

Electronic Supplementary Information

**Synthesis of novel diosgenyl saponin analogues and
apoptosis-inducing activity on A549 human lung
adenocarcinoma**

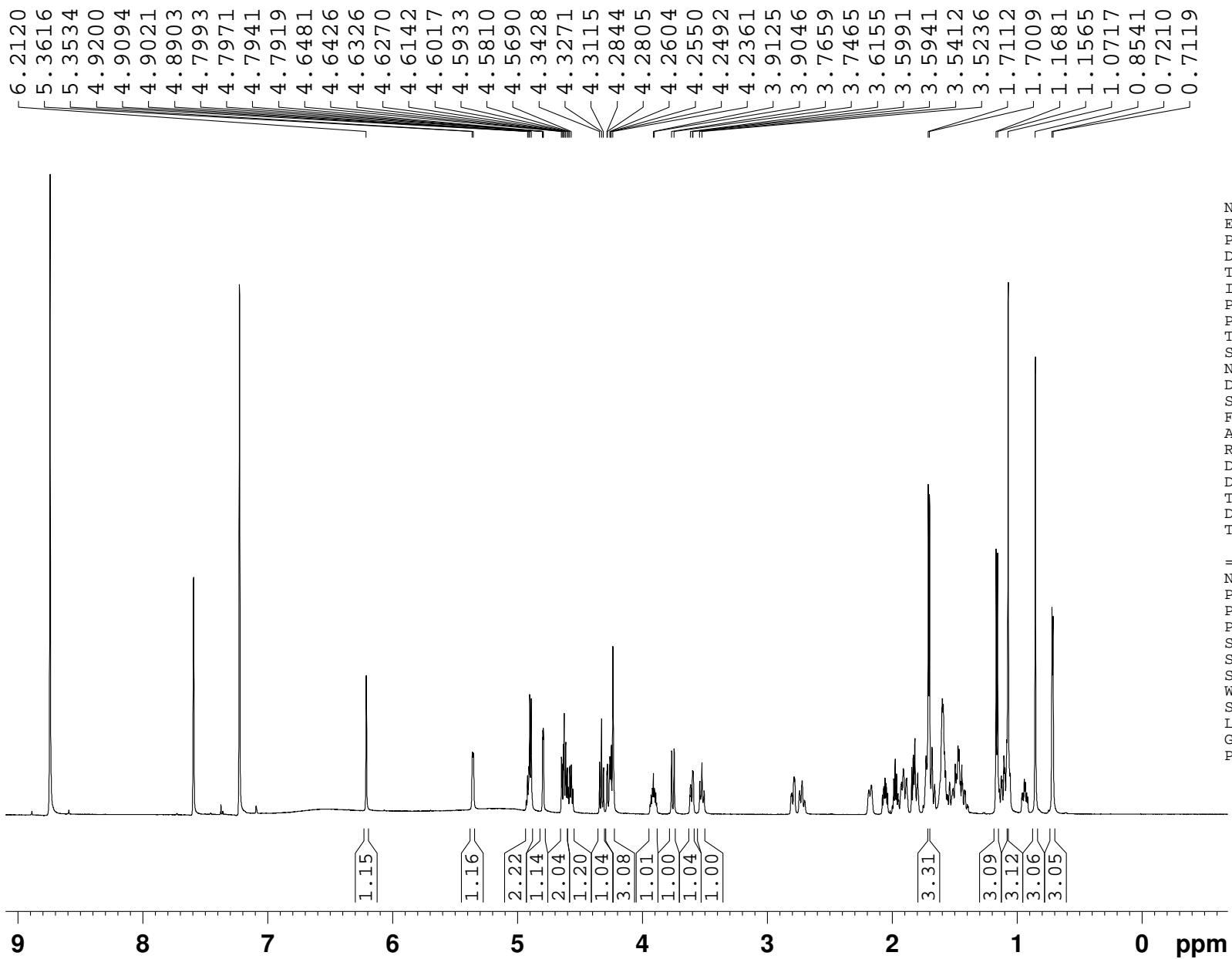
**Bo Wang,^a Jaemoo Chun,^b Yang Liu,^a Lina Han,^b Yan-shi Wang,^a Eun-Ji Joo,^b
Yeong-Shik Kim^{*b} and Mao-sheng Cheng^{*a}**

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^b Natural Products Research Institute, College of Pharmacy, Seoul National University, Seoul 151-742, Republic of Korea.

1H NMR of Compound 1

AV-600-1H



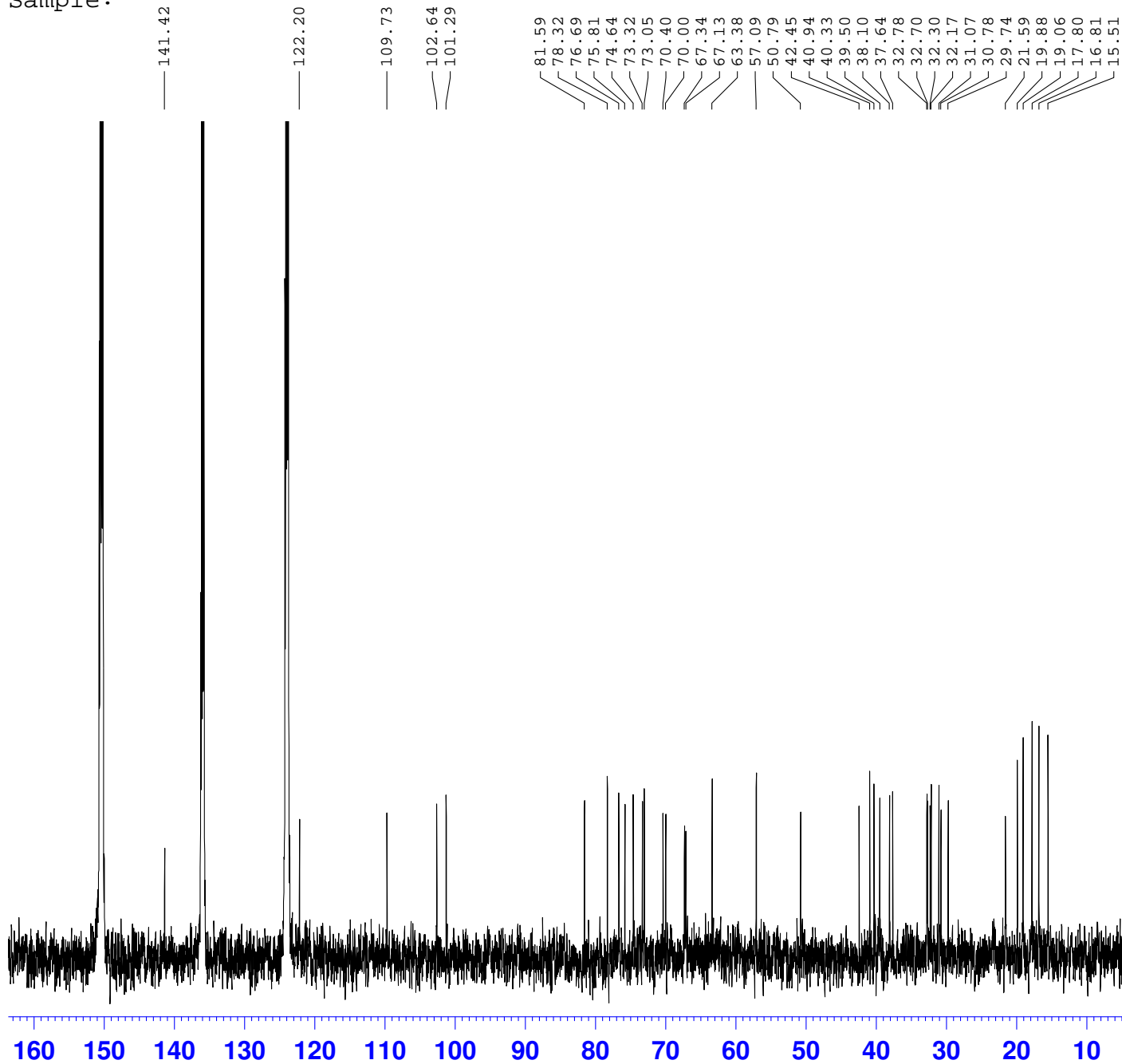
NAME ZP20110328B
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PROCNO 1
Date_ 20110328
Time 15.02
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 128
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1306576 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 1

AV-600-13C

Sample:



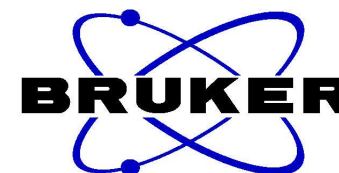
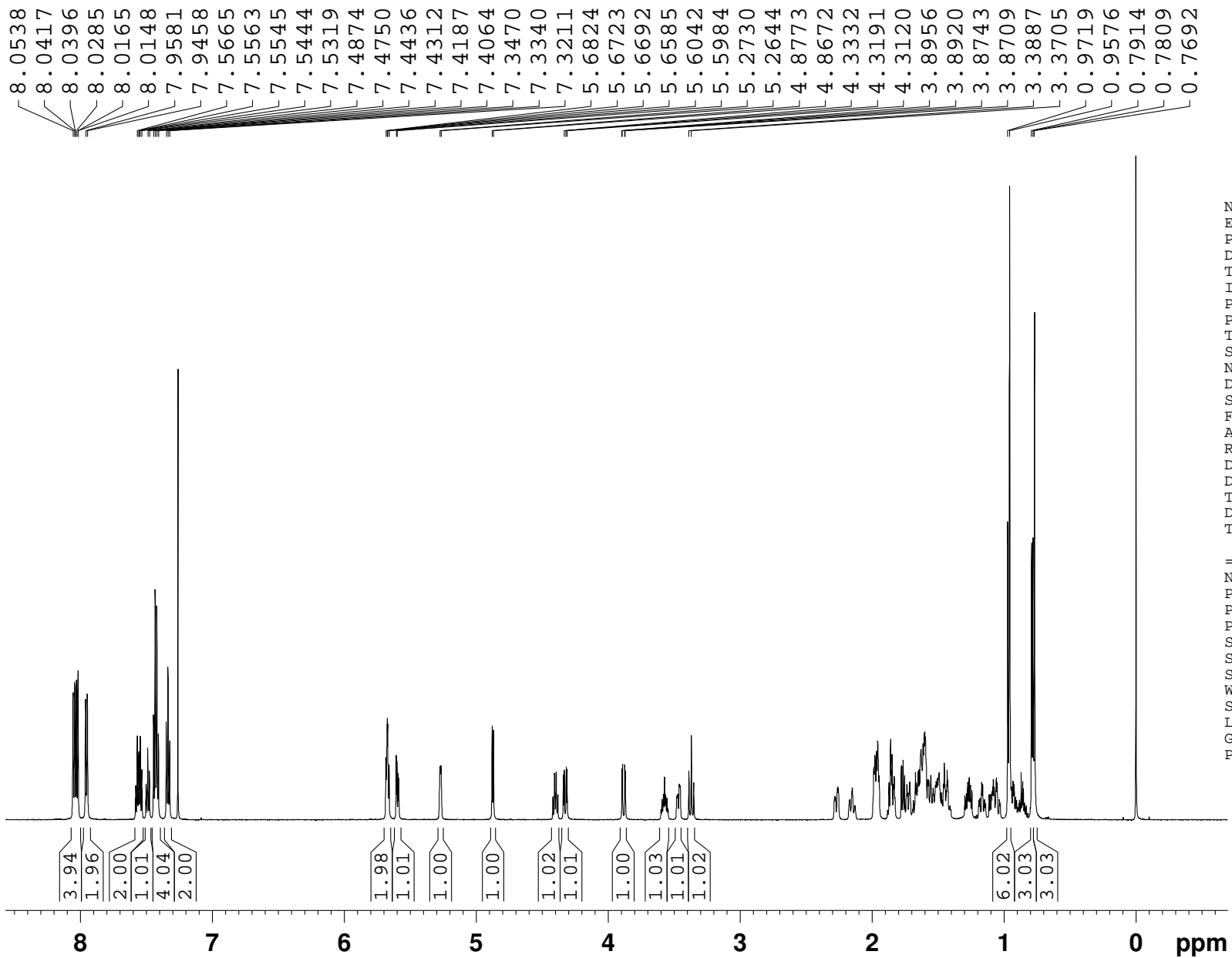
NAME ZP20110328B
EXPNO 2
PROCNO 1
Date_ 20110331
Time 19.23
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 78
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9027005 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

¹H NMR of Compound 2

AV-600-1H COMPOUND 2



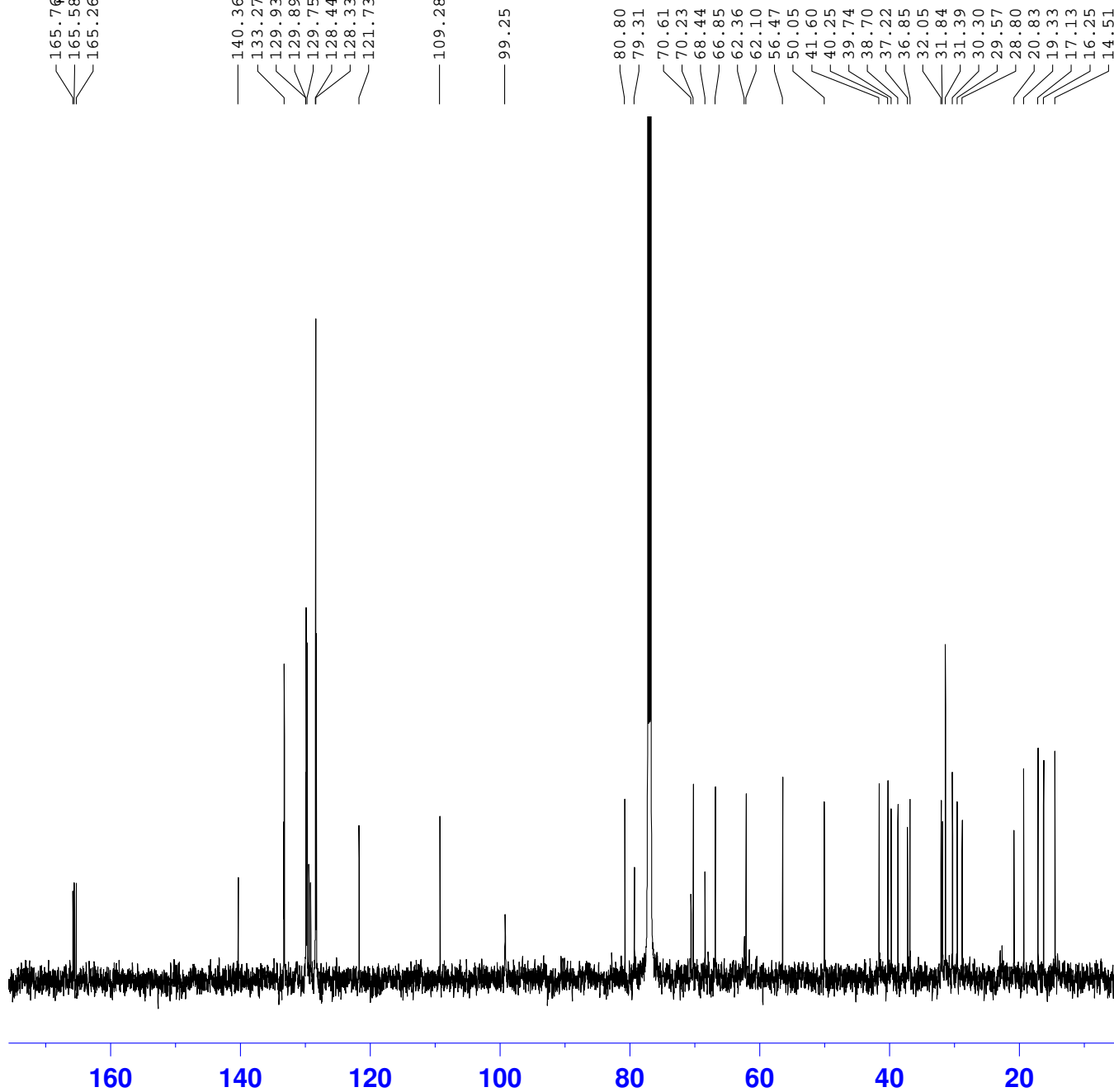
NAME ZP20101021
EXPNO 1
PROCNO 1
Date_ 20101022
Time 10.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300104 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 2

AV-600-13C

Sample:



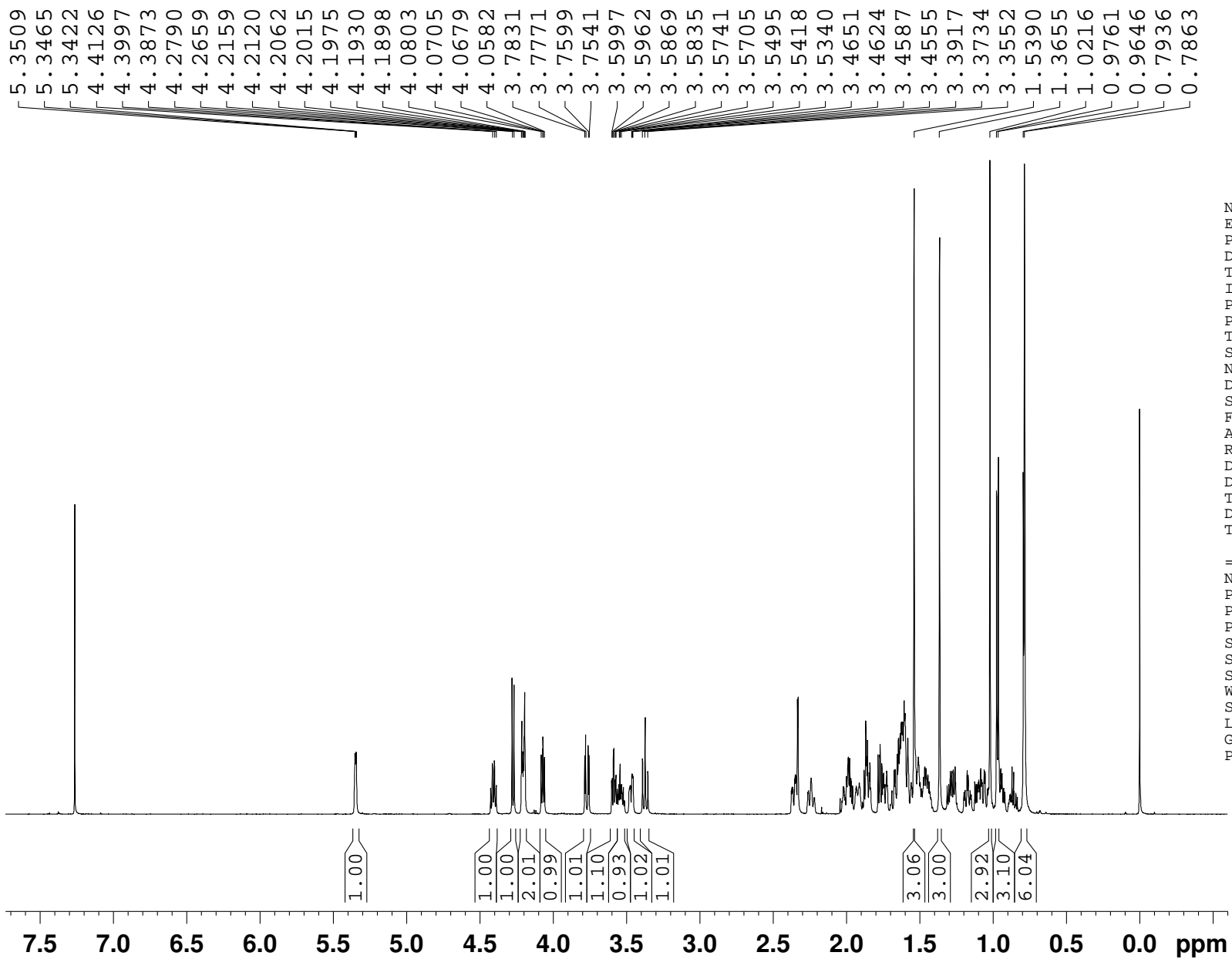
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EXPNO         2
PROCNO        1
Date_         20101022
Time          11.00
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            959
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            26000
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W           83.20243835 W
SFO1           150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9028090 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```

1H NMR of Compound 4

AV-600-1H



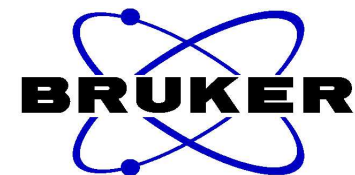
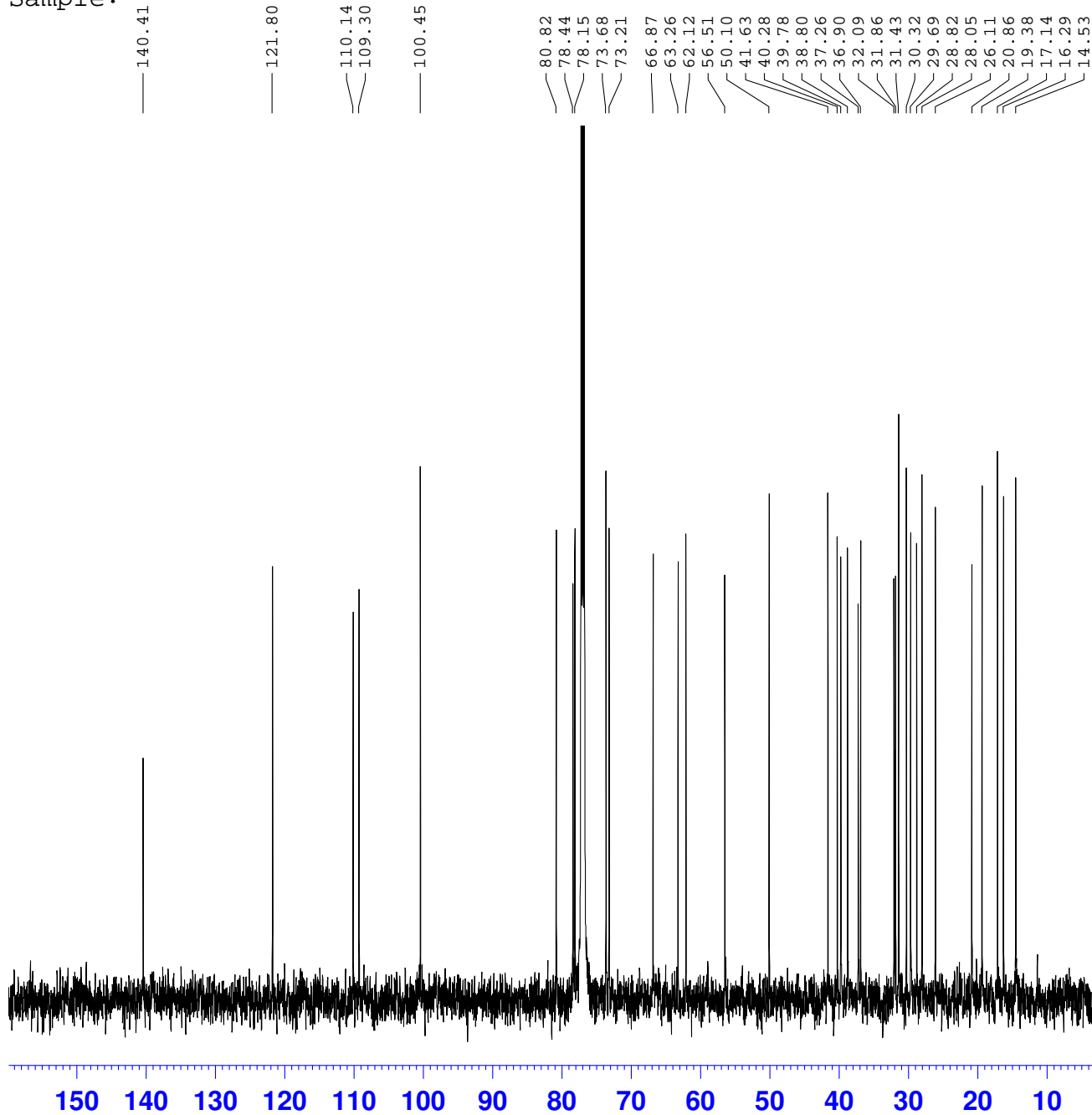
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EXPNO 1
PROCNO 1
Date_ 20101027
Time 16.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300084 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 4

AV-600-13C

Sample:

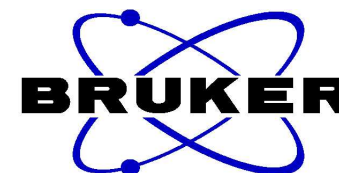
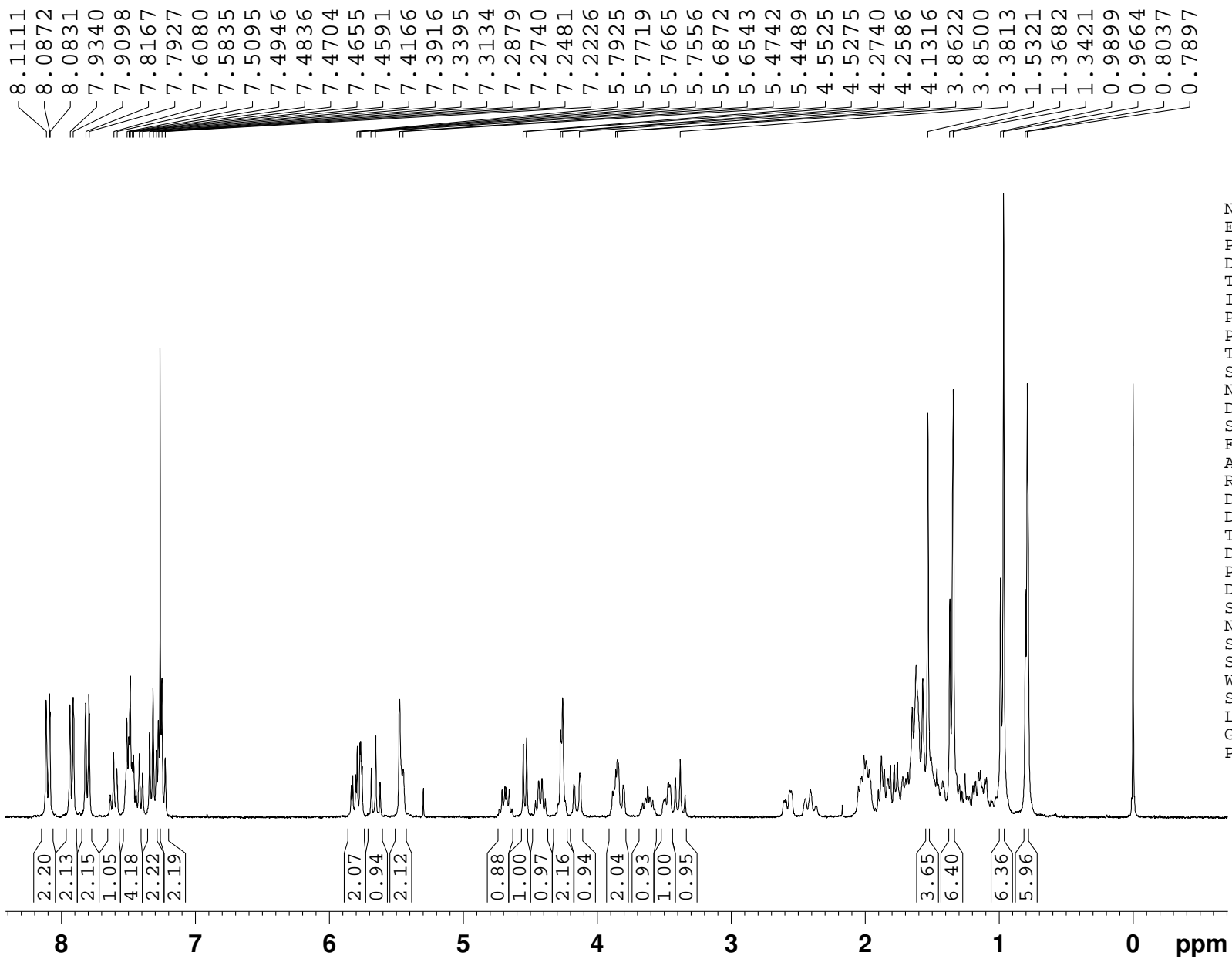


NAME ZP20101027B
EXPNO 2
PROCNO 1
Date_ 20101101
Time 9.08
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 894
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

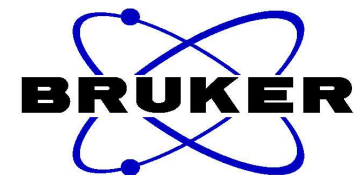
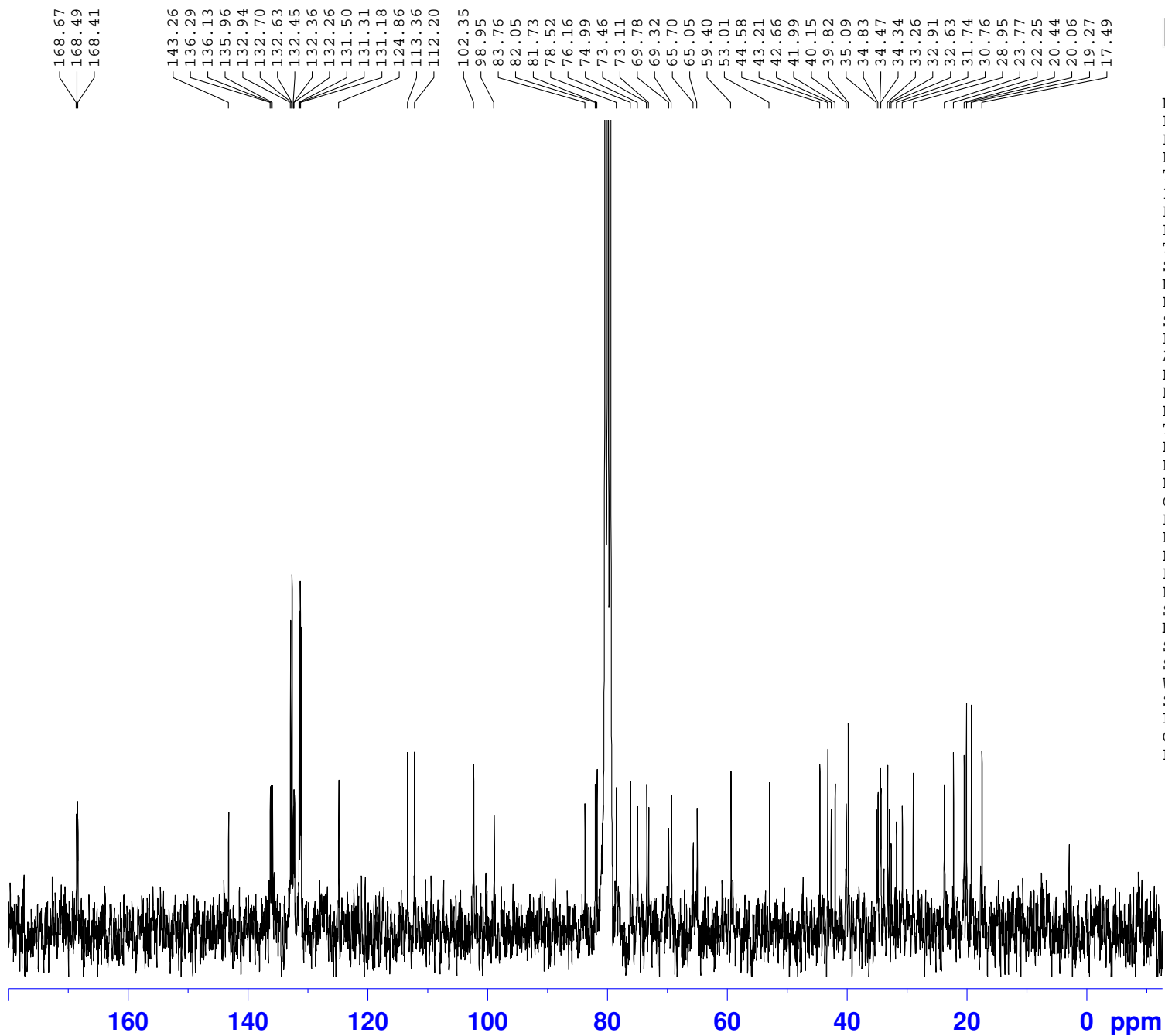
==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028061 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

