

Supporting Information

An Expedient Osmium(VI)/K₃Fe(CN)₆-Mediated Selective Oxidation of Benzylic, Allylic and Propargylic Alcohols

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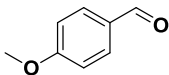
Contents

Copies of ¹H and ¹³C NMR spectra for all compounds.....S2–S42

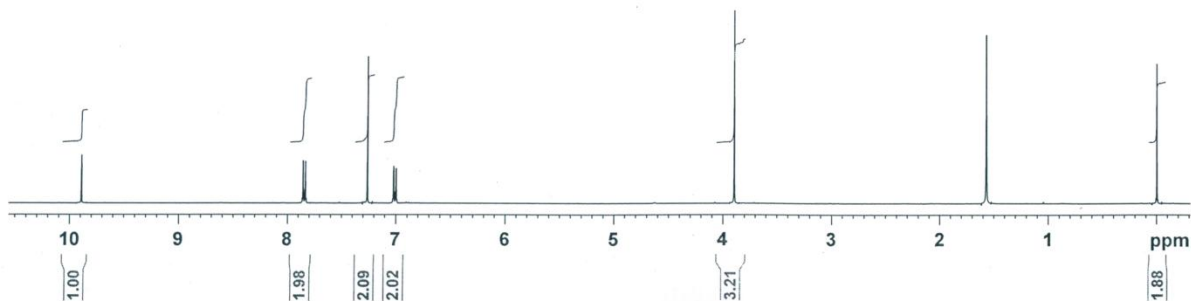
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 2a

NAME RAF-BV-432-1H
 EXPNO 9
 PROCNO 1
 Date 20140122
 Time 23.43
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 15
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 362
 DW 60.800 usec
 DE 6.50 usec
 TE 296.9 K
 D1 1.0000000 sec
 TD0 1

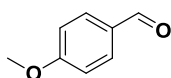
RAF-BV-432-1H



===== CHANNEL f1 =====
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 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300103 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



196.63
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 114.12
 77.26
 77.00
 76.75
 55.37

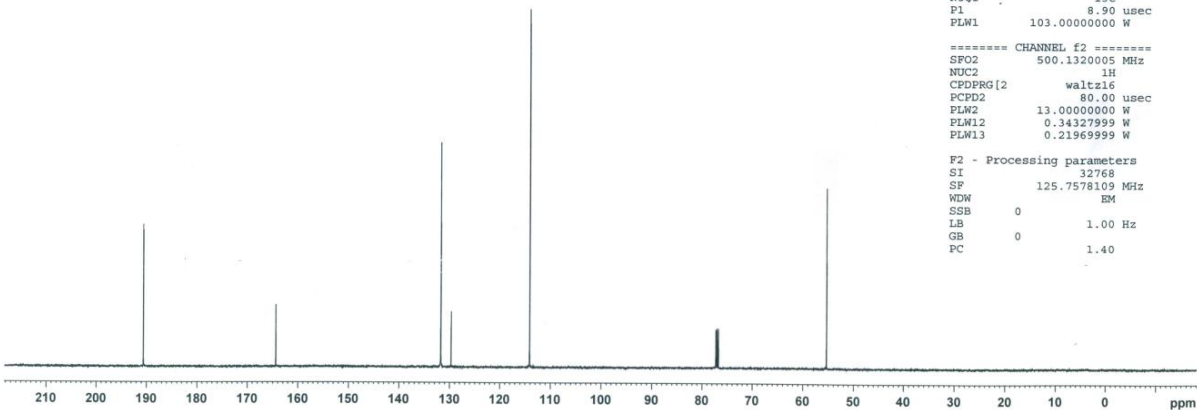


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 NAME RAF-BV-432-13C
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 PROCNO 1

F2 - Acquisition Parameters
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 INSTRUM spect
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 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 DS 4
 SWH 29761.904 Hz
 FIDRES 0.454131 Hz
 AQ 1.1010048 sec
 RG 197.27
 DW 16.800 usec
 DE 6.50 usec
 TE 295.7 K
 D1 1.0000000 sec
 D11 0.0300000 sec
 TD0 1

===== CHANNEL f1 =====
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 NUC1 13C
 P1 8.90 usec
 PLW1 103.0000000 W
 ===== CHANNEL f2 =====
 SFO2 500.1320005 MHz
 NUC2 1H
 CPDPRG2 waltz16
 PCPD2 80.00 usec
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 PLW12 0.34327999 W
 PLW13 0.21969999 W

F2 - Processing parameters
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 SF 125.7578109 MHz
 WDW EM
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¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2b

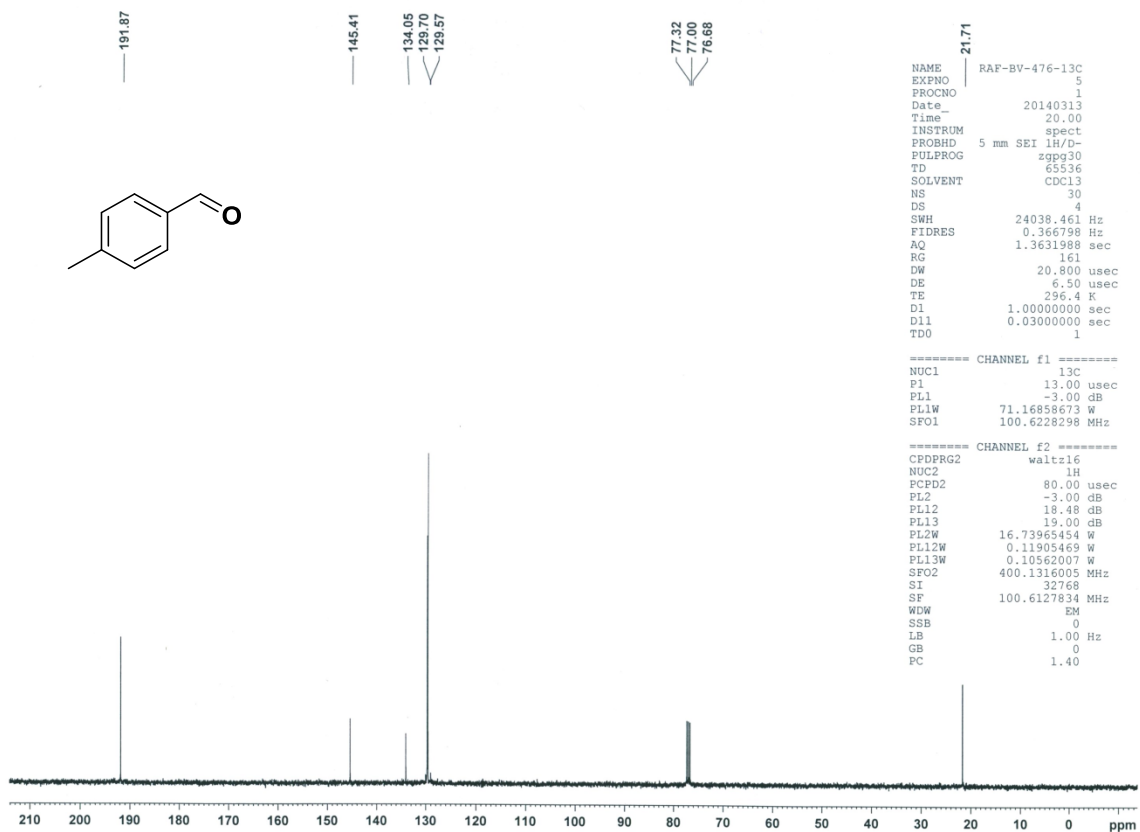
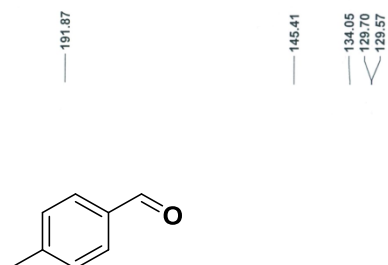
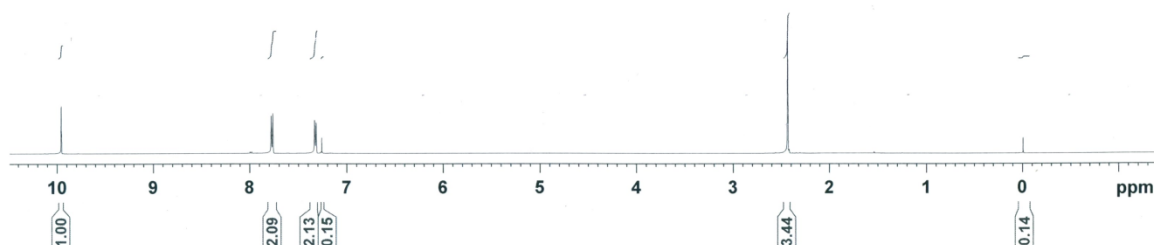
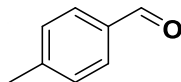
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 Time_ 0.19
 INSTRUM spect
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 PULPROG zg30
 TD 59998
 SOLVENT CDCl3
 NS 17
 DS 0
 SWH 10000.000 Hz
 FIDRES 0.156672 Hz
 AQ 2.9999001 sec
 RG 61.42
 DW 50.000 usec
 DE 6.50 usec
 TE 298.5 K
 D1 1.0000000 sec
 TDO 1

===== CHANNEL f1 =====
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 NUC1 1H
 P1 13.00 usec
 PLW1 13.0000000 W

F2 - Processing parameters
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 SF 500.1300121 MHz
 WDW EM
 SSB 0
 LB 0 Hz
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RAF-BV-476-1H

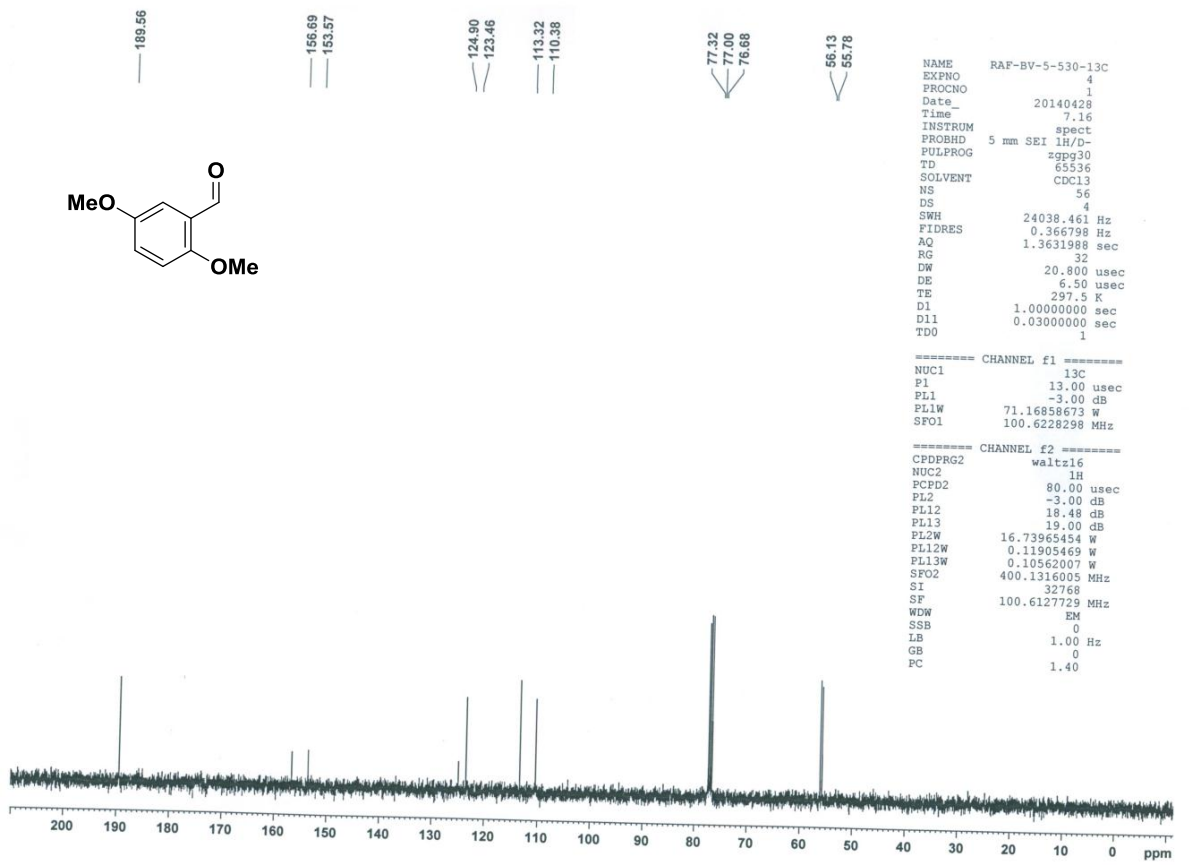
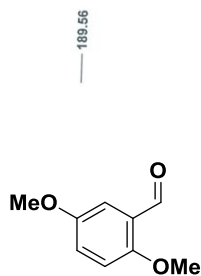
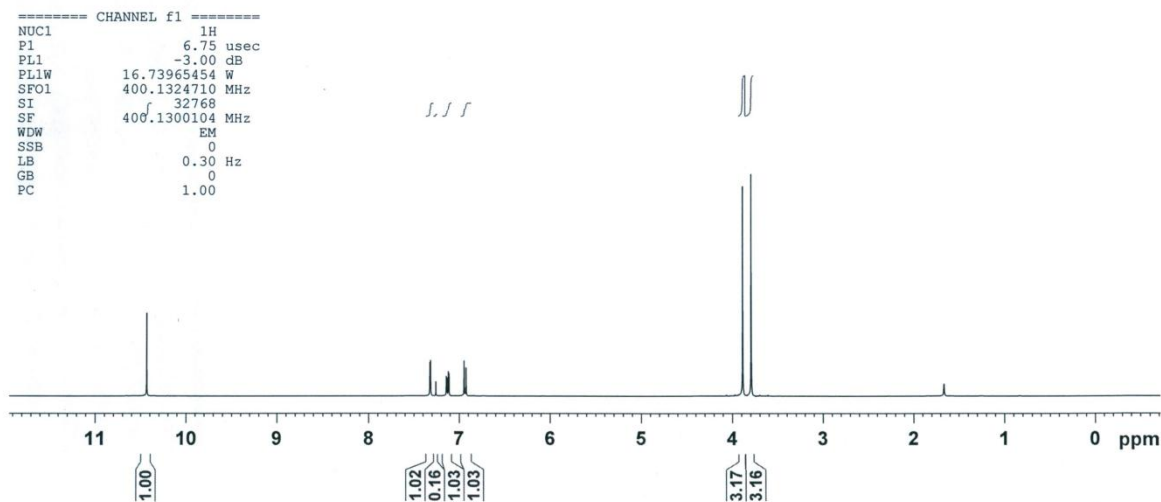
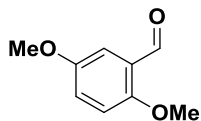


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2c

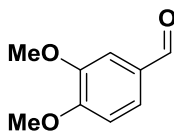
RAF-BV-5-530-1H

```

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PROCNO    1
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Time      7.12
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PROBHD    5 mm SEI 1H/D-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        16
DS        0
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        128
DW        60.800 usec
DE        6.50 usec
TE        297.1 K
D1        1.00000000 sec
TDO       1
    
```

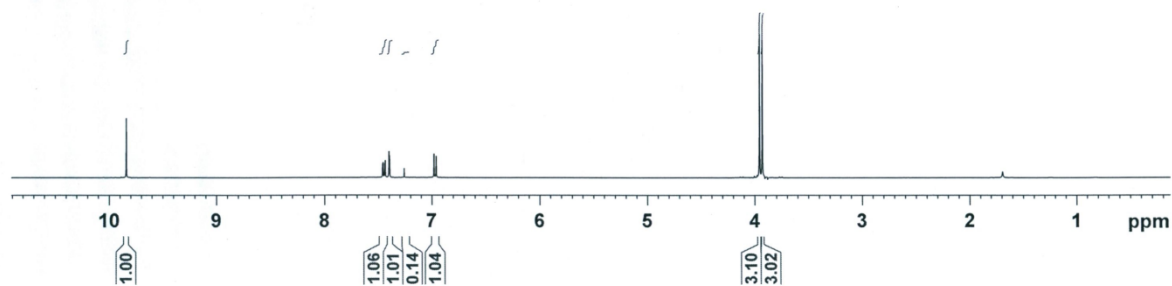


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2d



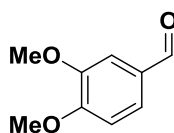
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EXPNO     5
PROCNO    1
Date_     20140428
Time      7.23
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        16
DS        0
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        128
DW        60.800 usec
DE        6.50 usec
TE        297.2 K
D1        1.0000000 sec
TD0       1
    
```



```

===== CHANNEL f1 =====
NUC1      1H
P1        6.75 usec
PL1       -3.00 dB
PL1W      16.73965454 W
SFO1      400.1324710 MHz
SI        32768
SF        400.1300102 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```



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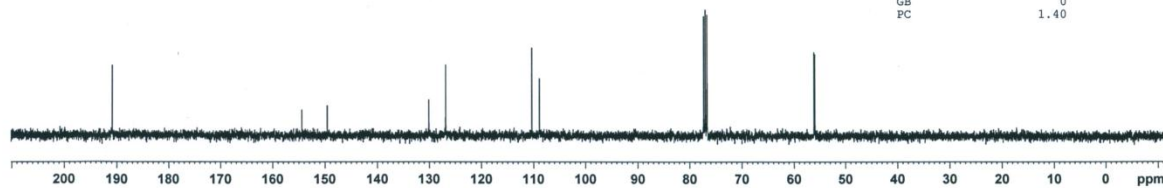
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PROCNO    1
Date_     20140428
Time      7.27
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        57
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        32
DW        20.800 usec
DE        6.50 usec
TE        297.5 K
D1        1.0000000 sec
D11       0.03000000 sec
TD0       1
    
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        13.00 usec
PL1       -3.00 dB
PL1W      71.16858673 W
SFO1      100.6228298 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -3.00 dB
PL12      18.48 dB
PL13      19.00 dB
PL2W      16.73965454 W
PL12W     0.11905469 W
PL13W     0.10562007 W
SFO2      400.1316005 MHz
SI        32768
SF        100.6127741 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
    
```



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 2e

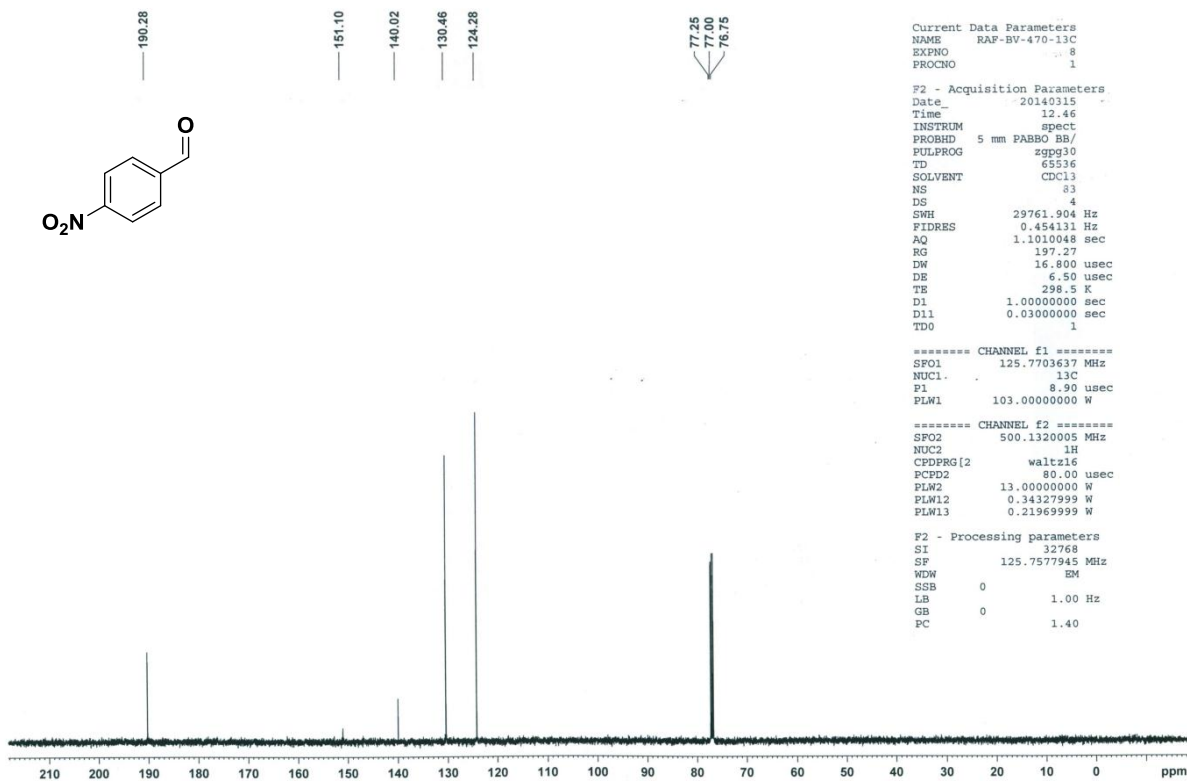
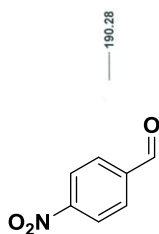
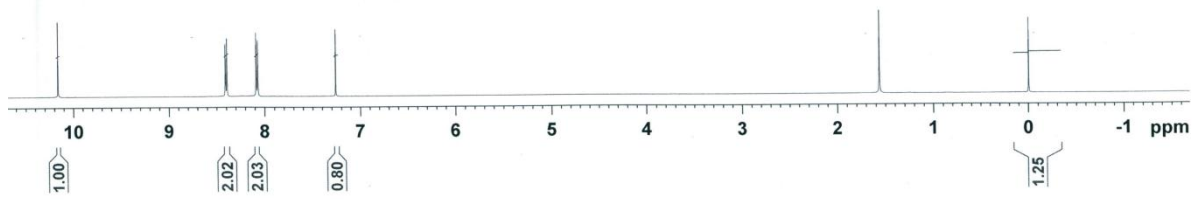
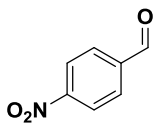
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EXPNO   1
PROCNO  1

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Time    12.05
INSTRUM spect
PROBHD  5 mm PABBO BB/
PULPROG zg30
TD       65536
SOLVENT CDCl3
NS       16
DS       2
SWH      10000.000 Hz
FIDRES   0.152589 Hz
AQ        3.2767999 sec
RG        197.27
DW        50.000 usec
DE        6.50 usec
TE        297.9 K
D1        1.00000000 sec
TD0       1

===== CHANNEL f1 =====
SFO1     500.1330885 MHz
NUC1      1H
P1        13.00 usec
PLW1     13.00000000 W

F2 - Processing parameters
SI        65536
SF        500.1300124 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```



```

Current Data Parameters
NAME    RAF-BV-470-13C
EXPNO   8
PROCNO  1

F2 - Acquisition Parameters
Date_   20140315
Time    12.46
INSTRUM spect
PROBHD  5 mm PABBO BB/
PULPROG zgpg30
TD       65536
SOLVENT CDCl3
NS       83
DS       4
SWH      29761.904 Hz
FIDRES   0.454131 Hz
AQ        1.1010048 sec
RG        197.27
DW        16.800 usec
DE        6.50 usec
TE        298.5 K
D1        1.00000000 sec
D11      0.03000000 sec
TD0       1

===== CHANNEL f1 =====
SFO1     125.7703637 MHz
NUC1      13C
P1        8.90 usec
PLW1     103.00000000 W

===== CHANNEL f2 =====
SFO2     500.1320005 MHz
NUC2      1H
CPDPRG2  waltz16
PCPD2    80.00 usec
PLW2     13.00000000 W
PLW12    0.34327999 W
PLW13    0.21969999 W

F2 - Processing parameters
SI        32768
SF        125.7577945 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
    
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¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2f

