

Design, Synthesis, and Evaluation of *B*-(Trifluoromethyl)phenyl Phosphine–Borane Derivatives as Novel Progesterone Receptor Antagonists

Yu Miyajima, Kotaro Ochiai, Shinya Fujii

Supplementary Materials

1. Supplementary Figures

Figure S1

Table S1

2. ^1H , ^{13}C , ^{11}B , ^{19}F and ^{31}P NMR Spectra of synthesized compounds

Figure S1. T47D Alkaline phosphatase assay of test compounds alone. None of the synthesized compounds alone affected the alkaline phosphatase activity.

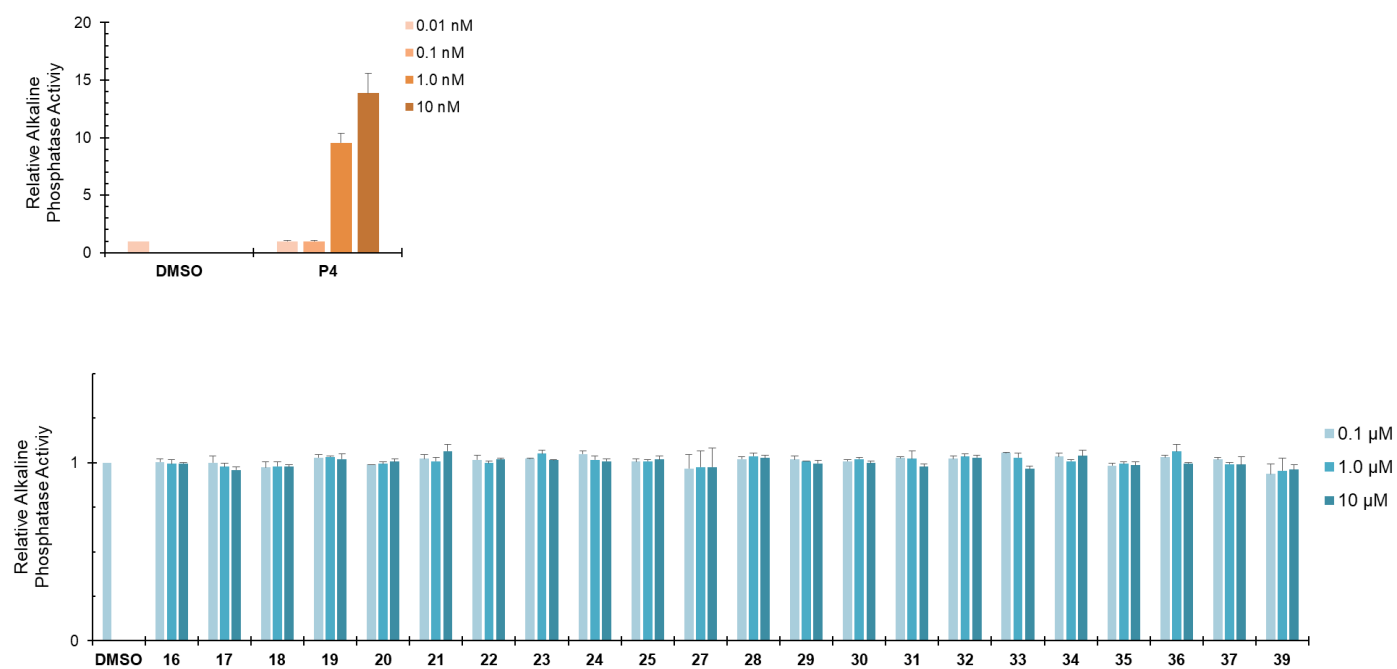


Table S1. Cell proliferation-promoting/inhibitory activity of compounds **28** and **34** toward androgen-dependent SC-3 cells. Both of the compounds did not exhibit cell proliferation promoting activity as well as inhibitory activity toward androgen-dependent cell proliferation.

Cmpd	EC ₅₀ (agonist) ^a	IC ₅₀ (antagonist) ^b
Dihydrotestosterone	0.12 nM	N.D.
Hydroxyflutamide	N.A.	0.37 μ M
28	N.A.	N.A.
34	N.A.	N.A.

^a Agonistic activity was evaluated by induction of cell-proliferation by single a treatment of the compound.

^b Antagonistic activity was evaluated by inhibitory activity toward 1 nM-DHT promoted cell proliferation.

N.A. no activity in the concentration range of 0.01 μ M to 10 μ M.

N.D. not determined.

Procedure of SC-3 assay. SC-3 cells were cultured in MEM α (Fujifilm Wako Co.) supplemented with 2 % FBS and 1 nM dihydrotestosterone (DHT) at 37 °C under 5 % CO₂. All experiments were per-formed in triplicate or more. Cells were trypsinized and diluted to 20,000 cells/mL with DMEM supplemented with 2 % charcoal-stripped FBS. This cell suspension was seeded in 96-well plates at a volume of 90 μ L per well and incubated at 24 h. Then, 10 μ L of the drug solution, which was supplemented with serial dilutions of the test compounds or DMSO as a dilution control in the presence of 1 nM DHT, was added. The plates were incubated at 37 °C under 5 % CO₂ for 3 days, and the cell number was determined using a Cell Counting Kit-8 (DOJINDO). A 10 μ L aliquot of WST-8 was added to each well, and the cells were further incubated for 2 h, then the absorbance at 450 nm was determined with a microplate reader as a measure of the number of living cells in the culture.

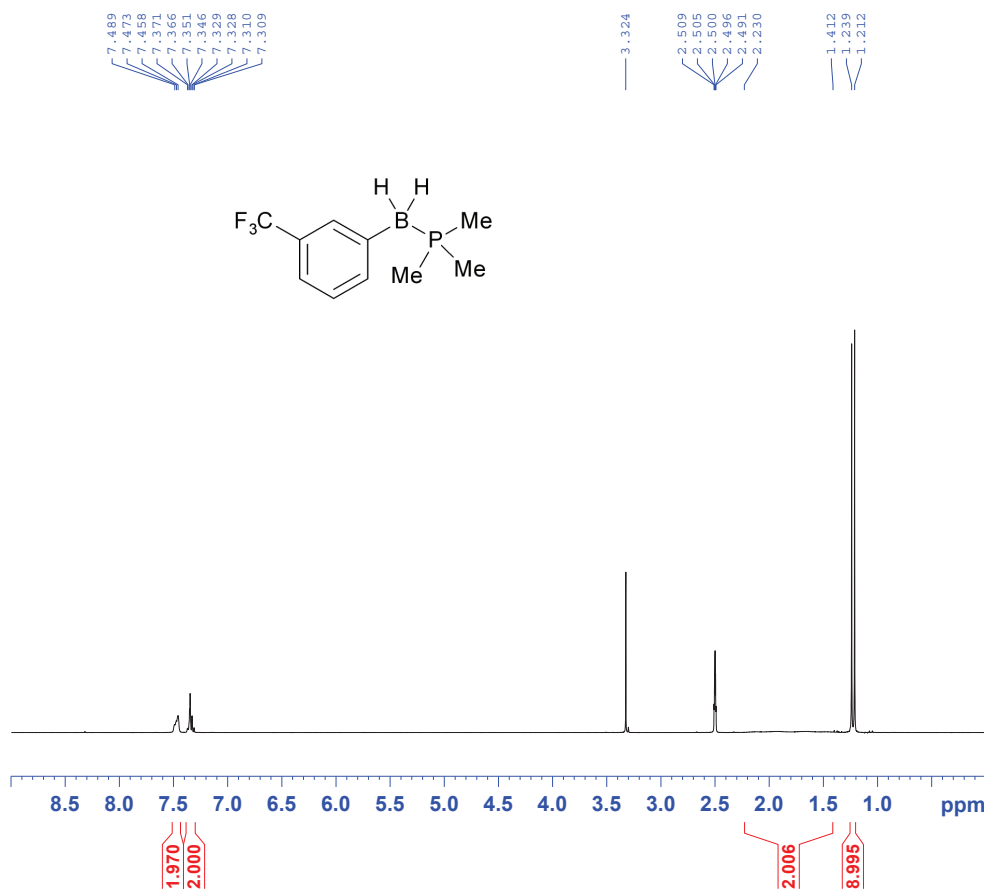
3CF3PhBH2PMe3

B-3-(Trifluoromethyl)phenyl trimethylphosphine-borane (16)

IBB-nmr Analysis

NAME Mar12-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220312
 Time_ 21.51
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.7 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300034 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



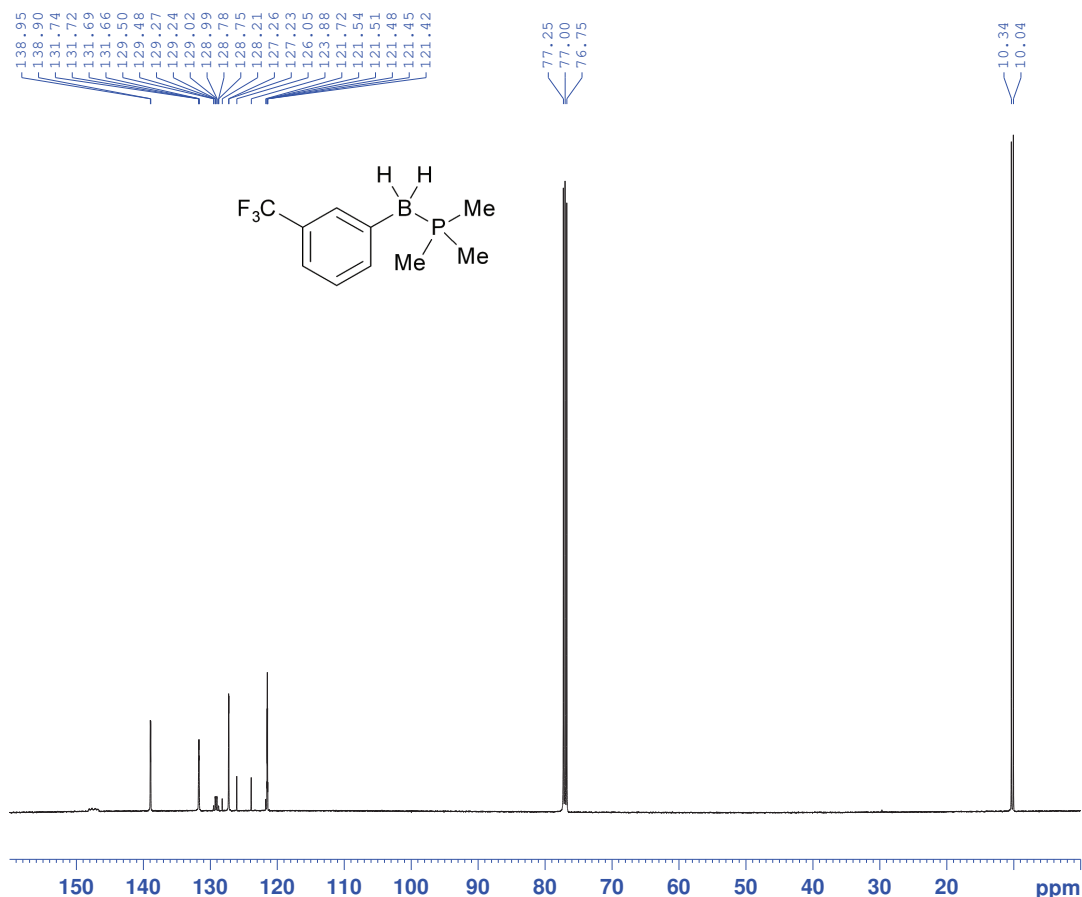
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IBB-nmr Analysis

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 PROCNO 1
 Date_ 20240307
 Time_ 23.44
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 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl₃
 NS 256
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

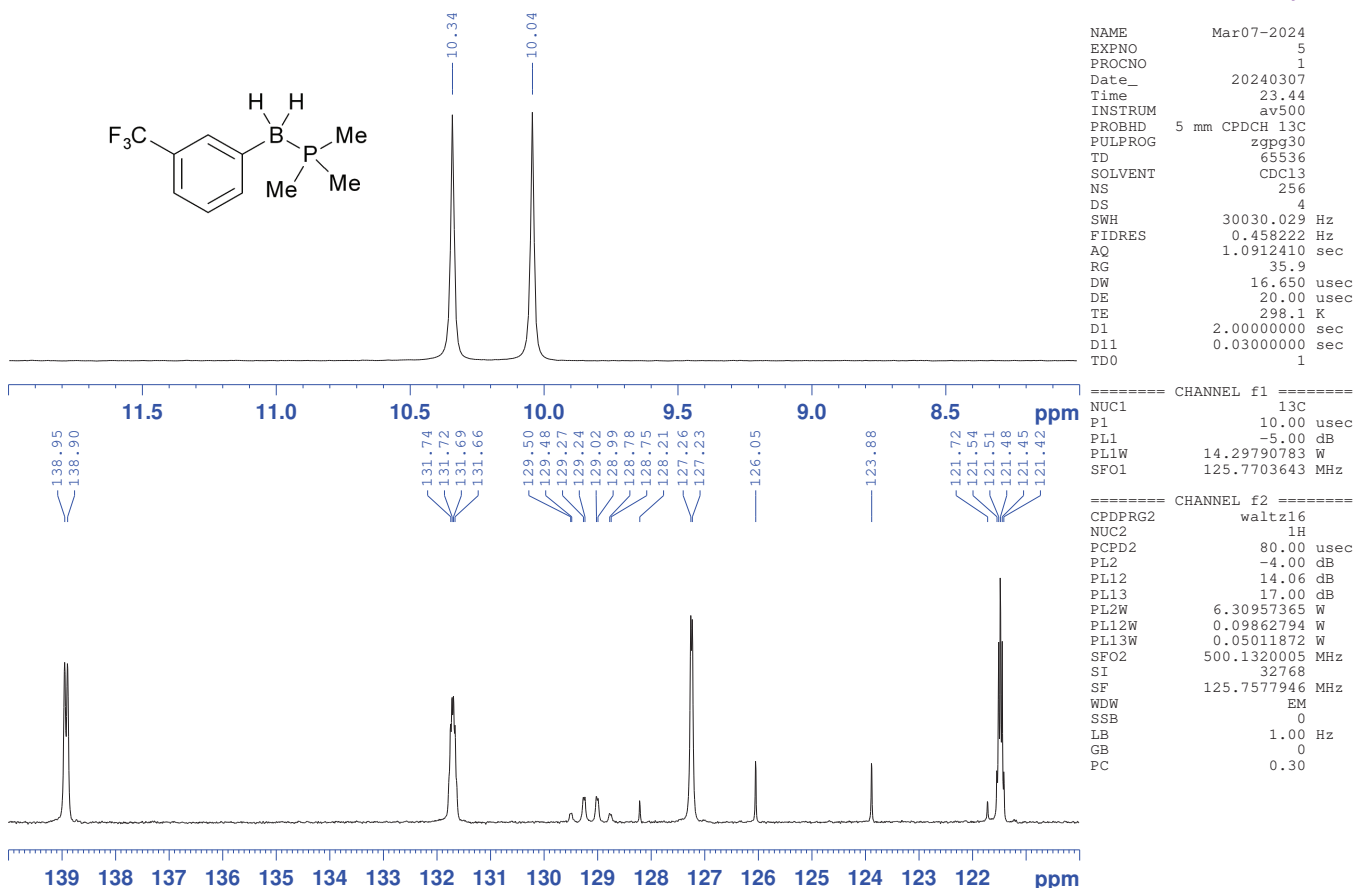
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577946 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



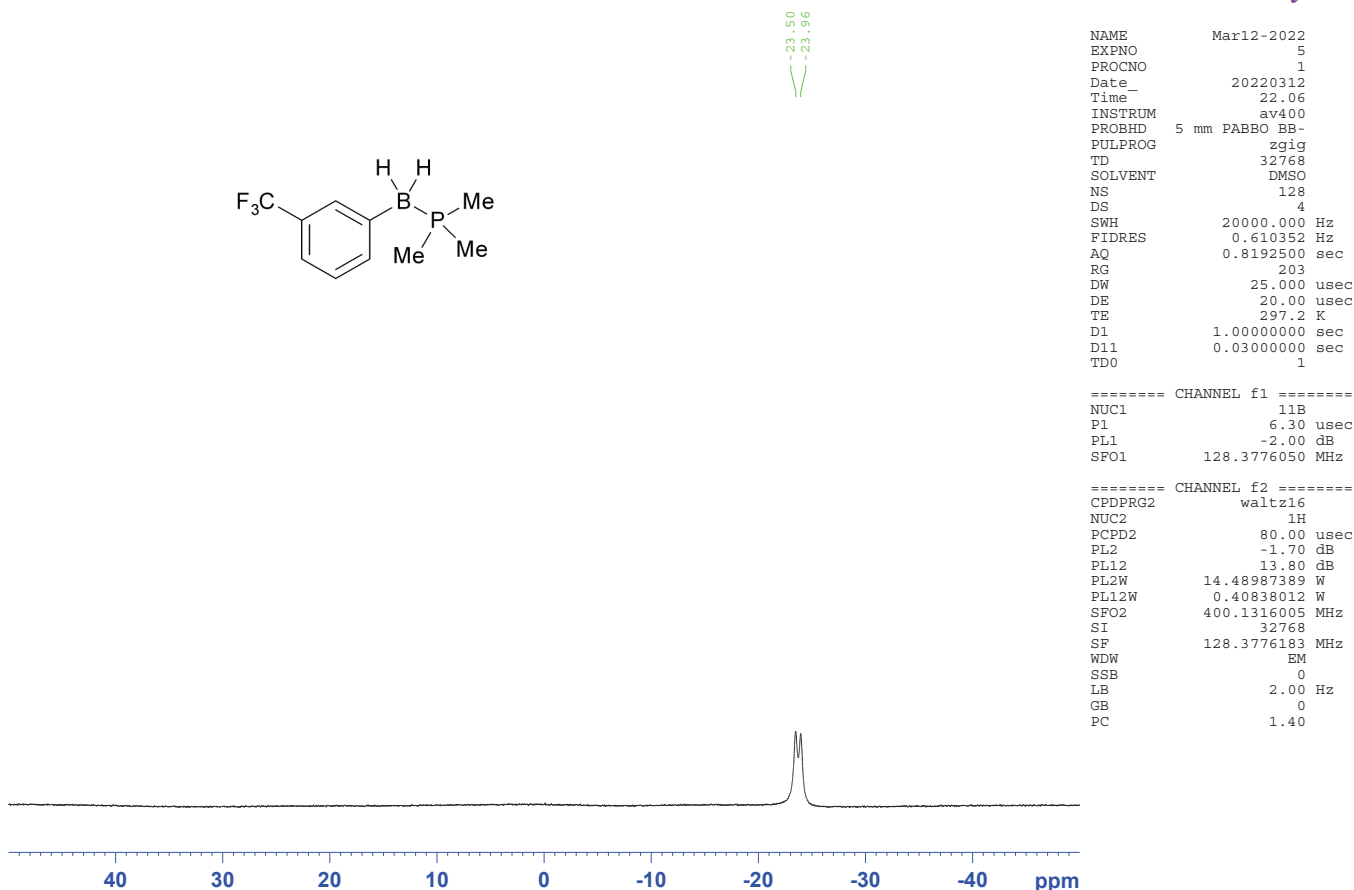
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IBB-nmr Analysis



3CF3PhBH2PMe3

IBB-nmr Analysis



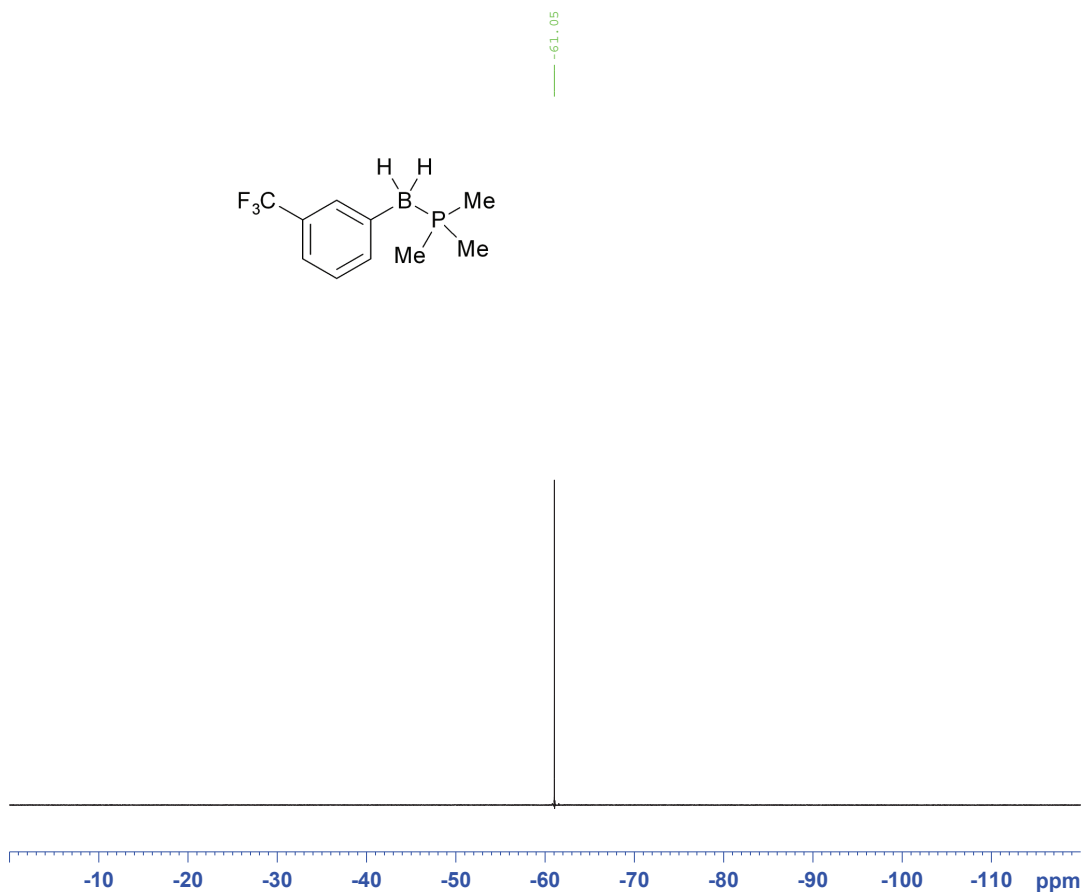
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IBB-nmr Analysis

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EXPNO           2
PROCNO          1
Date_           20220312
Time            21.55
INSTRUM         av400
PROBHD          5 mm PABBO BB-
PULPROG         zgfhigqn
TD              131072
SOLVENT         DMSO
NS               8
DS              4
SWH             89285.711 Hz
FIDRES          0.681196 Hz
AQ              0.7340532 sec
RG              203
DW              5.600 usec
DE              6.50 usec
TE              296.7 K
D1              1.00000000 sec
D11             0.03000000 sec
D12             0.00002000 sec
TD0             1
```

```
===== CHANNEL f1 =====
NUC1            19F
P1              19.50 usec
PL1             -4.00 dB
PL1W            16.40489006 W
SFO1            376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2         waltz16
NUC2            1H
PCPD2           112.00 usec
PL2             -4.00 dB
PL12            18.00 dB
PL2W            24.60733604 W
PL12W           0.15526180 W
SFO2            400.1316005 MHz
SI              65536
SF              376.4984617 MHz
WDW             EM
SSB             0
LB              0.30 Hz
GB              0
PC              1.00
```

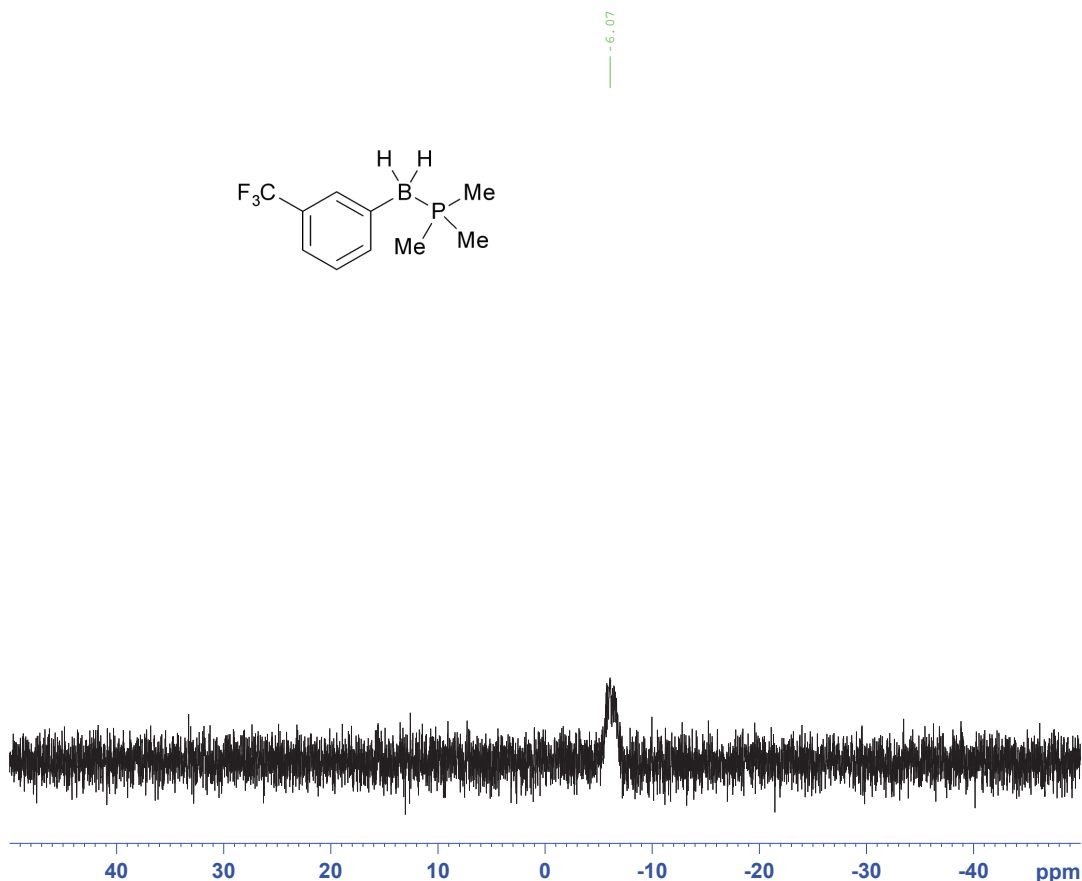


3CF3PhBH2PMe3

IBB-nmr Analysis

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EXPNO           4
PROCNO          1
Date_           20220312
Time            21.58
INSTRUM         av400
PROBHD          5 mm PABBO BB-
PULPROG         zg30
TD              65536
SOLVENT         DMSO
NS               8
DS              4
SWH             64102.563 Hz
FIDRES          0.978127 Hz
AQ              0.5112308 sec
RG              203
DW              7.800 usec
DE              6.50 usec
TE              296.5 K
D1              2.00000000 sec
TD0             1
```

```
===== CHANNEL f1 =====
NUC1            31P
P1              10.00 usec
PL1             -0.70 dB
PL1W            30.10233498 W
SFO1            161.9674942 MHz
SI              32768
SF              161.9754962 MHz
WDW             EM
SSB             0
LB              1.00 Hz
GB              0
PC              1.40
```



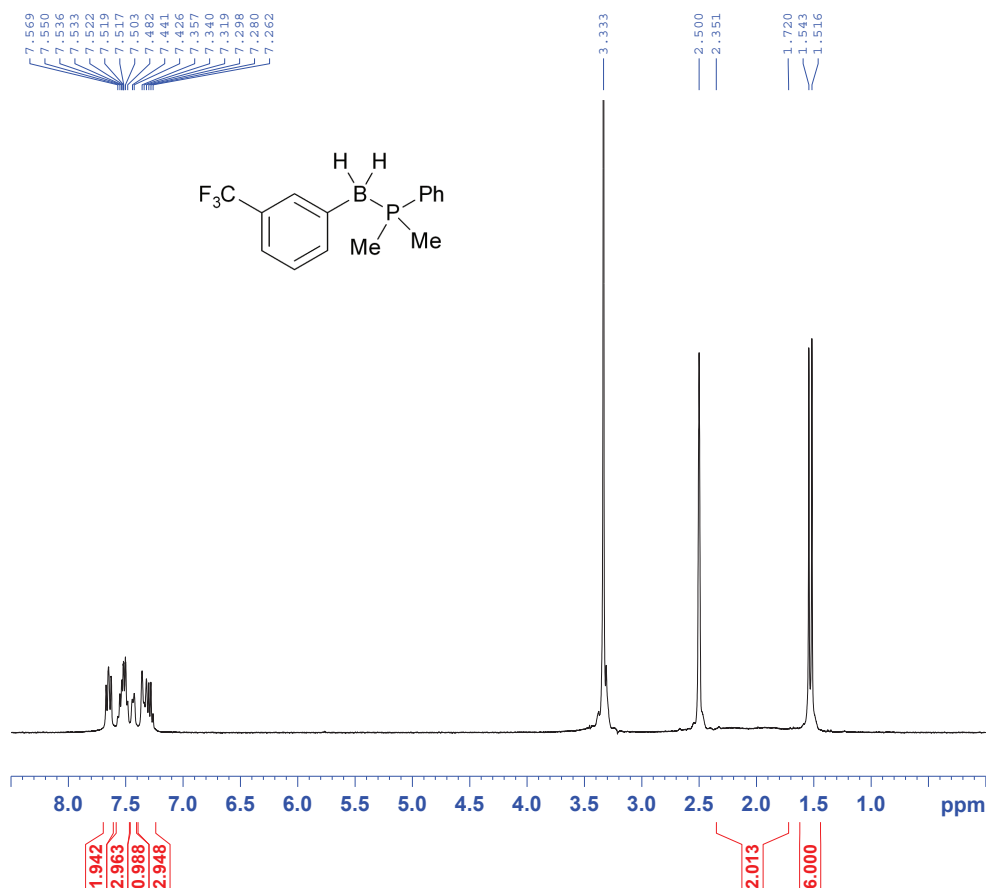
3CF3PhBH2PPhMe2 21-60Fr

B-(3-Trifluoromethyl)phenyl dimethyl(phenyl)phosphine-borane (17)

IBB-nmr Analysis

NAME Apr14-2022
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 PROCNO 1
 Date_ 20220414
 Time 21.36
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 295.6 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300038 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



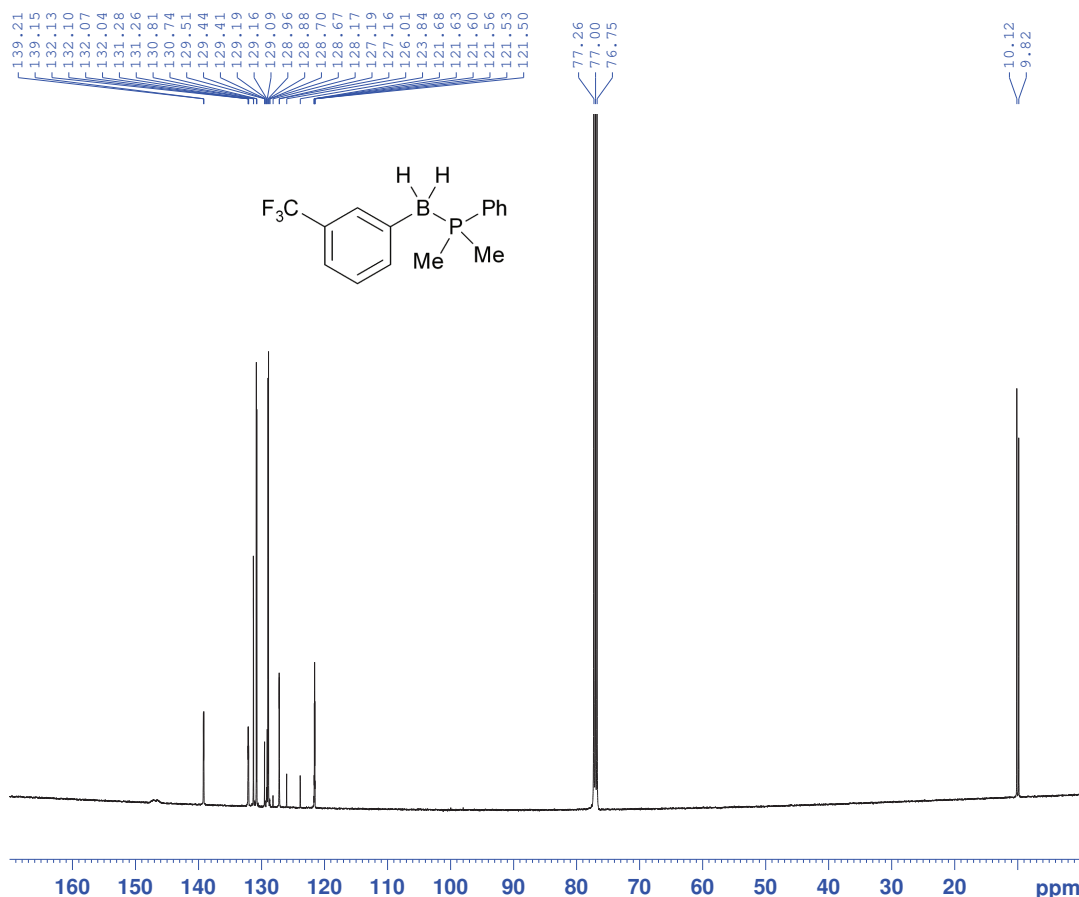
3CF3PhBH2PMe2Ph

IBB-nmr Analysis

NAME Mar08-2024
 EXPNO 7
 PROCNO 1
 Date_ 20240308
 Time 3.33
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

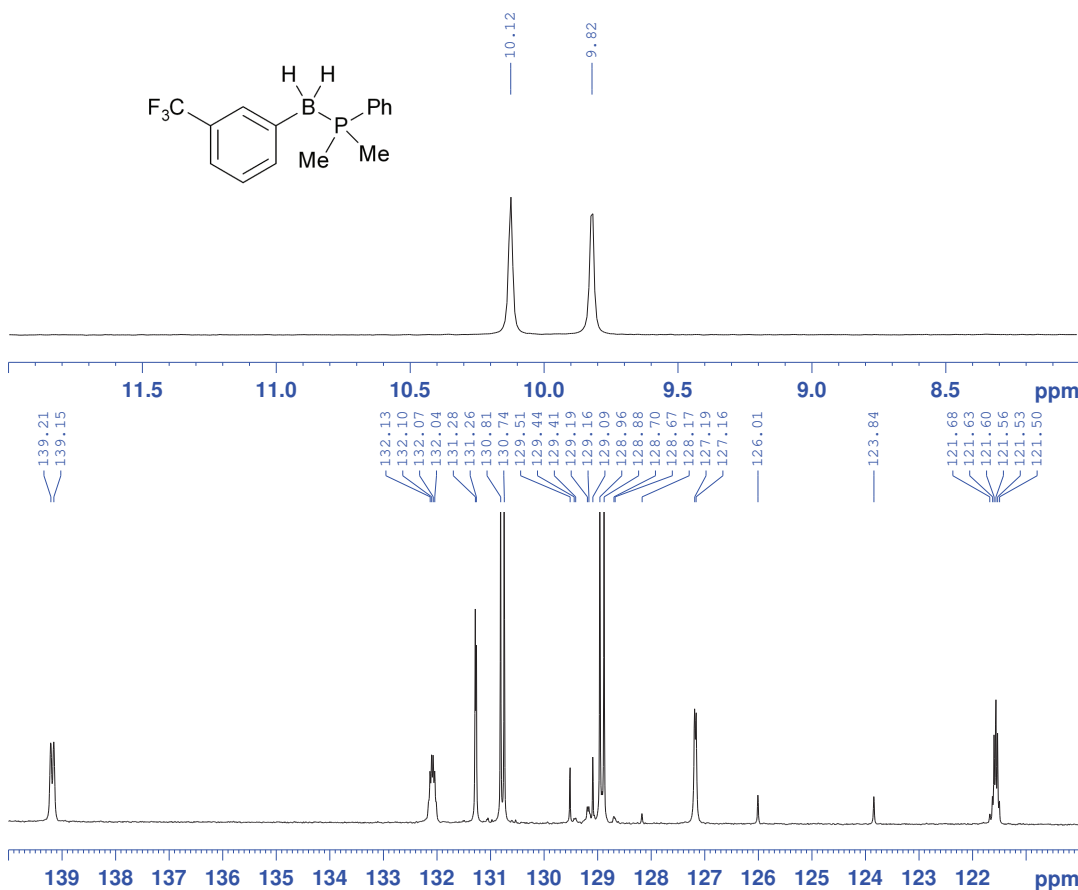
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577928 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



3CF3PhBH2PMe2Ph

IBB-nmr Analysis



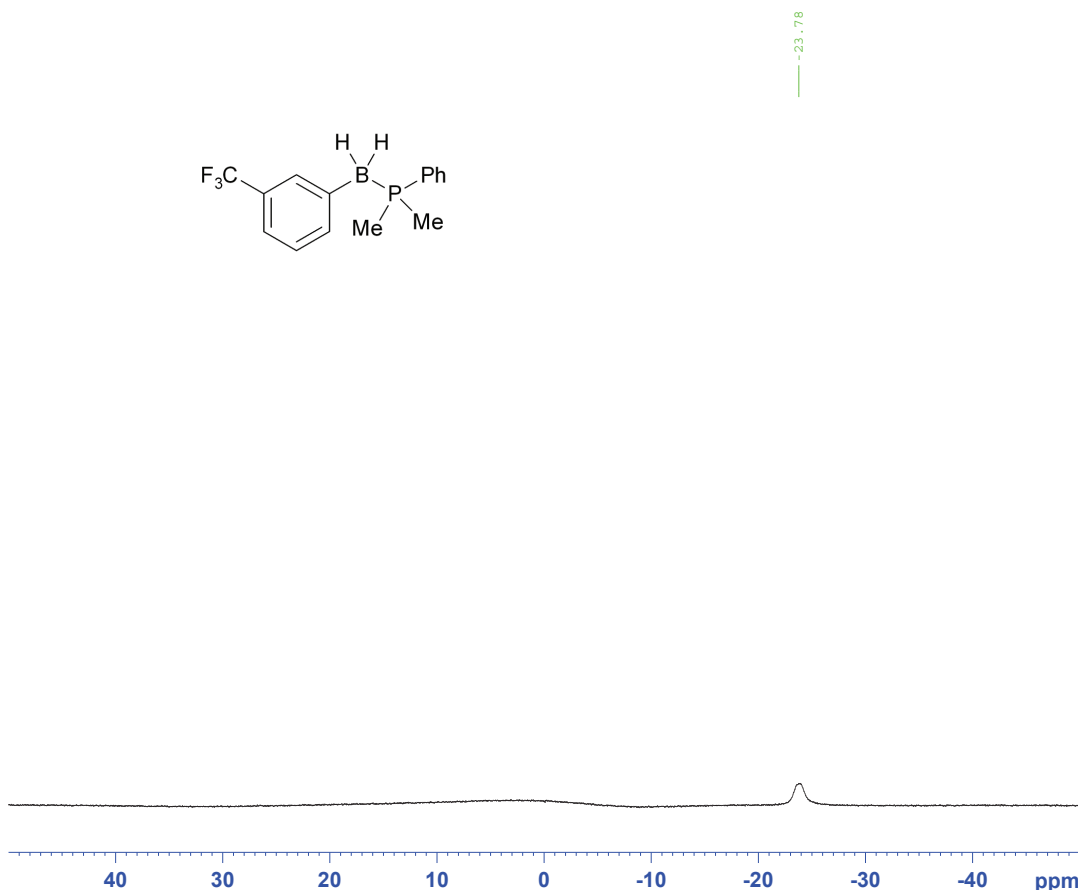
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PROCNO 1
Date_ 20240308
Time 3.33
INSTRUM av500
PROBHD 5 mm CPDCH 13C
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 30030.029 Hz
FIDRES 0.458222 Hz
AQ 1.0912410 sec
RG 35.9
DW 16.650 usec
DE 20.00 usec
TE 298.1 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 10.00 usec
PL1 -5.00 dB
PL1W 14.29790783 W
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 14.06 dB
PL13 17.00 dB
PL2W 6.30957365 W
PL12W 0.09862794 W
PL13W 0.05011872 W
SFO2 500.1320005 MHz
SI 32768
SF 125.7577928 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3HOPhBH2PMe2Ph

IBB-nmr Analysis

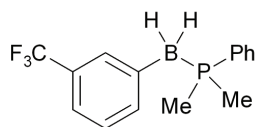


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Time 13.35
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgig
TD 32768
SOLVENT DMSO
NS 128
DS 4
SWH 20000.000 Hz
FIDRES 0.610352 Hz
AQ 0.8192500 sec
RG 203
DW 25.000 usec
DE 20.00 usec
TE 297.3 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

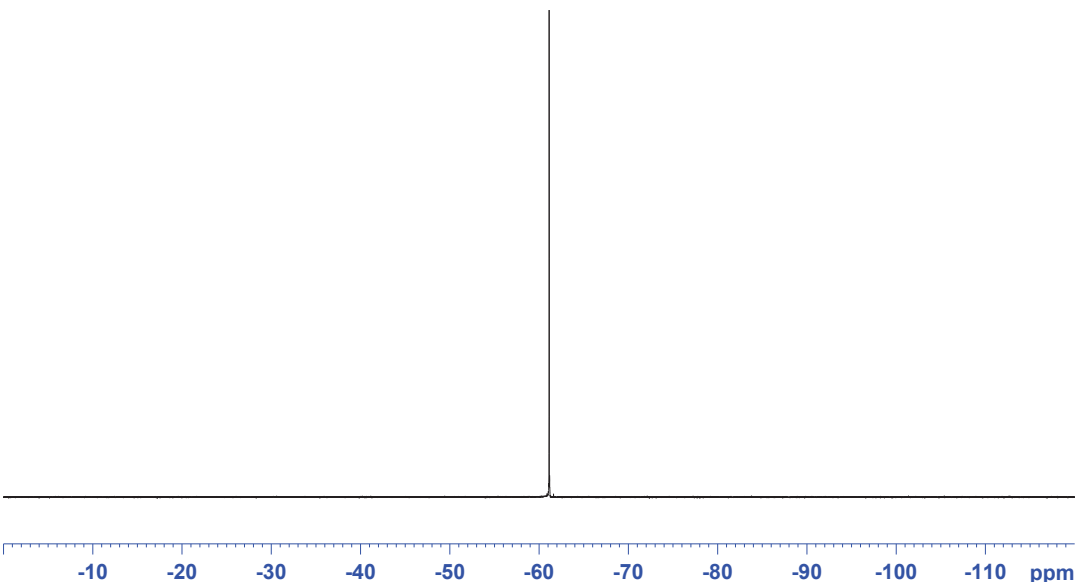
===== CHANNEL f1 =====
NUC1 11B
P1 6.30 usec
PL1 -2.00 dB
SFO1 128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 128.3776183 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

3CF3PhBH2PPhMe2



-61.13



IBB-nmr Analysis

```

NAME      Apr14-2022
EXPNO     3
PROCNO    1
Date_     20220414
Time      21.45
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         295.4 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz

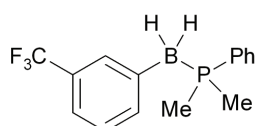
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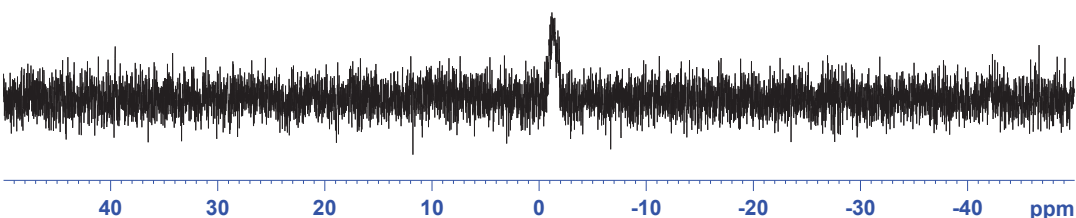
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2       -4.00 dB
PL12      18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF         376.4984617 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```

3CF3PhBH2PPhMe2 21-60Fr



-1.21



IBB-nmr Analysis

```

NAME      Apr14-2022
EXPNO     2
PROCNO    1
Date_     20220414
Time      21.41
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         16
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         295.5 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```