¹H NMR of Compound 5



NAME	ZP20110407
EXPNO	1
PROCNO	1
Date_	20110408
Time	7.24
INSTRUM	arx300
PROBHD	5 mm QNP 1H
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	16
DS	2
SWH	6250.000 Hz
FIDRES	0.190735 Hz
AQ	2.621490 sec
RG	4096
DW	80.000 usec
DE	114.29 usec
TE	300.0 K
D1	1.00000000 sec
P1	12.40 usec
DE	114.29 usec
SFO1	300.1318534 MHz
NUCLEUS	¹ H
SI	16384
SF	300.1300056 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

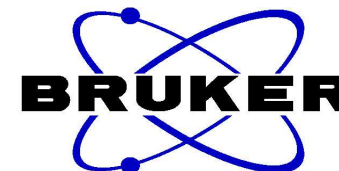
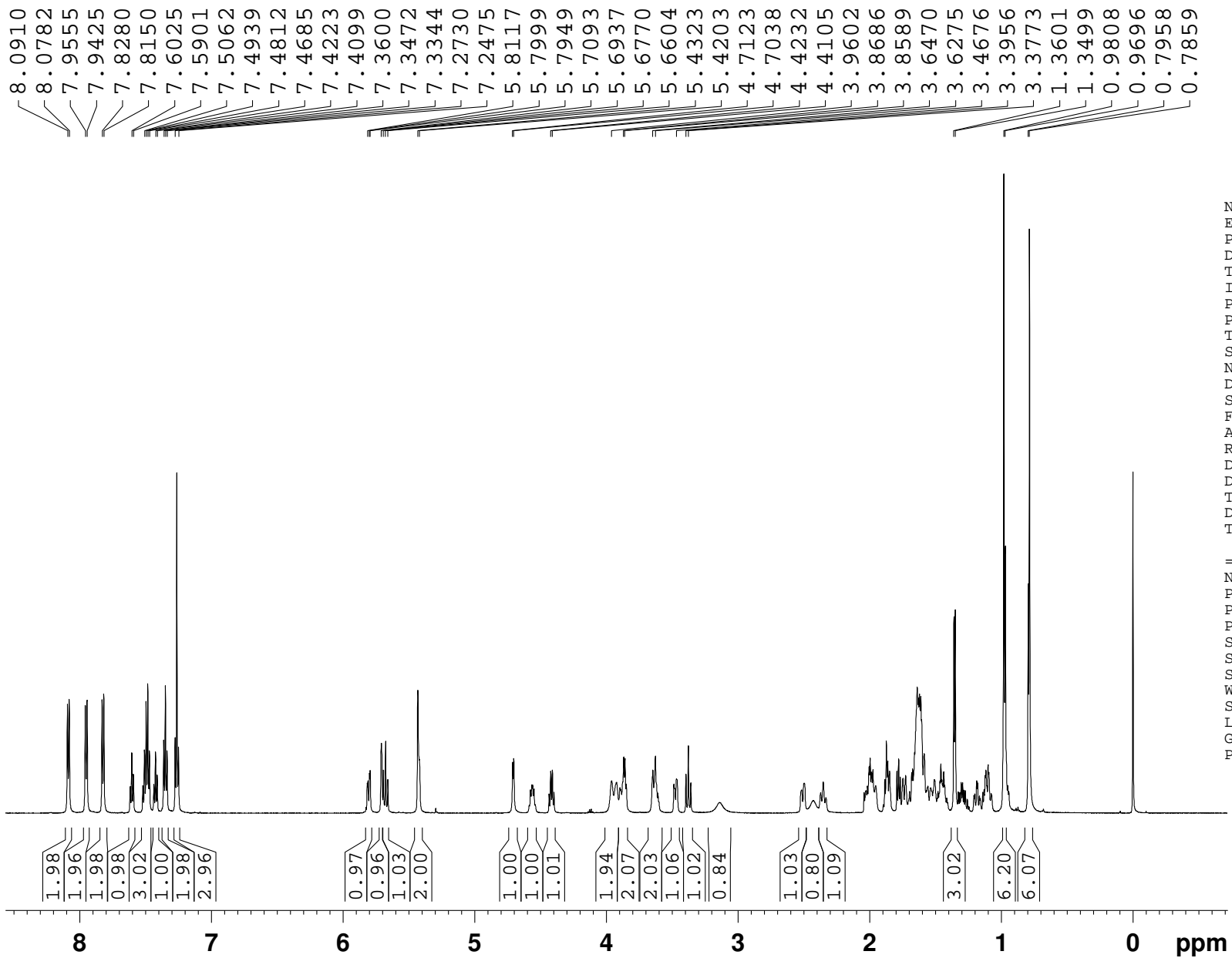
¹³C NMR of Compound 5



NAME ZP20110407
EXPNO 2
PROCNO 1
Date_ 20110421
Time 9.43
INSTRUM arx300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 3445
DS 2
SWH 25000.000 Hz
FIDRES 0.381470 Hz
AQ 1.3107700 sec
RG 32768
DW 20.000 usec
DE 28.57 usec
TE 300.0 K
D12 0.00002000 sec
DL6 20.00 dB
D1 2.00000000 sec
CPDPRG waltz16
P31 80.00 usec
D11 0.03000000 sec
DL5 20.00 dB
P1 13.70 usec
DE 28.57 usec
SF01 75.4772501 MHz
NUCLEUS ¹³C
SI 32768
SF 75.4675280 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

1H NMR of Compound 6

AV-600-1H



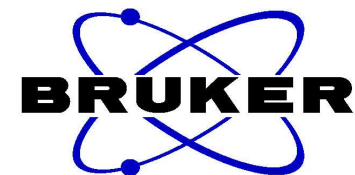
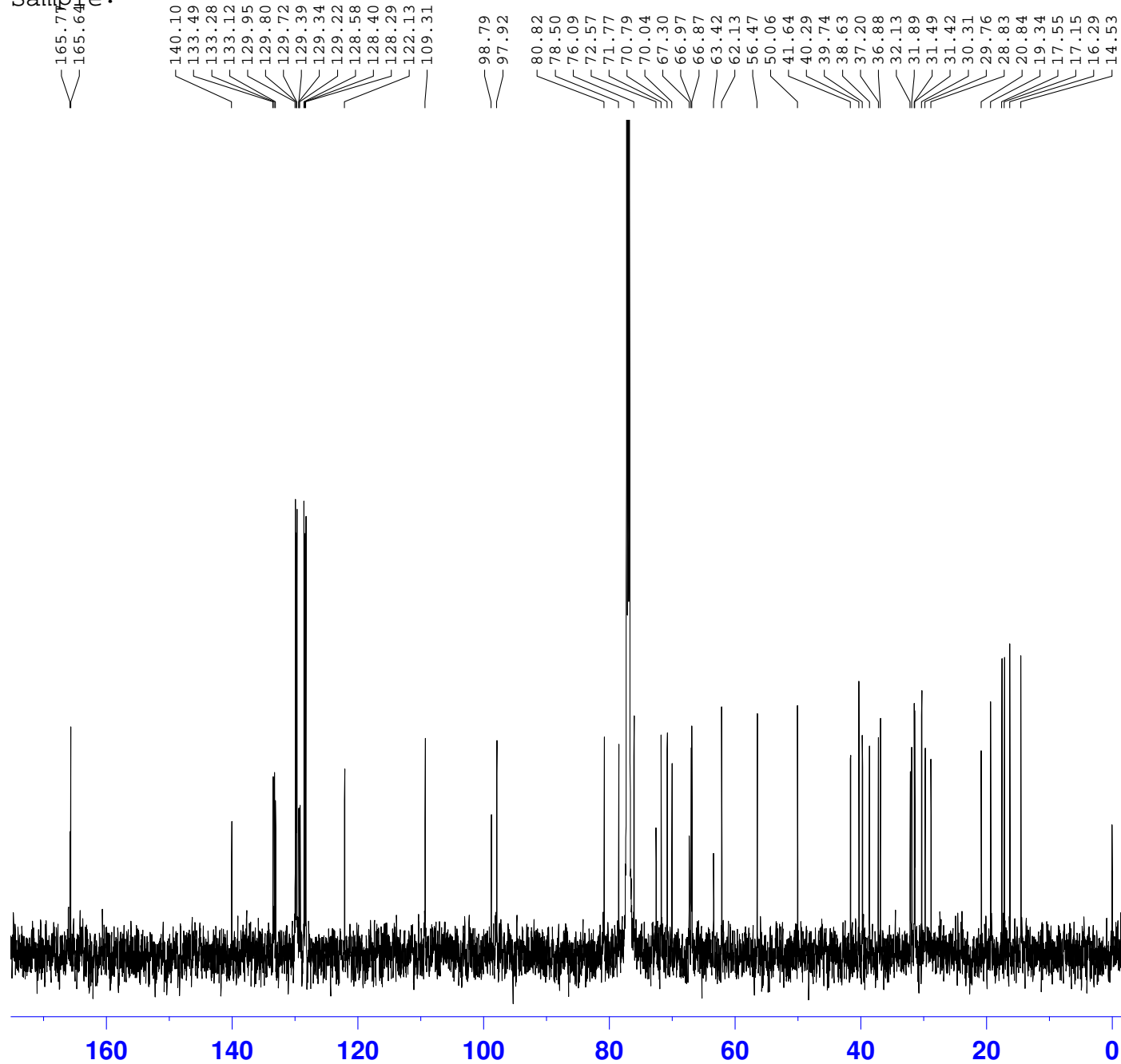
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EXPNO 1
PROCNO 1
Date_ 20101101
Time 16.19
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 203
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300094 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 6

AV-600-13C

Sample:

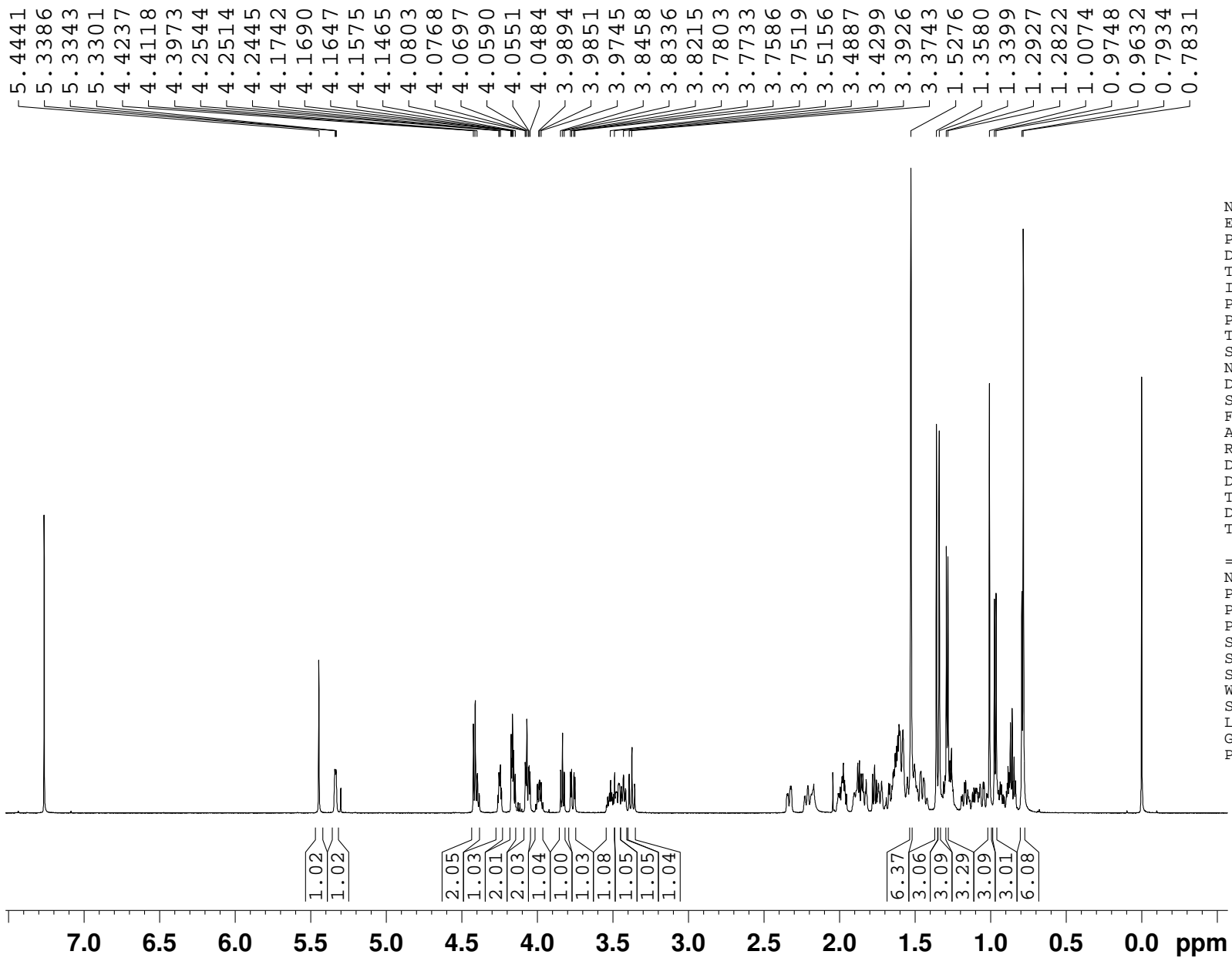


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NAME          ZP20101029
EXPNO         2
PROCNO        1
Date_         20101101
Time          16.26
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            458
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            20600
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W           83.20243835 W
SFO1           150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2            -4.00 dB
PL12           13.16 dB
PL13           16.00 dB
PL2W           34.70265579 W
PL12W          0.66736388 W
PL13W          0.34702653 W
SFO2           600.1324005 MHz
SI             32768
SF             150.9028063 MHz
WDW            EM
SSB            0
LB             3.00 Hz
GB             0
PC             1.40
```

AV-600-1H



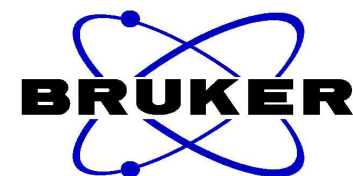
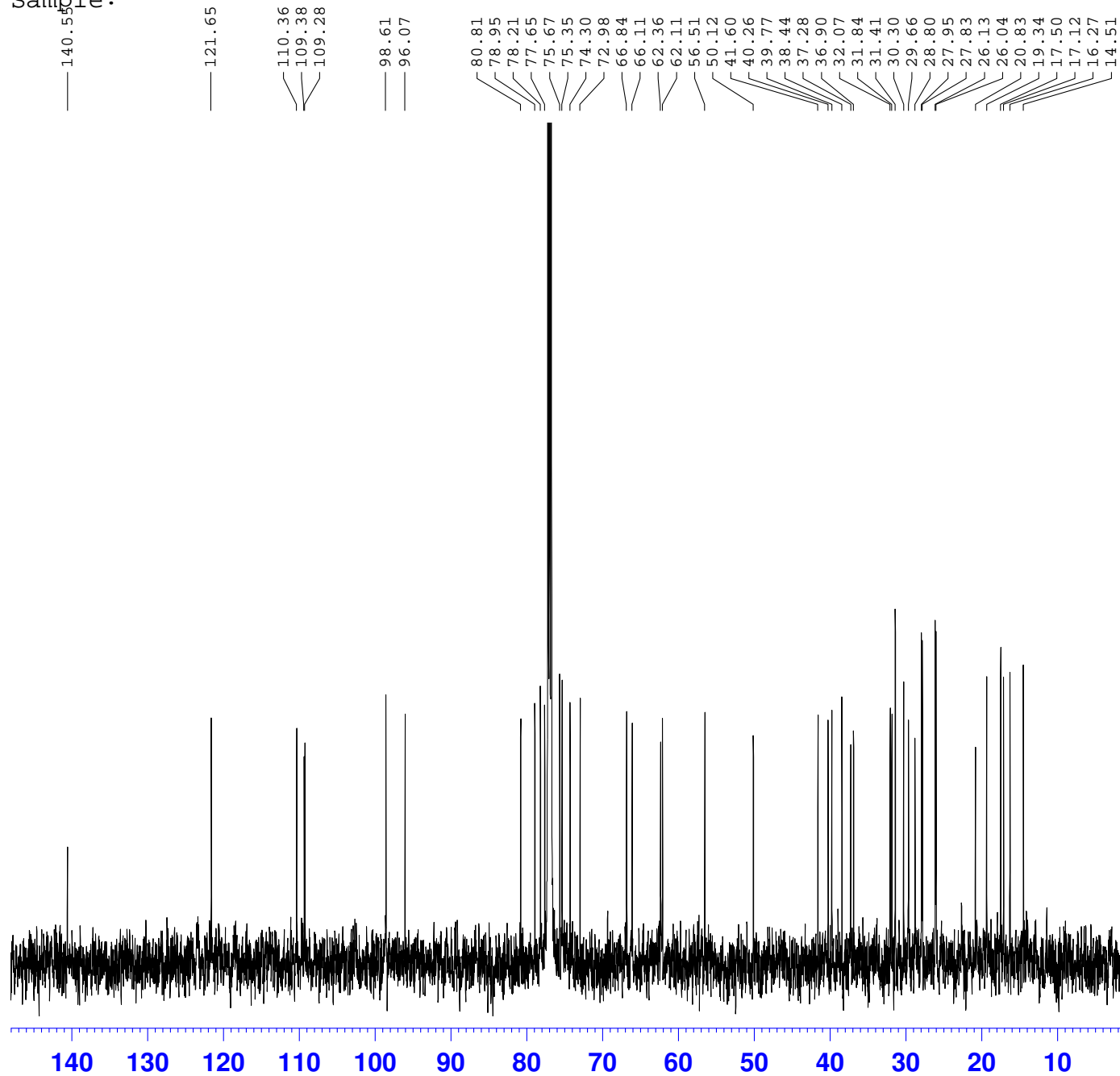
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EXPNO 1
PROCNO 1
Date_ 20101101
Time 17.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 287
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300086 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 7

AV-600-13C

Sample:



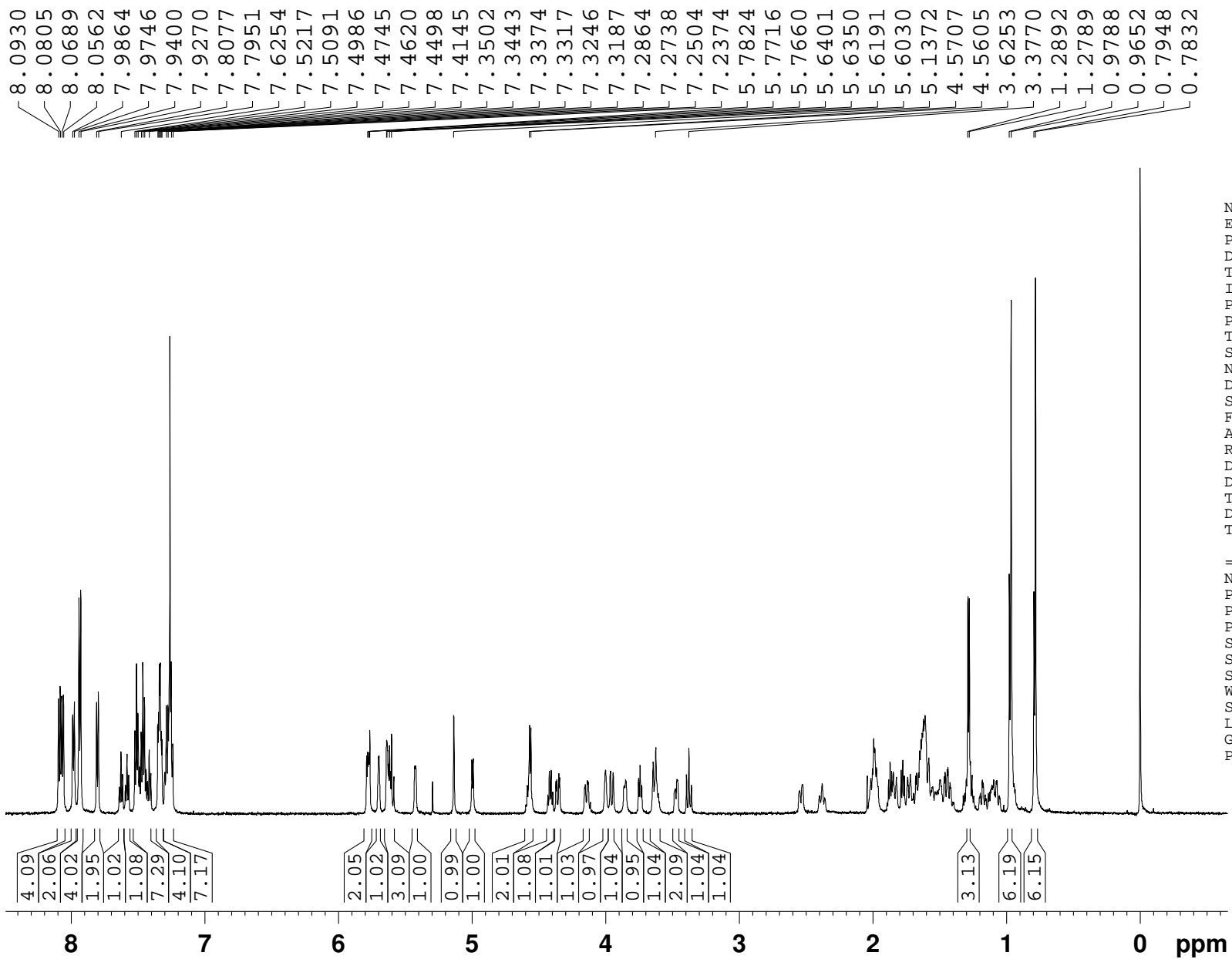
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EXPNO         2
PROCNO        1
Date_         20101101
Time          11.16
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            205
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            20600
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W           83.20243835 W
SFO1           150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2            -4.00 dB
PL12           13.16 dB
PL13           16.00 dB
PL2W           34.70265579 W
PL12W          0.66736388 W
PL13W          0.34702653 W
SFO2           600.1324005 MHz
SI             32768
SF             150.9028090 MHz
WDW            EM
SSB            0
LB             3.00 Hz
GB            0
PC             1.40
```

¹H NMR of Compound 8

AV-600-1H



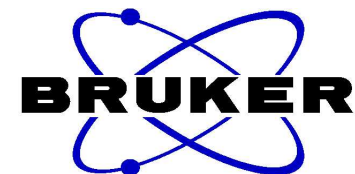
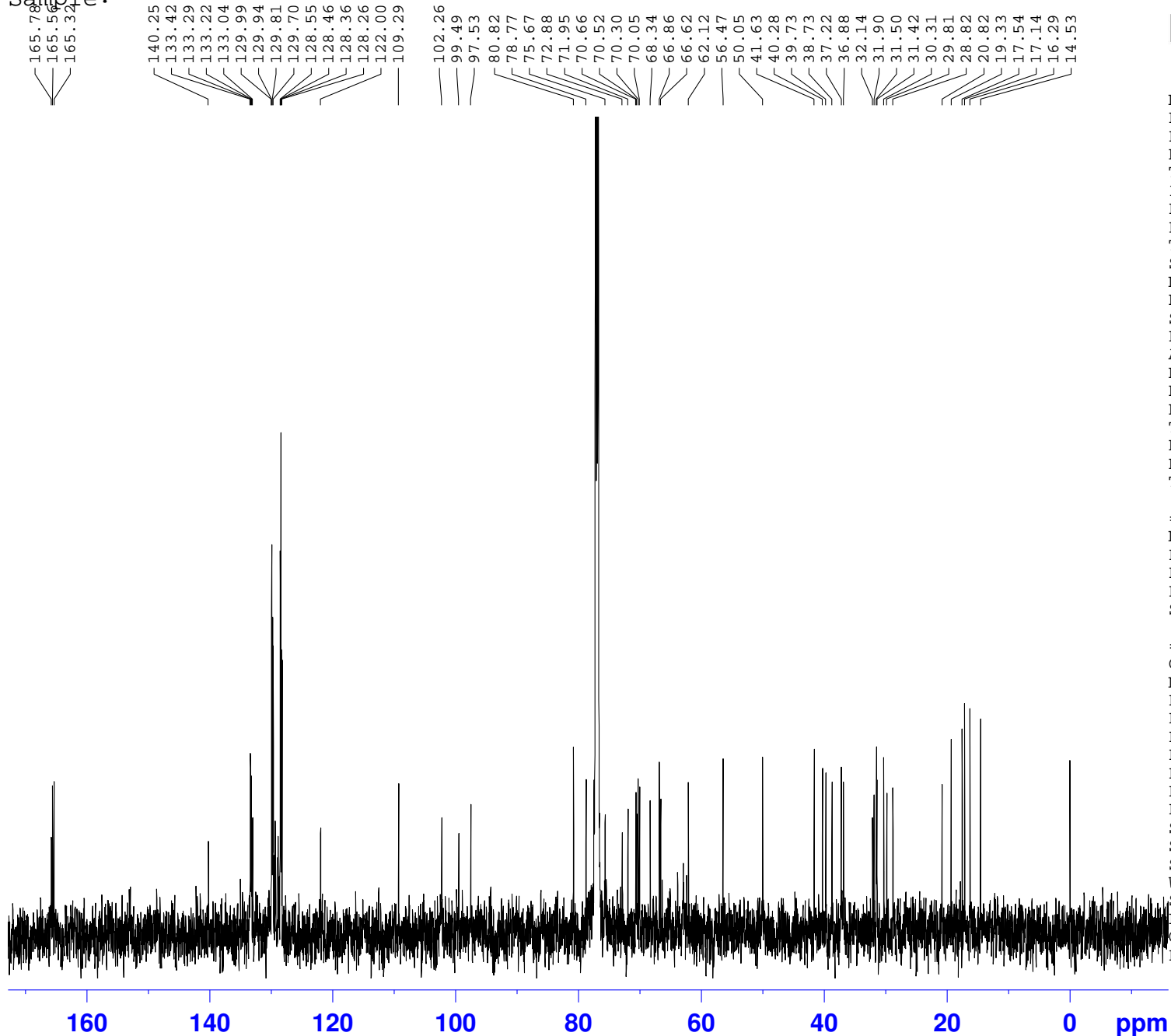
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EXPNO 1
PROCNO 1
Date_ 20101111
Time 10.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 1
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300103 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 8

AV-600-13C

Sample:



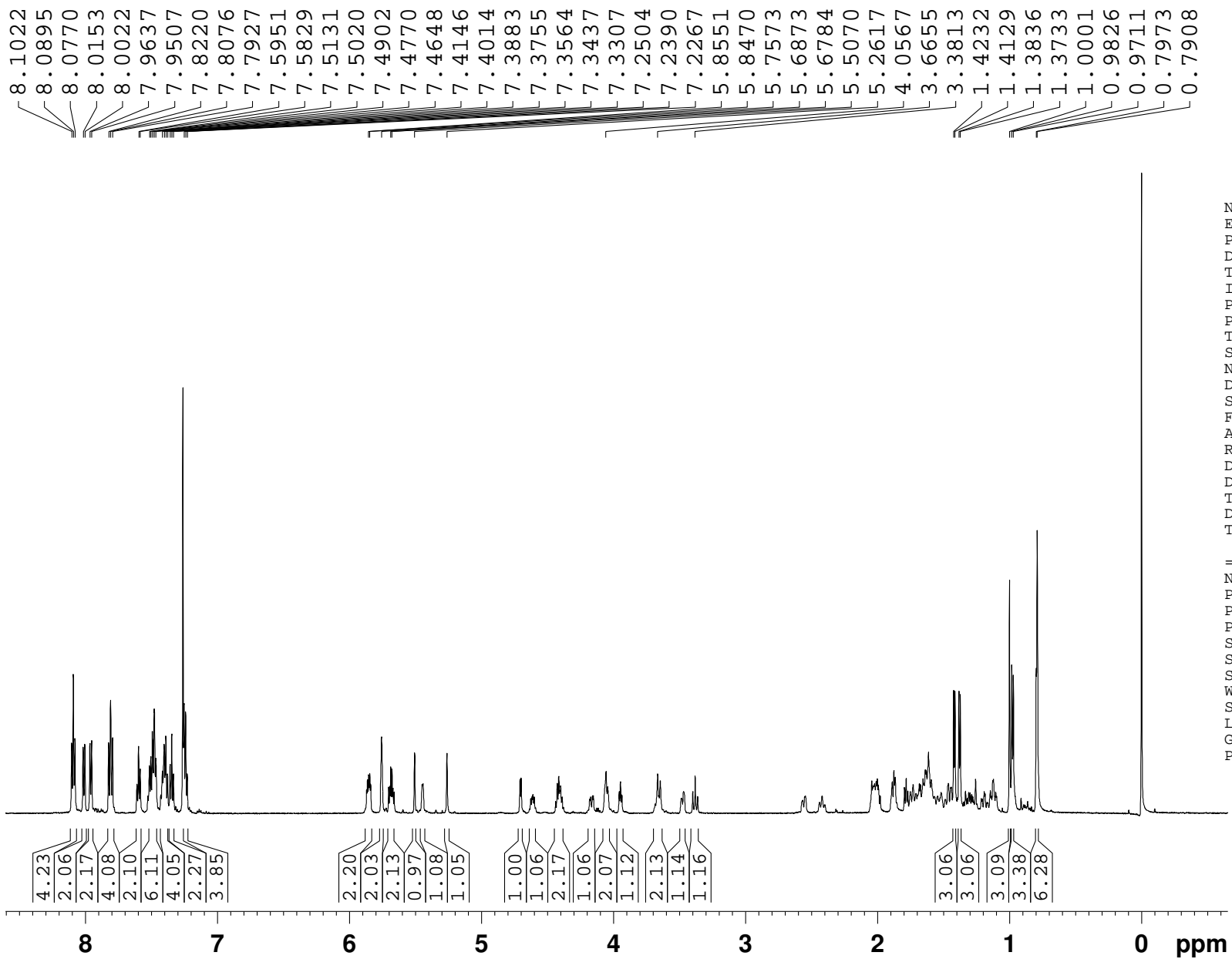
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NAME          ZP20101111B
EXPNO         2
PROCNO       1
Date_        20101112
Time         17.43
INSTRUM      spect
PROBHD       5 mm PABBO BB-
PULPROG      zgpg30
TD           65536
SOLVENT      CDCl3
NS           675
DS           2
SWH          45454.547 Hz
FIDRES       0.693581 Hz
AQ           0.7209570 sec
RG           20600
DW           11.000 usec
DE           6.50 usec
TE           298.2 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
```

```
===== CHANNEL f1 =====
NUC1          13C
P1            8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9028073 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```

