Supplementary Material (ESI) for Organic & Biomolecular Chemistry

Electronic Supplementary Informations

Exploiting enzymatic regioselectivity: a facile methodology for the synthesis of polyhydroxylated hybrid compounds

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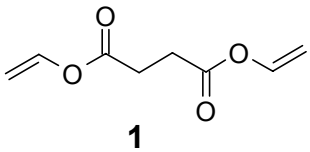
Experimental Section

Materials and Methods

All chemicals were obtained from commercial sources (Aldrich) and used without further purification. All solvents were of reagent grade or HPLC grade. Novozym® 435 (immobilized lipase from *Candida antarctica*) was a gift from Novozymes Inc. Thin-Layer Cromatography (TLC) analysis were performed on precoated silica gel 60 F_{254} plates (Merck) and treated with the molybdate reagent ($(NH_4)_6MoO_{24}\cdot 4H_2O$, 42 g; $Ce(SO_4)_2$, 2 g; H_2SO_4 concentrated 62 mL; made up to 1 L with deionizated water) or $KMnO_4$ (0.5 g in 100 mL of NaOH 1M) or UV light (254 and 366 nm). Flash chromatography was performed using silica gel 60 (70 – 230 mesh, Merck). Molecular sieves (4Å, beads, 8-12 mesh) were preactivated at ca. 150 °C for 3 days. The ^{1}H NMR and ^{13}C NMR spectra were recorded at the specified field strenght and in the solvent indicated using standard pulse techniques on Bruker 300, 400, or 500 MHz and Varian Mercury 300 MHz spectrometers at ambient temperatures. Chemical shifts (δ) were expressed in parts per million (ppm) and were referenced to TMS or the residual solvent peak. Coupling constants (*J*) are quoted to the nearest 0.1 Hertz (Hz). Assignements of signals were made where possible, using COSY, DEPT, APT, HMQC and HMBC experiments where necessary. EI and FAB mass spectra were recorded at an ionizing voltage of 6 keV on a VG 70–70 EQ instrument.

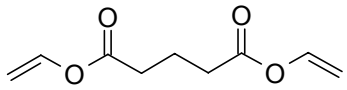
Compound 1: divinyl succinate



1

A solution of succinic acid (5.30 g, 44.92 mmol) and $Hg(OAc)_2$ (350 mg) in vinyl acetate (42 mL) was stirred under nitrogen flow at r.t. and fuming H_2SO_4 (20 μL) was carefully added dropwise. The reaction mixture was then heated under reflux for 4 h. After cooling to r.t., $NaOAc•3H_2O$ (150 mg) was added portionwise and the mixture was then concentrated under reduced pressure. The crude product was purified by silica gel column chromatography [PetEt/EtOAc (95:5)] obtaining the pure compound **1** as a colorless oil (4.92 g, 65 %). **1**: R_f = 0.55 [PetEt/EtOAc (95:5)] (TLC detection by $KMnO_4$). ^{1}H NMR (300MHz, $CDCl_3$) δ: 2.74 (4H, s, CH_2) 4.57 (2H, dd, *J* = 1.6, 6.0 Hz, CH_2vin) 4.86-4.92 (2H, dd, *J* = 1.6, 14.0 Hz, CH_2vin) 7.21-7.28 (2H, dd, *J* = 6.3, 14.0 Hz, CHvin). EI$^+$-MS (*m/z*) 170 $[M]^+$.

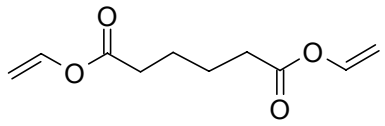
Compound 2: divinyl glutarate



2

A solution of glutaric acid (20.00 g, 0.15 mol) and $Hg(OAc)_2$ (1.21 g) in vinyl acetate (140 mL) was stirred under nitrogen flow at r.t. and fuming H_2SO_4 (100 μL) was carefully added dropwise. The reaction mixture was then heated under reflux for 4 h. After cooling to r.t., $NaOAc•3H_2O$ (440 mg) was added portionwise and the mixture was then concentrated under reduced pressure. The crude product was purified by silica gel column chromatography [PetEt/EtOAc (95:5)] obtaining the pure compound **2** (19.12 g, 69 %). **2:** R_f = 0.56 [PetEt/EtOAc (95:5)] (TLC detection by $KMnO_4$). ^{1}H NMR (300MHz, $CDCl_3$) δ: 2.06 (2H, t, *J* = 7.4 Hz, CH_2) 2.48 (4H, t, *J* = 7.4 Hz, CH_2) 4.55-4.58 (2H, dd, , *J* = 1.6, 6.3 Hz, CH_2vin) 4.84-4.90 (2H, dd, *J* = 1.6, 14.0 Hz, CH_2vin) 7.22-7.29 (2H, dd, *J* = 6.3, 14.0 Hz, CHvin). EI$^+$-MS (*m/z*) 184 $[M]^+$.

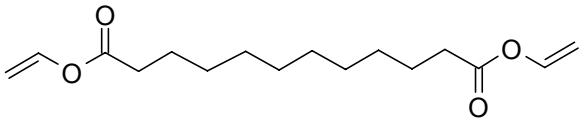
Compound 3: divinyl adipate



3

A solution of adipic acid (30.00 g, 0.20 mol) and $Hg(OAc)_2$ (1.65 g) in vinyl acetate (150 mL) was stirred under nitrogen flow at r.t. and fuming H_2SO_4 (100 μL) was carefully added dropwise. The reaction mixture was then heated under reflux for 4 h. After cooling to r.t., $NaOAc•3H_2O$ (600 mg) was added portionwise and the mixture was then concentrated under reduced pressure. The crude product was purified by silica gel column chromatography [PetEt/EtOAc (95:5)] obtaining the pure compound **3** as a colorless oil (21.00 g, 52 %). **3:** R_f = 0.18 [PetEt (100 %)] (TLC detection by $KMnO_4$). ^{1}H NMR (500MHz, $CDCl_3$) δ: 1.60-1.82 (4H, m, CH_2) 2.37-2.46 (4H, m, CH_2) 4.55 (2H, dd, J = 1.6, 6.3 Hz, CH_2vin) 4.86 (2H, dd, J = 1.5, 14.0 Hz, CH_2vin) 7.25 (2H, dd, J = 6.4, 14.0 Hz, CHvin). EI$^+$-MS (*m/z*) 198 $[M]^+$.

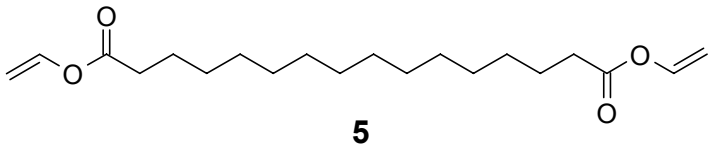
Compound 4: divinyl dodecanedioate



4

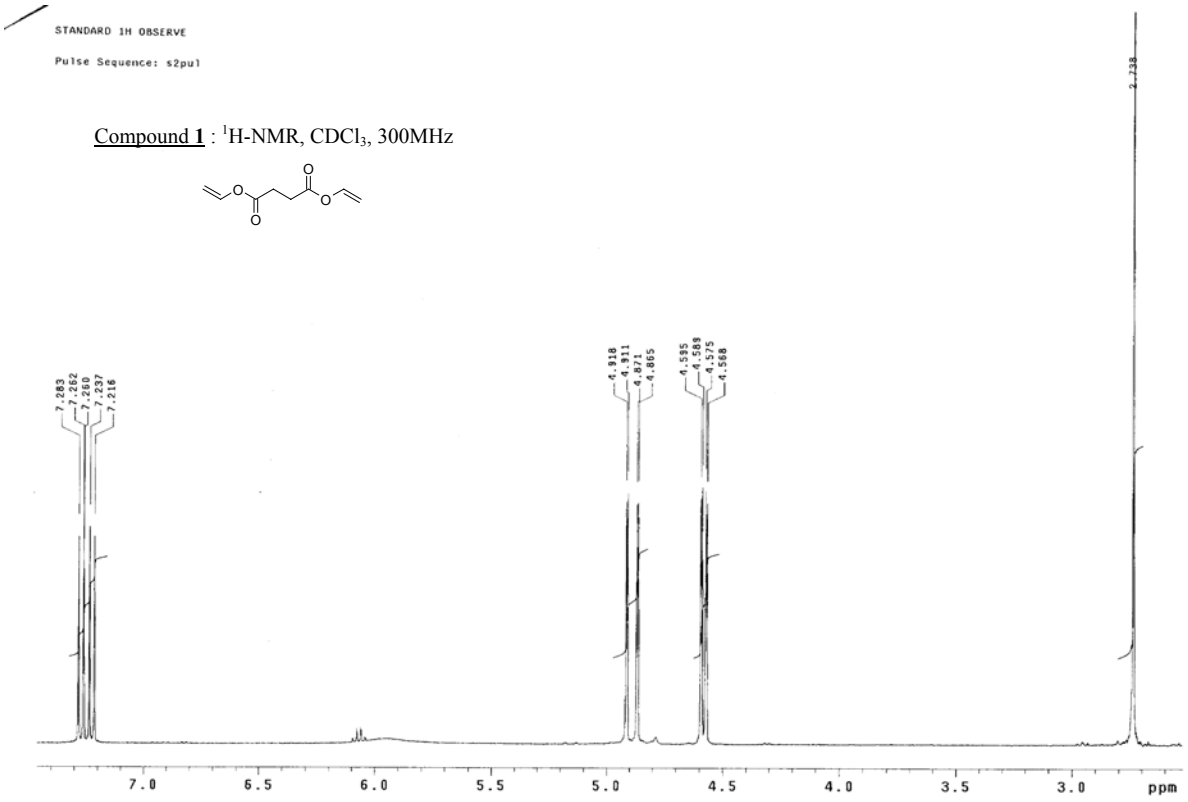
A solution of dodecanedioic acid (47.91 g, 0.21 mol) and $Hg(OAc)_2$ (1.66 g) in vinyl acetate (193 mL) was stirred under nitrogen flow at r.t. and fuming H_2SO_4 (100 μL) was carefully added dropwise. The reaction mixture was then heated under reflux for 4 h. After cooling to r.t., $NaOAc•3H_2O$ (600 mg) was added portionwise and the mixture was then concentrated under reduced pressure. The crude product was purified by silica gel column chromatography [PetEt/EtOAc (98:2)] obtaining the pure compound **4** as a colorless oil (35.50 g, 60 %). **4:** R_f = 0.27 [PetEt (100 %)] (TLC detection by $KMnO_4$). ^{1}H NMR (500MHz, CD_3Cl) δ: 1.30 (12H, m, CH_2) 1.66 (4H, m, CH_2) 2.39 (4H, t, J = 7.5 Hz, CH_2) 4.57 (2H, dd, J = 1.5, 6.5 Hz, CH_2vin) 4.89 (2H, dd, J = 1.5, 15.0 Hz, CH_2vin) 7.30 (2H, dd, J = 6.5, 15.0 Hz, CHvin). ^{13}C NMR (75 MHz, $CDCl_3$) δ: 24.76, 29.20, 29.36, 29.50, 34.10, 97.59, 141.41, 171.01. EI$^+$-MS (*m/z*) 282 $[M]^+$.

Compound 5: divinyl hexadecanedioate

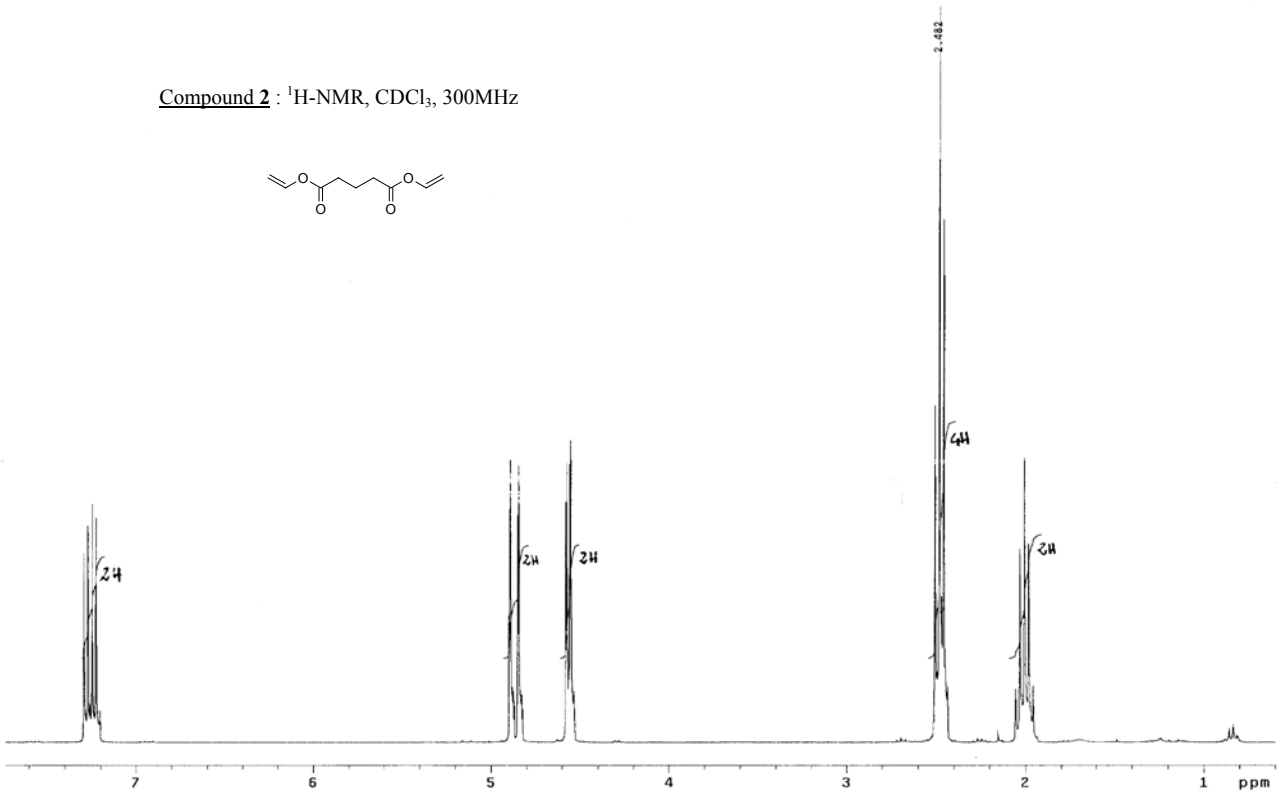


5

A solution of hexadecanedioic acid (5.00 g, 17.47 mmol) and $Hg(OAc)_2$ (140 mg) in vinyl acetate (16 mL) was stirred under nitrogen flow at r.t. and fuming H_2SO_4 (10 μL) was carefully added dropwise. The reaction mixture was then heated under reflux for 4 h. After cooling to r.t., NaOAc•$3H_2O$ (50 mg) was added portionwise and the mixture was then concentrated under reduced pressure. The crude product was purified by silica gel column chromatography [PetEt/EtOAc (98:2)] obtaining the pure compound **5** as a colorless oil (3.76 g, 64 %). **5:** R_f = 0.48 [PetEt/EtOAc (98:2)] (TLC detection by $KMnO_4$). ^{1}H NMR (300MHz, $CDCl_3$) δ: 1.25 (20H, m, CH_2) 1.64 (4H, m, CH_2) 2.37 (4H, t, J = 7.7 Hz, CH_2) 4.54 (2H, dd, J = 1.6, 6.3 Hz, CH_2vin) 4.85 (2H, dd, J = 1.4, 14.0 Hz, CH_2vin) 7.27 (2H, dd, J = 6.3, 14.0 Hz, CHvin). ^{13}C NMR (75 MHz, $CDCl_3$) δ: 24.82, 29.26, 29.43, 29.63, 29.78, 29.82, 33.17, 97.63, 141.43, 171.11. EI$^+$-MS (*m/z*) 338 $[M]^+$.

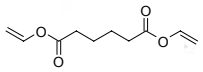


Compound **1** : ^{1}H-NMR, $CDCl_3$, 300MHz

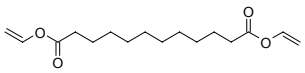


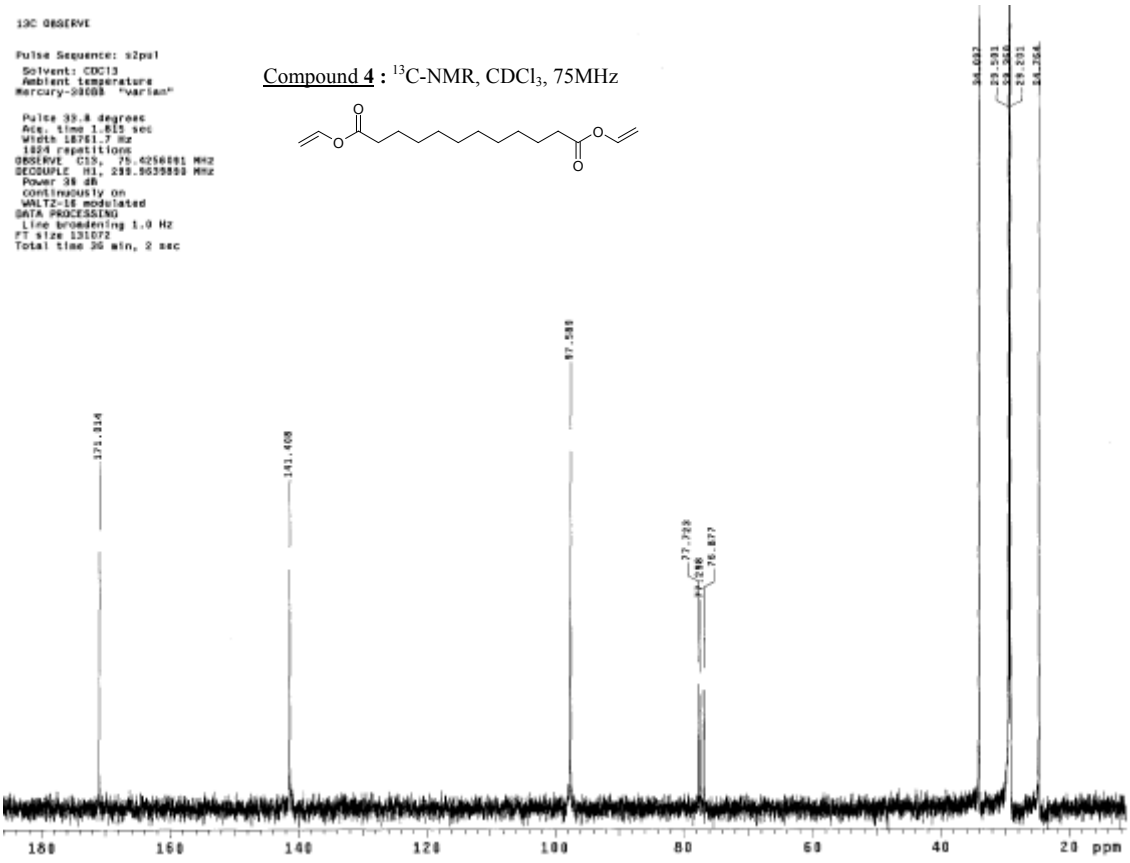
Compound **2** : ^{1}H-NMR, $CDCl_3$, 300MHz

Compound **3** : ^{1}H-NMR, $CDCl_3$, 500MHz



Compound **4** : ^{1}H-NMR, $CDCl_3$, 500MHz

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Solvent: CDCl3
Ambient temperature
Mercury-300BB "varian"
Pulse 33.8 degrees
Acq. time 1.815 sec
Width 18761.7 Hz
1824 repetitions
OBSERVE C13, 75.4256891 MHz
DECOUPLE H1, 299.9639899 MHz
Power 38 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 131072
Total time 36 min, 2 sec
Compound 4 : 13C-NMR, CDCl3, 75MHz
171.334
141.408
97.588
77.328
77.000
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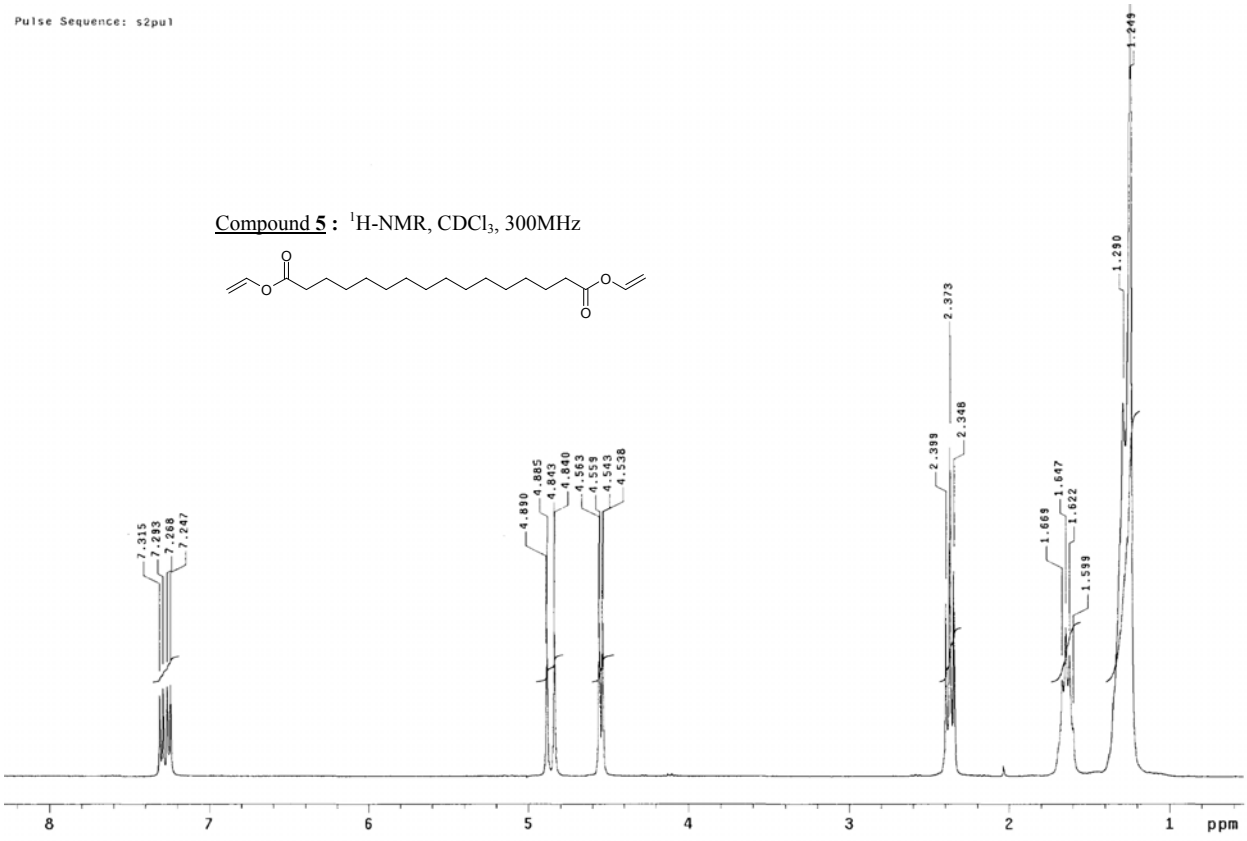
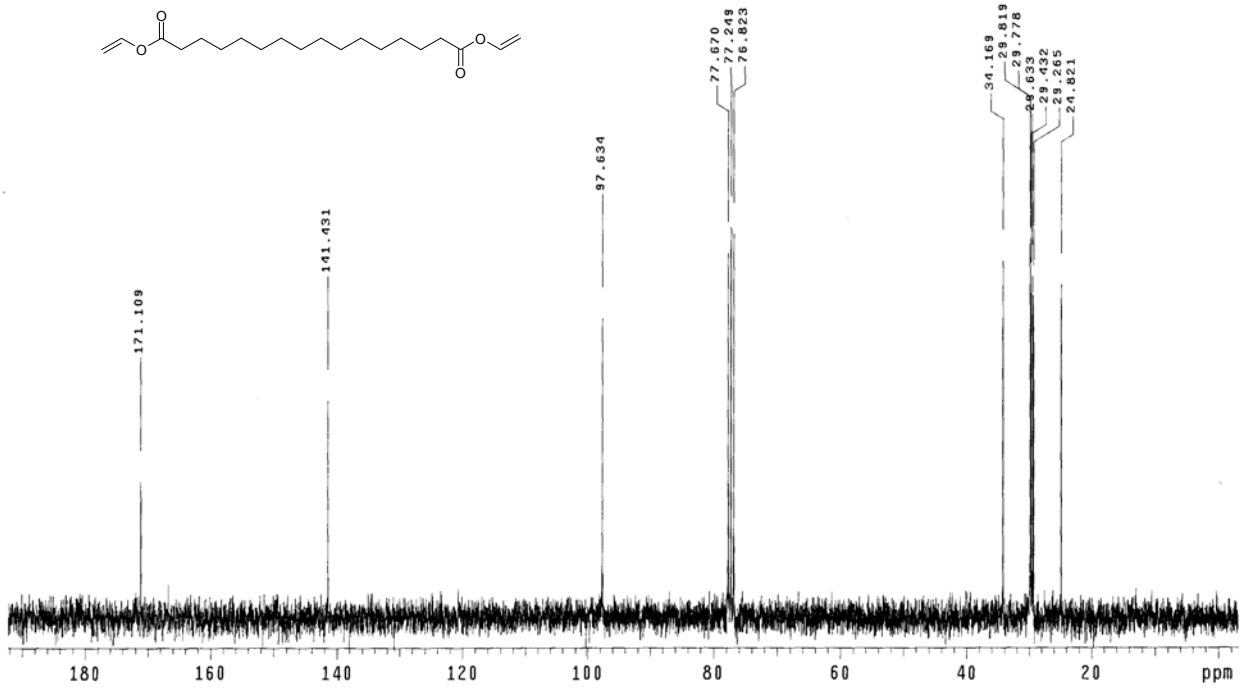
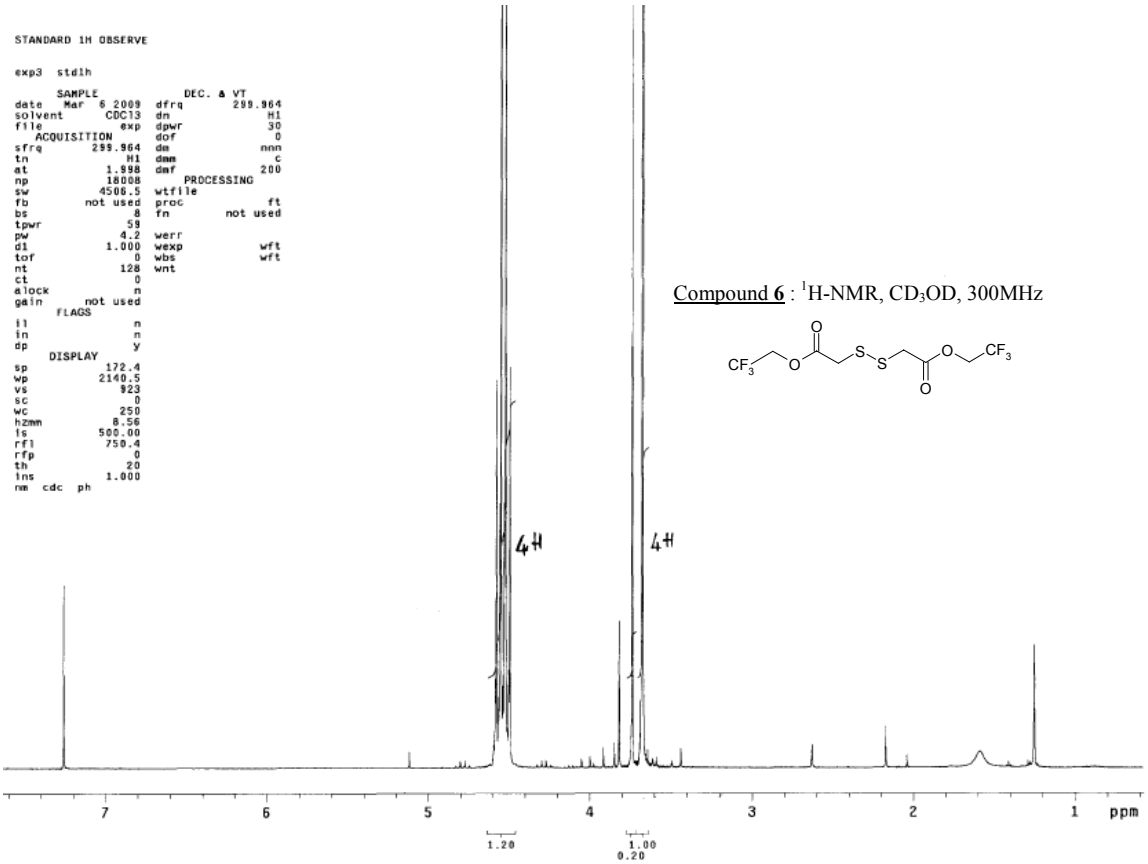
140
120
100
80
60
40
20 ppm


