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# **Appendices**

# **Appendix A**

## **Results of fat extraction**

Table 13. Lipid contents of butter cookie extracted by n-hexane at 40 and 80% ultrasonic intensity

Extraction time (min)	Lipid yield (mg/g sample)					
	40% Ultrasonic intensity			80% Ultrasonic intensity		
	Flask 1	Flask 2	Average	Flask 1	Flask 2	Average
60	246.6	244.6	245.6	247.0	246.3	246.6
90	243.7	244.0	243.8	243.1	245.1	244.1
120	250.0	250.0	250.0	252.0	250.0	251.0

Table 14 . Lipid contents of butter cookie and butter cake extracted by n-hexane at 40% ultrasonic intensity and different extraction time

Extraction time (min)	Lipid yield (mg/g sample)					
	Butter cookie			Butter cake		
	Flask 1	Flask 2	Average	Flask 1	Flask 2	Average
60	246.6	244.6	245.6	172.3	175.8	174.1
90	240.3	247.4	243.8	178.1	176.7	177.4
120	250.0	250.0	250.0	180.4	179.0	179.7
150	246.0	244.0	245.0	114.1	113.1	113.6

Table 15 . Lipid contents of butter cookie by sonication at 40% ultrasonic intensity for 120 minute in different solvent

Type of solvent <sup>a</sup>	Lipid yield (mg/g sample)		
	Flask 1	Flask 2	Average
Hex	250.0	250.0	250.0
Hex:Acet (4:1)	201.6	199.9	200.7
Hex:Acet:Pet (4:1:1)	176.7	176.1	176.4
Hex:Acet:Met (4:1:1)	75.8	77.6	76.7
Hex:Acet:Met (4:1:1.5)	53.4	53.8	53.6

<sup>a</sup> Hex = n-hexane, Acet = acetone, Pet = petroleum ether and Met = methanol

Table 16. Lipid contents of partially hydrogenated vegetable oil extracted by modified Bligh & Dyer extraction method and petroleum ether as a solvent

Sample name	Lipid yield (mg/g sample)		
	Flask 1	Flask 2	Average
Margarine (brand 1)	833.7	833.1	833.4
Margarine (brand 2)	826.5	827.3	826.9
Margarine (brand 3)	850.5	851.0	850.8
Shortening (brand 1)	978.8	977.7	978.2
Shortening (brand 2)	993.9	993.5	993.7
Shortening (brand 3)	985.9	984.8	985.3

Table 17. Lipid contents of bakery products extracted by n-hexane at 40% ultrasonic intensity for 120 minute

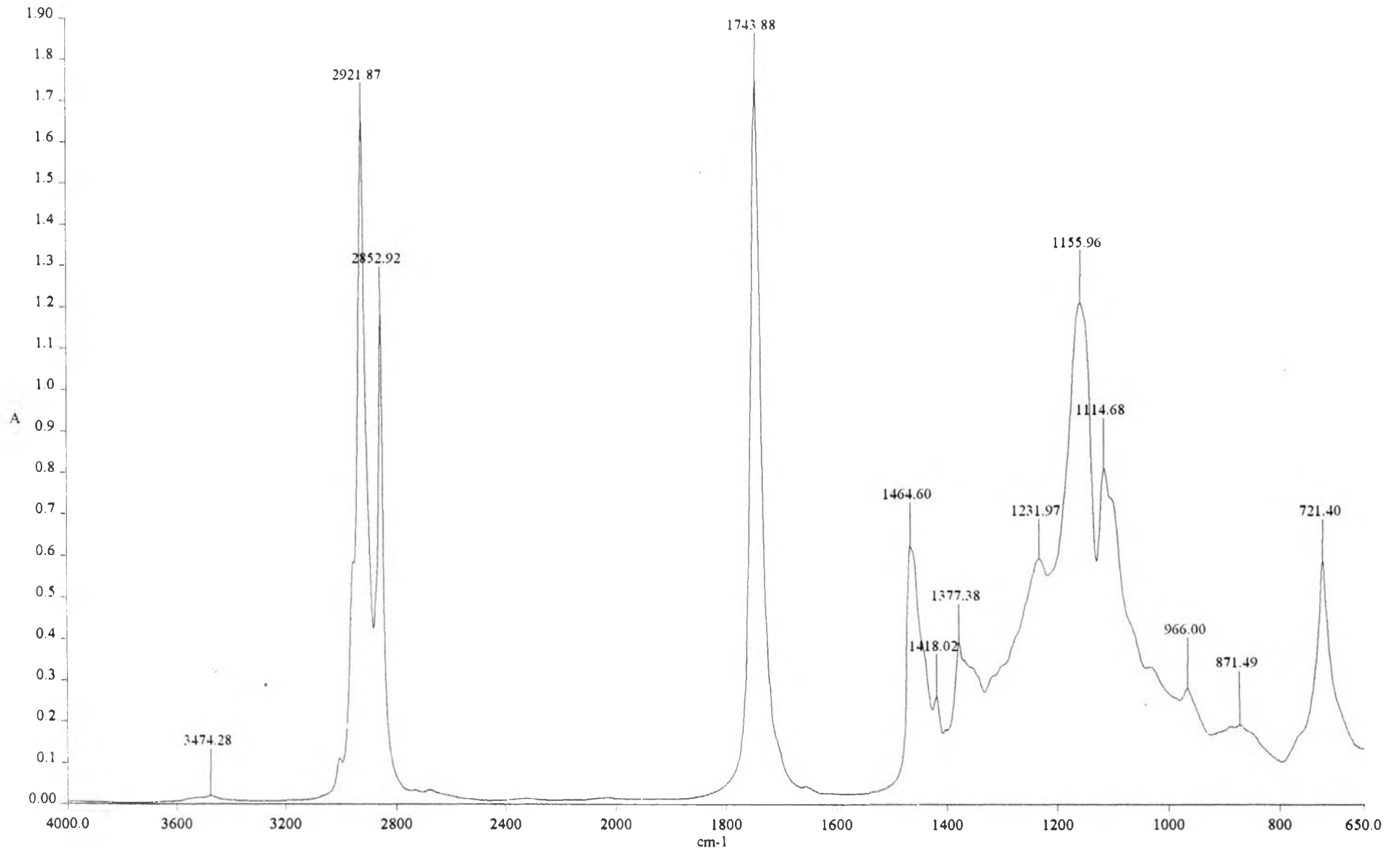
Sample name	Lipid yield (mg/g sample)		
	Flask 1	Flask 2	Average
Butter cookie (brand 1)	290.3	288.0	289.1
Butter cookie (brand 2)	225.4	227.2	226.3
Butter cookie (brand 3)	250.0	250.0	250.0
Cracker (brand 1)	198.7	199.5	199.1
Cracker (brand 2)	182.4	183.9	183.2
Cracker (brand 3)	192.8	191.2	192.0
Croissant (brand 1)	62.8	63.0	62.9
Croissant (brand 2)	208.2	211.1	209.6
Croissant (brand 3)	314.2	319.3	316.7
Brownie (brand 1)	62.0	63.0	62.5
Brownie (brand 2)	193.9	190.8	192.3
Brownie (brand 3)	186.1	183.1	184.6
Crispy pie (brand 1)	222.8	222.4	222.6
Crispy pie (brand 2)	203.9	206.7	205.3
Crispy pie (brand 3)	238.0	234.5	236.2
Sandwich chocolate cookie (brand 1)	185.0	188.0	186.5
Sandwich chocolate cookie (brand 2)	263.5	267.8	265.7
Sandwich chocolate cookie (brand 3)	190.6	187.6	189.1

Table 17. Lipid contents of bakery products extracted by n-hexane at 40% ultrasonic intensity for 120 minute (continued).

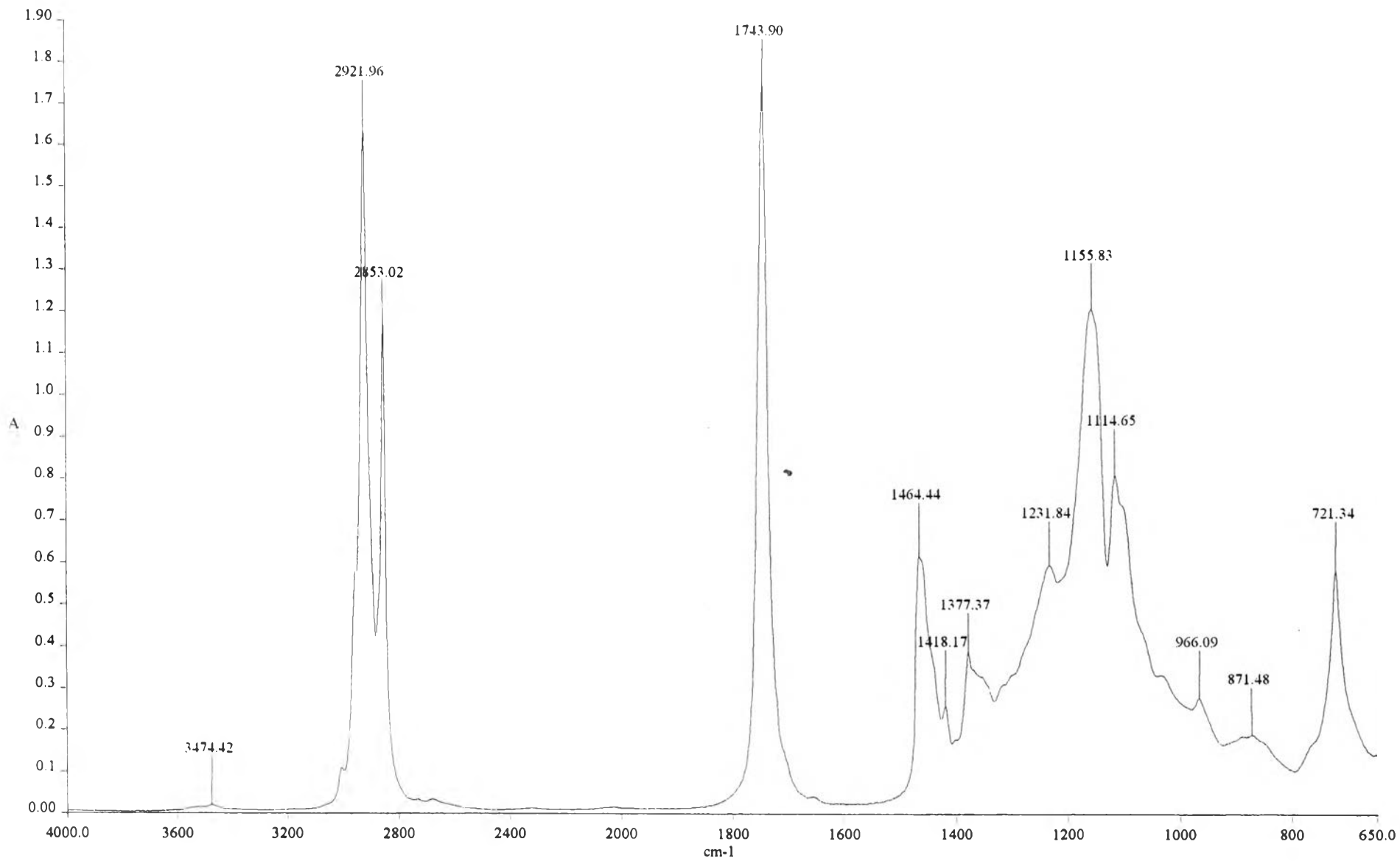
Sample name	Lipid yield (mg/g sample)		
	Flask 1	Flask 2	Average
Cake cream roll (brand 1)	178.0	177.6	177.8
Cake cream roll (brand 2)	185.2	182.3	183.7
Cake cream roll (brand 3)	161.4	158.8	160.1
Rich butter bun (brand 1)	123.3	125.3	124.3
Rich butter bun (brand 2)	213.9	217.3	215.6
Rich butter bun (brand 3)	94.3	92.8	93.5

# **Appendix B**

## **FTIR spectrums**

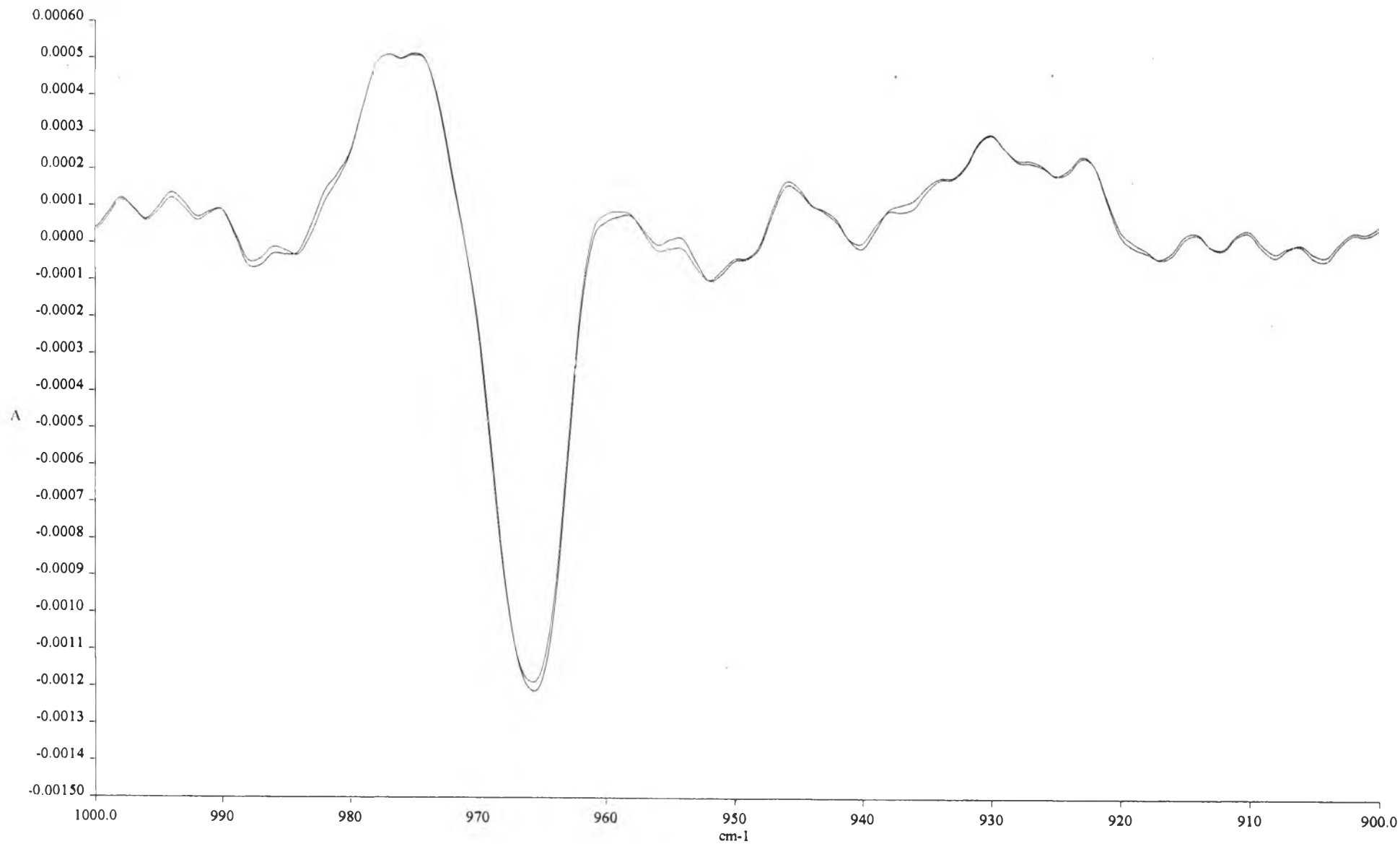


Shortening (brand 1) flask 1

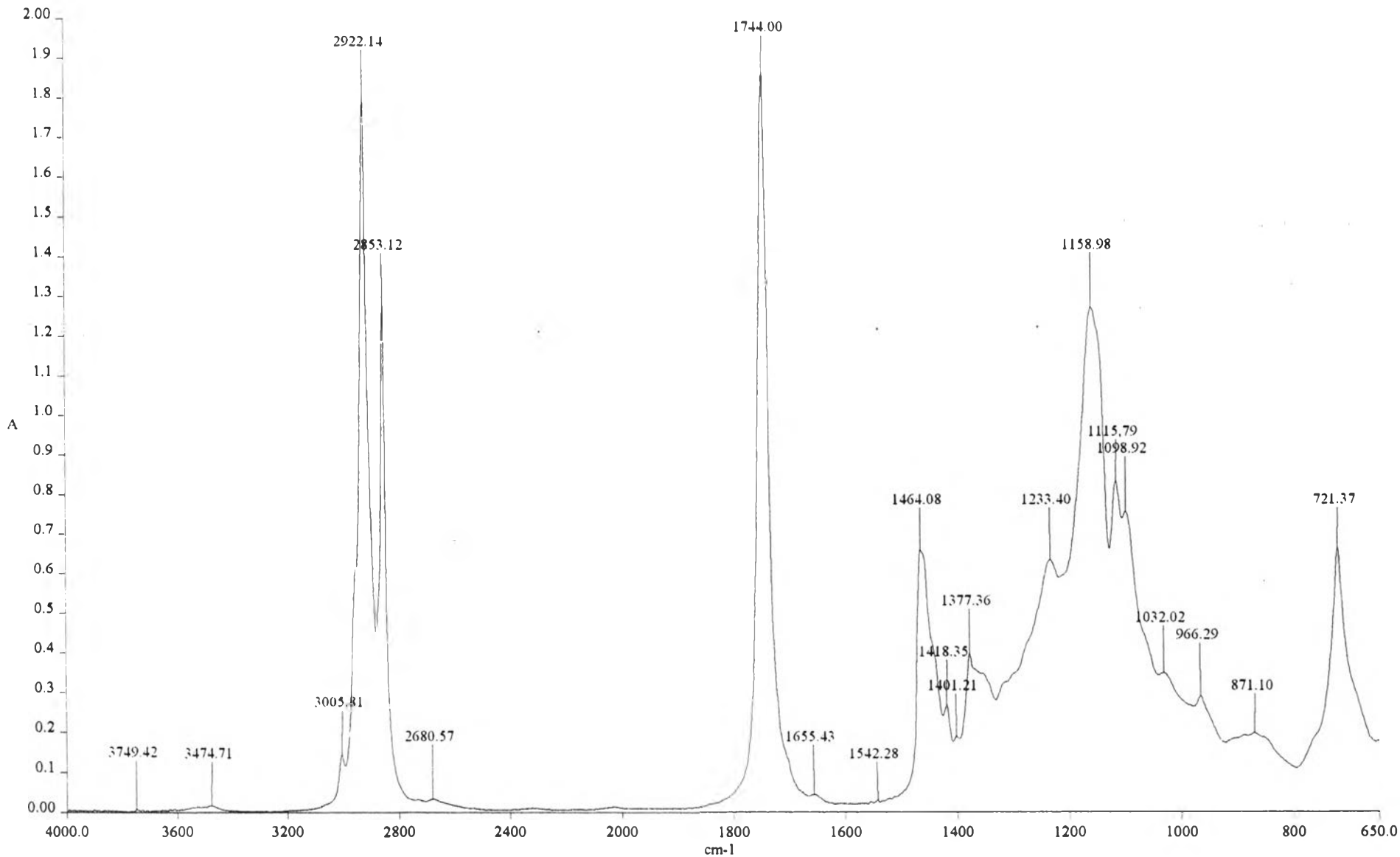


Shortening (brand 1) flask 2

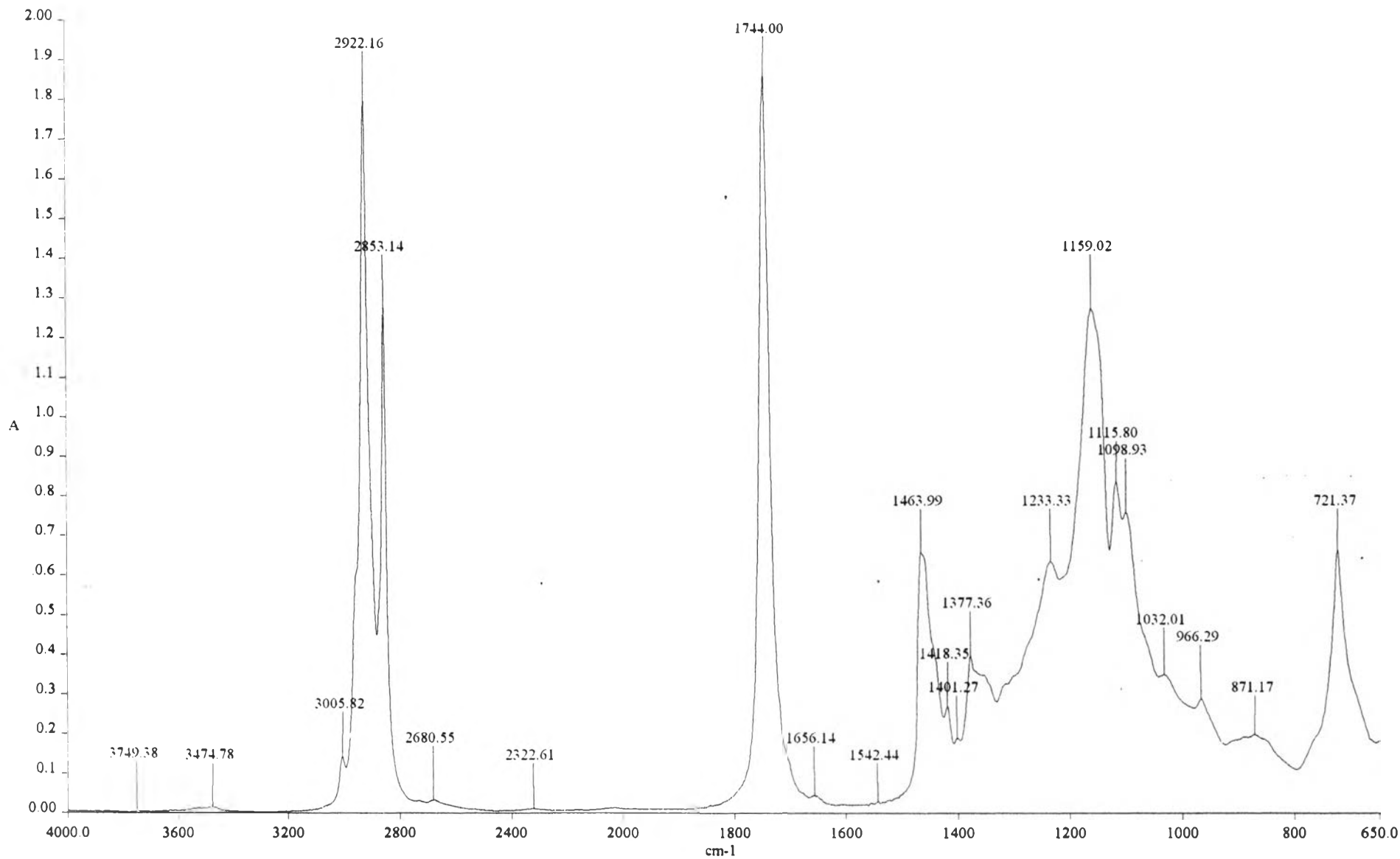




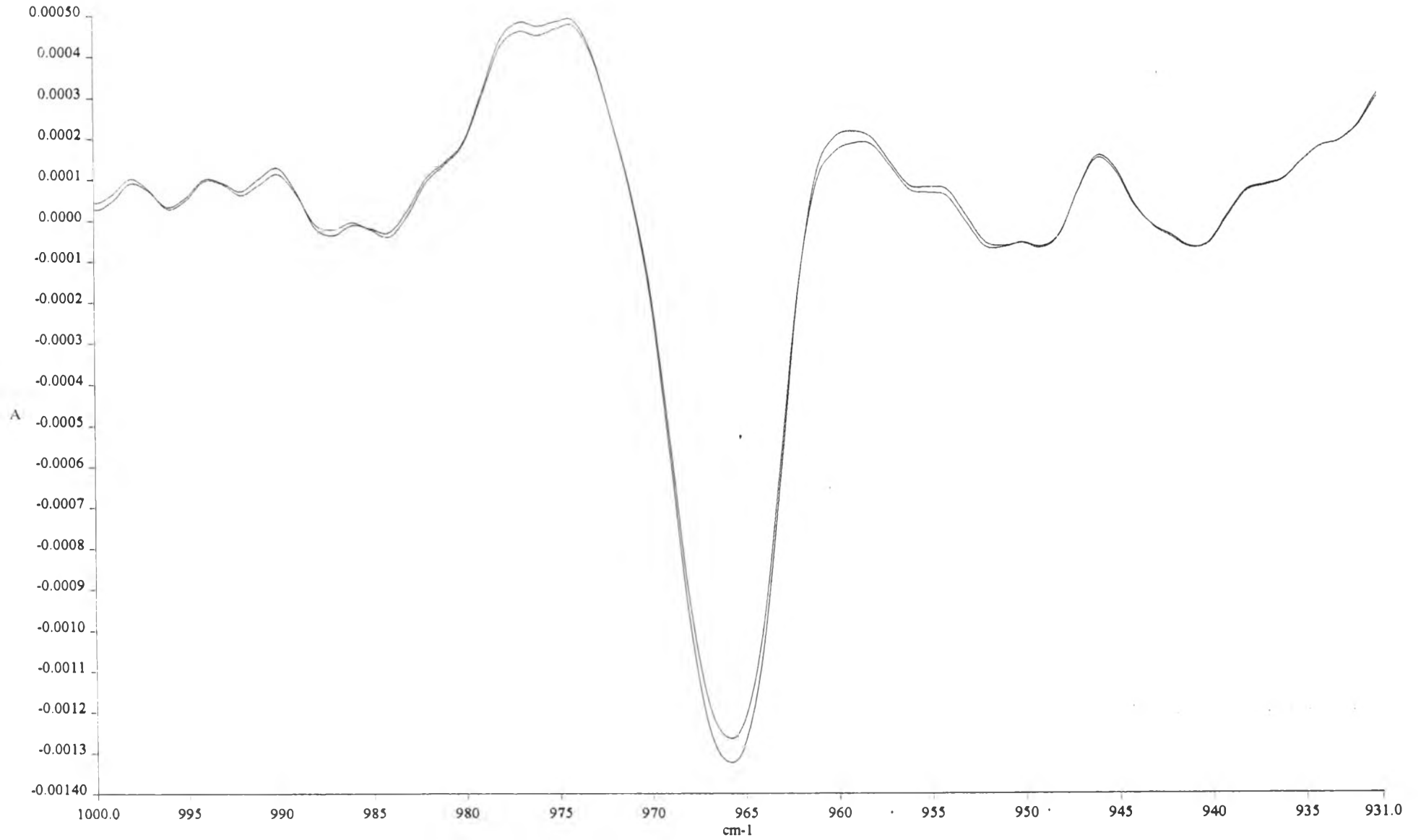
Negative second derivative  
Shortening brand 1 flask 1 & 2



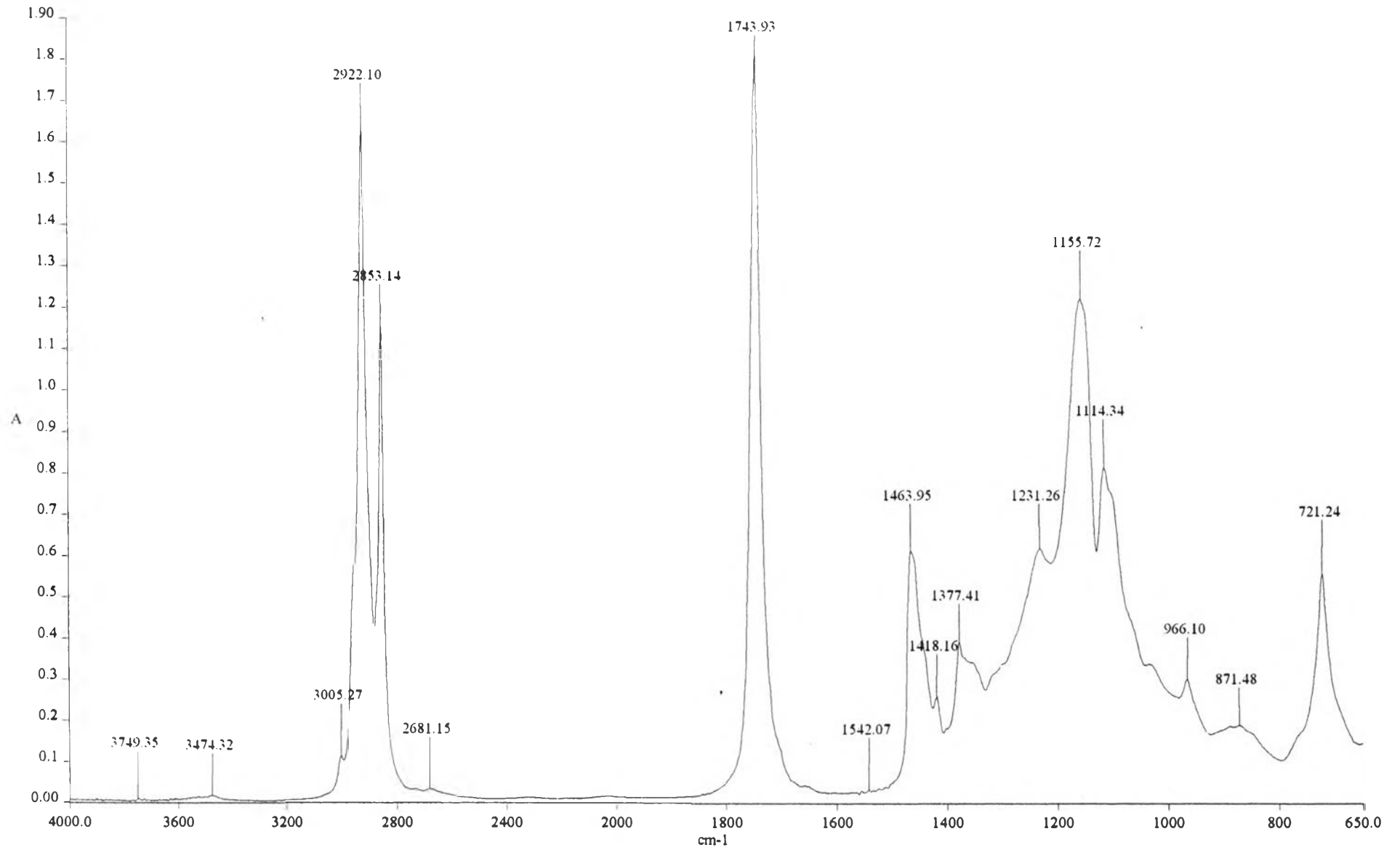
Shortening (brand 2) flask 1



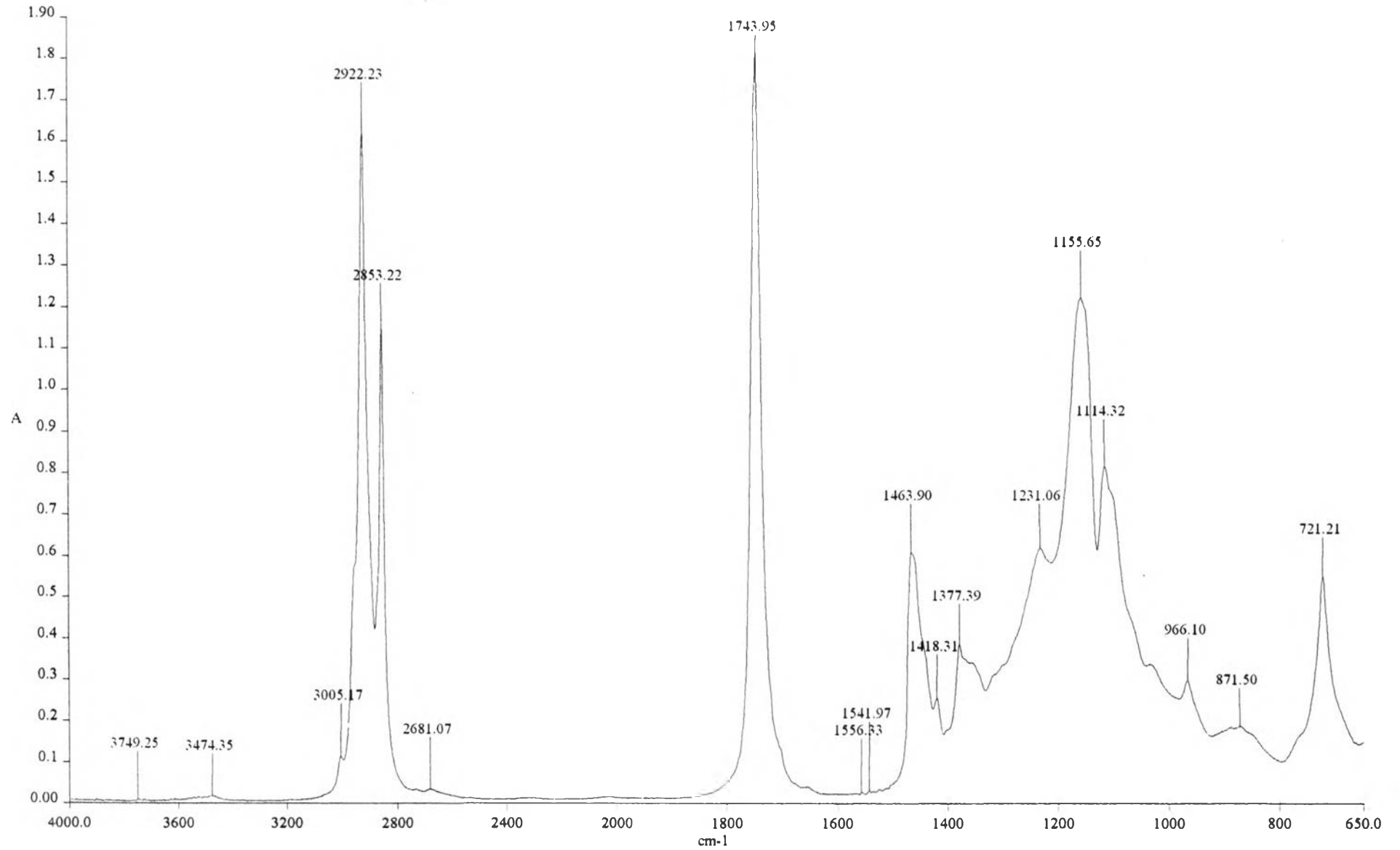
Shortening (brand 2) flask 2



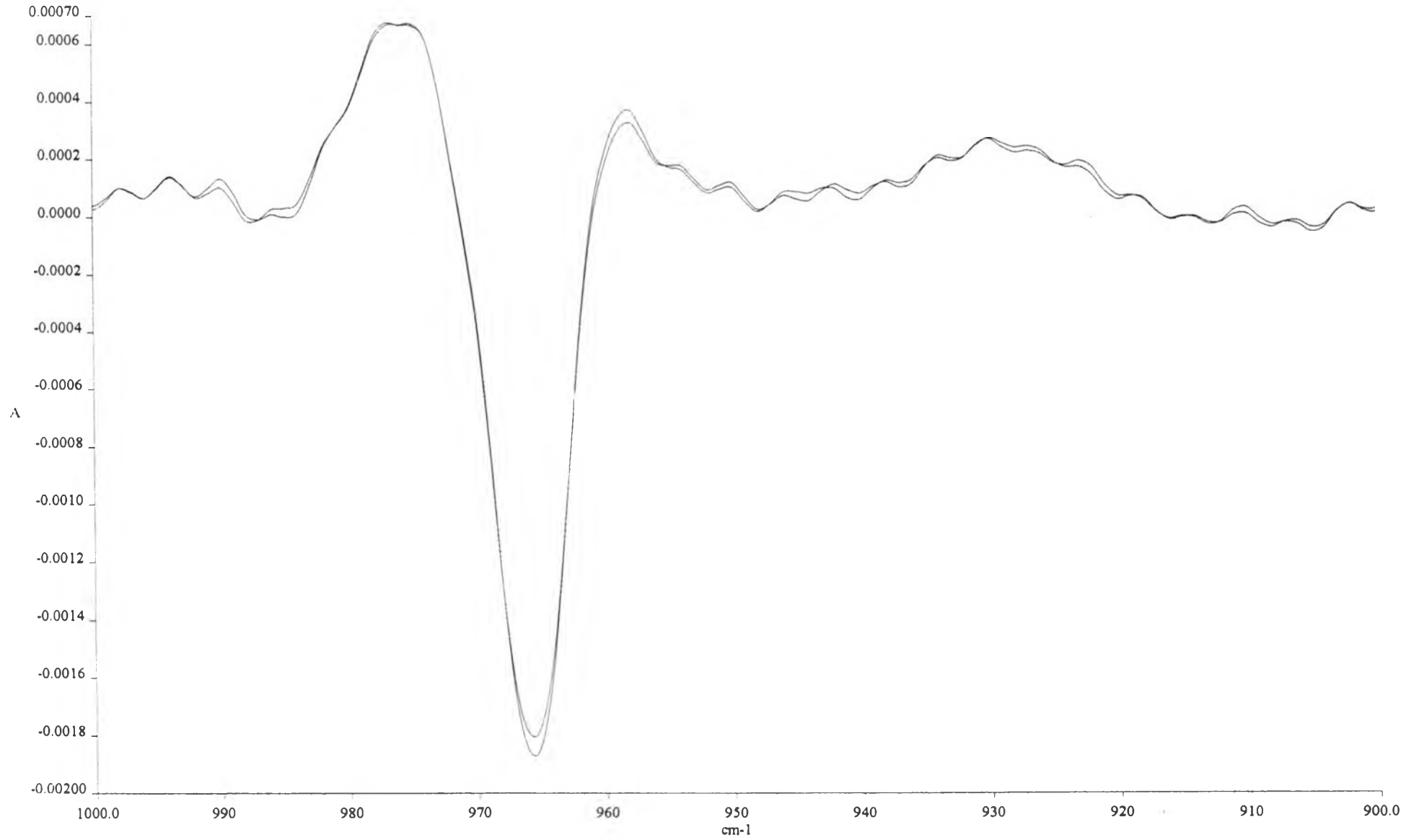
Negative second derivative  
Shortening brand 2 flask 1 & 2