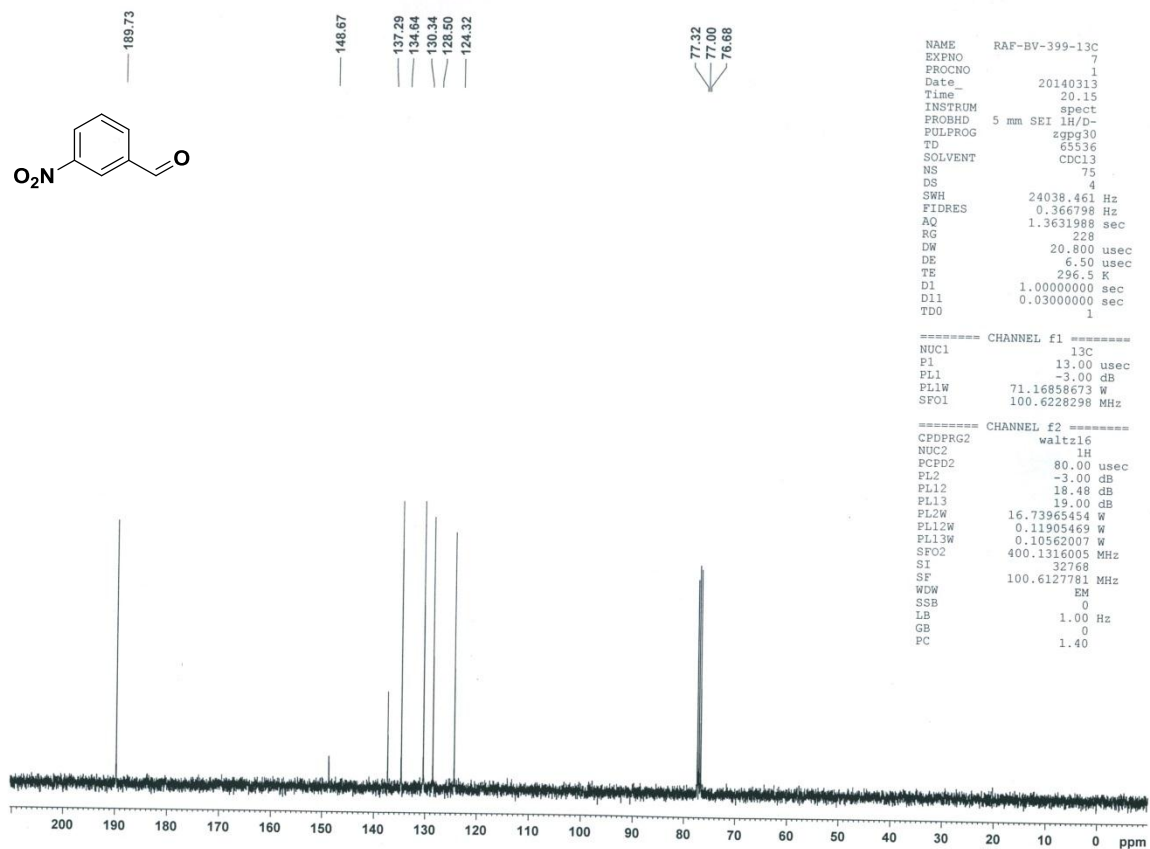
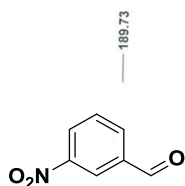
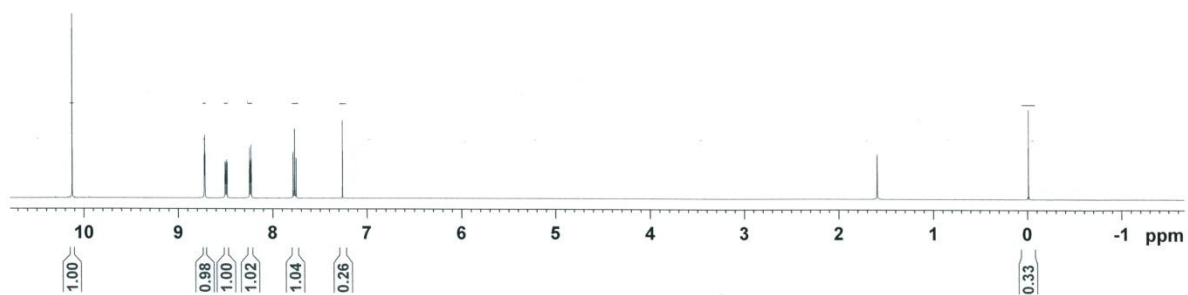
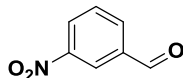
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EXPNO    6
PROCNO   1

F2 - Acquisition Parameters
Date_    20140313
Time     0.33
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zg30
TD       59998
SOLVENT  CDCl3
NS       15
DS       0
SWH      10000.000 Hz
FIDRES   0.166672 Hz
AQ       2.9999001 sec
RG       157.24
DW       50.000 usec
DE       6.50 usec
TE       295.5 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
SFO1     500.1330885 MHz
NUC1     1H
P1       13.00 usec
PLW1     13.00000000 W

F2 - Processing parameters
SI       65536
SF       500.1300121 MHz
WDW      EM
SSB      0
LB       0 Hz
GB       0
PC       1.00
    
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¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2g

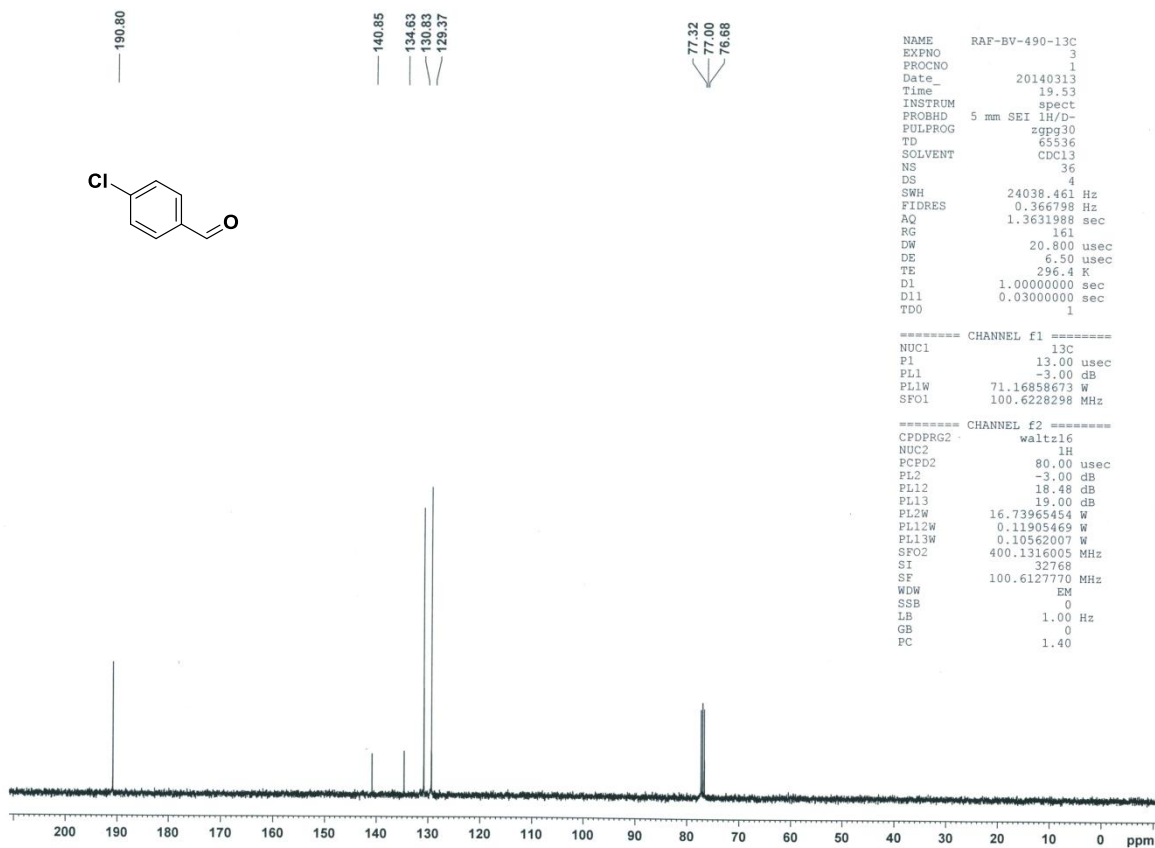
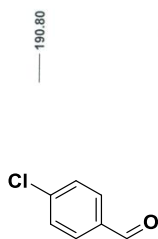
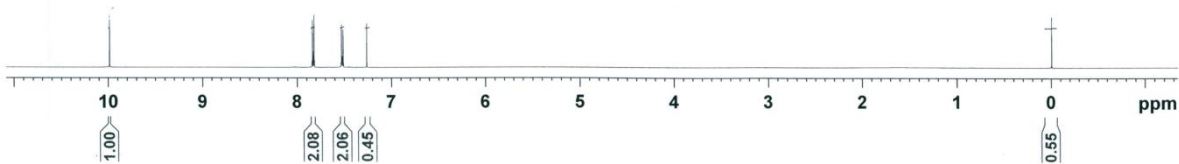
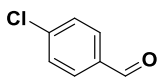
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PROCNO   1

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Time     0.24
INSTRUM  spect
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PULPROG  zg30
TD       53998
SOLVENT  CDCl3
NS       13
DS       0
SWH      10000.000 Hz
FIDRES   0.166672 Hz
AQ       2.9999001 sec
RG       157.24
DW       50.000 usec
DE       6.50 usec
TE       295.5 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
SFO1     500.1330885 MHz
NUC1     1H
P1       13.00 usec
PL1      13.0000000 W

F2 - Processing parameters
SI       65536
SF       500.1300121 MHz
WDW      EM
SSB      0
LB       0 Hz
GB       0
PC       1.00
    
```



```

NAME      RAF-BV-490-13C
EXPNO    3
PROCNO   1
Date_    20140313
Time     19.53
INSTRUM  spect
PROBHD   5 mm SEI 1H/D-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       36
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       161
DW       20.800 usec
DE       6.50 usec
TE       296.4 K
D1       1.00000000 sec
D11      0.03000000 sec
TD0      1
    
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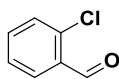
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NUC1     13C
P1       13.00 usec
PL1      -3.00 dB
PL1W     71.16858673 W
SFO1     100.6228298 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2      -3.00 dB
PL12     18.48 dB
PL13     19.00 dB
PL2W     16.73965454 W
PL12W    0.11905469 W
PL13W    0.10562007 W
SFO2    400.1316005 MHz
SI       32768
SF       100.6127770 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
    
```


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2h

RAF-BV-491-1H

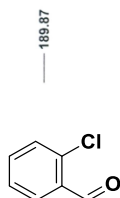
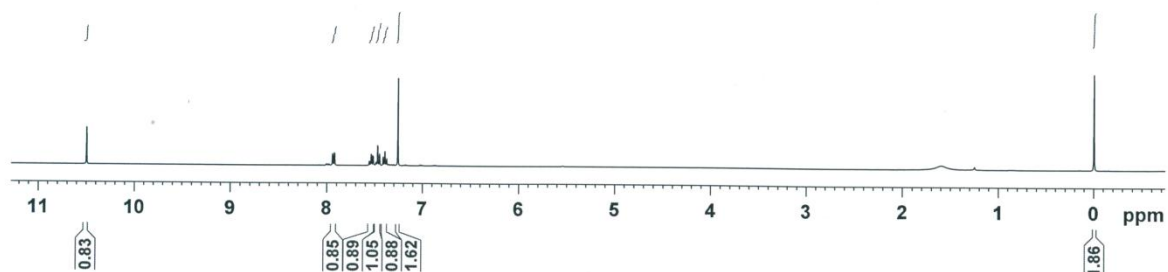


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PROCNO    1
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Time      18.09
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PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        51
DS        0
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        456
DW        60.800 usec
DE        6.50 usec
TE        293.5 K
D1        1.00000000 sec
TD0       1
    
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        6.75 usec
PL1       -3.00 dB
PL1W     16.73965454 W
SFO1     400.1324710 MHz
SI        32768
SF        400.1300101 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```



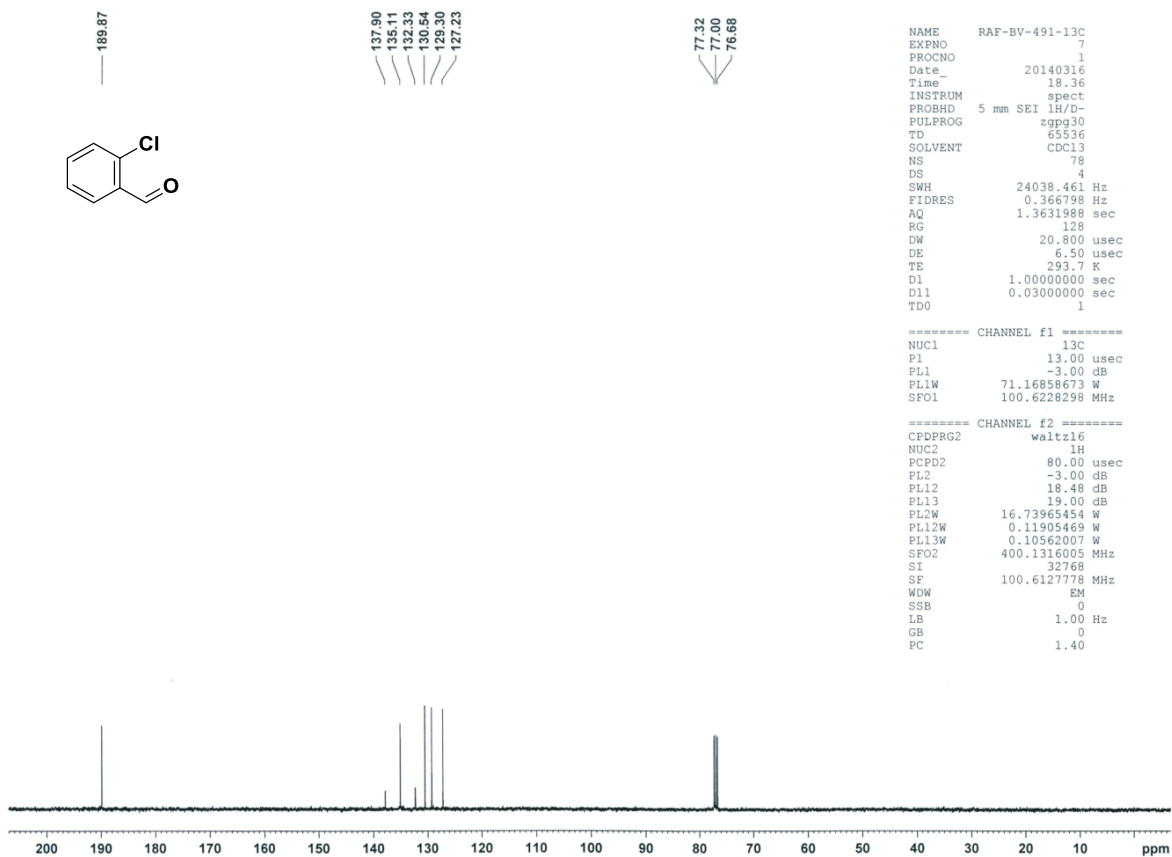
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PROCNO    1
Date_     20140316
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PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        78
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        128
DW        20.800 usec
DE        6.50 usec
TE        293.7 K
D1        1.00000000 sec
D11       0.03000000 sec
TD0       1
    
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        13.00 usec
PL1       -3.00 dB
PL1W     71.16858673 W
SFO1     100.6228298 MHz

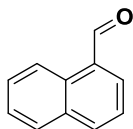
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -3.00 dB
PL12     18.44 dB
PL13     19.00 dB
PL2W     16.73965454 W
PL12W    0.11905469 W
PL13W    0.10562007 W
SFO2     400.1316005 MHz
SI        32768
SF        100.6127778 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
    
```



^1H NMR (400 MHz, CDCl_3/TMS) and ^{13}C NMR (100 MHz, CDCl_3) of compound 2i

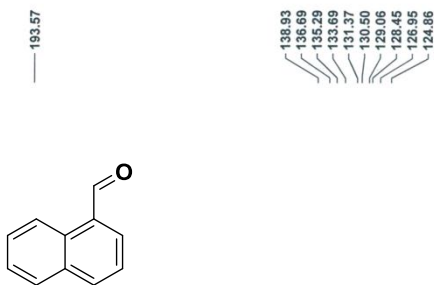
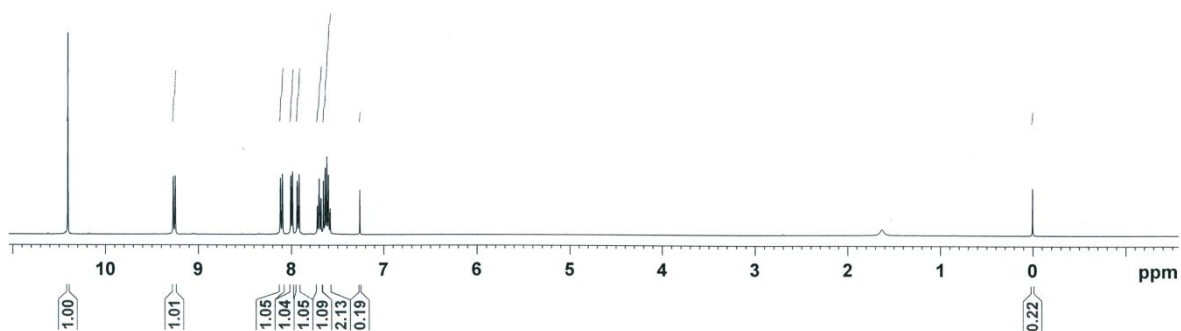
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NAME      RAF-BV-477-1H
EXPNO    7
PROCNO   1
Date_    20140305
Time     23.53
INSTRUM  spect
PROBHD   5 mm SEI 1H/D-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       10
DS       0
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       144
DW       60.800 usec
DE       6.50 usec
TE       294.5 K
D1       1.00000000 sec
TD0      1
    
```



```

===== CHANNEL f1 =====
NUC1    1H
P1      6.75 usec
PL1     -3.00 dB
PL1W    16.73965454 W
SF01    400.1324710 MHz
SI      32768
SF      400.1300103 MHz
WDW     EM
SSB     0
LB      0.30 Hz
GB      0
PC      1.00
    
```



193.57
138.93
136.69
135.29
133.69
131.37
130.50
129.06
128.45
126.95
124.86
77.32
77.00
76.68

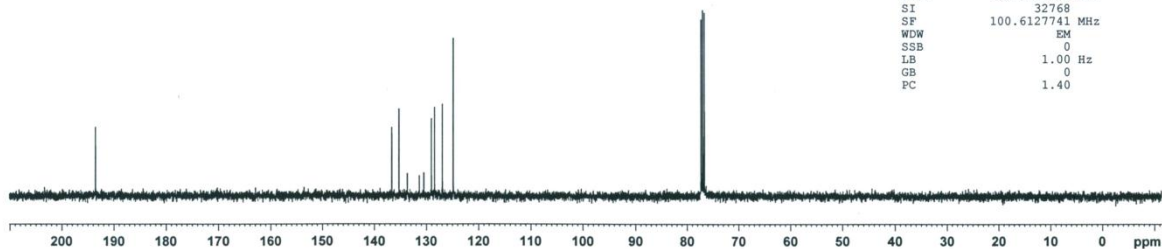
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NAME      RAF-BV-477-13C
EXPNO    8
PROCNO   1
Date_    20140305
Time     23.56
INSTRUM  spect
PROBHD   5 mm SEI 1H/D-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       94
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       144
DW       20.800 usec
DE       6.50 usec
TE       294.7 K
D1       1.00000000 sec
D11      0.03000000 sec
TD0      1
    
```

```

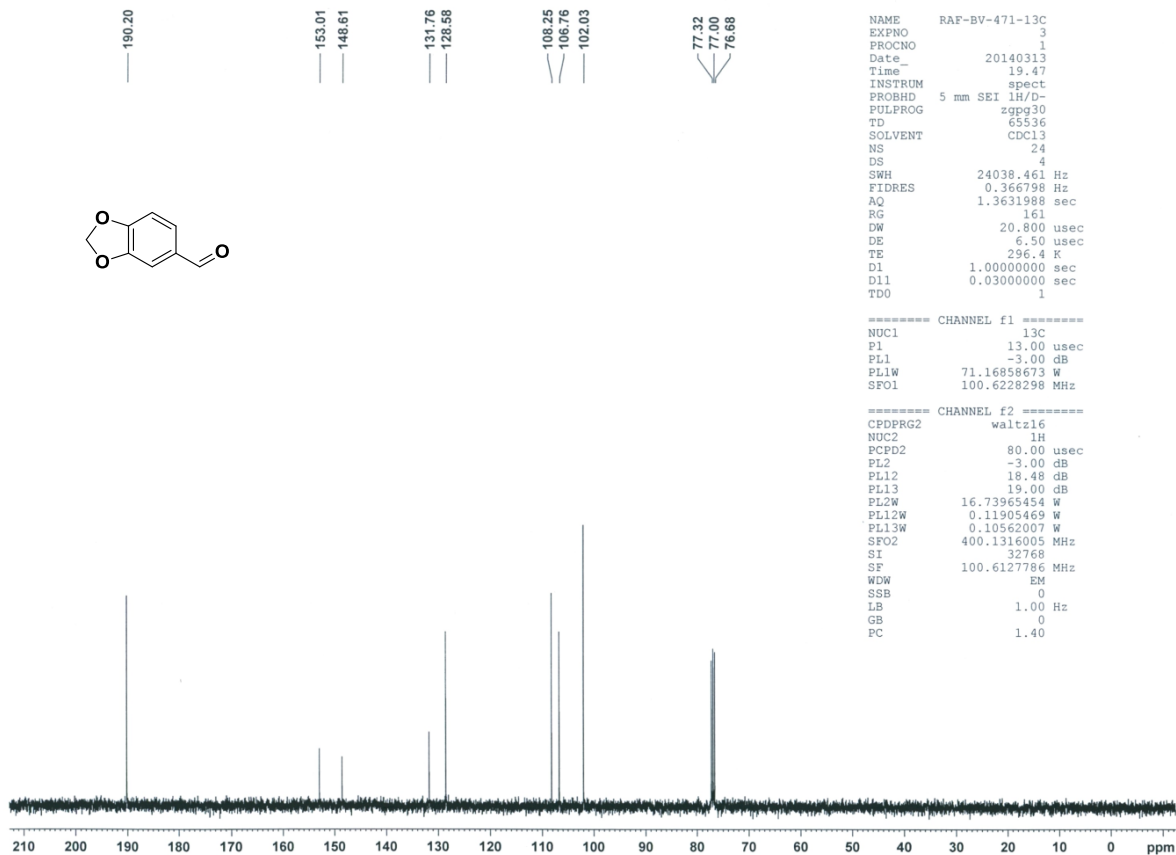
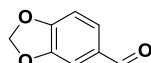
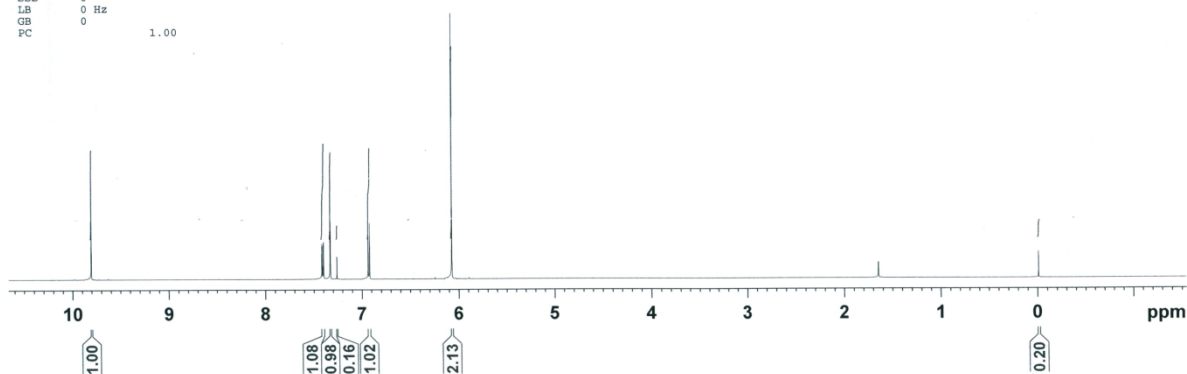
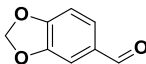
===== CHANNEL f1 =====
NUC1    13C
P1      13.00 usec
PL1     -3.00 dB
PL1W    71.16858673 W
SF01    100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2     -3.00 dB
PL12    18.48 dB
PL13    19.00 dB
PL2W    16.73965454 W
PL12W   0.11905469 W
PL13W   0.10562007 W
SF02    400.1316005 MHz
SI      32768
SF      100.6127741 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
    
```



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2j

Current Data Parameters
 NAME RAF-BV-471-1H
 EXPNO 1
 PROCNO 1
 F2 - Acquisition Parameters
 Date_ 20140313
 Time 0.13
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 59998
 SOLVENT CDCl3
 NS 23
 DS 0
 SWH 10000.000 Hz
 FIDRES 0.166572 Hz
 AQ 2.9999001 sec
 RG 106.54
 DW 50.000 usec
 DE 6.50 usec
 TE 295.5 K
 D1 1.0000000 sec
 TD0 1
 ----- CHANNEL f1 -----
 SF01 500.1330885 MHz
 NUC1 1H
 P1 13.00 usec
 PLW1 13.0000000 W
 F2 - Processing parameters
 SI 65536
 SF 500.1300122 MHz
 WDW EM
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

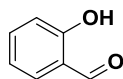
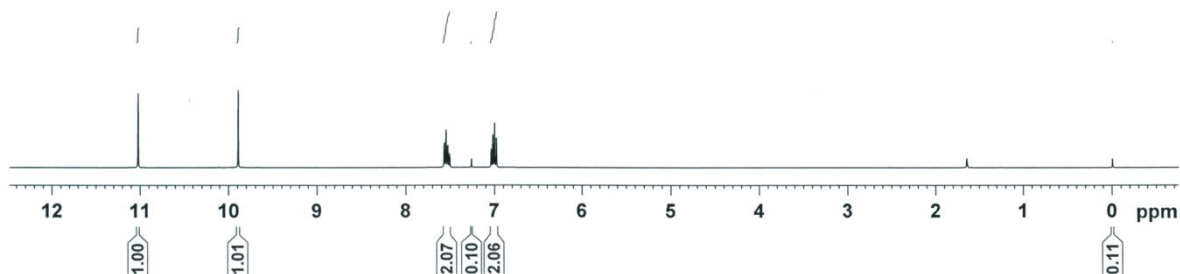
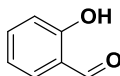