Pulse Sequence: s2pul
Compound 5 : 1H-NMR, CDCl3, 300MHz
7.315
7.293
7.268
7.247
4.890
4.885
4.863
4.840
4.563
4.559
4.543
4.538
2.399
2.373
2.348
1.669
1.647
1.622
1.599
1.290
1.249
8
7
6
5
4
3
2
1
ppm

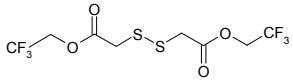
Compound **5** : ^{13}C-NMR, $CDCl_3$, 75MHz

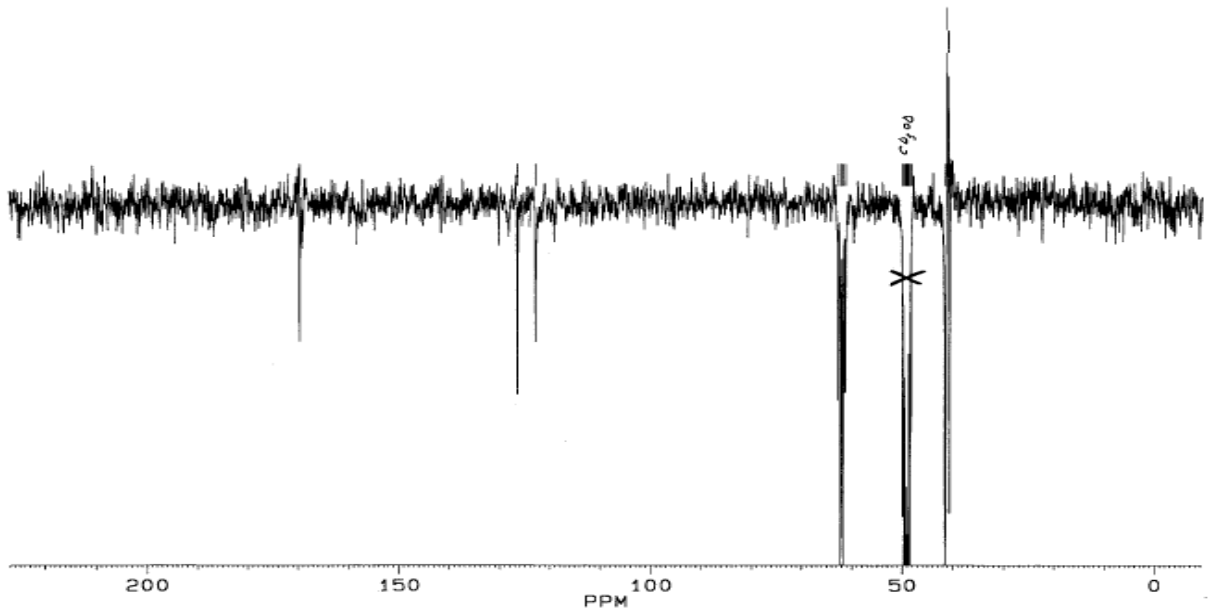




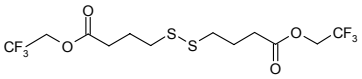
Compound **6** : ^{1}H-NMR, CD_3OD, 300MHz

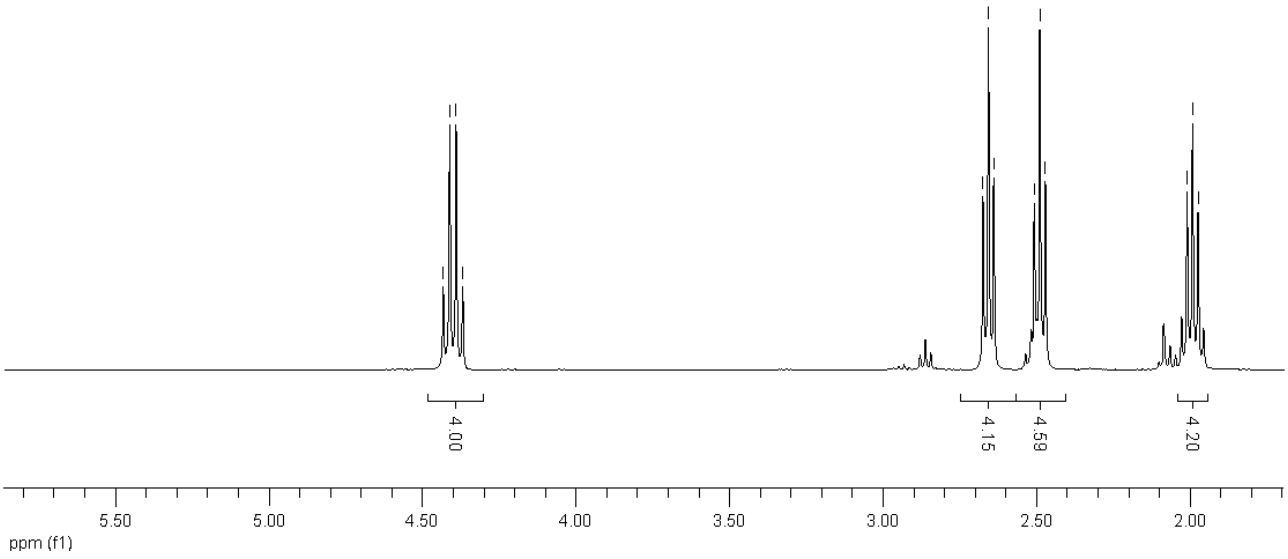
Compound **6** : ^{13}C-NMR (APT), CD_3OD, 75MHz



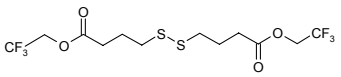


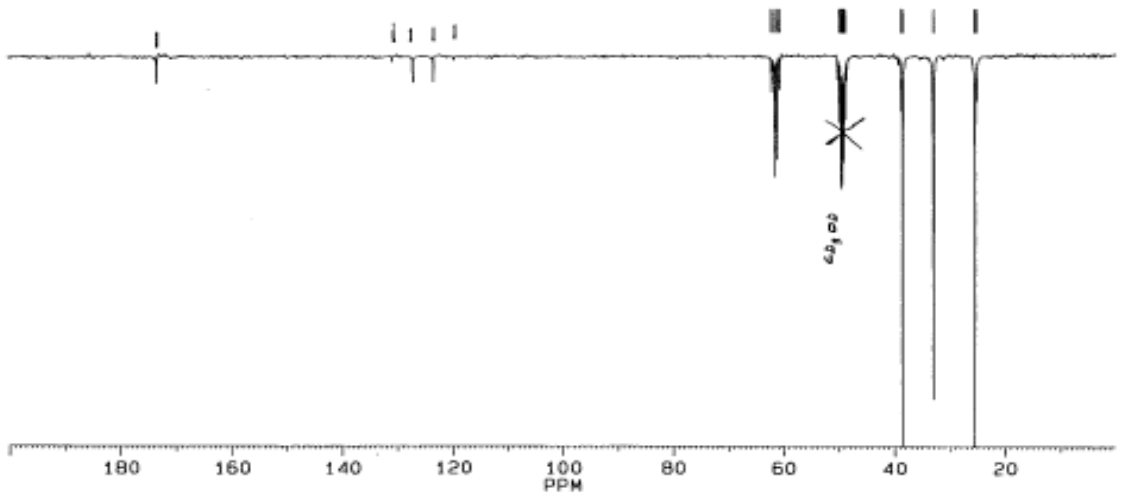
Compound **7**: ^{1}H-NMR, $CDCl_3$, 400MHz



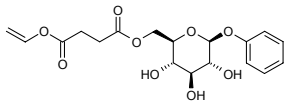


Compound **7**: ^{13}C-NMR (APT), CD_3OD, 75MHz

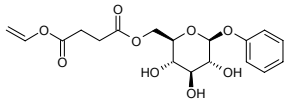




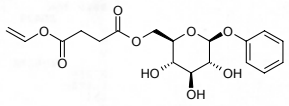
Compound **15**: ^{1}H-NMR, CD_3OD, 300MHz

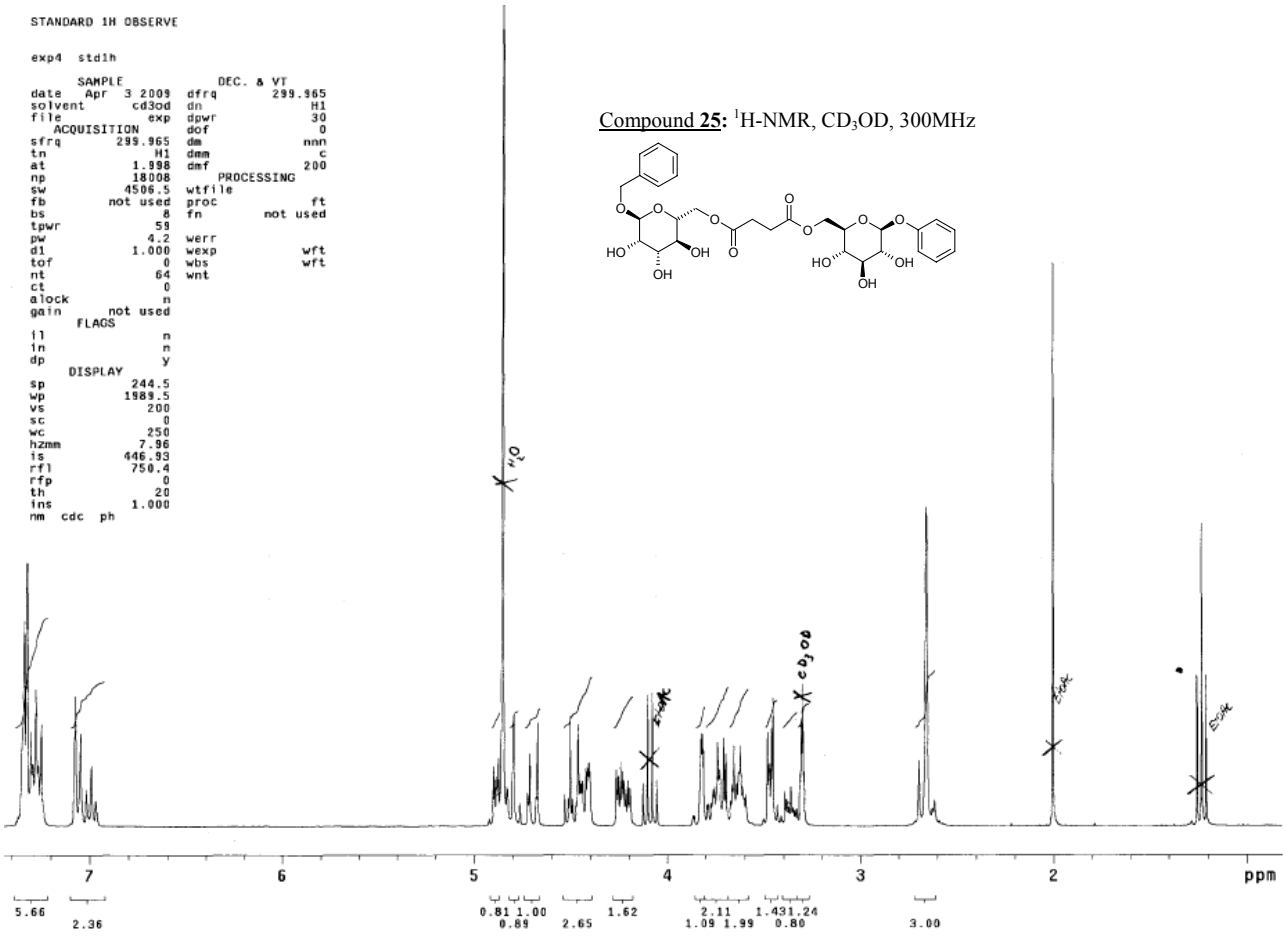


Compound **15**: ^{1}H-NMR, CD_3OD, 300MHz

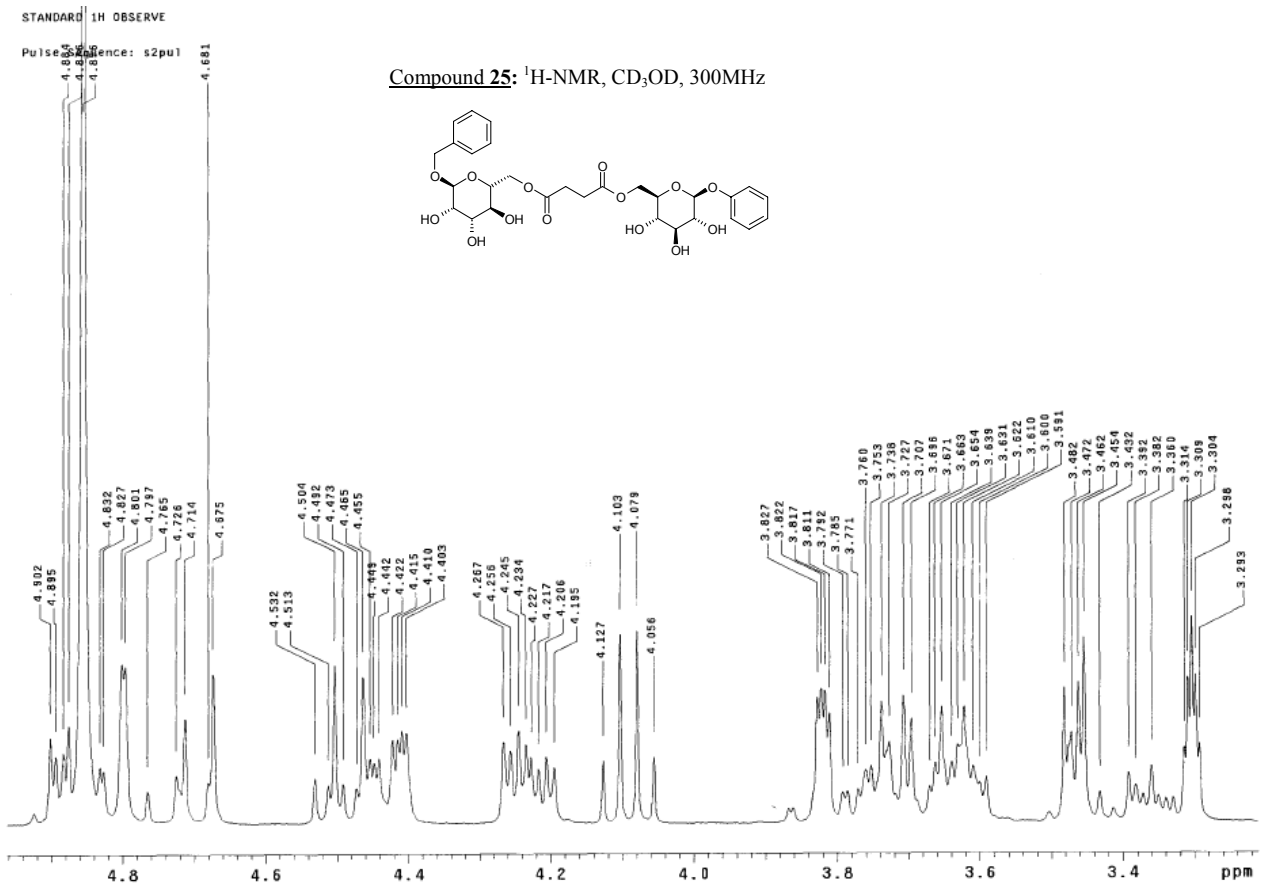


Compound **15**: ^{13}C-NMR, CD_3OD, 75MHz

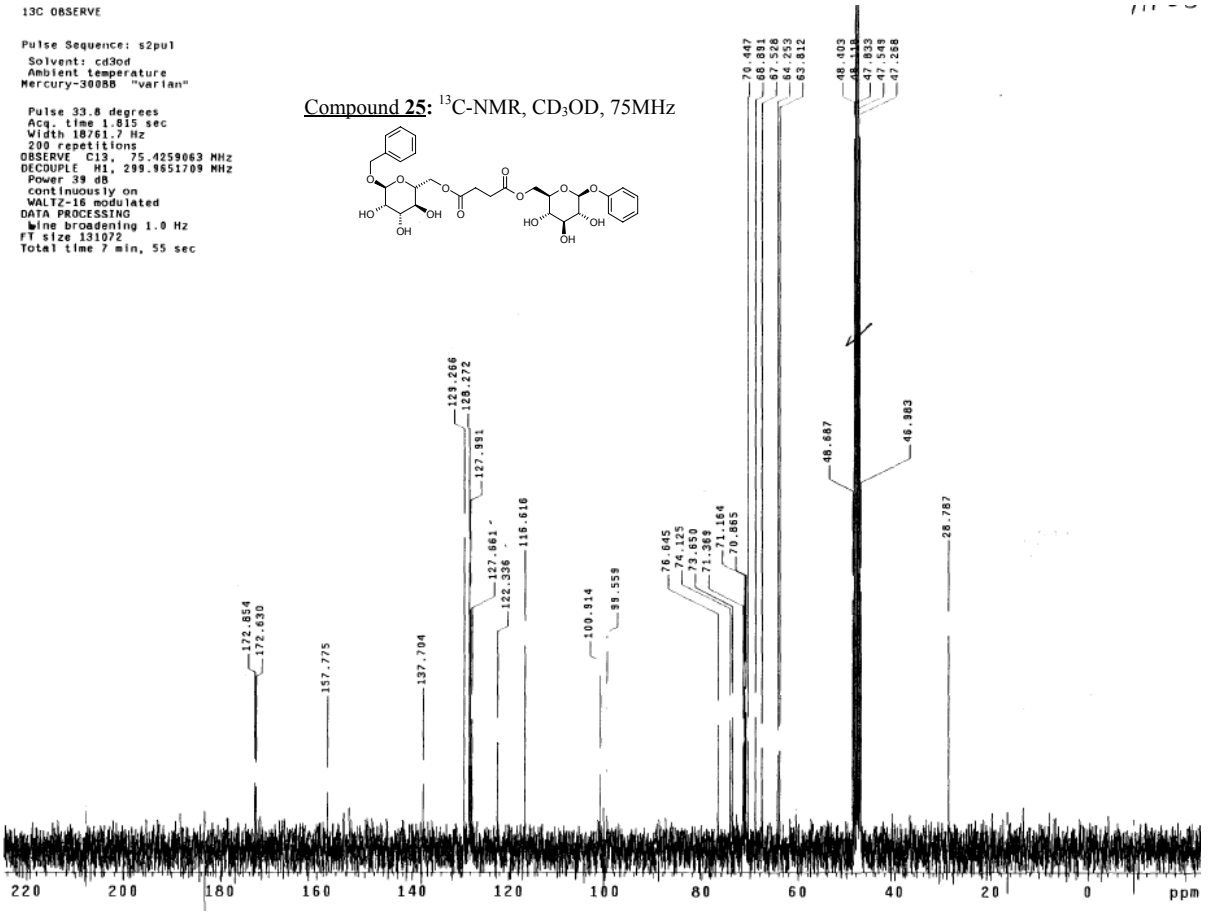




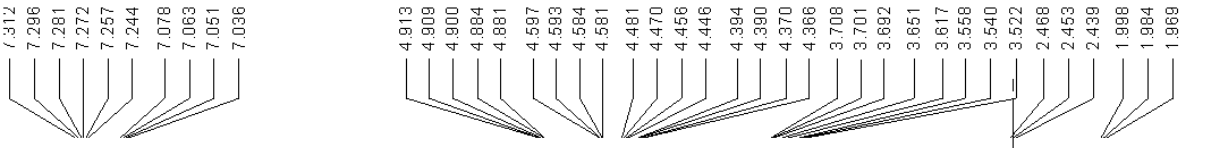
Compound **25**: ^{1}H-NMR, CD_3OD, 300MHz



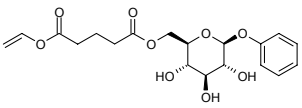
Compound **25**: ^{1}H-NMR, CD_3OD, 300MHz

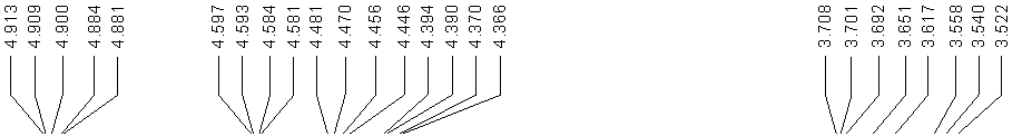


Compound **25**: ^{13}C-NMR, CD_3OD, 75MHz

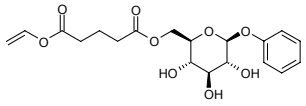


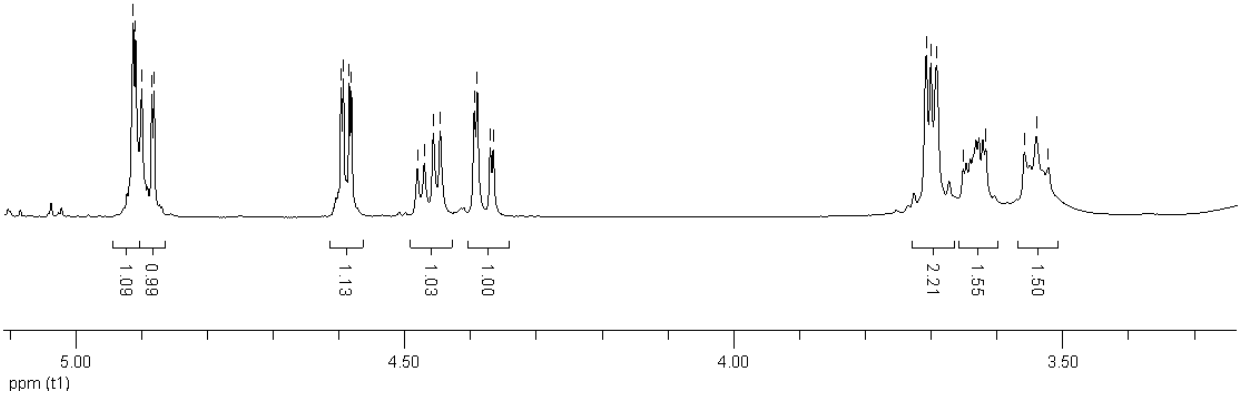
Compound **16**: ^{1}H-NMR, $CDCl_3$, 500MHz

