

Supplementary Information

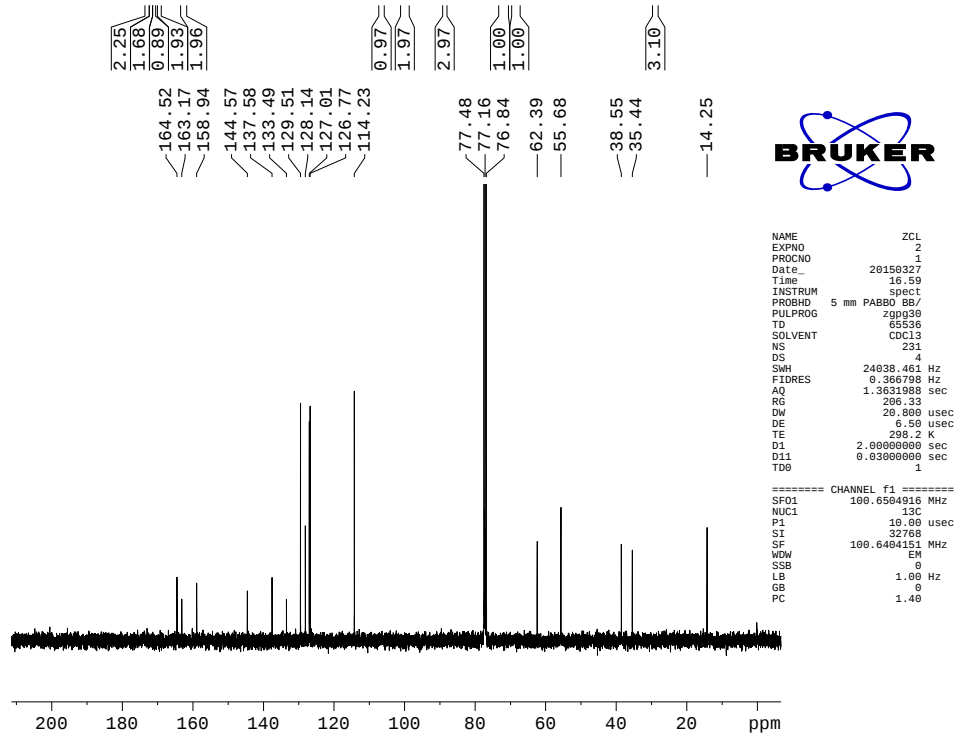
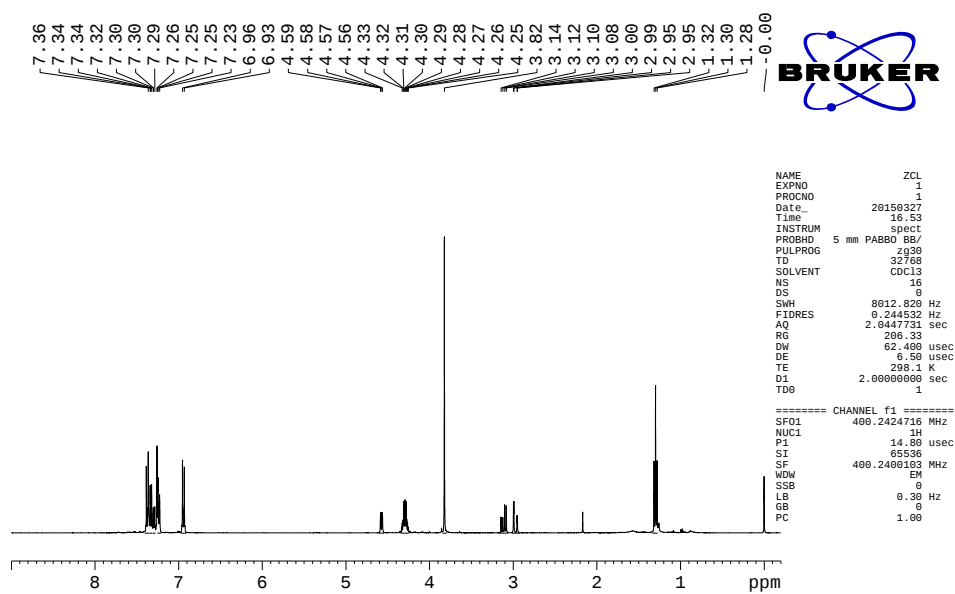
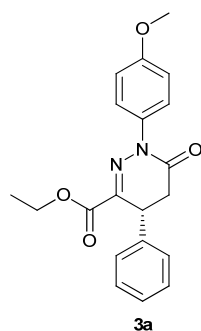
N-Heterocyclic Carbene -Catalyzed [3+3] Cycloaddition of Bromoenals with hydrazones: Highly Enantioselective Synthesis of dihydropyridazones

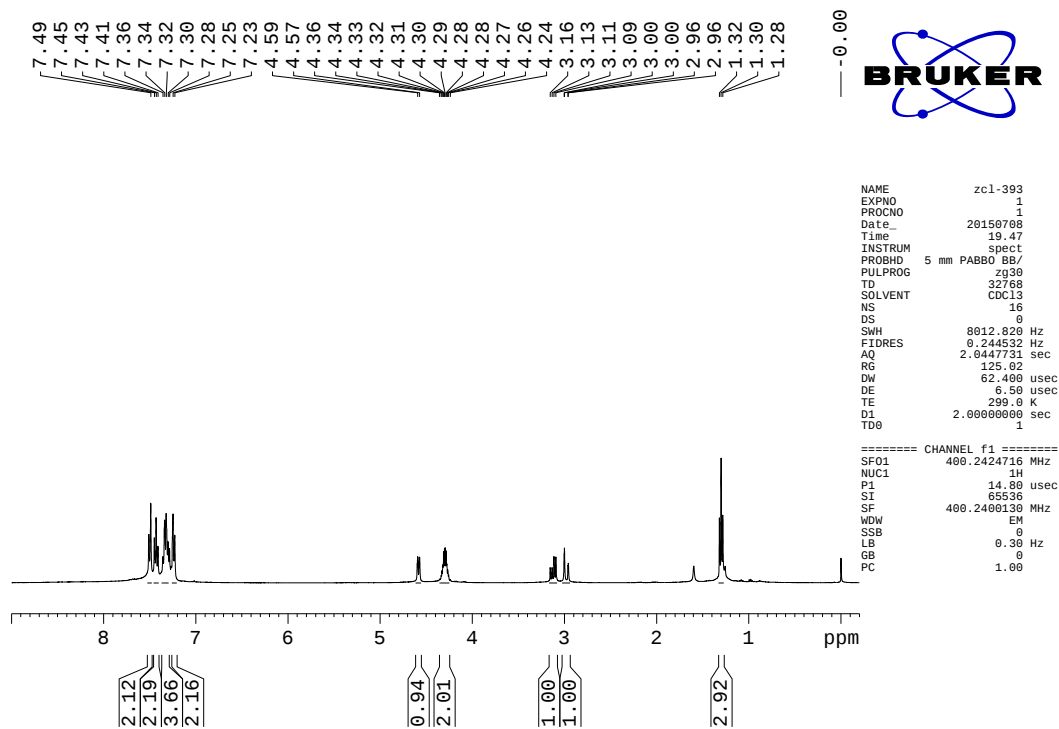
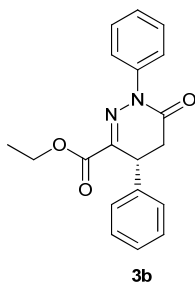
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Beijing National Laboratory for Molecular Sciences, Key Laboratory of
Molecular Recognition and Function, Institute of Chemistry, Chinese Academy
of Sciences, Beijing 100190, China.

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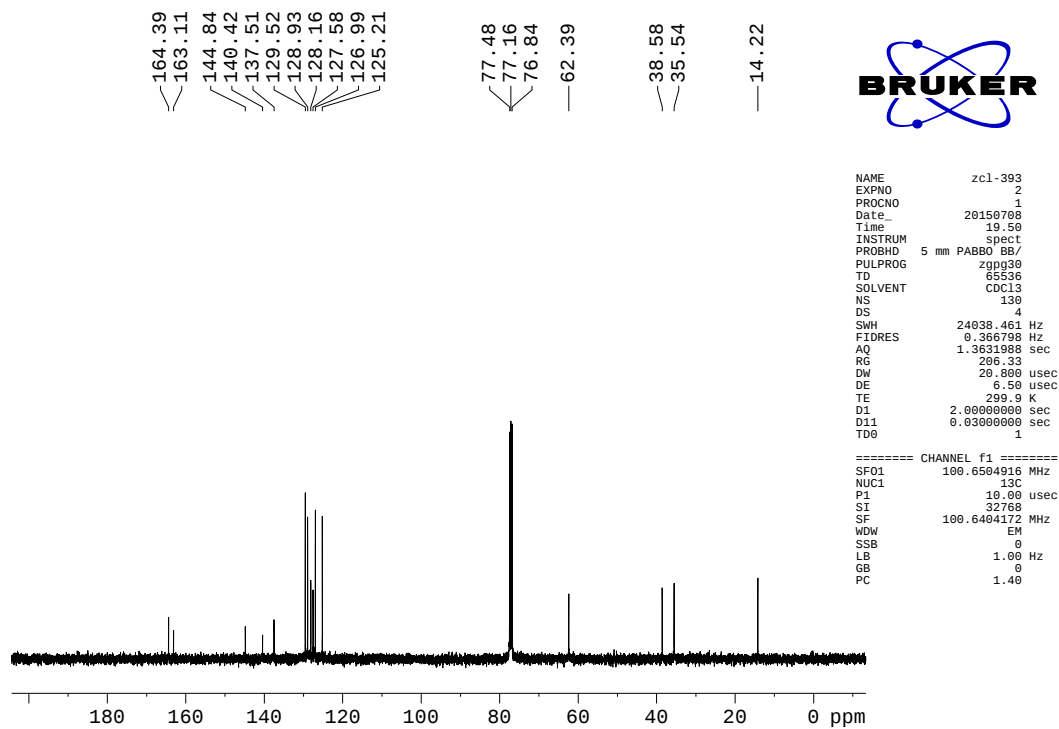
Part I NMR Spectra





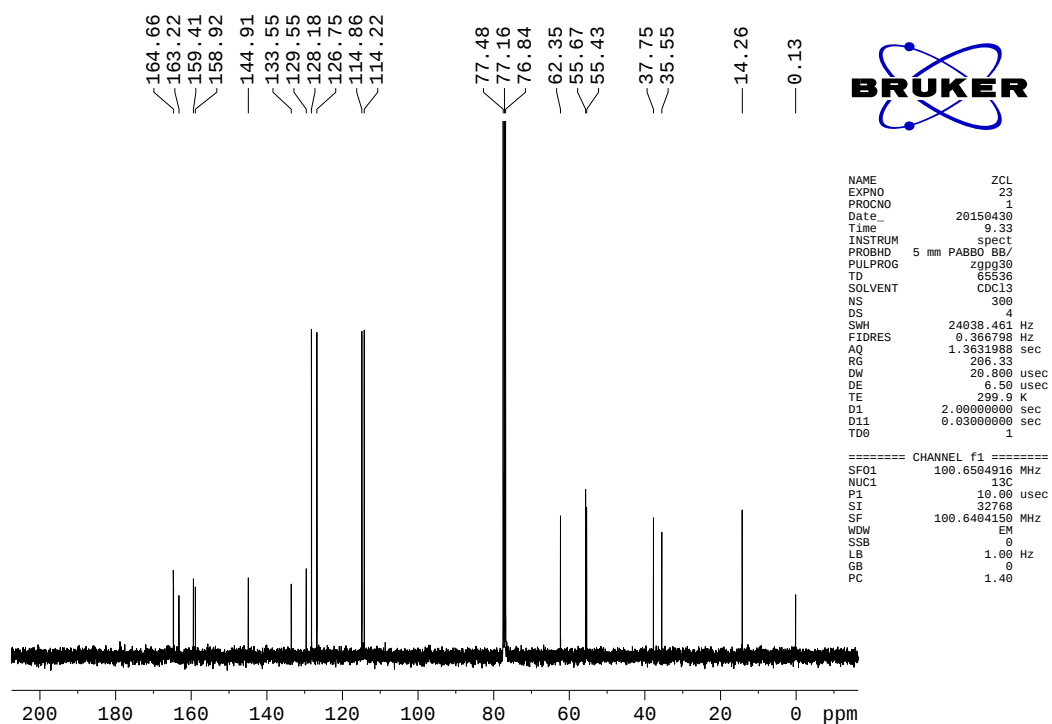
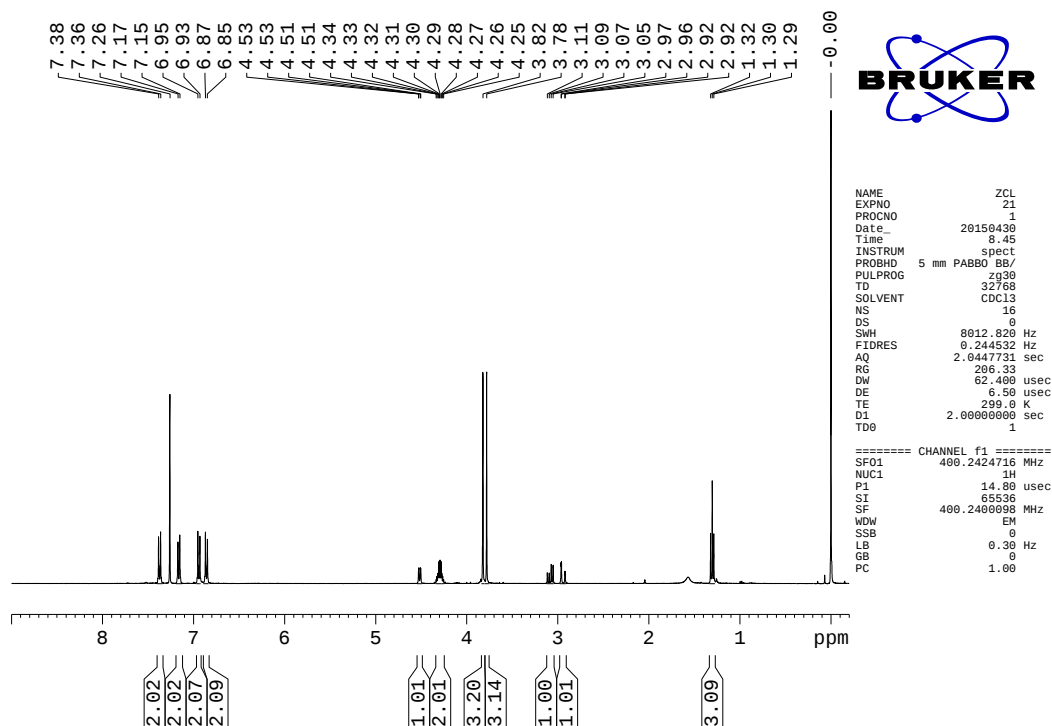
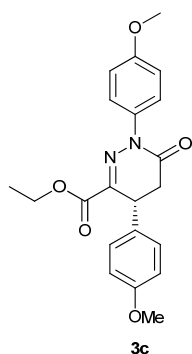
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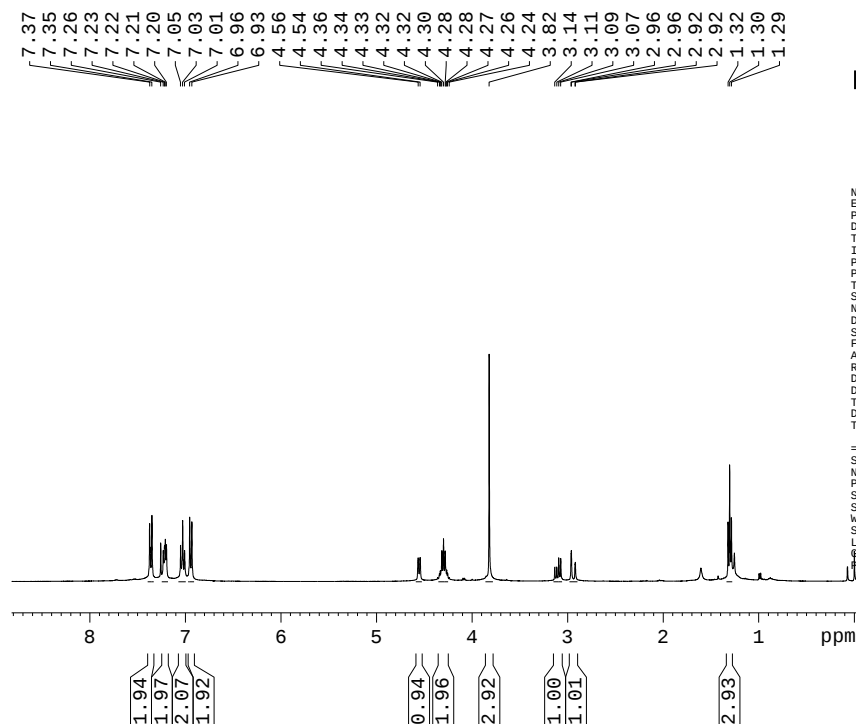
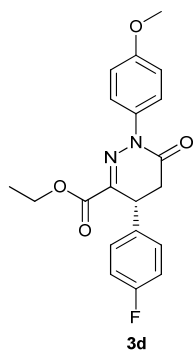
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PROCNO        1
Date_         20150708
Time          19.47
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8912.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            125.02
DW            62.400 usec
DE            6.50 usec
TE            299.0 K
D1            2.00000000 sec
D10           1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.80 usec
SI            65536
SF            400.2400130 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



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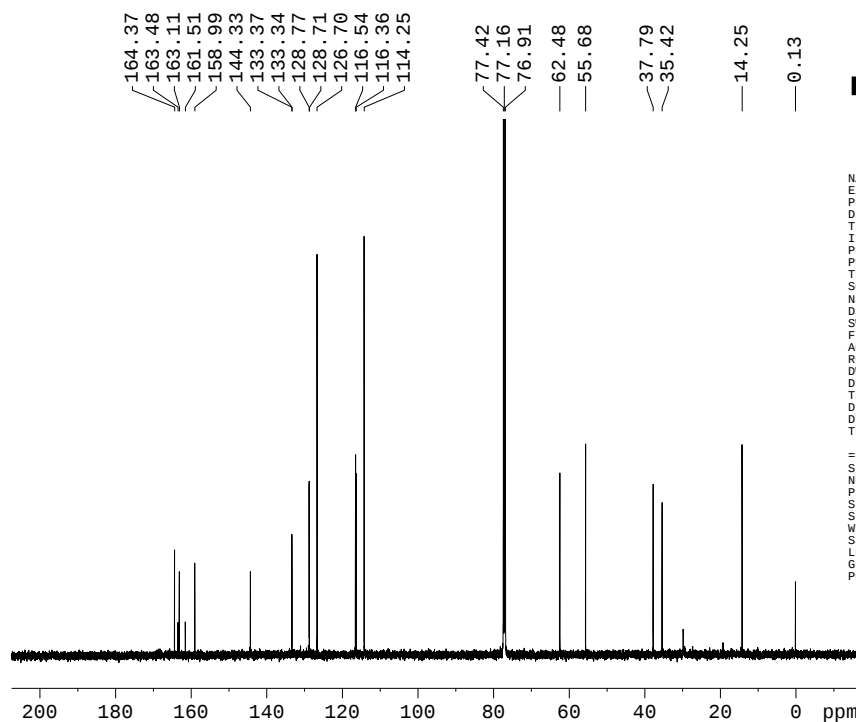
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PROCNO        1
Date_         20150708
Time          19.50
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            130
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            299.9 K
D1            2.00000000 sec
D11           0.03000000 sec
D10           1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404172 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
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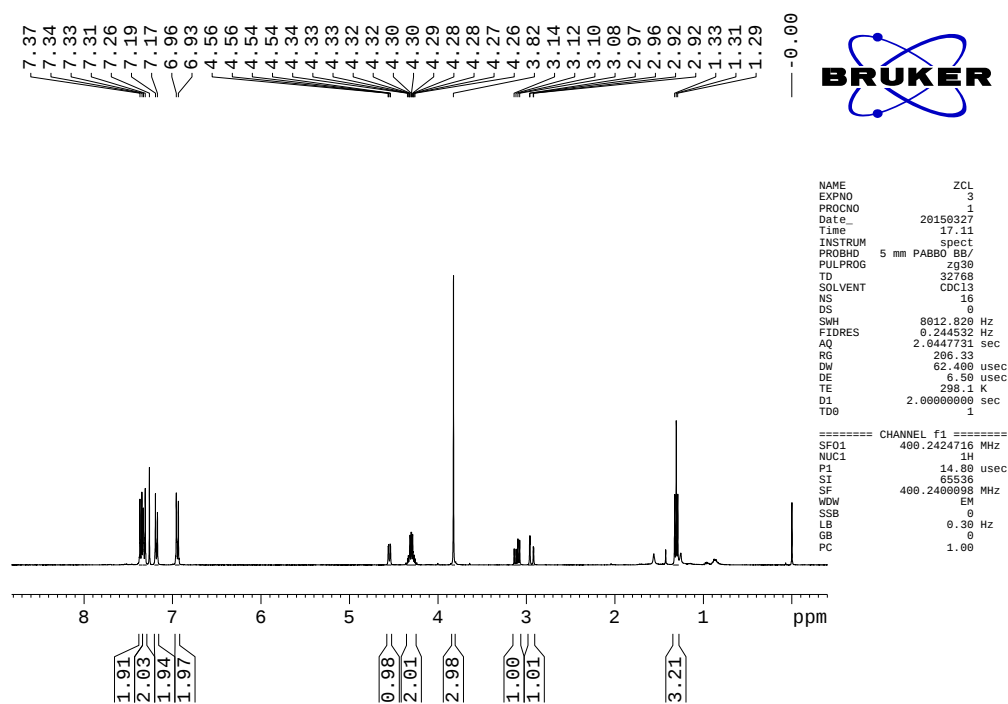
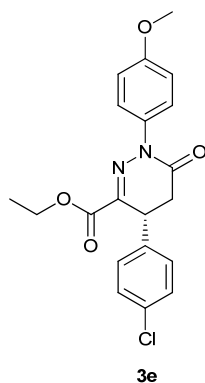
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EXPNO     1
PROCNO    1
Date_     20150707
Time      21.33
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         16
DS         0
SWH        8012.820 Hz
FIDRES     0.244532 Hz
AQ         2.0447731 sec
RG         125.02
DW         62.400 usec
DE         6.50 usec
TE         298.5 K
D1         2.0000000 sec
D0         1
===== CHANNEL f1 =====
SF01      400.2424716 MHz
NUC1       1H
P1         14.00 usec
SI         65536
SF         400.2400104 MHz
WDW        EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
  
