

Supplementary Information

Multicomponent Synthesis of Pyrano[2,3-*c*]coumarins

Wan-Chi Hsieh, Chi-Hui Lin, Yu-Ju Yang, and Ding-Yah Yang*

Department of Chemistry, Tunghai University,

No. 1727, Sec. 4, Taiwan Boulevard, Xitun District, Taichung City 40704, Taiwan

*Corresponding author Tel: 886-4-2359-0121; fax: 886-4-2359-0426;

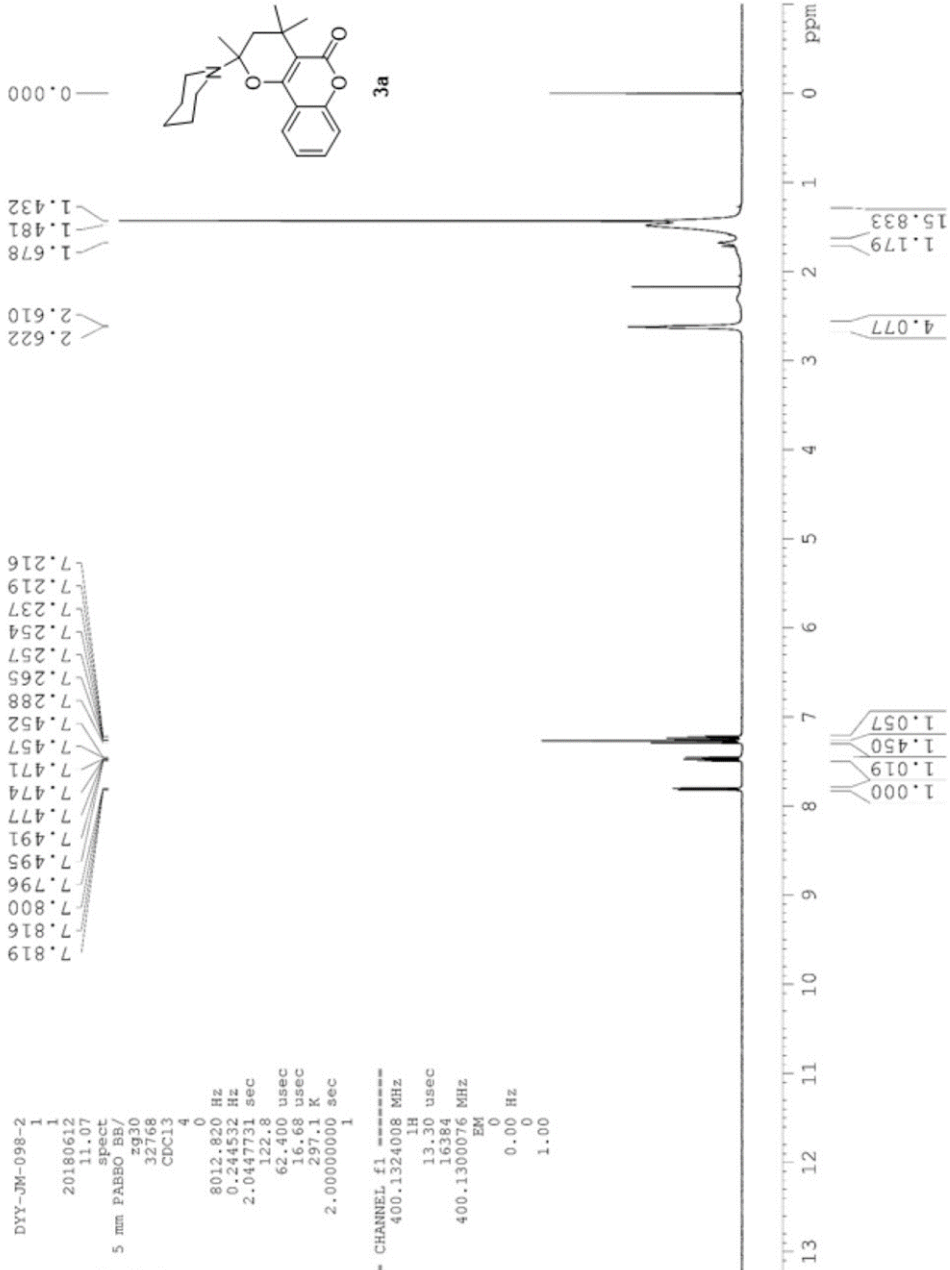
e-Mail: yang@thu.edu.tw

Table of Contents

1. Copies of ^1H and ^{13}C NMR spectra of compounds **3a–o** S2–S31
2. Copy of ^1H NMR spectra of compound **4** S32
3. Copies of ^1H and ^{13}C NMR spectra of compound **8**S33–S34
4. Copies of ^1H and ^{13}C NMR spectra of compounds **11a–e**S35–S44

NAME DYY-JM-098-2
 EXPNO 1
 PROCNO 1
 Date_ 20180612
 Time 11.07
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 4
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.244532 Hz
 AQ 2.0447731 sec
 RG 122.8
 DW 62.400 usec
 DE 16.68 usec
 TE 297.1 K
 D1 2.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1324008 MHz
 NUC1 1H
 P1 13.30 usec
 SI 16384
 SF 400.1300076 MHz
 WDW EM
 SSB 0
 LB 0.00 Hz
 GB 0
 FC 1.00



```

NAME          DYY-JM-098-C
EXPNO         1
PROCNO        1
Date_         20180609
Time          1.42
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDC13
NS            2048
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 sec
RG            205.92
DE            20.800 usec
TE            297.9 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

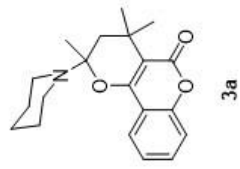
```

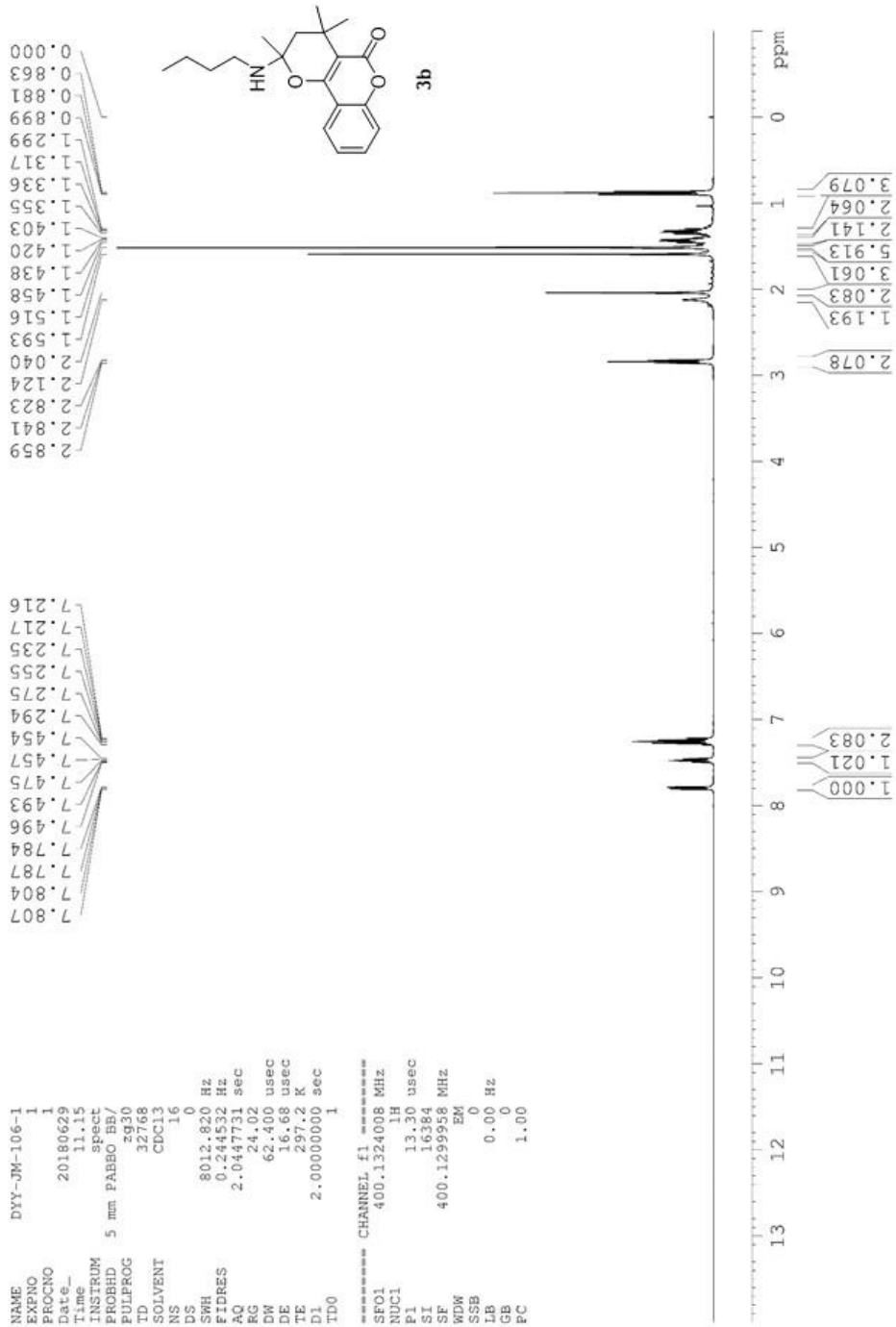
```

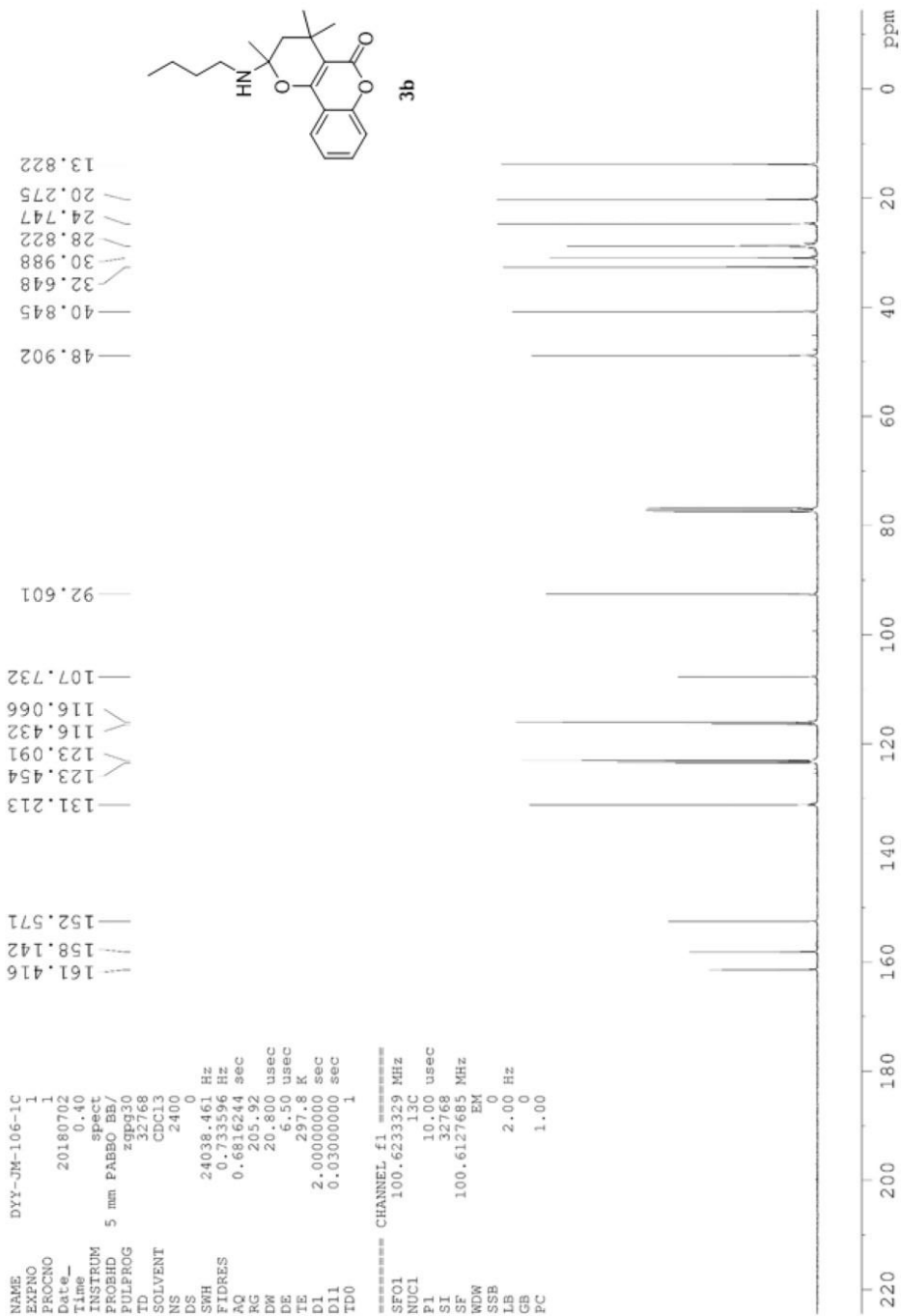
***** CHANNEL f1 *****
SF01         100.6233329 MHz
NUC1         13C
P1           10.00 usec
SI           32768
SF           100.6127685 MHz
WDW          EM
SSB          0
LB           2.00 Hz
GB           0
PC           1.00

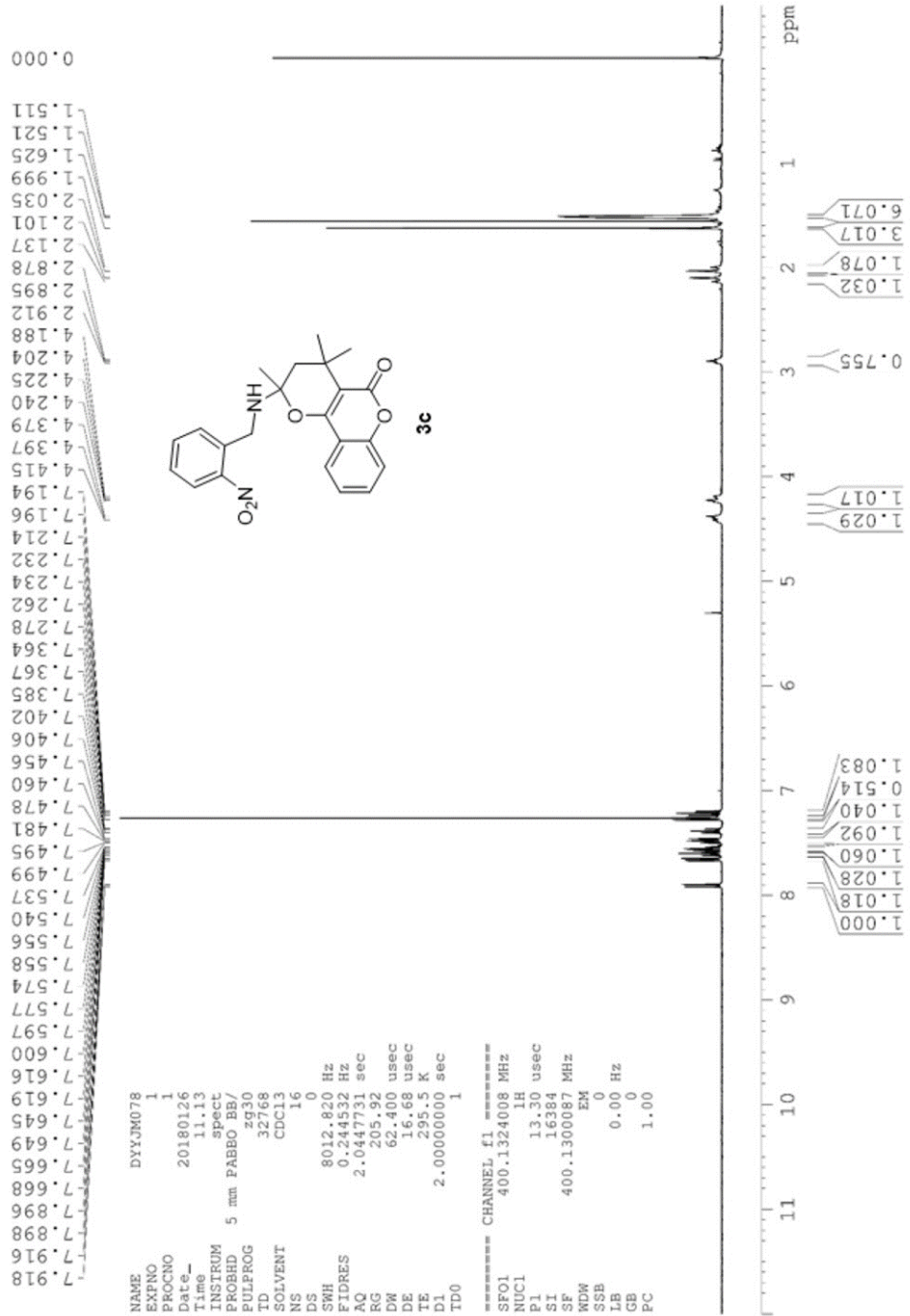
```

