

Synthesis of Pyrrolo(spiro-[2.3']-oxindole)-spiro-[4.3'']-oxindole *via*

1,3-Dipolar Cycloaddition of Azomethine Ylides with

3-Acetonylideneoxindole

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Supporting Information

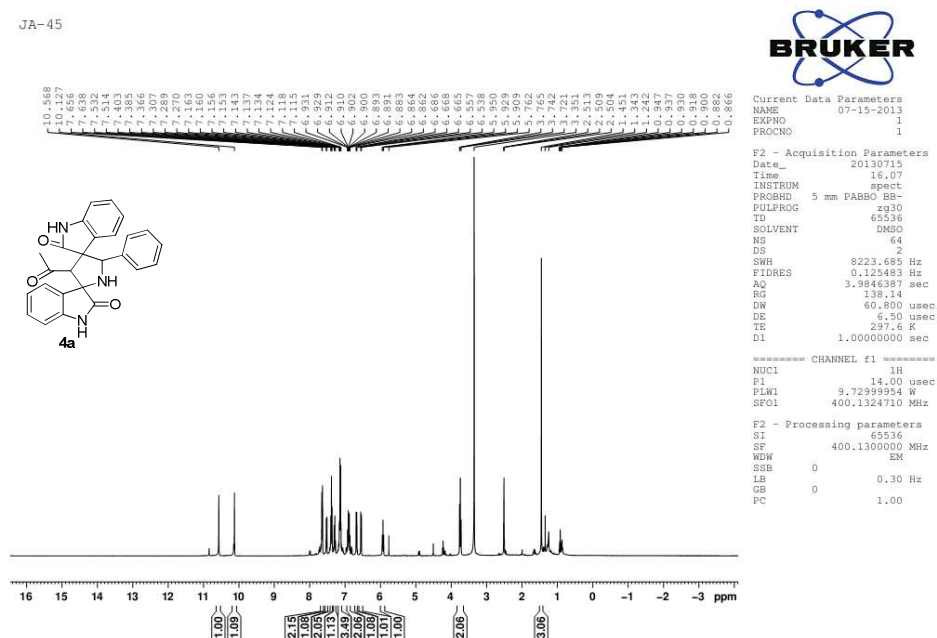
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¹H NMR and ¹³C NMR spectra for compounds 4a, 4b+5b, 4c, 4d, 5a, 5c, 5d, 8a, 8b, 8c, 8d, 8e, 8f, 8g, 9a, 9b, 9c, 9d, 9e, 9f, 9g, 12; crystal structure of compound 12.

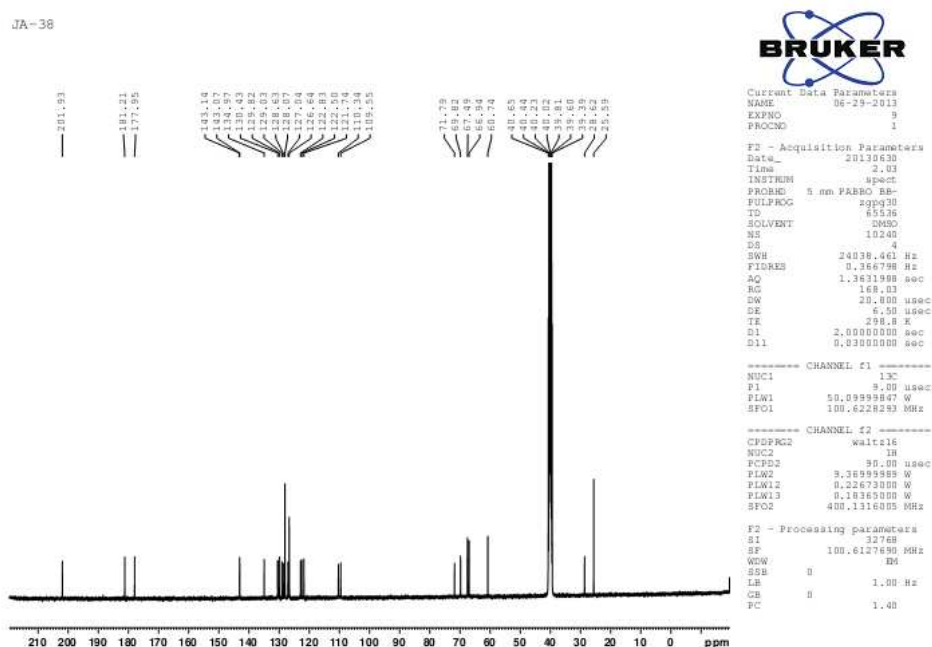
Compound 4a	S2
Compound 4c	S3
Compound 4d	S4
Compound 5a	S5
Compound 5c	S6
Compound 5d	S7
Compound 8a	S8
Compound 8b	S9
Compound 8c	S10
Compound 8d	S11
Compound 8e	S12
Compound 8f	S13
Compound 8g	S14
Compound 9a	S15
Compound 9b	S16
Compound 9c	S17
Compound 9d	S18
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Compound 9f	S20
Compound 9g	S21
Compound 12	S22
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Crystal structure of compound 8e	S24
Crystal structure of compound 9e	S24
Crystal structure of compound 12	S25

^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

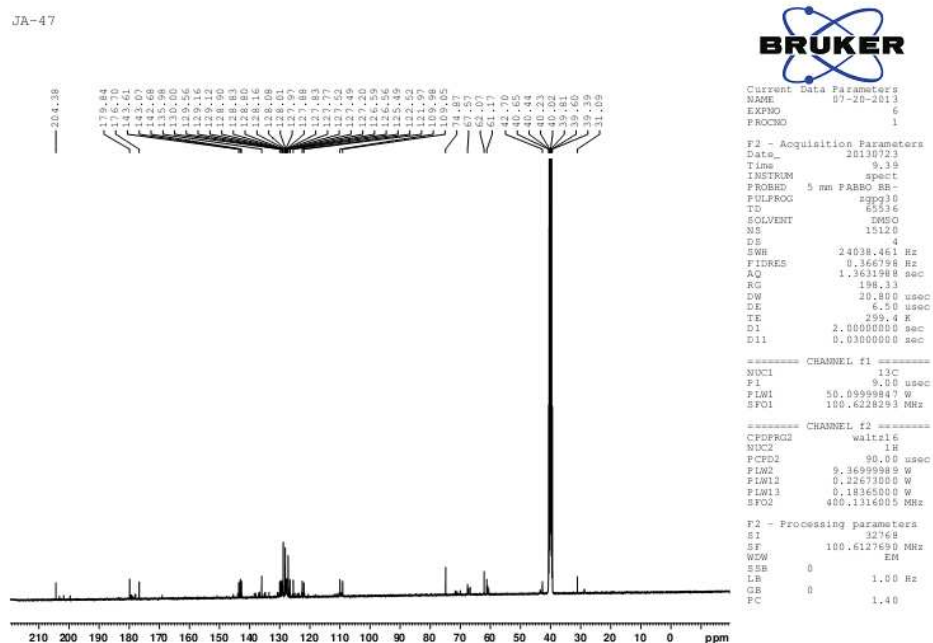
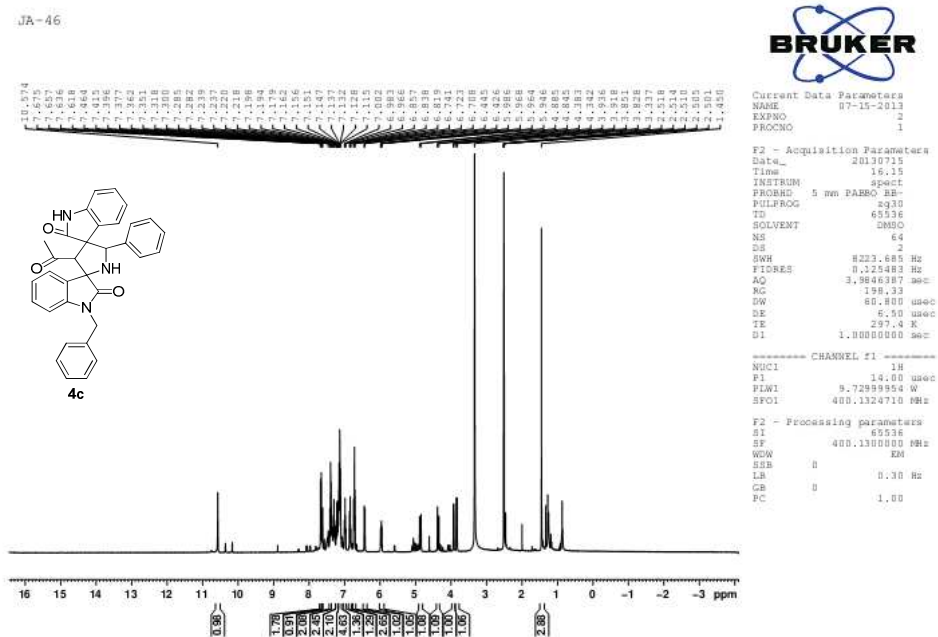
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JA-38