¹H NMR of Compound 9

AV-600-1H



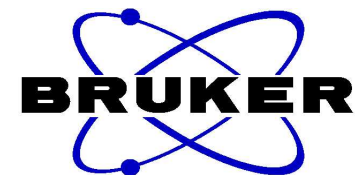
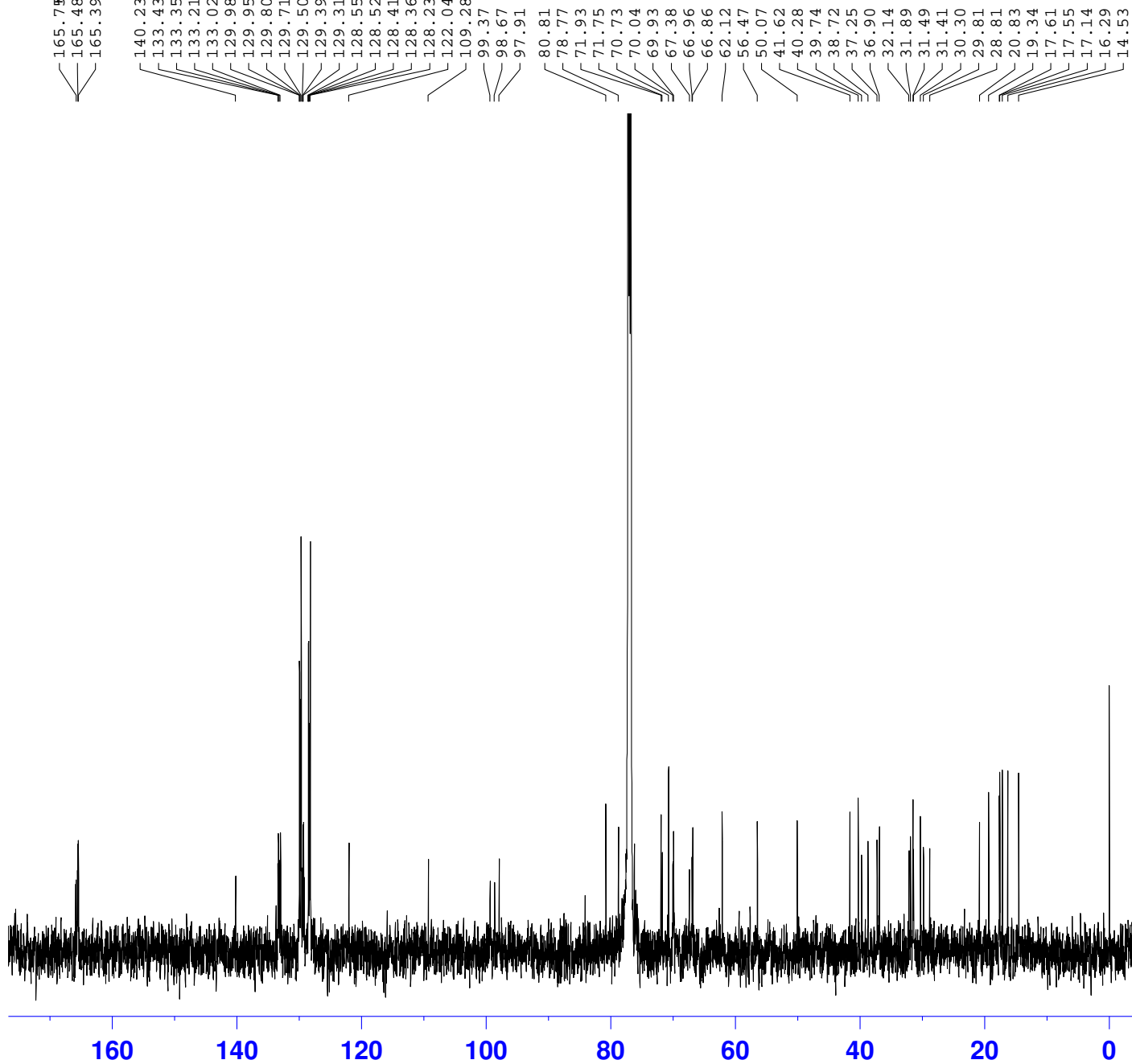
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EXPNO 1
PROCNO 1
Date_ 20101109
Time 12.04
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 362
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300104 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 9

AV-600-13C

Sample:

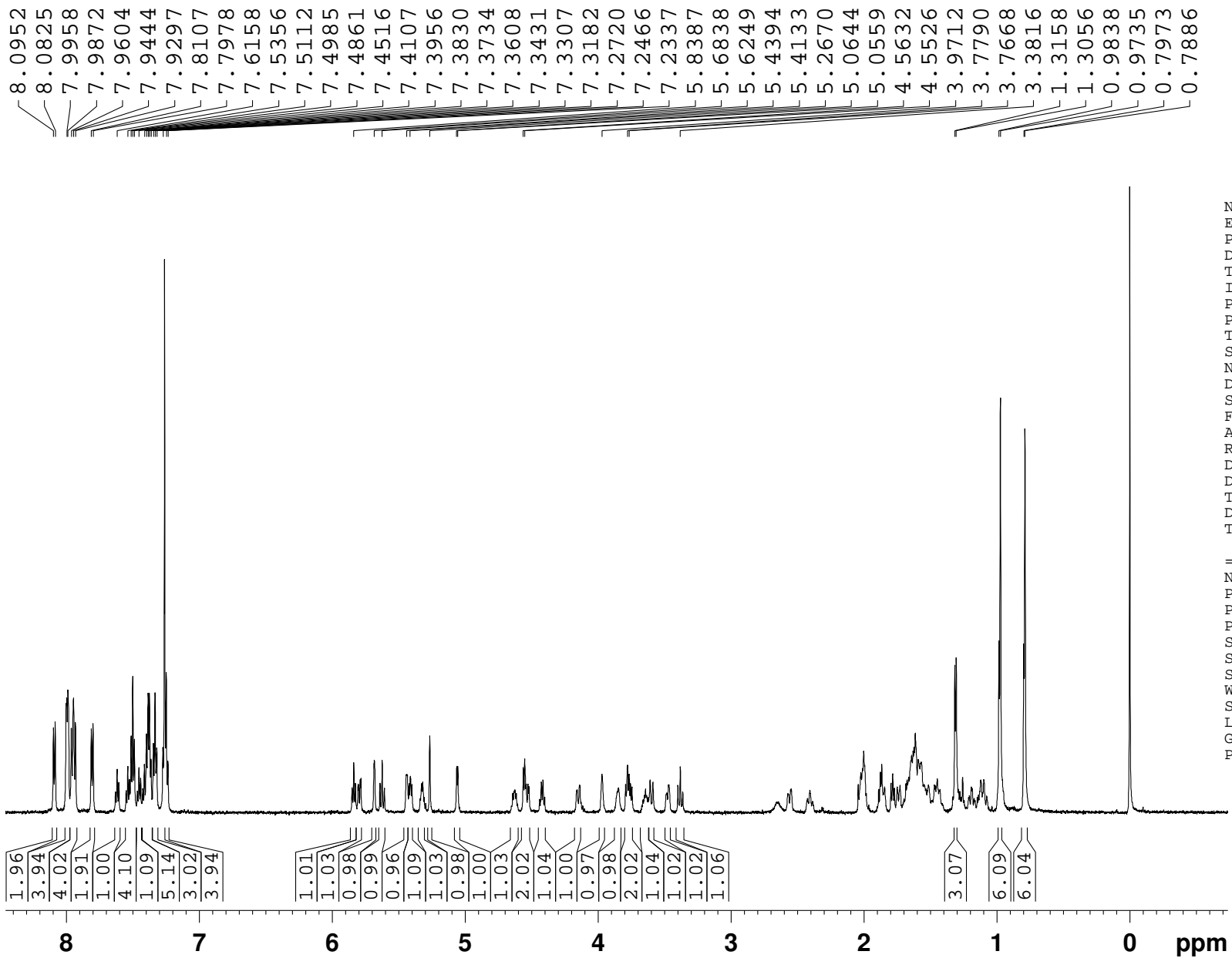


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EXPNO 2
PROCNO 1
Date_ 20101112
Time 21.24
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1626
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028090 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

AV-600-1H



NAME ZP20101111A
EXPNO 1
PROCNO 1
Date_ 20101111
Time 10.36
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 1
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 362
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300103 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 10

AV-600-13C

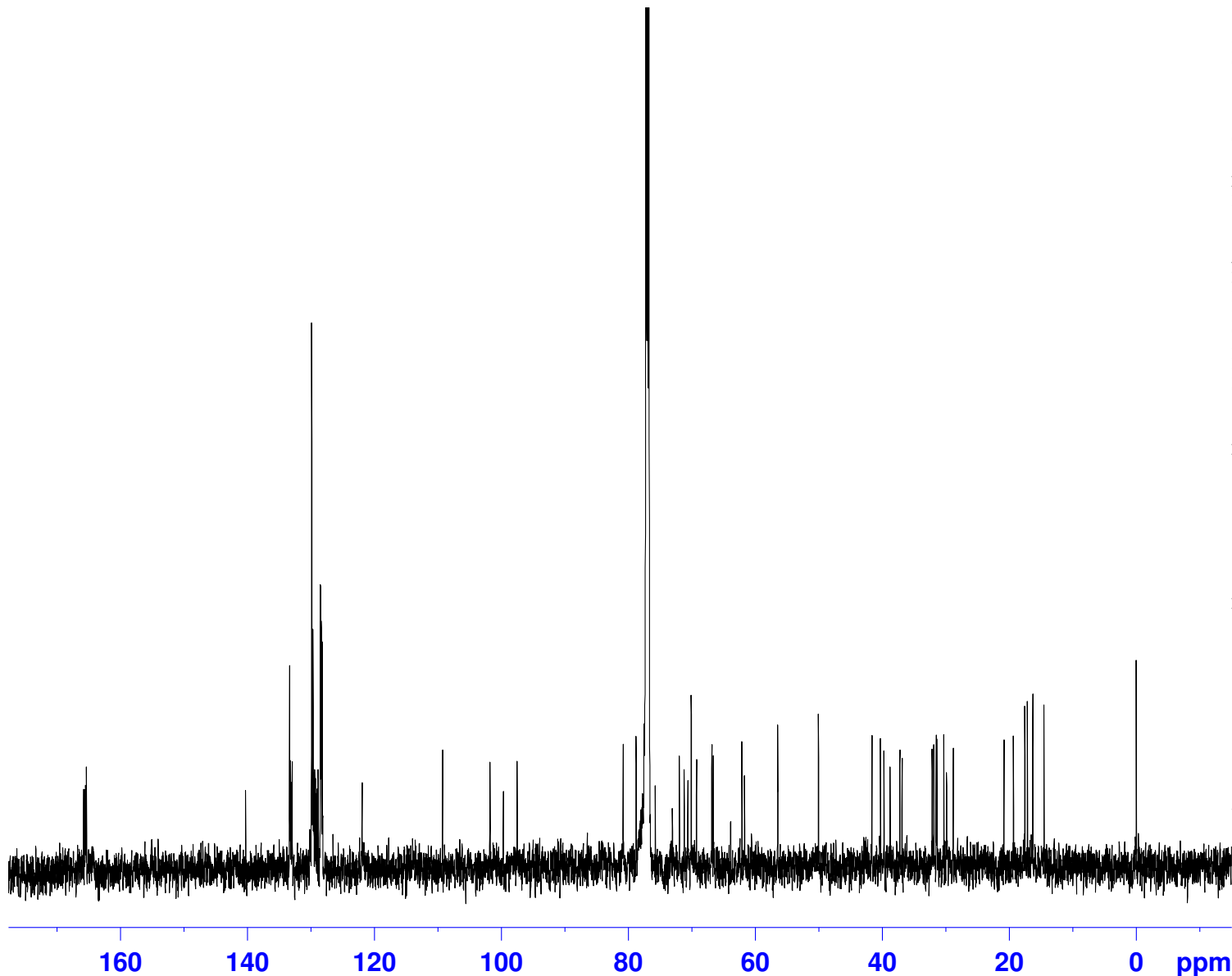
165.77
165.55
165.46
165.33
140.32
133.39
133.31
133.20
133.00
129.91
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129.43
129.33
129.19
129.05
128.89
128.55
128.51
128.44
128.40
128.36
128.23
121.97
109.29
101.83
99.70
97.55
80.82
78.79
75.79
73.09
72.00
71.22
70.65
70.12
69.27
66.87
66.63
62.13
61.73
56.48
50.06
41.63
40.29
39.74
38.79
37.24
36.90
32.16
31.91
31.51
31.42
30.31
29.87
28.83
20.83
19.35
17.55
17.15
16.30
14.54



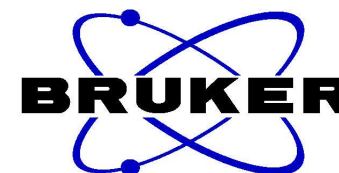
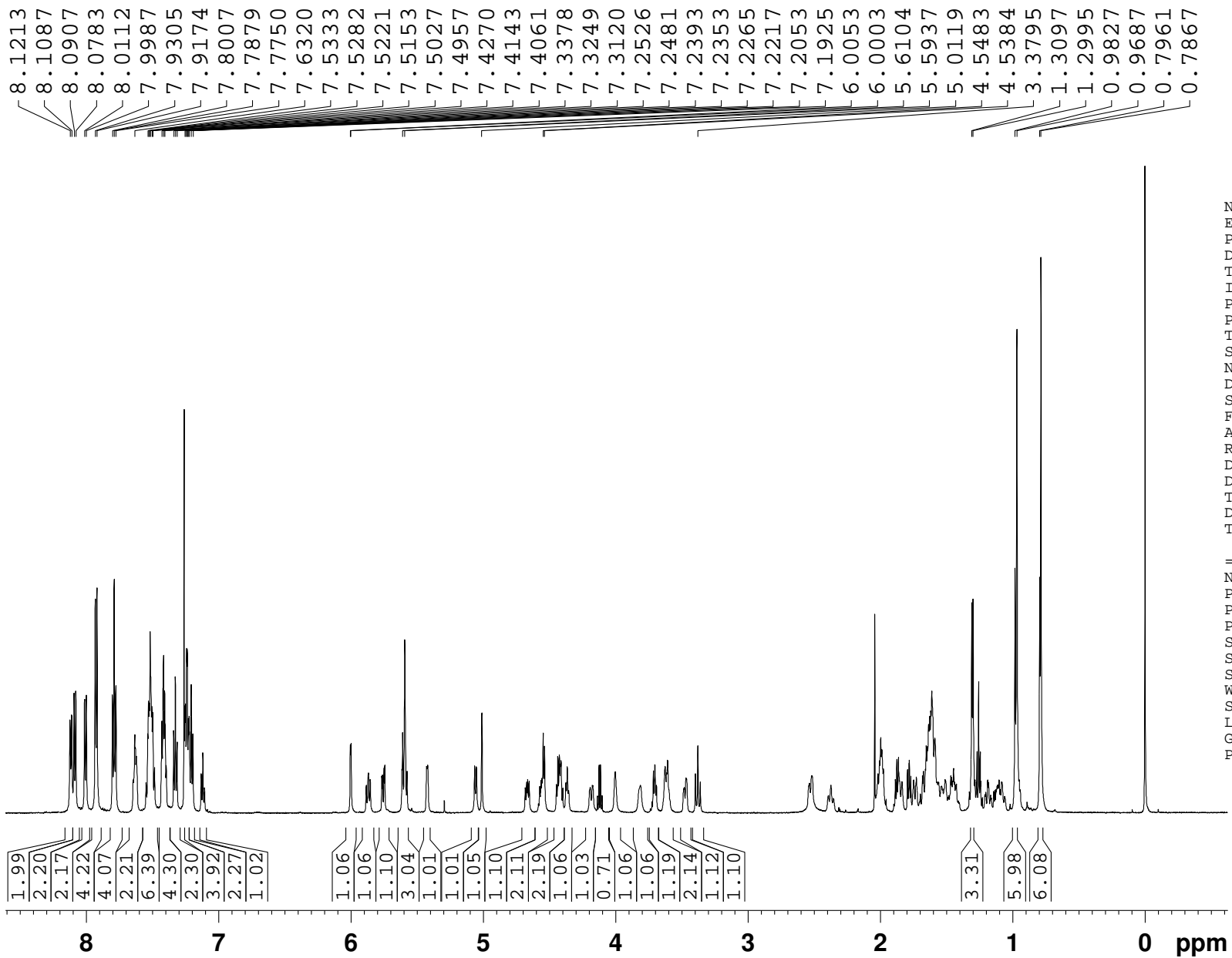
NAME ZP20101111A
EXPNO 2
PROCNO 1
Date_ 20101112
Time 19.05
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 2060
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028075 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



AV-600-1H



NAME ZP20101123
EXPNO 1
PROCNO 1
Date_ 20101124
Time 9.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

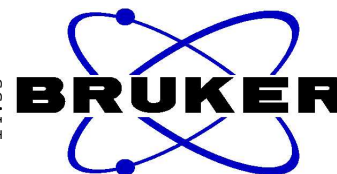
==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300104 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 11

AV-600-13C

Sample: ZP20101123

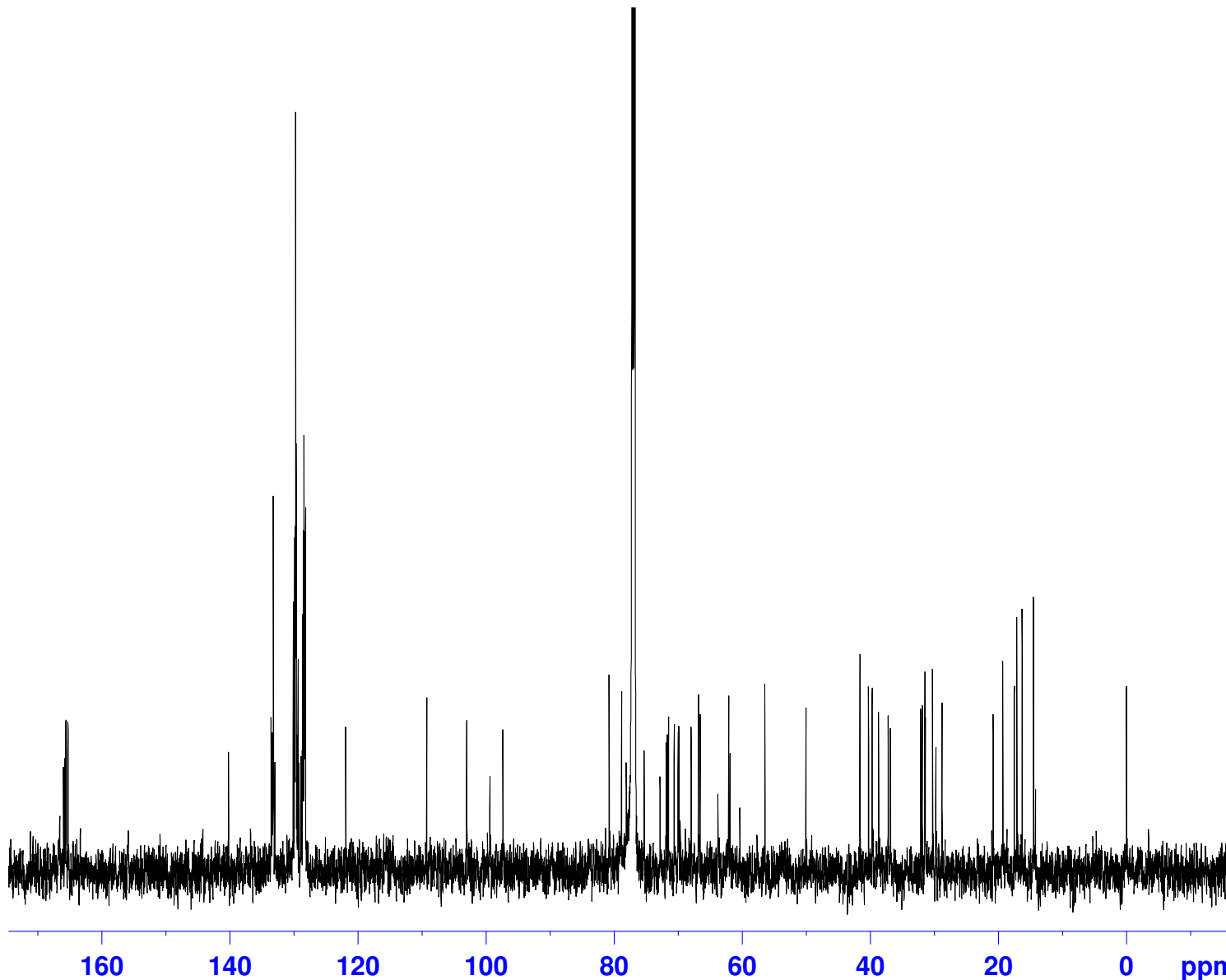
165.780
165.611
165.515
165.211
140.281
133.611
133.444
133.277
133.022
130.144
129.922
129.811
129.766
129.688
129.588
129.391
129.271
128.951
128.831
128.666
128.571
128.461
128.391
128.351
128.281
128.241
121.961
109.281
103.041
97.401
80.811
78.861
78.141
75.331
71.911
71.721
71.531
70.651
70.031
69.901
67.981
66.851
66.581
62.121
61.921
56.471
50.061
41.621
40.281
39.731
38.721
37.221
36.881
32.141
31.891
31.491
31.411
30.301
29.781
28.821
20.821
19.321
17.521
17.141
16.291
14.531



NAME ZP20101123
EXPNO 2
PROCNO 1
Date_ 20101124
Time 9.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1276
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 23100
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

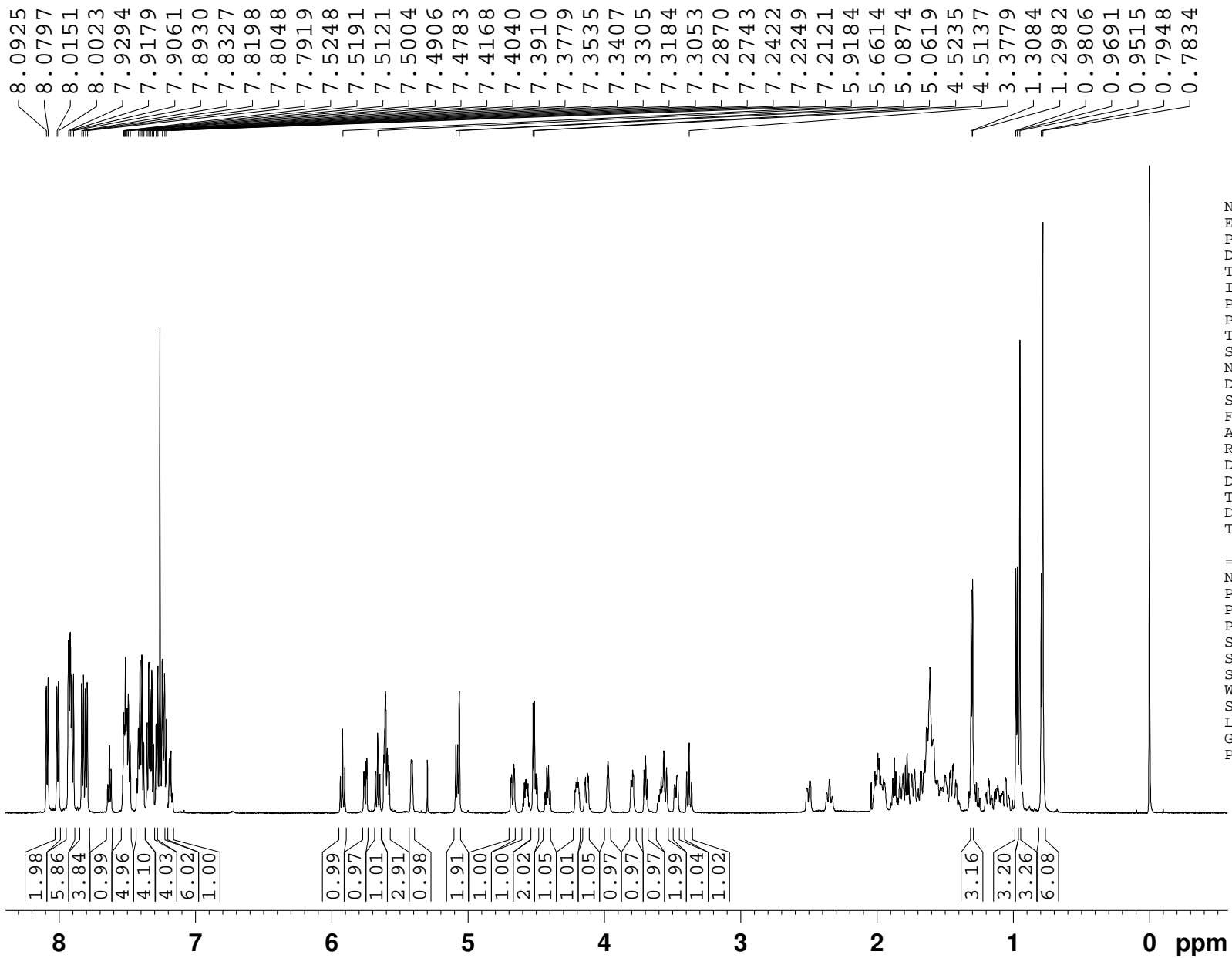
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028090 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



1H NMR of Compound 12

AV-600-1H



NAME ZP20101105
EXPNO 1
PROCNO 1
Date_ 20101105
Time 15.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300104 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 12

AV-600-13C

Sample: n-gram

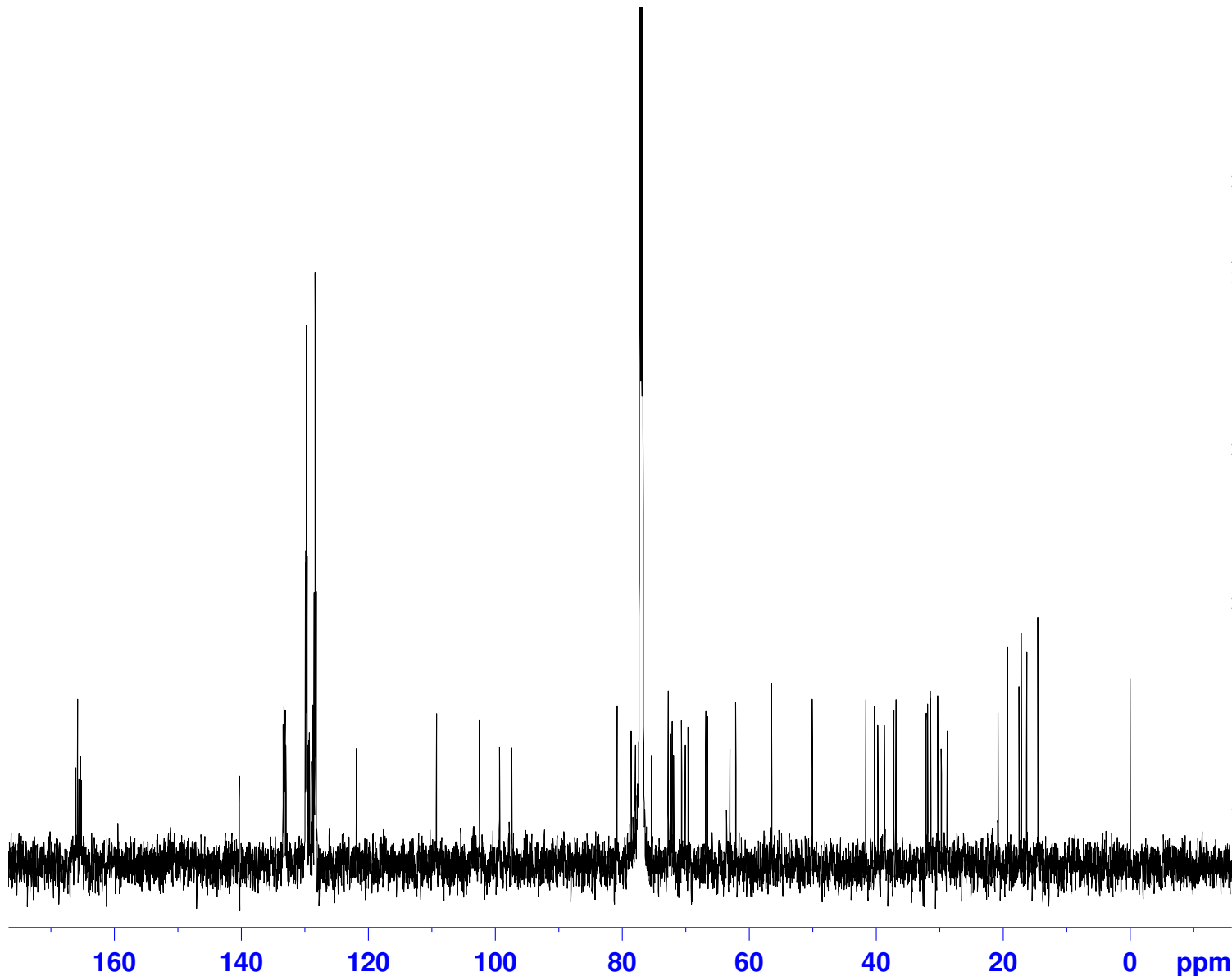
166.01
165.78
165.51
165.30
165.17
140.37
133.46
133.28
133.14
133.02
129.94
129.86
129.79
129.70
129.56
129.40
129.30
128.76
128.57
128.39
128.30
128.24
121.88
109.29
102.51
99.35
97.42
80.82
78.61
77.93
75.41
72.76
72.42
72.13
71.92
70.66
70.09
69.66
66.86
66.58
63.06
62.13
56.48
50.06
41.63
40.29
39.74
38.71
37.22
36.88
32.15
31.90
31.50
31.42
30.31
29.74
28.82
20.81
19.32
17.50
17.15
16.29
14.53



NAME ZP201011105
EXPNO 2
PROCNO 1
Date_ 20101105
Time 15.36
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1164
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 26000
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

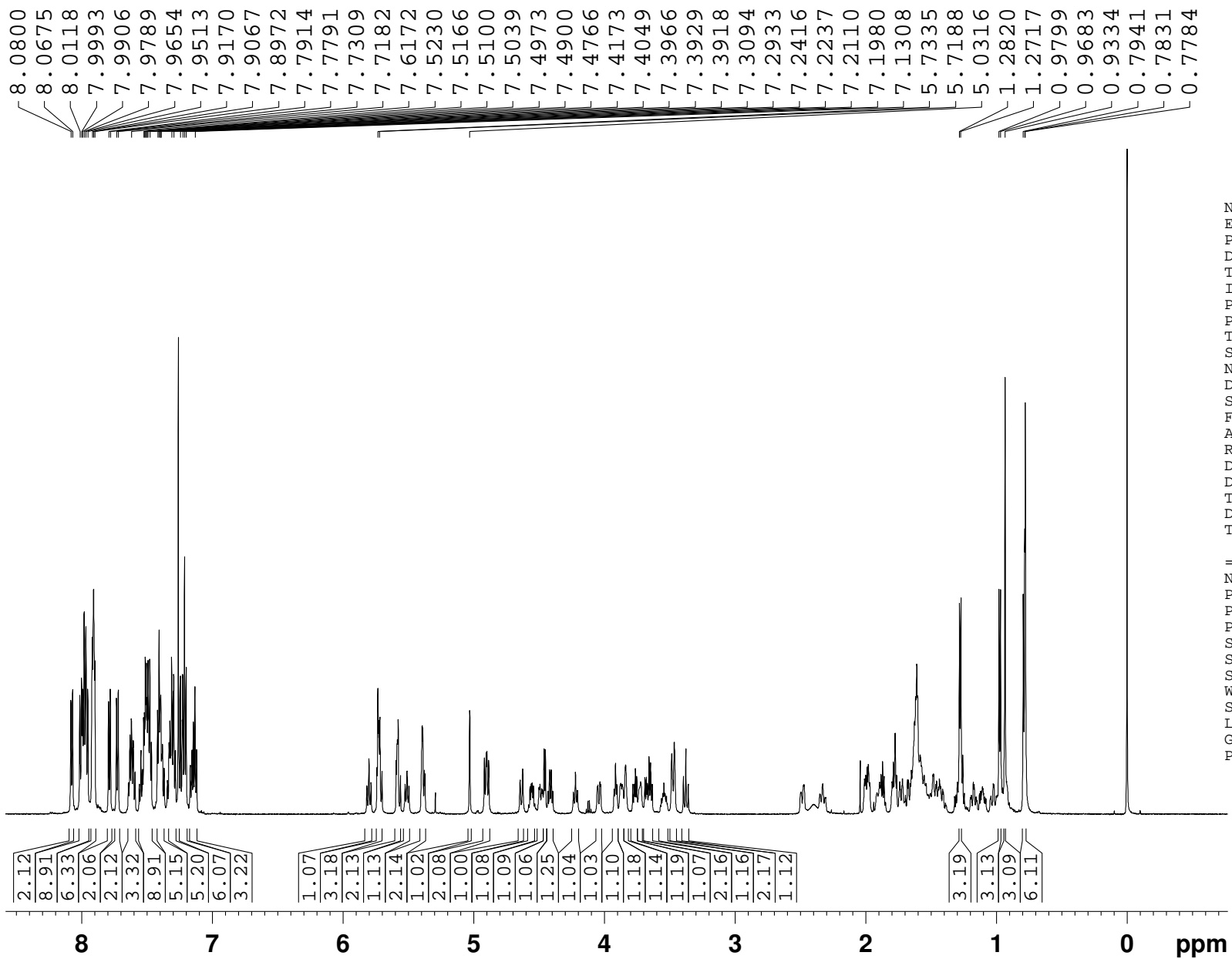
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028075 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



