

Supplementary Material

A simple and general synthetic route to *N*-alkylazetidines from 1,2-amino alcohols

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^aUniversity of Tunis El Manar, Faculty of Sciences of Tunis, Laboratory of Analytical Chemistry and Electrochemistry, 2092 Tunis El Manar, Tunisia

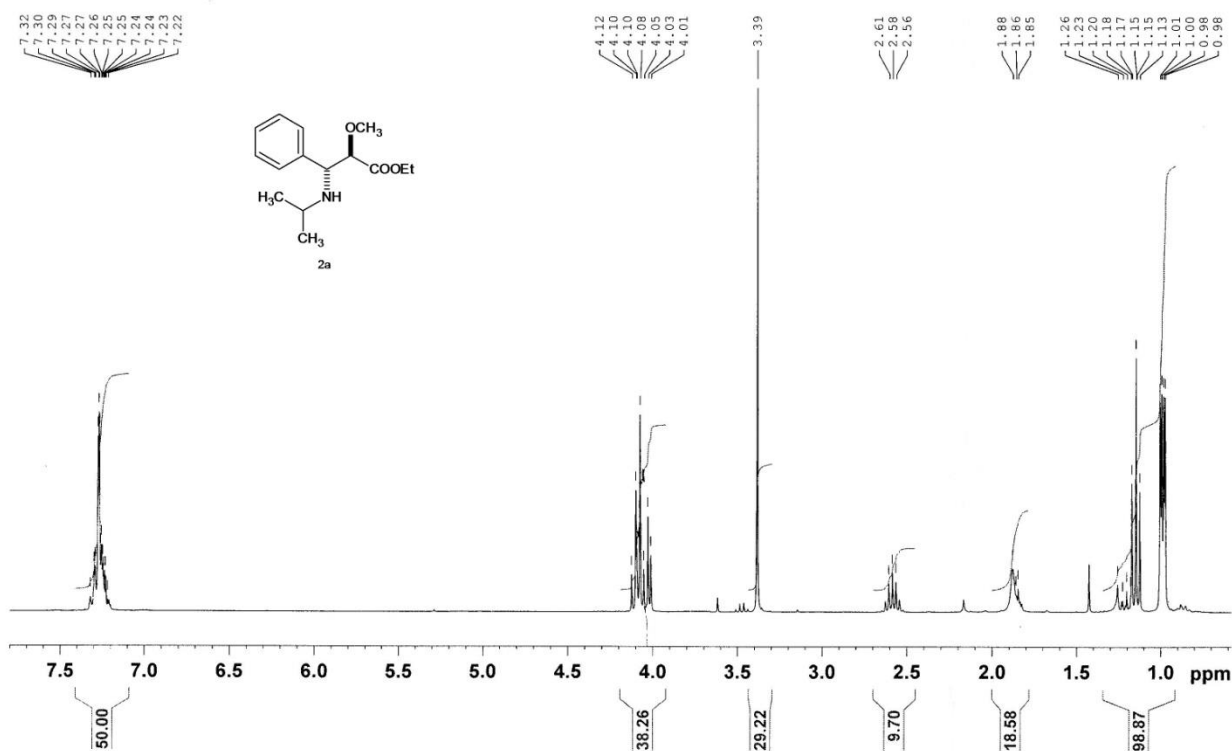
^bDepartment of Chemistry, College of Science and Arts at Ar Rass, Qassim University, P.O. Box 53, Ar Rass 51921, Saudi Arabia

Email: rafaa.besbes@fst.utm.tn

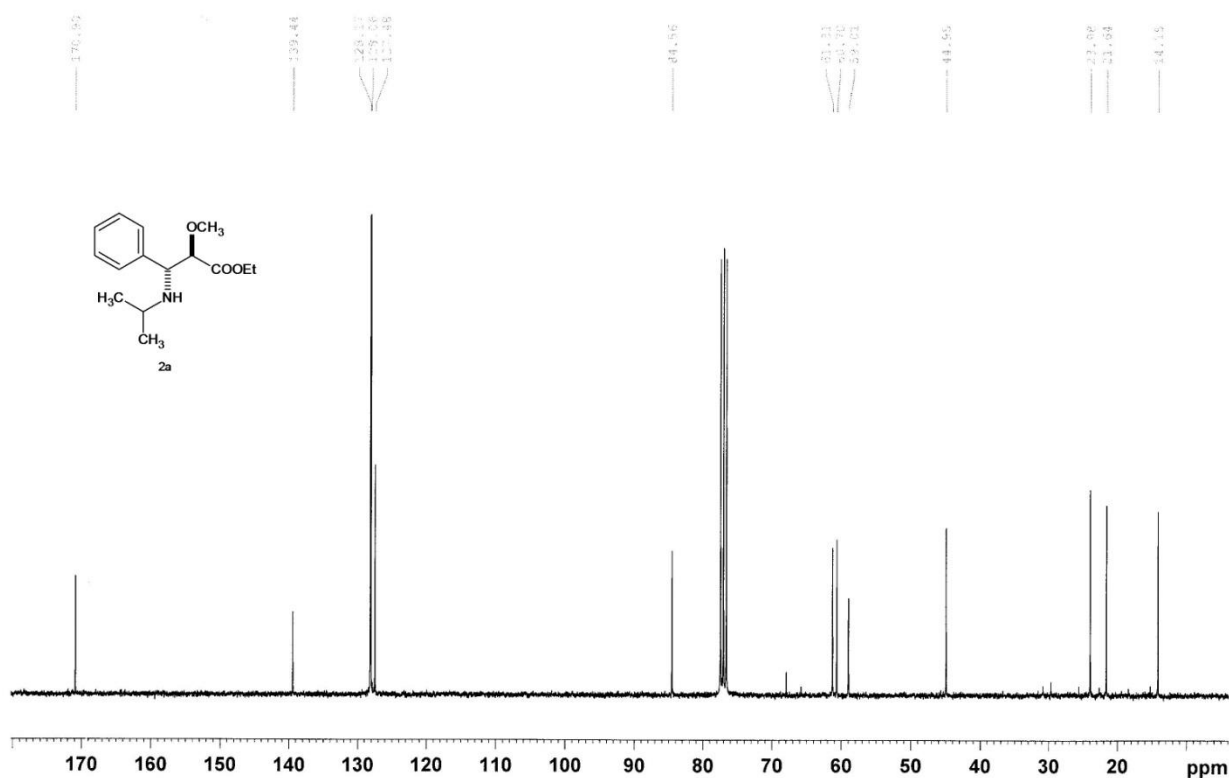
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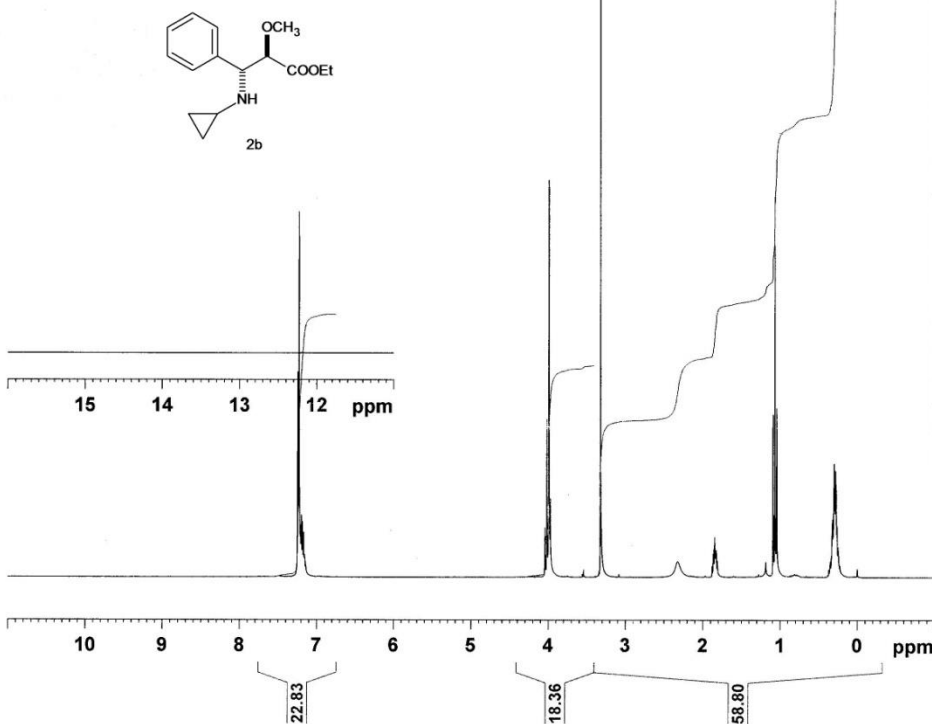
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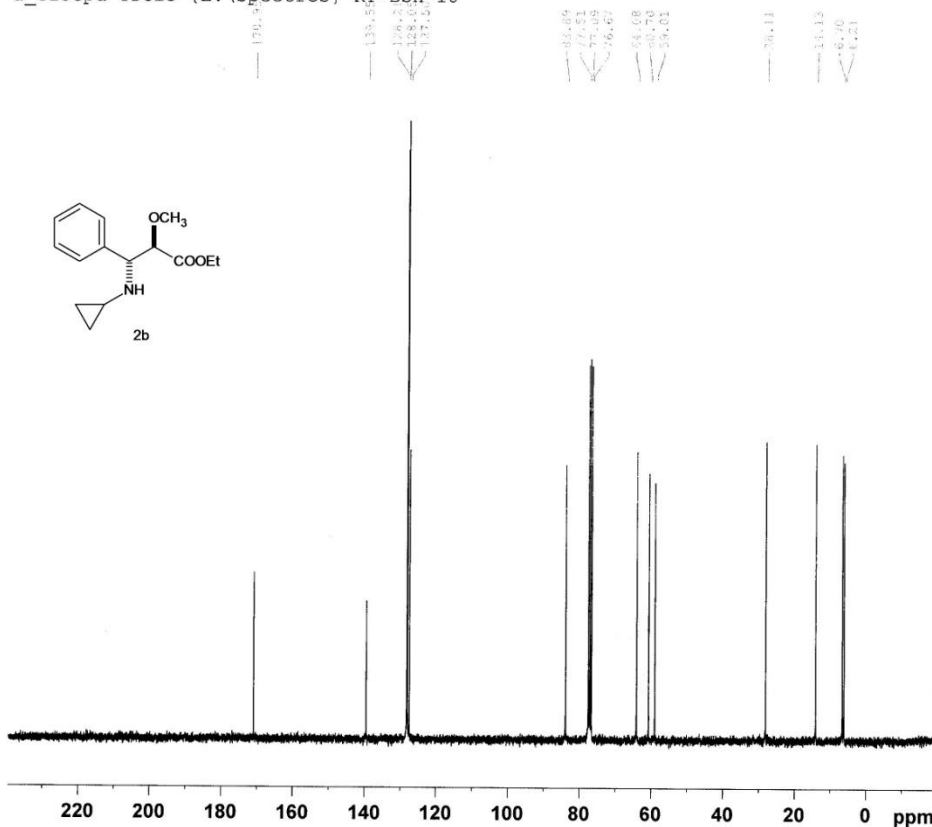
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TD 32768
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FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 57
DW 80.800 usec
DE 6.50 usec
TE 263.2 K
D1 1.00000000 sec
D10 1
TD0 1

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NUC1 1H
P1 9.70 usec
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SF 300.1300262 MHz
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SSB 0
LB 0.30 Hz
GB 0
PC 1.00