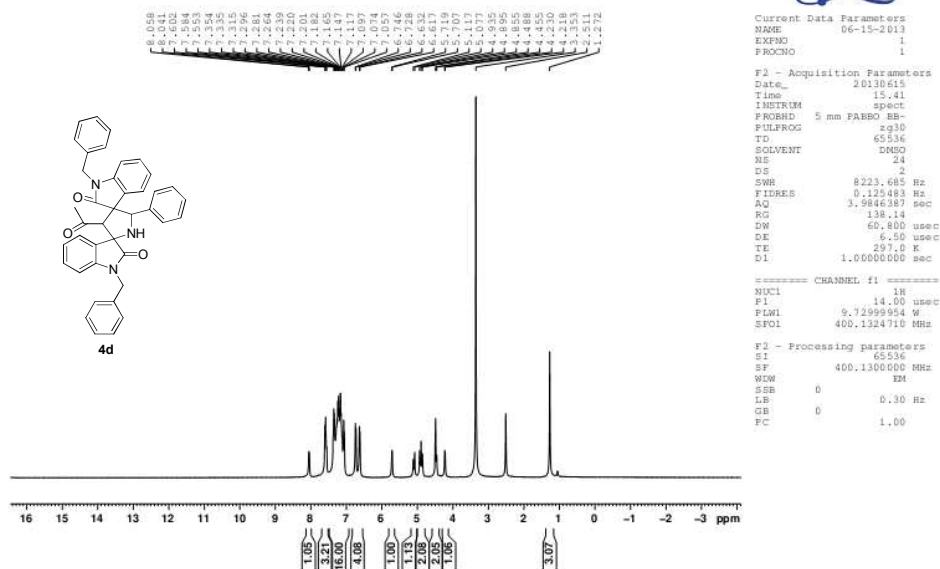


^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

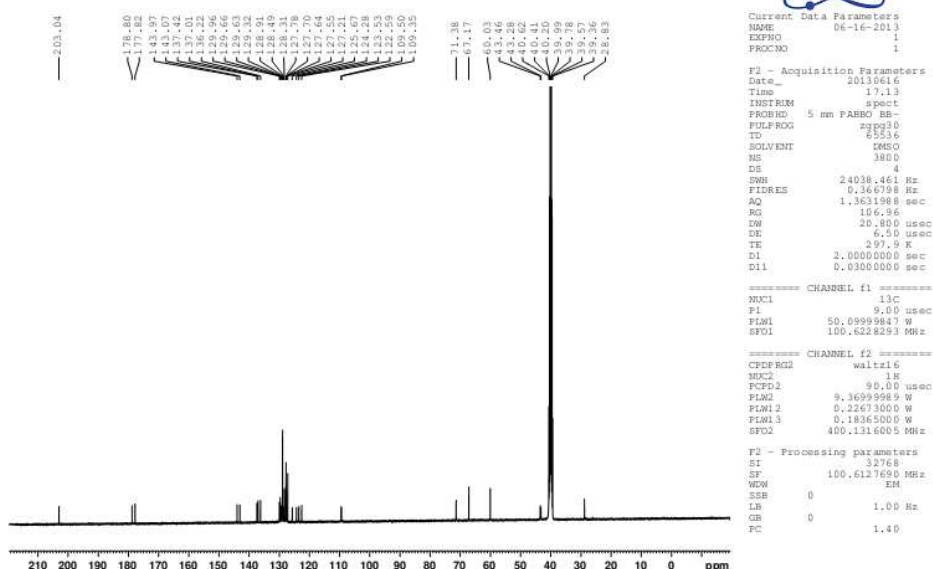


^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-27

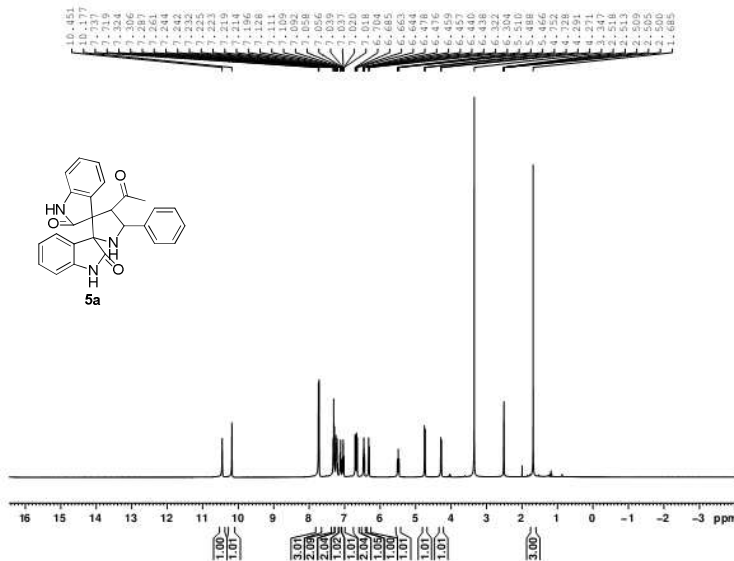


JA-27



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-39



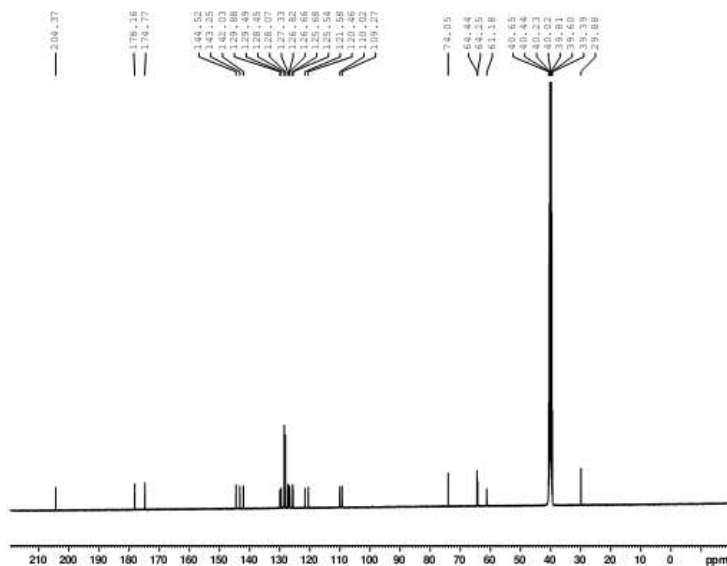
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PULPROG zg30
TD 65536
SOLVENT DMSO
NS 32
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 168.03
DW 60.800 usec
DE 6.50 usec
TE 296.5 K
D1 1.0000000 sec

===== CHANNEL f1 =====
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PLW1 9.72999954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
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SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JA-39



Current Data Parameters
NAME 06-29-2013
EXPNO 10
PROCNO 1

F2 - Acquisition Parameters
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Time 0.37
INSTRUM spect
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PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 10240
DS 4
SWH 24038.461 Hz
FIDRES 0.364788 Hz
AQ 1.1611988 sec
RG 152.51
DW 20.800 usec
DE 6.50 usec
TE 299.0 K
D1 2.0000000 sec
D11 0.0300000 sec

===== CHANNEL f1 =====
NUC1 13C
P1 8.00 usec
PLW1 50.09999847 W
SFO1 100.6228293 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PLW2 9.36999989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

F2 - Processing parameters
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GB 0
PC 1.40

JA-43



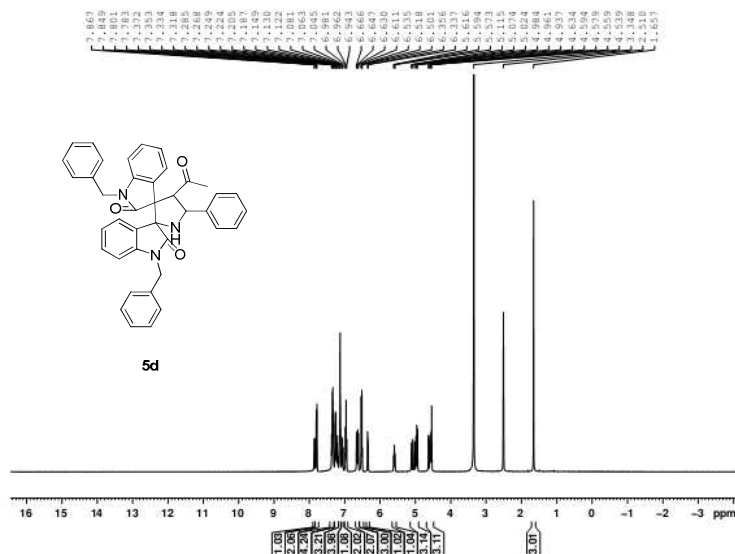
JA-43



S6

^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-28



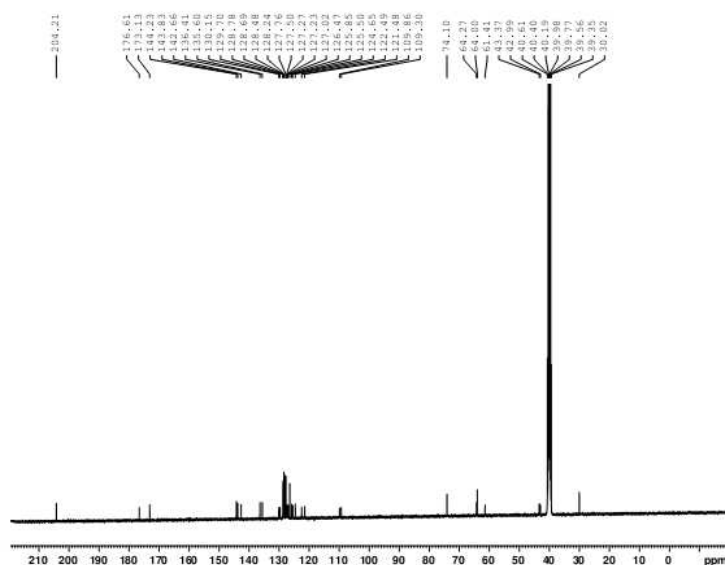
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PULPROG zg30
TD 65536
SOLVENT DMSO
NS 32
DS 2
SWH 8223.685 Hz
FIDRES 0.125403 Hz
AQ 3.9846387 sec
RG 168.03
DW 60.000 usec
DE 6.50 usec
TE 296.2 K
D1 1.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PLW1 9.72999954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JA-28