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2k

RAF-BV-488-1H

```

NAME      RAF-BV-488-1H
EXPNO     10
PROCNO    1
Date_     20140316
Time      19.20
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         26
DS         0
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         90.5
DW         60.800 usec
DE         6.50 usec
TE         293.5 K
D1         1.00000000 sec
TD0        1
    
```



```

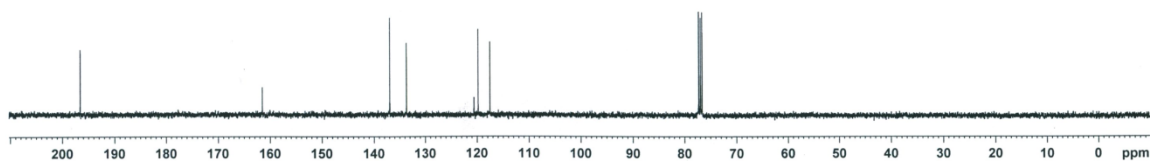
NAME      RAF-BV-488-13C
EXPNO     11
PROCNO    1
Date_     20140316
Time      19.24
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         109
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         32
DW         20.800 usec
DE         6.50 usec
TE         293.7 K
D1         1.00000000 sec
D11        0.03000000 sec
TD0        1
    
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         13.00 usec
PL1        -3.00 dB
PL1W       71.16858673 W
SF01      100.6228298 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        -3.00 dB
PL12       18.48 dB
PL13       19.00 dB
PL2W       16.73965454 W
PL12W      0.11905469 W
PL13W      0.10562007 W
SF02      400.1316005 MHz
SI         32768
SF         100.6127748 MHz
WDW        EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
    
```



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2I

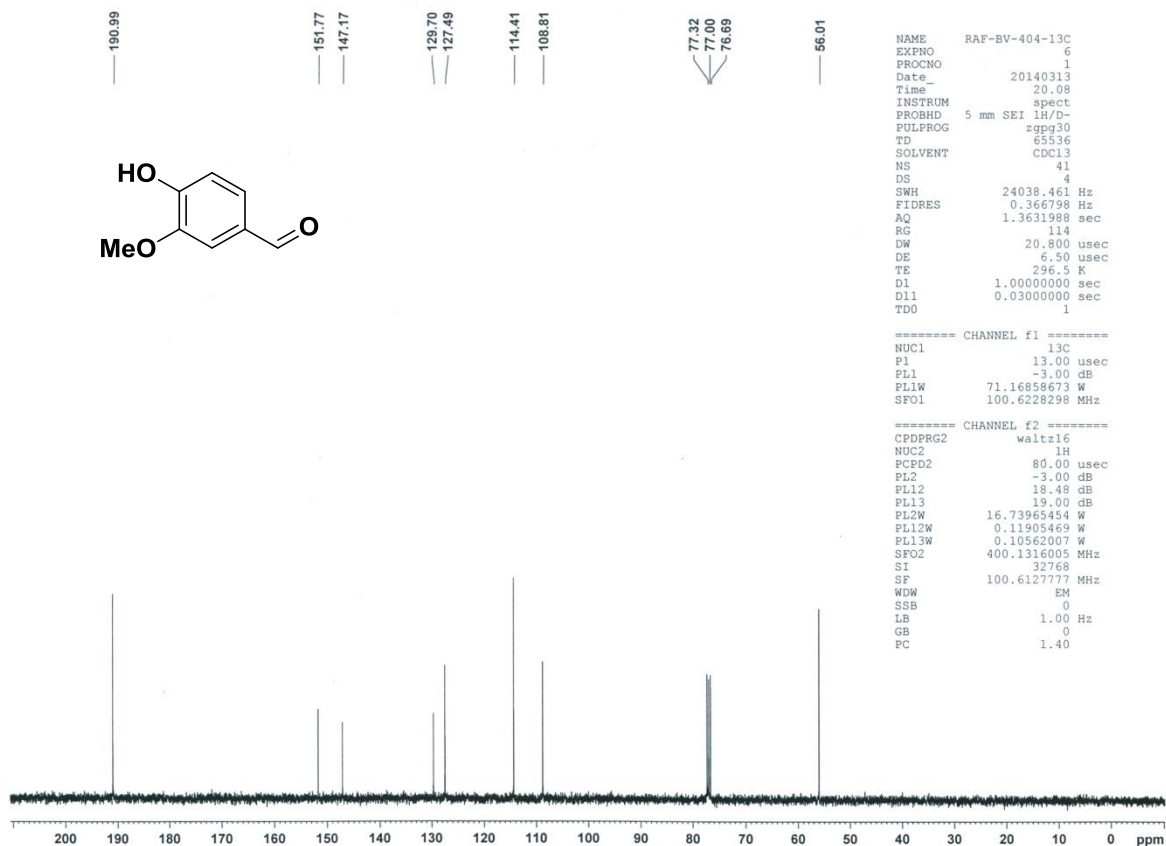
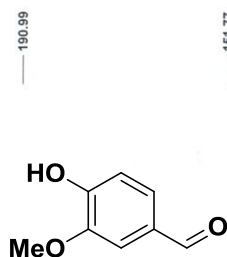
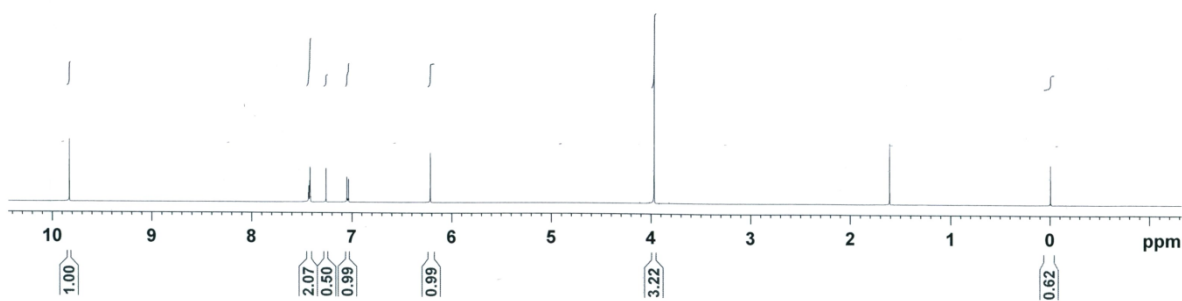
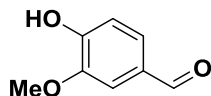
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Current Data Parameters
NAME      RAF-BV-404-1H
EXPNO    5
PROCNO   1

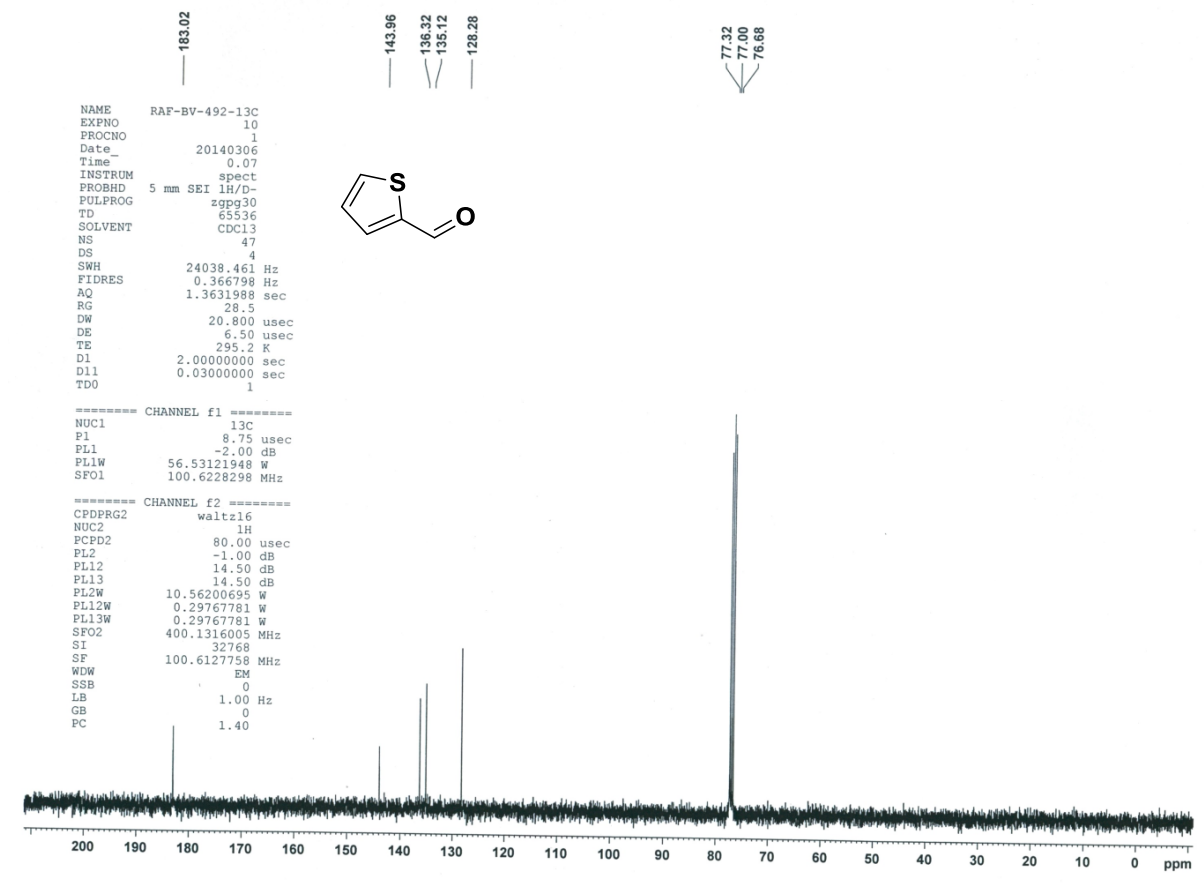
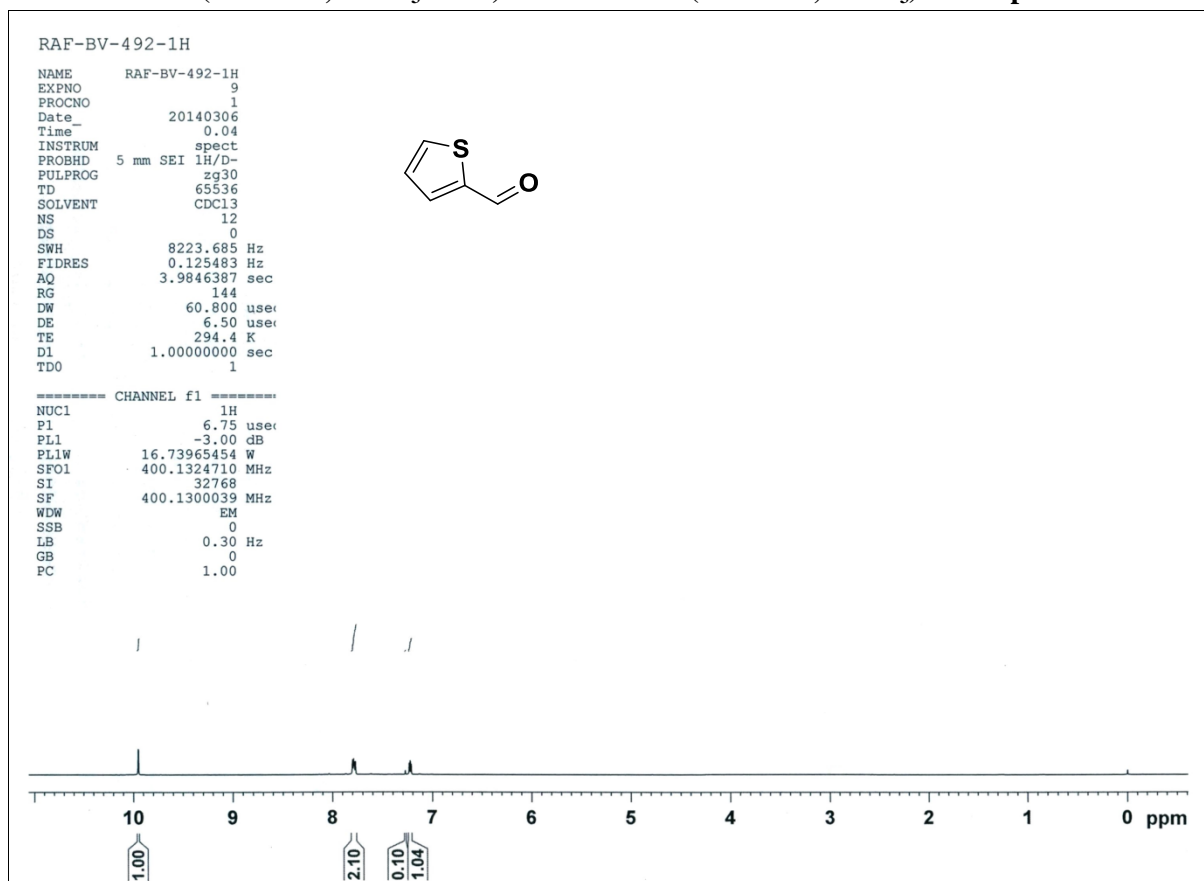
F2 - Acquisition Parameters
Date_    20140313
Time     0.28
INSTRUM spect
PROBHD   5 mm PABBO BB/
PULPROG zg30
TD       59998
SOLVENT  CDCl3
NS       15
DS       0
SWH      10000.000 Hz
FIDRES   0.166672 Hz
AQ       2.3999001 sec
RG       157.24
DW       50.000 usec
DE       6.50 usec
TE       295.5 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
SFO1     500.1330885 MHz
NUC1      1H
P1        13.00 usec
PL1       13.00000000 W

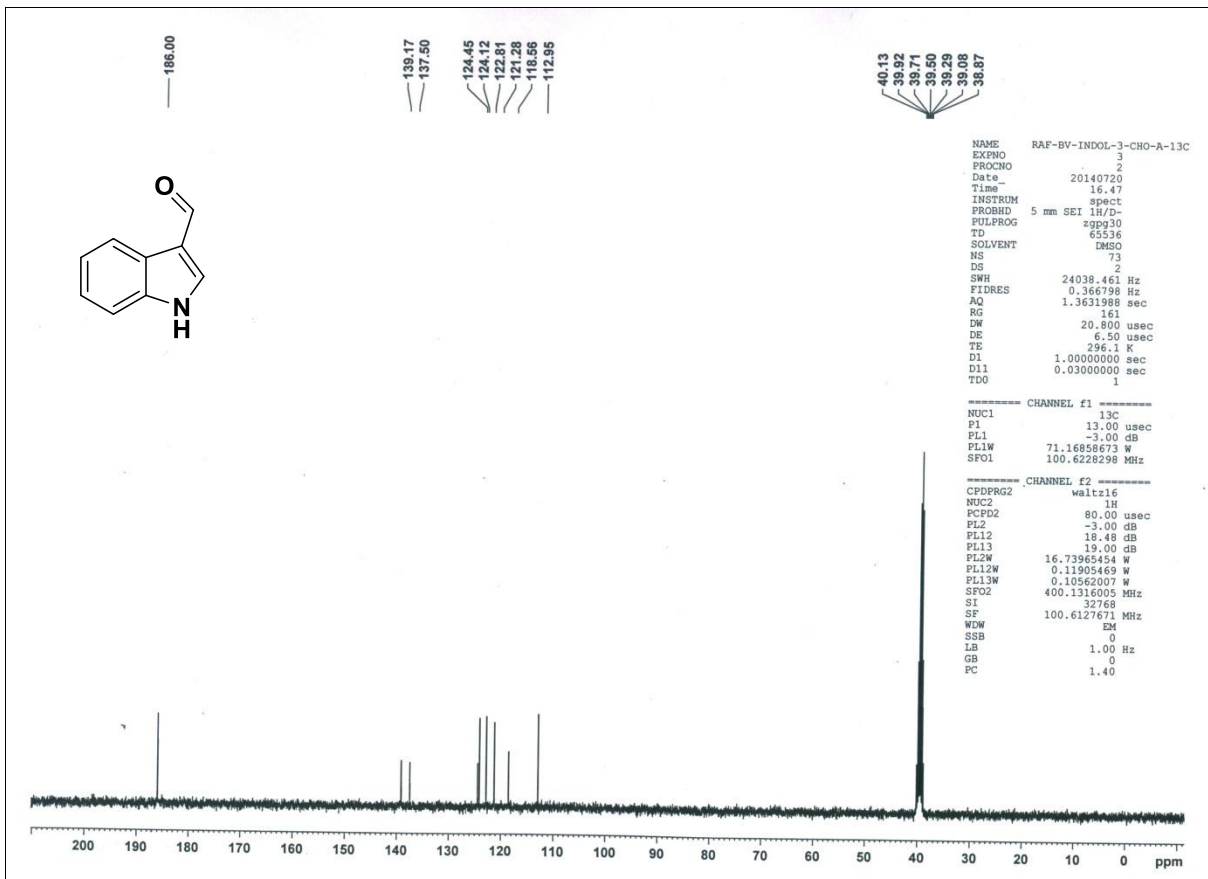
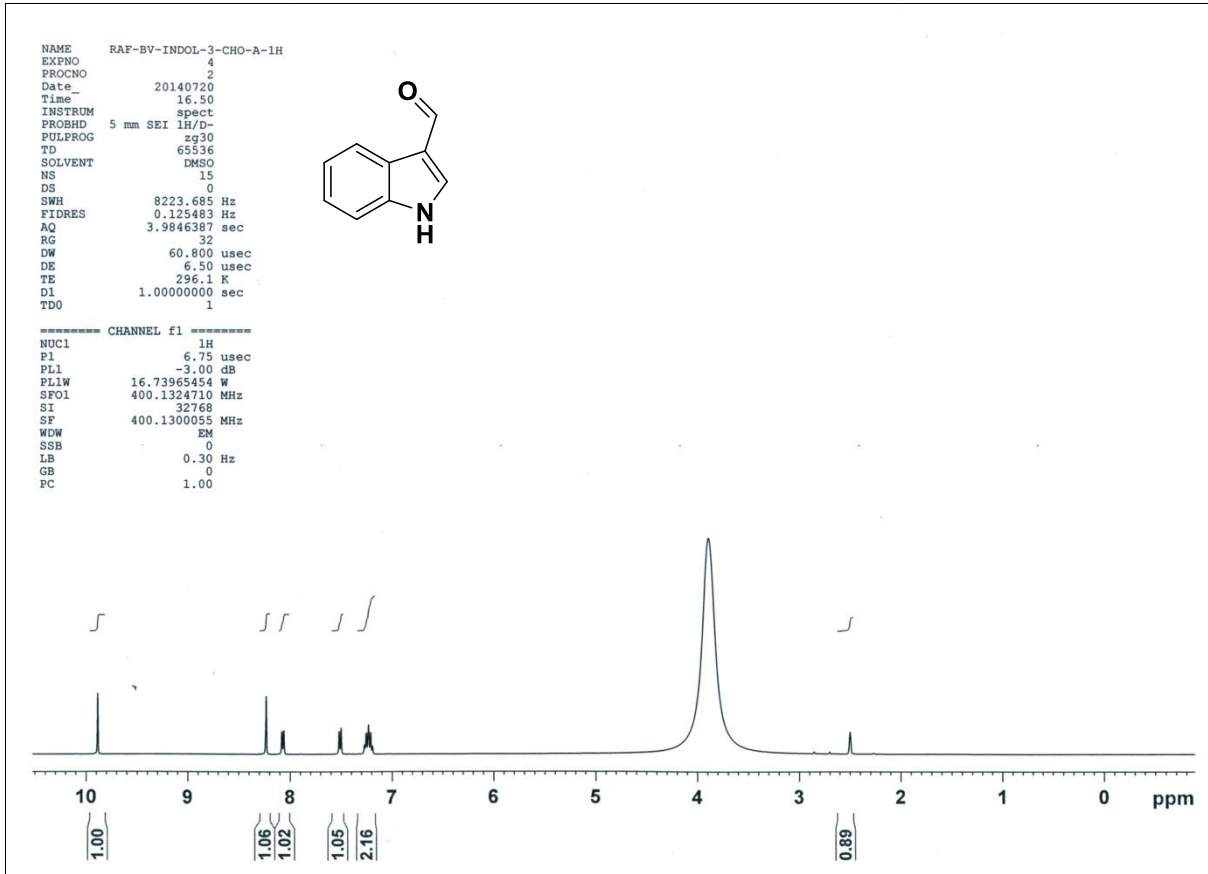
F2 - Processing parameters
SI        65536
SF        500.1300121 MHz
WDW       EM
SSB       0
LB        0 Hz
GB        0
PC        1.00
    
```



¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2m



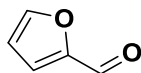
¹H NMR (400 MHz, DMSO-d₆) and ¹³C NMR (100 MHz, DMSO-d₆) of compound 2n



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 2o

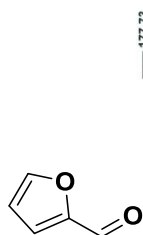
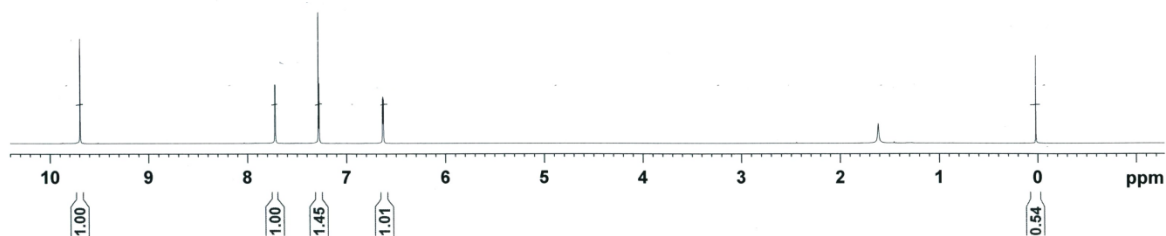
Current Data Parameters
NAME RAF-BV-474-1H
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140315
Time 12.11
INSTRUM spect
PROBHD 5 mm PABBO BB/
FULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 11
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 197.27
DW 50.000 usec
DE 6.50 usec
TE 297.9 K
D1 1.00000000 sec
TDO 1



===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 13.00 usec
PLW1 13.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



177.73
152.79
147.98
121.02
112.46
77.25
77.00
76.74

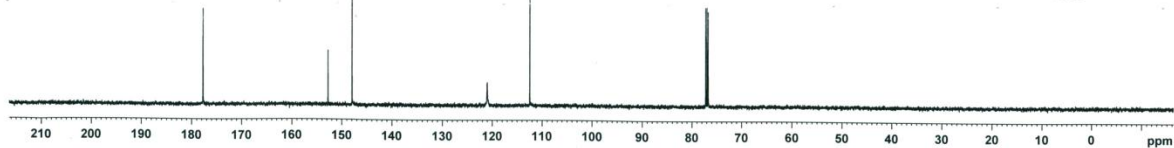
Current Data Parameters
NAME RAF-BV-474-13C
EXPNO 9
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140315
Time 12.54
INSTRUM spect
PROBHD 5 mm PABBO BB/
FULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 35
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 197.27
DW 16.800 usec
DE 6.50 usec
TE 298.4 K
D1 1.00000000 sec
D11 0.03000000 sec
TDO 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 8.90 usec
PLW1 103.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 13.00000000 W
PLW12 0.34327999 W
PLW13 0.21969999 W

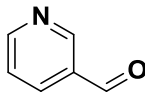
F2 - Processing parameters
SI 32768
SF 125.7578060 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2p

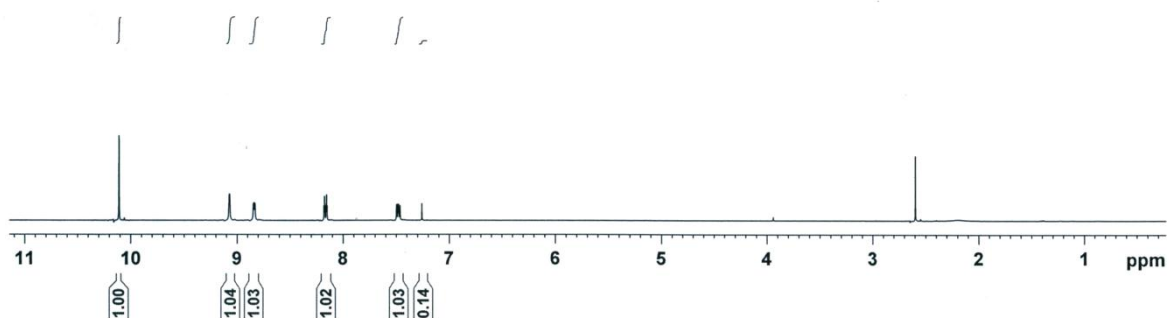
```

