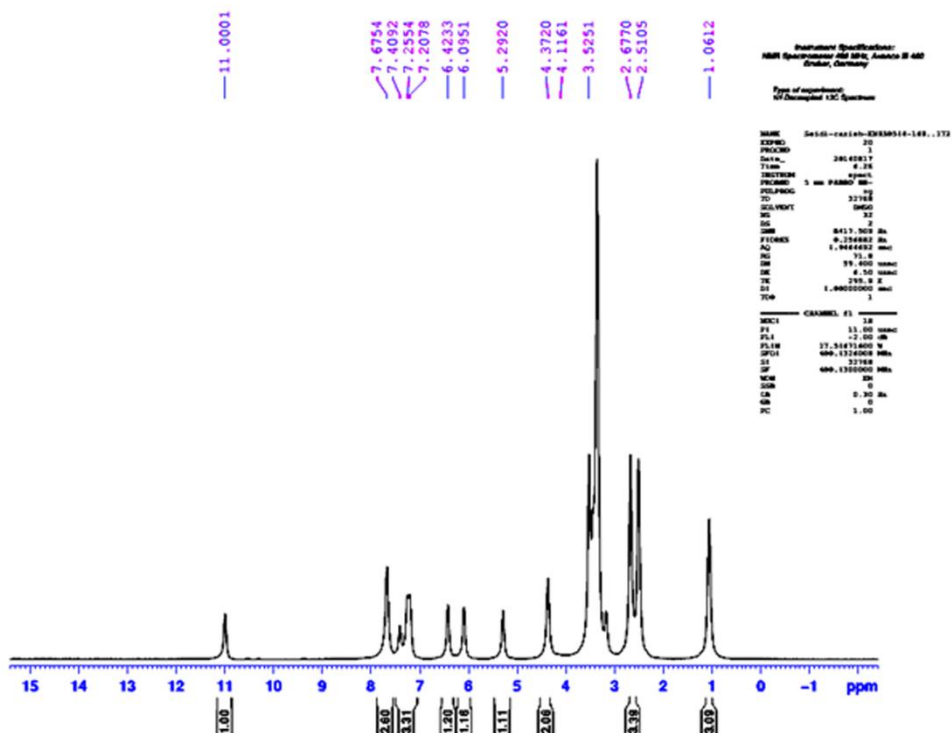
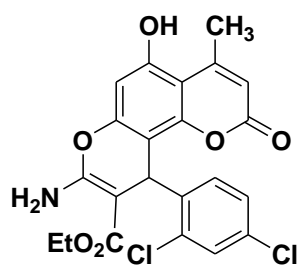


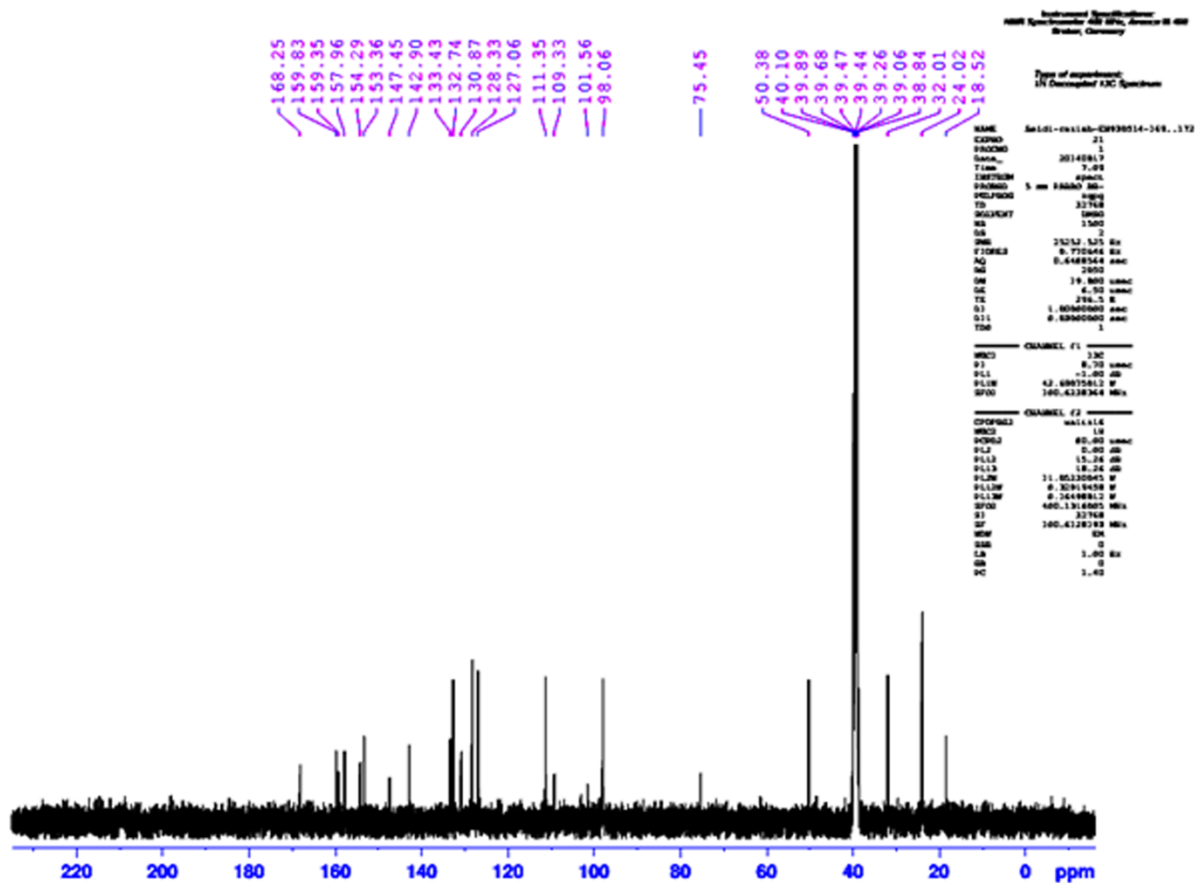
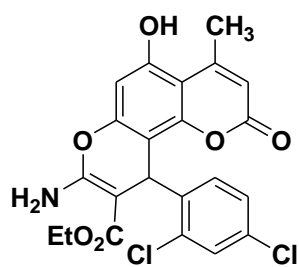
**Nano-Fe₃O₄@SiO₂ supported boron sulfonic acid as a novel
magnetically heterogeneous catalyst for the synthesis of pyrano
coumarins**

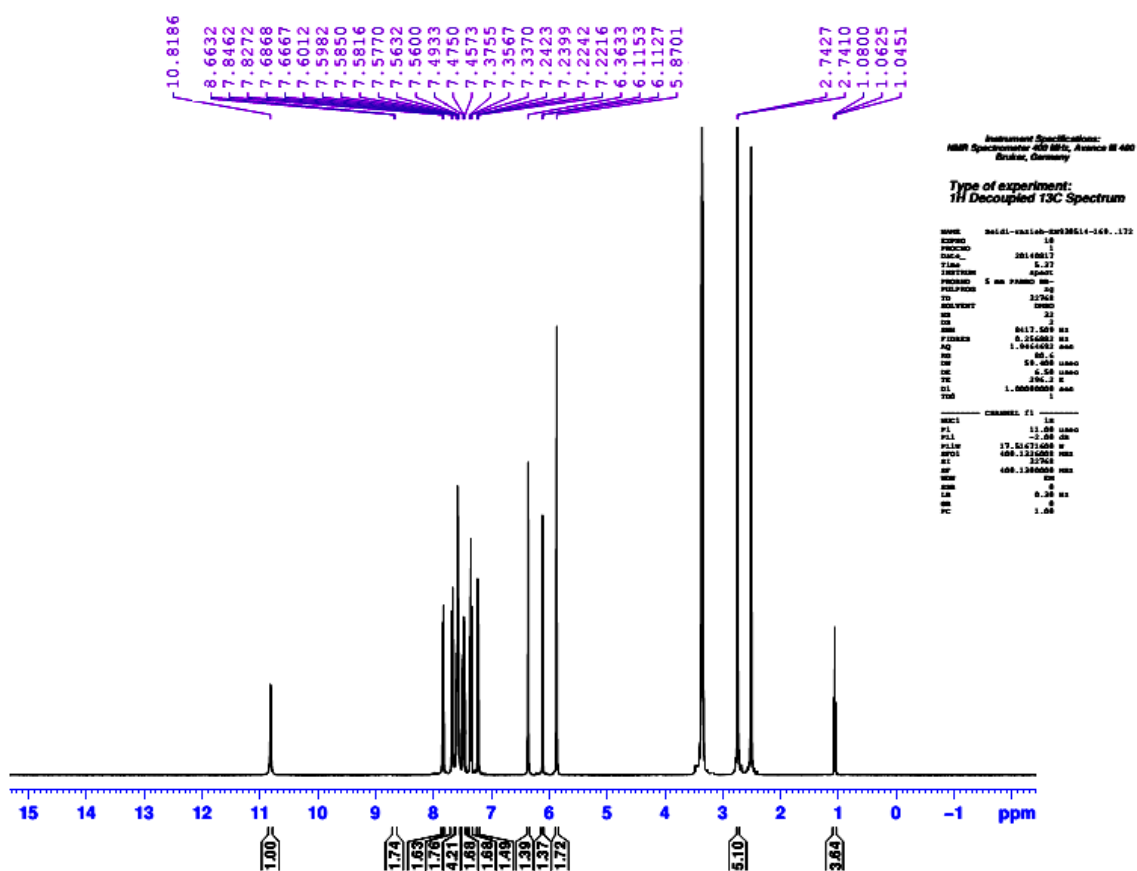
Mahnaz Farahi,* Bahador Karami, Raziye Keshavarz and Foroogh Khosravian

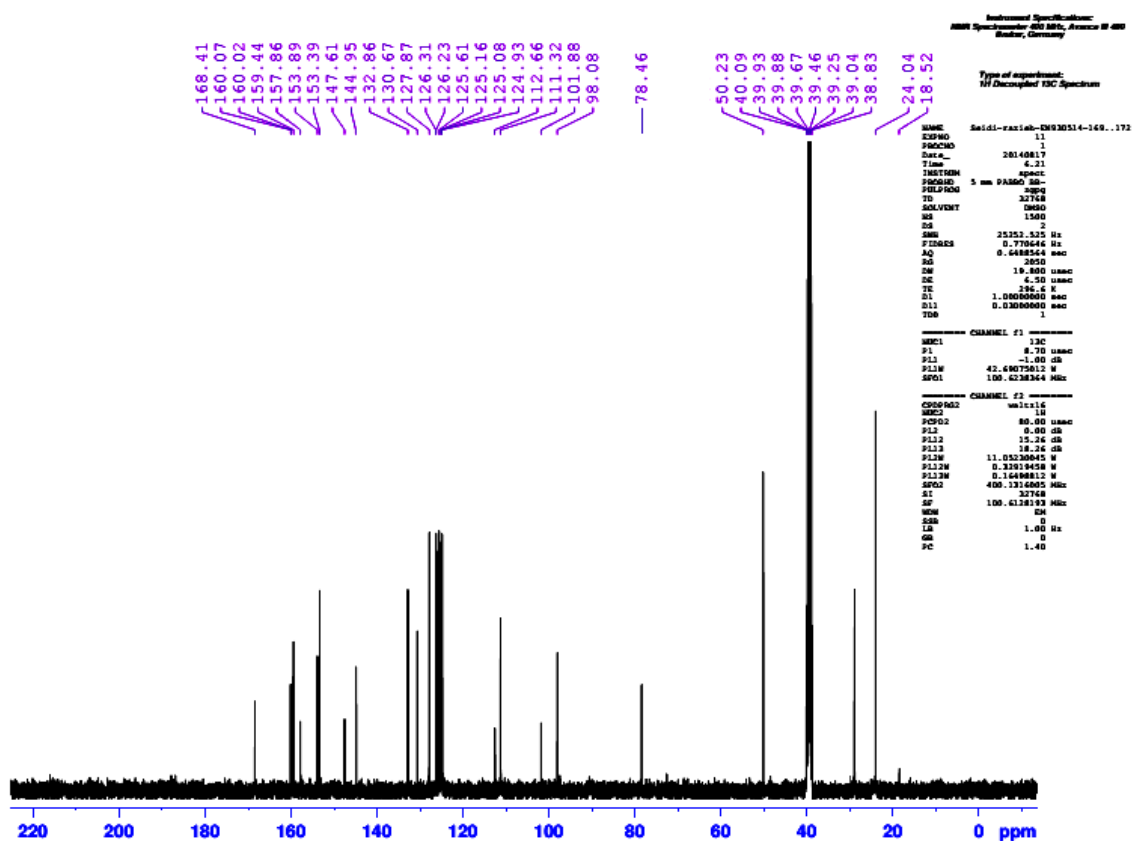
Department of Chemistry, Yasouj University, Yasouj, Iran

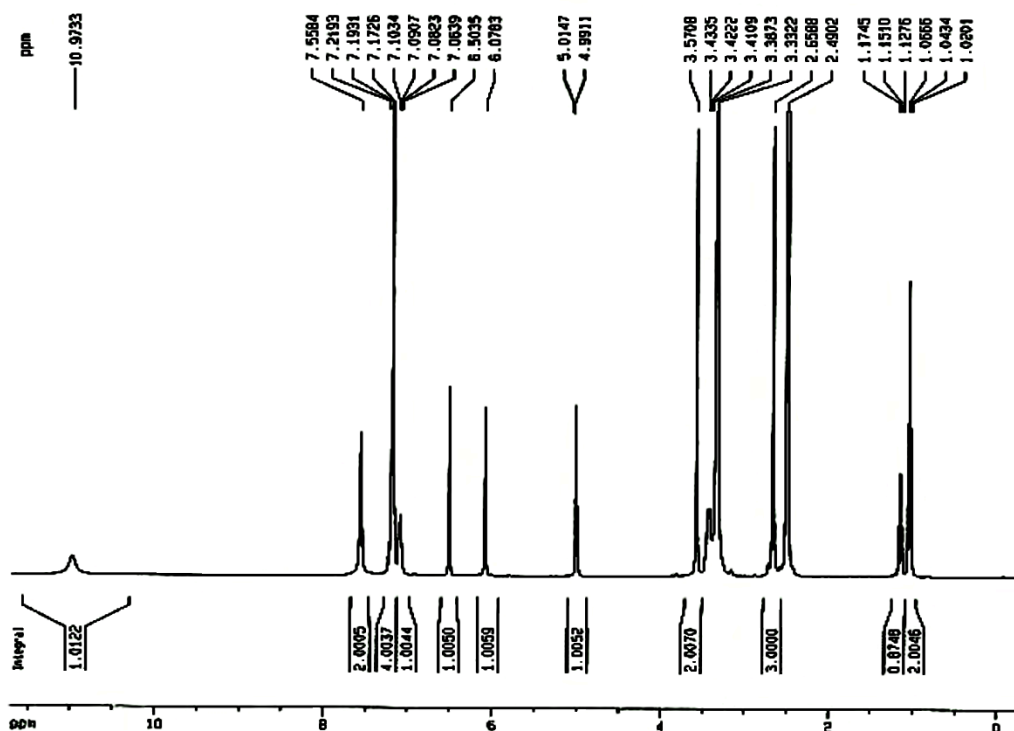
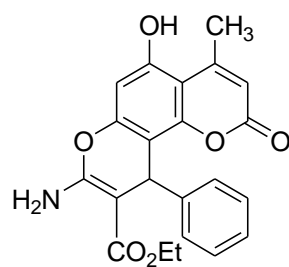
E-mail: farahimb@yu.ac.ir











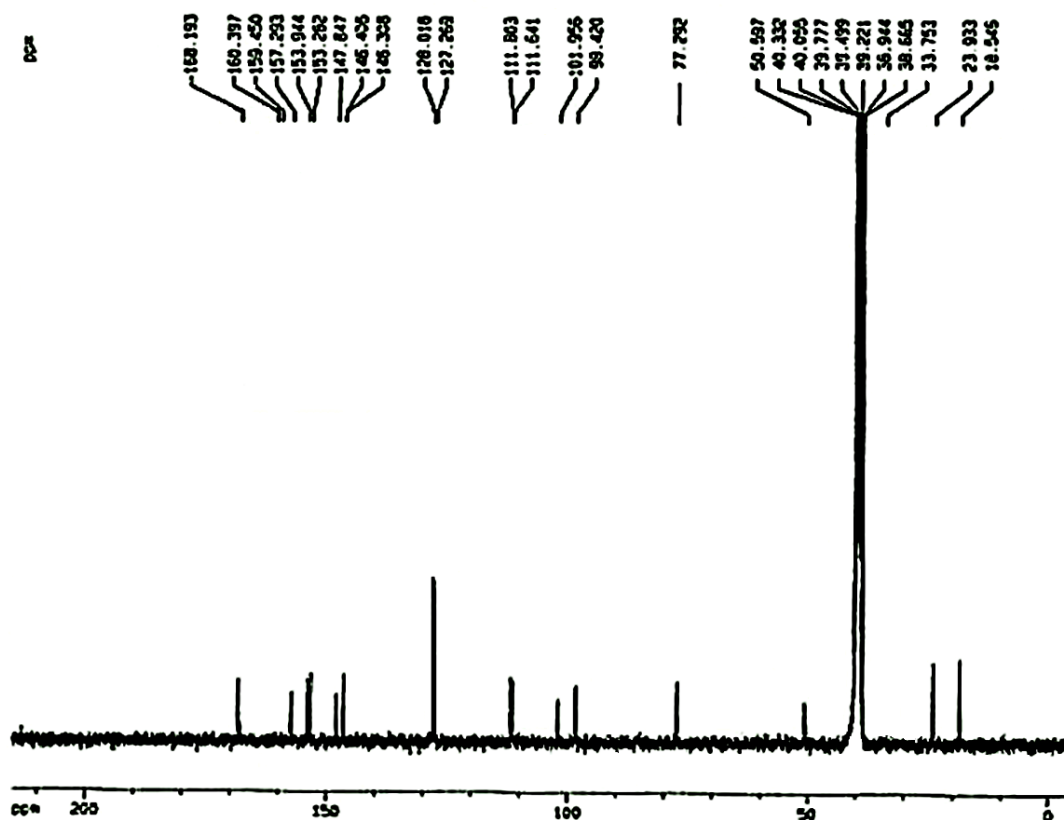
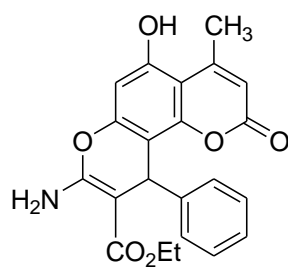
Current Data Parameters
NAME yabouj
EXPNO 60
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140706
Time 15.40
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 16
DS 2
SWH 5995.204 Hz
FIDRES 0.162959 Hz
AQ 2.7329011 sec
RG 228.1
ON 63.400 usec
OE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