161.310
156.940
152.640
131.050
123.503
122.881
116.199
109.496
92.635
46.962
45.192
30.572
28.618
26.768
25.883
24.825
18.866









```

NAME          DYY-JM-078-C
EXPNO         1
PROCNO        1
Date_         20180608
Time_         16.15
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            32768
SOLVENT       CCl3
NS            256
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 sec
RG            205.92
DW            20.800 usec
DE            6.50 usec
TE            298.8 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

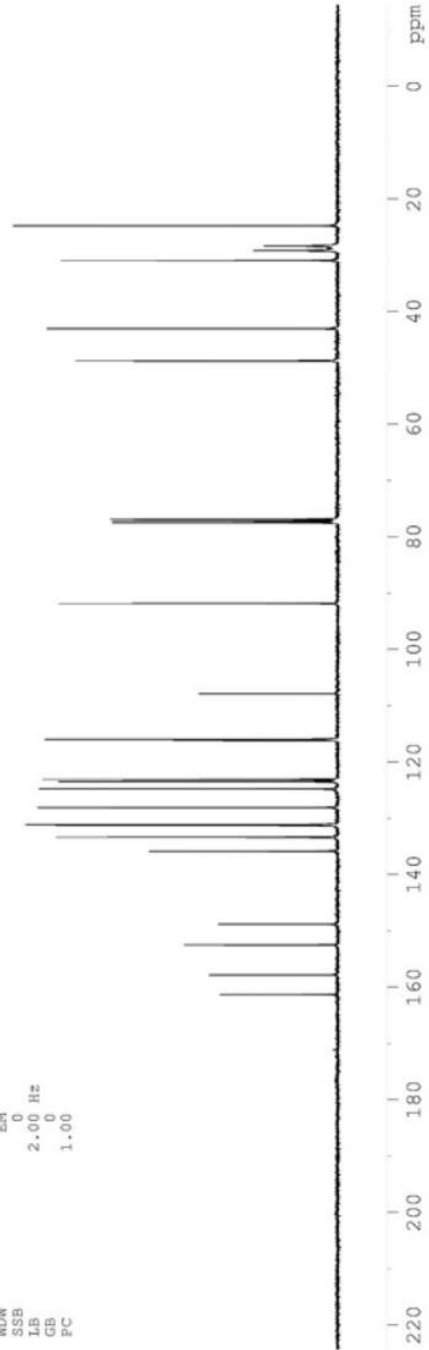
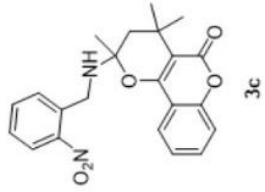
===== CHANNEL f1 =====
SFO1          100.6233329 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6127685 MHz
WDW           EM
SSB           0
LB            2.00 Hz
GB            0
PC            1.00

```

```

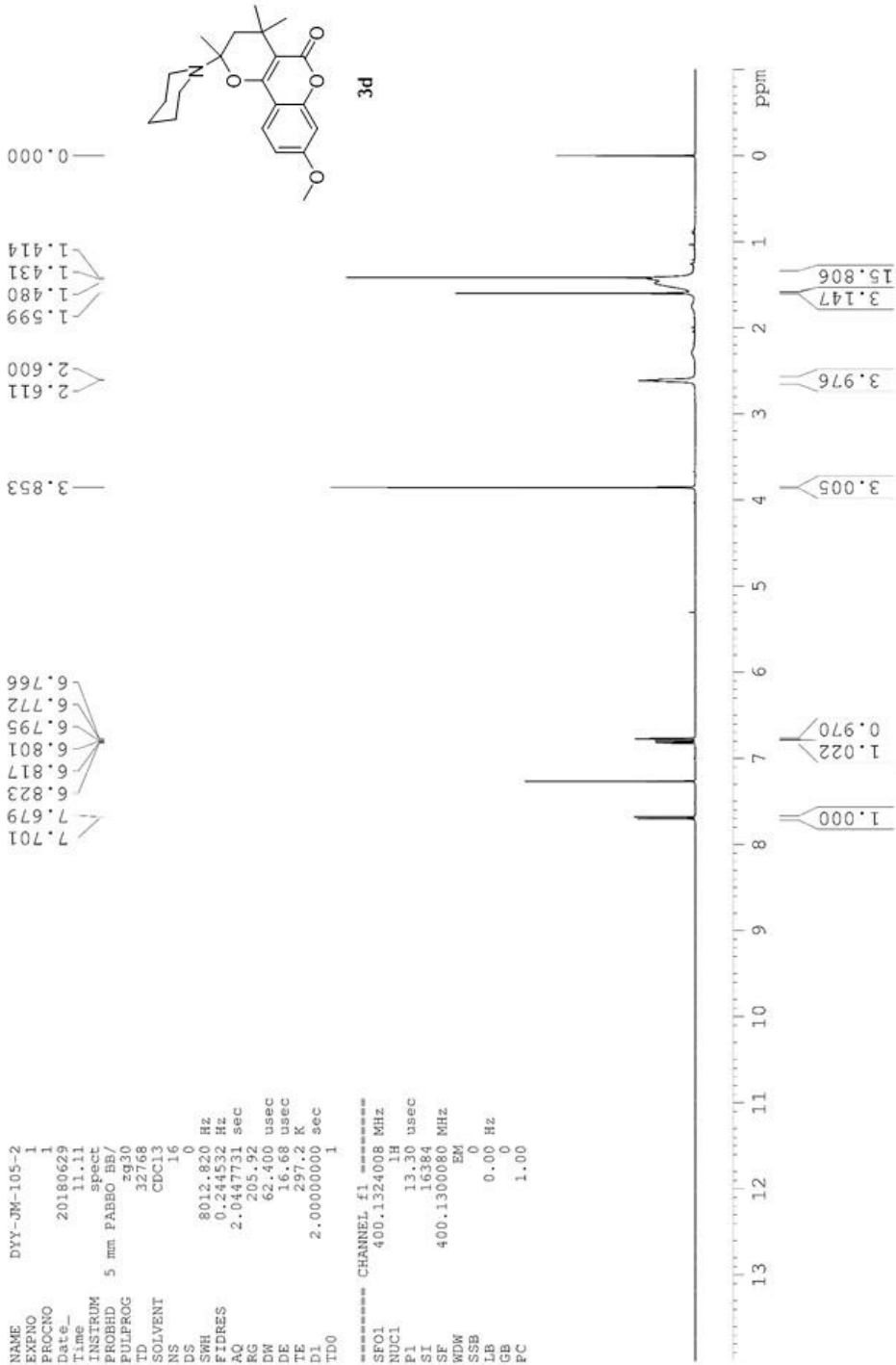
--161.330
--157.804
--152.486
--148.825
--135.833
--133.371
--131.286
--131.111
--128.104
--124.796
--123.520
--123.098
--116.174
--116.005
--107.888
-----91.863
-----48.773
-----43.057
-----30.951
-----29.194
-----28.353
-----24.778

```



NAME DYJ-JM-105-2
 EXPNO 1
 PROCNO 1
 Date_ 20180629
 Time_ 11.11
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 16
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.244532 Hz
 AQ 2.0447731 sec
 RG 205.92
 DW 62.400 usec
 DE 16.68 usec
 TE 297.2 K
 DI 1
 TDO 2.00000000 sec
 1

===== CHANNEL f1 =====
 SFO1 400.1324008 MHz
 NUC1 1H
 P1 13.30 usec
 SI 16384
 SF 400.1300080 MHz
 WDW EM
 SSB 0
 LB 0.00 Hz
 GB 0
 FC 1.00




```

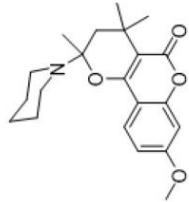
NAME      DYY-JM-105-2C
EXPNO    1
PROCNO   1
Date_    20180701
Time     22.47
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD        32768
SOLVENT  CDCl3
NS        2400
DS        0
SWH       24038.461 Hz
FIDRES    0.733596 Hz
AQ        0.6616244 sec
RG        205.82
DW        20.800 usec
DE        6.56 usec
TE        297.3 K
D1        2.00000000 sec
D11       0.03000000 sec
IDU       1
===== CHANNEL f1 =====
SFO1     100.6233329 MHz
NUC1     13C
P1        10.00 usec
SI        32768
SF        100.6127683 MHz
WDW       EK
SSB       0
LB        2.00 Hz
GB        0
FC        1.00

```

```

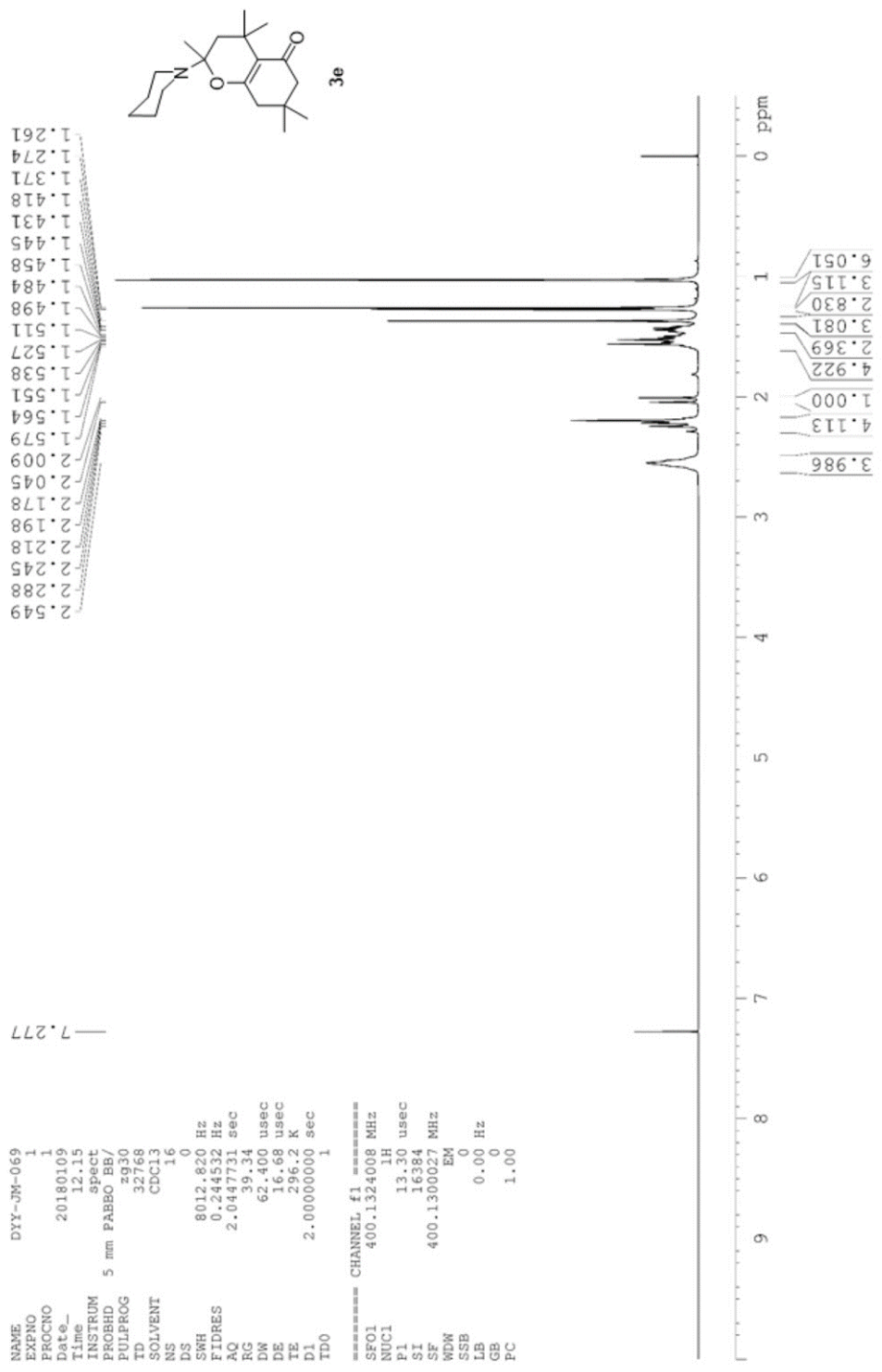
162.244
161.735
157.437
154.301
123.923
111.831
109.510
106.813
99.934
92.528
55.657
46.931
45.202
30.338
28.629
26.782
25.886
24.831
18.887

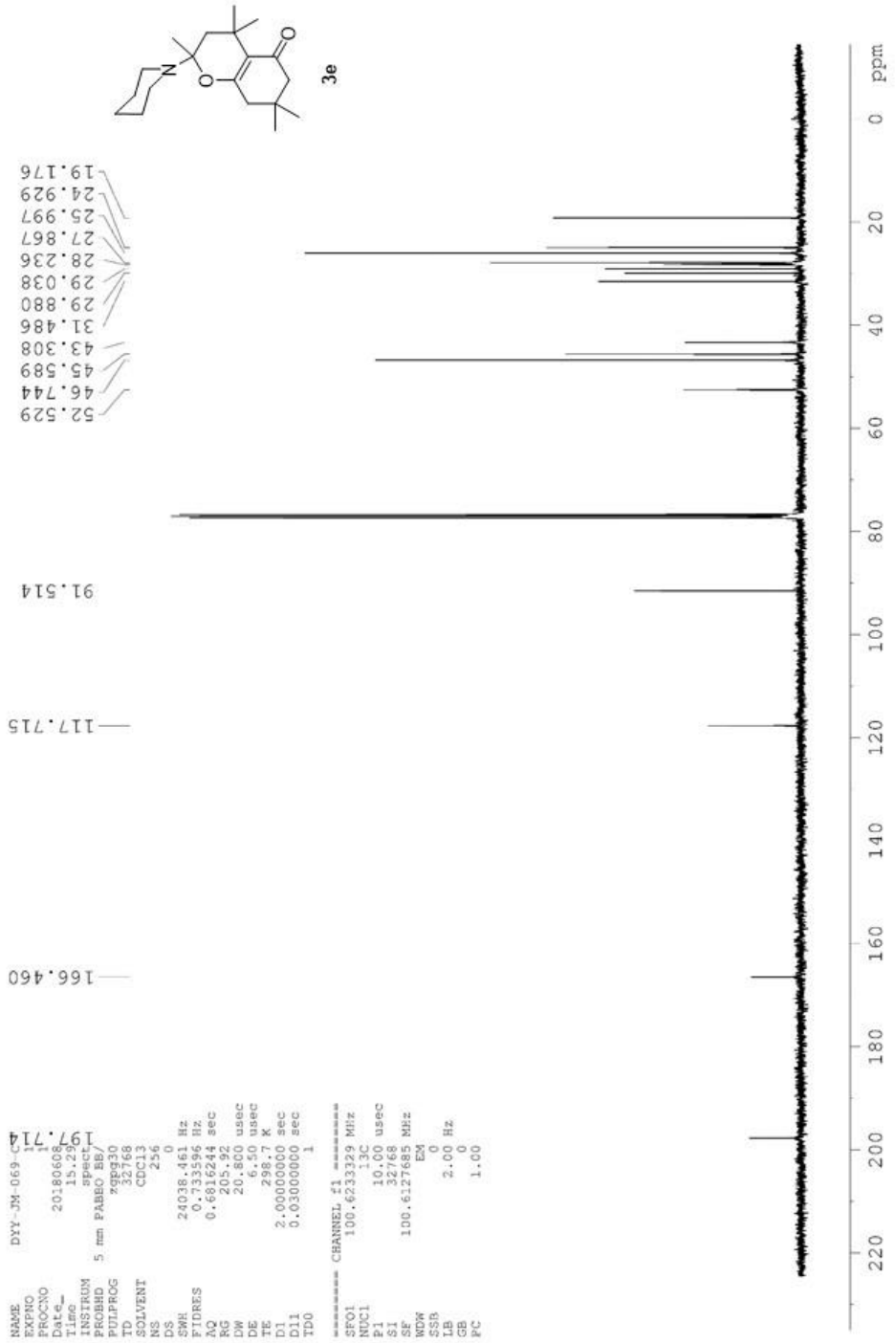
```

