Supporting Information for publication

An Efficient Synthesis of Dihydro- and Tetrahydropyran via Oxonium-Ene Cyclization Reaction

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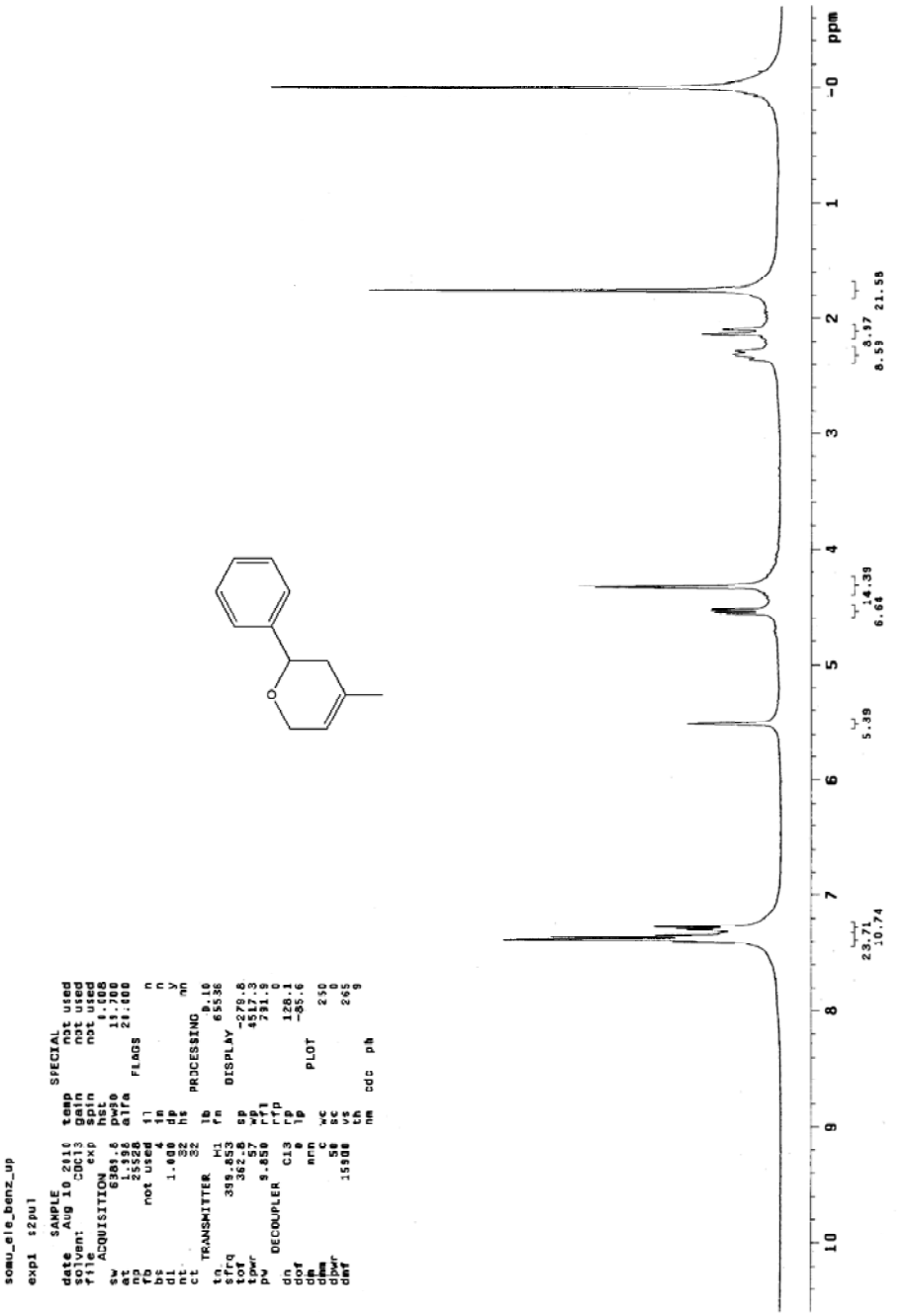
Suplementary information: General Experimental Section**,** ^{1}H NMR data **8a**, ^{1}H and ^{13}C NMR spectra of all compounds**,** Crystal structure & Crystallographic data of **6e, 10** and **17j.**

General Experimental Section

Melting points are uncorrected. ^{1}H NMR spectra were recorded in $CDCl_3$ on Varian AS 400 (400 MHz) spectrometer using TMS as internal standard. ^{13}C and ^{19}F NMR spectra were obtained on Varian AS 400 operating at 100 MHz and 376 MHz, respectively. IR spectra were recorded on Nicolet Impact 410 FT-IR spectrometer. Mass spectra were recorded using Waters LC-MS/MS system (Q-TOF–Premier). HRMS (ESCi-TOF) were calibrated with sodium formate solution and leucine enkephalin (SIGMA) was used as an external standard. Elemental analysis was performed on Perkin Elmer 2400 Series II CHNS analyser.

^{1}H NMR of 8a: ^{1}H NMR (400 MHz, $CDCl_3$): δ 2.20-2.25 (m, 1 H), 2.28-2.36 (m, 1 H), 2.40-2.48 (m, 2 H), 3.56 (dt, *J* = 12.4 and 1.8 Hz, 1 H), 4.24 (dd, *J* = 10.4 and 5.2 Hz, 1 H), 4.29 (dd, *J* = 11.2 and 2.4 Hz, 1 H), 4.78-4.82 (m, 2 H), 7.22-7.29 (m, 2 H, ArH), 7.34-7.40 (m, 3 H, ArH).

^{1}H NMR of **6a**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tpwr 57
pw 9.850
DECOUPLER
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dof 0
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dpwr 56
dmf 15900
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gain not used
spin not used
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sc 0
vs 265
th 9
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ppm
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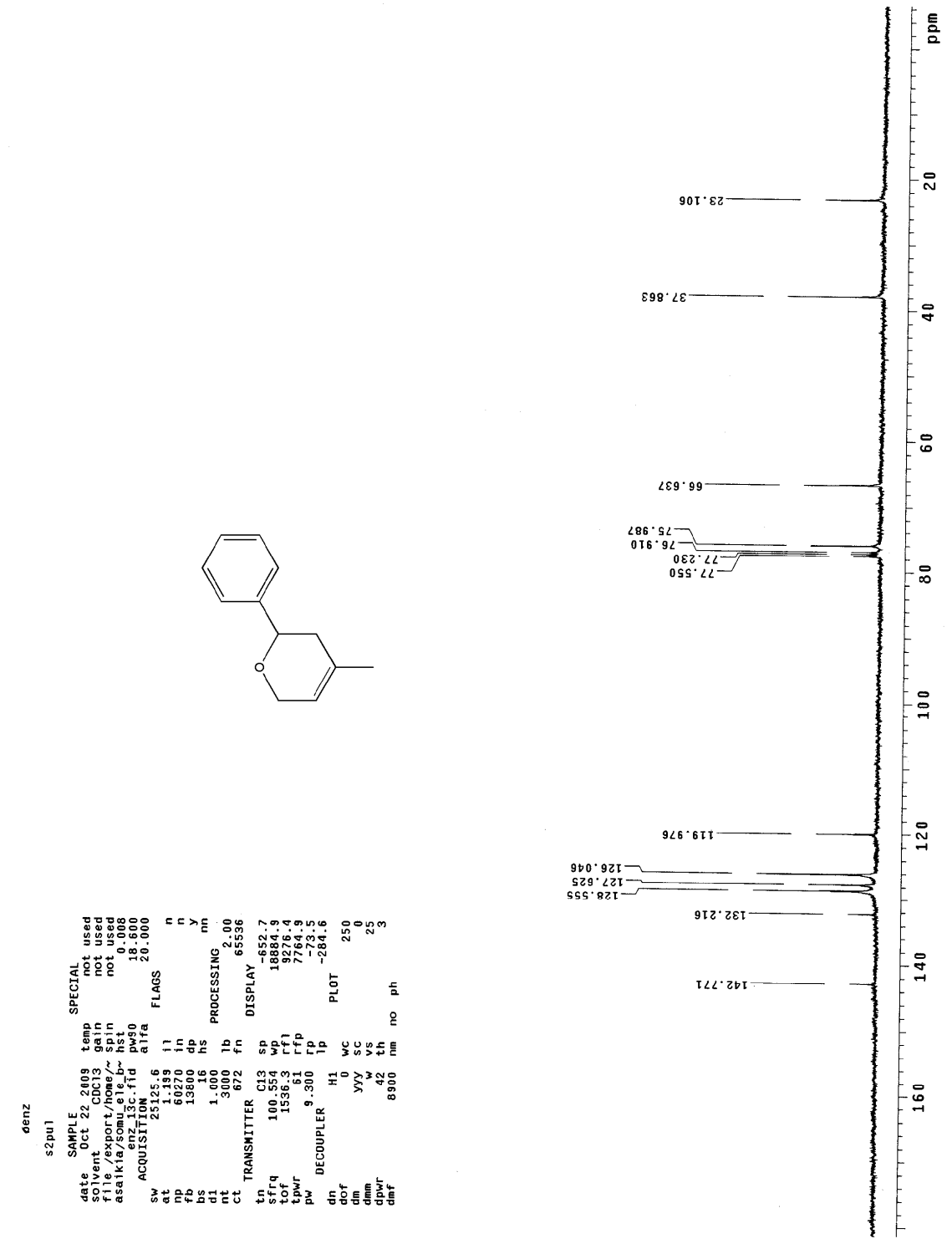
14.39
6.64
8.17
8.59
21.58

^{13}C NMR of **6a**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gain
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n
y
nn
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fn 65536
TRANSMITTER
tn C13
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rfp 7764.9
rp -73.5
lp -284.6
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yyy
w
42
8900
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250
0
25
3
wc
sc
vs
th
nm no ph
23.106
37.863
66.637
75.987
76.910
77.230
77.550
119.976
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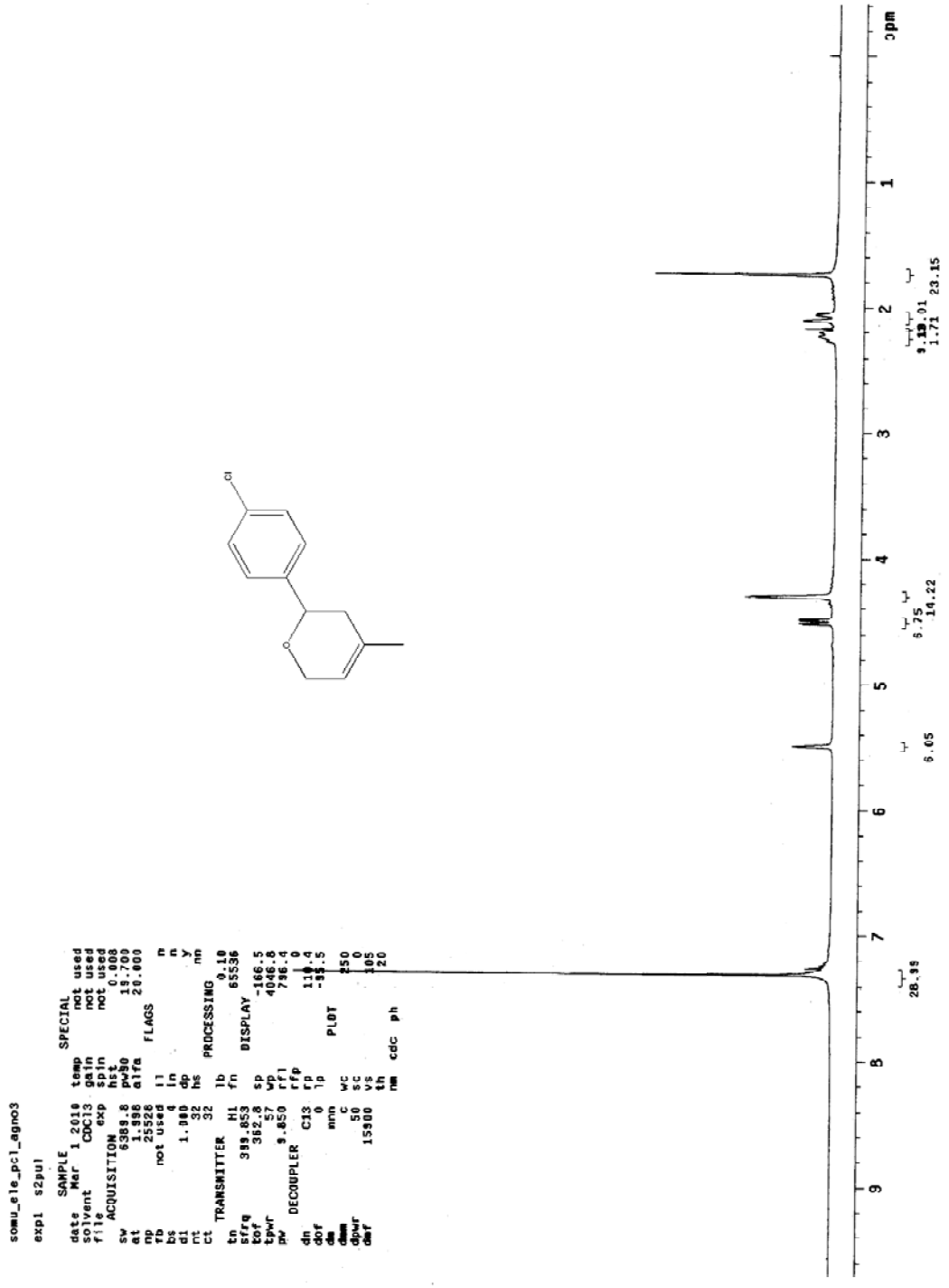
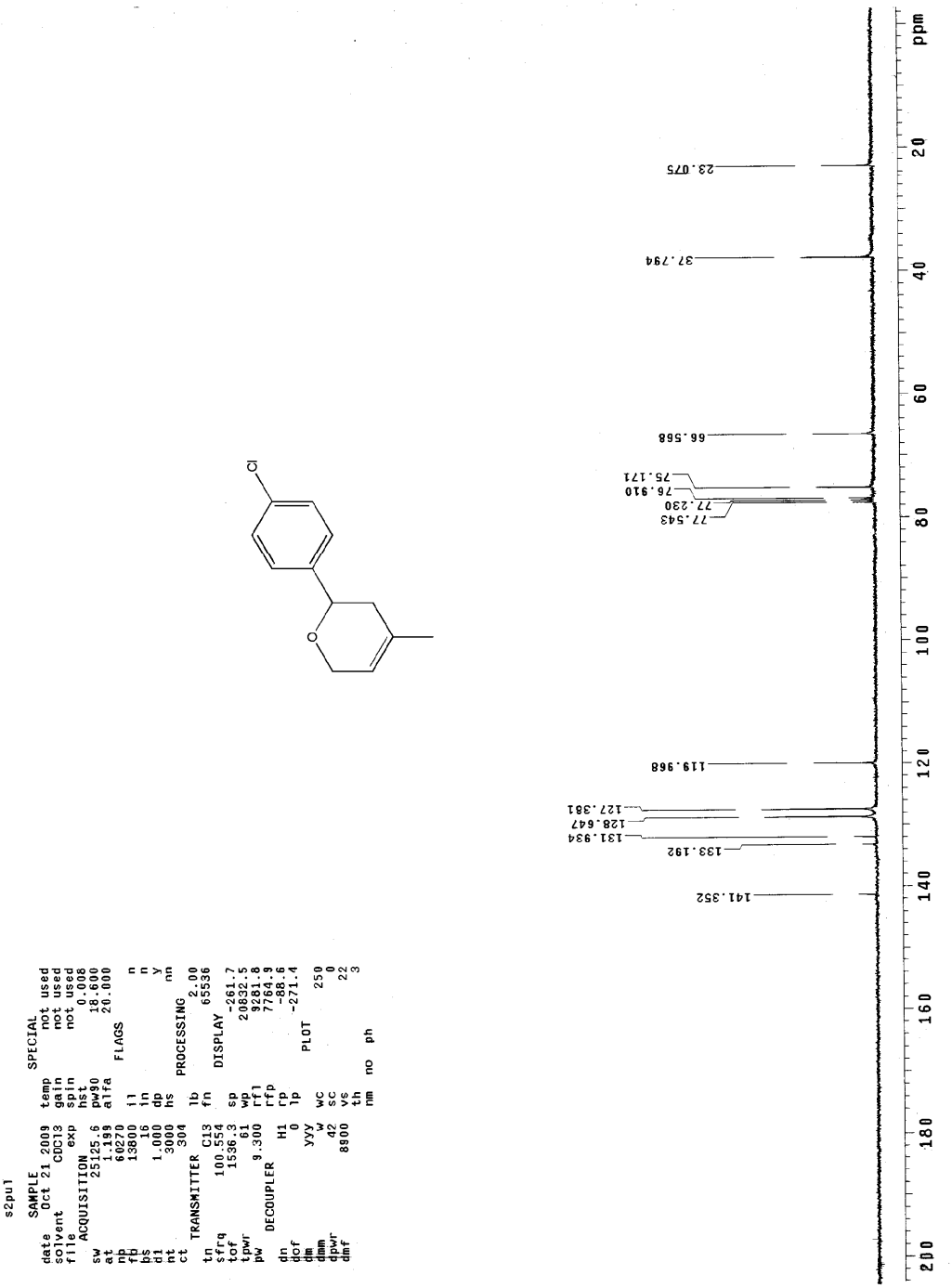
127.625
128.555
132.216
142.771
ppm

^{1}H NMR of **6b**



^{13}C NMR of **6b**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119.968
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77.230
76.910
75.171
ppm
200
180
160
140
120
100
80
60
40
20
s2pul
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solvent CDCl3
file
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d1 1.000
nt 3000
ct 304
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tn
sfrq 100.554
tof 1536.3
tpwr 61
pw 9.300
DECOUPLER H1
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dof 0
dm yyy
dmm w
dmf 8800
temp
gain
spin
hst 0.008
pw90 18.600
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
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fn 65536
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wp 20832.5
rfl 9281.8
rfp 7764.9
rp -88.6
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vs 22
th 3
nm no ph
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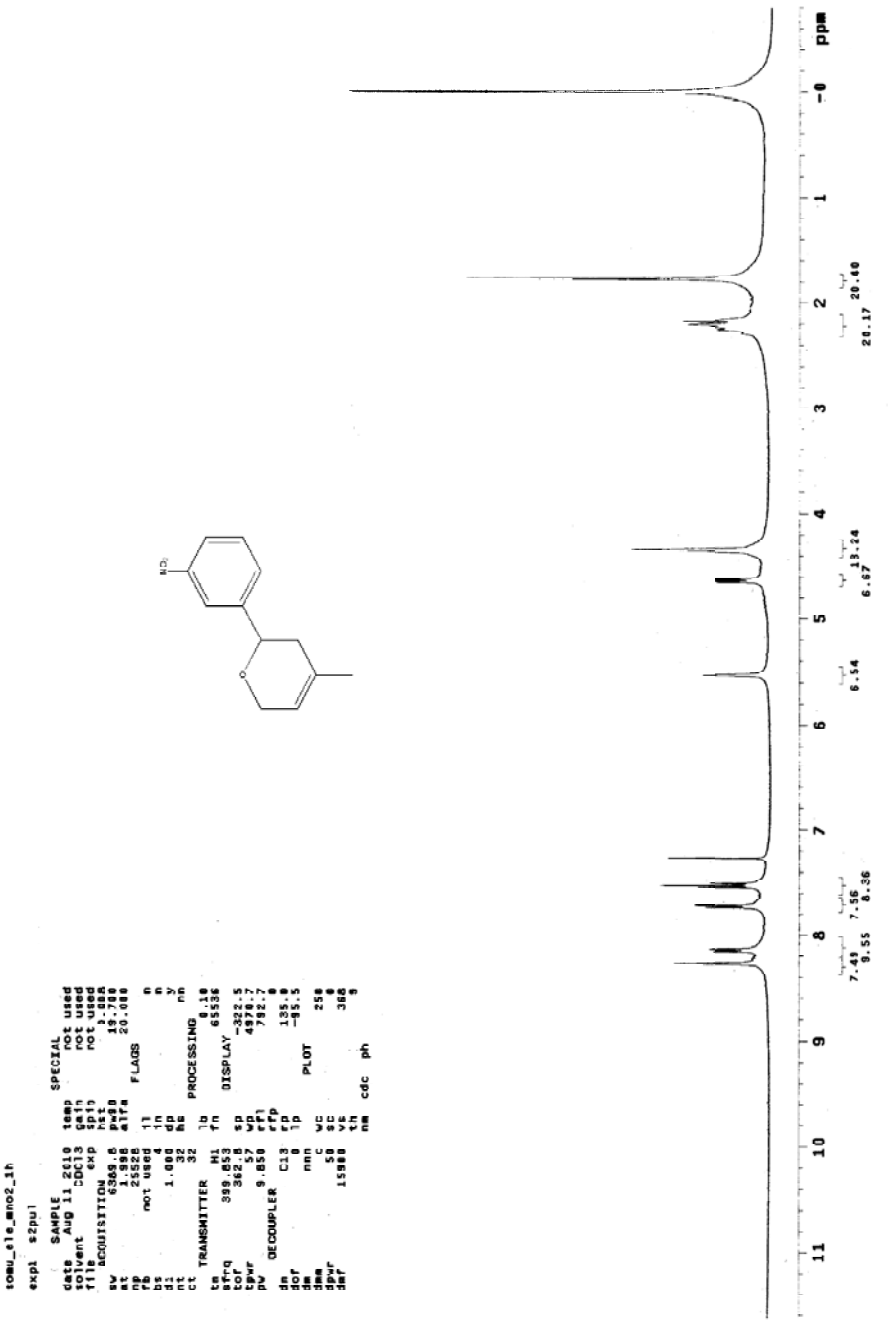
not used
not used

^{1}H NMR of **6c**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nt 32
ct
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tn H1
sfrq 399.853
tof 362.0
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15988
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gain not used
spin not used
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rfp
rp 185.8
lp -85.5
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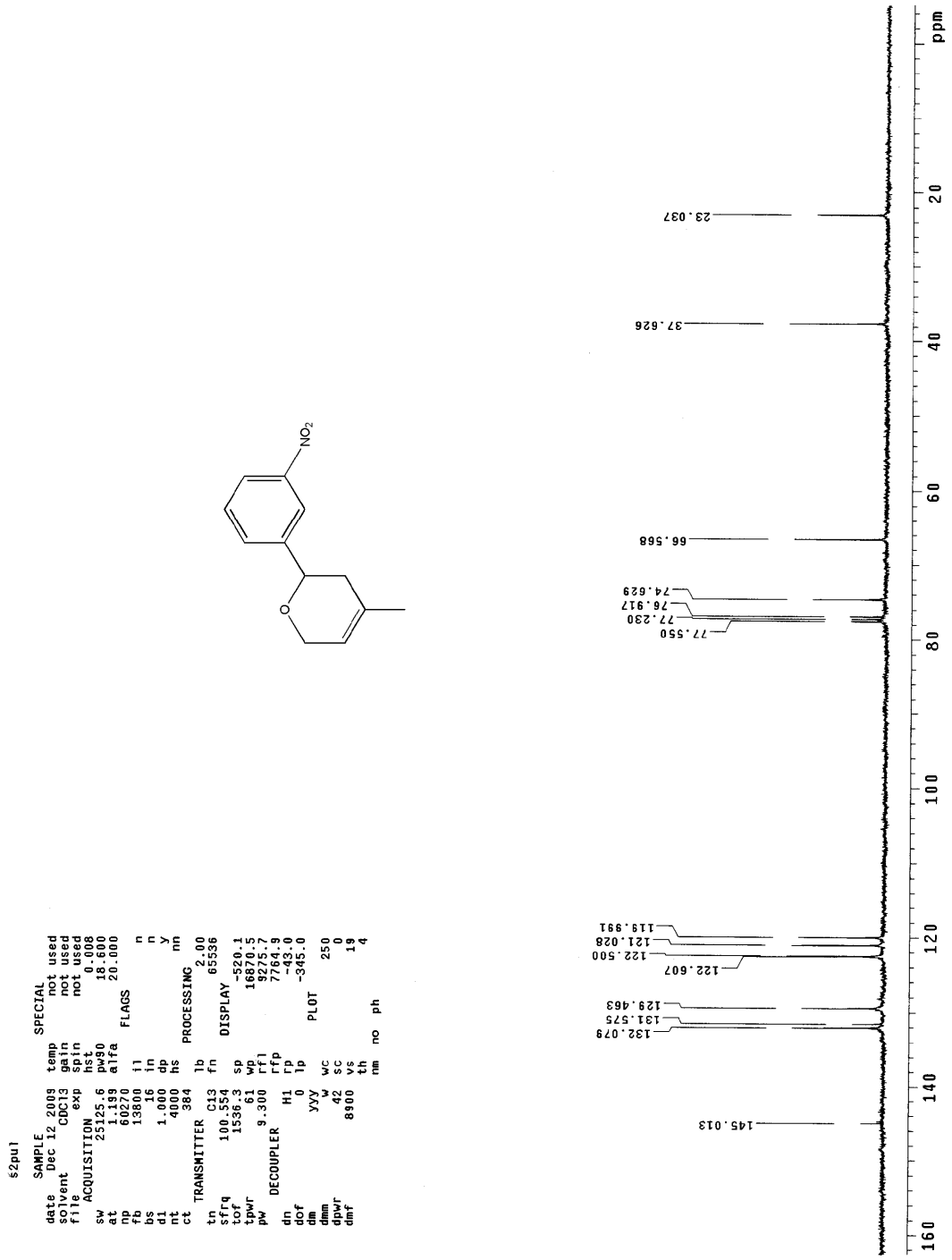
sc 0
vs 386
th 9
cdc ph
nm
7.49
7.48
7.55
7.56
6.36
6.54
6.67
13.14
20.17
20.60
ppm

^{13}C NMR of **6c**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37.826
66.568
74.629
76.917
77.280
77.550
119.991
121.028
122.500
122.607
129.463
131.575
132.079
145.013
ppm
20
40
60
80
100
120
140
160

^{1}H NMR of **6d**


somu_ele_pcoome_1
expl s2pul
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solvent CDCl3
file exp
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np 25528
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bs 4
d1 1.0000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dmf 15940
SPECIAL
temp not used
gain not used
spin not used
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pw90 19.700
alfa 20.000
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il n
in n
dp y
hs nn
PROCESSING
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fn 65536
DISPLAY
sp -263.1
wp 6651.7
rfl 791.9
rfp 0
rp 128.1
lp -85.6
PLOT
wc 250
sc 0
vs 114
th 19
cdc ph
ppm
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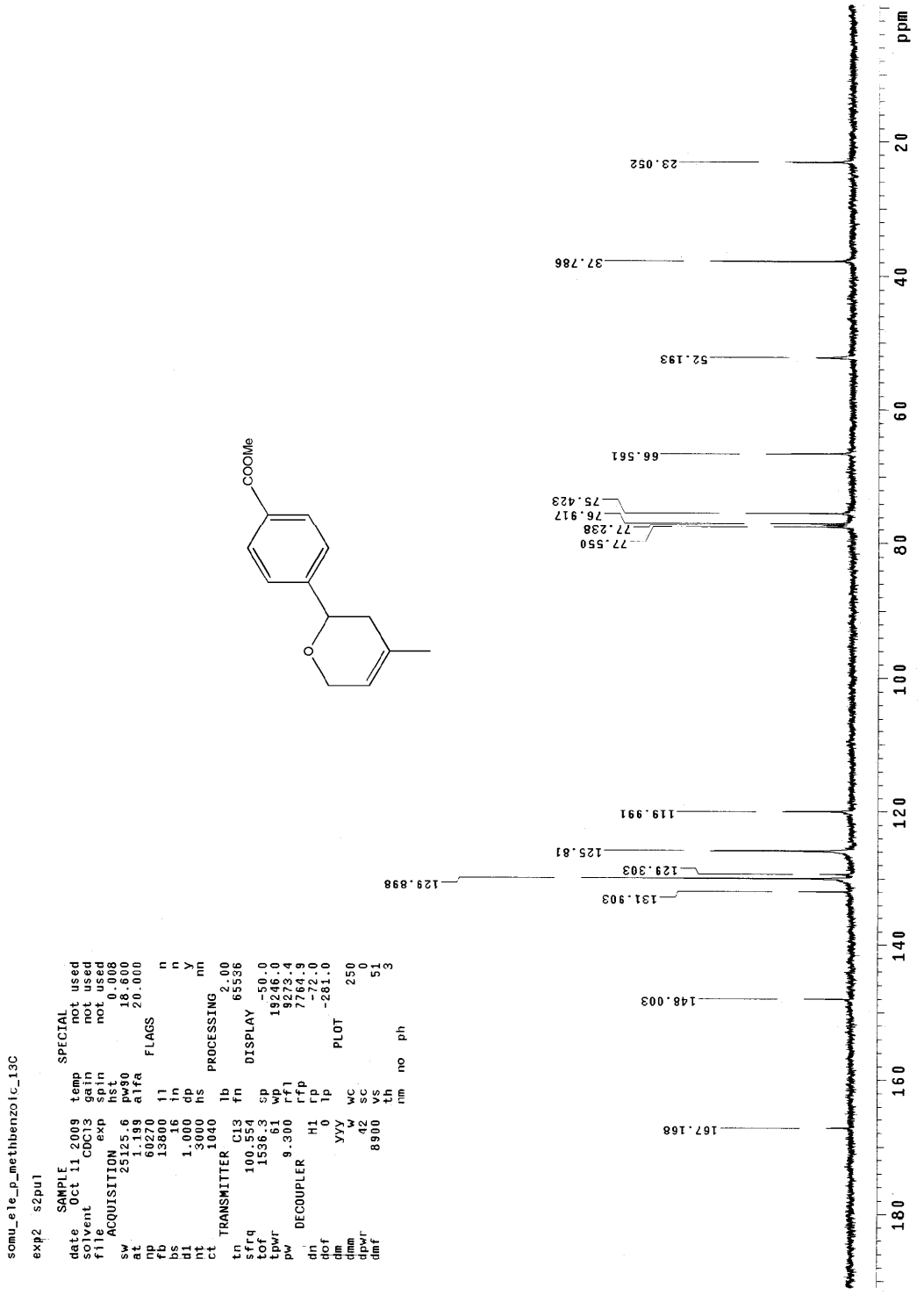
4.33
5.65
18.88
20.84
8.47
19.88
7.27

^{13}C NMR of **6d**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solvent CDCl3 gain not used
file exp spin not used
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at 1.199 alfa 20.000
np 60270 FLAGS
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bs 16 in n
d1 1.000 dp y
nt 3000 hs nn
ct 1040 PROCESSING
TRANSMITTER lb 2.00
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sfrq 100.554 DISPLAY
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pw 9.300 rfl 9273.4
DECOUPLER rfp 7764.9
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dmm yyy wc 250
dpwr w sc 0
dmf 42 vs 51
8900 th 3
nm no ph
COOMe
O
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148.003
131.903
129.898
129.303
125.81
119.991
77.550
77.238
76.917
75.423
66.561
52.193
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23.052
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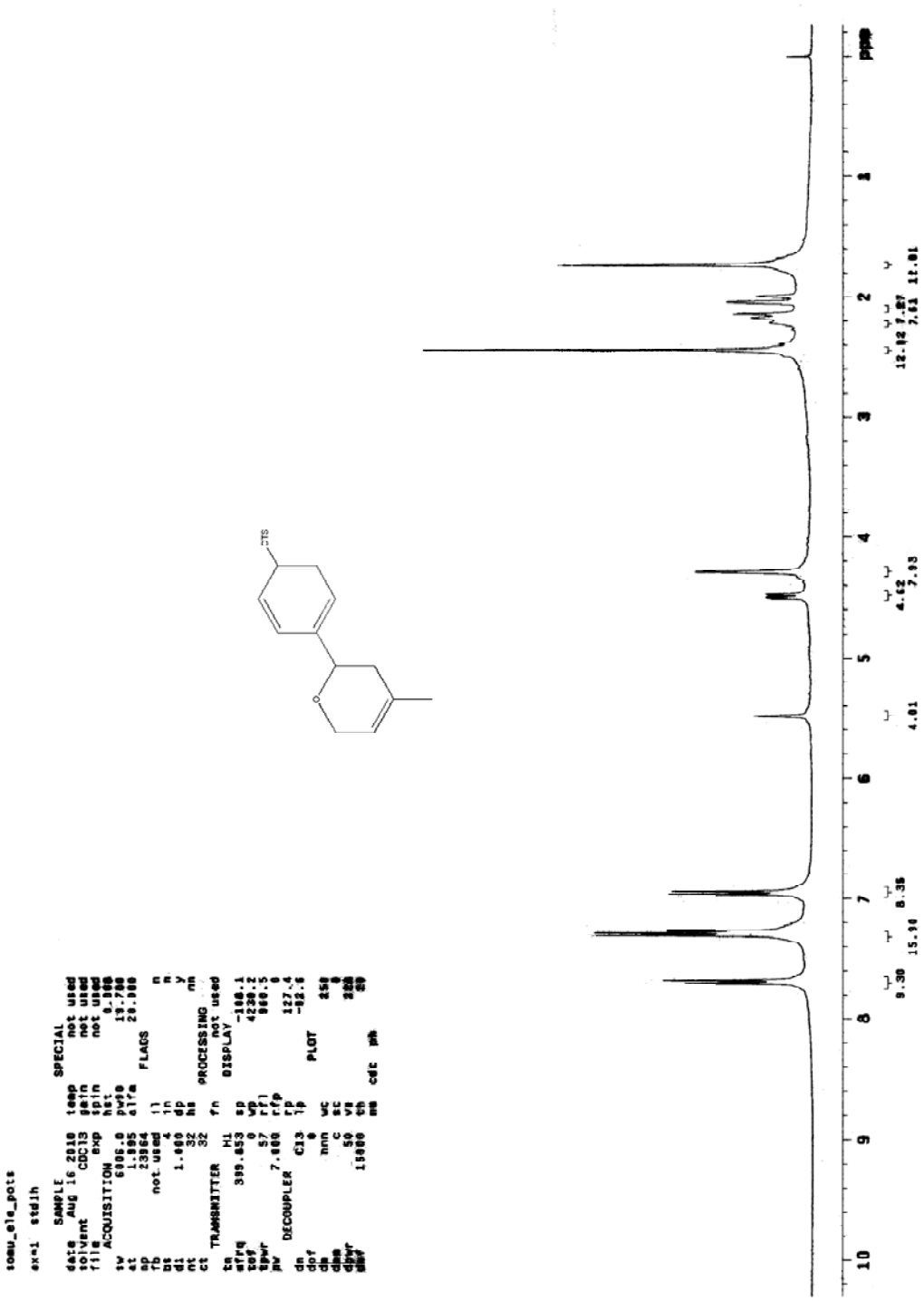
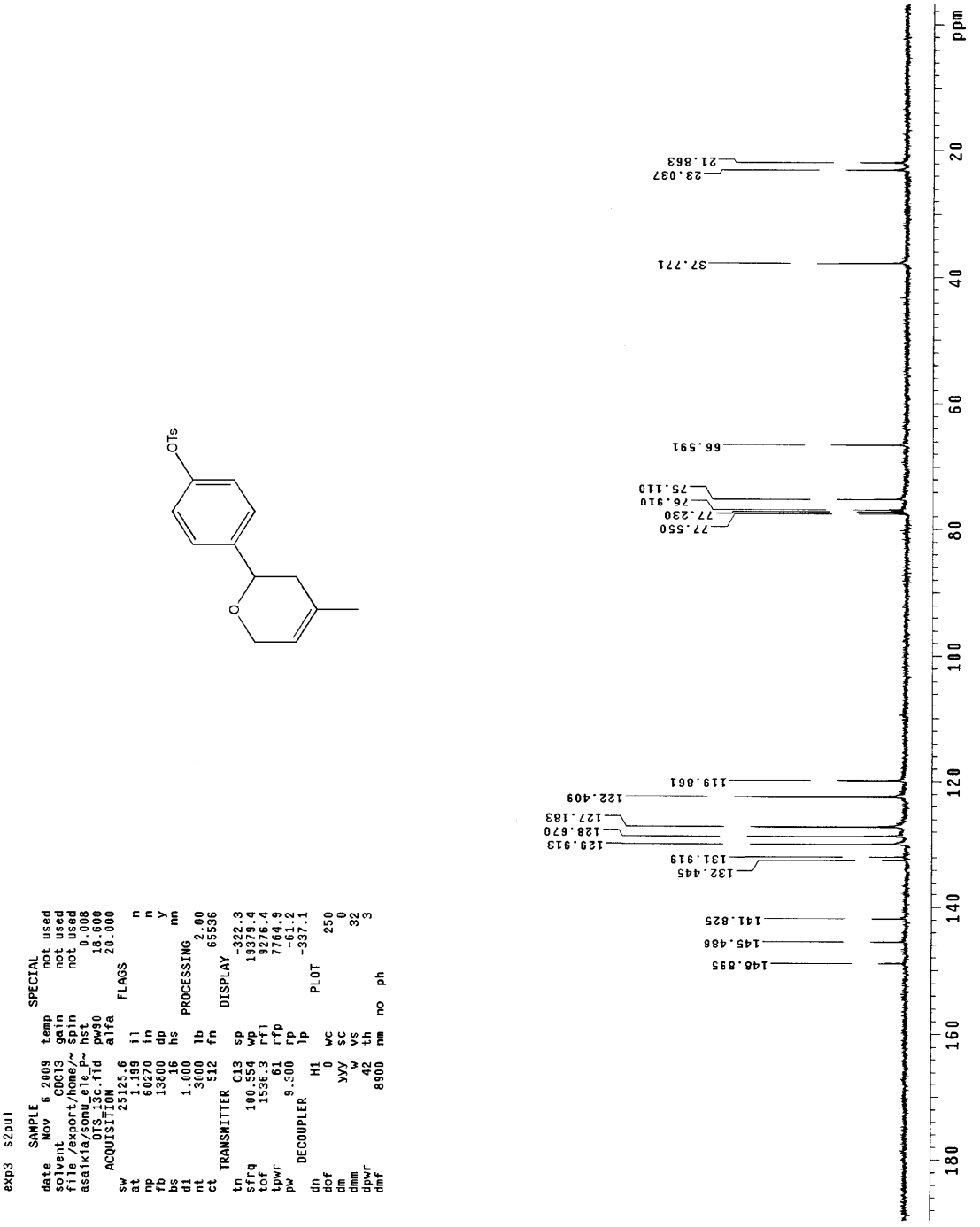
160
140
120
100
80
60
40
20

^{1}H NMR of **6e**



^{13}C NMR of **6e**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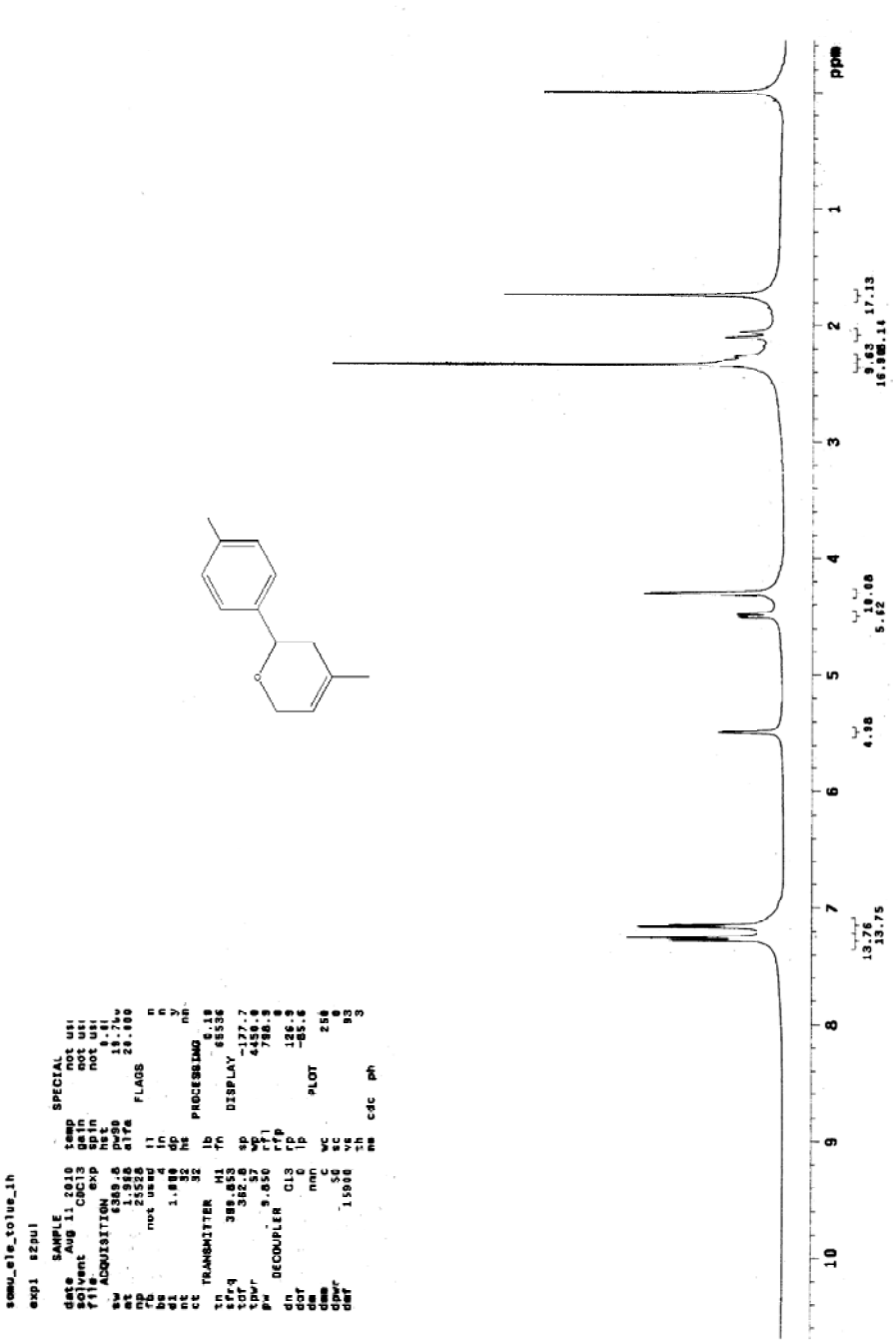
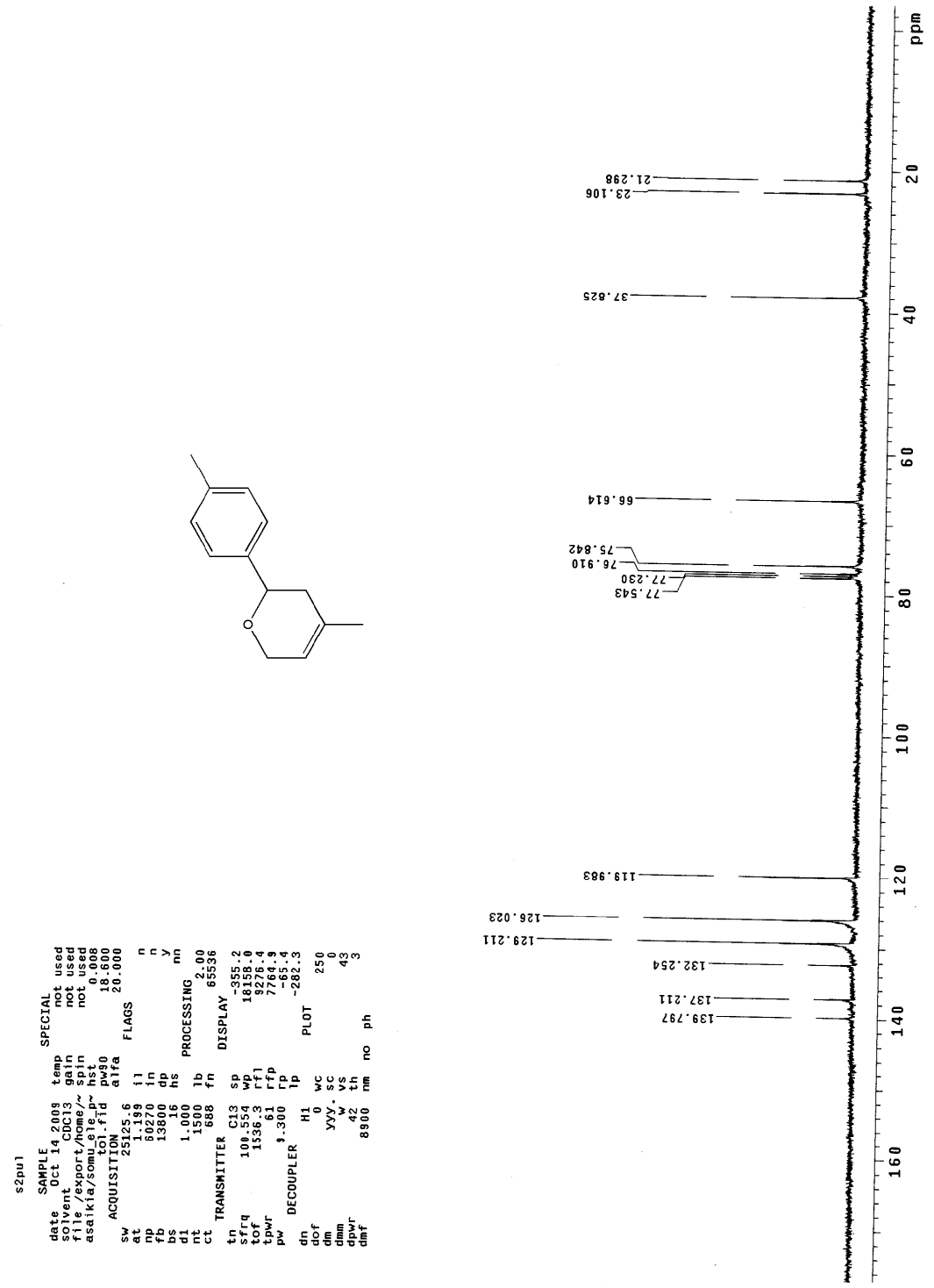
77.550
77.230
76.910
75.110
66.591
37.771
23.037
21.863
ppm
20
40
60
80
100
120
140
160
180