¹H NMR of Compound 13

AV-600-1H



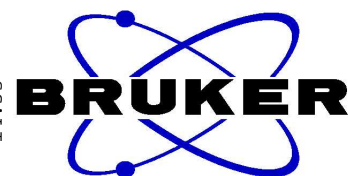
NAME ZP20101117A
EXPNO 1
PROCNO 1
Date_ 20101117
Time 15.10
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300107 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 13

AV-600-13C

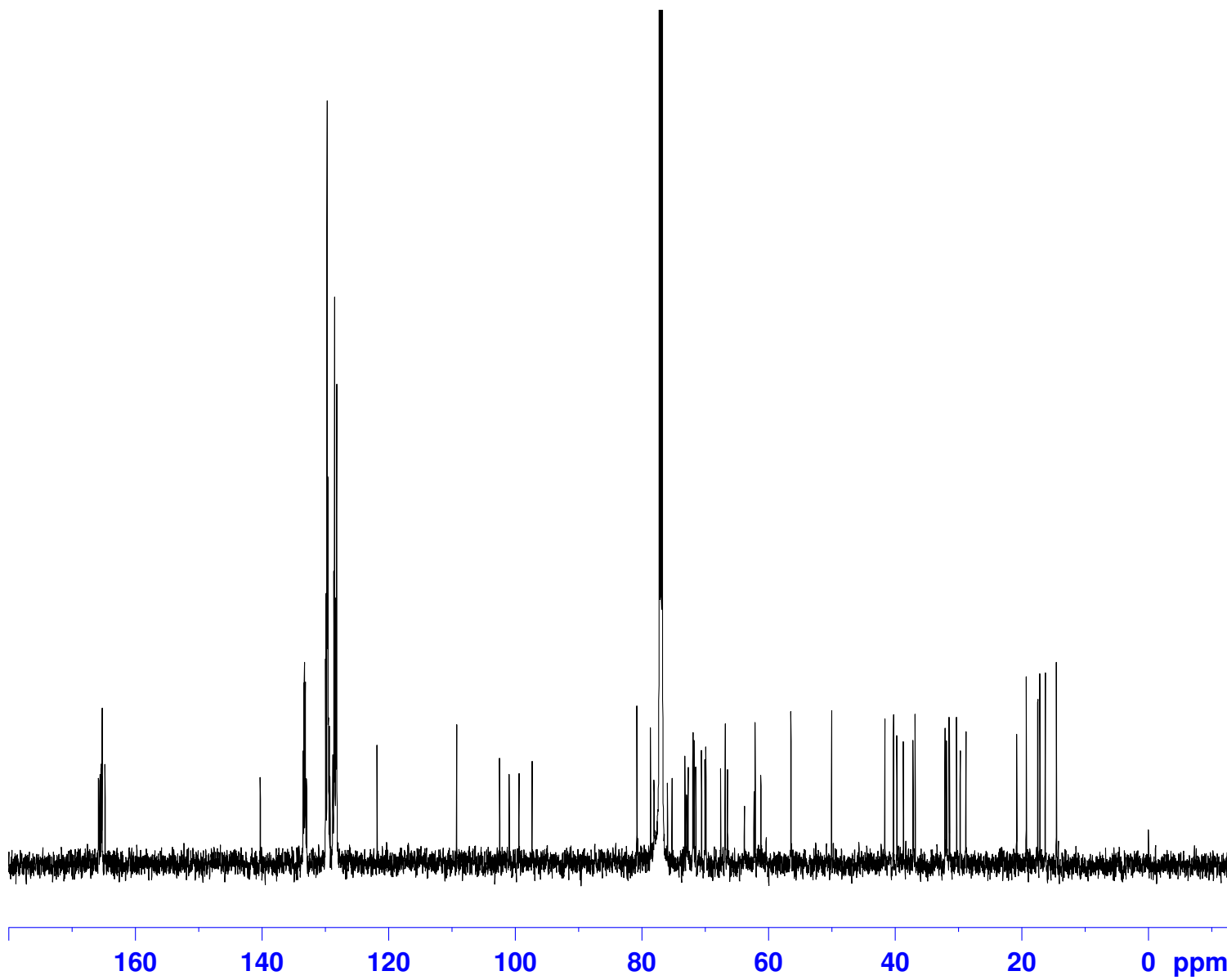
165.580
165.442
165.344
165.211
164.770
133.544
133.42
133.35
133.24
133.17
130.00
129.92
129.76
129.68
129.63
129.50
129.41
128.86
128.82
128.68
128.56
128.50
128.38
128.33
128.23
121.87
109.28
102.50
100.99
99.44
97.36
80.81
78.66
73.22
72.72
72.72
71.94
71.79
71.50
70.59
70.06
69.90
67.58
66.85
66.49
62.12
56.47
50.04
41.62
40.27
39.73
38.70
37.18
36.84
32.13
31.89
31.48
31.41
30.30
29.73
28.82
20.80
19.29
17.47
17.14
16.28
14.53



NAME ZP20101117A
EXPNO 2
PROCNO 1
Date_ 20101122
Time 9.08
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1372
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 23100
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

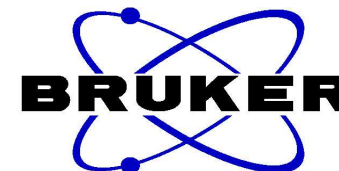
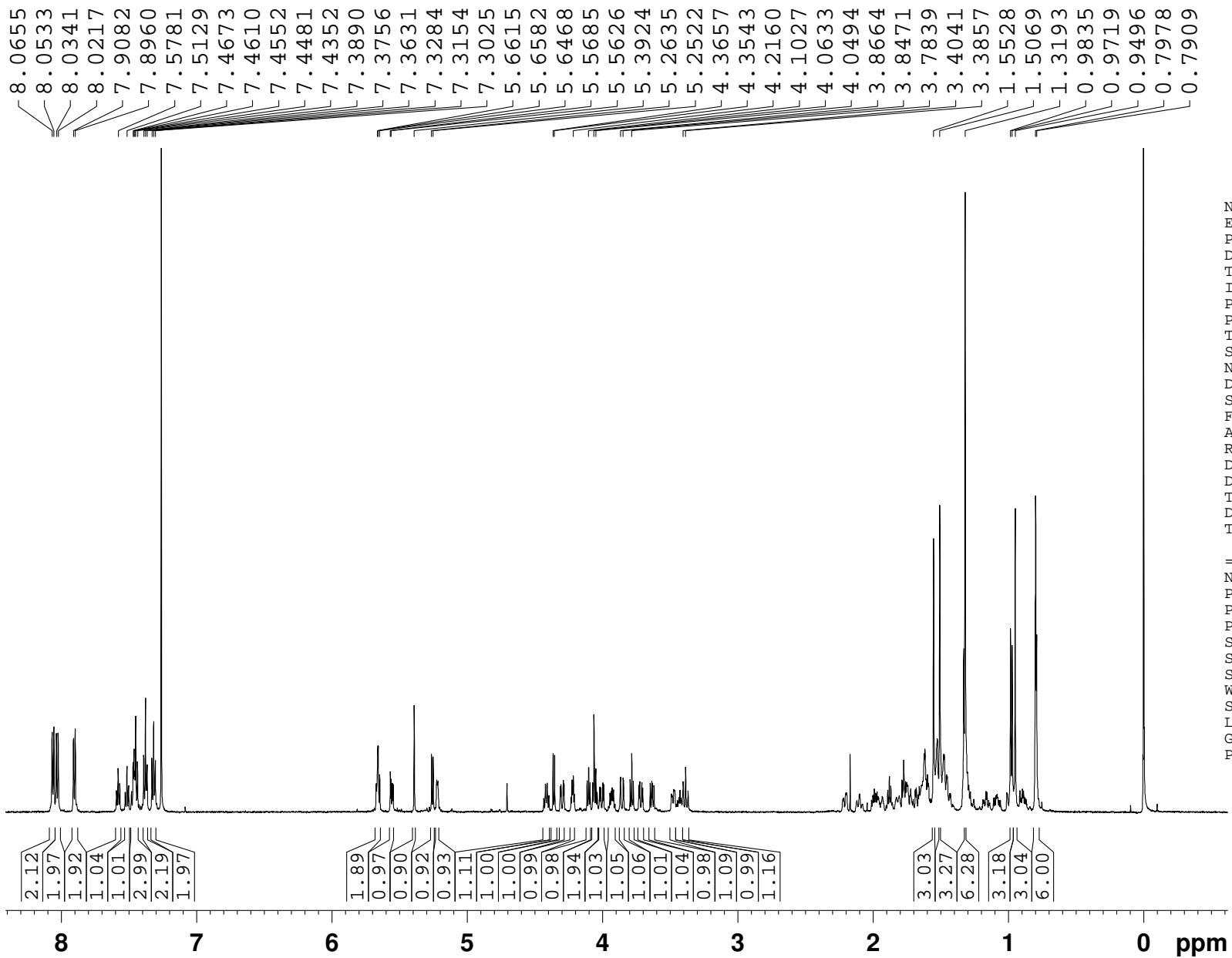
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028090 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



¹H NMR of Compound 14

AV-600-1H



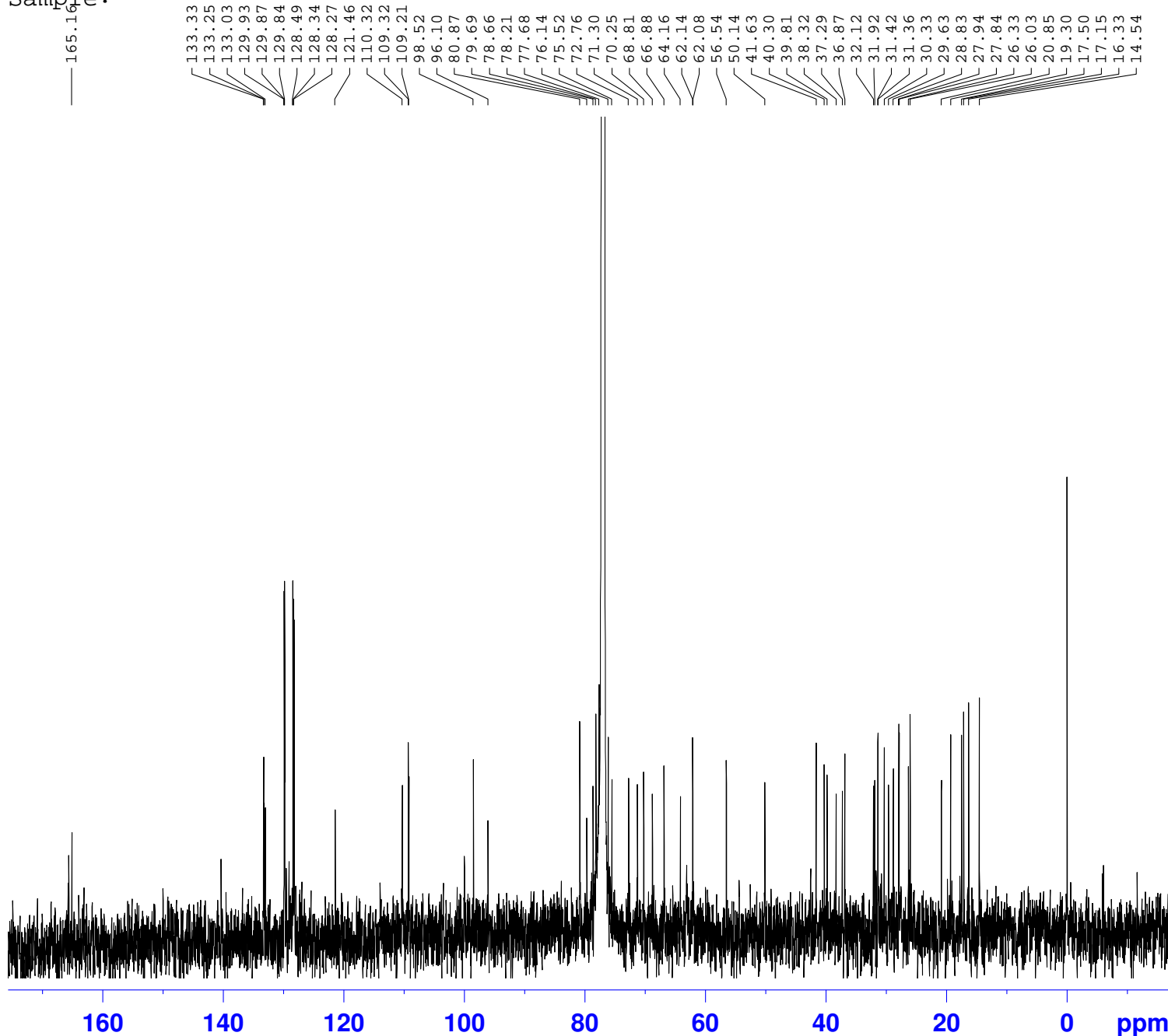
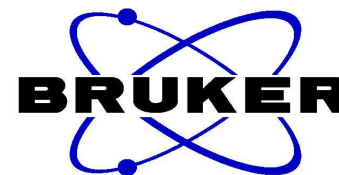
NAME ZP20101201C
EXPNO 1
PROCNO 1
Date_ 20101201
Time 14.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300103 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 14

AV-600-13C

Sample:



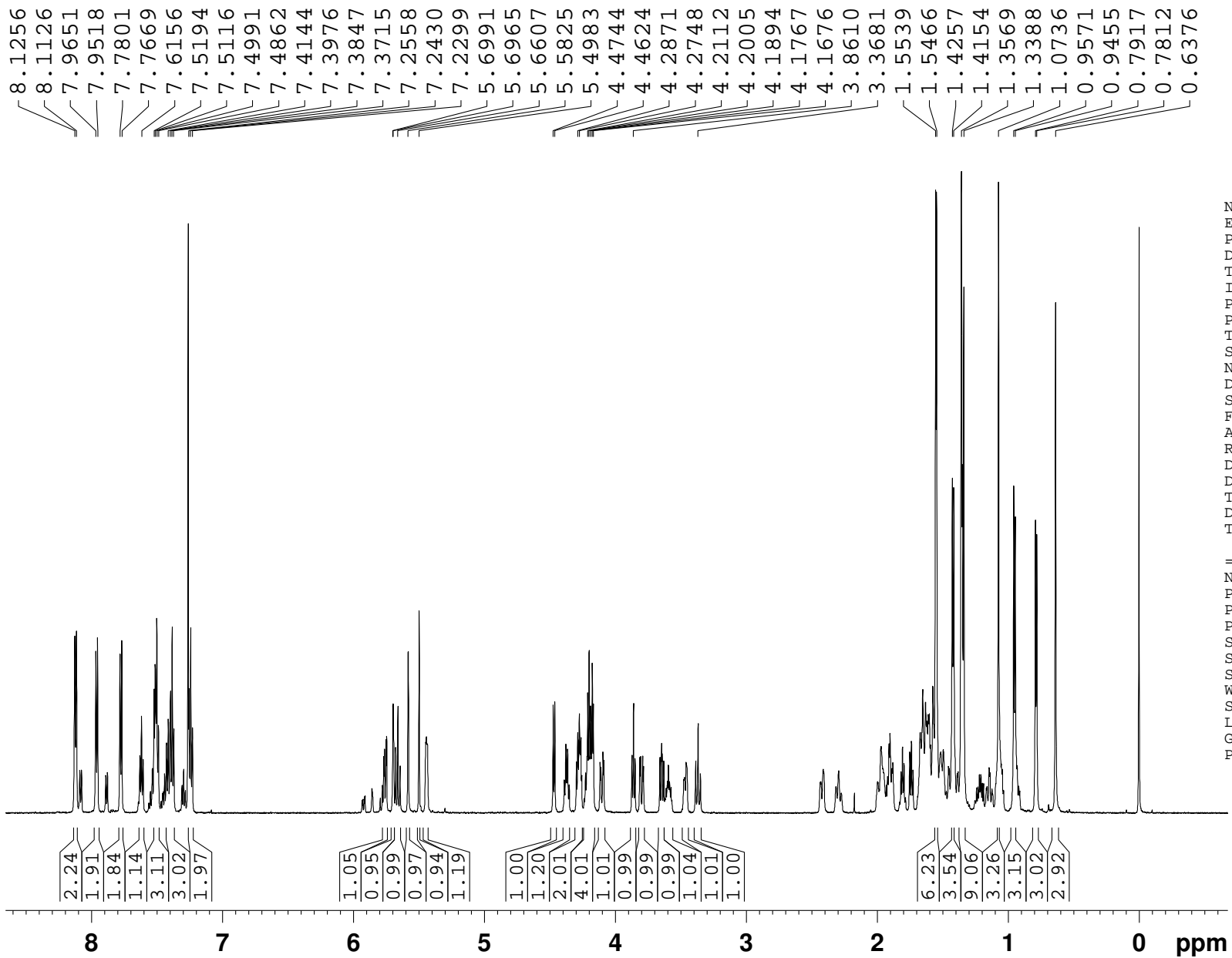
```
NAME          ZP20101201C
EXPNO          2
PROCNO         1
Date_          20101201
Time           14.43
INSTRUM        spect
PROBHD         5 mm PABBO BB-
PULPROG        zgpg30
TD             65536
SOLVENT        CDCl3
NS             4014
DS             2
SWH            45454.547 Hz
FIDRES         0.693581 Hz
AQ            0.7209570 sec
RG            23100
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2        waltz16
NUC2           1H
PCPD2          80.00 usec
PL2            -4.00 dB
PL12           13.16 dB
PL13           16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9028067 MHz
WDW            EM
SSB            0
LB            3.00 Hz
GB            0
PC            1.40
```

1H NMR of Compound 15

AV-600-1H



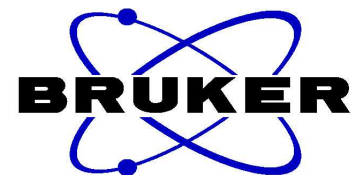
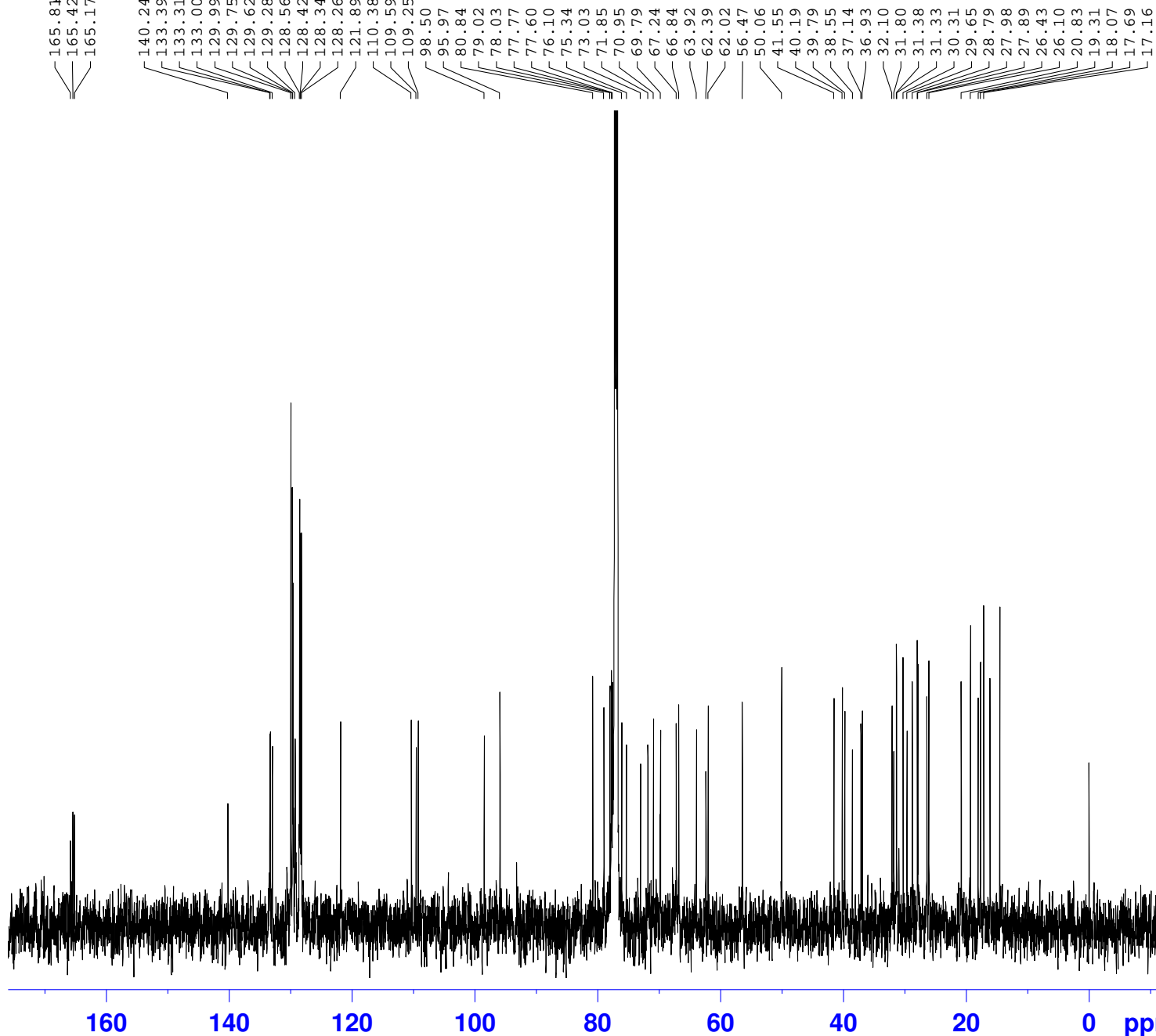
NAME ZP20110311
EXPNO 1
PROCNO 1
Date_ 20110311
Time 10.33
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300081 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 15

AV-600-13C

Sample:

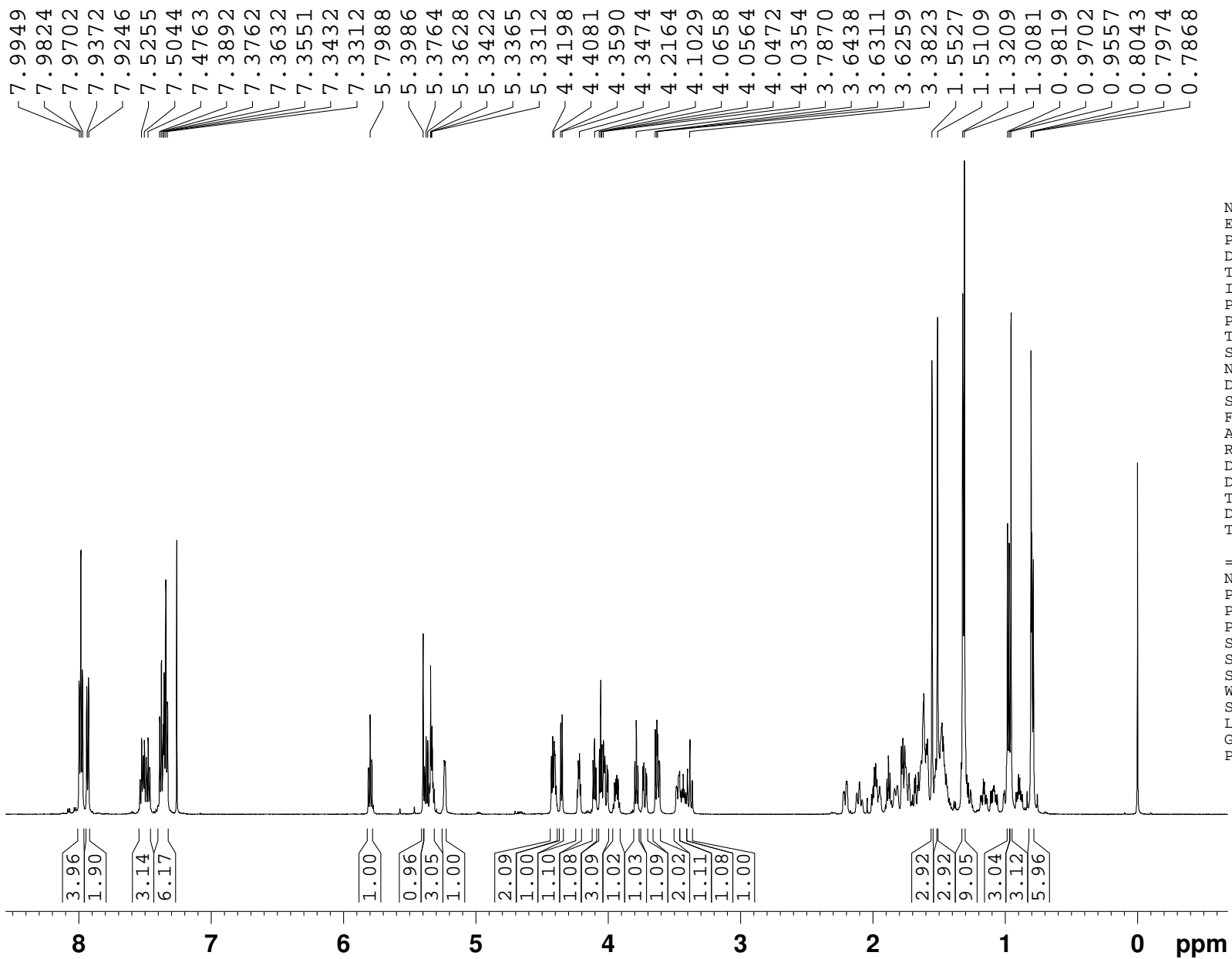


NAME ZP20110311
EXPNO 2
PROCNO 1
Date_ 20090413
Time 10.20
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 347
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 295.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028090 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

AV-600-1H



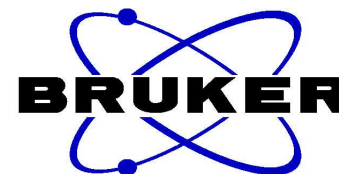
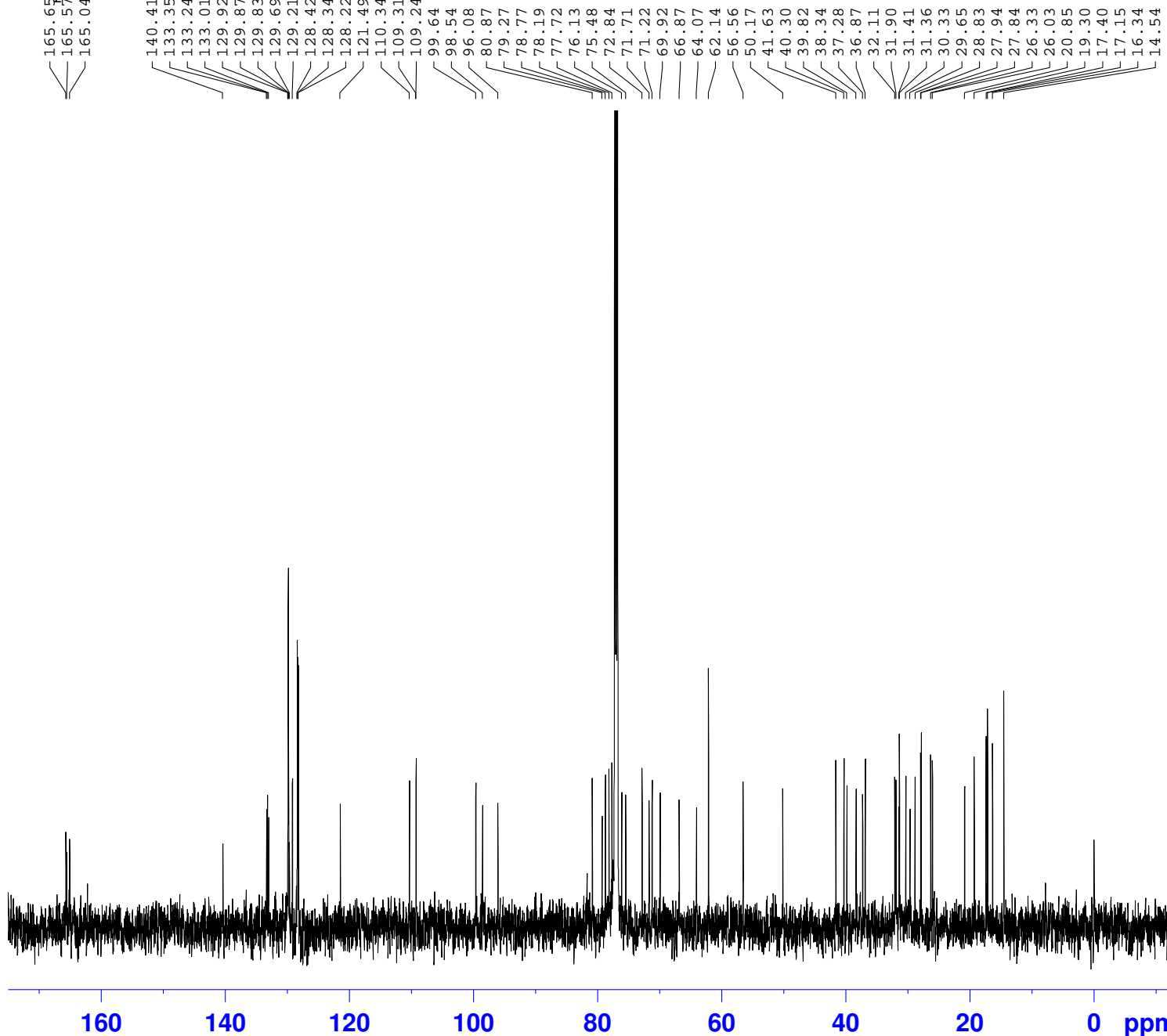
NAME ZP20101201B
EXPNO 1
PROCNO 1
Date_ 20101201
Time 11.08
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 144
DW 27.800 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300096 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 16

