Supporting Information

Synthesis of novel *N*-hydroxy heterocycles *via* intramolecular reductive cyclization of diketoximes by $NaBH_3CN$

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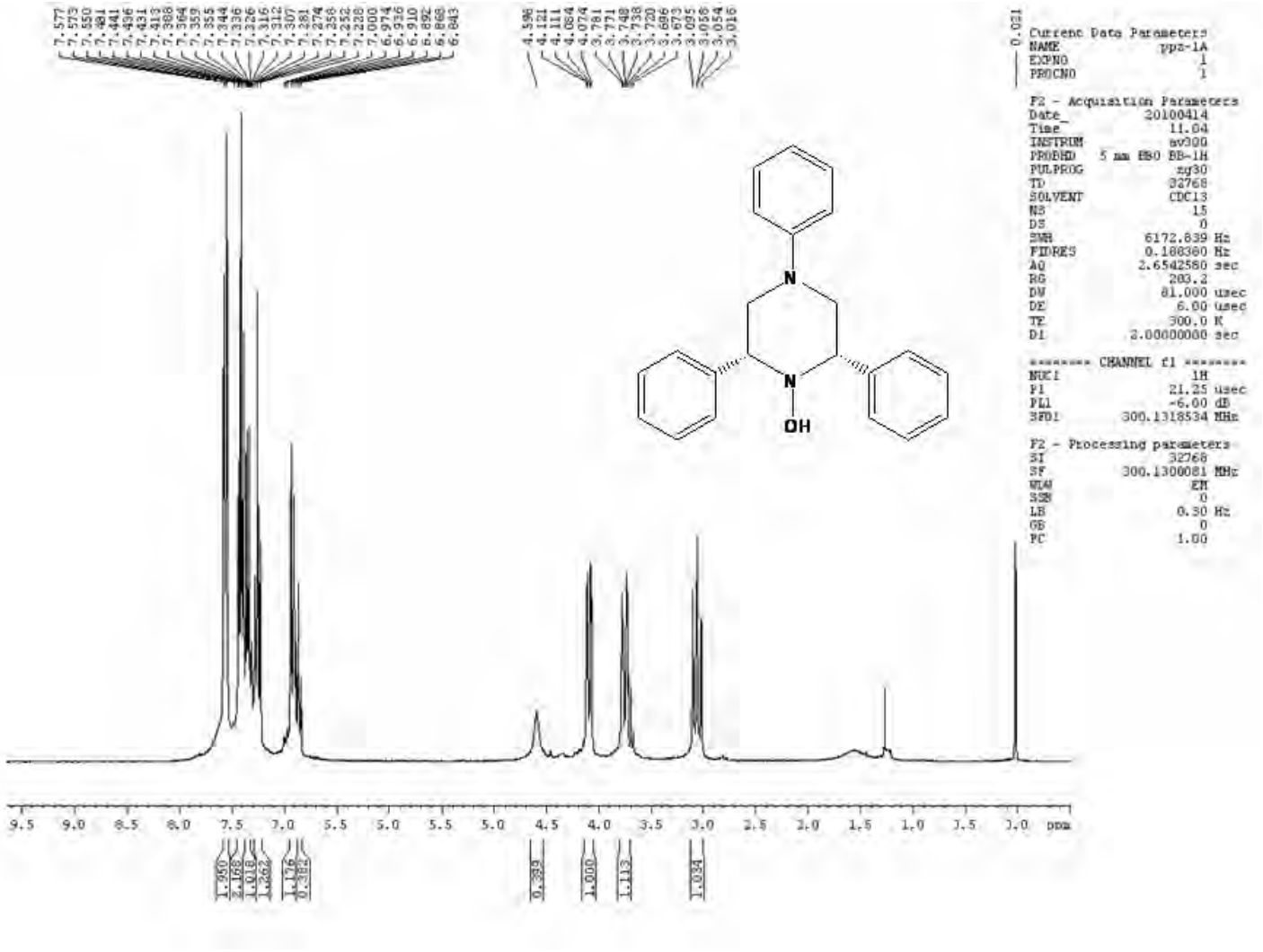
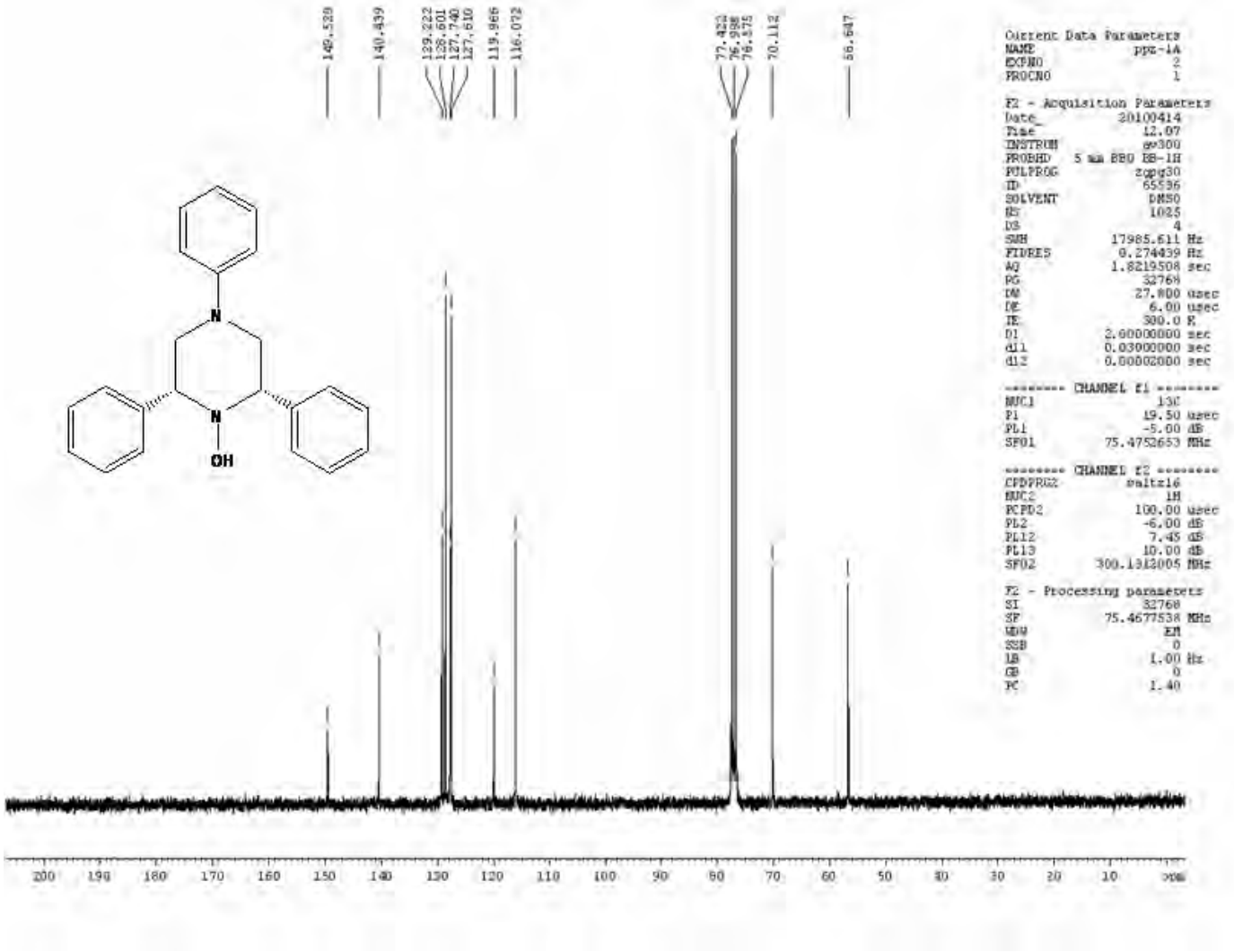
Page(s)

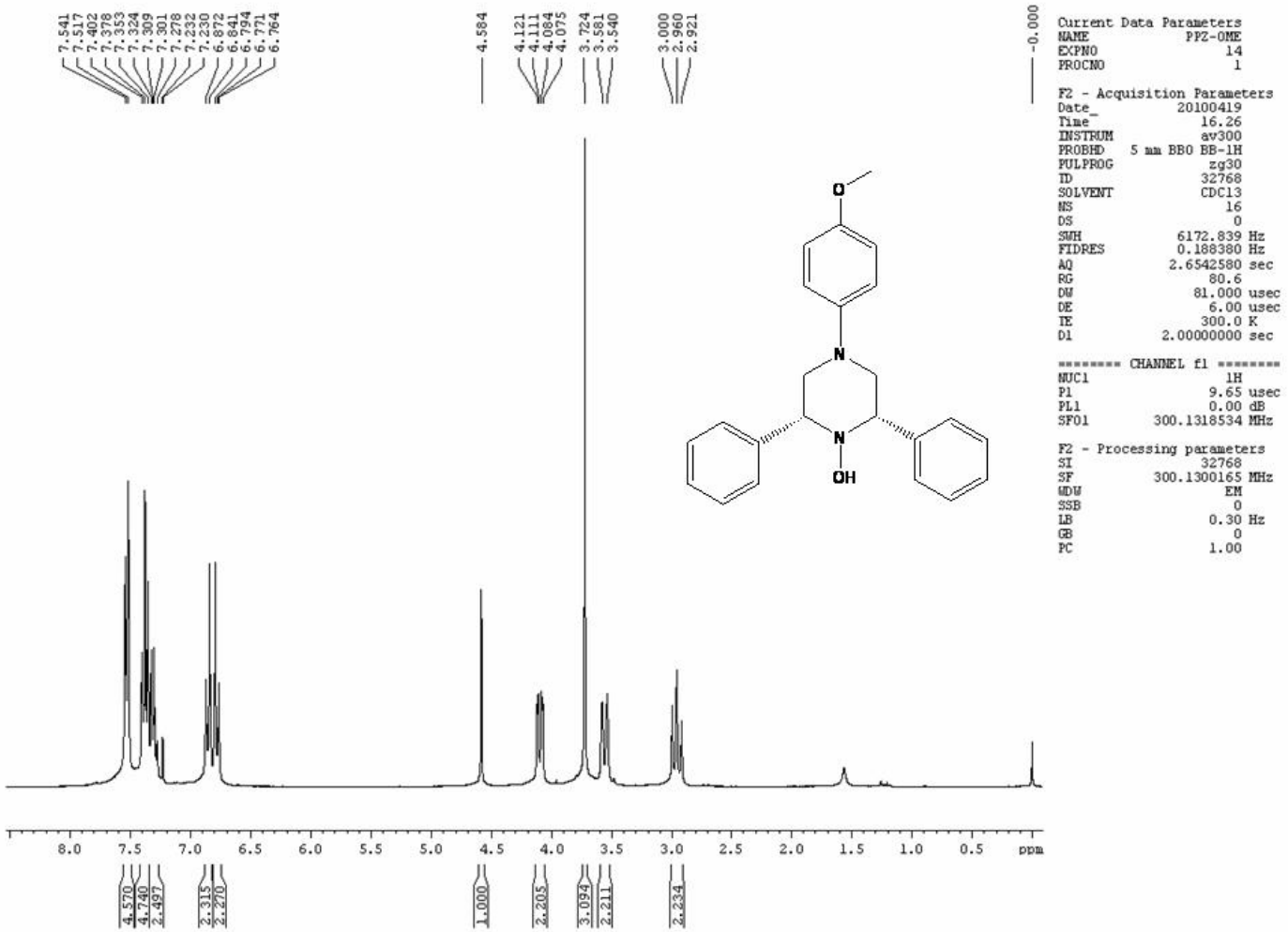
^{1}H NMR spectrum of **3a** (300 MHz, $CDCl_3$)



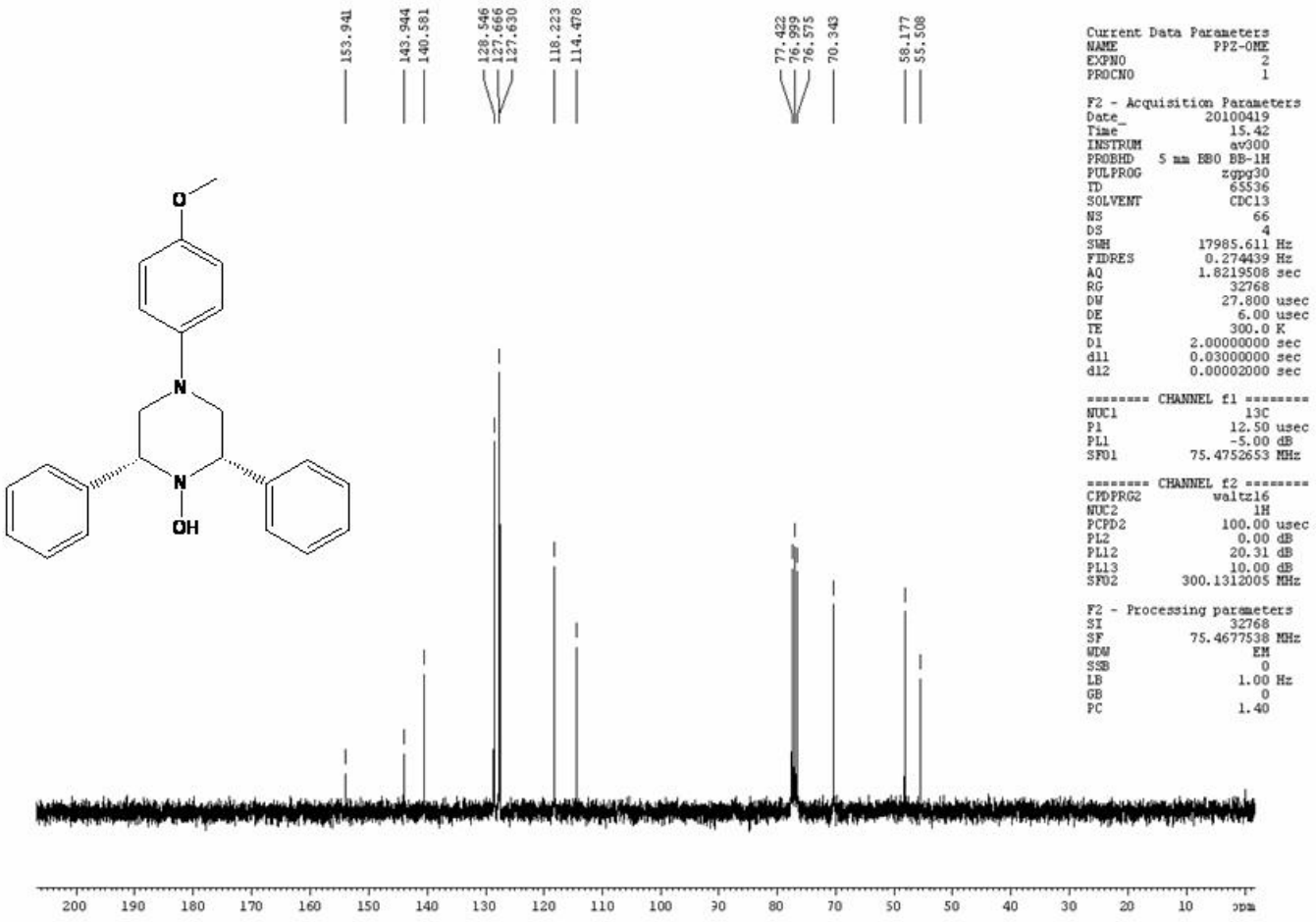
^{13}C NMR spectrum of **3a** (75 MHz, $CDCl_3$)



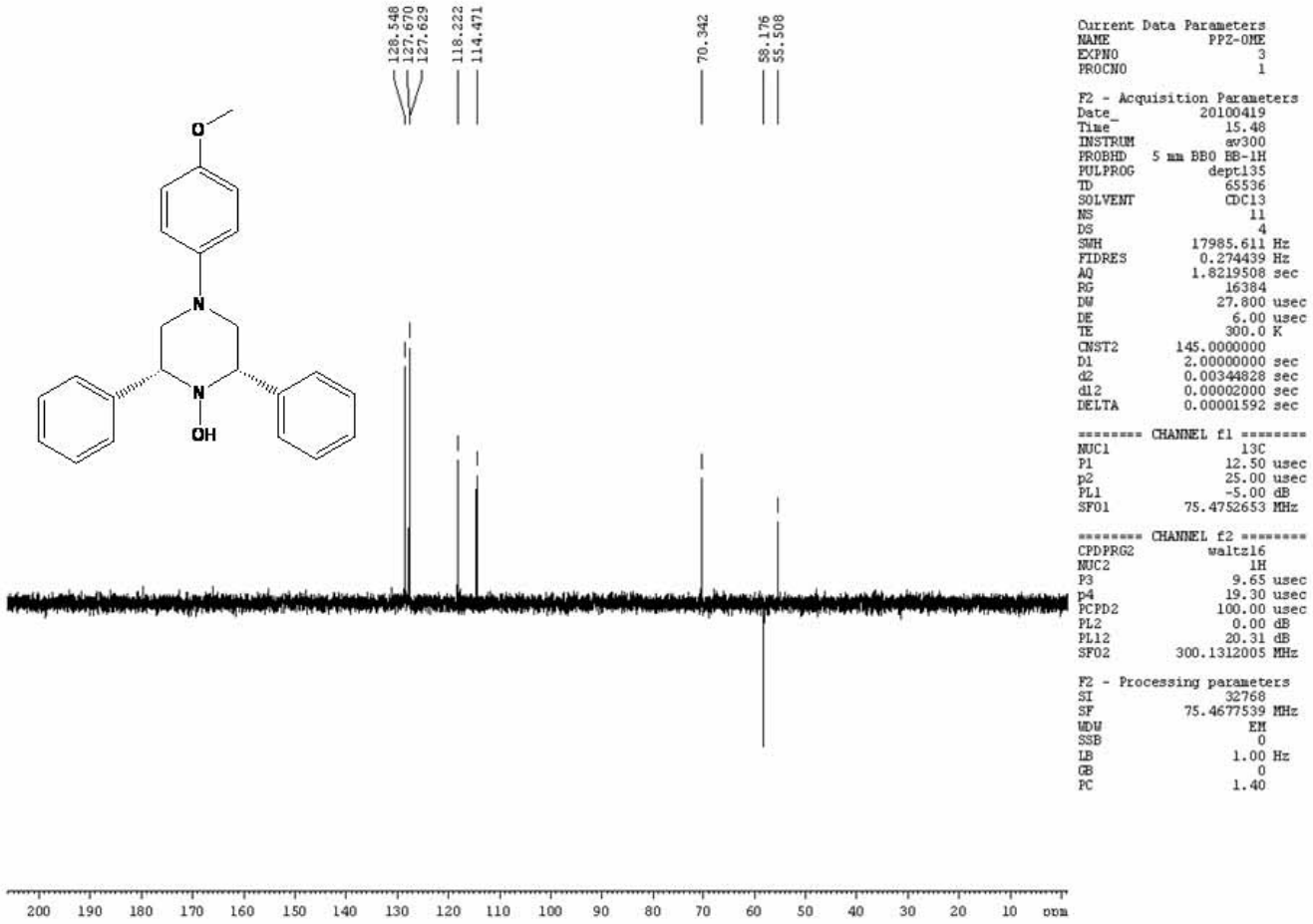
^{1}H NMR spectrum of **3b** (300 MHz, $CDCl_3$)



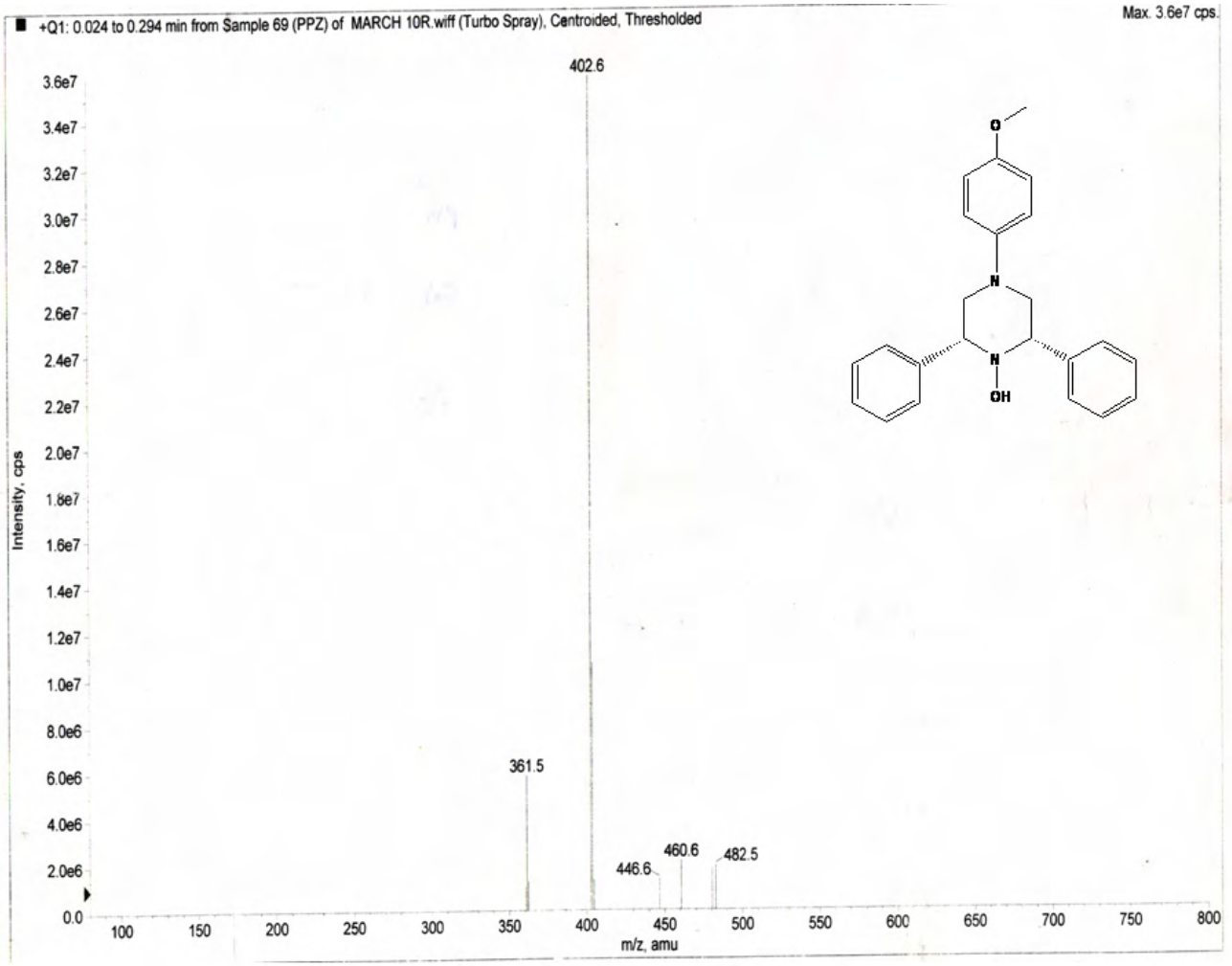
^{13}C NMR spectrum of **3b** (75 MHz, $CDCl_3$)



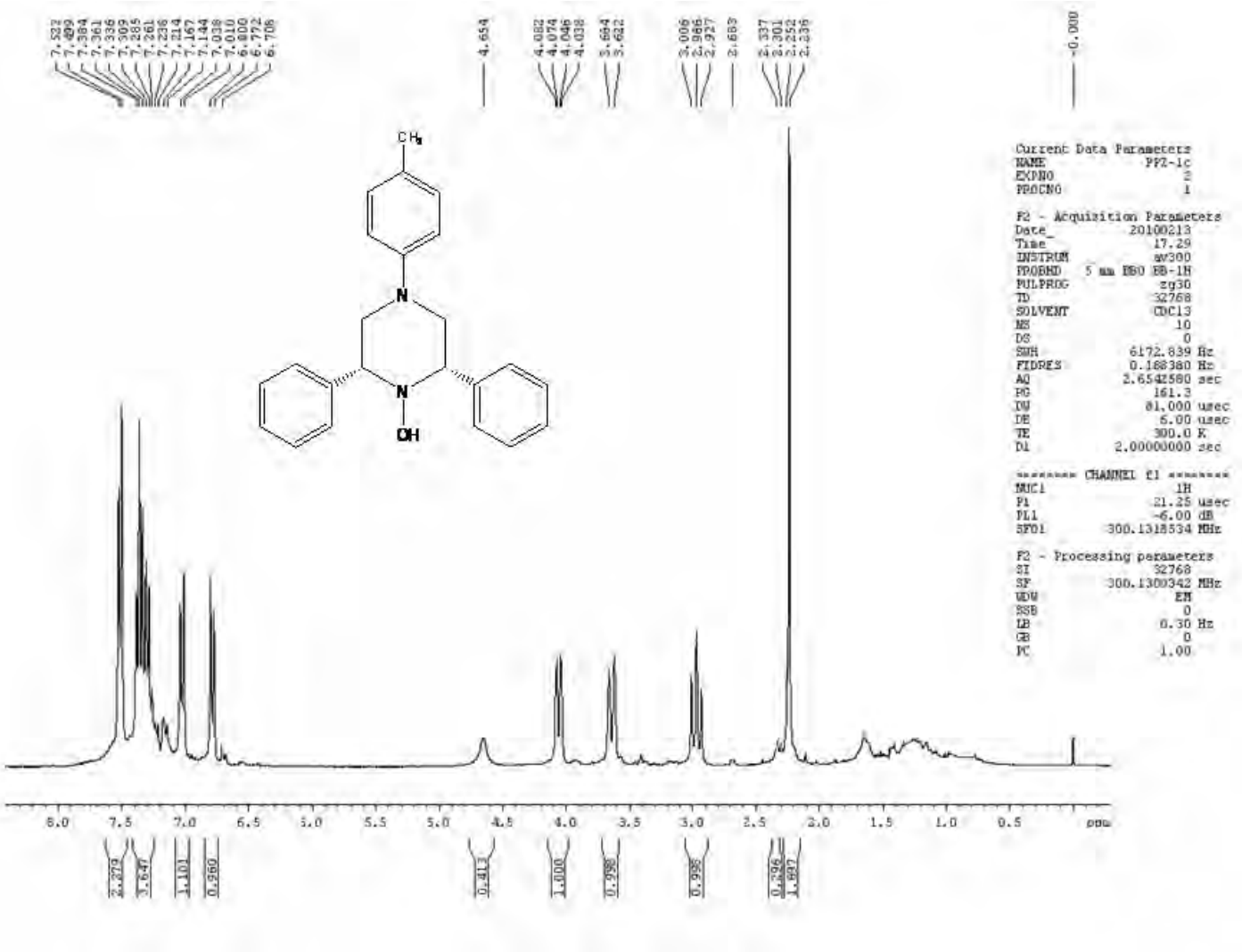
DEPT-135 spectrum of **3b**



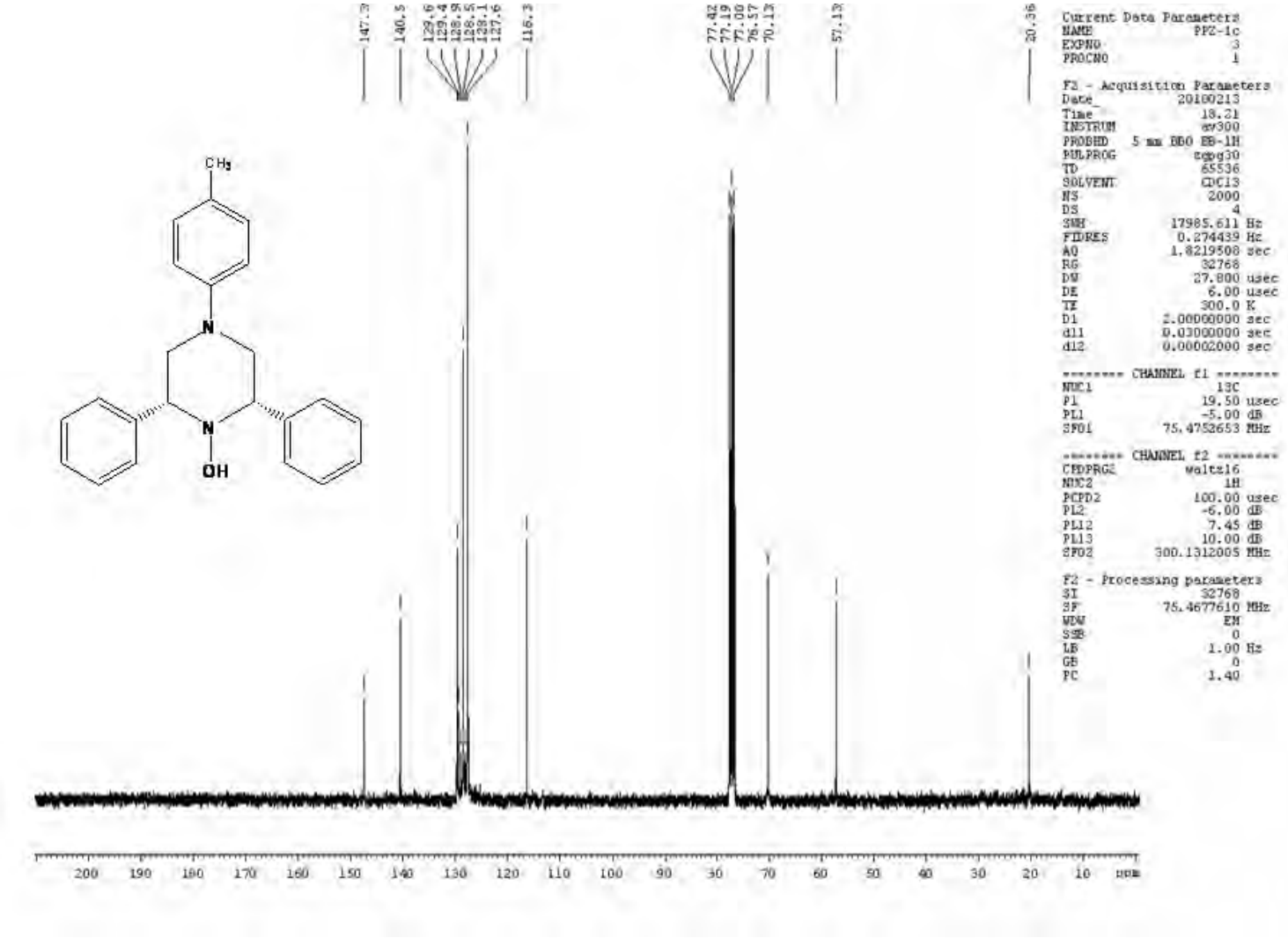
Mass spectrum of **3b**



^{1}H NMR spectrum of **3c** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **3c** (75 MHz, $CDCl_3$)



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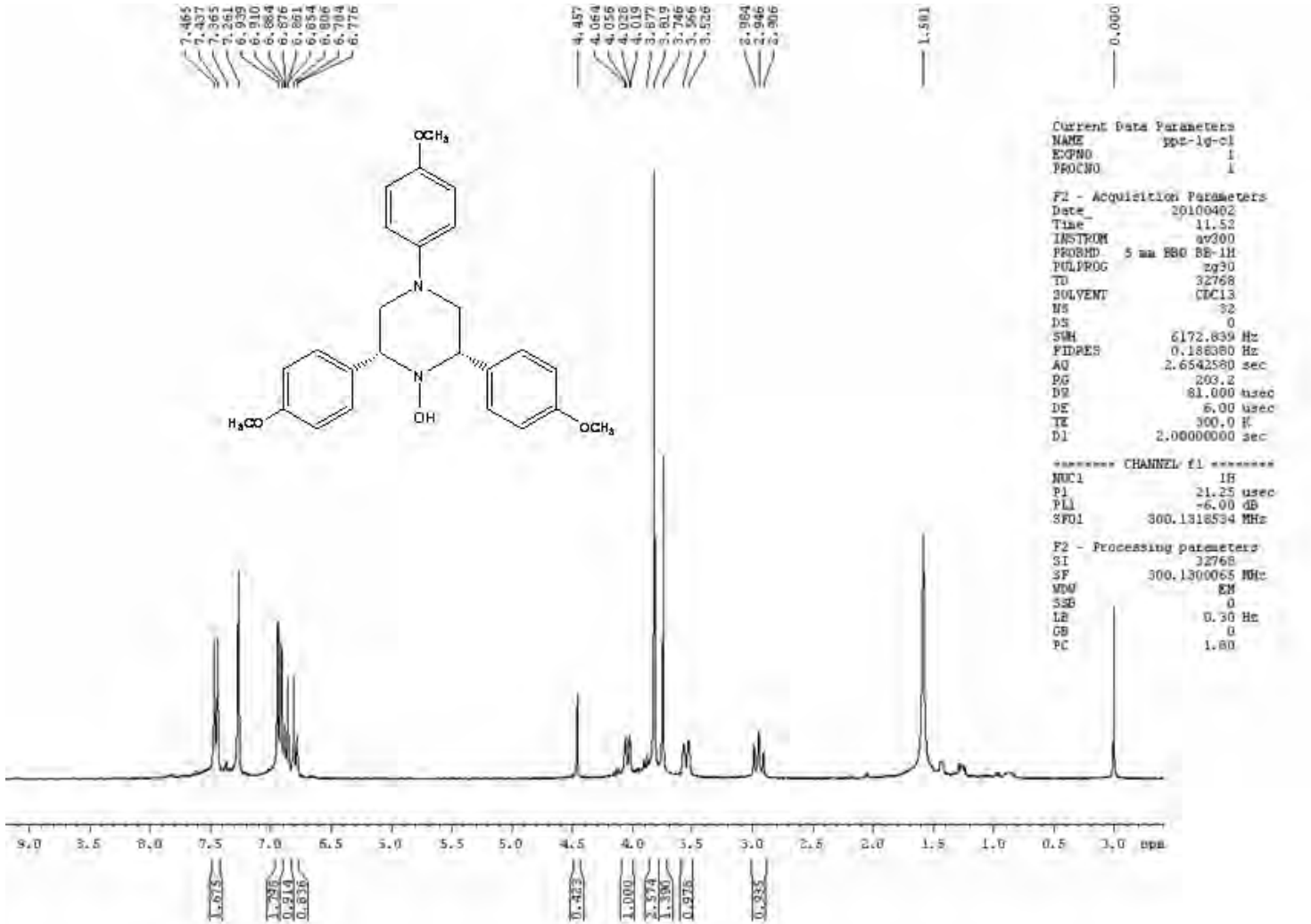
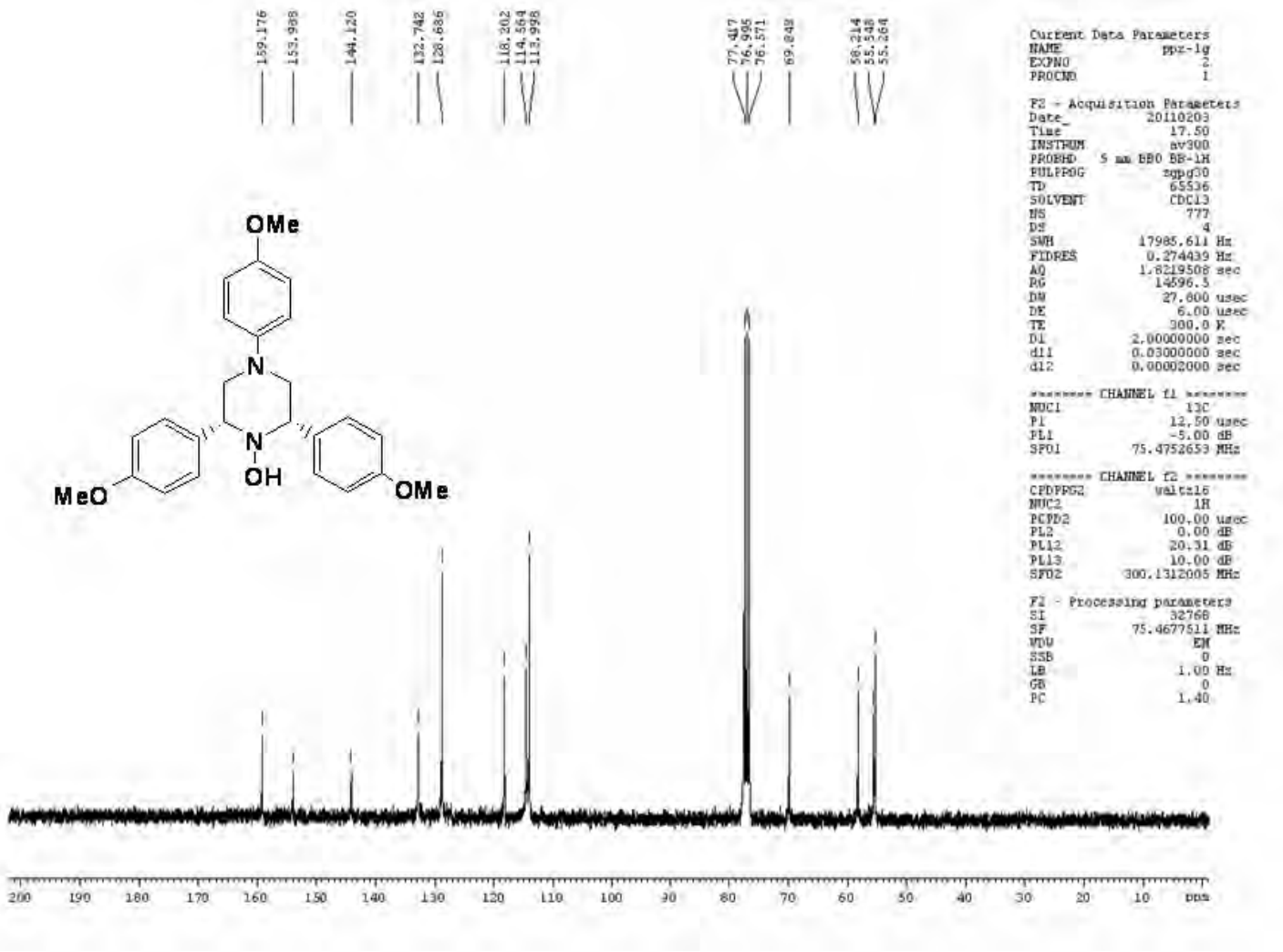
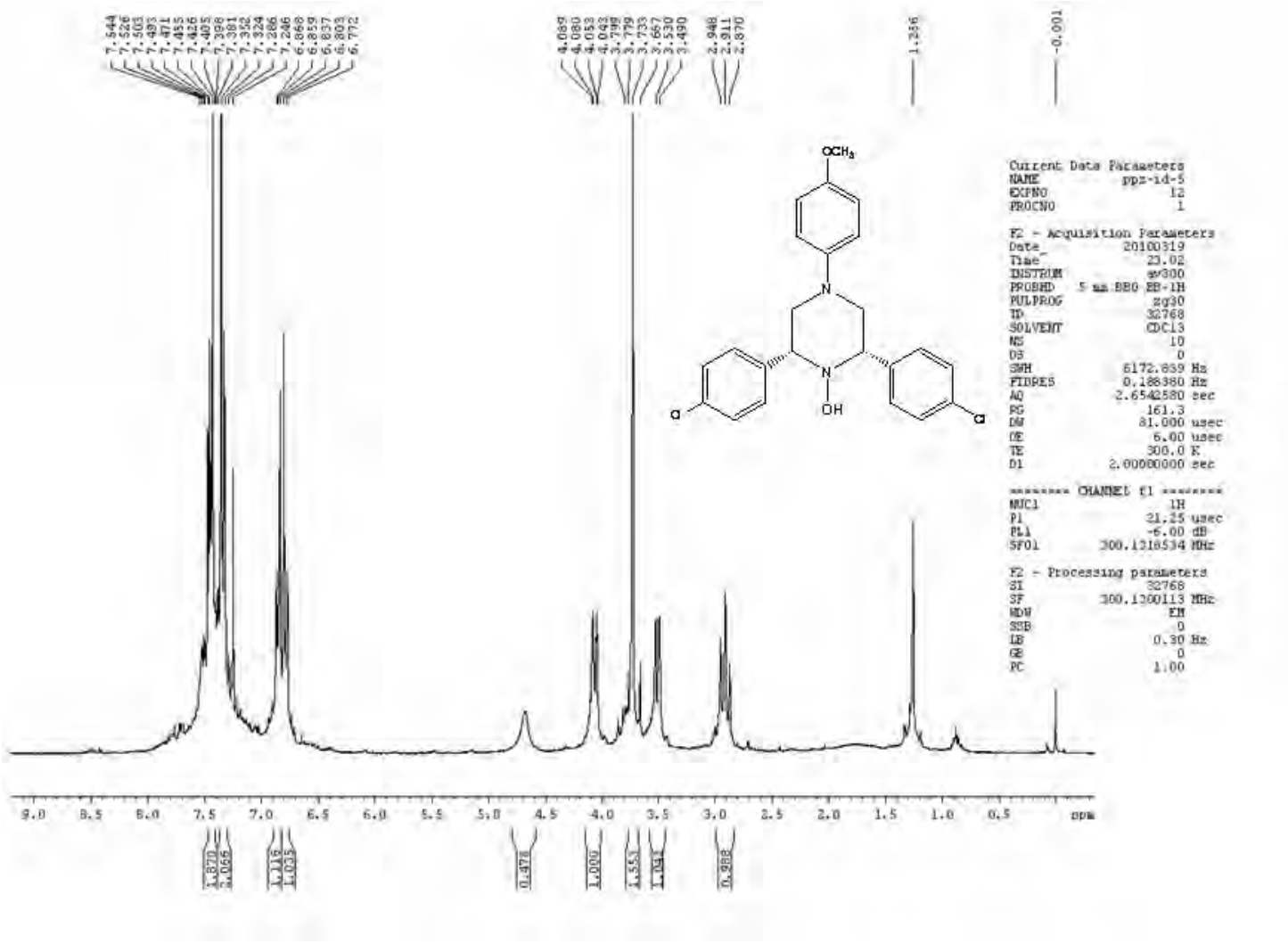


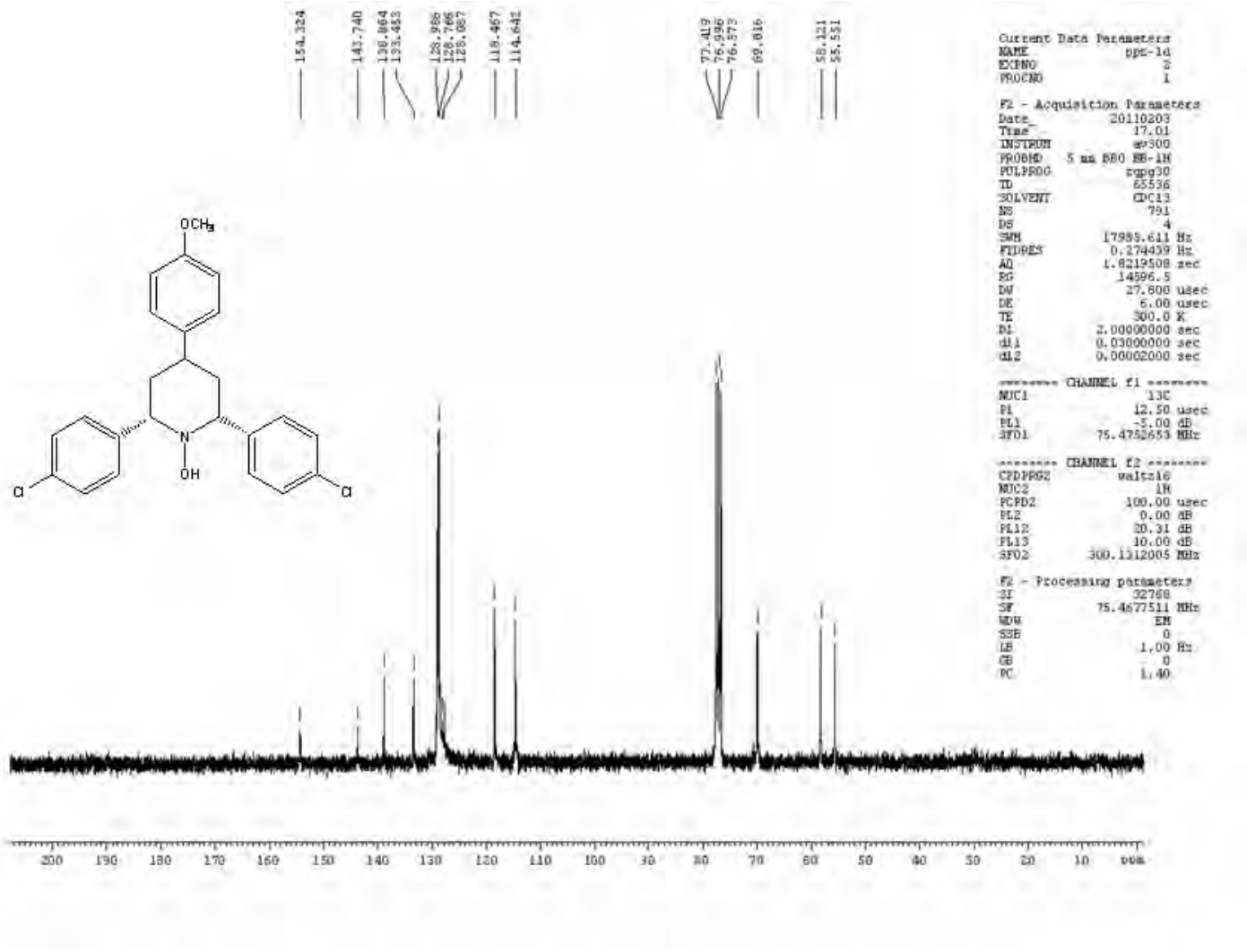
^{13}C NMR spectrum of **3d** (75 MHz, $CDCl_3$)



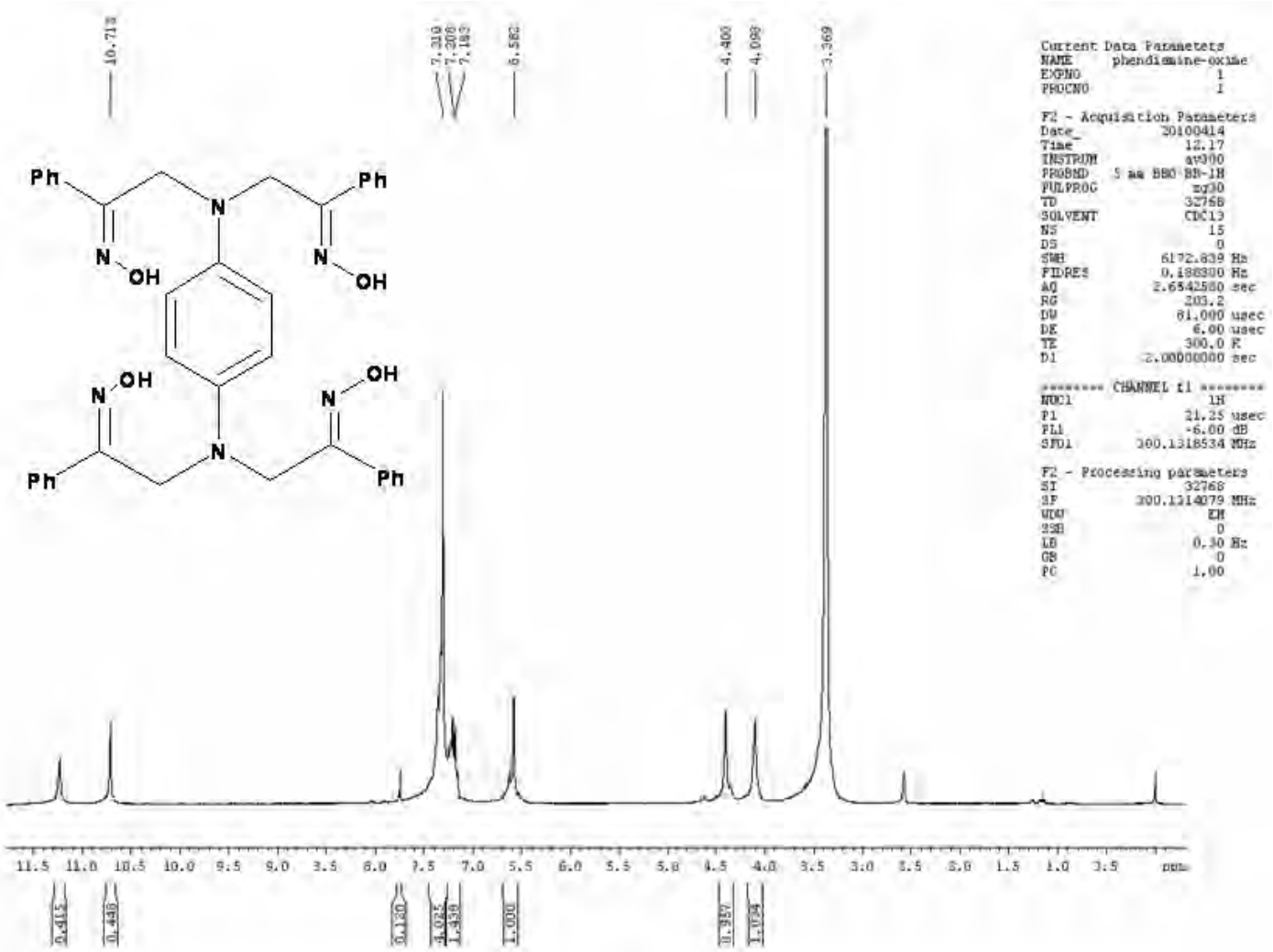
^{1}H NMR spectrum of **3e** (300 MHz, $CDCl_3$)



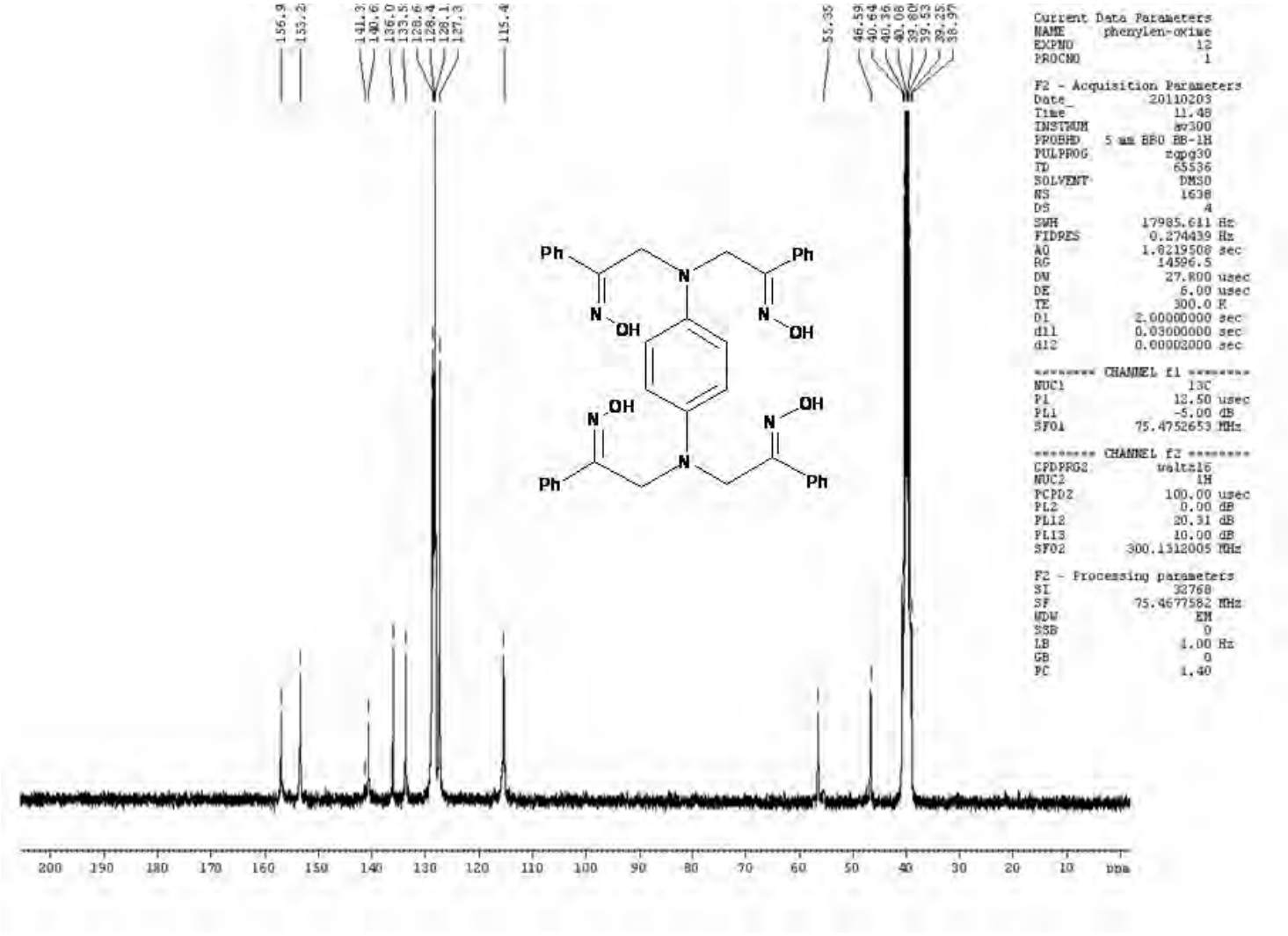
^{13}C NMR spectrum of **3e** (75 MHz, $CDCl_3$)