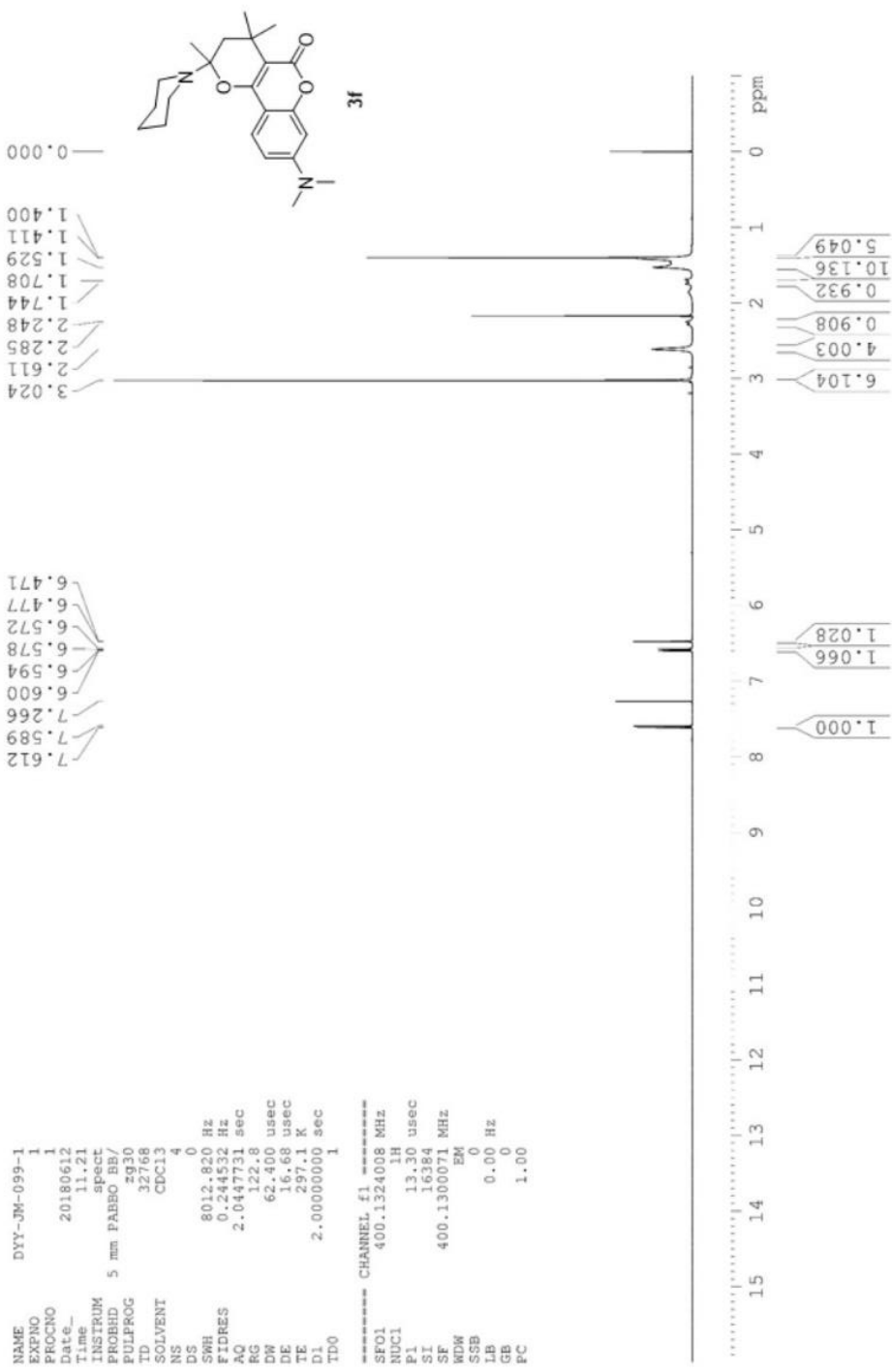


3d









```

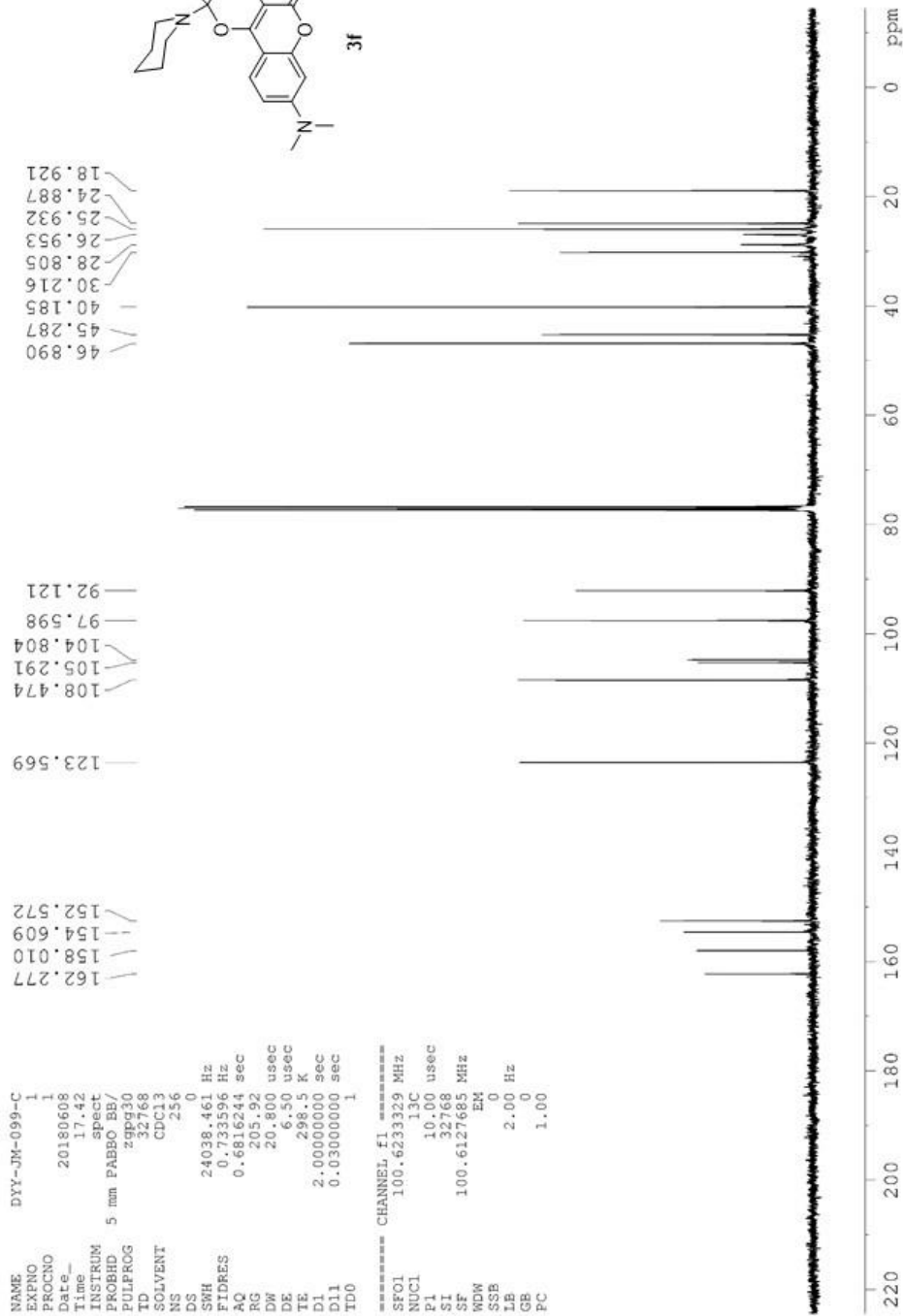
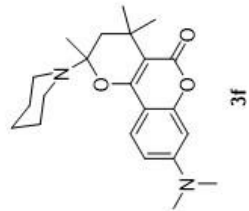
NAME          DYY-JM-099-C
EXPNO         1
PROCNO        1
Date_         20180608
Time         17.42
INSTRUM       spect
PROBHD        5 mm PABEO BB/
PULPROG       zgpg30
TD            32768
SOLVENT
NS            256
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 sec
RG            205.92
DW            20.800 usec
DE            6.50 usec
TE            298.5 K
D1            2.0000000 sec
D11           0.0300000 sec
TD0           1
===== CHANNEL f1 =====
SFO1          100.6233329 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6127685 MHz
WDW           EM
SSB           0
LB            2.00 Hz
GB            0
PC            1.00

```

```

162.277
158.010
154.609
152.572
123.569
108.474
105.291
104.804
97.598
92.121
46.890
45.287
40.185
30.216
28.805
26.953
25.932
24.887
18.921

```



```

NAME          DYY-JN-073
EXPNO         1
PROCNO        1
Date_         20180116
Time          10.38
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SMH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            101.51
DW            6.400 usec
DE            16.66 usec
TE            297.2 K
D1            2.00000000 sec
TD0           1

===== CHANNEL f1 =====
SF01          400.1324008 MHz
NUC1          1H
P1            13.30 usec
SI            16384
SF            400.1300066 MHz
WDW           EM
SSB           0
LB            0.00 Hz
GB            0
PC            1.00

```

```

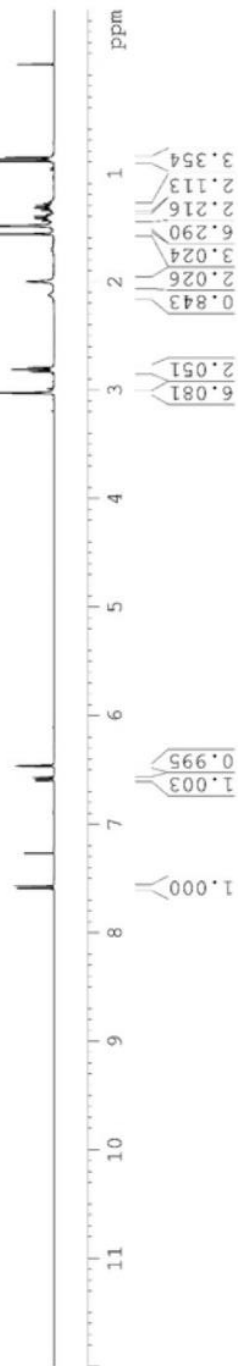
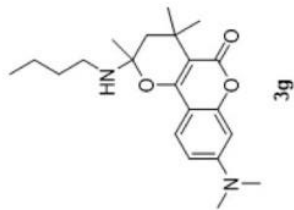
7.593
7.571
6.598
6.592
6.576
6.570
6.466
6.460

```

```

3.026
2.829
2.812
2.794
2.125
2.002
1.563
1.489
1.440
1.420
1.402
1.385
1.341
1.322
1.303
1.285
0.894
0.876
0.858

```



```

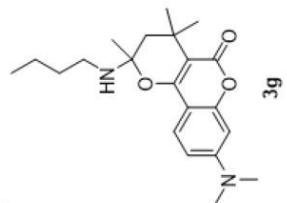
NAME          DIY-JM-073-C
EXPNO         1
PROCNO        1
Date_         20180616
Time          1.11
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            2000
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 sec
RG            205.92
DW            20.800 usec
DE            6.50 usec
TE            298.5 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
----- CHANNEL f1 -----
SFO1          100.6233329 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6127685 MHz
WDW           EM
SSB           0
LB            2.00 Hz
GB            0
FC            1.00

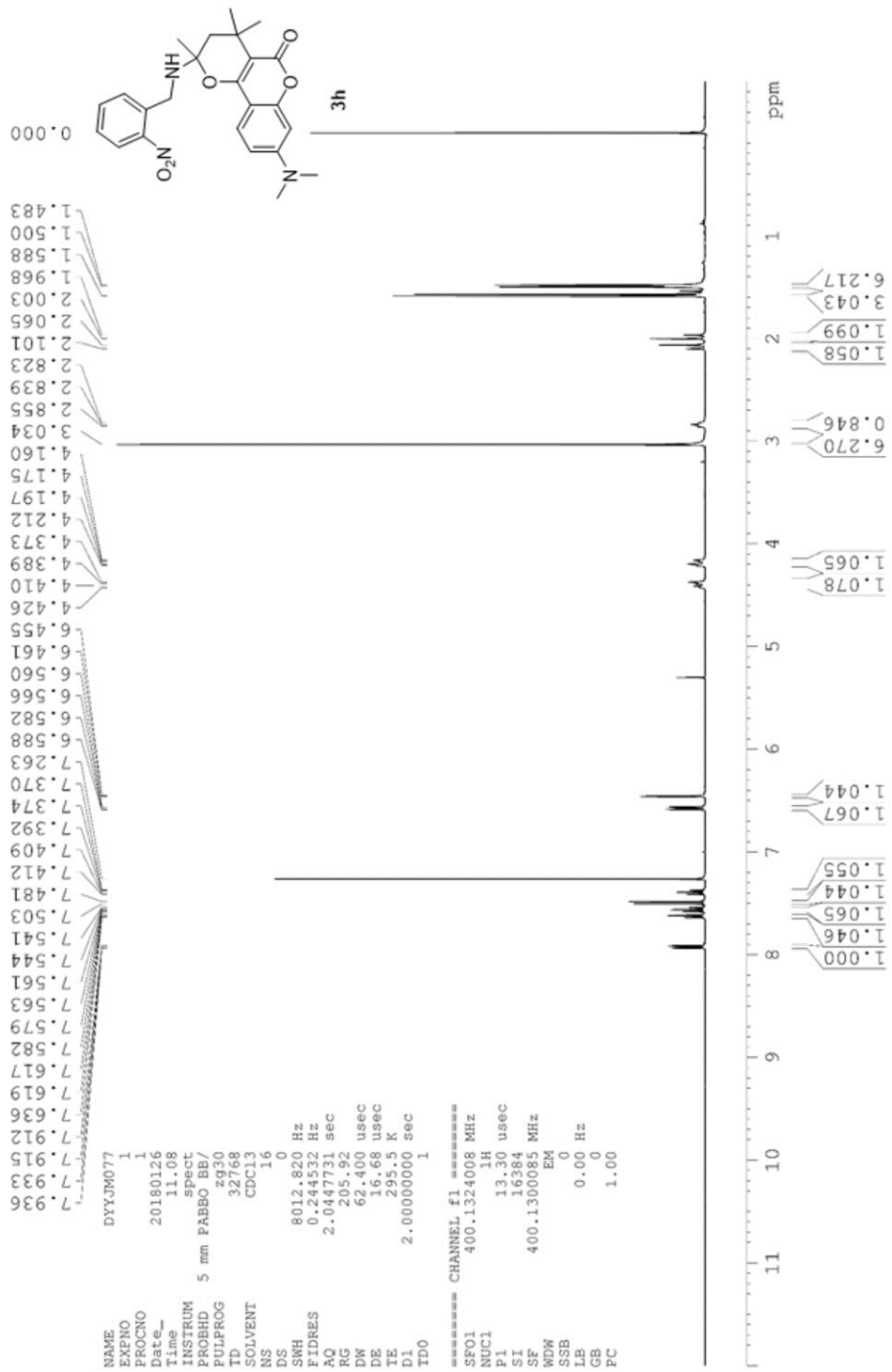
```

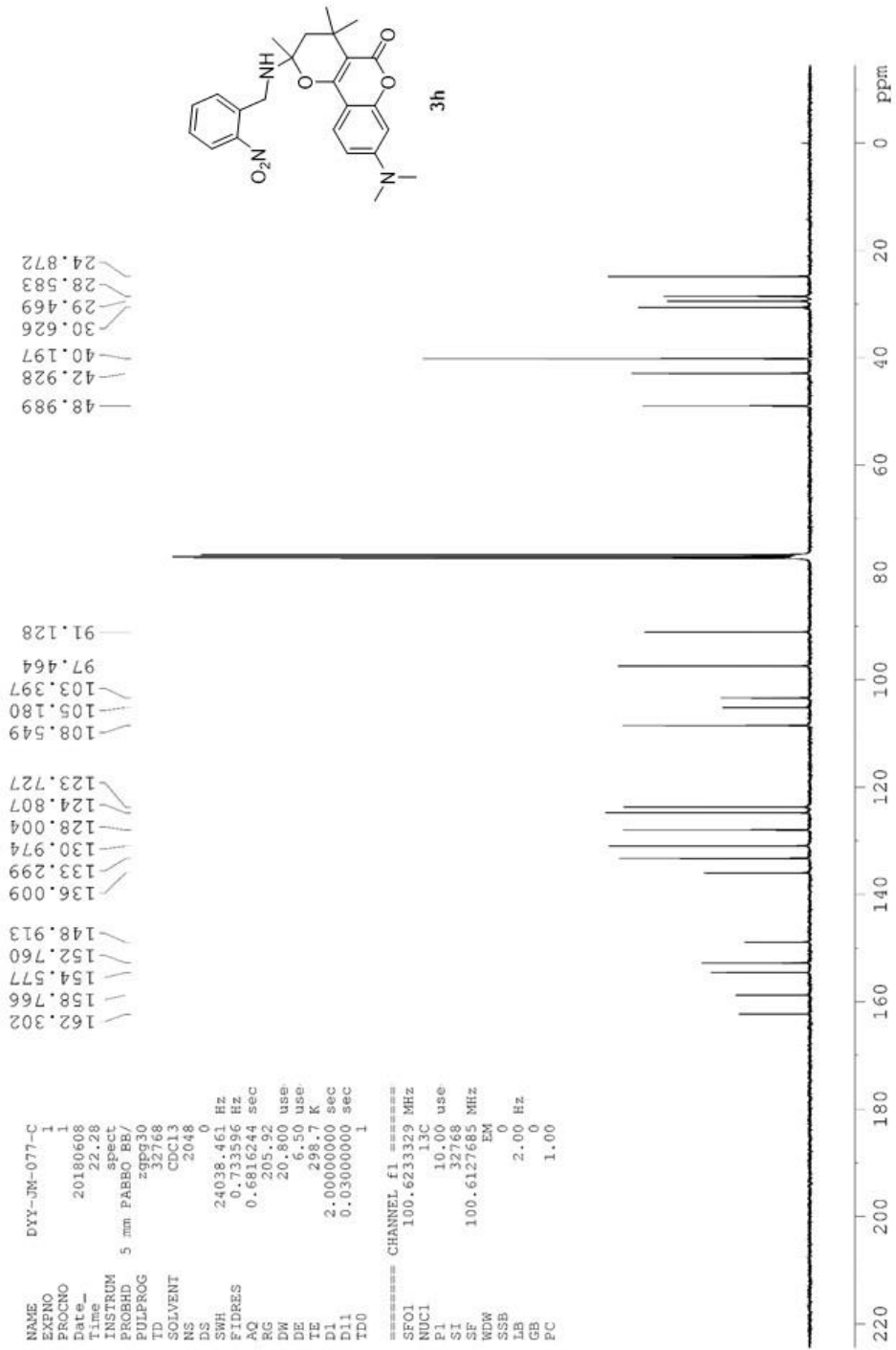
```

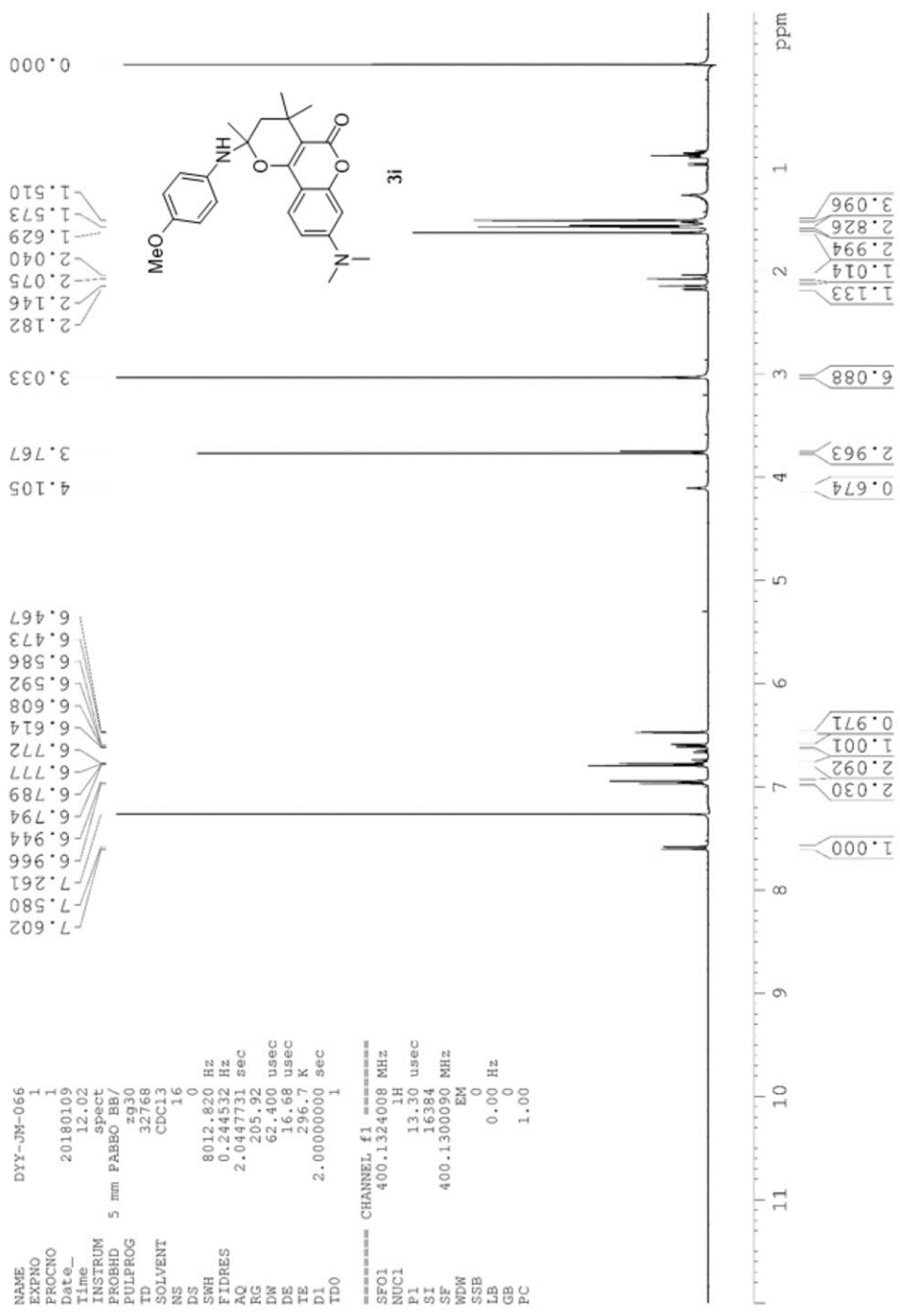
162.389 /
159.117 /
154.579 /
152.690 /
123.748 /
108.469 /
105.397 /
103.239 /
97.413 /
91.781 /
49.152 /
40.850 /
40.141 /
32.670 /
30.598 /
29.058 /
24.810 /
20.308 /
13.851 /

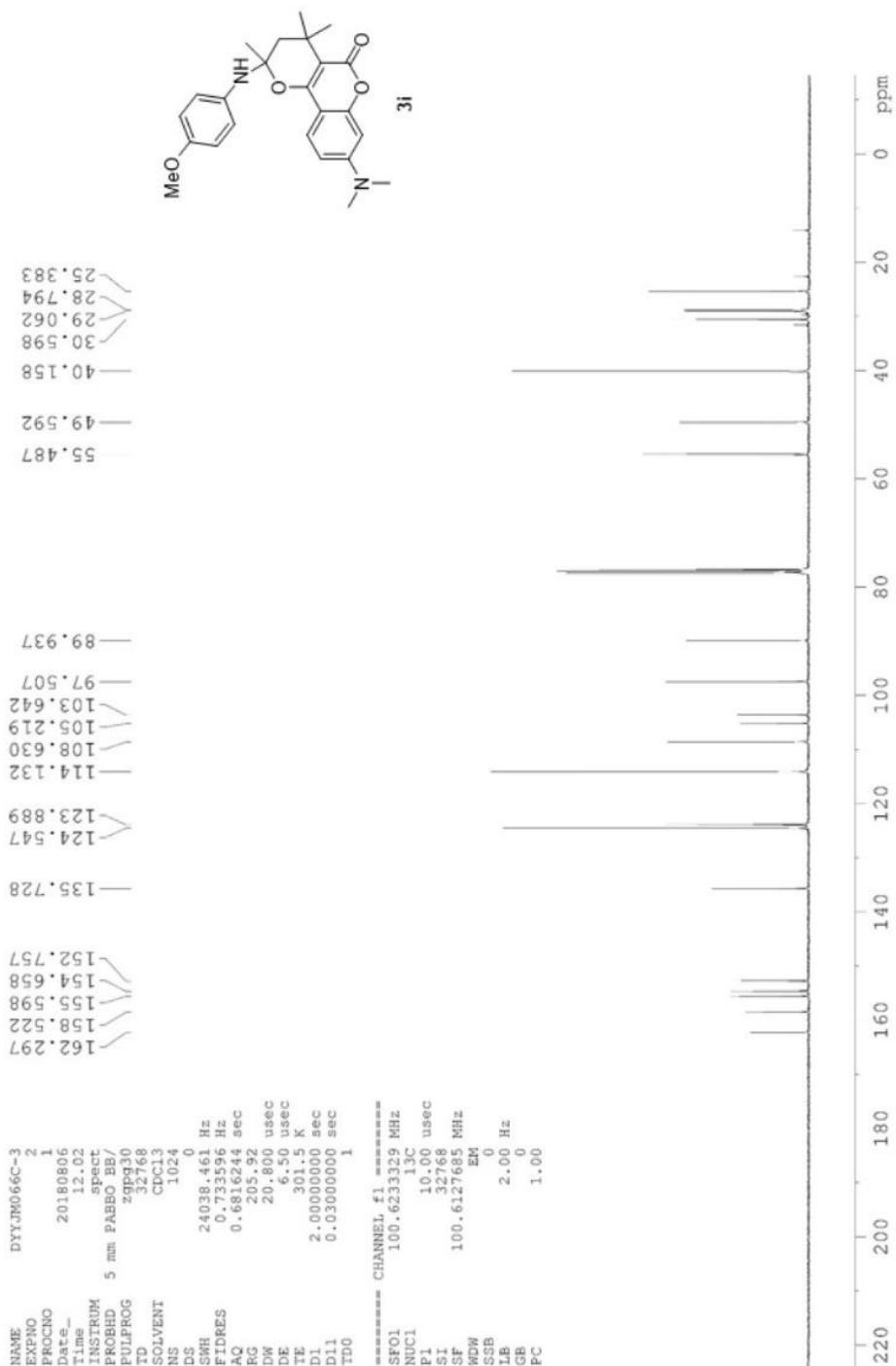
```