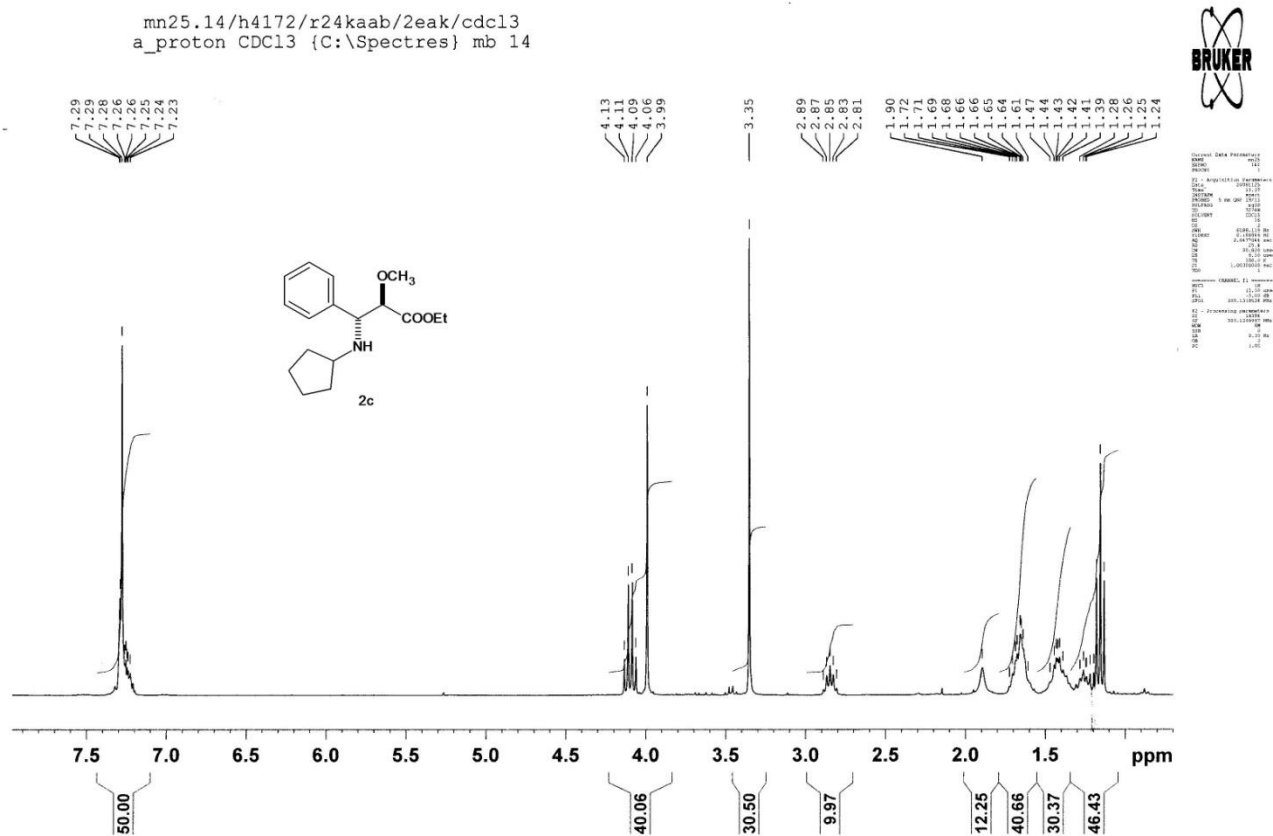
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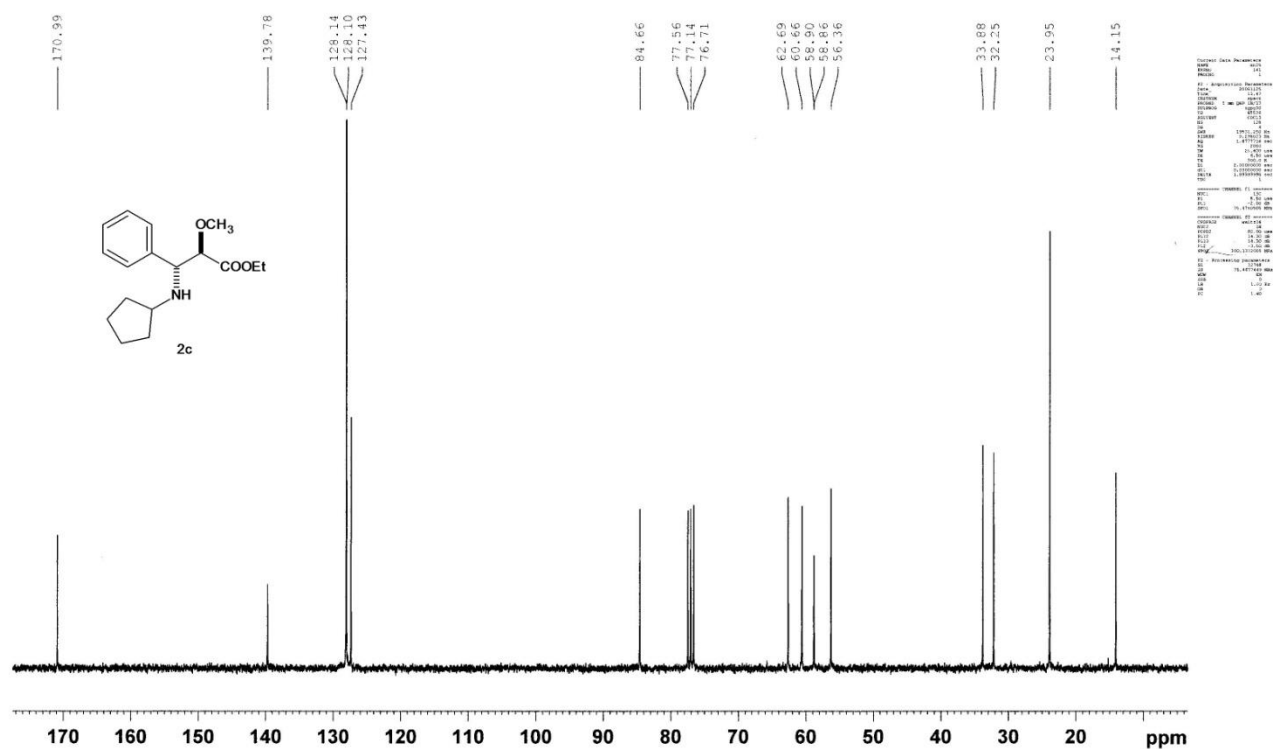
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AQ 1.6777716 sec
RG 2050
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TE 266.3 K
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D11 0.03000000 sec
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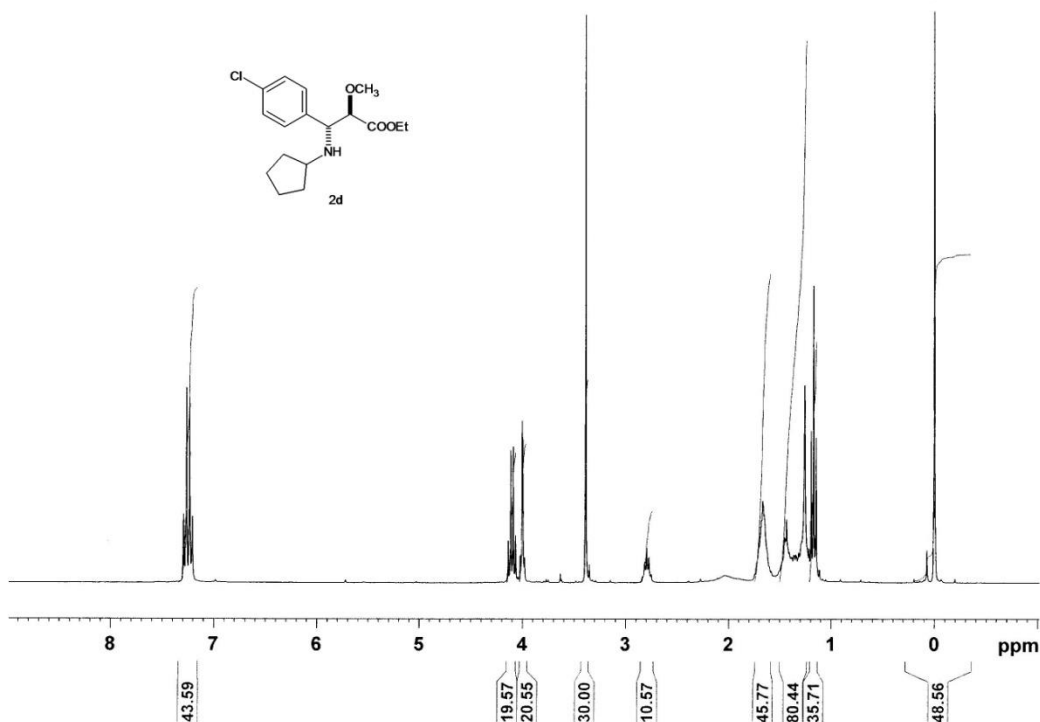
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PL12 22.00 dB
PL13 22.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



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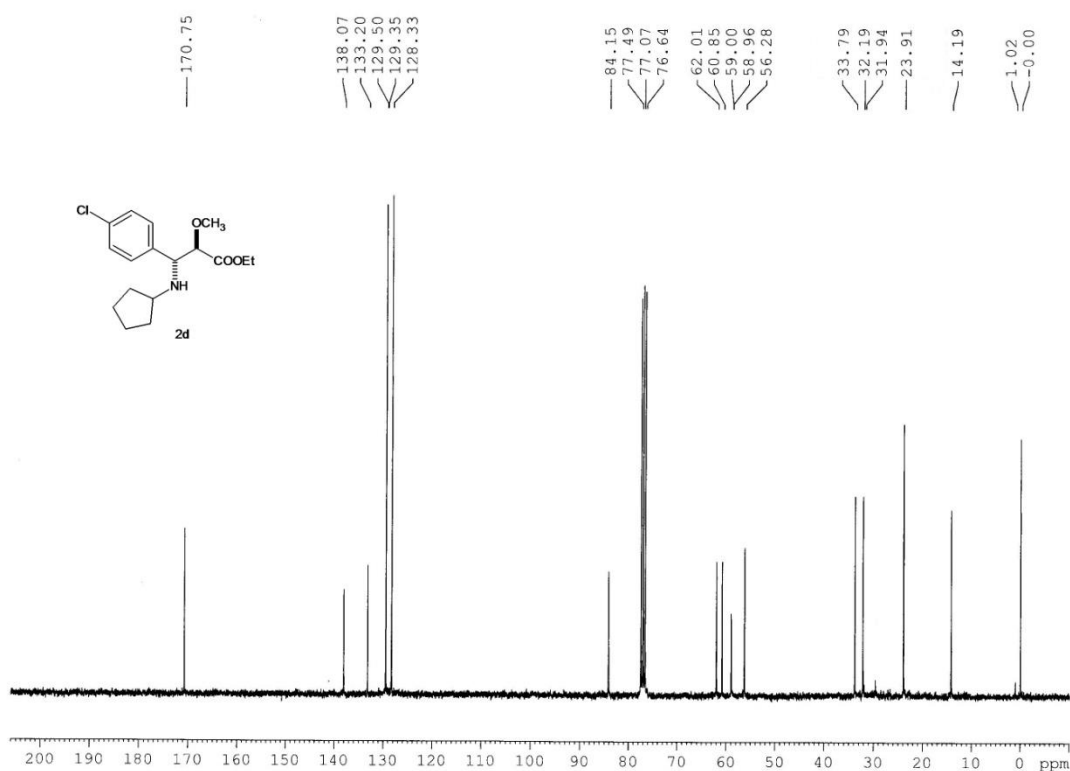
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PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 101
DW 80.800 usec
DE 6.50 usec
TE 289.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1299979 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

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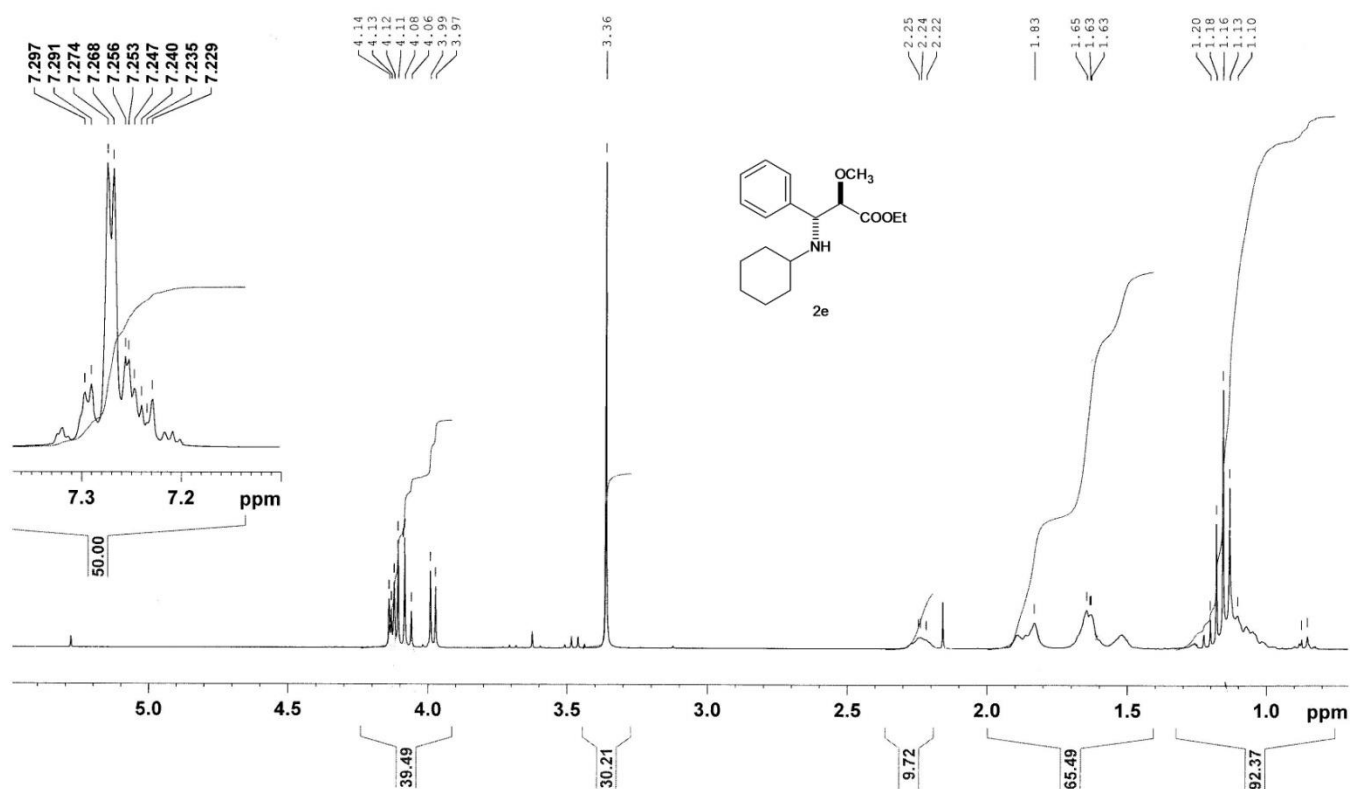


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SOLVENT CDCl3
NS 800
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 290.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

