REFERENCES

Baillie, A. J., Florence, A. T., Hume, L. R., Muirhead, G. T., Rogerson, A. 1985 The preparation and properties of niosomes-non-ionic surfactant vesicles. J. Pharm. Pharmacol. 37 :863-868.

Bhatt, P. P., Rytting, J. H., Topp, E. M. 1991. Influence of Azone and Lauryl alcohol on the transport of acetaminophen and ibuprofen through shed snake skin. Int. J. of Pharmaceutics. 72 :219-226.

Boehnlein, J., Sakr, A., Lichtin, J. L., Bronaugh, R. L. 1994.Characterization of Esterase and Alcohol Dehydrogenase Activity in Skin. Metabolism of Retinyl Palmitate to Retinol (Vitamin A) During Percutaneous Absorption. Phar. Res.11 (8) :1155-1159.

.Bouwstra, J. A., van den Bergh, B. A. I., Suhonen, M. 2001. Topical Application of Drugs: Mechanisms Involved in Chemical Enhancement. In Drug Targeting Technology :131-161. Marcel Dekker, Inc.

Boyland, J. C. 1986. Handbook of Pharmaceutical Excipients. : 217-220, 225-227, 281-283

Chen, L. H., Chien, Y. W.1999. Enhancement of Skin Permeation. In Magdassi, S., Touitou, E., Novel Cosmetic Delivery Systems : 51-69. Marcel Dekker, Inc.

Chien, Y. W. 1987. Developmental Concepts and Practice in Transdermal Therapeutic Systems. In Chien, Y. W., Transdermal Controlled Systemic Medications :25-77. Marcel Dekker, Inc.

Counts, D. F., Skreko, F., Mc Bee, J., Wich, A. G.1998. The effect of retinyl palmitate on skin composition and morphometry. J. Soc. Cosmet. Chem.,39: 235-240

Fang, J. Y., Yu, S. Y., Wu, P. C., Huang, Y. B.,Tsai, Y. H. 2001.In vitro skin permeation of estradiol from various proniosome formulations. Int. J. of Pharmaceutics. 215 : 91-99.

Florence, A. T. 1993. Nonionic surfactant vesicles: Preparation and Characterization. In Gregoriadis, G. Liposome Technology. :157-176. CRC Press, Inc.

Fox, C.1998, Technically Speaking.In Cosmetics & Toiletries.113:21-22

French, E. J., Pouton, C. W., Walters, K. A. 1993. Mechanisms and Prediction of Nonionic Surfactant Effects on Skin Permeability. In Walters, K. A., Hadgraft, J., Pharmaceutical skin penetration enhancement : 113-143. Marcel Dekker, Inc.

Guenin, E. P., Zata, J. L. 1995. Skin permeation of retinyl palmitate from vesicles. J. Soc. Cosmet. Chem. 46 : 261-270.

Haigh, J. M., Beyssac, E., Chanet, L., Aiache, J. M. 1998. In vitro permeation of progesterone from a gel through the shed skin of three different snake species. Int. J. of Pharmaceutics. 170: 151-156.

Hoftland, H.E.J., Bouwstra, J.A., Bodde, H.E., Spies, F., Junginger,H.E. 1989. Nonionic surfactant vesicles in transdermal formulations: controlled release and in-vitro effect on human skin. Pharm. Res. 6 (suppl.),s178

Hoftland, H.E.J., Junginger, H.E. and Bouwstra, J.A. 1994. Estradiol permeation from nonionic surfactant vesicles through human skin in-vitro, Pharm. Res. 11(5): 659-664

Itoh, M., Xia, J., Magavi, R., Nishihata, T., Rytting, J. H. 1990. Use of Shed Snake Skin as a Model Membrane for in Vitro Percutaneous Penetration Studies: Comparison with Human Skin.Pharm. Res. Vol. 7 , 10 :1042-1047.

Ji, H.G., Seo, B.S., 1999. Retinyl Palmitate at 5% in a Cream: Its Stability, Efficacy and Effect. Cosmet. Toiletries 107 (3) : 61-68

Komatsu, H., Okamoto,H., Miyagawa,K., Higaki, K., Hashida, M.,Sezaki, H. 1986 Preservative activity and in vivo percutaneous penetration of butyl paraben entrapped in liposomes, Chem. Pharm. Bull., 34 : 3415-3422

Lasic, D. D.1997. Liposome. In Lasic, D. D.Liposome in Gene Delivery. :67-112. CRC Press.

Martin, A.N., Swarbrick,J.,Cammarata, A. 1969. Micrometric. In Physical Pharmacy 467-496, Lea&Febiger.

Mezei, M.1994. Liposomes as Penetration Promoters and Localizers of Topically Applied Drugs. In Hsieh, D. S., Drug Permeation Enhancement. : 171-198. Marcel Dekker, Inc.

Michael, M.1993. Liposomes and The skin. In Gregoriadis, G., Florence, A. T., Patel, H. M.,Liposomes in Drug Delivery. :125-135. Harwood academic publishers.

Mitsui, T. 1997 Cosmetics and skin. In Mitsui,T., New Cosmetic Science. :38-45. Elsevier Science B.V.

Murdan, S. Gregoriadis, G., Florence, A. T. 1999. Sorbitan monostearate / polysorbate 20 organogels containing niosomes: a delivery vehicle for antigen? European Journal of Pharmaceutical Sciences. 8 : 177-185.

Montenegro, L., Panico, A. M., Ventimiglia, A., Bonina, F. P. 1996. In vitro retinoic acid release and skin permeation from different liposome formulations. Int. J. of Pharmaceutics. 133 : 89-96.

Namedo, A., Jain, N. K. 1996. Niosome as Drug Carriers. Indian J. Pharm. Sci. 58 (2) :41-46.

New, R. R. C. 1990. Preparation of liposomes. In New, R.R.C. Liposome A Practical Approach. : 33-103. Oxford University Press.

O'neil, M. J. 2001. The Merck Index. :1785. Merck & Co., Inc.

Patel, H. M., Moghimi, M. 1993. Liposomes and The skin Permeability barrier. In Gregoriadis, G., Florence, A. T., Patel, H. M.,Liposomes in Drug Delivery :137-147. Harwood academic publishers.

Rhodes, D. G., Hu, C. 2000. Proniosomes. In Uchegbu, I. F.,Synthetic Surfactant Vesicles. : 83-113. Harwood academic publishers.

Roberts, M. S., Walters, K. A., 1998.The Relationship Between Structure and Barrier Function of Skin. In Roberts, M. S., Walters, K. A. Dermal Absorption and Toxicity Assessment. :1-42. Marcel Dekker, Inc.

Schaefer, H., Redellmeier, T. E., Benech-Kieffer, F. 1999.The skin and Its permeability. In Magdassi, S., Touitou, E., Novel Cosmetic Delivery Systems. :9-49. Marcel Dekker, Inc.

Schreier, H., Bouwstra, J. 1994. Review Liposomes and Niosomes as topical drug carriers: dermal and transdermal drug delivery. J. of controlled Release. 30 : 1-15.

Smolinske, S. C. 1992. Handbook of Food, Drug and Cosmetic Excipients. : 295-301, 369-370.

Schmitt, W. H.1996. Skin-Care Product. In Williams, D. F., Schmitt, W. H. Chemistry and Technology of the Cosmetics and Toiletries Industry :104-148. Blackie Academid & Professional.

Flynn, G.L.1990. Dermal diffusion and delivery principles. In Swarbrick, J., Boylan, J. C Encyclopedia of pharmaceutical technology.: 457-503. Marcel dekker, Inc.

Uchegbu, I. F., Schatzlein, A., Vanlerberghe, G., Morgatiti, N., Florence, A. T. 1997. Polyhedral Nonionic Surfactant Vesicles. J. Pharm. Pharmacol.49 :606-610.

Uchegbu, I. F. 2000. Niosomes and Other Synthetic Surfactant Vesicles with Anti-tumour Drugs. In Uchegbu, I. F.,Synthetic Surfactant Vesicles. :115-133. Harwood academic publishers.

Uchegbu, I. F., Vyas, S. P. 1998. Non-ionic surfactant based vesicles (niosomes) in drug delivery. Int. J. of Pharmaceutics. 172 : 33-70.

United State Pharmacopeia Convention. 2000. USP 23: NF 19 (U.S. Pharmacopeia & National Formulary). Philadelphia : National Publishing.

Vora, B.,Khopade, A. J., Jain, N. K.1998. Proniosome based transdermal delivery of levonorgestrel for effective contraception. J. of controlled release 54 : 149-165.

Wenninger, J. A., Mc Ewen, G. N. 1992 CTFA Cosmetic Ingredient Handbook. : 346.

Wenninger, J. A. 1992. CTFA Cosmetic Ingredient Handbook. :74-75, 346, 380 and 420-421. The Cosmetic, Toiletry, and Fragrance Association.

Yoshioka, T., Florence, A. T. 1994. Vesicle (niosome)-in-water-in-oil (v/w/o) emulsion: and in vitro study. Int. J. of Pharmaceutics. 108: 117-123.

Yoshioka, T., Sternberg, B., Florence, A. T. 1994. Preparation and Properties of vesicles (niosomes) of sorbitan monoesters (Span 20, 40, 60 and 80) and a sorbitan triester (Span 85). Int. J. of Pharmaceutics. 105 :1-6

APPENDICES

APPENDIX I

The data of nonionic surfactants used in niosome preparations and permeation study

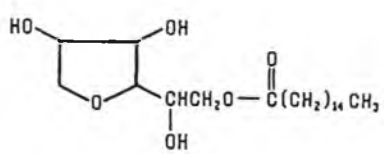
Span 40

Sorbitan palmitate

Sorbitan, ester, monohexadecanoate

Empirical formula	Molecular weight
$C_{22}H_{42}O_6$	403
HLB	6.7
Melting point range	44-47 °C
Functional category	wetting and/or solubilizing agent emulsifying and/or solubilizing agent

Structure formula (Wenninger, 1992)



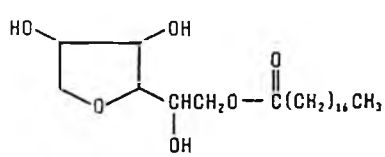
Span 60

Sorbitan stearate

Sorbitan, ester,mono-octadecanoate

Empirical formula	Molecular weight
$C_{24}H_{46}O_6$	431
HLB	4.7
Melting point range	50-53 °C
Functional category	wetting and/or solubilizing agent emulsifying and/or solubilizing agent

Structure formula (Wenninger, 1992)



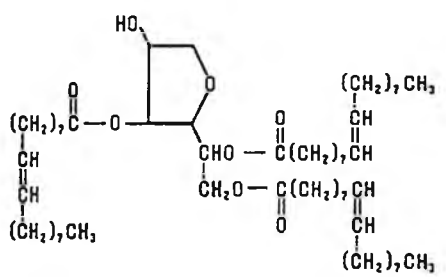
Span 85

Sorbitan trioleate

Sorbitan, ester,tri-9-octadecanoate,(Z,Z,Z)

Empirical formula	Molecular weight
$C_{60}H_{108}O_8$	958
HLB	1.8
Melting point range	liquid
Functional category	wetting and/or solubilizing agent emulsifying and/or solubilizing agent

Structure formula (Wenninger, 1992)



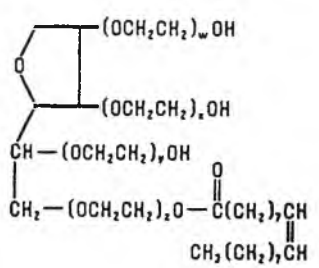
Polysorbate 80

Polyexyethylene 80 sorbitan monooleate

Empirical formula	Molecular weight
$C_{64}H_{125}O_{26}$	1309
HLB	15.0

Functional category: wetting and/or solubilizing agent; emulsifying and/or solubilizing agent

Structure formula (Wenninger, 1992)



APPENDIX II

The data of particle size distribution for niosome suspensions

Table 17. The data of particle size distribution for niosomes prepared by span 40:cholesterol:solulan C-24 (45:45:10)

Size_Low (μm)	In%	Size_High (μm)	Under%	Size_Low (μm)	In%	Size_High (μm)	Under%
0.05	0.01	0.06	0.01	6.63	8.62	7.72	62.70
0.06	0.01	0.07	0.02	7.72	8.91	9.00	71.61
0.07	0.02	0.08	0.05	9.00	7.84	10.48	79.45
0.08	0.04	0.09	0.08	10.48	6.29	12.21	85.74
0.09	0.05	0.11	0.13	12.21	4.58	14.22	90.32
0.11	0.08	0.13	0.21	14.22	2.98	16.57	93.29
0.13	0.11	0.15	0.32	16.57	1.69	19.31	94.98
0.15	0.17	0.17	0.50	19.31	0.79	22.49	95.78
0.17	0.27	0.20	0.76	22.49	0.31	26.20	96.08
0.20	0.41	0.23	1.18	26.20	0.15	30.53	96.23
0.23	0.61	0.27	1.79	30.53	0.20	35.56	96.44
0.27	0.80	0.31	2.58	35.56	0.34	41.43	96.78
0.31	0.91	0.36	3.49	41.43	0.46	48.27	97.25
0.36	0.97	0.42	4.46	48.27	0.51	56.23	97.76
0.42	1.07	0.49	5.53	56.23	0.48	65.51	98.24
0.49	1.20	0.58	6.73	65.51	0.39	76.32	98.63
0.58	1.28	0.67	8.01	76.32	0.27	88.91	98.91
0.67	1.39	0.78	9.40	88.91	0.17	103.58	99.08
0.78	1.40	0.91	10.80	103.58	0.11	120.67	99.18
0.91	1.43	1.06	12.23	120.67	0.08	140.58	99.26
1.06	1.42	1.24	13.65	140.58	0.09	163.77	99.36
1.24	1.41	1.44	15.06	163.77	0.12	190.80	99.48
1.44	1.41	1.68	16.47	190.80	0.16	222.28	99.64
1.68	1.48	1.95	17.95	222.28	0.16	258.95	99.80
1.95	1.69	2.28	19.63	258.95	0.13	301.68	99.93
2.28	2.09	2.65	21.72	301.68	0.07	351.46	100.00
2.65	2.74	3.09	24.46	351.46	0.00	409.45	100.00
3.09	3.65	3.60	28.11	409.45	0.00	477.01	100.00
3.60	4.77	4.19	32.88	477.01	0.00	555.71	100.00
4.19	5.99	4.88	38.87	555.71	0.00	647.41	100.00
4.88	7.15	5.69	46.02	647.41	0.00	754.23	100.00
5.69	8.06	6.63	54.08	754.23	0.00	878.67	100.00