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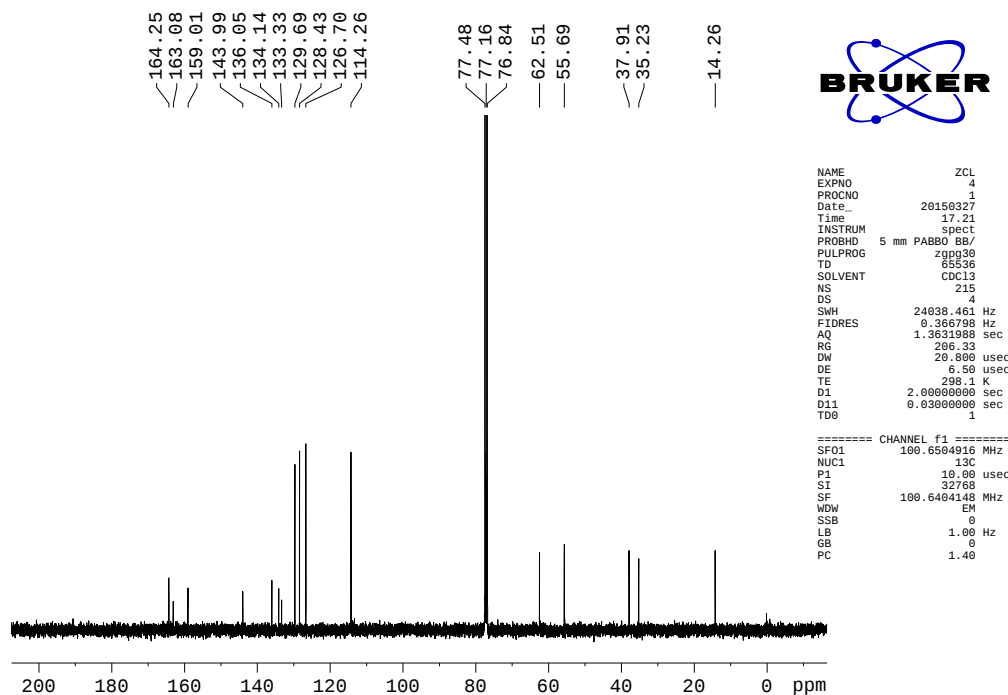
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NAME      zcl-446-500M
EXPNO     2
PROCNO    1
Date_     20150817
Time      21.21
INSTRUM   spect
PROBHD    5 mm CPPBBO BB
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         172
DS         4
SWH        29761.904 Hz
FIDRES     0.454131 Hz
AQ         1.1010548 sec
RG         192.89
DW         16.800 usec
DE         18.00 usec
TE         298.0 K
D1         2.0000000 sec
D11        0.0300000 sec
D0         1
===== CHANNEL f1 =====
SF01      125.7703637 MHz
NUC1       13C
P1         9.00 usec
SI         32768
SF         125.7577724 MHz
WDW        EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```



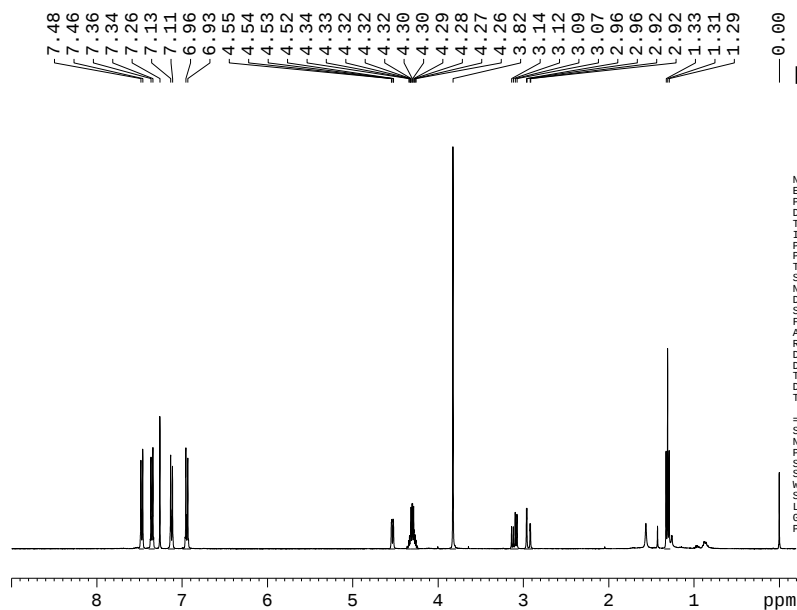
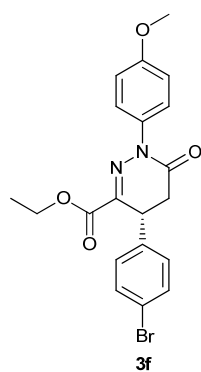
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EXPNO 3
PROCNO 1
Date_ 20150327
Time 17.11
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 32768
SOLVENT CDC13
NS 16
DS 0
SWH 8012.820 Hz
FIDRES 0.244532 Hz
AQ 2.0447731 sec
RG 206.33
DW 62.400 usec
DE 6.50 usec
TE 298.1 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SF01 400.2424716 MHz
NUC1 1H
P1 14.80 usec
SI 65536
SF 400.2400000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



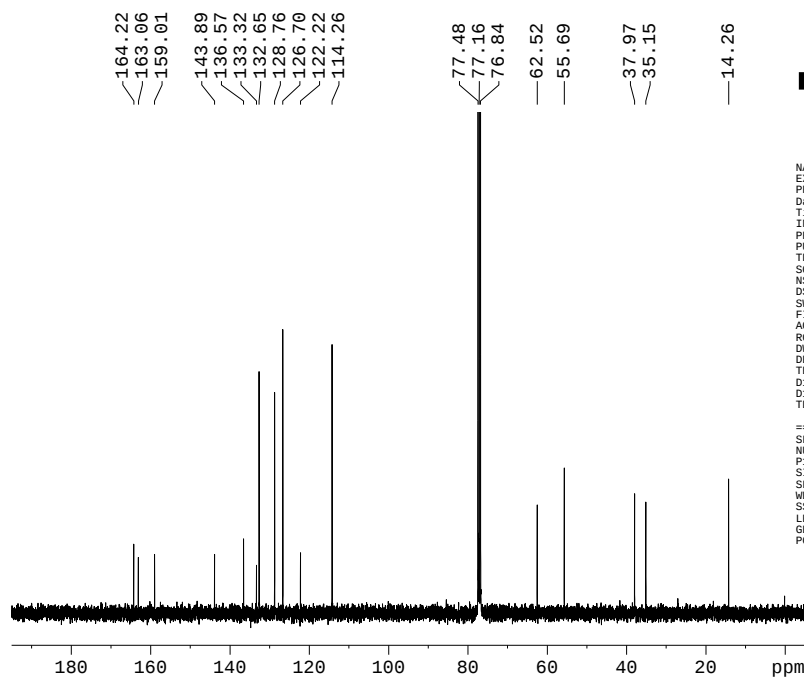
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EXPNO 4
PROCNO 1
Date_ 20150327
Time 17.21
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDC13
NS 215
DS 4
SWH 24038.461 Hz
FIDRES 0.386798 Hz
AQ 1.3651988 sec
RG 206.33
DW 28.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SF01 100.6504916 MHz
NUC1 13C
P1 10.00 usec
SI 32768
SF 100.6404148 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



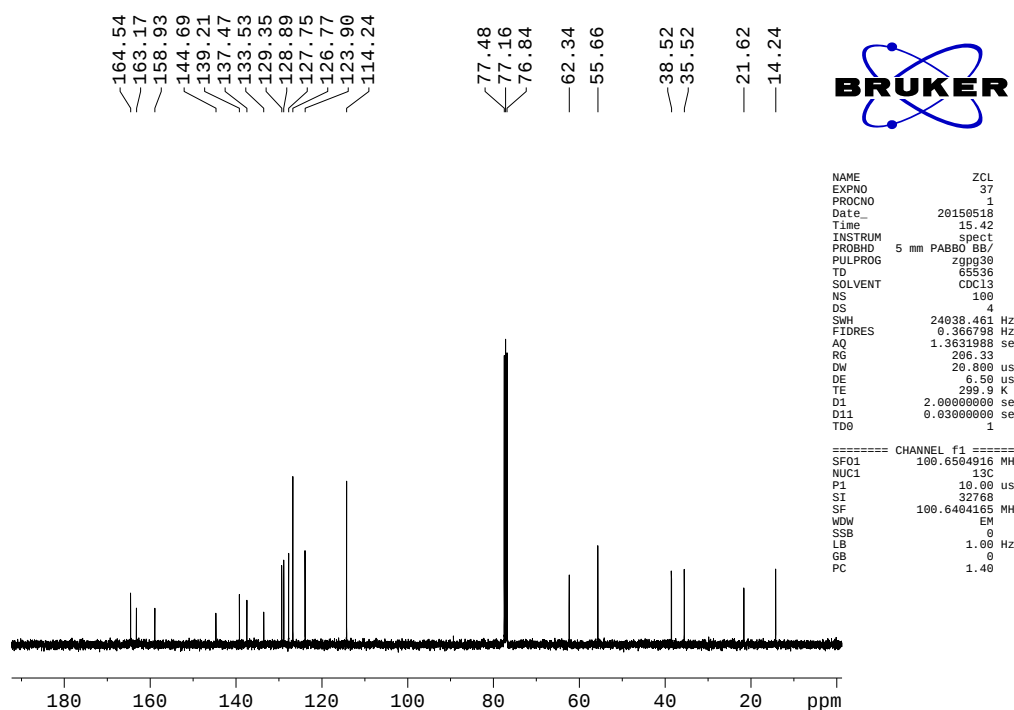
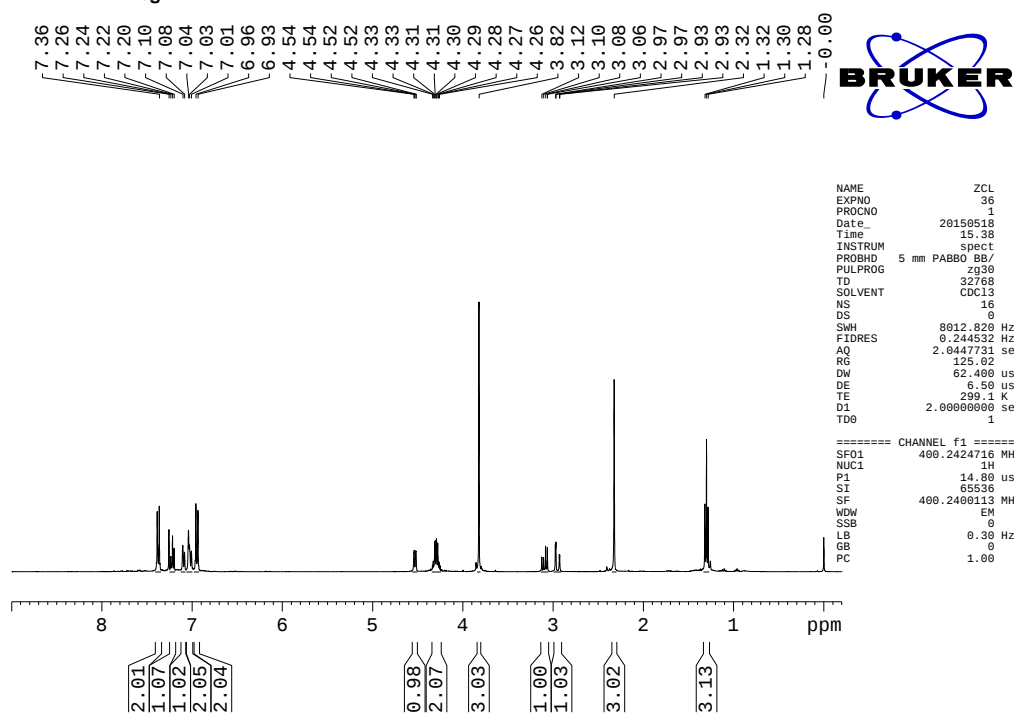
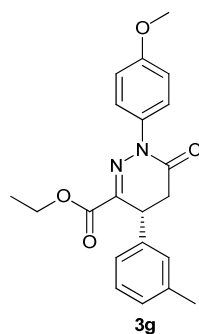
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EXPNO 8
PROCNO 1
Date_ 20150327
Time 18.28
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 0
SWH 8012.820 Hz
FIDRES 0.244532 Hz
AQ 2.0447731 sec
RG 206.33
DW 62.480 usec
DE 6.50 usec
TE 298.1 K
D1 2.00000000 sec
TD0 1

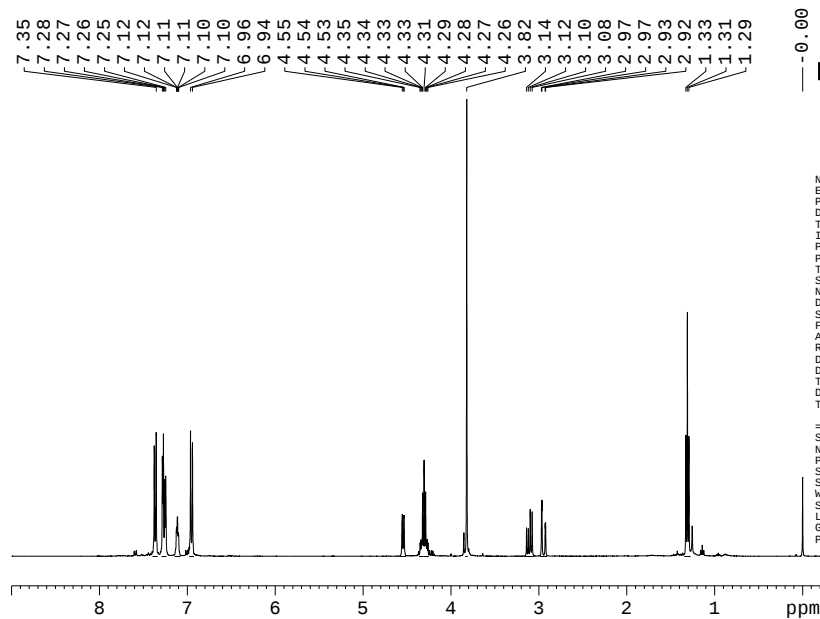
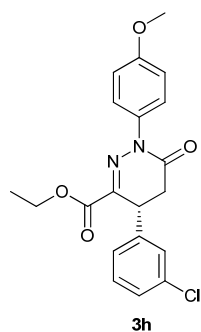
===== CHANNEL f1 =====
SF01 400.2424716 MHz
NUC1 1H
P1 14.80 usec
SI 65536
SF 400.2400097 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



NAME ZCL
EXPNO 9
PROCNO 1
Date_ 20150327
Time 18.34
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 322
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 206.33
DW 20.800 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SF01 100.6504916 MHz
NUC1 13C
P1 10.00 usec
SI 32768
SF 100.6404150 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



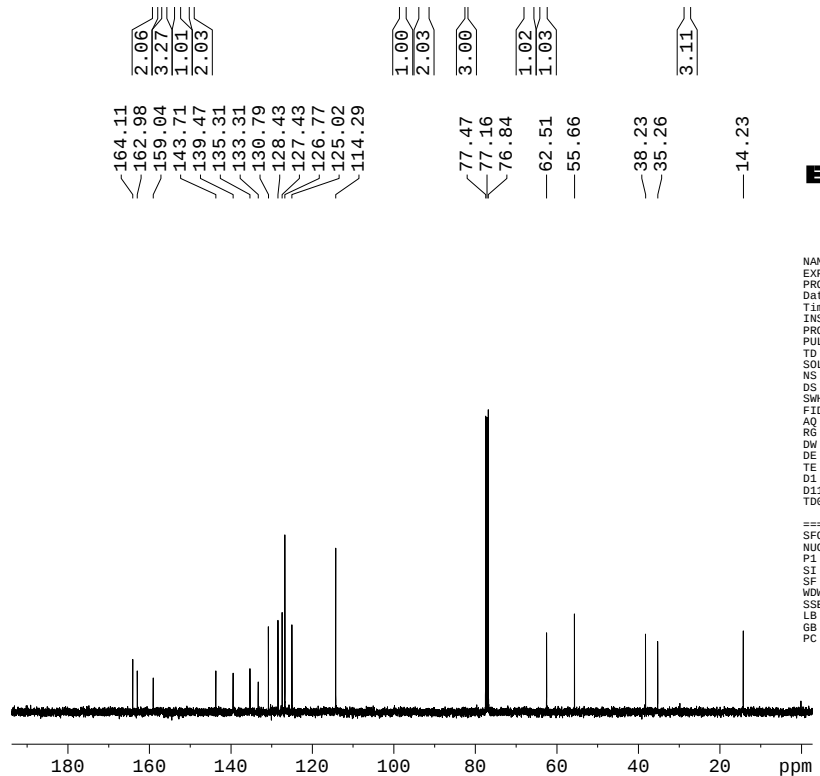


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NAME          ZCL
EXPNO         34
PROCNO        1
Date_         20150518
Time          15.26
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            125.02
DW            62.400 usec
DE            6.50 usec
TE            299.1 K
D1            2.00000000 sec
D0            1

===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.00 usec
SI            65536
SF            400.2400101 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

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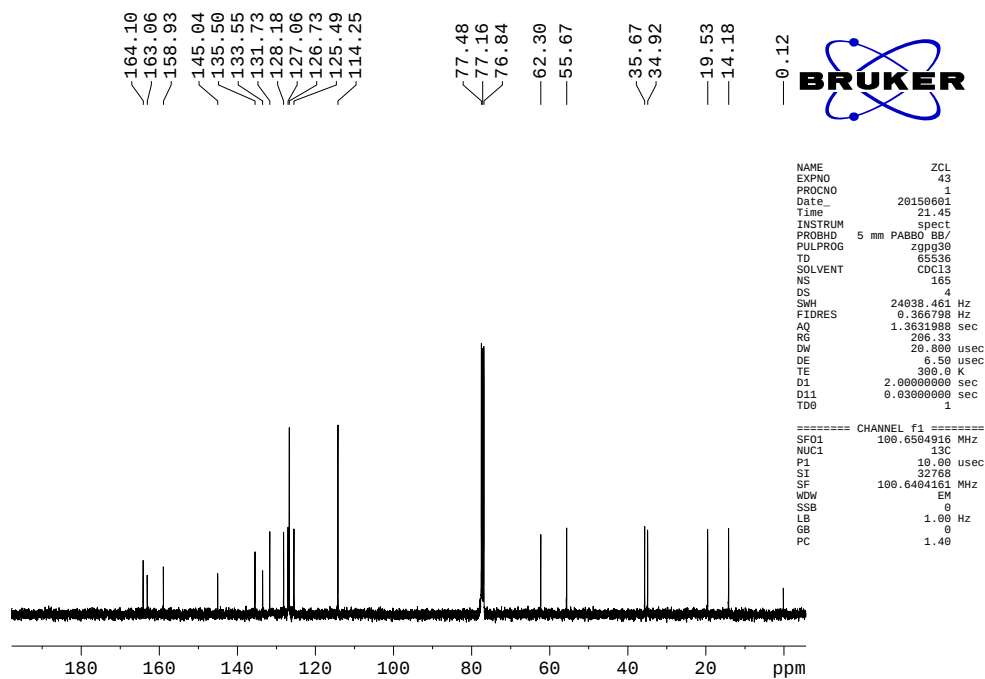
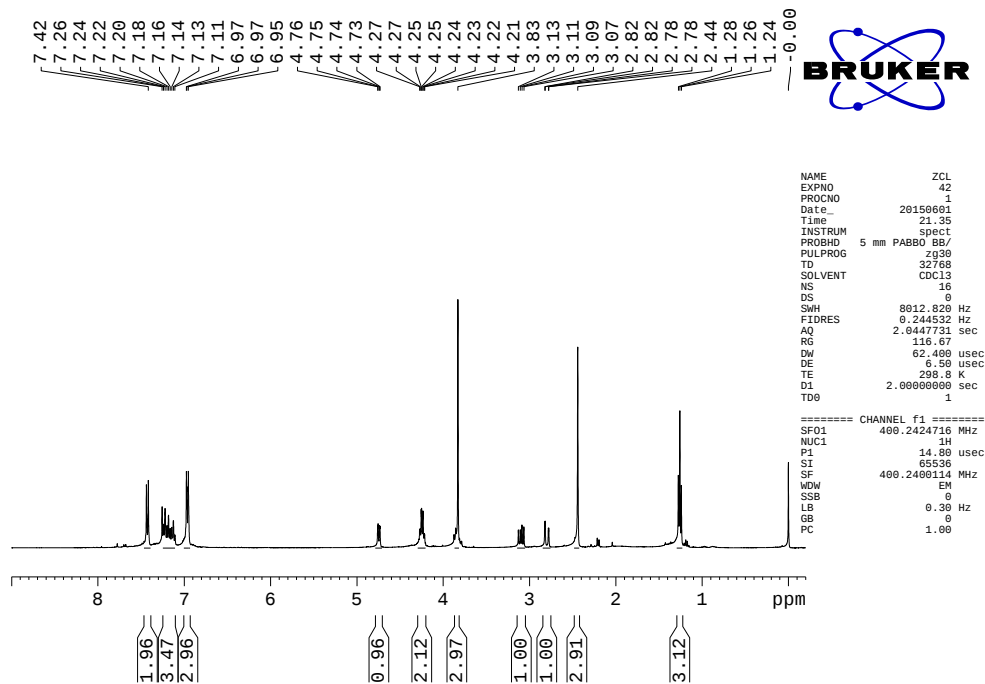
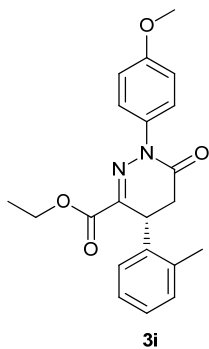