^{1}H NMR of **6f**



^{13}C NMR of **6f**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nt 1500
ct 688
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dof 0
dm yyy.
dmm w
dpwr 42
dmf 8900
SPECIAL
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gain not used
spin not used
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pw90 10.600
alfa 20.000
FLAGS
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in n
dp y
hs nn
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wp 18158.0
rfl 9276.4
rfp 7764.9
rp -65.4
lp -282.3
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vs 43
th 3
nm no ph
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23.106
37.825
66.614
75.842
76.910
77.230
77.543
119.983
126.023
129.211
132.254
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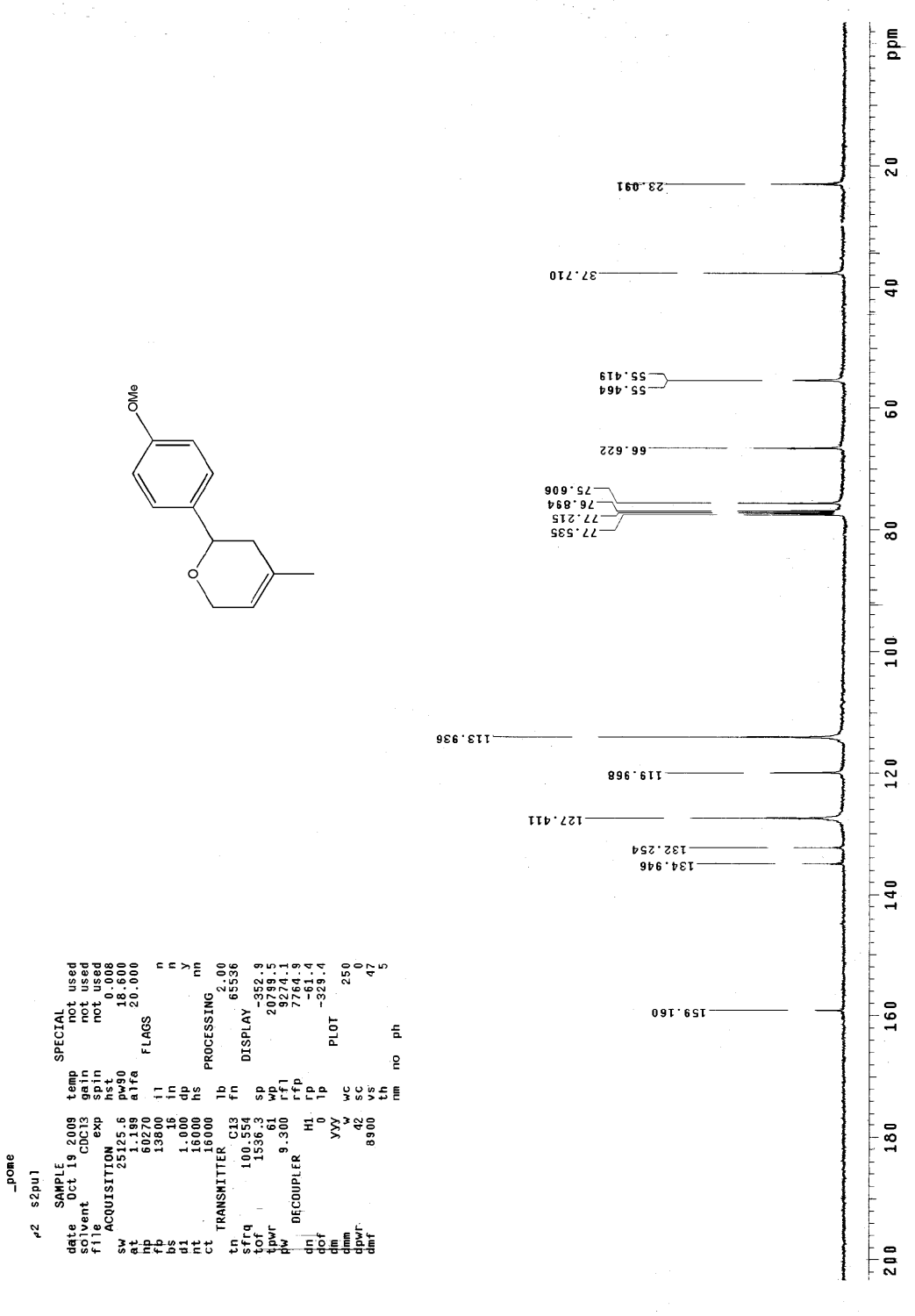
100
120
140
160

^{1}H NMR of **6g**

^{13}C NMR of **6g**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127.411
132.254
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ppm
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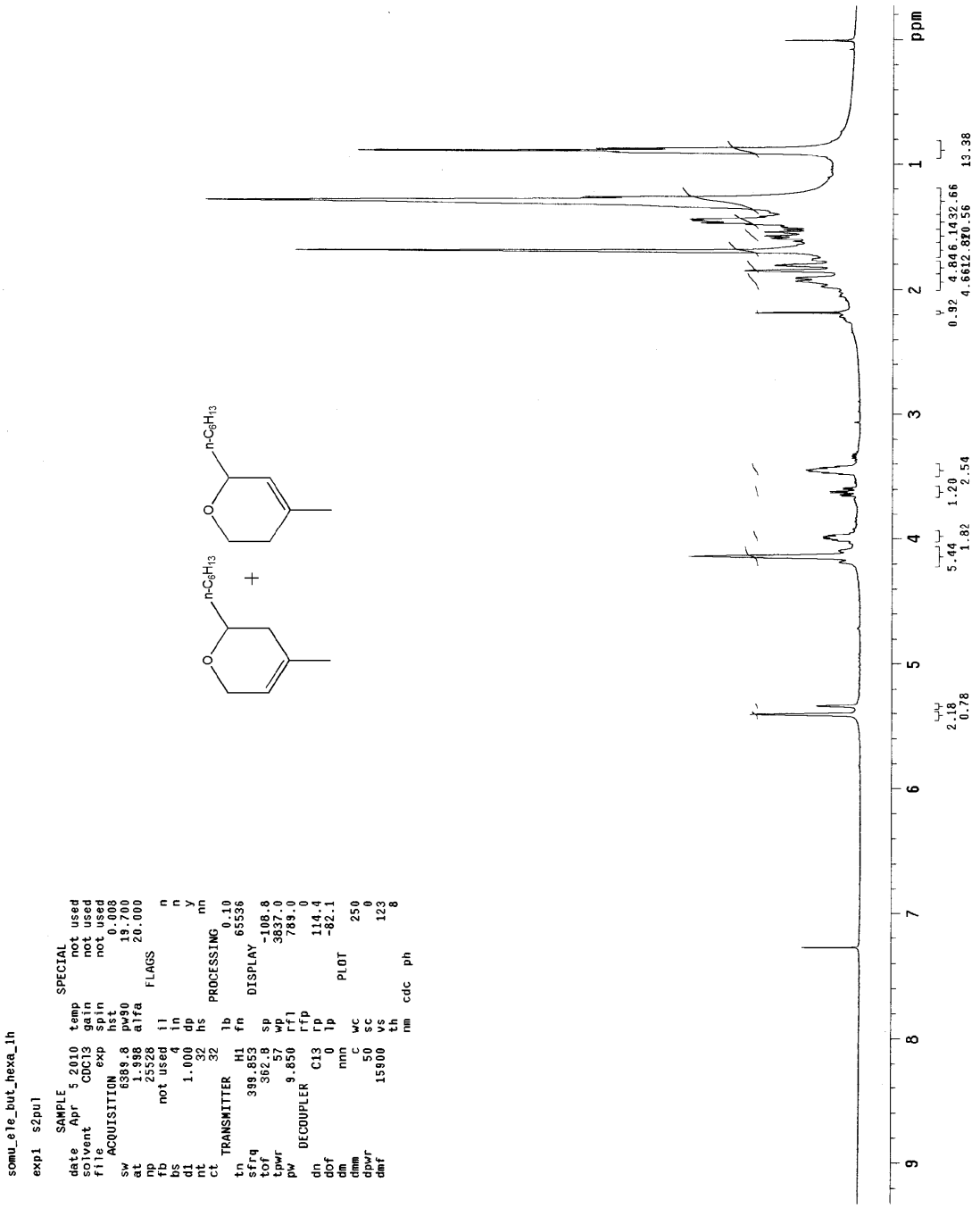
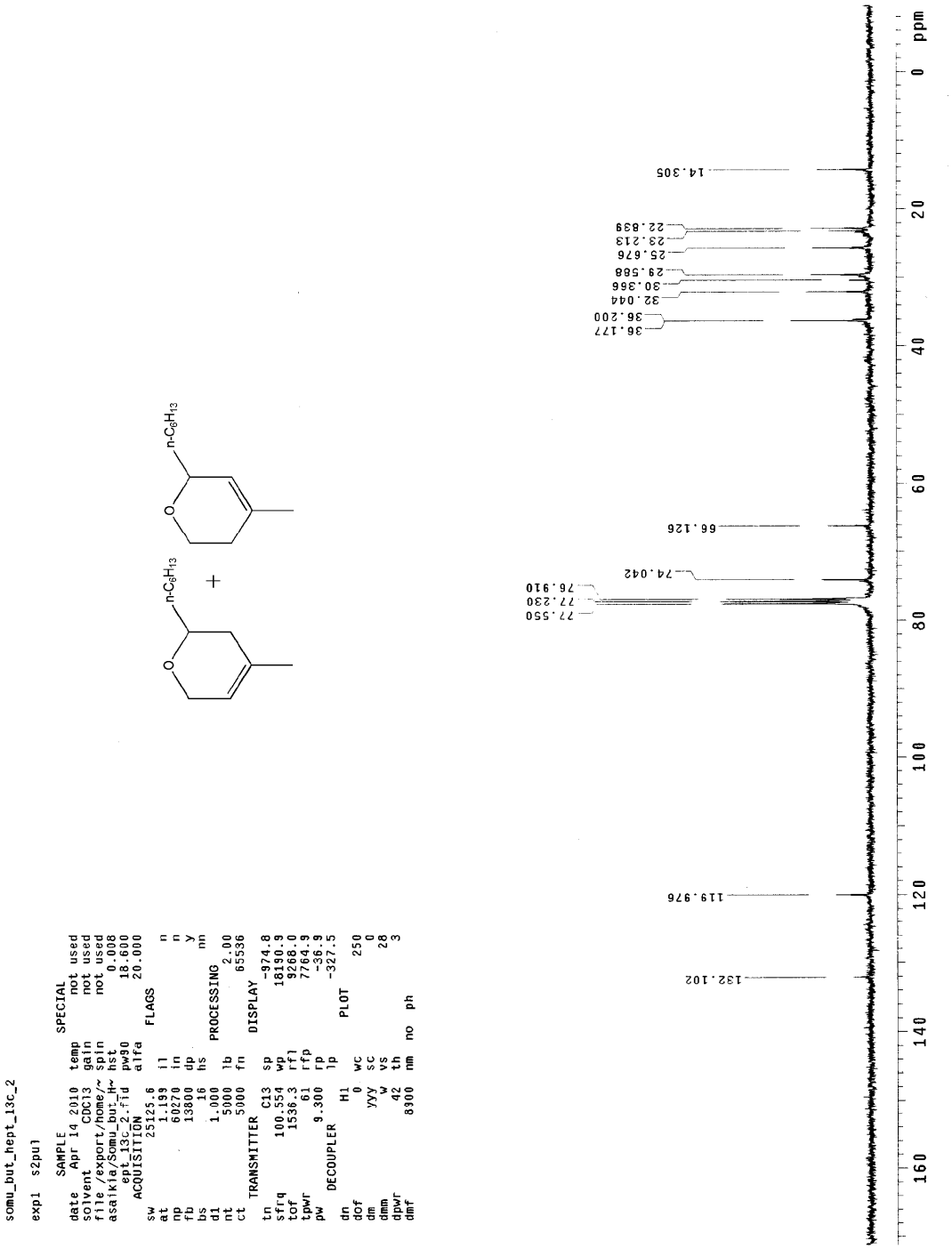
40
60
80
100
120
140
160
180
200

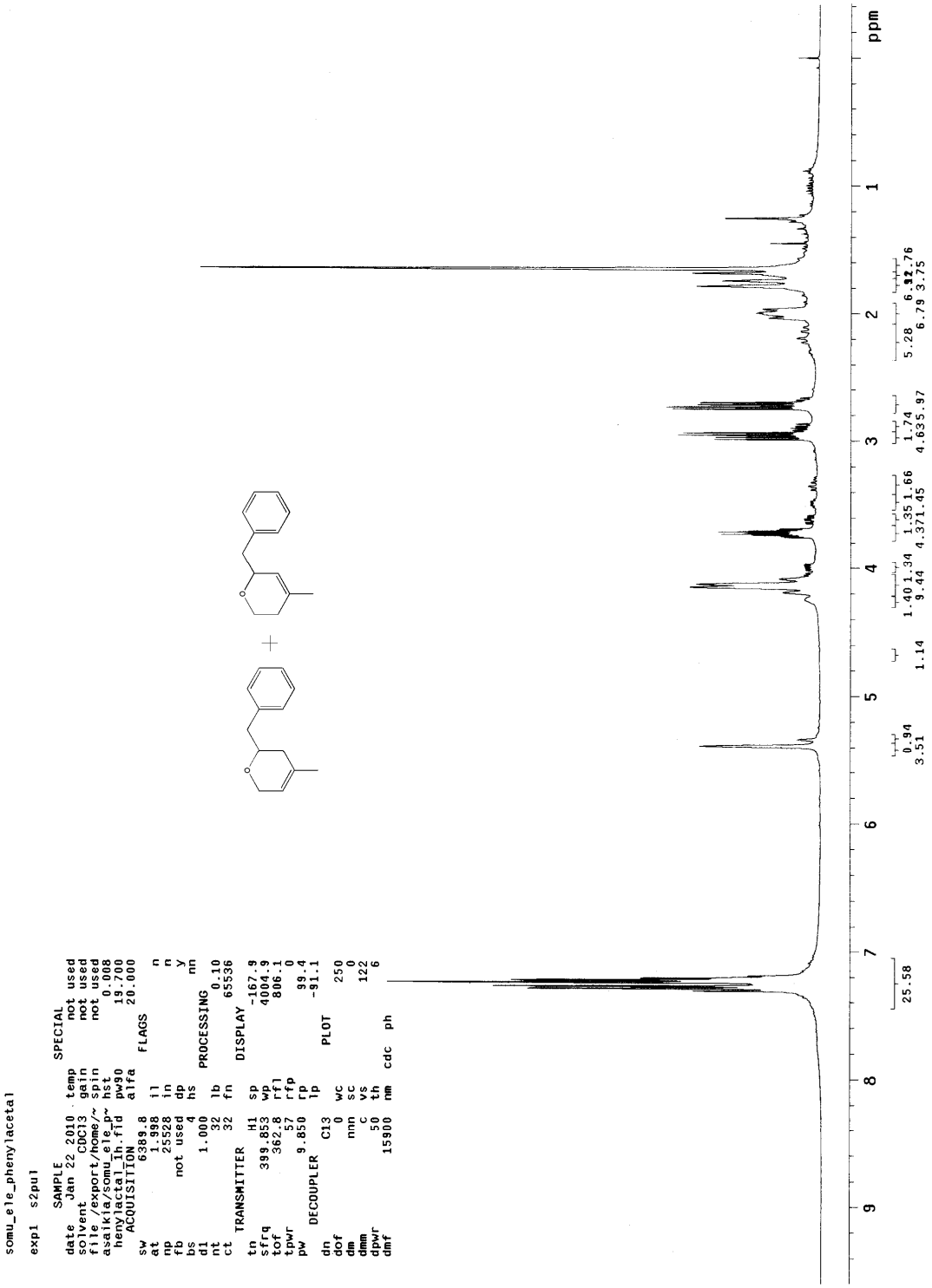
^{1}H NMR of **6h** & **7h**



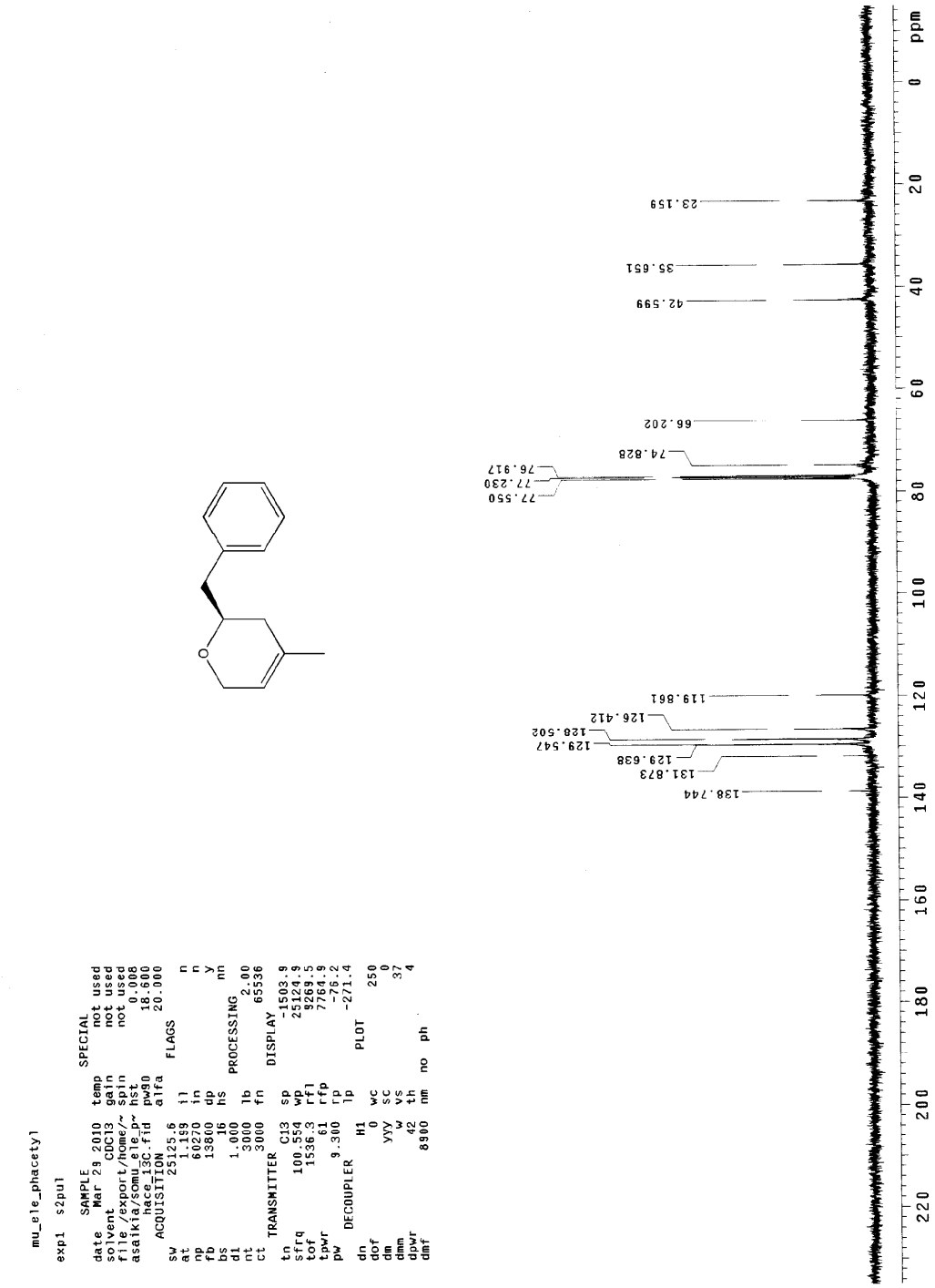
^{13}C NMR of **6h** & **7h**



^{1}H NMR of **6i** & **7i**



^{13}C NMR of **6i**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tof 1536.3
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pw 9.300
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dof 0
dm yyy
dmm w
dpwr 42
dmf 8900
temp
gain
spin
hst
pw90
alfa
FLAGS
il
in
dp
hs
PROCESSING
lb
fn
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sp
wp
rfl
rfp
rp
lp
PLOT
wc
sc
vs
th
nm
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not used
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20.000
n
n
y
nn
2.00
65536
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25124.9
9269.5
7764.9
-76.2
-271.4
250
0
37
4
no ph
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35.651
42.599
66.202
74.828
76.917
77.230
77.550
119.861
126.412
128.502
129.547
129.638
131.873
138.744
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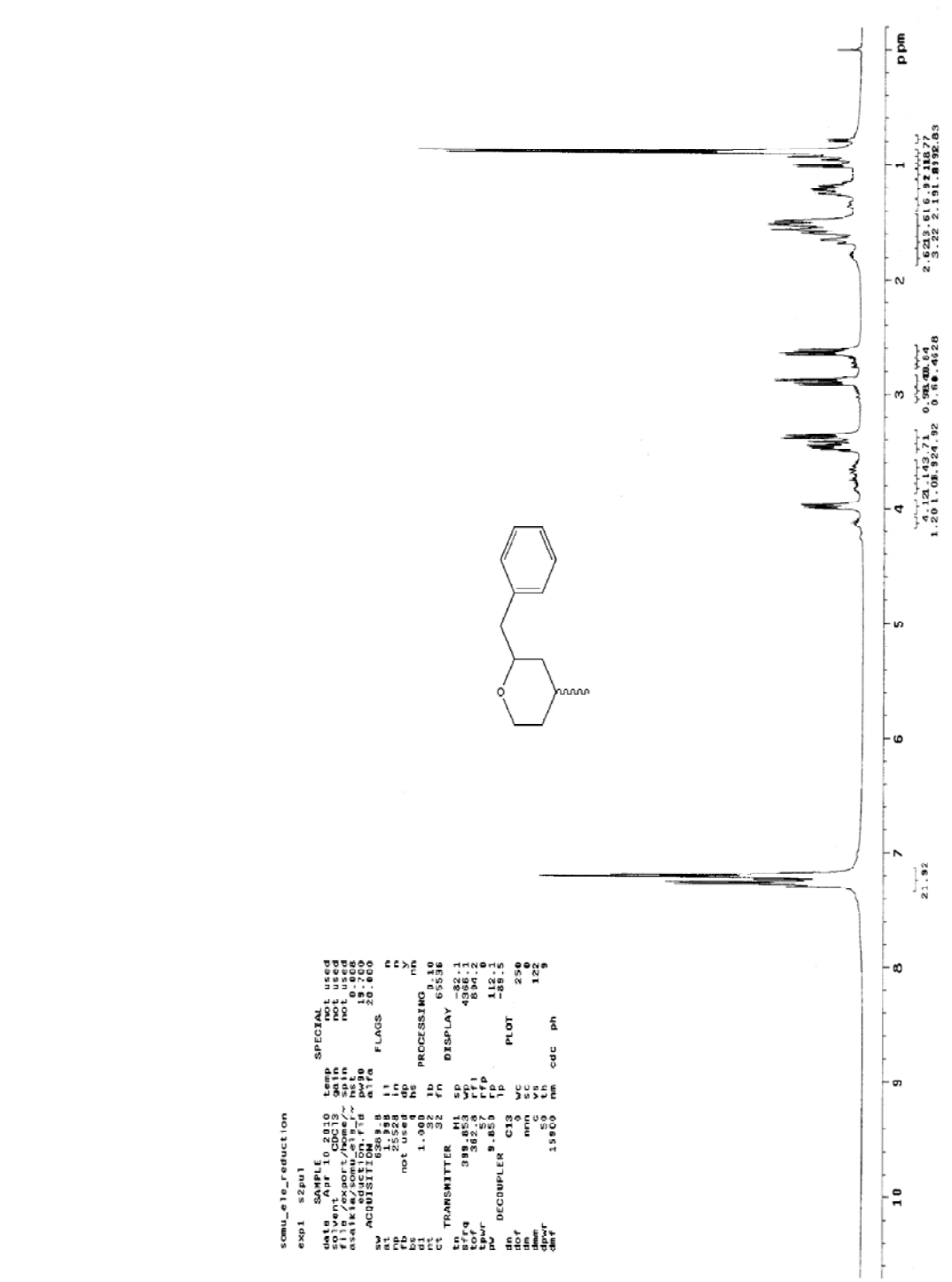
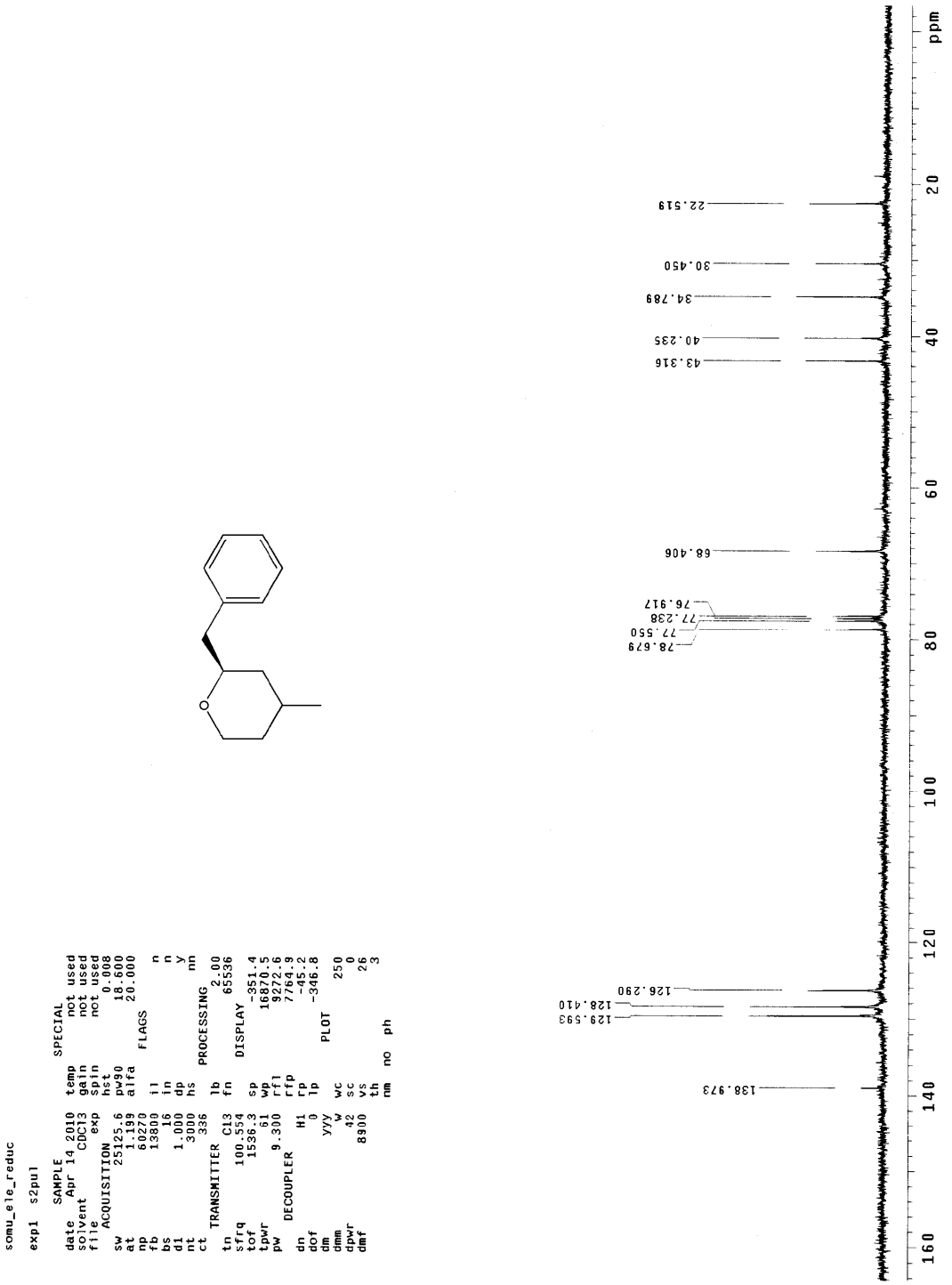
180
160
140
120
100
80
60
40
20
0
ppm

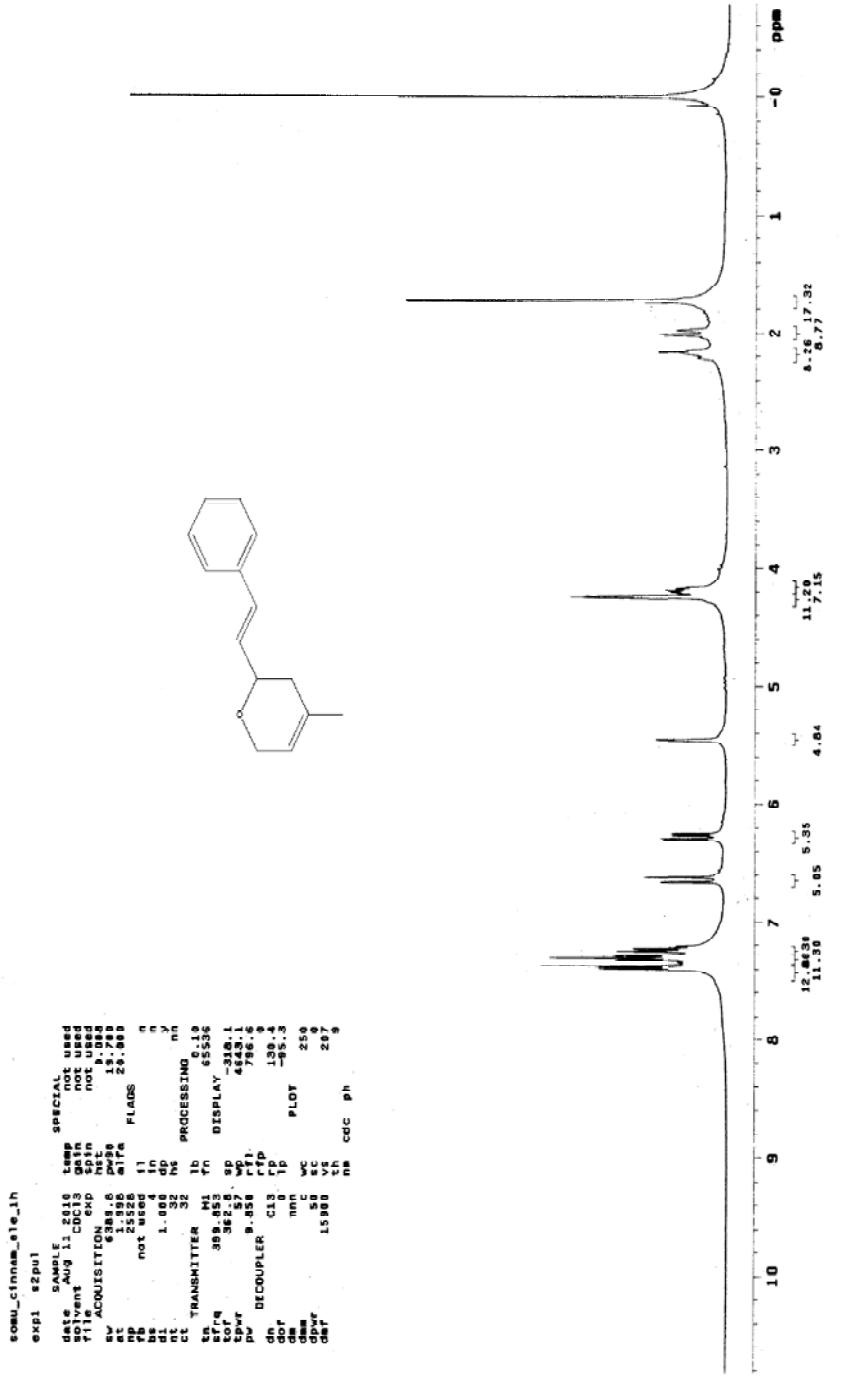
Hydrogenation product of **6i** & **7i**



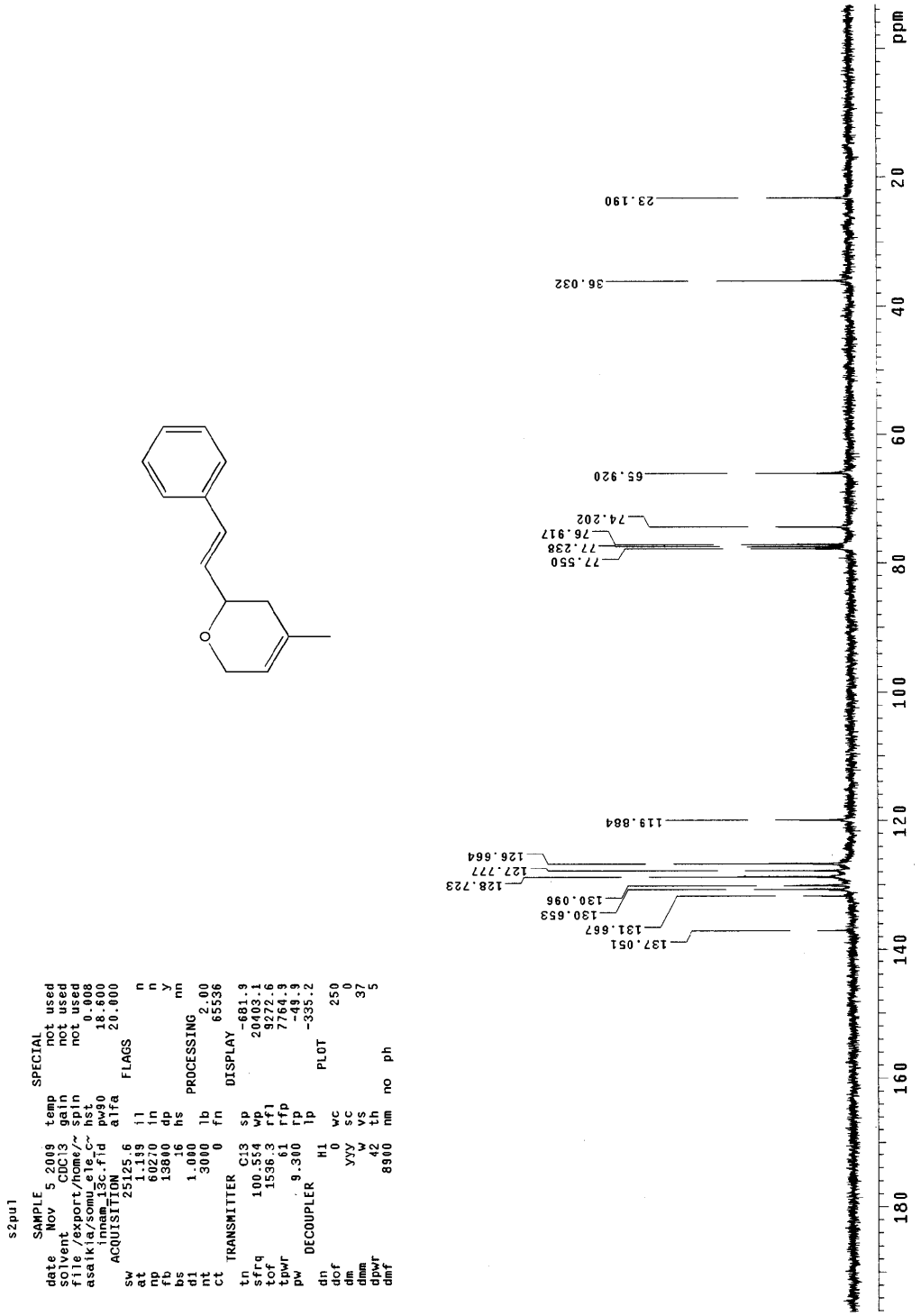
^{13}C NMR of hydrogenation product of **6i** & **7i** (Major product)



^{1}H NMR of **6j**



^{13}C NMR of **6j**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TRANSMITTER
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DECOUPLER
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dmm w
dpwr 42
dmf 8900
SPECIAL
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gain not used
spin not used
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alfa 20.000
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hs nn
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rfp 7764.9
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lp -335.2
PLOT
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sc 0
vs 37
th 5
nm no ph
23.190
36.032
65.920
74.202
76.917
77.238
77.550
119.864
126.664
127.777
128.723
130.096
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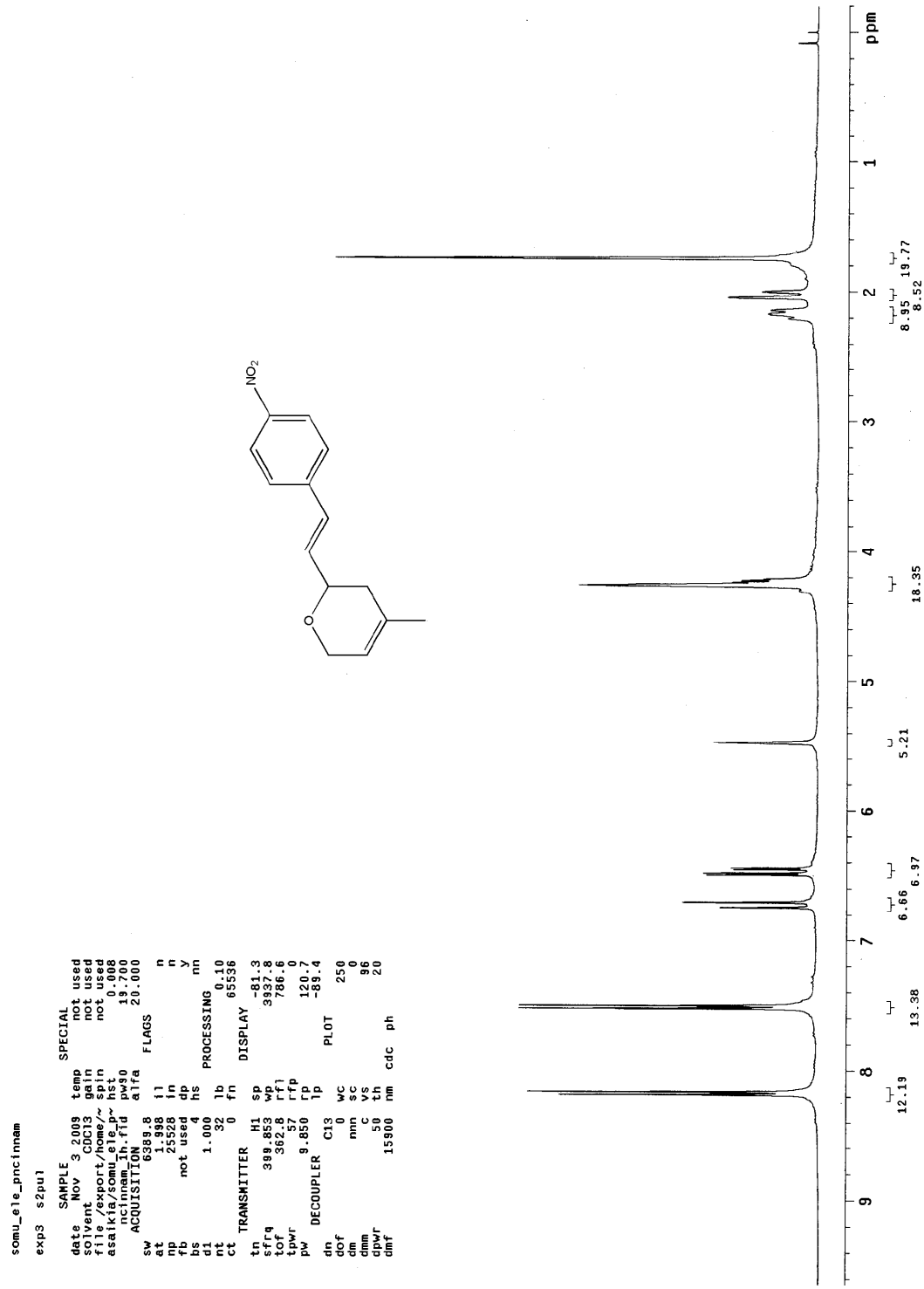
40
60
80
100
120
140
160
180

