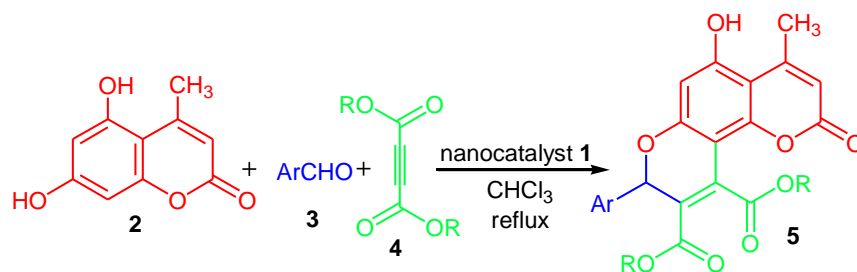
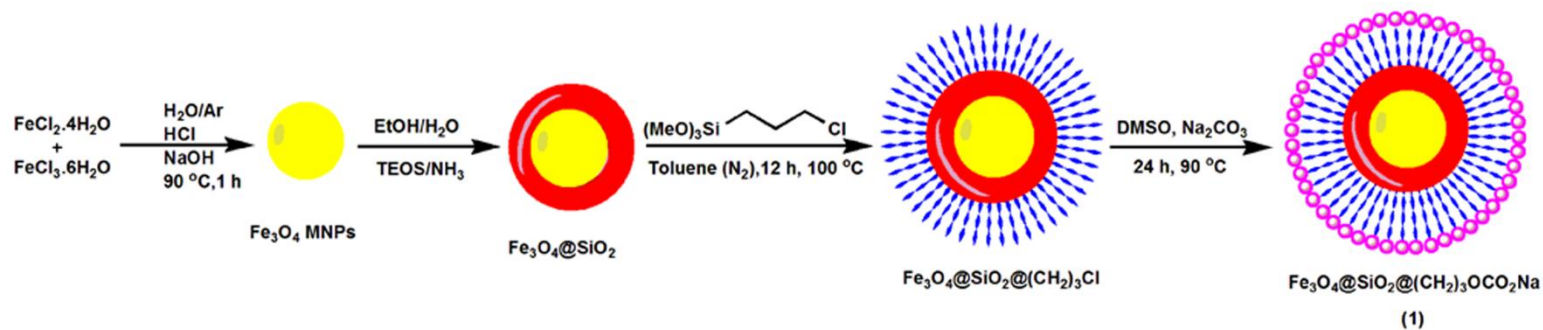
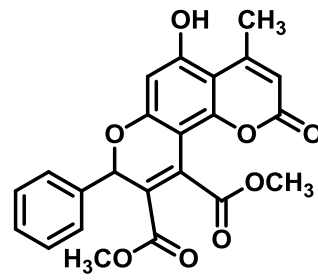


## Supporting Information

### A novel protocol for the synthesis of pyrano[2,3-*h*]coumarins in the presence of $\text{Fe}_3\text{O}_4@\text{SiO}_2@(\text{CH}_2)_3\text{OCO}_2\text{Na}$ as a magnetically heterogeneous catalyst