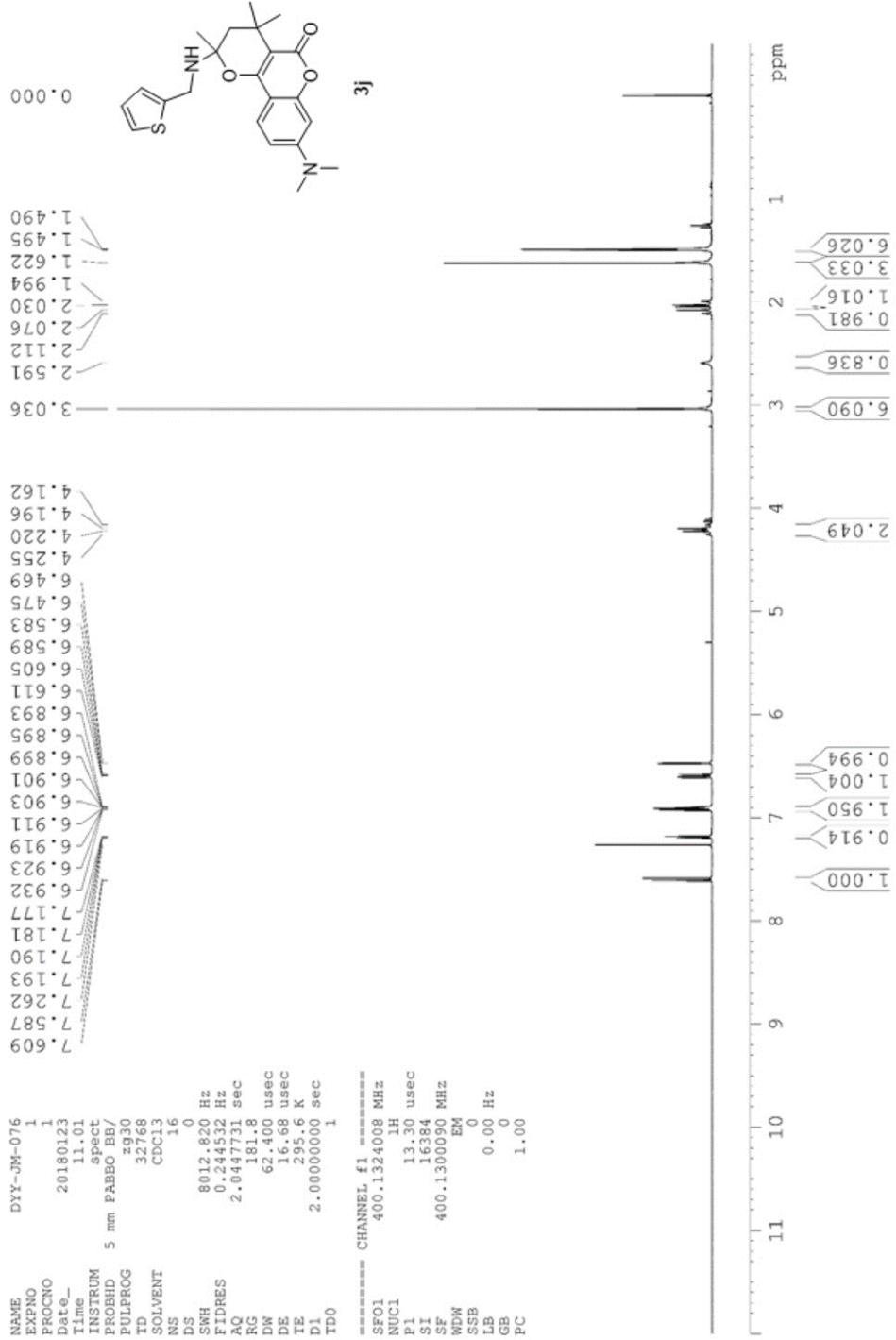


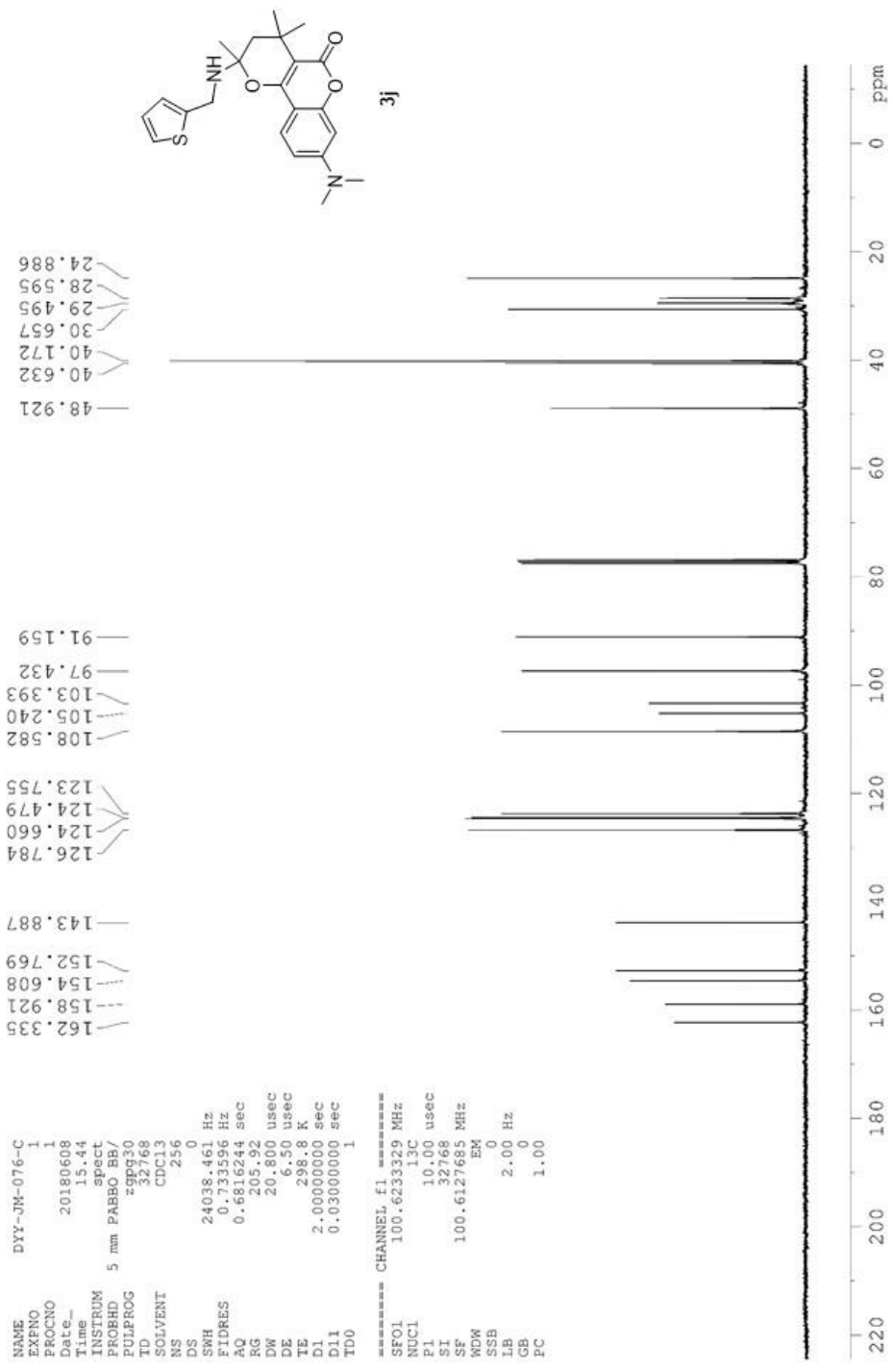


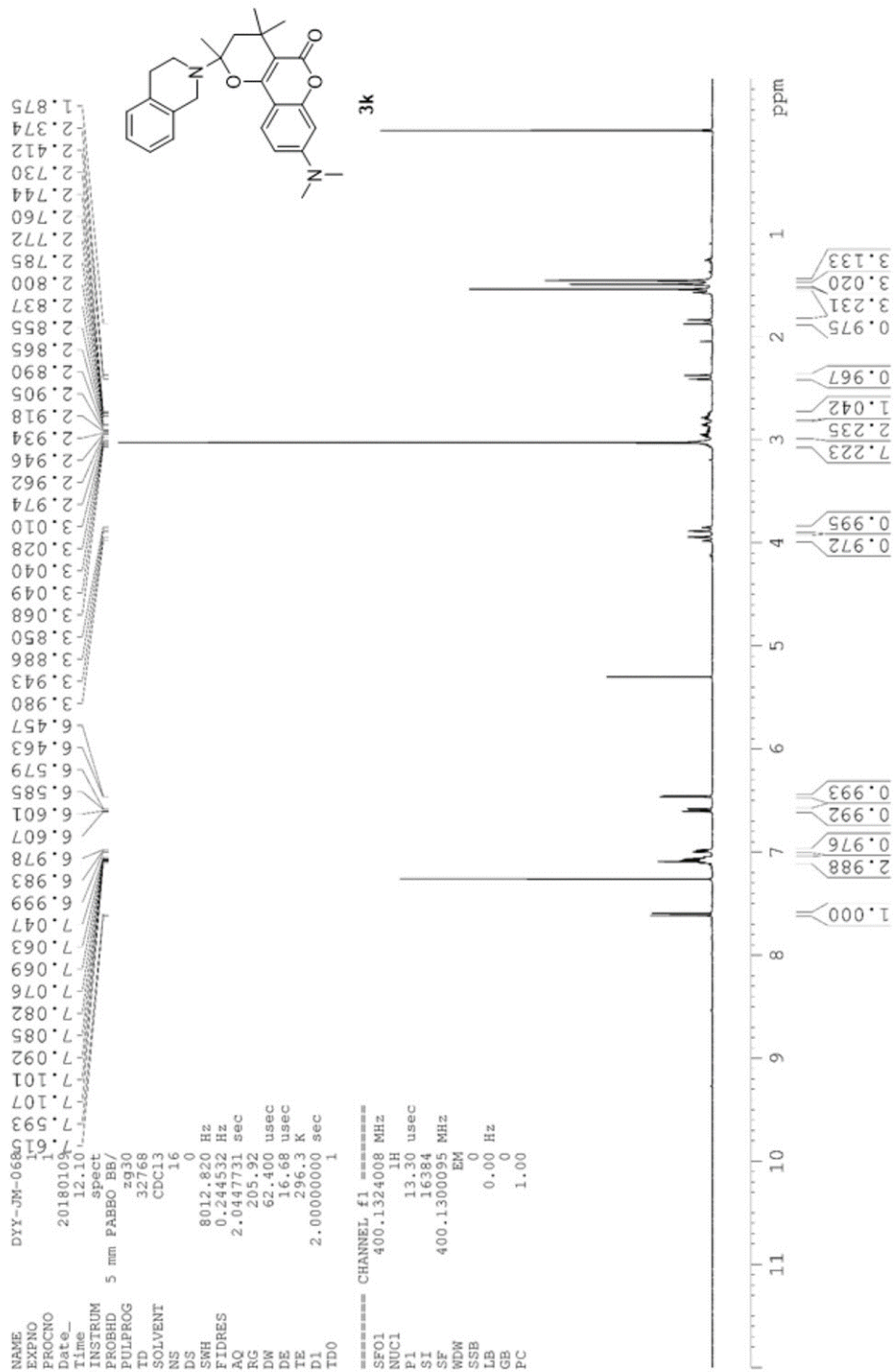












```

NAME          DYY-JM-068-C
EXPNO         1
PROCNO        1
Date_         20180608
Time         15.13
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            256
DS            0
SSB           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.681824 sec
RG            205.92
DW            20.800 usec
DE            6.50 usec
TE            298.3 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

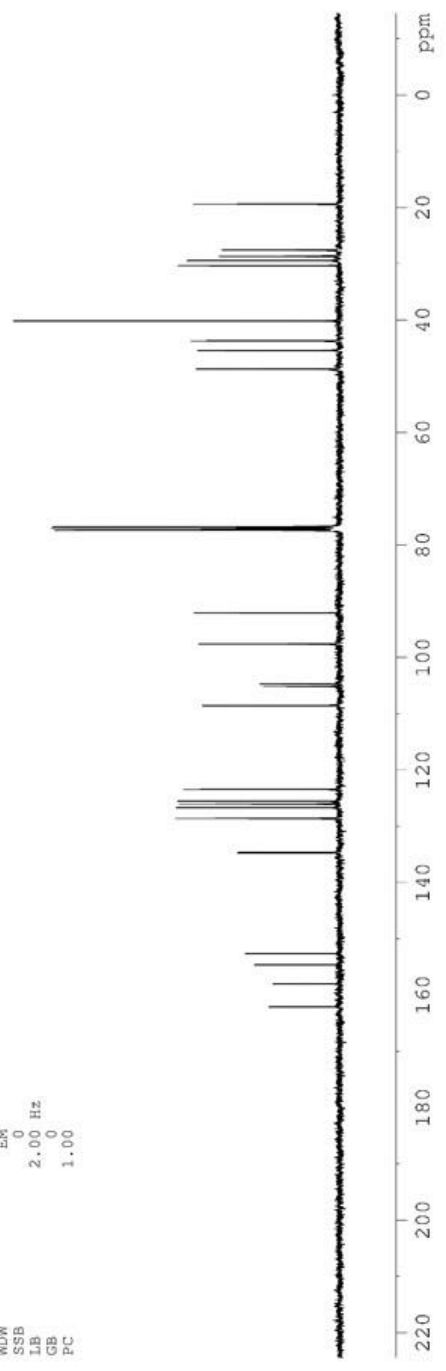
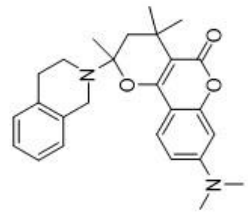
===== CHANNEL f1 =====
SFO1          100.6233329 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6127685 MHz
WDW           EM
SSB           0
LB            2.00 Hz
GB            0
PC            1.00

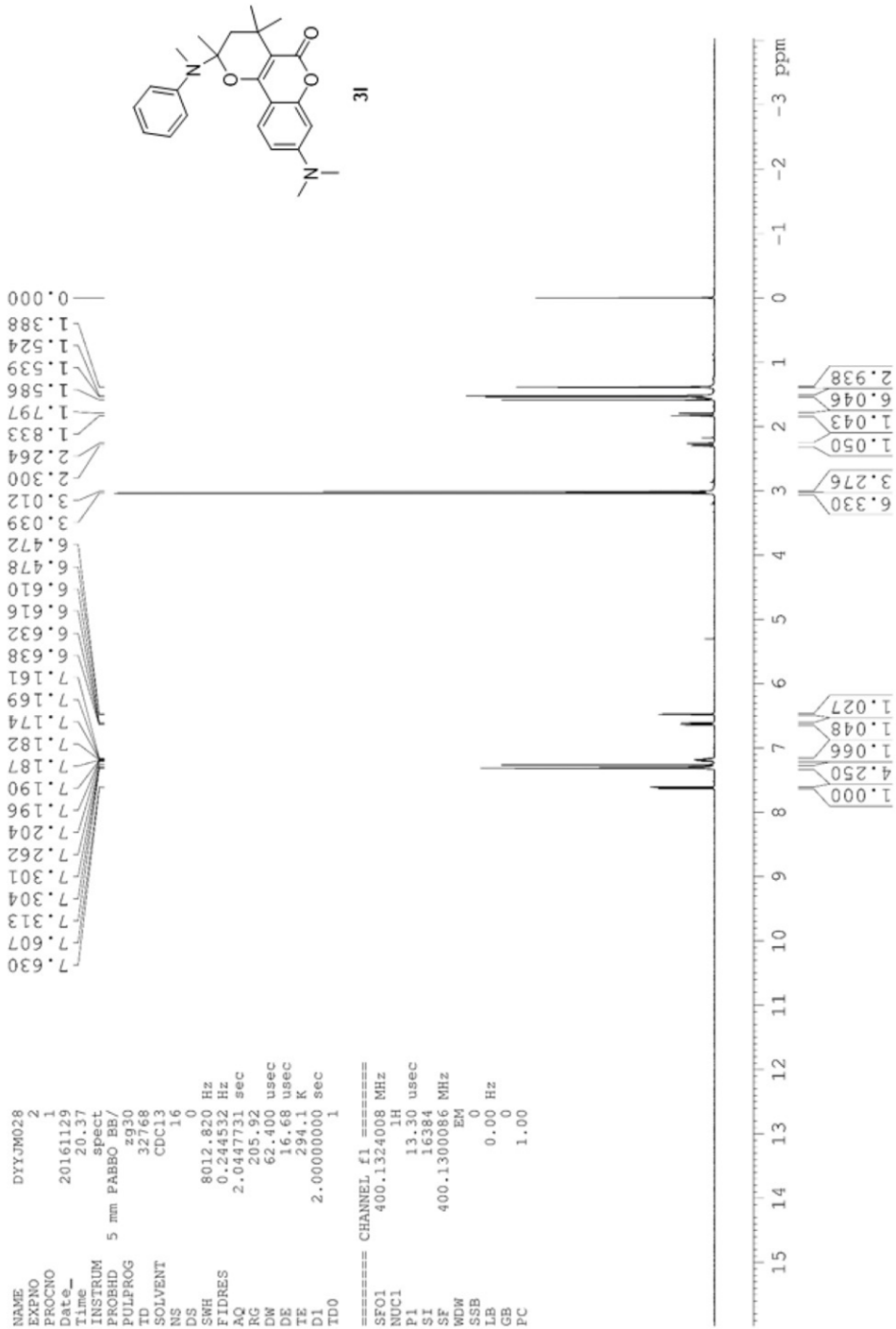
```

