

Supporting Information
for
Aluminacyclopentanes in the synthesis of 3-
substituted phospholanes and α,ω -bisphospholanes

Vladimir A. D'yakonov*, Alevtina L. Makhamatkhanova, Rina A. Agliullina, Leisan K. Dilmukhametova, Tat'yana V. Tyumkina, and Usein M. Dzhemilev

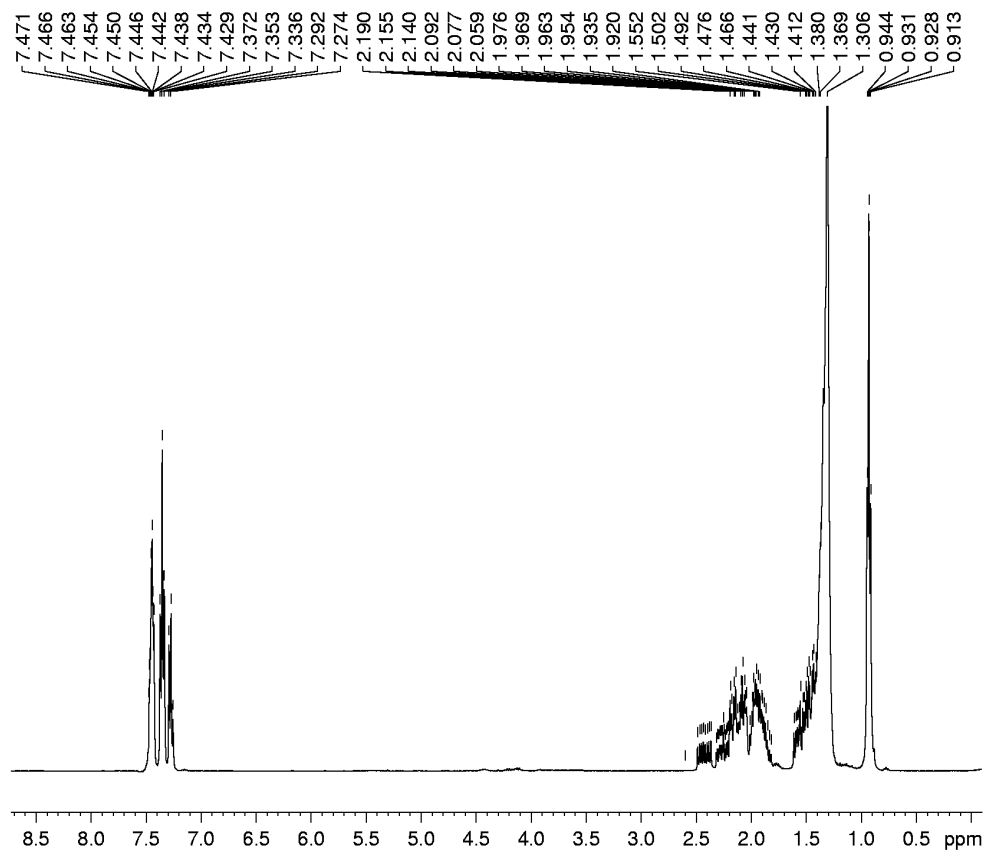
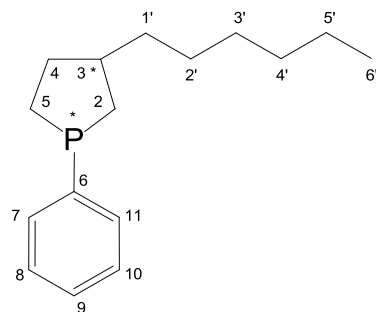
Address: Institute of Petrochemistry and Catalysis of Russian Academy of Sciences,
Prospekt Oktyabrya, Ufa 450075, Russian Federation

Email: Vladimir D'yakonov* - DyakonovVA@gmail.com

*Corresponding author

NMR spectra

¹H NMR (CDCl₃): **2b**



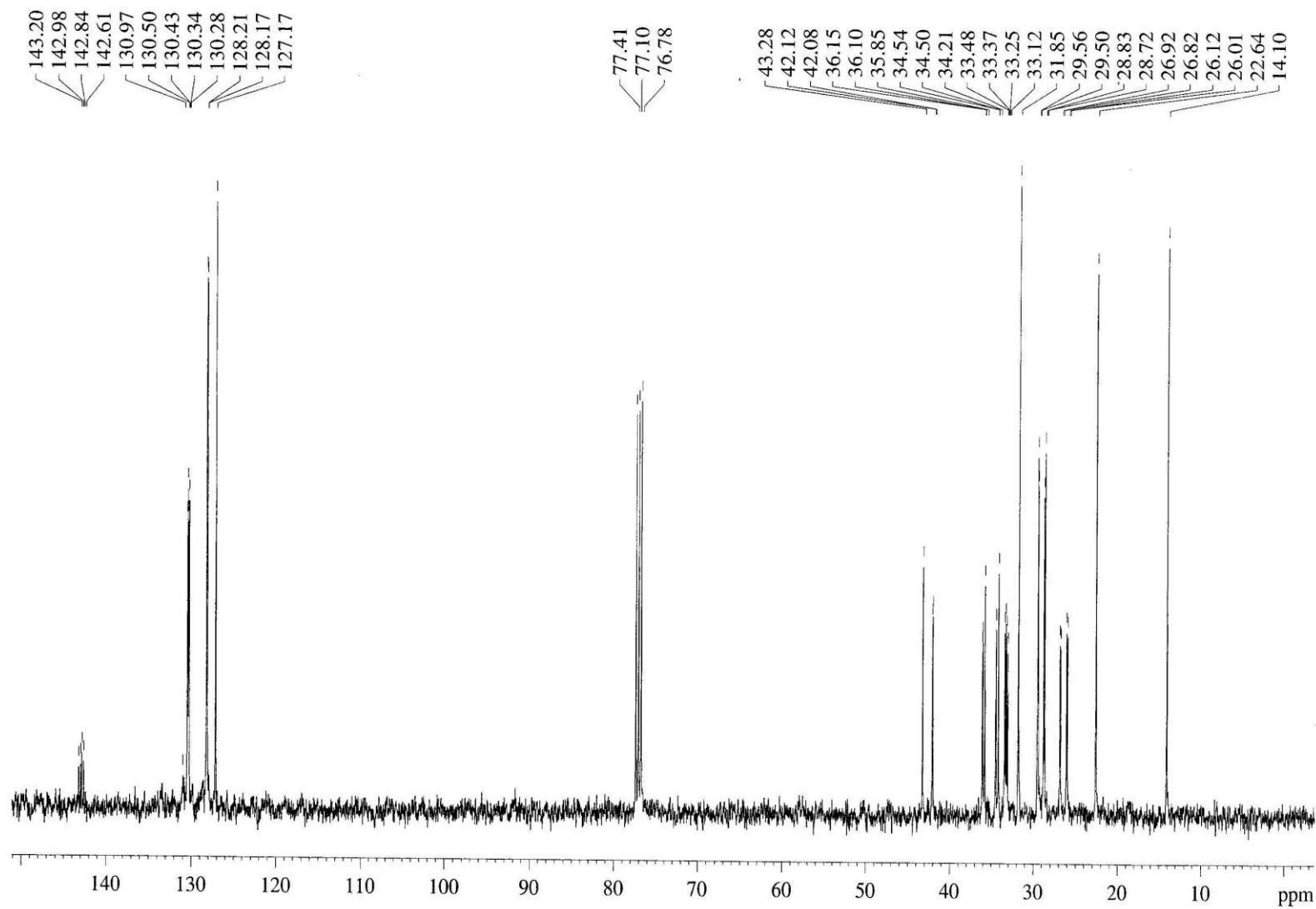
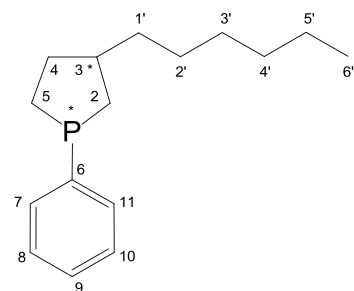
Current Data Parameters
NAME mahamathanova
EXPNO 122
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110630
Time 15.29
INSTRUM spect
PROBHD 5 mm PABBO BI
PULPROG zg
TD 16384
SOLVENT CDCl3
NS 1
DS 0
SWH 3612.717 Hz
FIDRES 0.220503 Hz
AQ 2.2675457 sec
RG 12.7
DW 138.400 usec
DE 6.00 usec
TE 285.3 K
D1 5.00000000 sec
TD0 1

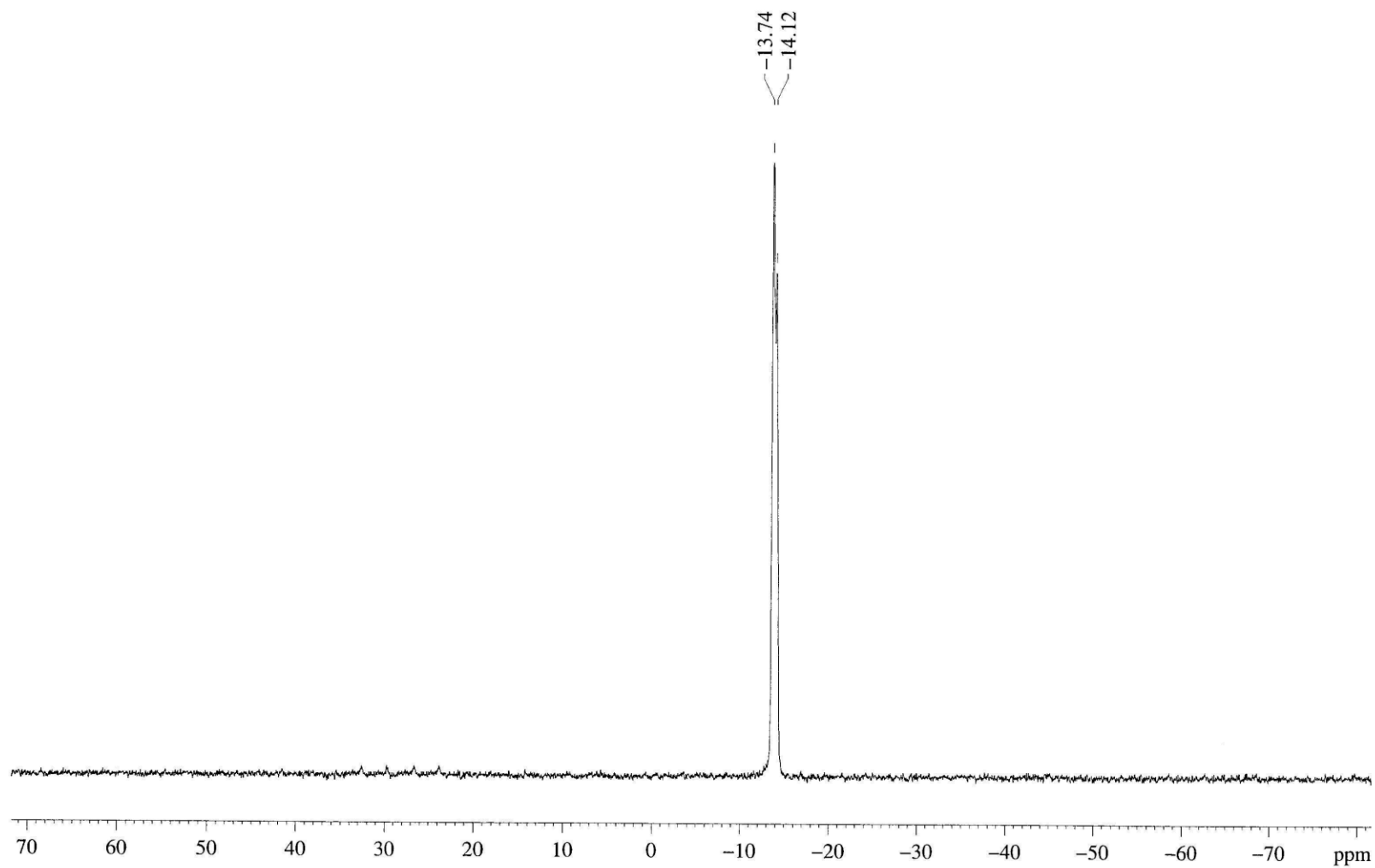
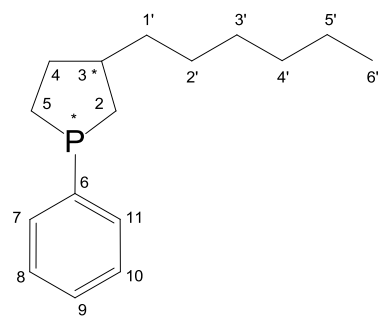
===== CHANNEL f1 =====
NUC1 1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317676 MH

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

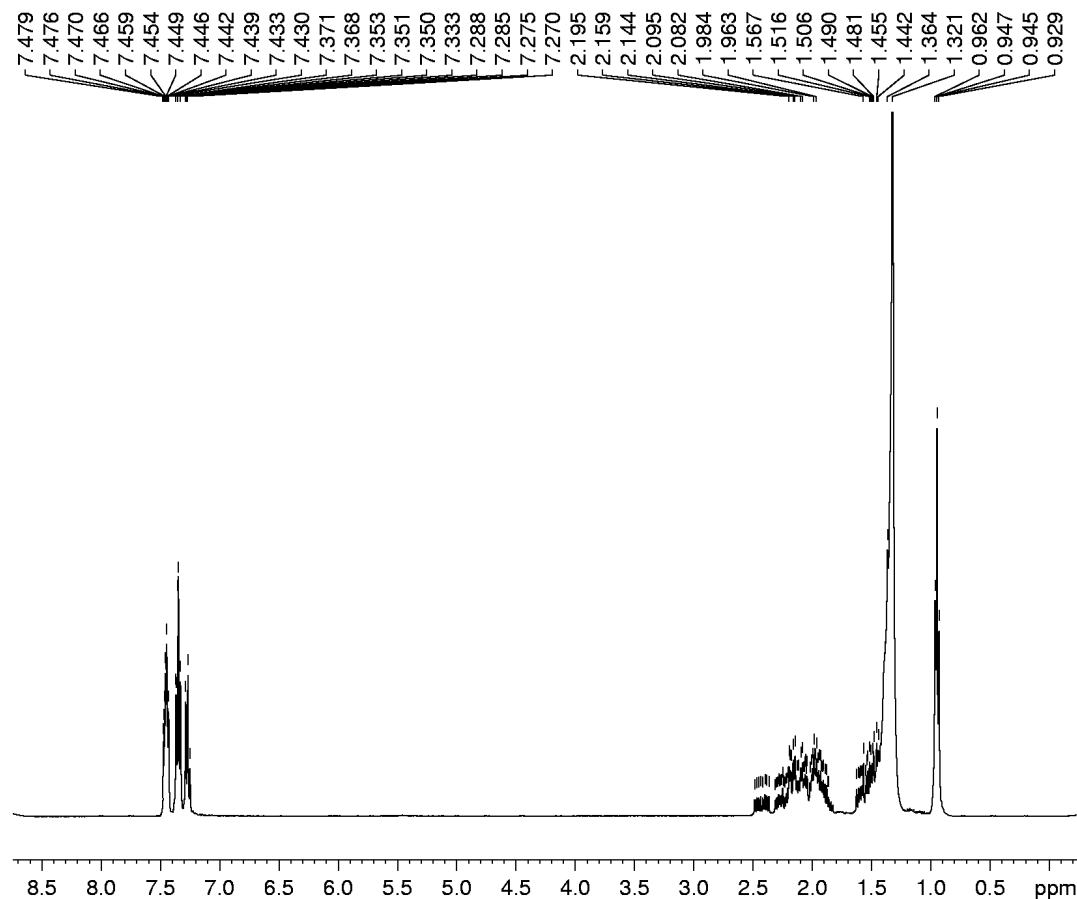
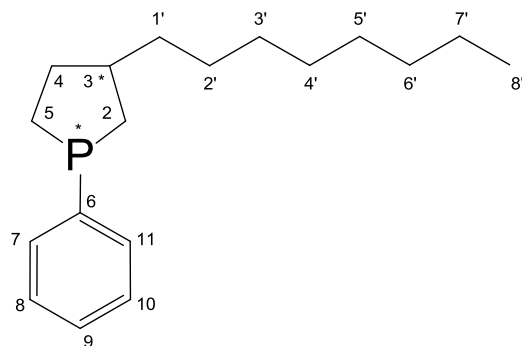
^{13}C NMR (CDCl_3): **2b**



^{31}P NMR (CDCl_3): **2b**



^1H NMR (CDCl_3): **2c**



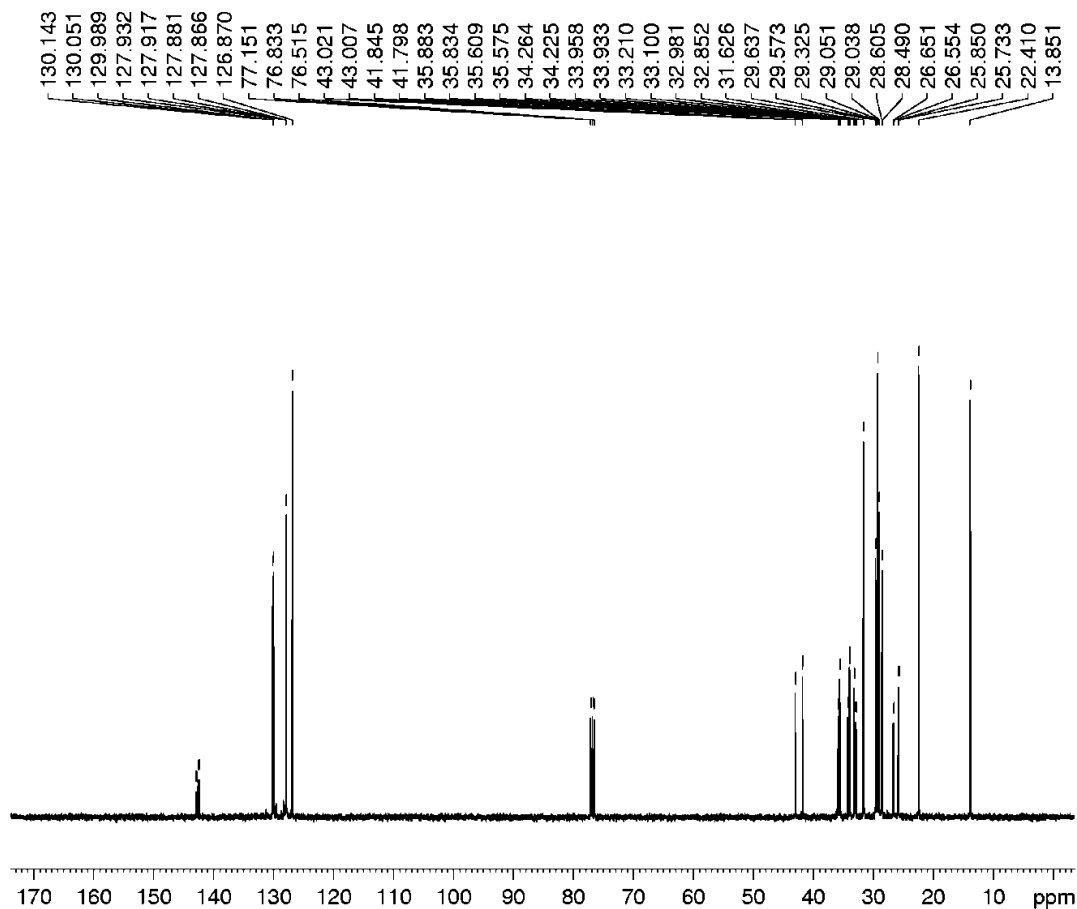
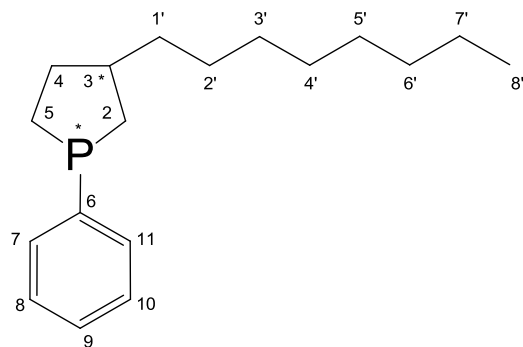
Current Data Parameters
NAME MRC-12
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121207
Time 13.27
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3591.954 Hz
FIDRES 0.219235 Hz
AQ 2.2806528 sec
RG 22.6
DW 139.200 usec
DE 6.00 usec
TE 297.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317034 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **2c**



Current Data Parameters
NAME MRC-12
EXPNO 2
PROCNO 1

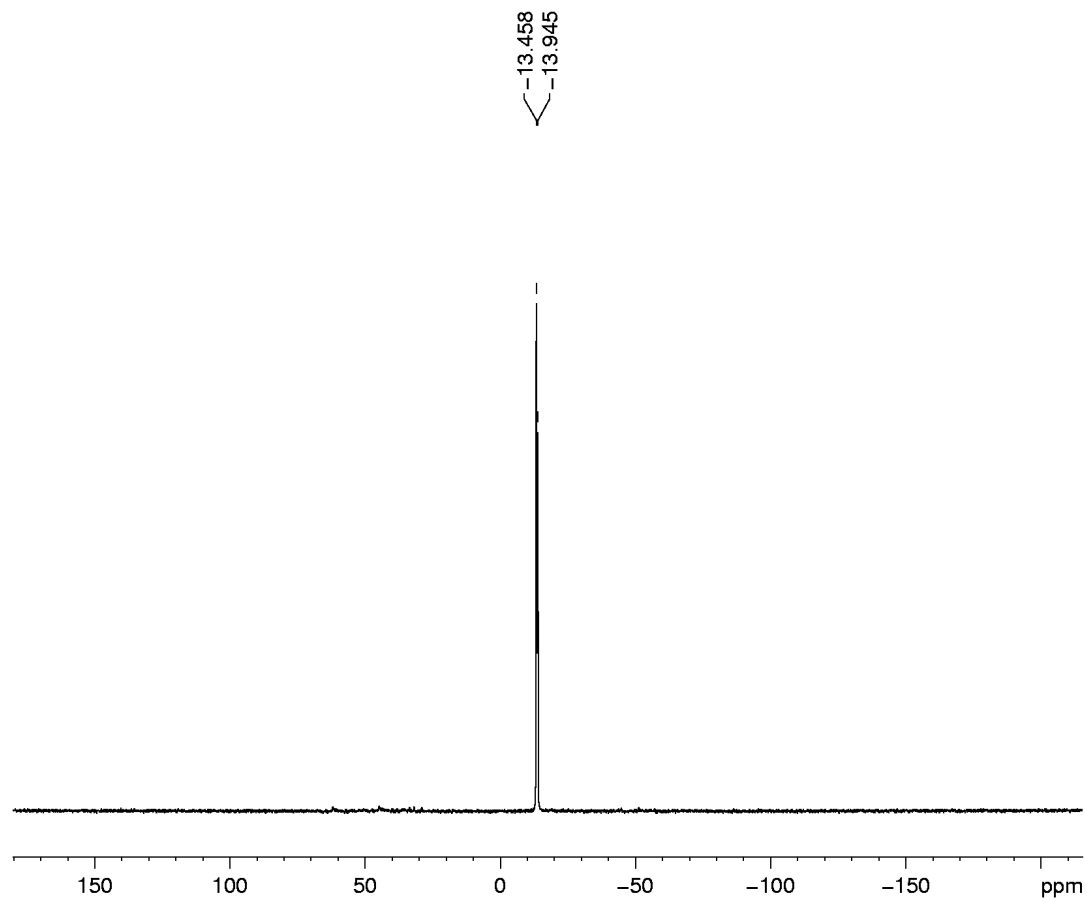
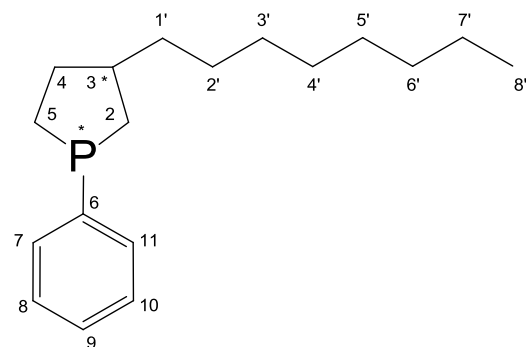
F2 - Acquisition Parameters
Date_ 20121207
Time 13.32
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 124
DS 2
SWH 17857.143 Hz
FIDRES 0.544957 Hz
AQ 0.9175040 sec
RG 2050
DW 28.000 usec
DE 6.00 usec
TE 298.0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6213714 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1319206 MHz

F2 - Processing parameters
SI 65536
SF 100.6128032 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **2c**



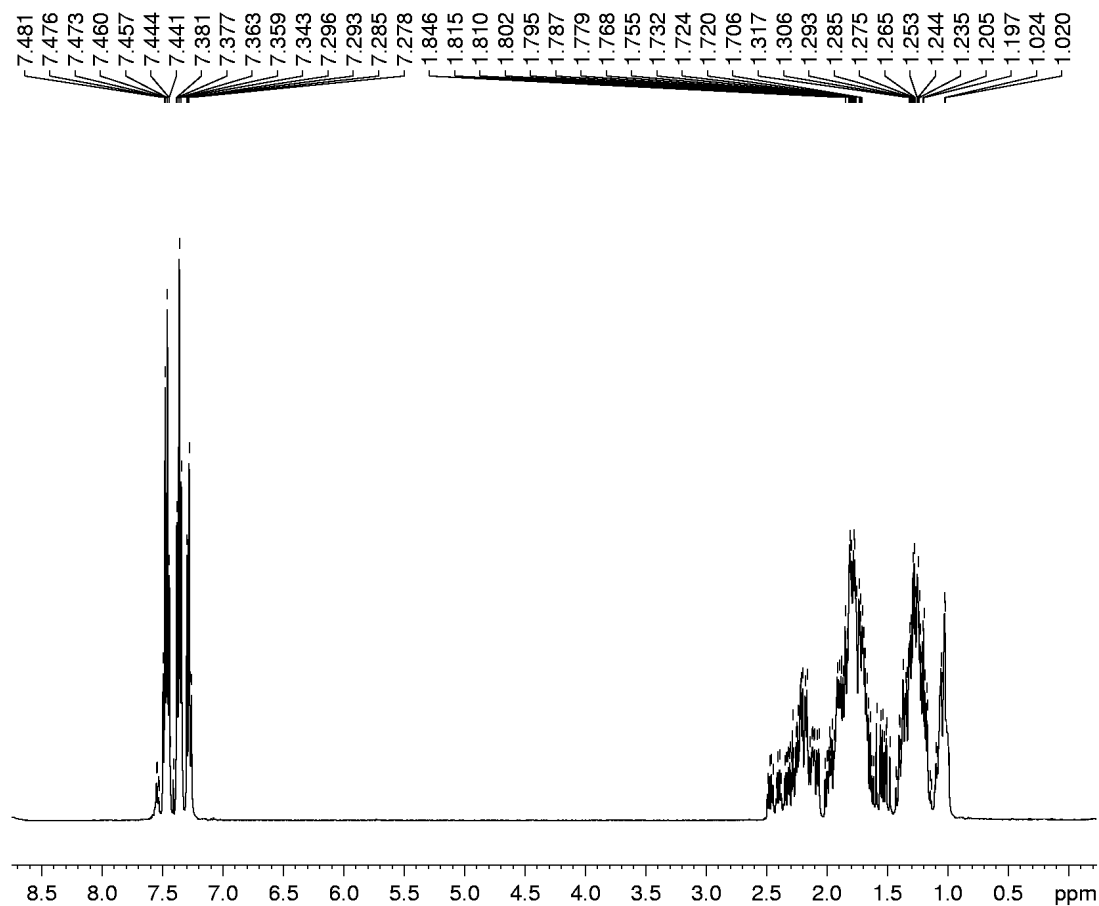
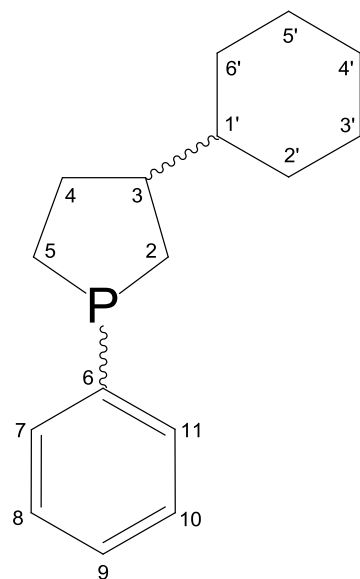
Current Data Parameters
 NAME MRC-12
 EXPNO 6
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20121207
 Time 14.06
 INSTRUM spect
 PROBHD 5 mm PABBO BE
 PULPROG zg
 TD 32768
 SOLVENT CDCl_3
 NS 30
 DS 0
 SWH 64102.563 Hz
 FIDRES 1.956255 Hz
 AQ 0.2555904 sec
 RG 2050
 DW 7.800 usec
 DE 6.00 usec
 TE 297.9 K
 D1 2.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^{31}P
 P1 9.10 usec
 PL1 0 dB
 PL1W 24.94303322 W
 SFO1 161.9727429 MHz

F2 - Processing parameters
 SI 16384
 SF 161.9755930 MHz
 WDW EM
 SSB 0
 LB 5.00 Hz
 GB 0
 PC 1.40

^1H NMR (CDCl_3): **2d**



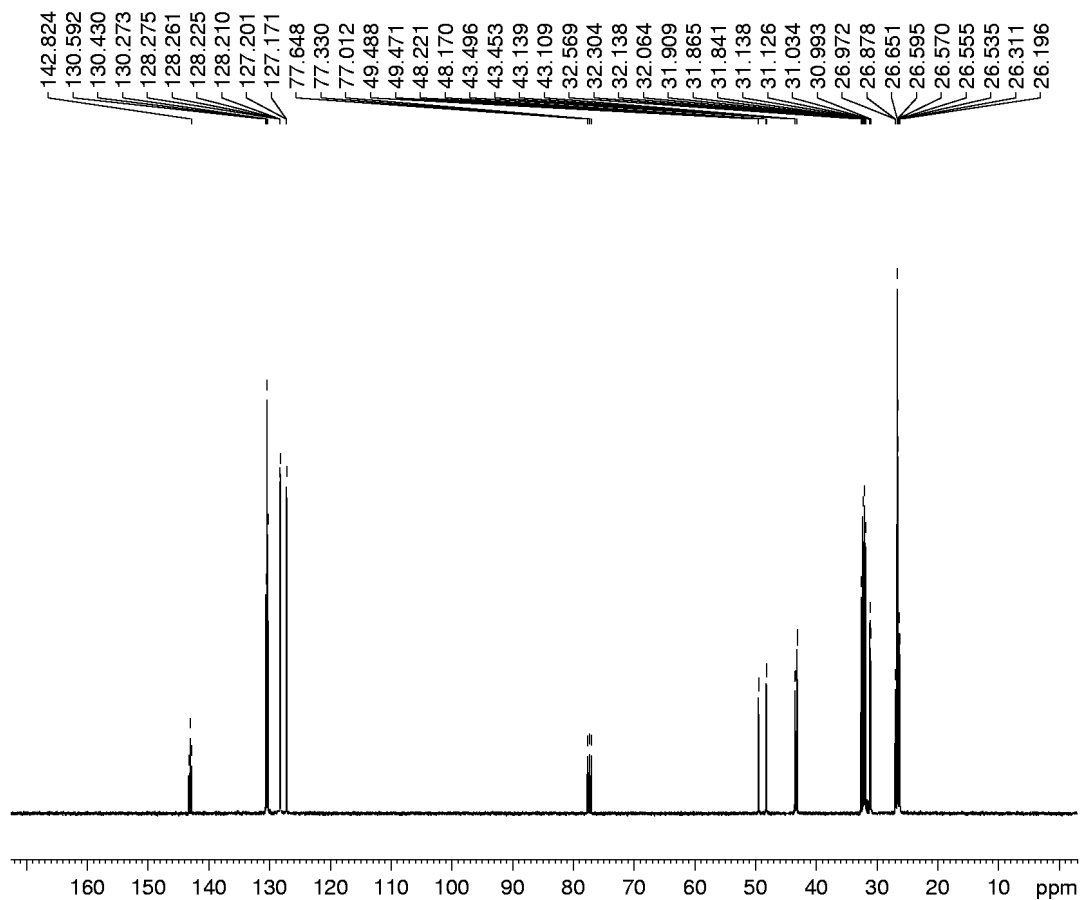
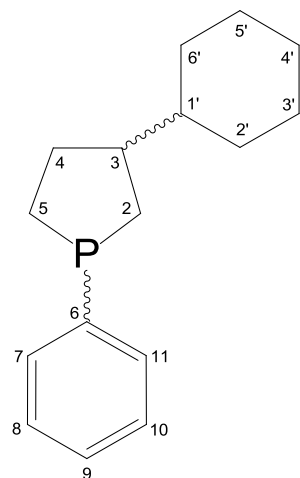
Current Data Parameters
 NAME MRC-07
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20121122
 Time 18.23
 INSTRUM spect
 PROBHD 5 mm PABBO BI
 PULPROG zg30
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 3591.954 Hz
 FIDRES 0.219235 Hz
 AQ 2.2806528 sec
 RG 12.7
 DW 139.200 usec
 DE 6.00 usec
 TE 298.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^1H
 P1 14.80 usec
 PL1 0 dB
 PL1W 8.86695957 W
 SFO1 400.1317034 MH

F2 - Processing parameters
 SI 32768
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

^{13}C NMR (CDCl_3): **2d**



Current Data Parameters

NAME MRC-07
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters

Date_ 20121122
Time 18.24
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 231
DS 2
SWH 23148.148 Hz
FIDRES 0.706425 Hz
AQ 0.7077888 sec
RG 2050
DW 21.600 usec
DE 6.00 usec
TE 298.3 K
D1 1.0000000 sec
D11 0.0300000 sec
TD0 8

===== CHANNEL f1 =====

NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6230315 MHz

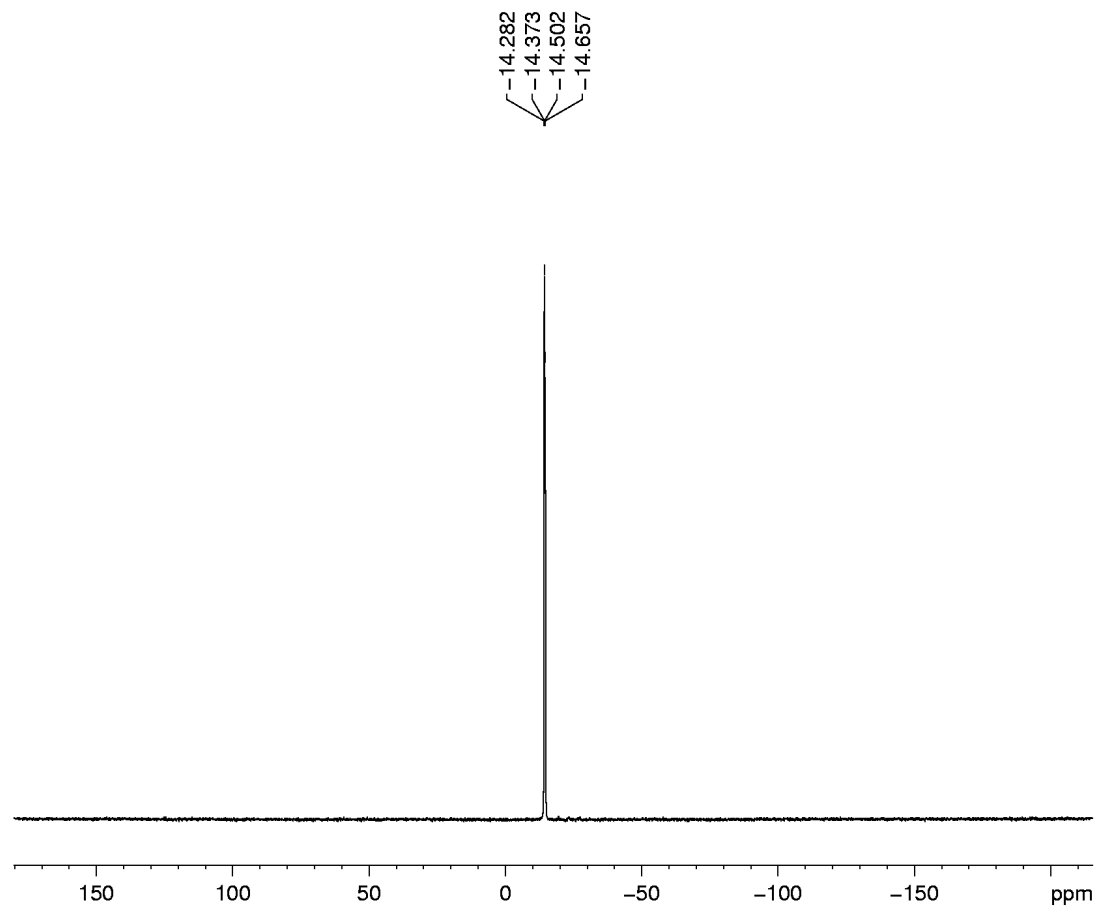
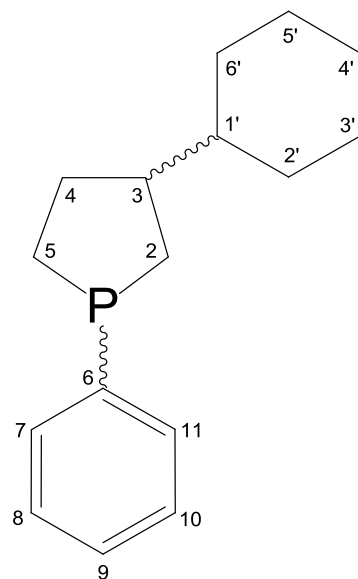
===== CHANNEL f2 =====

CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1319206 MHz

F2 - Processing parameters

SI 65536
SF 100.6127727 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **2d**



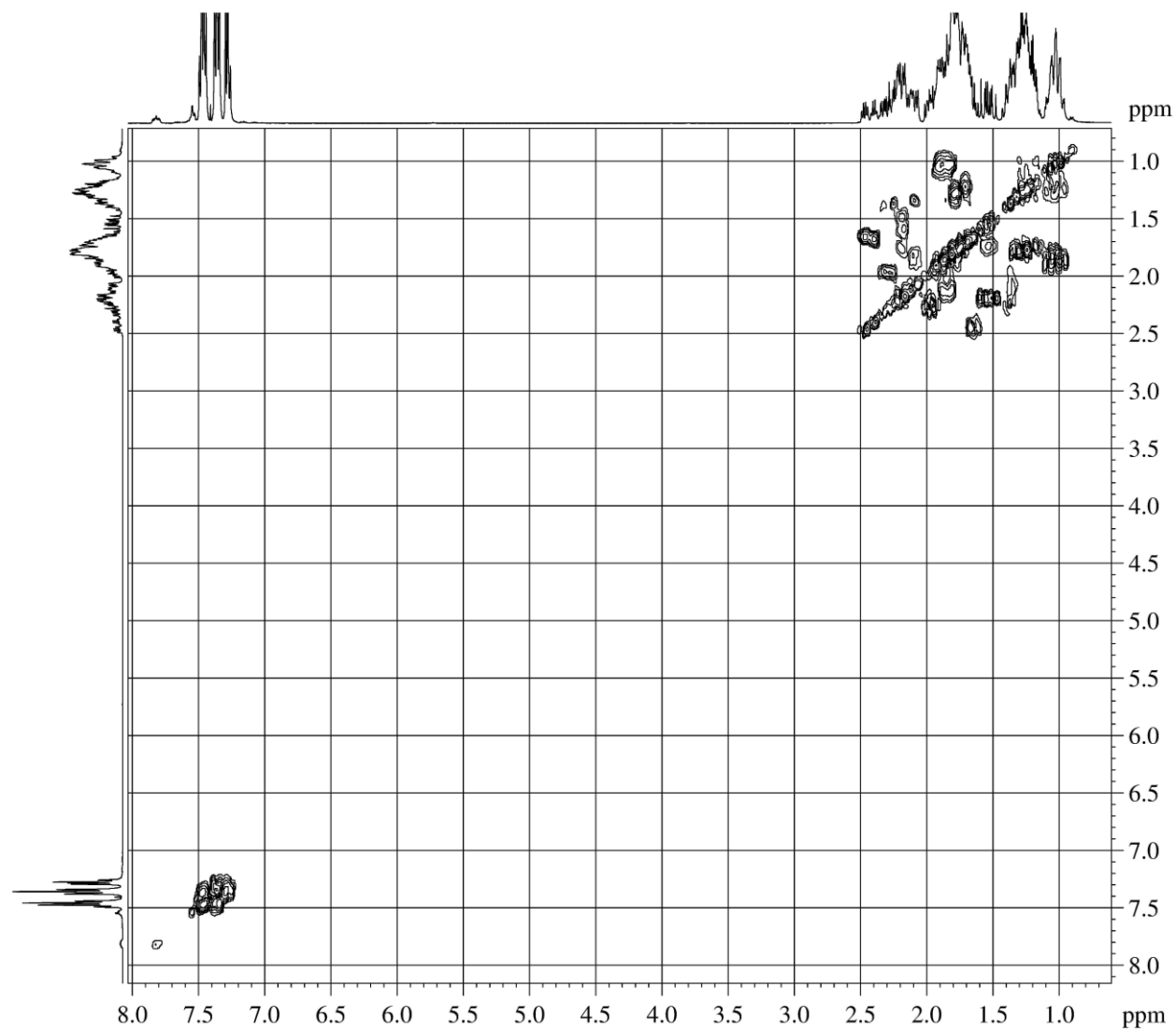
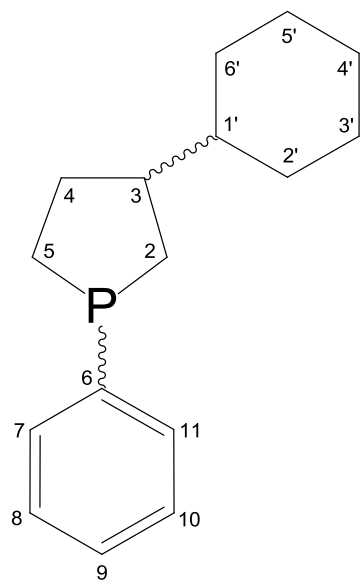
Current Data Parameters
NAME MRC-07
EXPNO 6
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121122
Time_ 18.17
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 32
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 298.2 K
D1 2.00000000 sec
TD0 1

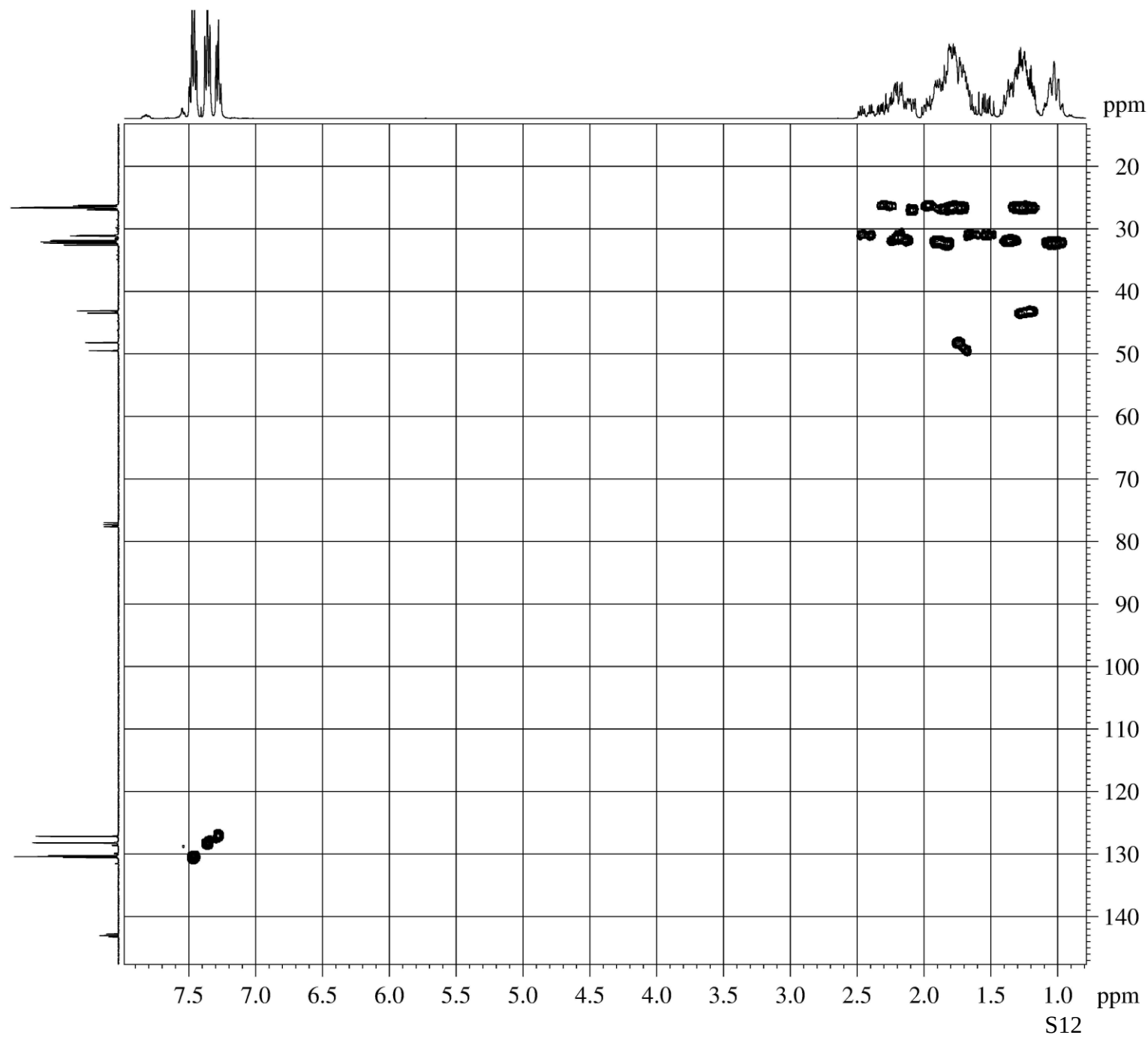
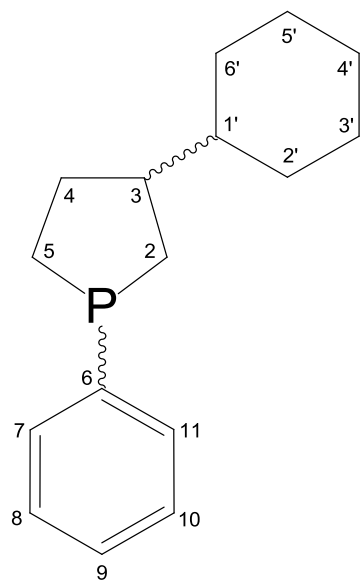
===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MH

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

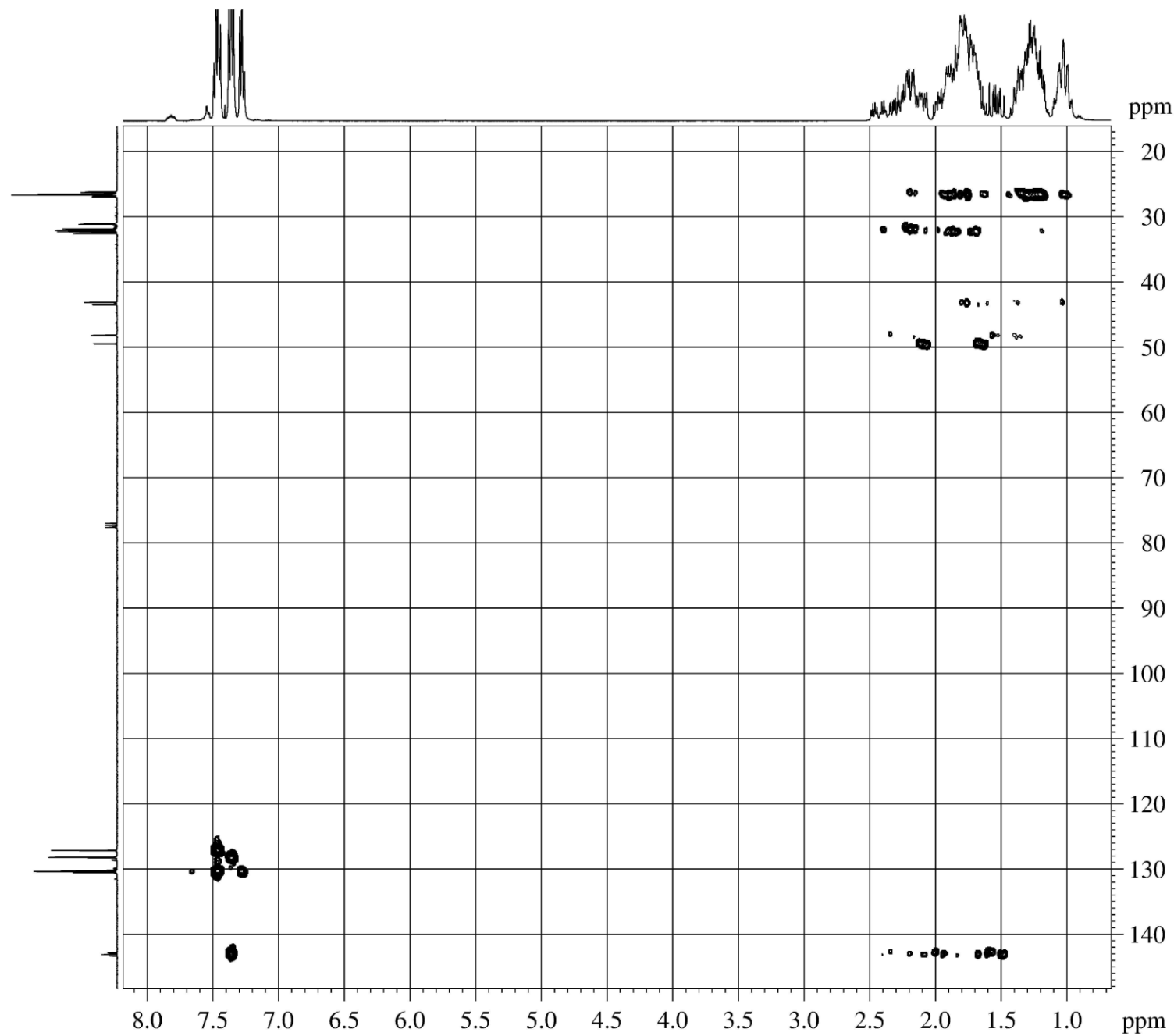
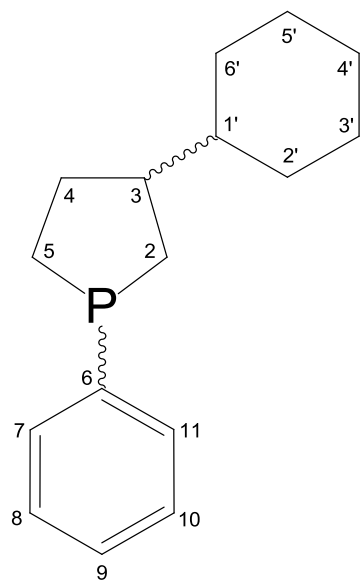
COSYHH: **2d**