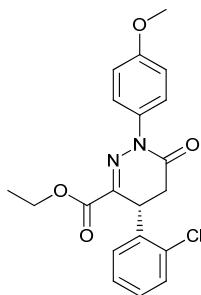
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NAME          ZCL
EXPNO         35
PROCNO        1
Date_         20150518
Time          15.31
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            100
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1

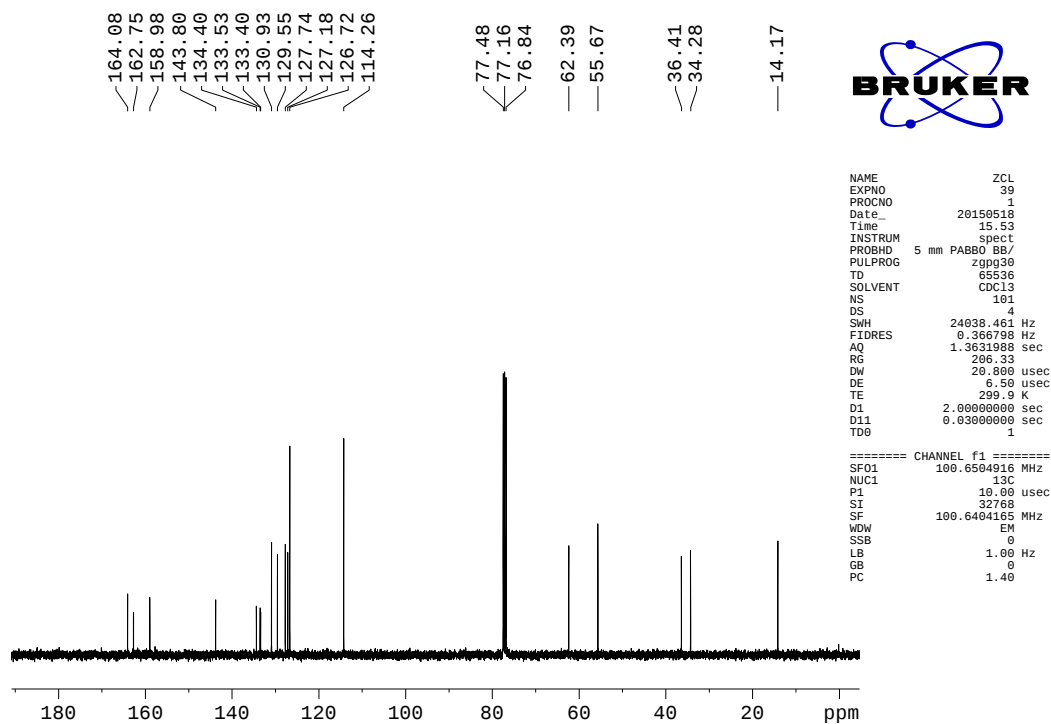
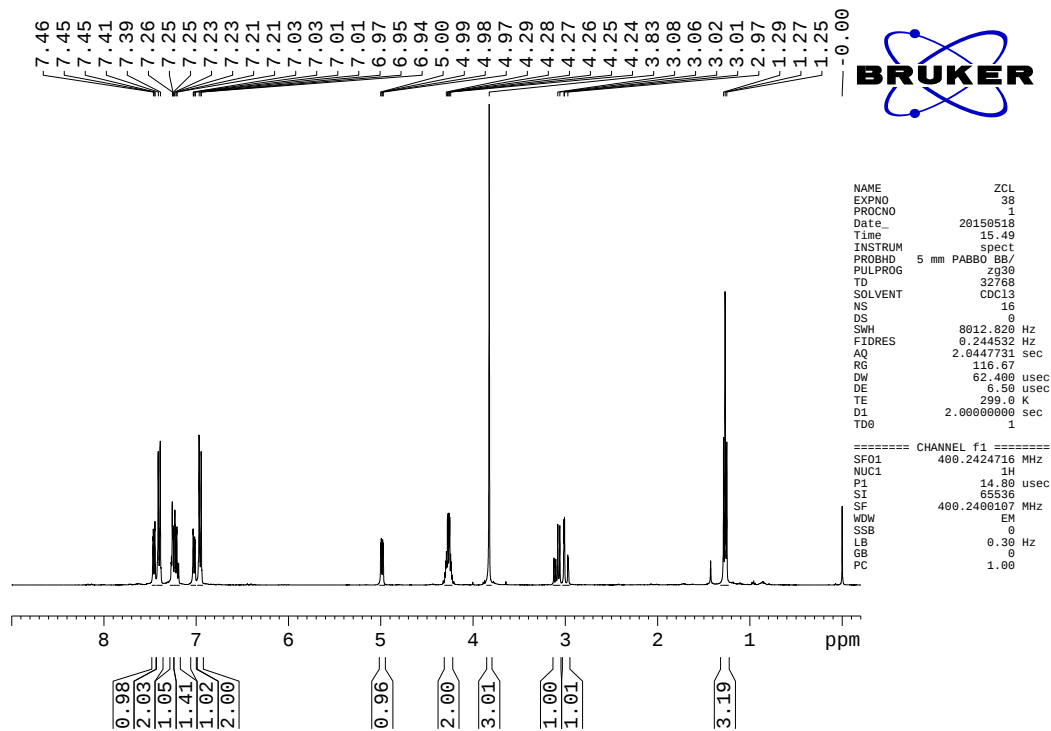
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SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404165 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

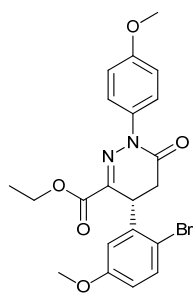
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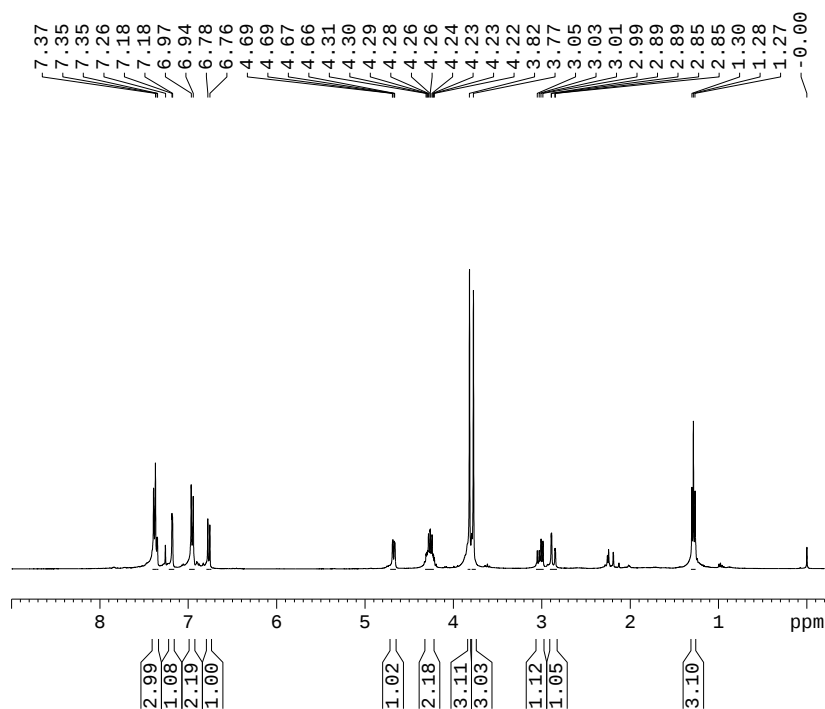


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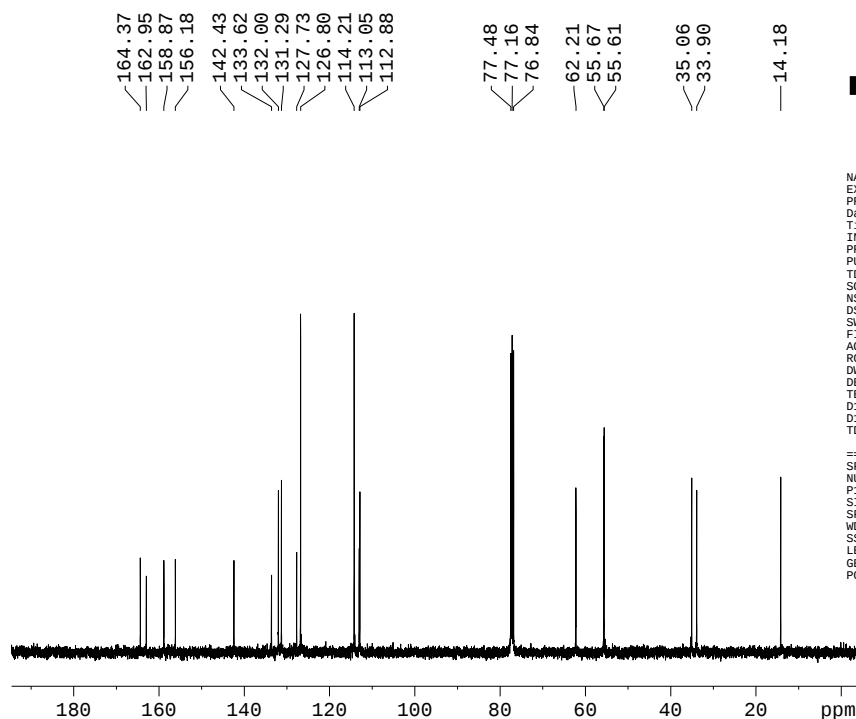


3k



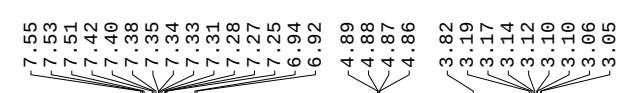
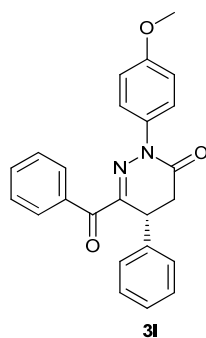
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NAME          ZCL
EXPNO         40
PROCNO        1
Date_         20150601
Time          21.19
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            8
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            80.72
DW            62.400 usec
DE            6.50 usec
TE            298.7 K
D1            2.00000000 sec
D0            1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1           1H
P1            14.80 usec
SI            65536
SF            400.2400104 MHz
WDW            EM
SSB            0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

NAME          ZCL
EXPNO         41
PROCNO        1
Date_         20150601
Time          21.29
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            160
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1
===== CHANNEL f1 =====
SF01          100.6504915 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404209 MHz
WDW            EM
SSB            0
LB            1.00 Hz
GB            0
PC            1.40
  
```

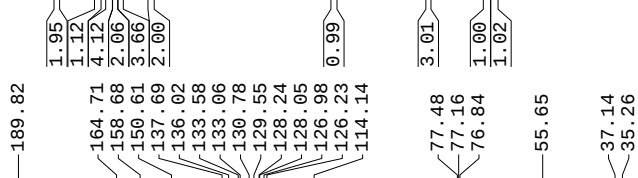
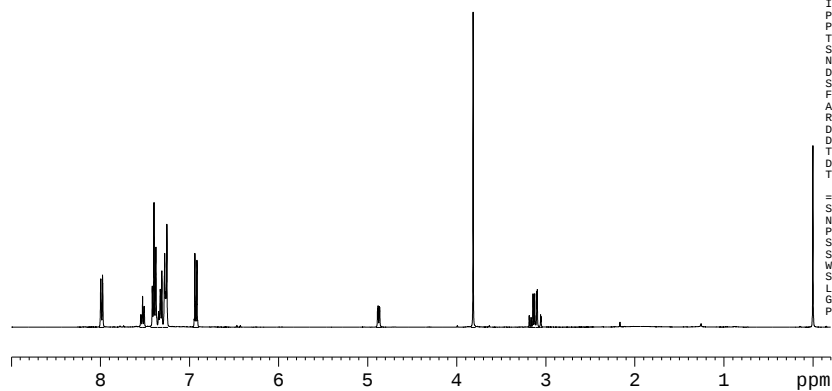


0.00



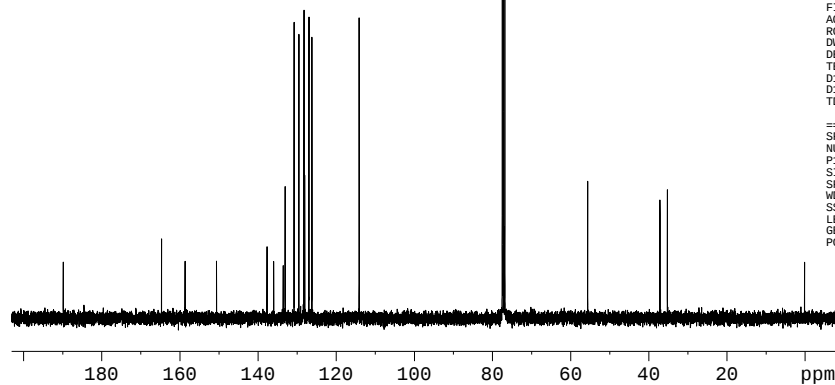
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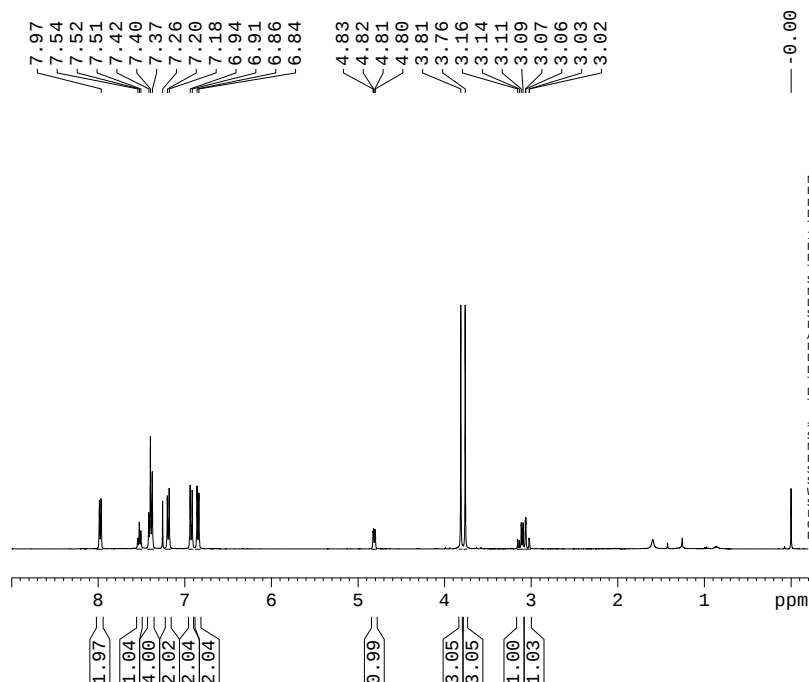
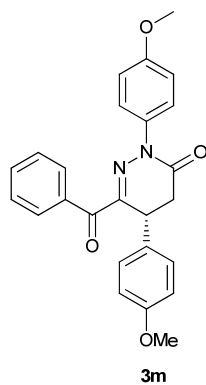
NAME          ZCL
EXPNO         50
PROCNO        1
Date_         20150611
Time          22.12
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            206.33
DW            62.400 usec
DE            6.50 usec
TE            298.0 K
D1            2.0000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1           1H
P1            14.00 usec
SI            65536
SF            400.2400118 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

NAME          ZCL
EXPNO         51
PROCNO        1
Date_         20150611
Time          22.17
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            242
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            298.0 K
D1            2.0000000 sec
D11           0.03000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1           13C
P1            10.00 usec
SI            32768
SF            100.6404157 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

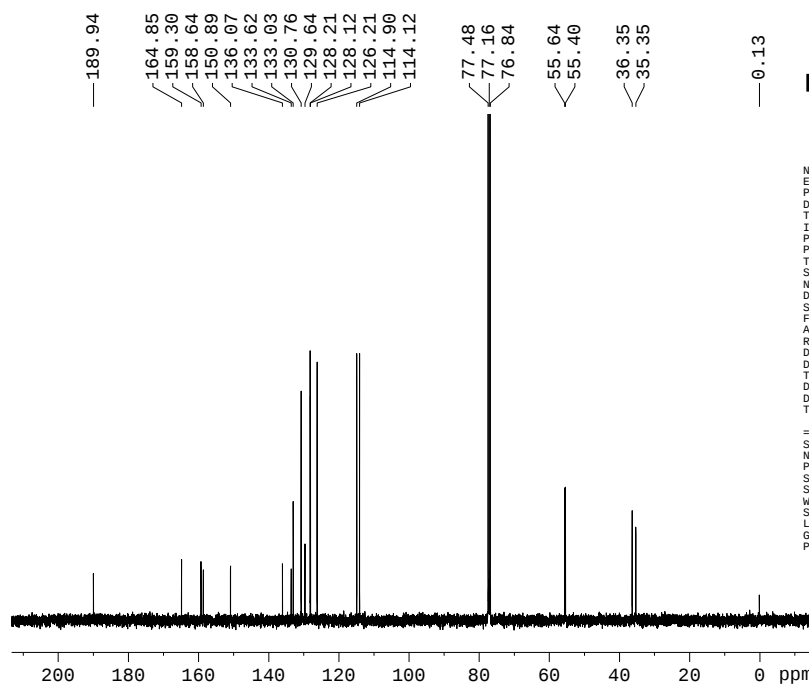




```

NAME          ZCL
EXPNO         13
PROCNO        1
Date_         20150429
Time          18.46
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            125.02
DW            62.400 usec
DE            6.50 usec
TE            298.0 K
D1            2.00000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.80 usec
SI            65536
SF            400.2400116 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

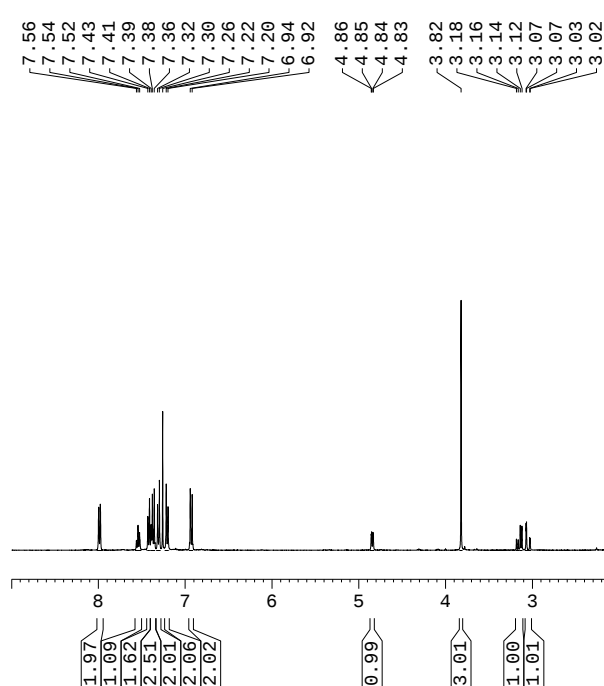
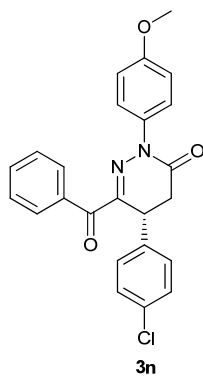
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```