^{1}H NMR spectrum of **4** (300 MHz, DMSO-d_6)



^{13}C NMR spectrum of **4** (75 MHz, DMSO-d_6)



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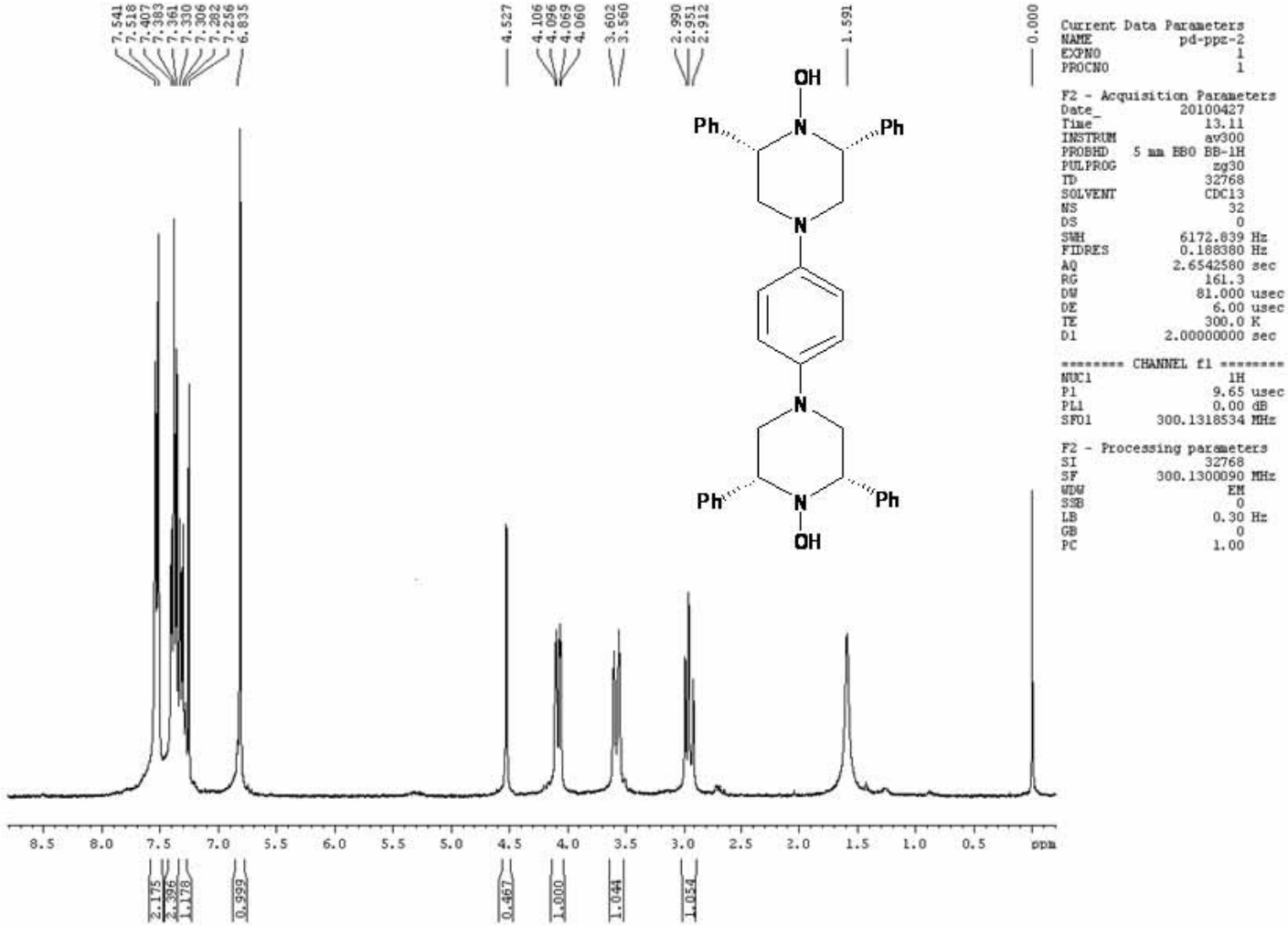


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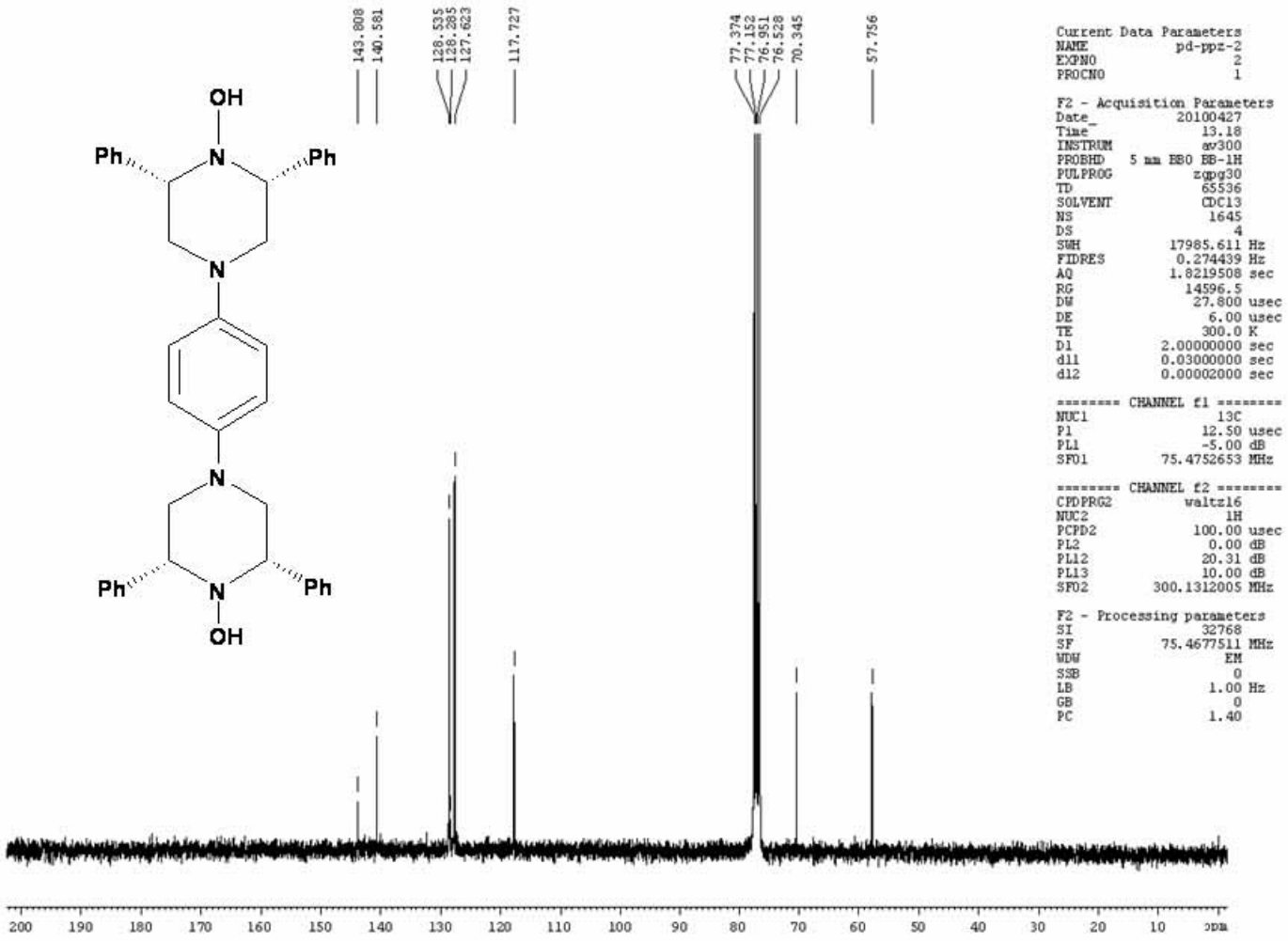
^{13}C NMR spectrum of **5** (75 MHz, $CDCl_3$)



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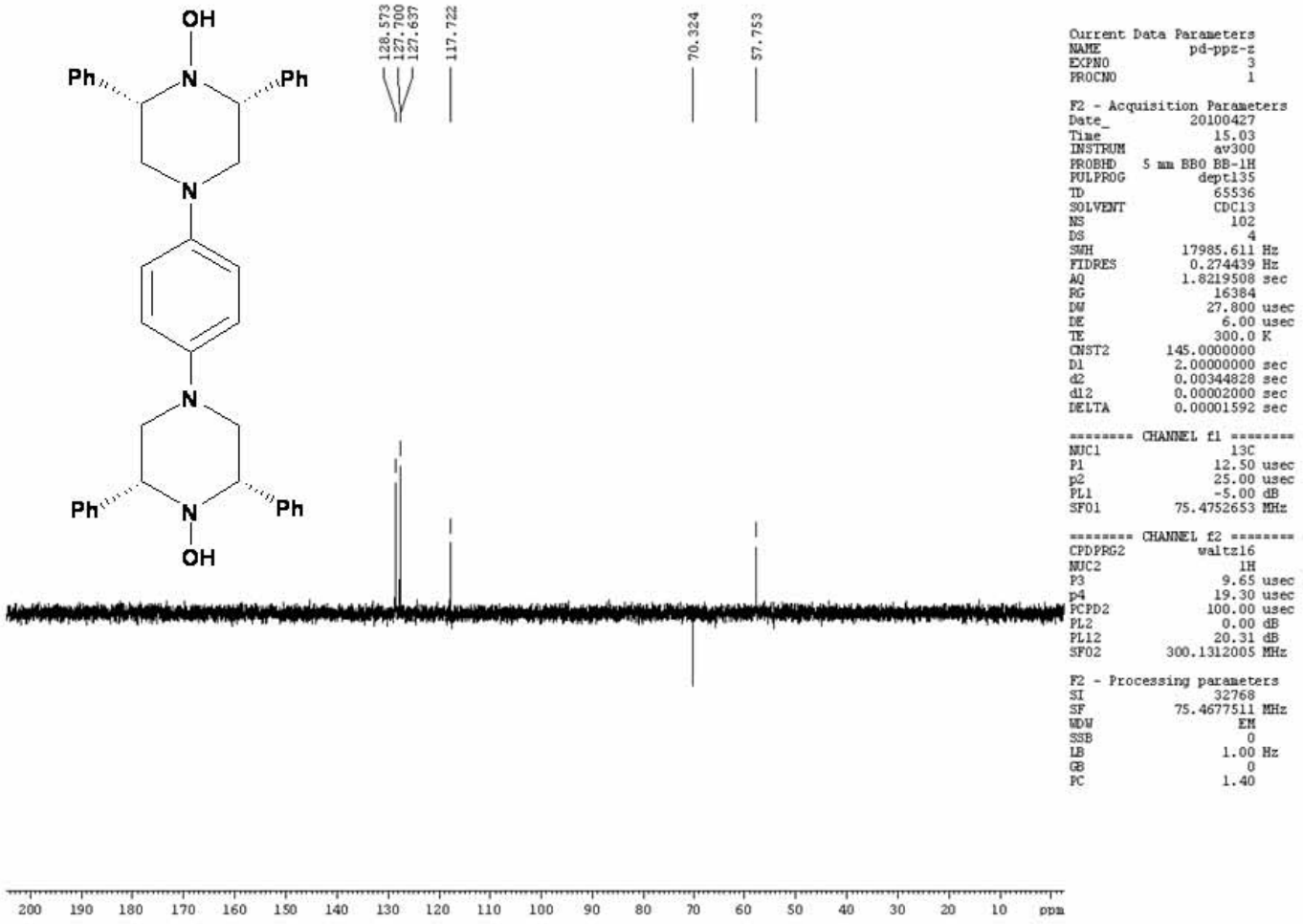


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d12                    0.00002000 sec
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p2                       25.00 usec
PL1                      -5.00 dB
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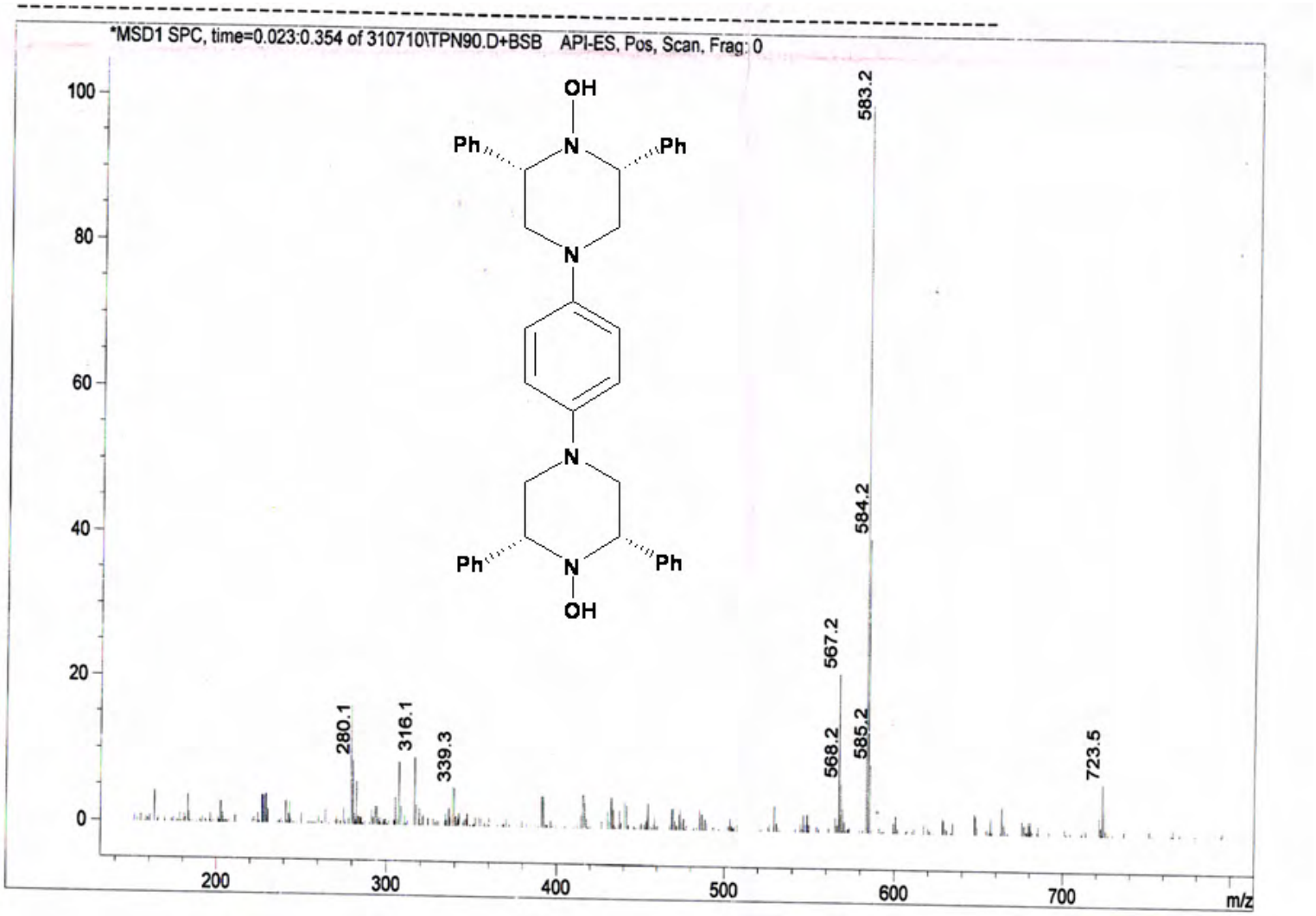
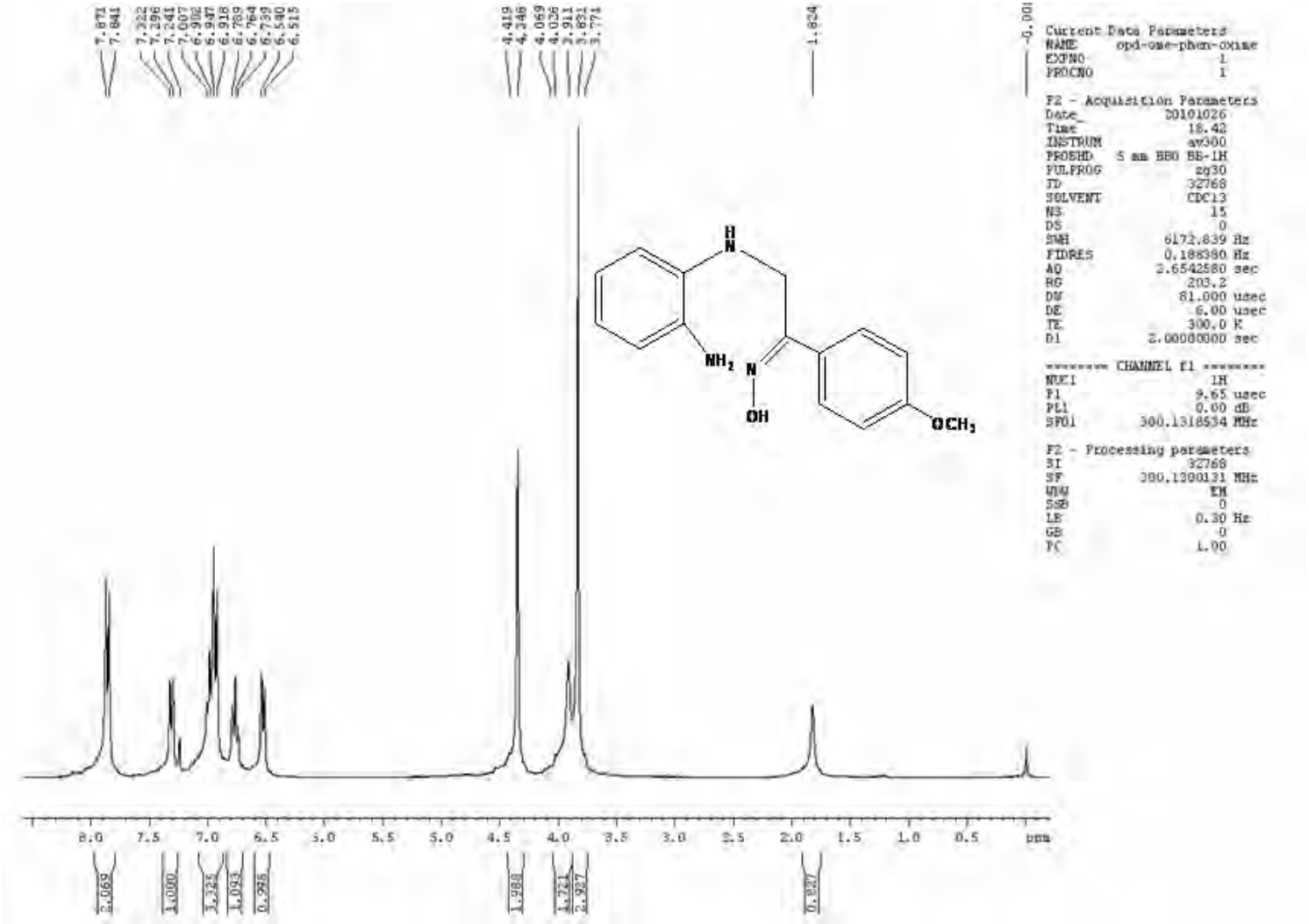
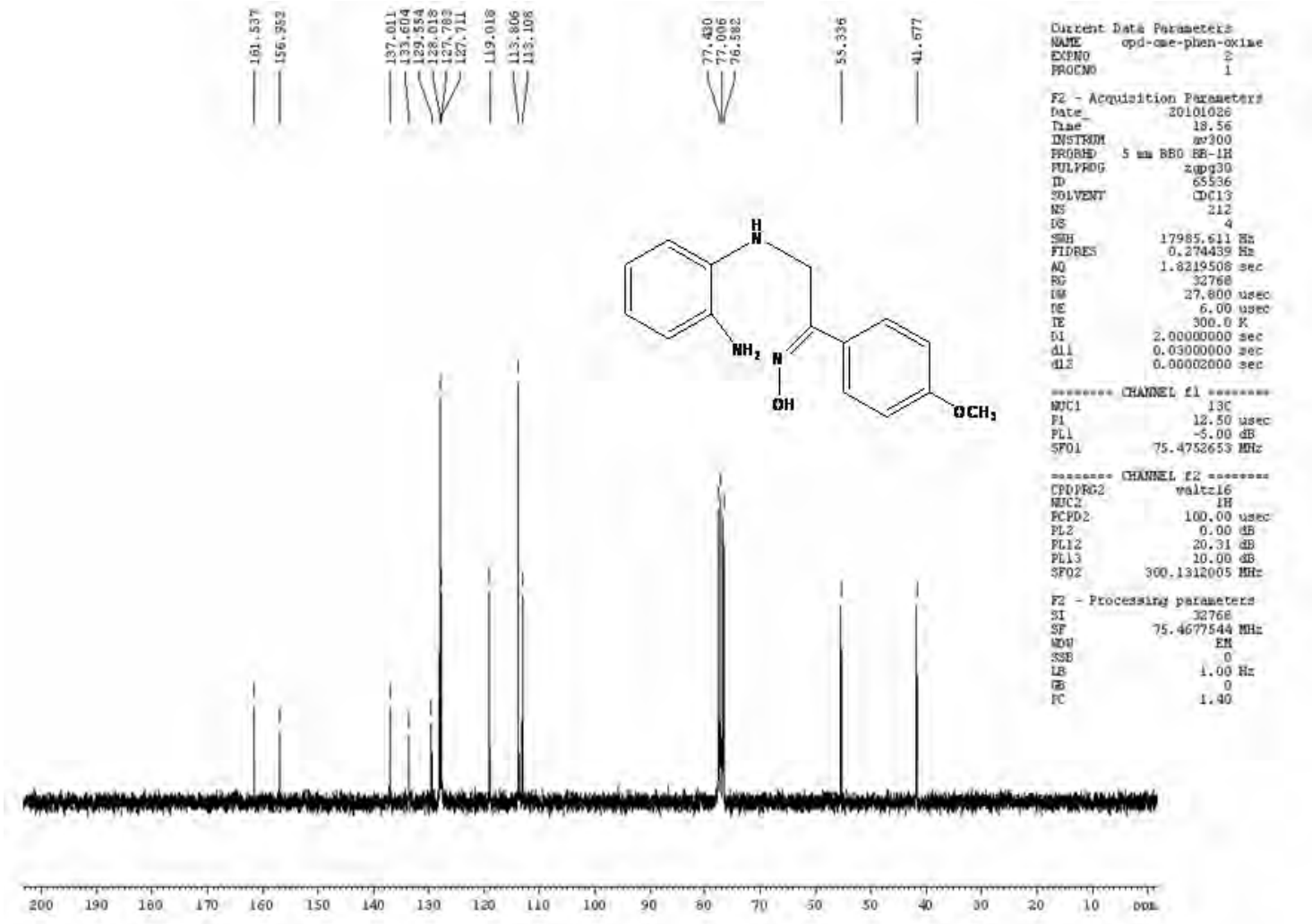


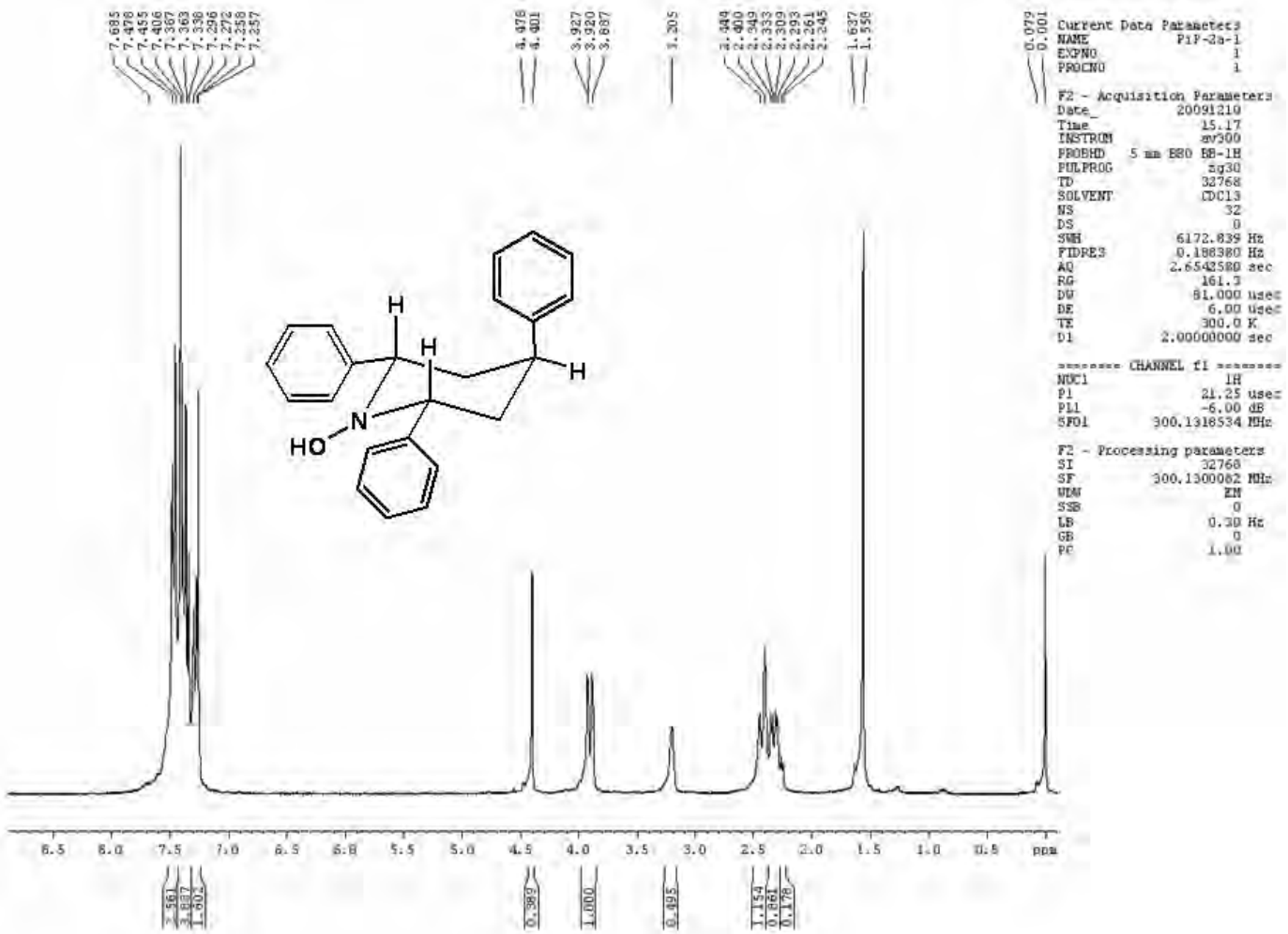
^{1}H NMR spectrum of **6** (300 MHz, $CDCl_3$)



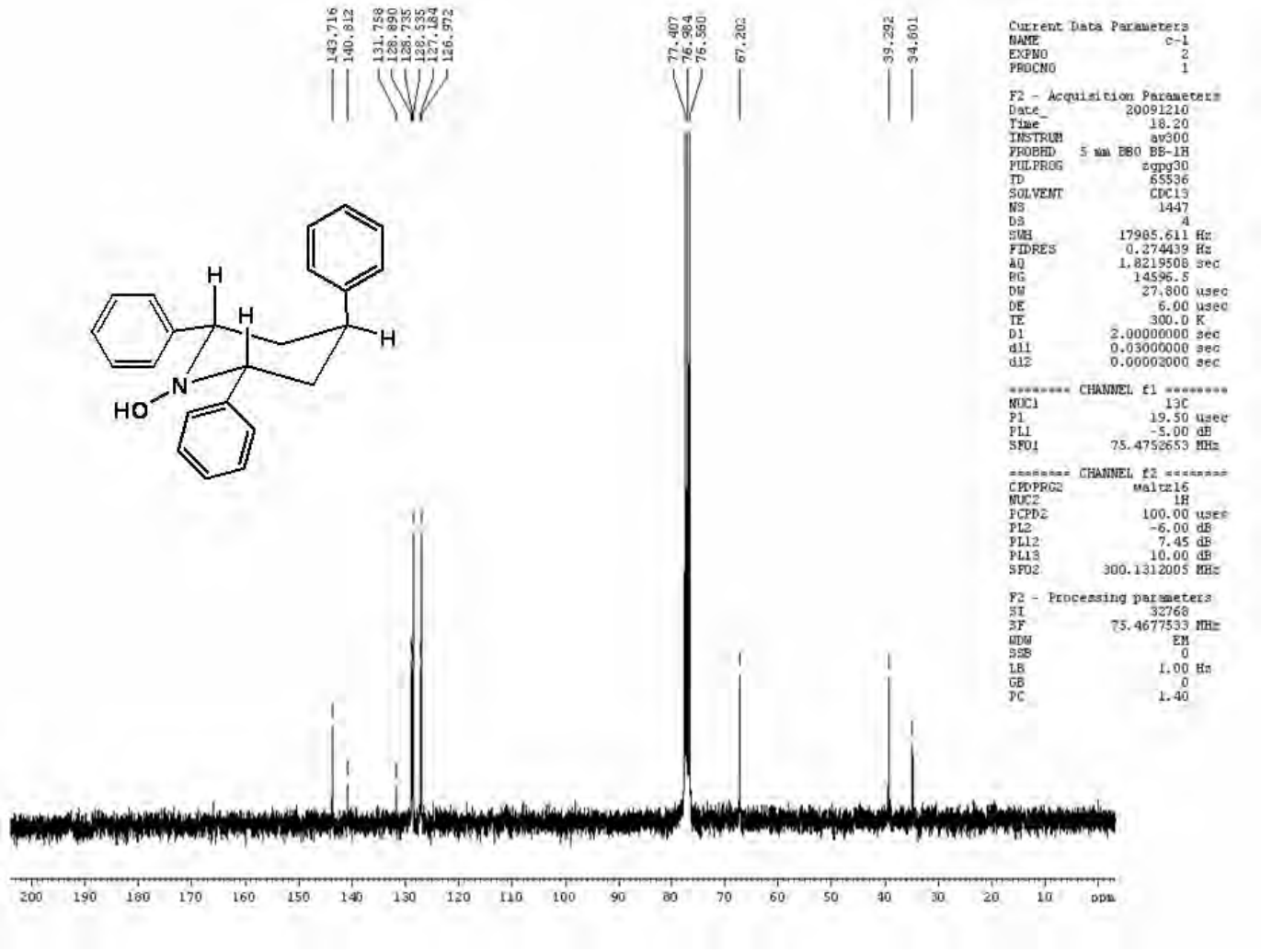
^{13}C NMR spectrum of **6** (75 MHz, $CDCl_3$)



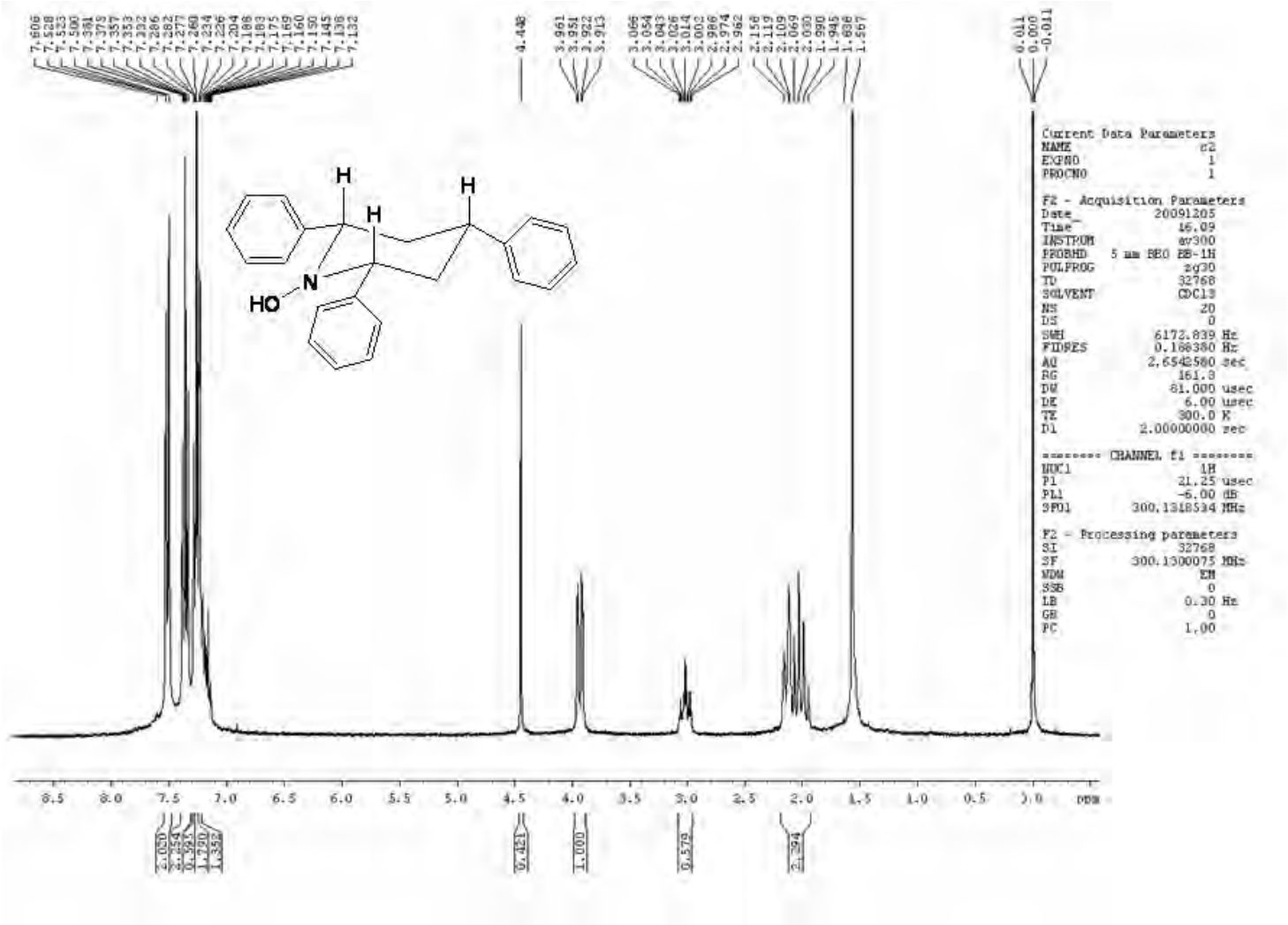
^{1}H NMR spectrum of **8a** (300 MHz, $CDCl_3$)



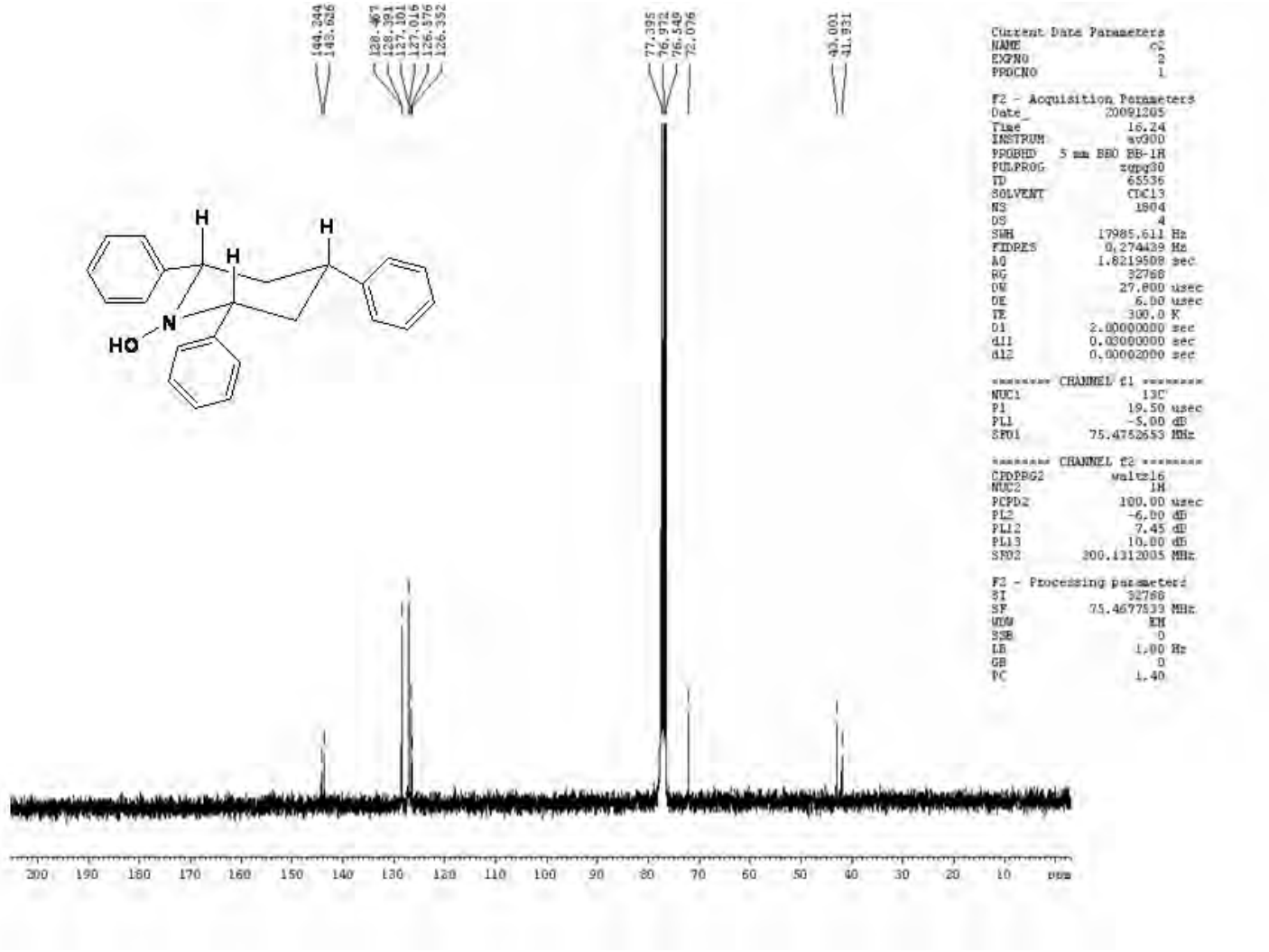
^{13}C NMR spectrum of **8a** (75 MHz, $CDCl_3$)



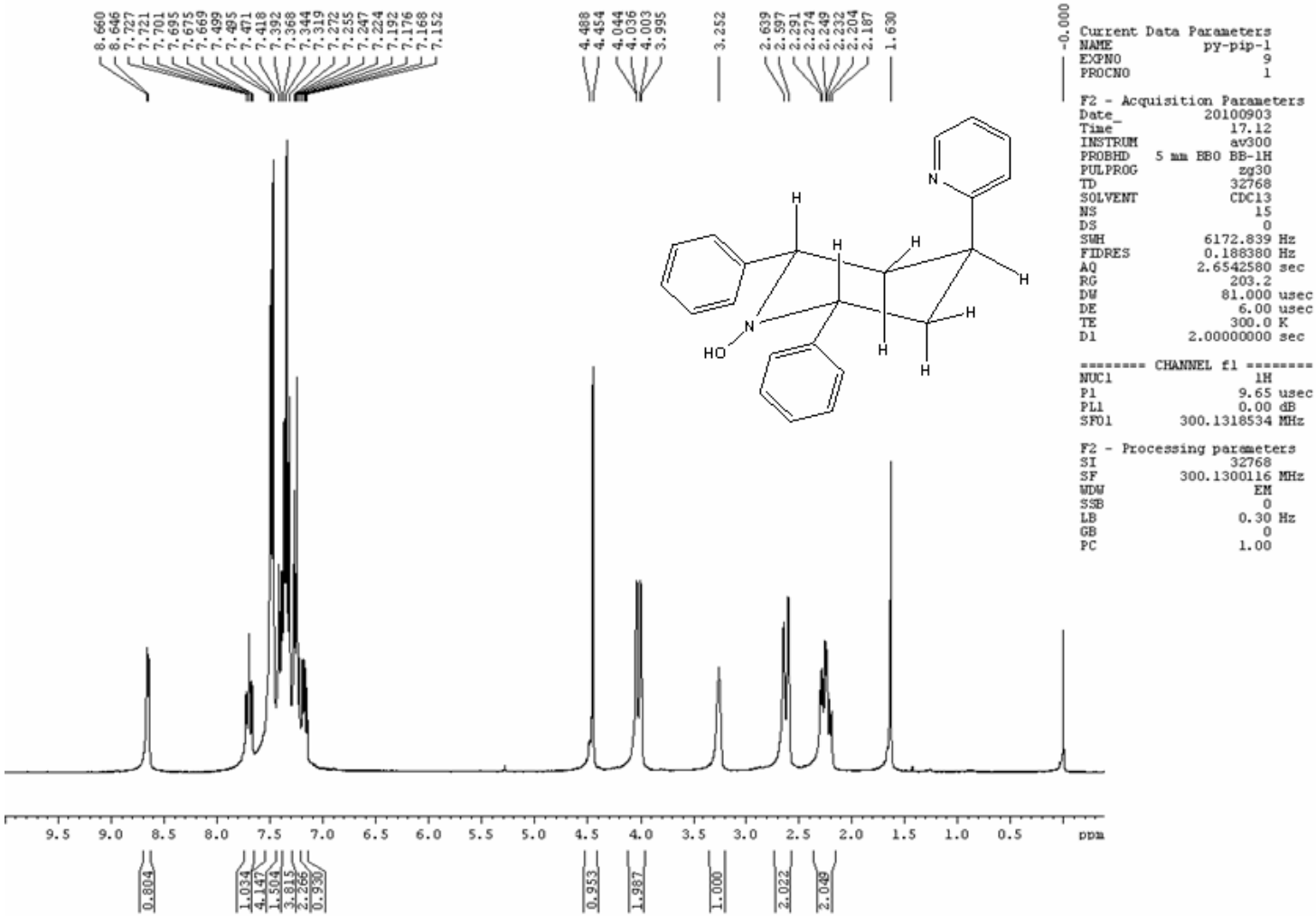
^{1}H NMR spectrum of **9a** (300 MHz, $CDCl_3$)



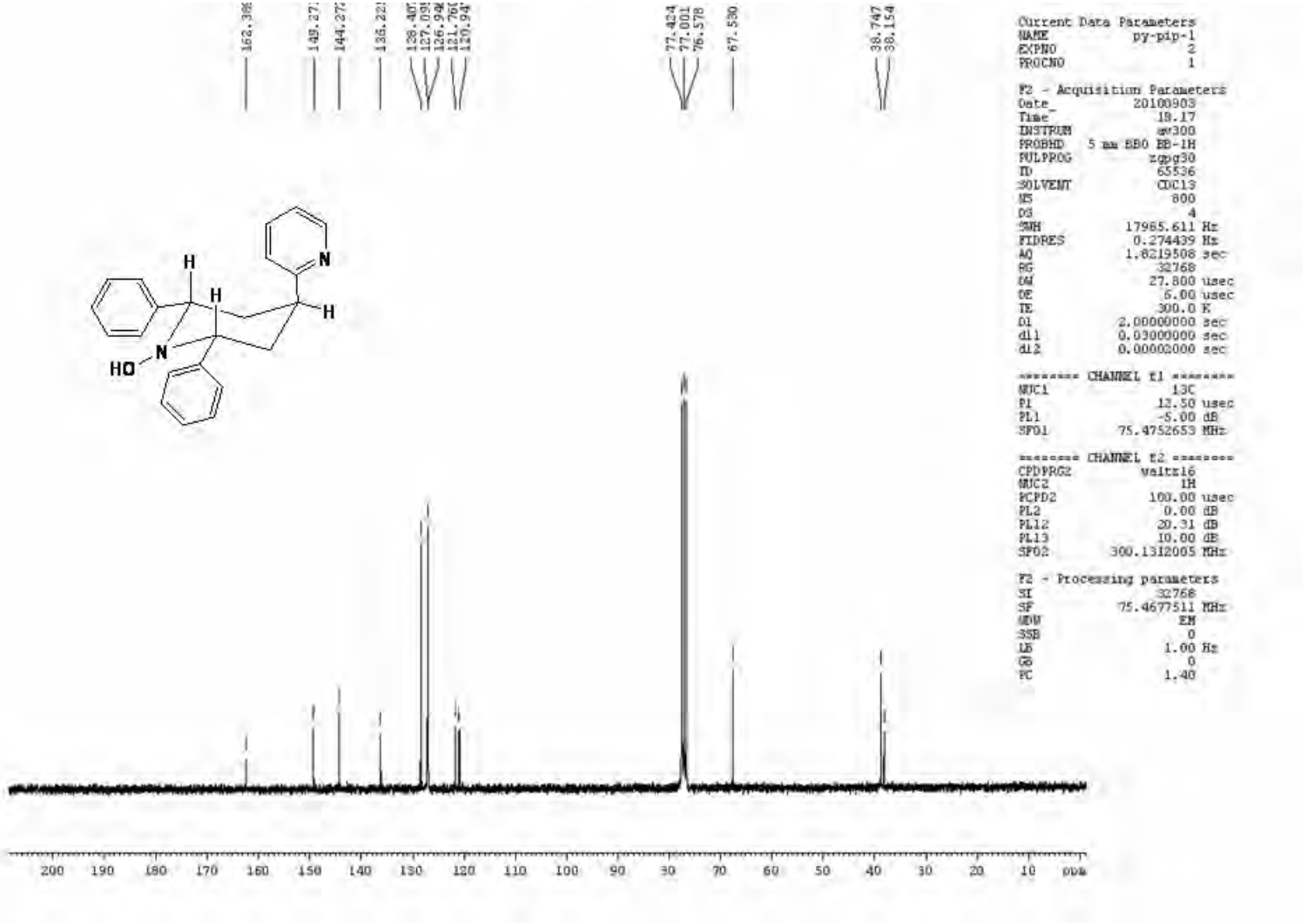
^{13}C NMR spectrum of **9a** (75 MHz, $CDCl_3$)



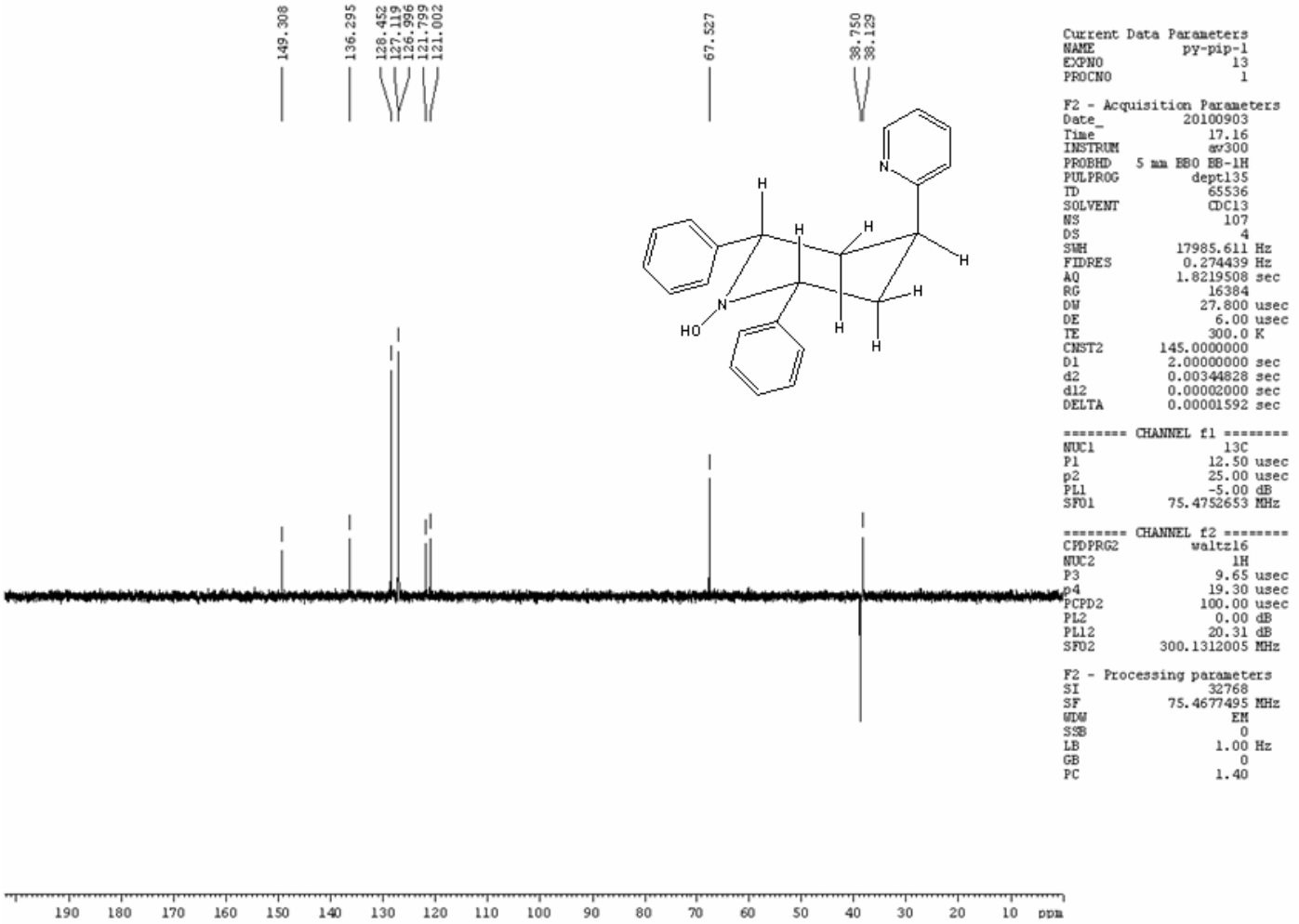
^{1}H NMR spectrum of **8b** (300 MHz, $CDCl_3$)



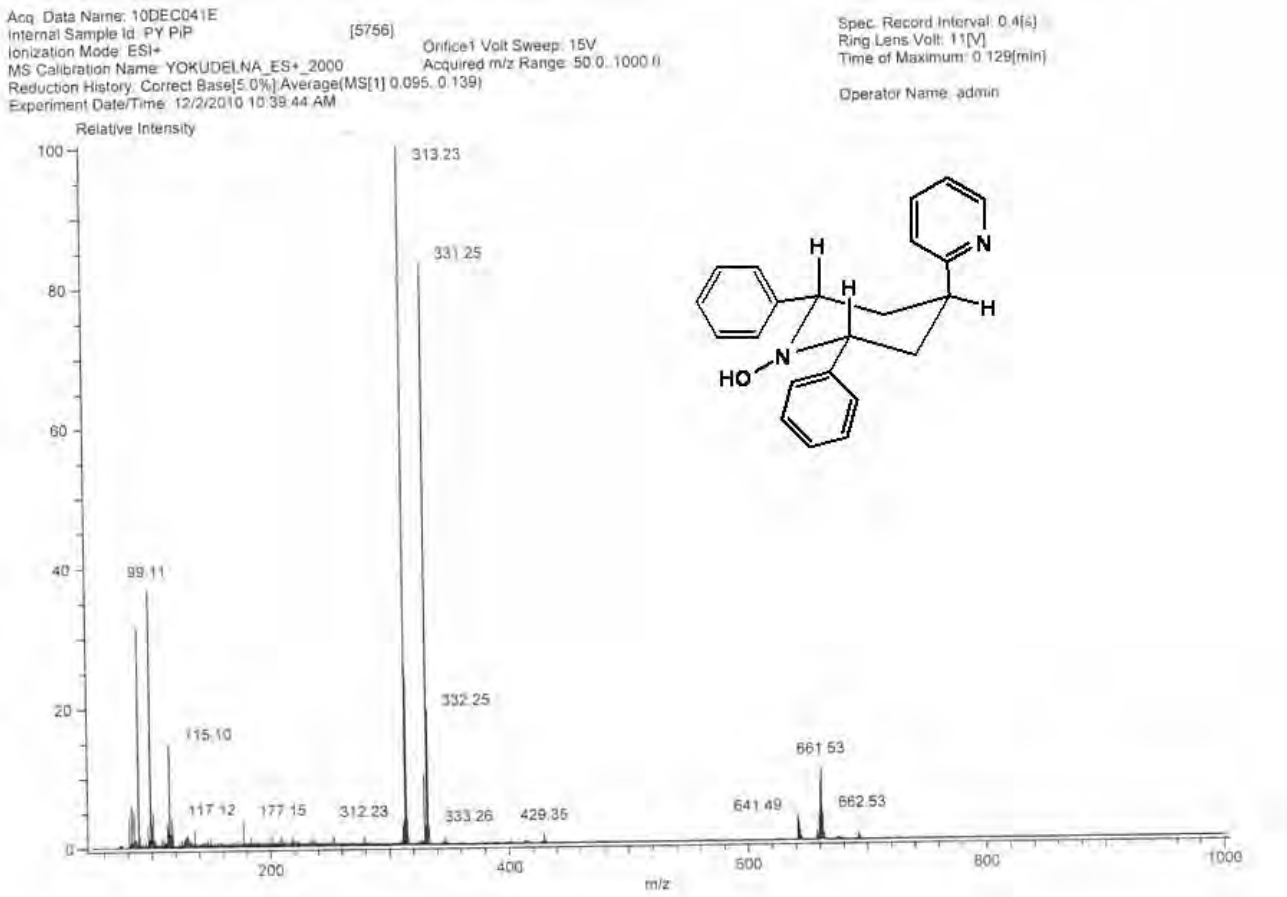
^{13}C NMR spectrum of **8b** (75 MHz, $CDCl_3$)