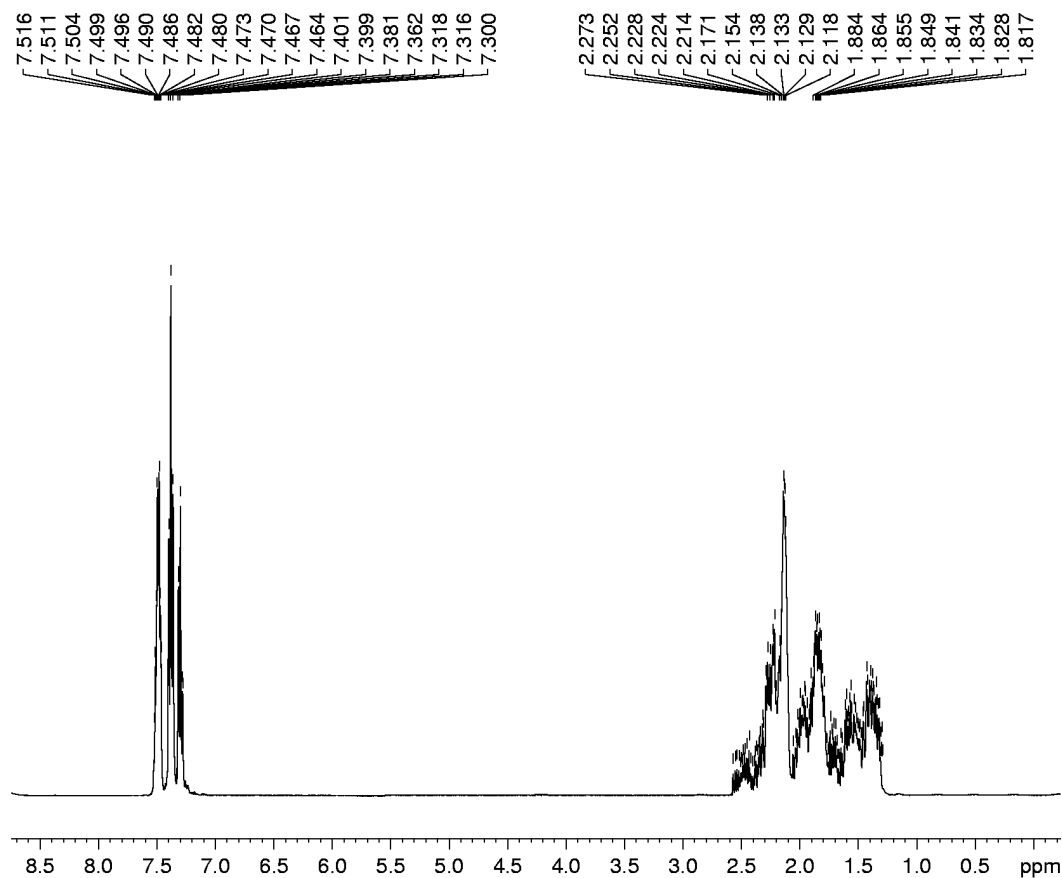
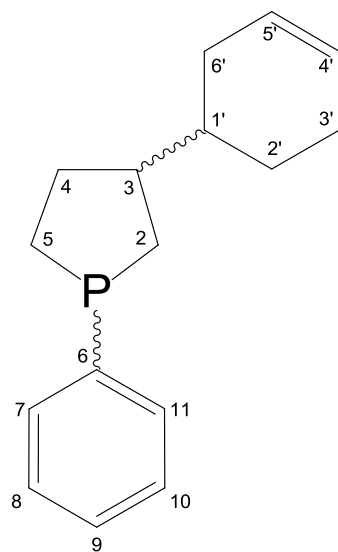
HSQC: 2d



HMBC: **2d**



^1H NMR (CDCl_3): **2e**



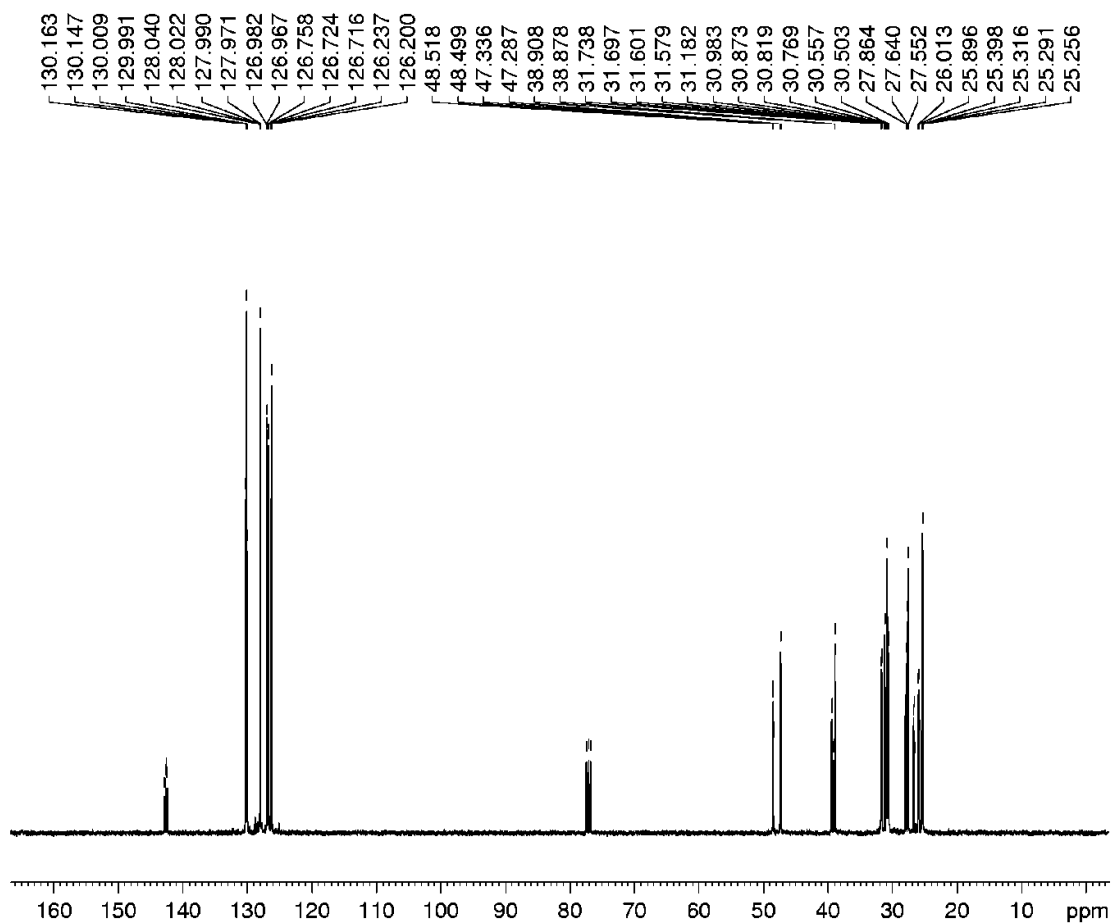
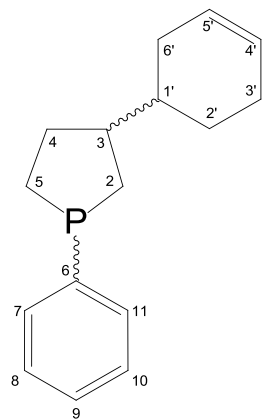
Current Data Parameters
NAME MRC-08
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121122
Time 19.02
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3591.954 Hz
FIDRES 0.219235 Hz
AQ 2.2806528 sec
RG 12.7
DW 139.200 usec
DE 6.00 usec
TE 298.3 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317034 MH.

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **2e**



Current Data Parameters
NAME MRC-08
EXPNO 2
PROCNO 1

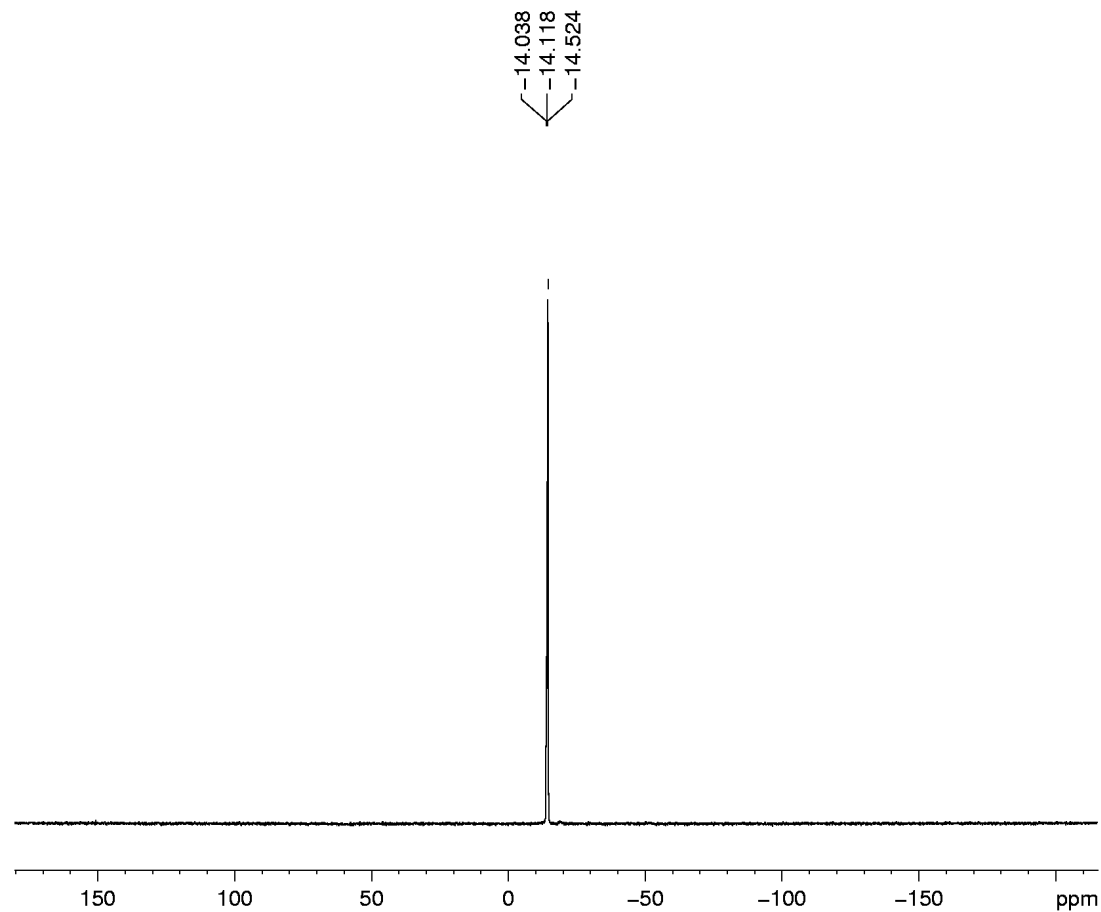
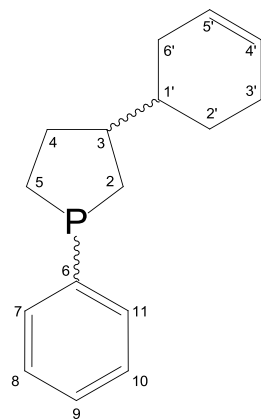
F2 - Acquisition Parameters
Date_ 20121122
Time 19.04
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 177
DS 2
SWH 17857.143 Hz
FIDRES 0.544957 Hz
AQ 0.9175040 sec
RG 2050
DW 28.000 usec
DE 6.00 usec
TE 298.4 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6213714 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1319206 MHz

F2 - Processing parameters
SI 65536
SF 100.6128032 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **2e**



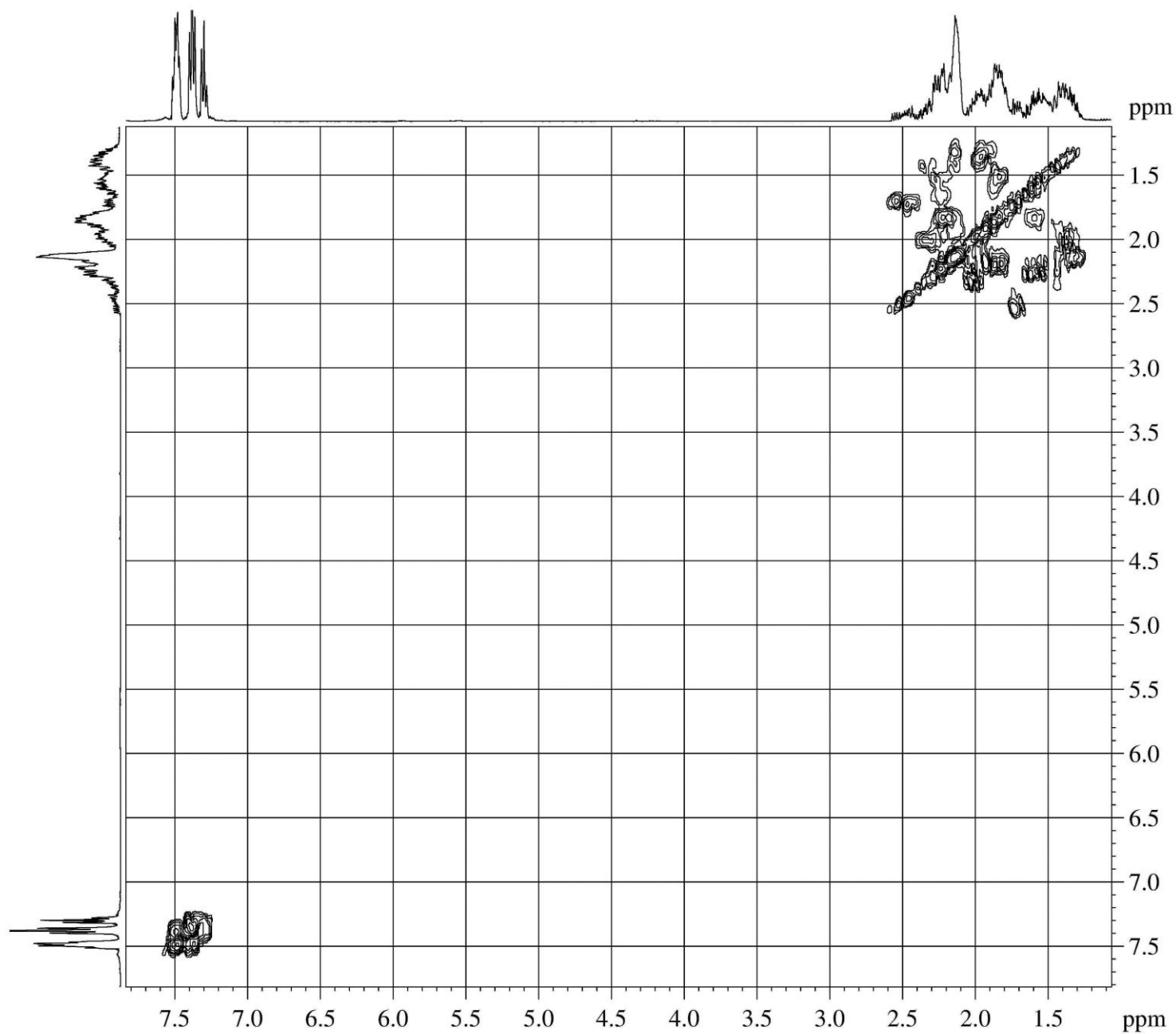
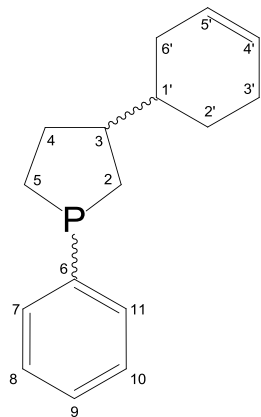
Current Data Parameters
NAME MRC-08
EXPNO 6
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121122
Time 18.13
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 18
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 298.1 K
D1 2.00000000 sec
TD0 1

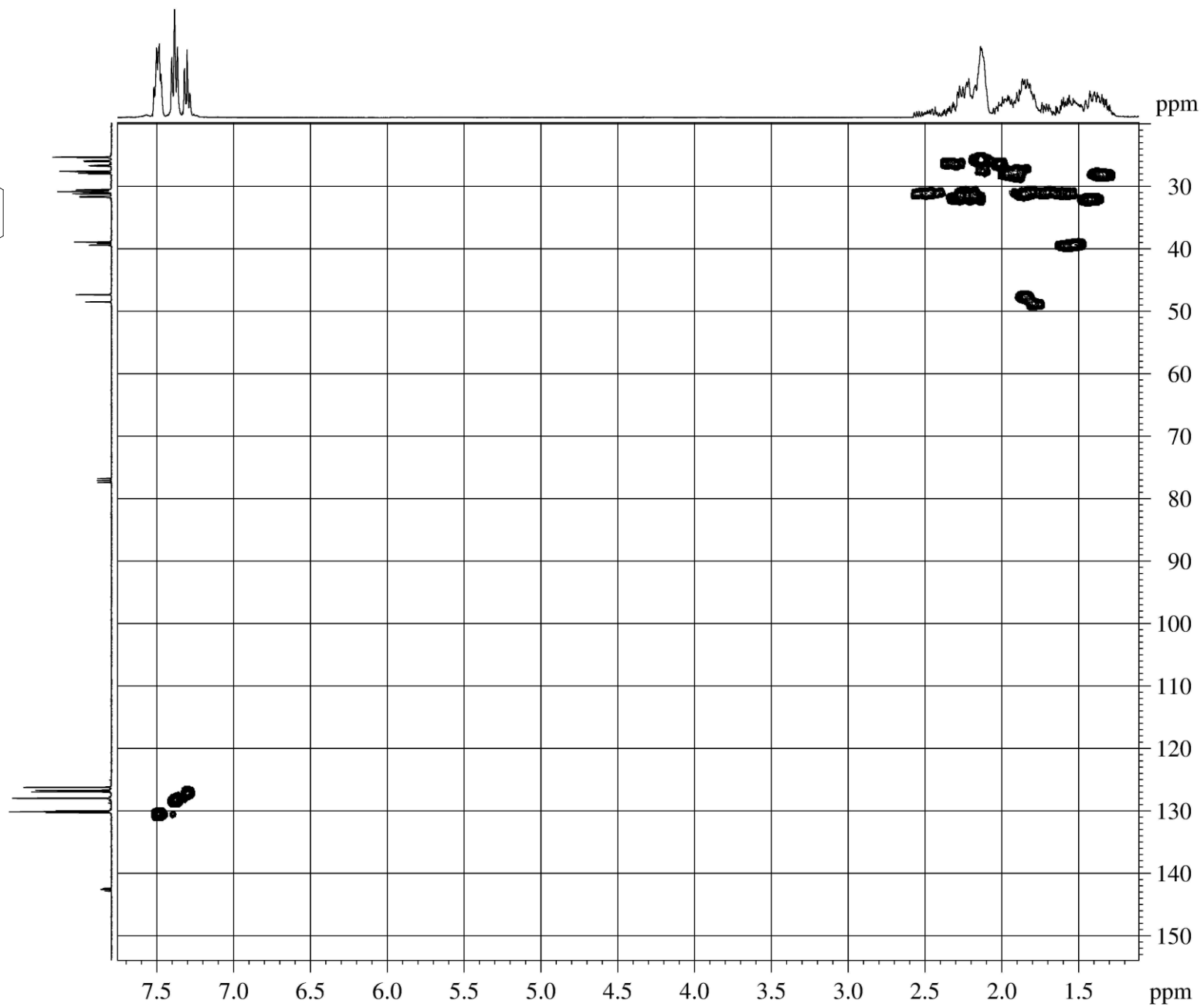
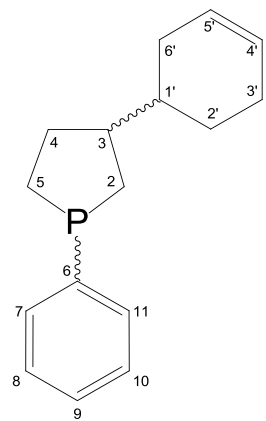
===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MH

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

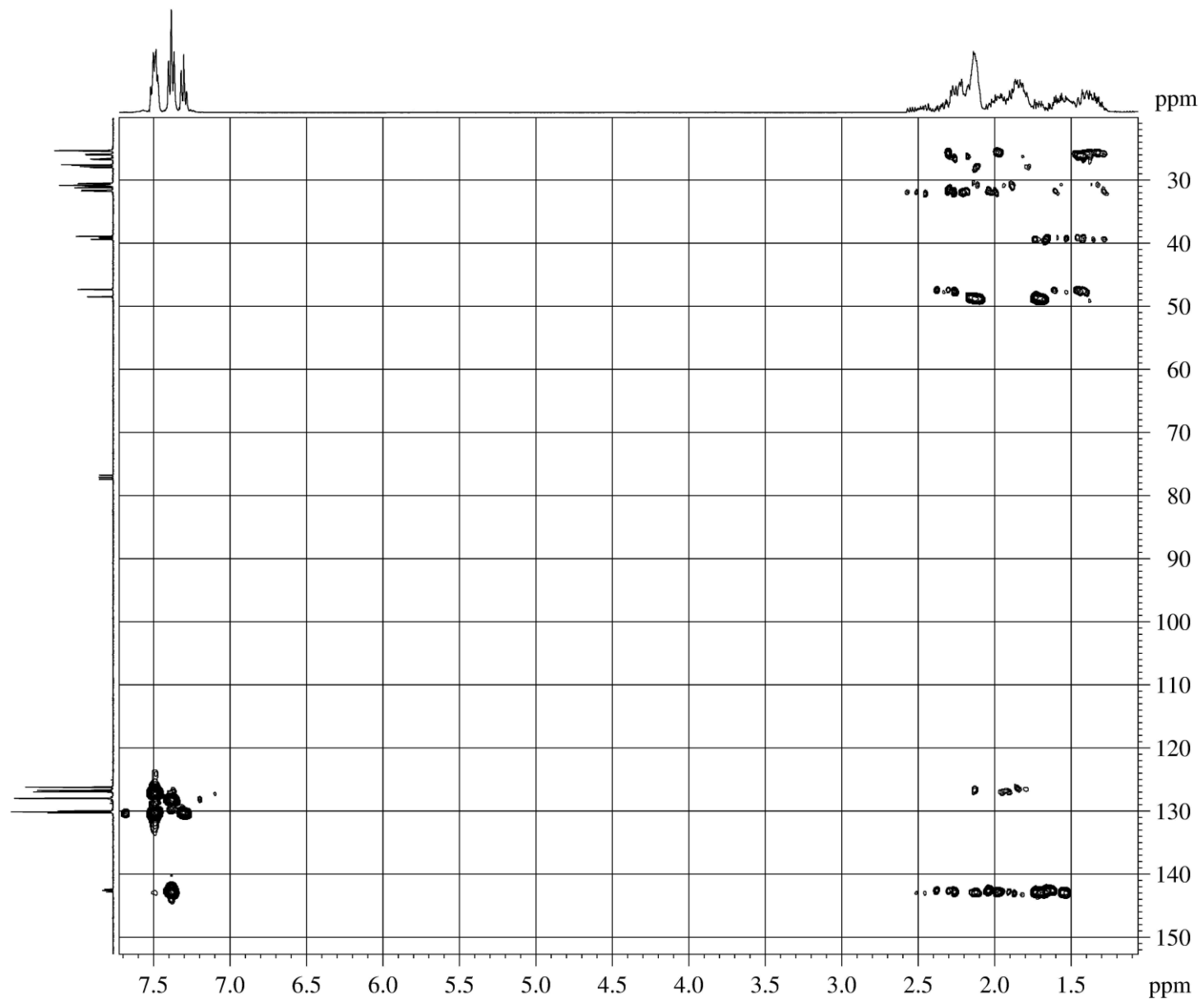
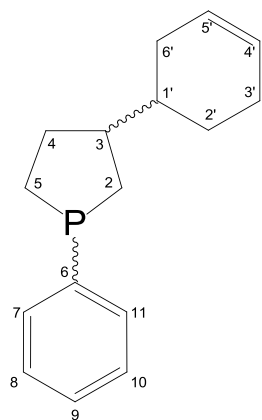
COSYHH: **2e**



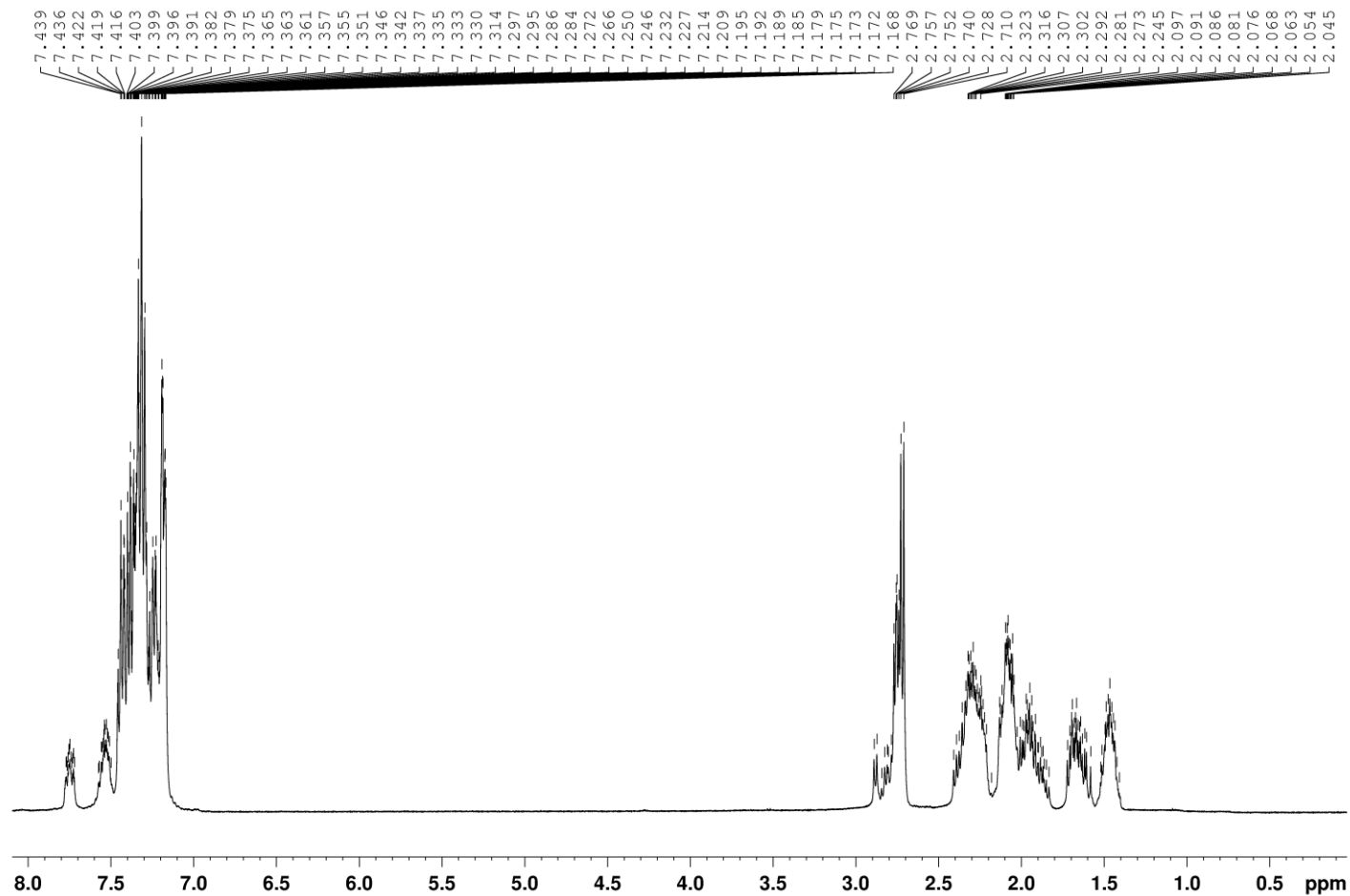
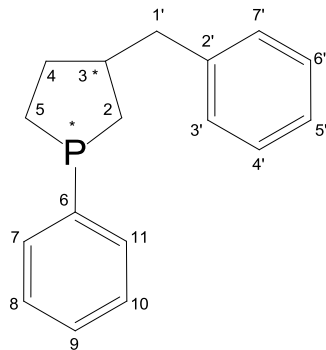
HSQC: **2e**



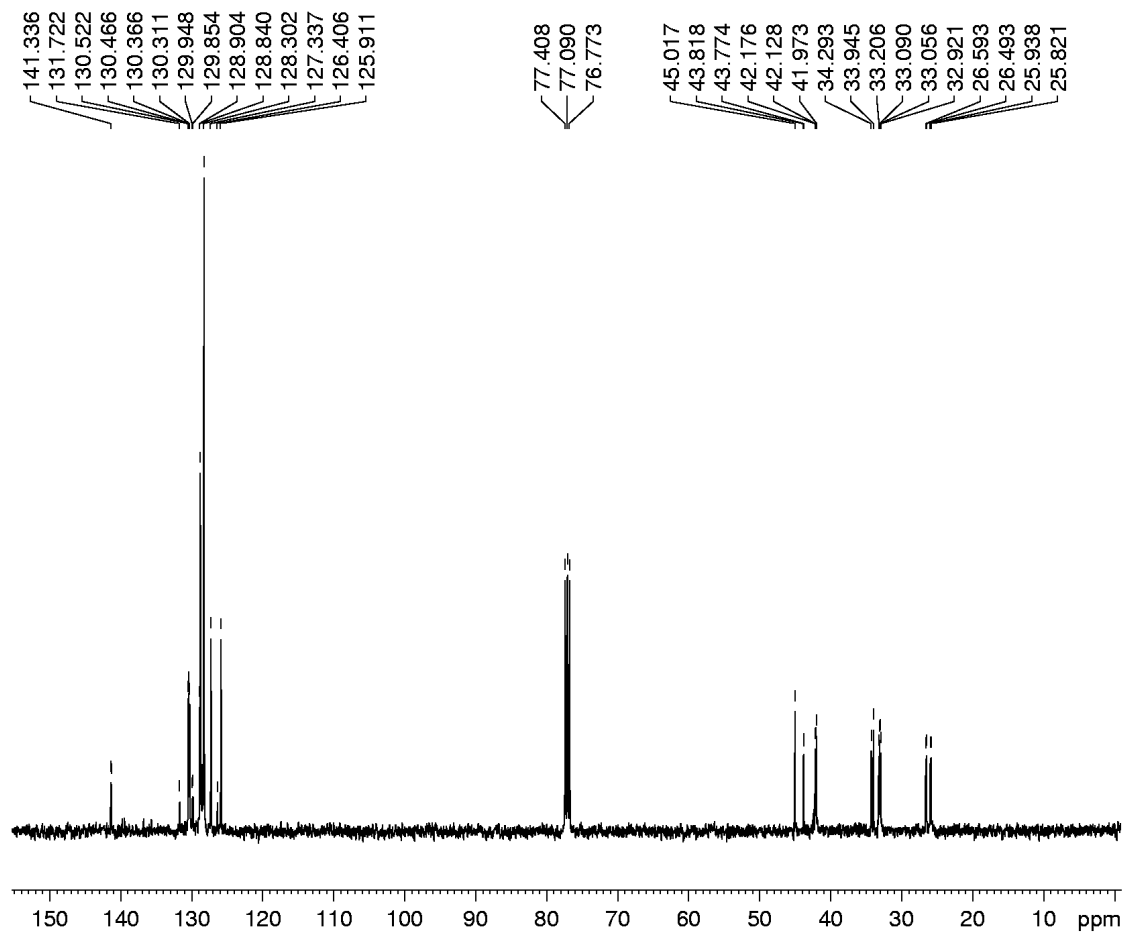
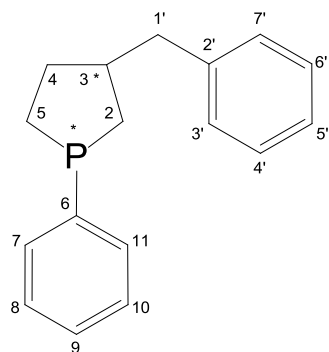
HMBC: **2e**



^1H NMR (CDCl_3): **2f**



^{13}C NMR (CDCl_3): **2f**



Current Data Parameters
NAME mahamathanova
EXPNO 69
PROCNO 1

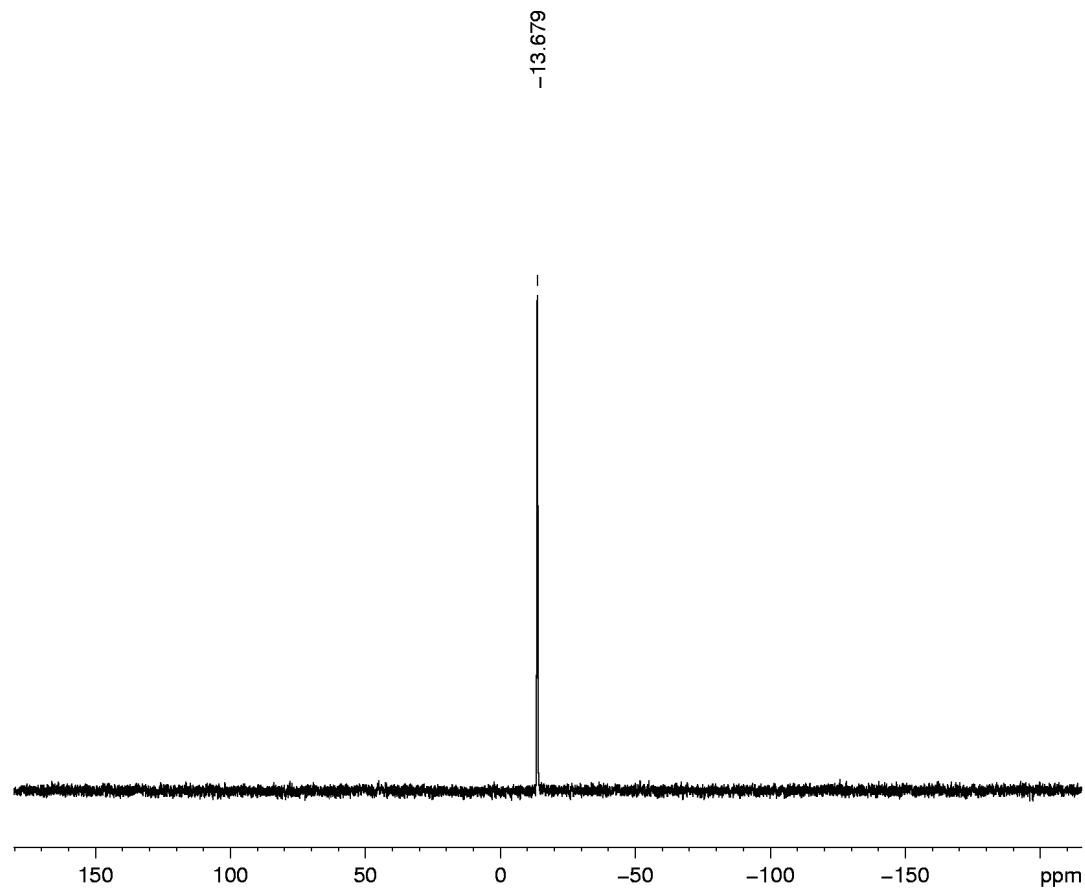
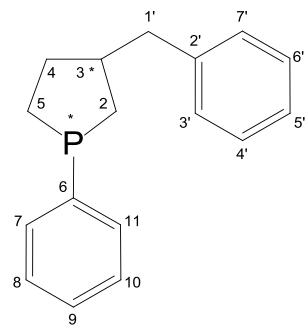
F2 - Acquisition Parameters
Date_ 20110602
Time 12.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 140
DS 0
SWH 16891.893 Hz
FIDRES 0.525507 Hz
AQ 0.9514624 sec
RG 2050
DW 29.600 usec
DE 30.00 usec
TE 299.1 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6199552 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **2f**



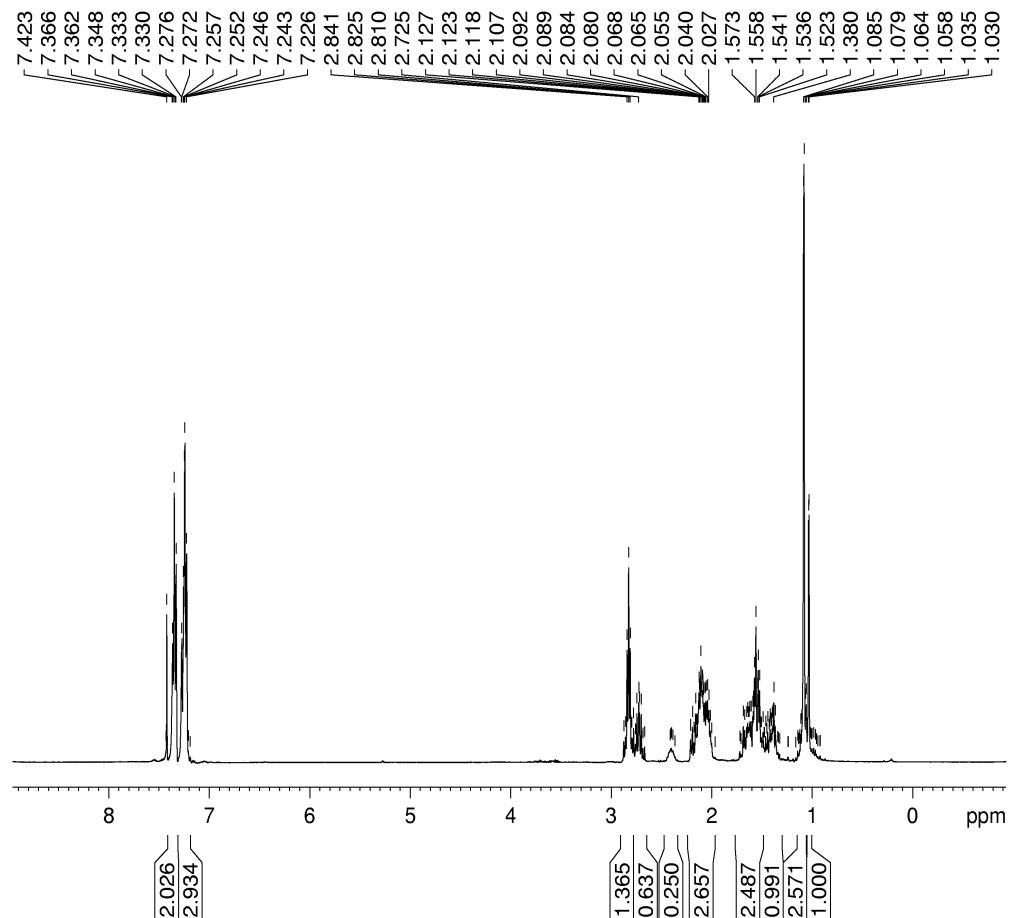
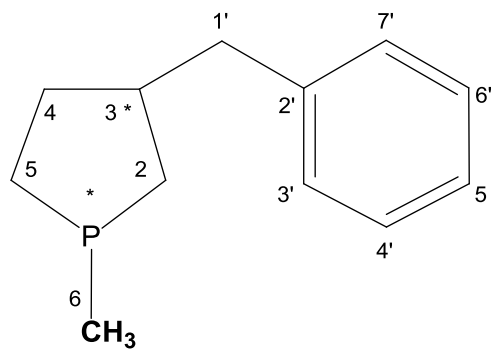
Current Data Parameters
NAME mahamathanova
EXPNO 74
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110602
Time 13.25
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 65
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 298.6 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **2g**



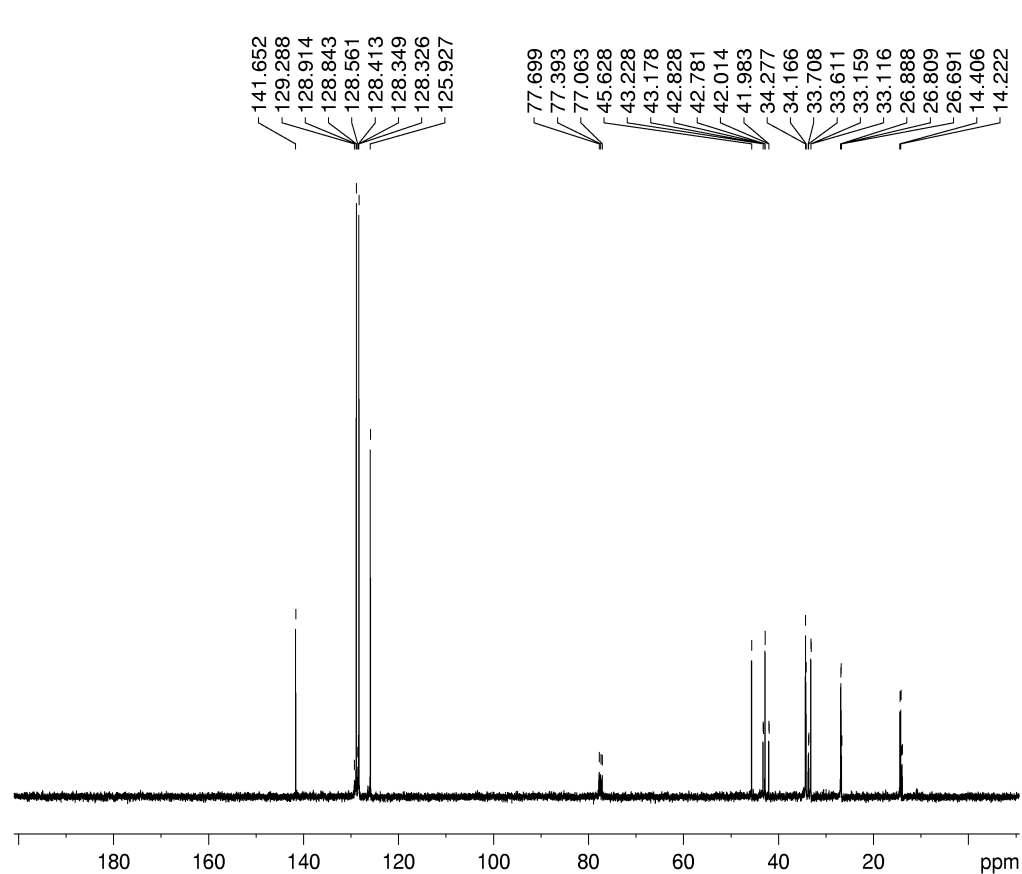
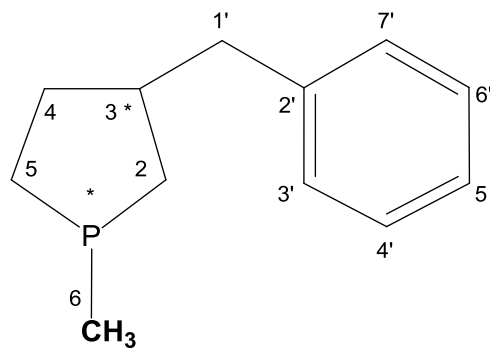
Current Data Parameters
NAME KRA-288
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141010
Time 13.11
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3955.696 Hz
FIDRES 0.241437 Hz
AQ 2.0709376 sec
RG 18
DW 126.400 usec
DE 6.00 usec
TE 299.4 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1316062 MHz
NUC1 ^1H
P1 14.80 usec
PLW1 8.86695862 W

F2 - Processing parameters
SI 32768
SF 400.1300003 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **2g**



Current Data Parameters
NAME KRA-288
EXPNO 2
PROCNO 1

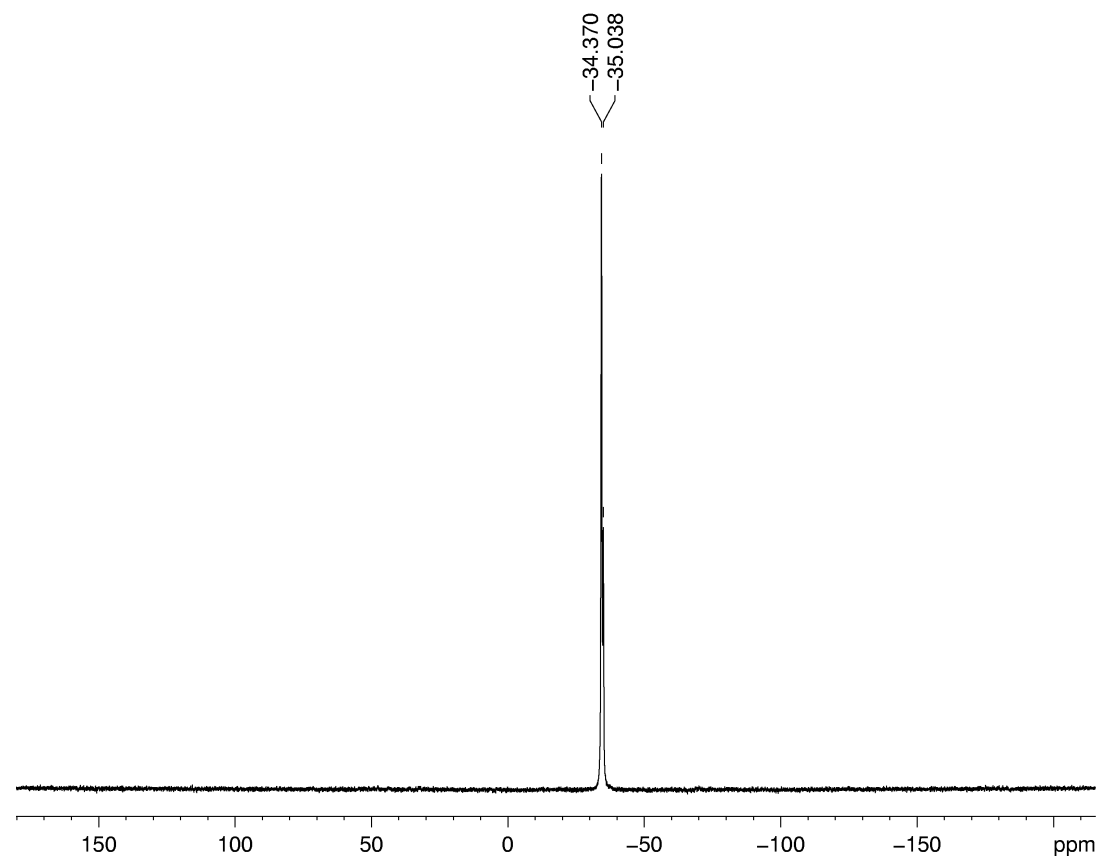
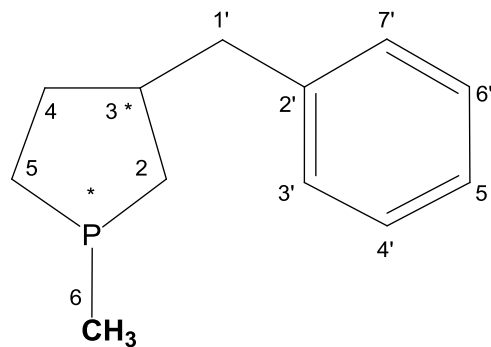
F2 - Acquisition Parameters
Date_ 20141010
Time 13.12
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 90
DS 2
SWH 21306.818 Hz
FIDRES 0.650232 Hz
AQ 0.7689557 sec
RG 1030
DW 23.467 usec
DE 6.00 usec
TE 299.7 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6223391 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 33.91046906 W

===== CHANNEL f2 =====
SFO2 400.1316005 MHz
NUC2 ^1H
CPDPRG2 waltz16
PCPD2 90.00 usec
PLW2 8.86695862 W
PLW12 0.23975889 W
PLW13 0.11961200 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0