Hamideh Mohamadi Tanuraghaj, Mahnaz Farahi\*



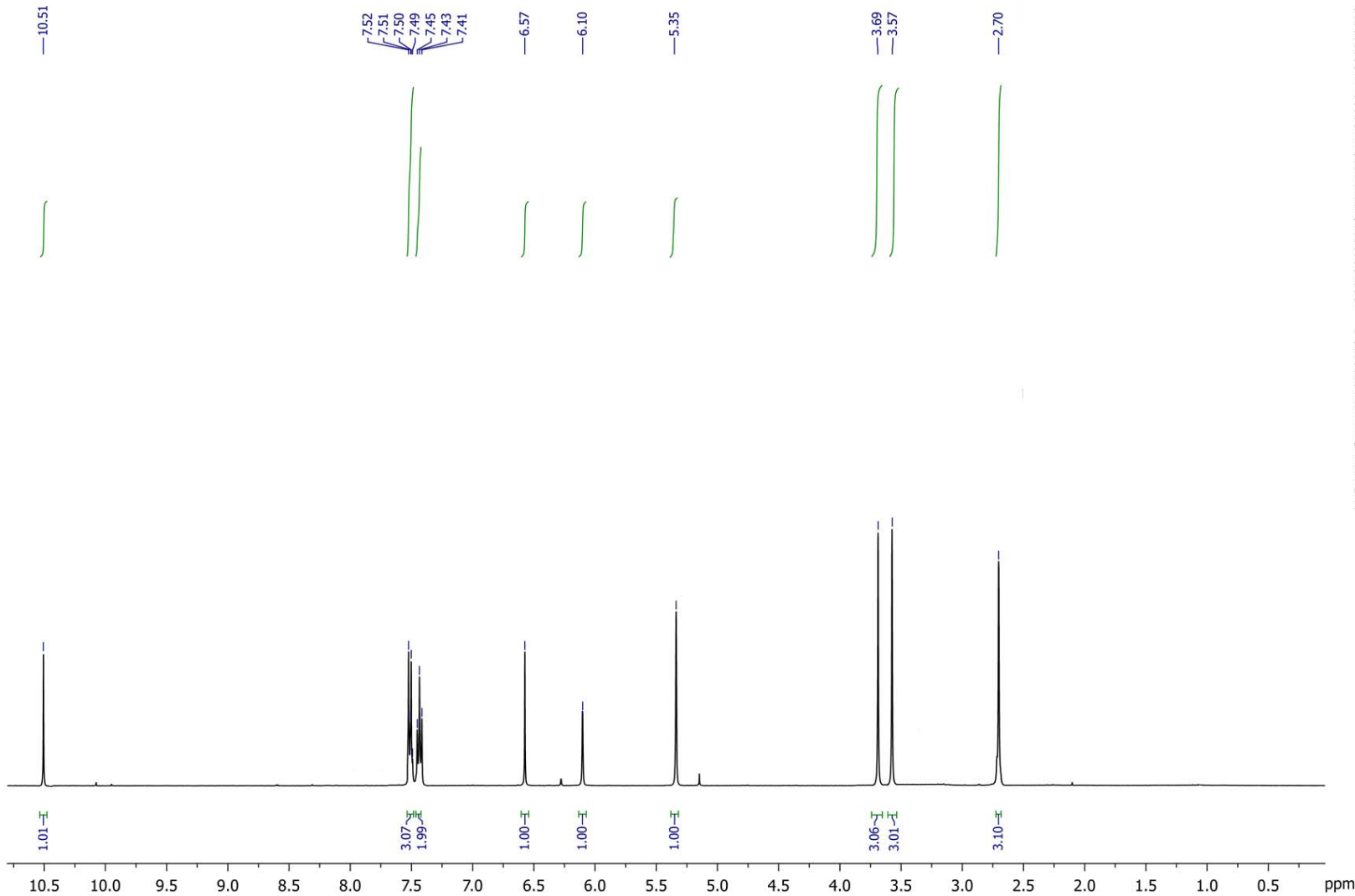


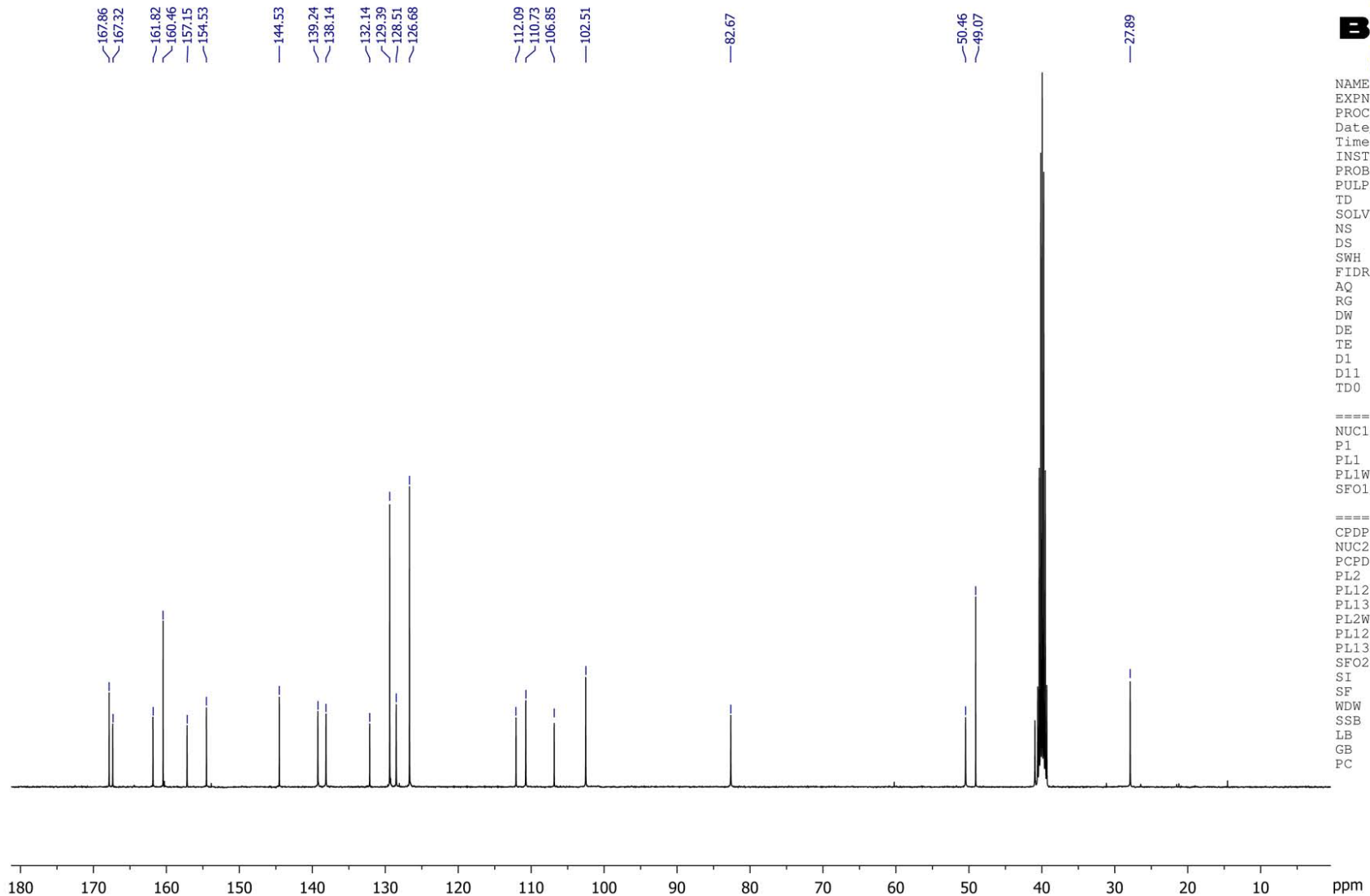
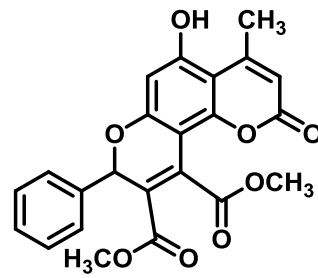
```

NAME      Yasooj UN
EXPNO     1229
PROCNO    1
Date_     20180526
Time      20.03
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS        52
DS        0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG        181
DW        62.400 usec
DE        6.50 usec
TE        293.7 K
D1        4.0000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -2.00 dB
PL1W     11.86359406 W
SF01     400.2236020 MHz
SI        32768
SF        400.2200000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```





```

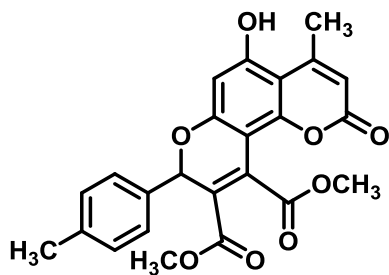
NAME      Yasooj UN
EXPNO     1229
PROCNO    1
Date_     20180526
Time      21.58
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   DMSO
NS        8192
DS        0
SWH       35714.285 Hz
FIDRES    0.544957 Hz
AQ        0.9175540 sec
RG        2050
DW        14.000 usec
DE        6.50 usec
TE        294.7 K
D1        1.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        9.00 usec
PL1       -0.90 dB
PL1W     42.02801895 W
SFO1     100.6479784 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12      14.16 dB
PL13      17.90 dB
PL2W     11.86359406 W
PL12W    0.28722104 W
PL13W    0.12139934 W
SFO2     400.2216009 MHz
SI        32768
SF        100.6353990 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