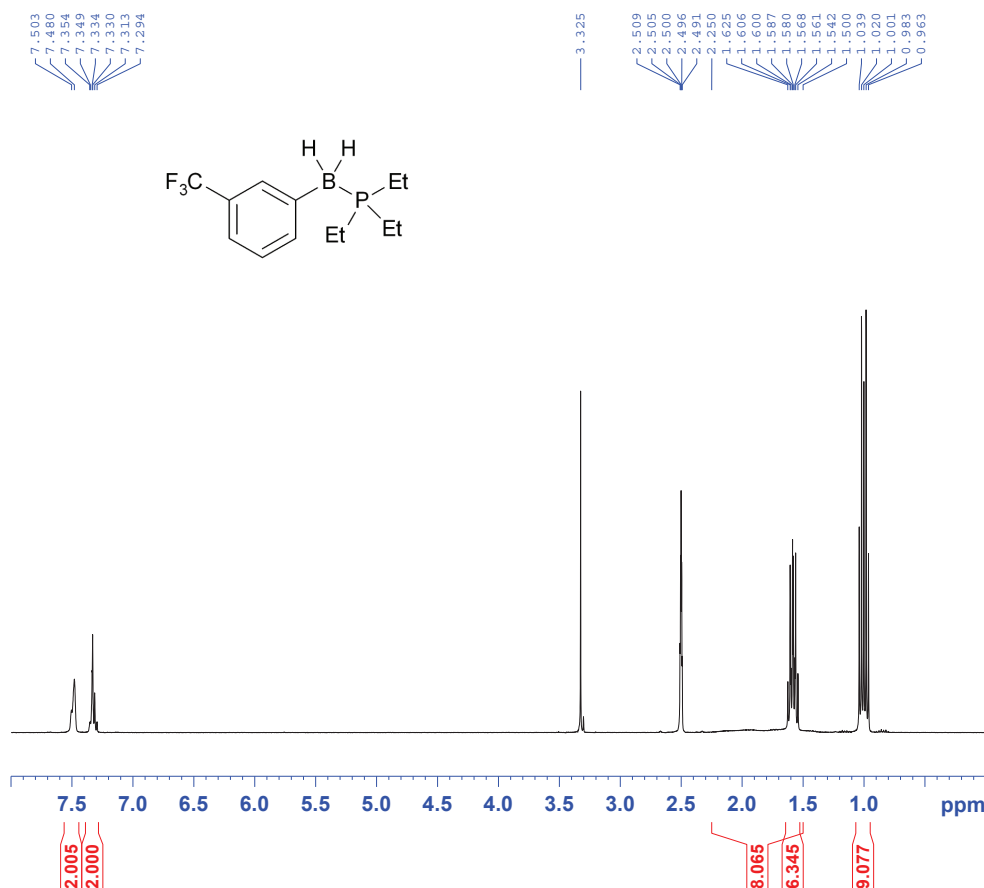
3CF3PhBH2PEt3

B-3-(Trifluoromethyl)phenyl triethylphosphine-borane (18)

IBB-nmr Analysis

NAME Jan16-2022
 EXPNO 4
 PROCNO 1
 Date_ 20220116
 Time_ 23.53
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300034 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



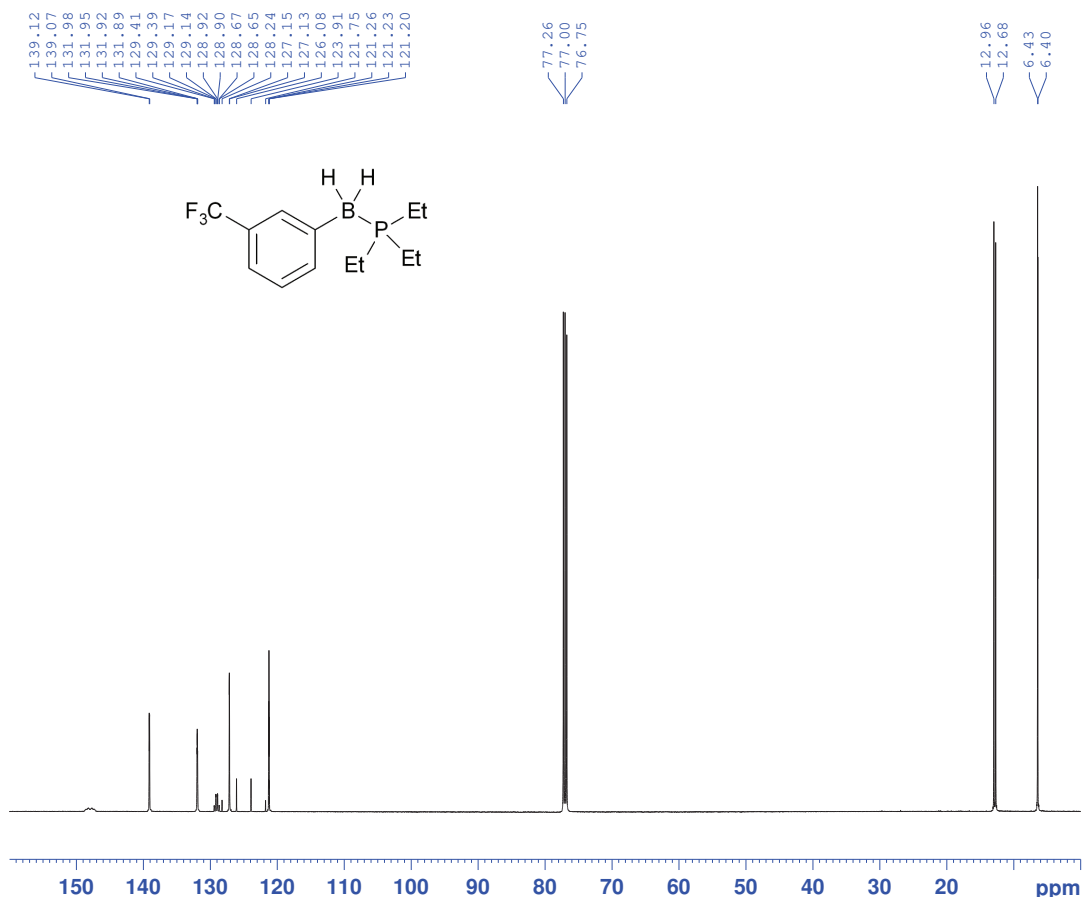
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IBB-nmr Analysis

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 Date_ 20240308
 Time_ 8.30
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

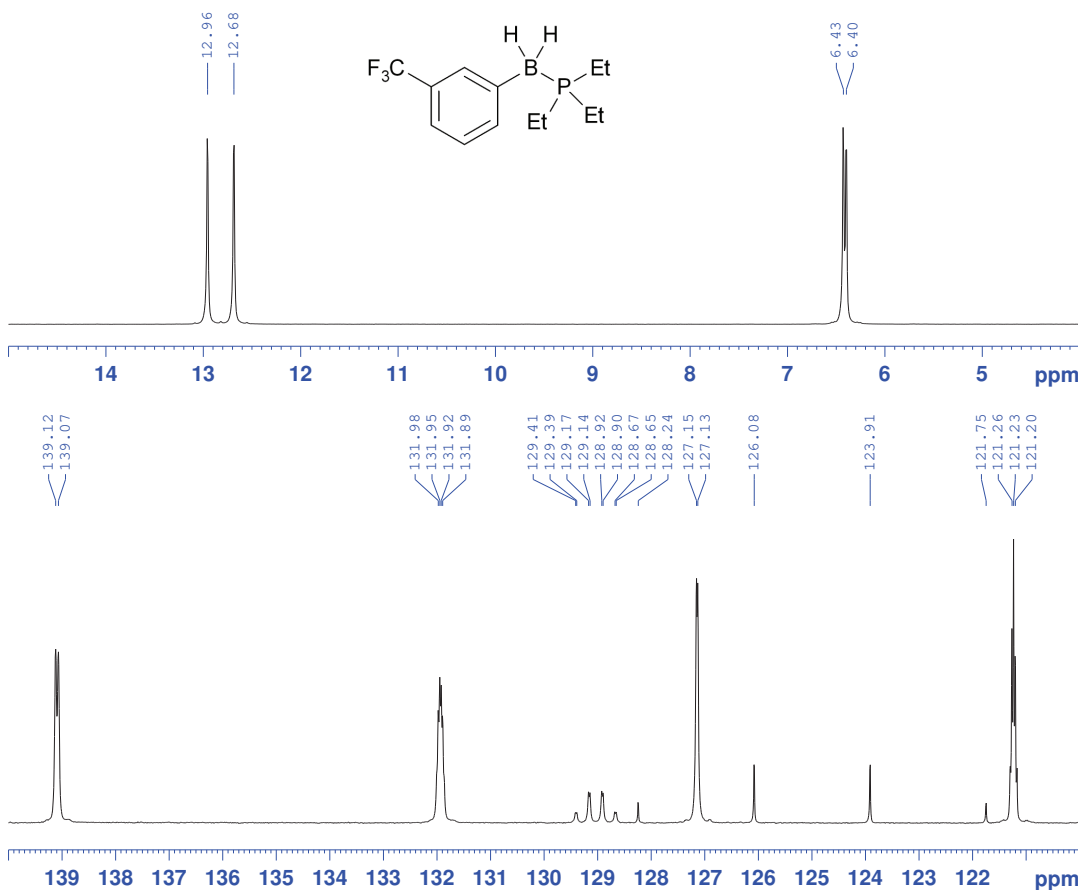
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577946 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



3CF3PhBH2PEt3

IBB-nmr Analysis



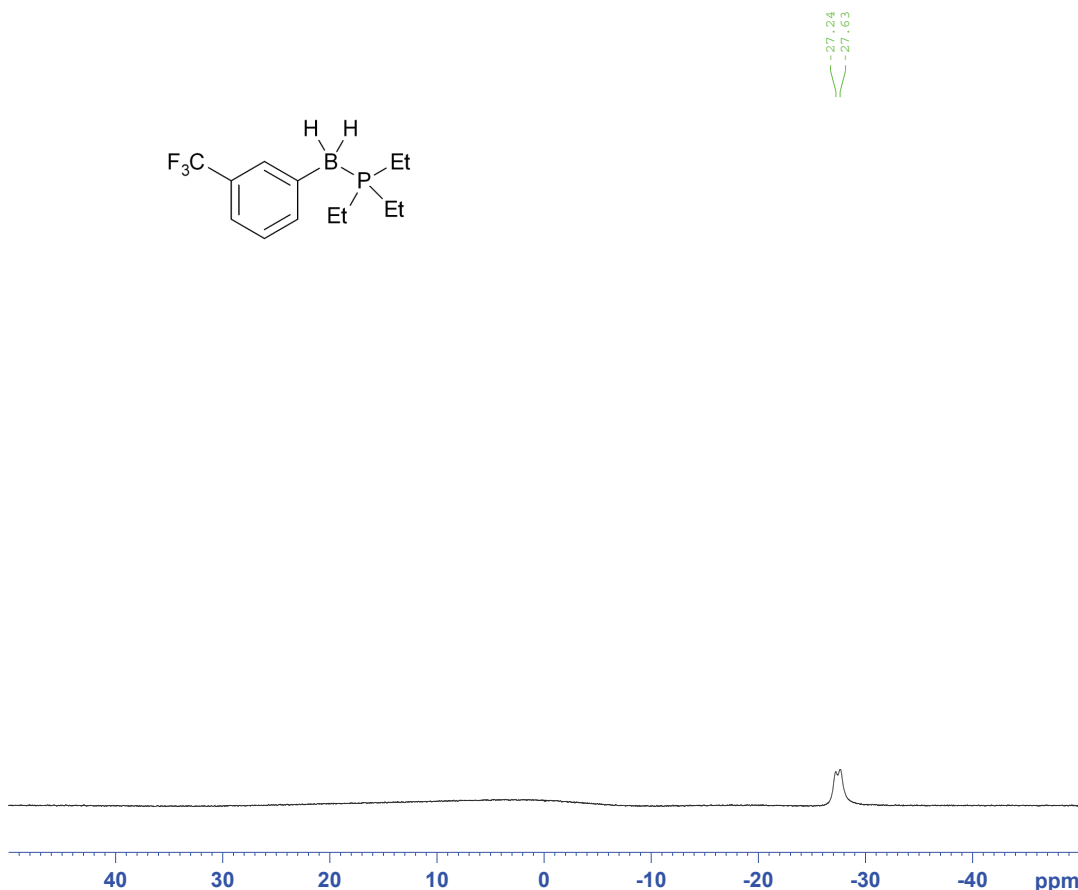
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PROCNO 1
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Time 8.30
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PROBHD 5 mm CPDCH 13C
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 30030.029 Hz
FIDRES 0.458222 Hz
AQ 1.0912410 sec
RG 90.5
DW 16.650 usec
DE 20.00 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 10.00 usec
PL1 -5.00 dB
PL1W 14.29790783 W
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 14.06 dB
PL13 17.00 dB
PL2W 6.30957365 W
PL12W 0.09862794 W
PL13W 0.05011872 W
SFO2 500.1320005 MHz
SI 32768
SF 125.7577946 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3CF3PhBH2PEt3

IBB-nmr Analysis

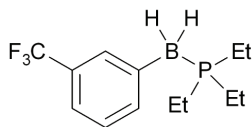


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PROCNO 1
Date_ 20220117
Time 0.00
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgig
TD 32768
SOLVENT DMSO
NS 128
DS 4
SWH 20000.000 Hz
FIDRES 0.610352 Hz
AQ 0.8192500 sec
RG 203
DW 25.000 usec
DE 20.00 usec
TE 296.9 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

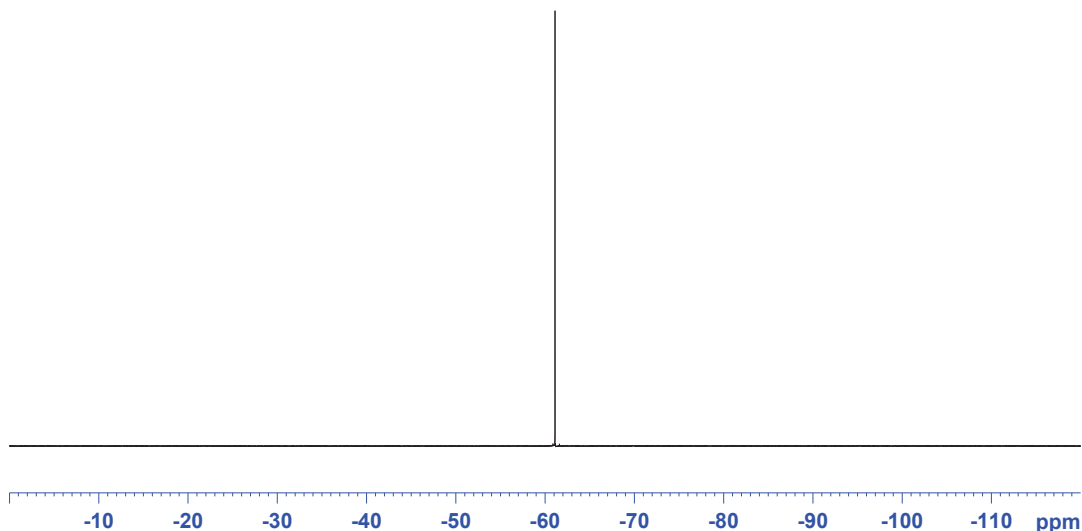
===== CHANNEL f1 =====
NUC1 11B
P1 6.30 usec
PL1 -2.00 dB
SFO1 128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 128.3776183 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

3CF3PhBH2PEt3



-61.12



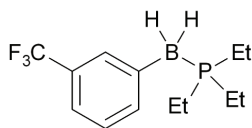
IBB-nmr Analysis

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PULPROG    zgfhigqn
TD         131072
SOLVENT    DMSO
NS          8
DS          4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG          203
DW         5.600 usec
DE         6.50 usec
TE         296.4 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

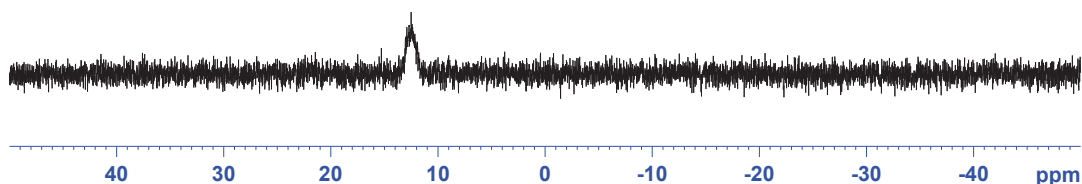
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===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12       18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984677 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```

3CF3PhBH2PEt3



12.50



IBB-nmr Analysis

```
NAME      Jan16-2022
EXPNO      6
PROCNO     1
Date_      20220117
Time       0.05
INSTRUM    av400
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    DMSO
NS          16
DS          4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG          203
DW         7.800 usec
DE         6.50 usec
TE         296.3 K
D1         2.00000000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI          32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```

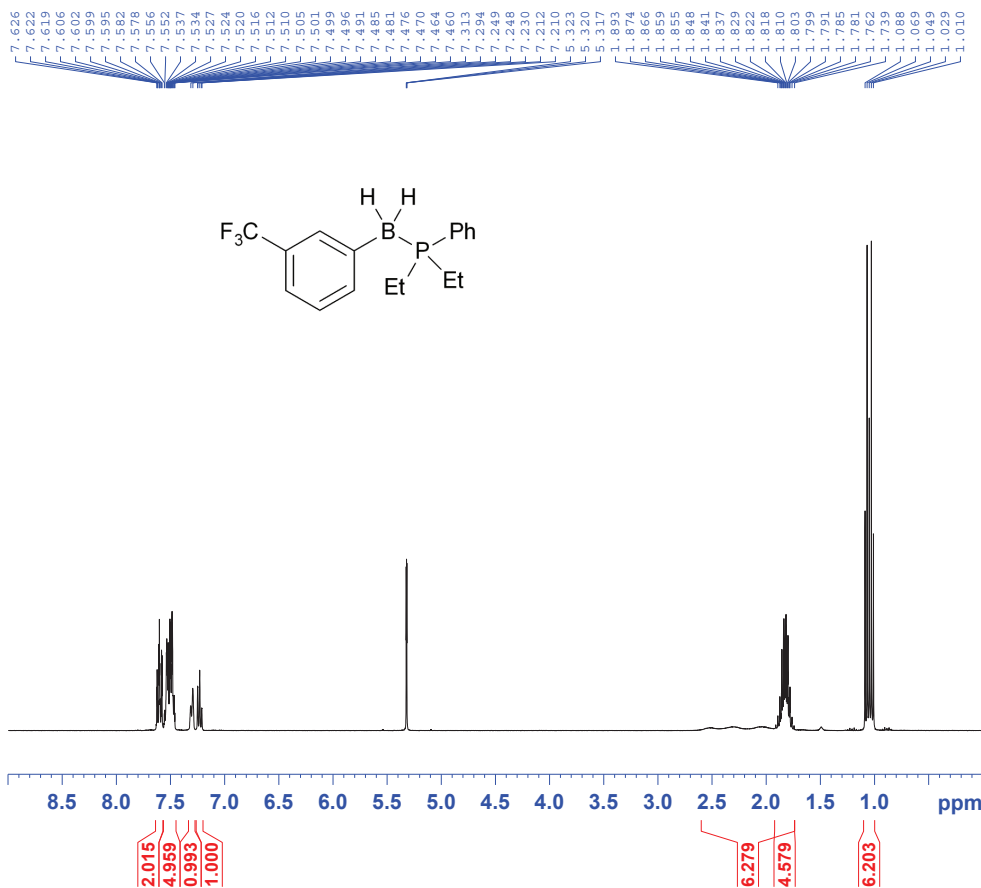

3CF3PhBH2PEt2Ph

B-3-(Trifluoromethyl)phenyl diethyl(phenyl)phosphine-borane (19)

IBB-nmr Analysis

NAME Mar5-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220305
 Time_ 22.04
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT CD2Cl2
 NS 16
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.5 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300154 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

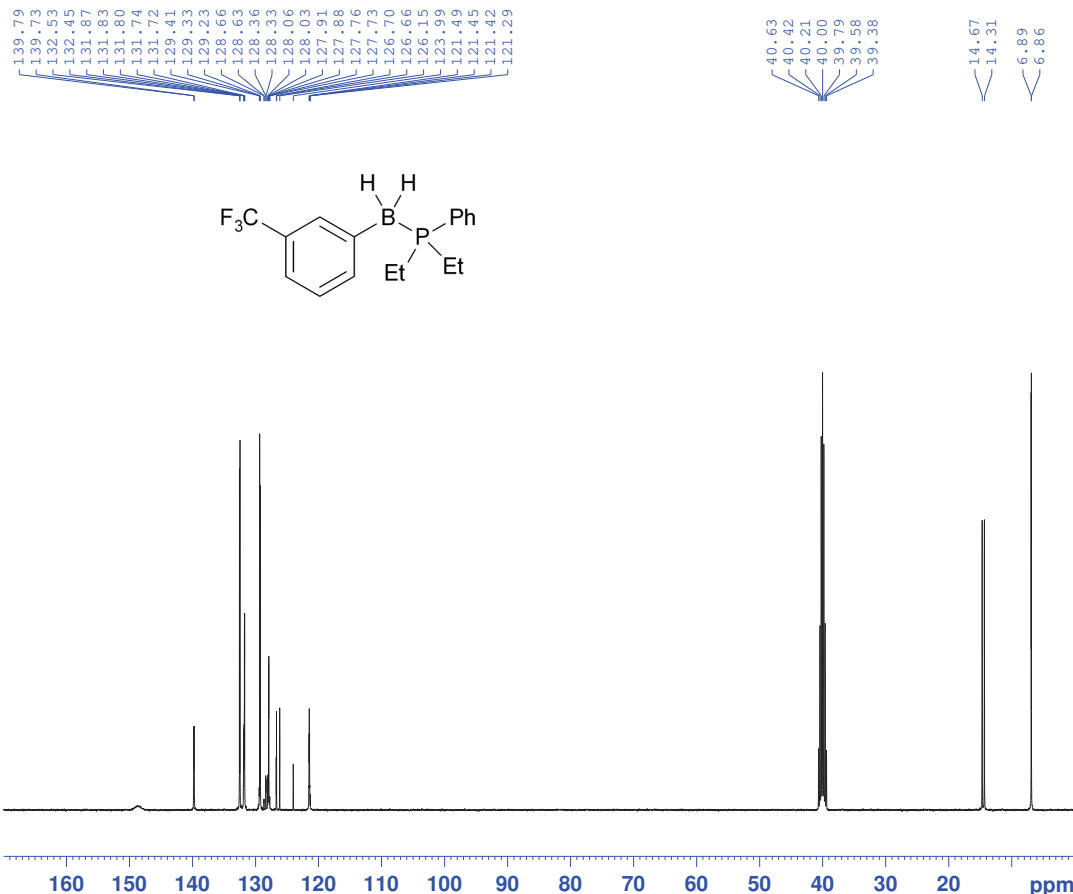


3CF3PhBH2PPhEt2

IBB-nmr Analysis

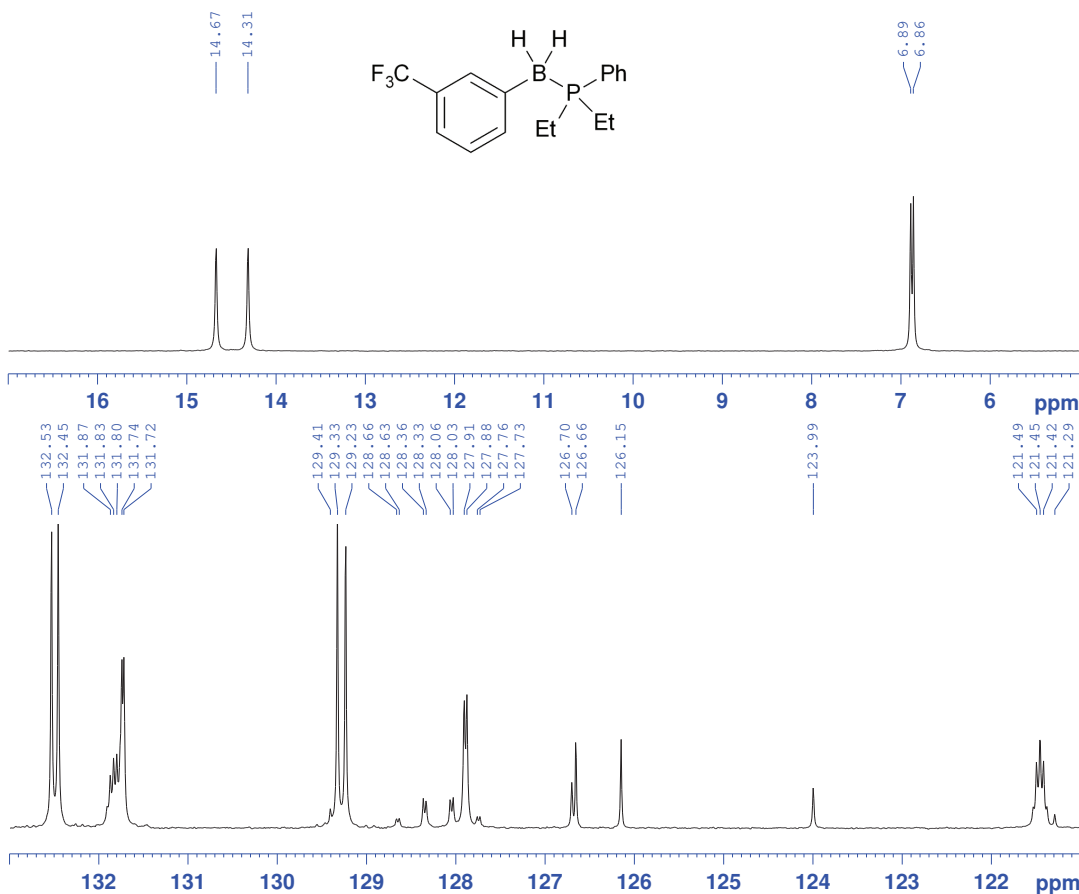
NAME Aug19-2023
 EXPNO 2
 PROCNO 1
 Date_ 20230819
 Time_ 20.58
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 1024
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 298.4 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -3.00 dB
 PL1W 73.17333984 W
 SFO1 100.6228298 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL13 13.80 dB
 PL2W 14.49887389 W
 PL12W 0.40838012 W
 PL13W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127689 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



3CF3PhBH2PPhEt2

IBB-nmr Analysis

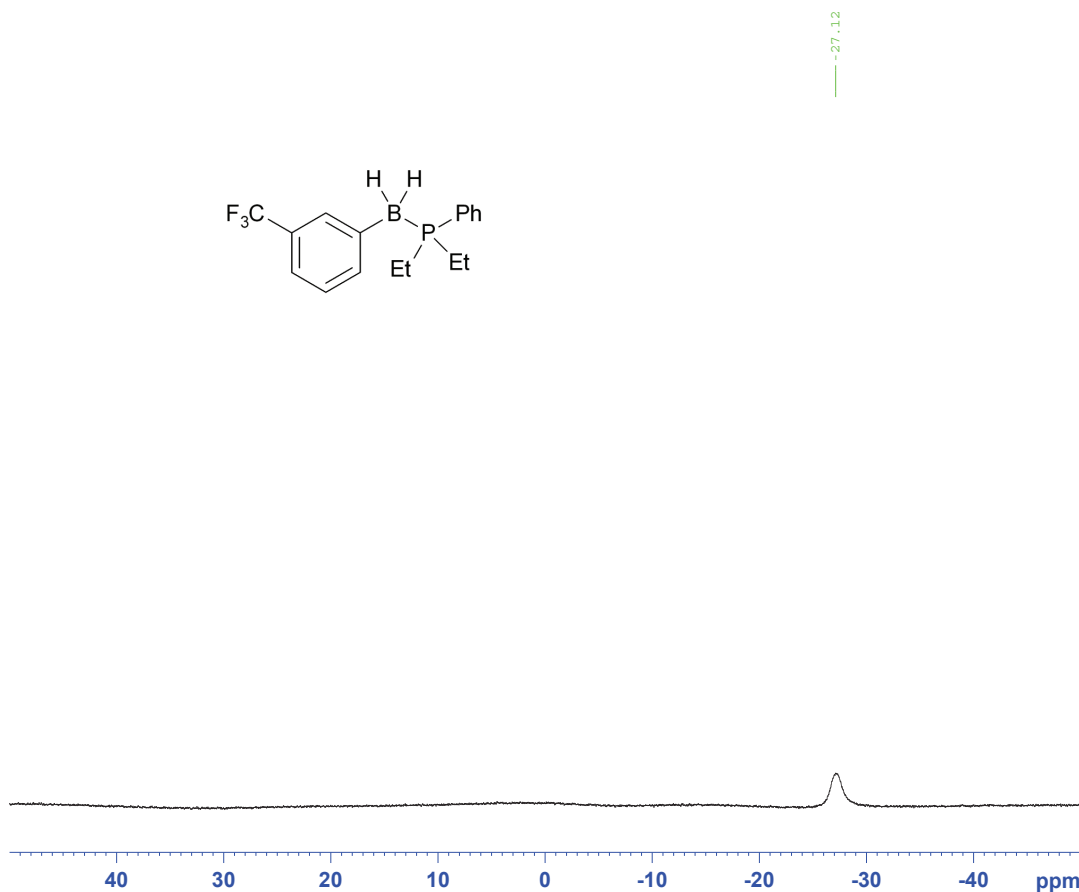


NAME Aug19-2023
 EXPNO 2
 PROCNO 1
 Date_ 20230819
 Time 20.58
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 1024
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 298.4 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -3.00 dB
 PL1W 73.17333984 W
 SFO1 100.6228298 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL13 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 PL13W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127689 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

3CF3PhBH2Et2Ph

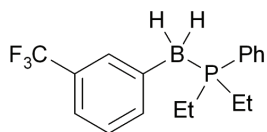
IBB-nmr Analysis



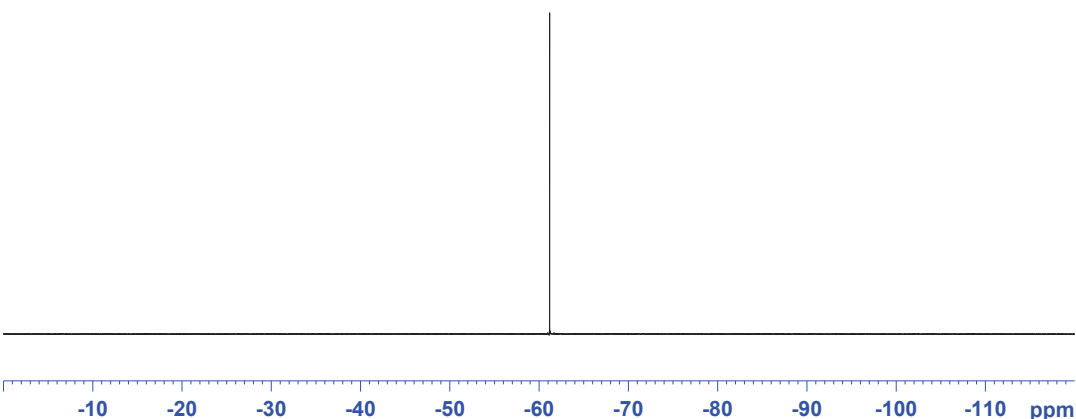
NAME Feb14-2022
 EXPNO 4
 PROCNO 1
 Date_ 20220214
 Time 23.57
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 296.8 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

3CF3PhBH2Et2Ph



-61.18



IBB-nmr Analysis

```

NAME      Feb14-2022
EXPNO     5
PROCNO    1
Date_     20220215
Time      0.01
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.3 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz

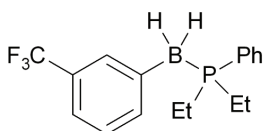
```

```

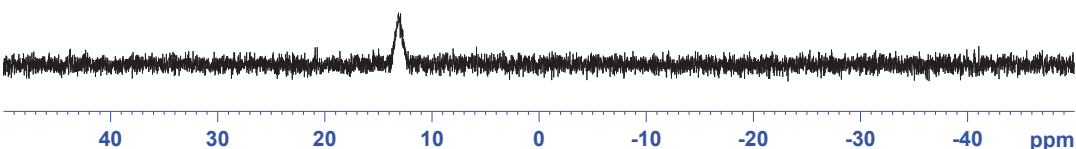
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2       112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W        24.60733604 W
PL12W       0.15526180 W
SFO2        400.1316005 MHz
SI          65536
SF          376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00

```

3CF3PhBH2Et2Ph



13.12



IBB-nmr Analysis

```

NAME      Feb14-2022
EXPNO     3
PROCNO    1
Date_     20220214
Time      23.46
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.1 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40

```

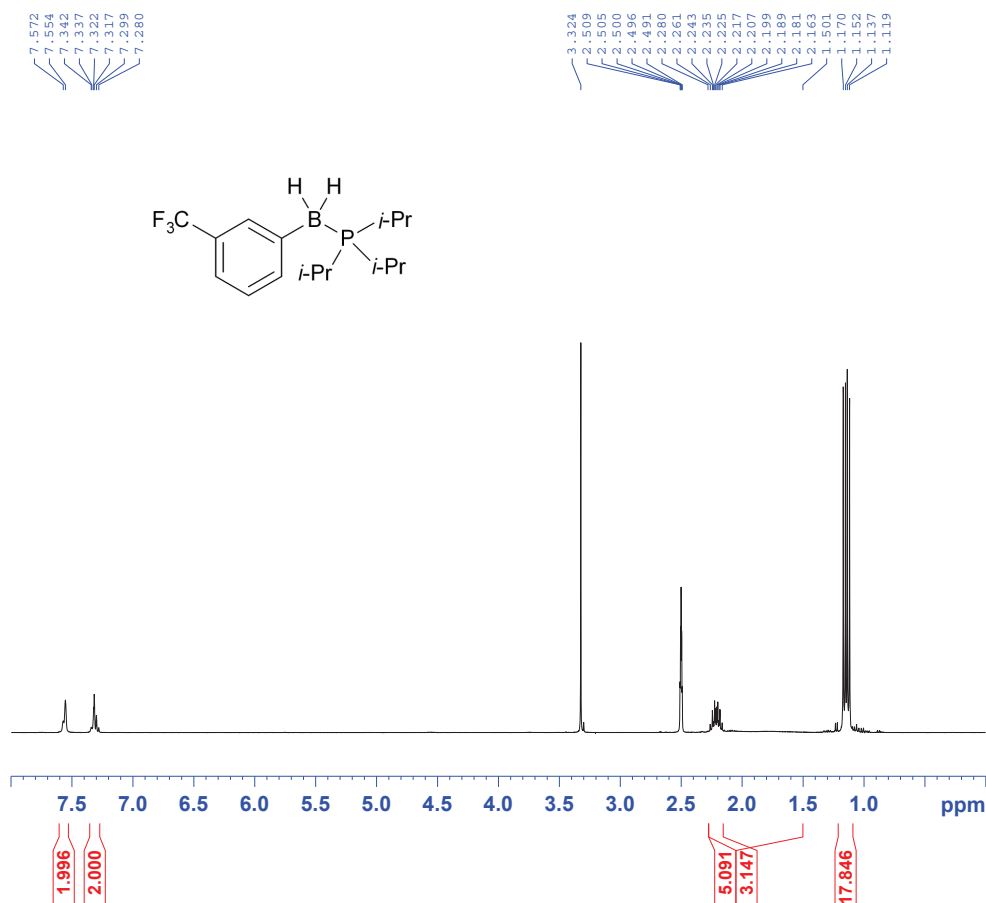
3CF₃PhBH₂P(*i*-Pr)₃

B-3-(Trifluoromethyl)phenyl triisopropylphosphine-borane (20)

IBB-nmr Analysis

NAME Apr29-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220429
 Time_ 18.21
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.8 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300028 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

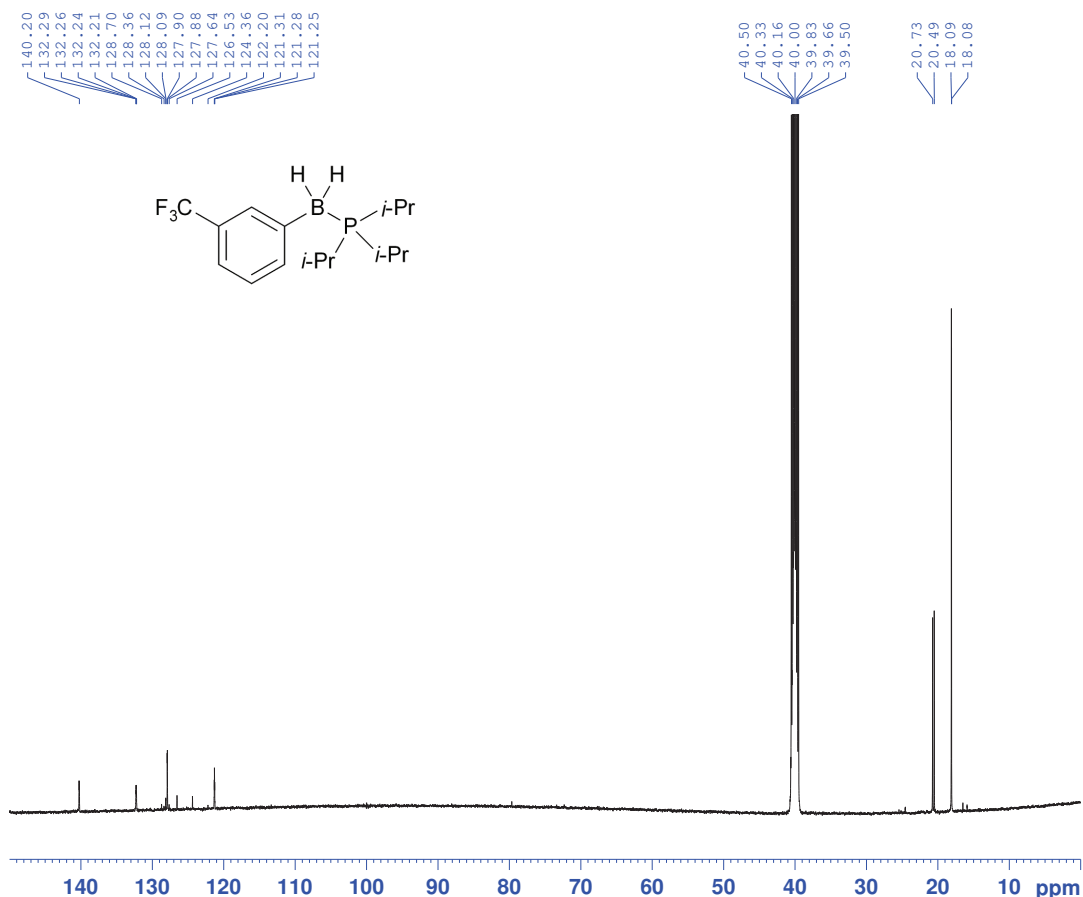
3CF₃PhBH₂P(*i*-Pr)₃

IBB-nmr Analysis

NAME Apr29-2022
 EXPNO 8
 PROCNO 1
 Date_ 20220429
 Time_ 19.54
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

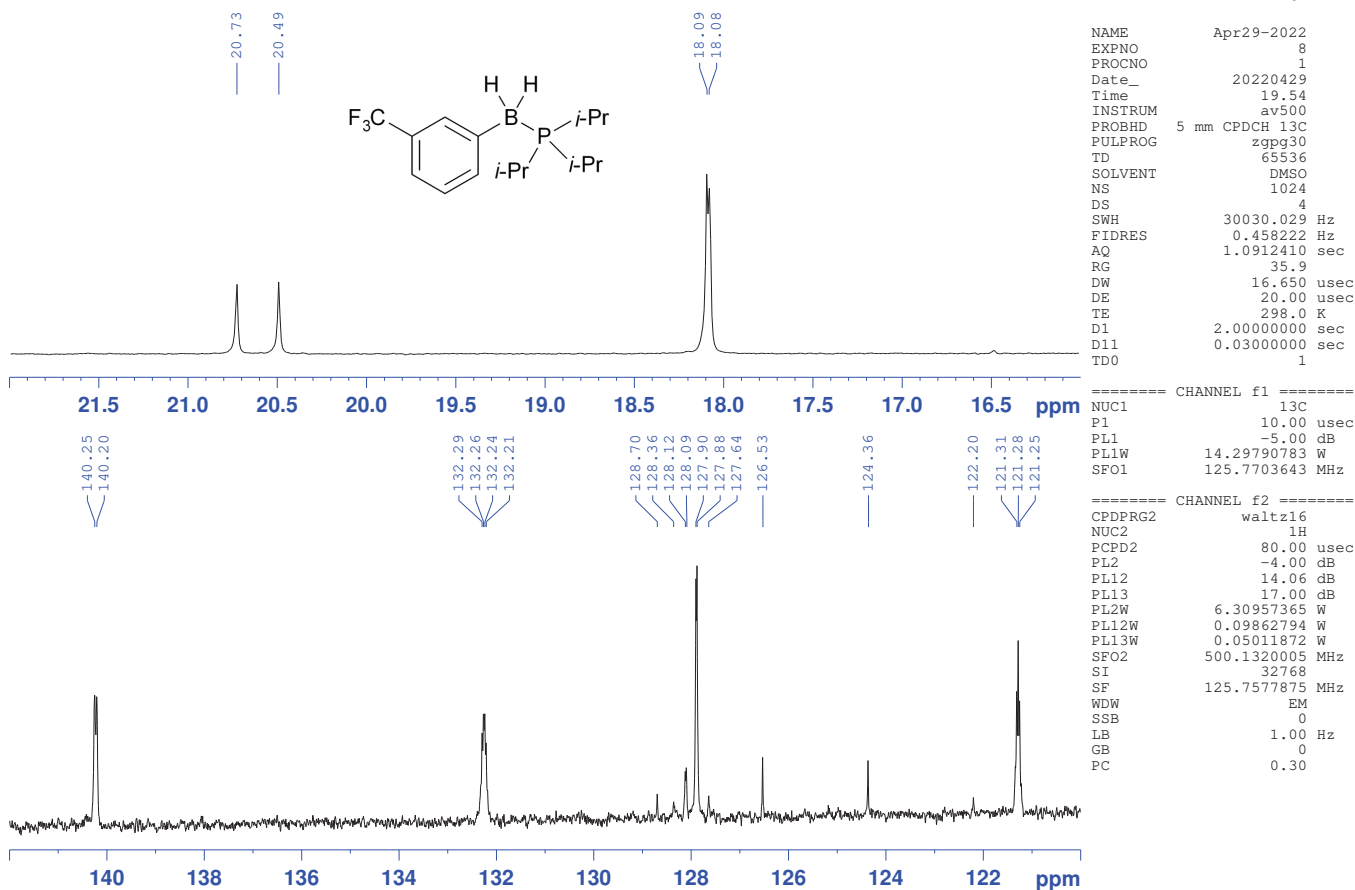
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577875 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



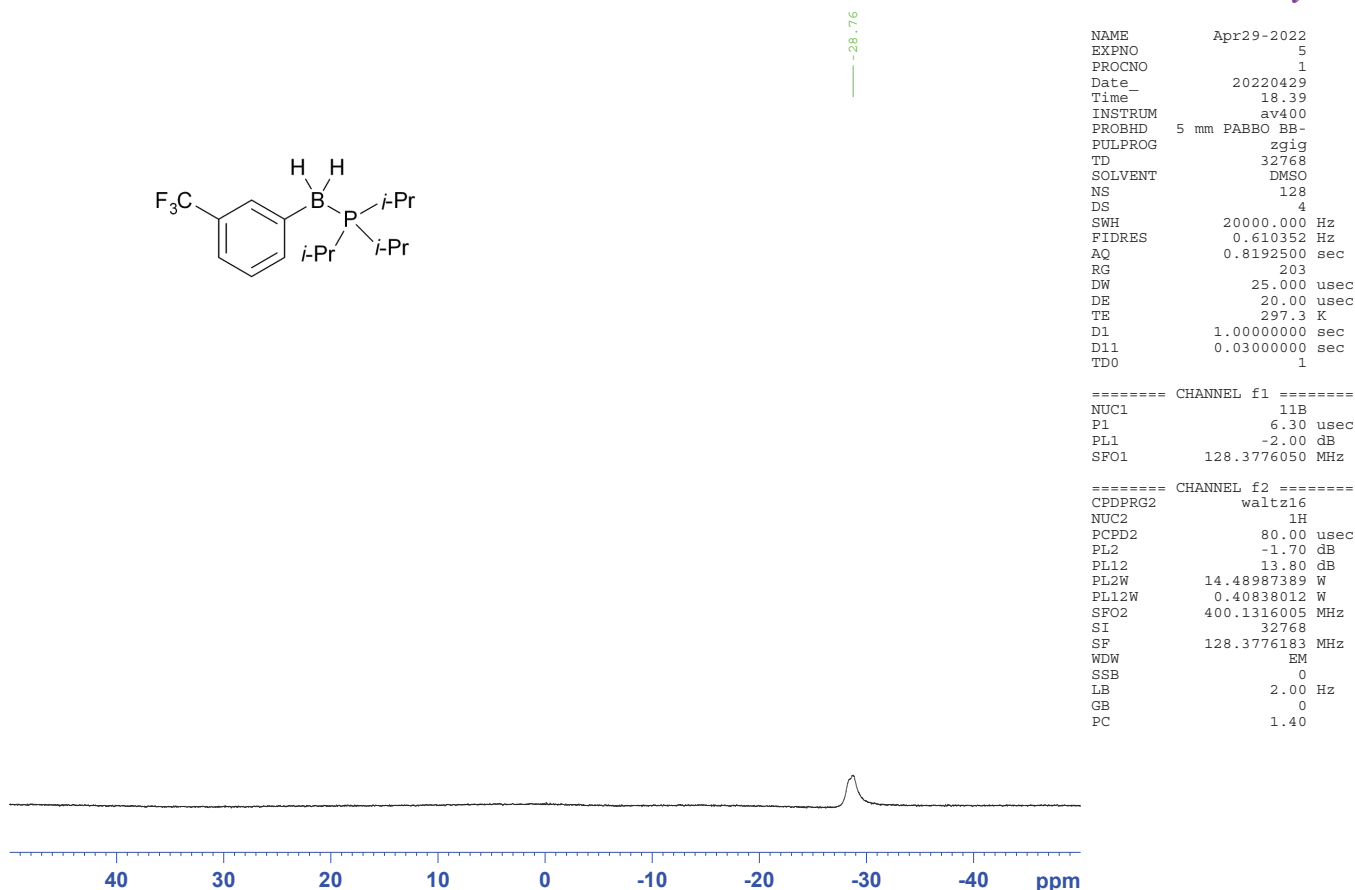
3CF3PhBH2P(i-Pr)3

IBB-nmr Analysis

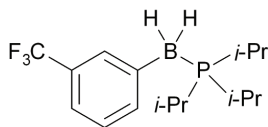


3CF3PhBH2P(i-Pr)3

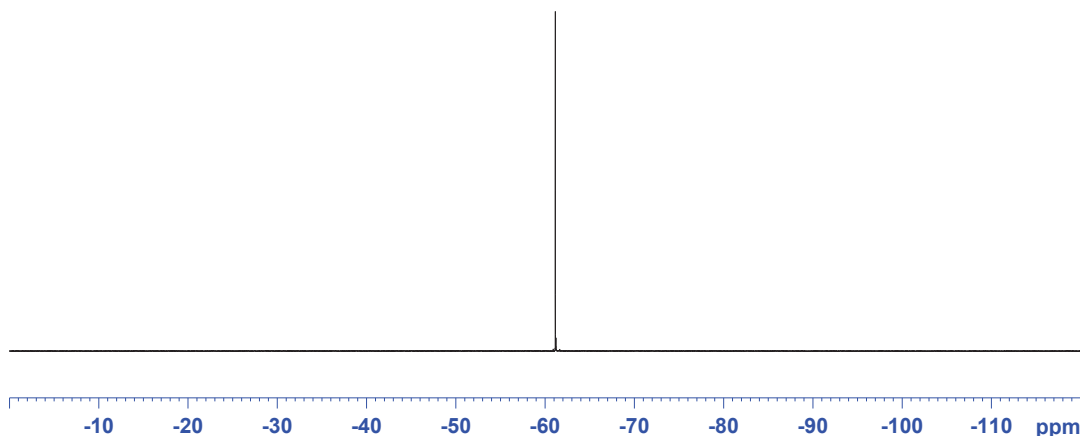
IBB-nmr Analysis



3CF3PhBH2P(*i*-Pr)₃



-61.15



IBB-nmr Analysis