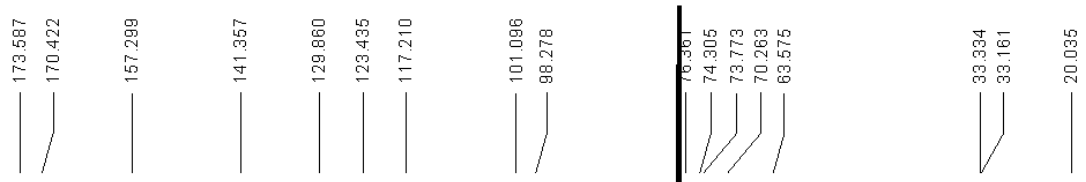




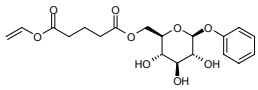
Compound **16**: ^{1}H-NMR, $CDCl_3$, 500MHz

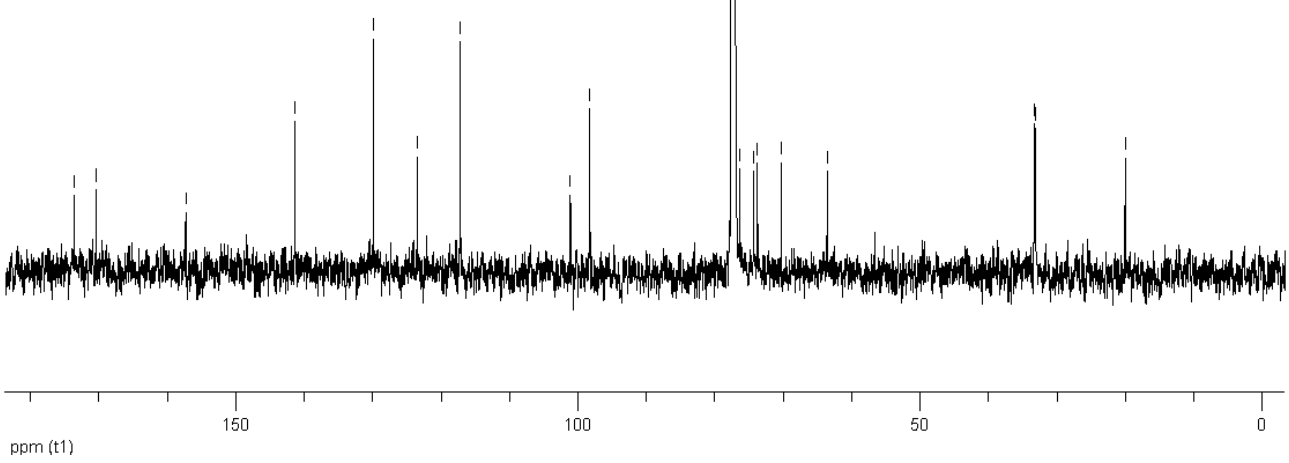


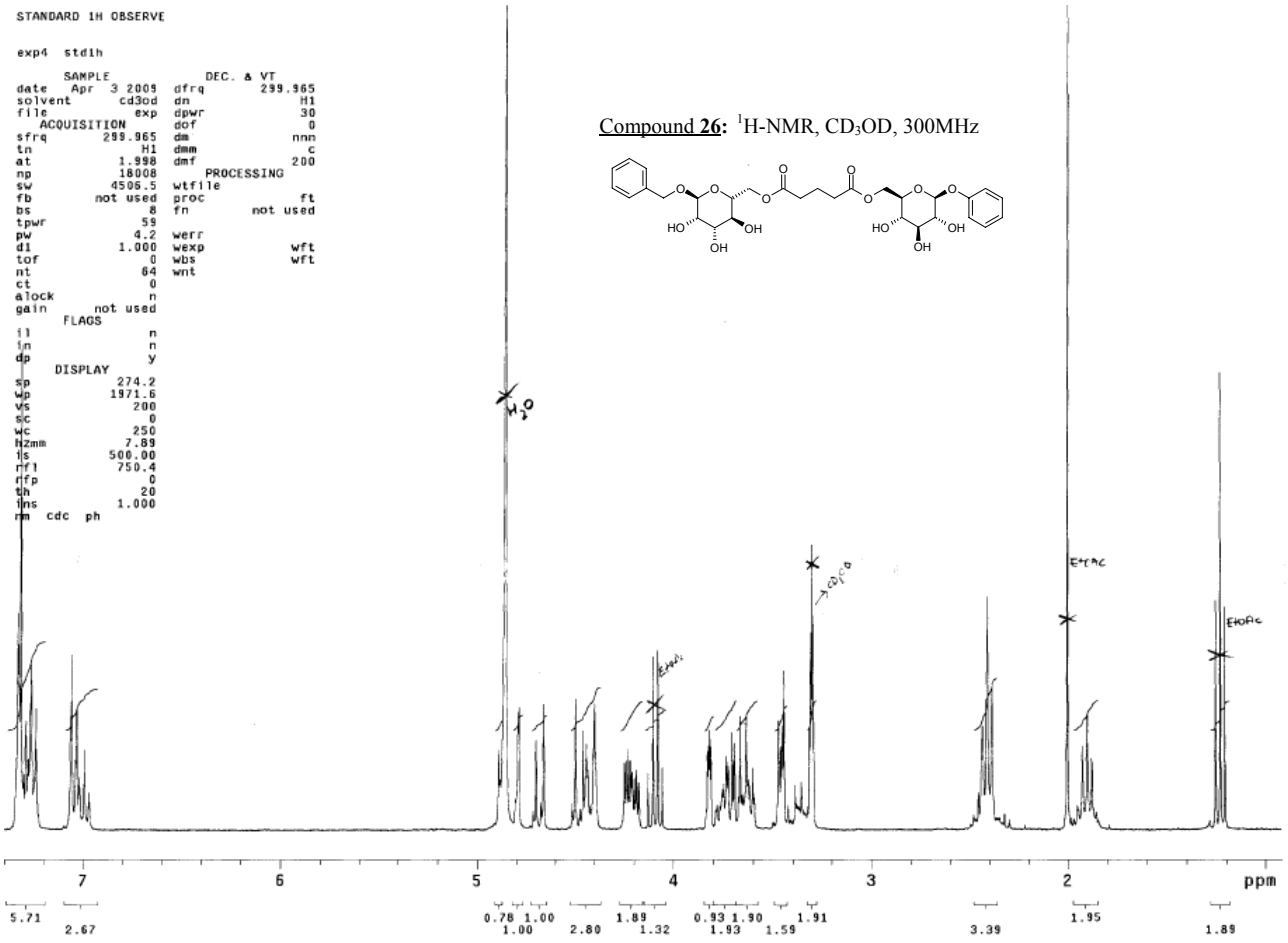




Compound **16**: ^{13}C-NMR, $CDCl_3$, 100MHz



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solvent cd3od
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sw 4506.5
fb not used
bs 8
tpwr 59
pw 4.2
d1 1.000
tof 0
nt 64
ct 0
alock n
gain not used
FLAGS
il n
in n
dp y
DISPLAY
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wp 1971.6
vs 200
sc 0
vc 250
hzmm 7.89
is 500.00
rfl 750.4
rfp 0
th 20
ins 1.000
nm cdc ph
DEC. & VT
dfrq 299.965
dn H1
dpwr 30
dof 0
dm nnn
dmm c
dmf 200
PROCESSING
wtfile
proc ft
fn not used
werr
wexp wft
wbs wft
wnt
Compound 26: 1H-NMR, CD3OD, 300MHz
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ppm
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1.00
2.80
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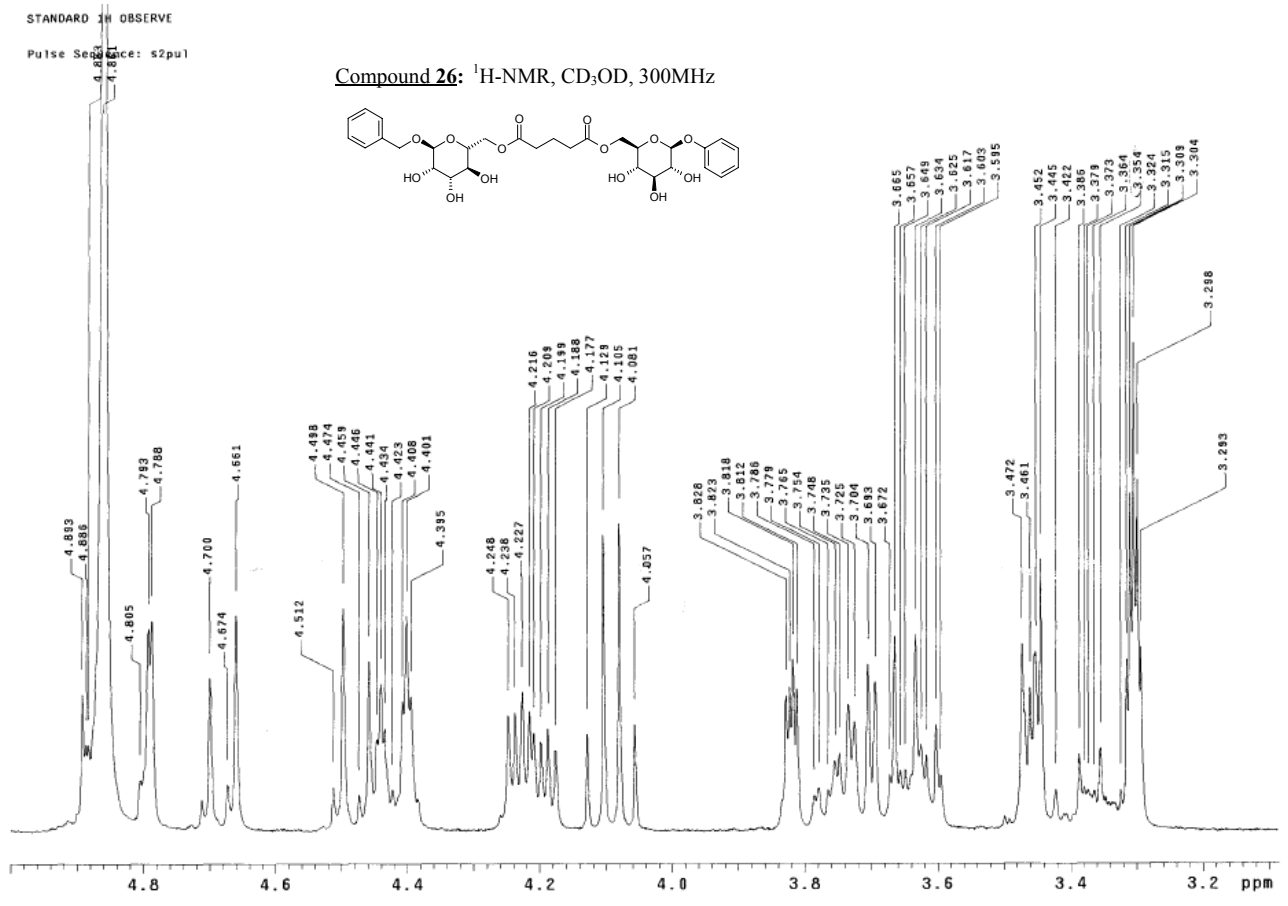
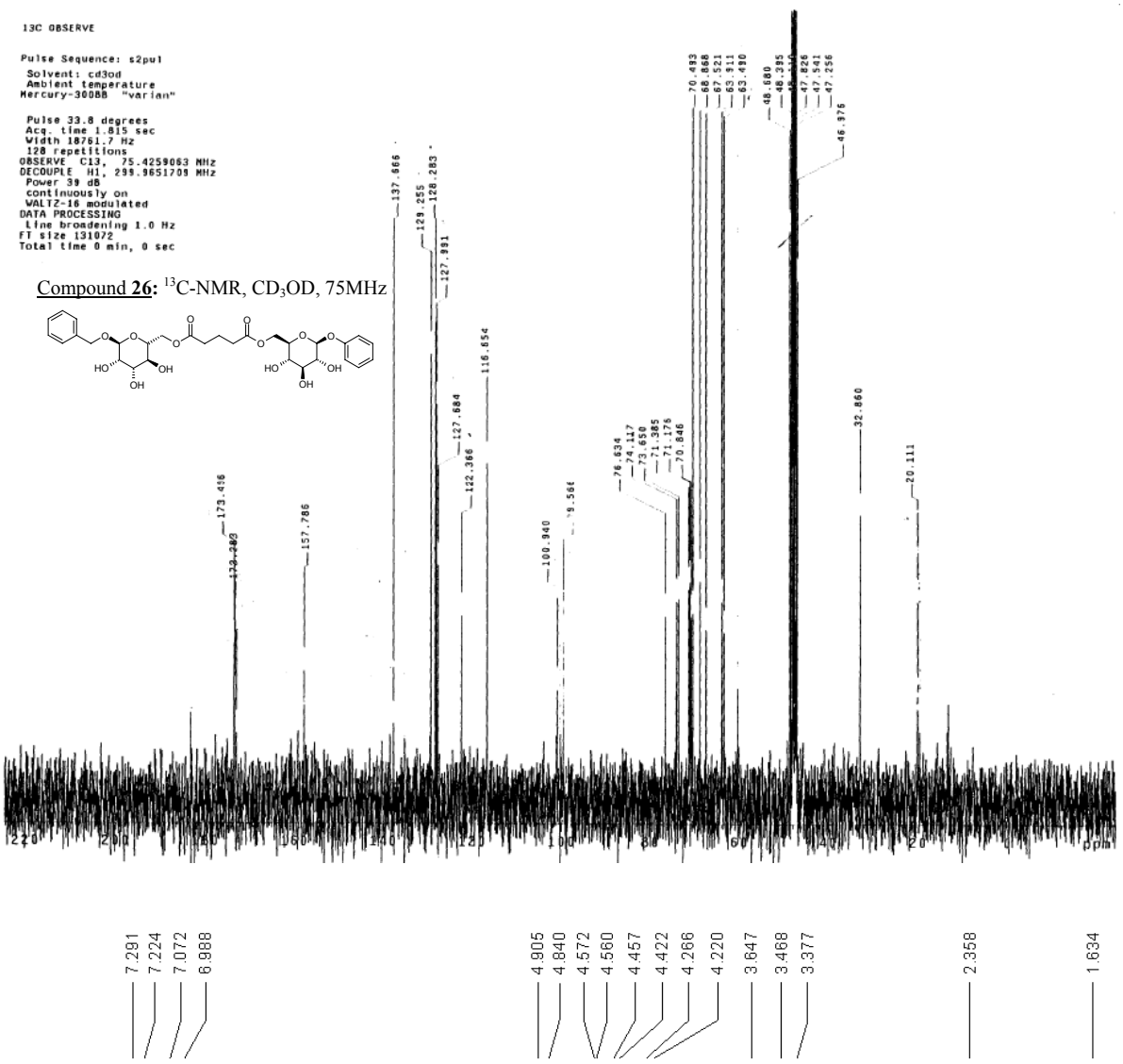
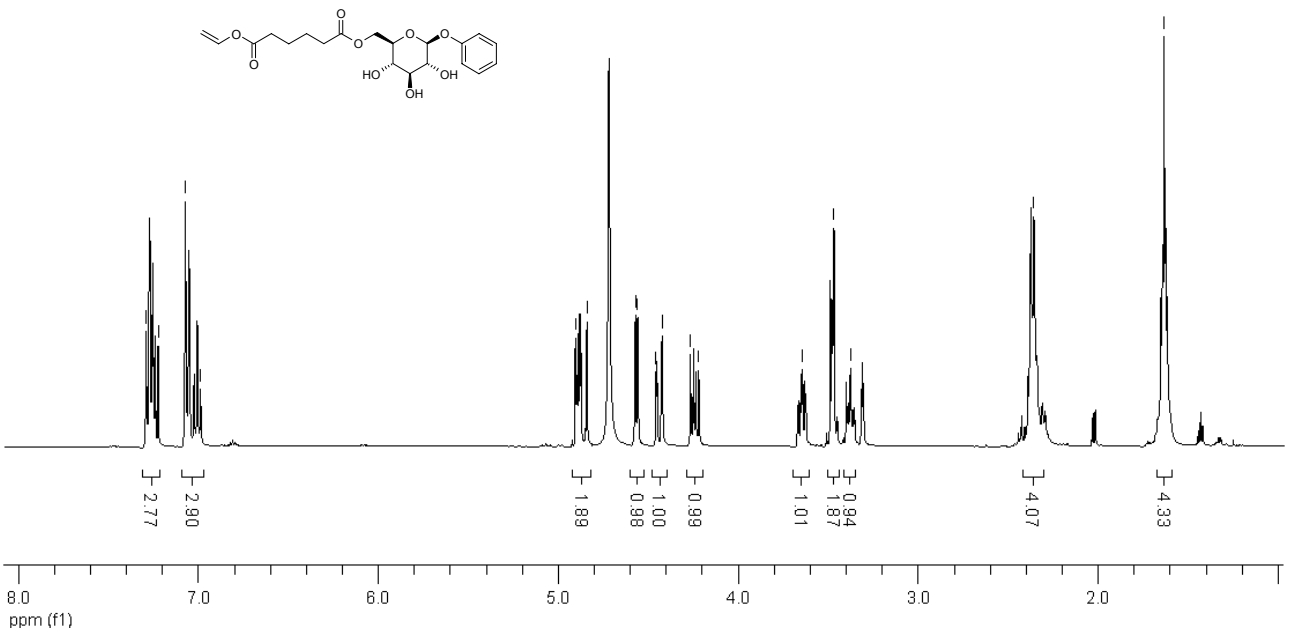
1.32
0.93
1.90
1.93
1.59
1.91
3.39
1.95
1.89

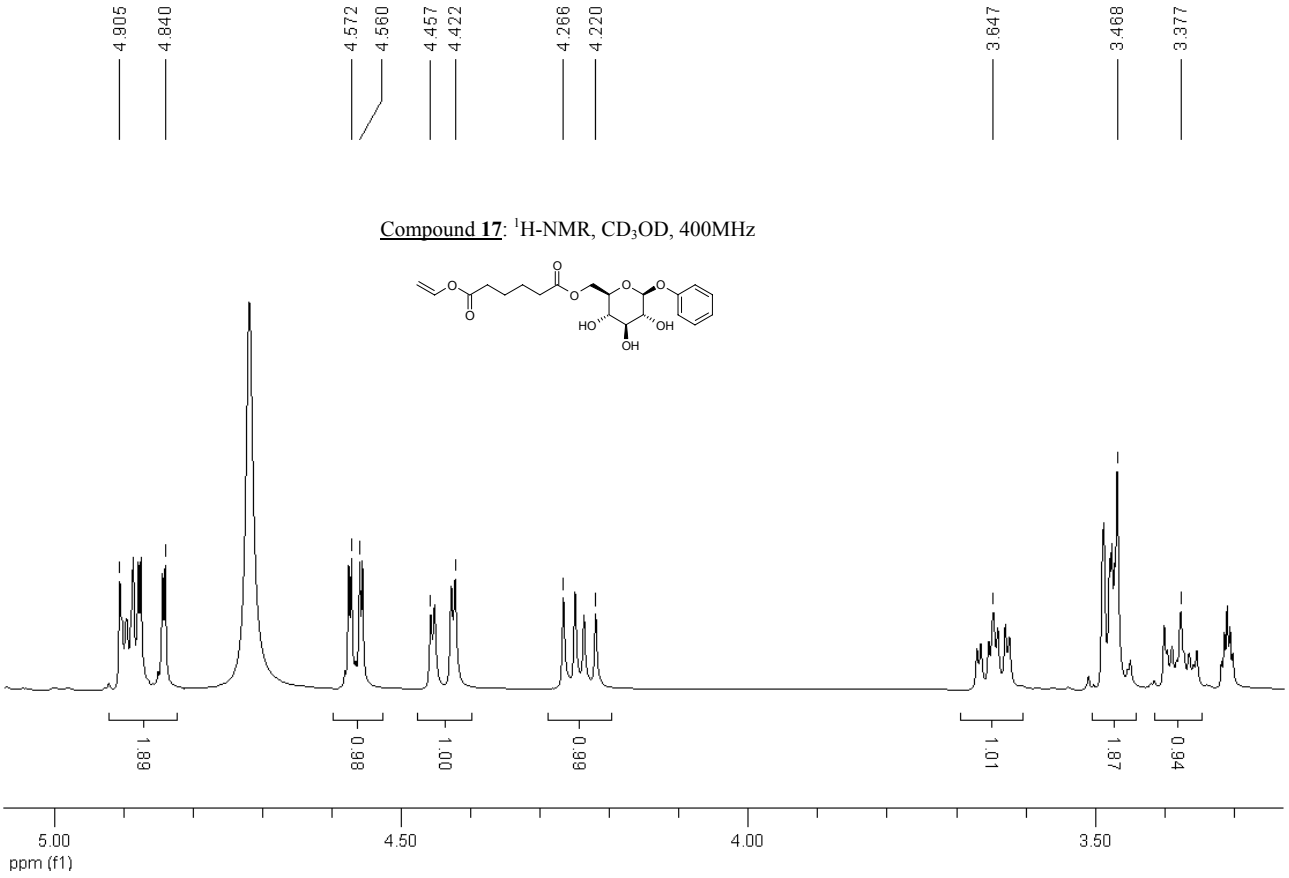

STANDARD 1H OBSERVE
Pulse Sequence: s2pul
Compound 26: 1H-NMR, CD3OD, 300MHz
4.824
4.811
4.793
4.788
4.893
4.886
4.805
4.700
4.674
4.661
4.512
4.488
4.474
4.459
4.446
4.441
4.434
4.423
4.408
4.401
4.395
4.248
4.238
4.227
4.216
4.209
4.199
4.188
4.177
4.129
4.105
4.081
4.057
3.828
3.823
3.818
3.812
3.786
3.779
3.765
3.754
3.748
3.735
3.725
3.704
3.693
3.672
3.665
3.657
3.649
3.634
3.625
3.617
3.603
3.595
3.472
3.461
3.452
3.445
3.422
3.386
3.379
3.373
3.364
3.354
3.324
3.315
3.309
3.304
3.288
3.283
4.8
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
ppm