^{31}P NMR (CDCl_3): **2g**



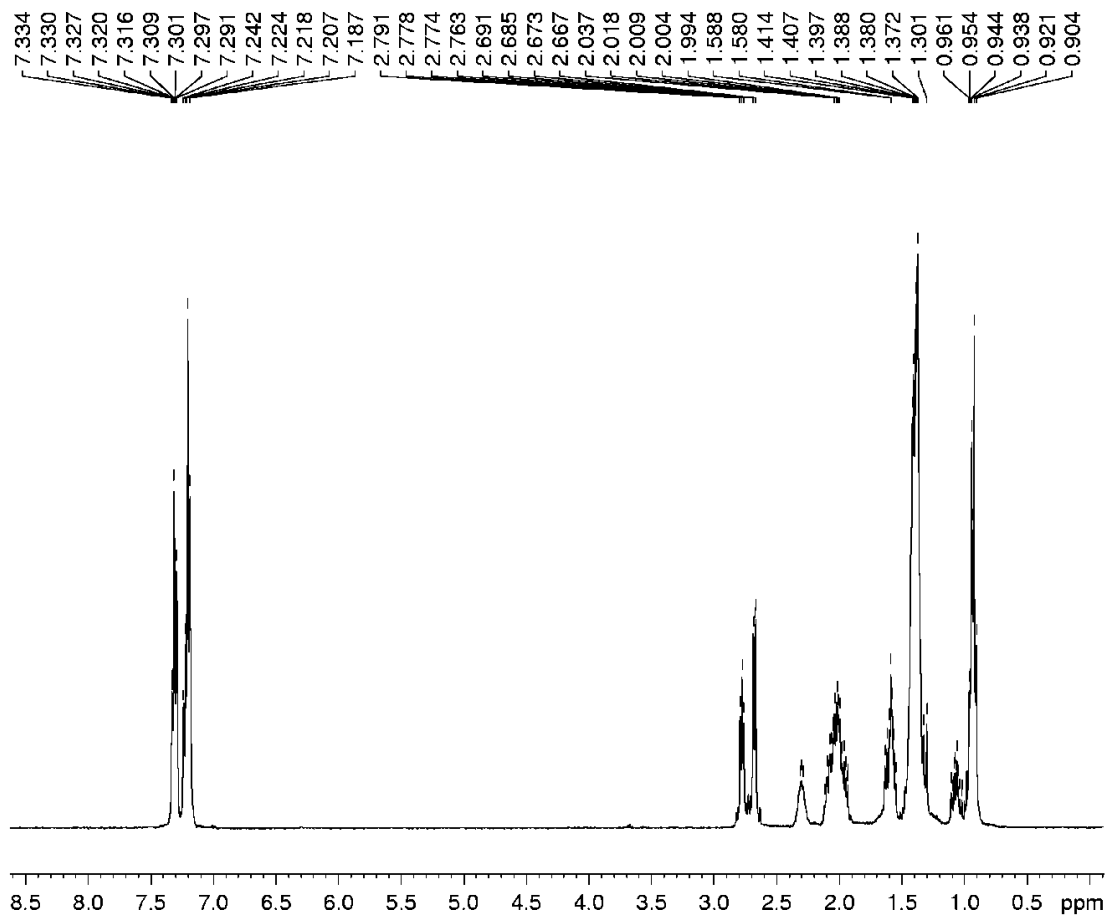
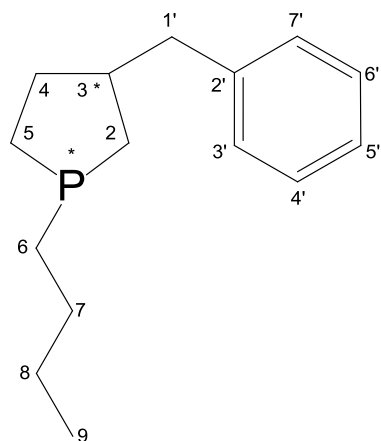
Current Data Parameters
NAME KRA-288
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141010
Time 13.08
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 19
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1620
DW 7.800 usec
DE 6.50 usec
TE 299.4 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9727429 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **2h**



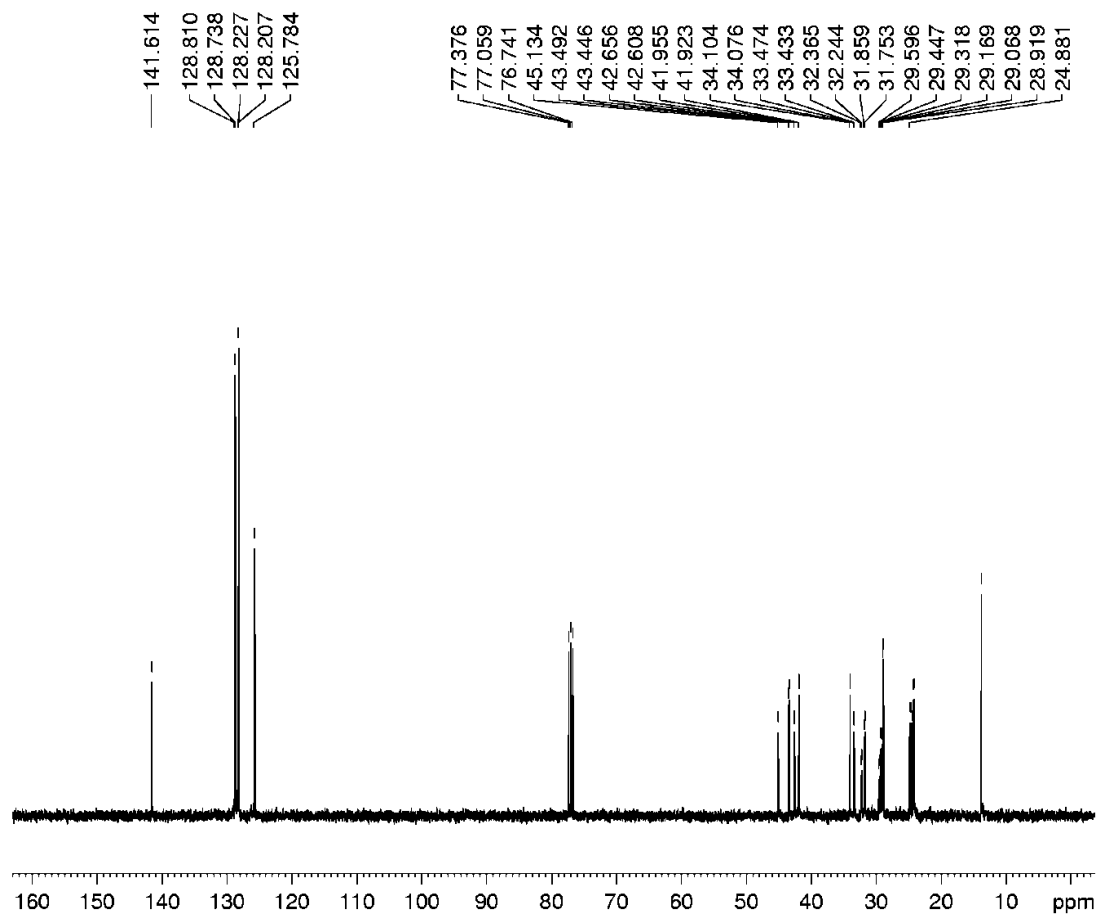
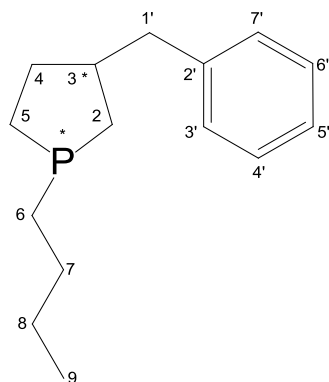
Current Data Parameters
 NAME MAL-180
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20121101
 Time 18.13
 INSTRUM spect
 PROBHD 5 mm PABBO BE
 PULPROG zg30
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 3840.246 Hz
 FIDRES 0.234390 Hz
 AQ 2.1331968 sec
 RG 45.2
 DW 130.200 usec
 DE 6.00 usec
 TE 299.2 K
 D1 1.00000000 sec
 TD0 1

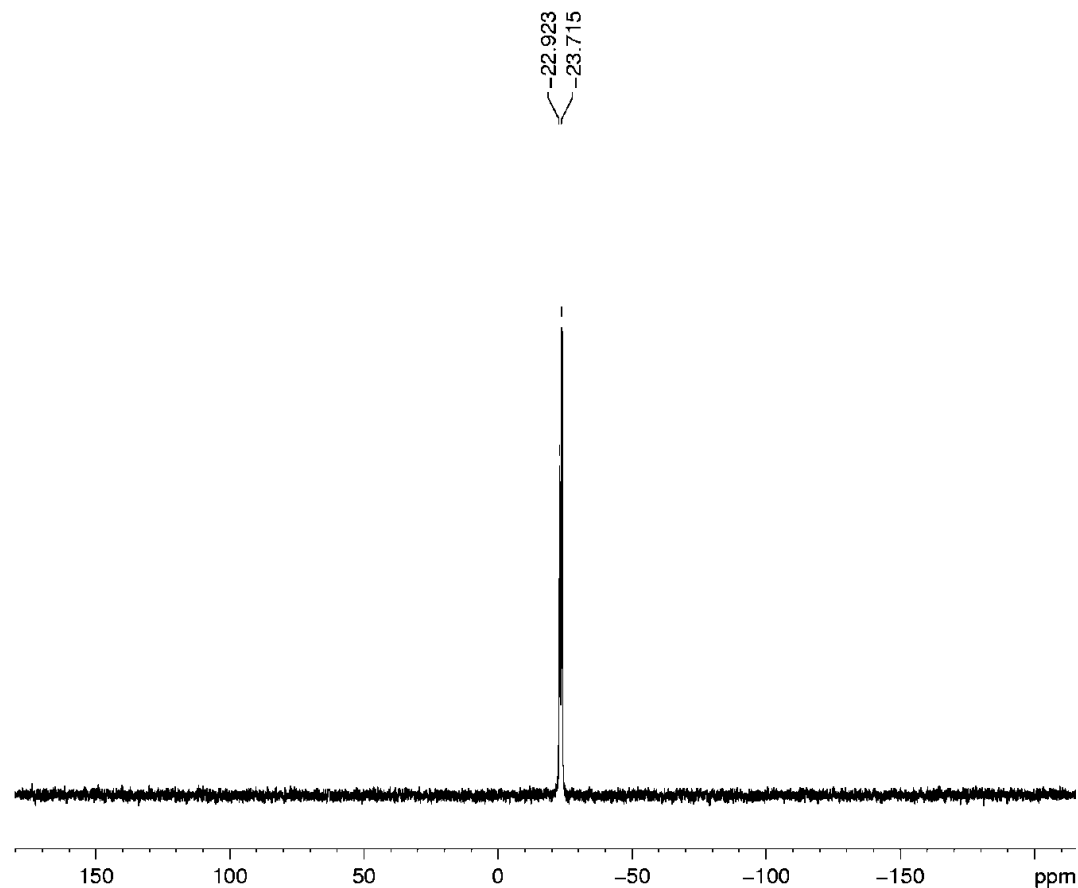
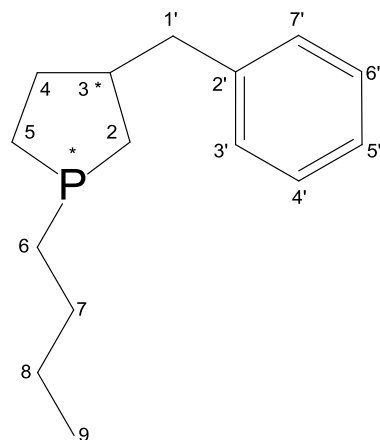
===== CHANNEL f1 =====
 NUC1 ^1H
 P1 14.80 usec
 PL1 0 dB
 PL1W 8.86695957 W
 SFO1 400.1318750 MHZ

F2 - Processing parameters
 SI 32768
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

^{13}C NMR (CDCl_3): **2h**



^{31}P NMR (CDCl_3): **2h**



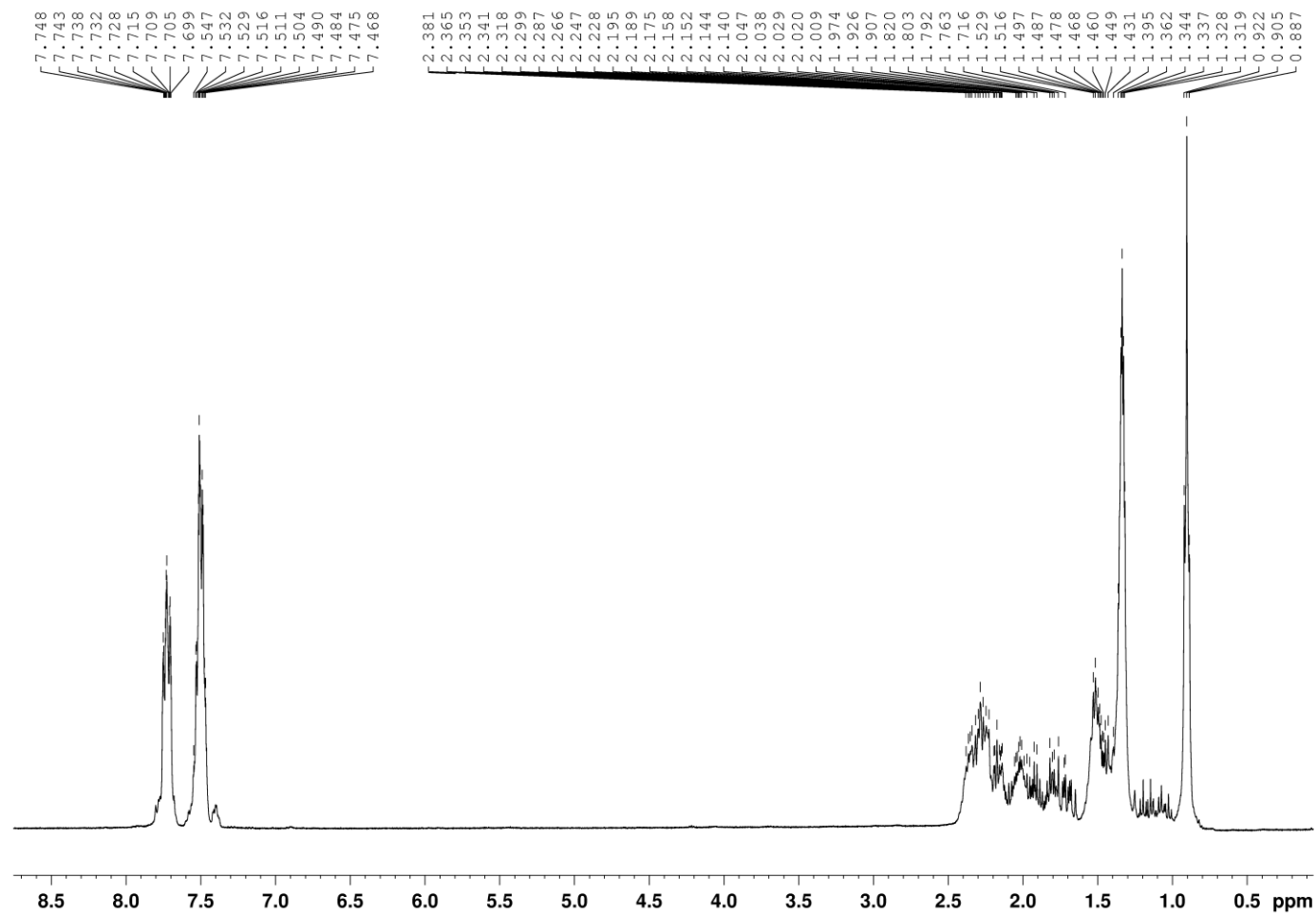
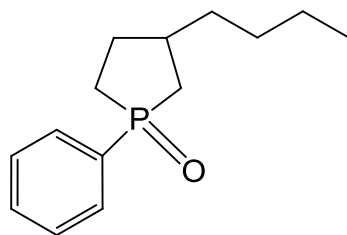
Current Data Parameters
NAME MAL-180
EXPNO 6
PROCNO 1

F2 - Acquisition Parameter:
Date_ 20121101
Time 18.45
INSTRUM spect
PROBHD 5 mm PABBO E
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 13
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 299.3 K
D1 2.0000000 sec
TD0 1

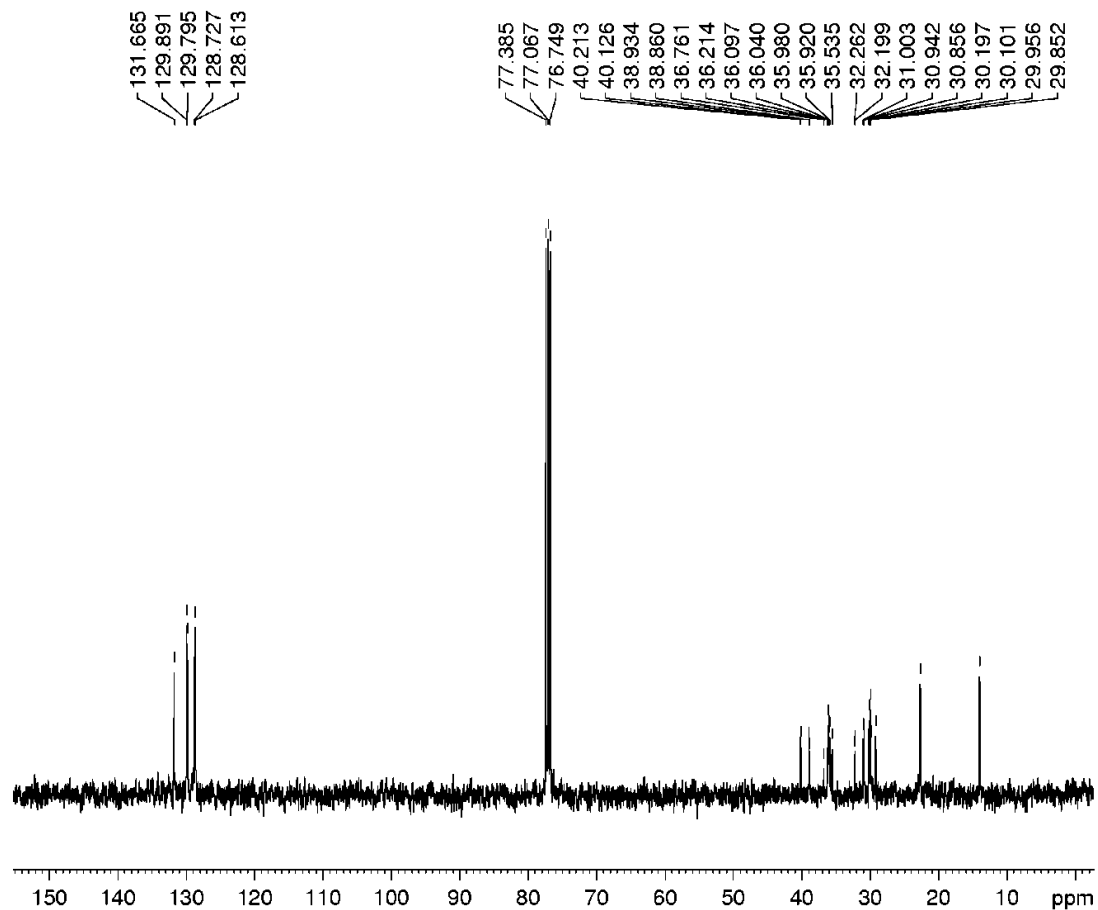
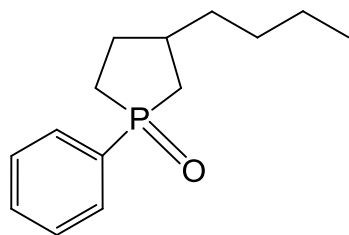
===== CHANNEL f1 ==
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameter:
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3a**



^{13}C NMR (CDCl_3): **3a**



Current Data Parameters
NAME mahamathanova
EXPNO 116
PROCNO 1

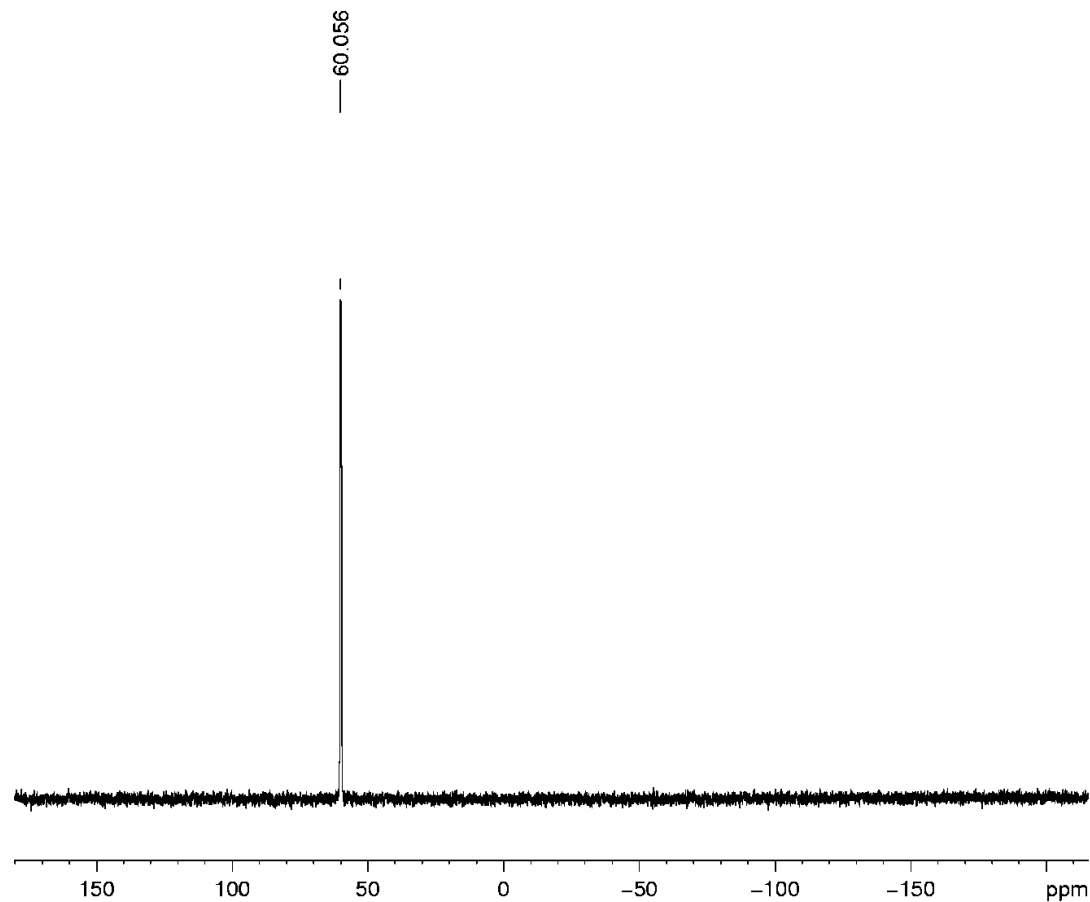
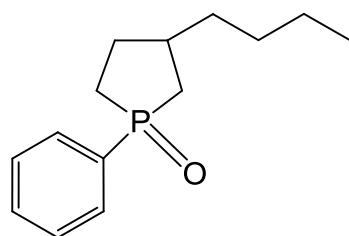
F2 - Acquisition Parameters
Date 20110630
Time 14.08
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 92
DS 0
SWH 16891.893 Hz
FIDRES 0.525507 Hz
AQ 0.9514624 sec
RG 2050
DW 29.600 usec
DE 30.00 usec
TE 299.3 K
D1 1.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6199552 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3a**



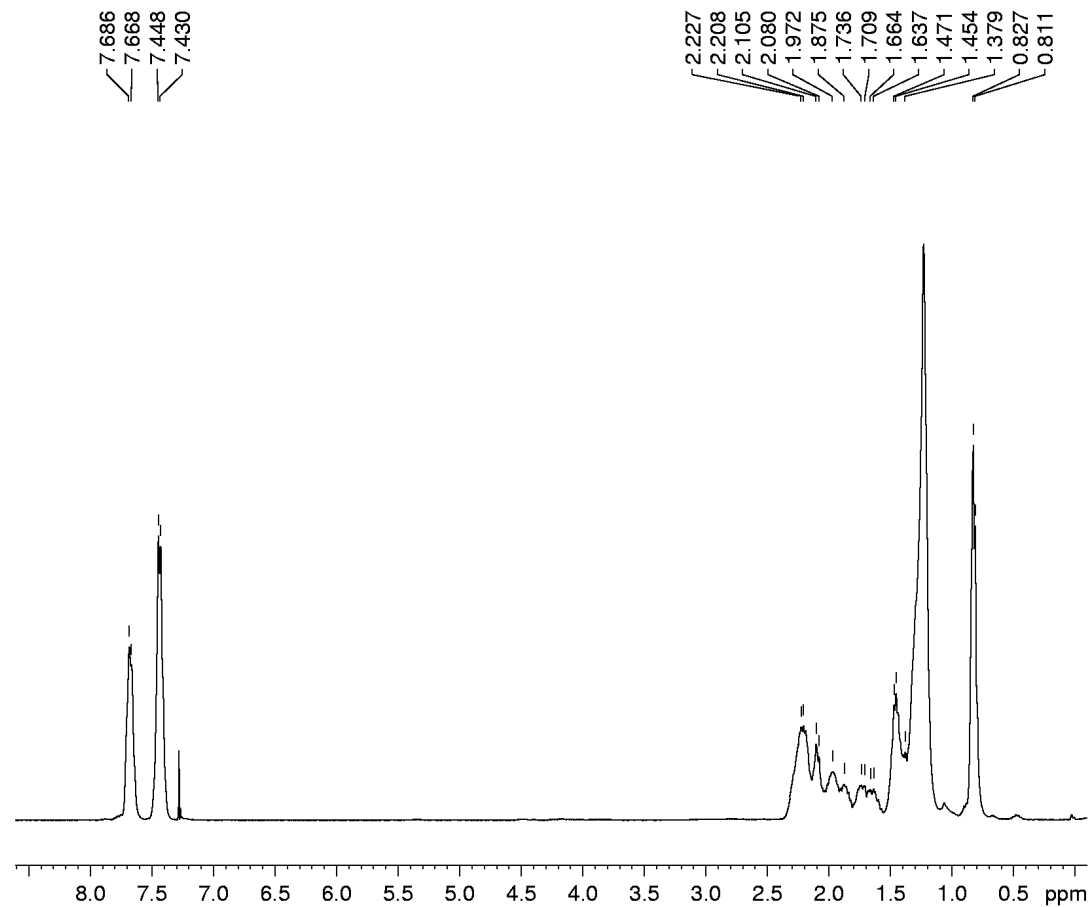
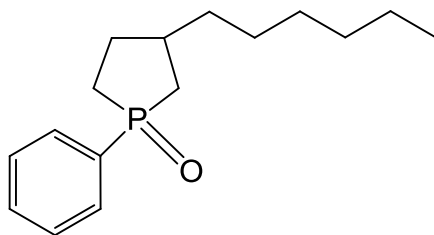
Current Data Parameters
NAME mahamathanova
EXPNO 121
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110630
Time 14.35
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 7
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 299.4 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3b**



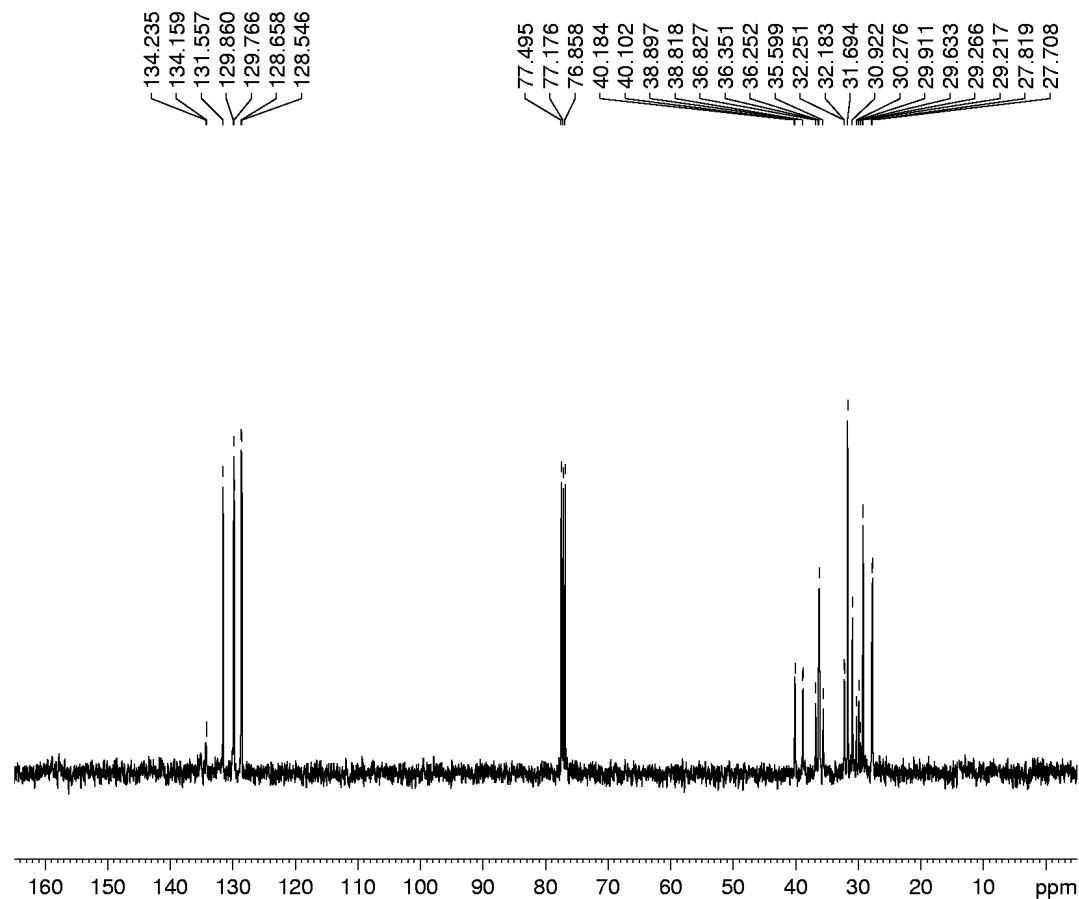
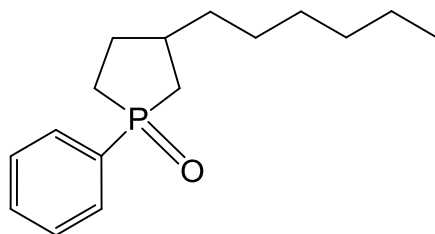
Current Data Parameters
 NAME mahamathanova
 EXPNO 26
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20110428
 Time 19.58
 INSTRUM spect
 PROBHD 5 mm PABBO BB
 PULPROG zg
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 3612.717 Hz
 FIDRES 0.220503 Hz
 AQ 2.2675457 sec
 RG 14.2
 DW 138.400 usec
 DE 6.00 usec
 TE 297.6 K
 D1 5.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^1H
 P1 14.80 usec
 PL1 0 dB
 PL1W 8.86695957 W
 SFO1 400.1317676 MHz

F2 - Processing parameters
 SI 32768
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

^{13}C NMR (CDCl_3): **3b**



Current Data Parameters
NAME mahamathanova
EXPNO 28
PROCNO 1

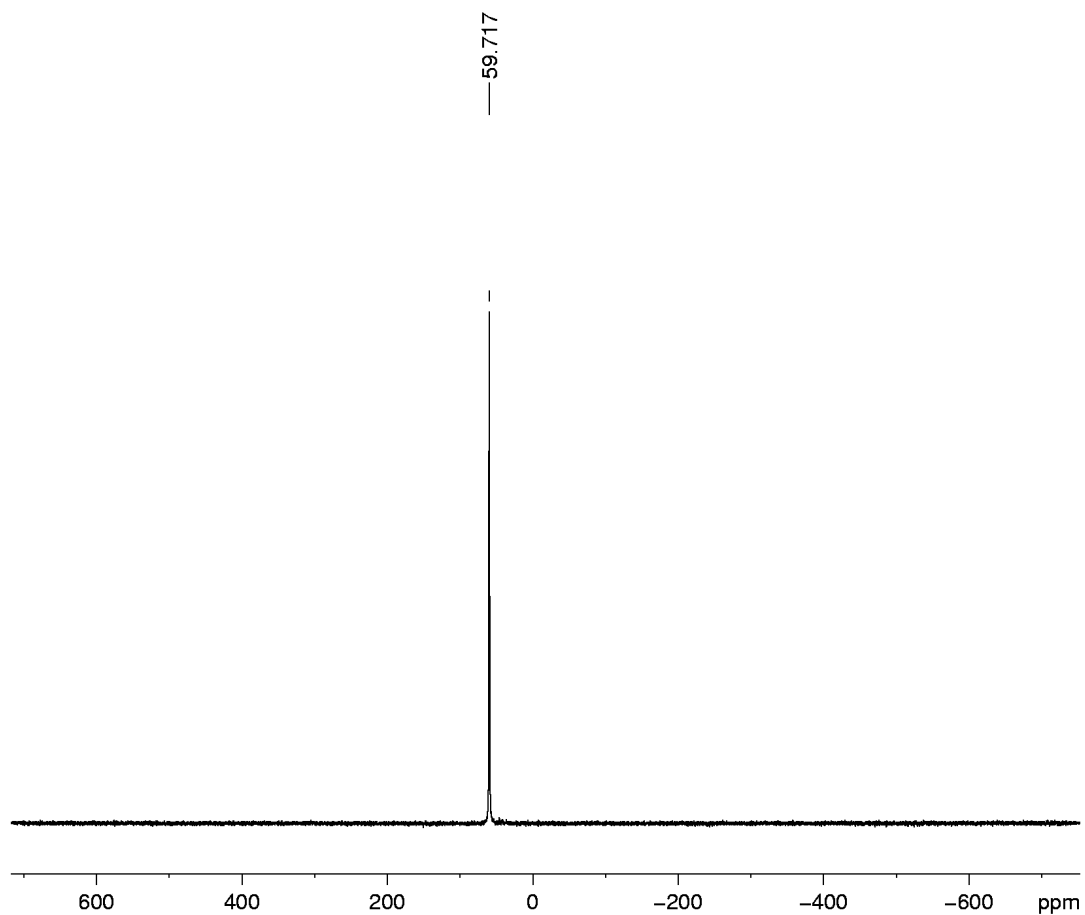
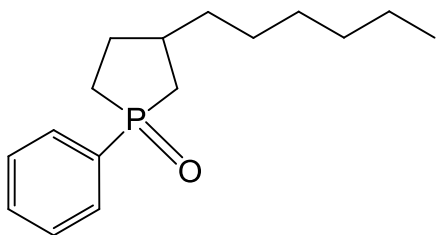
F2 - Acquisition Parameters
Date_ 20110428
Time 20.02
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 63
DS 0
SWH 23809.523 Hz
FIDRES 0.740714 Hz
AQ 0.6750240 sec
RG 2050
DW 21.000 usec
DE 30.00 usec
TE 297.7 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6232301 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3b**



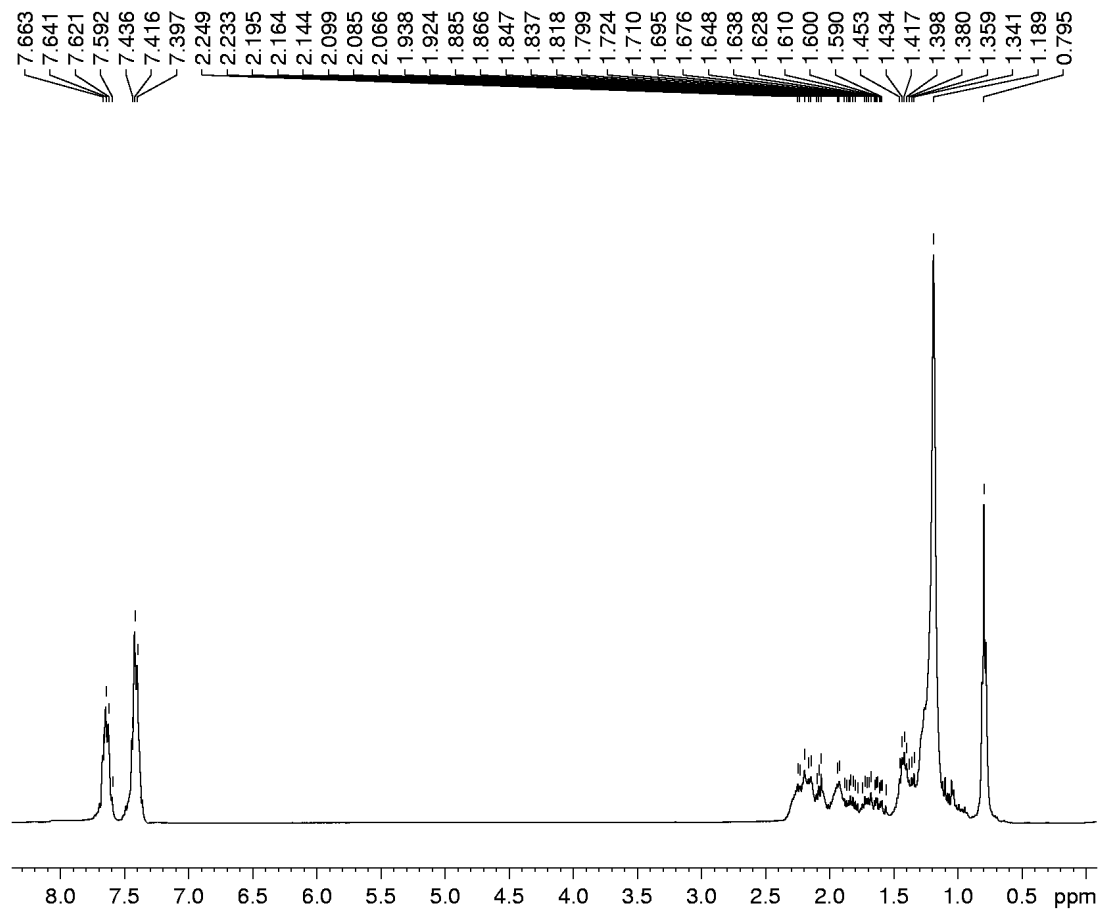
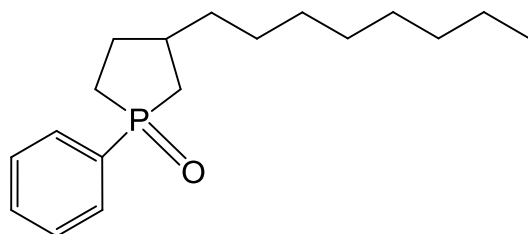
Current Data Parameters
NAME mahamathanova
EXPNO 30
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 20.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 13
DS 0
SWH 238095.234 Hz
FIDRES 7.266090 Hz
AQ 0.0688128 sec
RG 1820
DW 2.100 usec
DE 6.00 usec
TE 297.6 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3c**



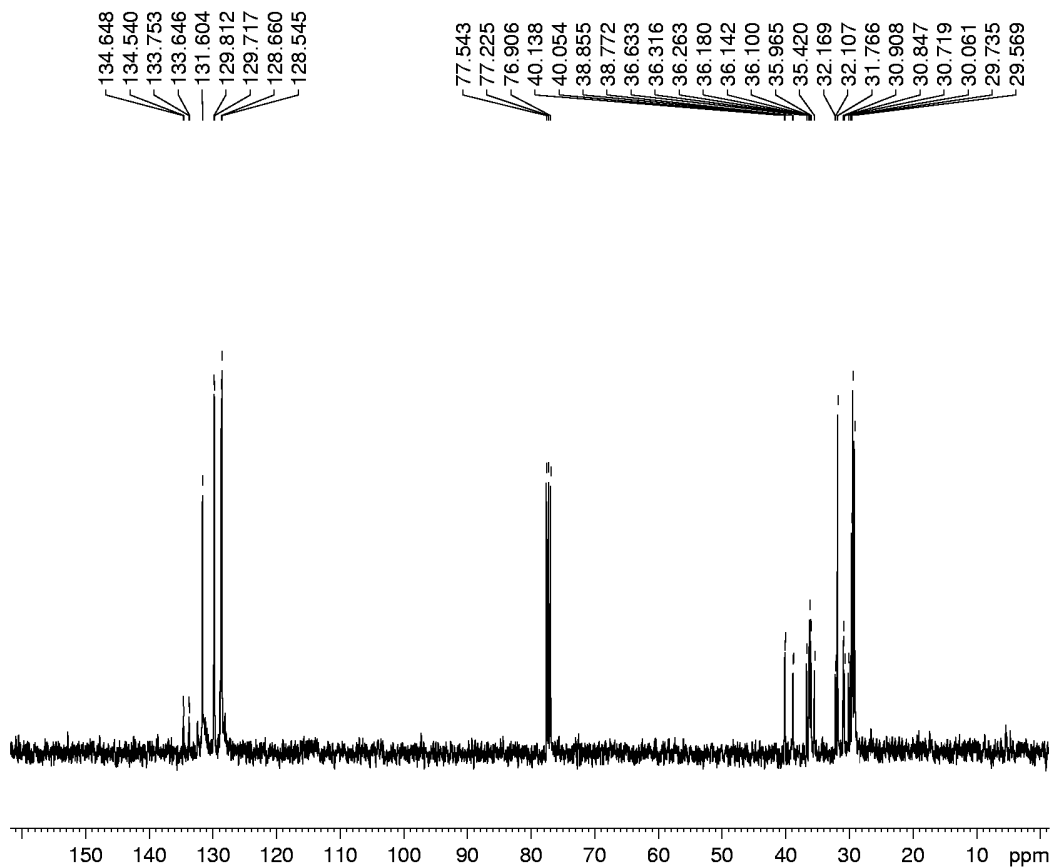
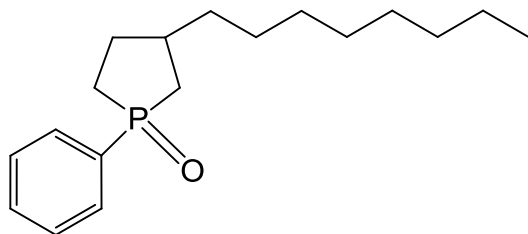
Current Data Parameters
NAME mahamathanova
EXPNO 32
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 20.20
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3612.717 Hz
FIDRES 0.220503 Hz
AQ 2.2675457 sec
RG 10
DW 138.400 usec
DE 6.00 usec
TE 297.5 K
D1 5.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317676 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **3c**



Current Data Parameters
NAME mahamathanova
EXPNO 34
PROCNO 1

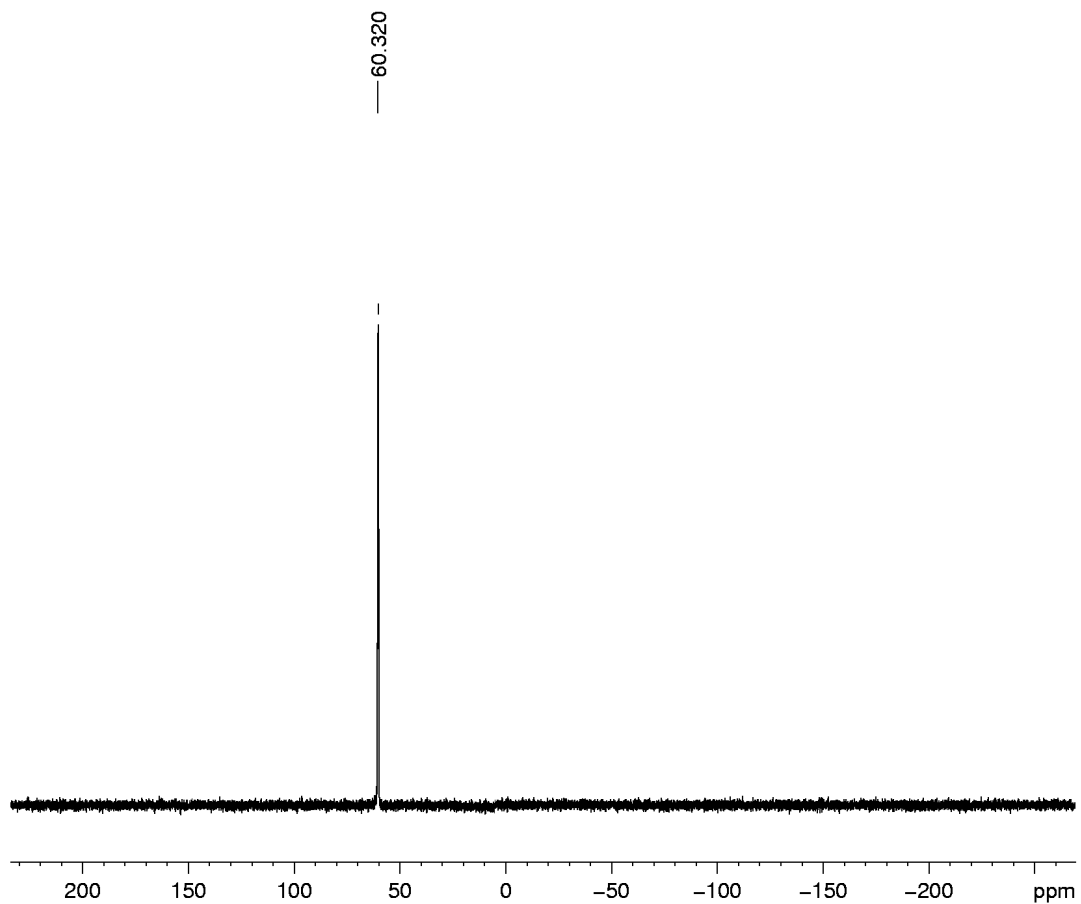
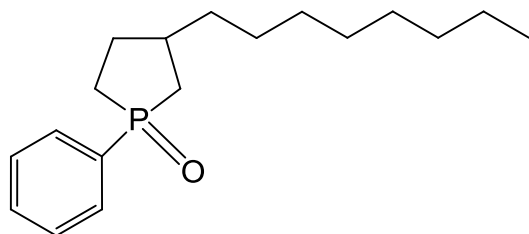
F2 - Acquisition Parameters
Date_ 20110428
Time 20.22
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 36
DS 0
SWH 23809.523 Hz
FIDRES 0.740714 Hz
AQ 0.6750240 sec
RG 2050
DW 21.000 usec
DE 30.00 usec
TE 297.5 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6232301 MHz

===== CHANNEL f2 =====
CPDPRG2 waitz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3c**



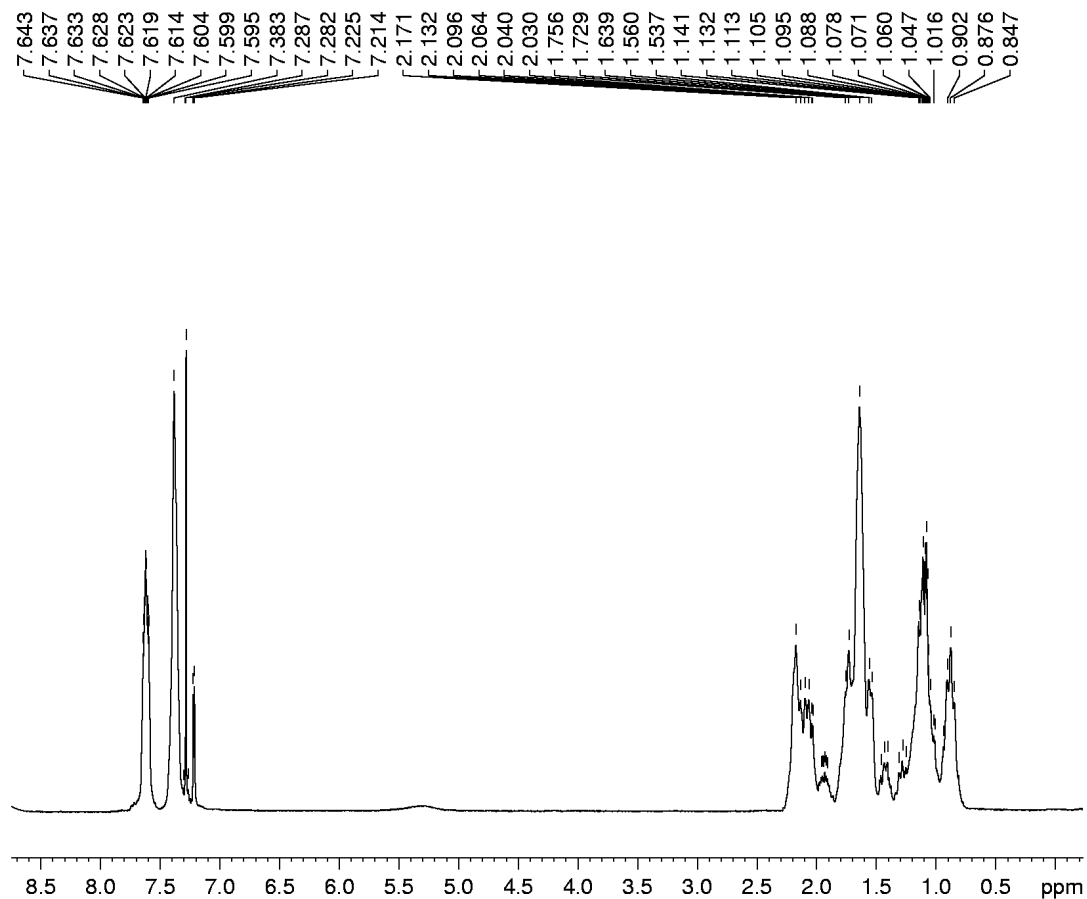
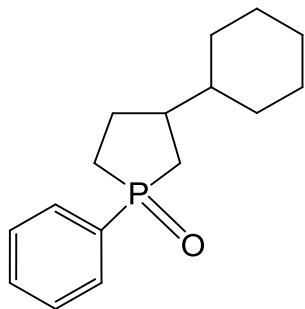
Current Data Parameters
NAME mahamathanova
EXPNO 35
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 20.17
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 3
DS 0
SWH 81521.742 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 1820
DW 6.133 usec
DE 6.00 usec
TE 297.5 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3d**