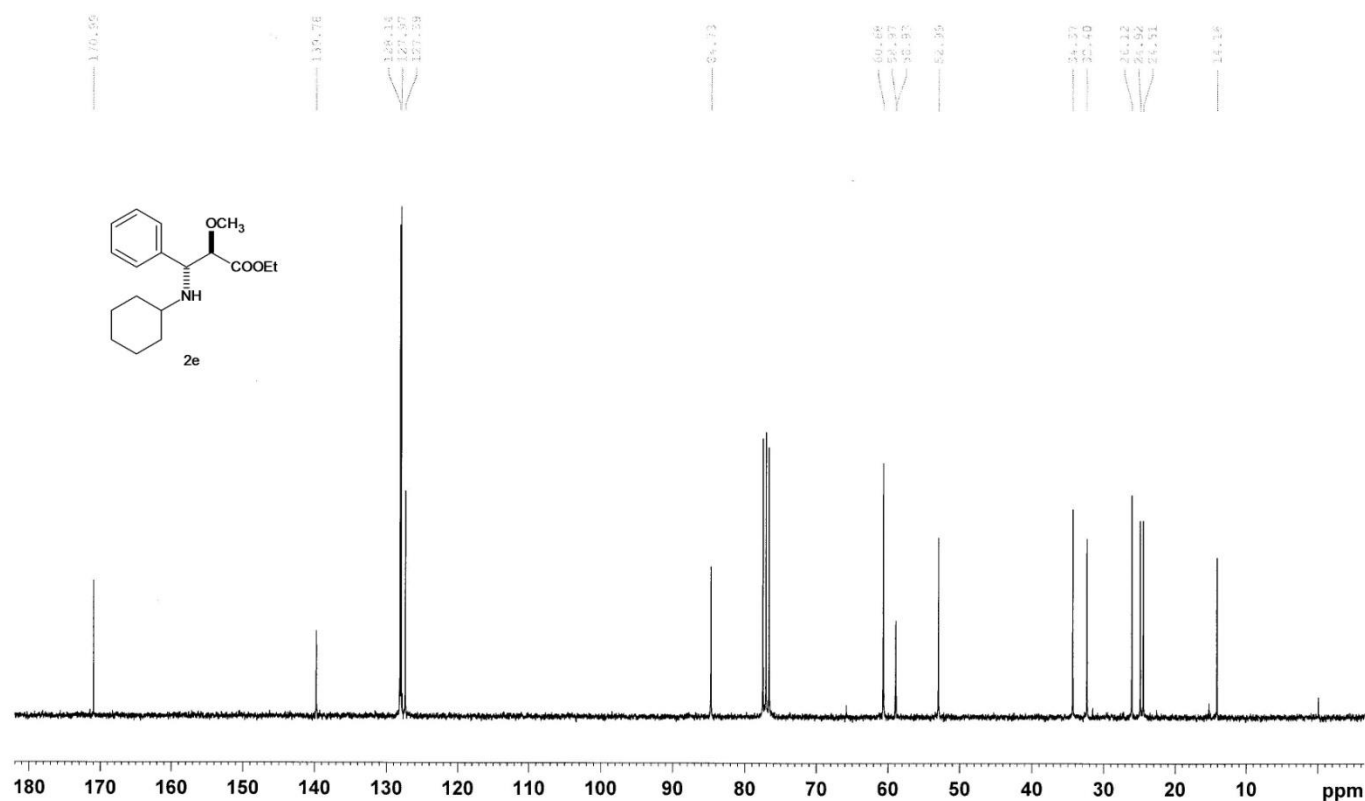
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NUC1 13C
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PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
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NUC2 1H
PCPD2 80.00 usec
PL2 -3.00 dB
PL12 12.50 dB
PL13 12.50 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677475 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

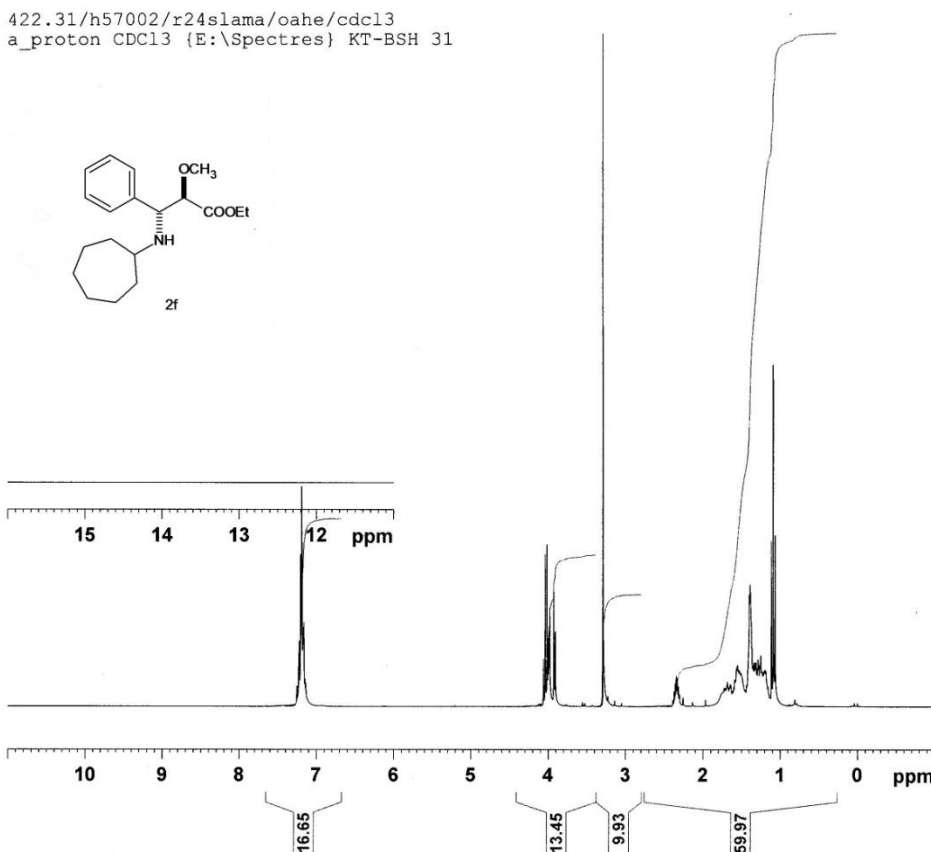
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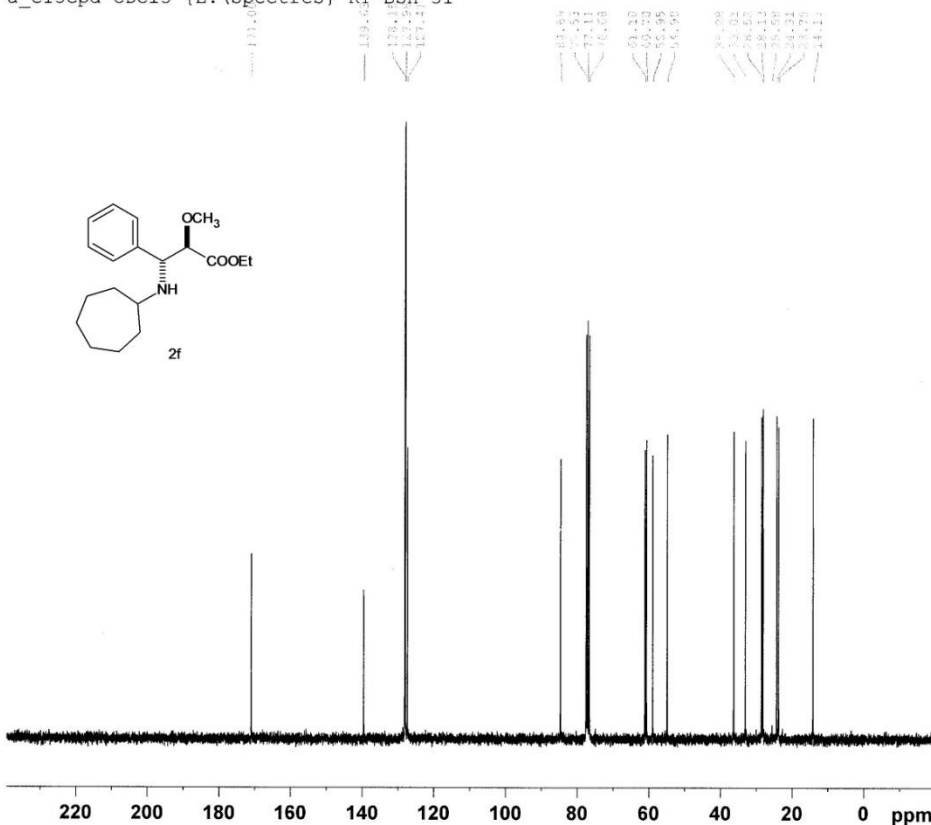
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PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 50.8
DW 80.800 usec
DE 6.50 usec
TE 485.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 9.70 usec
PL1 0.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300246 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

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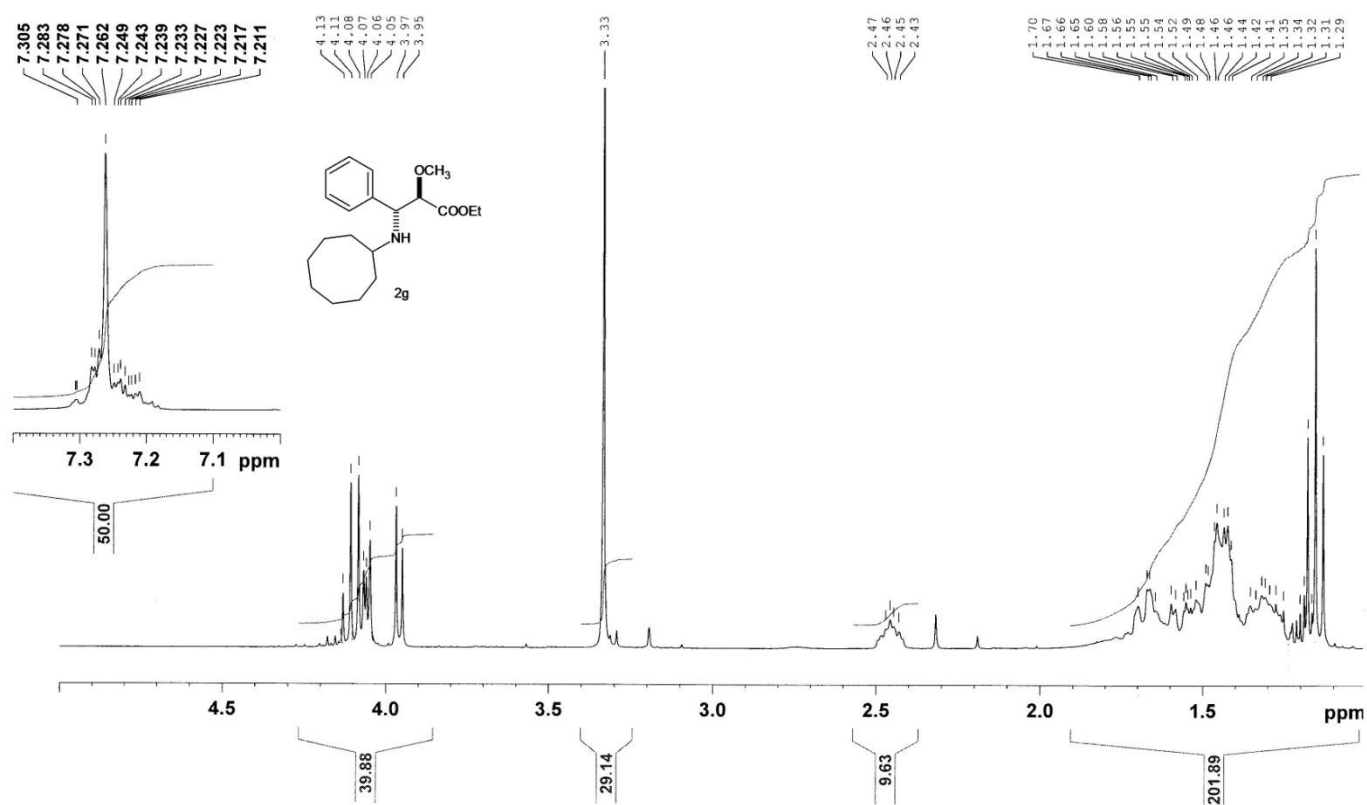


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PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 640
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 730.3 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

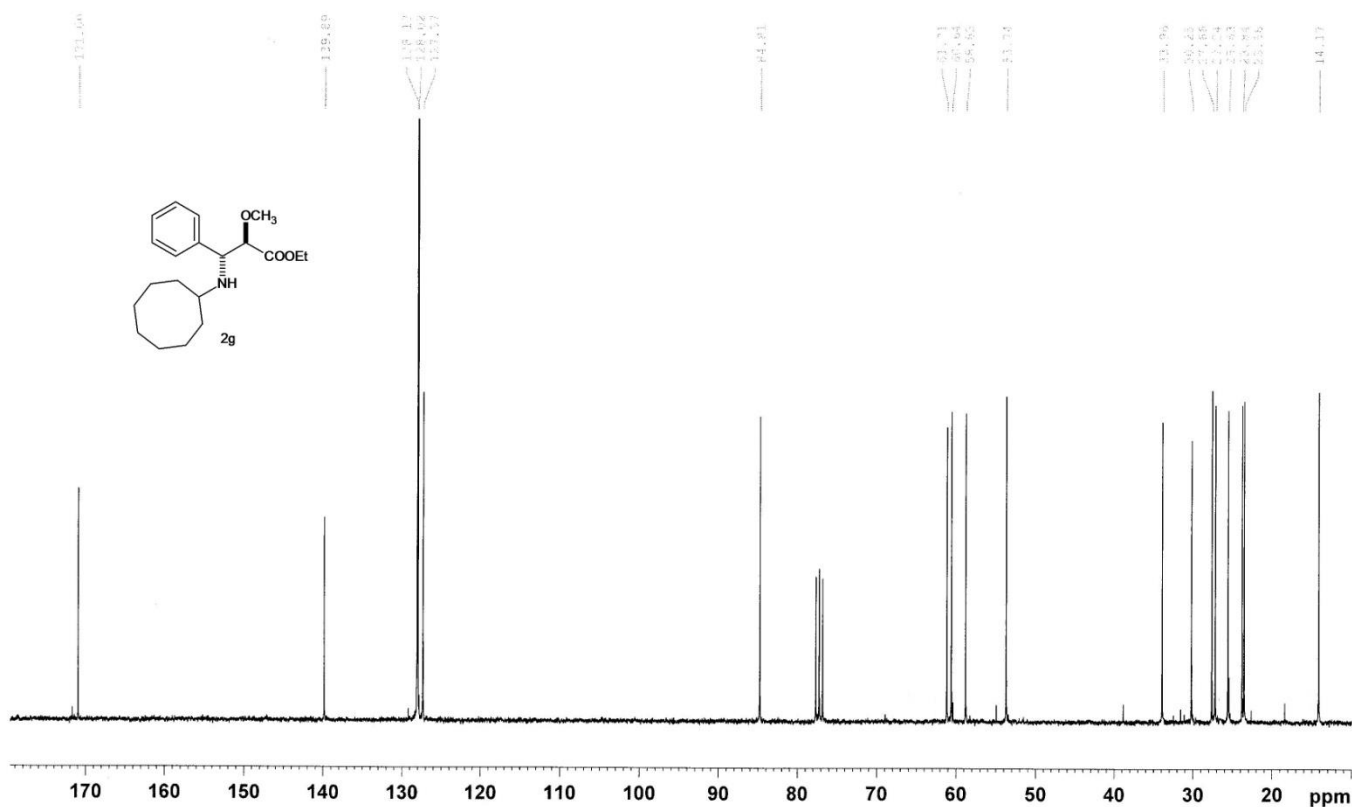
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NUC1 13C
P1 8.50 usec
PL1 3.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 0.00 dB
PL12 22.00 dB
PL13 22.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