Table 18. The data of particle size distribution for niosomes prepared by span 60:cholesterol:solulan C-24 (45:45:10)

Size_Low (μm)	In%	Size_High(μm)	Under%	Size_Low (μm)	In%	Size_High(μm)	Under%
0.05	0.00	0.06	0.00	6.63	7.99	7.72	58.16
0.06	0.00	0.07	0.00	7.72	8.32	9.00	66.48
0.07	0.00	0.08	0.00	9.00	7.70	10.48	74.18
0.08	0.00	0.09	0.00	10.48	6.69	12.21	80.86
0.09	0.00	0.11	0.00	12.21	5.45	14.22	86.31
0.11	0.00	0.13	0.00	14.22	4.17	16.57	90.48
0.13	0.00	0.15	0.00	16.57	2.97	19.31	93.45
0.15	0.01	0.17	0.01	19.31	1.96	22.49	95.42
0.17	0.02	0.20	0.03	22.49	1.19	26.20	96.61
0.20	0.07	0.23	0.10	26.20	0.66	30.53	97.27
0.23	0.18	0.27	0.28	30.53	0.34	35.56	97.61
0.27	0.35	0.31	0.63	35.56	0.19	41.43	97.80
0.31	0.47	0.36	1.10	41.43	0.13	48.27	97.93
0.36	0.51	0.42	1.61	48.27	0.13	56.23	98.07
0.42	0.63	0.49	2.24	56.23	0.14	65.51	98.21
0.49	0.82	0.58	3.07	65.51	0.16	76.32	98.37
0.58	0.92	0.67	3.99	76.32	0.16	88.91	98.53
0.67	1.11	0.78	5.09	88.91	0.17	103.58	98.70
0.78	1.21	0.91	6.30	103.58	0.17	120.67	98.87
0.91	1.37	1.06	7.67	120.67	0.17	140.58	99.04
1.06	1.52	1.24	9.20	140.58	0.16	163.77	99.20
1.24	1.66	1.44	10.85	163.77	0.15	190.80	99.36
1.44	1.76	1.68	12.62	190.80	0.14	222.28	99.50
1.68	1.90	1.95	14.51	222.28	0.13	258.95	99.62
1.95	2.12	2.28	16.64	258.95	0.12	301.68	99.74
2.28	2.46	2.65	19.10	301.68	0.10	351.46	99.84
2.65	3.00	3.09	22.09	351.46	0.08	409.45	99.92
3.09	3.72	3.60	25.81	409.45	0.05	477.01	99.97
3.60	4.63	4.19	30.44	477.01	0.03	555.71	100.00
4.19	5.64	4.88	36.08	555.71	0.00	647.41	100.00
4.88	6.64	5.69	42.72	647.41	0.00	754.23	100.00
5.69	7.45	6.63	50.17	754.23	0.00	878.67	100.00

Table 19. The data of particle size distribution for niosomes prepared by span 85:cholesterol:solulan C-24 (45:45:10)

Size_Low (μm)	ln%	Size_High (μm)	Under%	Size_Low (μm)	ln%	Size_High (μm)	Under%
0.05	0.01	0.06	0.01	6.63	7.83	7.72	57.53
0.06	0.02	0.07	0.02	7.72	8.70	9.00	66.23
0.07	0.03	0.08	0.05	9.00	8.36	10.48	74.59
0.08	0.04	0.09	0.09	10.48	7.34	12.21	81.93
0.09	0.06	0.11	0.14	12.21	5.85	14.22	87.78
0.11	0.08	0.13	0.22	14.22	4.20	16.57	91.99
0.13	0.12	0.15	0.35	16.57	2.66	19.31	94.64
0.15	0.18	0.17	0.53	19.31	1.42	22.49	96.06
0.17	0.29	0.20	0.82	22.49	0.58	26.20	96.64
0.20	0.45	0.23	1.27	26.20	0.14	30.53	96.78
0.23	0.67	0.27	1.94	30.53	0.03	35.56	96.81
0.27	0.88	0.31	2.82	35.56	0.11	41.43	96.92
0.31	1.01	0.36	3.83	41.43	0.26	48.27	97.18
0.36	1.09	0.42	4.92	48.27	0.38	56.23	97.57
0.42	1.22	0.49	6.13	56.23	0.43	65.51	98.00
0.49	1.39	0.58	7.53	65.51	0.40	76.32	98.40
0.58	1.51	0.67	9.03	76.32	0.32	88.91	98.71
0.67	1.67	0.78	10.71	88.91	0.22	103.58	98.94
0.78	1.73	0.91	12.44	103.58	0.15	120.67	99.09
0.91	1.80	1.06	14.24	120.67	0.12	140.58	99.21
1.06	1.81	1.24	16.04	140.58	0.13	163.77	99.34
1.24	1.76	1.44	17.80	163.77	0.15	190.80	99.49
1.44	1.67	1.68	19.47	190.80	0.17	222.28	99.66
1.68	1.58	1.95	21.06	222.28	0.16	258.95	99.82
1.95	1.58	2.28	22.63	258.95	0.11	301.68	99.93
2.28	1.71	2.65	24.35	301.68	0.07	351.46	100.00
2.65	2.07	3.09	26.41	351.46	0.00	409.45	100.00
3.09	2.66	3.60	29.07	409.45	0.00	477.01	100.00
3.60	3.51	4.19	32.59	477.01	0.00	555.71	100.00
4.19	4.56	4.88	37.15	555.71	0.00	647.41	100.00
4.88	5.71	5.69	42.86	647.41	0.00	754.23	100.00
5.69	6.84	6.63	49.70	754.23	0.00	878.67	100.00

Table 20. Particle sizes of three different types of niosomes

Type	Size
Span 40	9.77
	10.24
	11.73
Span 60	10.92
	8.83
	14.09
Span 85	10.21
	11.91
	9.48

General Linear Models Procedure

Dependent Variable : SIZE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	1.04968889	0.52484444	0.16	0.8526
Error	6	19.23166667	3.20527778		
Corrected Total	8	20.28135556			

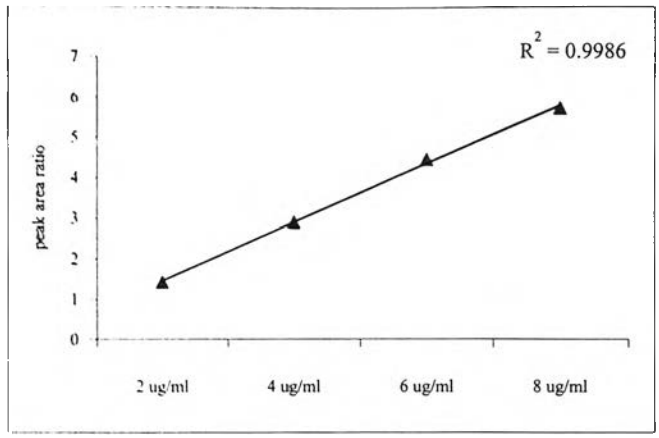
R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.051756	16.58053	1.79032896	10.79777778

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
TYPE	2	1.04968889	0.52484444	0.16	0.8526

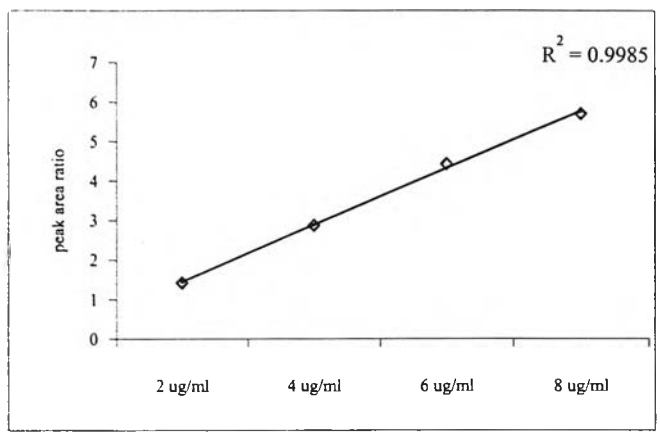
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
TYPE	2	1.04968889	0.52484444	0.16	0.8526

APPENDIX III

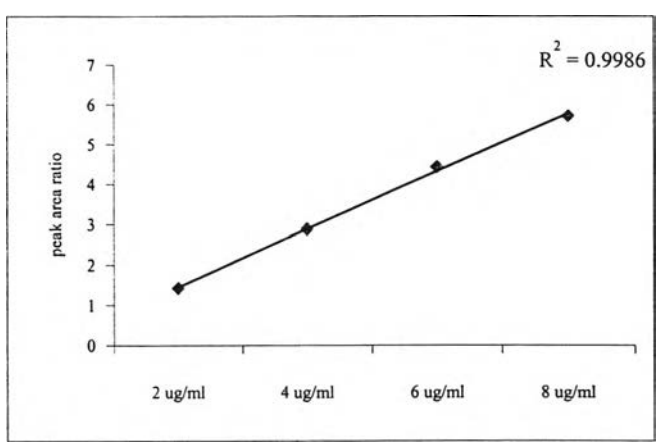
The chromatograms and statistical data from studying drug loading optimization and entrapment efficiency of retinyl palmitate niosomes



(a)



(b)



(c)