NAME          ZCL
EXPNO         14
PROCNO        1
Date_         20150429
Time          18.51
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            4
DS            0
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3651988 sec
RG            266.33
DW            20.800 usec
DE            6.50 usec
TE            298.5 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404155 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

```



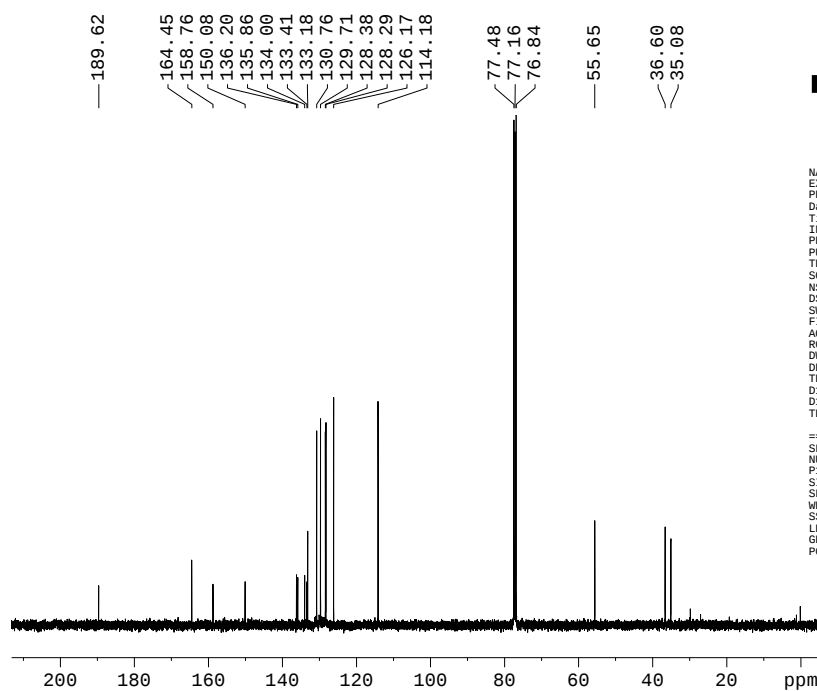
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```

NAME          ZCL
EXPNO         16
PROCNO        1
Date_         20150429
Time          19.02
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            206.33
DW            62.400 usec
DE            6.50 usec
TE            298.0 K
D1            2.00000000 sec
TD0           1

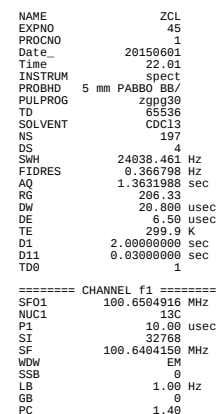
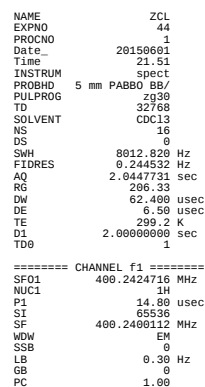
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.80 usec
SI            65536
SF            400.2400101 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

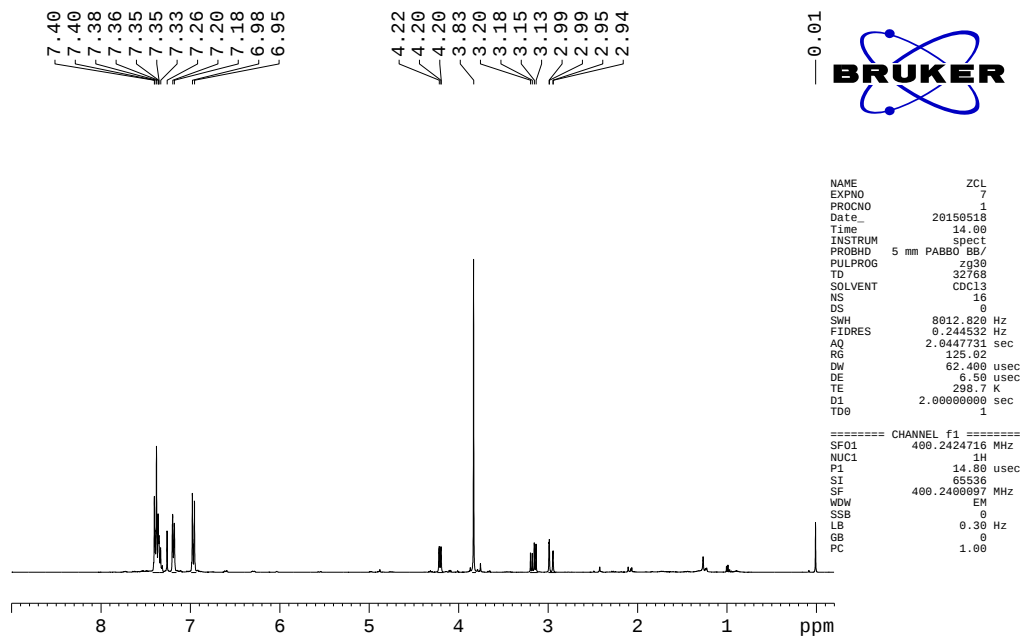
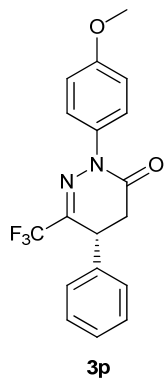


```

NAME          ZCL
EXPNO         24
PROCNO        1
Date_         20150430
Time          9.56
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            201
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631908 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            299.8 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404162 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

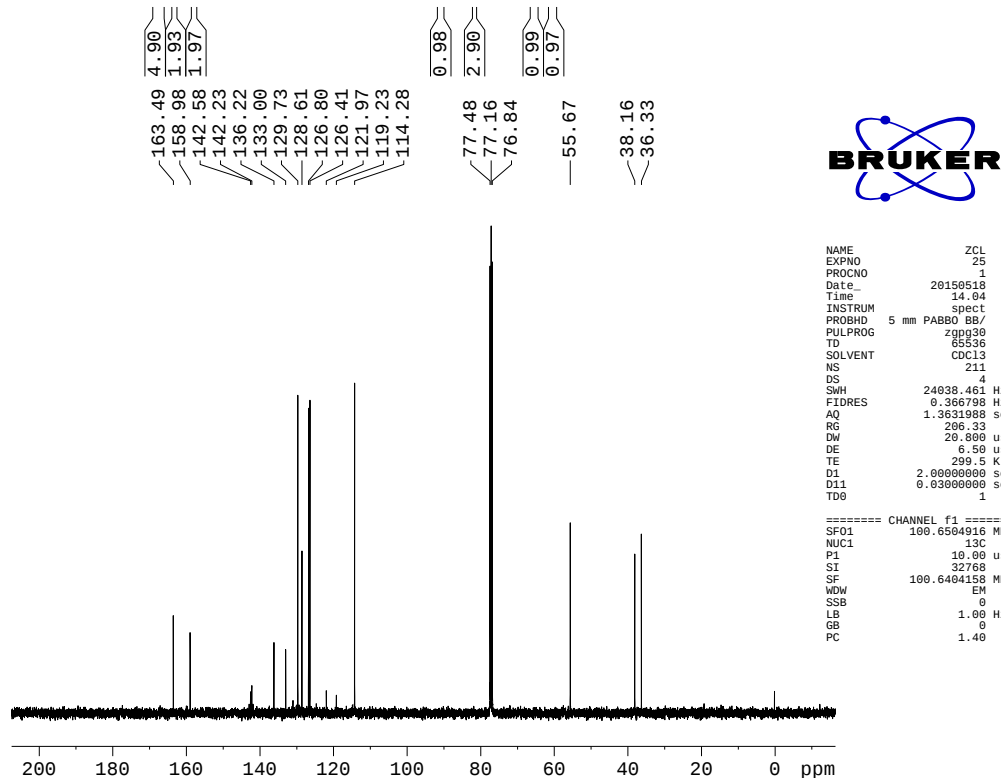




```

NAME          ZCL
EXPNO         7
PROCNO        1
Date_         20150518
Time          14.00
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            125.02
DW            62.400 usec
DE            6.50 usec
TE            298.7 K
D1            2.00000000 sec
D0            1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.00 usec
SI            65536
SF            400.2400097 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

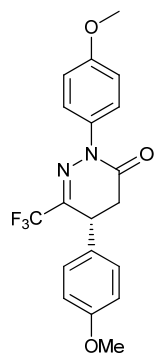
```



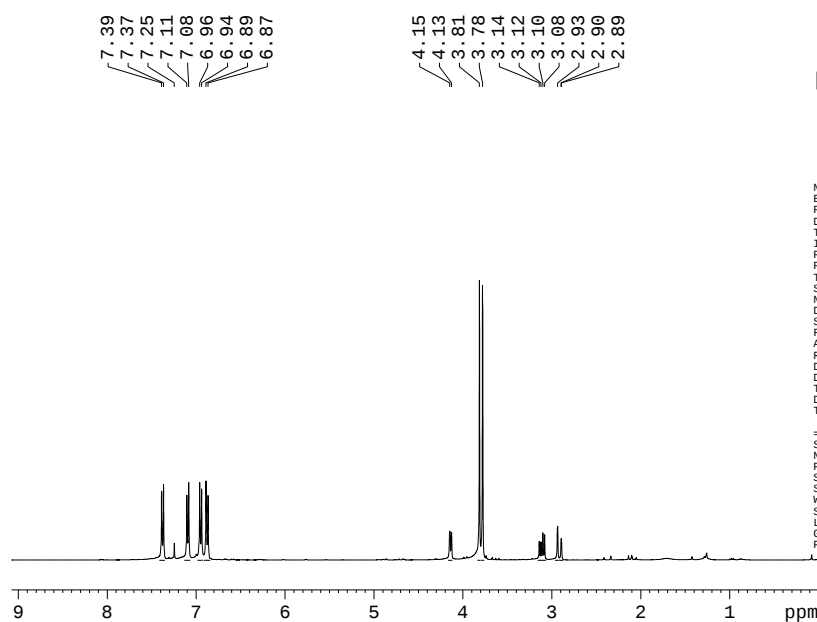
```

NAME          ZCL
EXPNO         25
PROCNO        1
Date_         20150518
Time          14.04
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            211
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            299.5 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404150 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

```

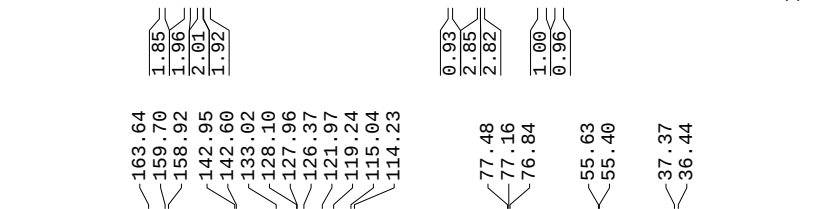


3q



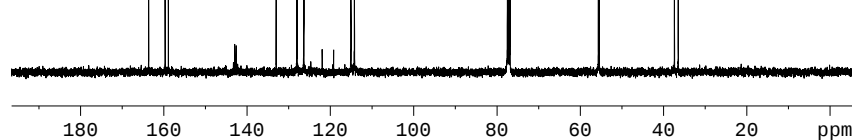
```

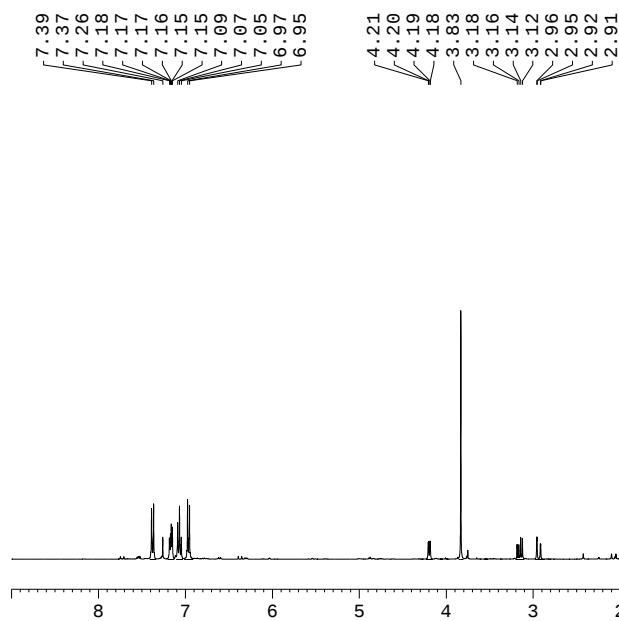
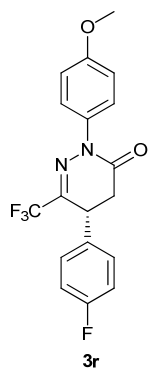
NAME          zcl-470
EXPNO         1
PROCNO        1
Date_         20150707
Time          21.46
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDC13
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            80.72
DW            62.400 usec
DE            6.50 usec
TE            298.5 K
D1            2.00000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1          1H
P1            14.80 usec
SI            65536
SF            400.2400155 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

NAME          zcl-470
EXPNO         2
PROCNO        1
Date_         20150707
Time          21.54
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDC13
NS            130
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            299.4 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404194 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```





— 0.01

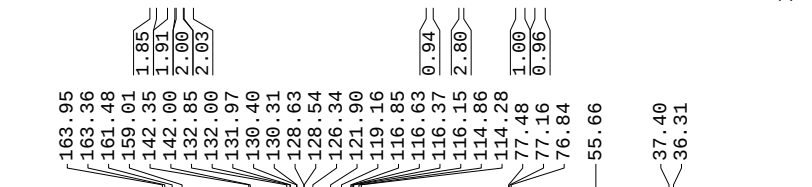


```

NAME          ZCL
EXPNO         54
PROCNO        1
Date_         20150611
Time_         22.43
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            102.73
DW            62.400 usec
DE            6.50 usec
TE            298.1 K
D1            2.00000000 sec
D0            1
  
```

```

===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1           1H
P1            14.00 usec
SI            65536
SF            400.2400097 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

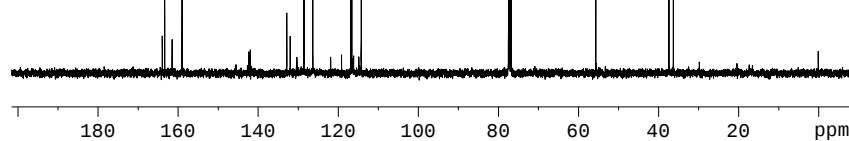


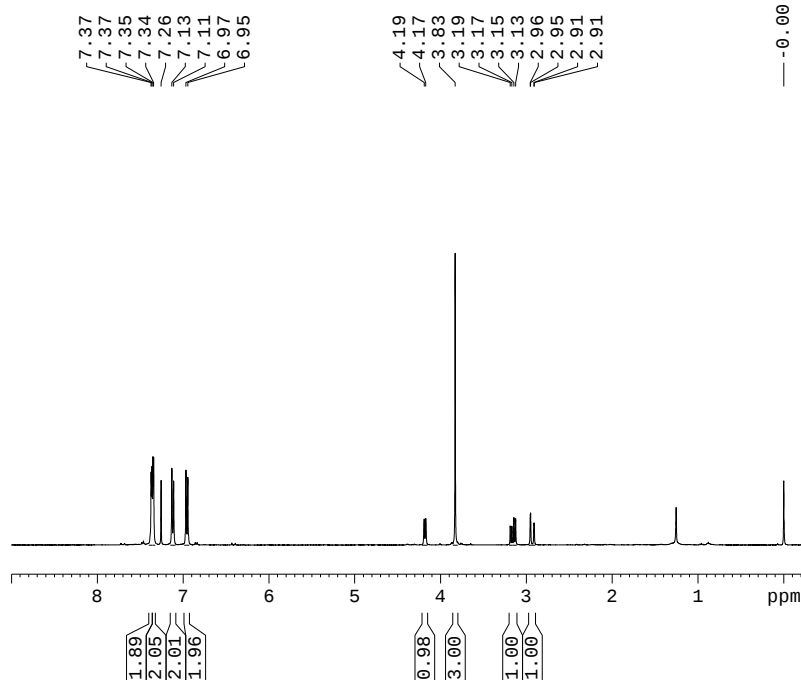
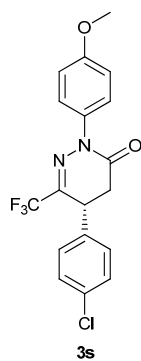
```

NAME          ZCL
EXPNO         55
PROCNO        1
Date_         20150611
Time_         22.46
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            144
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1
  
```

```

===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1           13C
P1            10.00 usec
SI            32768
SF            100.6404172 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



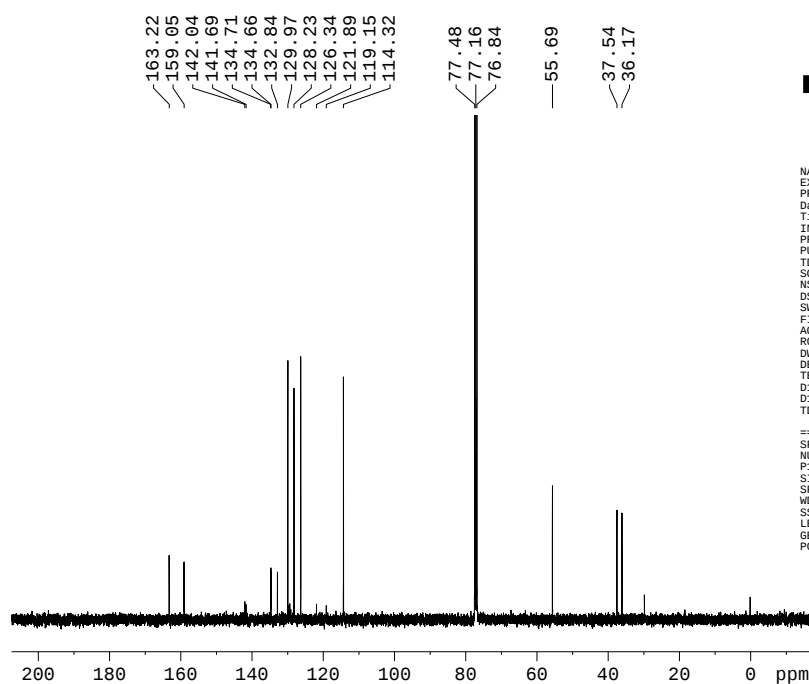


— 0.00



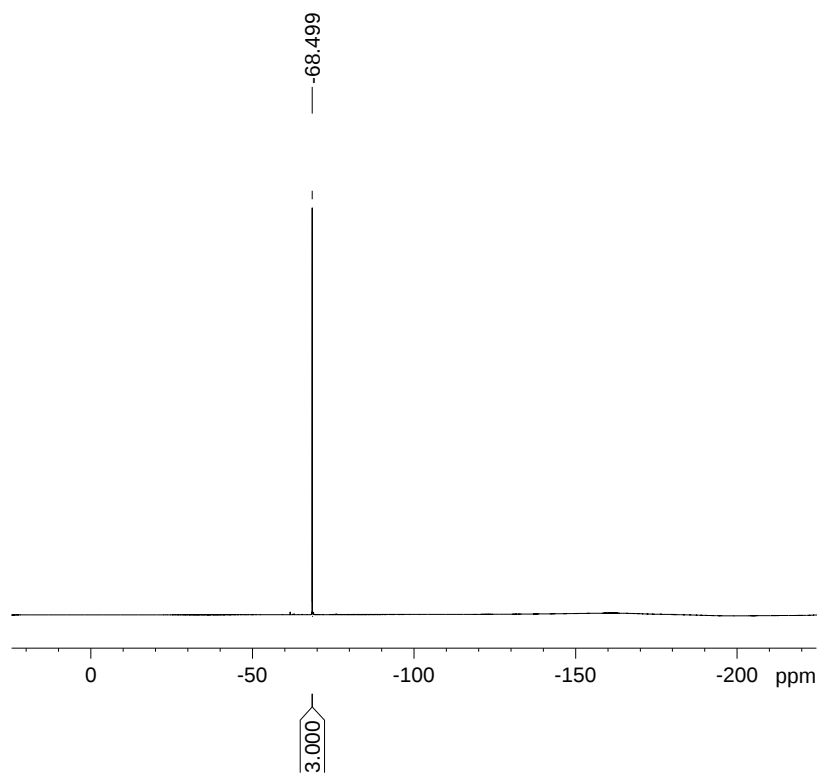
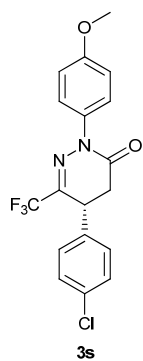
```

NAME          ZCL
EXPNO         32
PROCNO        1
Date_         20150518
Time          15.02
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8912.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            296.33
DW            62.400 usec
DE            6.50 usec
TE            299.3 K
D1            2.00000000 sec
D0            1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1           1H
P1            14.00 usec
SI            65536
SF            400.2400108 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