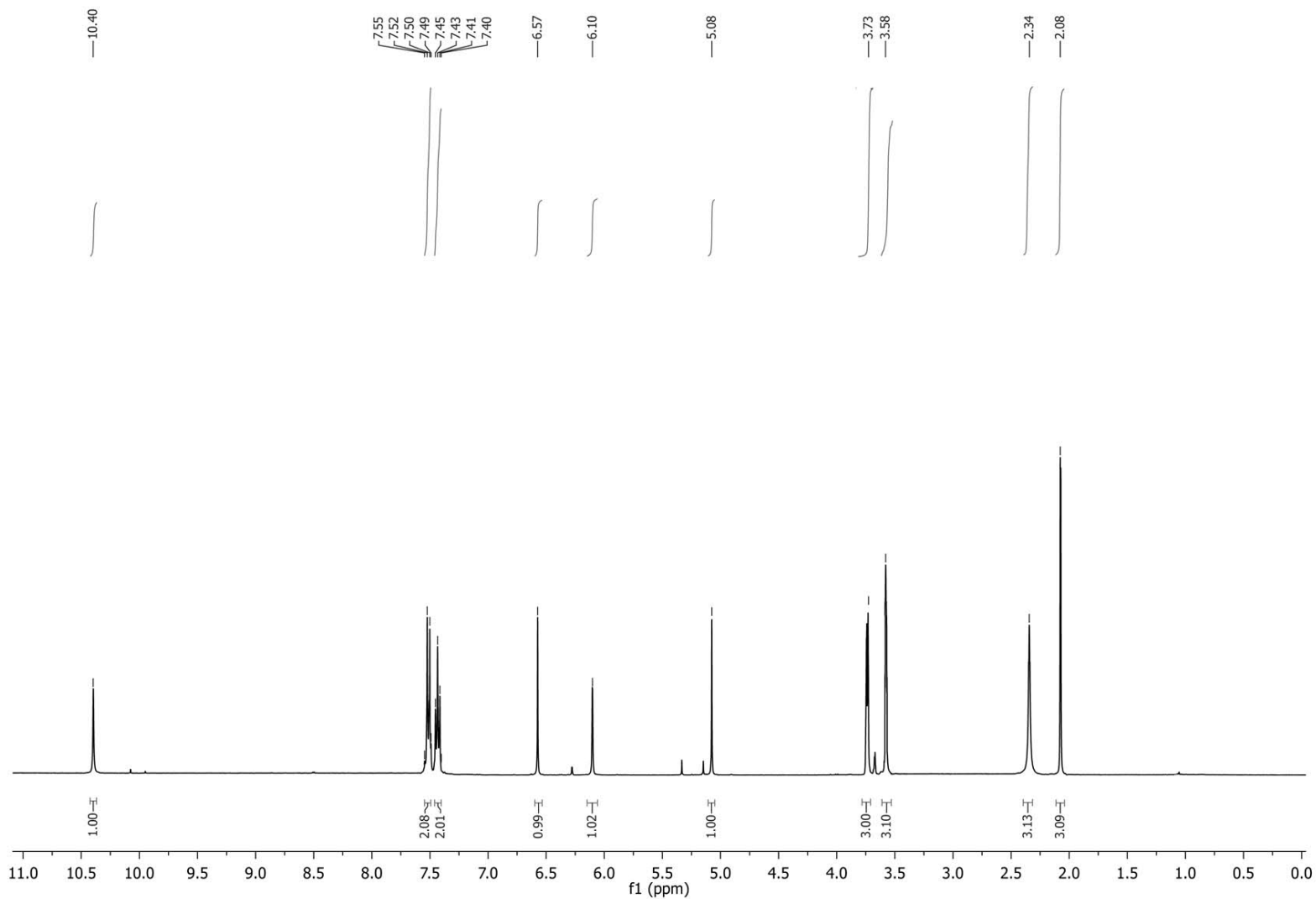


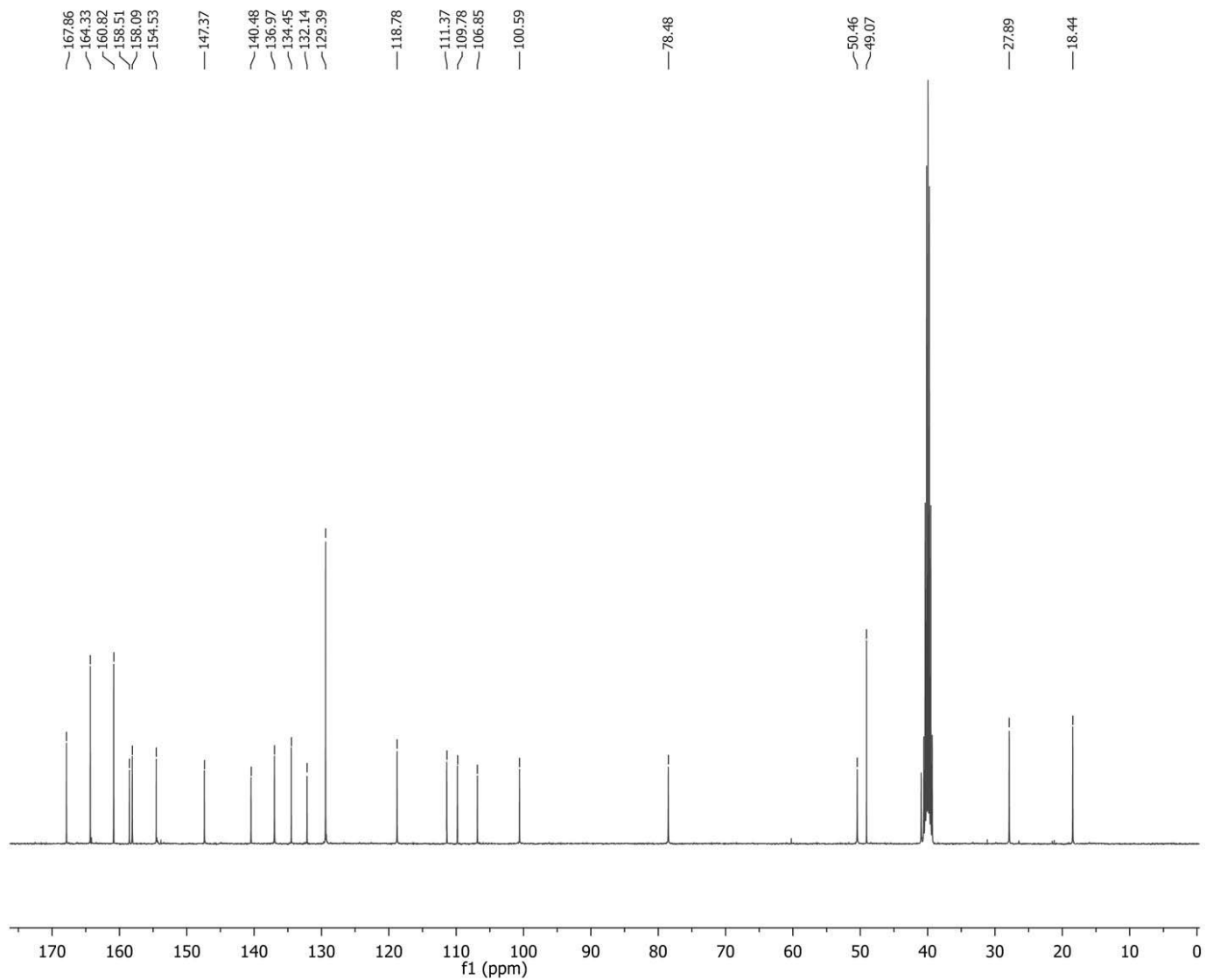
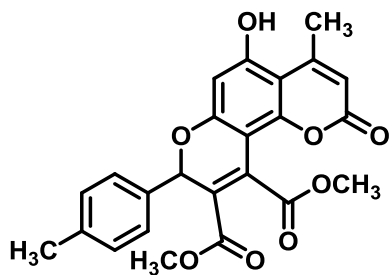
```

NAME      Yasooj UN
EXPNO     1262
PROCNO    1
Date_     20180815
Time      7.31
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS        20
DS        0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG        203
DW        62.400 usec
DE        6.50 usec
TE        294.5 K
D1        4.0000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -2.00 dB
PL1W      11.86359406 W
SFO1     400.2236020 MHz
SI        32768
SF        400.2200000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```