Current Data Parameters
NAME 06-16-2013
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130616
Time 22.01
INSTRUM spect
PROBHD 5 mm F4BBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 3800
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3611988 sec
RG 168.03
DW 20.400 usec
DE 6.50 usec
TE 297.9 K
D1 2.00000000 sec
D11 0.03000000 sec

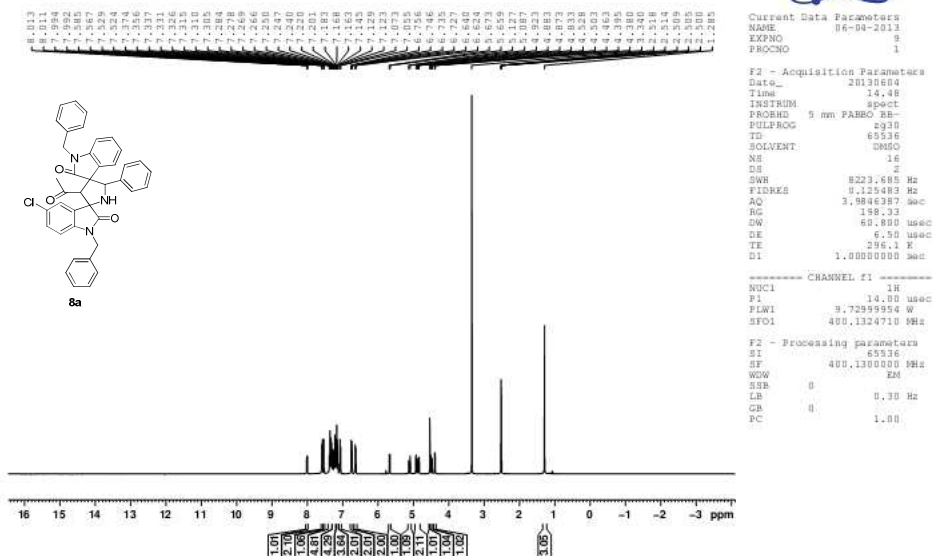
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NUC1 13C
P1 9.00 usec
PLW1 50.09999847 W
SFO1 100.6228293 MHz

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NUC2 1H
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PLW2 9.36999989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

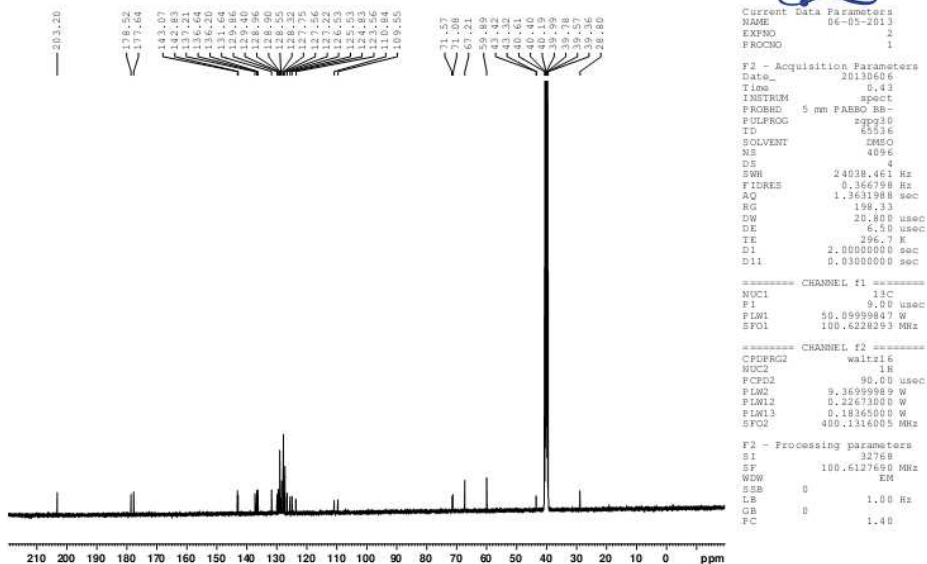
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^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-15

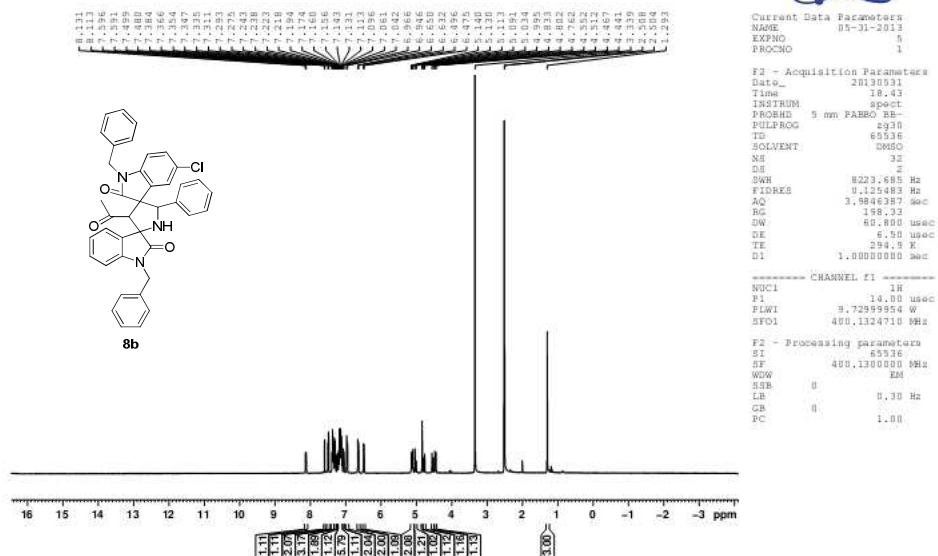


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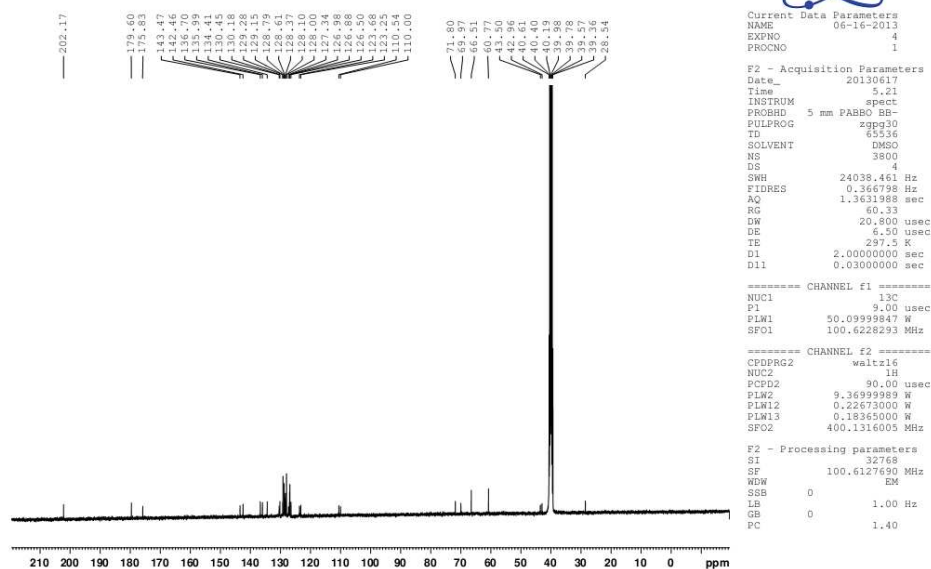