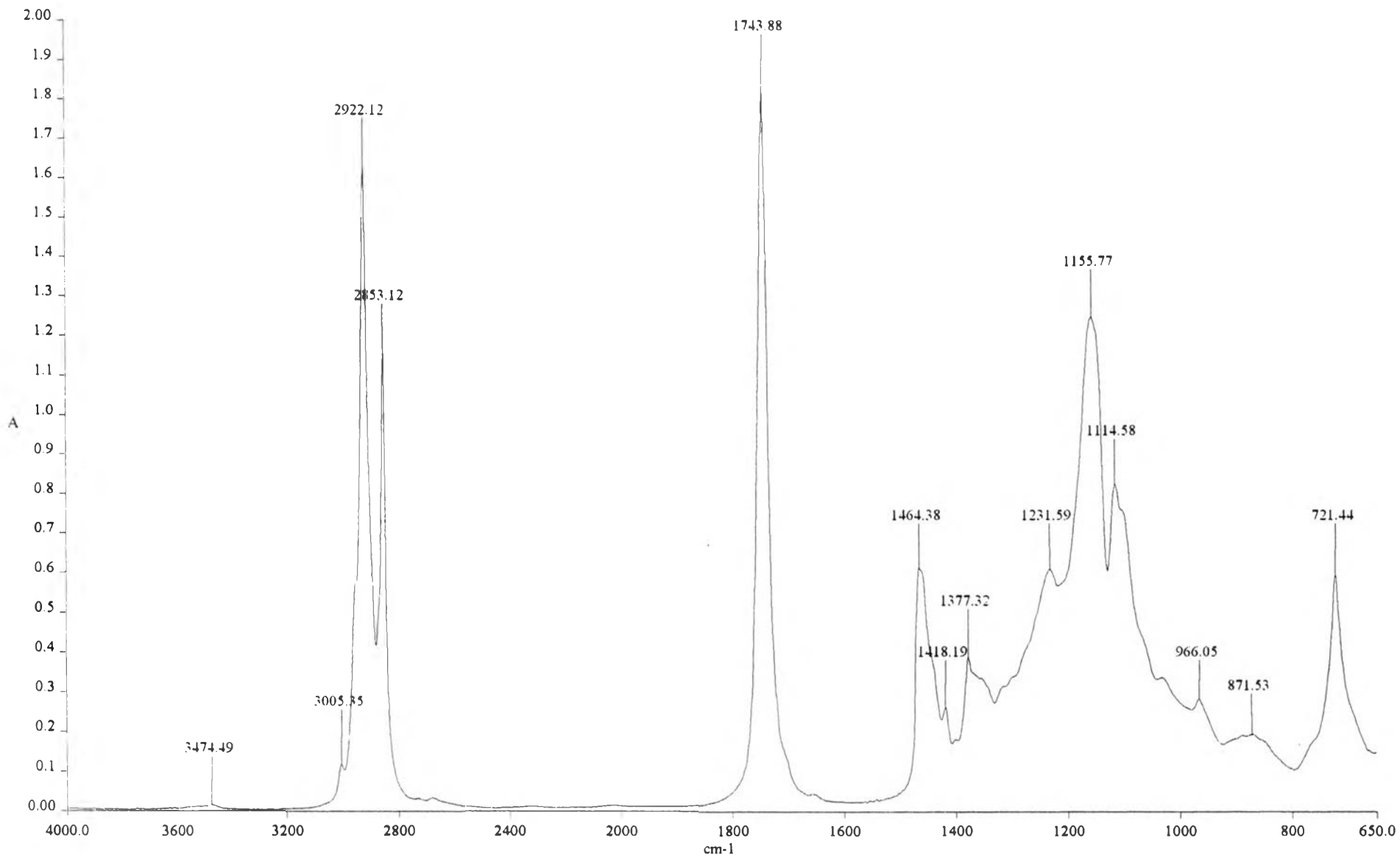
Shortening (brand 3) flask 1



Shortening (brand 3) flask 2

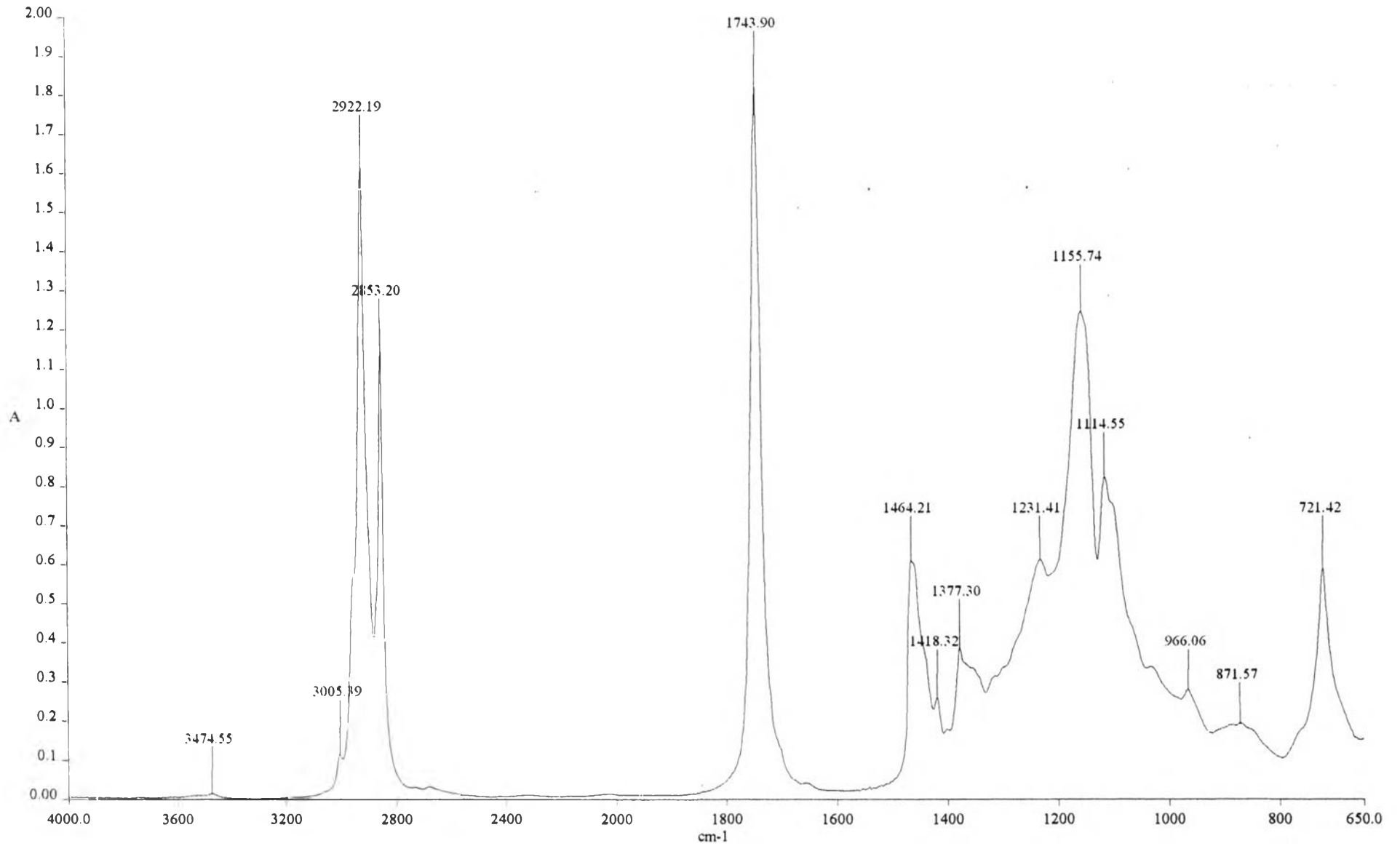


Negative second derivative  
Shortening brand 3 flask 1 & 2

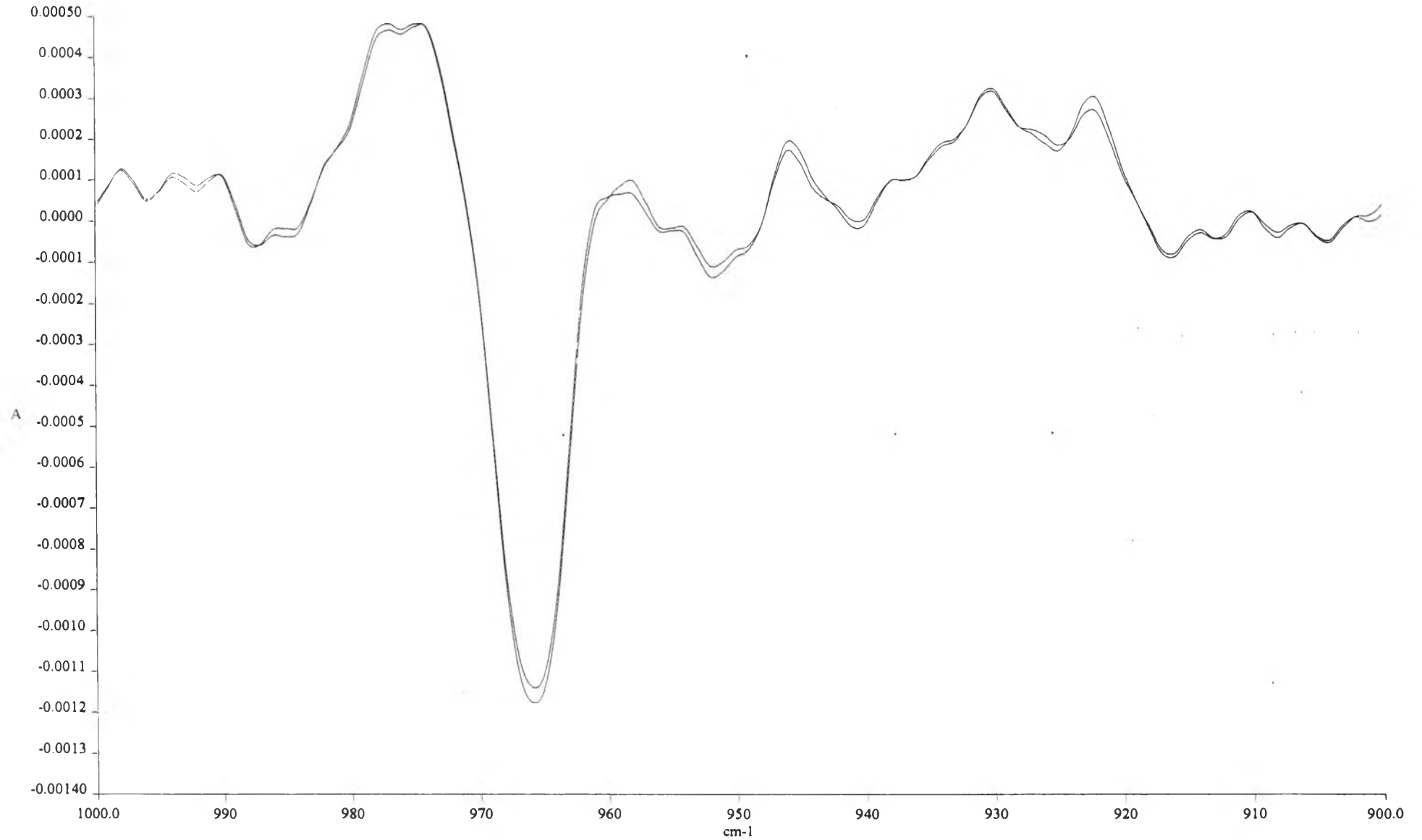


Margarine (brand 1) flask 1

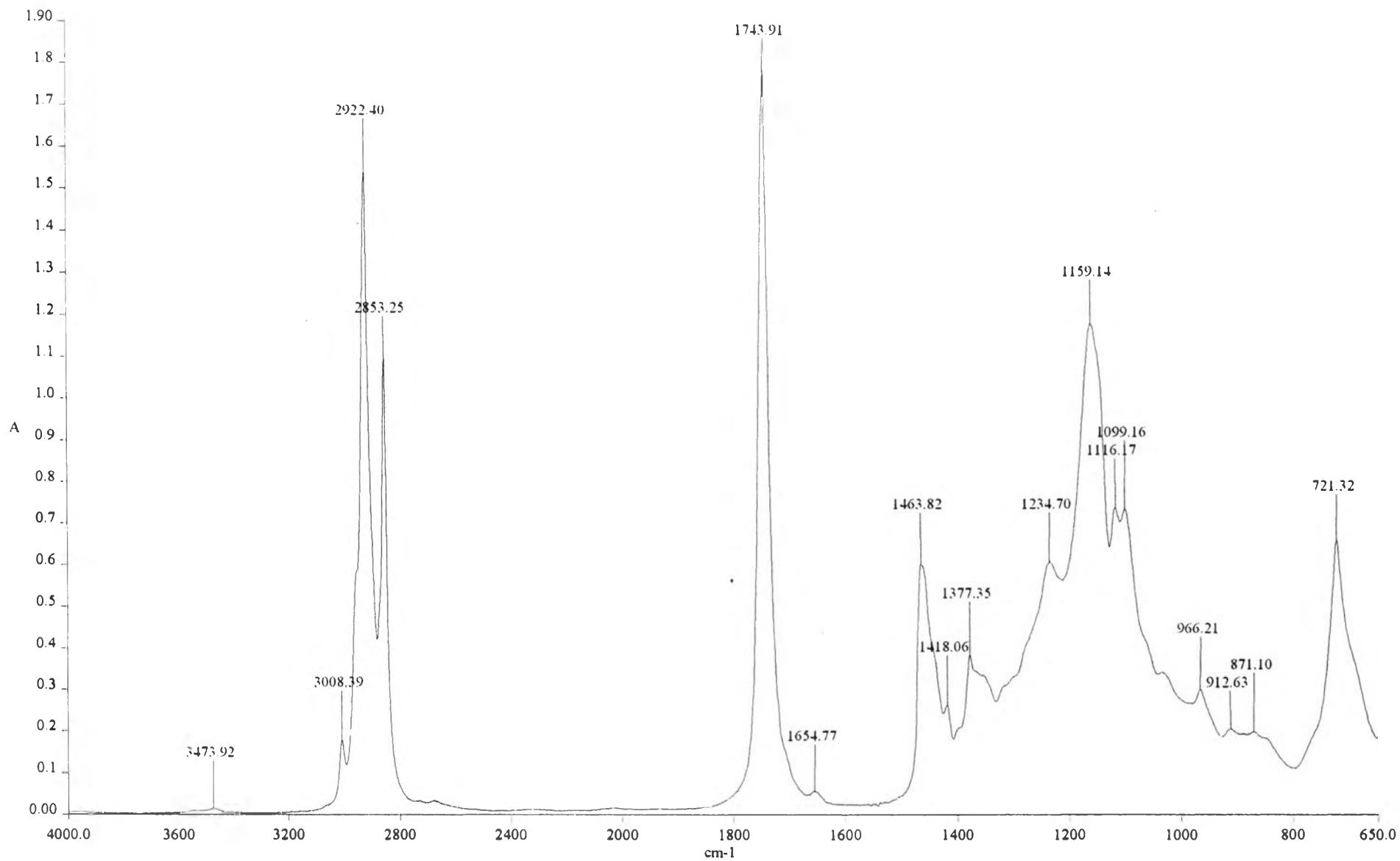




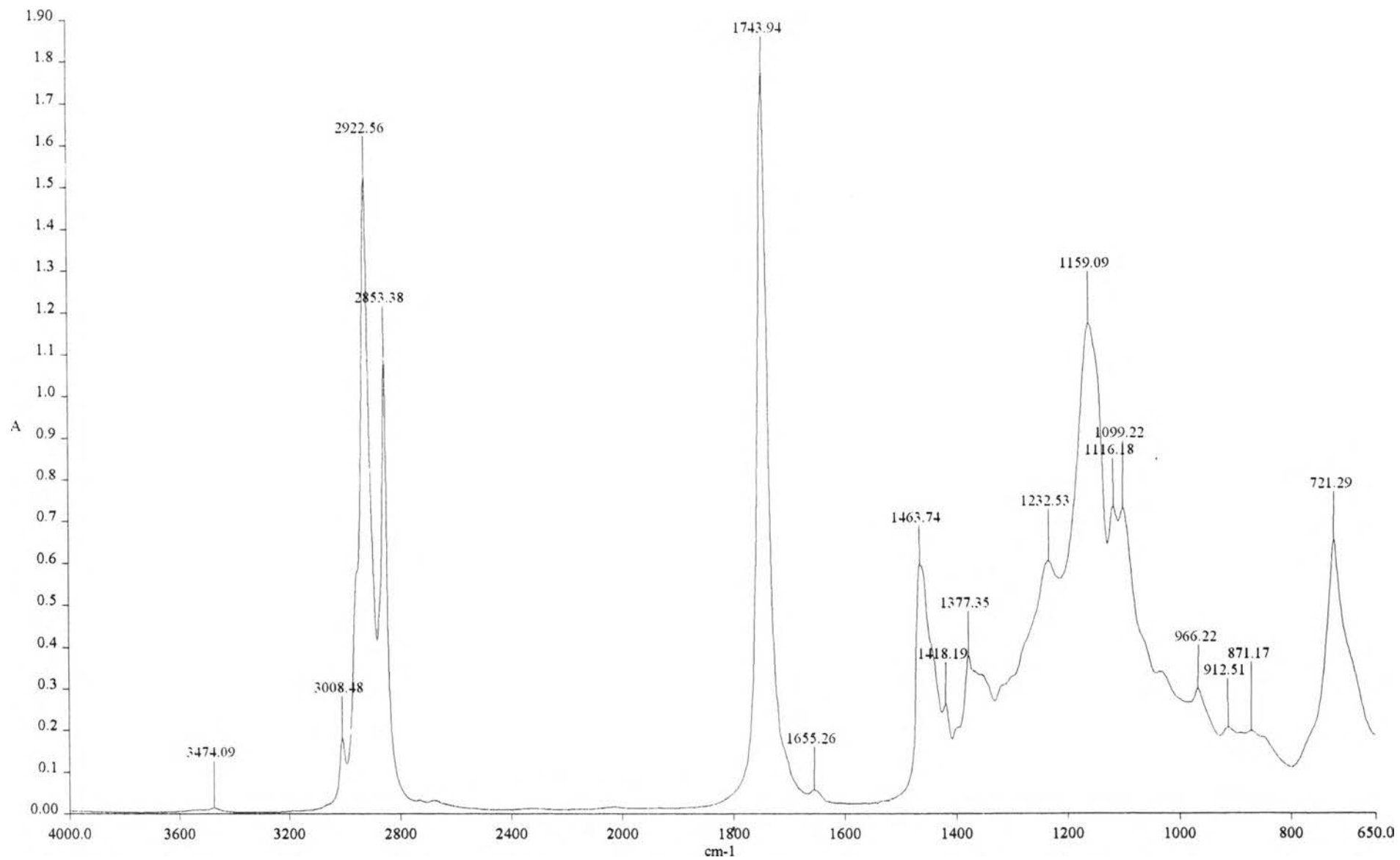
Margarine (brand 1) flask 2



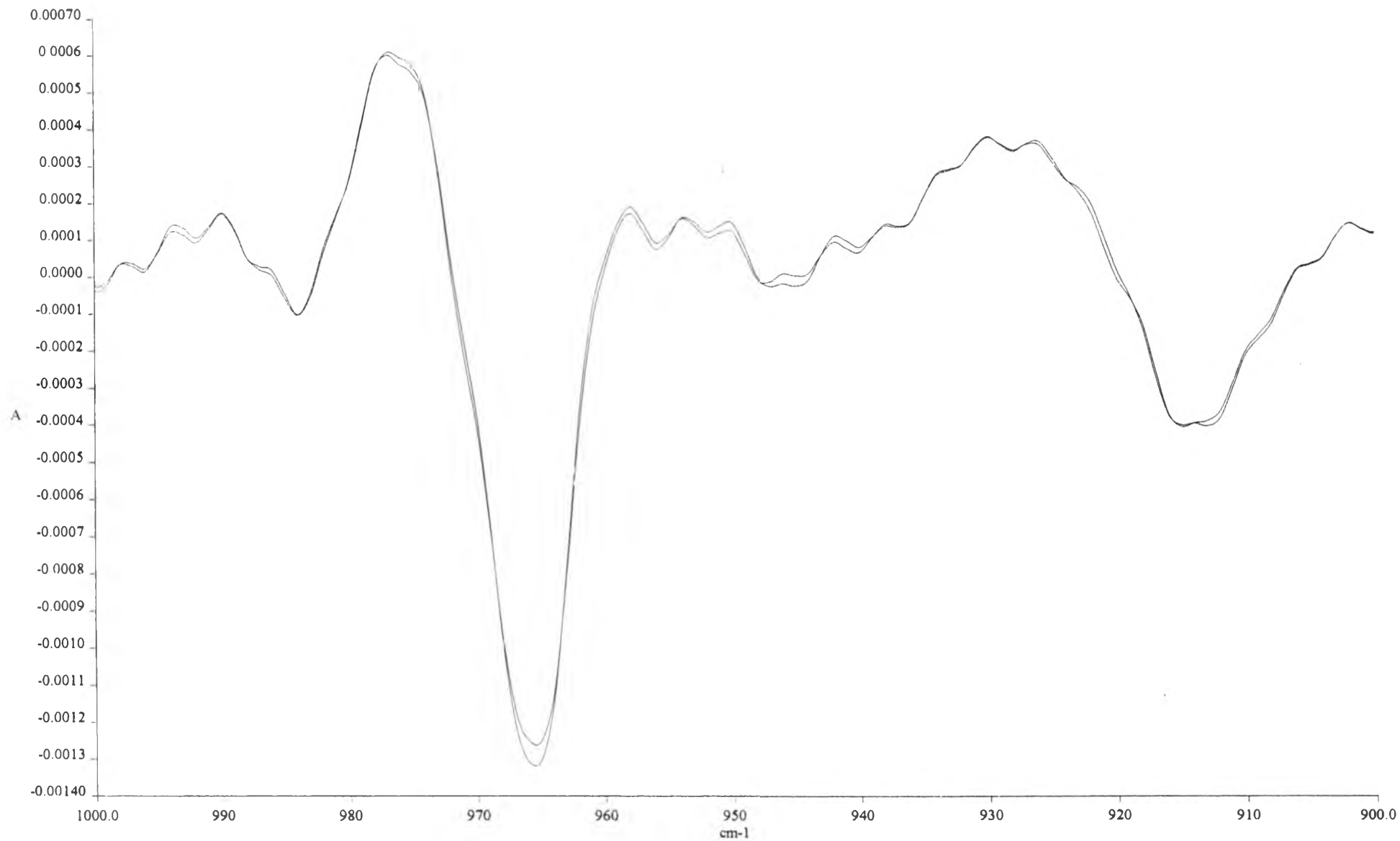
Negative second derivative  
Margarine brand 1 flask 1 & 2



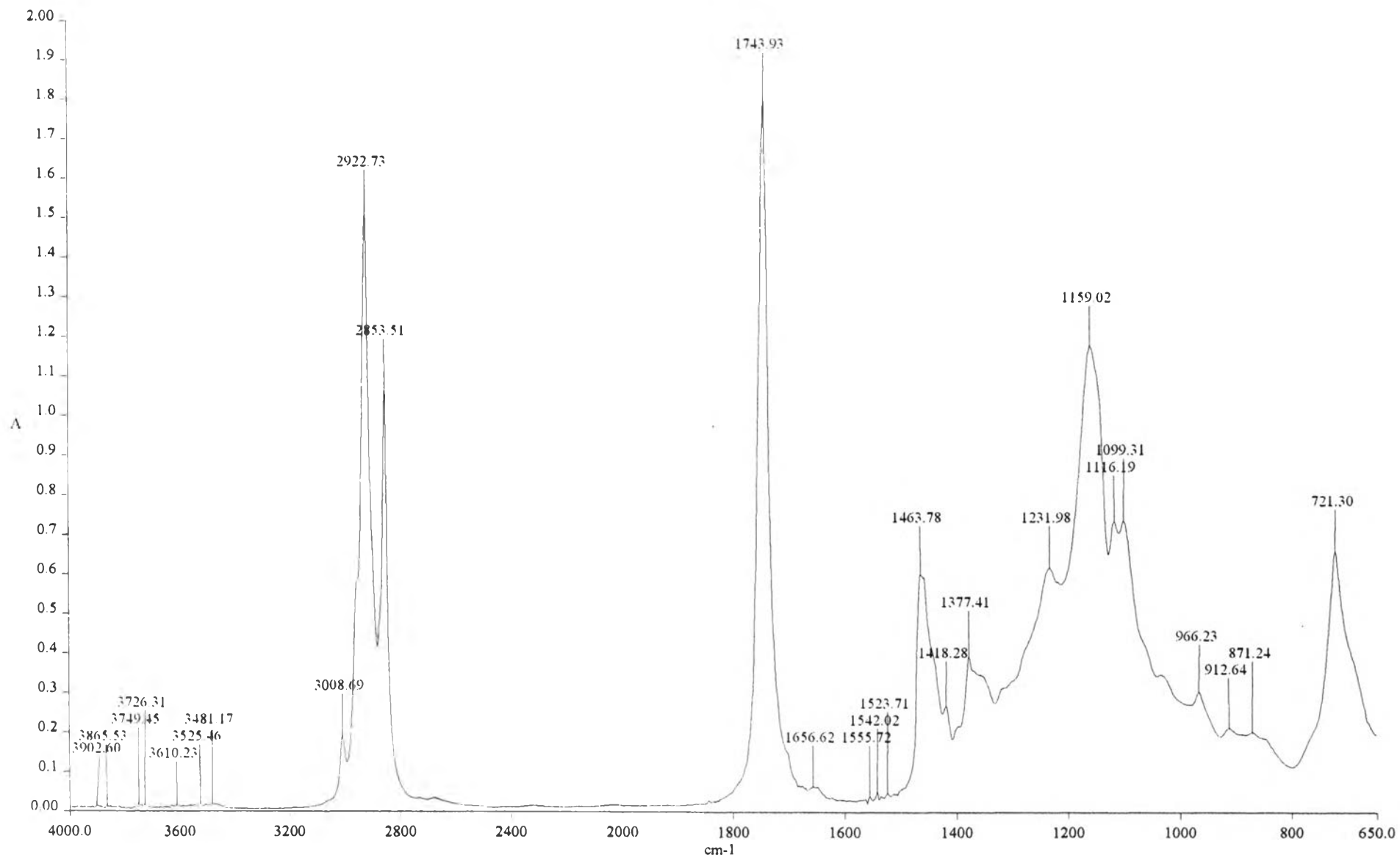
Margarine (brand 2) flask 1



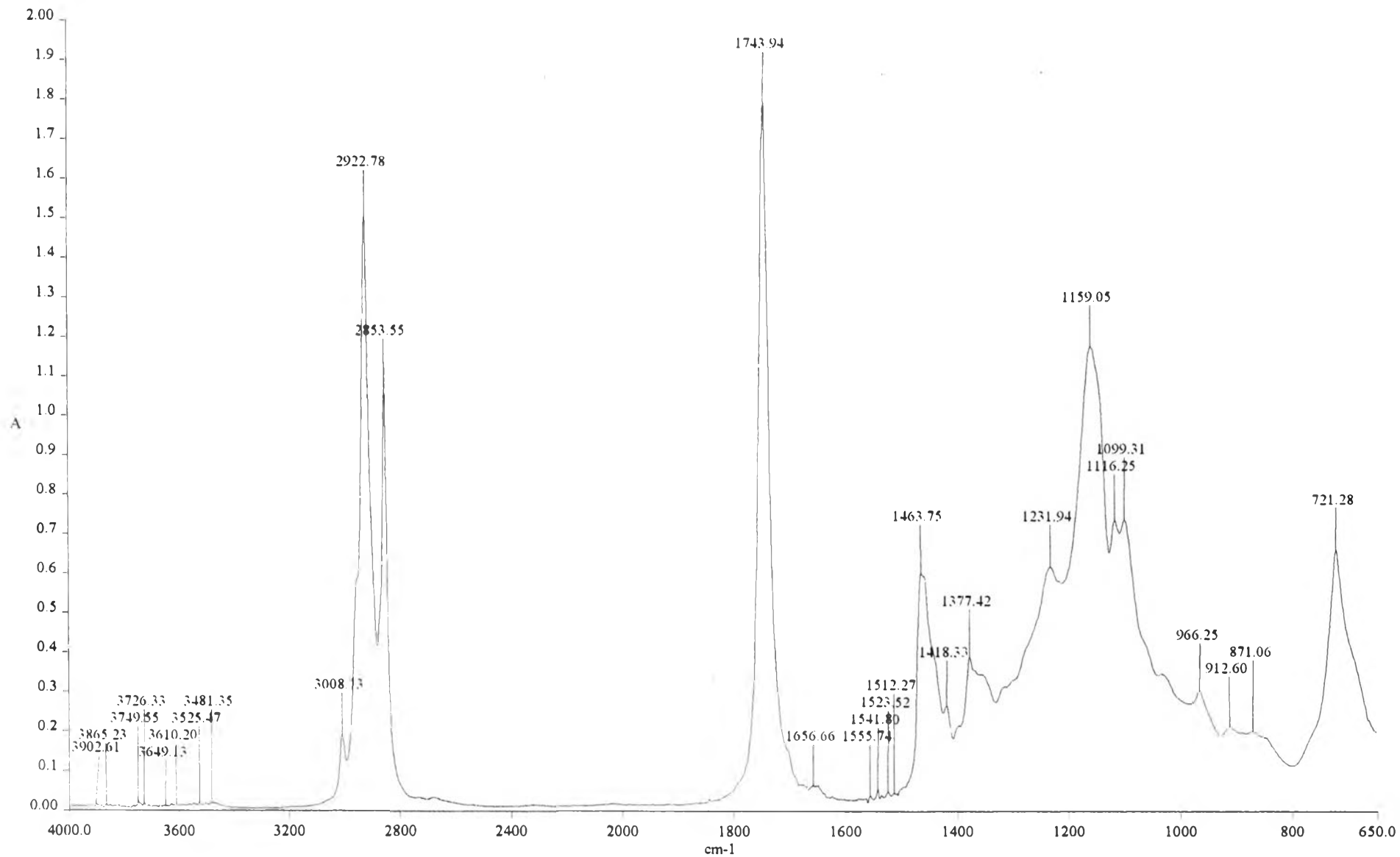
Margarine (brand 2) flask 2



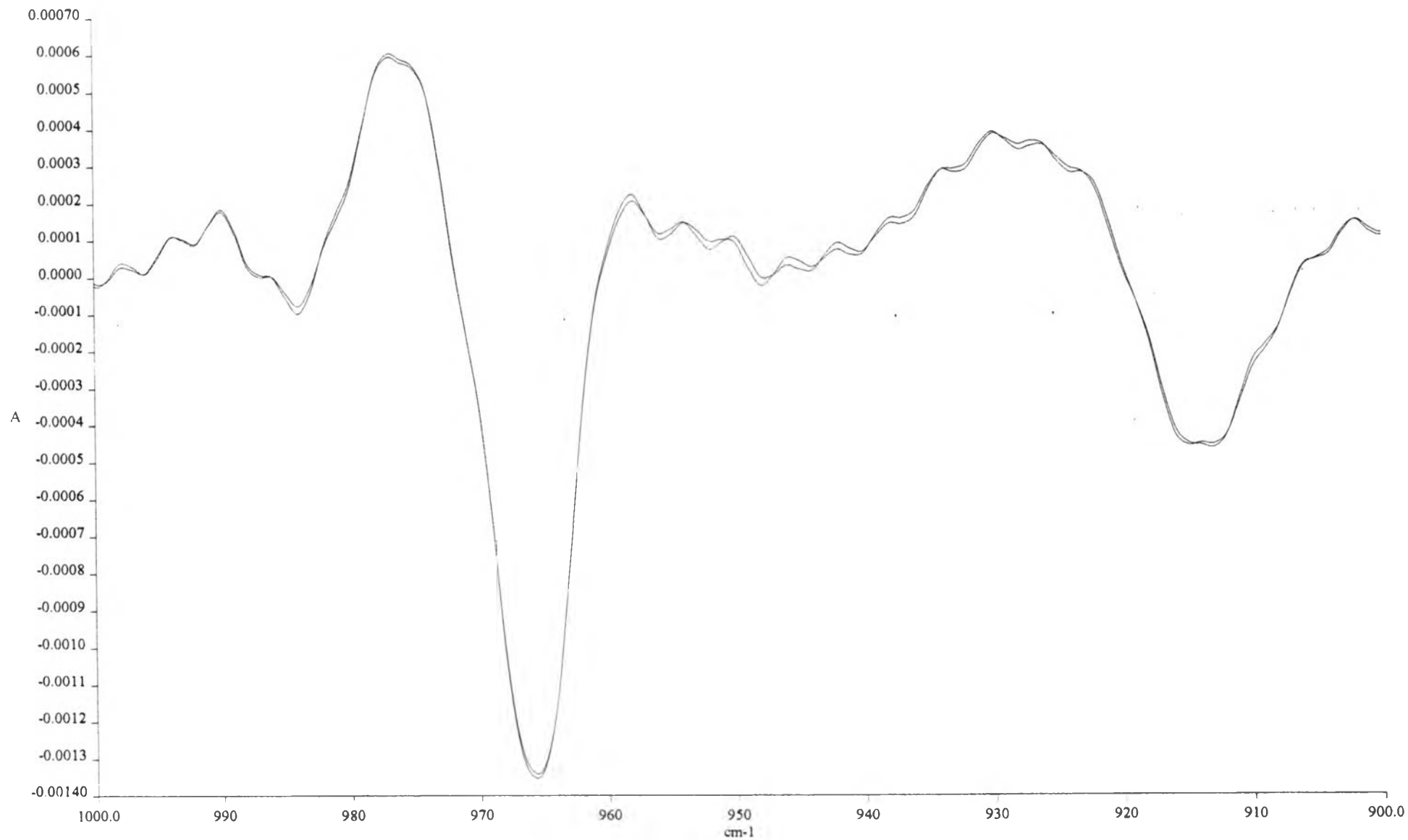
Negative second derivative  
Margarine brand 2 flask 1 & 2



Margarine (brand 3) flask 1

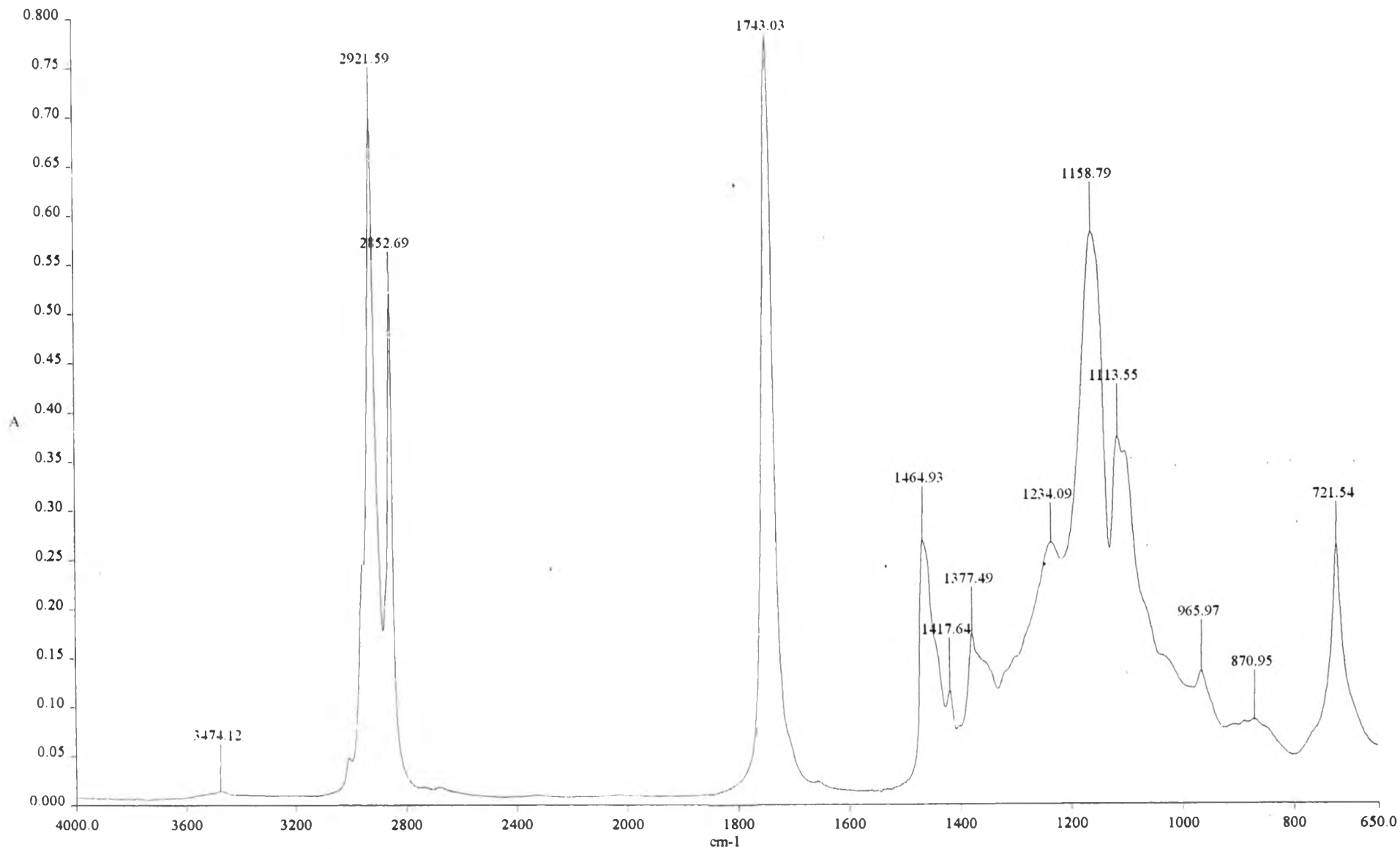


Margarine (brand 3) flask 2

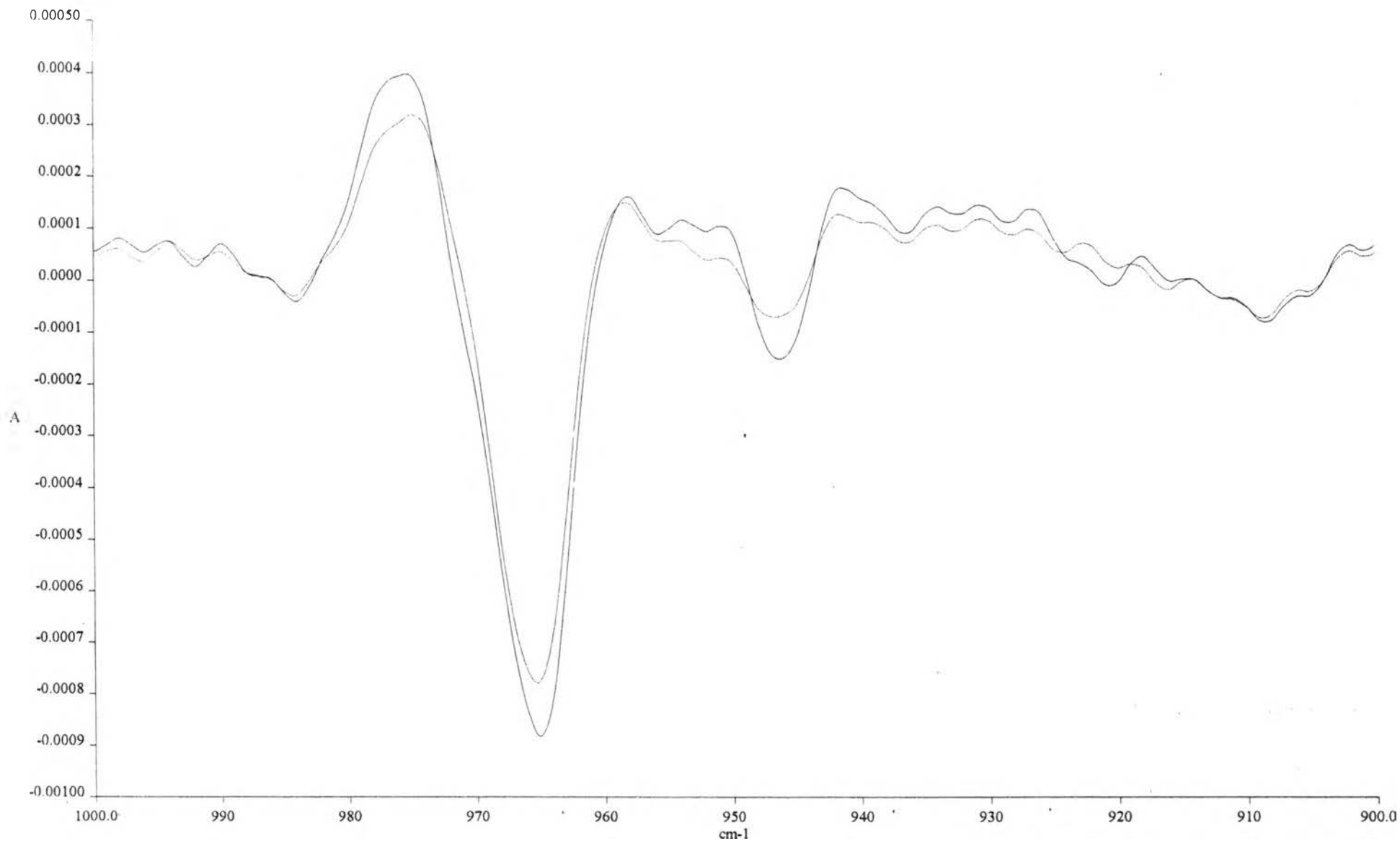


Negative second derivative  
Margarine brand 3 flask 1 & 2

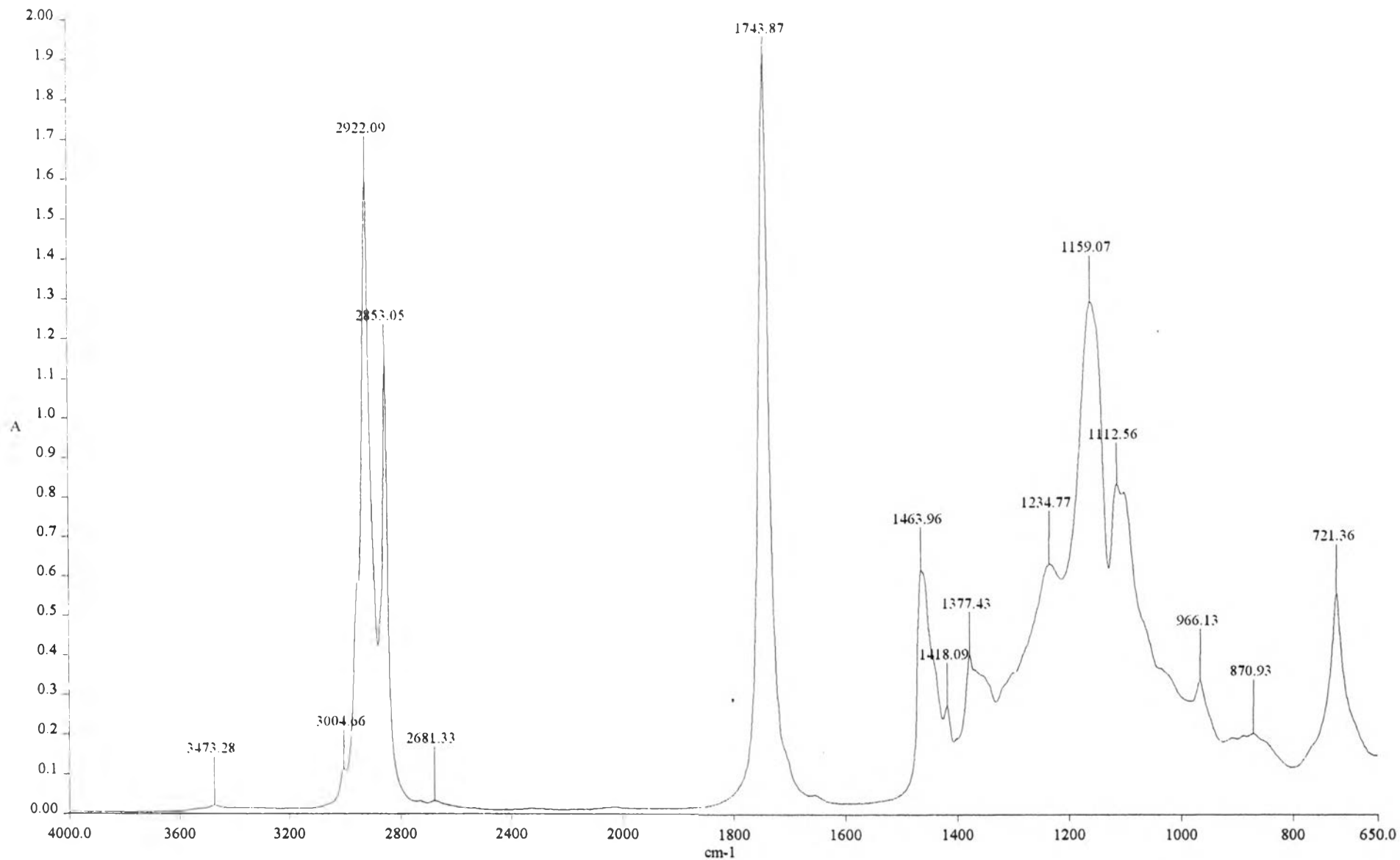




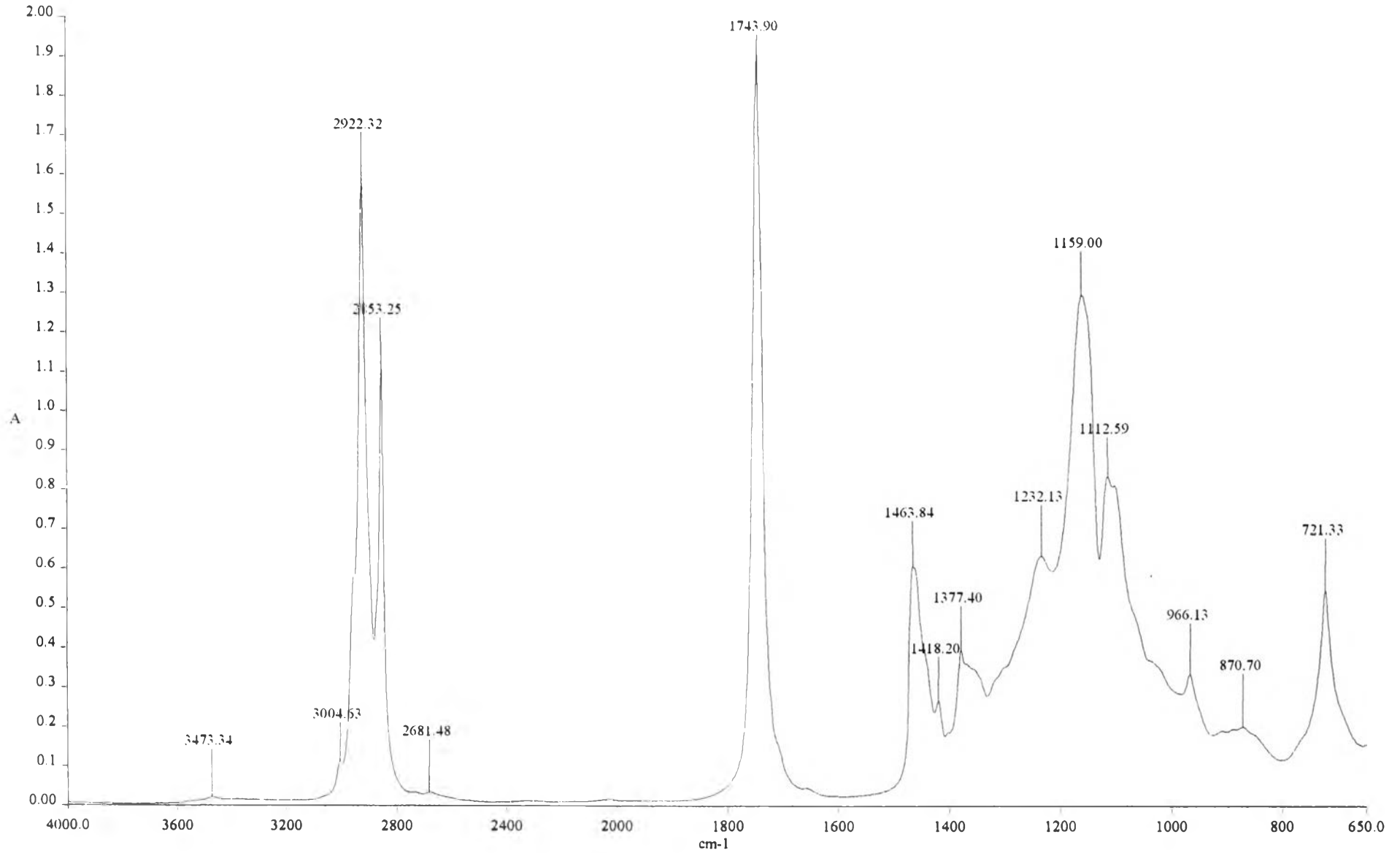
Butter cookie (brand 1) flask 1



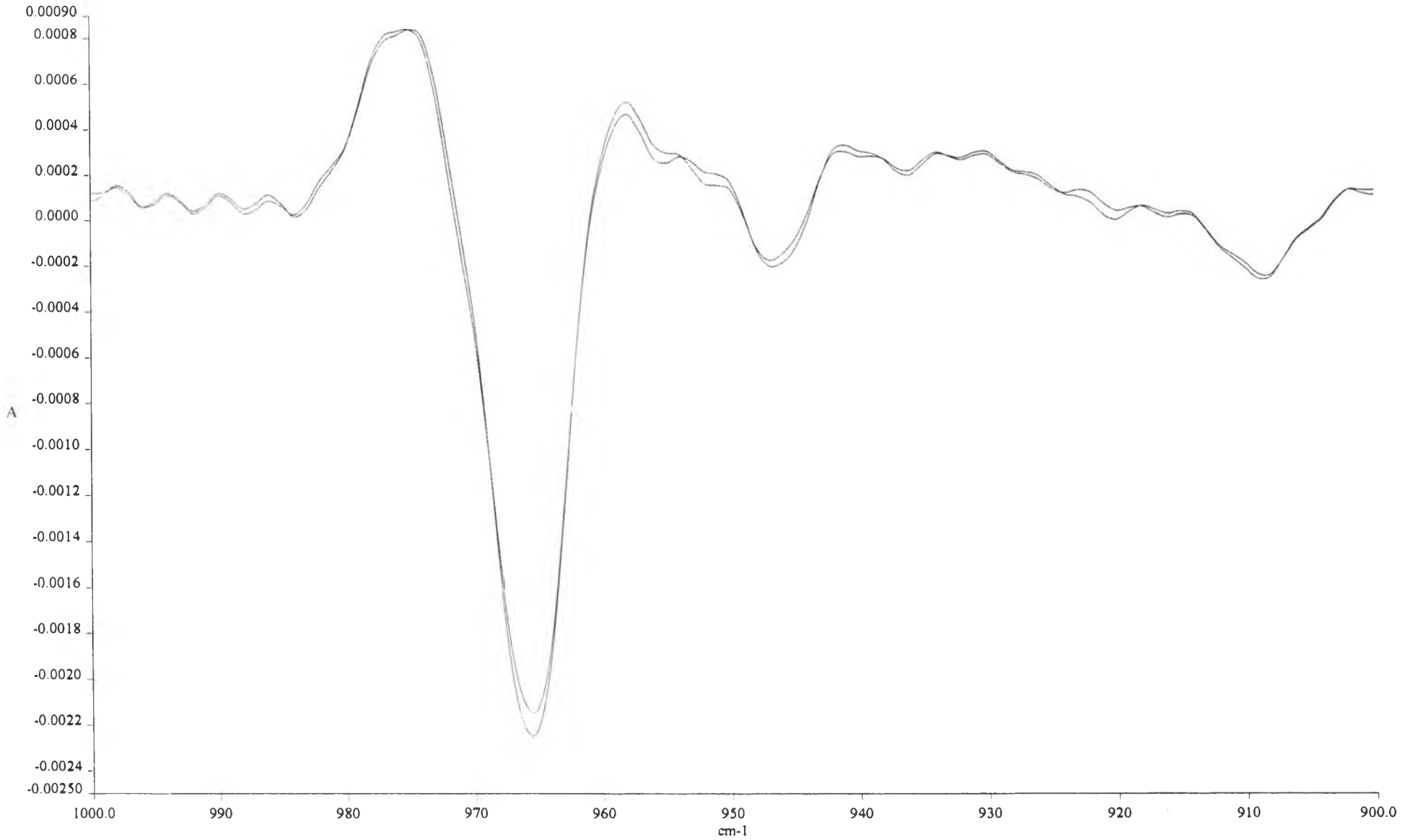
Negative second derivative  
Butter cookie brand 1 flask 1 & 2