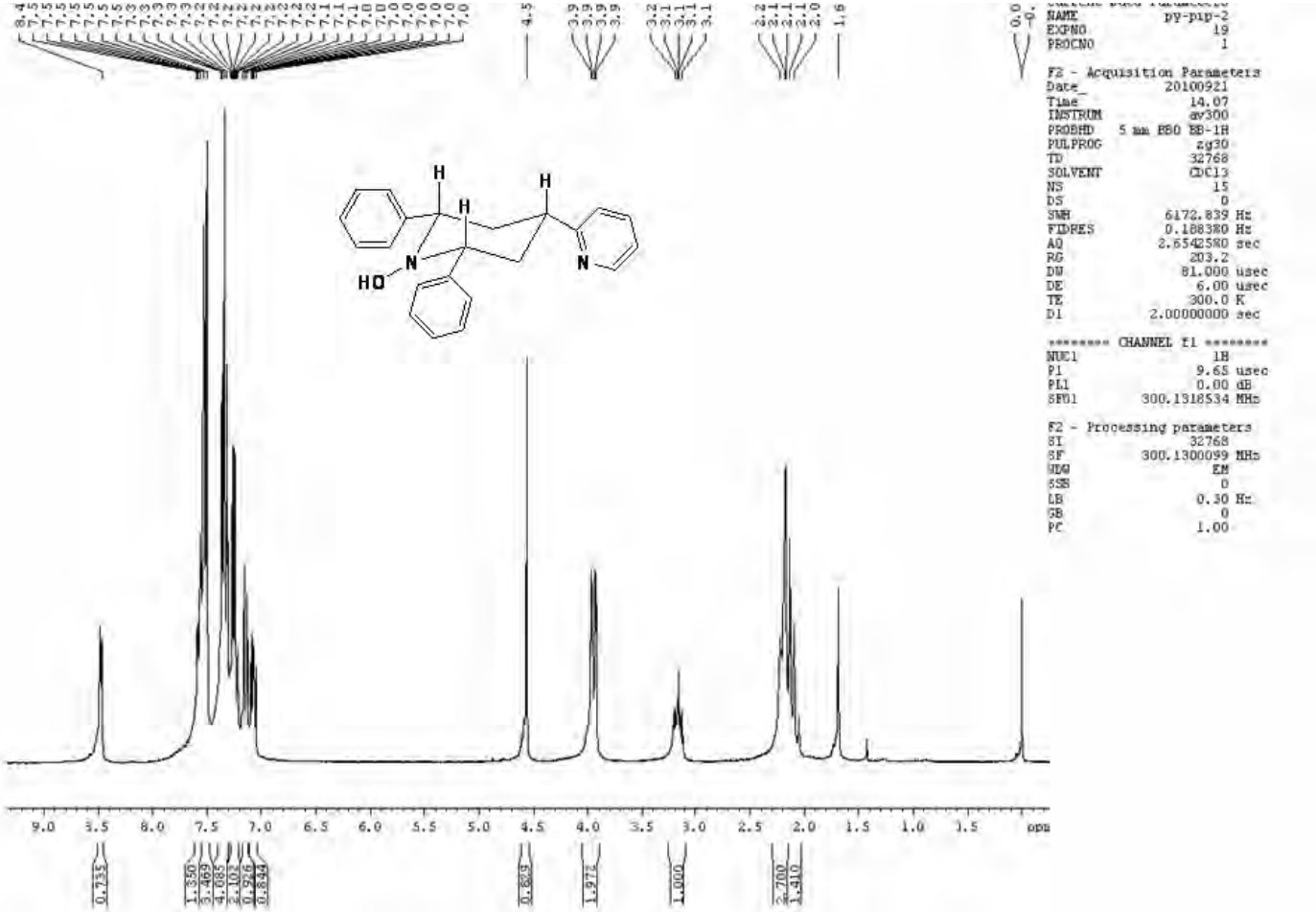
DEPT-135 spectrum of **8b**



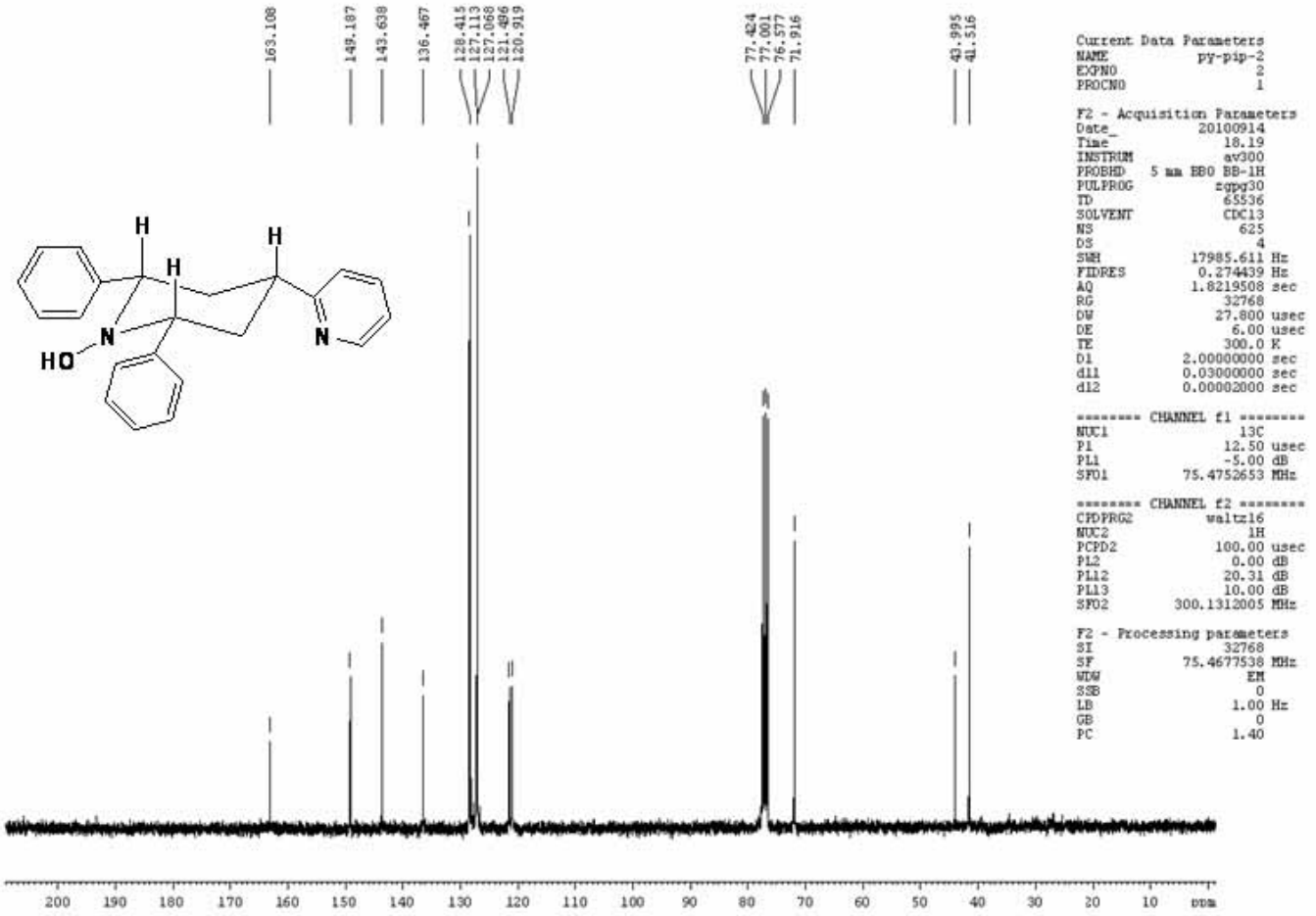
Mass spectrum of **8b**



^{1}H NMR spectrum of **9b** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **9b** (75 MHz, $CDCl_3$)



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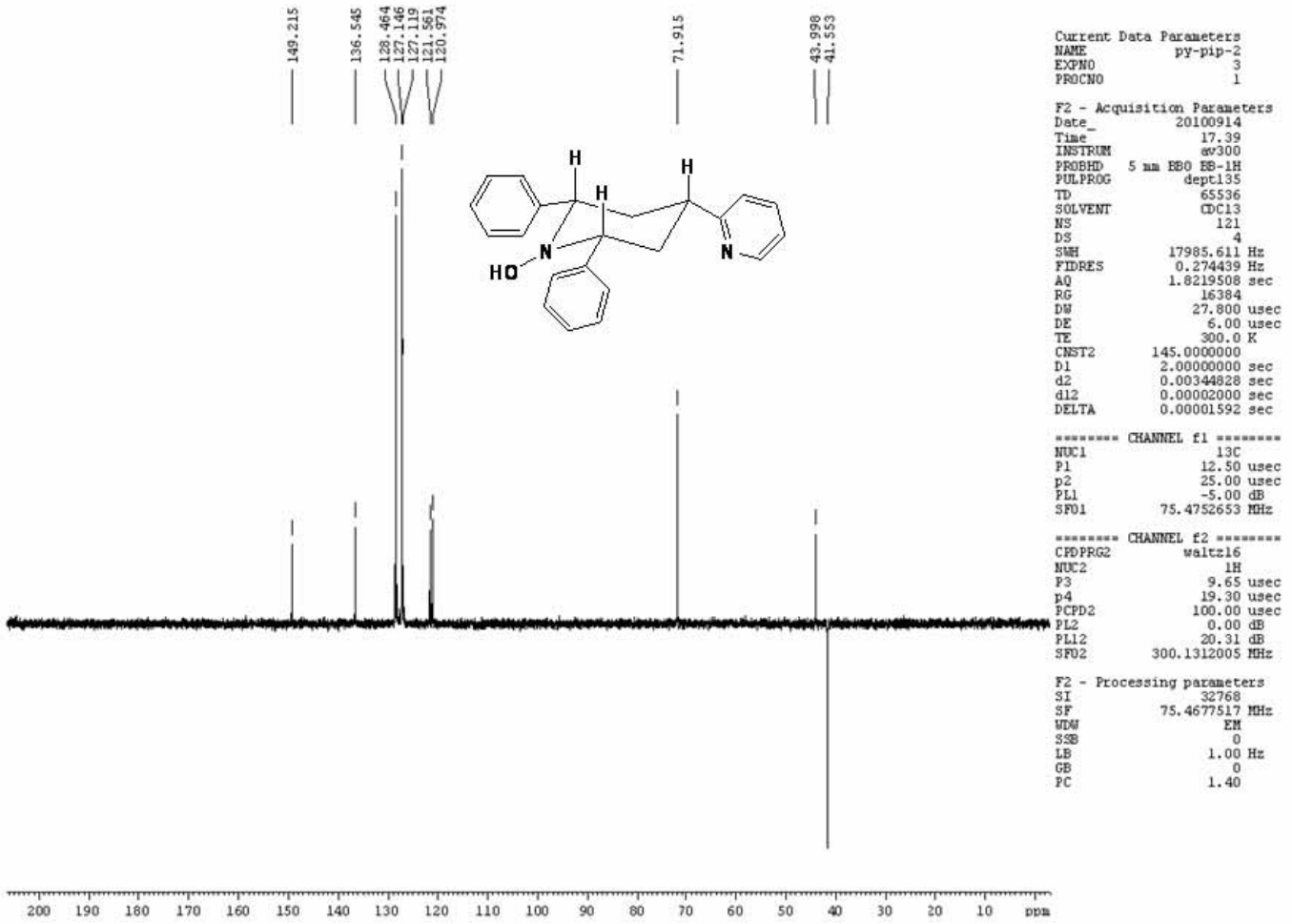
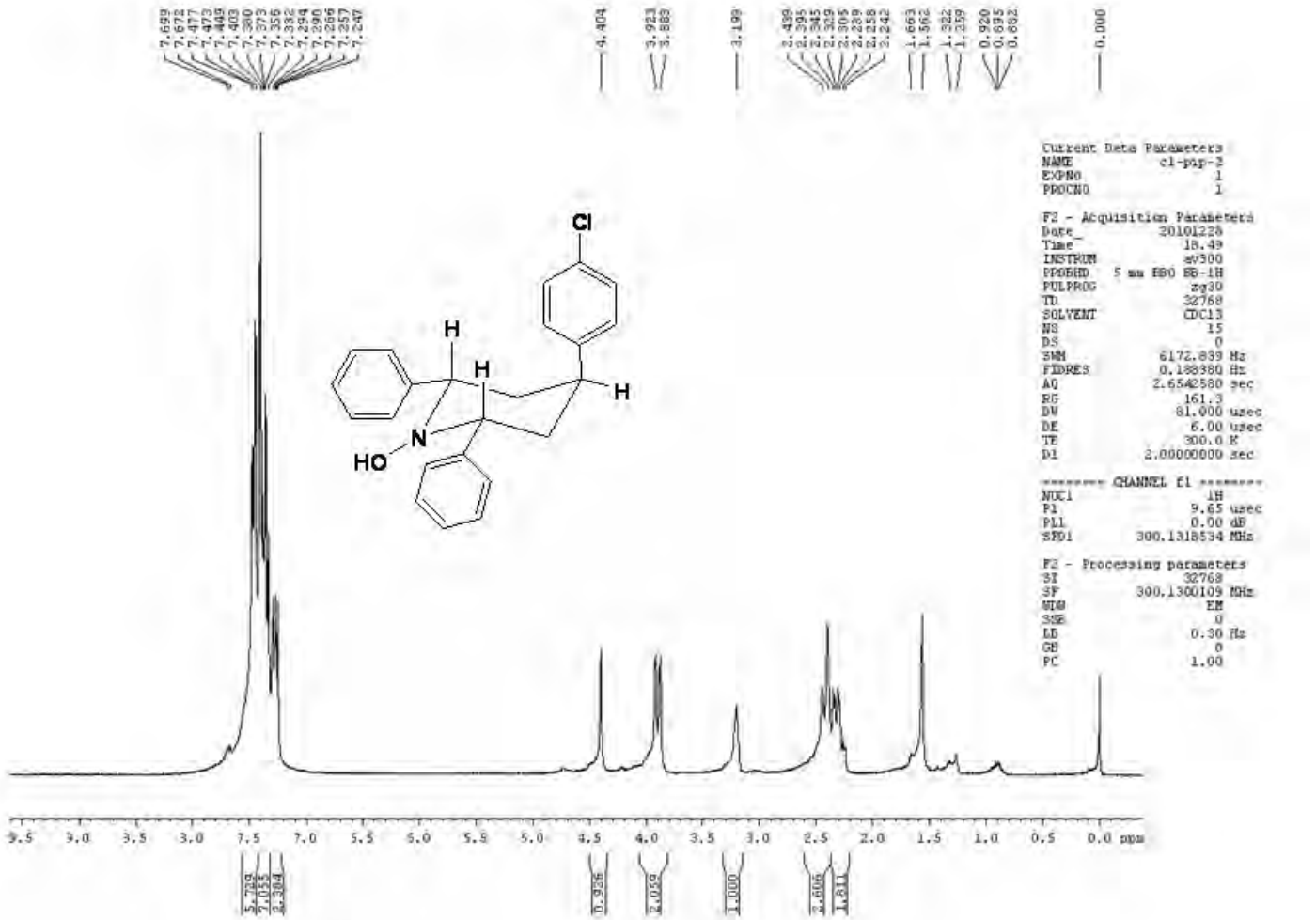
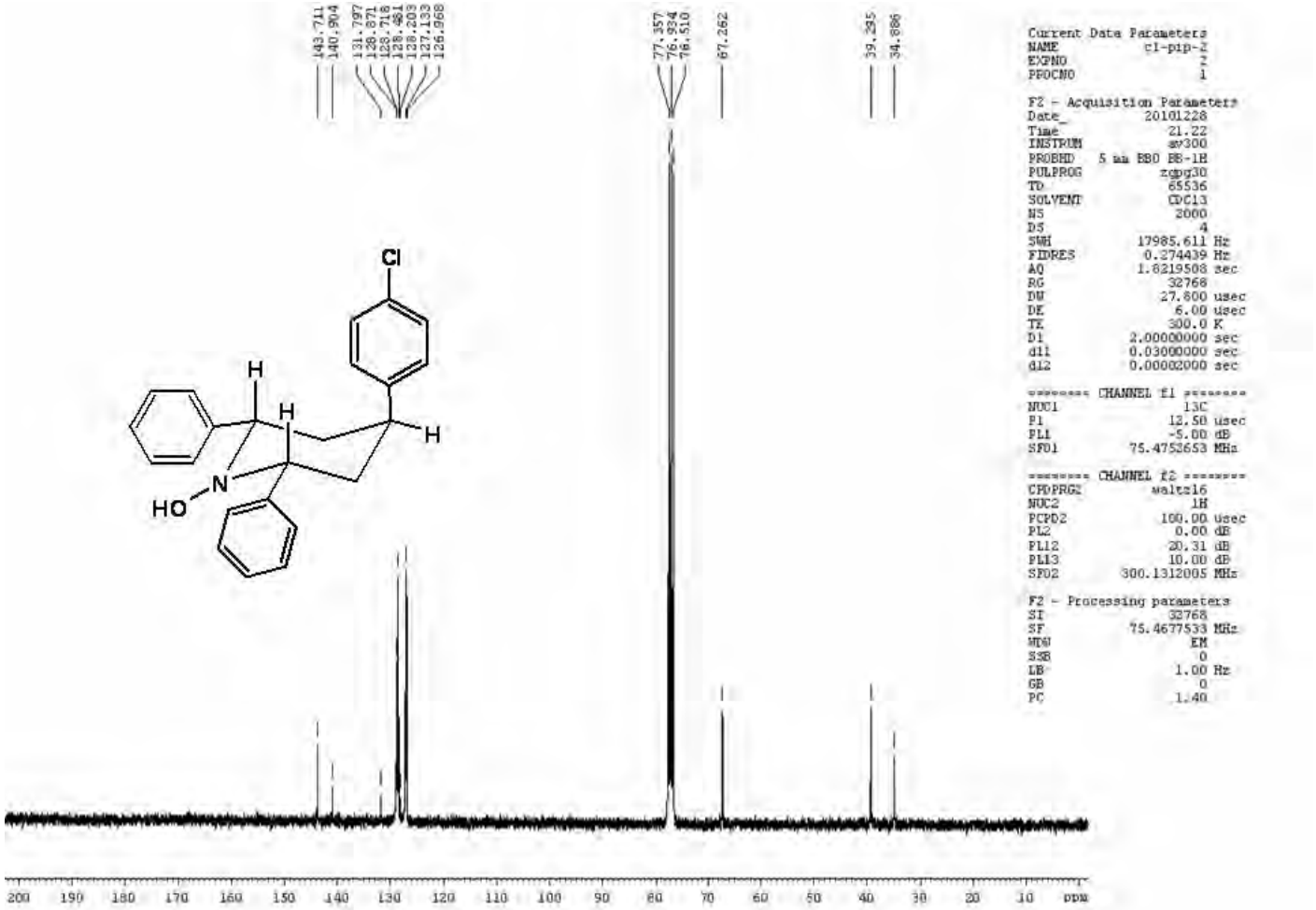


^{1}H NMR spectrum of **8c** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **8c** (75 MHz, $CDCl_3$)



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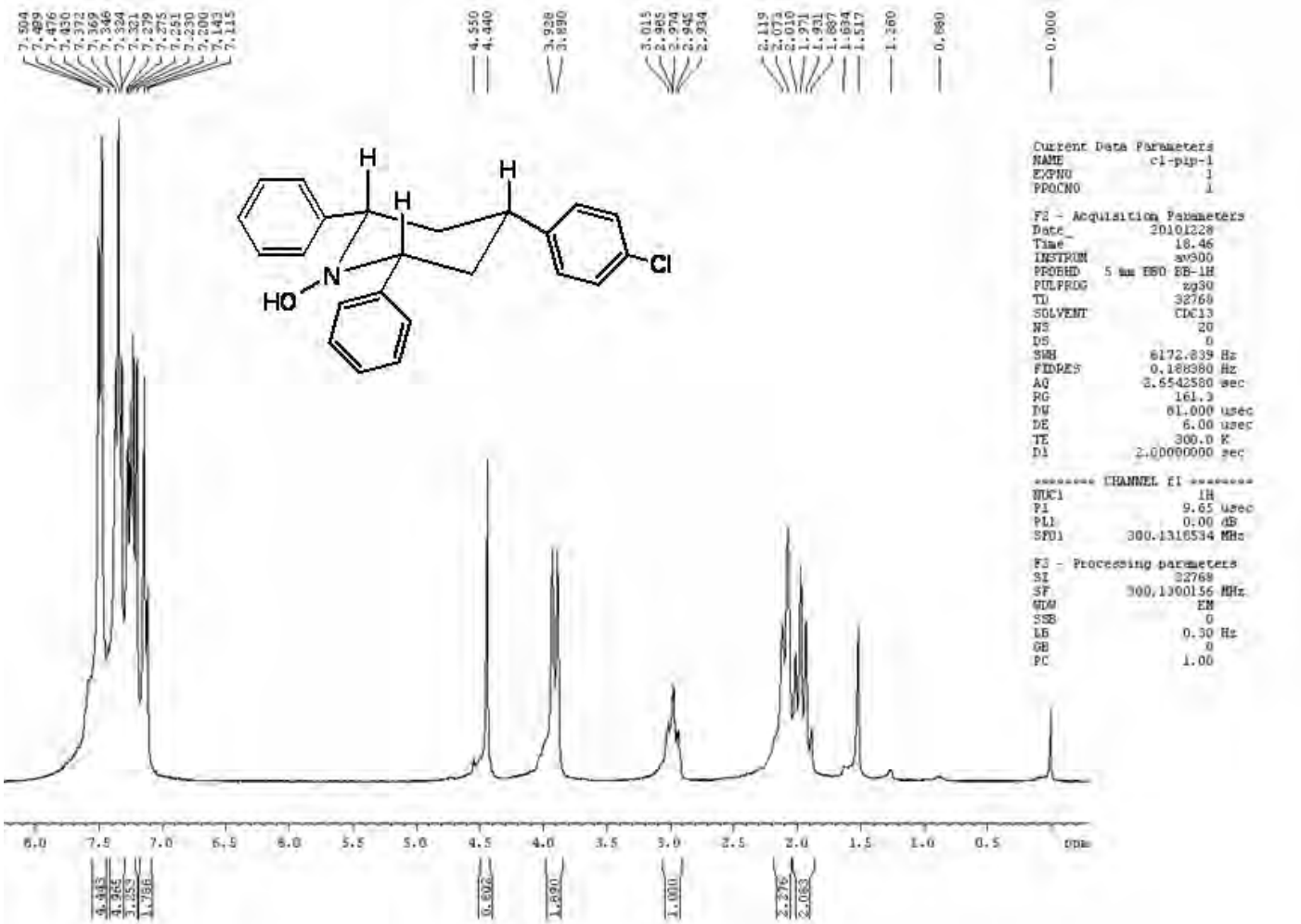
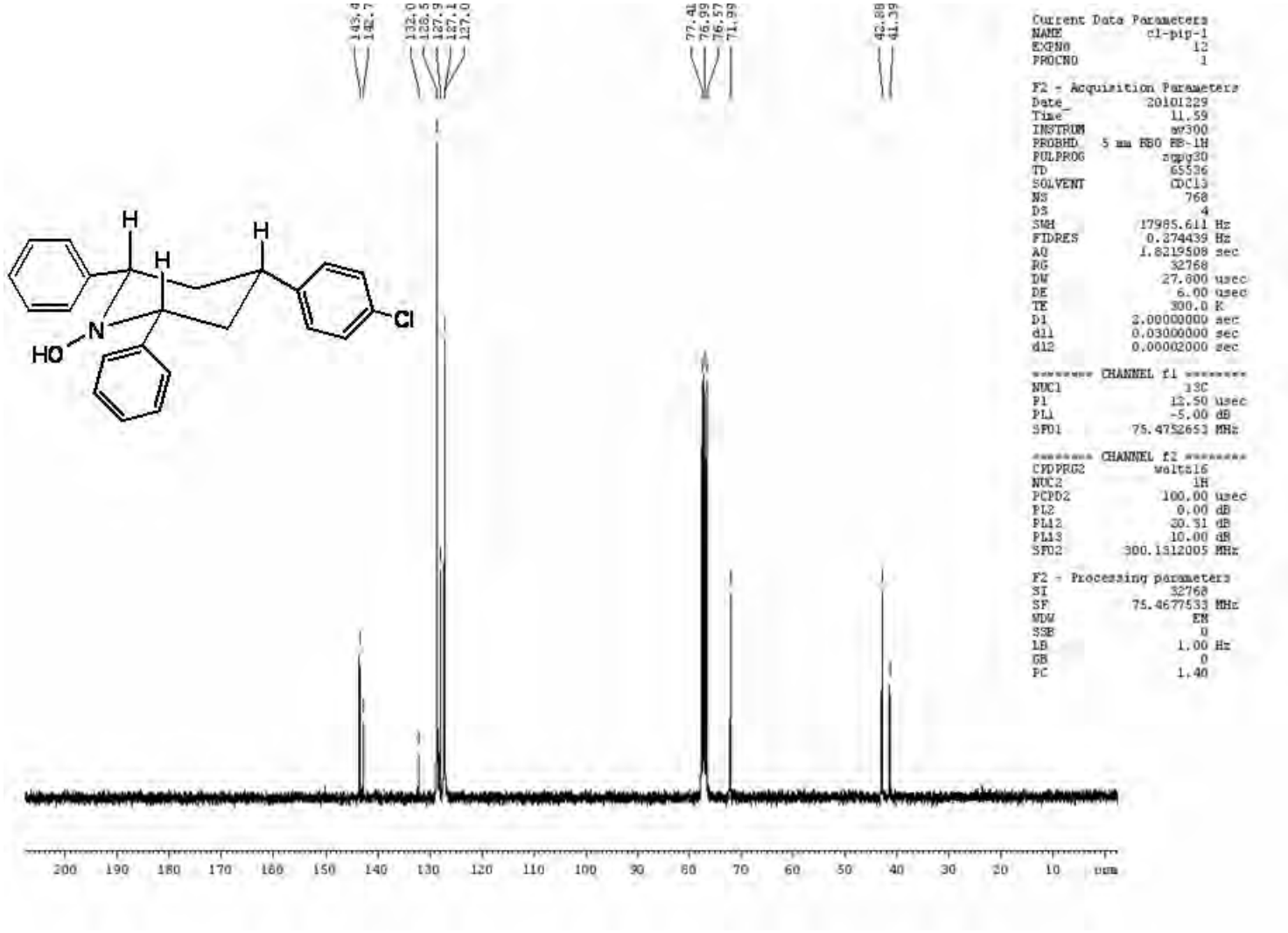
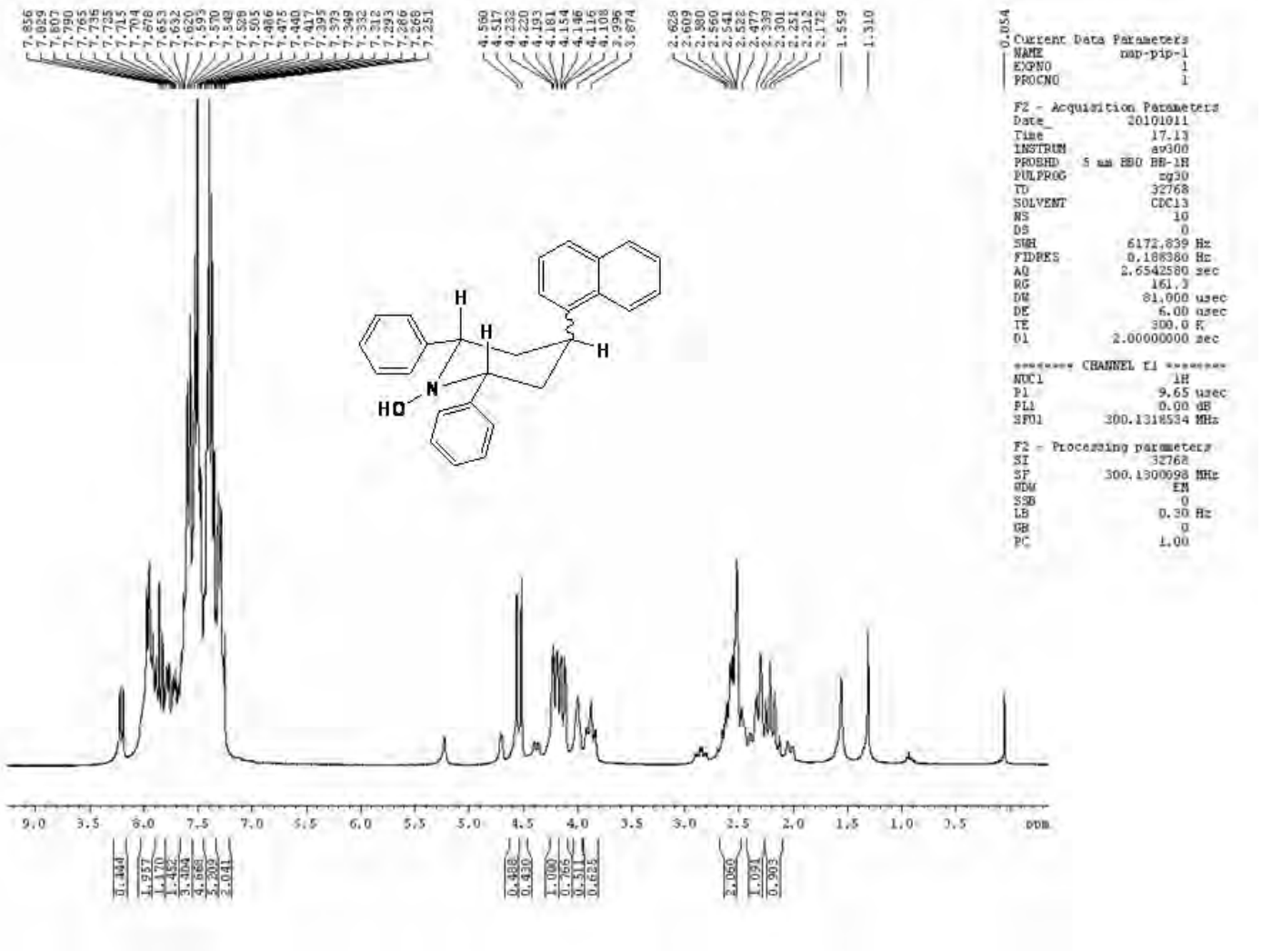


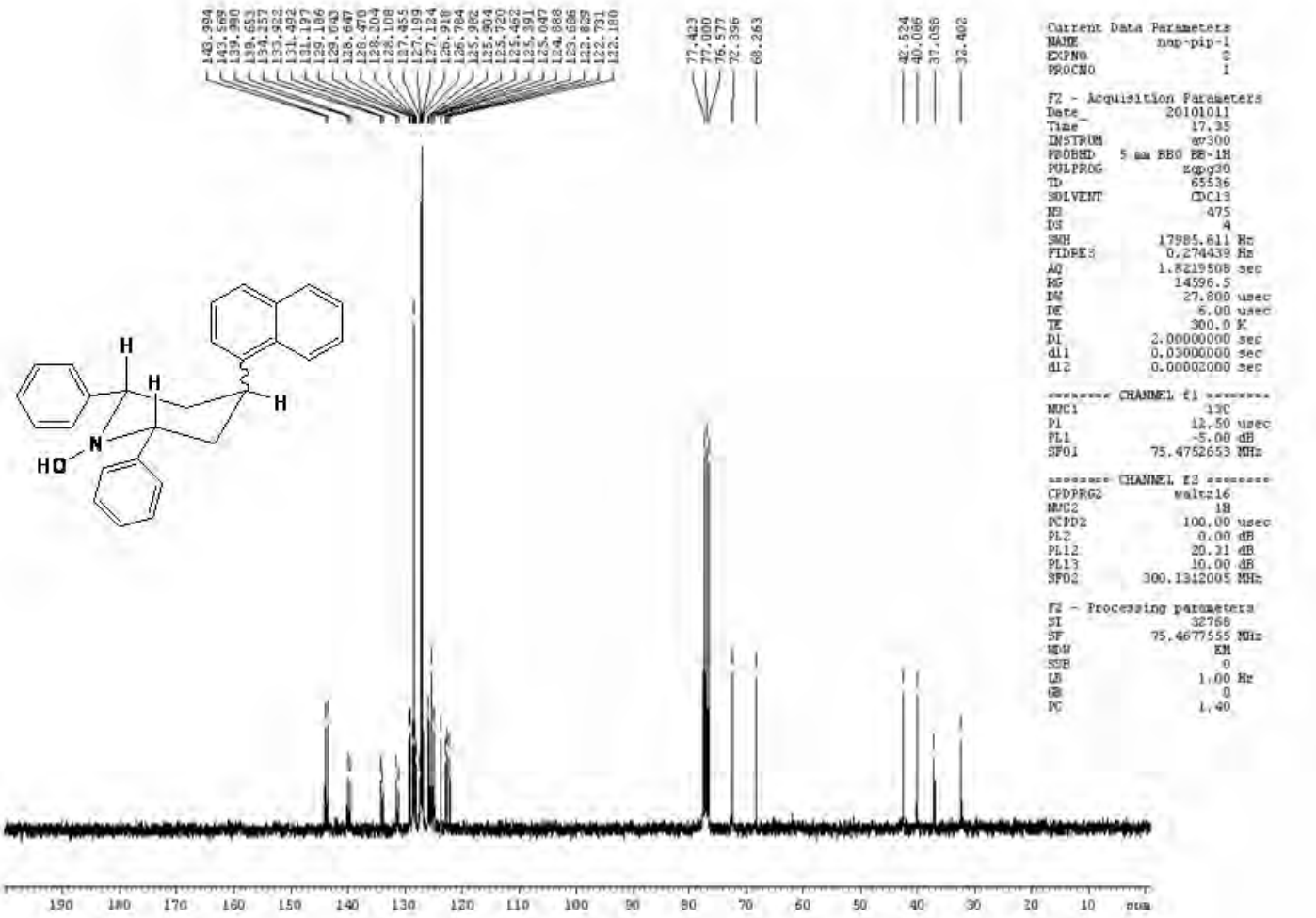
^{13}C NMR spectrum of **9c** (75 MHz, $CDCl_3$)



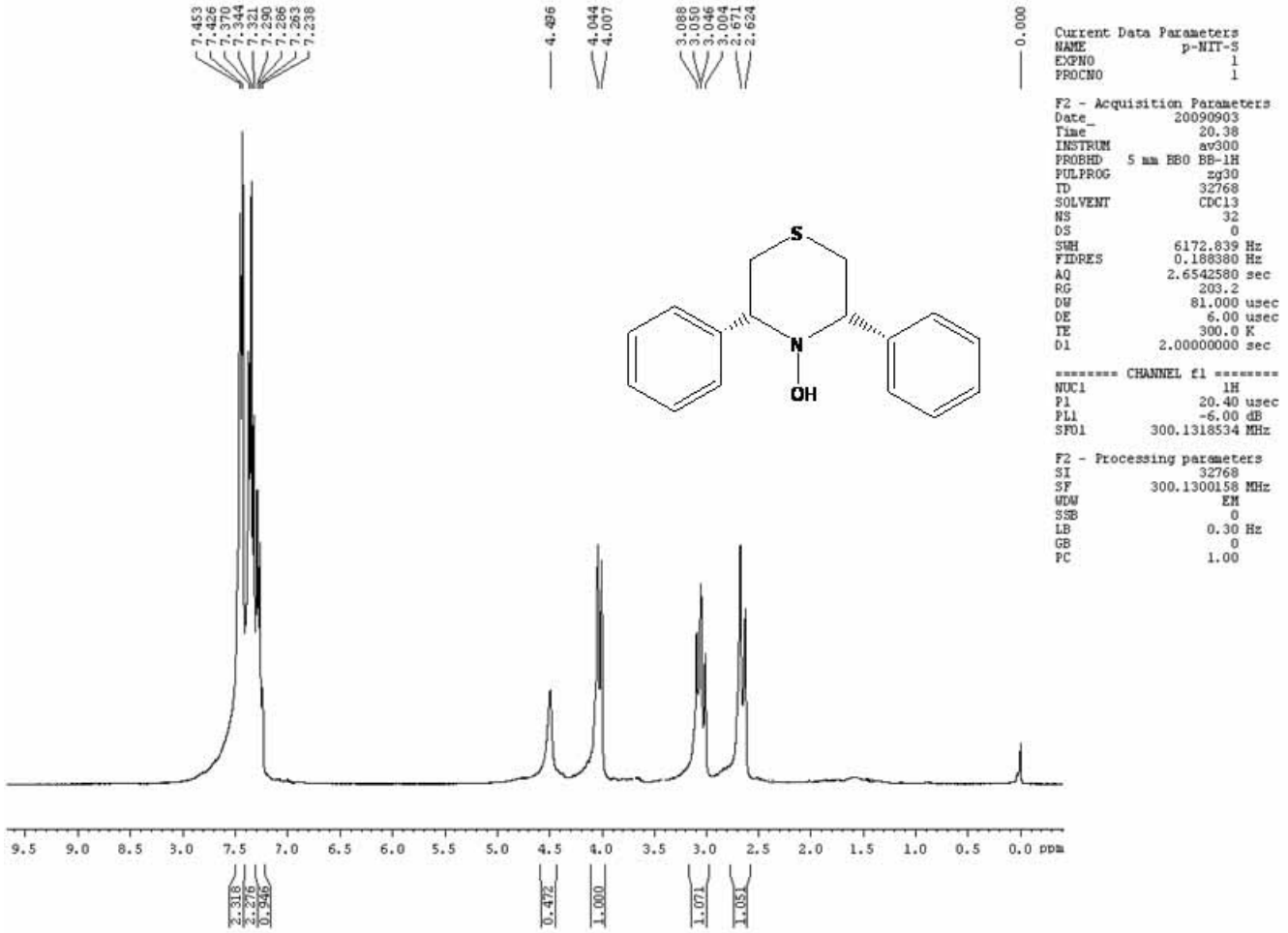
^{1}H NMR spectrum of **8d and 9d** (300 MHz, $CDCl_3$)



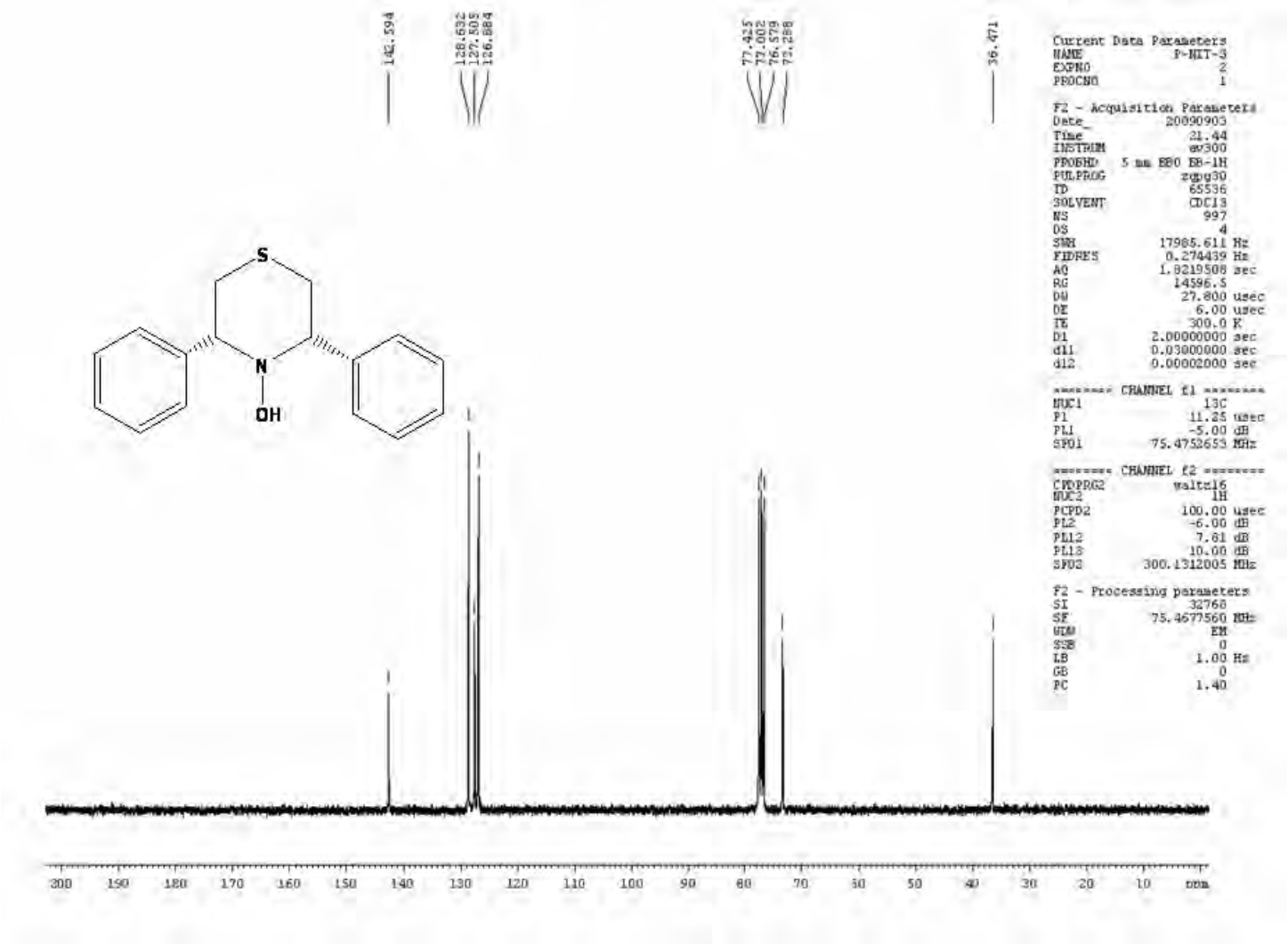
^{13}C NMR spectrum of **8d and 9d** (75 MHz, $CDCl_3$)



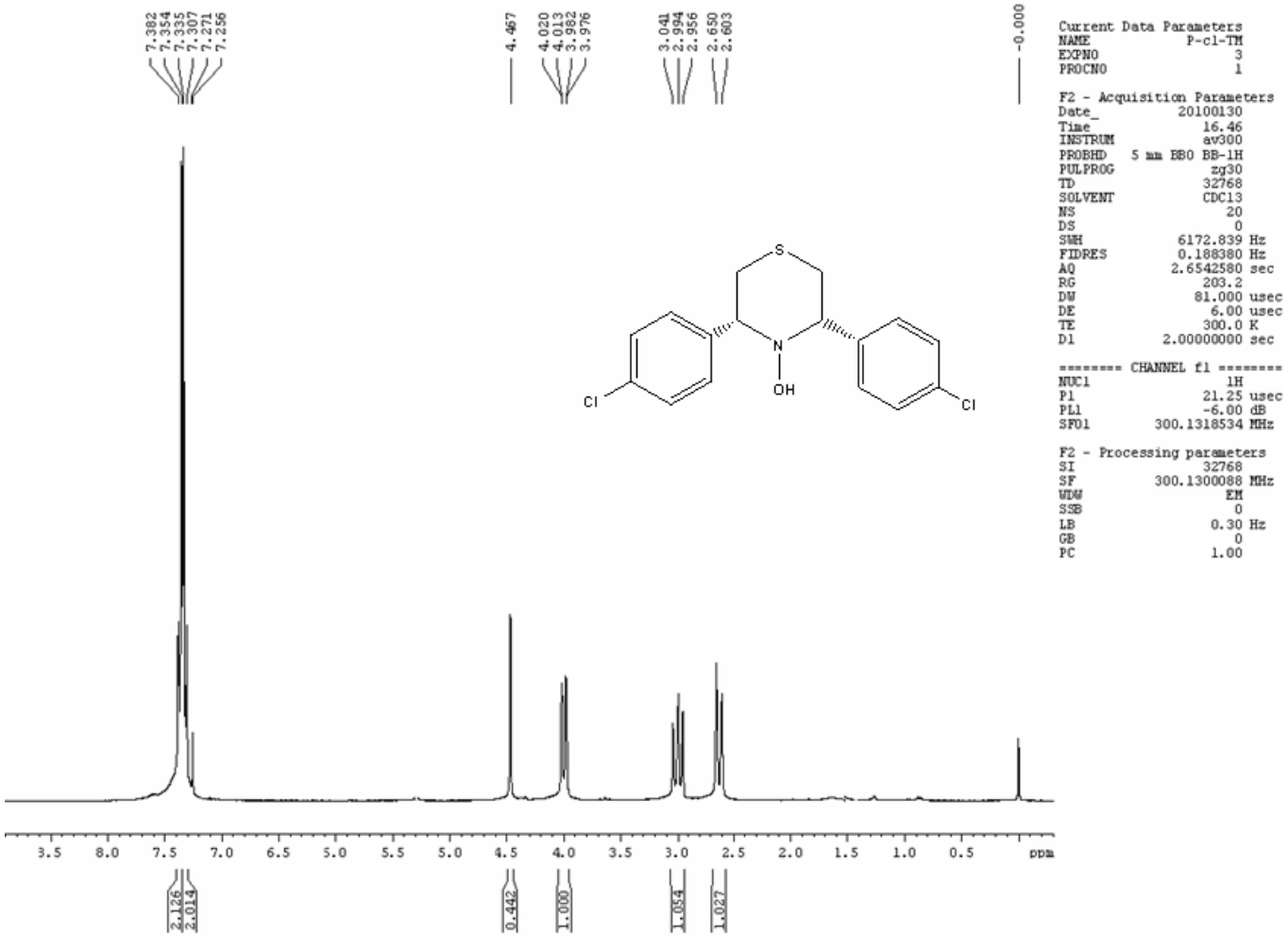
^{1}H NMR spectrum of **11a** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **11a** (75 MHz, $CDCl_3$)



^{1}H NMR spectrum of **11b** (300 MHz, $CDCl_3$)

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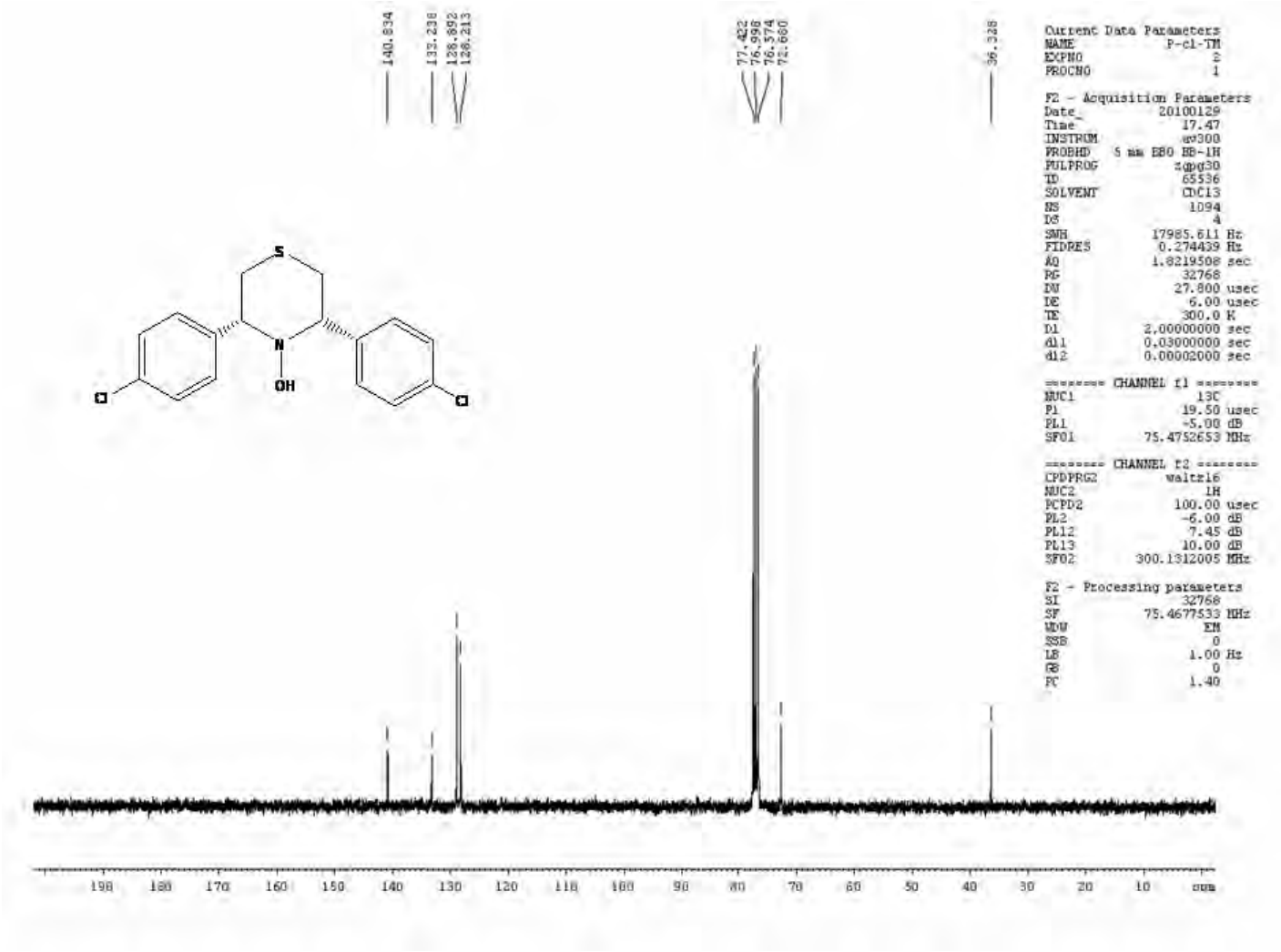
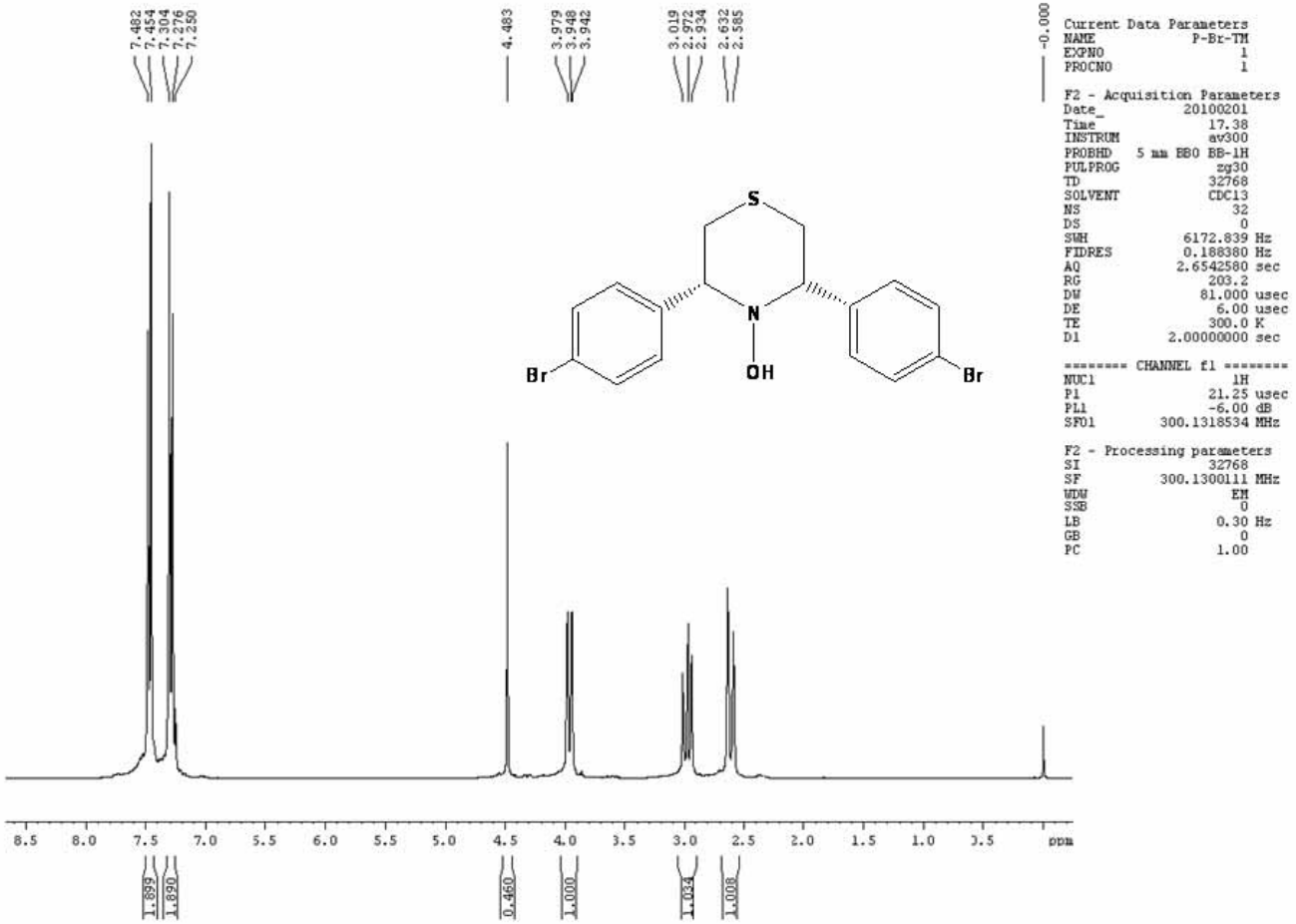
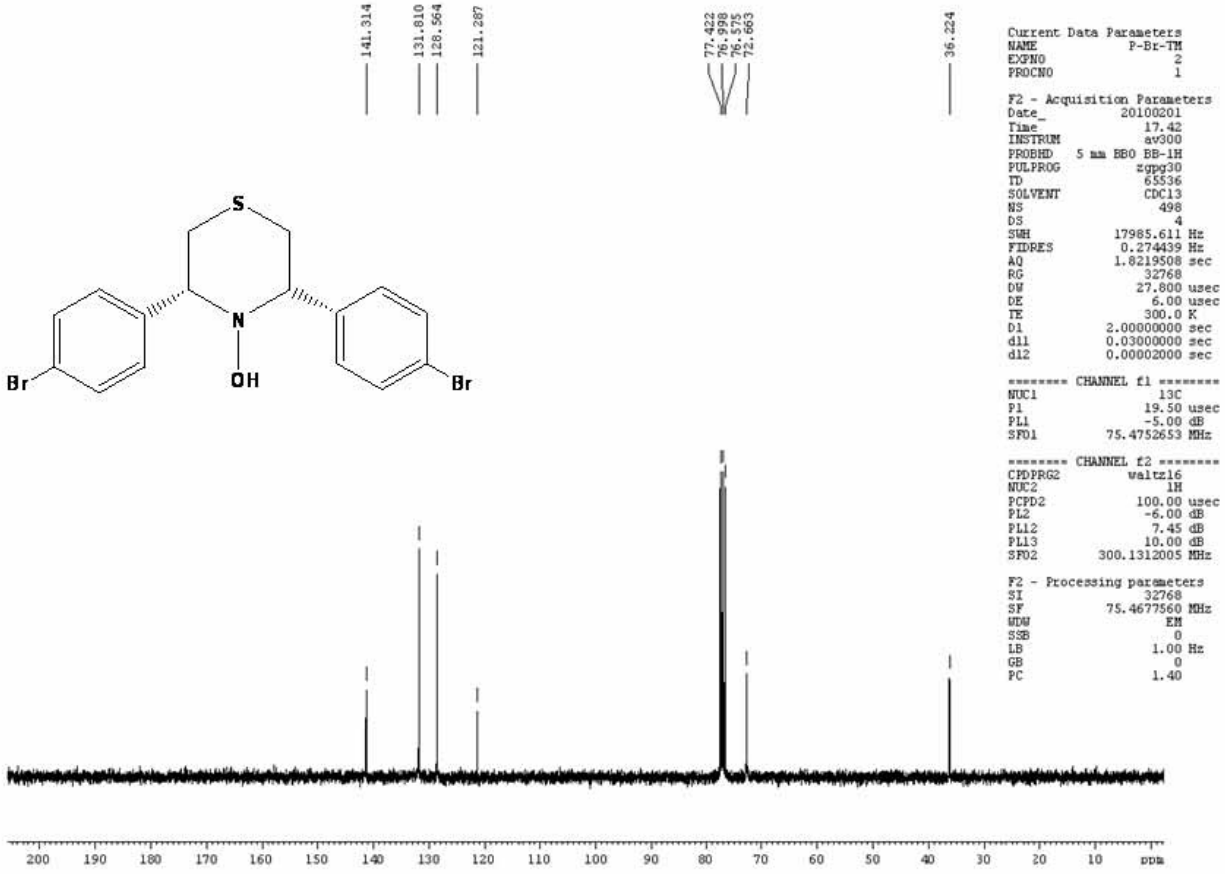
^{13}C NMR spectrum of **11b** (75 MHz, $CDCl_3$)