^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JK-10

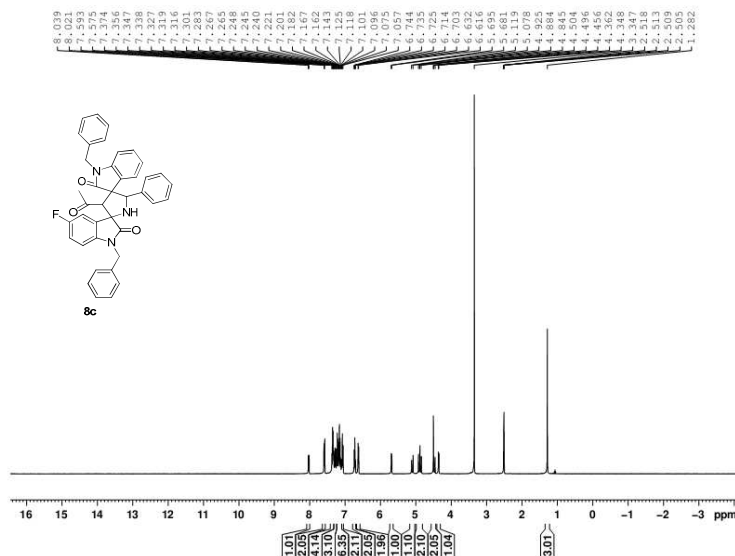


JA-30



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-19



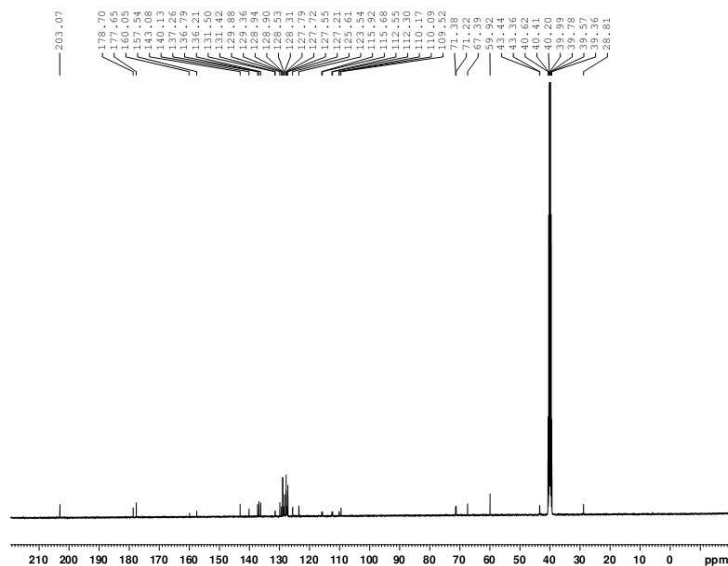
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NAME 06-07-2013
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
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Time 13.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 168.03
DW 60.800 usec
DE 6.50 usec
TE 295.8 K
D1 1.00000000 sec

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.00 usec
PLW1 9.7299954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JA-19



Current Data Parameters
NAME 06-07-2013
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130607
Time 17.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 4
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.1631988 sec
RG 198.33
DW 20.800 usec
DE 6.50 usec
TE 297.1 K
D1 2.00000000 sec
D11 0.03000000 sec

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 9.00 usec
PLW1 50.09999847 W
SFO1 100.6226293 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PLW2 9.3699989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

F2 - Processing parameters
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SF 100.6127690 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

JK-11



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Current Data Parameters
Name          05-31-2013
EXPNO         1
PROCNO        6

F2 - Acquisition Parameters
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Time          20130531
INSTRUM       spect
GBBD          5 mm PABBO
PULPROG       zg30
TD            65536
SOLVENT       DMSO
NS            16
DS            4
FIDRES        8223.685 Hz
AQ            0.125483 Hz
RQ            3.9846387 sec
NUC1           1H
NUC2           13C
P1            198.23
PC            60.800 usec
DE            6.50 usec
TE            294.7 K
D1            1.00000000 sec

===== CHANNEL f1 =====
NUC1          1H
P1            9.7293924 MHz
SFO1          104.13470 MHz

F2 - Processing parameters
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SI            65536
SF            400.1300000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

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JK-11



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Current Data Parameters
NAME 06-02-2013
EXPNO 13
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130603
Time 11:23
INSTRUM spect
PROBHD 5 mm PABBO-BB
PULPROG zgpg30
TD 65536
SOLVENT MS
NS 3072
DS 4
SWH 24038.941 Hz
FIDRES 0.3667998 Hz
AQ 1.3631988 sec
RG 198.33
DE 20.800 usec
TE 6.50 usec
TW 295.2 K
D1 2.00000000 sec
D11 0.03000000 sec

===== CHANNEL f1 =====
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PLM1 50.0999847 MHz
NUC2 1H
P2 9.00 usec
PLM2 500.6282893 MHz

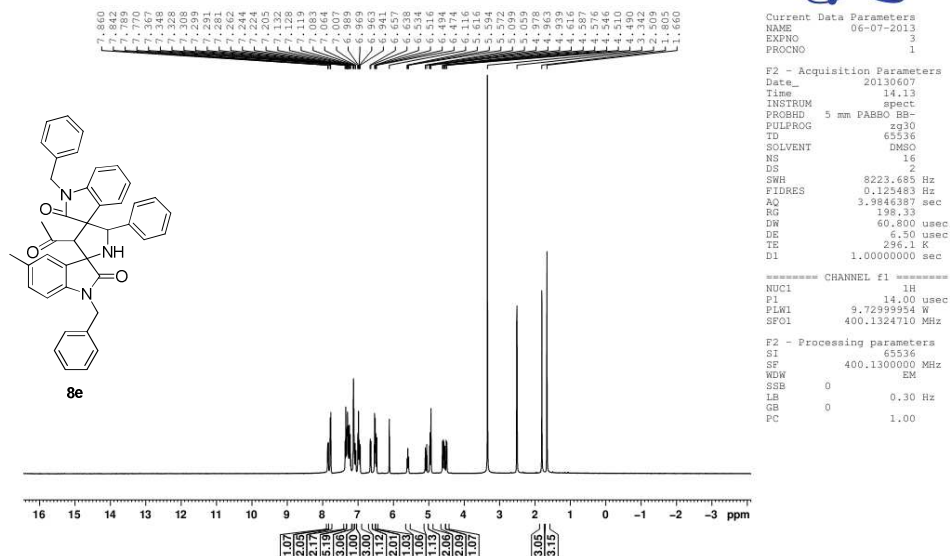
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CPDPRG2 waltz16
NUC1 1H
PCPD2 9.00 usec
PLM2 9.96999898 MHz
NUC2 13C
PLM13 0.18365000 MHz
SF02 400.1316005 MHz

F2 - Processing parameters
S1 32768
SF 100.6127690 MHz
NUC1 1H
SS 50
SF0 1.00 Hz
LB 0
GB 1.40 Hz

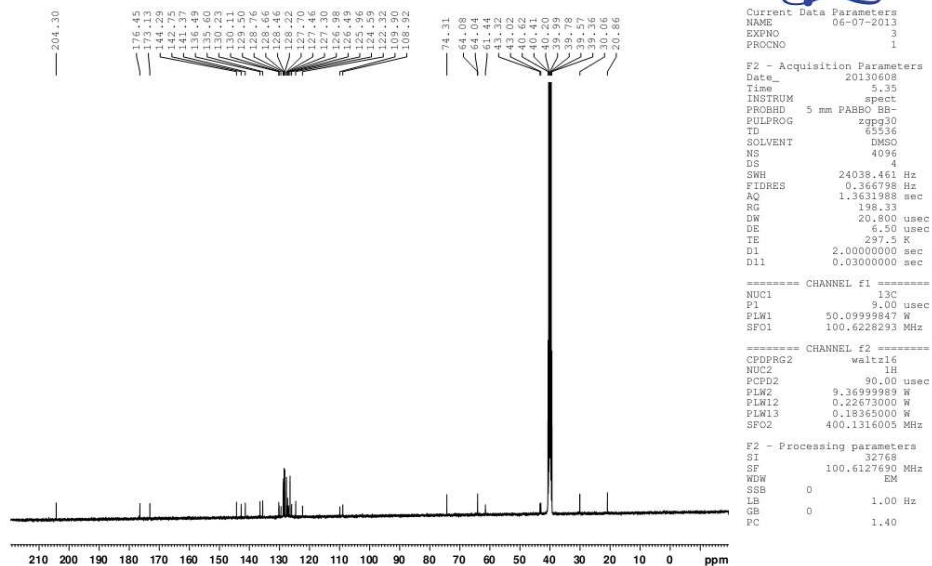
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^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-21