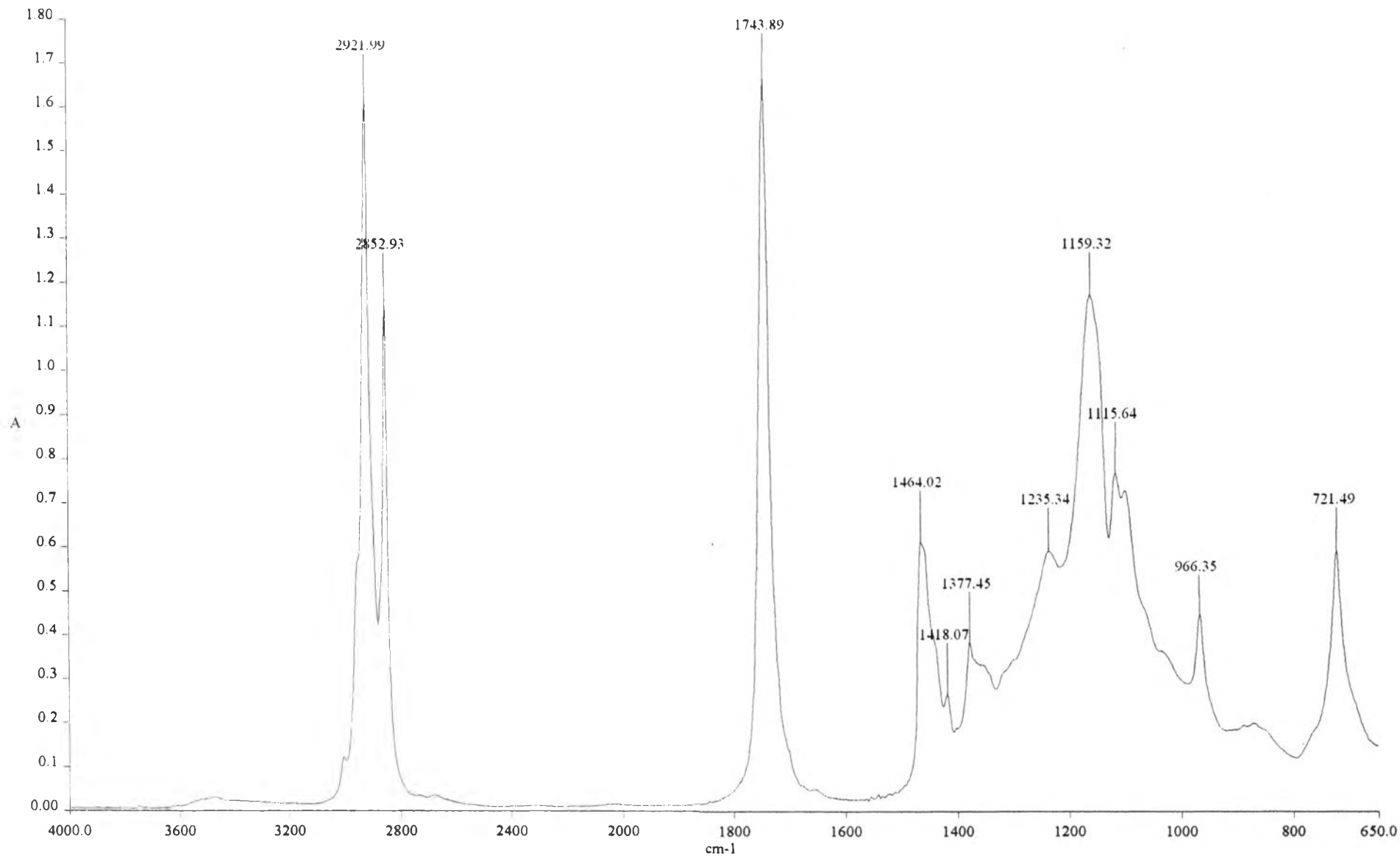
Butter cookie (brand 2) flask 1



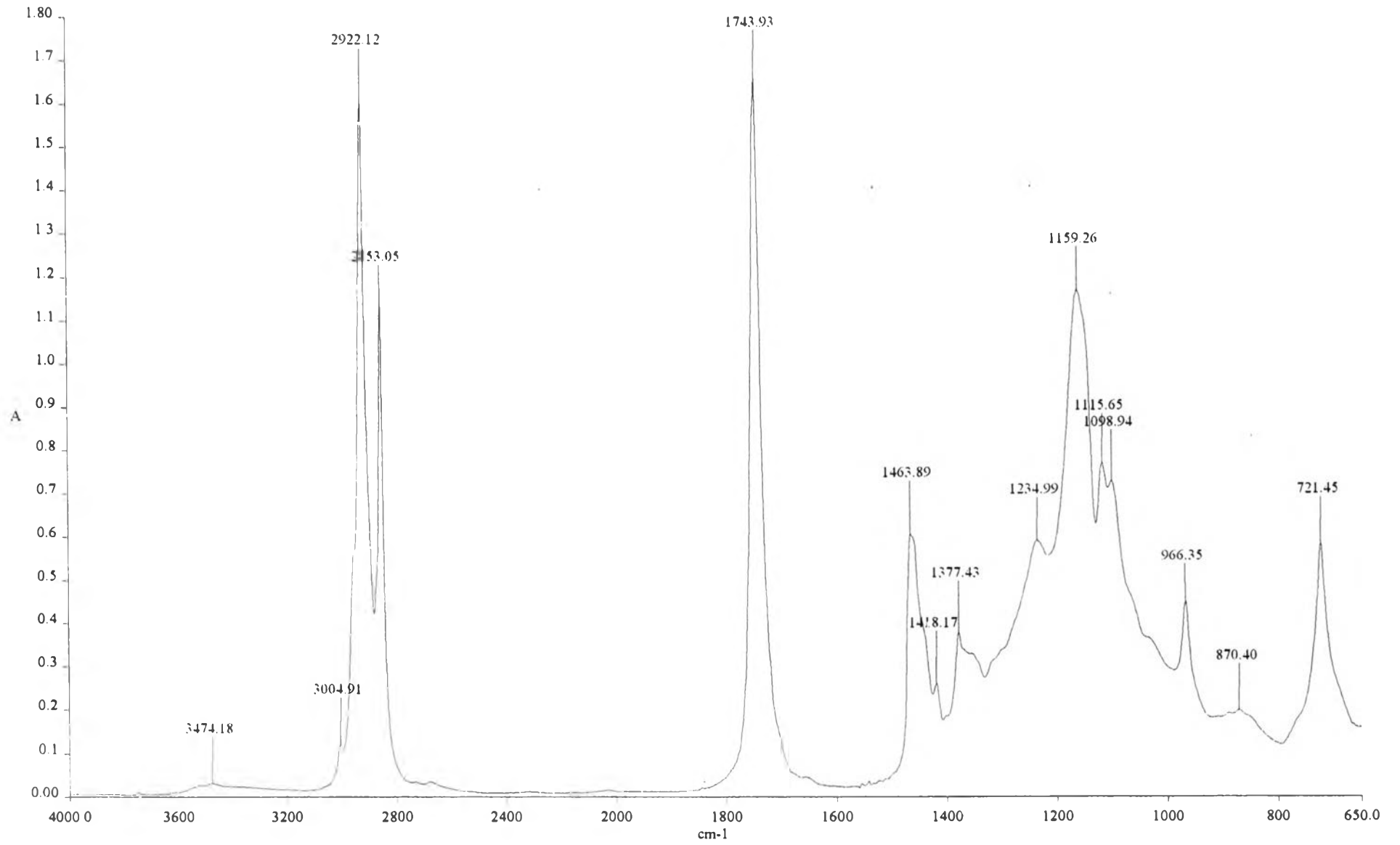
Butter cookie (brand 2) flask 2



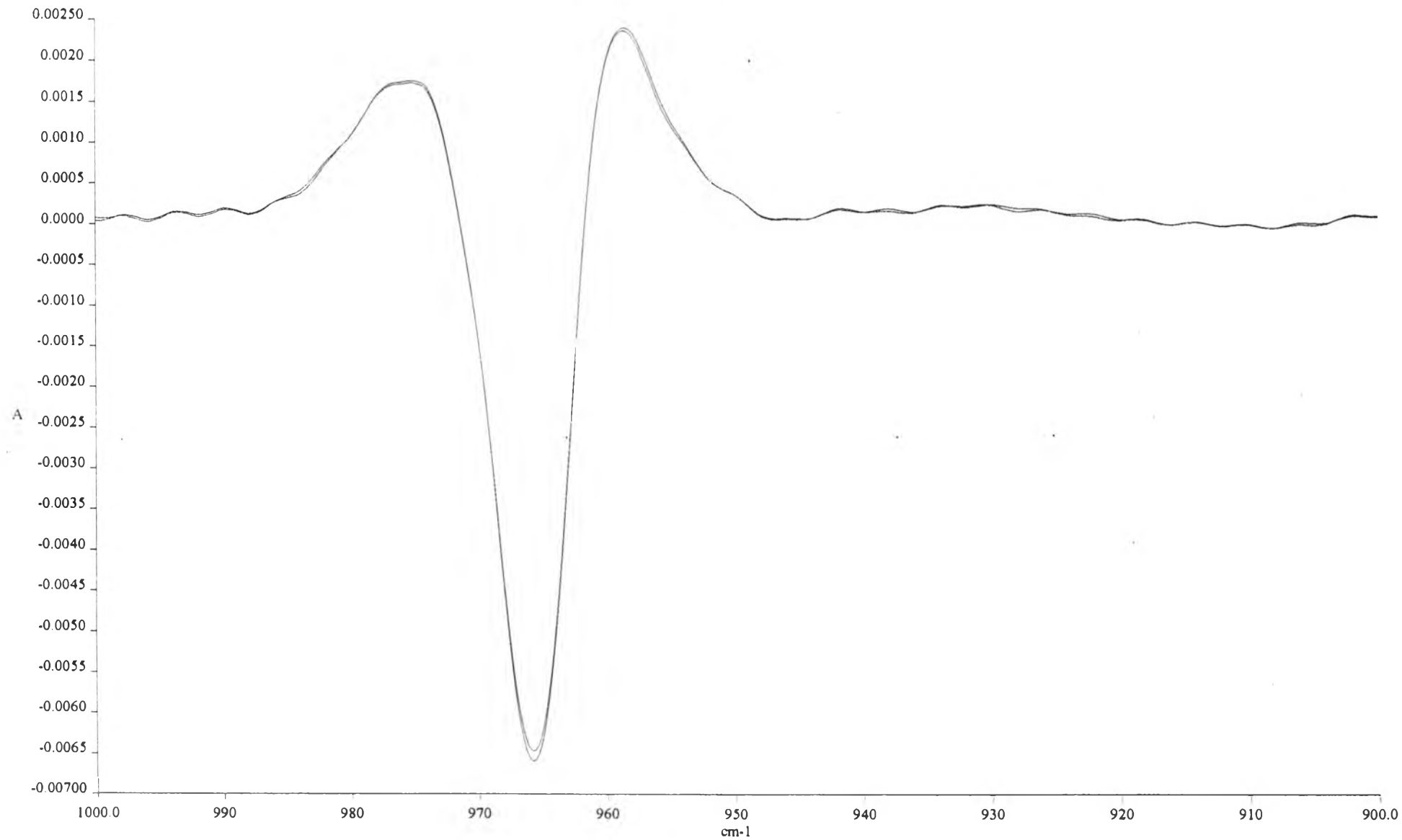
Negative second derivative  
Butter cookie brand 2 flask 1 & 2



Butter cookie (brand 3) flask 1

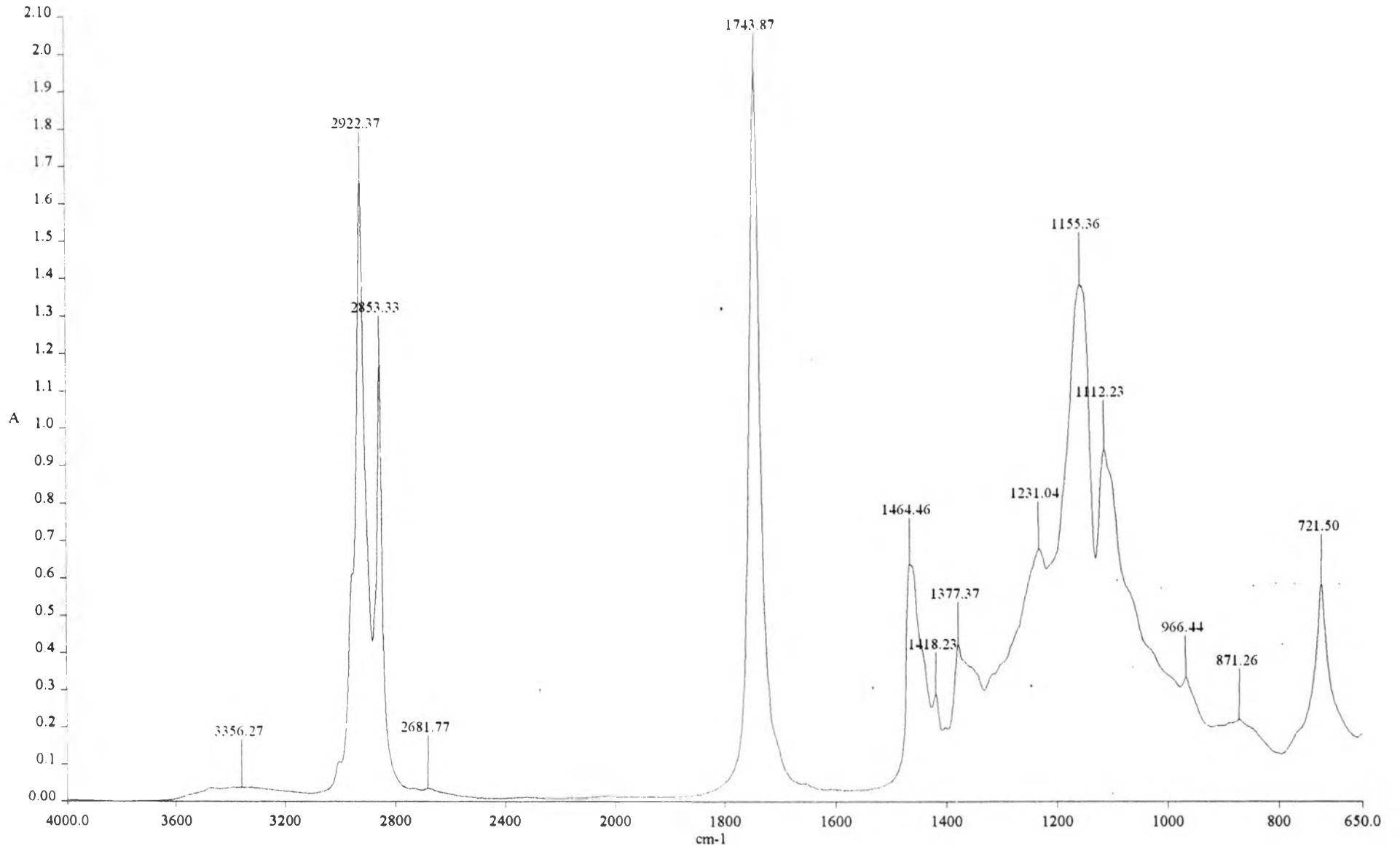


Butter cookie (brand 3) flask 2

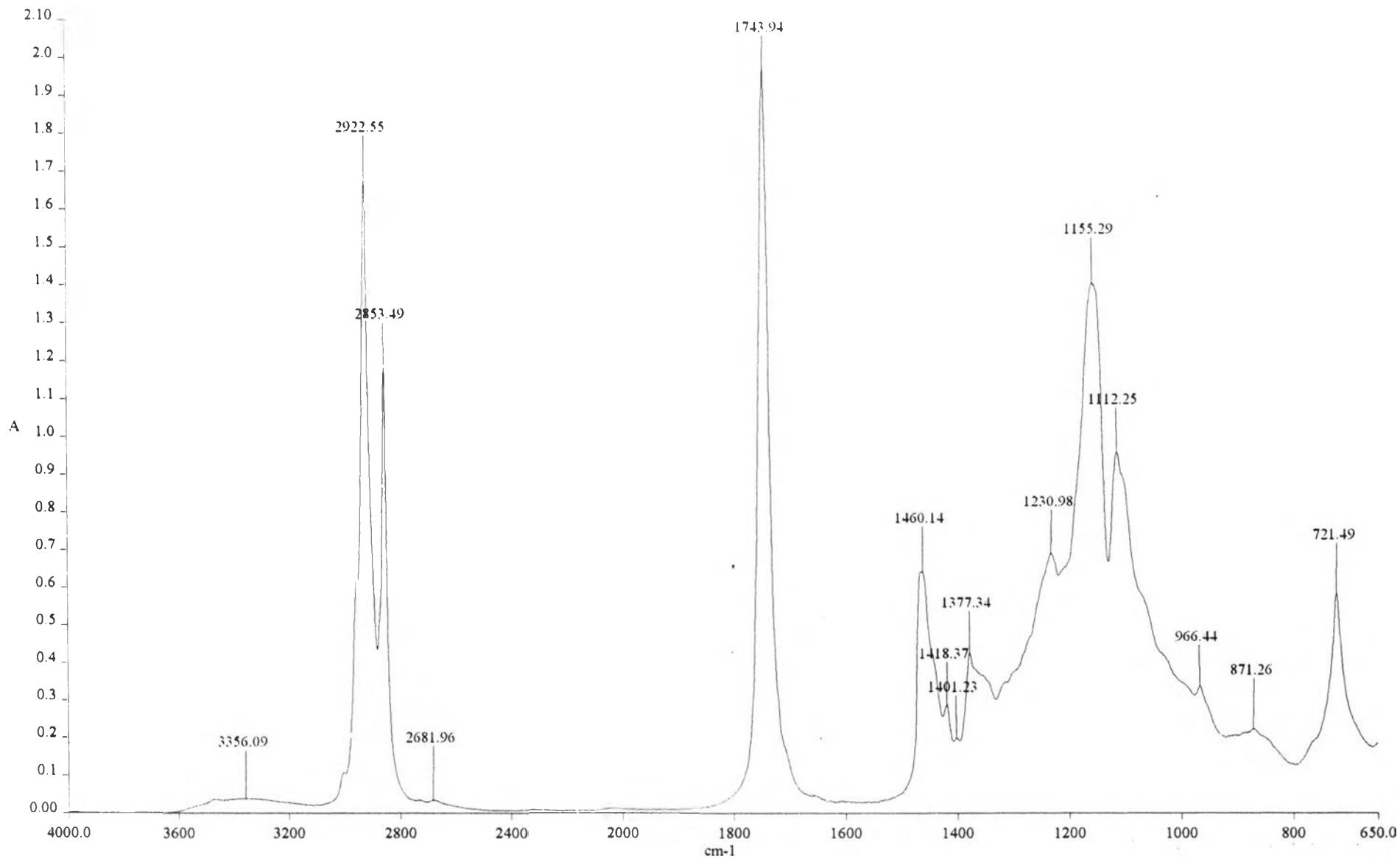


Negative second derivative  
Butter cookie brand 3 flask 1 & 2

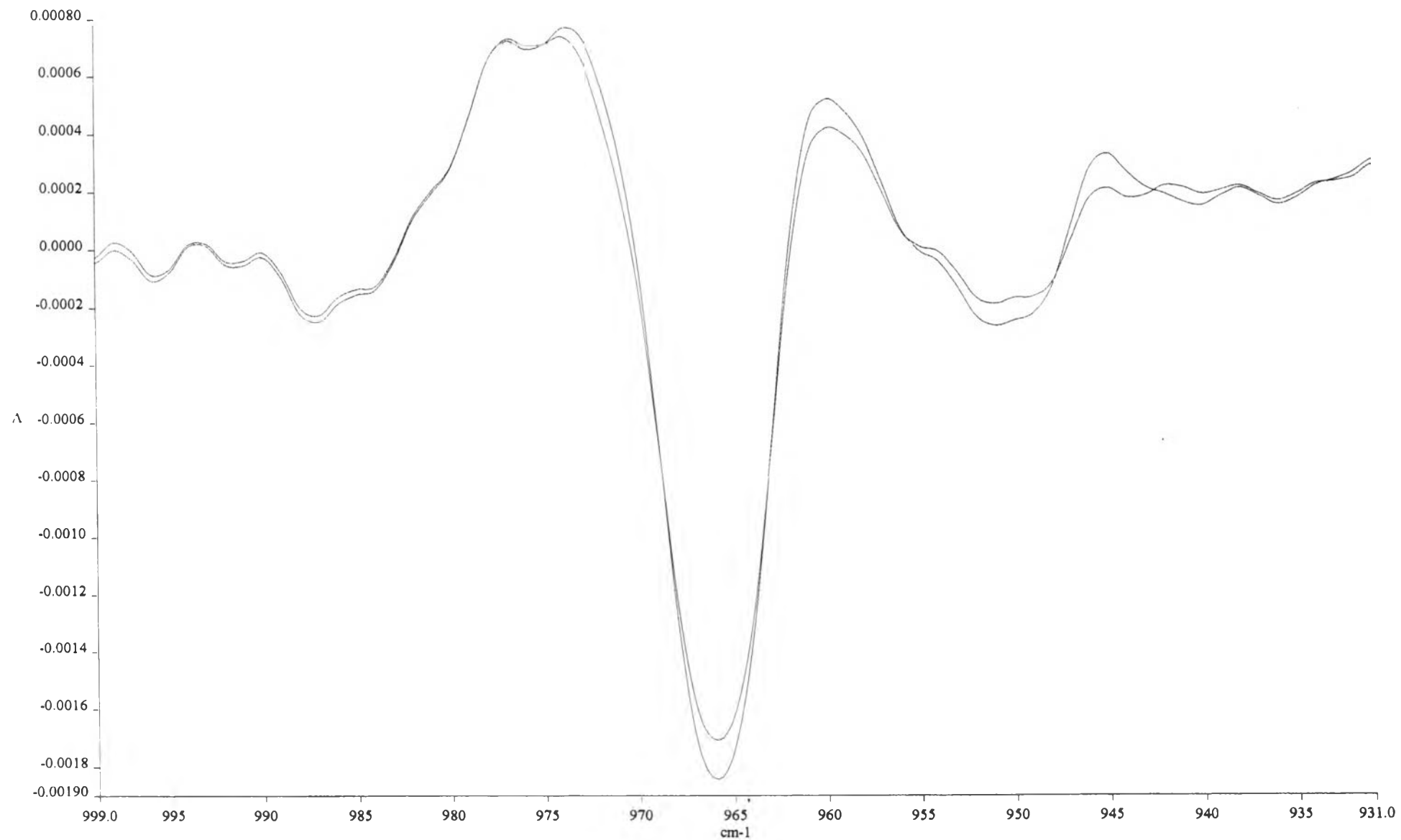




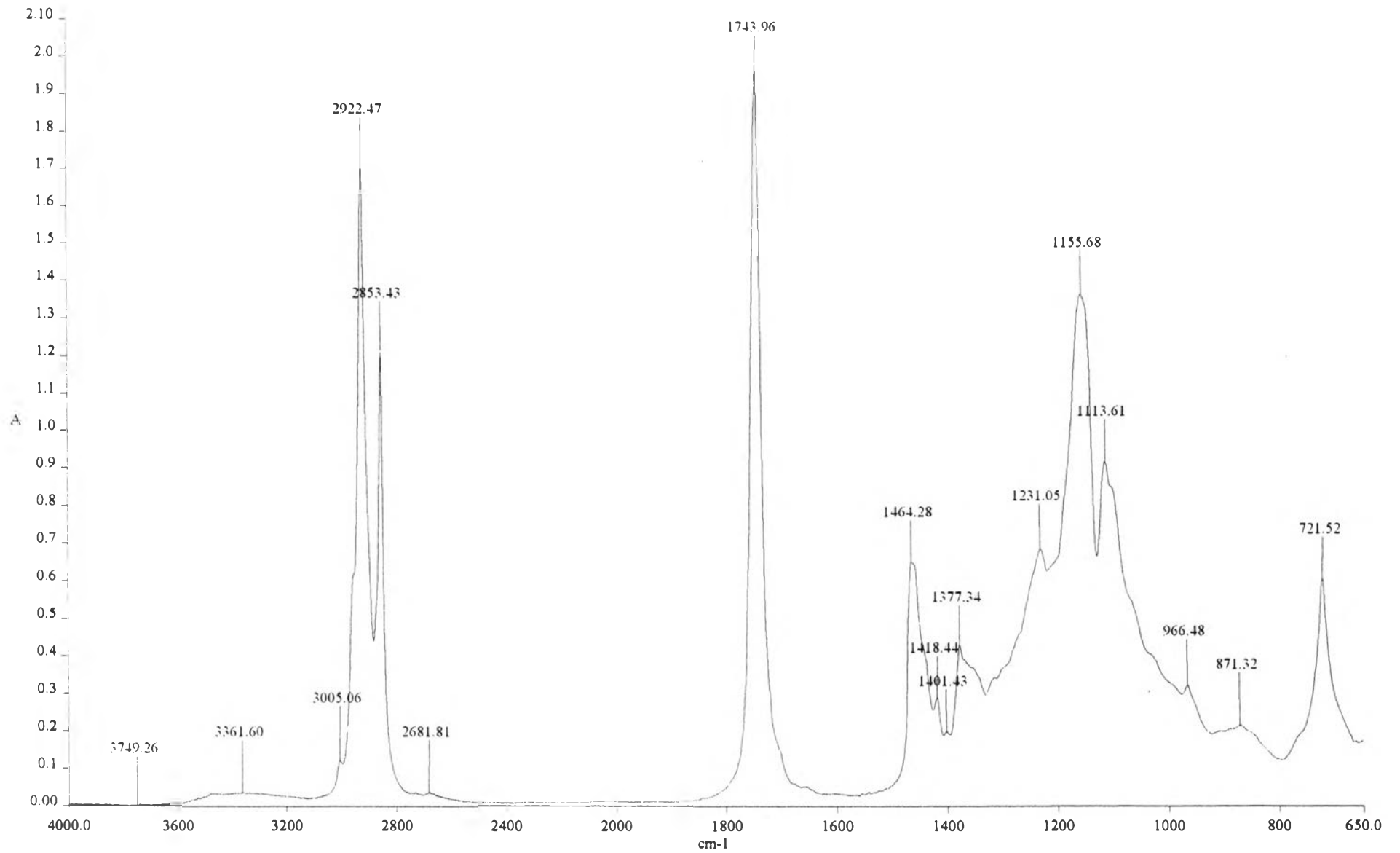
Brownie (brand 1) flask 1



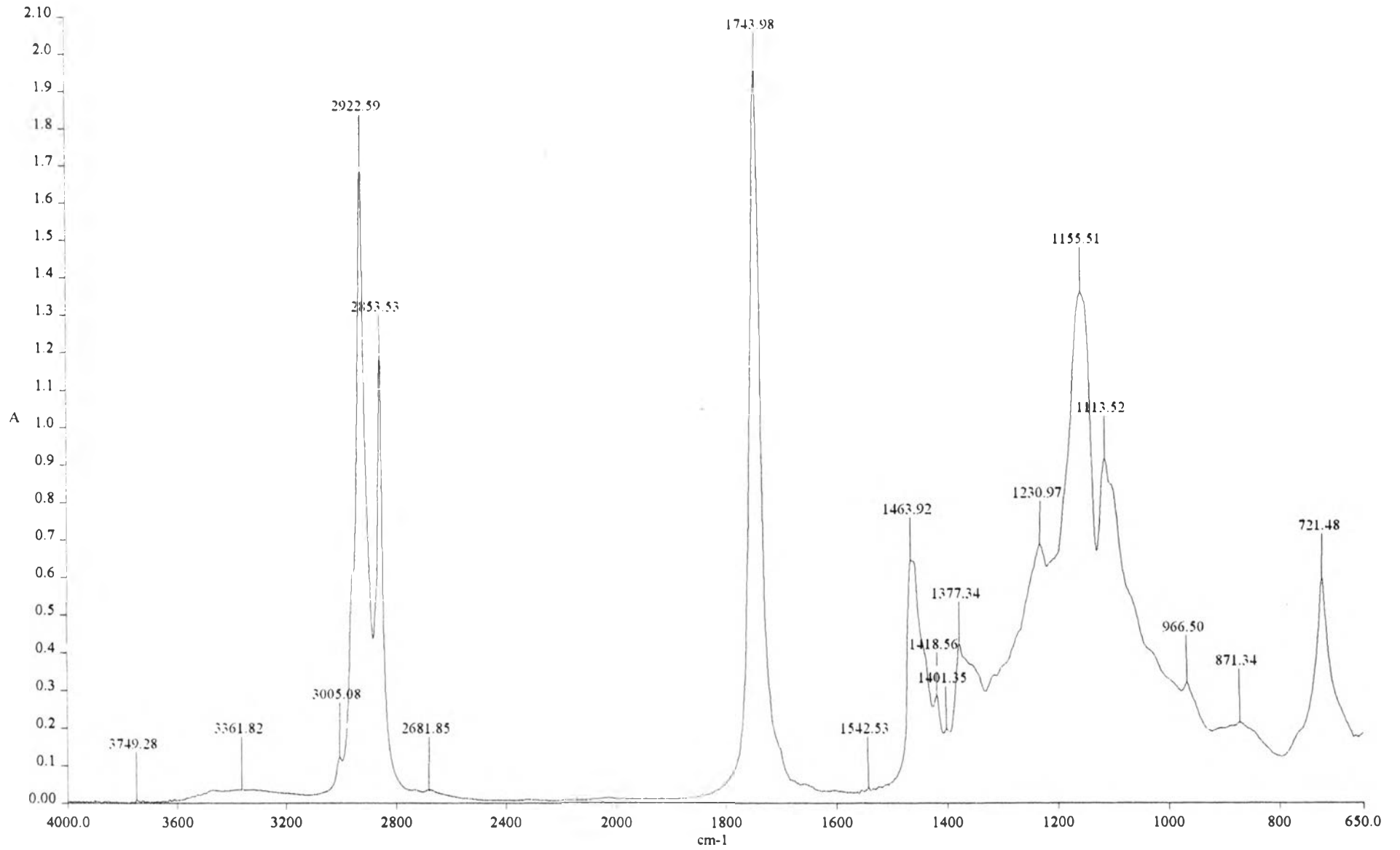
Brownie (brand 1) flask 2



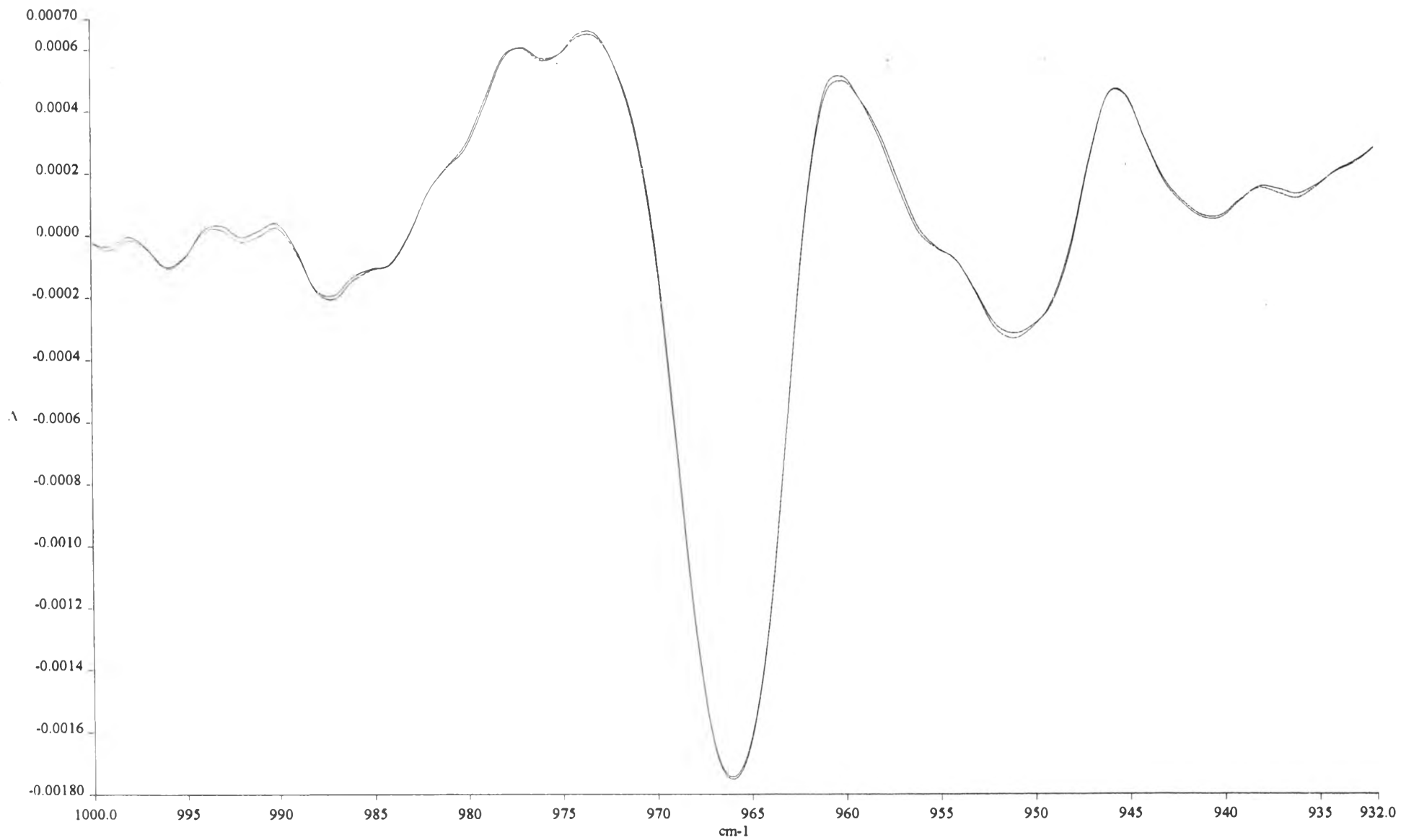
Negative second derivative  
Brownie brand 1 flask 1 & 2



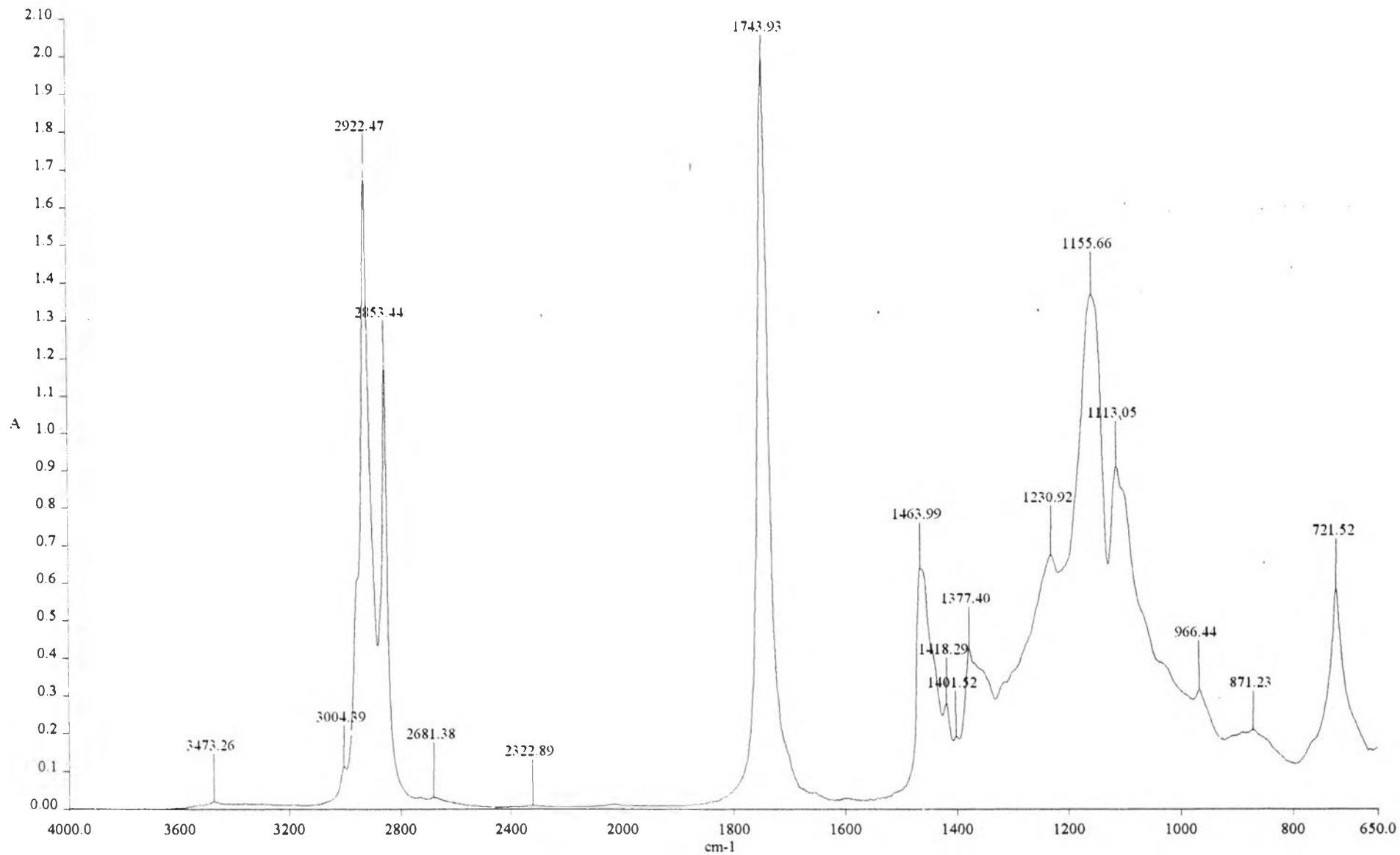
Brownie (brand 2) flask 1



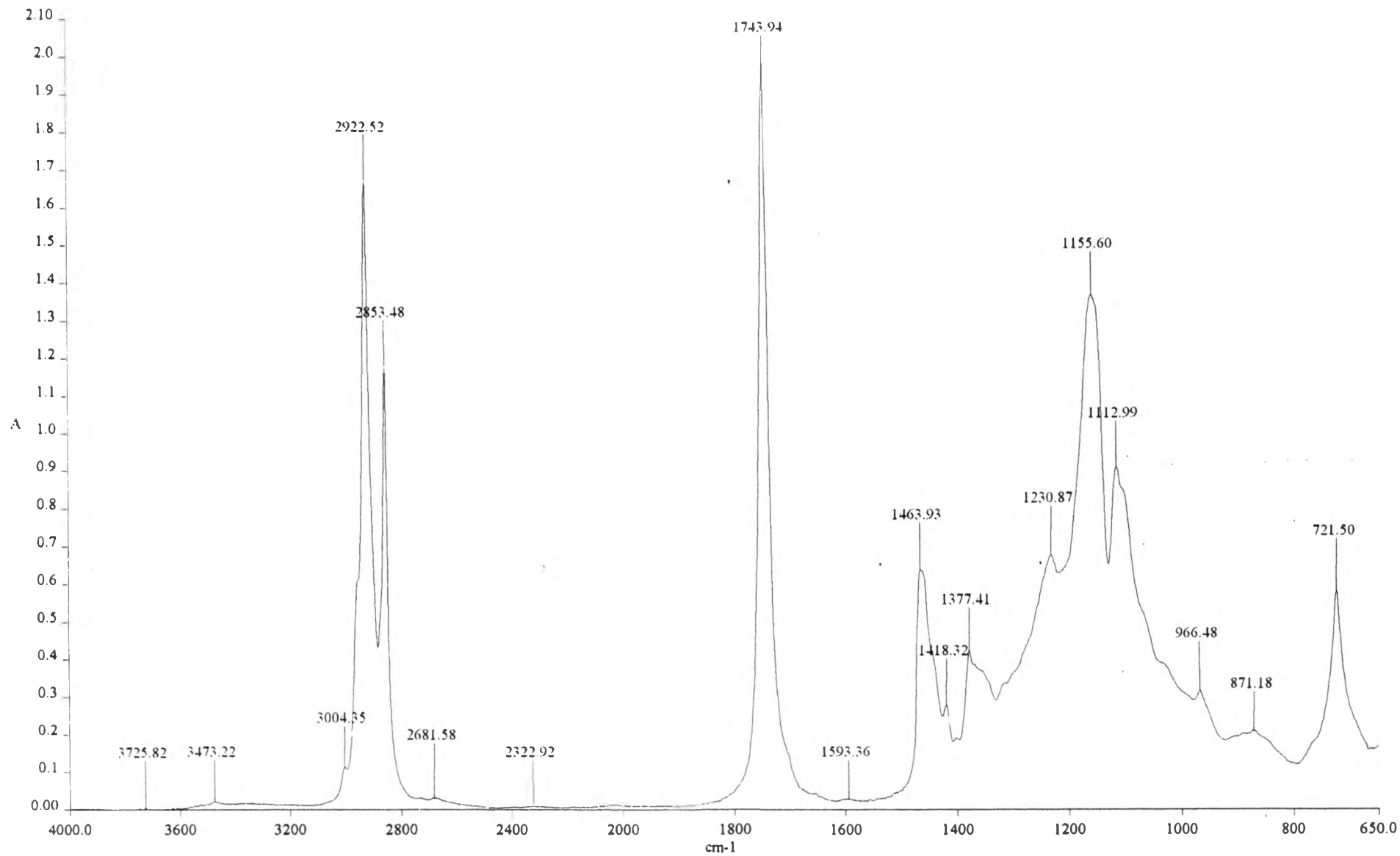
Brownie (brand 2) flask 2



Negative second derivative  
Brownie brand 2 flask 1 & 2

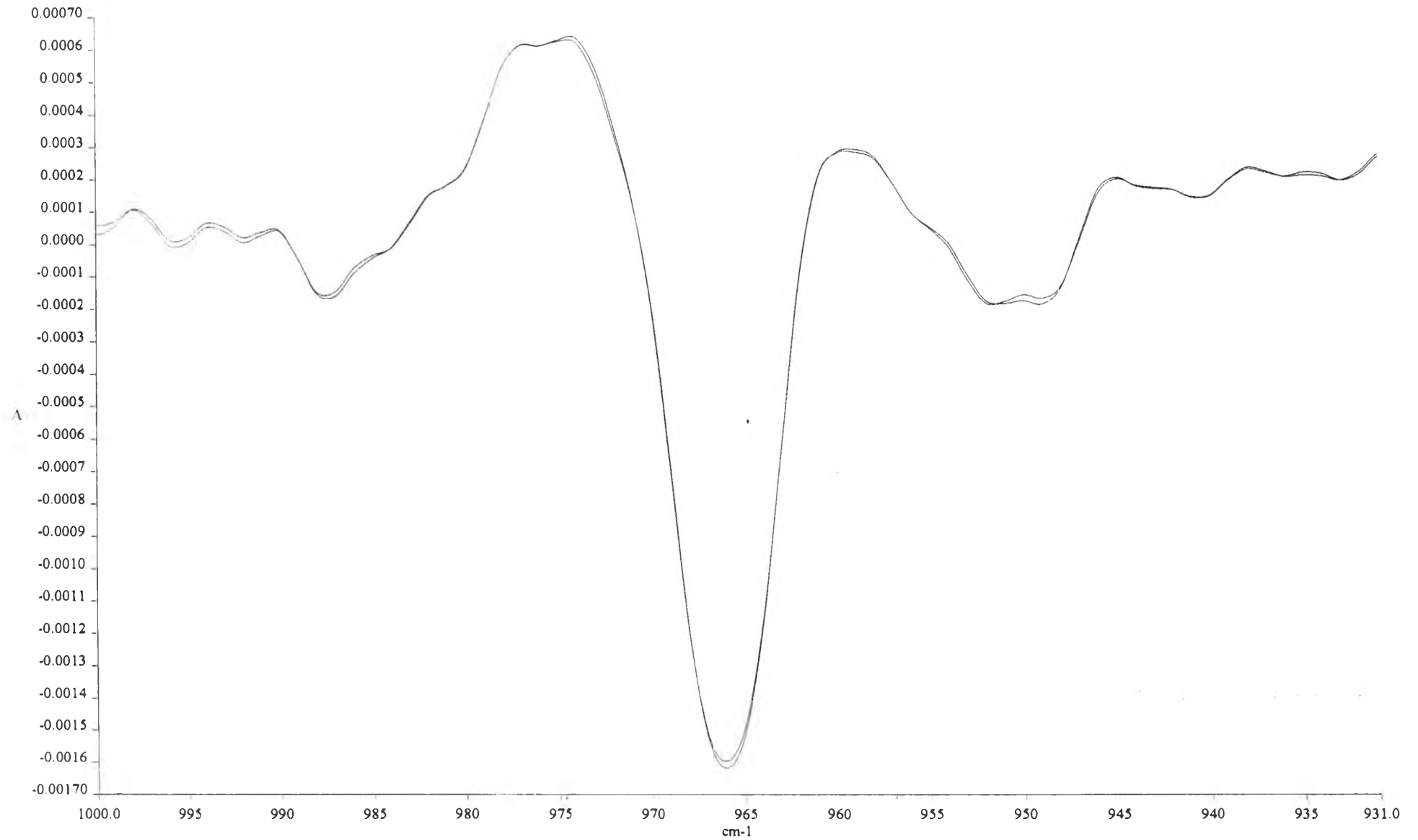


Brownie (brand 3) flask 1

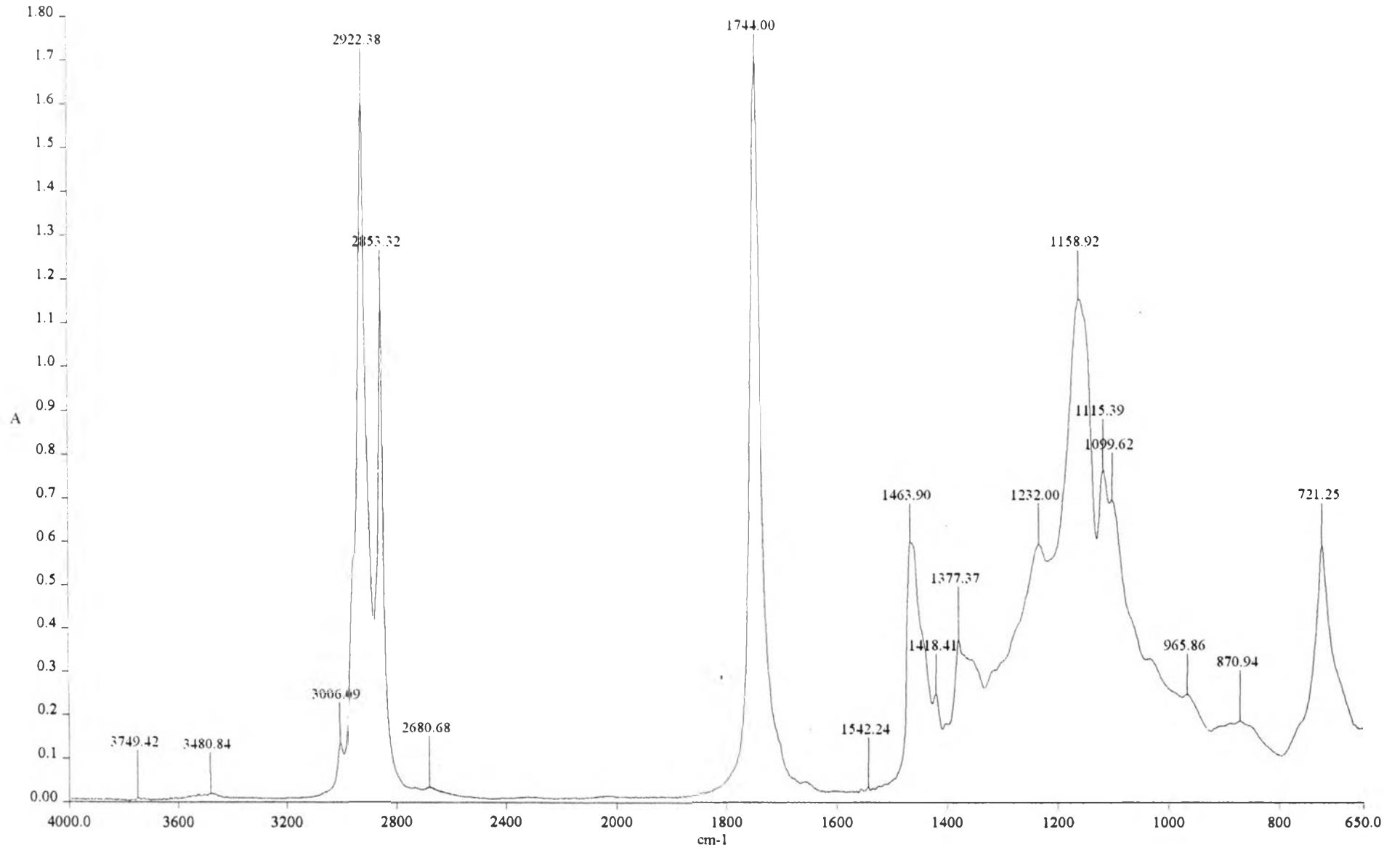


Brownie (brand 3) flask 2

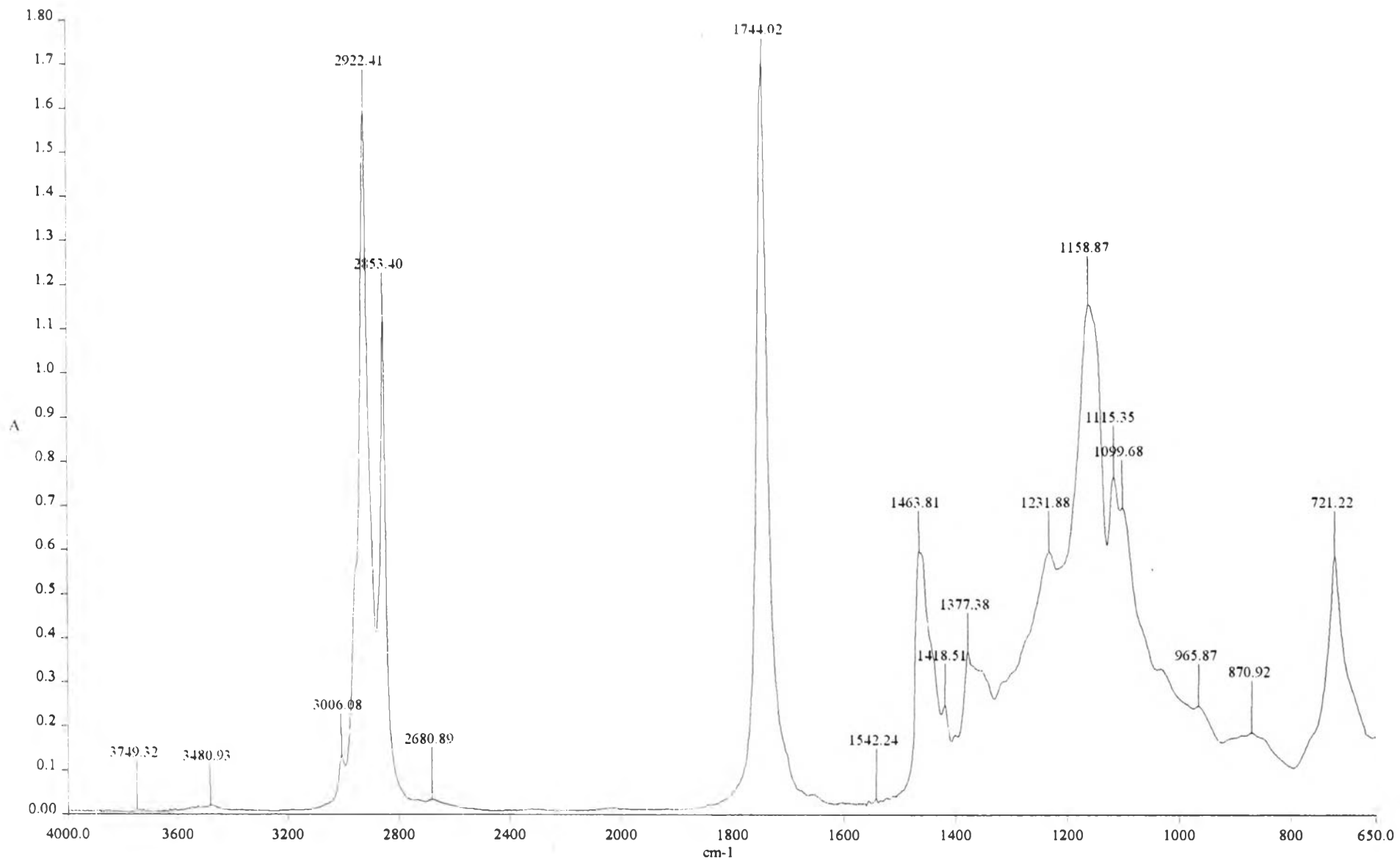




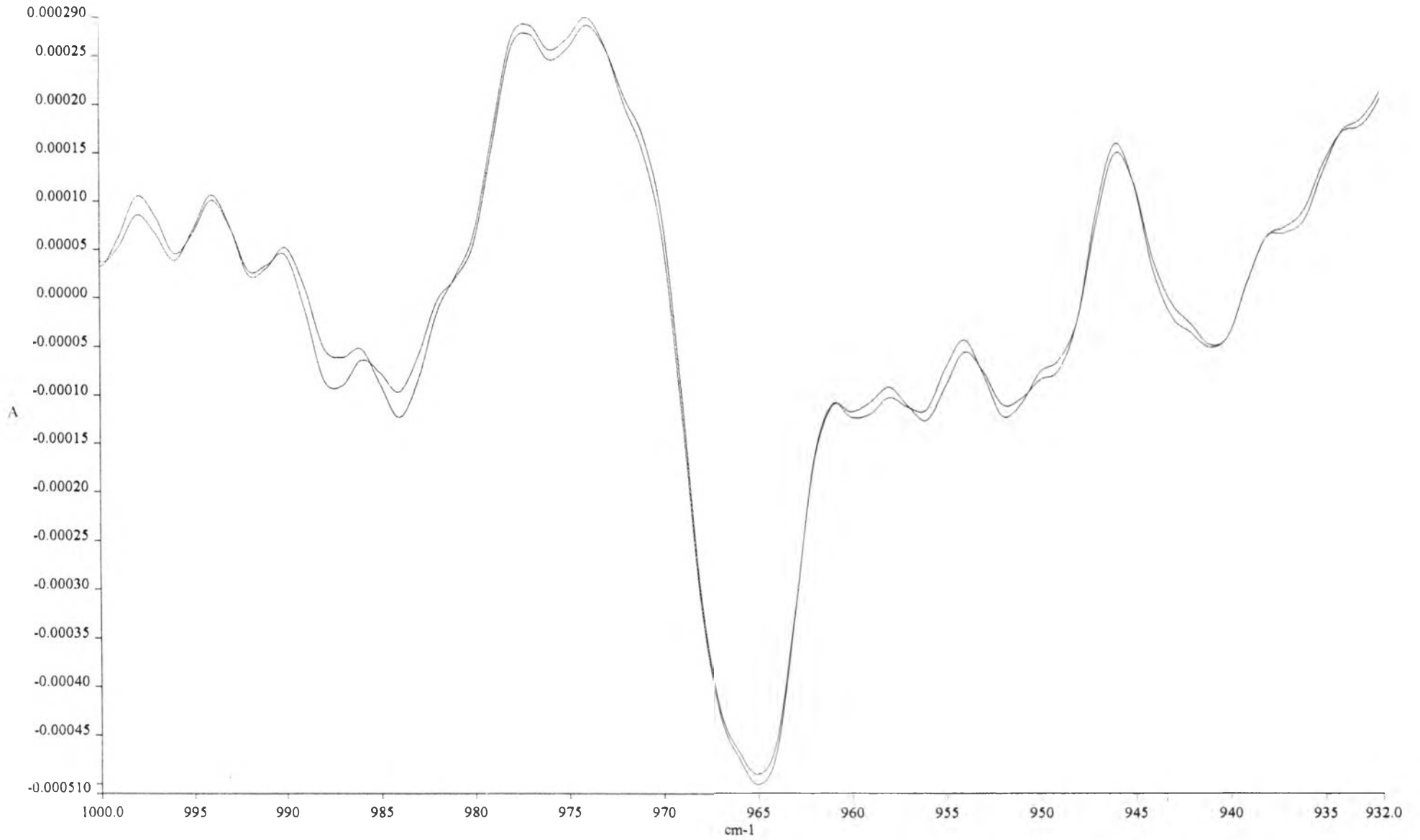
Negative second derivative  
Brownie brand 3 flask 1 & 2