AV-600-13C

Sample: ZP20101201B

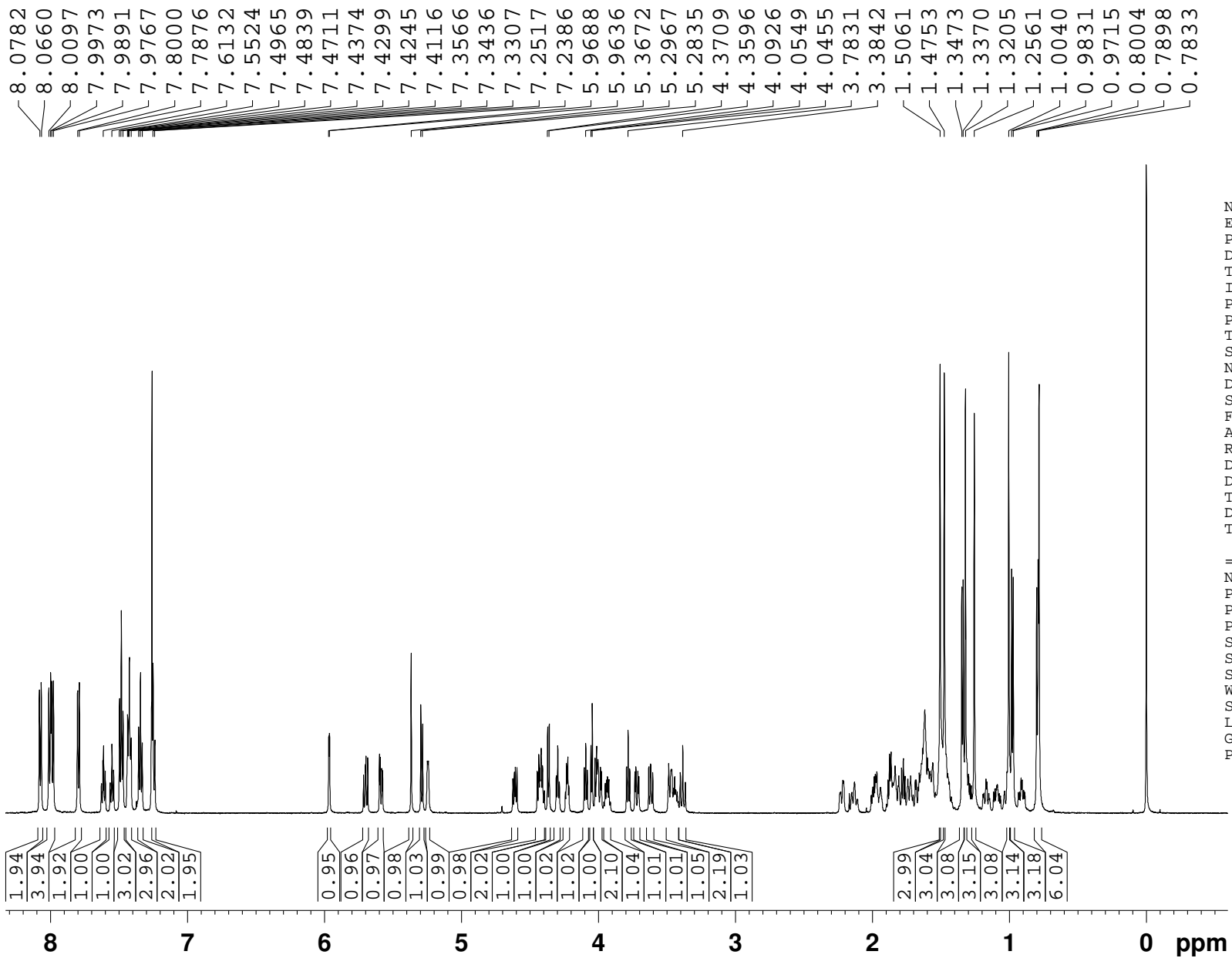


NAME ZP20101201B
EXPNO 2
PROCNO 1
Date_ 20101201
Time 11.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 412
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 23100
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028069 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

AV-600-1H



NAME ZP20101126B
EXPNO 1
PROCNO 1
Date_ 20101126
Time 15.33
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 203
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

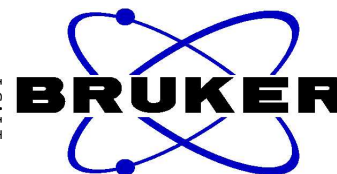
==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300101 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 17

AV-600-13C

Sample: ZP20101126B

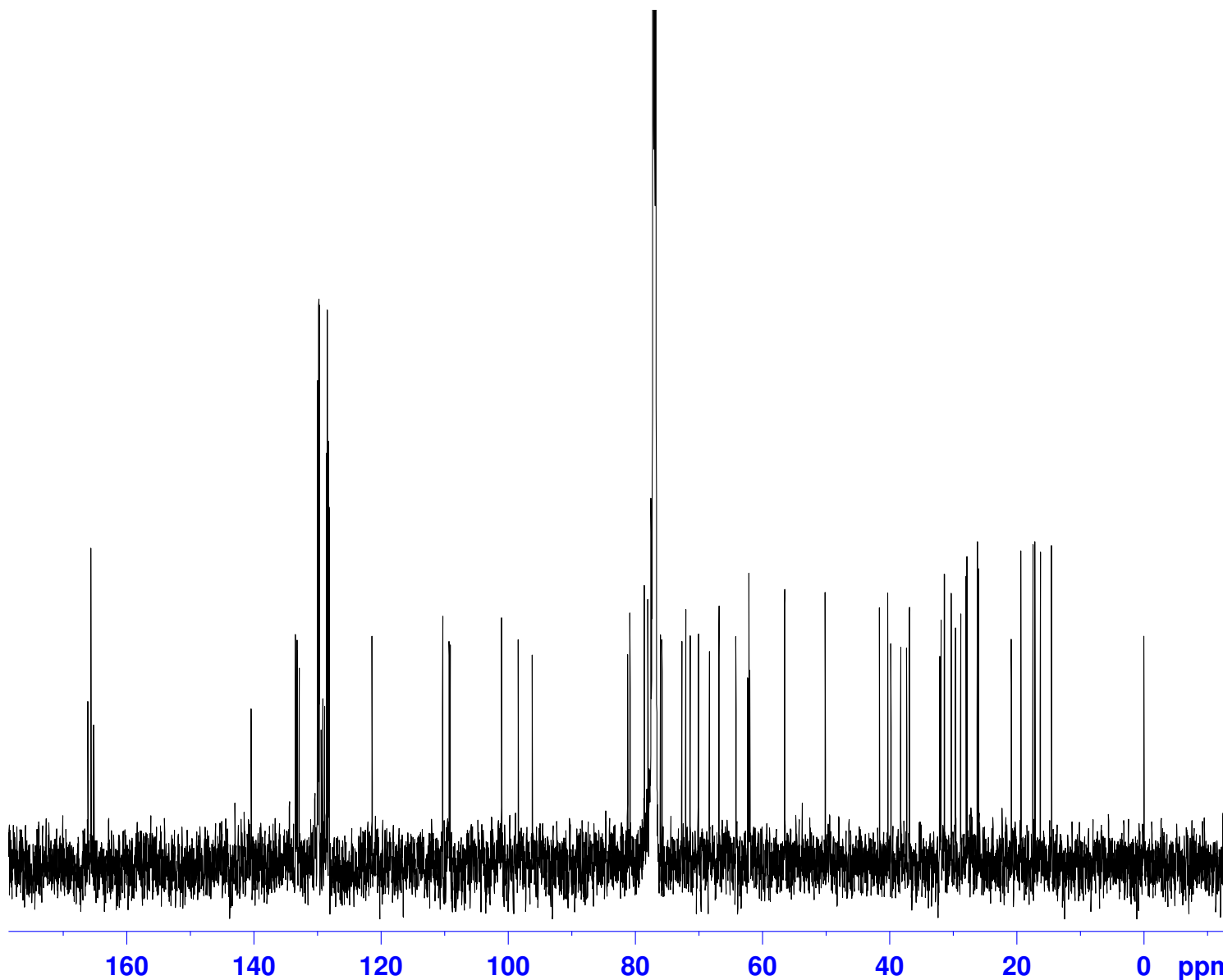
166.100
165.611
165.266
140.461
133.459
133.271
133.191
132.911
130.011
129.821
129.751
129.201
128.911
128.621
128.481
128.261
128.181
121.441
110.331
109.311
109.151
101.071
98.451
96.251
81.221
80.861
78.601
78.051
77.551
76.071
75.831
72.711
72.081
71.401
70.091
68.371
66.871
64.191
62.321
62.141
62.001
56.531
50.151
41.631
40.291
39.801
38.281
37.331
36.911
32.141
31.921
31.421
31.381
30.321
29.651
28.831
27.981
27.841
26.211
25.991
20.861
19.371
17.461
17.151
16.301
14.541



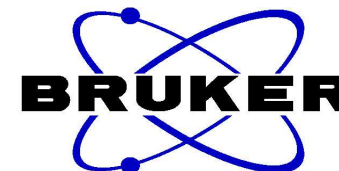
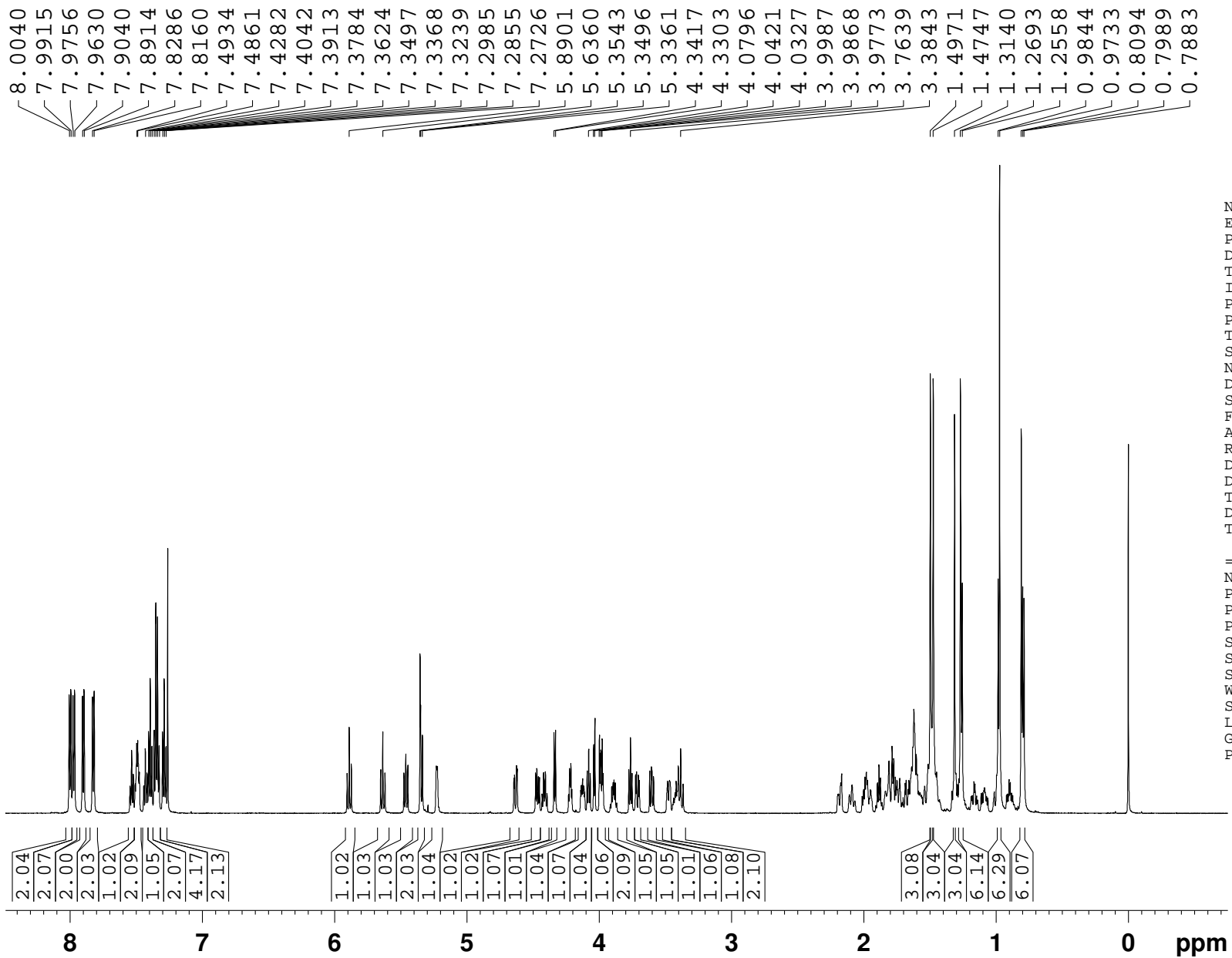
NAME ZP20101126B
EXPNO 2
PROCNO 1
Date_ 20101126
Time 16.21
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1059
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028071 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



AV-600-1H



NAME ZP20101126A
EXPNO 1
PROCNO 1
Date_ 20101126
Time 15.02
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 203
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

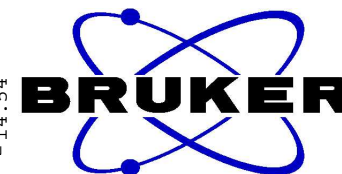
==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300101 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 18

AV-600-13C

Sample: ZP20101126A

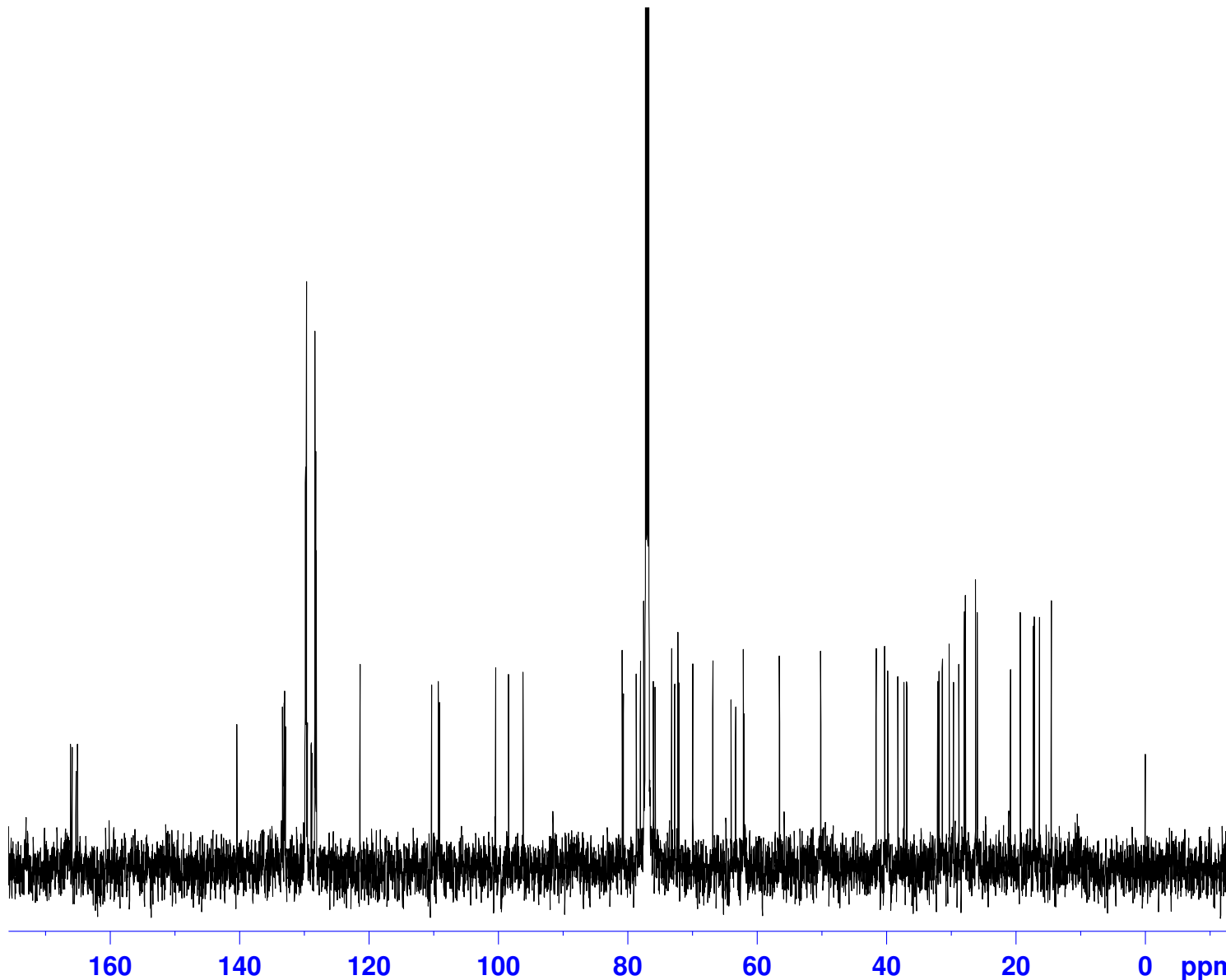
166.12
165.85
165.07
140.46
133.39
133.15
133.09
132.94
129.86
129.84
129.77
129.74
129.58
128.97
128.38
128.27
128.18
121.42
110.33
109.31
109.14
100.45
98.45
96.21
80.87
80.71
78.71
78.07
77.56
76.07
75.78
73.24
72.78
72.27
72.10
72.10
69.97
66.87
64.04
63.33
62.14
62.04
56.56
50.18
41.62
40.30
39.82
38.25
37.32
36.88
32.12
31.91
31.42
31.37
30.33
29.65
28.83
27.98
27.82
26.25
25.99
20.85
19.33
17.31
17.15
16.35
14.54



NAME ZP20101126A
EXPNO 2
PROCNO 1
Date_ 20101126
Time 15.12
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 339
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

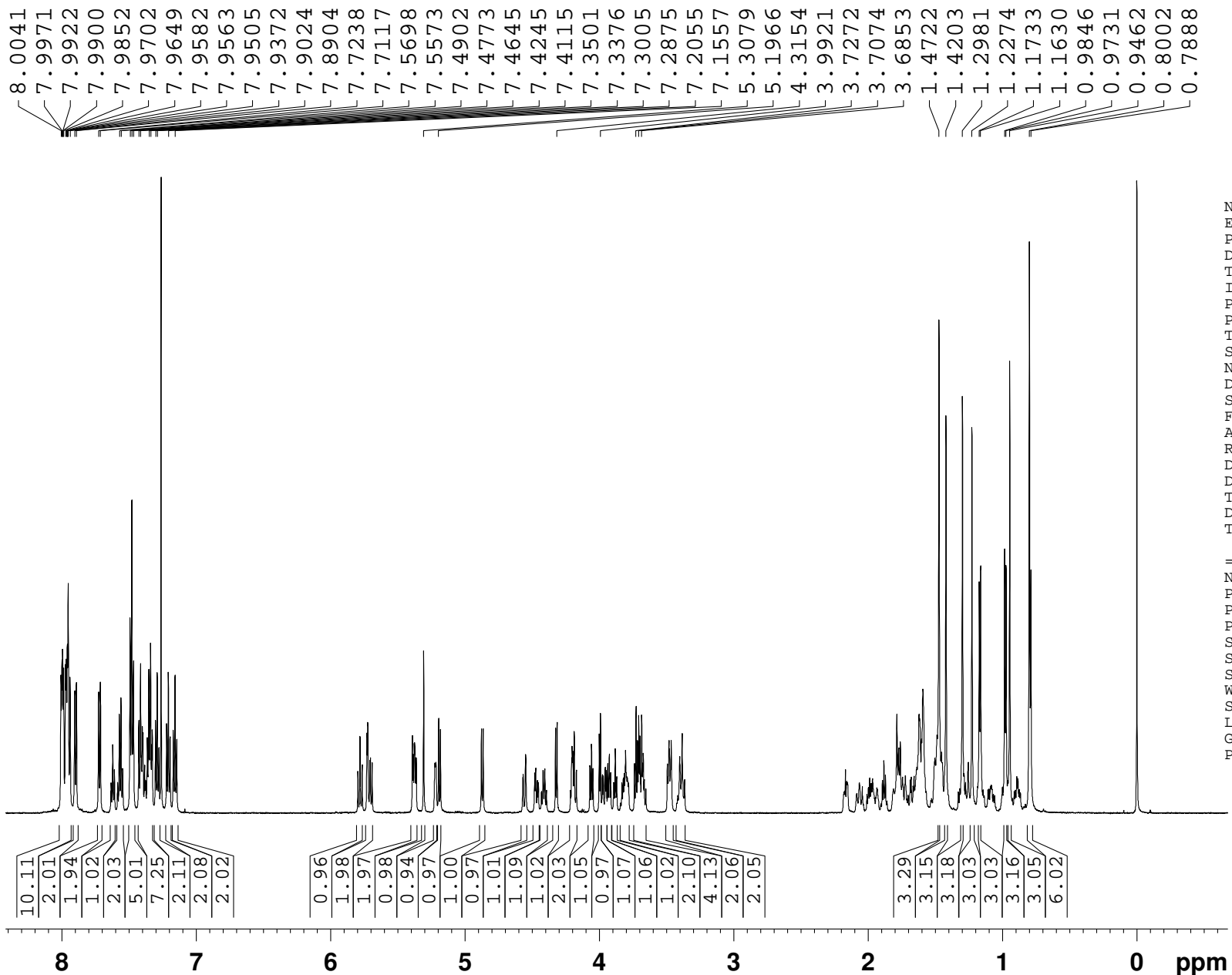
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028076 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



¹H NMR of Compound 19

AV-600-1H



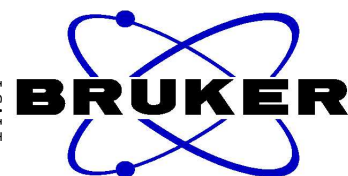
NAME ZP20110328A
EXPNO 1
PROCNO 1
Date_ 20110328
Time 15.06
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 256
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300101 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 19

AV-600-13C

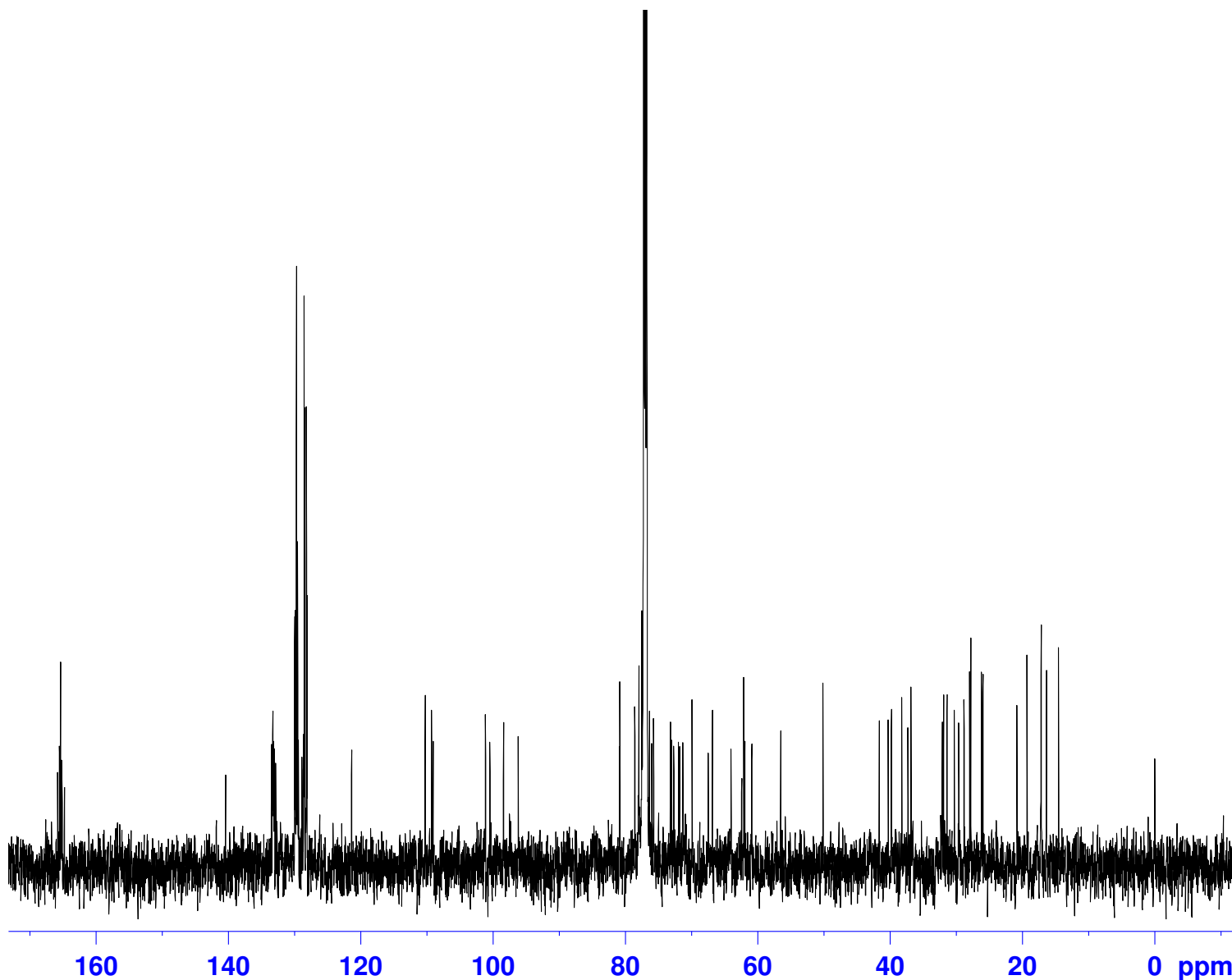
165.560
165.400
133.511
133.321
133.266
133.091
130.01
129.92
129.71
129.57
129.46
128.58
128.51
128.24
128.15
110.29
109.31
109.07
101.16
100.50
98.44
96.23
80.94
80.86
78.59
77.96
77.53
76.38
76.03
75.76
73.21
73.04
72.70
71.99
71.82
71.32
69.96
66.87
64.05
62.13
61.97
60.92
56.54
50.15
41.63
40.29
39.81
38.24
37.31
36.85
32.10
31.91
31.38
30.32
29.63
28.83
27.98
27.80
26.18
25.97
20.84
19.31
17.20
17.15
16.35
14.54



NAME ZP20110328A
EXPNO 2
PROCNO 1
Date_ 20110331
Time 8.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 728
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 20600
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

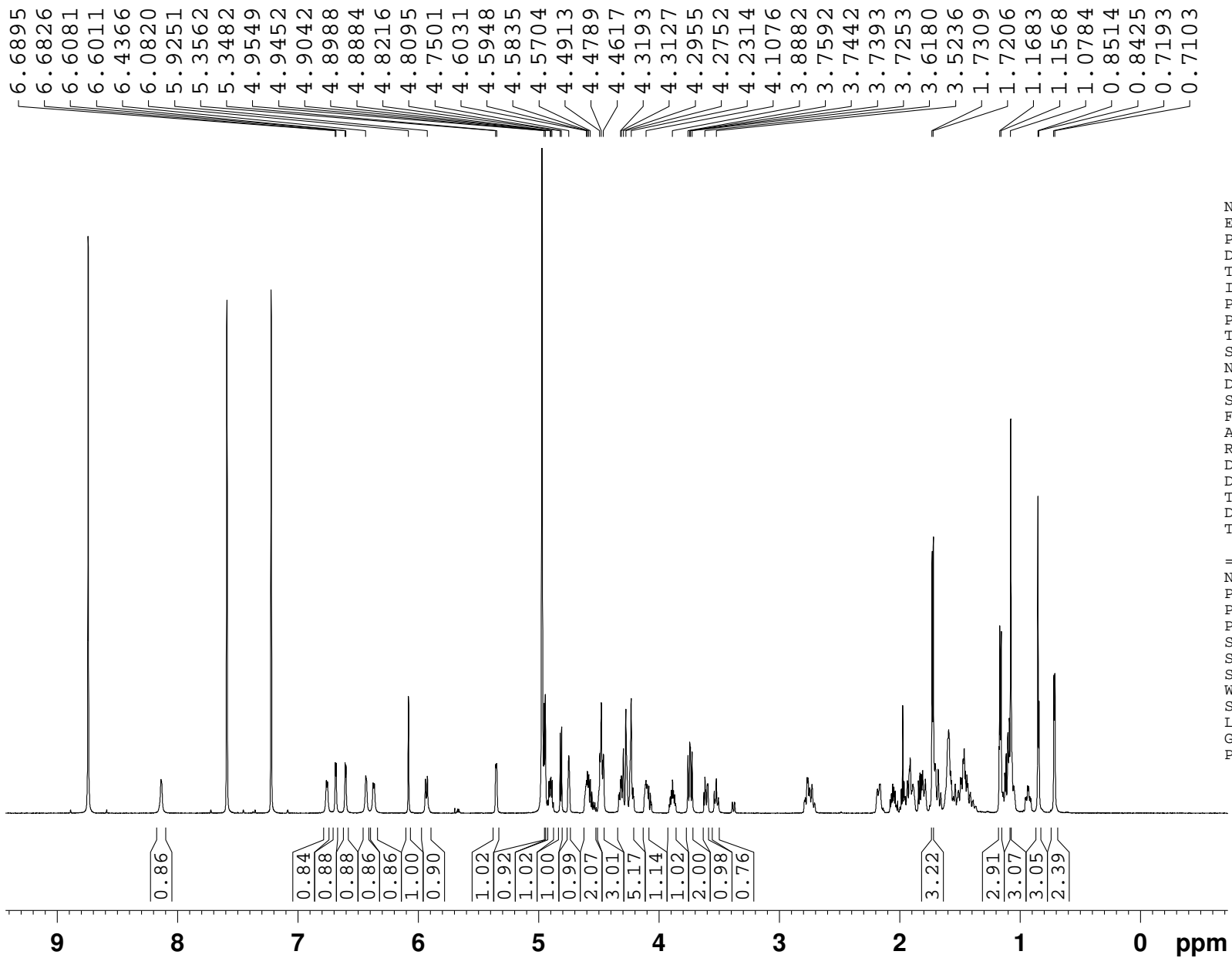
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9028076 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40



1H NMR of Compound 20

AV-600-1H



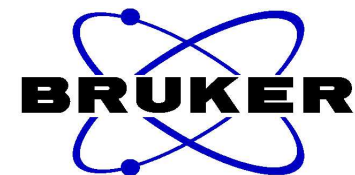
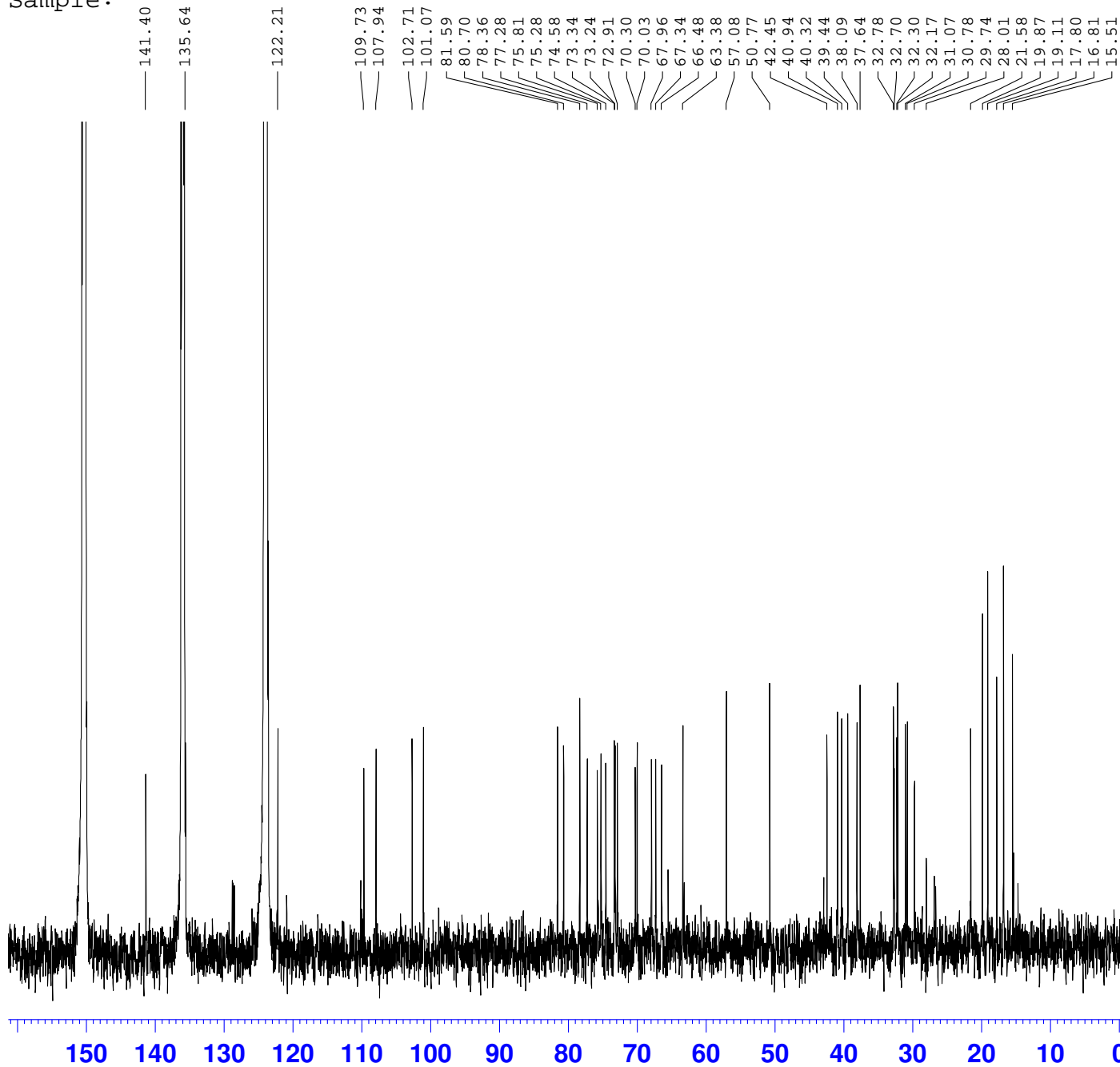
NAME ZP20110412A
EXPNO 1
PROCNO 1
Date_ 20110413
Time 8.04
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 456
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299729 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 20