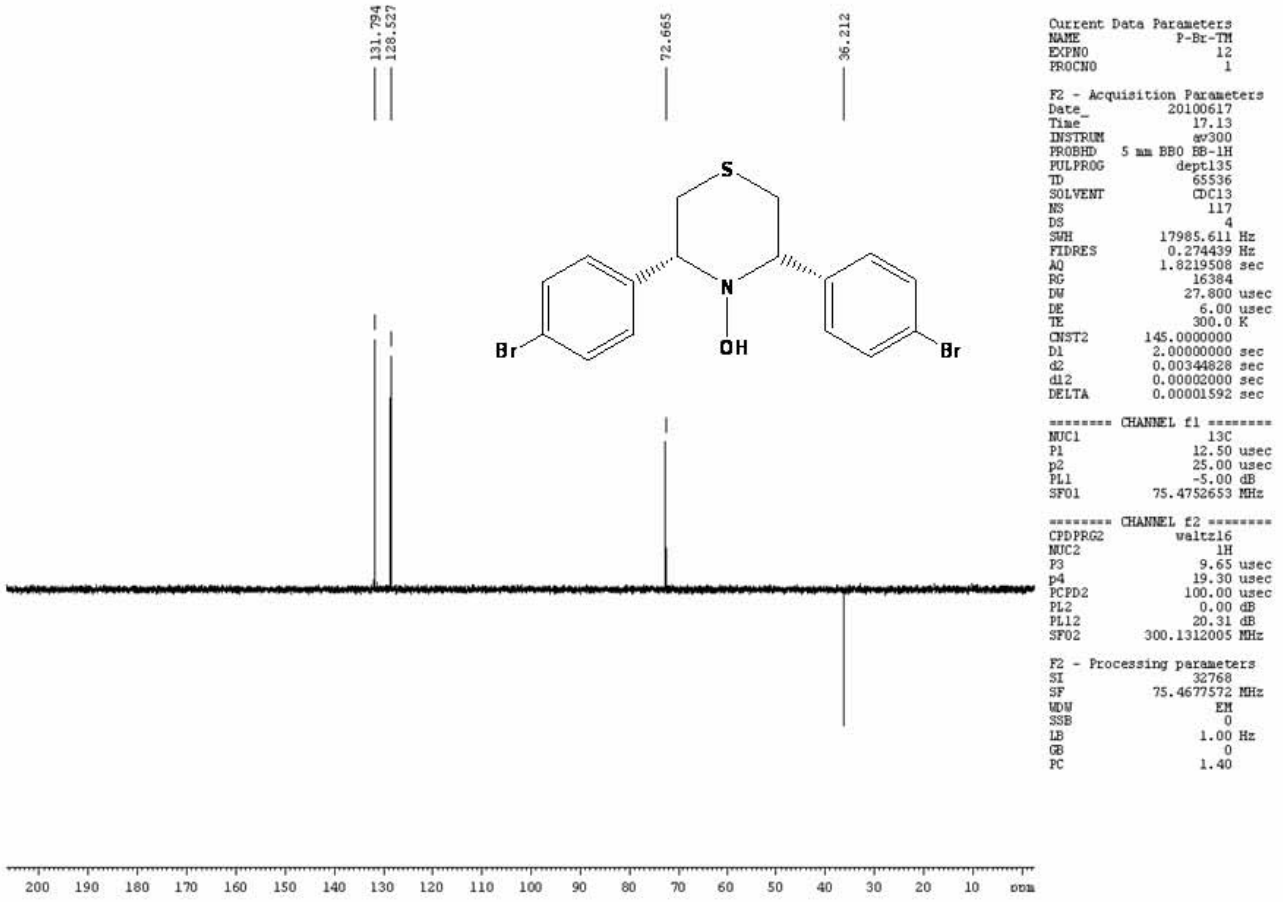
^{1}H NMR spectrum of **11c** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **11c** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **11c**

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FIDRES                 0.274439 Hz
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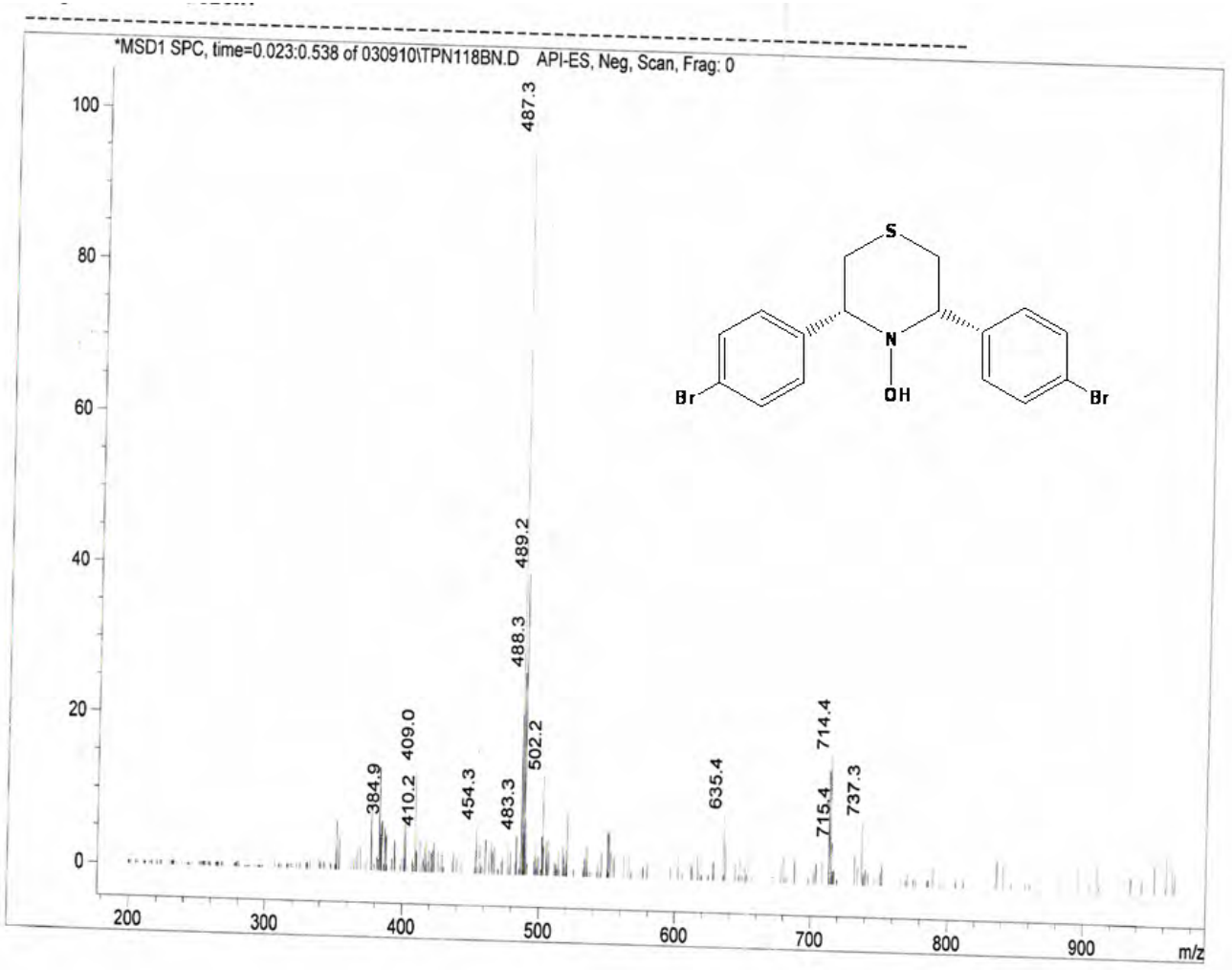
RG                         16384
DW                        27.800 usec
DE                         6.00 usec
TE                       300.0 K
CNST2                145.0000000
D1                     2.00000000 sec
d2                     0.00344828 sec
d12                    0.00002000 sec
DELTA                  0.00001592 sec

======== CHANNEL f1 ========
NUC1                         13C
P1                         12.50 usec
p2                         25.00 usec
PL1                        -5.00 dB
SF01                75.4752653 MHz

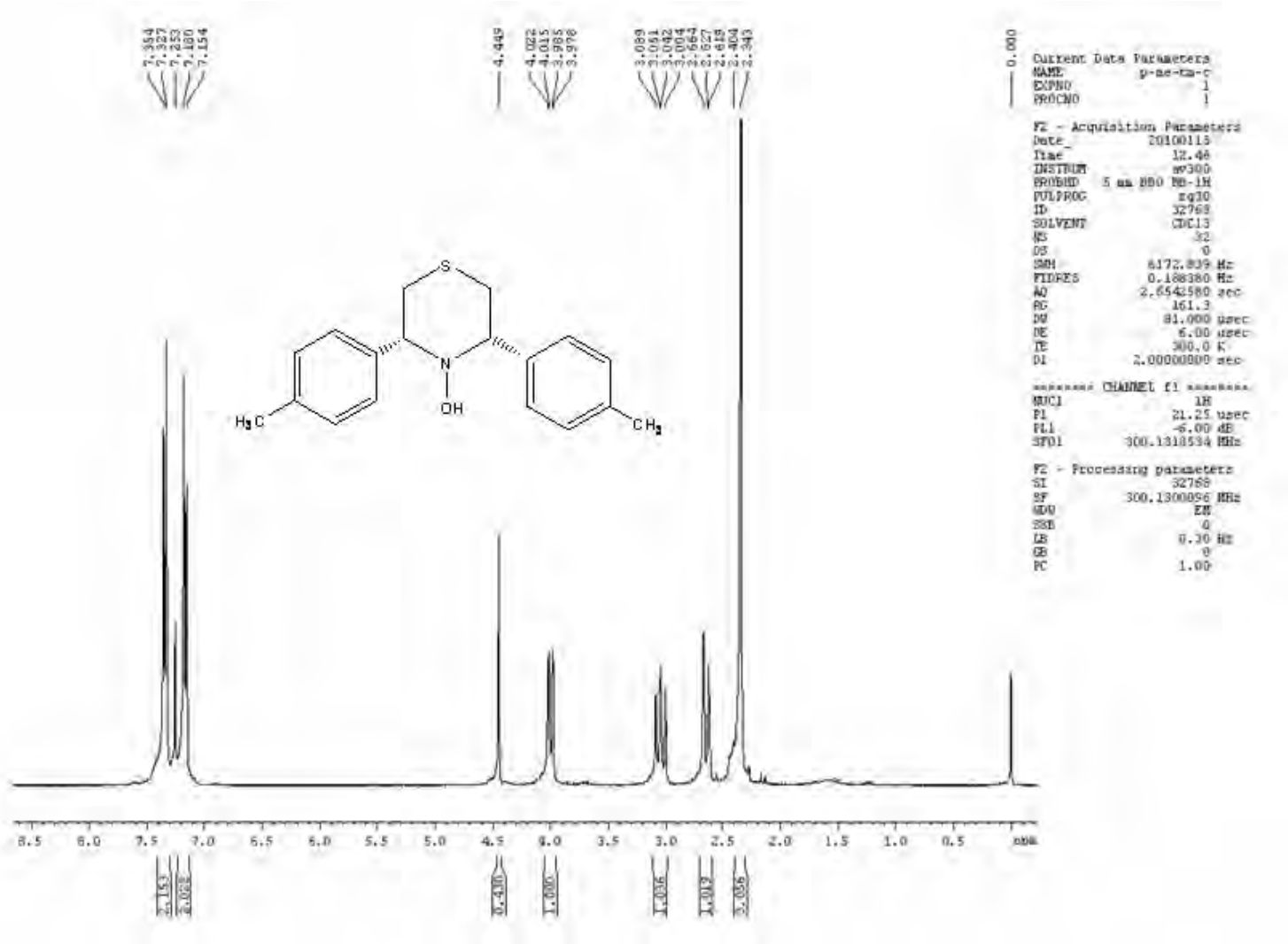
======== CHANNEL f2 ========
CPDPRG2                  waltz16
NUC2                         1H
P3                          9.65 usec
p4                         19.30 usec
PCPD2                     100.00 usec
PL2                         0.00 dB
PL12                       20.31 dB
SF02               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                  75.4677572 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```

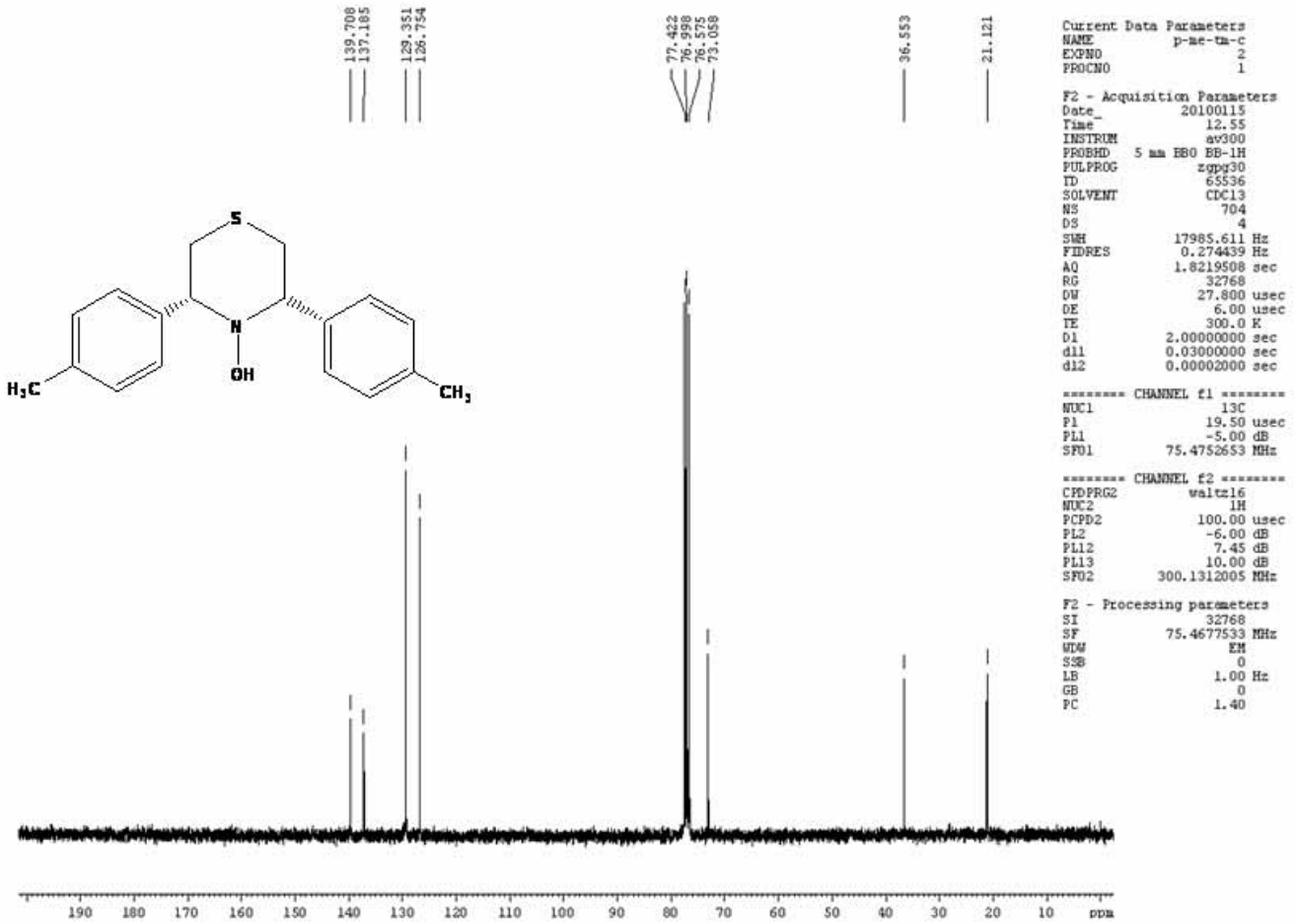
Mass spectrum of **11c**



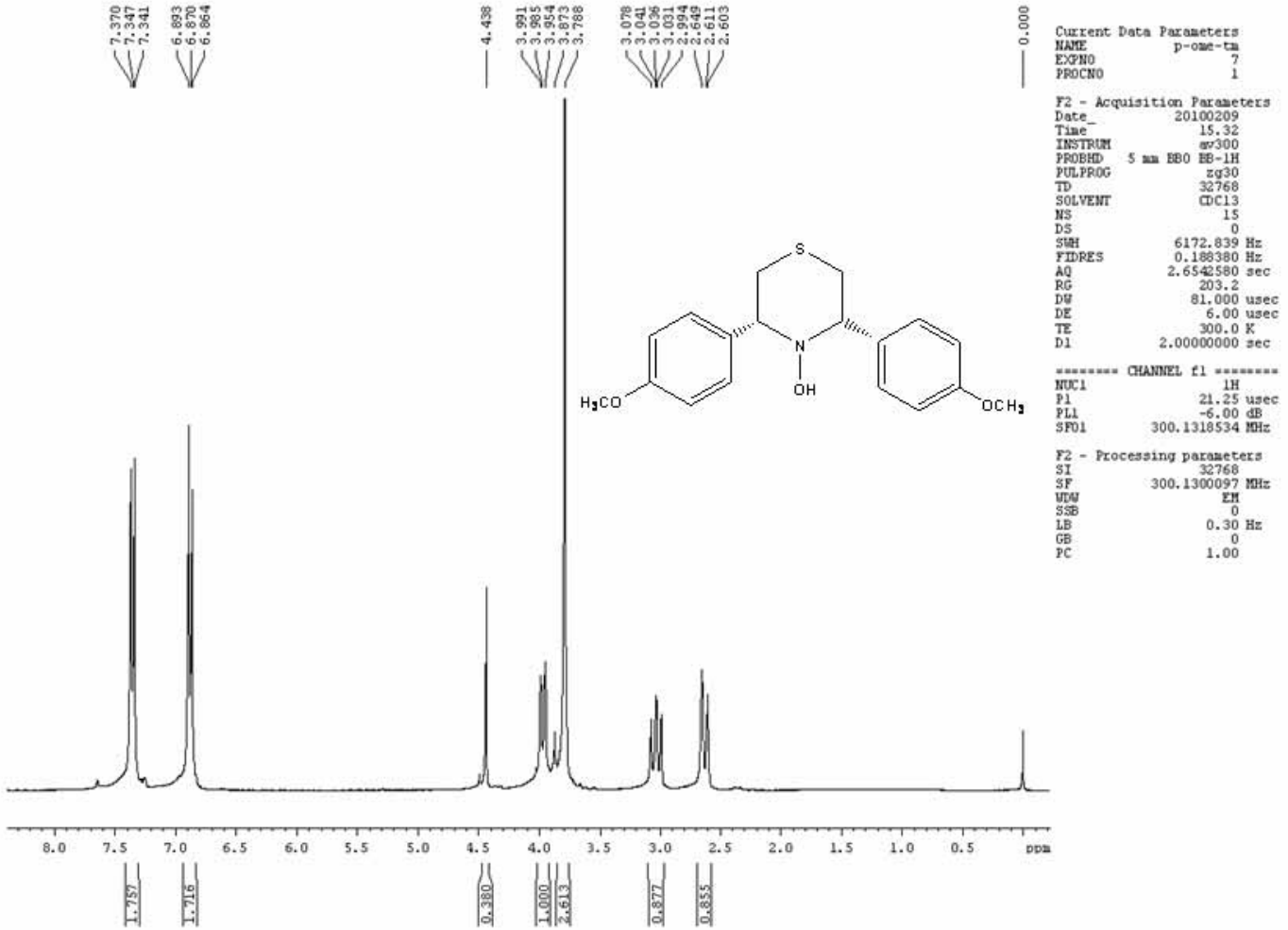
^{1}H NMR spectrum of **11d** (300 MHz, $CDCl_3$)



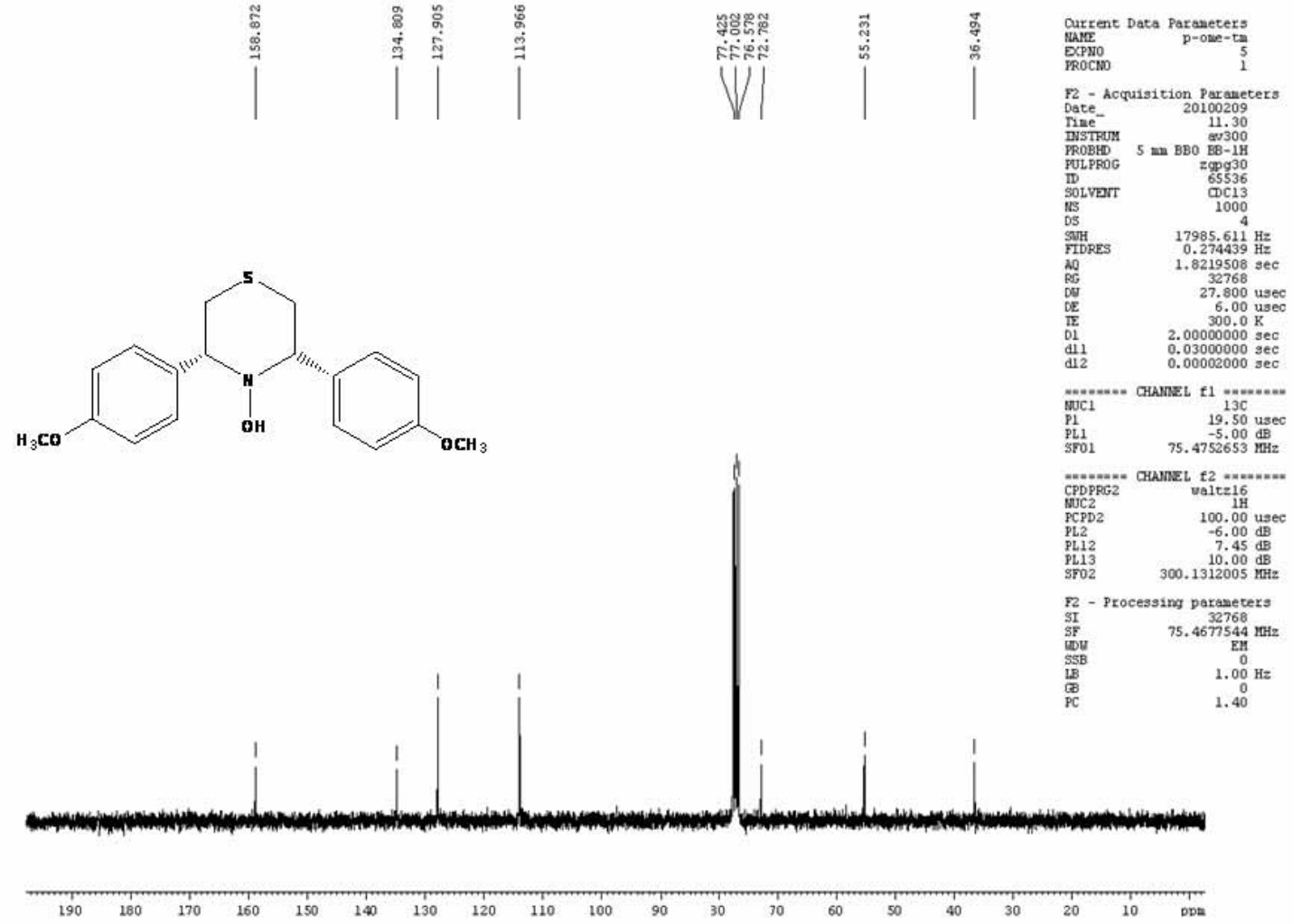
^{13}C NMR spectrum of **11d** (75 MHz, $CDCl_3$)



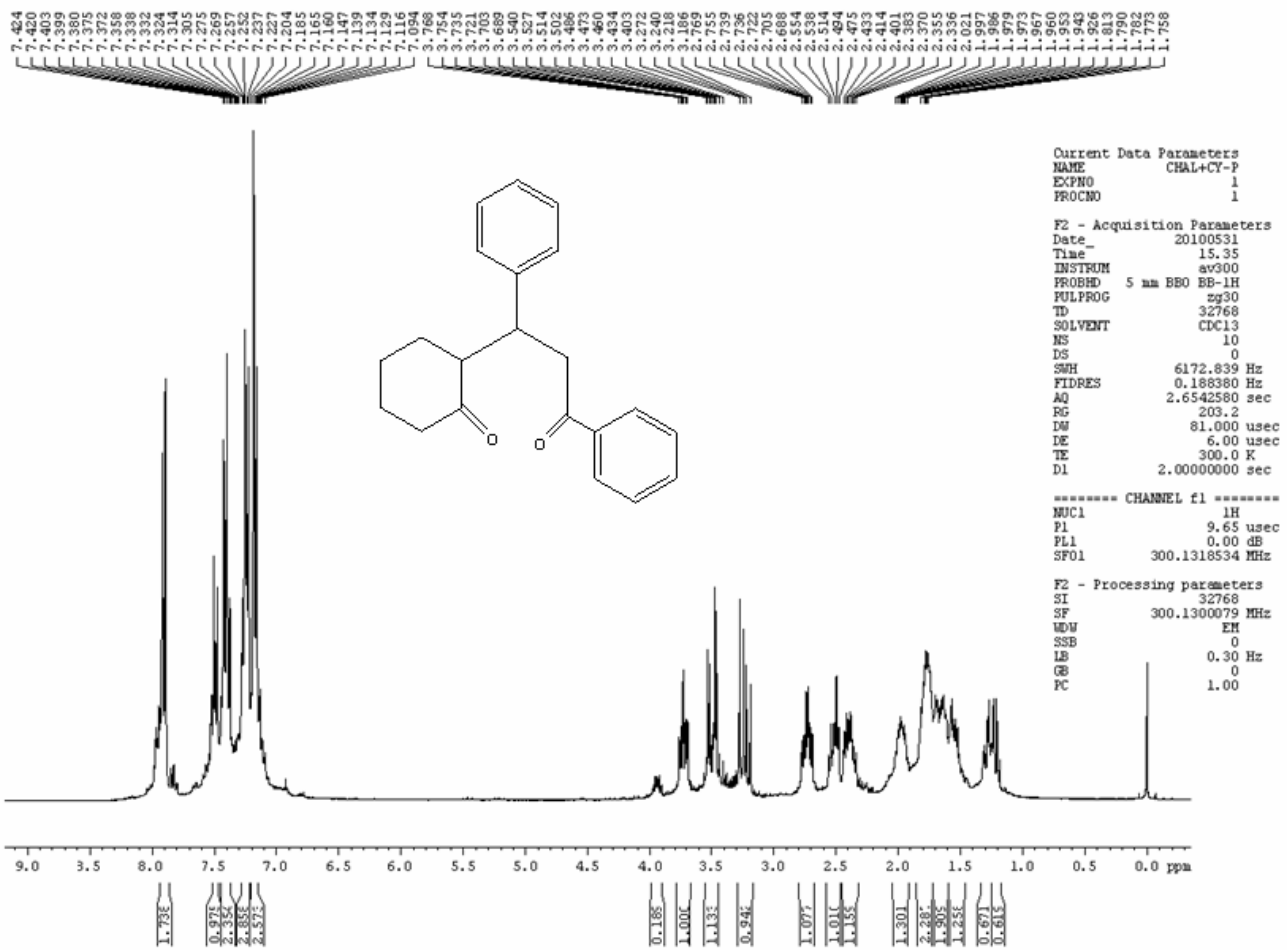
^{1}H NMR spectrum of **11e** (300 MHz, $CDCl_3$)



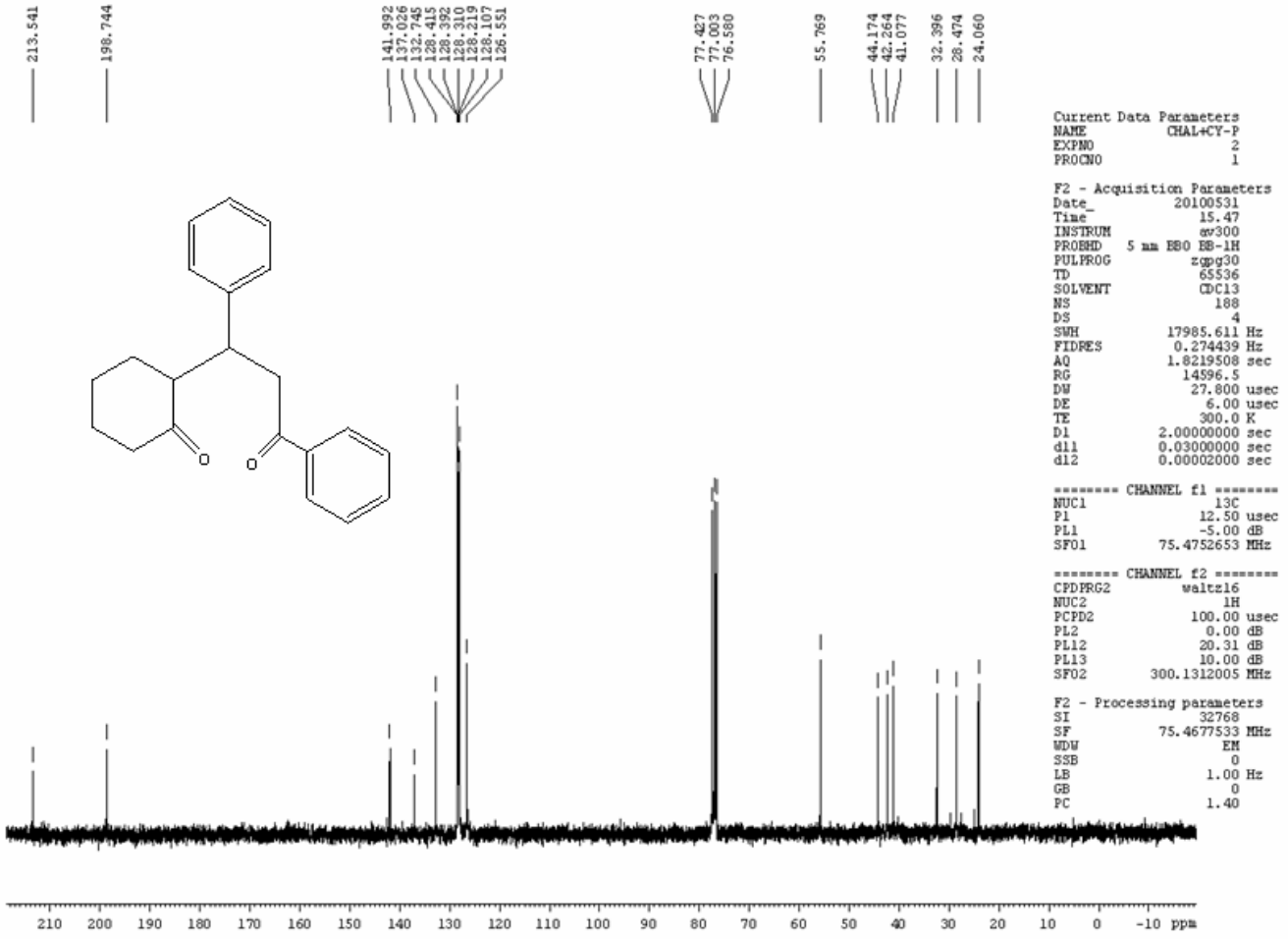
^{13}C NMR spectrum of **11e** (75 MHz, $CDCl_3$)



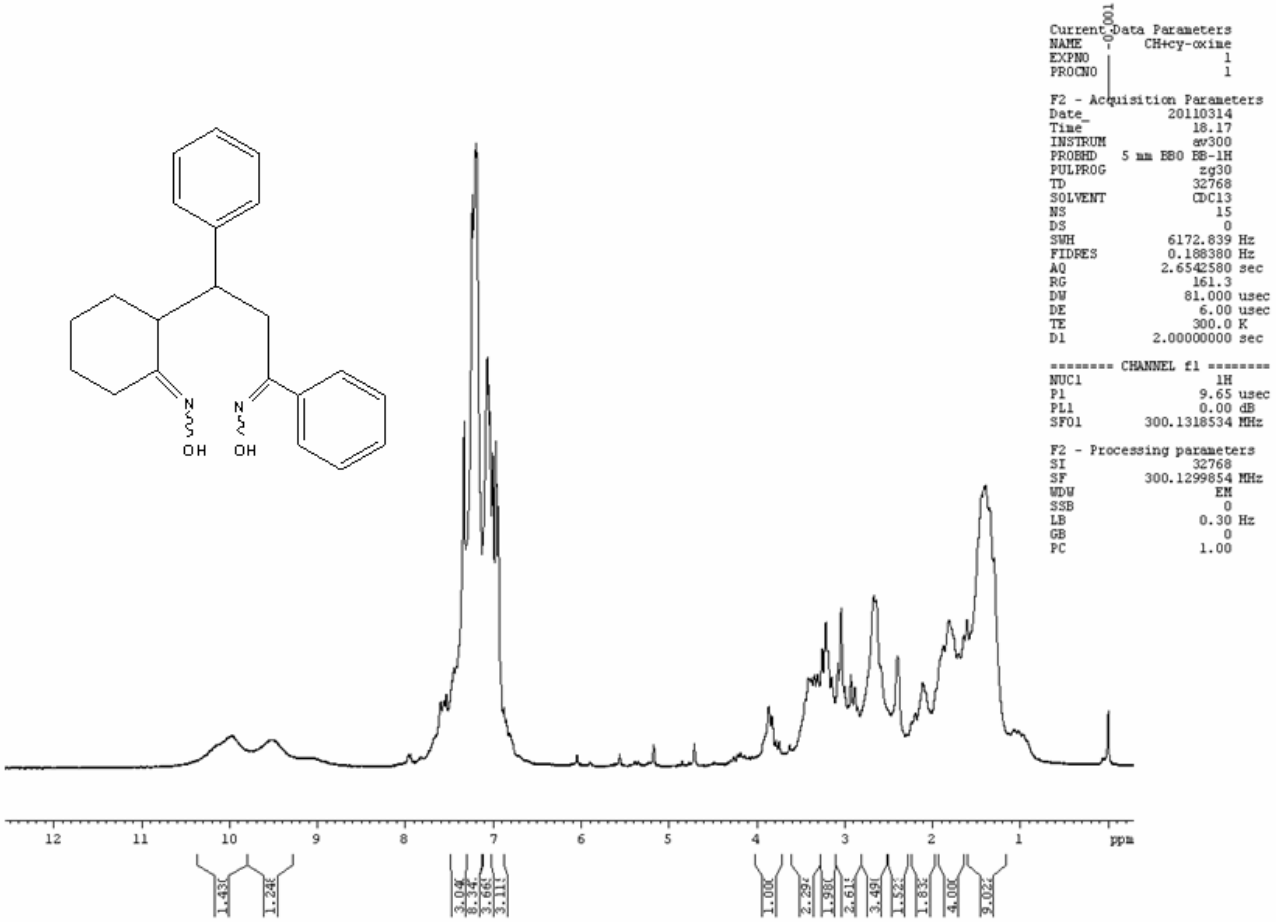
^{1}H NMR spectrum of **12a** ketone (300 MHz, $CDCl_3$)



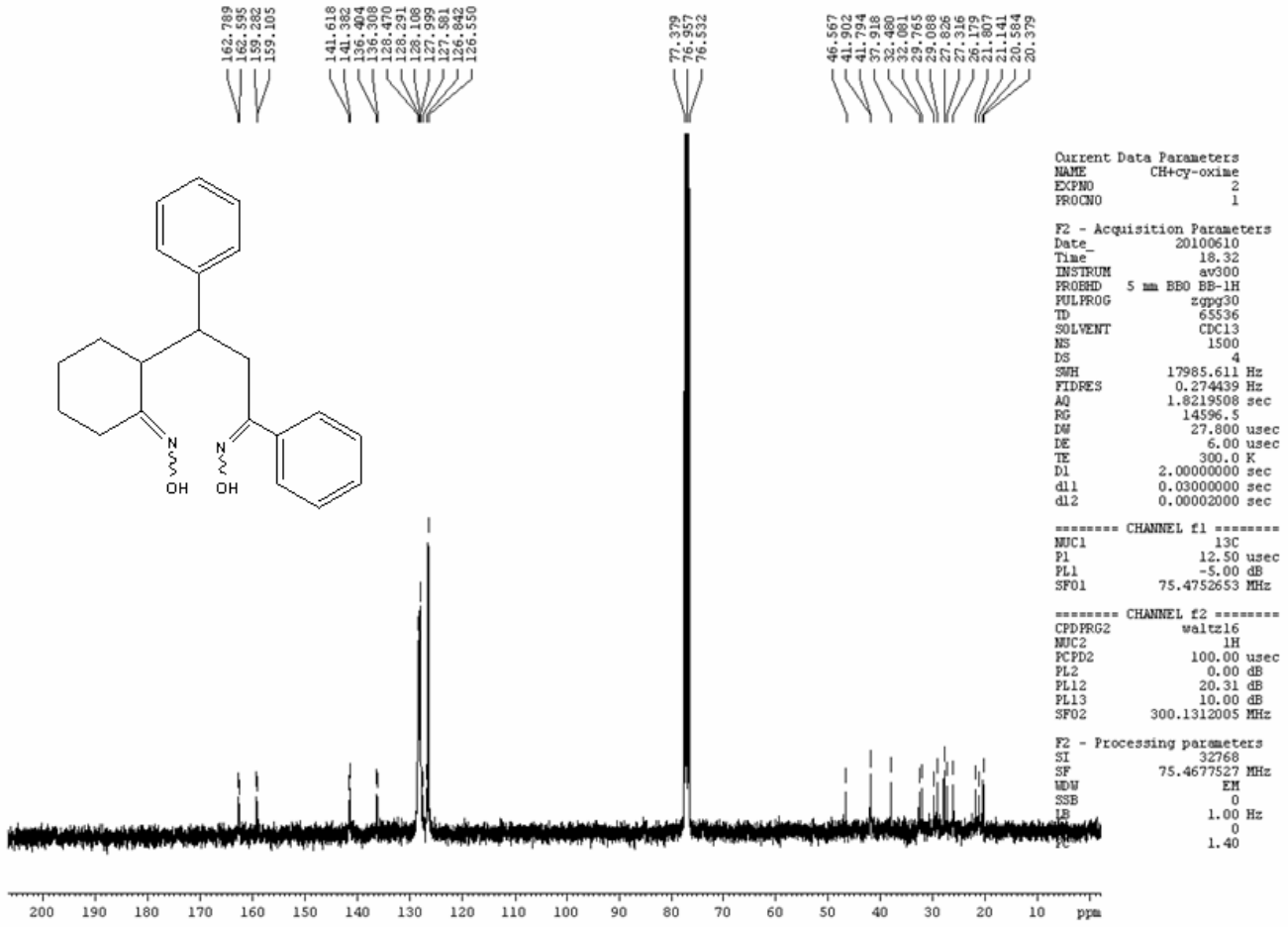
^{13}C NMR spectrum of **12a** ketone (75 MHz, $CDCl_3$)



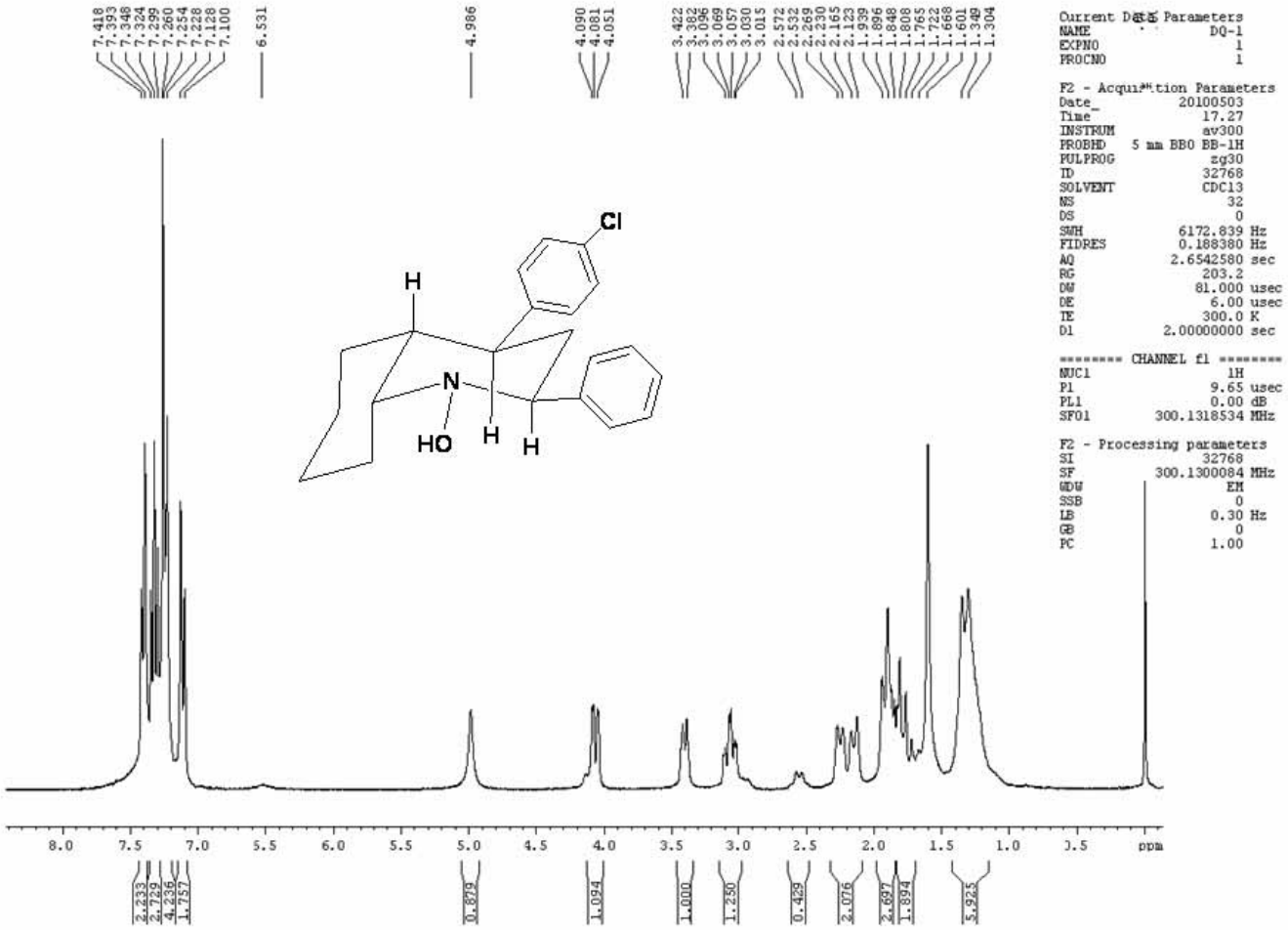
^{1}H NMR spectrum of **12a** (300 MHz, $CDCl_3$)



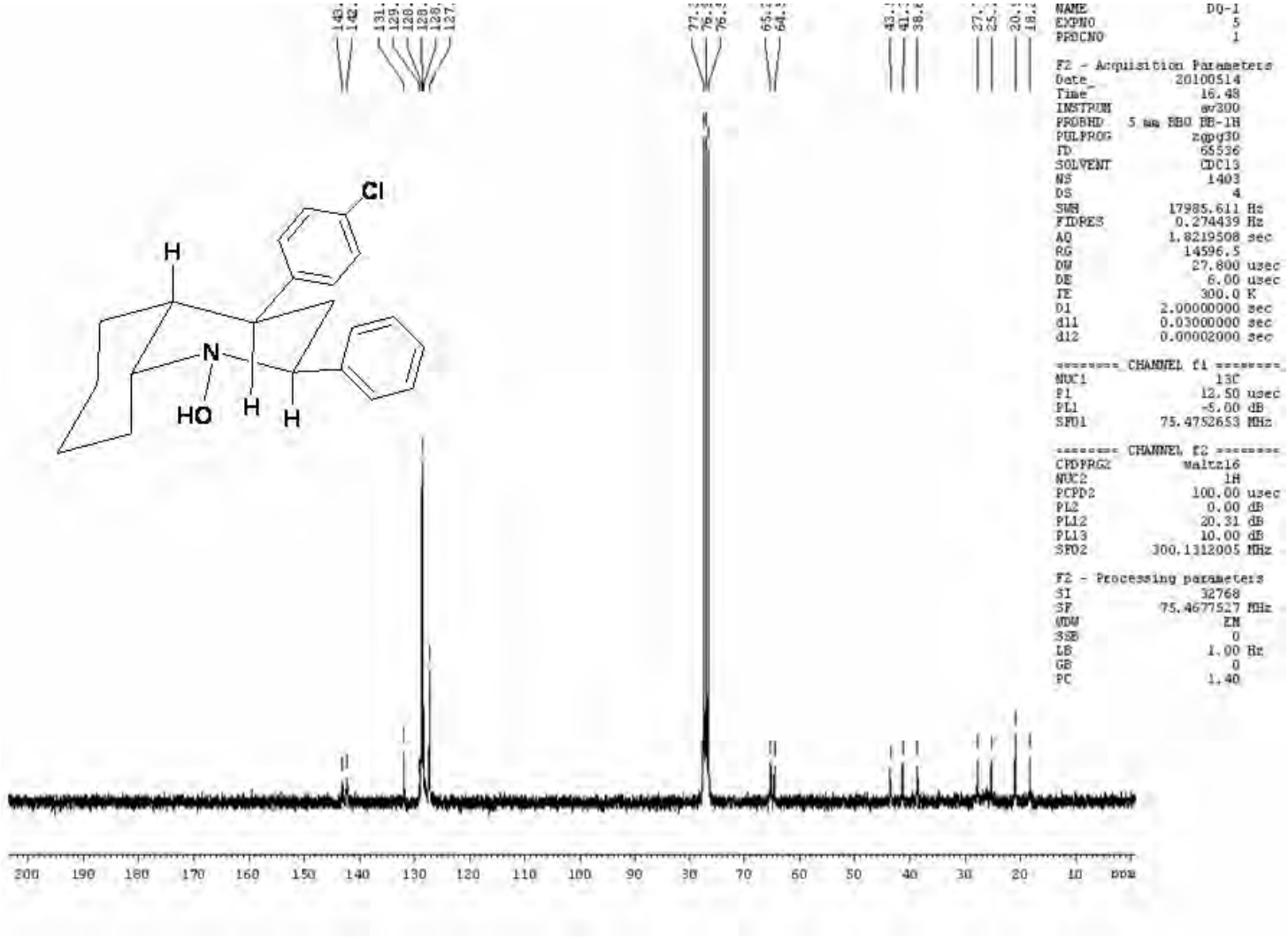
^{13}C NMR spectrum of **12a** (75 MHz, $CDCl_3$)



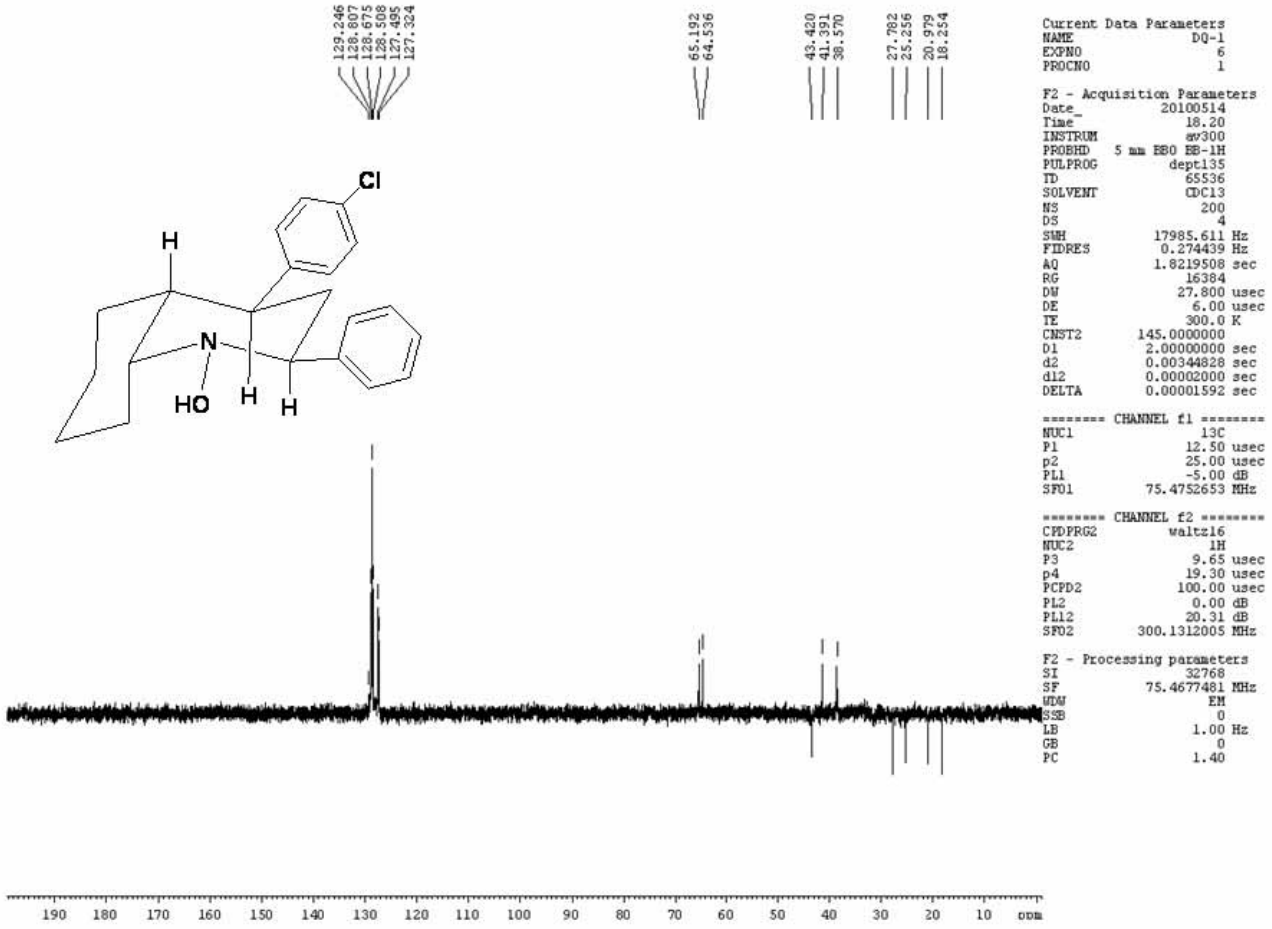
^{1}H NMR spectrum of **13b** (300 MHz, $CDCl_3$)