^{1}H NMR of **6k**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at 1.998
np 25528
fb not used
bs 4
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nt 32
ct 0
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
temp not used
gain not used
spin 0.008
hst 19.700
pw90 20.000
alfa
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in n
dp y
hs nn
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DISPLAY
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wp 3937.8
rfl 786.6
rfp 0
rp 120.7
lp -89.4
PLOT
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sc 0
vs 96
th 20
cdc ph
nm
NO2
O
ppm
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6.66
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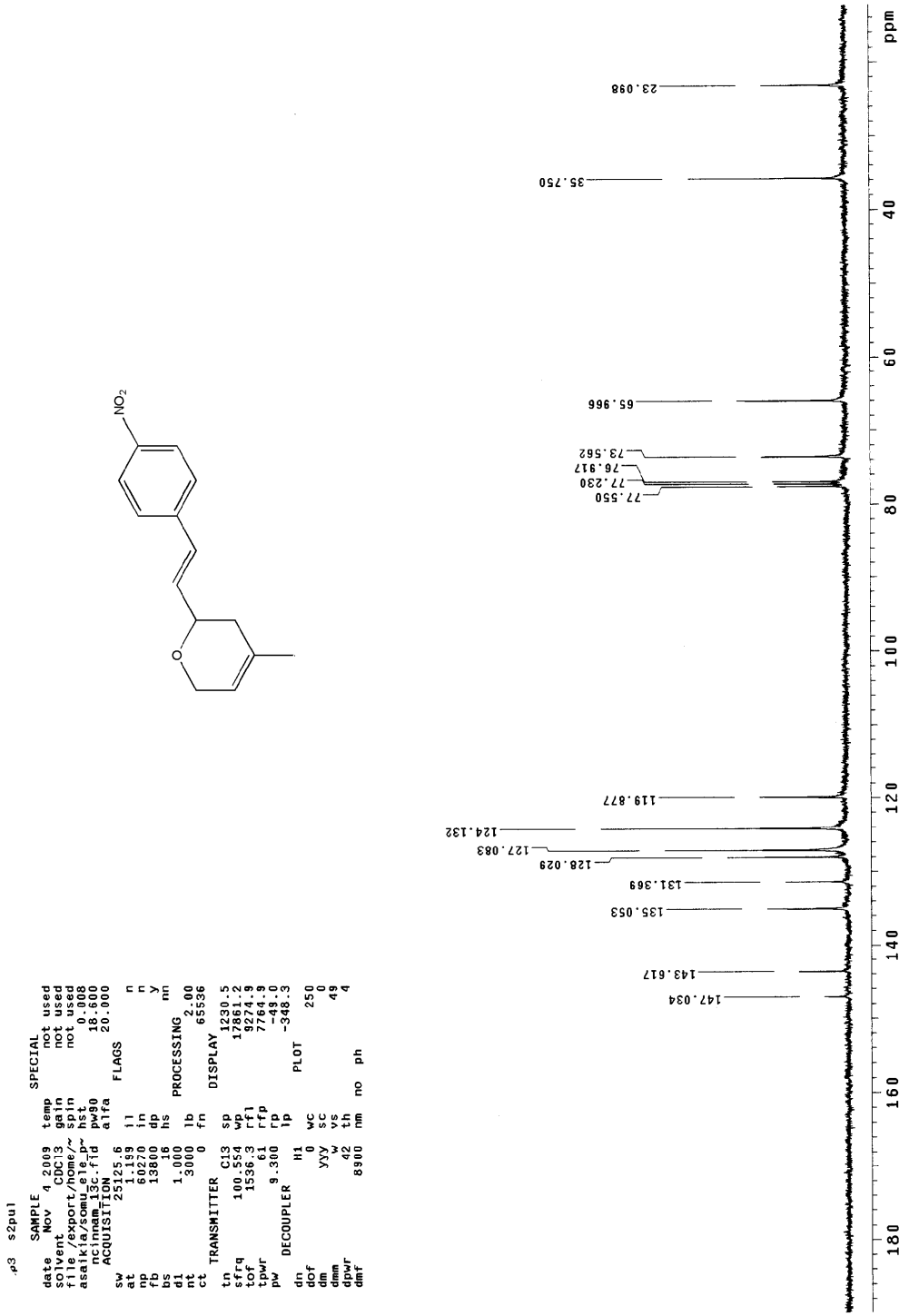
18.35
8.95
8.52
19.77

^{13}C NMR of **6k**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73.562
76.917
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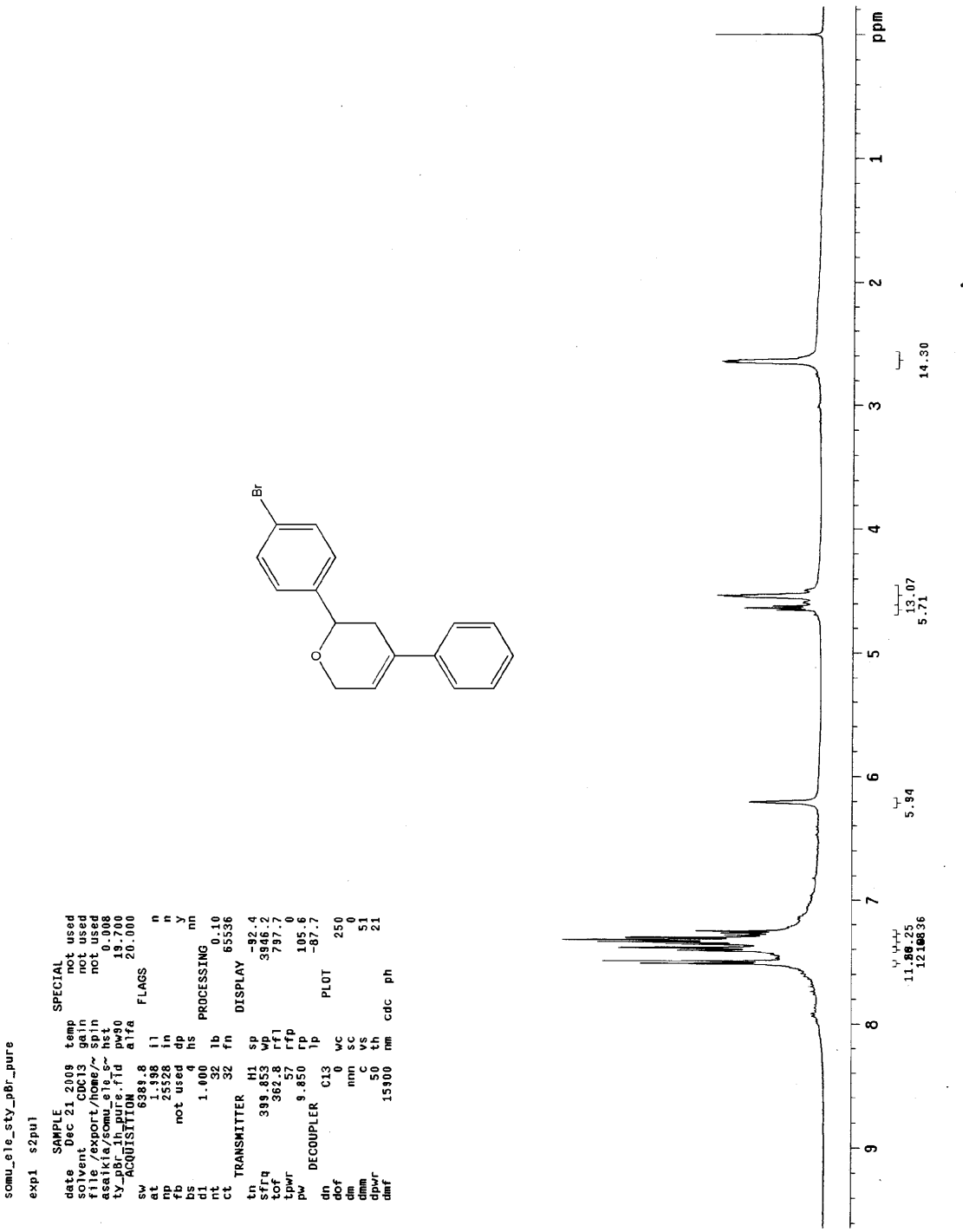
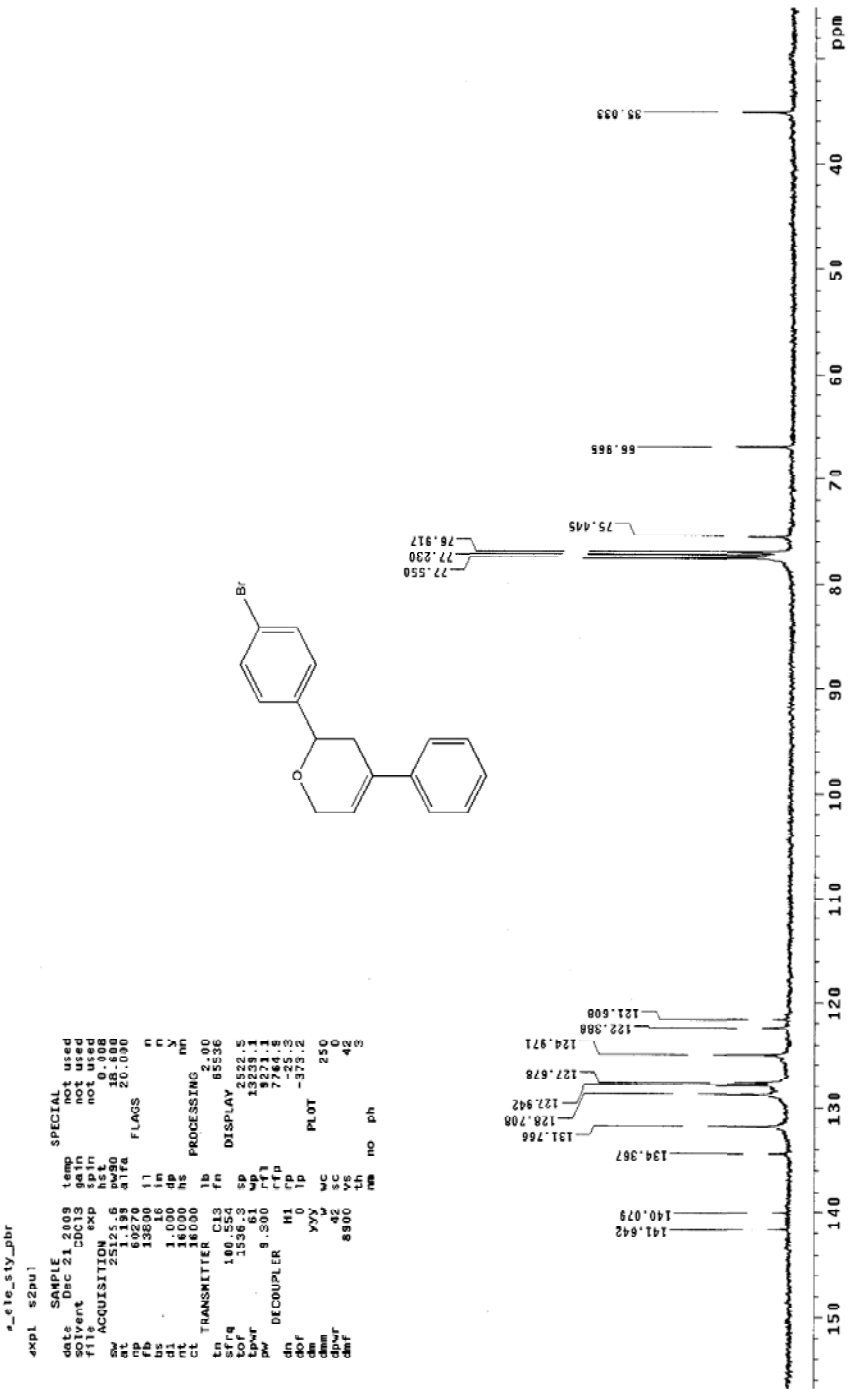
77.550
119.877
124.132
127.083
128.029
131.369
135.053
143.617
147.034
ppm
180
160
140
120
100
80
60
40

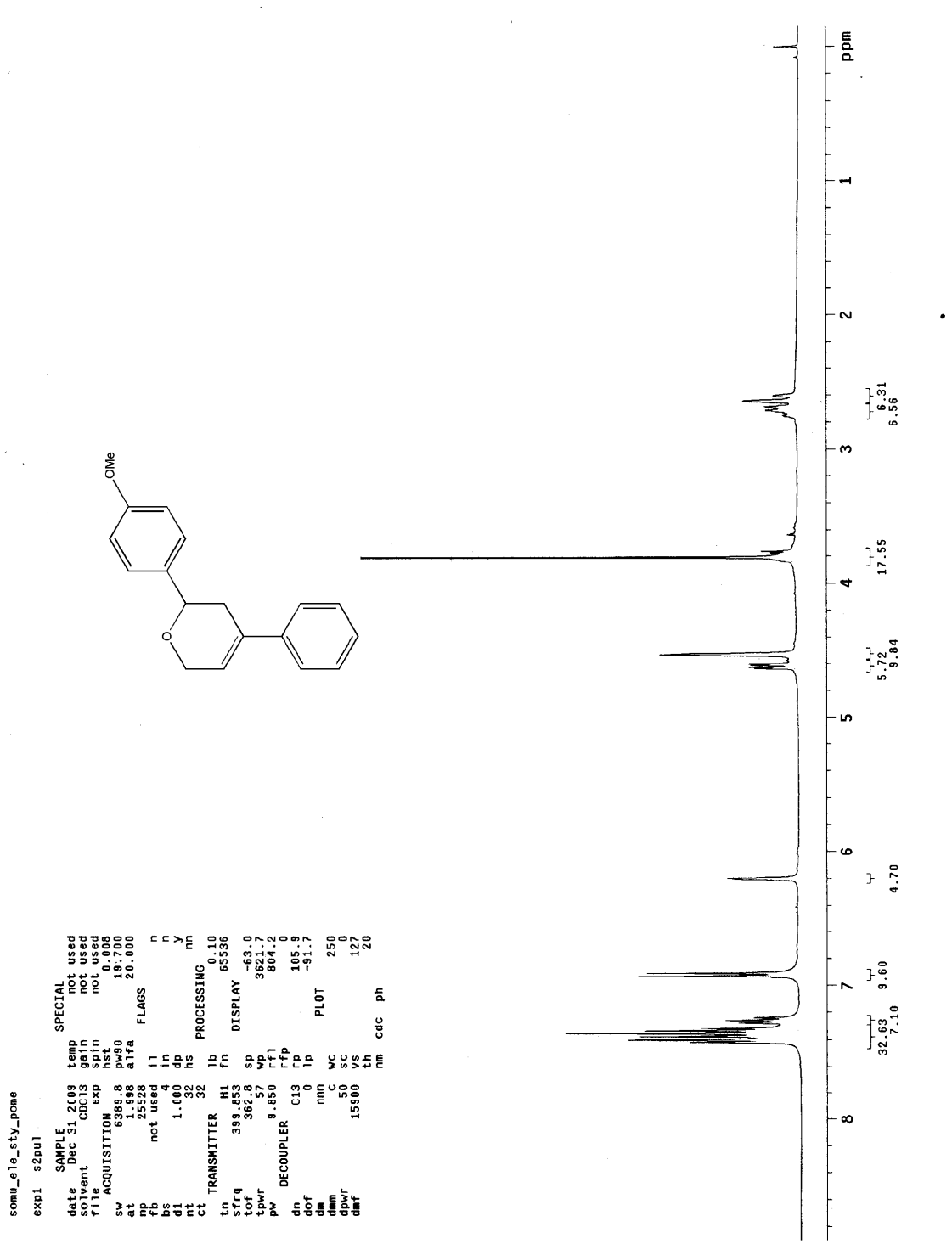
^{1}H NMR of **6l**


somu_ele_sty_p8r_pure
exp1 s2pul
SAMPLE SPECIAL
date Dec 21 2009 temp not used
solvent CDCl3 gain not used
file /export/home/~ spin not used
asaikia/somu_ele_s~ hst 0.008
ty_p8r_1h_pure.fid pw90 19.700
ACQUISITION 20.000
sw 6388.8 FLAGS n
at 1.198 il n
np 25528 in n
fb not used dp y
bs 4 hs nn
d1 1.000 PROCESSING
nt 32 lb 0.10
ct 32 fn 65536
TRANSMITTER DISPLAY
tn H1 sp -82.4
sfrq 399.853 wp 3946.2
tof 362.8 rfl 797.7
tpwr 57 rfp 0
pw 9.850 rp 105.6
DECOUPLER lp -87.7
dn C13 PLOT
dof 0 wc 250
dm nnn sc 0
dmm c vs 51
dpwr 50 th 21
dmf 15900 nm cdc ph
Br
O
ppm
1
2
3
4
5
6
7
8
9
14.30
13.07
5.71
5.94
11.25

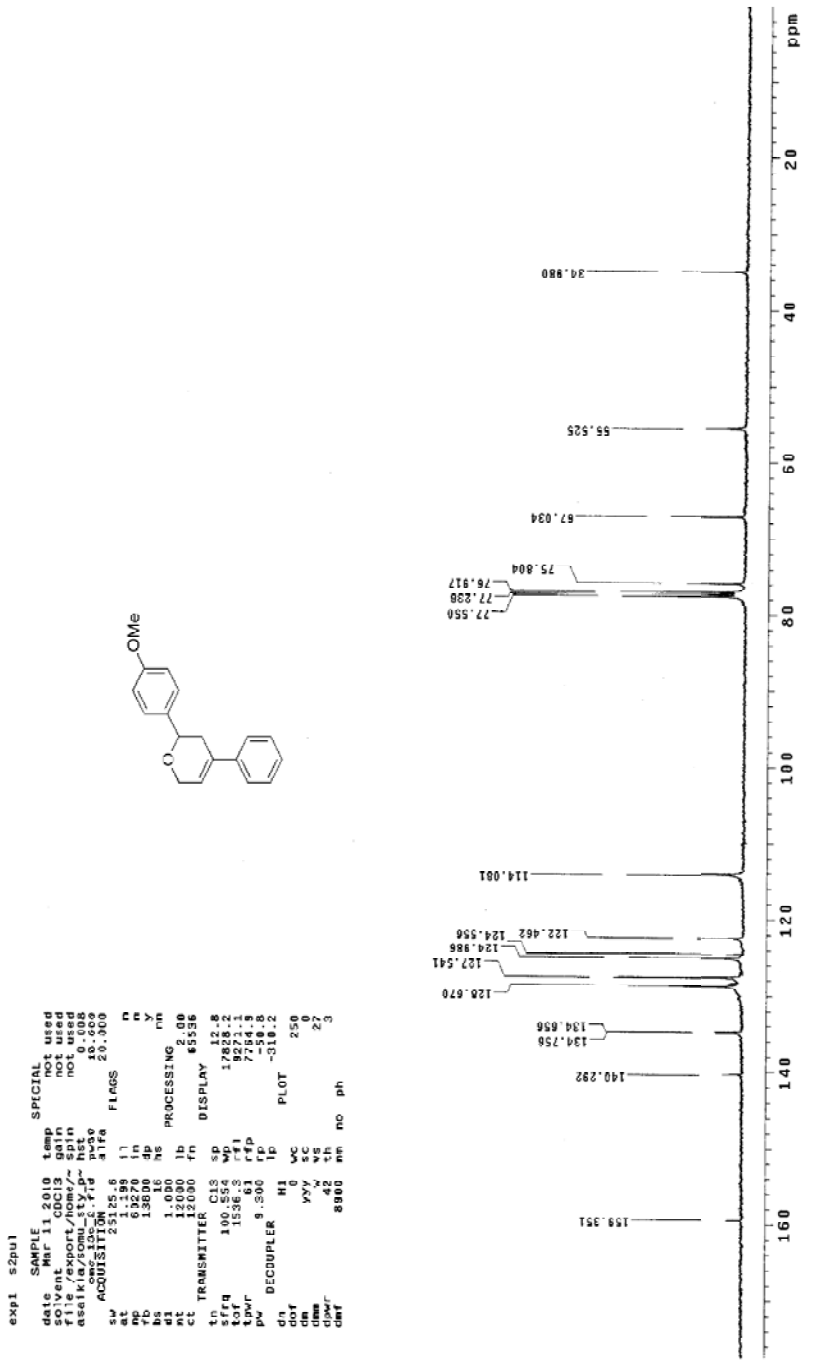
^{13}C NMR of **6l**


Br
O
77.550
77.290
76.917
75.445
66.865
35.033
121.608
122.388
124.971
127.678
127.942
128.708
131.766
134.367
140.079
141.642
ppm

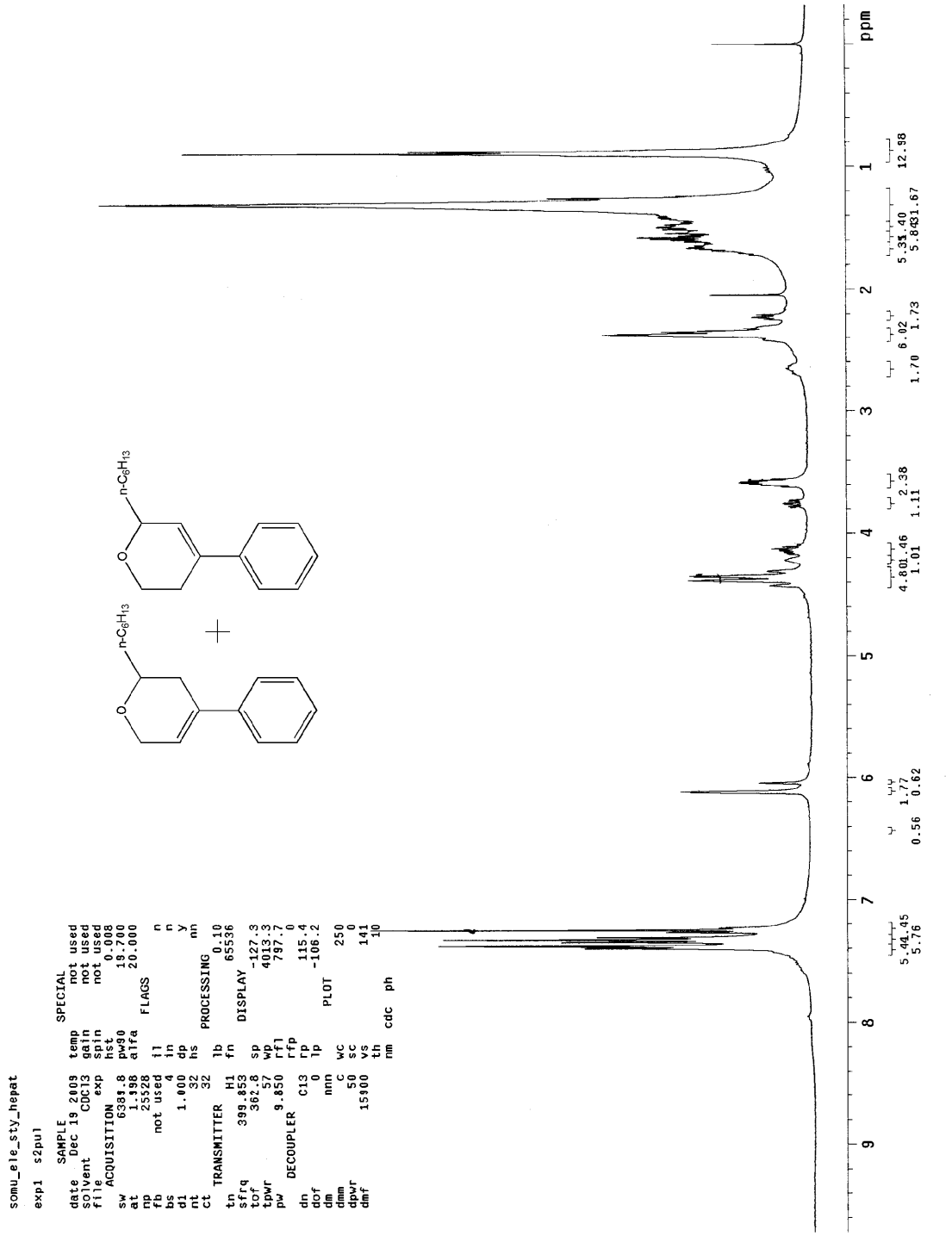
^{1}H NMR of **6m**


somu_ele_sty_pome
expl s2pul
SAMPLE
date Dec 31 2009
solvent CDCl3
file exp
ACQUISITION
sw 6389.8
at 1.998
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
temp not used
gain not used
spin not used
hst 0.008
pw90 19.700
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -63.0
wp 3621.7
rfl 804.2
rfp 0
rp 105.9
lp -91.7
PLOT
wc 250
sc 0
vs 127
th 20
nm cdc ph
OMe
O
ppm
1
2
3
4
5
6
7
8
6.31
6.56
17.55
5.72
9.84
4.70
32.63
7.10
9.60

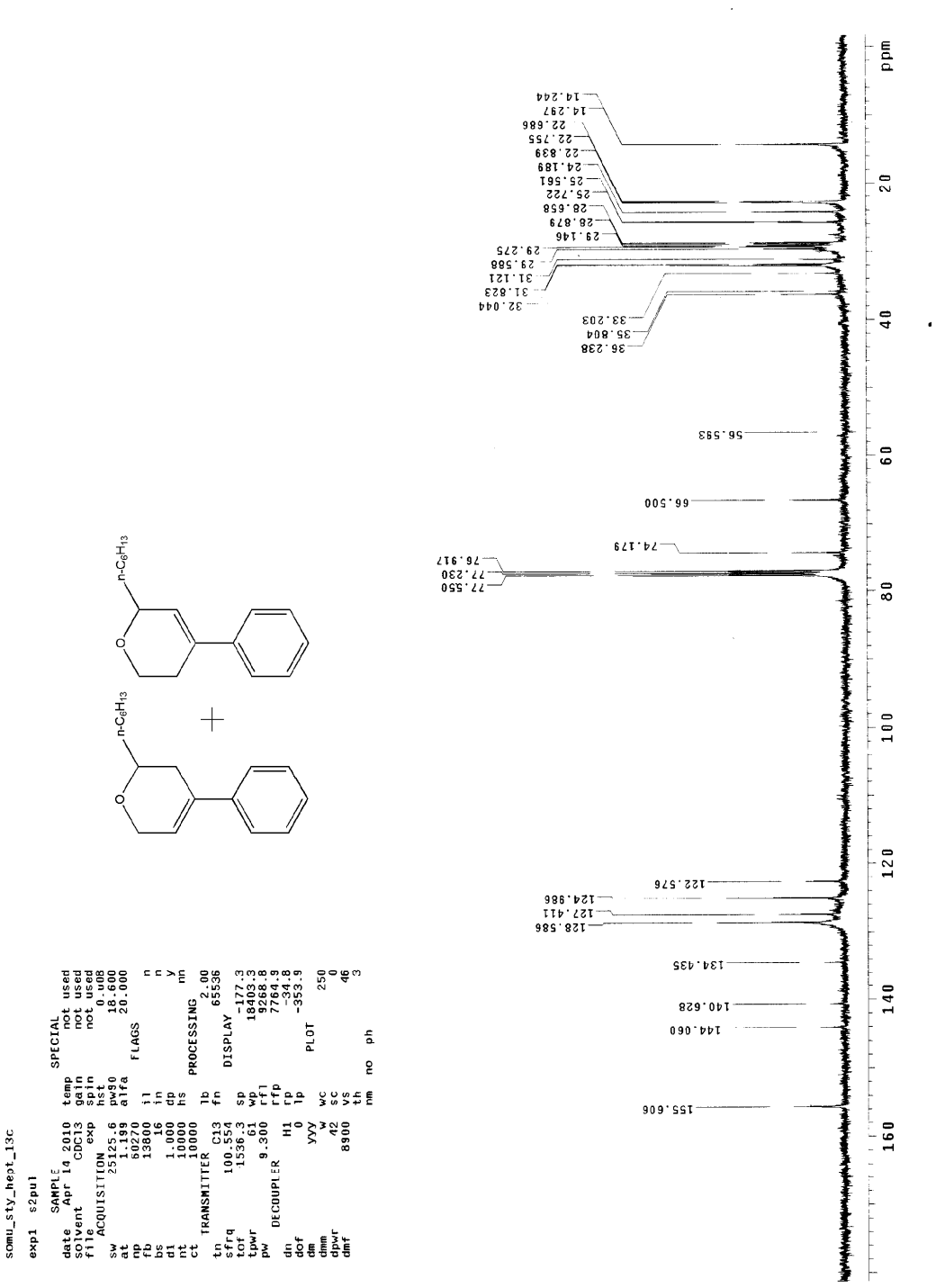
^{13}C NMR of **6m**


OMe
O
34.880
55.525
67.034
75.804
76.917
77.288
77.550
114.081
122.462
124.356
124.886
127.541
128.670
134.656
134.756
140.292
159.351
ppm
20
40
60
80
100
120
140
160

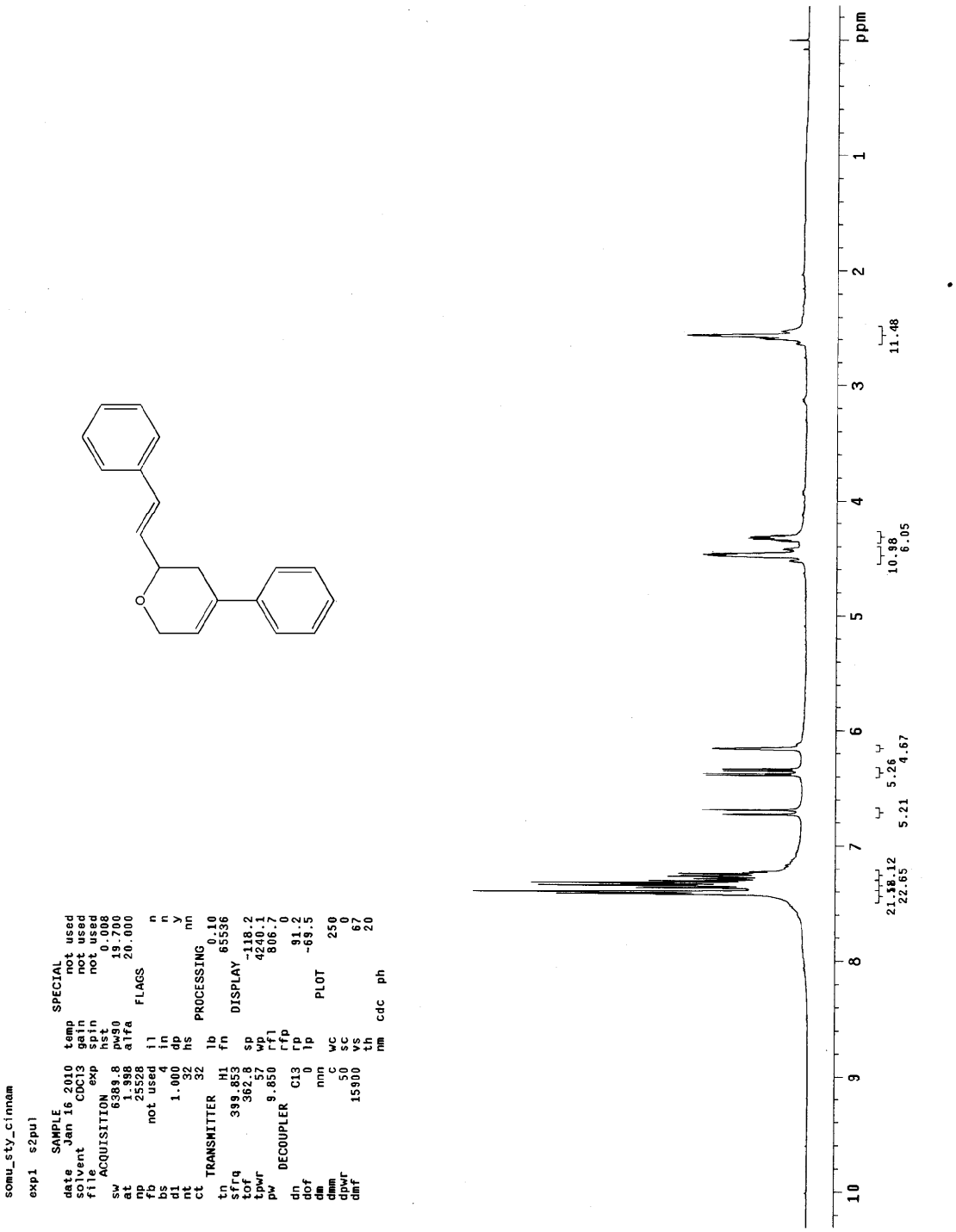
^{1}H NMR of **6n** & **7n**



^{13}C NMR of **6n** & **7n**



^{1}H NMR of **6o**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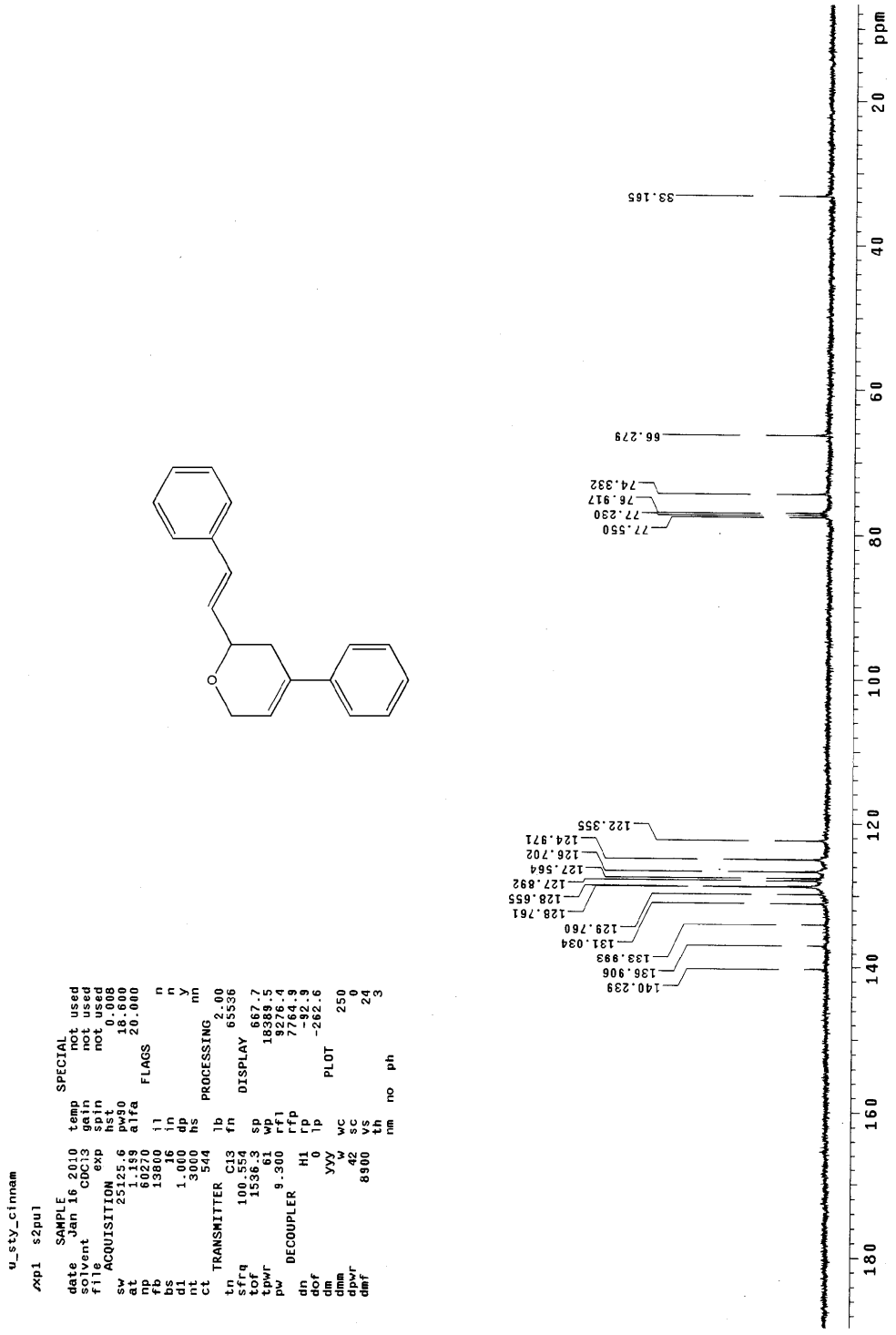
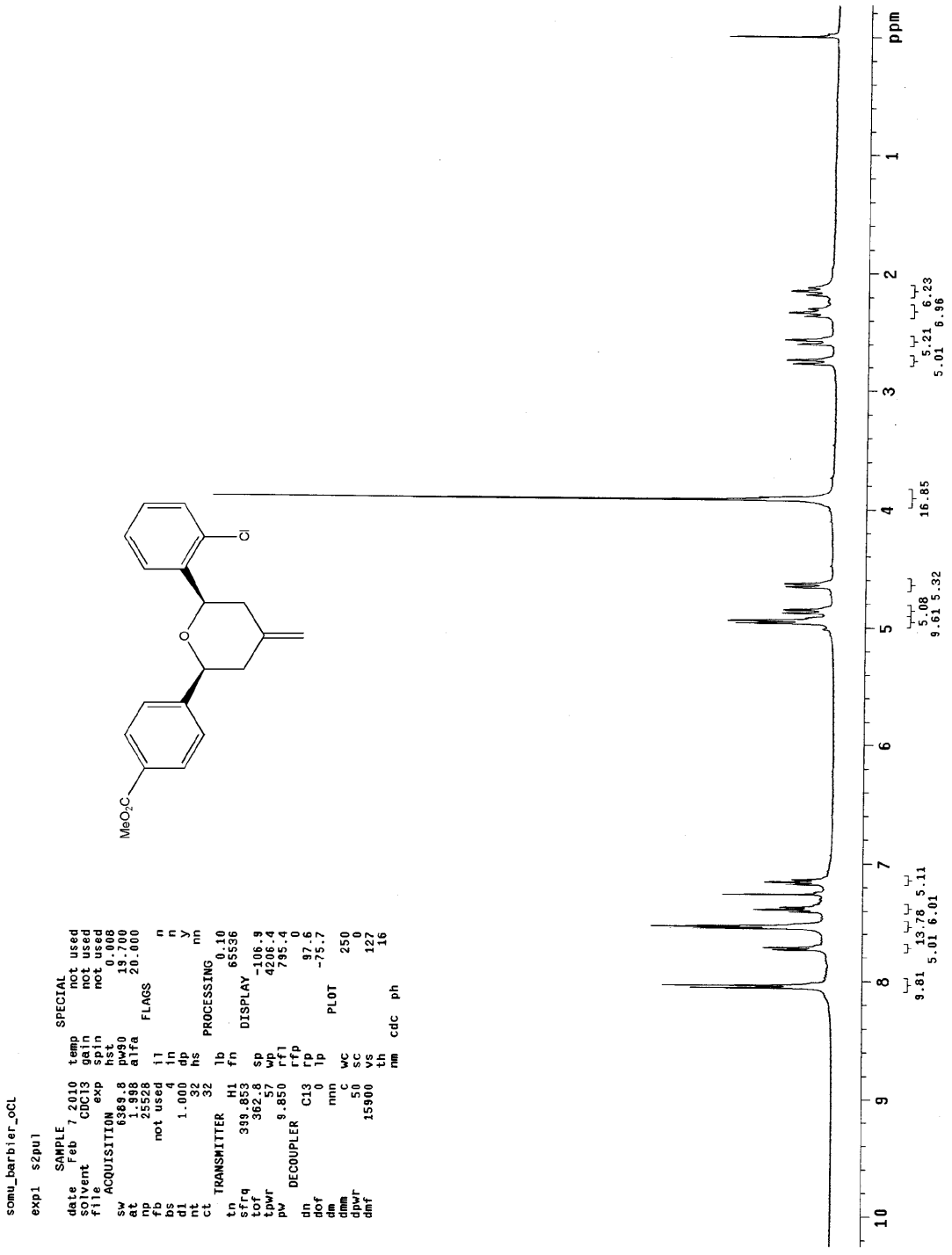
exp1 s2pul
SAMPLE
date Jan 16 2010
solvent CDCl3
file
ACQUISITION
sw 6388.8
at 1.998
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
not used
not used
not used
temp
gain
spin
hst 0.008
pw90 19.700
atfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -118.2
wp 4240.1
rfl 806.7
rfp 0
rp 91.2
lp -69.5
PLOT
wc 250
sc 0
vs 67
th 20
nm cdc ph
ppm
11.48
10.98
6.05
5.26
4.67
5.21
22.65

^{13}C NMR of **6o**


u_sty_cinnam
/xp1 s2pul
SAMPLE
date Jan 16 2010
solvent CDCl3
file exp
ACQUISITION
sw 25125.6
at 1.199
np 60270
fb 13800
bs 16
d1 1.000
nt 3000
ct 544
TRANSMITTER
tn C13
sfrq 100.554
tof 1536.3
tpwr 61
pw 9.300
DECOUPLER
dn H1
dof 0
dm yyy
dmm y
dpwr 42
dmf 8900
SPECIAL
temp not used
gain not used
spin not used
hst 0.008
pw90 18.600
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 2.00
fn 65536
DISPLAY
sp 687.7
wp 18389.5
rfl 9278.4
rfp 7764.9
rp -32.9
lp -262.6
PLOT
wc 250
sc 0
vs 24
th 3
nm no ph
33.165
66.279
74.332
76.917
77.230
77.550
122.355
124.971
126.702
127.564
127.692
128.655
128.761
129.760
131.034
133.893
136.906
140.239
ppm

^{1}H NMR of **8p**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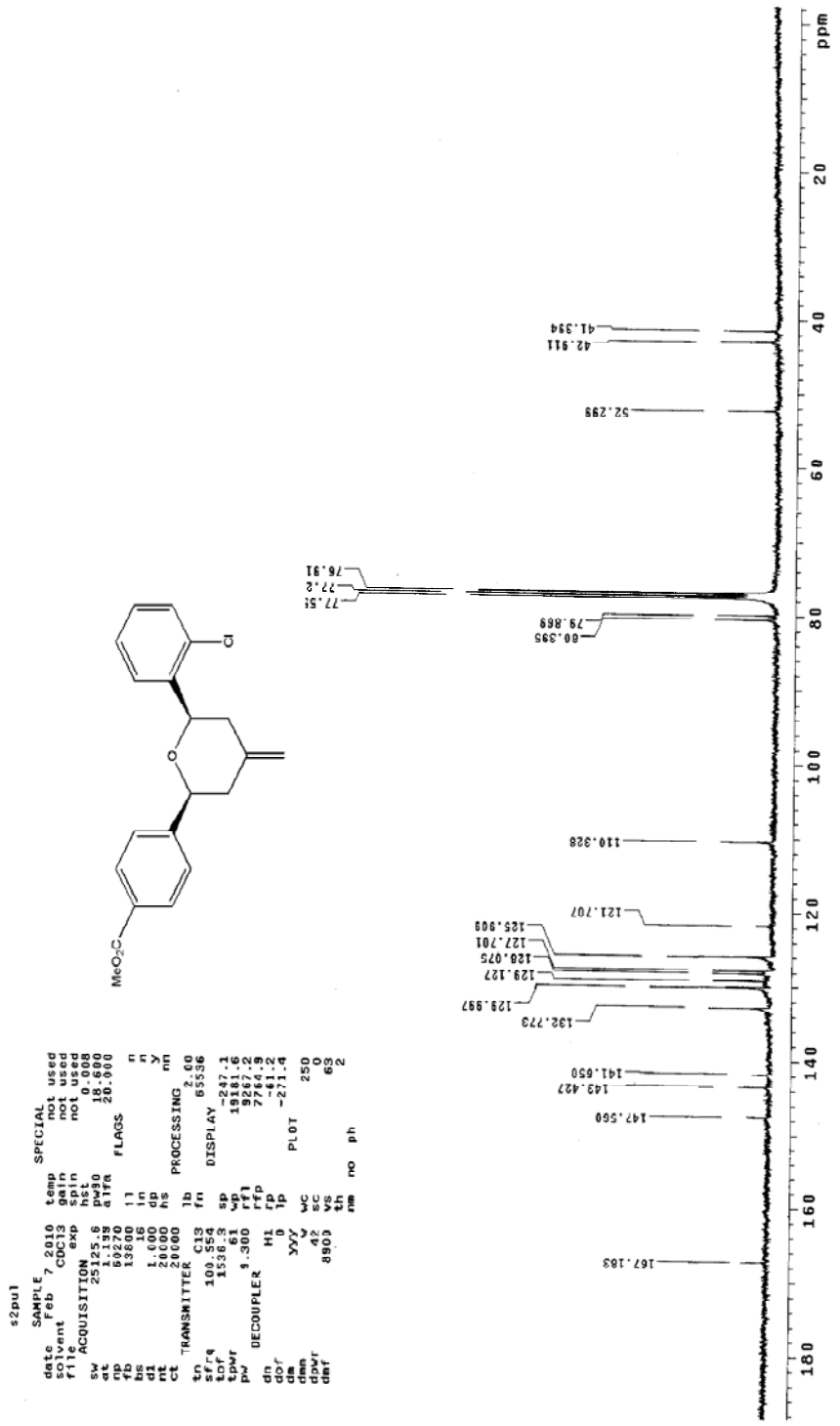
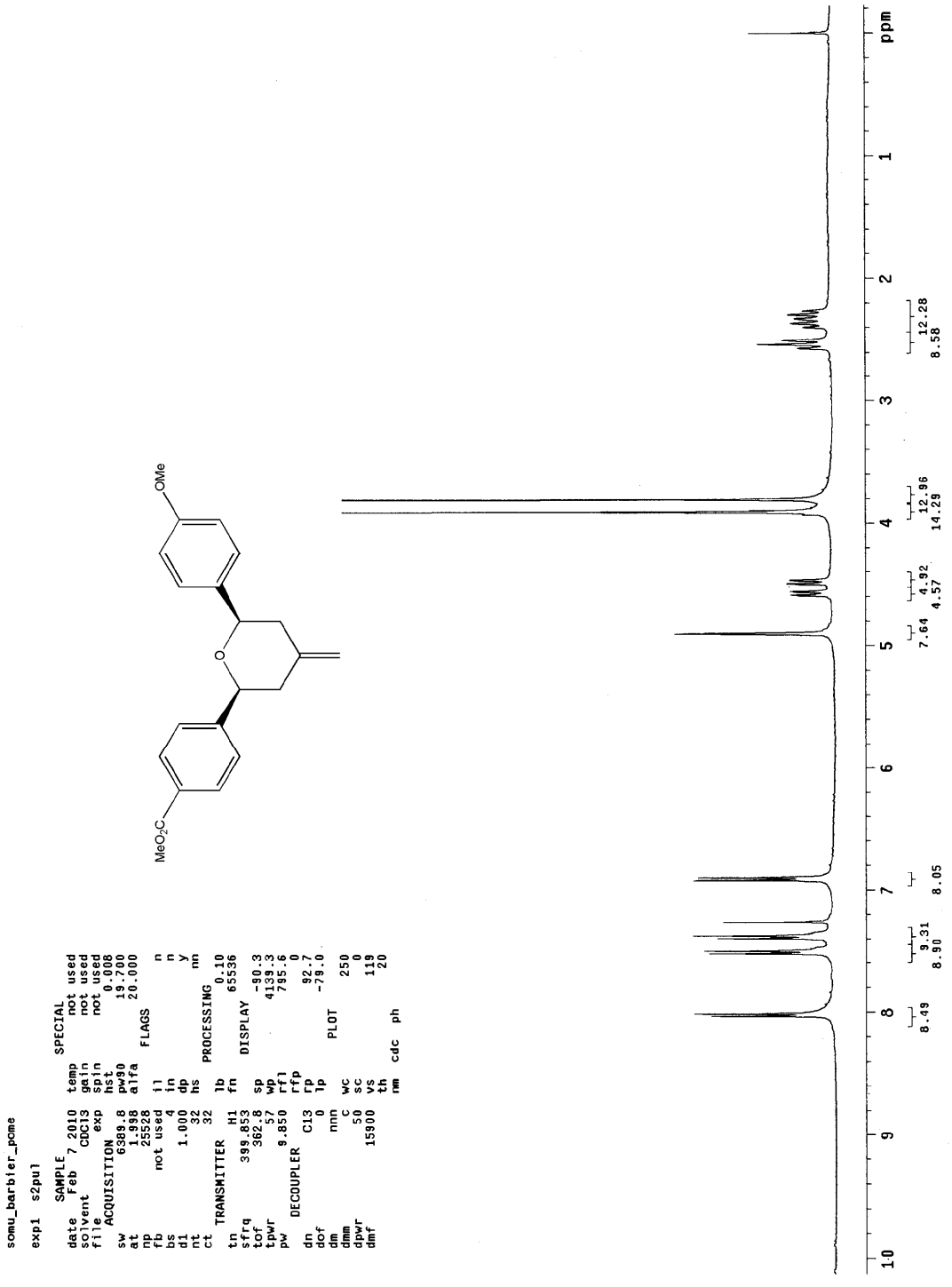
expl s2pul
SAMPLE
date Feb 7 2010
solvent CDCl3
file exp
ACQUISITION
sw 6389.8
at 1.998
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
temp not used
gain not used
spin not used
hst 0.008
pw90 19.700
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -106.9
wp 4206.4
rfl 795.4
rfp 0
rp 97.6
lp -75.7
PLOT
wc 250
sc 0
vs 127
th 16
cdc ph
nm
Cl
O
MeO2C
ppm
9.81
13.78
5.01
5.11
6.01
9.61
5.08
5.32
16.85
5.01
5.21
6.96
6.23