AV-600-13C

Sample:



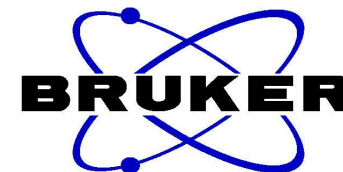
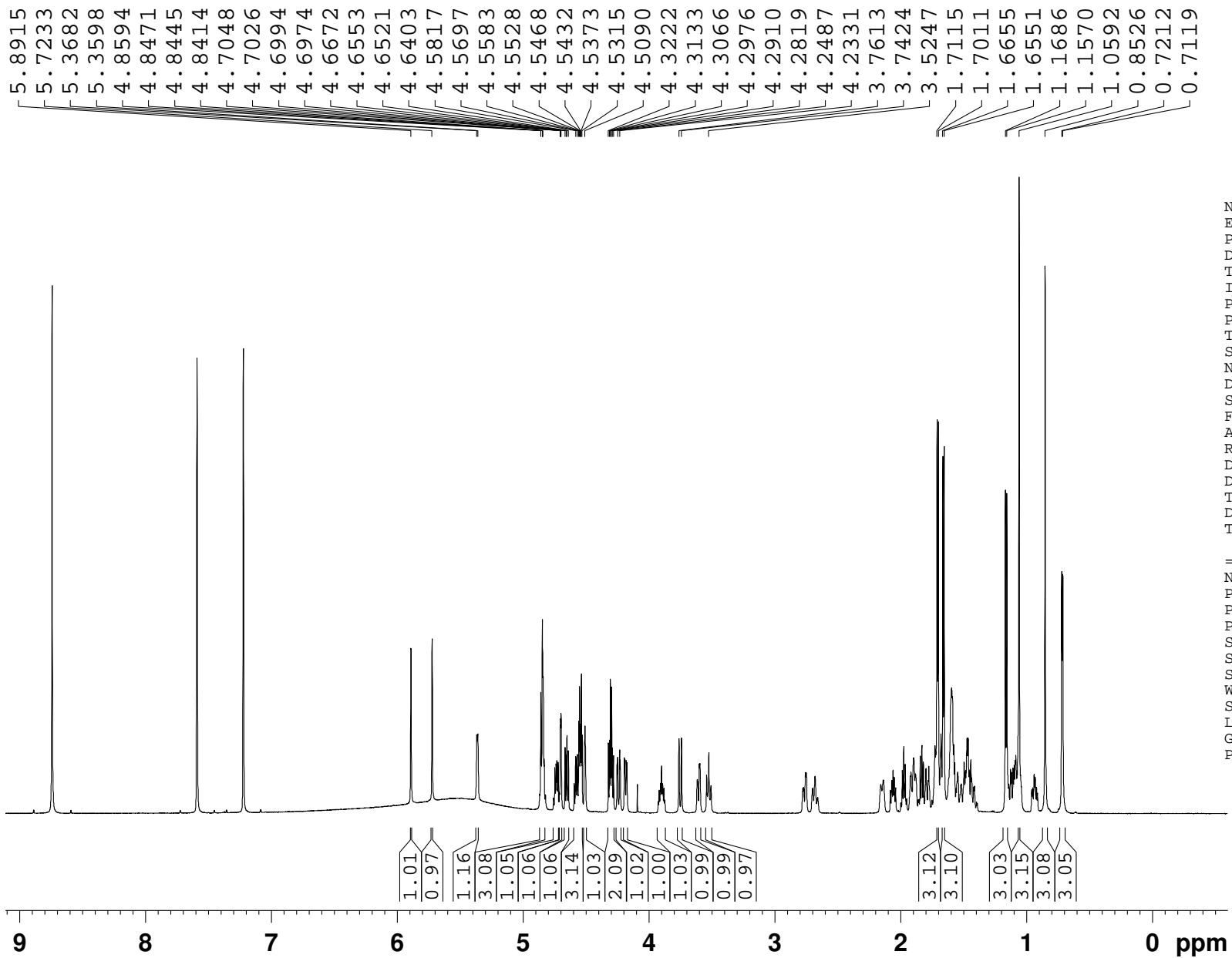
NAME ZP20110412A
EXPNO 2
PROCNO 1
Date_ 20110413
Time 8.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 841
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9027005 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

1H NMR of Compound 21

AV-600-1H



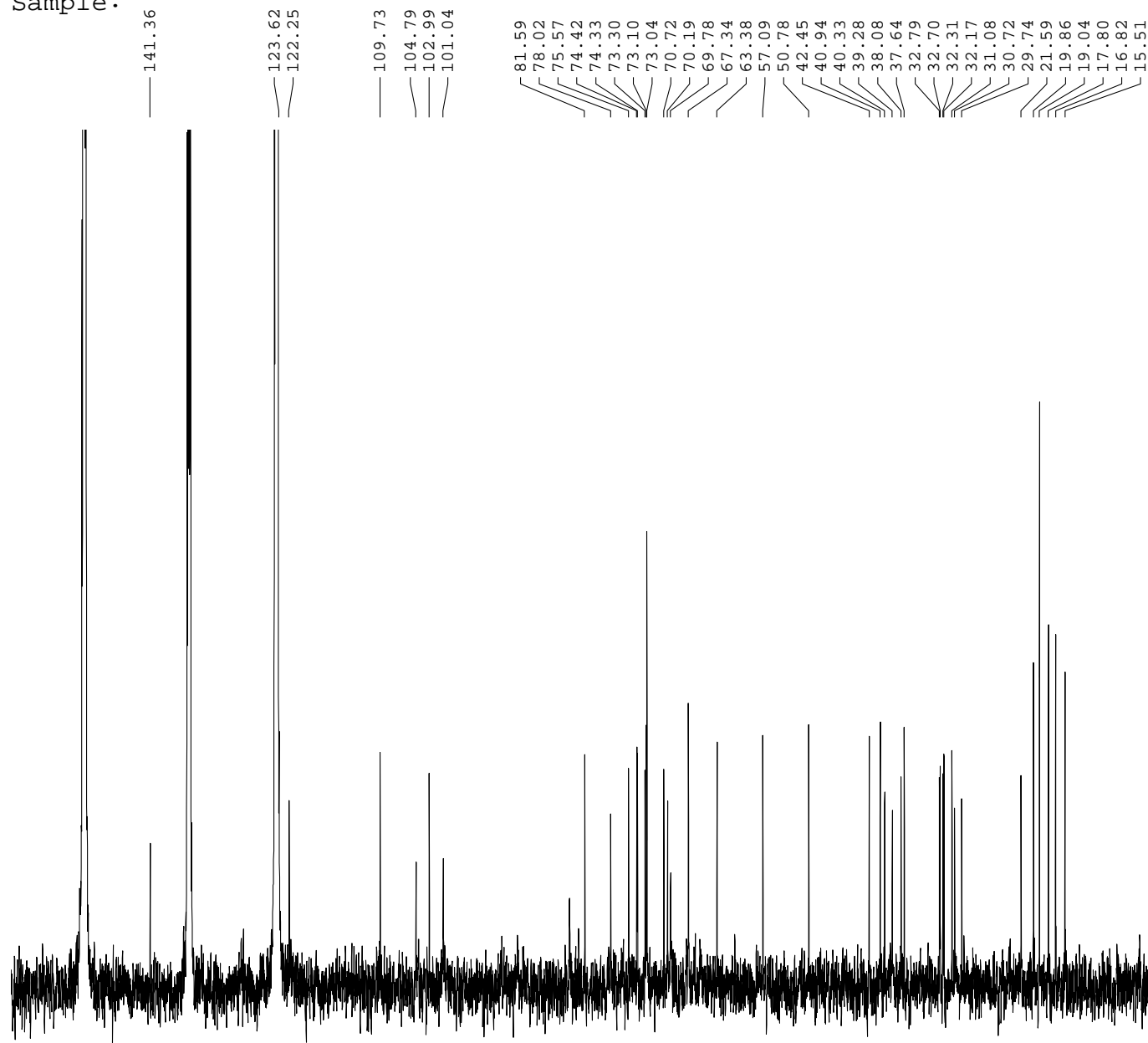
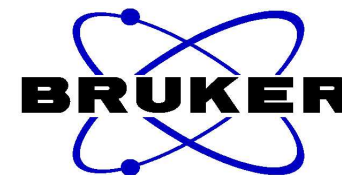
NAME ZP20110406
EXPNO 1
PROCNO 1
Date_ 20110407
Time 11.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 144
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299728 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 21

AV-600-13C

Sample:



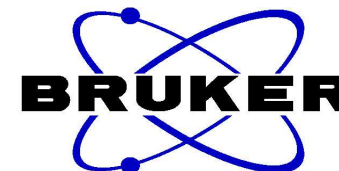
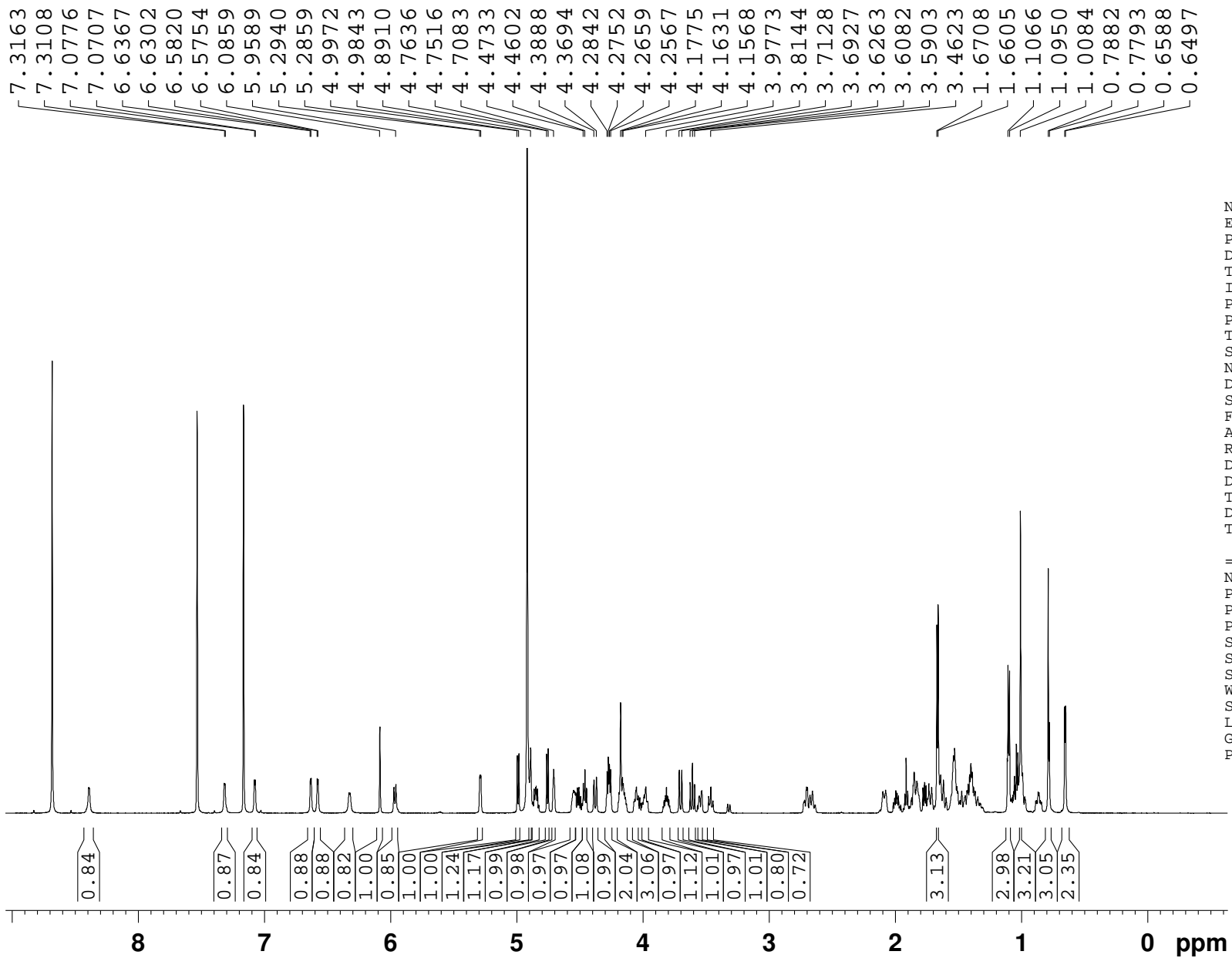
```
NAME ZP20110406
EXPNO 2
PROCNO 1
Date_ 20110407
Time 11.35
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 231
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
```

```
===== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9027002 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40
```

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

AV-600-1H



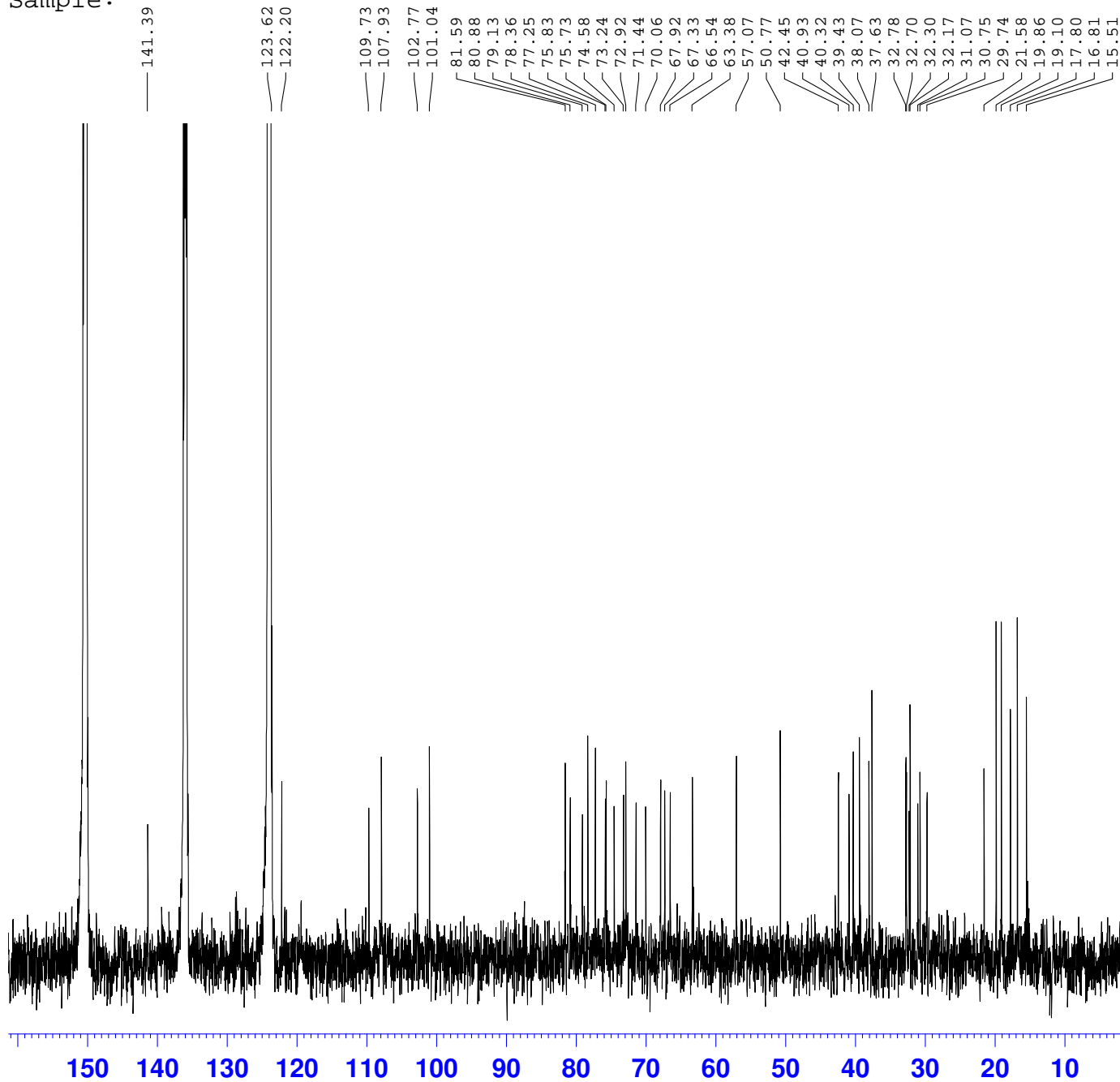
NAME ZP20110412B
EXPNO 1
PROCNO 1
Date_ 20110413
Time 9.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 456
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1300086 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 22

AV-600-13C

Sample:



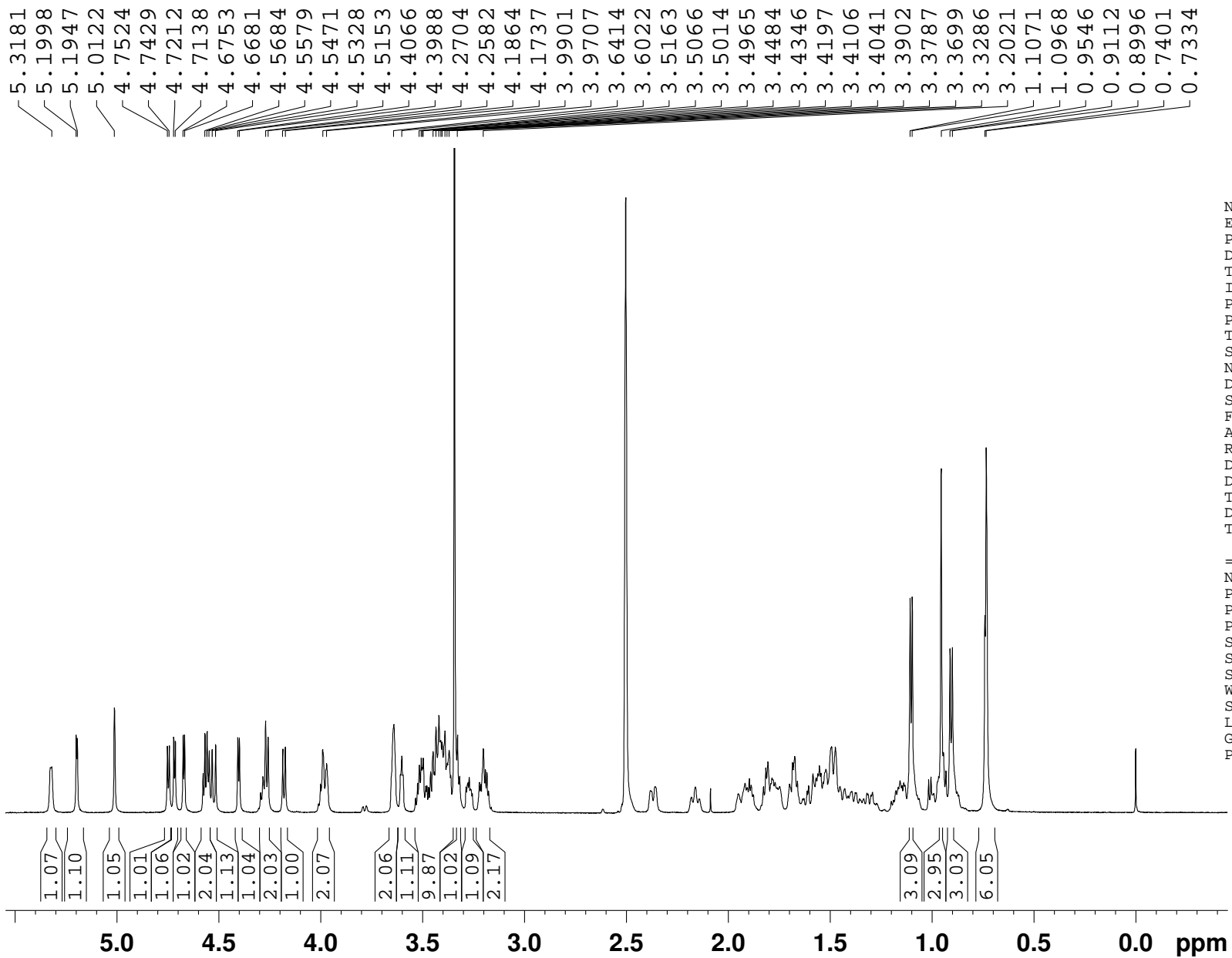
```
NAME          ZP20110412B
EXPNO         2
PROCNO       1
Date_        20110413
Time         9.52
INSTRUM      spect
PROBHD       5 mm PABBO BB-
PULPROG      zgpg30
TD           65536
SOLVENT      Pyr
NS           507
DS           2
SWH          45454.547 Hz
FIDRES       0.693581 Hz
AQ           0.7209570 sec
RG           9200
DW           11.000 usec
DE           6.50 usec
TE           298.2 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
```

```
===== CHANNEL f1 =====
NUC1          13C
P1            8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2          -4.00 dB
PL12         13.16 dB
PL13         16.00 dB
PL2W         34.70265579 W
PL12W        0.66736388 W
PL13W        0.34702653 W
SFO2         600.1324005 MHz
SI           32768
SF           150.9027005 MHz
WDW          EM
SSB          0
LB           3.00 Hz
GB           0
PC           1.40
```

1H NMR of Compound 23

AV-600-1H



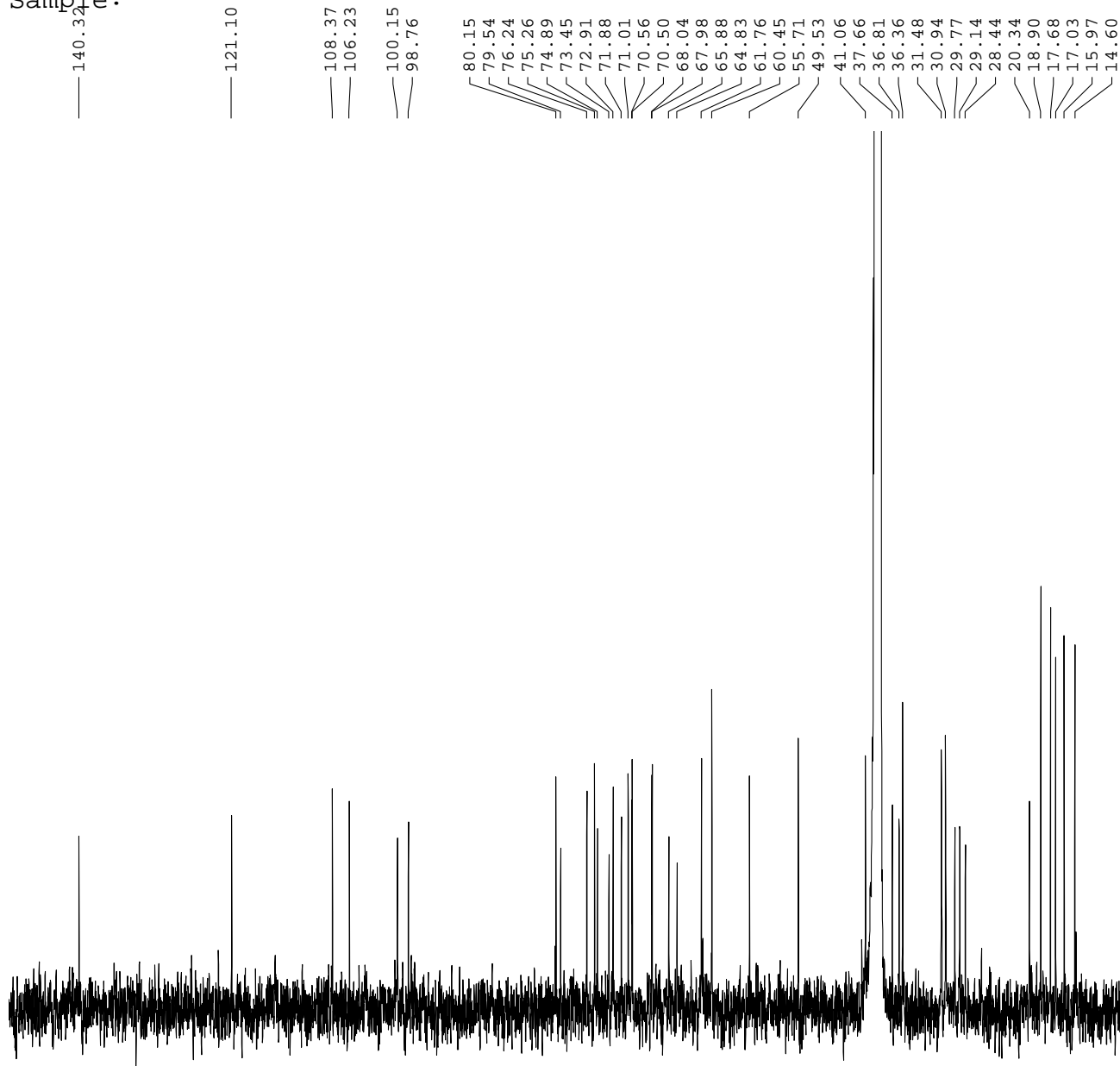
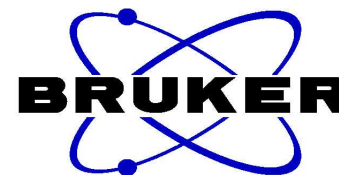
NAME ZP20110310
EXPNO 1
PROCNO 1
Date_ 20110311
Time 9.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 8
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219786 sec
RG 228
DW 27.800 usec
DE 6.50 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299976 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 23

AV-600-13C

Sample:



```
NAME          ZP20110310
EXPNO          2
PROCNO         1
Date_          20110318
Time           16.13
INSTRUM        spect
PROBHD         5 mm PABBO BB-
PULPROG        zgpg30
TD             65536
SOLVENT        DMSO
NS             2110
DS             2
SWH            45454.547 Hz
FIDRES         0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            300.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

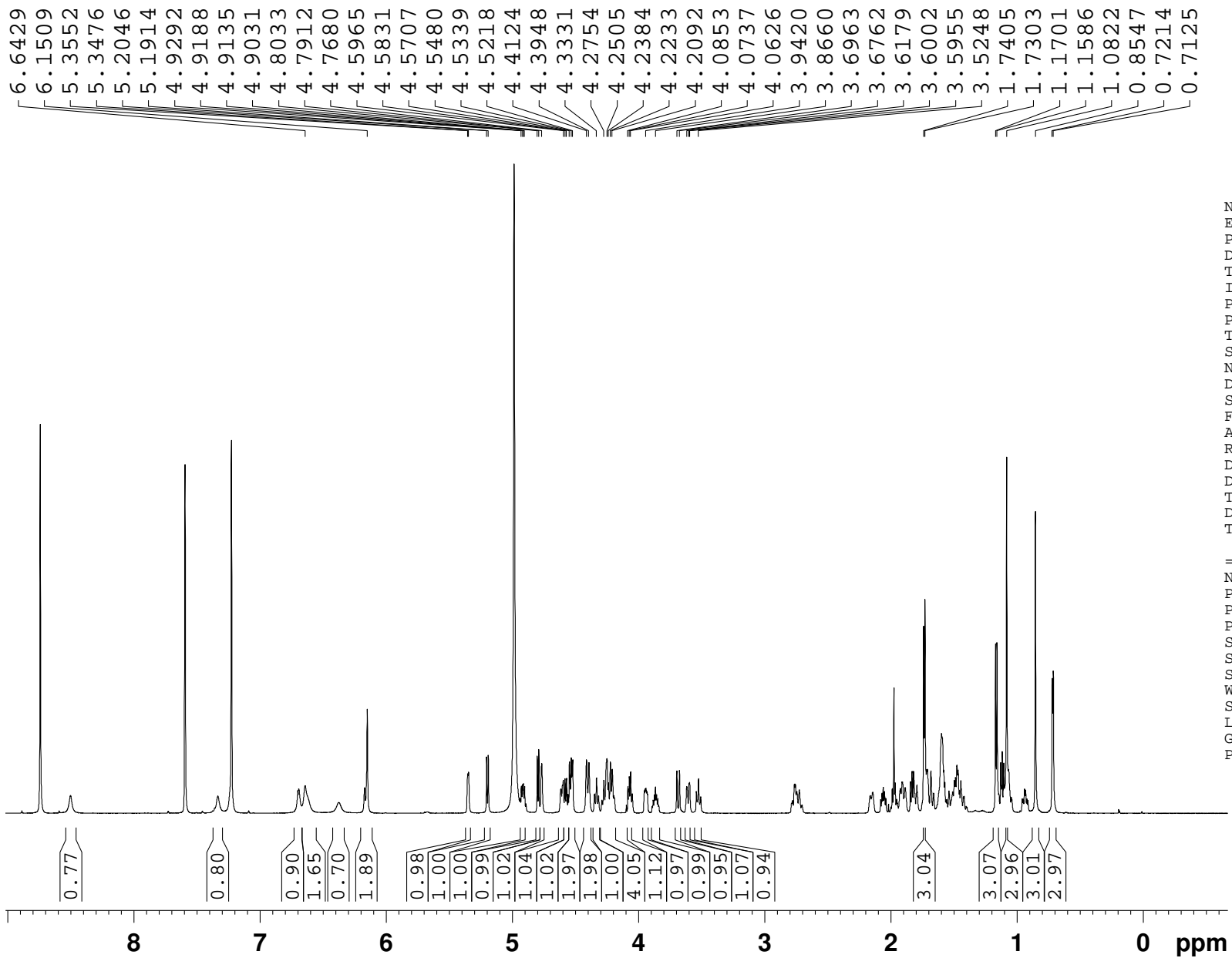
```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9028846 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