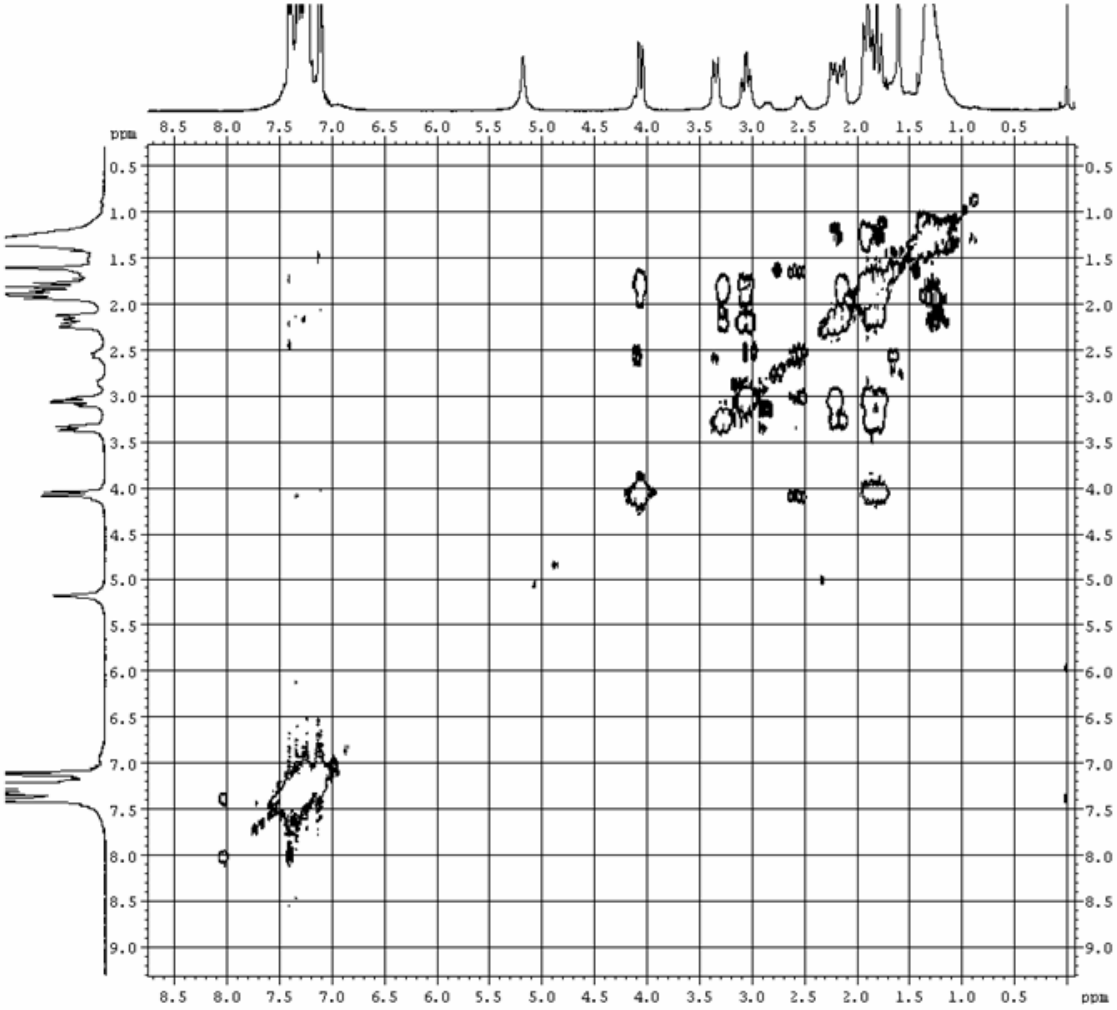
^{13}C NMR spectrum of **13b** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **13b**



H-H COSY spectrum of **13b**




```
Current Data Parameters
NAME                  Dq-1
EXPNO                    4
PROCNO                   1

F2 - Acquisition Parameters
Date_              20100514
Time                 16.29
INSTRUM              av300
PROBHD   5 mm BBO BB-1H
PULPROG          cosygpqf
TD                   2048
SOLVENT              DMSO
NS                      1
DS                      8
SWH               4006.410 Hz
FIDRES            1.956255 Hz
AQ               0.2556404 sec
RG                     64
DW                124.800 usec
DE                  6.00 usec
TE                 300.0 K
d0              0.00000300 sec
D1              1.48689198 sec
d13             0.00000400 sec
D16             0.00015000 sec
IN0             0.00024960 sec
MCREST          0.00000000 sec
MCWRK           1.48689198 sec

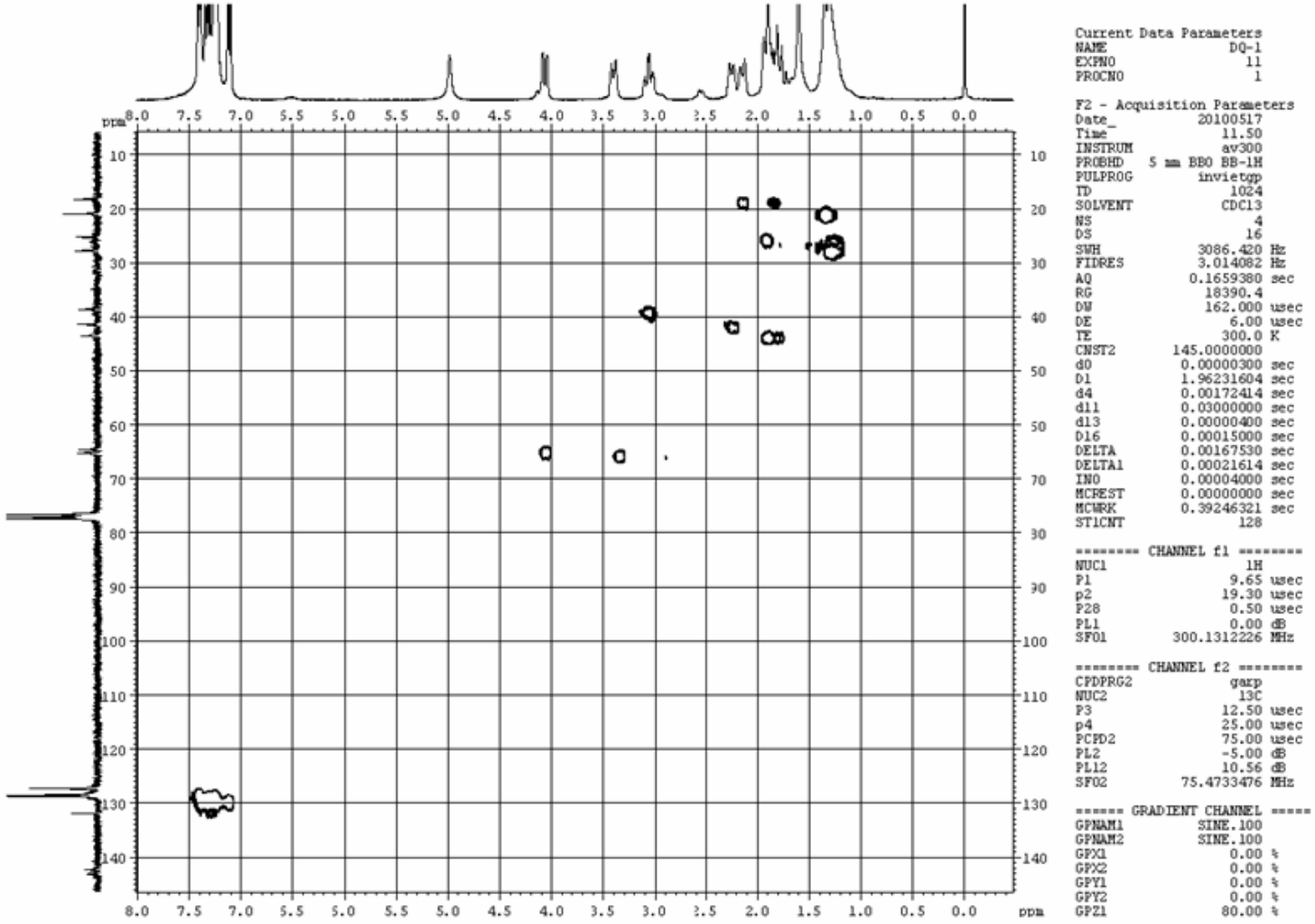
======== CHANNEL f1 ========
NUC1                   1H
P0                   9.65 usec
P1                   9.65 usec
PL1                  0.00 dB
SF01          300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1           SINE.100
GPNAM2           SINE.100
GPX1                 0.00 %
GPX2                 0.00 %
GPY1                 0.00 %
GPY2                 0.00 %
GPZ1                10.00 %
GPZ2                10.00 %
P16               1500.00 usec

F1 - Acquisition parameters
ND0                    1
TD                   128
SF01          300.1318 MHz
FIDRES         31.300079 Hz
SW                13.349 ppm

F2 - Processing parameters
SI                  1024
SF          300.1300046 MHz
WDW                 SINE
SSB                    0
LB                  0.00 Hz
```

C-H COSY spectrum of **13b**




```
Current Data Parameters
NAME                  DQ-1
EXPNO                   11
PROCNO                   1

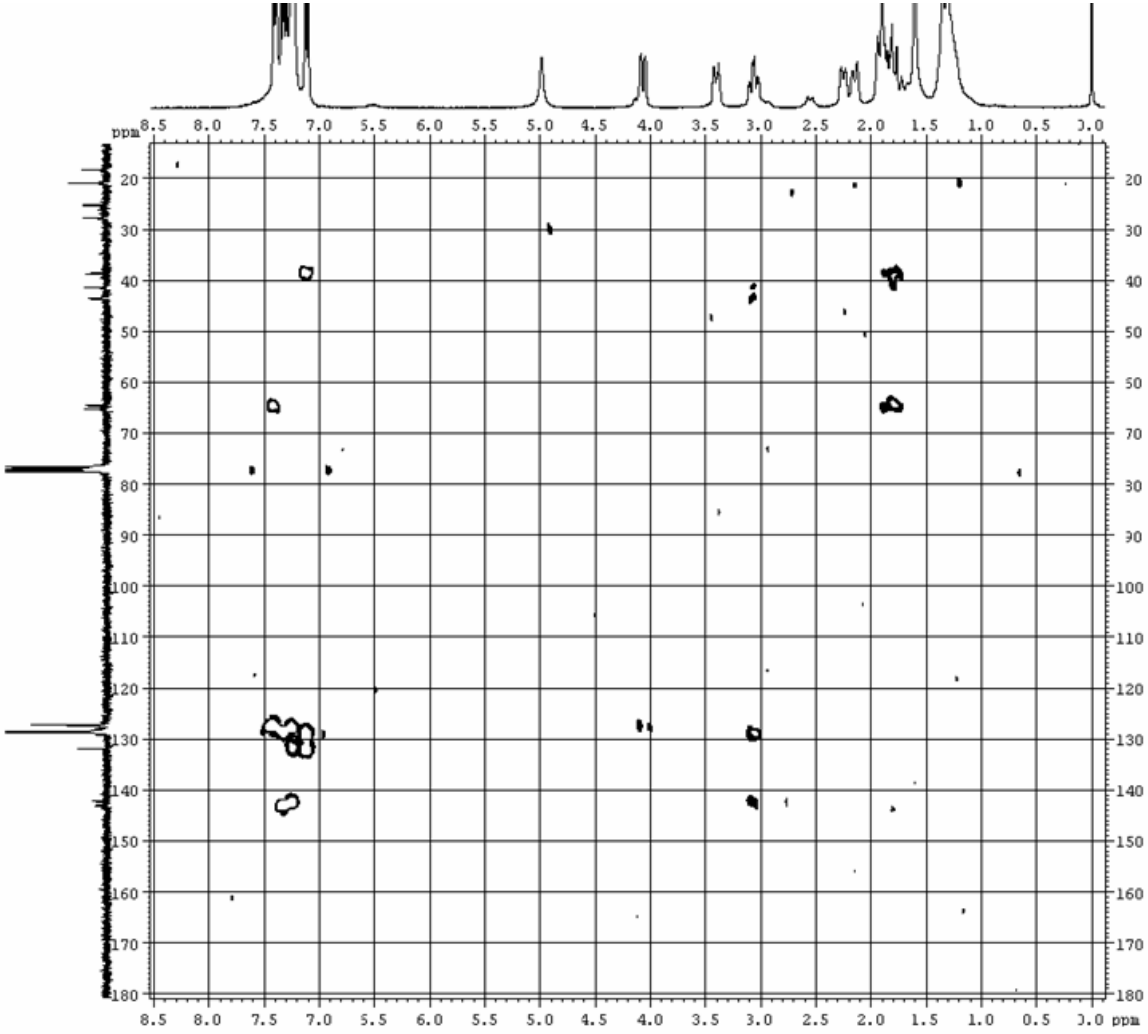
F2 - Acquisition Parameters
Date_               20100517
Time                   11.50
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG            invietgp
TD                     1024
SOLVENT               CDCl3
NS                        4
DS                       16
SWH                3086.420 Hz
FIDRES             3.014082 Hz
AQ                 0.1659380 sec
RG                   18390.4
DW                   162.000 usec
DE                     6.00 usec
TE                   300.0 K
CNST2              145.0000000
d0                 0.00000300 sec
D1                 1.96231604 sec
d4                 0.00172414 sec
d11                0.03000000 sec
d13                0.00000400 sec
D16                0.00015000 sec
DELTA              0.00167530 sec
DELTA1             0.00021614 sec
IN0                0.00004000 sec
MCREST             0.00000000 sec
MCWRK              0.39246321 sec
ST1CNT                   128

======== CHANNEL f1 ========
NUC1                     1H
P1                     9.65 usec
p2                    19.30 usec
P28                    0.50 usec
PL1                    0.00 dB
SF01           300.1312226 MHz

======== CHANNEL f2 ========
CPDPRG2                gaxp
NUC2                    13C
P3                    12.50 usec
p4                    25.00 usec
PCPD2                 75.00 usec
PL2                   -5.00 dB
PL12                  10.56 dB
SF02           75.4733476 MHz

====== GRADIENT CHANNEL =====
GPNAM1             SINE.100
GPNAM2             SINE.100
GPX1                   0.00 %
GPX2                   0.00 %
GPY1                   0.00 %
GPY2                   0.00 %
GPZ1                  80.00 %
```

HMBC spectrum of **13b**




```
Current Data Parameters
NAME                  DQ-1
EXPNO                   23
PROCNO                   1

F2 - Acquisition Parameters
Date_              20100531
Time                 14.32
INSTRUM              av300
PROBHD    5 mm BBO BB-1H
PULPROG  inv4gplplrndqf
TD                    1024
SOLVENT               CDCl3
NS                      16
DS                      16
SWH                3360.215 Hz
FIDRES             3.281460 Hz
AQ                 0.1524212 sec
RG                     16384
DW                   148.800 usec
DE                     6.00 usec
TE                    300.0 K
CNST2            145.0000000
d0                 0.00000300 sec
D1                 1.47521901 sec
d2                 0.00344828 sec
D6                 0.06500000 sec
d13                0.00000400 sec
D16                0.00015000 sec
IN0                0.00002990 sec
MCREST             0.00000000 sec
MCWRK              1.47521901 sec

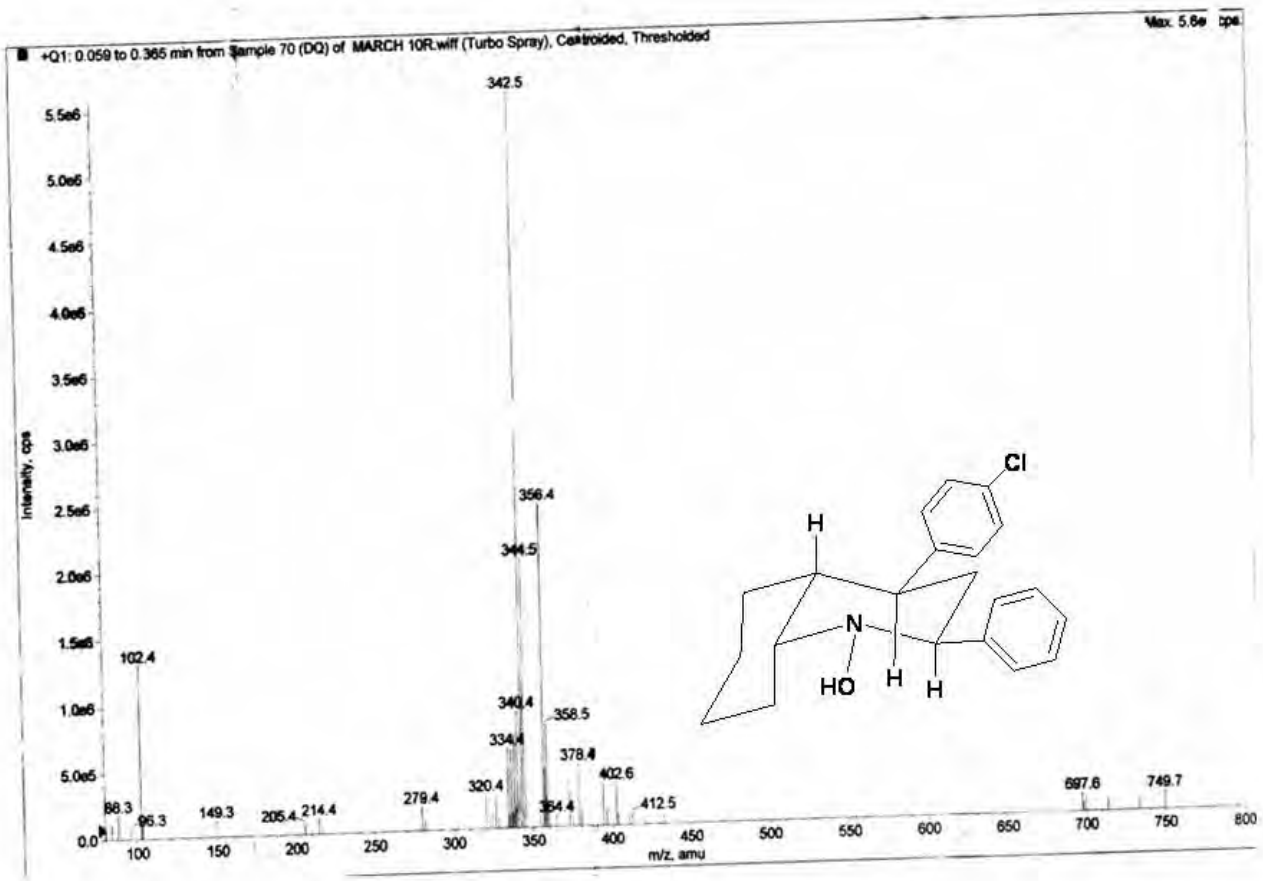
======== CHANNEL f1 ========
NUC1                      1H
P1                     9.65 usec
p2                    19.30 usec
PL1                    0.00 dB
SFO1           300.1314236 MHz

======== CHANNEL f2 ========
NUC2                     13C
P3                    12.50 usec
PL2                   -5.00 dB
SFO2            75.4752239 MHz

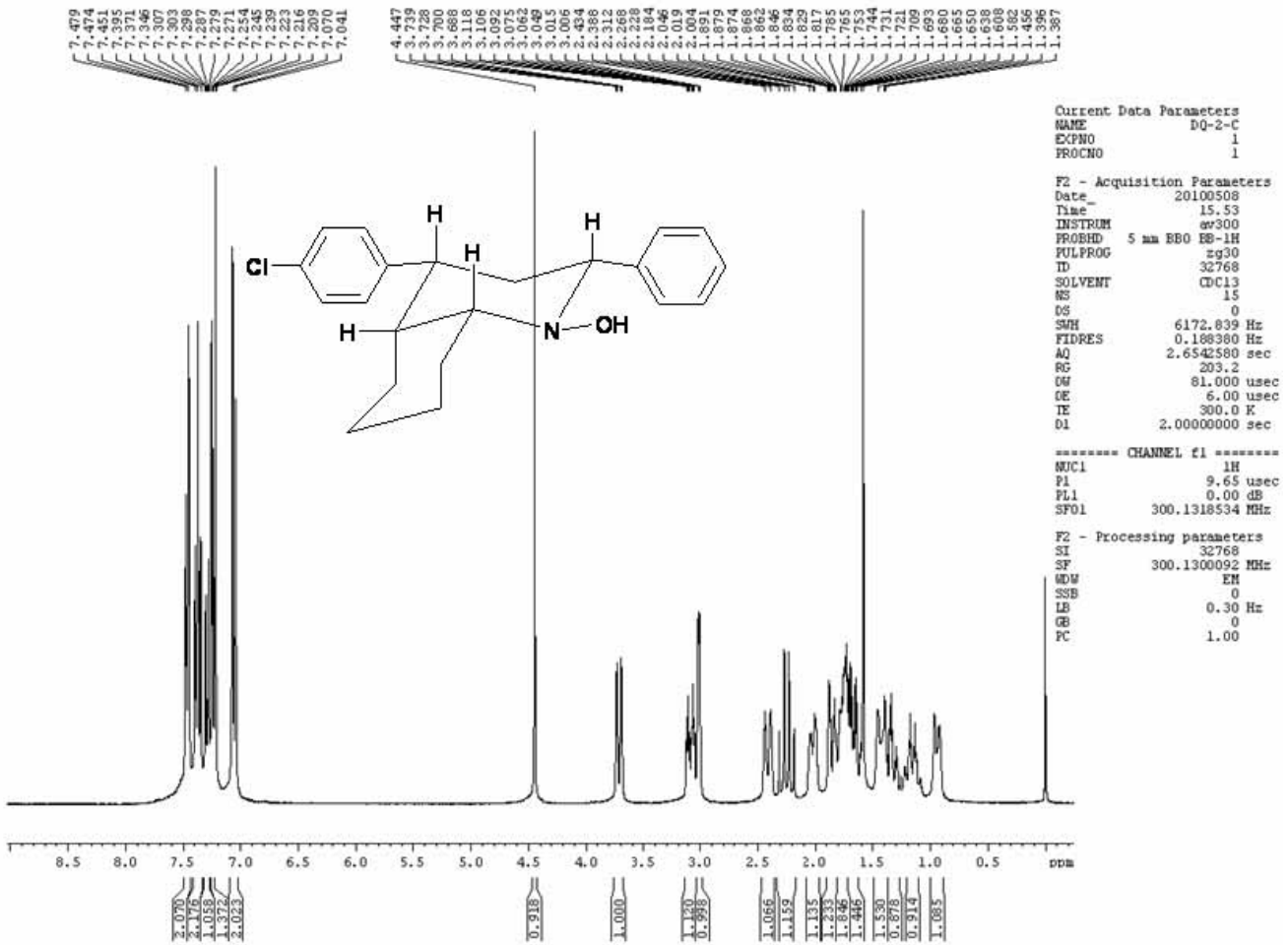
====== GRADIENT CHANNEL =====
GPNAM1             SINE.100
GPNAM2             SINE.100
GPNAM3             SINE.100
GPX1                   0.00 %
GPX2                   0.00 %
GPX3                   0.00 %
GPY1                   0.00 %
GPY2                   0.00 %
GPY3                   0.00 %
GPZ1                  50.00 %
GPZ2                  30.00 %
GPZ3                  40.10 %
P16                 1500.00 usec

F1 - Acquisition parameters
```

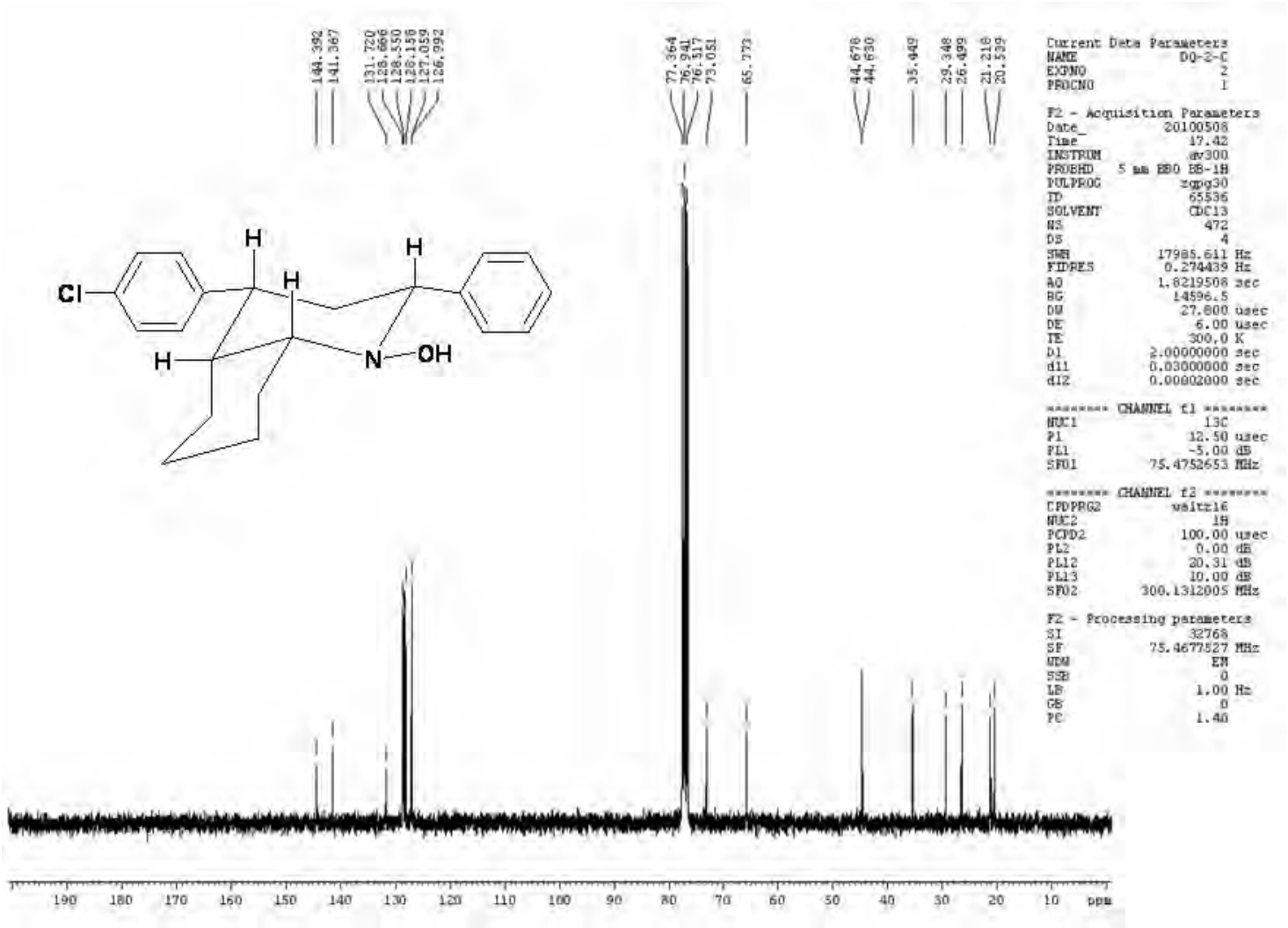
Mass spectrum of **13b**



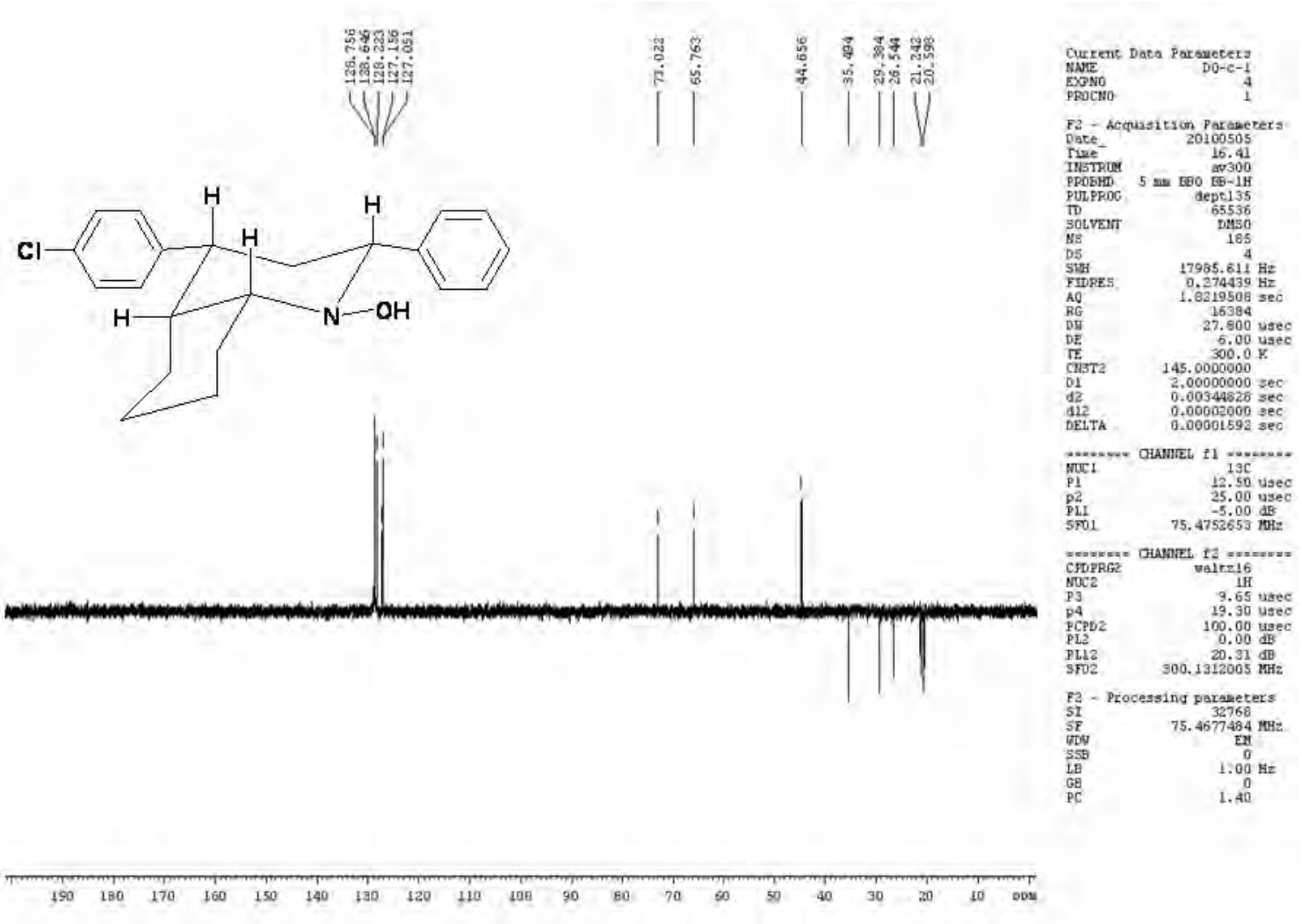
^{1}H NMR spectrum of **14b** (300 MHz, $CDCl_3$)



^{13}C NMR spectrum of **14b** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **14b**



Current Data Parameters
NAME DO-c-1
EXPNO 4
PROCNO 1

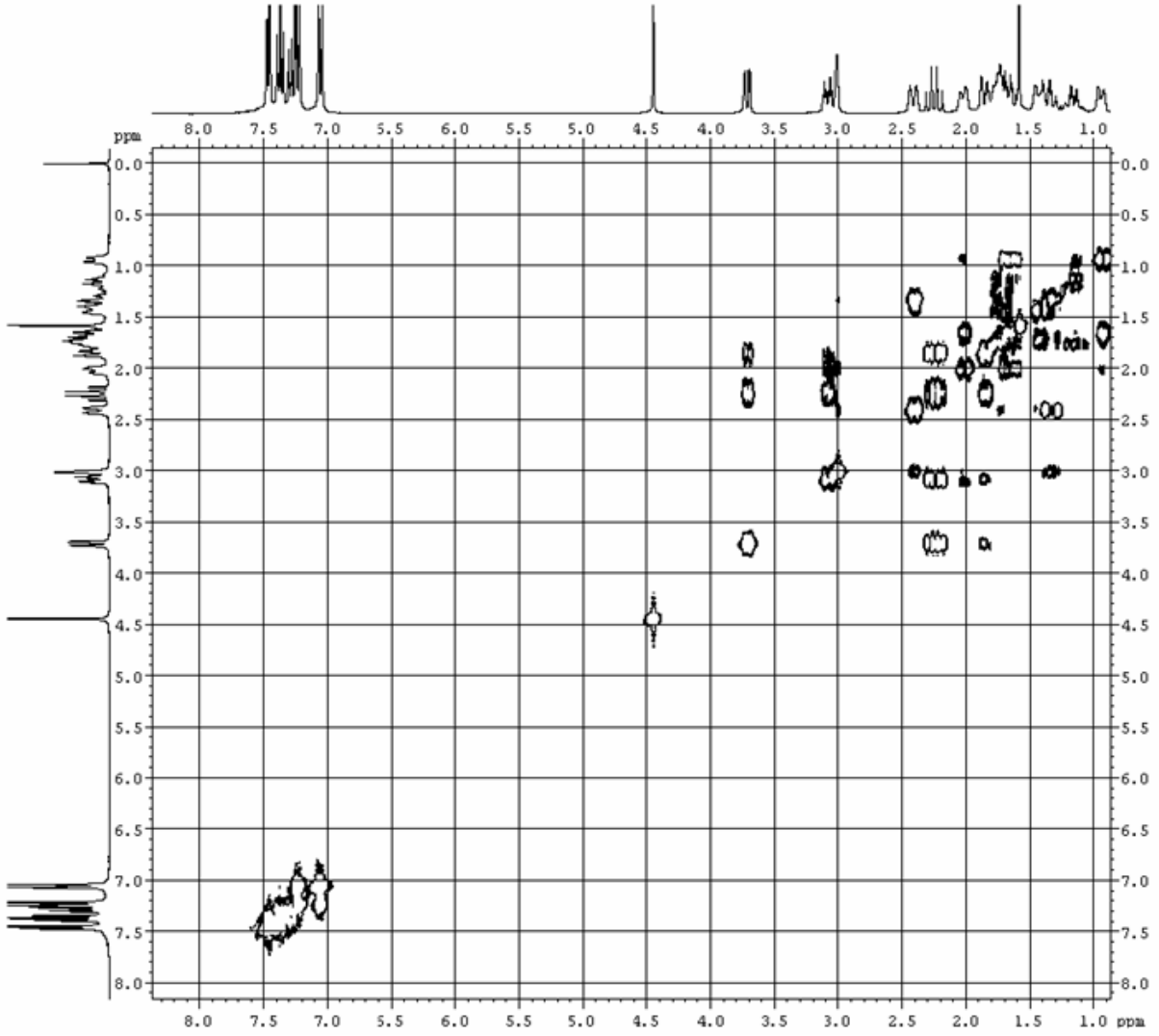
F2 - Acquisition Parameters
Date_ 20100505
Time 16.41
INSTRUM av300
PROBHD 5 mm BBO BB-1H
PULPROG dept135
TD 65536
SOLVENT DMSO
NS 165
DS 4
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219508 sec
RG 16384
DW 27.800 usec
DE 6.00 usec
TE 300.0 K
CNST2 145.0000000
D1 2.00000000 sec
d2 0.00344828 sec
d12 0.00002000 sec
DELTA 0.00001592 sec

======== CHANNEL f1 ========
NUC1 13C
P1 12.50 usec
p2 25.00 usec
PL1 -5.00 dB
SFO1 75.4752653 MHz

======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 9.65 usec
p4 19.30 usec
PCPD2 100.00 usec
PL2 0.00 dB
PL12 20.31 dB
SFO2 300.1312005 MHz

F2 - Processing parameters
SI 32768
SF 75.4677484 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

H-H COSY spectrum of **14b**




```
Current Data Parameters
NAME                  DQ-2-C
EXPNO                      6
PROCNO                     1

F2 - Acquisition Parameters
Date_              20100514
Time                  15.11
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG           cosygpqf
TD                     2048
SOLVENT                DMSO
NS                        1
DS                        8
SWH                4006.410 Hz
FIDRES             1.956255 Hz
AQ                 0.2556404 sec
RG                        64
DW                  124.800 usec
DE                    6.00 usec
TE                   300.0 K
d0                 0.00000300 sec
D1                 1.48689198 sec
d13                0.00000400 sec
D16                0.00015000 sec
IN0                0.00024960 sec
MCREST             0.00000000 sec
MCWRK              1.48689198 sec

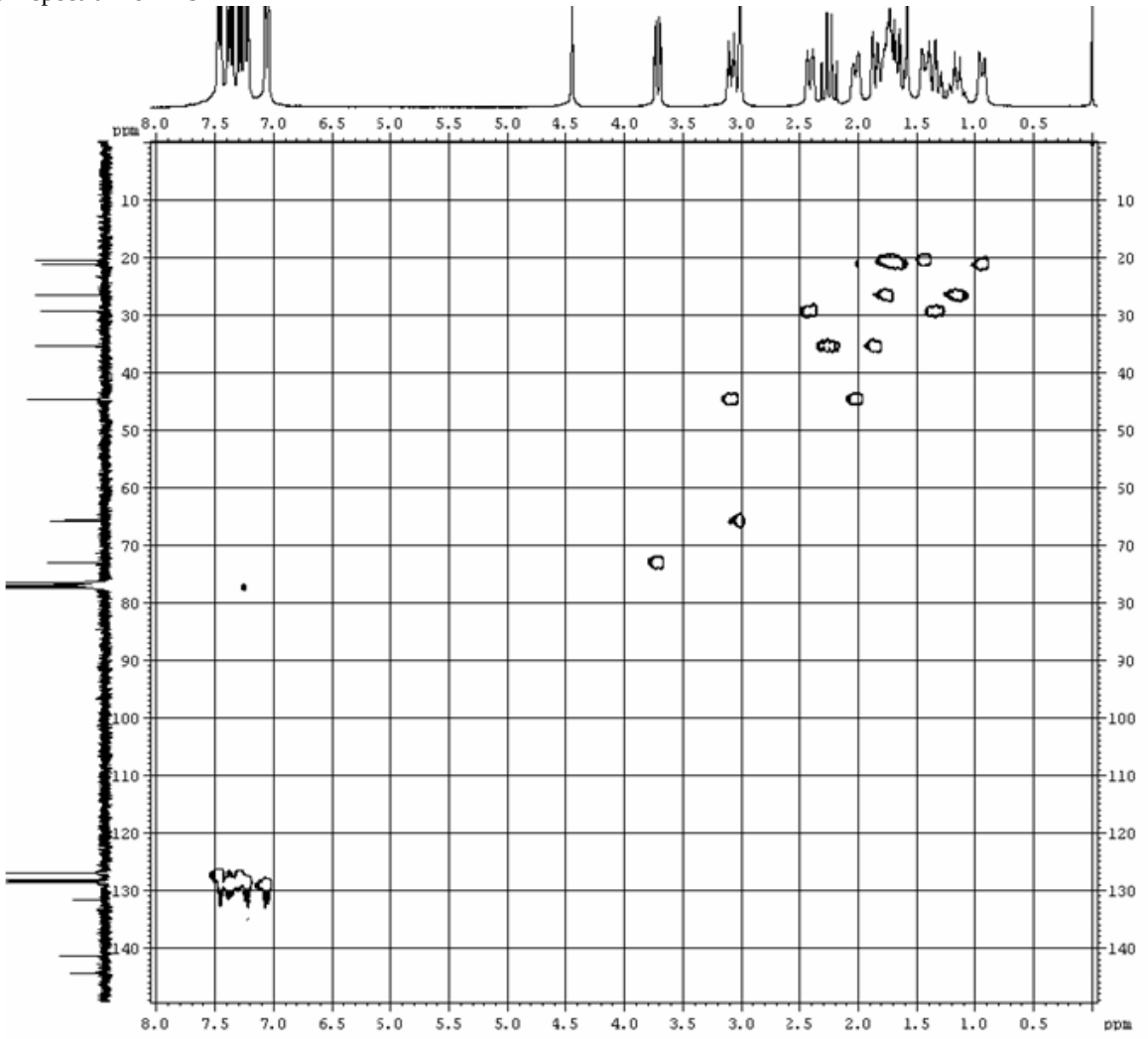
======== CHANNEL f1 ========
NUC1                      1H
P0                     9.65 usec
P1                     9.65 usec
PL1                    0.00 dB
SF01           300.1318044 MHz

====== GRADIENT CHANNEL ====
GPNAM1              SINE.100
GPNAM2              SINE.100
GPX1                   0.00 %
GPX2                   0.00 %
GPY1                   0.00 %
GPY2                   0.00 %
GPZ1                  10.00 %
GPZ2                  10.00 %
P16                 1500.00 usec

F1 - Acquisition parameters
NDO                       1
TD                      128
SF01               300.1318 MHz
FIDRES            31.300079 Hz
SW                   13.349 ppm

F2 - Processing parameters
SI                     1024
SF             300.1300091 MHz
WDW                    SINE
SSB                       0
LB                     0.00 Hz
GB                        0
PC                     1.40
```

C-H COSY spectrum of **14b**




```
Current Data Parameters
NAME                  DQ-2-C
EXPNO                     11
PROCNO                     1

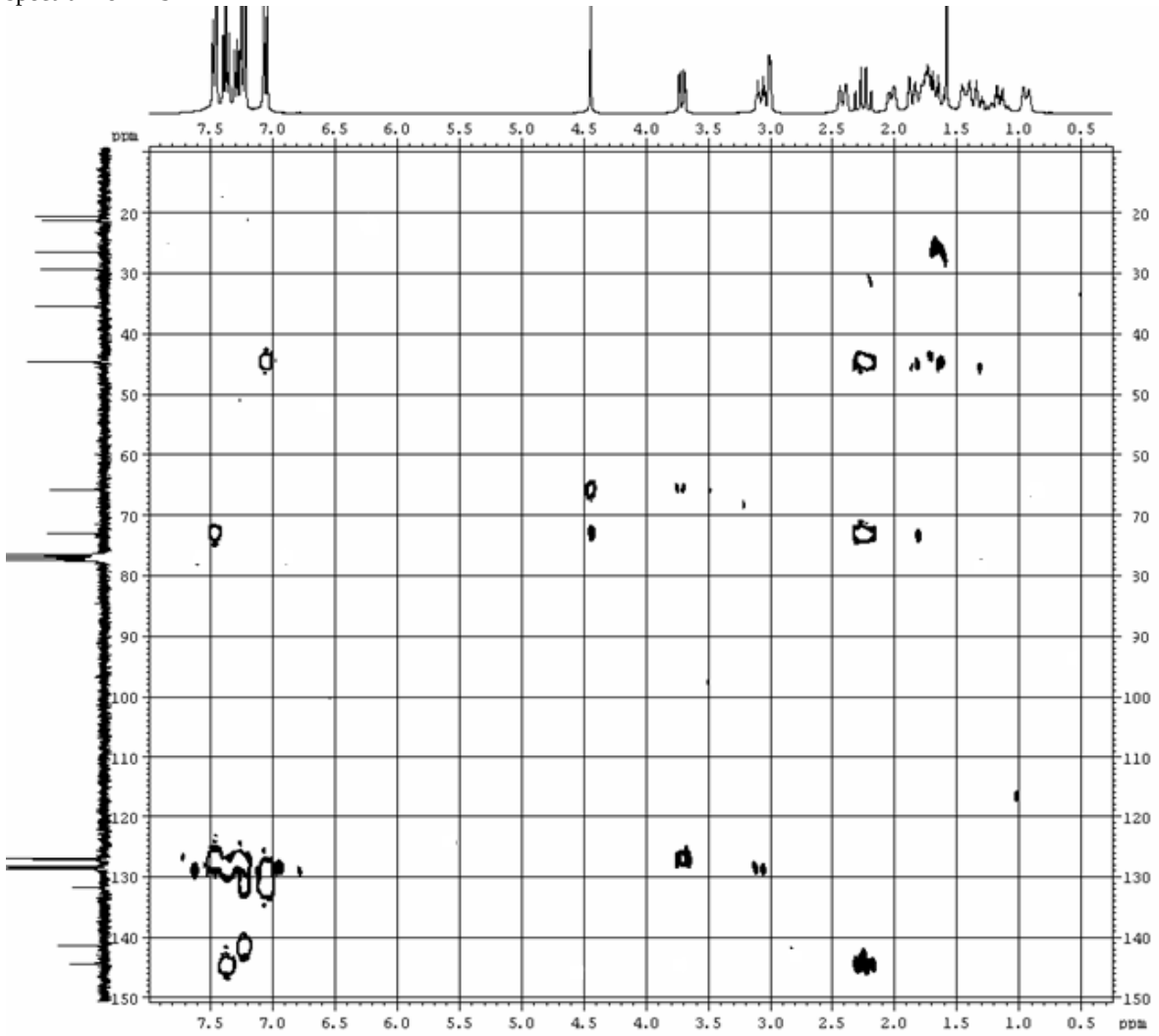
F2 - Acquisition Parameters
Date_               20100517
Time                   10.31
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG             invietgp
TD                      1024
SOLVENT                CDCl3
NS                         4
DS                        16
SWH                 3086.420 Hz
FIDRES              3.014082 Hz
AQ                  0.1659380 sec
RG                    18390.4
DW                  162.000 usec
DE                    6.00 usec
TE                    300.0 K
CNST2             145.0000000
d0                  0.00000300 sec
D1                  1.96231604 sec
d4                  0.00172414 sec
d11                 0.03000000 sec
d13                 0.00000400 sec
D16                 0.00015000 sec
DELTA               0.00167530 sec
DELTA1              0.00021614 sec
IN0                 0.00004000 sec
MCREST              0.00000000 sec
MCWRK               0.39246321 sec
ST1CNT                    128

======== CHANNEL f1 ========
NUC1                      1H
P1                    9.65 usec
p2                   19.30 usec
P28                   0.50 usec
PL1                   0.00 dB
SF01          300.1312226 MHz

======== CHANNEL f2 ========
CPDPRG2                 garp
NUC2                     13C
P3                   12.50 usec
p4                   25.00 usec
PCPD2                75.00 usec
PL2                  -5.00 dB
PL12                 10.56 dB
SF02           75.4733476 MHz

====== GRADIENT CHANNEL =====
GPNAM1             SINE.100
GPNAM2             SINE.100
GPX1                  0.00 %
GPX2                  0.00 %
GPY1                  0.00 %
GPY2                  0.00 %
GPZ1                 80.00 %
GPZ2                 20.10 %
P16                1500.00 usec
```

HMBC spectrum of **14b**




```
Current Data Parameters
NAME                  DQ-2-C
EXPNO                      3
PROCNO                     1

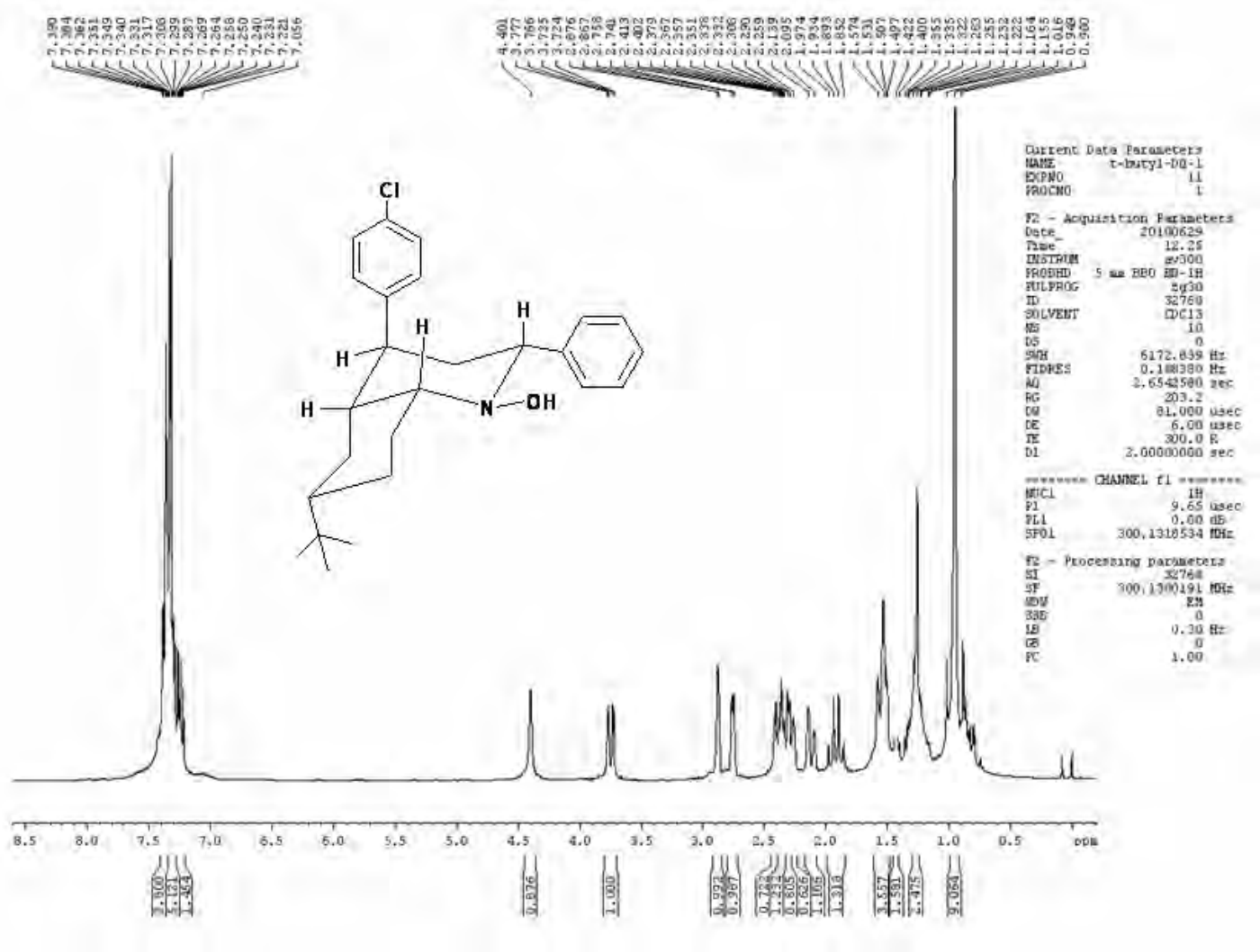
F2 - Acquisition Parameters
Date_              20100514
Time                  14.43
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG   inv4gplp1rndqf
TD                      1024
SOLVENT                 CDCl3
NS                         8
DS                        16
SWH                 3360.215 Hz
FIDRES                 3.281460 Hz
AQ                  0.1524212 sec
RG                        16384
DW                    148.800 usec
DE                      6.00 usec
TE                      300.0 K
CNST2               145.0000000
d0                  0.00000300 sec
D1                  1.47521901 sec
d2                  0.00344828 sec
D6                  0.06500000 sec
d13                 0.00000400 sec
D16                 0.00015000 sec
IN0                 0.00002990 sec
MCREST              0.00000000 sec
MCWRK               1.47521901 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                      9.65 usec
p2                     19.30 usec
PL1                     0.00 dB
SF01                300.1314236 MHz

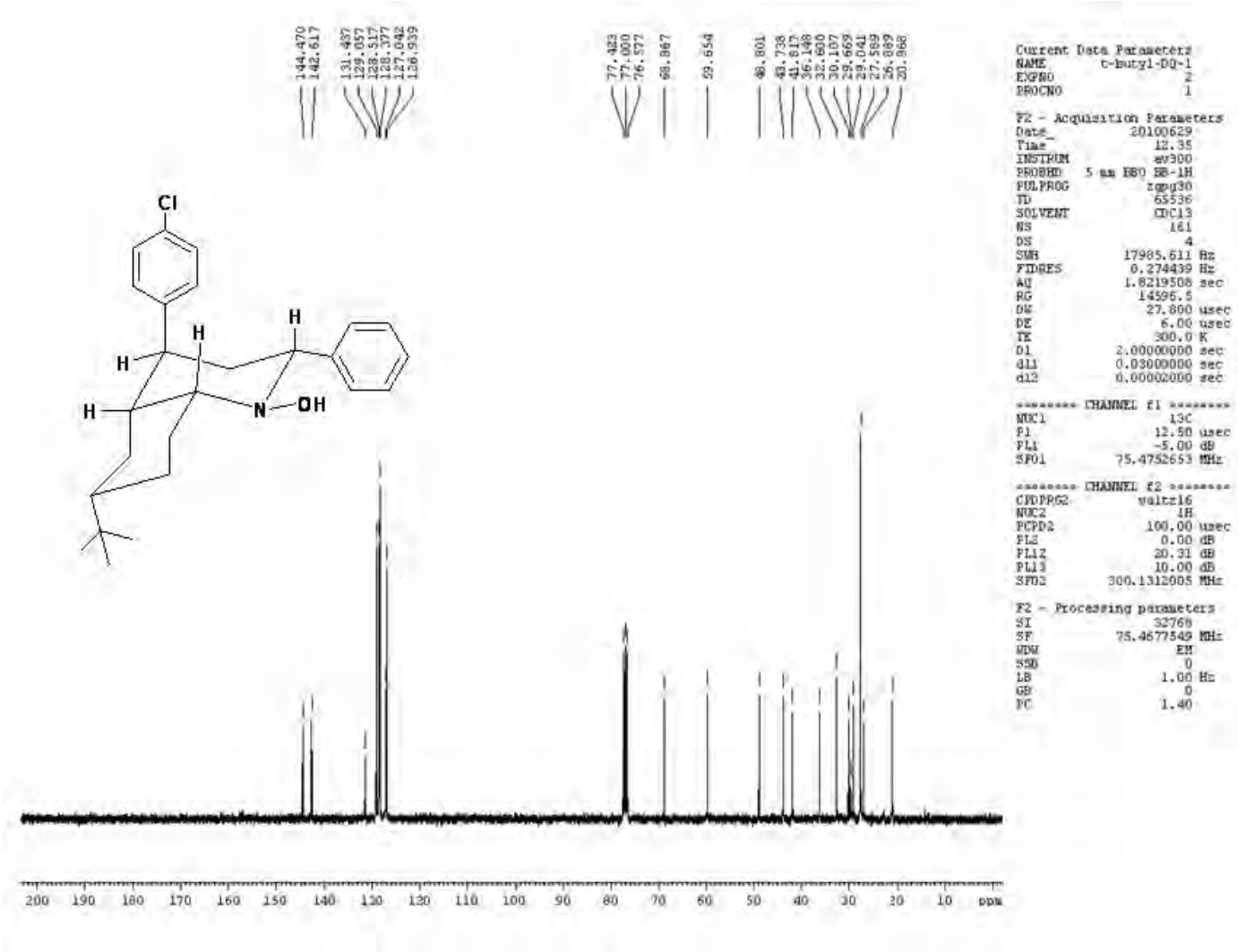
======== CHANNEL f2 ========
NUC2                       13C
P3                     12.50 usec
PL2                    -5.00 dB
SF02                75.4752239 MHz

====== GRADIENT CHANNEL =====
GPNAM1               SINE.100
GPNAM2               SINE.100
GPNAM3               SINE.100
GPX1                    0.00 %
GPX2                    0.00 %
GPX3                    0.00 %
GPY1                    0.00 %
GPY2                    0.00 %
GPY3                    0.00 %
GPZ1                   50.00 %
GPZ2                   30.00 %
GPZ3                   40.10 %
P16                 1500.00 usec
```