CHANNEL f1 1H
NUC1 1H
P1 10.00 usec
PL1 0.00 dB
SFO1 300.1320589 MHz

F2 - Processing parameters
SI 32768
SF 300.1300047 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CK 20.00 cm
CY 45.00 cm
F1p 11.708 ppm
F1 3511.52 Hz
F2p -90.04 ppm
F2 -90.04 Hz
P1pCH 0.60000 ppm/cm
HZCH 180.07799 Hz/cm



Current Data Parameters
NAME: 20140706
EXPNO: 1
PROCNO: 1

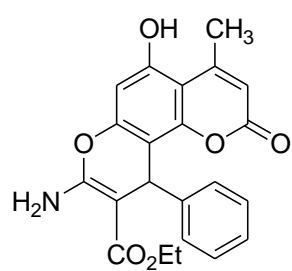
F2 - Acquisition Parameters
Date_: 20140706
Time: 19:22
INSTRUM: spect
PROBHD: 5 mm HLLHNP1
PULPROG: zgpg30
TD: 32768
SOLVENT: CDCl3
NS: 10240
DS: 4
SWH: 17005.631 Hz
FIDRES: 0.346877 Hz
AQ: 0.9180004 sec
RG: 819.2
DQ: 27.000 umax
RQ: 0.00 umax
PQ: 300.0 Hz
DI: 7.0000000 sec
D11: 0.0200000 sec
D12: 0.0002000 sec

===== CHANNEL f1 =====
NUC1: 13C
P1: 7.00 umax
PL1: -0.00 dB
SFO1: 75.475453 MHz

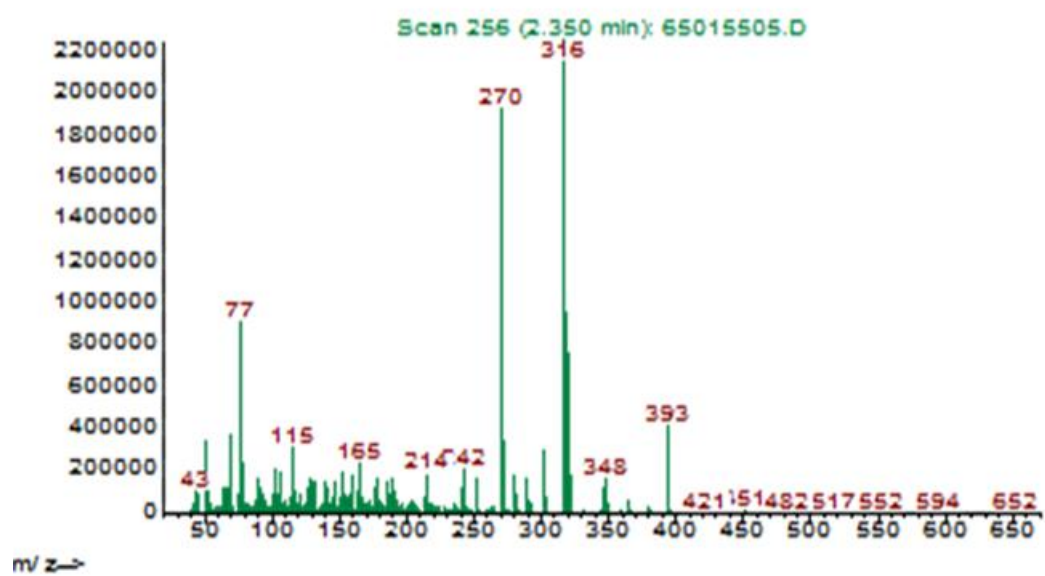
===== CHANNEL f2 =====
CPDPRG2: zgpg30
NUC2: 1H
PCPD2: 00.00 umax
PL2: 0.00 dB
PL12: 21.00 dB
PL13: 21.00 dB
SFO2: 100.626095 MHz

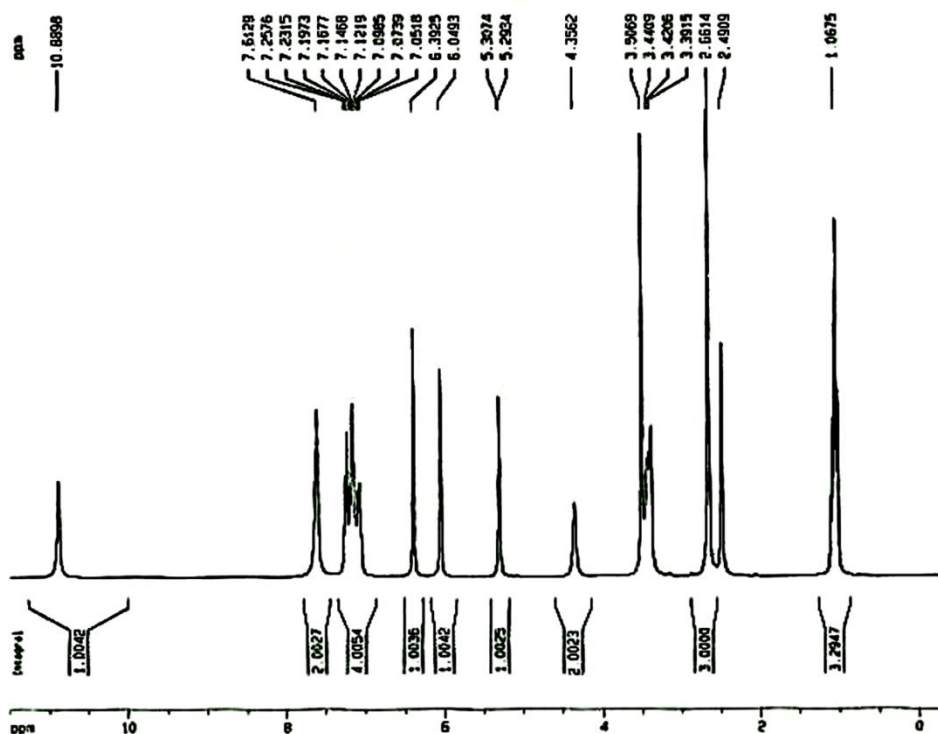
F2 - Processing Parameters
SI: 32768
SF: 75.475453 MHz
GB: 0
LB: 1.00 Hz
GB: 0
PC: 1.00

NOISE parameters
EN: 20.00 dB
CN: 100.00 dB
FSP: 275.000 ppm
F1: 16225.37 Hz
F2: -3.000 ppm
F3: -277.34 Hz
F4: 11.0000 ppm/Hz
ACQ: 0.00 14563 Hz/Hz

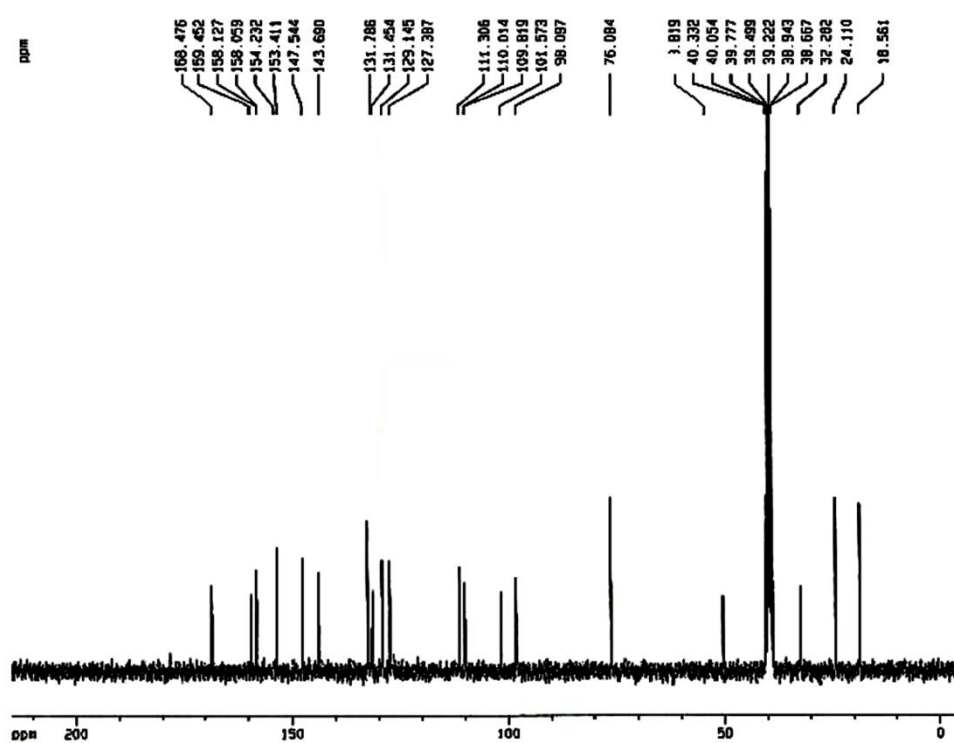
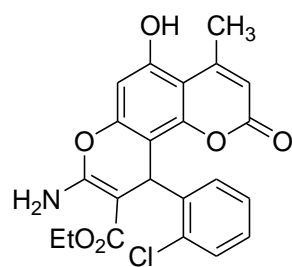


Abundance





9



Current Data Parameters
NAME yssouj
EXPNO 64
PROCNO 1

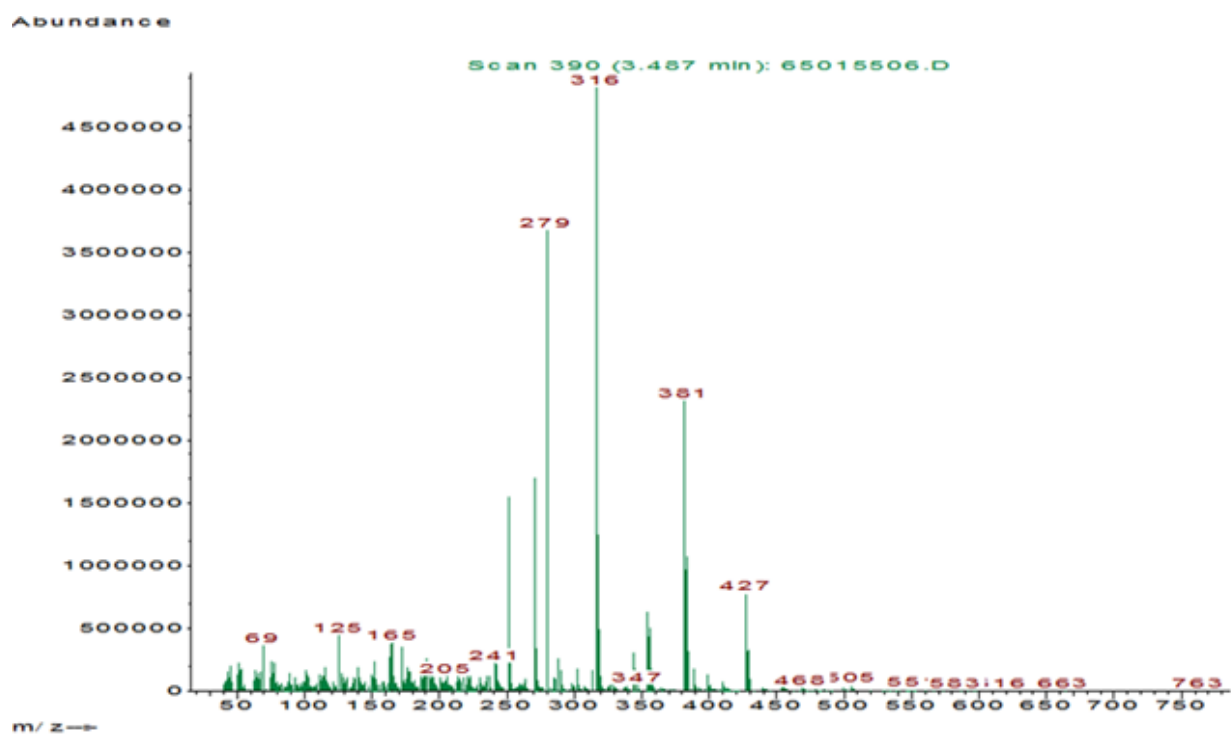
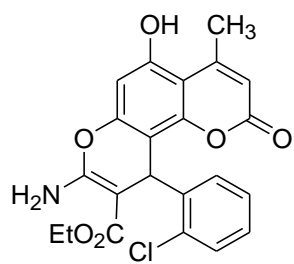
F2 - Acquisition Parameters
Date_ 20140708
Time 16.30
INSTRUM spect
PROBHD 5 mm HX119-1
PULPROG zgpg30
TD 32768
SOLVENT DMSO
NS 250
DS 4
SWH 17965.811 Hz
FIDRES 0.348877 Hz
AQ 0.9110004 sec
RG 832
DT 0.000195 sec
DE 6.00 umol
TE 300.0 K
D1 2.00000000 sec
d11 0.05000000 sec
d12 0.00000000 sec

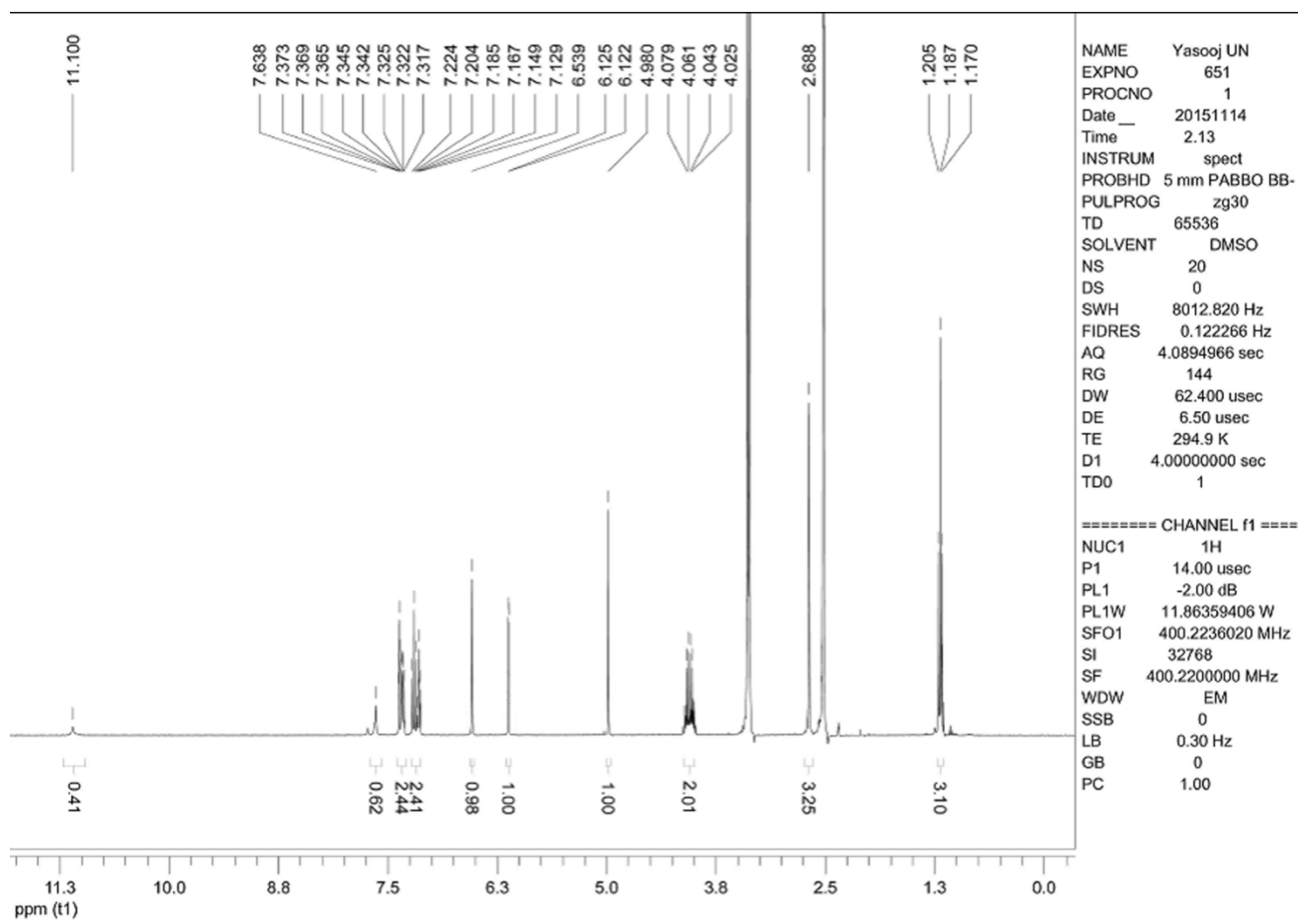
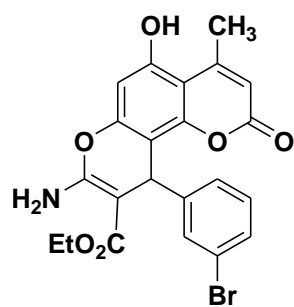
===== CHANNEL f1 =====
NUC1 13C
P1 7.00 usec
PL1 -4.00 dB
SFO1 75.4752833 MHz