Figure 33. The calibration curves of retinyl palmitate for within run precision

(a) Sample No.1 (b) Sample No. 2 (c) Sample No. 3

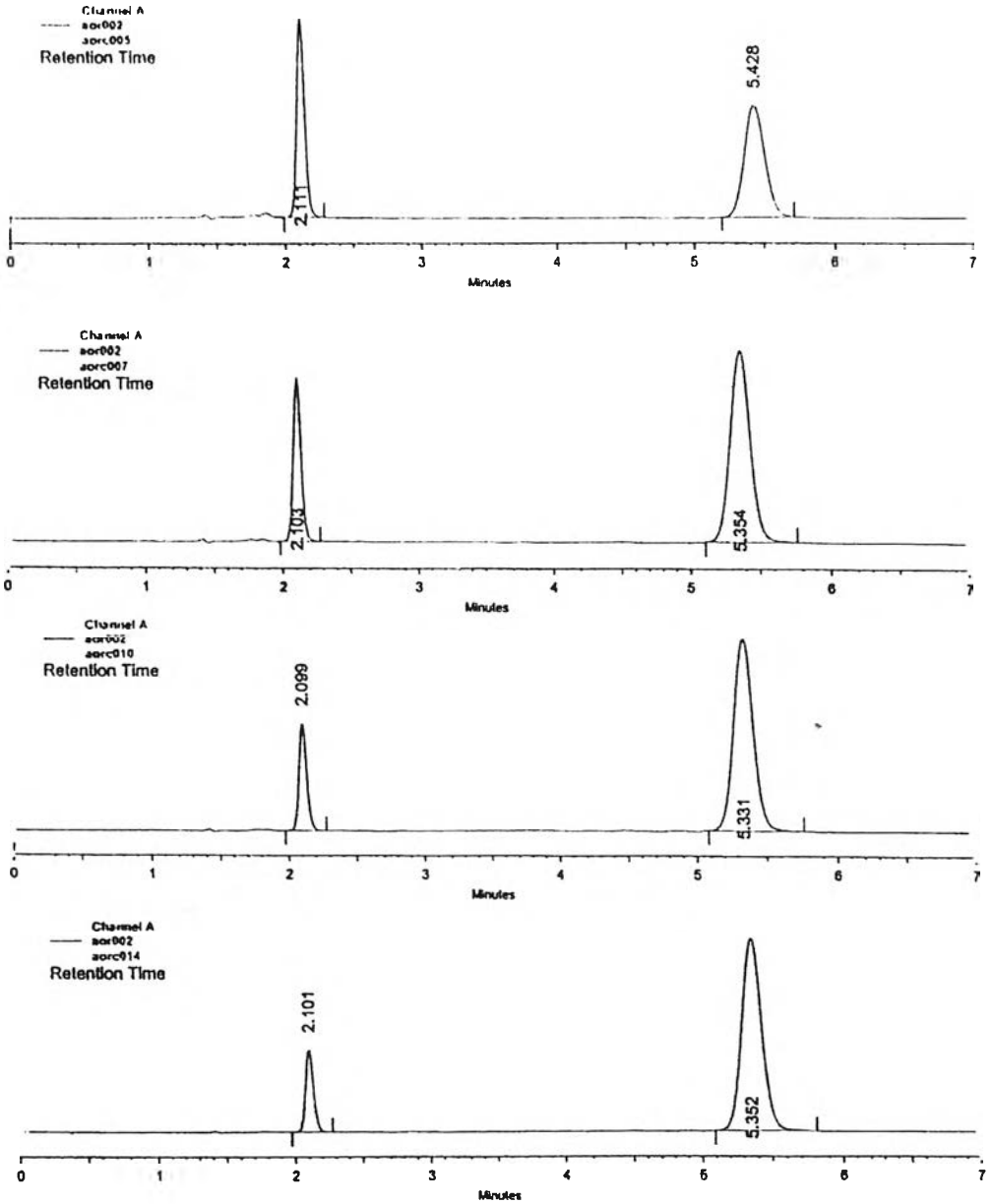


Figure 34. a) The chromatograms of retinyl palmitate standard solutions

Within run precision

Sample No 1

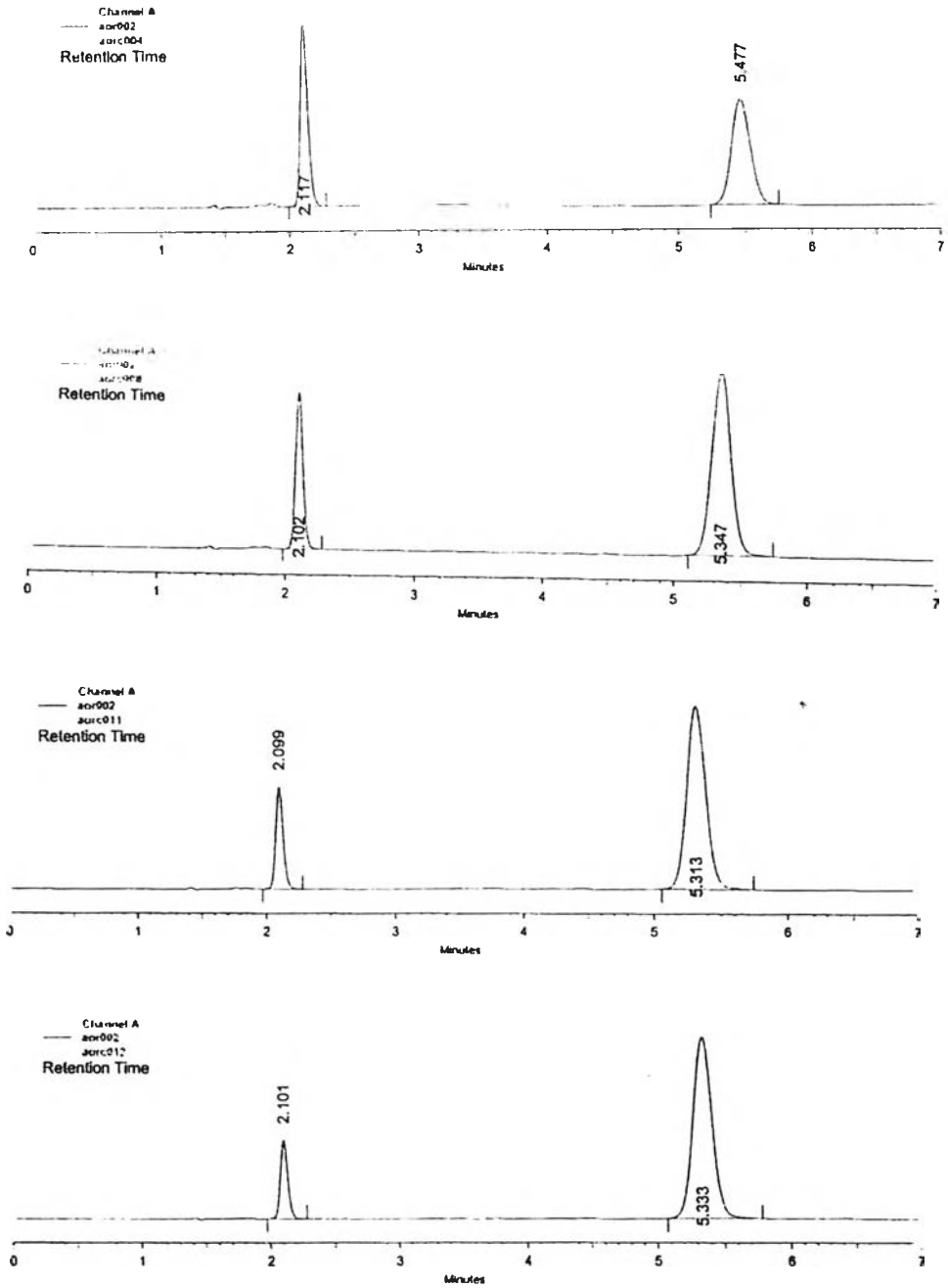


Figure 34. b) The chromatograms of retinyl palmitate standard solutions

Within run precision

Sample No 2

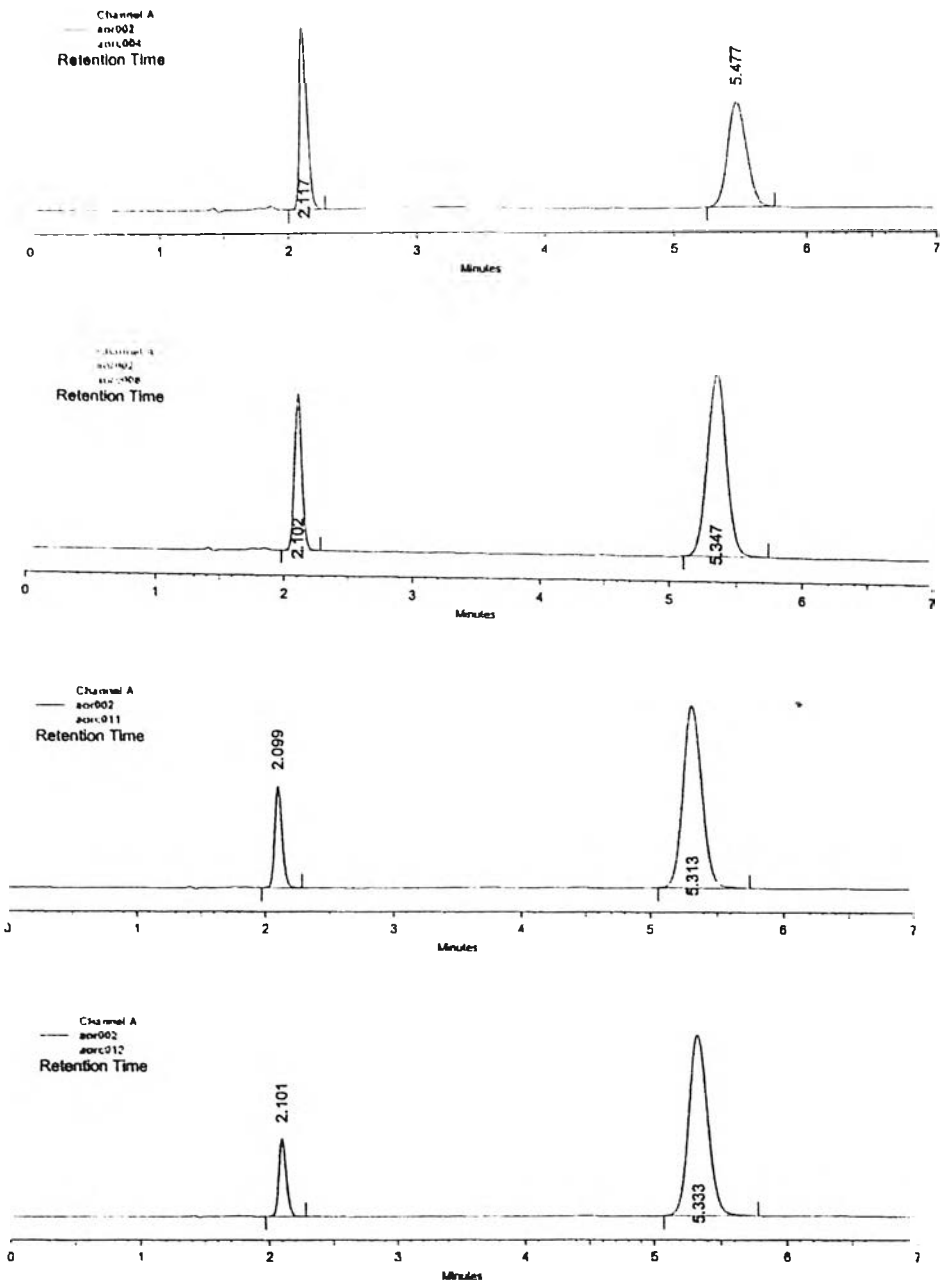
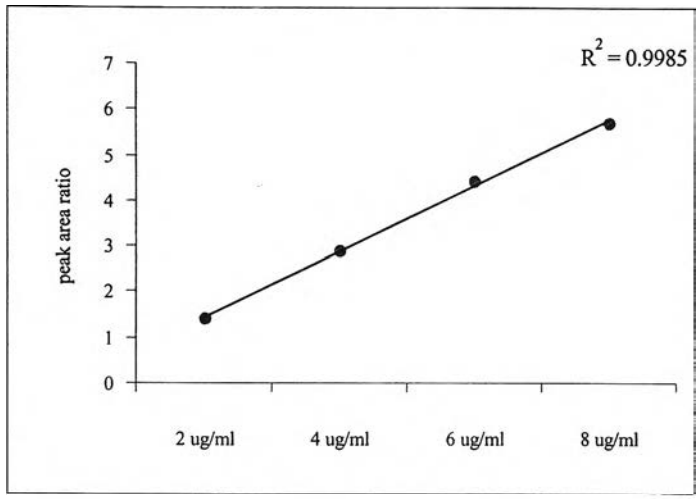


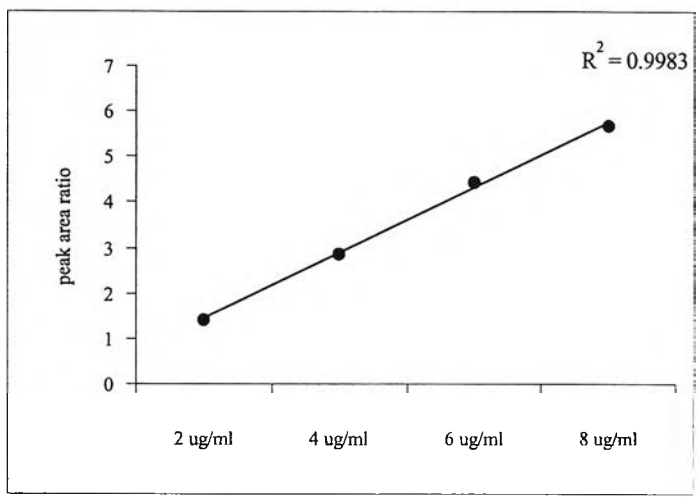
Figure 34. c) The chromatograms of retinyl palmitate standard solutions

Within run precision

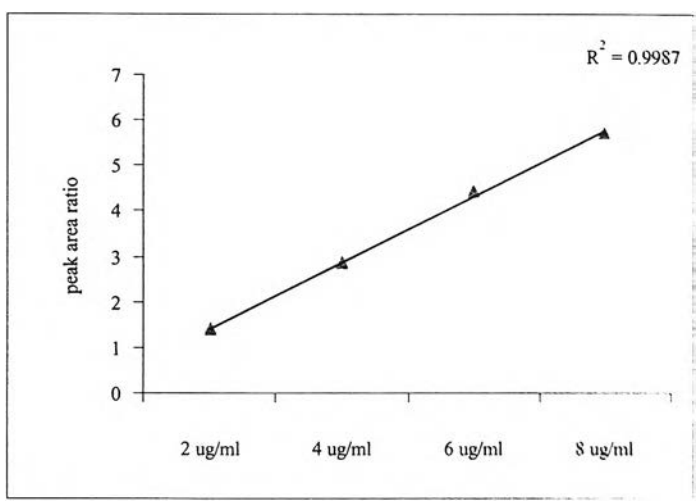
Sample No 3



(a)



(b)



(c)