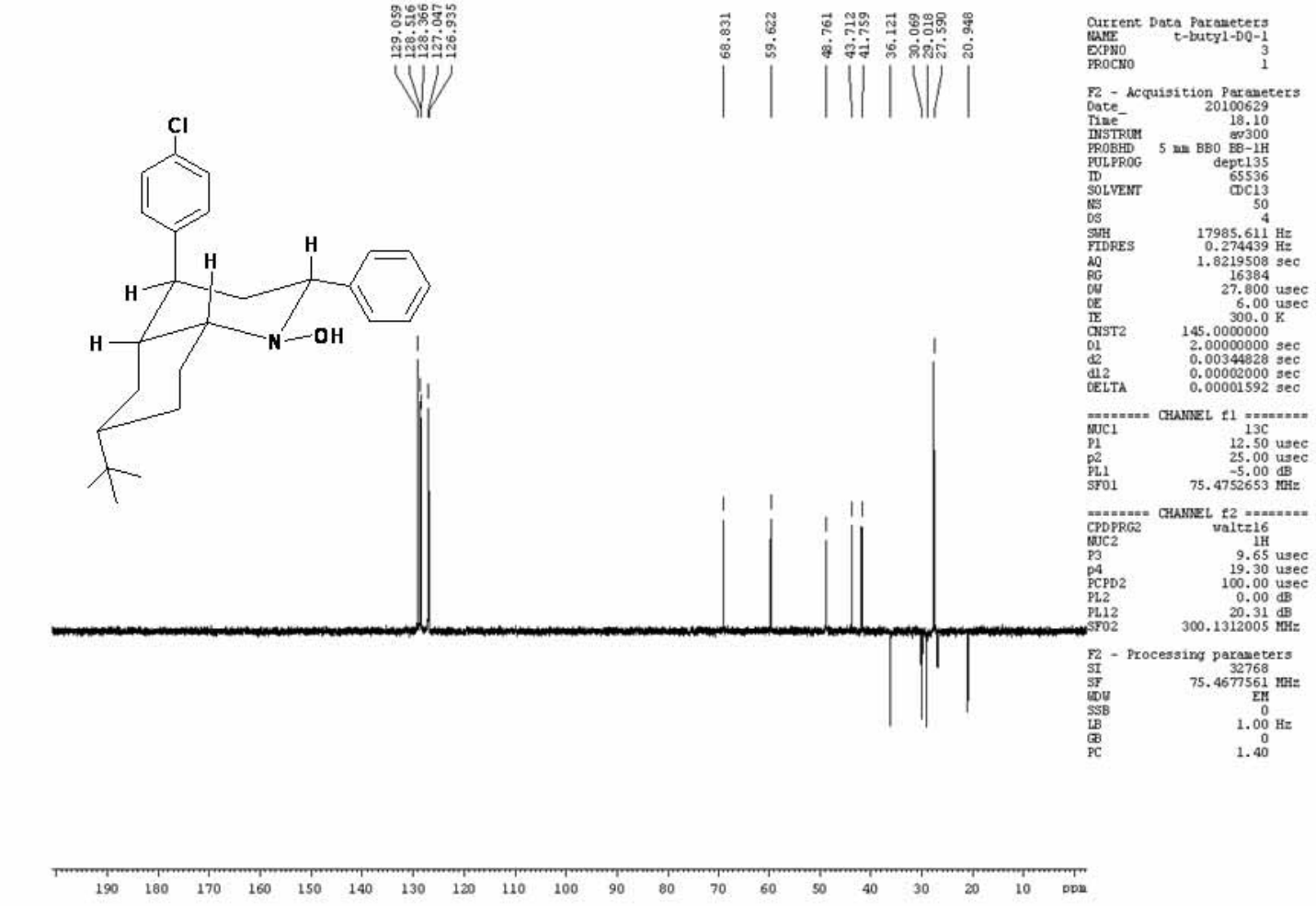
^{1}H NMR spectrum of **15c** (300 MHz, $CDCl_3$)



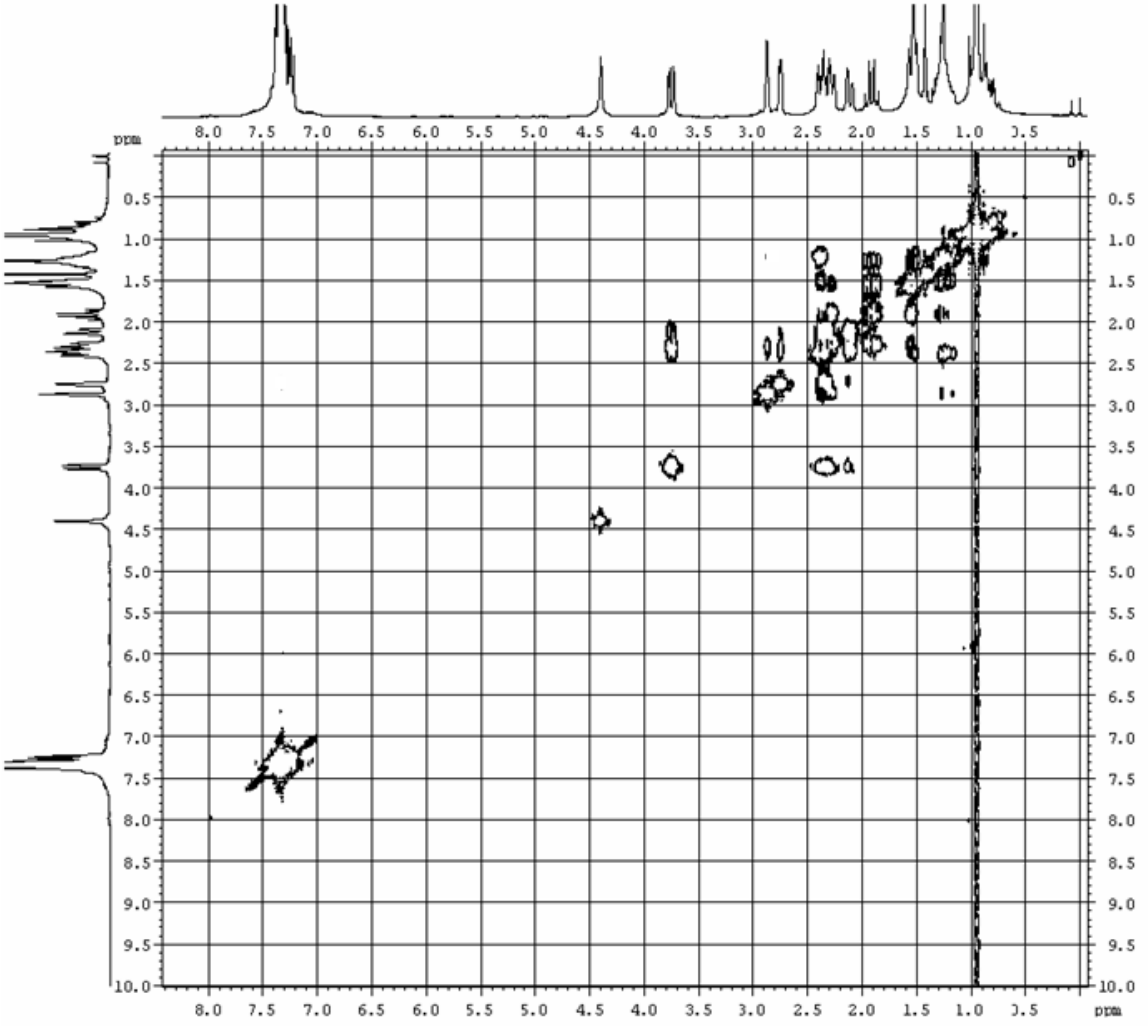
^{13}C NMR spectrum of **14b** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **15c**



H-H COSY spectrum of **15c**




```
Current Data Parameters
NAME          t-butyl-DQ-1
EXPNO                    4
PROCNO                   1

F2 - Acquisition Parameters
Date_             20100629
Time                 17.40
INSTRUM              av300
PROBHD   5 mm BBO BB-1H
PULPROG          cosygpqf
TD                   2048
SOLVENT              CDC13
NS                       1
DS                       8
SWH              4006.410 Hz
FIDRES           1.956255 Hz
AQ               0.2556404 sec
RG                      64
DW                124.800 usec
DE                  6.00 usec
TE                 300.0 K
d0               0.00000300 sec
D1               1.48689198 sec
d13              0.00000400 sec
D16              0.00015000 sec
IN0              0.00024960 sec
MCREST           0.00000000 sec
MCWRK            1.48689198 sec

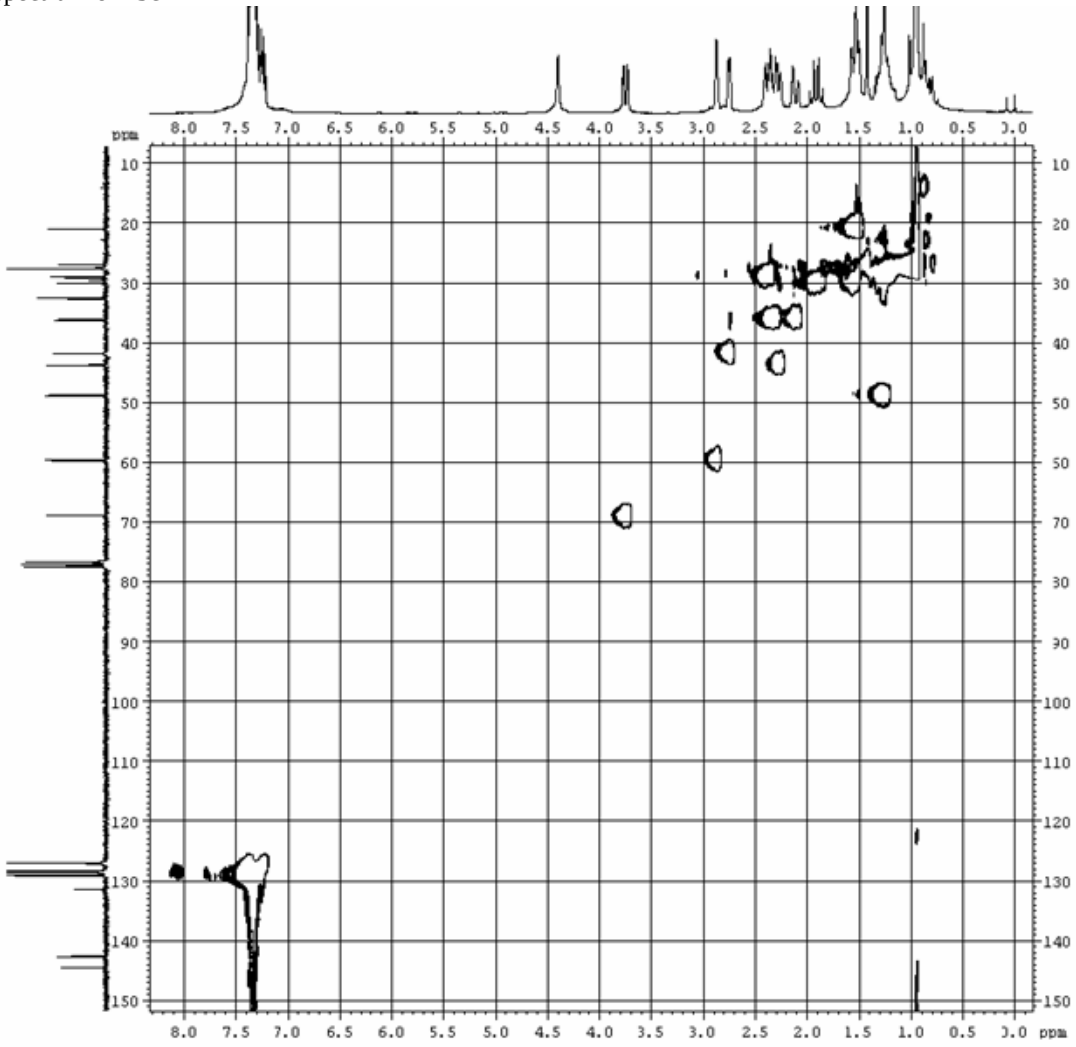
======== CHANNEL f1 ========
NUC1                    1H
P0                   9.65 usec
P1                   9.65 usec
PL1                  0.00 dB
SFO1          300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1           SINE.100
GPNAM2           SINE.100
GPX1                 0.00 %
GPX2                 0.00 %
GPY1                 0.00 %
GPY2                 0.00 %
GPZ1                10.00 %
GPZ2                10.00 %
P16               1500.00 usec

F1 - Acquisition parameters
NDO                      1
TD                     128
SFO1          300.1318 MHz
FIDRES         31.300079 Hz
SW                13.349 ppm

F2 - Processing parameters
SI                    1024
SF            300.1300178 MHz
WDW                   SINE
SSB                      0
LB                    0.00 Hz
GB                       0
```

C-H COSY spectrum of **15c**




```
Current Data Parameters
NAME        t-butyl-DQ-1
EXPNO                  5
PROCNO                 1

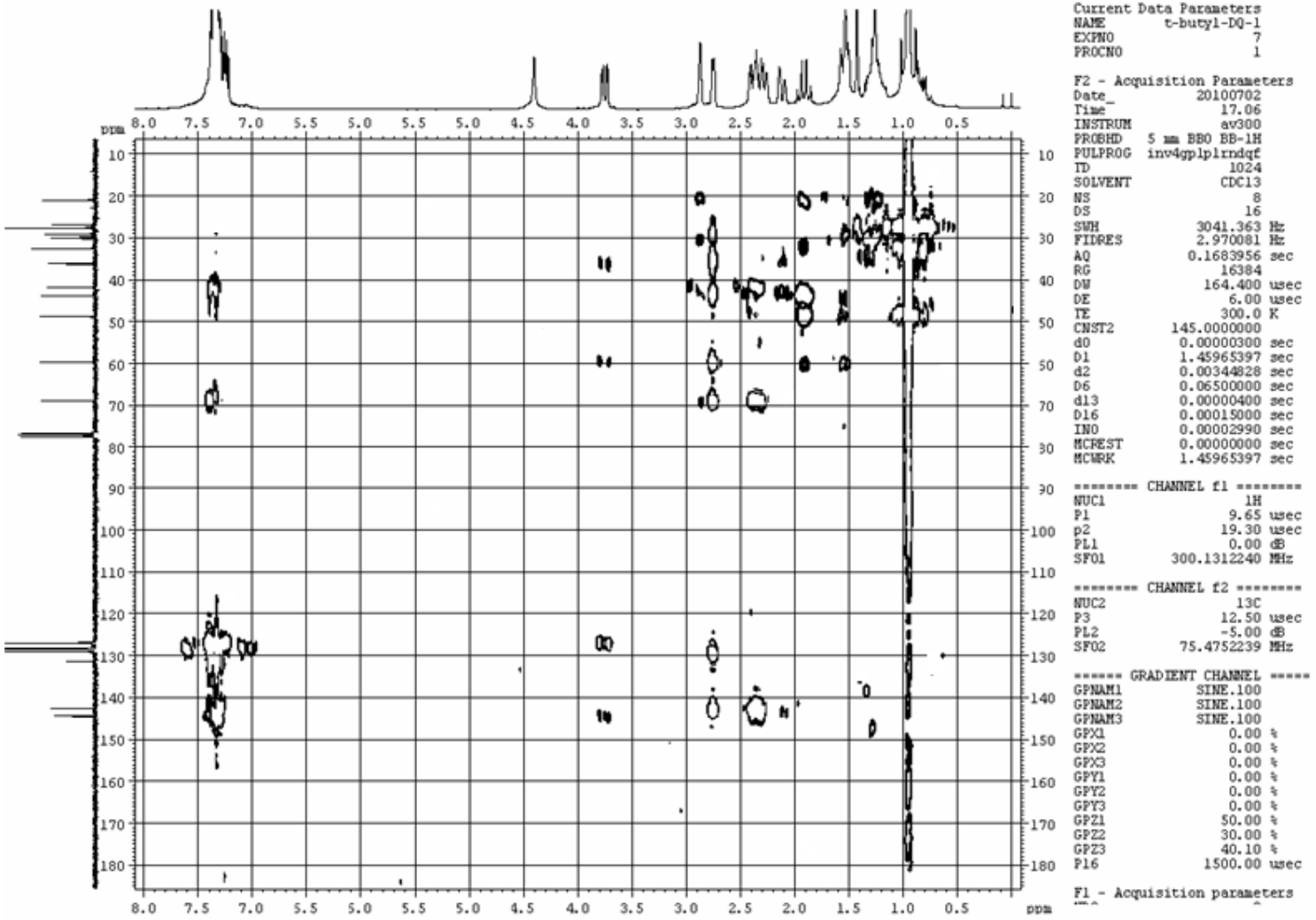
F2 - Acquisition Parameters
Date_           20100629
Time               17.48
INSTRUM            av300
PROBHD   5 mm BBO BB-1H
PULPROG         invietgp
TD                 1024
SOLVENT            CDCl3
NS                    4
DS                   16
SWH           3086.420 Hz
FIDRES          3.014082 Hz
AQ             0.1659380 sec
RG              18390.4
DW              162.000 usec
DE                6.00 usec
TE               300.0 K
CNST2        145.0000000
d0             0.00000300 sec
D1             1.96231604 sec
d4             0.00172414 sec
d11            0.03000000 sec
d13            0.00000400 sec
D16            0.00015000 sec
DELTA          0.00167530 sec
DELTA1         0.00021614 sec
IN0            0.00004000 sec
MCREST         0.00000000 sec
MCWRK          0.39246321 sec
ST1CNT              128

======== CHANNEL f1 ========
NUC1                1H
P1                9.65 usec
p2               19.30 usec
P28               0.50 usec
PL1               0.00 dB
SF01       300.1312226 MHz

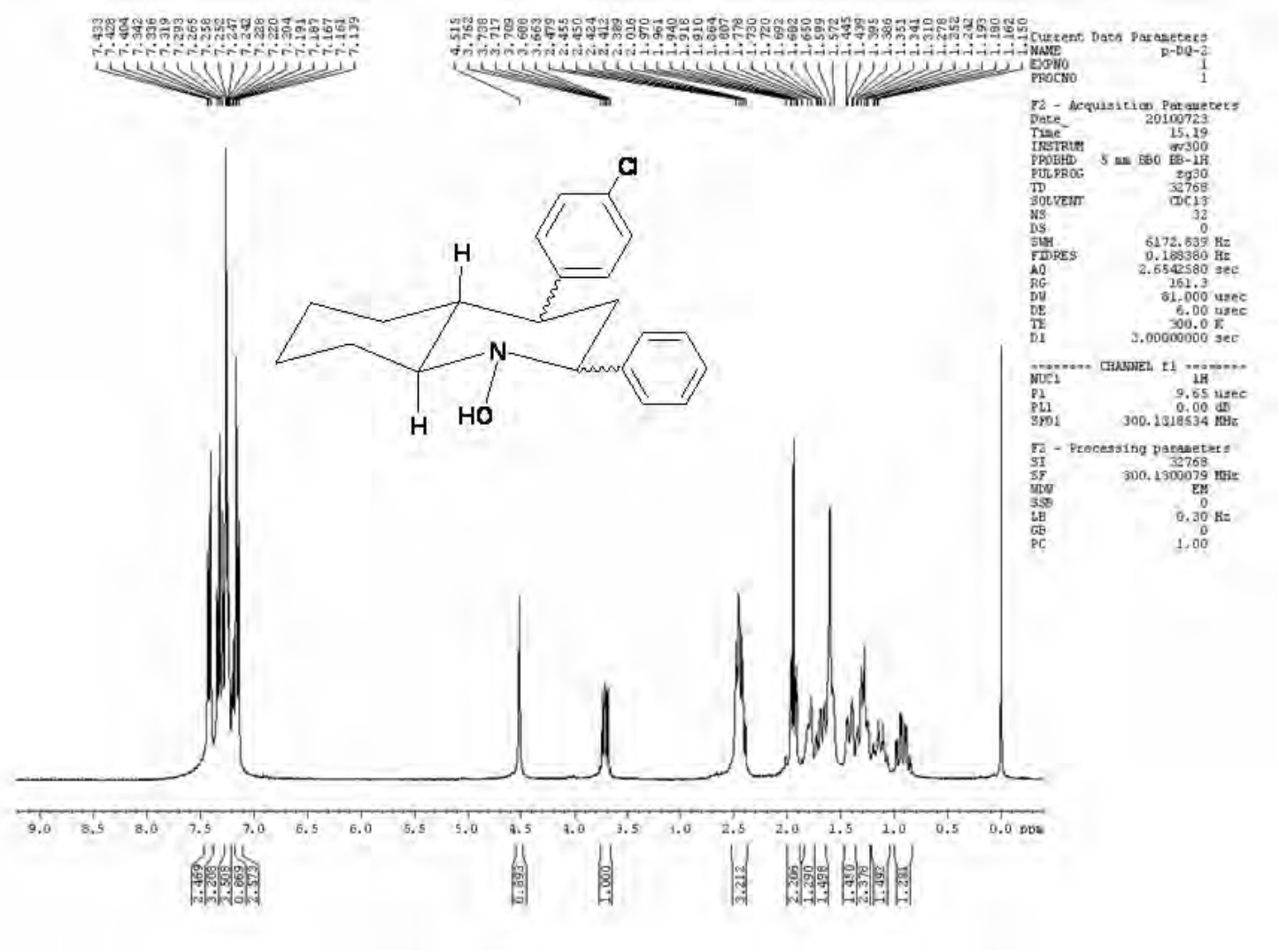
======== CHANNEL f2 ========
CPDPRG2          garp
NUC2              13C
P3               12.50 usec
p4               25.00 usec
PCPD2            75.00 usec
PL2              -5.00 dB
PL12             10.56 dB
SF02       75.4733476 MHz

====== GRADIENT CHANNEL =====
GPNAM1         SINE.100
GPNAM2         SINE.100
GPX1              0.00 %
GPX2              0.00 %
GPY1              0.00 %
GPY2              0.00 %
GPZ1             80.00 %
GPZ2             20.10 %
P16            1500.00 usec
```

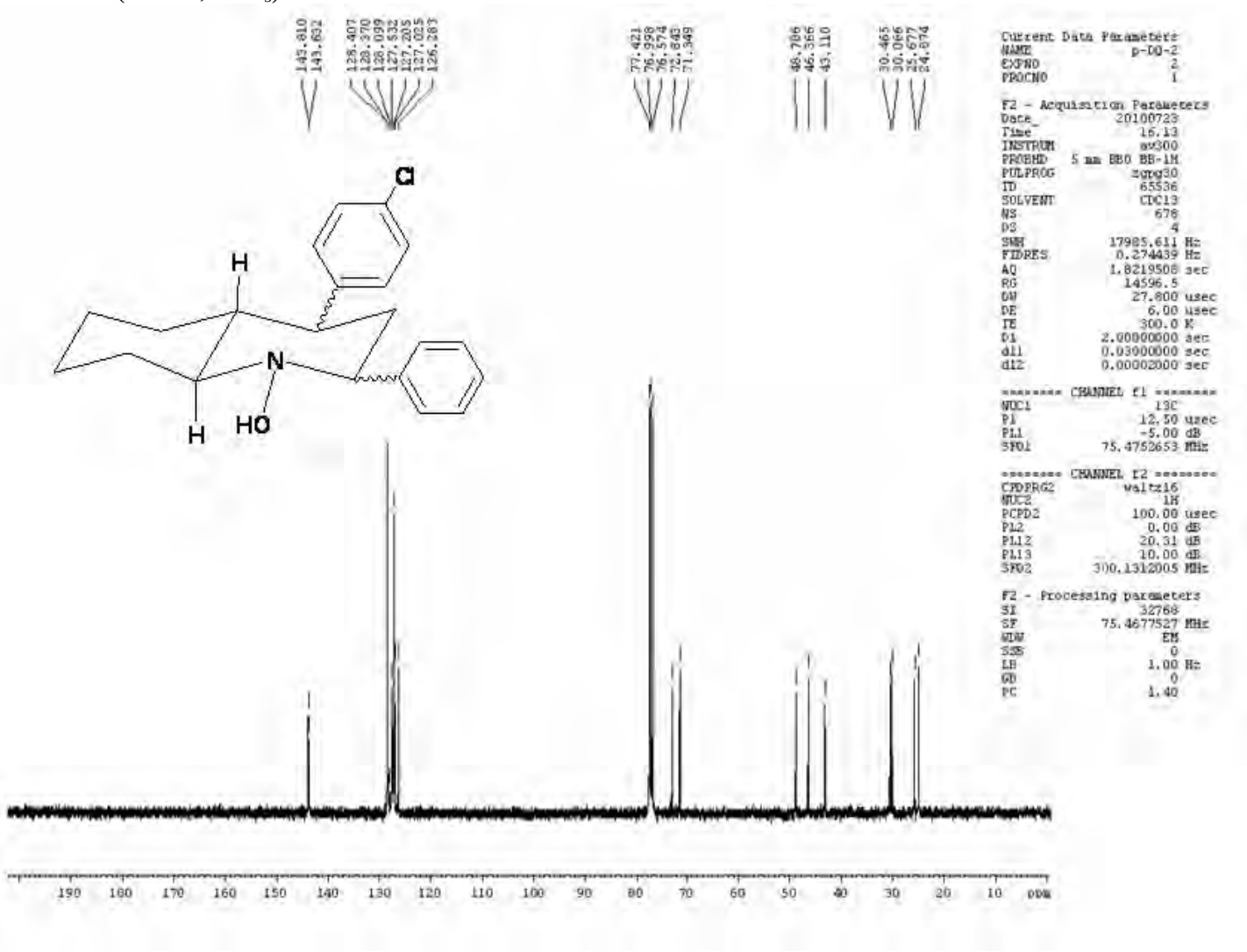
HMBC spectrum of **15c**



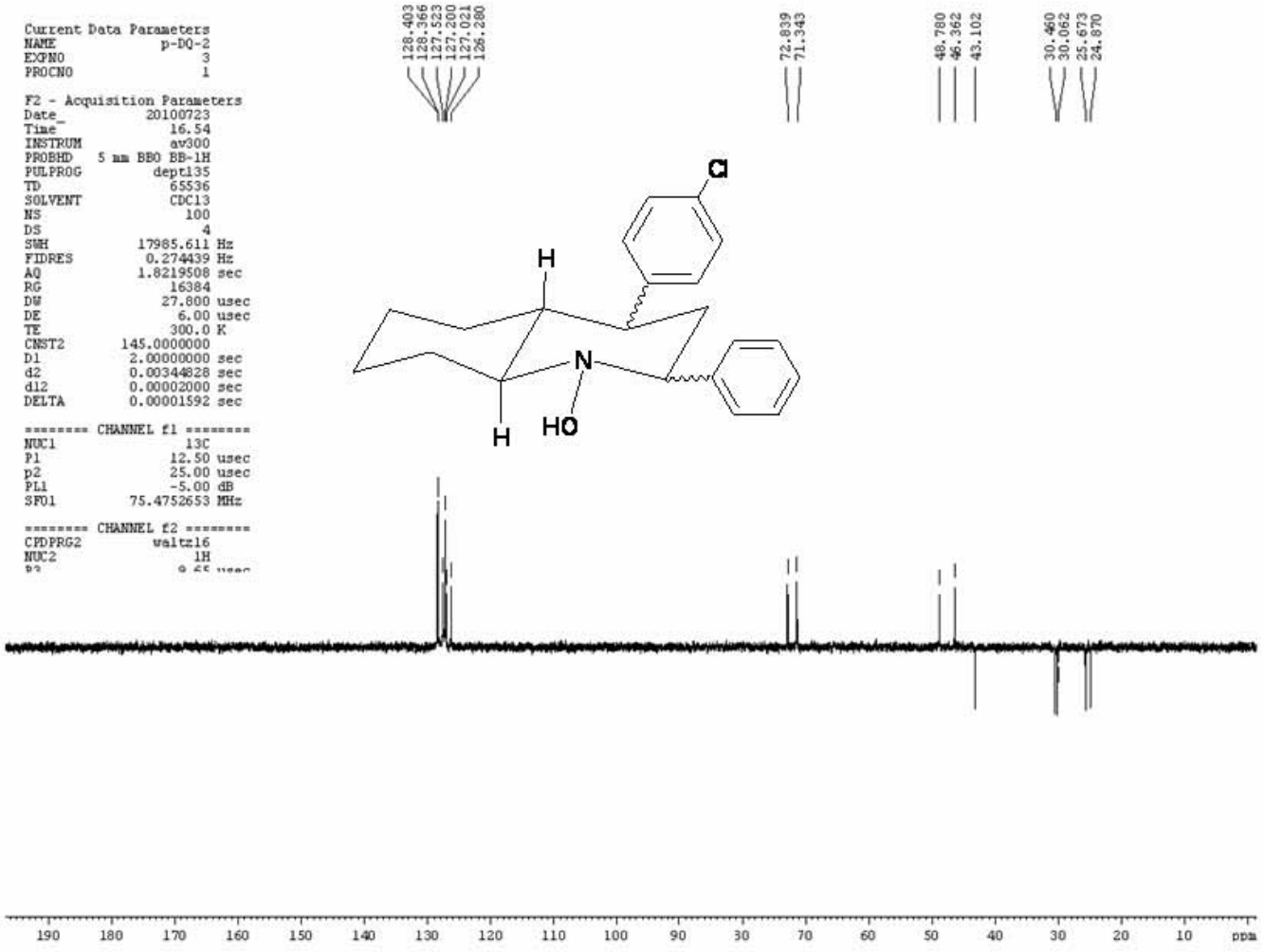
^{1}H NMR spectrum of **16b** (300 MHz, $CDCl_3$)



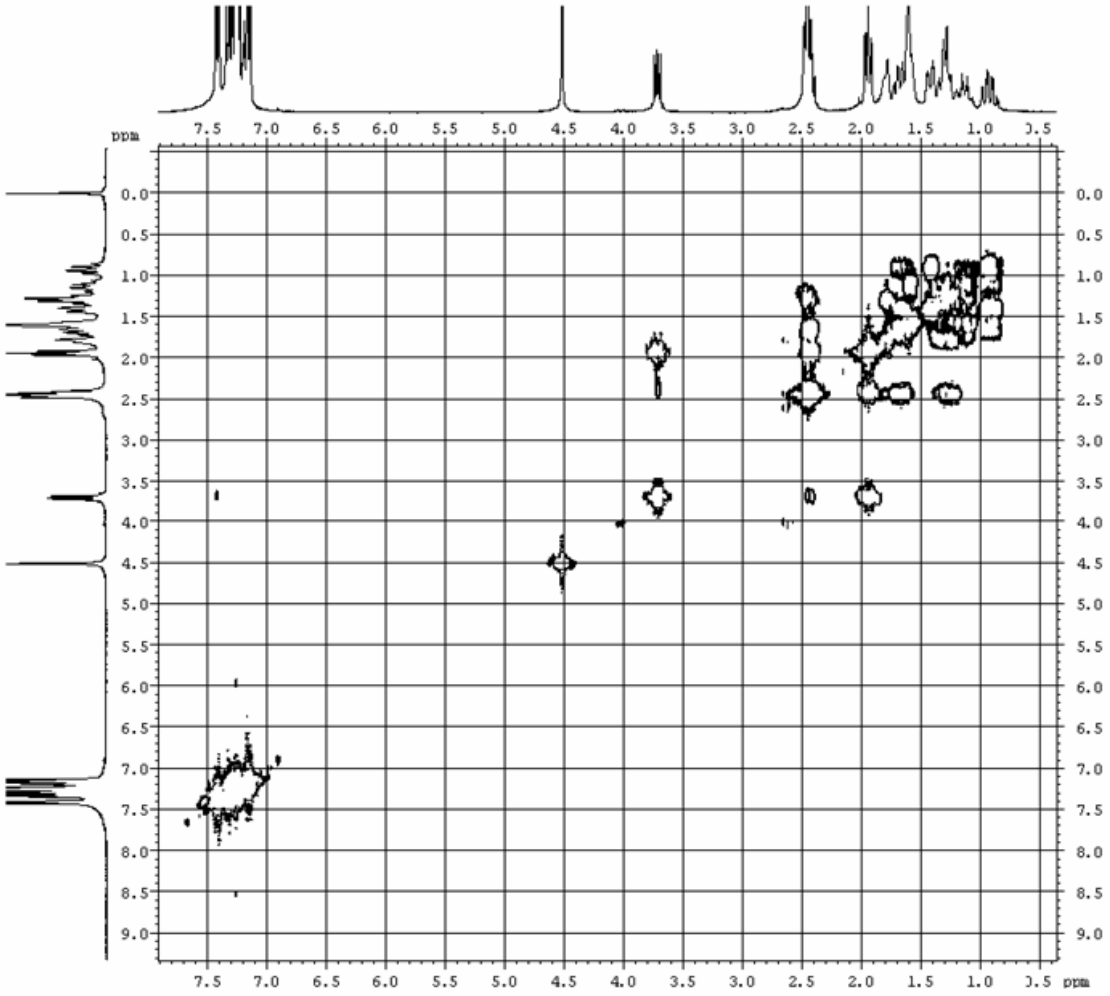
^{13}C NMR spectrum of **16b** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **16b**



H-H COSY spectrum of **16b**




```
Current Data Parameters
NAME                  p-DQ-2
EXPNO                      4
PROCNO                     1

F2 - Acquisition Parameters
Date_                20100723
Time                    15.23
INSTRUM                 av300
PROBHD   5 mm BBO BB-1H
PULPROG             cosygpqf
TD                       2048
SOLVENT                  DMSO
NS                          2
DS                          8
SWH                  4006.410 Hz
FIDRES               1.956255 Hz
AQ                   0.2556404 sec
RG                         64
DW                    124.800 usec
DE                      6.00 usec
TE                     300.0 K
d0                   0.00000300 sec
D1                   1.48689198 sec
d13                  0.00000400 sec
D16                  0.00015000 sec
IN0                  0.00024960 sec
MCREST               0.00000000 sec
MCWRK                1.48689198 sec

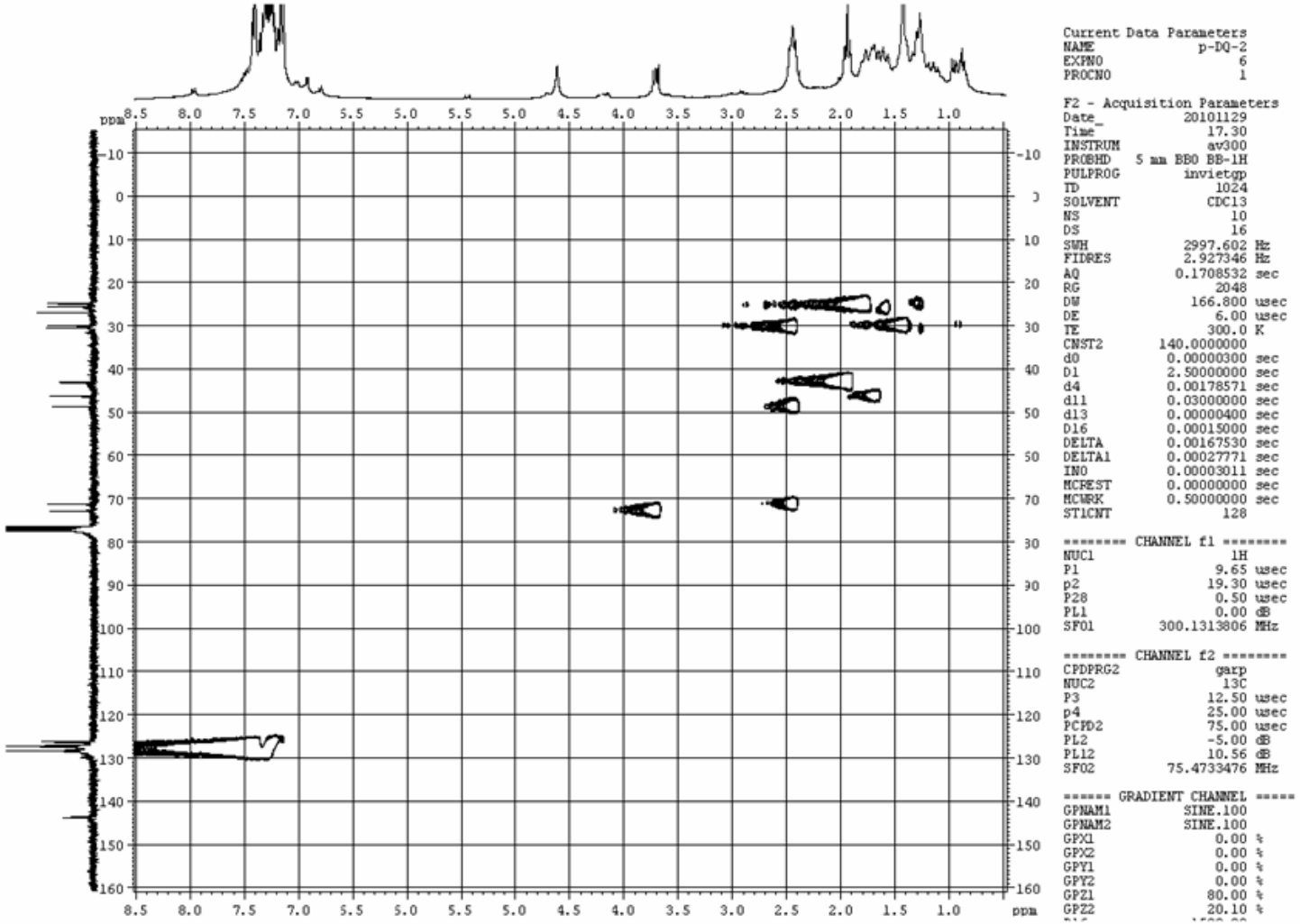
======== CHANNEL f1 ========
NUC1                       1H
P0                      9.65 usec
P1                      9.65 usec
PL1                     0.00 dB
SF01               300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1                SINE.100
GPNAM2                SINE.100
GPX1                    0.00 %
GPX2                    0.00 %
GPY1                    0.00 %
GPY2                    0.00 %
GPZ1                   10.00 %
GPZ2                   10.00 %
P16                  1500.00 usec

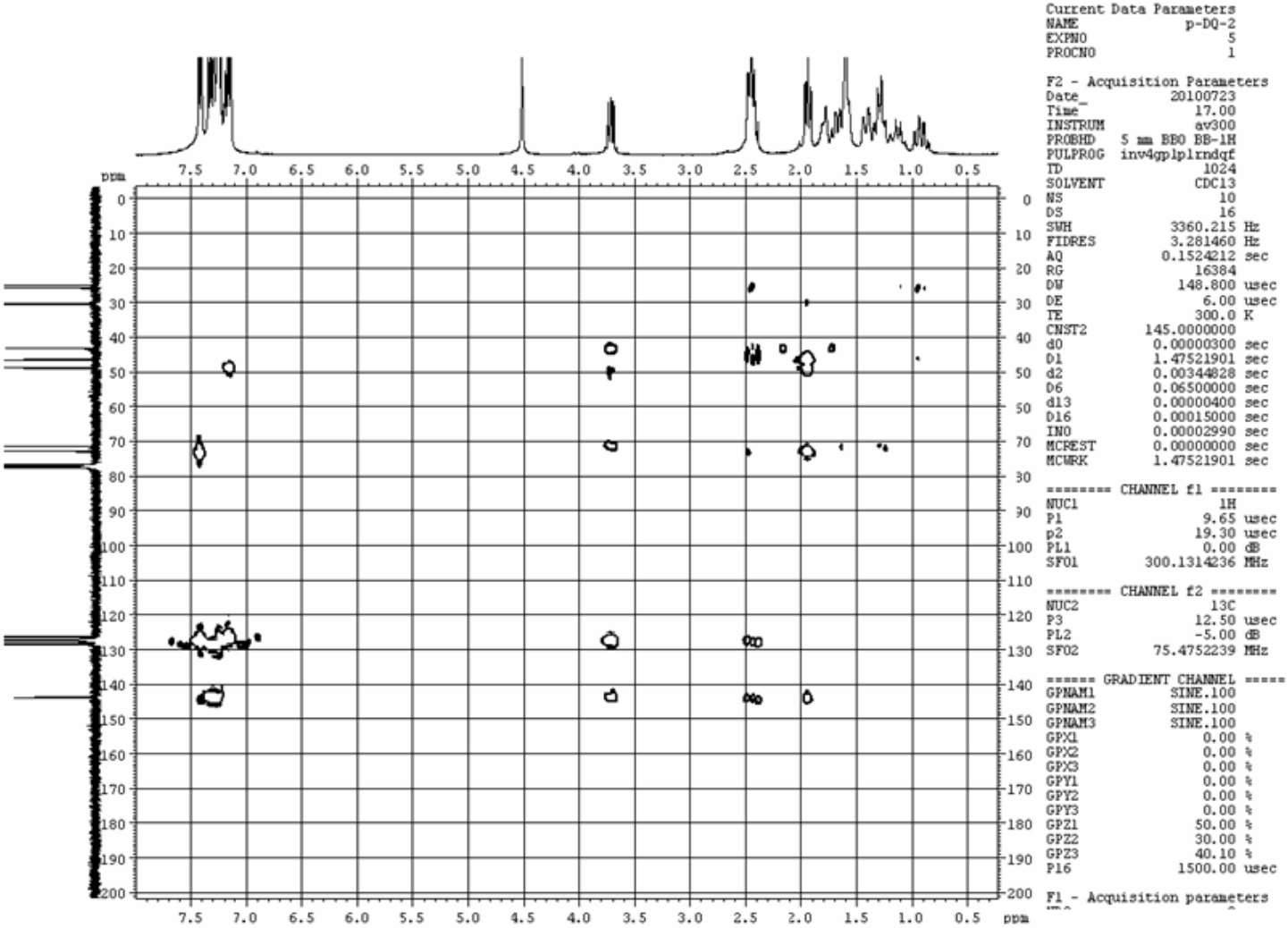
F1 - Acquisition parameters
ND0                        1
TD                       128
SF01               300.1318 MHz
FIDRES              31.300079 Hz
SW                     13.349 ppm

F2 - Processing parameters
SI                      1024
SF                 300.1300073 MHz
WDW                     SINE
SSB                        0
LB                      0.00 Hz
GB                         0
```

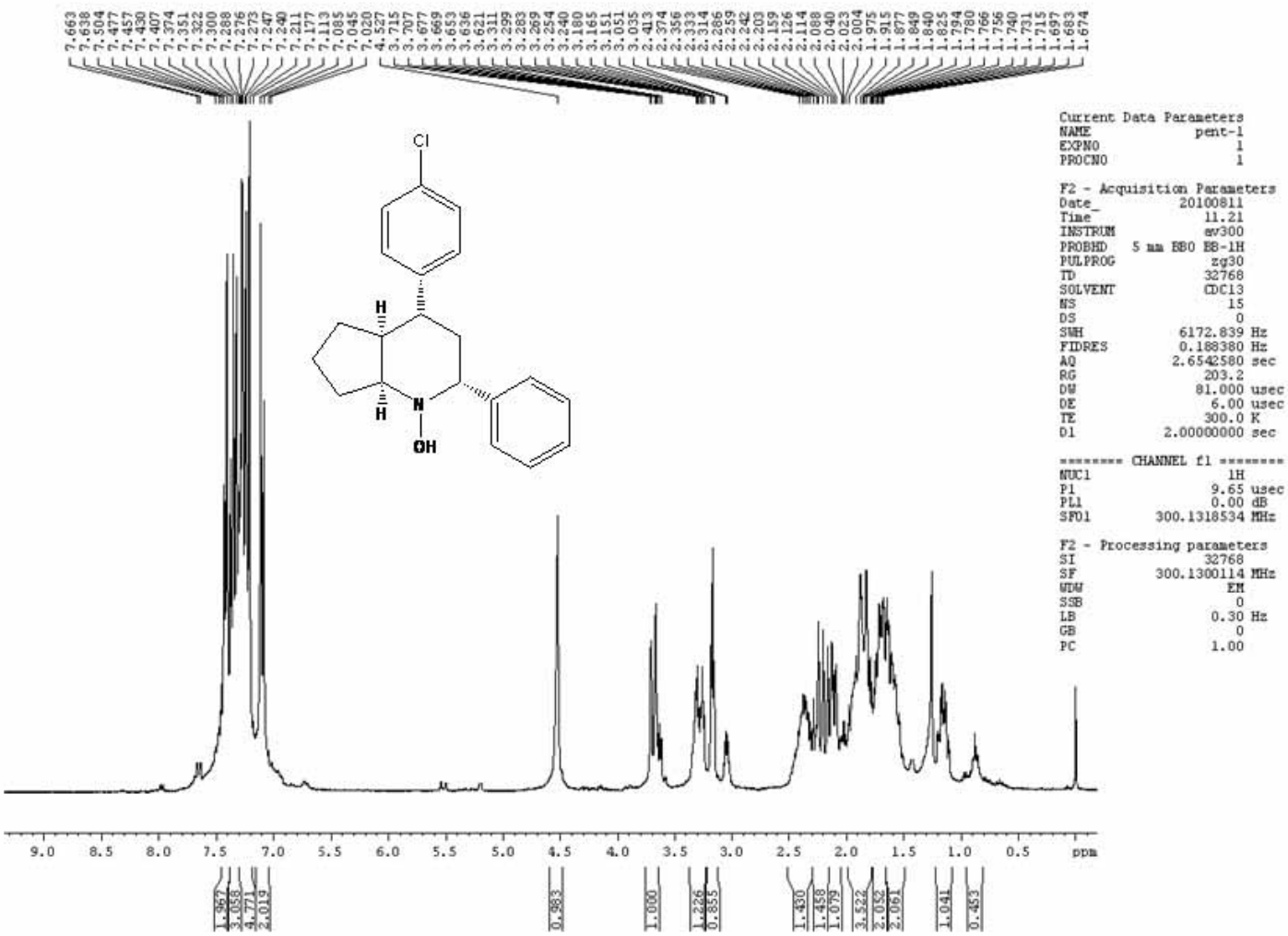
C-H COSY spectrum of **16b**



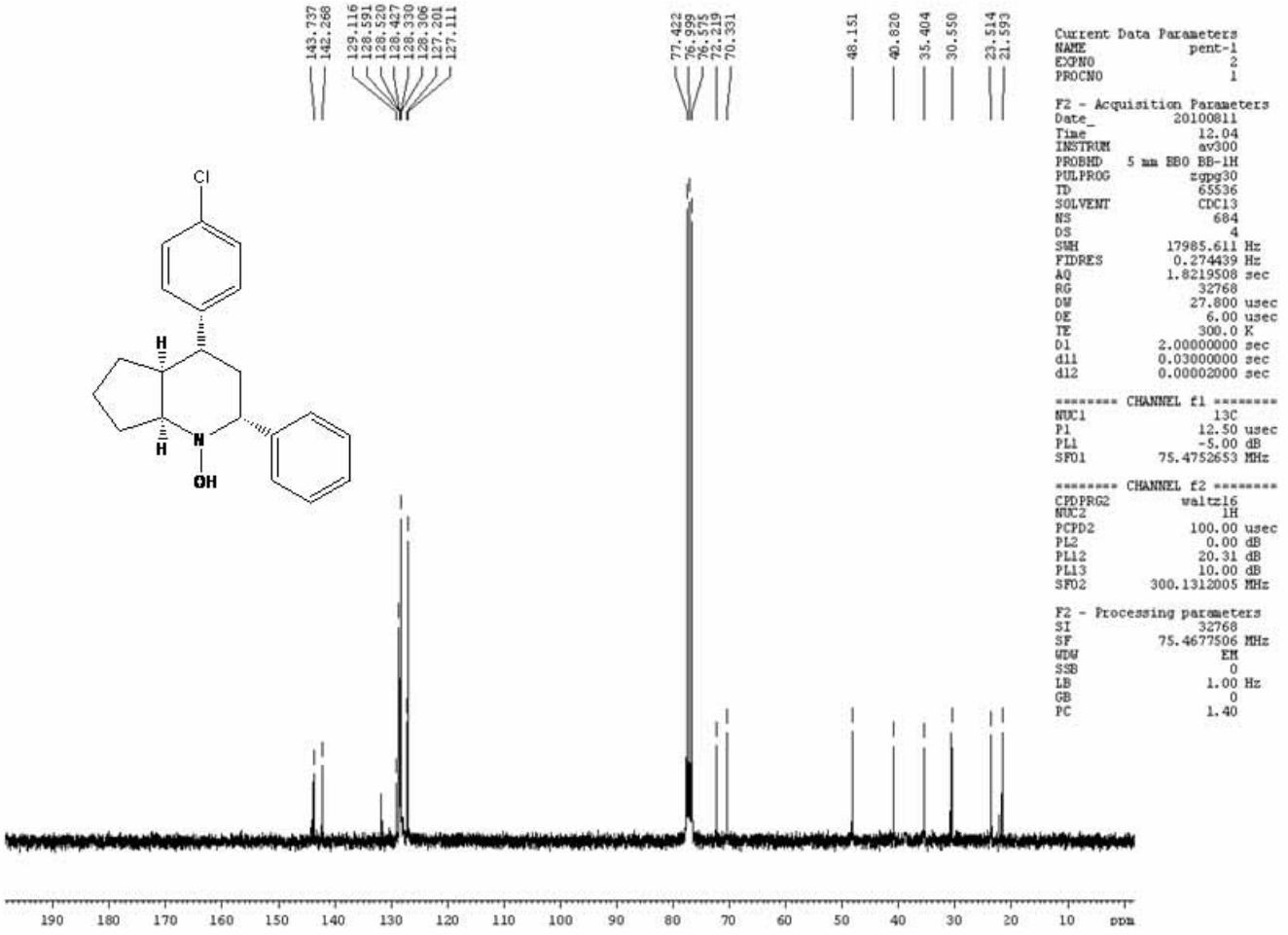
HMBC spectrum of **16b**



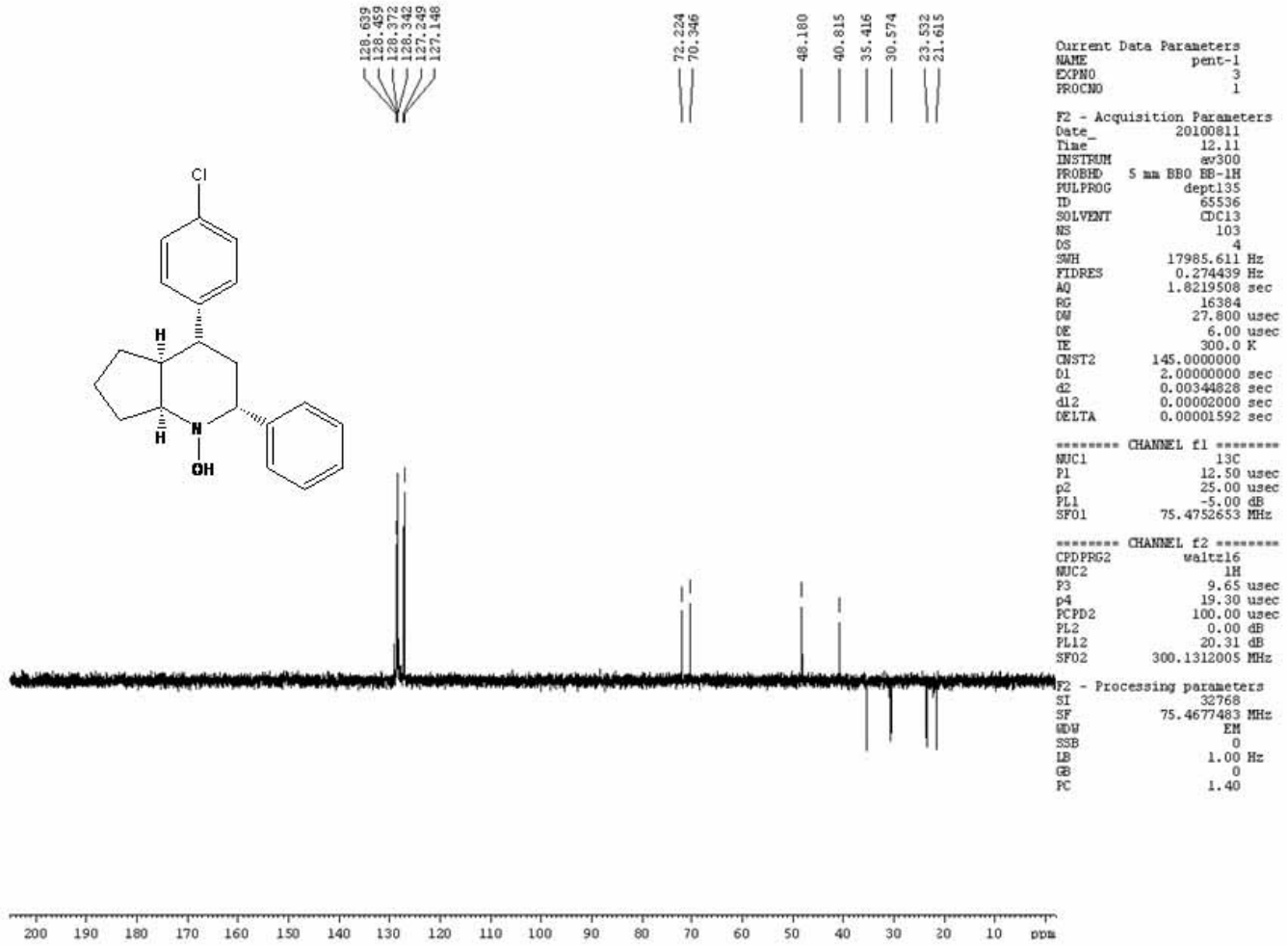
^{1}H NMR spectrum of **18** (300 MHz, $CDCl_3$)