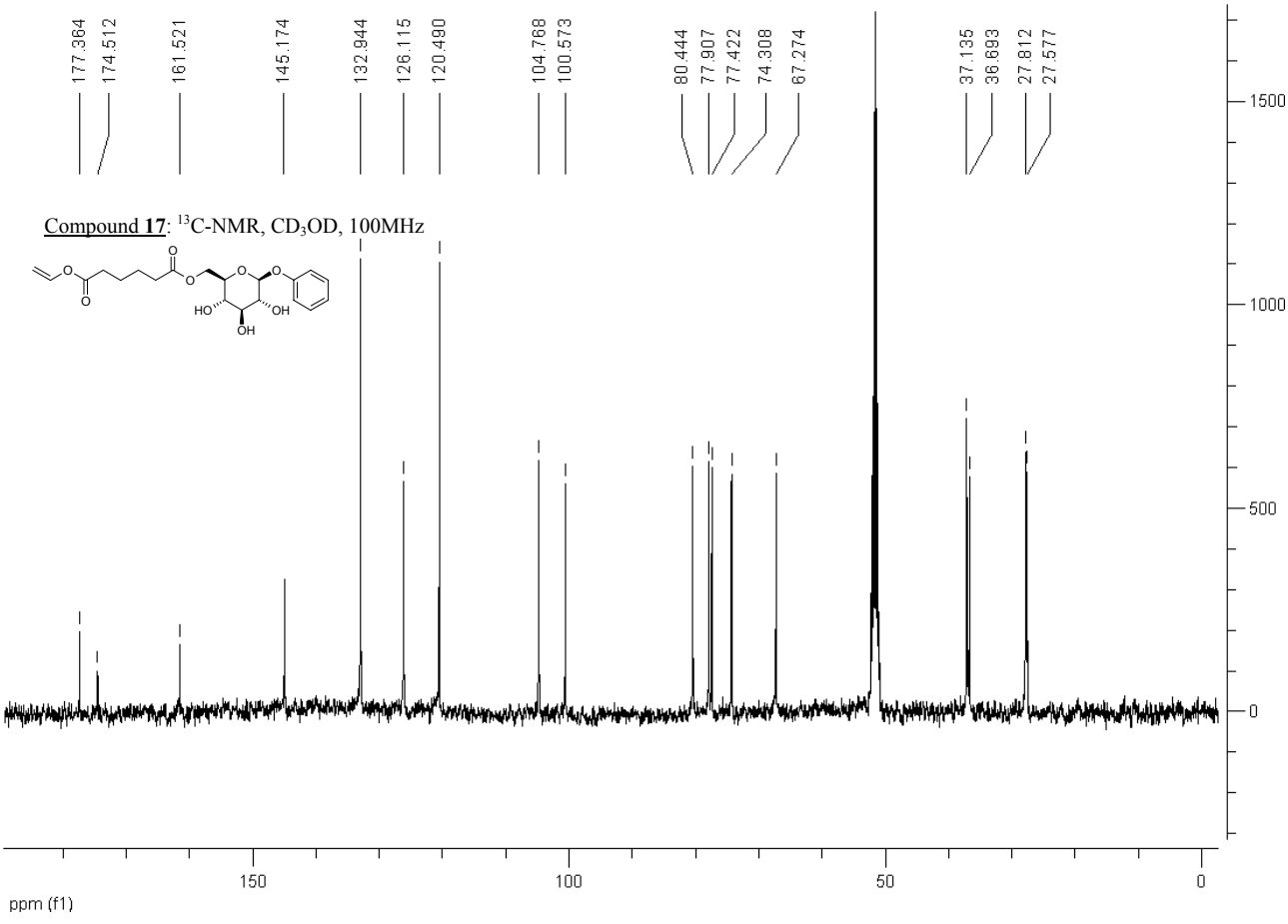


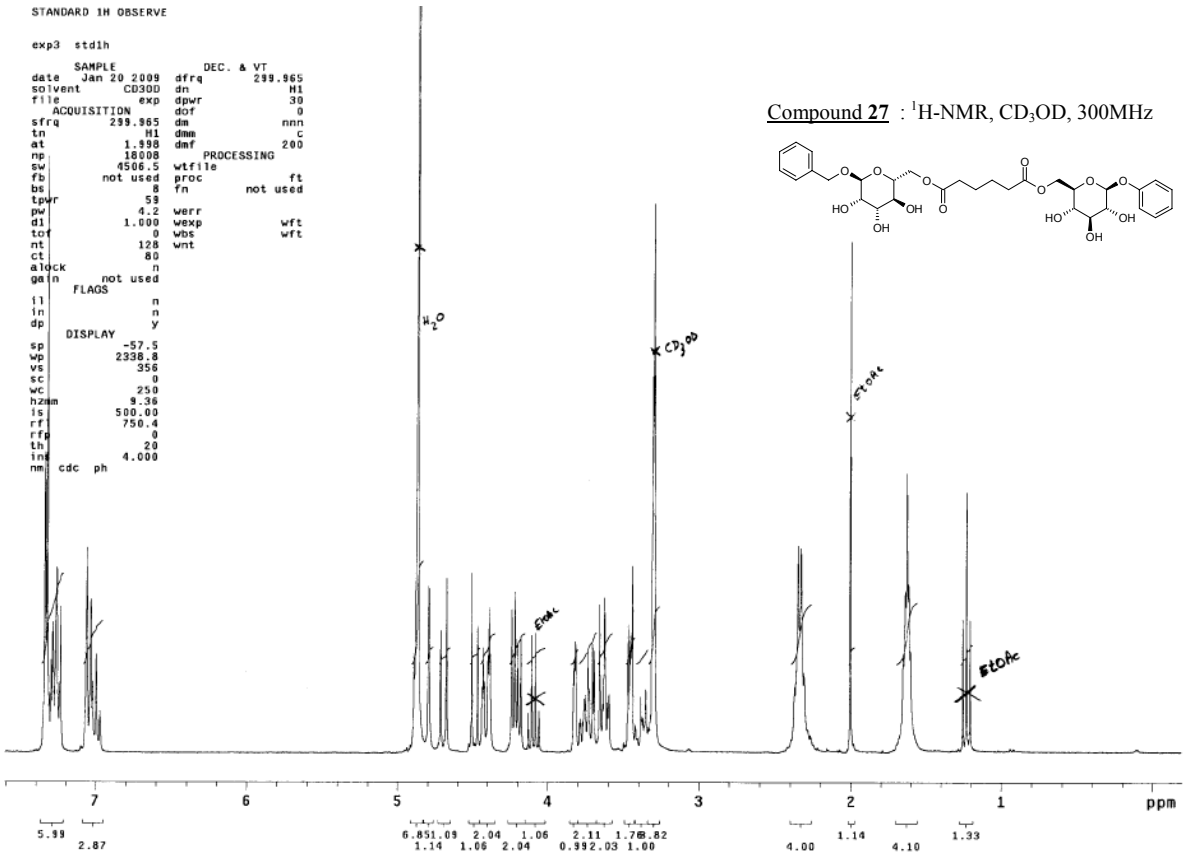
Compound **26**: ^{13}C-NMR, CD_3OD, 75MHz

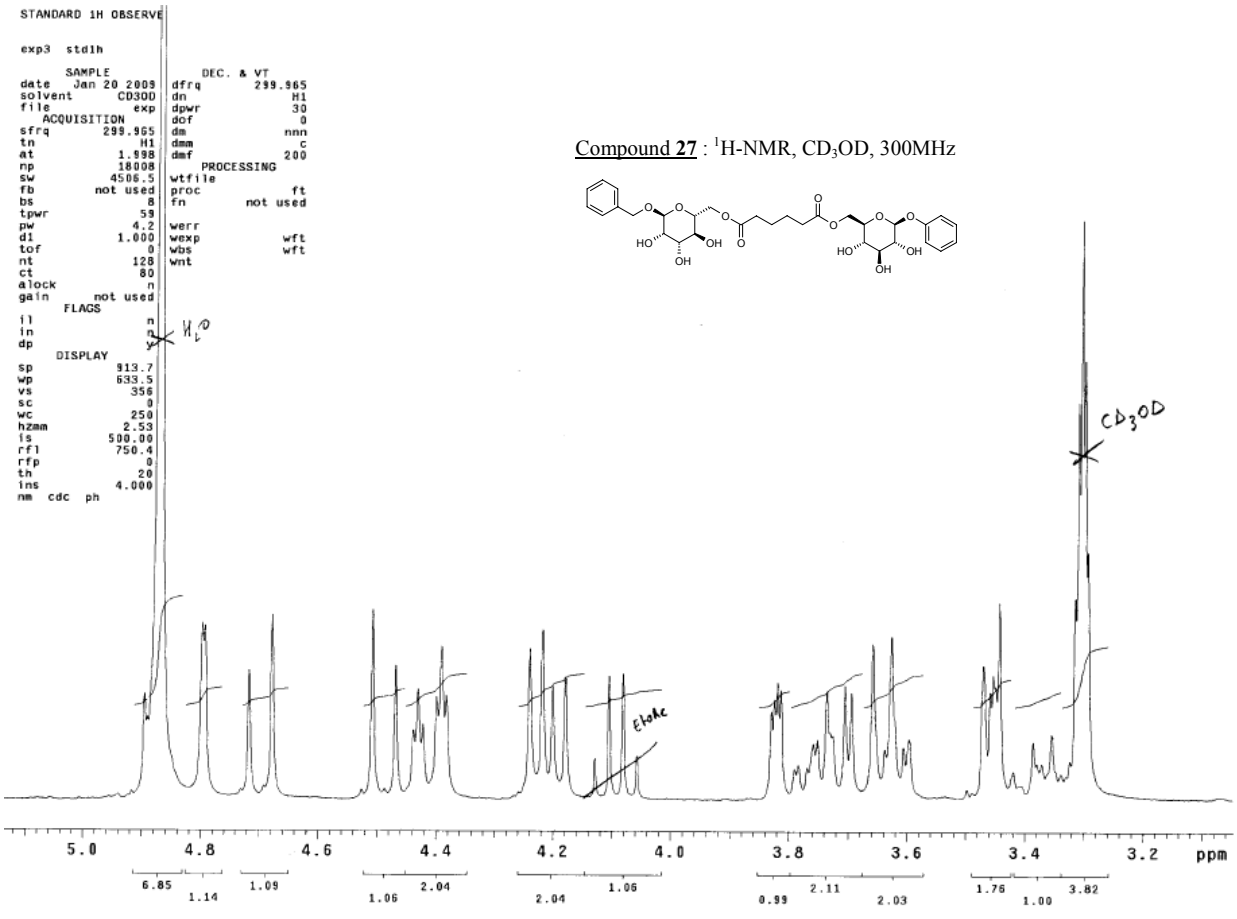


Compound **17**: ^{1}H-NMR, CD_3OD, 400MHz

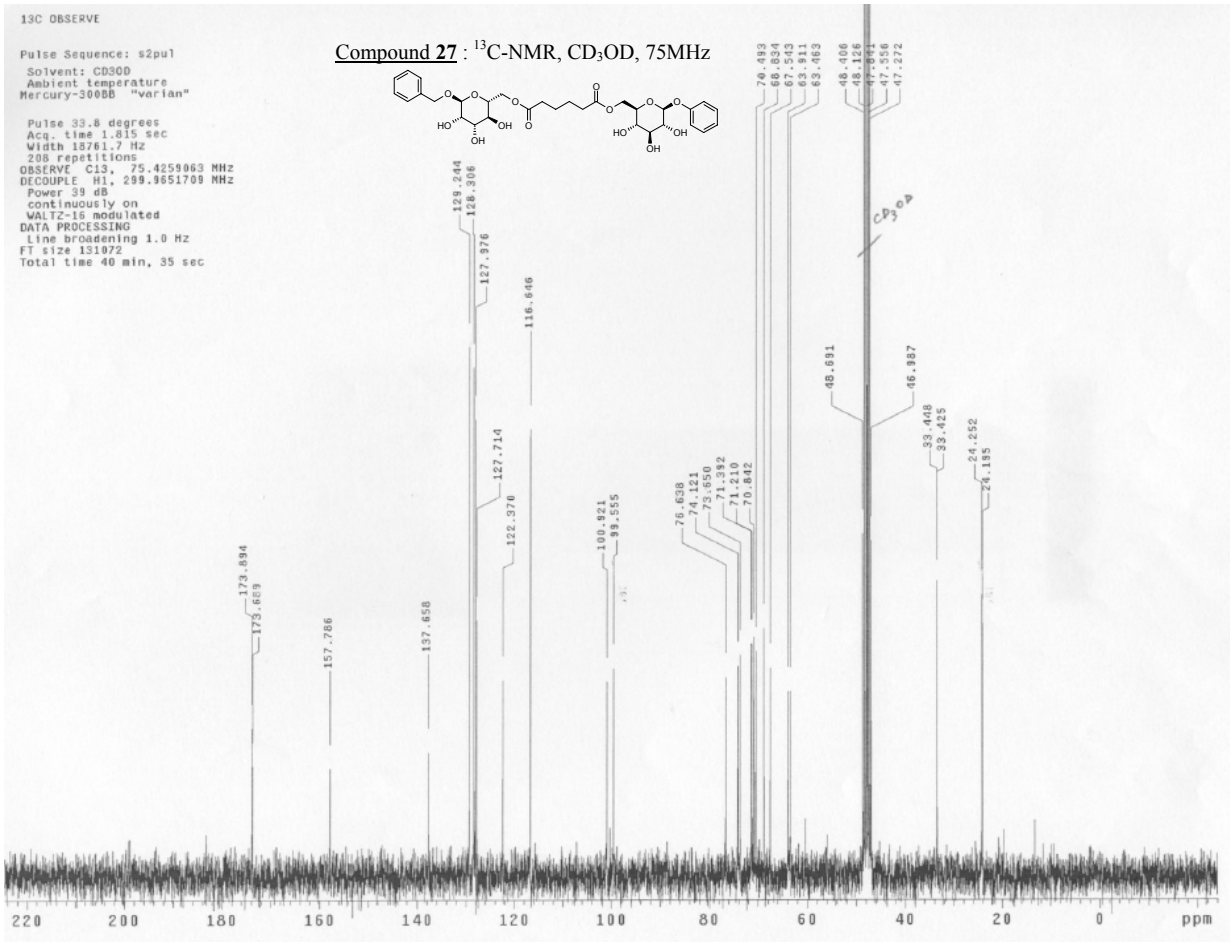

4.905
4.840
4.572
4.560
4.457
4.422
4.266
4.220
3.647
3.468
3.377
Compound 17: 1H-NMR, CD3OD, 400MHz
1.89
0.98
1.00
0.99
1.01
1.87
0.94
5.00
4.50
4.00
3.50
ppm (f1)


177.364
174.512
161.521
145.174
132.944
126.115
120.490
104.768
100.573
80.444
77.907
77.422
74.308
67.274
37.135
36.683
27.812
27.577
Compound 17: 13C-NMR, CD3OD, 100MHz
1500
1000
500
0
150
100
50
0
ppm (f1)

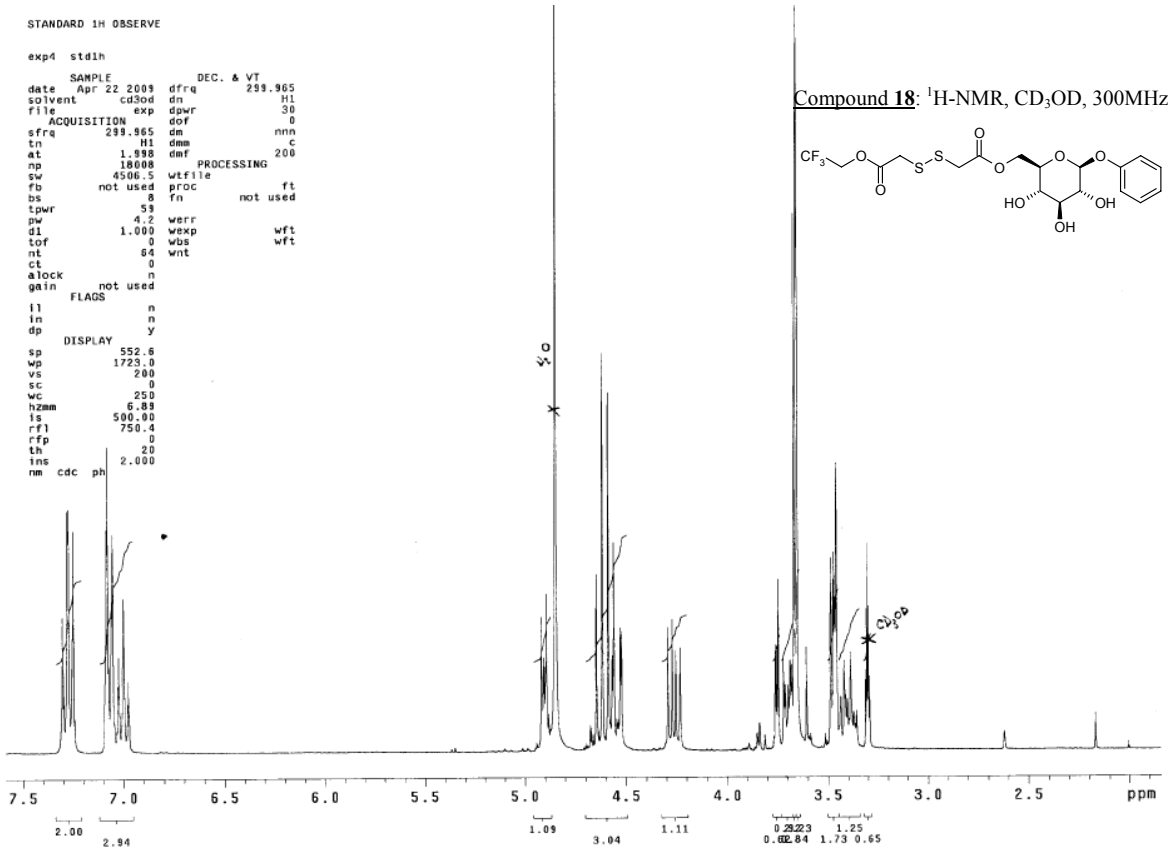

STANDARD 1H OBSERVE
exp3 std1h
SAMPLE
date Jan 20 2009
solvent CD3OD
file exp
ACQUISITION
sfrq 299.965
tn H1
at 1.998
np 18008
sw 4506.5
fb not used
bs 8
tpwr 59
pw 4.2
d1 1.000
tof 0
nt 128
ct 80
alock n
gain not used
FLAGS
il n
in n
dp y
DISPLAY
sp -57.5
wp 2338.8
vs 356
sc 0
wc 250
hzmm 9.36
is 500.00
rfl 750.4
rfp 0
th 20
ins 4.000
nm cdc ph
DEC. & VT
dfrq 299.965
dn H1
dpwr 30
dof 0
dm nnn
dmm c
dmf 200
PROCESSING
wtfile
proc ft
fn not used
werr
wexp wft
wbs wft
wnt
H2O
CD3OD
EtOAc
EtOAc
Compound 27 : 1H-NMR, CD3OD, 300MHz
7
6
5
4
3
2
1
ppm
5.99
2.87
6.85 1.03 2.04 1.06 2.11 1.78 3.82
1.14 1.06 2.04 0.99 2.03 1.00
4.00
1.14
4.10
1.33


STANDARD 1H OBSERVE
exp3 std1h
SAMPLE
date Jan 20 2009
solvent CD3OD
file exp
ACQUISITION
sfrq 299.965
tn H1
at 1.998
np 18008
sw 4506.5
fb not used
bs 8
tpwr 59
pw 4.2
d1 1.000
tof 0
nt 128
ct 80
alock n
gain not used
FLAGS
il n
in n
dp y
DISPLAY
sp 913.7
wp 633.5
vs 356
sc 0
wc 250
hzmm 2.53
is 500.00
rfl 750.4
rfp 0
th 20
ins 4.000
nm cdc ph
DEC. & VT
dfrq 299.965
dn H1
dpwr 30
dof 0
dm nnn
dmm c
dmf 200
PROCESSING
wtfile
proc ft
fn not used
werr
wexp wft
wbs wft
wnt
H2O
CD3OD
EtOAc
Compound 27 : 1H-NMR, CD3OD, 300MHz
5.0
4.8
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
ppm
6.85
1.14
1.09
1.06
2.04
2.04
1.06
0.99
2.11
2.03
1.76
1.00
3.82

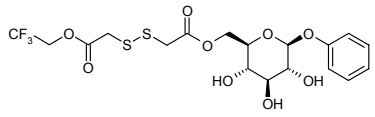
Compound **27** : ^{13}C-NMR, CD_3OD, 75MHz



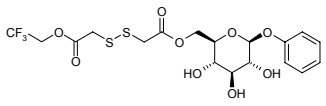
Compound **18**: ^{1}H-NMR, CD_3OD, 300MHz



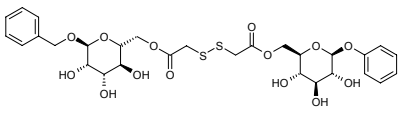
Compound **18**: ^{1}H-NMR, CD_3OD, 300MHz



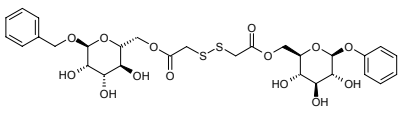
Compound **18**: ^{13}C-NMR, CD_3OD, 75MHz