Figure 35. The calibration curves of retinyl palmitate for between run precision

(a) Day 1 (b) Day 2 (c) Day 3

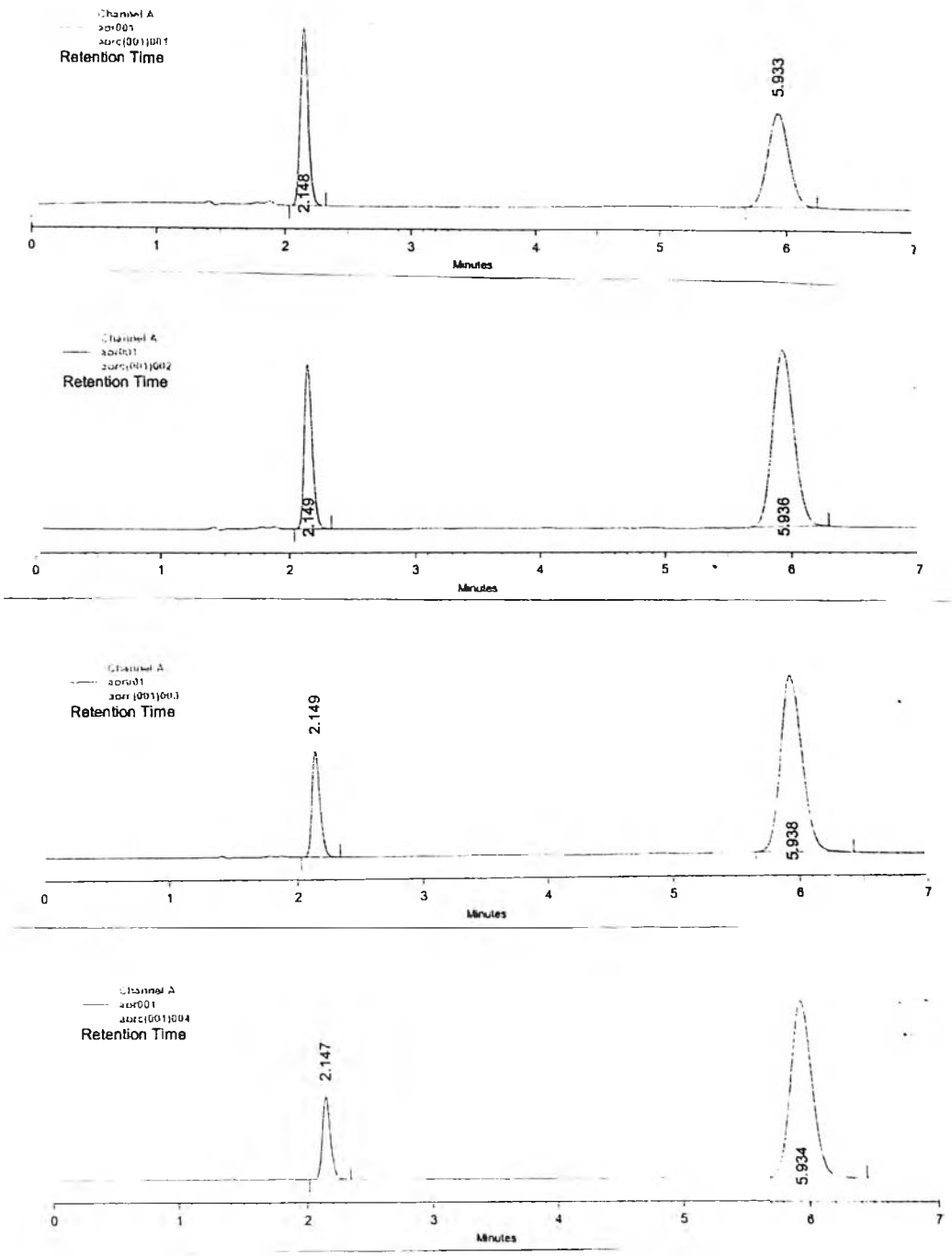


Figure 36. a) The chromatograms of retinyl palmitate standard solutions

Between run precision Day 1

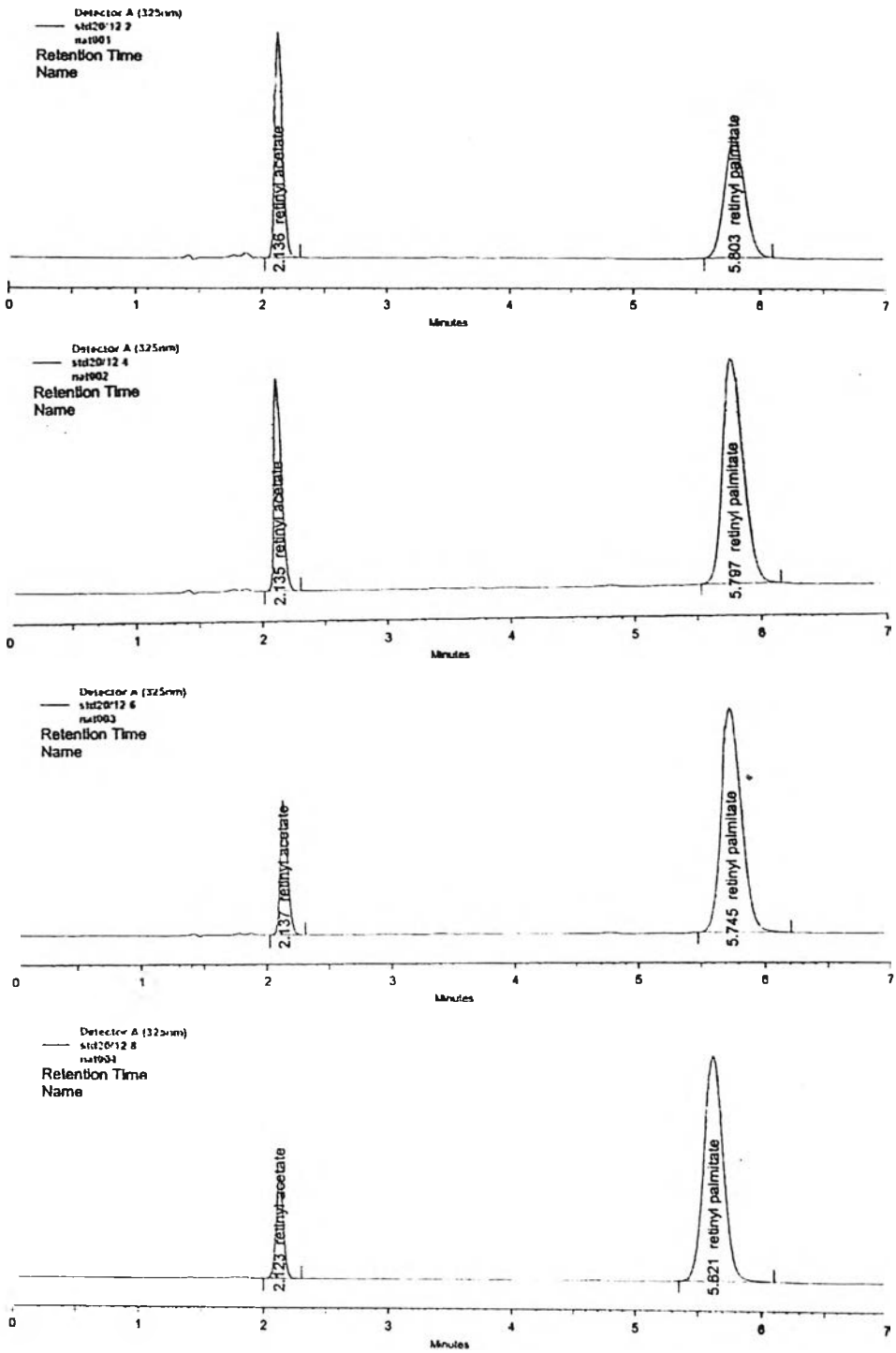


Figure 36. b) The chromatograms of retinyl palmitate standard solutions

Between run precision Day 2

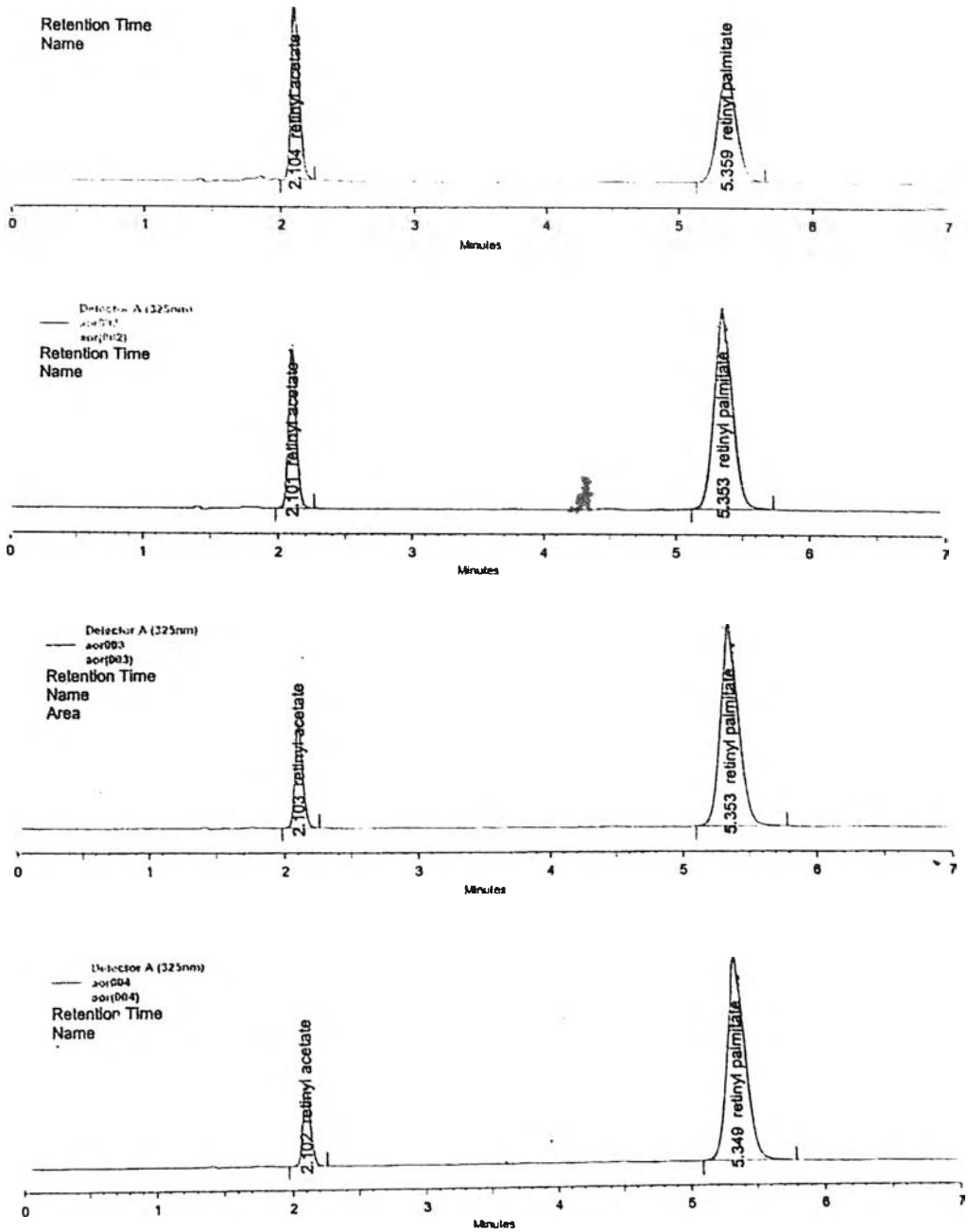


Figure 36. c) The chromatograms of retinyl palmitate standard solutions

Between run precision Day 3

Table 21. The statistical data of the entrapped retinyl palmitate loading in niosomes prepared by span 40

Loading amount	Entrapped RP
5.1 mg	4.99
	4.93
	5.02
8.6mg	7.67
	7.65
	7.65
10.5 mg	9.24
	9.38
	9.65

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr >F**
Model	2	30.02886667	15.01443333	986.35	0.0001
Error	6	0.09133333	0.01522222		
Corrected Total	8	30.12020000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.996968	1.677856	0.12337837	7.35333333

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	2	30.02886667	15.01443333	986.35	0.0001
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	2	30.02886667	15.01443333	986.35	0.0001

Table 22. The statistical data of the entrapped retinyl palmitate loading in niosomes prepared by span 60

Loading amount	Entrapped RP
5 mg	5.04
	4.91
	4.79
8.3 mg	7.28
	7.39
	7.40
10.2 mg	8.17
	8.25
	7.93

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	16.80882222	15.01443333	986.35	0.0001
Error	6	0.09560000	0.01522222		
Corrected Total	8	16.90442222			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.994345	1.857498	0.12622731	6.79555556

Source	DF	Type I SS	Mean Square	F Value	Pr > F
RATIO	2	16.80882222	8.40441111	527.47	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	2	16.80882222	8.40441111	527.47	0.0001

E2049578

Table 23. The statistical data of the entrapped retinyl palmitate loading in niosomes prepared by span 85

Loading amount	Entrapped RP
5.4 mg	5.31
	5.51
	5.45
8.5 mg	5.79
	5.96
	5.99
10.7 mg	6.70
	6.72
	6.72

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	2.54420000	1.27210000	171.13	0.0001
Error	6	0.04460000	0.00743333		
Corrected Total	8	2.58880000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.982772	1.432966	0.08621678	6.01666667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	2	2.54420000	1.27210000	171.13	0.0001
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	2	2.54420000	1.27210000	171.13	0.0001

Span 40:cholesterol:solulan C-24

Table 24. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (45:45:10)

Ratio	Entrapped RP
10:80:10	7.53
	7.57
	7.57
45:45:10	7.67
	7.65
	7.65

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Square**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.01500000	0.01500000	45.00	0.0026
Error	4	0.00133333	0.00033333		
Corrected Total	5	0.01633333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.918367	0..240019	0.0182574	7.6066667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.01500000	0.01500000	45.00	0.0026
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.01500000	0.01500000	45.00	0.0026

Span 40:cholesterol:solulan C-24

Table 25. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (65:25:10)

Ratio	Entrapped RP
10:80:10	7.53
	7.57
	7.57
65:25:10	7.91
	7.88
	7.89

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.17001667	0.17001667	443.52	0.0001
Error	4	0.00153333	0.00038333		
Corrected Total	5	0.17155000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.991062	0.253449	0.0195789	7.7250000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.17001667	0.17001667	443.52	0.0001
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.17001667	0.17001667	443.52	0.0001

Span 40:cholesterol:solulan C-24

Table 26. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (90:0:10)

Ratio	Entrapped RP
10:80:10	7.53
	7.57
	7.57
90:0:10	7.54
	7.54
	7.58

General Linear Models Procedure

Dependent Variable : VALUE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00001667	0.00001667	0.03	0.8683
Error	4	0.00213333	0.00053333		
Corrected Total	5	0.00215000			

R- Square	C.V	Root MSE	VALUE Mean
0.007752	0.305679	0.0230940	7.5550000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
RATIO	1	0.00001667	0.00001667	0.03	0.8683
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.00001667	0.00001667	0.03	0.8683

Span 40:cholesterol:solulan C-24

Table 27. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (65:25:10)

Ratio	Entrapped RP
45:45:10	7.67
	7.65
	7.65
65:25:10	7.91
	7.88
	7.89

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.08401667	0.08401667	458.27	0.0001
Error	4	0.00073333	0.00018333		
Corrected Total	5	0.08475000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.991347	0.174149	0.0135401	7.7750000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.08401667	0.08401667	458.27	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.08401667	0.08401667	458.27	0.0001

Span 40:cholesterol:solulan C-24

Table 28. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (90:0:10)

Ratio	Entrapped RP
45:45:10	7.67
	7.65
	7.65
90:0:10	7.54
	7.54
	7.58

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.01601667	0.01601667	48.05	0.0023
Error	4	0.00133333	0.00033333		
Corrected Total	5	0.01735000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.923151	0.240071	0.0182574	7.6050000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.01601667	0.01601667	48.05	0.0023

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.01601667	0.01601667	48.05	0.0023

Span 40:cholesterol:solulan C-24

Table 29. The statistical data of the cholesterol effect on drug entrapment between (65:25:10) and (90:0:10)