NAME    RAF-BV-PY-CHO-1H
EXPNO   1
PROCNO  1
Date_   20140428
Time    7.02
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zg30
TD       65536
SOLVENT CDCl3
NS       16
DS       0
SWH     8223.695 Hz
FIDRES  0.125483 Hz
AQ      3.9846387 sec
RG       128
DW      60.800 usec
DE      6.50 usec
TE      297.1 K
D1      1.0000000 sec
TDO     1
    
```

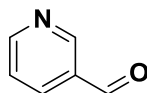


```

===== CHANNEL f1 =====
NUC1    1H
P1      6.75 usec
PL1     -3.00 dB
PL1W    16.73965454 W
SFO1    400.1324710 MHz
SI      32768
SF      400.1300103 MHz
WDW     EM
SSB     0
LB      0.30 Hz
GB      0
PC      1.00
    
```



190.70
154.69
152.04
135.78
131.39
124.06
77.32
77.00
76.68



```

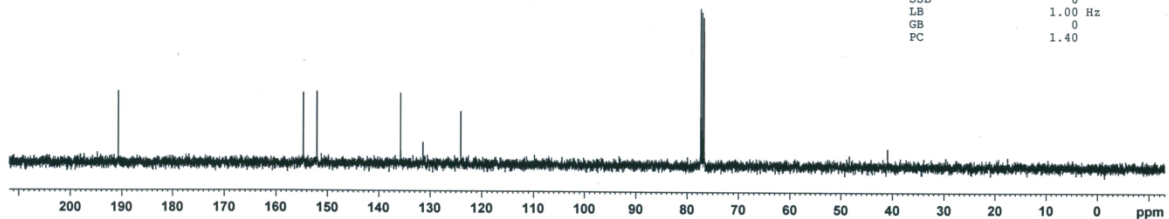
NAME    RAF-BV-PY-CHO-13C
EXPNO   2
PROCNO  1
Date_   20140428
Time    7.05
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zgpg30
TD       65536
SOLVENT CDCl3
NS       82
DS       4
SWH     24038.461 Hz
FIDRES  0.366798 Hz
AQ      1.3631988 sec
RG       32
DW      20.800 usec
DE      6.50 usec
TE      297.4 K
D1      1.0000000 sec
D11     0.0300000 sec
TDO     1
    
```

```

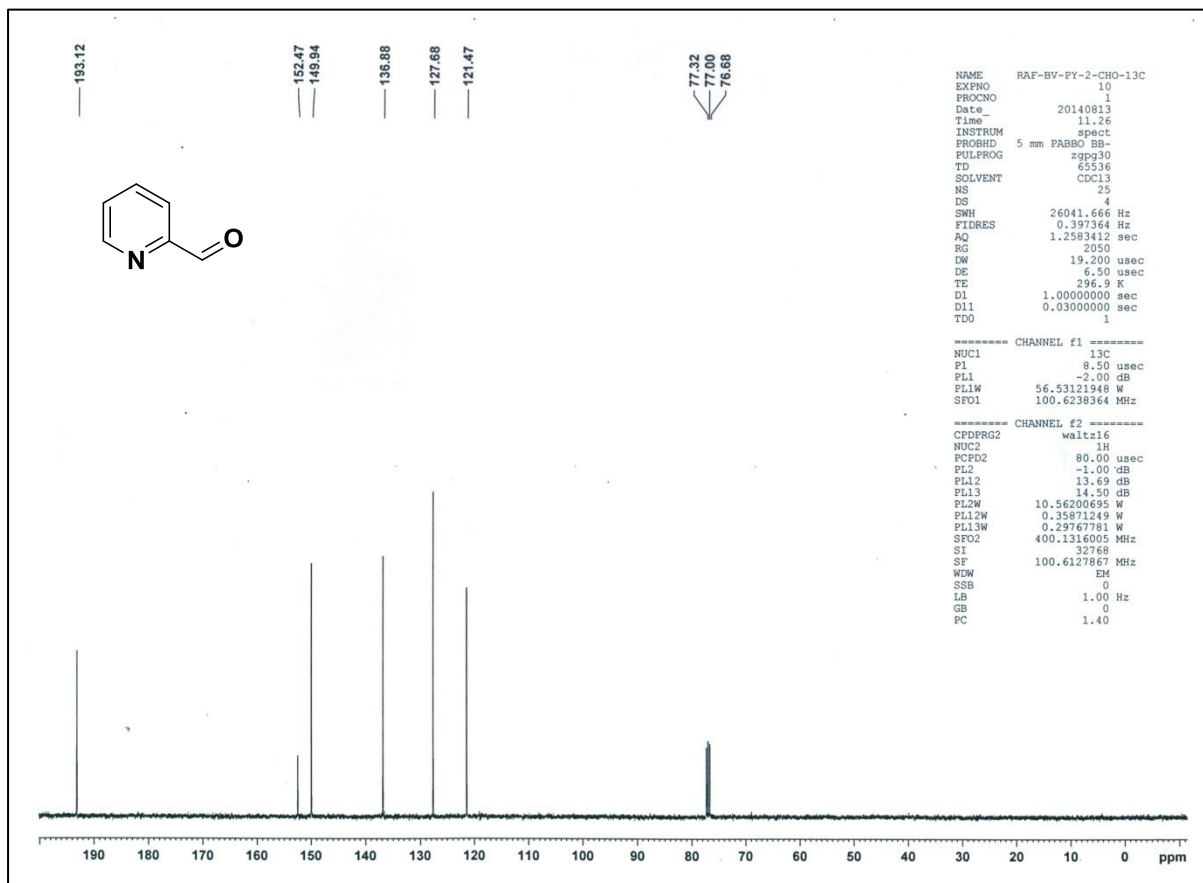
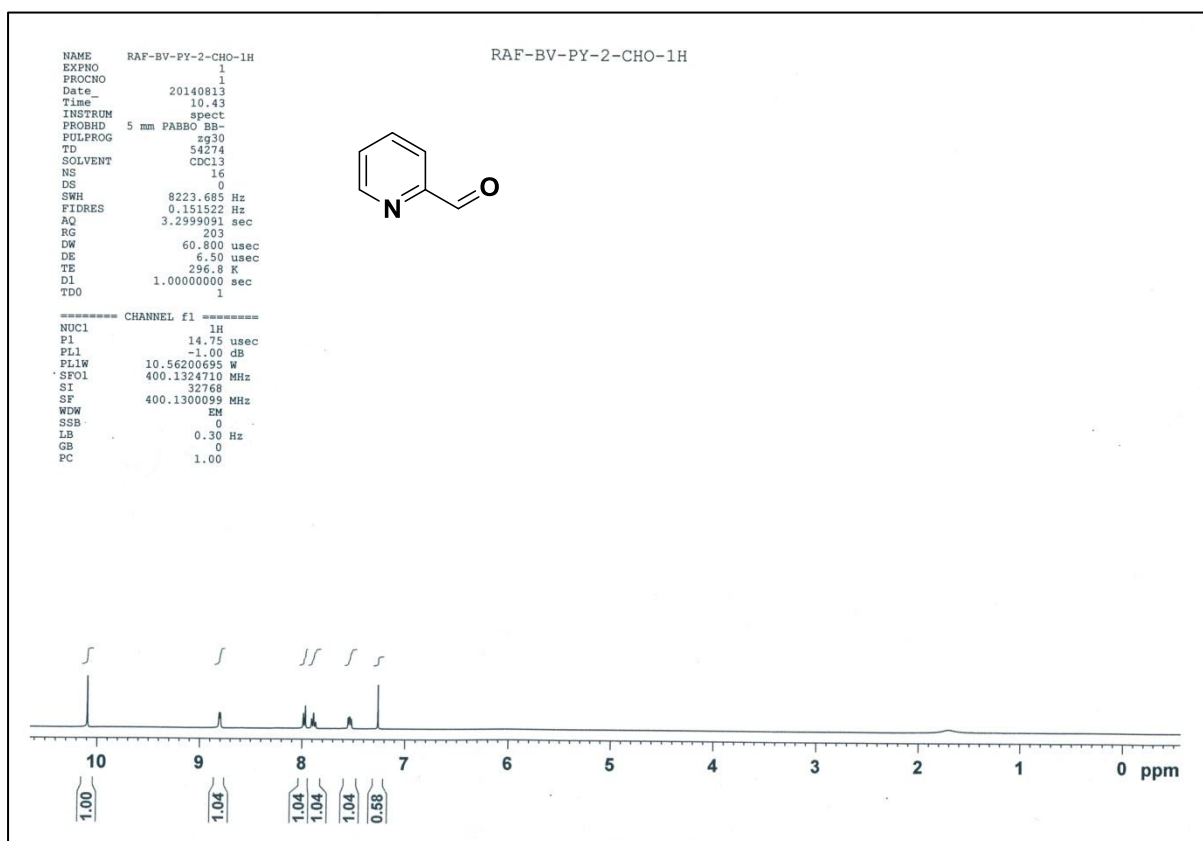
===== CHANNEL f1 =====
NUC1    13C
P1      13.00 usec
PL1     -3.00 dB
PL1W    71.16858673 W
SFO1    100.6228298 MHz
    
```

```

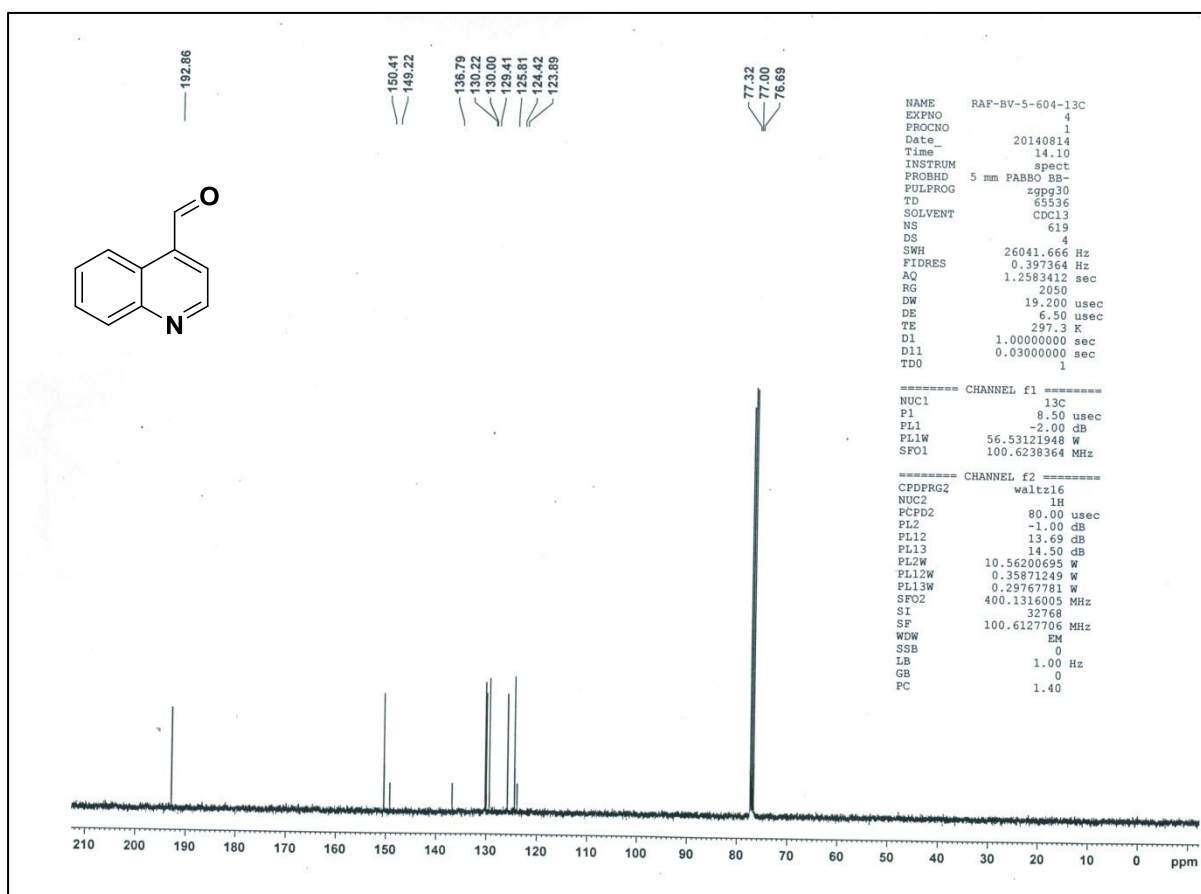
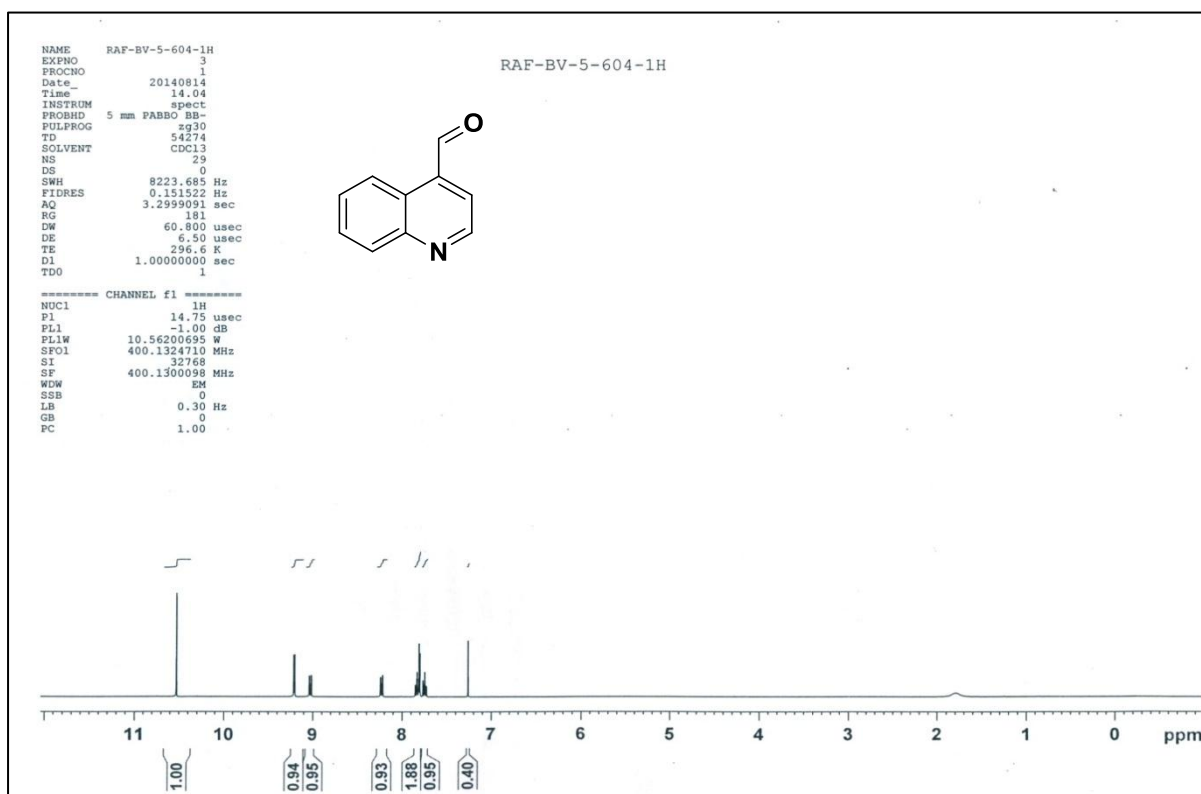
===== CHANNEL f2 =====
CPDPRG2. waltz16
NUC2    1H
PCPD2   80.00 usec
PL2     -3.00 dB
PL12    18.48 dB
PL13    19.00 dB
PL2W    16.73965454 W
PL12W   0.11905469 W
PL13W   0.10562007 W
SFO2    400.1316005 MHz
SI      32768
SF      100.6127741 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
    