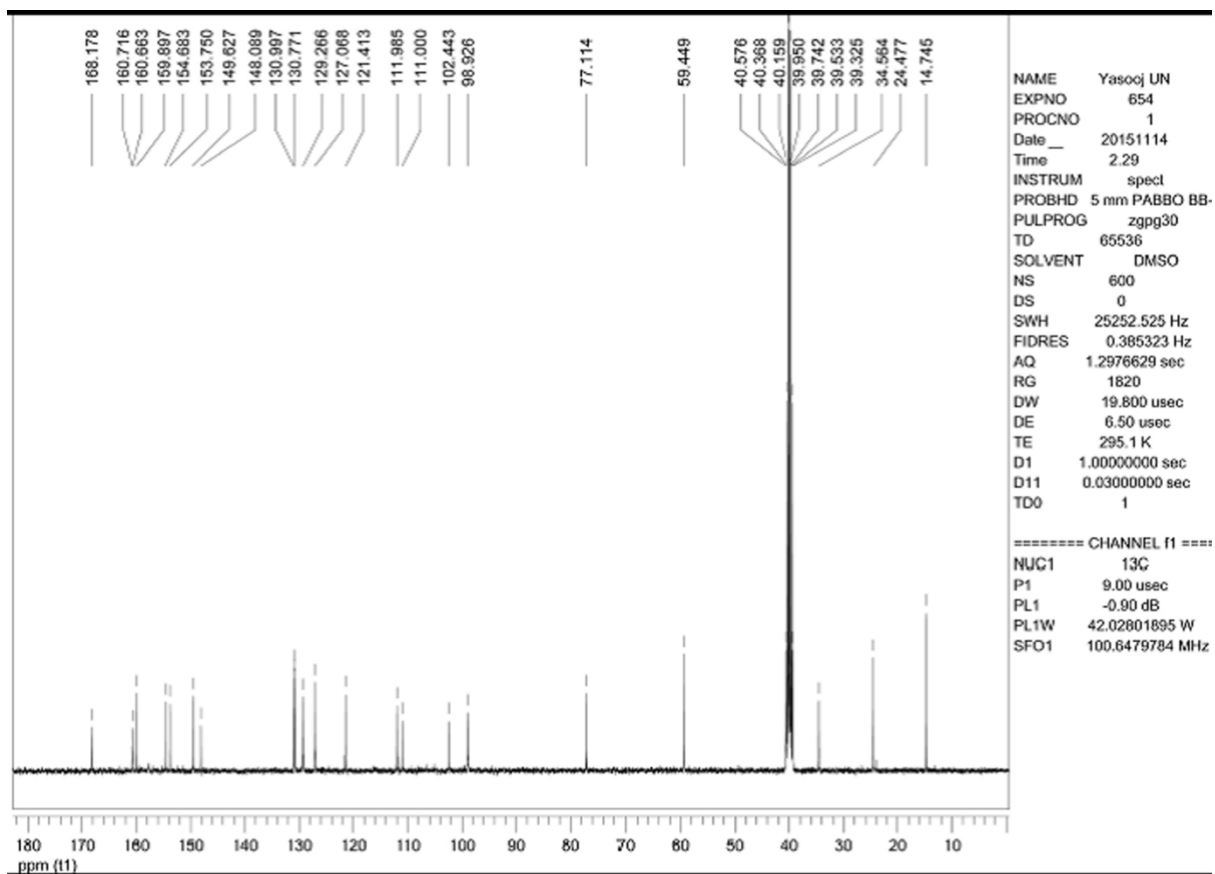
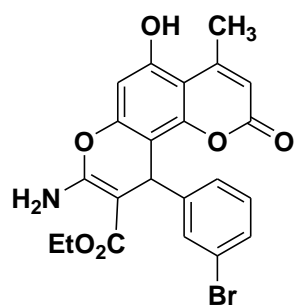
===== CHANNEL f2 =====
CHPROG2 zgpg30
NUC2 1H
PCPRO2 60.00 usec
PL2 0.00 dB
PL12 21.00 dB
PL13 21.00 dB
SFO2 300.1350652 MHz

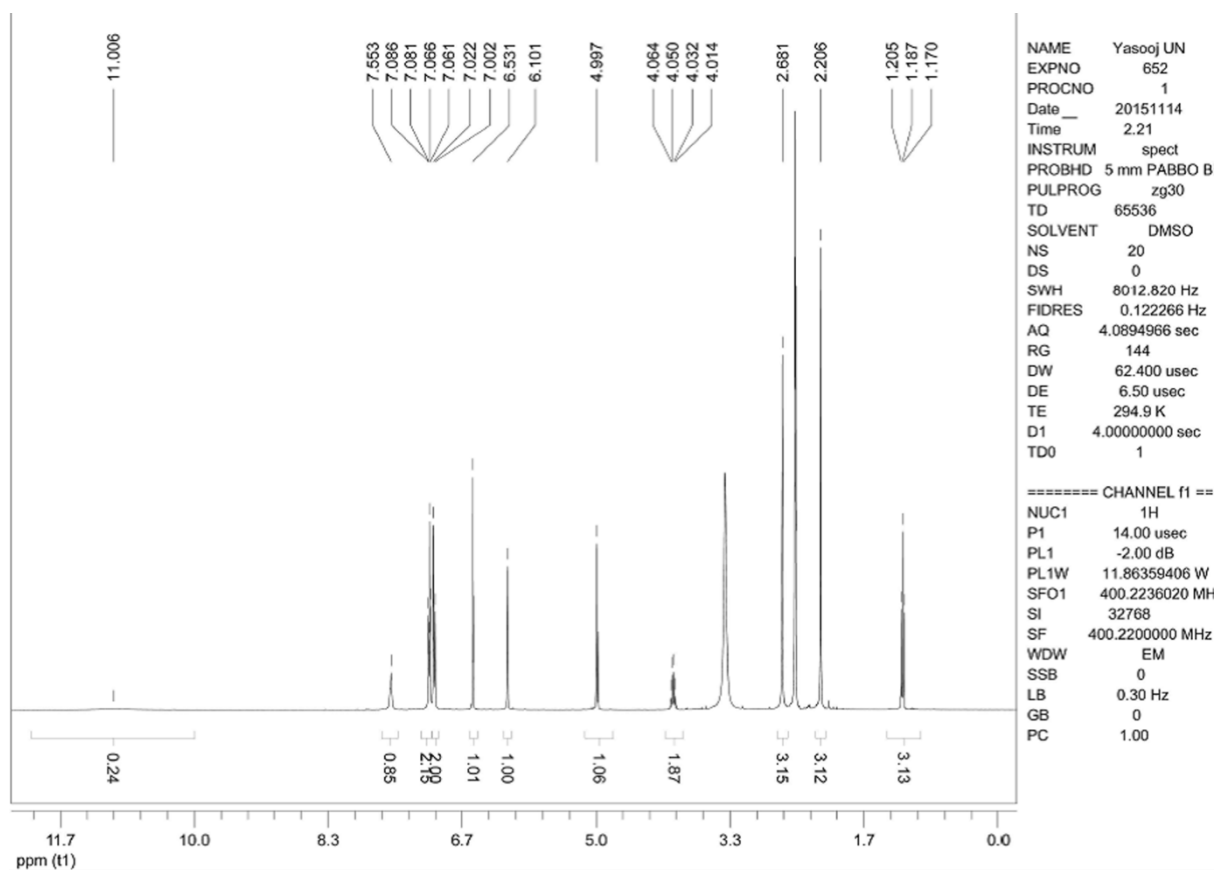
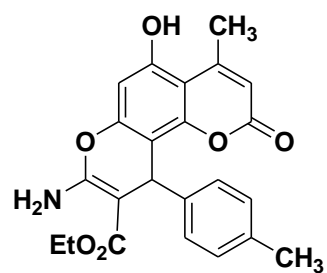
F2 - Processing parameters
SI 65536
SF 75.4677832 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

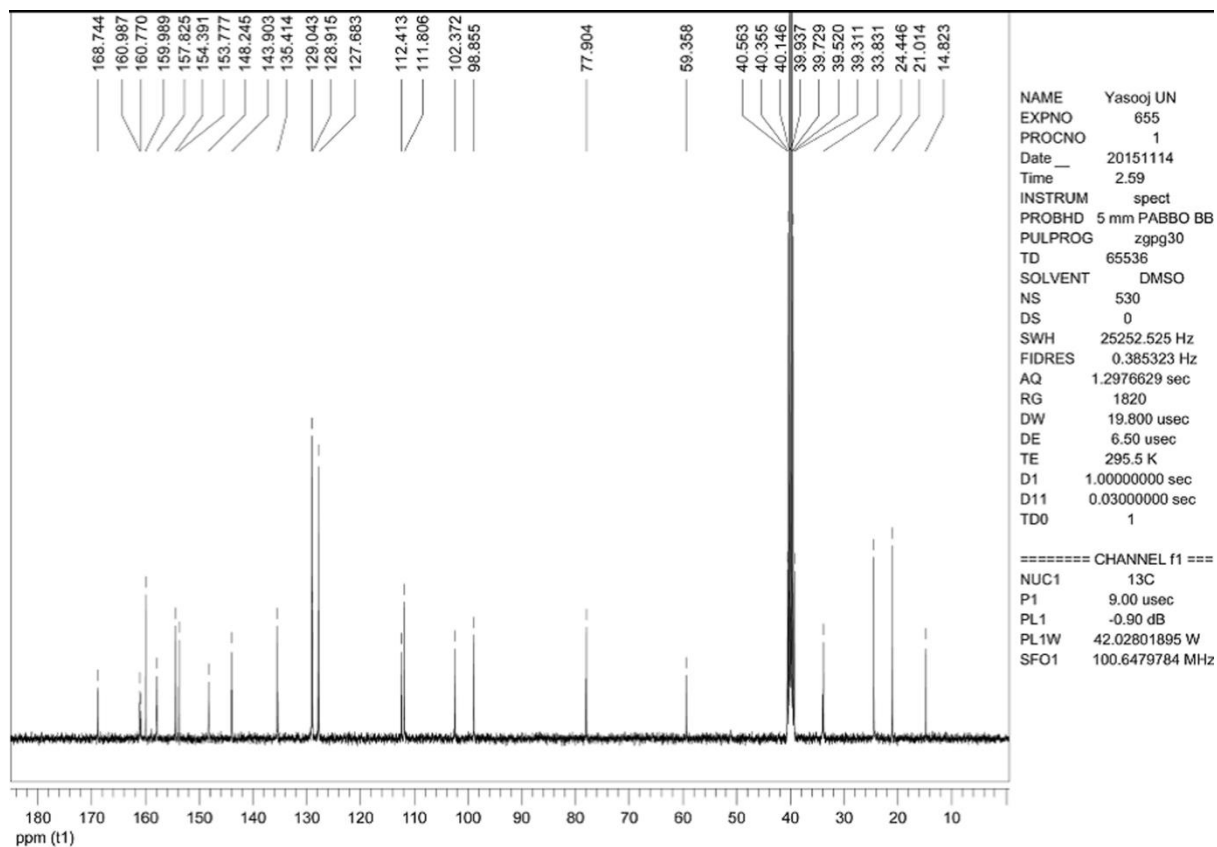
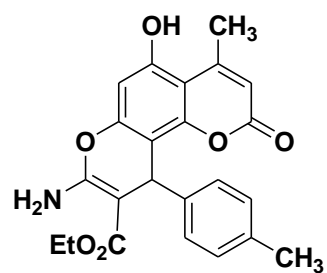
10 non plot parameters
CX 20.00 cm
CY 25.00 cm
F1 225.800 ppm
F2 16526.52 Hz
F3 -3.000 ppm
F4 -377.34 Hz
NUC1 13.00000 ppm/cm
NUC2 830.14557 Hz/cm

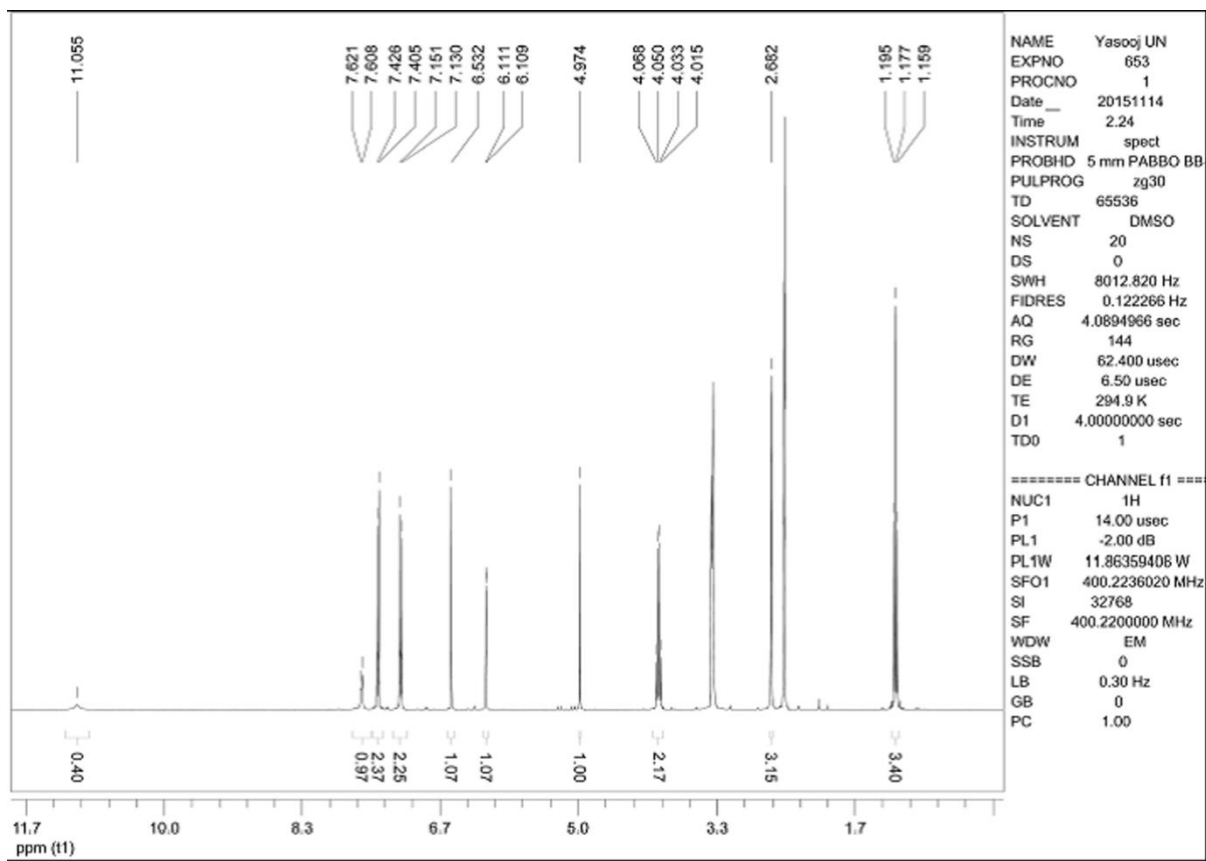
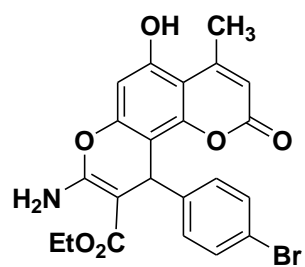