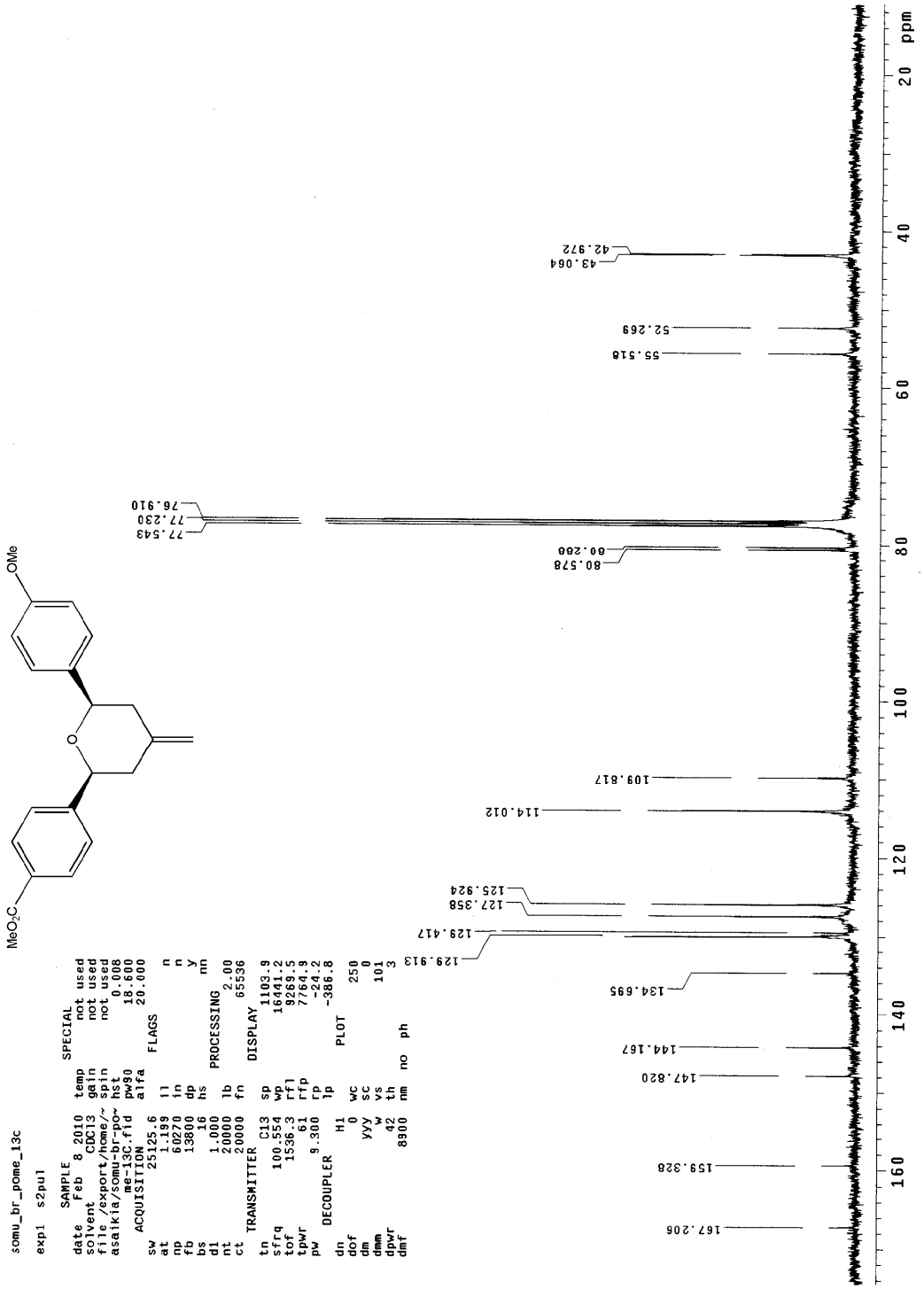
^{13}C NMR of **8p**


Cl
O
MeO2C
s2pul
SAMPLE
date Feb 7 2010
solvent CDCl3
file
ACQUISITION
sw 25125.6
at 1.139
np 60270
fb 13800
bs 16
d1 1.000
nt 20000
ct
TRANSMITTER
tn C13
sfrq 100.554
tof 1536.3
tpwr 61
pw 9.300
DECOUPLER
dn H1
dof 0
dm yyy
dmm y
dmf 42
dpwr 8909
SPECIAL
temp not used
gain not used
spin
hst 0.008
per 18.000
d1fa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 2.00
fn 65536
DISPLAY
sp -247.1
wp 19181.6
rfl 9267.2
rfp 9264.8
rp -61.2
lp -271.4
PLOT
wc 250
sc 0
vs 63
th 2
nm nn ph
ppm
167.183
147.560
143.427
141.650
132.773
129.997
129.127
128.075
127.701
125.908
121.707
110.328
80.395
79.869
77.59
77.2
76.91
52.299
42.911
41.394

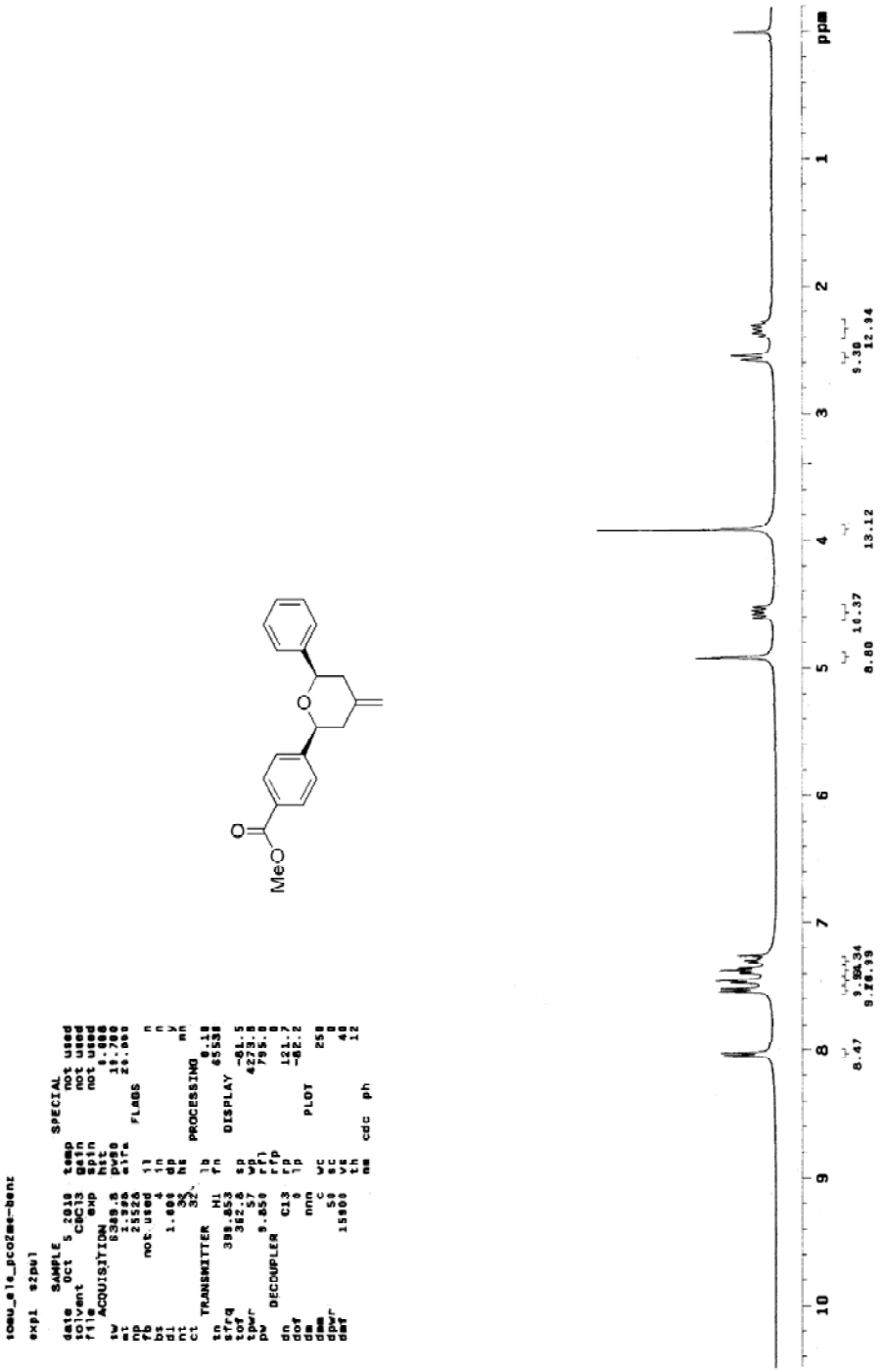
^{1}H NMR of **8q**


somu_barbier_pcme
expl s2pul
SAMPLE
date Feb 7 2010
solvent CDCl3
file ACQUISITION
sw 6389.8
at 1.938
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER H1
tn
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER C13
dn
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL not used
temp not used
gain not used
spin 0.008
hst 19.700
pw90 20.000
alfa
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -80.3
wp 4139.3
rfl 795.6
rfp 0
rp 92.7
lp -79.0
PLOT
wc 250
sc 0
vs 119
th 20
cdc ph
OMe
MeO2C
ppm
8.49
8.90
9.31
8.05
7.64
4.57
4.92
14.29
12.96
8.58
12.28

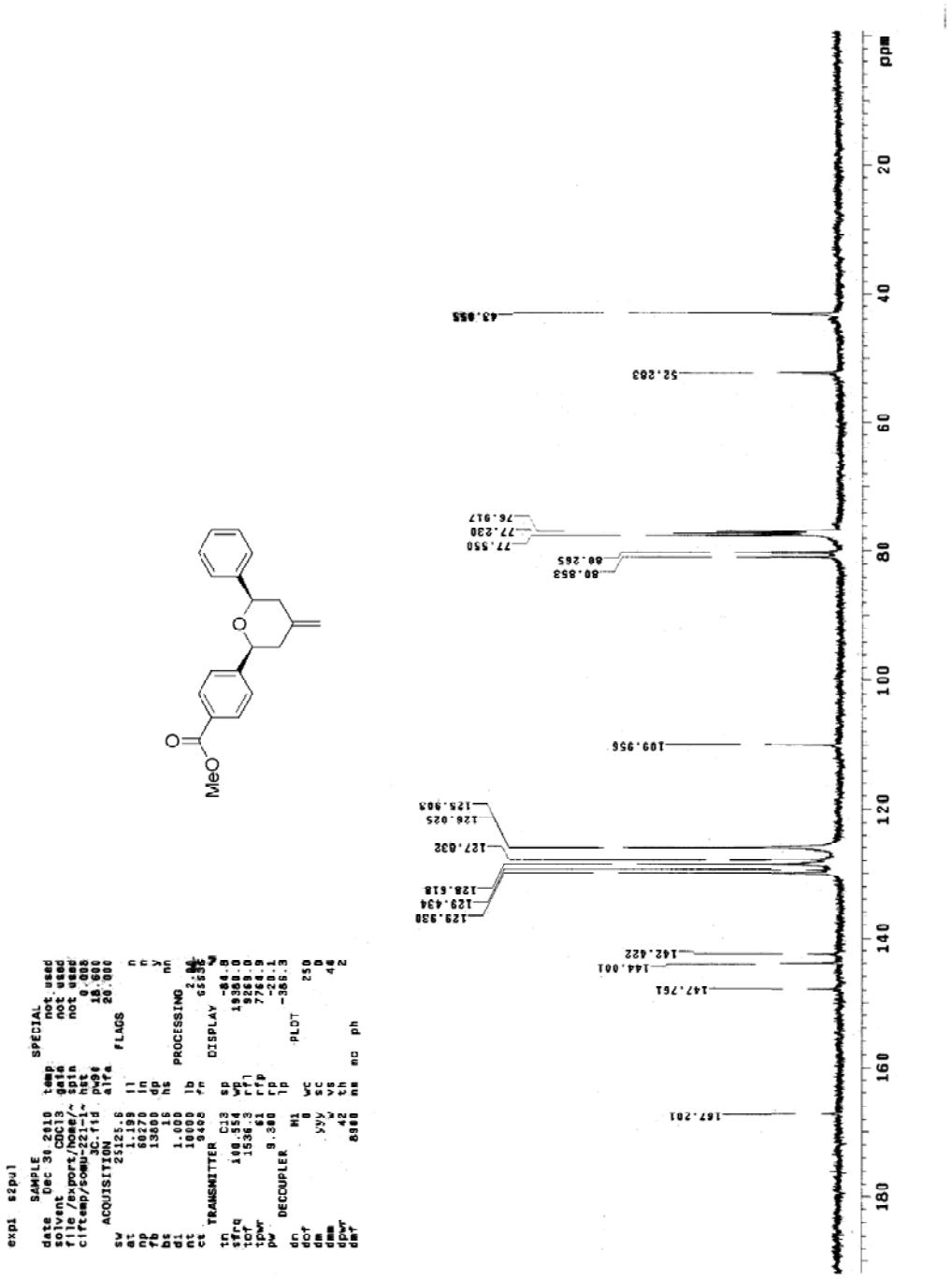
^{13}C NMR of **8q**


OMe
MeO2C
167.206
159.328
147.820
144.167
134.695
129.913
129.417
127.358
125.924
114.012
109.817
80.578
80.288
77.543
77.230
76.910
55.518
52.269
43.064
42.972
20 ppm
40
60
80
100
120
140
160

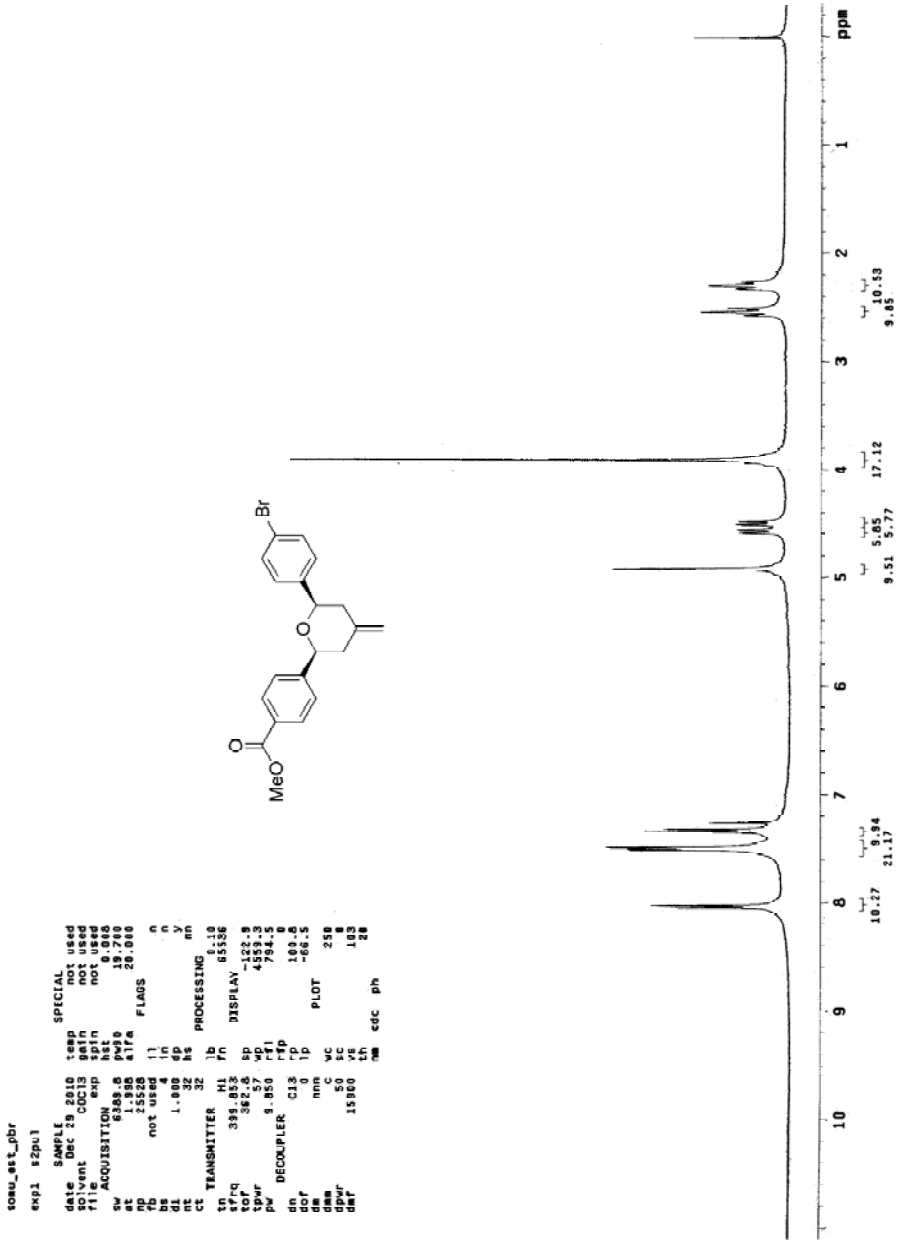
^{1}H NMR of 8r



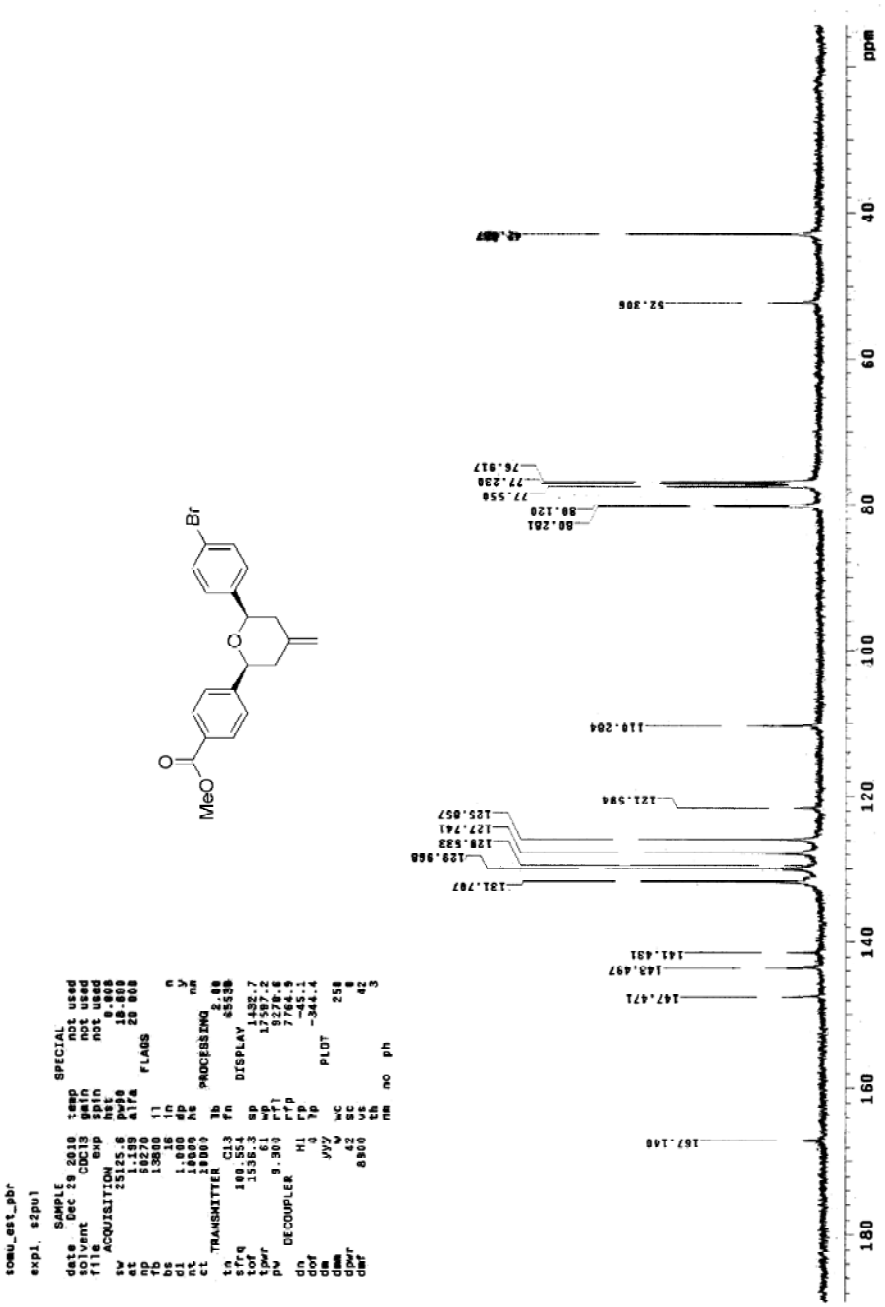
^{13}C NMR of 8r


MeO
43.055
52.263
76.917
77.230
77.550
80.853
80.265
109.956
125.903
126.025
127.032
128.618
129.434
129.950
142.622
144.001
147.761
167.201
ppm

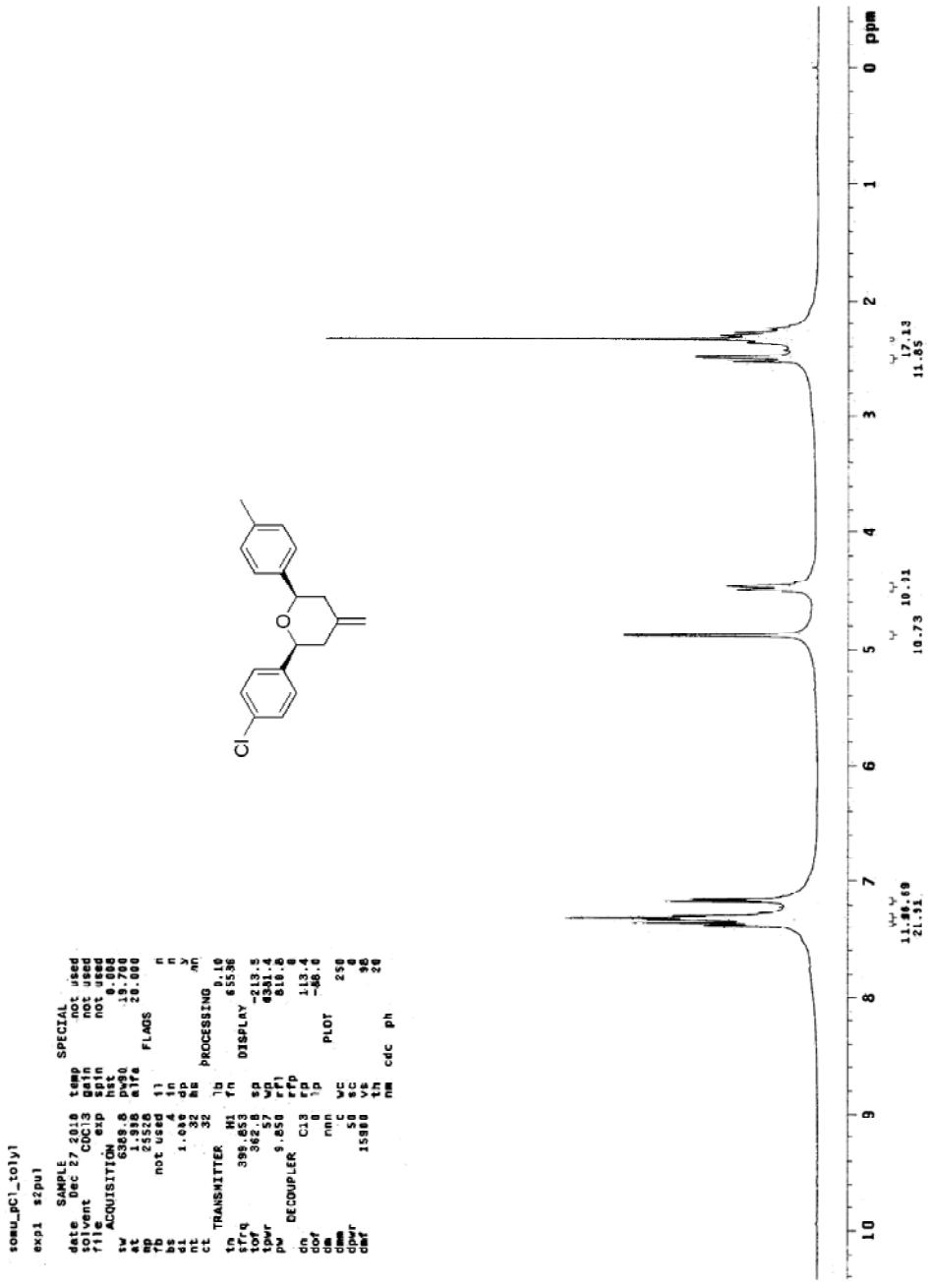
^{1}H NMR of 8s



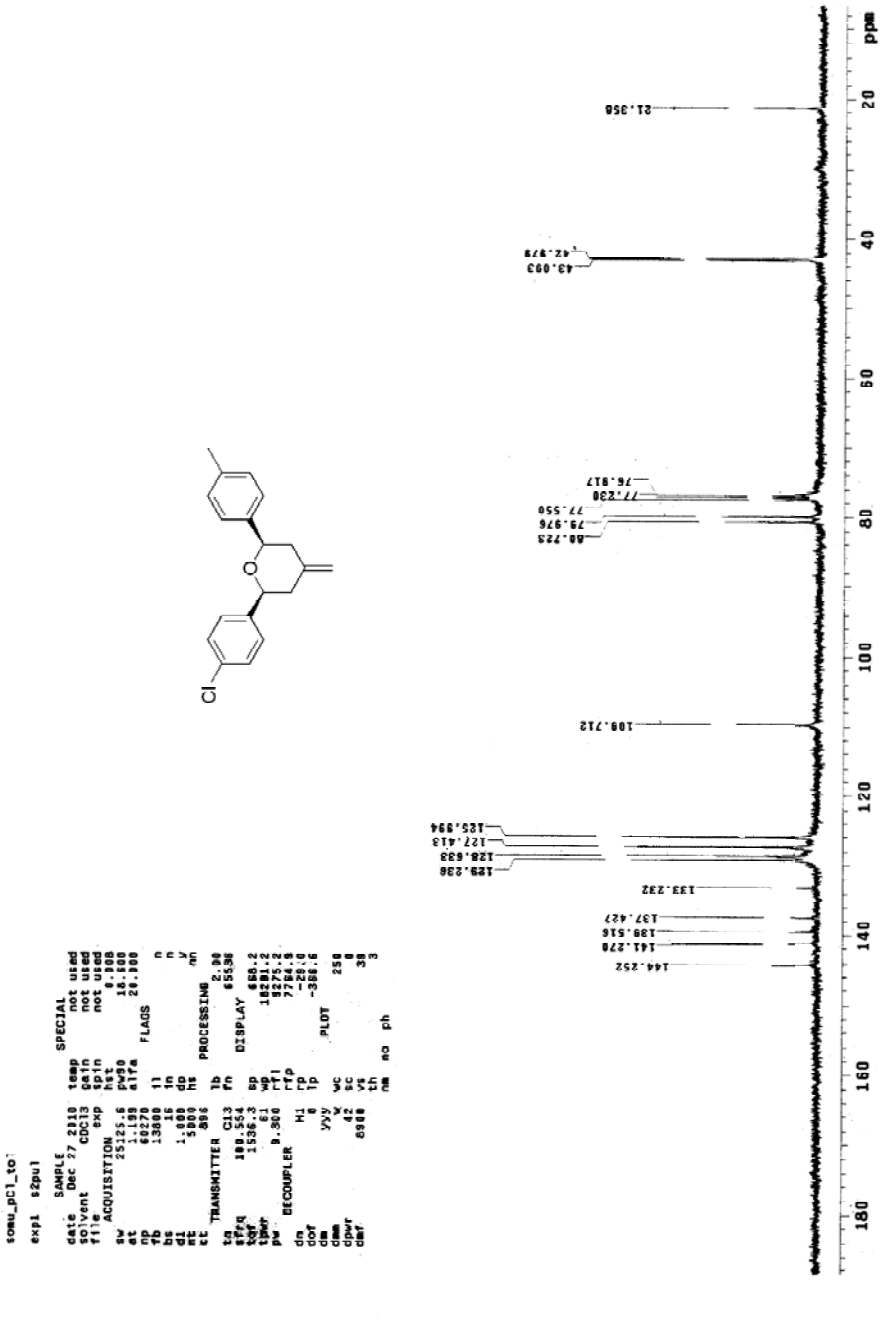
^{13}C NMR of 8s


Br
O
O
MeO
42.687
52.306
76.917
77.236
77.559
80.120
80.261
118.264
121.584
125.057
127.741
128.533
128.968
131.787
141.481
143.497
147.471
167.146
ppm
40
60
80
100
120
140
160
180

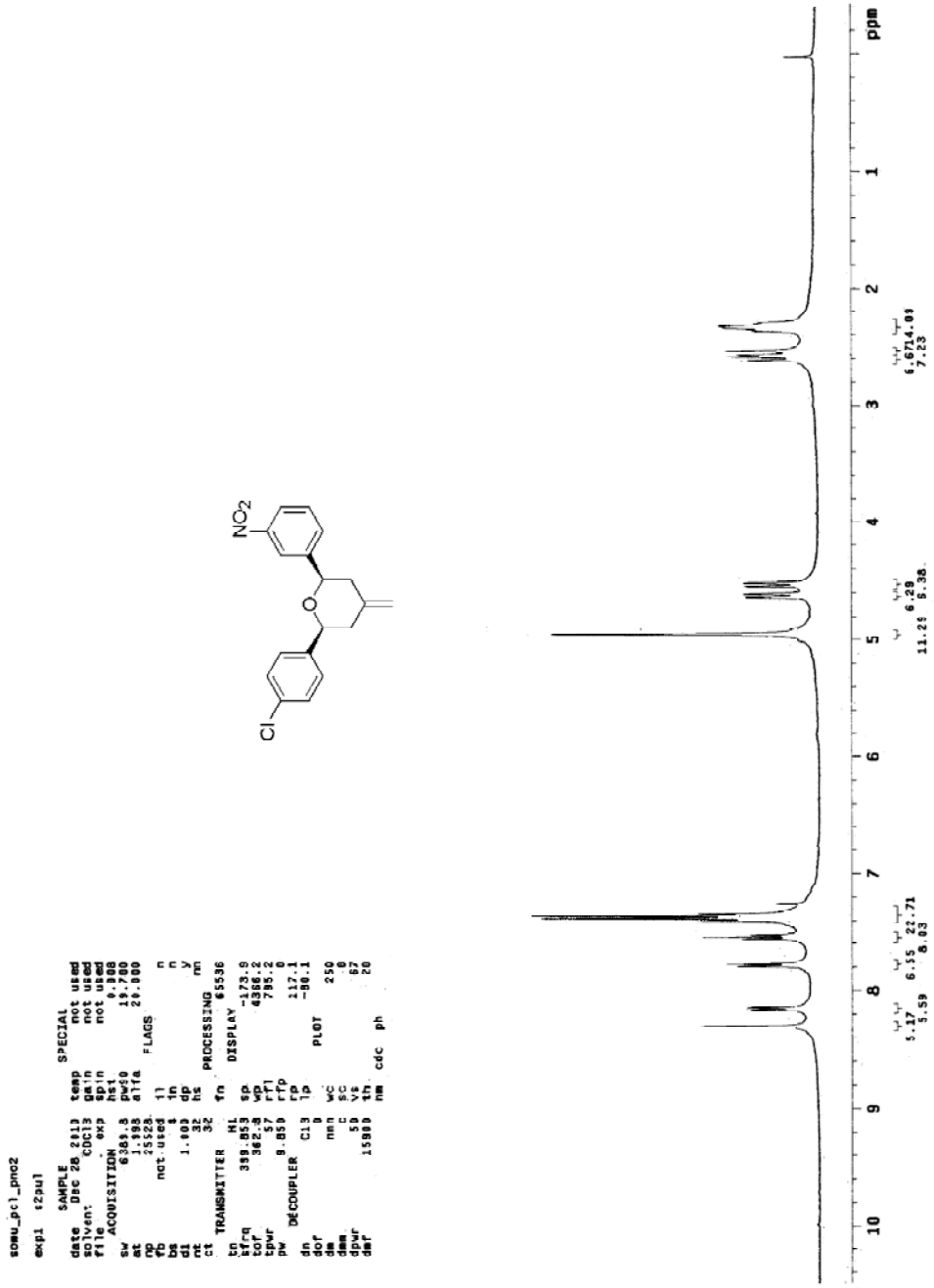
^{1}H NMR of 8t


somu_pCl_tolyl
exp1 s2pul
SAMPLE
date Dec 27 2010
solvent CDCl3
file
ACQUISITION
PROCESSING
DISPLAY
PLOT
SPECIAL
FLAGS
TRANSMITTER
DECOUPLER
Cl
11.69
21.11
10.73
10.11
17.13
11.85
ppm

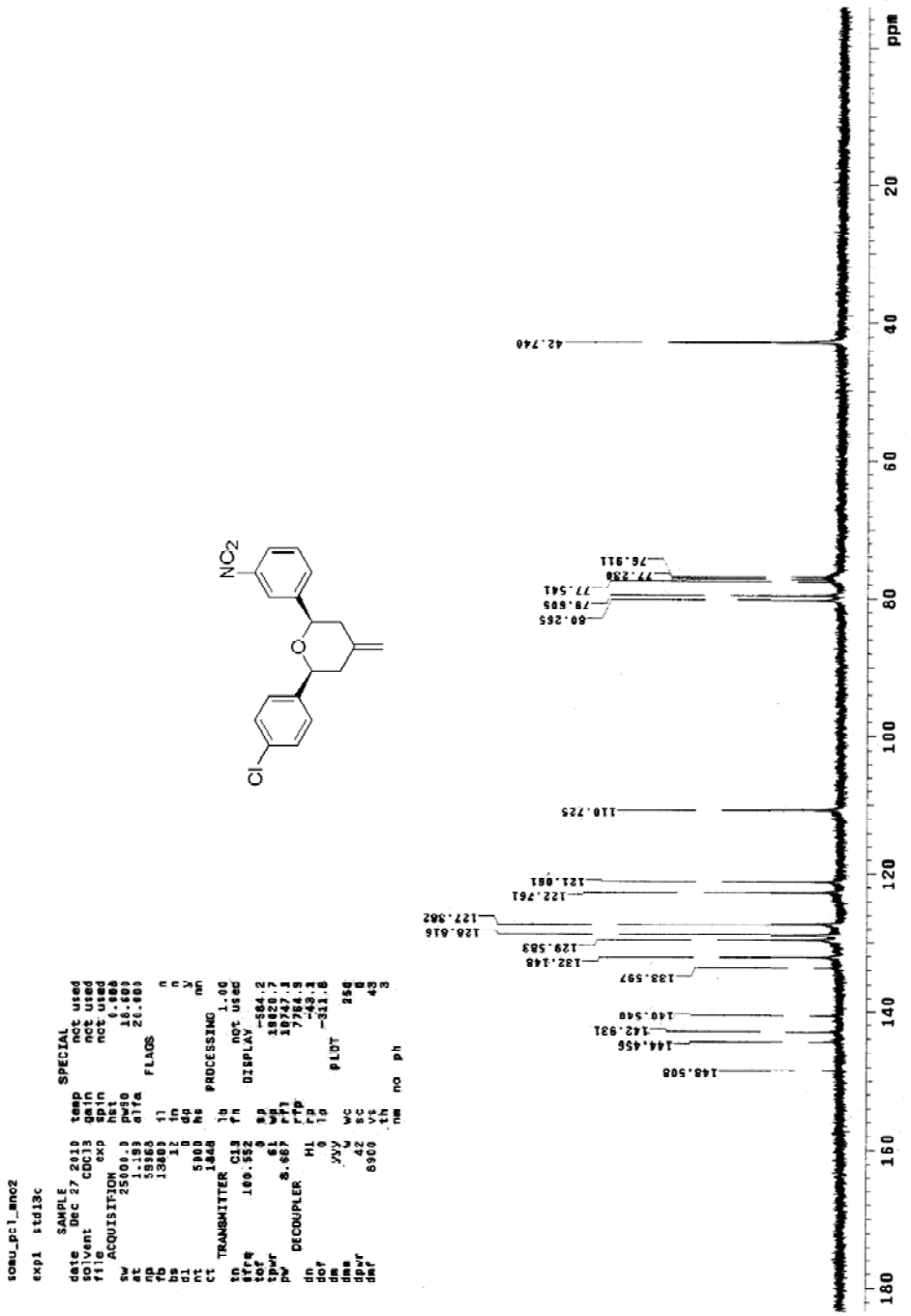
^{13}C NMR of 8t


21.358
43.093
42.878
76.817
77.230
77.550
79.976
80.723
109.742
125.994
127.413
128.633
129.236
133.232
137.427
139.516
141.278
144.252
ppm

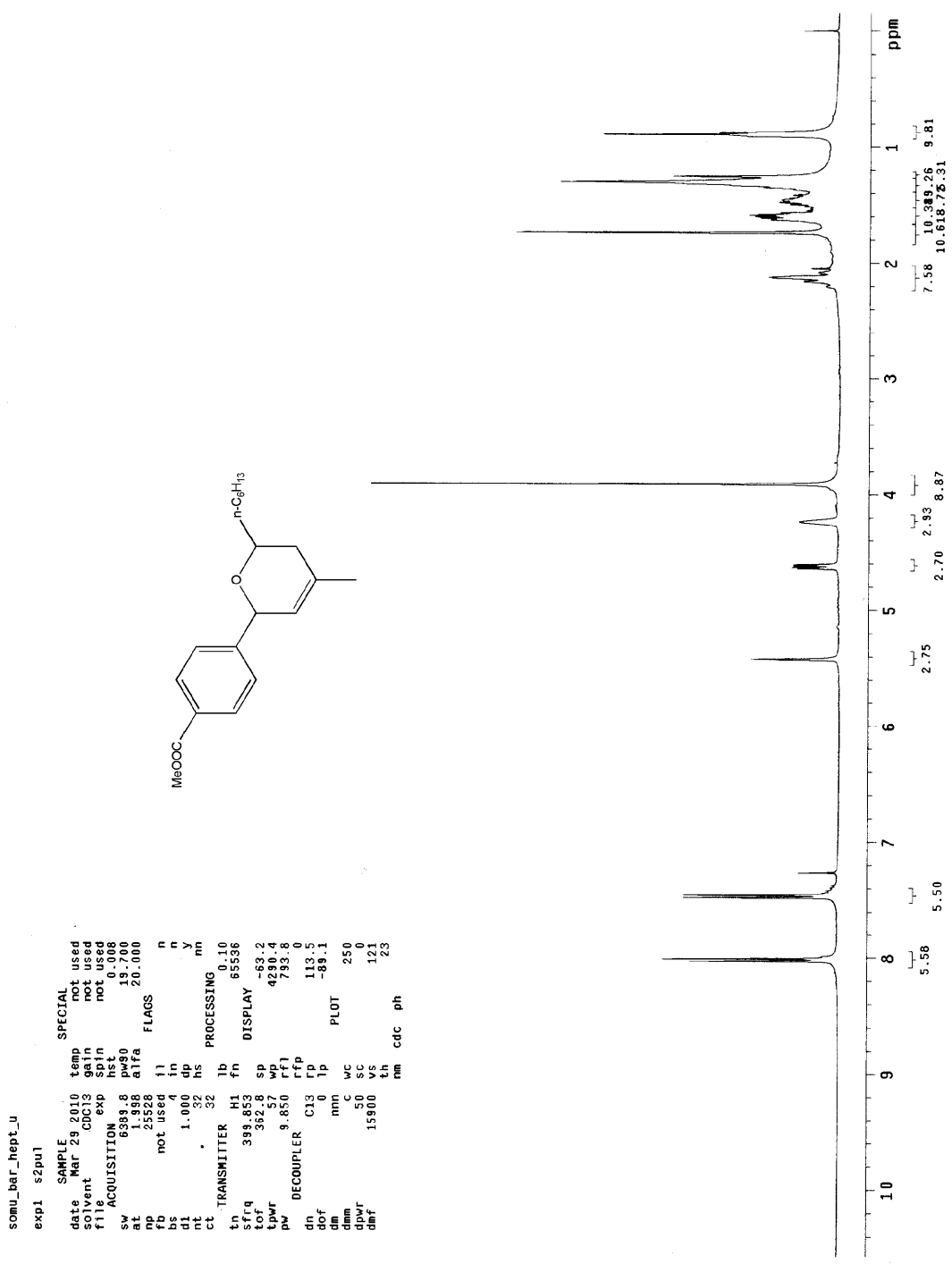
^{1}H NMR of 8u


NO2
Cl
O
ppm
1
2
3
4
5
6
7
8
9
10
5.17
5.59
6.55
8.03
22.71
11.21
6.29
8.38
6.6714.01
7.23