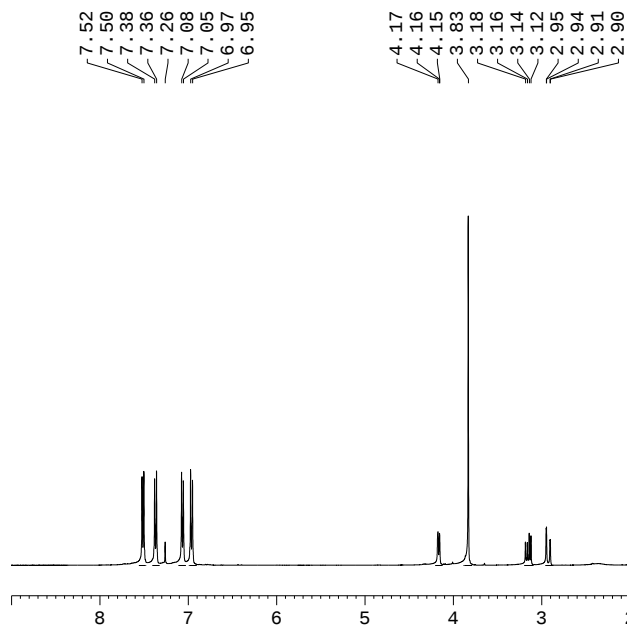
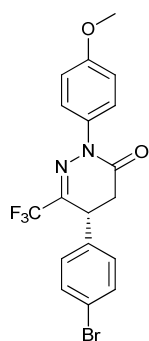
```

NAME          ZCL
EXPNO         33
PROCNO        1
Date_         20150518
Time          15.06
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            395
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            296.33
DW            20.800 usec
DE            6.50 usec
TE            299.9 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1          13C
P1            10.00 usec
SI            32768
SF            100.6404143 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



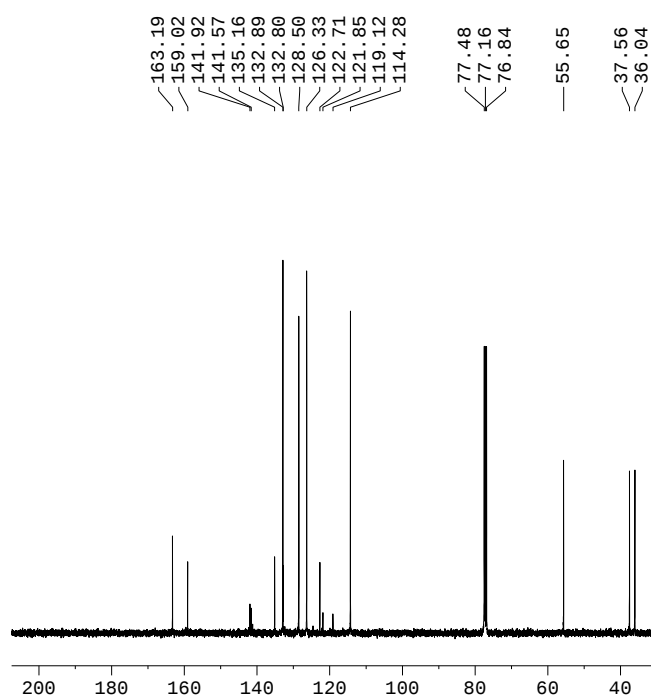
NAME ZCL
 EXPNO 225
 PROCNO 1
 Date_ 20150611
 Time_ 16.46
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgfhigqn.2
 TD 131072
 SOLVENT CDCl3
 NS 32
 DS 4
 SWH 117187.500 Hz
 FIDRES 0.894070 Hz
 AQ 0.5592905 sec
 RG 83.94
 DW 4.267 usec
 DE 6.50 usec
 TE 300.5 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 D12 0.00002000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 470.5453180 MHz
 NUC1 19F
 P1 12.50 usec
 SI 65536
 SF 470.5923772 MHz
 WDW EM
 SSB 0
 LB 5.00 Hz
 GB 0
 PC 1.00



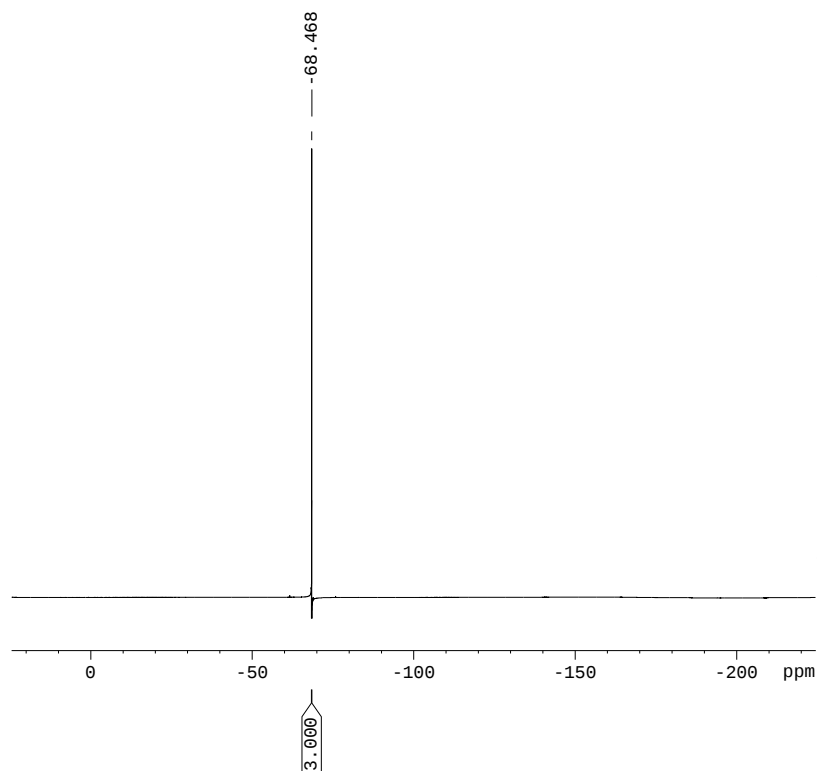
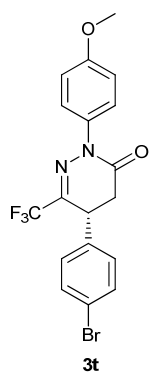
```

NAME          ZCL
EXPNO         46
PROCNO        1
Date_         20150601
Time          22.09
INSTRUM       spect
PROBHD        5 mm PABBO B8/
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            16
DS            0
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG            92.09
DW            62.400 usec
DE            6.50 usec
TE            299.2 K
D1            2.00000000 sec
D0            1
===== CHANNEL f1 =====
SF01          400.2424716 MHz
NUC1           1H
P1            14.00 usec
SI            65536
SF            400.2400100 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

NAME          ZCL
EXPNO         47
PROCNO        1
Date_         20150601
Time          22.13
INSTRUM       spect
PROBHD        5 mm PABBO B8/
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            174
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            206.33
DW            20.800 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
D0            1
===== CHANNEL f1 =====
SF01          100.6504916 MHz
NUC1           13C
P1            10.00 usec
SI            32768
SF            100.6404187 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

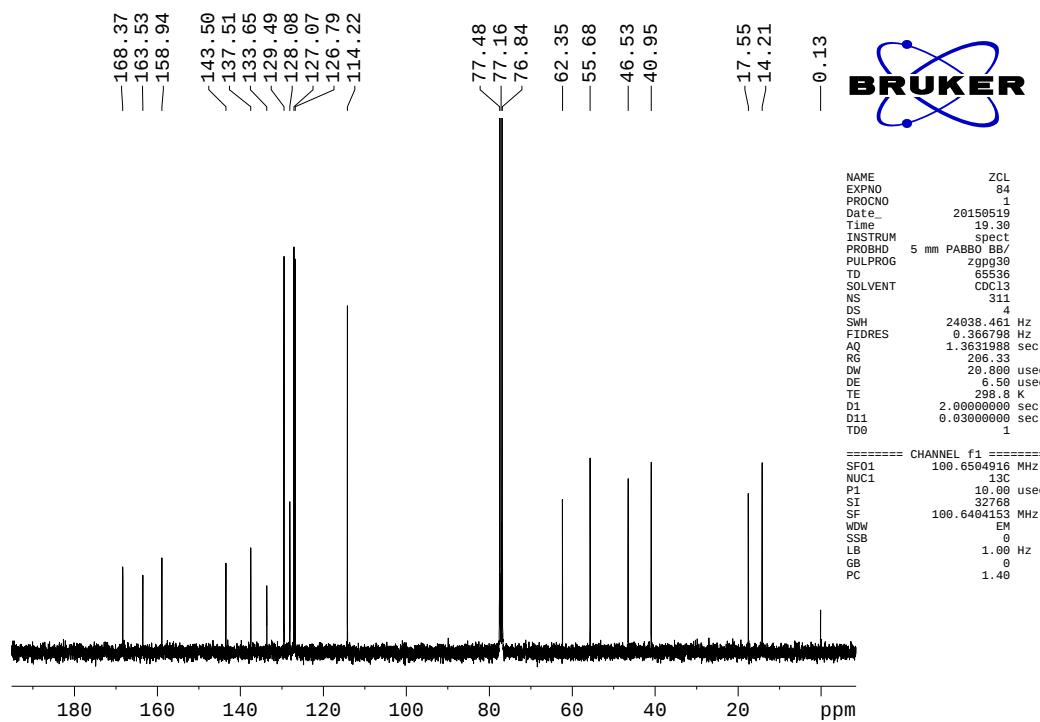
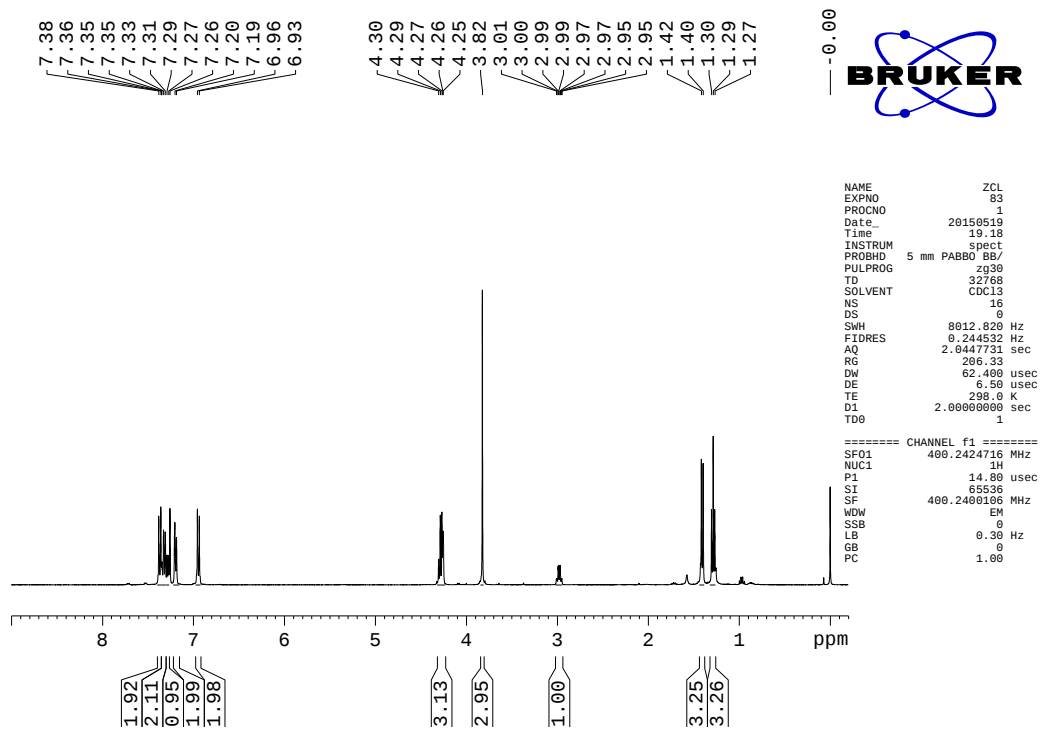
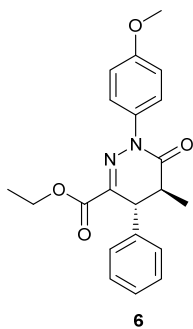


```

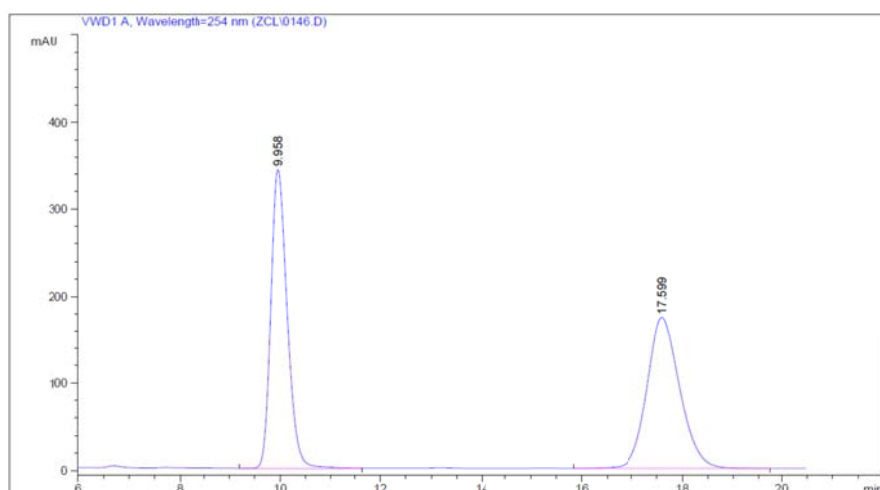
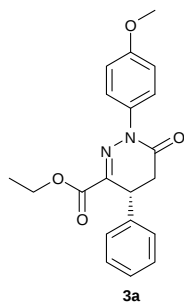
NAME          ZCL
EXPNO         226
PROCNO        1
Date_         20150611
Time          16.52
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgfhigqn.2
TD            131072
SOLVENT       CDCl3
NS            32
DS            4
SWH           117187.500 Hz
FIDRES        0.894070 Hz
AQ            0.5592905 sec
RG            83.94
DW            4.267 usec
DE            6.50 usec
TE            300.7 K
D1            1.00000000 sec
D11           0.03000000 sec
D12           0.00002000 sec
TD0           1

===== CHANNEL f1 =====
SF01          470.5453180 MHz
NUC1          19F
P1            12.50 usec
SI            65536
SF            470.5923772 MHz
WDW           EM
SSB           0
LB            5.00 Hz
GB            0
PC            1.00

```



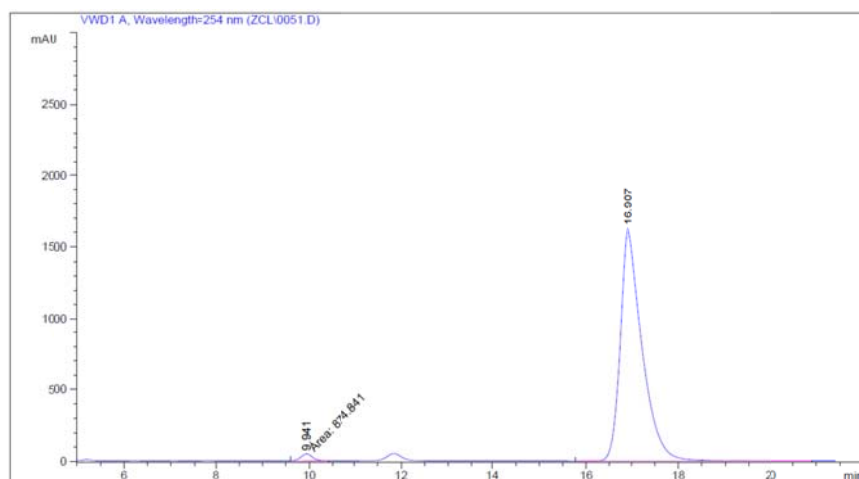
Part II HPLC Spectra



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	9.958	VB	0.3417	7660.43311	343.48914	49.7631
2	17.599	VB	0.6713	7733.35938	173.54951	50.2369

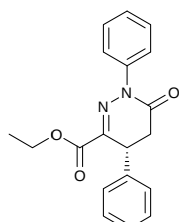
Totals : 1.53938e4 517.03865



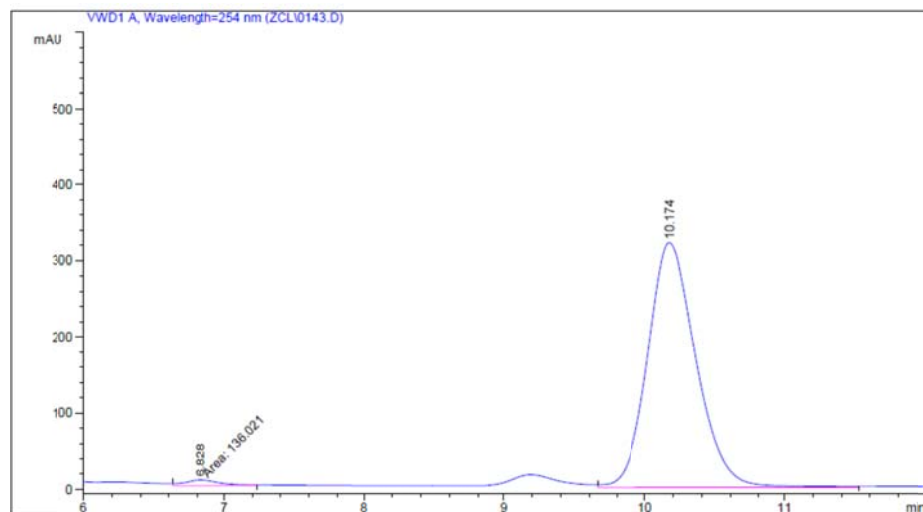
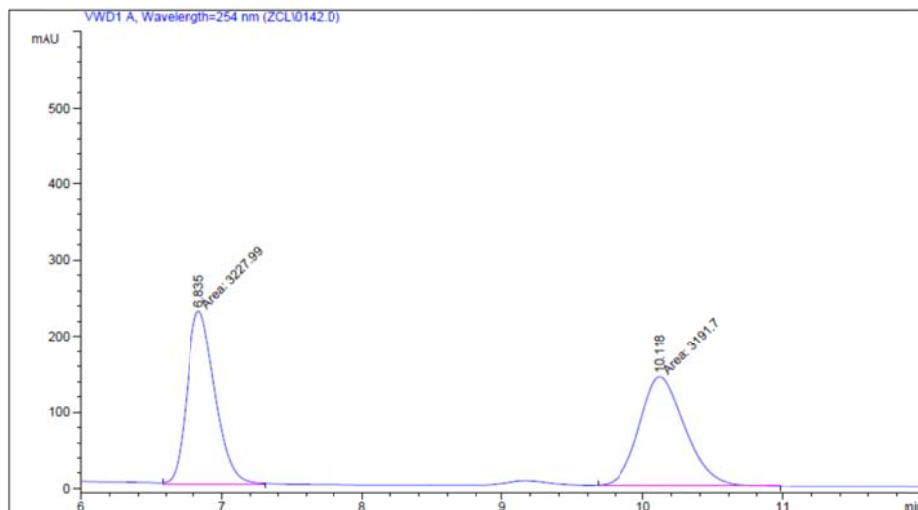
Signal 1: VWD1 A, Wavelength=254 nm

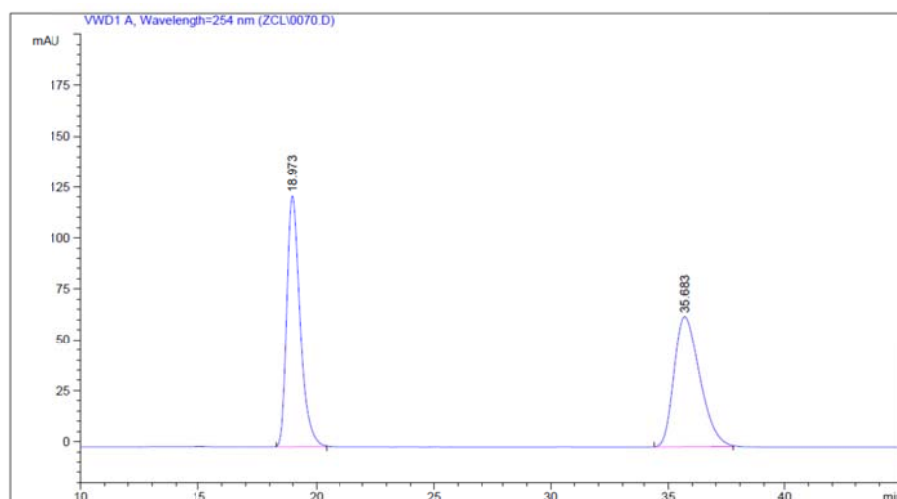
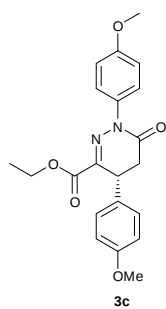
Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	9.941	MM	0.2931	374.84058	49.74946	1.5535
2	16.907	VB	0.5016	5.54402e4	1629.98669	98.4465

Totals : 5.63150e4 1679.73616



3b

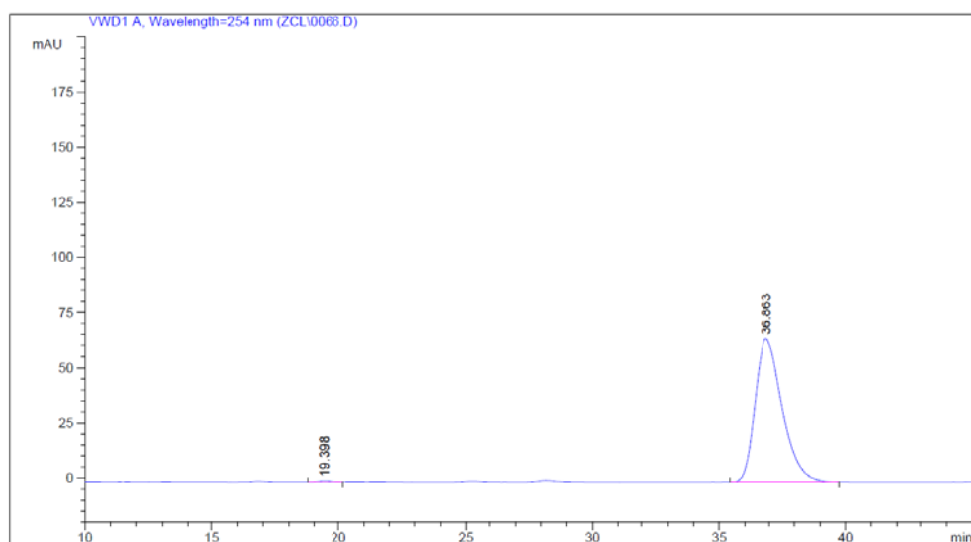




Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU]	Area %
1	18.973	BB	0.5954	4803.99365		122.99802	50.0281
2	35.683	BB	1.1768	4798.60205		64.05634	49.9719