```

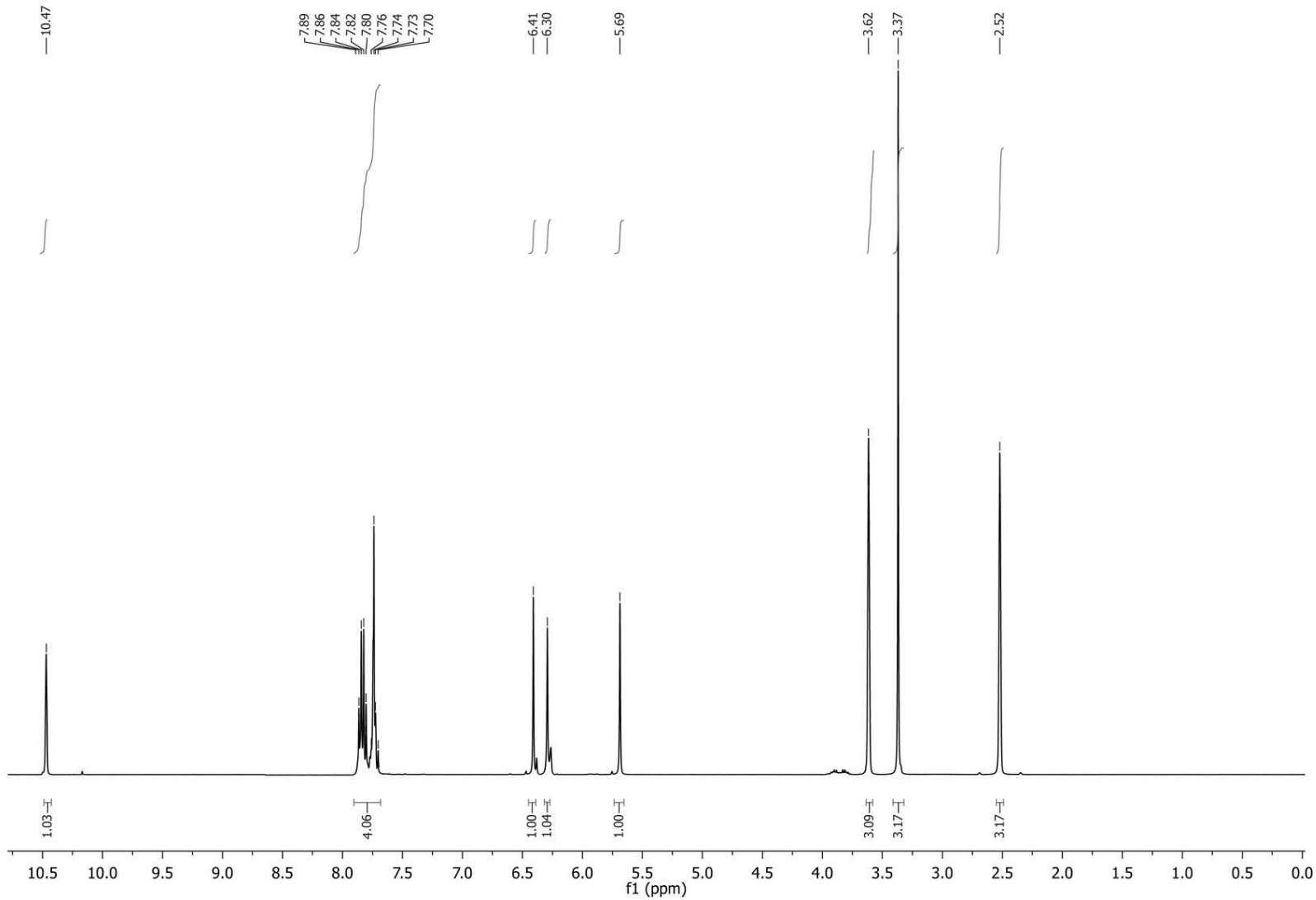
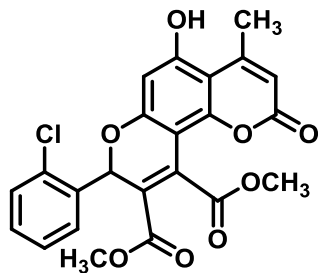
NAME      Yasooj UN
EXPNO     1000
PROCNO    1
Date_     20170628
Time      21.58
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   DMSO
NS        8192
DS        0
SWH       35714.285 Hz
FIDRES    0.544957 Hz
AQ        0.9175540 sec
RG        2050
DW        14.000 usec
DE        6.50 usec
TE        294.7 K
D1        1.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        9.00 usec
PL1       -0.90 dB
PL1W     42.02801895 W
SFO1     100.6479784 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12     14.16 dB
PL13     17.90 dB
PL2W     11.86359406 W
PL12W    0.28722104 W
PL13W    0.12139934 W
SFO2     400.2216009 MHz
SI        32768
SF       100.6353990 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