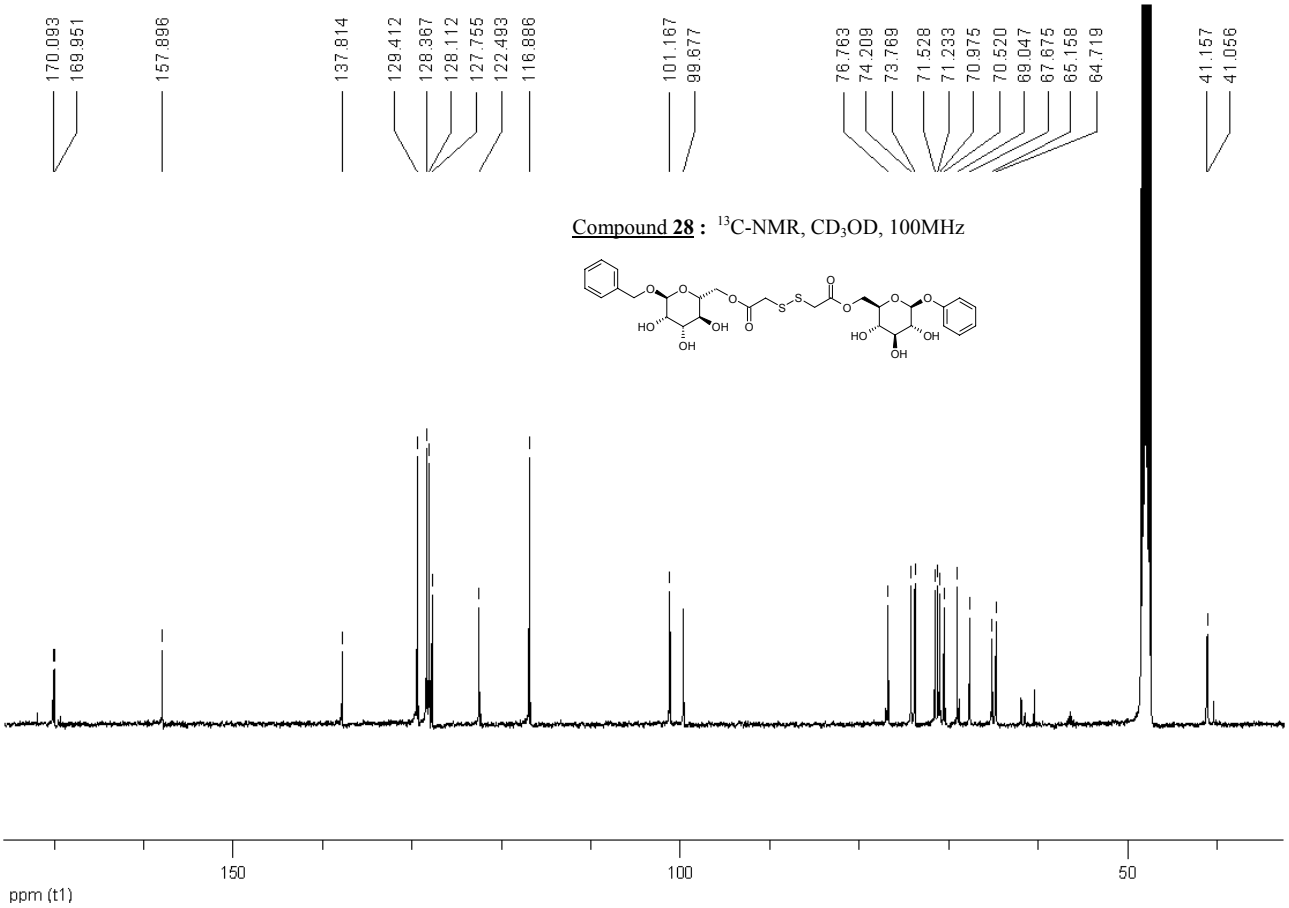


Compound **28** : ^{1}H-NMR, CD_3OD, 500MHz

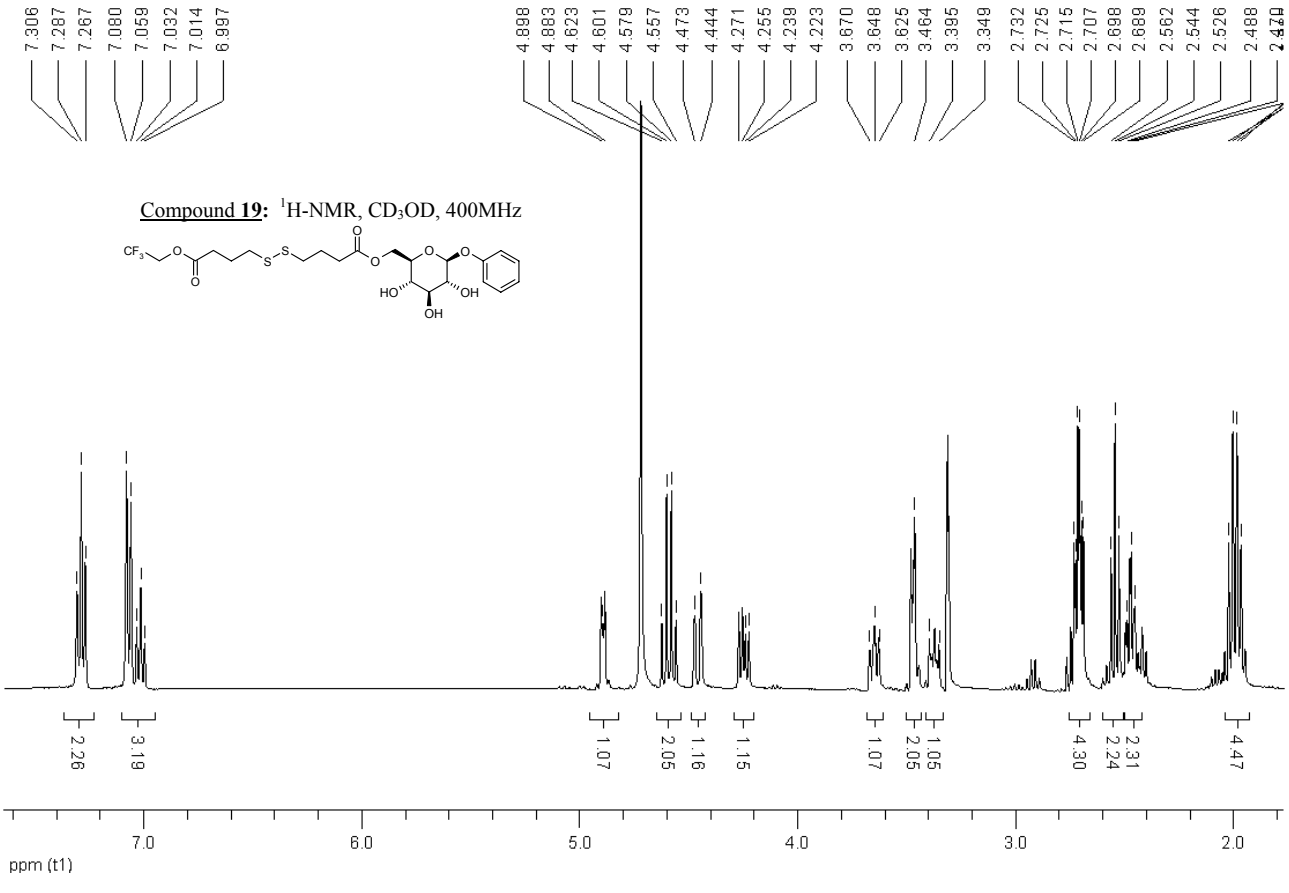


Compound **28** : ^{1}H-NMR, CD_3OD, 500MHz

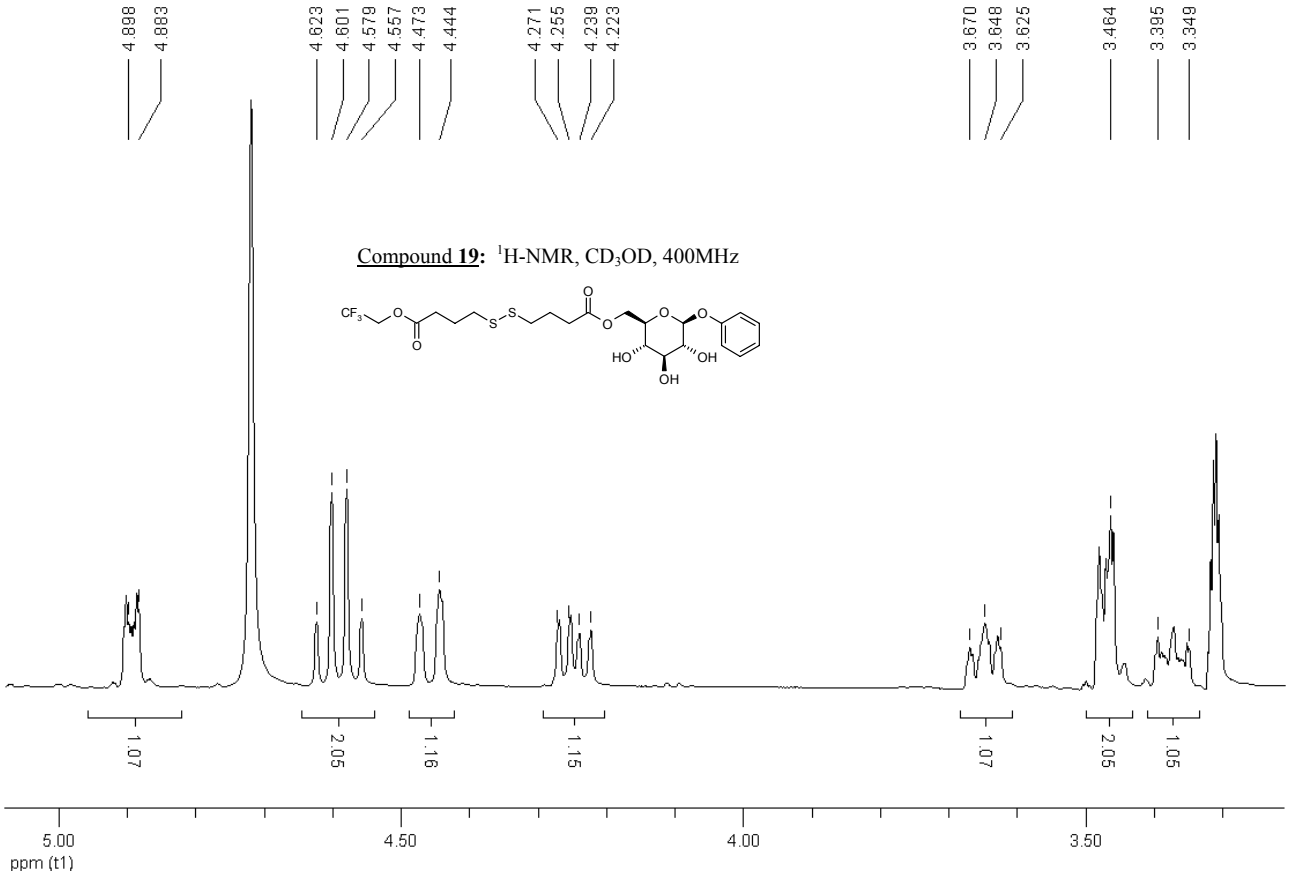




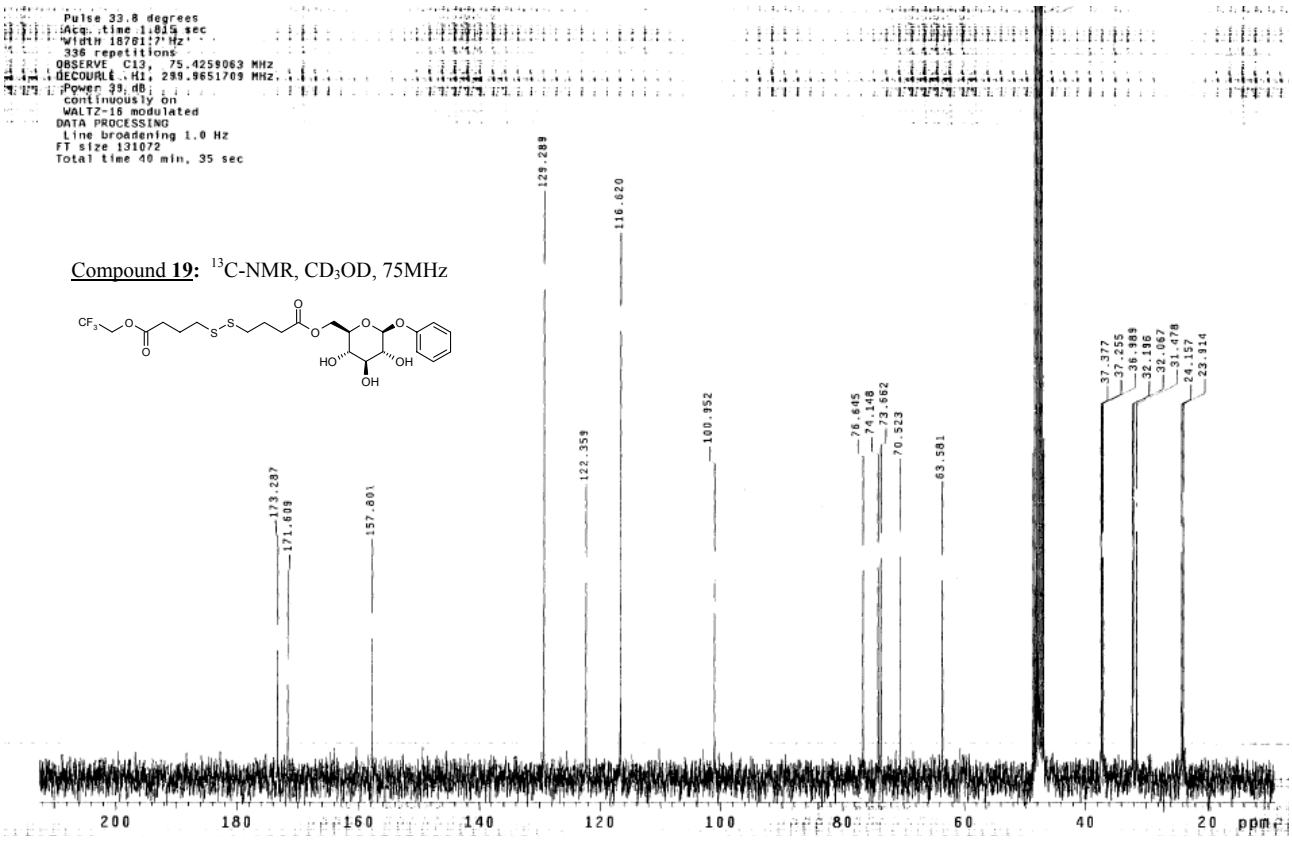
Compound **28** : ^{13}C-NMR, CD_3OD, 100MHz



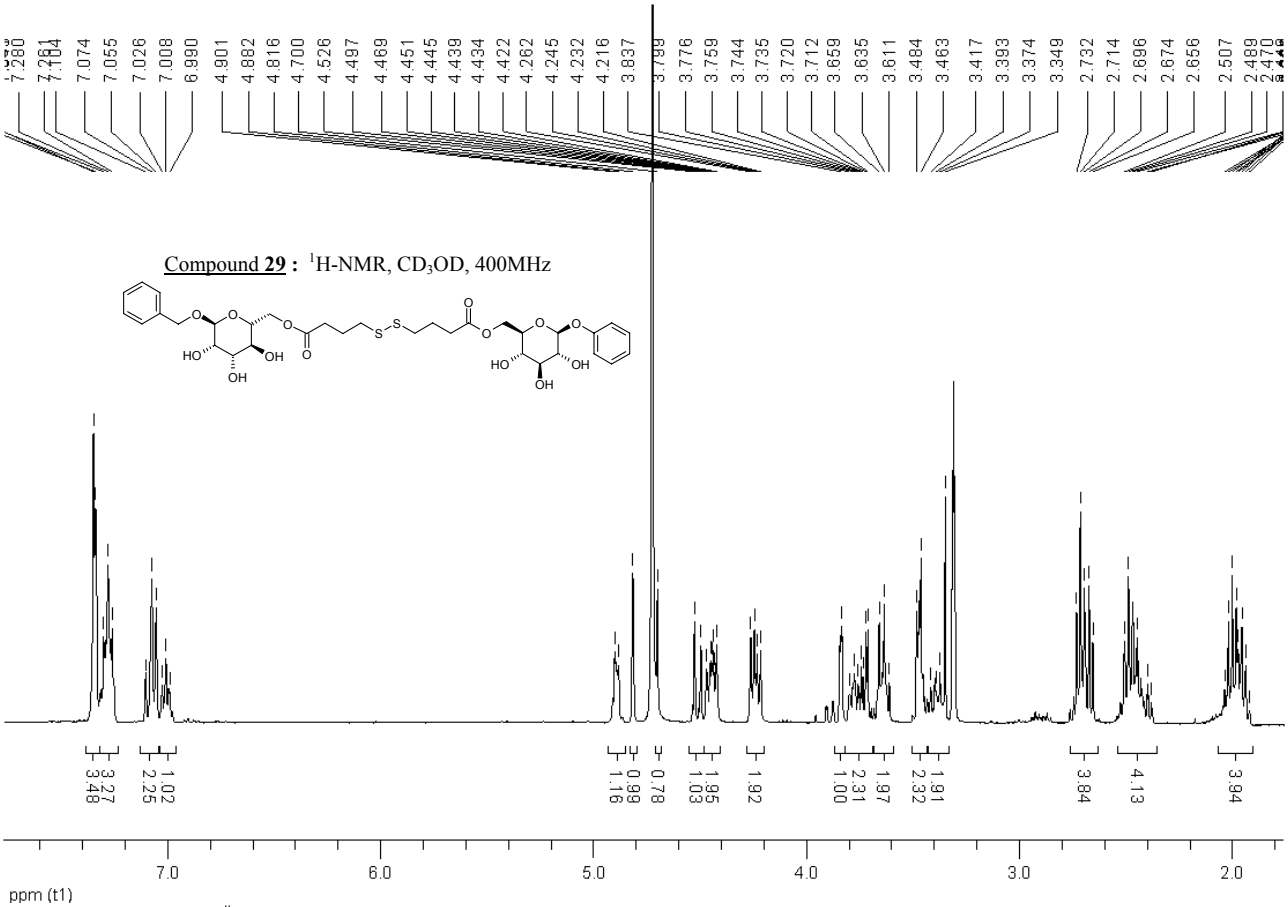
Compound **19**: ^{1}H-NMR, CD_3OD, 400MHz

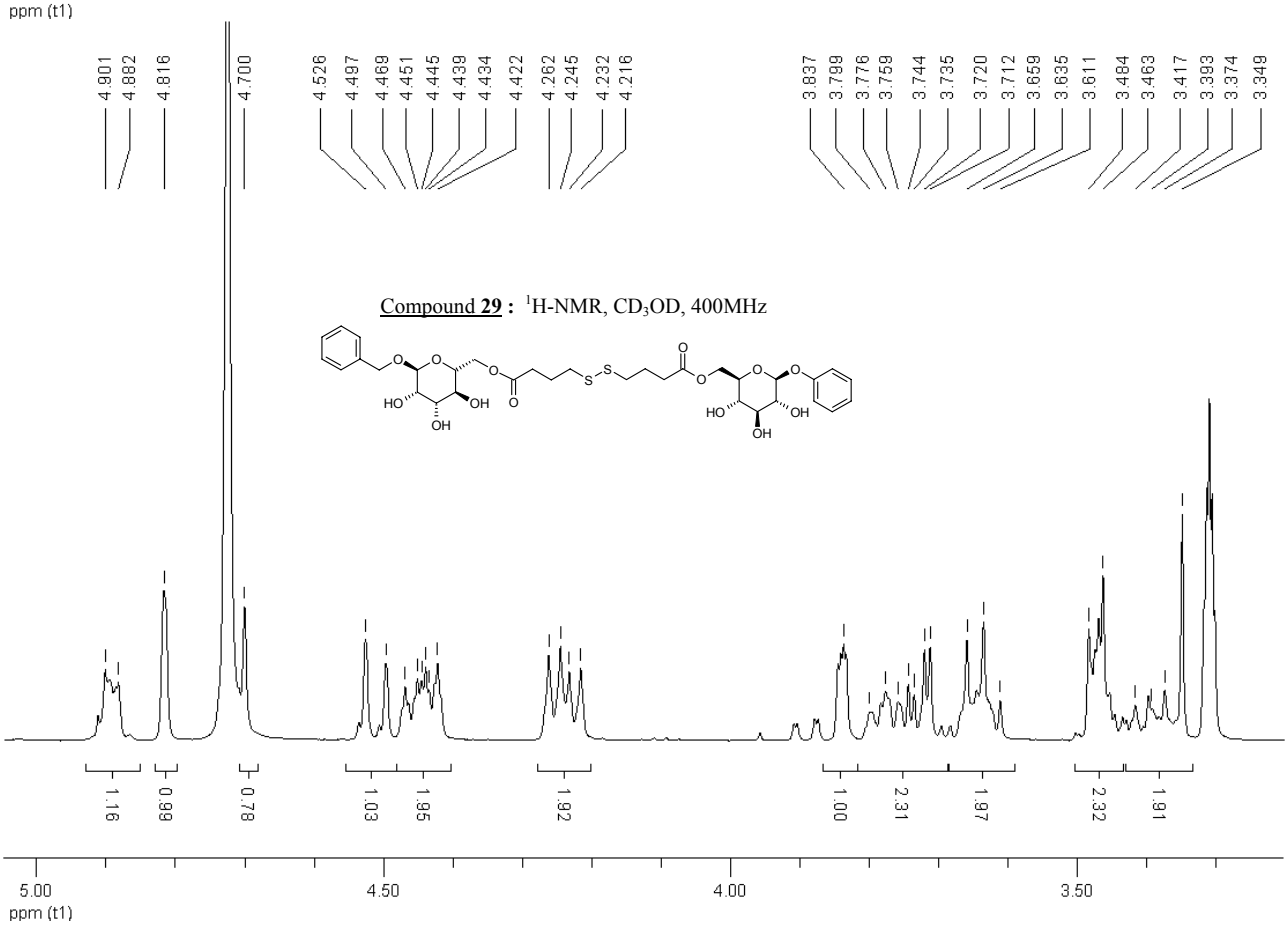


Compound **19**: ^{1}H-NMR, CD_3OD, 400MHz

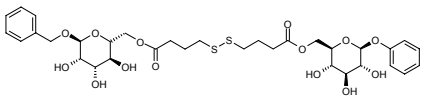


Compound **19**: ^{13}C-NMR, CD_3OD, 75MHz

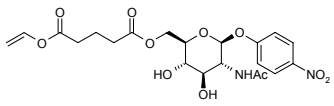

7.280
7.261
7.184
7.074
7.055
7.026
7.008
6.990
4.901
4.882
4.816
4.700
4.526
4.497
4.469
4.451
4.445
4.439
4.434
4.422
4.262
4.245
4.232
4.216
3.837
3.789
3.776
3.759
3.744
3.735
3.720
3.712
3.659
3.635
3.611
3.484
3.463
3.417
3.393
3.374
3.349
2.732
2.714
2.696
2.674
2.656
2.507
2.489
2.470
Compound 29 : 1H-NMR, CD3OD, 400MHz
HO
OH
OH
O
S
S
O
O
HO
OH
OH
3.48
3.27
2.25
1.02
1.16
0.89
0.78
1.03
1.95
1.92
1.00
2.31
1.97
2.32
1.91
3.84
4.13
3.94
7.0
6.0
5.0
4.0
3.0
2.0
ppm (t1)

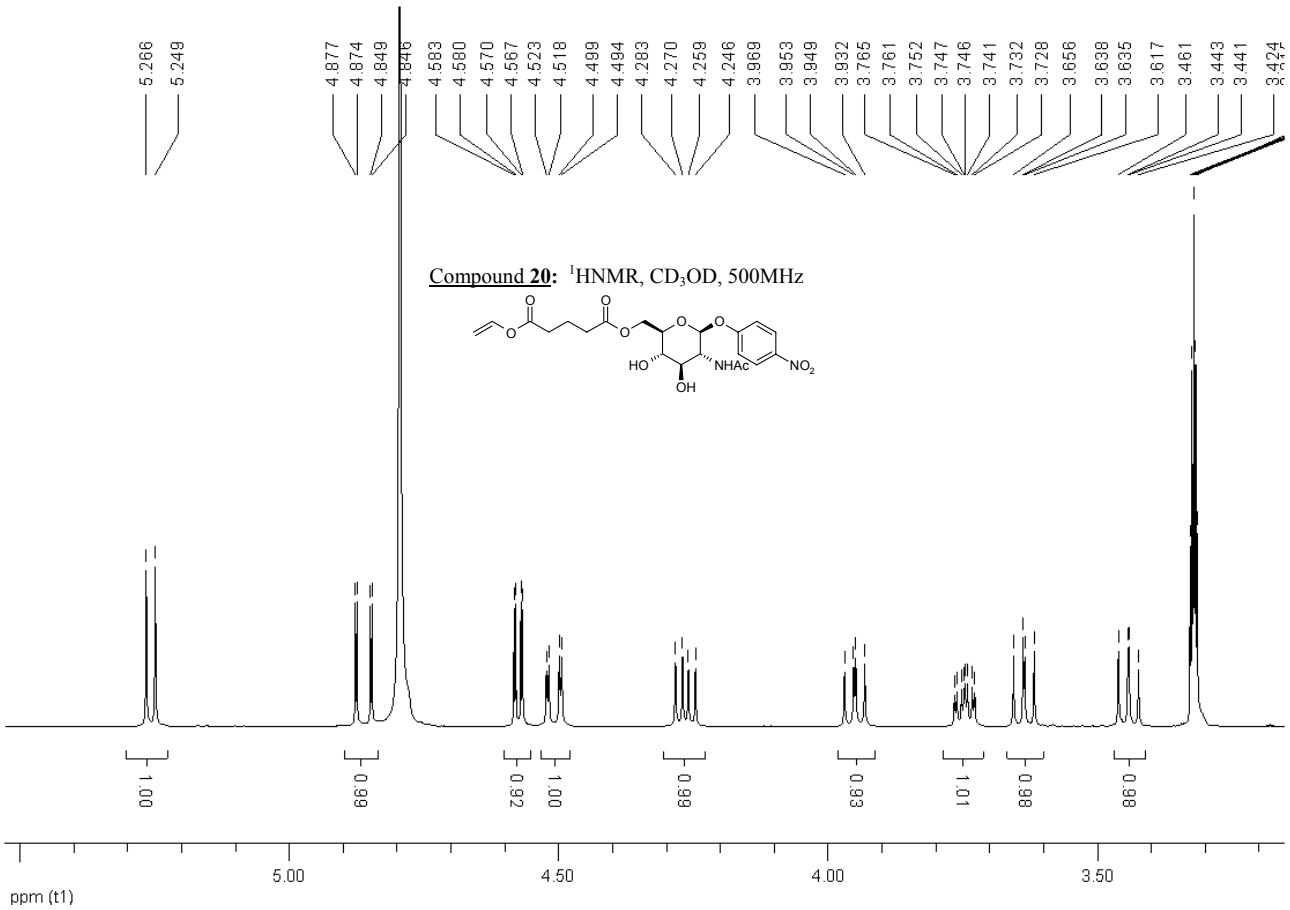

4.901
4.882
4.816
4.700
4.526
4.497
4.469
4.451
4.445
4.439
4.434
4.422
4.262
4.245
4.232
4.216
3.837
3.799
3.776
3.759
3.744
3.735
3.720
3.712
3.659
3.635
3.611
3.484
3.463
3.417
3.393
3.374
3.349
Compound 29 : 1H-NMR, CD3OD, 400MHz
HO
OH
OH
O
S
S
O
O
HO
OH
OH
1.16
0.89
0.78
1.03
1.95
1.92
1.00
2.31
1.87
2.32
1.81
5.00
4.50
4.00
3.50
ppm (t1)