```



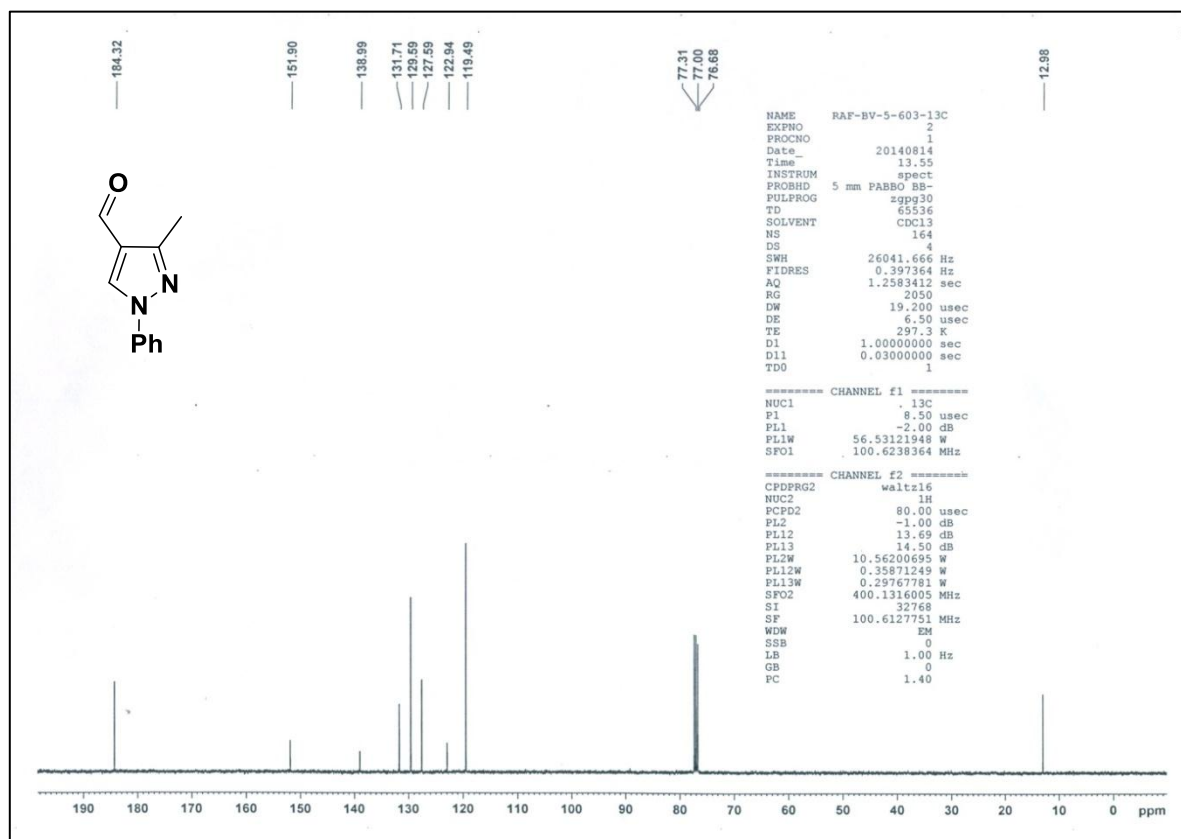
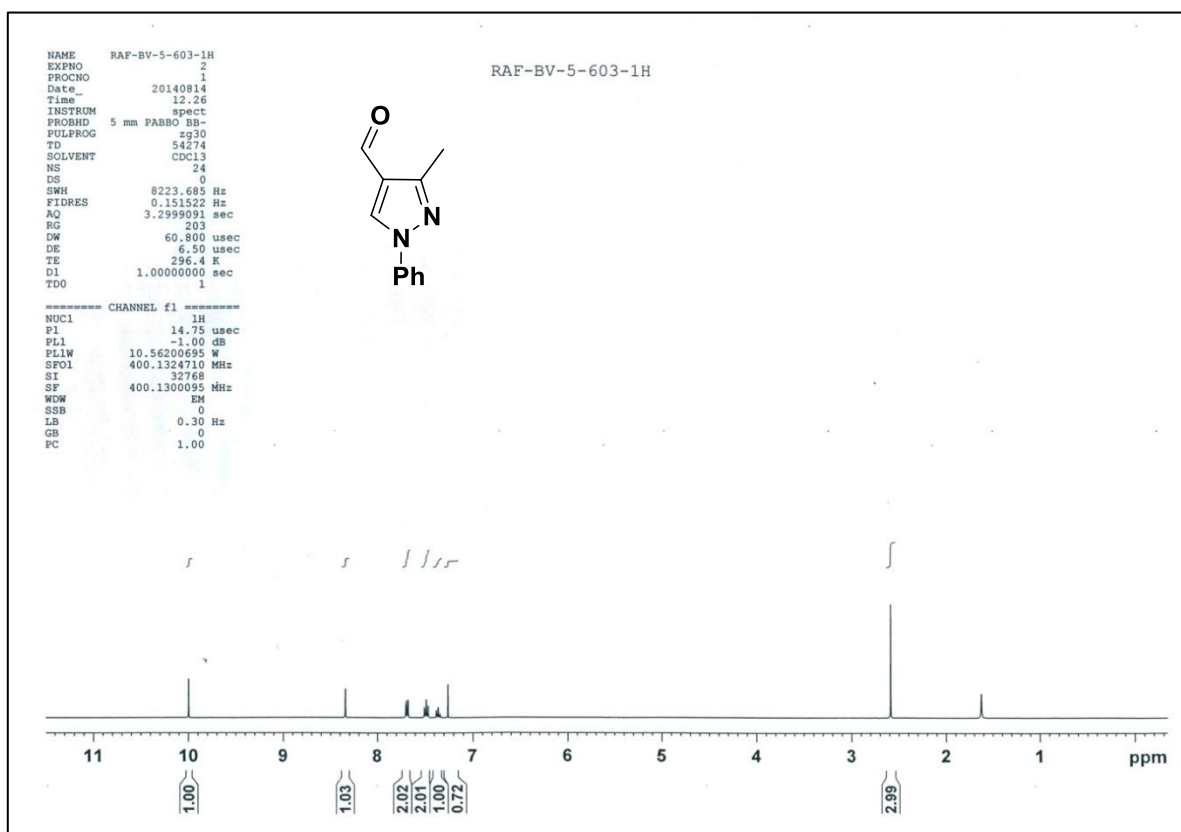
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2q



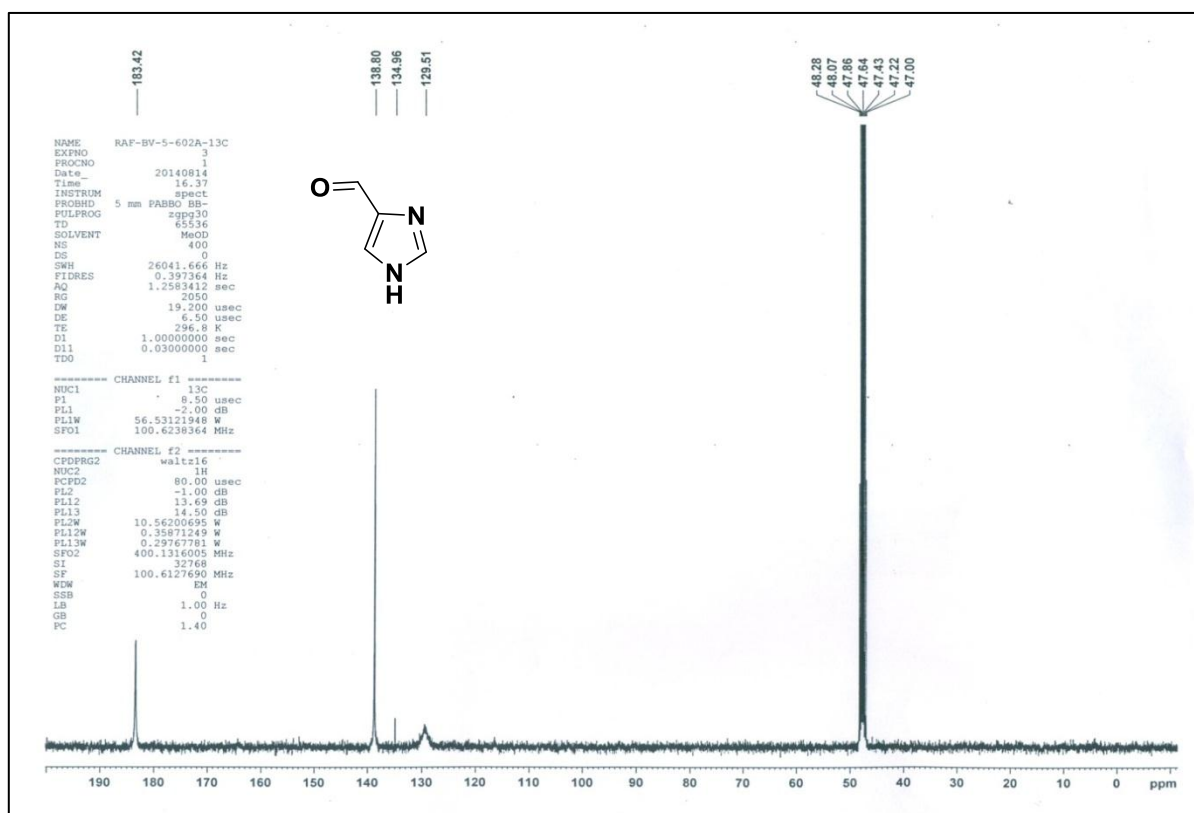
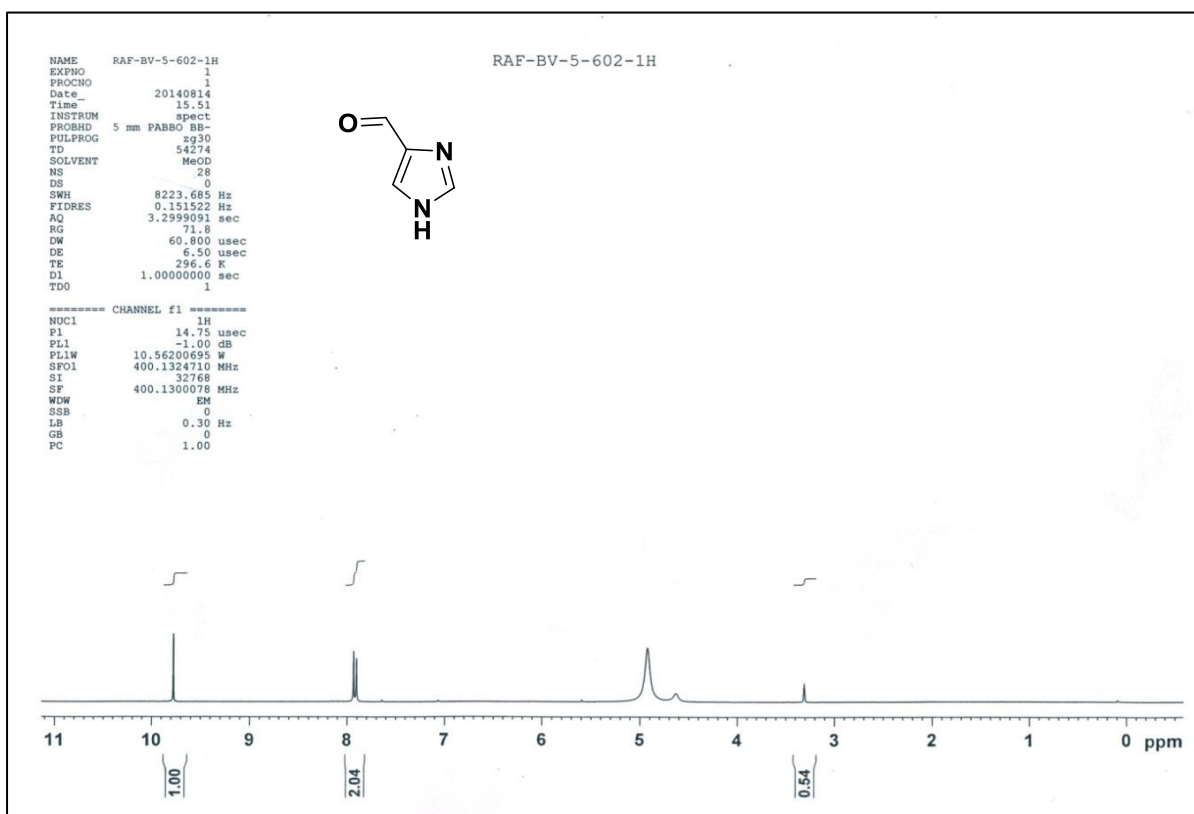
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2r



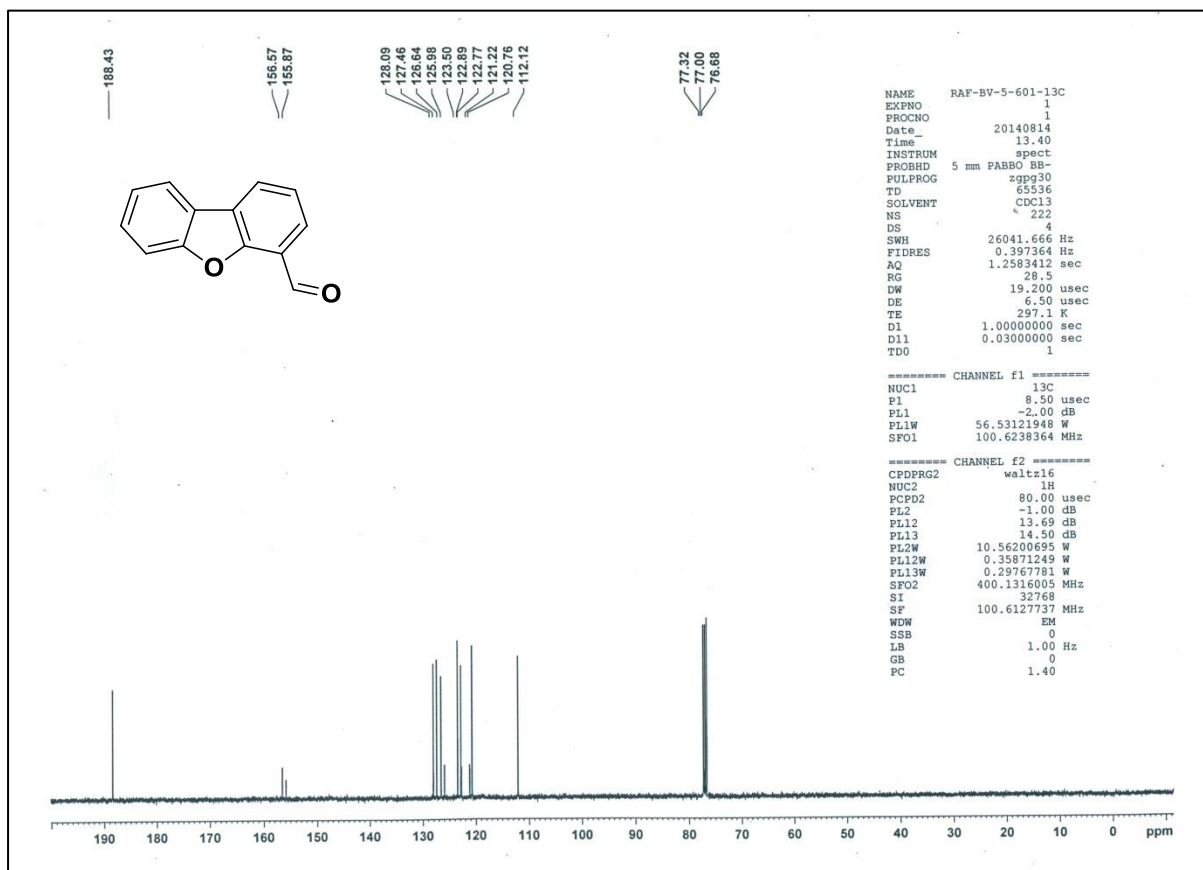
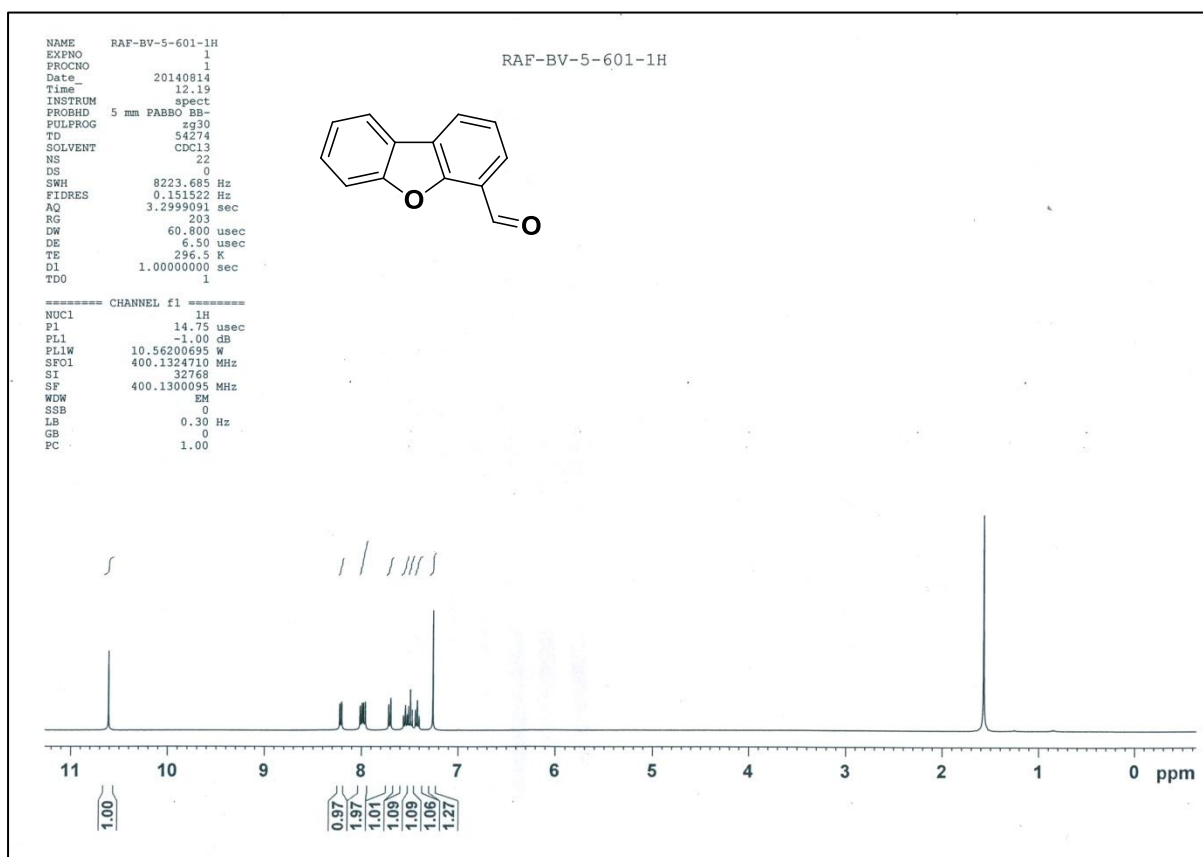
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2s



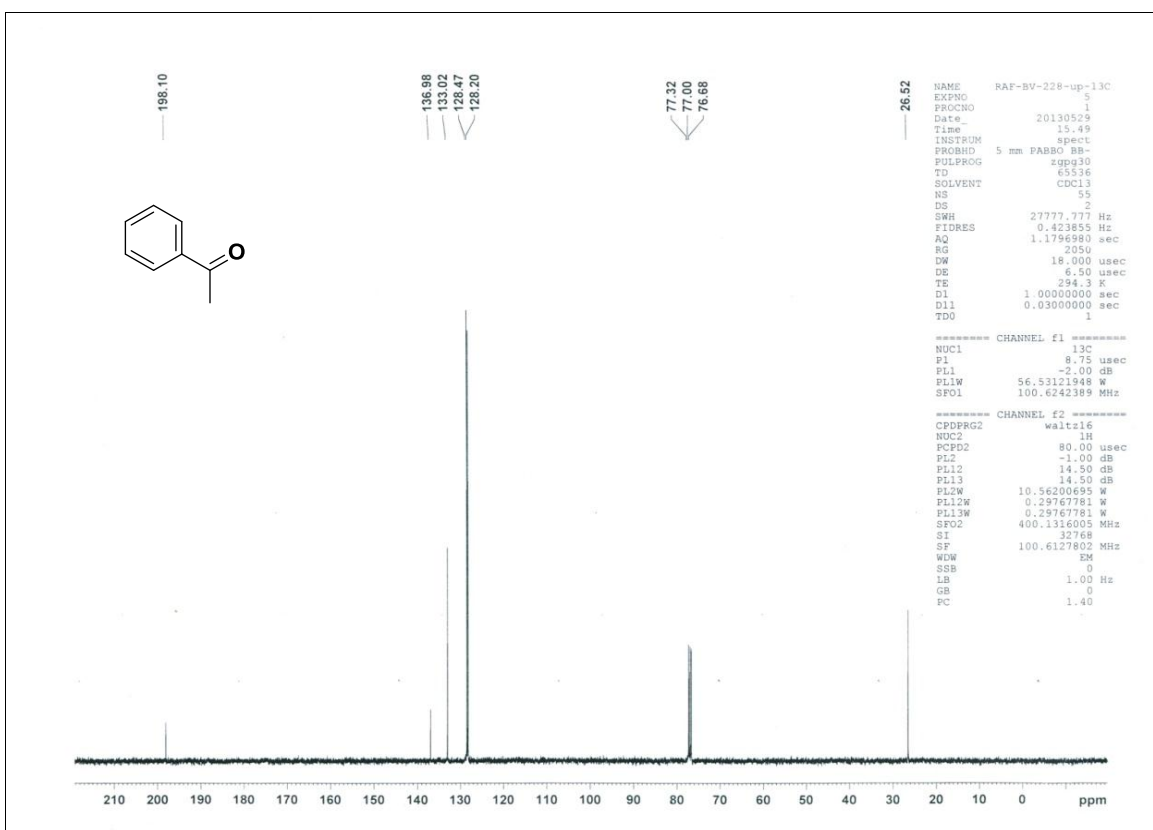
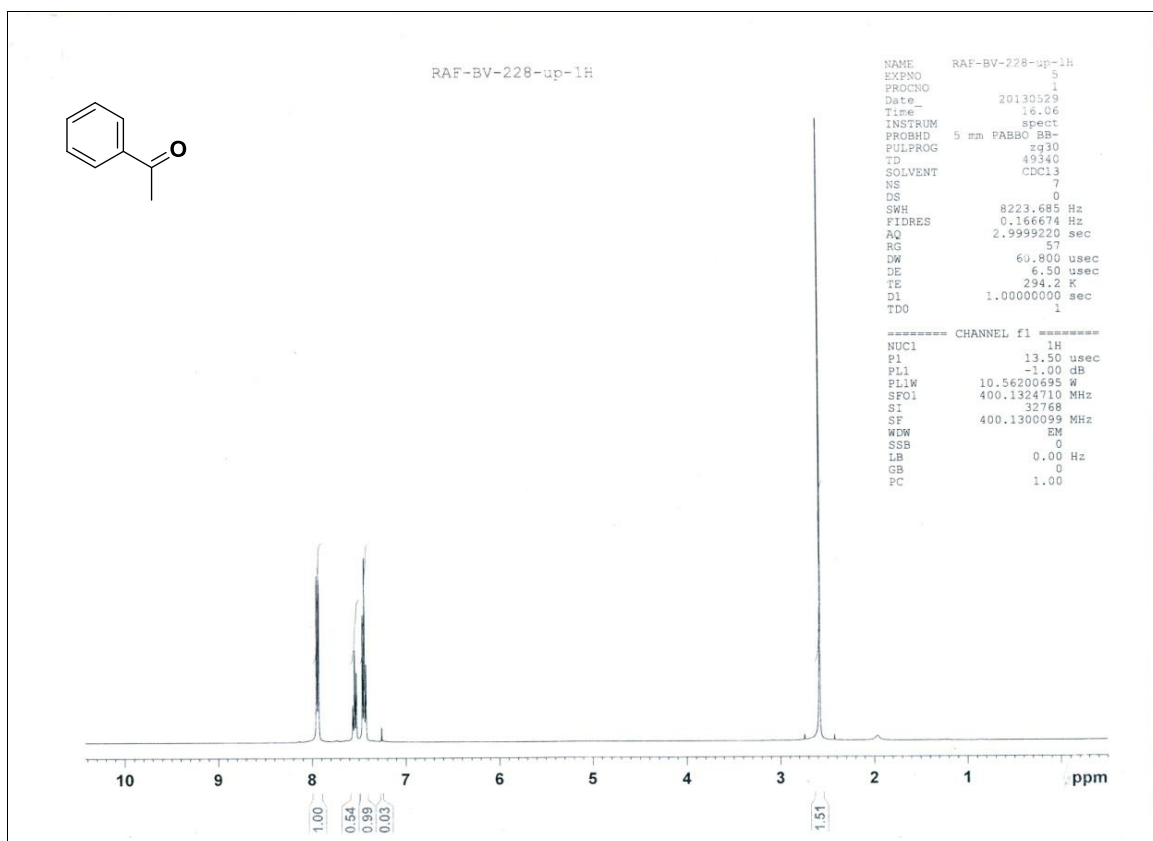
¹H NMR (400 MHz, CD₃OD) and ¹³C NMR (100 MHz, CD₃OD) of compound 2t



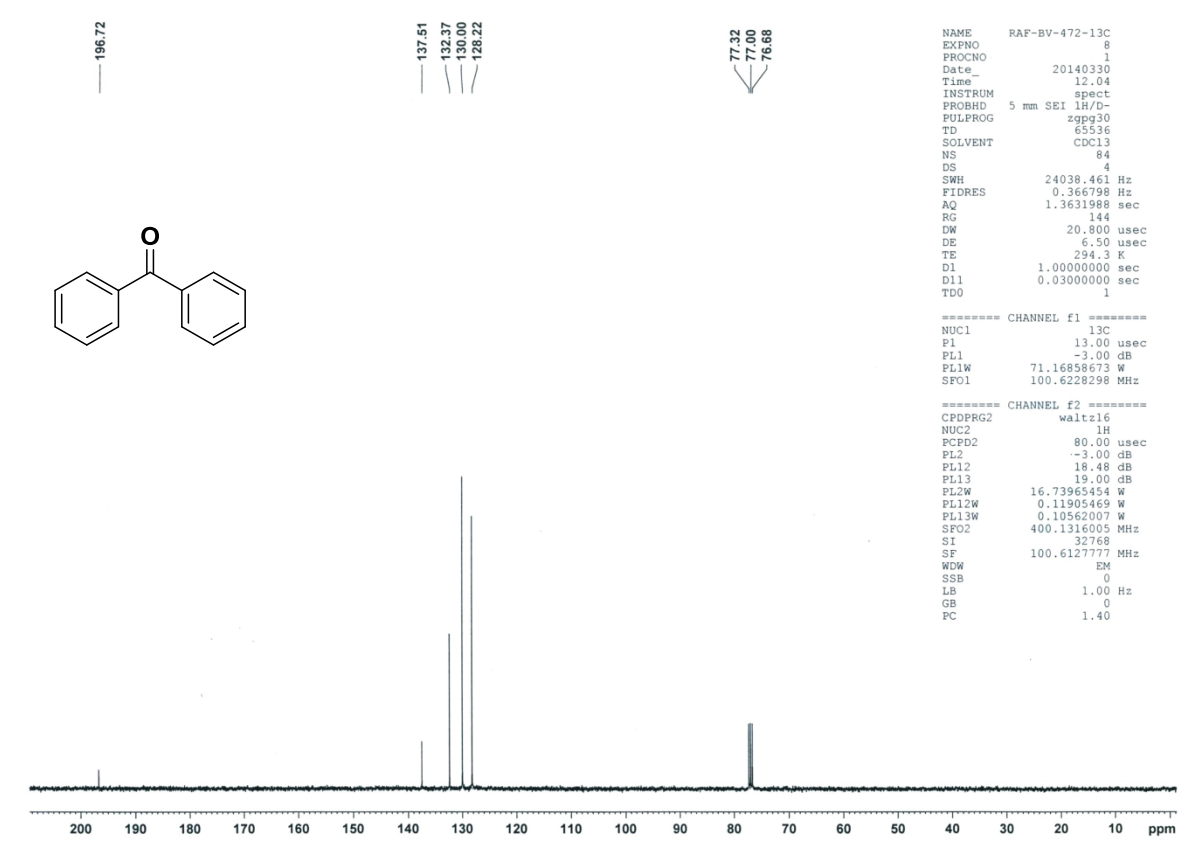
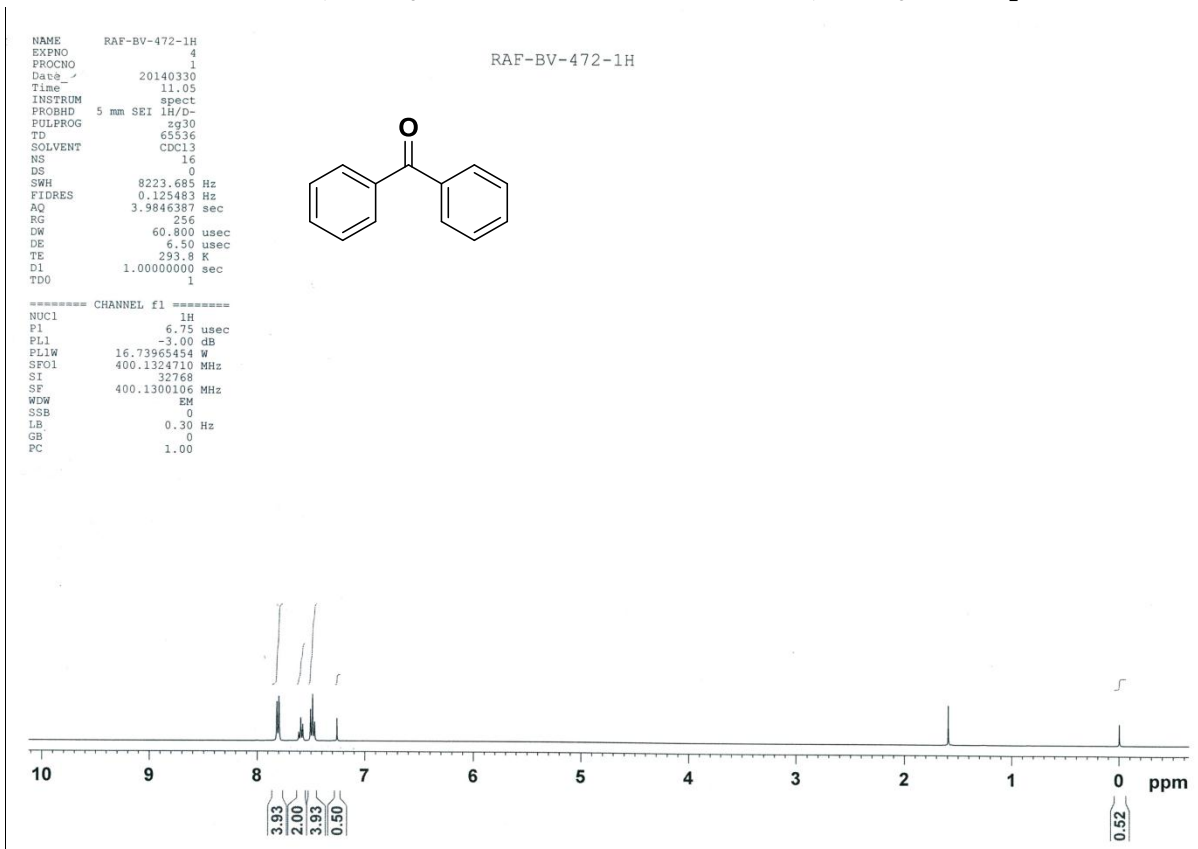
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2u



¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2v



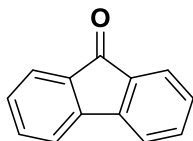
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2w



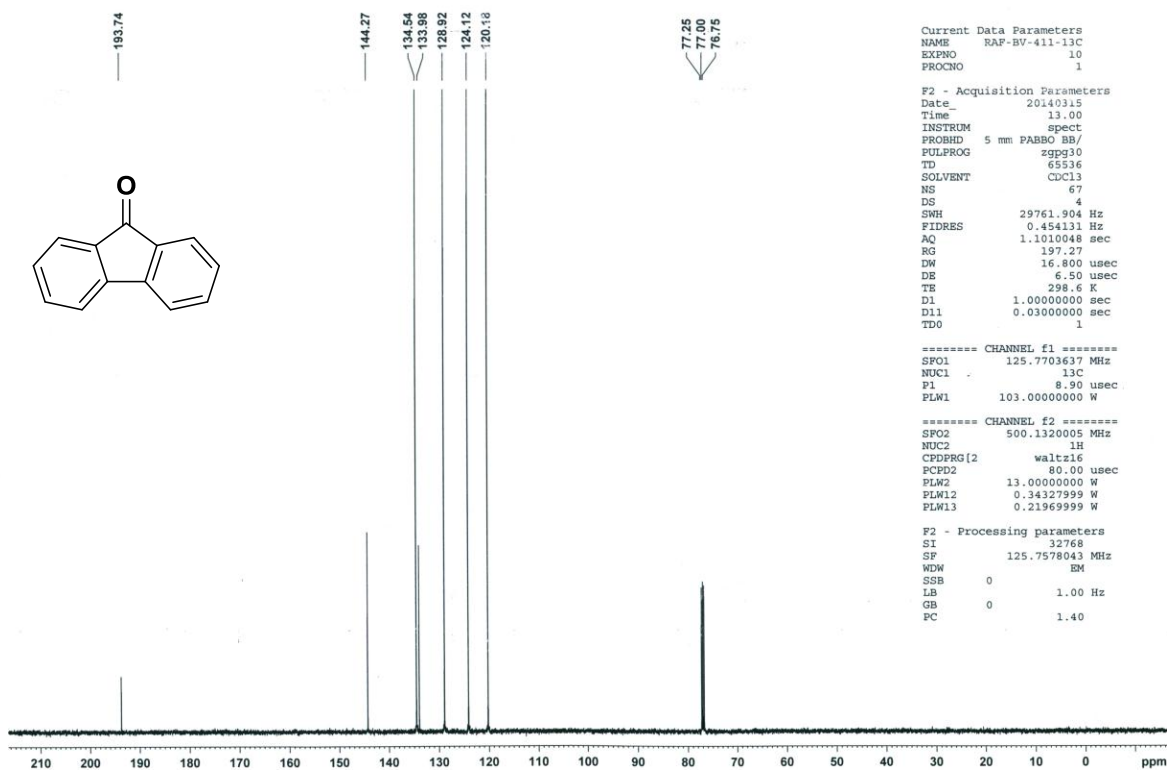
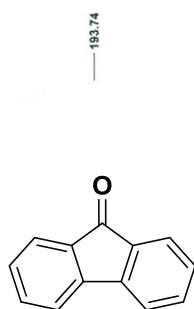
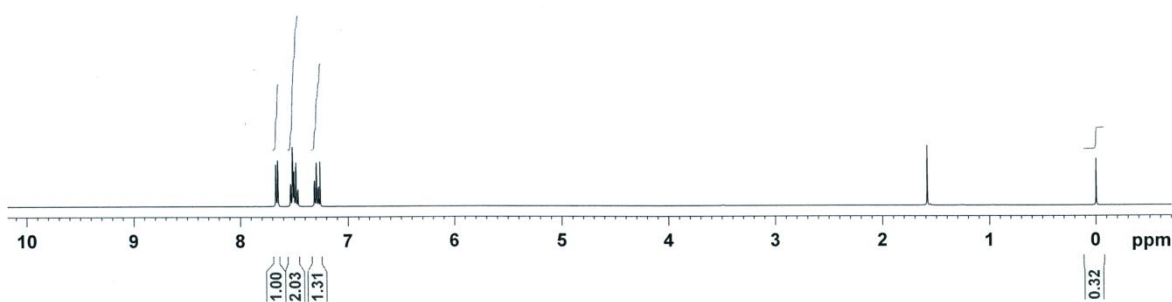
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 2x

NAME RAF-BV-411-1H
 EXPNO 1
 PROCNO 1
 Date_ 20140315
 Time 11.32
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 30
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 256
 DW 60.800 usec
 DE 6.50 usec
 TE 296.3 K
 D1 1.00000000 sec
 TDO 1

RAF-BV-411-1H



----- CHANNEL f1 -----
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PLW 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300106 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 FC 1.00



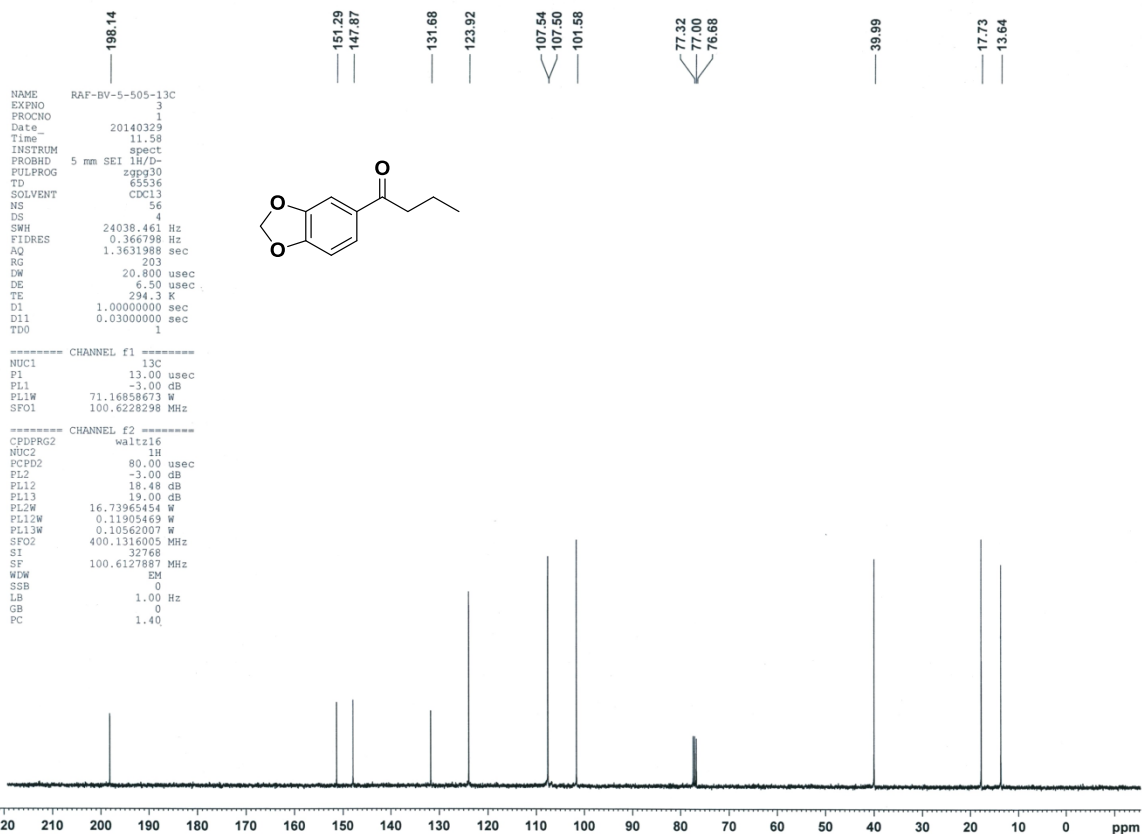
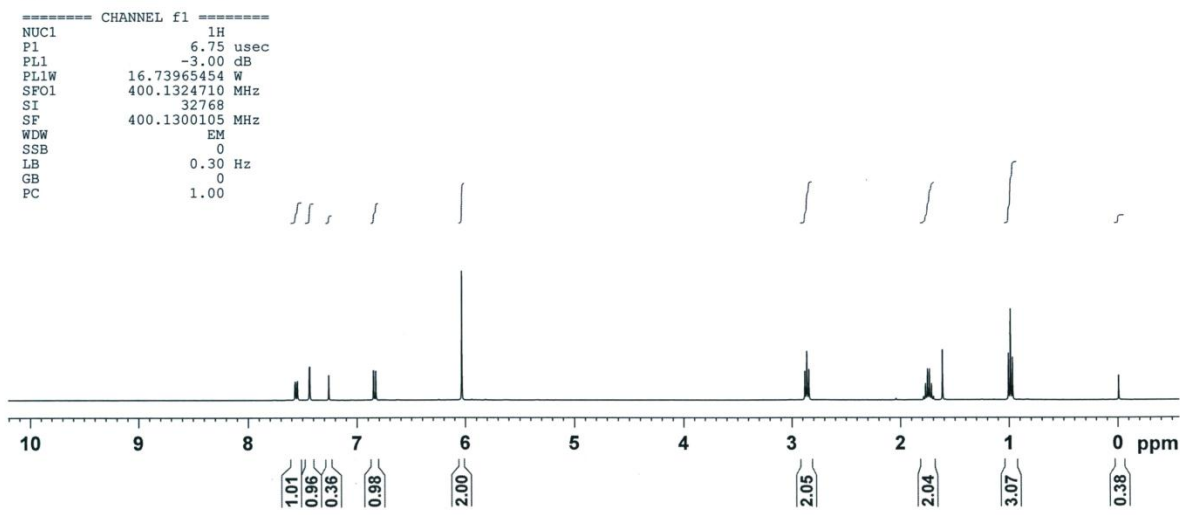
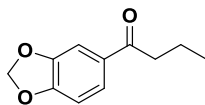
Current Data Parameters
 NAME RAF-BV-411-13C
 EXPNO 10
 PROCNO 1
 F2 - Acquisition Parameters
 Date_ 20140315
 Time 13.00
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 67
 DS 4
 SWH 29761.904 Hz
 FIDRES 0.454131 Hz
 AQ 1.1010048 sec
 RG 197.27
 DW 16.800 usec
 DE 6.50 usec
 TE 298.6 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TDO 1
 ----- CHANNEL f1 -----
 SFO1 125.7703637 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 103.00000000 W
 ----- CHANNEL f2 -----
 SFO2 500.1320005 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 80.00 usec
 PLW2 13.00000000 W
 PLW12 0.34327999 W
 PLW13 0.21969999 W
 F2 - Processing parameters
 SI 32768
 SF 125.7578043 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 2y

RAF-BV-5-505-1H