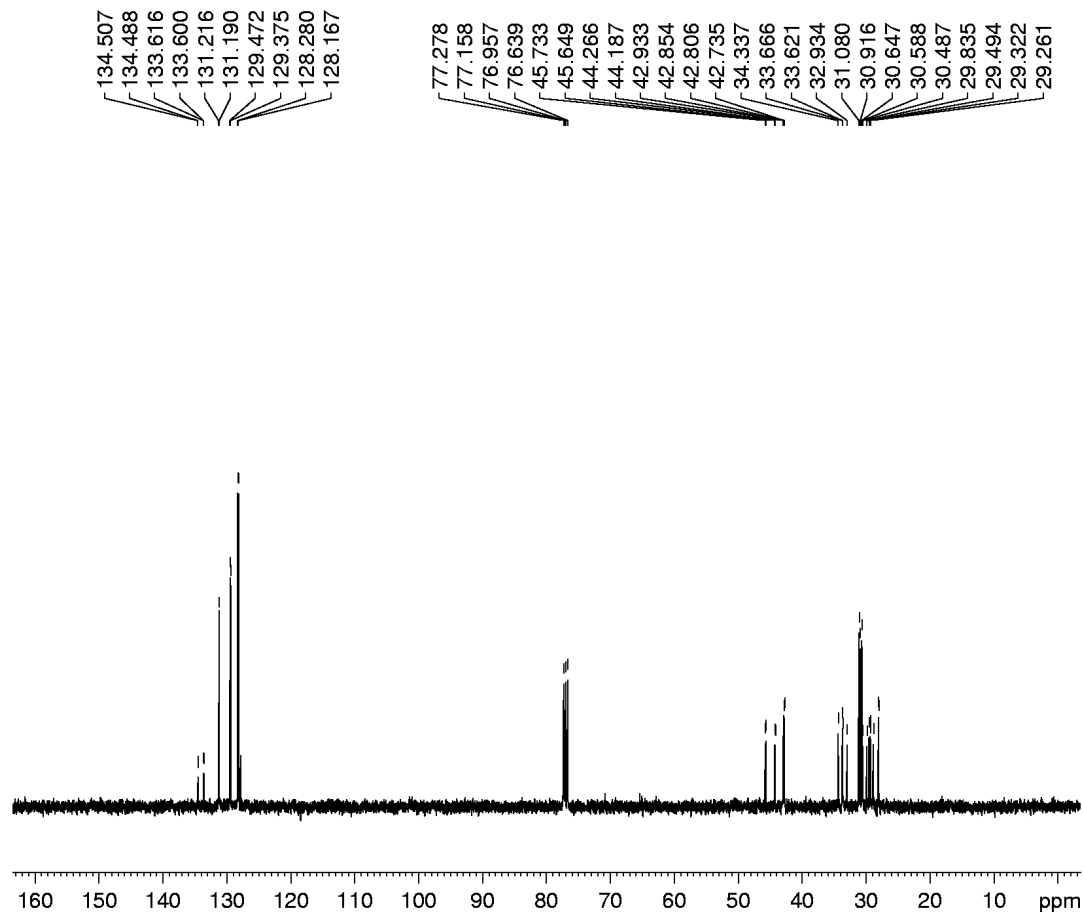
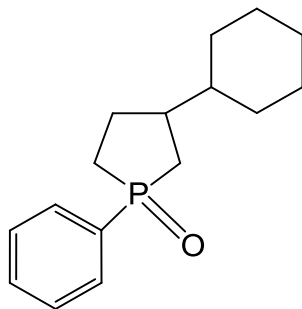
Current Data Parameters
NAME MRC-16
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121207
Time 16.15
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3591.954 Hz
FIDRES 0.219235 Hz
AQ 2.2806528 sec
RG 25.4
DW 139.200 usec
DE 6.00 usec
TE 297.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317034 MHZ

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **3d**



Current Data Parameters
NAME MRC-16
EXPNO 2
PROCNO 1

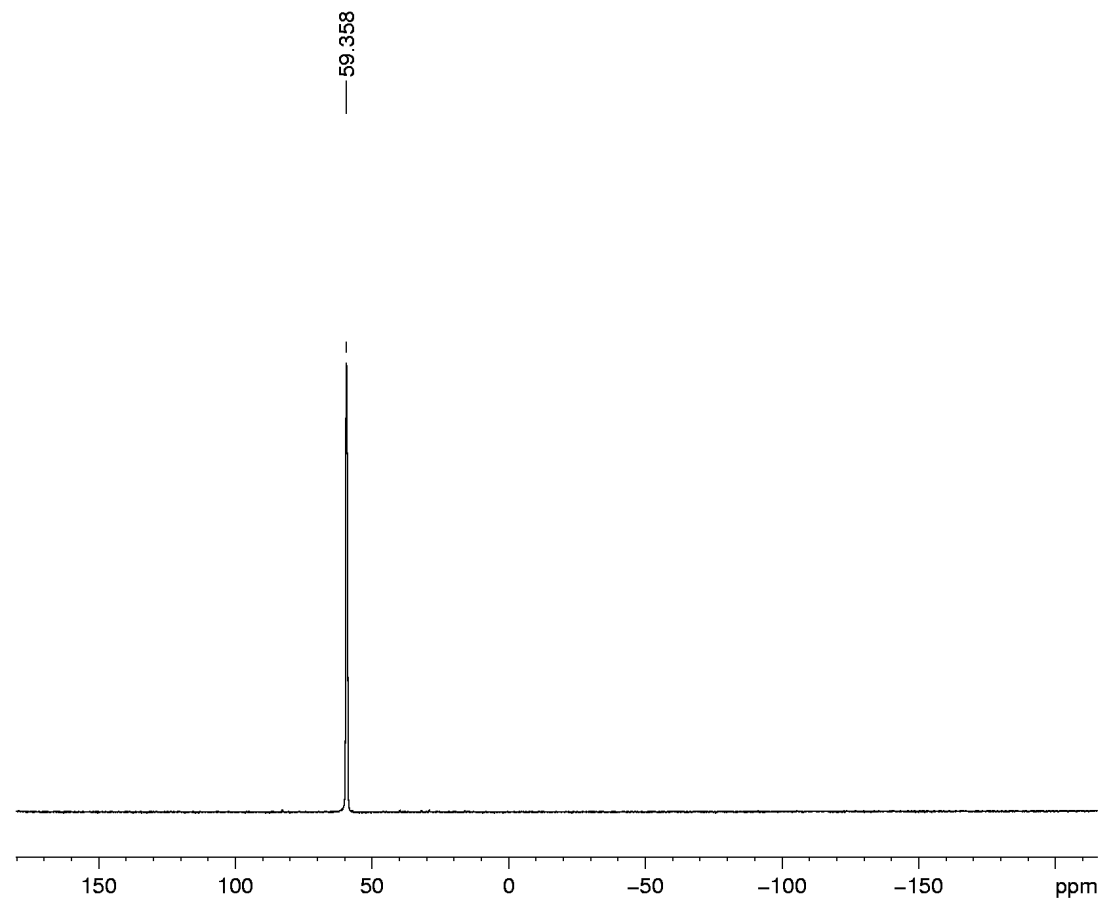
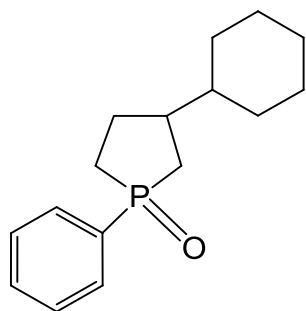
F2 - Acquisition Parameters
Date_ 20121207
Time_ 16.16
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 55
DS 2
SWH 17857.143 Hz
FIDRES 0.544957 Hz
AQ 0.9175040 sec
RG 2050
DW 28.000 usec
DE 6.00 usec
TE 297.9 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6213714 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1319206 MHz

F2 - Processing parameters
SI 65536
SF 100.6128032 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3d**



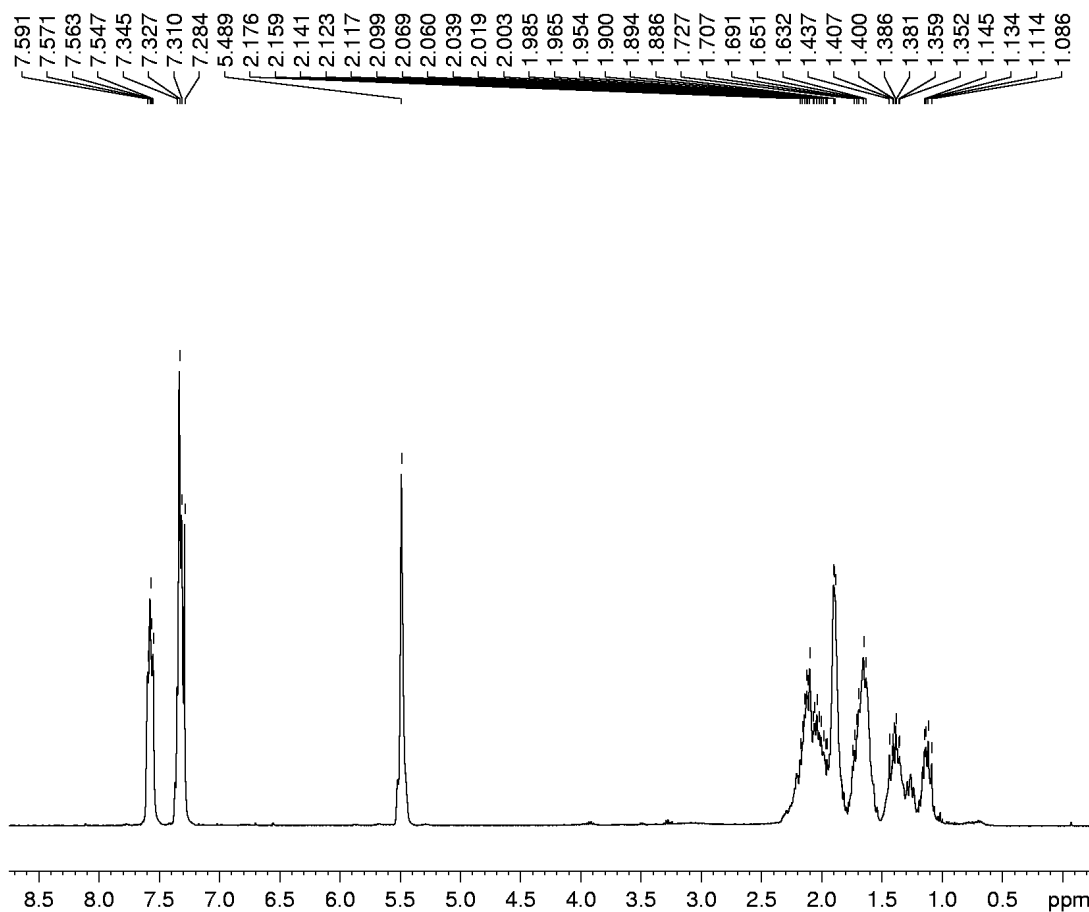
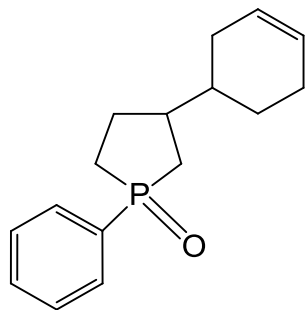
Current Data Parameters
NAME MRC-16
EXPNO 6
PROCNO 1

F2 - Acquisition Parameter:
Date_ 20121207
Time 17.11
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 839
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1820
DW 7.800 usec
DE 6.00 usec
TE 297.9 K
D1 2.0000000 sec
TD0 1

===== CHANNEL f1 ==
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameter:
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3e**



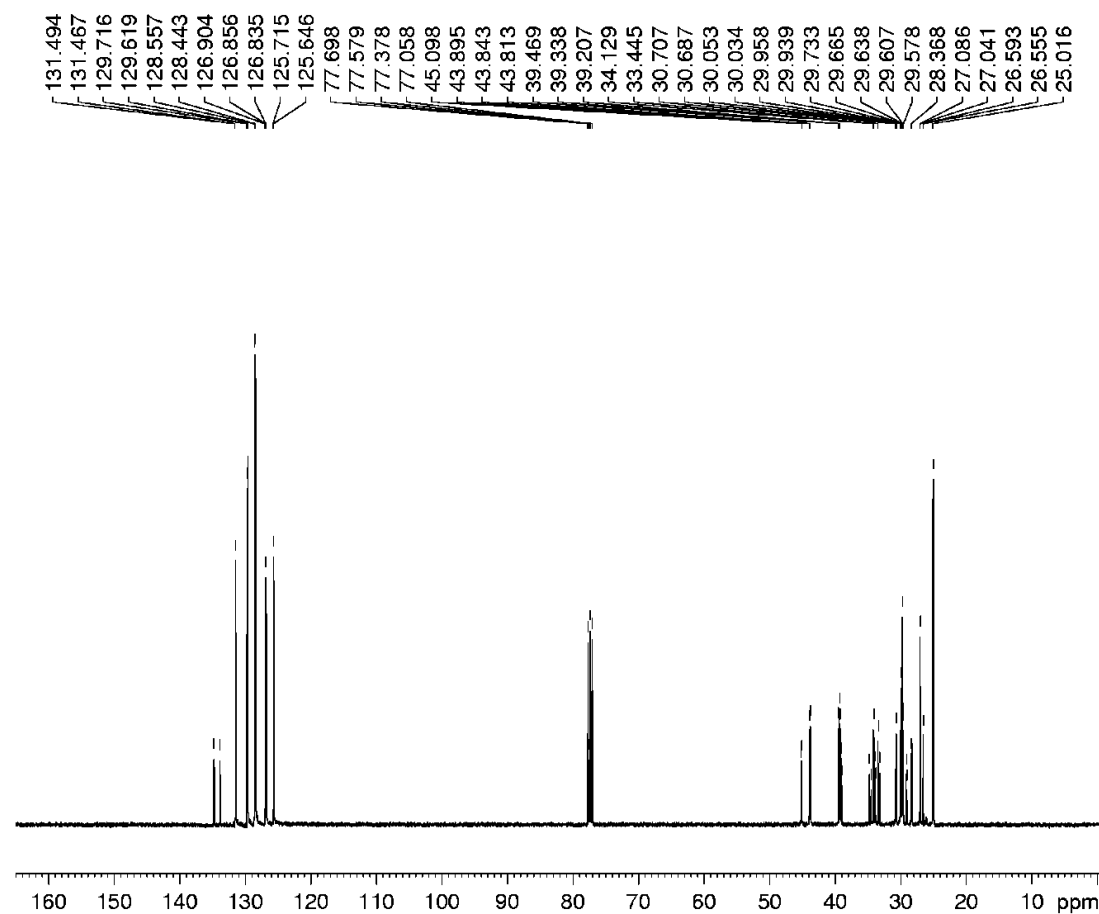
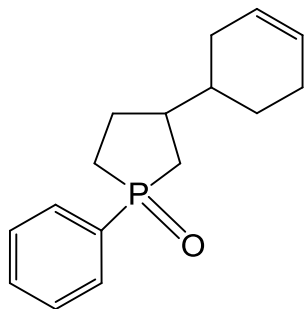
Current Data Parameters
NAME MRC-002
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120823
Time 16.10
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3881.988 Hz
FIDRES 0.236938 Hz
AQ 2.1102593 sec
RG 20.2
DW 128.800 usec
DE 6.00 usec
TE 298.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317604 MH

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **3e**



Current Data Parameters
NAME MRC-002
EXPNO 2
PROCNO 1

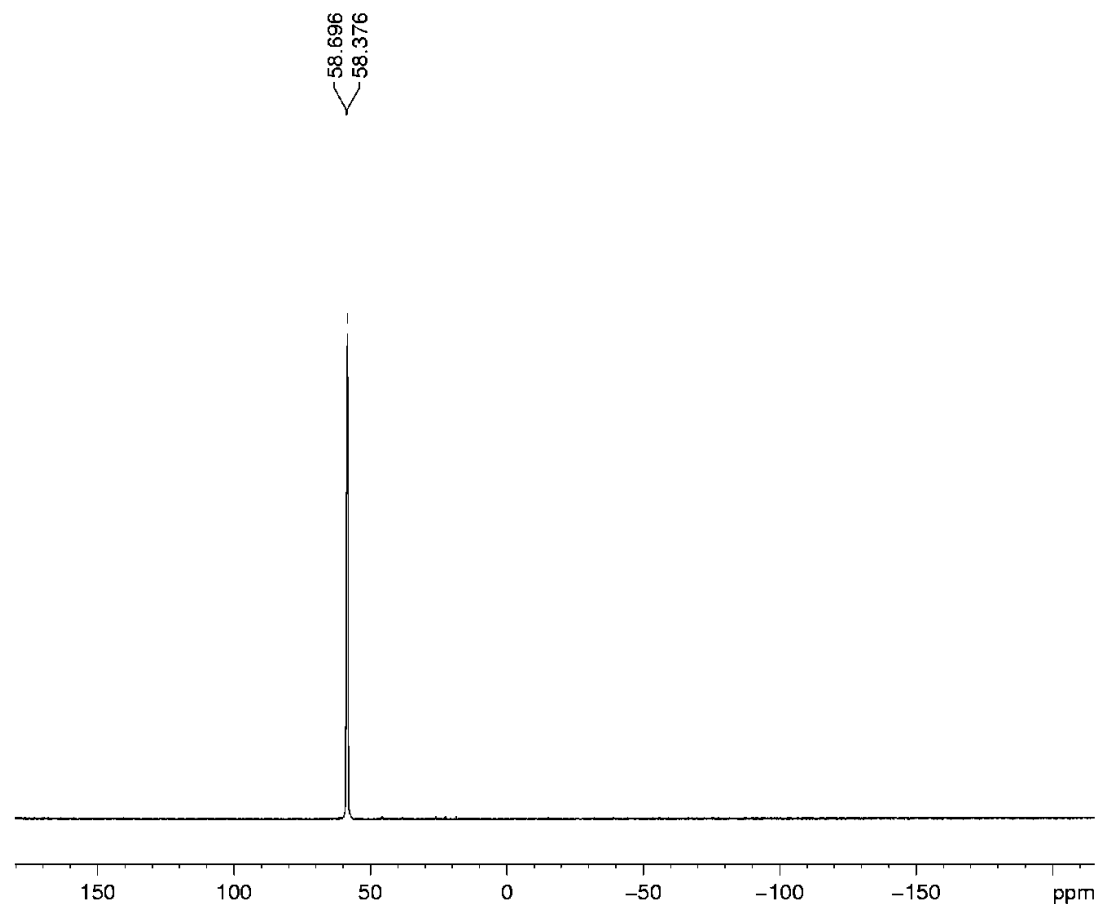
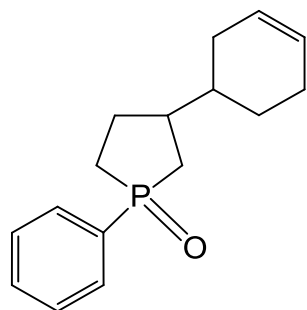
F2 - Acquisition Parameters
Date_ 20120823
Time 16.11
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 275
DS 2
SWH 17857.143 Hz
FIDRES 0.544957 Hz
AQ 0.9175040 sec
RG 2050
DW 28.000 usec
DE 6.00 usec
TE 299.0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6216730 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127727 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3e**



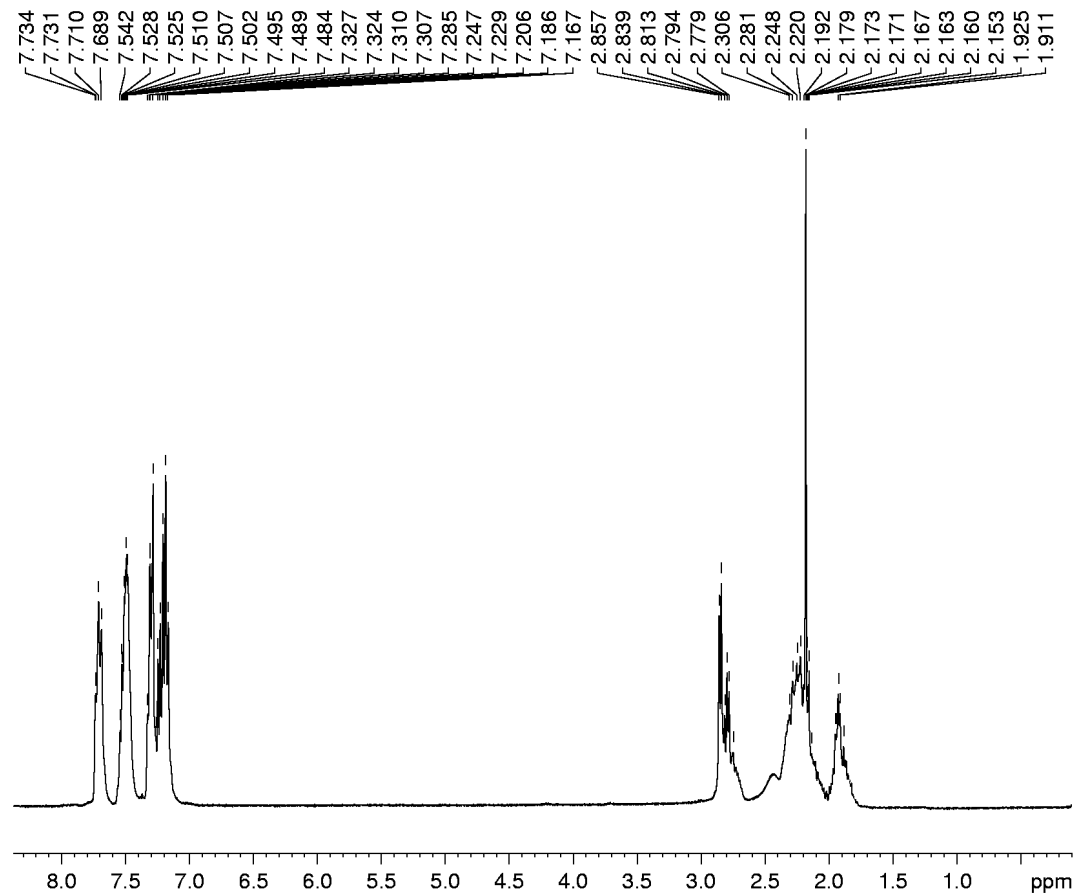
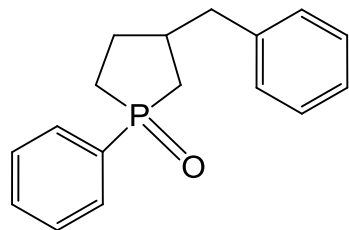
Current Data Parameters
NAME MRC-002
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120823
Time 17.13
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 13
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 299.2 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3f**



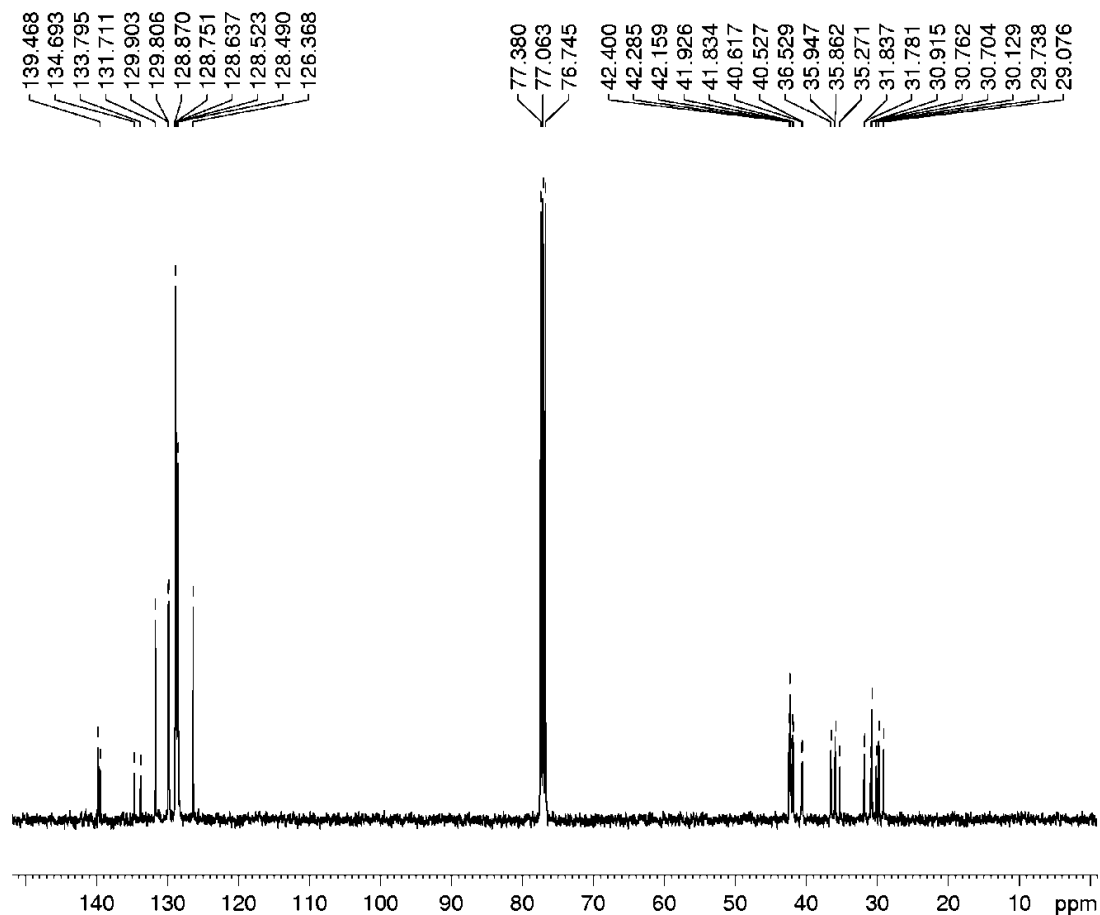
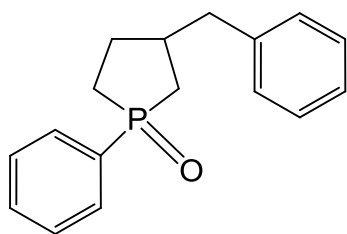
Current Data Parameters
 NAME mahamathanova
 EXPNO 52
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20110527
 Time 13.48
 INSTRUM spect
 PROBHD 5 mm PABBO BE
 PULPROG zg
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 3612.717 Hz
 FIDRES 0.220503 Hz
 AQ 2.2675457 sec
 RG 50.8
 DW 138.400 usec
 DE 6.00 usec
 TE 299.1 K
 D1 5.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^1H
 P1 14.80 usec
 PL1 0 dB
 PL1W 8.86695957 W
 SFO1 400.1317676 MHz

F2 - Processing parameters
 SI 32768
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

^{13}C NMR (CDCl_3): **3f**



Current Data Parameters
NAME mahamathanova
EXPNO 53
PROCNO 1

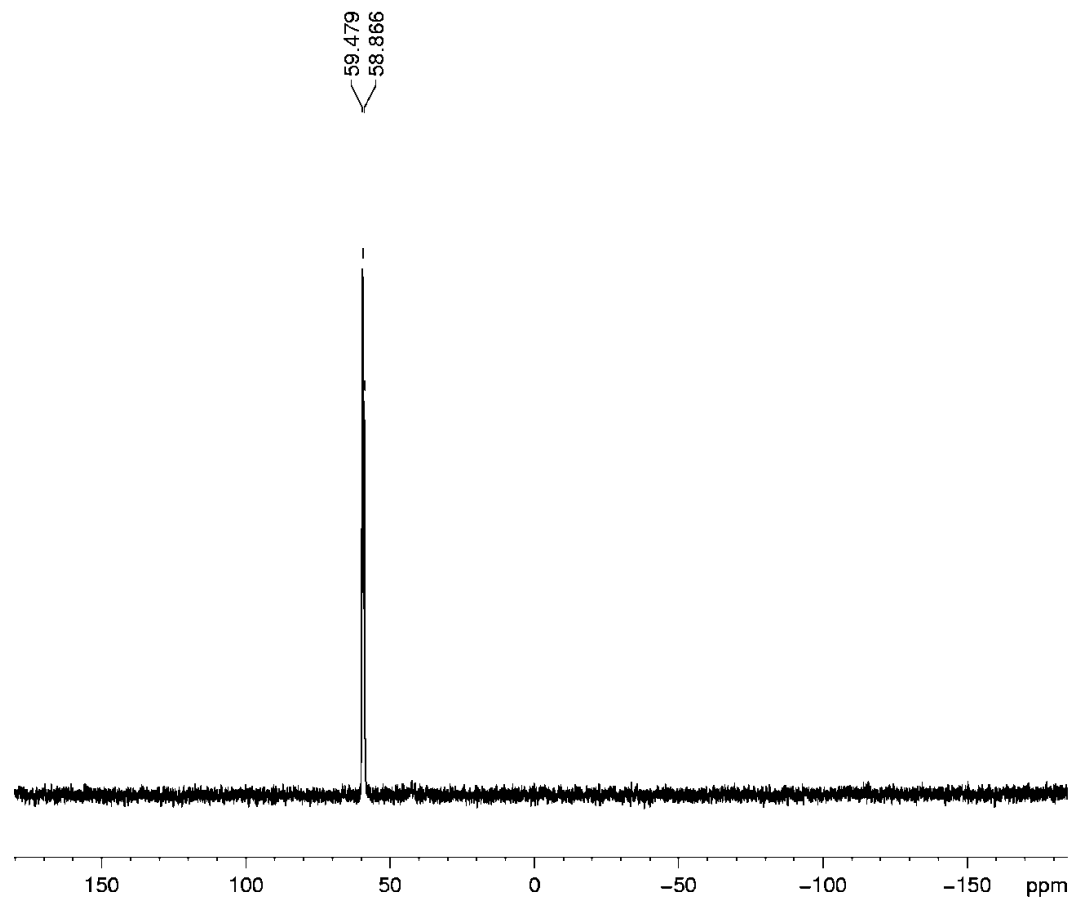
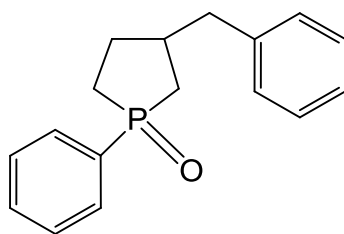
F2 - Acquisition Parameters
Date_ 20110527
Time 14.44
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 634
DS 0
SWH 16891.893 Hz
FIDRES 0.525507 Hz
AQ 0.9514624 sec
RG 2050
DW 29.600 usec
DE 30.00 usec
TE 300.0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6199552 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3f**



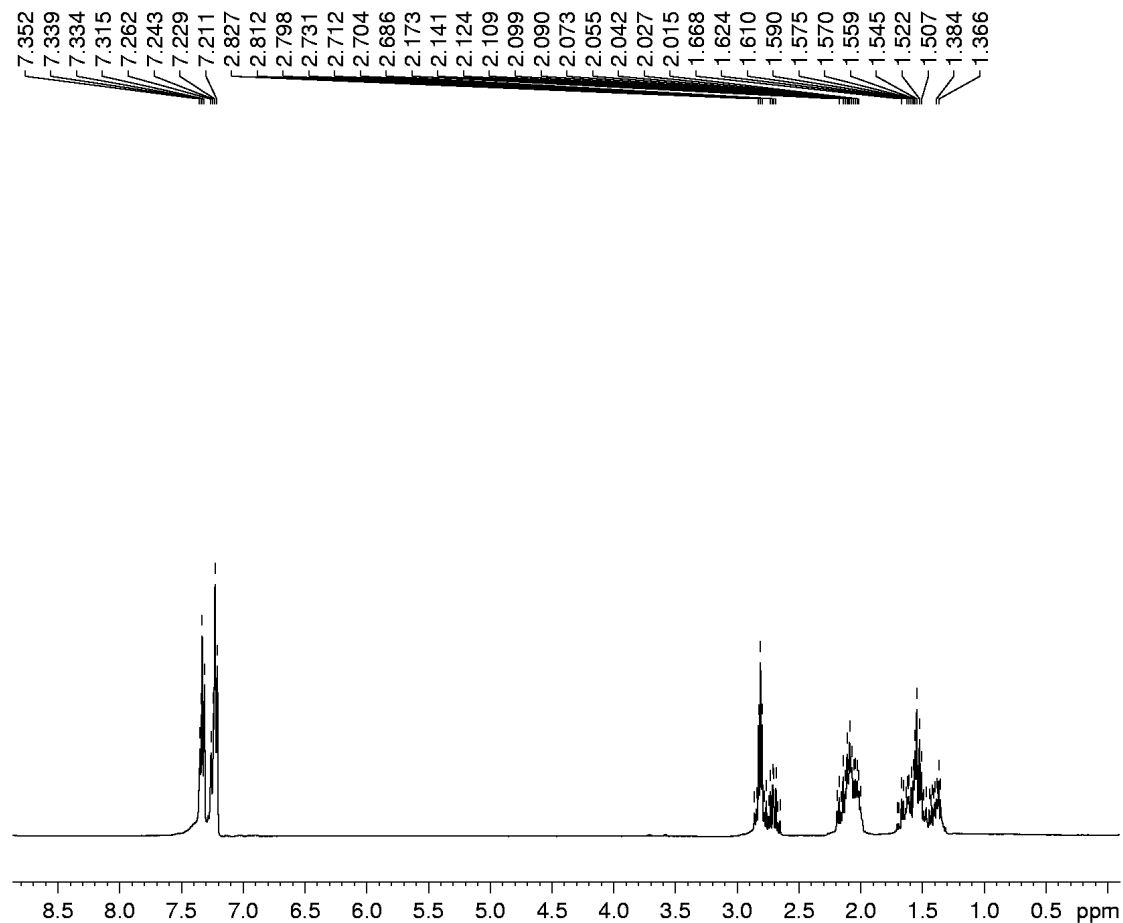
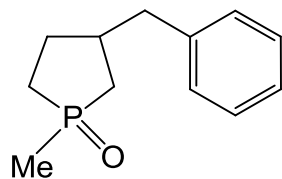
Current Data Parameters
NAME mahamathanova
EXPNO 58
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110527
Time 14.47
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 6
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 299.5 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3g**



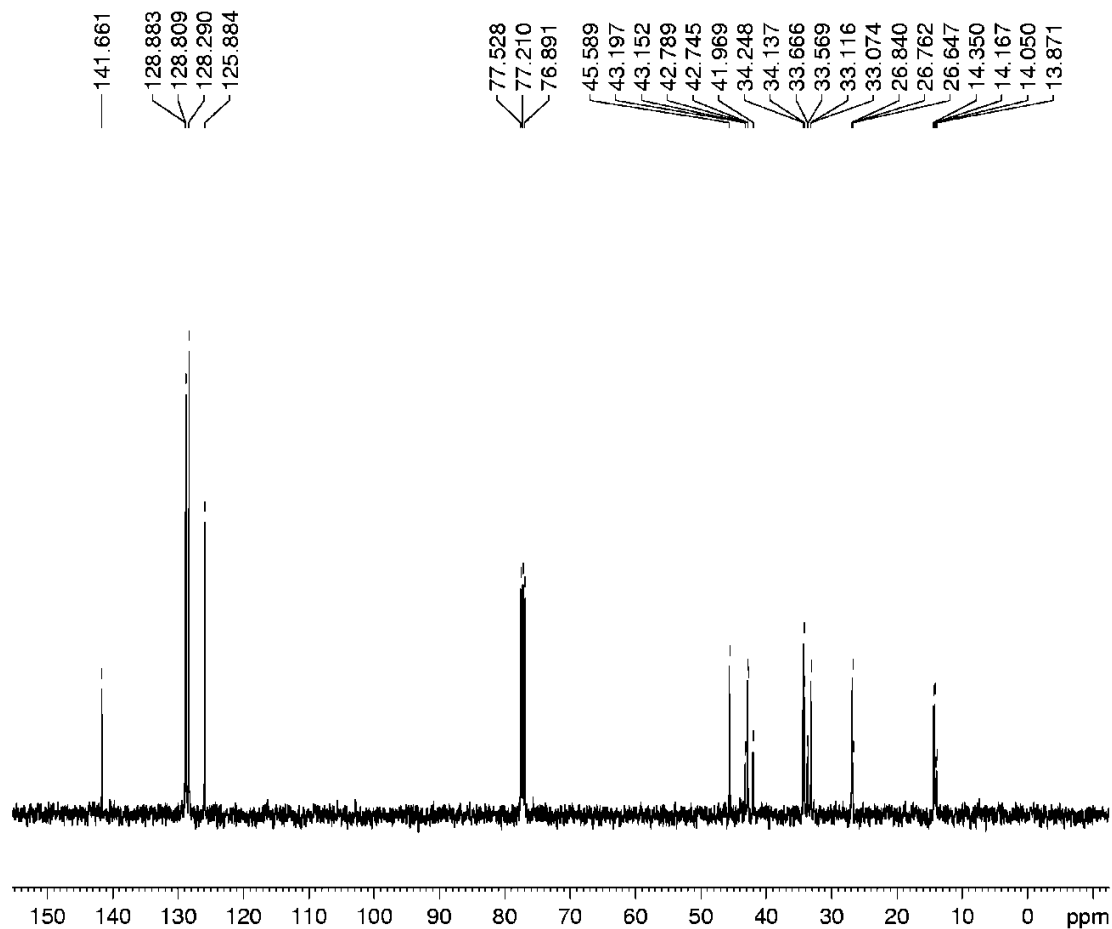
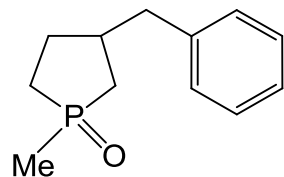
Current Data Parameters
NAME mahamathanova
EXPNO 160
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110707
Time 15.22
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3612.717 Hz
FIDRES 0.220503 Hz
AQ 2.2675457 sec
RG 18
DW 138.400 usec
DE 6.00 usec
TE 299.3 K
D1 5.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317676 MH

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **3g**



Current Data Parameters
 NAME mahamathanova
 EXPNO 161
 PROCNO 1

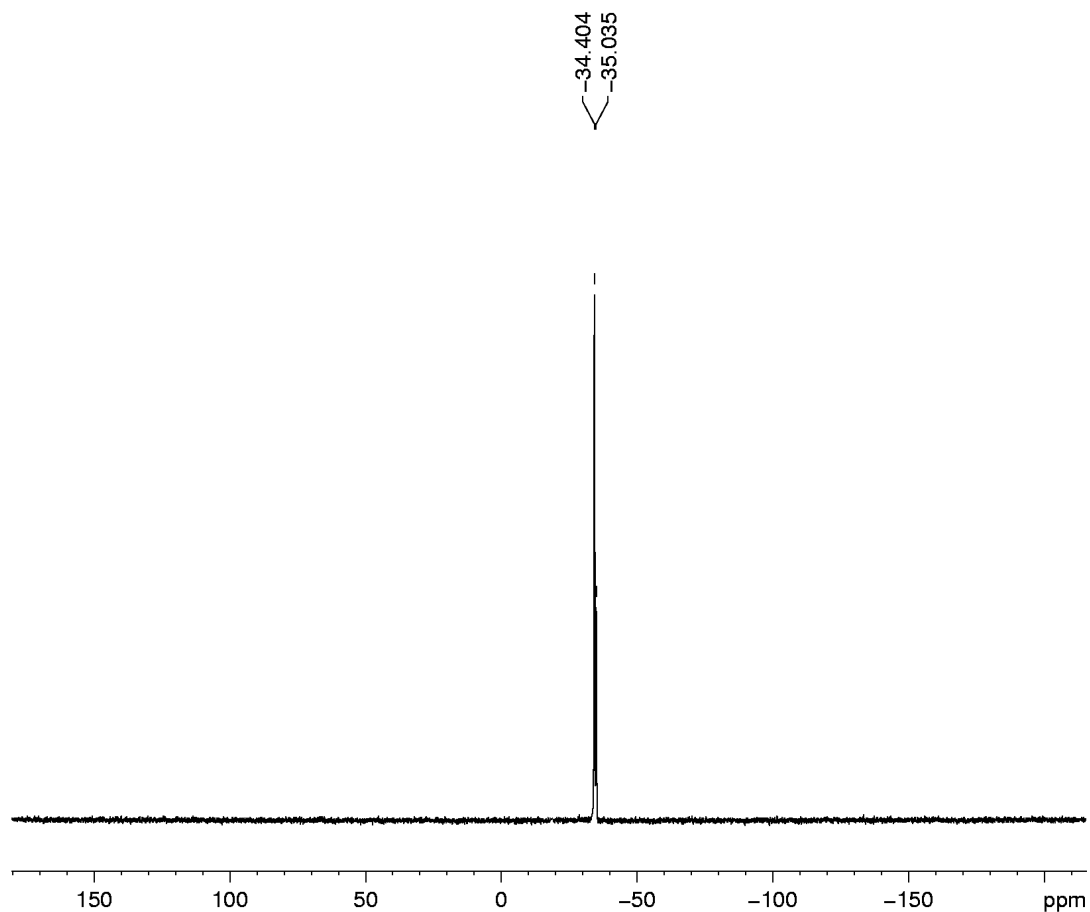
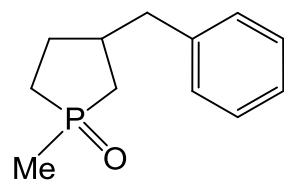
F2 - Acquisition Parameters
 Date_ 20110707
 Time 15.23
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 32144
 SOLVENT CDCl_3
 NS 25
 DS 0
 SWH 16891.893 Hz
 FIDRES 0.525507 Hz
 AQ 0.9514624 sec
 RG 2050
 DW 29.600 μsec
 DE 30.00 μsec
 TE 299.4 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^{13}C
 P1 10.00 μsec
 PL1 0 dB
 PL1W 33.91046524 W
 SFO1 100.6199552 MHz

===== CHANNEL f2 =====
 CPDPRG[2] waltz16
 NUC2 ^1H
 PCPD2 90.00 μsec
 PL2 0 dB
 PL12 15.68 dB
 PL13 18.70 dB
 PL2W 8.86695957 W
 PL12W 0.23975886 W
 PL13W 0.11961196 W
 SFO2 400.1317606 MHz

F2 - Processing parameters
 SI 32768
 SF 100.6127690 MHz
 WDW EM
 SSB 0

^{31}P NMR (CDCl_3): **3g**



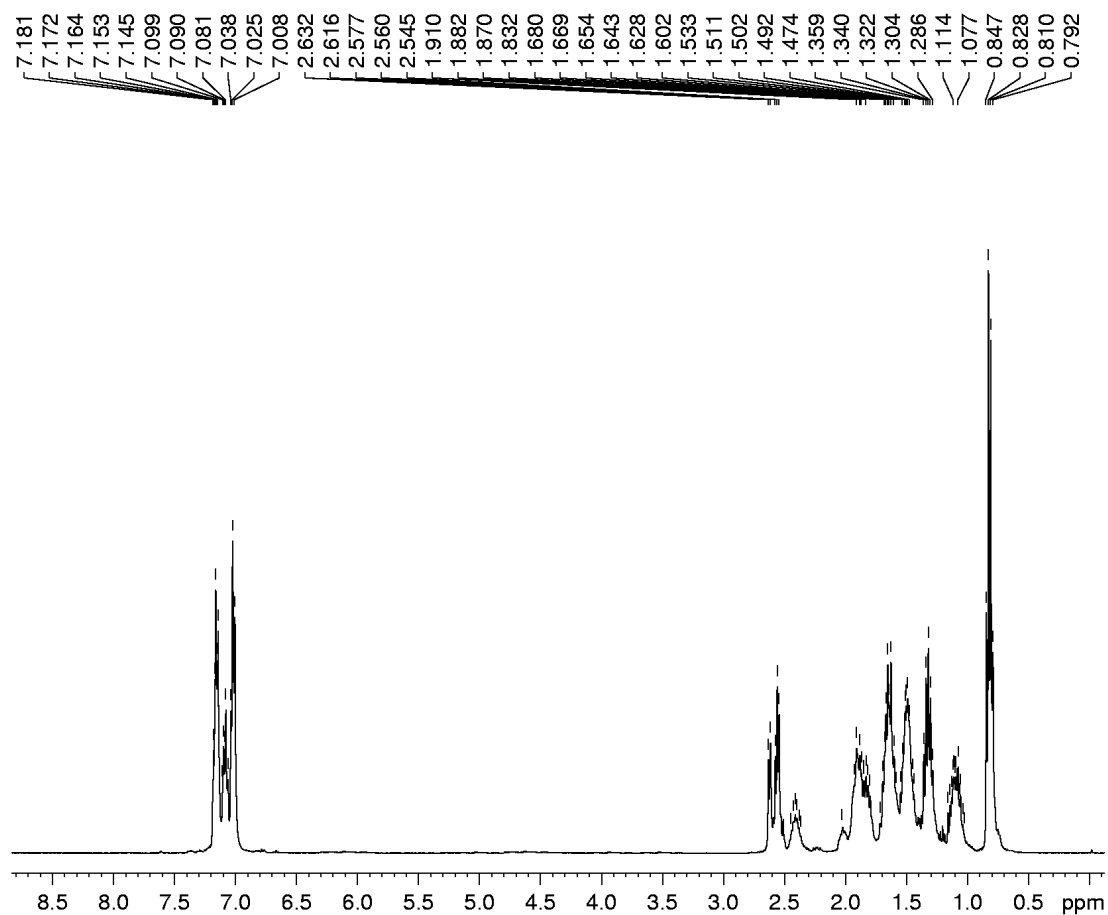
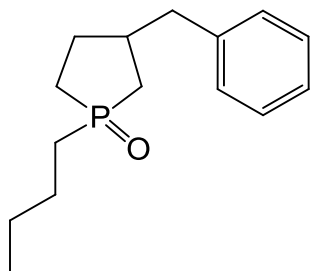
Current Data Parameters
NAME mahamathanova
EXPNO 165
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110707
Time 15.56
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 9
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1290
DW 7.800 usec
DE 6.00 usec
TE 299.2 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **3h**



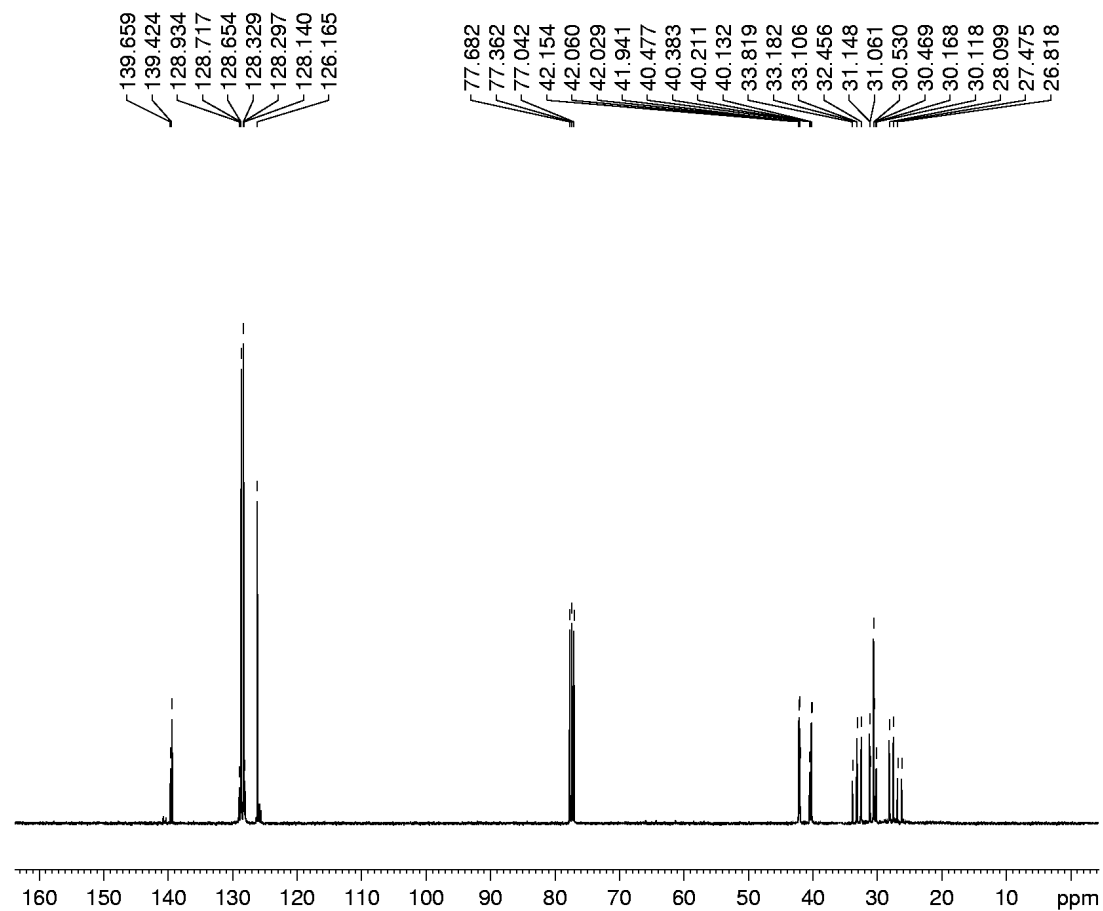
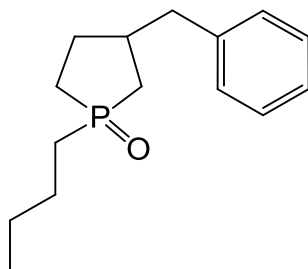
Current Data Parameters
NAME SRE-7
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120517
Time 14.01
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 4618.227 Hz
FIDRES 0.281874 Hz
AQ 1.7738410 sec
RG 16
DW 108.267 usec
DE 6.00 usec
TE 298.7 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1319527 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.10 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **3h**