```

NAME      Apr29-2022
EXPNO     4
PROCNO    1
Date_     20220429
Time      18.32
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.7 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

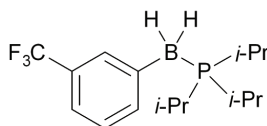
```

===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
  
```

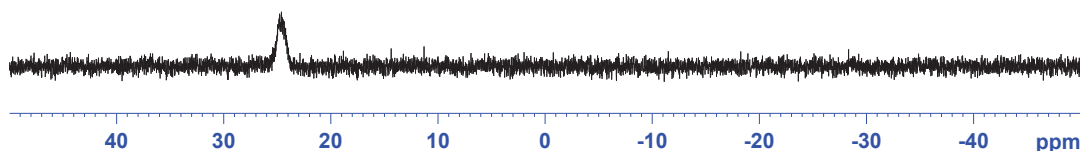
```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2        -4.00 dB
PL12       18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF         376.4984617 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB          0
PC          1.00
  
```

3CF3PhBH2P(*i*-Pr)₃



24.50



IBB-nmr Analysis

```

NAME      Apr29-2022
EXPNO     3
PROCNO    1
Date_     20220429
Time      18.28
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.8 K
D1         2.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB          0
PC          1.40
  
```

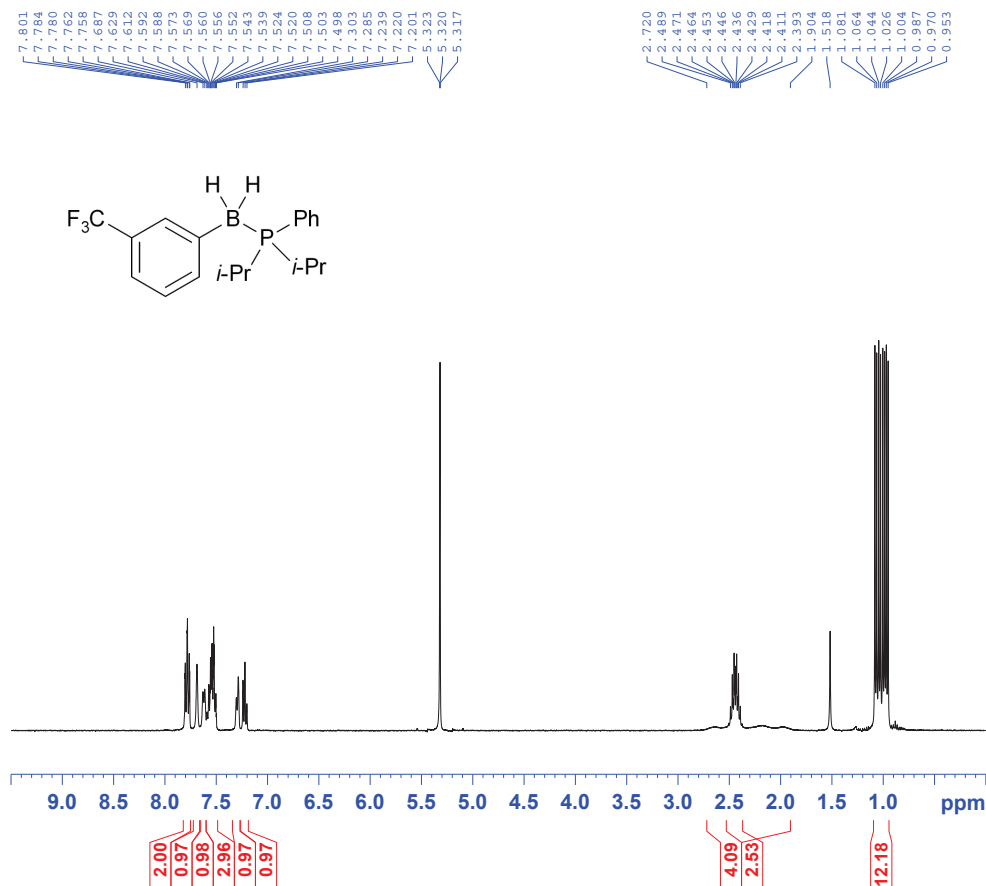
B-3-(Trifluoromethyl)phenyl diisopropyl(phenyl)phosphine-borane (21)

3CF3PhBH2PPh (i-Pr) 2

IBB-nmr Analysis

NAME Jun12-2022
EXPNO 8
PROCNO 1
Date_ 20220613
Time_ 0.40
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CD2Cl2
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 203
DW 60.800 usec
DE 6.50 usec
TE 296.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 -1.80 dB
PL1W 14.82738590 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300154 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



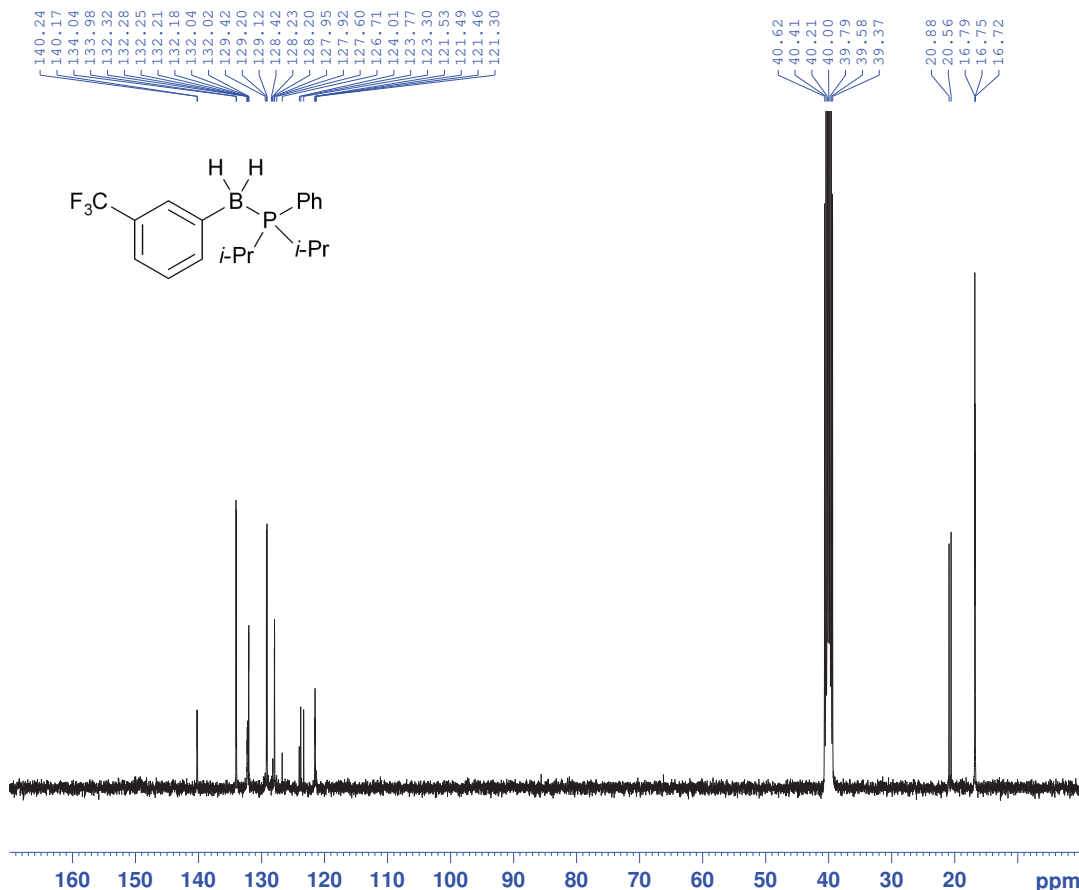
3CF3PhBH2PPh (i-Pr) 2

IBB-nmr Analysis

NAME Aug21-2023
EXPNO 2
PROCNO 1
Date_ 20230821
Time_ 7.55
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 2048
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 128
DW 20.800 usec
DE 6.50 usec
TE 298.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

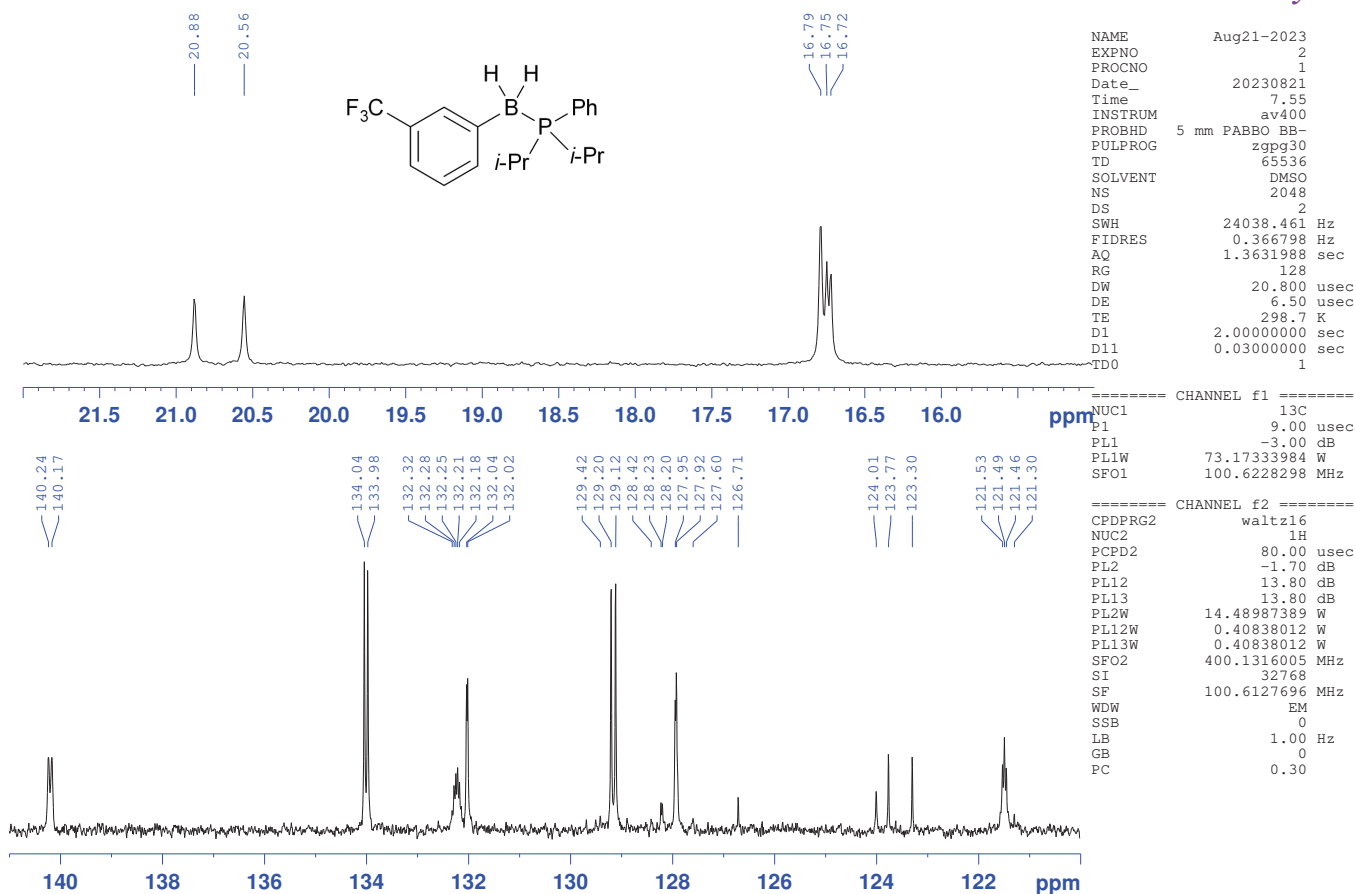
===== CHANNEL f1 =====
NUC1 13C
P1 9.00 usec
PL1 -3.00 dB
PL1W 73.17333984 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL13 13.80 dB
PL2W 14.49887389 W
PL12W 0.40838012 W
PL13W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127696 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30



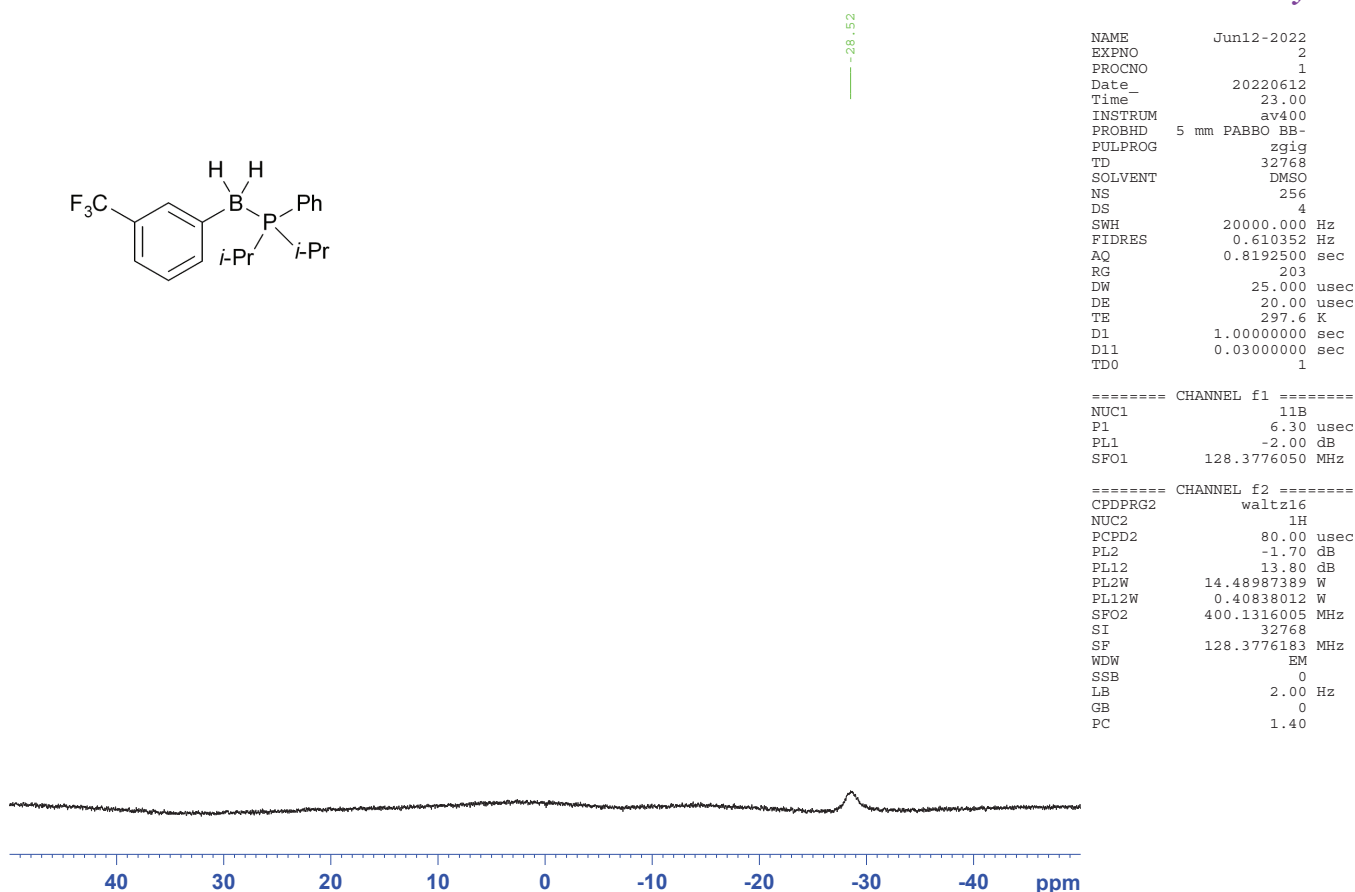
3CF3PhBH2PPh (i-Pr) 2

IBB-nmr Analysis

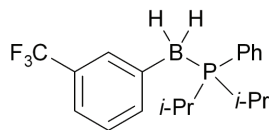


3CF3PhBH2PPh (i-Pr) 2

IBB-nmr Analysis



3CF3PhBH2PPh(i-Pr)2



-61.20

IBB-nmr Analysis

```

NAME      Jun12-2022
EXPNO      3
PROCNO      1
Date_      20220612
Time       23.04
INSTRUM     av400
PROBHD      5 mm PABBO BB-
PULPROG     zgfhigqn
TD          131072
SOLVENT      DMSO
NS           8
DS           4
SWH          89285.711 Hz
FIDRES       0.681196 Hz
AQ           0.7340532 sec
RG           203
DW           5.600 usec
DE           6.50 usec
TE           297.1 K
D1           1.00000000 sec
D11          0.03000000 sec
D12          0.0002000 sec
TD0          1

```

```

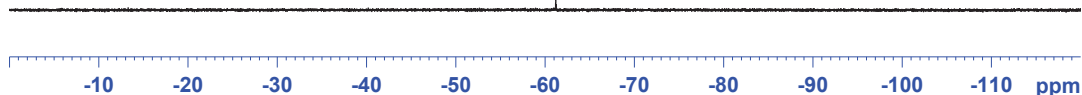
===== CHANNEL f1 =====
NUC1        19F
P1           19.50 usec
PL1          -4.00 dB
PL1W         16.40489006 W
SFO1         376.4607164 MHz

```

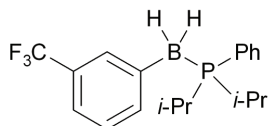
```

===== CHANNEL f2 =====
CPDPRG2     waltz16
NUC2         1H
PCPD2        112.00 usec
PL2          -4.00 dB
PL12         18.00 dB
PL2W         24.60733604 W
PL12W        0.15526180 W
SFO2         400.1316005 MHz
SI           65536
SF           376.4984617 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00

```



3CF3PhBH2PPh(i-Pr)2



22.07

IBB-nmr Analysis

```

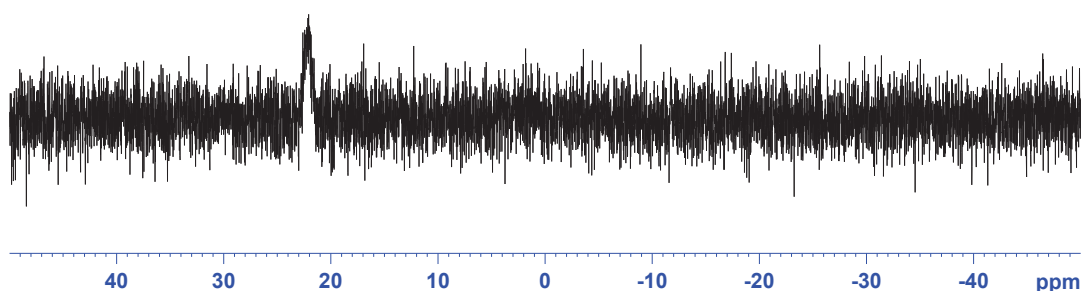
NAME      Jun12-2022
EXPNO      7
PROCNO      1
Date_      20220613
Time       0.33
INSTRUM     av400
PROBHD      5 mm PABBO BB-
PULPROG     zg30
TD          65536
SOLVENT      DMSO
NS           128
DS           4
SWH          64102.563 Hz
FIDRES       0.978127 Hz
AQ           0.5112308 sec
RG           203
DW           7.800 usec
DE           6.50 usec
TE           297.0 K
D1           2.00000000 sec
TD0          1

```

```

===== CHANNEL f1 =====
NUC1        31P
P1           10.00 usec
PL1          -0.70 dB
PL1W         30.10233498 W
SFO1         161.9674942 MHz
SI           32768
SF           161.9754962 MHz
WDW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40

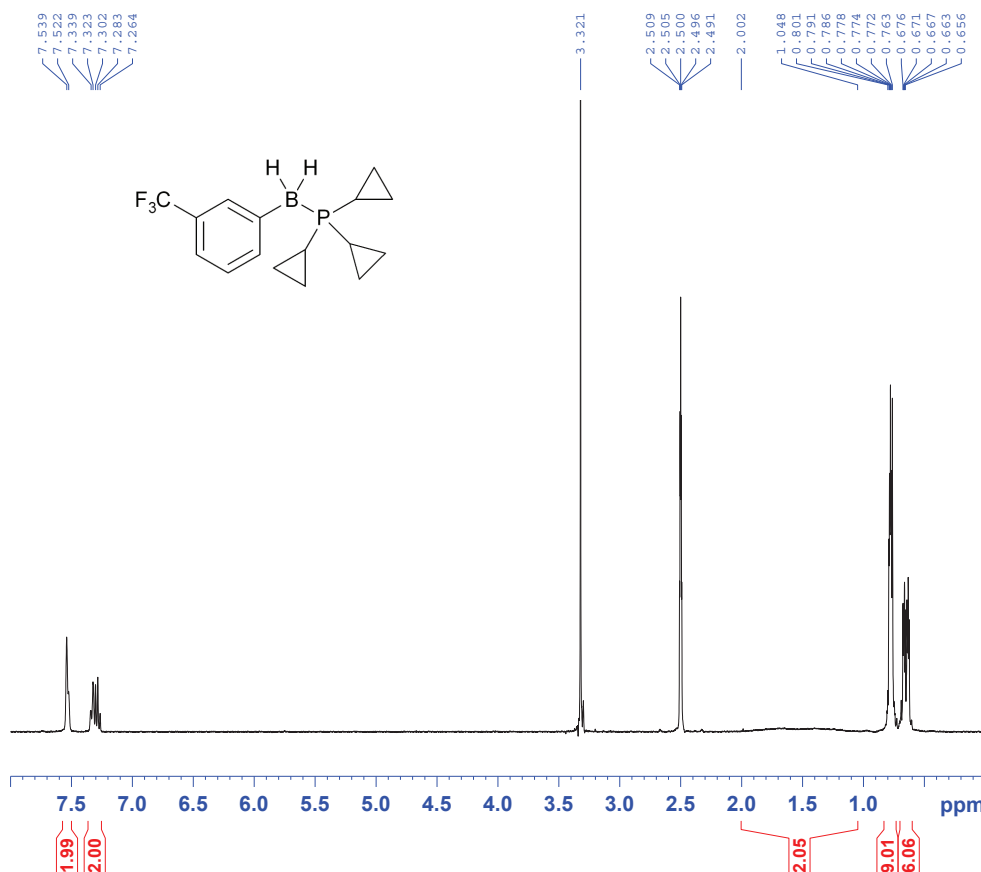
```



B-3-(Trifluoromethyl)phenyl tricyclopropylphosphine-borane (22)

3CF3PhBH2P(cyclopropyl)3

IBB-nmr Analysis

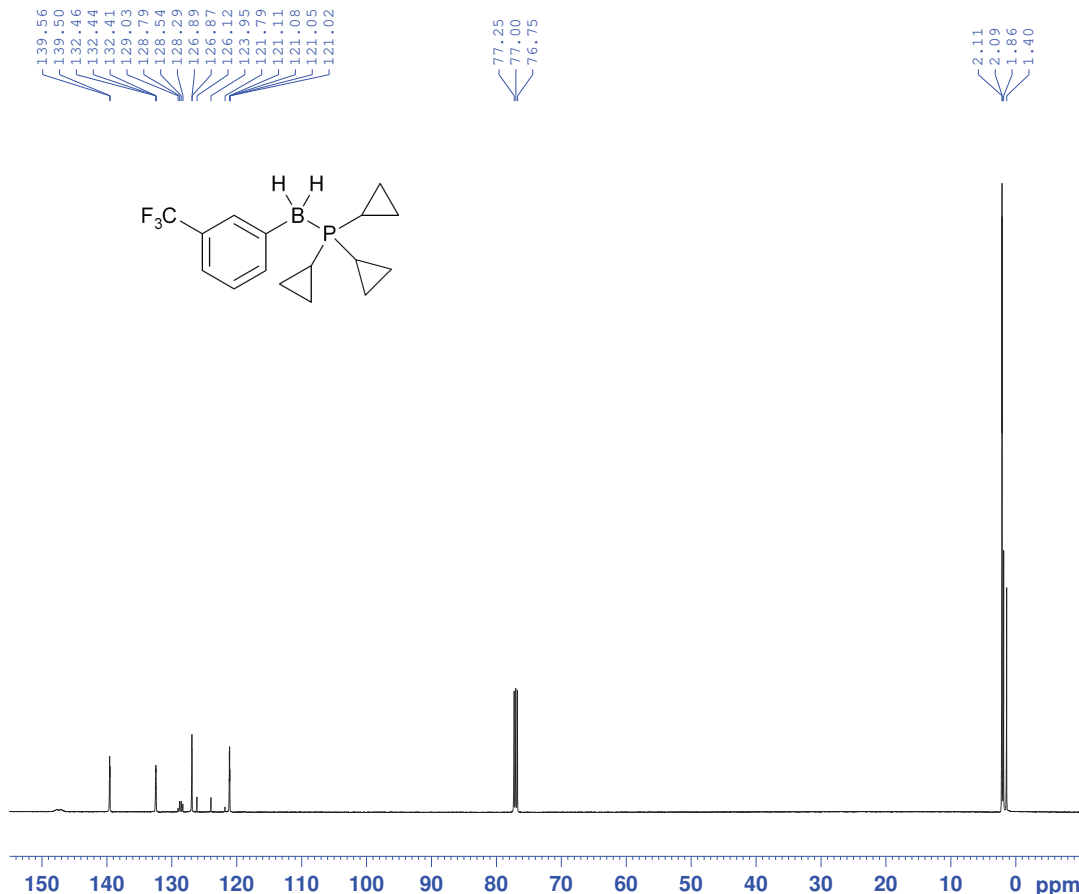


NAME July11-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220711
 Time 21.22
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 4
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.4 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

3CF3PhBH2P(cyclopropyl)3

IBB-nmr Analysis



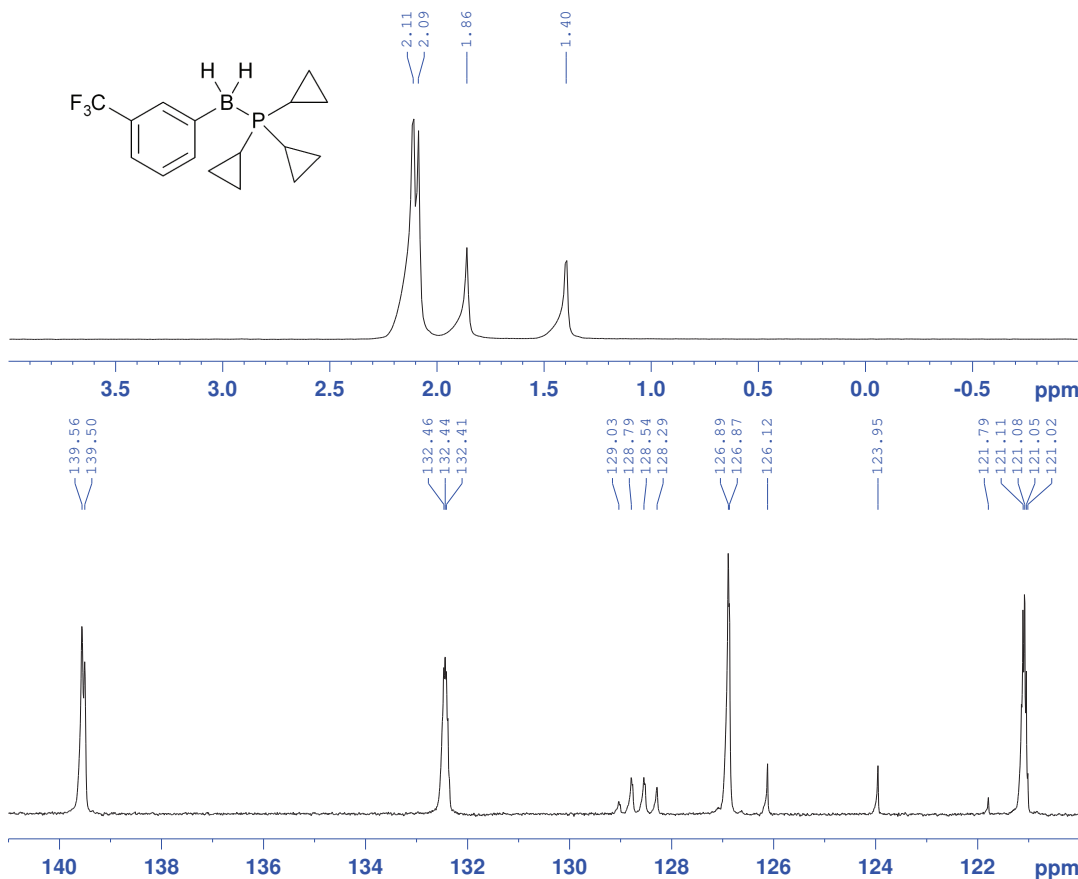
NAME Mar11-2024
 EXPNO 3
 PROCNO 1
 Date_ 20240311
 Time 15.20
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 40.3
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577974 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

3CF3PhBH2P (cyclopropyl) 3

IBB-nmr Analysis



```

NAME      Mar11-2024
EXPNO     3
PROCNO    1
Date_     20240311
Time      15.20
INSTRUM   av500
PROBHD    5 mm CPDCH 13C
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         64
DS         4
SWH        30030.029 Hz
FIDRES     0.458222 Hz
AQ         1.0912410 sec
RG         40.3
DW         16.650 usec
DE         20.00 usec
TE         298.1 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

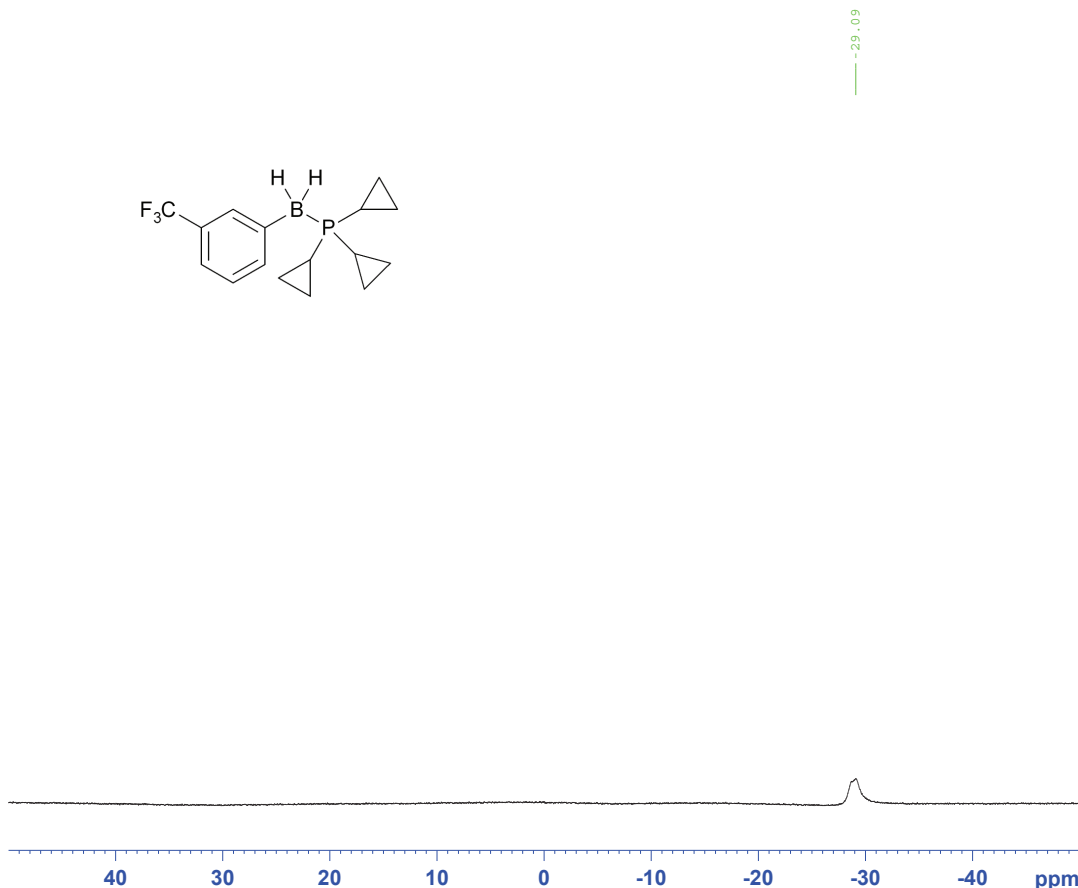
```

===== CHANNEL f1 =====
NUC1      13C
P1        10.00 usec
PL1       -5.00 dB
PL1W      14.29790783 W
SFO1      125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -4.00 dB
PL12      14.06 dB
PL13      17.00 dB
PL2W      6.30957365 W
PL12W     0.09862794 W
PL13W     0.05011872 W
SFO2      500.1320005 MHz
SI        32768
SF        125.7577974 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         0.30
  
```

3CF3PhBH2P (cyclopropyl) 3

IBB-nmr Analysis



```

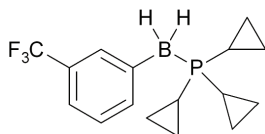
NAME      July11-2022
EXPNO     5
PROCNO    1
Date_     20220711
Time      23.00
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgig
TD         32768
SOLVENT   DMSO
NS         128
DS         4
SWH        20000.000 Hz
FIDRES     0.610352 Hz
AQ         0.8192500 sec
RG         203
DW         25.000 usec
DE         20.00 usec
TE         297.8 K
D1         1.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

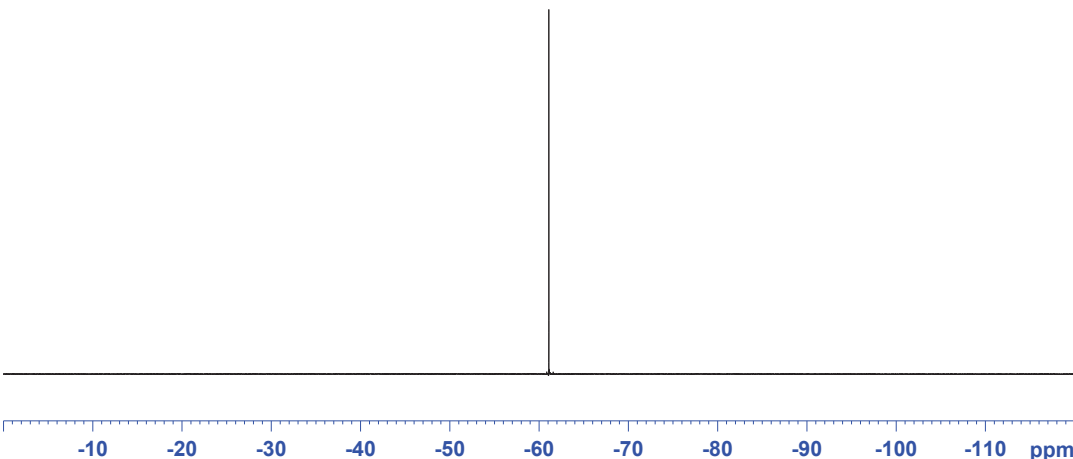
===== CHANNEL f1 =====
NUC1      11B
P1        6.30 usec
PL1       -2.00 dB
SFO1      128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.70 dB
PL12      13.80 dB
PL13      14.48987389 W
PL12W     0.40838012 W
SFO2      400.1316005 MHz
SI        32768
SF        128.3776183 MHz
WDW        EM
SSB        0
LB         2.00 Hz
GB         0
PC         1.40
  
```

3CF3PhBH2P(cyclopropyl)3



-61.09



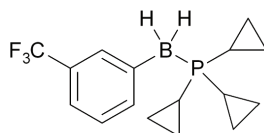
IBB-nmr Analysis

```
NAME      July11-2022
EXPNO     2
PROCNO    1
Date_     20220711
Time      21.26
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.5 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

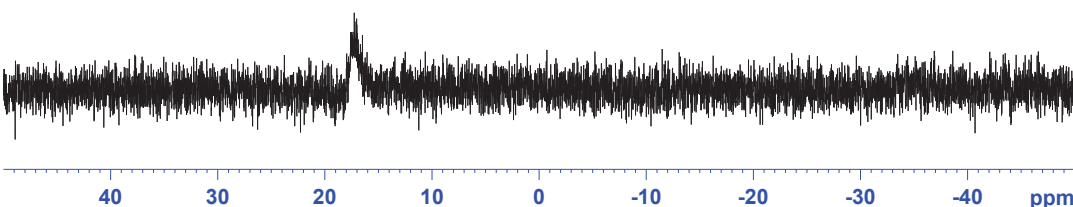
```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```

3CF3PhBH2P(cyclopropyl)3



17.25



IBB-nmr Analysis

```
NAME      July11-2022
EXPNO     4
PROCNO    1
Date_     20220711
Time      22.52
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         16
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         297.3 K
D1         2.00000000 sec
D11        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI          32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```

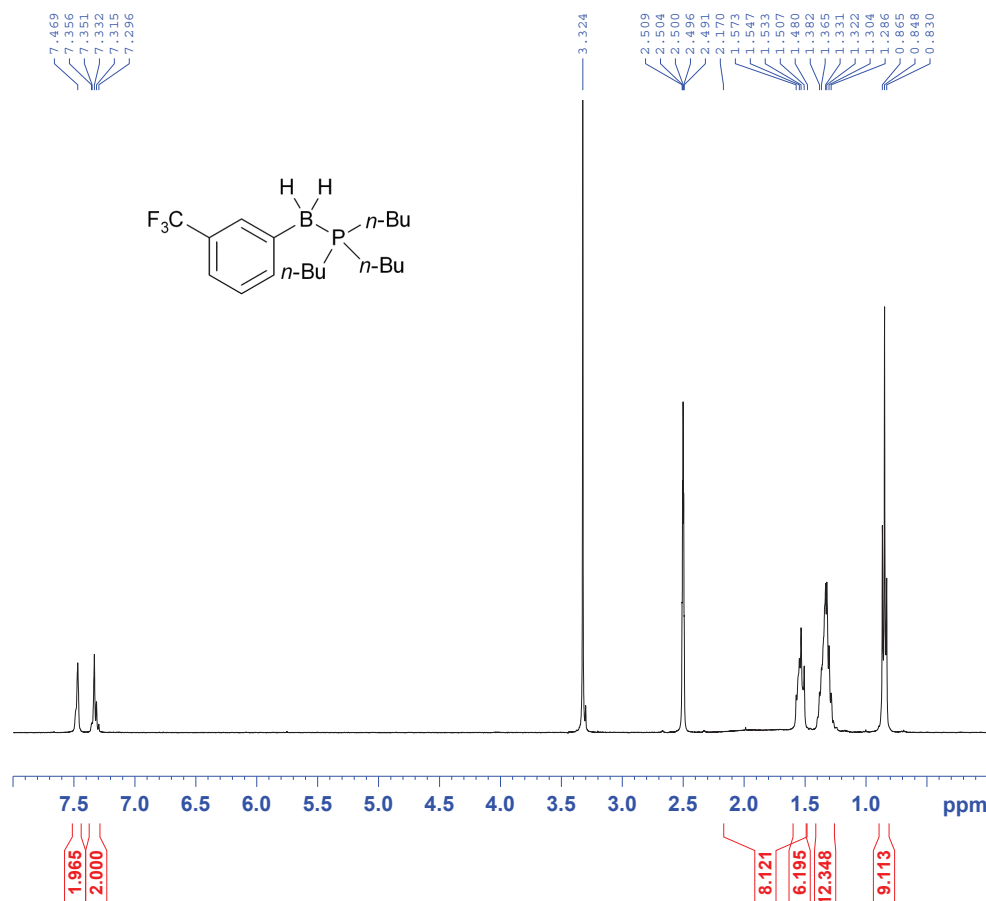
3CF₃PhBH₂P(n-Bu)₃

B-3-(Trifluoromethyl)phenyl tri-n-butylphosphine-borane (23)

IBB-nmr Analysis

NAME May23-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220523
 Time_ 21.48
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.9 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