```

NAME      RAF-BV-5-505-1H
EXPNO    3
PROCNO   1
Date_    20140328
Time     22.52
INSTRUM  spect
PROBHD   5 mm SEI 1H/D-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       18
DS       0
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       144
DW       60.800 usec
DE       6.50 usec
TE       294.4 K
D1       1.0000000 sec
TDO     1
    
```



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 4a

```

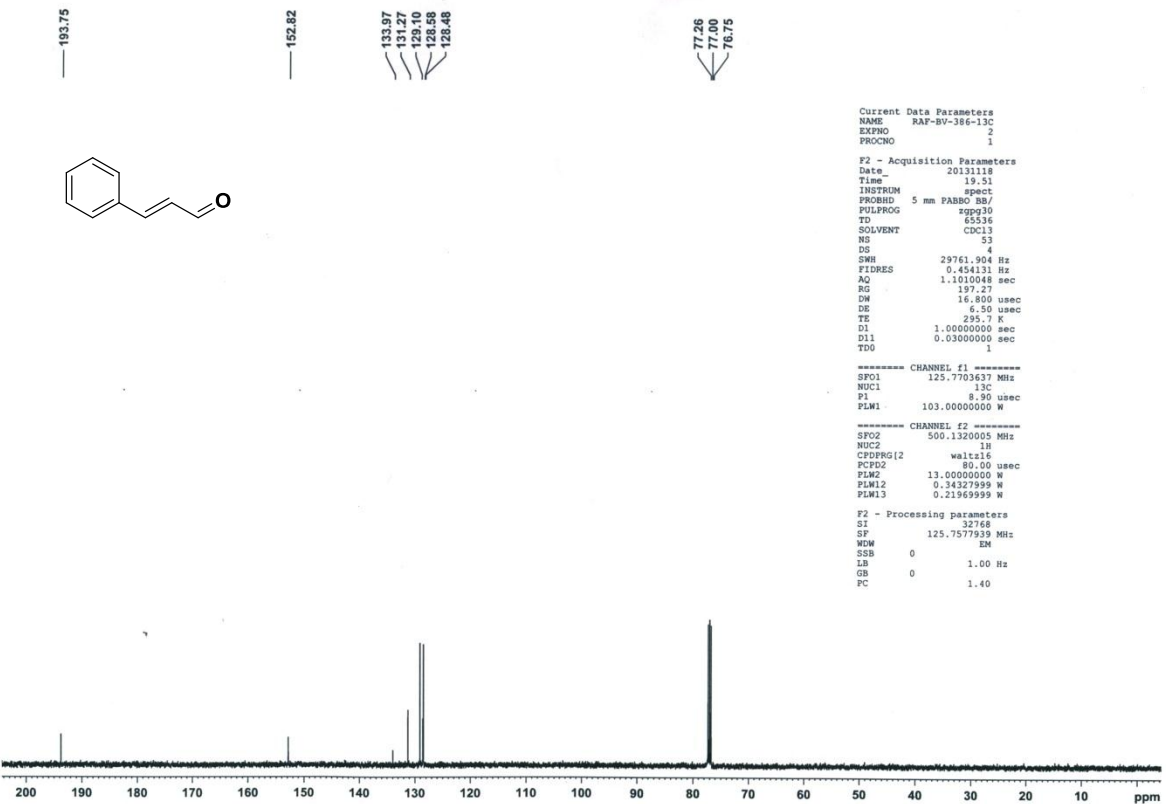
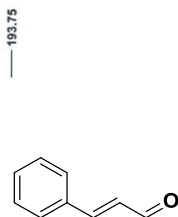
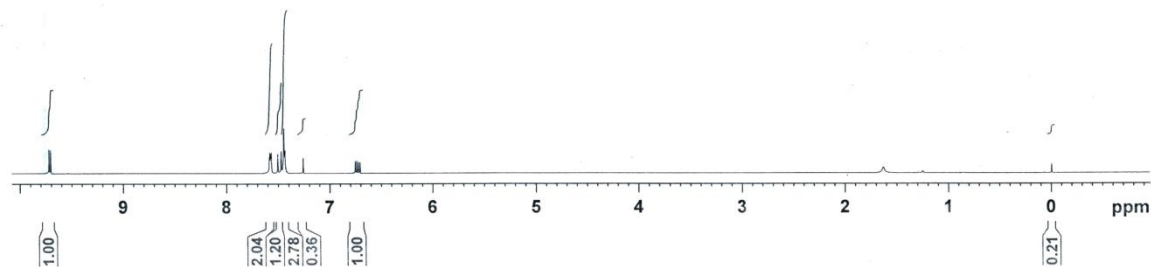
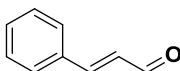
Current Data Parameters
NAME   RAF-BV-386-1H
EXPNO  2
PROCNO  1

F2 - Acquisition Parameters
Date_   20131115
Time    20.50
INSTRUM spect
PROBHD  5 mm PABBO BB/
PULPROG zg30
TD       65536
SOLVENT CDCl3
NS       18
DS       2
SWH      10000.000 Hz
FIDRES   0.152588 Hz
AQ       3.276799 sec
RG       119.07
DW       50.000 usec
DE       6.50 usec
TE       294.7 K
D1       1.00000000 sec
TDO      1

===== CHANNEL f1 =====
SFO1    500.1330885 MHz
NUC1     1H
P1       13.00 usec
PLM1     13.00000000 W

F2 - Processing parameters
SI       65536
SF       500.1300125 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
    
```

RAF-BV-386-1H



```

Current Data Parameters
NAME   RAF-BV-386-13C
EXPNO  2
PROCNO  1

F2 - Acquisition Parameters
Date_   20131118
Time    19.51
INSTRUM spect
PROBHD  5 mm PABBO BB/
PULPROG zgpg30
TD       65536
SOLVENT CDCl3
NS       53
DS       4
SWH      29761.904 Hz
FIDRES   0.454131 Hz
AQ       1.1010048 sec
RG       197.27
DW       16.500 usec
DE       6.50 usec
TE       295.7 K
D1       1.00000000 sec
D11     0.03000000 sec
TDO      1

===== CHANNEL f1 =====
SFO1    125.7703637 MHz
NUC1     13C
P1       8.90 usec
PLM1     103.00000000 W

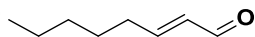
===== CHANNEL f2 =====
SFO2    500.1320005 MHz
NUC2     1H
CPDPRG2 waltz16
PCPD2   80.00 usec
PLM2    13.00000000 W
PLM12   0.34327999 W
PLM13   0.21959999 W

F2 - Processing parameters
SI       32768
SF       125.7577939 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
    
```

¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4b

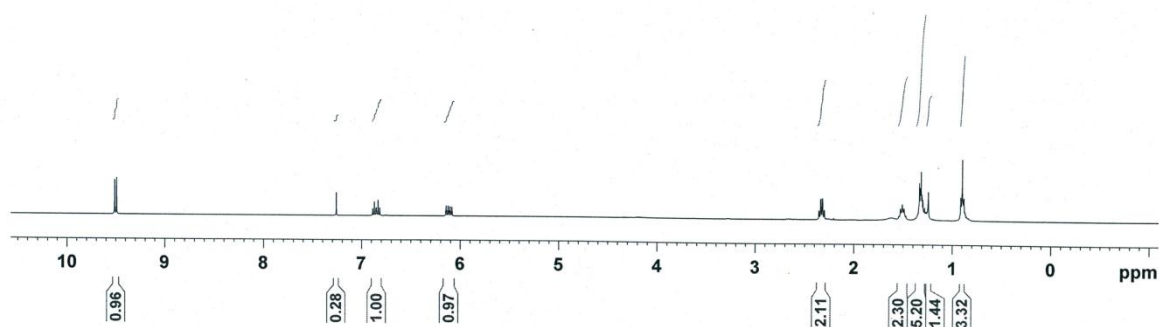
```

NAME      RAF-BV-412-1H
EXPNO     1
PROCNO    1
Date_     20140424
Time      0.45
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         0
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         101
DW         60.800 usec
DE         6.50 usec
TE         296.7 K
D1         1.0000000 sec
D11        1
TD0        1
    
```



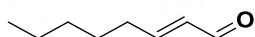
```

===== CHANNEL f1 =====
NUC1      1H
P1         6.75 usec
PL1        -3.00 dB
PL1W       16.73965454 W
SFO1       400.1324710 MHz
SI         32768
SF         400.1300102 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00
    
```



```

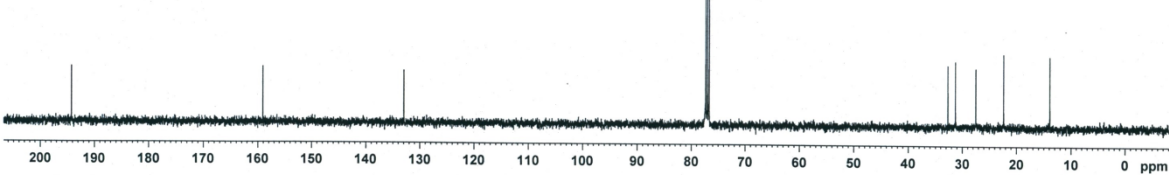
NAME      RAF-BV-412-13C
EXPNO     2
PROCNO    1
Date_     20140424
Time      0.50
INSTRUM   spect
PROBHD    5 mm SEI 1H/D-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         218
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         181
DW         20.800 usec
DE         6.50 usec
TE         297.0 K
D1         1.0000000 sec
D11        0.0300000 sec
D12        1
TD0        1
    
```



```

===== CHANNEL f1 =====
NUC1      13C
P1         13.00 usec
PL1        -3.00 dB
PL1W       71.16858673 W
SFO1       100.6228298 MHz

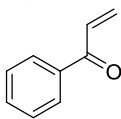
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        -3.00 dB
PL12       18.48 dB
PL13       19.00 dB
PL2W       16.73965454 W
PL12W      0.11905469 W
PL13W      0.10562007 W
SFO2       400.1316005 MHz
SI         32768
SF         100.6127715 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB         0
PC         1.40
    