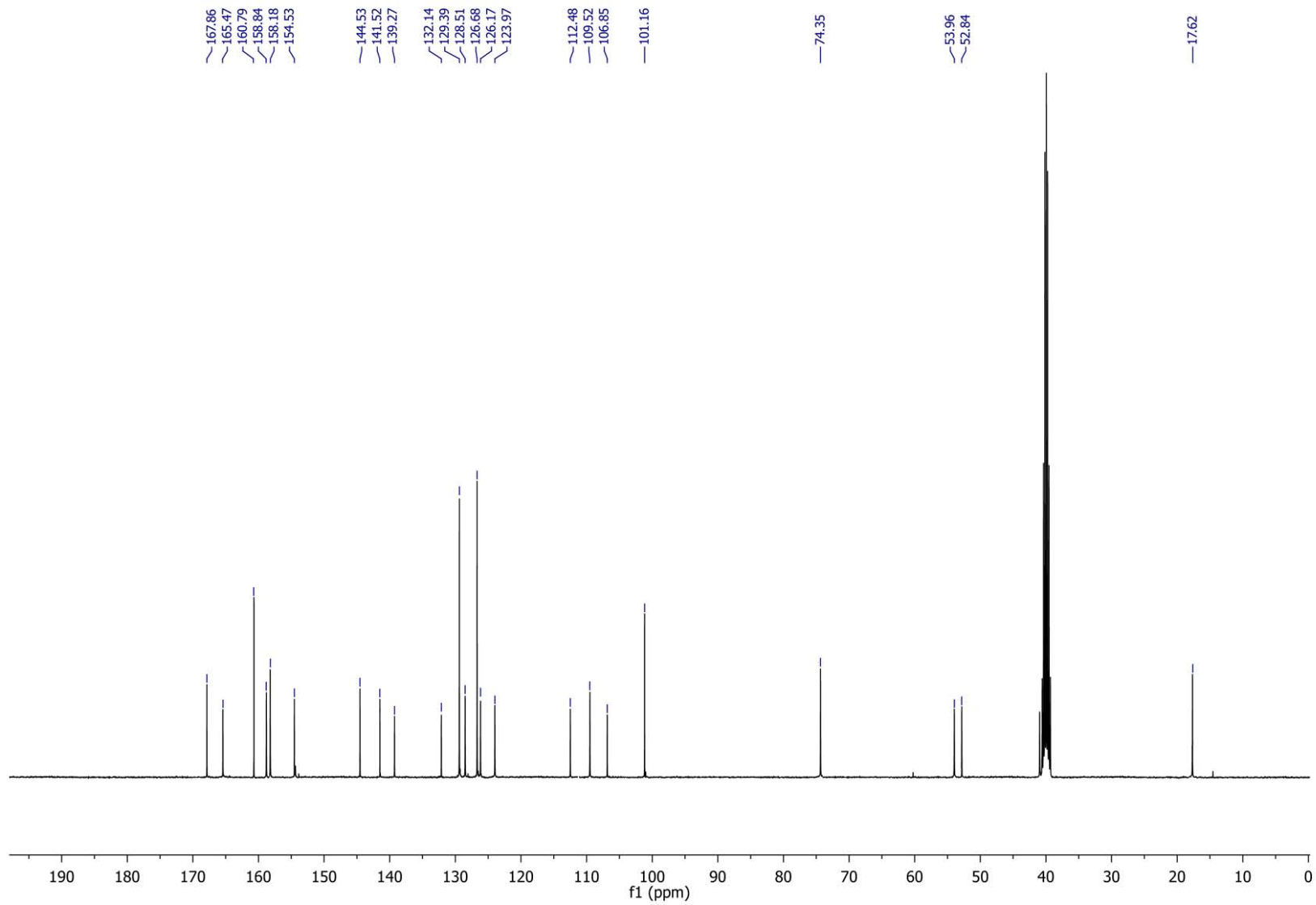
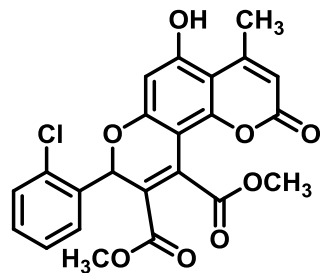


```

NAME      Yasooj UN
EXPNO     1763
PROCNO    1
Date_     20180809
Time      6.27
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         20
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         203
DW         62.400 usec
DE         6.50 usec
TE         294.5 K
D1         4.0000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -2.00 dB
PL1W      11.86359406 W
SFO1      400.2236020 MHz
SI        32768
SF        400.2200000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```

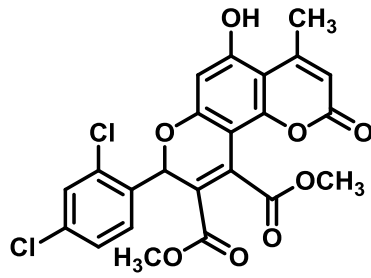


```

NAME      Yasooj UN
EXPNO     899
PROCNO    1
Date_     20181015
Time      15.09
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   DMSO
NS        403
DS        0
SWH       35714.285 Hz
FIDRES    0.544957 Hz
AQ        0.9175540 sec
RG        2050
DW        14.000 usec
DE        6.50 usec
TE        294.5 K
D1        1.00000000 sec
D11       0.03000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      13C
P1        9.00 usec
PL1       -0.90 dB
PL1W     42.02801895 W
SFO1     100.6479784 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12     14.16 dB
PL13     17.90 dB
PL2W     11.86359406 W
PL12W    0.28722104 W
PL13W    0.12139934 W
SFO2     400.2216009 MHz
SI        32768
SF        100.6353990 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