Compound **29** : ^{13}C-NMR (APT), CD_3OD, 75MHz

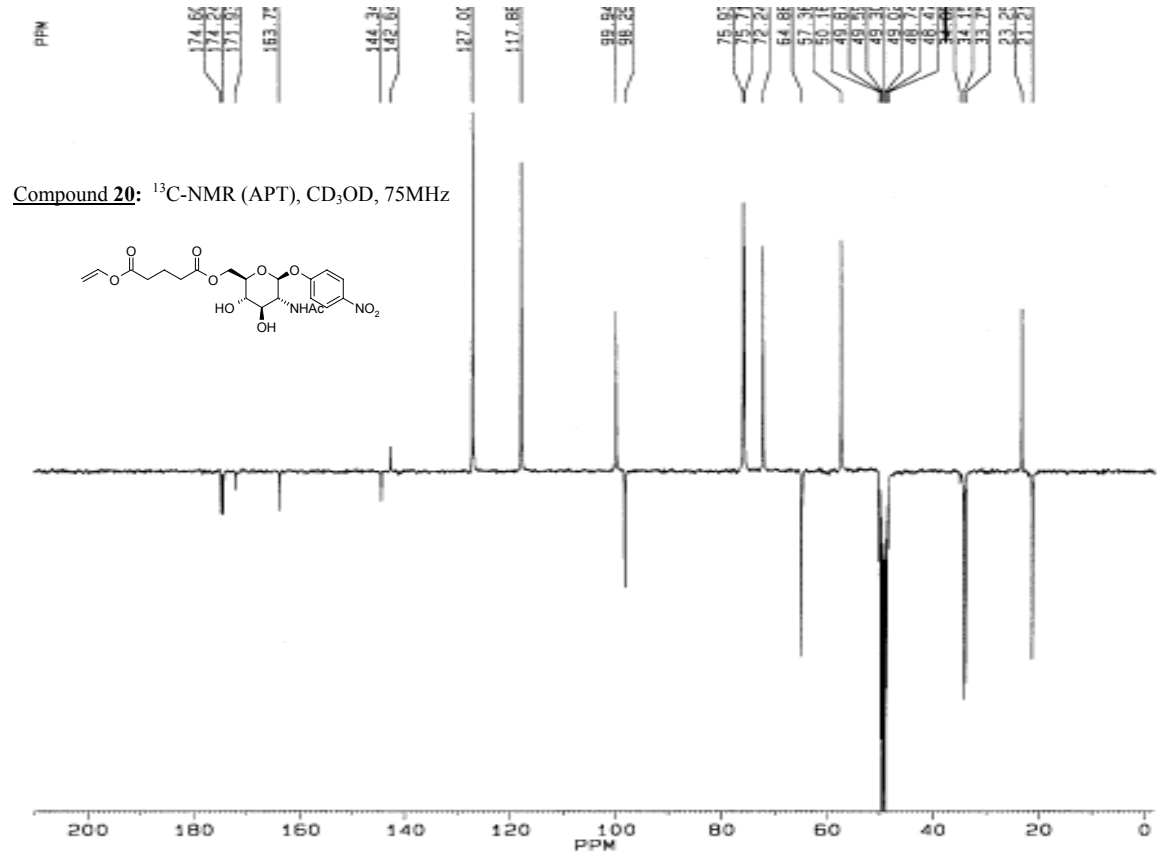


Compound **20**: ^{1}H-NMR, CD_3OD, 500MHz



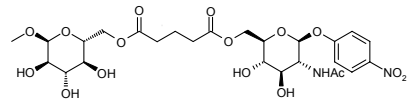


Compound **20**: ^{1}HNMR, CD_3OD, 500MHz

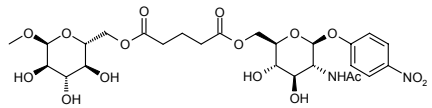


Compound **20**: ^{13}C-NMR (APT), CD_3OD, 75MHz

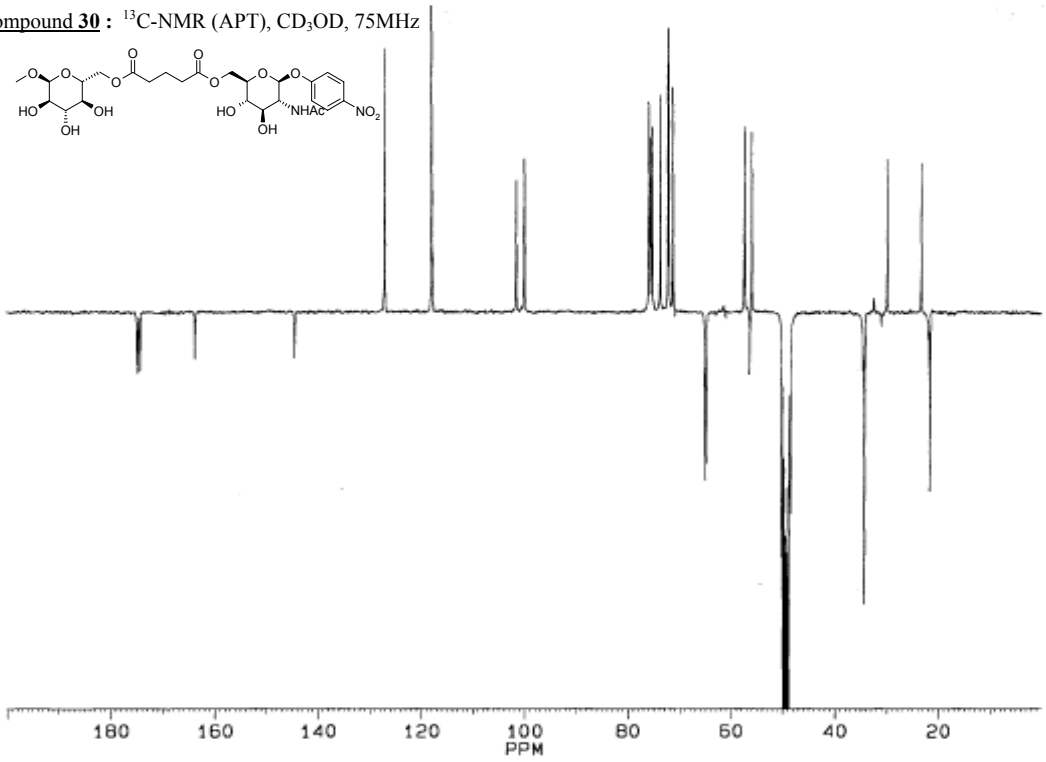
Compound **30** : ^{1}H-NMR, CD_3OD, 400MHz

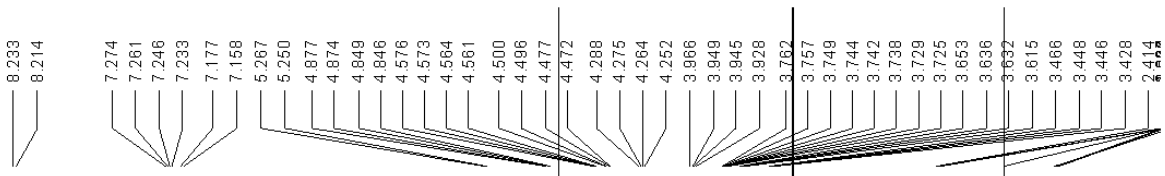


Compound **30** : ^{1}H-NMR, CD_3OD, 400MHz

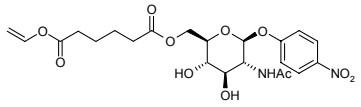


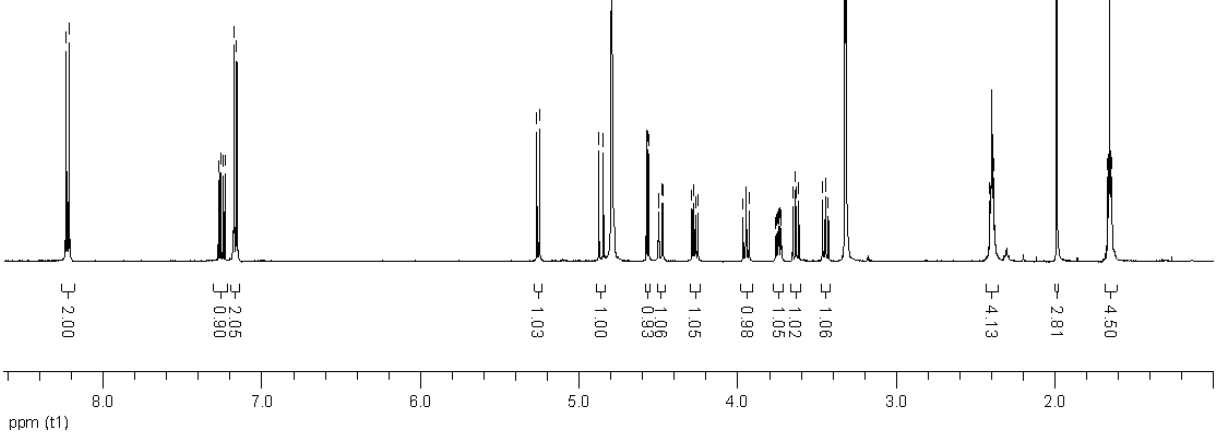
Compound **30** : ^{13}C-NMR (APT), CD_3OD, 75MHz

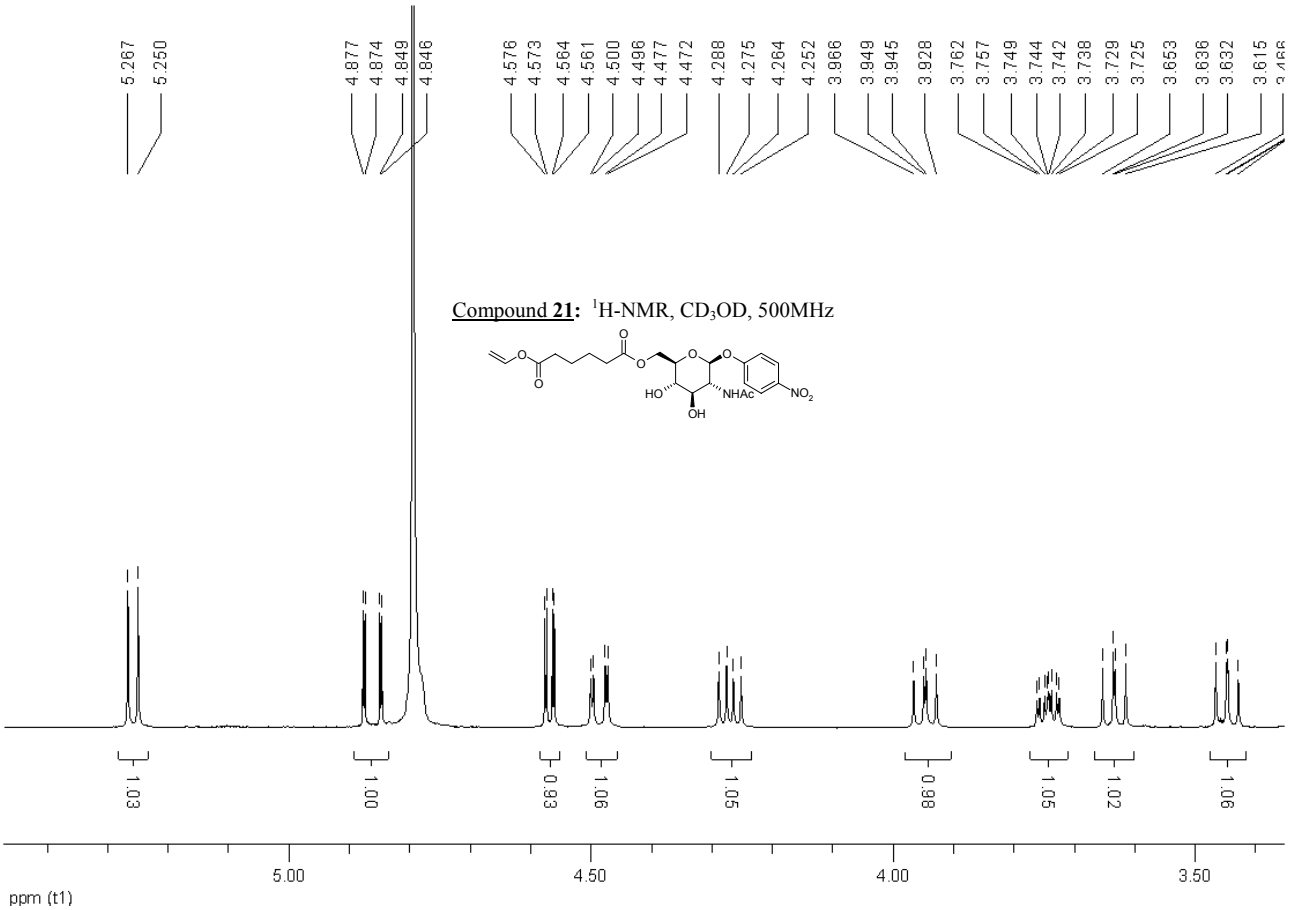




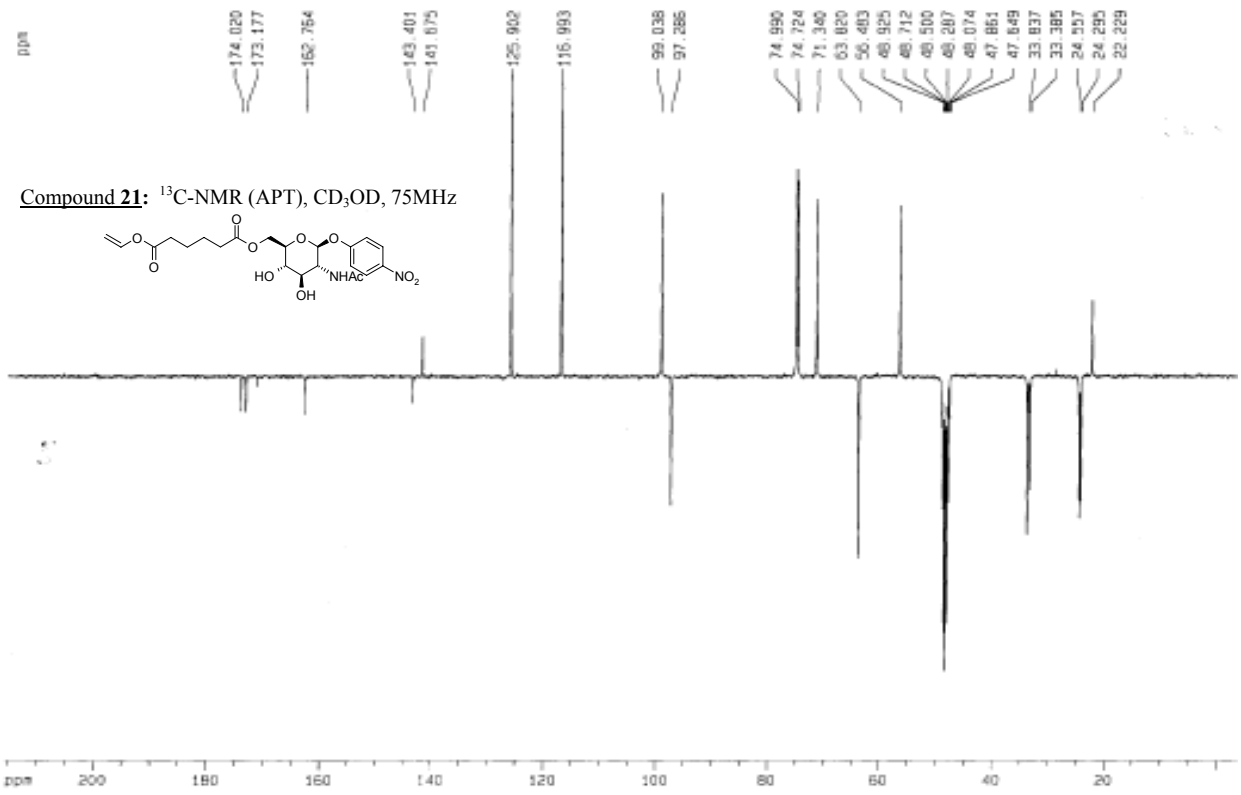
Compound **21**: ^{1}H-NMR, CD_3OD, 500MHz





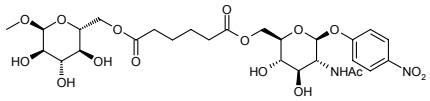


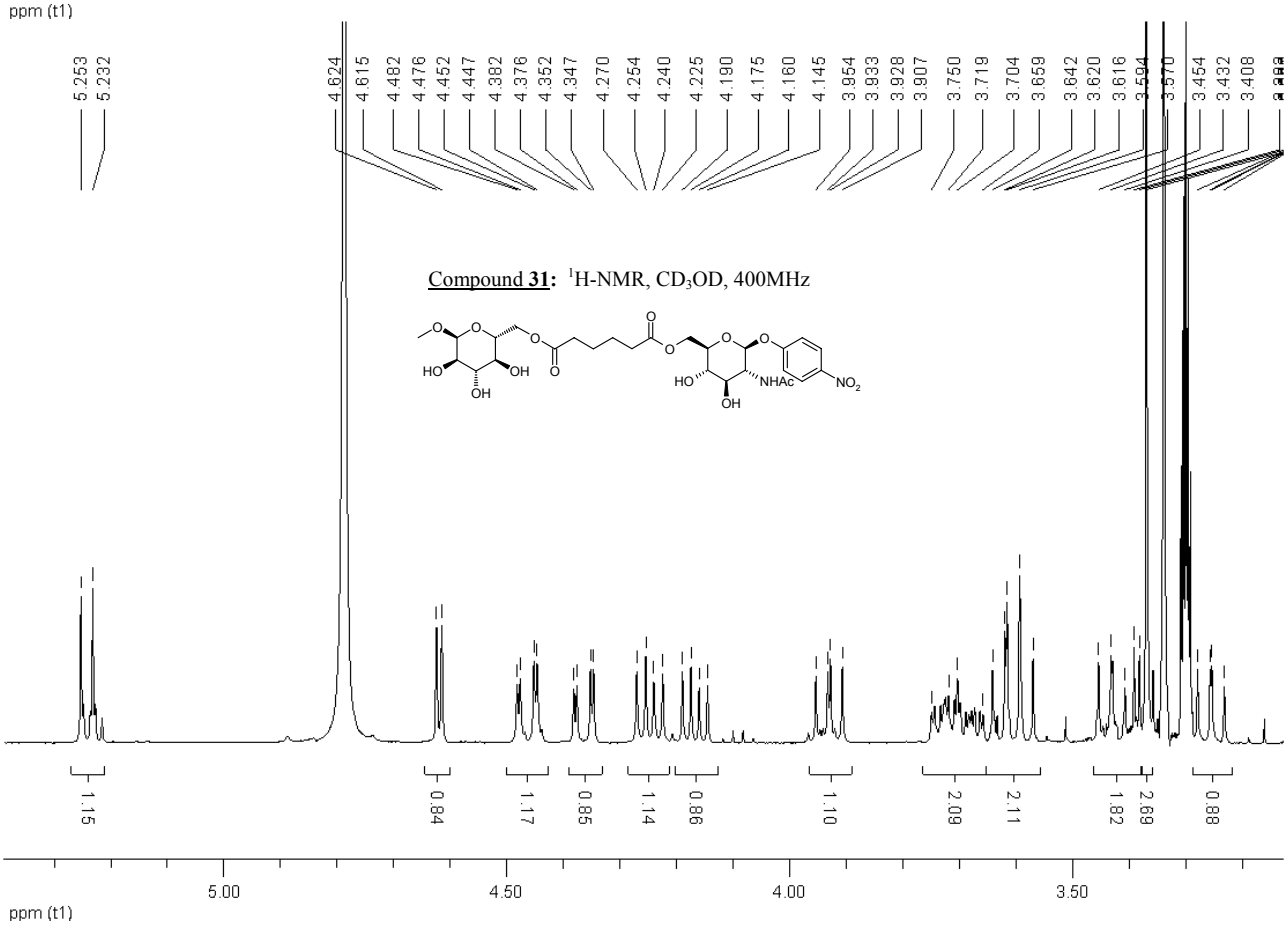
Compound **21**: ^{1}H-NMR, CD_3OD, 500MHz



Compound **21**: ^{13}C-NMR (APT), CD_3OD, 75MHz

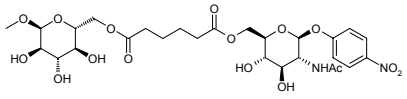
Compound **31**: ^{1}H-NMR, CD_3OD, 400MHz



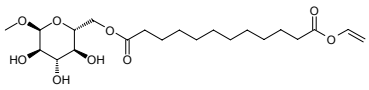


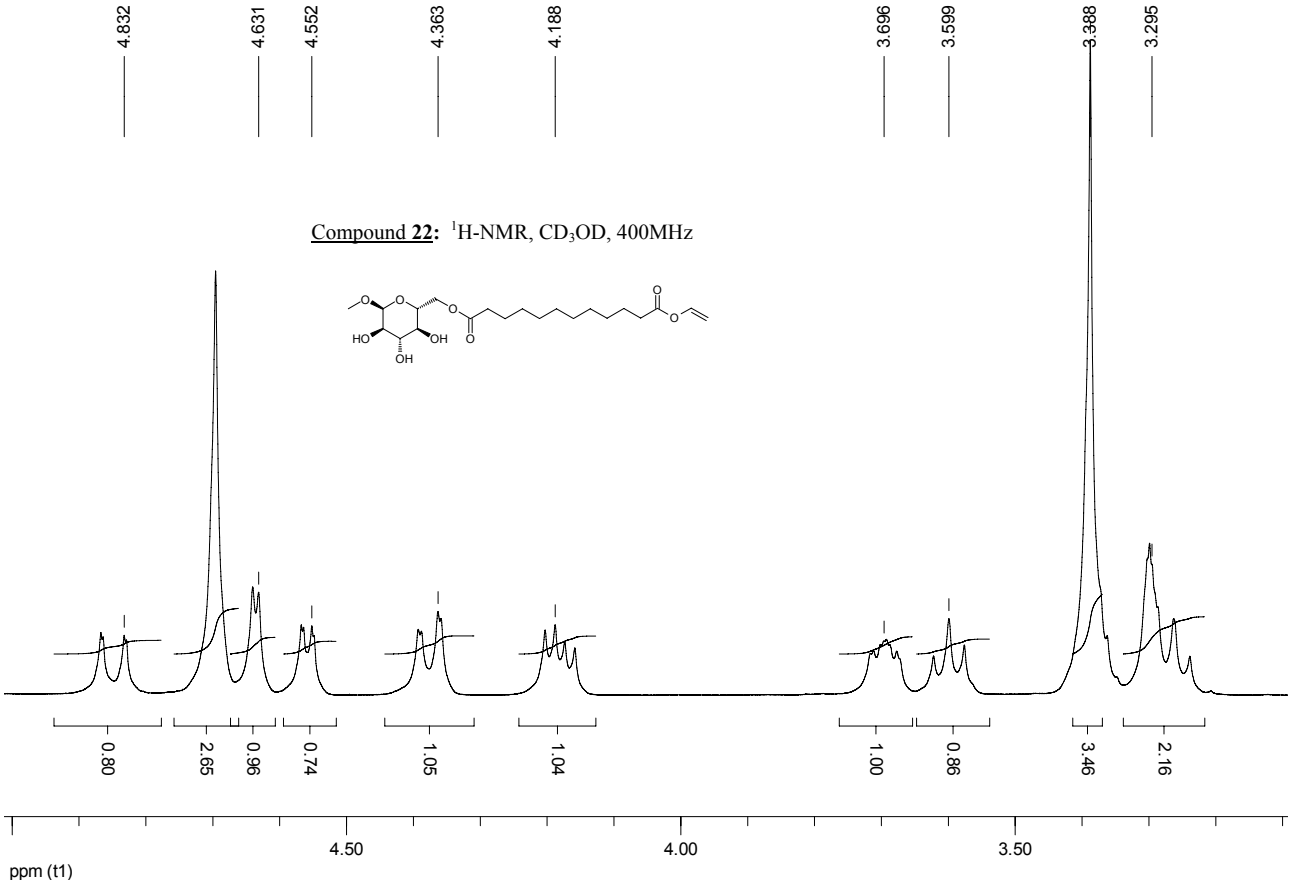
Compound **31**: ^{1}H-NMR, CD_3OD, 400MHz