1H NMR of Compound 24

AV-600-1H



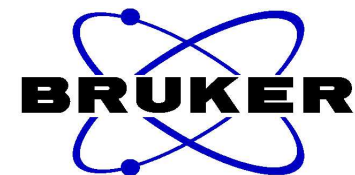
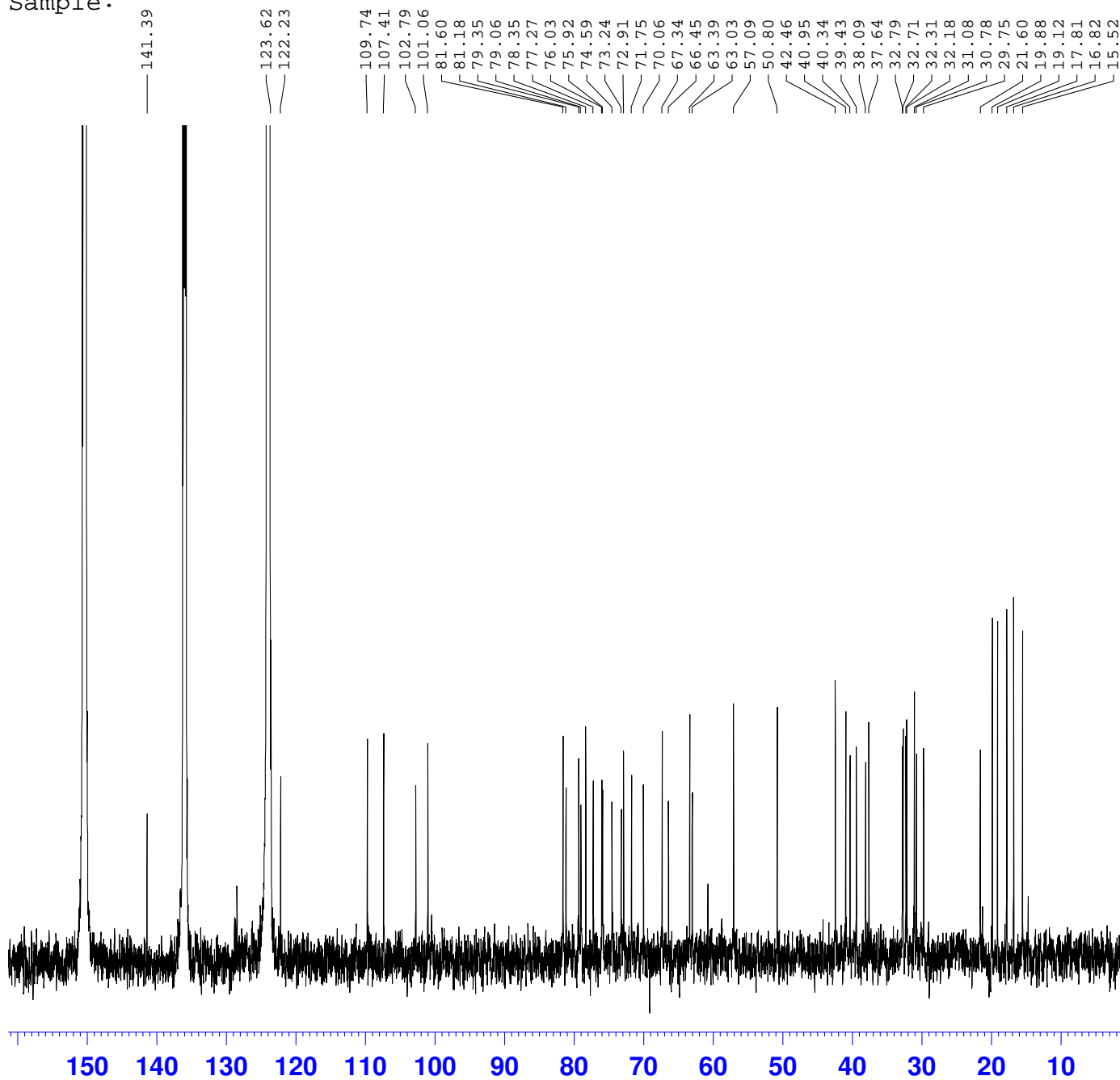
NAME ZP20110412C
EXPNO 1
PROCNO 1
Date_ 20110413
Time 9.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 456
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299730 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 24

AV-600-13C

Sample:

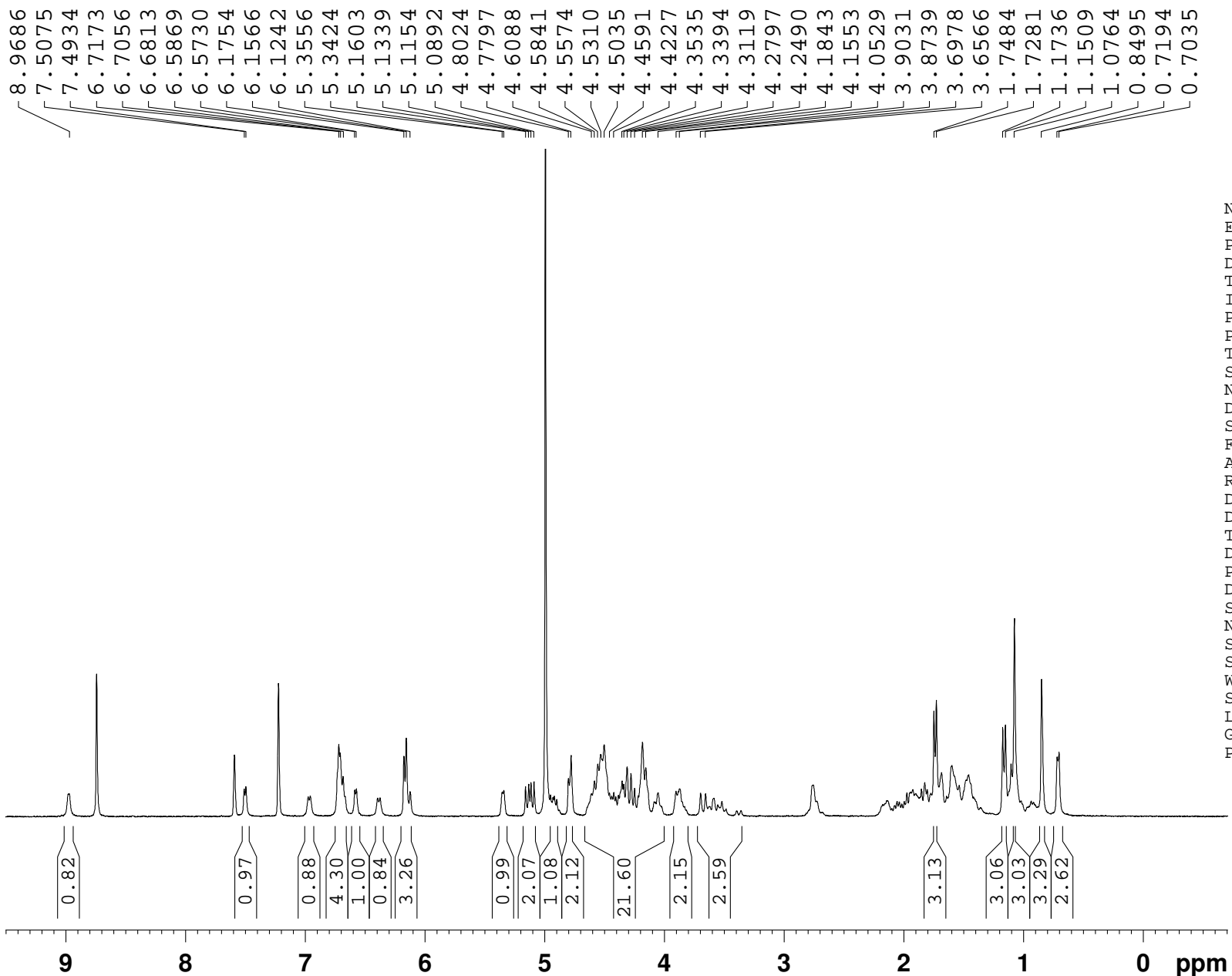


```
NAME          ZP20110412C
EXPNO         2
PROCNO        1
Date_         20110413
Time          9.34
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       Pyr
NS            672
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W           83.20243835 W
SFO1           150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2            -4.00 dB
PL12           13.16 dB
PL13           16.00 dB
PL2W           34.70265579 W
PL12W          0.66736388 W
PL13W          0.34702653 W
SFO2           600.1324005 MHz
SI             32768
SF             150.9026996 MHz
WDW            EM
SSB            0
LB             3.00 Hz
GB             0
PC             1.40
```

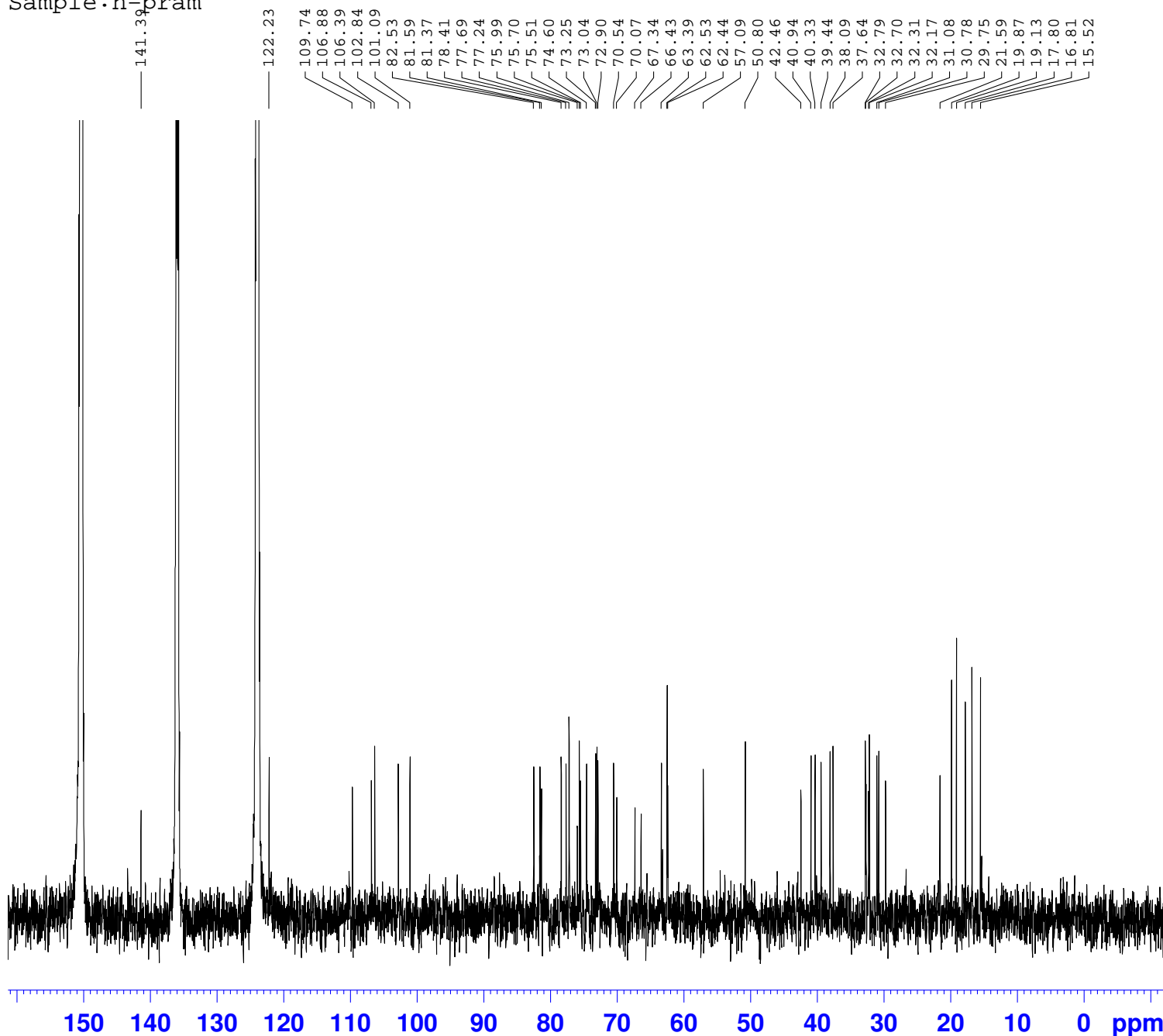
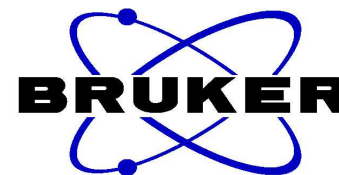
¹H NMR of Compound 25



NAME ZP20110414
EXPNO 1
PROCNO 1
Date_ 20110415
Time 5.53
INSTRUM arx300
PROBHD 5 mm QNP 1H
PULPROG zg30
TD 32768
SOLVENT Pyr
NS 16
DS 2
SWH 6024.096 Hz
FIDRES 0.183841 Hz
AQ 2.7197940 sec
RG 2048
DW 83.000 usec
DE 118.57 usec
TE 300.0 K
D1 1.00000000 sec
P1 12.40 usec
DE 118.57 usec
SFO1 300.1318534 MHz
NUCLEUS 1H
SI 16384
SF 300.1303307 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 25

AV-600-13C
Sample:n_pram

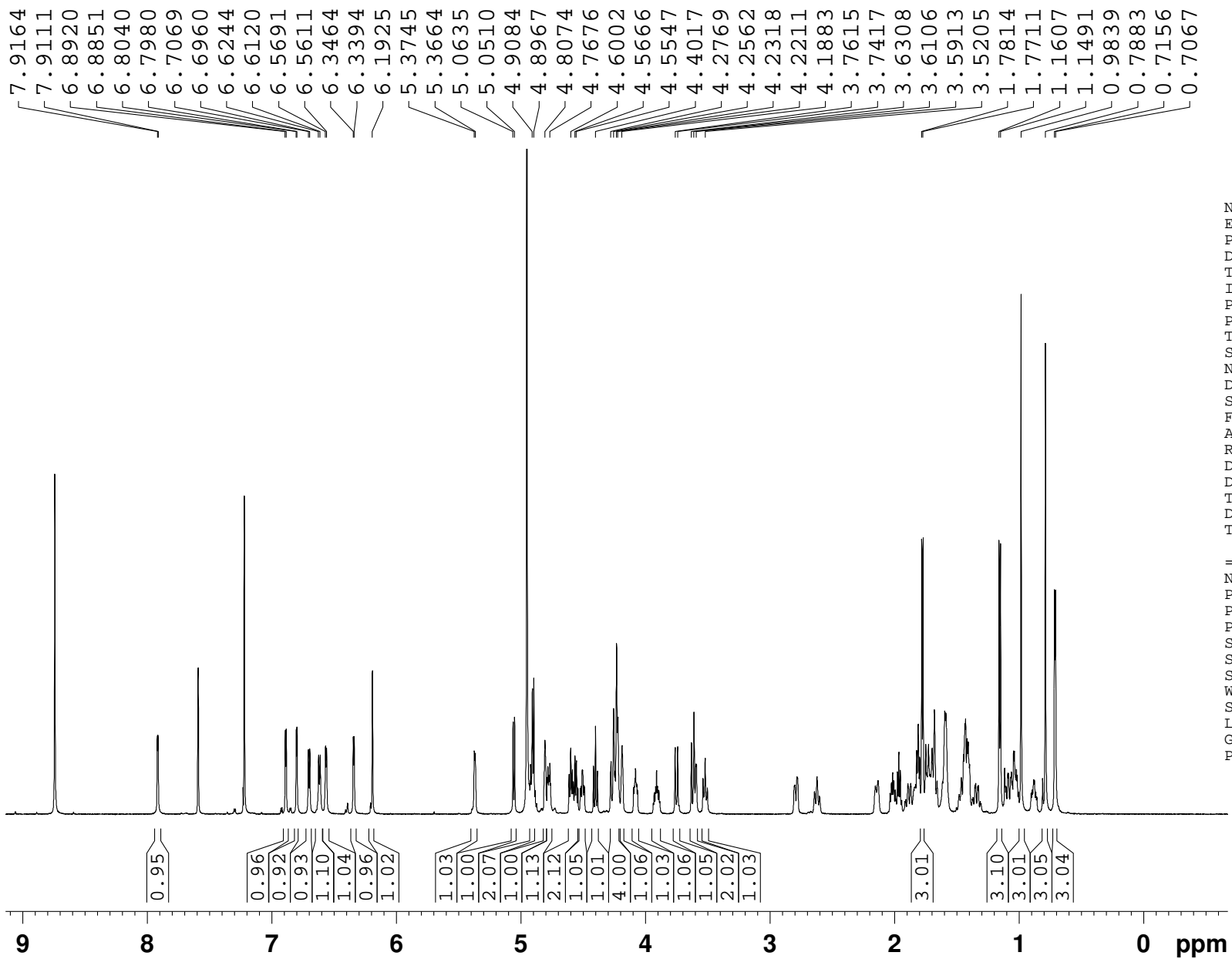


NAME ZP20110414
EXPNO 2
PROCNO 1
Date_ 20110429
Time 11.05
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 522
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9026996 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

AV-600-1H



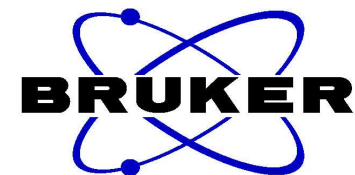
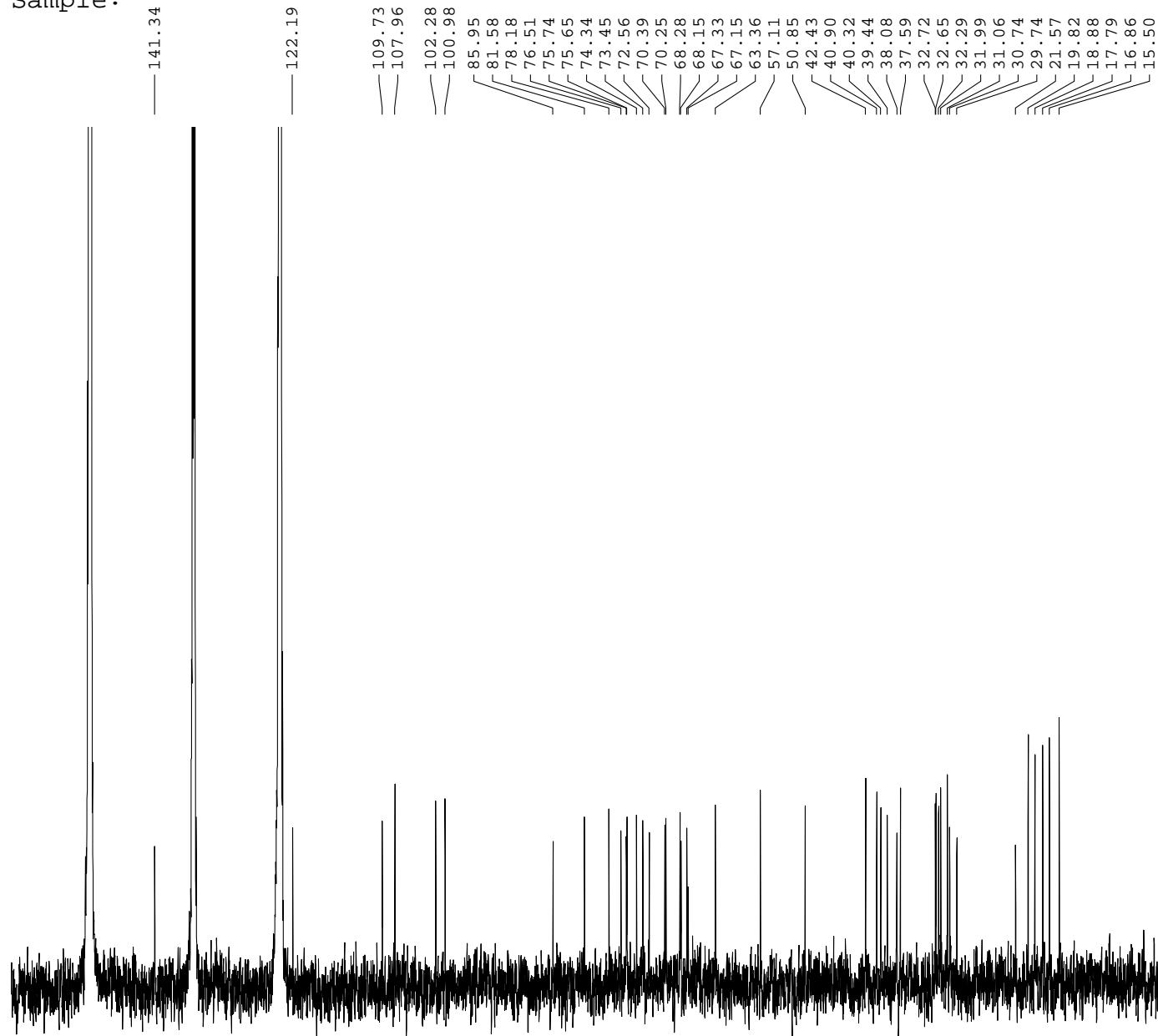
NAME ZP20110415A
EXPNO 1
PROCNO 1
Date_ 20110415
Time 15.10
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 256
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299729 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 26

AV-600-13C

Sample:



NAME ZP20110415A
EXPNO 2
PROCNO 1
Date_ 20110419
Time 8.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Pyr
NS 313
DS 2
SWH 45454.547 Hz
FIDRES 0.693581 Hz
AQ 0.7209570 sec
RG 9200
DW 11.000 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

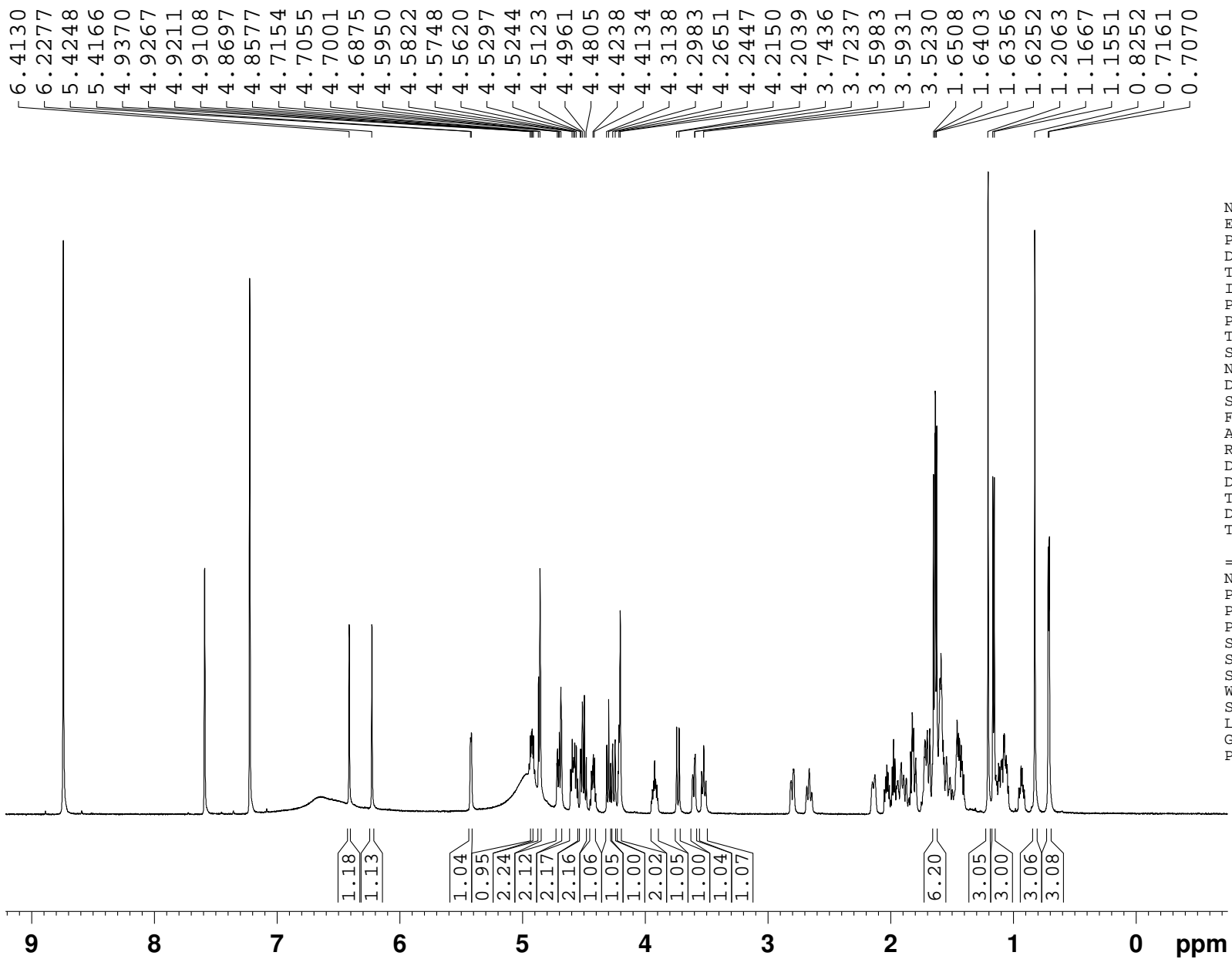
==== CHANNEL f1 =====
NUC1 13C
P1 8.80 usec
PL1 1.00 dB
PL1W 83.20243835 W
SFO1 150.9178993 MHz

==== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 13.16 dB
PL13 16.00 dB
PL2W 34.70265579 W
PL12W 0.66736388 W
PL13W 0.34702653 W
SFO2 600.1324005 MHz
SI 32768
SF 150.9027010 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.40

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

¹H NMR of Compound 27

AV-600-1H



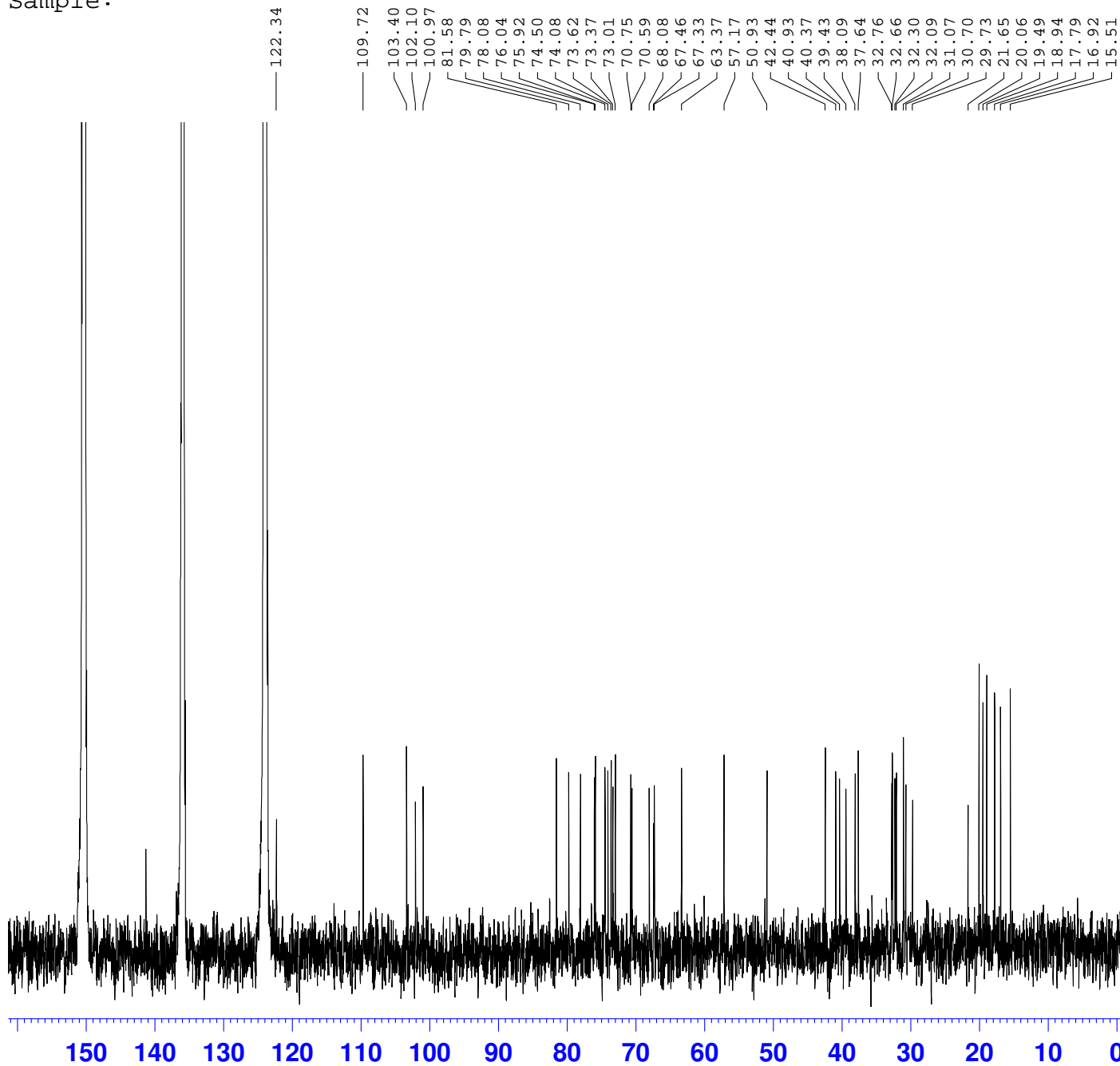
NAME ZP20110415B
EXPNO 1
PROCNO 1
Date_ 20110415
Time 15.06
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 322
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299730 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

13C NMR of Compound 27

AV-600-13C

Sample:



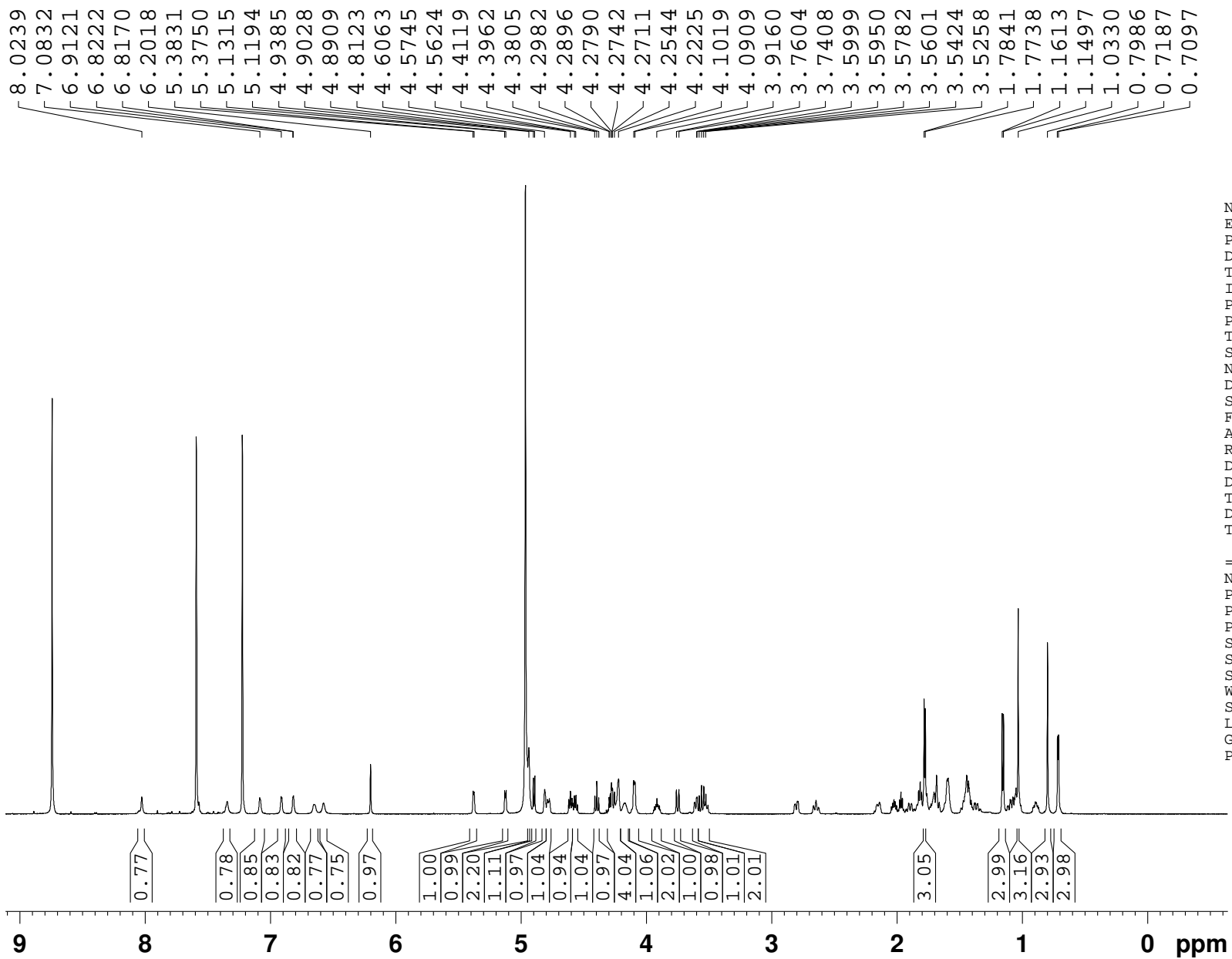
```
NAME          ZP20110415B
EXPNO          2
PROCNO         1
Date_          20110419
Time           14.11
INSTRUM        spect
PROBHD         5 mm PABBO BB-
PULPROG        zgpg30
TD             65536
SOLVENT        Pyr
NS             658
DS             2
SWH            45454.547 Hz
FIDRES         0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9028741 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB           0
PC            1.40
```