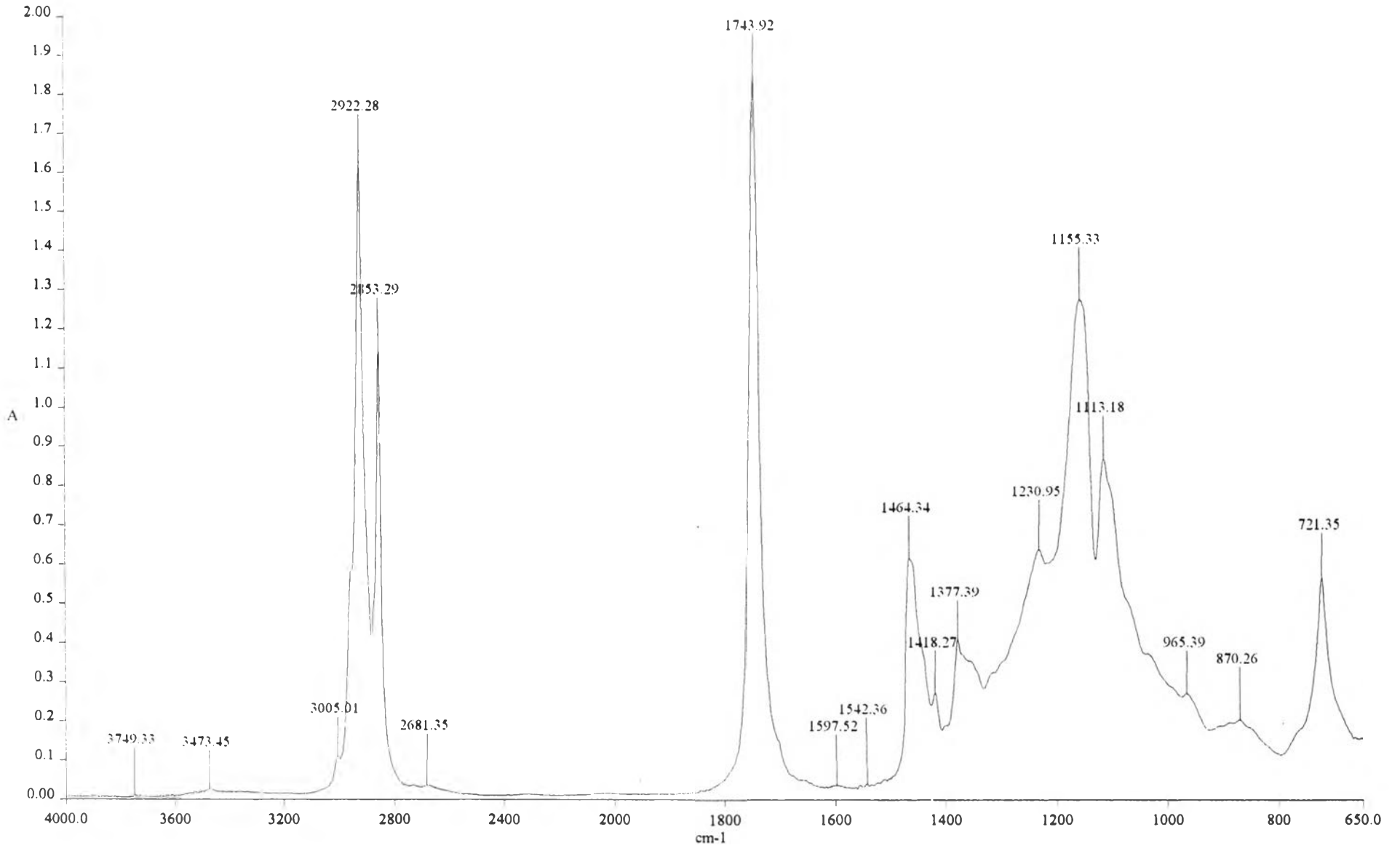
Sandwich chocolate cookie (brand1) flask 1



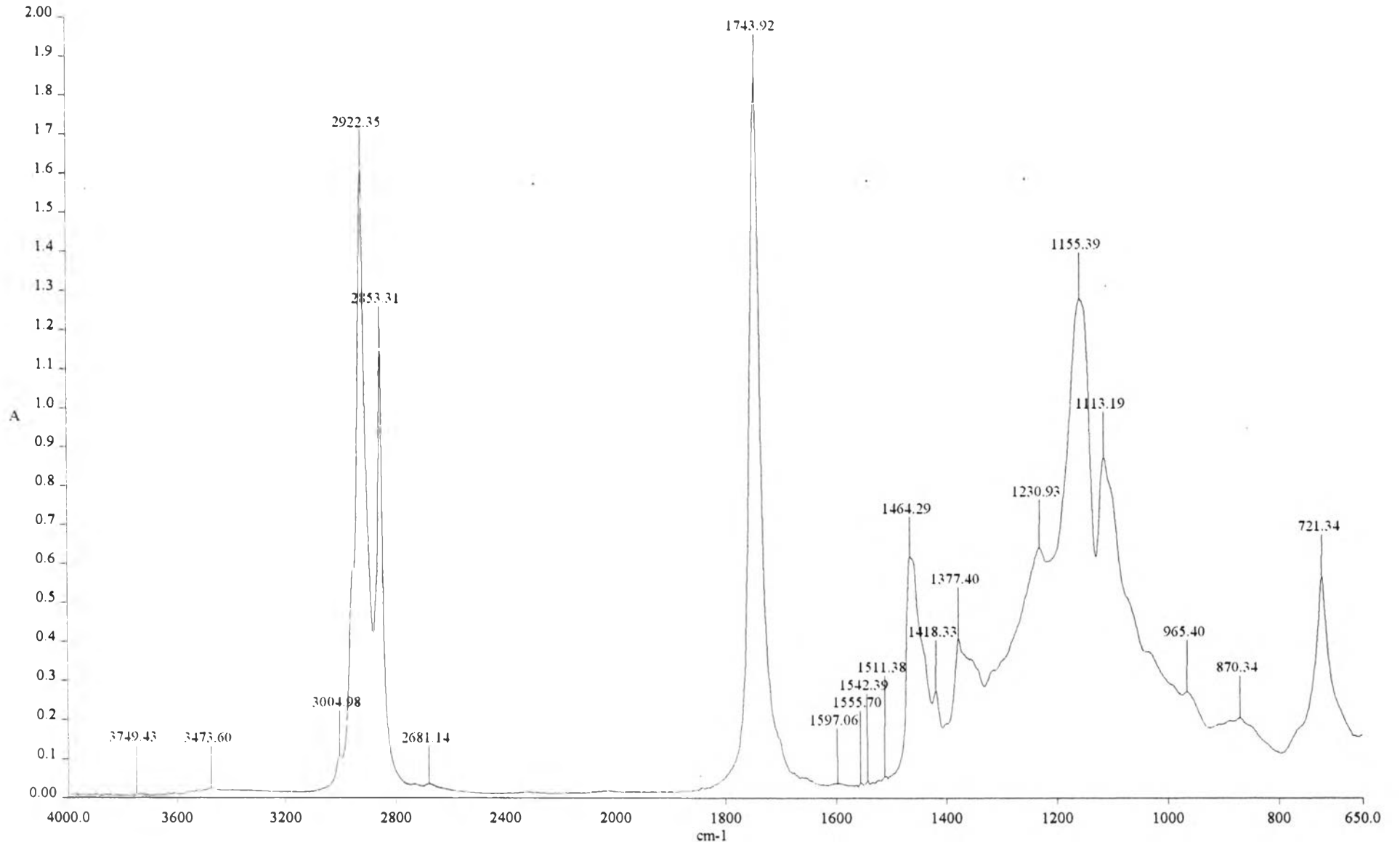
Sandwich chocolate cookie (brand1) flask 2



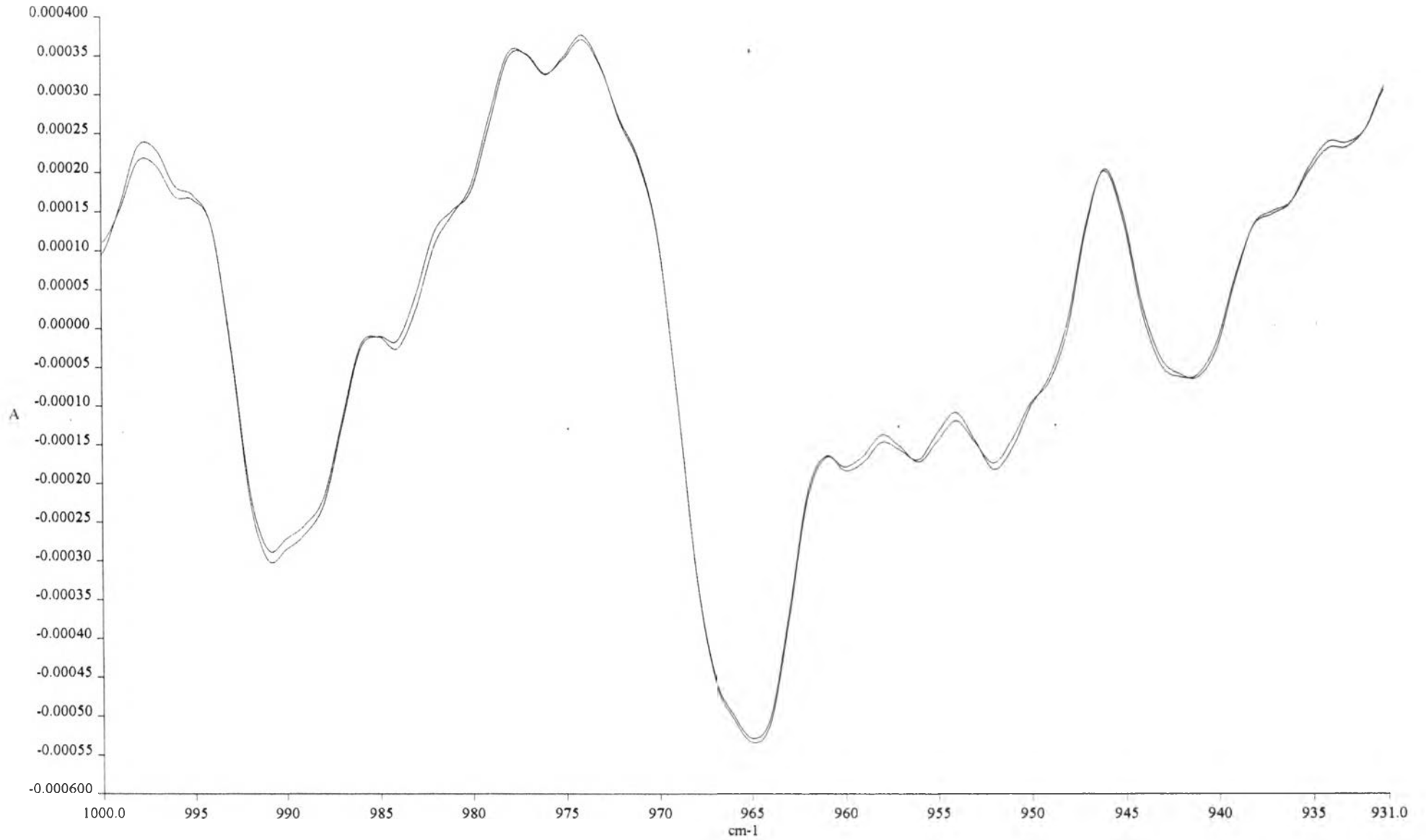
Negative second derivative  
Sandwich chocolate cookie brand 1 flask 1 & 2



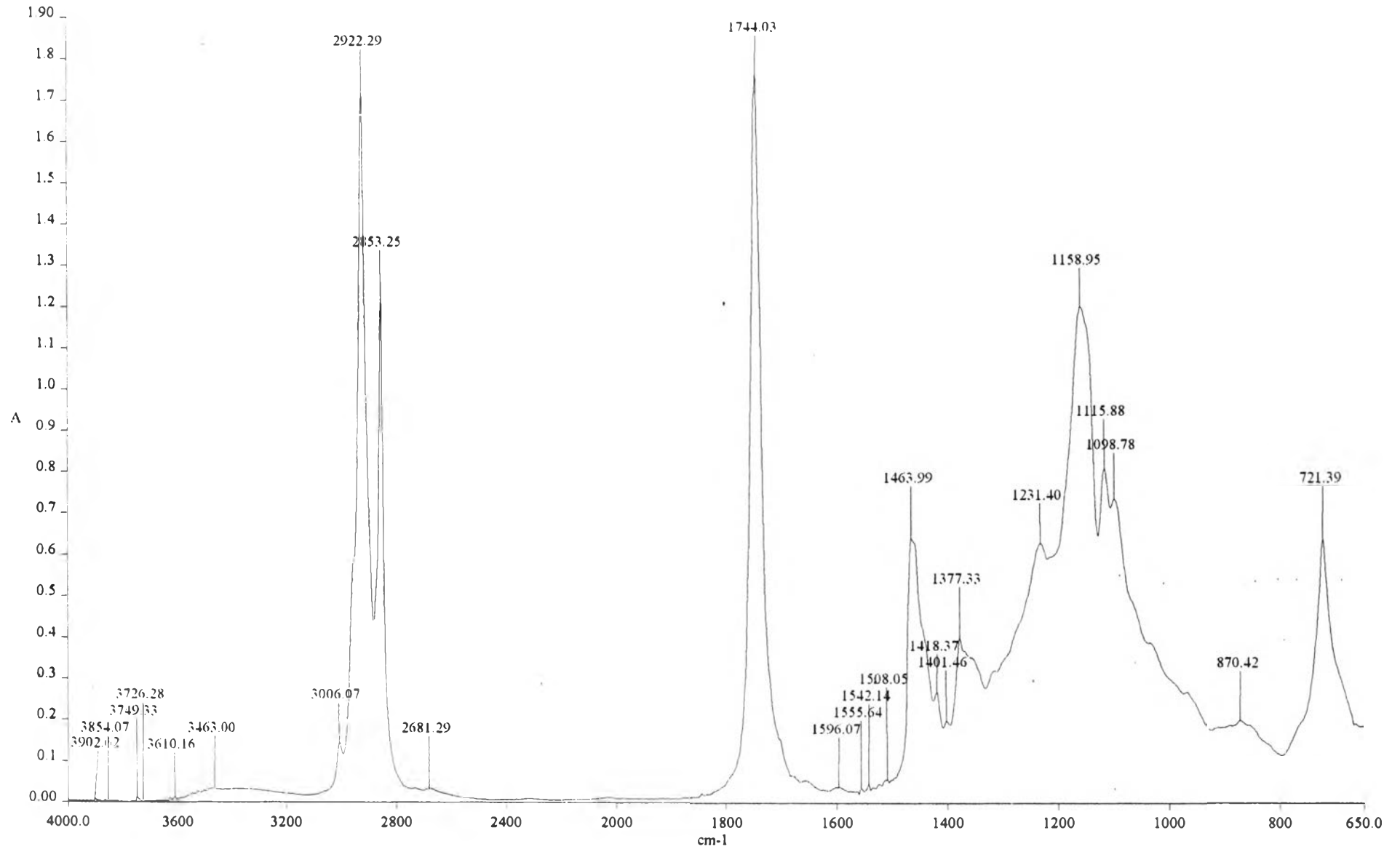
Sandwich chocolate cookie (brand 2) flask 1



Sandwich chocolate cookie (brand 2) flask 2

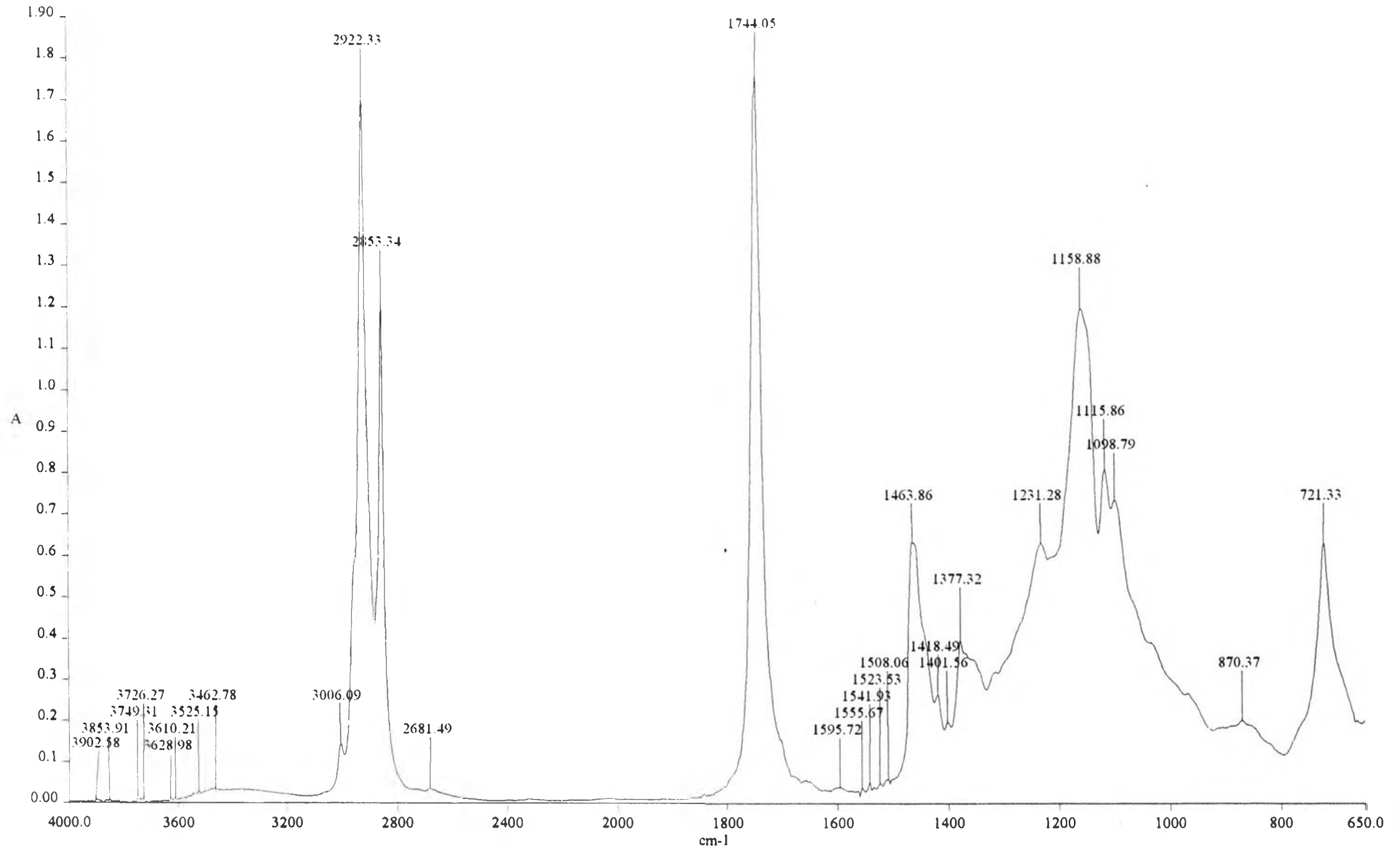


Negative second derivative  
Sandwich chocolate cookie brand 2 flask 1 & 2

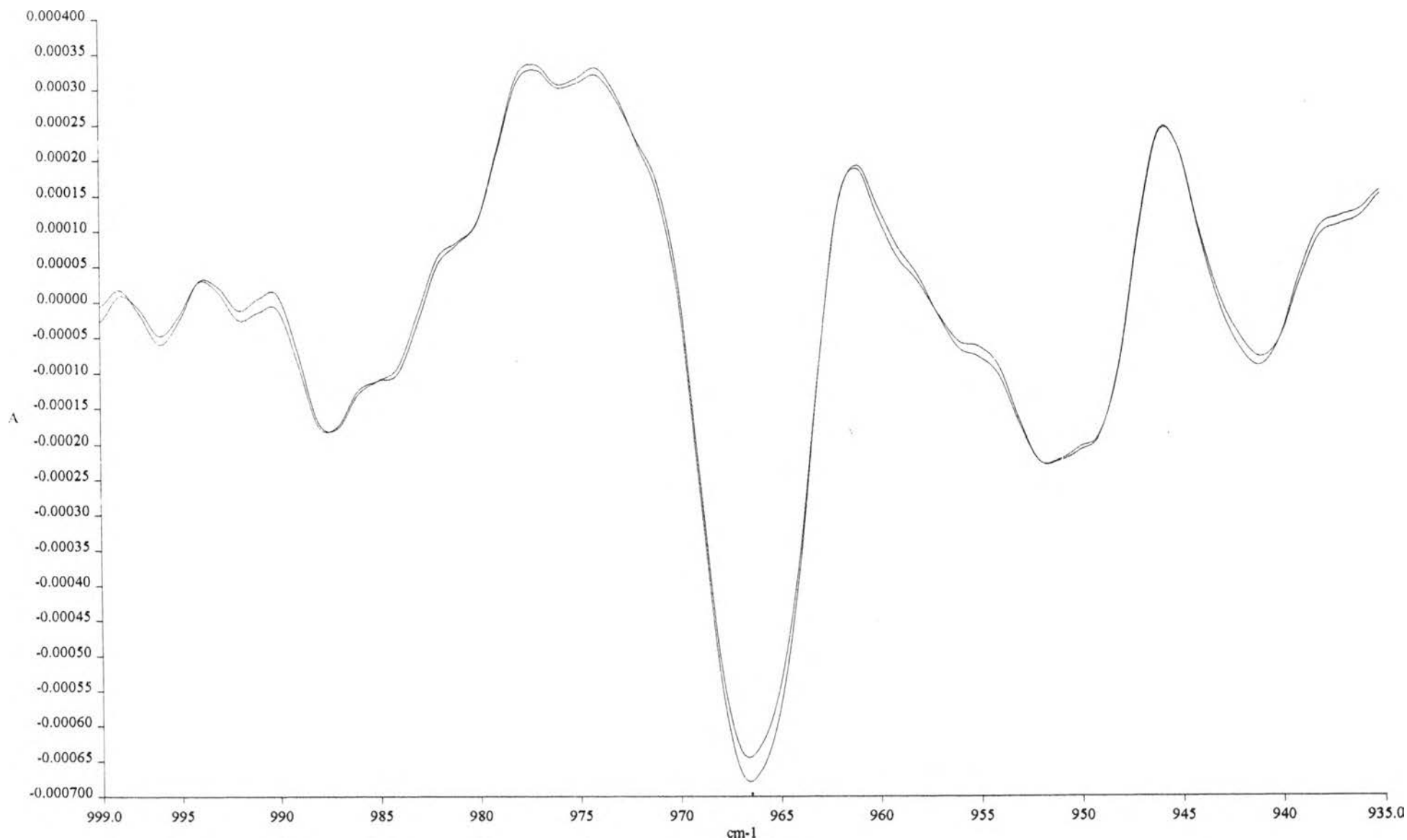


Sandwich chocolate cookie (brand 3) flask 1

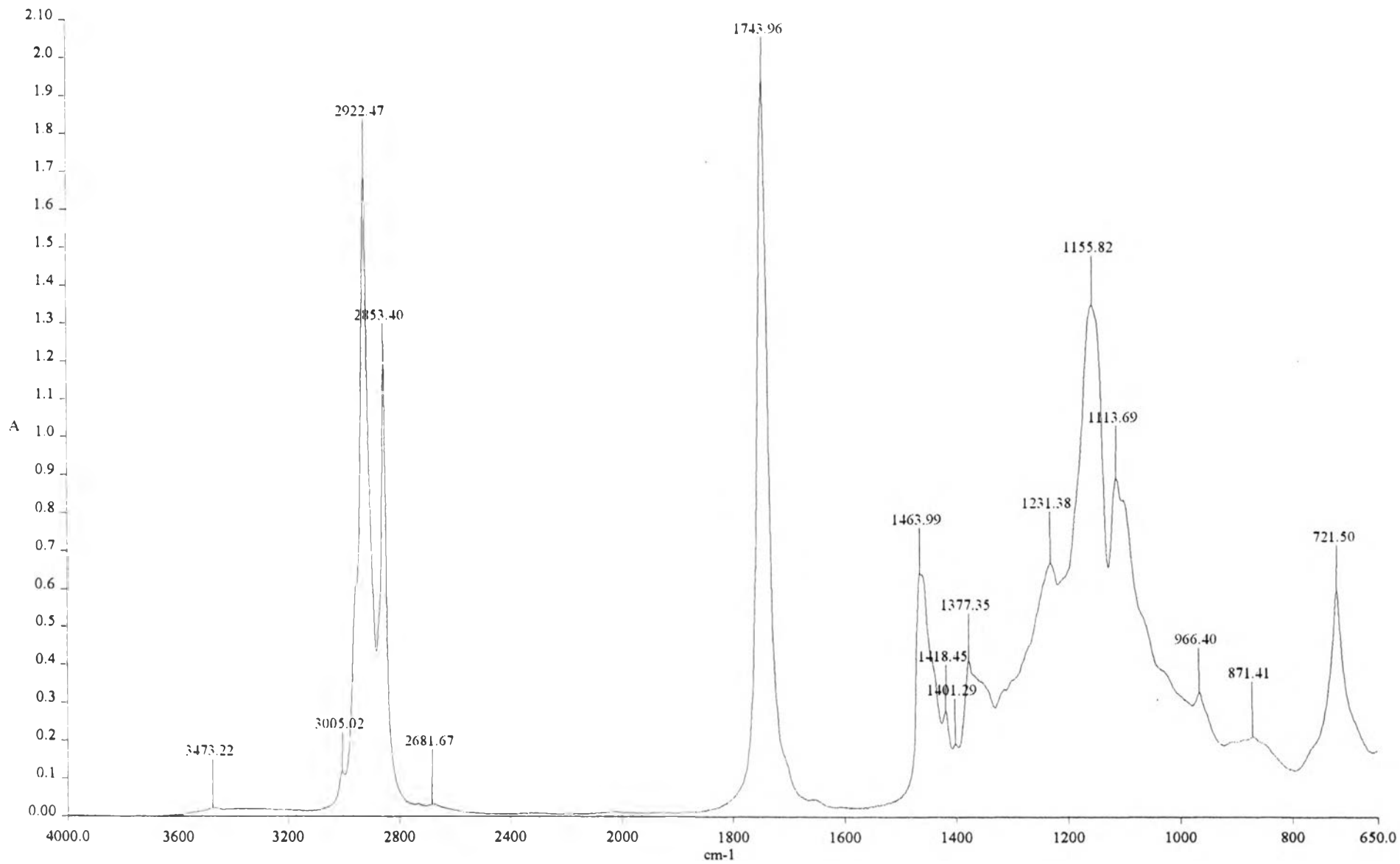




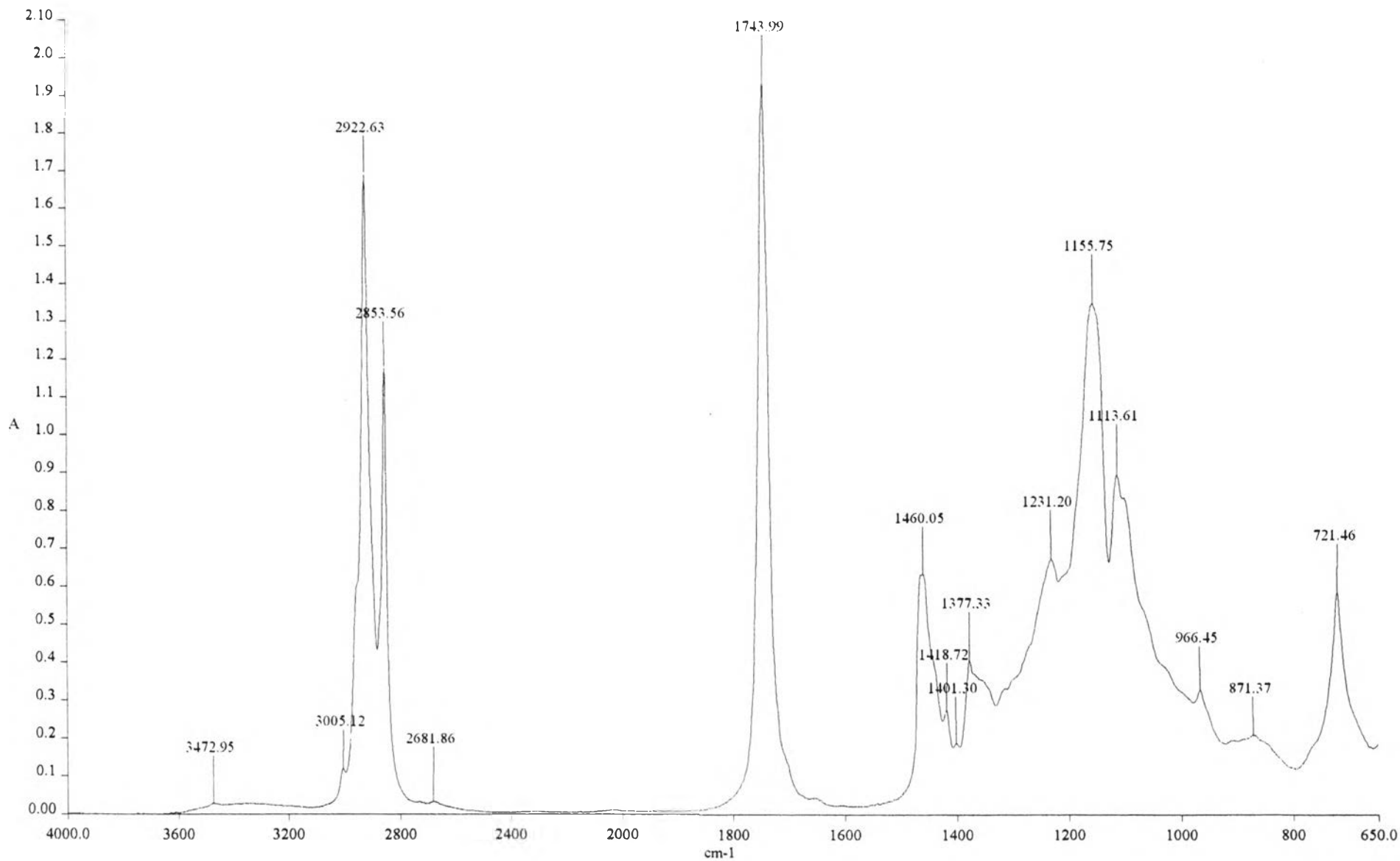
Sandwich chocolate cookie (brand 3) flask 2



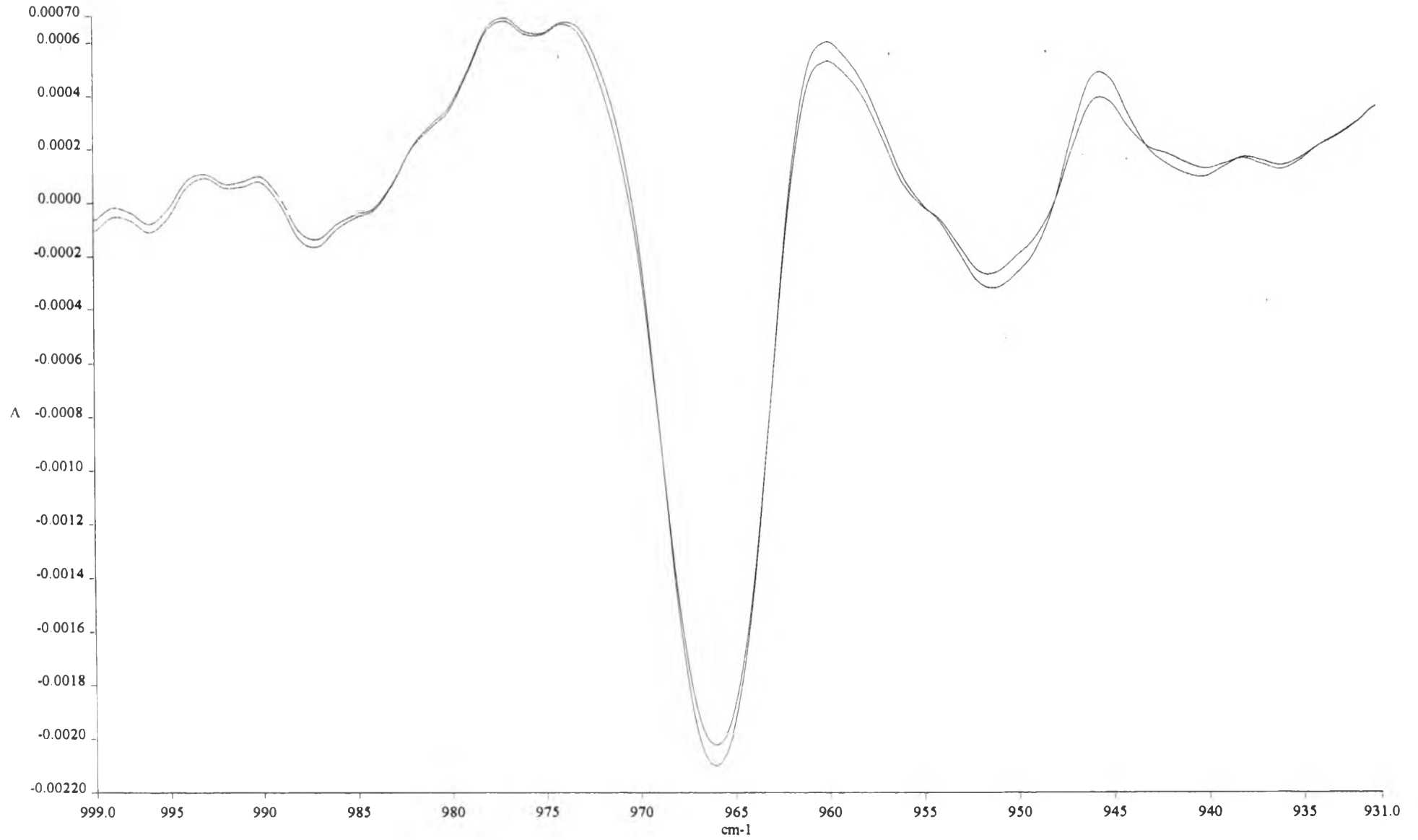
Negative second derivative  
Sandwich chocolate cookie brand 3 flask 1 & 2



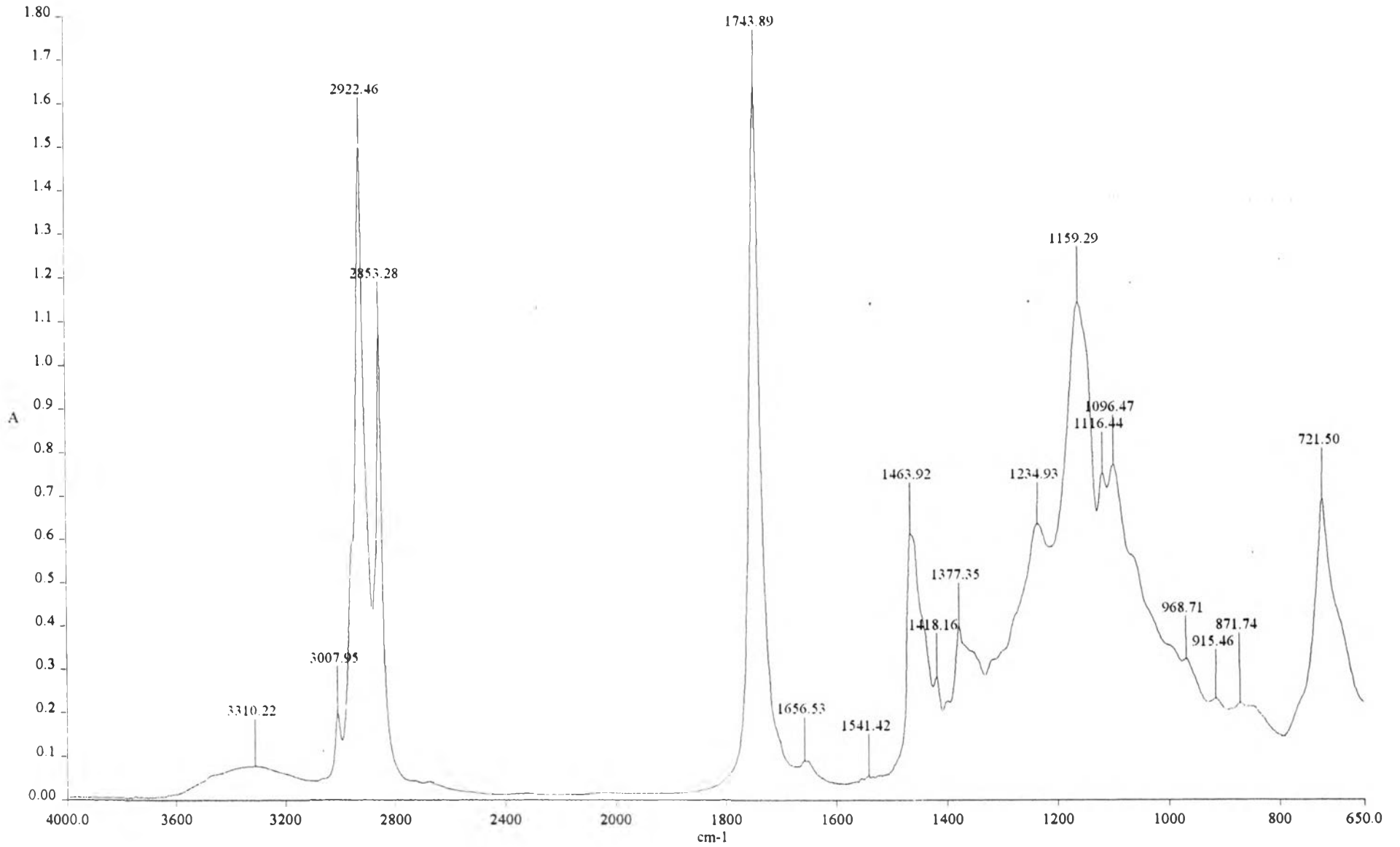
Cake cream roll (brand 1) flask 1



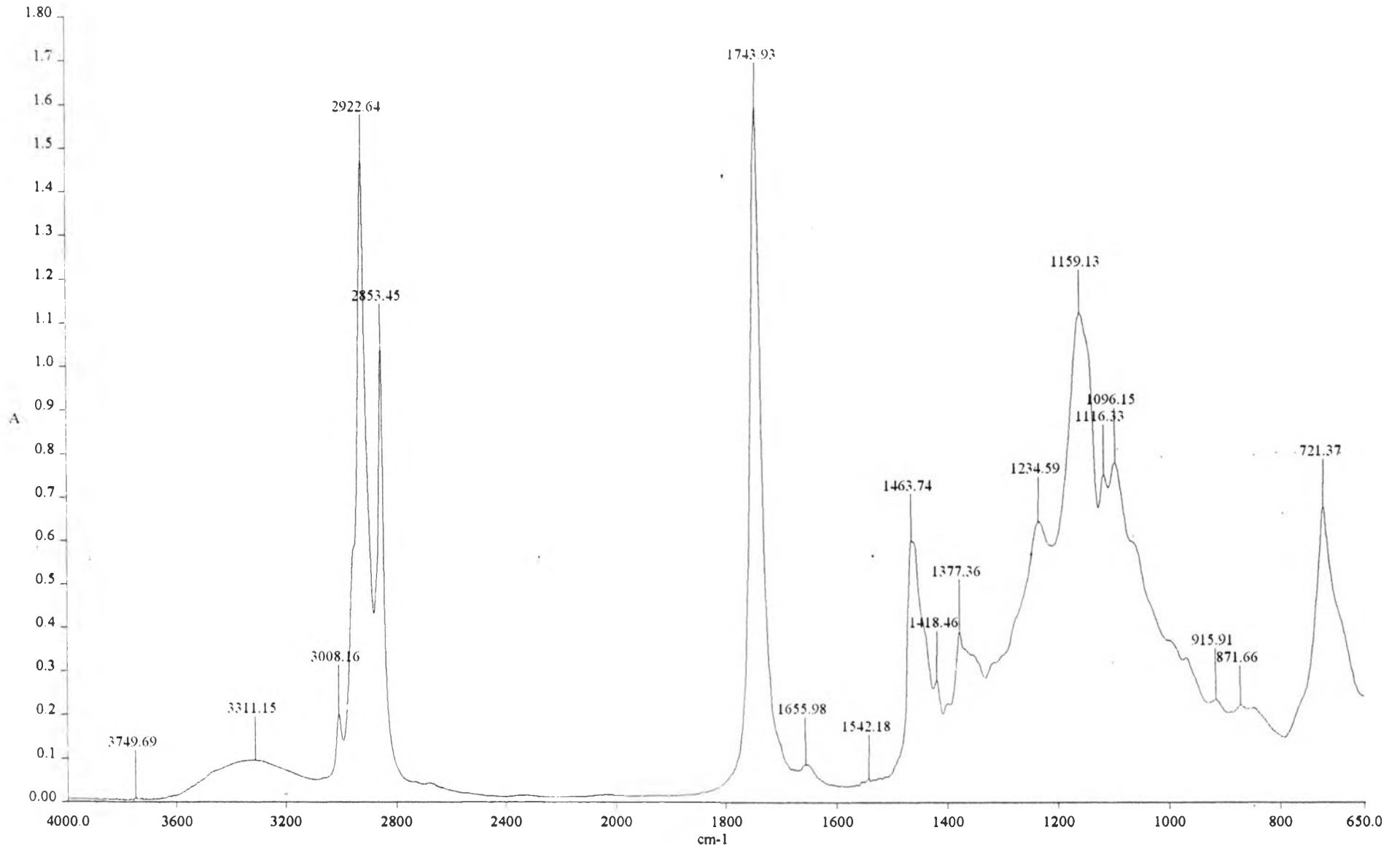
Cake cream roll (brand 1) flask 2



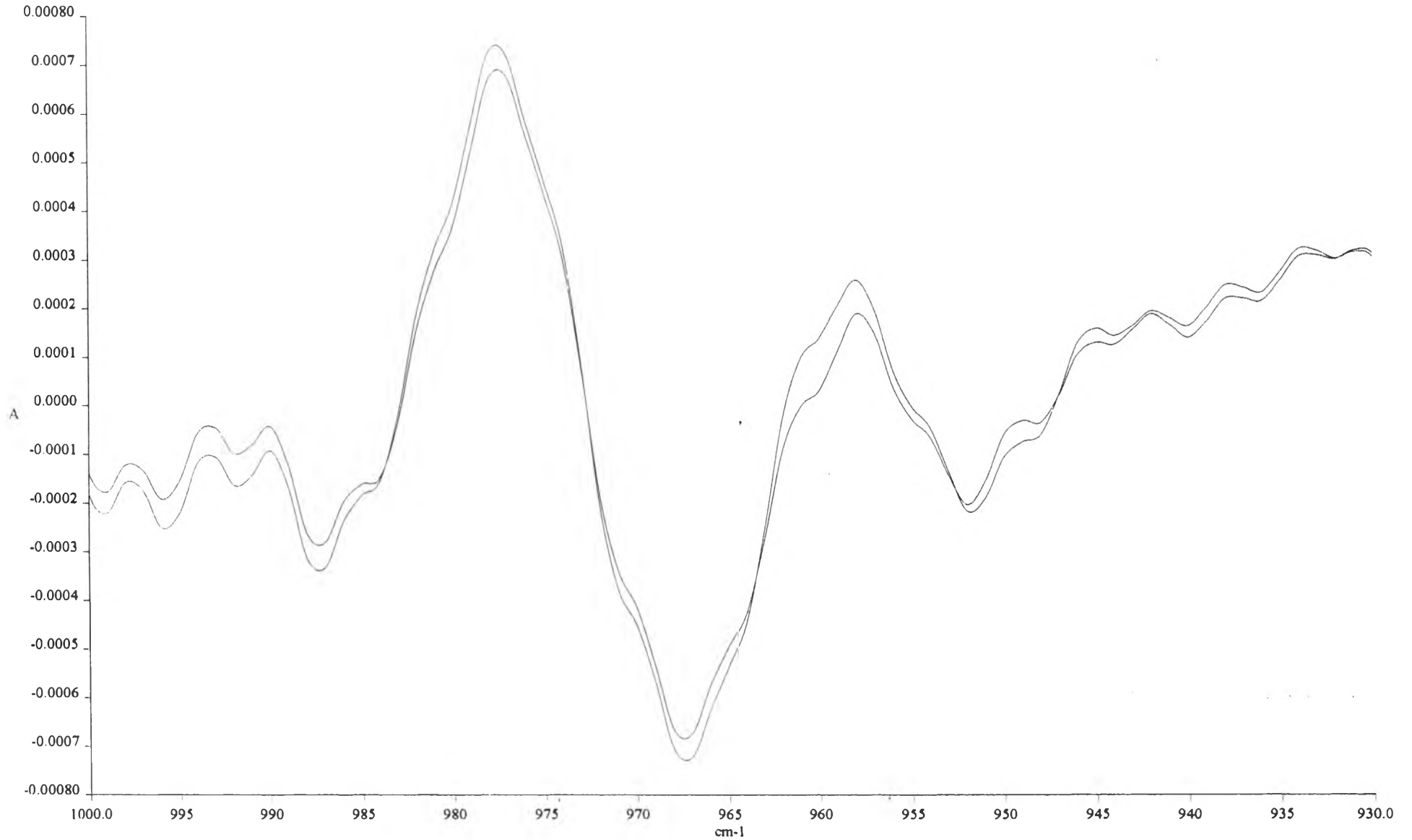
Negative second derivative  
Cake cream roll brand 1 flask 1 & 2