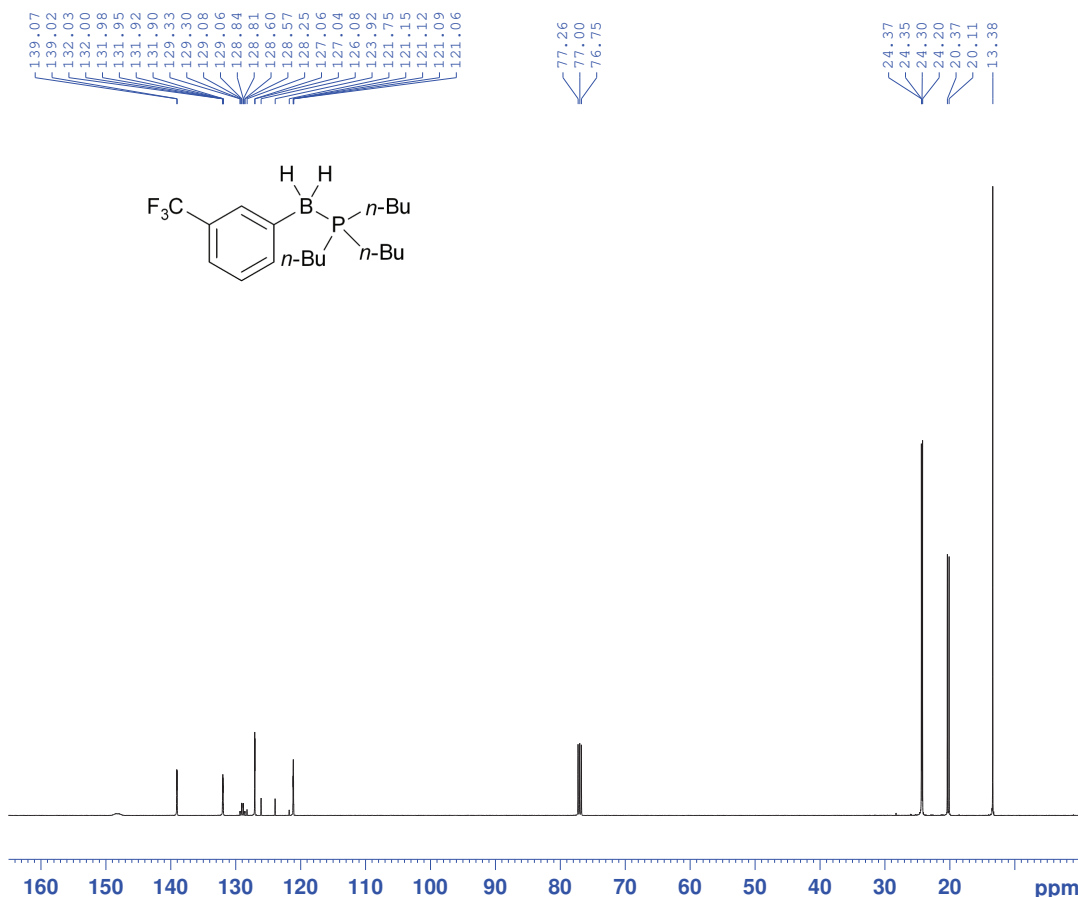
3CF₃PhBH₂P(n-Bu)₃

IBB-nmr Analysis

NAME Mar08-2024
 EXPNO 10
 PROCNO 1
 Date_ 20240308
 Time_ 5.46
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl₃
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

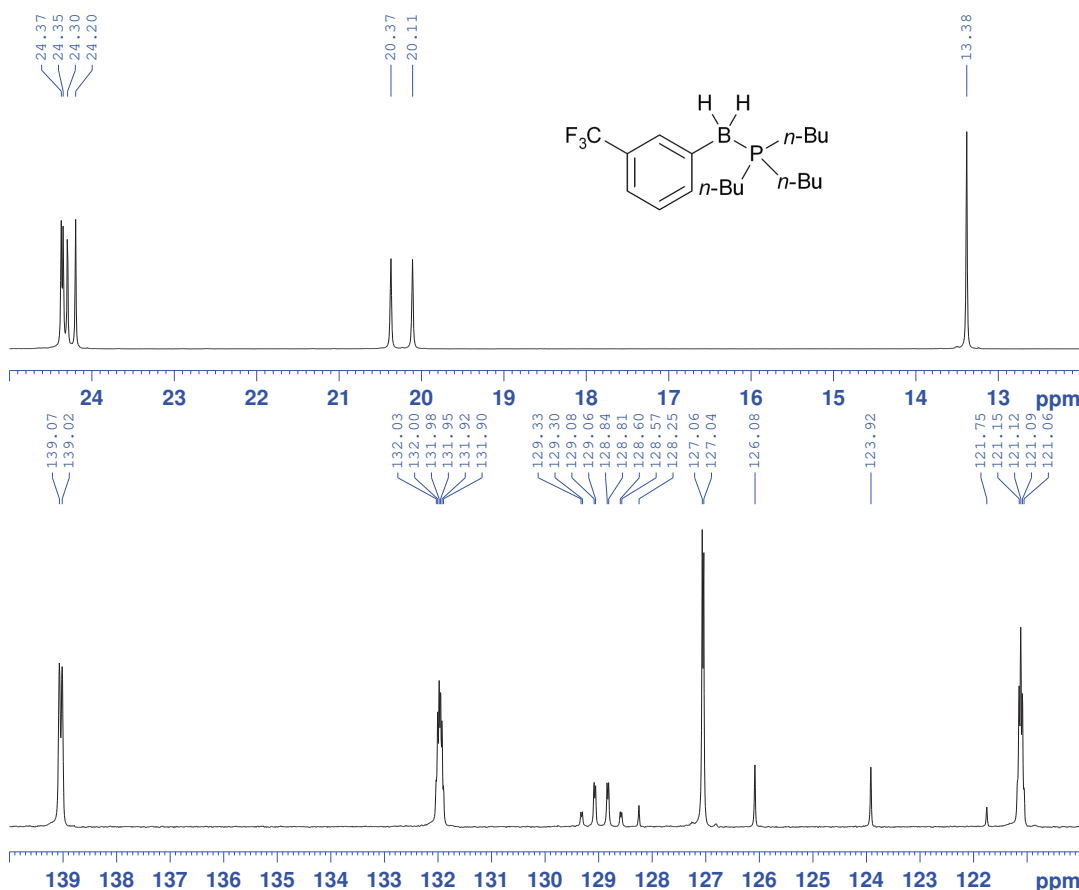
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7578001 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



3CF3PhBH2P (n-Bu) 3

IBB-nmr Analysis



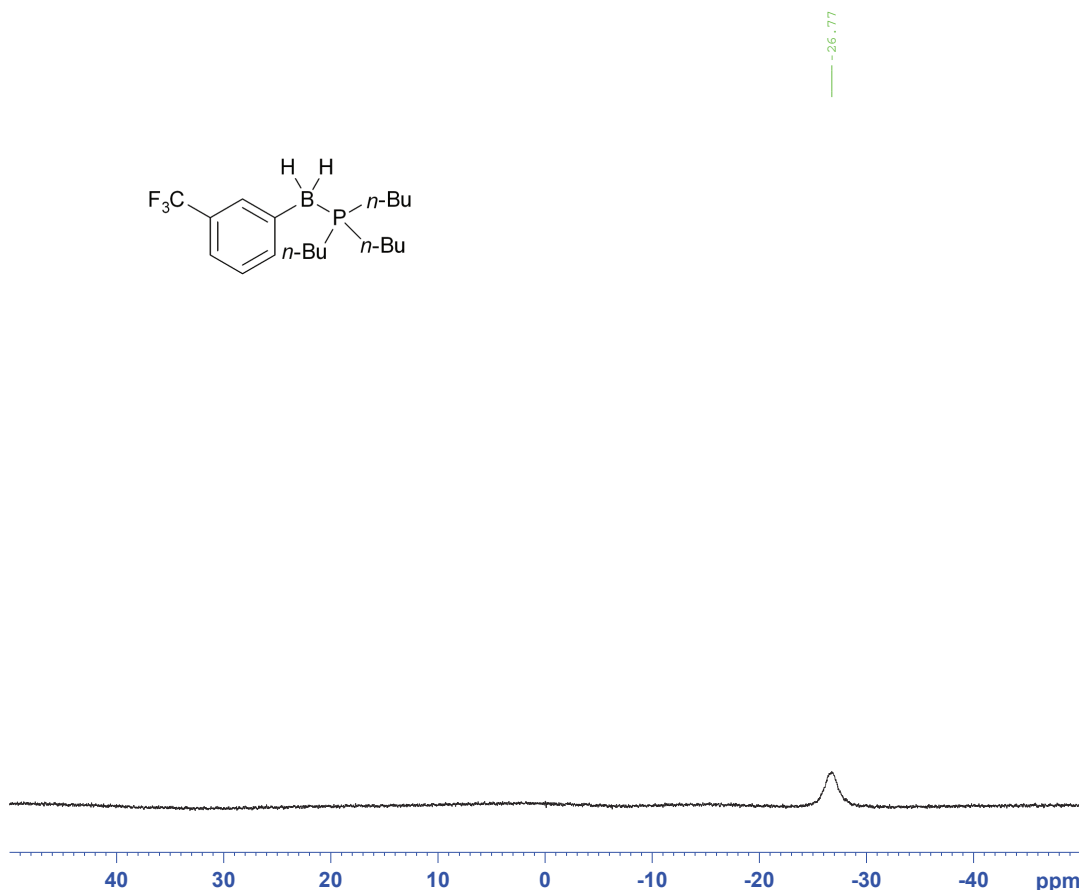
NAME Mar08-2024
 EXPNO 10
 PROCNO 1
 Date_ 20240308
 Time 5.46
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7578001 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

3CF3PhBH2P (n-Bu) 3

IBB-nmr Analysis

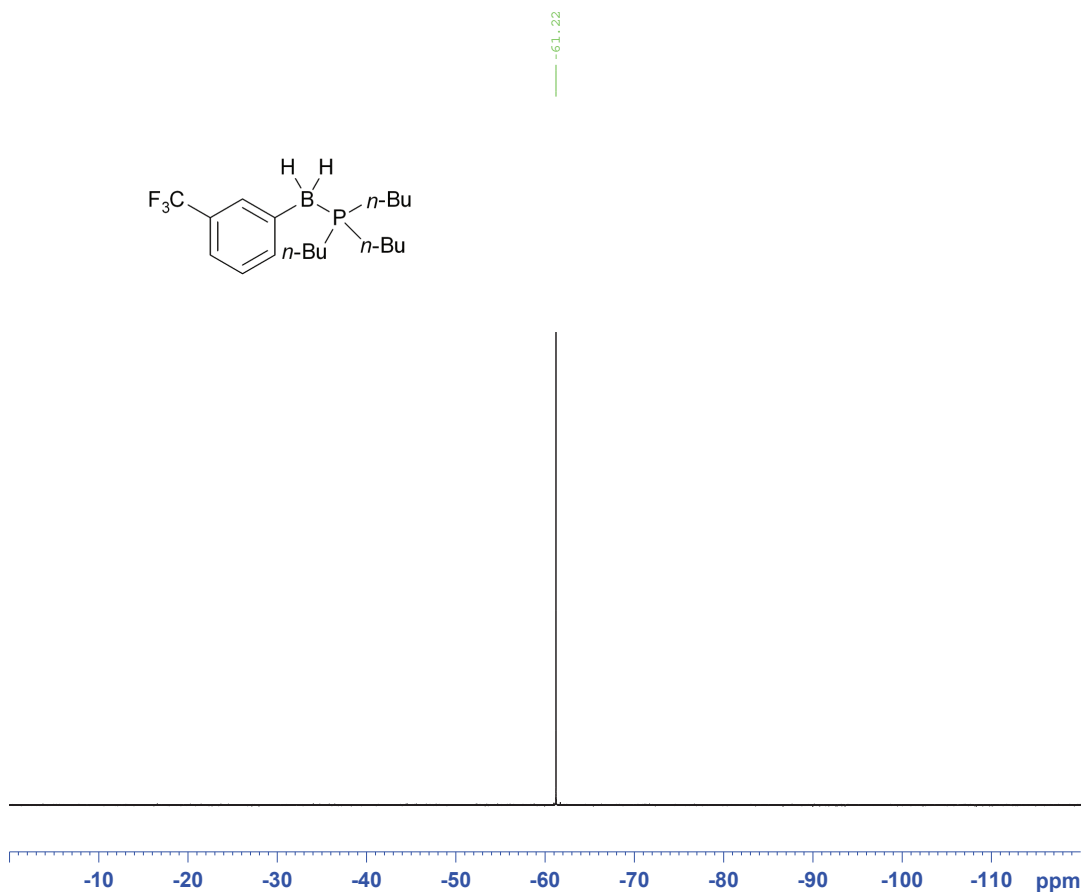
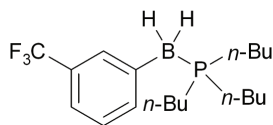


NAME May23-2022
 EXPNO 5
 PROCNO 1
 Date_ 20220523
 Time 22.33
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.6 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

3CF3PhBH2P (n-Bu) 3



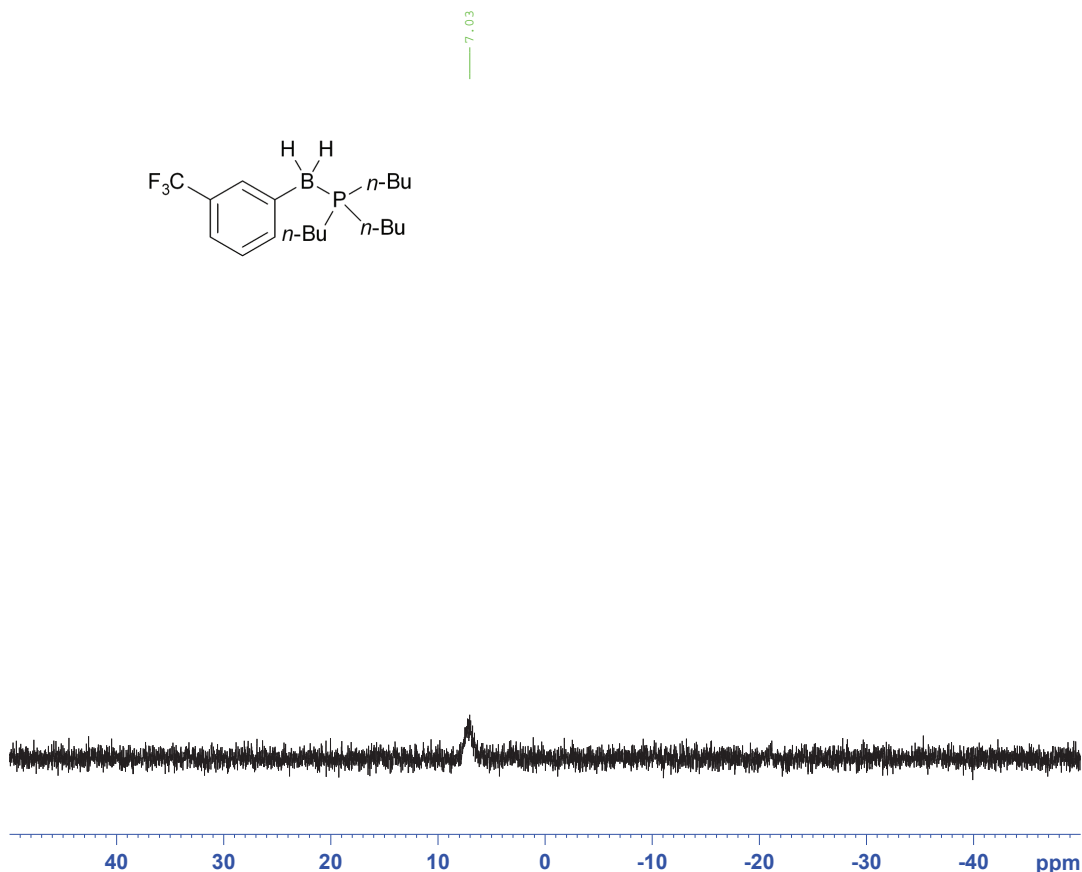
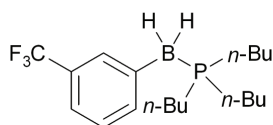
IBB-nmr Analysis

```
NAME      May23-2022
EXPNO     2
PROCNO    1
Date_     20220523
Time      21.52
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.0 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2       -4.00 dB
PL12      18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF         376.4984617 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
```

3CF3PhBH2P (n-Bu) 3



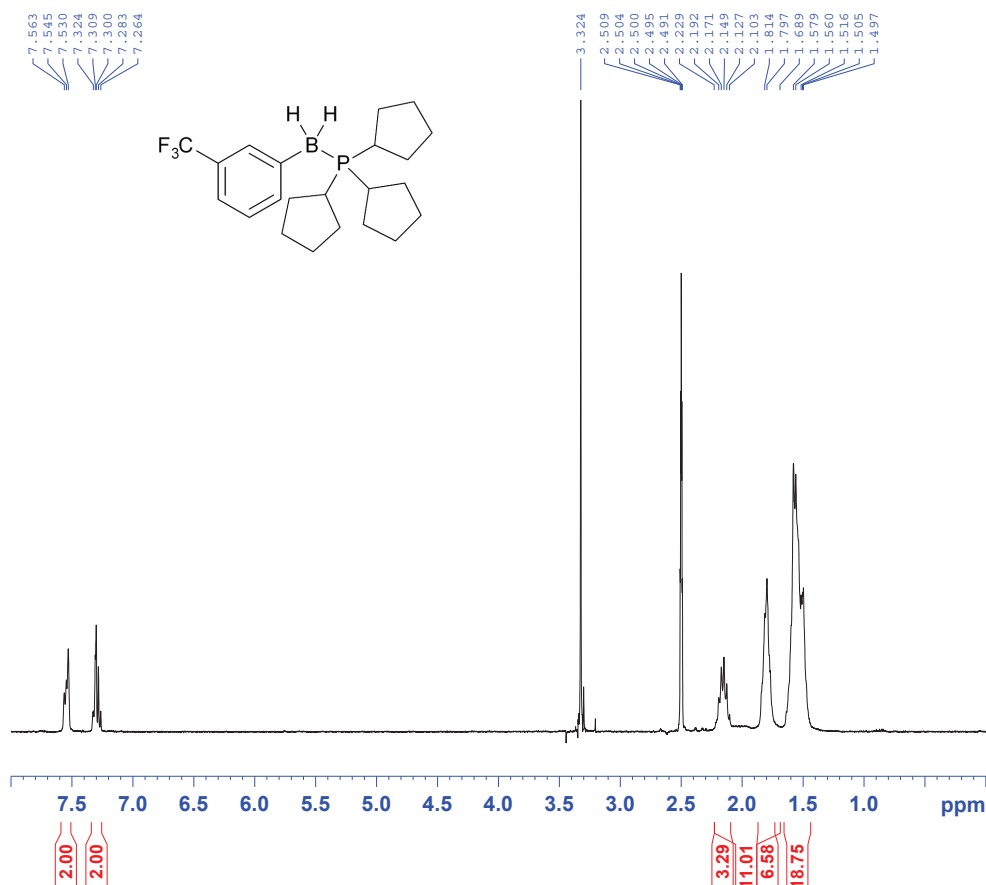
IBB-nmr Analysis

```
NAME      May23-2022
EXPNO     4
PROCNO    1
Date_     20220523
Time      22.26
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         16
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.9 K
D1         2.00000000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
```

B-3-(Trifluoromethyl)phenyl tricyclopentylphosphine-borane (24)

3CF3PhBH2PPh (cyclopentyl) 3

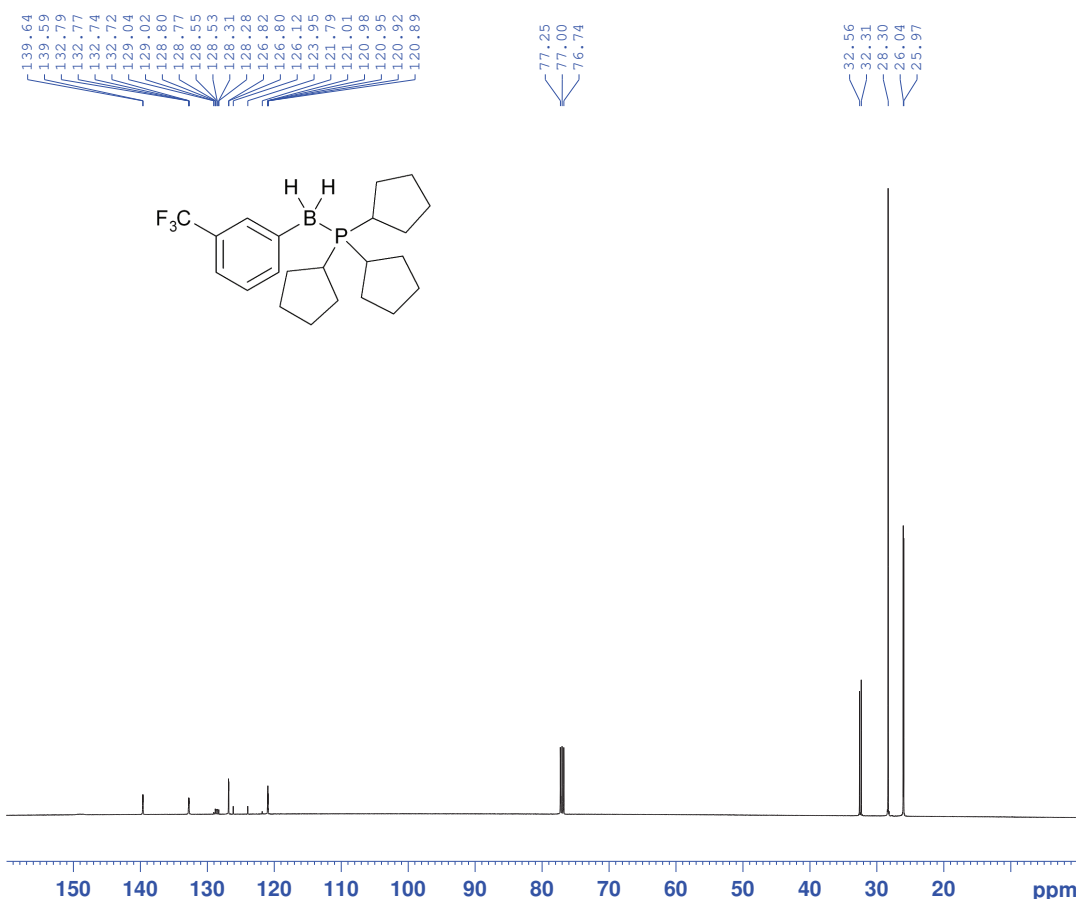


IBB-nmr Analysis

NAME Apr23-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220423
 Time 12.06
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 4
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.7 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

3CF3PhBH2P (cyclopentyl) 3



IBB-nmr Analysis

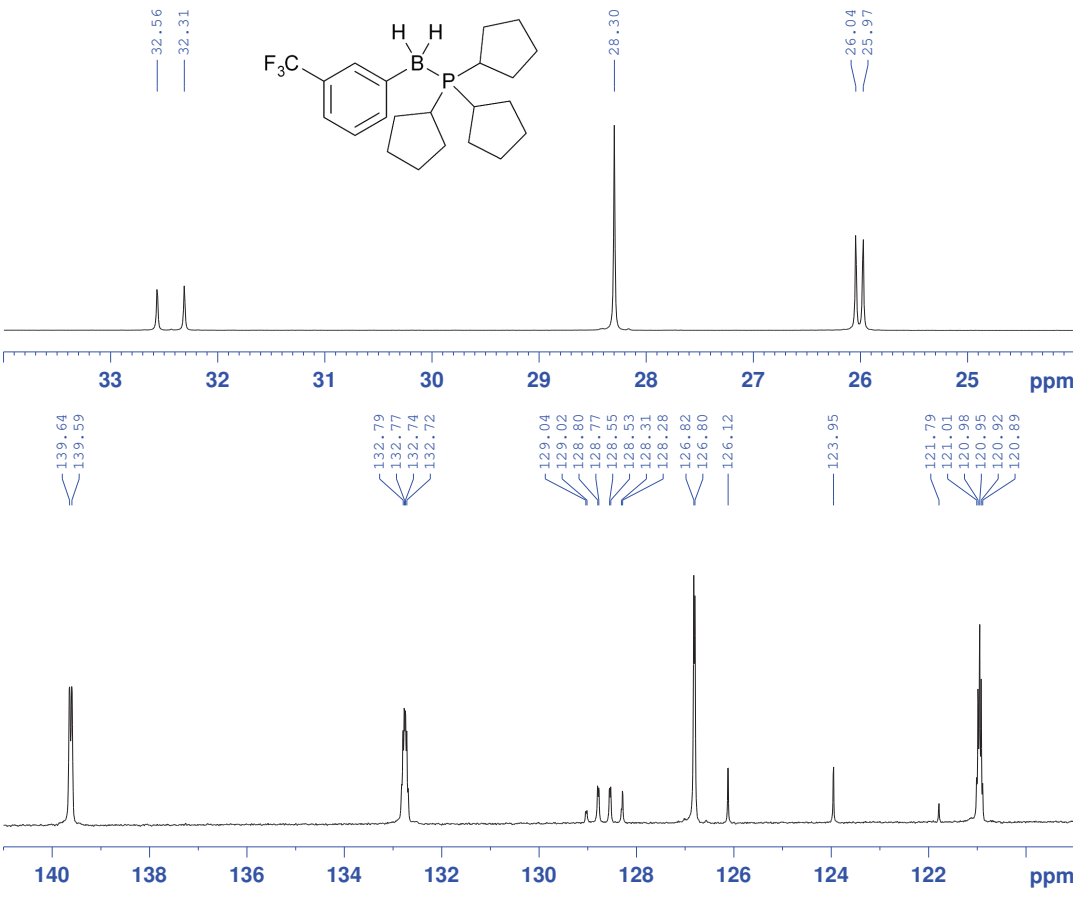
NAME Mar08-2024
 EXPNO 2
 PROCNO 1
 Date_ 20240308
 Time 0.47
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577985 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

3CF3PhBH2P(cyclopentyl)3

IBB-nmr Analysis



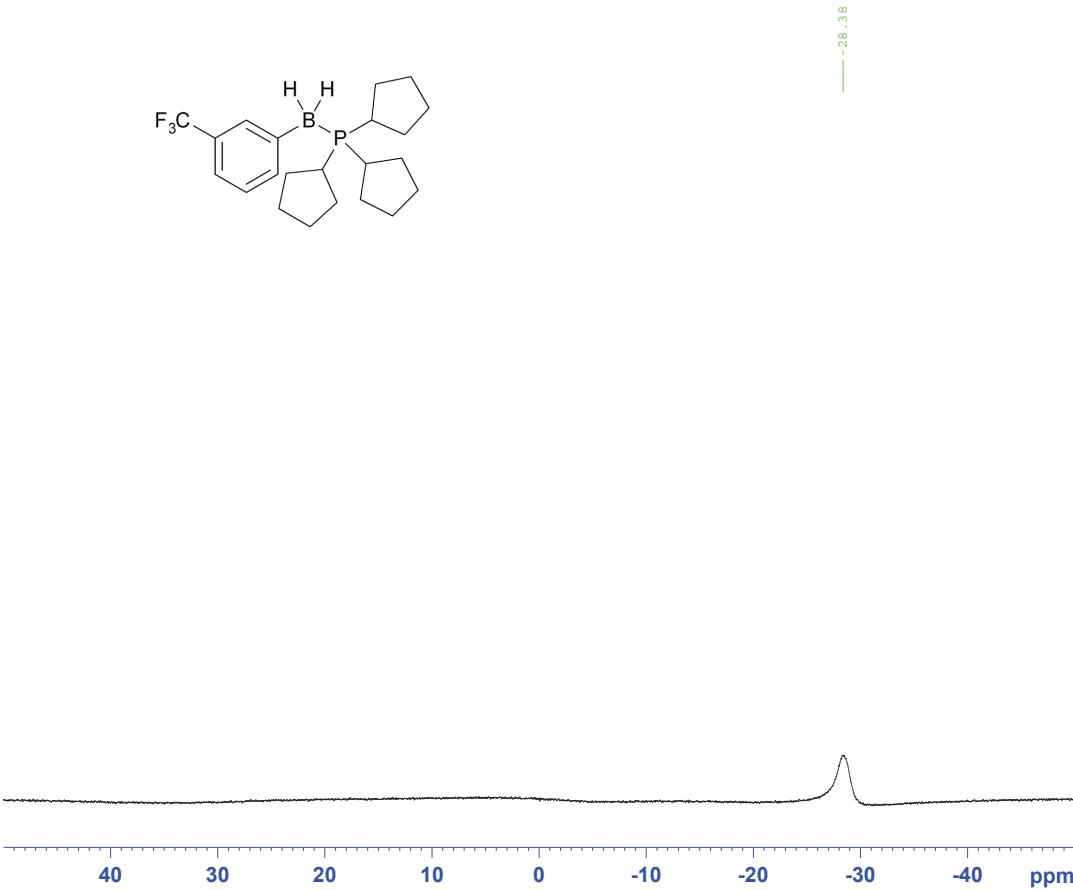
NAME Mar08-2024
EXPNO 2
PROCNO 1
Date_ 20240308
Time 0.47
INSTRUM av500
PROBHD 5 mm CPDCH 13C
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 64
DS 4
SWH 30030.029 Hz
FIDRES 0.458222 Hz
AQ 1.0912410 sec
RG 90.5
DW 16.650 usec
DE 20.00 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 10.00 usec
PL1 -5.00 dB
PL1W 14.29790783 W
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 14.06 dB
PL13 17.00 dB
PL2W 6.30957365 W
PL12W 0.09862794 W
PL13W 0.05011872 W
SFO2 500.1320005 MHz
SI 32768
SF 125.7577985 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3CF3PhBH2PPh(cyclopentyl)3

IBB-nmr Analysis

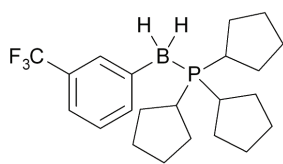


NAME Apr23-2022
EXPNO 4
PROCNO 1
Date_ 20220423
Time 12.30
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgig
TD 32768
SOLVENT DMSO
NS 256
DS 4
SWH 20000.000 Hz
FIDRES 0.610352 Hz
AQ 0.8192500 sec
RG 203
DW 25.000 usec
DE 20.00 usec
TE 297.5 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 11B
P1 6.30 usec
PL1 -2.00 dB
SFO1 128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 128.3776183 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

3CF₃PhBH₂PPh(cyclopentyl)₃



-61.19

IBB-nmr Analysis

```

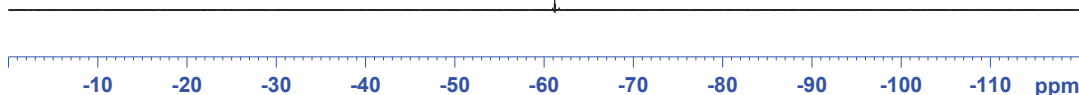
NAME      Apr23-2022
EXPNO     3
PROCNO    1
Date_     20220423
Time      12.18
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.8 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

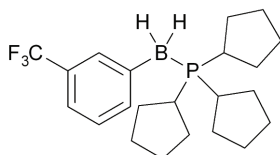
===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2      112.00 usec
PL2        -4.00 dB
PL12       18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI         65536
SF         376.4984617 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```



3CF₃PhBH₂PPh(cyclopentyl)₃



19.12

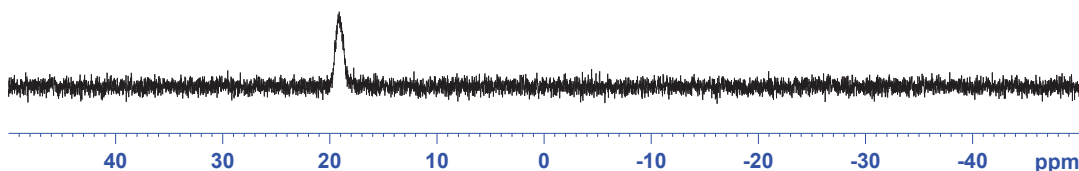
IBB-nmr Analysis

```

NAME      Apr23-2022
EXPNO     2
PROCNO    1
Date_     20220423
Time      12.13
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.7 K
D1         2.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



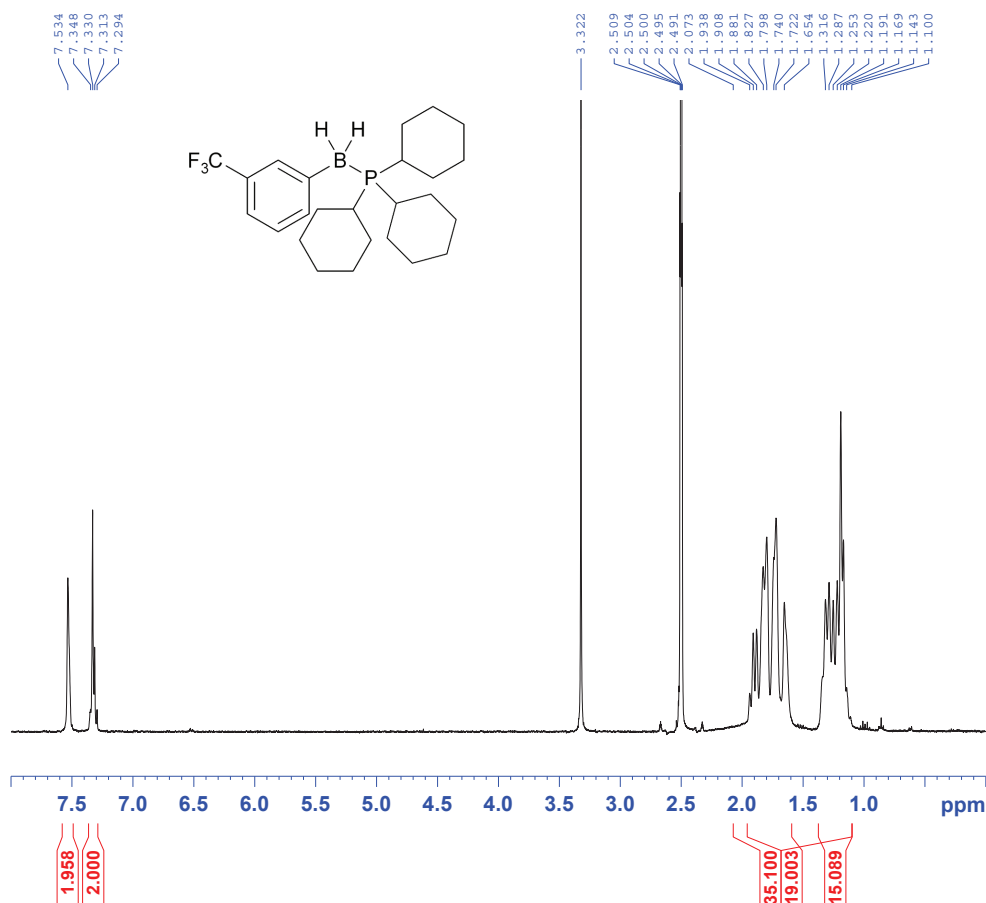
3CF3PhBH2P(cyclohexyl)3

B-3-(Trifluoromethyl)phenyl tricyclohexylphosphine-borane (25)

IBB-nmr Analysis

NAME Mar23-2022
 EXPNO 2
 PROCNO 1
 Date_ 20220323
 Time_ 20.41
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.6 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



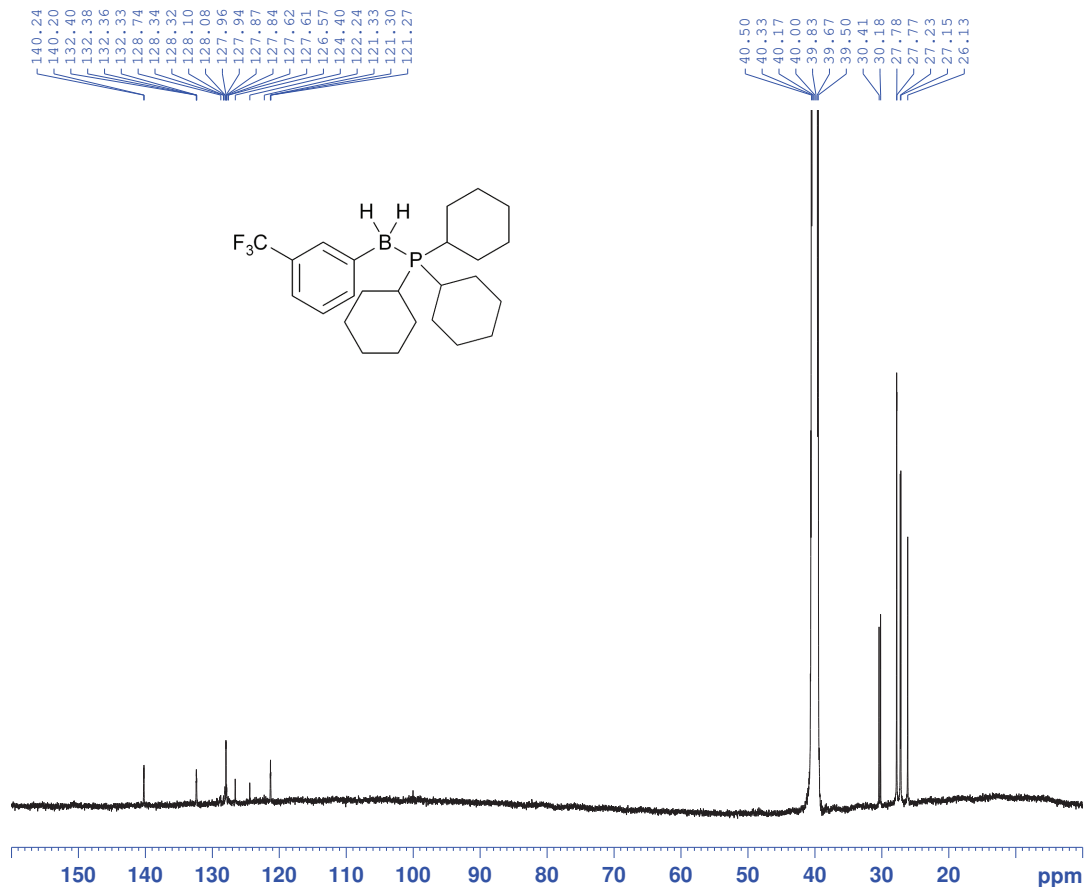
3CF3PhBH2P(cyclohexyl)3

IBB-nmr Analysis

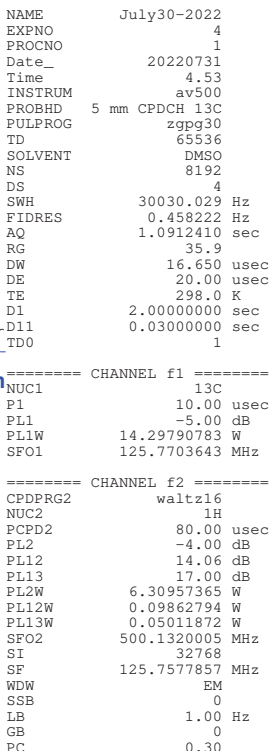
NAME July30-2022
 EXPNO 4
 PROCNO 1
 Date_ 20220731
 Time_ 4.53
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 8192
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

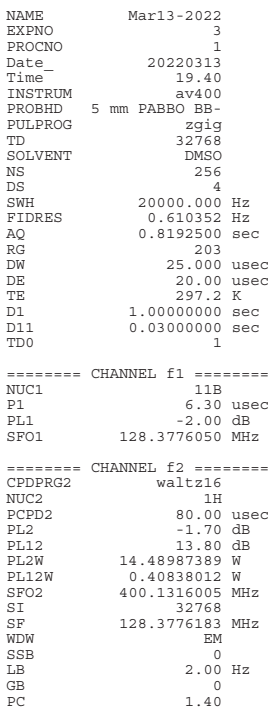
===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.0501872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577857 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



IBB-nmr Analysis

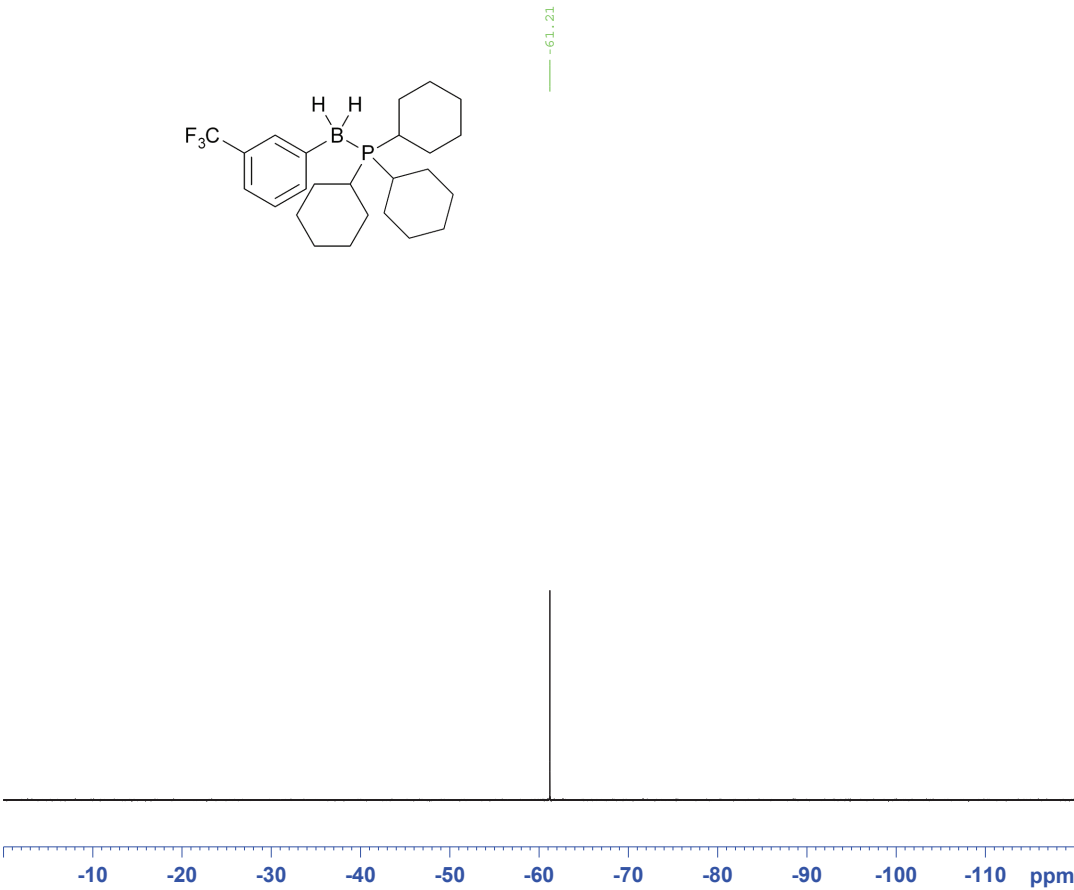


IBB-nmr Analysis



3CF3PhBH2P(cyclohexyl)3

IBB-nmr Analysis



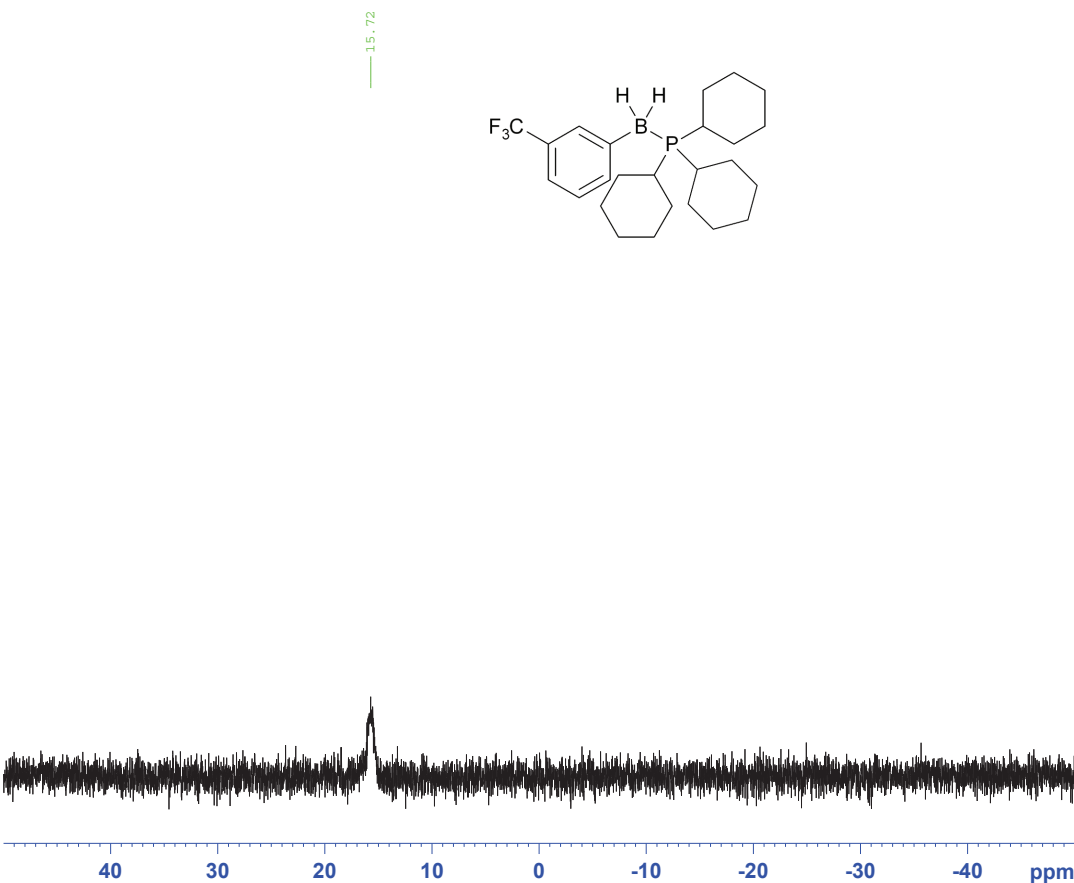
NAME Mar13-2022
EXPNO 2
PROCNO 1
Date_ 20220313
Time 19.29
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgfhgqn
TD 131072
SOLVENT DMSO
NS 8
DS 4
SWH 89285.711 Hz
FIDRES 0.681196 Hz
AQ 0.7340532 sec
RG 203
DW 5.600 usec
DE 6.50 usec
TE 296.7 K
D1 1.00000000 sec
D11 0.03000000 sec
D12 0.00002000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 19F
P1 19.50 usec
PL1 -4.00 dB
PL1W 16.40489006 W
SFO1 376.4607164 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 112.00 usec
PL2 -4.00 dB
PL12 18.00 dB
PL2W 24.60733604 W
PL12W 0.15526180 W
SFO2 400.1316005 MHz
SI 65536
SF 376.4984617 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