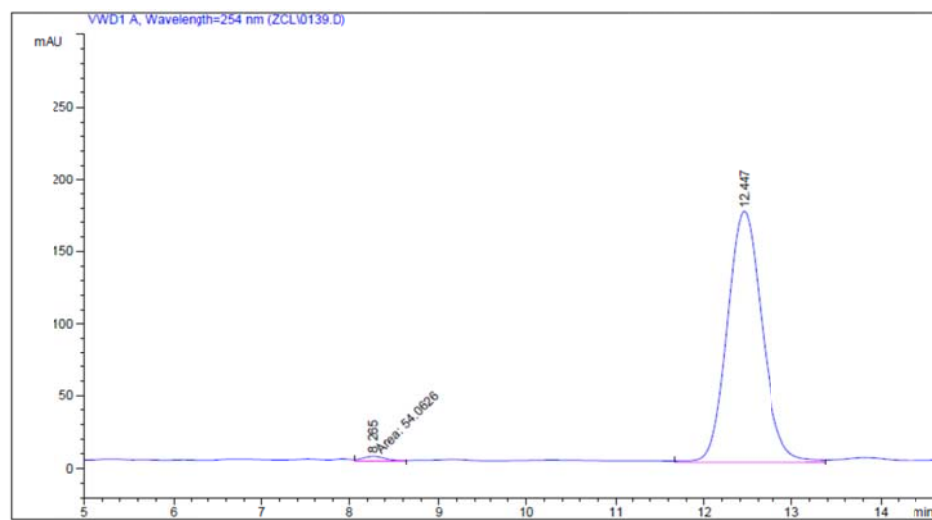
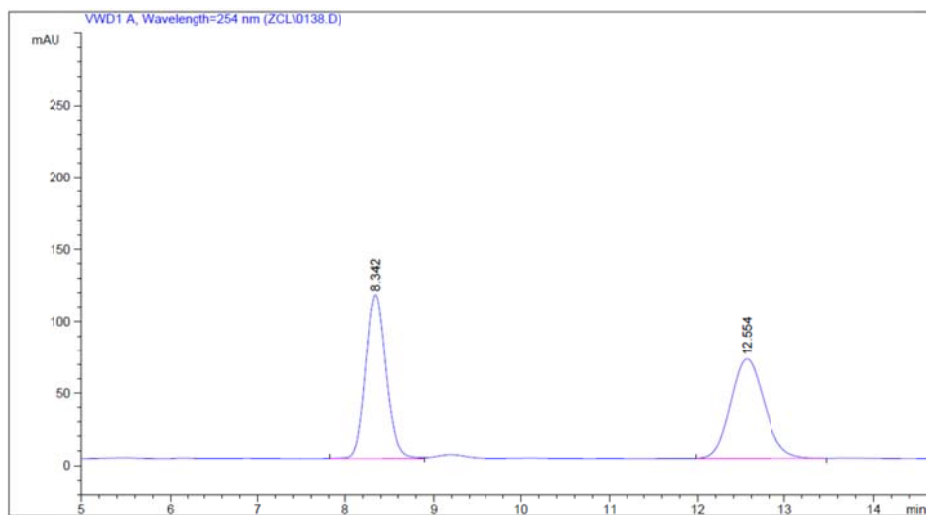
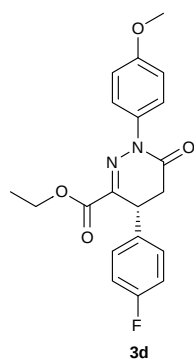
Totals : 9602.59570 187.05436

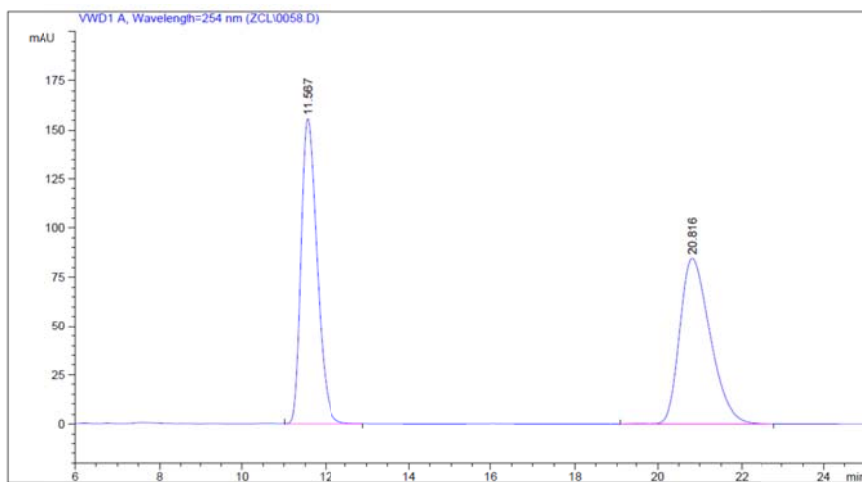
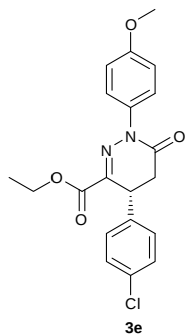


Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU]	Area %
1	19.398	BV	0.5292	21.44558		5.89591e-1	0.4312
2	36.863	BB	1.1677	4952.38574		65.05206	99.5688

Totals : 4973.83132 65.64165

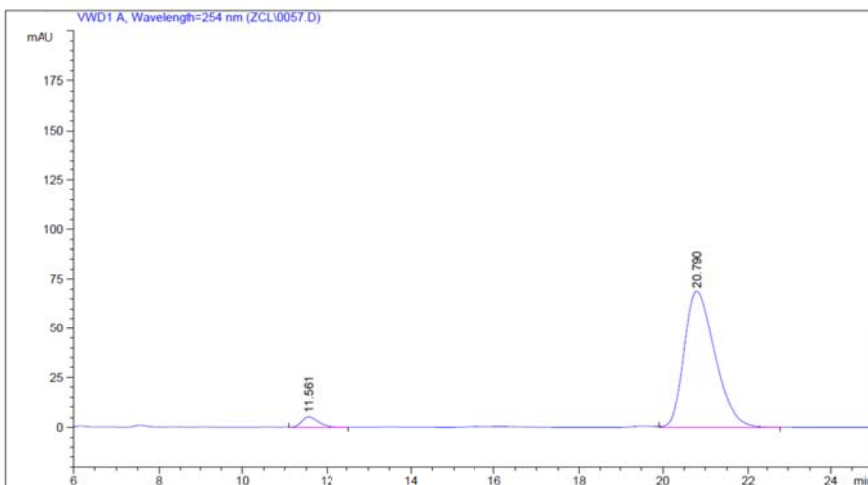




Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	11.567	VB	0.4167	4161.65479	155.70308	49.5856
2	20.816	BB	0.7749	4231.20996	84.71165	50.4144

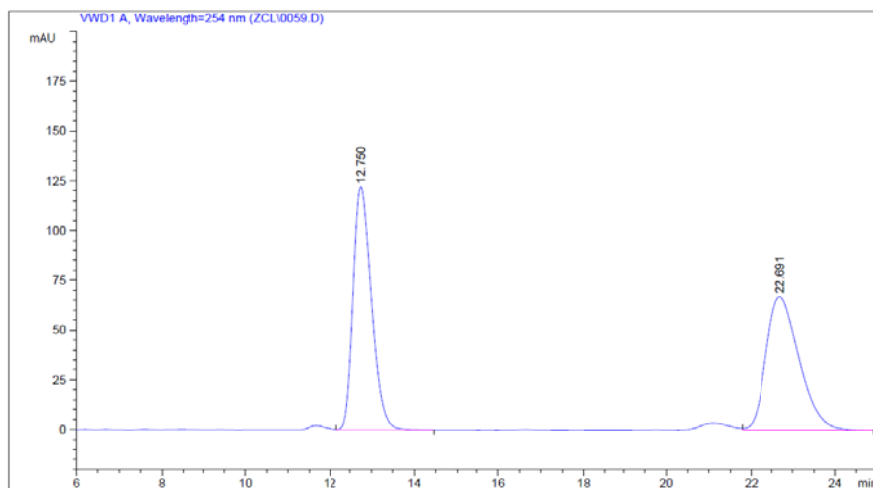
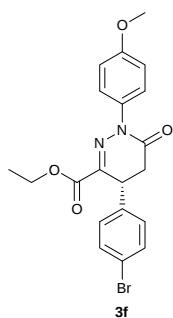
Totals : 8392.86475 240.41473



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	11.561	VB	0.4270	145.22456	5.25923	4.0616
2	20.790	VB	0.7728	3430.29346	68.92546	95.9384

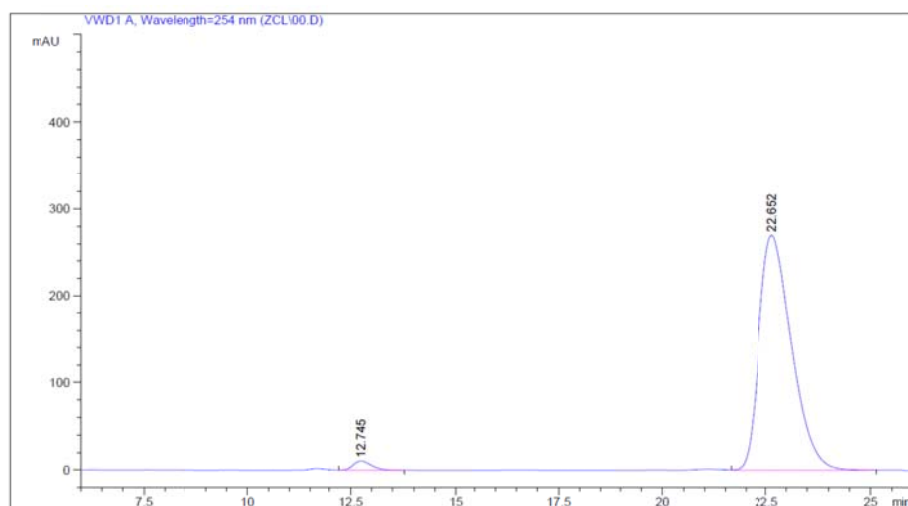
Totals : 3575.51802 74.18469



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	12.750	VB	0.4662	3662.38550		122.17480	49.9140
2	22.691	VB	0.8548	3675.01270		67.06659	50.0860

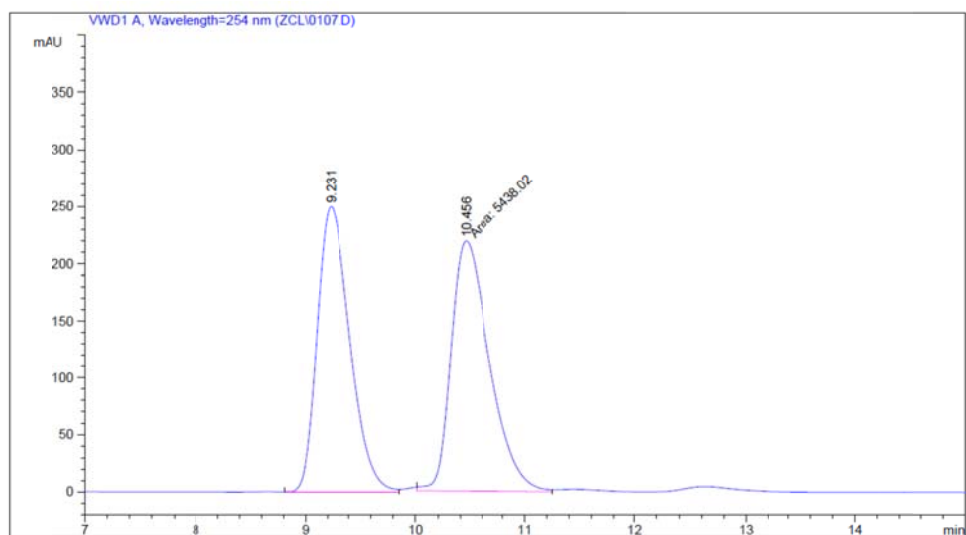
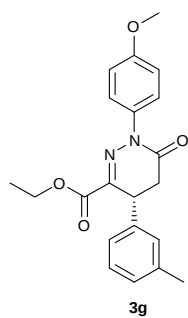
Totals : 7337.39819 189.24139



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	12.745	VB	0.4683	318.75690		10.57035	2.1011
2	22.652	VB	0.8517	1.48521e4		269.88104	97.8989

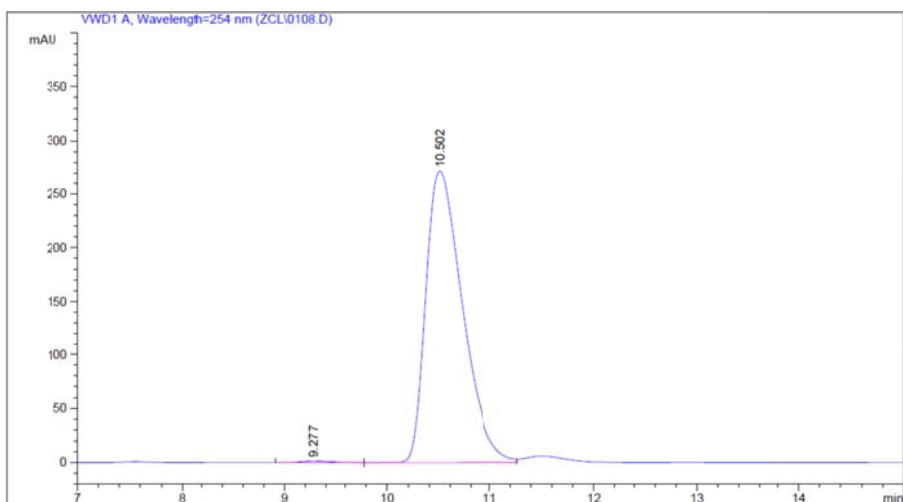
Totals : 1.51709e4 280.45140



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	9.231	VV	0.3266	5253.05322		250.05840	49.1349
2	10.456	MM	0.4135	5438.02344		219.16377	50.8651

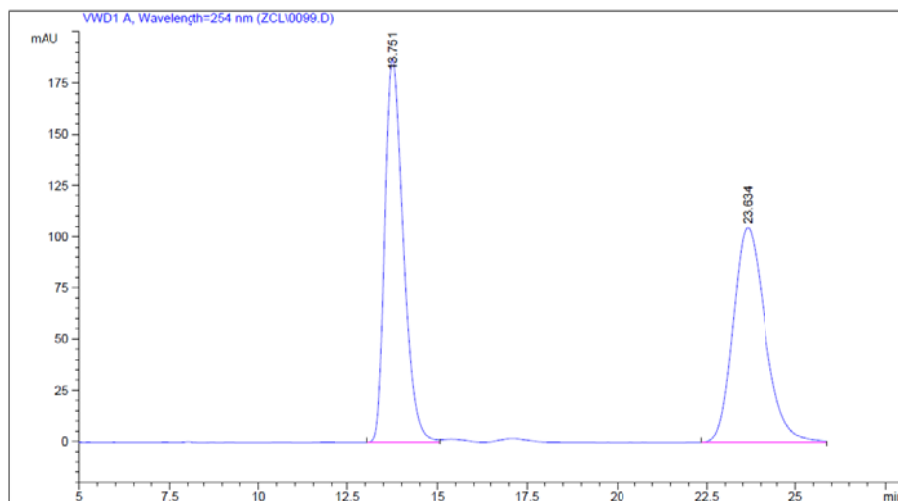
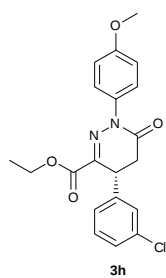
Totals : 1.06911e4 469.22217



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	9.277	EV	0.3233	38.59523		1.90833	0.5750
2	10.502	VV	0.3792	6673.10840		272.22635	99.4250

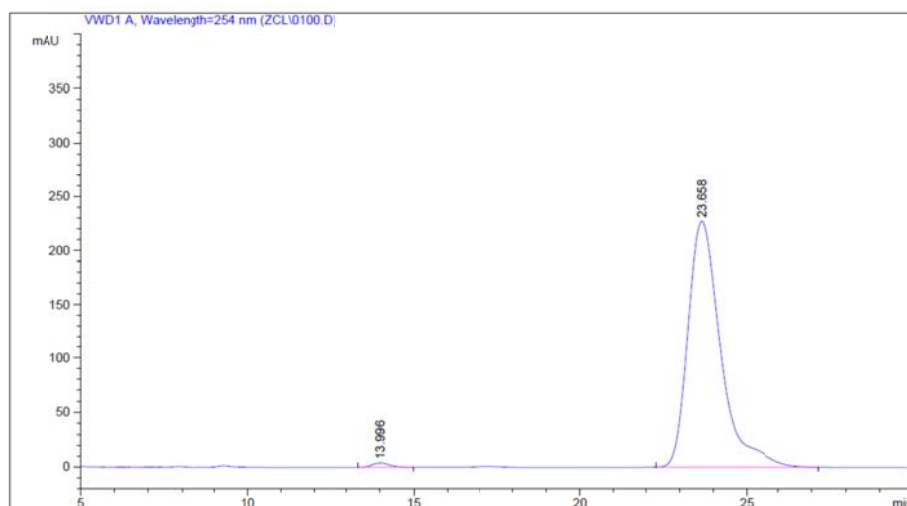
Totals : 6711.70362 274.13518



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.751	BB	0.5456	6653.25879	187.22067	49.9124
2	23.634	BBA	0.9872	6676.60742	104.89912	50.0876

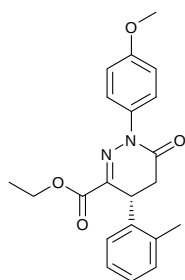
Totals : 1.33299e4 292.11980



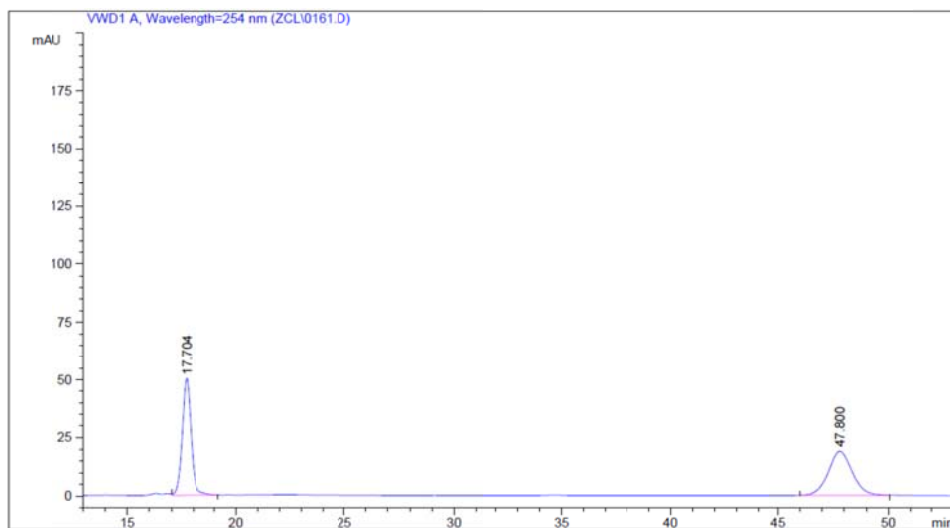
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.996	BB	0.5544	144.13354	3.97227	0.9312
2	23.658	BB	1.0407	1.53341e4	227.20114	99.0688

Totals : 1.54783e4 231.17341



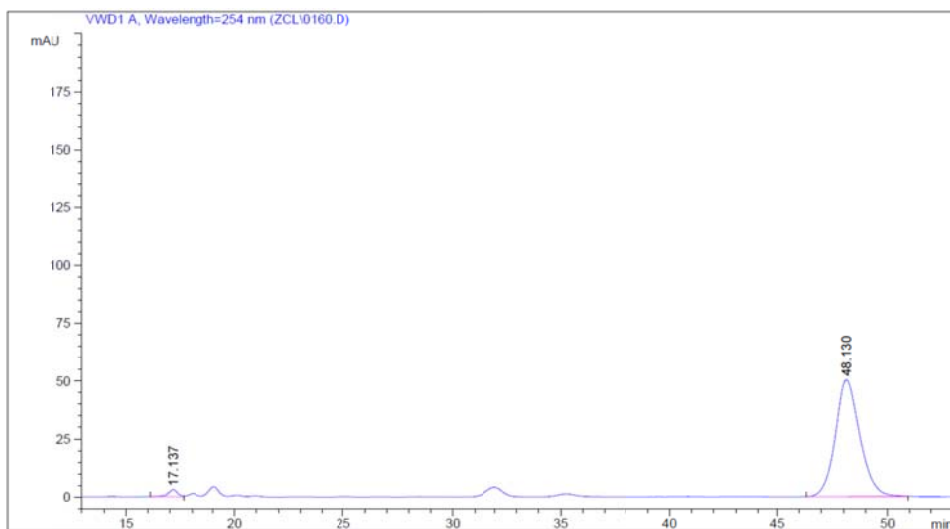
3i



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	17.704	VB	0.4384	1446.86192	50.16209	50.1090
2	47.800	BB	1.1223	1440.57166	19.02152	49.8910