Current Data Parameters

NAME SRE-7
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters

Date_ 20120517
Time 14.18
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 650
DS 2
SWH 23809.523 Hz
FIDRES 0.726609 Hz
AQ 0.6881280 sec
RG 2050
DW 21.000 usec
DE 6.00 usec
TE 299.4 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====

NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6242392 MHz

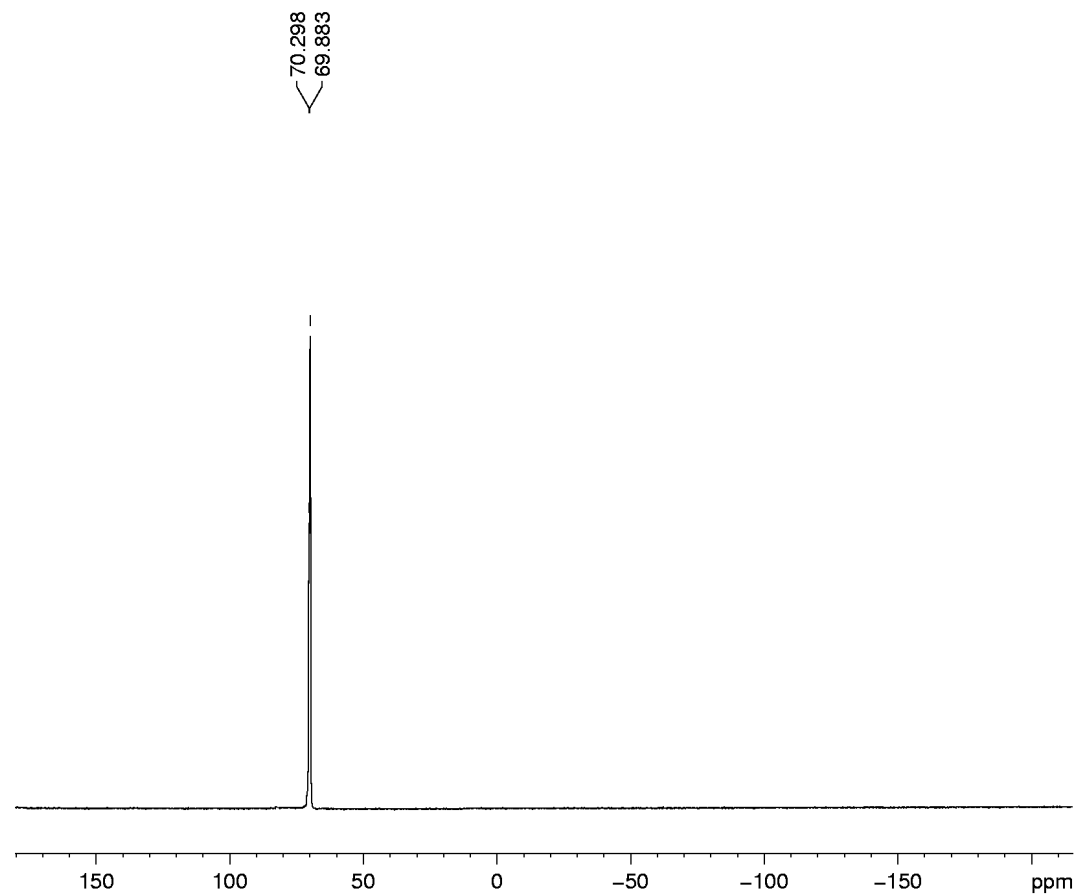
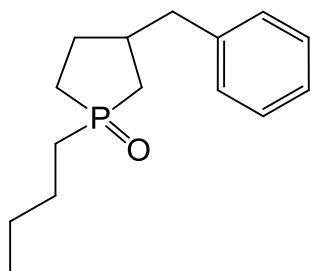
===== CHANNEL f2 =====

CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1316005 MHz

F2 - Processing parameters

SI 65536
SF 100.6127727 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **3h**



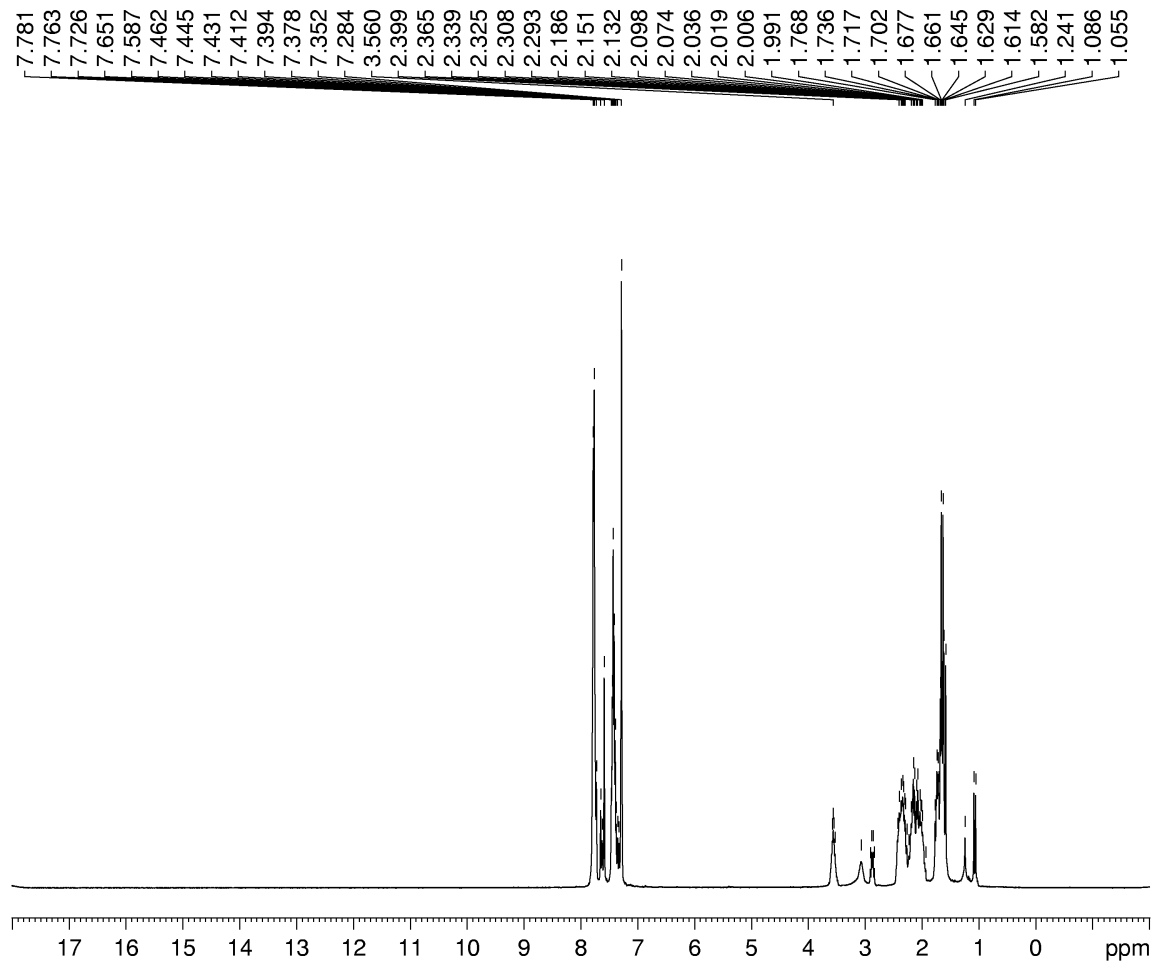
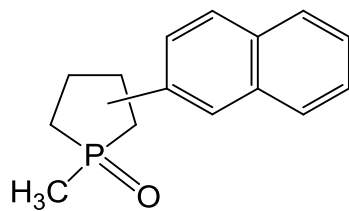
Current Data Parameters
NAME SRE-7
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120517
Time 15.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 34
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 298.8 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **7e**, **8e**



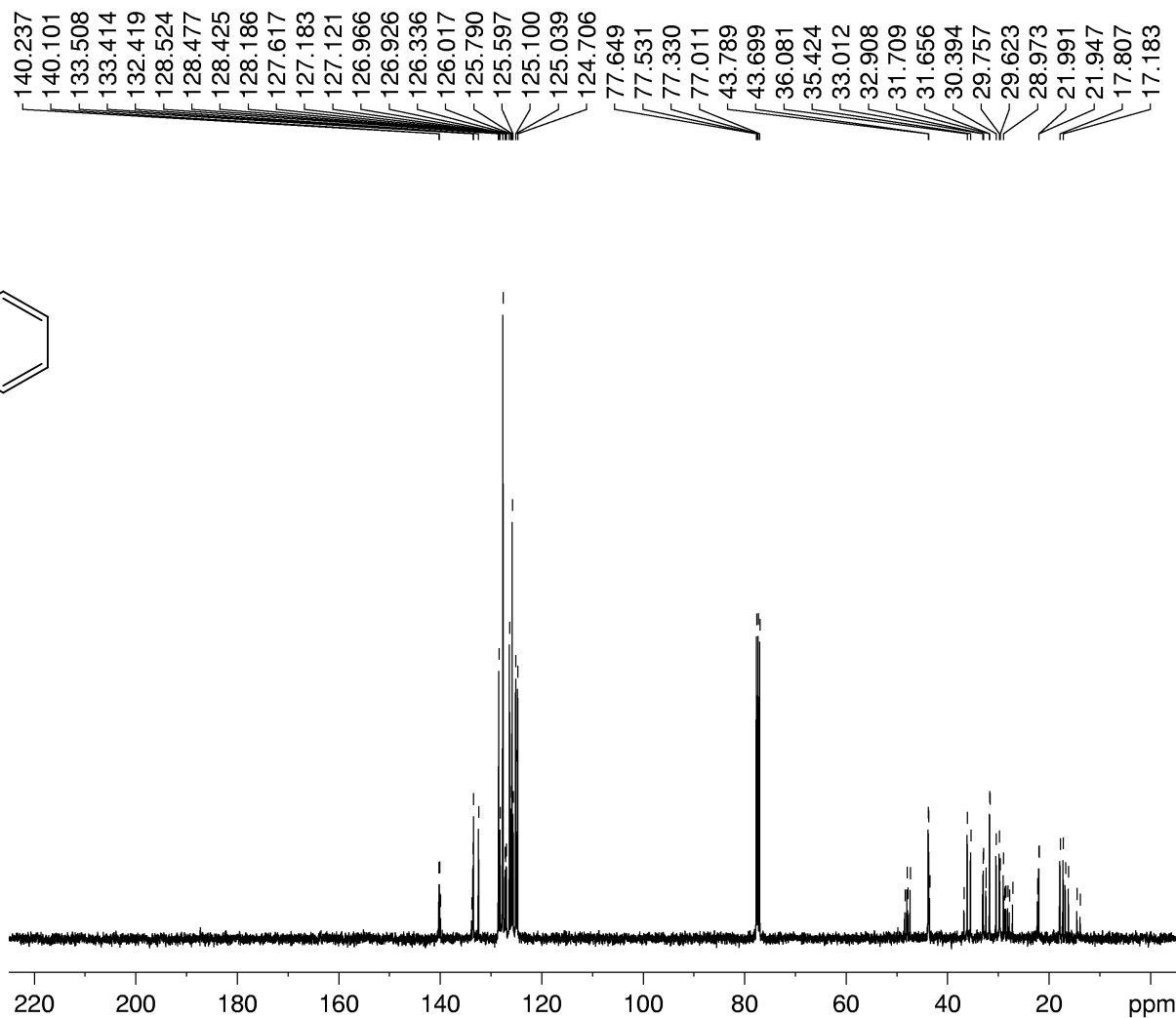
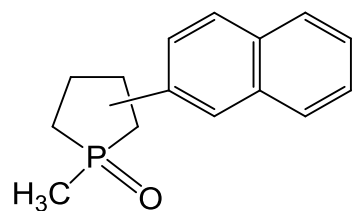
Current Data Parameters
NAME KRA-342-30
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150514
Time 15.33
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 8012.820 Hz
FIDRES 0.489064 Hz
AQ 1.0223616 sec
RG 36
DW 62.400 usec
DE 6.50 usec
TE 297.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1332010 MHz
NUC1 ^1H
P1 14.80 usec
PLW1 8.89999962 W

F2 - Processing parameters
SI 16384
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **7e, 8e**



Current Data Parameters
NAME KRA-342-30
EXPNO 13
PROCNO 1

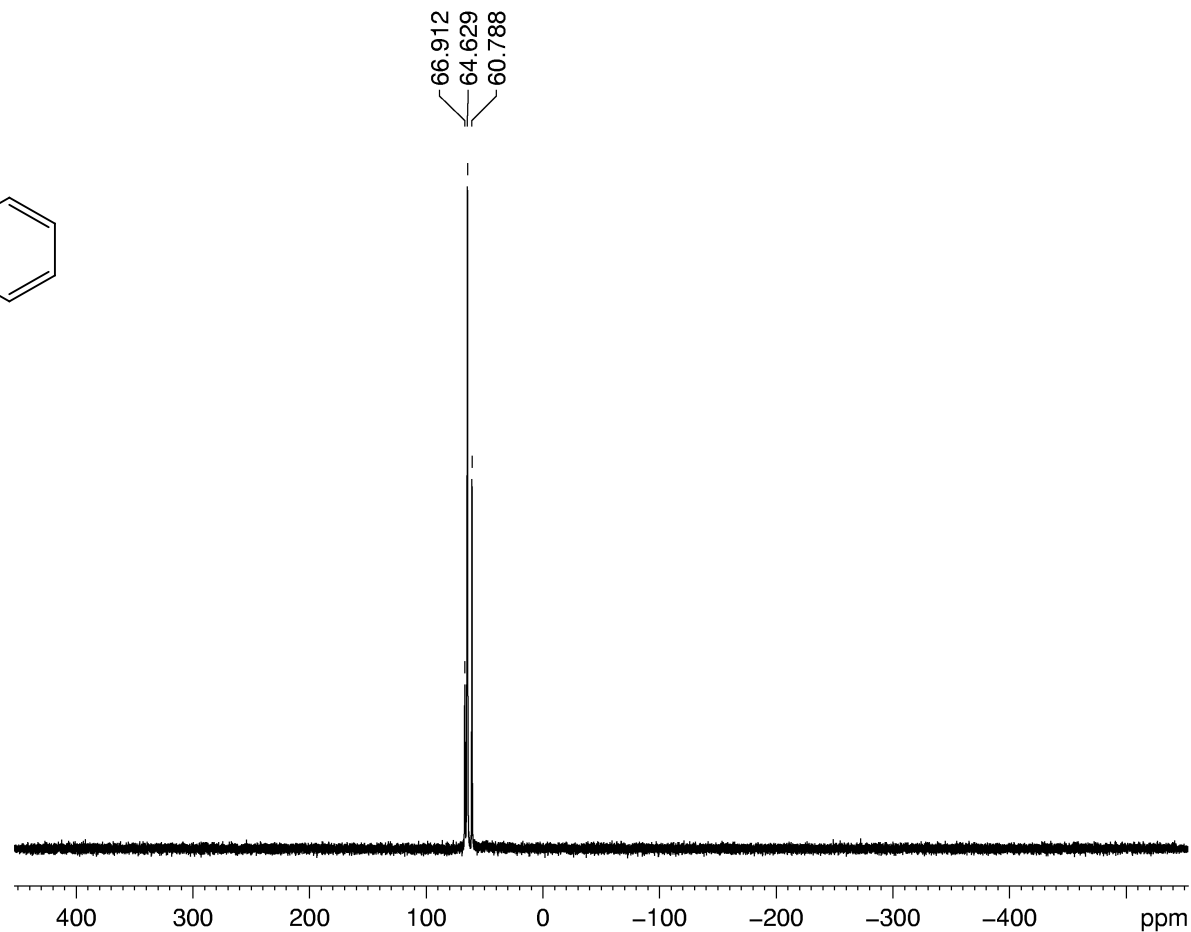
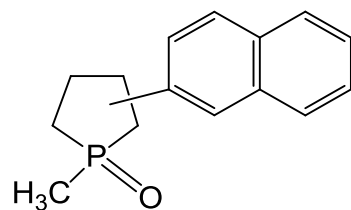
F2 - Acquisition Parameters
Date_ 20150514
Time 15.34
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 96
DS 2
SWH 23148.148 Hz
FIDRES 0.706425 Hz
AQ 0.7077888 sec
RG 2050
DW 21.600 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6238364 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1316005 MHz
NUC2 ^1H
CPDPRG2 waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127689 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

^{31}P NMR (CDCl_3): **7e**, **8e**



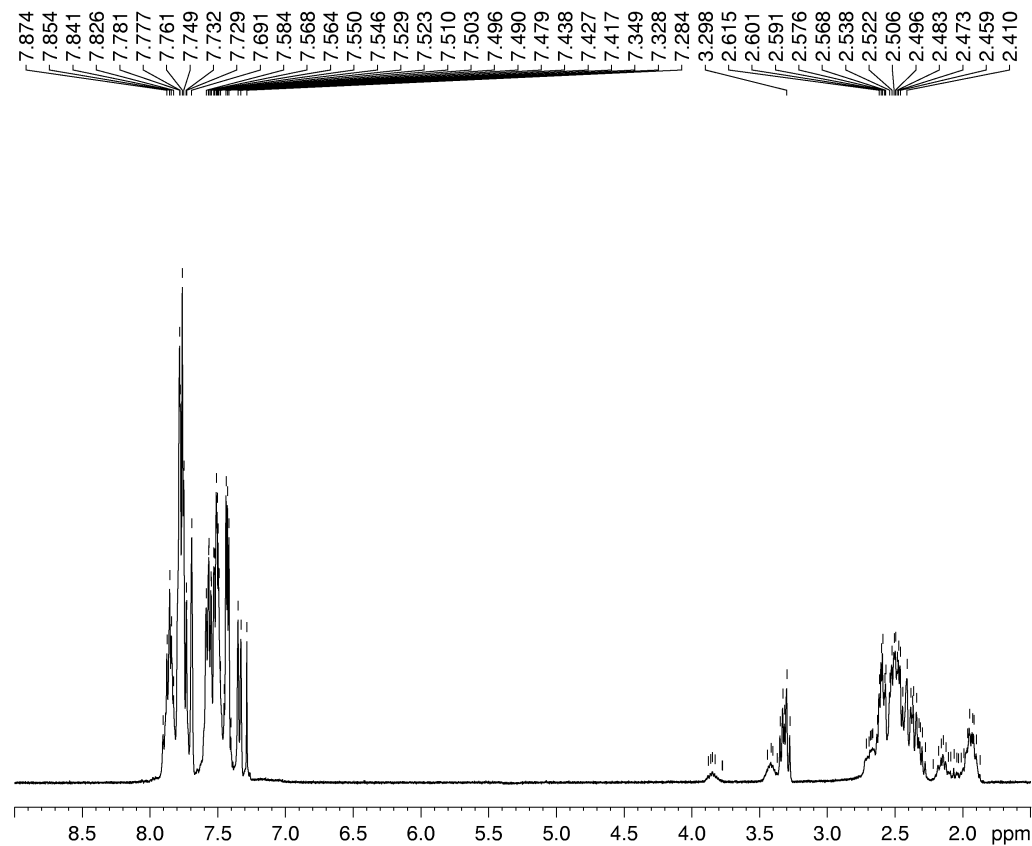
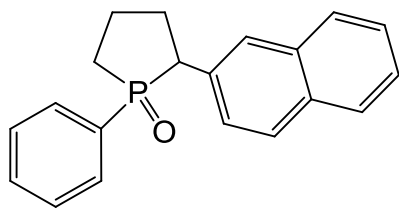
Current Data Parameters
NAME KRA-342-30
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150514
Time 15.31
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 32
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 297.9 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **8f**



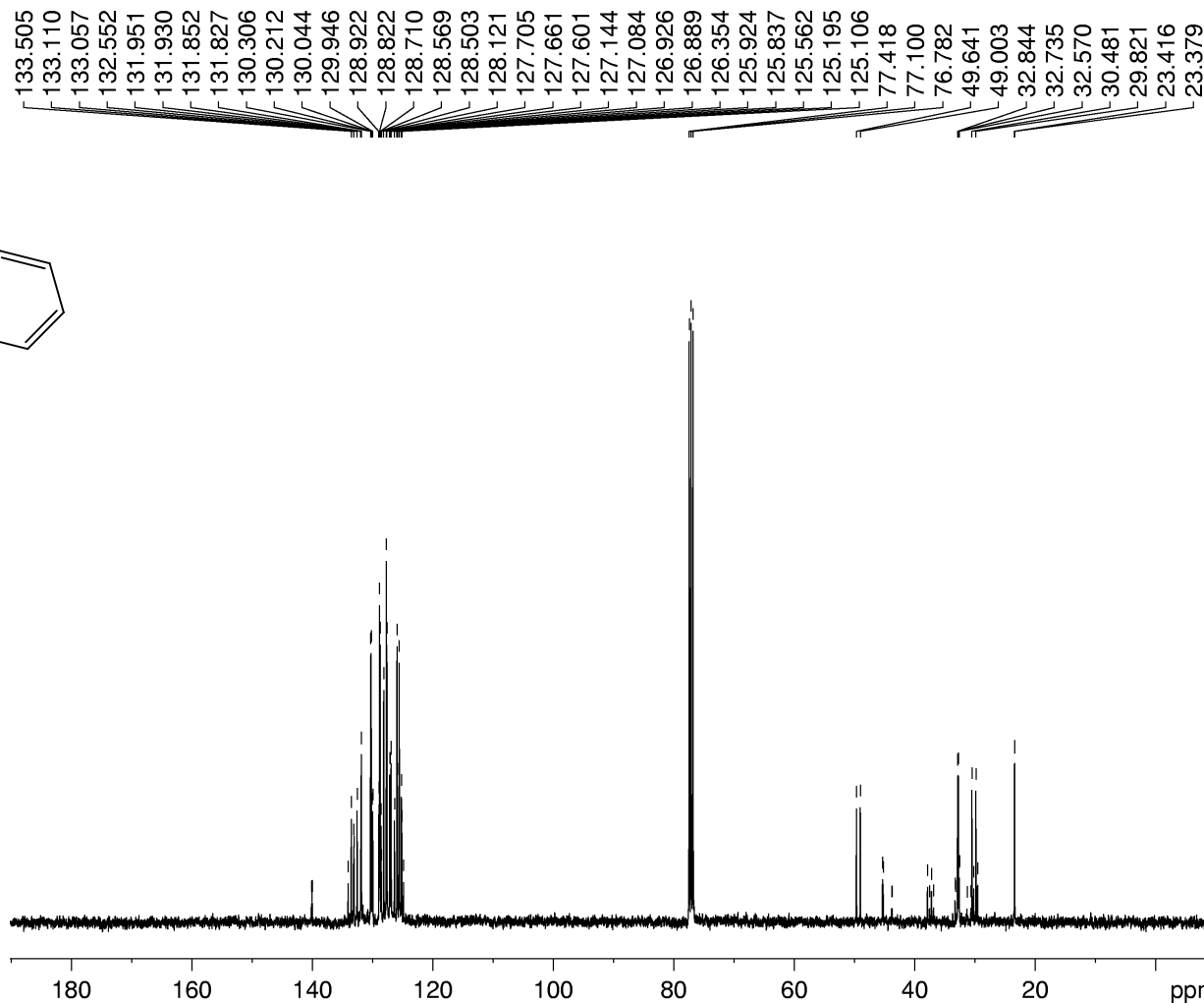
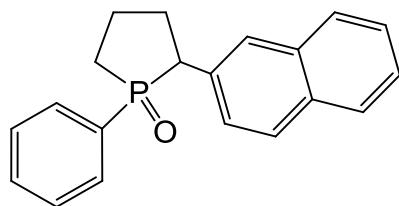
Current Data Parameters
NAME KRA-333-3-30
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150420
Time 10.30
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 4901.961 Hz
FIDRES 0.299192 Hz
AQ 1.6711680 sec
RG 101
DW 102.000 usec
DE 6.50 usec
TE 298.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1322177 MHz
NUC1 ^1H
P1 14.80 usec
PLW1 8.89999962 W

F2 - Processing parameters
SI 16384
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **8f**



Current Data Parameters
NAME KRA-333-3-30
EXPNO 13
PROCNO 1

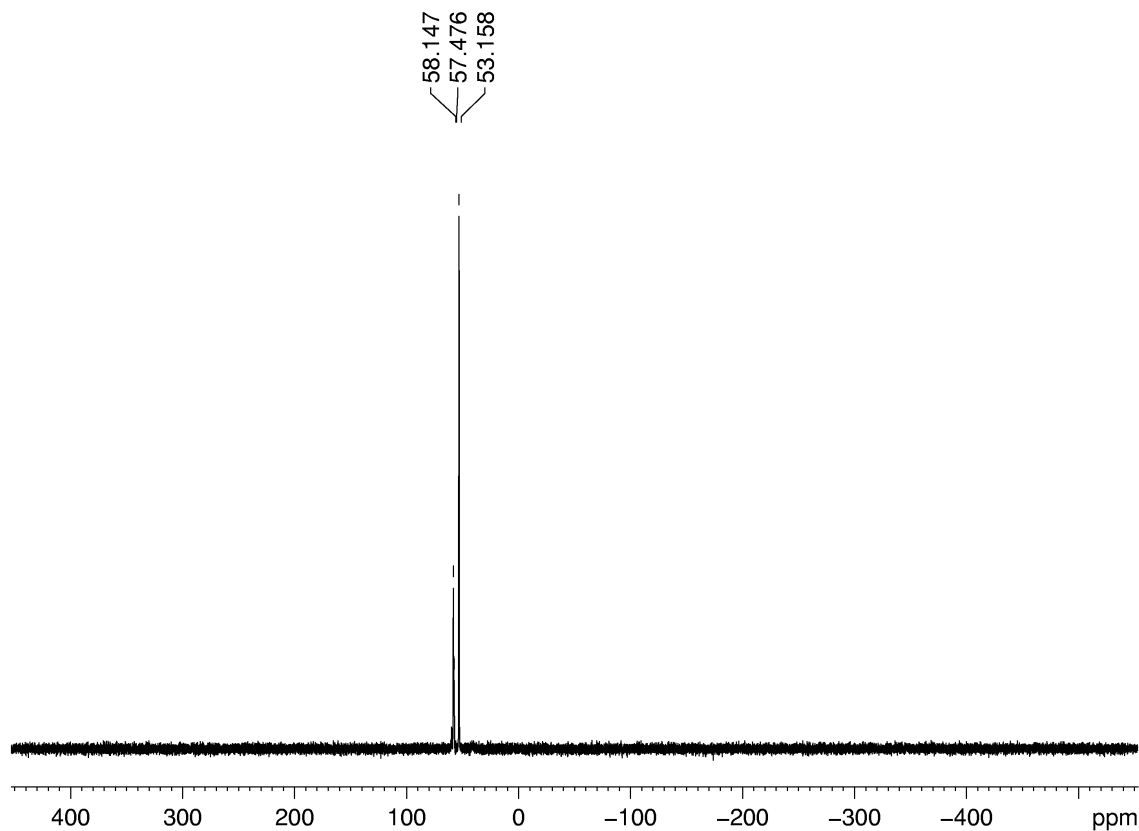
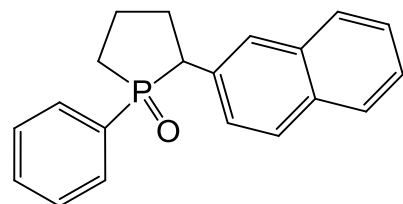
F2 - Acquisition Parameters
Date_ 20150420
Time 10.32
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 16384
SOLVENT CDCl_3
NS 658
DS 2
SWH 20161.291 Hz
FIDRES 1.230548 Hz
AQ 0.4063232 sec
RG 2050
DW 24.800 usec
DE 6.50 usec
TE 298.9 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 ===
SFO1 100.6218241 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 ===
SFO2 400.1322007 MHz
NUC2 ^1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127692 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

^{31}P NMR (CDCl_3): **8f**



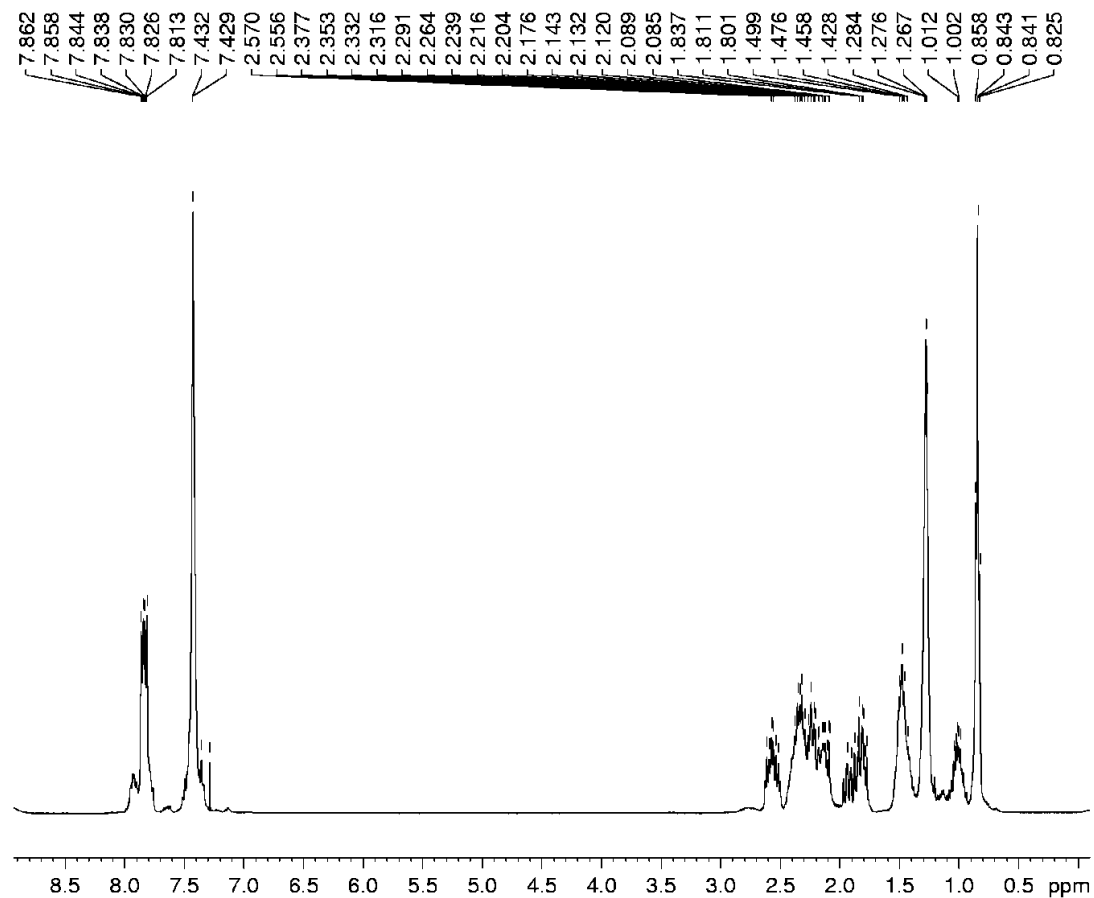
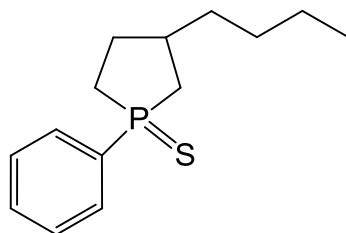
Current Data Parameters
NAME KRA-333-3-30
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150420
Time 11.04
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 64
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.9 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **4a**



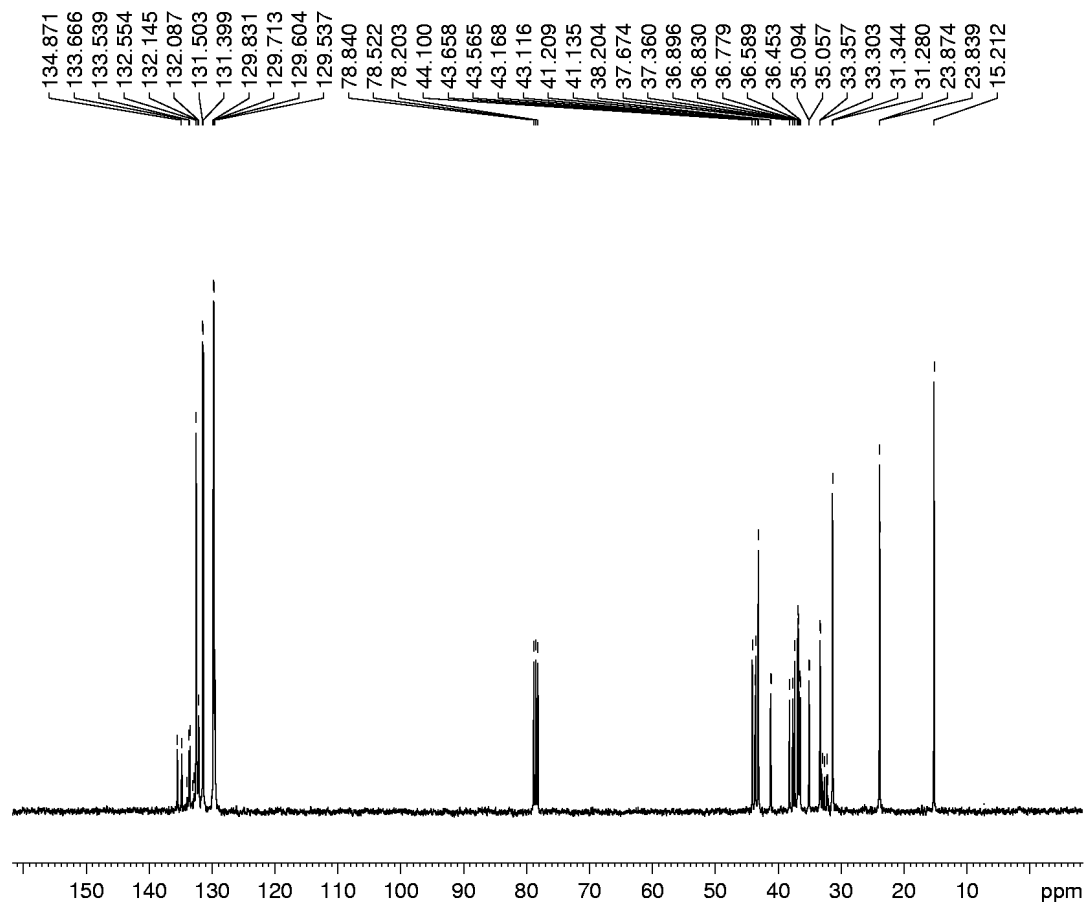
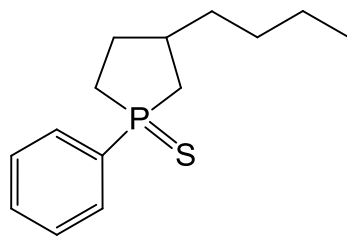
Current Data Parameters
NAME mahamathanova
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 16.27
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3612.717 Hz
FIDRES 0.220503 Hz
AQ 2.2675457 sec
RG 10
DW 138.400 usec
DE 6.00 usec
TE 297.5 K
D1 5.0000000 sec
TD0 1

===== CHANNEL f1 ===
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317676 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **4a**



Current Data Parameters
NAME mahamathanova
EXPNO 2
PROCNO 1

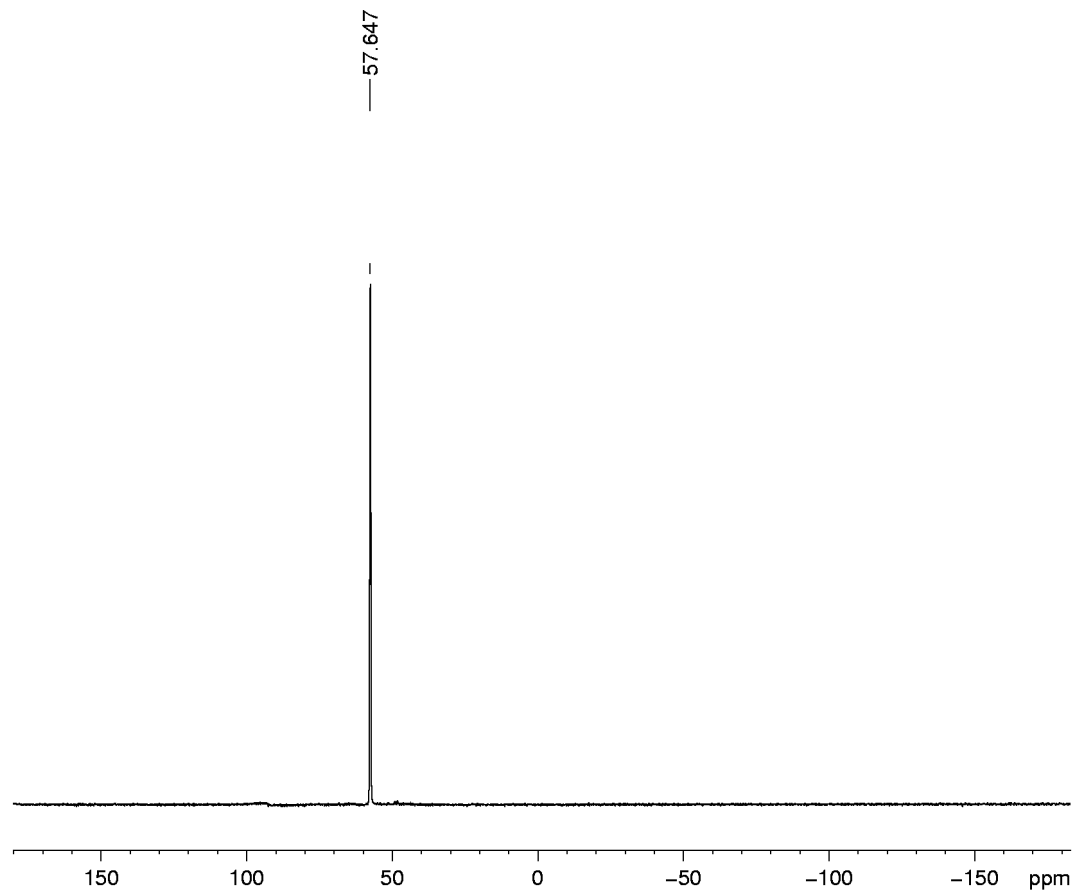
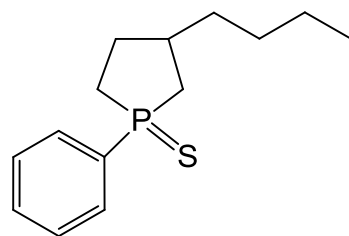
F2 - Acquisition Parameters
Date_ 20110428
Time 16.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 193
DS 0
SWH 26315.789 Hz
FIDRES 0.818684 Hz
AQ 0.6107360 sec
RG 2050
DW 19.000 usec
DE 30.00 usec
TE 297.6 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6233499 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6126514 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **4a**



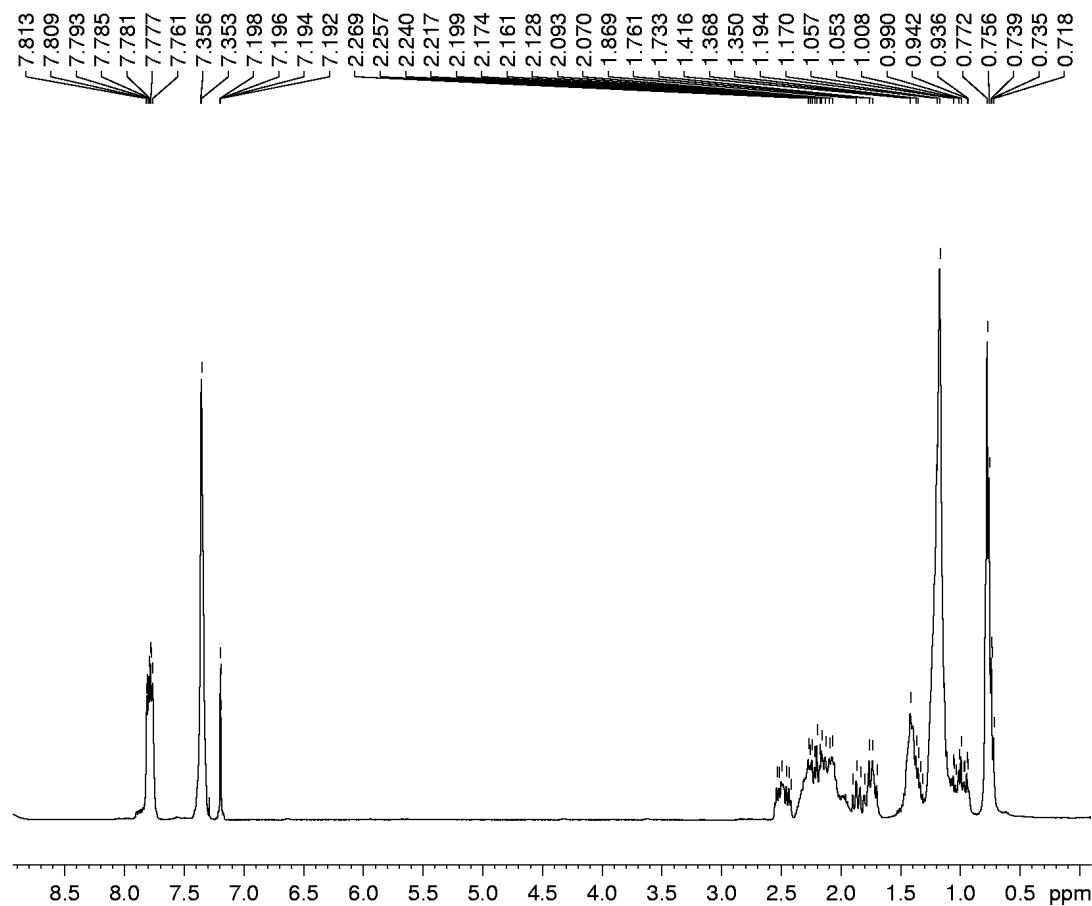
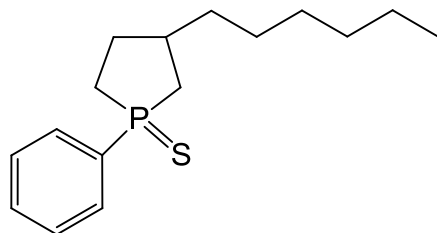
Current Data Parameters
NAME mahamathanova
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 17.09
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 32
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 297.6 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MH:

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **4b**



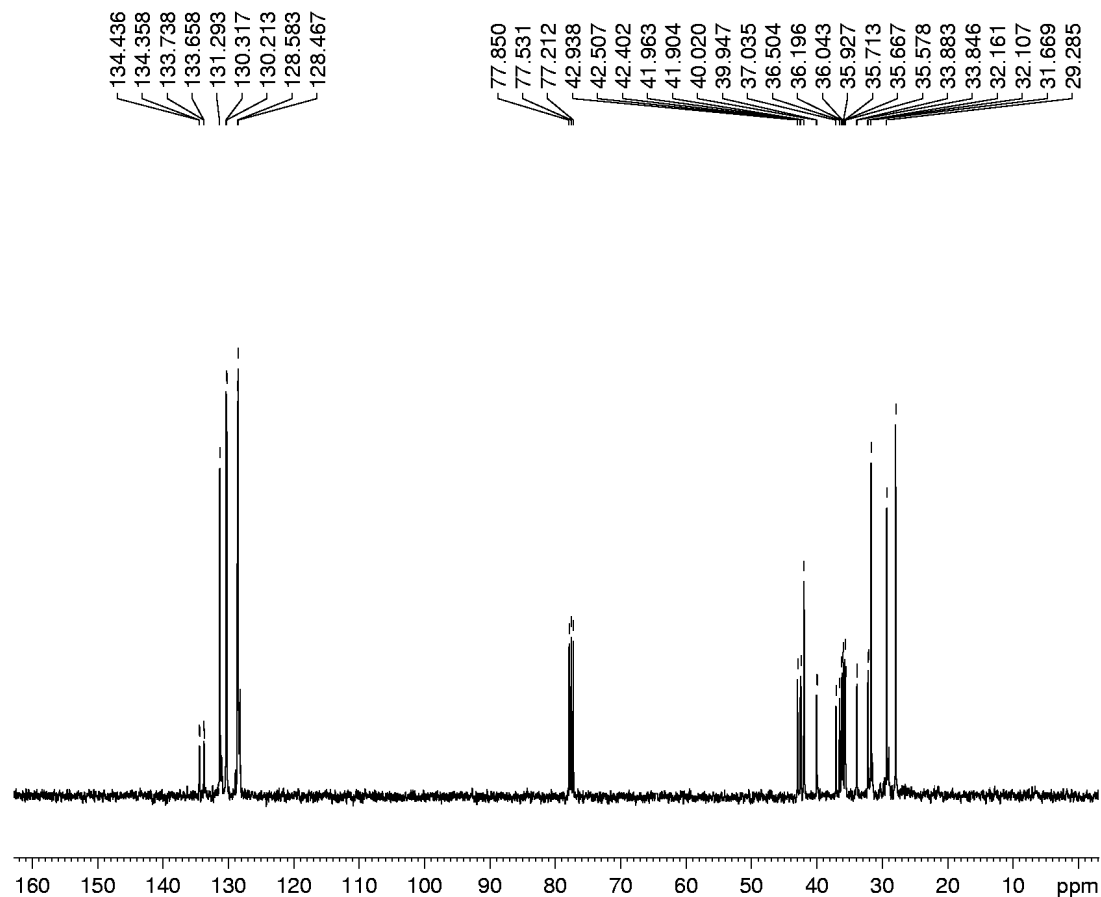
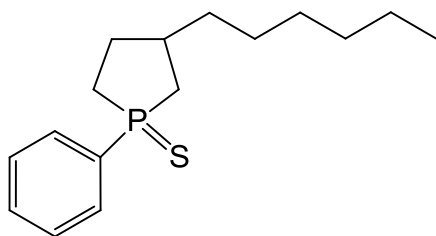
Current Data Parameters
NAME mahamathanova
EXPNO 12
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time 18.56
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zg
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3612.717 Hz
FIDRES 0.220503 Hz
AQ 2.2675457 sec
RG 5.6
DW 138.400 usec
DE 6.00 usec
TE 298.5 K
D1 5.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317676 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **4b**



Current Data Parameters
NAME mahamathanova
EXPNO 13
PROCNO 1

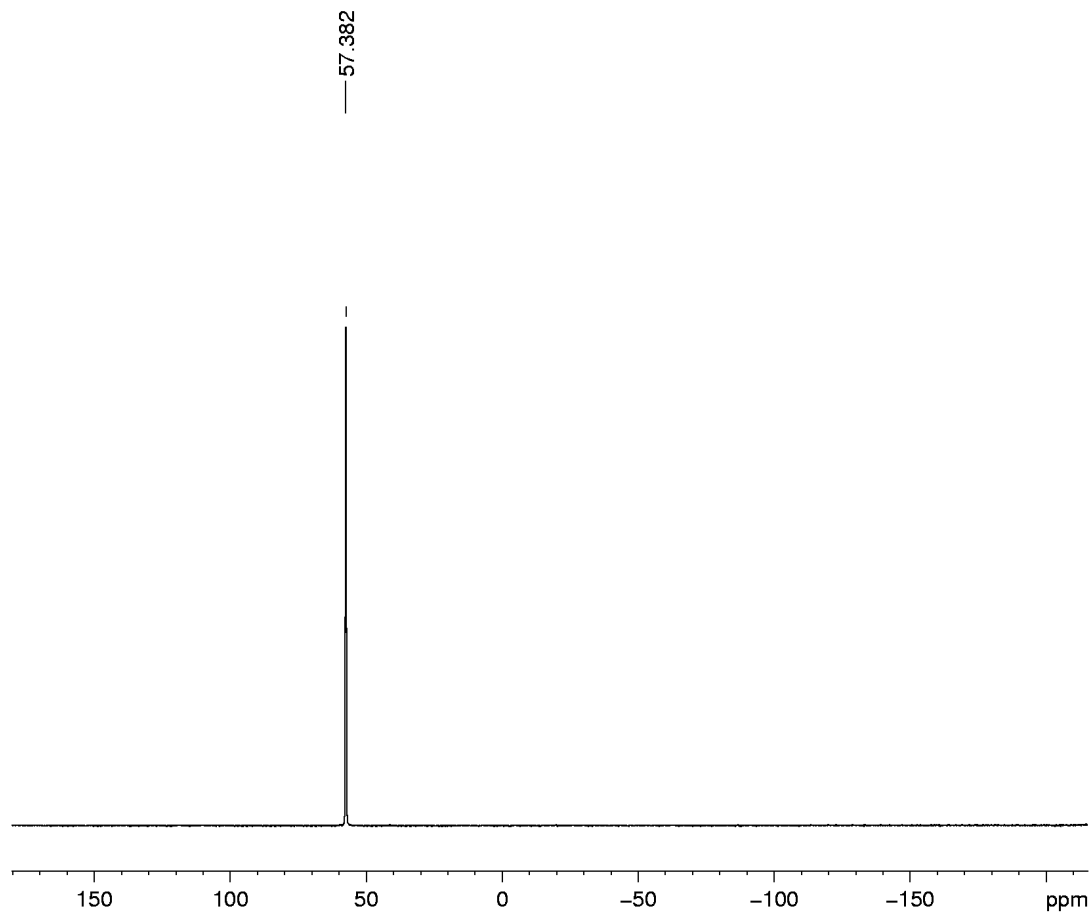
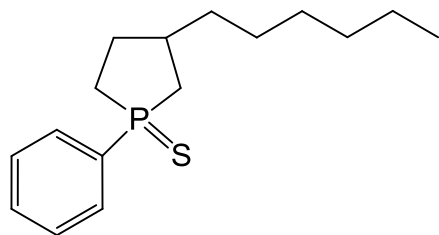
F2 - Acquisition Parameters
Date_ 20110428
Time 18.58
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32144
SOLVENT CDCl_3
NS 46
DS 0
SWH 23809.523 Hz
FIDRES 0.740714 Hz
AQ 0.6750240 sec
RG 2050
DW 21.000 usec
DE 30.00 usec
TE 298.6 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6232301 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1317606 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **4b**

