

Supplementary material

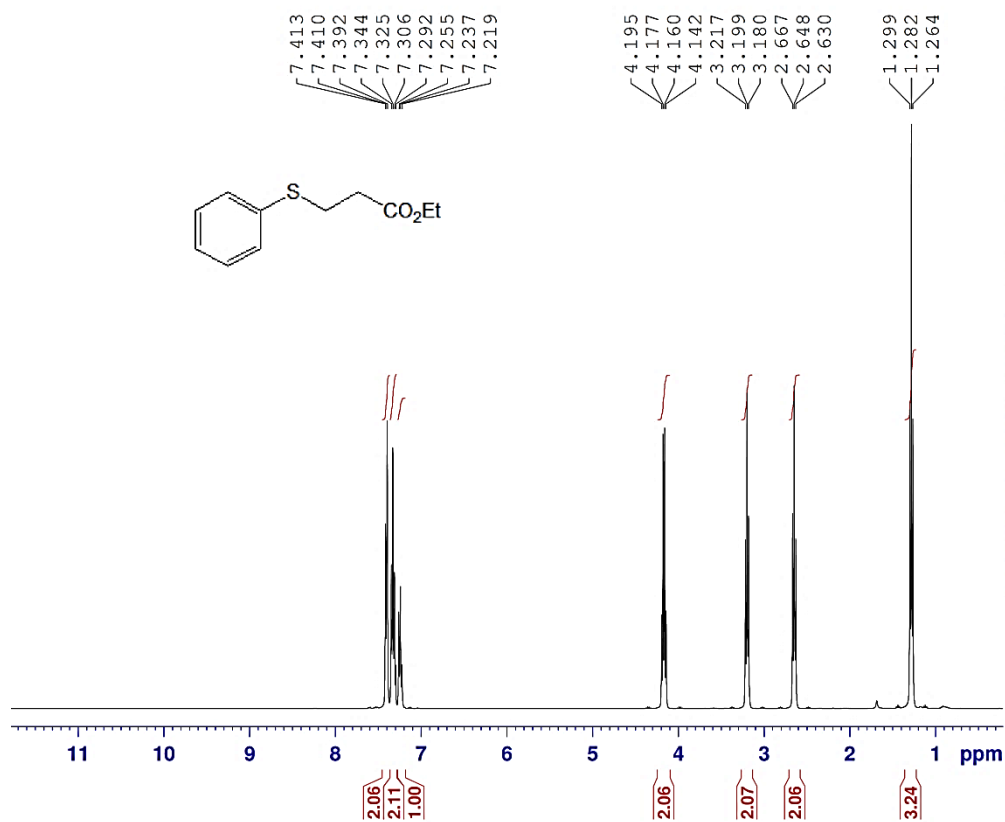
One-pot and Odorless Thia-Michael Reaction by Copper Ferrite Nanoparticles Catalyzed Reaction of Elemental Sulfur, Aryl Halides and Electron-deficient Alkenes

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45195-1159, Gava zang, Zanjan 45137-6731, Iran

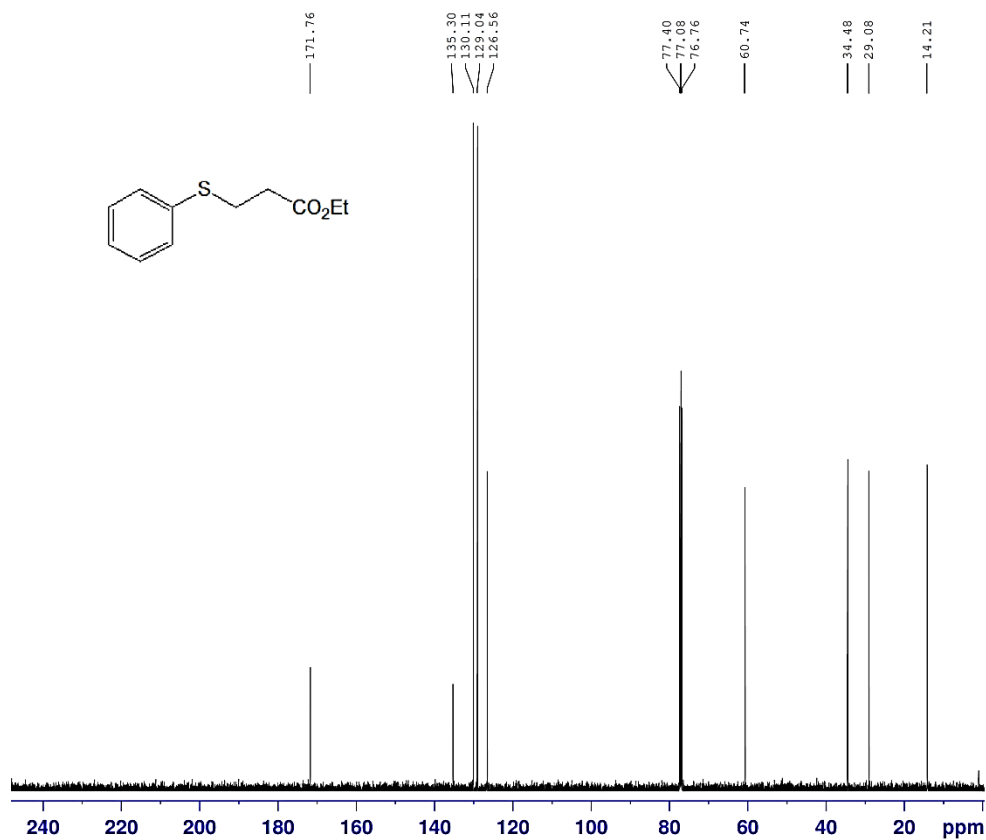
^bThe Late Professor Ali Akbar Moshfegh Laboratory, Department of Chemistry, College of
Sciences Shiraz University, Shiraz, 71454, Iran



NAME Dr.Gholi nejad
 EXPNO 329
 PROCNO 1
 Date_ 20130206
 Time 9.38
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 10
 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 296.5 K
 D1 6.0000000 sec
 TDO 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

¹H NMR of 1a



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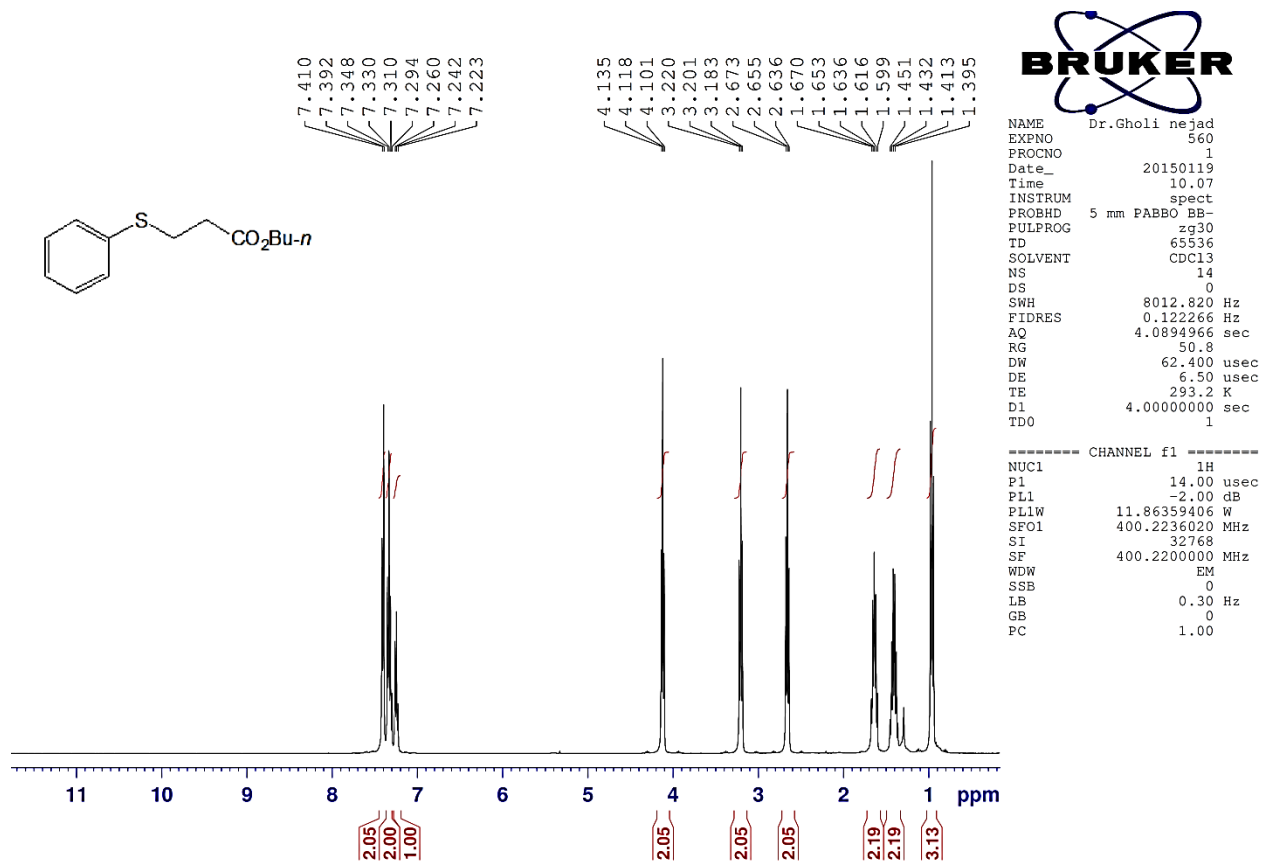
NAME      Dr.Gholi nejad
EXPNO     330
PROCNO    1
Date_     20130206
Time      9.41
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         80
DS         0
SWH       25252.525 Hz
FIDRES    0.385323 Hz
AQ        1.2976629 sec
RG         2050
DW        19.800 usec
DE         6.50 usec
TE         296.6 K
D1         2.00000000 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

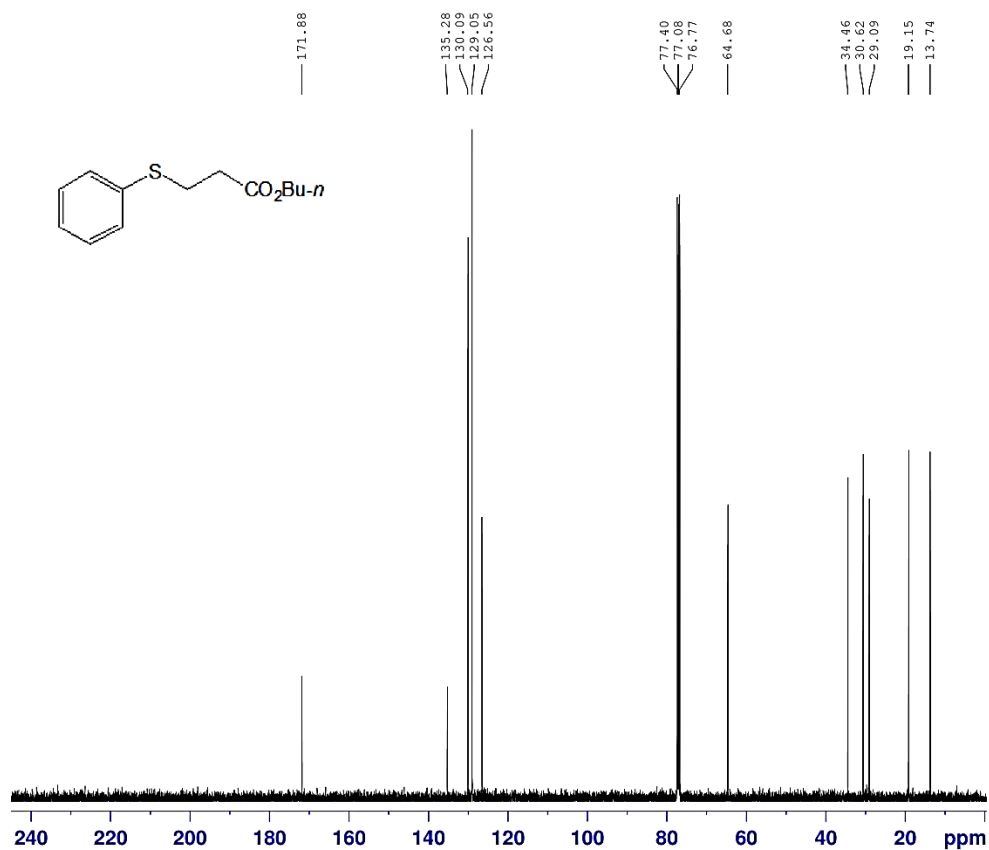
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL12W      11.86359406 W
PL13W      0.28722104 W
SFO2       400.2216009 MHz
SI         32768
SF         100.6353990 MHz
WDW        EM
SSB         0
LB         1.00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