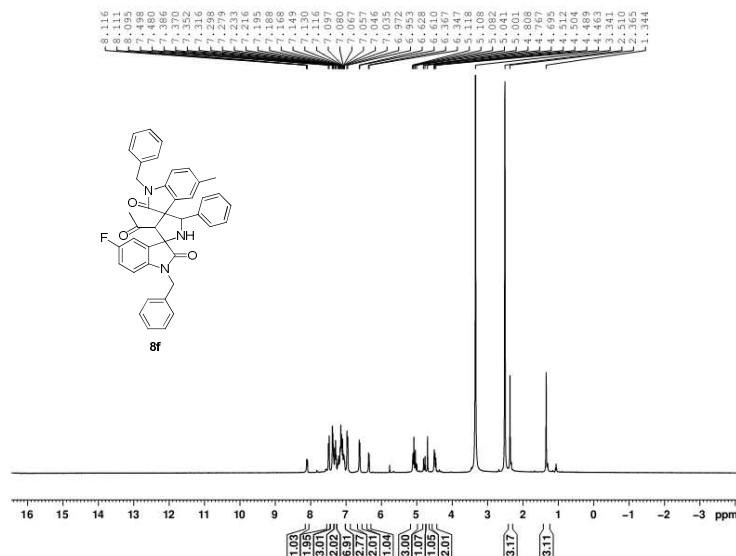


JA-21



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-24

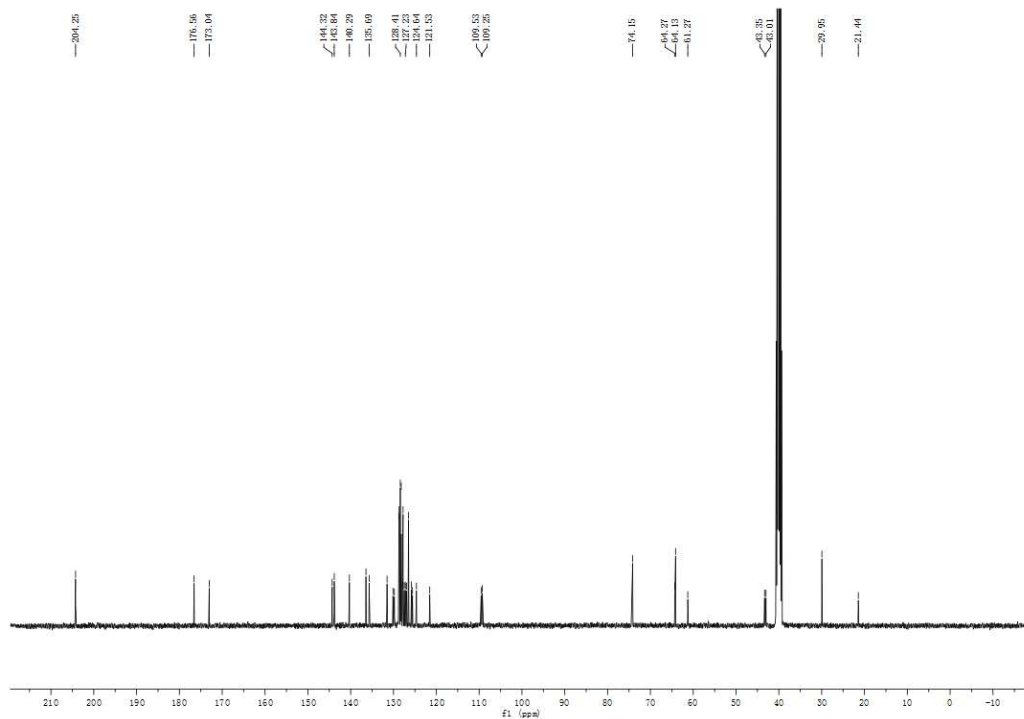


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EXPNO 10
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130607
Time 16.26
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 128
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 198.33
DW 60.800 usec
DE 6.50 usec
TE 296.0 K
D1 1.00000000 sec

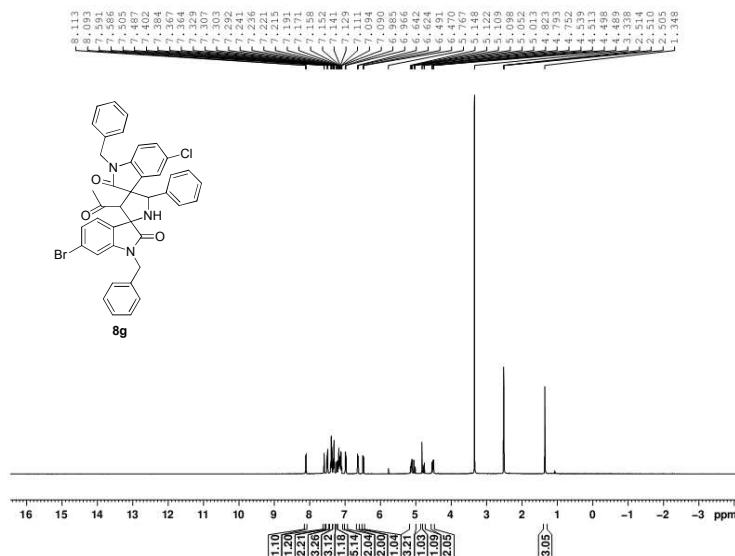
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NUC1 ^1H
P1 14.00 usec
PLW1 9.7299954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-17



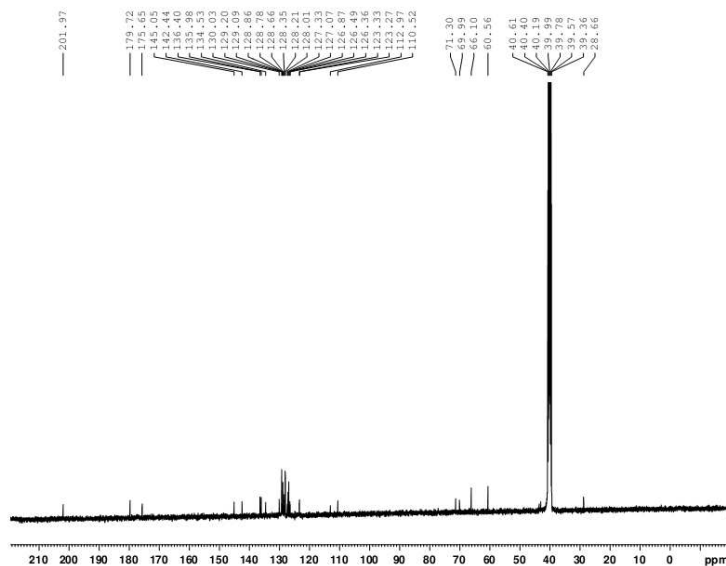
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Date_ 20130604
Time 15.00
INSTRUM spect
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PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 198.33
DW 60.800 usec
DE 6.50 usec
TE 296.2 K
D1 1.00000000 sec

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.00 usec
PLW1 9.7299954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JA-17



Current Data Parameters
NAME 06-05-2013
EXPNO 4
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130606
Time 8.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 4
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.1631988 sec
RG 198.33
DW 20.800 usec
DE 6.50 usec
TE 296.7 K
D1 2.00000000 sec
D11 0.03000000 sec

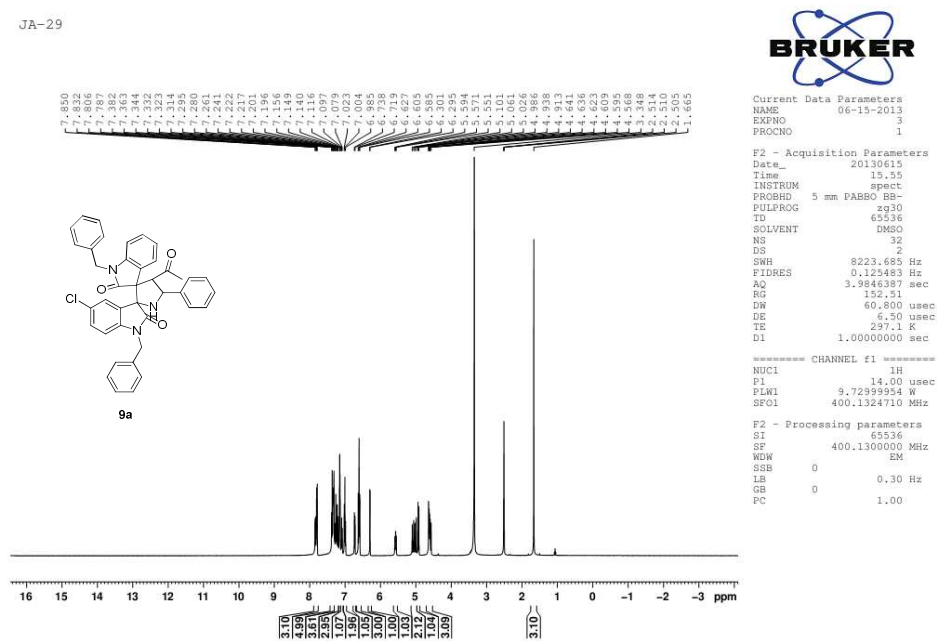
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NUC1 ^{13}C
P1 9.00 usec
PLW1 50.09999847 W
SFO1 100.6226293 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PLW2 9.3699989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

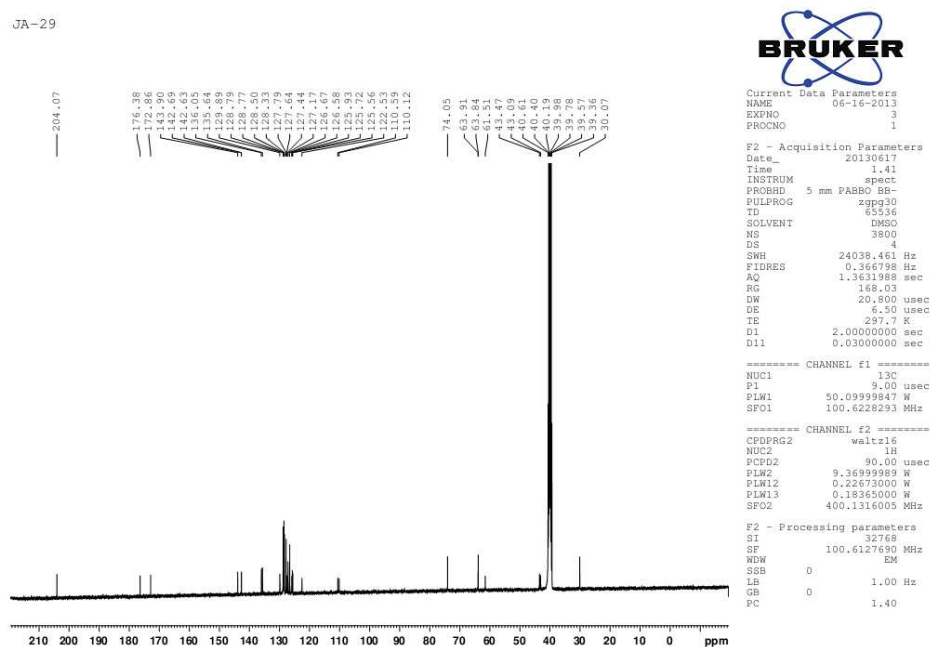
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GB 0
PC 1.40