```



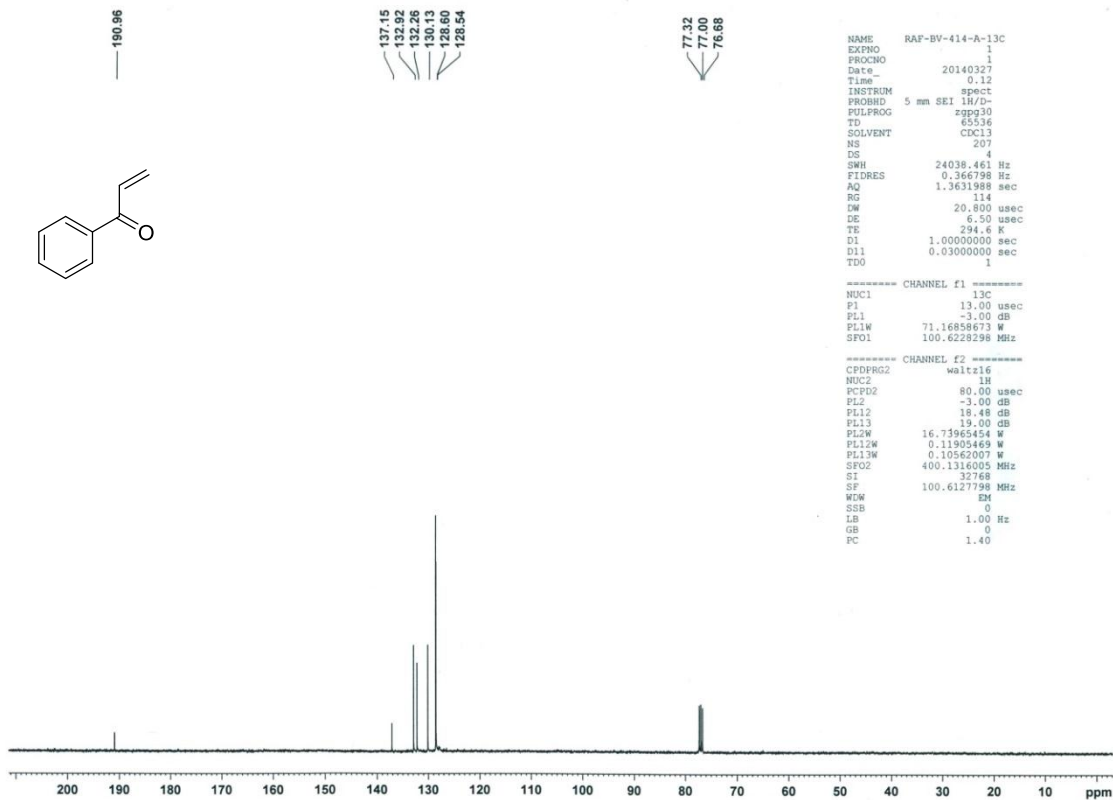
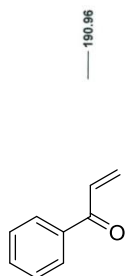
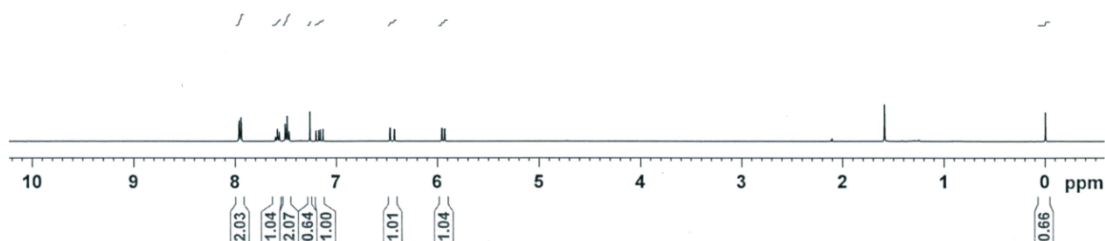
^1H NMR (400 MHz, CDCl_3/TMS) and ^{13}C NMR (100 MHz, CDCl_3) of compound 4c

RAF-BV-414-A-1H

NAME RAF-BV-414-A-1H
EXPNO 1
PROCNO 1
Date_ 20140326
Time_ 22.21
INSTRUM spect
PROBHD 5 mm SEI 1H/D-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 51
DS 0
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 203
DW 60.800 usec
DE 6.50 usec
TE 295.0 K
D1 1.00000000 sec
TD0 1



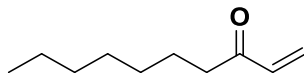
===== CHANNEL f1 =====
NUC1 ^1H
P1 6.75 usec
PL1 -3.00 dB
PL1W 16.73965454 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300103 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



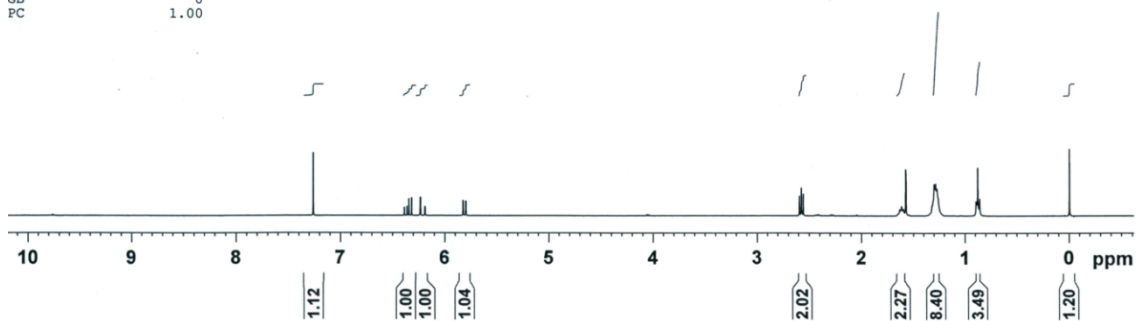
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4d

RAF-BV-413-A-1H

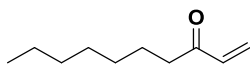
NAME RAF-BV-413-A-1H
EXPNO 6
PROCNO 1
Date_ 20140325
Time 18.58
INSTRUM spect
PROBHD 5 mm SEI 1H/D-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 15
DS 0
SWH 8223.685 Hz
FIDRES 0.125493 Hz
AQ 3.9846387 sec
RG 287
DW 60.800 usec
DE 6.50 usec
TE 296.1 K
D1 1.0000000 sec
TDO 1



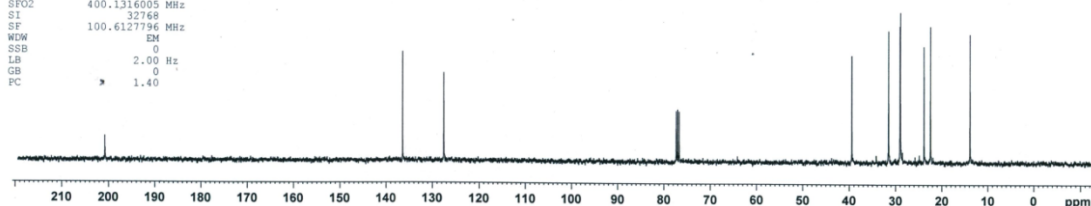
===== CHANNEL f1 =====
NUC1 1H
P1 6.75 usec
PL1 -3.00 dB
PL1W 16.73965454 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300101 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



NAME RAF-BV-413-A-13C
EXPNO 9
PROCNO 1
Date_ 20140325
Time 19.16
INSTRUM spect
PROBHD 5 mm SEI 1H/D-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 35
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 181
RG 20.800 usec
DE 6.50 usec
TE 296.4 K
D1 1.0000000 sec
D11 0.03000000 sec
TDO 1



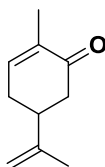
===== CHANNEL f1 =====
NUC1 13C
P1 13.00 usec
PL1 -3.00 dB
PL1W 71.16858673 W
SFO1 100.6228298 MHz
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -3.00 dB
PL12 18.48 dB
PL13 19.00 dB
PL2W 16.73965454 W
FL12W 0.11905469 W
FL13W 0.10562007 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127796 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40



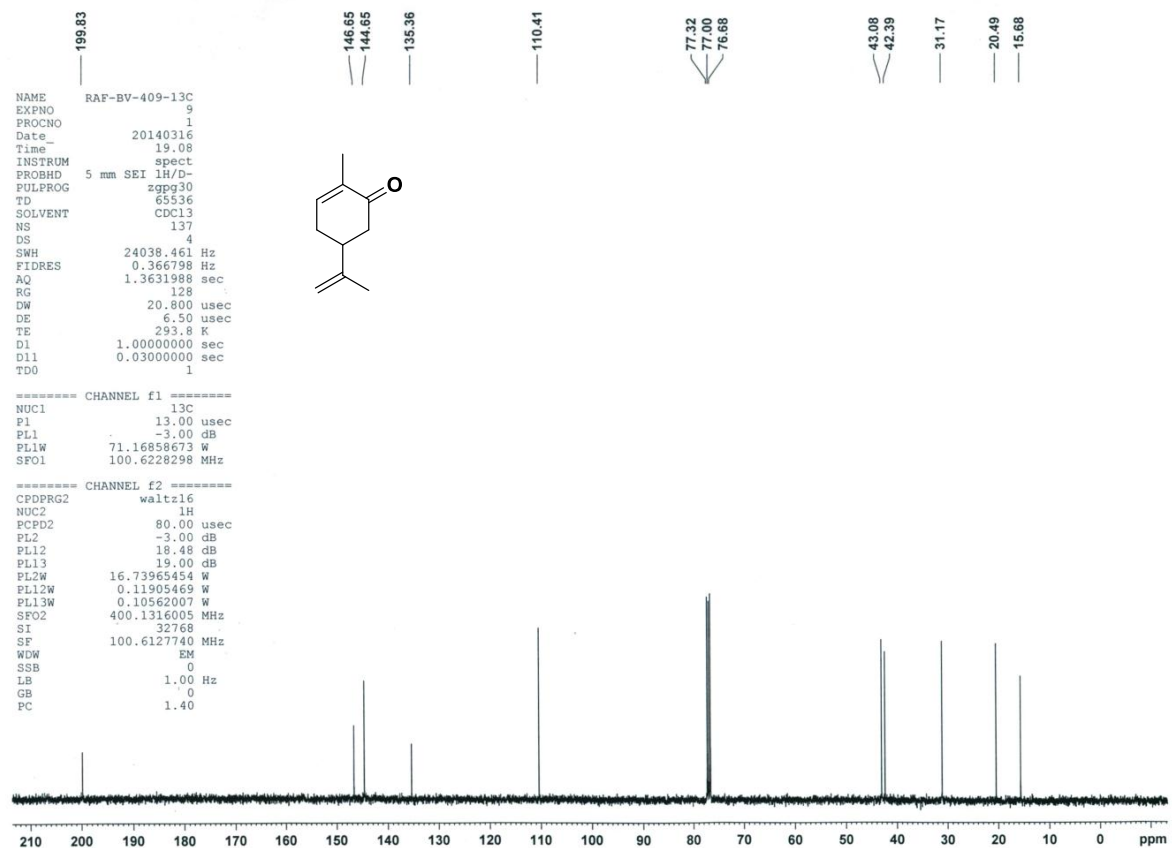
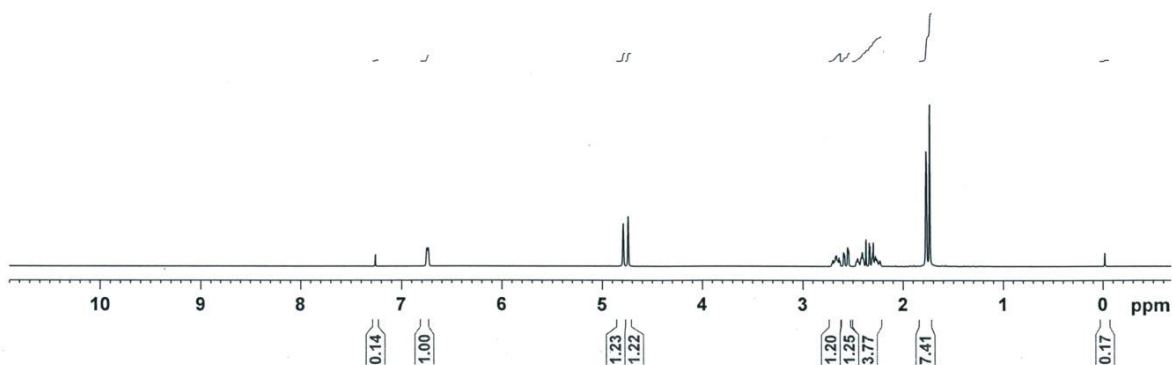
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4e

NAME RAF-BV-409-1H
 EXNO 8
 PROCNO 1
 Date_ 20140316
 Time 19.13
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 13
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 57
 DW 60.800 usec
 DE 6.50 usec
 TE 293.7 K
 D1 1.00000000 sec
 TDO 1

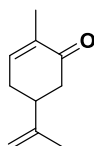
RAF-BV-409-1H



===== CHANNEL f1 =====
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300101 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



NAME RAF-BV-409-13C
 EXNO 9
 PROCNO 1
 Date_ 20140316
 Time 19.08
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 137
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 293.8 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TDO 1

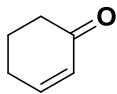


===== CHANNEL f1 =====
 NUC1 13C
 P1 13.00 usec
 PL1 -3.00 dB
 PL1W 71.16858673 W
 SFO1 100.6228298 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -3.00 dB
 PL12 18.48 dB
 PL13 19.00 dB
 PL2W 16.73965454 W
 PL12W 0.11905469 W
 PL13W 0.10562007 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127740 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4f

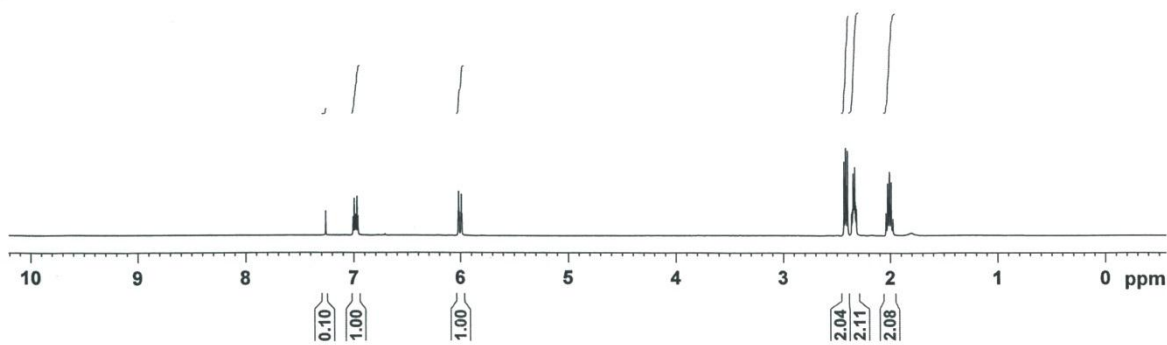
```

NAME    RAF-BV-CYCLOHEXENON-1H
EXPNO   16
PROCNO  1
Date_   20140504
Time    11.55
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zg30
TD      65536
SOLVENT CDCl3
NS      16
DS      0
SWH     8223.685 Hz
FIDRES  0.125483 Hz
AQ      3.9846387 sec
RG      80.6
DW      60.800 usec
DE      6.50 usec
TE      295.8 K
D1      1.00000000 sec
TDO     1
    
```



```

----- CHANNEL f1 -----
NUC1    1H
P1      6.75 usec
PL1     -3.00 dB
PL1W    16.73965454 W
SFO1    400.1324710 MHz
SI      32768
SF      400.1300101 MHz
WDW     EM
SSB     0
LB      0.30 Hz
GB      0
PC      1.00
    
```



199.75

150.66

129.88

77.32

77.00

76.68

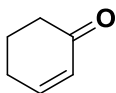
38.06

25.62

22.67

```

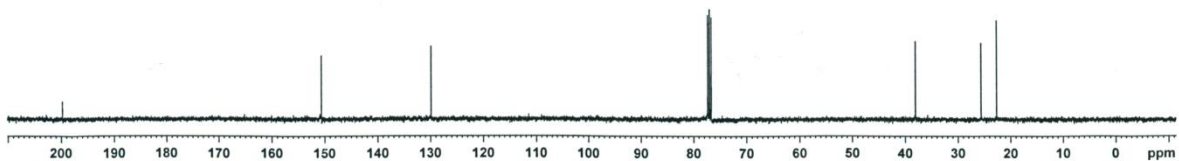
NAME    RAF-BV-CYCLOHEXENON-13C
EXPNO   17
PROCNO  1
Date_   20140504
Time    11.58
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zgpg30
TD      65536
SOLVENT CDCl3
NS      138
DS      4
SWH     24038.461 Hz
FIDRES  0.366798 Hz
AQ      1.3631988 sec
RG      28.5
DW      20.800 usec
DE      6.50 usec
TE      296.0 K
D1      1.00000000 sec
D11     0.03000000 sec
TDO     1
    
```



```

----- CHANNEL f1 -----
NUC1    13C
P1      13.00 usec
PL1     -3.00 dB
PL1W    71.16858673 W
SFO1    100.6228298 MHz

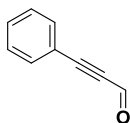
----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2    1H
PCPD2   80.00 usec
PL2     -3.00 dB
PL2W    18.48 dB
PL13    19.00 dB
PL2W    16.73965454 W
PL12W   0.11905469 W
PL13W   0.10562007 W
SFO2    400.1316005 MHz
SI      32768
SF      100.6127743 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
    
```



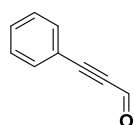
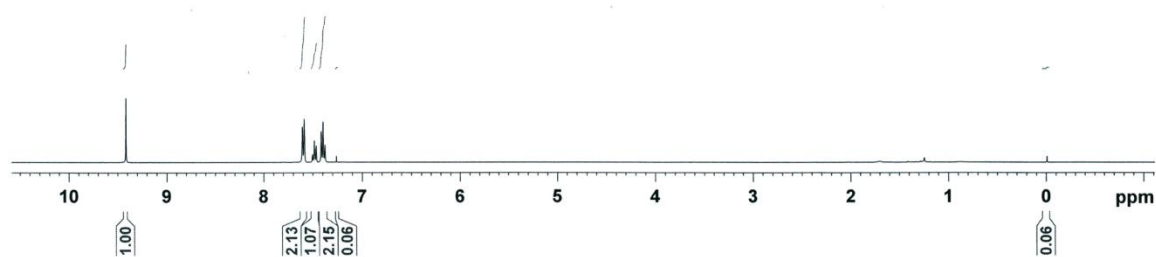
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4g

NAME RAF-BV-408-1H
 EXPNO 3
 PROCNO 1
 Date_ 20140316
 Time_ 12.49
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 10
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 57
 DW 60.800 usec
 DE 6.50 usec
 TE 293.3 K
 D1 1.00000000 sec
 TD0 1

RAF-BV-408-1H



===== CHANNEL f1 =====
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300103 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

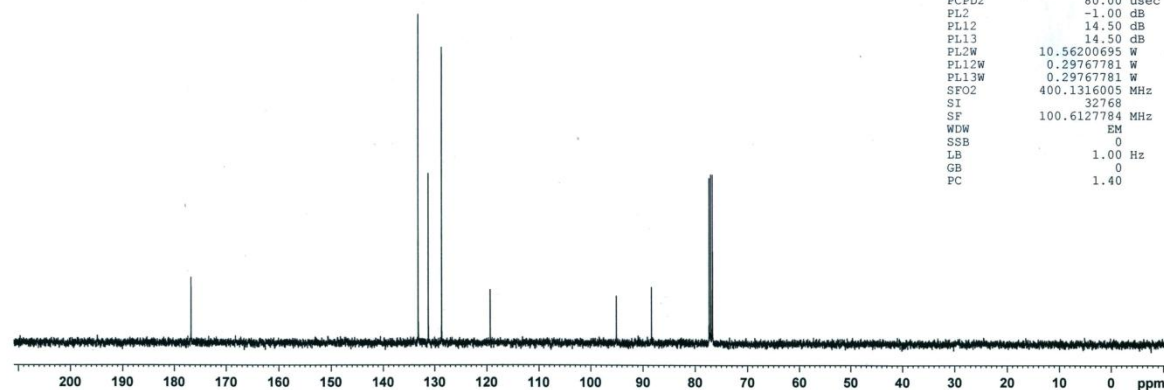


176.75
 133.21
 131.24
 128.67
 118.32
 95.07
 88.35
 77.32
 77.00
 76.68

NAME RAF-BV-408-13C
 EXPNO 4
 PROCNO 1
 Date_ 20140316
 Time_ 12.55
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 71
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 256
 DW 20.800 usec
 DE 6.50 usec
 TE 294.3 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 PL1W 56.53121948 W
 SFO1 100.6228298 MHz

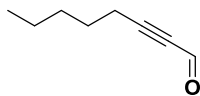
===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.00 dB
 PL12 14.50 dB
 PL13 14.50 dB
 PL2W 10.56200695 W
 PL12W 0.29767781 W
 PL13W 0.29767781 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127784 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40



¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4h

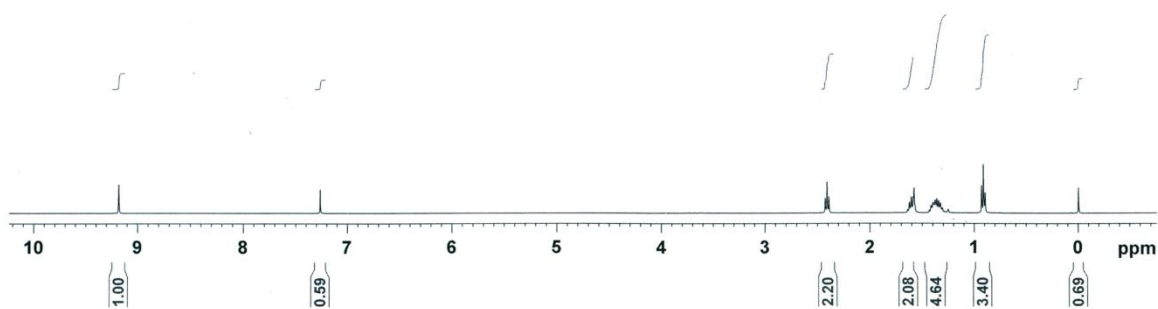
```

NAME    RAF-BV-407-1-1H
EXPNO   1
PROCNO  1
Date_   20140316
Time    16.24
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zg30
TD       65536
SOLVENT CDCl3
NS       32
DS       0
SWH      8223.685 Hz
FIDRES   0.125493 Hz
AQ       3.9846387 sec
RG       128
DW       60.800 usec
DE       6.50 usec
TE       293.6 K
D1       1.0000000 sec
TDO      1
    
```



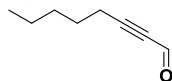
```

===== CHANNEL f1 =====
NUC1    1H
P1      6.75 usec
PL1     -3.00 dB
PL1W    16.73965454 W
SF01    400.1324710 MHz
SI      32768
SF      400.1300095 MHz
WDW     EM
SSB     0
LB      0.30 Hz
GB      0
PC      1.00
    
```



```

NAME    RAF-BV-407-13C
EXPNO   3
PROCNO  1
Date_   20140316
Time    13.18
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zgpg30
TD       65536
SOLVENT CDCl3
NS       86
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       203
DW       20.800 usec
DE       6.50 usec
TE       293.8 K
D1       1.0000000 sec
D11     0.0300000 sec
TDO      1
    
```

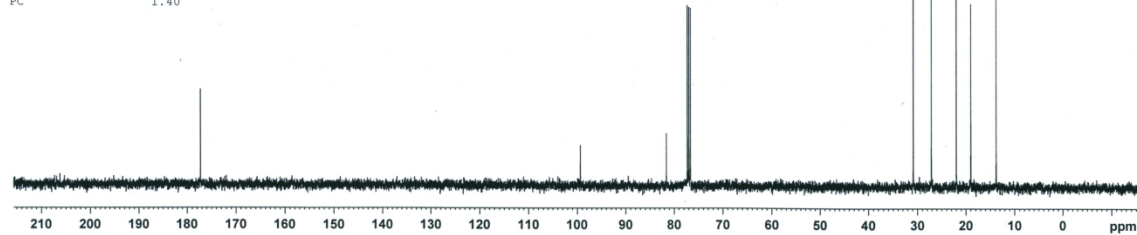


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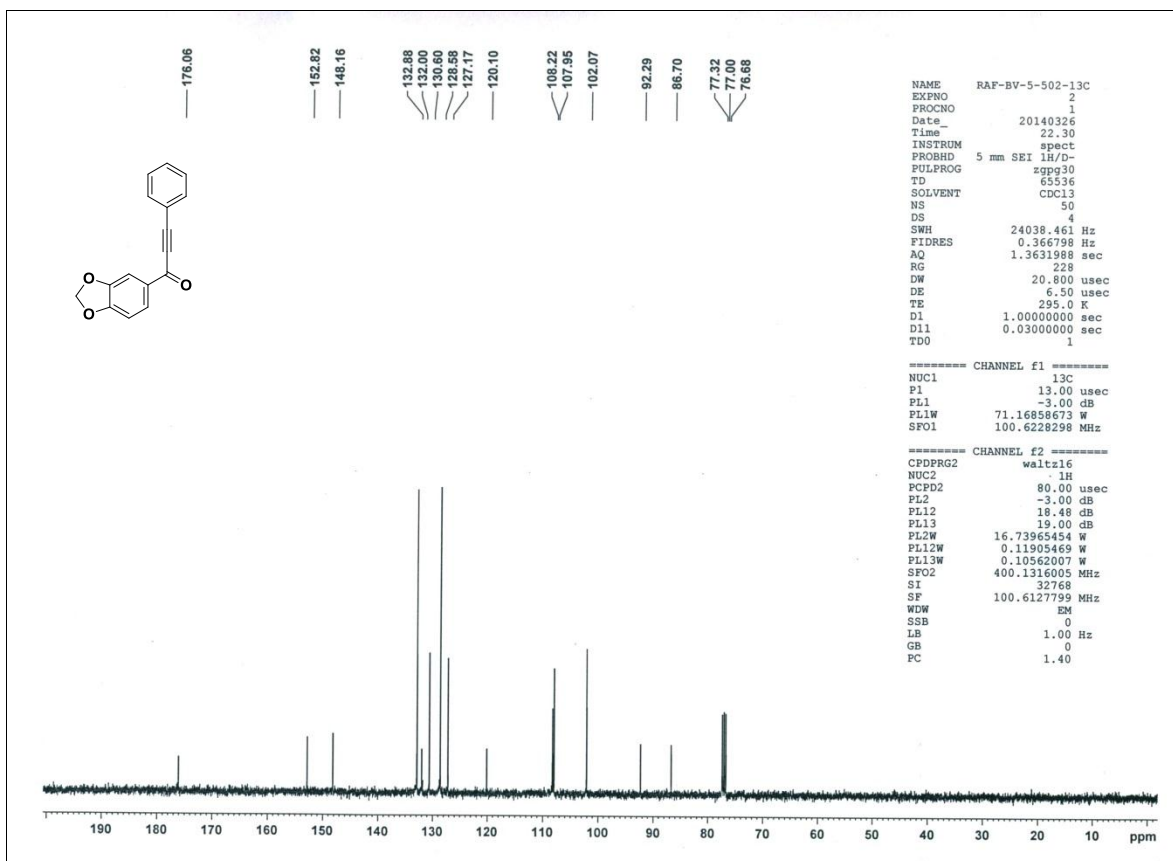
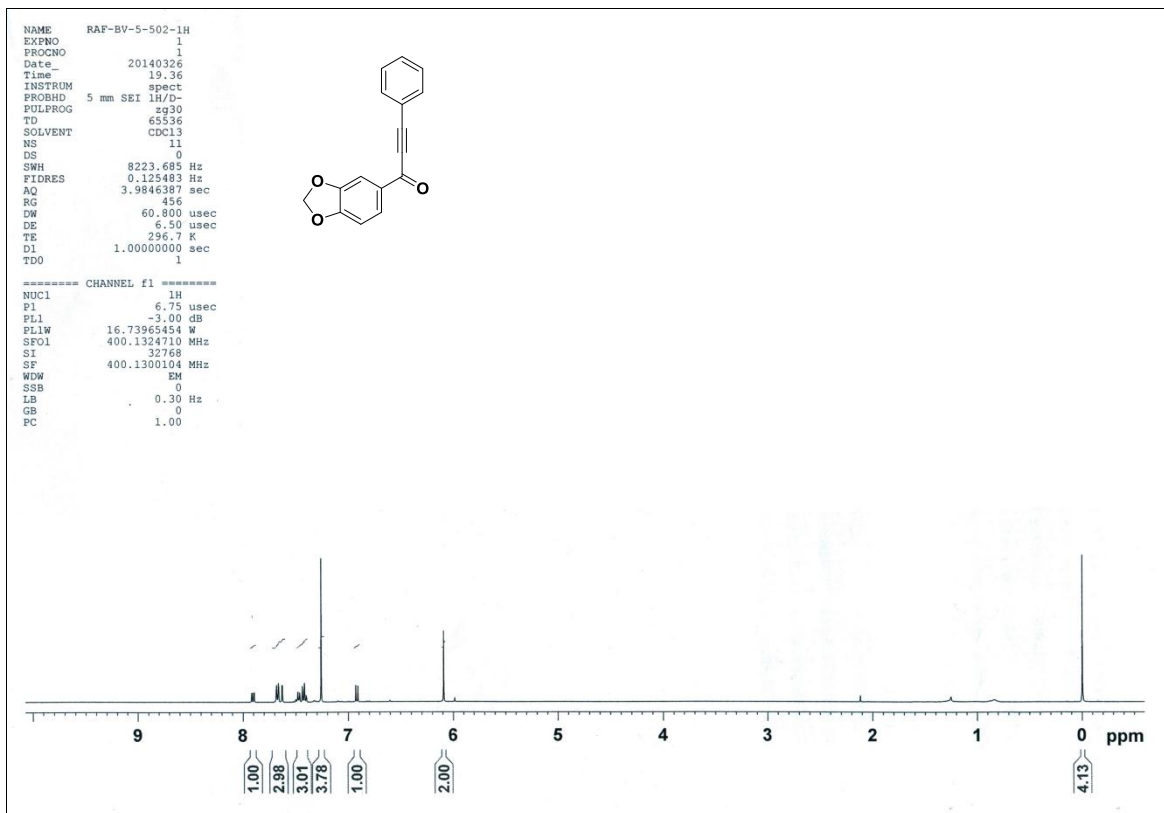
===== CHANNEL f1 =====
NUC1    13C
P1      13.00 usec
PL1     -3.00 dB
PL1W    71.16858673 W
SF01    100.6228298 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2    1H
PCPD2   80.00 usec
PL2     -3.00 dB
PL12    16.48 dB
PL13    19.00 dB
PL2W    16.73965454 W
PL12W   0.11905469 W
PL13W   0.10562007 W
SF02    400.1316005 MHz
SI      32768
SF      100.6127749 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
    
```



¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4i

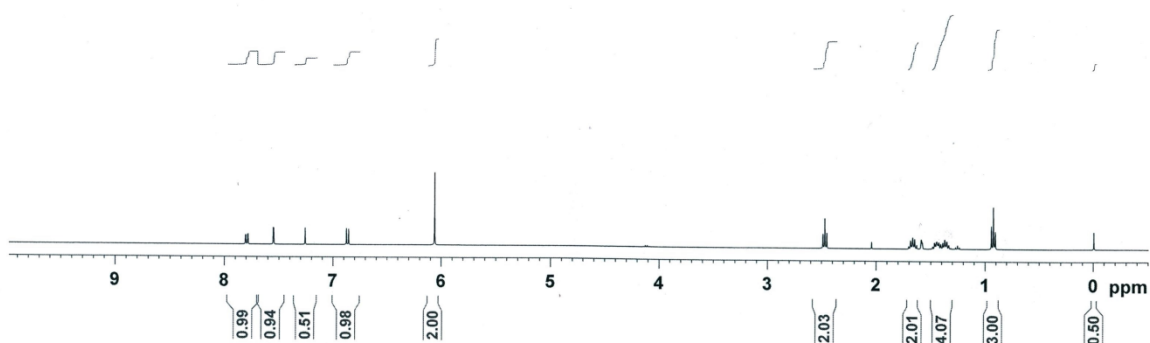
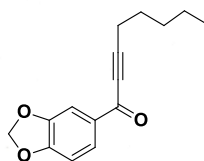