¹H NMR of Compound 28

AV-600-1H

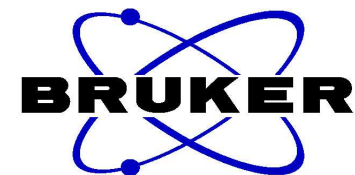
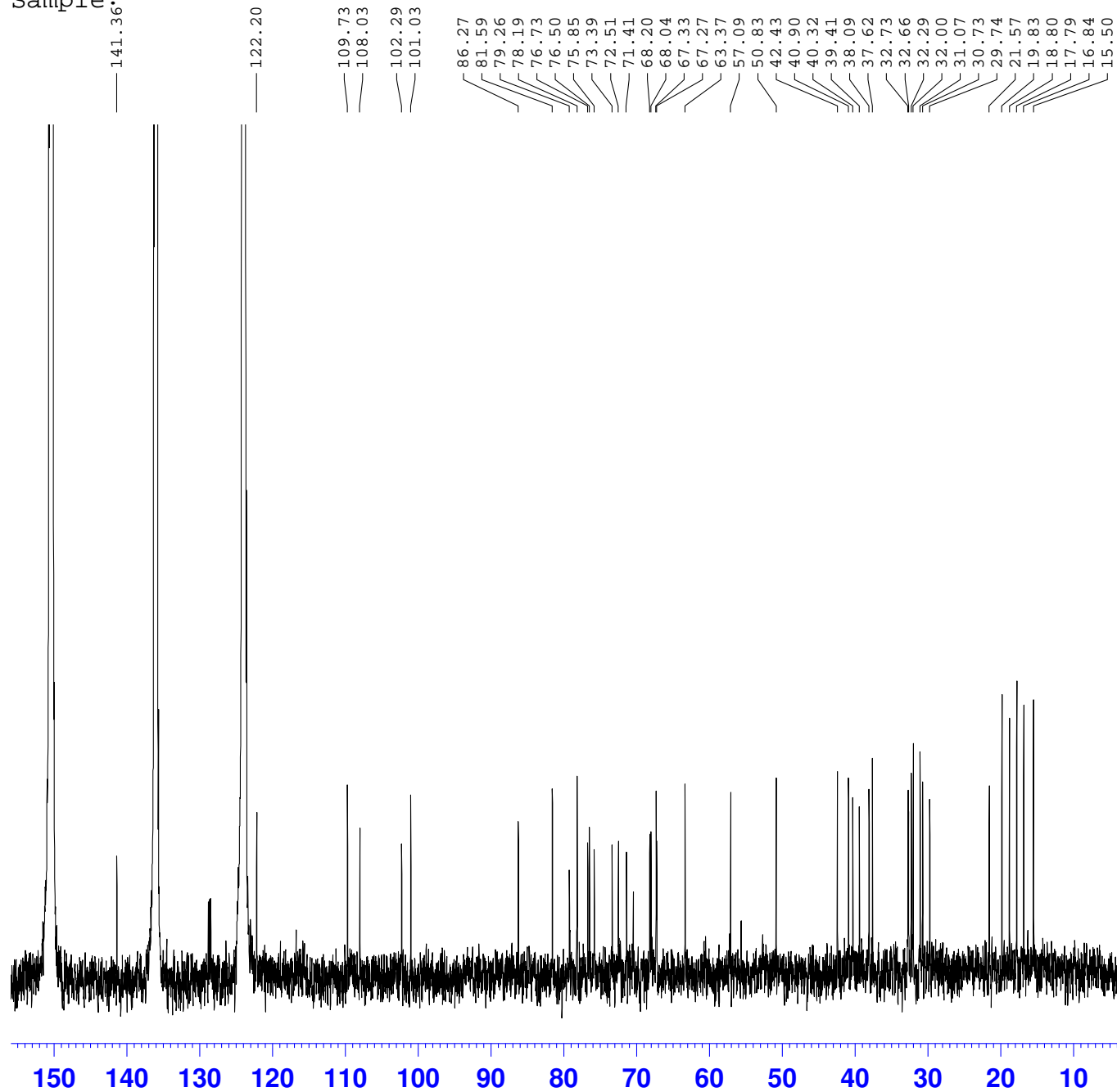


NAME ZP20110415C
EXPNO 1
PROCNO 1
Date_ 20110415
Time 15.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 256
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1299729 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

AV-600-13C

Sample:



```

NAME          ZP20110415C
EXPNO         2
PROCNO        1
Date_         20110419
Time          14.47
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       Pyr
NS            1435
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.80 usec
PL1           1.00 dB
PL1W         83.20243835 W
SFO1         150.9178993 MHz

```

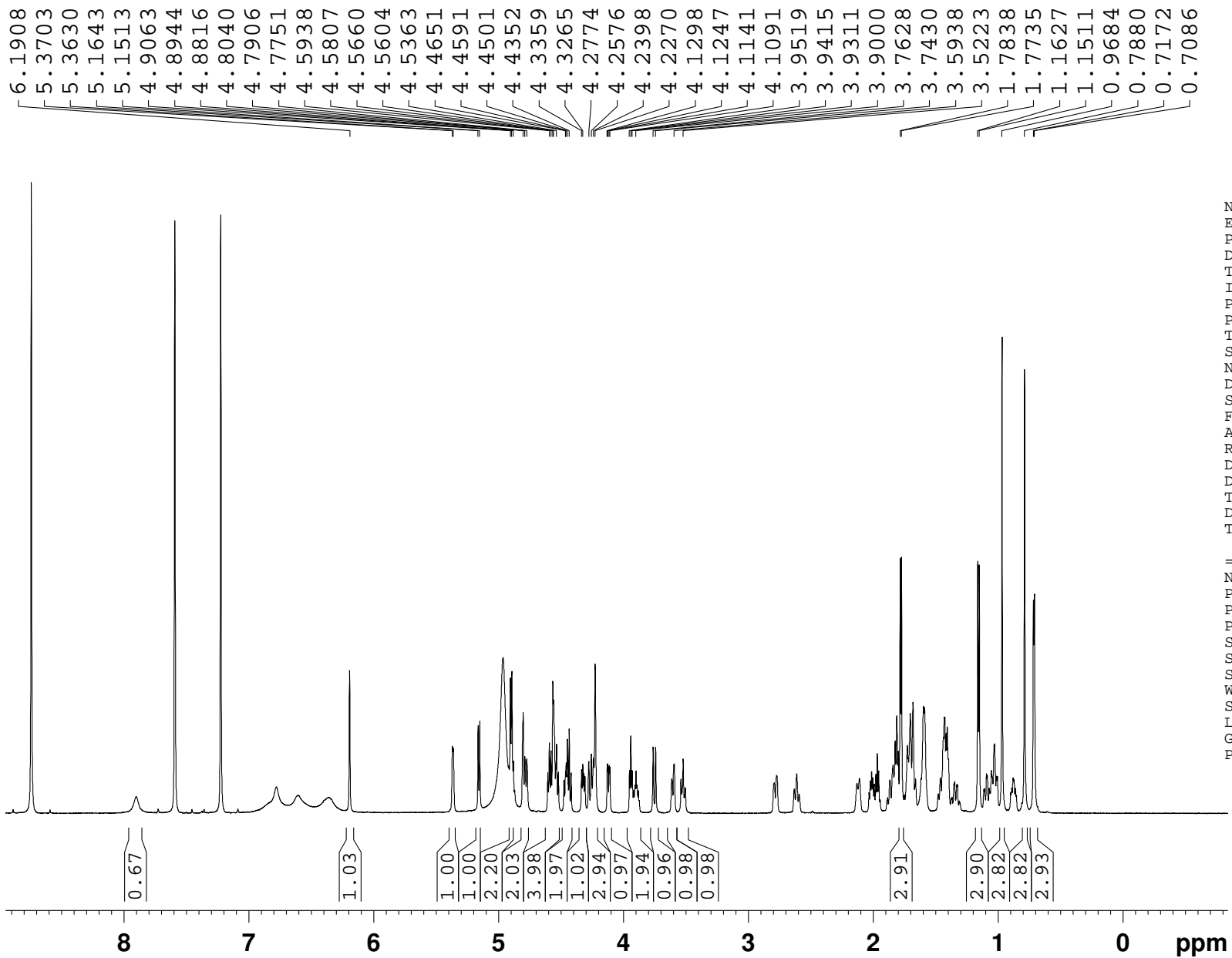
```

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2           -4.00 dB
PL12         13.16 dB
PL13         16.00 dB
PL2W         34.70265579 W
PL12W        0.66736388 W
PL13W        0.34702653 W
SFO2         600.1324005 MHz
SI            32768
SF           150.9028734 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40

```

¹H NMR of Compound 29

AV-600-1H



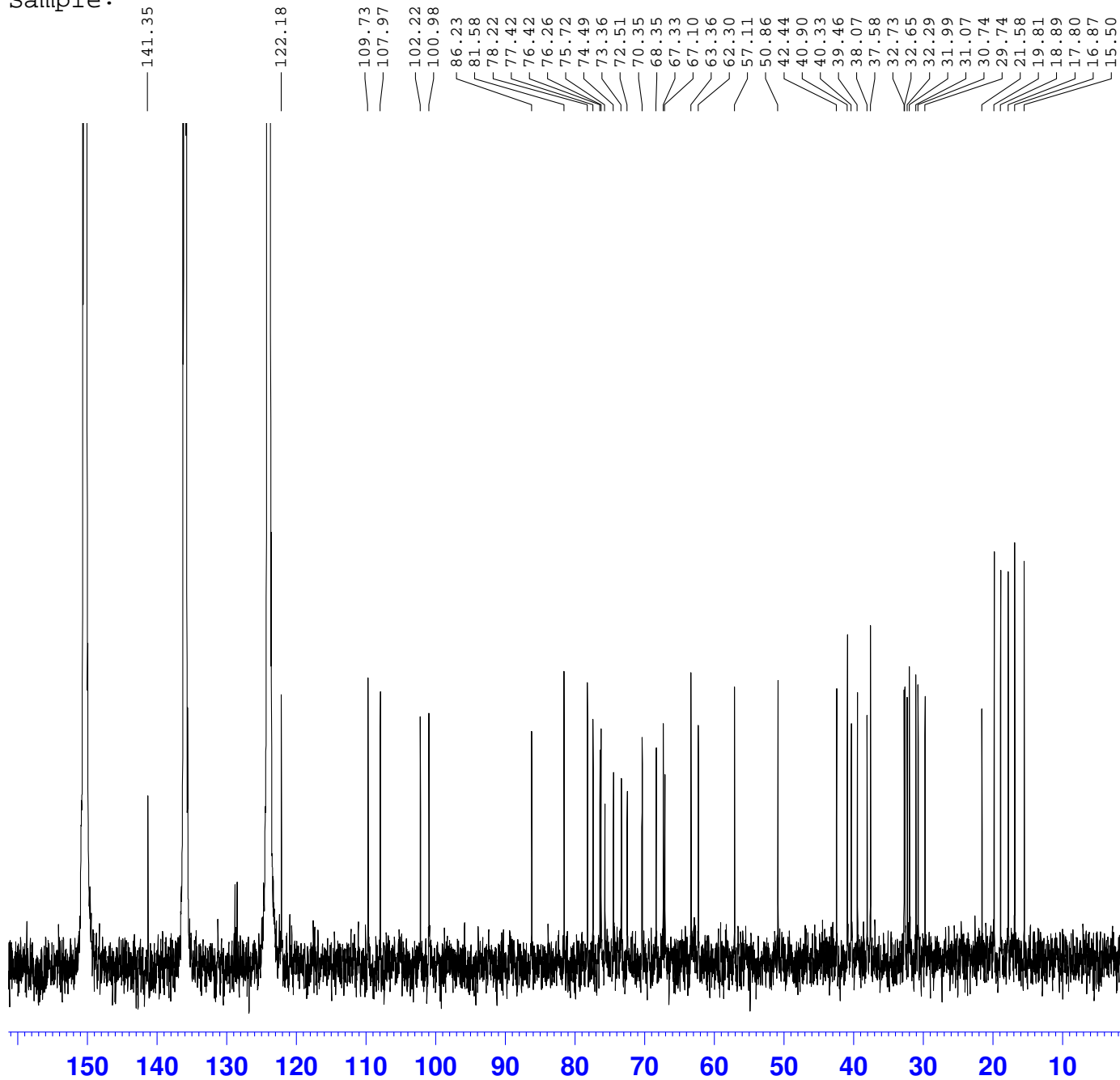
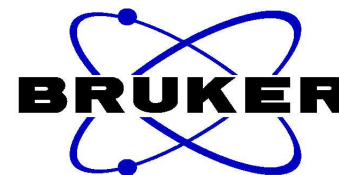
NAME ZP20110415E
EXPNO 1
PROCNO 1
Date_ 20110415
Time 15.20
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Pyr
NS 8
DS 2
SWH 12019.230 Hz
FIDRES 0.183399 Hz
AQ 2.7263892 sec
RG 144
DW 41.600 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

==== CHANNEL f1 =====
NUC1 1H
P1 11.10 usec
PL1 -4.00 dB
PL1W 34.70265579 W
SF01 600.1324005 MHz
SI 32768
SF 600.1308781 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

¹³C NMR of Compound 29

AV-600-13C

Sample:

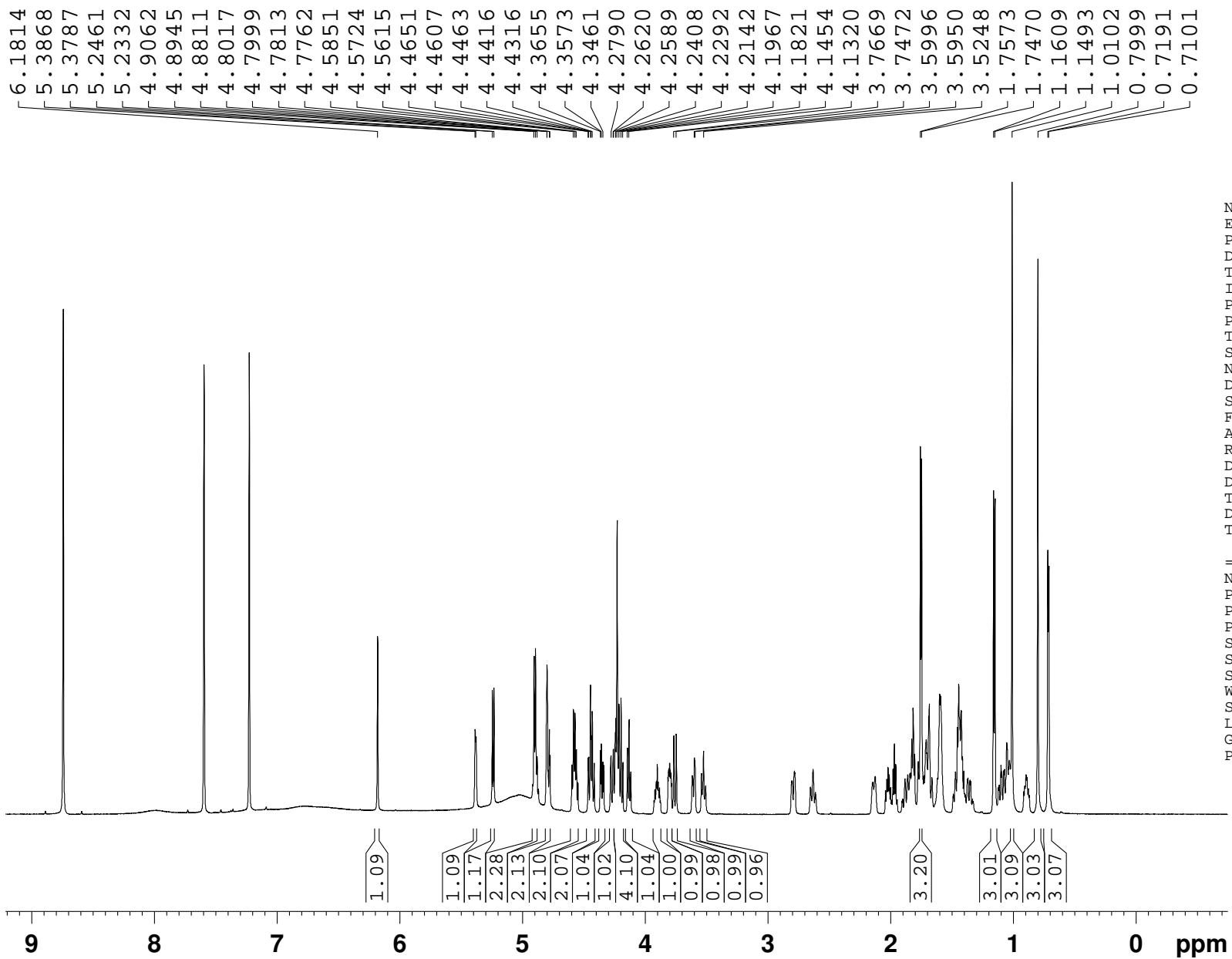


```
NAME          ZP20110415E
EXPNO         2
PROCNO        1
Date_         20110419
Time          16.16
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       Pyr
NS            865
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1          13C
P1            8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9029280 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```

AV-600-1H



```

NAME      ZP20110415D
EXPNO     1
PROCNO    1
Date_     20110415
Time      15.16
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   Pyr
NS         8
DS         2
SWH       12019.230 Hz
FIDRES    0.183399 Hz
AQ         2.7263892 sec
RG         144
DW         41.600 usec
DE         6.50 usec
TE         298.2 K
D1         1.00000000 sec
TD0        1
    
```

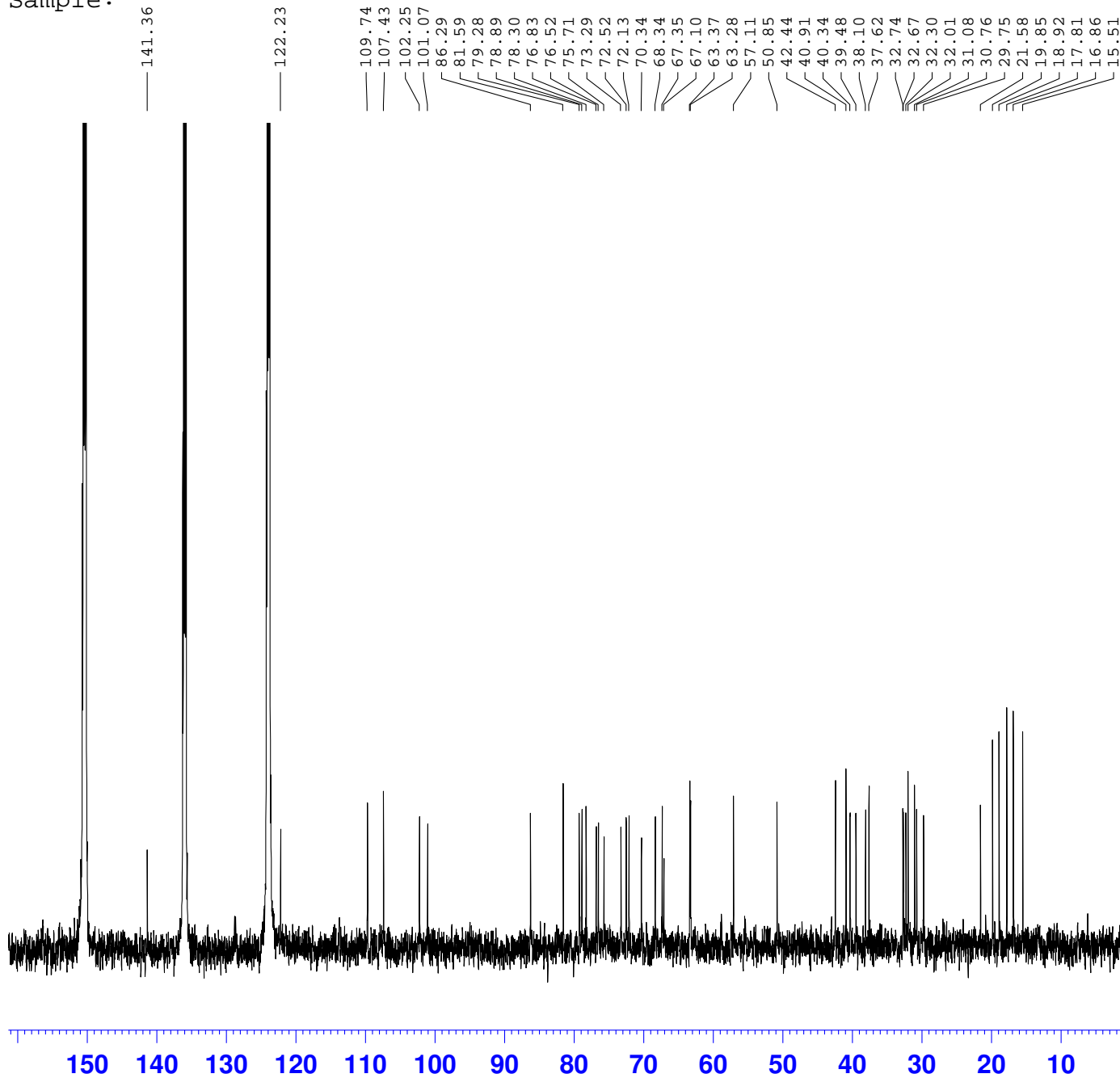
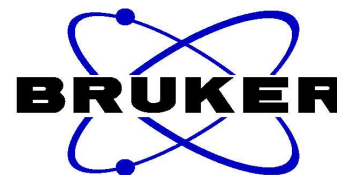
```

===== CHANNEL f1 =====
NUC1      1H
P1        11.10 usec
PL1       -4.00 dB
PL1W      34.70265579 W
SF01      600.1324005 MHz
SI        32768
SF        600.1306569 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```

¹³C NMR of Compound 30

AV-600-13C

Sample:

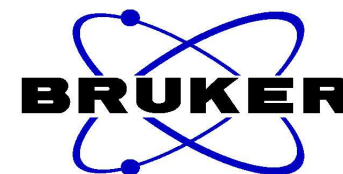
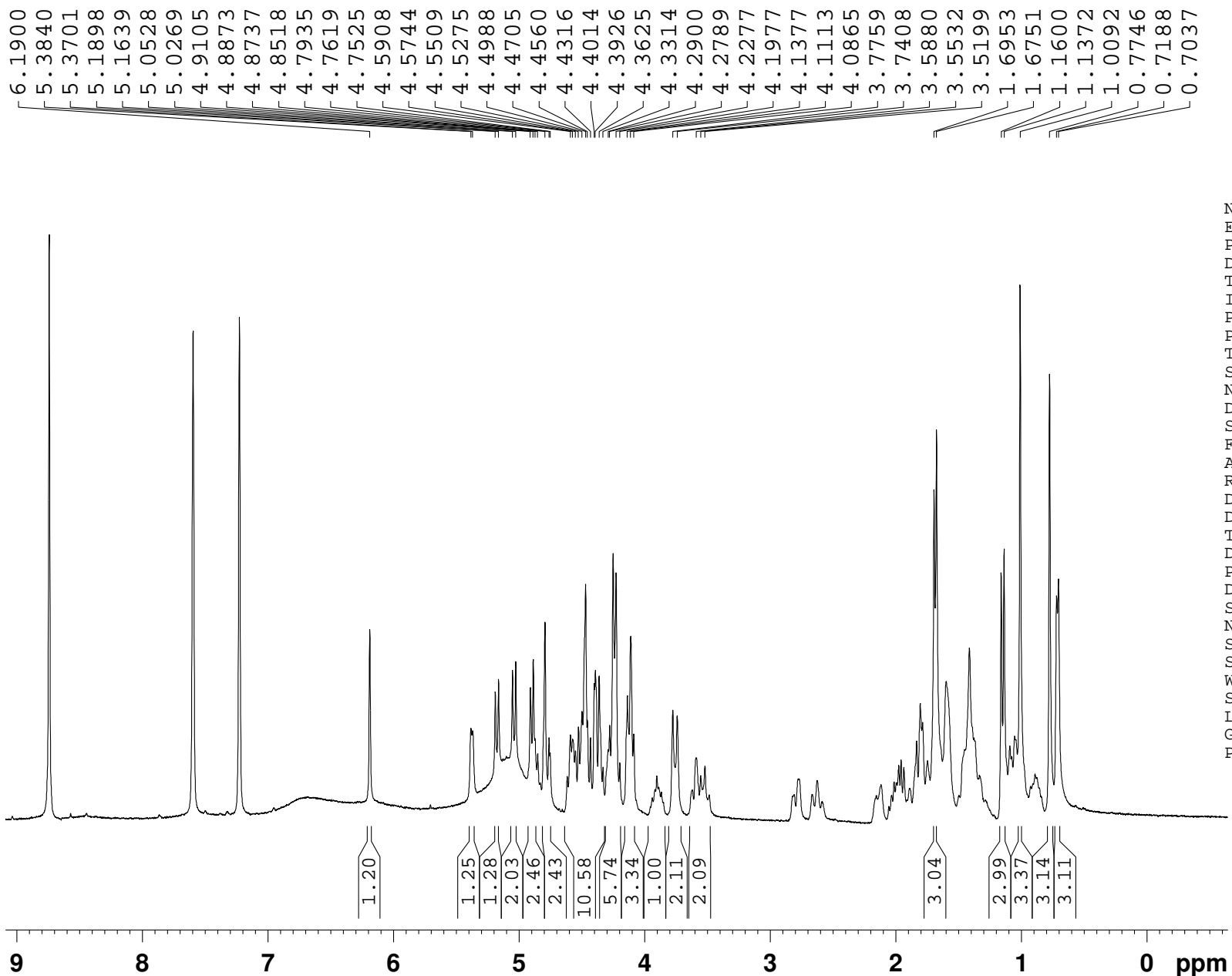


```
NAME          ZP20110415D
EXPNO          2
PROCNO         1
Date_          20110419
Time           9.05
INSTRUM        spect
PROBHD         5 mm PABBO BB-
PULPROG        zgpg30
TD             65536
SOLVENT        Pyr
NS             241
DS             2
SWH            45454.547 Hz
FIDRES         0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1           1.00 dB
PL1W          83.20243835 W
SFO1          150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2          600.1324005 MHz
SI            32768
SF            150.9026995 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```

1H NMR of Compound 31

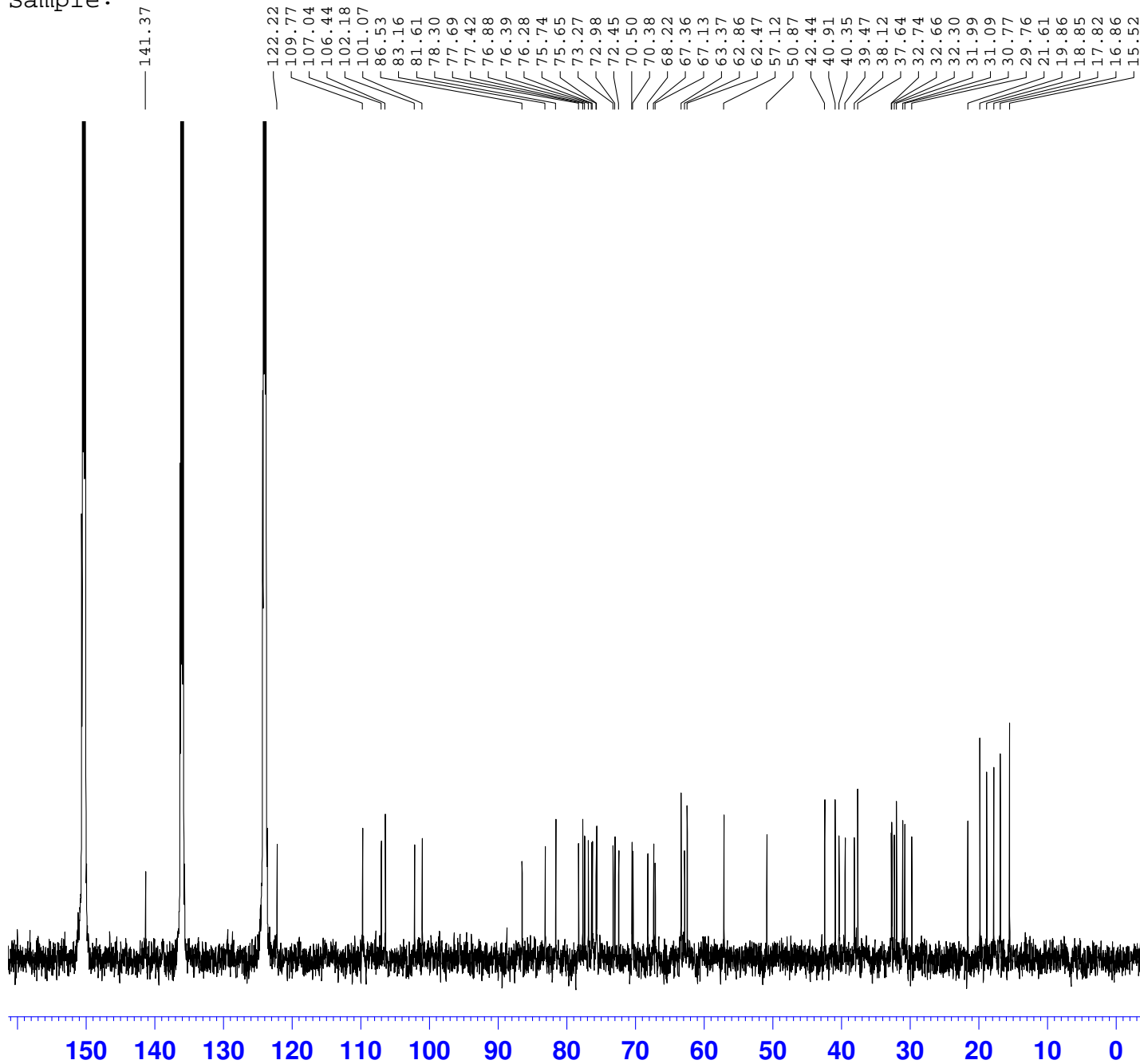
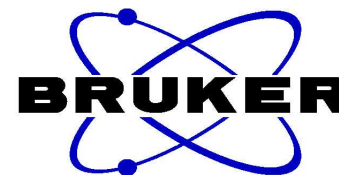


NAME	ZP20110414B
EXPNO	1
PROCNO	1
Date_	20110415
Time	5.56
INSTRUM	arx300
PROBHD	5 mm QNP 1H
PULPROG	zg30
TD	32768
SOLVENT	Pyr
NS	16
DS	2
SWH	6024.096 Hz
FIDRES	0.183841 Hz
AQ	2.7197940 sec
RG	1024
DW	83.000 usec
DE	118.57 usec
TE	300.0 K
D1	1.00000000 sec
P1	12.40 usec
DE	118.57 usec
SFO1	300.1318534 MHz
NUCLEUS	1H
SI	16384
SF	300.1303291 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

¹³C NMR of Compound 31

AV-600-13C

Sample:



```
NAME          ZP20110414B
EXPNO         2
PROCNO        1
Date_         20110429
Time          13.43
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       Pyr
NS            256
DS            2
SWH           45454.547 Hz
FIDRES        0.693581 Hz
AQ            0.7209570 sec
RG            9200
DW            11.000 usec
DE            6.50 usec
TE            298.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
```

```
===== CHANNEL f1 =====
NUC1           13C
P1             8.80 usec
PL1            1.00 dB
PL1W           83.20243835 W
SFO1           150.9178993 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2           1H
PCPD2         80.00 usec
PL2           -4.00 dB
PL12          13.16 dB
PL13          16.00 dB
PL2W          34.70265579 W
PL12W         0.66736388 W
PL13W         0.34702653 W
SFO2           600.1324005 MHz
SI            32768
SF            150.9026977 MHz
WDW           EM
SSB           0
LB            3.00 Hz
GB            0
PC            1.40
```