^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-29

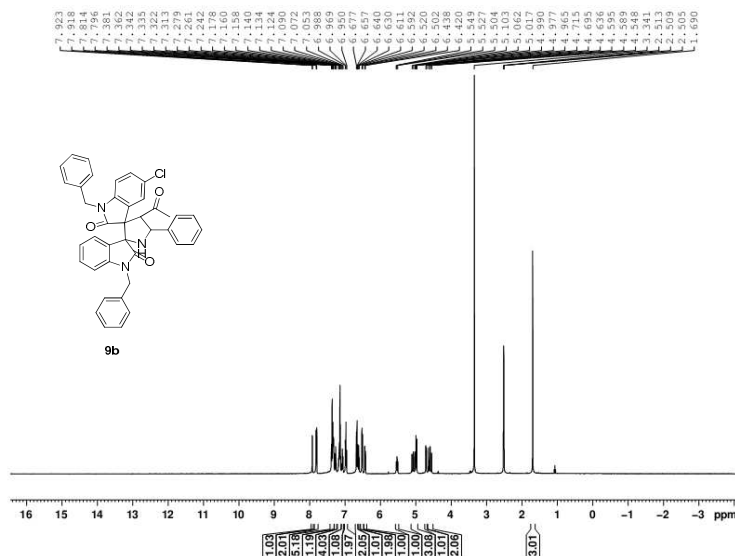


JA-29



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-16



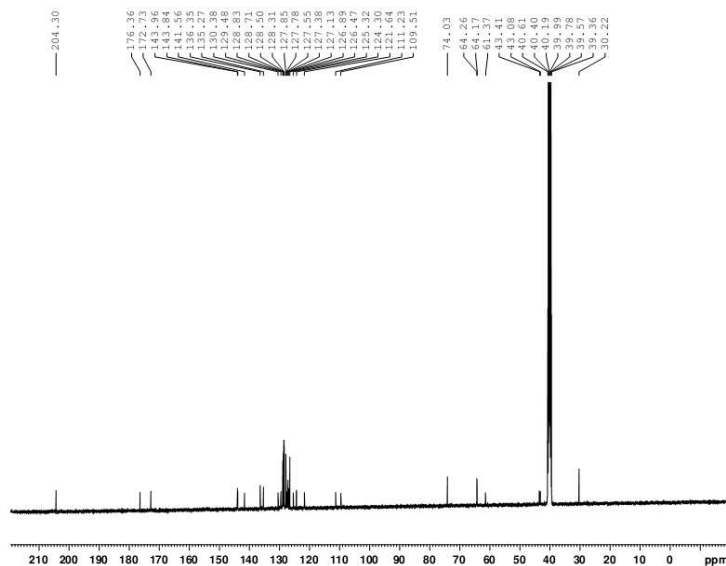
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EXPNO 10
PROCNO 1

F2 - Acquisition Parameters
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Time 14.54
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PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 198.33
DW 60.800 usec
DE 6.50 usec
TE 296.0 K
D1 1.00000000 sec

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.00 usec
PLW1 9.7299954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JA-16



Current Data Parameters
NAME 06-05-2013
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130606
Time 4.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 4
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.1631988 sec
RG 60.33
DW 20.800 usec
DE 6.50 usec
TE 296.6 K
D1 2.00000000 sec
D11 0.03000000 sec

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 9.00 usec
PLW1 50.09999847 W
SFO1 100.6226293 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PLW2 9.36999989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

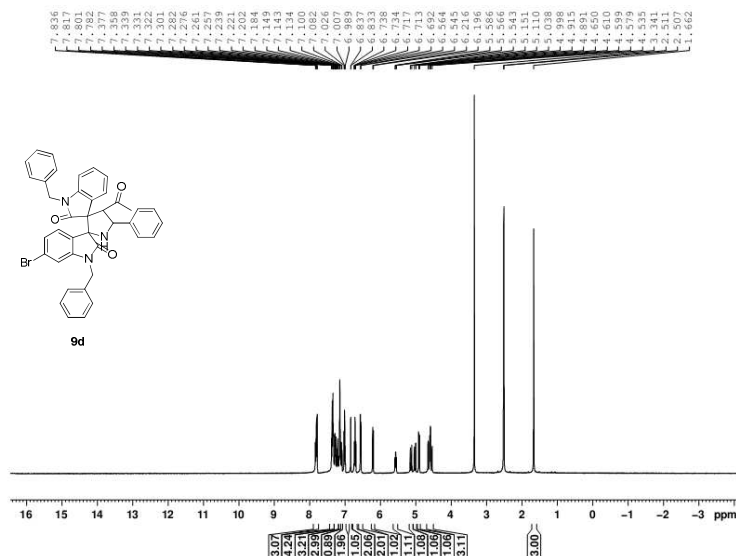
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GB 0
PC 1.40

JA-31



^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JK-12



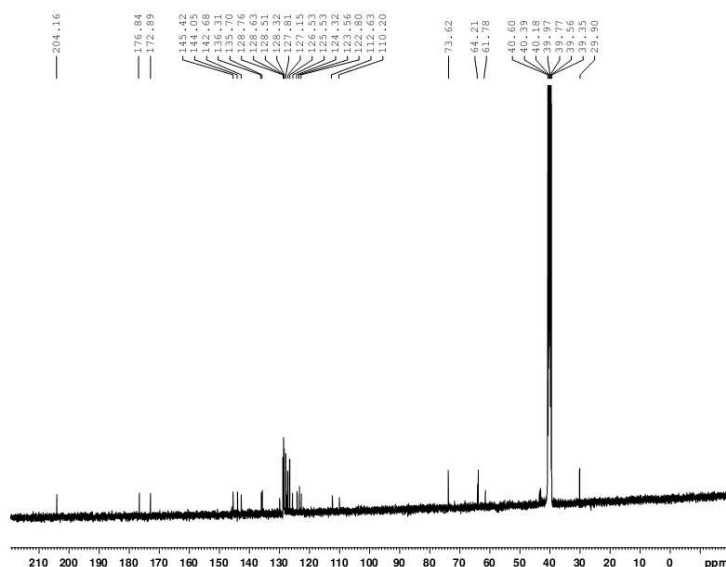
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NAME 05-31-2013
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
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Time 18.55
INSTRUM spect
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PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 198.33
DW 60.800 usec
DE 6.50 usec
TE 294.7 K
D1 1.00000000 sec

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.00 usec
PLW1 9.7299954 W
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

JK-12



Current Data Parameters
NAME 06-02-2013
EXPNO 14
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130603
Time 4.21
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 3072
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.1631988 sec
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DE 6.50 usec
TE 295.4 K
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D11 0.03000000 sec

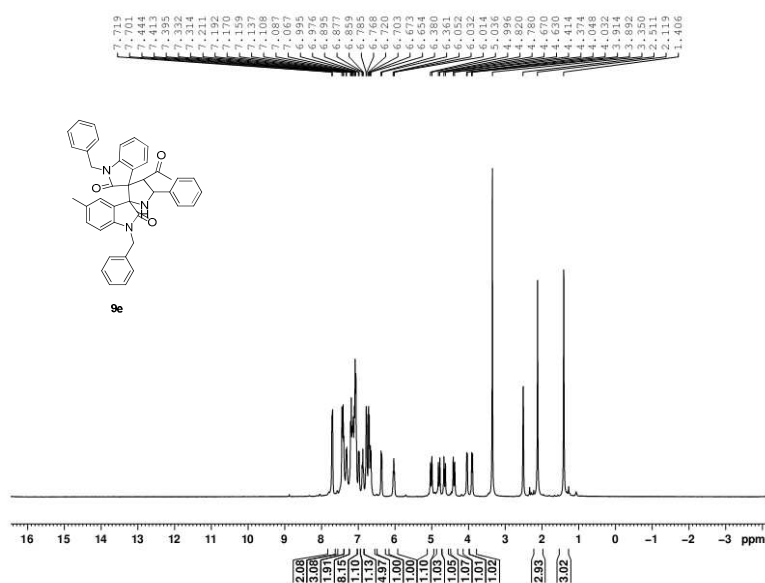
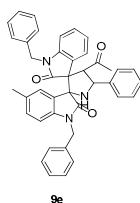
===== CHANNEL f1 =====
NUC1 ^{13}C
P1 9.00 usec
PLW1 50.09999847 W
SFO1 100.6226293 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PLW2 9.3699989 W
PLW12 0.22673000 W
PLW13 0.18365000 W
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

¹H NMR (400 MHz; DMSO-*d*₆), ¹³C NMR (100 MHz; DMSO-*d*₆)

JA-20



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Current Data Parameters
NAME          06-07-2013
EXPNO        2
PROCNO       1