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¹³C NMR of **1a**



¹H NMR of **1b**



Dr.Gholi nejad

```

NAME      Dr.Gholi nejad
EXPNO     561
PROCNO    1
Date_     20150119
Time      10.10
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        100
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        293.3 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1

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

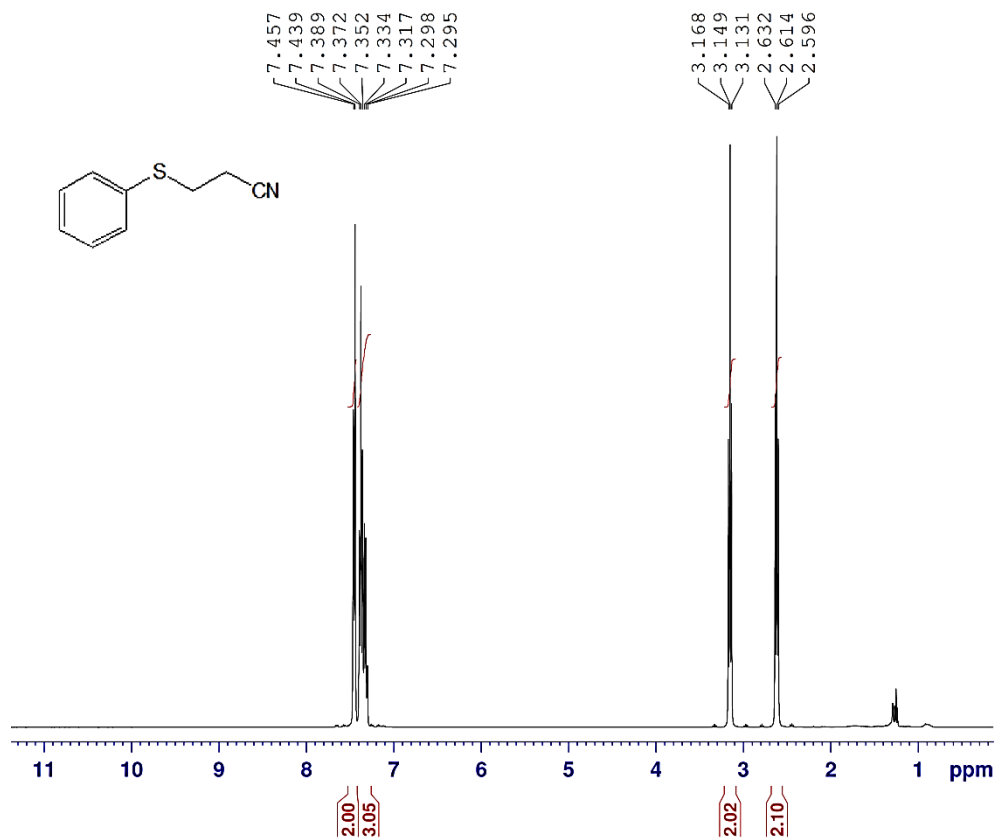
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===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12      14.16 dB
PL13      17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI        32768
SF 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

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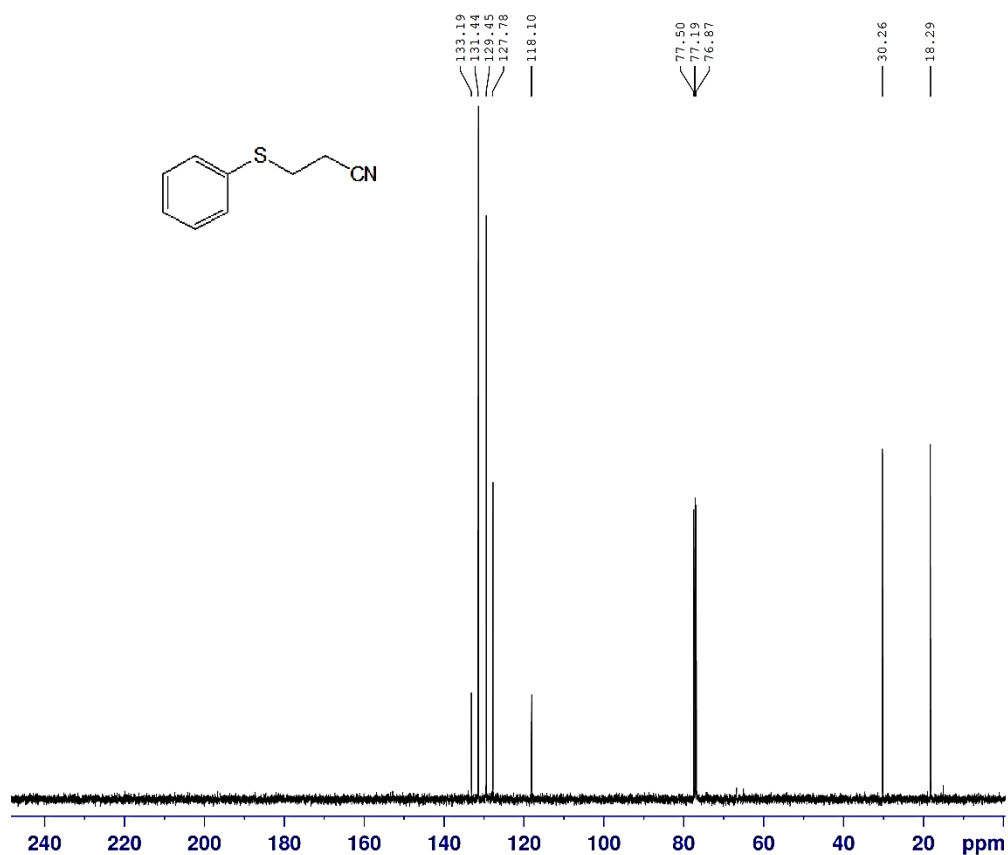
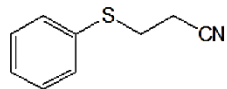
¹³C NMR of **1b**



NAME Dr.Gholi nejad
 EXPNO 562
 PROCNO 1
 Date_ 20150119
 Time 10.21
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 14
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 50.8
 DW 62.400 usec
 DE 6.50 usec
 TE 293.2 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

¹H NMR of 1c



¹³C NMR of **1c**



```

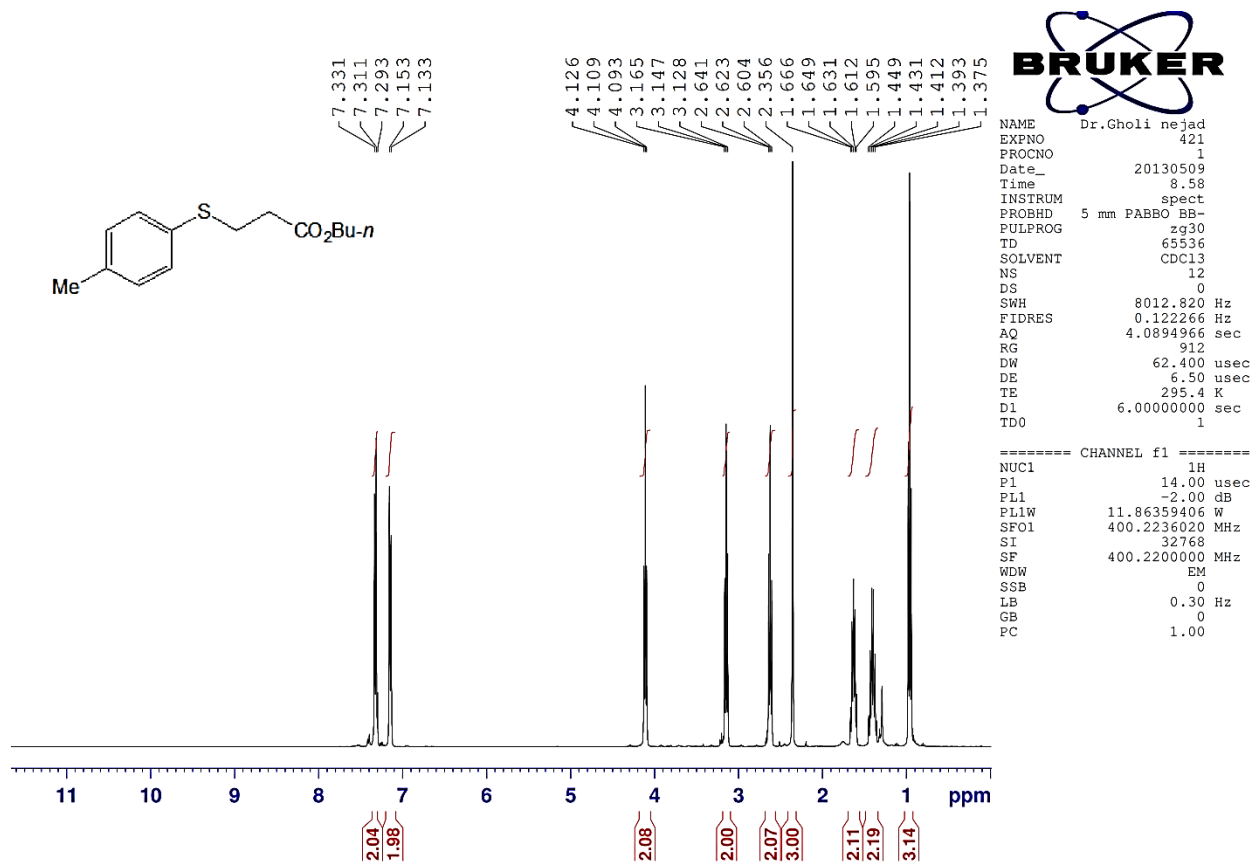
NAME      Dr.Gholi nejad
EXPNO     563
PROCNO    1
Date_     20150119
Time      10.25
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         40
DS         0
SWH       25252.525 Hz
FIDRES    0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 use
DE         6.50 use
TE         293.2 K
D1         2.0000000 sec
D11        0.0300000 sec
TDO        1
  
```

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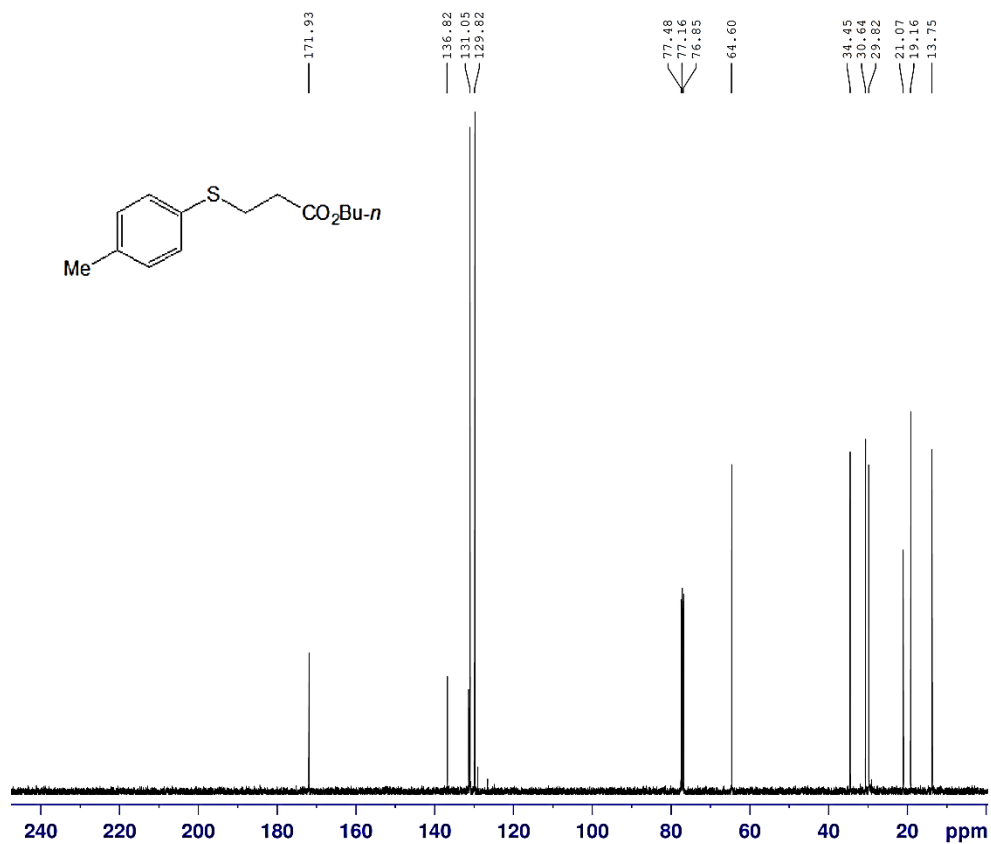
===== CHANNEL f1 =====
NUC1      13C
P1         9.00 use
PL1        -0.90 dB
PL1W      42.02801895 W
SFO1      100.6479784 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 use
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
  
```



¹H NMR of 1d

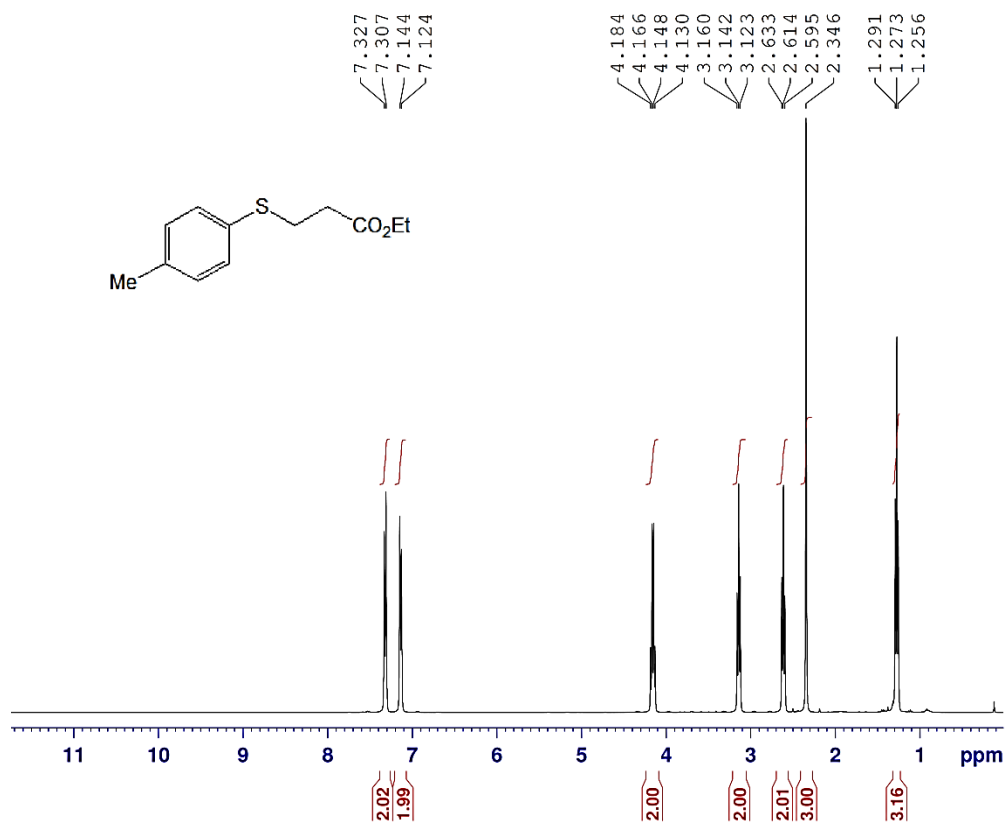


NAME Dr.Gholi nejad
 EXPNO 423
 PROCNO 1
 Date_ 20130511
 Time 8.51
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 ID 65536
 SOLVENT CDCl3
 NS 40
 DS 0
 SWH 25252.525 Hz
 FIDRES 0.385323 Hz
 AQ 1.2976629 sec
 RG 2050
 DW 19.800 usec
 DE 6.50 usec
 TE 292.8 K
 D1 2.00000000 sec
 D11 0.03000000 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

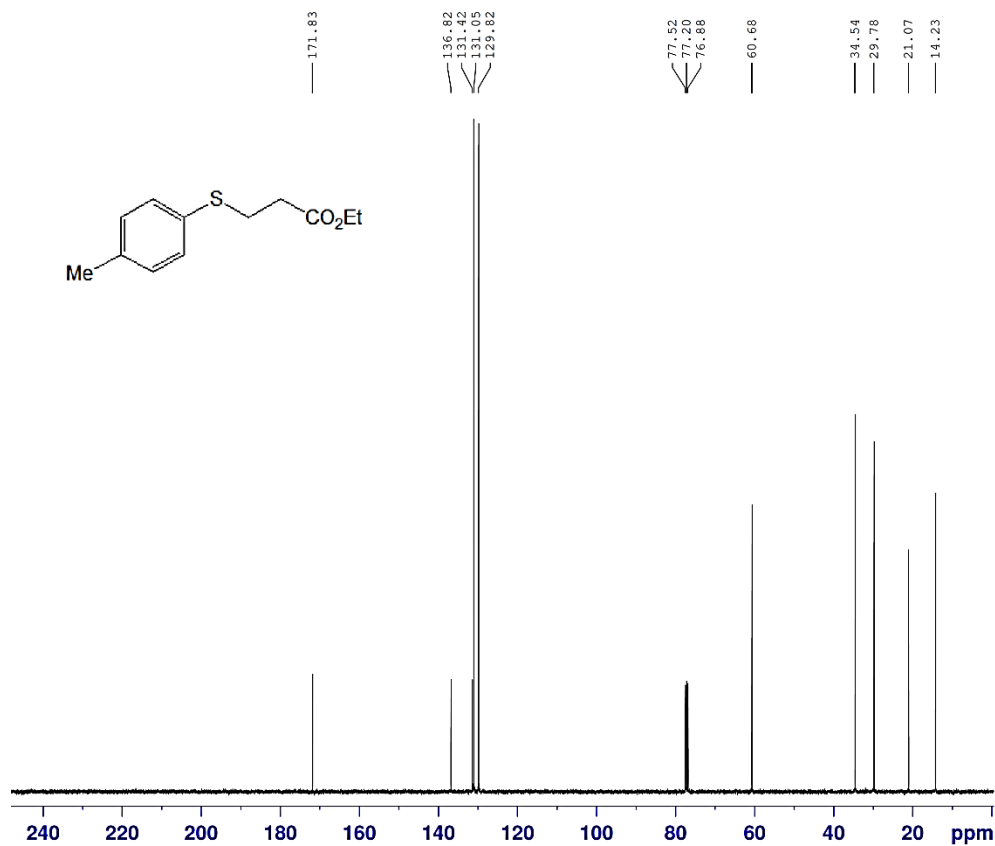
¹³C NMR of 1d



NAME Dr.Gholi nejad
 EXPNO 420
 PROCNO 1
 Date_ 20130509
 Time 8.52
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 10
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 287
 DW 62.400 usec
 DE 6.50 usec
 TE 295.4 K
 D1 6.0000000 sec
 TDO 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