Ratio	Entrapped RP
65:25:10	7.91
	7.88
	7.89
90:0:10	7.54
	7.54
	7.58

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.17340000	0.17340000	452.35	0.0001
Error	4	0.00153333	0.00038333		
Corrected Total	5	0.17493333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.991235	0.253503	0.0195789	7.7233333

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.17340000	0.17340000	452.35	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.17340000	0.17340000	452.35	0.0001

Span 60:cholesterol:solulan C-24

Table 30. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (45:45:10)

Ratio	Entrapped RP
10:80:10	7.43
	7.43
	7.43
45:45:10	7.28
	7.39
	7.40

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00806667	0.00806667	3.64	0.1291
Error	4	0.00886667	0.00221667		
Corrected Total	5	0.01693333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.476378	0..636810	0.0470815	7.3933333

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.00806667	0.01500000	3.64	0.1291
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.00806667	0.00806667	3.64	0.1291

Span 60:cholesterol:solulan C-24

Table 31. The statistical data of the cholesterol effect on drug entrapment Between (10:80:10) and (65:25:10)

Ratio	Entrapped RP
10:80:10	7.43
	7.43
	7.43
65:25:10	8.57
	8.56
	8.56

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	1.92666667	1.92666667	99999.99	0.0001
Error	4	0.00006667	0.00001667		
Corrected Total	5	1.92673333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.999965	0.051052	0.0040825	7.9966667

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	1.92666667	1.92666667	99999.99	0.0001
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	1.92666667	1.92666667	99999.99	0.0001

Span 60:cholesterol:solulan C-24

Table 32. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (90:0:10)

Ratio	Entrapped RP
10:80:10	7.43
	7.43
	7.43
90:0:10	8.79
	8.79
	8.75

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	2.70681667	2.70681667	12493.00	0.0001
Error	4	0.00086667	0.00021667		
Corrected Total	5	2.70768333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.999680	0.181686	0.0147196	8.1016667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.70681667	2.70681667	12493.00	0.0001
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.70681667	2.70681667	12493.00	0.0001

Span 60:cholesterol:solulan C-24

Table 33. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (65:25:10)

Ratio	Entrapped RP
45:45:10	7.23
	7.39
	7.40
65:25:10	8.57
	8.56
	8.56

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	2.18406667	2.18406667	977.94	0.0001
Error	4	0.00893333	0.00223333		
Corrected Total	5	2.19300000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.995926	0.593695	0.0472582	7.9600000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.18406667	2.18406667	45.00	0.0026
Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.18406667	2.18406667	977.94	0.0001

Span 60:cholesterol:solulan C-24

Table 34. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (90:0:10)

Ratio	Entrapped RP
45:45:10	7.28
	7.39
	7.40
90:0:10	8.79
	8.78
	8.75

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	3.01041667	3.01041667	1237.16	0.0001
Error	4	0.00973333	0.00243333		
Corrected Total	5	3.02015000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.996777	0.611641	0.0493288	8.0650000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	3.01041667	3.01041667	1237.16	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	3.01041667	3.01041667	1237.16	0.0001

Span 60:cholesterol:solulan C-24

Table 35. The statistical data of the cholesterol effect on drug entrapment between (65:25:10) and (90:0:10)

Ratio	Entrapped RP
65:25:10	8.57
	8.56
	8.56
90:0:10	8.79
	8.78
	8.75

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.06615000	0.06615000	283.50	0.0001
Error	4	0.00093333	0.00023333		
Corrected Total	5	0.06708333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.986087	0.176219	0.0152753	8.6683333

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.06615000	0.06615000	283.50	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.06615000	0.06615000	283.50	0.0001

Span 85:cholesterol:solulan C-24

Table 36. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (45:45:10)

Ratio	Entrapped RP
10:80:10	6.42
	6.37
	6.35
45:45:10	5.79
	5.96
	5.99

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Squares**	**F Value**	**Pr > F**
Model	1	0.32666667	0.32666667	50.52	0.0021
Error	4	0.02586667	0.00646667		
Corrected Total	5	0.35253333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.926626	1.308280	0.0804156	6.1466667

Source	**DF**	**Type I SS**	**Mean Squares**	**F Value**	**Pr > F**
RATIO	1	0.32666667	0.32666667	50.52	0.0021

Source	**DF**	**Type III SS**	**Mean Squares**	**F Value**	**Pr > F**
RATIO	1	0.32666667	0.32666667	50.52	0.0021

Span 85:cholesterol:solulan C-24

Table 37. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (65:25:10)

Ratio	Entrapped RP
10:80:10	6.42
	6.37
	6.35
65:25:10	5.50
	5.50
	5.56

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	1.10940000	1.10940000	887.52	0.0001
Error	4	0.00500000	0.00125000		
Corrected Total	5	1.11440000			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.995513	0.594207	0.0353553	5.9500000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	1.10940000	1.10940000	887.52	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	1.10940000	1.10940000	887.52	0.0001

Span 85:cholesterol:solulan C-24

Table 38. The statistical data of the cholesterol effect on drug entrapment between (10:80:10) and (90:0:10)

Ratio	Entrapped RP
10:80:10	6.42
	6.37
	6.35
90:0:10	7.13
	7.15
	7.18

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.89706667	0.89706667	928.00	0.0001
Error	4	0.00386667	0.00096667		
Corrected Total	5	0.90093333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.995708	0.459477	0.0310913	6.7666667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.89706667	0.89706667	928.00	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.89706667	0.89706667	928.00	0.0001

Span 85:cholesterol:solulan C-24

Table 39. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (65:25:10)

Ratio	Entrapped RP
45:45:10	5.79
	5.96
	5.99
65:25:10	5.50
	5.50
	5.56

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.23206667	0.23206667	36.17	0.0038
Error	4	0.02566667	0.00641667		
Corrected Total	5	0.25773333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.900414	1.401238	0.0801041	5.7166667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.23206667	0.23206667	36.17	0.0038

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	0.23206667	0.23206667	36.17	0.0038

Span 85:cholesterol:solulan C-24

Table 40. The statistical data of the cholesterol effect on drug entrapment between (45:45:10) and (90:0:10)

Ratio	Entrapped RP
45:45:10	5.79
	5.96
	5.99
90:0:10	7.13
	7.15
	7.18

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	2.30640000	2 .30640000	376.04	0.0001
Error	4	0.02453333	0.00613333		
Corrected Total	5	2.33093333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.989475	1.198708	0.0783156	6.5333333

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.30640000	2.30640000	376.04	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	2.30640000	2.30640000	376.04	0.0001

Span 85:cholesterol:solulan C-24

Table 41. The statistical data of the cholesterol effect on drug entrapment between (65:25:10) and (90:0:10)

Ratio	Entrapped RP
65:25:10	5.50
	5.50
	5.56
90:0:10	7.13
	7.15
	7.18

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	4.00166667	4.00166667	4365.45	0.0001
Error	4	0.00366667	0.00091667		
Corrected Total	5	4.00533333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.999085	0.477799	0.03027650	6.33666667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	4.00166667	4.00166667	4365.45	0.0001

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
RATIO	1	4.00166667	4.00166667	4365.45	0.0001

APPENDIX IV

The chromatogram and statistical data from studying retinyl palmitate niosomes permeation in vitro

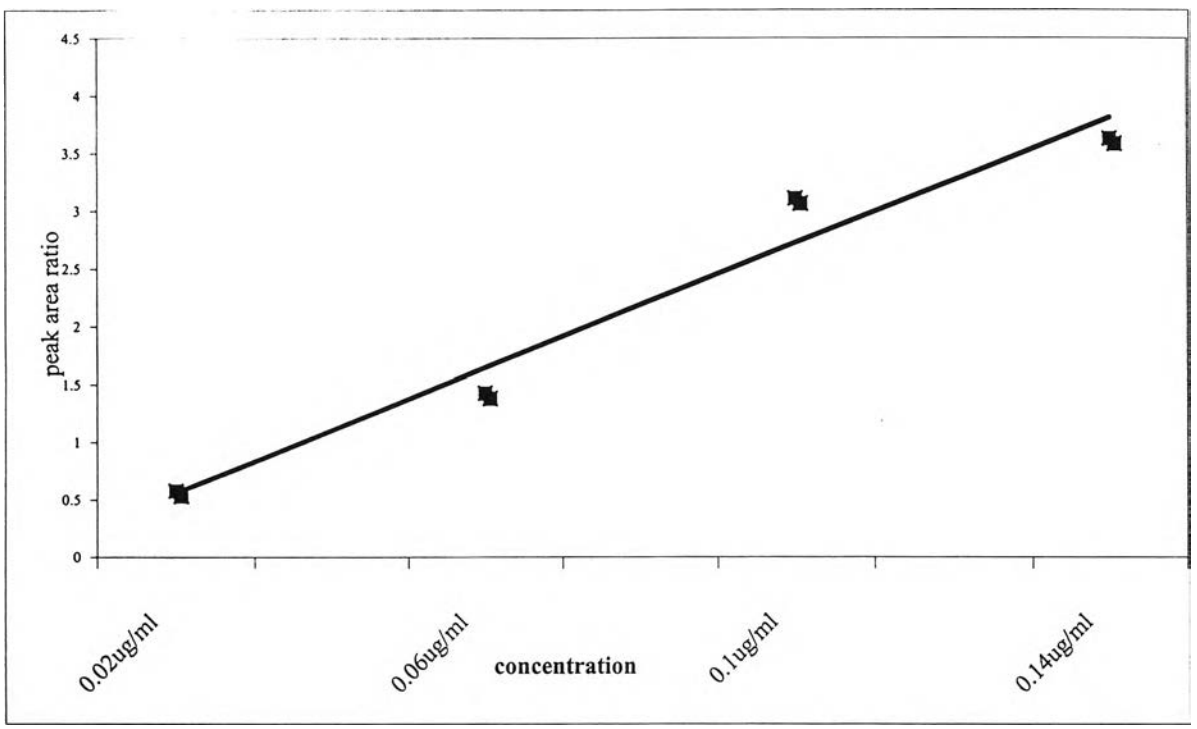


Figure 37. The calibration curve of retinyl palmitate for permeation study

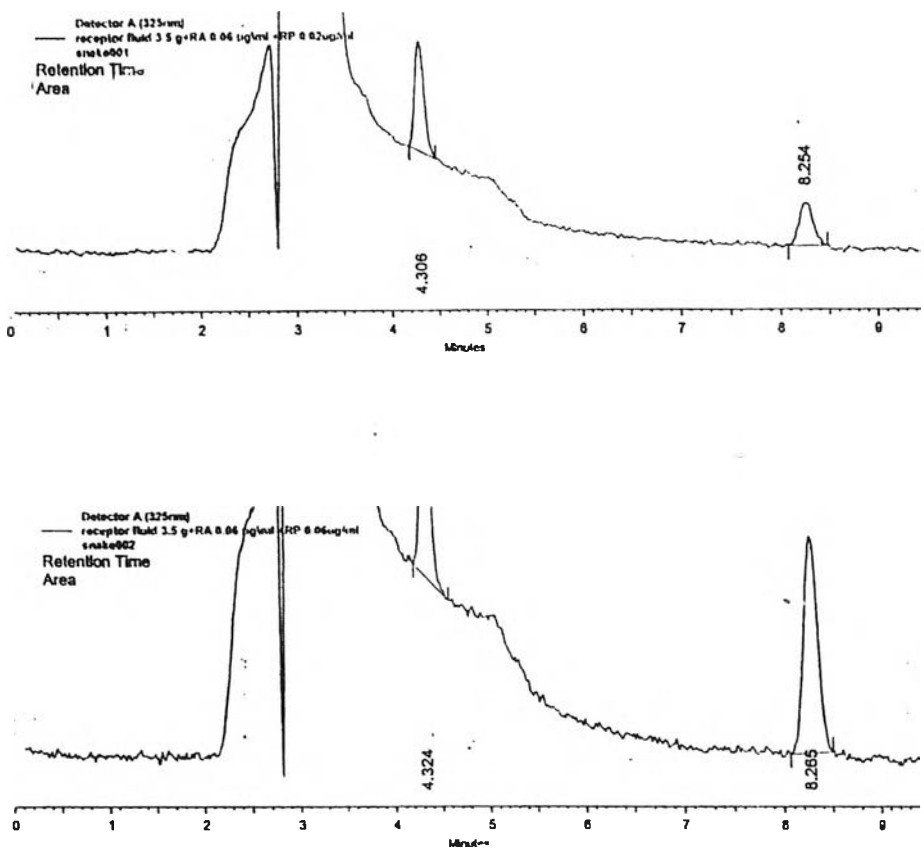


Figure 38. The chromatograms of retinyl palmitate standard solutions with receptor fluid (a) RP 0.02 μg/ml (b) RP 0.06 μg/ml