^{13}C NMR of 8u


NC2
Cl
O
42.740
76.911
77.258
77.541
78.695
80.265
110.725
121.081
122.761
127.362
128.616
129.583
132.148
133.597
140.540
142.981
144.456
148.508
ppm
20
40
60
80
100
120
140
160
180

^{1}H NMR of **6v**


somu_bar_hept_u
expl s2pul
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date Mar 29 2010
solvent CDCl3
file exp
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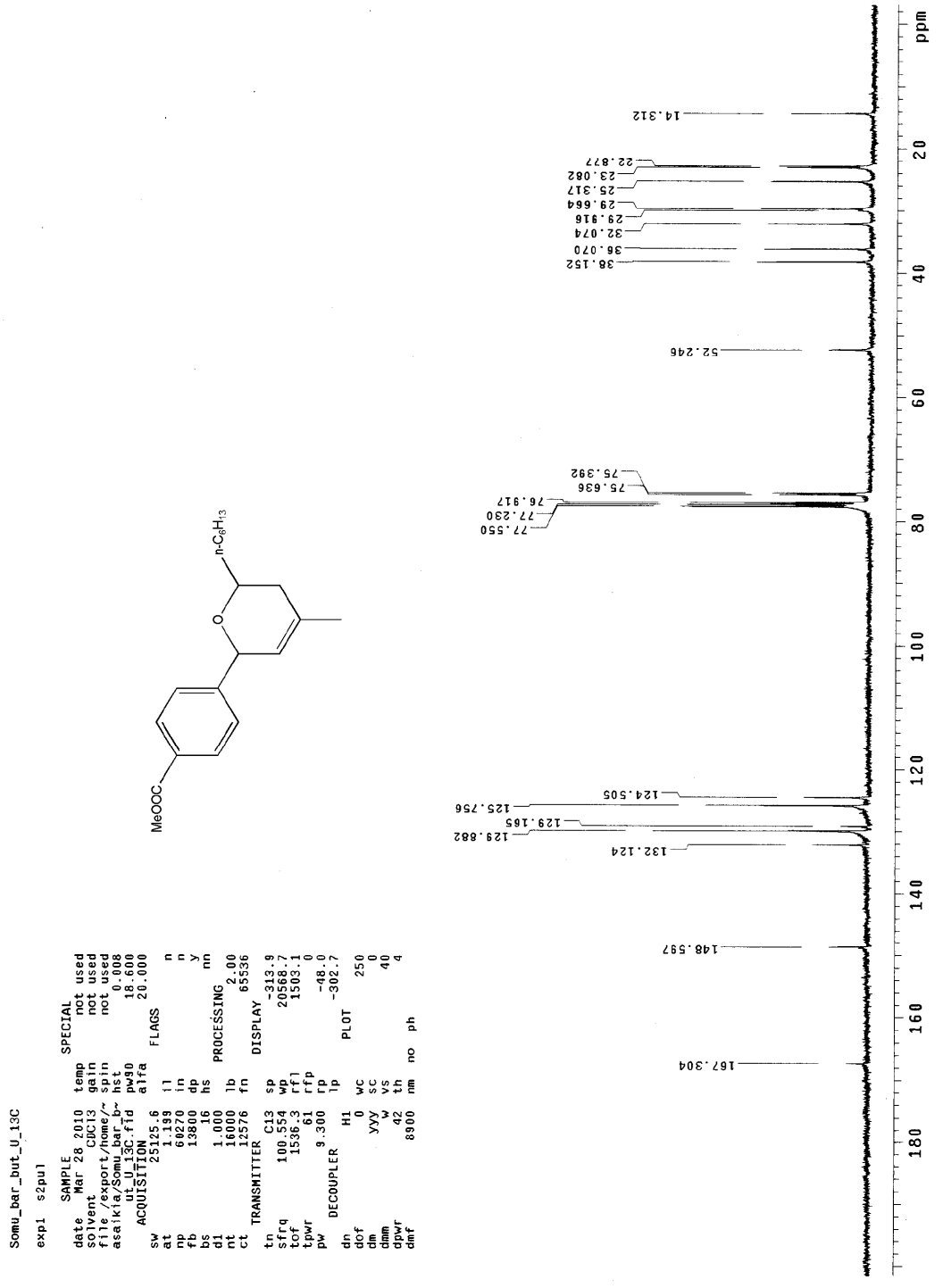
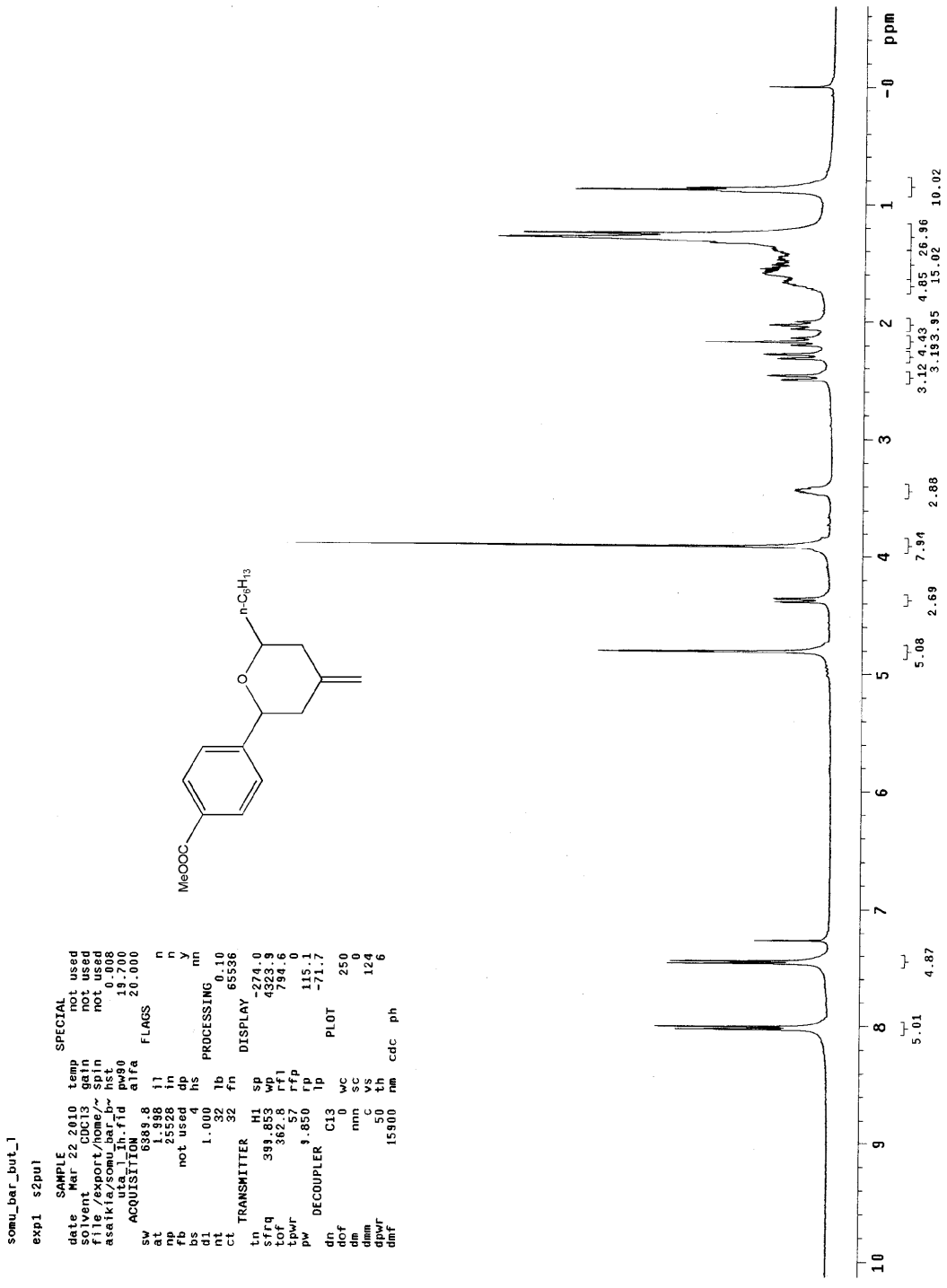
at 1.998
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
gain not used
spin not used
hst 0.008
pw90 19.700
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -63.2
wp 4290.4
rfl 793.8
rfp 0
rp 113.5
lp -89.1
PLOT
wc 250
sc 0
vs 121
th 23
nm cdc ph
MeOOC
n-C6H13
O
ppm
5.58
5.50
2.75
2.70
2.93
8.87
7.58
10.38
10.61
9.81
8.76
1.31

^{13}C NMR of **6v**


Somu_bar_but_U_13C
expl s2pul
SAMPLE
date Mar 28 2010
solvent CDCl3
file /export/home/~
asalkia/Somu_bar_b~
ut_U_13C.fid
ACQUISITION
sw 25125.6
at 1.199
np 60270
fb 13800
bs 16
d1 1.000
nt 16000
ct 12576
TRANSMITTER
tn C13
sfrq 100.554
tof 1538.3
tpwr 61
pw 9.300
DECOUPLER
dn H1
dof 0
dm yyy
dmm w
dpwr 42
dmf 8900
SPECIAL
temp not used
gain not used
spin not used
hst 0.008
pw90 18.600
alfa 20.000
FLAGS
il n
in n
dp y
hs nn
PROCESSING
lb 2.00
fn 65536
DISPLAY
sp -313.9
wp 20568.7
rfl 1503.1
rfp 0
rp -48.0
lp -302.7
PLOT
wc 250
sc 0
vs 40
th 4
MeOOC
n-C6H13
O
14.312
22.877
23.082
25.317
29.664
29.916
32.074
36.070
38.152
52.246
75.392
75.636
76.917
77.230
77.550
124.505
125.756
129.165
129.882
132.124
148.597
167.304
ppm

^{1}H NMR of **8v**


somu_bar_but_1
exp1 s2pul
SAMPLE
date Mar 22 2010
solvent CDCl3
file /export/home/~
asaikia/somu_bar_b~
uta_1_1h.fid
ACQUISITION
sw 6389.8
at 1.998
np 25528
fb not used
bs 4
d1 1.000
nt 32
ct 32
TRANSMITTER
tn H1
sfrq 399.853
tof 362.8
tpwr 57
pw 9.850
DECOUPLER
dn C13
dof 0
dm nnn
dmm c
dpwr 50
dmf 15900
SPECIAL
temp not used
gain not used
spin not used
hst 0.008
pw90 19.700
alfa 20.000
FLAGS
PROCESSING
lb 0.10
fn 65536
DISPLAY
sp -274.0
wp 4323.9
rfl 794.6
rfp 0
rp 115.1
lp -71.7
PLOT
wc 250
sc 0
vs 124
th 6
cdc ph
MeOOC
n-C6H13
O
ppm
5.01
4.87
5.08
2.69
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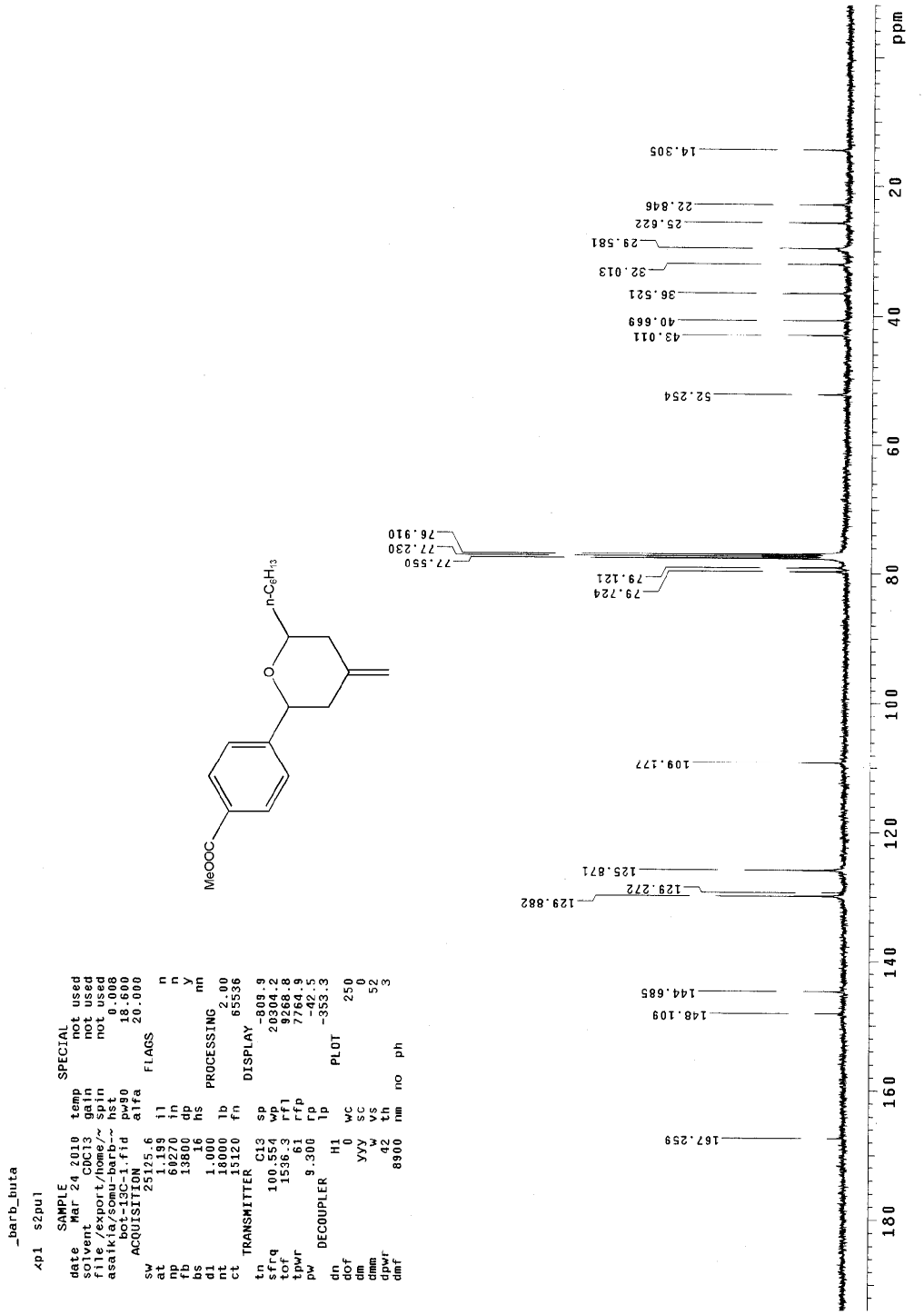
3.12
4.43
3.193.95
4.85
15.02
26.96
10.02

^{13}C NMR of **8v**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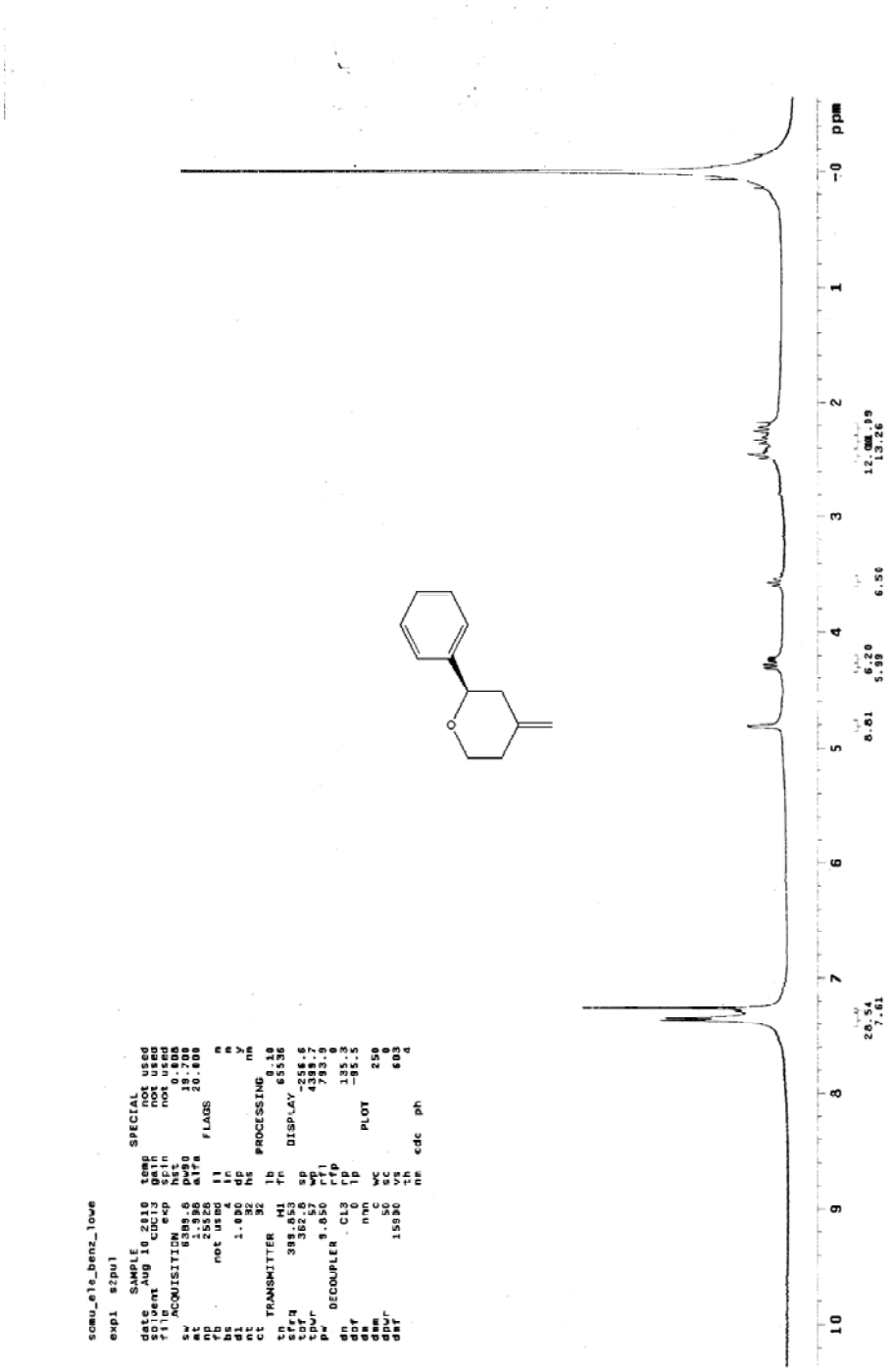
O

^{1}H NMR of **8a**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dpwr 50
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gain not used
spin not used
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in n
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hs nn
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th 4
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12.00
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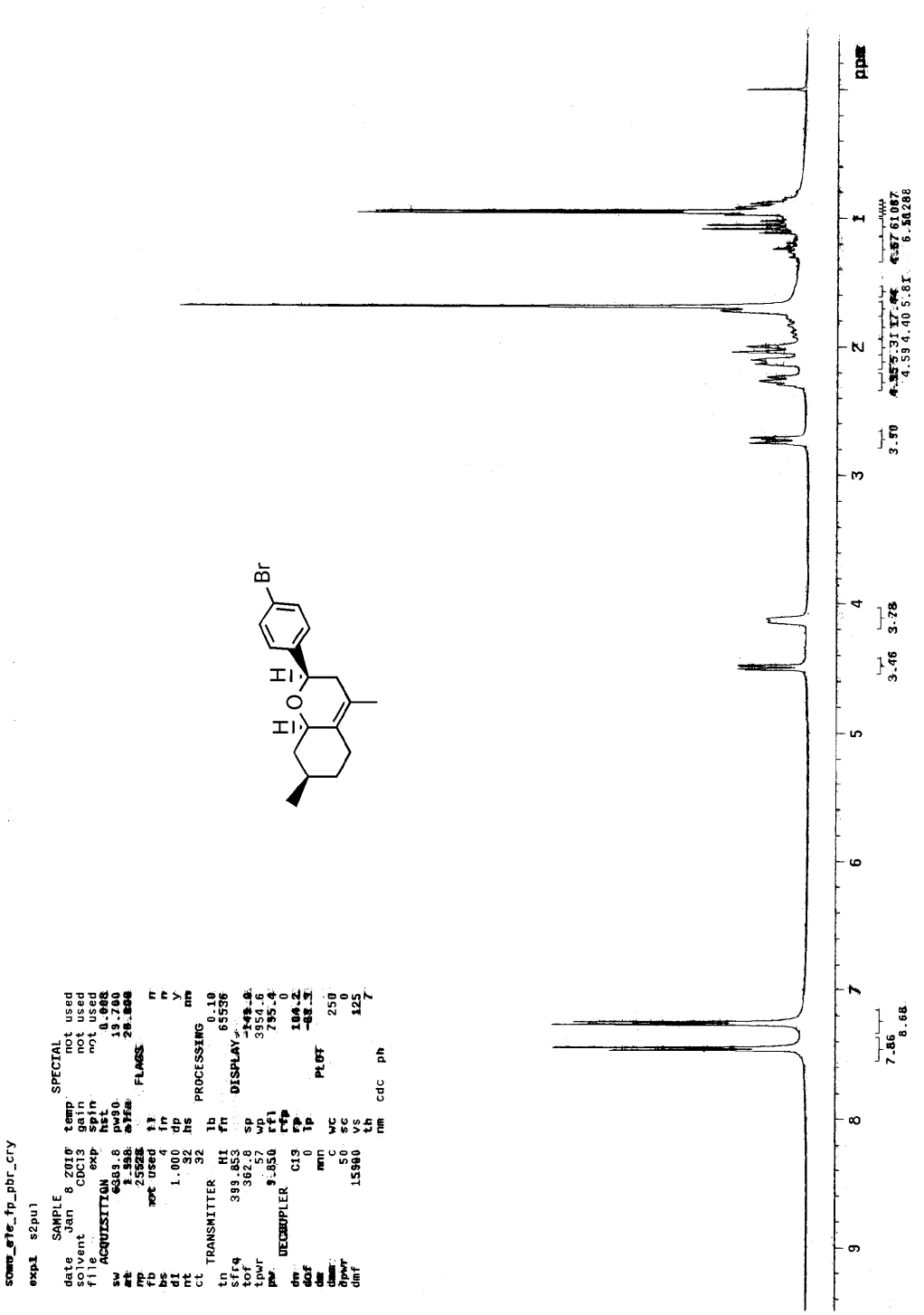
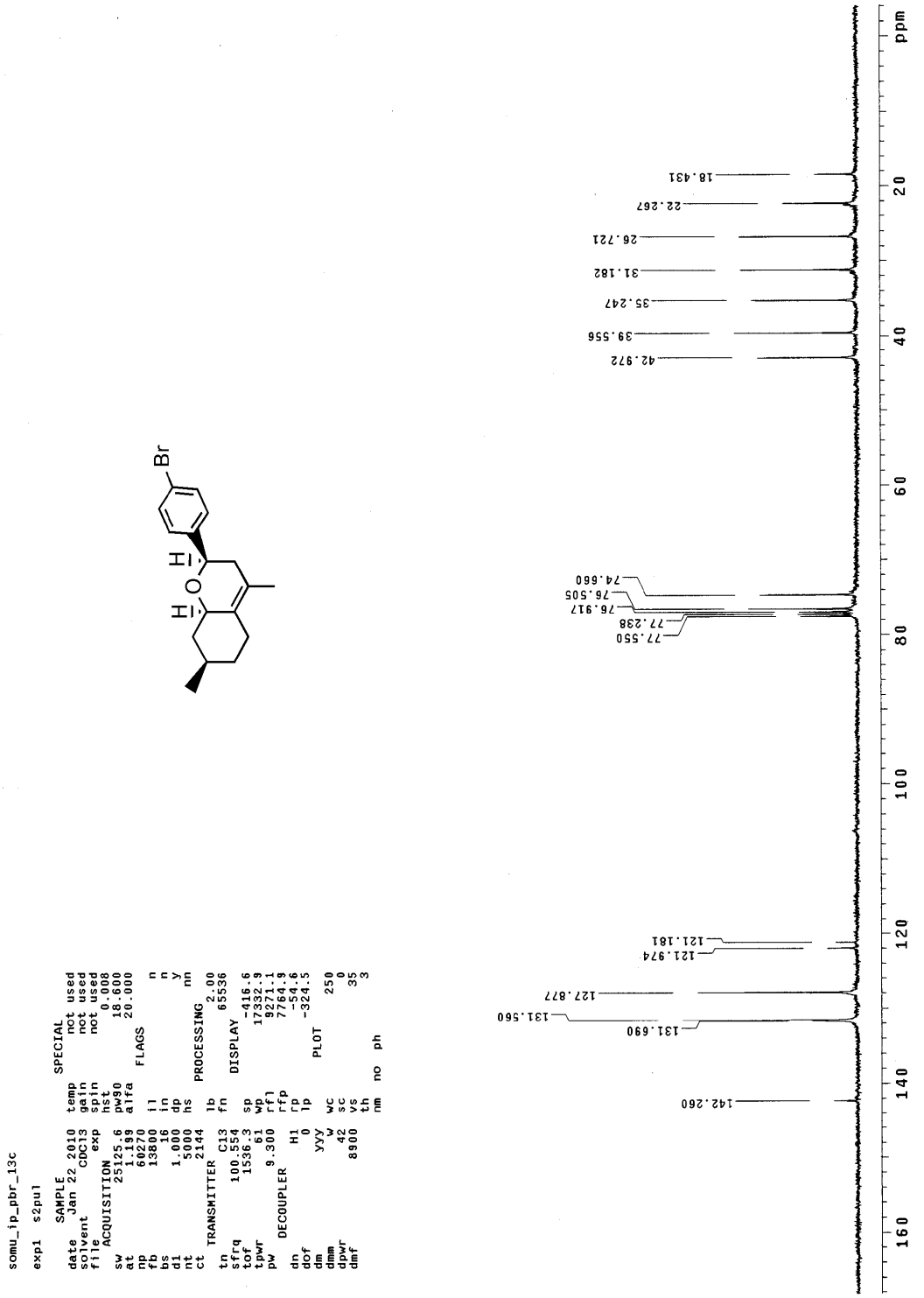
^{1}H NMR of **10**



^{13}C NMR of **10**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gain not used
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76.917
77.238
77.550
121.181
121.974
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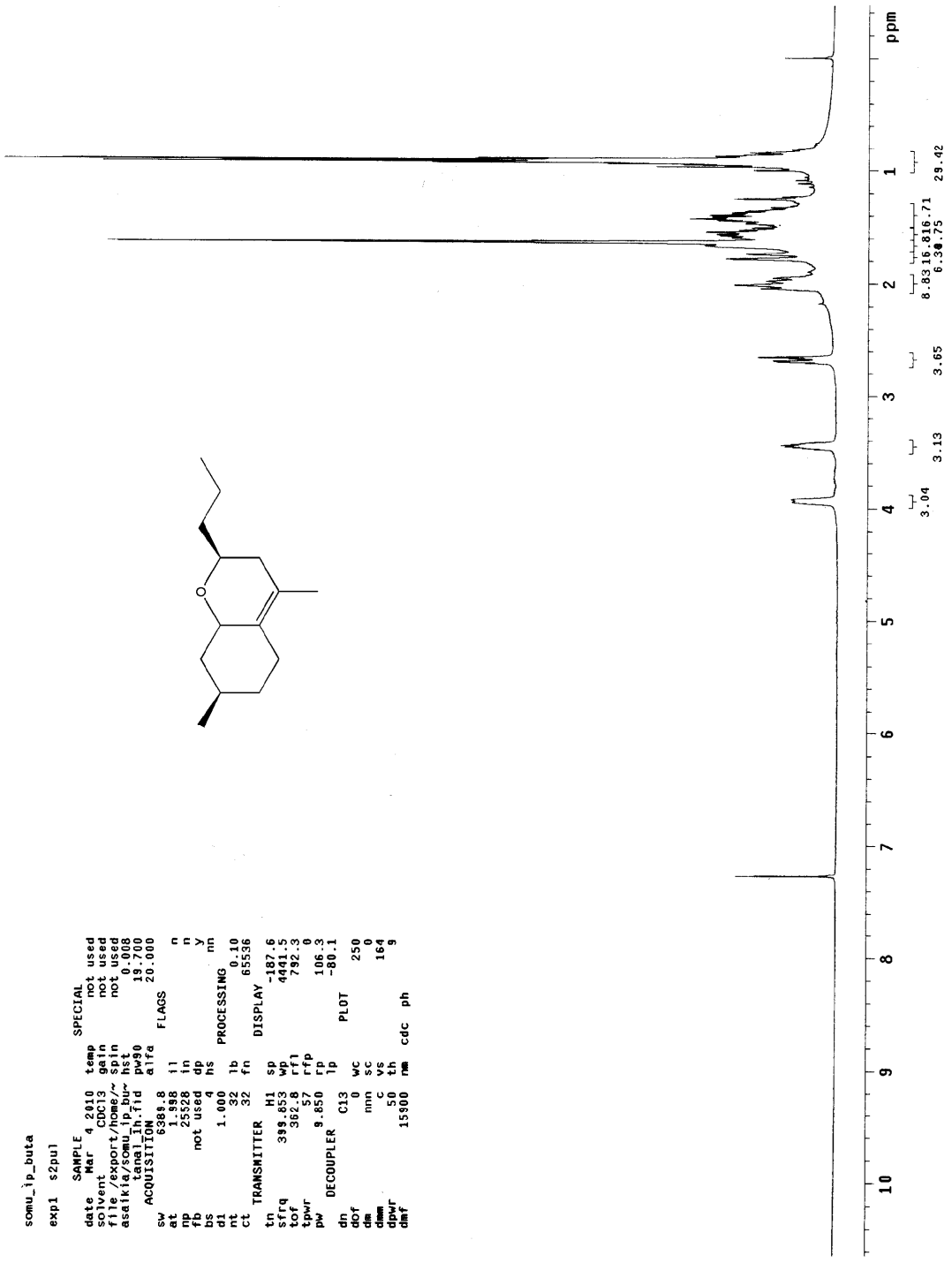
60
80
100
120
140
160

^{1}H NMR of **11**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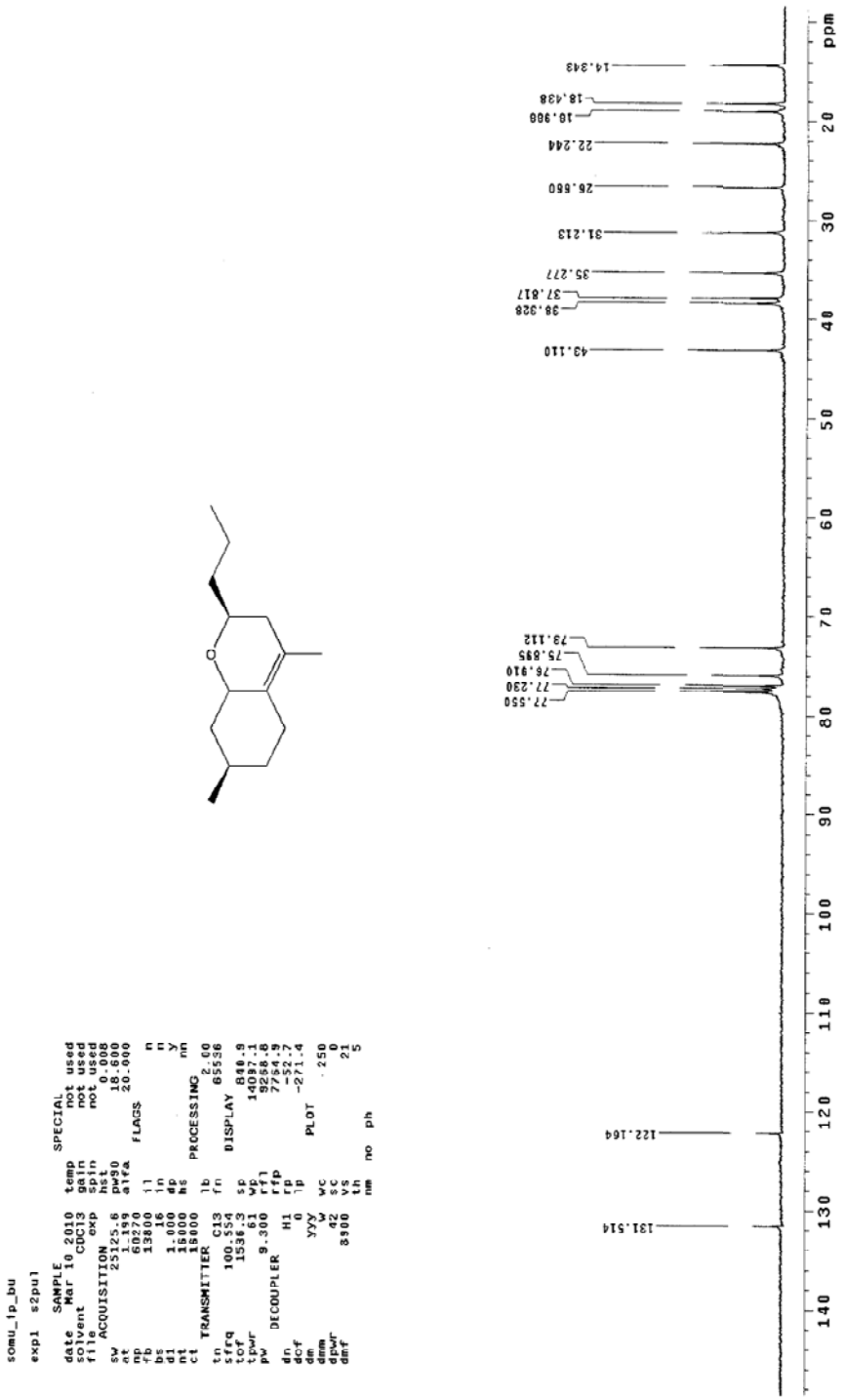
^{13}C NMR of **11**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tof 1536.3
tpwr 61
pw 9.300
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dmm w
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n
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y
nn
PROCESSING
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rfp 7764.9
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lp -271.4
PLOT
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vs 21
th 5
nm no ph
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18.438
18.988
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26.860
31.213
35.277
37.817
38.328
43.110
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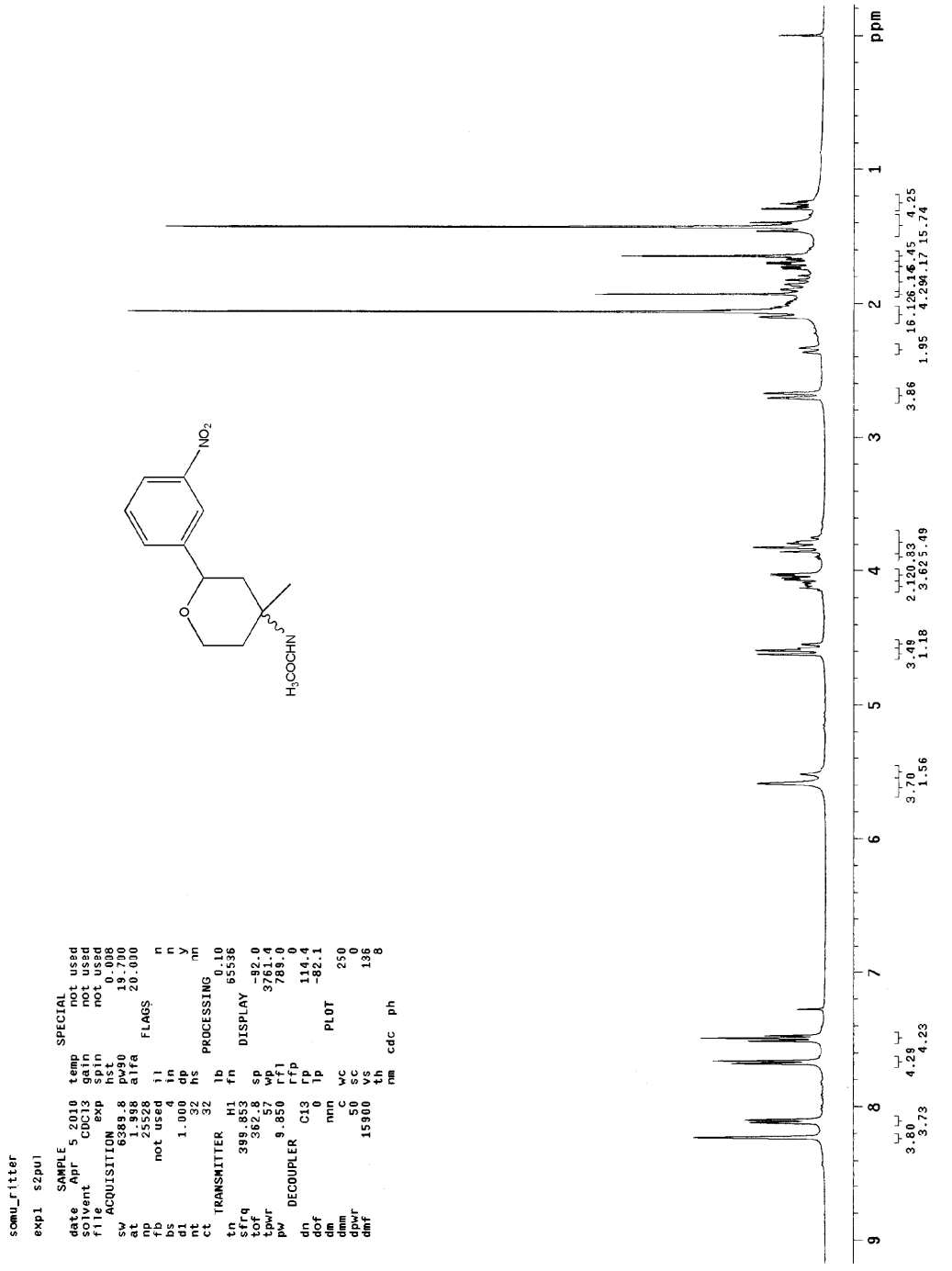
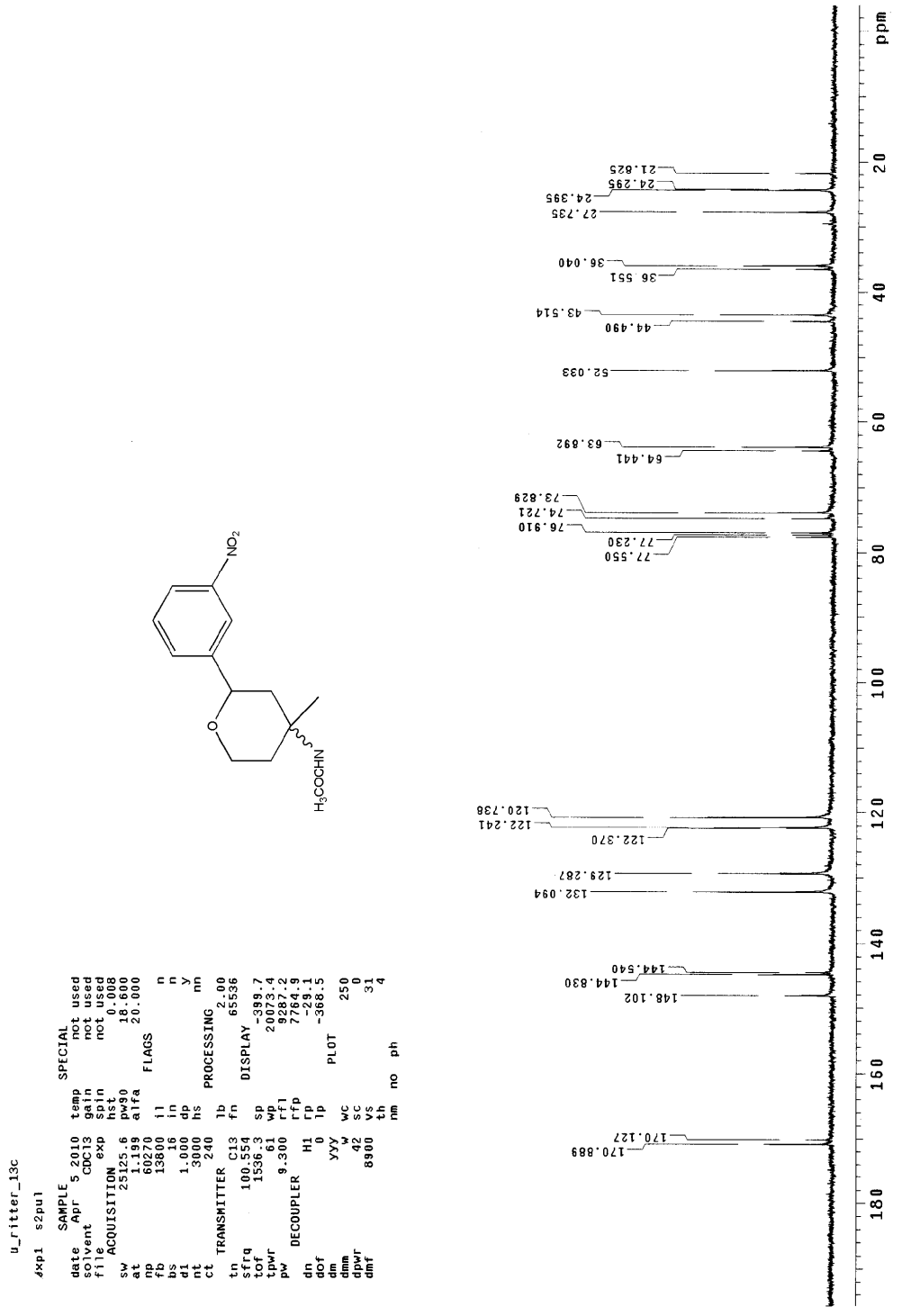
76.910
77.230
77.550
79.112
122.164
131.514
ppm