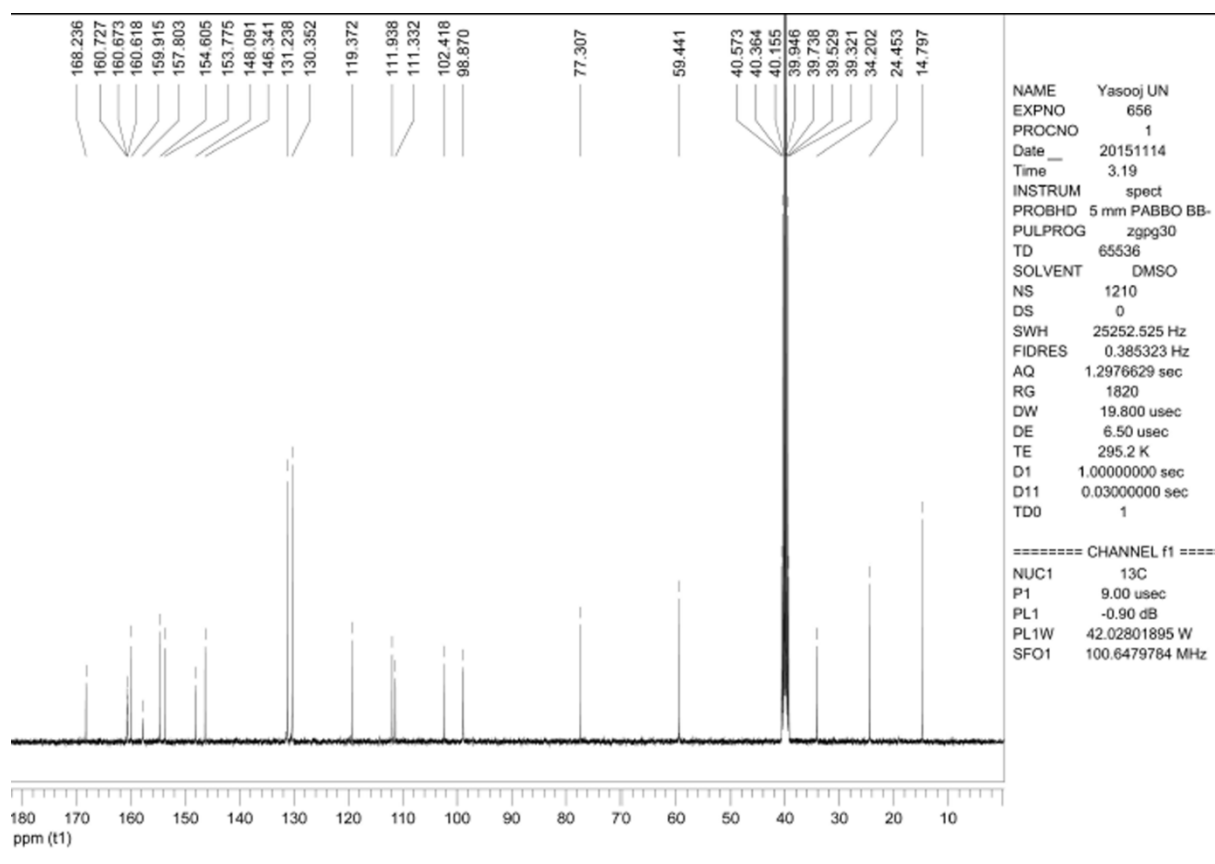


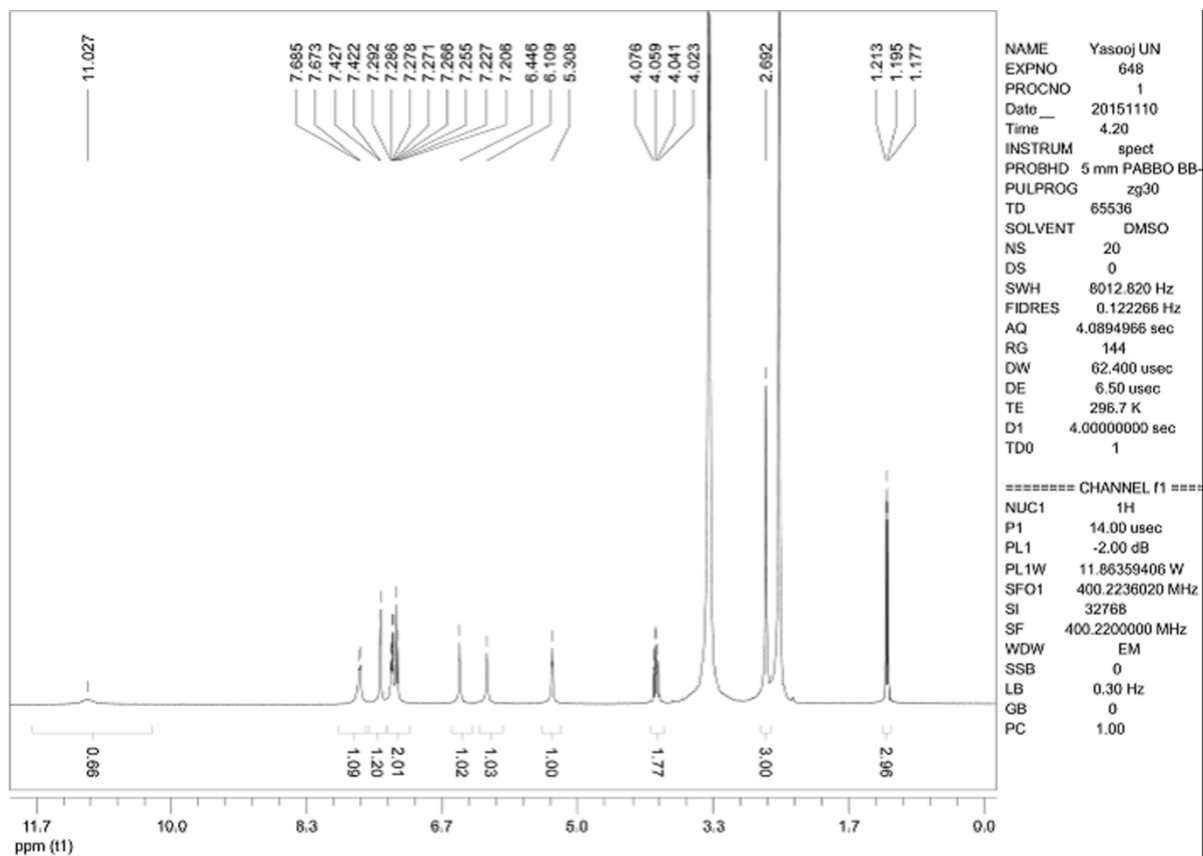
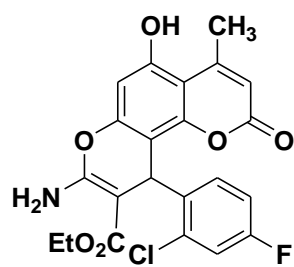


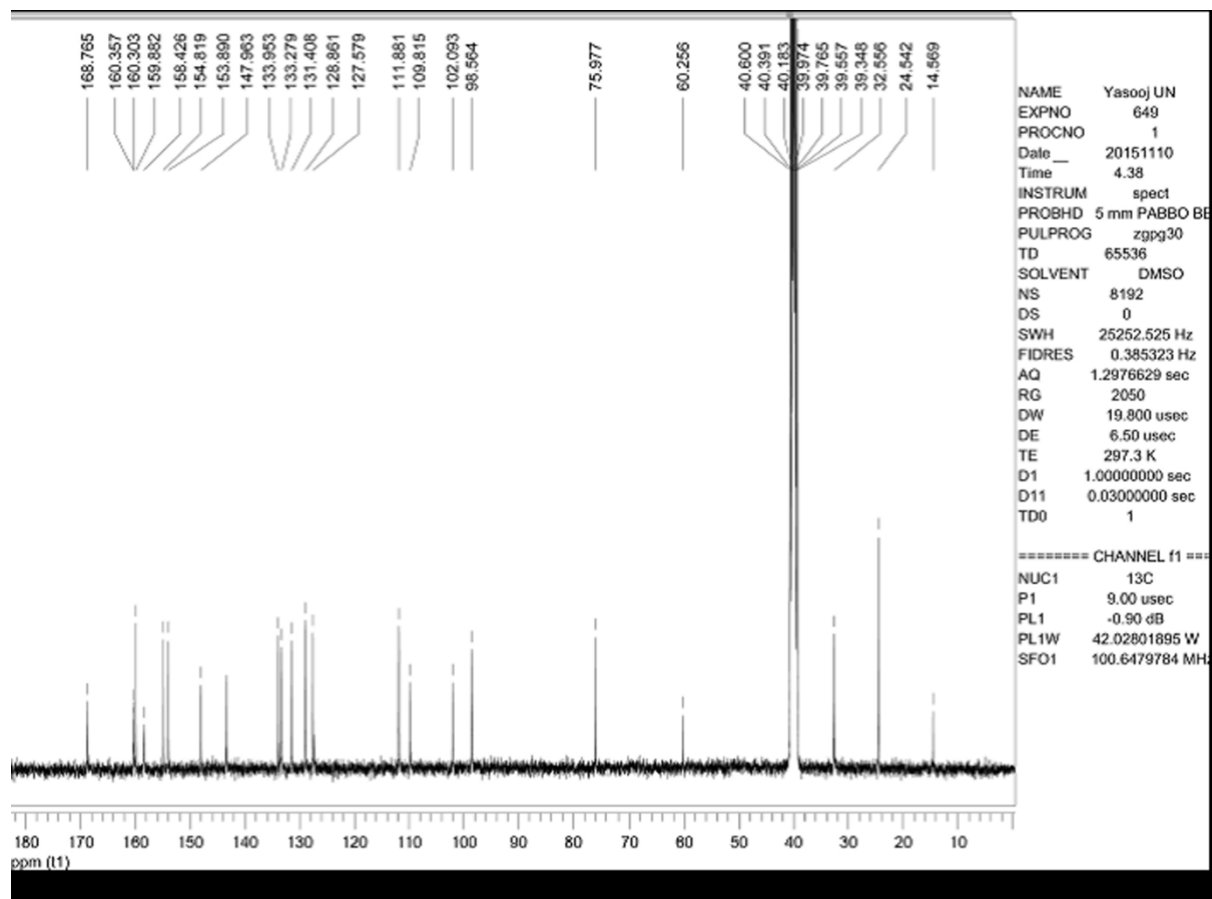
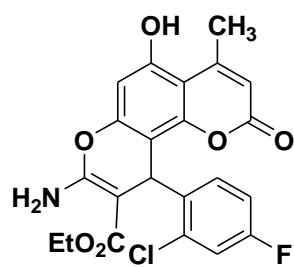


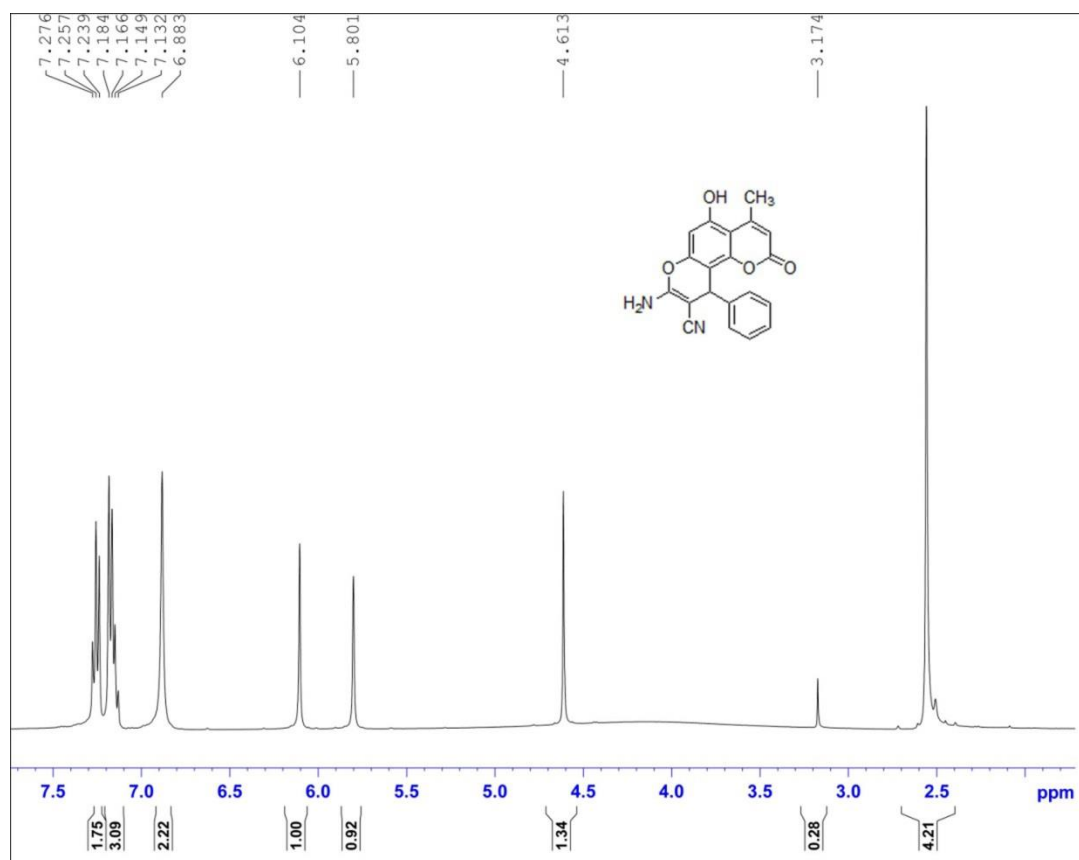


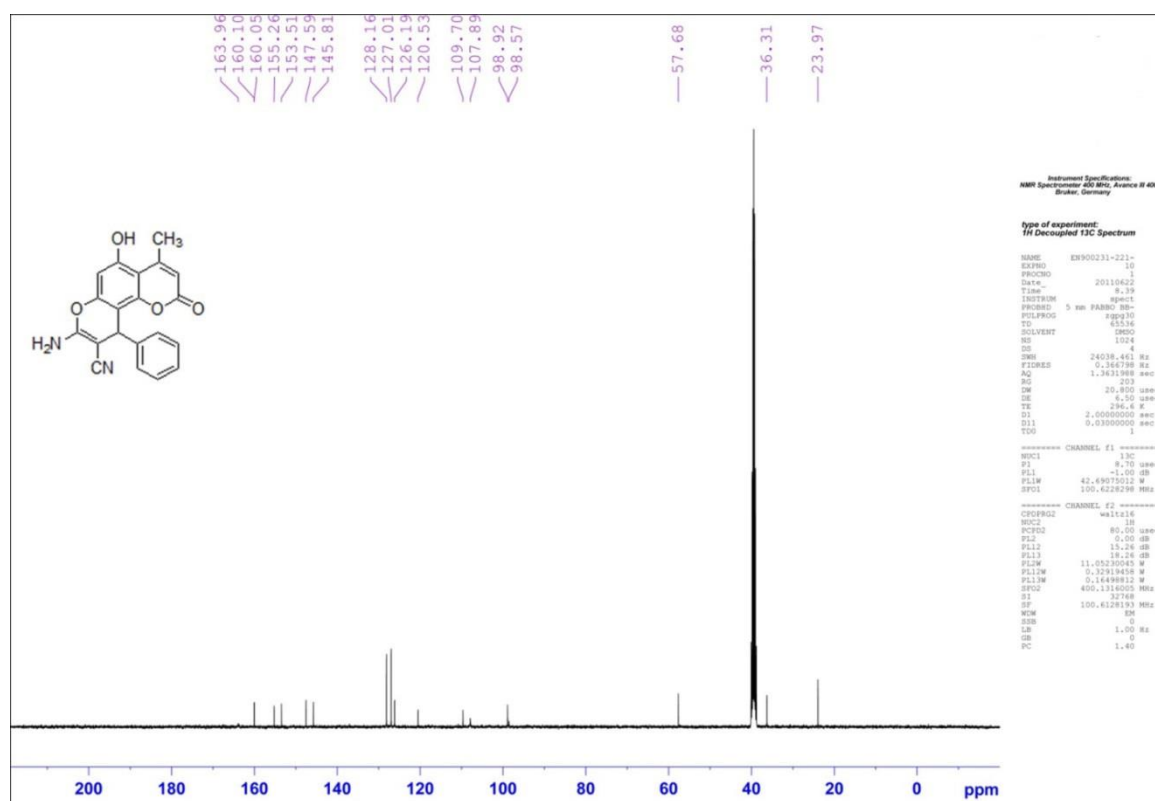


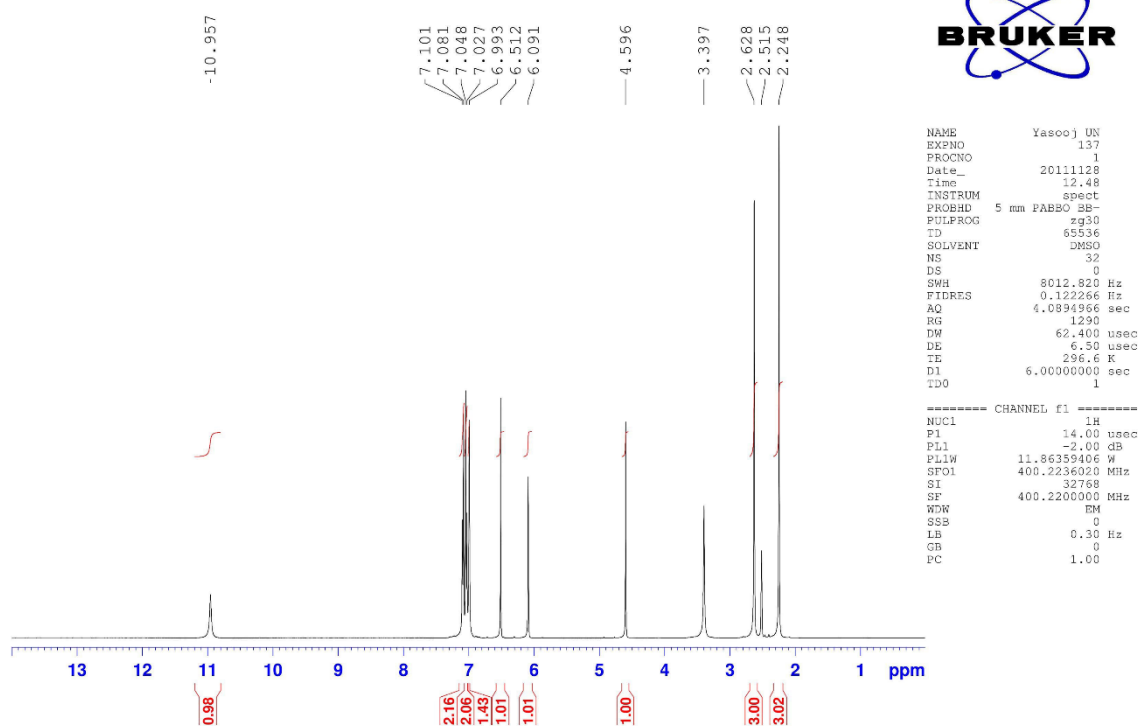
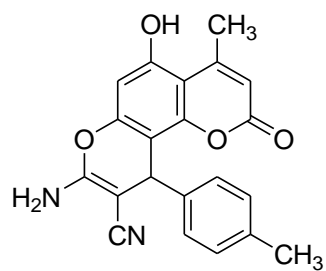