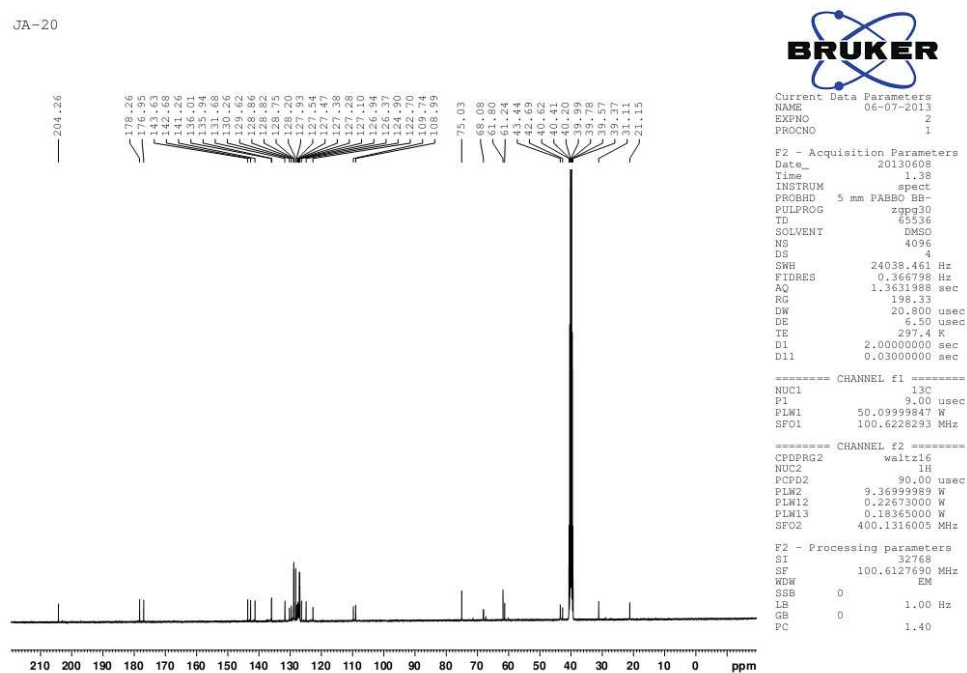
F2 - Acquisition Parameters
Date_        20130607
Time         13.58
INSTRUM      spect
PROBHD       5 mm PABBO ABX
PULPROG      zg30
TD           65536
SOLVENT      DMSO
SOLVENT      DMSO
NS            32
DS            2
FIDRES       8223.685 Hz
AQ           0.125483 sec
AQ           3.9846387 sec
DE           138.24 Hz
DE           60.800 usec
RW           6.50 usec
TE           296.1 K
D1           1.0000000 sec

===== CHANNEL f1 =====
NUC1          1H
NUC2          14.00 usec
PLW1         9.72999954 W
SFO1         400.1327101 MHz

F2 - Processing parameters
SI            5536
SF            400.1300000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

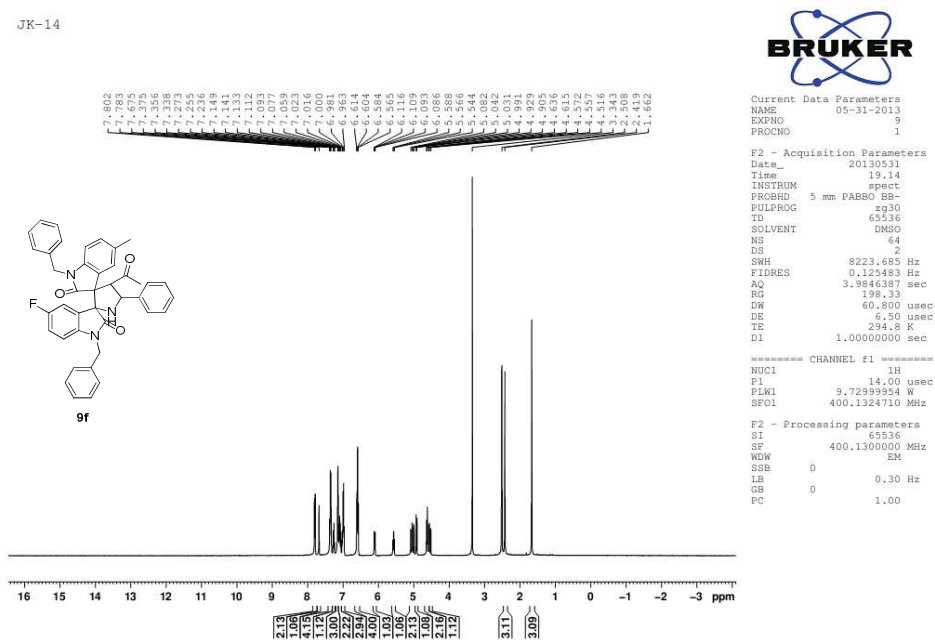
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JA-20

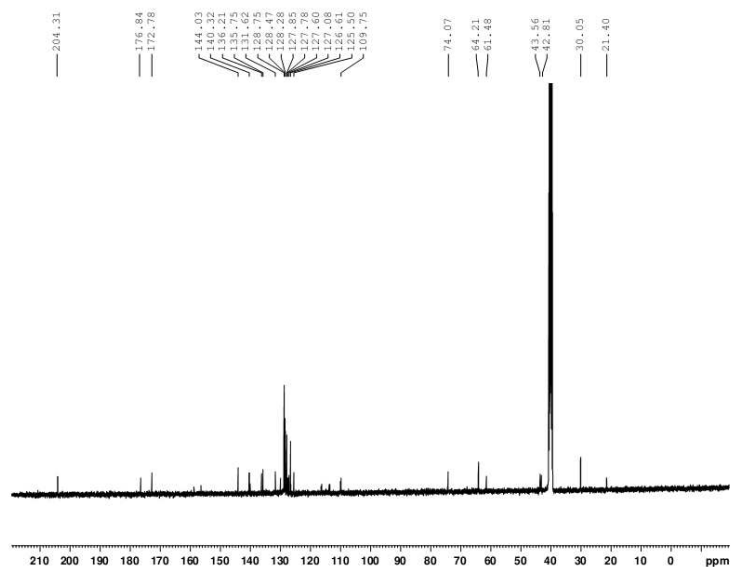


^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JK-14



JK-14



Current Data Parameters
 NAME 06-02-2013
 EXPNO 15
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20130603
 Time 7.19
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 3072
 DS 4
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 198.33
 DW 20.800 usec
 DE 6.50 usec
 TE 295.5 K
 D1 2.00000000 sec
 D11 0.03000000 sec

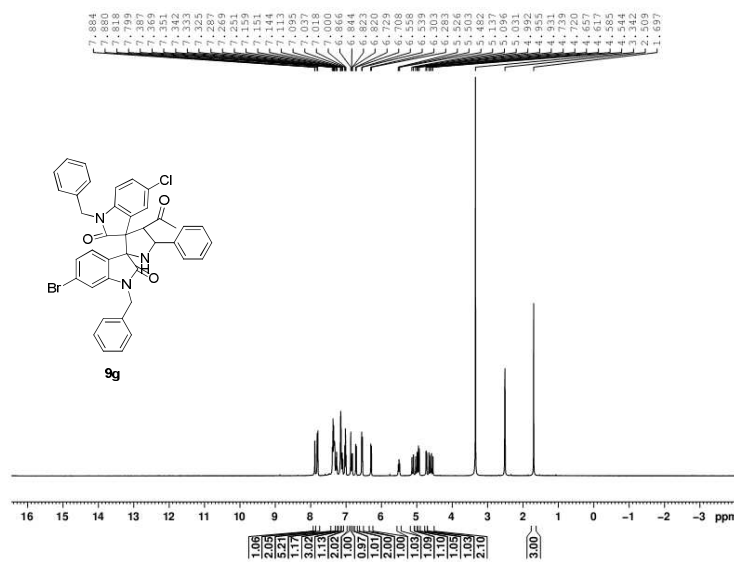
===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PLW1 50.09999847 W
 SFO1 100.6228293 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 P2 90.00 usec
 PLW2 9.36999989 W
 PLW12 0.22673000 W
 PLW13 0.18365000 W
 SFO2 400.1316005 MHz

F2 - Processing parameters
 S1 32768
 SF 100.6127690 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-26



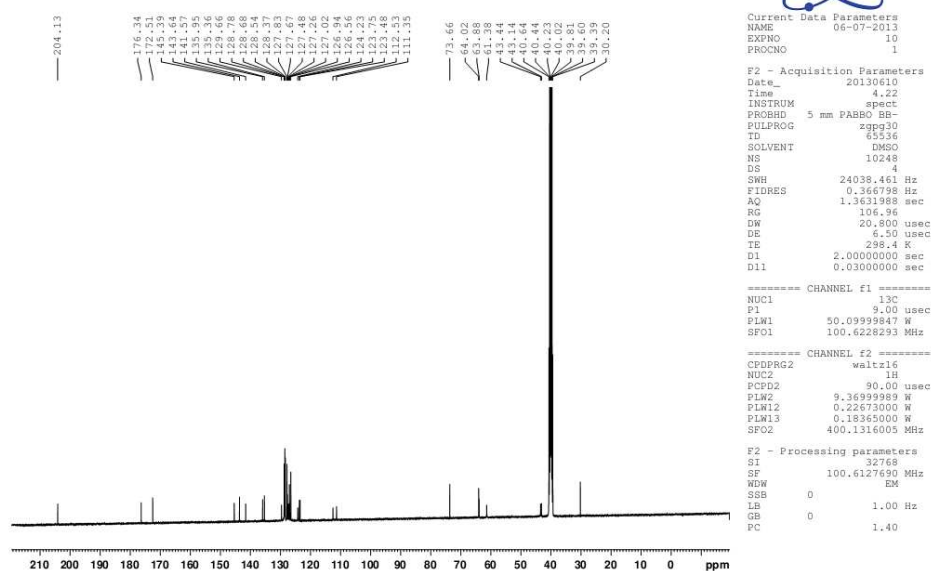
Current Data Parameters
 NAME 06-07-2013
 EXPNO 8
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20130607
 Time 15.09
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 32
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 198.33
 DW 60.800 usec
 DE 6.50 usec
 TE 296.1 K
 D1 1.00000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PLW1 9.72999954 W
 SFO1 400.1324710 MHz