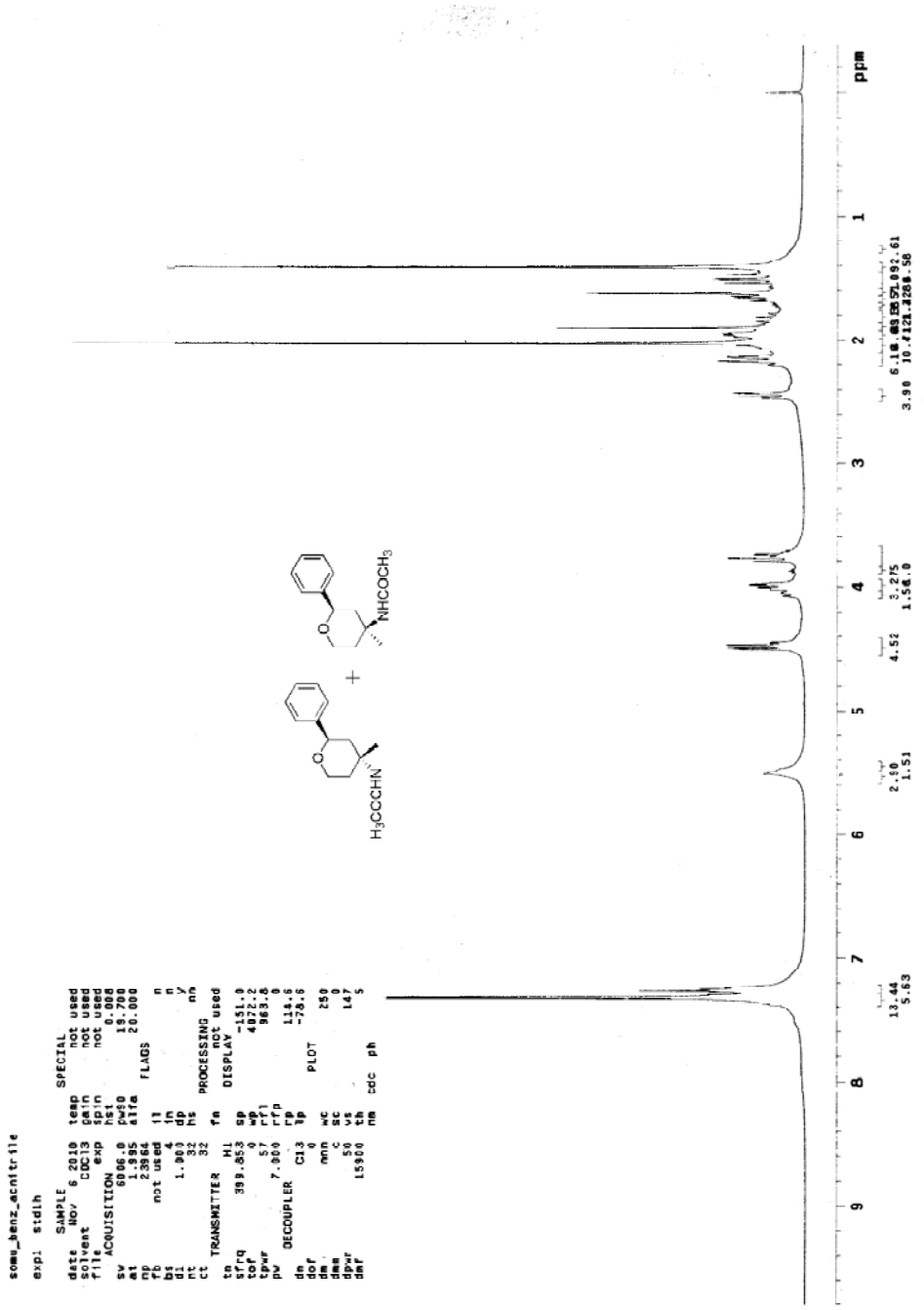
^{1}H NMR of **17a/18a**



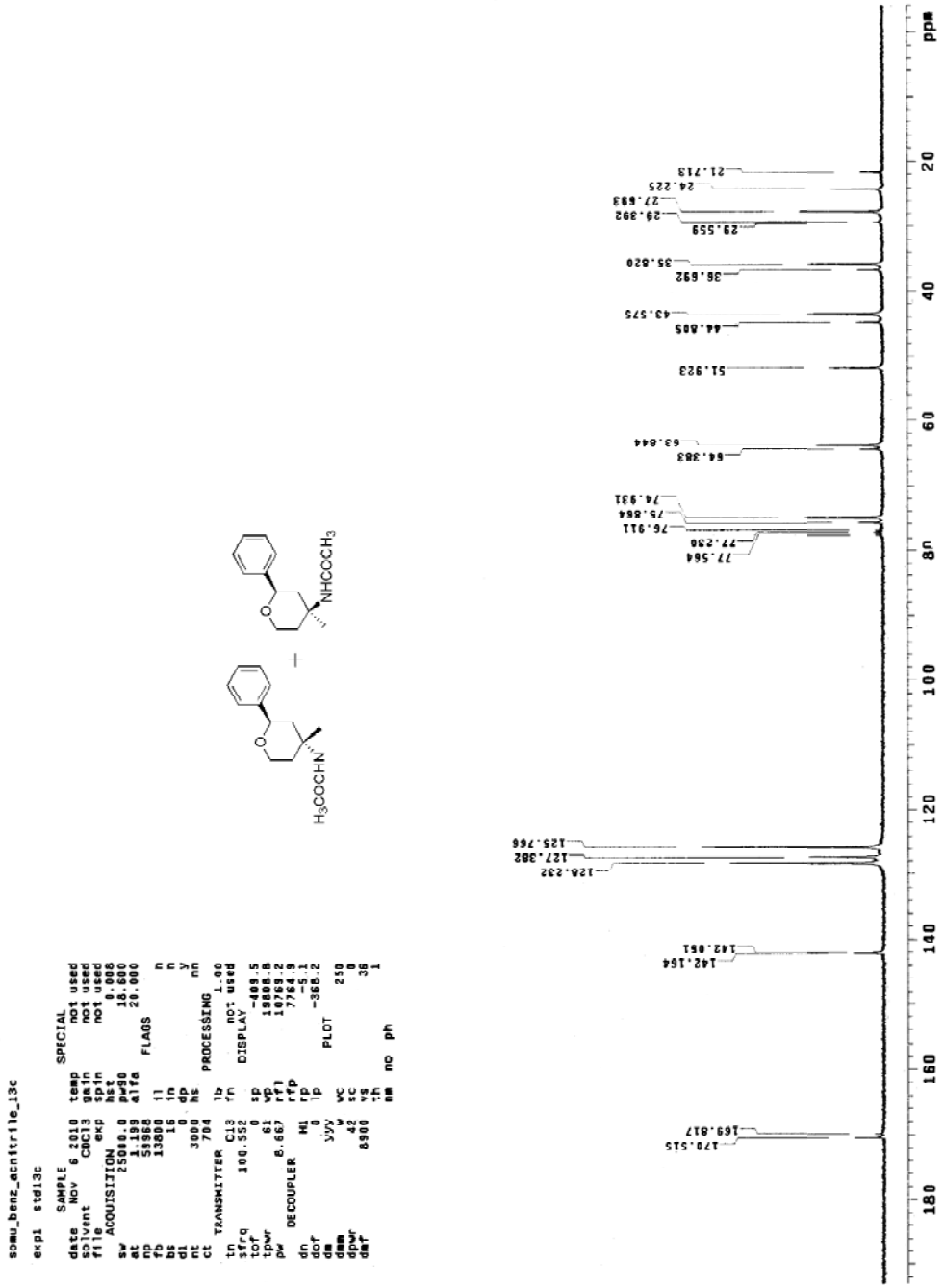
^{13}C NMR of **17a/18a**



^{1}H NMR of 17b/18b



^{13}C NMR of **17b/18b**



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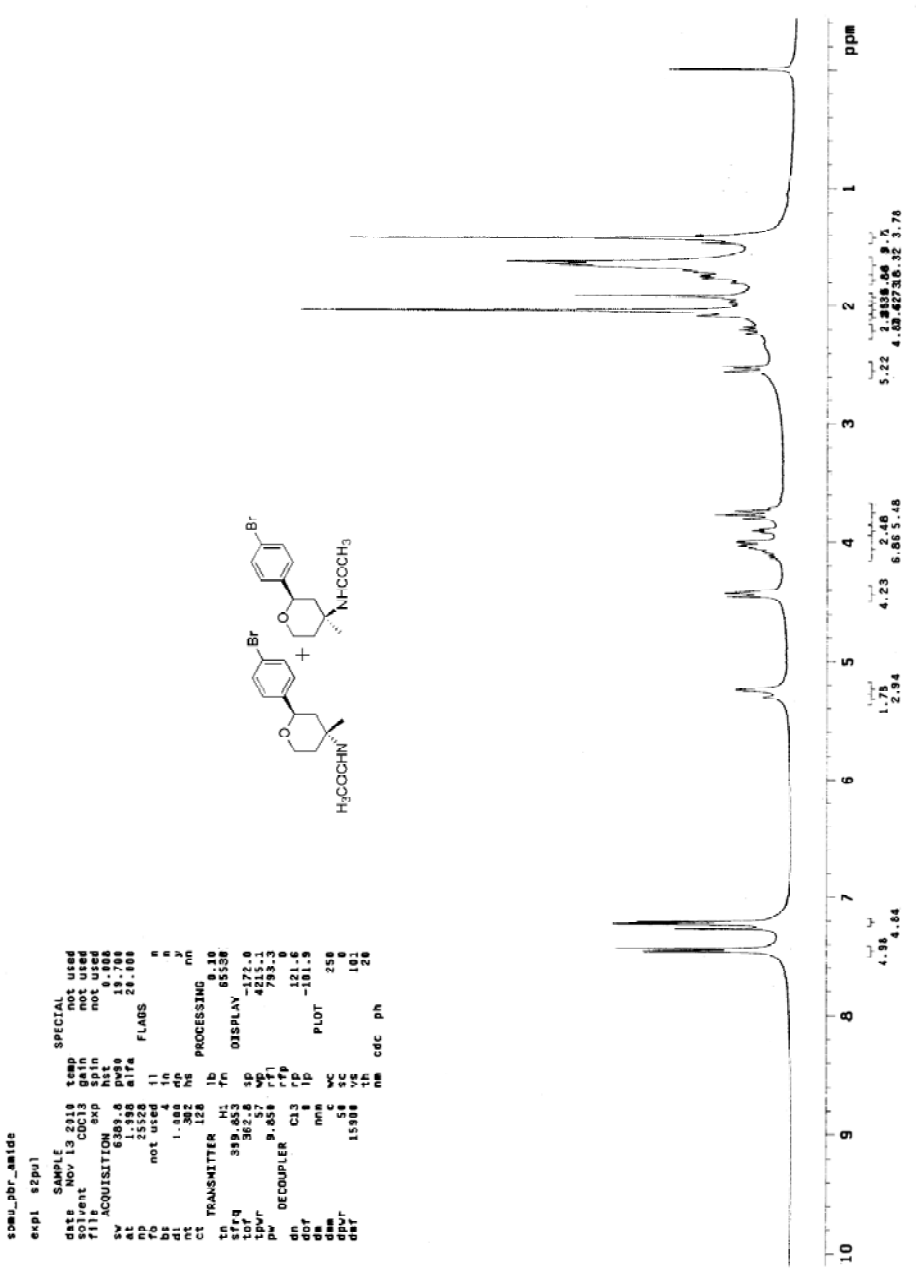

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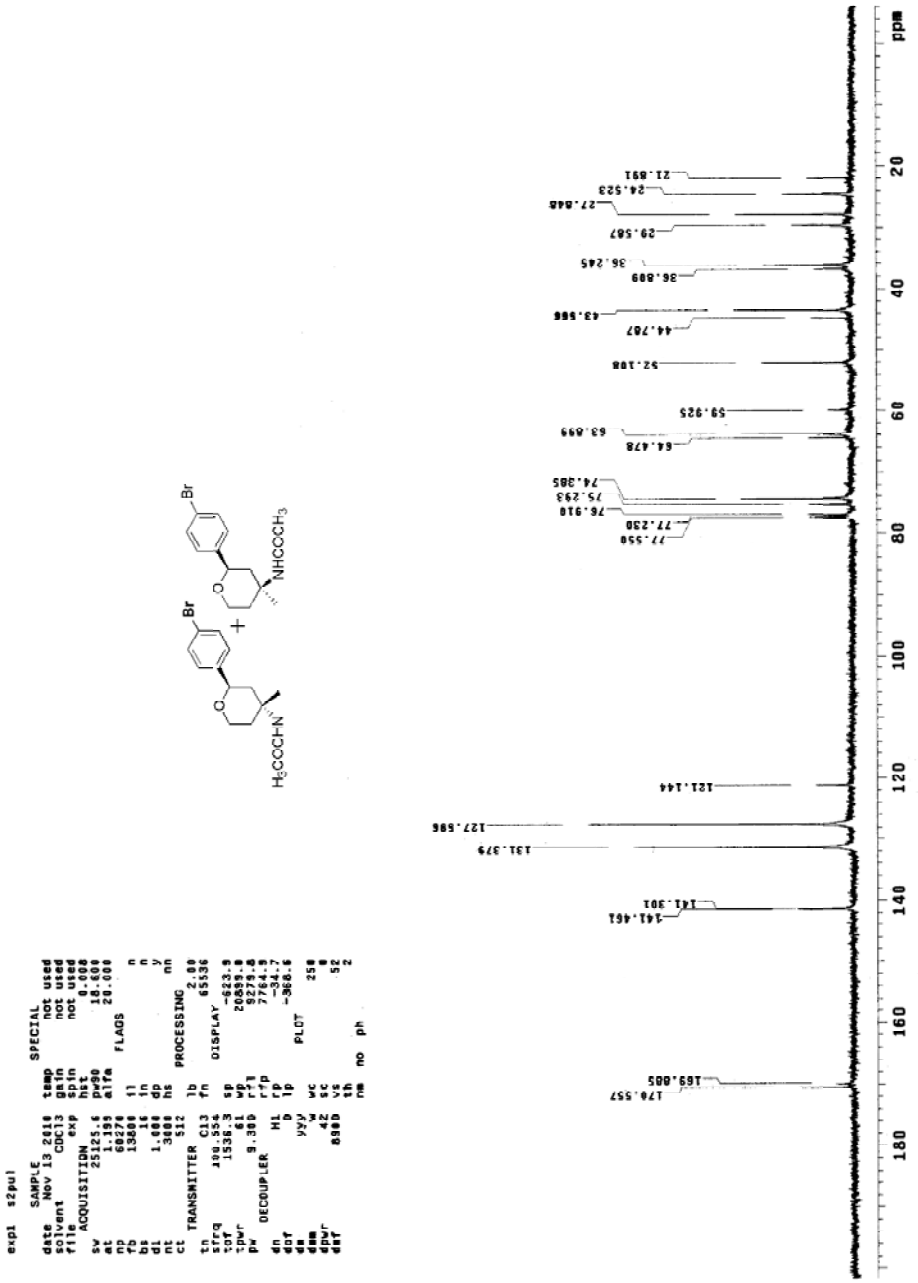
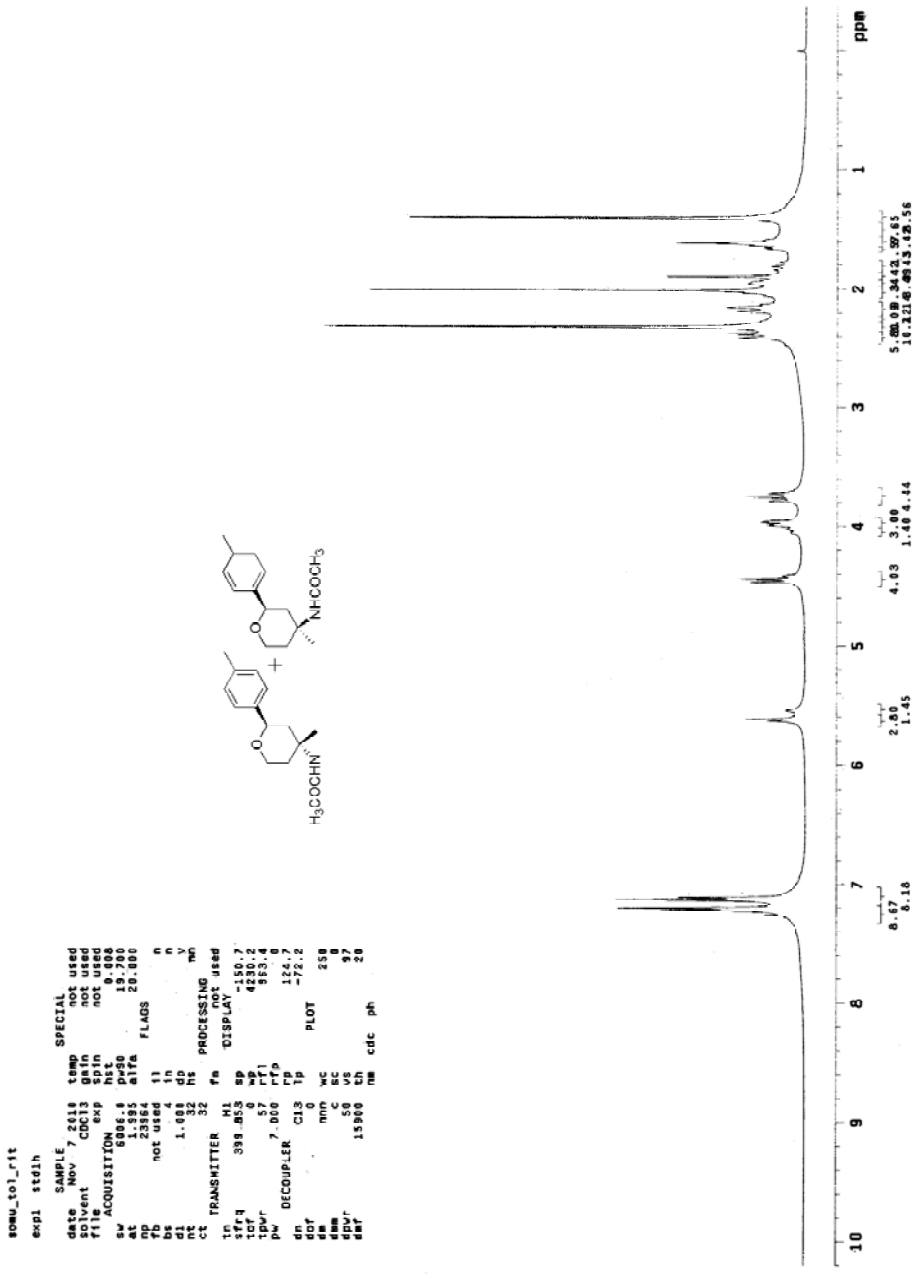


^{1}H NMR of **17d/18d**



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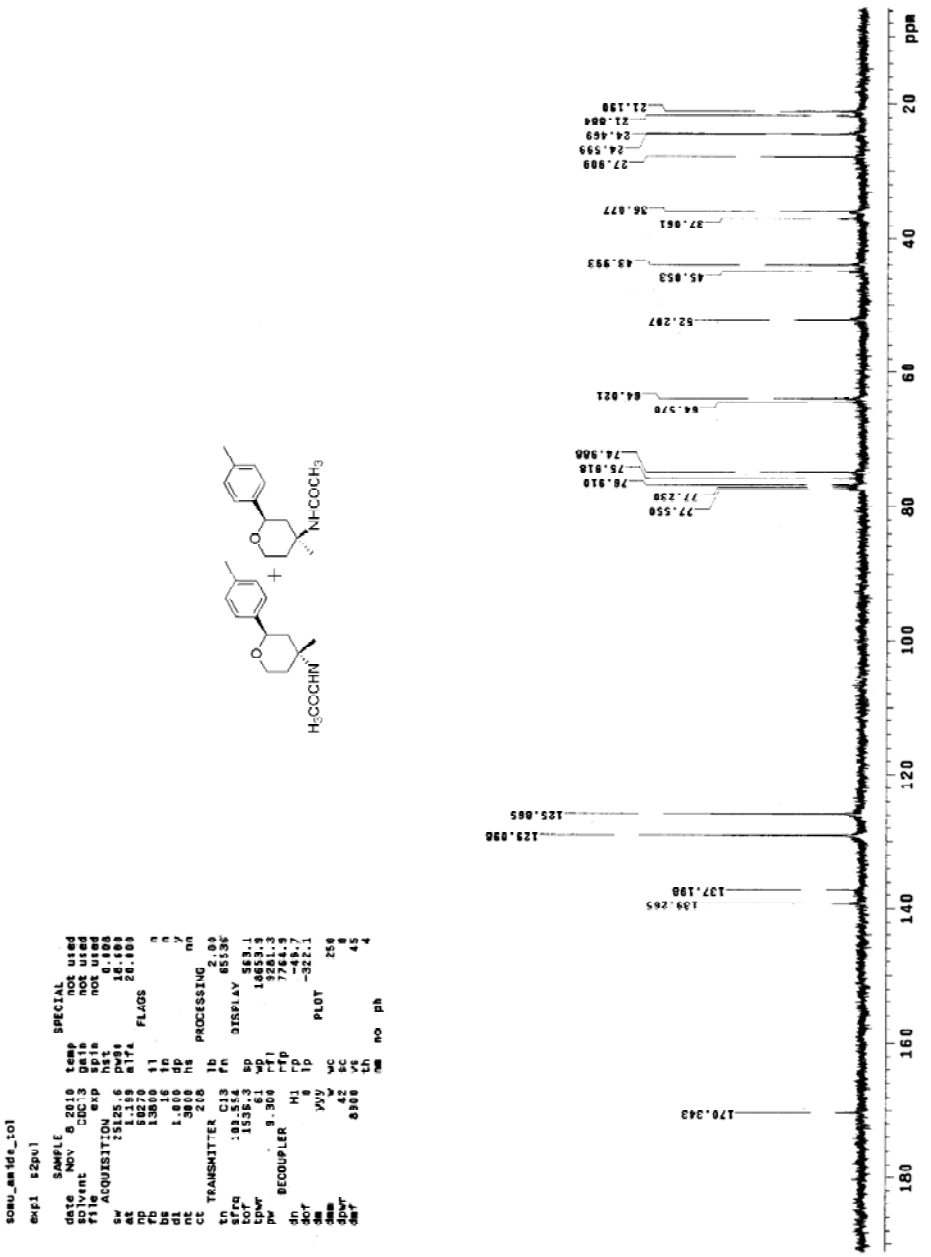
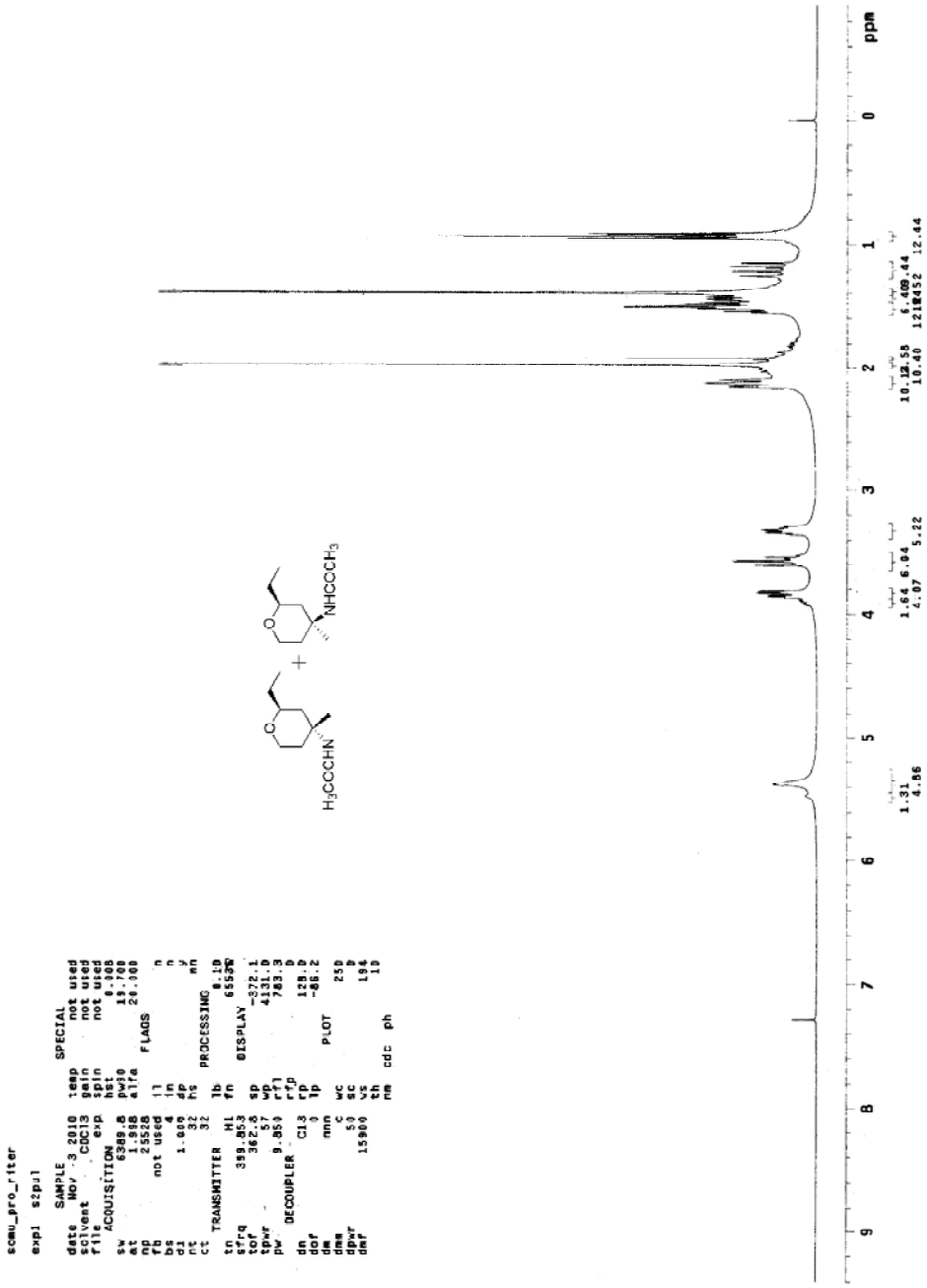
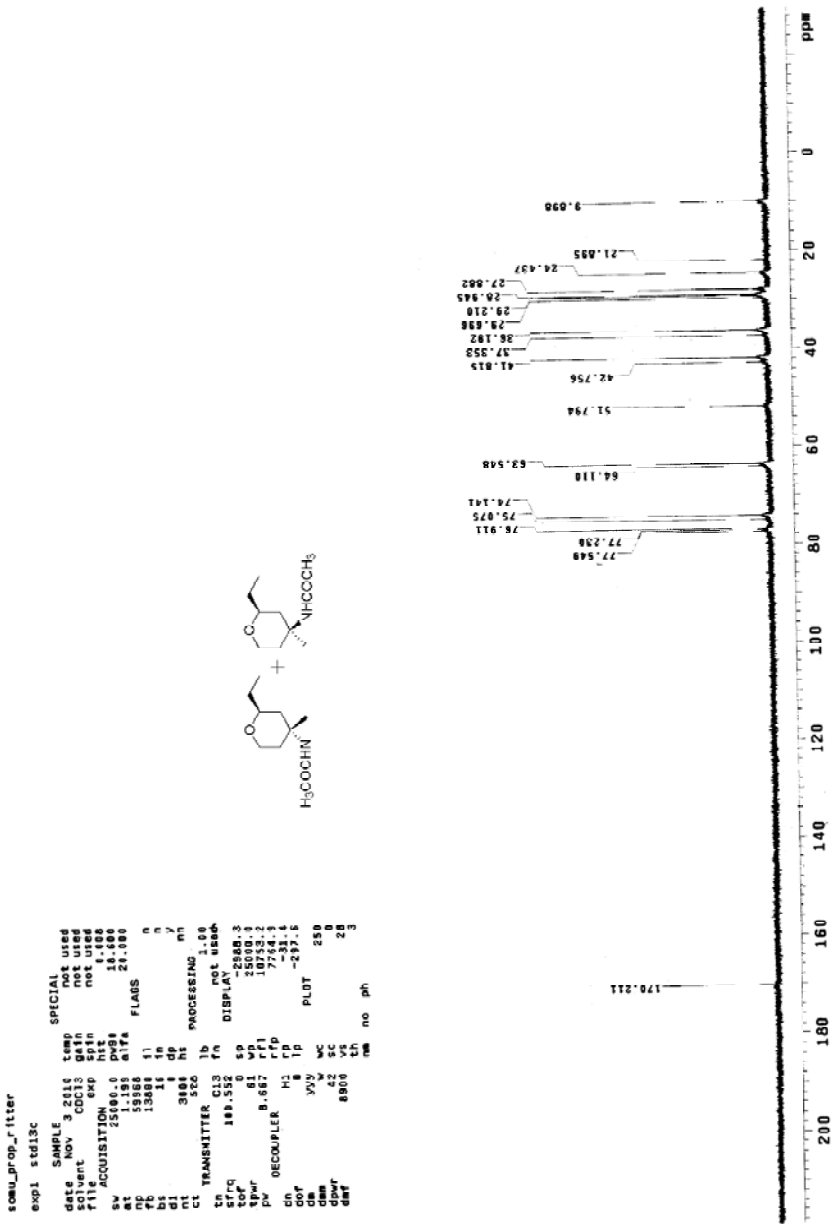