3CF3PhBH2P(cyclohexyl)3

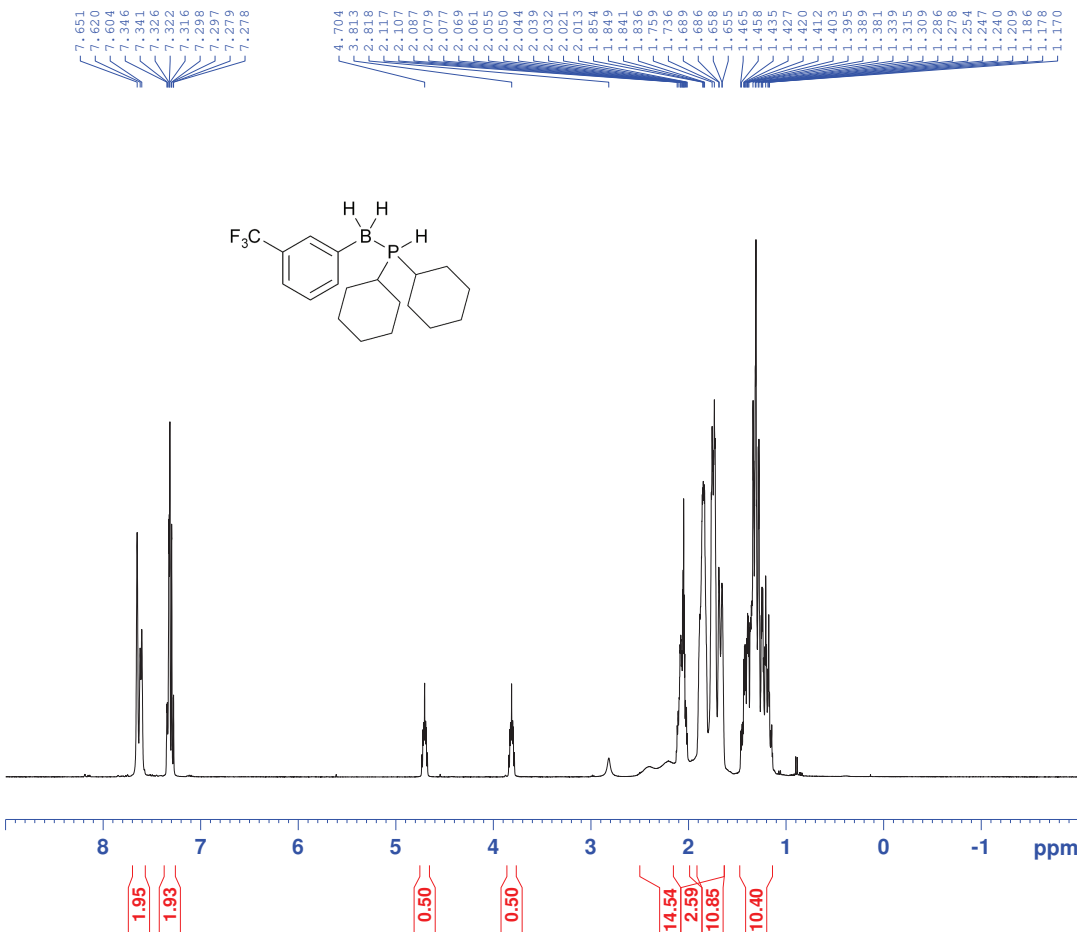
IBB-nmr Analysis



NAME Mar13-2022
EXPNO 5
PROCNO 1
Date_ 20220313
Time 20.02
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 256
DS 4
SWH 64102.563 Hz
FIDRES 0.978127 Hz
AQ 0.5112308 sec
RG 203
DW 7.800 usec
DE 6.50 usec
TE 296.5 K
D1 2.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 31P
P1 10.00 usec
PL1 -0.70 dB
PL1W 30.10233498 W
SFO1 161.9674942 MHz
SI 32768
SF 161.9754962 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

3CF3PhBH2PH(cyclohexyl) 2 **B-3-(Trifluoromethyl)phenyl dicyclohexylphosphine-borane (26)**

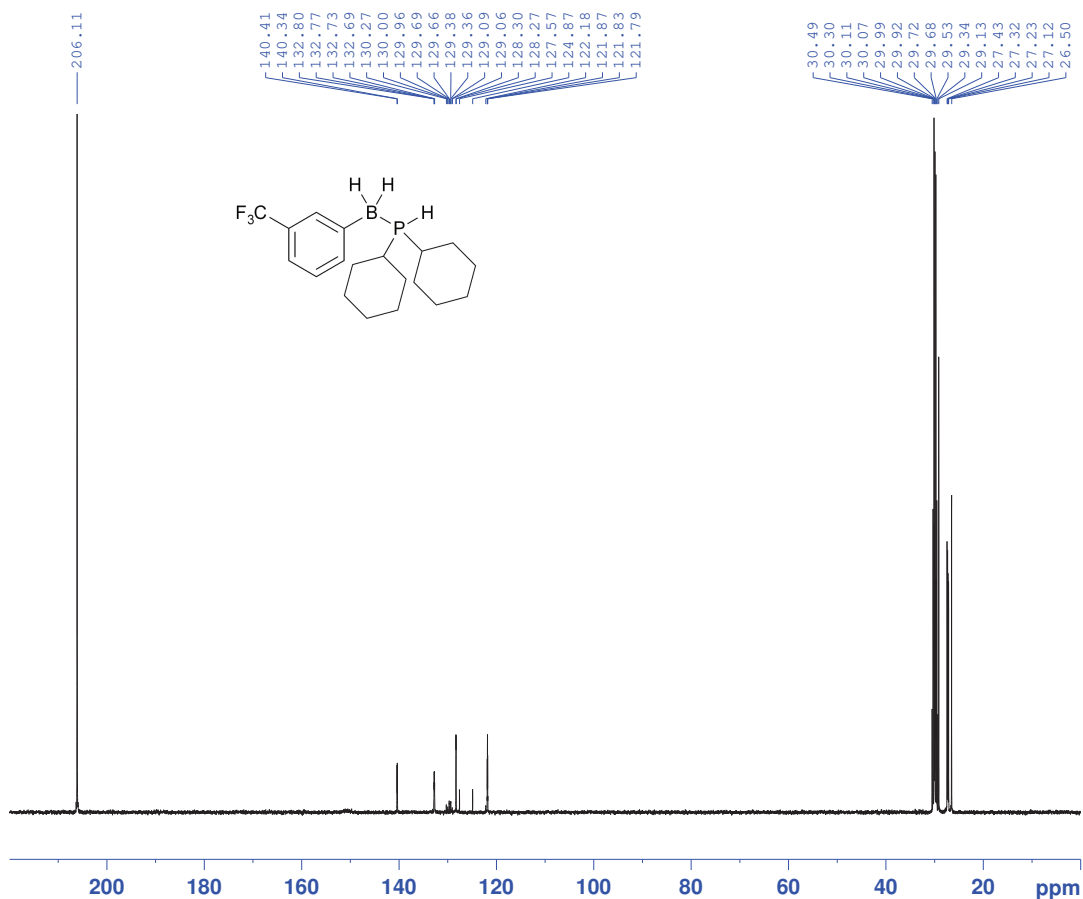


IBB-nmr Analysis

NAME Aug12-2023
EXPNO 2
PROCNO 1
Date_ 20230812
Time 19.39
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT Acetone
NS 16
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 32
DW 60.800 usec
DE 6.50 usec
TE 297.1 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 -1.80 dB
PL1W 14.82738590 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300070 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

3CF3PhBH2PH(cyclohexyl) 2



IBB-nmr Analysis

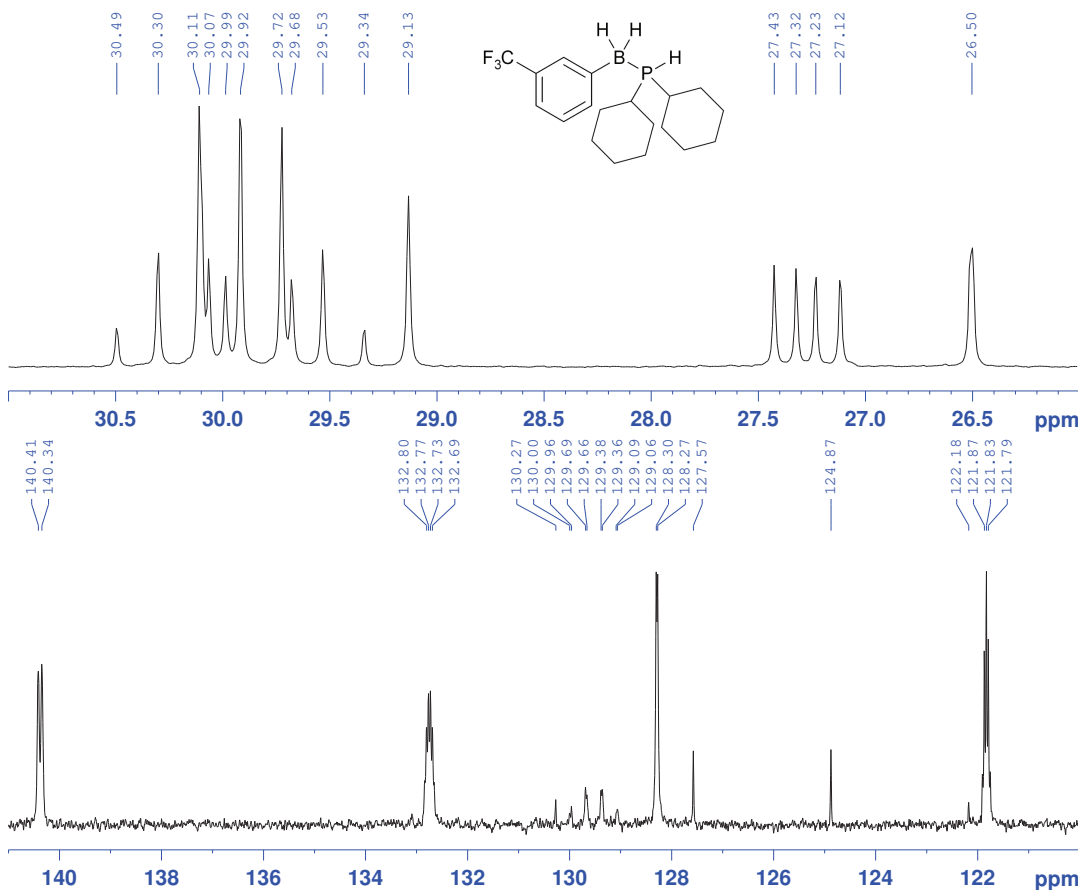
NAME Aug12-2023
EXPNO 3
PROCNO 1
Date_ 20230812
Time 19.57
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Acetone
NS 257
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 128
DW 20.800 usec
DE 6.50 usec
TE 298.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.00 usec
PL1 -3.00 dB
PL1W 73.17333984 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL13 13.80 dB
PL2W 14.49887389 W
PL12W 0.40838012 W
PL13W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6126724 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3CF3PhBH2PH (cyclohexyl) 2

IBB-nmr Analysis



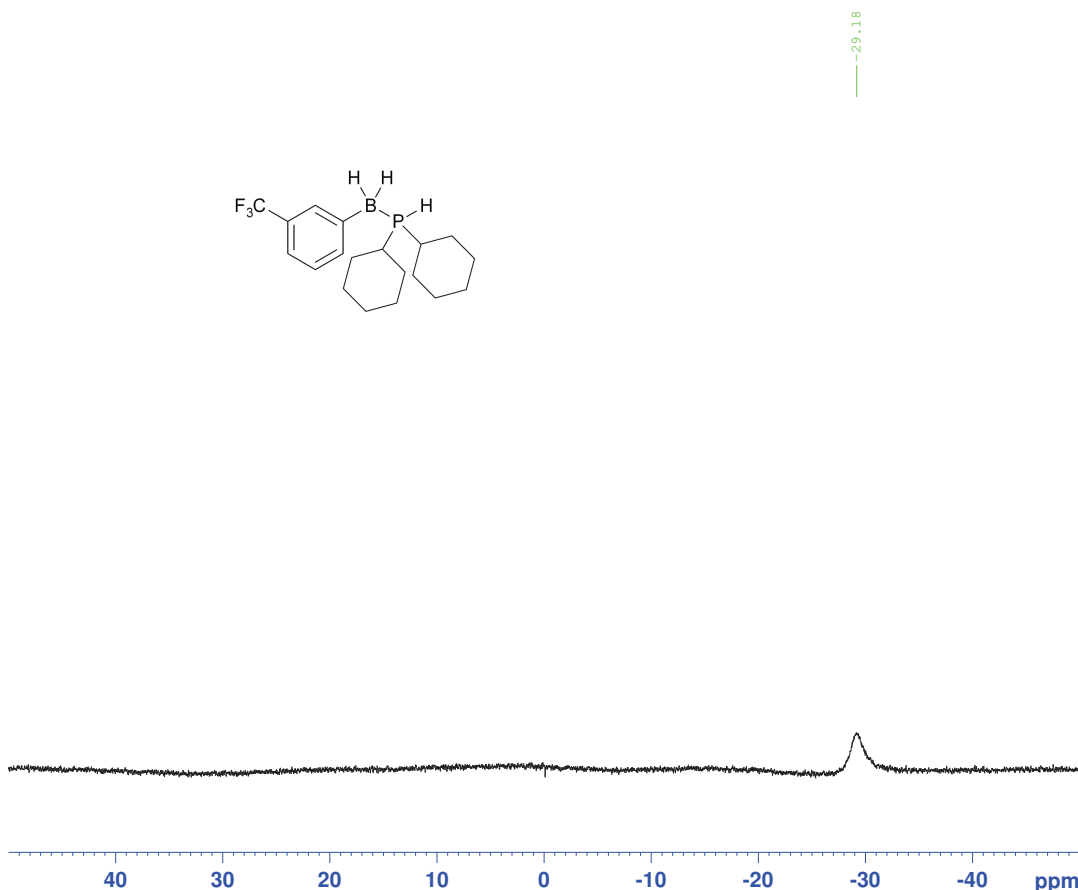
NAME Aug12-2023
EXPNO 3
PROCNO 1
Date_ 20230812
Time 19.57
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT Acetone
NS 257
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 128
DW 20.800 usec
DE 6.50 usec
TE 298.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.00 usec
PL1 -3.00 dB
PL1W 73.17333984 W
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL13 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
PL13W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6126724 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3CF3PhBH2PH (cyclohexyl) 2

IBB-nmr Analysis

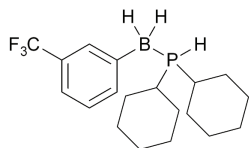


NAME Jul127-2023
EXPNO 4
PROCNO 1
Date_ 20230727
Time 9.26
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgig
TD 32768
SOLVENT DMSO
NS 64
DS 4
SWH 20000.000 Hz
FIDRES 0.610352 Hz
AQ 0.8192500 sec
RG 203
DW 25.000 usec
DE 20.00 usec
TE 297.1 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 11B
P1 6.30 usec
PL1 -2.00 dB
SFO1 128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 128.3776183 MHz
WDW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

3CF3PhBH2PH(cyclohexyl) 2



-61.12

IBB-nmr Analysis

```

NAME          Jul127-2023
EXPNO         5
PROCNO        1
Date_         20230727
Time          9.30
INSTRUM       av400
PROBHD        5 mm PABBO BB-
PULPROG       zgfhigqn
TD            131072
SOLVENT       DMSO
NS            8
DS            4
SWH           89285.711 Hz
FIDRES        0.681196 Hz
AQ            0.7340532 sec
RG            203
DW            5.600 usec
DE            6.50 usec
TE            296.7 K
D1            1.00000000 sec
D11           0.03000000 sec
D12           0.00002000 sec
TD0           1
  
```

```

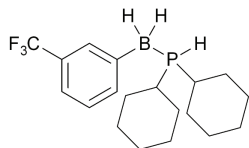
===== CHANNEL f1 =====
NUC1          19F
P1            19.50 usec
PL1           -4.00 dB
PL1W          16.40489006 W
SFO1          376.4607164 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         112.00 usec
PL2           -4.00 dB
PL12          18.00 dB
PL2W          24.60733604 W
PL12W         0.15526180 W
SFO2          400.1316005 MHz
SI            65536
SF            376.4984617 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



3CF3PhBH2PH(cyclohexyl) 2



11.05
8.87

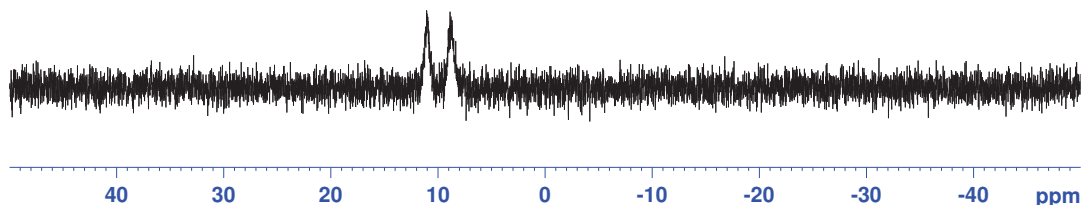
IBB-nmr Analysis

```

NAME          Jul127-2023
EXPNO         3
PROCNO        1
Date_         20230727
Time          9.21
INSTRUM       av400
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       DMSO
NS            64
DS            4
SWH           64102.563 Hz
FIDRES        0.978127 Hz
AQ            0.5112308 sec
RG            203
DW            7.800 usec
DE            6.50 usec
TE            296.6 K
D1            2.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          31P
P1            10.00 usec
PL1           -0.70 dB
PL1W          30.10233498 W
SFO1          161.9674942 MHz
SI            32768
SF            161.9754962 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



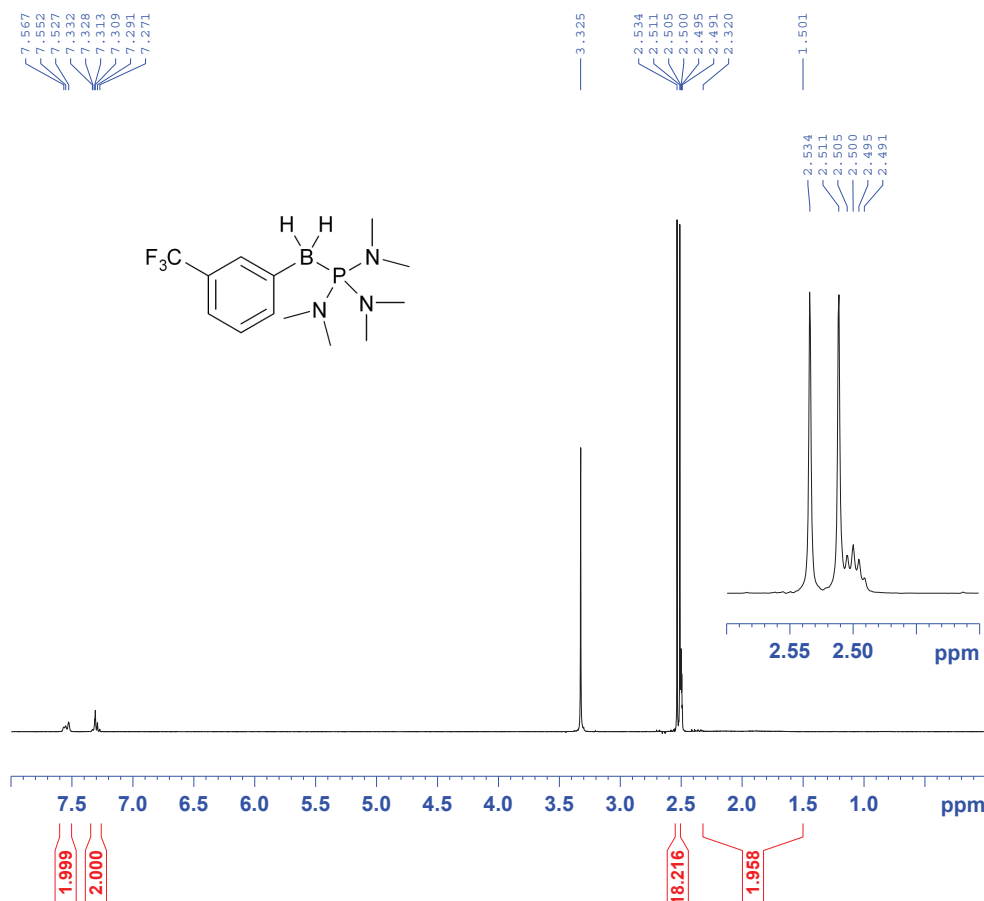
3CF₃PhBH₂P (NMe₂)₃

B-3-(Trifluoromethyl)phenyl tris(dimethylamino)phosphine-borane (27)

IBB-nmr Analysis

NAME July18-2022
 EXPNO 2
 PROCNO 1
 Date_ 20220718
 Time 17.37
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 4
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300034 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

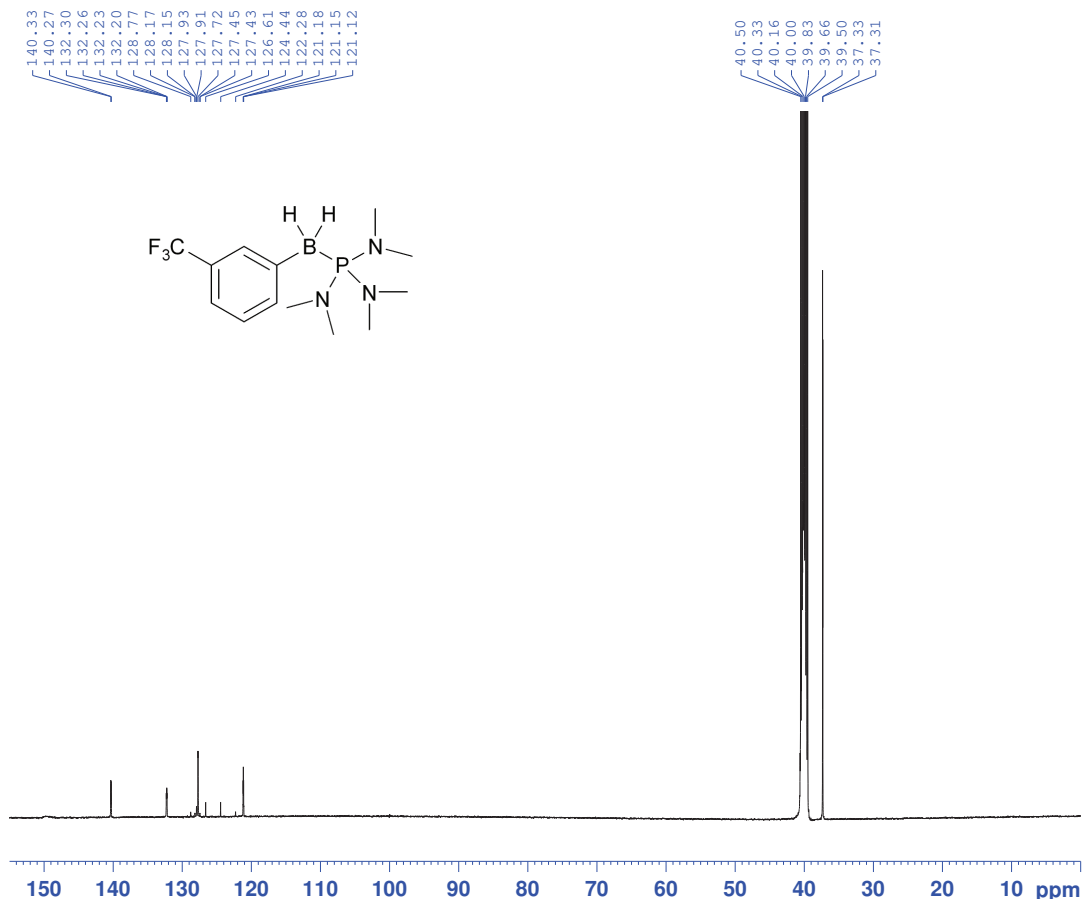
3CF₃PhBH₂P (NMe₂)₃

IBB-nmr Analysis

NAME July18-2022
 EXPNO 6
 PROCNO 1
 Date_ 20220718
 Time 21.37
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 4096
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

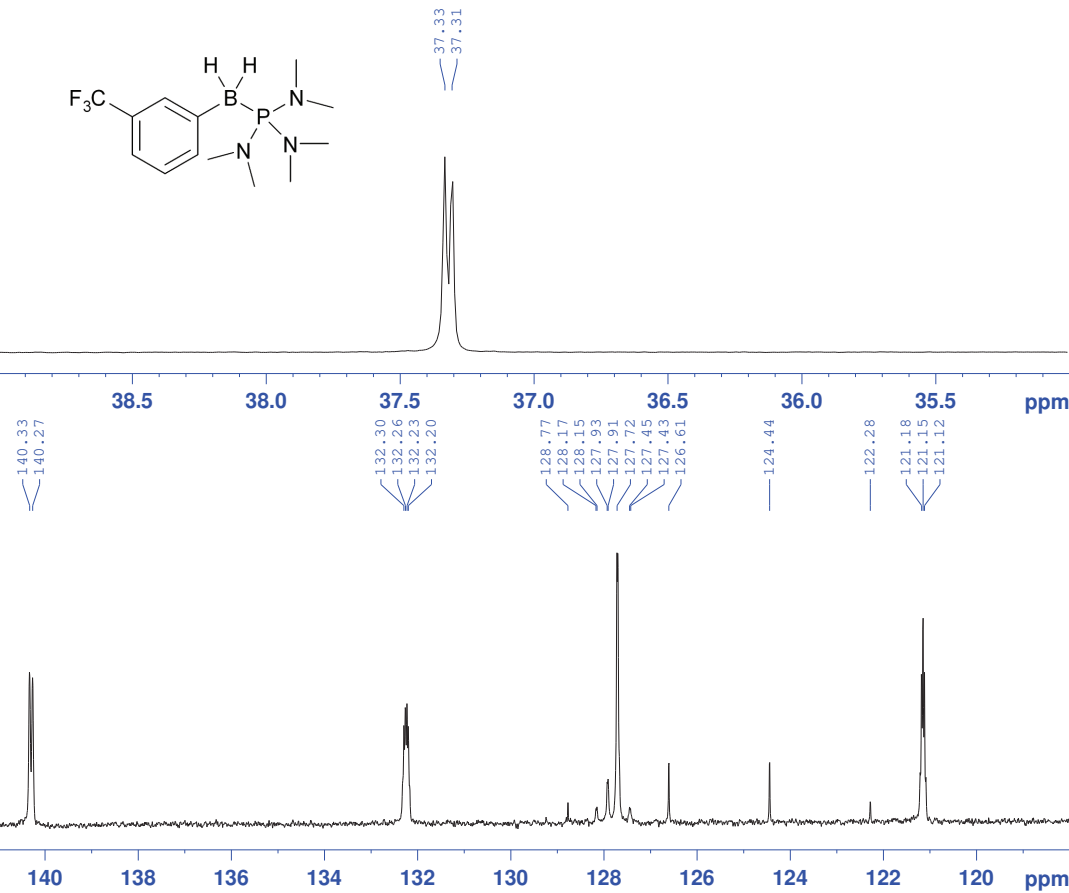
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577866 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



3CF3PhBH2P (NMe2) 3

IBB-nmr Analysis



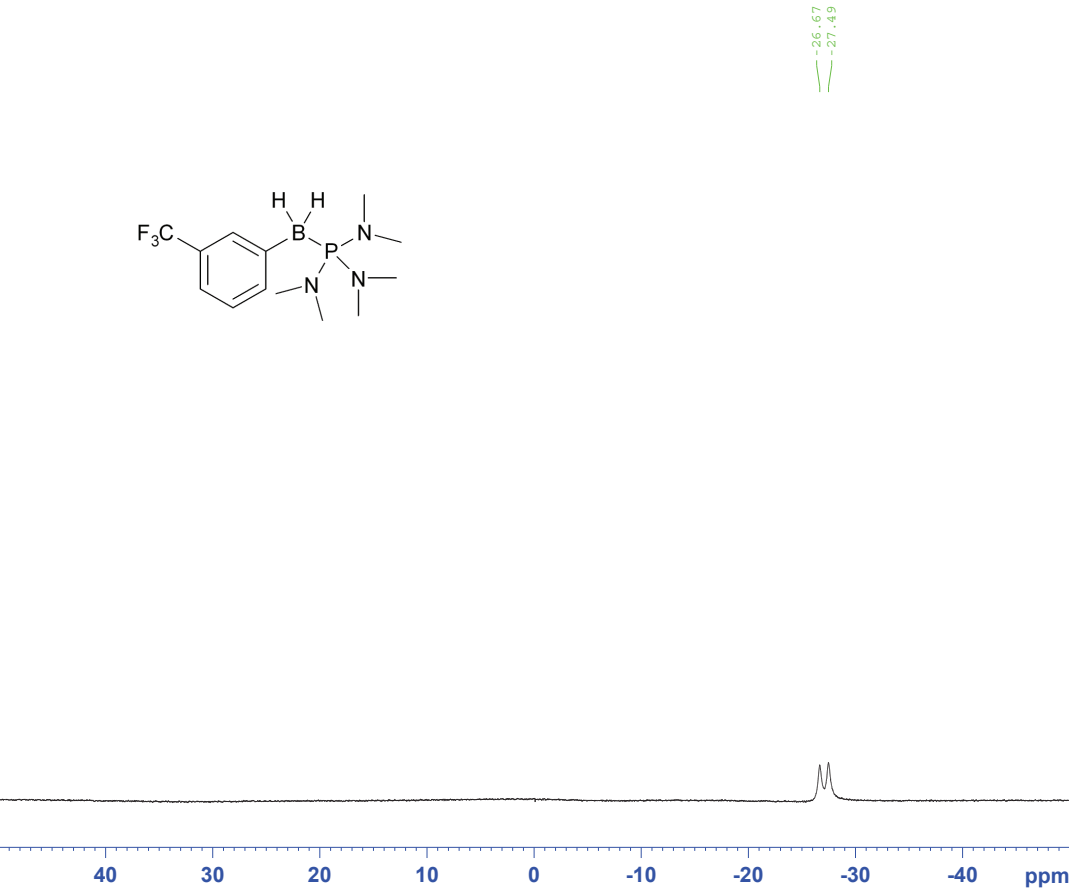
NAME July18-2022
EXPNO 6
PROCNO 1
Date_ 20220718
Time 21.37
INSTRUM av500
PROBHD 5 mm CPDCH 13C
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 4096
DS 4
SWH 30030.029 Hz
FIDRES 0.458222 Hz
AQ 1.0912410 sec
RG 35.9
DW 16.650 usec
DE 20.00 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 10.00 usec
PL1 -5.00 dB
PL1W 14.29790783 W
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 14.06 dB
PL13 17.00 dB
PL2W 6.30957365 W
PL12W 0.09862794 W
PL13W 0.05011872 W
SFO2 500.1320005 MHz
SI 32768
SF 125.7577866 MHz
WDFW EM
SSB 0
LB 1.00 Hz
GB 0
PC 0.30

3CF3PhBH2P (NMe2) 3

IBB-nmr Analysis



NAME July18-2022
EXPNO 5
PROCNO 1
Date_ 20220718
Time 17.52
INSTRUM av400
PROBHD 5 mm PABBO BB-
PULPROG zgig
TD 32768
SOLVENT DMSO
NS 128
DS 4
SWH 20000.000 Hz
FIDRES 0.610352 Hz
AQ 0.8192500 sec
RG 203
DW 25.000 usec
DE 20.00 usec
TE 297.7 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 11B
P1 6.30 usec
PL1 -2.00 dB
SFO1 128.3776050 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -1.70 dB
PL12 13.80 dB
PL2W 14.48987389 W
PL12W 0.40838012 W
SFO2 400.1316005 MHz
SI 32768
SF 128.3776183 MHz
WDFW EM
SSB 0
LB 2.00 Hz
GB 0
PC 1.40

3CF₃PhBH₂P(NMe₂)₃

IBB-nmr Analysis

```

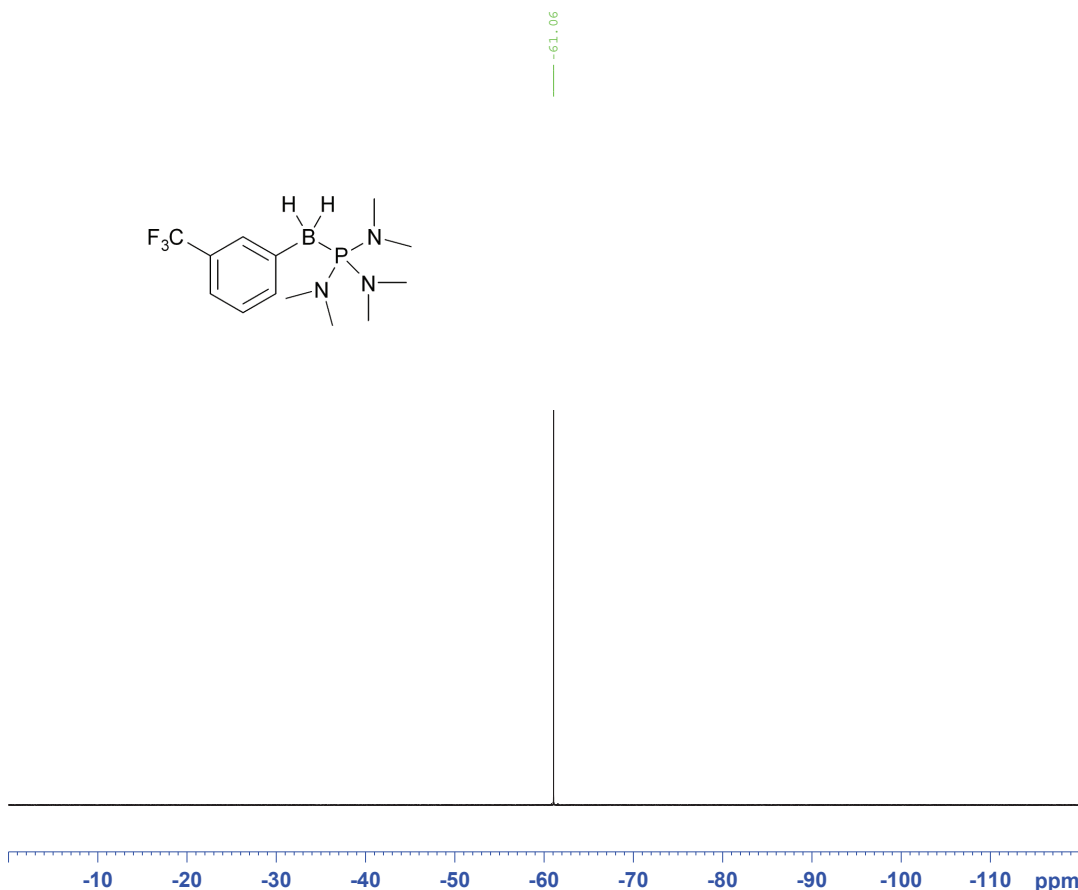
NAME      July18-2022
EXPNO     4
PROCNO    1
Date_     20220718
Time      17.45
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.2 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
  