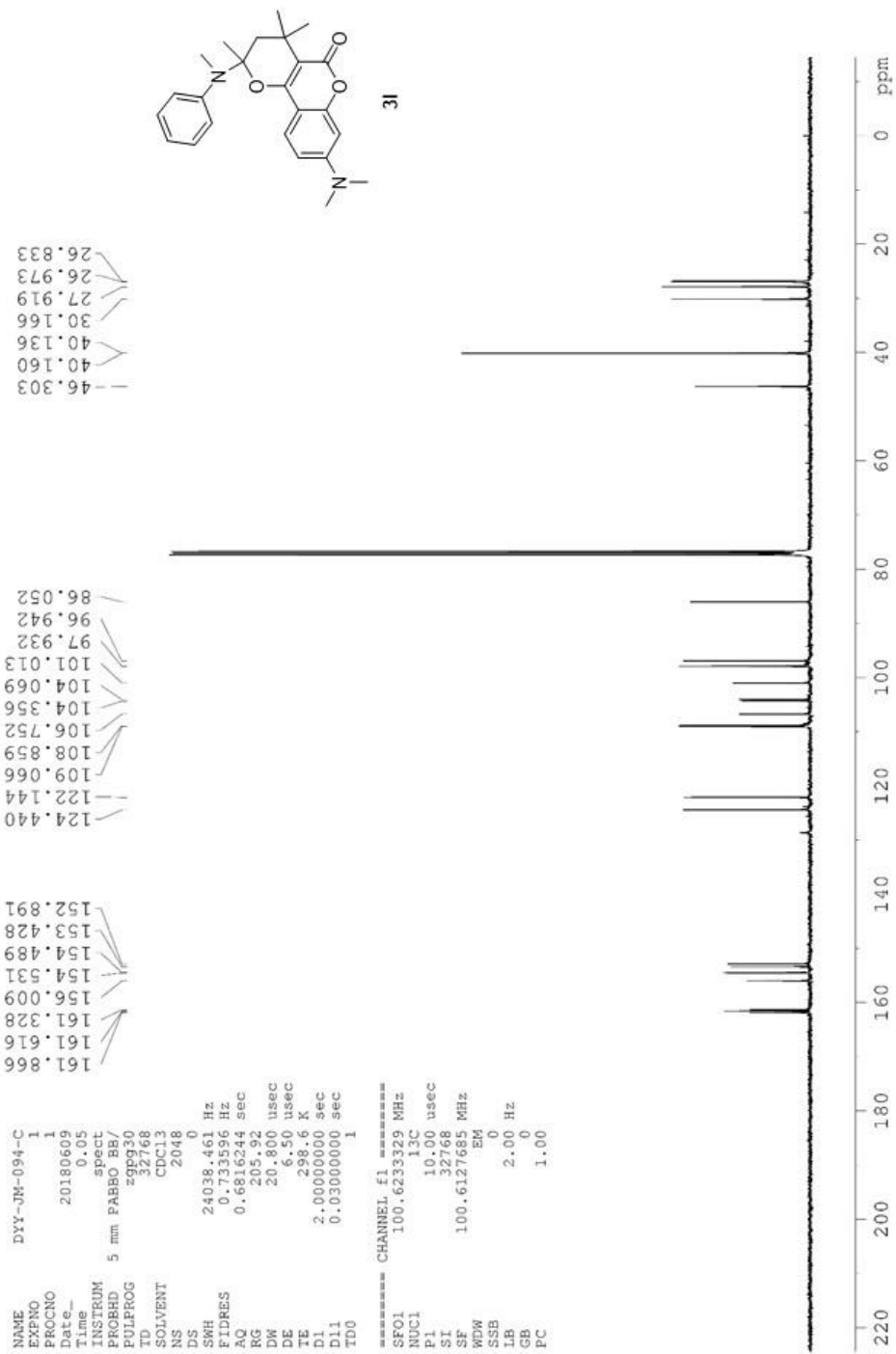
```

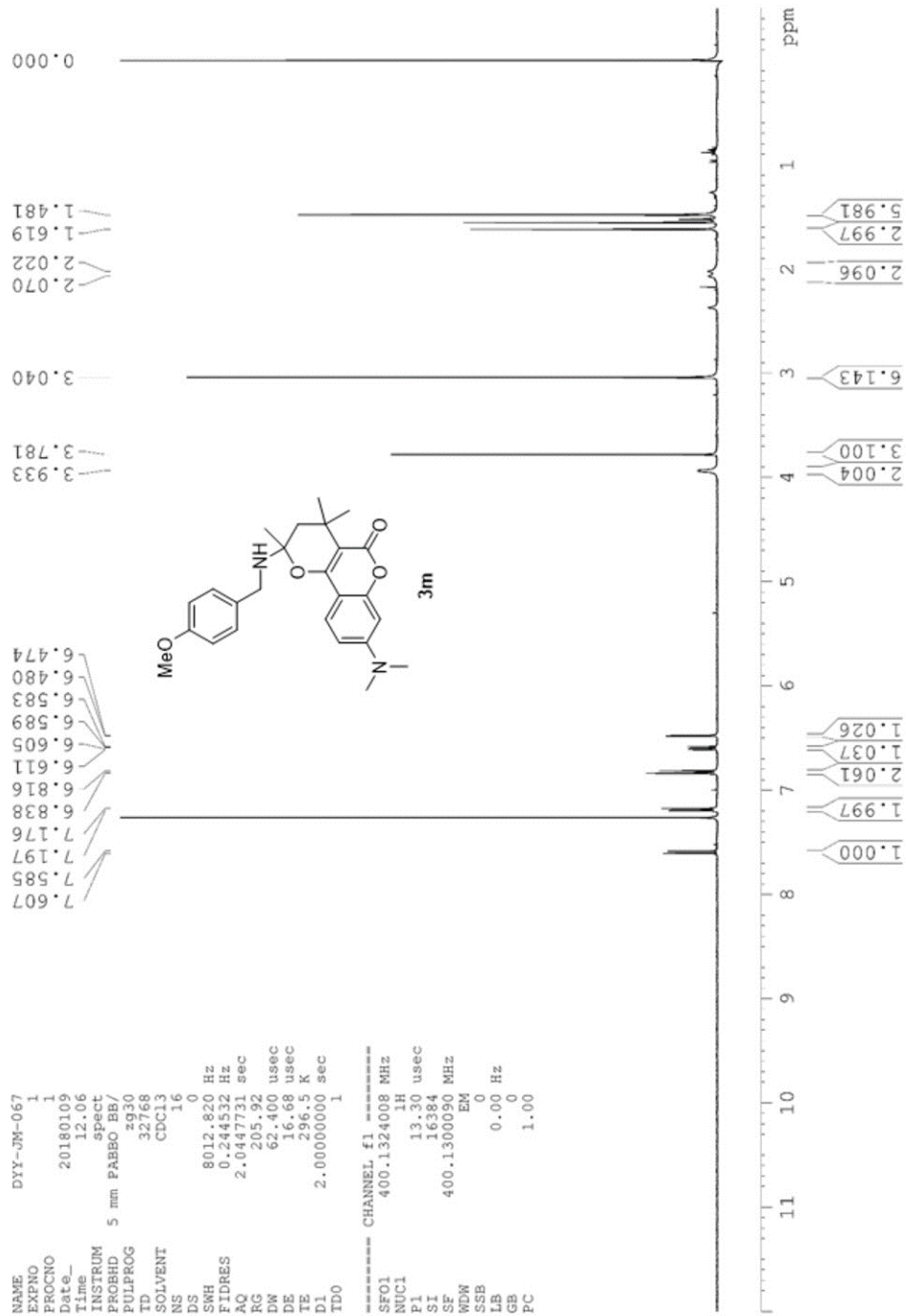
162.132
158.029
154.628
152.653
134.747
134.632
128.626
126.709
126.059
125.543
123.458
108.558
105.141
104.699
97.628
92.076
48.755
45.436
43.736
40.199
30.354
29.449
28.696
27.606
19.429

```









```

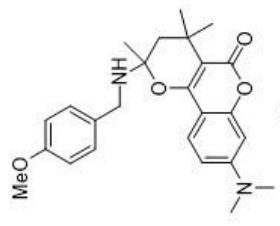
NAME          DYY-JM-067-C
EXPNO         1
PROCNO        1
Date_         20180608
Time         20.51
INSTRUM       spect
PROBHD        5 mm PABEO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDC13
NS            2048
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 se
RG            205.92
DM            20.800 us
DE            5.50 us
TE            296.8 K
D1            2.0000000 se
D11           0.03000000 se
TD0           1
===== CHANNEL f1 =====
SF01          100.6233329 MH
NUC1          13C
P1            10.00 us
SI            32768
SF            100.6127685 MH
WDW           EM
SSB           0
LB            2.00 Hz
GB            0
PC            1.00

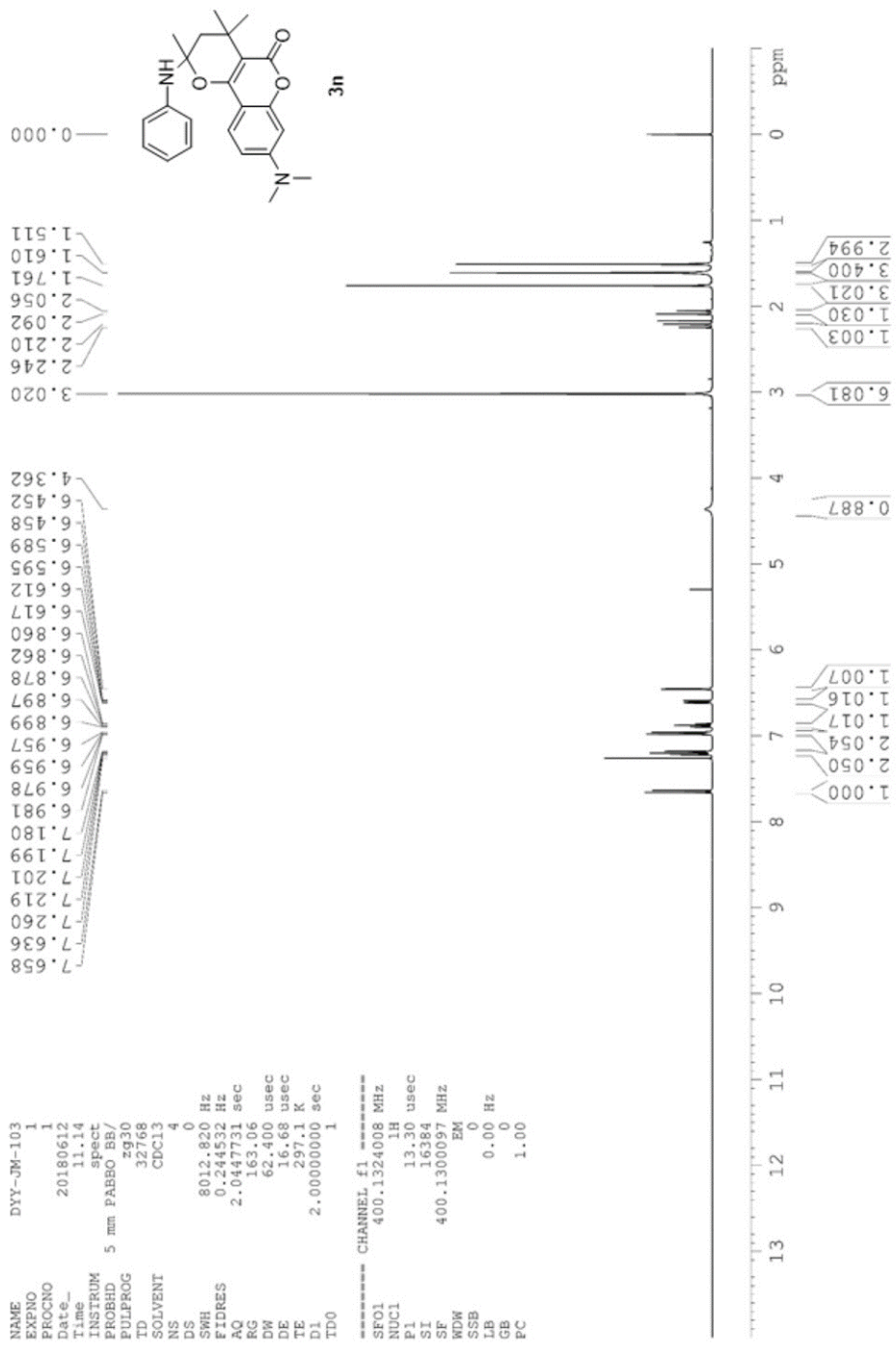
```