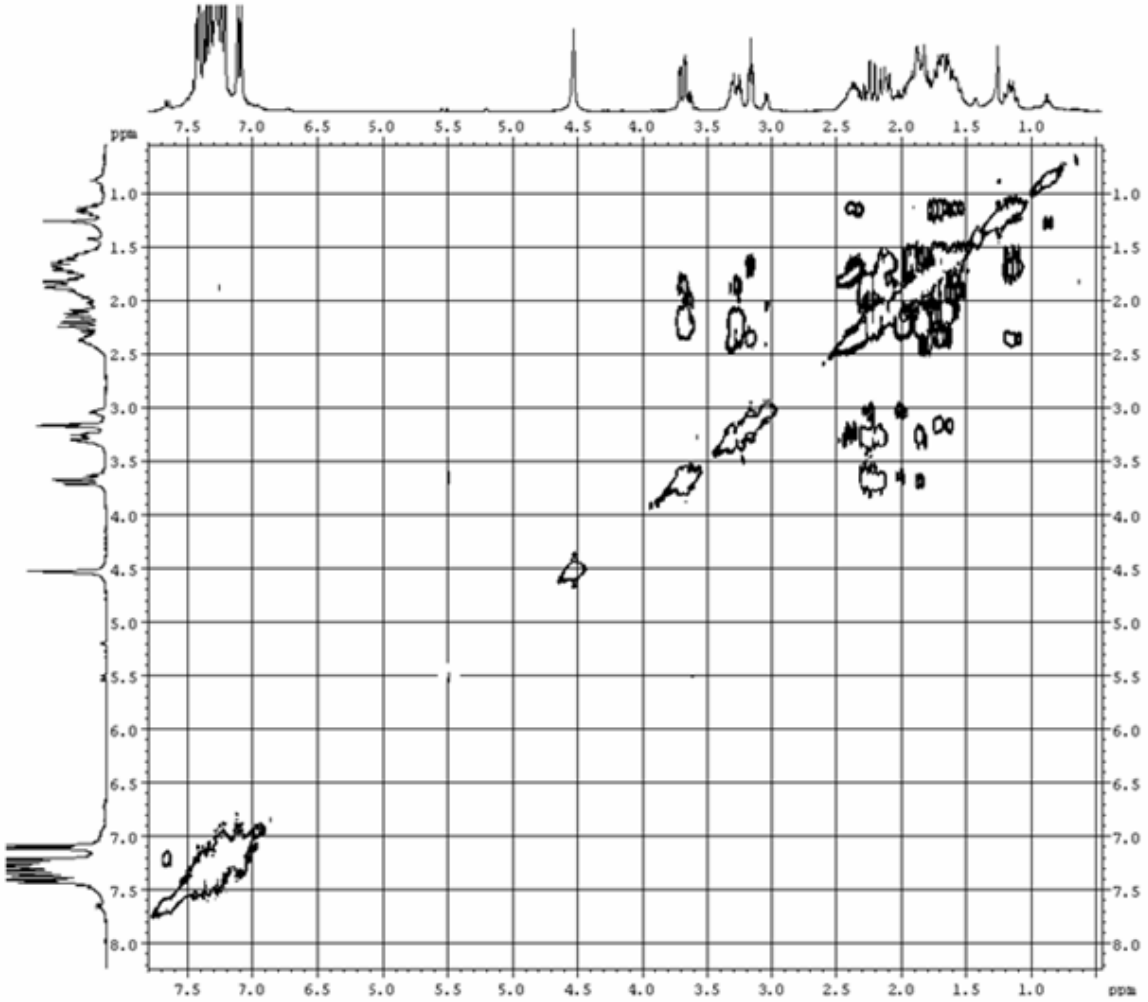
^{13}C NMR spectrum of **18** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **18**



H-H COSY spectrum of **18**




```
Current Data Parameters
NAME                  pent-1
EXPNO                      4
PROCNO                     1

F2 - Acquisition Parameters
Date_              20100811
Time                  12.16
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG          cosygpqf
TD                      2048
SOLVENT                 DMSO
NS                         1
DS                         8
SWH                4006.410 Hz
FIDRES             1.956255 Hz
AQ                 0.2556404 sec
RG                        64
DW                   124.800 usec
DE                     6.00 usec
TE                    300.0 K
d0                 0.00000300 sec
D1                 1.48689198 sec
d13                0.00000400 sec
D16                0.00015000 sec
IN0                0.00024960 sec
MCREST             0.00000000 sec
MCWRK              1.48689198 sec

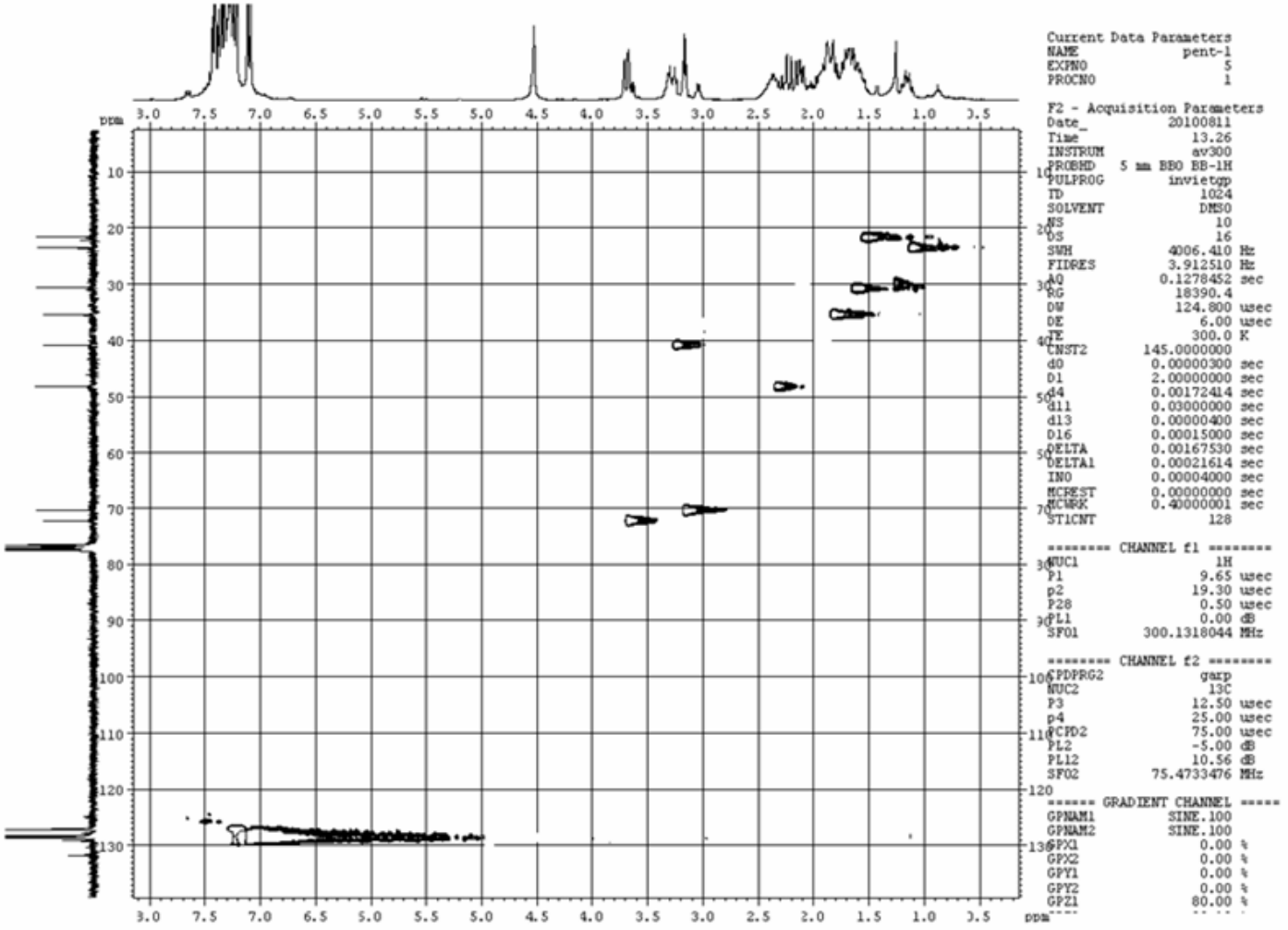
======== CHANNEL f1 ========
NUC1                      1H
P0                      9.65 usec
P1                      9.65 usec
PL1                     0.00 dB
SF01           300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1               SINE.100
GPNAM2               SINE.100
GPX1                    0.00 %
GPX2                    0.00 %
GPY1                    0.00 %
GPY2                    0.00 %
GPZ1                   10.00 %
GPZ2                   10.00 %
P16                  1500.00 usec

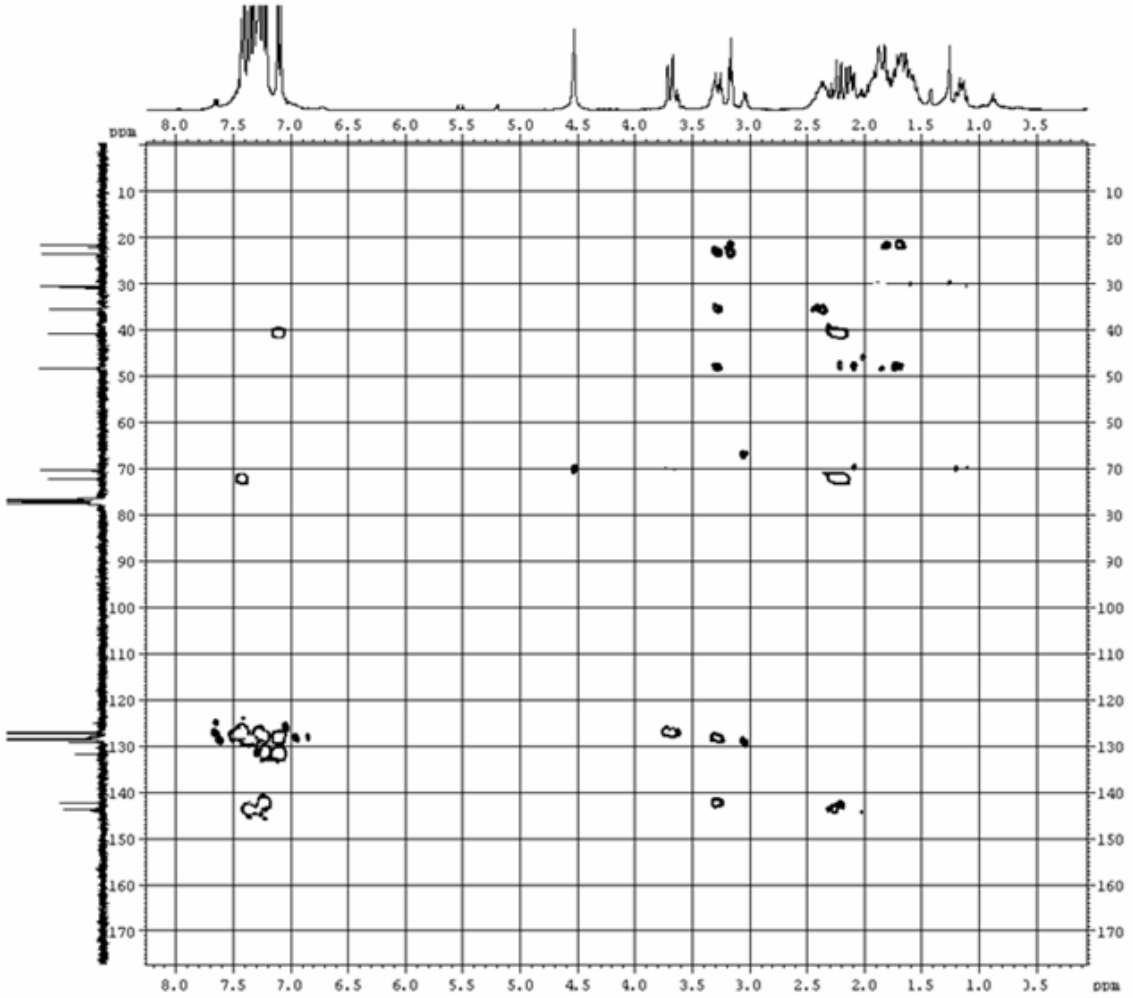
F1 - Acquisition parameters
NDO                        1
TD                       128
SF01               300.1318 MHz
FIDRES            31.300079 Hz
SW                   13.349 ppm

F2 - Processing parameters
SI                      1024
SF             300.1300126 MHz
WDW                    SINE
SSB                       0
LB                     0.00 Hz
GB                        0
PC                     1.40
```

C-H COSY spectrum of **18**



HMBC spectrum of **18**




```
Current Data Parameters
NAME                  pent-1
EXPNO                      6
PROCNO                     1

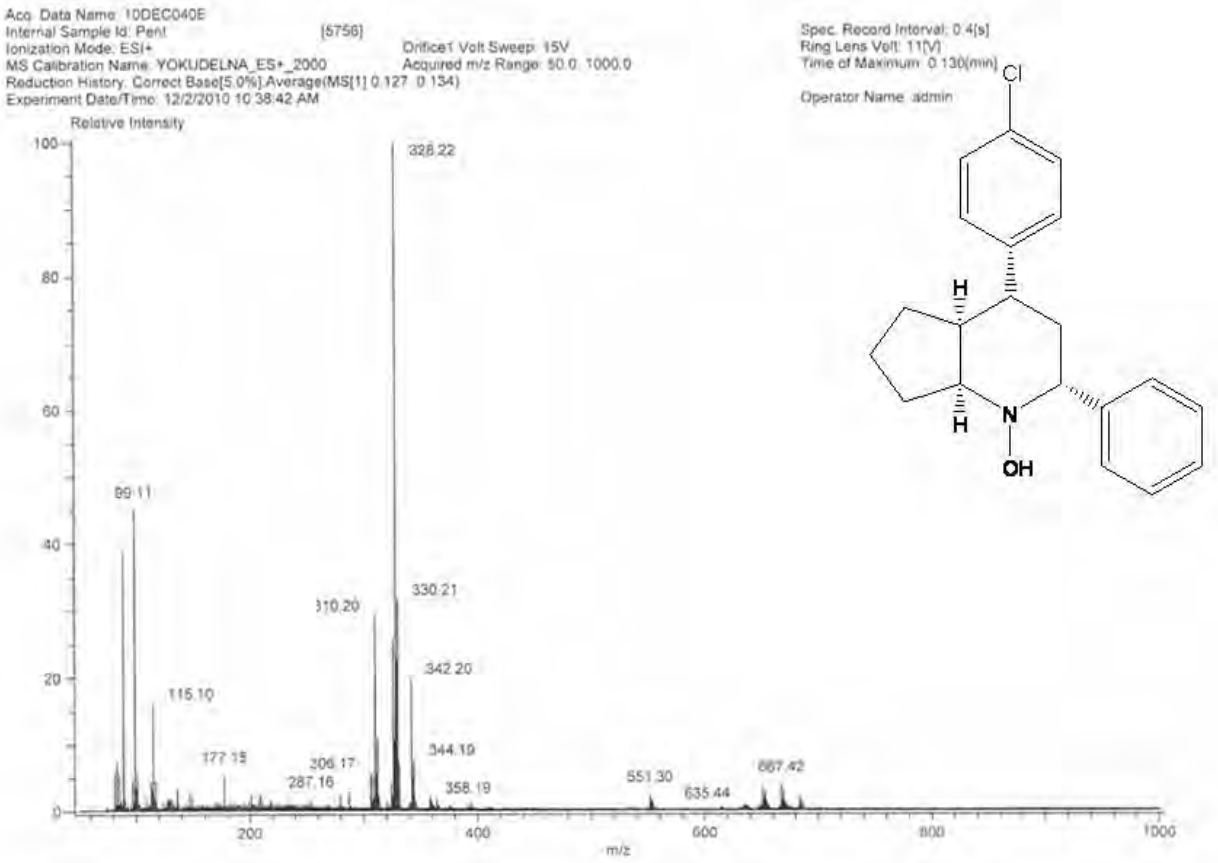
F2 - Acquisition Parameters
Date_              20100811
Time                  12.23
INSTRUM                av300
PROBHD   5 mm BBO BB-1H
PULPROG  inv4gplp1rndqf
TD                      1024
SOLVENT                CDCl3
NS                        12
DS                        16
SWH                 3360.215 Hz
FIDRES              3.281460 Hz
AQ                  0.1524212 sec
RG                      16384
DW                    148.800 usec
DE                      6.00 usec
TE                     300.0 K
CNST2              145.0000000
d0                  0.00000300 sec
D1                  1.47521901 sec
d2                  0.00344828 sec
D6                  0.06500000 sec
d13                 0.00000400 sec
D16                 0.00015000 sec
IN0                 0.00002990 sec
MCREST              0.00000000 sec
MCWRK               1.47521901 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       9.65 usec
p2                      19.30 usec
PL1                      0.00 dB
SF01             300.1314236 MHz

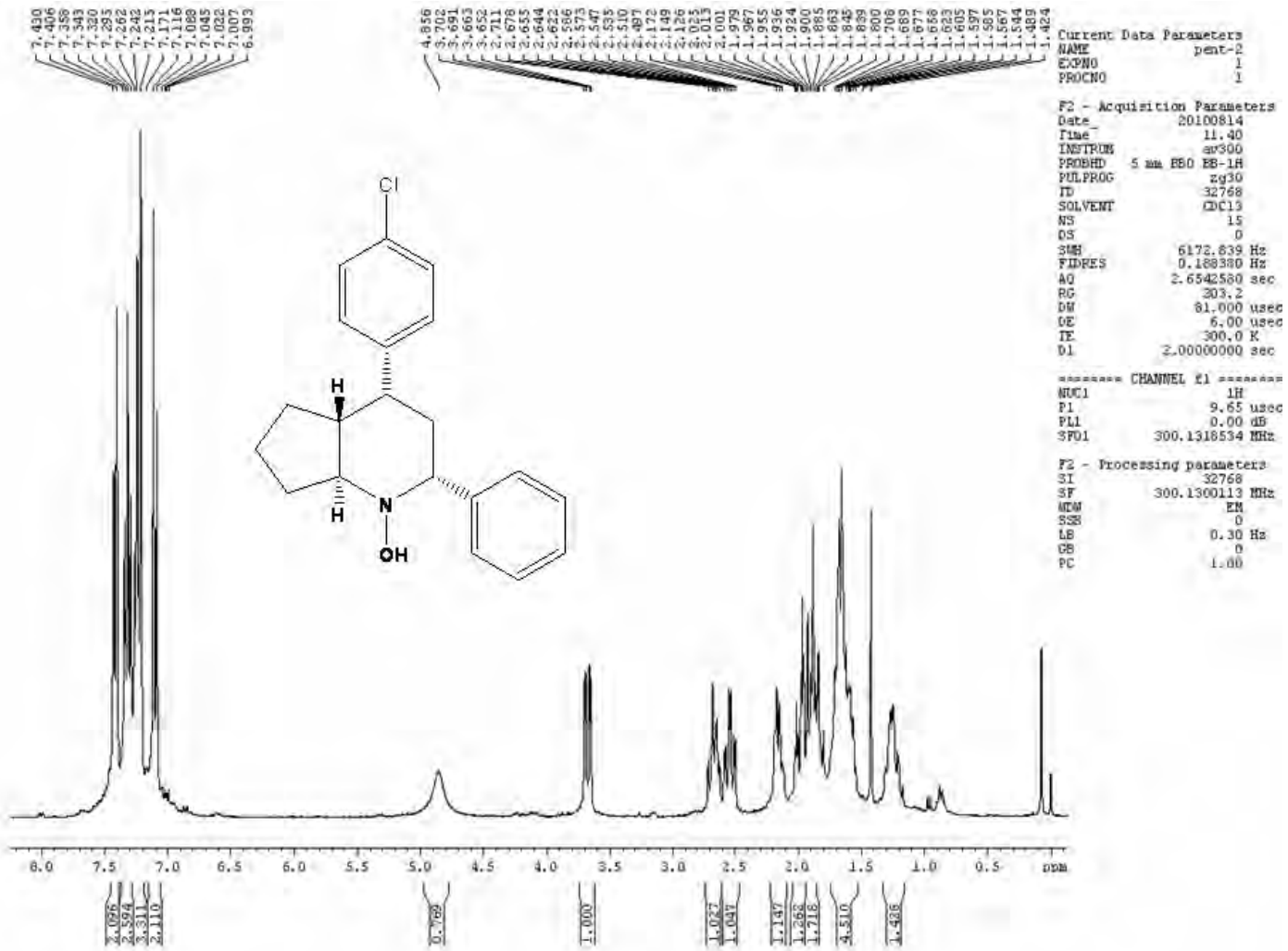
======== CHANNEL f2 ========
NUC2                      13C
P3                      12.50 usec
PL2                     -5.00 dB
SF02              75.4752239 MHz

====== GRADIENT CHANNEL =====
GPNAM1               SINE.100
GPNAM2               SINE.100
GPNAM3               SINE.100
GPX1                     0.00 %
GPX2                     0.00 %
GPX3                     0.00 %
GPY1                     0.00 %
GPY2                     0.00 %
GPY3                     0.00 %
GPZ1                    50.00 %
GPZ2                    30.00 %
GPZ3                    40.10 %
P16                   1500.00 usec
```

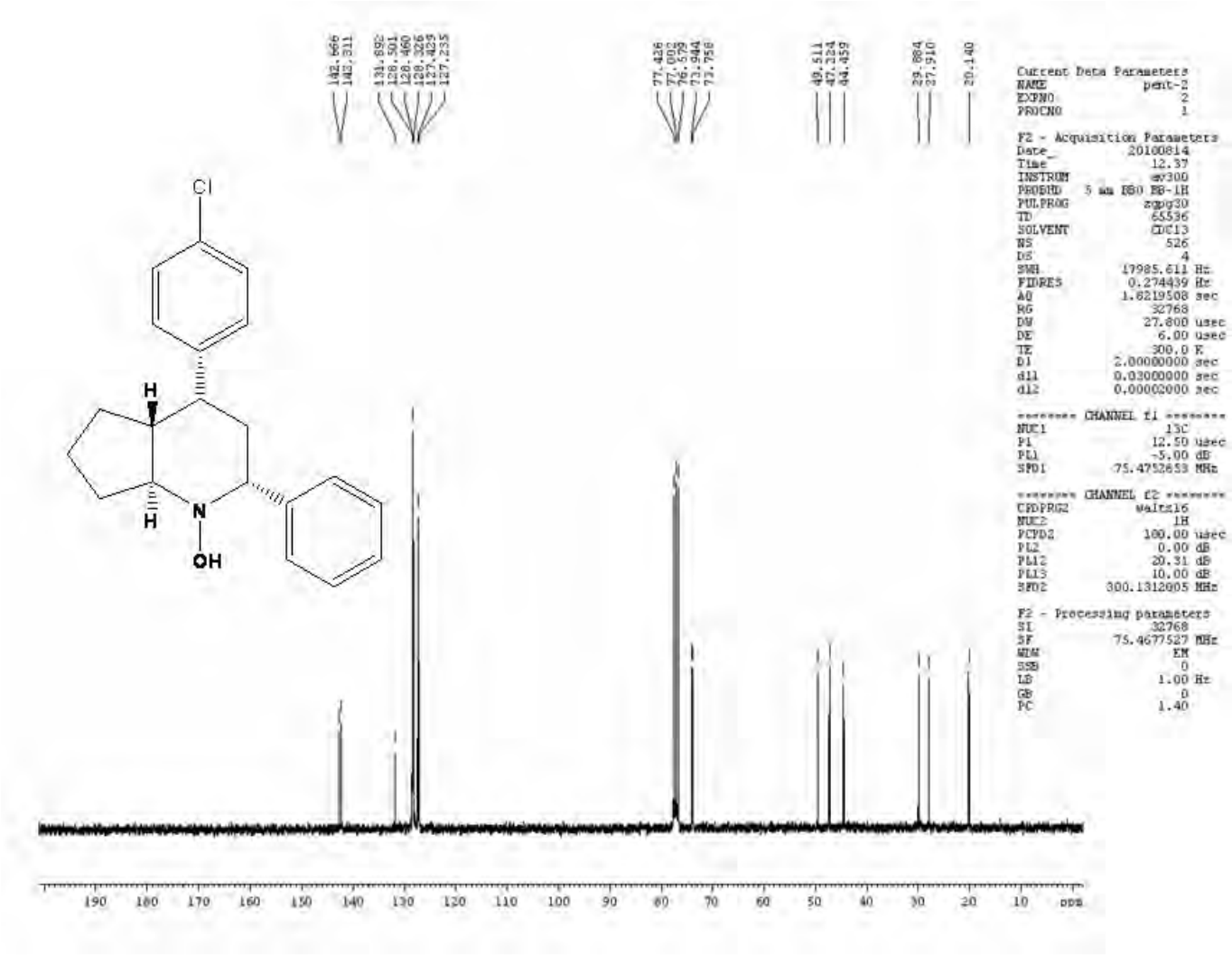
Mass spectrum of **18**



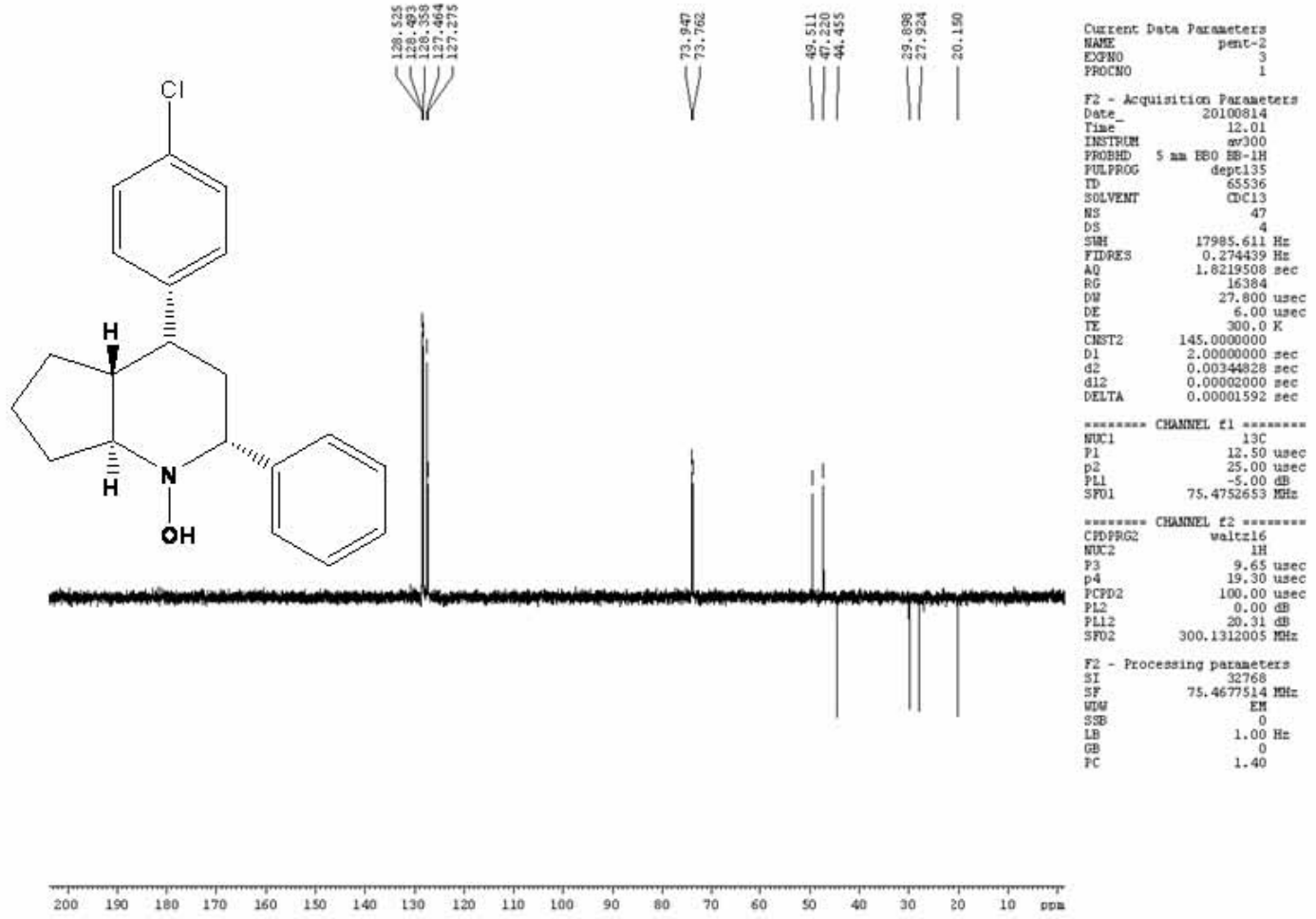
^{1}H NMR spectrum of **19** (300 MHz, $CDCl_3$)



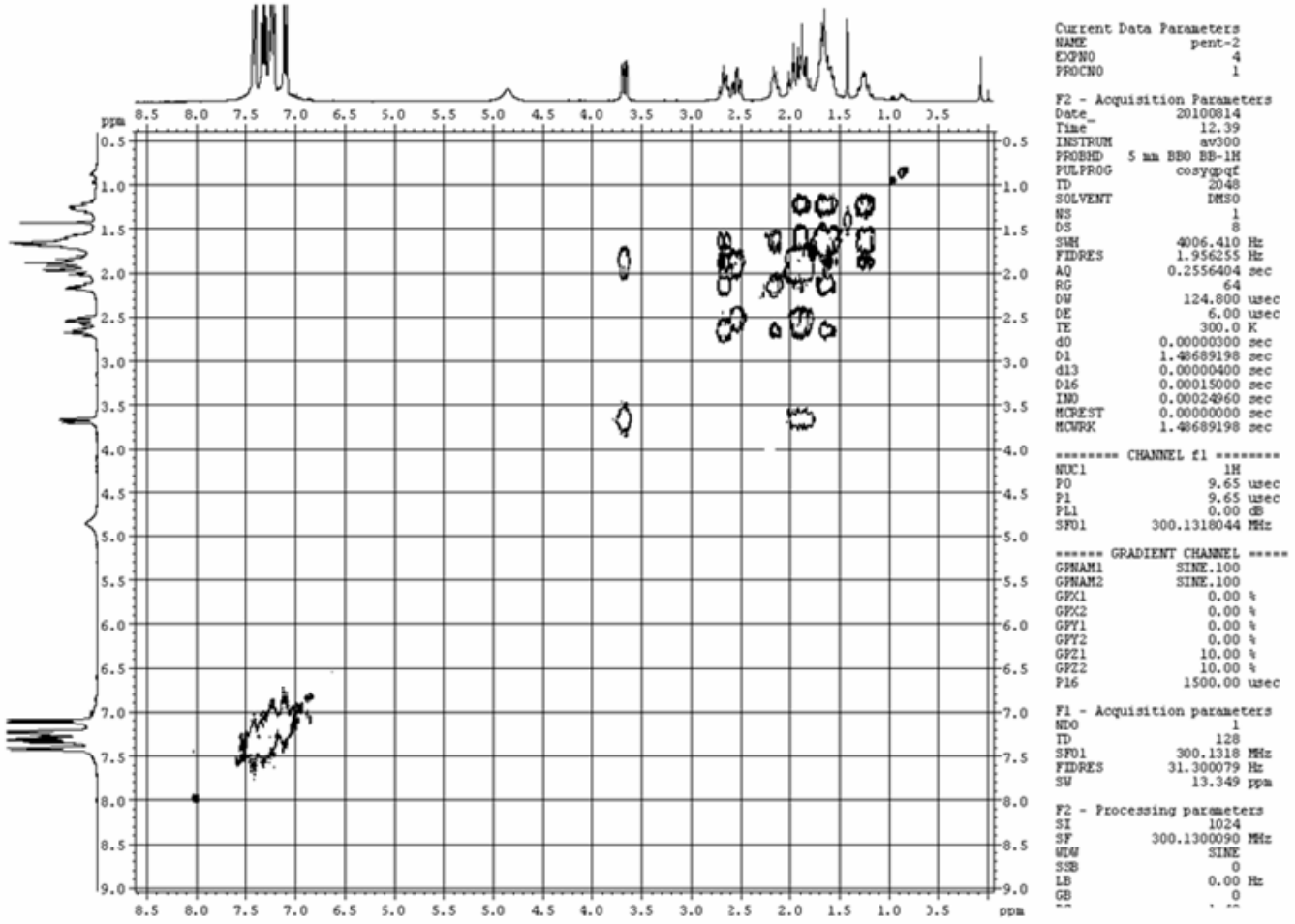
^{13}C NMR spectrum of **19** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **19**



H-H COSY spectrum of **19**




```
Current Data Parameters
NAME                  pent-2
EXPNO                      4
PROCNO                     1

F2 - Acquisition Parameters
Date_              20100814
Time                  12.39
INSTRUM                av300
PROBHD   5 mm BBO BB-1H
PULPROG           cosygpqf
TD                     2048
SOLVENT                DMSO
NS                        1
DS                        8
SWH                4006.410 Hz
FIDRES             1.956255 Hz
AQ                 0.2556404 sec
RG                        64
DW                   124.800 usec
DE                     6.00 usec
TE                   300.0 K
d0                 0.00000300 sec
D1                 1.48689198 sec
d13                0.00000400 sec
D16                0.00015000 sec
IN0                0.00024960 sec
MCREST             0.00000000 sec
MCWRK              1.48689198 sec

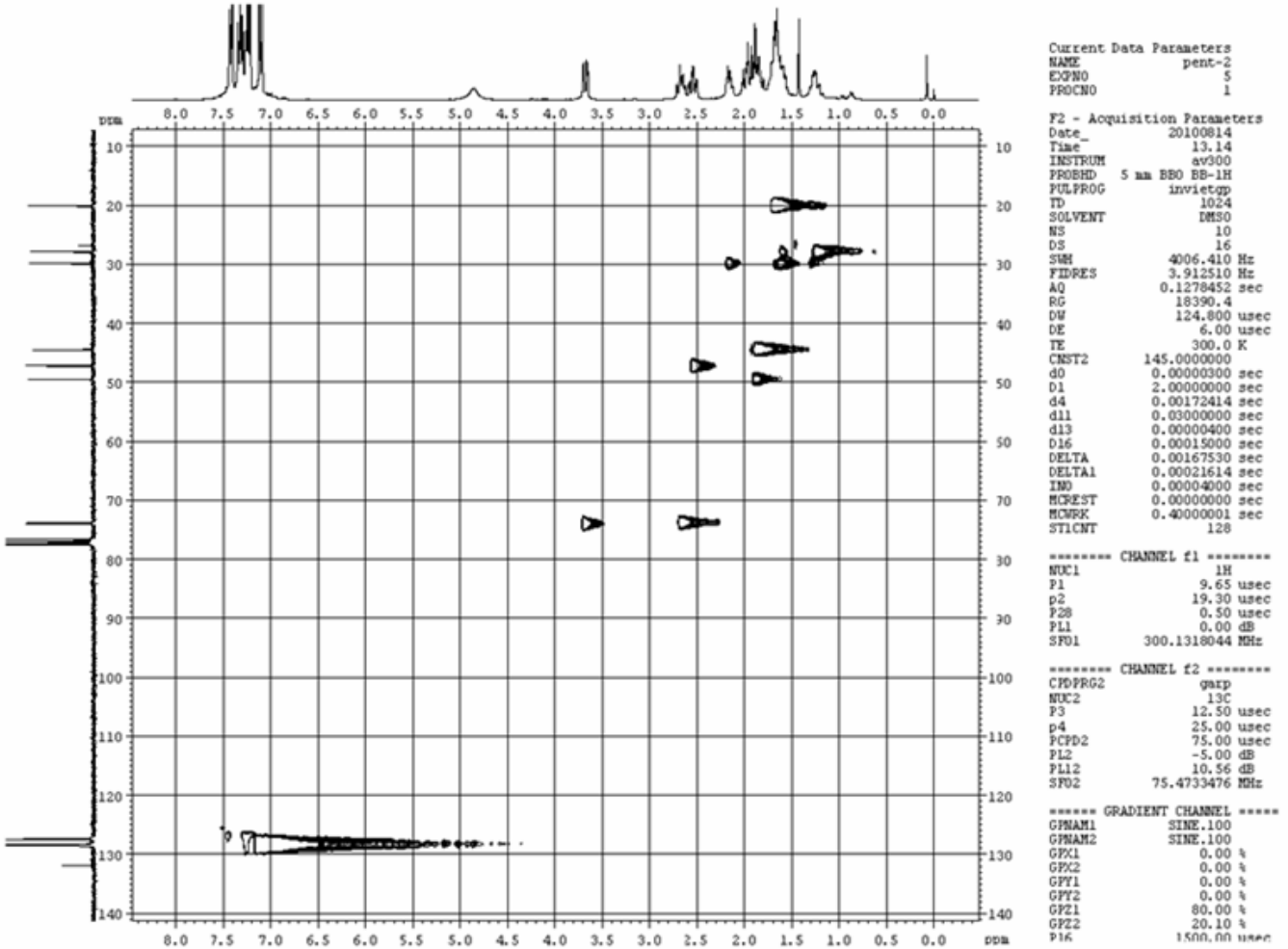
======== CHANNEL f1 ========
NUC1                      1H
P0                     9.65 usec
P1                     9.65 usec
PL1                    0.00 dB
SFO1          300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1              SINE.100
GPNAM2              SINE.100
GPX1                   0.00 %
GPX2                   0.00 %
GPY1                   0.00 %
GPY2                   0.00 %
GPZ1                  10.00 %
GPZ2                  10.00 %
P16                 1500.00 usec

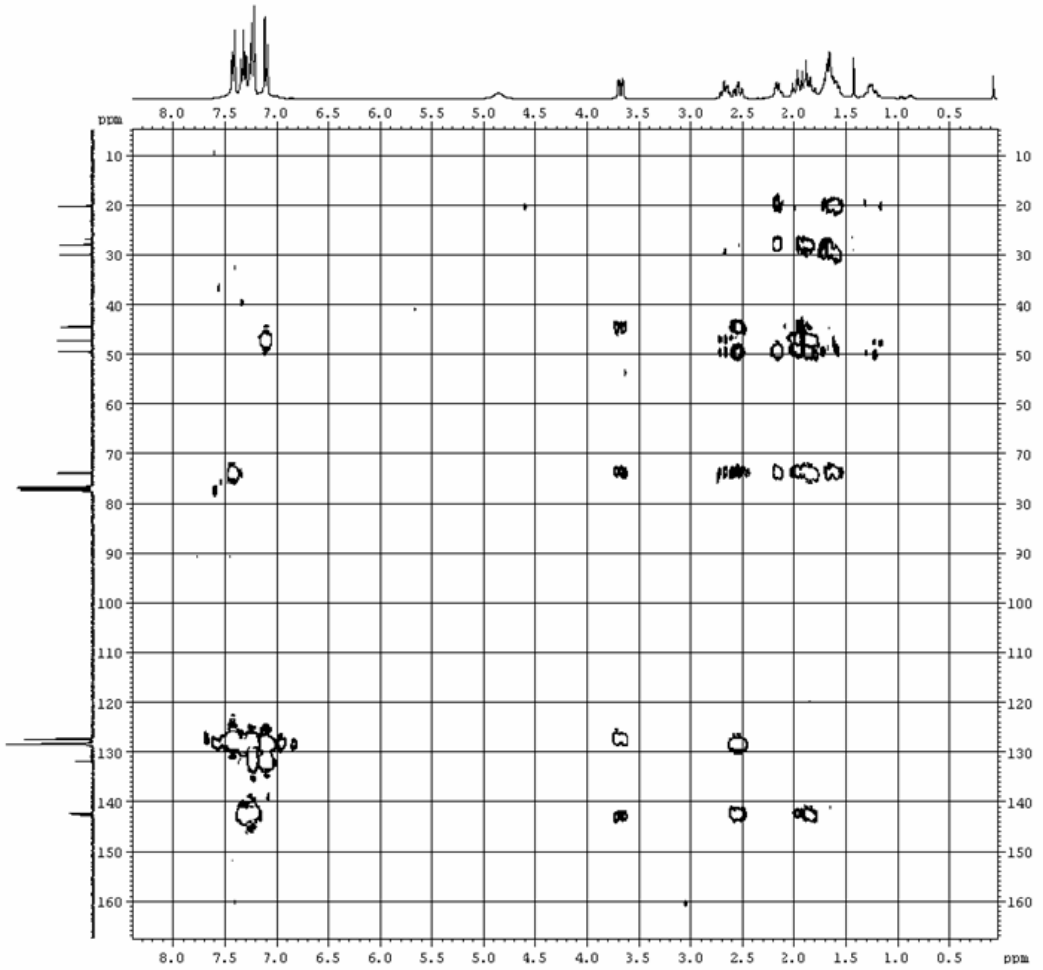
F1 - Acquisition parameters
NDO                       1
TD                      128
SFO1             300.1318 MHz
FIDRES            31.300079 Hz
SW                   13.349 ppm

F2 - Processing parameters
SI                      1024
SF            300.1300090 MHz
WDW                     SINE
SSB                        0
LB                    0.00 Hz
GB                         0
```

C-H COSY spectrum of **19**



HMBC spectrum of **19**




```
Current Data Parameters
NAME                  pent-2
EXPNO                      6
PROCNO                     1

F2 - Acquisition Parameters
Date_              20100814
Time                  12.45
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG   inv4gplp1rndqf
TD                      1024
SOLVENT                 CDCl3
NS                         8
DS                        16
SWH                 3360.215 Hz
FIDRES              3.281460 Hz
AQ                  0.1524212 sec
RG                      16384
DW                    148.800 usec
DE                      6.00 usec
TE                     300.0 K
CNST2              145.0000000
d0                  0.00000300 sec
D1                  1.47521901 sec
d2                  0.00344828 sec
D6                  0.06500000 sec
d13                 0.00000400 sec
D16                 0.00015000 sec
IN0                 0.00002990 sec
MCREST              0.00000000 sec
MCWRK               1.47521901 sec

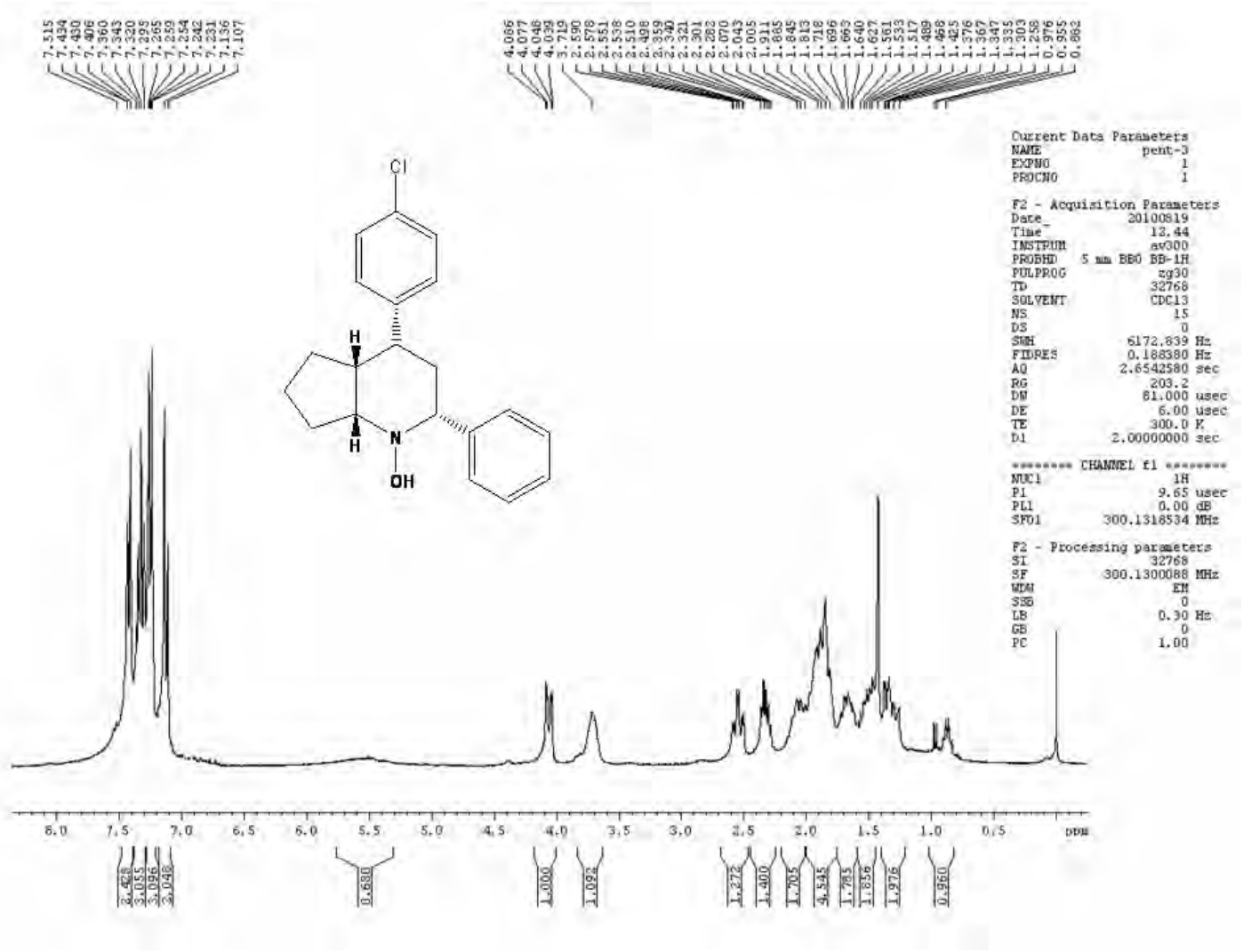
======== CHANNEL f1 ========
NUC1                       1H
P1                       9.65 usec
p2                      19.30 usec
PL1                      0.00 dB
SF01             300.1314236 MHz

======== CHANNEL f2 ========
NUC2                      13C
P3                      12.50 usec
PL2                     -5.00 dB
SF02              75.4752239 MHz

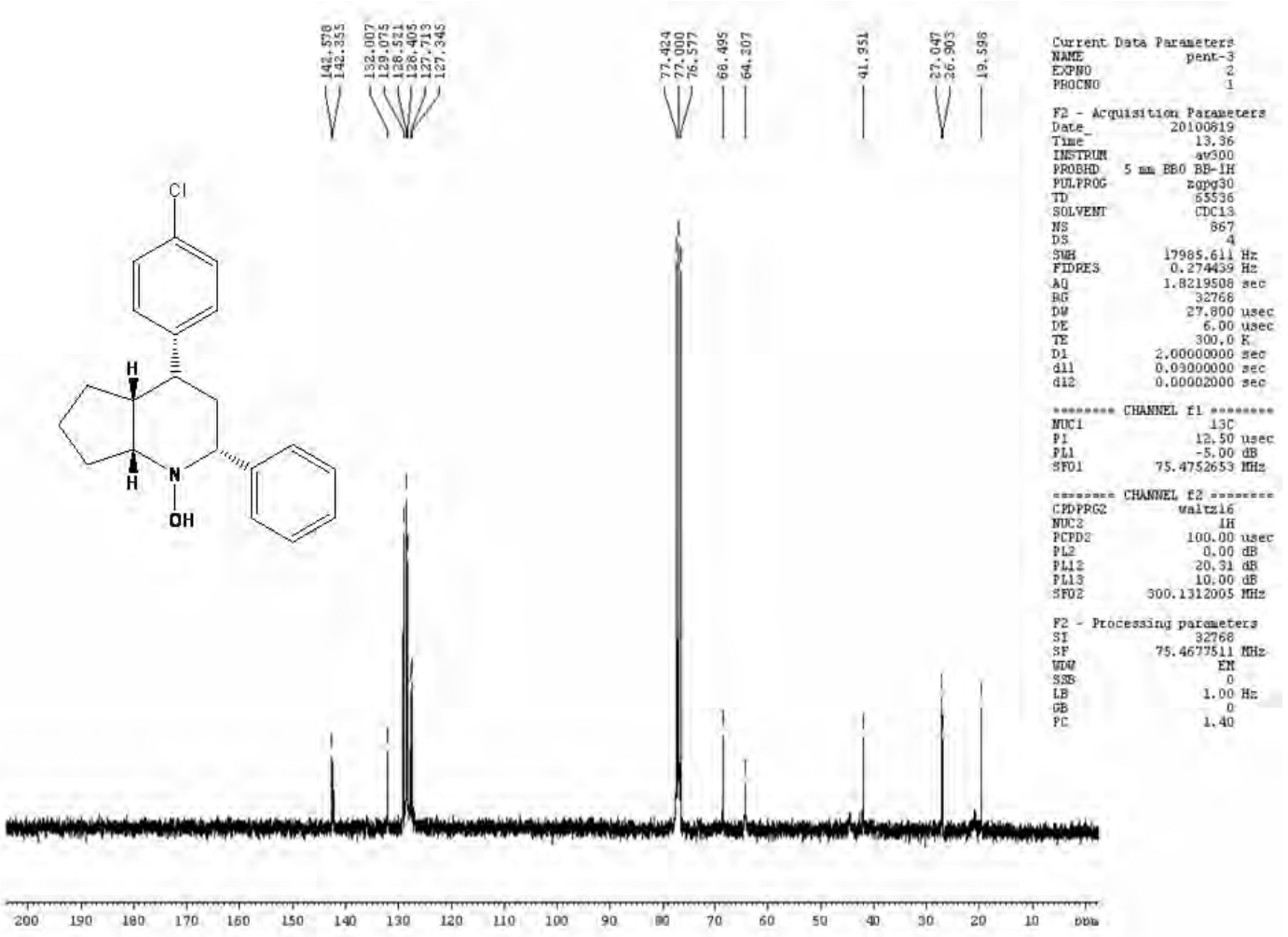
====== GRADIENT CHANNEL =====
GPNAM1               SINE.100
GPNAM2               SINE.100
GPNAM3               SINE.100
GPX1                     0.00 %
GPX2                     0.00 %
GPX3                     0.00 %
GPY1                     0.00 %
GPY2                     0.00 %
GPY3                     0.00 %
GPZ1                    50.00 %
GPZ2                    30.00 %
GPZ3                    40.10 %
P16                   1500.00 usec

F1 - Acquisition parameters
MD0                        2
```