¹H NMR of 1e

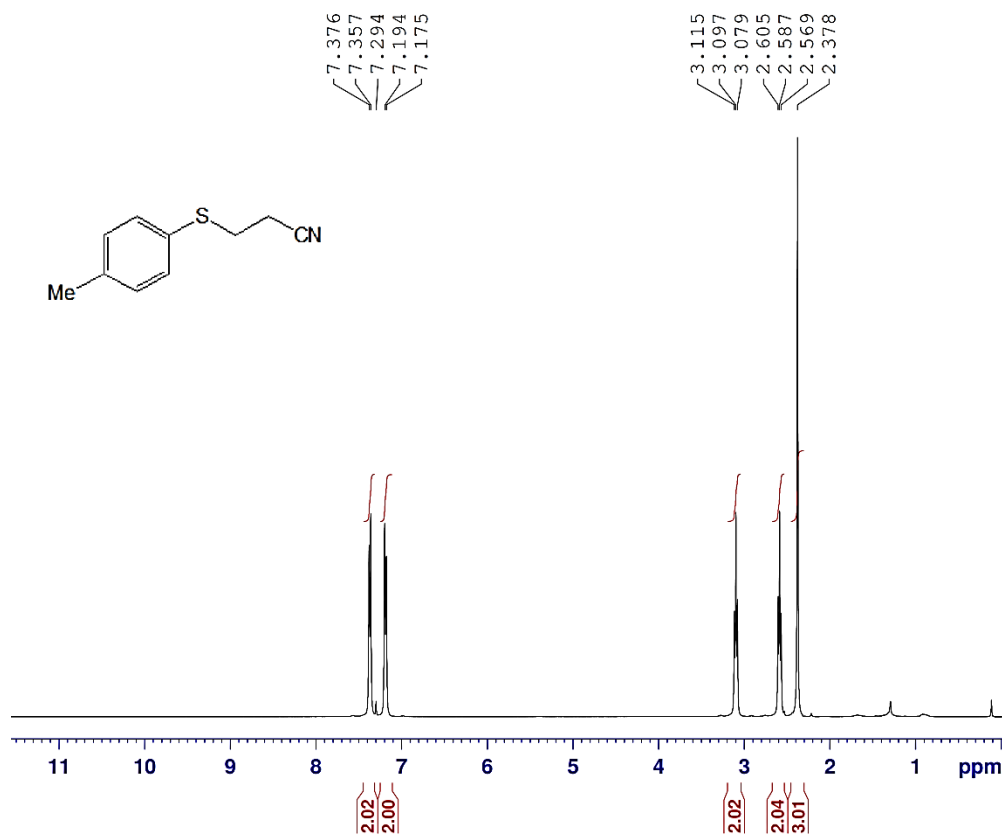


Dr.Gholi nejad
 NAME
 EXPNO 424
 PROCNO 1
 Date_ 20130511
 Time 9.03
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 79
 DS 0
 SWH 25252.525 Hz
 FIDRES 0.385323 Hz
 AQ 1.2976629 sec
 RG 2050
 DW 19.800 usec
 DE 6.50 usec
 TE 293.1 K
 D1 2.0000000 sec
 D11 0.0300000 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

¹³C NMR of 1e



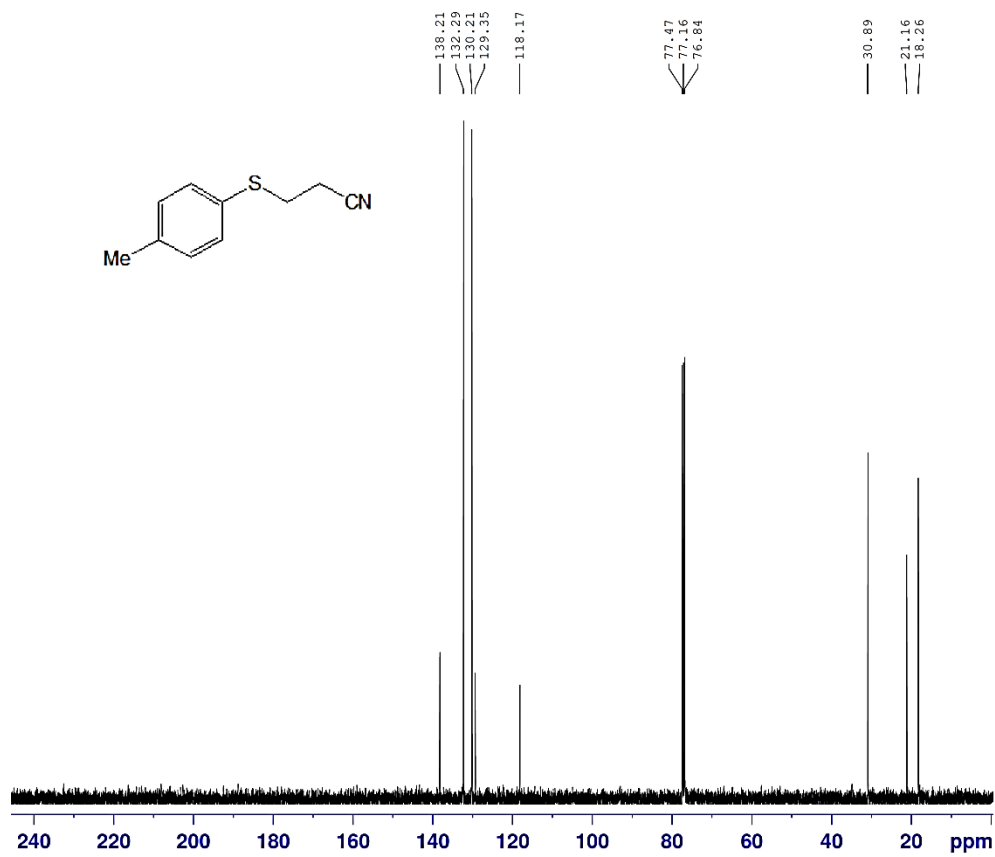
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NAME      Dr.Gholi nejad
EXPNO     564
PROCNO    1
Date_     20150119
Time      10.31
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         14
DS         0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ         4.0894966 sec
RG         50.8
DW         62.400 usec
DE         6.50 usec
TE         293.2 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
  
```

¹H NMR of 1f



```

NAME      Dr.Gholi nejad
EXPNO     565
PROCNO    1
Date_     20150119
Time      10.34
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         30
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         293.3 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
  
```

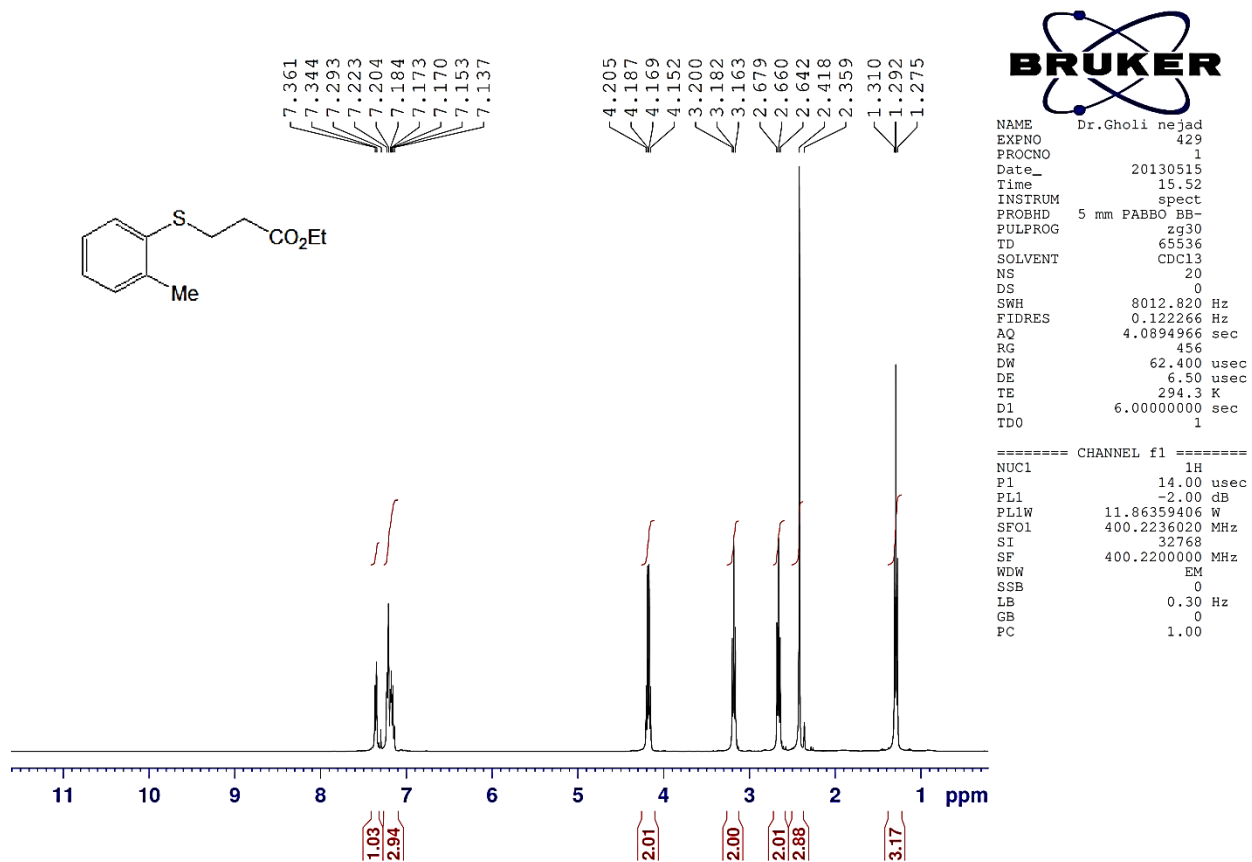
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===== CHANNEL f1 =====
NUC1      13C
P1         9.00 usec
PL1        -0.90 dB
PLLW      42.02801895 W
SFO1      100.6479784 MHz
  
```

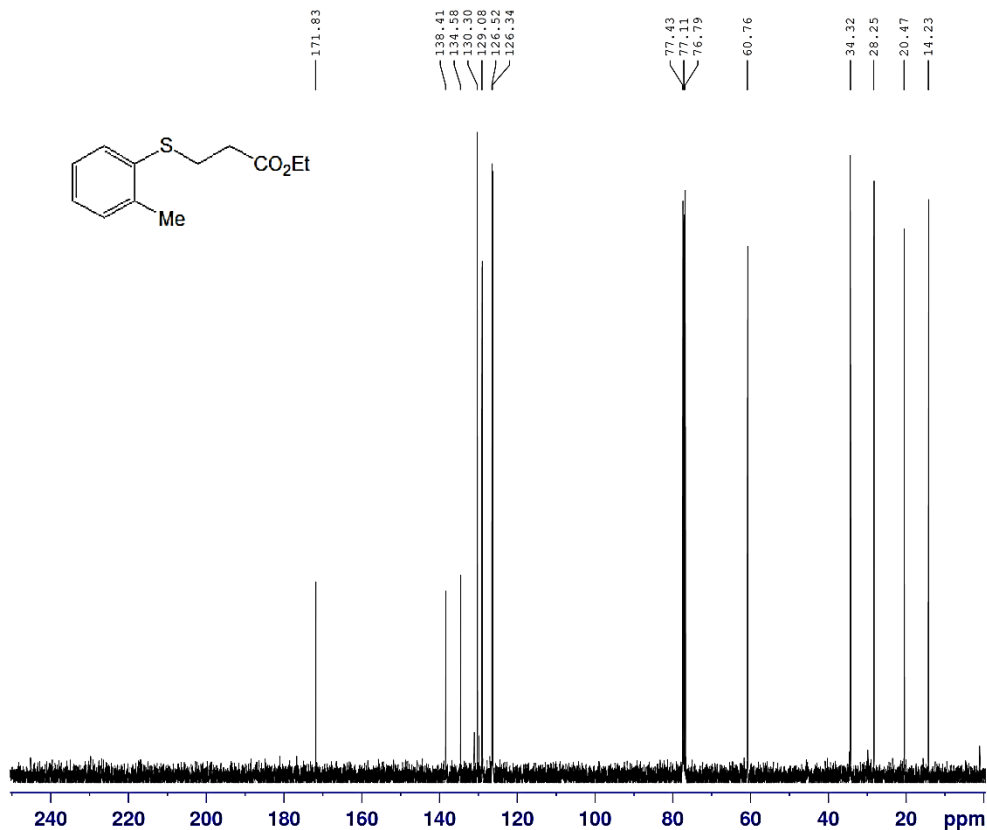
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===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI         32768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

¹³C NMR of **1f**



¹H NMR of **1g**

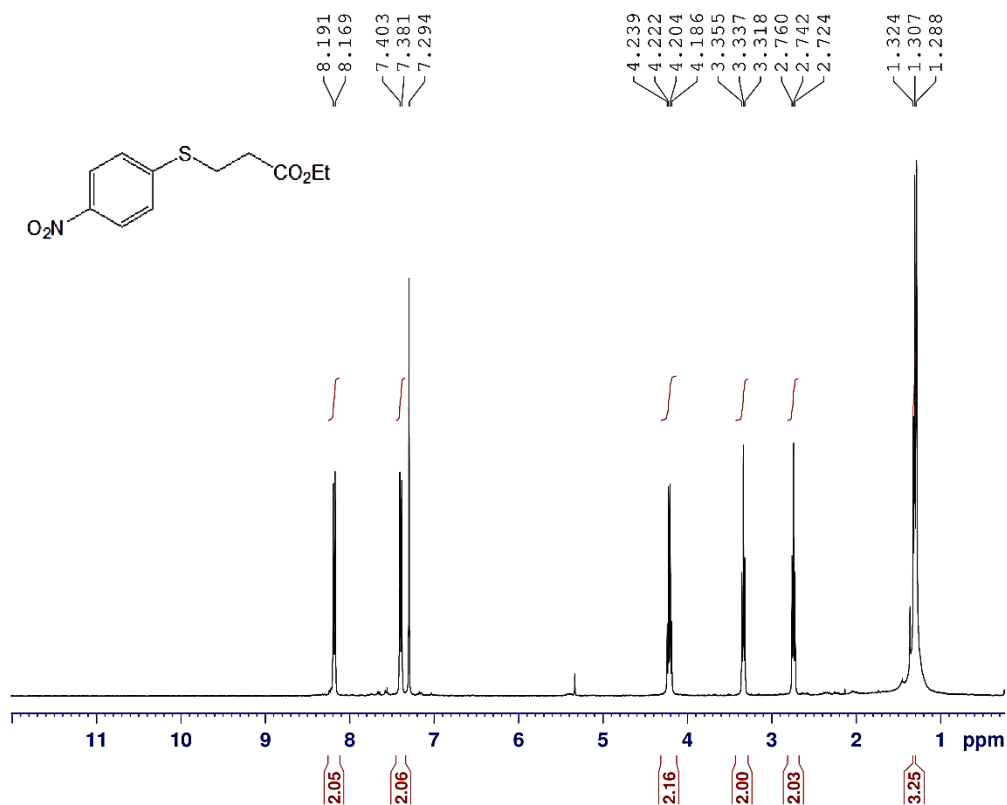
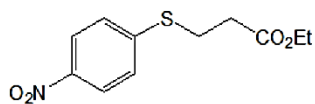