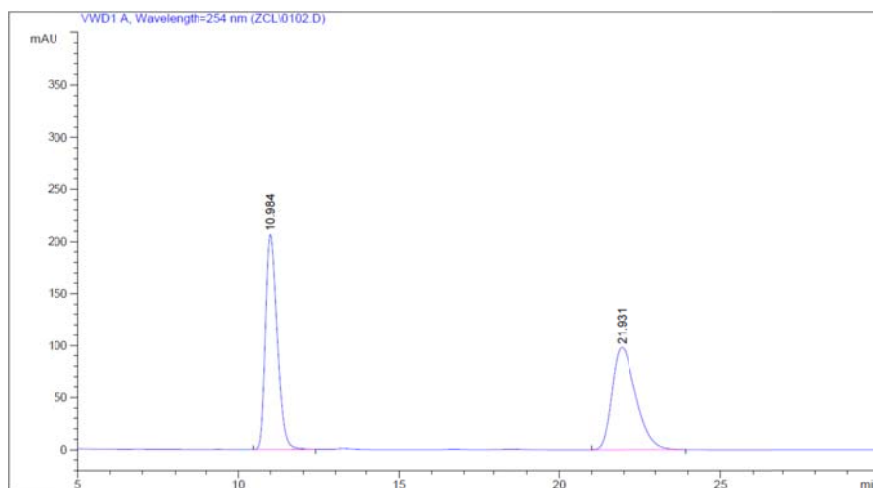
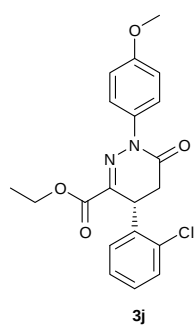
Totals : 2887.43558 69.18361



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	17.137	BV	0.4623	96.62363	3.10284	2.4248
2	48.130	B3	1.1439	3888.12476	50.44173	97.5752

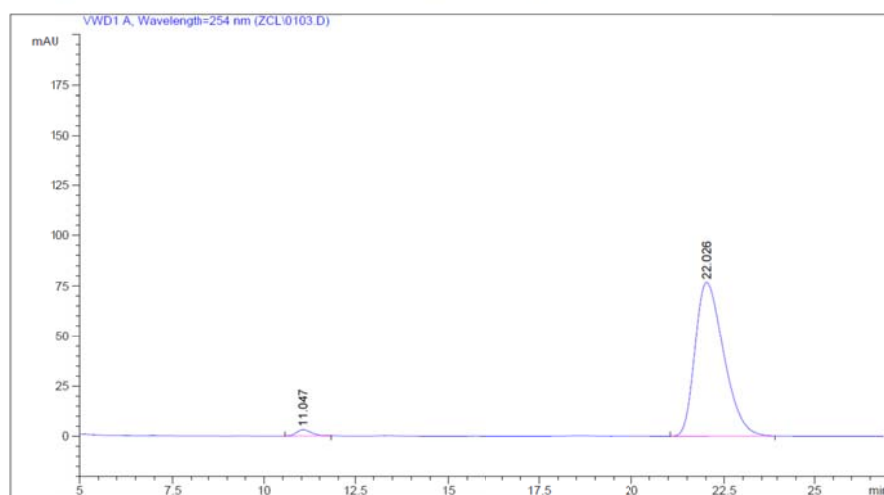
Totals : 3984.74838 53.54457



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	10.984	BE	0.3936	5210.40625	206.36429	50.0718
2	21.931	BE	0.8189	5195.46240	98.08156	49.9282

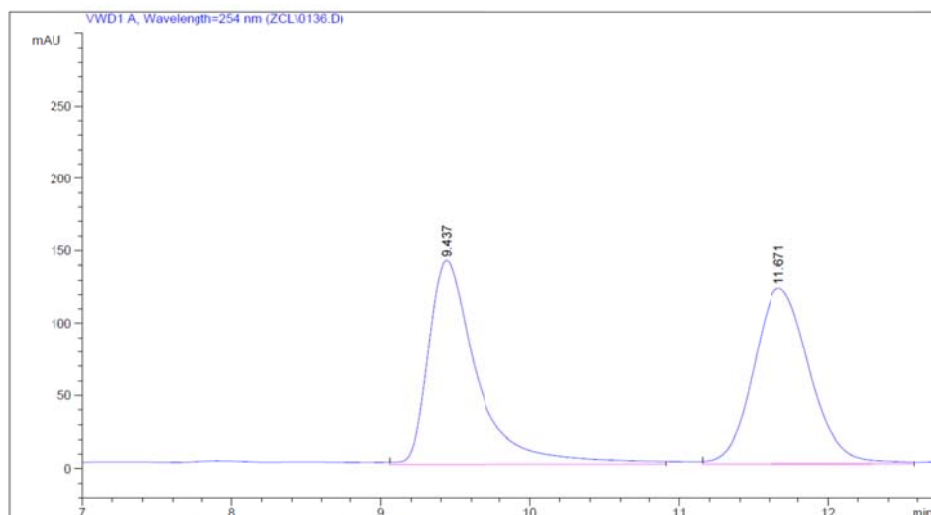
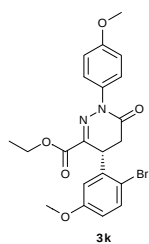
Totals : 1.04059e4 304.44585



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	11.047	BB	0.4319	89.15513	3.12503	2.1291
2	22.026	BB	0.8287	4098.39746	76.87430	97.8709

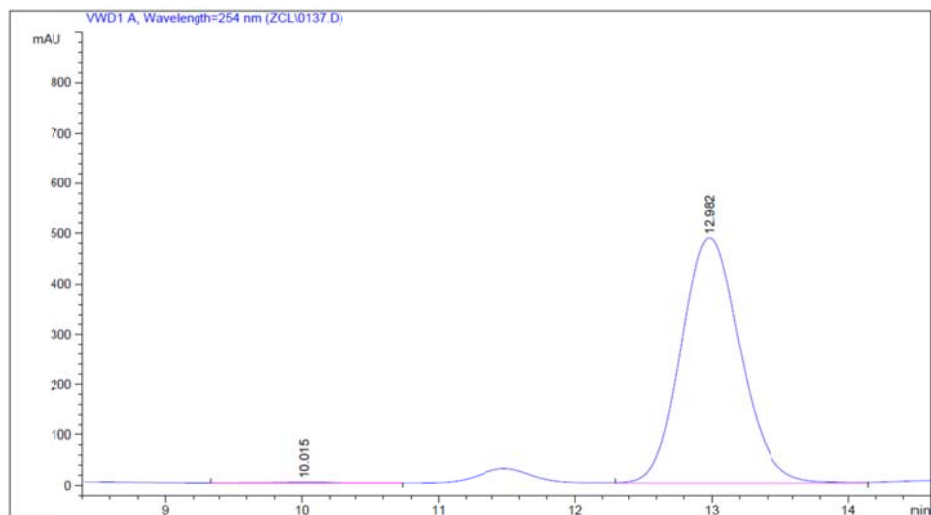
Totals : 4187.55259 79.99933



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area %	Height [mAU]	Area %
1	9.437	BB	0.3416	3192.78687	50.0224	140.10358	50.0224
2	11.671	BV	0.4125	3189.92505	49.9776	120.97221	49.9776

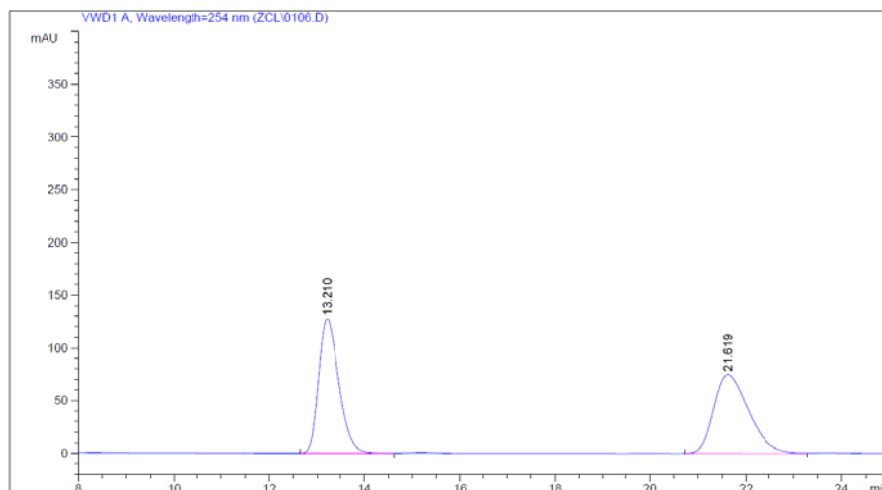
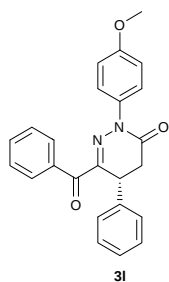
Totals : 6382.71191 261.07579



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area %	Height [mAU]	Area %
1	10.015	BB	0.5065	69.16456	0.4744	1.93863	0.4744
2	12.982	BB	0.4645	1.45115e4	99.5256	485.43280	99.5256

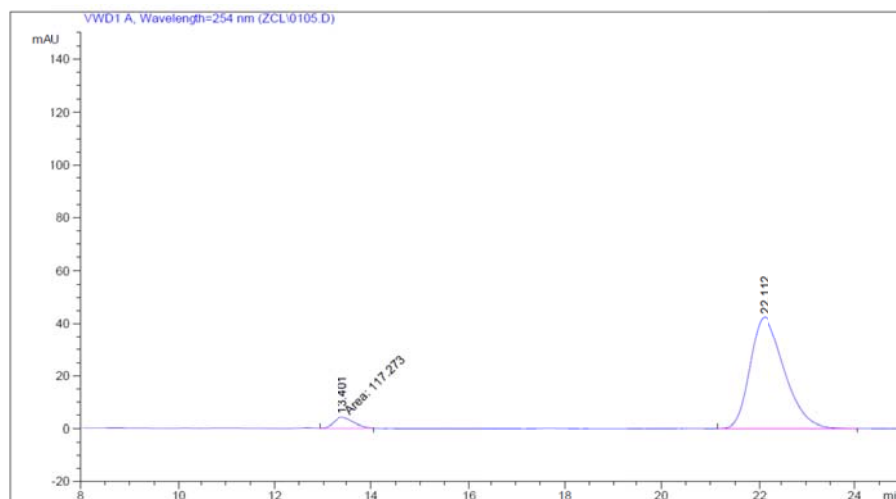
Totals : 1.45807e4 488.37143



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU]	Area %
1	13.210	BB	0.4677	3843.36548		127.66206	50.0133
2	21.619	BV	0.7960	3841.32690		74.94691	49.9867

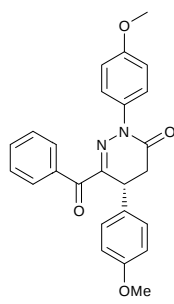
Totals : 7684.69238 202.60897



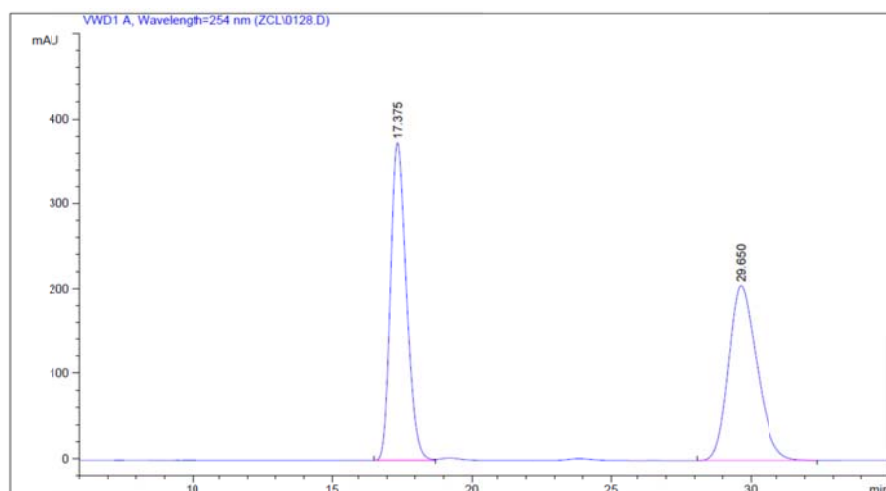
Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area nAU	*s	Height [nAU]	Area %
1	13.401	MM	0.4896	117.27317		3.99211	5.1343
2	22.112	BE	0.8114	2166.81958		42.41961	94.8657

Totals : 2284.09275 46.41172



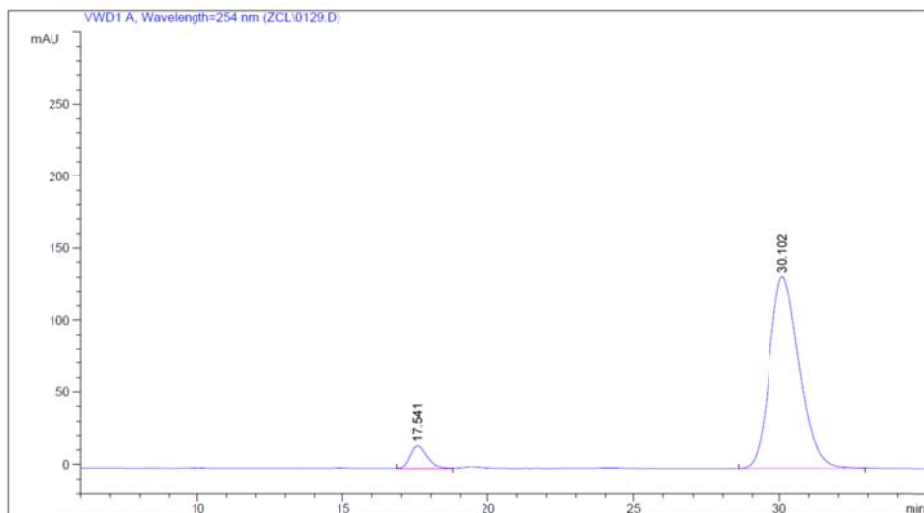
3m



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	17.375	BV	0.5965	1.45720e4		374.65634	49.9164
2	29.650	BB	1.0897	1.46208e4		206.11565	50.0836

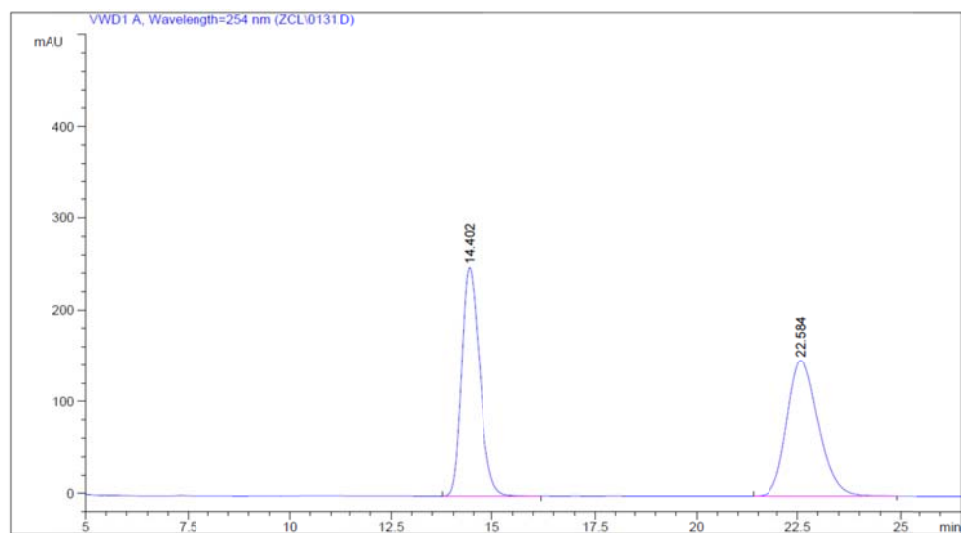
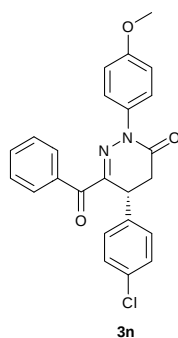
Totals : 2.91928e4 580.77199



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	17.541	BB	0.6007	614.74786		15.65769	6.0148
2	30.102	BB	1.1143	9605.78125		132.86003	93.9852

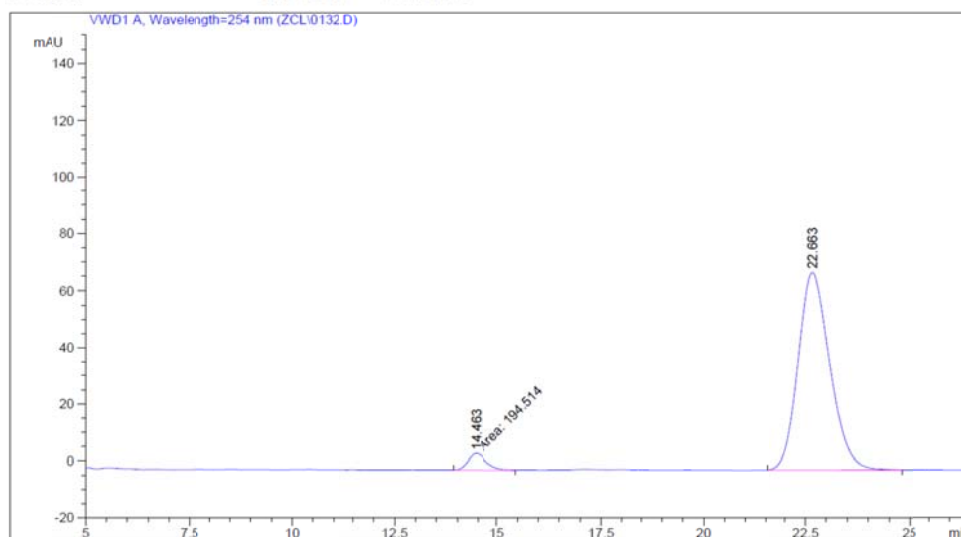
Totals : 1.02205e4 148.51772



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	14.402	BB	0.4895	7902.26123	249.12579	50.0361
2	22.584	BB	0.8140	7890.85889	148.05202	49.9639

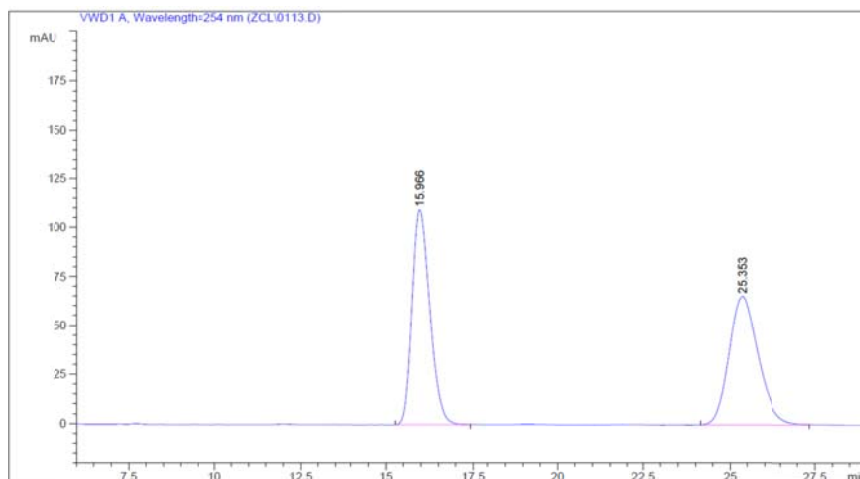
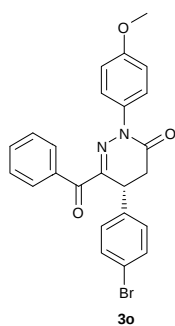
Totals : 1.57931e4 397.17781



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	14.463	MM	0.5513	194.51384	5.83093	5.0188
2	22.663	BB	0.8131	3681.16650	69.49758	94.9812

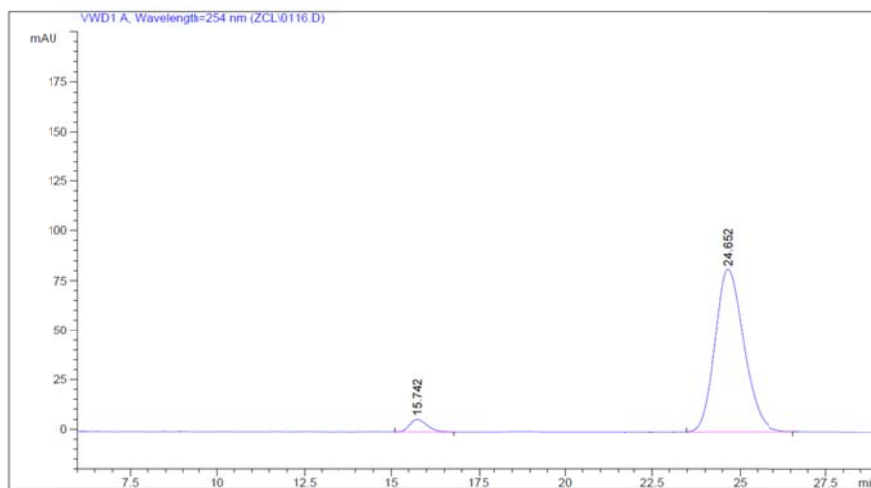
Totals : 3875.68034 75.37851



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	15.966	BB	0.5476	3885.13306	109.58324	50.1548
2	25.353	BB	0.9030	3861.14453	65.52451	49.8452