```



3CF₃PhBH₂P(NMe₂)₃

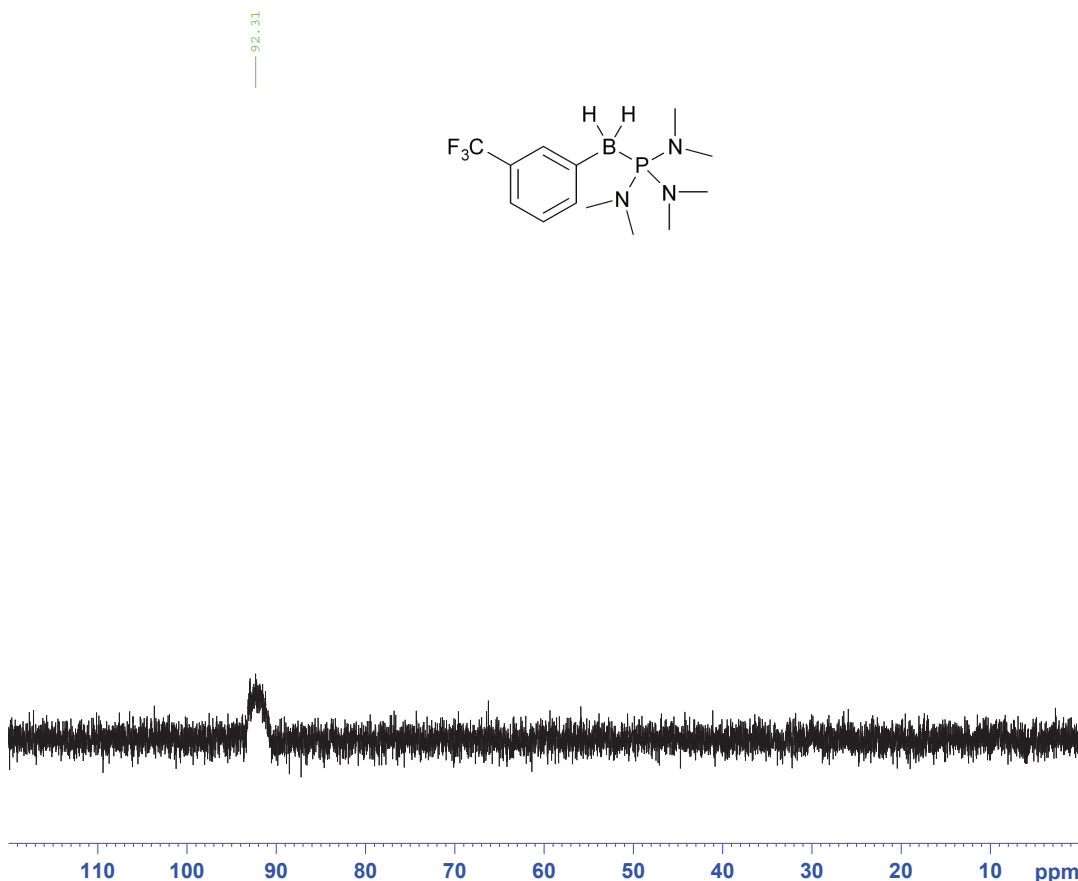
IBB-nmr Analysis

```

NAME      July18-2022
EXPNO     3
PROCNO    1
Date_     20220718
Time      17.42
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         297.1 K
D1         2.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```



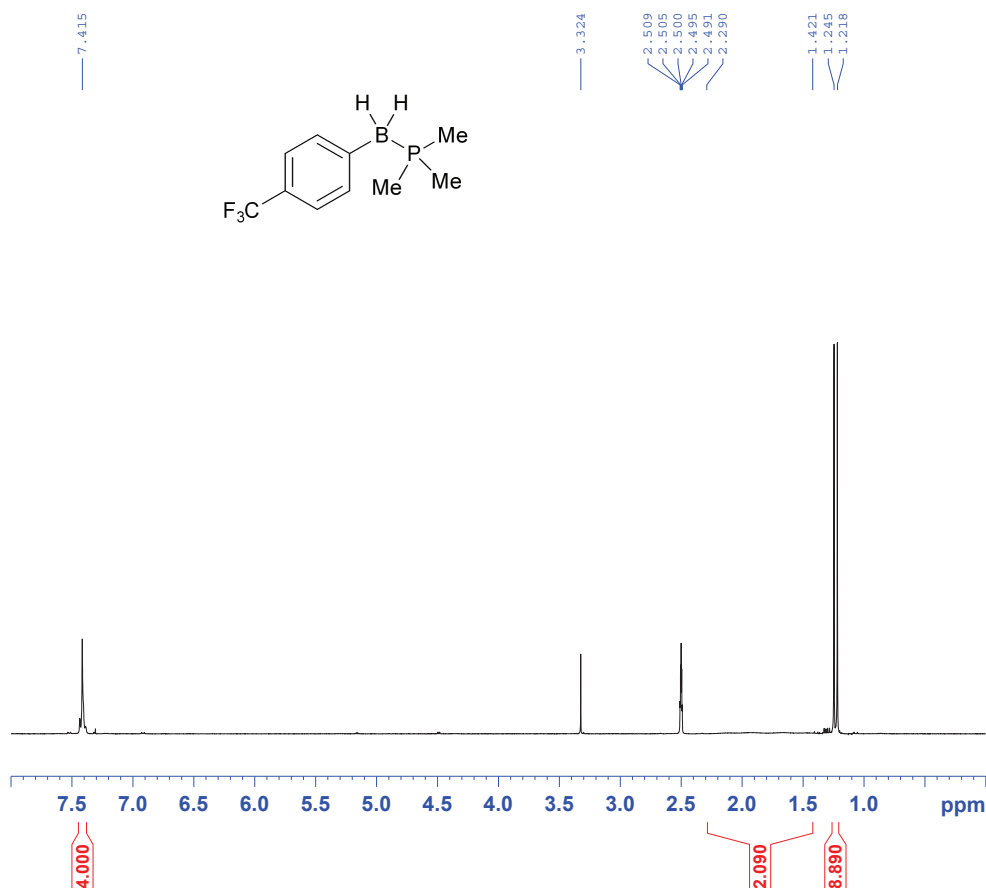
4CF3PhBH2PMe3 5-14Fr

B-4-(Trifluoromethyl)phenyl trimethylphosphine-borane (28)

IBB-nmr Analysis

NAME Dec6-2021
 EXPNO 1
 PROCNO 1
 Date_ 20211206
 Time_ 20.49
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.6 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300035 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



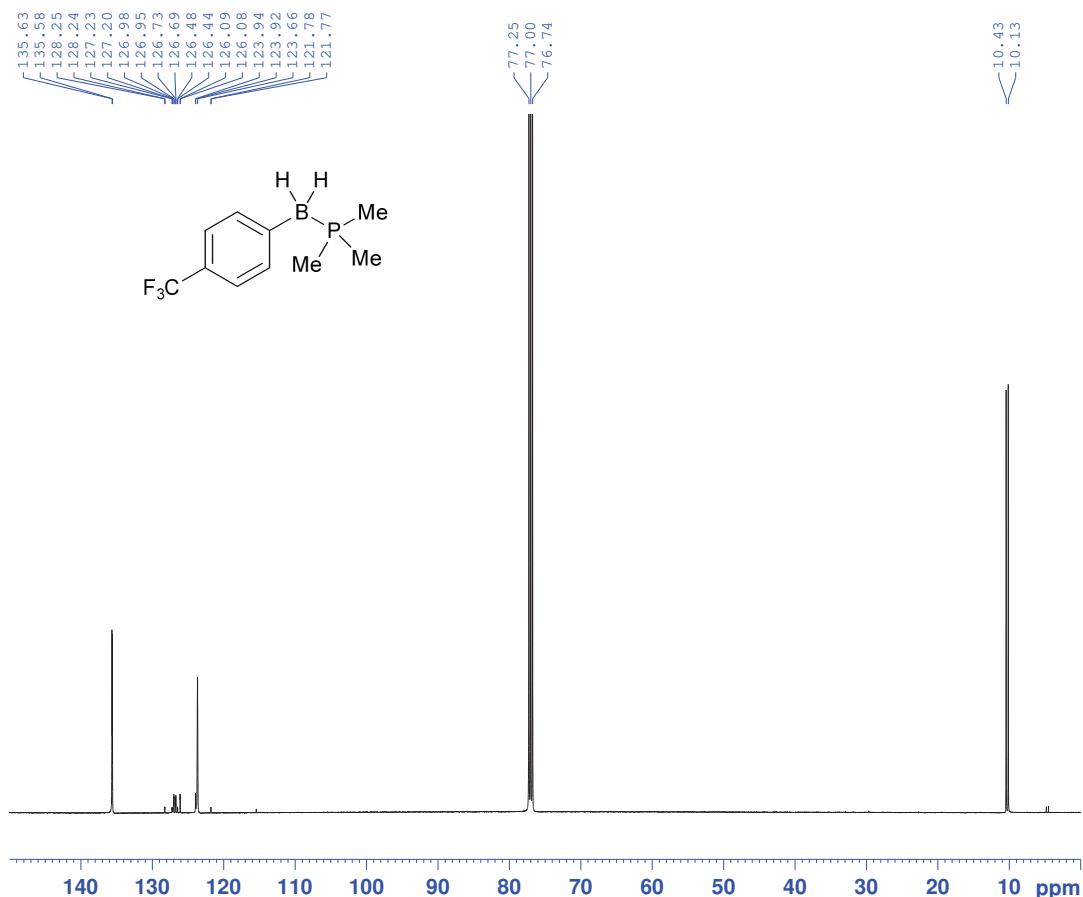
4CF3PhBH2PMe3

IBB-nmr Analysis

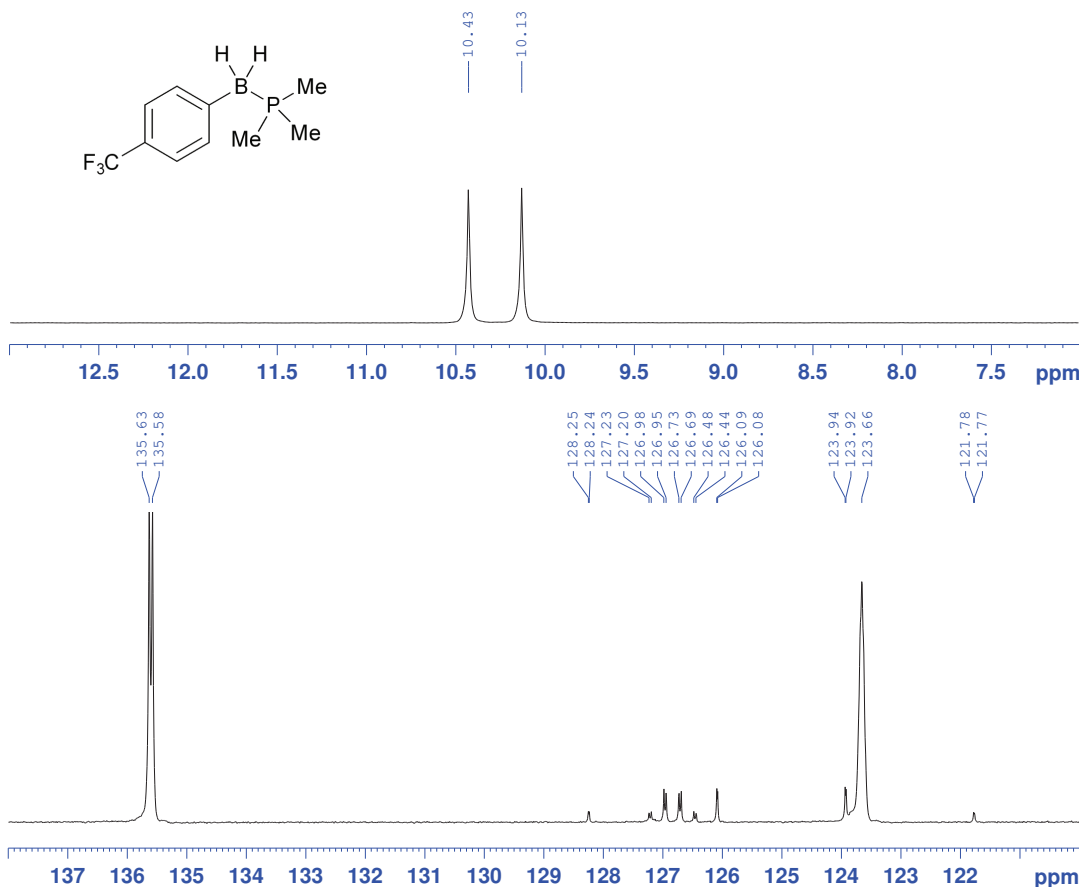
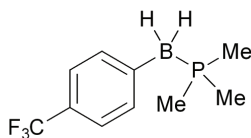
NAME Mar07-2024
 EXPNO 2
 PROCNO 1
 Date_ 20240307
 Time_ 12.21
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 297.9 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577937 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



4CF3PhBH2PMe3



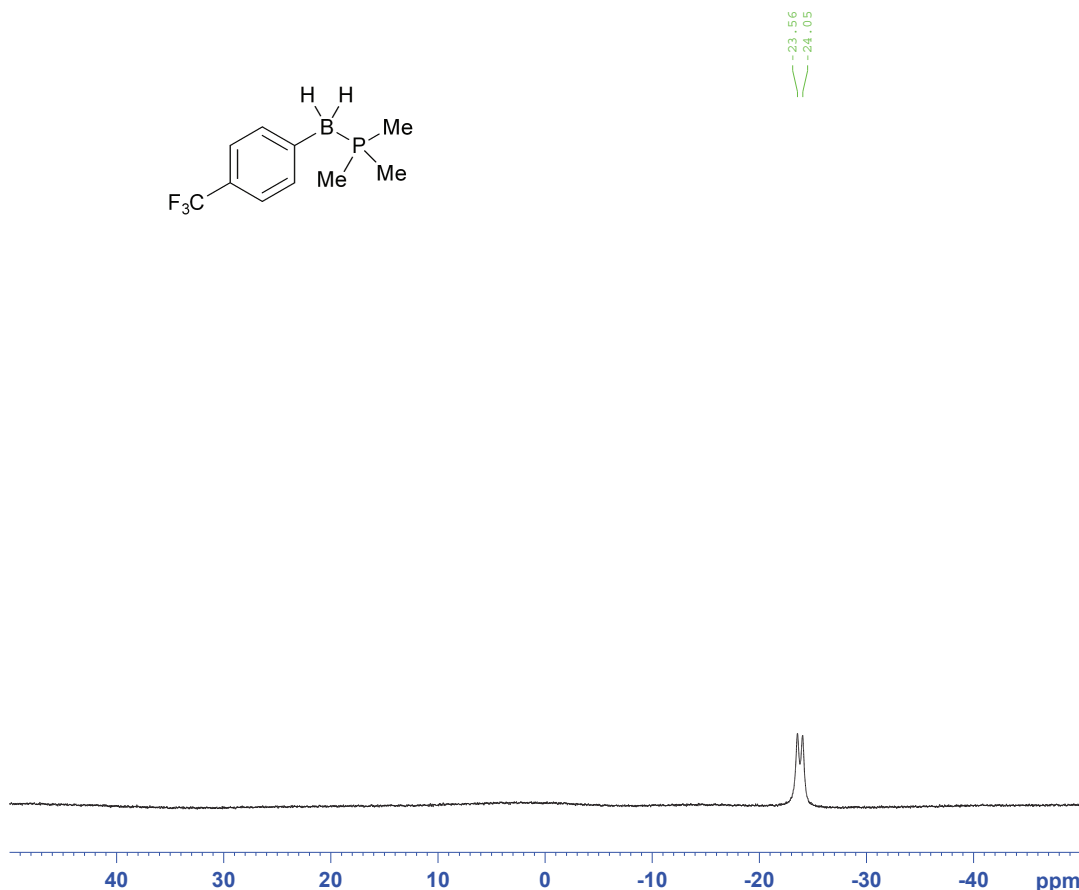
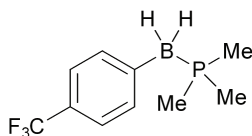
IBB-nmr Analysis

NAME Mar07-2024
 EXPNO 2
 PROCNO 1
 Date_ 20240307
 Time 12.21
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl₃
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 297.9 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577937 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2PMe3



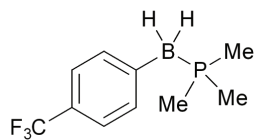
IBB-nmr Analysis

NAME Dec4-2021
 EXPNO 4
 PROCNO 1
 Date_ 20211204
 Time 12.23
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.3 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

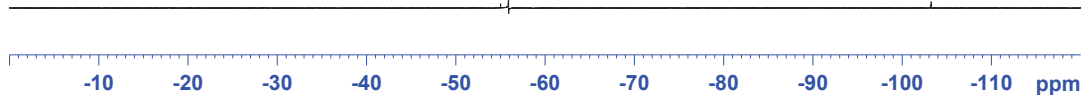
===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2PMe3



-55.90



IBB-nmr Analysis

```

NAME          Dec4-2021
EXPNO         6
PROCNO        1
Date_         20211204
Time_         12.36
INSTRUM       av400
PROBHD        5 mm PABBO BB-
PULPROG       zgfhigqn
TD            131072
SOLVENT       DMSO
NS            4
DS            8
SWH           89285.711 Hz
FIDRES        0.681196 Hz
AQ            0.7340532 sec
RG            203
DW            5.600 usec
DE            6.50 usec
TE            296.7 K
D1            1.00000000 sec
D11           0.03000000 sec
D12           0.00002000 sec
TD0           1

```

```

===== CHANNEL f1 =====
NUC1          19F
P1            19.50 usec
PL1           -4.00 dB
PL1W          16.40489006 W
SFO1          376.4607164 MHz

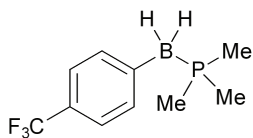
```

```

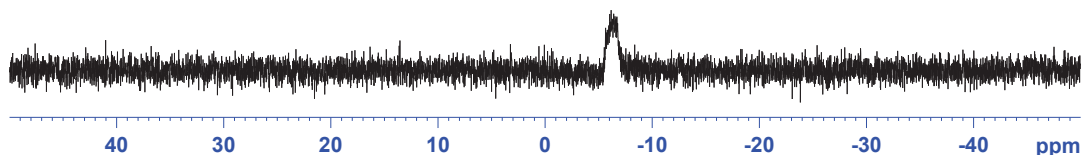
===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         112.00 usec
PL2           -4.00 dB
PL12          18.00 dB
PL2W          24.60733604 W
PL12W         0.15526180 W
SFO2          400.1316005 MHz
SI            65536
SF            376.4966788 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

```

4CF3PhBH2PMe3



-6.17



IBB-nmr Analysis

```

NAME          Dec4-2021
EXPNO         3
PROCNO        1
Date_         20211204
Time_         12.12
INSTRUM       av400
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       DMSO
NS            64
DS            4
SWH           64102.563 Hz
FIDRES        0.978127 Hz
AQ            0.5112308 sec
RG            203
DW            7.800 usec
DE            6.50 usec
TE            296.6 K
D1            2.00000000 sec
TD0           1

```

```

===== CHANNEL f1 =====
NUC1          31P
P1            10.00 usec
PL1           -0.70 dB
PL1W          30.10233498 W
SFO1          161.9674942 MHz
SI            32768
SF            161.9754962 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

```

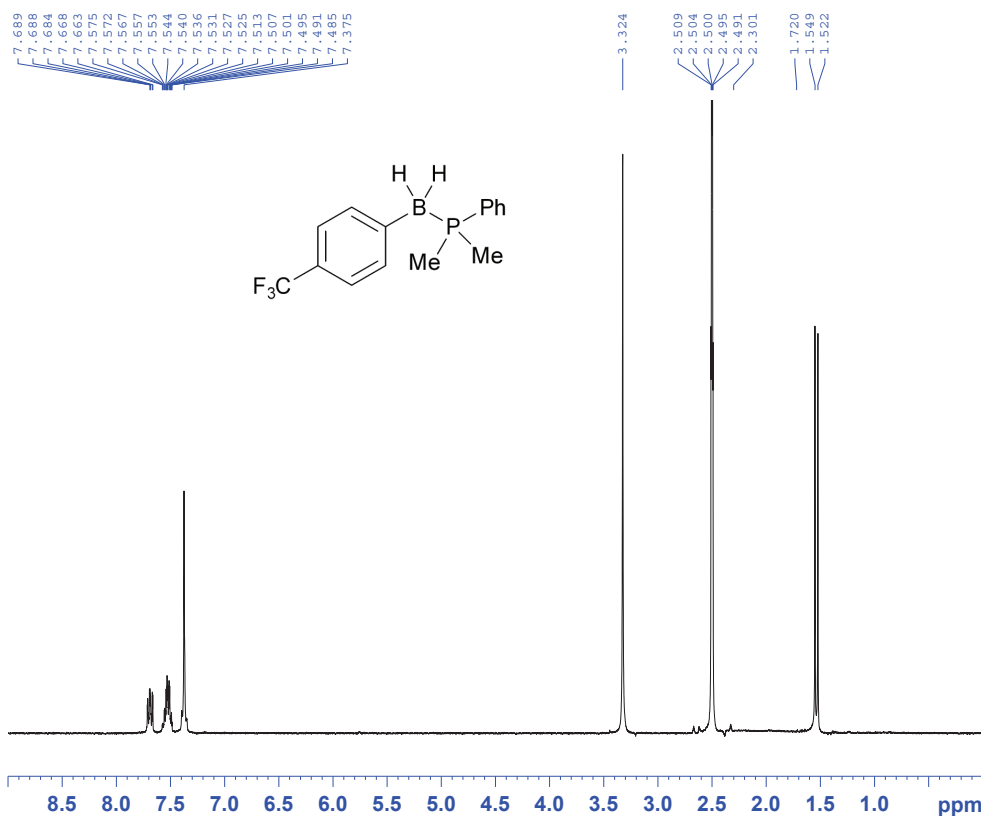
4CF3PhBH2Me2Ph 7-13Fr

B-4-(Trifluoromethyl)phenyl dimethyl(phenyl)phosphine-borane (29)

IBB-nmr Analysis

NAME Feb6-2022
 EXPNO 5
 PROCNO 1
 Date_ 20220206
 Time_ 14.34
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300033 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



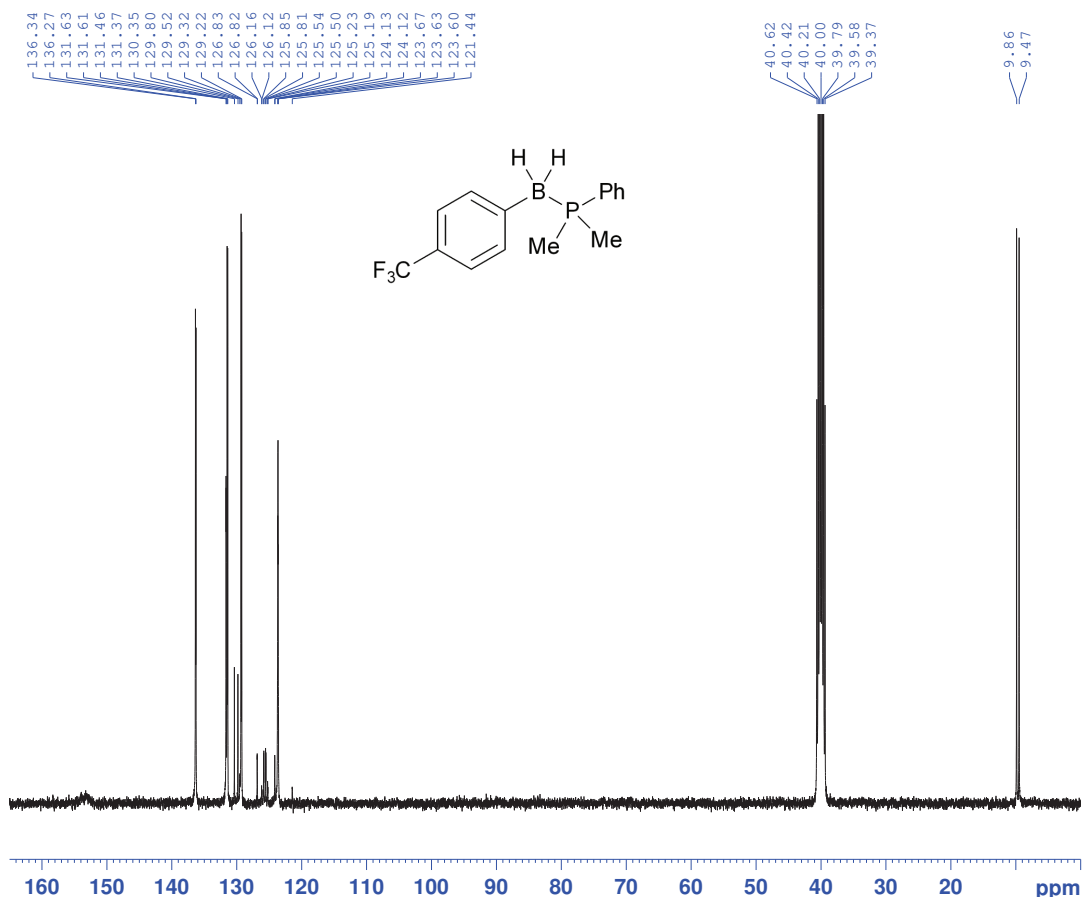
4CF3PhBH2PPhMe2

IBB-nmr Analysis

NAME Aug16-2023
 EXPNO 1
 PROCNO 1
 Date_ 20230816
 Time_ 20.49
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 2048
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 298.6 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

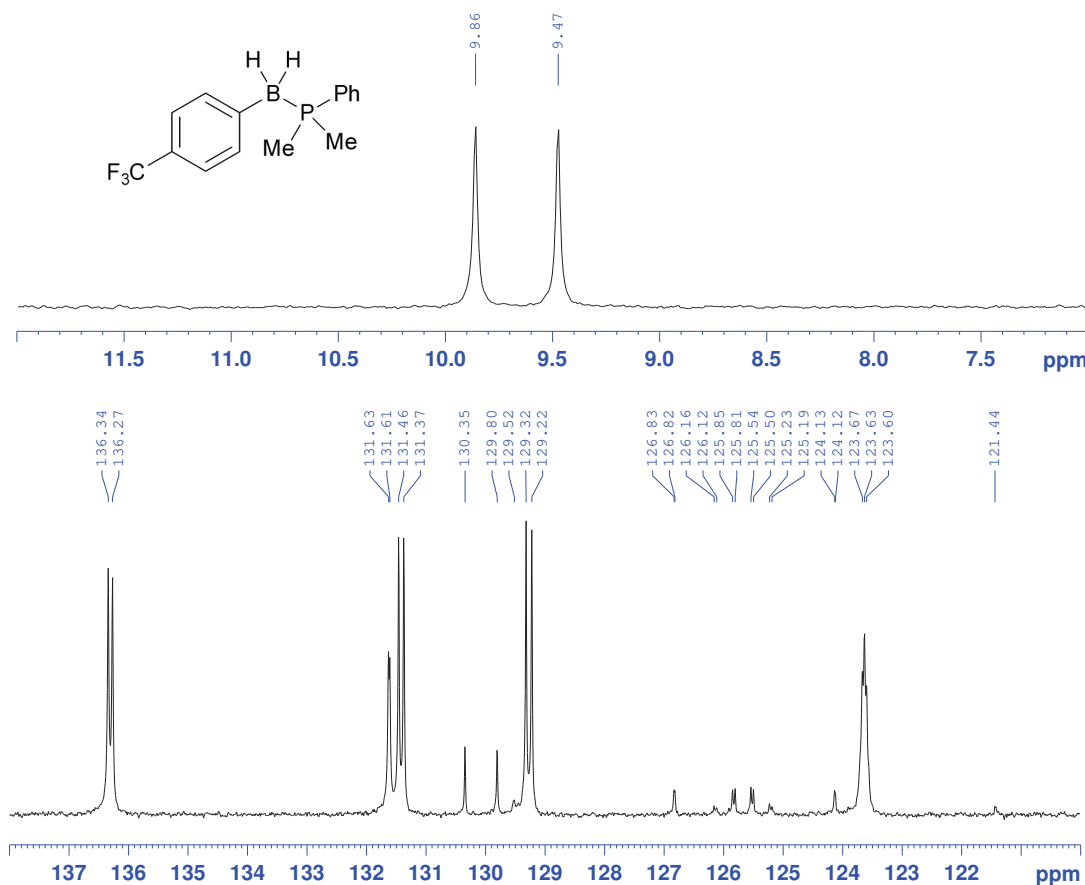
===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -3.00 dB
 PL1W 73.17333984 W
 SFO1 100.6228298 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL13 13.80 dB
 PL2W 14.49887389 W
 PL12W 0.40838012 W
 PL13W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127689 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



4CF3PhBH2PPhMe2

IBB-nmr Analysis



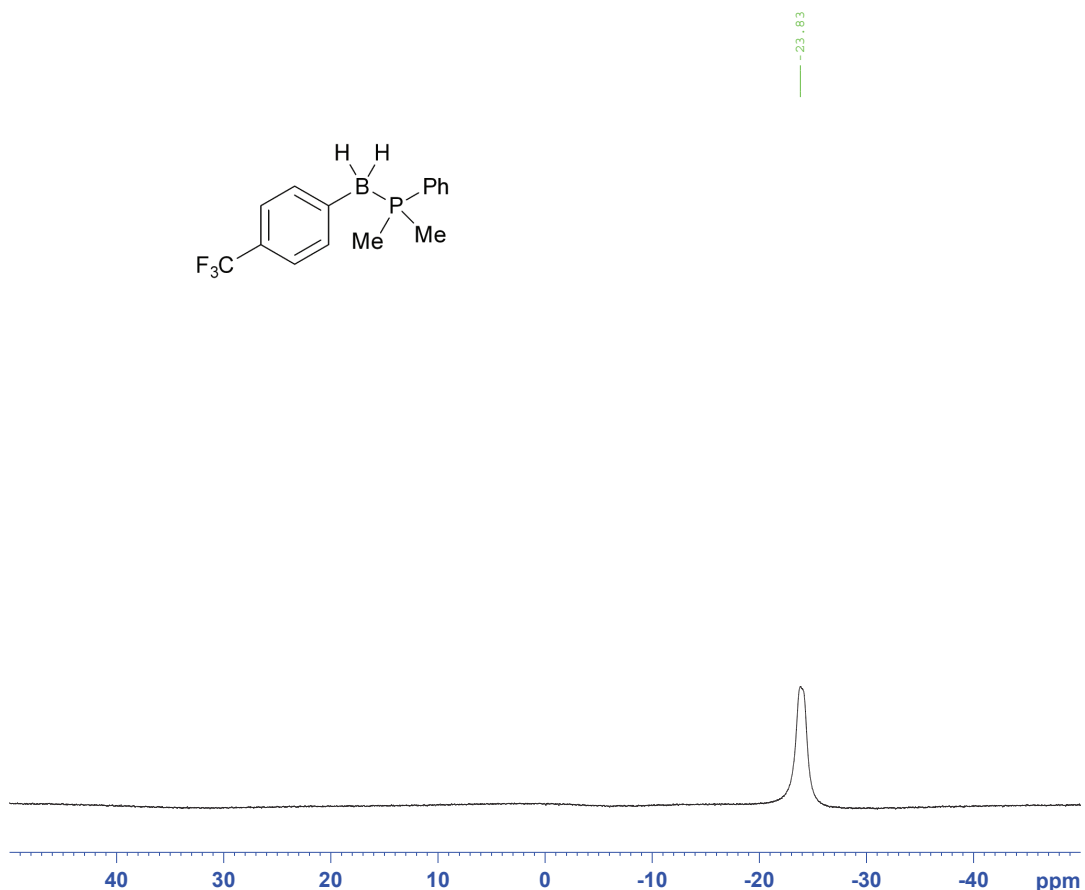
NAME Aug16-2023
 EXPNO 1
 PROCNO 1
 Date_ 20230816
 Time 20.49
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 2048
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 298.6 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -3.00 dB
 PL1W 73.17333984 W
 SFO1 100.6228298 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL13 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 PL13W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6127689 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2Me2Ph 7-13Fr

IBB-nmr Analysis

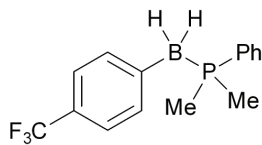


NAME Feb6-2022
 EXPNO 14
 PROCNO 1
 Date_ 20220206
 Time 23.03
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 512
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.1 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2Me2Ph 7-13Fr



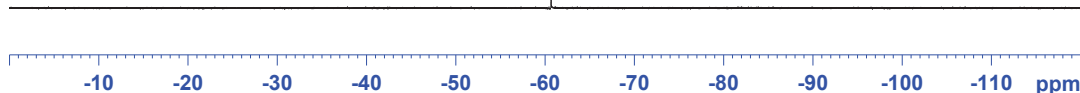
-60.67
-60.68

IBB-nmr Analysis

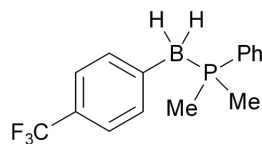
```
NAME      Feb6-2022
EXPNO     6
PROCNO    1
Date_     20220206
Time      14.40
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.3 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```



4CF3PhBH2Me2Ph 7-13Fr

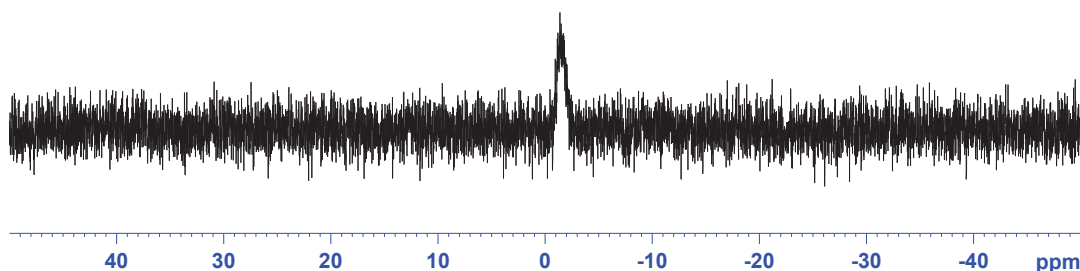


-1.39

IBB-nmr Analysis

```
NAME      Feb6-2022
EXPNO     9
PROCNO    1
Date_     20220206
Time      15.10
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         256
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.1 K
D1         2.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```



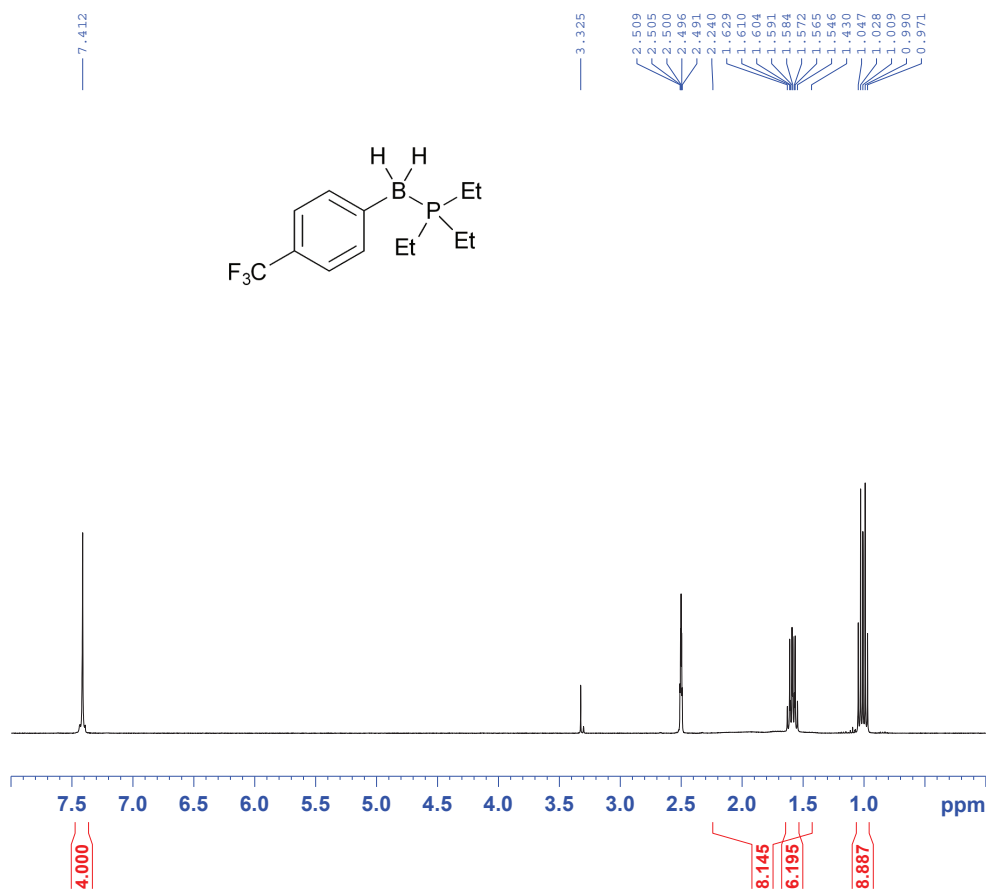
4CF3PhBH2PEt3 4-9Fr

B-4-(Trifluoromethyl)phenyl triethylphosphine-borane (30)

IBB-nmr Analysis

NAME Feb2-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220202
 Time_ 22.04
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.3 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300026 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



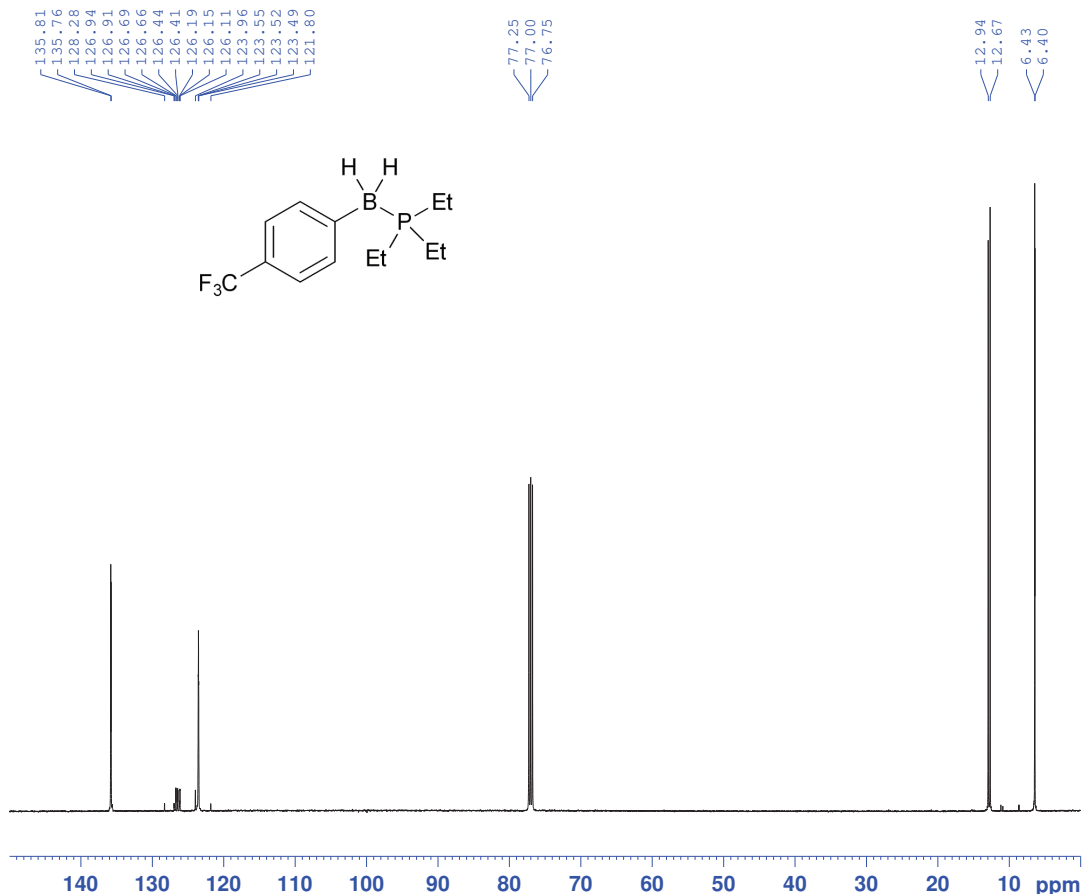
4CF3PhBH2PEt3

IBB-nmr Analysis

NAME Mar07-2024
 EXPNO 7
 PROCNO 1
 Date_ 20240308
 Time_ 0.11
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 40.3
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

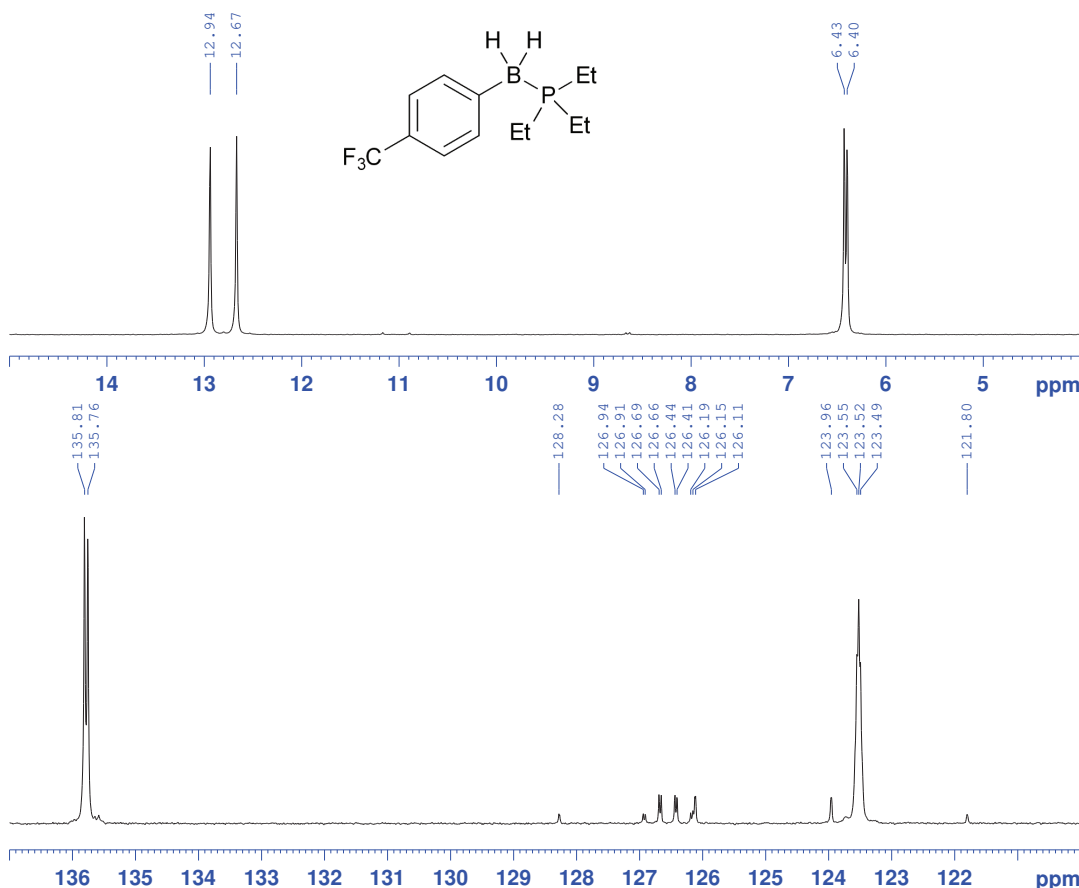
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577965 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



4CF3PhBH2PEt3

IBB-nmr Analysis



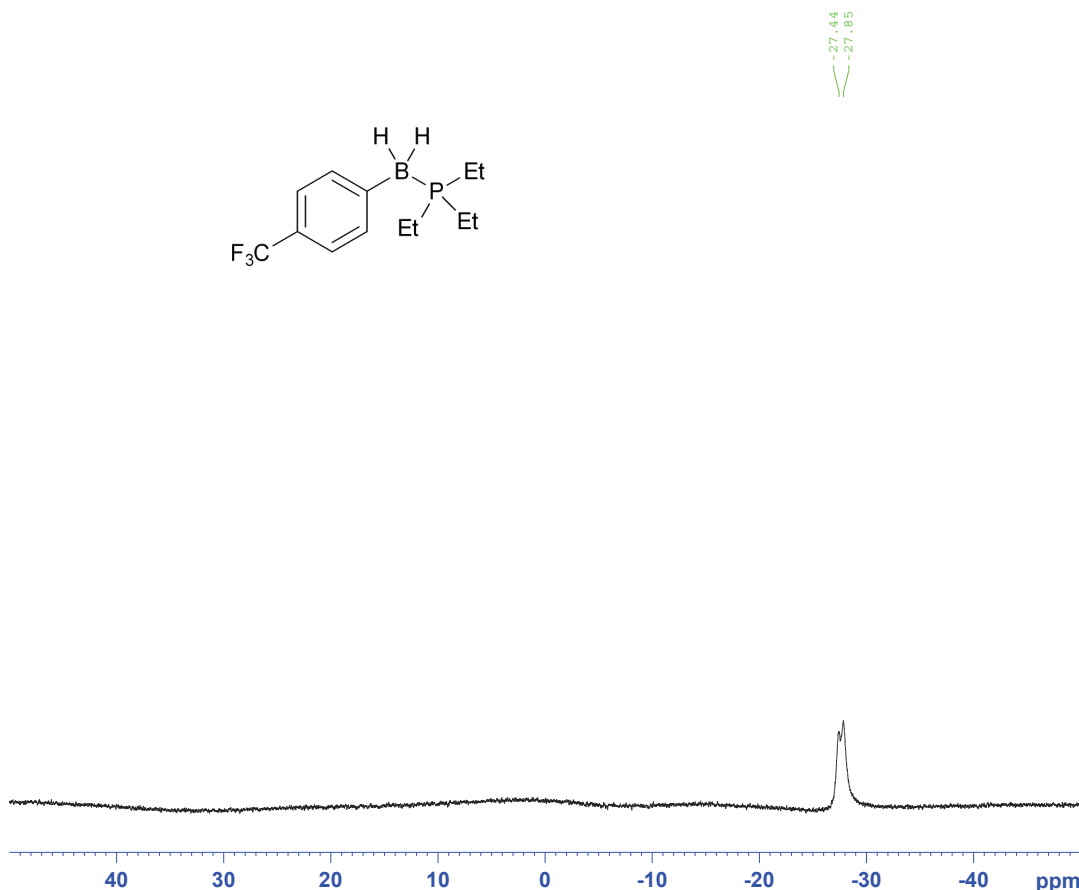
NAME Mar07-2024
 EXPNO 7
 PROCNO 1
 Date_ 20240308
 Time 0.11
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 64
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 40.3
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577965 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2PEt3 4-9Fr

IBB-nmr Analysis

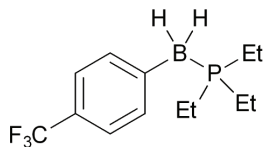


NAME Feb1-2022
 EXPNO 4
 PROCNO 1
 Date_ 20220202
 Time 0.13
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.0 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2PEt3 4-9Fr



-60.65
-60.66

IBB-nmr Analysis

```

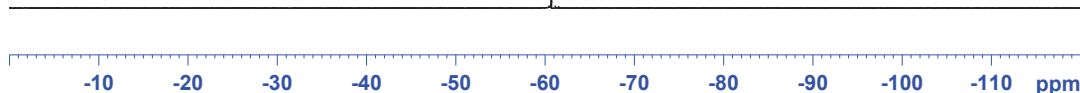
NAME      Feb2-2022
EXPNO     4
PROCNO    1
Date_     20220202
Time      22.19
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.4 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

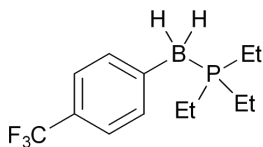
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2       112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W        24.60733604 W
PL12W       0.15526180 W
SFO2        400.1316005 MHz
SI          65536
SF          376.4984677 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
  
```



4CF3PhBH2PEt3 4-9Fr



12.75

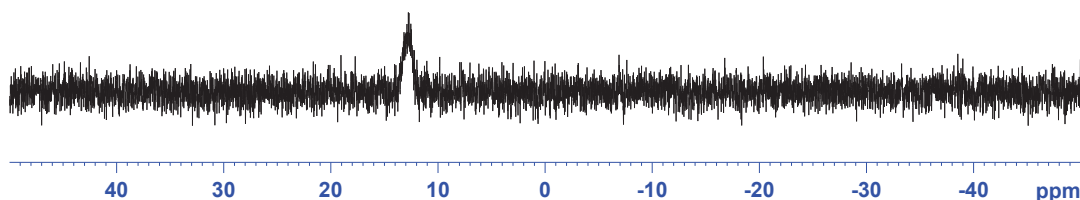
IBB-nmr Analysis

```

NAME      Feb1-2022
EXPNO     3
PROCNO    1
Date_     20220202
Time      0.02
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.3 K
D1         2.00000000 sec
D10        1
  
```

```

===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```



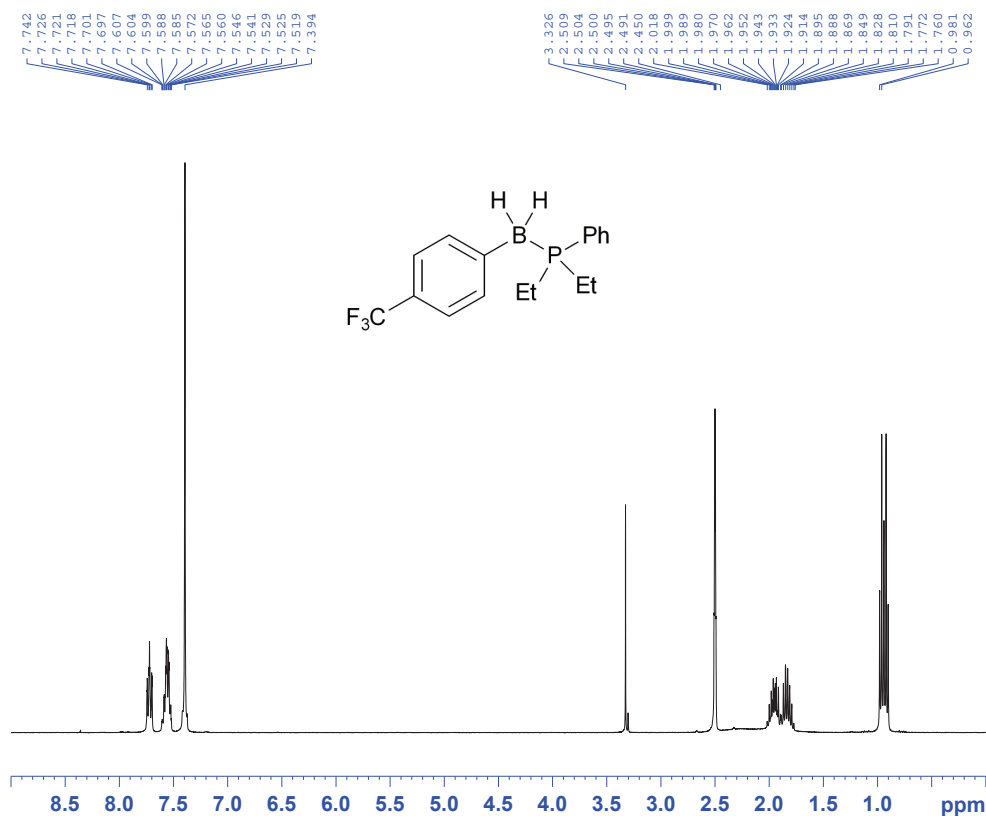
4CF3PhBH2Et2Ph 11-21Fr

B-4-(Trifluoromethyl)phenyl diethyl(phenyl)phosphine-borane (31)

IBB-nmr Analysis

NAME Feb11-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220211
 Time_ 18.22
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300036 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