NAME Dr.Gholi nejad
 EXPNO 430
 PROCNO 1
 Date_ 20130515
 Time 15.58
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 61
 DS 0
 SWH 25252.525 Hz
 FIDRES 0.385323 Hz
 AQ 1.2976629 sec
 RG 2050
 DW 19.800 usec
 DE 6.50 usec
 TE 294.9 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -0.50 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
 FC 1.40

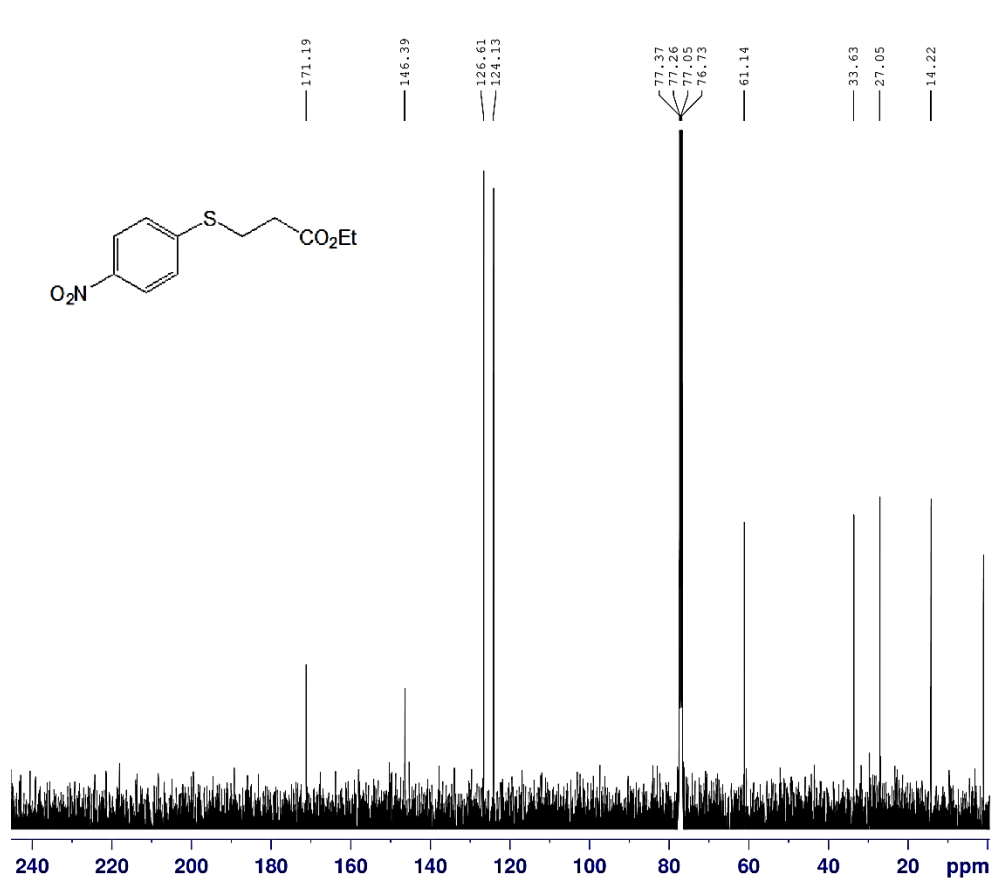
¹³C NMR of 1g



```

NAME      Dr.Gholi nejad
EXPNO     558
PROCNO    1
Date_     20150119
Time      9.59
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         14
DS         0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ         4.0894966 sec
RG         161
DW         62.400 usec
DE         6.50 usec
TE         293.2 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
  
```

¹H NMR of 1h



```

NAME      Dr.Gholi nejad
EXPNO     559
PROCNO    1
Date_     20150119
Time      9.28
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         501
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         293.3 K
D1         2.0000000 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

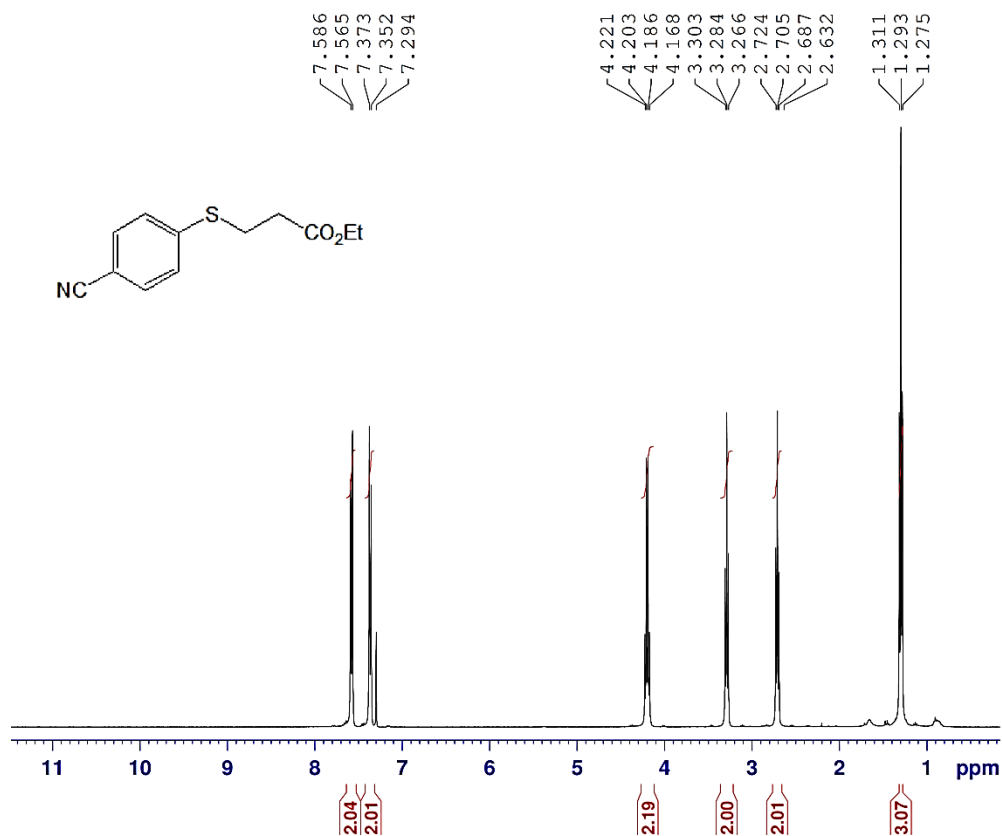
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```

===== 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

```

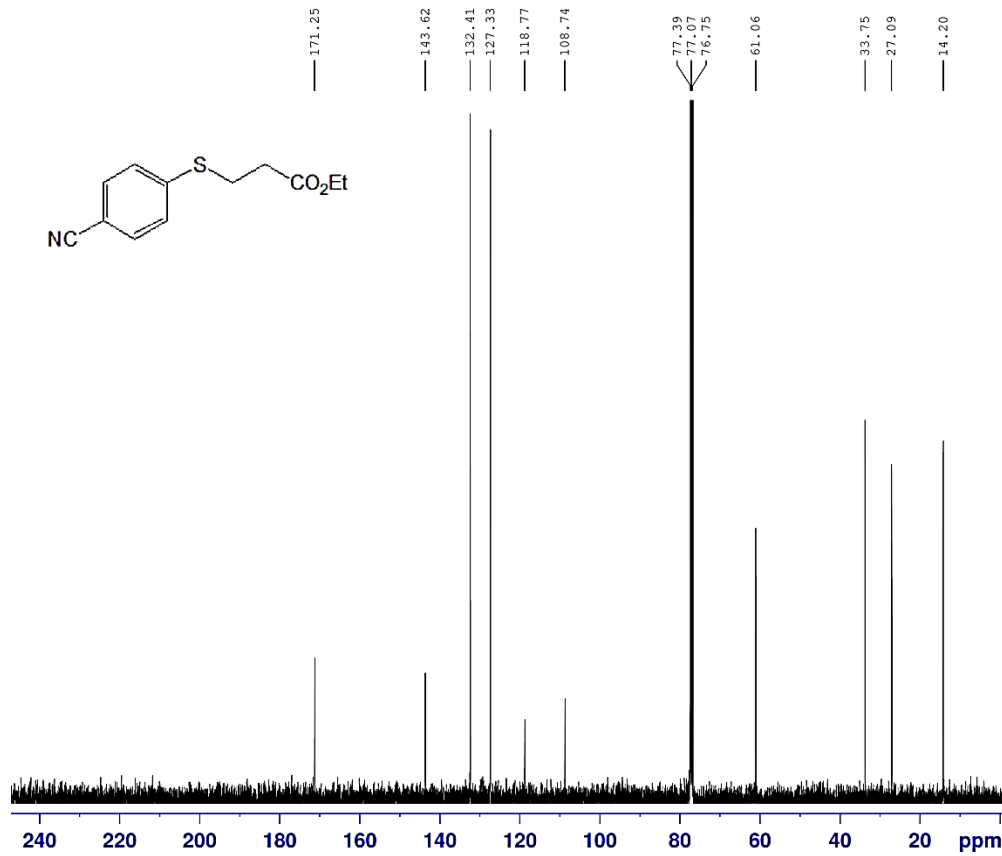
¹³C NMR of **1h**



Dr. Gholi nejad
 NAME
 EXPNO 580
 PROCNO 1
 Date_ 20150128
 Time 9.37
 INSTRUM spect
 PROBHD 5 mm PABBO EB-
 PULPROG zg30
 TD 65536
 SOLVENT CDC13
 NS 10
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 161
 DW 62.400 usec
 DE 6.50 usec
 TE 294.8 K
 D1 4.0000000 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL -2.00 dB
 PLW 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

¹H NMR of **1i**

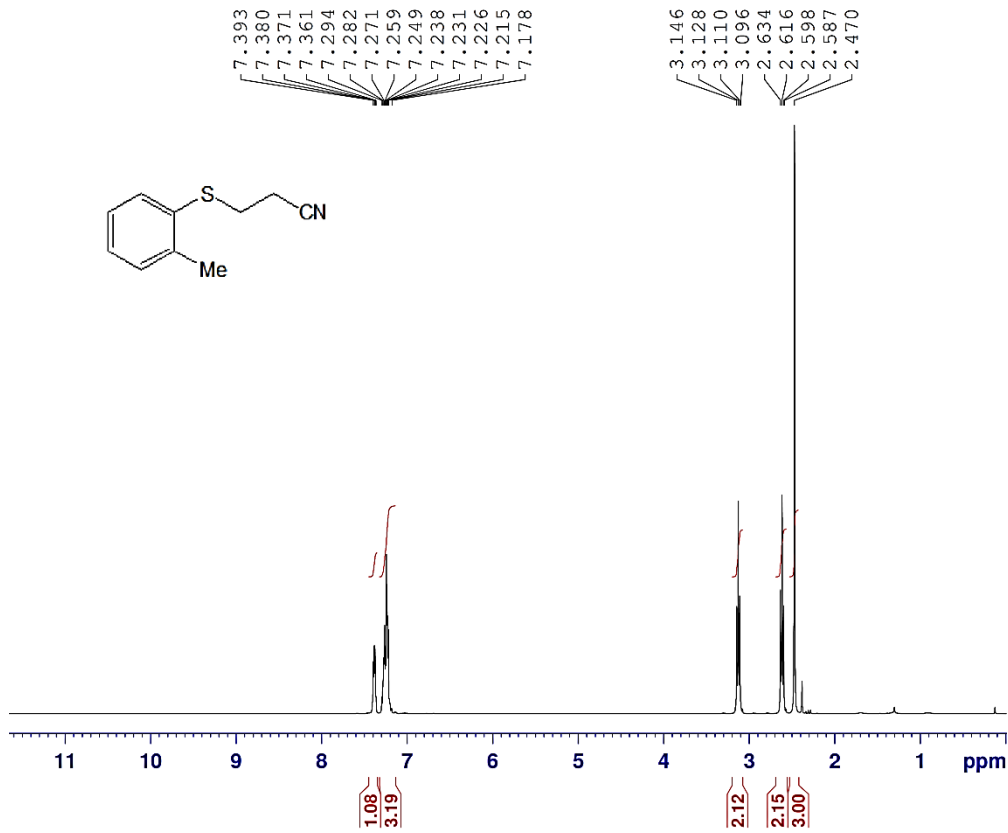
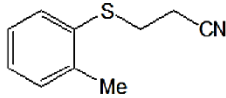


Dr.Gholi nejad
 NAME
 EXPNO 581
 PROCNO 1
 Date_ 20150128
 Time 9.41
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 120
 DS 0
 SWH 25252.525 Hz
 FIDRES 0.385323 Hz
 AQ 1.2976629 sec
 RG 2050
 DW 19.800 use
 DE 6.50 use
 TE 295.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

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

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 90.00 use
 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

¹³C NMR of 1i



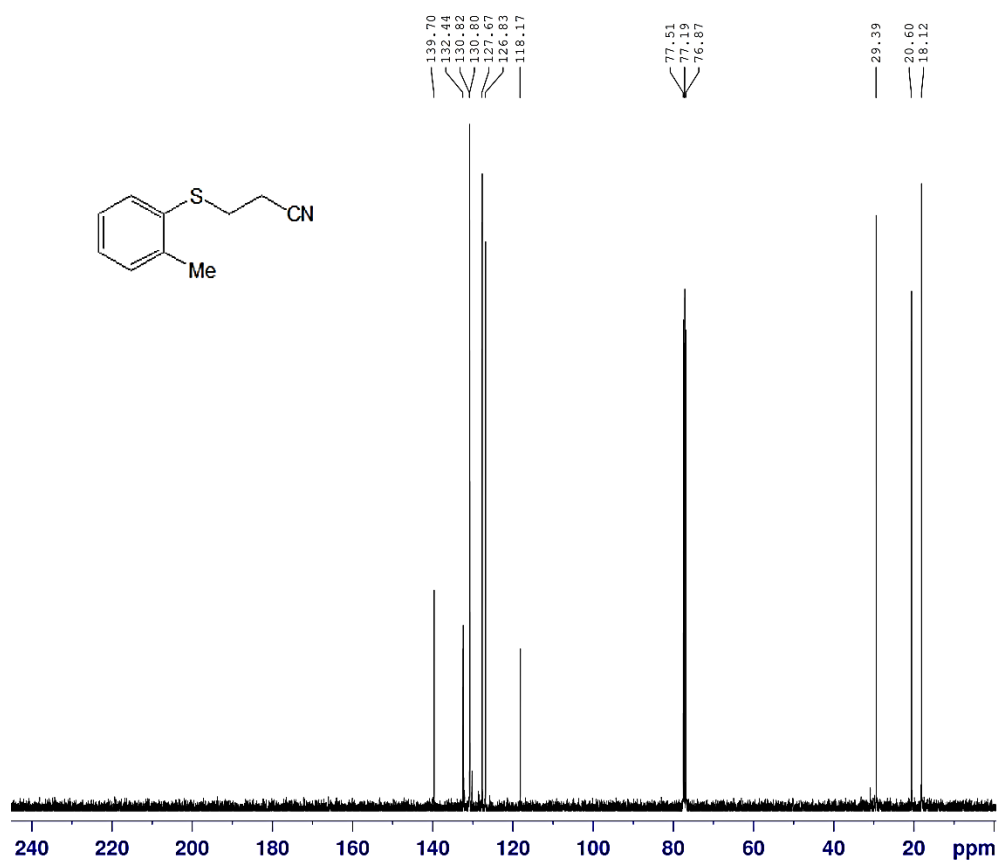
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NAME      Dr.Gholi nejad
EXPNO     572
PROCNO    1
Date_     20150121
Time      13.33
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         10
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         36
DW         62.400 usec
DE         6.50 usec
TE         293.8 K
D1         4.00000000 sec
TDO        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
  
```

¹H NMR of 1j