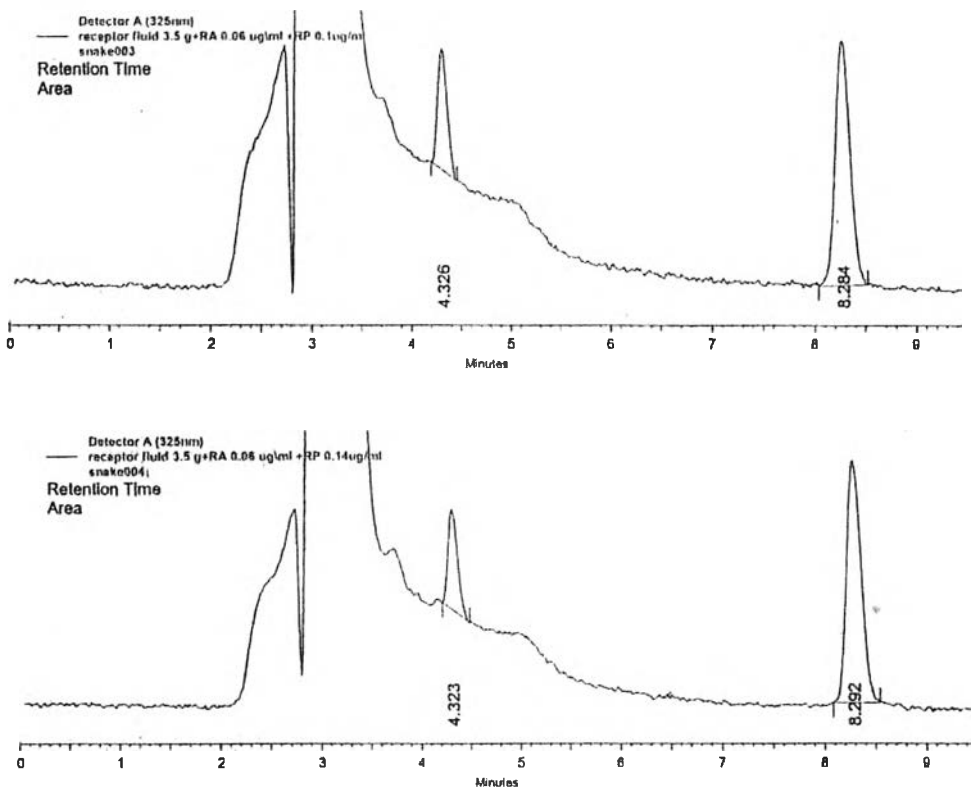


Figure 39. The chromatograms of retinyl palmitate standard solutions with receptor fluid (a) RP 0.1 μg/ml (b) RP 0.14 μg/ml

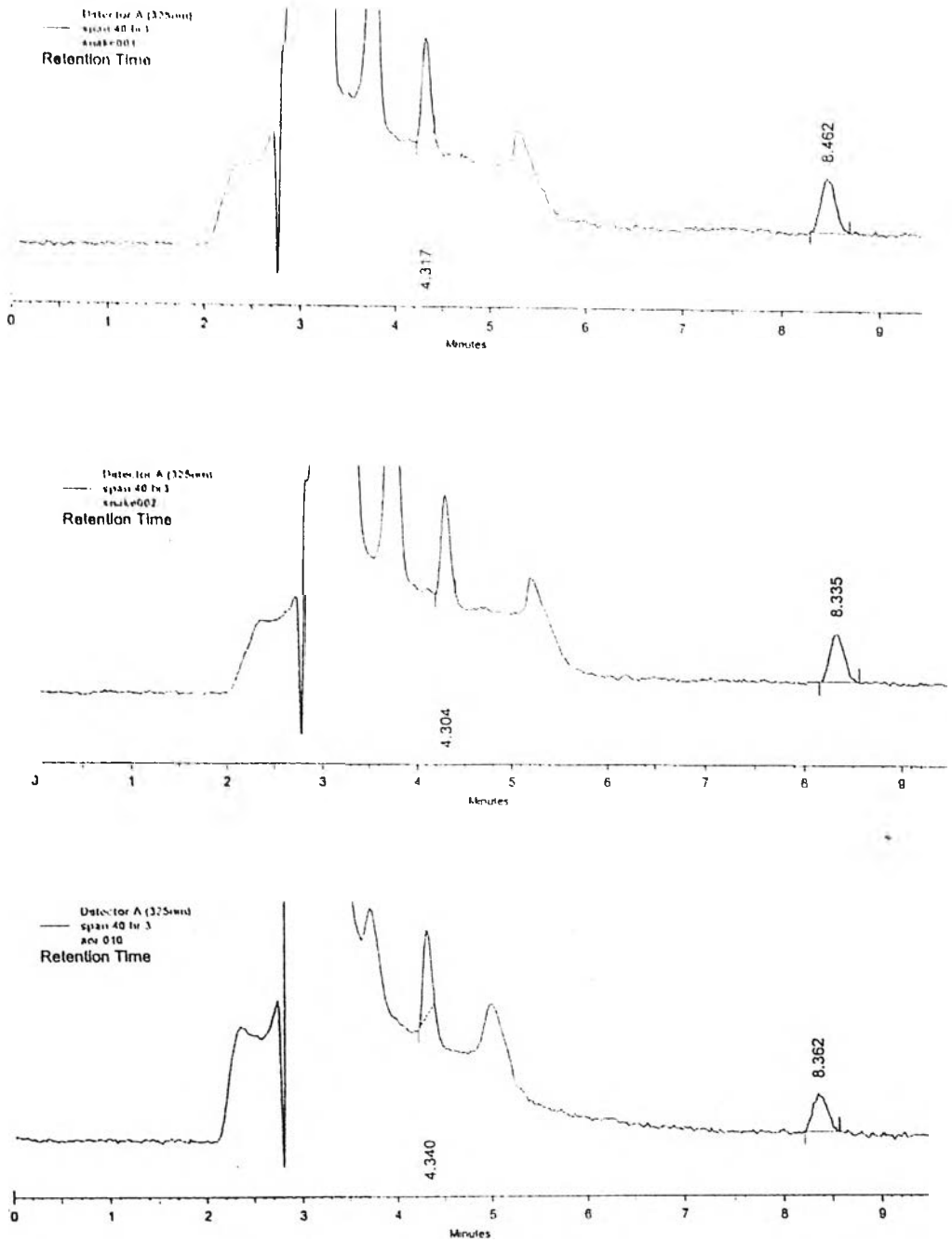


Figure 40. a) The chromatograms of permeable retinyl palmitate from niosomes prepared by span40:cholesterol:solulan C-24 (45:45:10) 3 Hr

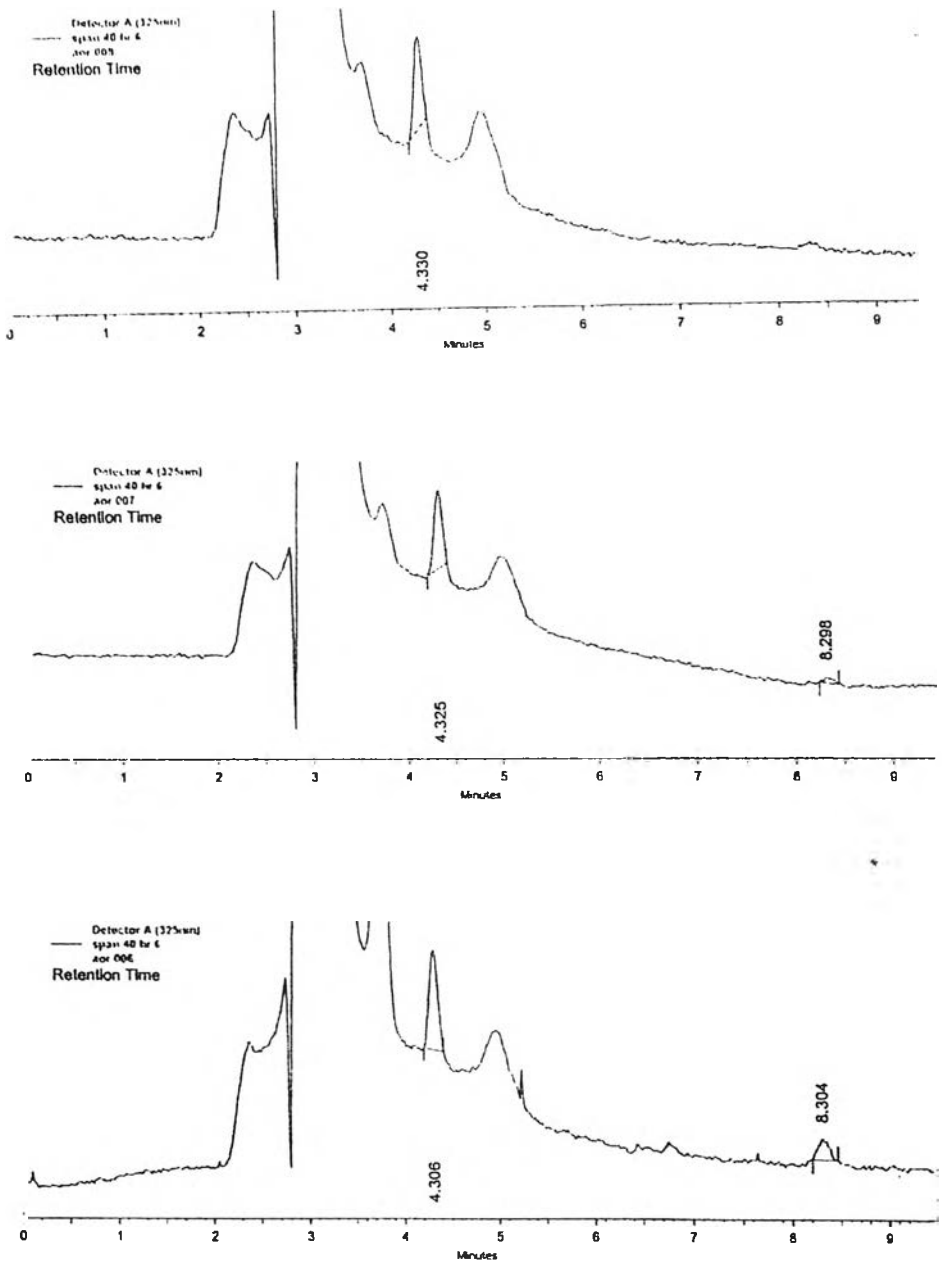


Figure 40. b) The chromatograms of permeable retinyl palmitate from niosomes prepared by span40:cholesterol:solulan C-24 (45:45:10)

6 Hr

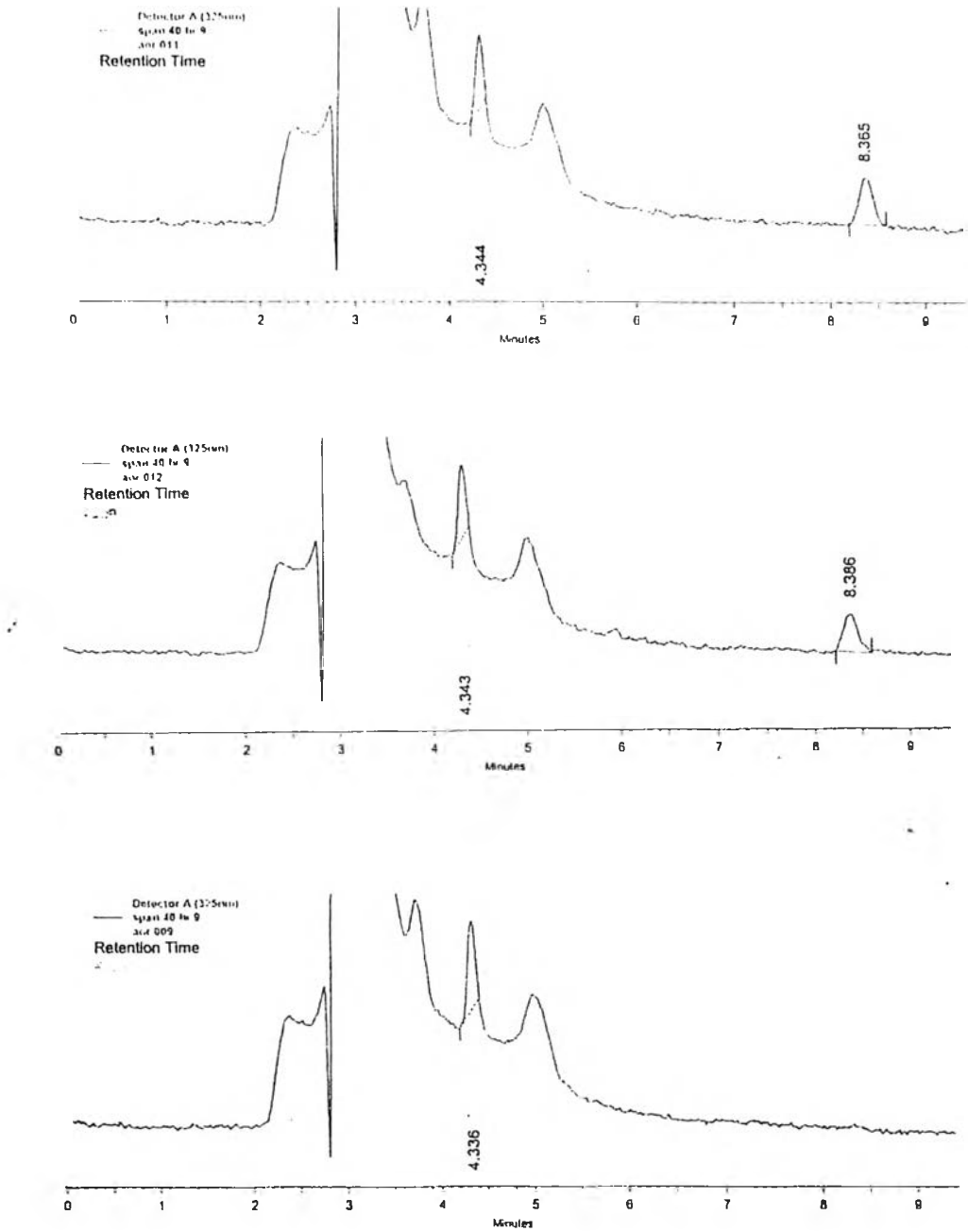


Figure 40. c) The chromatograms of permeable retinyl palmitate from niosomes prepared by span40:cholesterol:solulan C-24 (45:45:10) 9 Hr