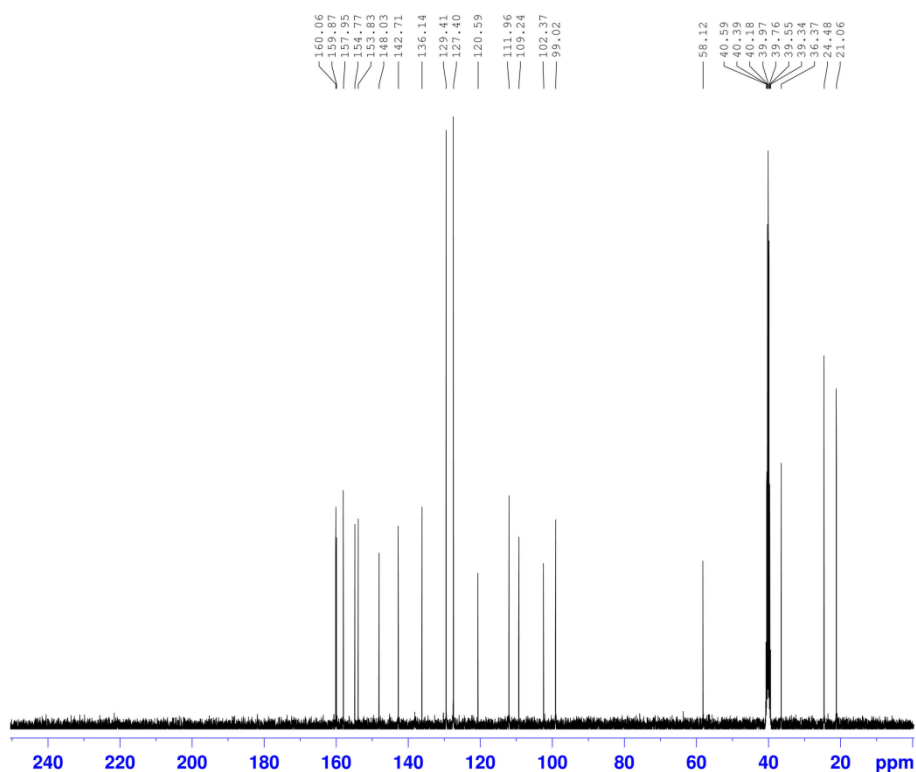
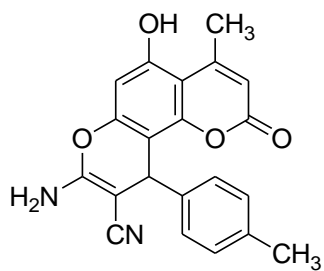












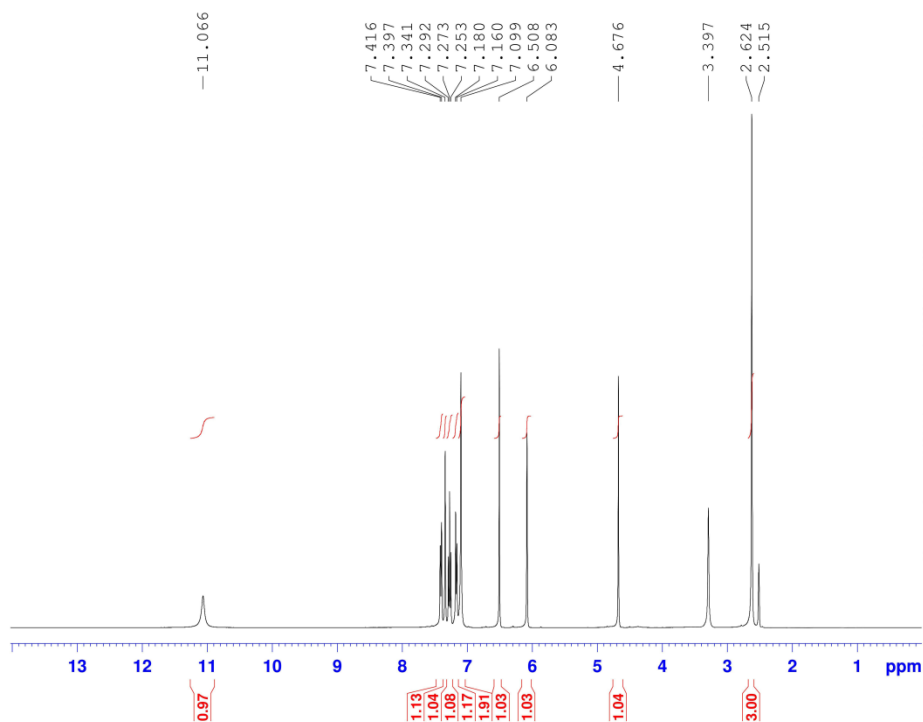
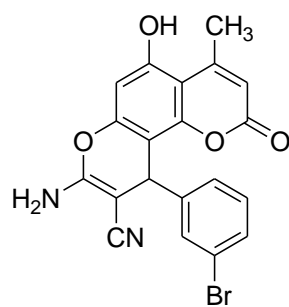
```

NAME      Yasooj UN
EXPNO     150
PROCNO    1
Date_     20111128
Time      15.24
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg
TD         65536
SOLVENT   DMSO
NS         130
DS         0
SWH        25252.525 Hz
FIDRES     0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 usec
DE         6.50 usec
TE         297.3 K
D1         3.0000000 sec
D11        0.0300000 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

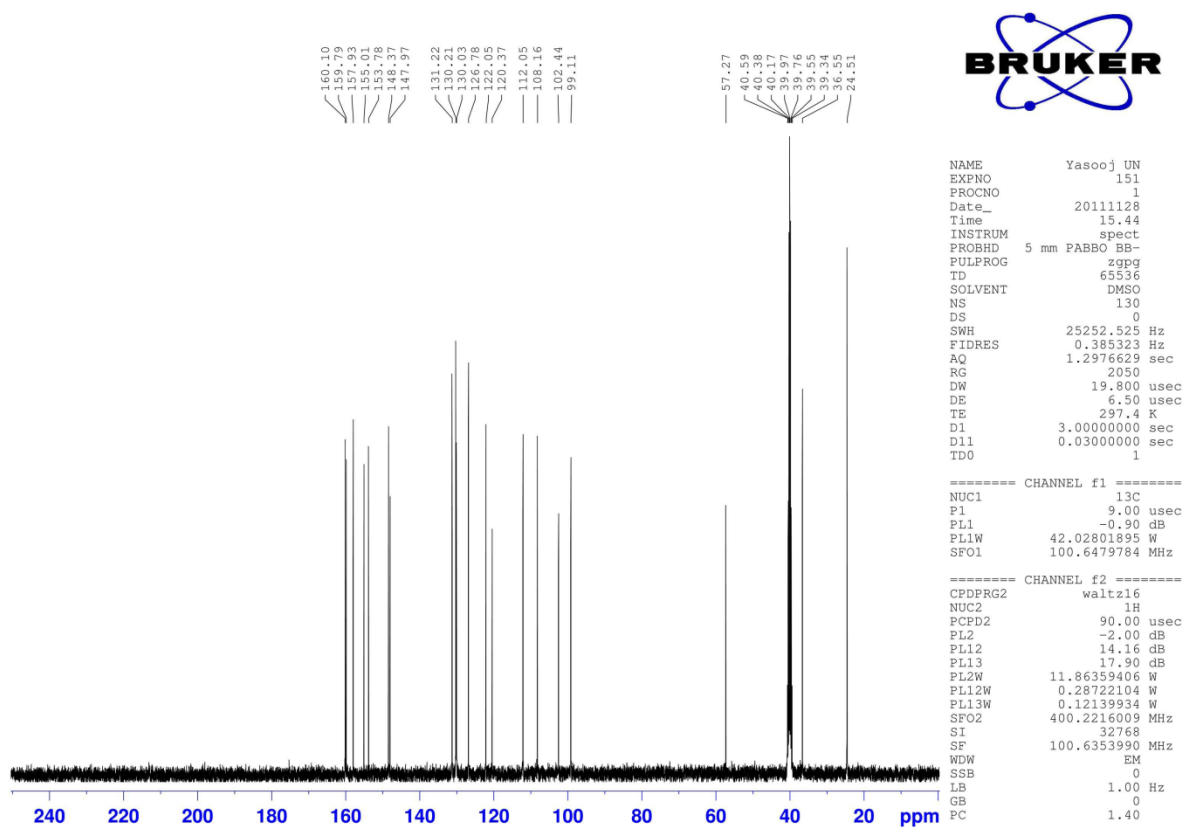
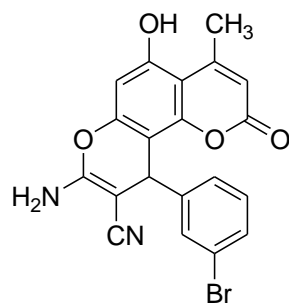
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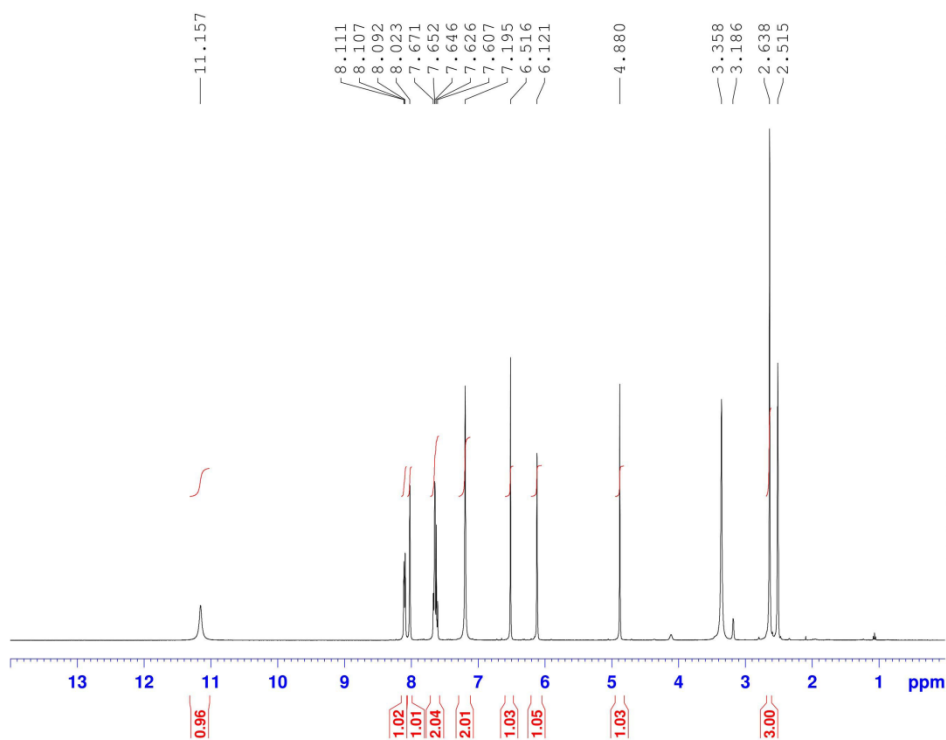
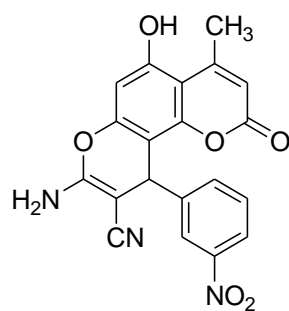


```

NAME      Yasooj UN
EXPNO     138
PROCNO    1
Date_     20111128
Time      12.57
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         1290
DW         62.400 usec
DE         6.50 usec
TE         296.7 K
D1         6.00000000 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

```



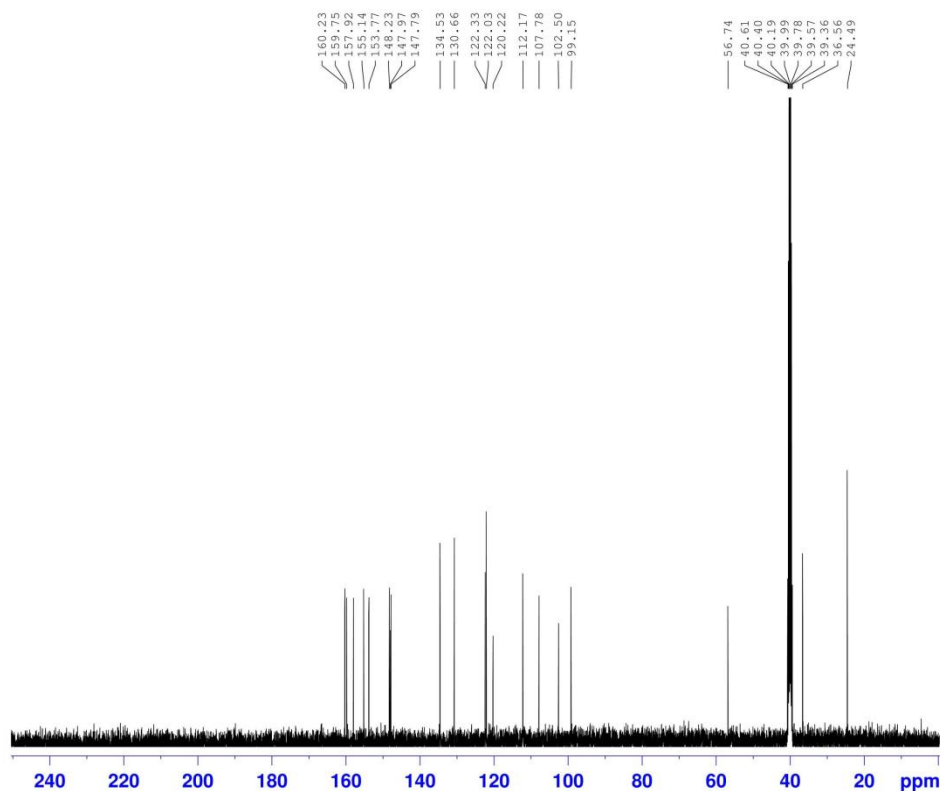
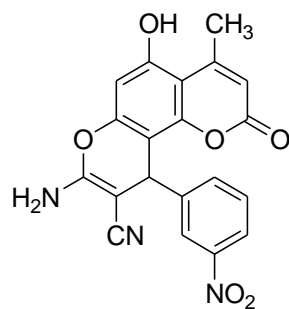


```

NAME      Yasooj UN
EXPNO     139
PROCNO    1
Date_     20111128
Time      13.06
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         2050
DW         62.400 usec
DE         6.50 usec
TE         296.7 K
D1         6.00000000 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

```



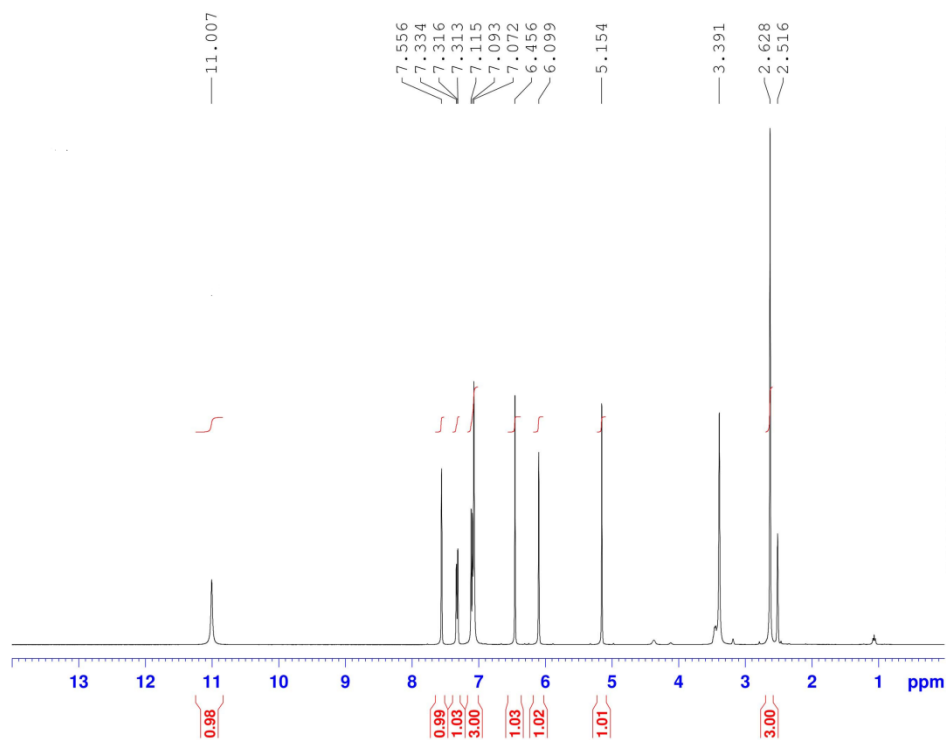
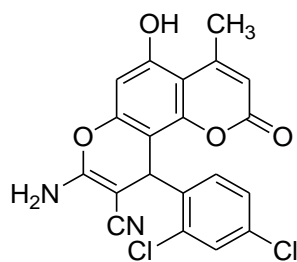
```