```

NAME      Dr.Gholi nejad
EXPNO     573
PROCNO    1
Date_     20150121
Time      13.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        52
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        294.1 K
D1        2.00000000 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

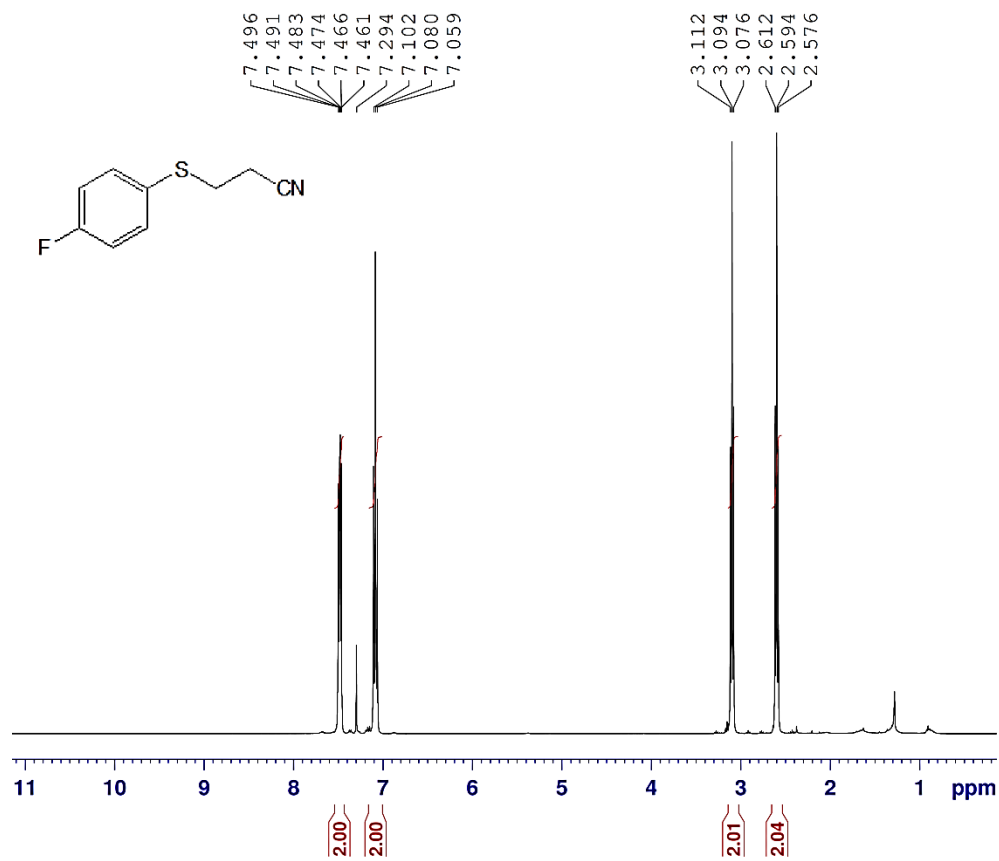
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```

===== 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

```

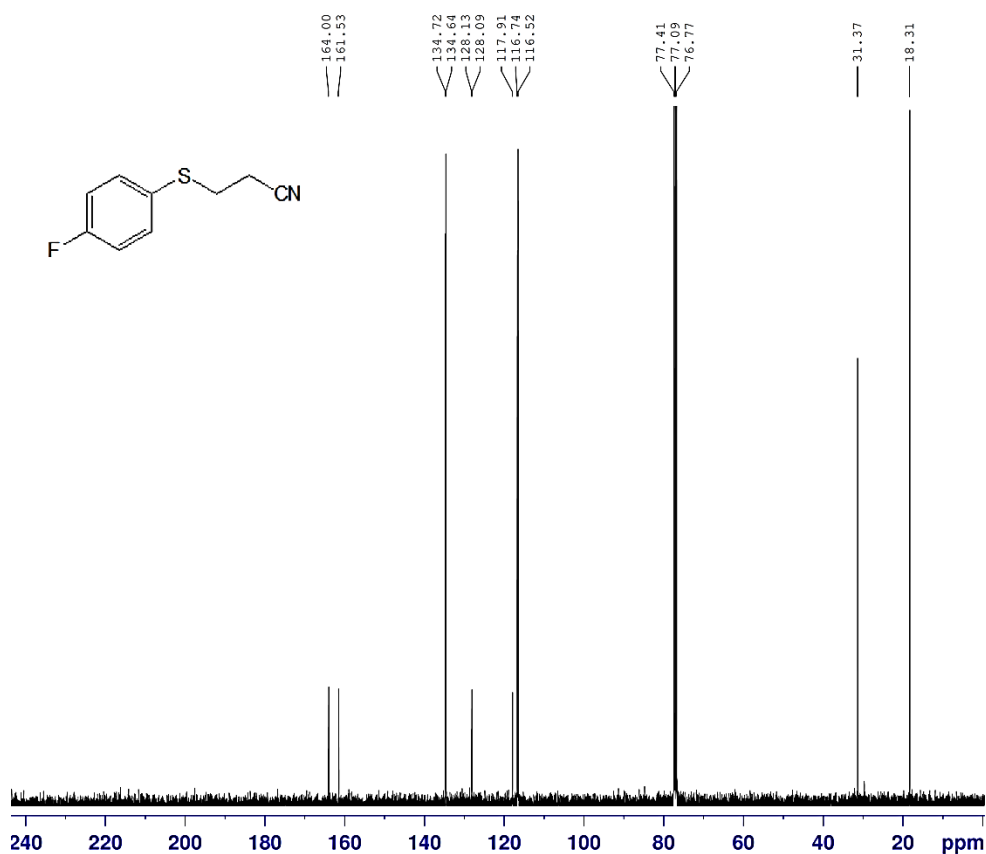
¹³C NMR of **1j**



NAME Dr.Gholi nejad
 EXPNO 570
 PROCNO 1
 Date_ 20150121
 Time 13.16
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 10
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 128
 DW 62.400 use
 DE 6.50 use
 TE 293.7 K
 D1 4.0000000 sec
 TD0 1

----- CHANNEL f1 -----
 NUC1 1H
 P1 14.00 use
 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

¹H NMR of 1k



```

NAME      Dr.Gholi nejad
EXPNO     571
PROCNO    1
Date_     20150121
Time      13.18
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         190
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         293.7 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
  
```

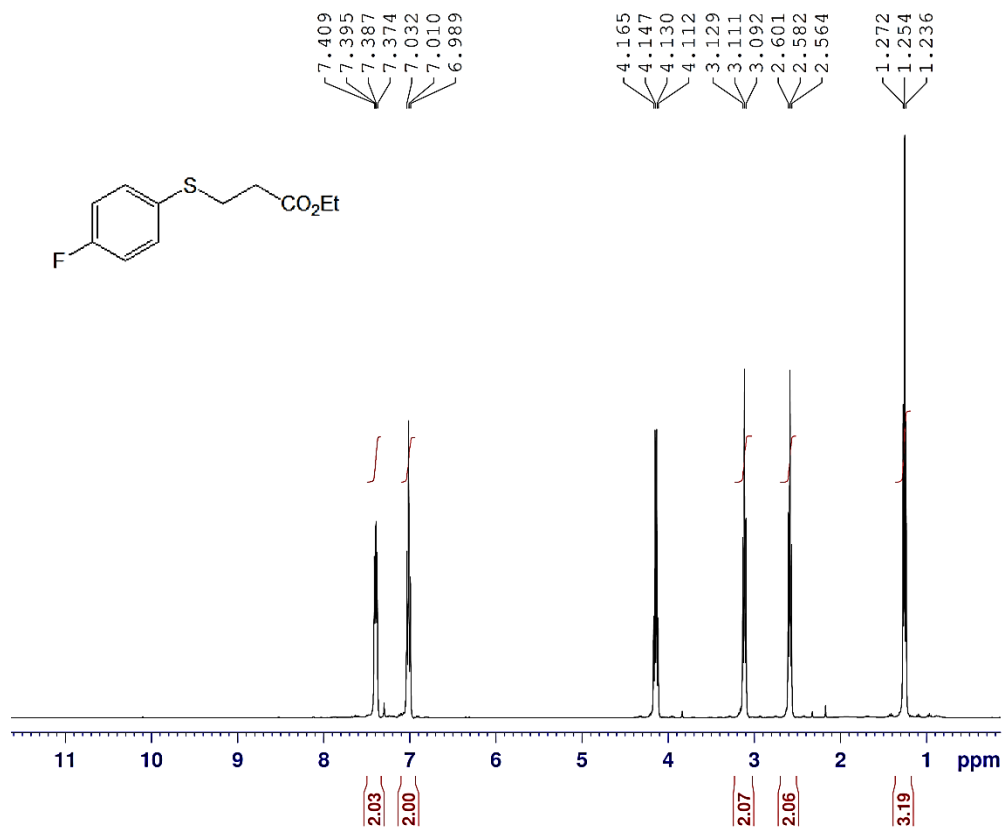
```

===== 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
  
```

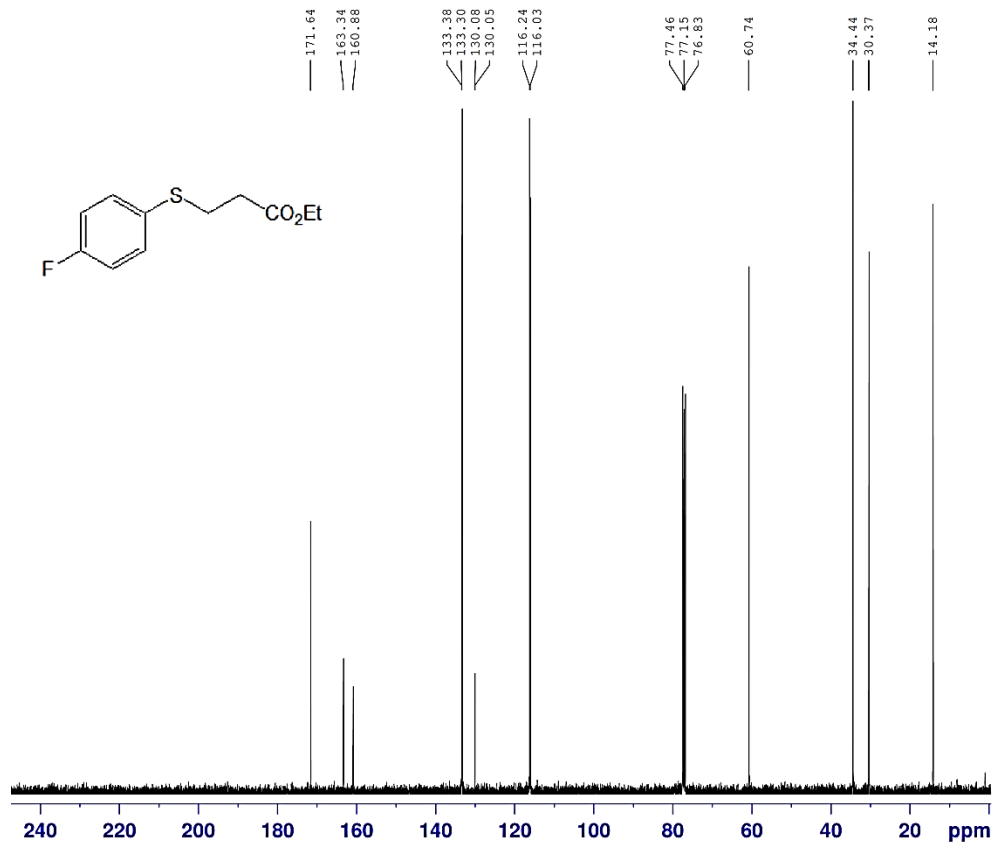
¹³C NMR of 1k



NAME Dr.Gholi nejad
 EXPNO 508
 PROCNO 1
 Date_ 20141122
 Time 11.56
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 12
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 sec
 RG 28.5
 DW 62.400 usec
 DE 6.50 usec
 TE 293.4 K
 D1 4.0000000 sec
 TDO 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

¹H NMR of 11

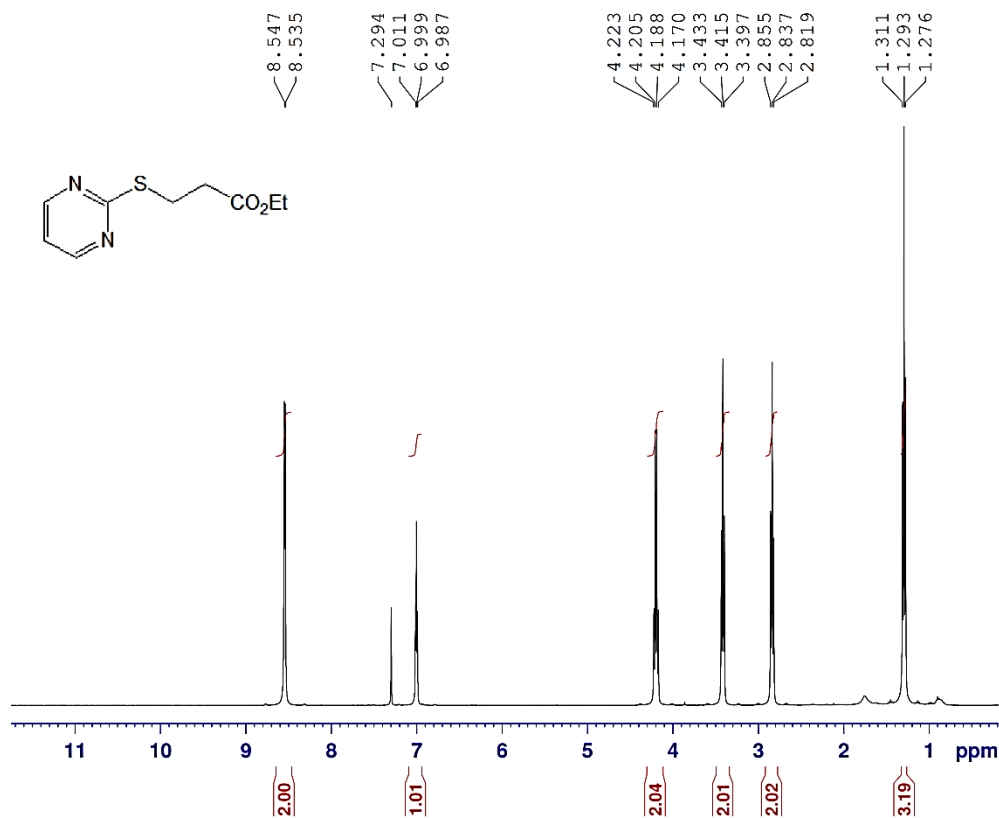


NAME Dr.Gholi nejad
 EXPNO 509
 PROCNO 1
 Date_ 20141122
 Time 11.58
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 40
 DS 0
 SWH 25252.525 Hz
 FIDRES 0.385323 Hz
 AQ 1.2976629 sec
 RG 2050
 DW 19.800 usec
 DE 6.50 usec
 TE 293.4 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 TDO 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
 FCFD2 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

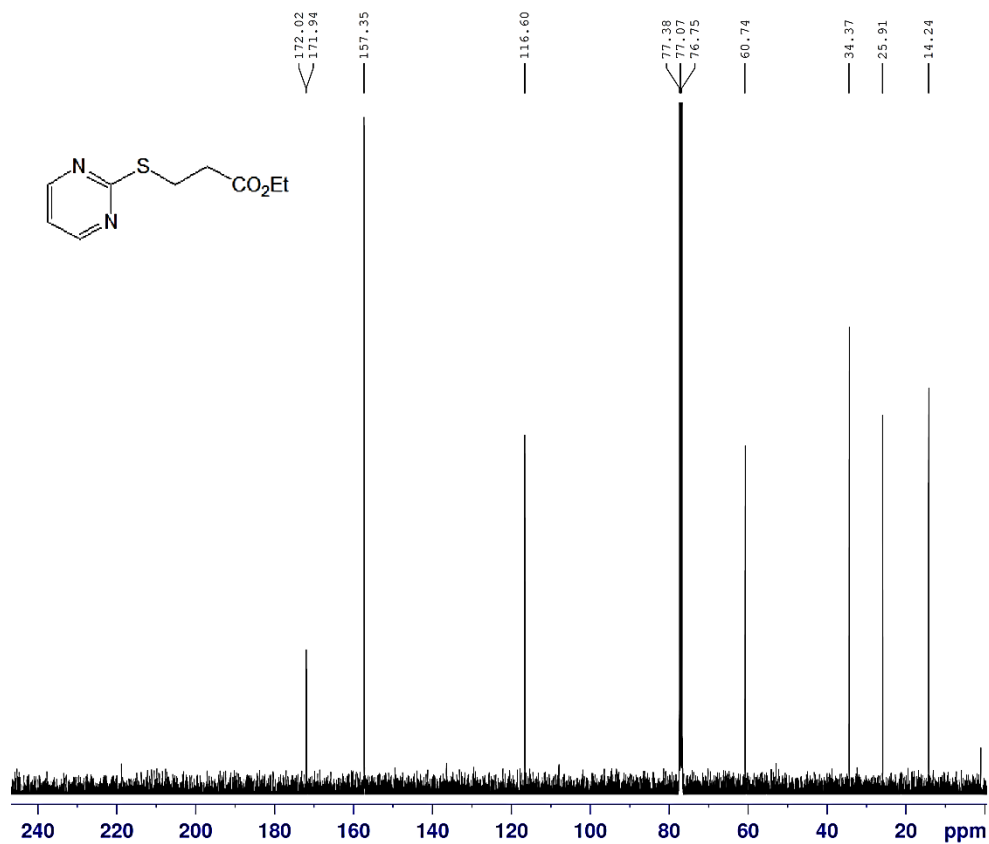
¹³C NMR of **11**



NAME Dr.Gholi nejad
 EXPNO 504
 PROCNO 1
 Date_ 20141117
 Time 10.47
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 17
 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 293.0 K
 D1 6.0000000 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

¹H NMR of 1m