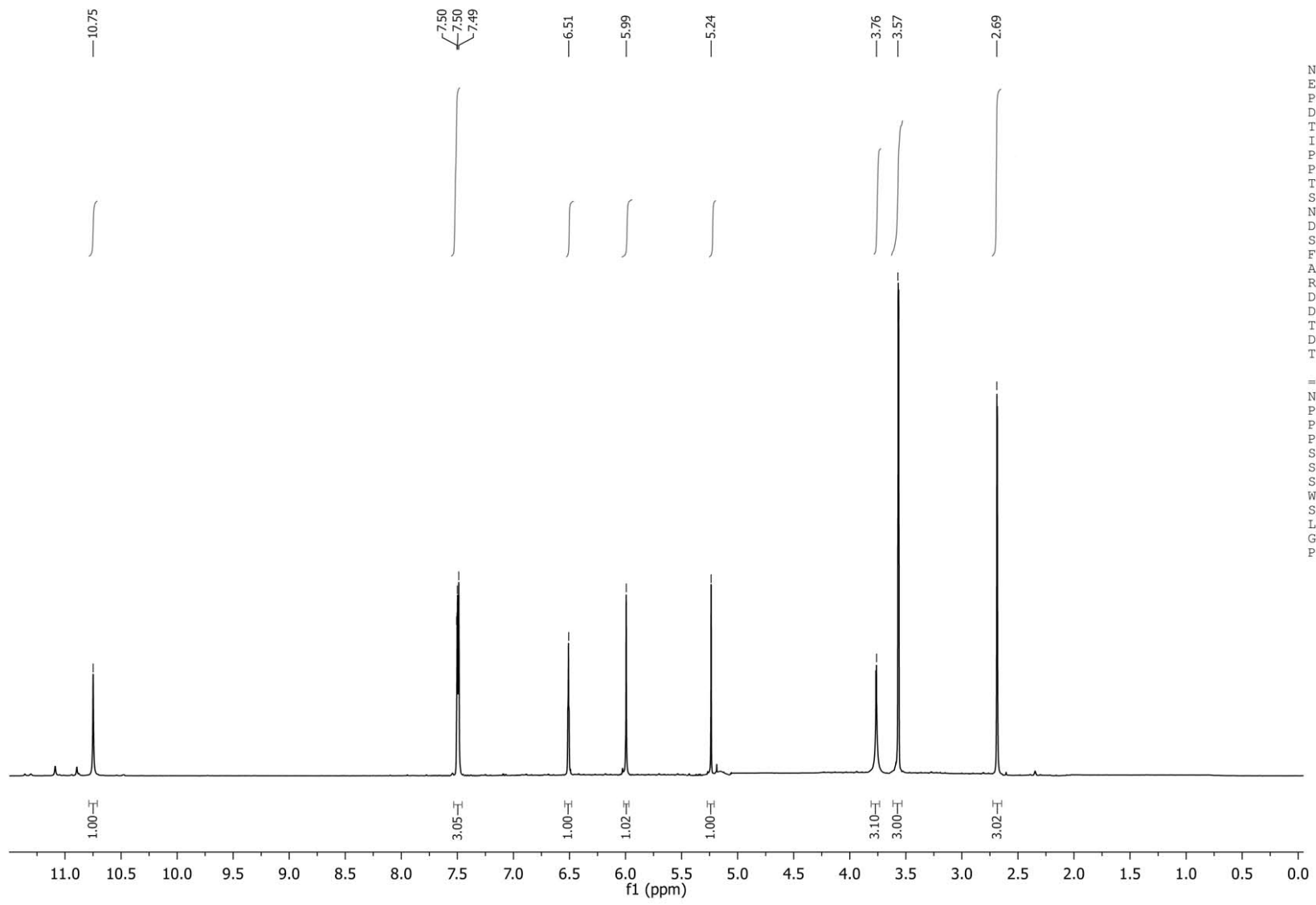


```

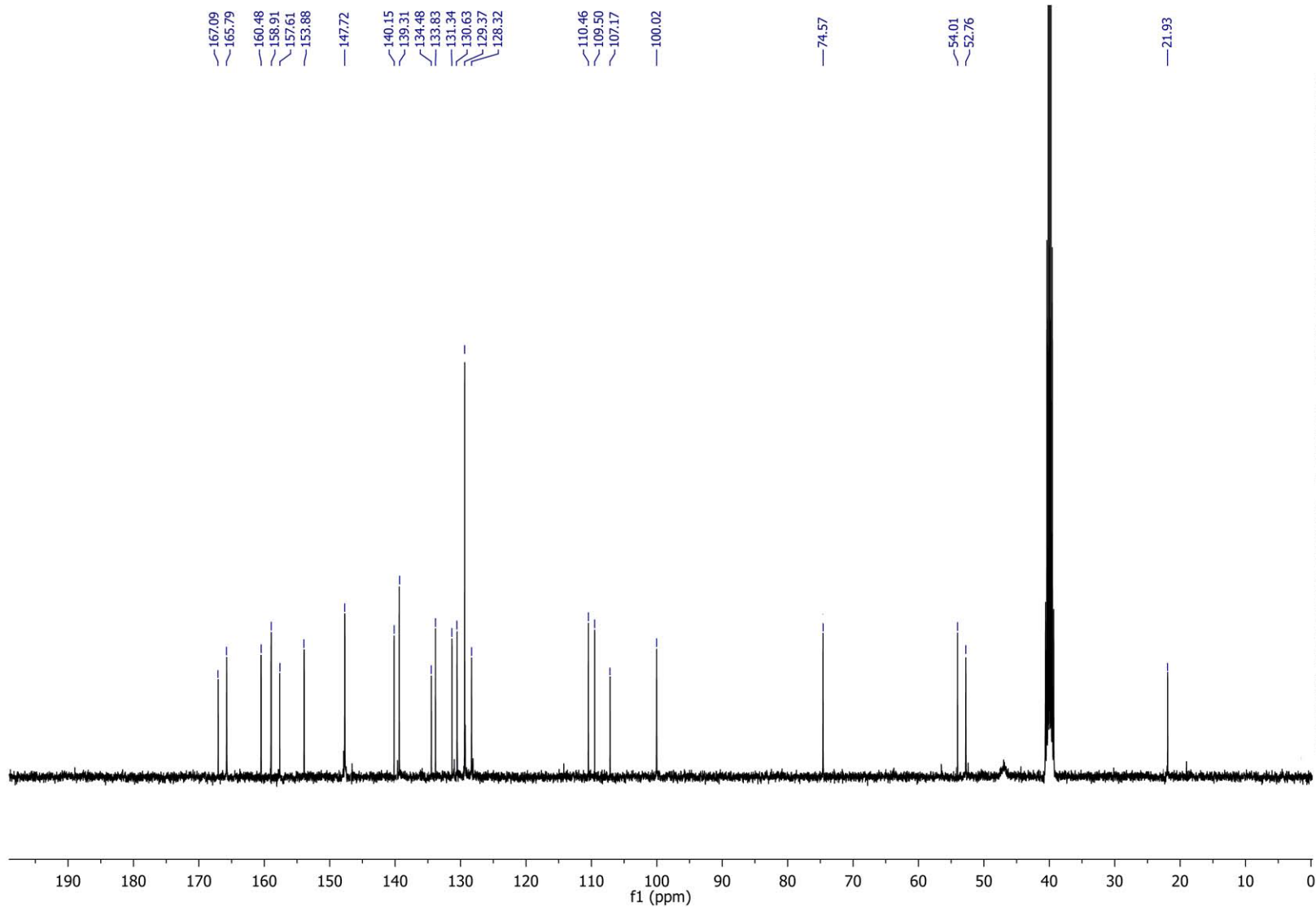
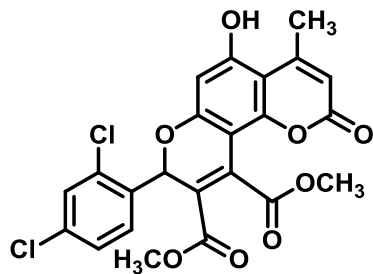
NAME      Yasooj UN
EXPNO     1663
PROCNO    1
Date_     20181021
Time      6.23
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS        20
DS        0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG        203
DW        62.400 usec
DE        6.50 usec
TE        294.5 K
D1        4.00000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -2.00 dB
PL1W      11.86359406 W
SF01      400.2236020 MHz
SI        32768
SF        400.2200000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```