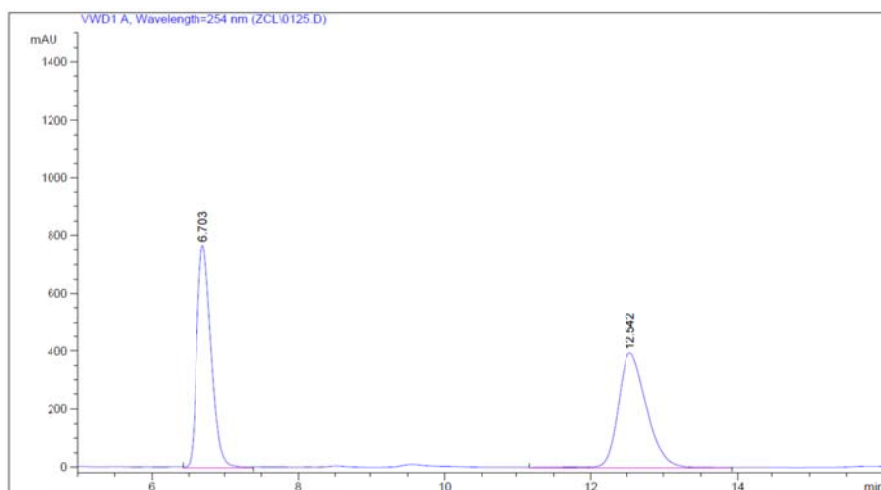
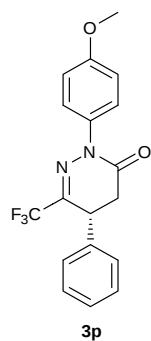
Totals : 7746.27759 175.10775



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	15.742	BB	0.5191	214.76840	6.31414	4.3819
2	24.652	BB	0.8869	4686.53125	82.14122	95.6181

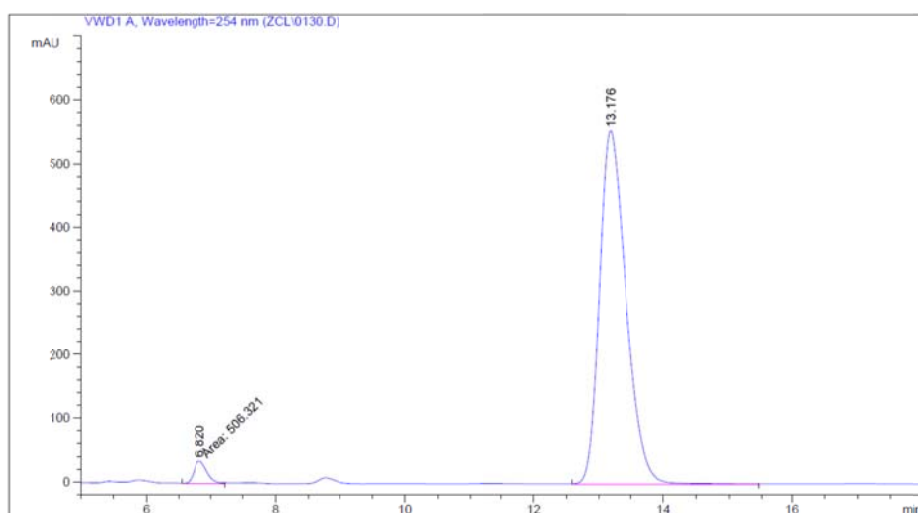
Totals : 4901.29965 88.45536



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.703	VV	0.2165	1.05852e4	766.29993	49.6044
2	12.542	VB	0.4173	1.07540e4	394.23724	50.3956

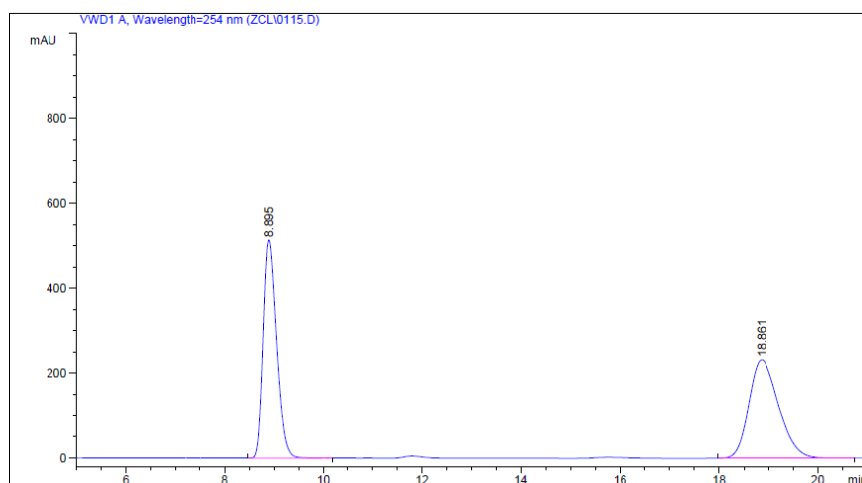
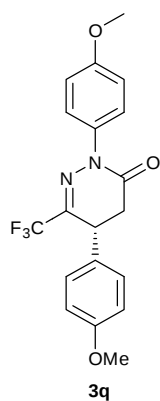
Totals : 2.13393e4 1160.53717



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.820	MM	0.2380	506.32056	35.45490	3.0721
2	13.176	BB	0.4407	1.59749e4	554.96594	96.9279

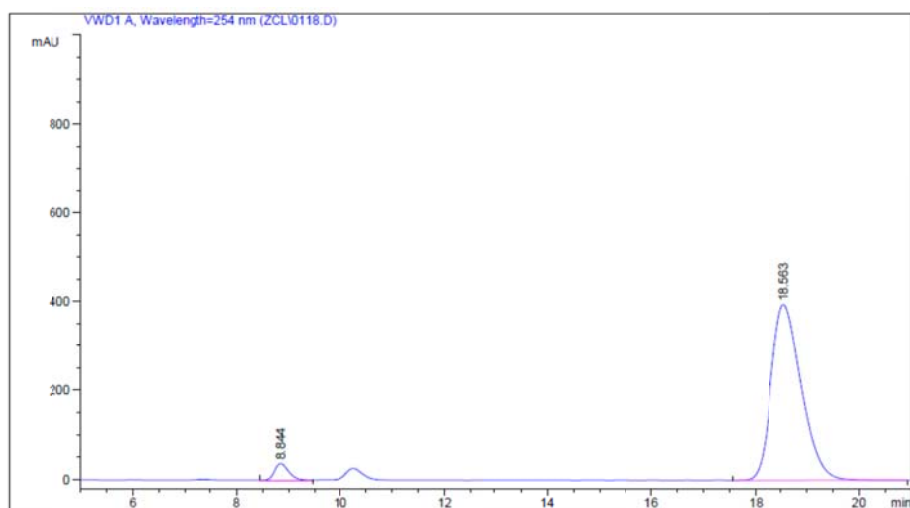
Totals : 1.64813e4 590.42084



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	8.895	VB	0.2941	9614.03613	513.71002	49.6744
2	18.861	BB	0.6410	9740.07129	232.10823	50.3254

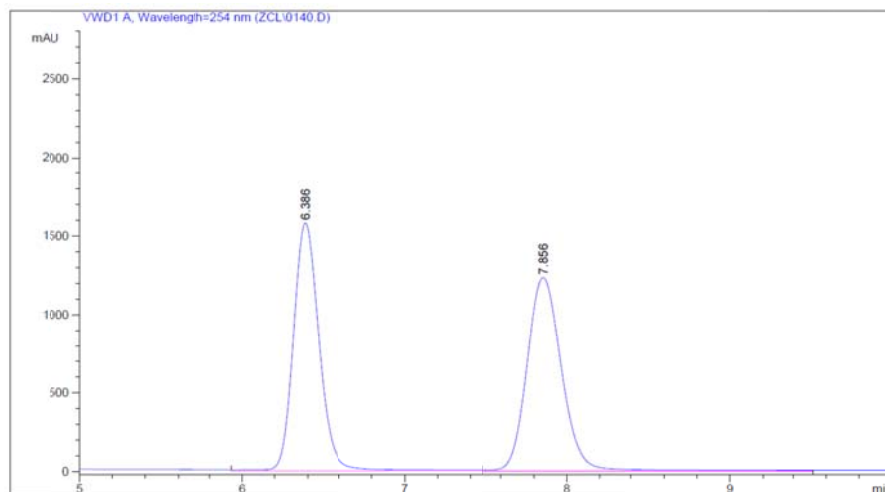
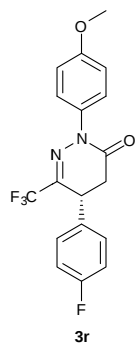
Totals : 1.93541e4 745.81825



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	8.844	BV	0.2872	704.65485	37.82377	4.1866
2	18.563	VB	0.6289	1.61265e4	394.02734	95.8134

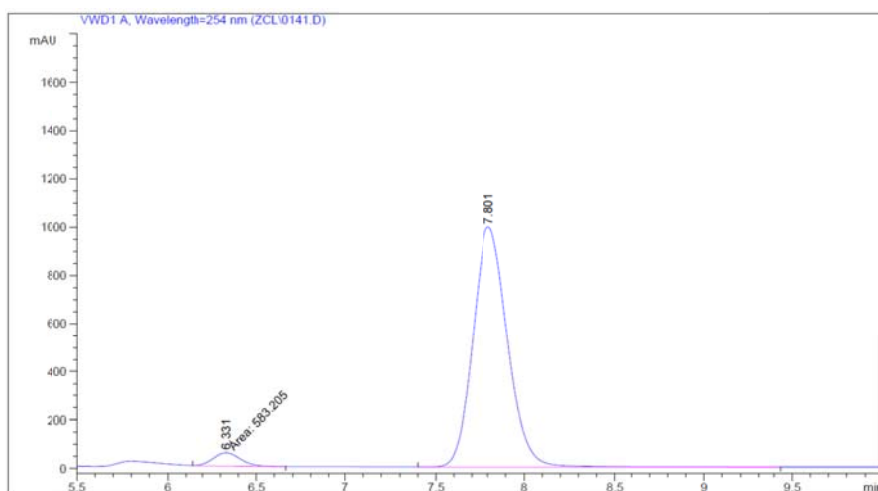
Totals : 1.68312e4 431.85111



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.386	VV	0.1726	1.74281e4	1577.54224	49.2213
2	7.856	VV	0.2257	1.79795e4	1231.53821	50.7787

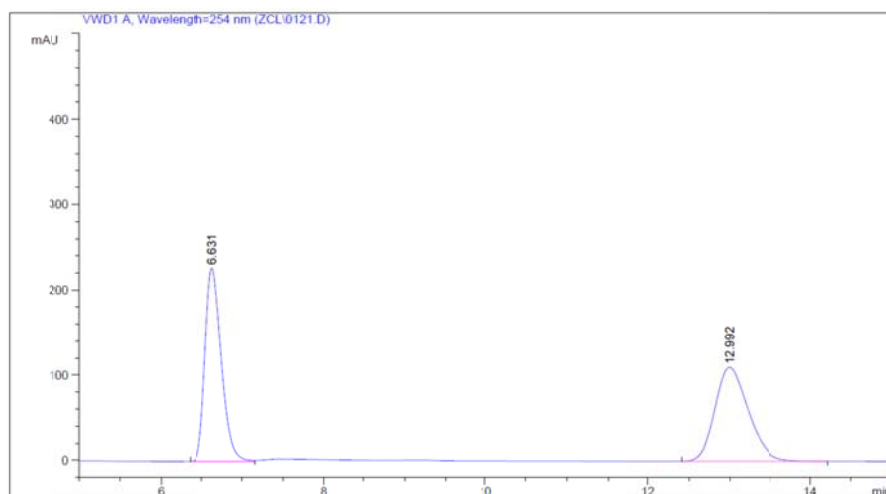
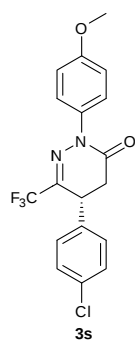
Totals : 3.54076e4 2809.08044



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.331	MM	0.1762	583.20544	55.15239	4.0278
2	7.801	VV	0.2213	1.38963e4	994.14362	95.9722

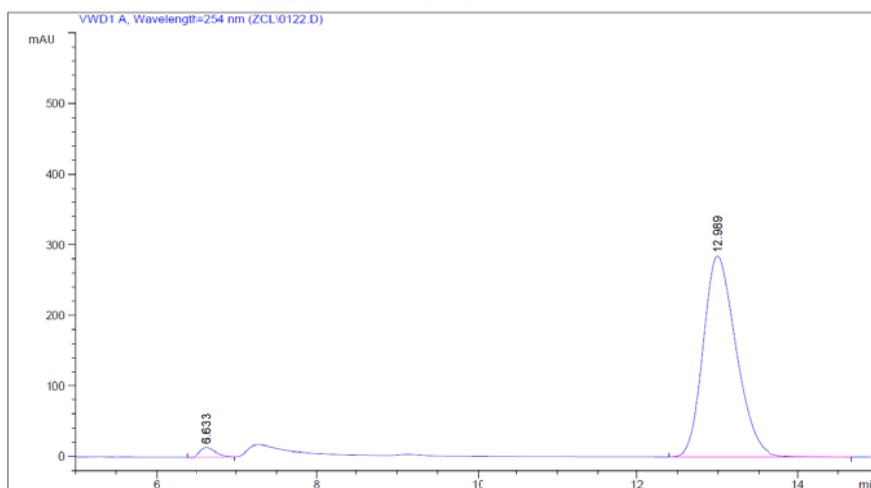
Totals : 1.44795e4 1049.29600



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.631	BV	0.2212	3167.80273	226.80905	50.2780
2	12.992	BB	0.4421	3132.76611	110.27907	49.7220

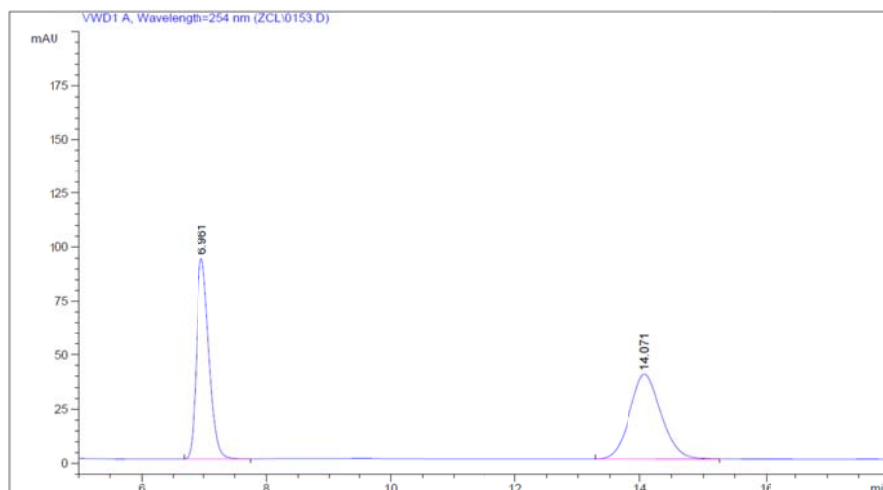
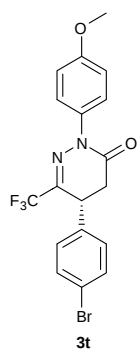
Totals : 6300.56885 337.08812



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	6.633	VV	0.2137	196.07309	14.18608	2.3849
2	12.989	BB	0.4339	8025.20117	284.51047	97.6151

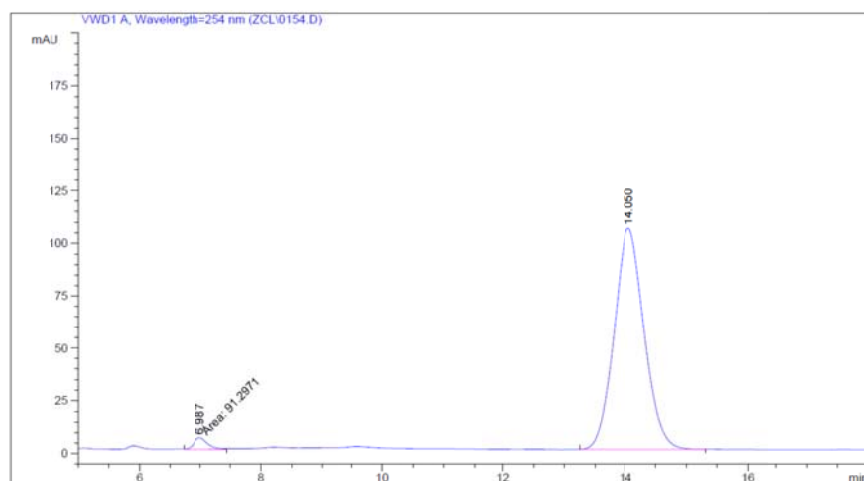
Totals : 8221.27426 298.69655



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	6.961	BB	0.2268	1362.65137		92.72162	49.8669
2	14.071	BB	0.5287	1369.92712		39.04298	50.1331

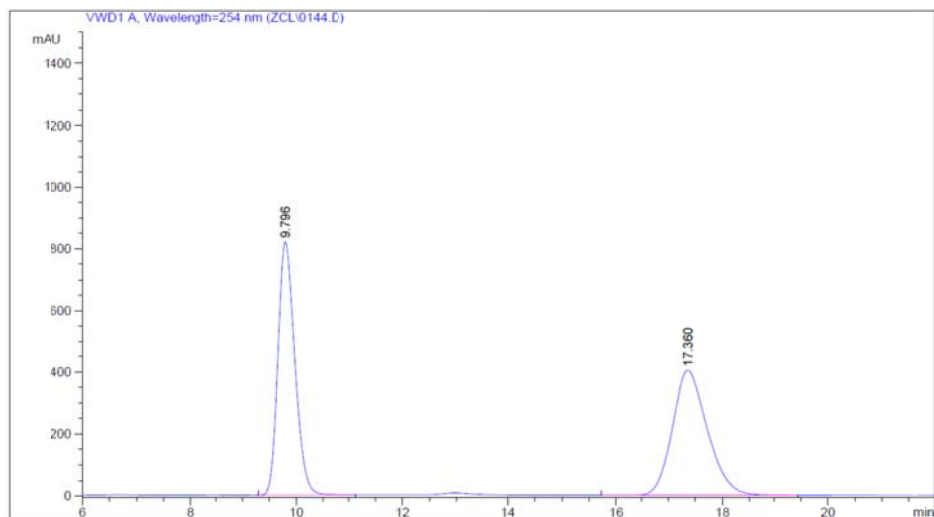
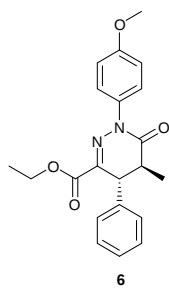
Totals : 2732.57849 131.76460



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Area *s	Height [mAU]	Area %
1	6.987	MM	0.2698	91.29713		5.64077	2.4361
2	14.050	BB	0.5279	3656.39648		105.17792	97.5639

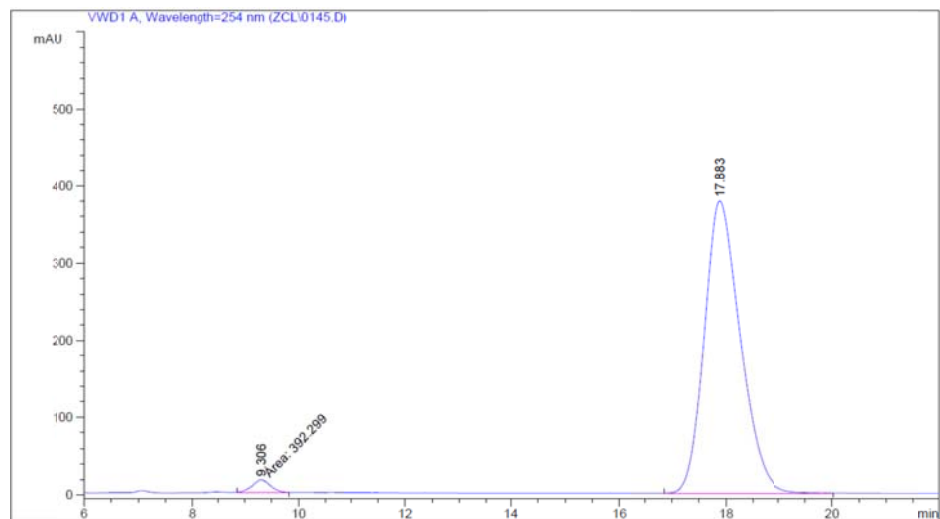
Totals : 3747.69362 110.81869



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	9.796	BB	0.3357	1.78368e4	818.61951	49.7867
2	17.360	BB	0.6712	1.79856e4	403.77426	50.2133

Totals : 3.58264e4 1222.39317



Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	9.306	MM	0.3947	392.29922	16.56355	2.1965
2	17.883	BB	0.6965	1.74675e4	377.93100	97.8035

Totals : 1.78598e4 394.49454