```

NAME      Dr.Gholi nejad
EXPNO     505
PROCNO    1
Date_     20141117
Time      10.50
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        140
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        293.2 K
D1        2.00000000 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
  
```

```

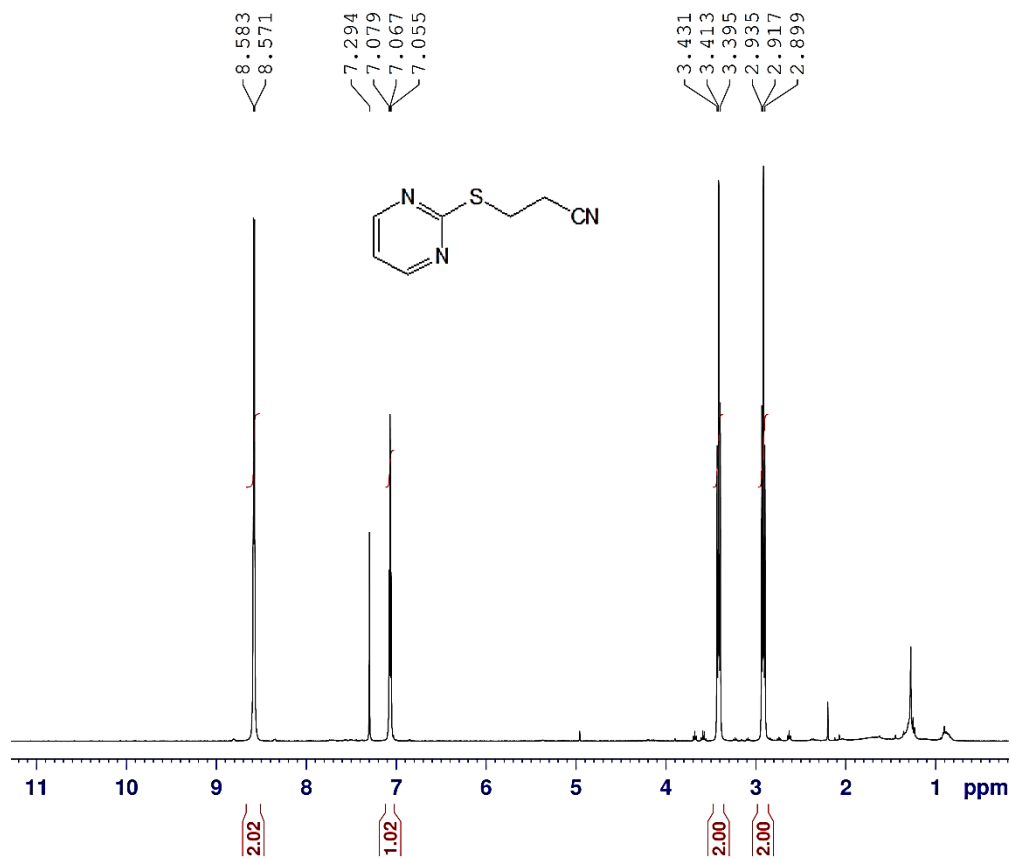
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PL2       -2.00 dB
PL12      14.16 dB
PL13      17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI        32768
SF        100.6353990 MHz
WDW       EM
SSB       0
LB   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

¹³C NMR of 1m

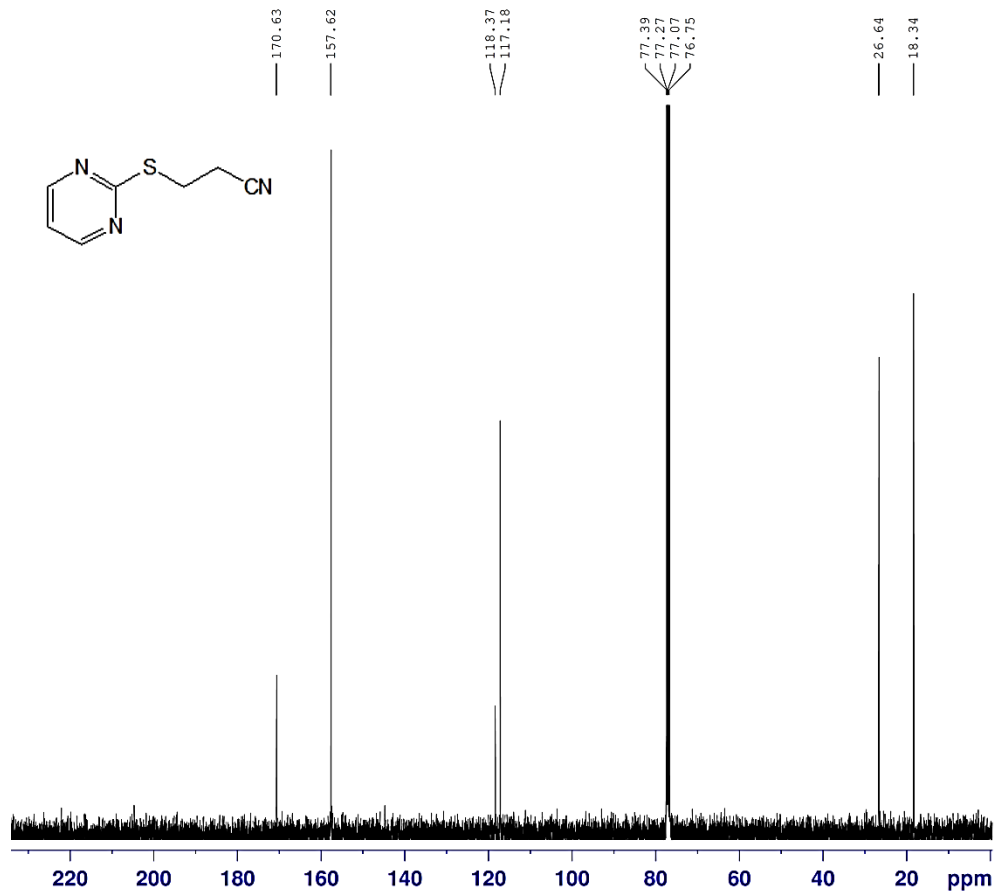


NAME Dr.Gholi nejad
EXPNO 576
PROCNO 1
Date_ 20150121
Time 14.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 14
DS 0
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894566 se
RG 203
DW 62.400 us
DE 6.50 us
TE 293.6 K
D1 4.0000000 se
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 us
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



¹H NMR of 1n



```

NAME      Dr.Gholi nejad
EXPNO     577
PROCNO    1
Date_     20150121
Time      14.33
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDC13
NS         220
DS         0
SWH        25252.525 Hz
FIDRES     0.385323 Hz
AQ         1.2976629 se
RG         2050
DW         19.800 us
DE         6.50 us
TE         293.9 K
D1         2.0000000 se
D11        0.0300000 se
TD0        1
  
```

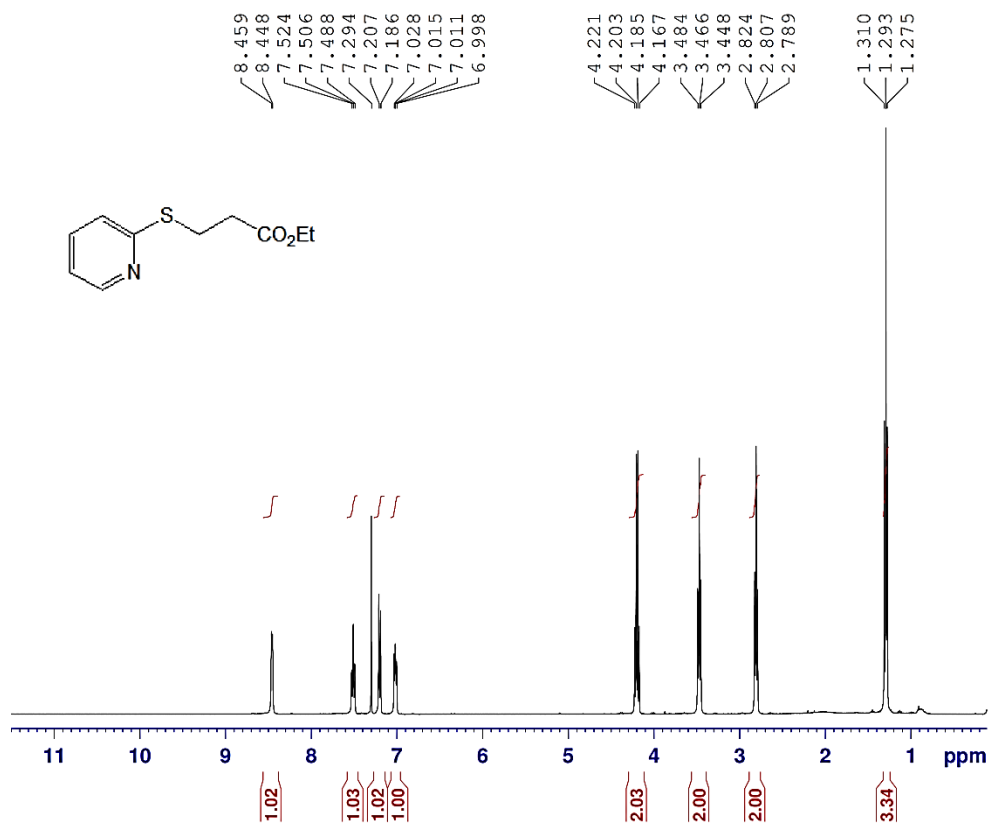
```

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

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 us
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 MH
SI         32768
SF         100.6353990 MH
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

¹³C NMR of **1n**



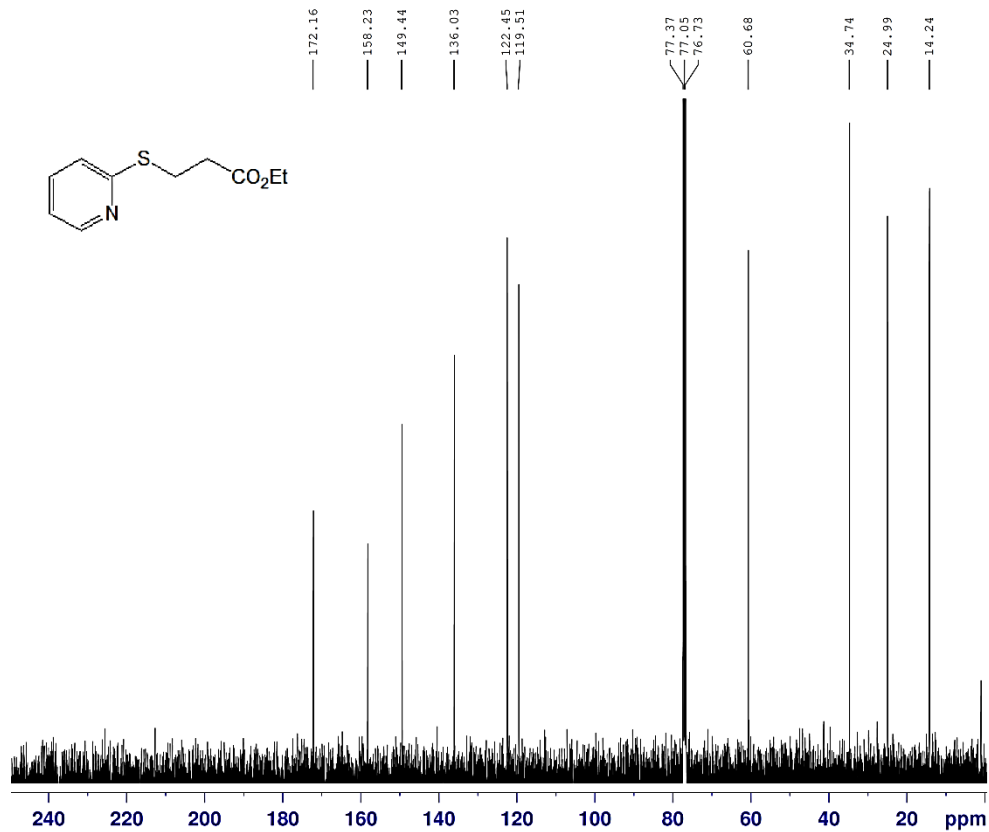
```

NAME      Dr.Gholi nejad
EXPNO     516
PROCNO    1
Date_     20141126
Time      14.28
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        12
DS        0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG        228
DW        62.400 usec
DE        6.50 usec
TE        293.7 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

```

¹H NMR of **1o**



```

NAME      Dr.Gholi nejad
EXPNO     517
PROCNO    1
Date_     20141126
Time      14.34
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDC13
NS         200
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         294.1 K
D1         2.00000000 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
  
```