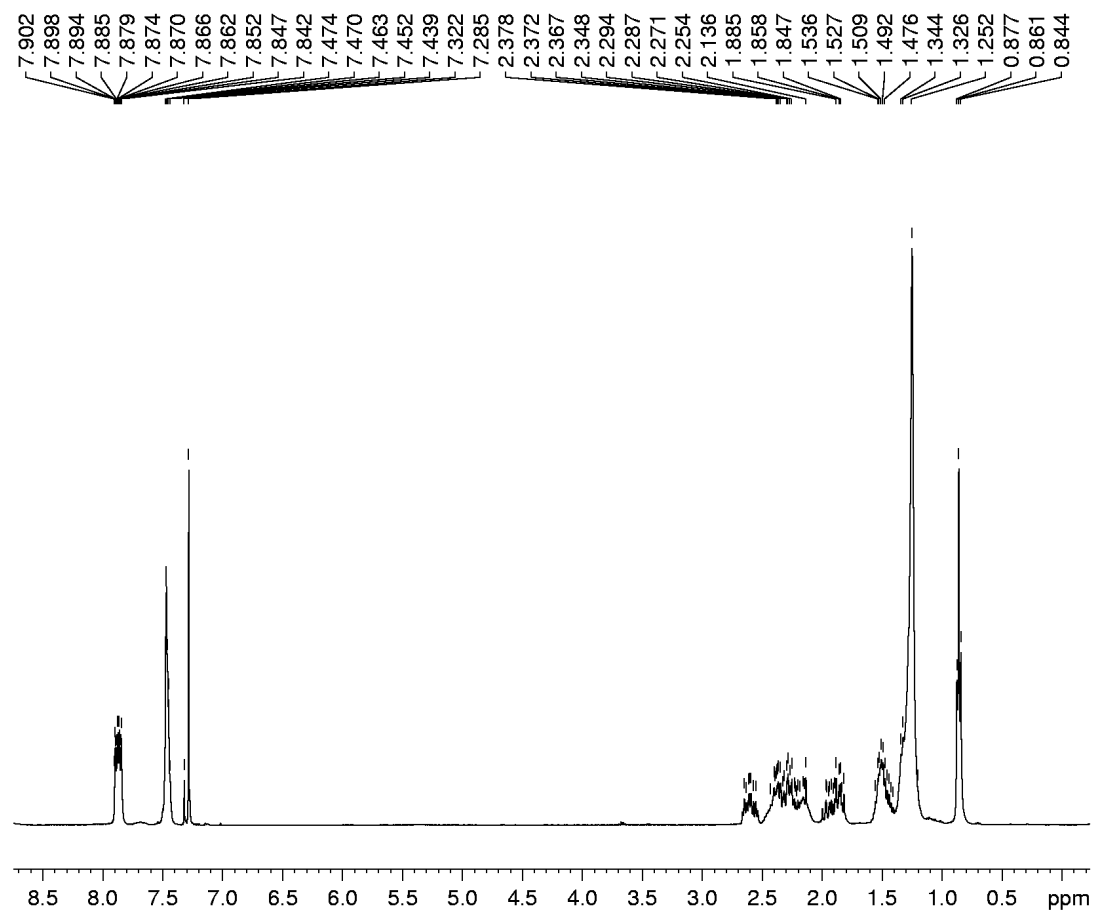


Current Data Parameters
NAME mahamathanova
EXPNO 18
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110428
Time_ 19.21
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 12
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1820
DW 7.800 usec
DE 6.00 usec
TE 297.5 K
D1 2.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

CCCCCCCCC1CCCC1P(=S)(c2ccccc2)S3CCCC3

```

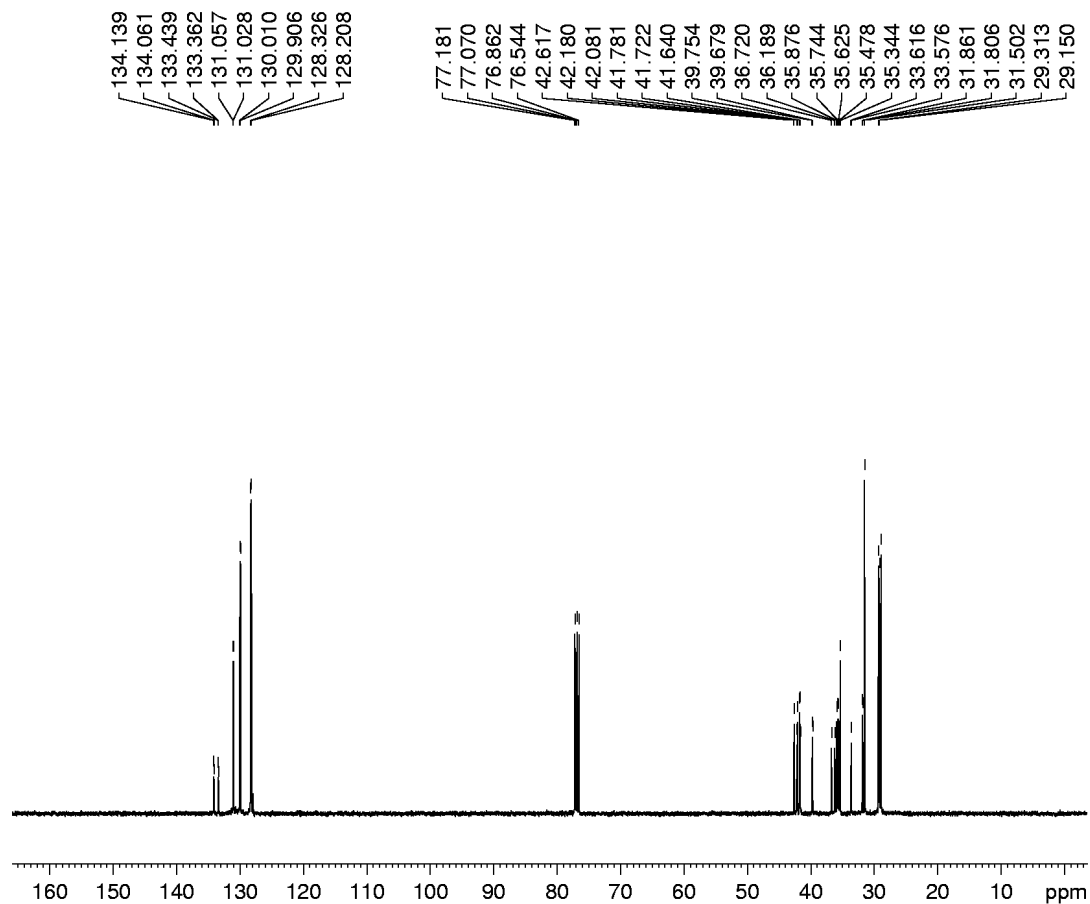
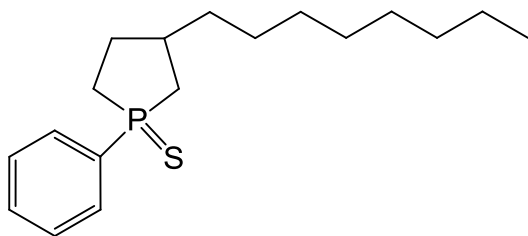
F2 - Acquisition Parameters
Date_      20121206
Time       14.27
INSTRUM    spect
PROBHD     5 mm PABBO BE
PULPROG    zg30
TD          16384
SOLVENT     CDCl3
NS          1
DS          0
SWH         3591.954 Hz
FIDRES      0.219235 Hz
AQ          2.2806528 sec
RG          22.6
DW          139.200 usec
DE          6.00 usec
TE          297.9 K
D1          1.00000000 sec
TD0         1

```

```
===== CHANNEL f1 =====
NUC1          1H
P1            14.80 usec
PL1          0 dB
PL1W          8.86695957 W
SFO1          400.1317034 MHz
```

F2 – Processing parameters	
SI	32768
SF	400.1300000 MHz
WDW	EM
SSB	0
LB	0.10 Hz
GB	0
PC	1.00

^{13}C NMR (CDCl_3): **4c**



Current Data Parameters
NAME MRC-17
EXPNO 5
PROCNO 1

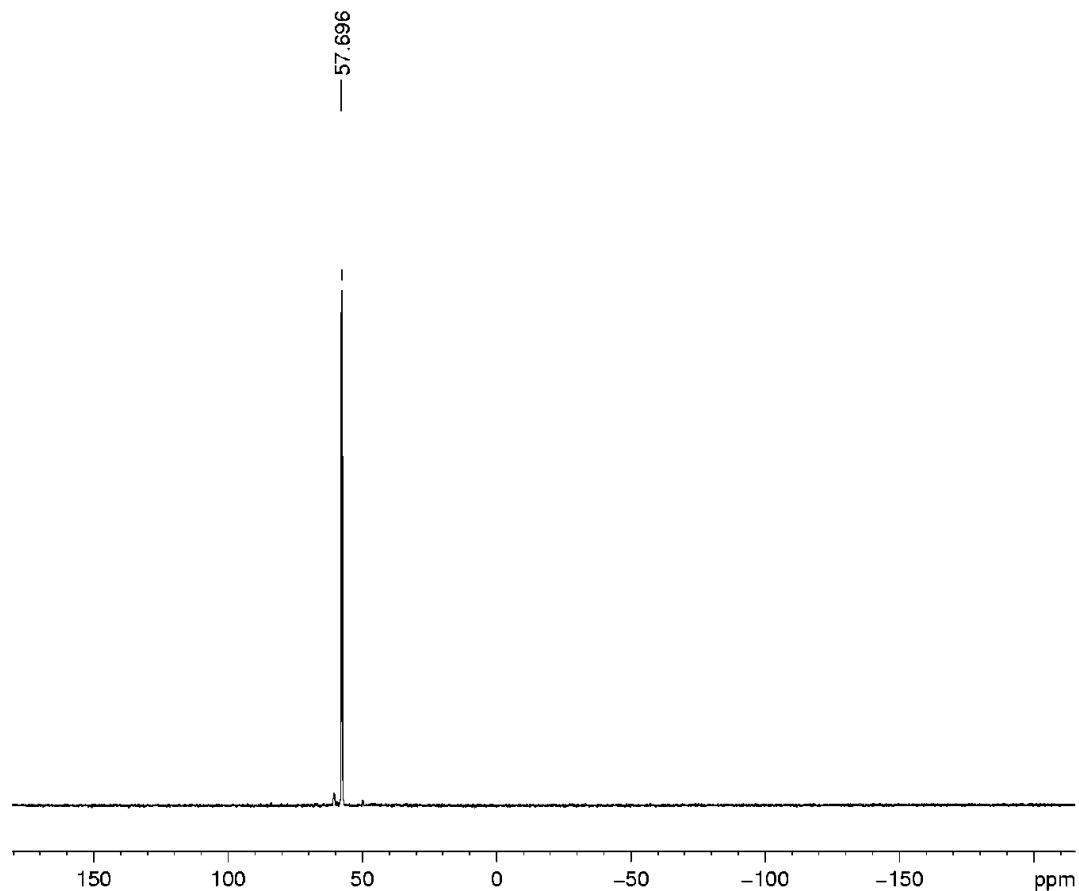
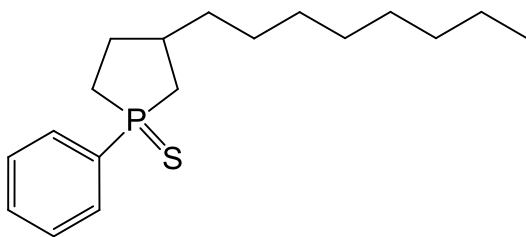
F2 - Acquisition Parameters
Date_ 20121206
Time 15.03
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 366
DS 2
SWH 17857.143 Hz
FIDRES 0.544957 Hz
AQ 0.9175040 sec
RG 2050
DW 28.000 usec
DE 6.00 usec
TE 298.7 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6213714 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1319206 MHz

F2 - Processing parameters
SI 65536
SF 100.6128032 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **4c**



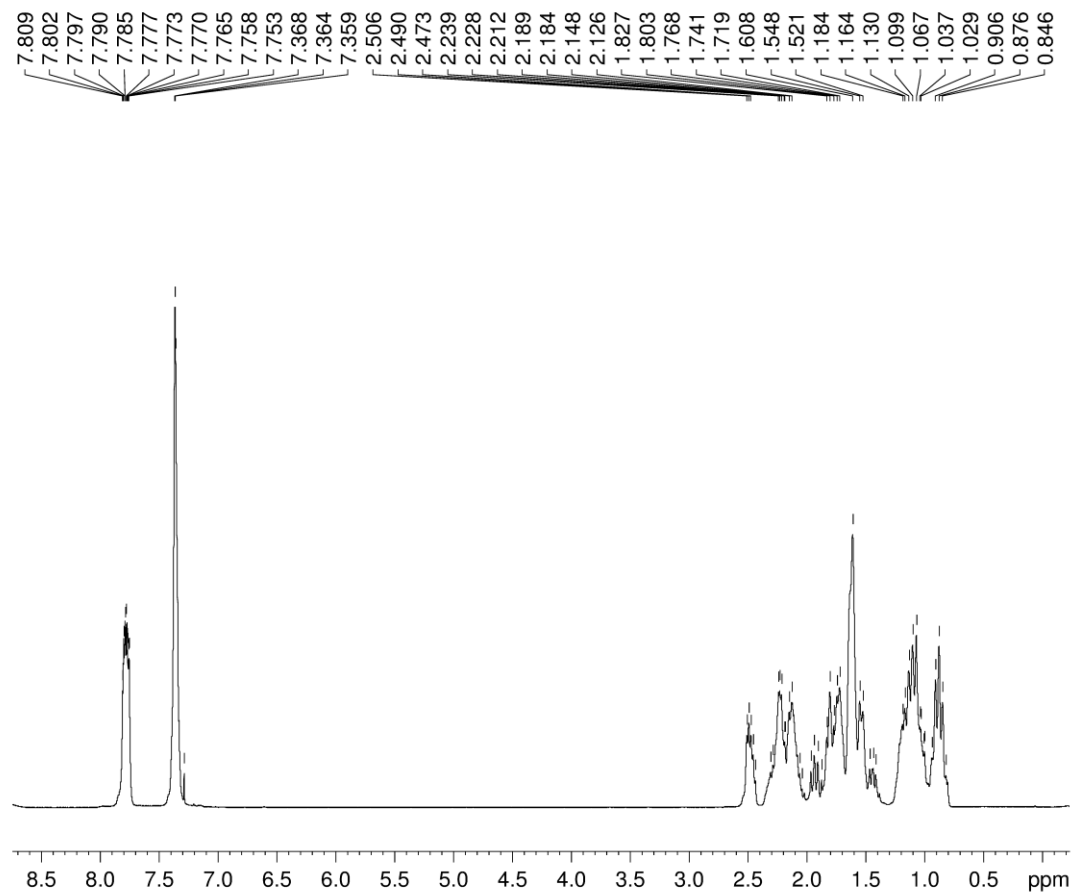
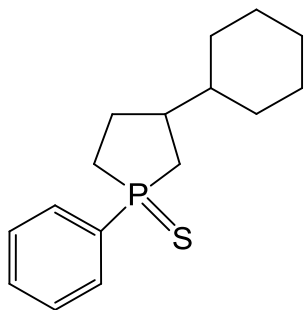
Current Data Parameters
NAME MRC-17
EXPNO 6
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121207
Time 16.03
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 18
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1820
DW 7.800 usec
DE 6.00 usec
TE 297.8 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 ==
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

¹H NMR (CDCl₃): **4d**



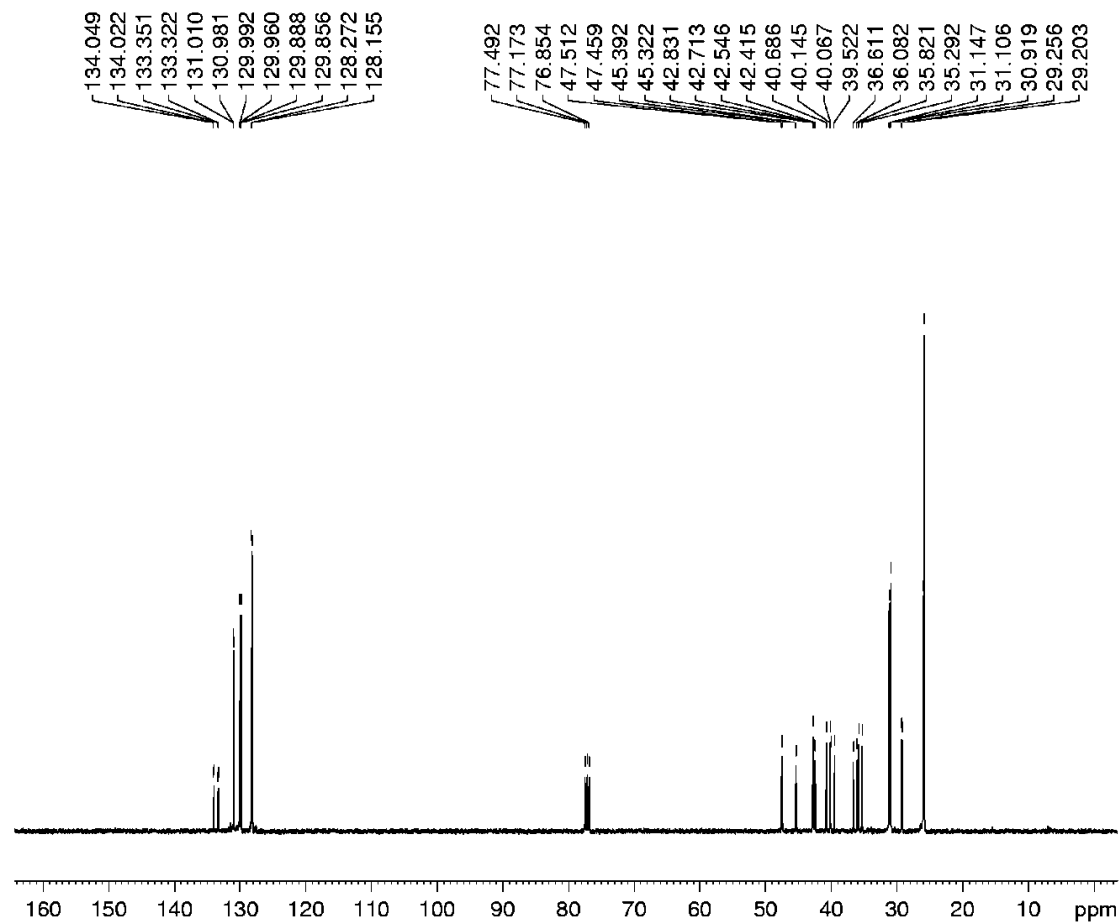
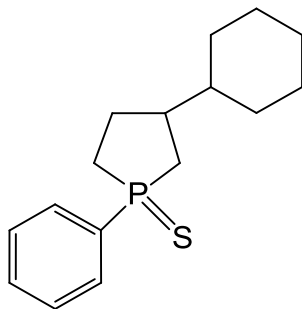
Current Data Parameters
NAME MRC-15
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121207
Time 15.25
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zg30
TD 16384
SOLVENT CDCl3
NS 1
DS 0
SWH 3591.954 Hz
FIDRES 0.219235 Hz
AQ 2.2806528 sec
RG 12.7
DW 139.200 usec
DE 6.00 usec
TE 297.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 ===
NUC1 1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317034 MHz

F2 - Processing parameters
SI 32768
SF 400.130000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **4d**



Current Data Parameters
 NAME MRC-15
 EXPNO 2
 PROCNO 1

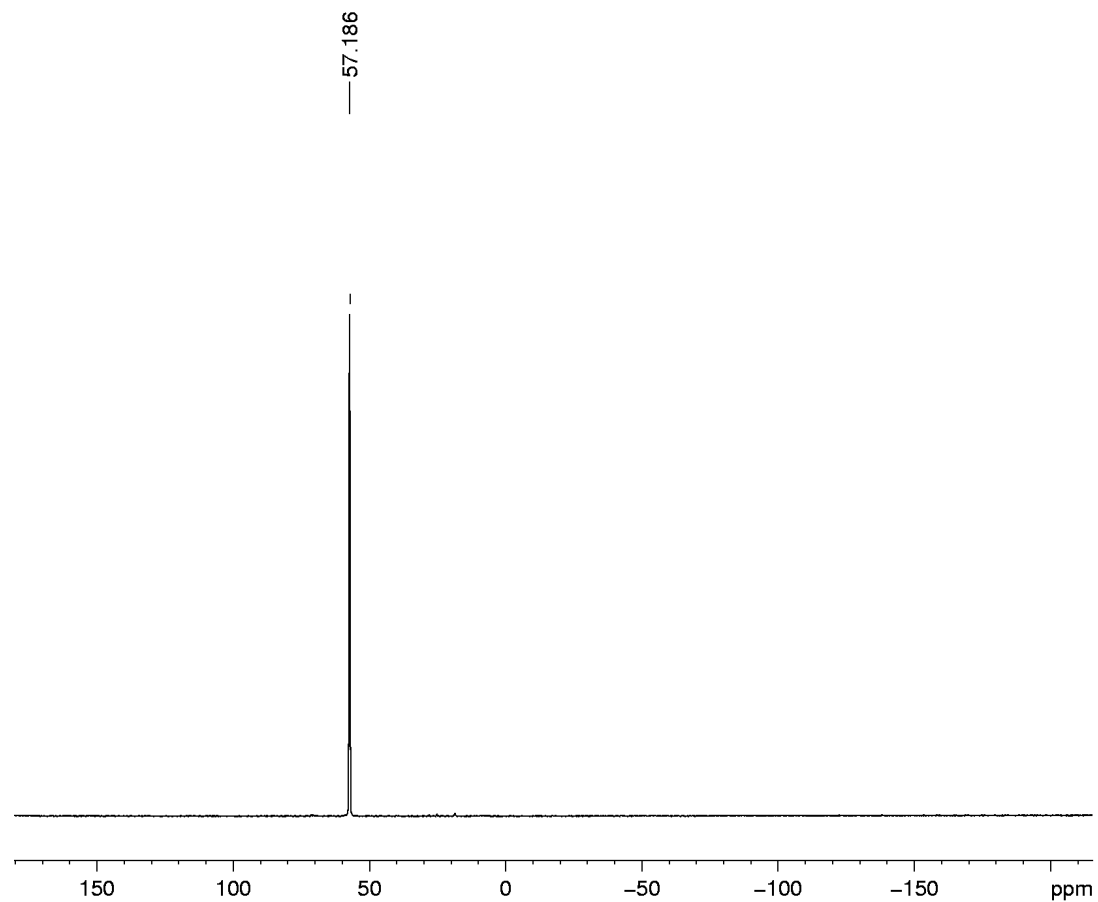
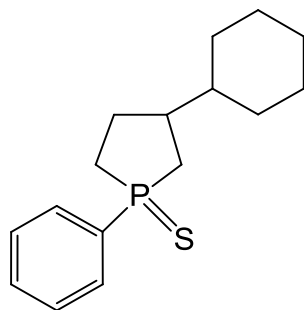
F2 - Acquisition Parameters
 Date_ 20121207
 Time 15.26
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 32768
 SOLVENT CDCl_3
 NS 70
 DS 2
 SWH 17857.143 Hz
 FIDRES 0.544957 Hz
 AQ 0.9175040 sec
 RG 2050
 DW 28.000 usec
 DE 6.00 usec
 TE 298.2 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 8

===== CHANNEL f1 =====
 NUC1 ^{13}C
 P1 10.00 usec
 PL1 0 dB
 PL1W 33.91046524 W
 SFO1 100.6213714 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 ^1H
 PCPD2 90.00 usec
 PL2 0 dB
 PL12 15.68 dB
 PL13 18.70 dB
 PL2W 8.86695957 W
 PL12W 0.23975886 W
 PL13W 0.11961196 W
 SFO2 400.1319206 MHz

F2 - Processing parameters
 SI 65536
 SF 100.6128032 MHz
 WDW EM
 SSB 0

^{31}P NMR (CDCl_3): **4d**



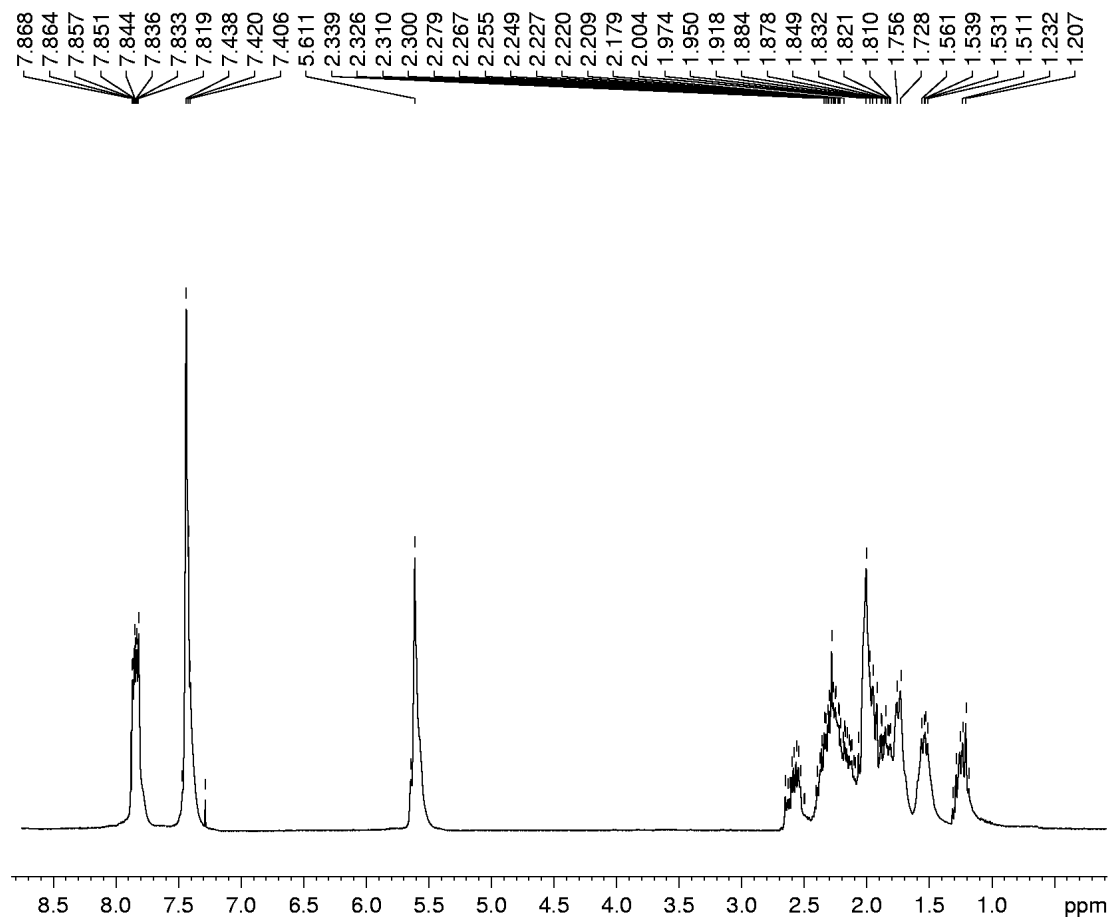
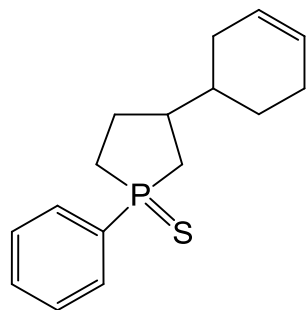
Current Data Parameters
NAME MRC-15
EXPNO 6
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121207
Time 15.57
INSTRUM spect
PROBHD 5 mm PABBO BE
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 21
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 1820
DW 7.800 usec
DE 6.00 usec
TE 297.9 K
D1 2.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **4e**



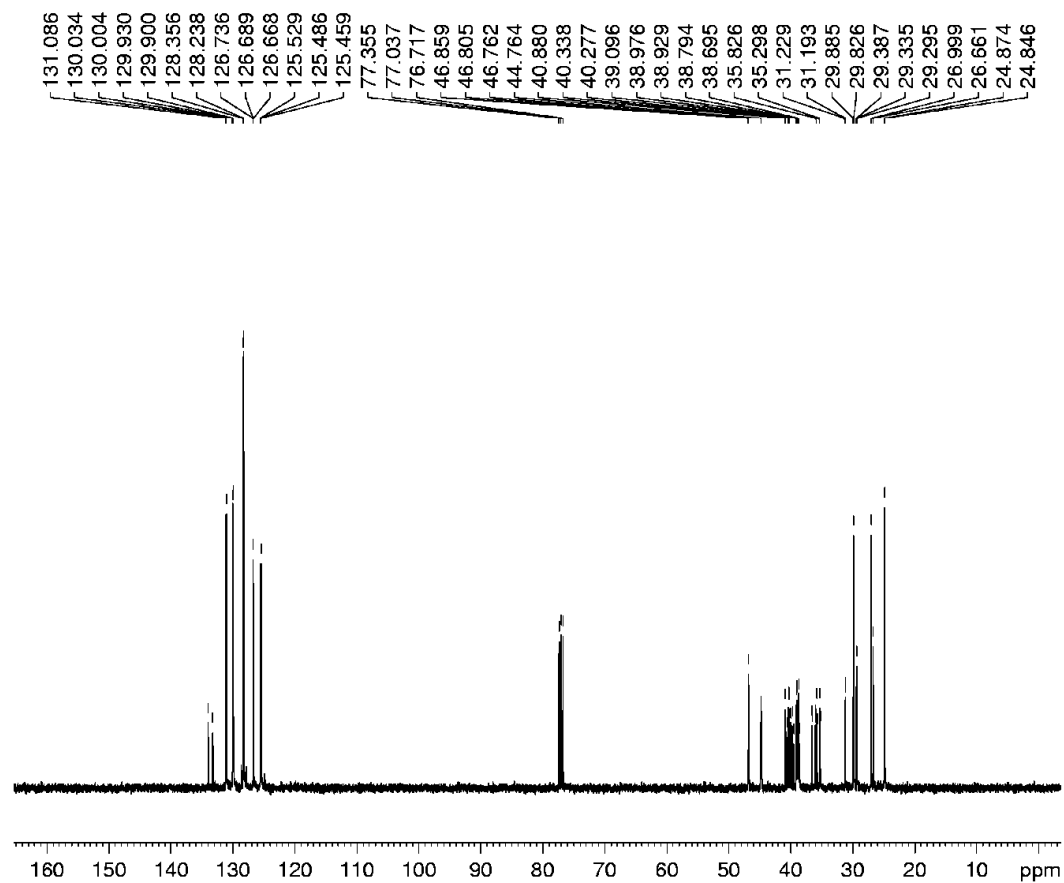
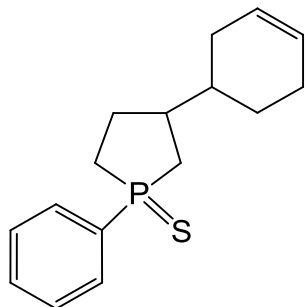
Current Data Parameters
NAME MRC-11
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121129
Time 16.06
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 3591.954 Hz
FIDRES 0.219235 Hz
AQ 2.2806528 sec
RG 22.6
DW 139.200 usec
DE 6.00 usec
TE 297.5 K
D1 1.00000000 sec
TD0 1

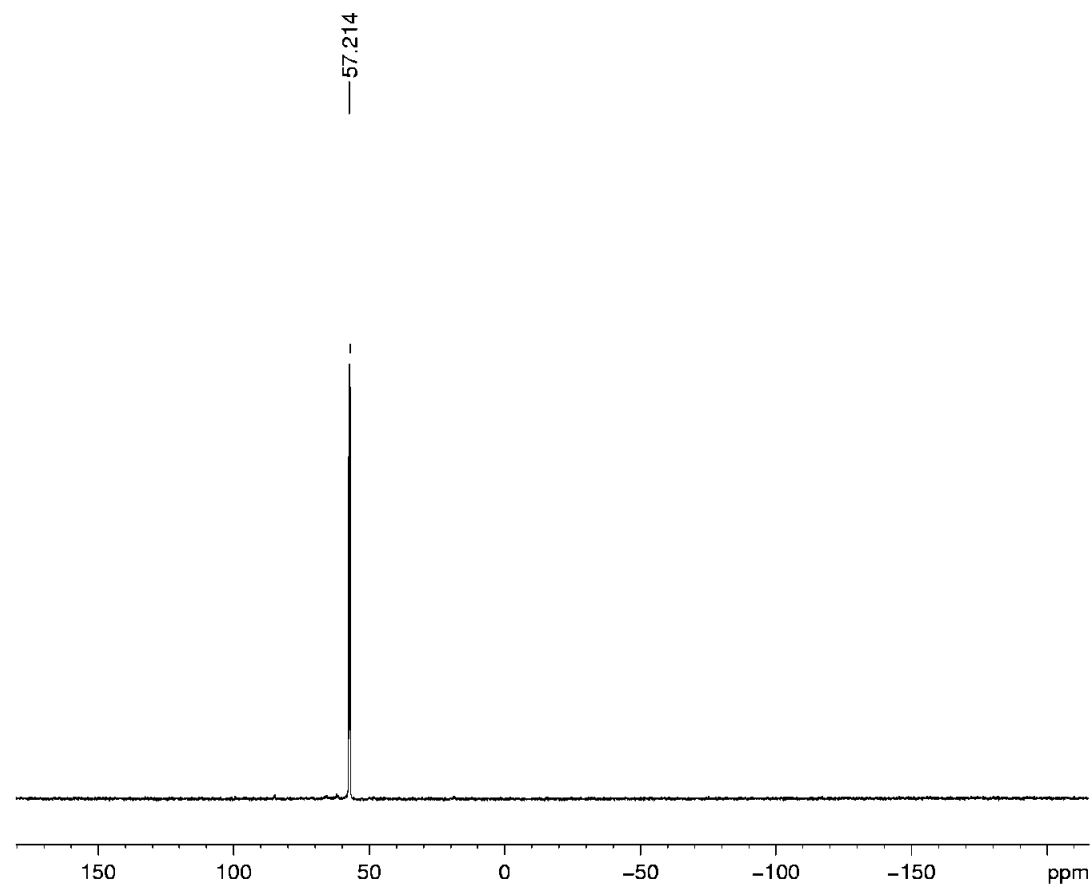
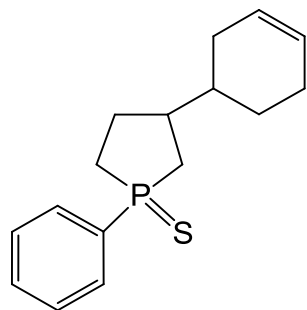
===== CHANNEL f1 ==
NUC1 ^1H
P1 14.80 usec
PL1 0 dB
PL1W 8.86695957 W
SFO1 400.1317034 MHz

F2 - Processing parameters
SI 32768
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **4e**



^{31}P NMR (CDCl_3): **4e**



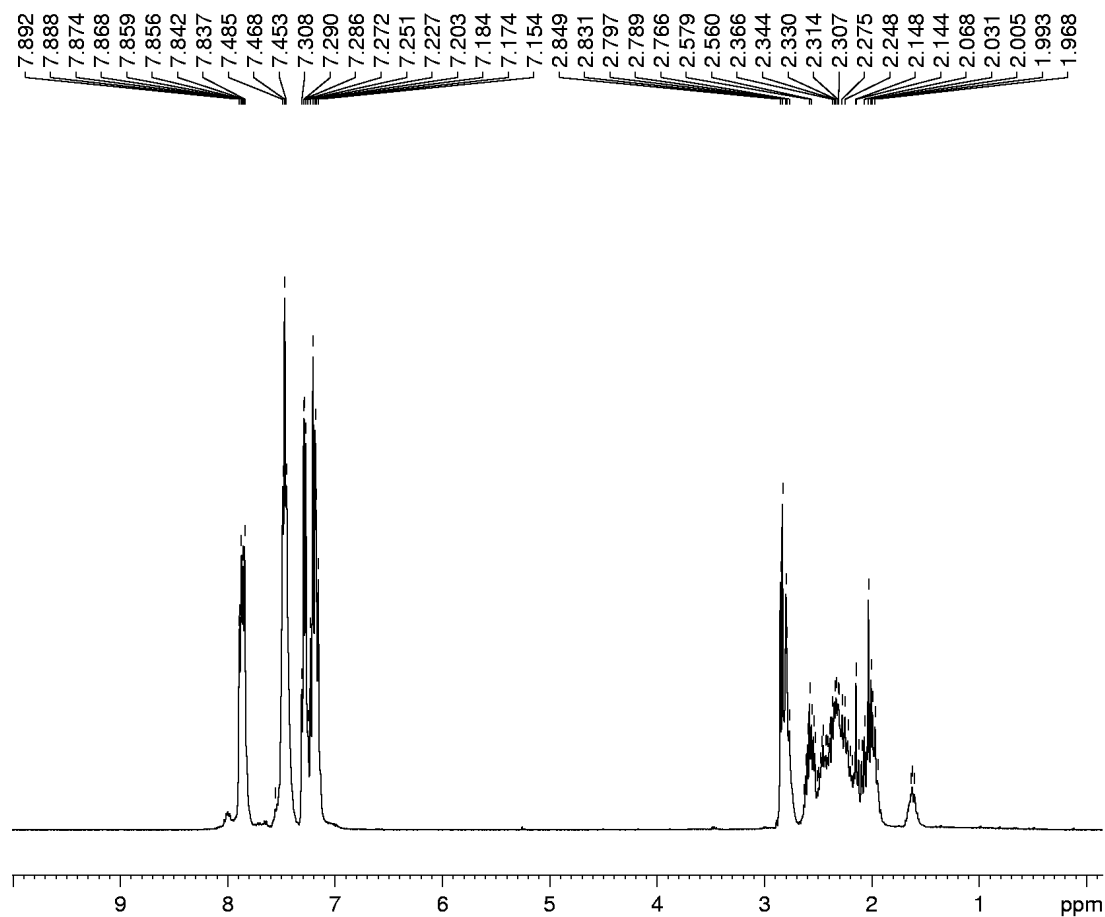
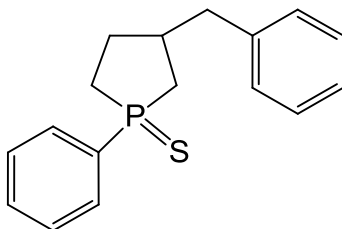
Current Data Parameters
NAME MRC-11
EXPNO 6
PROCNO 1

F2 - Acquisition Parameters
Date_ 20121129
Time 16.39
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 69
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 297.6 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **4f**



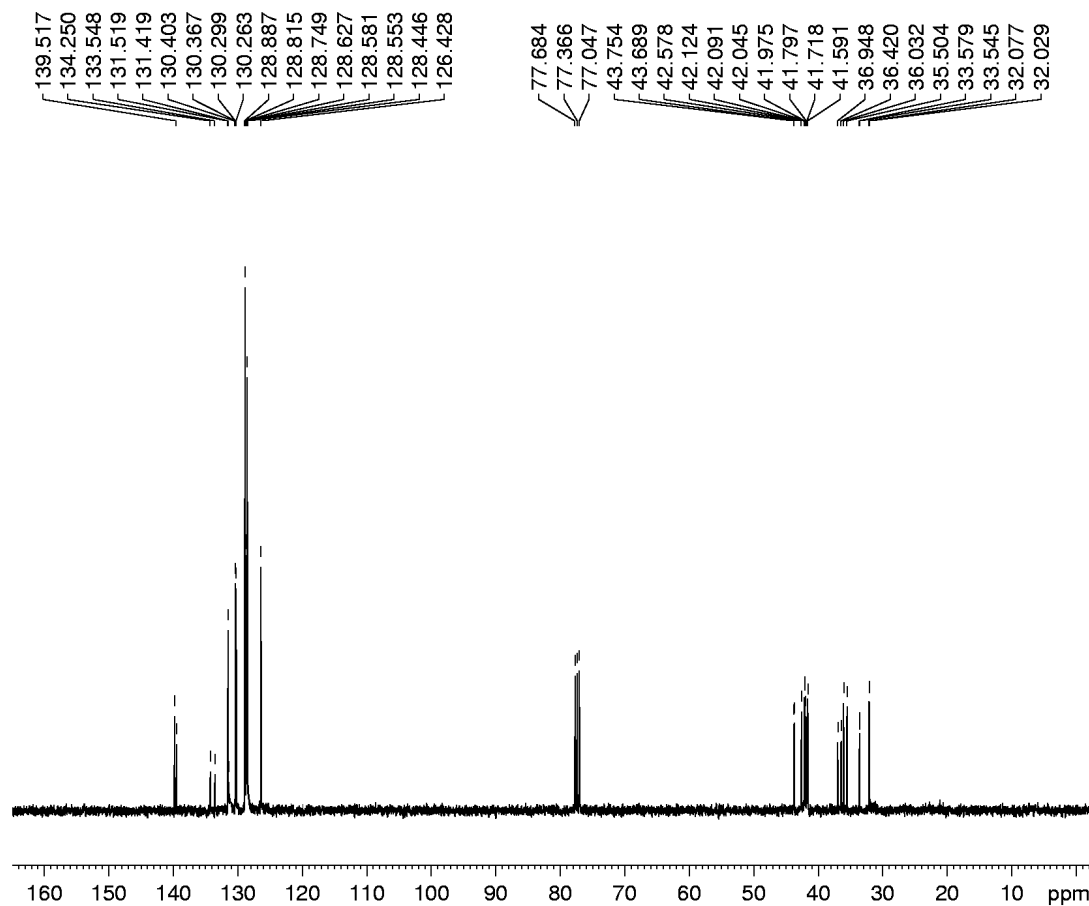
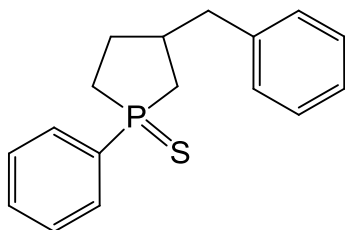
Current Data Parameters
 NAME MAL-134-2
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20120305
 Time 12.38
 INSTRUM spect
 PROBHD 5 mm PABBO BB
 PULPROG zg30
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 6009.615 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631488 sec
 RG 28.5
 DW 83.200 usec
 DE 6.00 usec
 TE 298.8 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 ^1H
 P1 14.80 usec
 PL1 0 dB
 PL1W 8.86695957 W
 SFO1 400.1324008 MHz

F2 - Processing parameters
 SI 32768
 SF 400.1300000 MHz
 WDW EM
 SSB 0
 LB 0.10 Hz
 GB 0
 PC 1.00

^{13}C NMR (CDCl_3): **4f**



Current Data Parameters

NAME MAL-134-2
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters

Date_ 20120305
Time 12.39
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 16384
SOLVENT CDCl_3
NS 52
DS 2
SWH 25252.525 Hz
FIDRES 1.541292 Hz
AQ 0.3244032 sec
RG 2050
DW 19.800 usec
DE 6.00 usec
TE 299.0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====

NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6243395 MHz

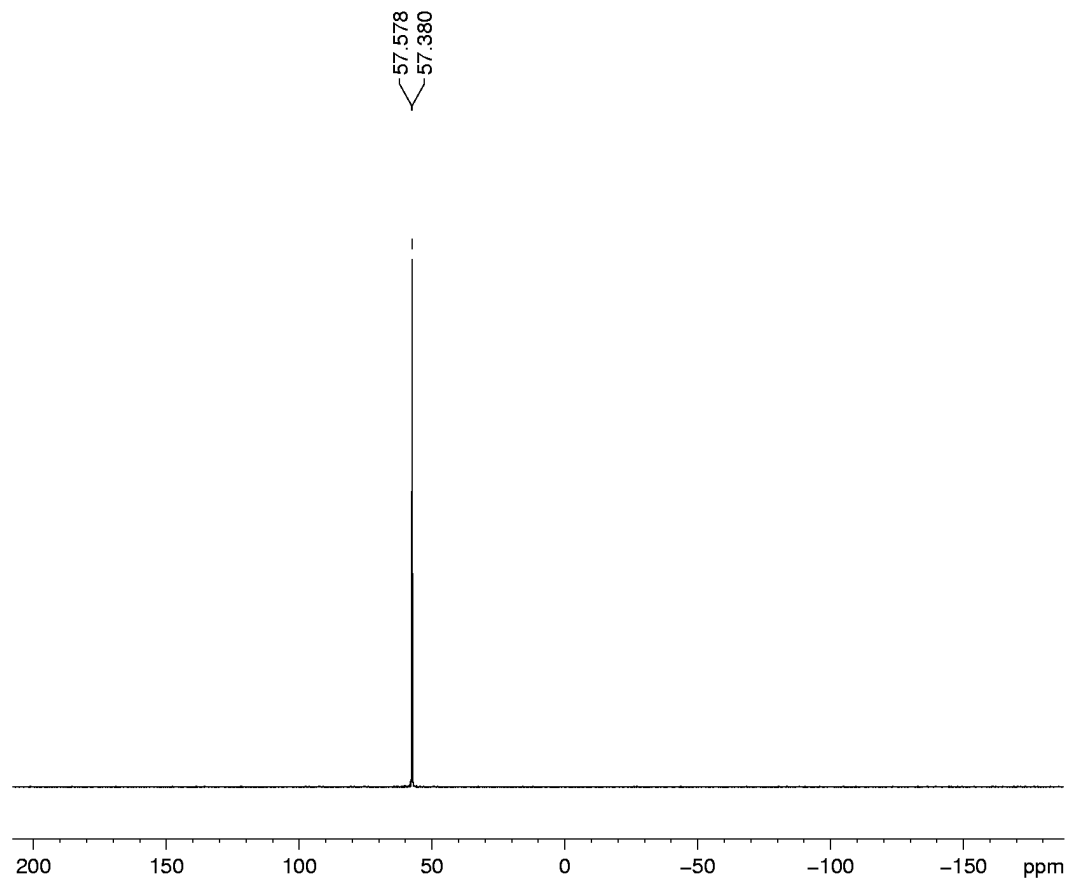
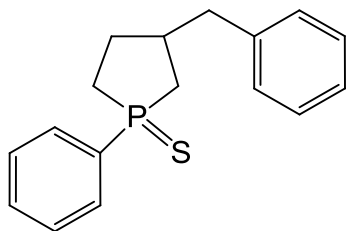
===== CHANNEL f2 =====

CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1316005 MHz

F2 - Processing parameters

SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **4f**



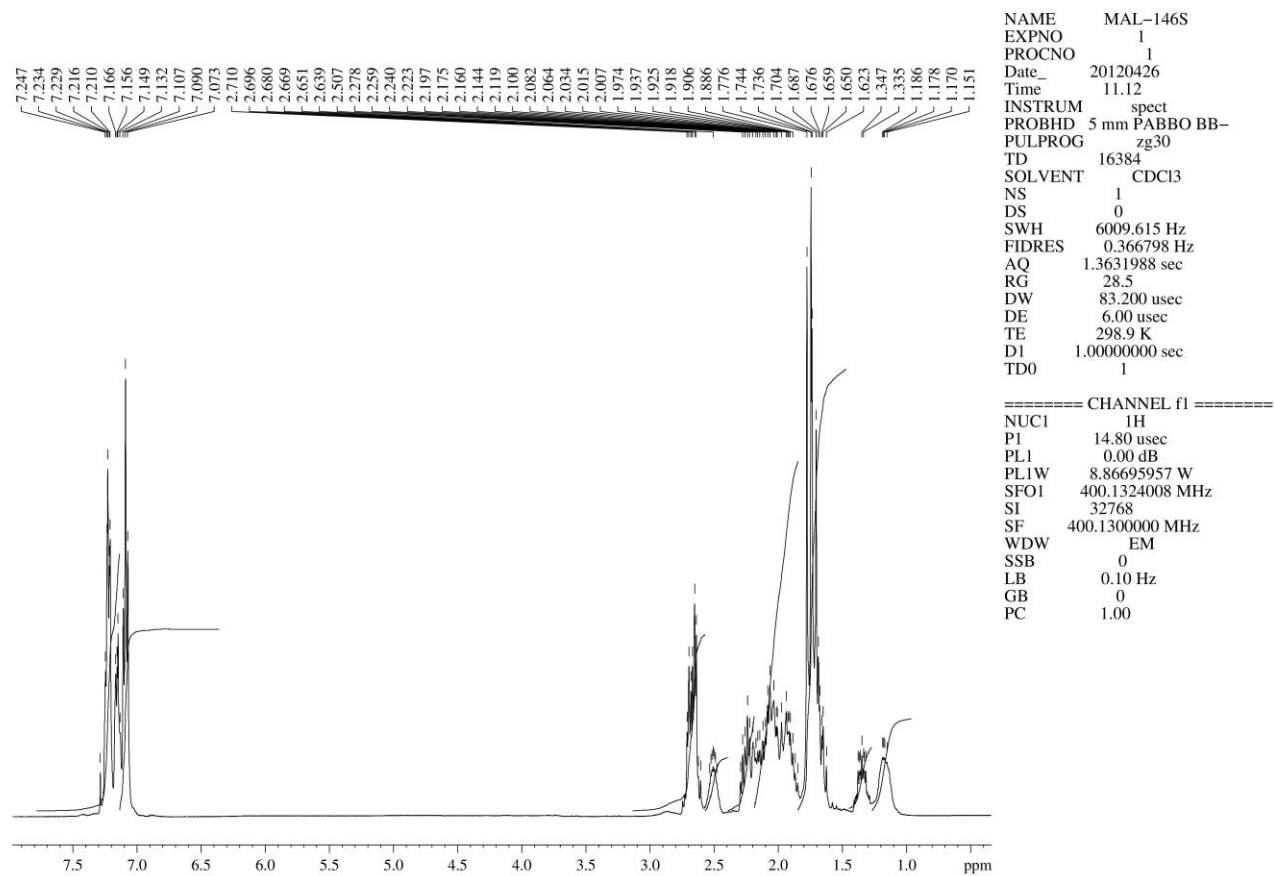
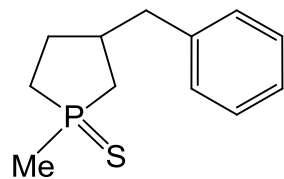
Current Data Parameters
NAME MAL-134-2
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120305
Time 12.29
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 64102.563 Hz
FIDRES 3.912510 Hz
AQ 0.1277952 sec
RG 1290
DW 7.800 usec
DE 6.50 usec
TE 298.9 K
D1 10.00000000 sec
D11 0.03000000 sec
TD0 1

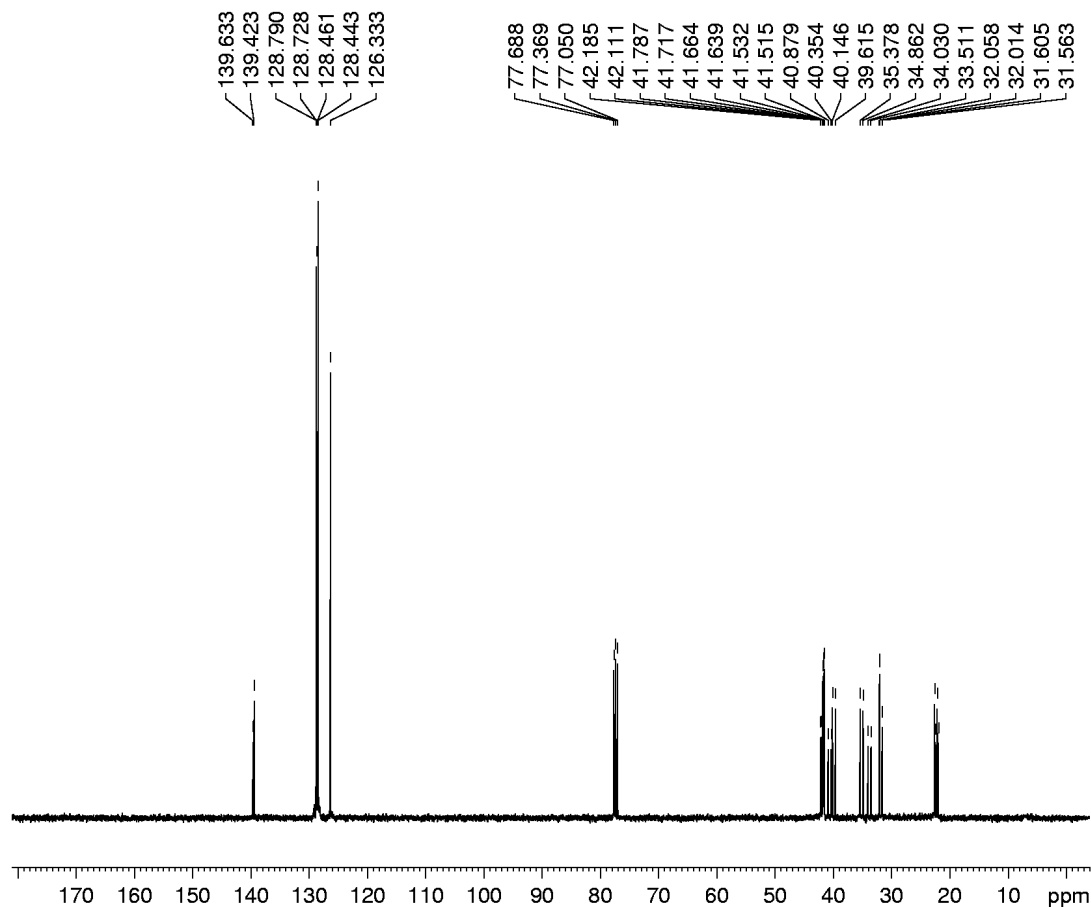
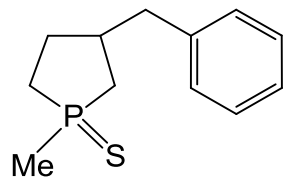
===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9772128 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PI 2W 8 86695957 W

^1H NMR (CDCl_3): **4g**



^{13}C NMR (CDCl_3): **4g**



Current Data Parameters
NAME MAL-146S
EXPNO 2
PROCNO 1

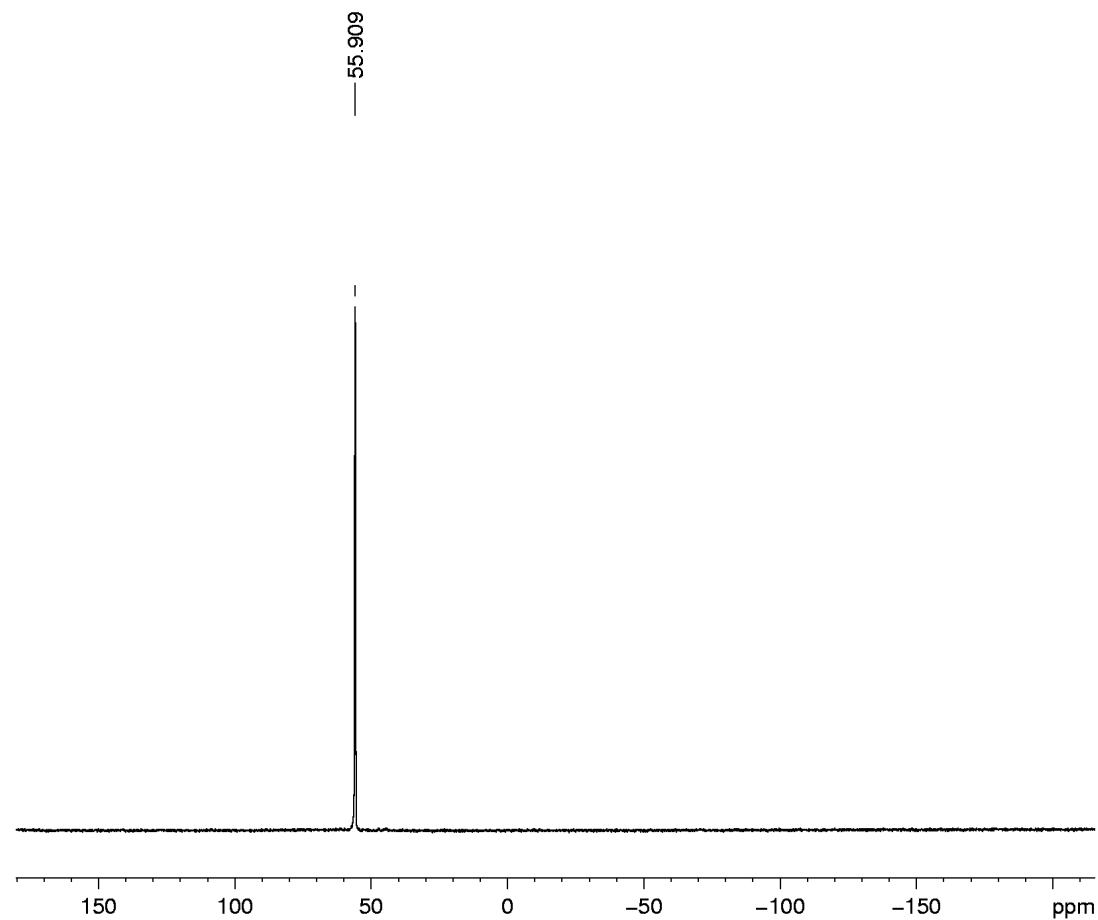
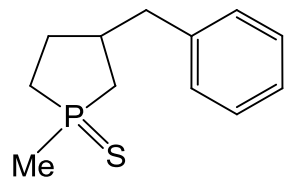
F2 - Acquisition Parameters
Date_ 20120426
Time 16.14
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 134
DS 2
SWH 23809.523 Hz
FIDRES 0.726609 Hz
AQ 0.6881280 sec
RG 2050
DW 21.000 usec
DE 6.00 usec
TE 298.9 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
NUC1 ^{13}C
P1 10.00 usec
PL1 0 dB
PL1W 33.91046524 W
SFO1 100.6242392 MHz

===== CHANNEL f2 =====
CPDPRG[2] waltz16
NUC2 ^1H
PCPD2 90.00 usec
PL2 0 dB
PL12 15.68 dB
PL13 18.70 dB
PL2W 8.86695957 W
PL12W 0.23975886 W
PL13W 0.11961196 W
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127727 MHz
WDW EM
SSB 0

^{31}P NMR (CDCl_3): **4g**



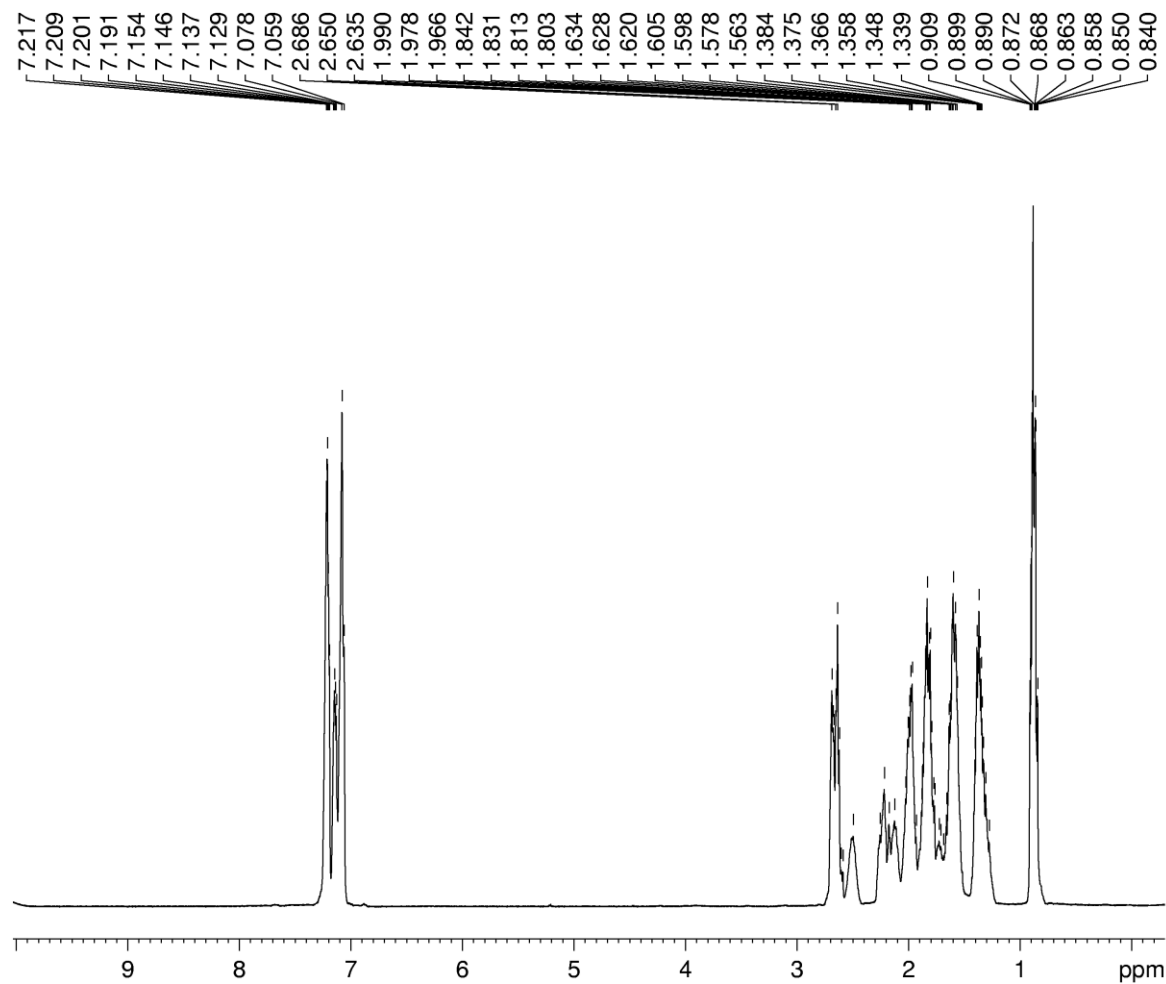
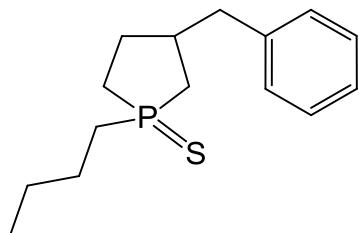
Current Data Parameters
NAME MAL-146S
EXPNO 7
PROCNO 1

F2 - Acquisition Parameters
Date_ 20120426
Time 16.43
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg
TD 32768
SOLVENT CDCl_3
NS 4
DS 0
SWH 64102.563 Hz
FIDRES 1.956255 Hz
AQ 0.2555904 sec
RG 2050
DW 7.800 usec
DE 6.00 usec
TE 299.0 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 ^{31}P
P1 9.10 usec
PL1 0 dB
PL1W 24.94303322 W
SFO1 161.9727429 MHz

F2 - Processing parameters
SI 16384
SF 161.9755930 MHz
WDW EM
SSB 0
LB 5.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **4h**



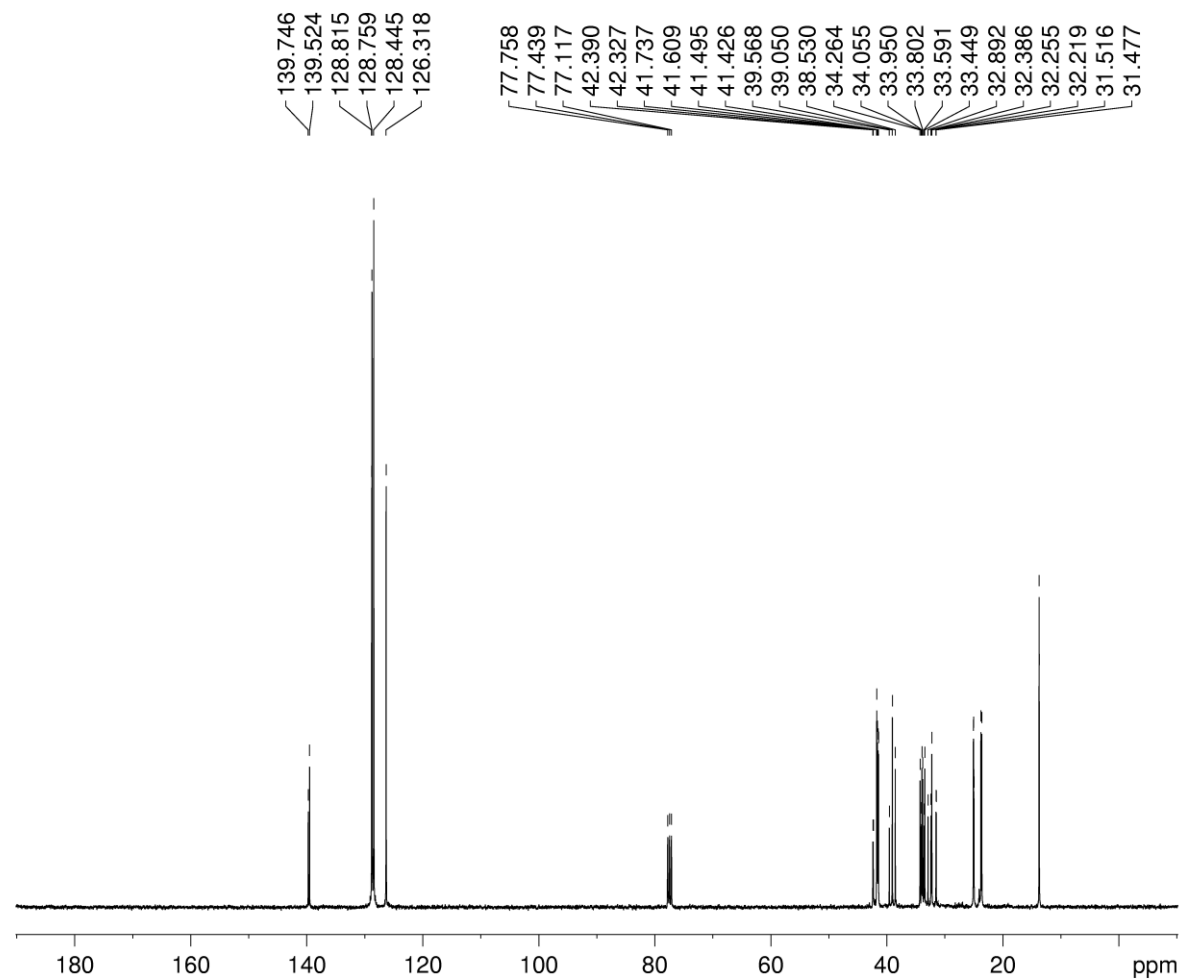
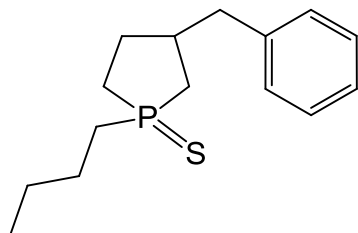
Current Data Parameters
 NAME KRA-289-1_1_13
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20150219
 Time 13.23
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 4132.231 Hz
 FIDRES 0.252211 Hz
 AQ 1.9824640 sec
 RG 16
 DW 121.000 usec
 DE 6.50 usec
 TE 298.5 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1319468 MHz
 NUC1 ^1H
 P1 14.80 usec
 PLW1 8.89999962 W

F2 - Processing parameters
 SI 16384
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

¹³C NMR (CDCl₃): **4h**



Current Data Parameters
NAME KRA-289-1_1_1:
EXPNO 13
PROCNO 1

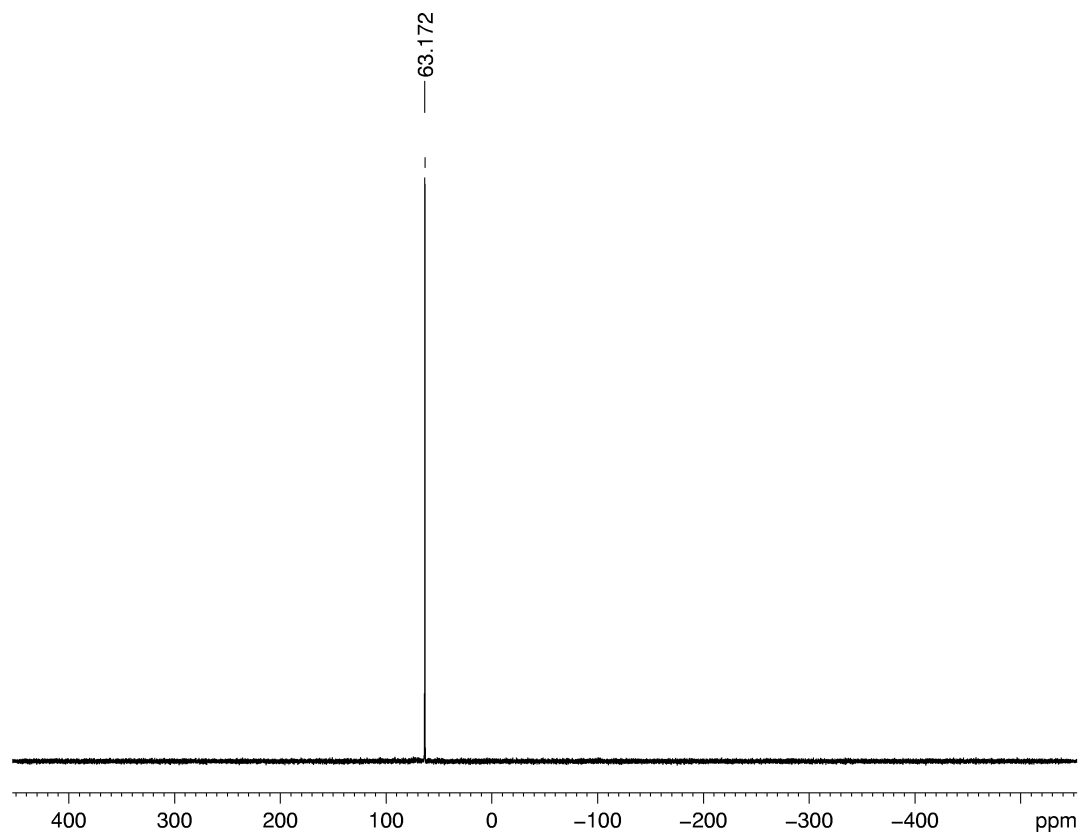
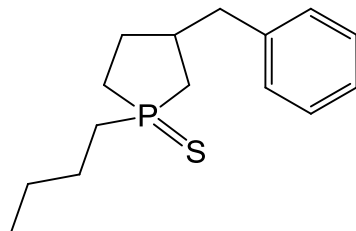
F2 - Acquisition Parameter
Date_ 20150219
Time 13.32
INSTRUM spect
PROBHD 5 mm PABBO E
PULPROG zgpg30
TD 32768
SOLVENT CDCl3
NS 267
DS 2
SWH 20161.291 Hz
FIDRES 0.615274 Hz
AQ 0.8126464 sec
RG 2050
DW 24.800 usec
DE 6.50 usec
TE 299.3 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 ==
SFO1 100.6218241 MHz
NUC1 13C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 ==
SFO2 400.1319206 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameter
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.00

^{31}P NMR (CDCl_3): **4h**



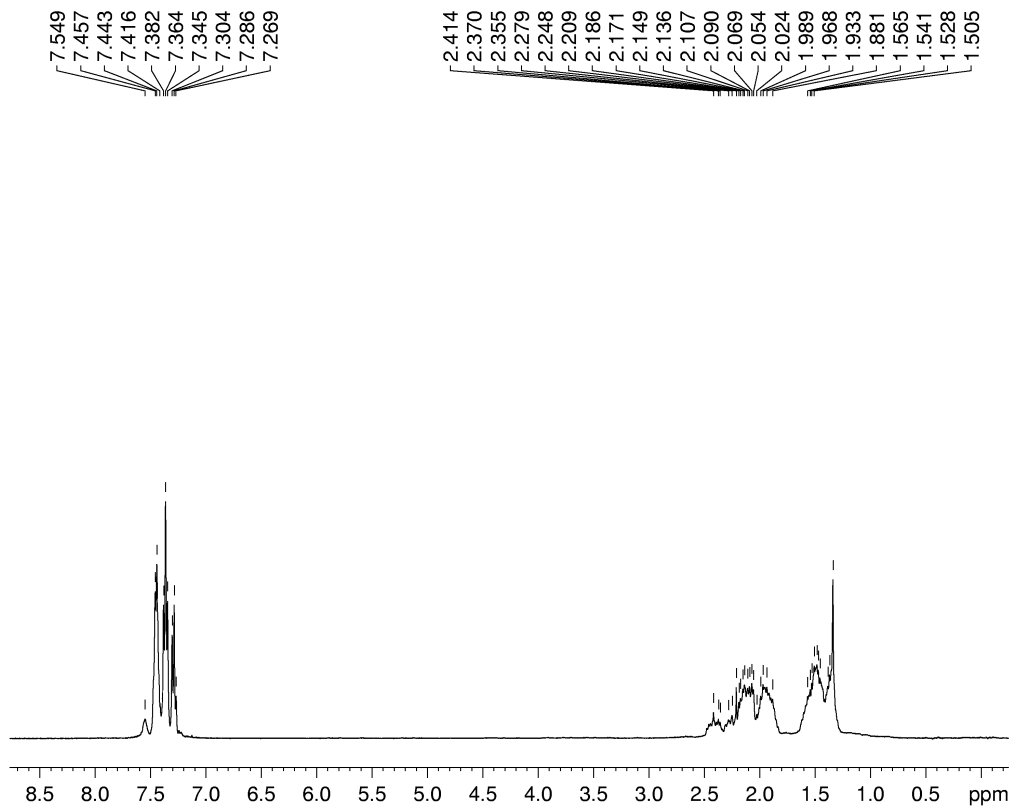
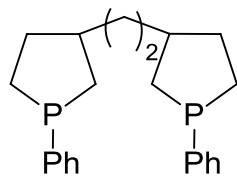
Current Data Parameters
NAME KRA-289-1_1_13
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150219
Time 13.19
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 25
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.5 K
D1 2.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **10a**



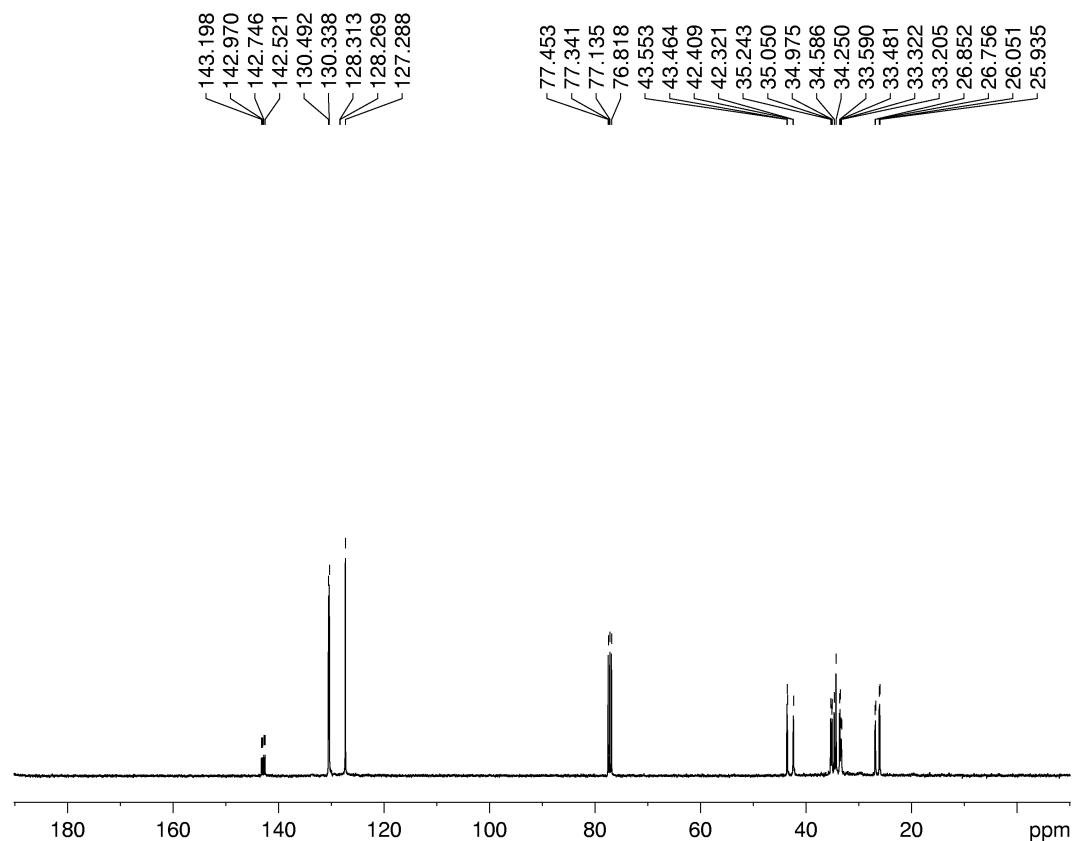
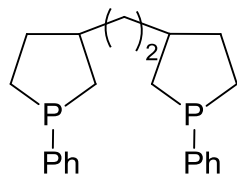
Current Data Parameters
NAME KRA-335_1_13_11
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150326
Time 15.17
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 5081.301 Hz
FIDRES 0.310138 Hz
AQ 1.6121856 sec
RG 36
DW 98.400 usec
DE 6.50 usec
TE 298.3 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1322666 MHz
NUC1 ^1H
P1 14.80 usec
PLW1 8.89999962 W

F2 - Processing parameters
SI 16384
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **10a**



Current Data Parameters
NAME KRA-335_1_13_11
EXPNO 13
PROCNO 1

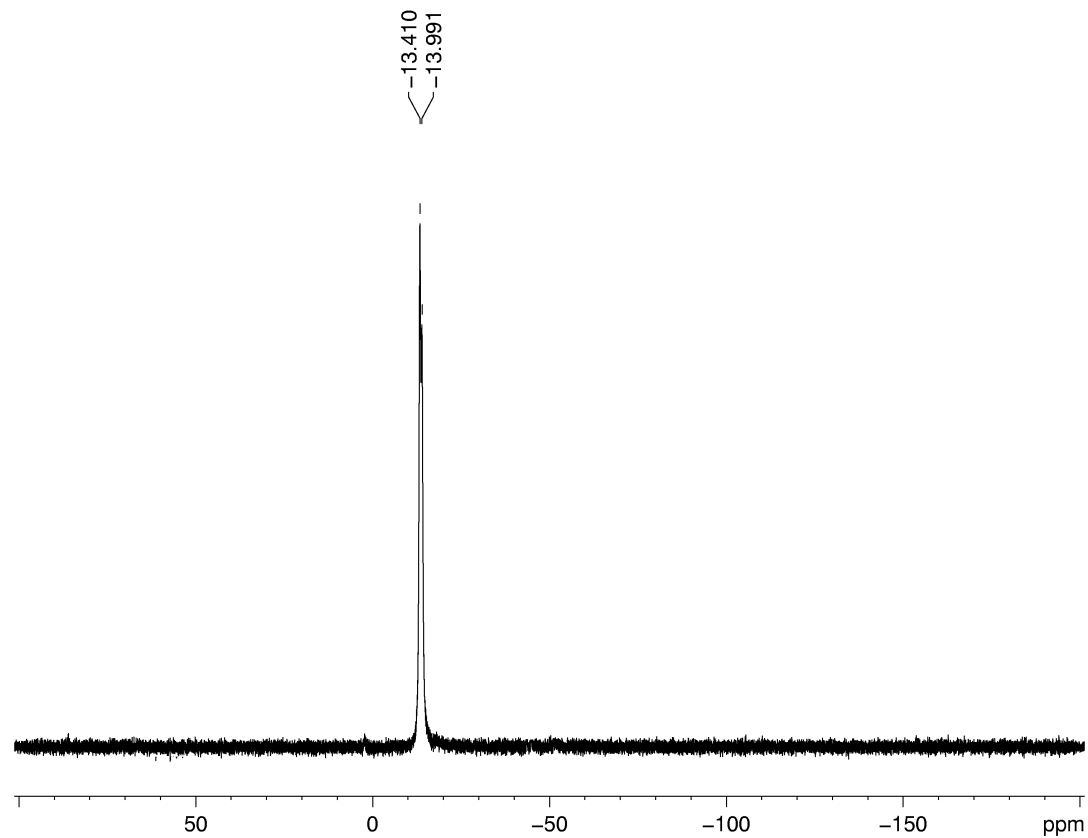
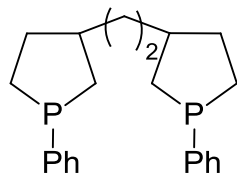
F2 - Acquisition Parameters
Date_ 20150326
Time 15.26
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 1838
DS 2
SWH 20161.291 Hz
FIDRES 0.615274 Hz
AQ 0.8126464 sec
RG 2050
DW 24.800 usec
DE 6.50 usec
TE 299.2 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6218241 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1322407 MHz
NUC2 ^1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

^{31}P NMR (CDCl_3): **10a**



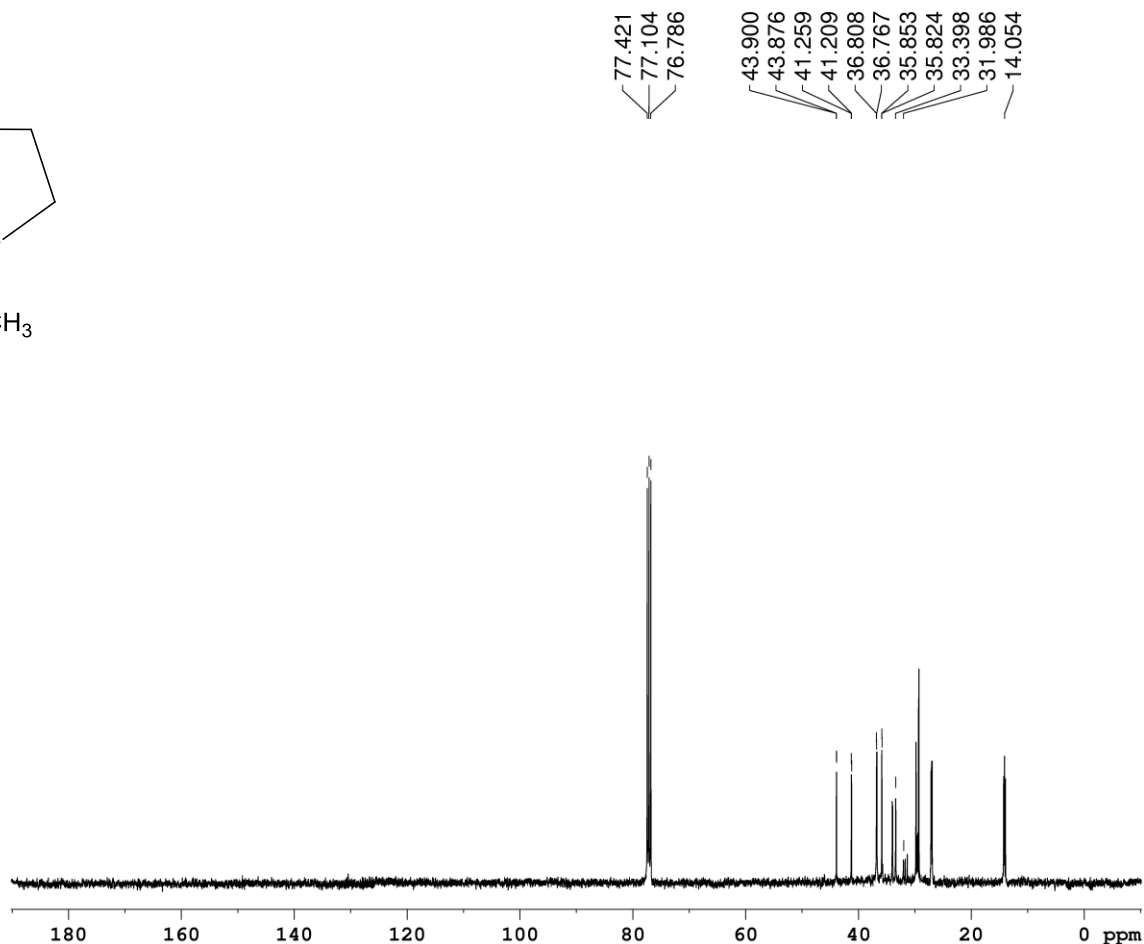
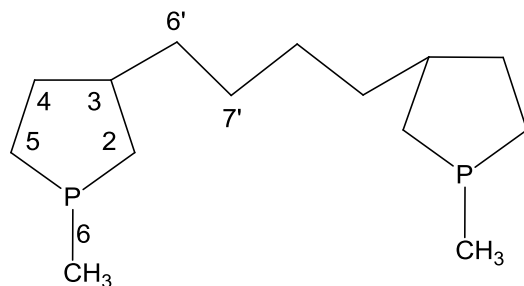
Current Data Parameters
NAME KRA-335_1_13_11
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150326
Time 14.57
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 32
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.4 K
D1 2.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^{13}C NMR (CDCl_3): **10e**



Current Data Parameters
NAME KRA-352
EXPNO 13
PROCNO 1

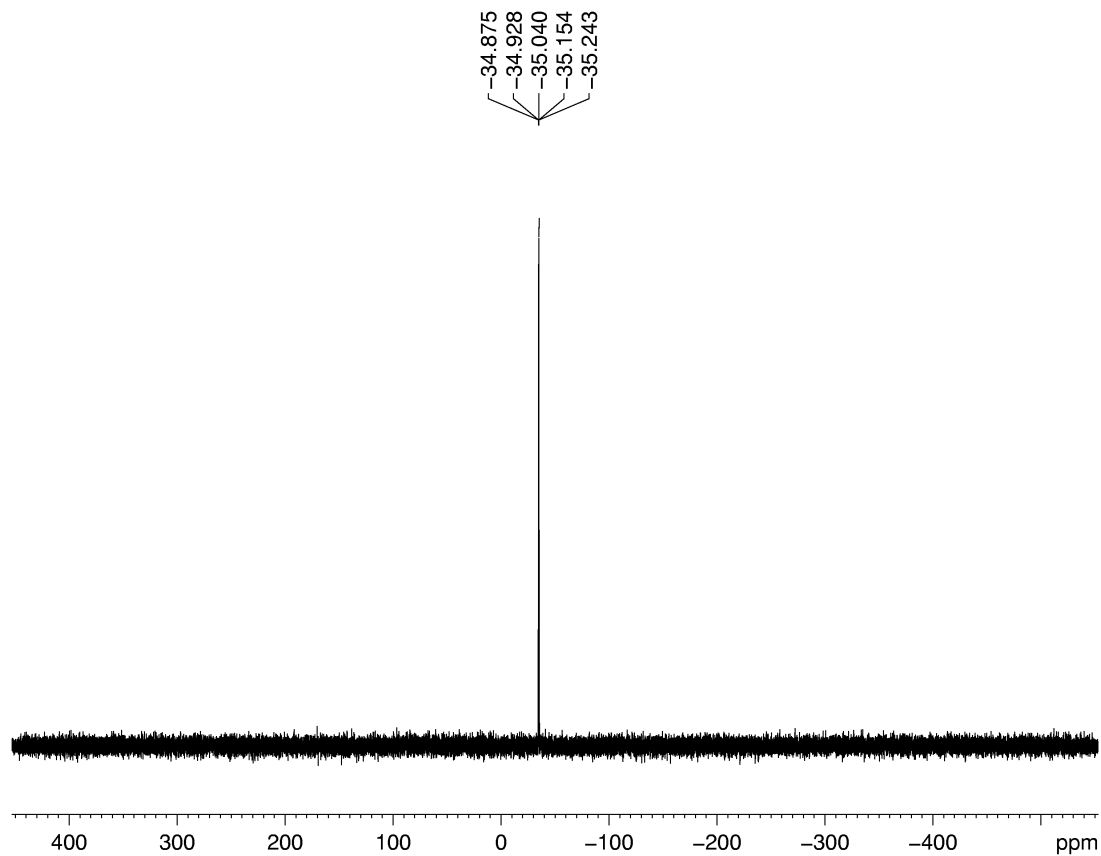
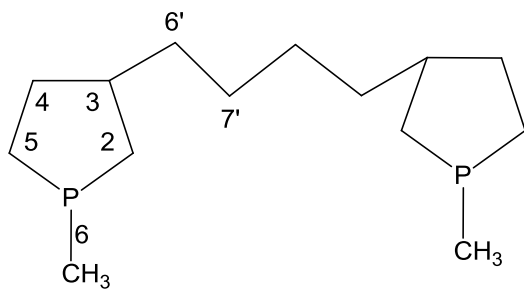
F2 - Acquisition Parameter
Date_ 20150605
Time 10.28
INSTRUM spect
PROBHD 5 mm PABBO E
PULPROG zgpg30
TD 16384
SOLVENT CDCl_3
NS 2759
DS 2
SWH 20161.291 Hz
FIDRES 1.230548 Hz
AQ 0.4063232 sec
RG 2050
DW 24.800 usec
DE 6.50 usec
TE 298.9 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 ==
SFO1 100.6218241 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 ==
SFO2 400.1319086 MHz
NUC2 ^1H
CPDPRG2 waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameter
SI 65536
SF 100.6127668 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0

^{31}P NMR (CDCl_3): **10e**



Current Data Parameters

NAME KRA-352
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters

Date_ 20150604
Time 21.34
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 64
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.4 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====

SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters

SI 32768
SF 161.9755930 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.40

HPLC analysis: **11b**

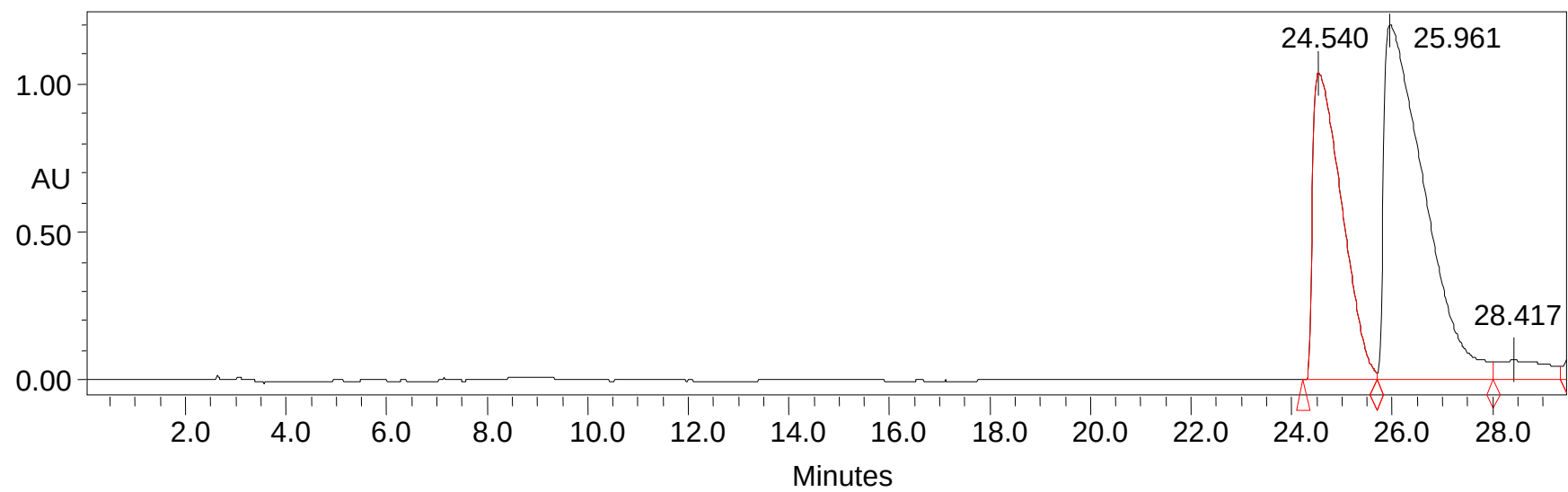
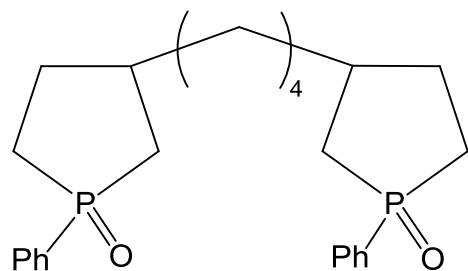
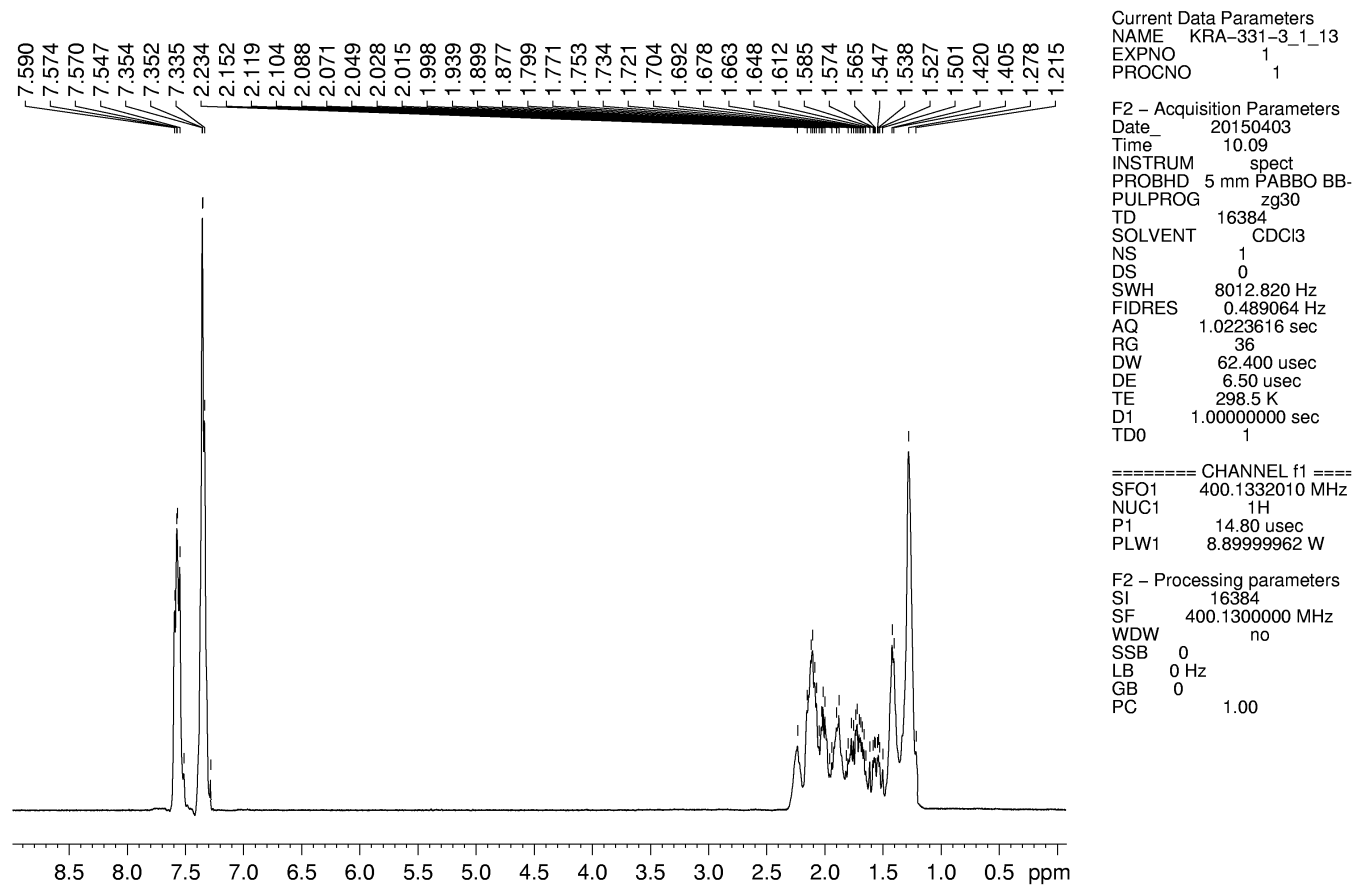
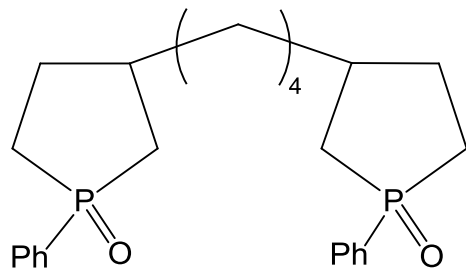
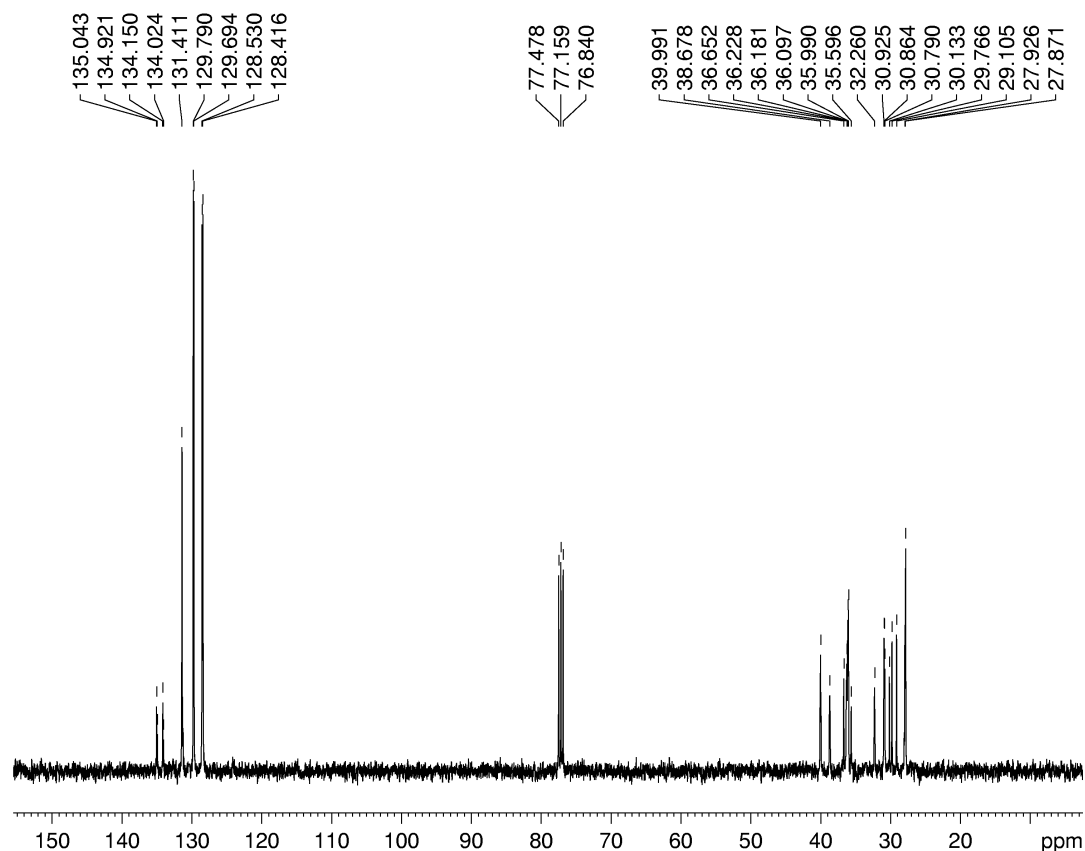
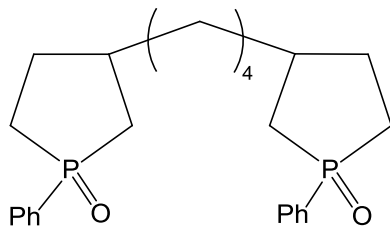


Figure S1. HPLC analysis for compound **11b**.