Cake cream roll (brand 2) flask 1

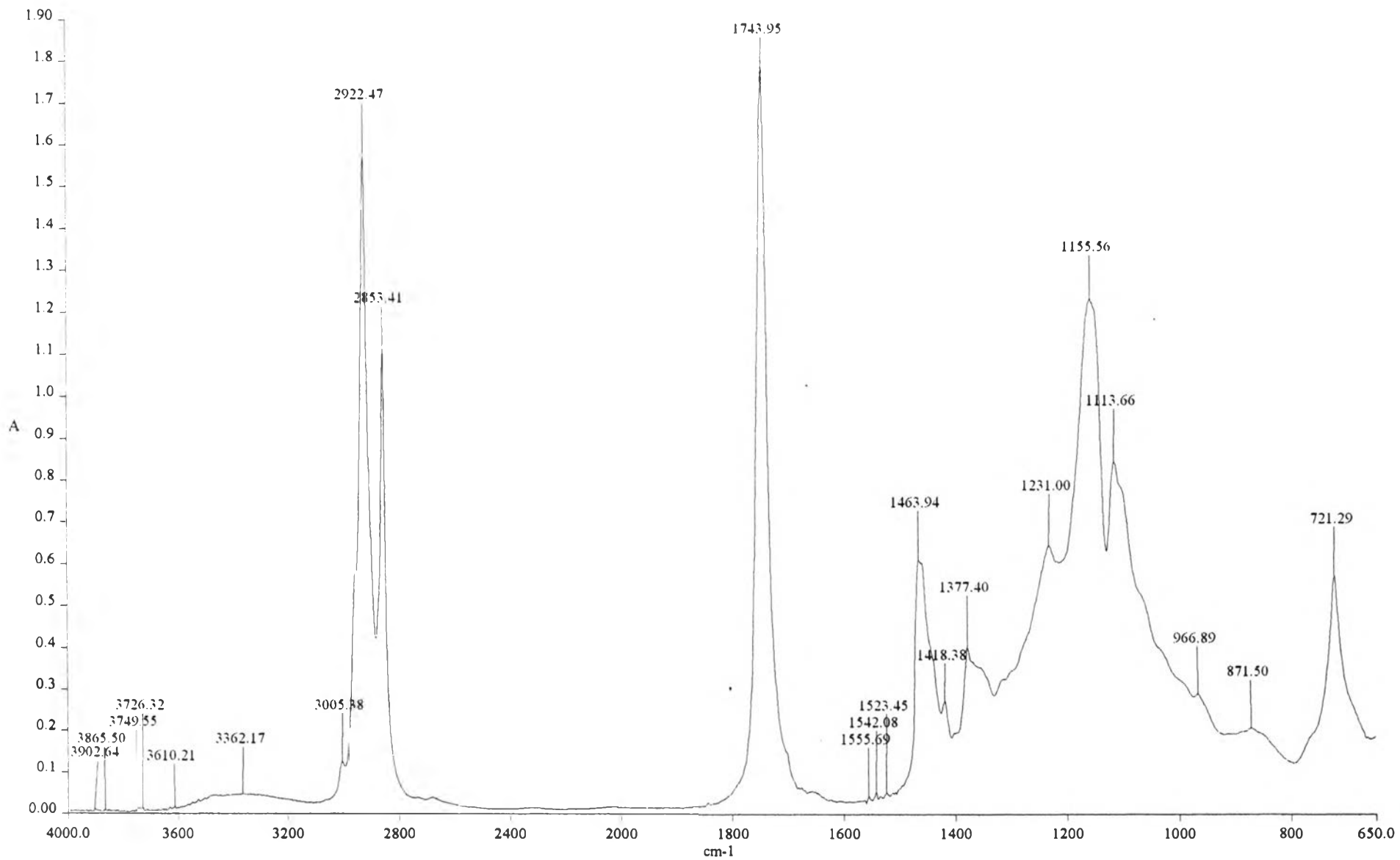


Cake cream roll (brand 2) flask 2

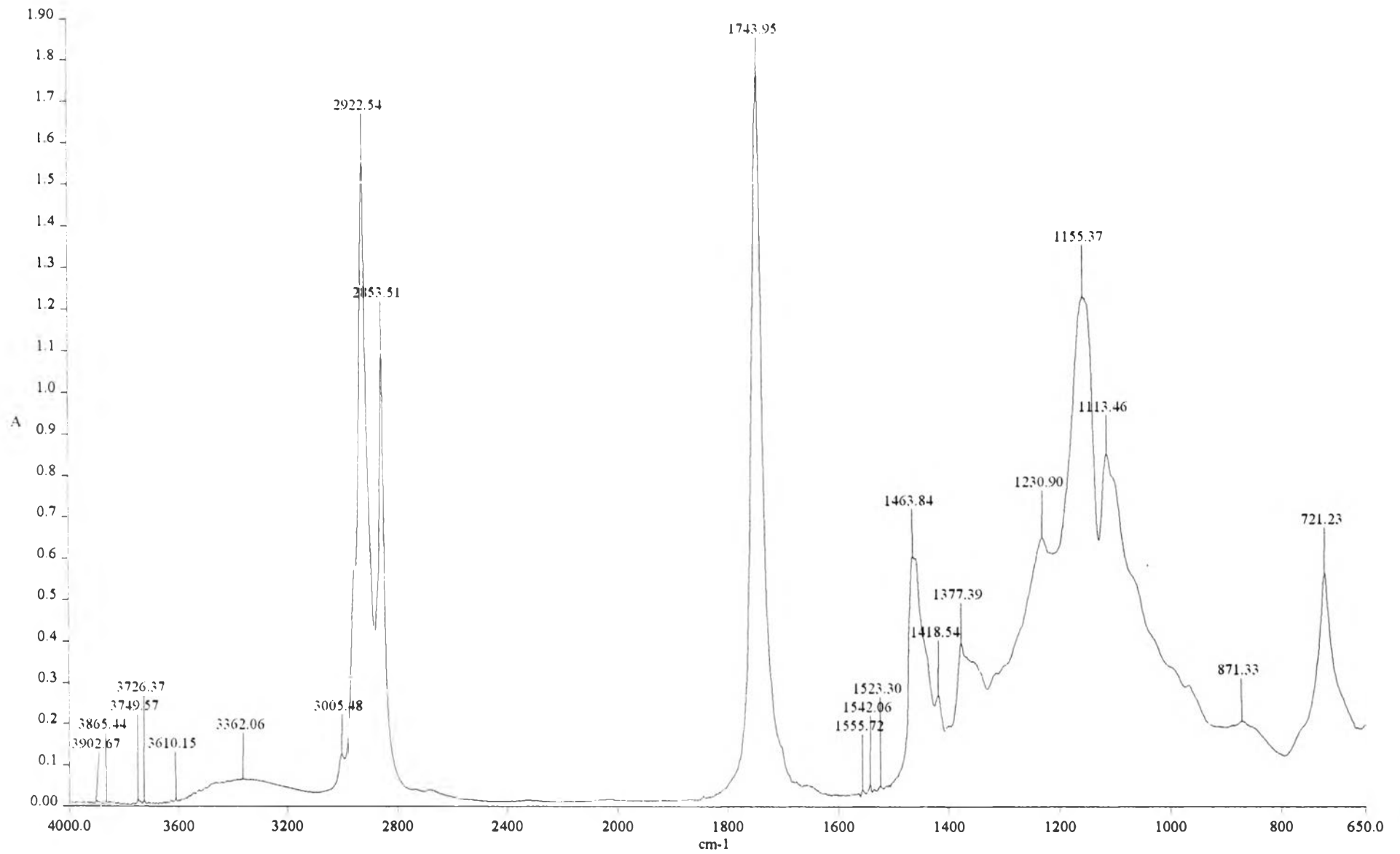


Negative second derivative  
Cake cream roll brand 2 flask 1 & 2

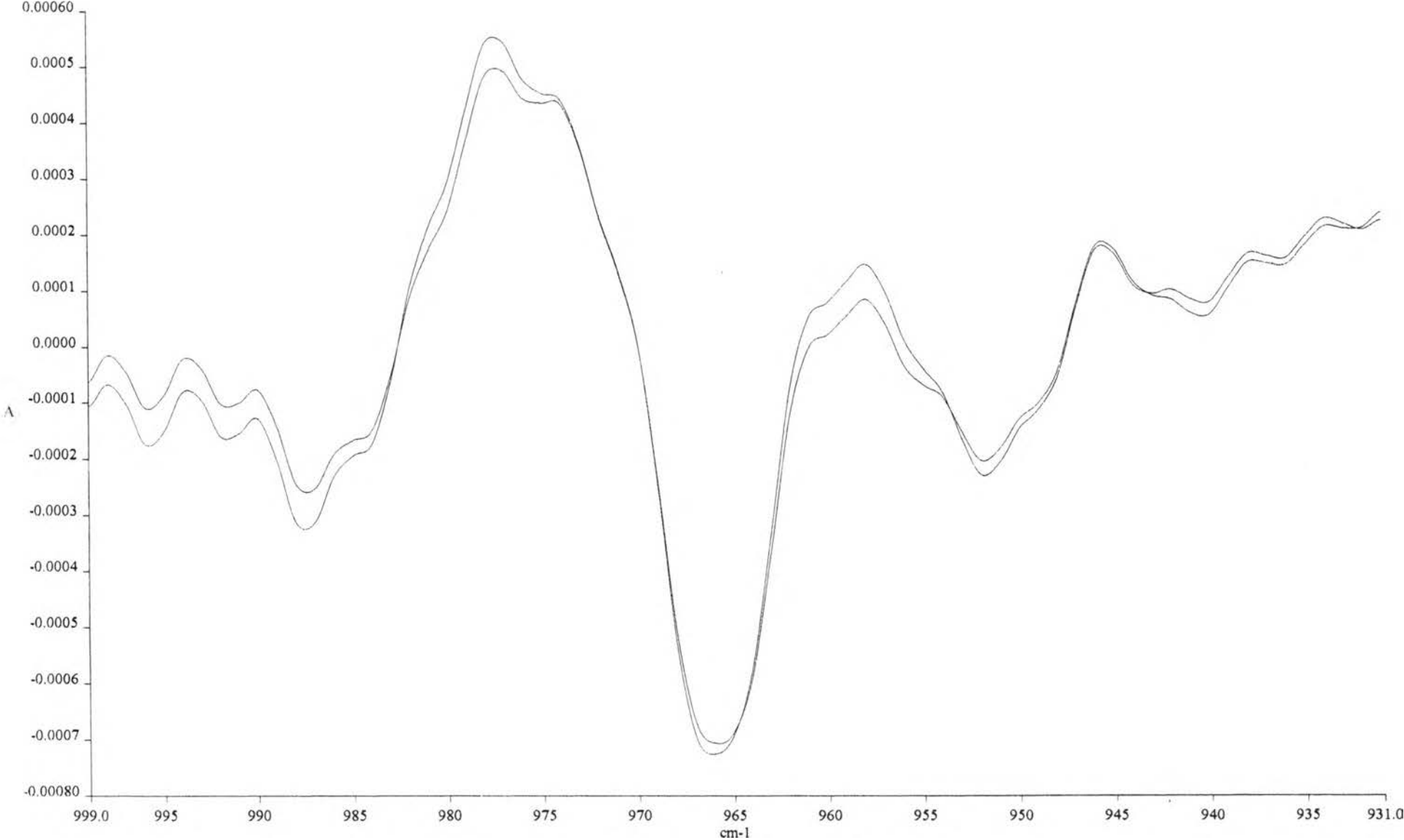




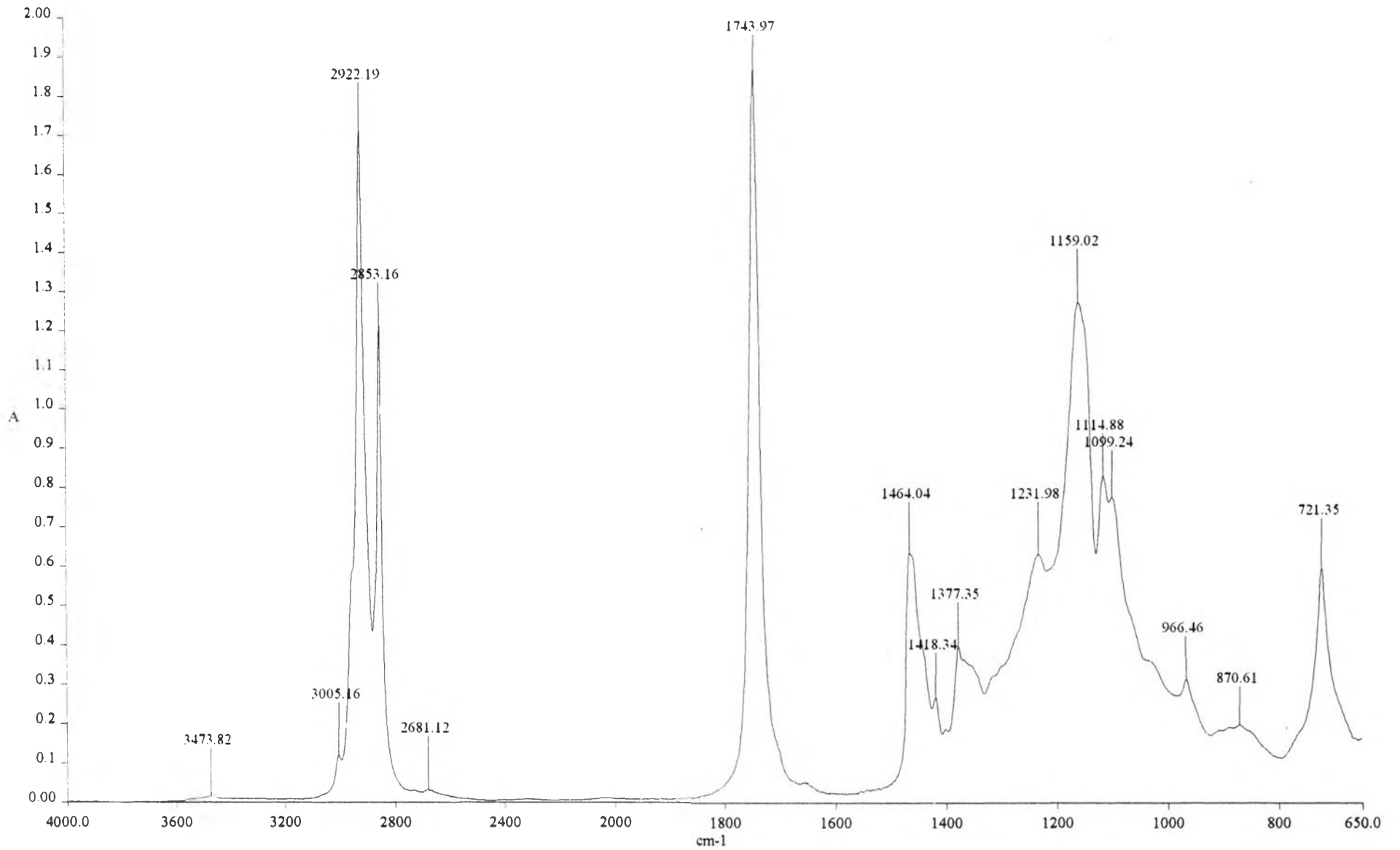
Cake cream roll (brand 3) flask 1



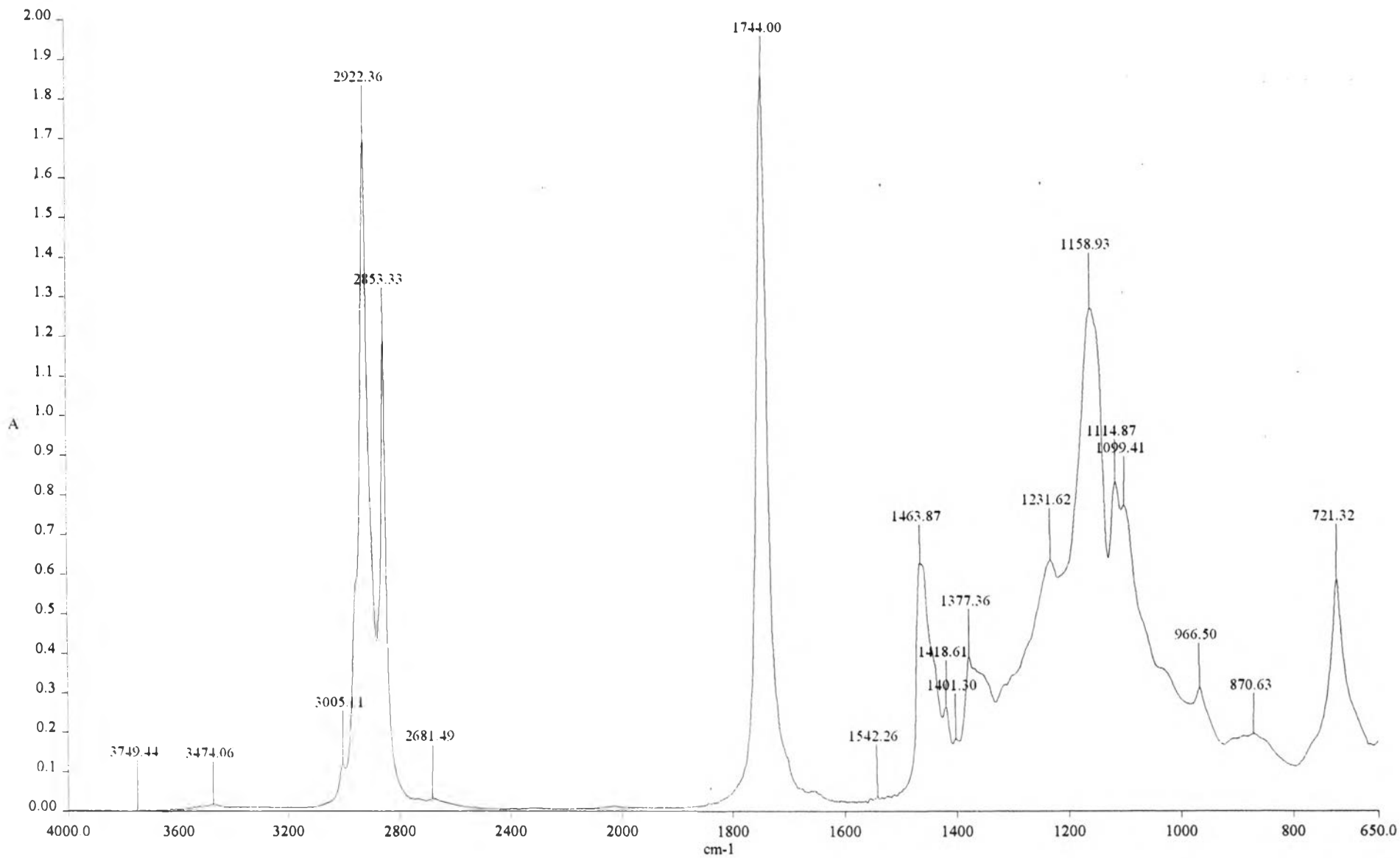
Cake cream roll (brand 3) flask 2



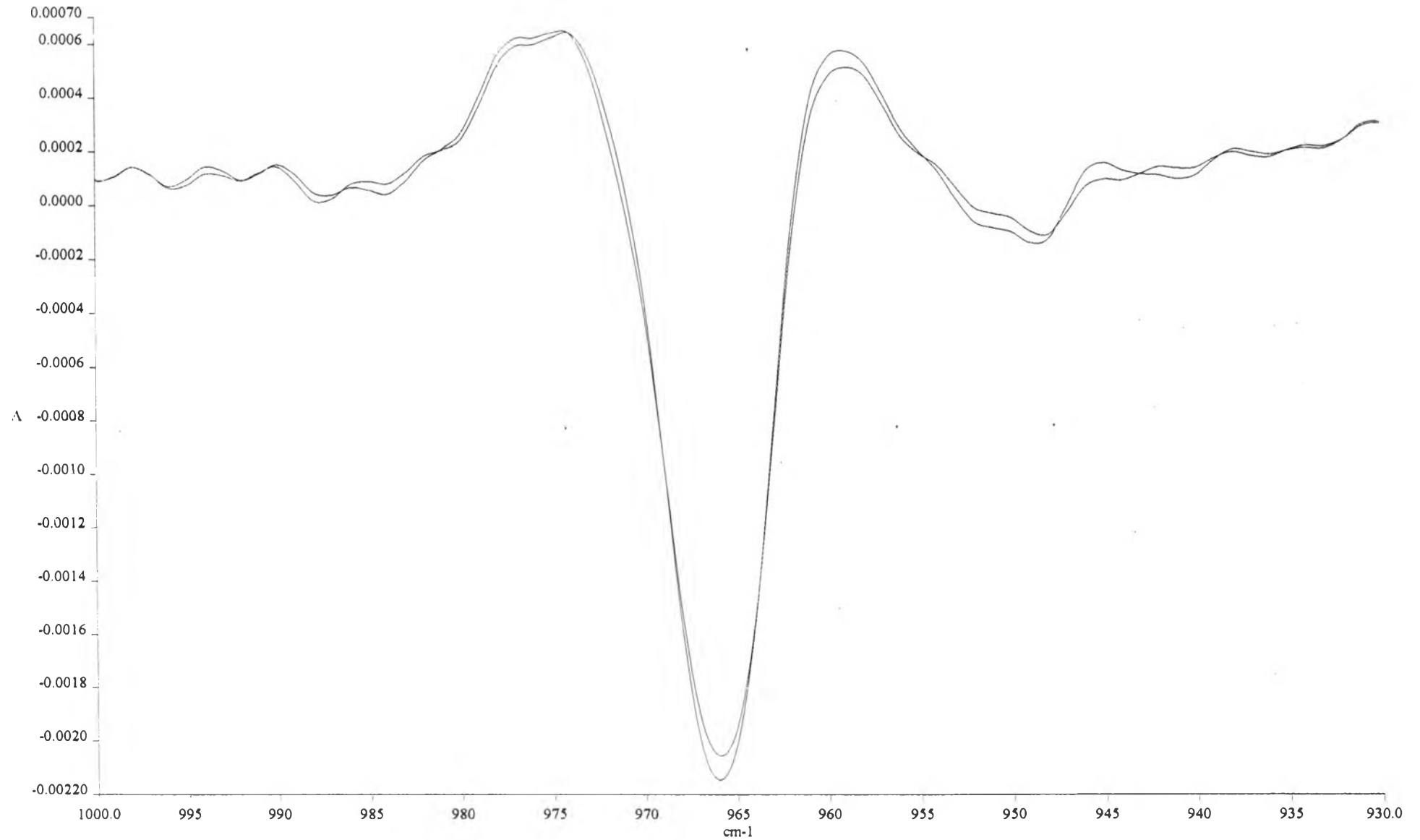
Negative second derivative  
Cake cream roll brand 3 flask 1 & 2



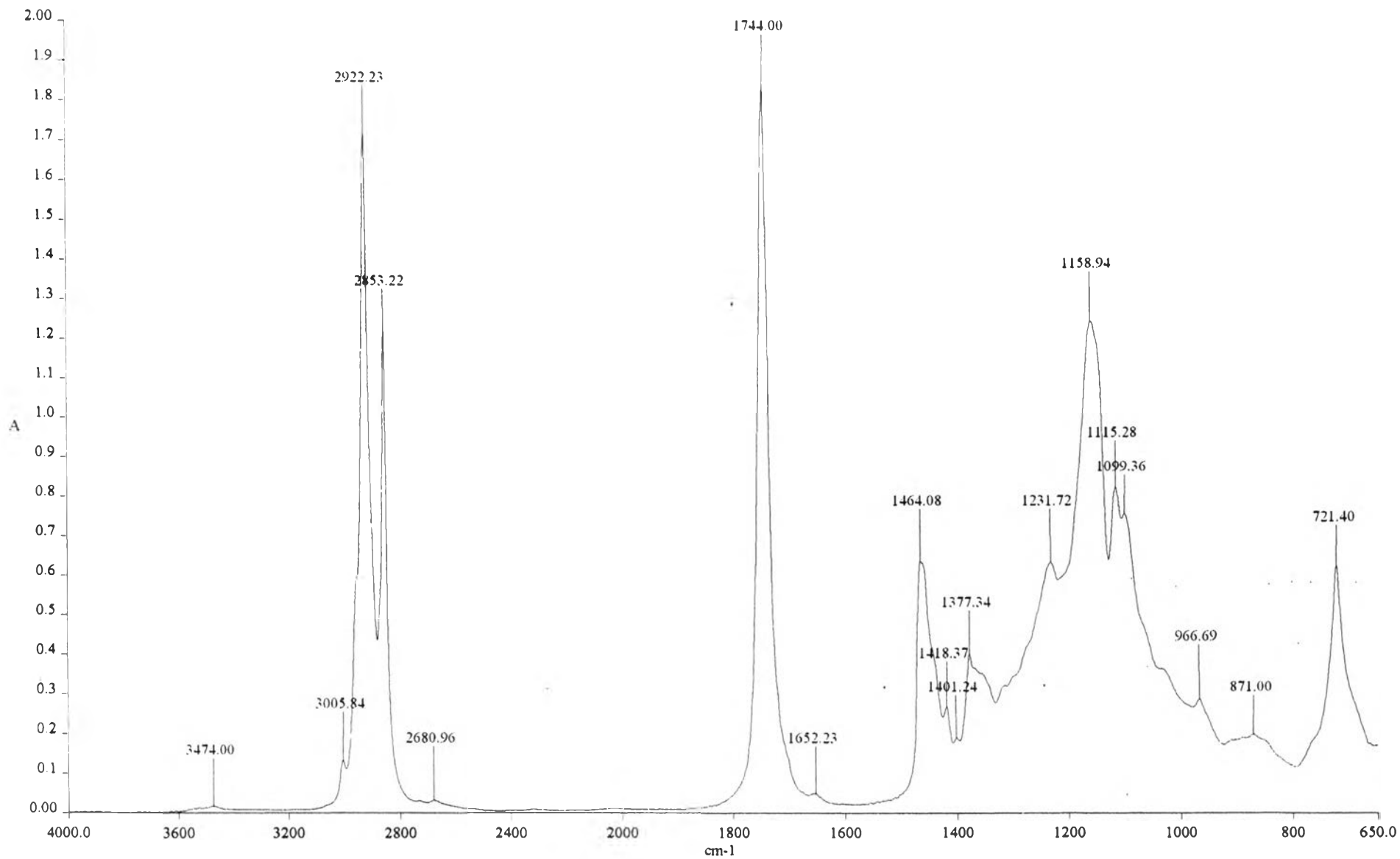
Croissant (brand 1) flask 1



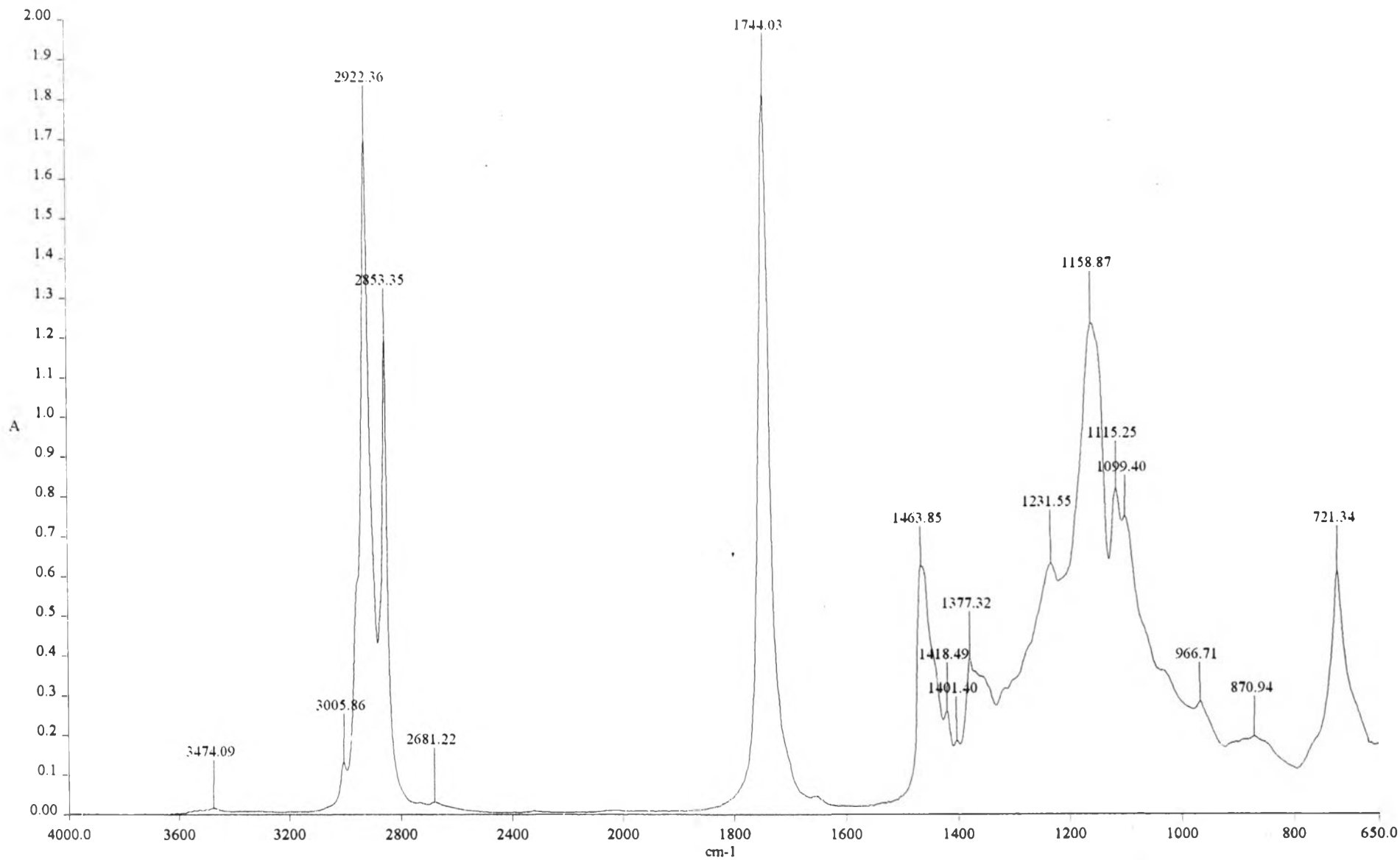
Croissant (brand 1) flask 2



Negative second derivative  
Croissant brand 1 flask 1 & 2

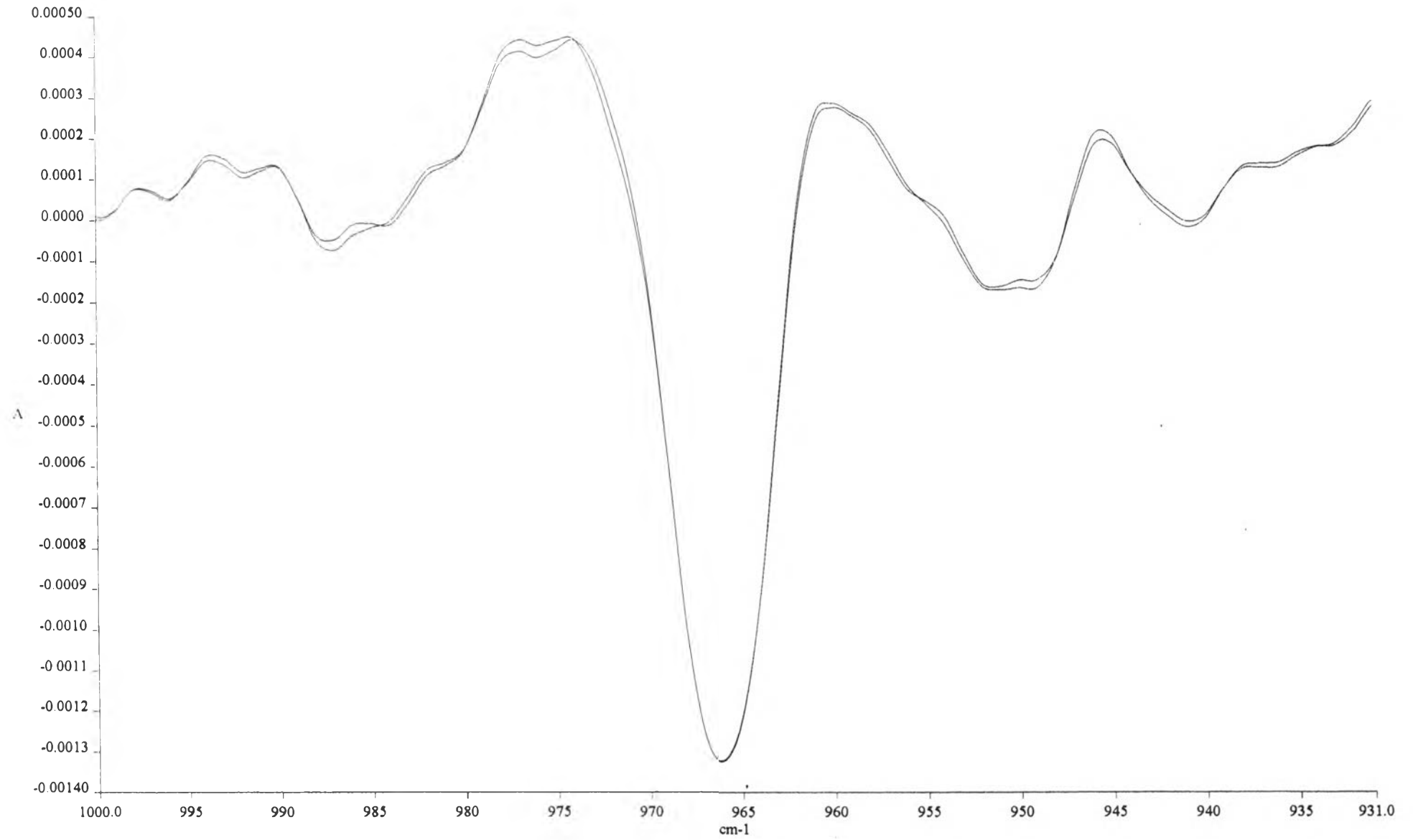


Croissant (brand 2) flask 1

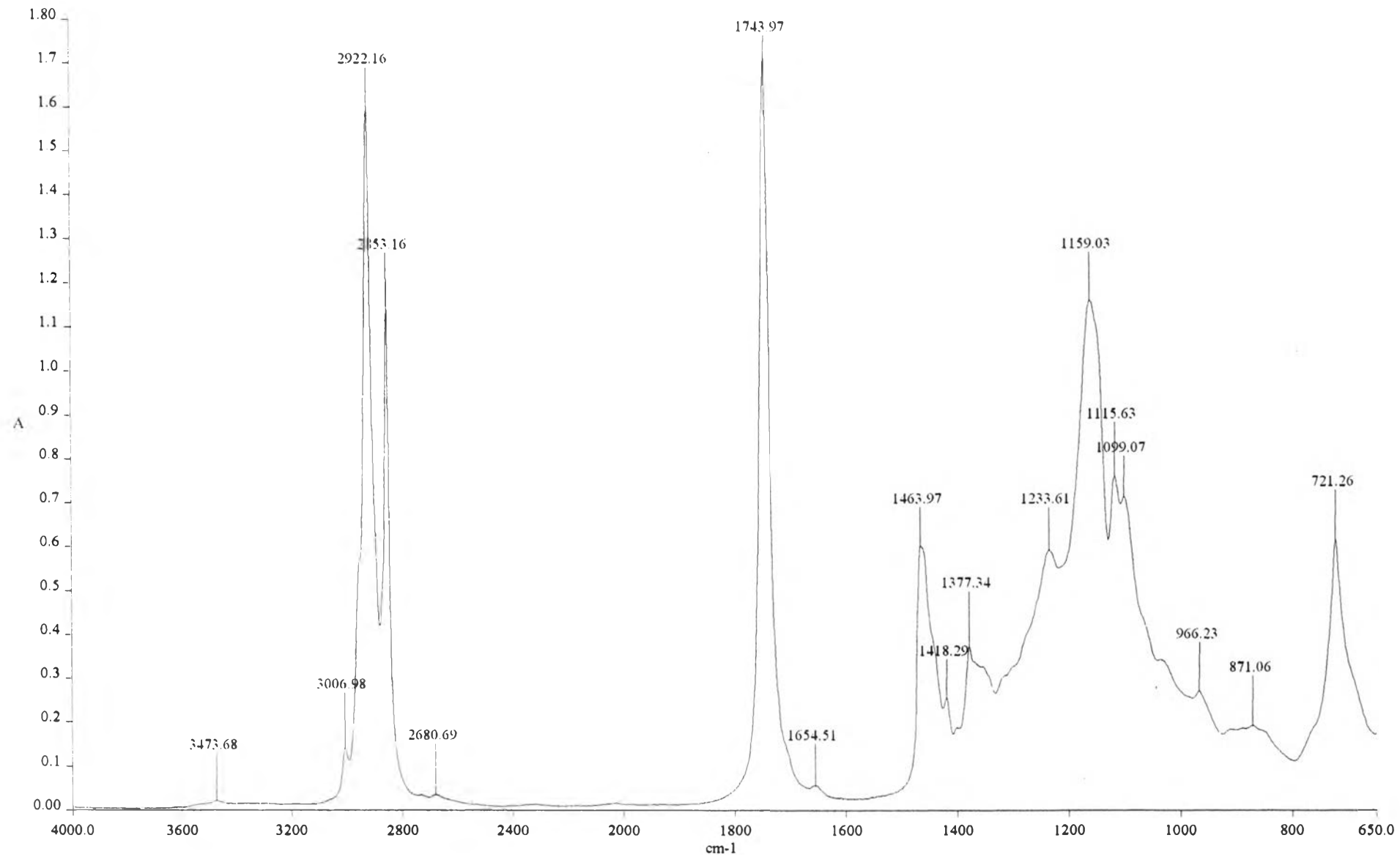


Croissant (brand 2) flask 2

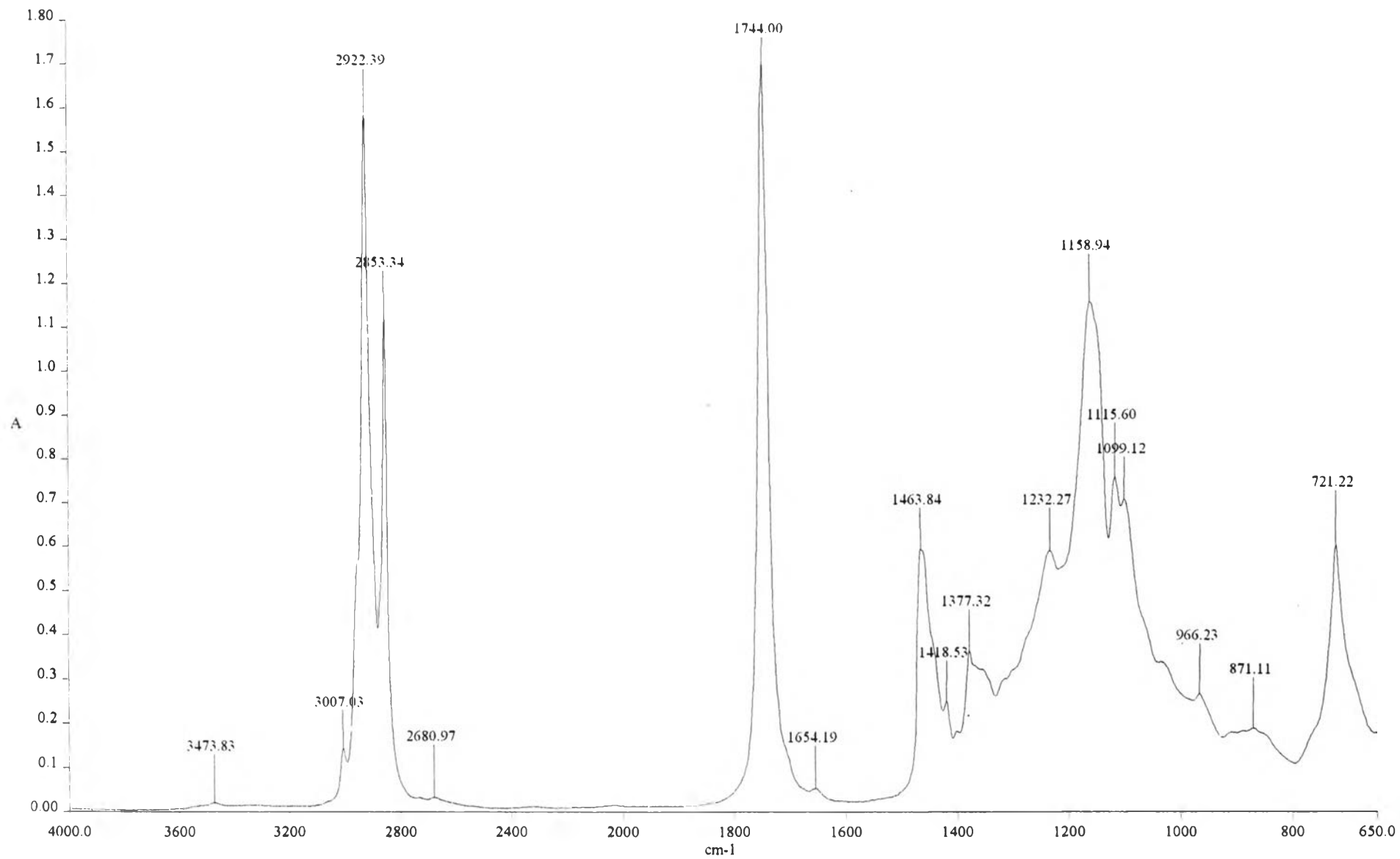




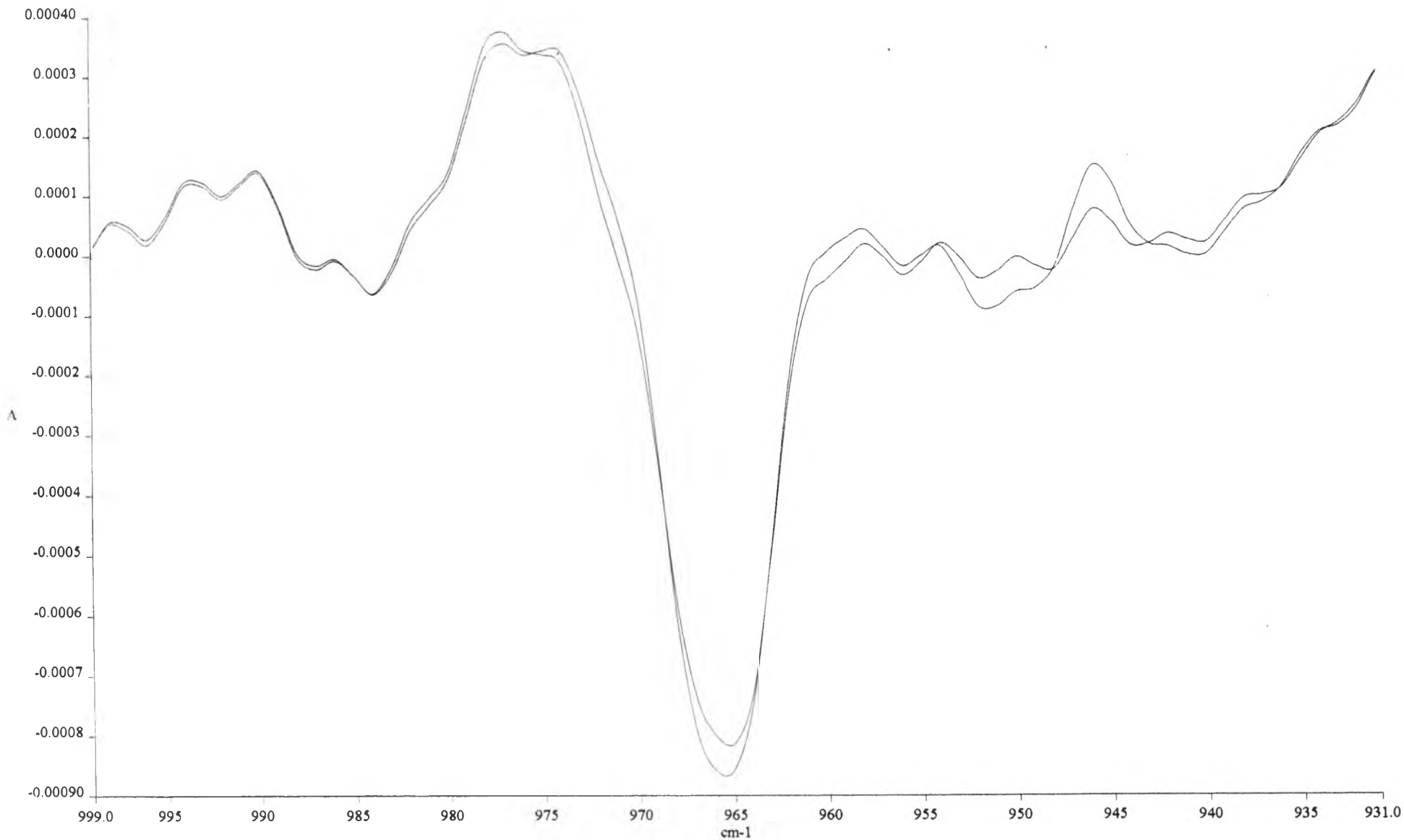
Negative second derivative  
Croissant brand 2 flask 1 & 2