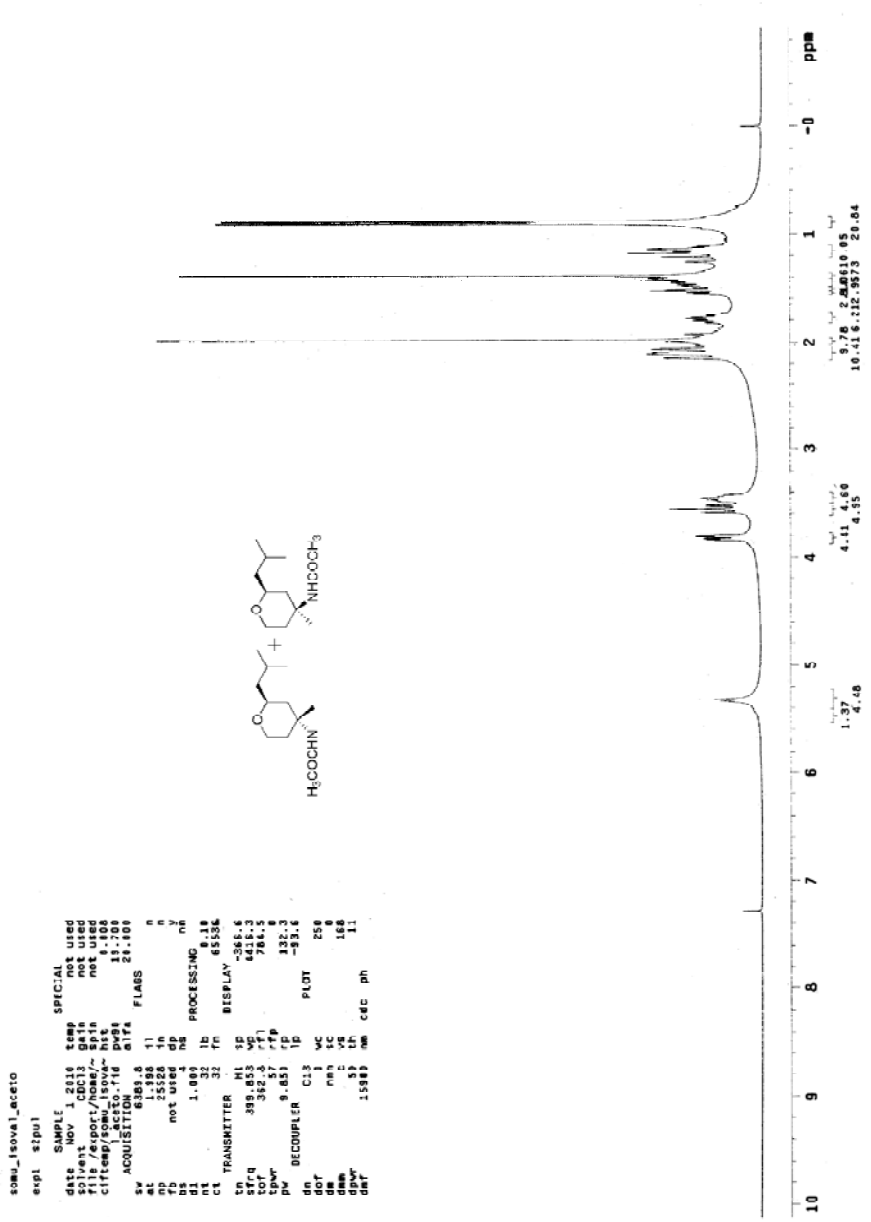
^{1}H NMR of **17e/18e**



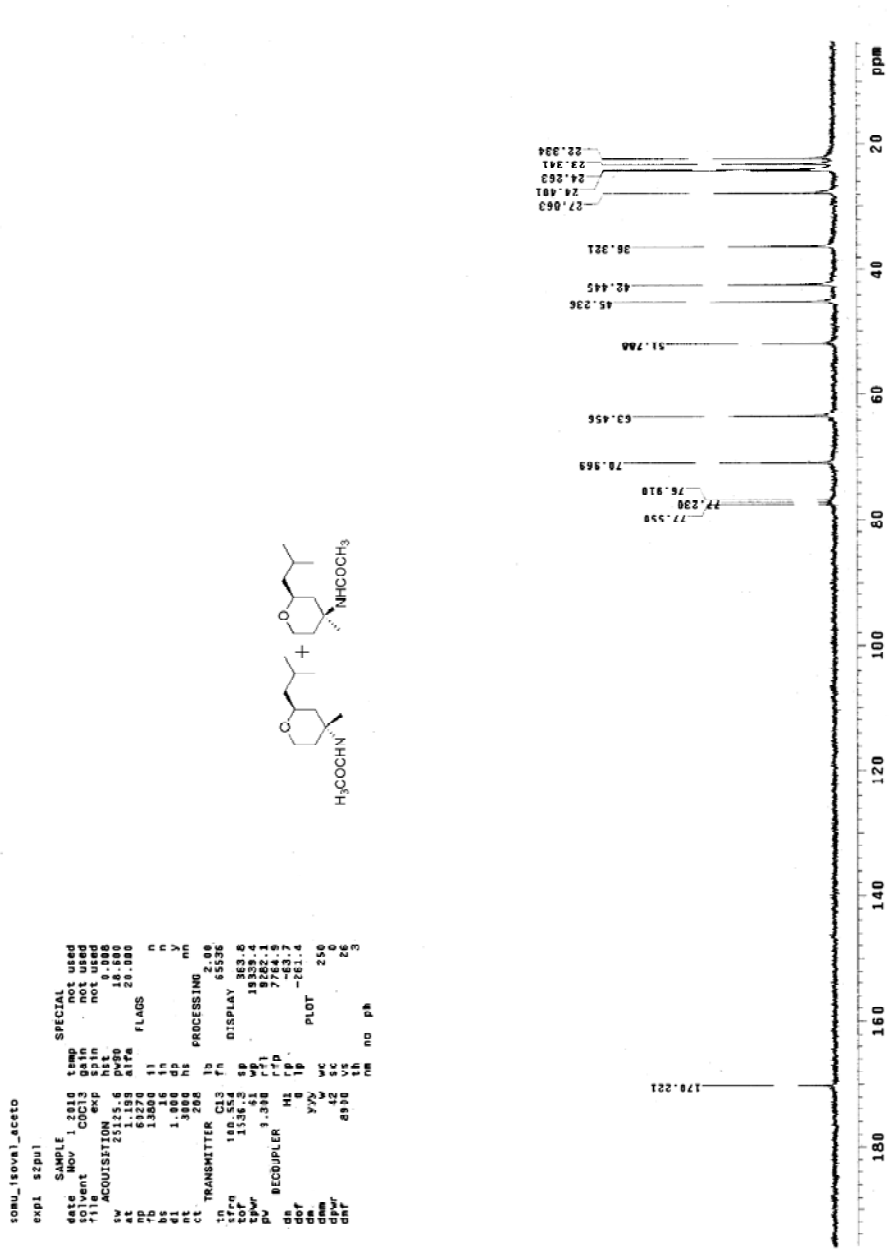
^{13}C NMR of **17e/18e**



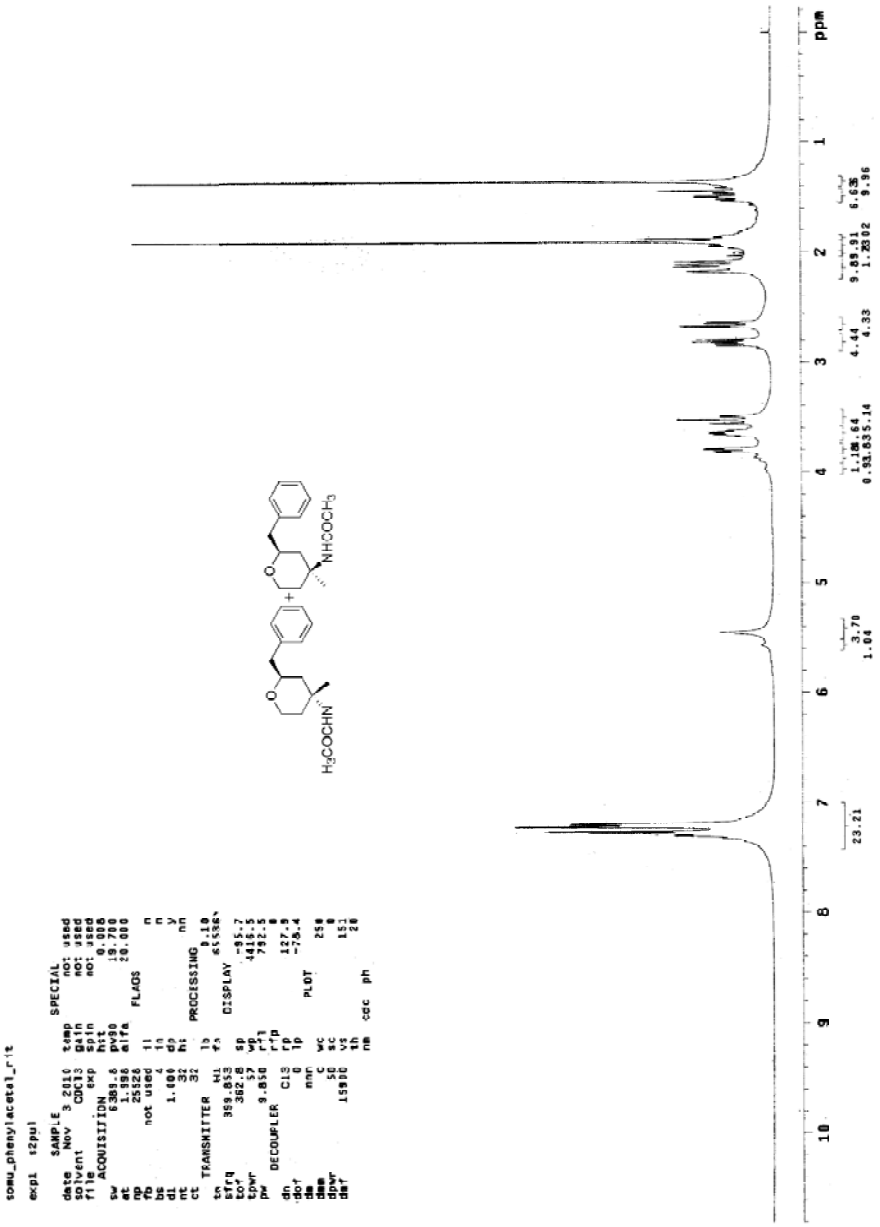
^{1}H NMR of **17f/18f**



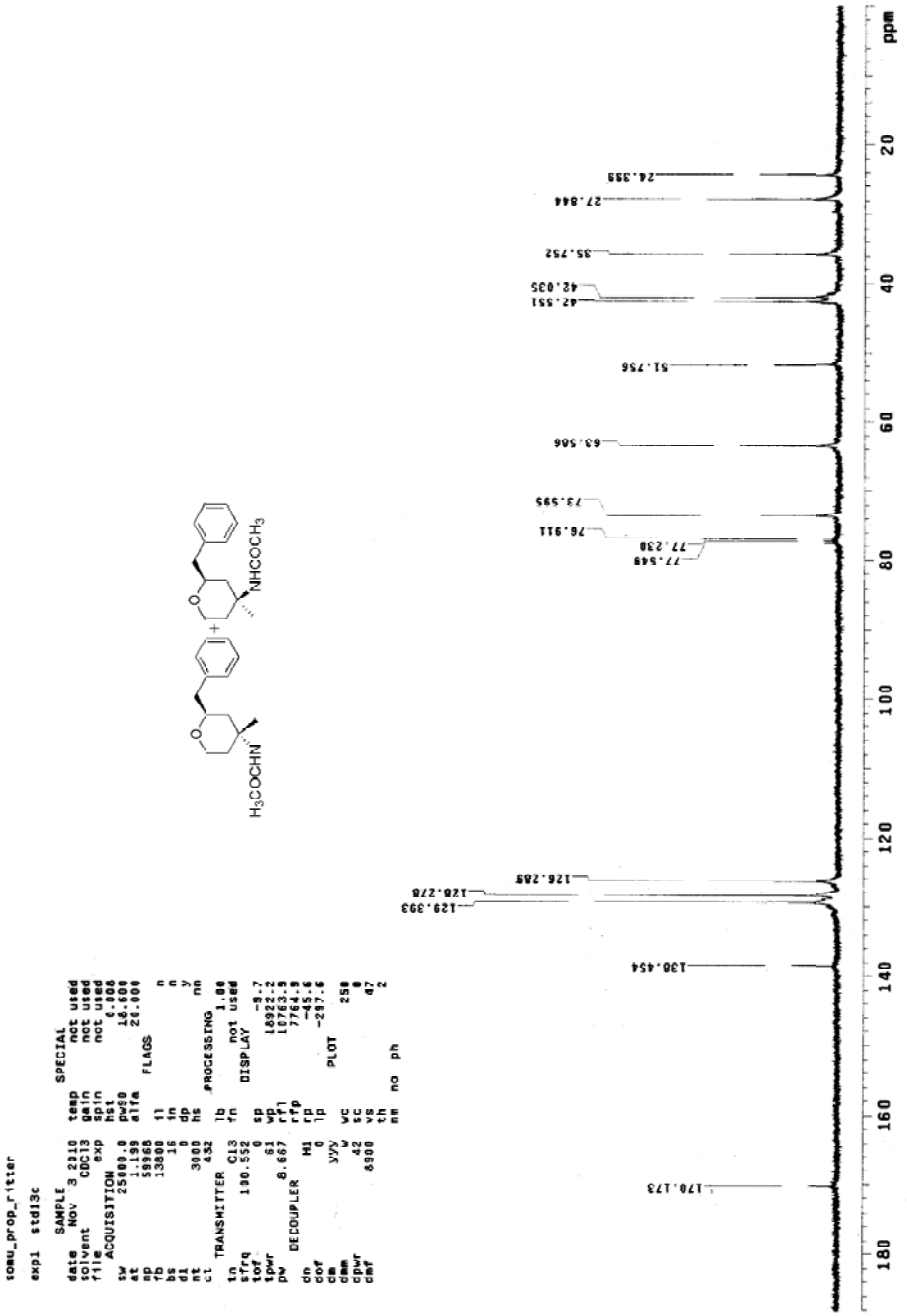
^{13}C NMR of **17f/18f**



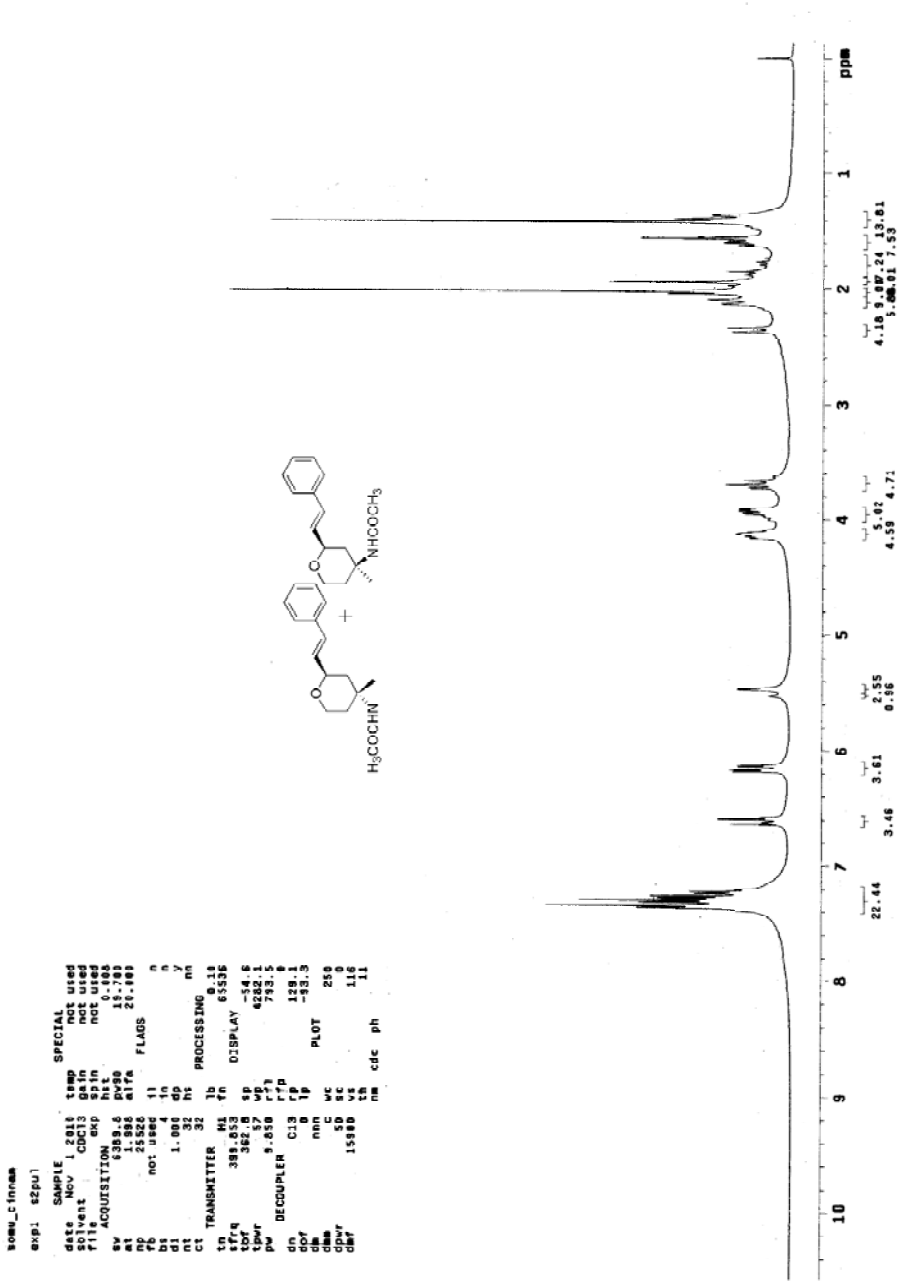
^{1}H NMR of **17g/18g**



^{13}C NMR of **17g/18g**



^{1}H NMR of **17h/18h**



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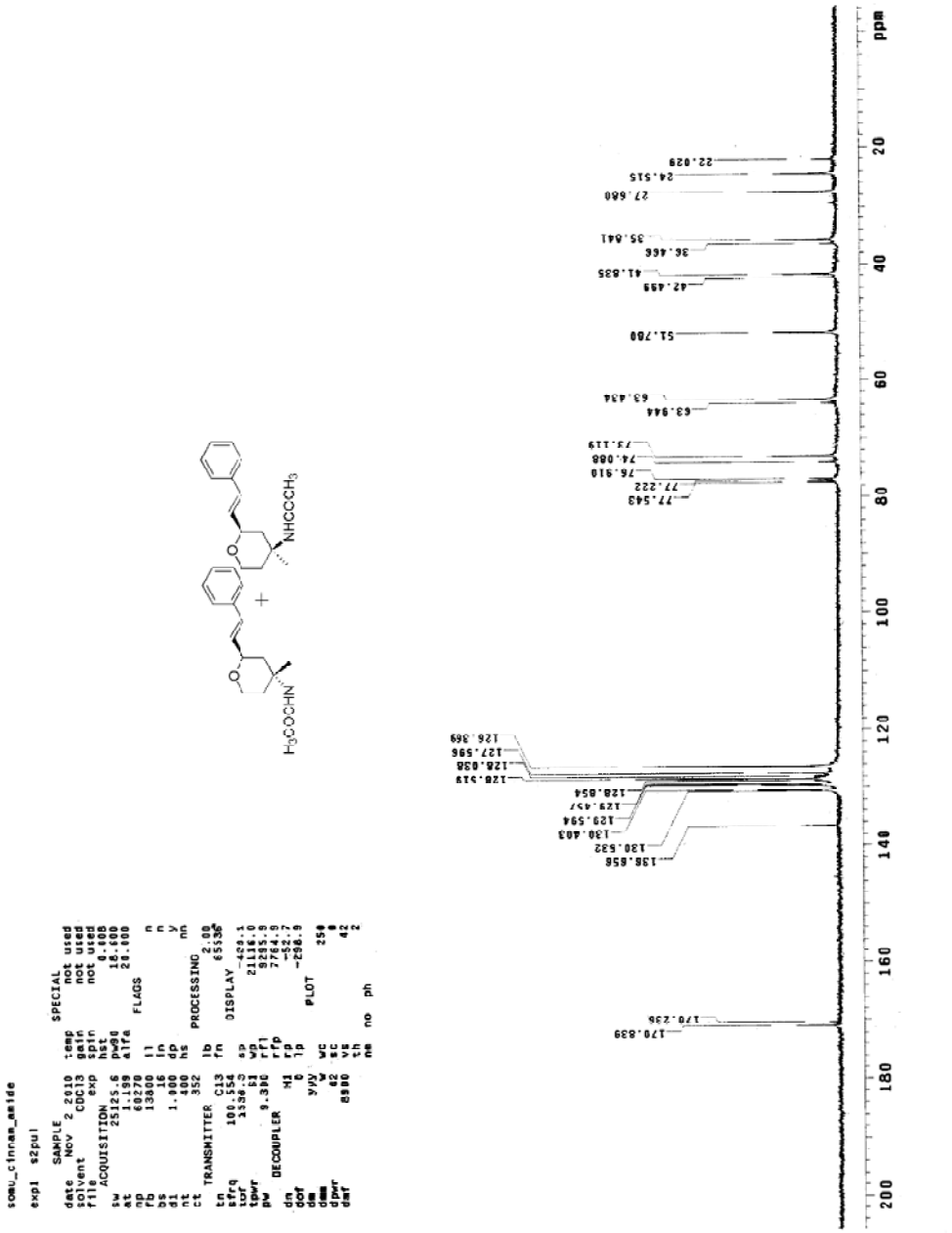
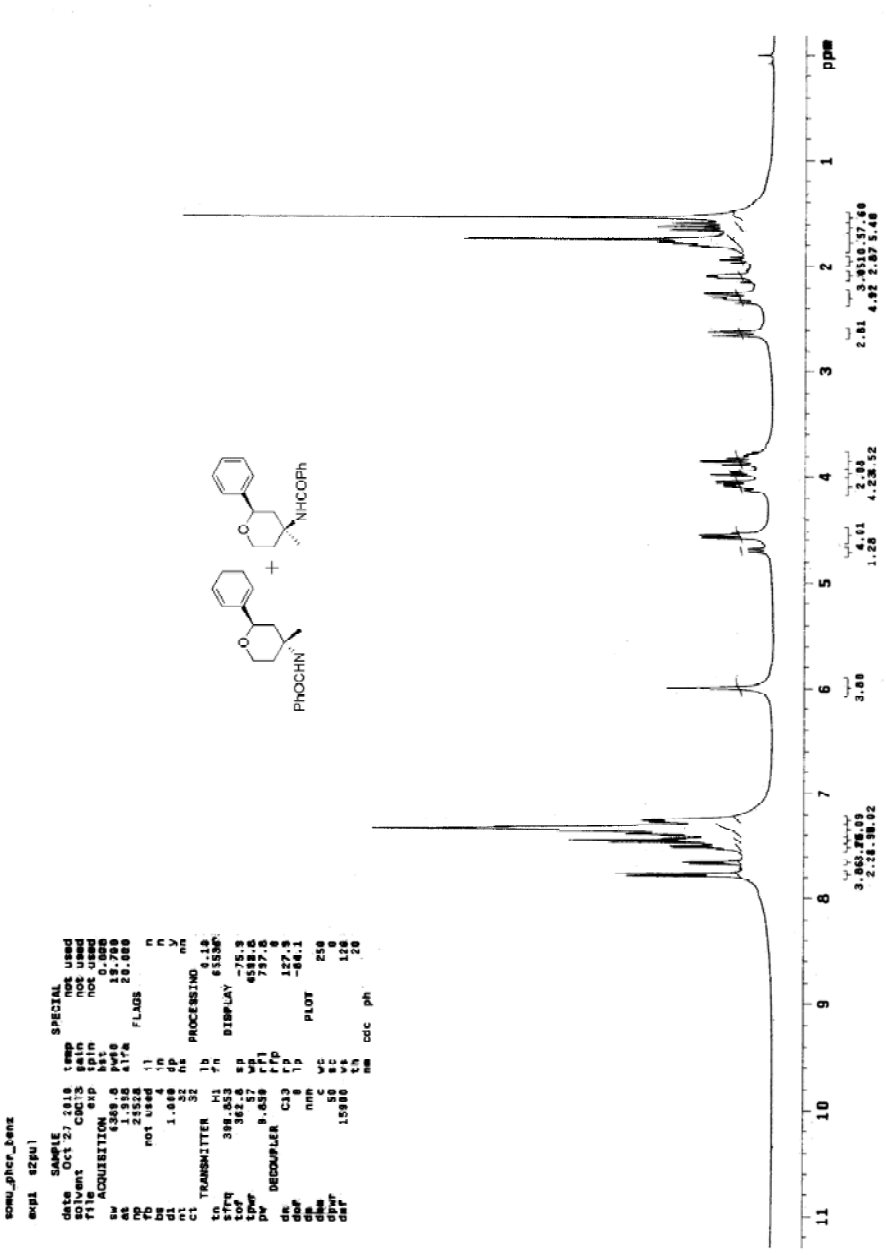


^{1}H NMR of **17i/18i**



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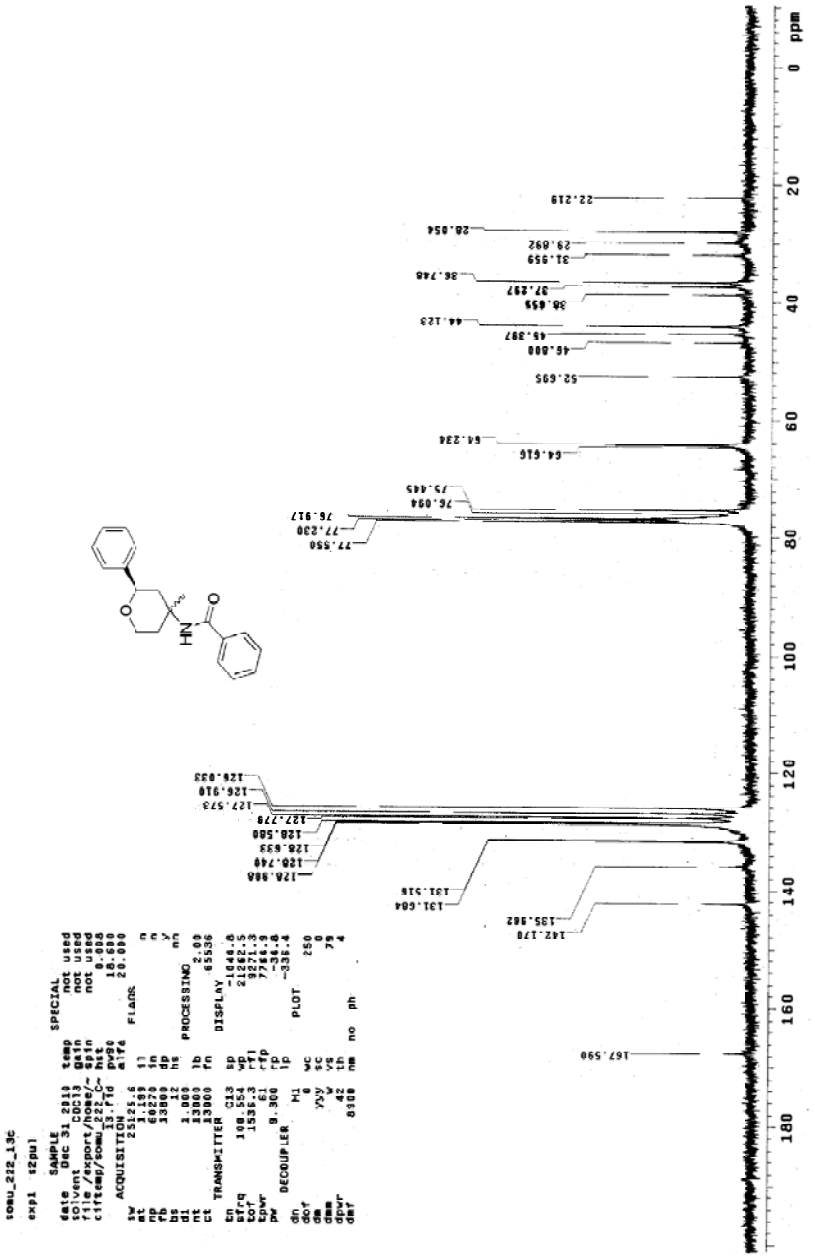

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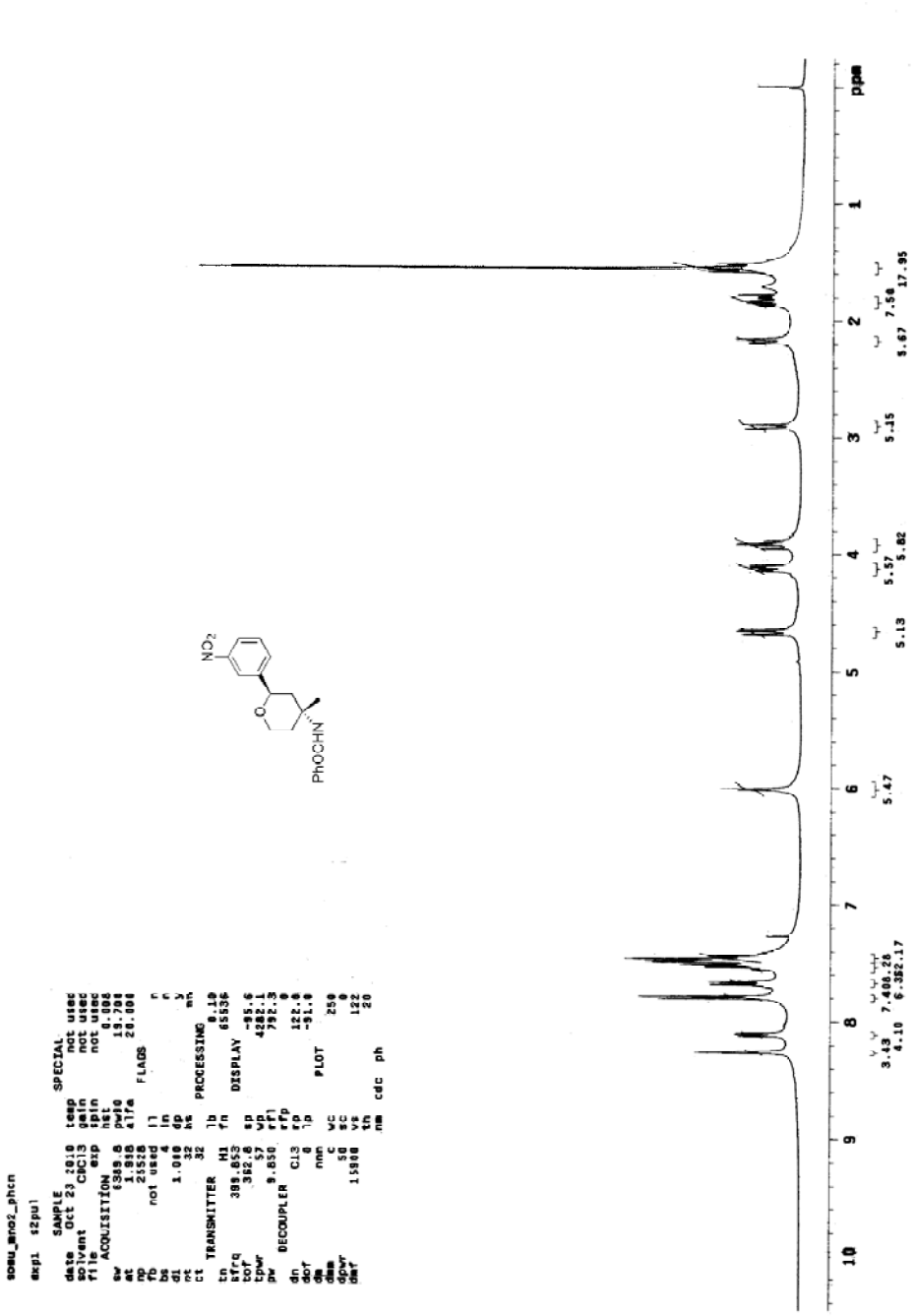

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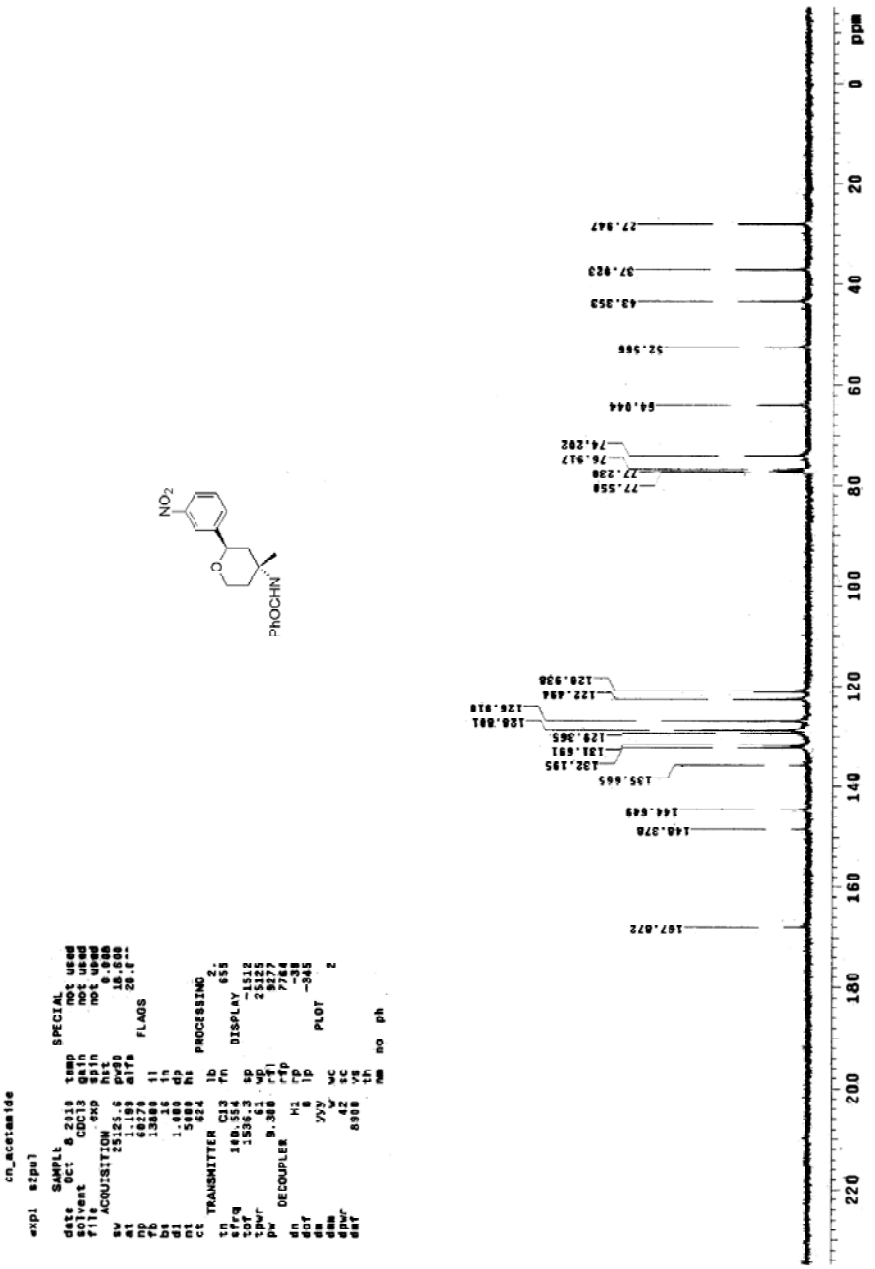

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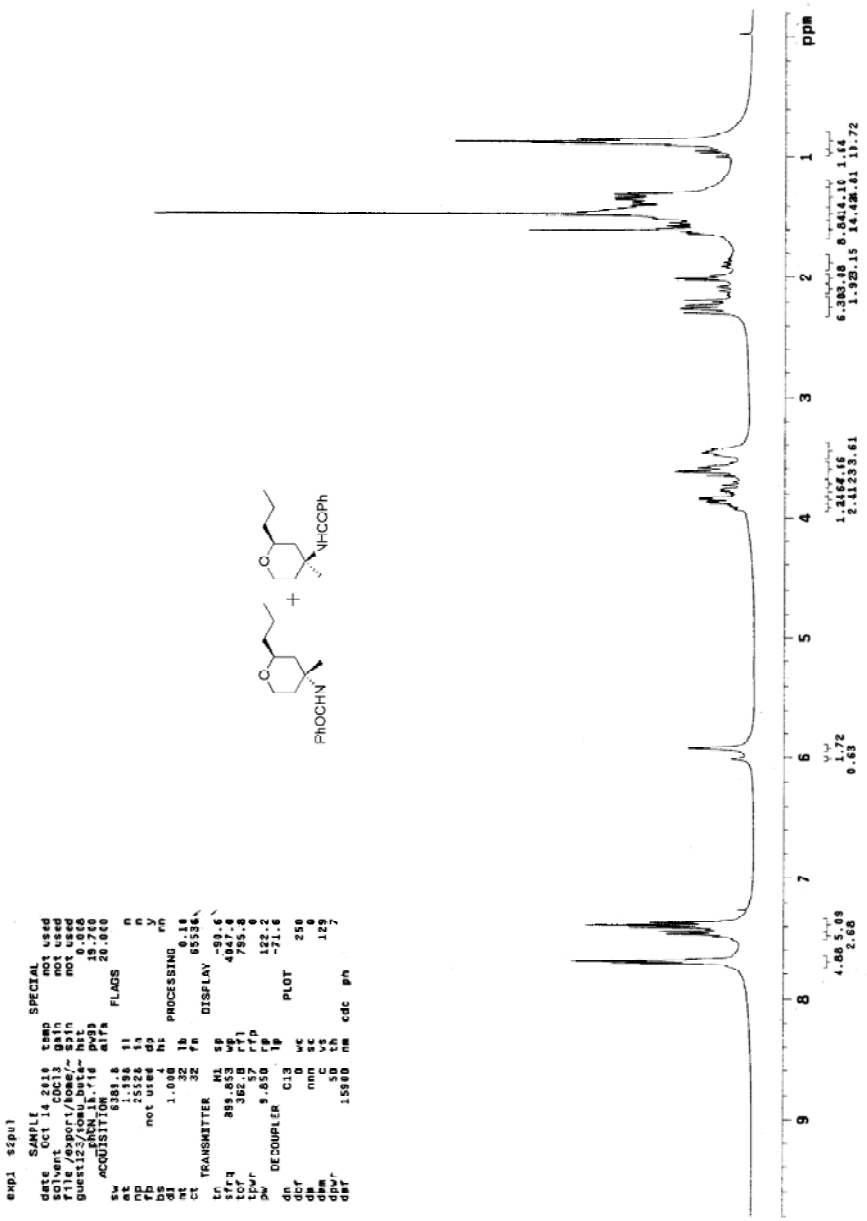
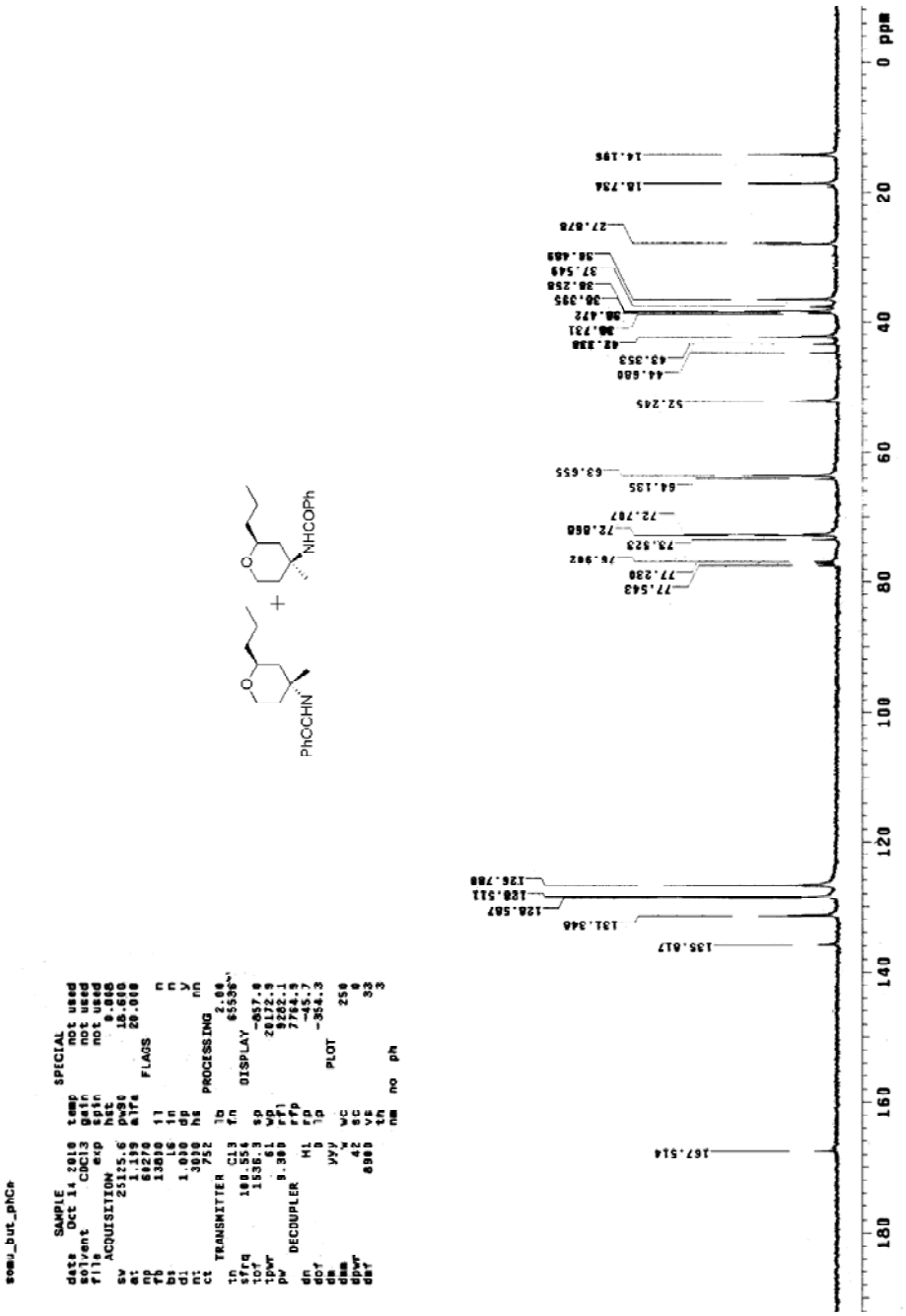
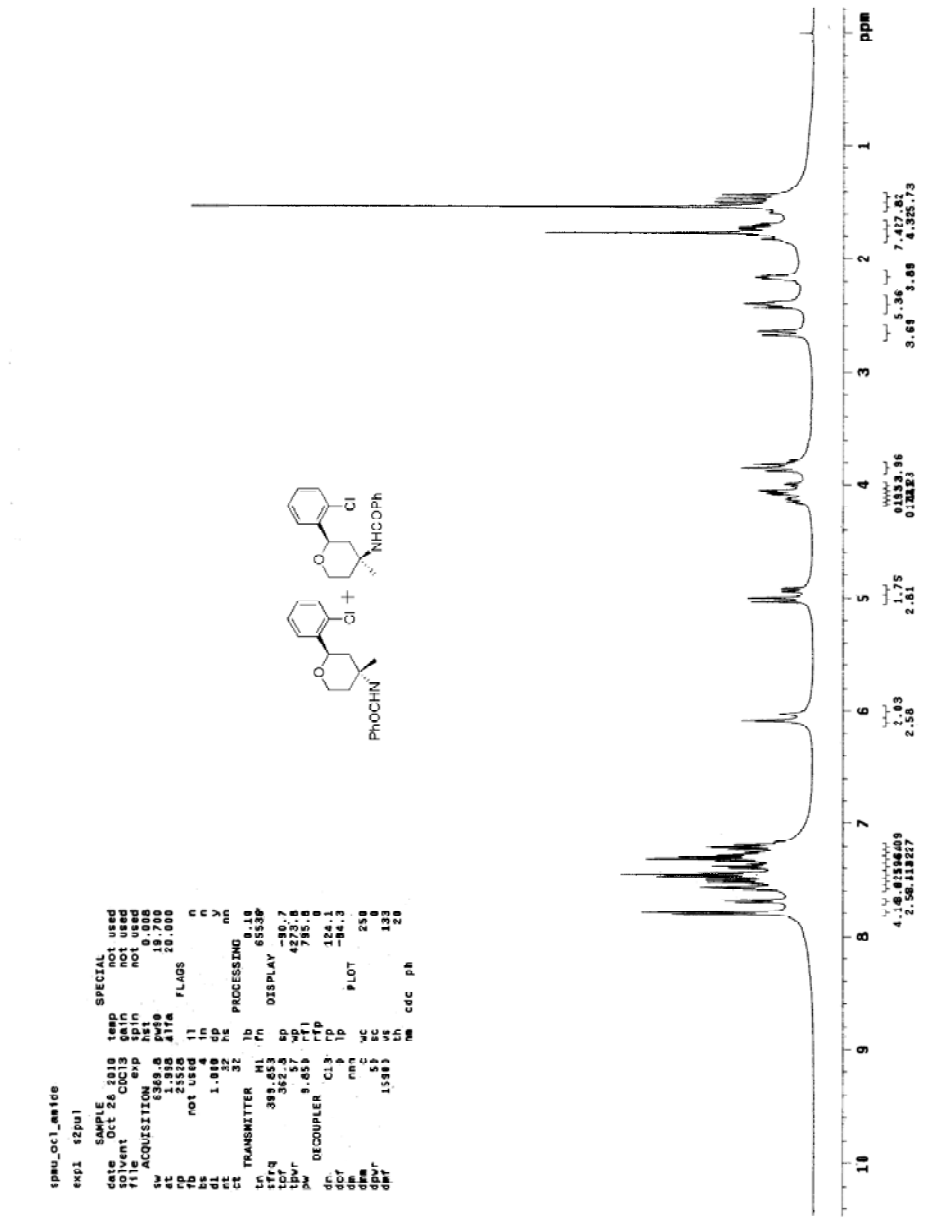


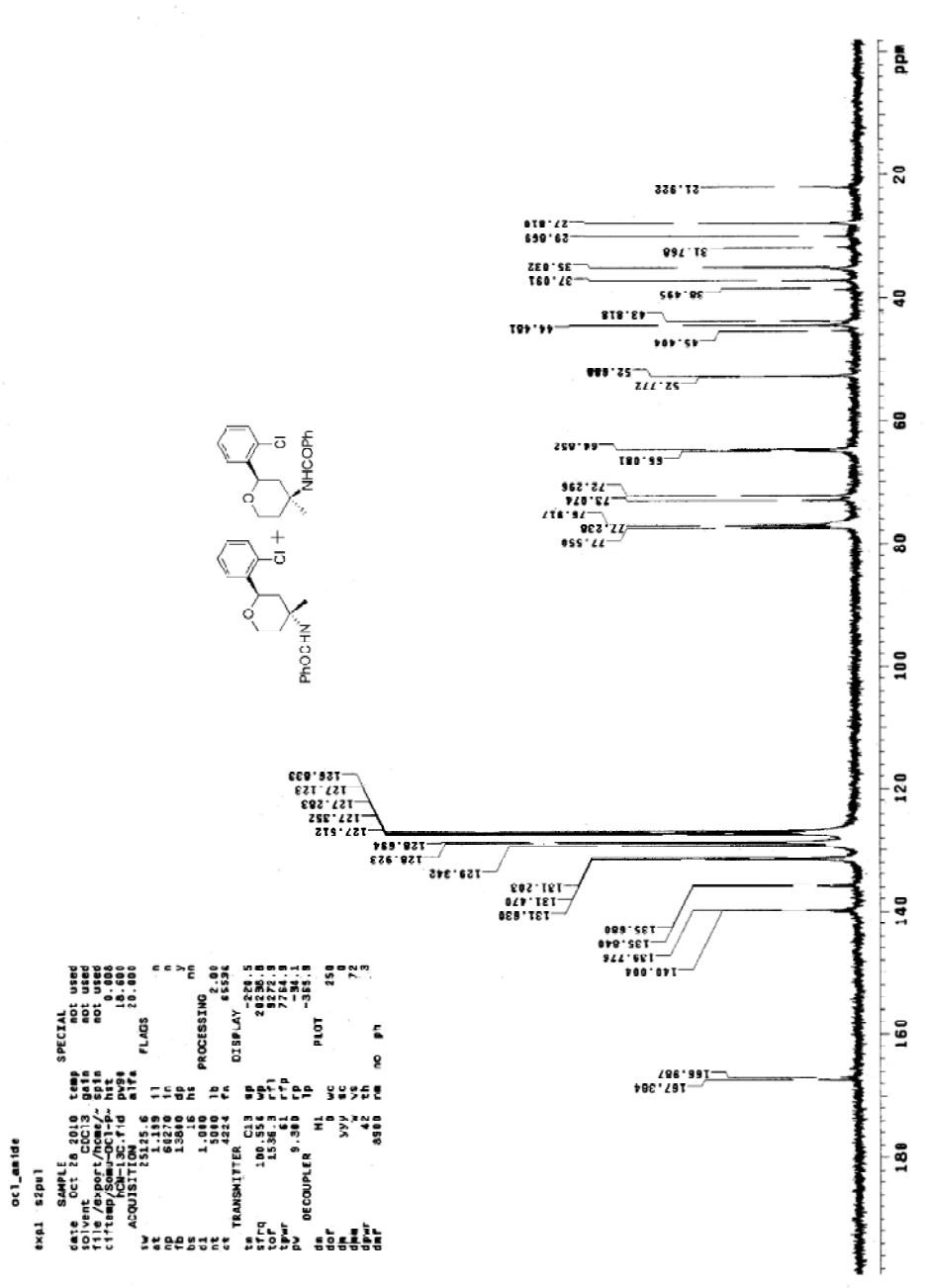
^{13}C NMR of **17k/18k**



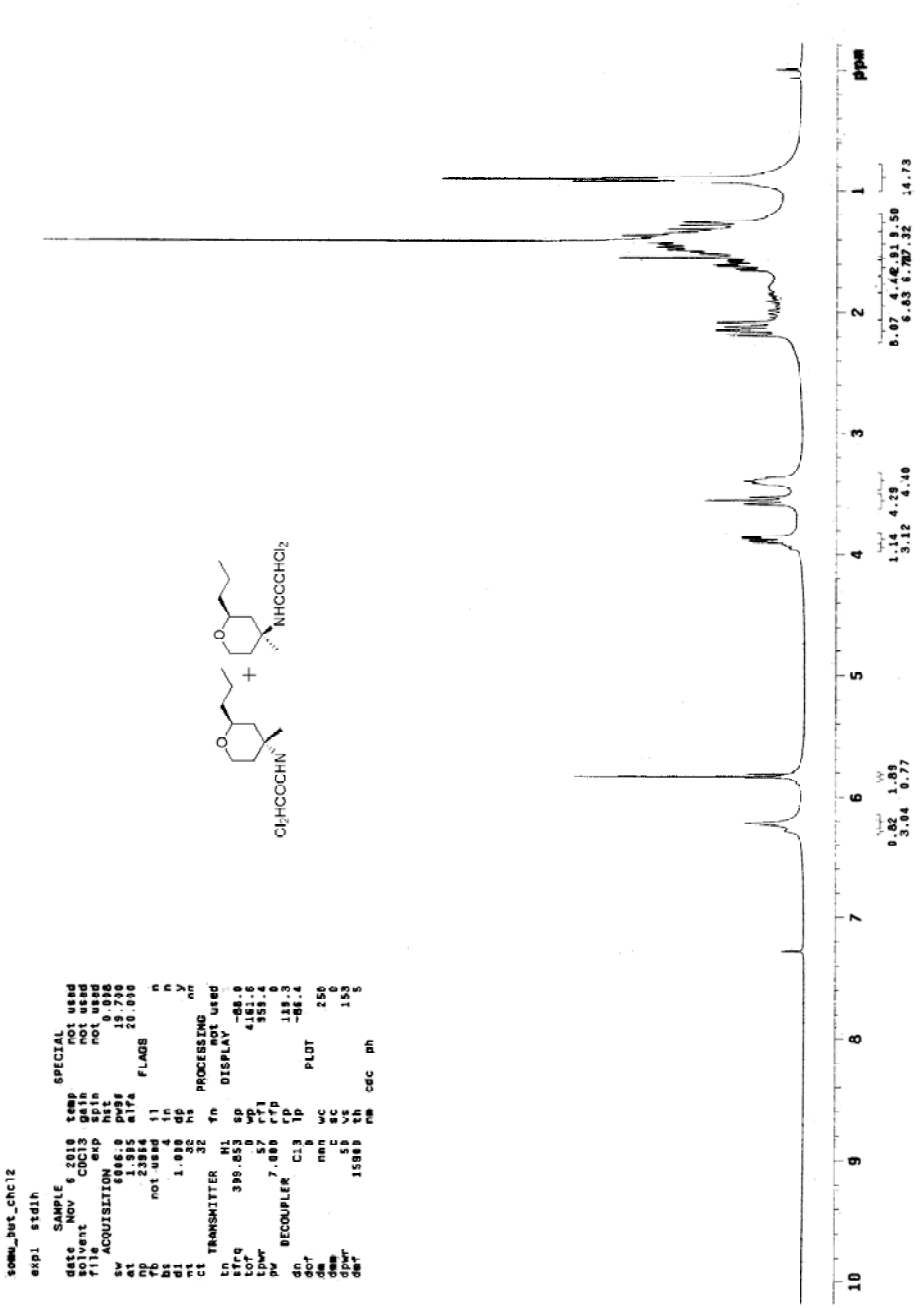
^{1}H NMR of **17l/18l**



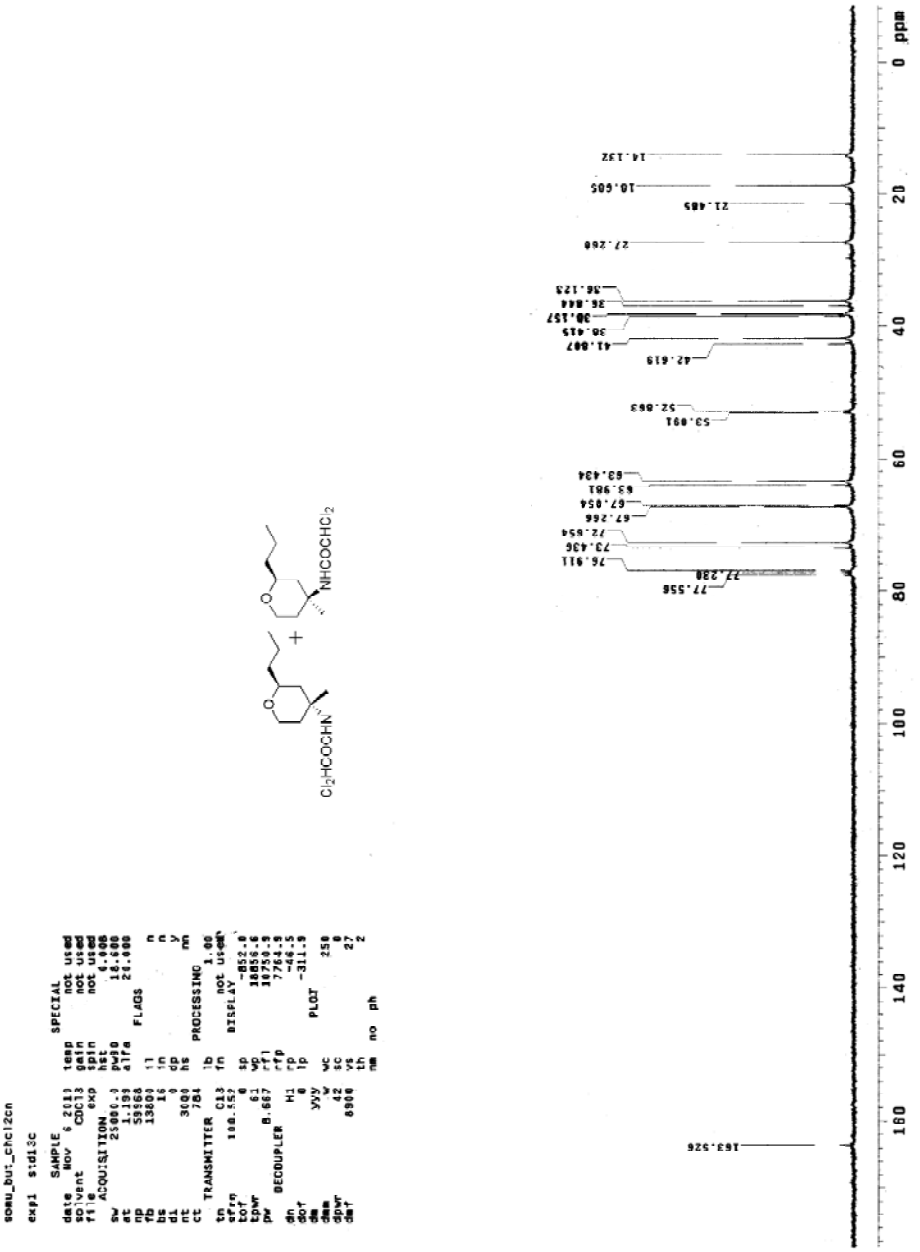
^{13}C NMR of **17l/18l**



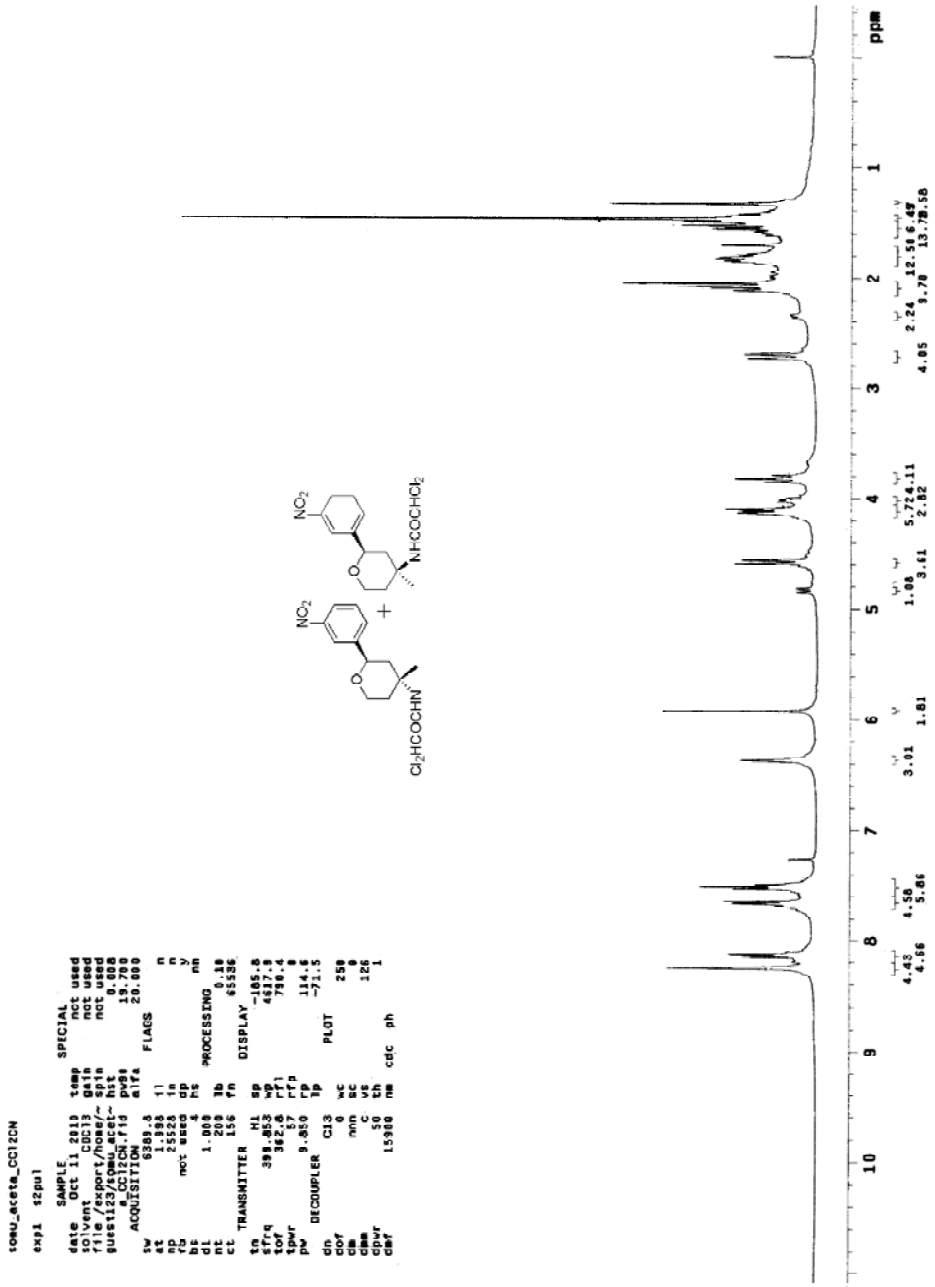
^{1}H NMR of **17m/18m**



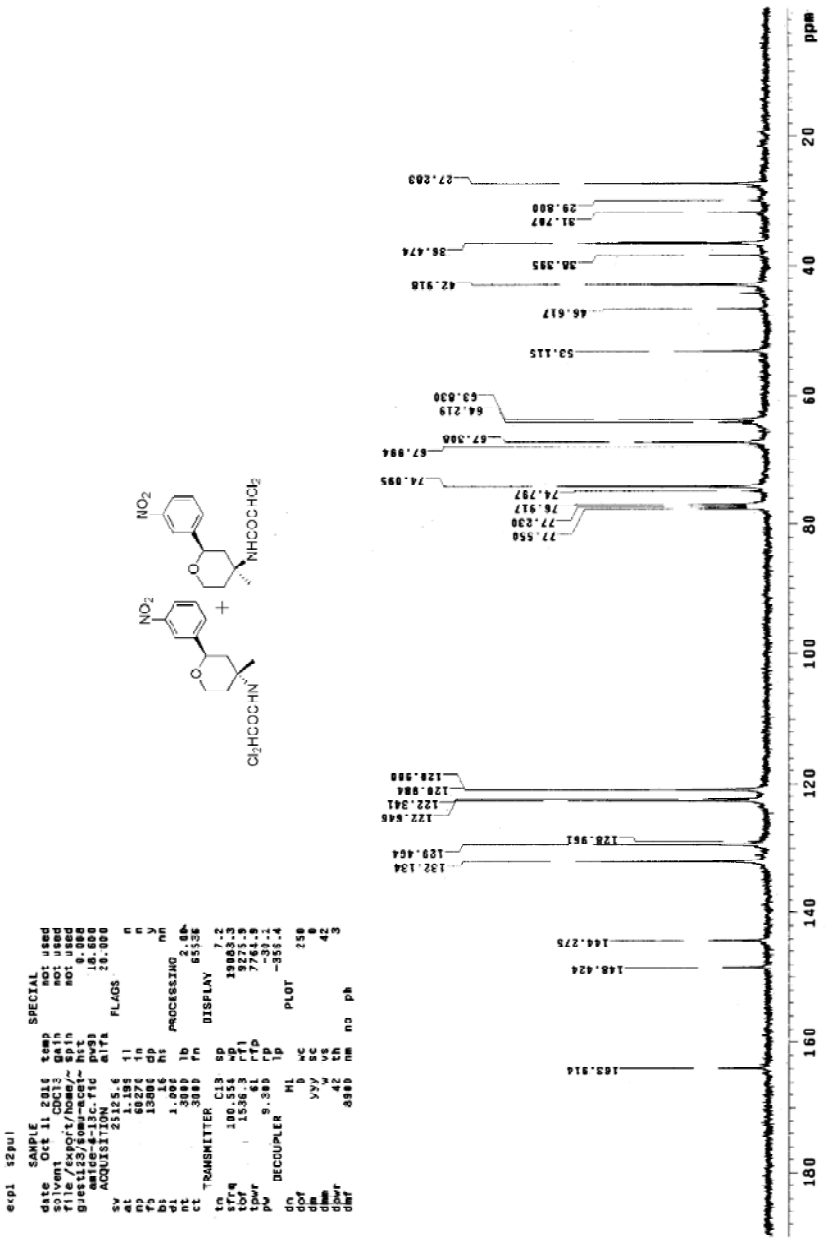
^{13}C NMR of **17m/18m**



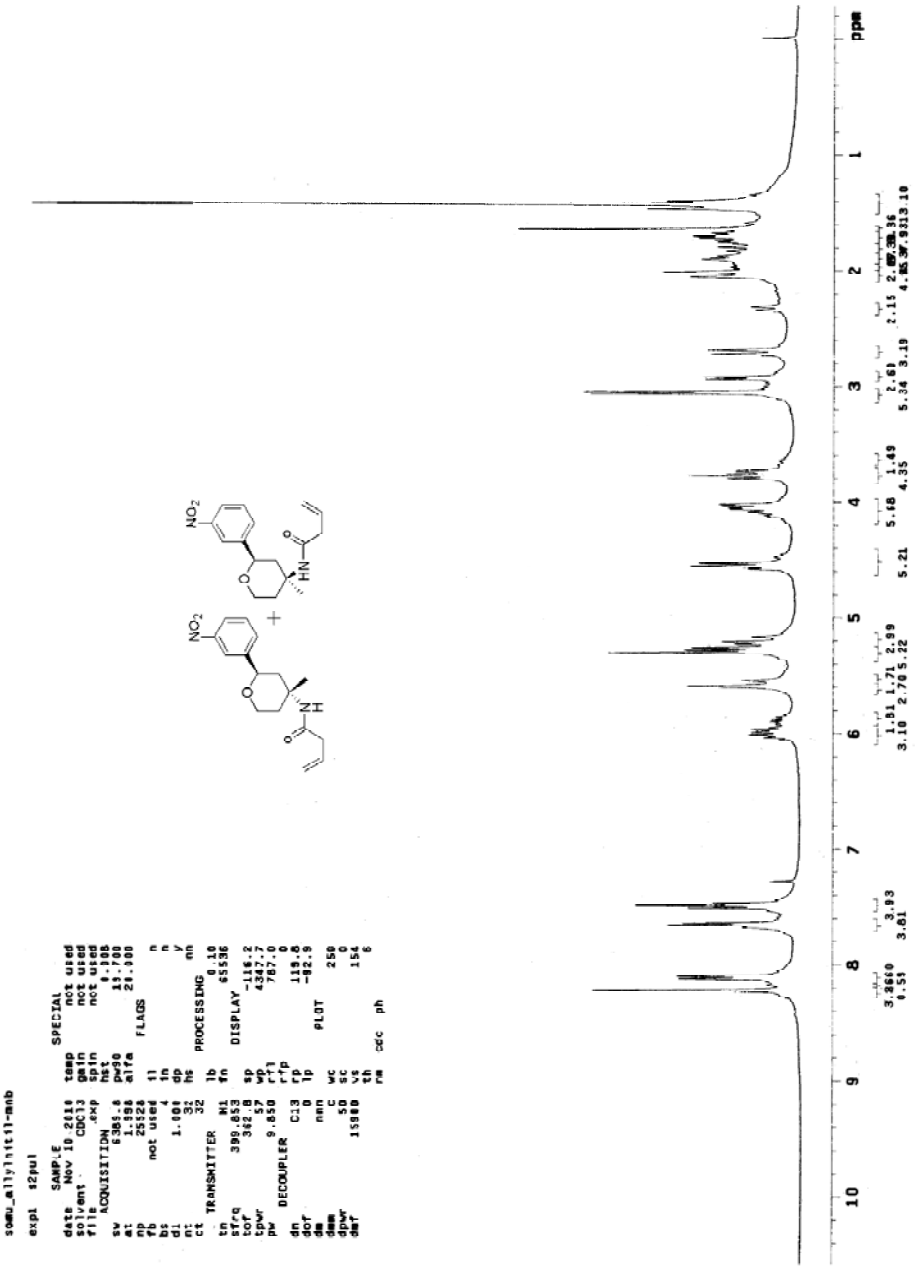
^{1}H NMR of **17n/18n**



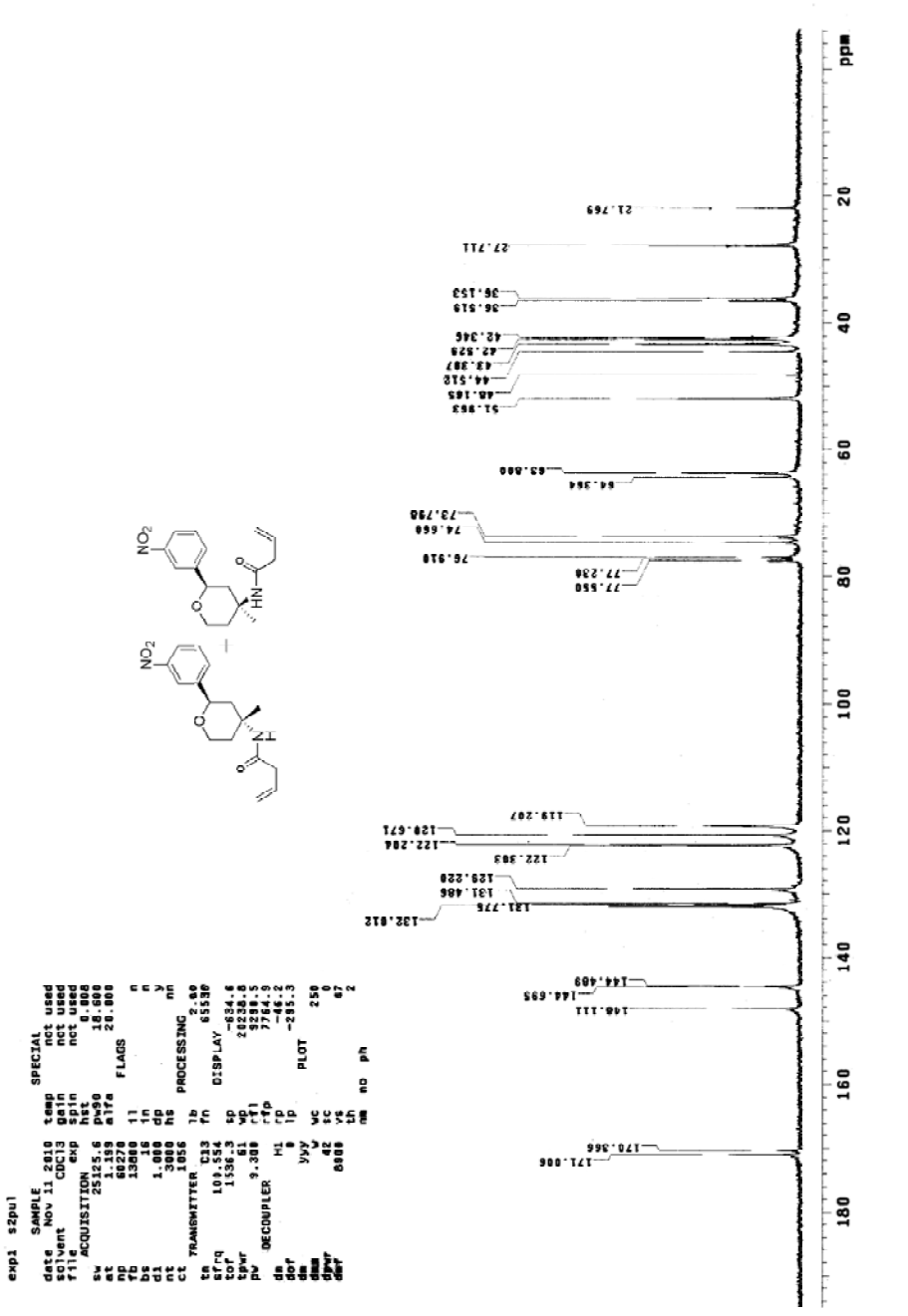
^{13}C NMR of **17n/18n**



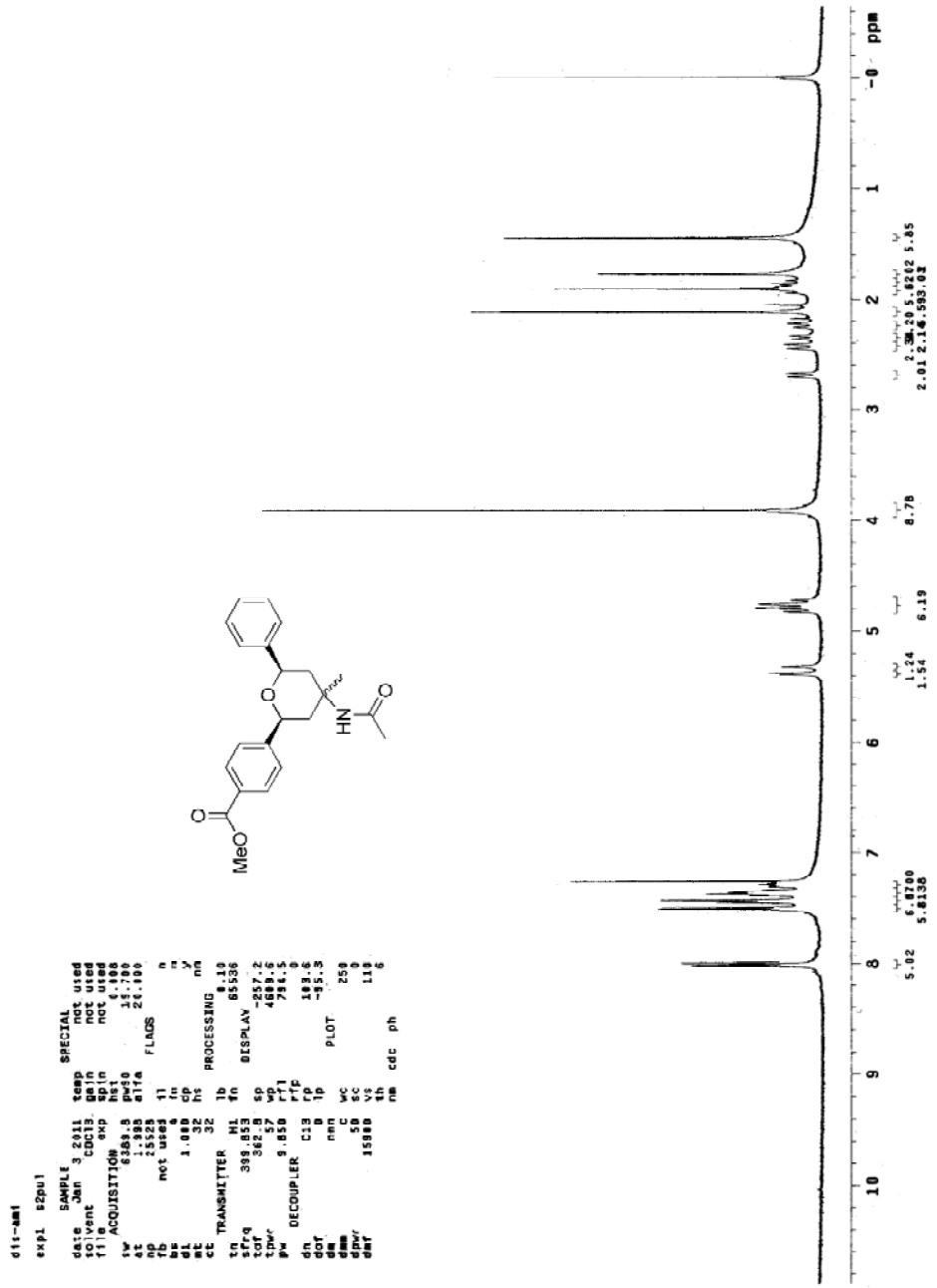
^{1}H NMR of **17o/18o**



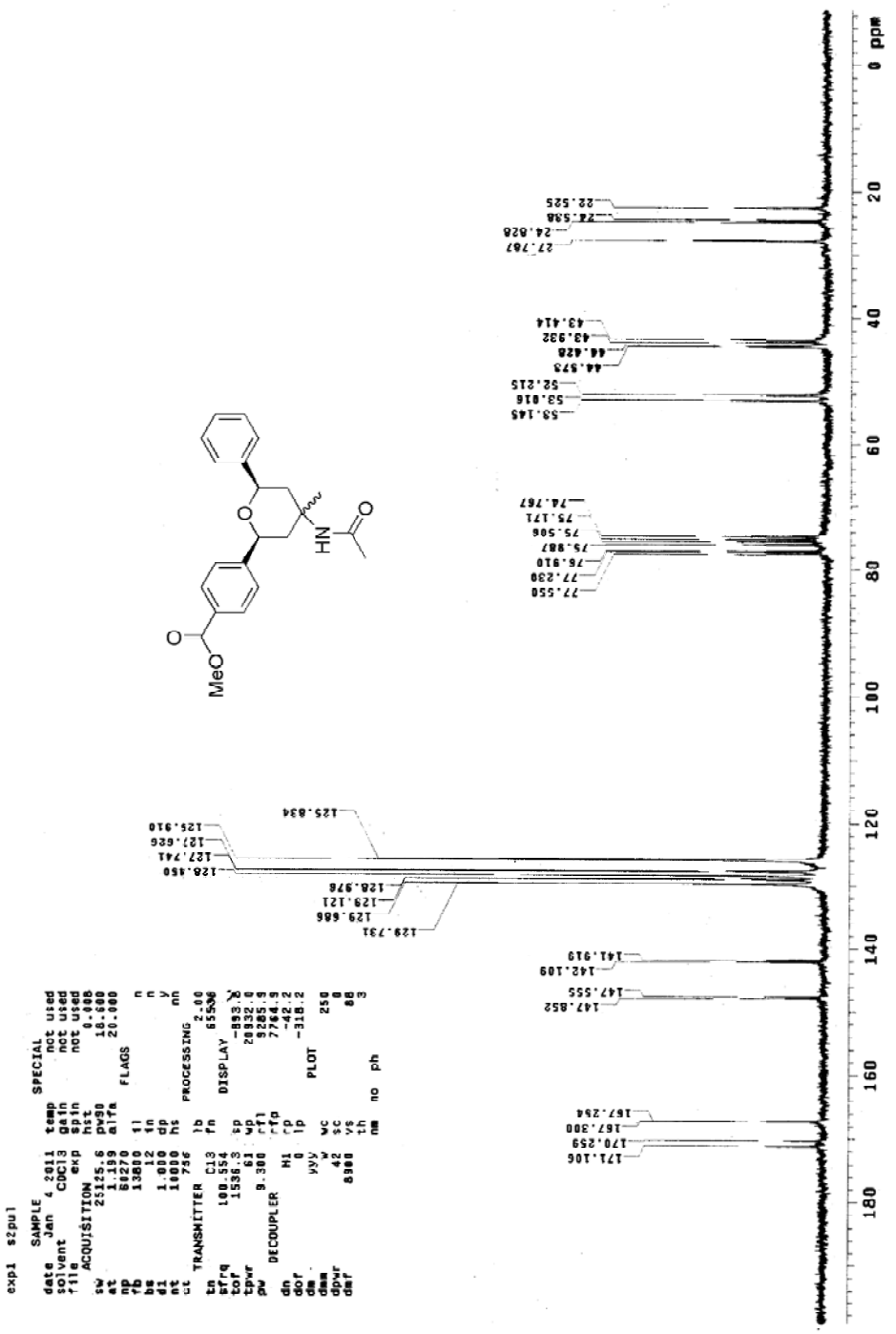
^{13}C NMR of **17o/18o**



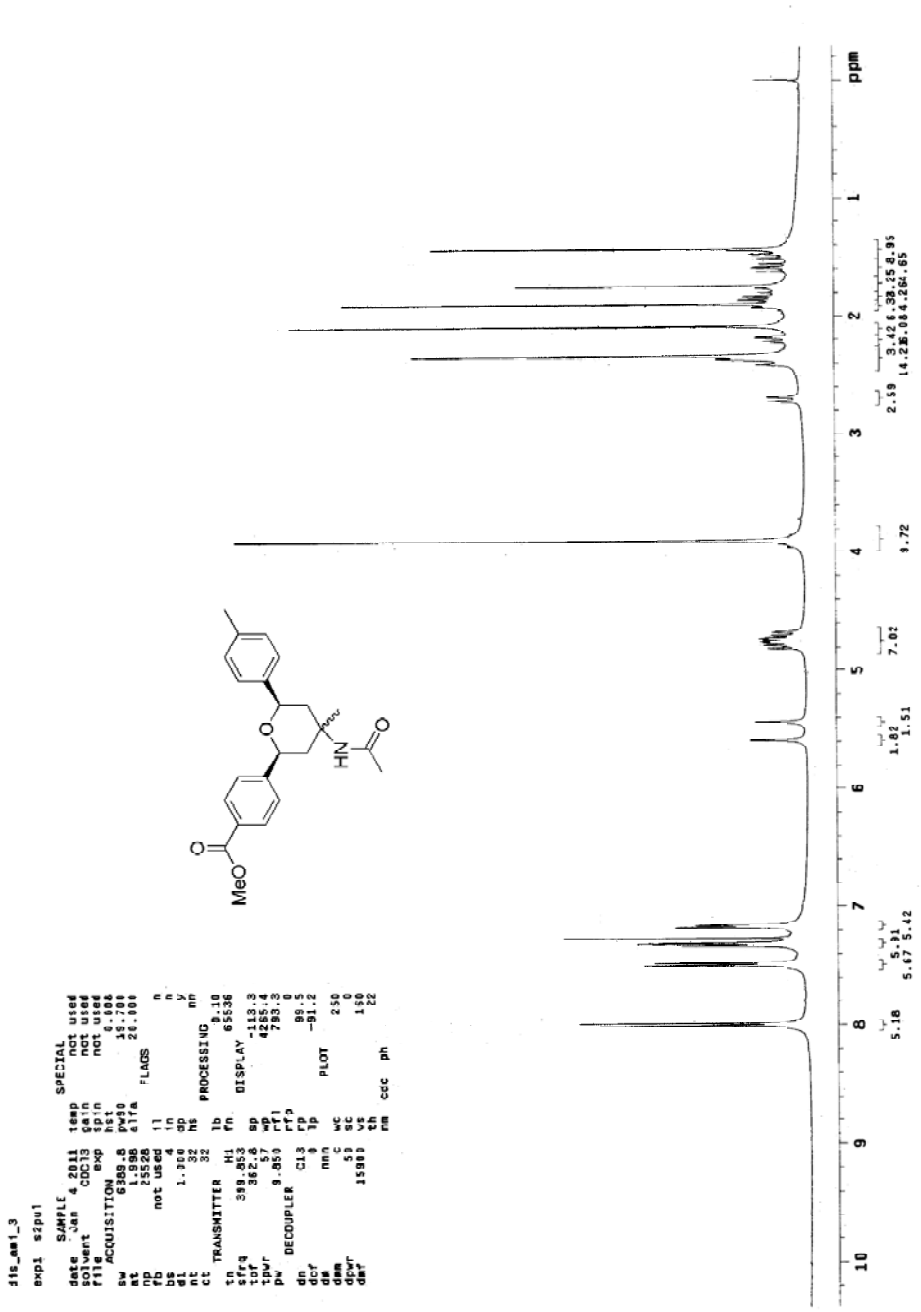
^{1}H NMR of 17p/18p



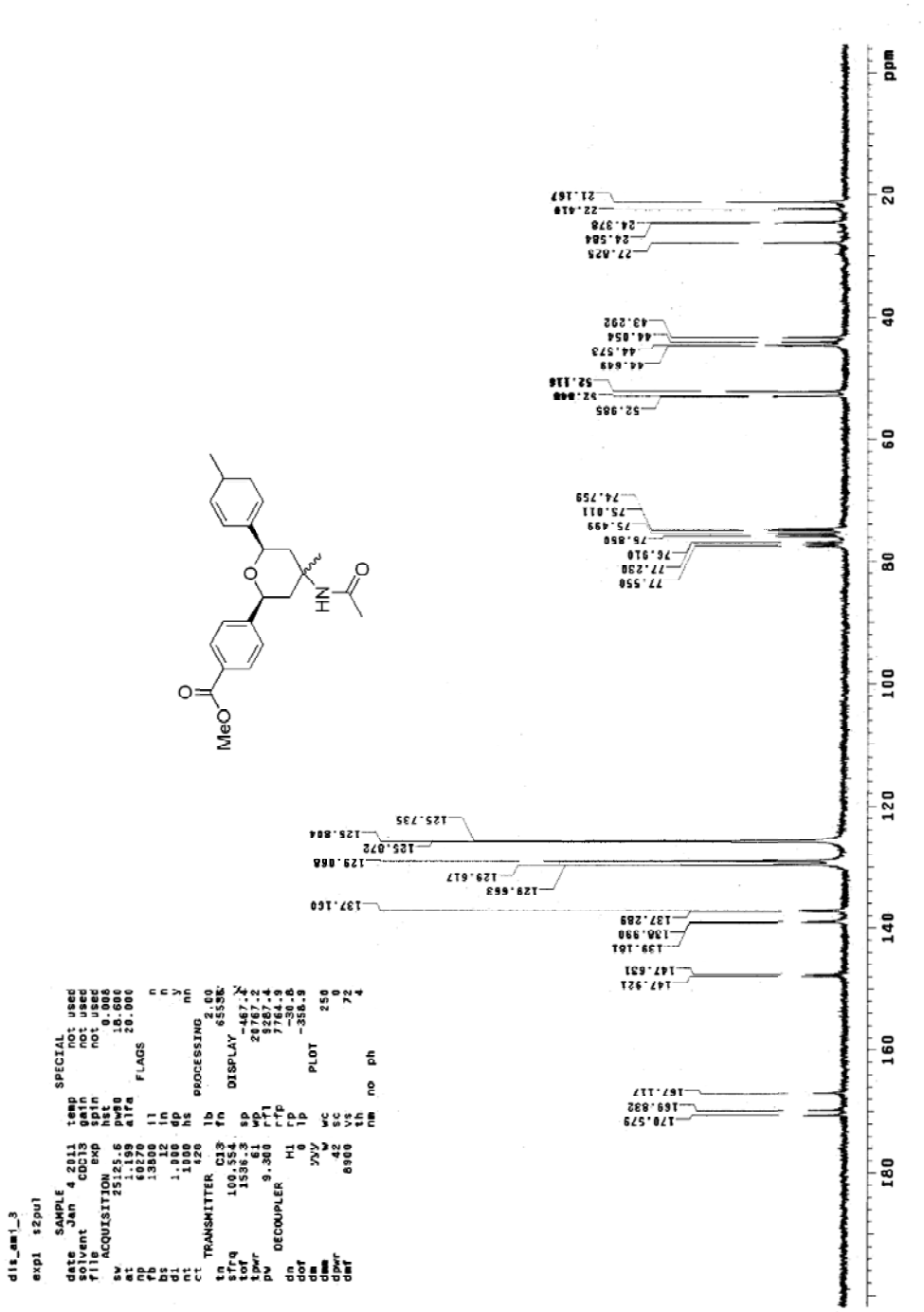
^{13}C NMR of 17p/18p



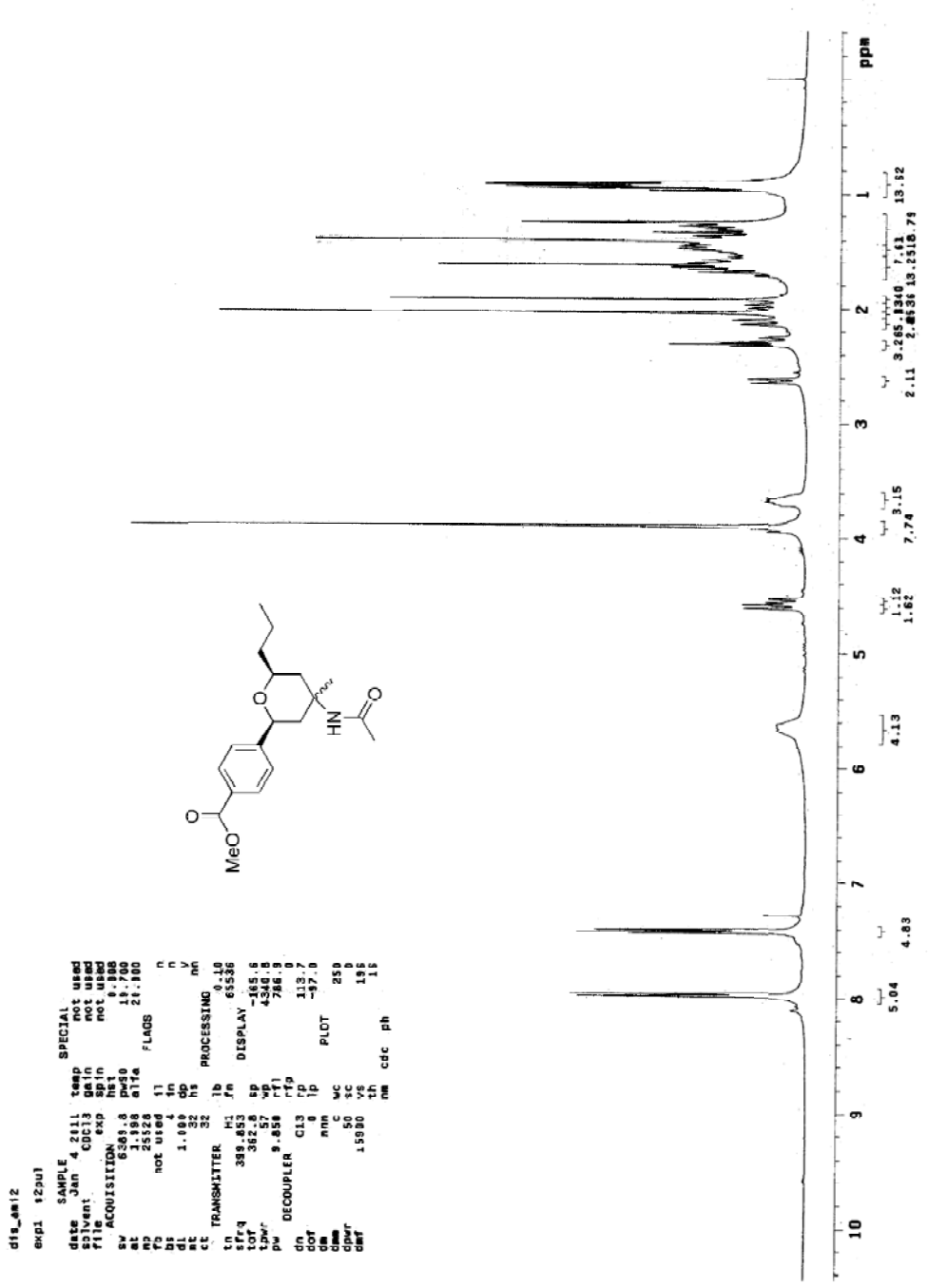
^{1}H NMR of 17q/18q



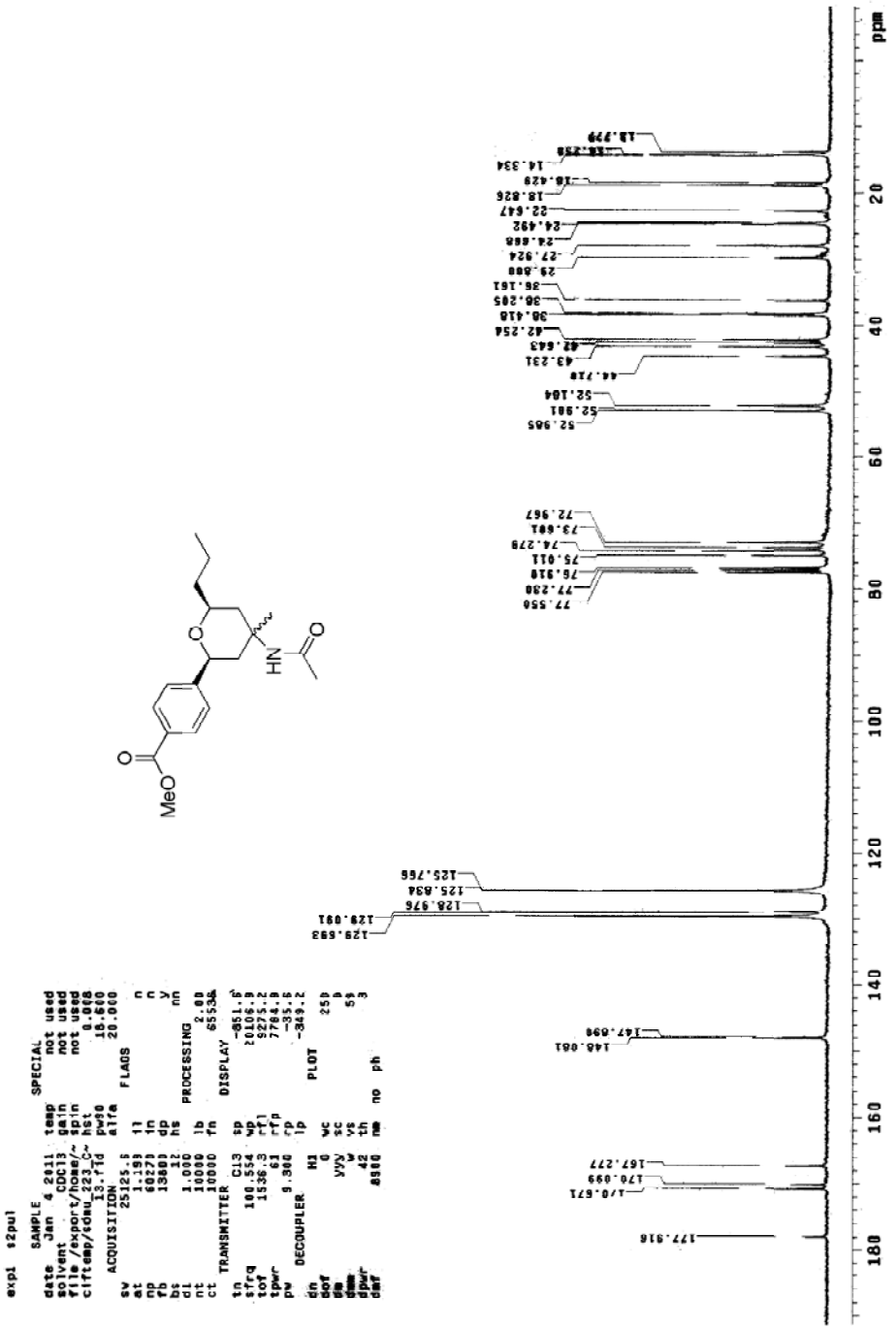
^{13}C NMR of 17q/18q



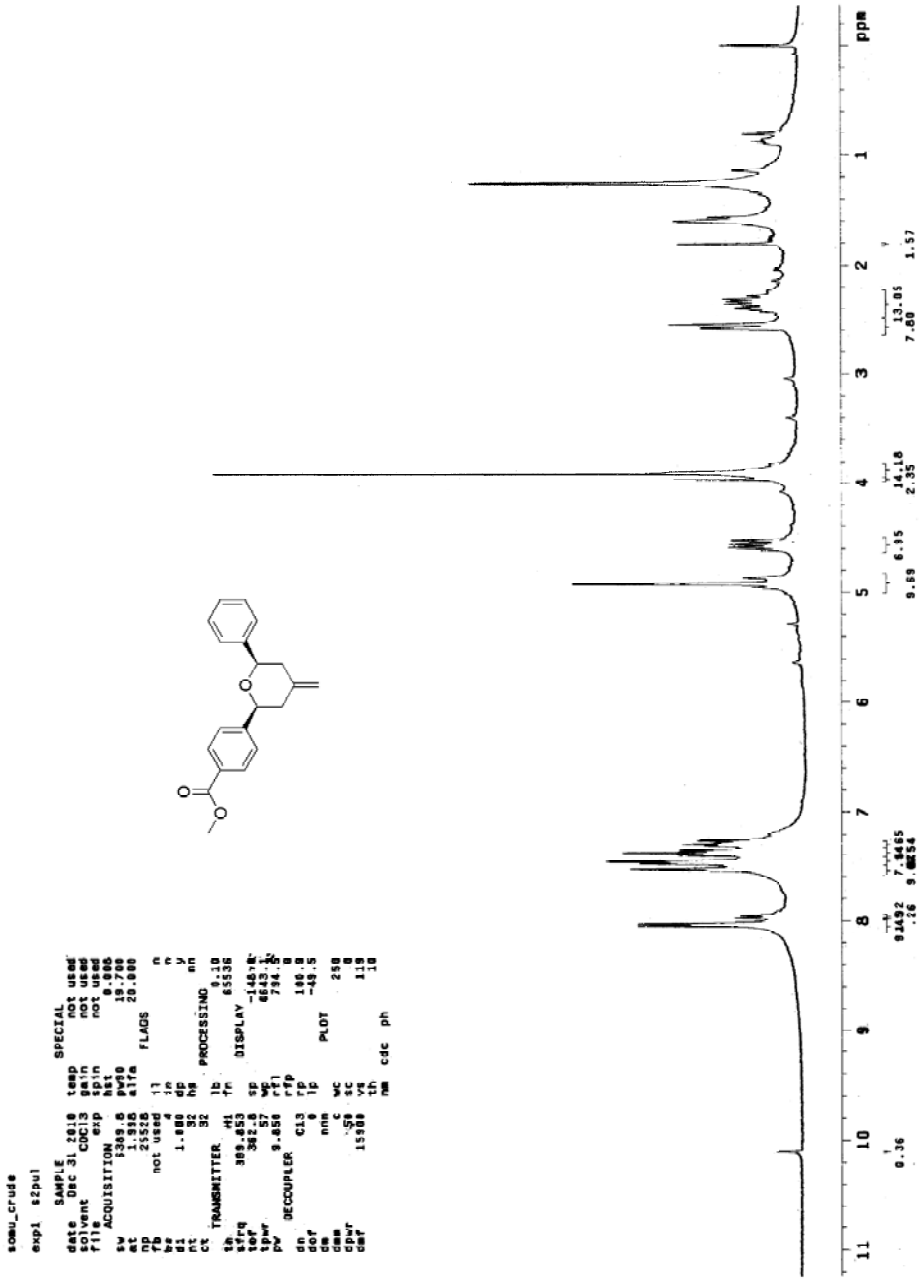
^{1}H NMR of 17r/18r



^{13}C NMR of 17r/18r

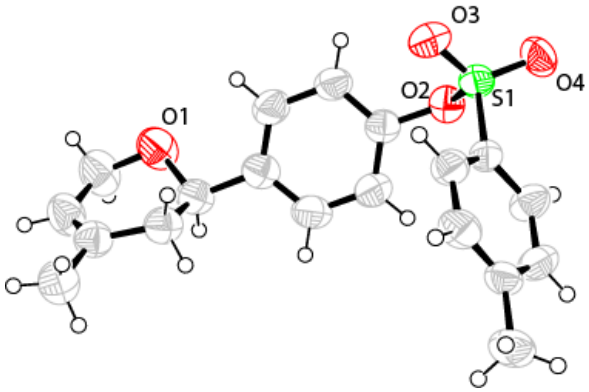


Crude ^{1}H NMR of **8r**



Crystallographic data

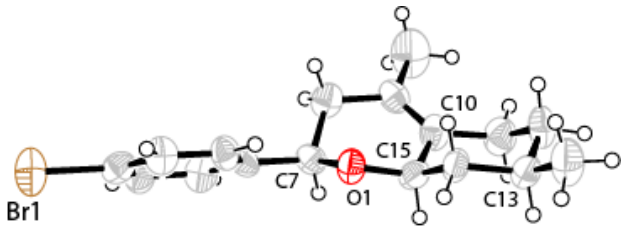
Figure 1: ORTEP Diagram of "Toluene 4-sulfonic acid 4-(4-Methyl-2,3-dihydro-2*H*-pyran-2-yl) phenyl ester" **6e**



The crystal parameters of compound 6e

	6e- CCDC 765896
Formula	C19 H20 O4 S
Formula weight	344.41
T/K	296(2)
Crystal system	Triclinic
Space group	P (1)
a/Å	9.8247(5)
b/Å	11.1954(6)
c/Å	16.1562(9)
α/º	101.883 (3)
β/º	95.733 (3)
γ/º	91.650 (3)
V/Å^3	1728.04(16)
Z	4
Abs. Coeff./mm^{-1}	0.207
Abs. Correction	Multi-Scan
GOF on F^2	1.007
Final *R* indices [$I > 2\sigma(I)$]	*R1* = 0.0514
	wR2 = 0.1409
R indices [all data]	*R1* = 0.0798
	wR2 = 0.1578

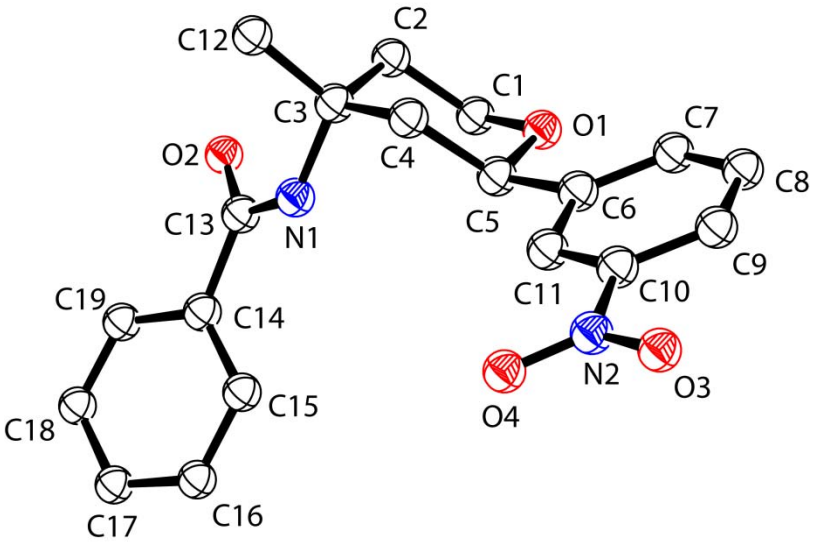
Figure 2: ORTEP Diagram of "2-(4-Bromophenyl)-4,7-dimethyl-3,5,6,7,8,8a-hexahydro-2,4-chromene" **10**



The crystal parameters of compound 10

	10- CCDC 765895
Formula	C17 H21 Br O
Formula weight	321.24
T/K	296(2)
Crystal system	Monoclinic
Space group	P2(1)
a/Å	4.7575 (2)
b/Å	9.8672(4)
c/Å	16.6178(6)
α/º	90.00
β/º	92.210 (2)
γ/º	90.00
V/Å^3	779.51(5)
Z	2
Abs. Coeff./mm^{-1}	2.628
Abs. Correction	Multi-Scan
GOF on F^2	1.077
Final *R* indices [$I > 2\sigma(I)$]	*R1* = 0.0525
	wR2 = 0.1308
R indices [all data]	*R1* = 0.0605
	wR2 = 0.1449

Figure 3: ORTEP Diagram of *N*-[4-Methyl-2-(3-nitrophenyl)-tetrahydropyran-4-yl]-benzamide 17j



The crystal parameters of compound 17j

	17j- CCDC 800377
Formula	C19 H20N2O4
Formula weight	340.37
T/K	296(2)
Crystal system	Monoclinic
Space group	P2(1)/n
a/Å	11.6207(12)
b/Å	19.274(2)
c/Å	16.3163(15)
α/°	90.00
β/°	100.451(7)
γ/°	90.00
V/Å^3	3593.8(6)
Z	8
Abs. Coeff./mm^{-1}	0.089
Abs. Correction	Multi-Scan
GOF on F^2	1.003
Final *R* indices [$I > 2\sigma(I)$]	*R1* = 0.0522
	wR2 = 0.1180
R indices [all data]	*R1* = 0.0988
	wR2 = 0.1411