```

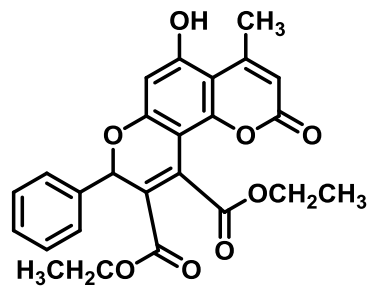
NAME      Yasooj UN
EXPNO     1
PROCNO    1
Date_     20181005
Time      15.32
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   DMSO
NS         8192
DS         0
SWH       35714.285 Hz
FIDRES    0.544957 Hz
AQ         0.9175540 sec
RG         2050
DW         14.000 usec
DE         6.50 usec
TE         294.2 K
D1         1.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         9.00 usec
PL1       -0.90 dB
PL1W      42.02801895 W
SFO1      100.6479784 MHz
  
```

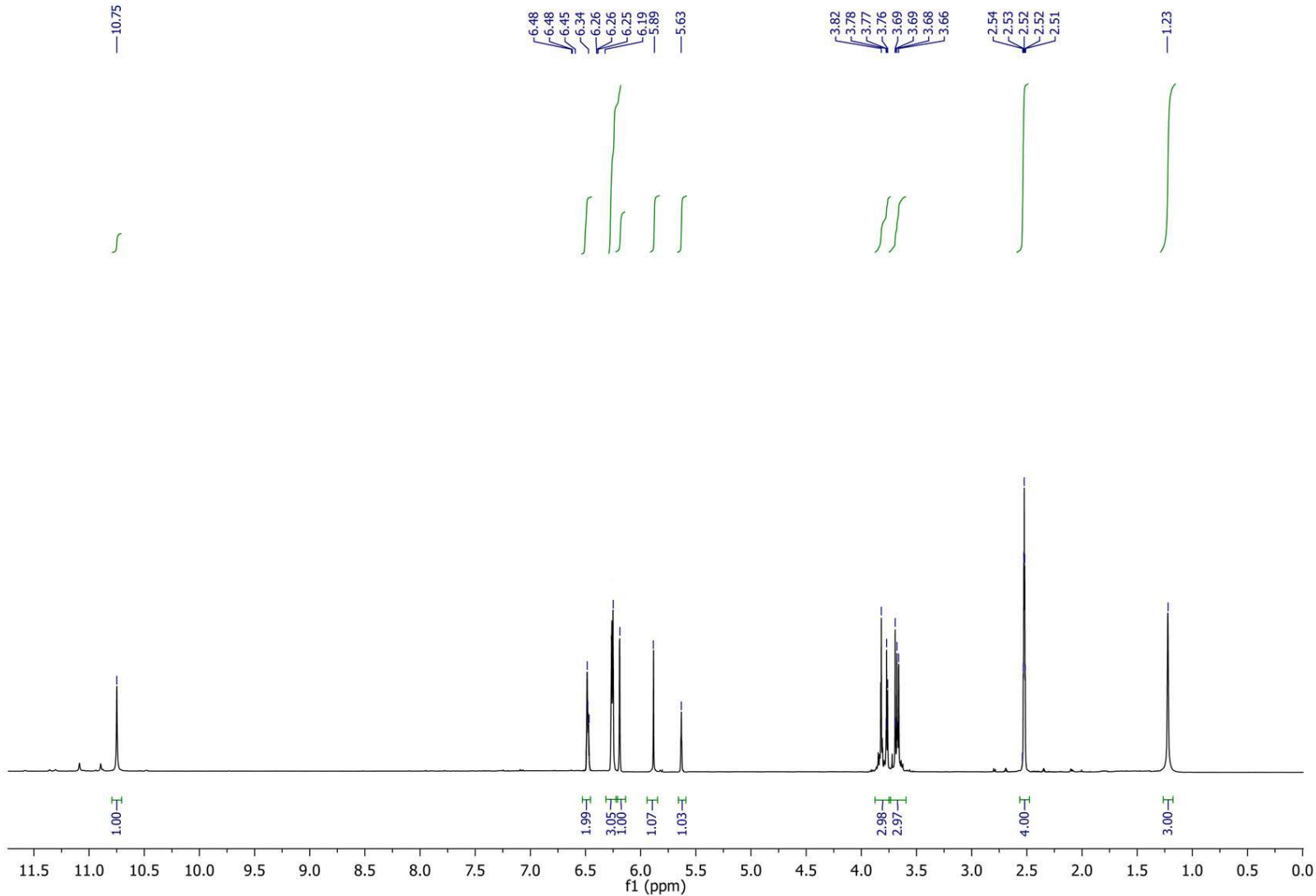
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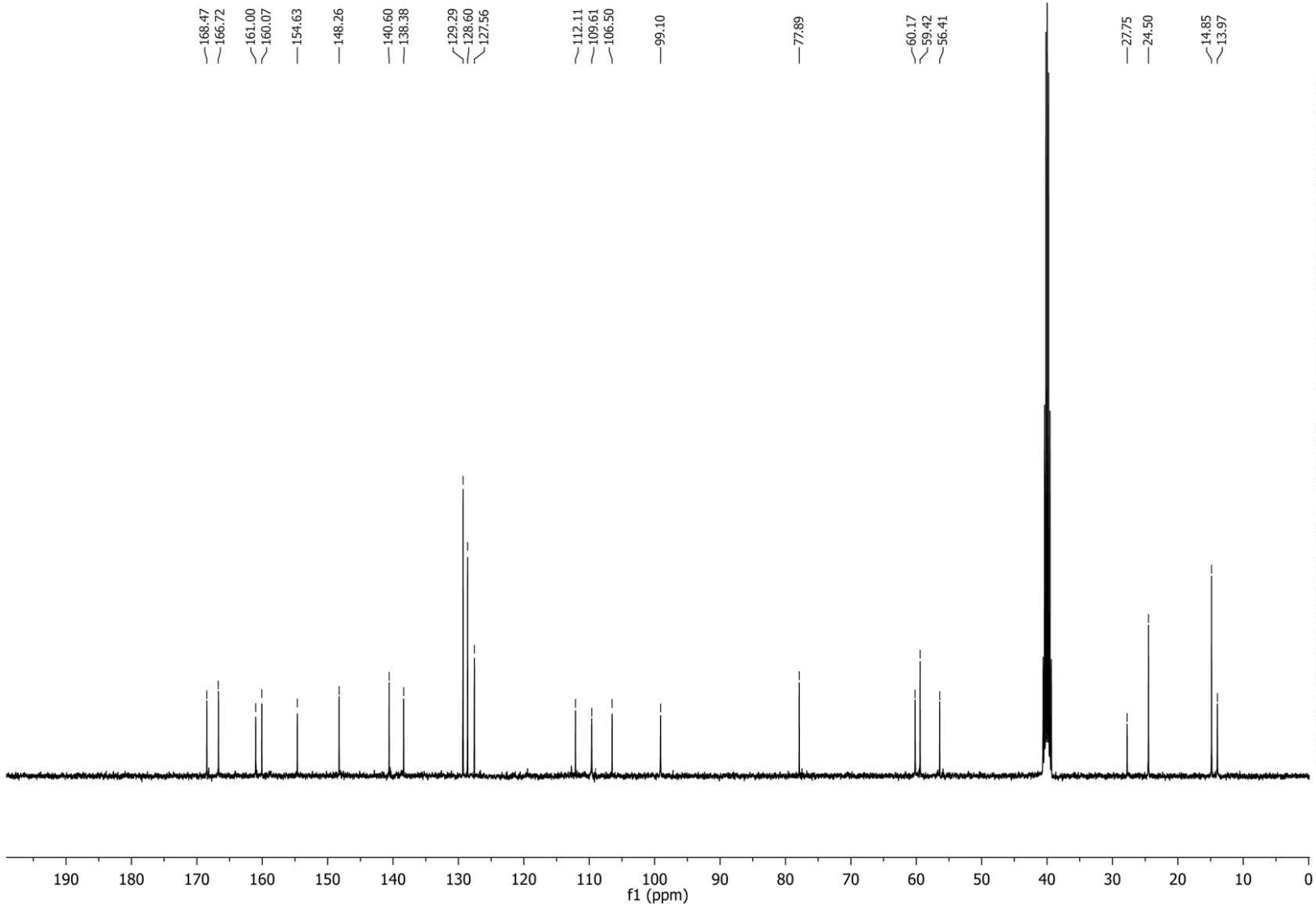
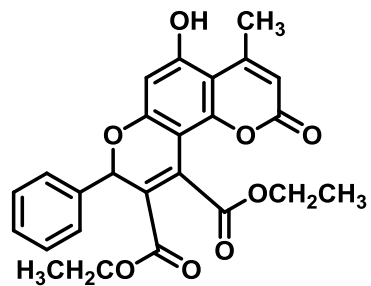
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI         32768
SF         100.6353990 MHz
WDW        EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```



NAME Yasooj UN  
 EXPNO 999  
 PROCNO 1  
 Date\_ 20181016  
 Time 18.10  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB-  
 PULPROG zg30  
 TD 65536  
 SOLVENT DMSO  
 NS 20  
 DS 0  
 SWH 8012.820 Hz  
 FIDRES 0.122266 Hz  
 AQ 4.0894966 sec  
 RG 90.5  
 DW 62.400 usec  
 DE 6.50 usec  
 TE 293.9 K  
 D1 4.0000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 NUC1 1H  
 P1 14.00 usec  
 PL1 -2.00 dB  
 PL1W 11.86359406 W  
 SFO1 400.2236020 MHz  
 SI 32768  
 SF 400.2200000 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00





~168.47  
 ~166.72  
 ~161.00  
 ~160.07  
 ~154.63  
 ~148.26  
 ~140.60  
 ~138.38  
 ~129.29  
 ~128.60  
 ~127.56  
 ~112.11  
 ~109.61  
 ~106.50  
 ~99.10  
 ~77.89  
 ~60.17  
 ~59.42  
 ~56.41  
 ~27.75  
 ~24.50  
 ~14.85  
 ~13.97



```

NAME      Yasooj UN
EXPNO     909
PROCNO    1
Date_     20181005
Time      15.32
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   DMSO
NS         8192
DS         0
SWH        35714.285 Hz
FIDRES     0.544957 Hz
AQ         0.9175540 sec
RG         2050
DW         14.000 usec
DE         6.50 usec
TE         294.2 K
D1         1.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         9.00 usec
PL1        -0.90 dB
PL1W       42.02801895 W
SFO1      100.6479784 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W       11.86359406 W
PL12W      0.28722104 W
PL13W      0.12139934 W
SFO2      400.2216009 MHz
SI         32768
SF         100.6353990 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```