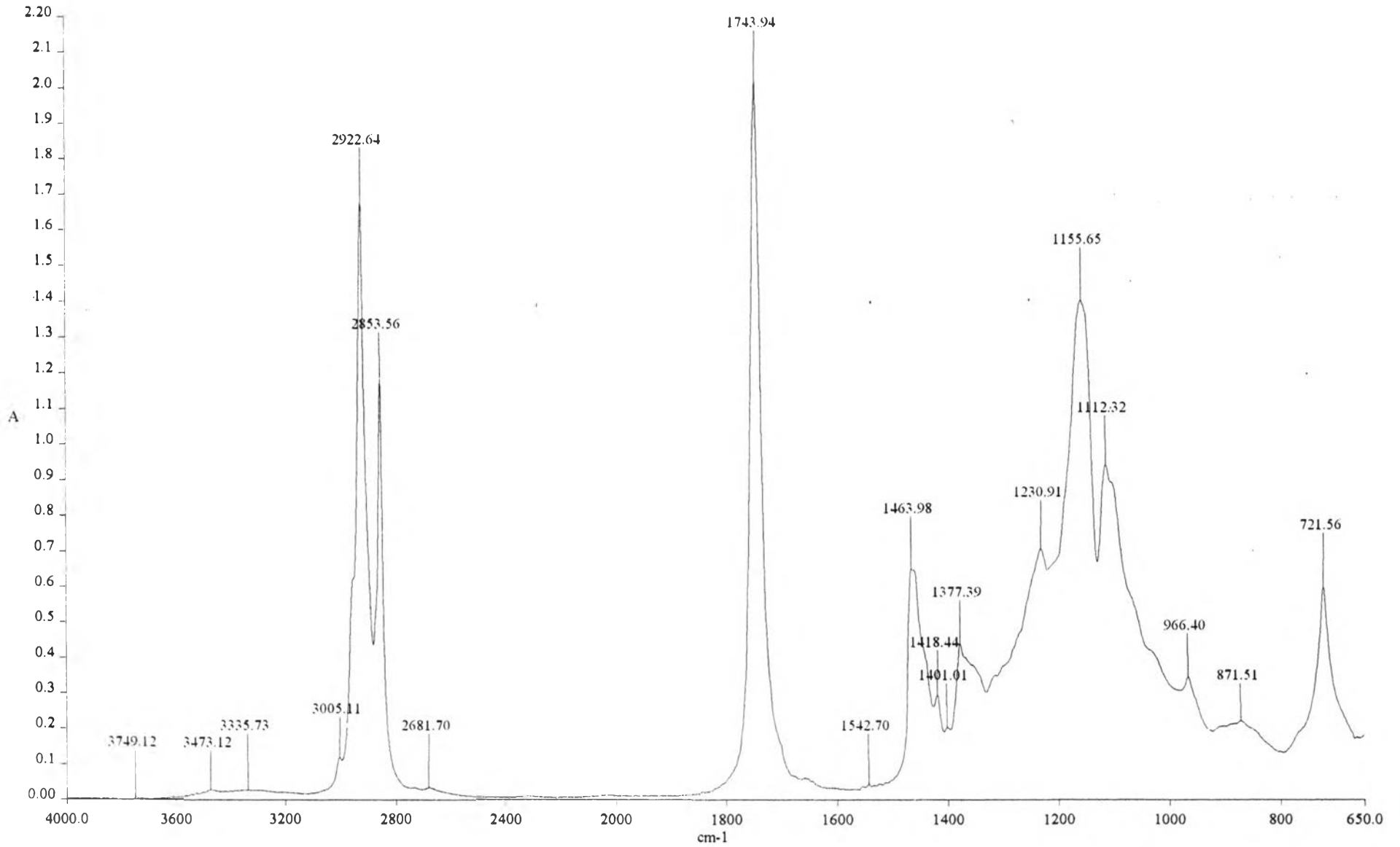
Croissant (brand 3) flask 1



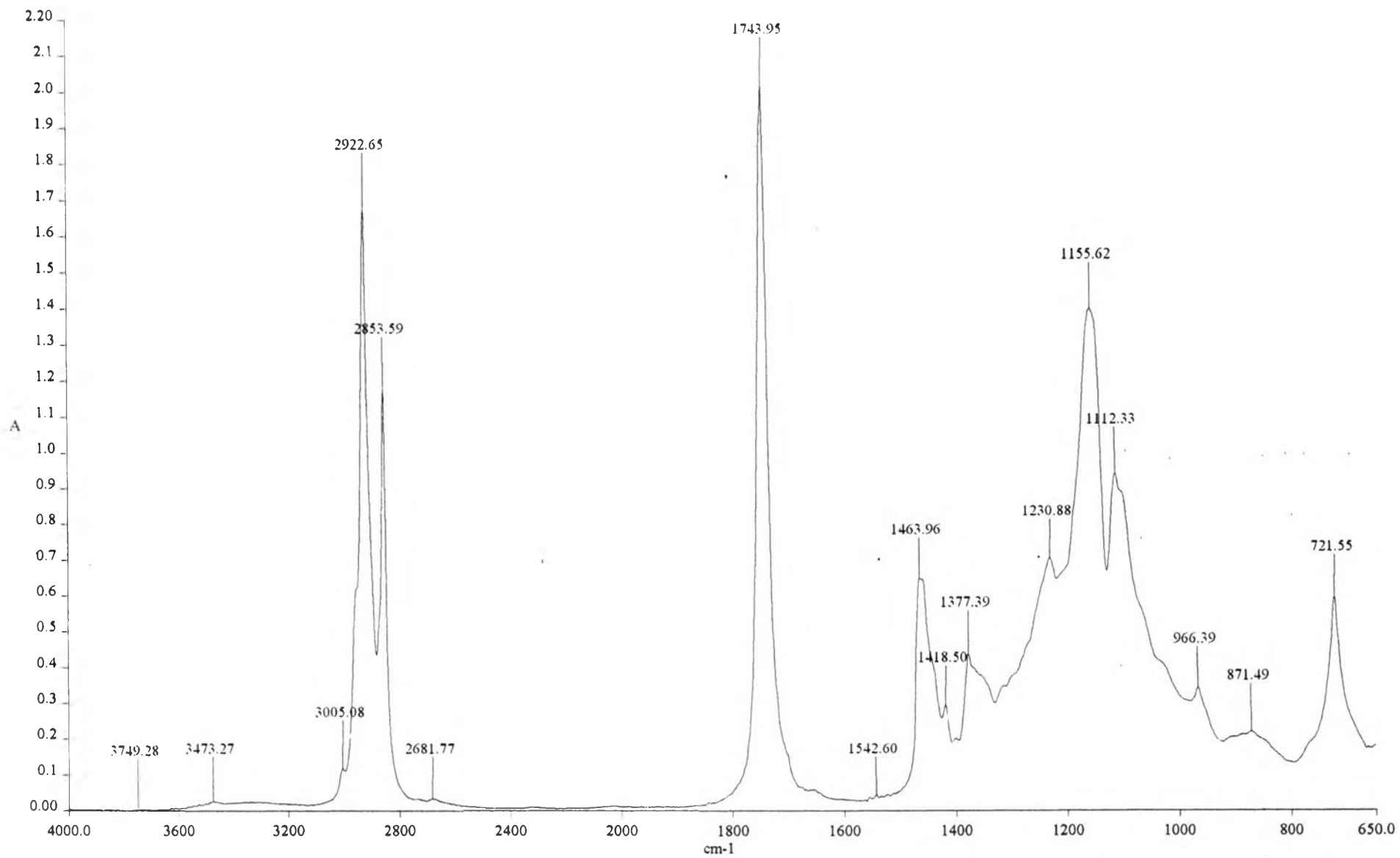
Croissant (brand 3) flask 2



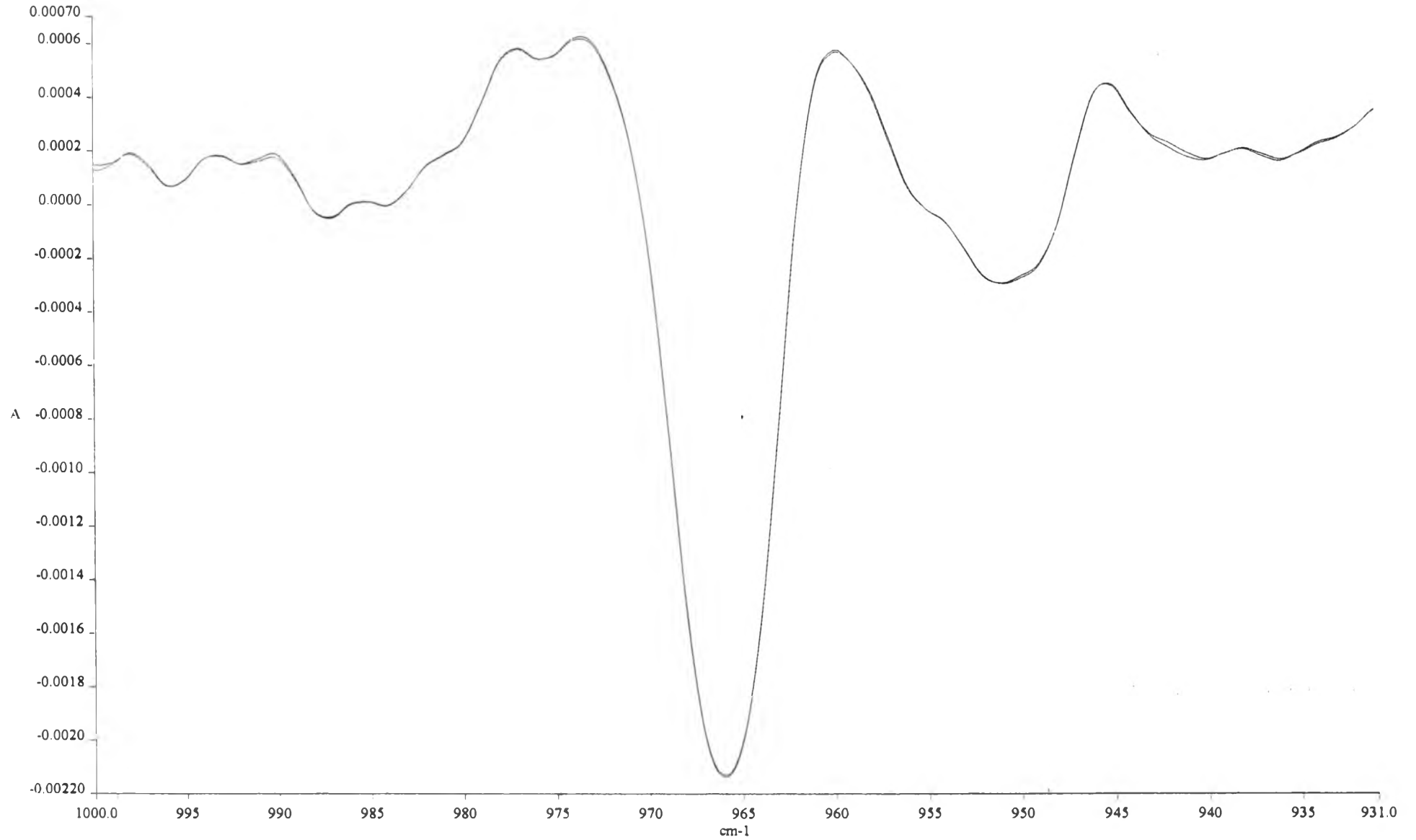
Negative second derivative  
Croissant brand 3 flask 1 & 2



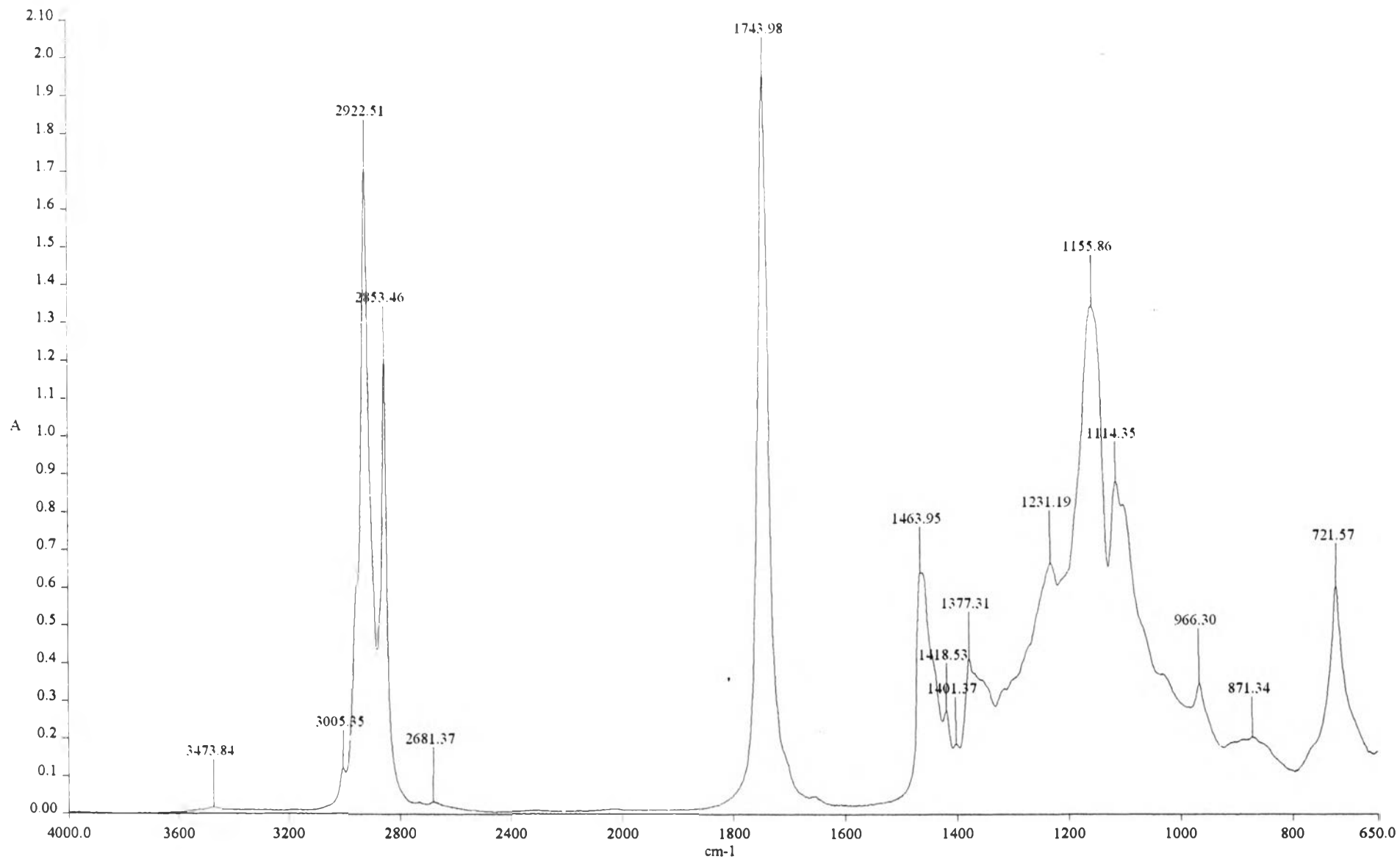
Rich butter bun (brand 1) flask 1



Rich butter bun (brand 1) flask 2

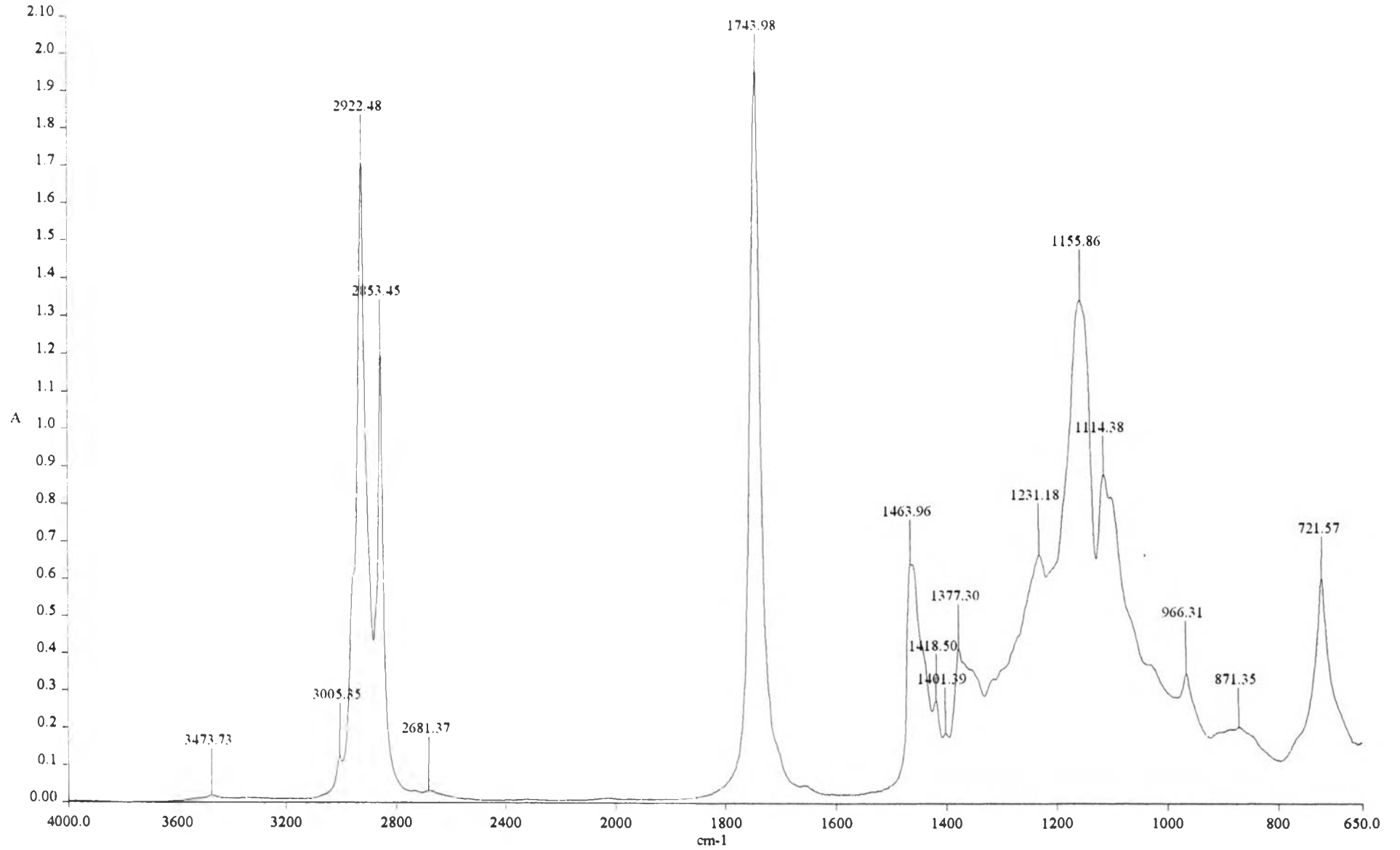


Negative second derivative  
Rich butter bun brand 1 flask 1 & 2

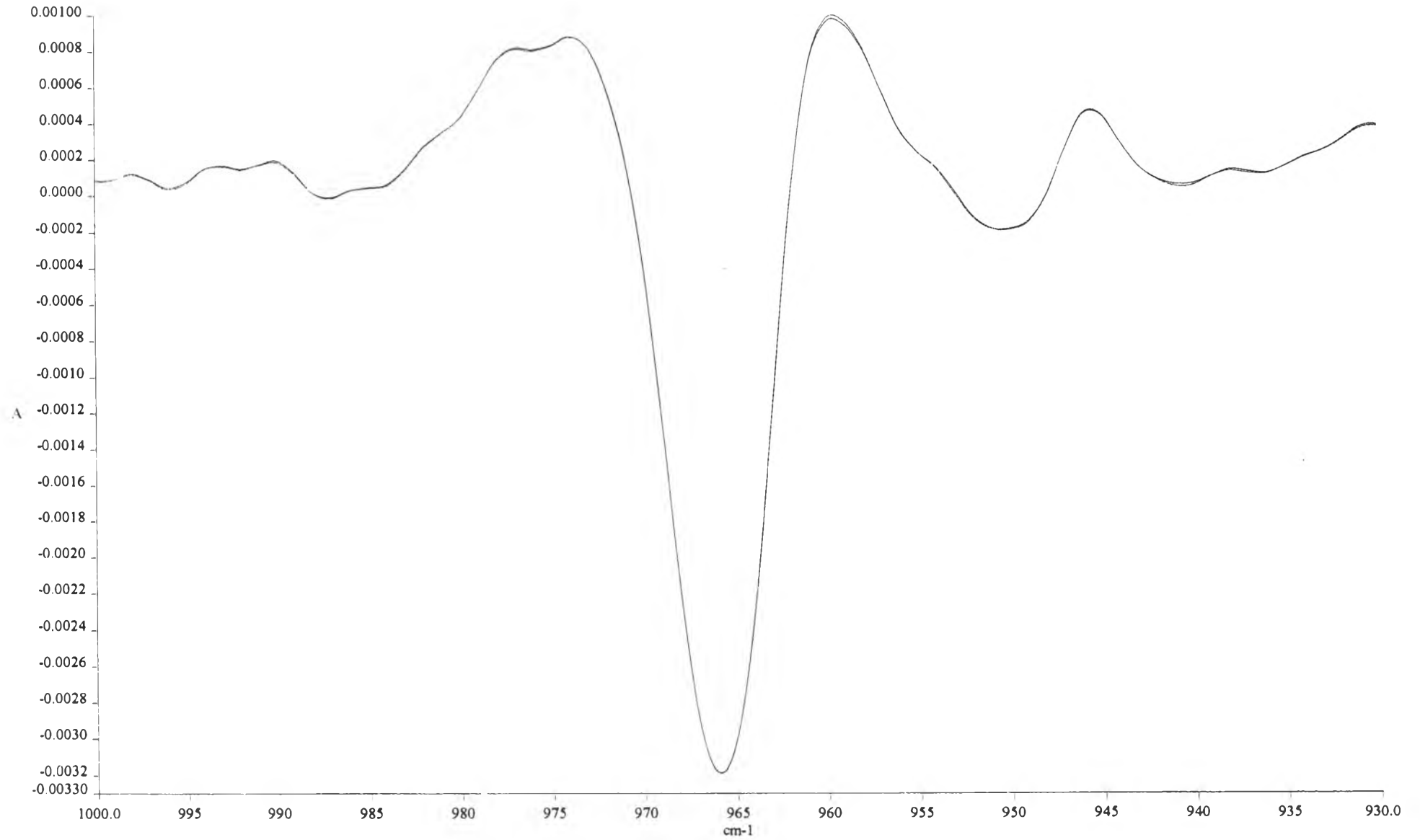


Rich butter bun (brand 2) flask 1

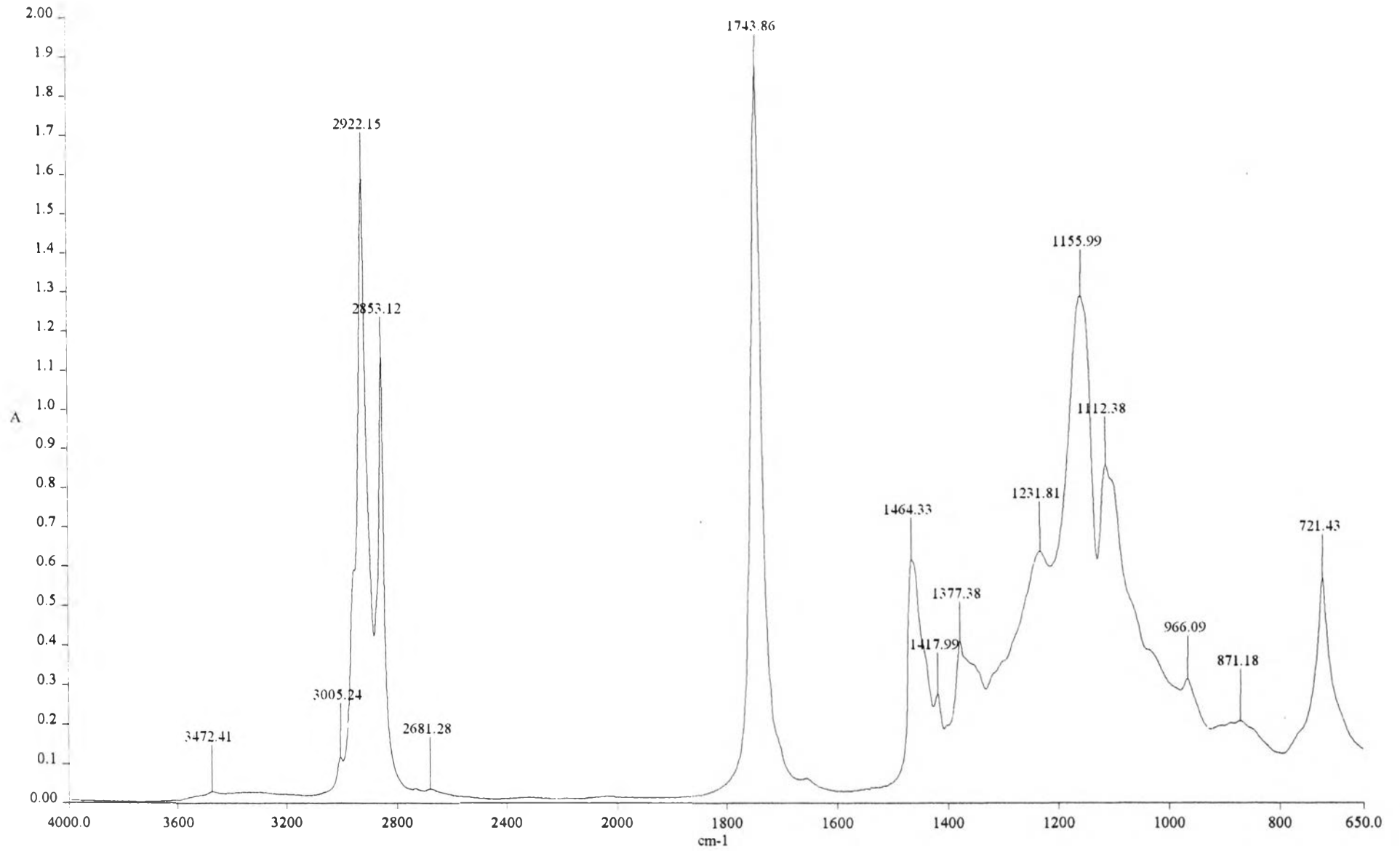




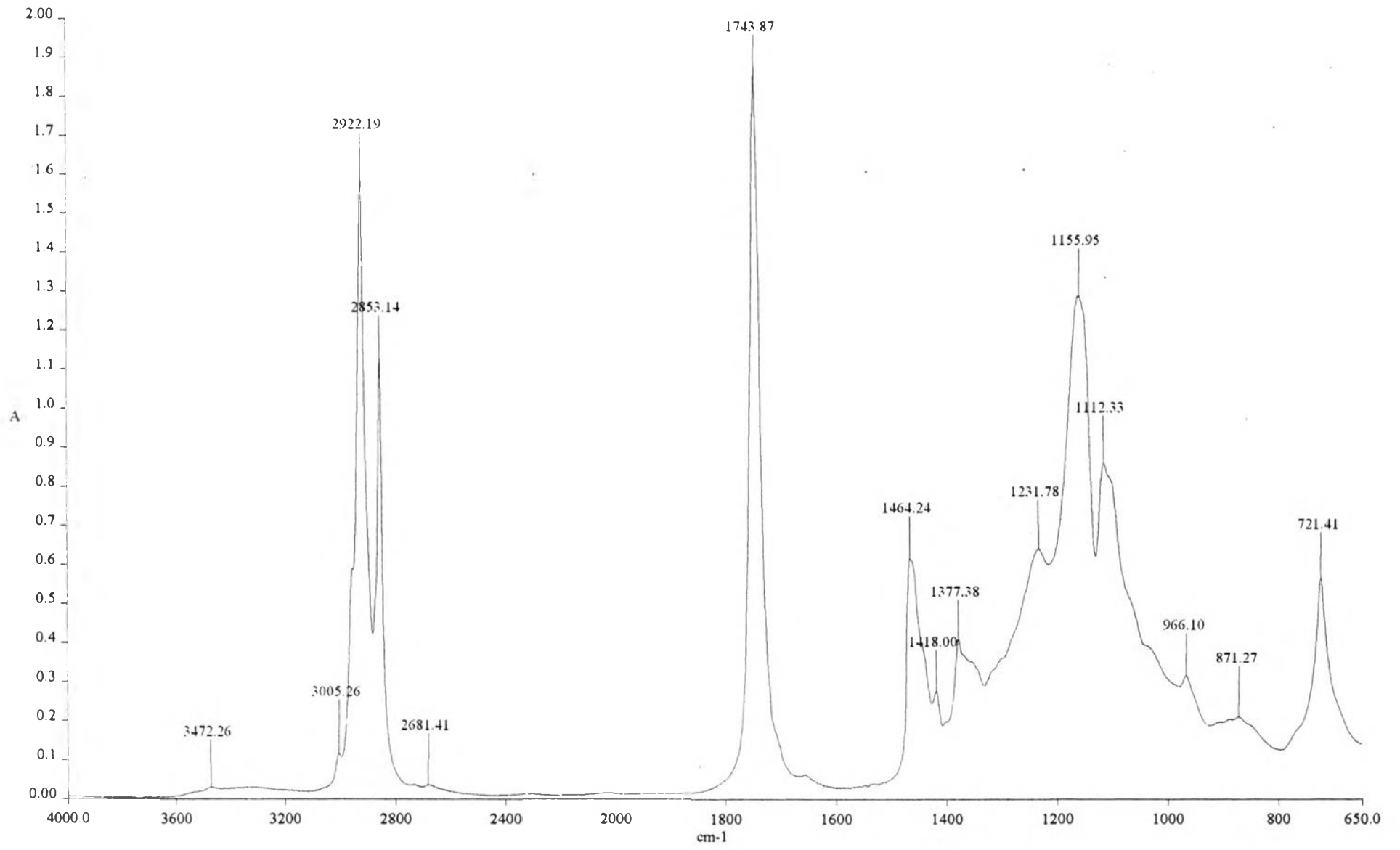
Rich butter bun (brand 2) flask 2



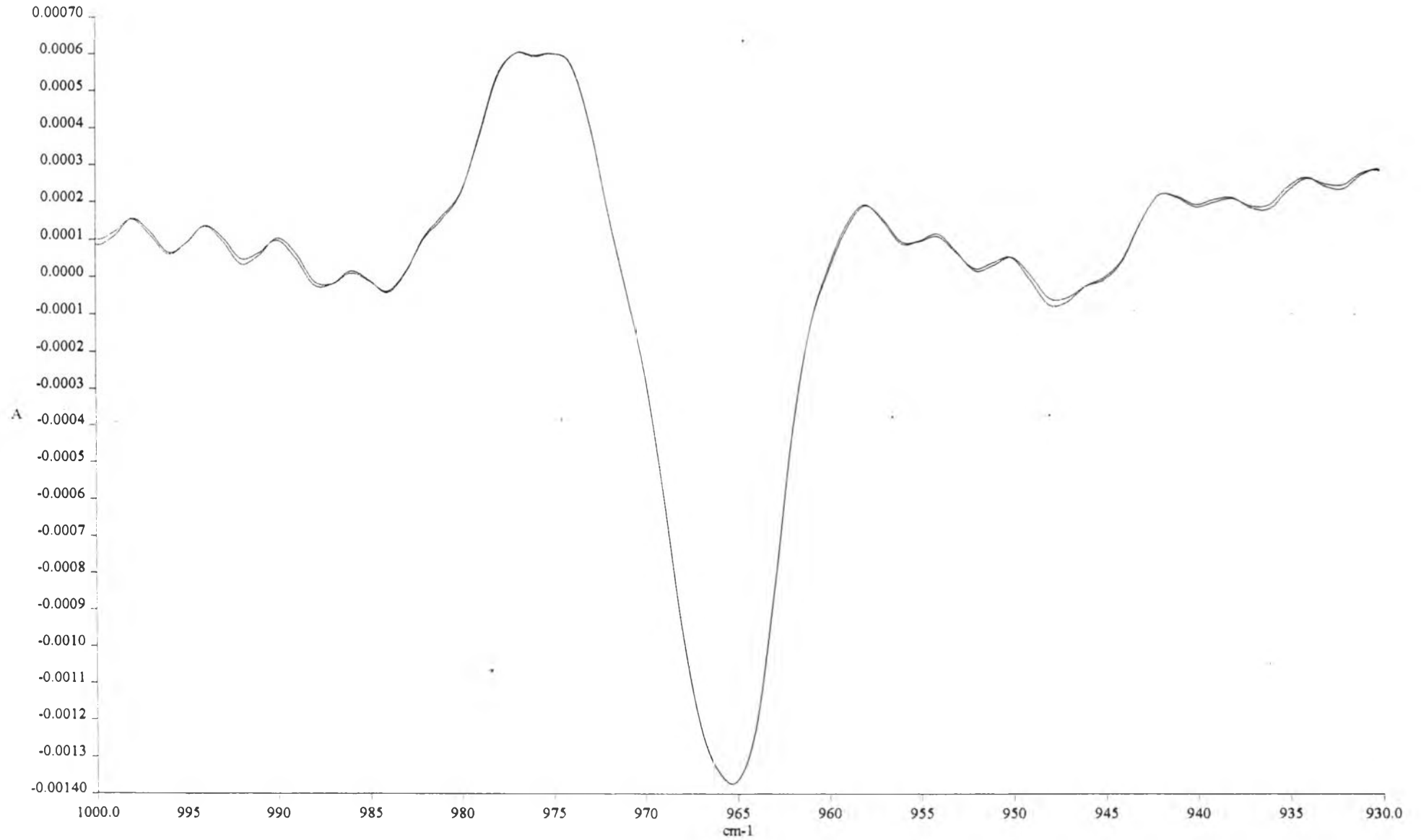
Negative second derivative  
Rich butter bun brand 2 flask 1 & 2



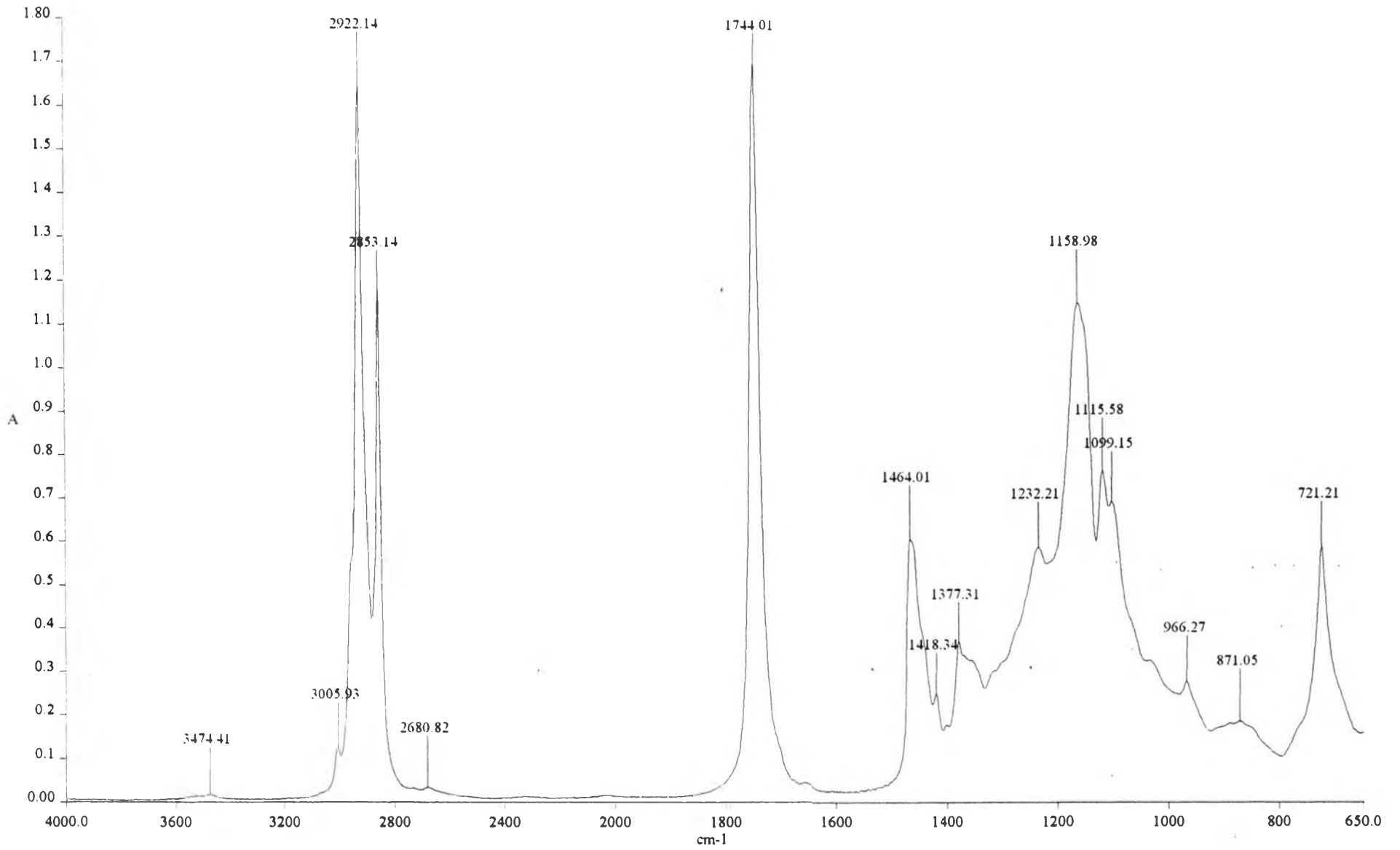
Rich butter bun (brand 3) flask 1



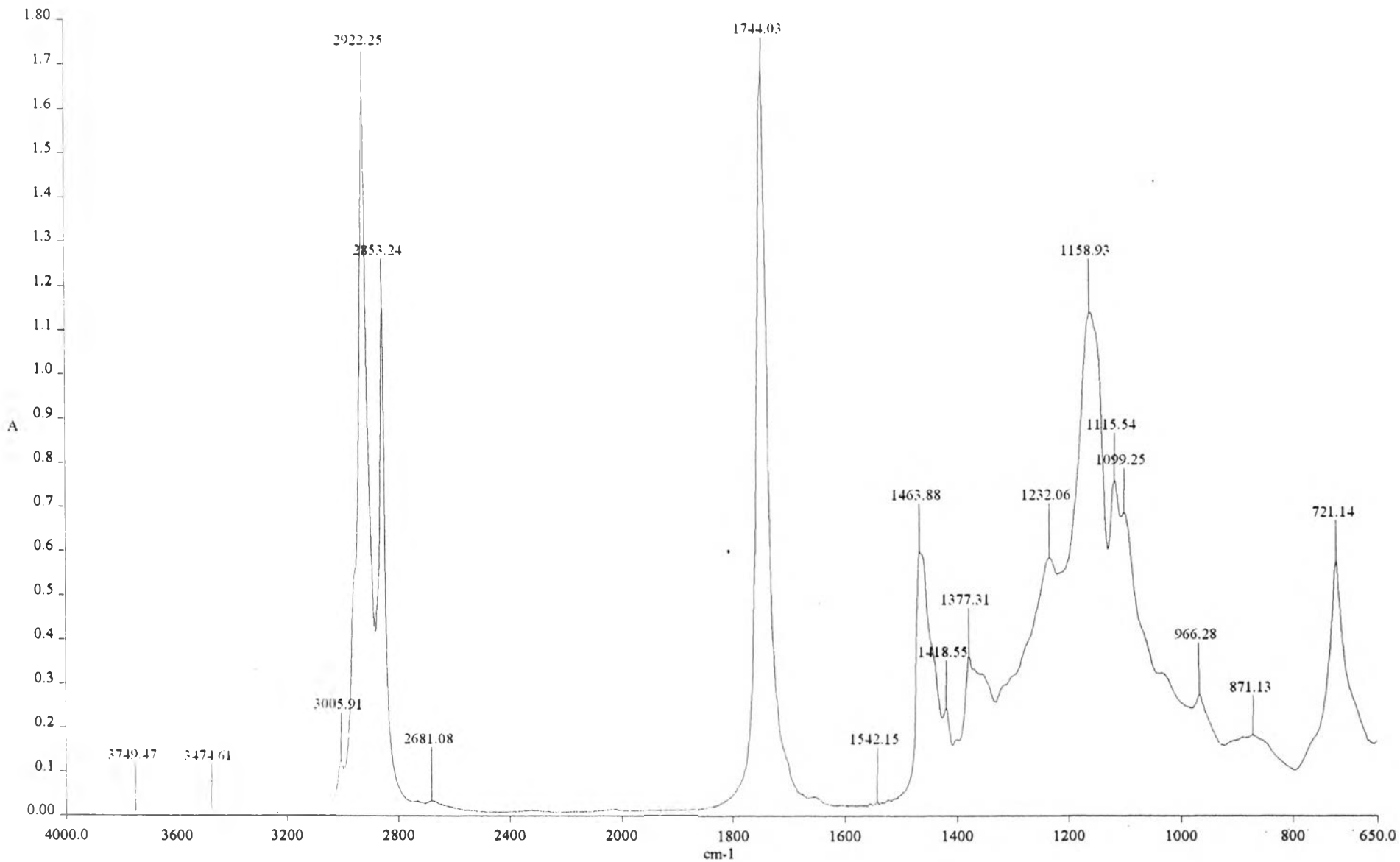
Rich butter bun (brand 3) flask 2



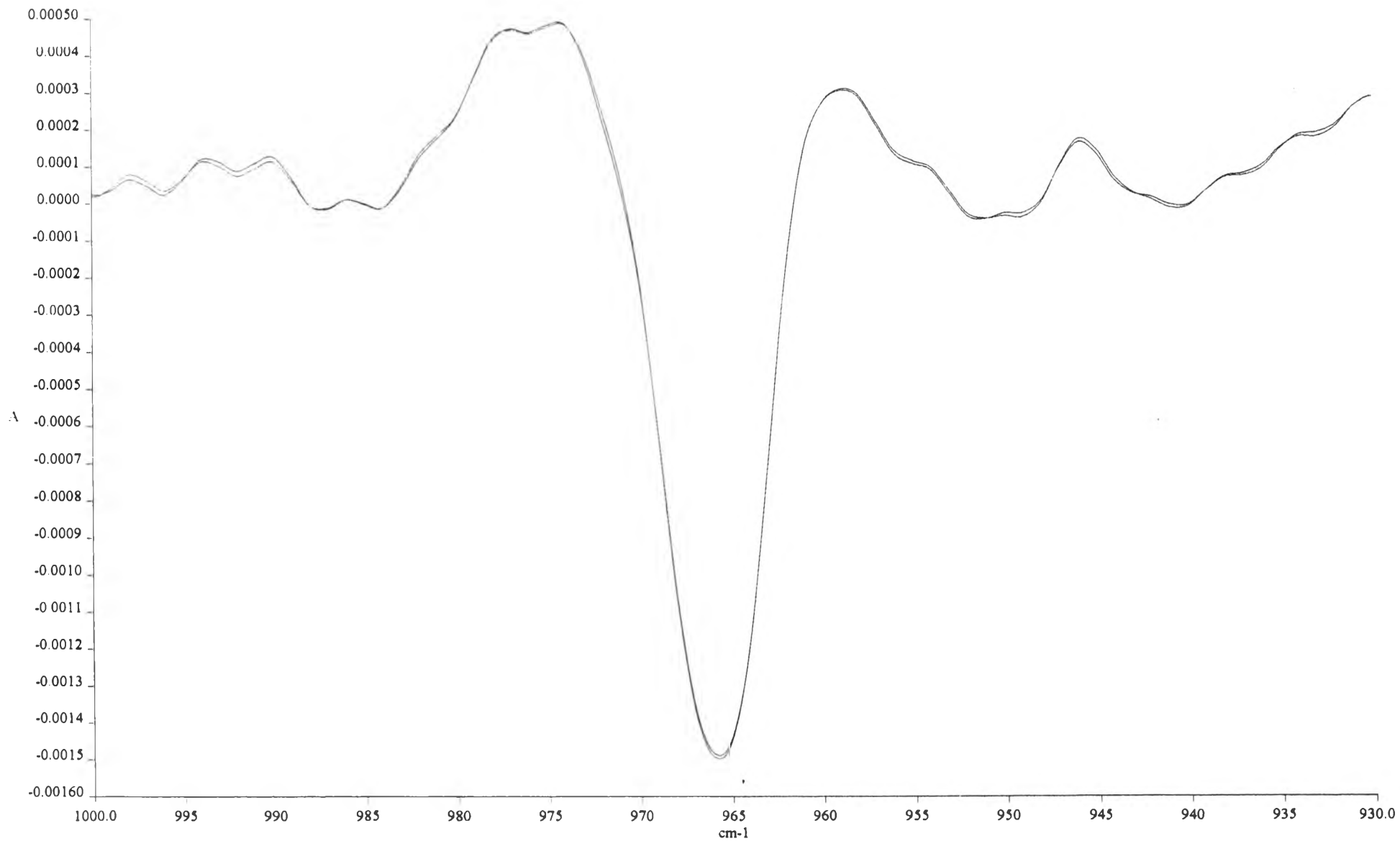
Negative second derivative  
Rich butter bun brand 3 flask 1 & 2