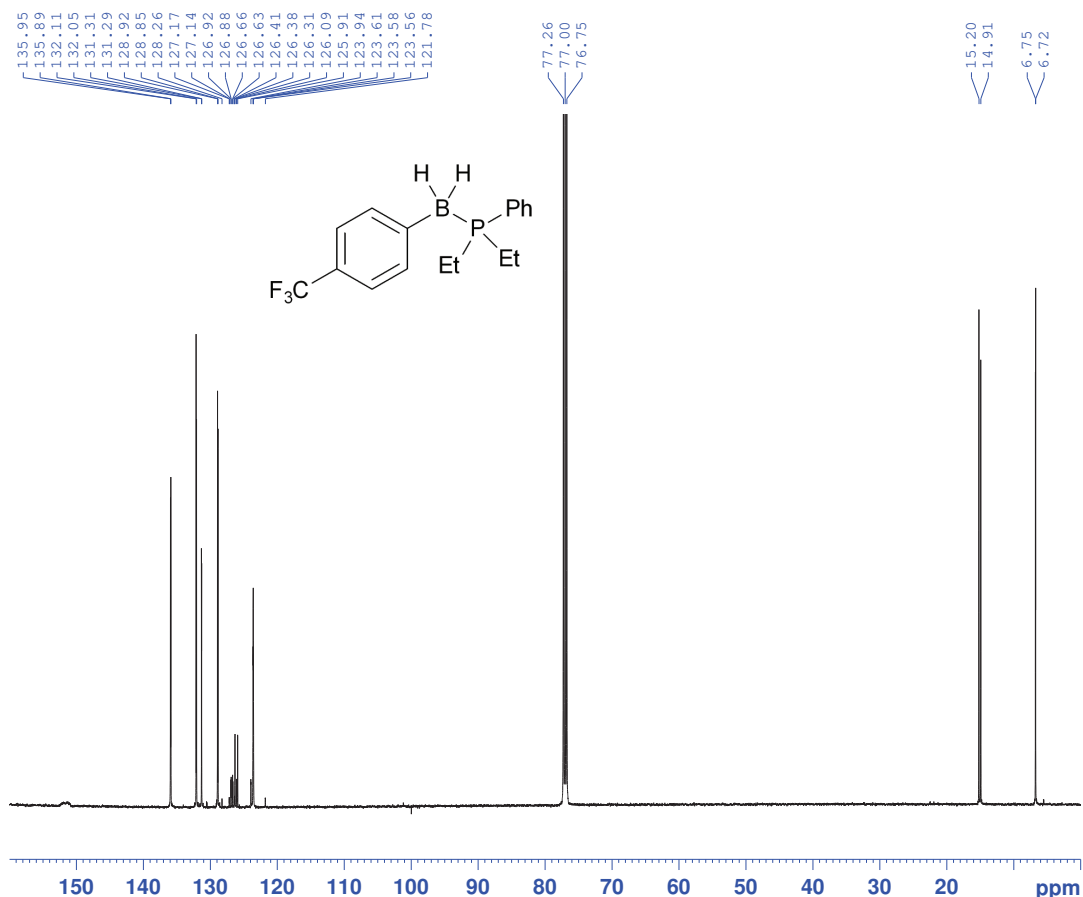
4CF3PhBH2PEt2Ph

IBB-nmr Analysis

NAME Mar07-2024
 EXPNO 3
 PROCNO 1
 Date_ 20240307
 Time_ 13.36
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 512
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 40.3
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

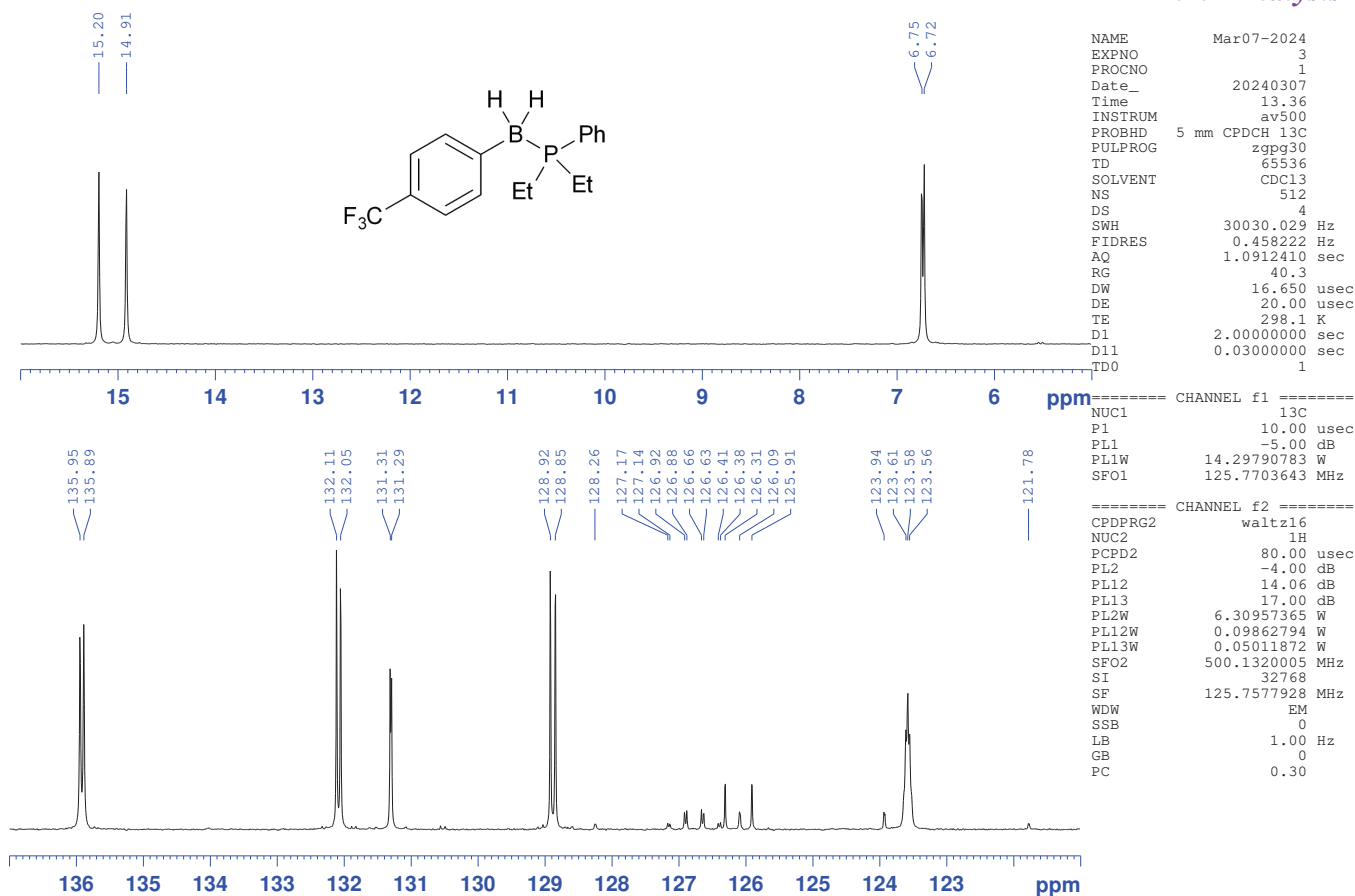
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577928 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



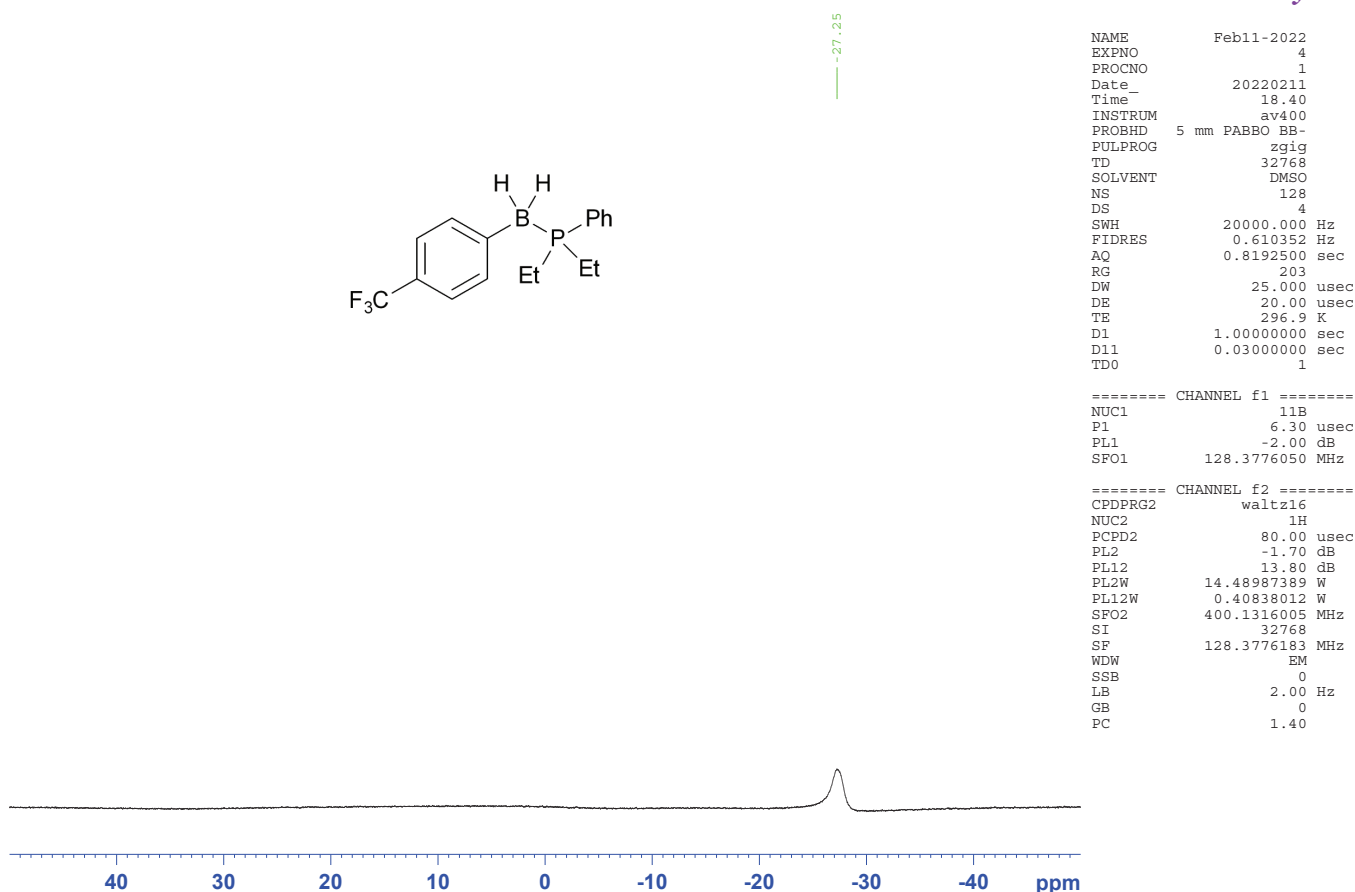
4CF3PhBH2PEt2Ph

IBB-nmr Analysis

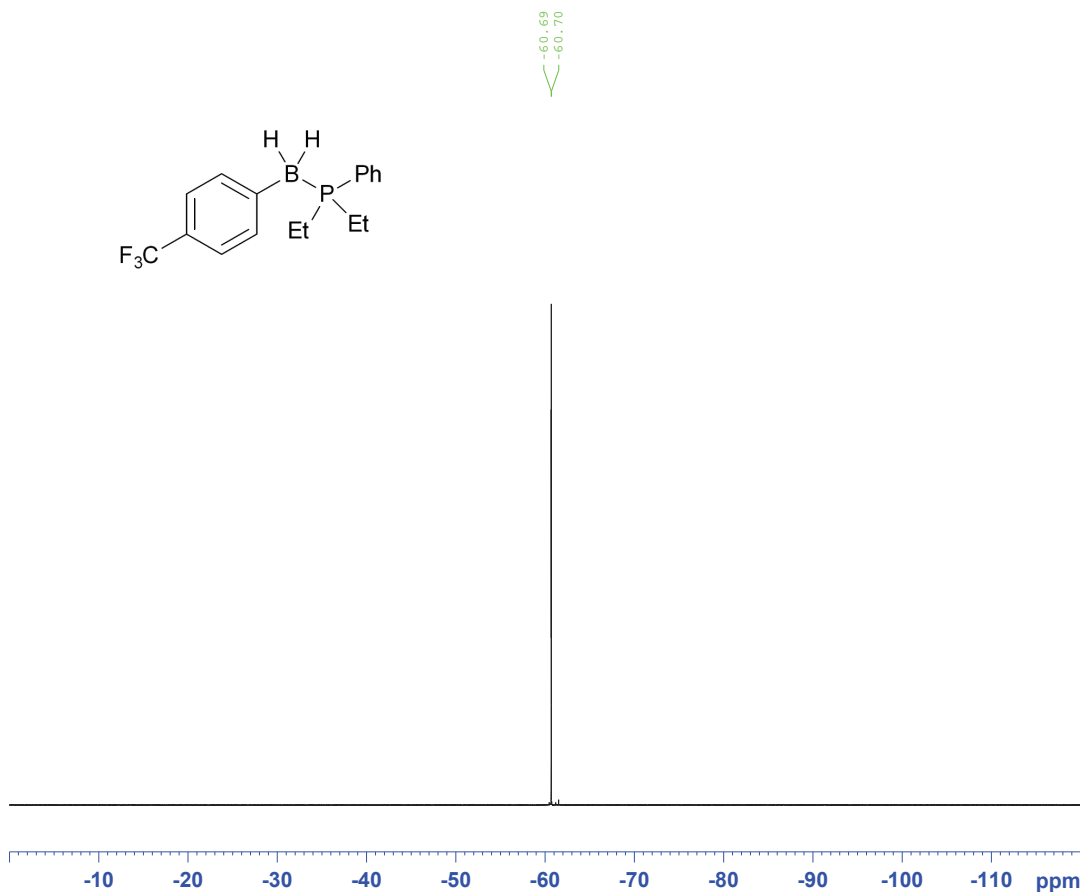
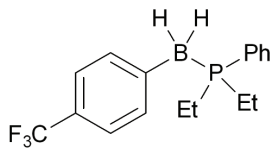


4CF3PhBH2Et2Ph 11-21Fr

IBB-nmr Analysis



4CF3PhBH2Et2Ph 11-21Fr



IBB-nmr Analysis

```

NAME      Feb11-2022
EXPNO     3
PROCNO    1
Date_     20220211
Time      18.32
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.2 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

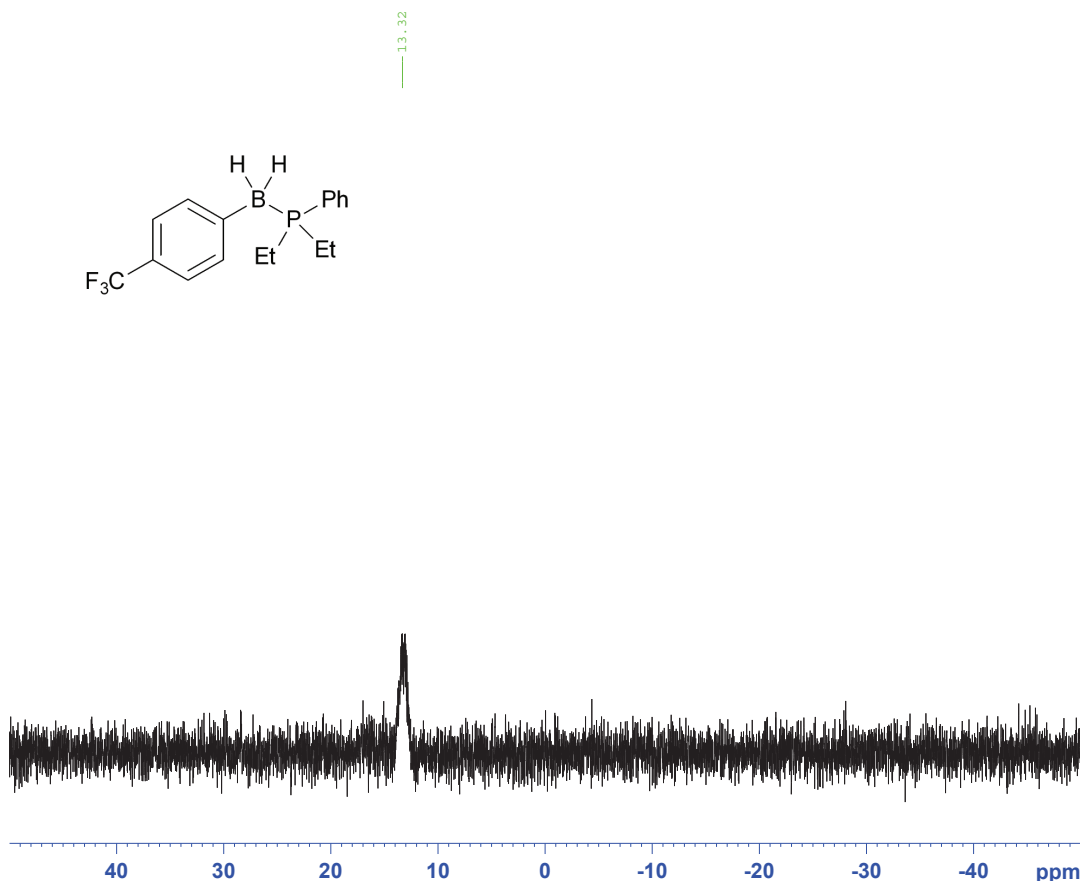
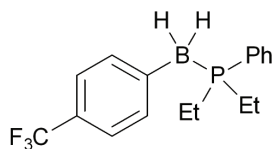
```

===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2       -4.00 dB
PL12      18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF        376.4984617 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

4CF3PhBH2Et2Ph 11-21Fr



IBB-nmr Analysis

```

NAME      Feb11-2022
EXPNO     2
PROCNO    1
Date_     20220211
Time      18.28
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         8
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.4 K
D1         2.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

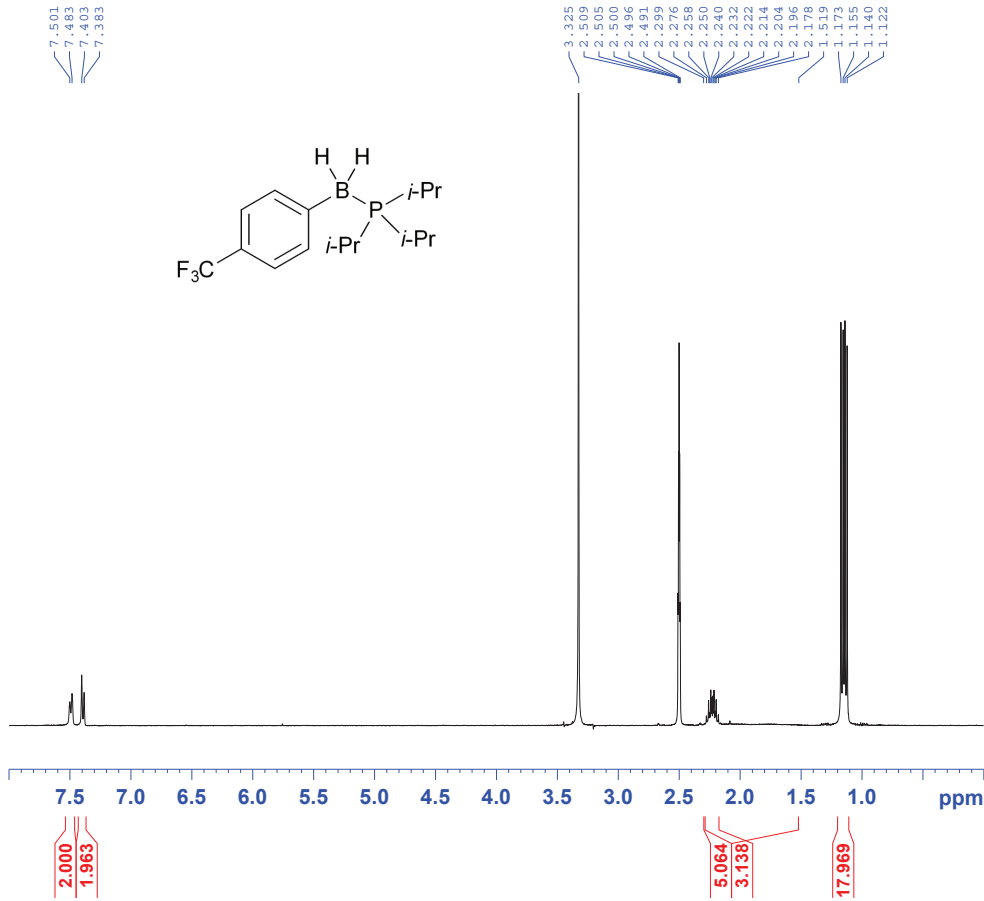
```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF        161.9754962 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

4CF3PhBH2P(i-Pr)3

B-4-(Trifluoromethyl)phenyl trisopropylphosphine-borane (32)

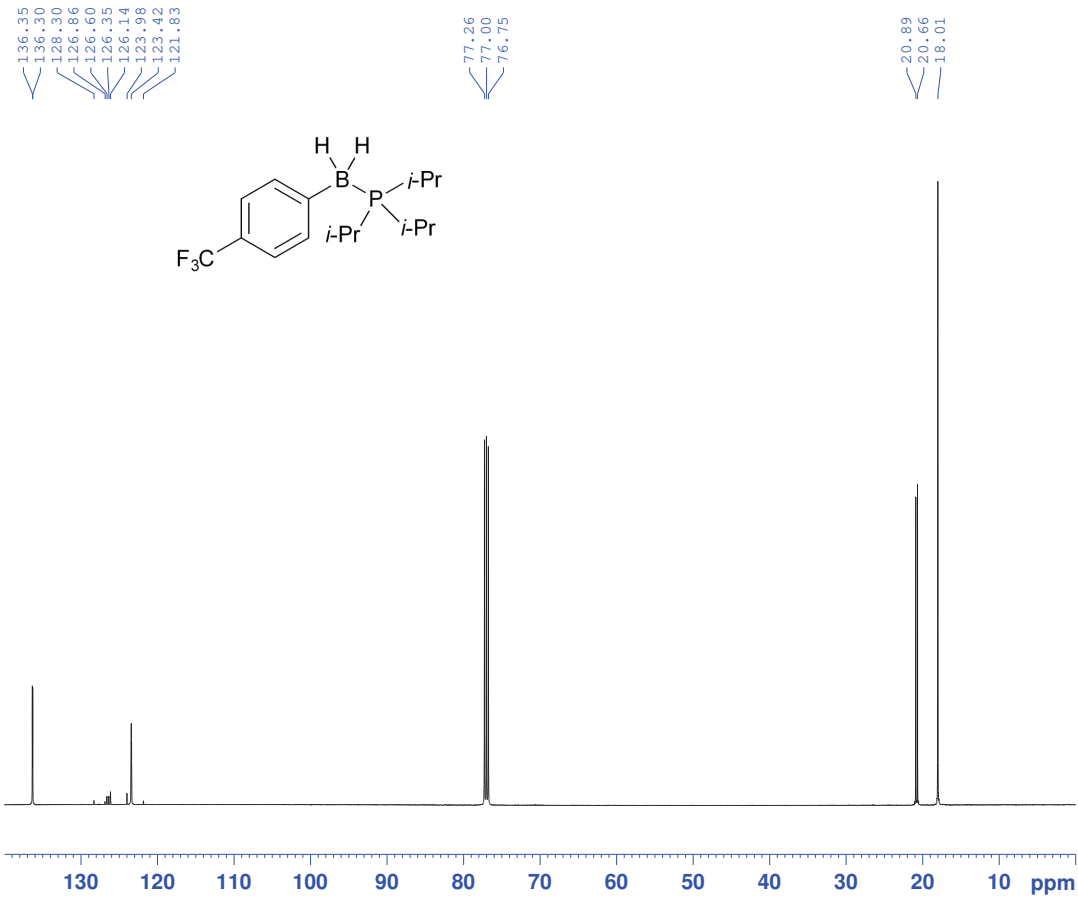
IBB-nmr Analysis



NAME May28-2022
 EXPNO 10
 PROCNO 1
 Date_ 20220528
 Time 22.52
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300034 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

4CF3PhBH2P(i-Pr)3



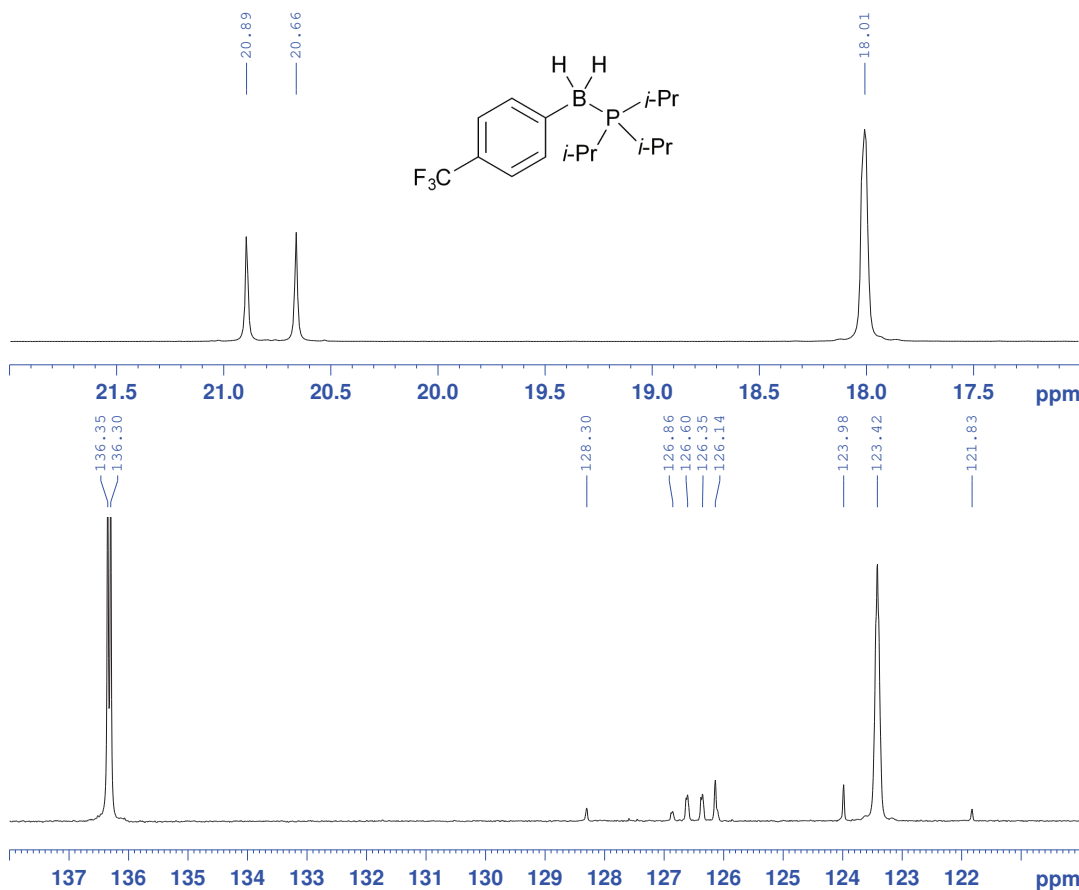
IBB-nmr Analysis

NAME Mar08-2024
 EXPNO 9
 PROCNO 1
 Date_ 20240308
 Time 5.14
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz
 ===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577928 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P(i-Pr)3

IBB-nmr Analysis



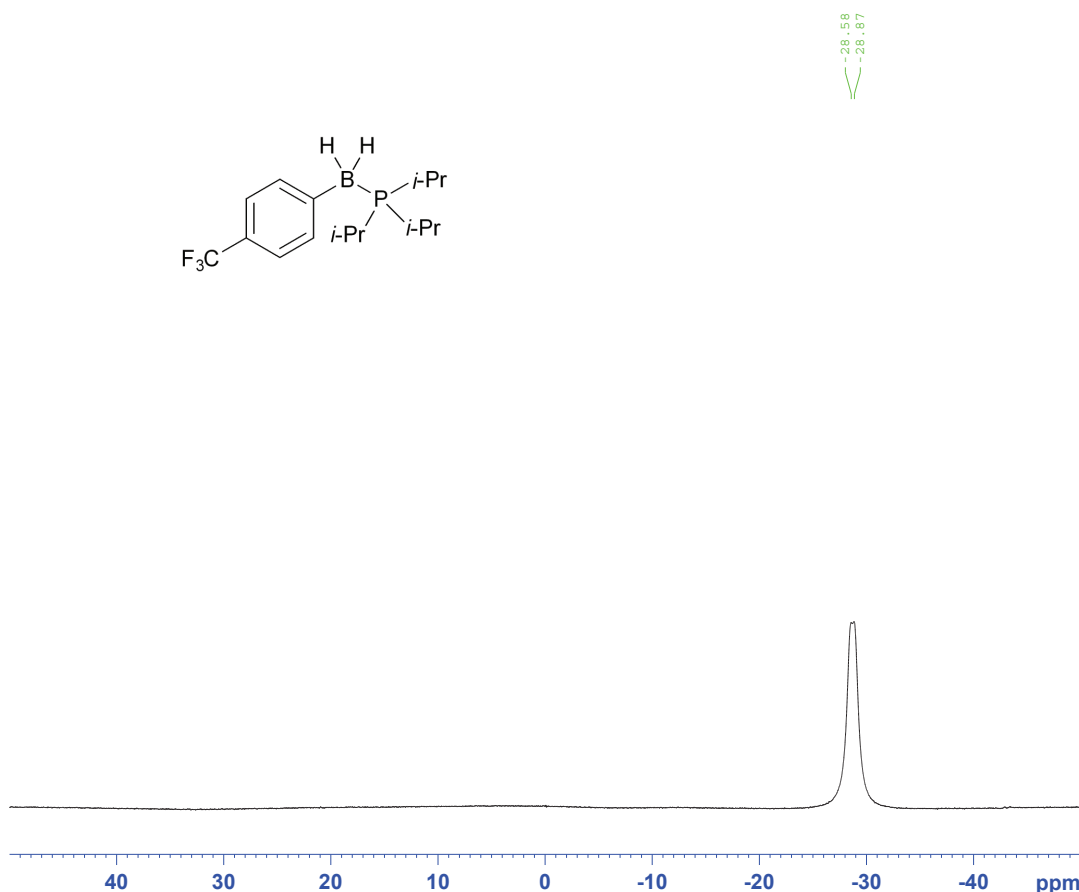
NAME Mar08-2024
 EXPNO 9
 PROCNO 1
 Date_ 20240308
 Time 5.14
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577928 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P(i-Pr)3

IBB-nmr Analysis

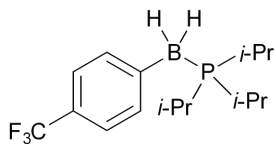


NAME Apr10-2022
 EXPNO 5
 PROCNO 1
 Date_ 20220410
 Time 19.49
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 296.5 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

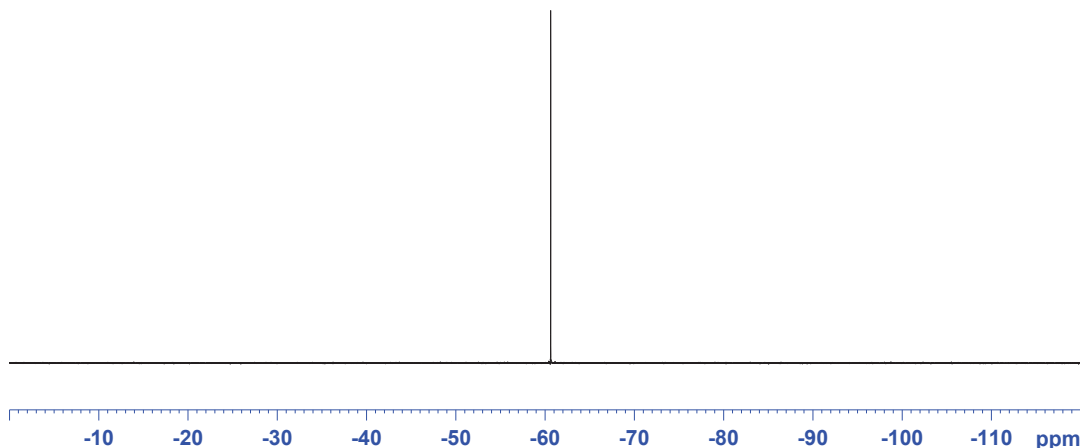
===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2P(i-Pr)3



-60.62
-60.63



IBB-nmr Analysis

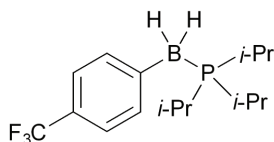
```
NAME      May27-2022
EXPNO     2
PROCNO    1
Date_     20220527
Time      23.39
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.2 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2       112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W        24.60733604 W
PL12W       0.15526180 W
SFO2        400.1316005 MHz
SI          65536
SF          376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```

4CF3PhBH2P(i-Pr)3

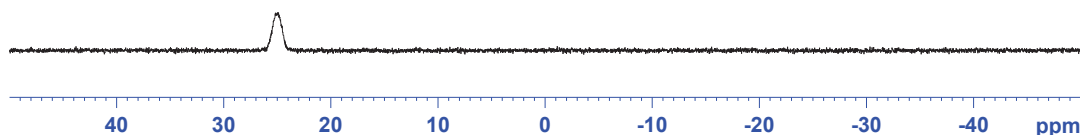
24.32



IBB-nmr Analysis

```
NAME      Apr10-2022
EXPNO     7
PROCNO    1
Date_     20220410
Time      19.55
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         16
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.0 K
D1         2.00000000 sec
D11        1
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```



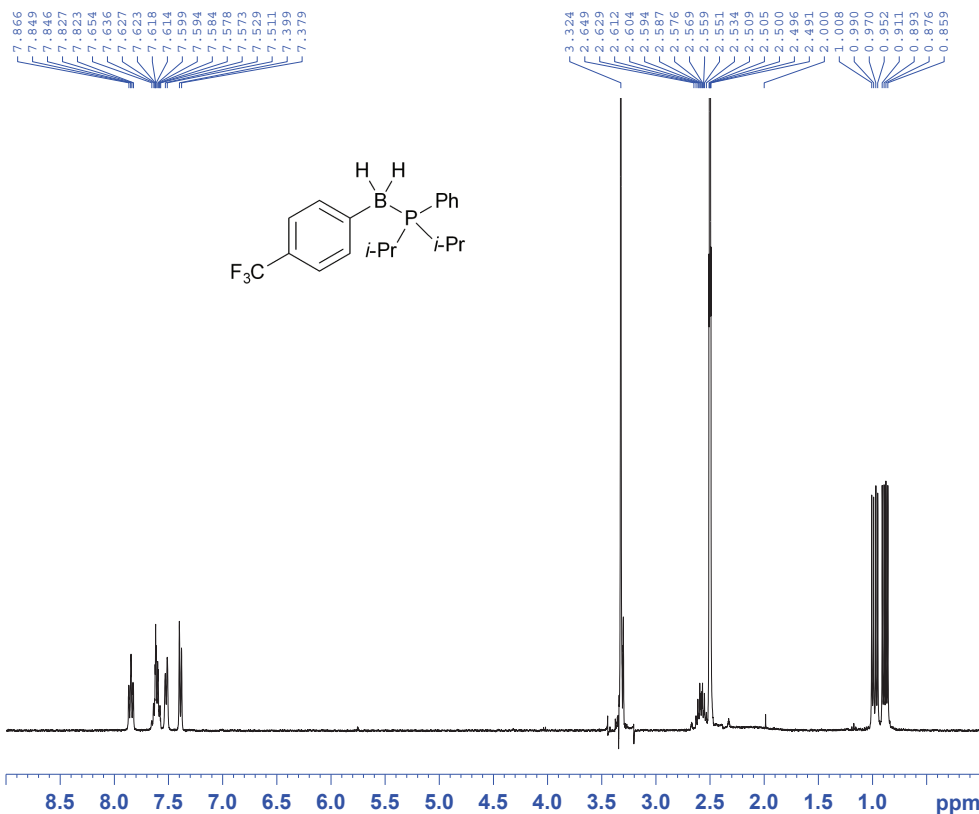
4CF3PhBH2PPh(i-Pr)2

B-4-(Trifluoromethyl)phenyl diisopropyl(phenyl)phosphine-borane (33)

IBB-nmr Analysis

NAME May28-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220528
 Time_ 19.10
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.1 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



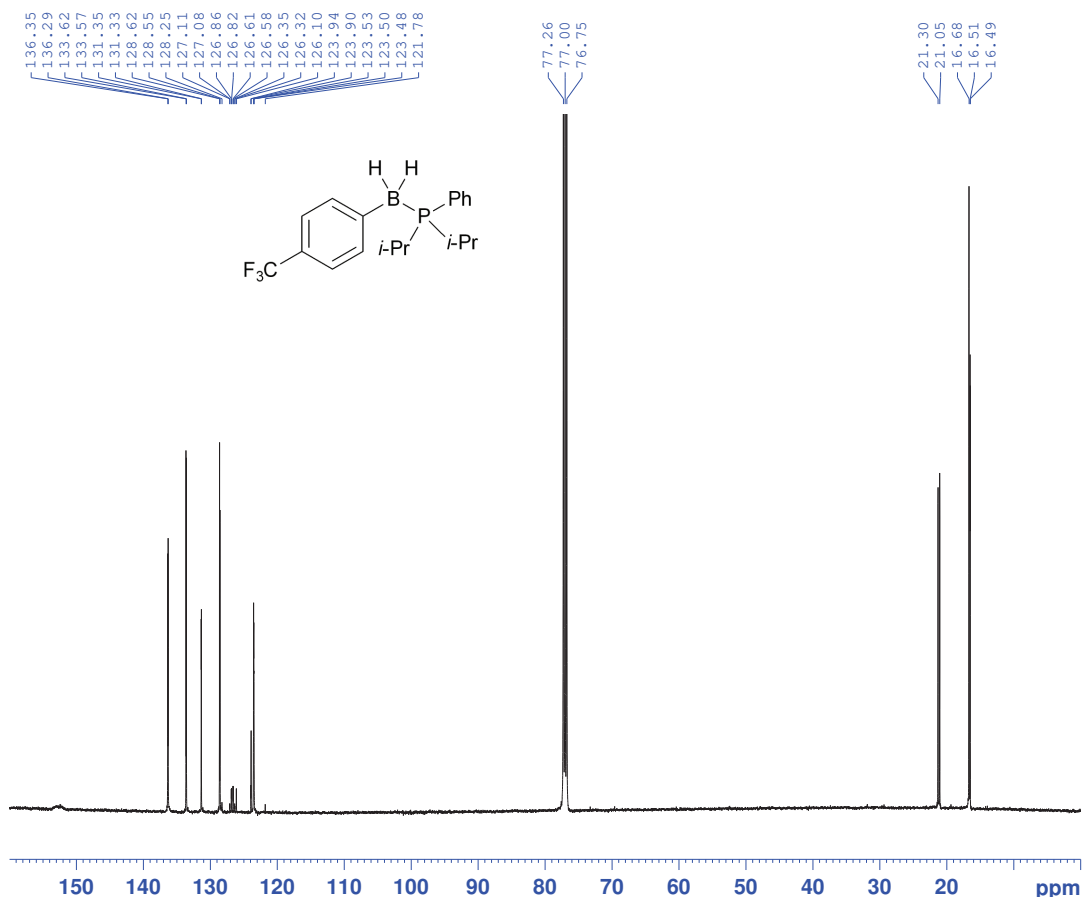
4CF3PhBH2PPh(i-Pr)2

IBB-nmr Analysis

NAME Mar06-2024
 EXPNO 13
 PROCNO 1
 Date_ 20240306
 Time_ 20.54
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 1024
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 297.9 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

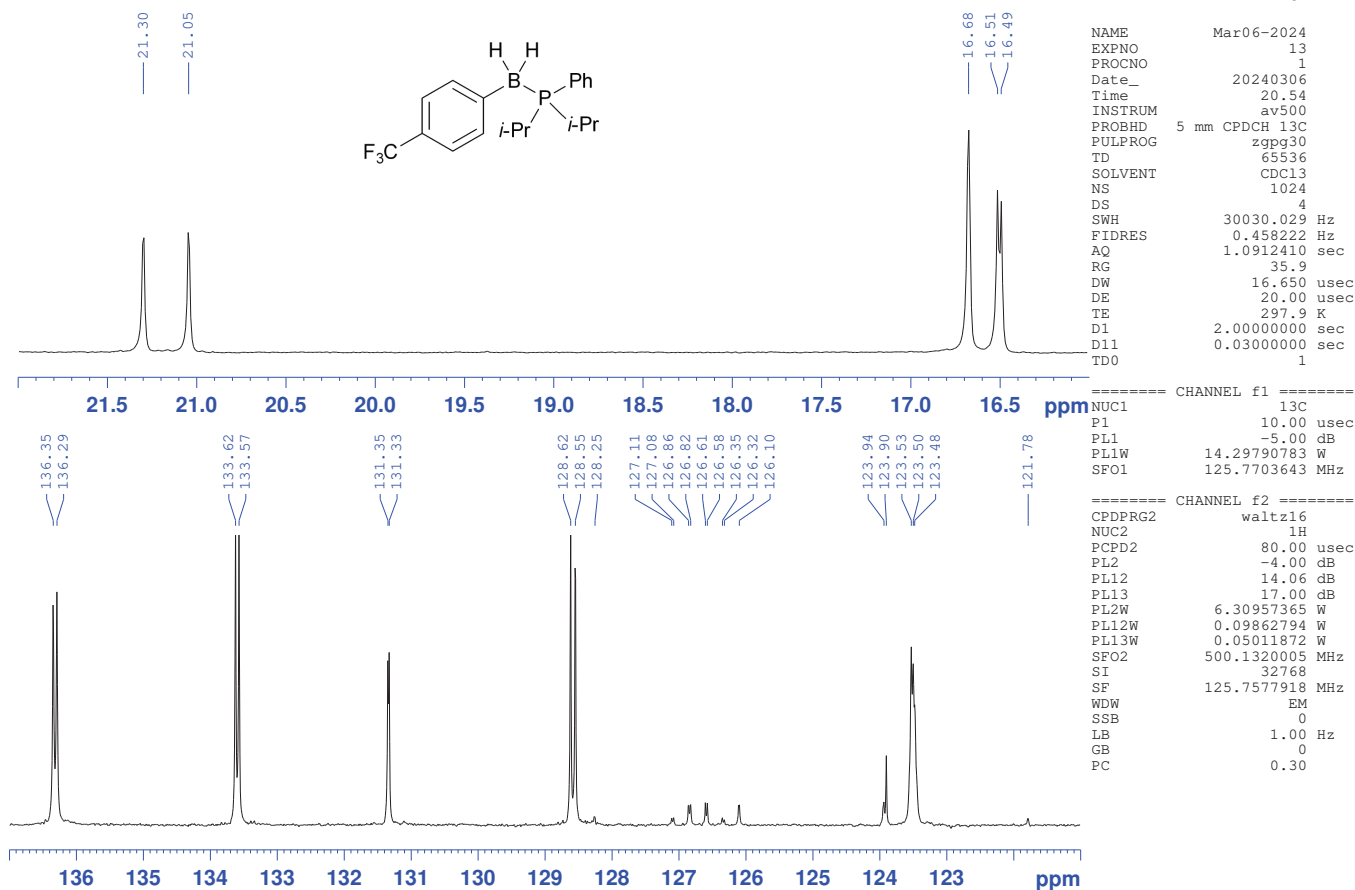
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577918 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