NAME      Yasooj UN
EXPNO     152
PROCNO    1
Date_     20111128
Time      15.53
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg
TD         65536
SOLVENT   DMSO
NS         152
DS         0
SWH        25252.525 Hz
FIDRES     0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 usec
DE         6.50 usec
TE         297.3 K
D1         3.00000000 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

```

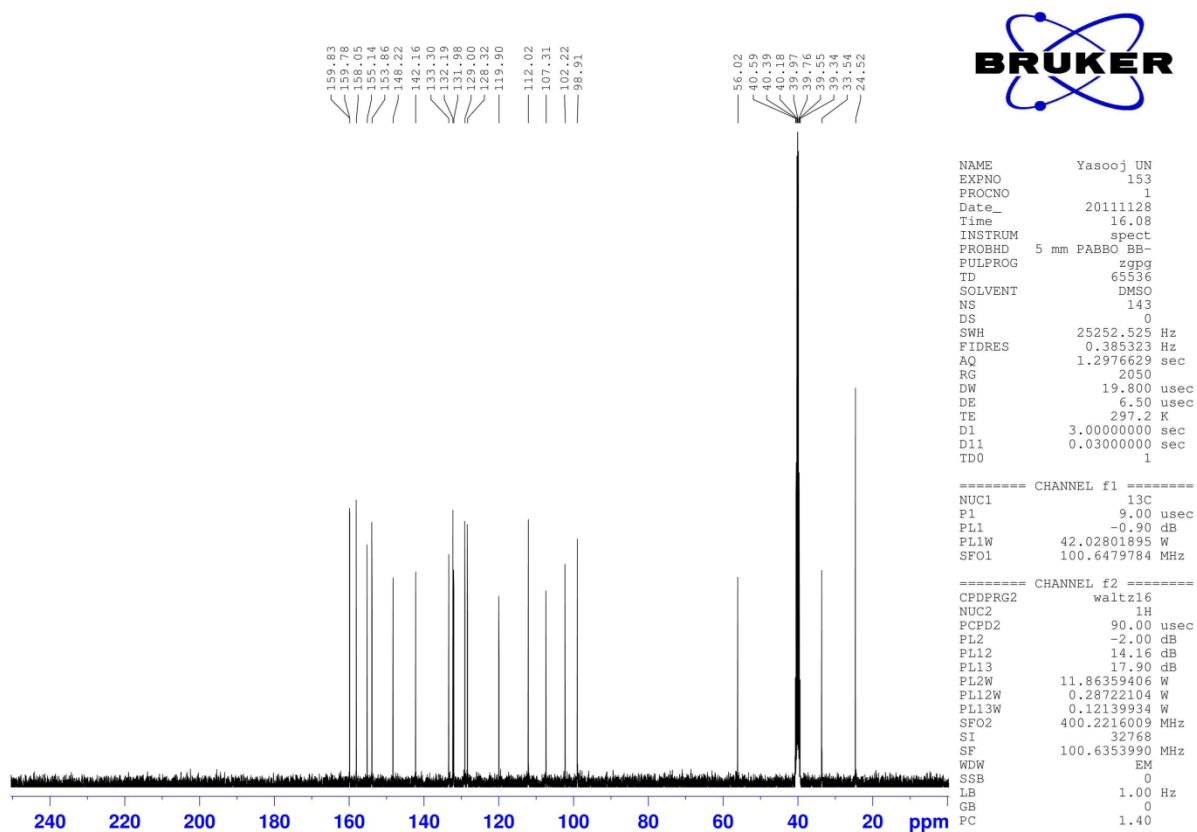
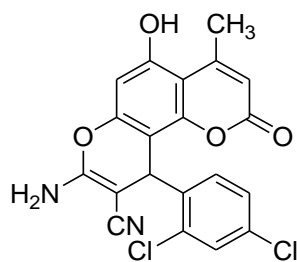


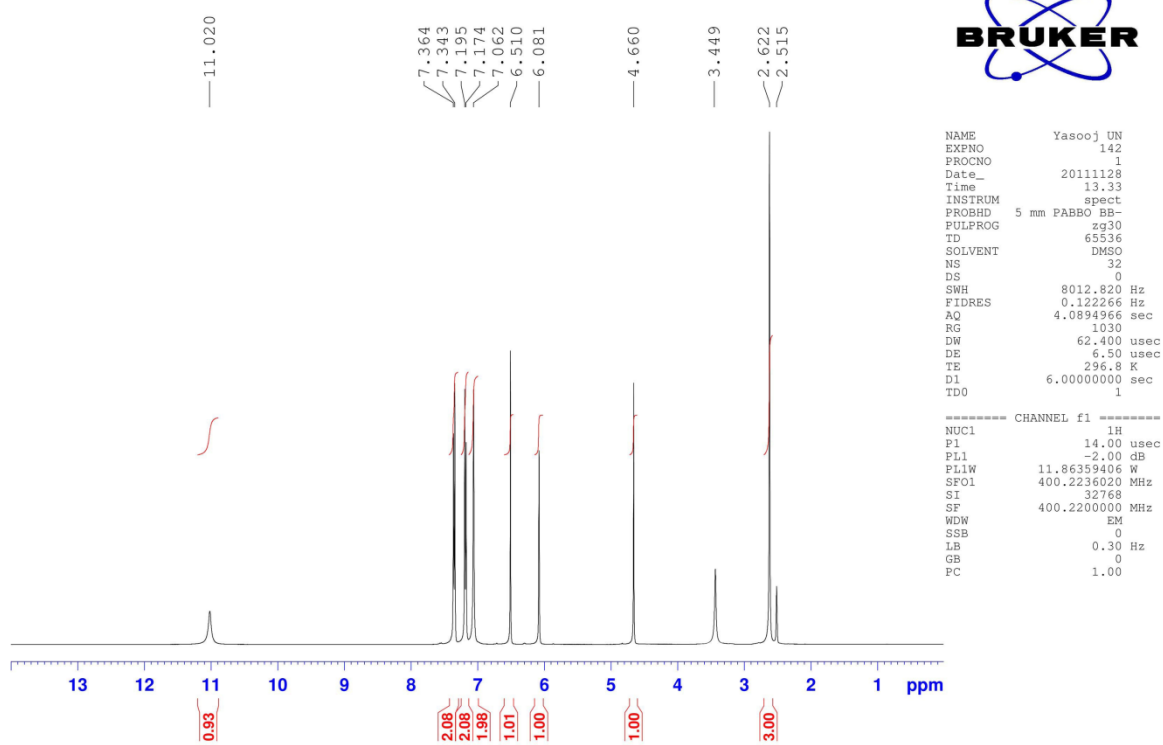
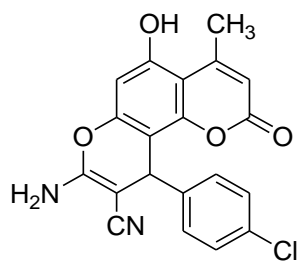
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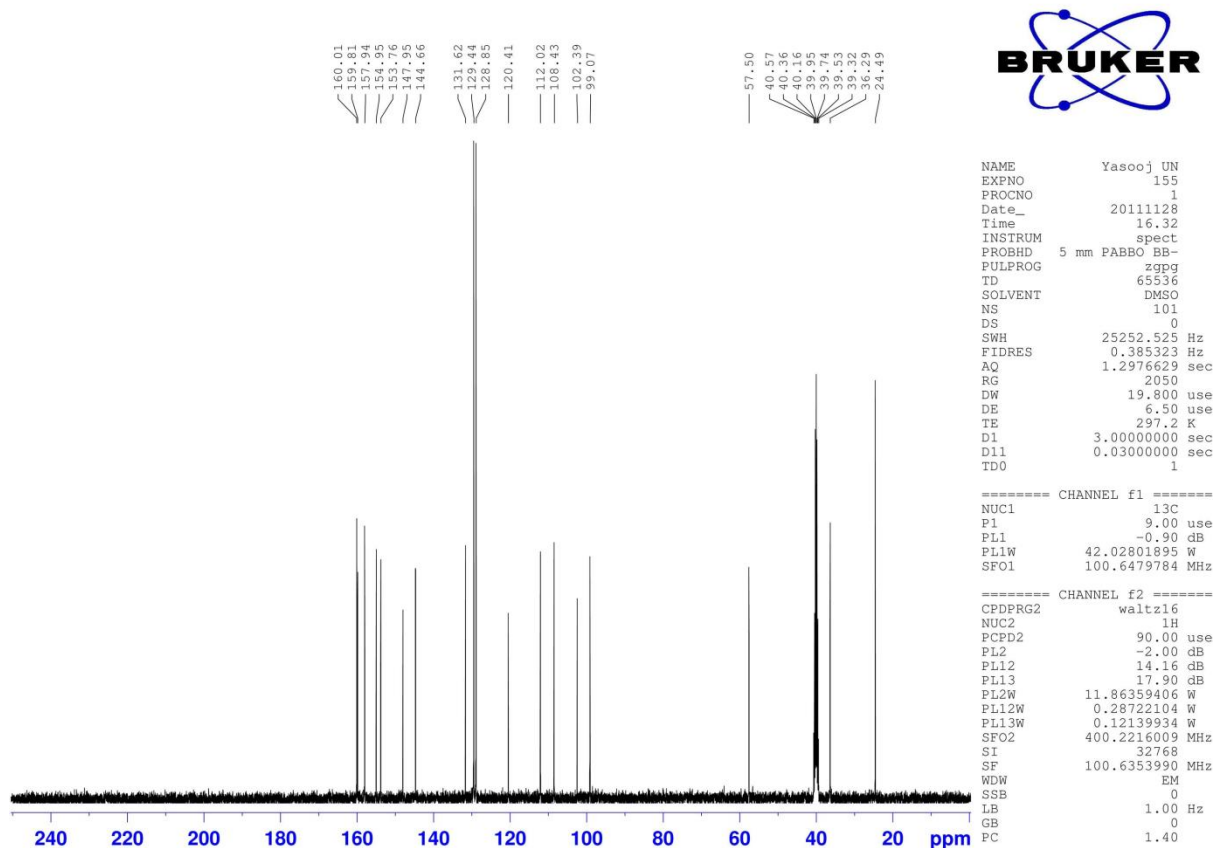
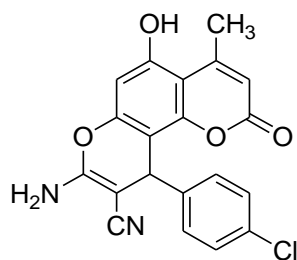
NAME      Yasooj UN
EXPNO     140
PROCNO    1
Date_     20111128
Time      13.15
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         1620
DW         62.400 usec
DE         6.50 usec
TE         296.7 K
D1         6.00000000 sec
TD0        1

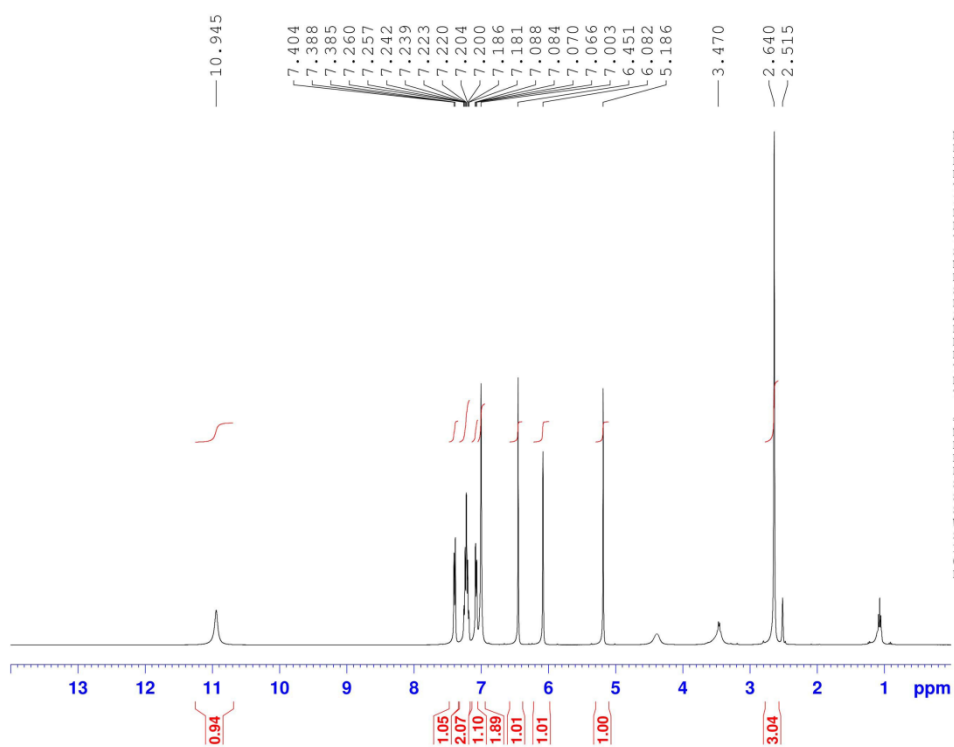
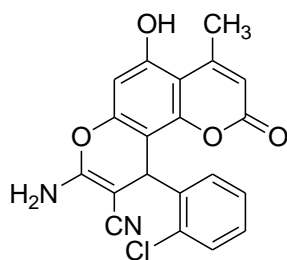
===== CHANNEL f1 =====
NUC1       1H
P1         14.00 usec
PL1        -2.00 dB
PL1W       11.86359406 W
SFO1       400.2236020 MHz
SI         32768
SF         400.2200000 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```





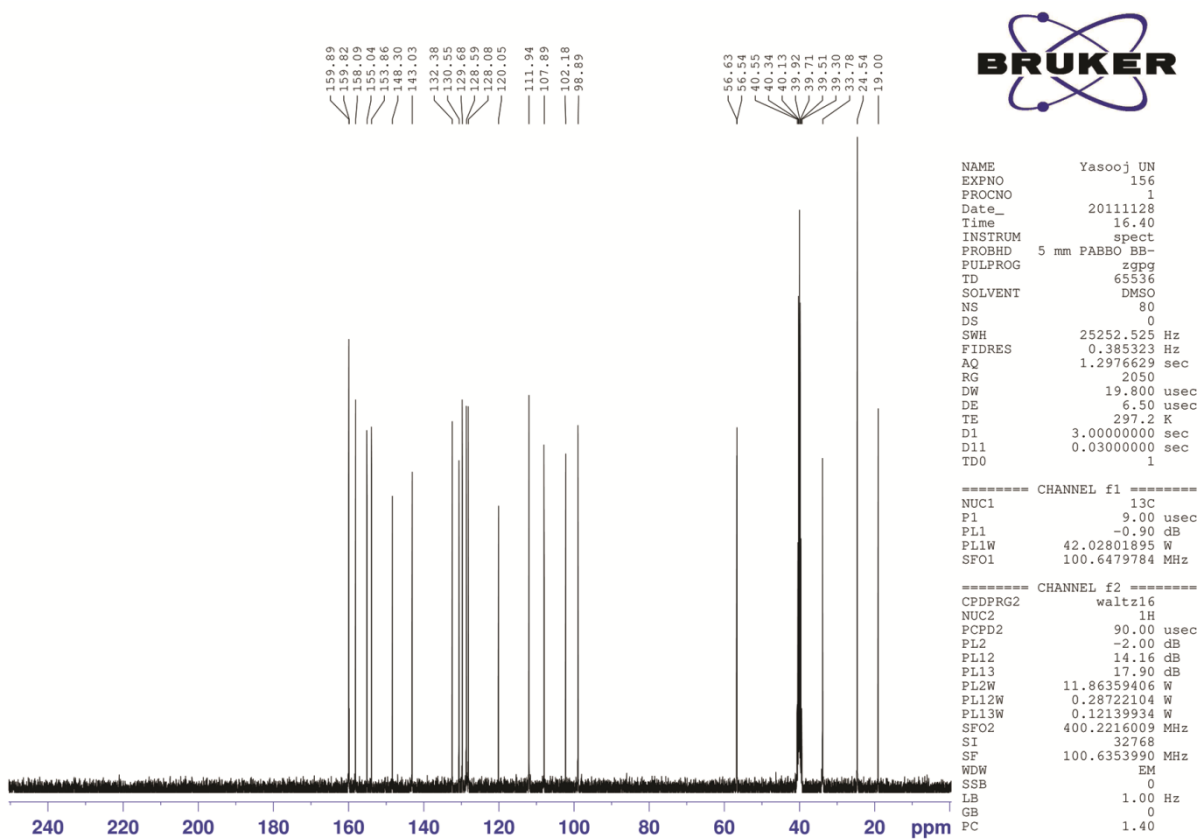
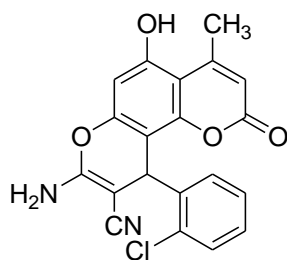


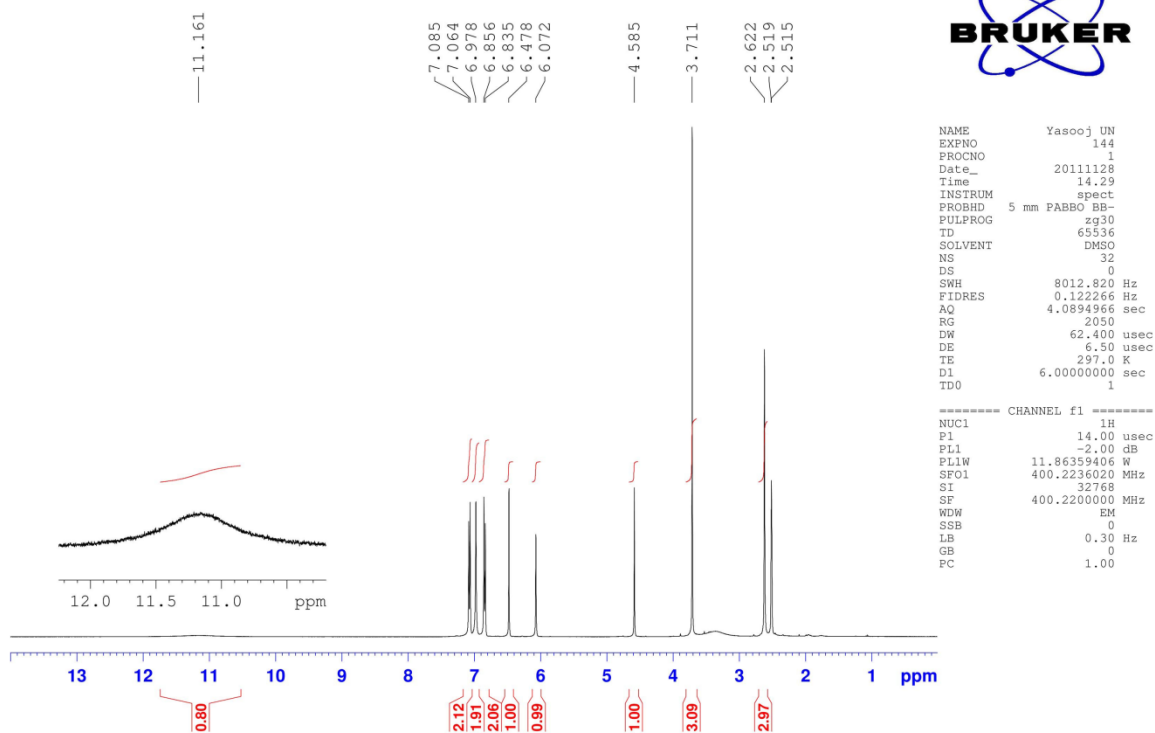
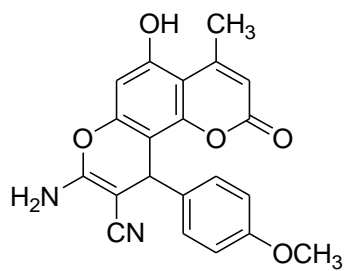
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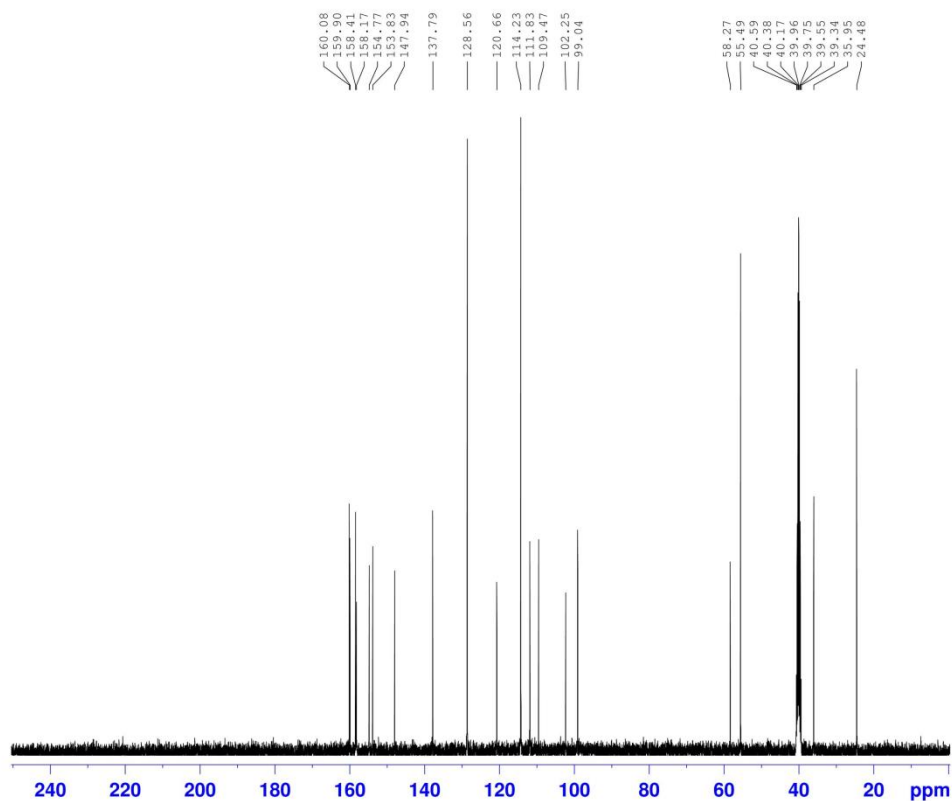
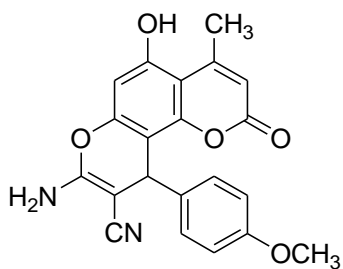
NAME      Yasooj UN
EXPNO     143
PROCNO    1
Date_     20111128
Time      13.41
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         144
DW         62.400 usec
DE         6.50 usec
TE         296.9 K
D1         6.00000000 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

```







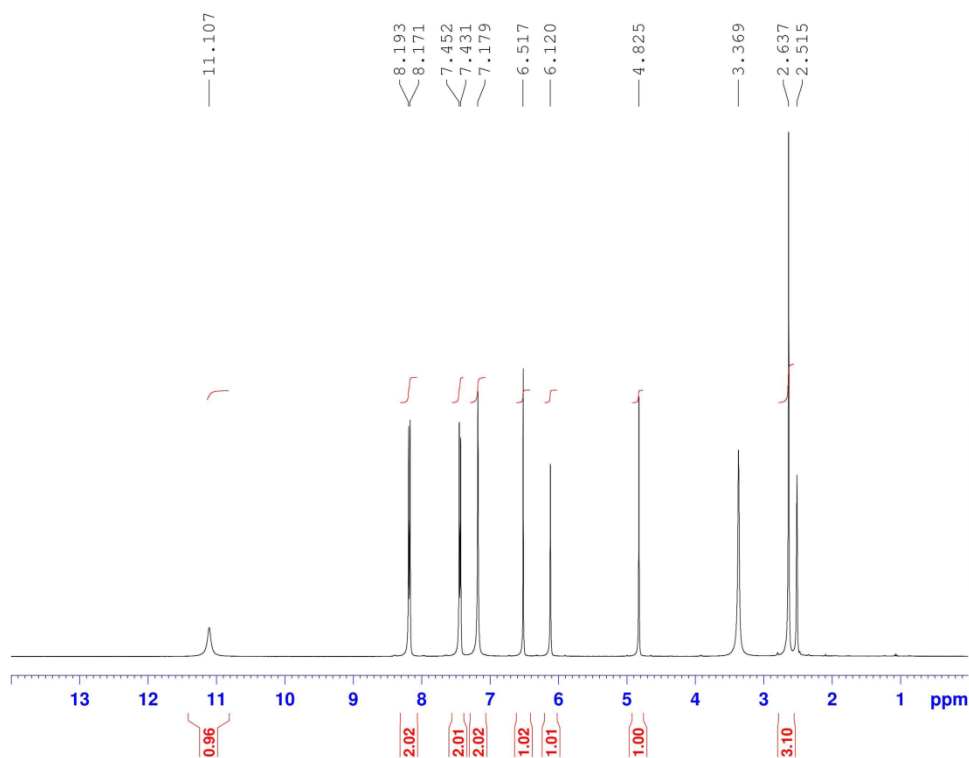
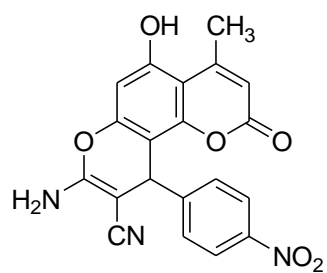
```

NAME      Yasooj UN
EXPNO     157
PROCNO    1
Date_     20111128
Time      16.55
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpgg
TD         65536
SOLVENT   DMSO
NS         111
DS         0
SWH        25252.525 Hz
FIDRES     0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 usec
DE         6.50 usec
TE         297.1 K
D1         3.00000000 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

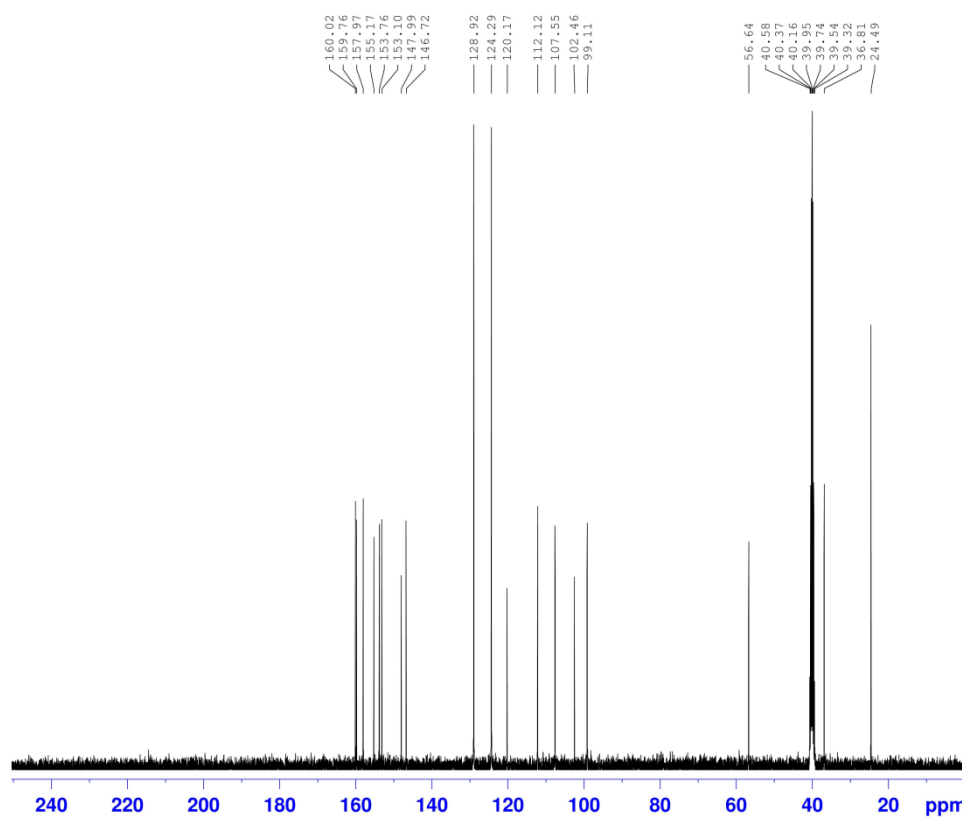
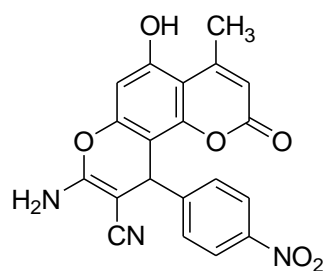
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W       11.86359406 W
PL12W      0.28722104 W
PL13W      0.12139934 W
SFO2       400.2216009 MHz
SI         32768
SF         100.6353990 MHz
WDW        EM
SSB 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

```



NAME Yasooj UN
 EXPNO 145
 PROCNO 1
 Date_ 20111128
 Time 14.38
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 32
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 2050
 DW 62.400 usec
 DE 6.50 usec
 TE 297.0 K
 D1 6.00000000 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     158
PROCNO    1
Date_     20111128
Time      17.11
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg
TD         65536
SOLVENT   DMSO
NS         110
DS         0
SWH        25252.525 Hz
FIDRES     0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 usec
DE         6.50 usec
TE         297.2 K
D1         3.00000000 sec
D11        0.03000000 sec
TD0        1

```

```

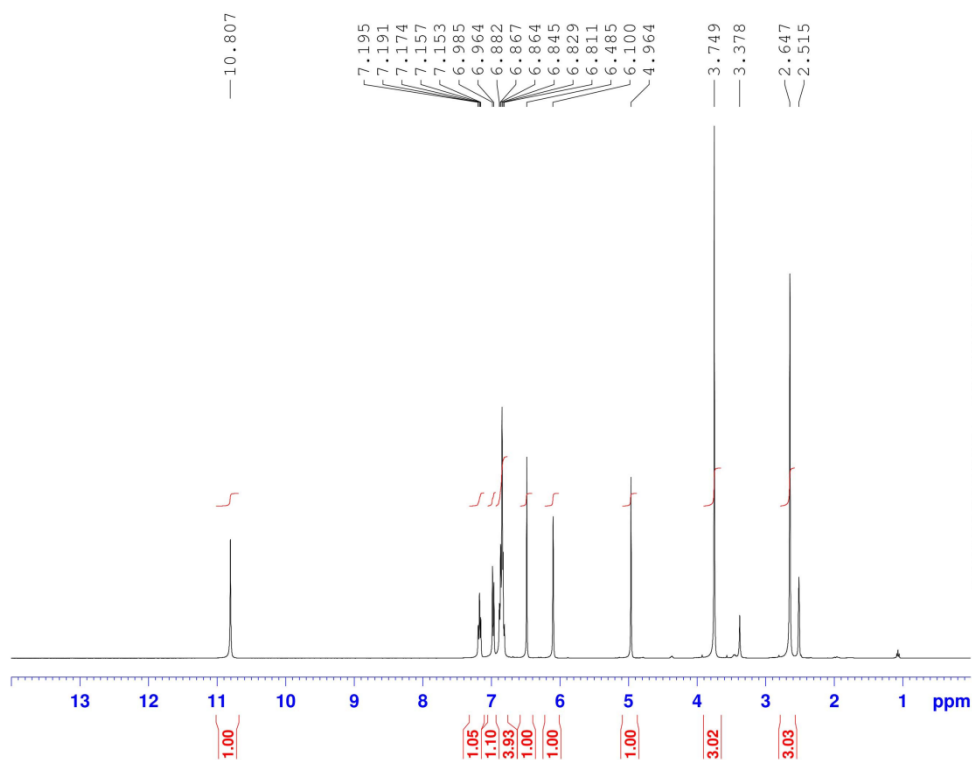
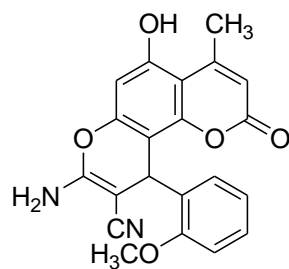
===== CHANNEL f1 =====
NUC1       13C
P1         9.00 usec
PL1        -0.90 dB
PL1W       42.02801895 W
SFO1       100.6479784 MHz

```

```

===== 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

```

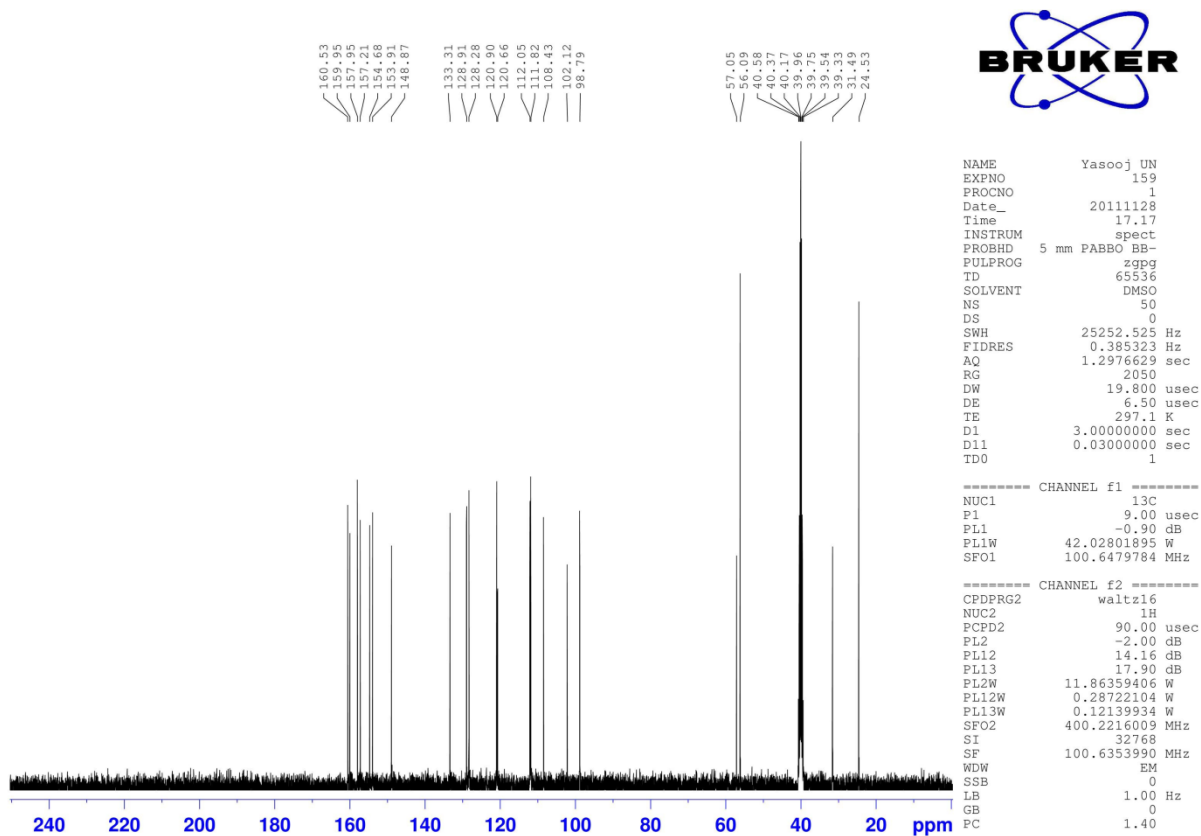
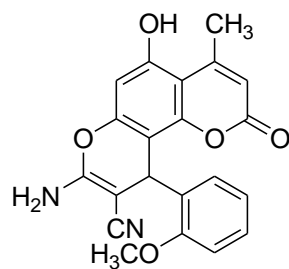


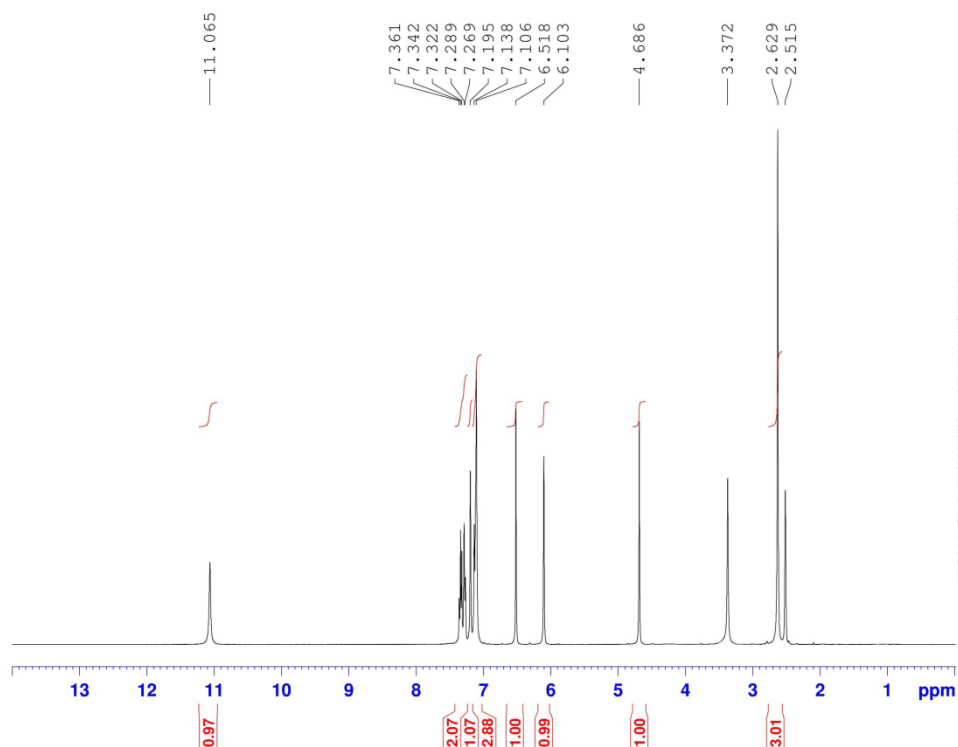
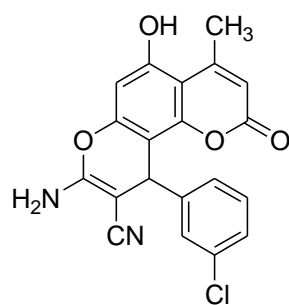
```

NAME      Yasooj UN
EXPNO     146
PROCNO    1
Date_     20111128
Time      14.48
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         1620
DW         62.400 usec
DE         6.50 usec
TE         297.0 K
D1         6.00000000 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

```





```

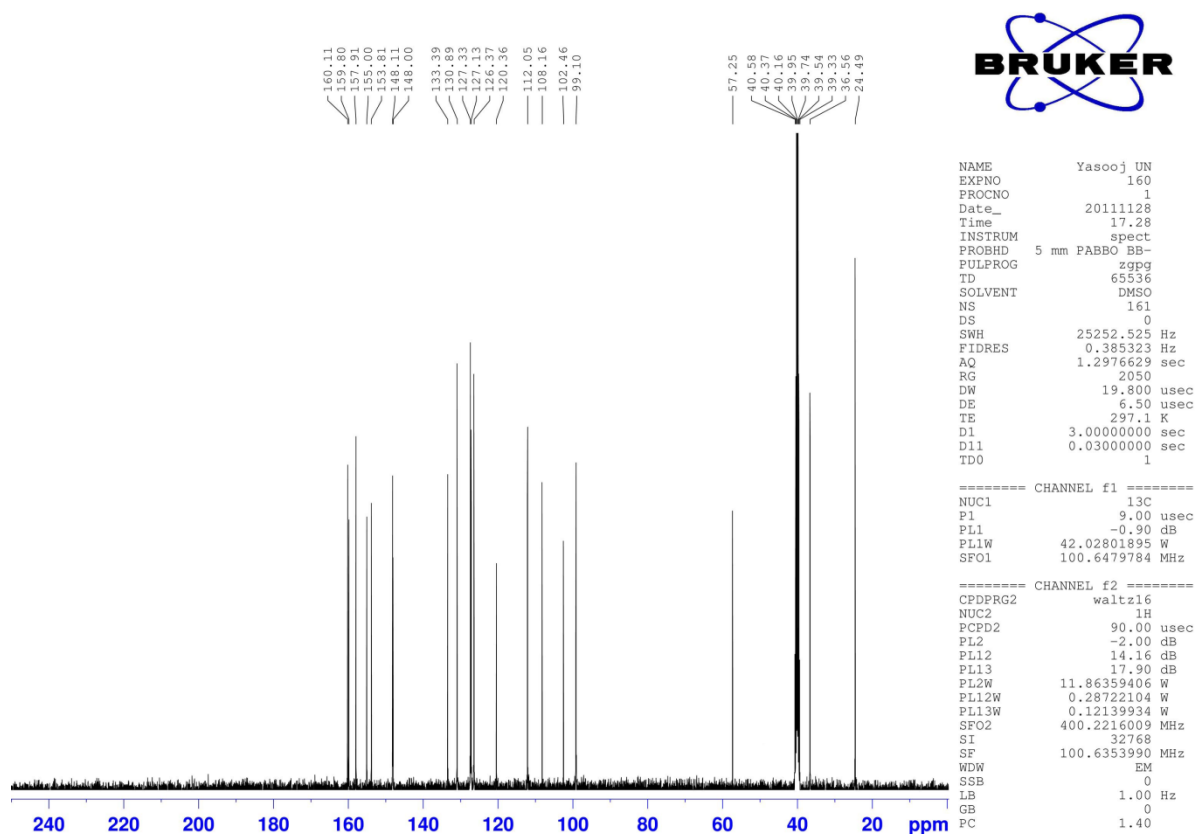
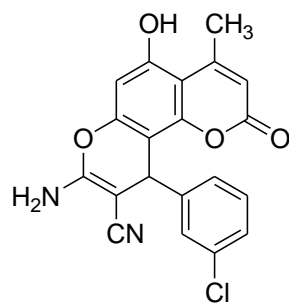
NAME      Yasooj UN
EXPNO     147
PROCNO    1
Date_     20111128
Time      14.57
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         1620
DW         62.400 usec
DE         6.50 usec
TE         297.0 K
D1         6.00000000 sec
TD0        1

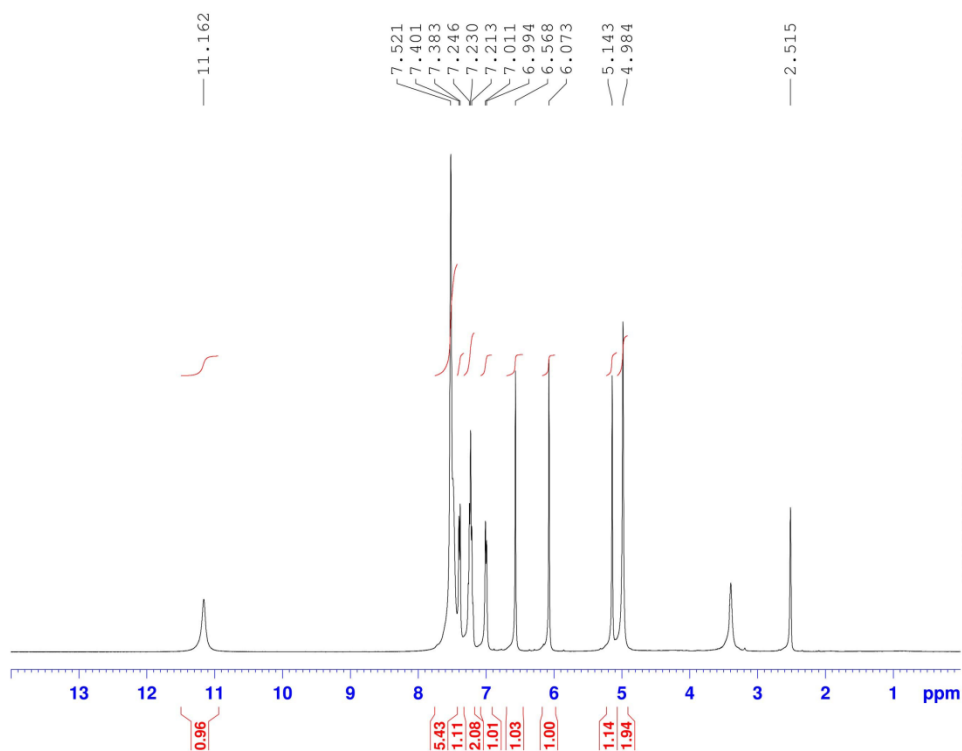
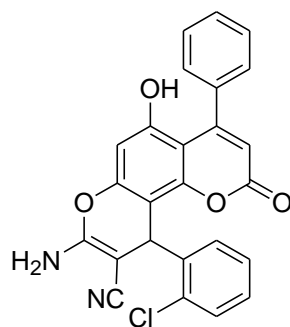
```

```

===== 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

```



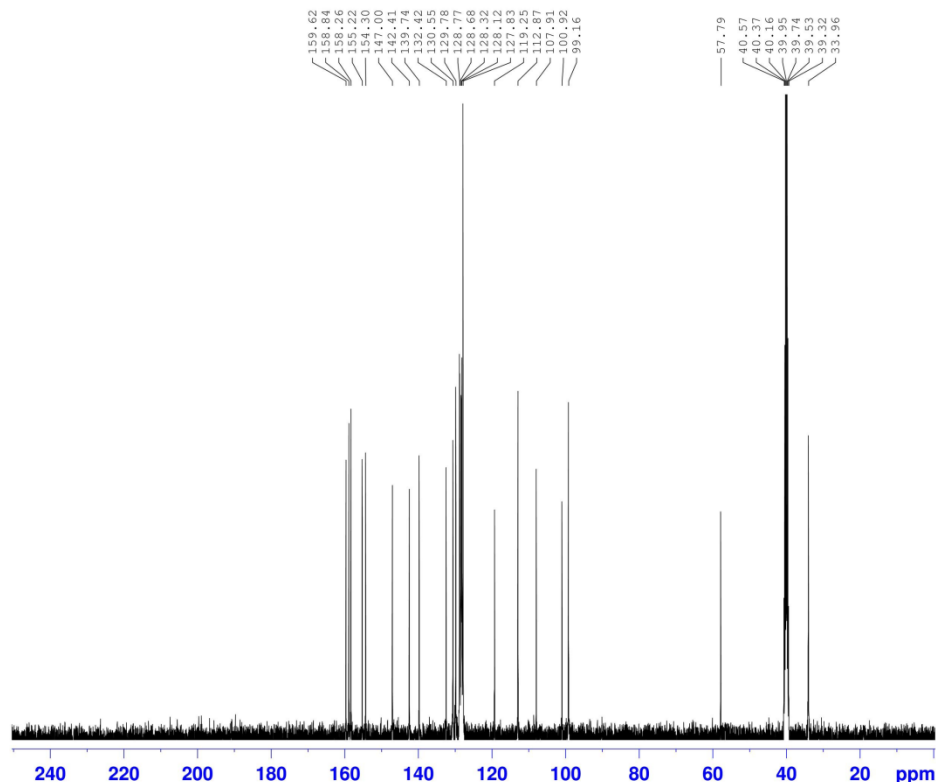
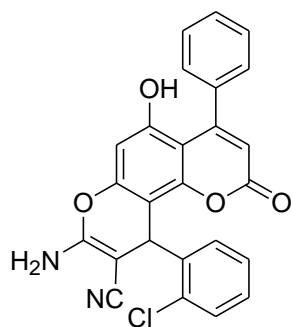


```

NAME      Yasooj UN
EXPNO     148
PROCNO    1
Date_     20111128
Time      15.06
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         1290
DW         62.400 usec
DE         6.50 usec
TE         297.0 K
D1         6.00000000 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

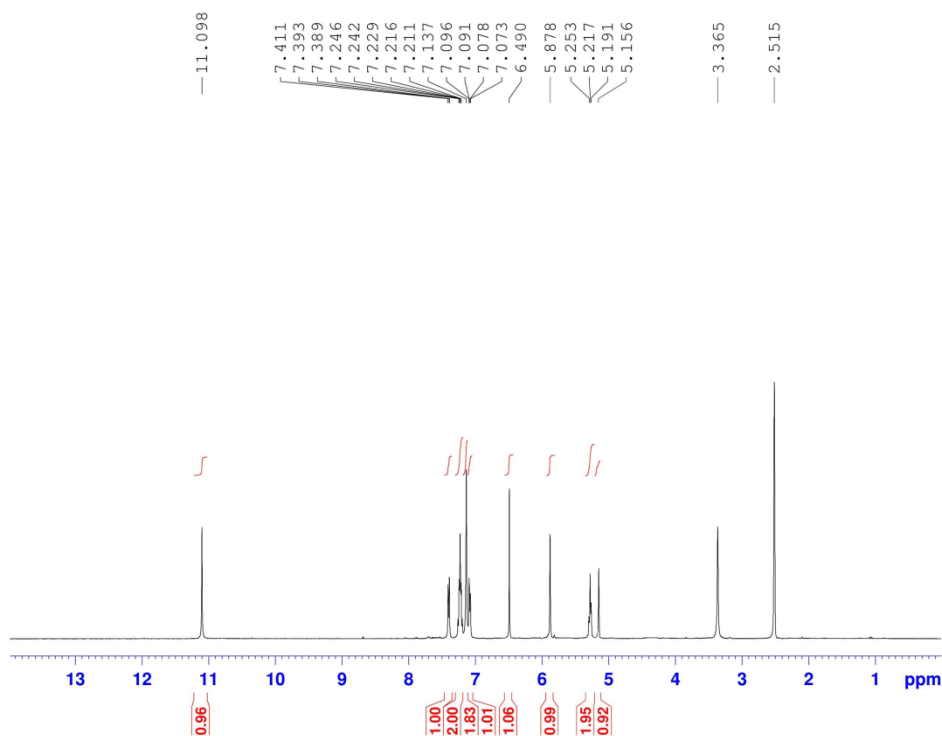
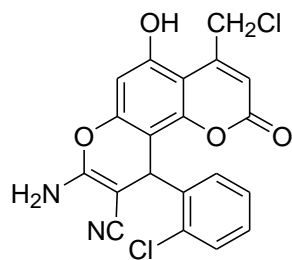
```



NAME Yasooj UN
EXPNO 161
PROCNO 1
Date_ 20111128
Time 17.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg
TD 65536
SOLVENT DMSO
NS 130
DS 0
SWH 25252.525 Hz
FIDRES 0.385323 Hz
AQ 1.2976629 sec
RG 2050
DW 19.800 usec
DE 6.50 usec
TE 297.1 K
D1 3.00000000 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     149
PROCNO    1
Date_     20111128
Time      15.20
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         2050
DW         62.400 usec
DE         6.50 usec
TE         297.1 K
D1         6.00000000 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

```