Crispy pie (brand 1) flask 1

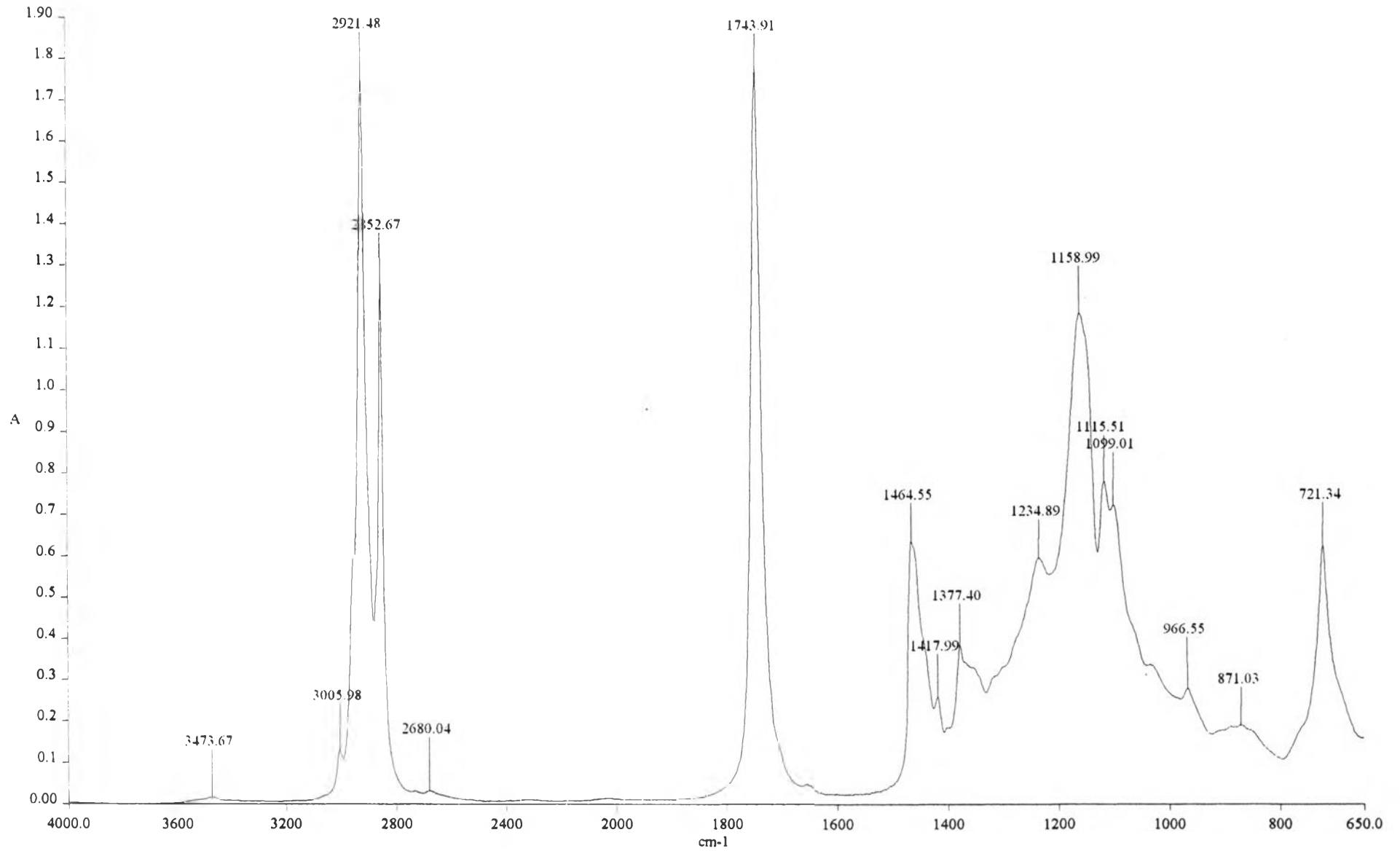


Crispy pie (brand 1) flask 2

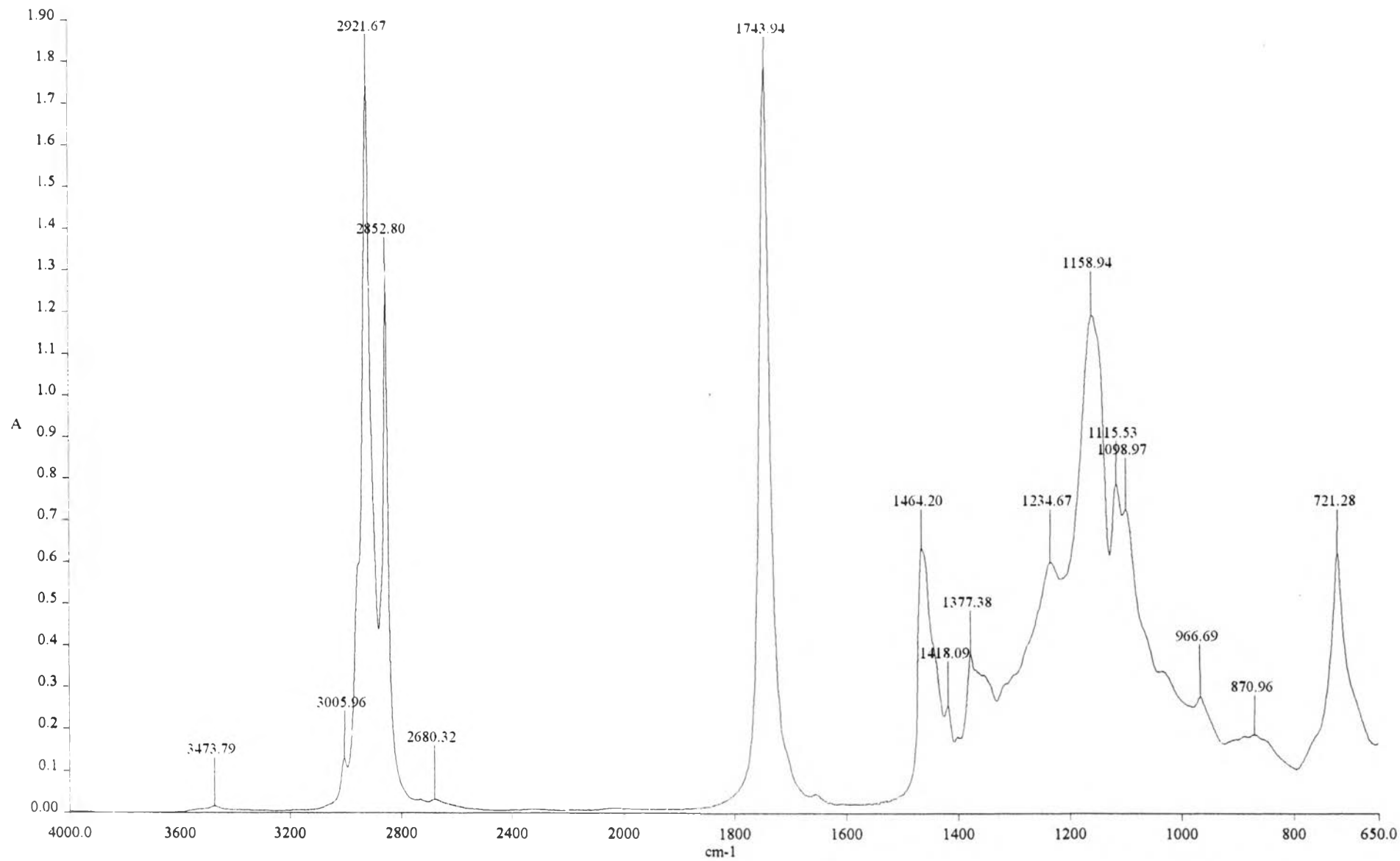


Negative second derivative  
Crispy pie brand 1 flask 1 & 2

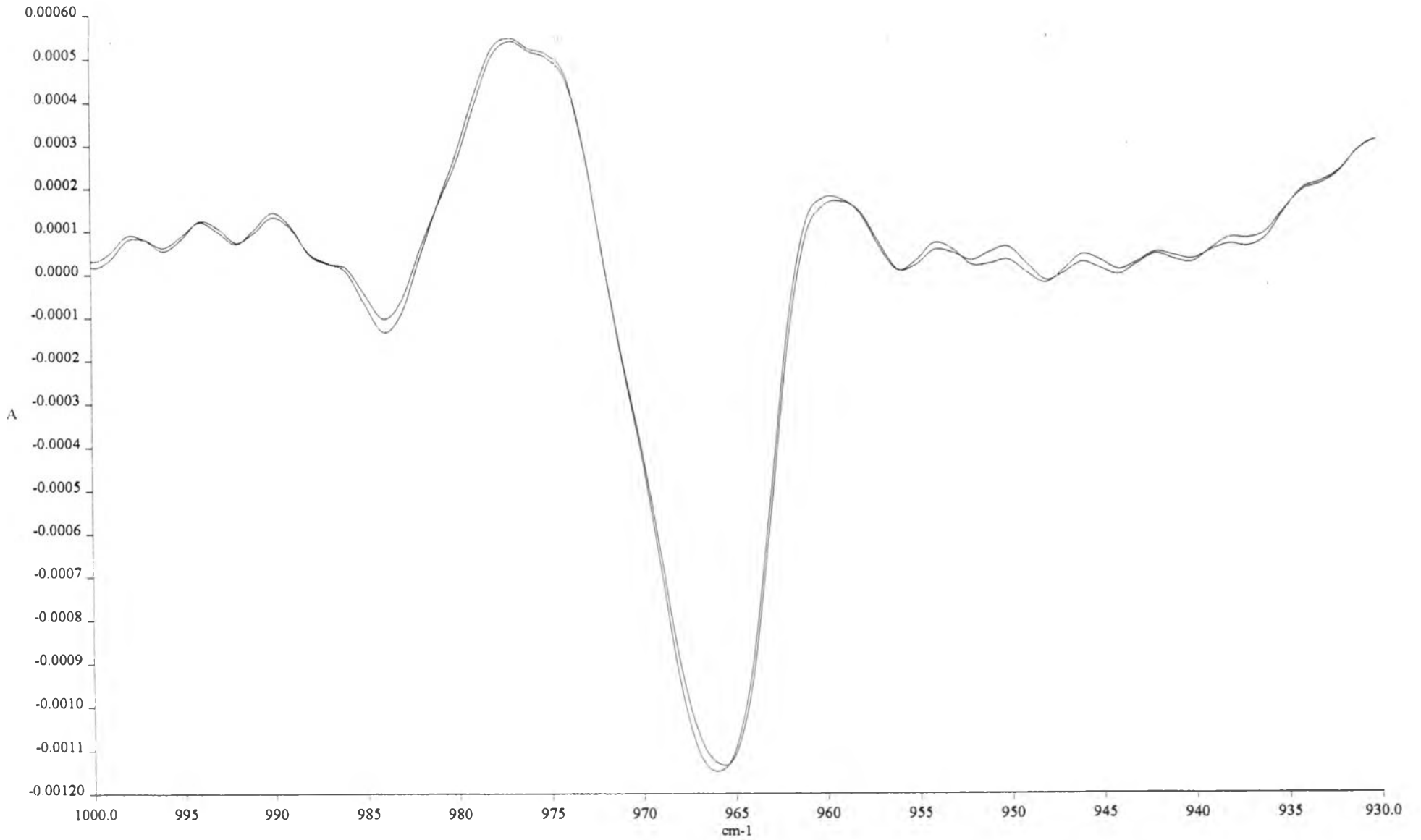




Crispy pie (brand 2) flask 1

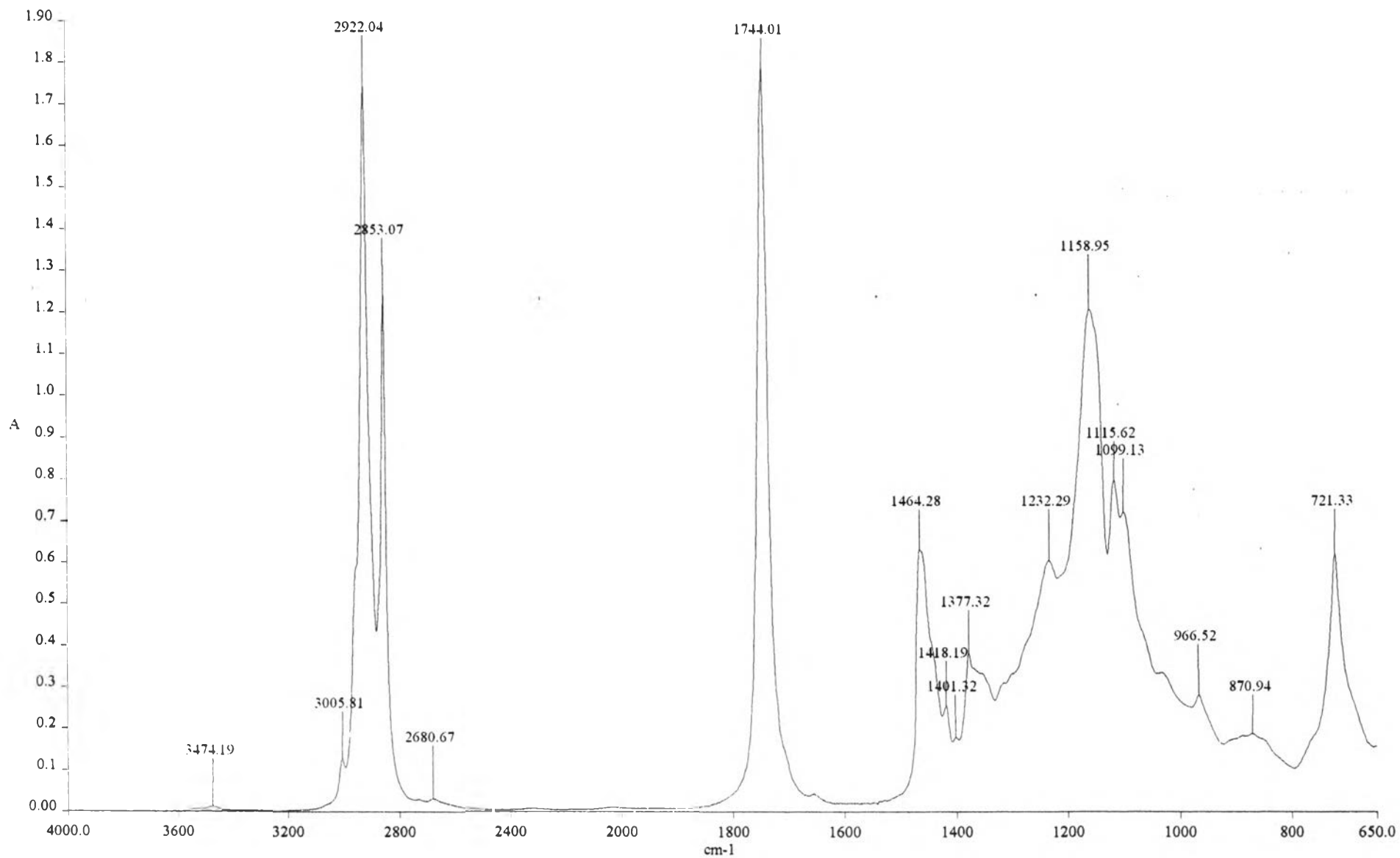


Crispy pie (brand 2) flask 2

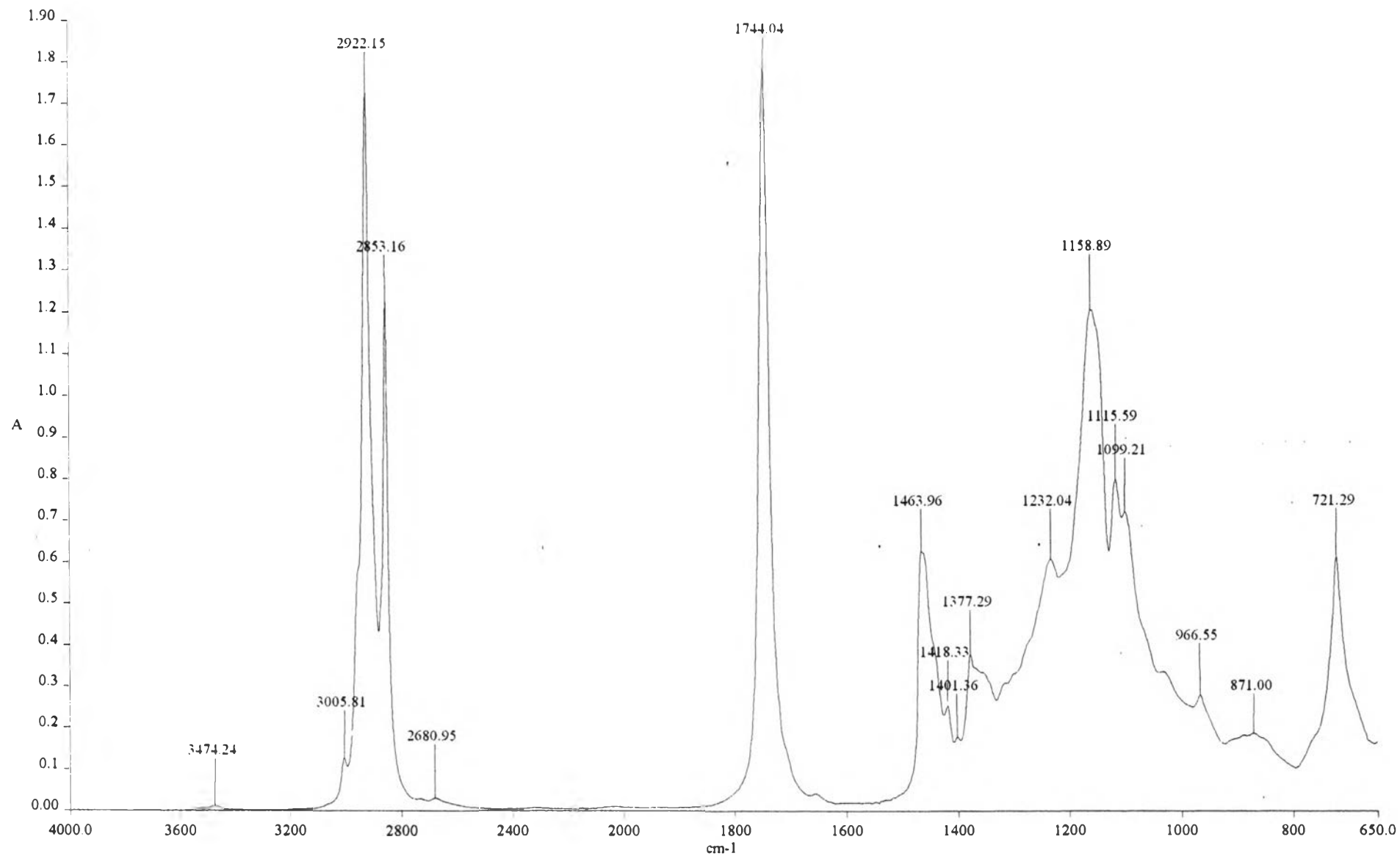


1 24806376

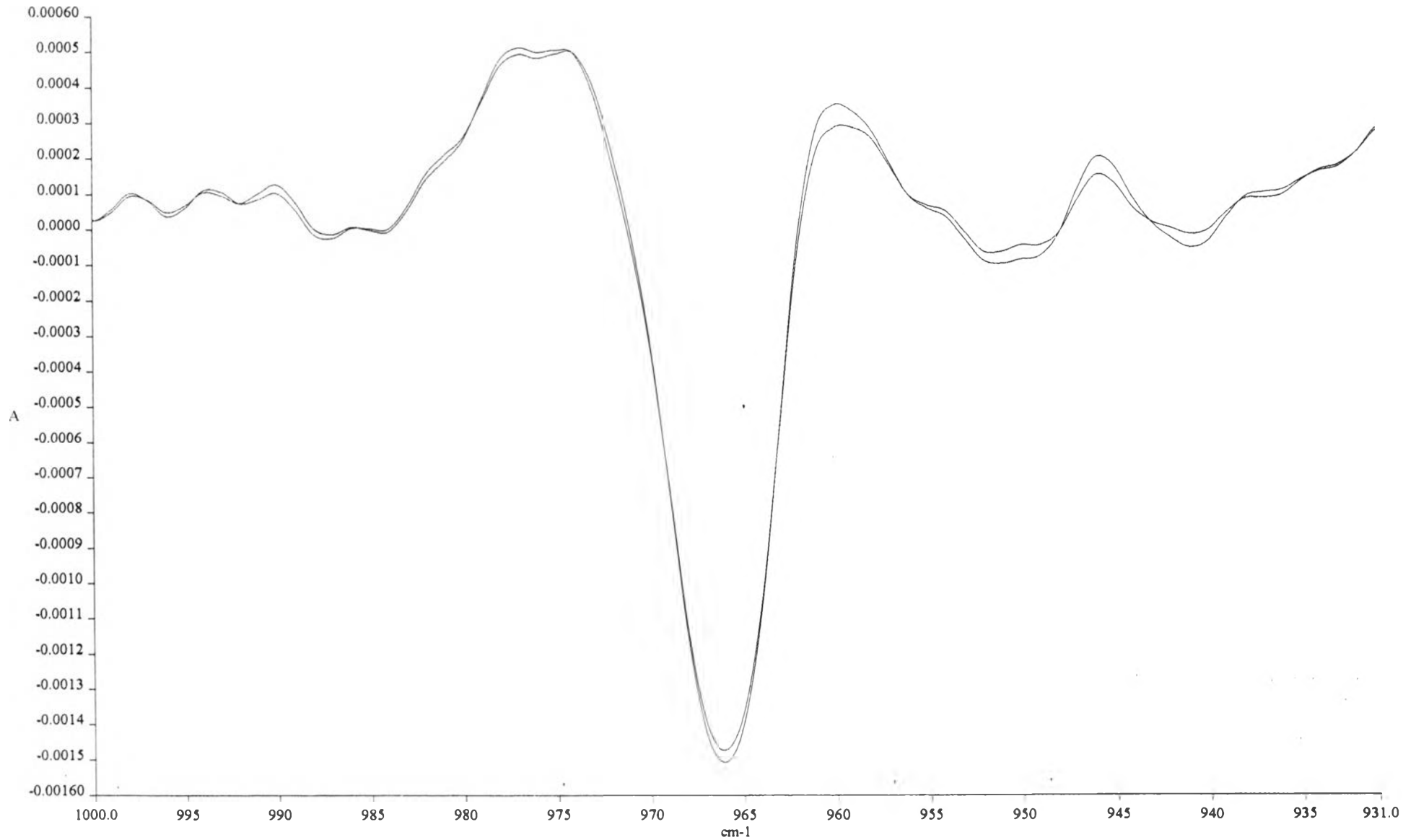
Negative second derivative  
Crispy pie brand 2 flask 1 & 2



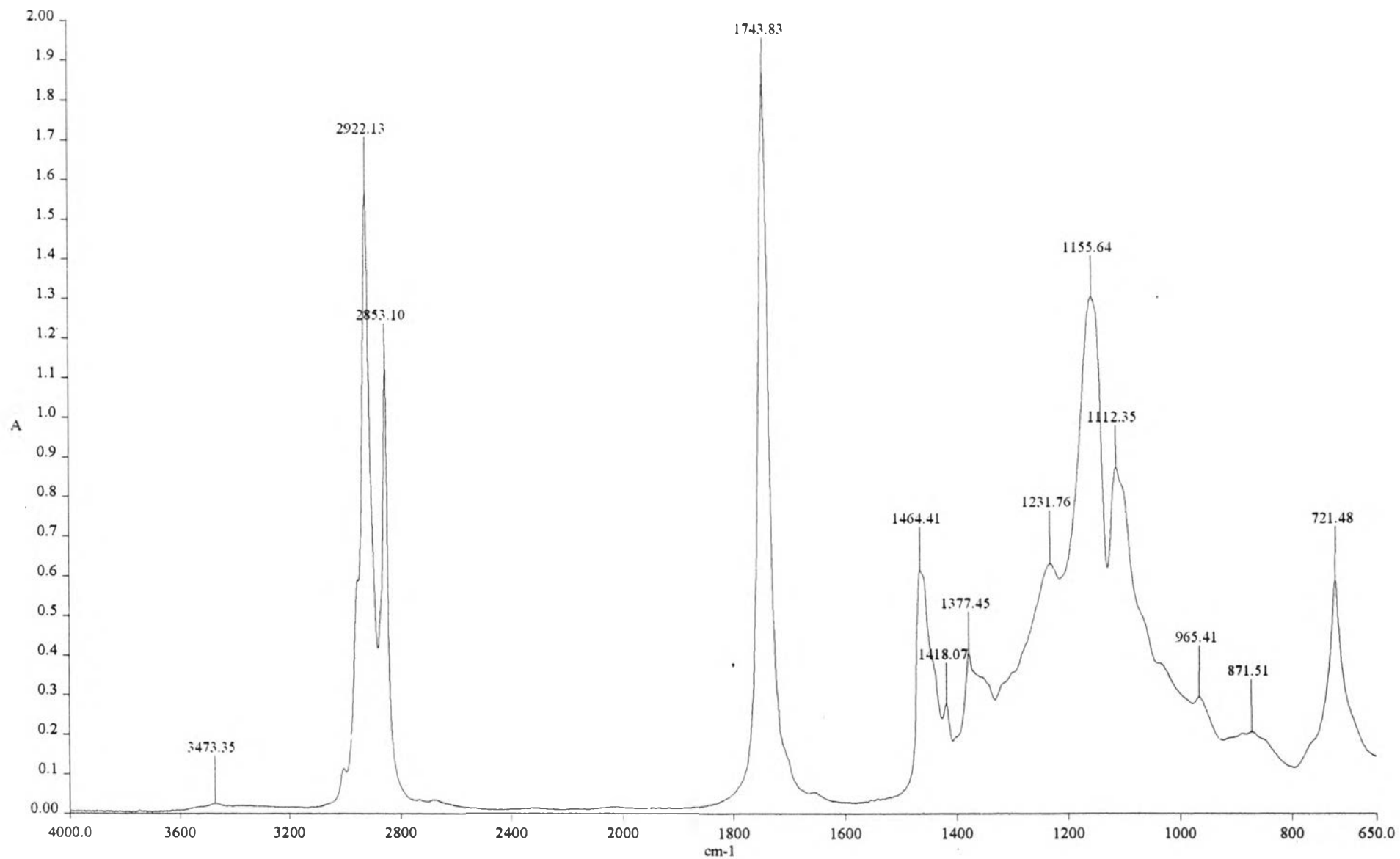
Crispy pie (brand 3) flask 1



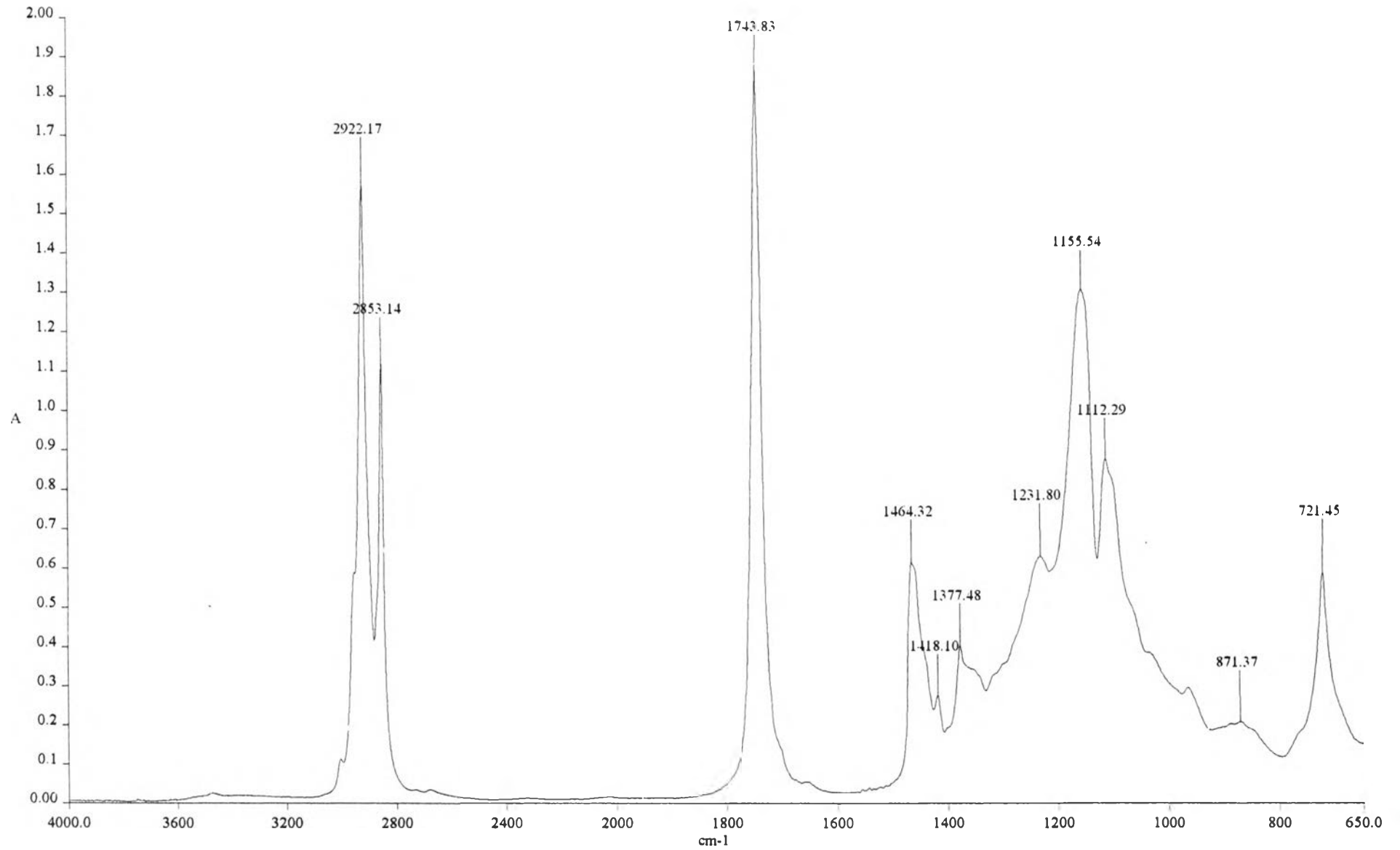
Crispy pie (brand 3) flask 2



Negative second derivative  
Crispy pie brand 3 flask 1 & 2

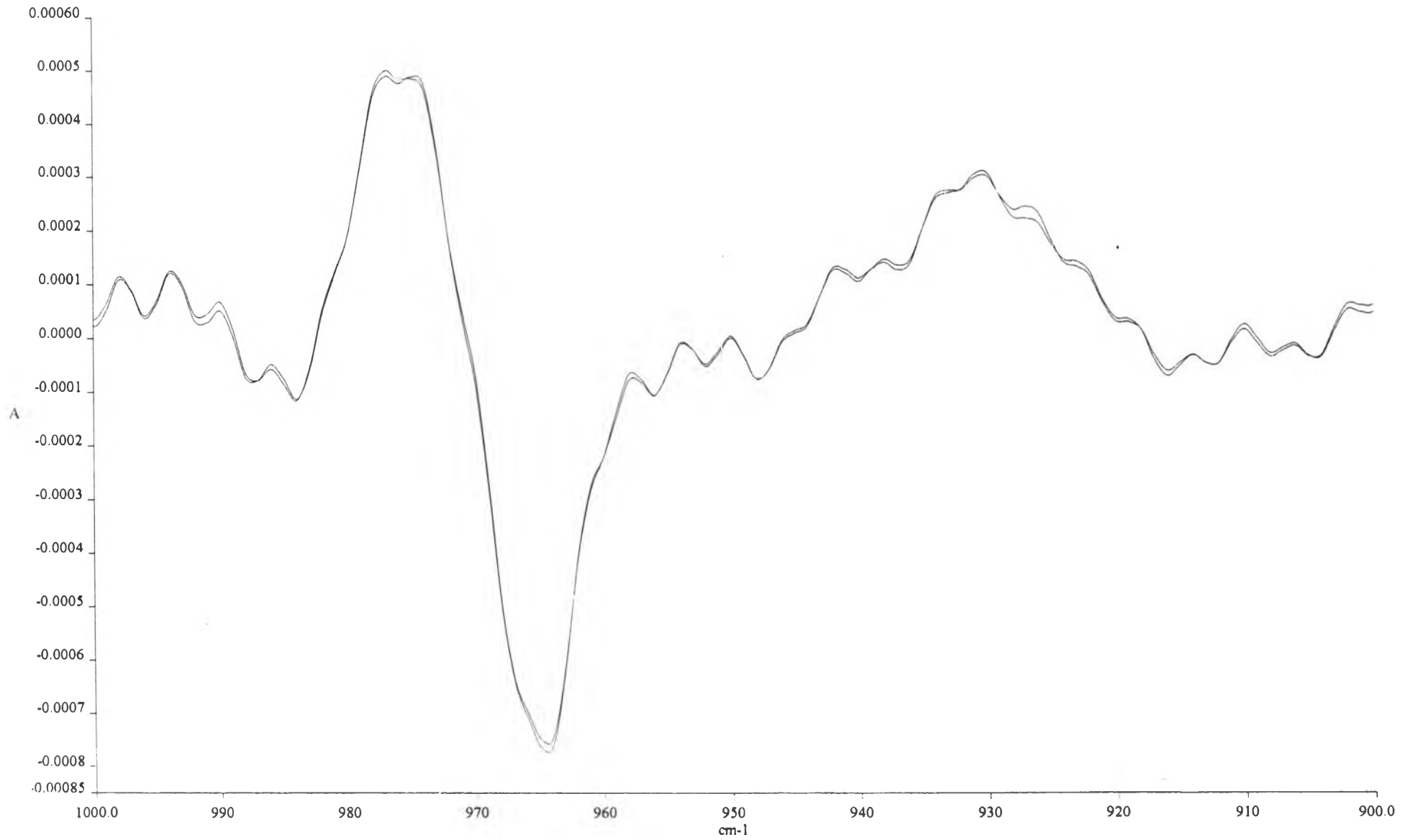


Cracker (brand 1) flask 1

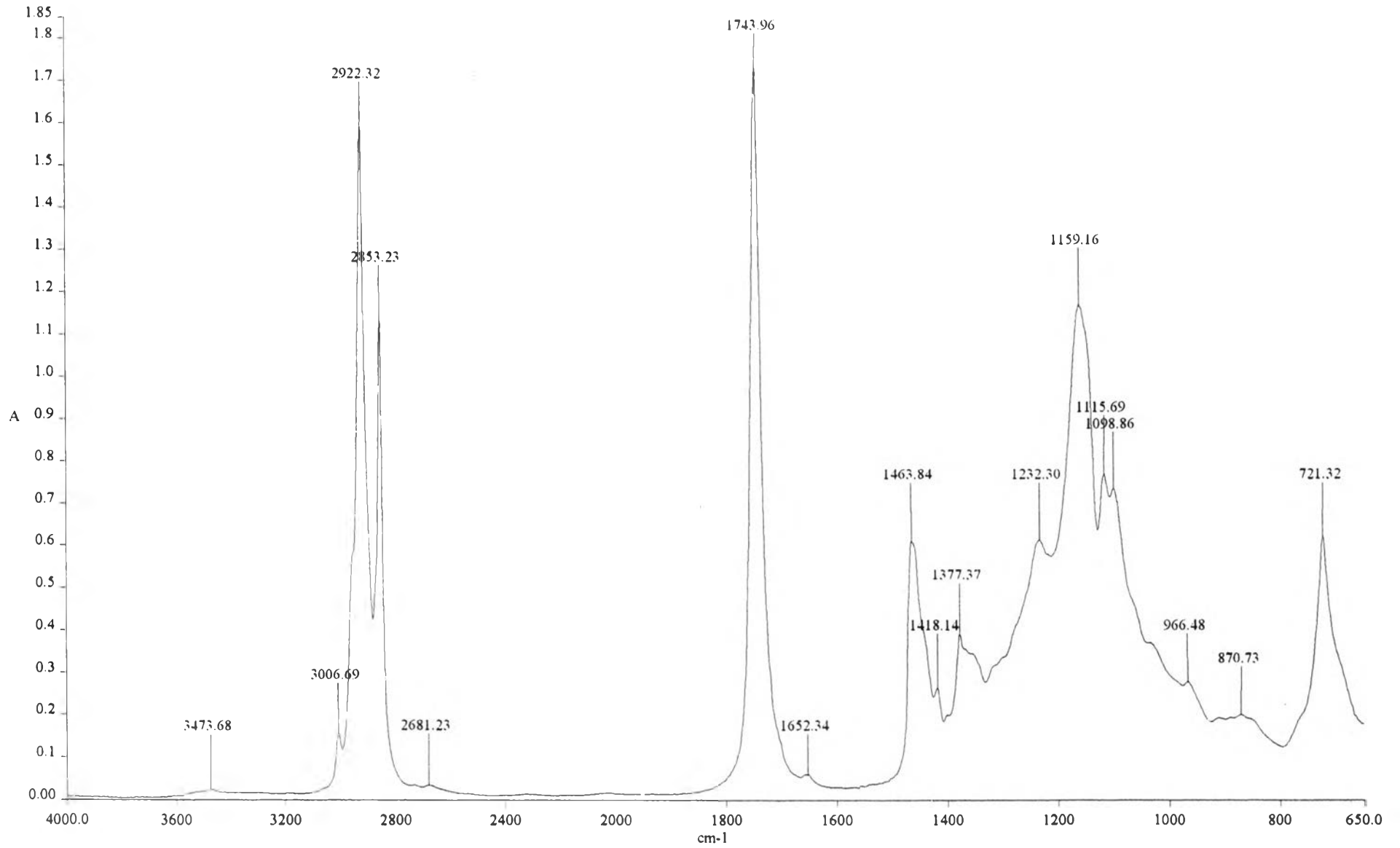


Cracker (brand 1) flask 2

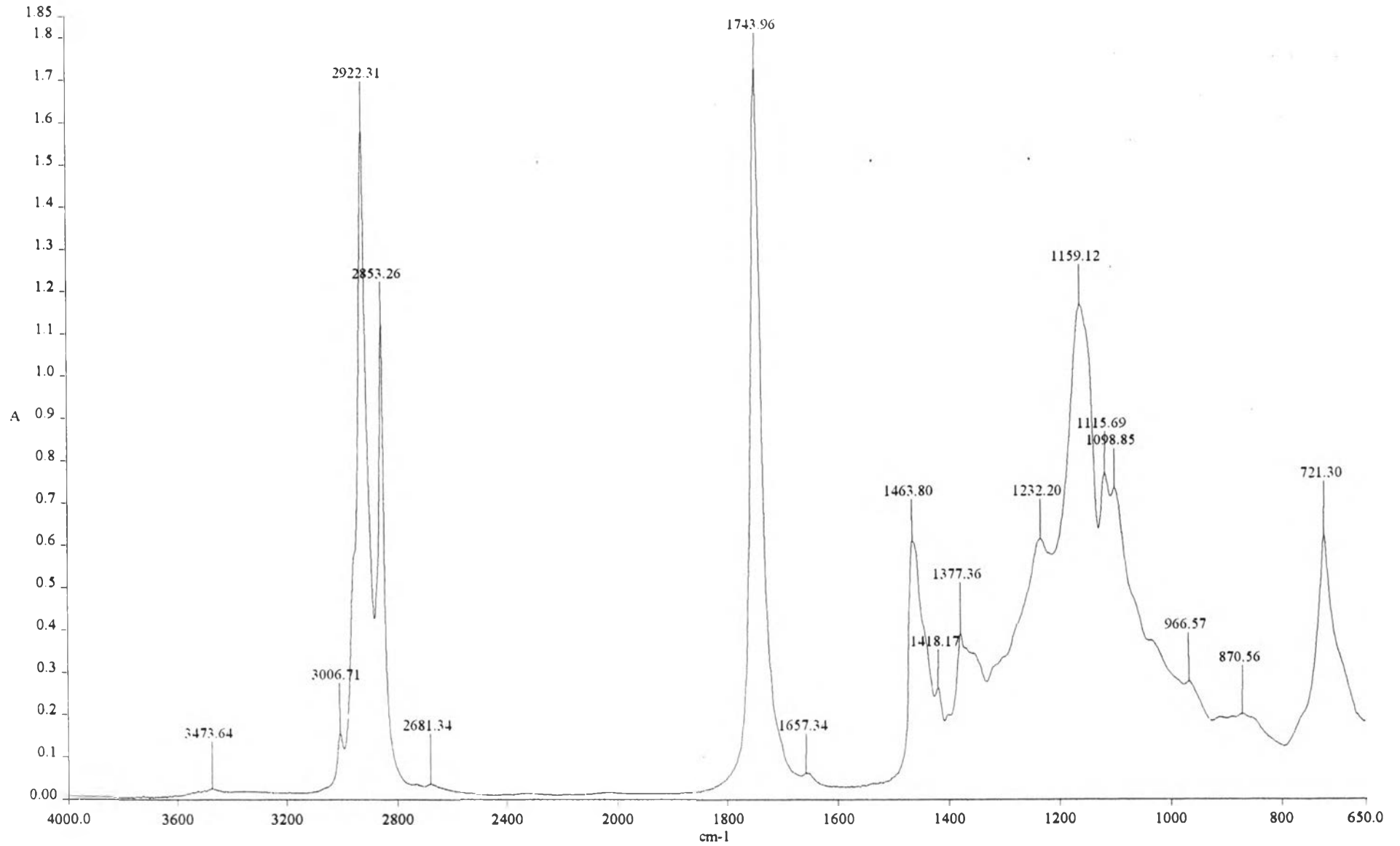




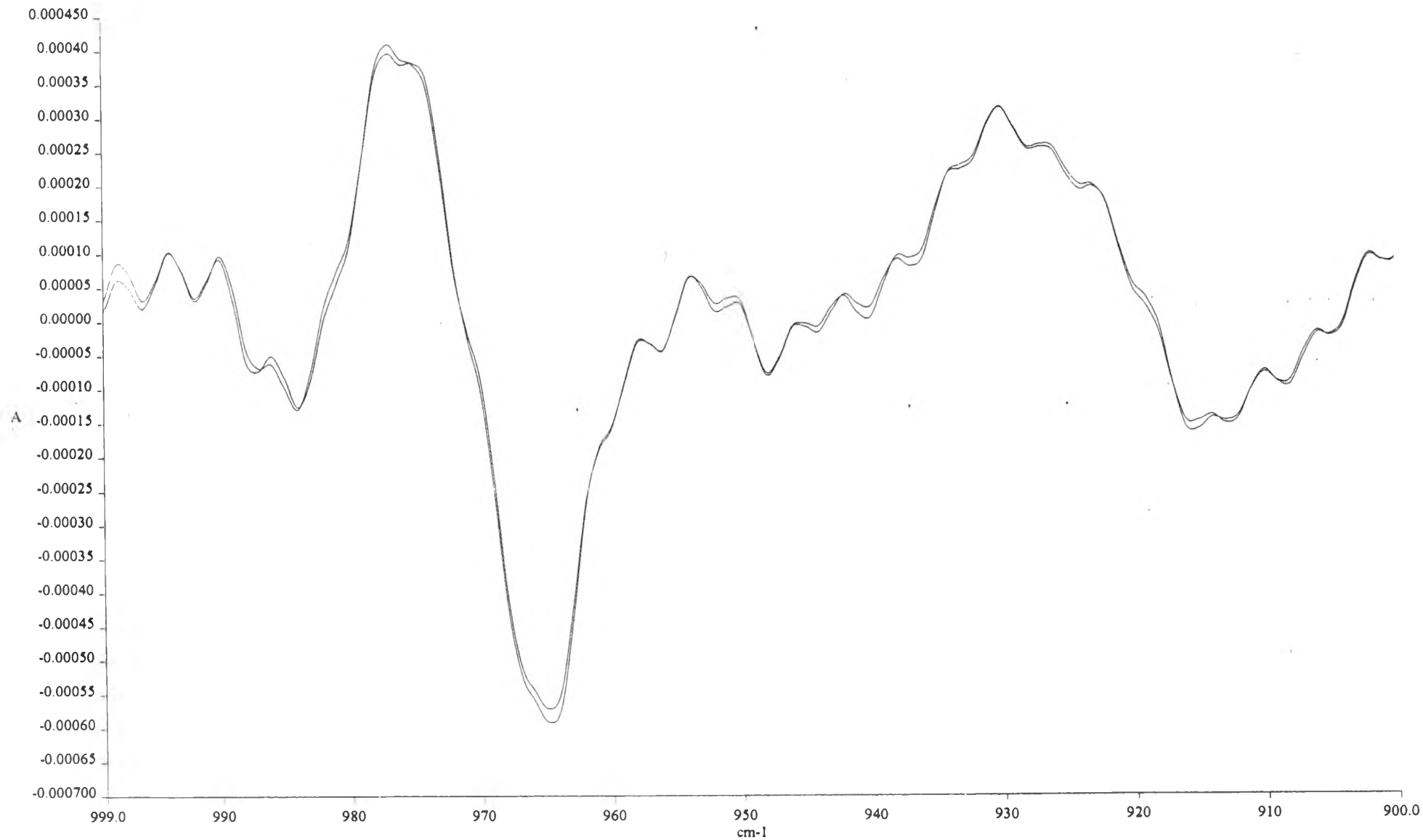
Negative second derivative  
Cracker brand 1 flask 1 & 2