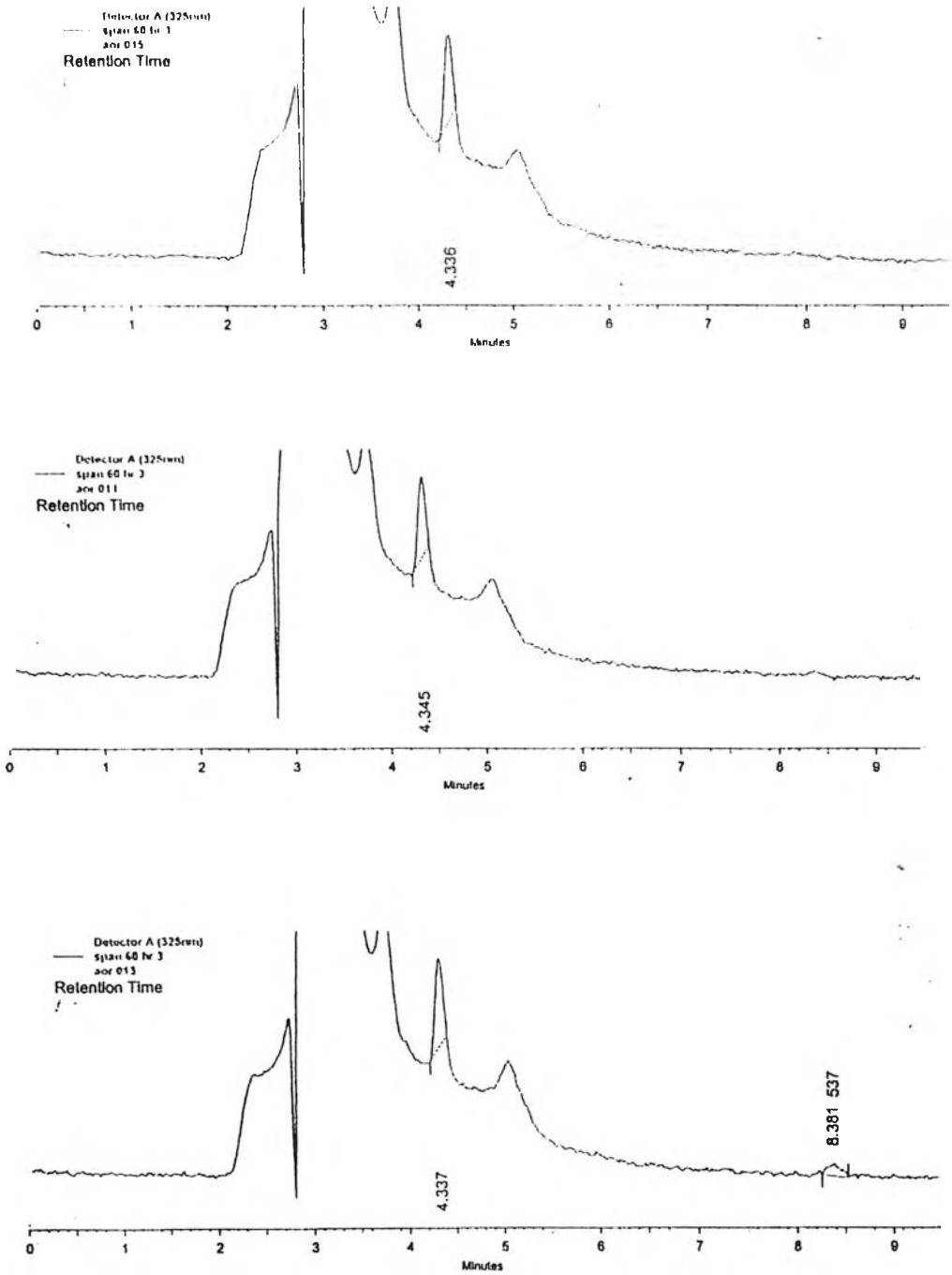


Figure 41. a) The chromatograms of permeable retinyl palmitate from niosomes prepared by span60:cholesterol:solulan C-24 (45:45:10) 3 Hr

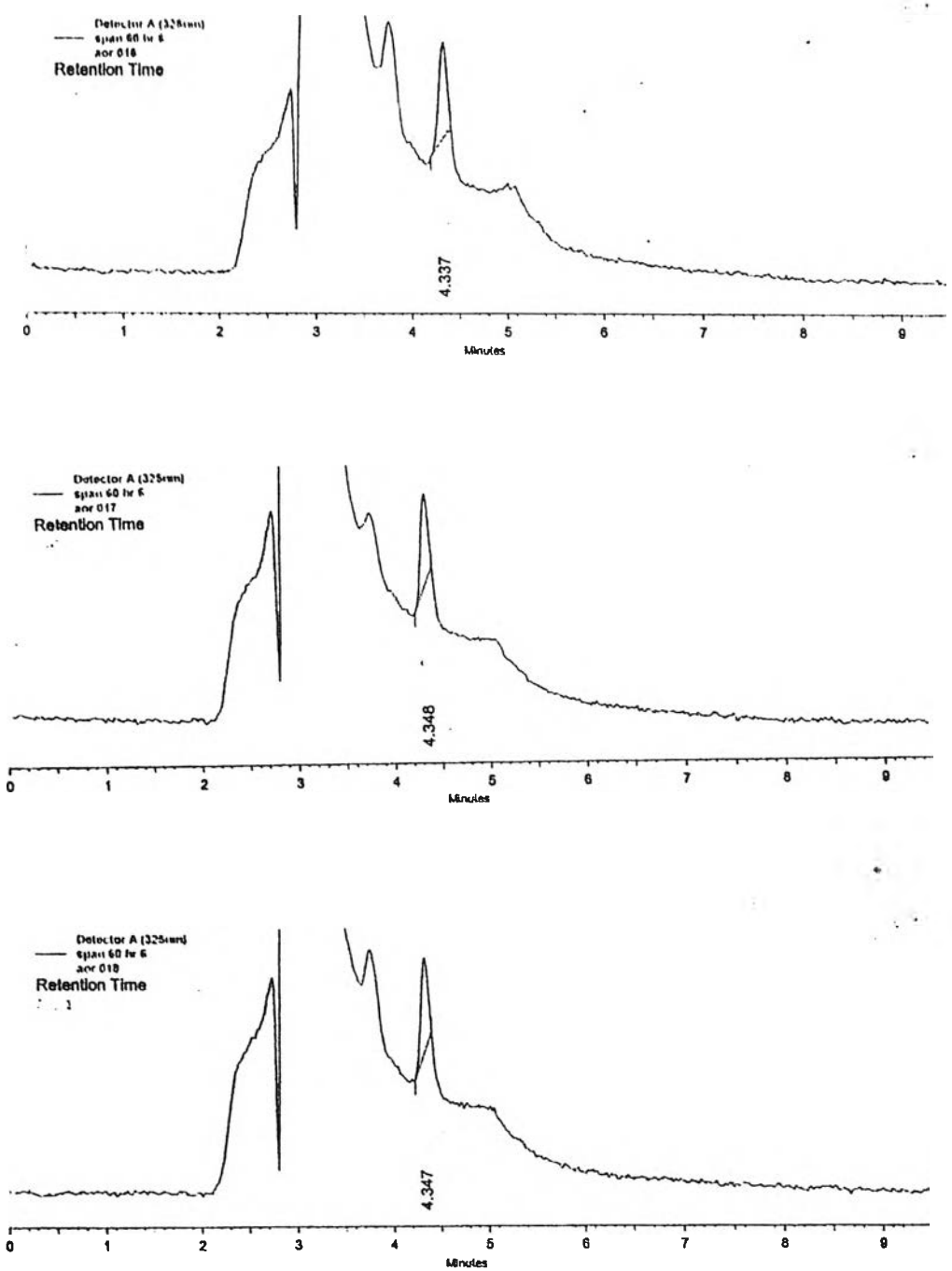


Figure 41. b) The chromatograms of permeable retinyl palmitate from niosomes prepared by span60:cholesterol:solulan C-24 (45:45:10) 6 Hr

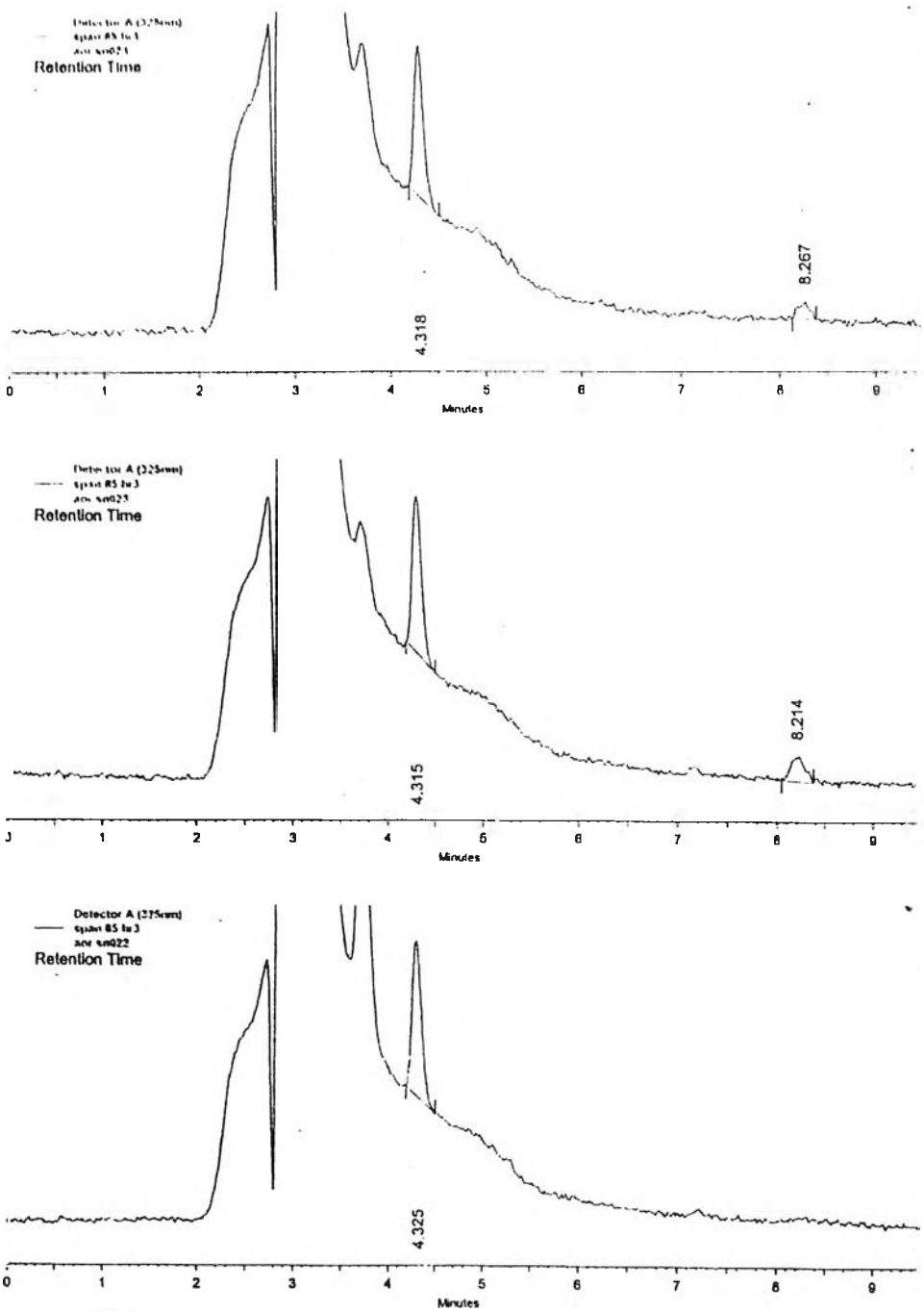


Figure 41. c) The chromatograms of permeable retinyl palmitate from niosomes prepared by span60:cholesterol:solulan C-24 (45:45:10) 9 Hr

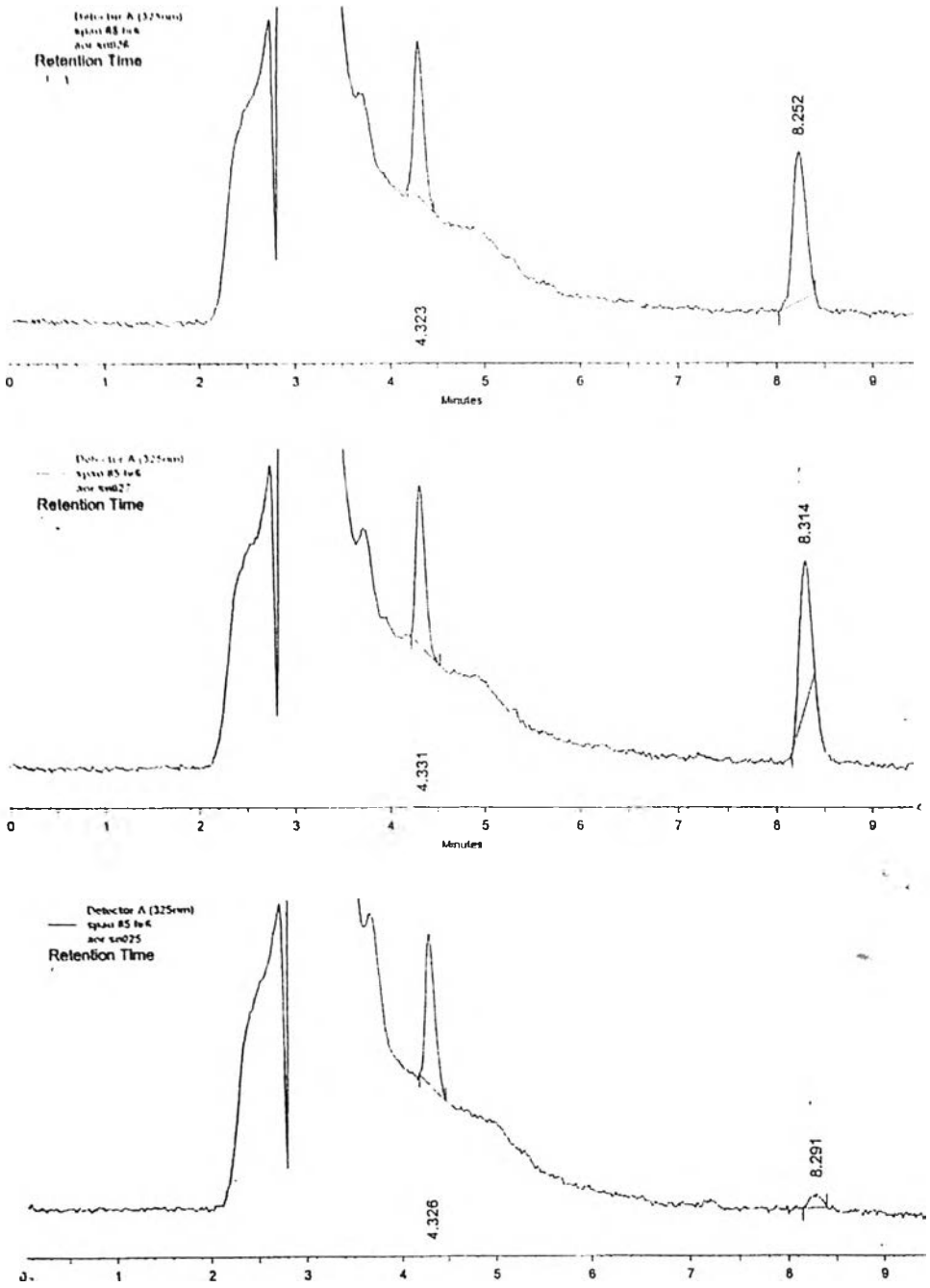


Figure 42. a) The chromatograms of permeable retinyl palmitate from niosomes prepared by span85:cholesterol:solulan C-24 (45:45:10) 3 Hr