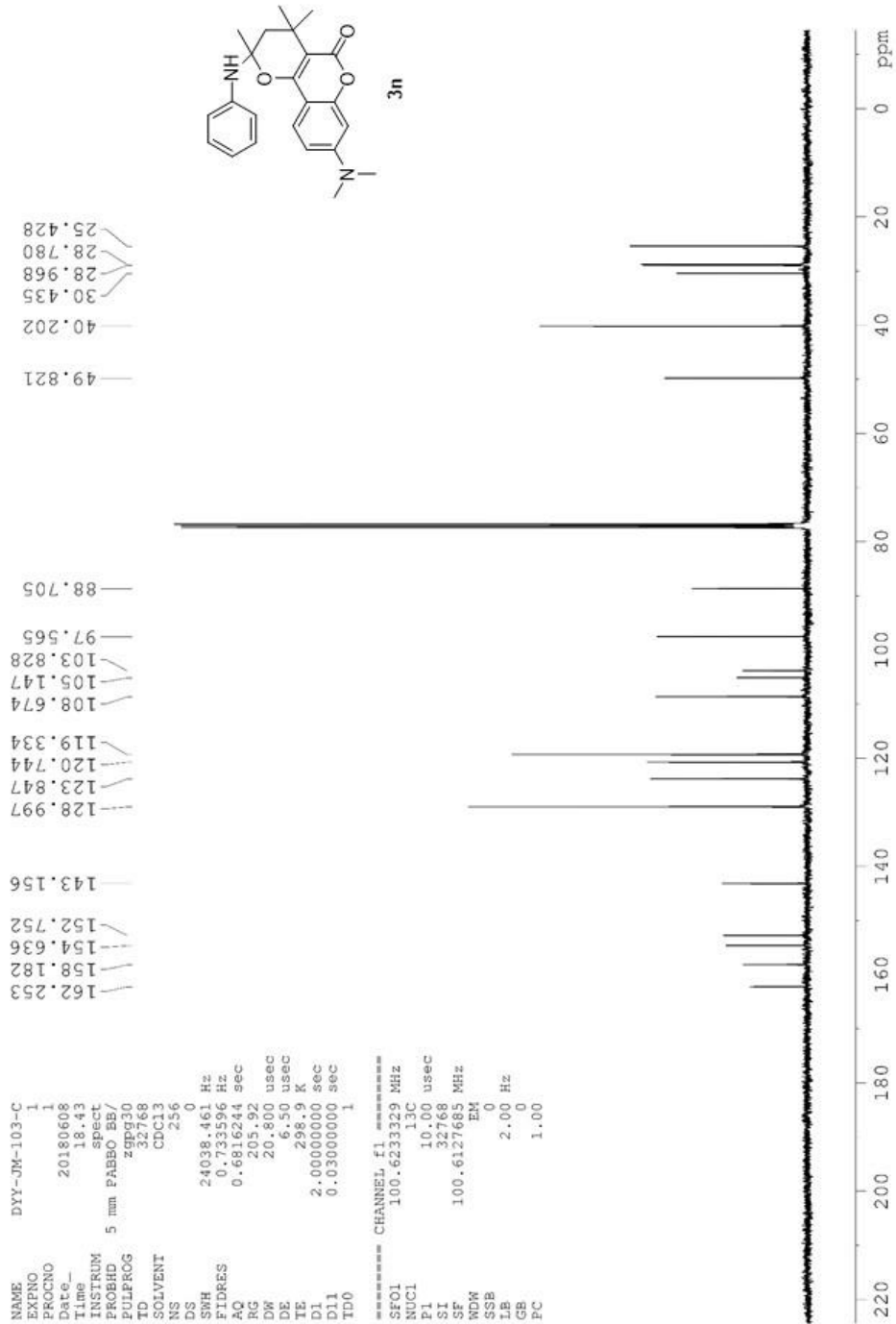
```

162.387
159.017
158.729
154.632
152.757
132.238
129.136
123.744
113.982
108.526
105.395
103.460
97.536
91.553
55.270
49.105
45.140
40.206
30.677
29.511
28.645
24.984

```



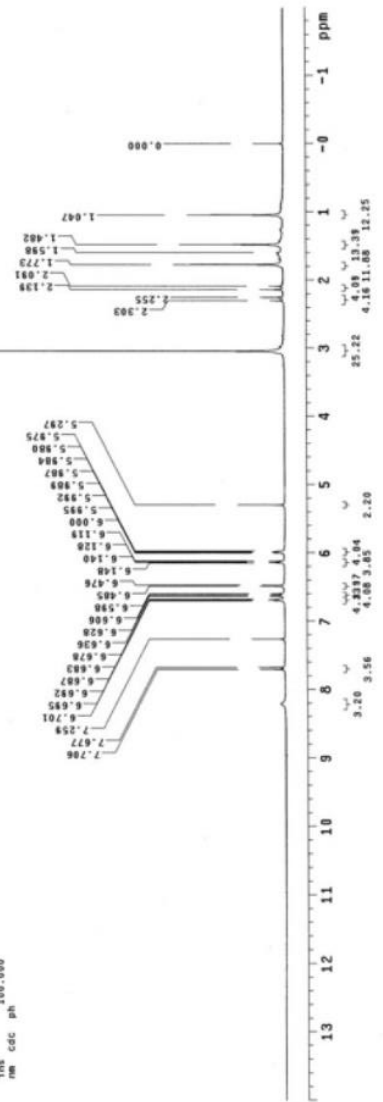
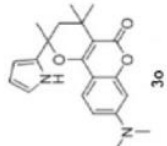




```

DVTYJ855C
exp1 5121N
date       Jul 4 2013   dfrq   DEC. & VT   300.085
solvent    CDCl3        dn      M1
F1         ACQUISITION  exp   J8
F2         300.085      dm      mmn
F3         3.413        daw      200
AT         327.08      discq   1.0
PB         48200        homo    n
BU         58          vst116  PROCESSING n
pawr      5.5         proc    ft
d1        2.000        r'n     65538
nt        20318       math    f
Clock     18         werr
gain      not used   wbp
flms      not used   wnt
ll        n
ln        n
nl        n
nt        DISPLAY   m
up        288.8
vc        48000.8
vc        69000.8
lc        200
h2mm     18.20
f2        588.0
f3        588.0
rff       0
th        100.000
nm        CDC pH

```



```

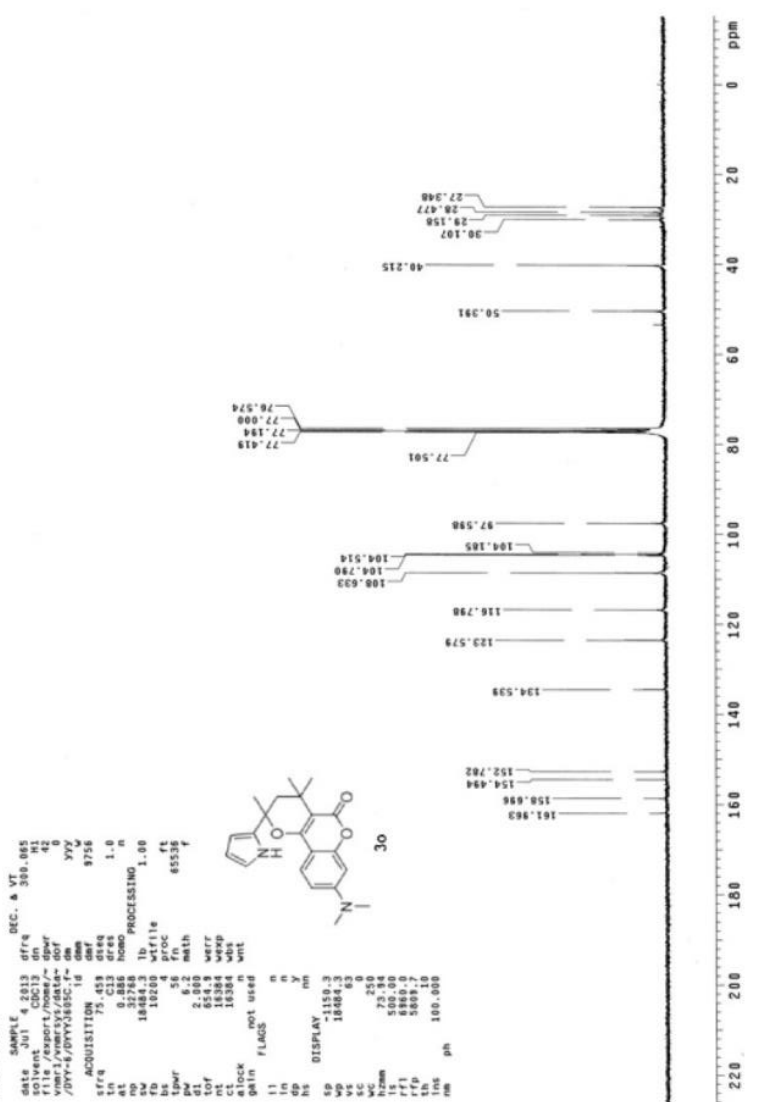
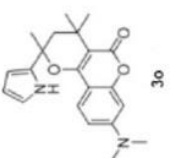
DVTYJ685C
exp2 51613C
SAMPLE
  date      Jul 4 2013   dfrq
  time      10:46:33    hz
  f1 file   /export/home/~gpcw
  vnmr1/vnrcs/data/007
  /DVTYJ685C-18
  q         9756
  acq       75.438     def
  AT       0.385       n
  PV       18281.3    lb
  FB       102200    wfile
  BK       58        proc
  PWR      5.2       math
  dl       2.000     warr
  nt       16594     wexp
  ctlock   16384     wst
  gain     not used
  ll       n
  ll       n
  ll       n
  SP       -1159.3    m
  W9       1640853   y
  W5       0
  W3       0
  W1       0
  WC       75.34
  W2       75.34
  W4       500.00
  W6       6868.7
  W7       50667.0
  W8       500010
  W9       100.000
  ms       pH

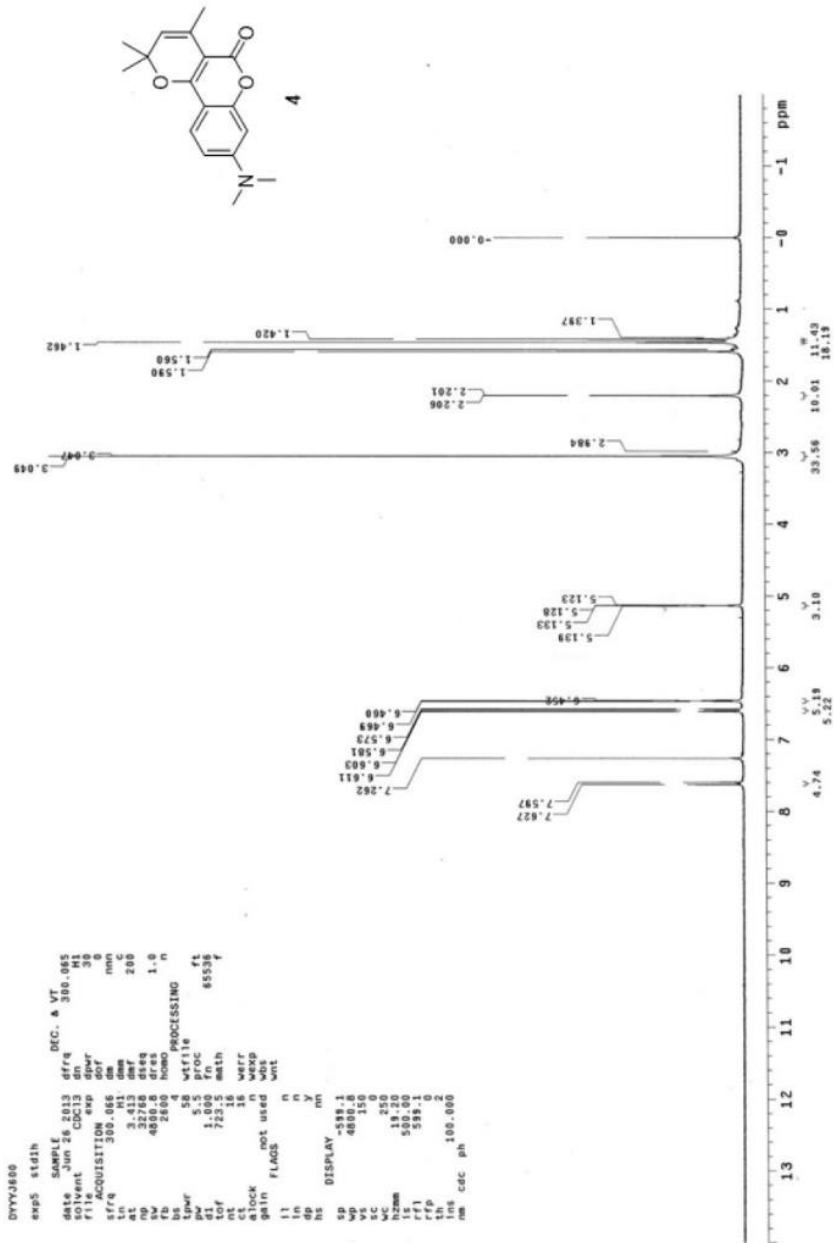
```

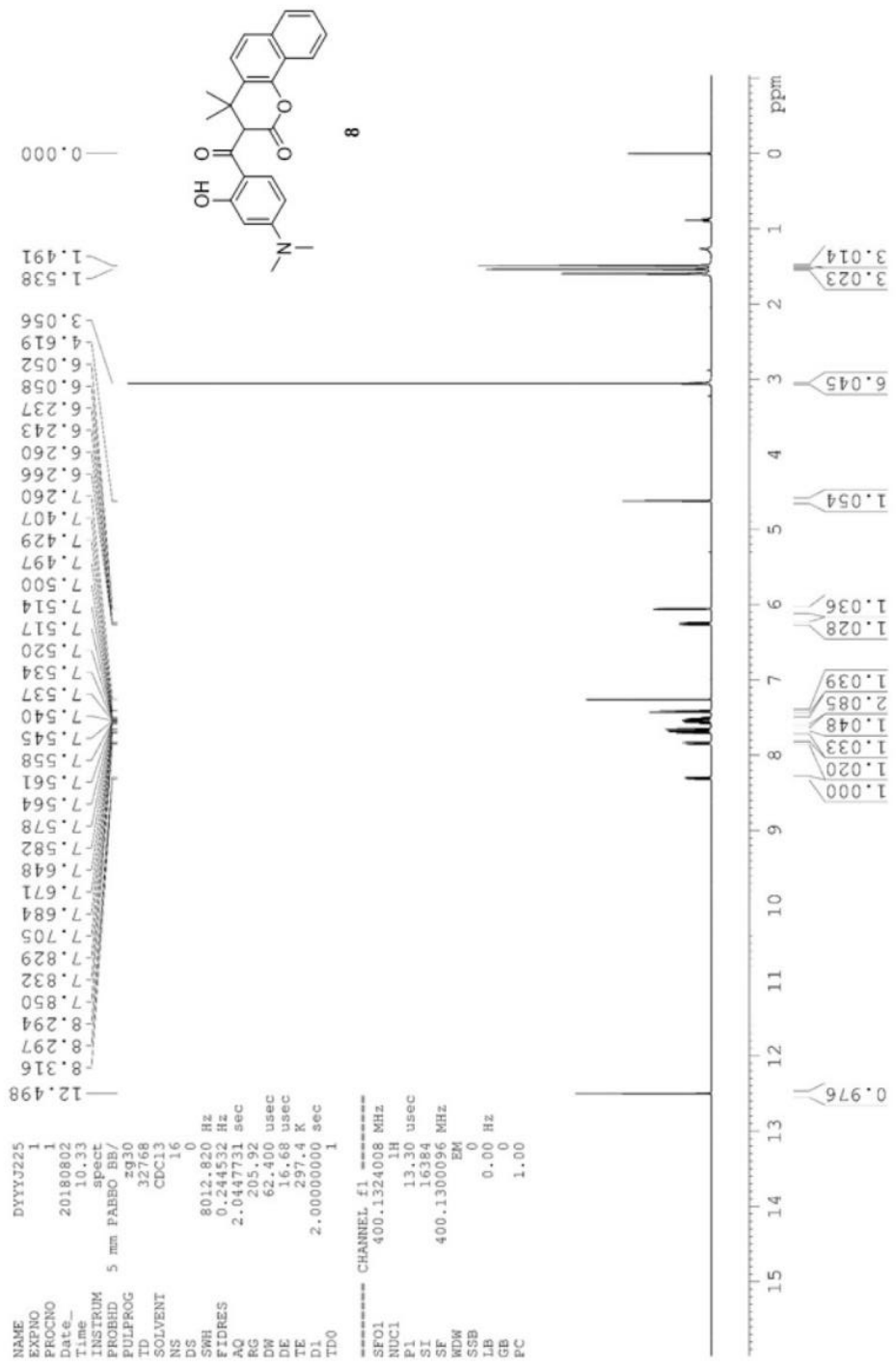
```

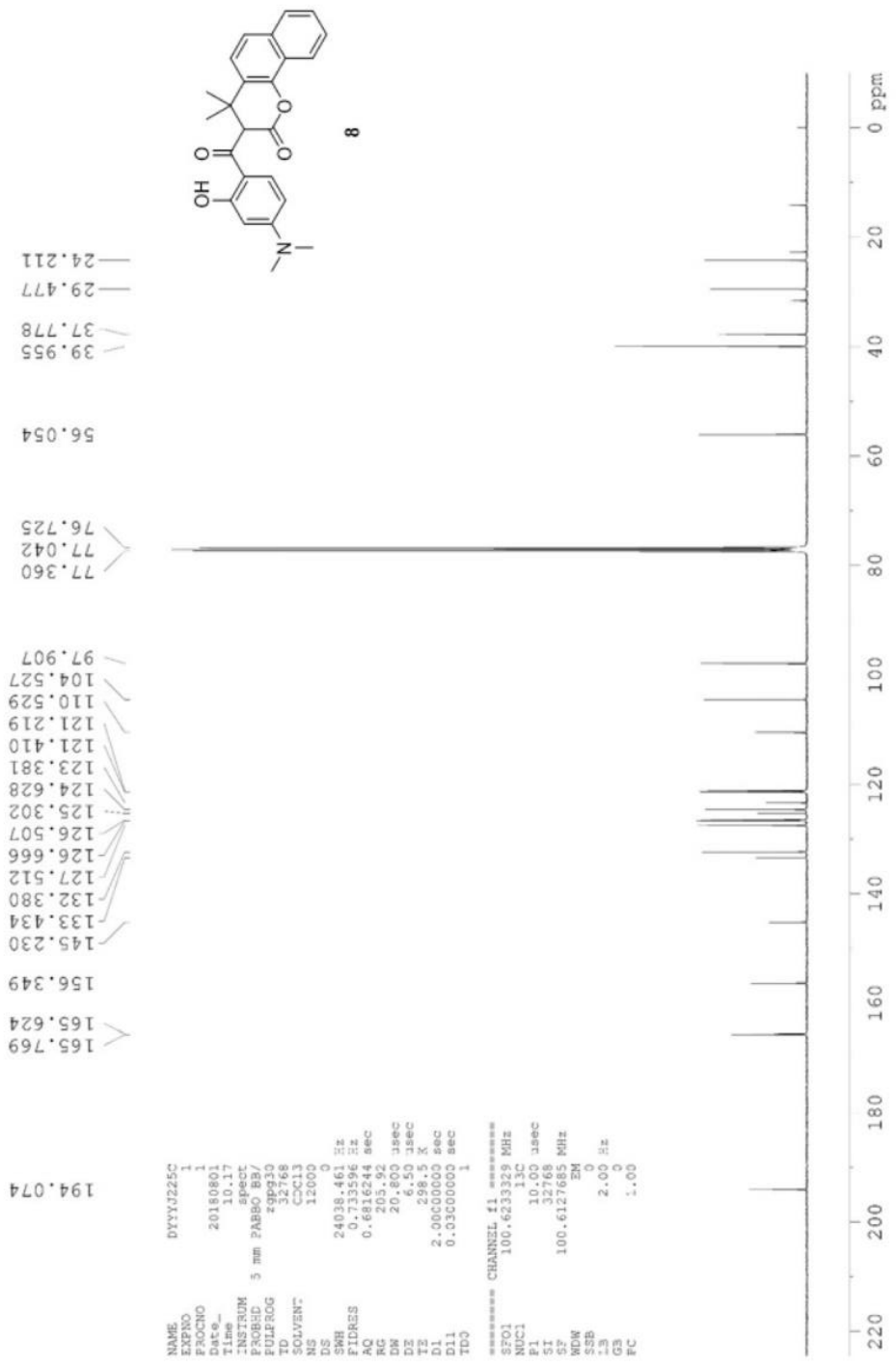
DEC. & VT
  42
  397
  9756
  1.0
  1.00
  wfile
  math
  warr
  wexp
  wst
  not used
  n
  n
  n
  m
  y
  0
  0
  75.34
  75.34
  500.00
  6868.7
  50667.0
  500010
  100.000
  pH

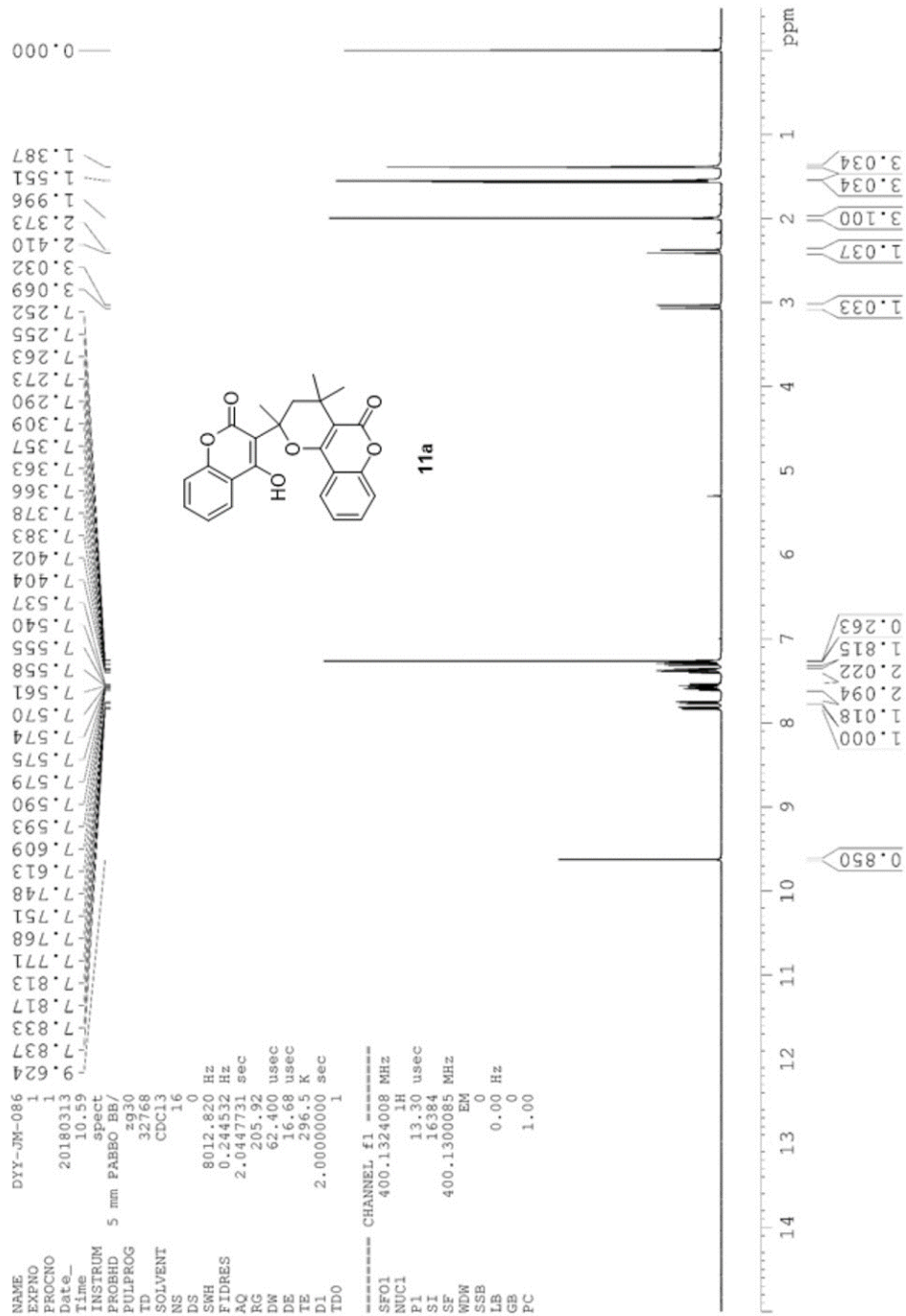
```