Compound **31**: ^{13}C-NMR (APT), CD_3OD, 75MHz

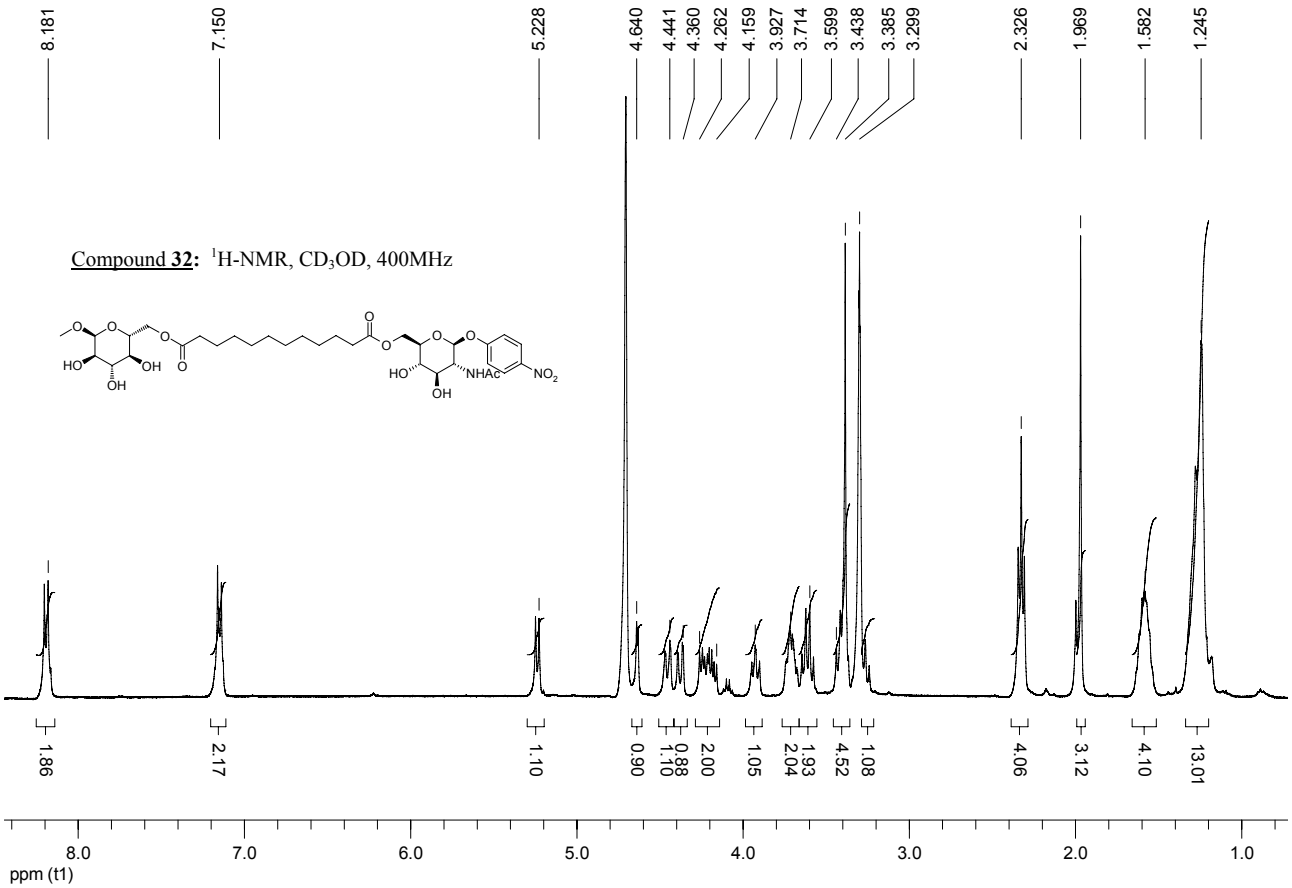


Compound **22**: ^{1}H-NMR, CD_3OD, 400MHz

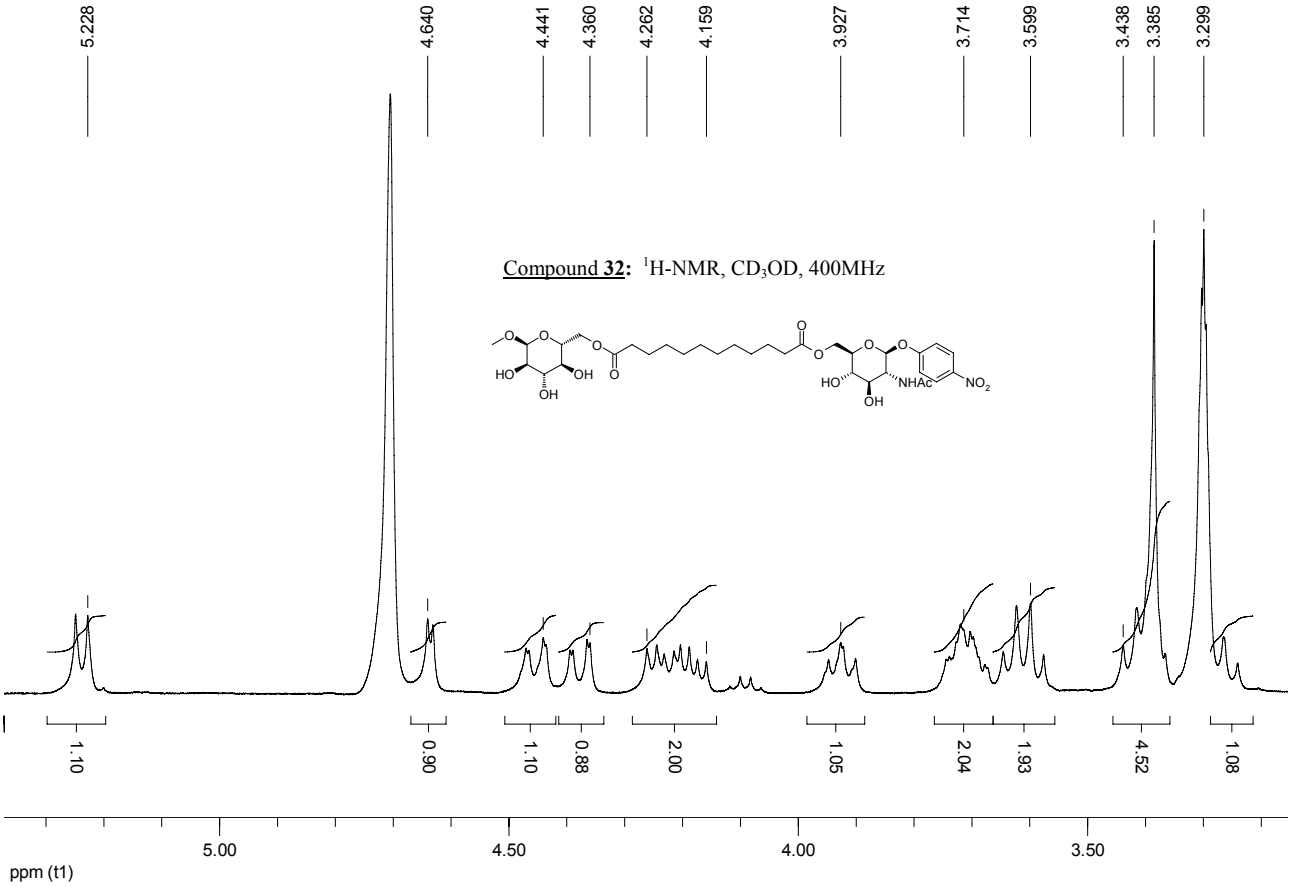


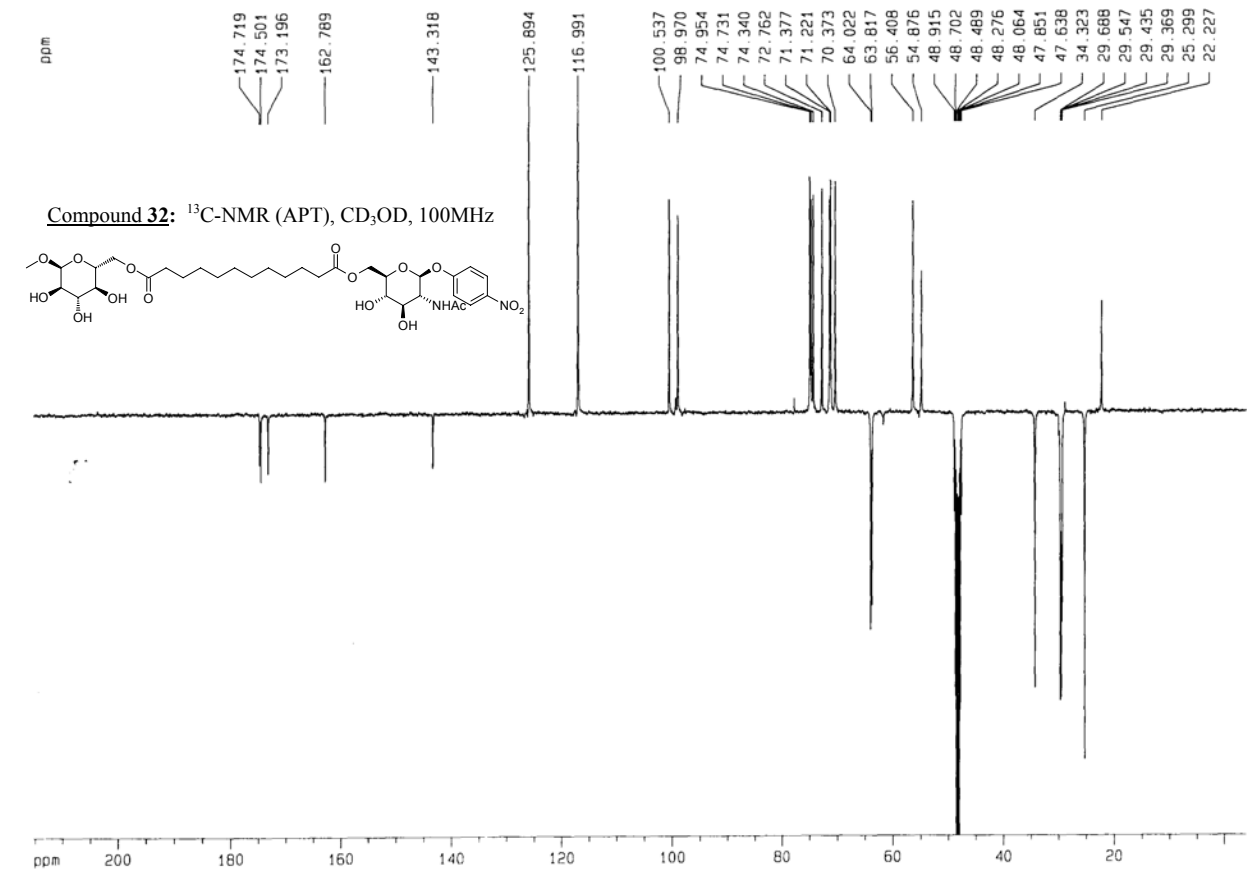


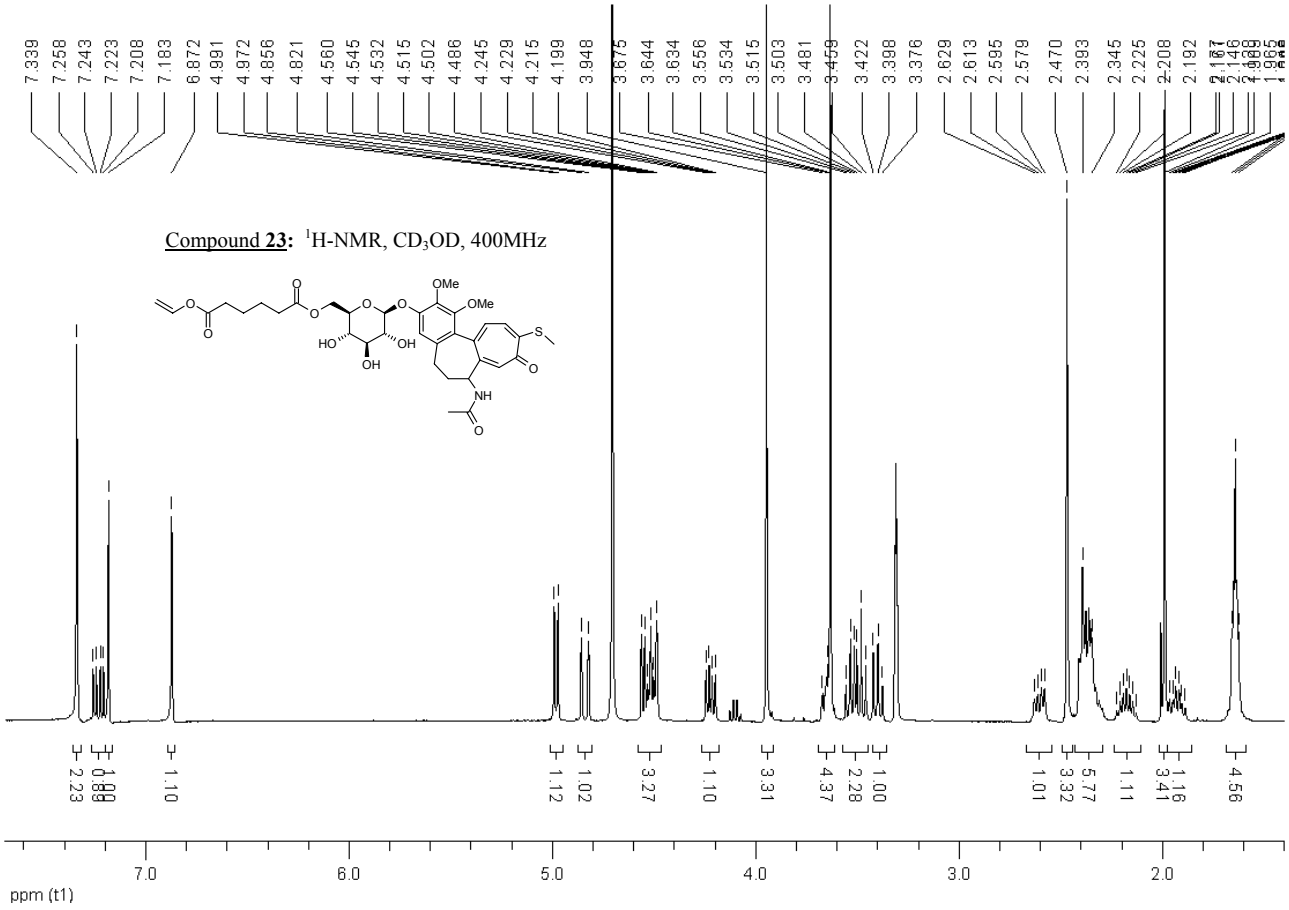
Compound **22**: ^{1}H-NMR, CD_3OD, 400MHz

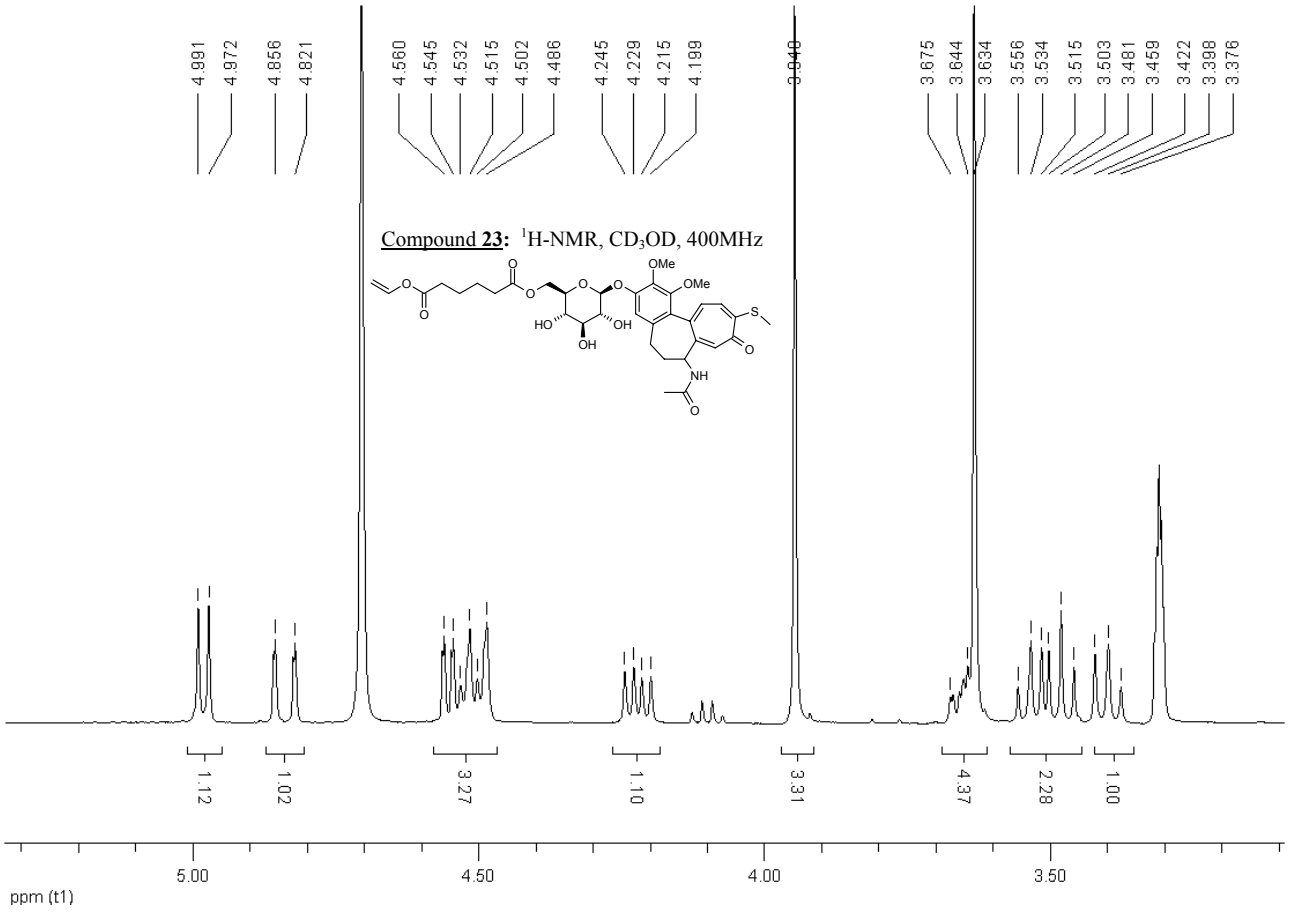


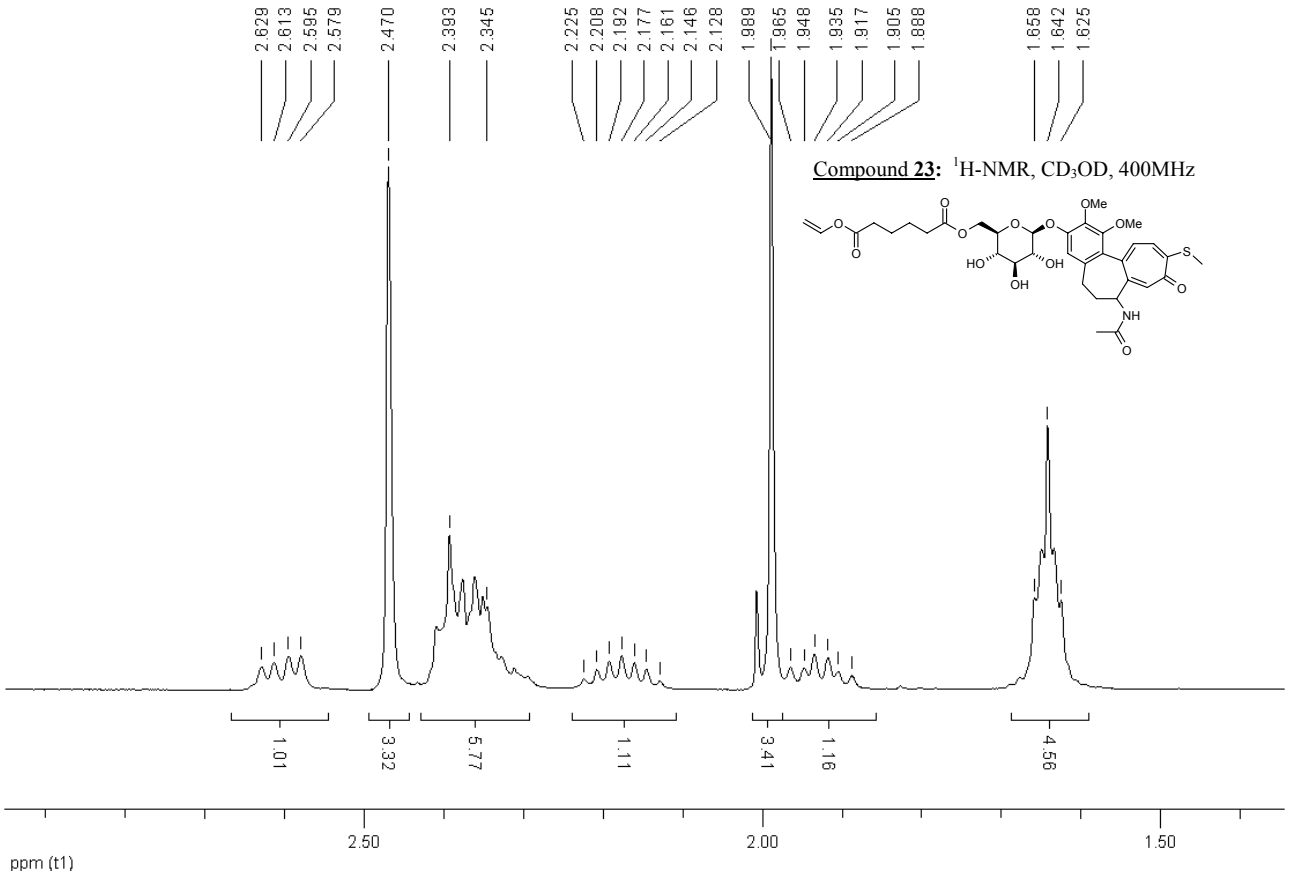
Compound **32**: ^{1}H-NMR, CD_3OD, 400MHz


5.228
4.640
4.441
4.360
4.262
4.159
3.927
3.714
3.599
3.438
3.385
3.299
Compound 32: 1H-NMR, CD3OD, 400MHz
1.10
0.90
1.10
0.88
2.00
1.05
2.04
1.93
4.52
1.08
5.00
4.50
4.00
3.50
ppm (t1)


ppm
174.719
174.501
173.196
162.789
143.318
125.894
116.991
100.537
98.970
74.954
74.731
74.340
72.762
71.377
71.221
70.373
64.022
63.817
56.408
54.876
48.915
48.702
48.489
48.276
48.064
47.851
47.638
34.323
29.688
29.547
29.435
29.369
25.299
22.227
Compound 32: 13C-NMR (APT), CD3OD, 100MHz
ppm
200
180
160
140
120
100
80
60
40
20

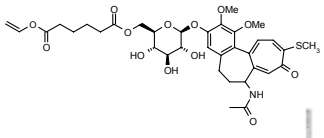

Compound 23: 1H-NMR, CD3OD, 400MHz
ppm (t1)

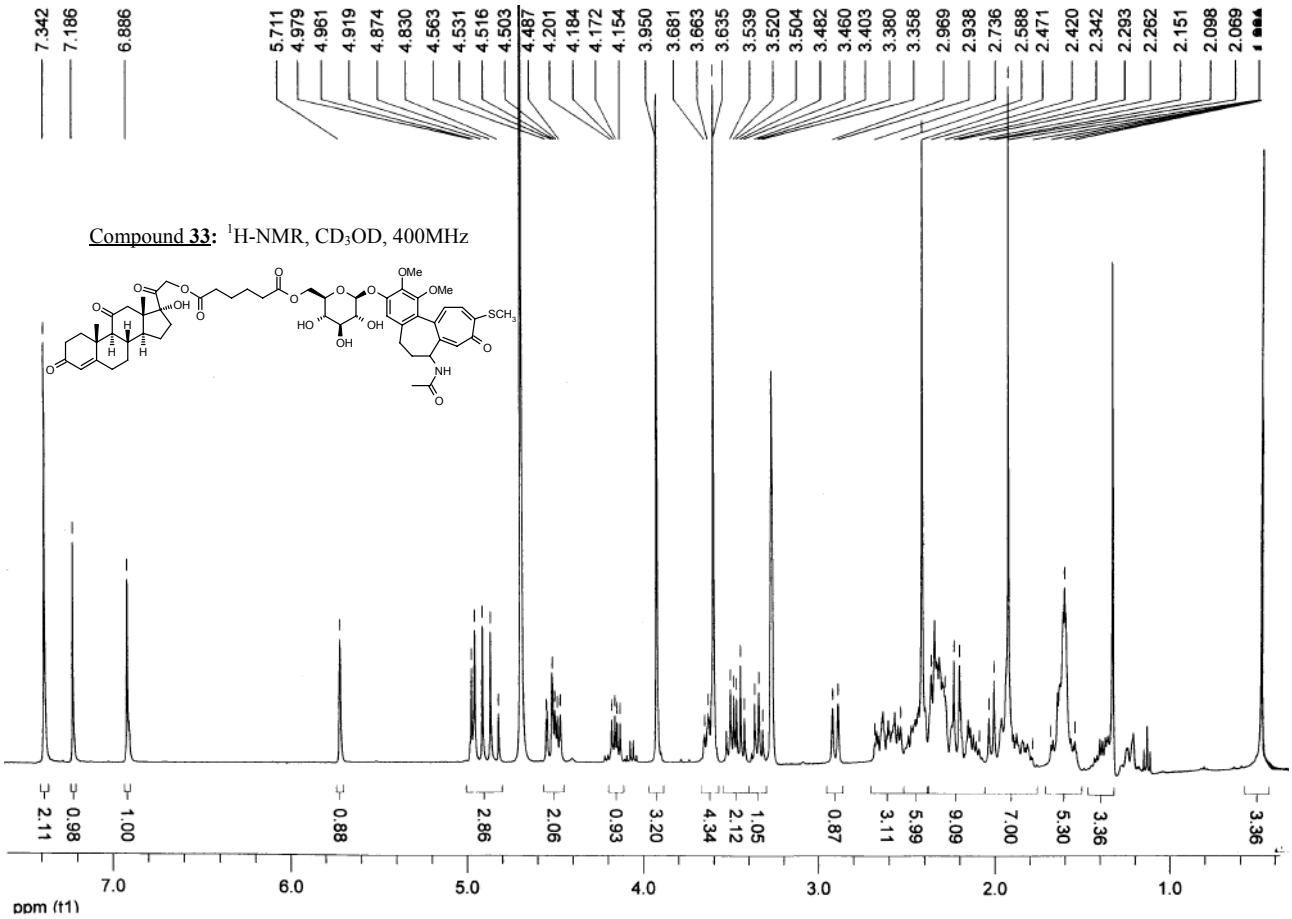

Compound 23: 1H-NMR, CD3OD, 400MHz
ppm (t1)