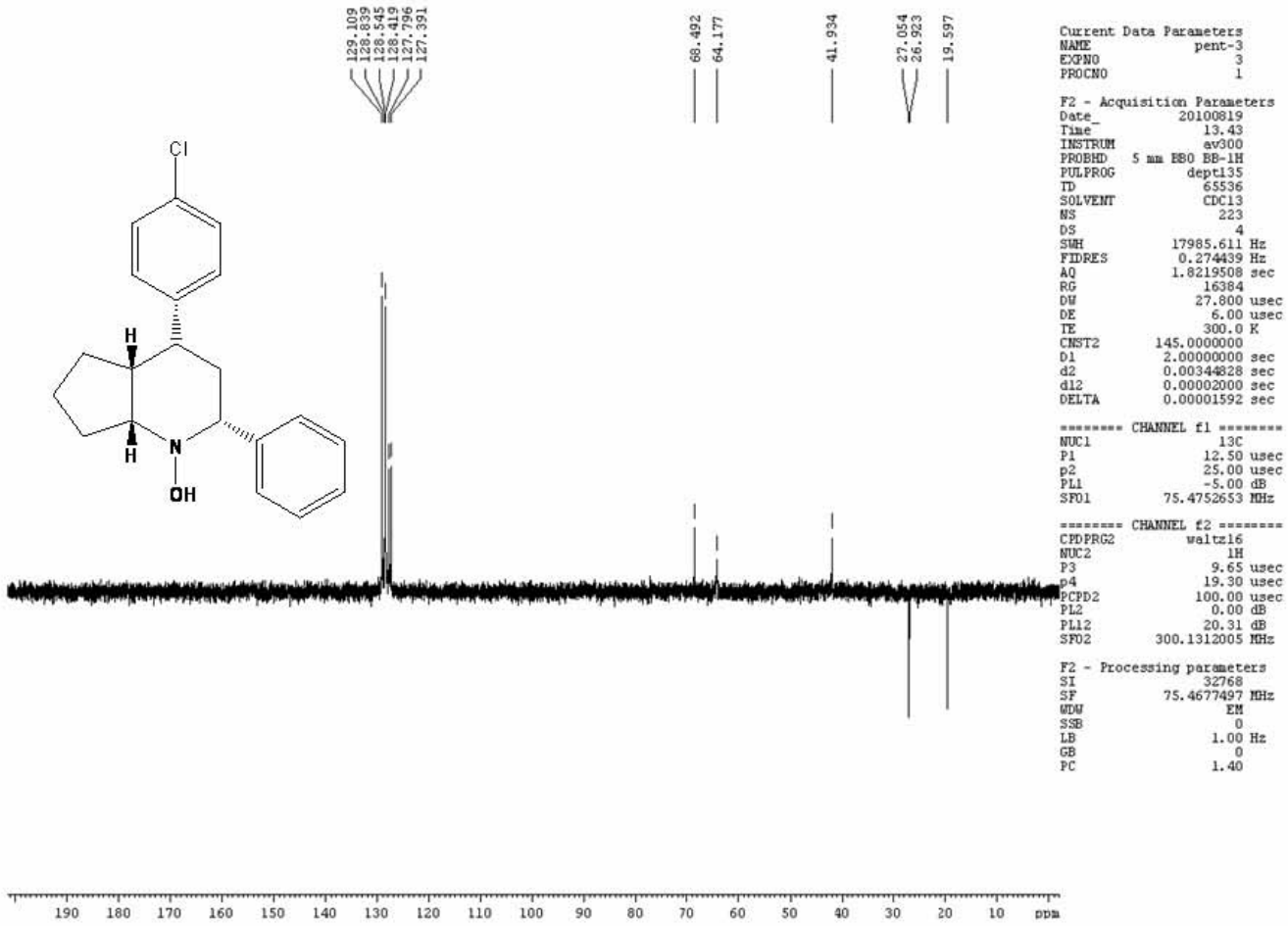
^{1}H NMR spectrum of **20** (300 MHz, $CDCl_3$)



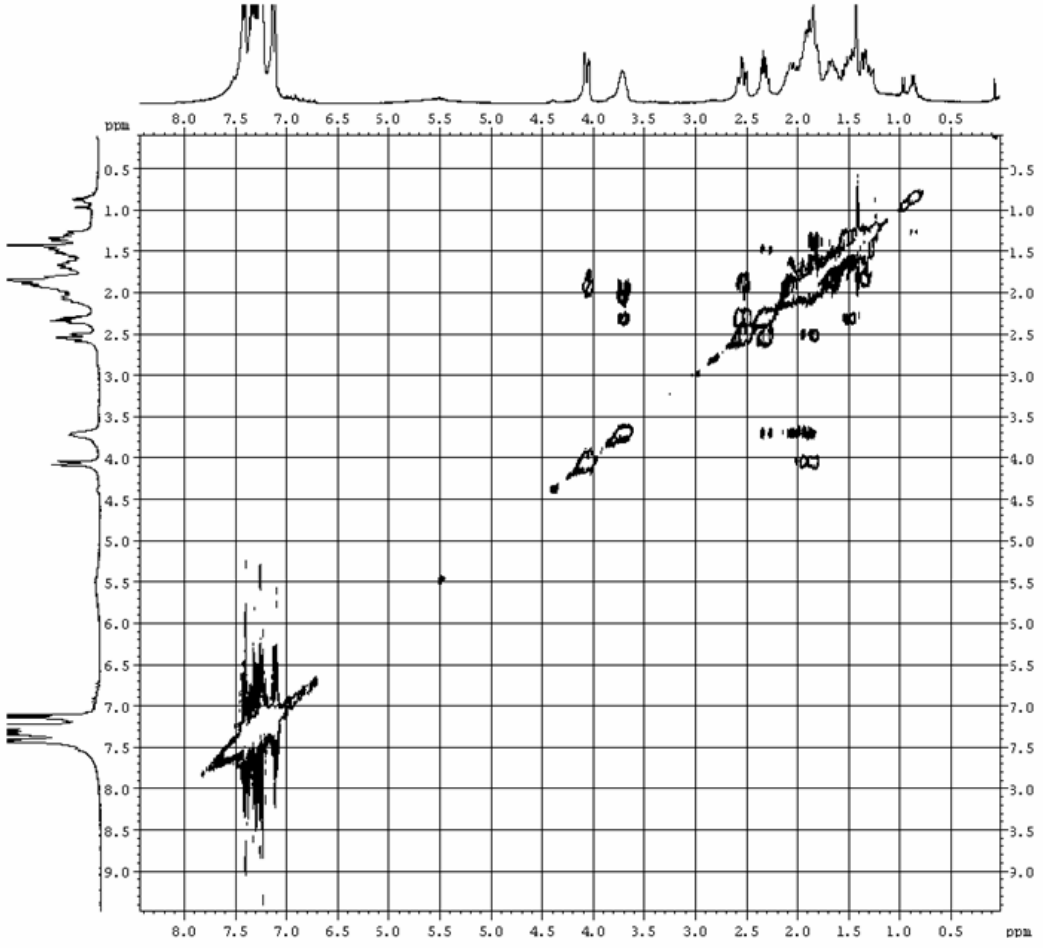
^{13}C NMR spectrum of **20** (75 MHz, $CDCl_3$)



DEPT-135 spectrum of **20**



H-H COSY spectrum of **20**




```
Current Data Parameters
NAME                  pent-3
EXPNO                      4
PROCNO                     1

F2 - Acquisition Parameters
Date_              20100819
Time                  15.39
INSTRUM                av300
PROBHD    5 mm BBO BB-1H
PULPROG          cosygpqf
TD                      2048
SOLVENT                DMSO
NS                         1
DS                         8
SWH                4006.410 Hz
FIDRES             1.956255 Hz
AQ                 0.2556404 sec
RG                        64
DW                  124.800 usec
DE                    6.00 usec
TE                   300.0 K
d0                 0.00000300 sec
D1                 1.48689198 sec
d13                0.00000400 sec
D16                0.00015000 sec
IN0                0.00024960 sec
MCREST             0.00000000 sec
MCWRK              1.48689198 sec

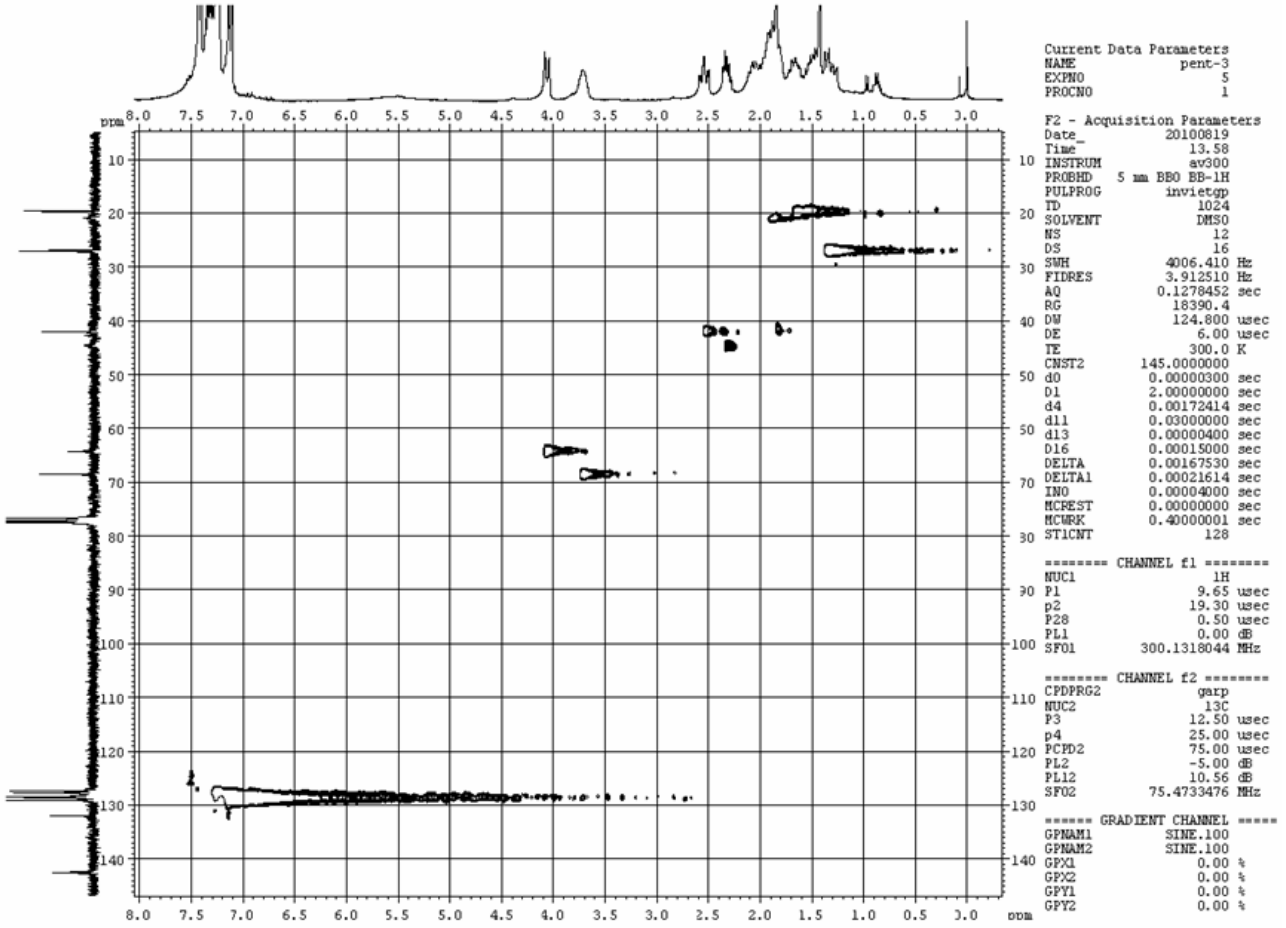
======== CHANNEL f1 ========
NUC1                      1H
P0                    9.65 usec
P1                    9.65 usec
PL1                   0.00 dB
SF01          300.1318044 MHz

====== GRADIENT CHANNEL =====
GPNAM1              SINE.100
GPNAM2              SINE.100
GPX1                  0.00 %
GPX2                  0.00 %
GPY1                  0.00 %
GPY2                  0.00 %
GPZ1                 10.00 %
GPZ2                 10.00 %
P16                1500.00 usec

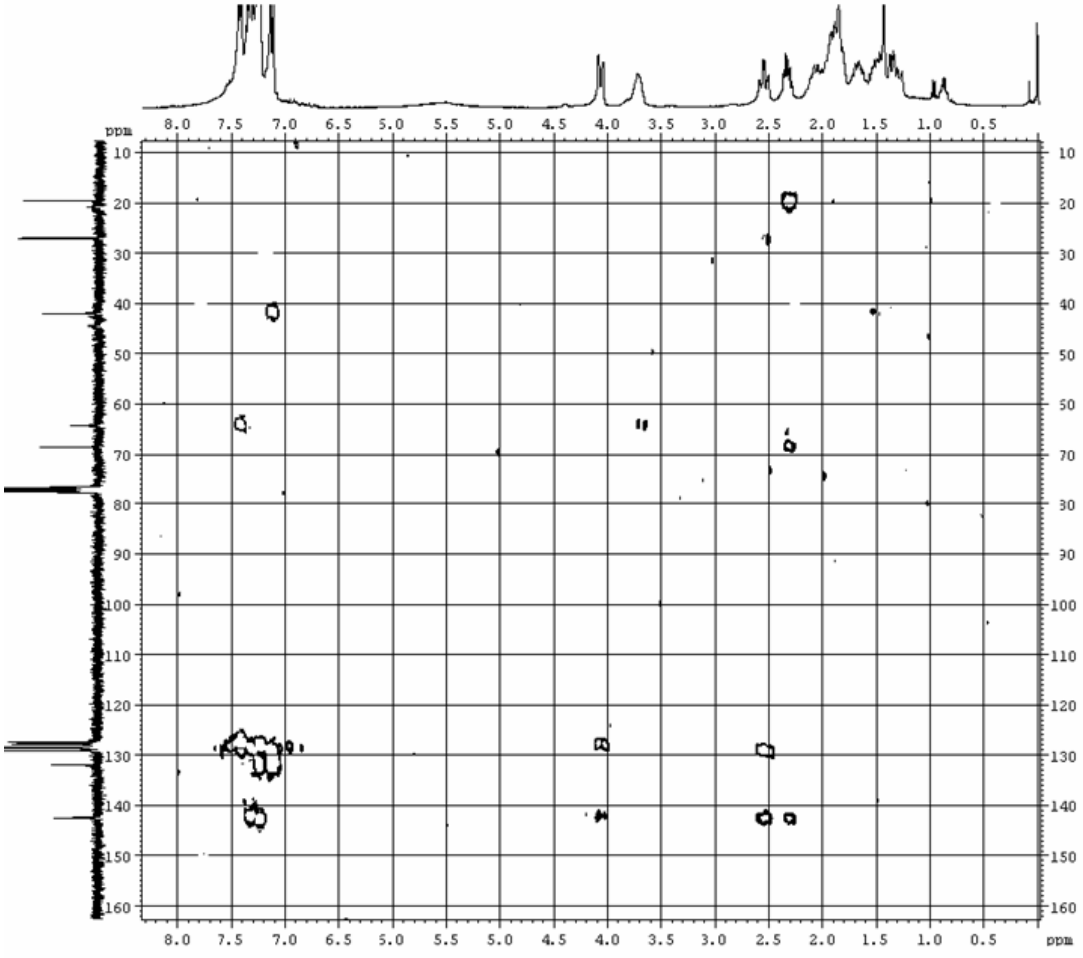
F1 - Acquisition parameters
ND0                        1
TD                       128
SF01            300.1318 MHz
FIDRES           31.300079 Hz
SW                  13.349 ppm

F2 - Processing parameters
SI                      1024
SF            300.1300122 MHz
WDW                     SINE
SSB                        0
LB                    0.00 Hz
GB                         0
PC                      1.40
```

C-H COSY spectrum of **20**



HMBC spectrum of **20**




```
Current Data Parameters
NAME                  pent-3
EXPNO                      6
PROCNO                     1

F2 - Acquisition Parameters
Date_                20100825
Time                    11.07
INSTRUM                 av300
PROBHD    5 mm BBO BB-1H
PULPROG  inv4gp1p1rndqf
TD                       1024
SOLVENT                CDCl3
NS                         10
DS                         16
SWH                  3360.215 Hz
FIDRES               3.281460 Hz
AQ                  0.1524212 sec
RG                       16384
DW                   148.800 usec
DE                     6.00 usec
TE                     300.0 K
CNST2              145.0000000
d0                  0.00000300 sec
D1                  1.47521901 sec
d2                  0.00344828 sec
D6                  0.06500000 sec
d13                 0.00000400 sec
D16                 0.00015000 sec
IN0                 0.00002990 sec
MCREST              0.00000000 sec
MCWRK               1.47521901 sec

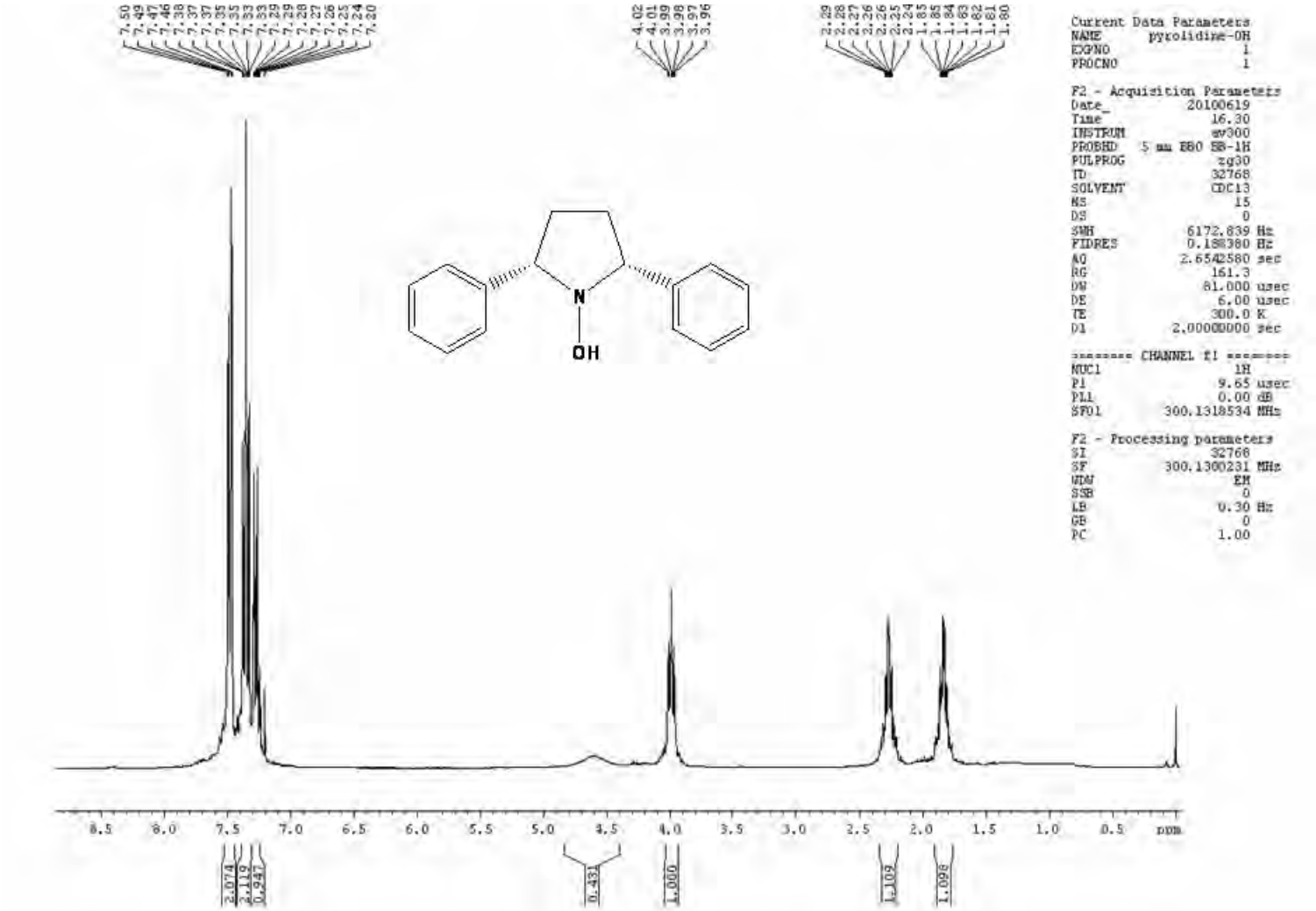
======== CHANNEL f1 ========
NUC1                       1H
P1                      9.65 usec
p2                     19.30 usec
PL1                     0.00 dB
SF01             300.1314236 MHz

======== CHANNEL f2 ========
NUC2                      13C
P3                     12.50 usec
PL2                    -5.00 dB
SF02              75.4752239 MHz

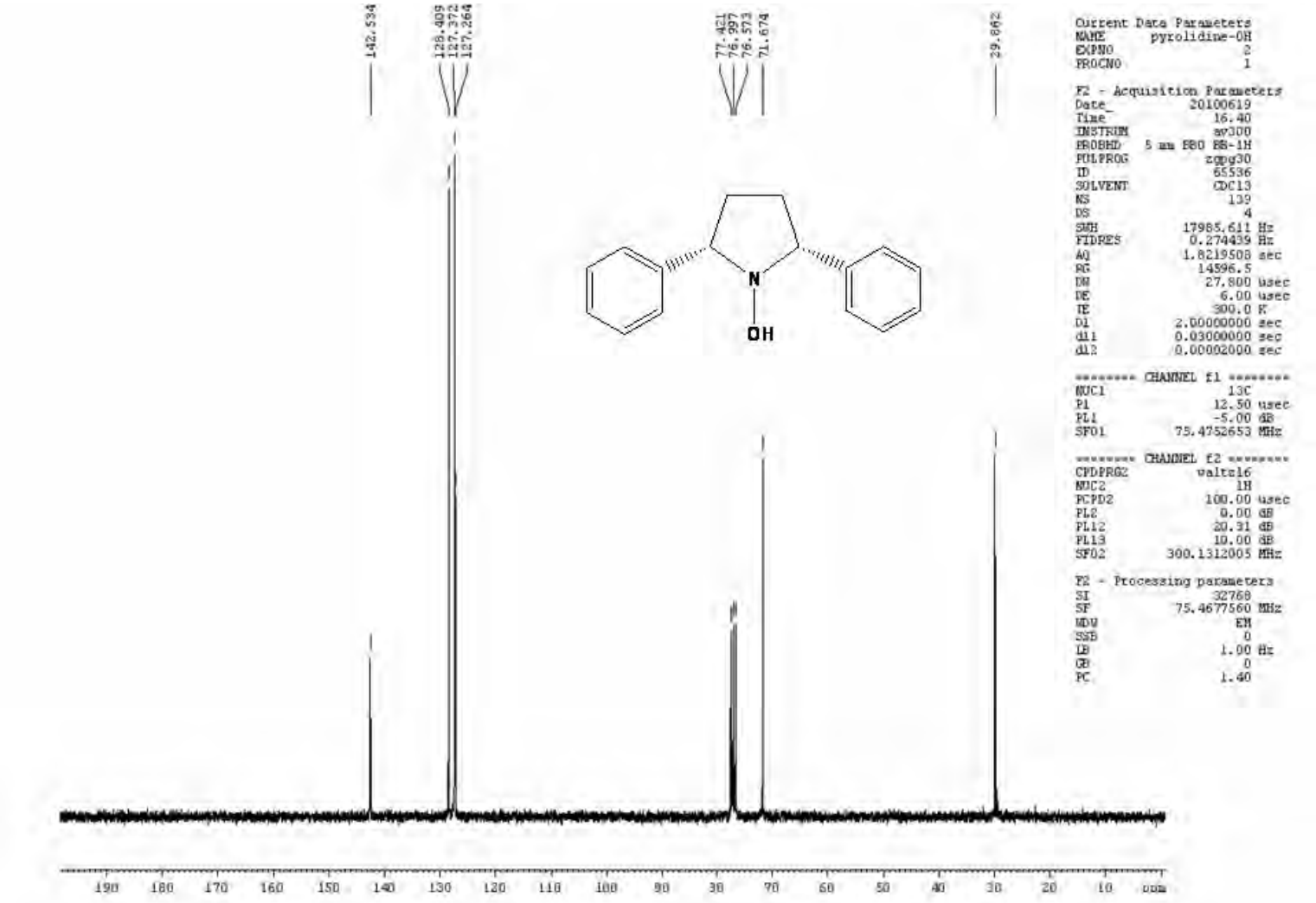
====== GRADIENT CHANNEL =====
GPNAM1               SINE.100
GPNAM2               SINE.100
GPNAM3               SINE.100
GPX1                    0.00 %
GPX2                    0.00 %
GPX3                    0.00 %
GPY1                    0.00 %
GPY2                    0.00 %
GPY3                    0.00 %
GPZ1                   50.00 %
GPZ2                   30.00 %
GPZ3                   40.10 %
P16                 1500.00 usec

F1 - Acquisition parameters
```

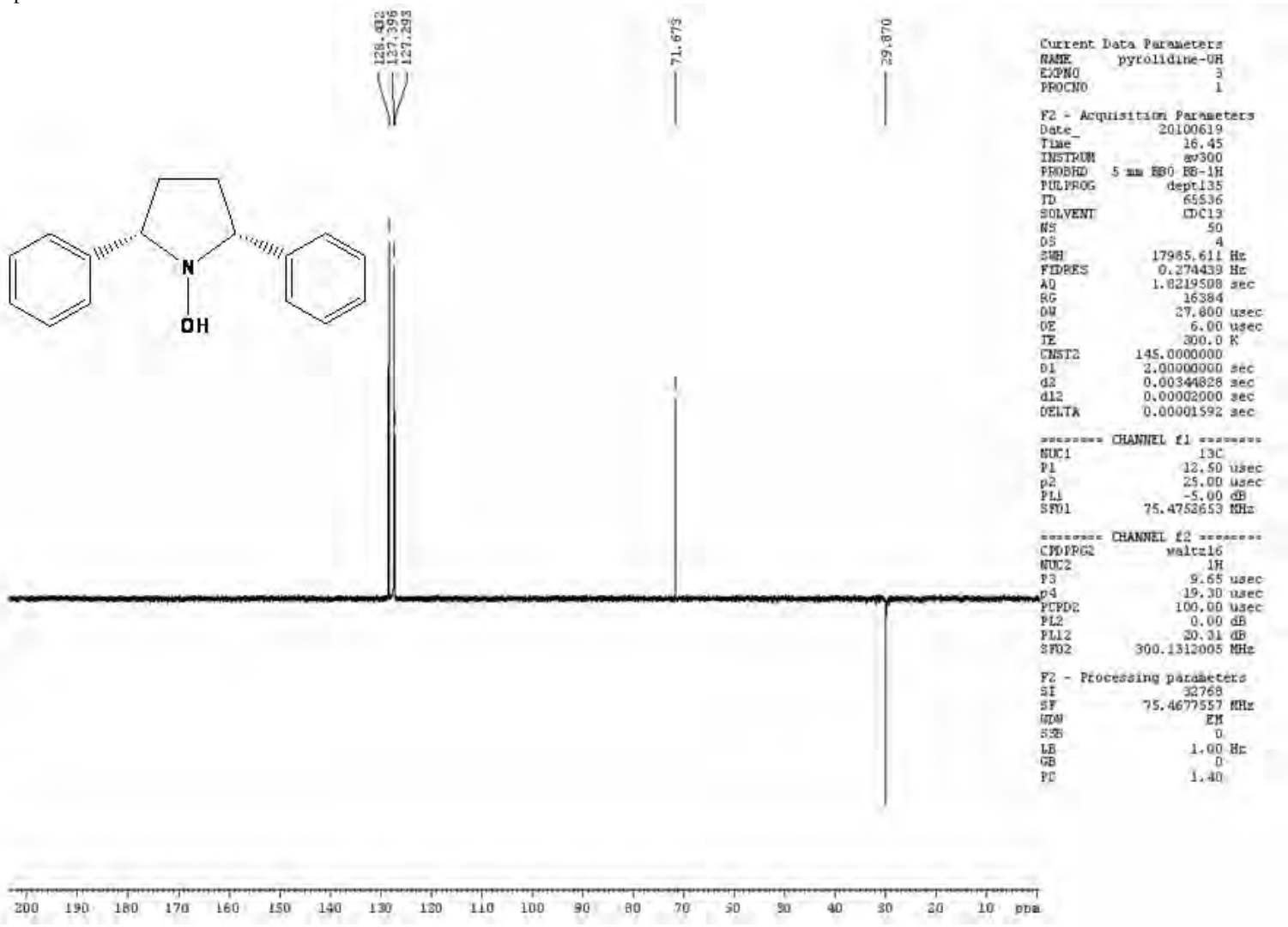
^{1}H NMR spectrum of **22** (300 MHz, $CDCl_3$)



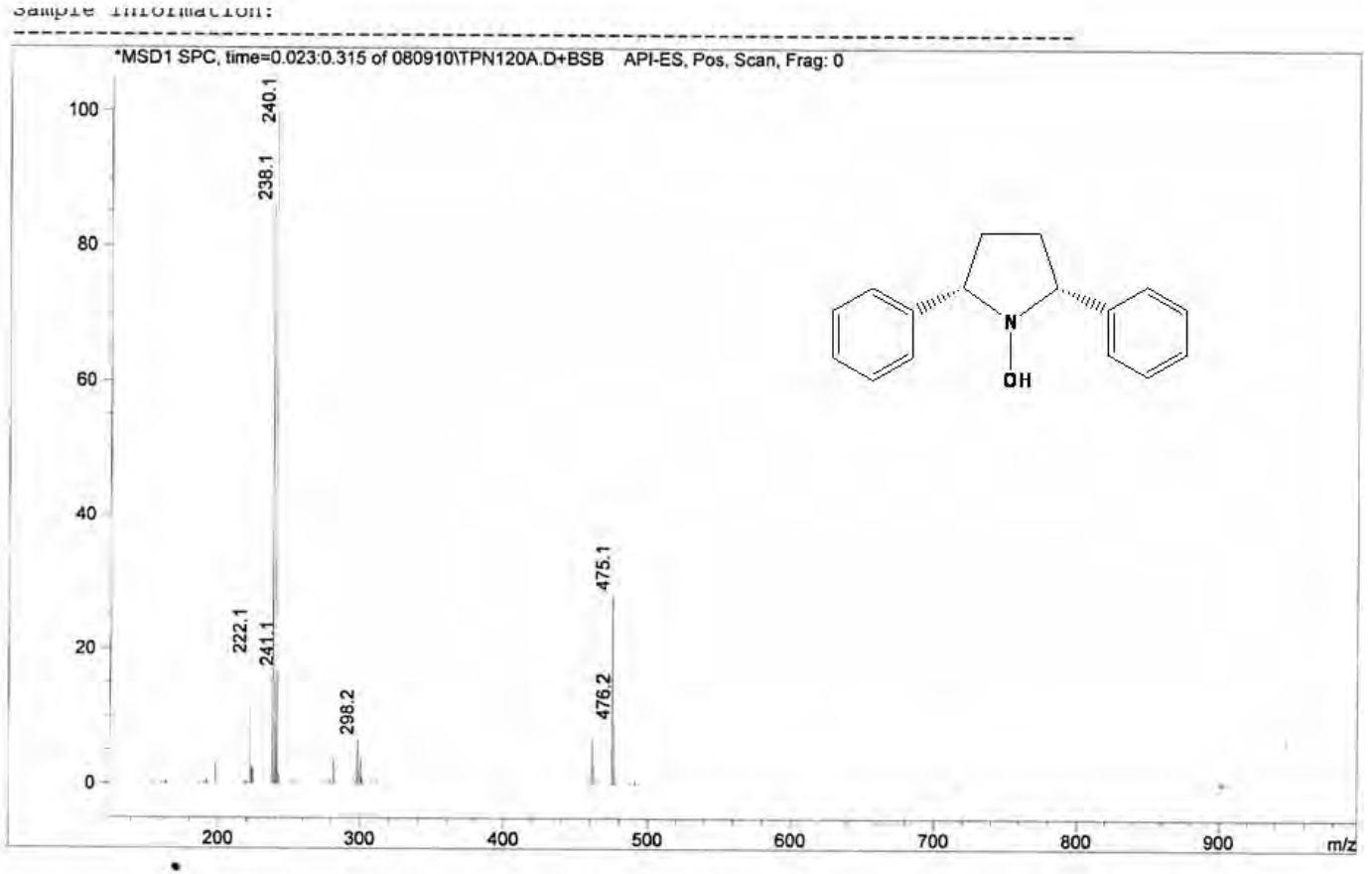
^{13}C NMR spectrum of **22** (75 MHz, $CDCl_3$)



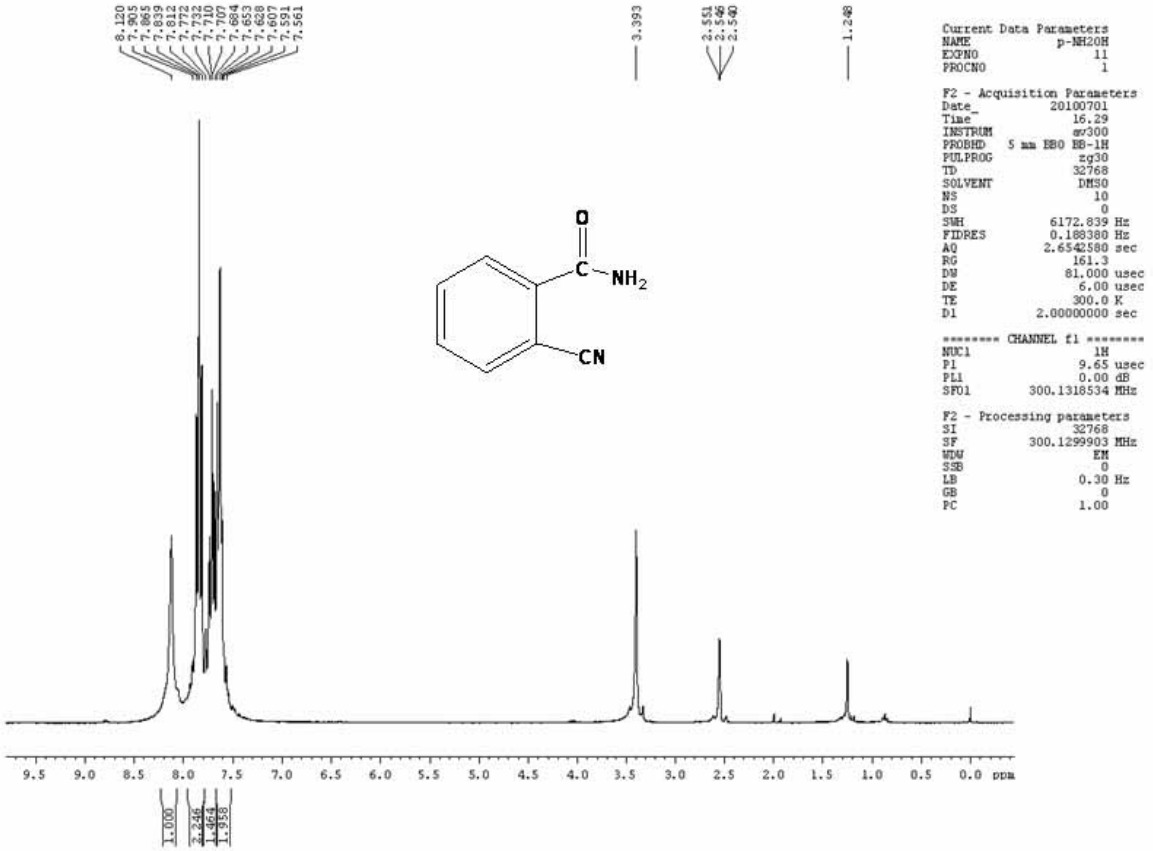
DEPT-135 spectrum of **22**



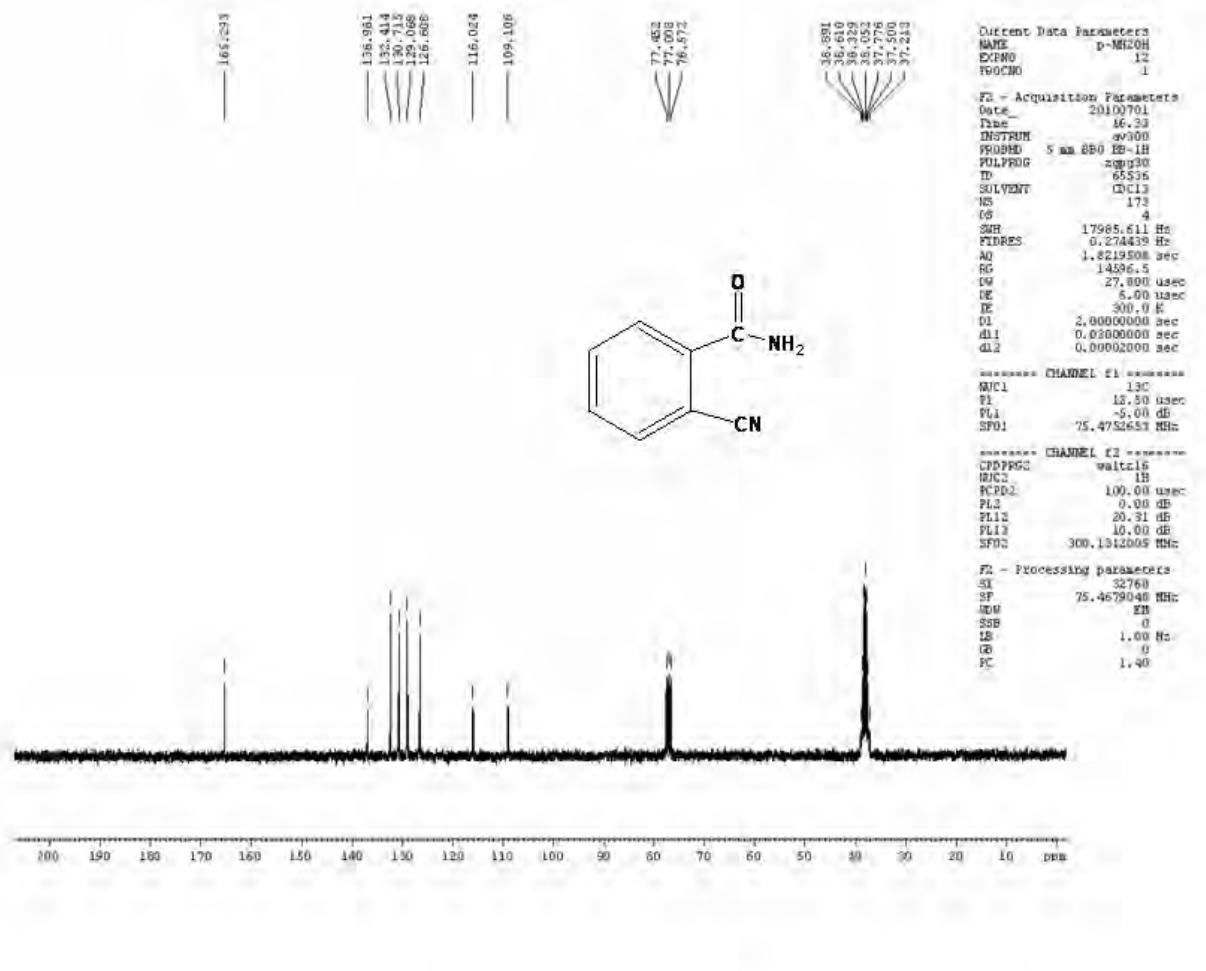
Mass spectrum of **22**



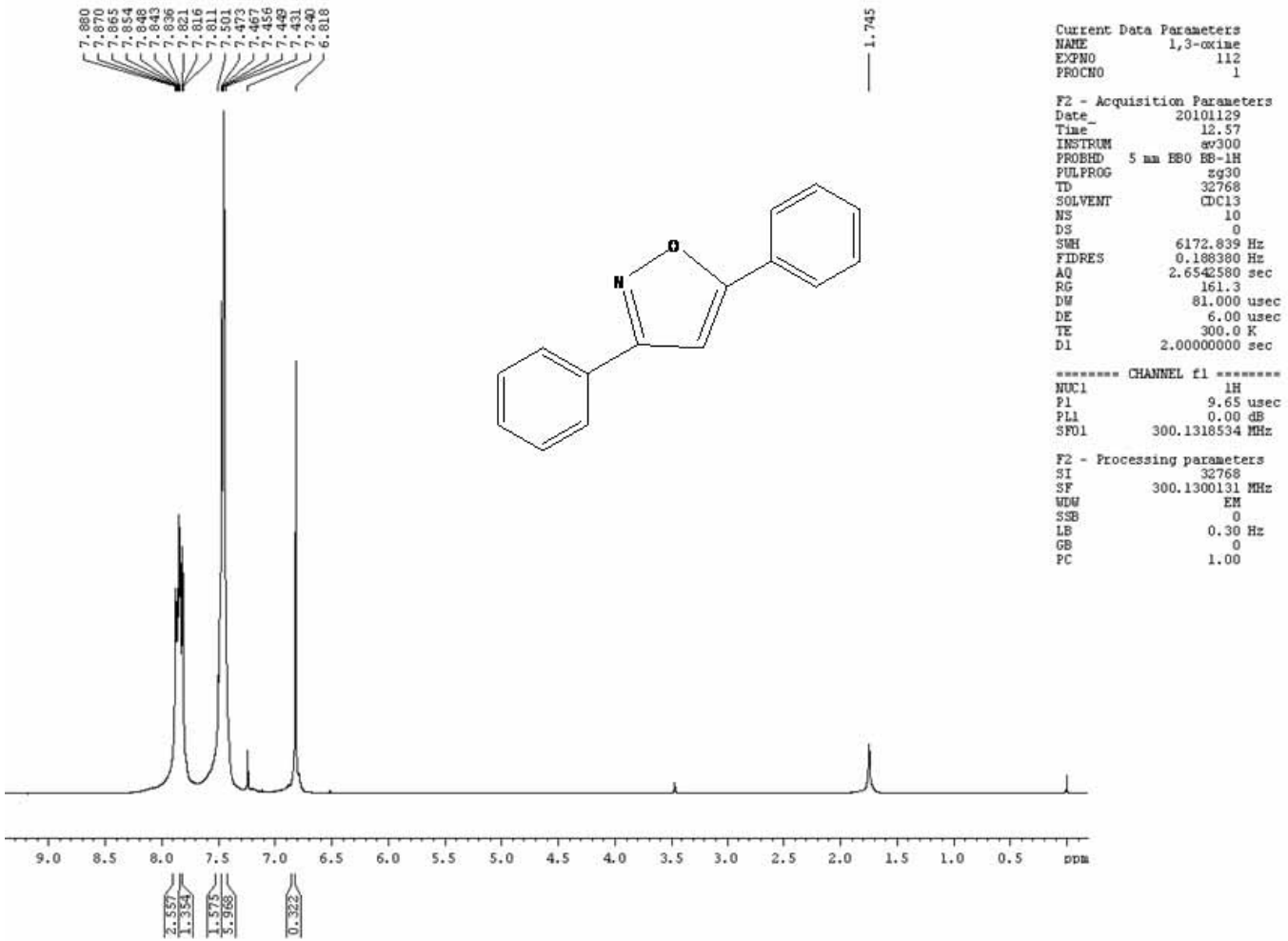
^{1}H NMR spectrum of **23** (300 MHz, DMSO-d_6 and $CDCl_3$)



^{13}C NMR spectrum of **23** (75 MHz, DMSO-d_6 and $CDCl_3$)



^{1}H NMR spectrum of **24** (300 MHz, $CDCl_3$)

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EXPNO                 112
PROCNO                  1

F2 - Acquisition Parameters
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Time                12.57
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PROBHD   5 mm BBO BB-1H
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    10
DS                     0
SWH             6172.839 Hz
FIDRES          0.188380 Hz
AQ              2.6542580 sec
RG                 161.3
DW                81.000 usec
DE                 6.00 usec
TE                300.0 K
D1             2.00000000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                 9.65 usec
PL1                0.00 dB
SFO1         300.1318534 MHz

F2 - Processing parameters
SI                 32768
SF           300.1300131 MHz
WDW                   EM
SSB                    0
LB                 0.30 Hz
GB                     0
PC                 1.00
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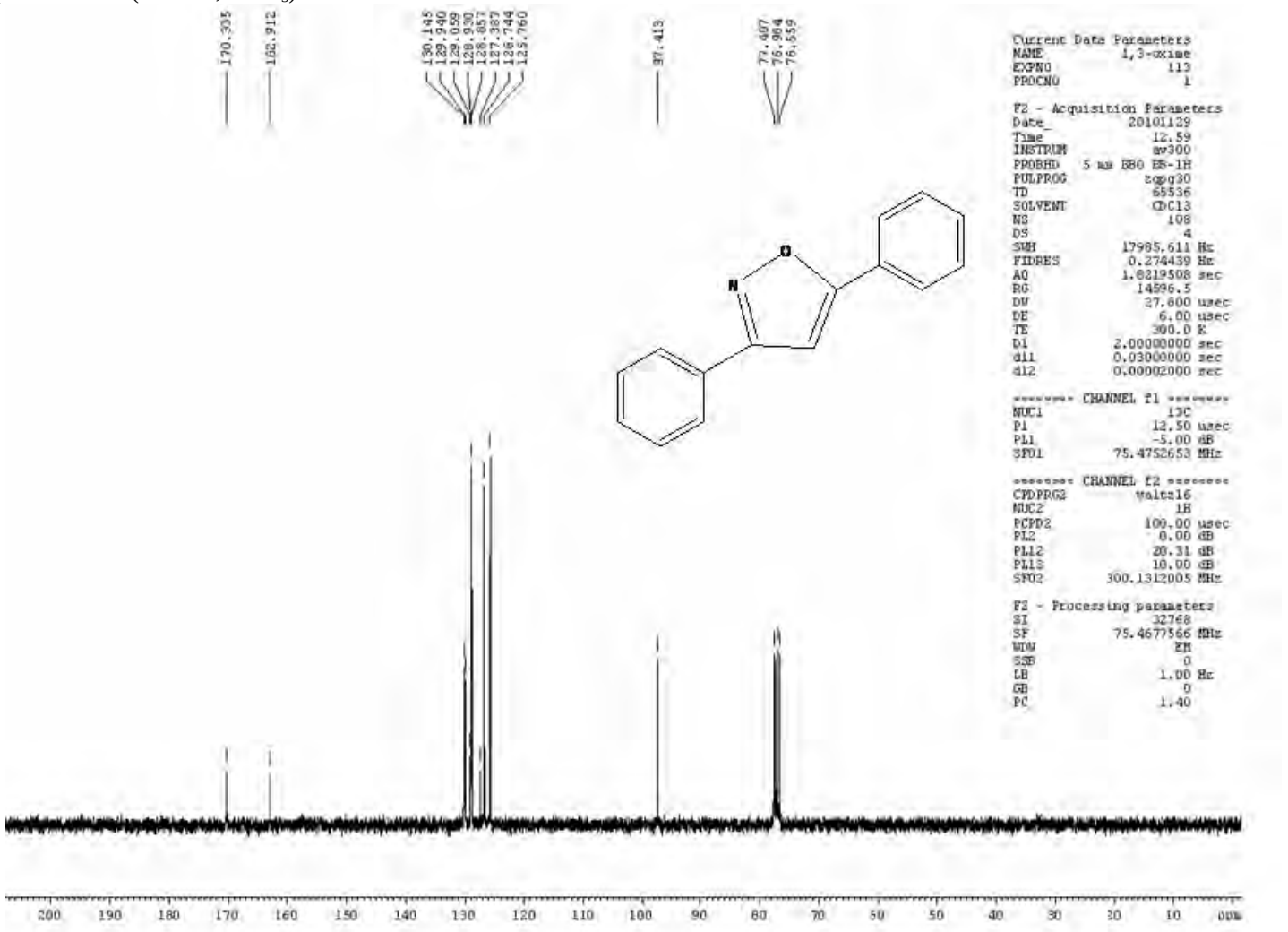
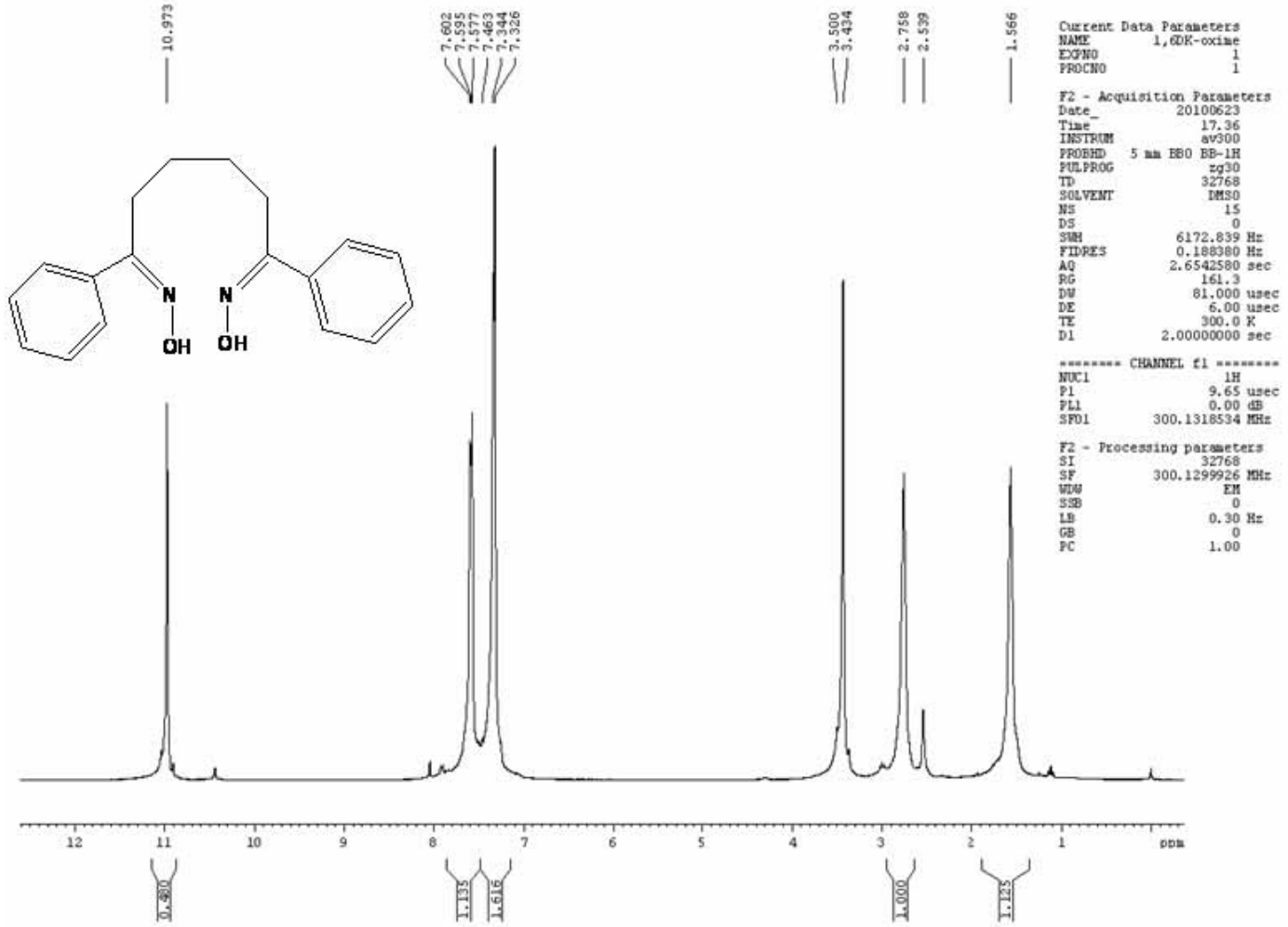
^{13}C NMR spectrum of **24** (75 MHz, $CDCl_3$)



^{1}H NMR spectrum of **25** (300 MHz, DMSO-d_6 and $CDCl_3$)



^{13}C NMR spectrum of **25** (75 MHz, DMSO-d_6 and $CDCl_3$)