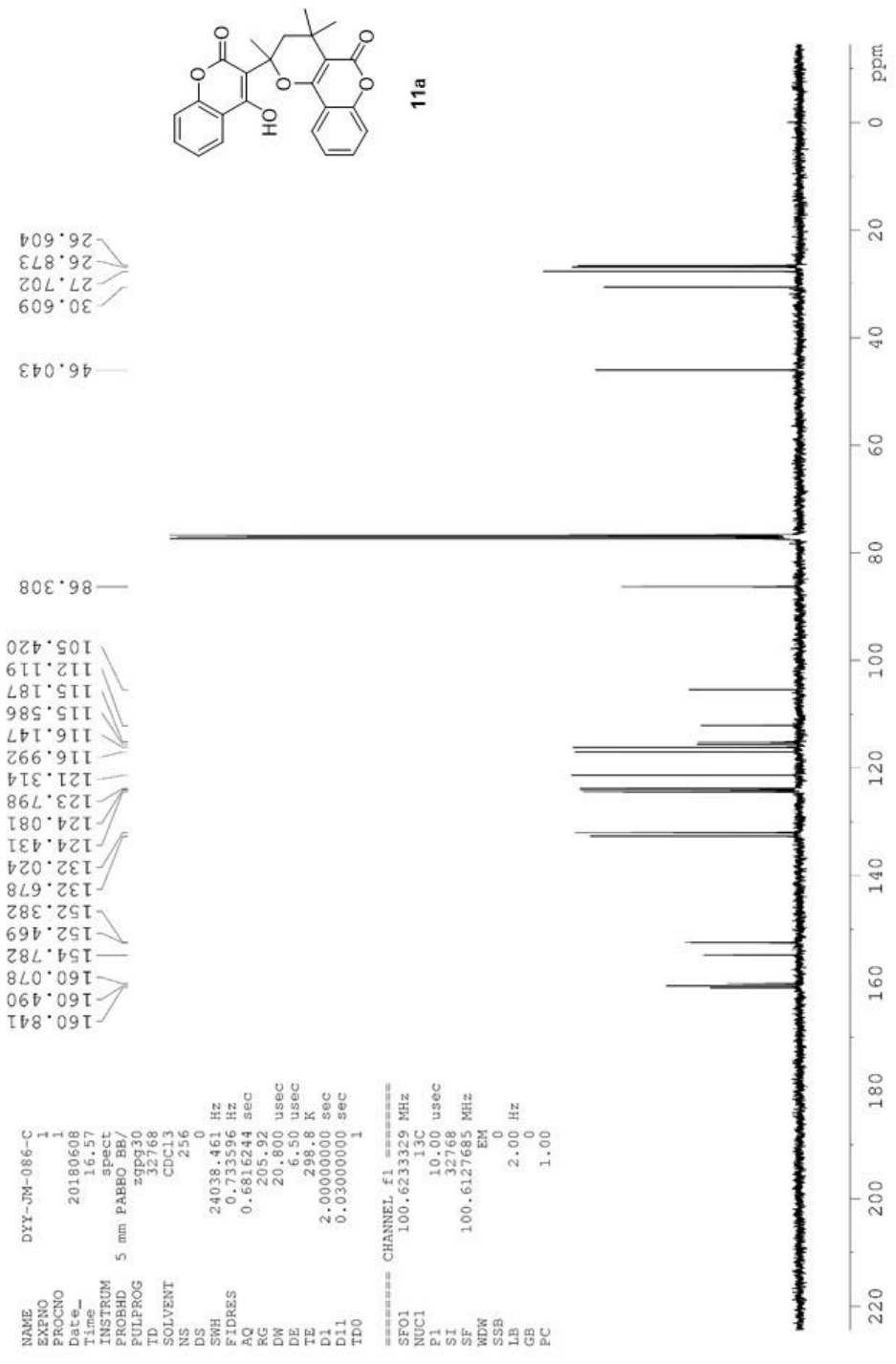


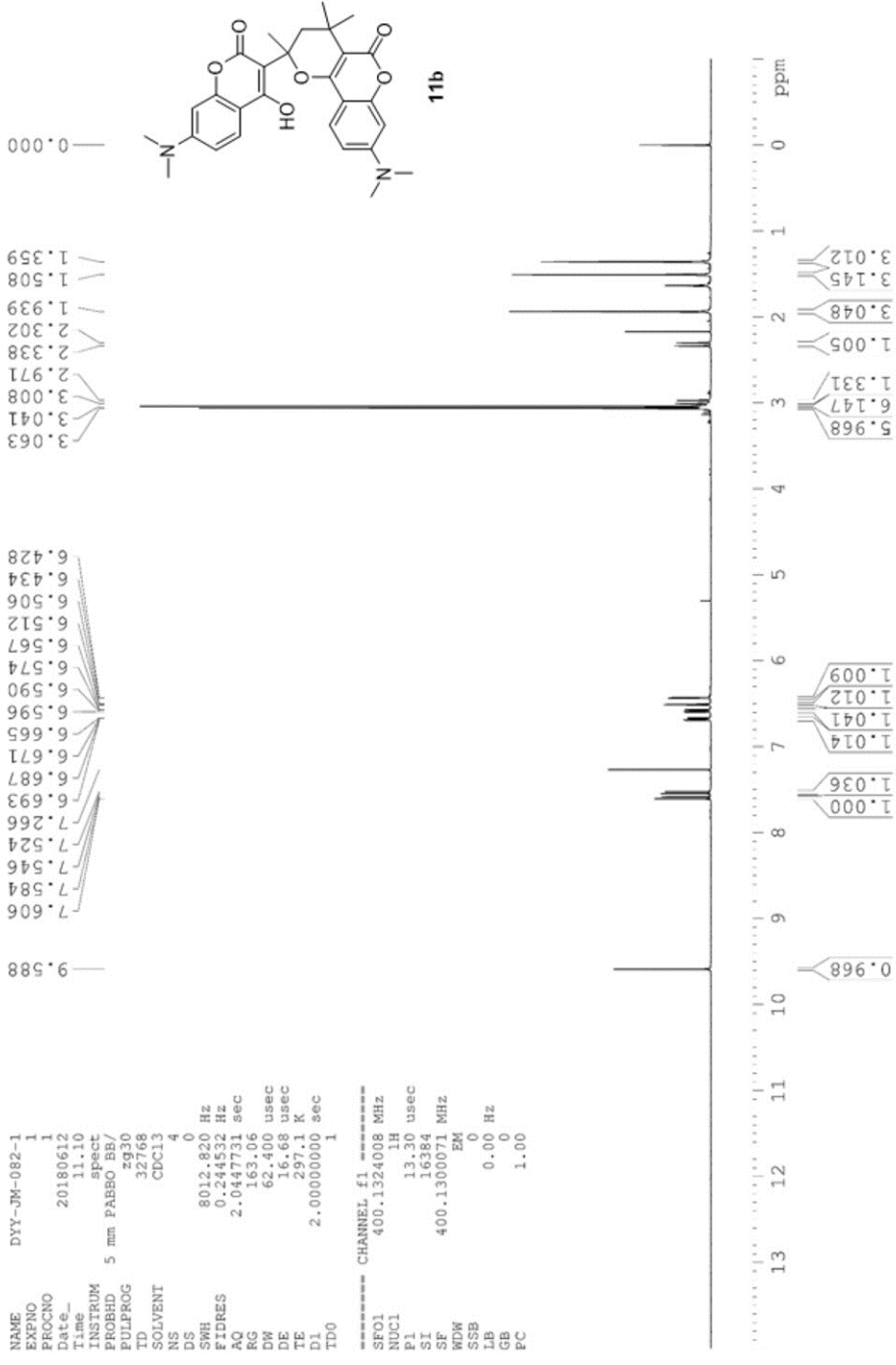




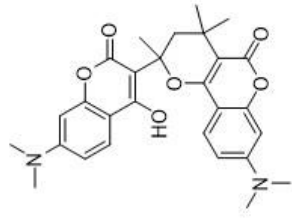




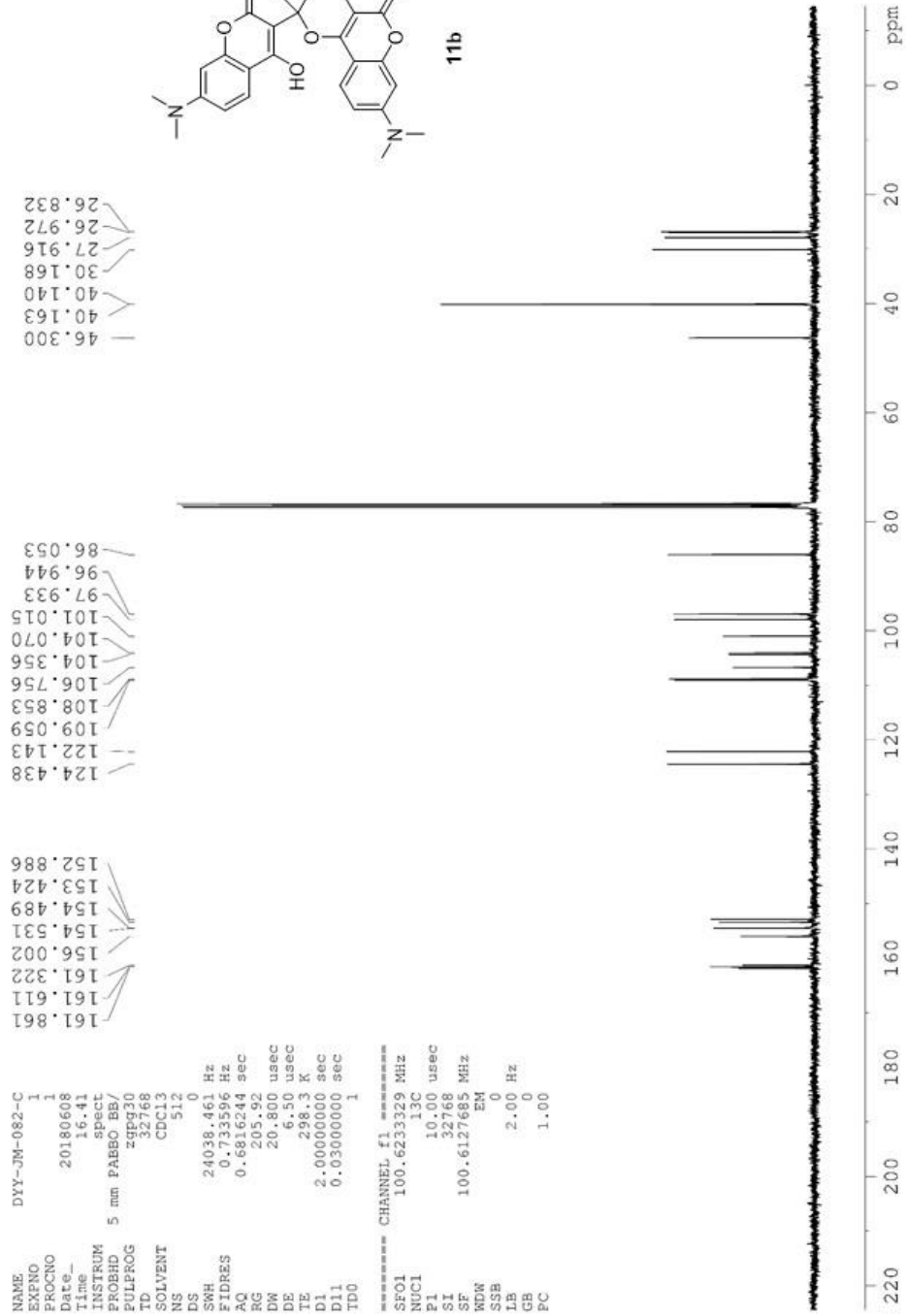




NAME DYX-JM-082-C
 EXPNO 1
 PROCNO 1
 Date_ 20180608
 Time 16.41
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT CDCl3
 NS 512
 DS 0
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AC 0.6816244 sec
 RG 205.92
 DW 20.800 usec
 DE 6.50 usec
 TE 298.3 K
 D1 2.0000000 sec
 D11 0.03000000 sec
 TDD 1