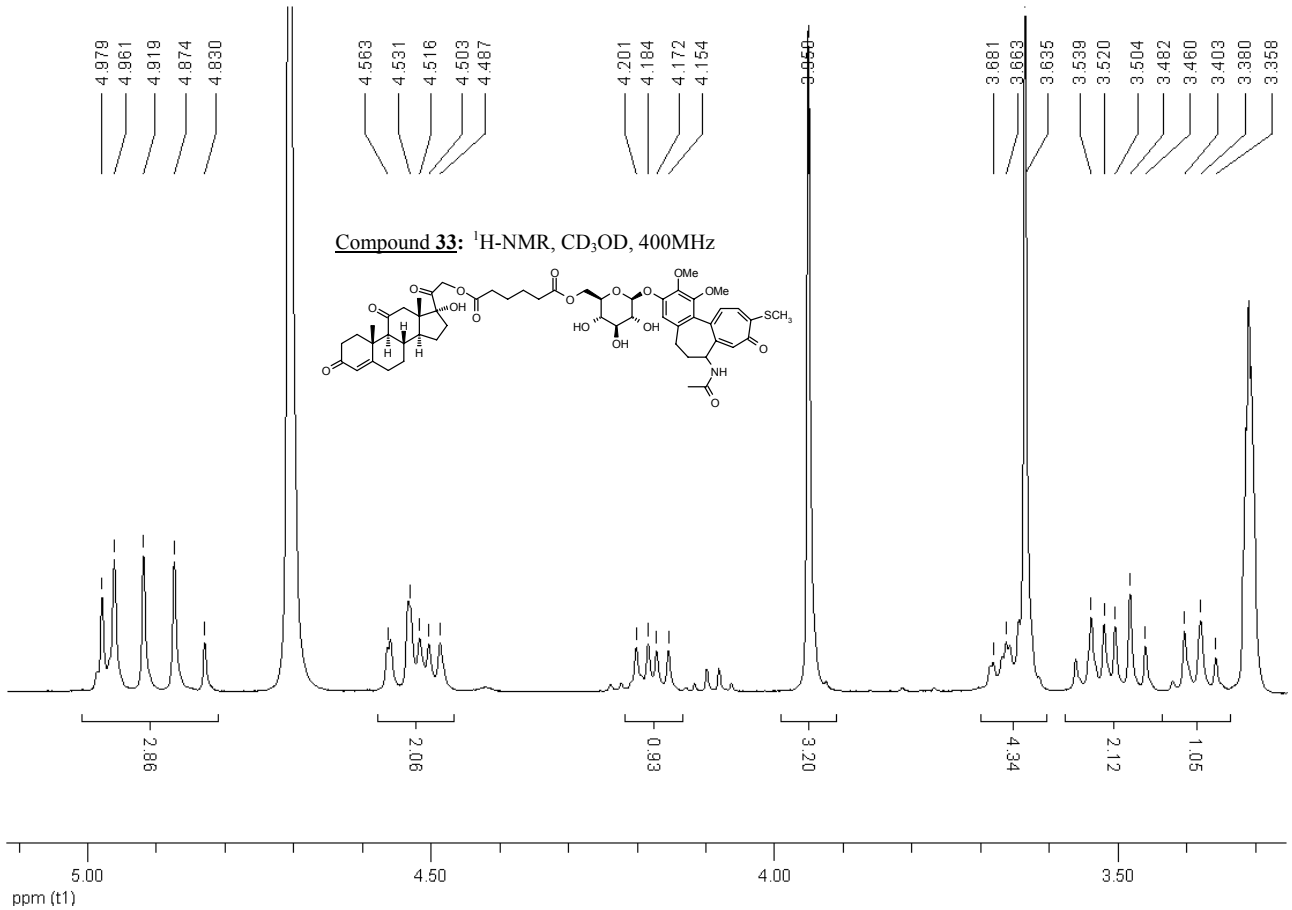


Compound **23:** ^{1}H-NMR, CD_3OD, 400MHz

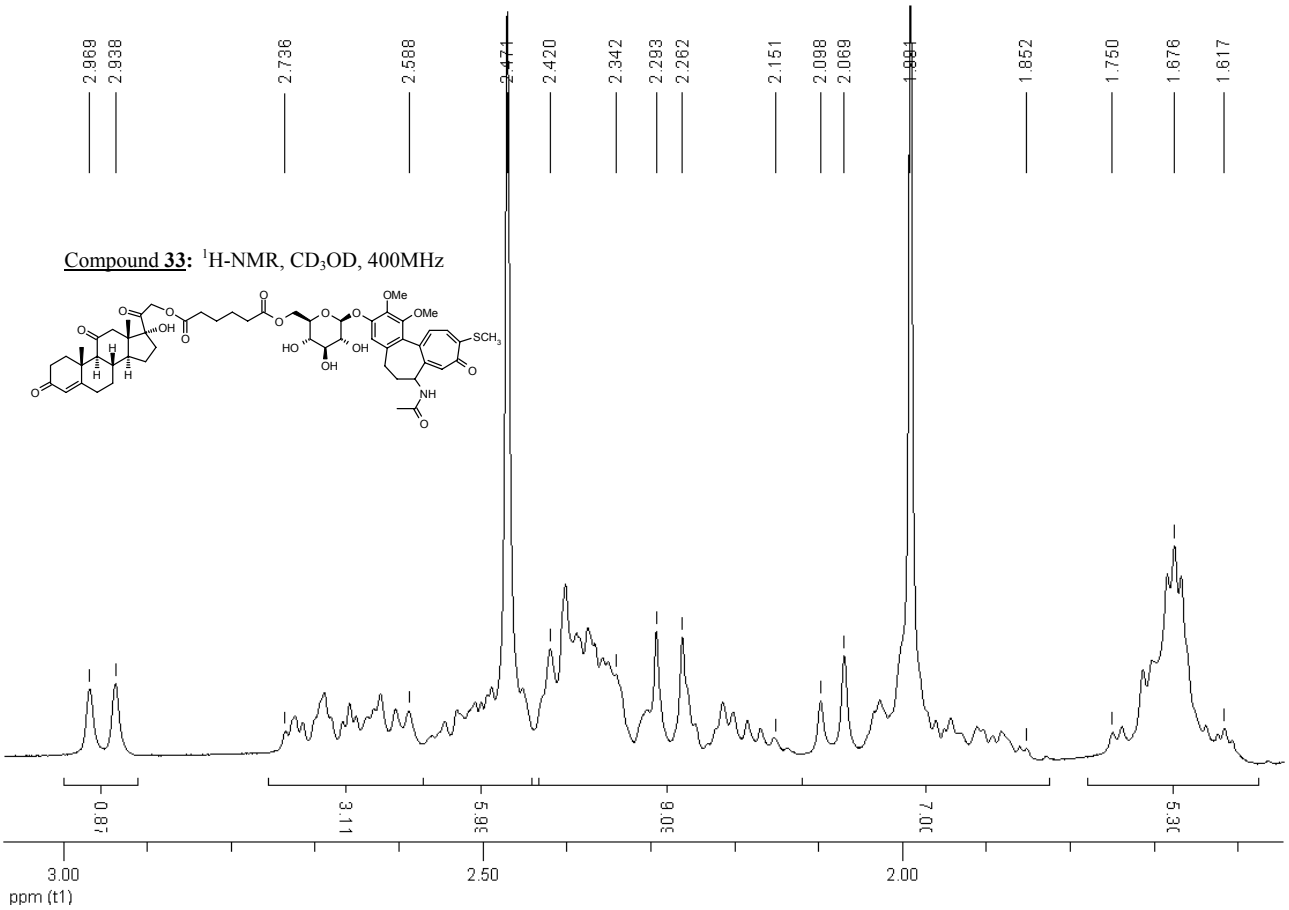
Compound **23**: ^{13}C-NMR (APT), CD_3OD, 75MHz

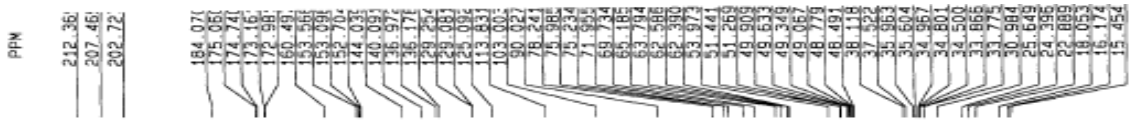



7.342
7.186
6.886
5.711
4.979
4.961
4.919
4.874
4.830
4.563
4.531
4.516
4.503
4.487
4.201
4.184
4.172
4.154
3.950
3.681
3.663
3.635
3.539
3.520
3.504
3.482
3.460
3.403
3.380
3.358
2.969
2.938
2.736
2.588
2.471
2.420
2.342
2.293
2.262
2.151
2.098
2.069
Compound 33: 1H-NMR, CD3OD, 400MHz
2.11
0.98
1.00
0.88
2.86
2.06
0.93
3.20
4.34
2.12
1.05
0.87
3.11
5.99
9.09
7.00
5.30
3.36
3.36
7.0
6.0
5.0
4.0
3.0
2.0
1.0
ppm (t1)

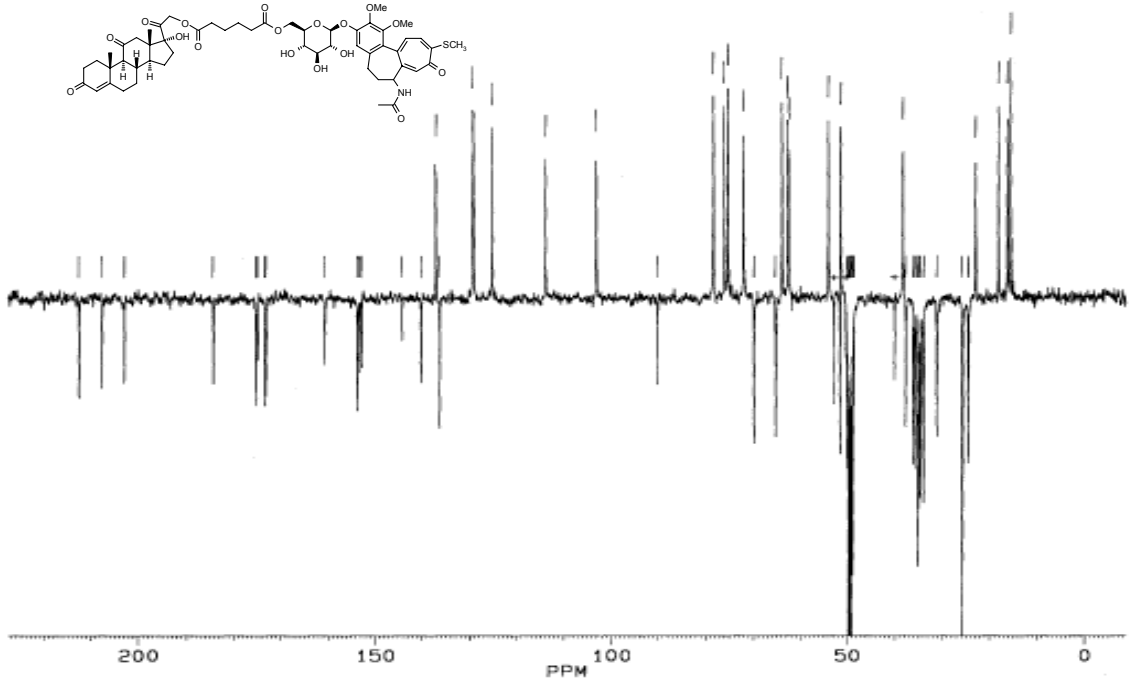

4.979
4.961
4.919
4.874
4.830
4.563
4.531
4.516
4.503
4.487
4.201
4.184
4.172
4.154
3.950
3.681
3.663
3.635
3.539
3.520
3.504
3.482
3.460
3.403
3.380
3.358
Compound 33: 1H-NMR, CD3OD, 400MHz
2.86
2.06
0.93
3.20
4.34
2.12
1.05
5.00
4.50
4.00
3.50
ppm (t1)

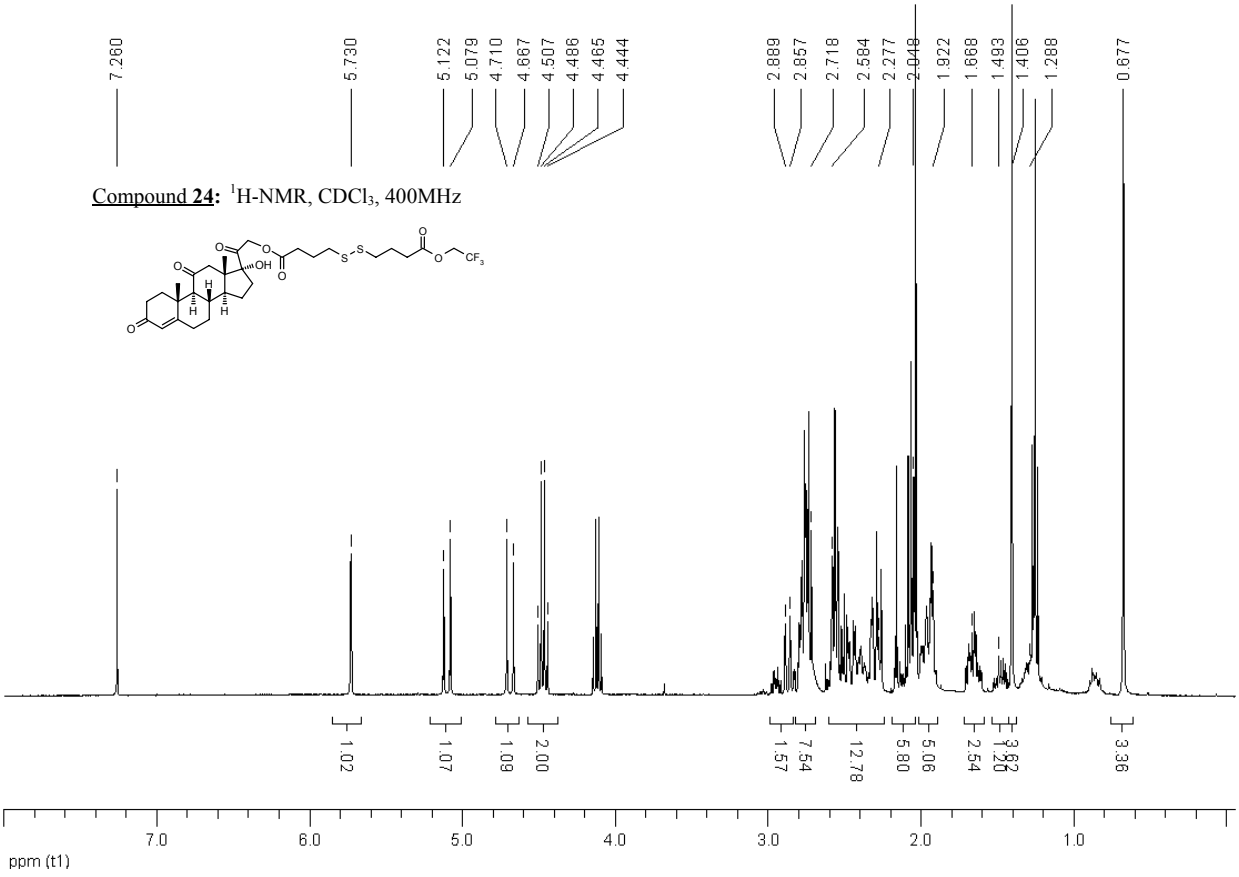
Compound **33**: ^{1}H-NMR, CD_3OD, 400MHz



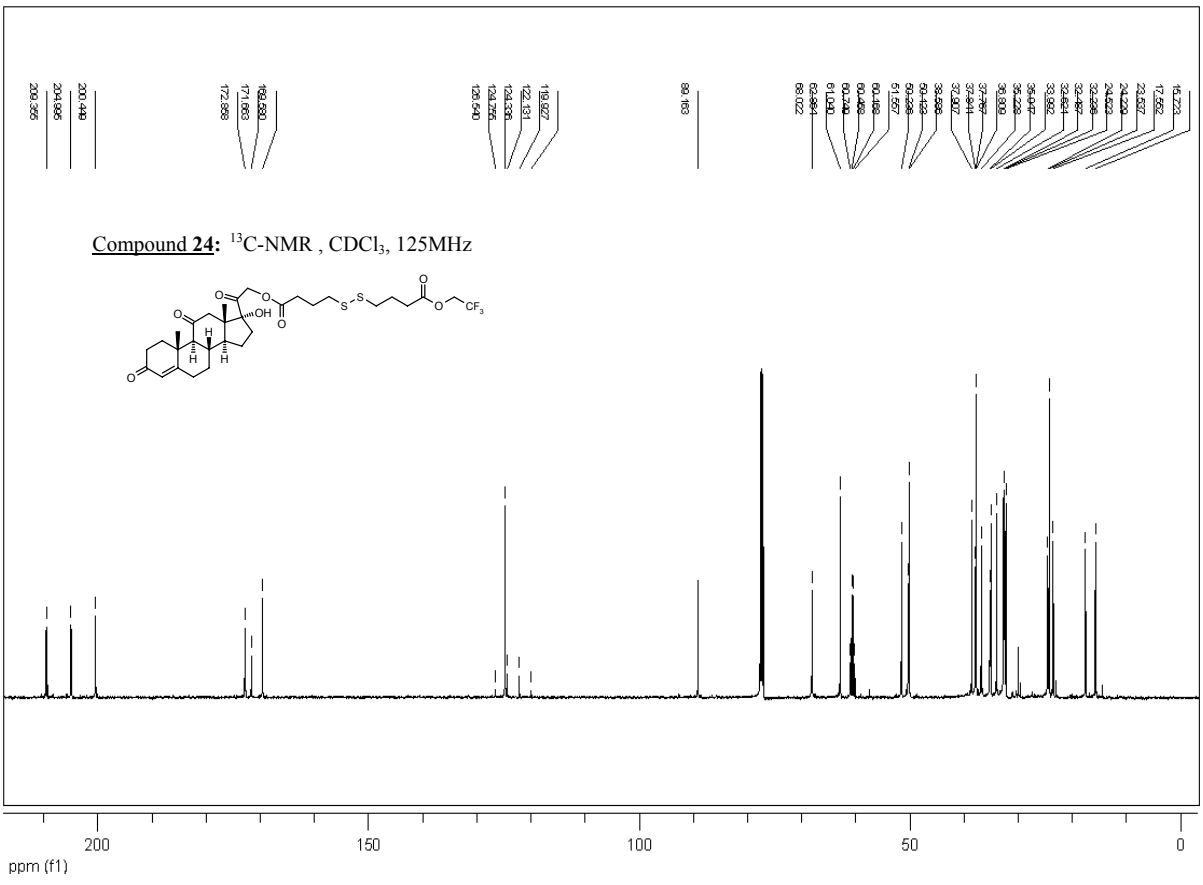


Compound **33**: ^{13}C-NMR (APT), CD_3OD, 75MHz

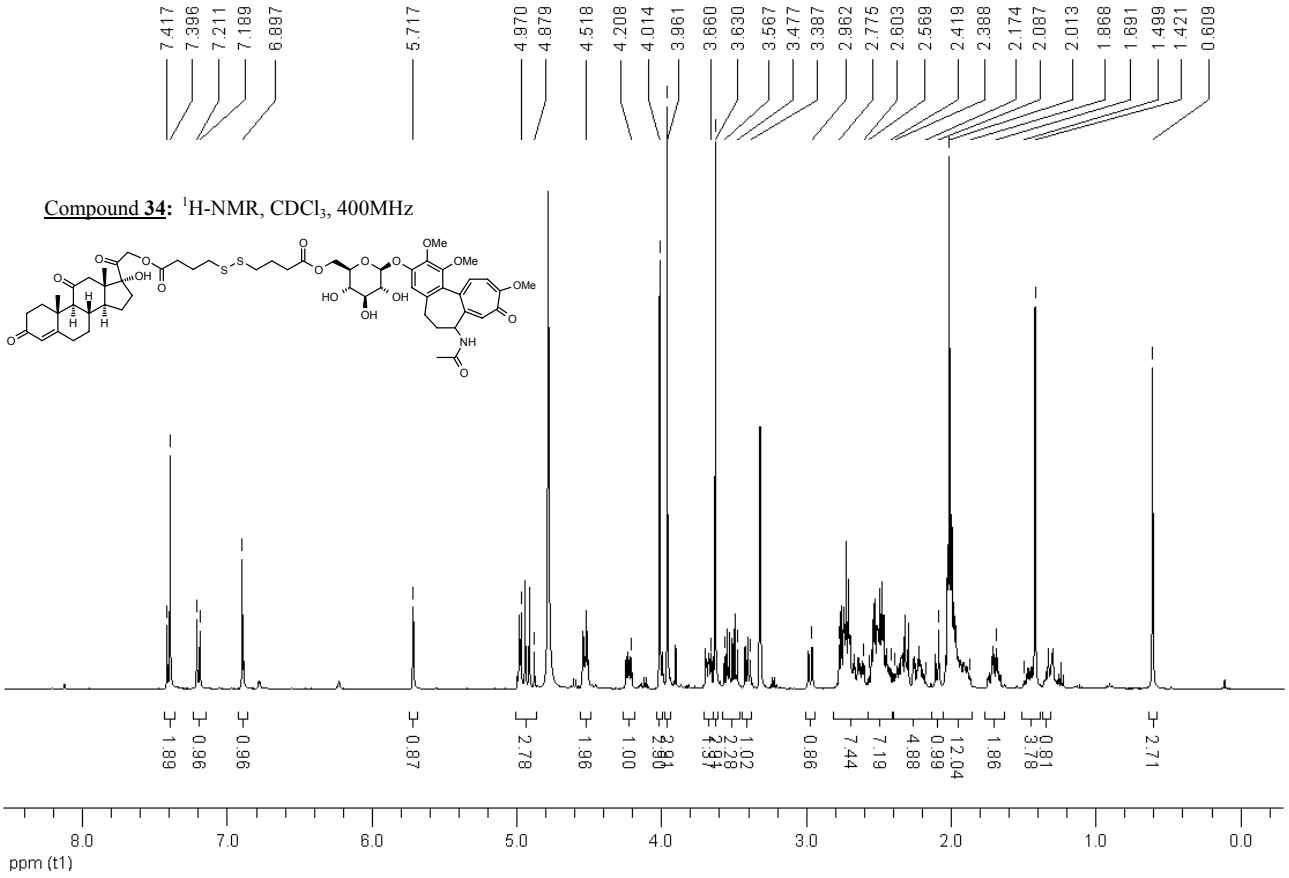




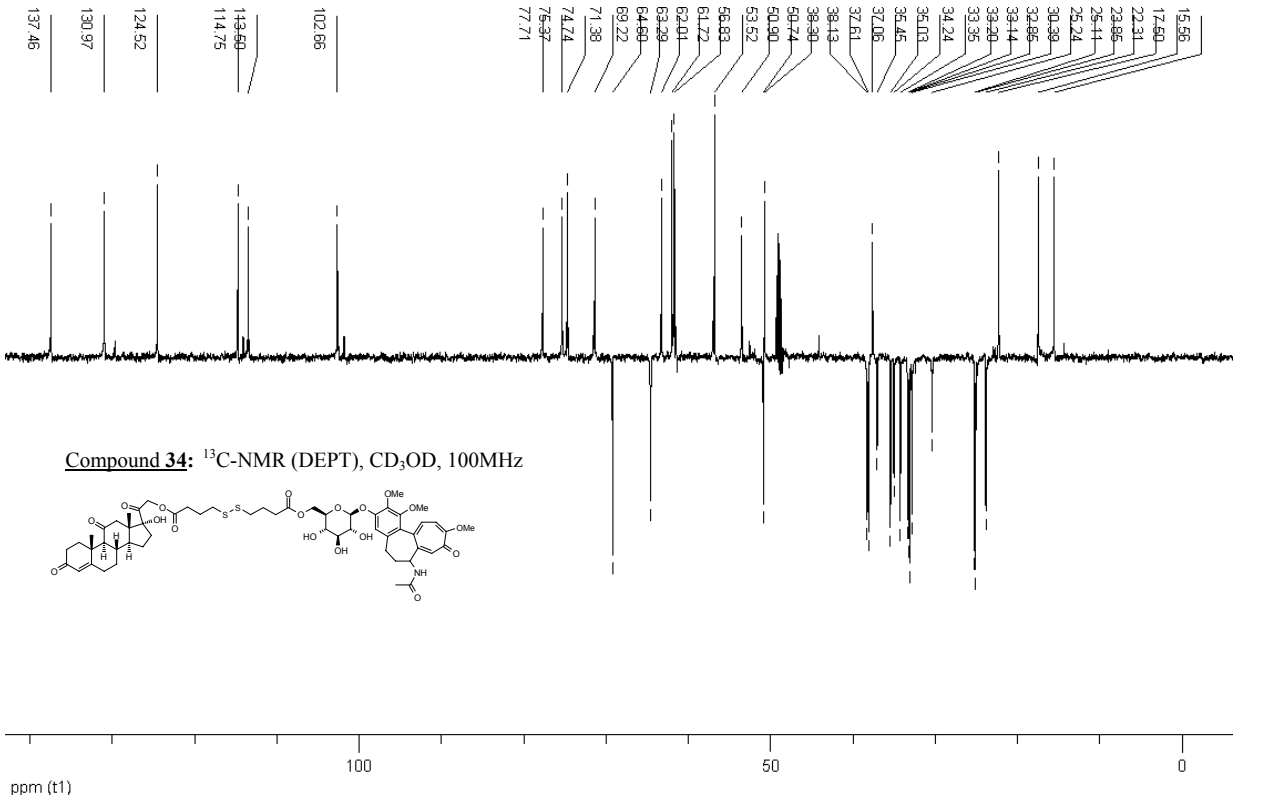
Compound **24**: ^{1}H-NMR, $CDCl_3$, 400MHz



Compound **24**: ^{13}C-NMR , $CDCl_3$, 125MHz



Compound **34**: ^{1}H-NMR, $CDCl_3$, 400MHz



Compound **34**: ^{13}C-NMR (DEPT), CD_3OD, 100MHz