```

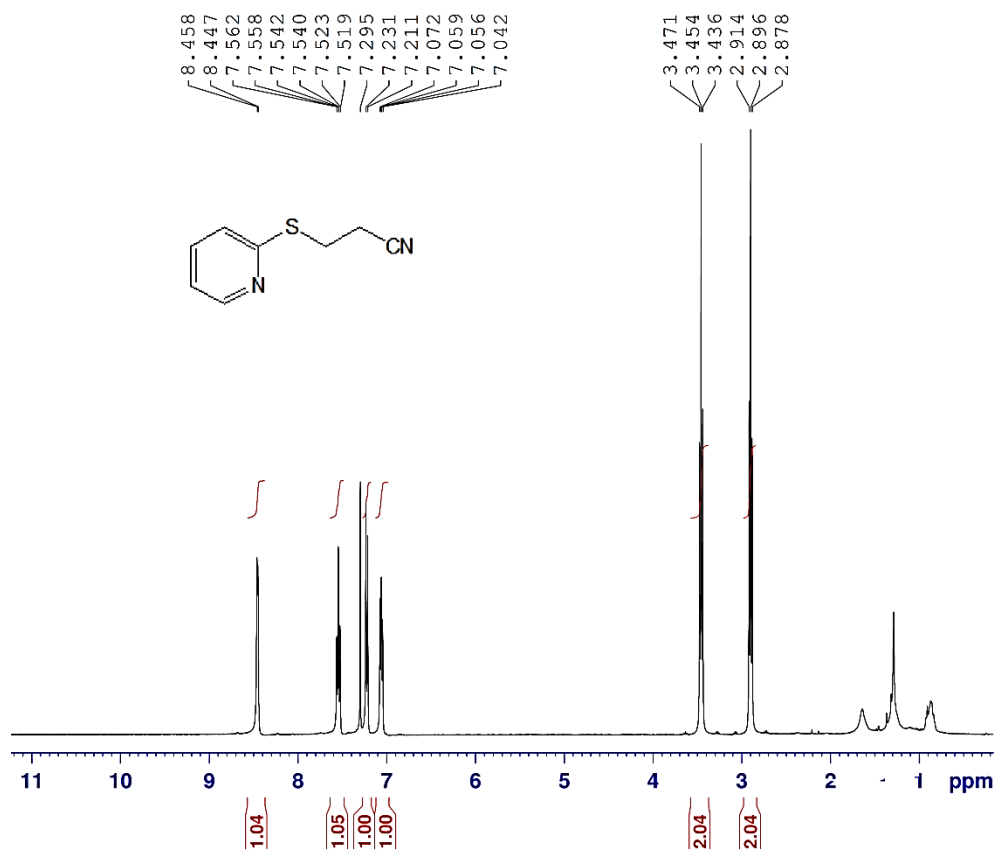
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI         32768
SF         100.6353990 MHz
WDW        EM
SSB       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

¹³C NMR of **1o**

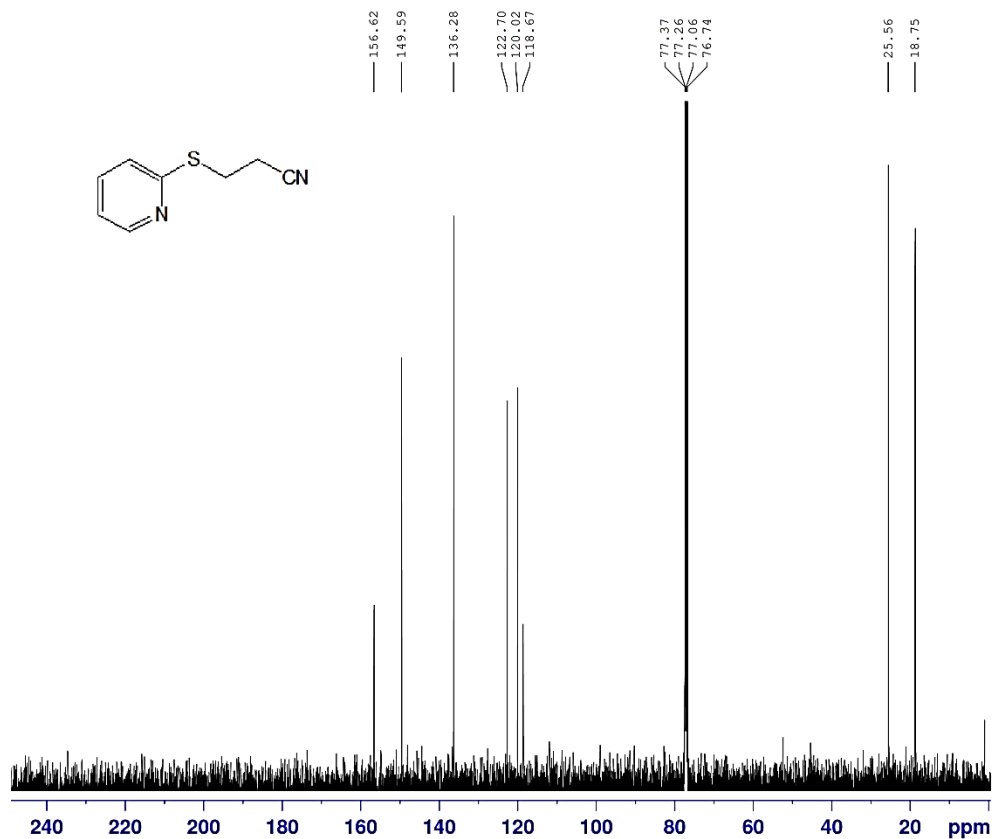


NAME Dr.Gholi nejad
EXPNO 522
PROCNO 1
Date_ 20141203
Time 10.31
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 14
DS 0
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894966 sec
RG 256
DW 62.400 usec
DE 6.50 usec
TE 293.4 K
D1 4.0000000 sec
TD0 1

==== 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



^1H NMR of **1p**



```

NAME      Dr.Gholi nejad
EXPNO     523
PROCNO    1
Date_     20141203
Time      10.34
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         240
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         293.6 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
  
```

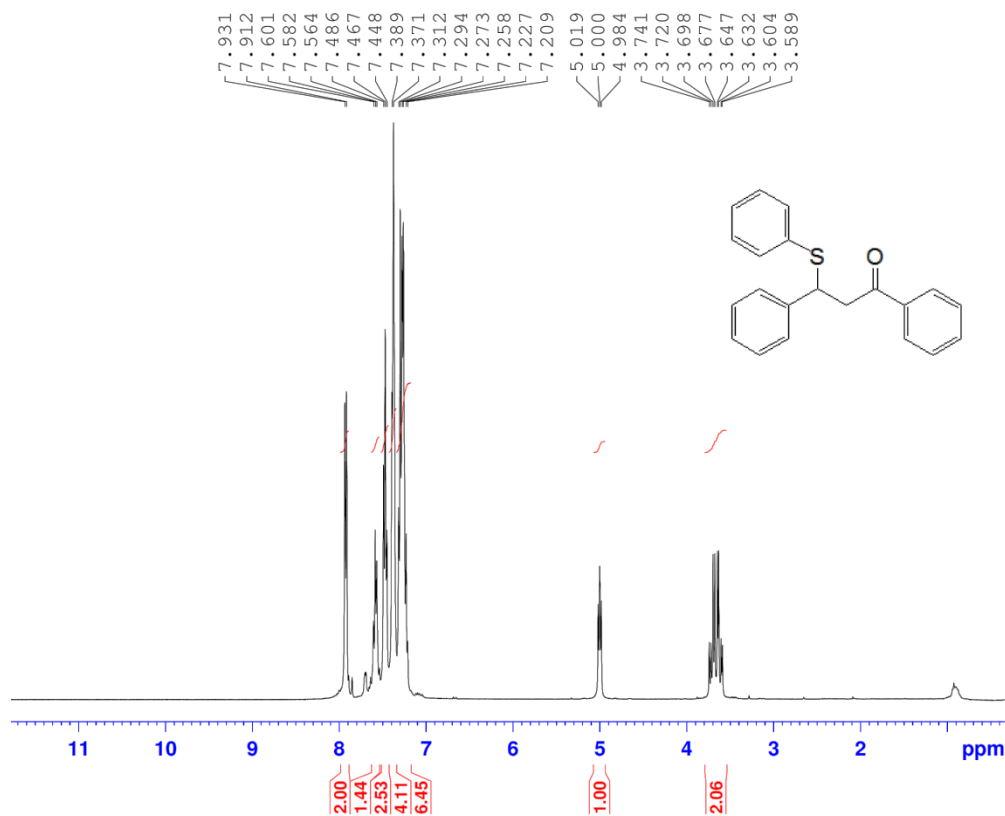
```

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

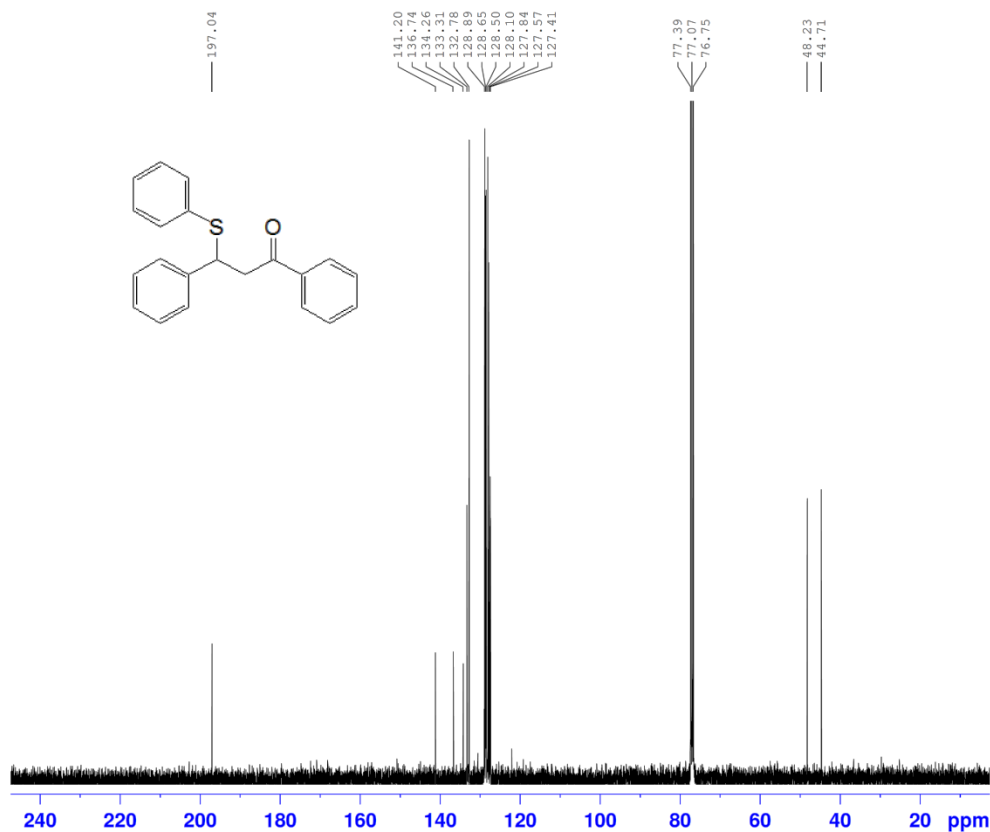
```

===== 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
  
```

¹³C NMR of 1p



¹H NMR of 1q



```

NAME      Dr.Gholi nejad
EXPNO     601
PROCNO    1
Date_     20150509
Time      9.49
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         200
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         294.5 K
D1         2.0000000 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

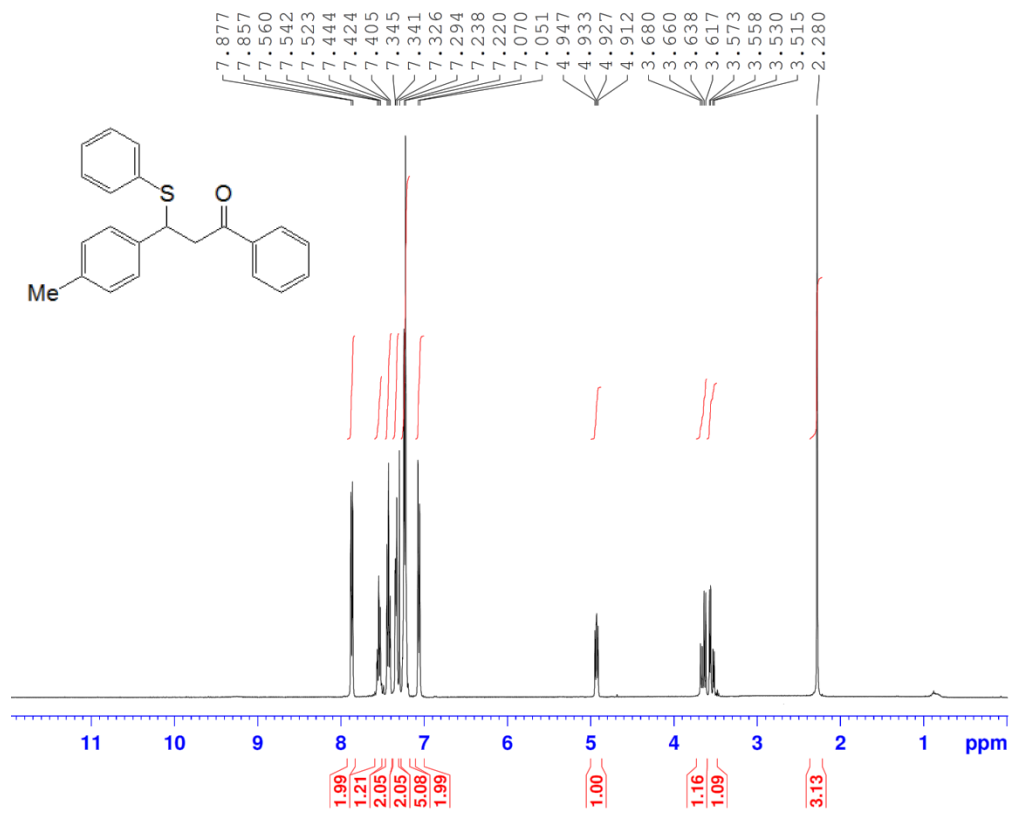
```

```

===== 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

```

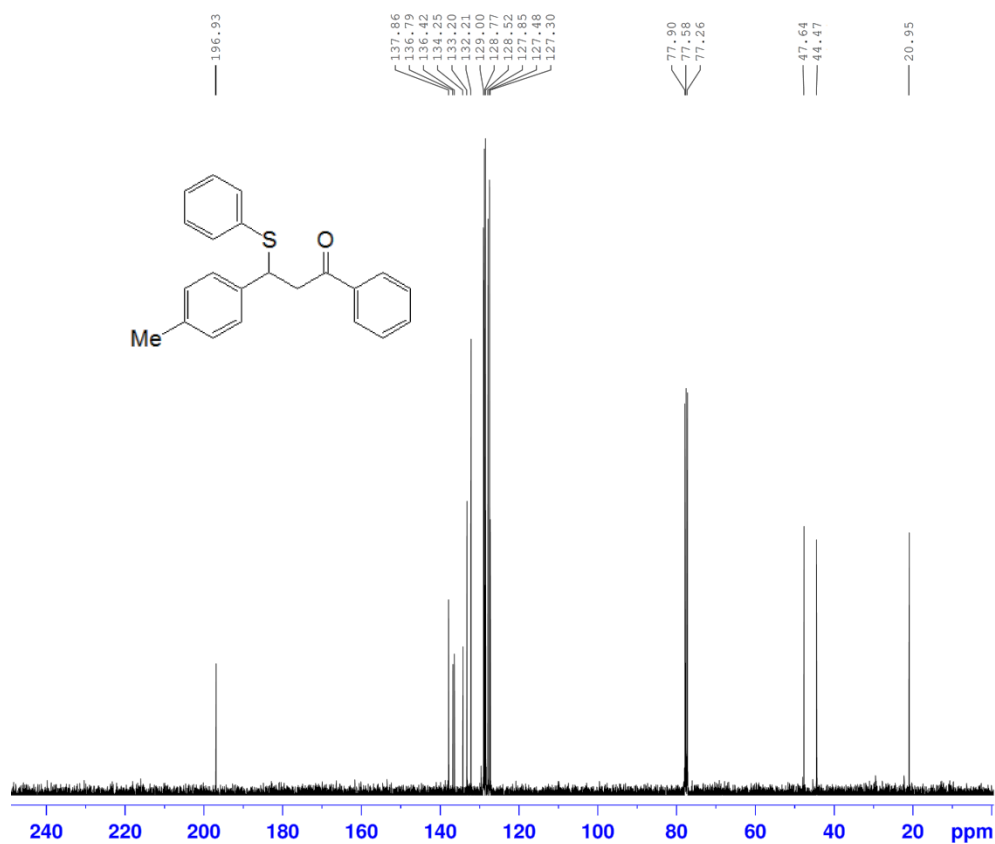
¹³C NMR of 1q



Dr.Gholi nejad
 NAME
 EXPNO 597
 PROCNO 1
 Date_ 20150507
 Time 12.36
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 14
 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 293.0 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

¹H NMR of 1r