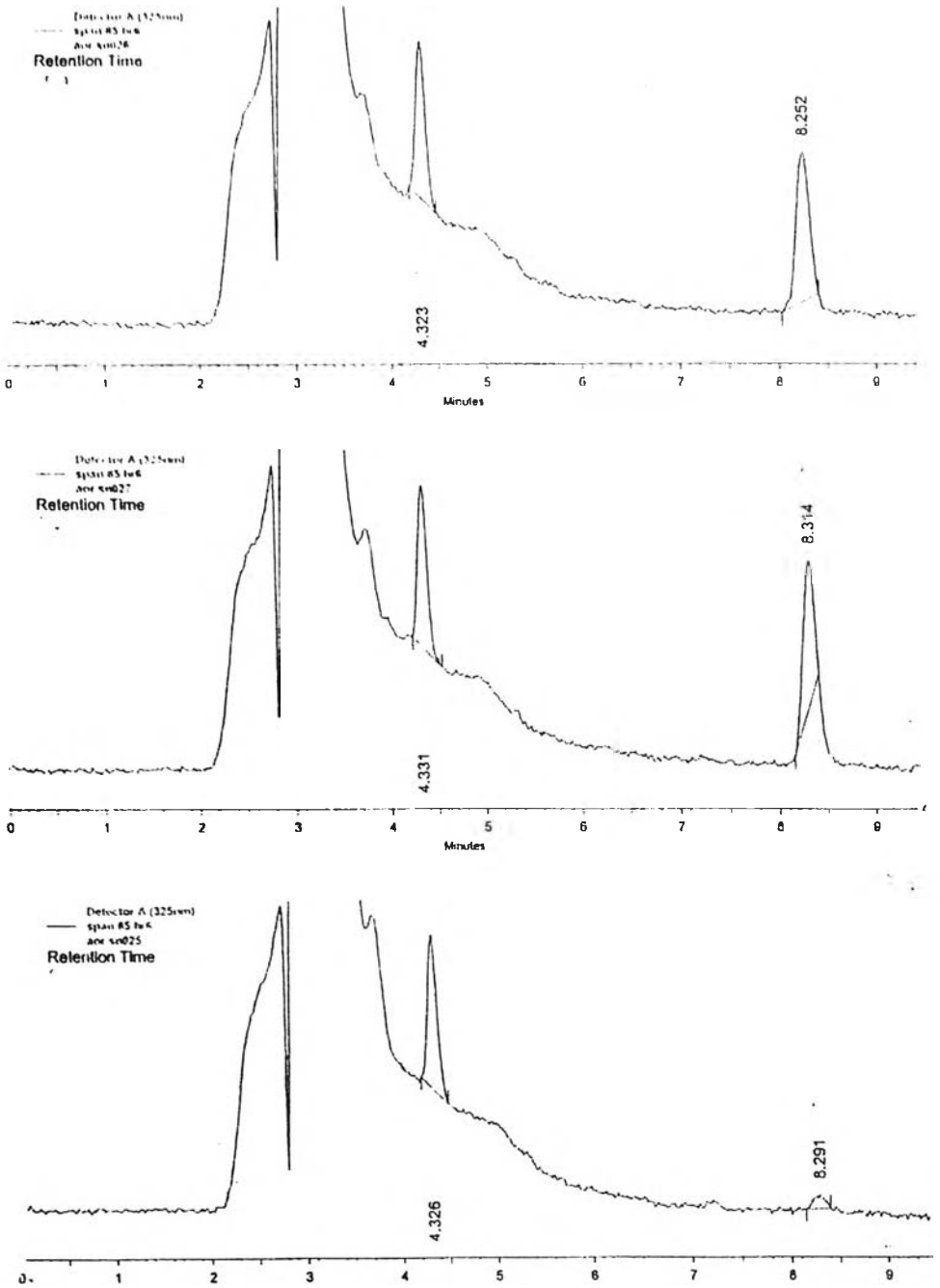


Figure 42. b) The chromatograms of permeable retinyl palmitate from niosomes prepared by span85:cholesterol:solulan C-24 (45:45:10) 6 Hr

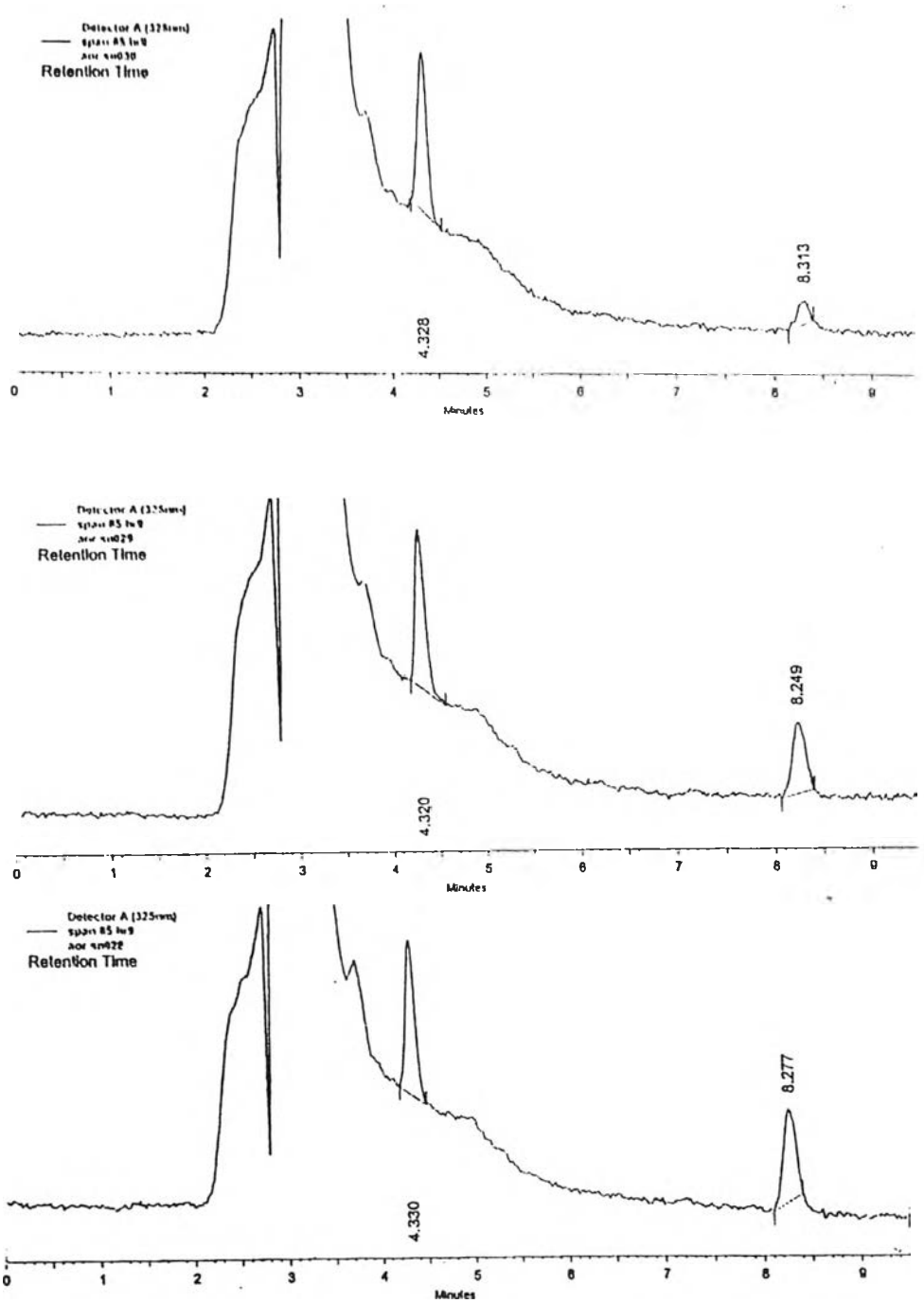


Figure 42. c) The chromatograms of permeable retinyl palmitate from niosomes prepared by span85:cholesterol:solulan C-24 (45:45:10) 9 Hr

Table 42. The statistical data of RP flux from niosomes prepared by span 40 and span 60

Type	Entrapped RP
Span 40	1.290
	1.547
	1.467
	3.149
	3.343
Span 60	0.000
	0.000
	0.000
	0.000
	0.000

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	11.65536160	11.65536160	23.37	0.0013
Error	8	3.99052480	0.49881560		
Corrected Total	9	15.64588640			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.744947	65.41949	0.70626879	1.07960000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	11.65536160	11.65536160	23.37	0.0013

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	11.65536160	11.65596160	23.37	0.0013

Level of Flux	N	Mean	SD
Span 40	5	2.15920000	0.99881490
Span 60	5	0.00000000	0.00000000

Table 43. The statistical data of RP flux from niosomes prepared by span 40 and span 85

Type	Entrapped RP
Span 40	1.290
	1.547
	1.467
	3.149
	3.343
Span 85	0.000
	0.000
	0.000
	1.313
	1.248

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	5.23452250	5.23452250	5.24	0.0513
Error	8	7.98465360	0.99808170		
Corrected Total	9	13.21917610			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.395979	80.84813	0.99904039	1.23570000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	5.23452250	5.23452250	5.24	0.0513

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	5.23452250	5.23452250	5.24	0.0513

Level of Flux	N	Mean	SD
Span 40	5	1.95920000	1.22626718
Span 85	5	0.00000000	0.70173514

Table 44. The statistical data of RP flux from niosomes prepared by span 60 and span 85

Type	Entrapped RP
Span 60	0.000
	0.000
	0.000
	0.000
	0.000
Span 85	0.000
	0.000
	0.000
	1.313
	1.248

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.65587210	0.65587210	2.66	0.1413
Error	8	1.96972880	0.24621610		
Corrected Total	9	2.62560090			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.249799	193.7531	0.49620167	0.25610000

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	0.65587210	0.65587210	2.66	0.1413

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	1	0.65587210	0.65587210	2.66	0.1413

Level of Flux	N	Mean	SD
Span 60	5	0.00000000	0.00000000
Span 85	5	0.51220000	0.70173514

Table 45. The statistical data of cumulative RP from niosomes prepared by span 40 with different time intervals

3 hour*	6 hour*	9 hour*
1.18	0.00	2.60
1.10	0.00	1.10
1.34	0.00	2.95
2.08	5.31	6.33
2.87	4.95	6.72

* Time

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	14.38977333	7.19488667	1.48	0.2656
Error	12	58.19920000	4.84993333		
Corrected Total	14	72.58897333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.198236	85.73539	2.20225642	2.56866667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	2	14.38977333	7.19488667	1.48	0.2656

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	2	14.38977333	7.19488667	1.48	0.2656

Level of Flux	N	Mean	SD
3 hour	5	1.71400000	0.75371082
6 hour	5	2.05200000	2.81269799
9 hour	5	3.94000000	2.46382832

Table 46. The statistical data of cumulative RP from niosomes prepared by span 85 with different time intervals

3 hour*	6 hour*	9 hour*
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	1.81	2.64
0.00	1.45	2.51

* Time

General Linear Models Procedure

Dependent Variable : VALUE

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	2.71481333	1.35740667	1.45	0.2724
Error	12	11.21828000	0.93485667		
Corrected Total	14	13.93309333			

R- Square	**C.V**	**Root MSE**	**VALUE Mean**
0.194846	172.4518	0.96687986	0.56066667

Source	**DF**	**Type I SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	2	2.71481333	1.35740667	1.45	0.2724

Source	**DF**	**Type III SS**	**Mean Square**	**F Value**	**Pr > F**
FLUX	2	2.71481333	1.35740667	1.45	0.2724

Level of Flux	N	Mean	SD
3 hour	5	0.00000000	0.00000000
6 hour	5	0.65200000	0.90181484
9 hour	5	1.03000000	1.41113430

VITA

Miss Nattanan Chuansanit was born on April 15, 1974 in Bangkok, Thailand. She received her Bachelor Degree of Science in Pharmacy from the Faculty of Pharmaceutical Sciences, Chulalongkorn University in1997. After graduation she worked at The National Blood Center, Thai Red Cross Society, Bangkok, Thailand for 2 years. She moved to Petcharavej hospital for 9 months and then worked as a part time pharmacist at Wachiira hospital from January 2000 to February 2002 while she was studying the Master's Degree program in Pharmaceutical Technology at Chulalongkorn University.