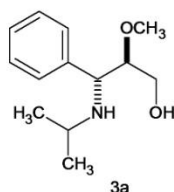
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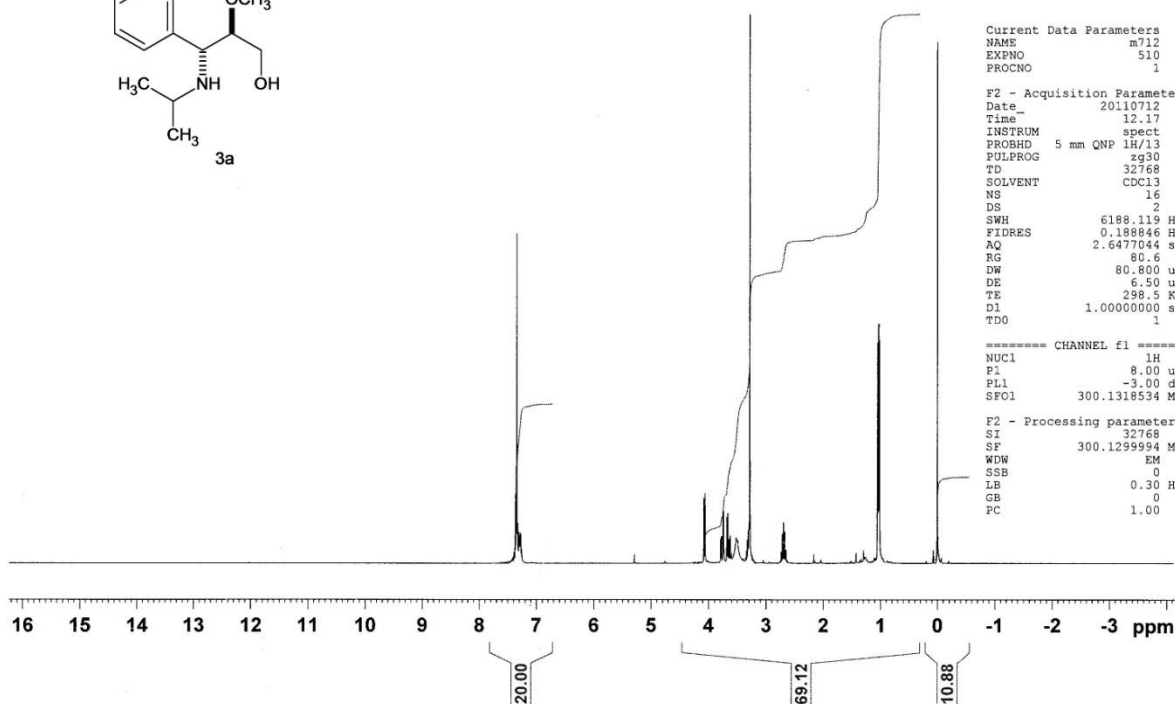


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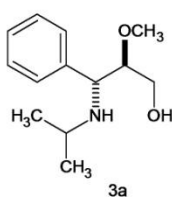
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PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 80.6
DW 80.800 usec
DE 6.50 usec
TE 298.5 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz

F2 - Processing parameters
SI 32768
SF 300.1299994 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



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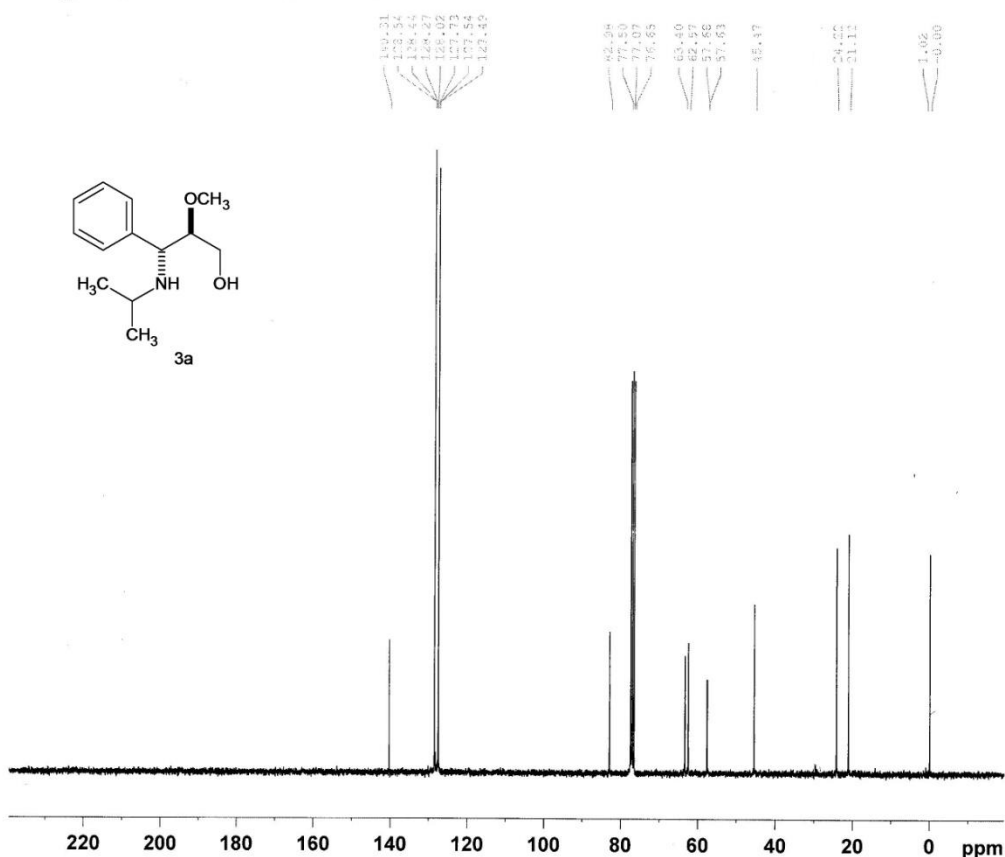
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PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 960
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 298.7 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1

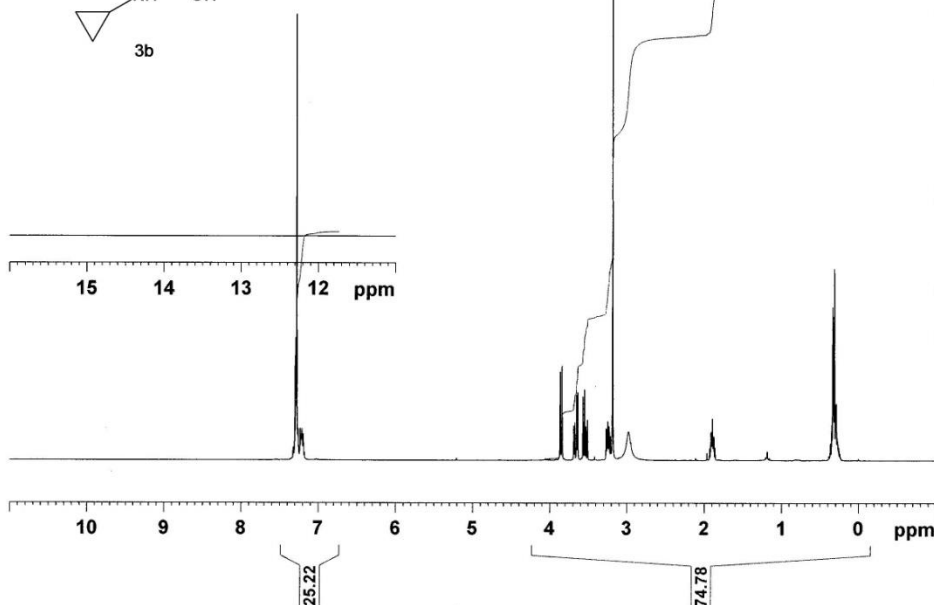
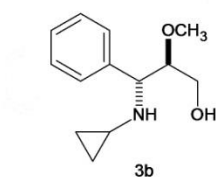
===== CHANNEL f1 =====
NUC1 13C
P1 6.30 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL12 12.50 dB
PL13 12.50 dB
PL2 -3.00 dB
SFO2 300.1312005 MHz

F2 - Processing parameters
SI 65536
SF 75.4677467 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



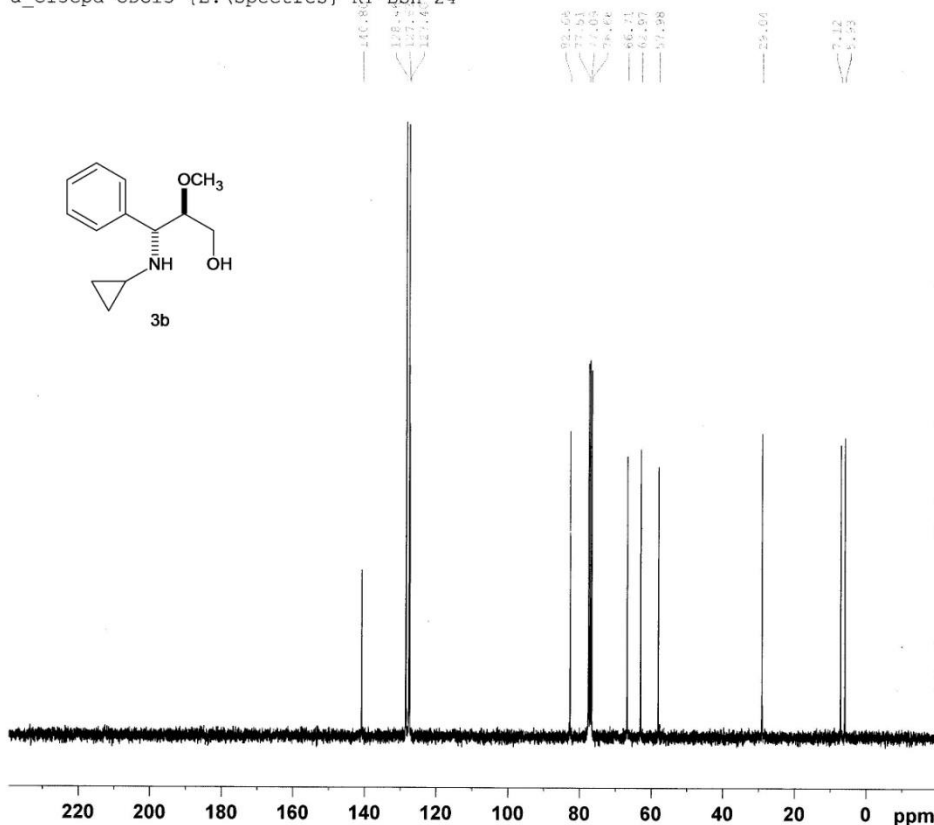
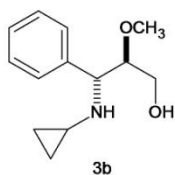
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PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 57
DW 80.800 usec
DE 6.50 usec
TE 264.0 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 9.70 usec
PL1 0.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300265 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

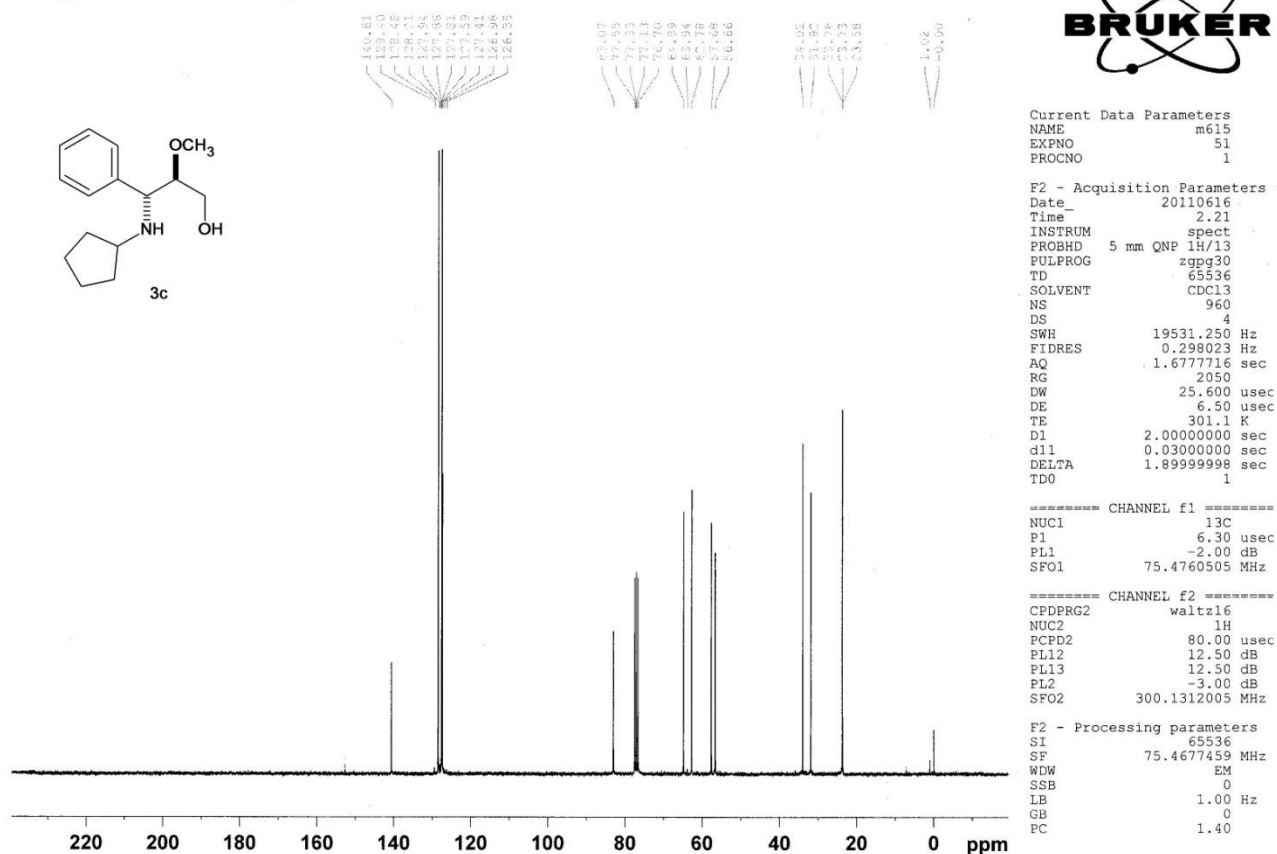
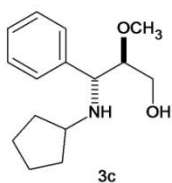
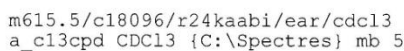
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PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 512
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 263.1 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.50 usec
PL1 3.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 0.00 dB
PL12 22.00 dB
PL13 22.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