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4j

```

NAME    RAF-BV-5-503-1H
EXPNO   3
PROCNO  1
Date_   20140328
Time    18.00
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zg30
TD      65536
SOLVENT CDCl3
NS      14
DS      0
SWH     8223.685 Hz
FIDRES  0.125483 Hz
AQ      3.9846397 sec
RG      144
DW      60.800 usec
DE      6.50 usec
TE      297.3 K
D1      1.00000000 sec
TD0     1
    
```

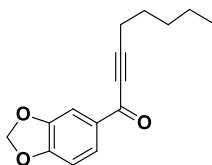
RAF-BV-5-503-1H



176.20, 152.49, 147.82, 131.82, 126.88, 108.09, 107.69, 101.92, 95.86, 79.31, 77.32, 77.00, 76.68, 30.83, 27.34, 21.84, 18.94, 13.74

```

NAME    RAF-BV-5-503-13C
EXPNO   6
PROCNO  1
Date_   20140330
Time    11.18
INSTRUM spect
PROBHD  5 mm SEI 1H/D-
PULPROG zgpg30
TD      65536
SOLVENT CDCl3
NS      100
DS      4
SWH     24038.461 Hz
FIDRES  0.366798 Hz
AQ      1.3631988 sec
RG      203
DW      20.800 usec
DE      6.50 usec
TE      294.0 K
D1      1.00000000 sec
D11     0.03000000 sec
TD0     1
    
```

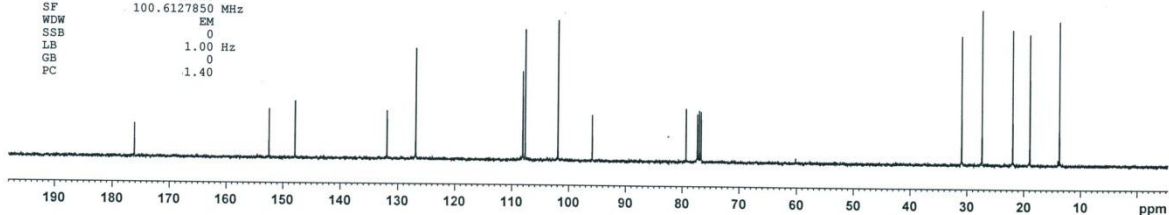


```

===== CHANNEL f1 =====
NUC1    13C
P1      13.00 usec
PL1     -3.00 dB
PL1W    71.16898673 W
SF01    100.6228298 MHz
    
```

```

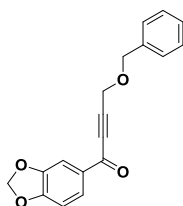
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2    1H
PCPD2   80.00 usec
PL2     -3.00 dB
PL12    18.48 dB
PL13    19.00 dB
PL2W    16.73965454 W
PL12W   0.11905469 W
PL13W   0.10562007 W
SF02    400.1316005 MHz
SI      32768
SF      100.6127850 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
    
```



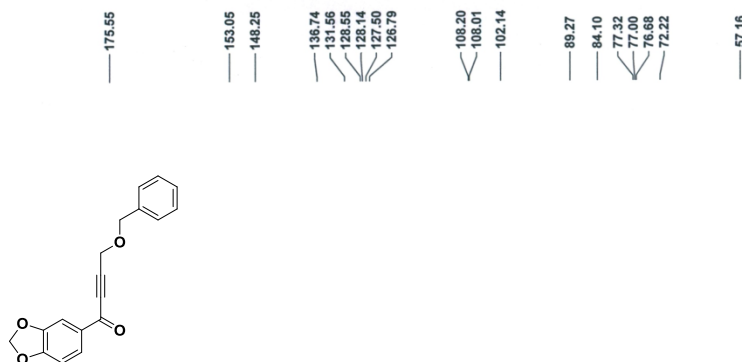
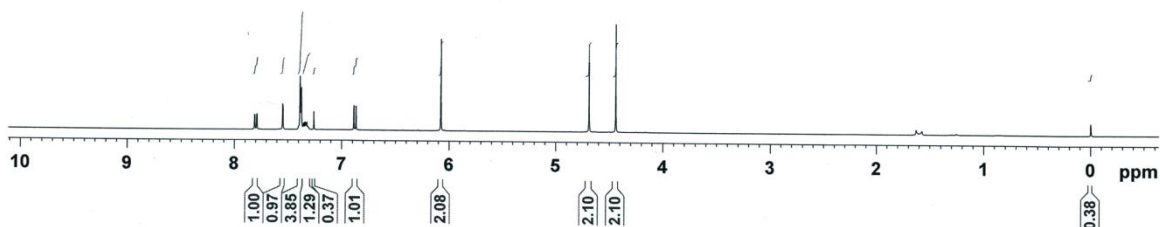
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4k

NAME RAF-BV-5-504-1H
 EXPNO 1
 PROCNO 1
 Date 20140329
 Time 11.43
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 19
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 128
 DW 60.800 usec
 DE 6.50 usec
 TE 294.0 K
 D1 1.00000000 sec
 TD0 1

RAF-BV-5-504-1H



===== CHANNEL f1 =====
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SF01 400.1324710 MHz
 SI 32768
 SF 400.1300104 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



NAME RAF-BV-5-504-13C
 EXPNO 2
 PROCNO 1
 Date 20140329
 Time 11.52
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 209
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 203
 DW 20.800 usec
 DE 6.50 usec
 TE 294.4 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 13.00 usec
 PL1 -3.00 dB
 PL1W 71.16858673 W
 SF01 100.6228298 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -3.00 dB
 PL12 18.48 dB
 PL13 19.00 dB
 PL2W 16.73965454 W
 PL12W 0.11905469 W
 PL13W 0.10562007 W
 SF02 400.1316005 MHz
 SI 32768
 SF 100.6127748 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

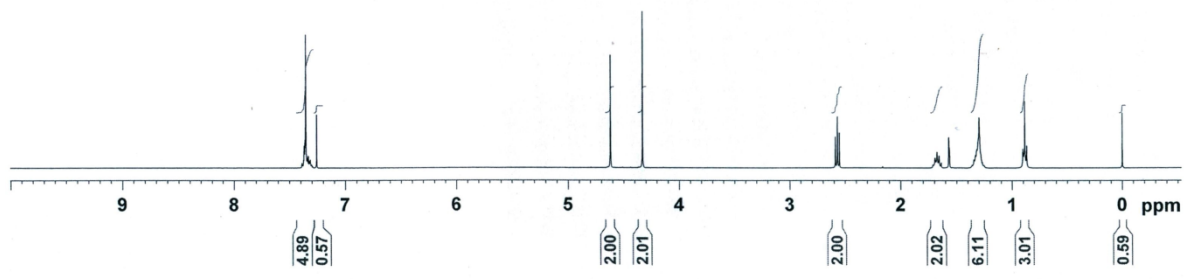
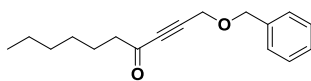


¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4I

NAME RAF-BV-5-506-1H
 EXPNO 1
 PROCNO 1
 Date_ 20140328
 Time 17.07
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 46
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 144
 DW 60.800 usec
 DE 6.50 usec
 TE 297.9 K
 D1 1.00000000 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300103 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

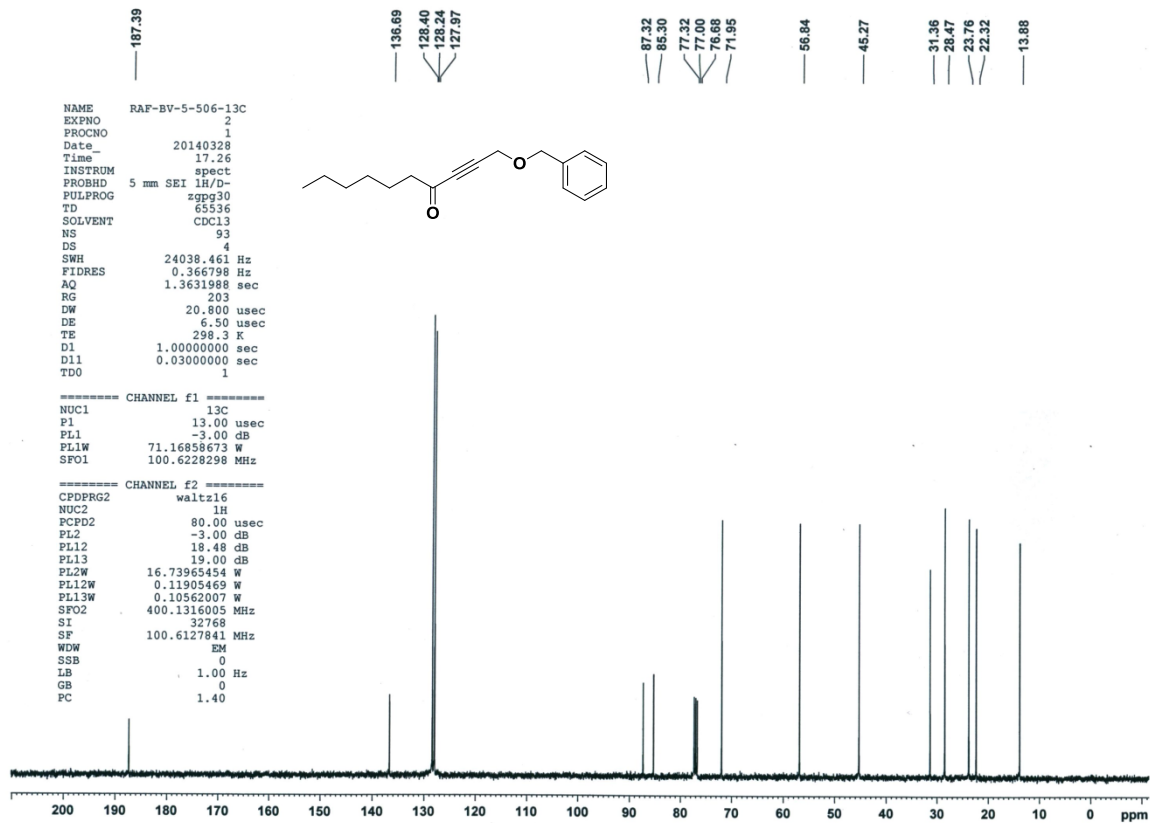
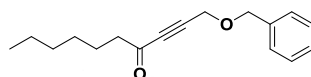
RAF-BV-5-506-1H



NAME RAF-BV-5-506-13C
 EXPNO 2
 PROCNO 1
 Date_ 20140328
 Time 17.26
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 93
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 203
 DW 20.800 usec
 DE 6.50 usec
 TE 298.3 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 13.00 usec
 PL1 -3.00 dB
 PL1W 71.16858673 W
 SFO1 100.6228298 MHz

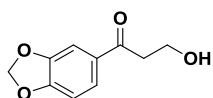
===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 FCPD2 80.00 usec
 PL2 -3.00 dB
 PL12 18.48 dB
 PL13 19.00 dB
 PL2W 16.73965454 W
 PL12W 0.11905469 W
 PL13W 0.10562007 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127841 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40



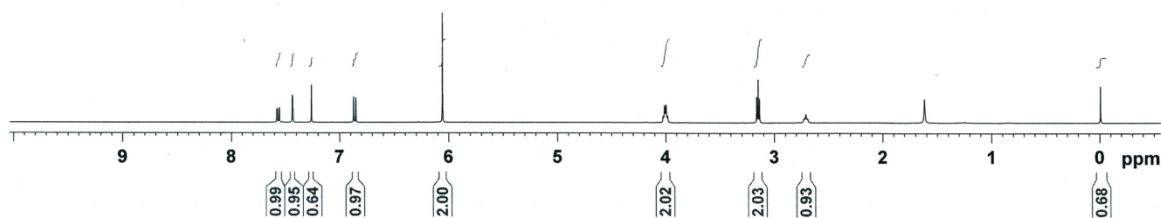
¹H NMR (400 MHz, CDCl₃/TMS) and ¹³C NMR (100 MHz, CDCl₃) of compound 4m

NAME RAF-BV-5-507-1H
 EXPNO 1
 PROCNO 1
 Date_ 20140331
 Time 7.43
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zg30
 TD 65536
 SOLVENT cdcl3
 NS 16
 DS 0
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 228
 DW 60.800 usec
 DE 6.50 usec
 TE 293.7 K
 D1 1.00000000 sec
 TDO 1

RAF-BV-5-507-1H

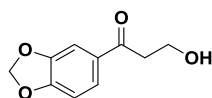


===== CHANNEL f1 =====
 NUC1 1H
 P1 6.75 usec
 PL1 -3.00 dB
 PL1W 16.73965454 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300104 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

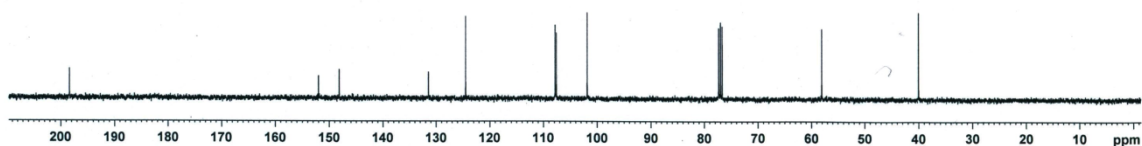


198.38
 152.01
 148.15
 131.43
 124.47
 107.85
 107.81
 104.87
 77.32
 77.00
 76.68
 56.07
 40.04

NAME RAF-BV-5-507-13C
 EXPNO 6
 PROCNO 1
 Date_ 20140331
 Time 8.17
 INSTRUM spect
 PROBHD 5 mm SEI 1H/D-
 PULPROG zgpg30
 TD 65536
 SOLVENT cdcl3
 NS 53
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 203
 DW 20.800 usec
 DE 6.50 usec
 TE 294.0 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TDO 1



===== CHANNEL f1 =====
 NUC1 13C
 P1 13.00 usec
 PL1 -3.00 dB
 PL1W 71.16858673 W
 SFO1 100.6228298 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 FCPD2 80.00 usec
 PL2 -3.00 dB
 PL12 18.48 dB
 PL13 19.00 dB
 PL2W 16.73965454 W
 PL12W 0.11905469 W
 PL13W 0.10562007 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127765 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

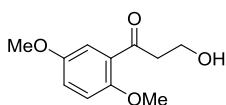


¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 4n

Current Data Parameters
NAME RAF-BV-2,5-OMe-1H
EXPNO 3
PROCNO 1

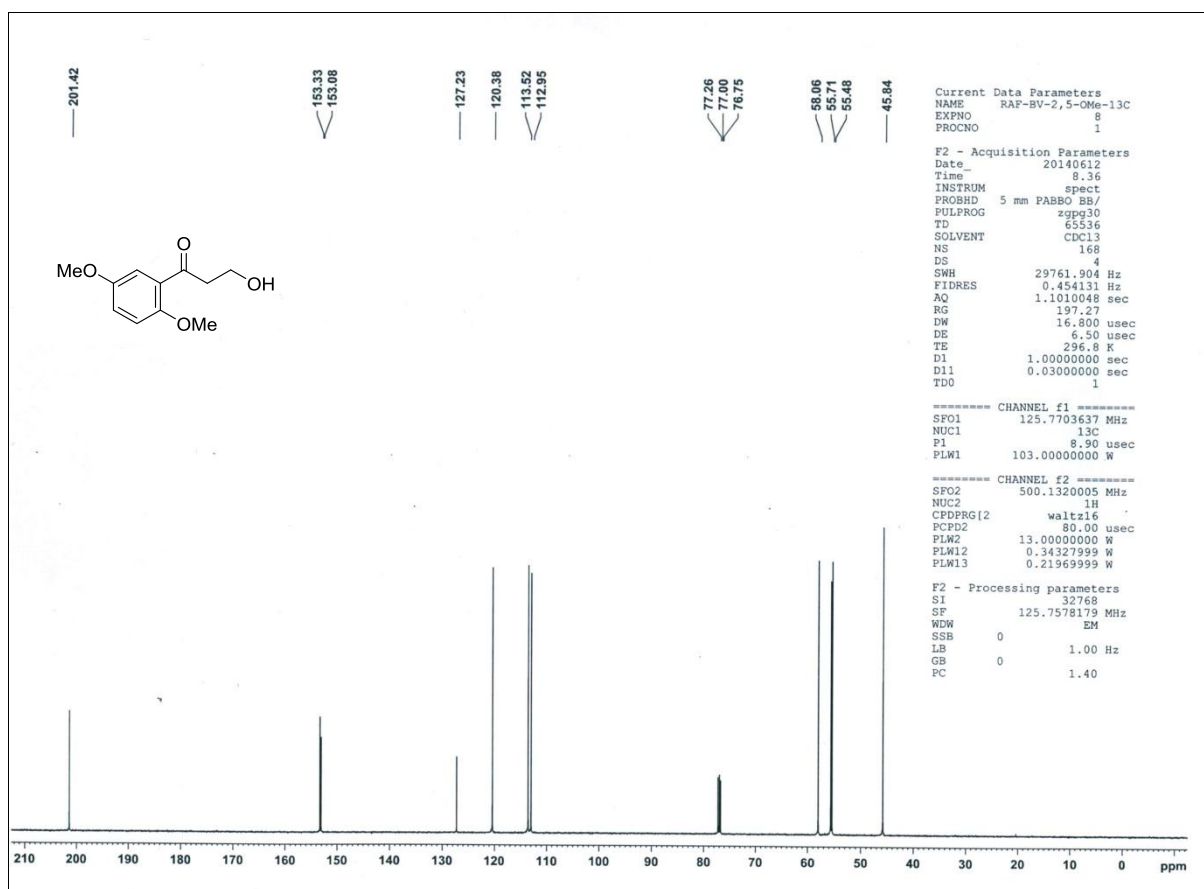
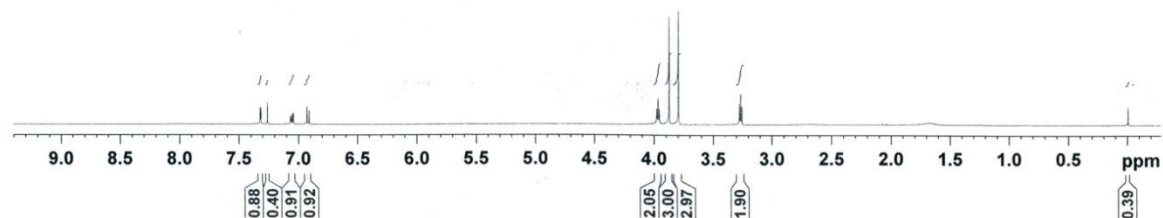
RAF-BV-2,5-OMe-1H

F2 - Acquisition Parameters
Date_ 20140612
Time 7.51
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 119.07
DW 50.000 usec
DE 6.50 usec
TE 296.1 K
D1 1.0000000 sec
TD0 1



----- CHANNEL f1 -----
SFO1 500.1330885 MHz
NUC1 1H
P1 13.00 usec
PLW1 13.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300122 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 4o

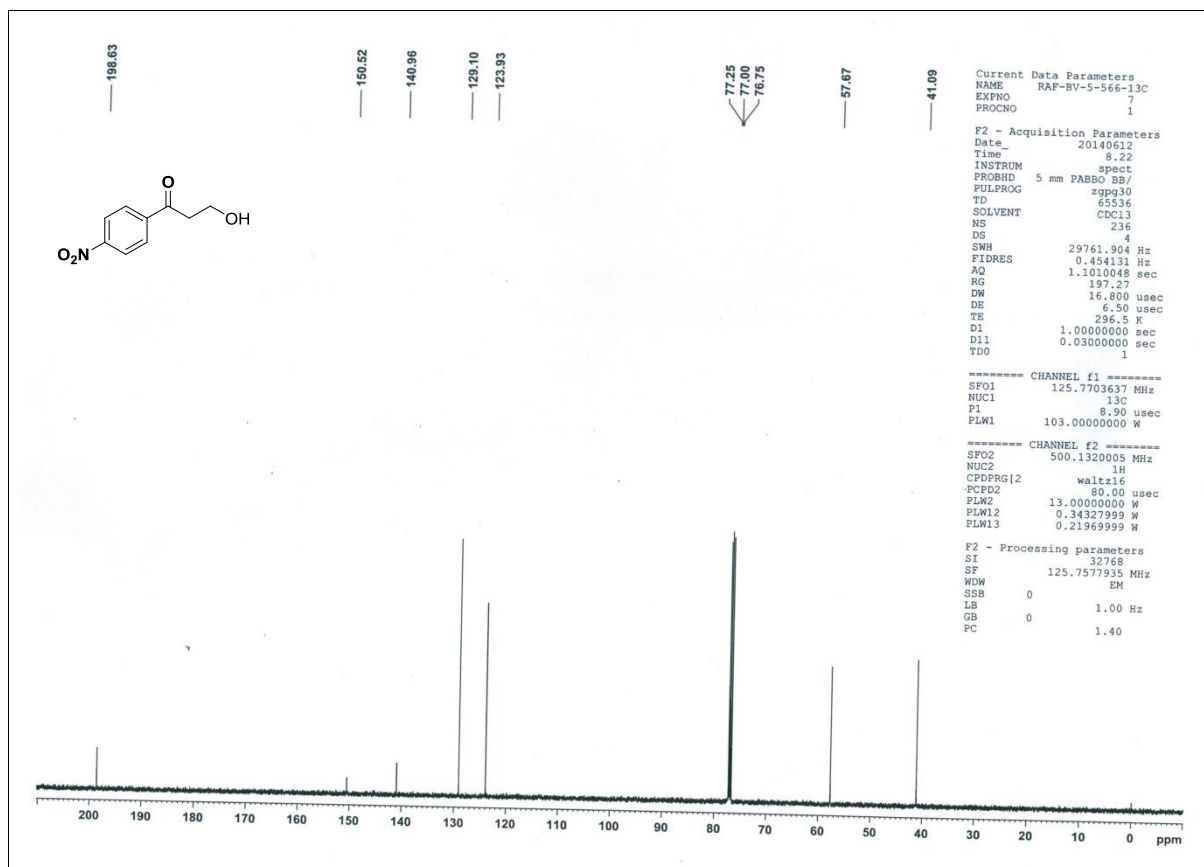
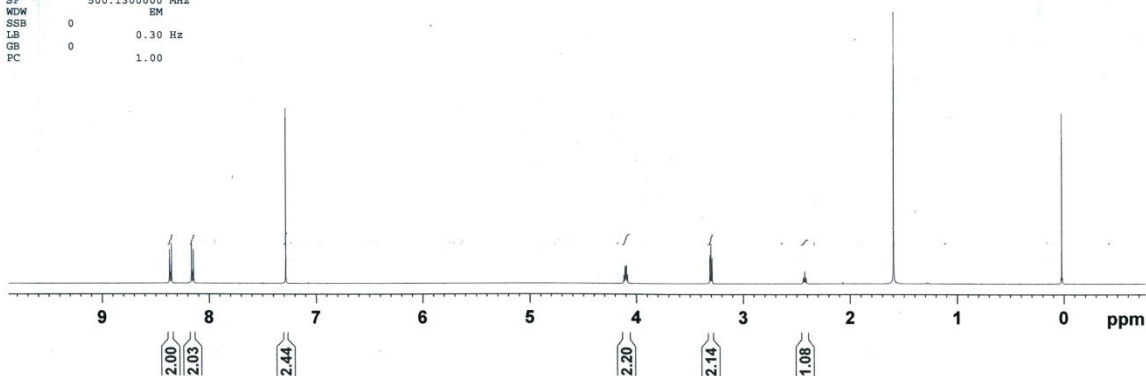
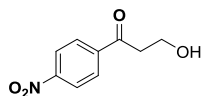
Current Data Parameters
NAME RAF-BV-5-566-1H
EXPNO 4
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140612
Time 7.56
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 119.07
DW 50.000 usec
DE 6.50 usec
TE 296.0 K
D1 1.0000000 sec
TDO 1

----- CHANNEL f1 -----
SFO1 500.130085 MHz
NUC1 1H
P1 13.00 usec
PLW1 13.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

RAF-BV-5-566-1H



¹H NMR (500 MHz, CDCl₃/TMS) and ¹³C NMR (125 MHz, CDCl₃) of compound 4p

Current Data Parameters
 NAME RAF-BV-p-Cl-1H
 EXPNO 2
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20140612
 Time 7.46
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 10000.000 Hz
 FIDRES 0.152588 Hz
 AQ 3.2767999 sec
 RG 157.24
 DW 50.000 usec
 DE 6.50 usec
 TE 296.2 K
 D1 1.0000000 sec
 TDO 1

----- CHANNEL f1 -----
 SFO1 500.1330885 MHz
 NUC1 1H
 P1 13.00 usec
 PLW1 13.00000000 W

F2 - Processing parameters
 SI 65536
 SF 500.1300123 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

RAF-BV-p-Cl-1H