===== CHANNEL f1 =====
 SFO1 100.6233329 MHz
 NUC1 13C
 P1 10.00 usec
 S1 32768
 SF 100.6127685 MHz
 EM
 NDW 0
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.00



```

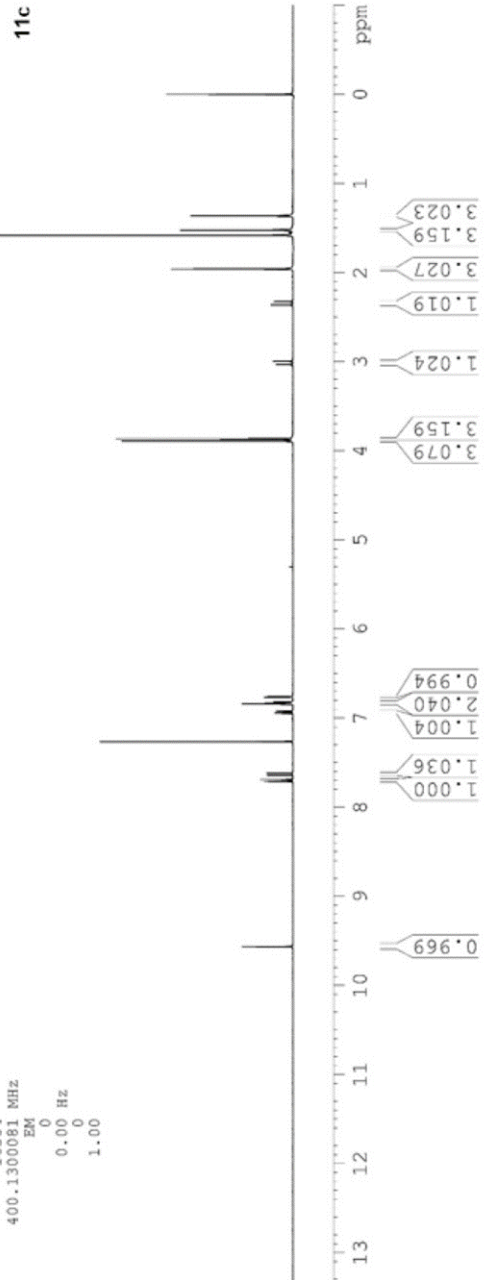
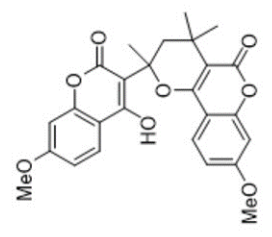
NAME          DYY-JM-101
EXPNO         1
PROCNO        1
Date_         20180605
Time_        11.54
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            205.92
DW            62.400 usec
DE            16.68 usec
TE            297.2 K
D1            2.00000000 sec
TD0           1
===== CHANNEL f1 =====
SFO1          400.1324008 MHz
NUC1          1H
P1            13.30 usec
SI            16384
SF            400.1300081 MHz
WDW           EM
SSB           0
LB            0.00 Hz
GB            0
PC            1.00

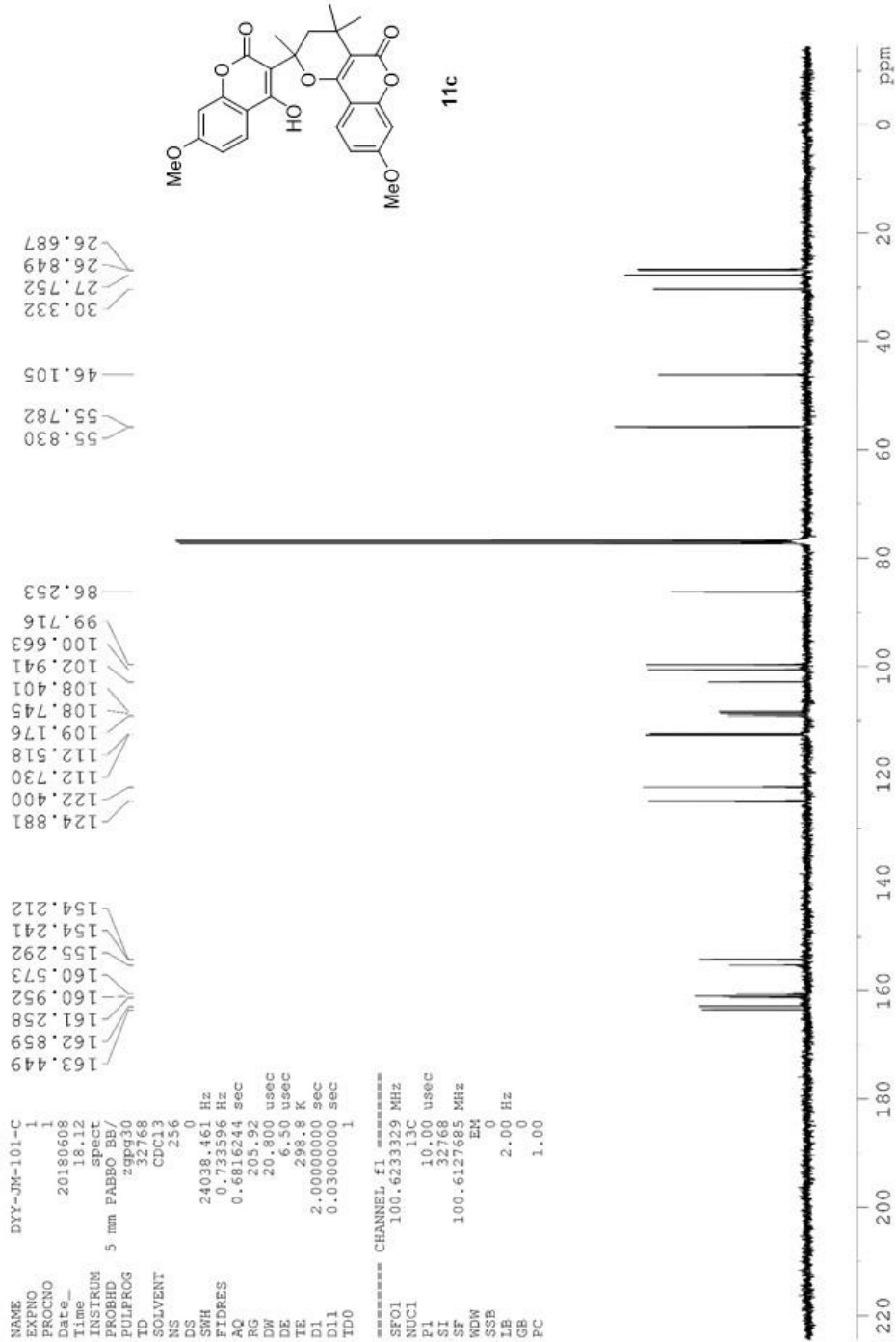
```

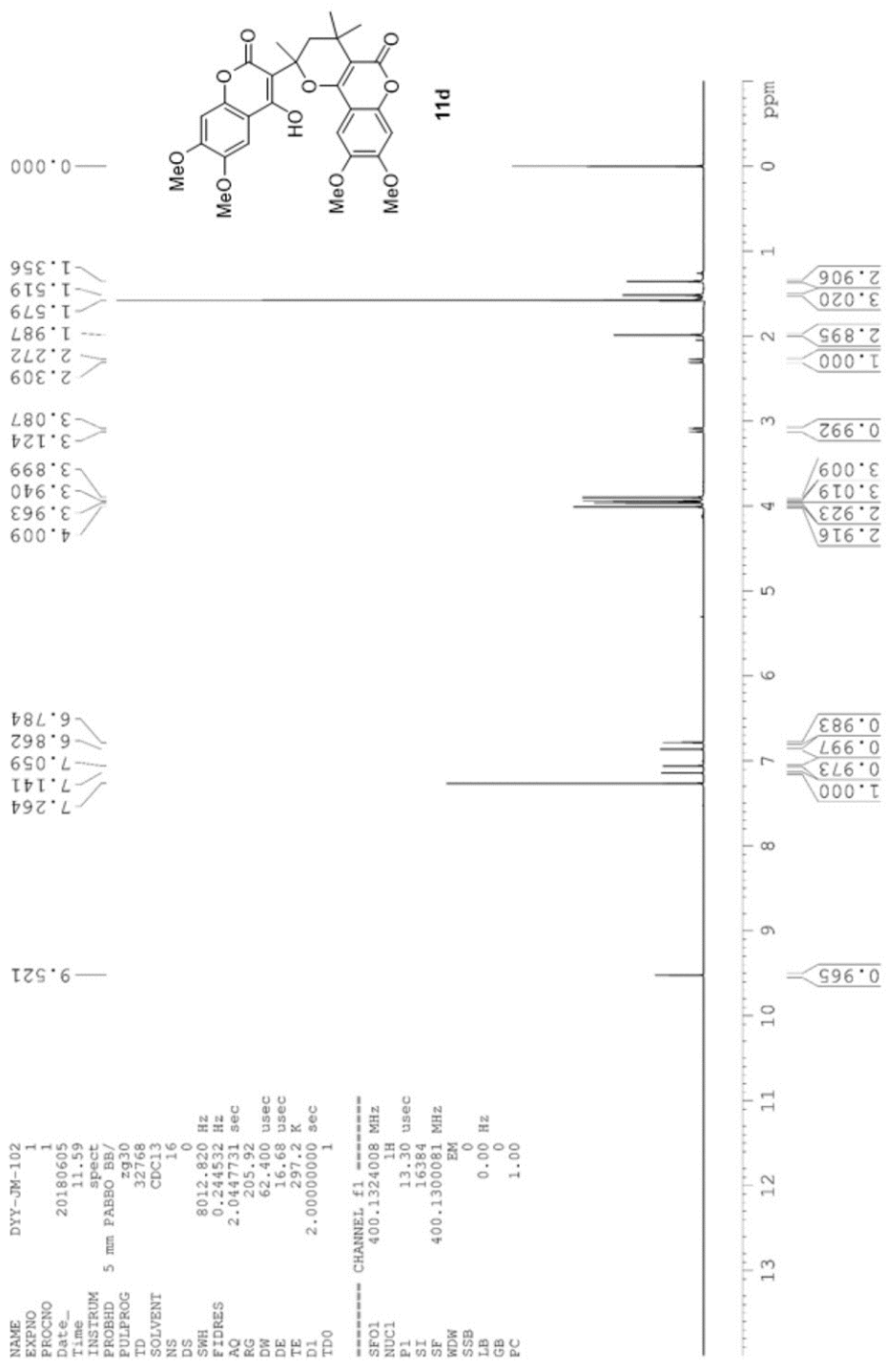
```

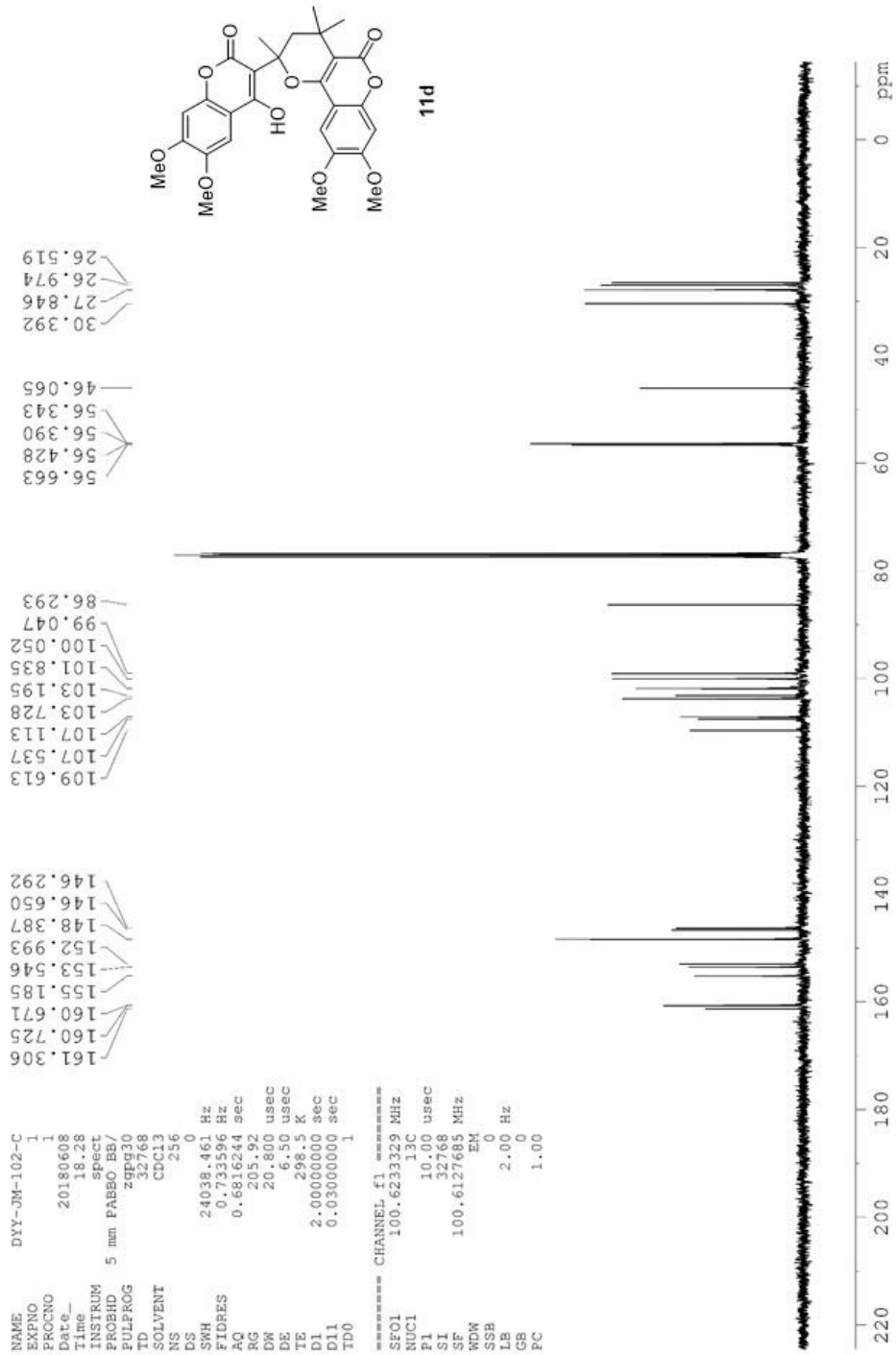
9.565
7.711
7.689
7.641
7.619
7.264
6.947
6.941
6.925
6.919
6.845
6.838
6.832
6.822
6.816
6.765
6.759
3.892
3.866
3.033
2.996
2.364
2.327
1.960
1.524
1.364
0.000

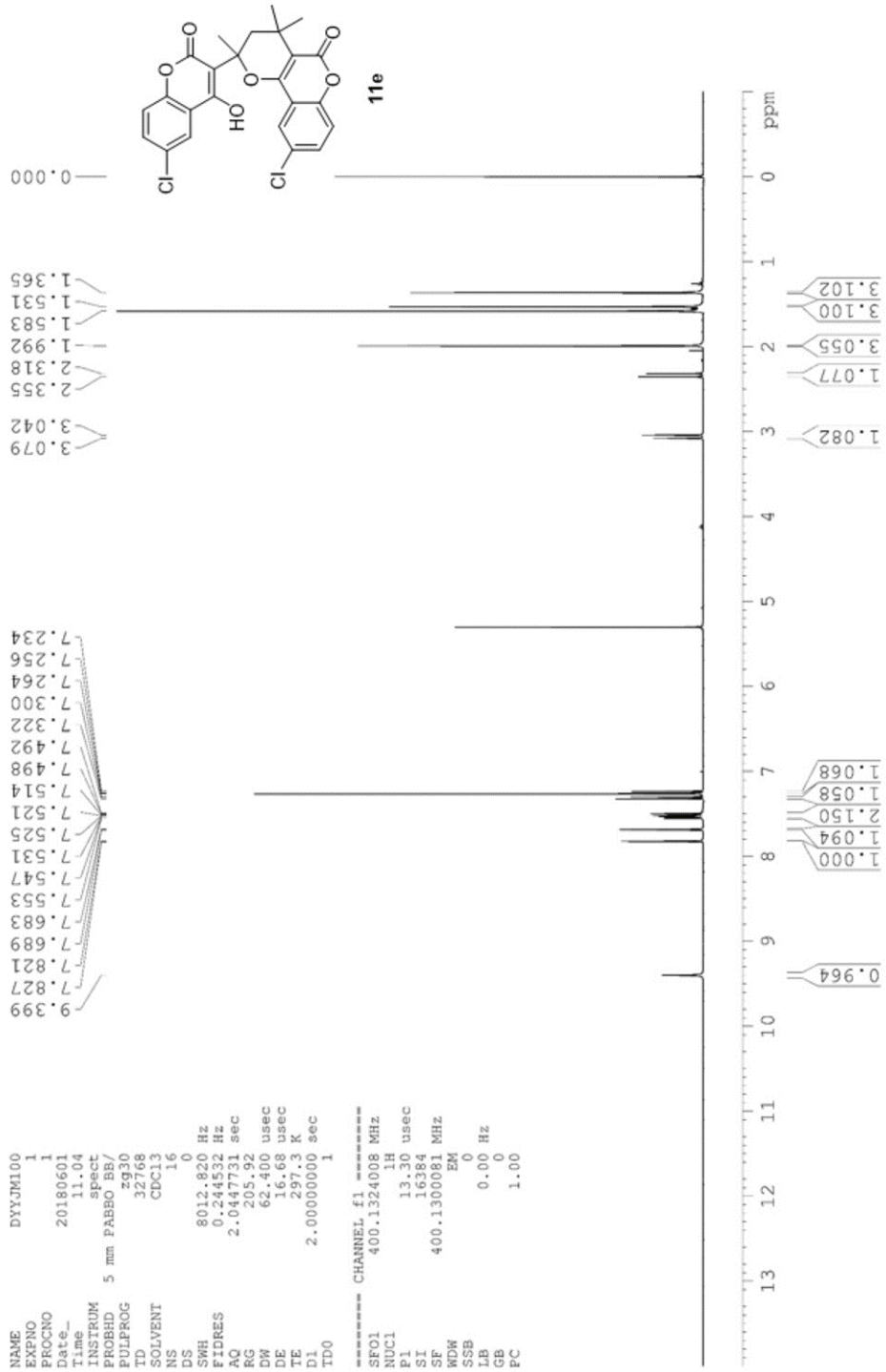
```











```

NAME          DYY-JM-100-C
EXPNO         1
PROCNO        1
Date_         20180608
Time          17.57
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            256
DS            0
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            0.6816244 sec
RG            205.92
DW            20.800 usec
DE            286.50 usec
TE            288.4 K
D1            2.0000000 sec
D11           0.03000000 sec
TD0           1

```

```

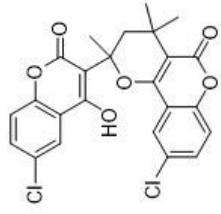
===== CHANNEL f1 =====
SFO1         100.6233329 MHz
NUC1         13C
P1           10.00 usec
SI           32768
SF           100.6127685 MHz
WDW          EM
SSB          0
LB           2.00 Hz
GB           0
PC           1.00

```

```

160.268
159.418
159.355
159.775
150.815
150.698
132.789
132.132
130.035
129.775
123.470
120.890
118.509
117.650
116.647
116.274
113.128
106.017
86.520
45.922
30.749
27.677
26.704
26.627

```



11e