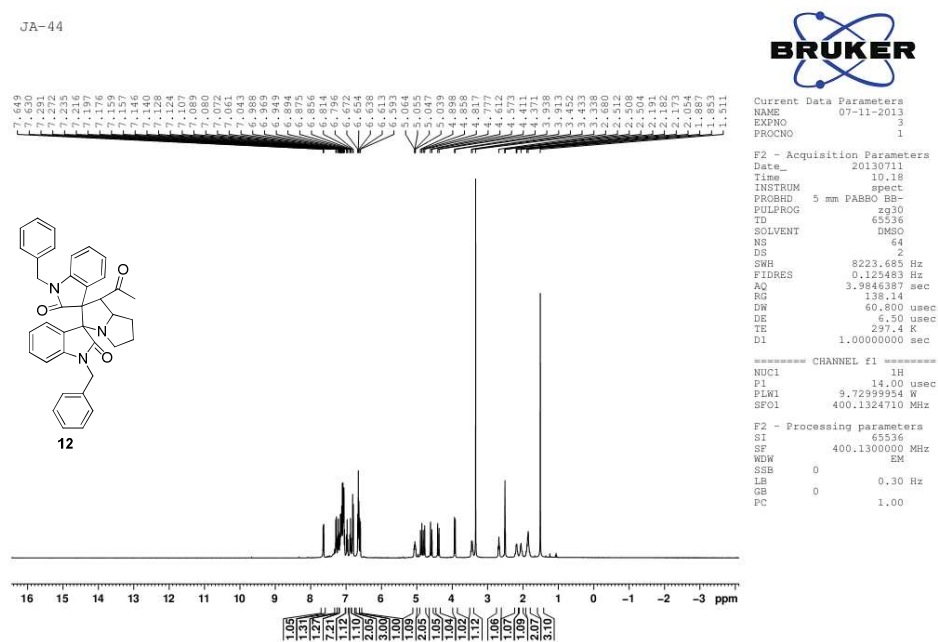
F2 - Processing parameters
 S1 65536
 SF 400.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

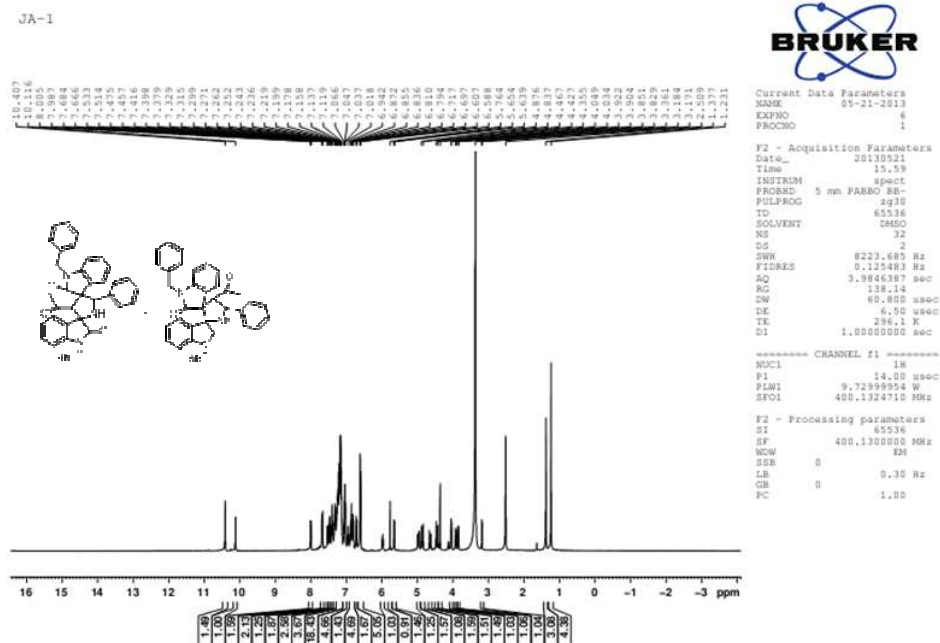
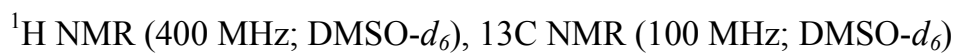
JA-26



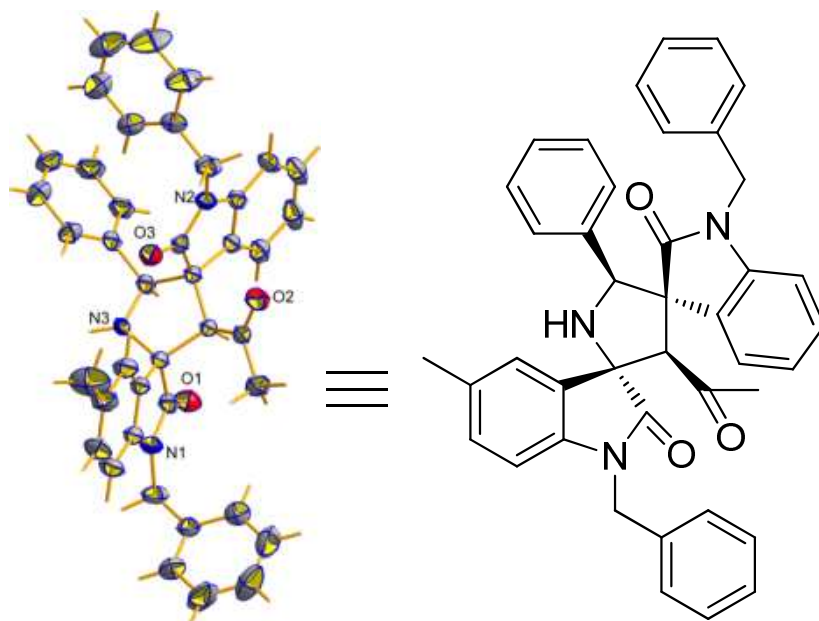
^1H NMR (400 MHz; DMSO- d_6), ^{13}C NMR (100 MHz; DMSO- d_6)

JA-44

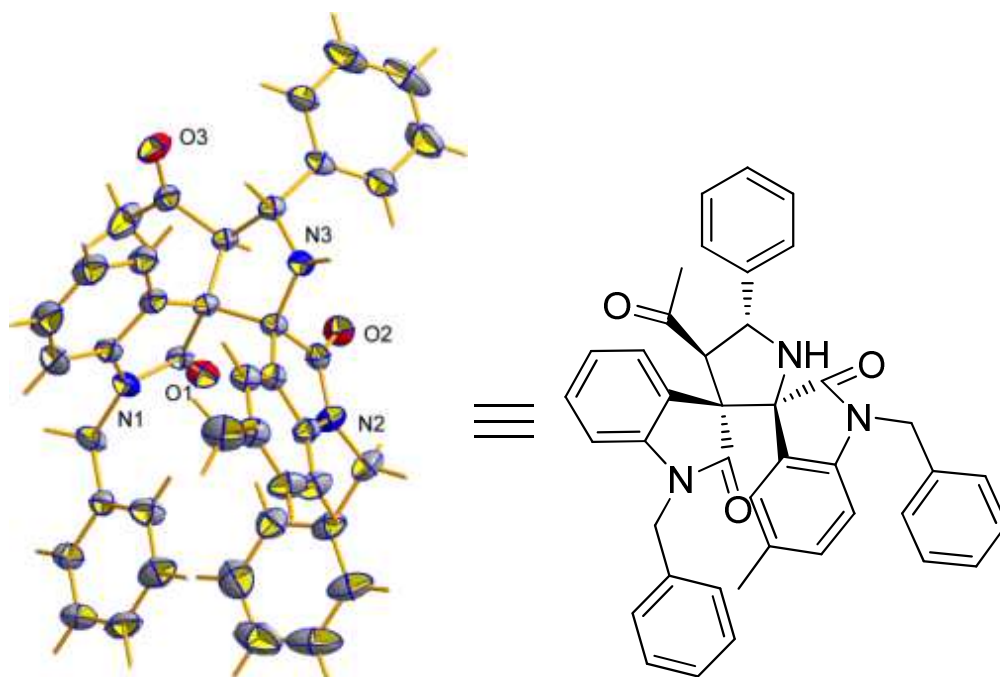




Crystal Structure of Compound **8e**:



Crystal Structure of Compound **9e**:



Crystal Structure of Compound **12**:

