-factor design with aging periods as variables are also pointed in these figures.

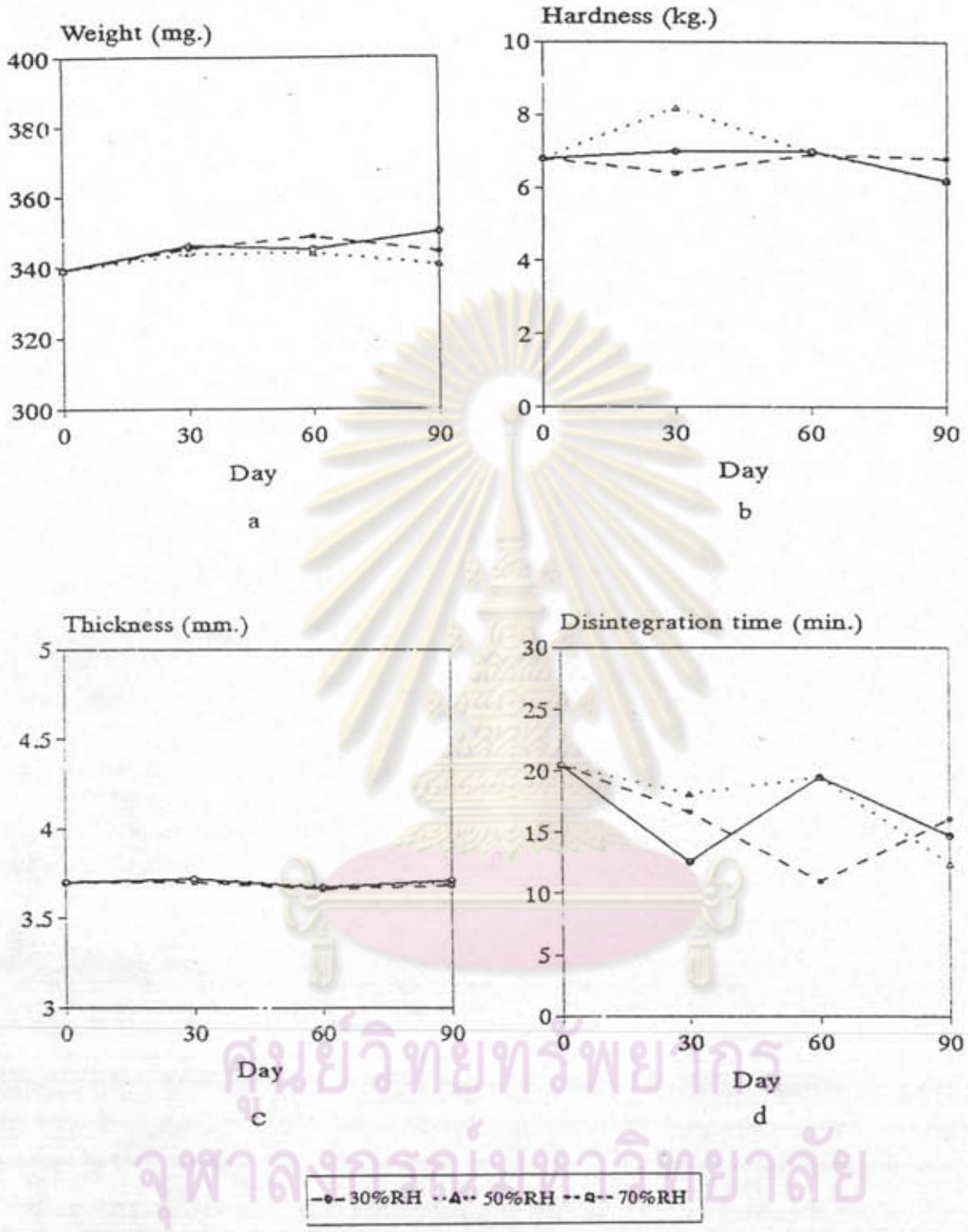

Figure D-1 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.1 After Storing in Closed Container under Different Conditions.

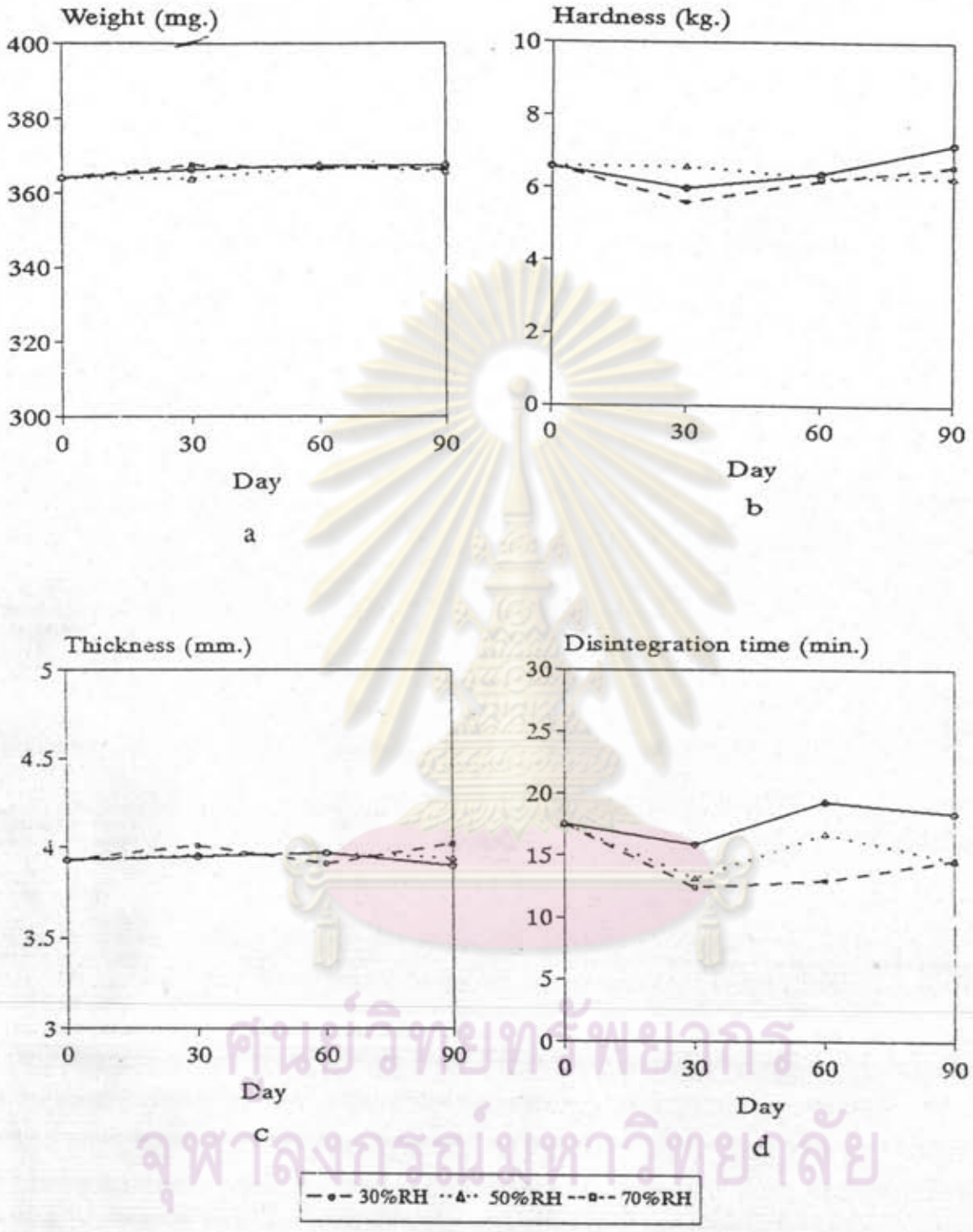

Figure D-2 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.2 After Storing in Closed Container under Different Conditions.

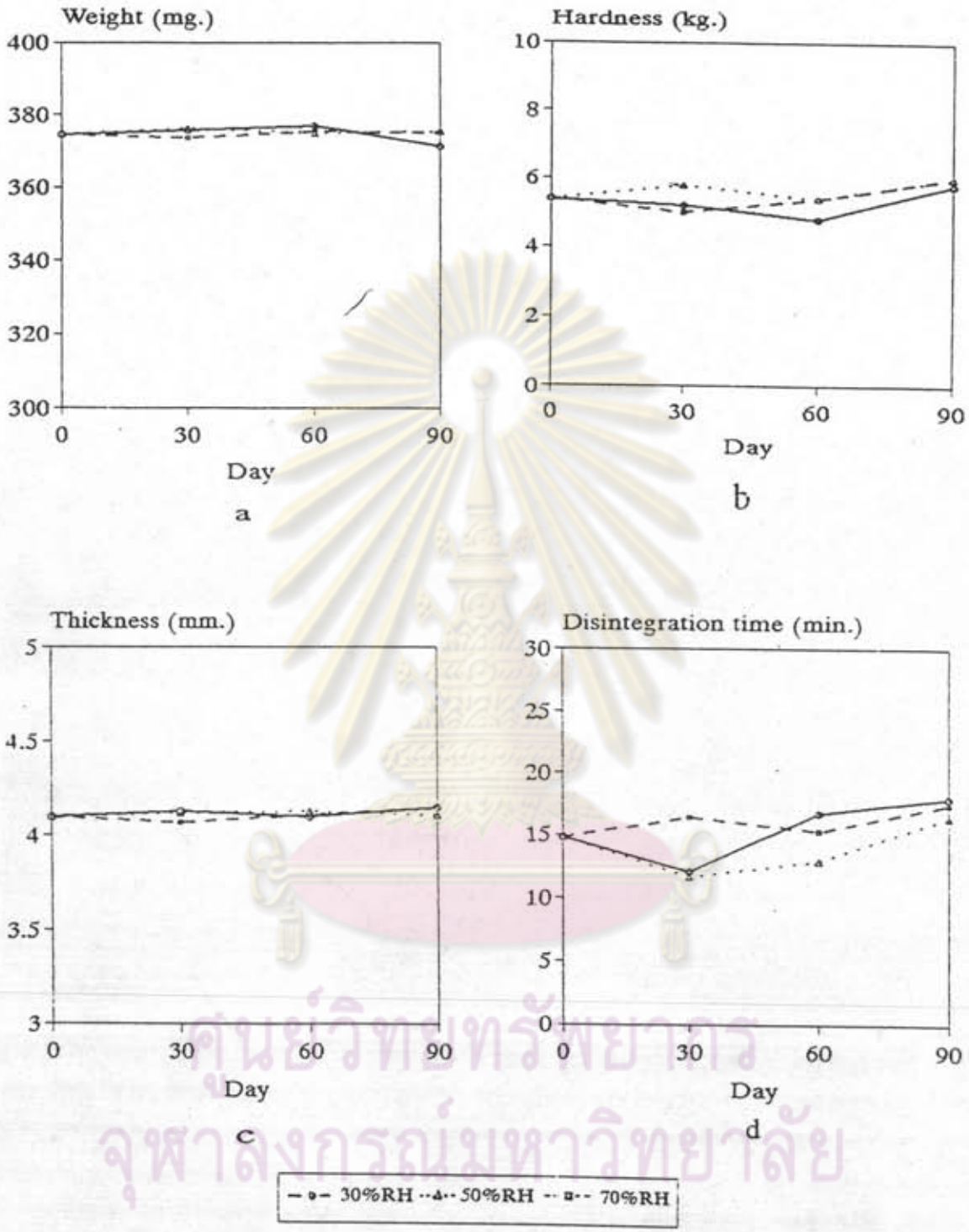

Figure D-3 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.3 After Storing in Closed Container under Different Conditions.

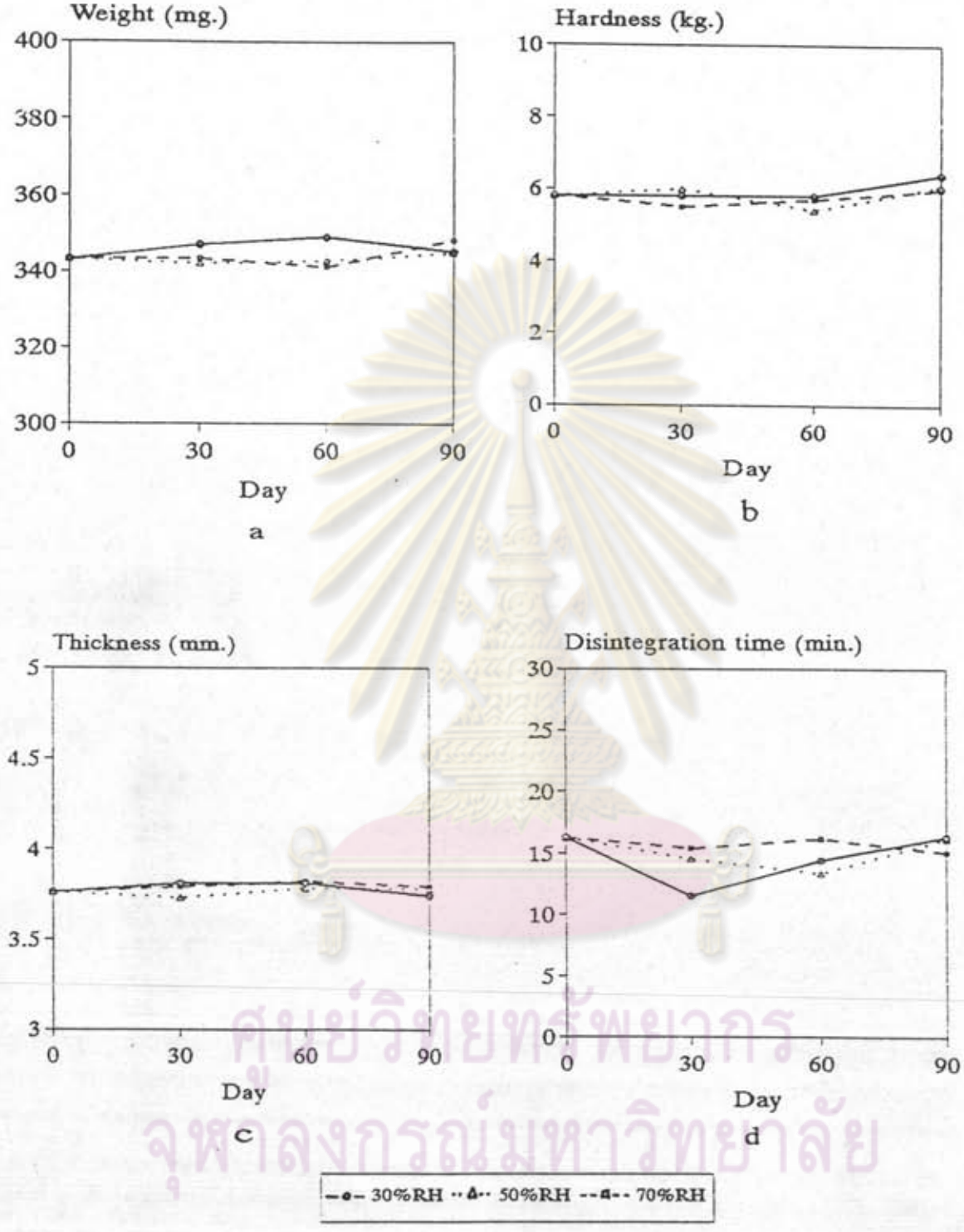

Figure D-4 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.4 After Storing in Closed Container under Different Conditions.

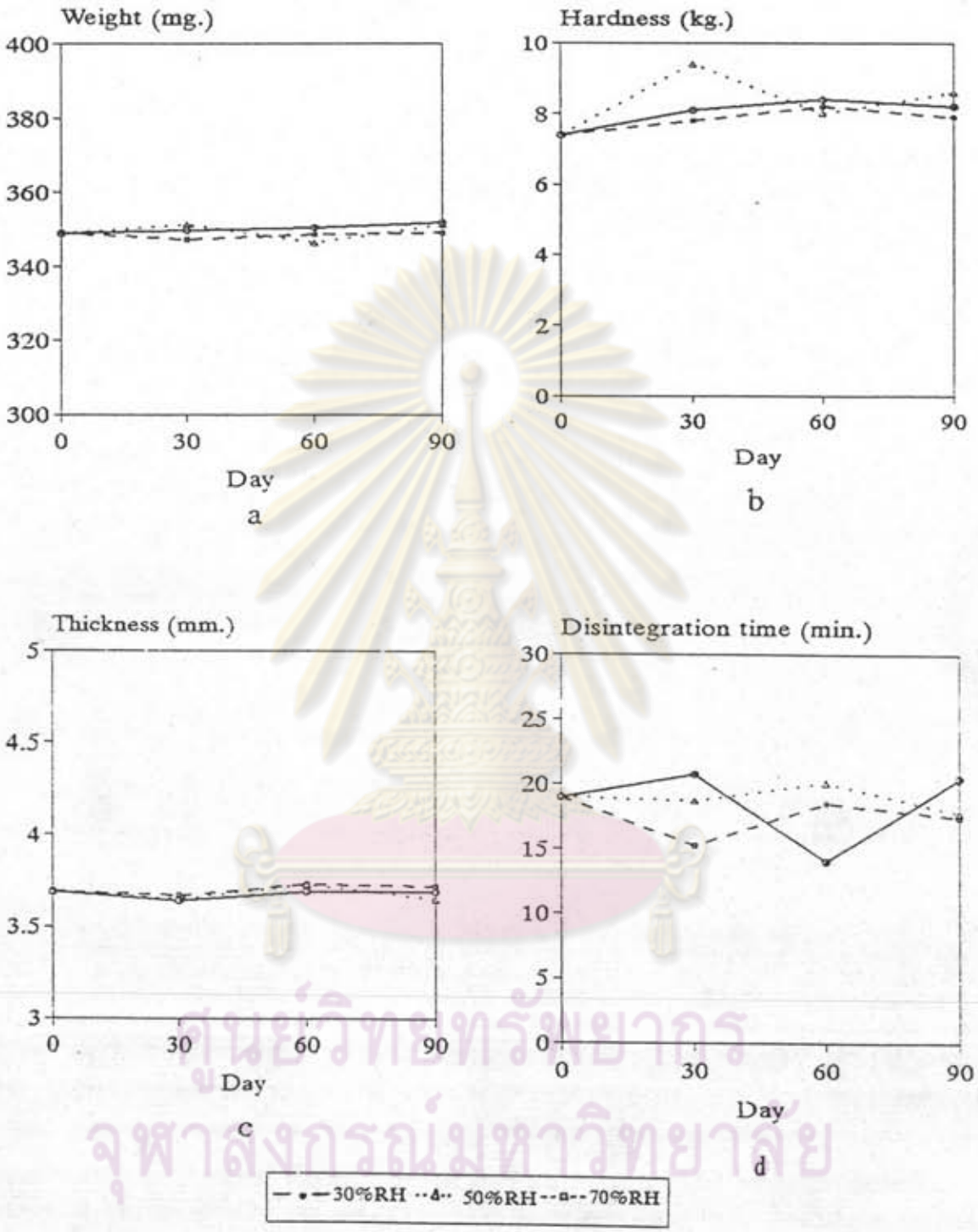

Figure D-5 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.5 After Storing in Closed Container under Different Conditions.

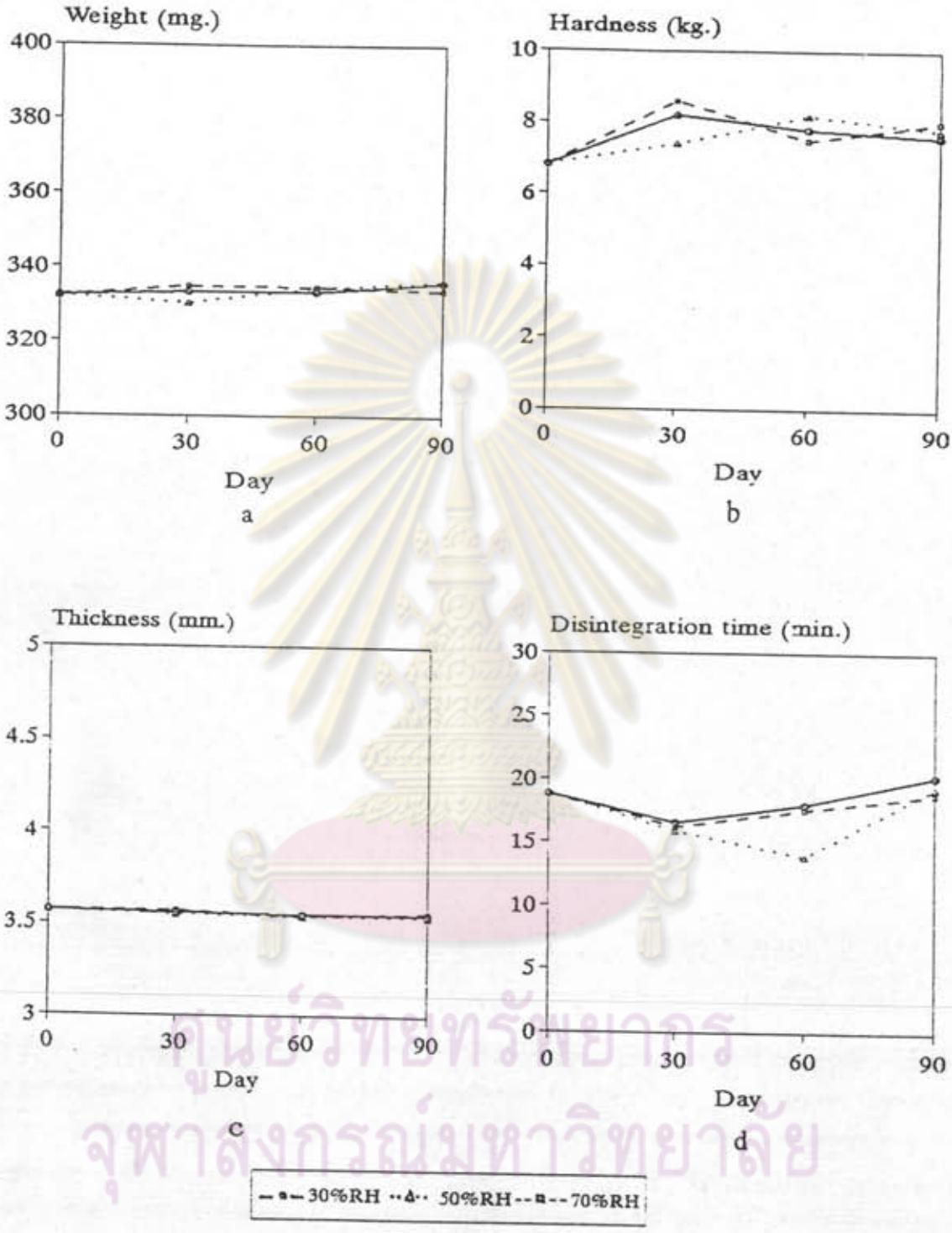

Figure D-6 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.6 After Storing in Closed Container under Different Conditions.

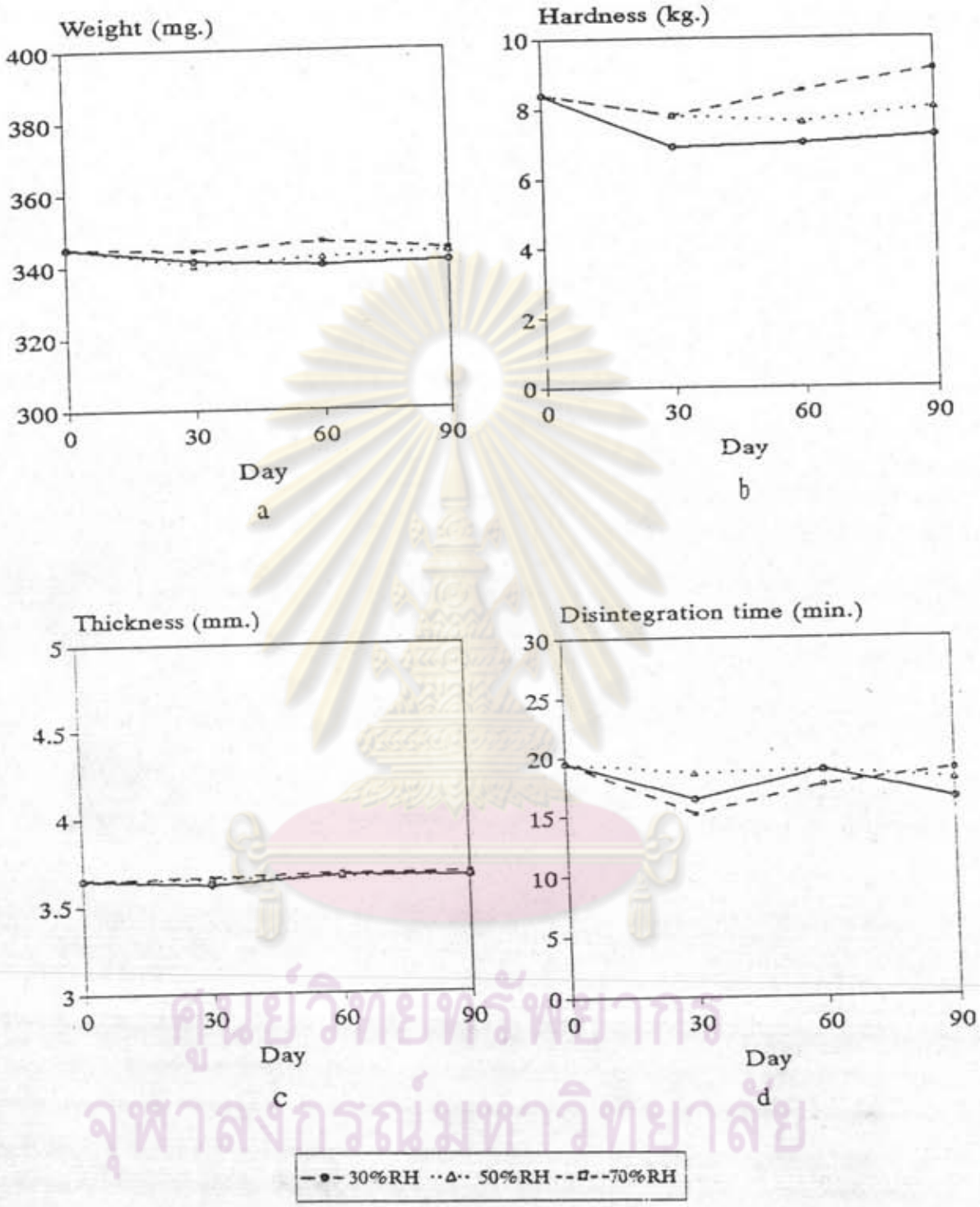

Figure D-7 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.7 After Storing in Closed Container under Different Conditions.

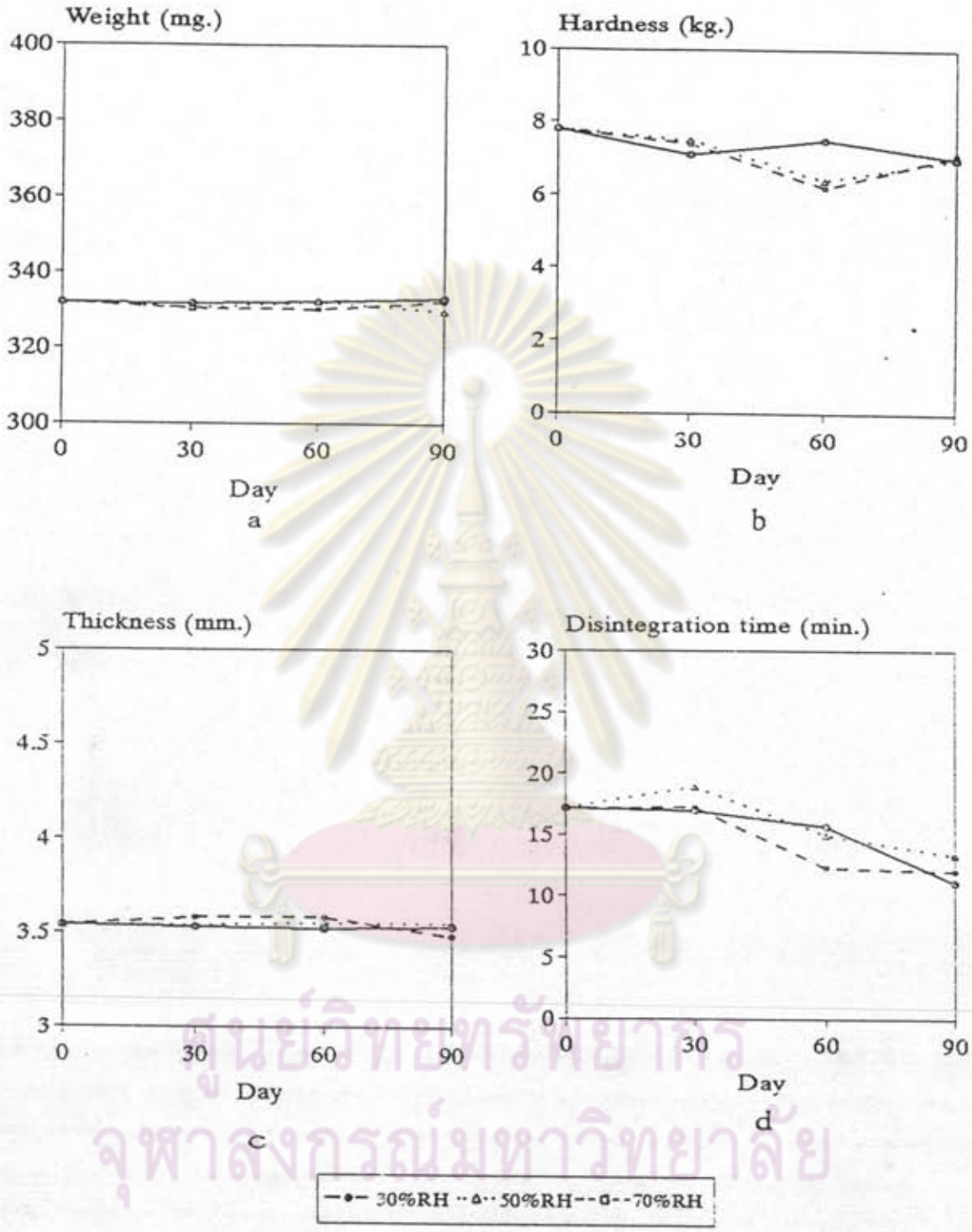

Figure D-8 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.8 After Storing in Closed Container under Different Conditions.

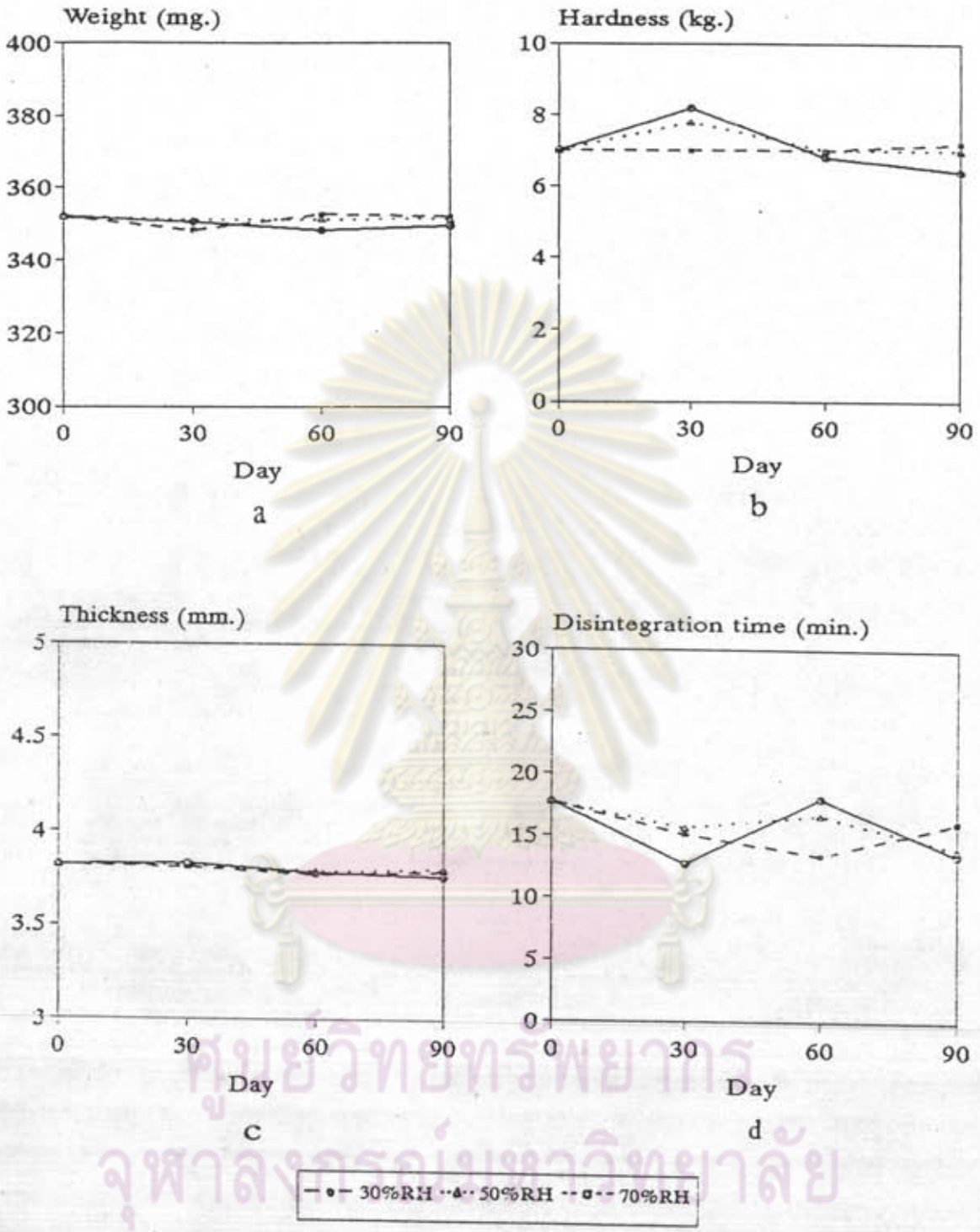

Figure D-9 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.9 After Storing in Closed Container under Different Conditions.

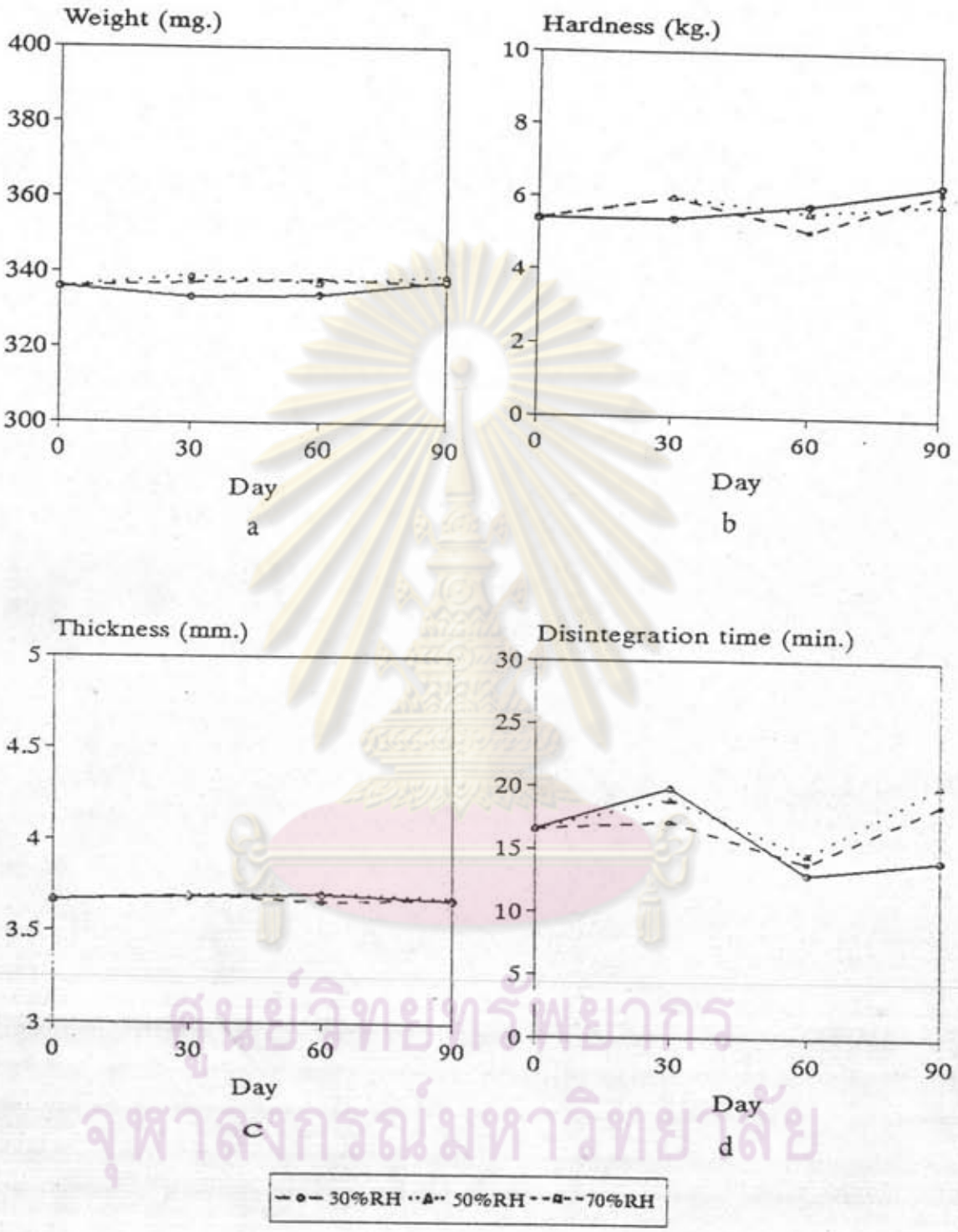

Figure D-10 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.10 After Storing in Closed Container under Different Conditions.

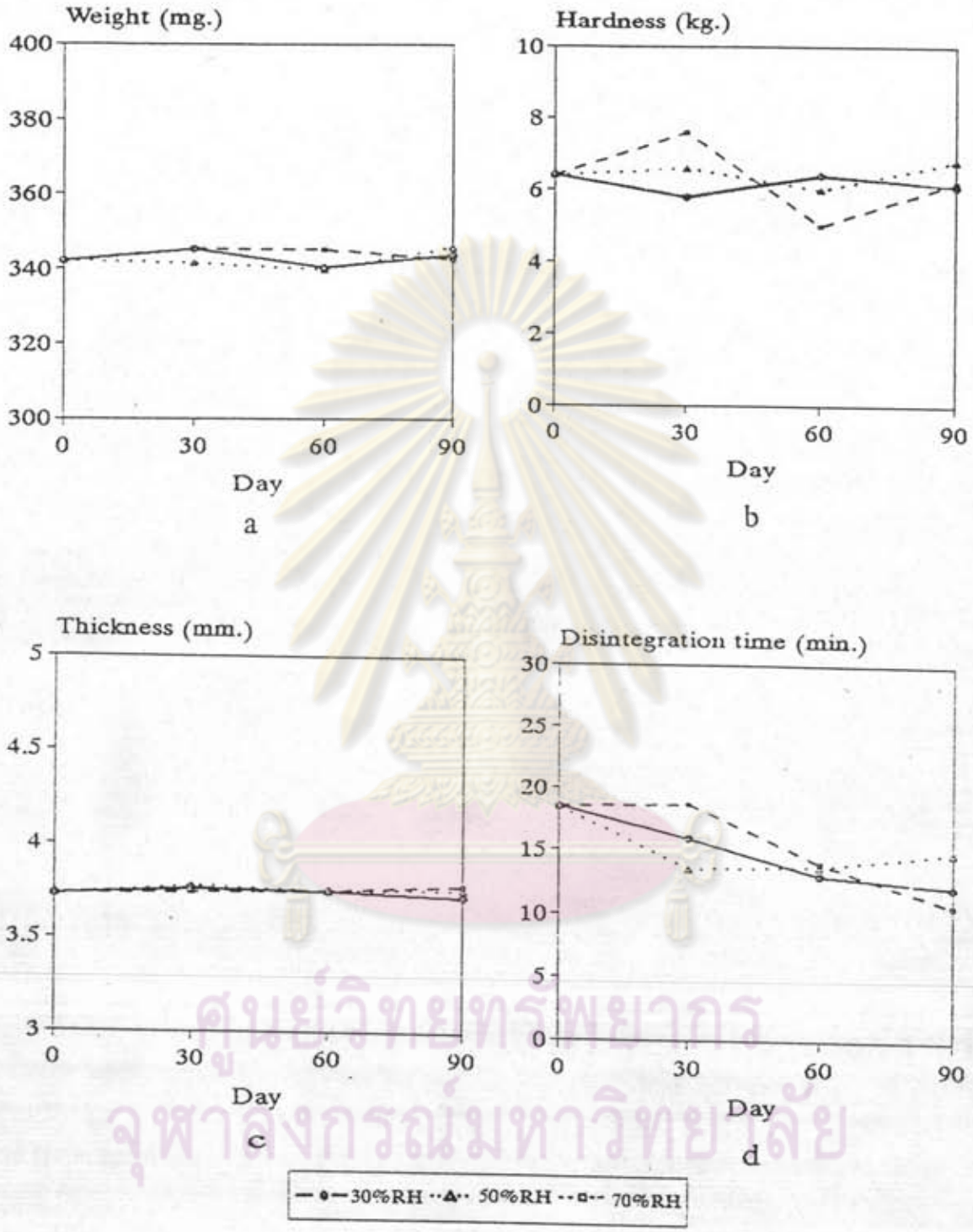

Figure D-11 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.11 After Storing in Closed Container under Different Conditions.

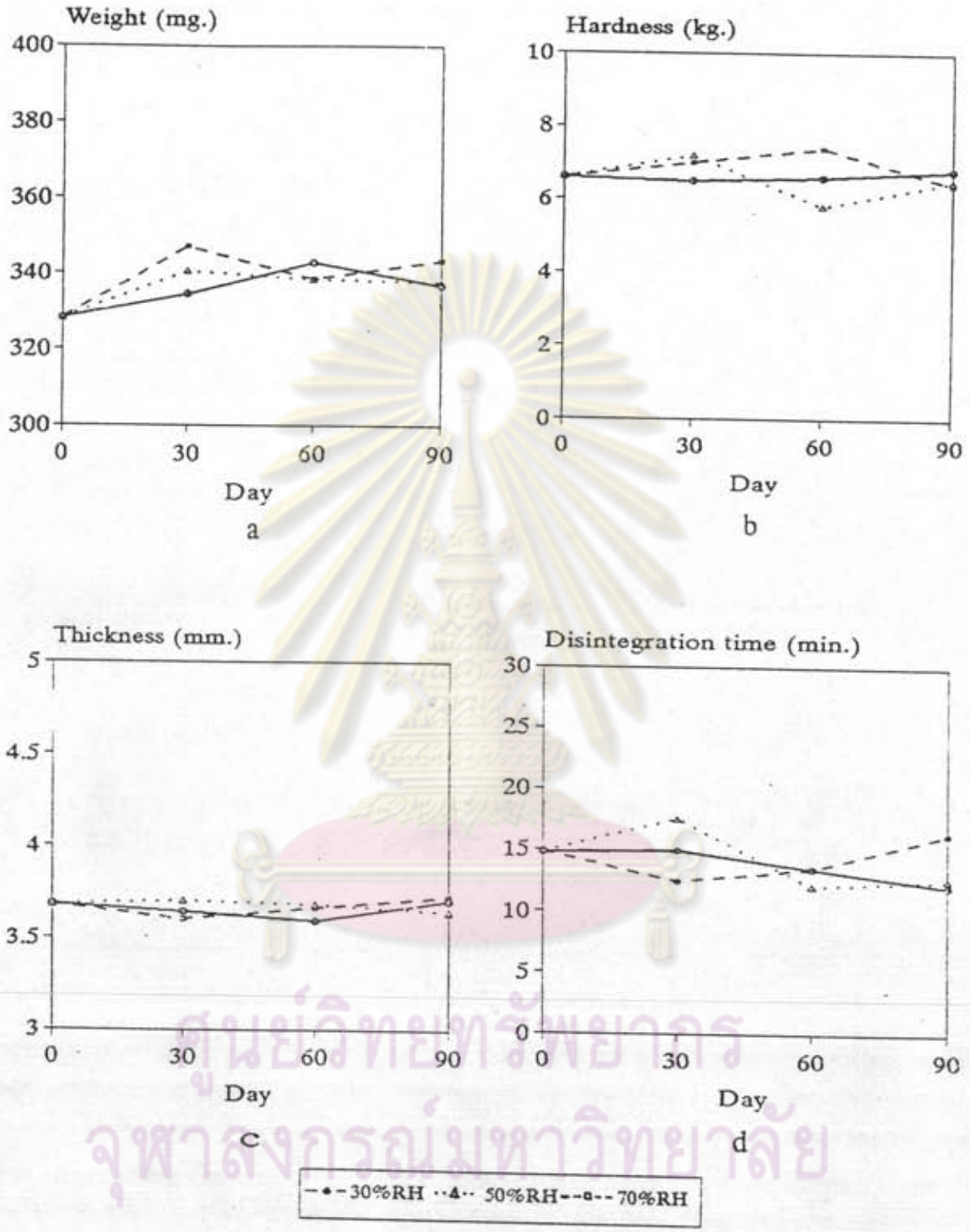

Figure D-12 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.12 After Storing in Closed Container under Different Conditions.

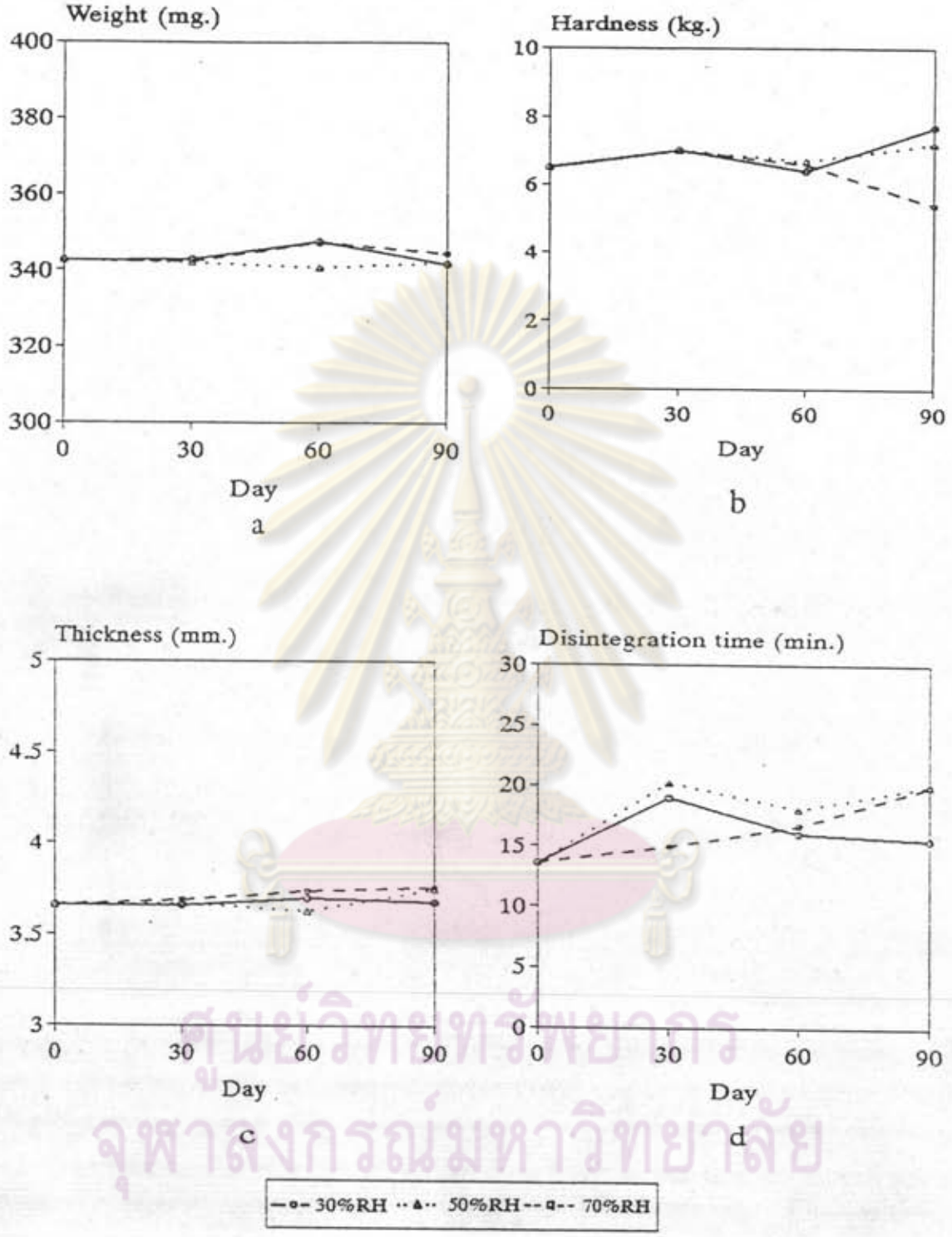

Figure D-13 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.13 After Storing in Closed Container under Different Conditions.

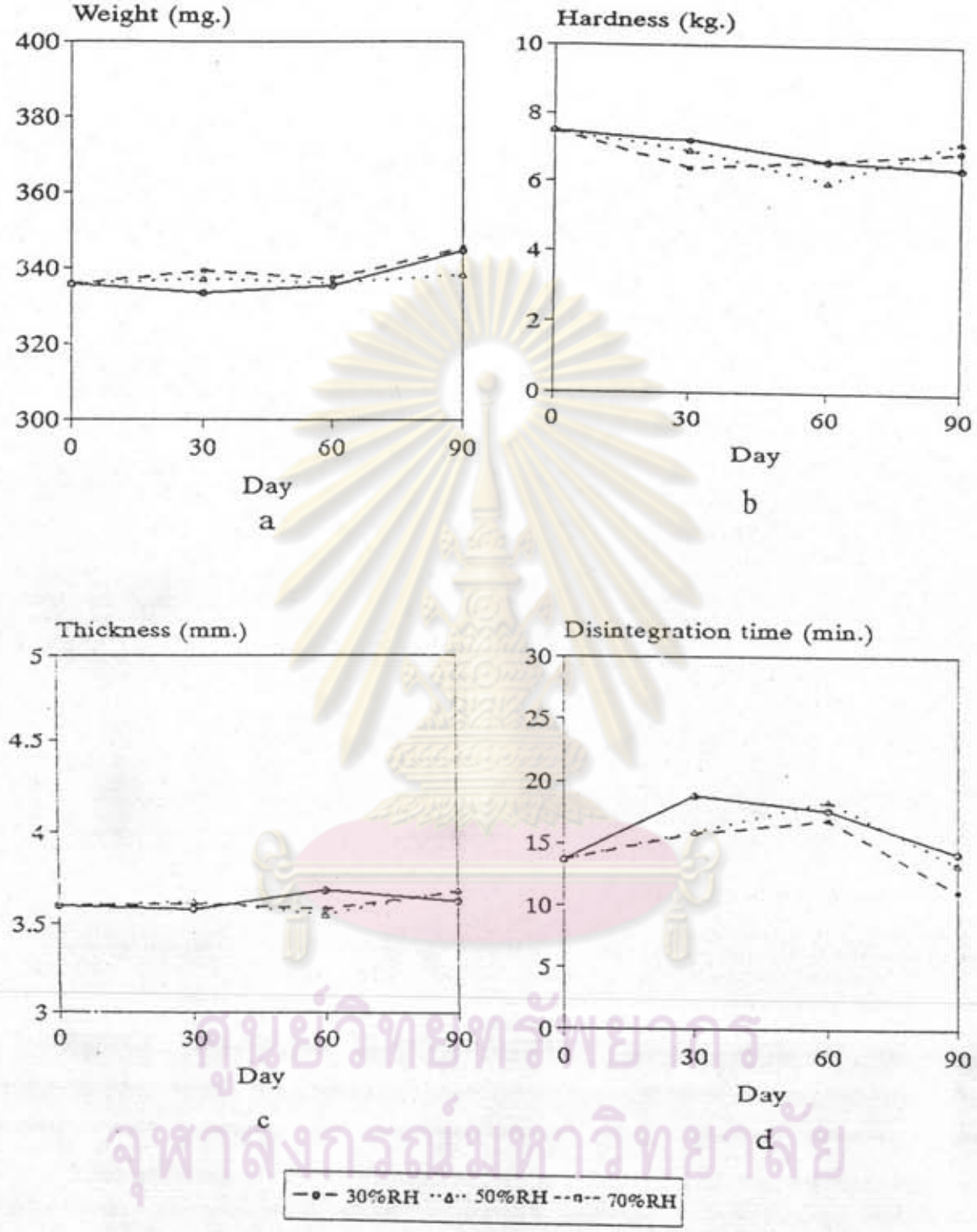

Figure D-14 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.14 After Storing in Closed Container under Different Conditions.

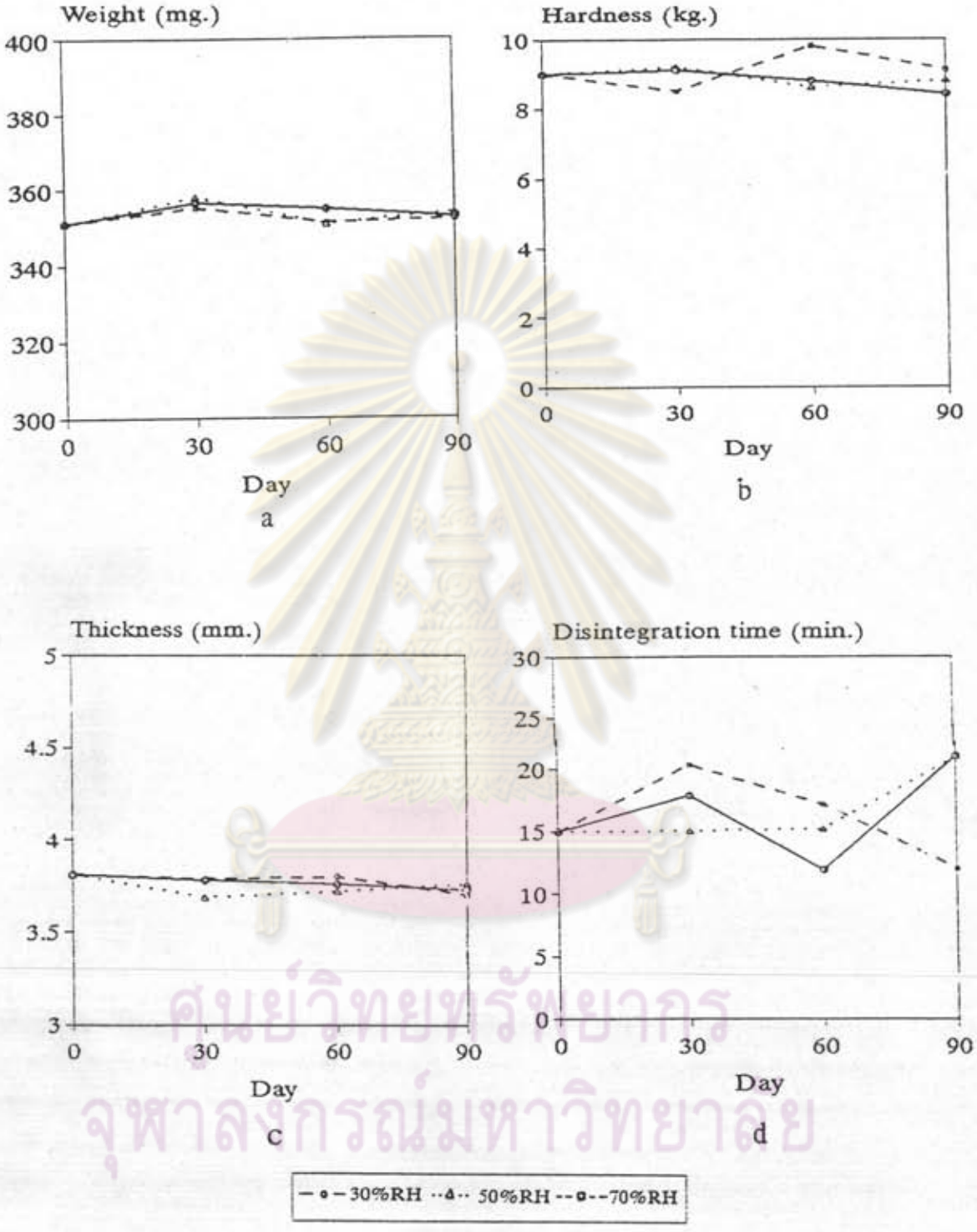

Figure D-15 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.15 After Storing in Closed Container under Different Conditions.

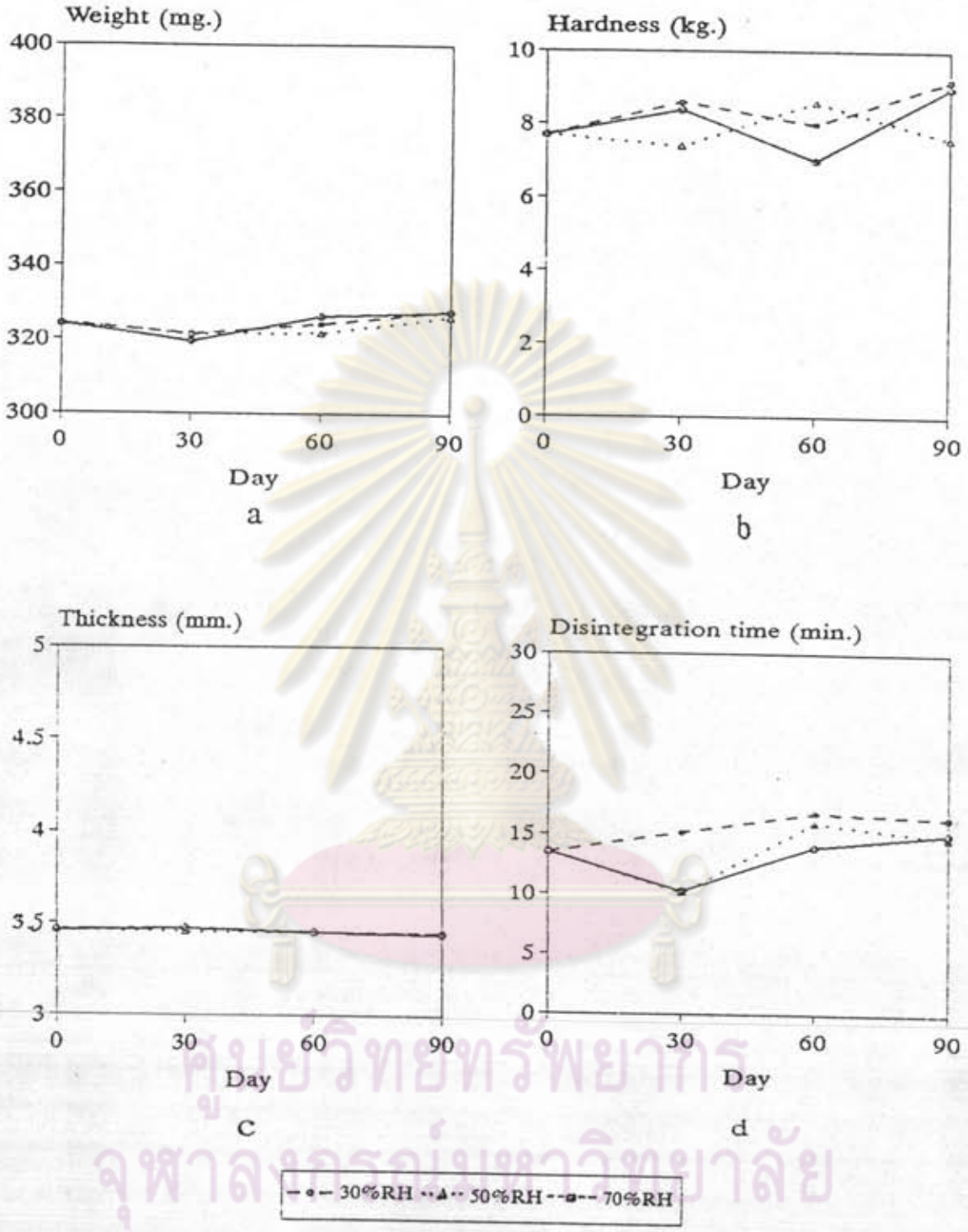

Figure D-16 Effect of Aging Periods on (a) Weight, (b) Hardness, (c) Thickness, and (d) Disintegration Time of Yeast Extract Tablet Formula No.16 After Storing in Closed Container under Different Conditions.

VITAE

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