^1H NMR (CDCl_3): **11b**



^{13}C NMR (CDCl_3): **11b**



Current Data Parameters
NAME KRA-331-3_1_13
EXPNO 13
PROCNO 1

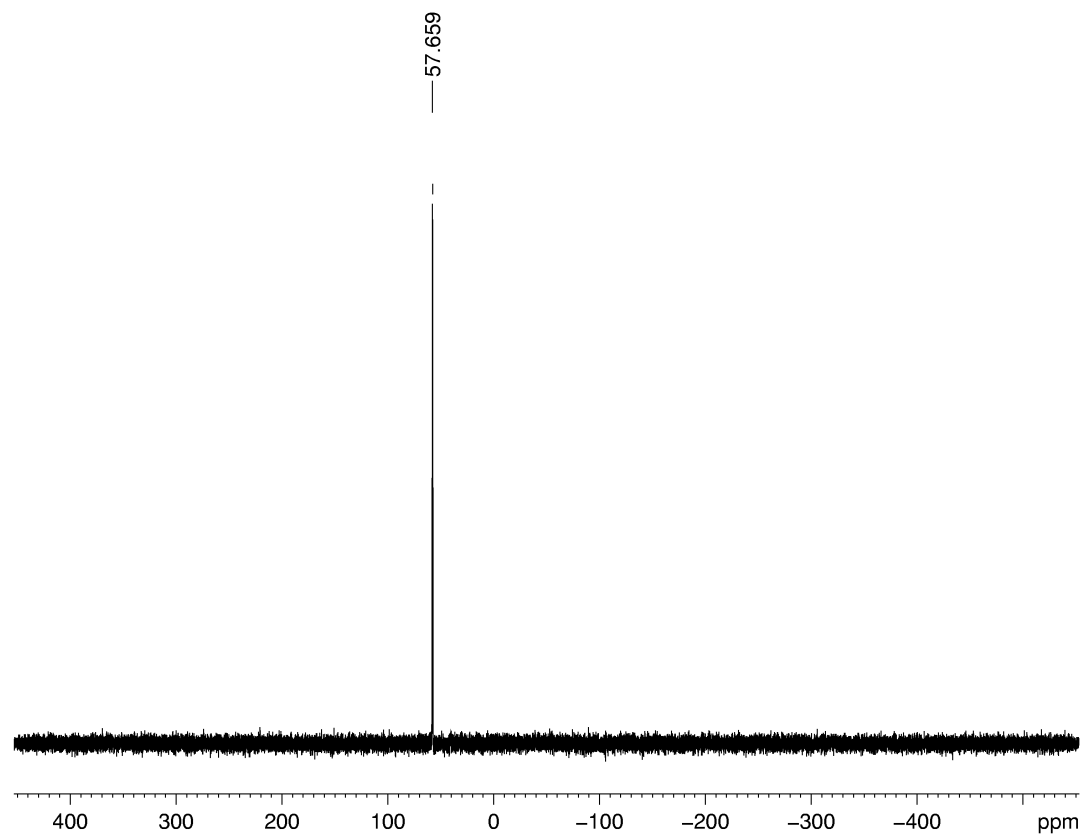
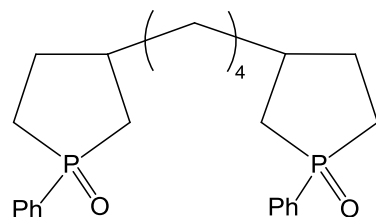
F2 - Acquisition Parameters
Date_ 20150403
Time 10.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 125
DS 2
SWH 25252.525 Hz
FIDRES 0.770646 Hz
AQ 0.6488064 sec
RG 2050
DW 19.800 usec
DE 6.50 usec
TE 299.1 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6248425 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1316005 MHz
NUC2 ^1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

^{31}P NMR (CDCl_3): **11b**



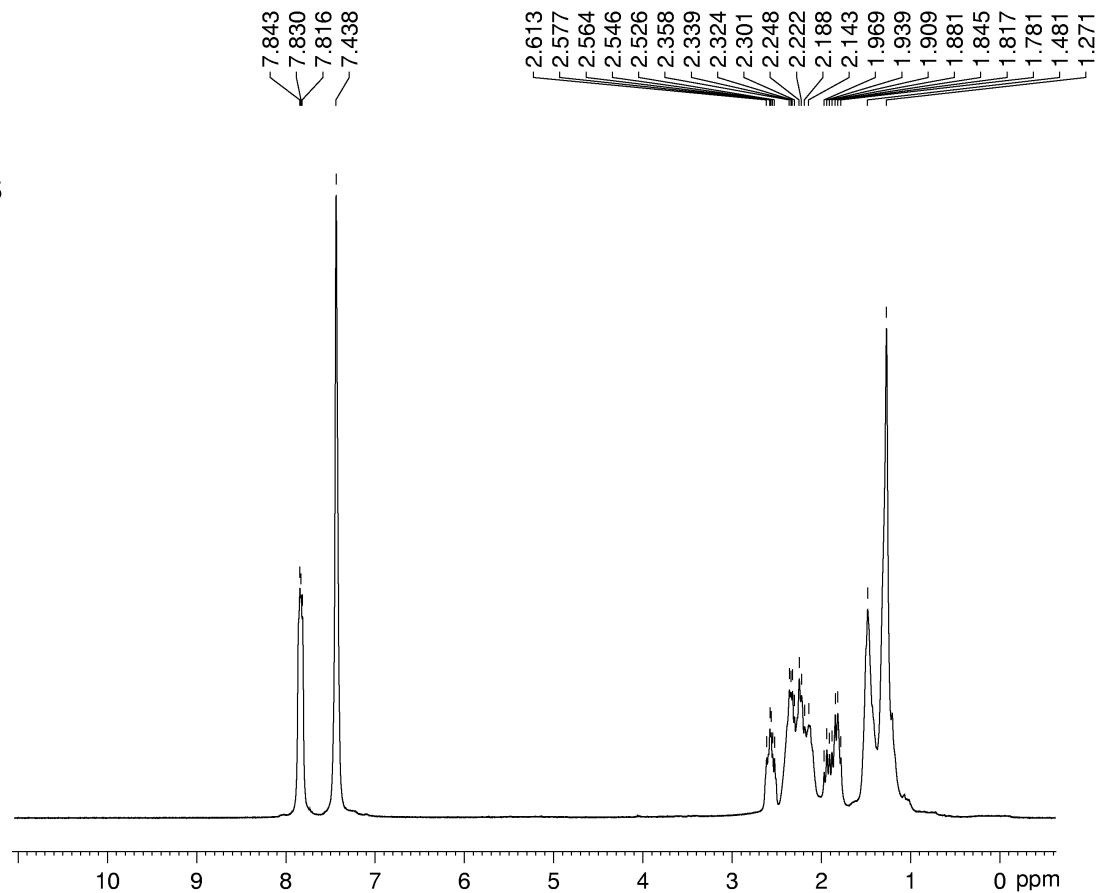
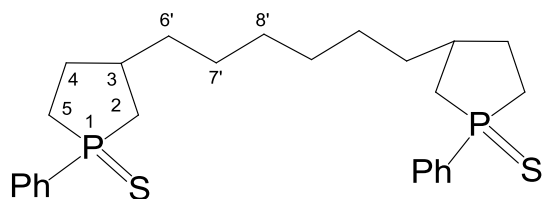
Current Data Parameters
NAME KRA-331-3_1_13
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150403
Time 10.06
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 32
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.6 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

¹H NMR (CDCl₃): **12c**



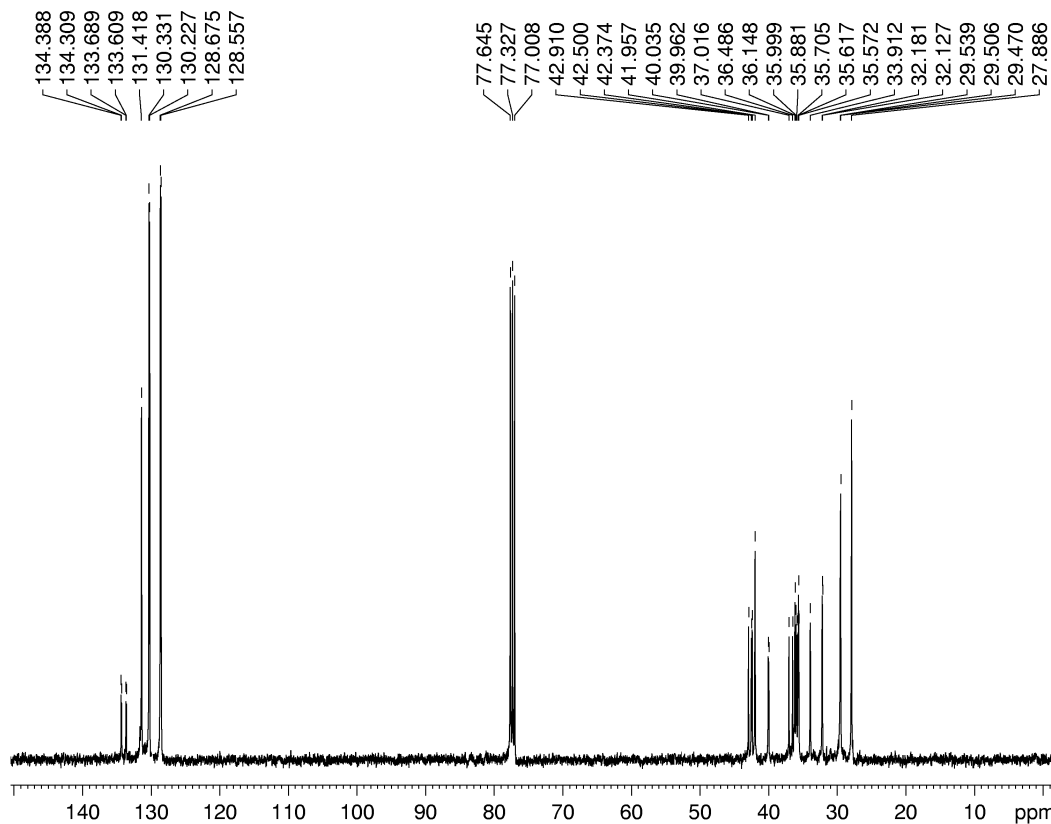
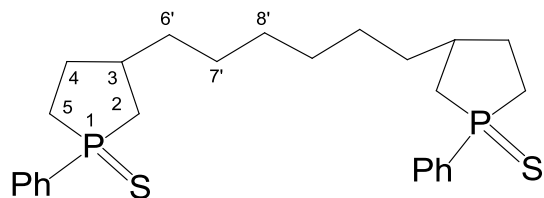
Current Data Parameters
NAME KRA-328-2_1_13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150219
Time 14.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 16384
SOLVENT CDCl3
NS 1
DS 0
SWH 4973.475 Hz
FIDRES 0.303557 Hz
AQ 1.6471381 sec
RG 20.2
DW 100.533 usec
DE 6.50 usec
TE 298.5 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1319409 MHz
NUC1 1H
P1 14.80 usec
PLW1 8.89999962 W

F2 - Processing parameters
SI 16384
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **12c**



Current Data Parameters
NAME KRA-328-2_1_13
EXPNO 13
PROCNO 1

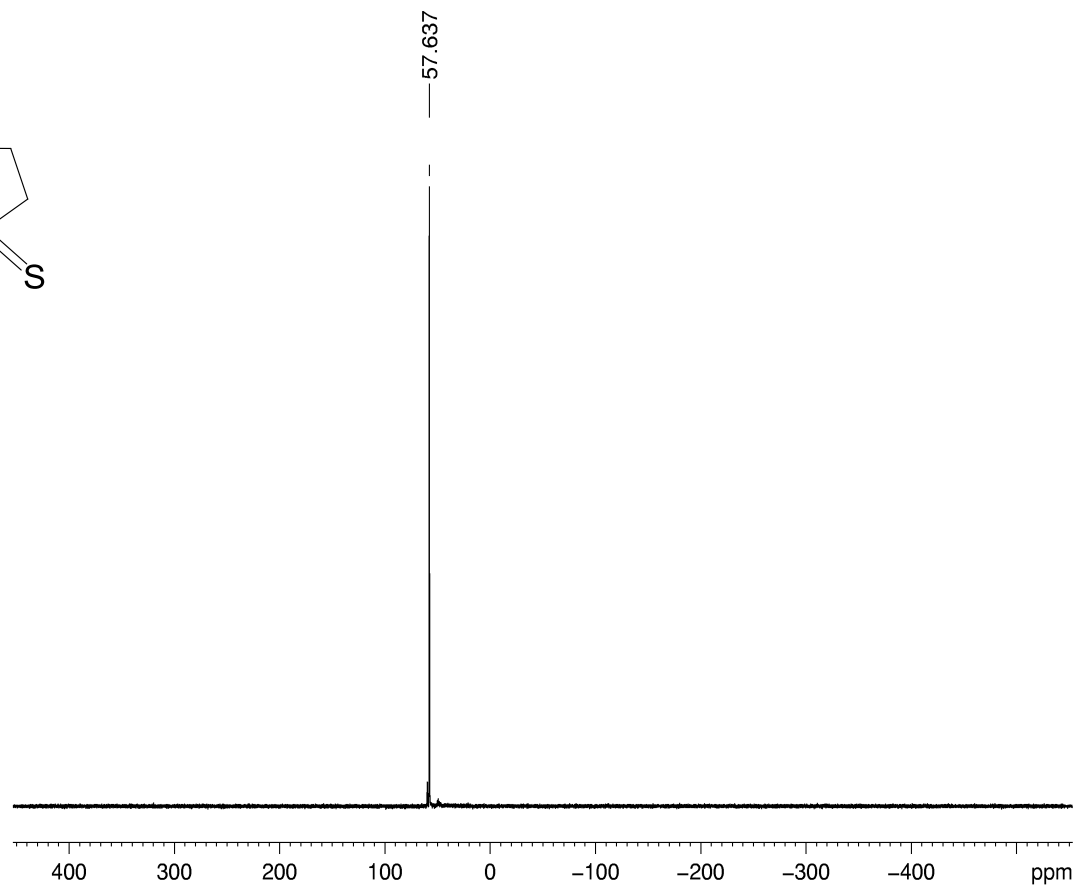
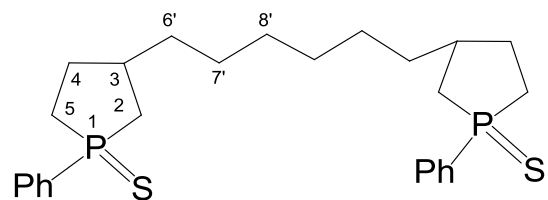
F2 - Acquisition Parameters
Date_ 20150219
Time 14.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 140
DS 2
SWH 25252.525 Hz
FIDRES 0.770646 Hz
AQ 0.6488064 sec
RG 2050
DW 19.800 usec
DE 6.50 usec
TE 298.6 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6248425 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1318006 MHz
NUC2 ^1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

^{31}P NMR (CDCl_3): **12c**



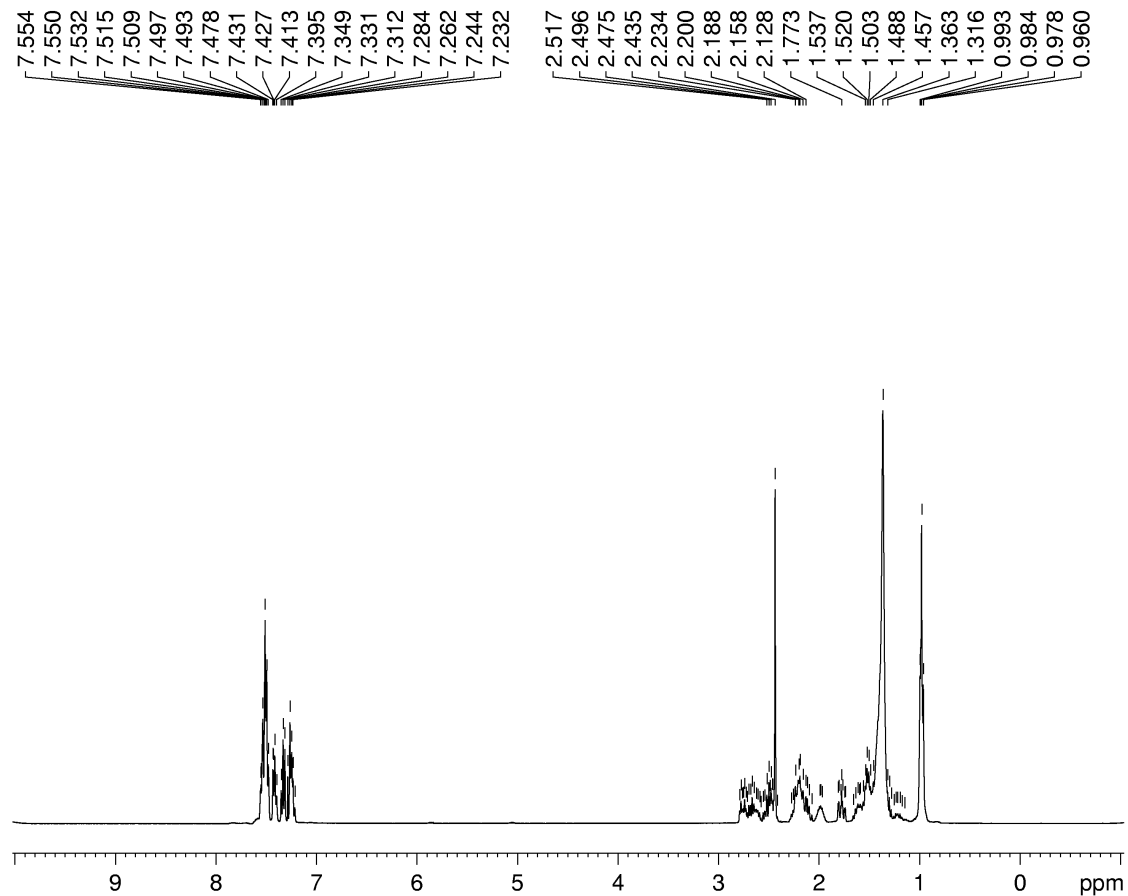
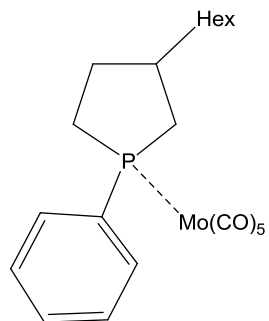
Current Data Parameters
NAME KRA-328-2_1_13
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150219
Time 14.50
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 29
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.5 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **13b**



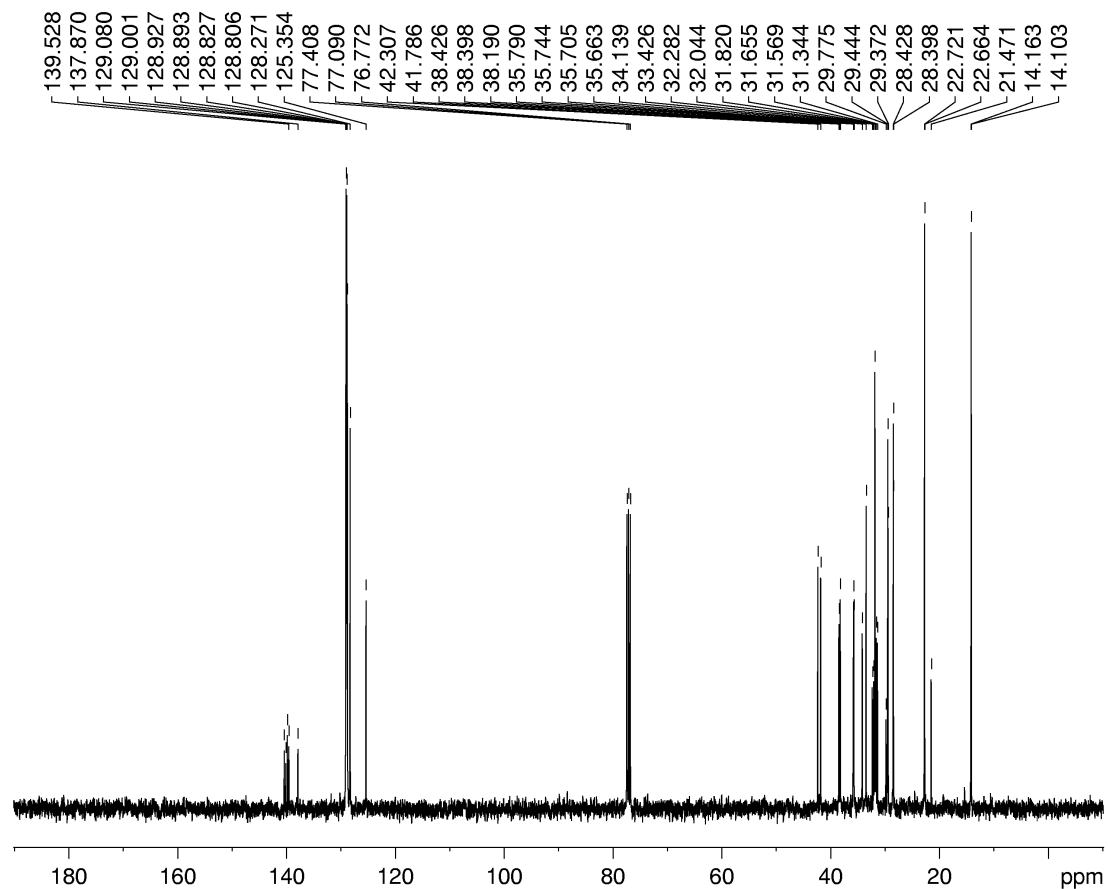
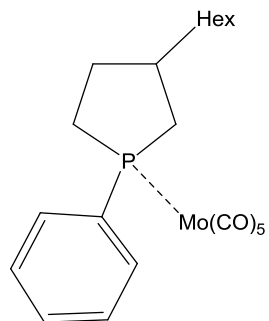
Current Data Parameters
 NAME KRA-249-1
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date 20150219
 Time 15.33
 INSTRUM spect
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 16384
 SOLVENT CDCl_3
 NS 1
 DS 0
 SWH 4424.779 Hz
 FIDRES 0.270067 Hz
 AQ 1.8513920 sec
 RG 20.2
 DW 113.000 usec
 DE 6.50 usec
 TE 298.8 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1317984 MHz
 NUC1 ^1H
 P1 14.80 usec
 PLW1 8.89999962 W

F2 - Processing parameters
 SI 16384
 SF 400.1300000 MHz
 WDW no
 SSB 0
 LB 0 Hz
 GB 0
 PC 1.00

¹³C NMR (CDCl₃): **13b**



Current Data Parameters
NAME KRA-249-1
EXPNO 13
PROCNO 1

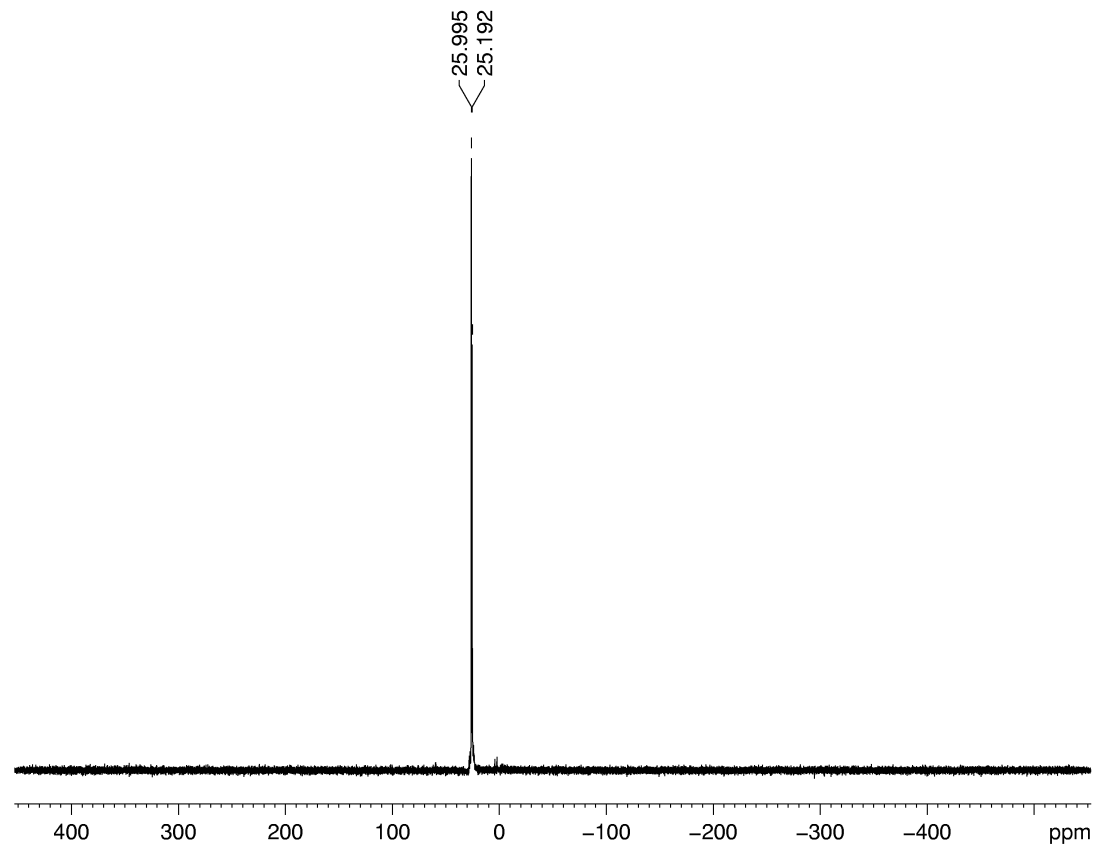
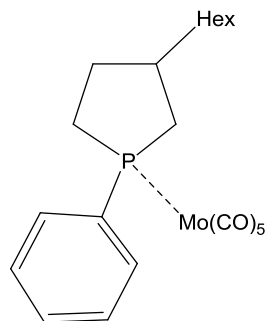
F2 - Acquisition Parameters
Date_ 20150219
Time 15.36
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl3
NS 97
DS 2
SWH 20161.291 Hz
FIDRES 0.615274 Hz
AQ 0.8126464 sec
RG 1440
DW 24.800 usec
DE 6.50 usec
TE 299.4 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6218241 MHz
NUC1 ¹³C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1318006 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0

^{31}P NMR (CDCl_3): **13b**



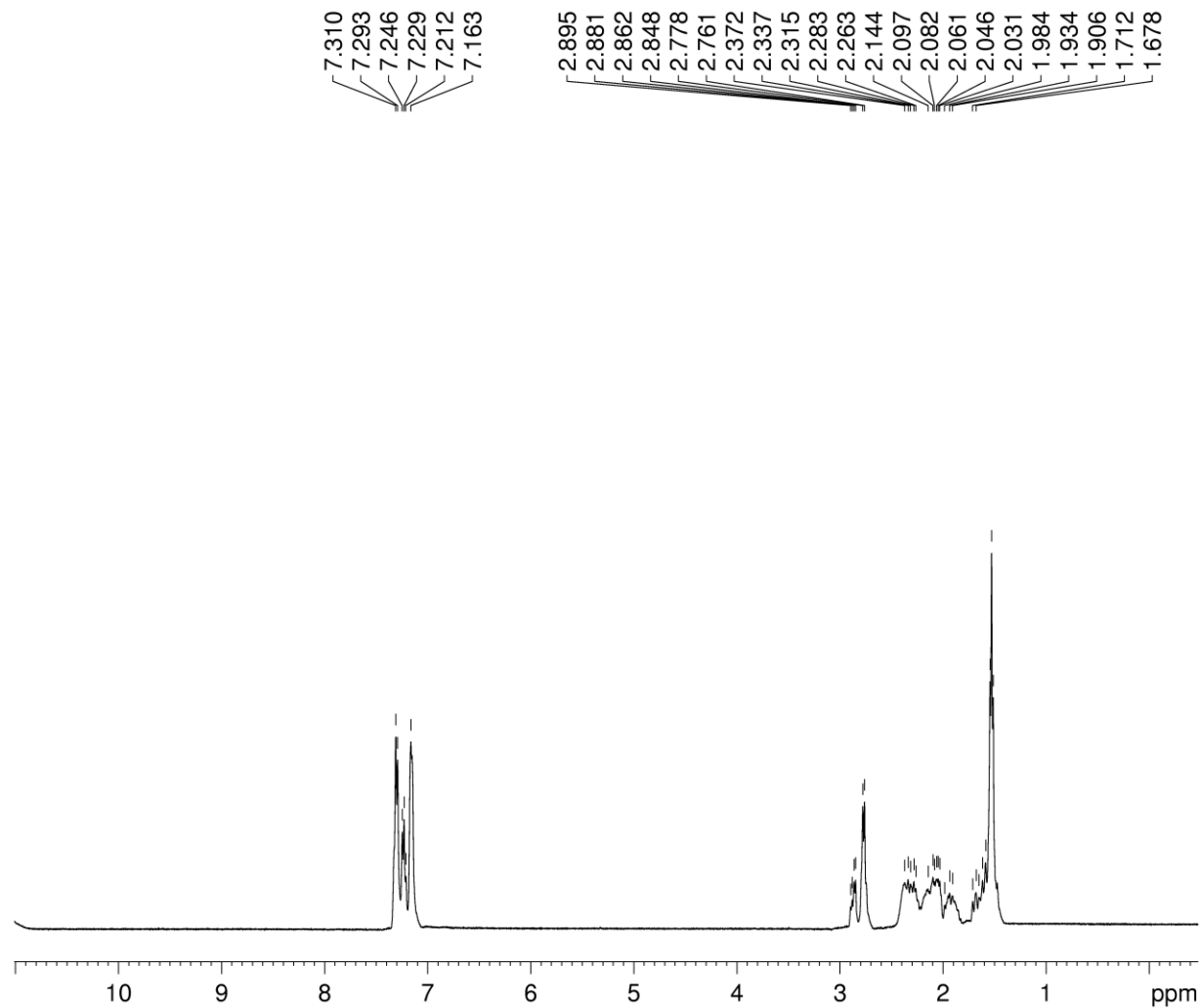
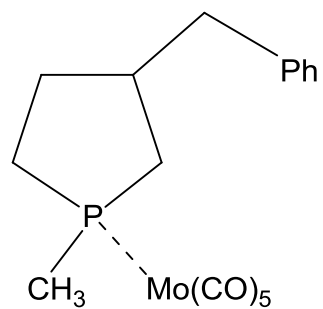
Current Data Parameters
NAME KRA-249-1
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150219
Time 15.30
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 32
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.8 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **14g**



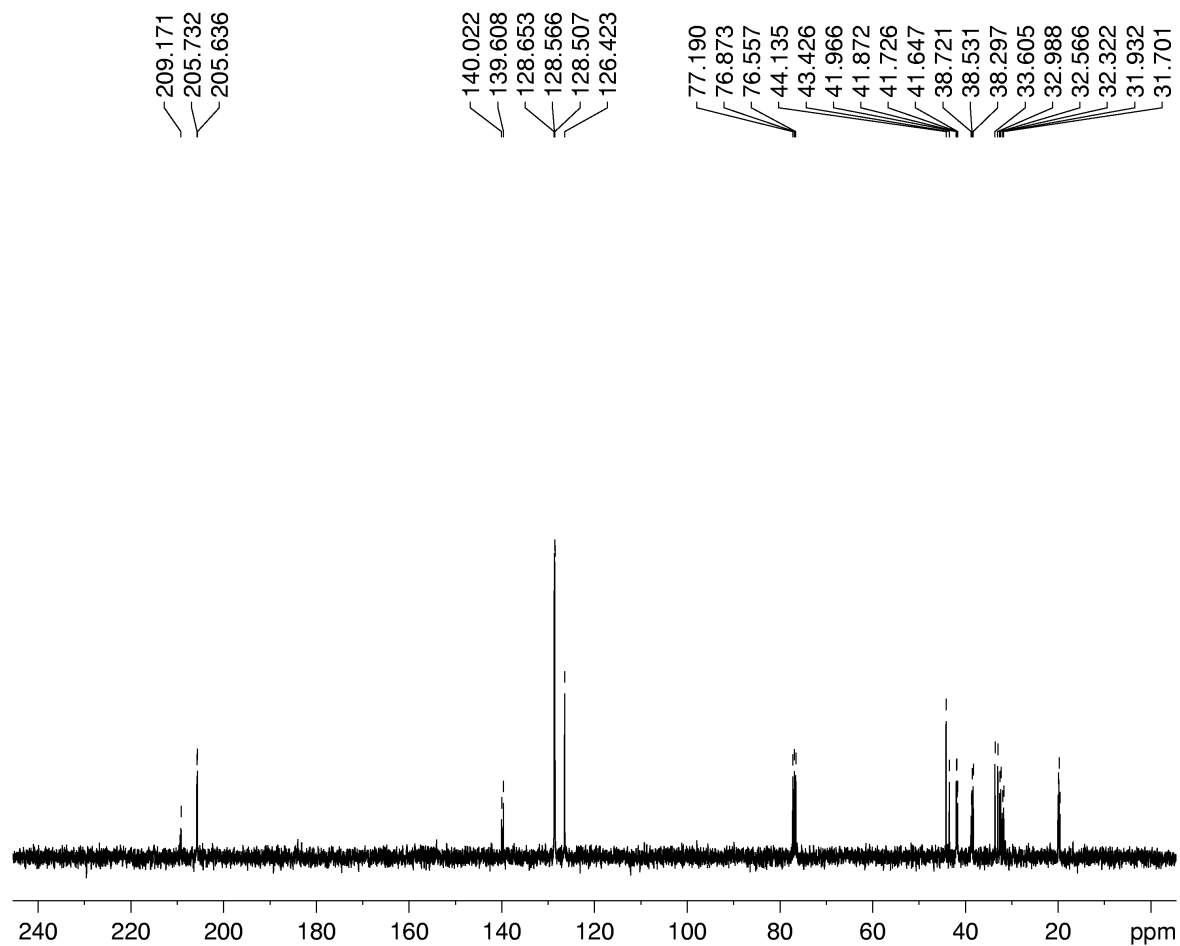
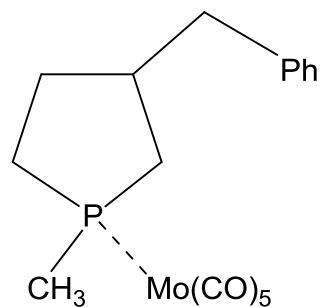
Current Data Parameters
NAME KRA-341-2
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150420
Time 13.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 16384
SOLVENT CDCl_3
NS 1
DS 0
SWH 4595.588 Hz
FIDRES 0.280492 Hz
AQ 1.7825792 sec
RG 80.6
DW 108.800 usec
DE 6.50 usec
TE 298.6 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 400.1321079 MHz
NUC1 ^1H
P1 14.80 usec
PLW1 8.89999962 W

F2 - Processing parameters
SI 16384
SF 400.1300000 MHz
WDW no
SSB 0
LB 0 Hz
GB 0
PC 1.00

^{13}C NMR (CDCl_3): **14g**



Current Data Parameters
NAME KRA-341-2_1_13_31
EXPNO 13
PROCNO 1

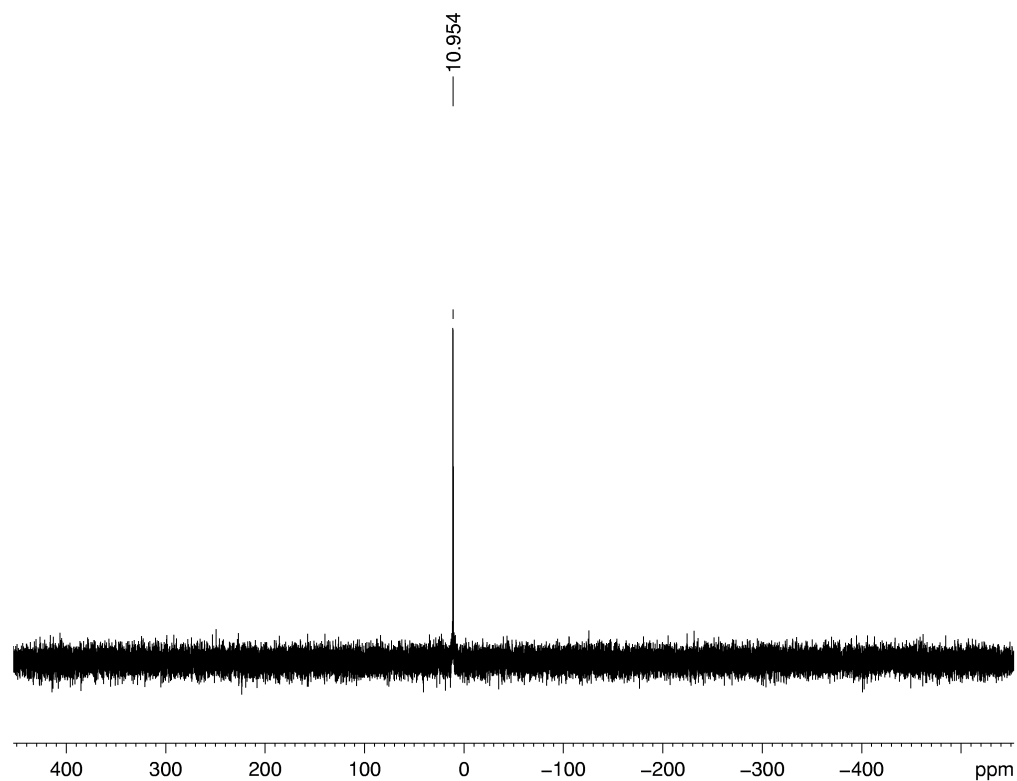
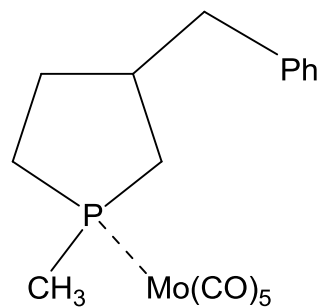
F2 - Acquisition Parameters
Date_ 20150420
Time 13.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl_3
NS 100
DS 2
SWH 25252.525 Hz
FIDRES 0.770646 Hz
AQ 0.6488064 sec
RG 2050
DW 19.800 usec
DE 6.50 usec
TE 299.3 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 8

===== CHANNEL f1 =====
SFO1 100.6248425 MHz
NUC1 ^{13}C
P1 10.00 usec
PLW1 34.00000000 W

===== CHANNEL f2 =====
SFO2 400.1320007 MHz
NUC2 ^1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 8.89999962 W
PLW12 0.24067000 W
PLW13 0.19495000 W

F2 - Processing parameters
SI 65536
SF 100.6127690 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0

^{31}P NMR (CDCl_3): **14g**



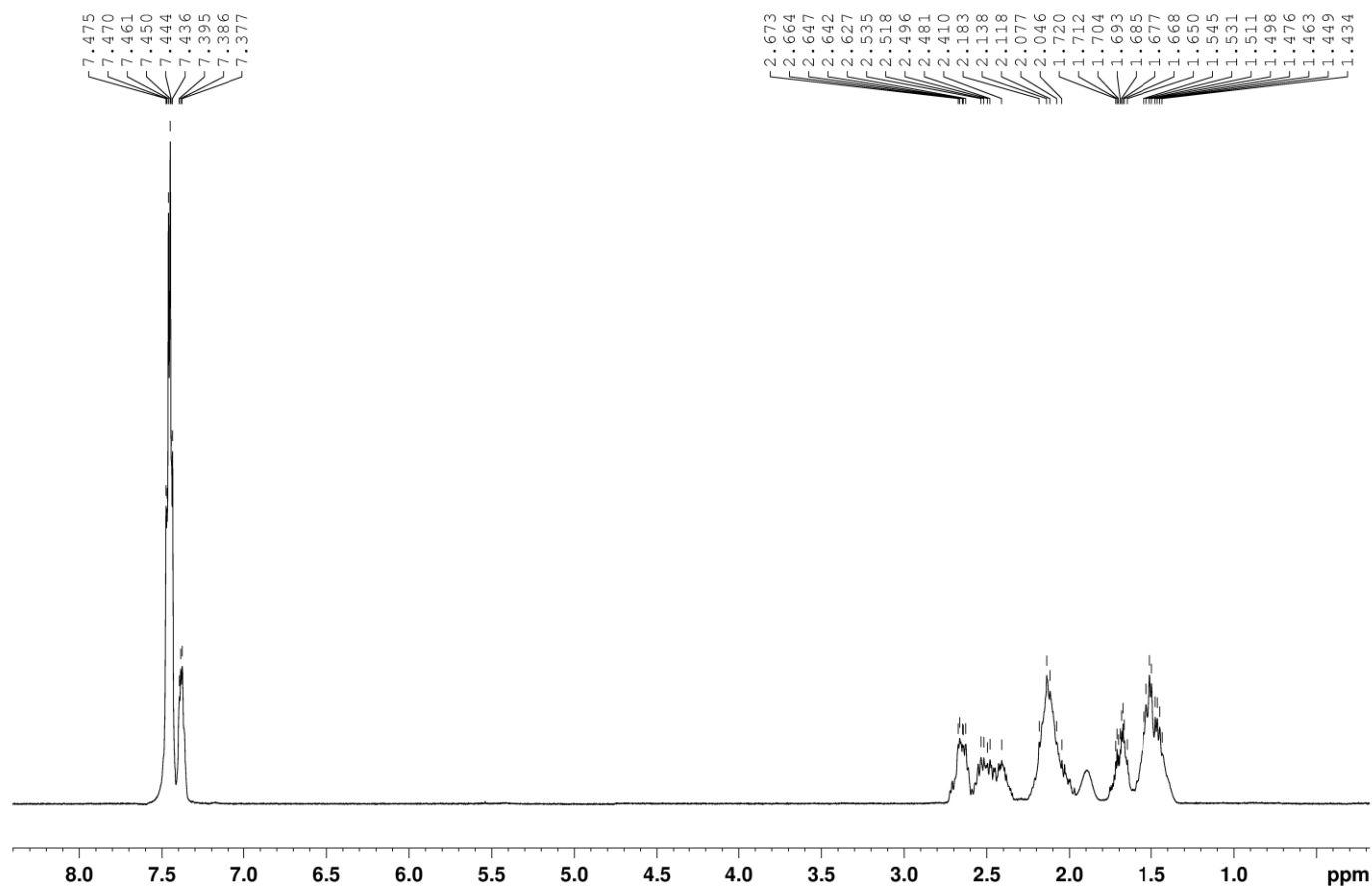
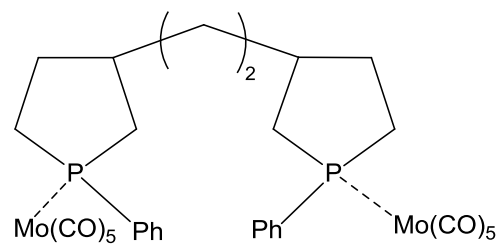
Current Data Parameters
NAME KRA-341-2_1_13_3
EXPNO 31
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150420
Time 13.32
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl_3
NS 32
DS 4
SWH 163043.484 Hz
FIDRES 2.487846 Hz
AQ 0.2009771 sec
RG 2050
DW 3.067 usec
DE 6.50 usec
TE 298.8 K
D1 2.00000000 sec
TD0 1

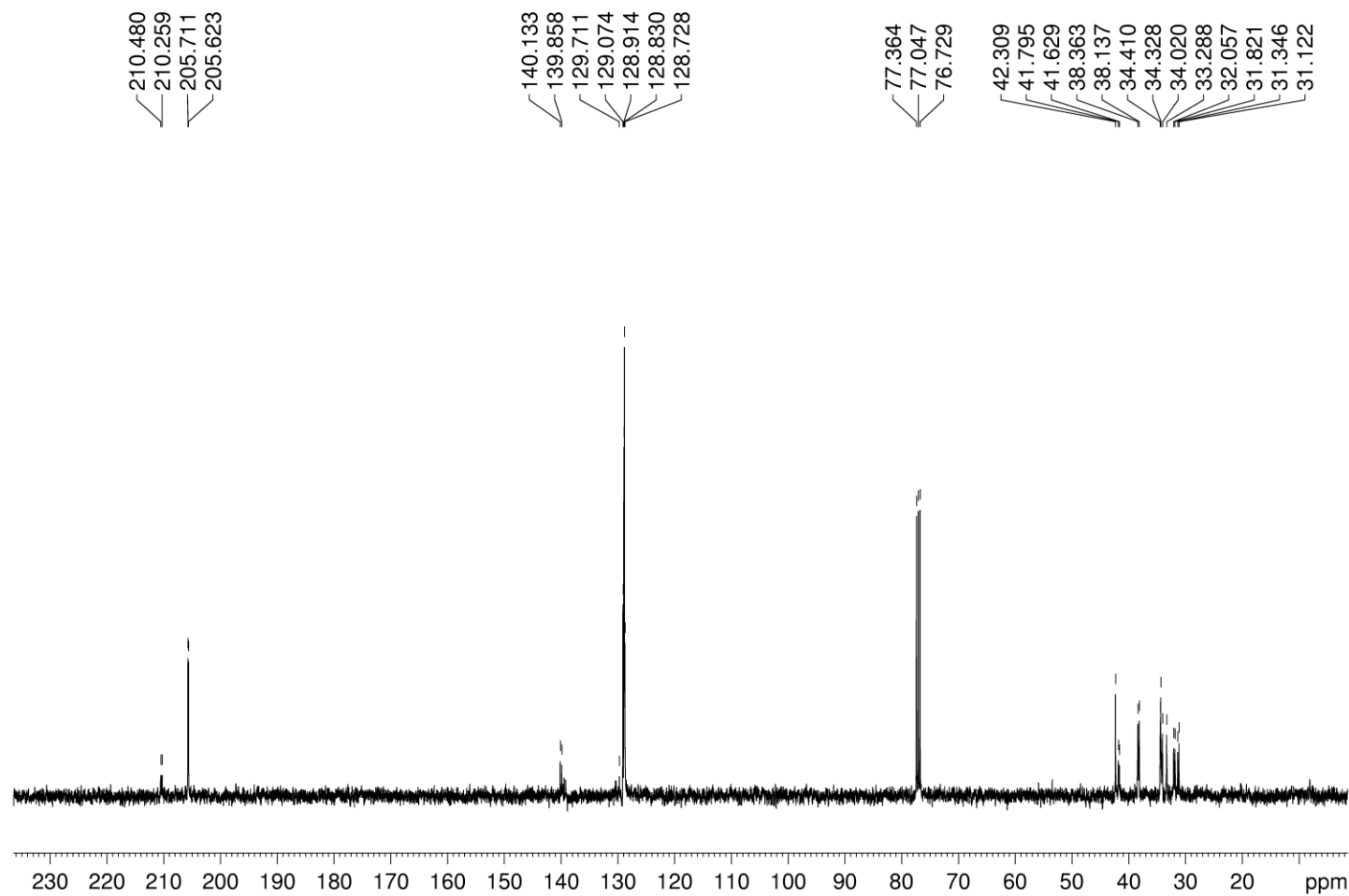
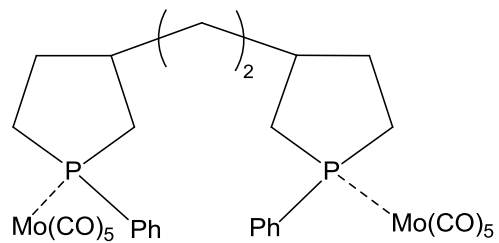
===== CHANNEL f1 =====
SFO1 161.9674942 MHz
NUC1 ^{31}P
P1 10.00 usec
PLW1 25.00000000 W

F2 - Processing parameters
SI 32768
SF 161.9755930 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

^1H NMR (CDCl_3): **15a**



^{13}C NMR (CDCl_3): **15a**



^{31}P NMR (CDCl_3): **15a**