```

NAME      Dr.Gholi nejad
EXPNO     598
PROCNO    1
Date_     20150507
Time      12.47
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         50
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         292.9 K
D1         2.0000000 sec
D11        0.0300000 sec
TDO        1
  
```

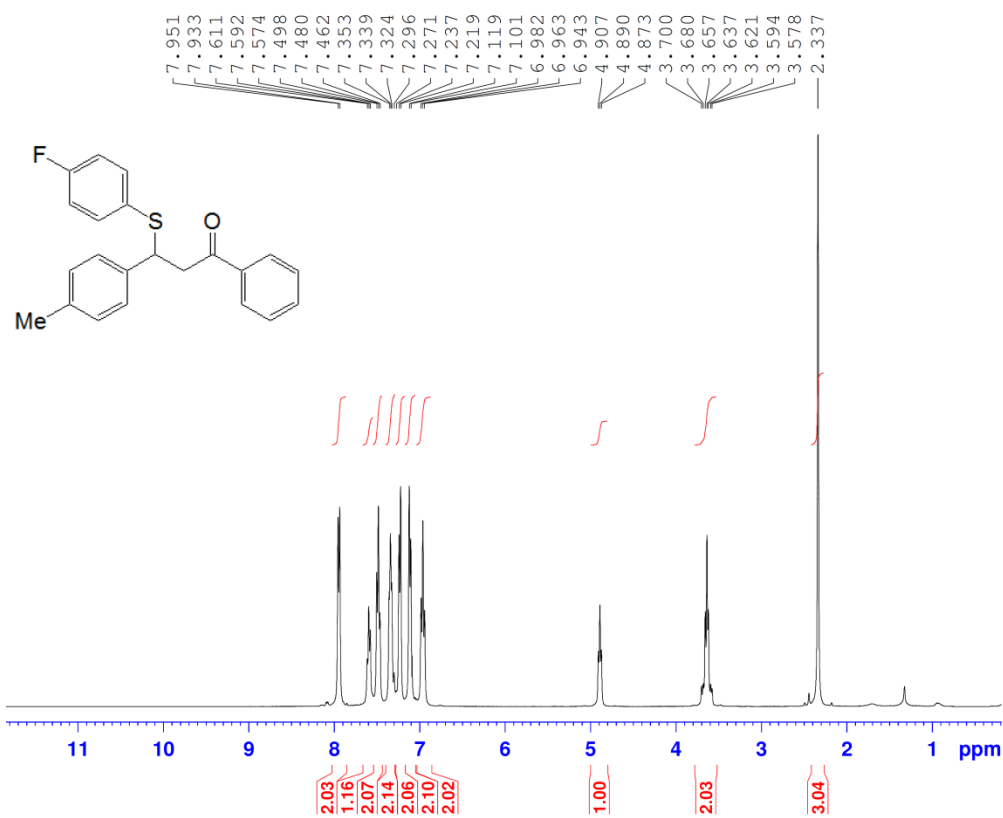
```

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

```

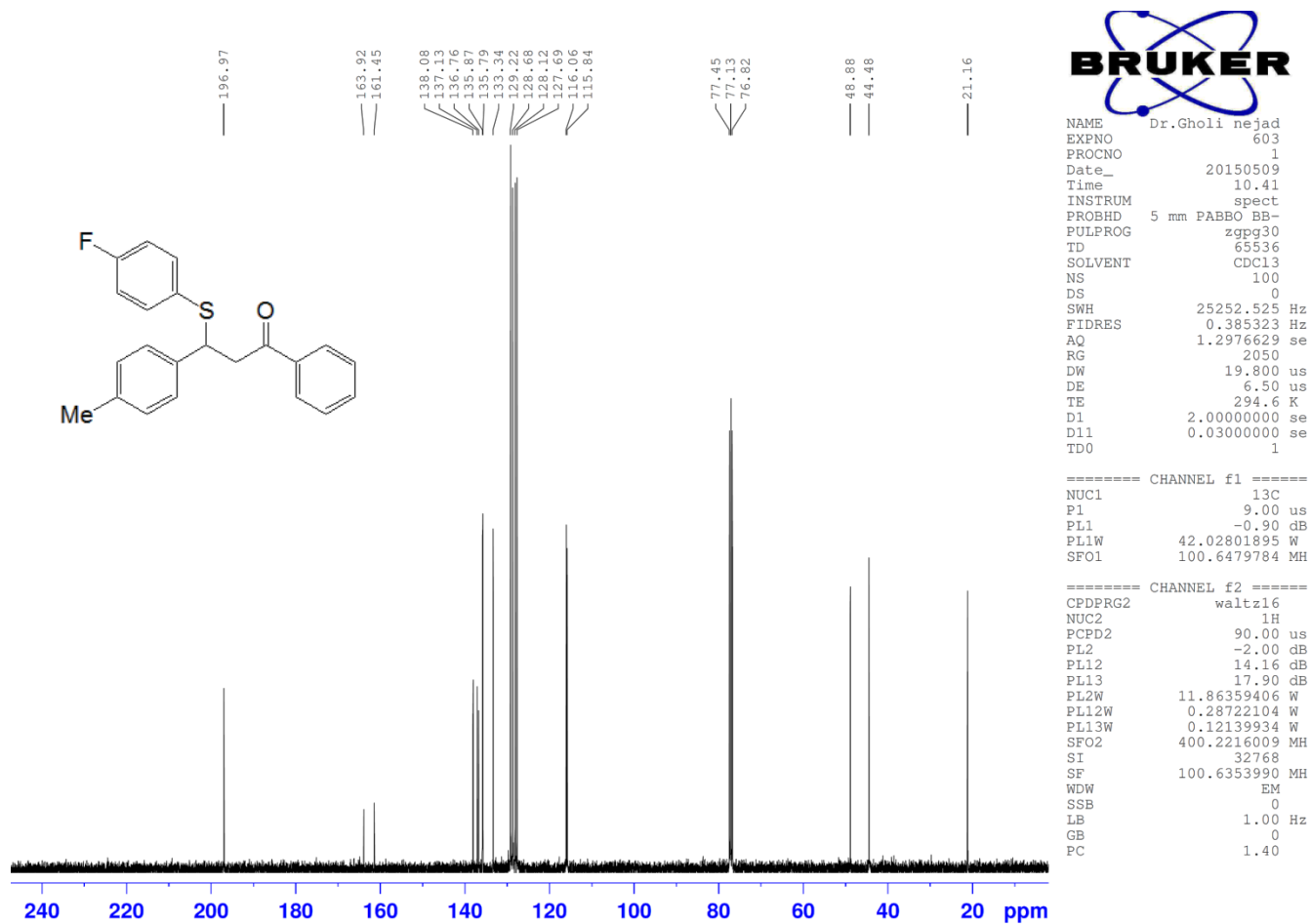
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     90.00 usec
PL2        -2.00 dB
PL12       14.16 dB
PL13       17.90 dB
PL2W      11.86359406 W
PL12W     0.28722104 W
PL13W     0.12139934 W
SFO2      400.2216009 MHz
SI         32768
SF        100.6353990 MHz
WDW        EM
SSB        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

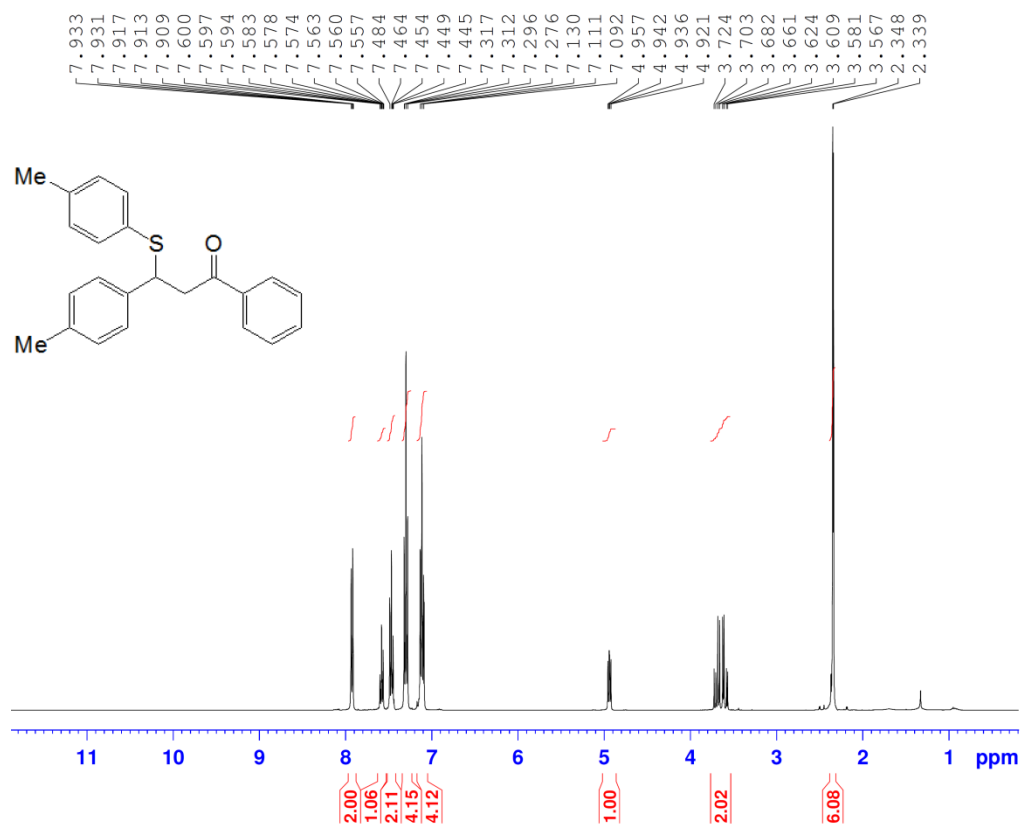
¹³C NMR of 1r



```
NAME      Dr.Gholi nejad
EXPNO     602
PROCNO    1
Date_     20150509
Time      10.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         14
DS         0
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.0894966 sec
RG         40.3
DW         62.400 usec
DE         6.50 usec
TE         294.4 K
D1         4.00000000 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
WDB        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
```

^1H NMR of 1s

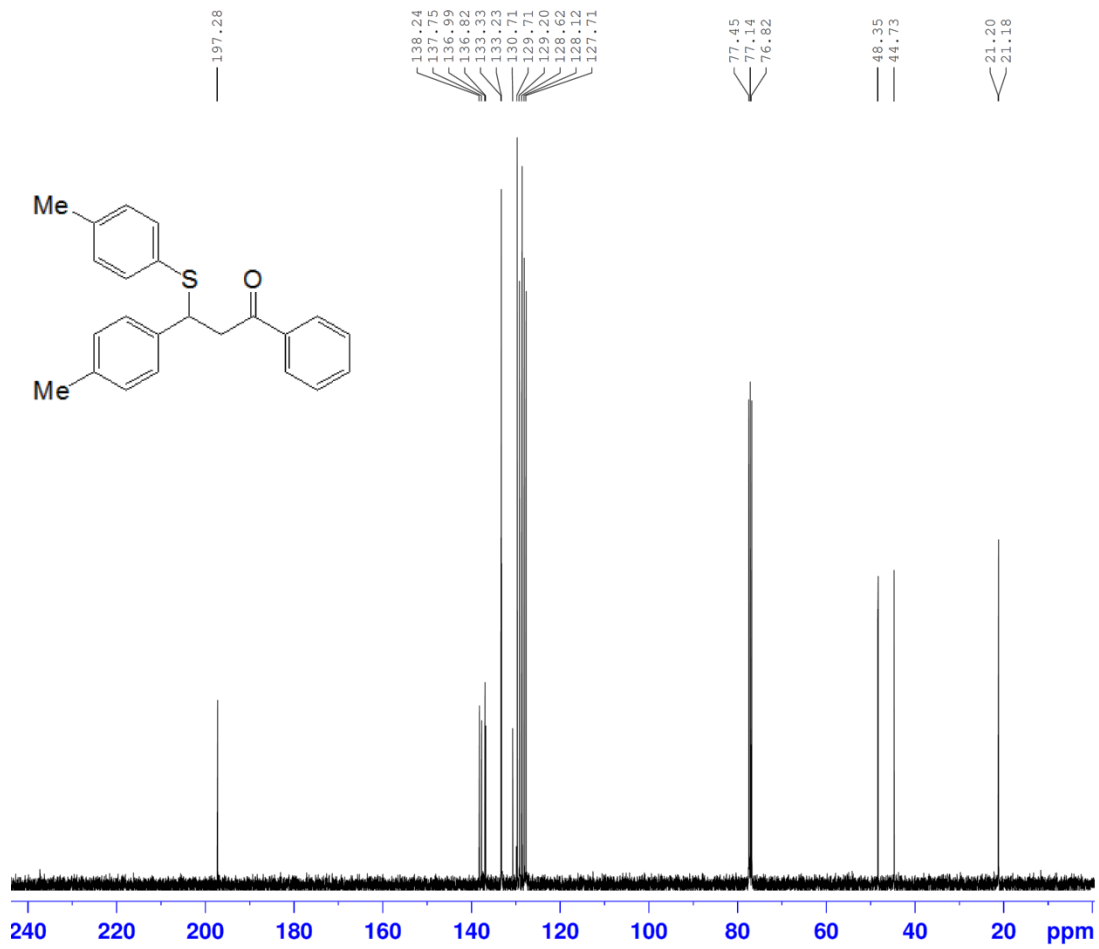




NAME Dr.Gholi nejad
 EXPNO 604
 PROCNO 1
 Date_ 20150509
 Time 10.53
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 14
 DS 0
 SWH 8012.820 Hz
 FIDRES 0.122266 Hz
 AQ 4.0894966 se
 RG 40.3
 DW 62.400 us
 DE 6.50 us
 TE 294.5 K
 D1 4.00000000 se
 TD0 1

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

¹H NMR of 1t



```

NAME      Dr.Gholi nejad
EXPNO     605
PROCNO    1
Date_     20150509
Time      10.55
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         60
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         294.4 K
D1         2.00000000 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
  
```

¹³C NMR of 1t