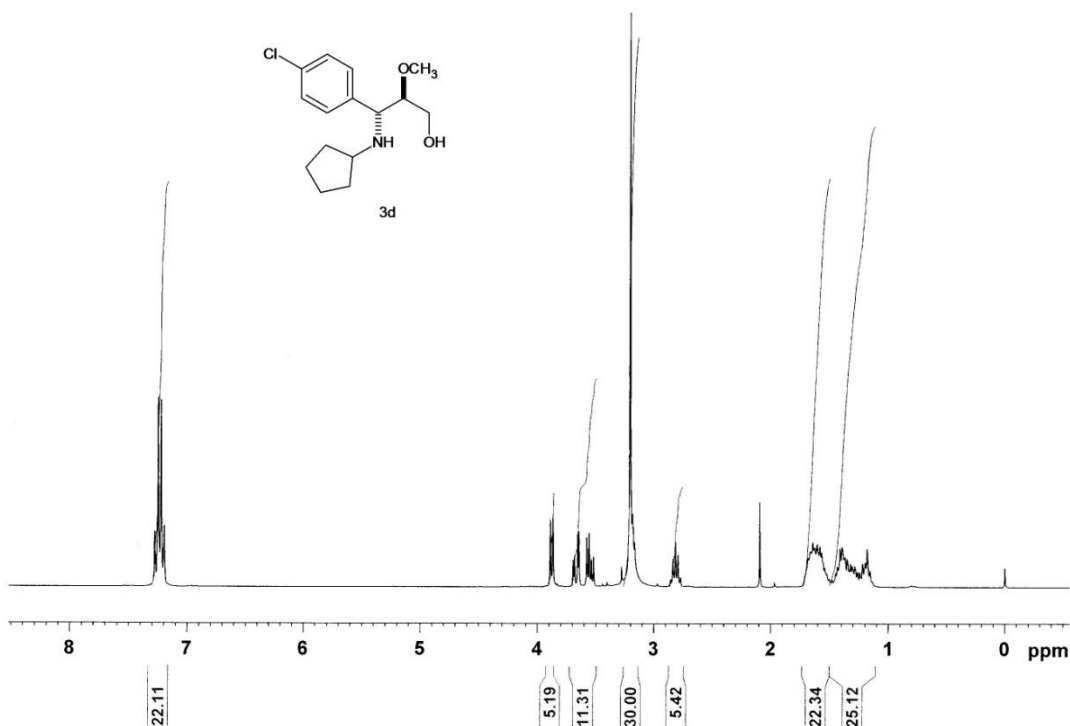


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PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 80.6
DW 80.800 usec
DE 6.50 usec
TE 297.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300189 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



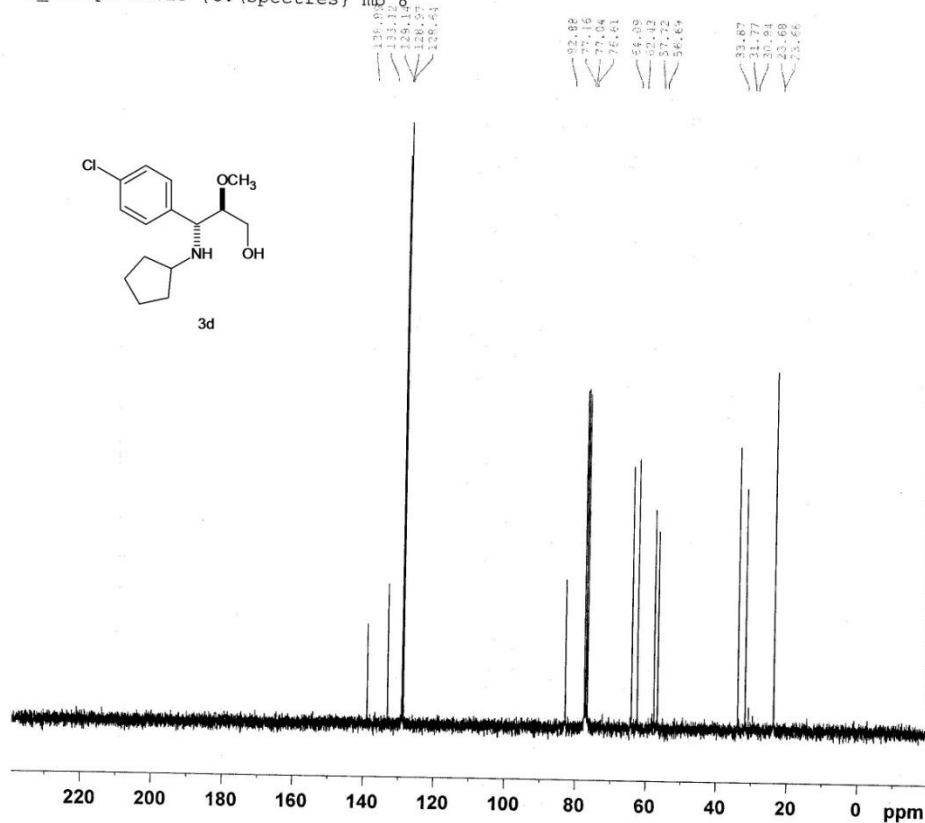
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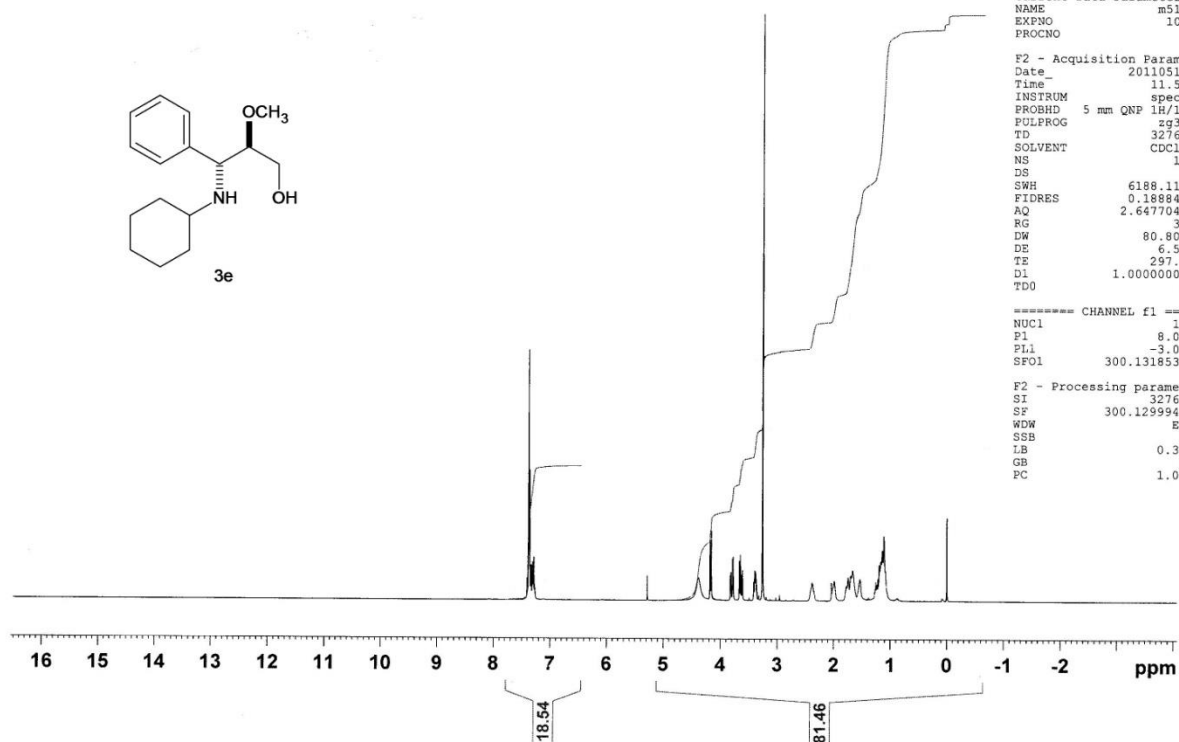
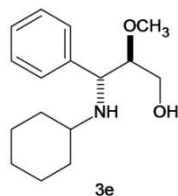
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SOLVENT CDCl3
NS 176
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 298.8 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 6.30 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -3.00 dB
PL12 12.50 dB
PL13 12.50 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



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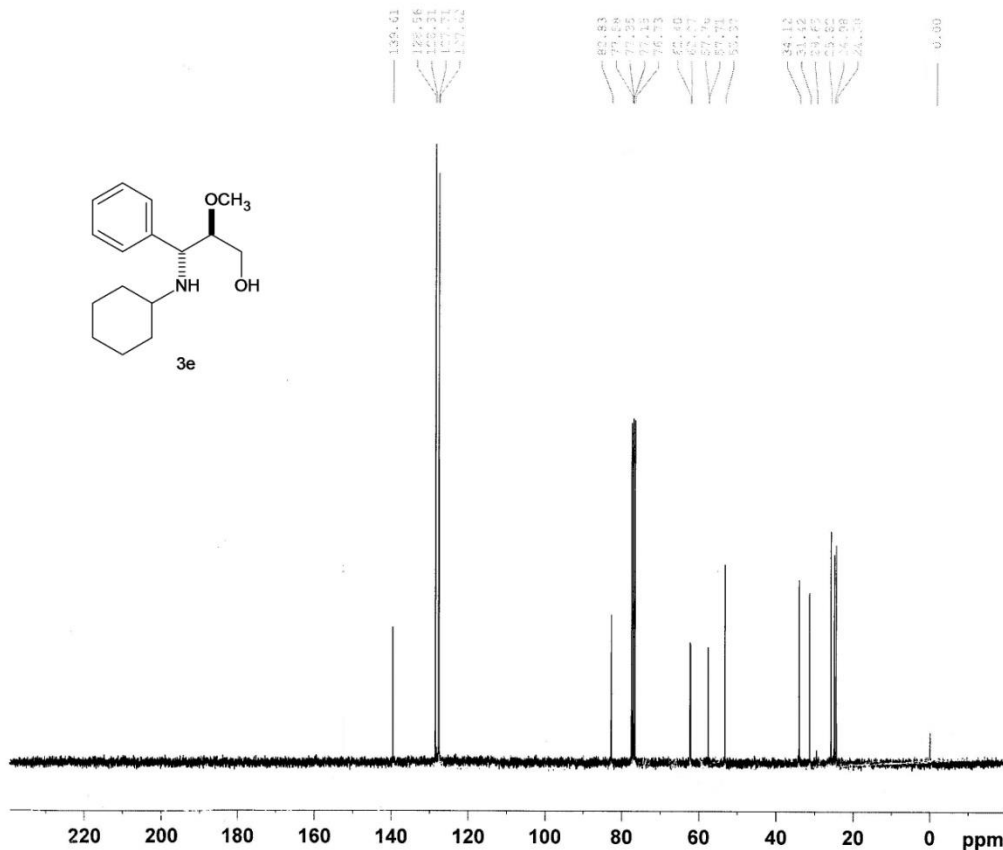
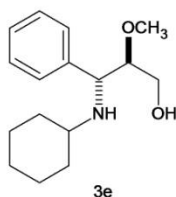
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SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 36
DW 80.800 usec
DE 6.50 usec
TE 297.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz

F2 - Processing parameters
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SF 300.1299946 MHz
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LB 0.30 Hz
GB 0
PC 1.00

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PROCNO 1

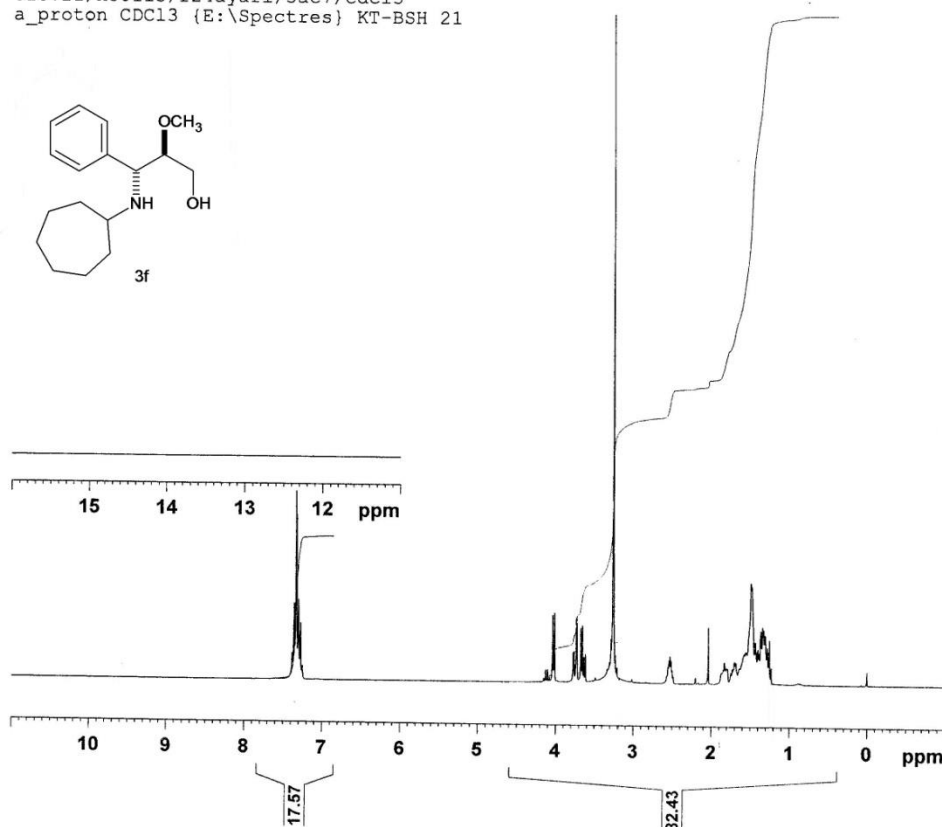
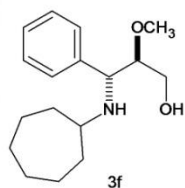
F2 - Acquisition Parameters
Date_ 20110518
Time 9.33
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 320
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 298.3 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 6.30 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL12 12.50 dB
PL13 12.50 dB
PL2 -3.00 dB
SFO2 300.1312005 MHz

F2 - Processing parameters
SI 65536
SF 75.4677467 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

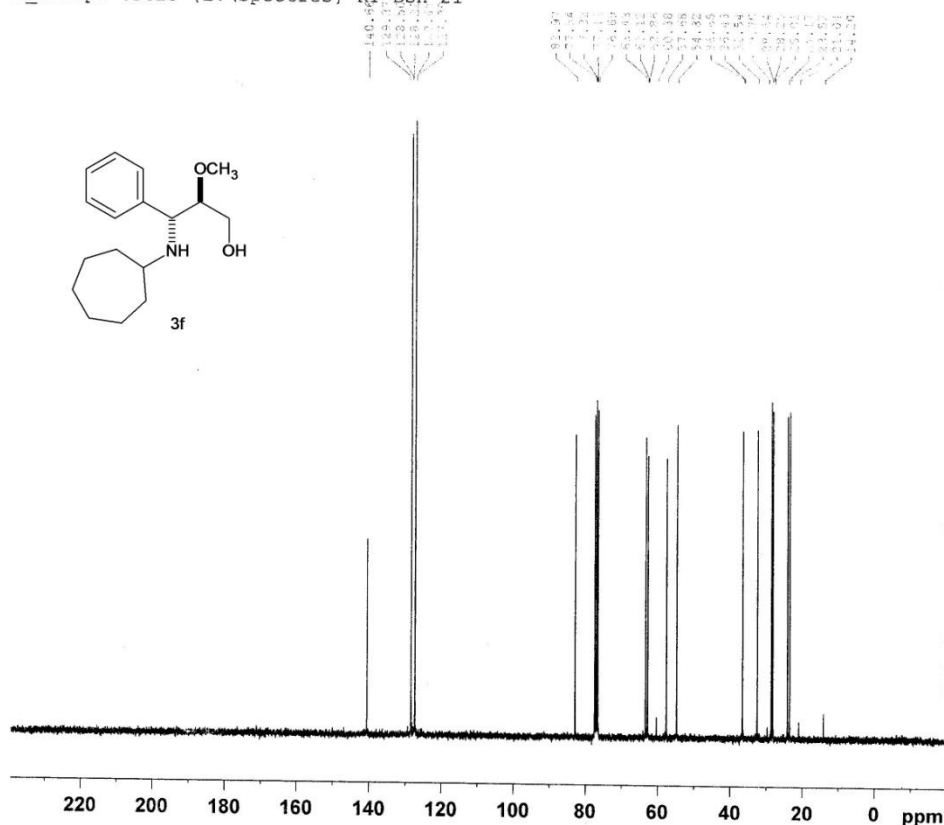
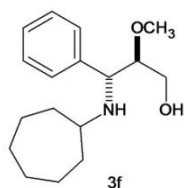
513.21/h581113/r24ayari/3ac7/cdcl3
a_proton CDC13 {E:\Spectres} KT-BSH 21



NAME May13-2016
EXPNO 210
PROCNO 1
Date_ 20160513
Time 11.44
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDC13
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188946 Hz
AQ 2.6477044 sec
RG 50.8
DW 80.800 usec
DE 6.50 usec
TE 730.3 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 9.70 usec
PL1 0.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300019 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

513.21/c581/r24ayari/3ac7/cdcl3
a_c13cpd CDC13 {E:\Spectres} KT-BSH 21

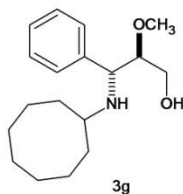


NAME May13-2016
EXPNO 211
PROCNO 1
Date_ 20160514
Time 5.54
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDC13
NS 512
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 730.3 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.50 usec
PL1 3.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 0.00 dB
PL12 22.00 dB
PL13 22.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

m714.3/h18802/r24kaabi/faer/cdcl3
a_proton CDC13 {C:\Spectres} mb 3

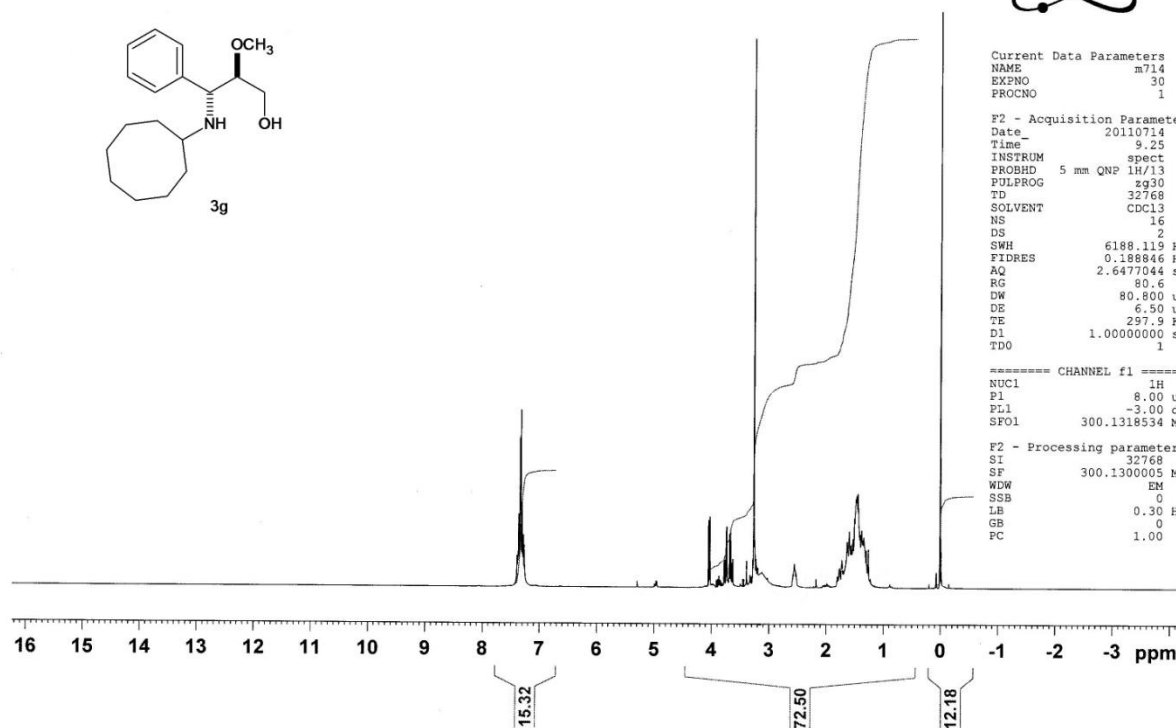


Current Data Parameters
NAME m714
EXPNO 30
PROCNO 1

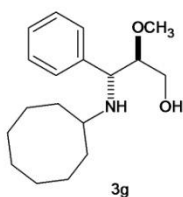
F2 - Acquisition Parameters
Date_ 20110714
Time 9.25
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDC13
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 80.6
DW 80.800 usec
DE 6.50 usec
TE 297.9 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz

F2 - Processing parameters
SI 32768
SF 300.1300005 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



m714.3/c18853/r24kaabi/faer/cdcl3
a_c13cpd CDC13 {C:\Spectres} mb 3



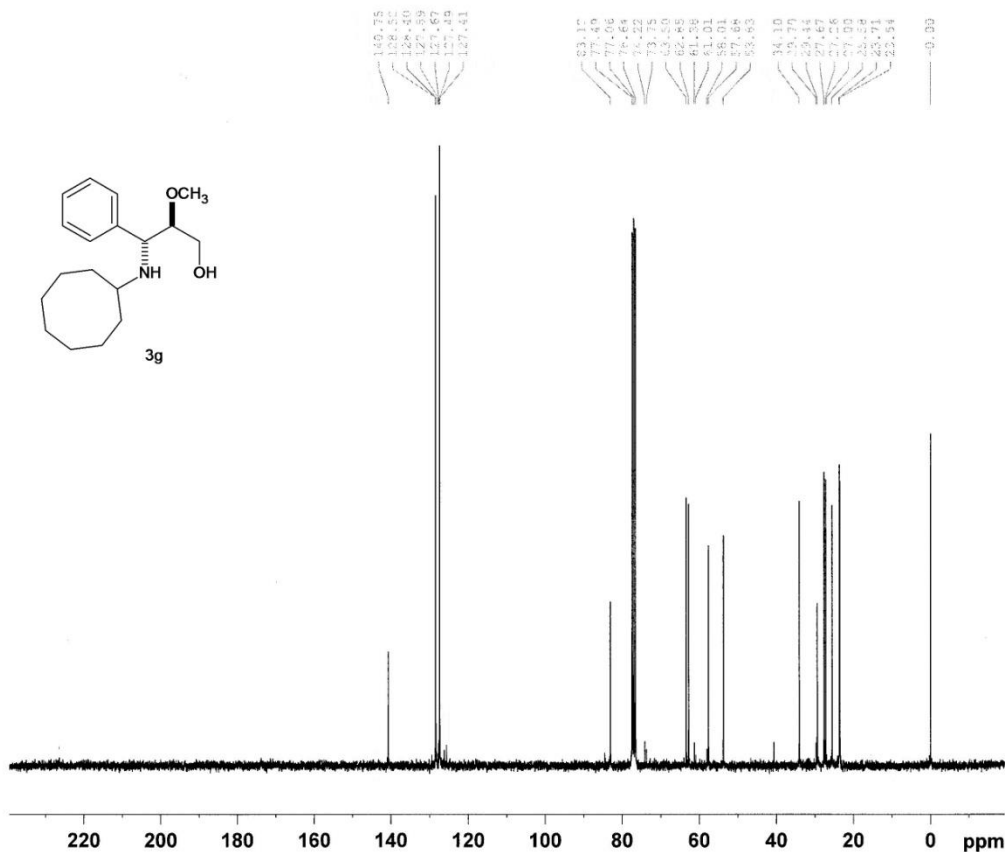
Current Data Parameters
NAME m714
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110714
Time 16.05
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDC13
NS 960
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 301.1 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 1

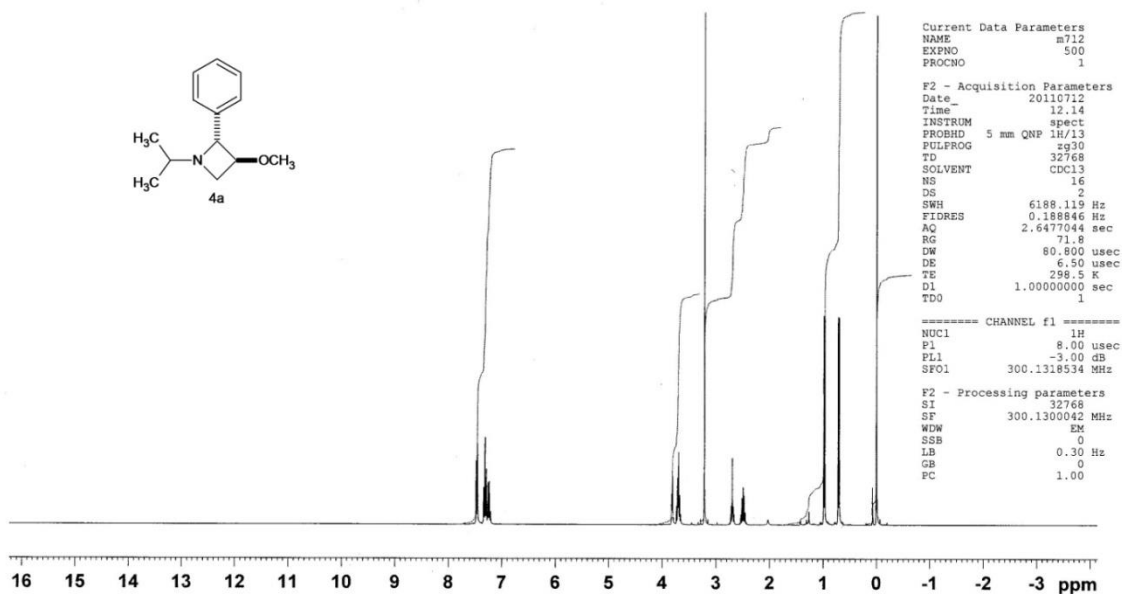
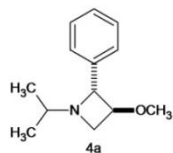
===== CHANNEL f1 =====
NUC1 13C
P1 6.30 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL12 12.50 dB
PL13 12.50 dB
PL2 -3.00 dB
SFO2 300.1312005 MHz

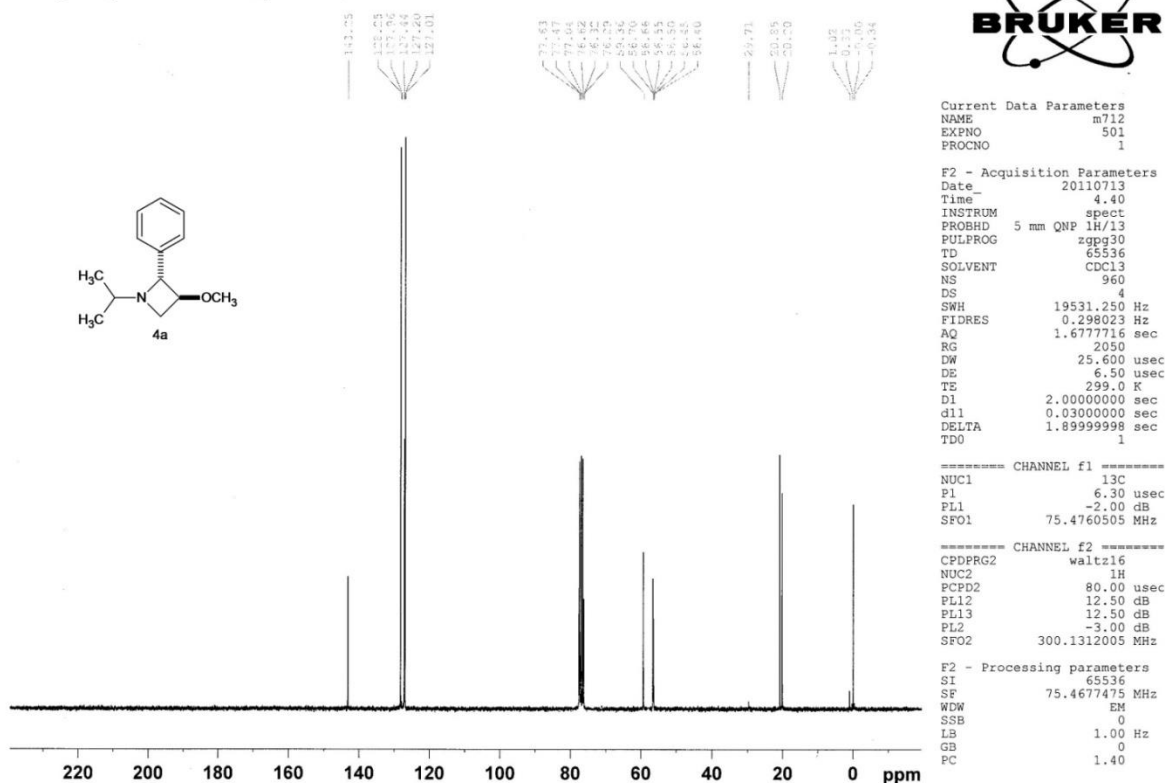
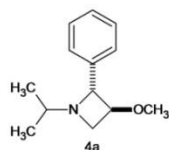
F2 - Processing parameters
SI 65536
SF 75.4677455 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



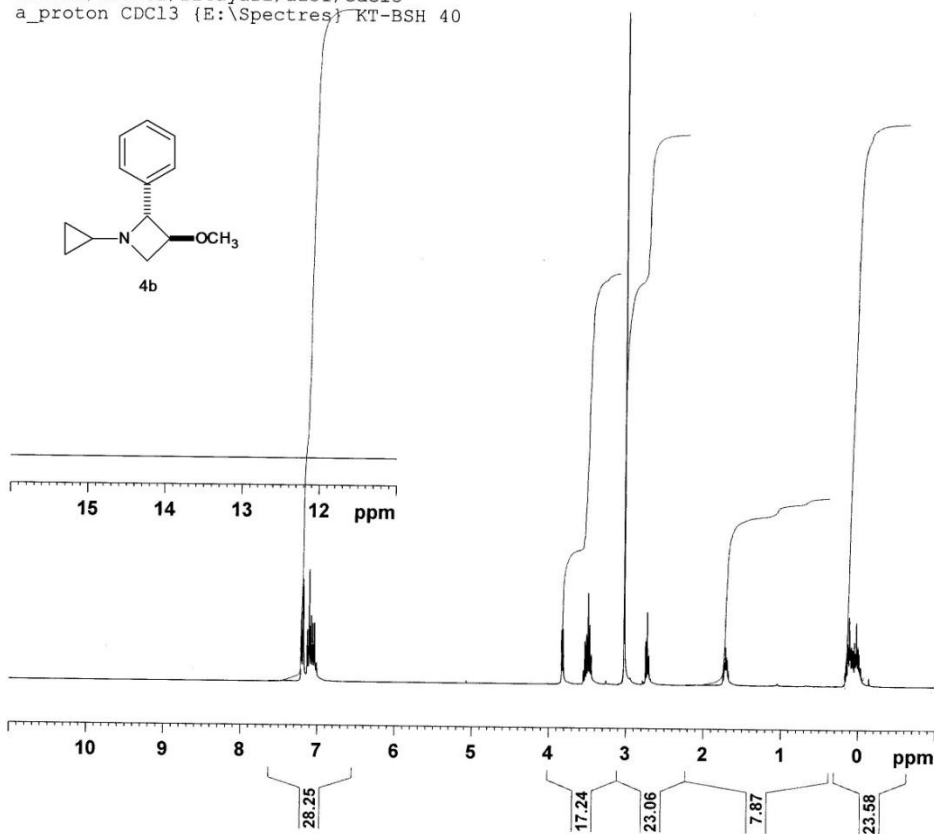
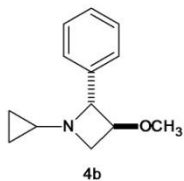
m712.50/h18713/r24kaabi/aerz/cdcl3
a_proton CDC13 {C:\Spectres} mb 50



m712.50/c18723/r24kaabi/aerz/cdcl3
a_c13cpd CDC13 {C:\Spectres} mb 50



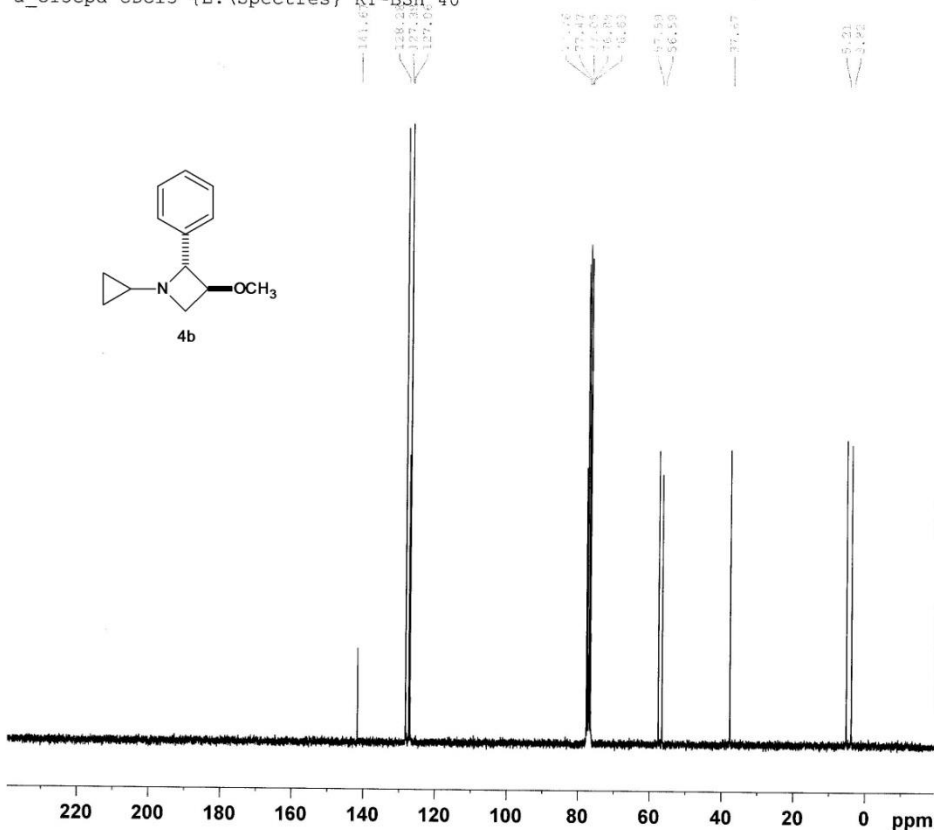
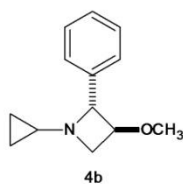
622.39/h60262/r24ayari/az31/cdcl3
a_proton CDC13 {E:\Spectres} KT-BSH 40



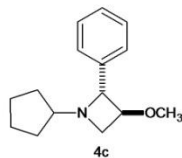
NAME Jun22-2016
EXPNO 400
PROCNO 1
Date 20160623
Time 7.34
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 128
DW 80.800 usec
DE 6.50 usec
TE 264.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 9.70 usec
PL1 0.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300727 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

622.39/c60263/r24ayari/az31/cdcl3
a_c13cpd CDC13 {E:\Spectres} KT-BSH 40



m621.18/h18403/r24kaabi/eart/cdcl3
a_proton CDCl3 {C:\Spectres} mb 18

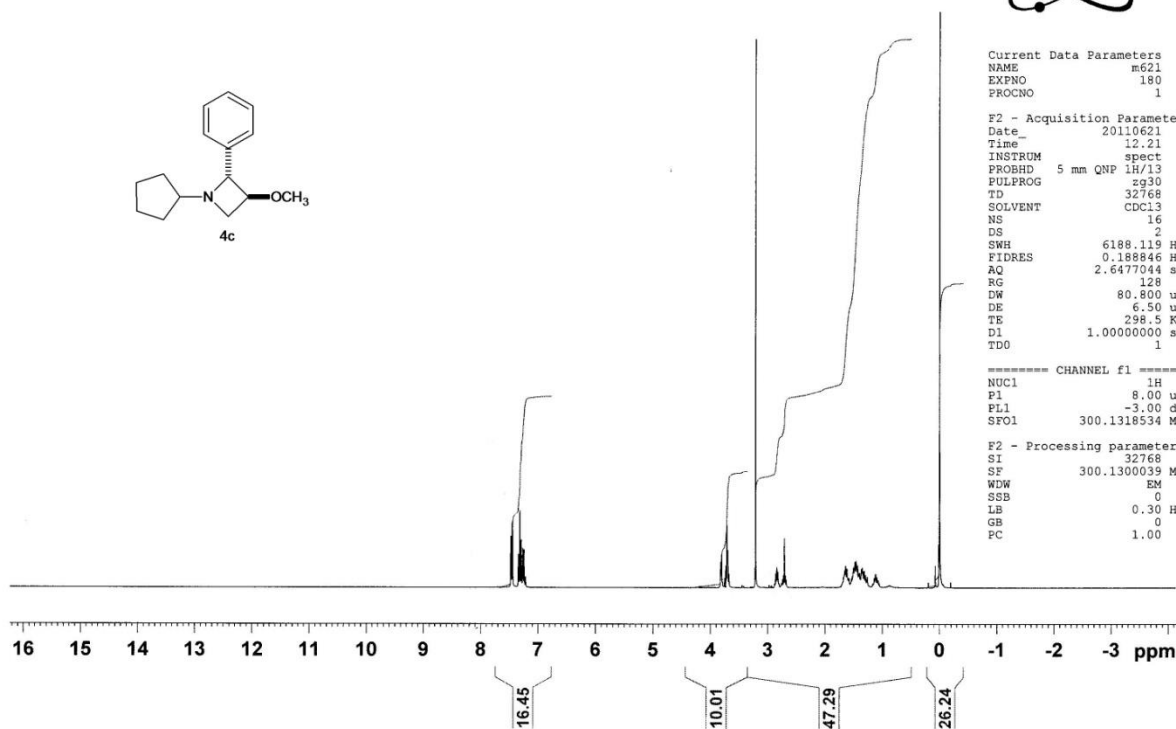


Current Data Parameters
NAME m621
EXPNO 180
PROCNO 1

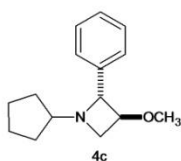
F2 - Acquisition Parameters
Date_ 20110621
Time_ 12.21
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 128
DW 80.800 usec
DE 6.50 usec
TE 298.5 K
D1 1.0000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 8.00 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz

F2 - Processing parameters
SI 32768
SF 300.1300039 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



m621.18/c18404/r24kaabi/eart/cdcl3
a_c13cpd CDCl3 {C:\Spectres} mb 18



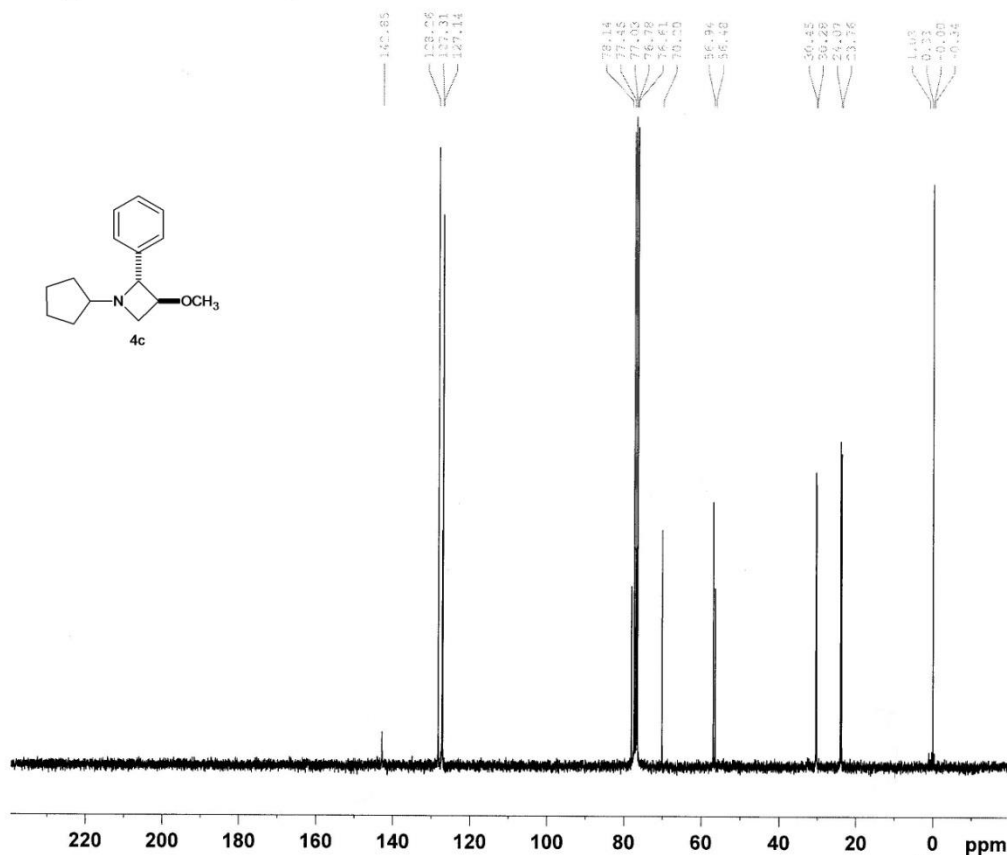
Current Data Parameters
NAME m621
EXPNO 181
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110621
Time_ 14.22
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 302.1 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.8999999 sec
TDO 1

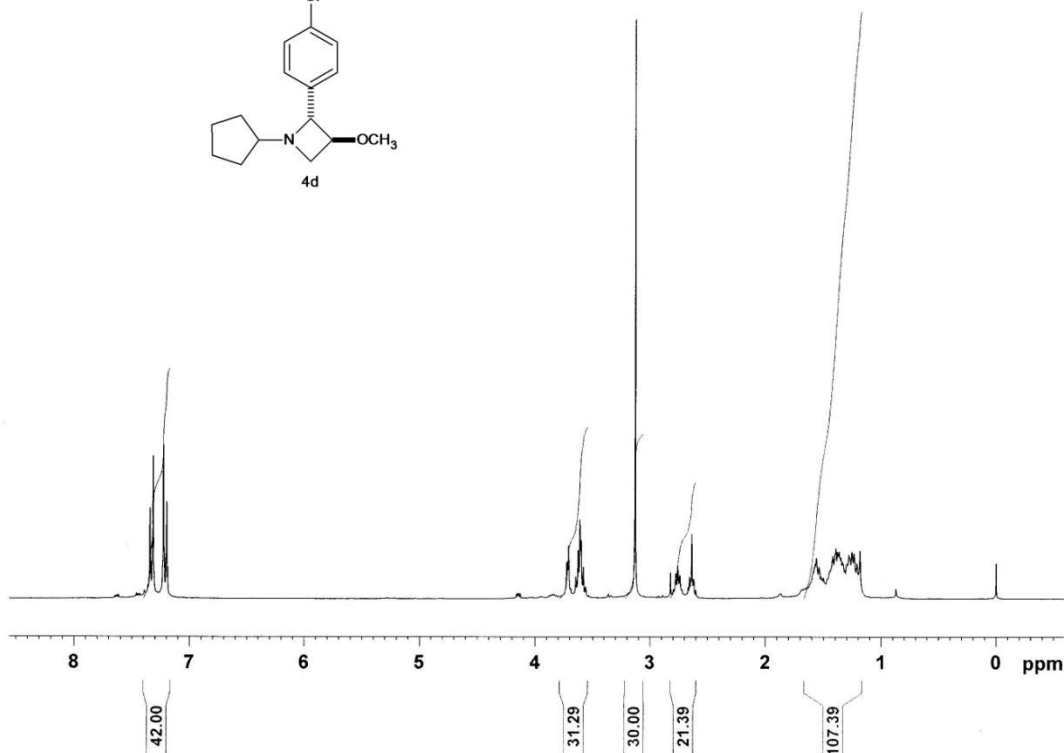
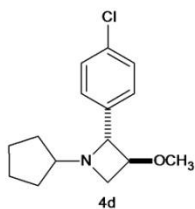
===== CHANNEL f1 =====
NUC1 13C
P1 6.30 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL12 12.50 dB
PL13 12.50 dB
PL2 -3.00 dB
SFO2 300.1312005 MHz

F2 - Processing parameters
SI 65536
SF 75.4677448 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



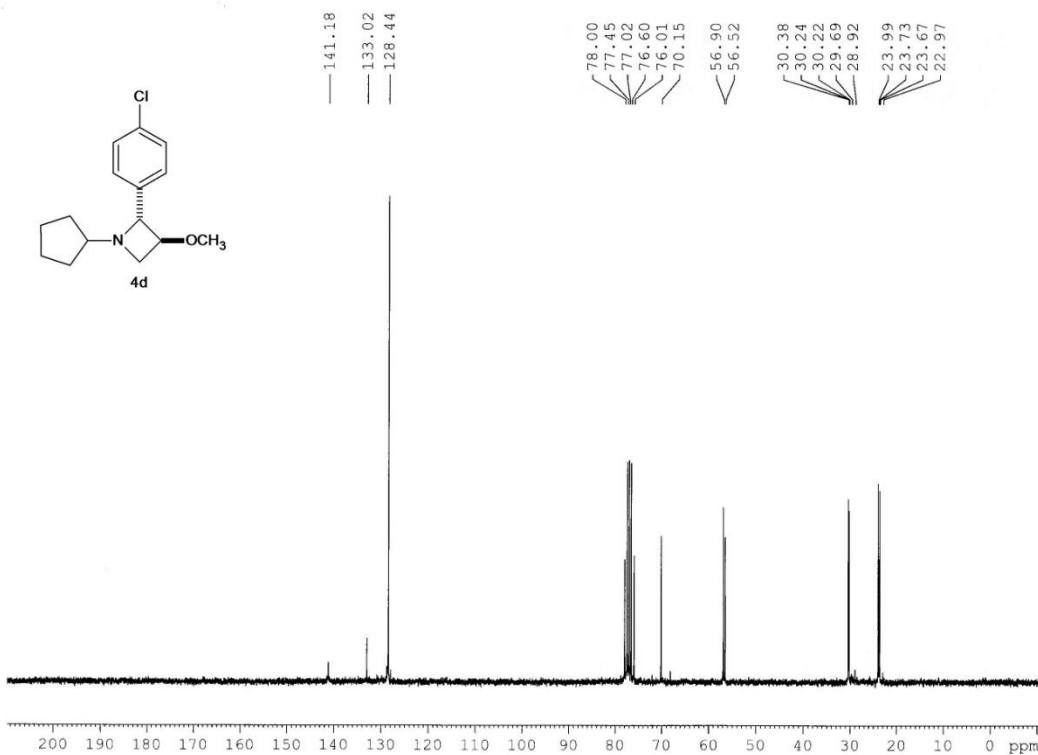
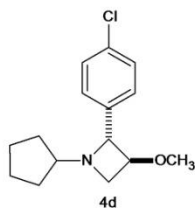
m620.24/h26257/r24azek/ae27/cdcl3
a_proton CDC13 {C:\Spectres} mb 24



NAME m620
EXPNO 240
PROCNO 1
Date 20120620
Time 14.52
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 114
DW 80.800 usec
DE 6.50 usec
TE 301.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 7.50 usec
PL1 -3.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300266 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

m620.24/c26273/r24azek/ae27/cdcl3
a_c13cpd CDC13 {C:\Spectres} mb 24

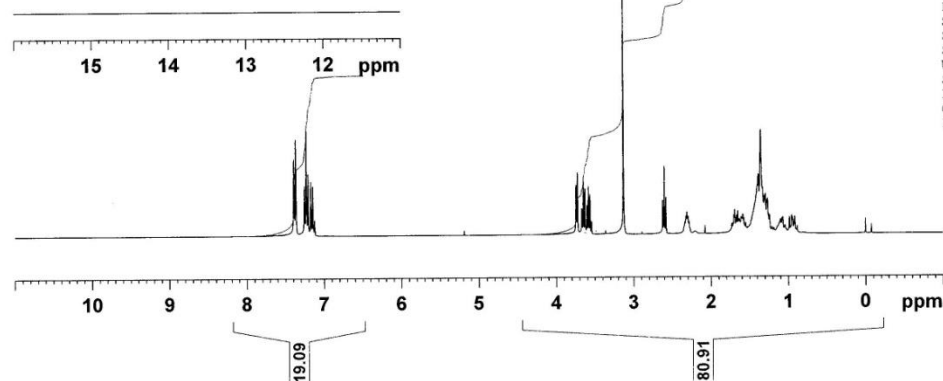
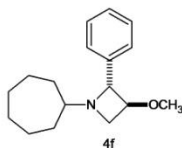


NAME m620
EXPNO 241
PROCNO 1
Date 20120620
Time 15.27
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 576
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 1820
DW 25.600 usec
DE 6.50 usec
TE 300.9 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 6.00 usec
PL1 -2.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 21.00 dB
PL13 21.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

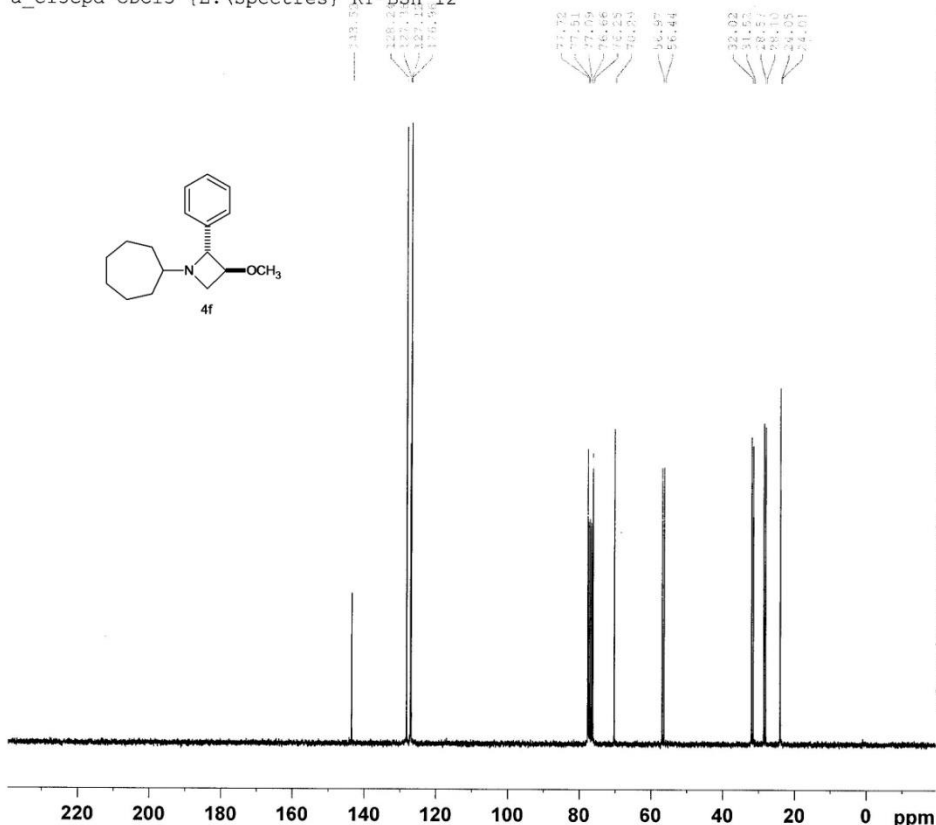
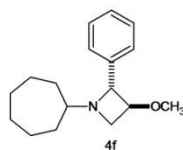
601.12/h59132/r24ayari/azc7/cdcl3
a_proton CDC13 {E:\Spectres} KT-BSH 12



NAME Jun01-2016
EXPNO 120
PROCNO 1
Date_ 20160601
Time_ 12.38
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.188846 Hz
AQ 2.6477044 sec
RG 45.2
DW 80.800 usec
DE 6.50 usec
TE 263.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 9.70 usec
PL1 0.00 dB
SFO1 300.1318534 MHz
SI 32768
SF 300.1300329 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

601.12/c591/r24ayari/azc7/cdcl3
a_c13cpd CDC13 {E:\Spectres} KT-BSH 12

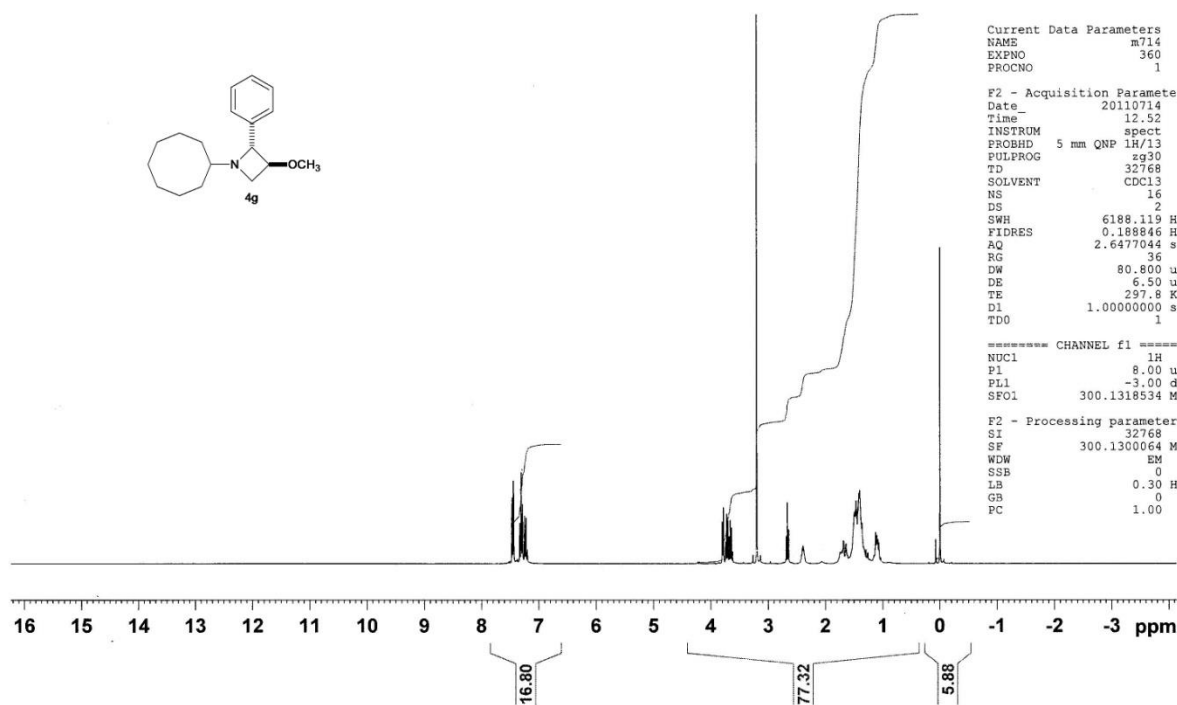
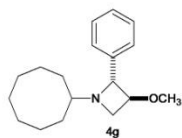


NAME Jun01-2016
EXPNO 121
PROCNO 1
Date_ 20160601
Time_ 22.33
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 512
DS 4
SWH 19531.250 Hz
FIDRES 0.298023 Hz
AQ 1.6777716 sec
RG 2050
DW 25.600 usec
DE 6.50 usec
TE 263.3 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.50 usec
PL1 3.00 dB
SFO1 75.4760505 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 0.00 dB
PL12 22.00 dB
PL13 22.00 dB
SFO2 300.1312005 MHz
SI 65536
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

m714.36/h18844/r24kaabi/farz/cdc13
a_proton CDC13 {C:\Spectres} mb 36



m714.36/c18861/r24kaabi/farz/cdc13
a_c13cpd CDC13 {C:\Spectres} mb 36