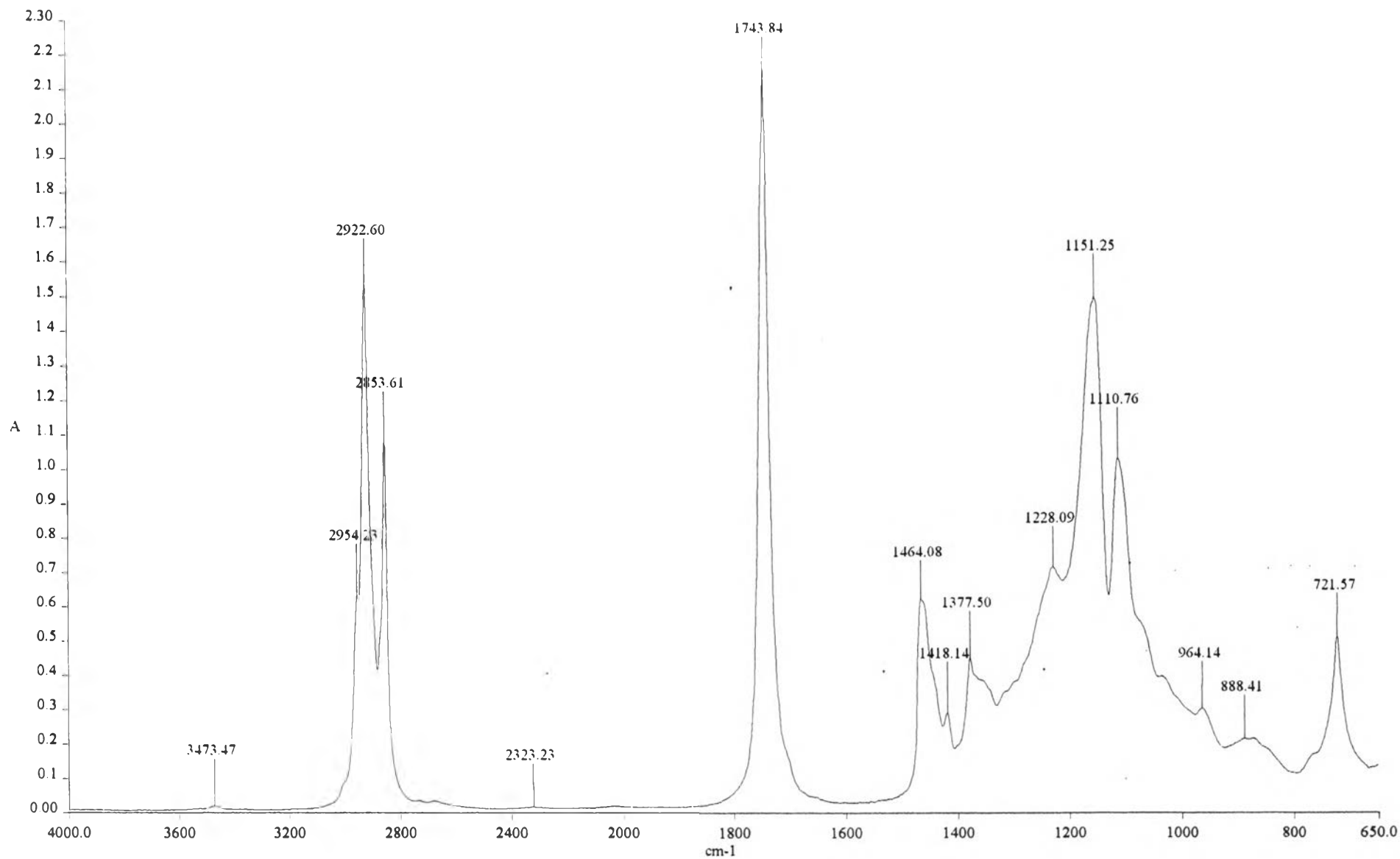
Cracker (brand 2) flask 1



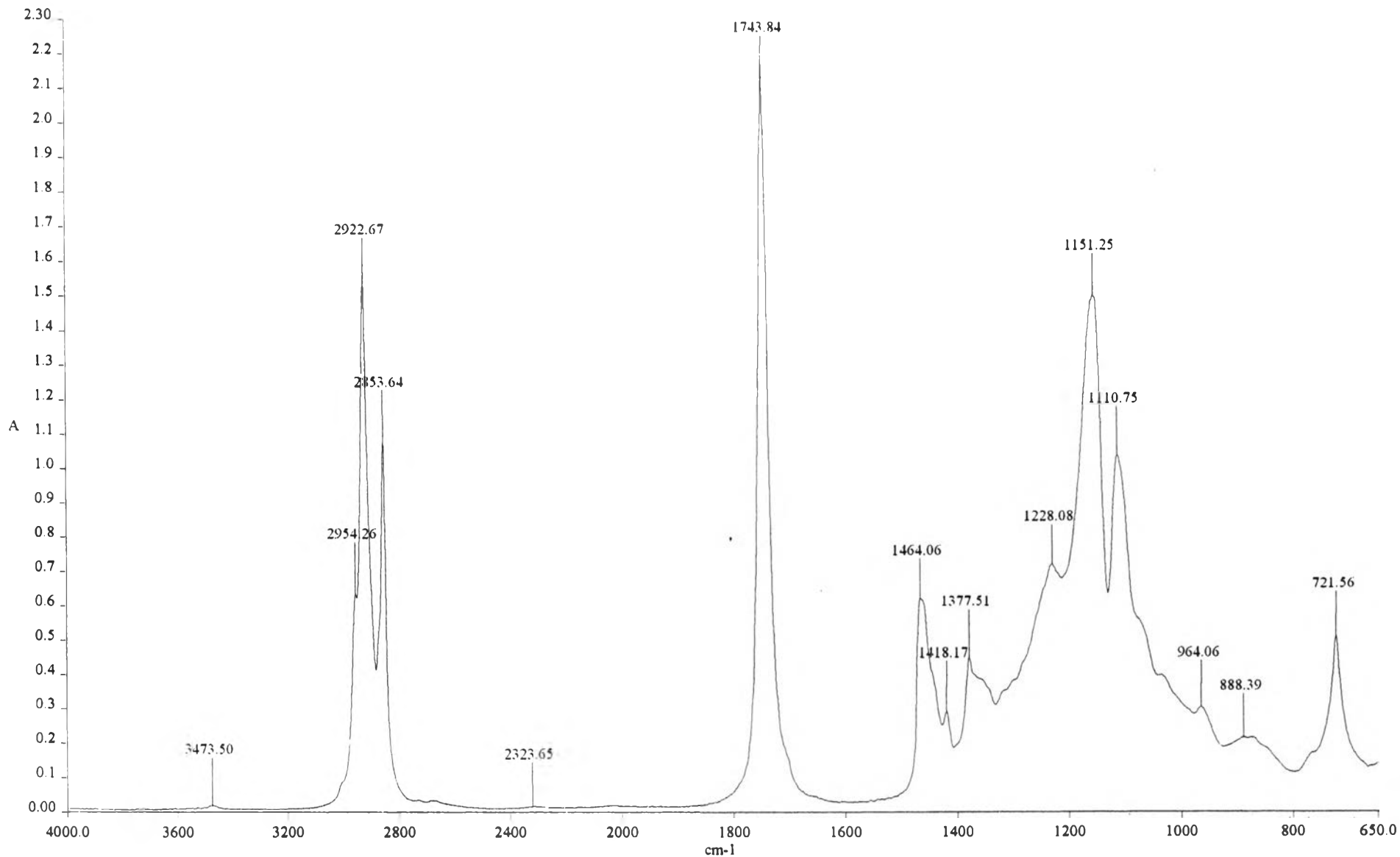
Cracker (brand 2) flask 2



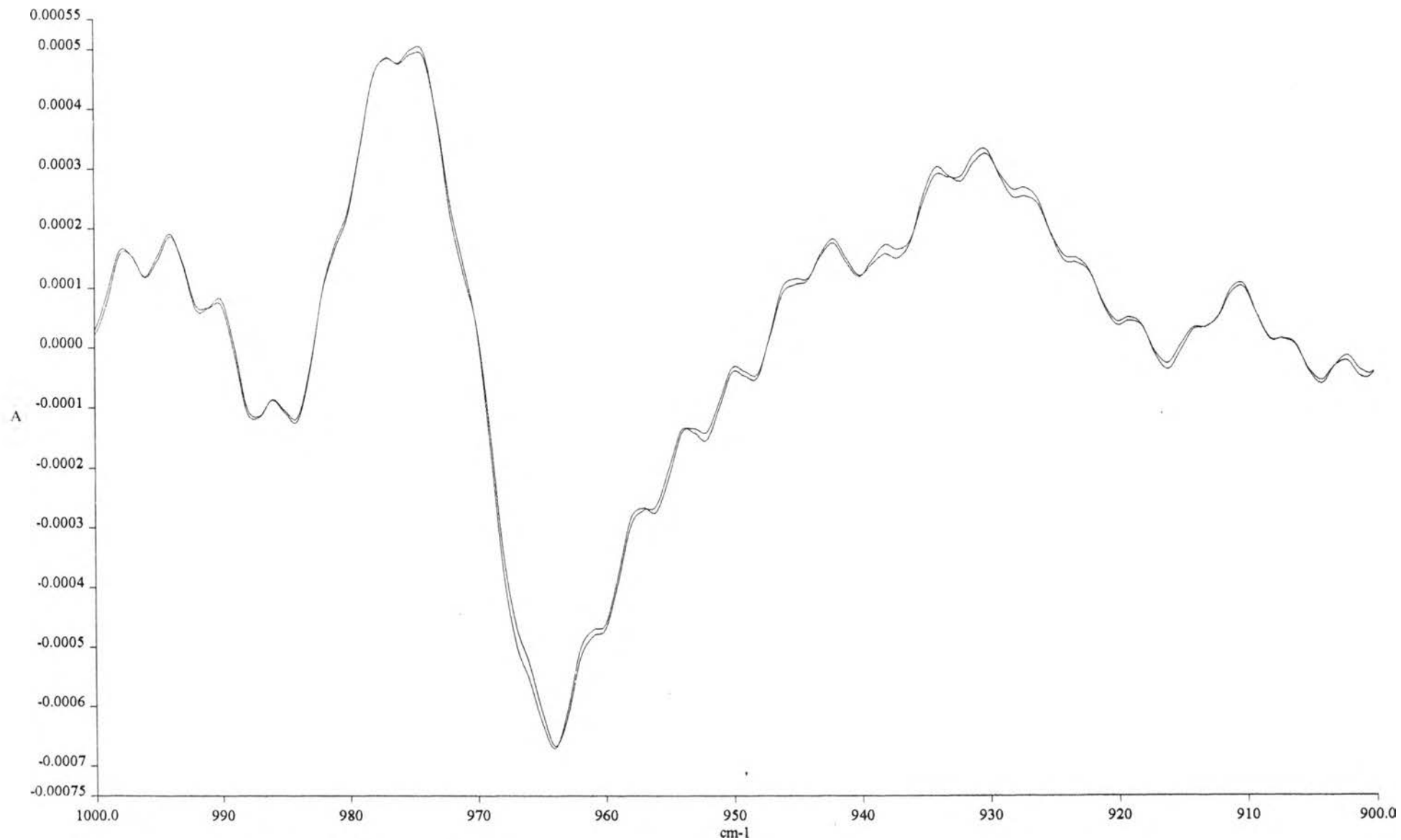
Negative second derivative  
Cracker brand 2 flask 1 & 2



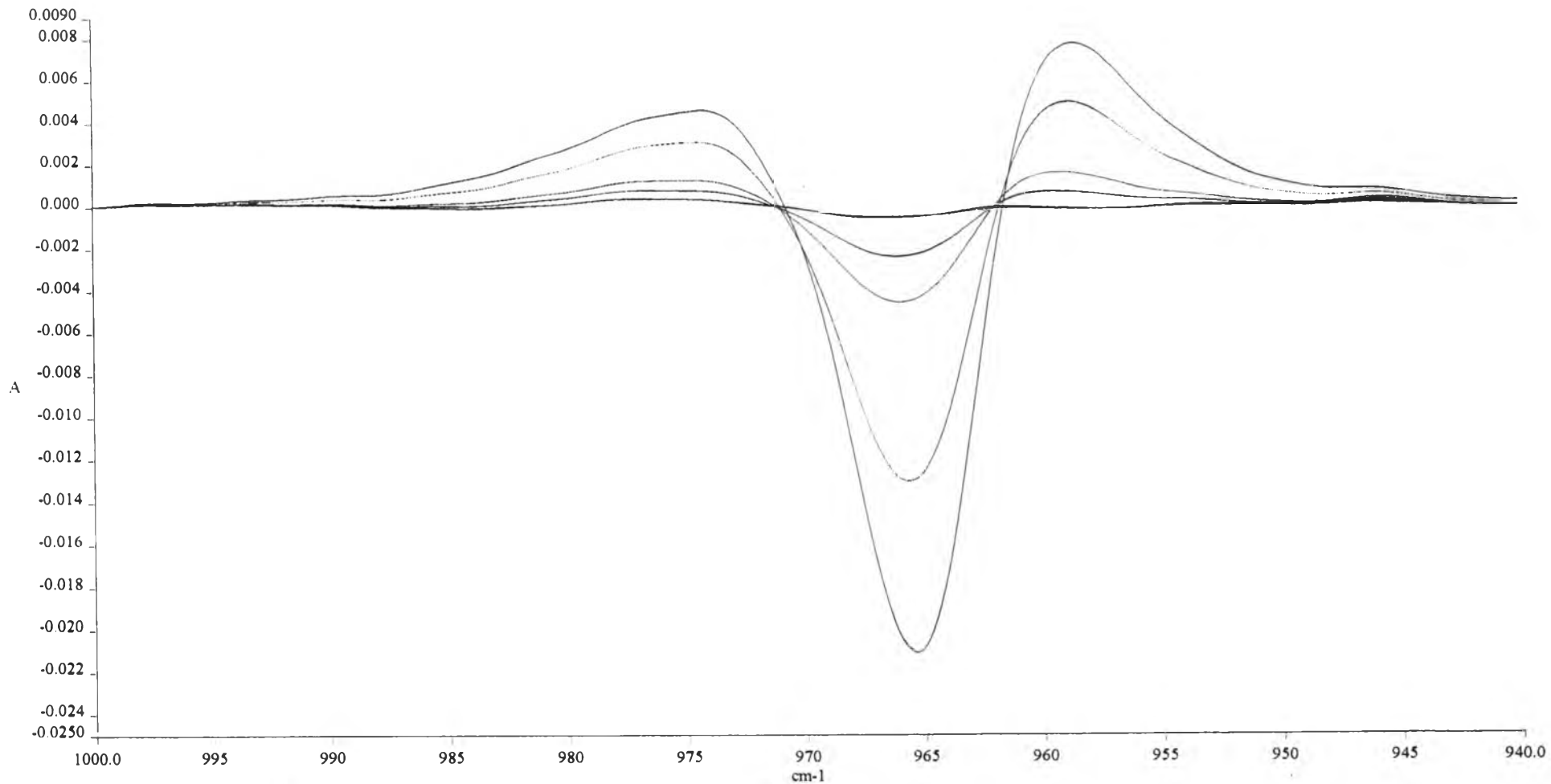
Cracker (brand 3) flask 1



Cracker (brand 3) flask 2



Negative second derivative  
Cracker brand 3 flask 1 & 2



- 0.5-d.sp - 6/25/2008
- 0.5#2-d.sp - 6/25/2008
- 5-d.sp - 6/25/2008
- 5#2-d.sp - 6/25/2008
- 10.0-d.sp - 6/25/2008
- 10.0#2-d.sp - 6/25/2008
- 30-d.sp - 6/25/2008
- 30#2-d.sp - 6/25/2008
- 50-d.sp - 6/25/2008
- 50#2-d.sp - 6/25/2008



# **Appendix C**

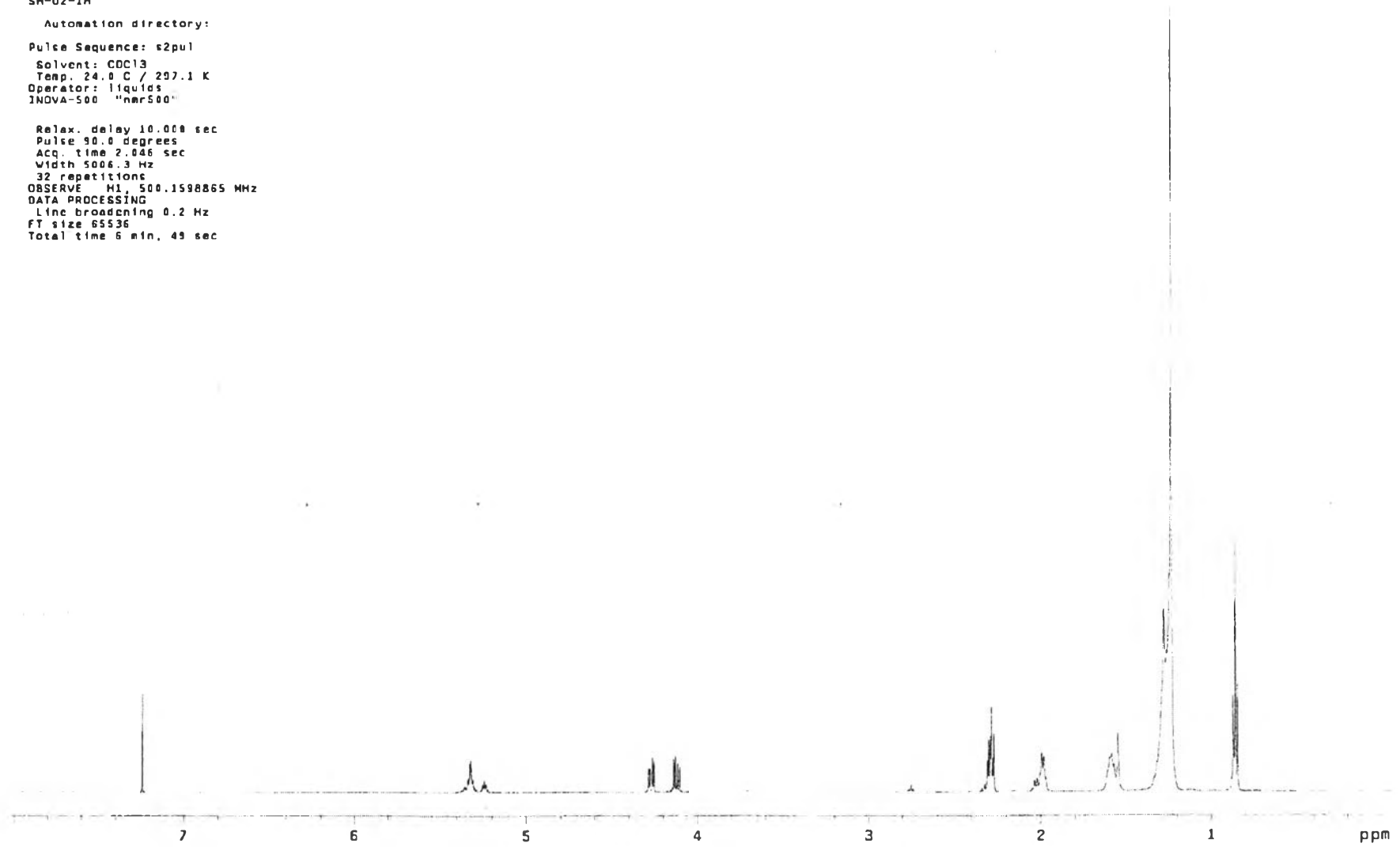
## **NMR spectrums**

SM-U2-1H

Automation directory:

Pulse Sequence: s2pul  
Solvent: CDCl3  
Temp. 24.0 C / 297.1 K  
Operator: liquids  
INOVA-500 "nmr500"

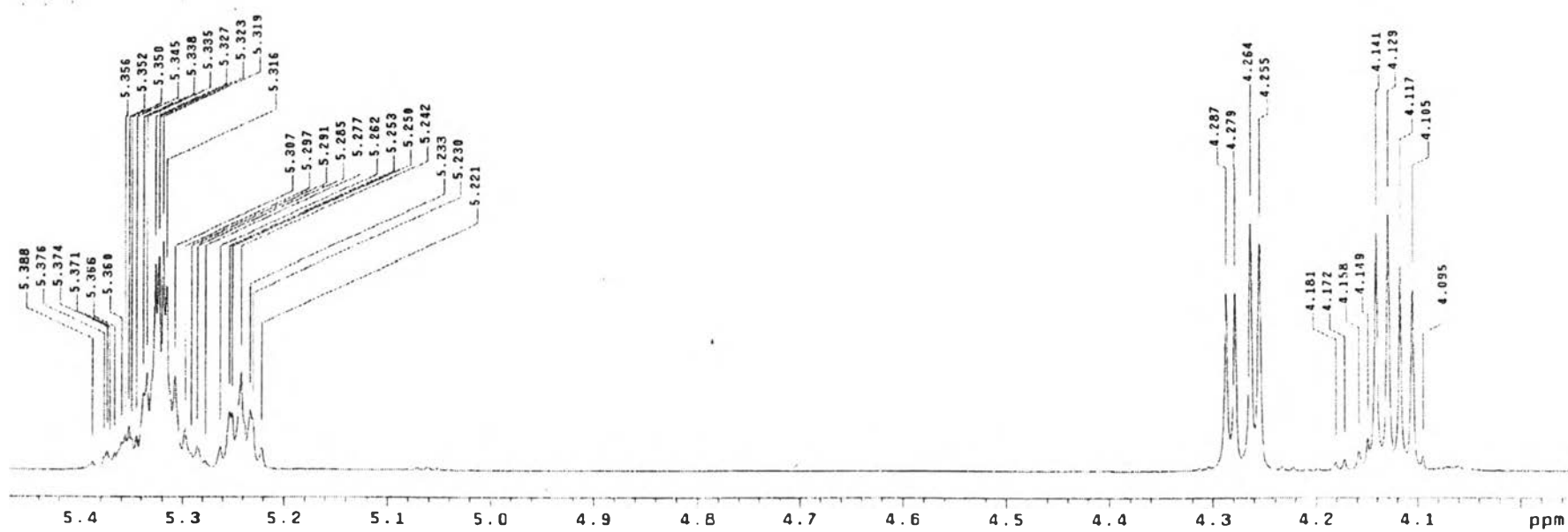
Relax. delay 10.000 sec  
Pulse 90.0 degrees  
Acq. time 2.046 sec  
Width 5006.3 Hz  
32 repetitions  
OBSERVE H1, 500.1598865 MHz  
DATA PROCESSING  
Line broadening 0.2 Hz  
FT size 65536  
Total time 6 min, 49 sec



SM-U2-1M

Automation directory:

Pulse Sequence: s2pu1

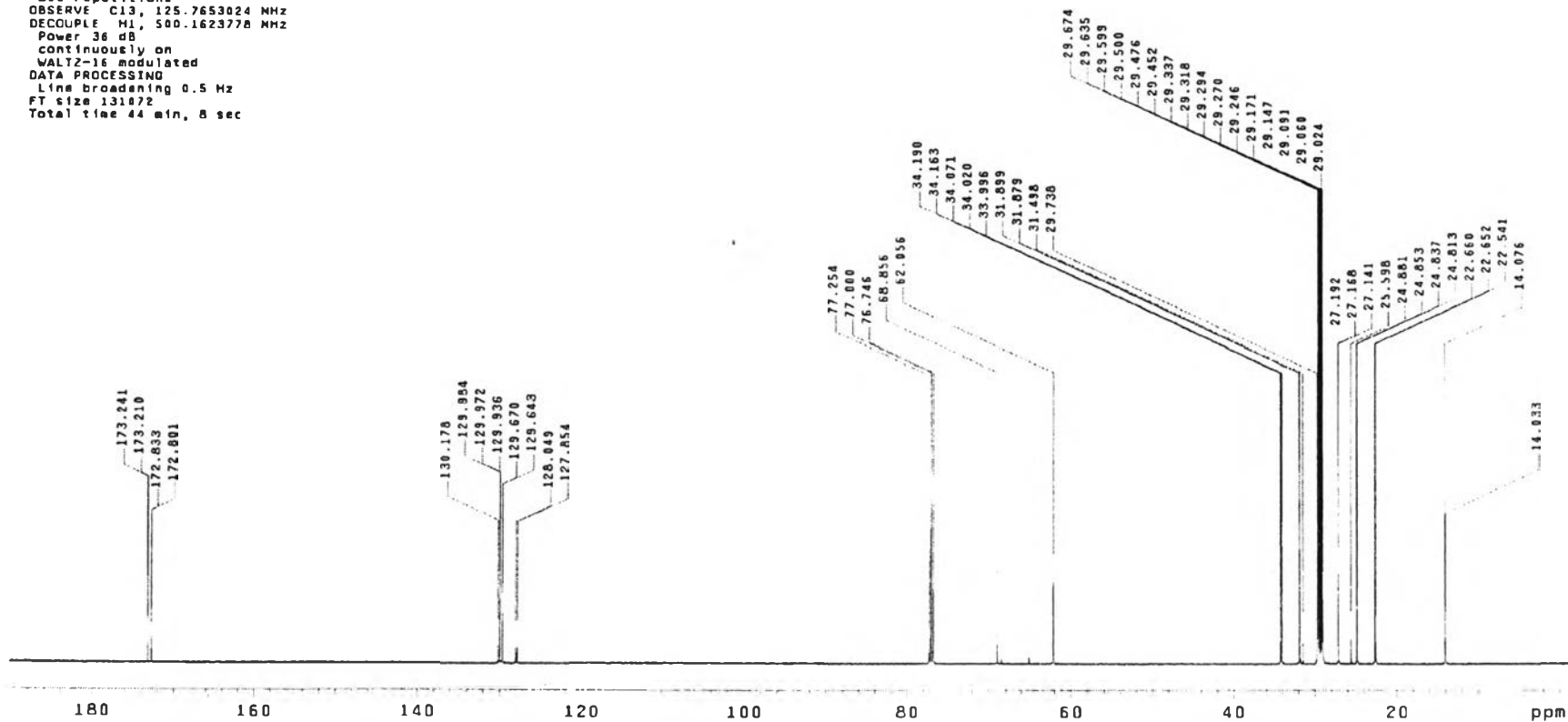


SH(U2)-13C

Automation directory:

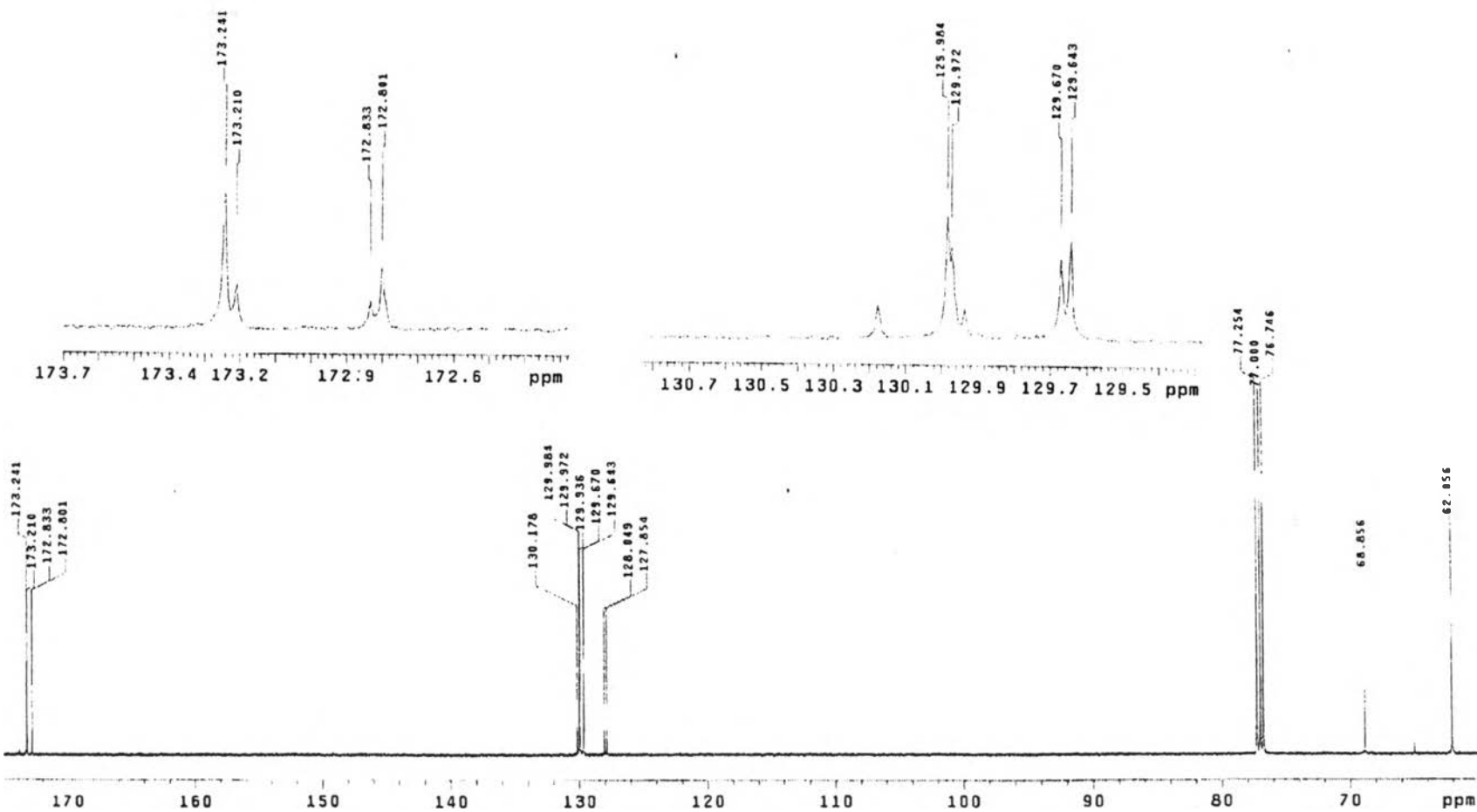
Pulse Sequence: s2pu1  
Solvent: CDCl3  
Temp. 24.0 C / 297.1 K  
Operator: liquids  
INOVA-500 "nmr500"

Relax. delay 2.000 sec  
Pulse 45.0 degrees  
Acq. time 1.302 sec  
Width 32679.7 Hz  
800 repetitions  
OBSERVE C13, 125.7653024 MHz  
DECOUPLE H1, 500.1623778 MHz  
Power 36 dB  
continuously on  
WALTZ-16 modulated  
DATA PROCESSING  
Line broadening 0.5 Hz  
FT size 131072  
Total time 44 min, 8 sec



SH(U2)-13C

Automation directory:  
Pulse Sequence: s2pul



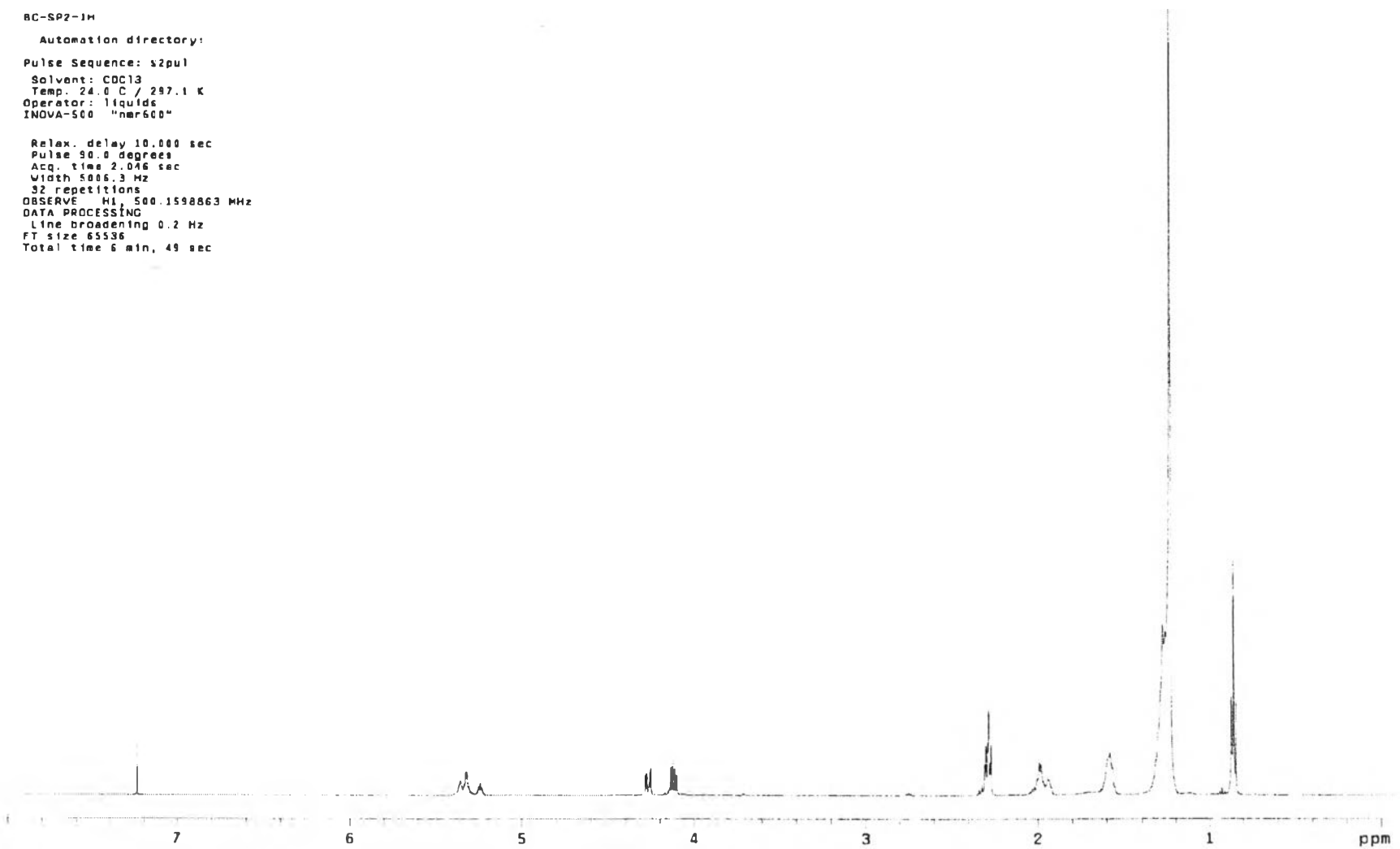
8C-SP2-1M

Automation directory:

Pulse Sequence: s2pul

Solvent: CDC13  
Temp: 24.0 C / 297.1 K  
Operator: liquids  
INOVA-500 "nr500"

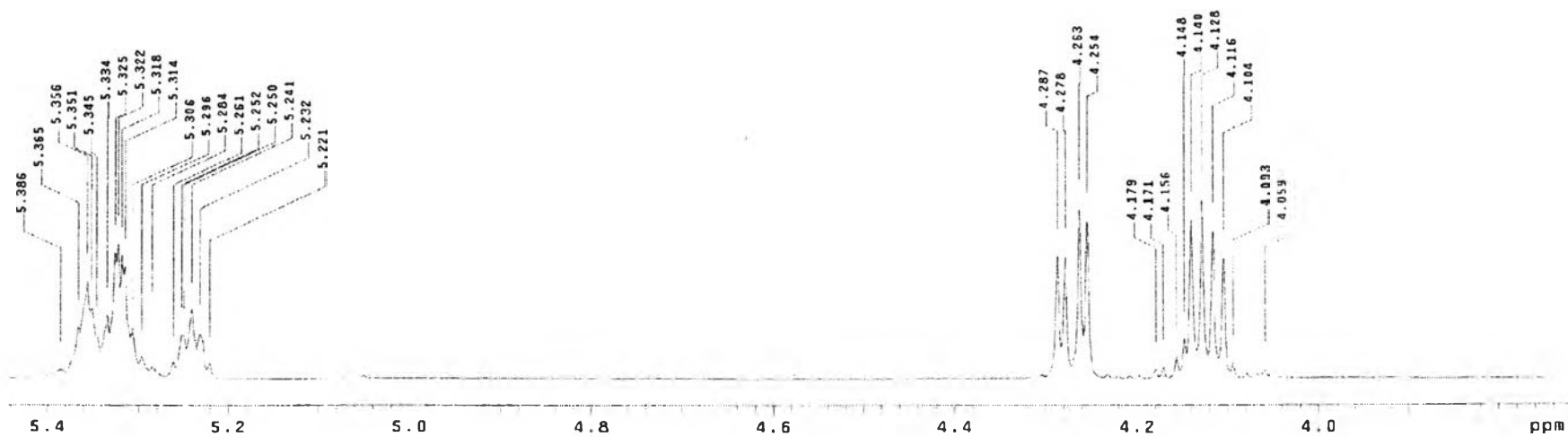
Relax. delay 10.000 sec  
Pulse 90.0 degrees  
Acq. time 2.046 sec  
Width 5006.3 Hz  
32 repetitions  
OBSERVE H1, 500.1590863 MHz  
DATA PROCESSING  
Line broadening 0.2 Hz  
FT size 65536  
Total time 5 min, 49 sec



BC-SP2-1H

Automation directory:

Pulse Sequence: t2pu1

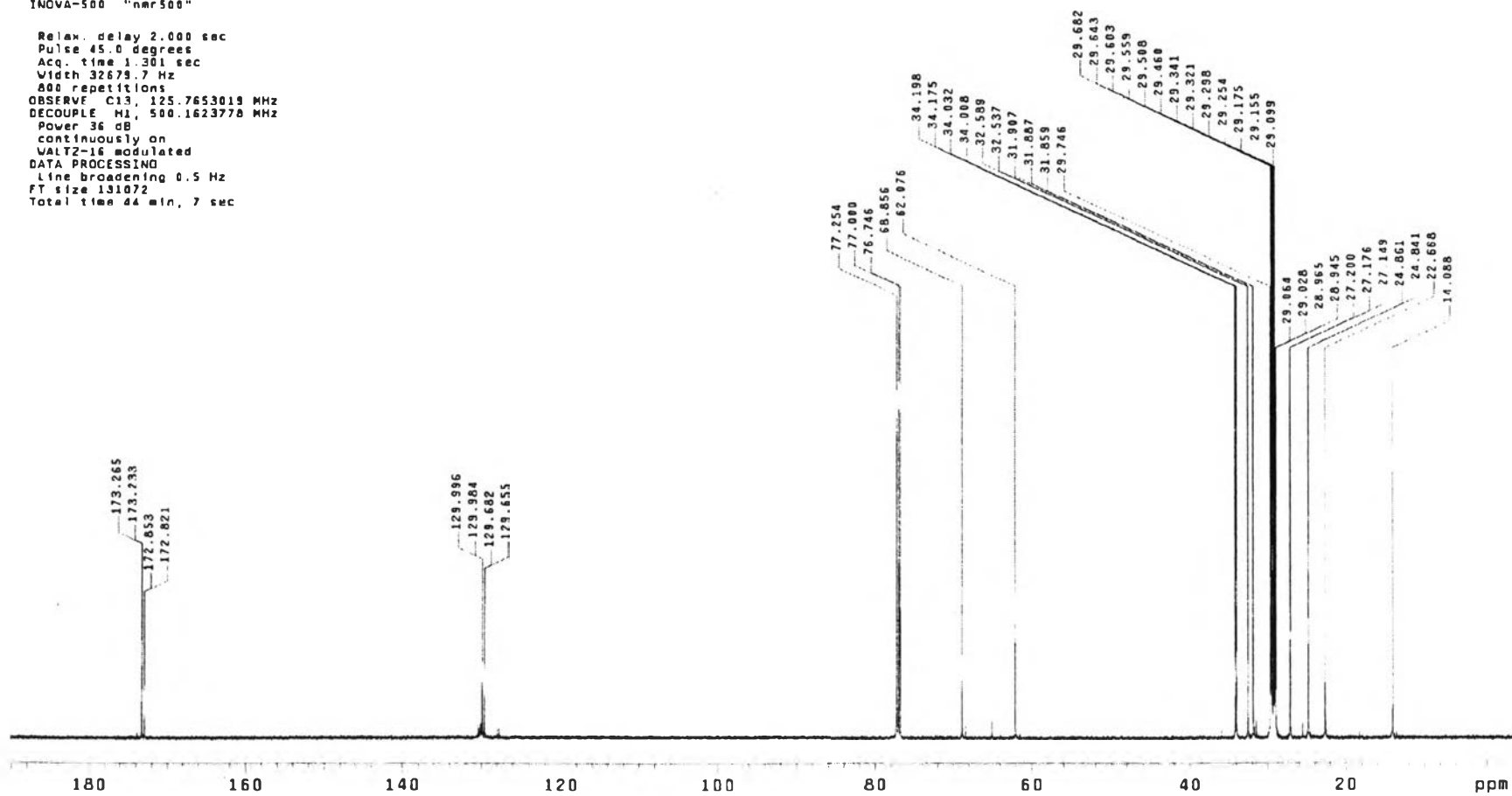


BC(SP2)-13C

Automation directory:

Pulse Sequence: s2pu1  
Solvent: CDCl3  
Temp. 24.0 C / 297.1 K  
Operator: lliquids  
INOVA-500 "nmr500"

Relax. delay 2.000 sec  
Pulse 45.0 degrees  
Acq. time 1.301 sec  
Width 32679.7 Hz  
800 repetitions  
OBSERVE C13, 125.7653019 MHz  
DECOUPLE H1, 500.1623778 MHz  
Power 36 dB  
continuously on  
VOLTAGE-16 modulated  
DATA PROCESSING  
Line broadening 0.5 Hz  
FT size 131072  
Total time 44 min, 7 sec

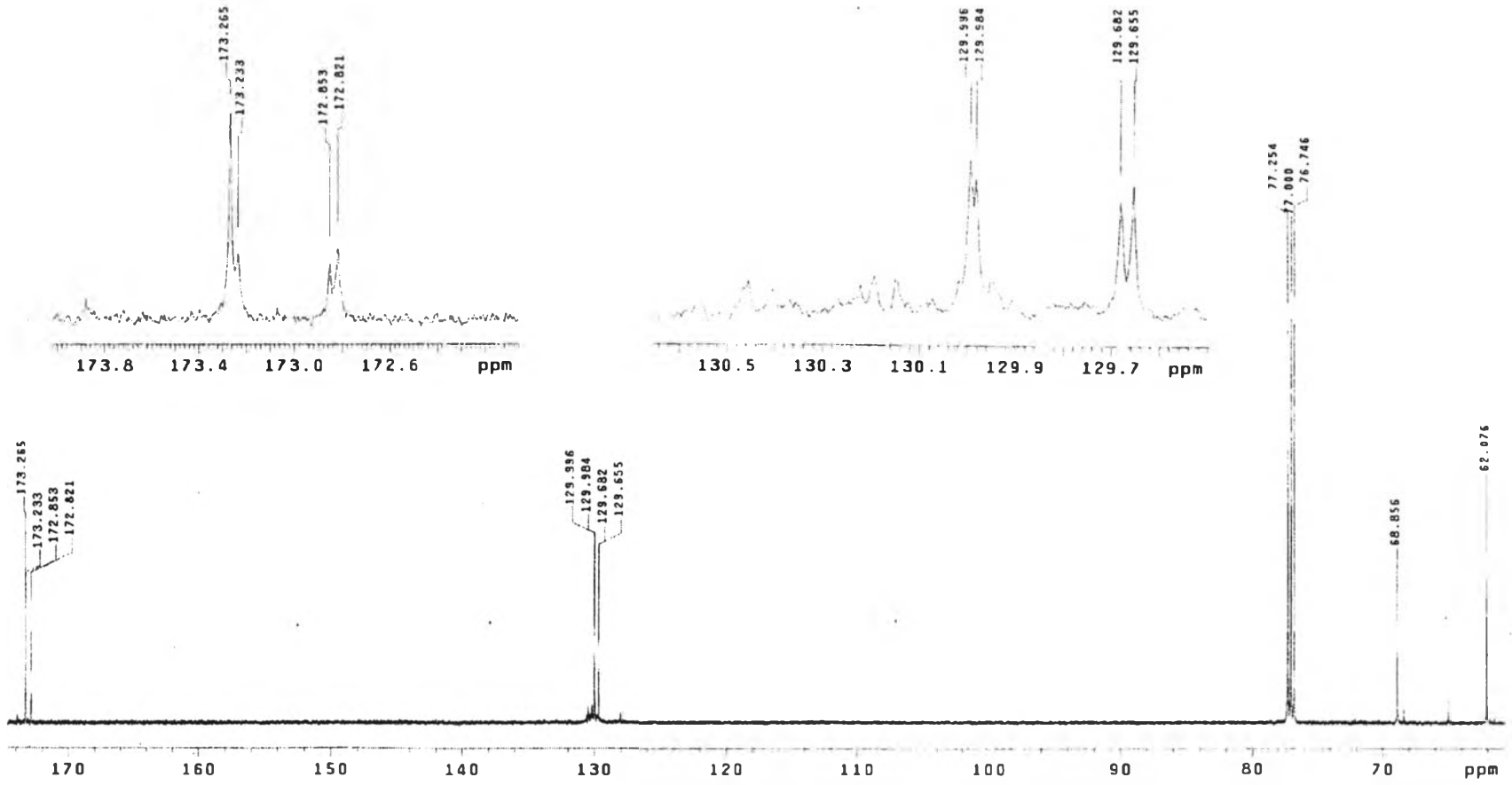




BC(SP2)-13C

Automation directory:

Pulse Sequence: s2pul





## BIOGRAPHY

<b>NAME</b>	Miss Nareepan Narkwichian
<b>DATE OF BIRTH</b>	March 15, 1980
<b>PLACE OF BIRTH</b>	Bangkok, Thailand
<b>INSTITUTIONS ATTENDED</b>	Slipakorn University, 1998-2003; Bachelor of Science in Pharmacy  Chulalongkorn University, 2006-2008; Master of Science in Pharmacy (Food Chemistry and Medical Nutrition)
<b>OCCUPATIONS</b>	Food and Drug Administration, Ministry of Public Health.