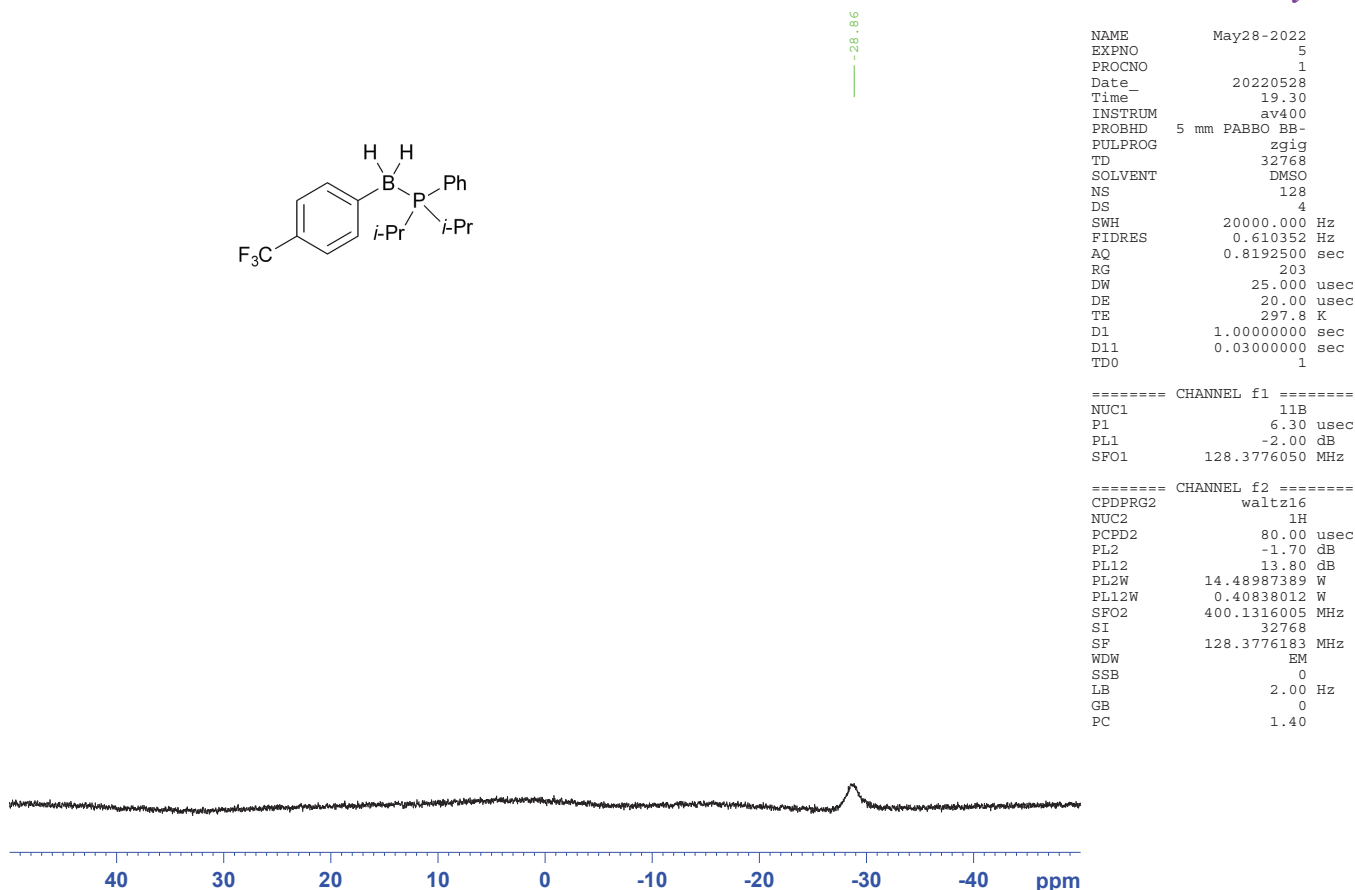
4CF3PhBH2PPh(i-Pr)2

IBB-nmr Analysis

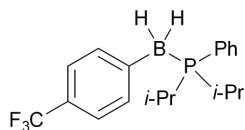


4CF3PhBH2PPh(i-Pr)2

IBB-nmr Analysis



4CF3PhBH2PPh(i-Pr)2



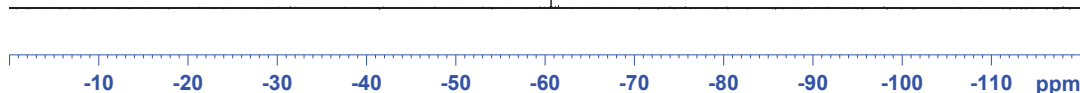
-60.67
-60.68

IBB-nmr Analysis

```
NAME      May28-2022
EXPNO      4
PROCNO     1
Date_      20220528
Time       19.23
INSTRUM    av400
PROBHD     5 mm PABBO BB-
PULPROG    zgfhigqn
TD         131072
SOLVENT    DMSO
NS          8
DS          4
SWH         89285.711 Hz
FIDRES      0.681196 Hz
AQ          0.7340532 sec
RG          203
DW          5.600 usec
DE          6.50 usec
TE          297.2 K
D1          1.00000000 sec
D11         0.03000000 sec
D12         0.00002000 sec
TD0         1
```

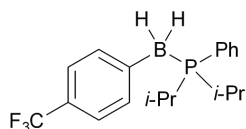
```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB          0
LB          0.30 Hz
GB          0
PC          1.00
```



4CF3PhBH2PPh(i-Pr)2

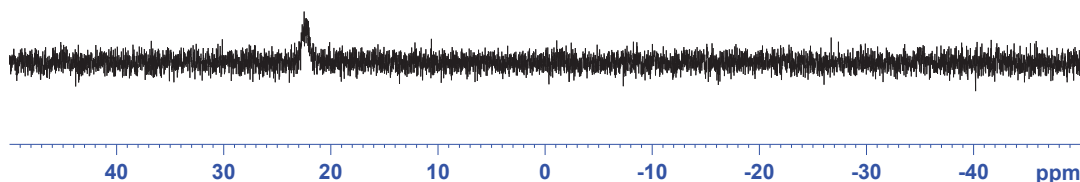
22.49



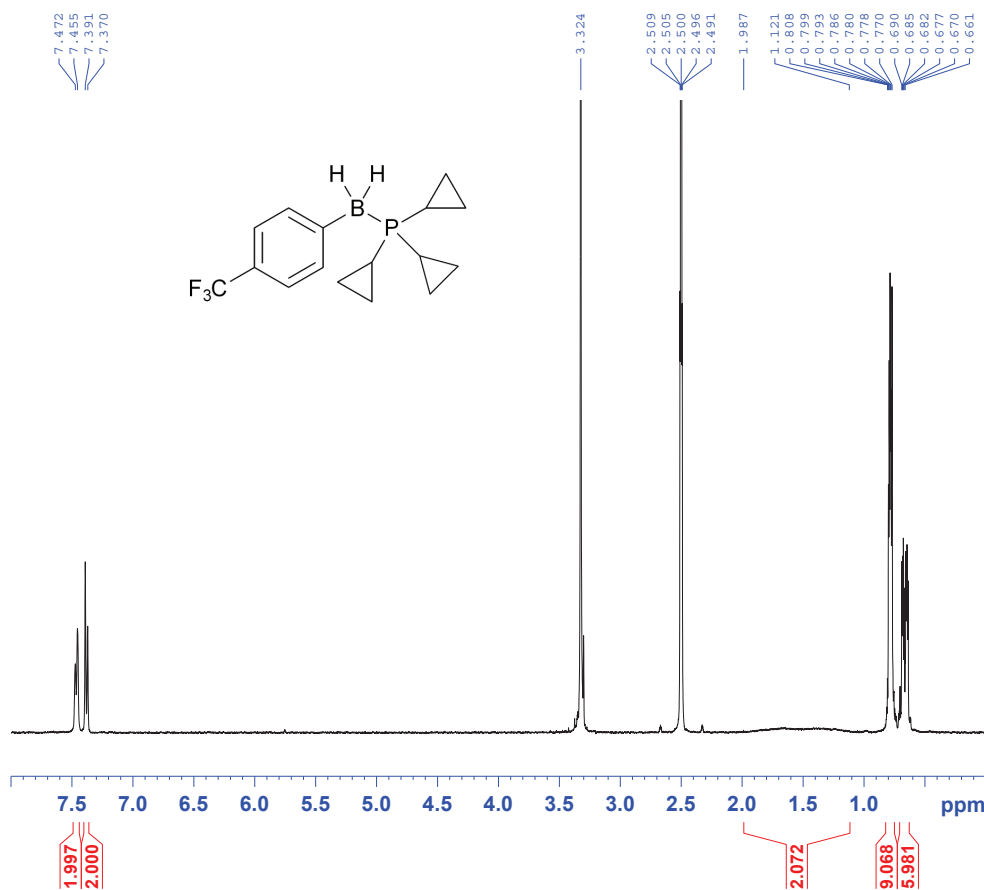
IBB-nmr Analysis

```
NAME      May28-2022
EXPNO      3
PROCNO     1
Date_      20220528
Time       19.20
INSTRUM    av400
PROBHD     5 mm PABBO BB-
PULPROG    zg30
TD         65536
SOLVENT    DMSO
NS         128
DS          4
SWH         64102.563 Hz
FIDRES      0.978127 Hz
AQ          0.5112308 sec
RG          203
DW          7.800 usec
DE          6.50 usec
TE          297.1 K
D1          2.00000000 sec
TD0         1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB          0
LB          1.00 Hz
GB          0
PC          1.40
```



4CF3PhBH2P(cyclopropyl)3 8-15Fr B-4-(Trifluoromethyl)phenyl tricyclopropylphosphine-borane (34)

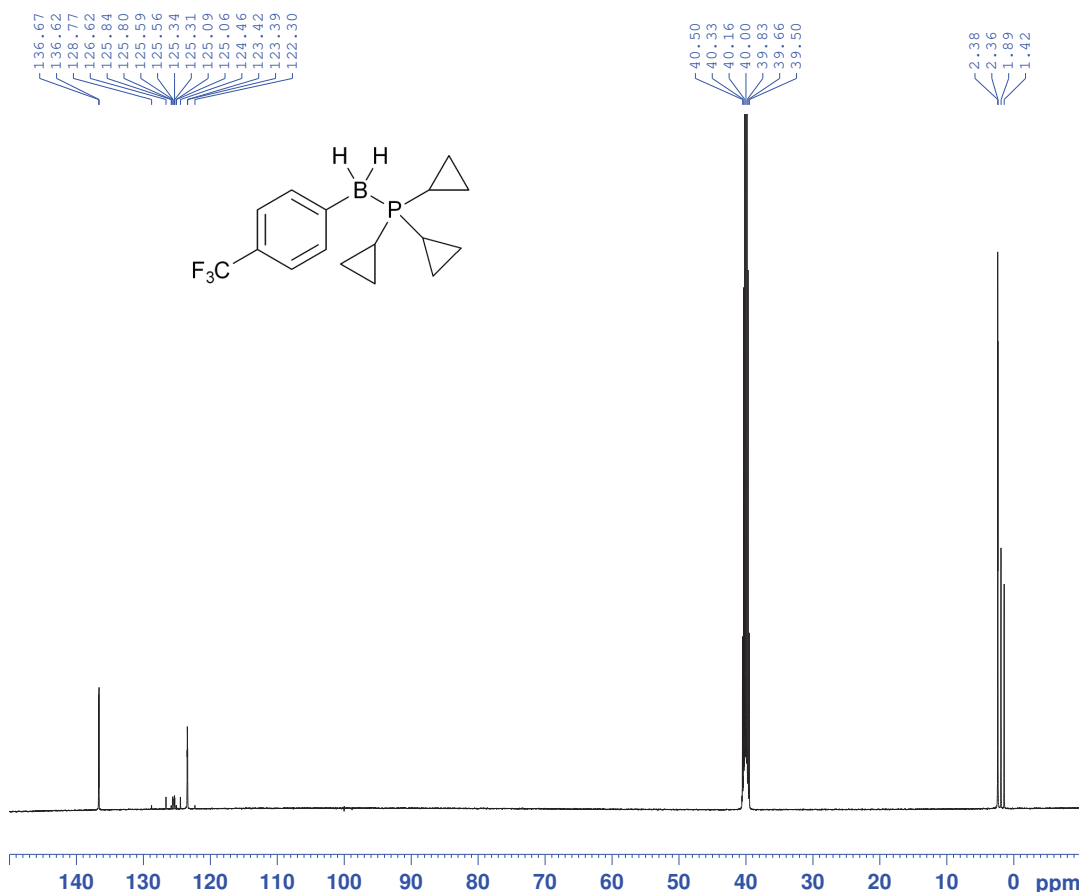


IBB-nmr Analysis

NAME July14-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220713
 Time_ 23.54
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.1 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

4CF3PhBH2P(cyclopropyl)3



IBB-nmr Analysis

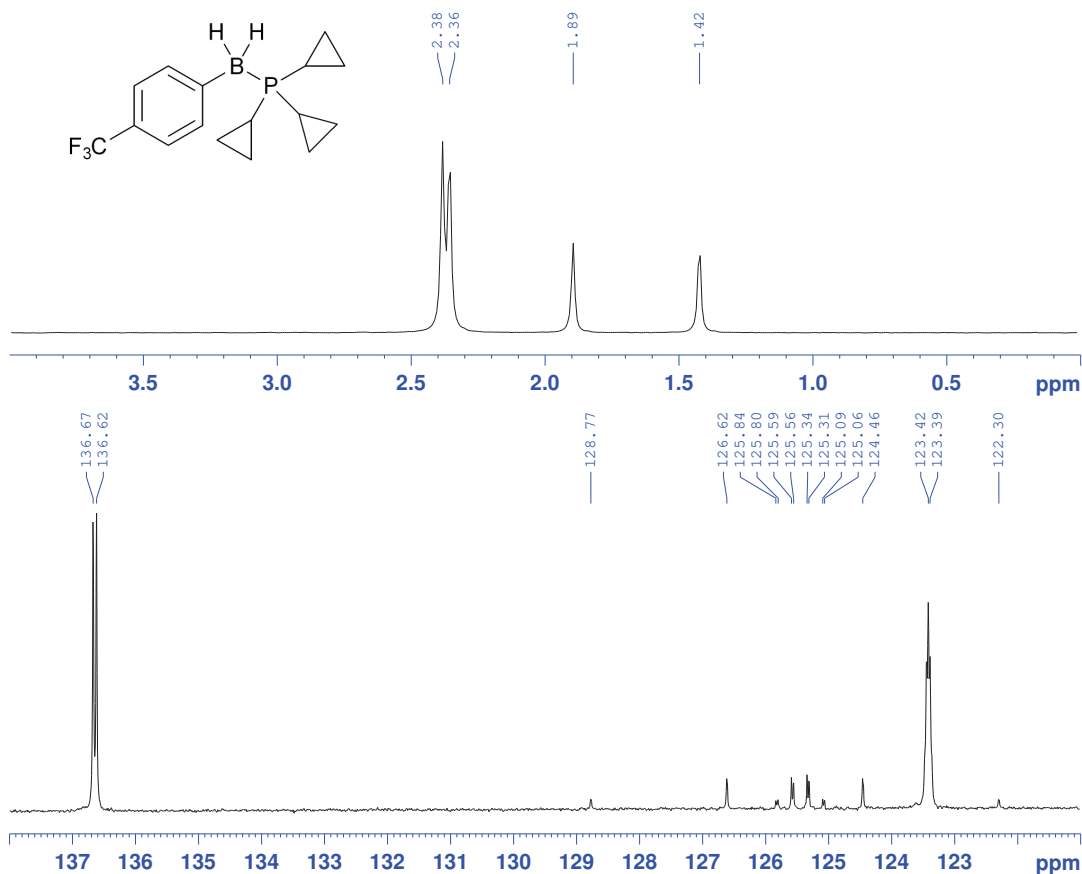
NAME Mar06-2024
 EXPNO 5
 PROCNO 1
 Date_ 20240306
 Time_ 1.42
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577875 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P (cyclopropyl) 3

IBB-nmr Analysis



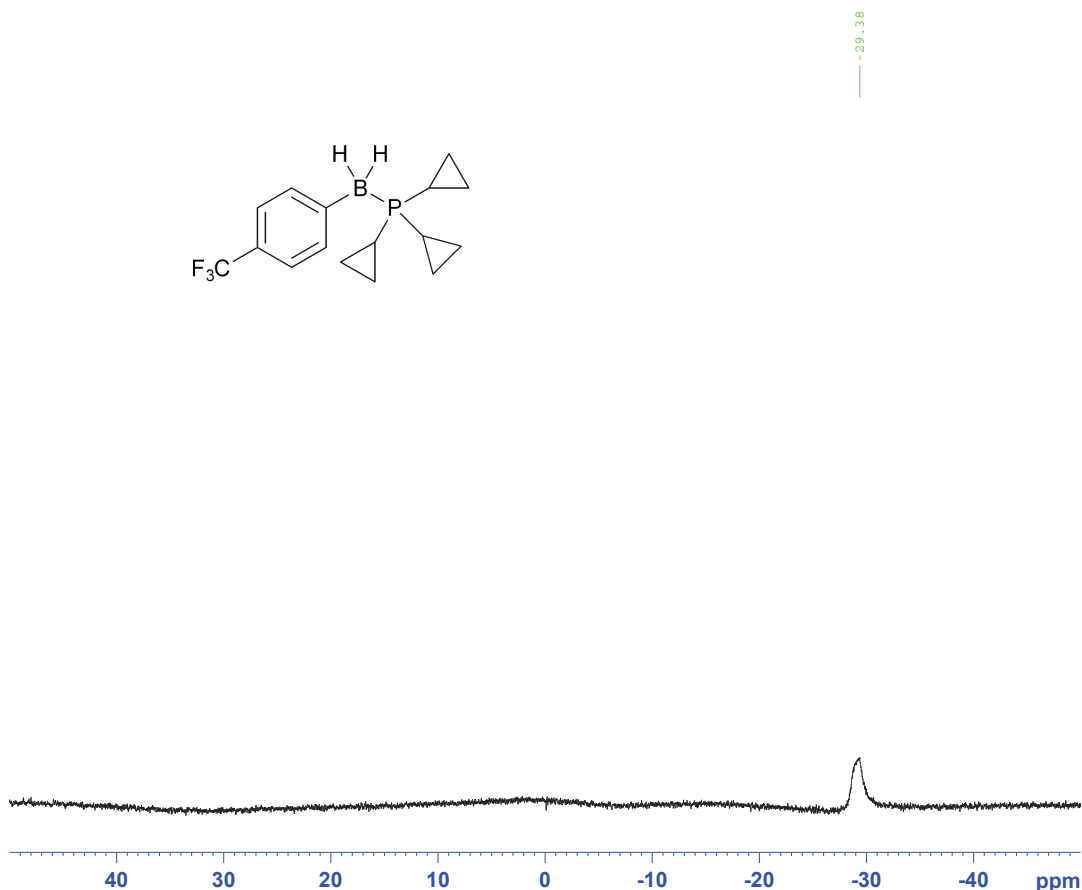
NAME Mar06-2024
 EXPNO 5
 PROCNO 1
 Date_ 20240306
 Time 1.42
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 256
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577875 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P (cyclopropyl) 3 8-15Fr

IBB-nmr Analysis

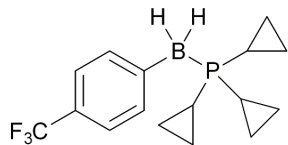


NAME July14-2022
 EXPNO 4
 PROCNO 1
 Date_ 20220714
 Time 0.10
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.8 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2P(cyclopropyl)3 8-15Fr



-60.62
-60.63

IBB-nmr Analysis

```

NAME      July14-2022
EXPNO     2
PROCNO    1
Date_     20220713
Time      23.57
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.2 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
  
```

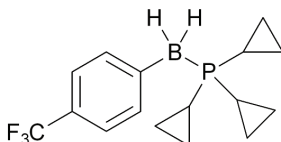
```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2        -4.00 dB
PL12       18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF        376.4984617 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB          0
PC          1.00
  
```



4CF3PhBH2P(cyclopropyl)3 8-15Fr

17.69



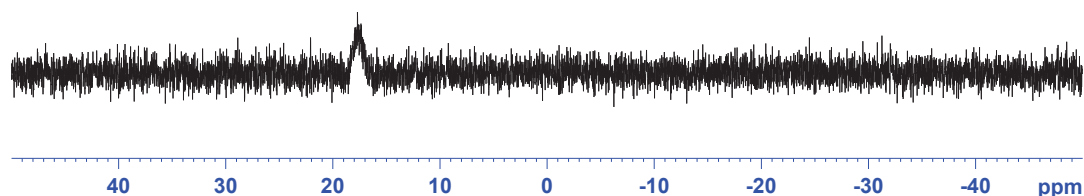
IBB-nmr Analysis

```

NAME      July14-2022
EXPNO     3
PROCNO    1
Date_     20220714
Time      0.03
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         297.1 K
D1         2.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF        161.9754962 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB          0
PC          1.40
  
```



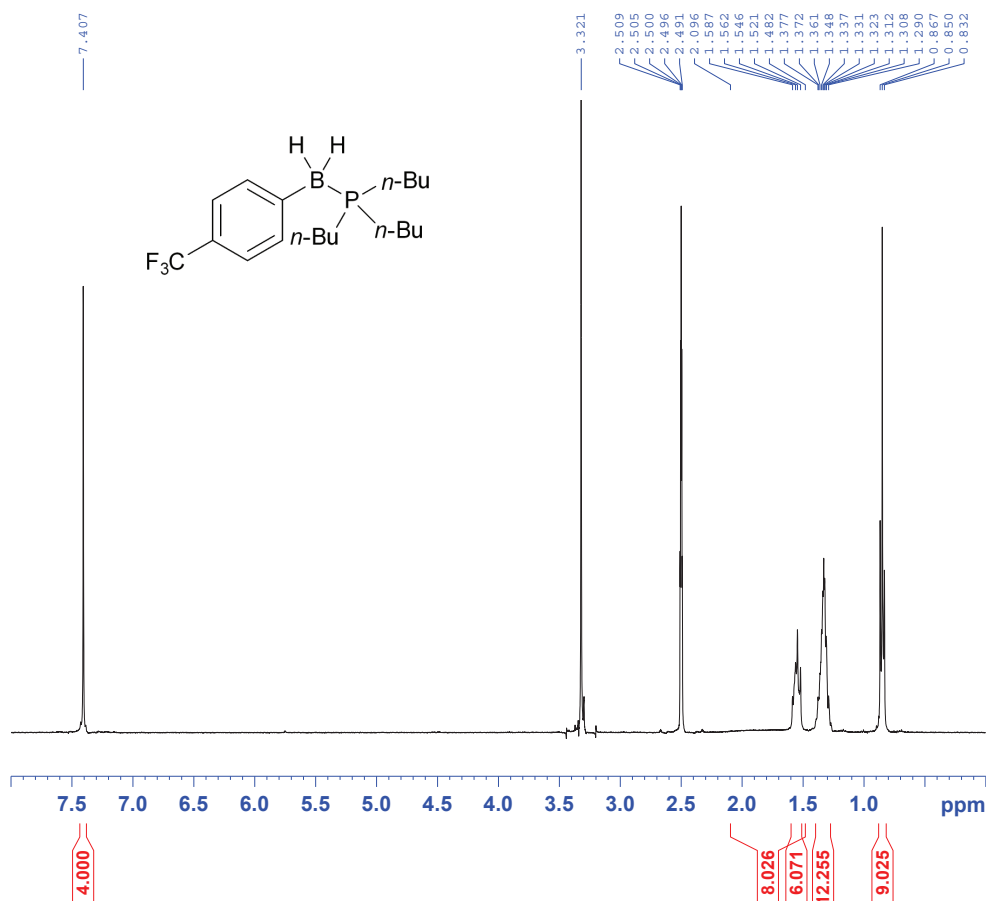
4CF3PhBH2P(n-Bu)3 recolumn

B-4-(Trifluoromethyl)phenyl tri-n-butylphosphine-borane (35)

IBB-nmr Analysis

NAME July26-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220726
 Time_ 21.28
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.8 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



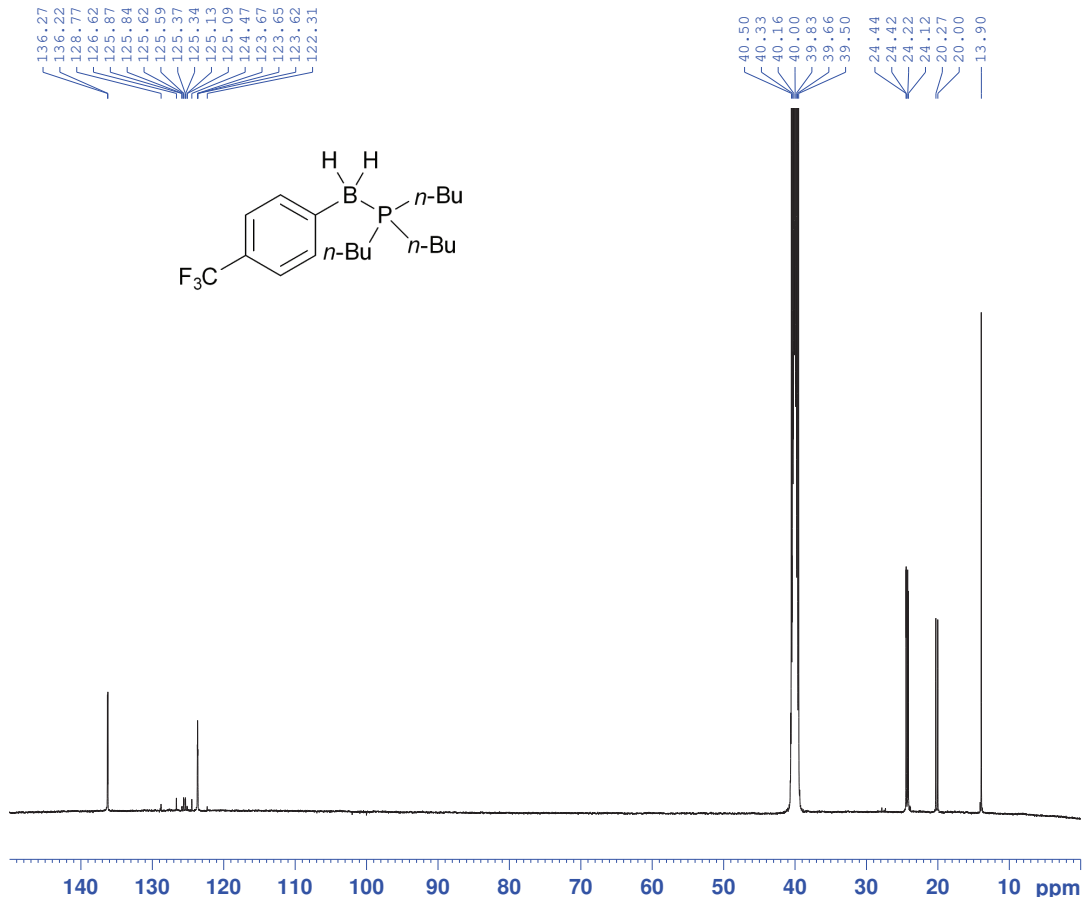
4CF3PhBH2P(n-Bu)3 recolumn

IBB-nmr Analysis

NAME July28-2022
 EXPNO 2
 PROCNO 1
 Date_ 20220729
 Time_ 5.28
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 8192
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

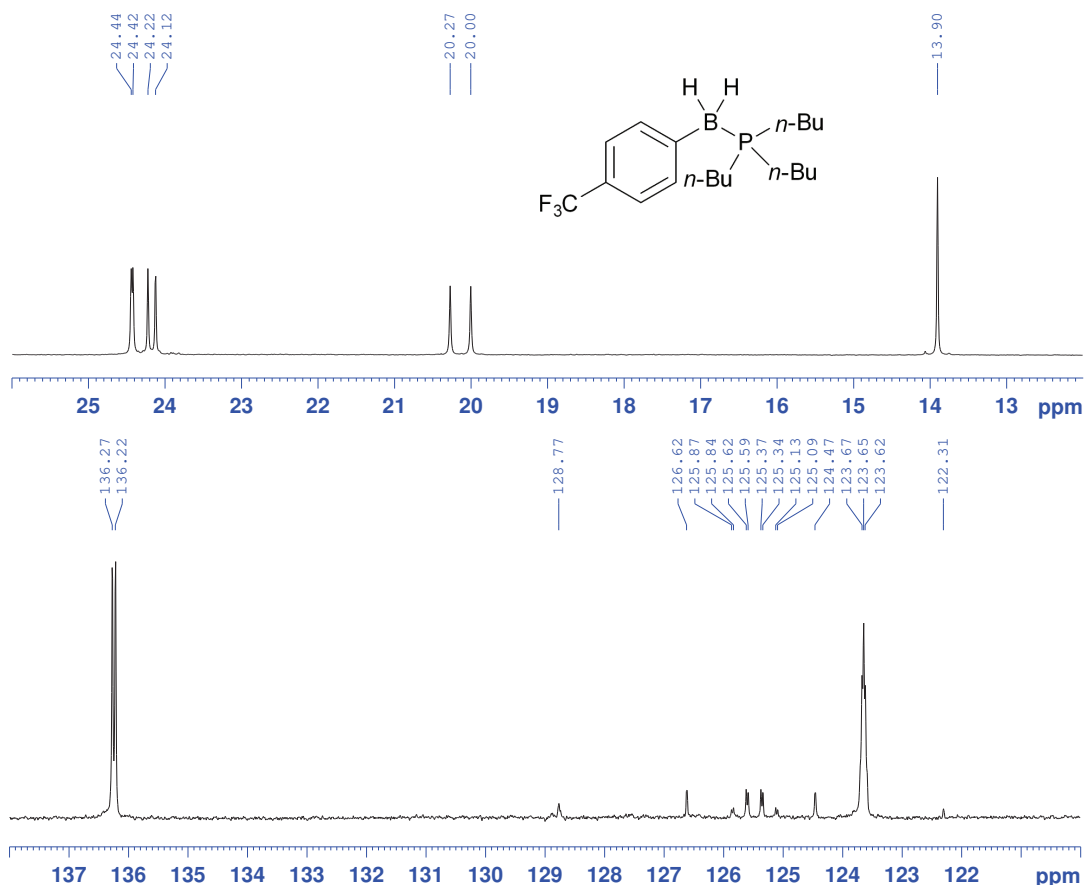
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577866 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



4CF3PhBH2P(n-Bu)3 recolumn

IBB-nmr Analysis



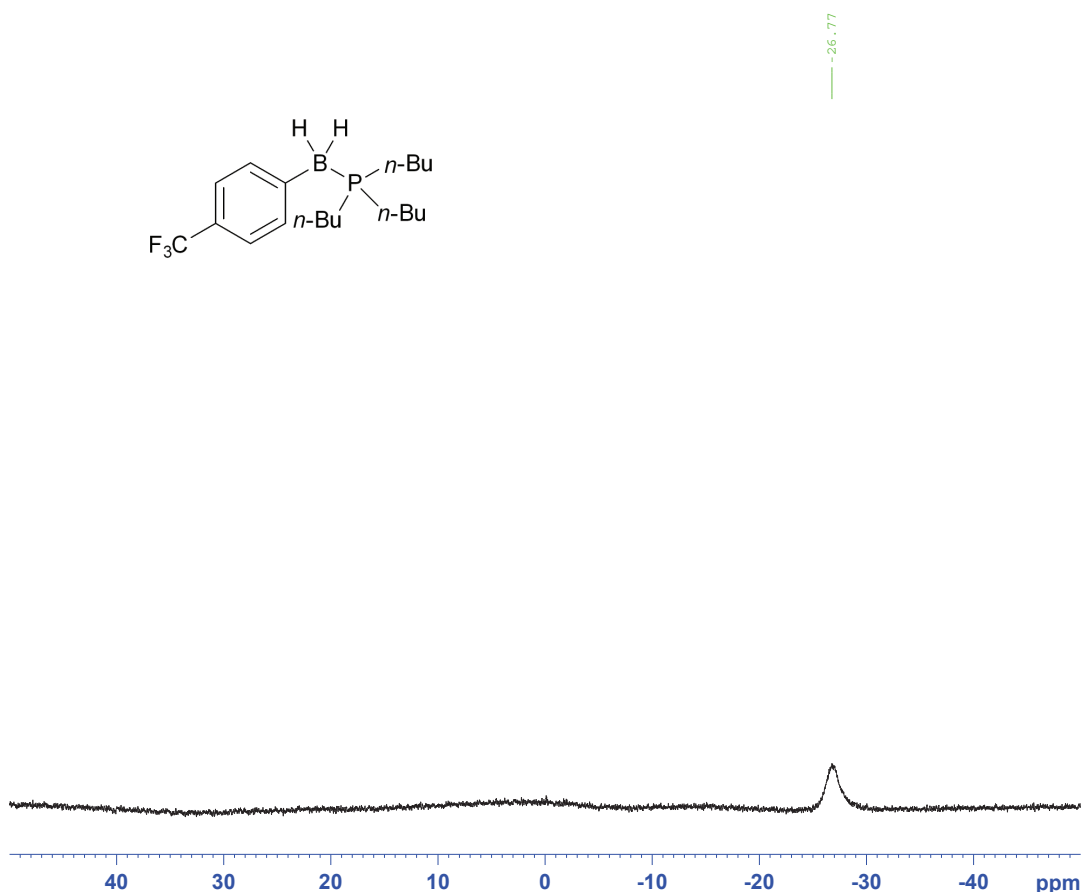
NAME July28-2022
 EXPNO 2
 PROCNO 1
 Date_ 20220729
 Time 5.28
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 8192
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577866 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P(n-Bu)3 recolumn

IBB-nmr Analysis

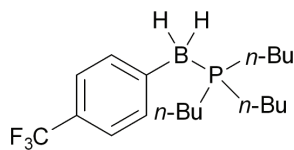


NAME July26-2022
 EXPNO 3
 PROCNO 1
 Date_ 20220726
 Time 21.39
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 298.4 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2P(n-Bu)3 recolumn



-60.65
-60.66

IBB-nmr Analysis

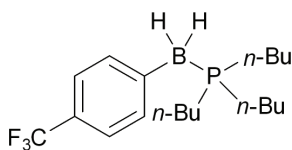
```
NAME      July26-2022
EXPNO     2
PROCNO    1
Date_     20220726
Time      21.32
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhgqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.9 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```



4CF3PhBH2P(n-Bu)3 recolumn

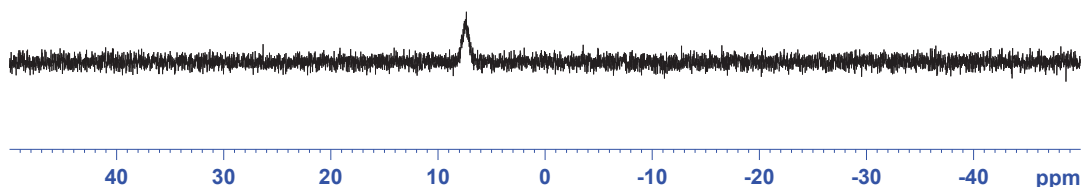


7.35

IBB-nmr Analysis

```
NAME      July26-2022
EXPNO     4
PROCNO    1
Date_     20220726
Time      21.45
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         64
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         297.8 K
D1         2.00000000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```



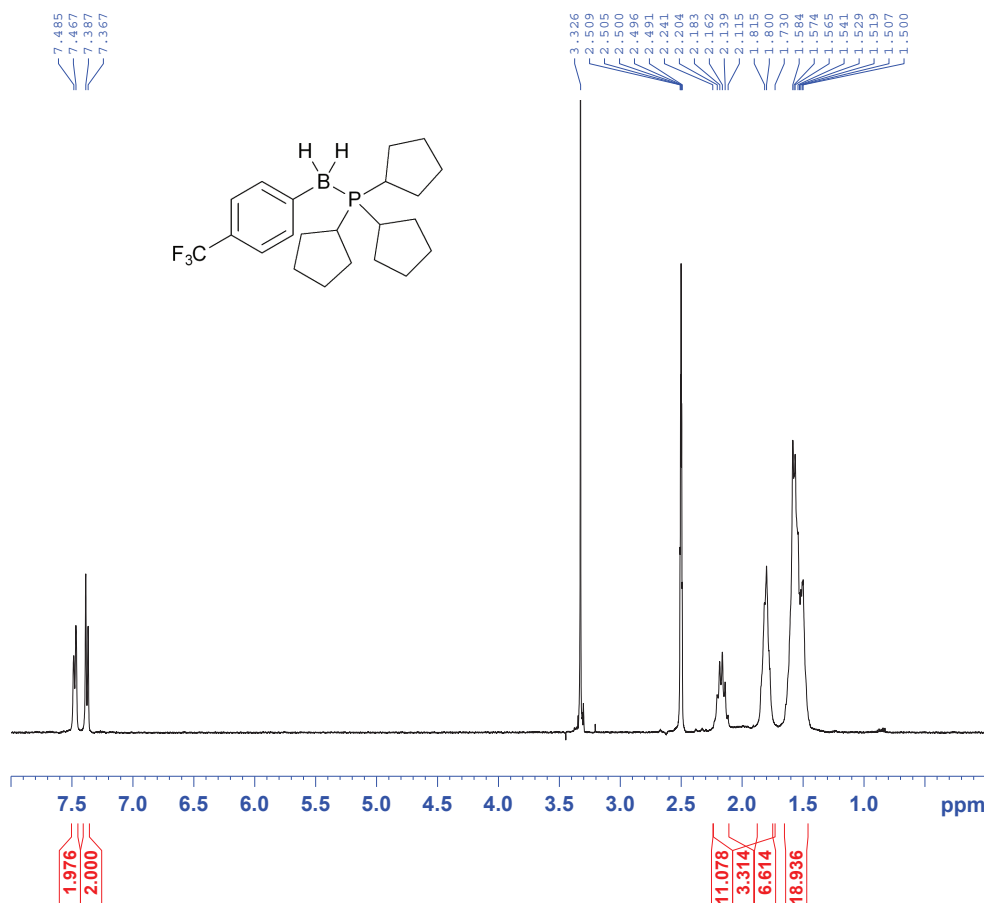
4-CF₃PhBH₂P(cyclopentyl)₃

B-4-(Trifluoromethyl)phenyl tricyclopentylphosphine-borane (36)

IBB-nmr Analysis

NAME Feb17-2022
 EXPNO 2
 PROCNO 1
 Date_ 20220217
 Time_ 22.09
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zg30
 TD 65536
 SOLVENT DMSO
 NS 4
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.125483 Hz
 AQ 3.9846387 sec
 RG 203
 DW 60.800 usec
 DE 6.50 usec
 TE 296.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

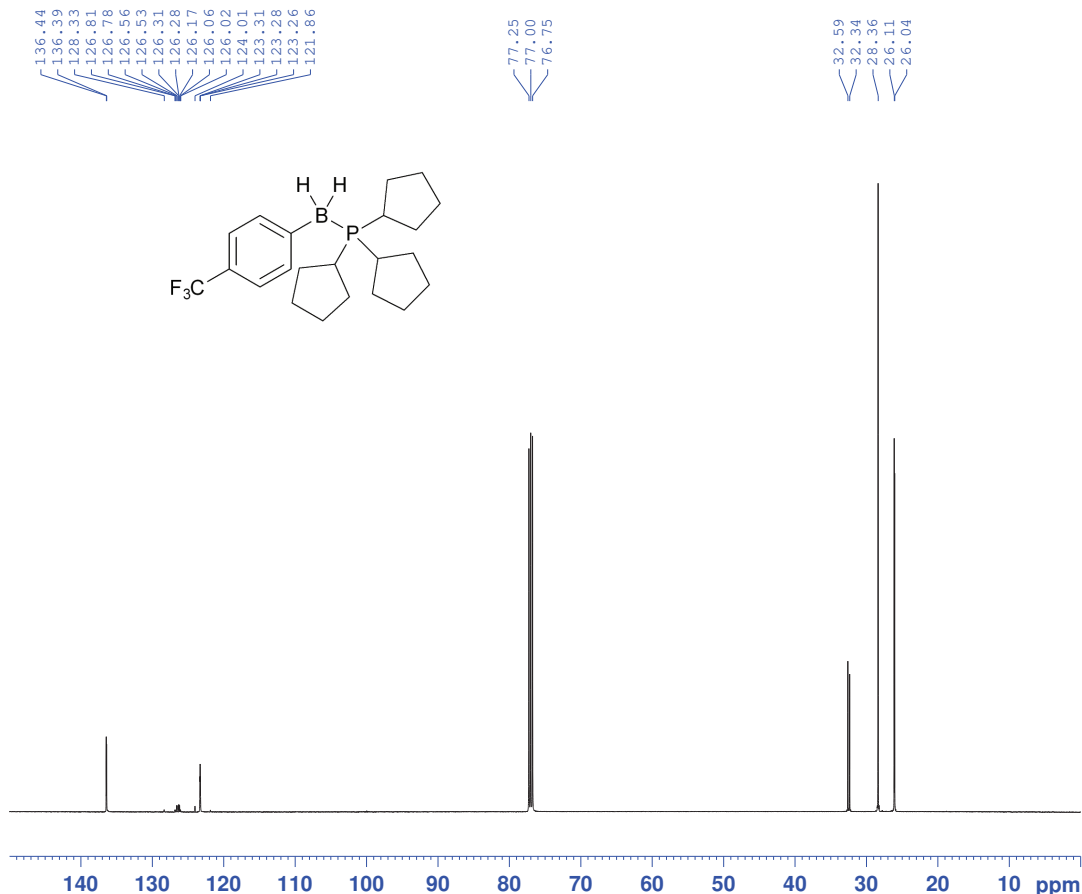
4CF₃PhBH₂P(cyclopentyl)₃

IBB-nmr Analysis

NAME Mar08-2024
 EXPNO 13
 PROCNO 1
 Date_ 20240308
 Time_ 7.10
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 512
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 35.9
 DW 16.650 usec
 DE 20.00 usec
 TE 298.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

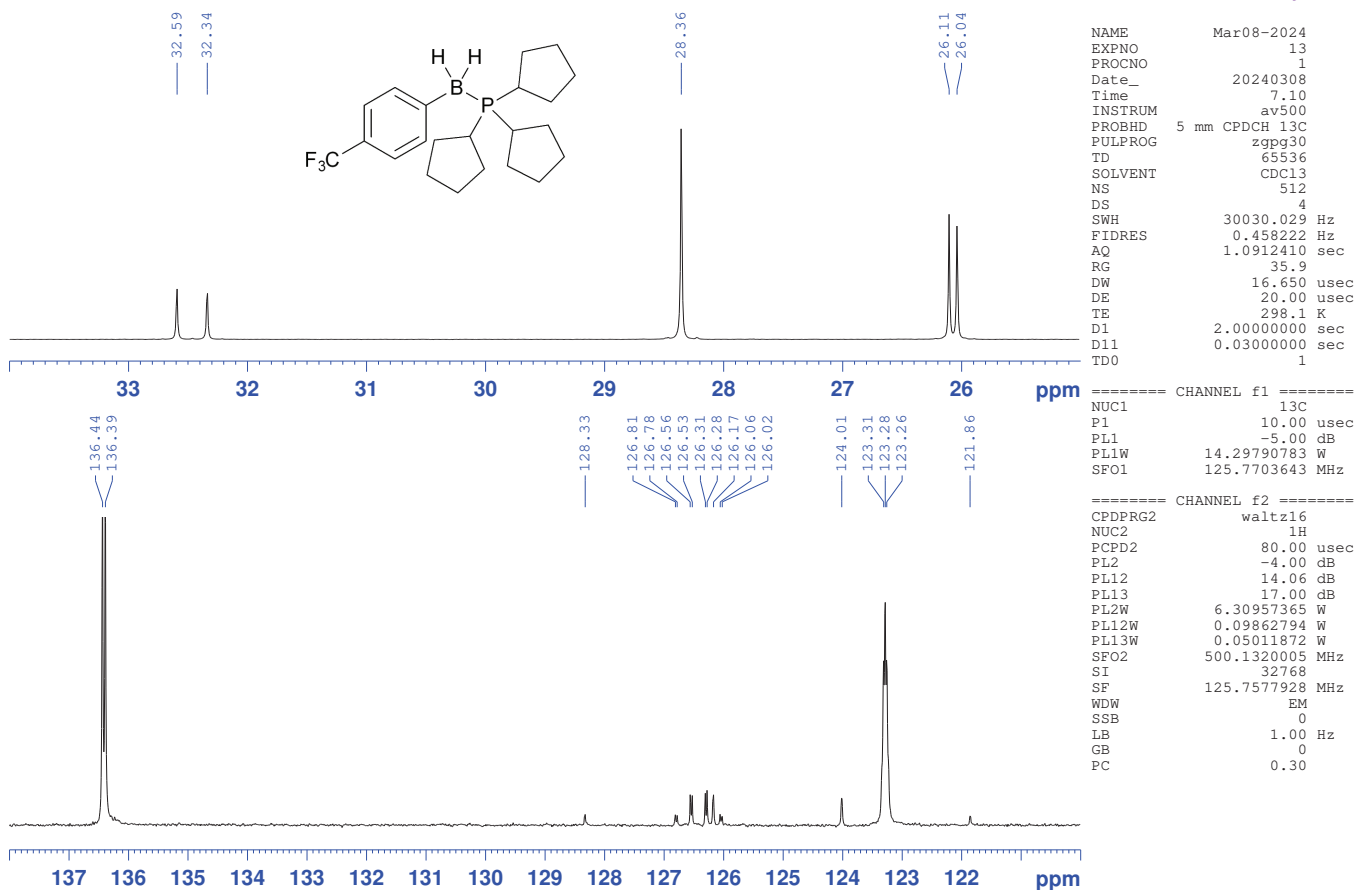
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30857365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577928 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



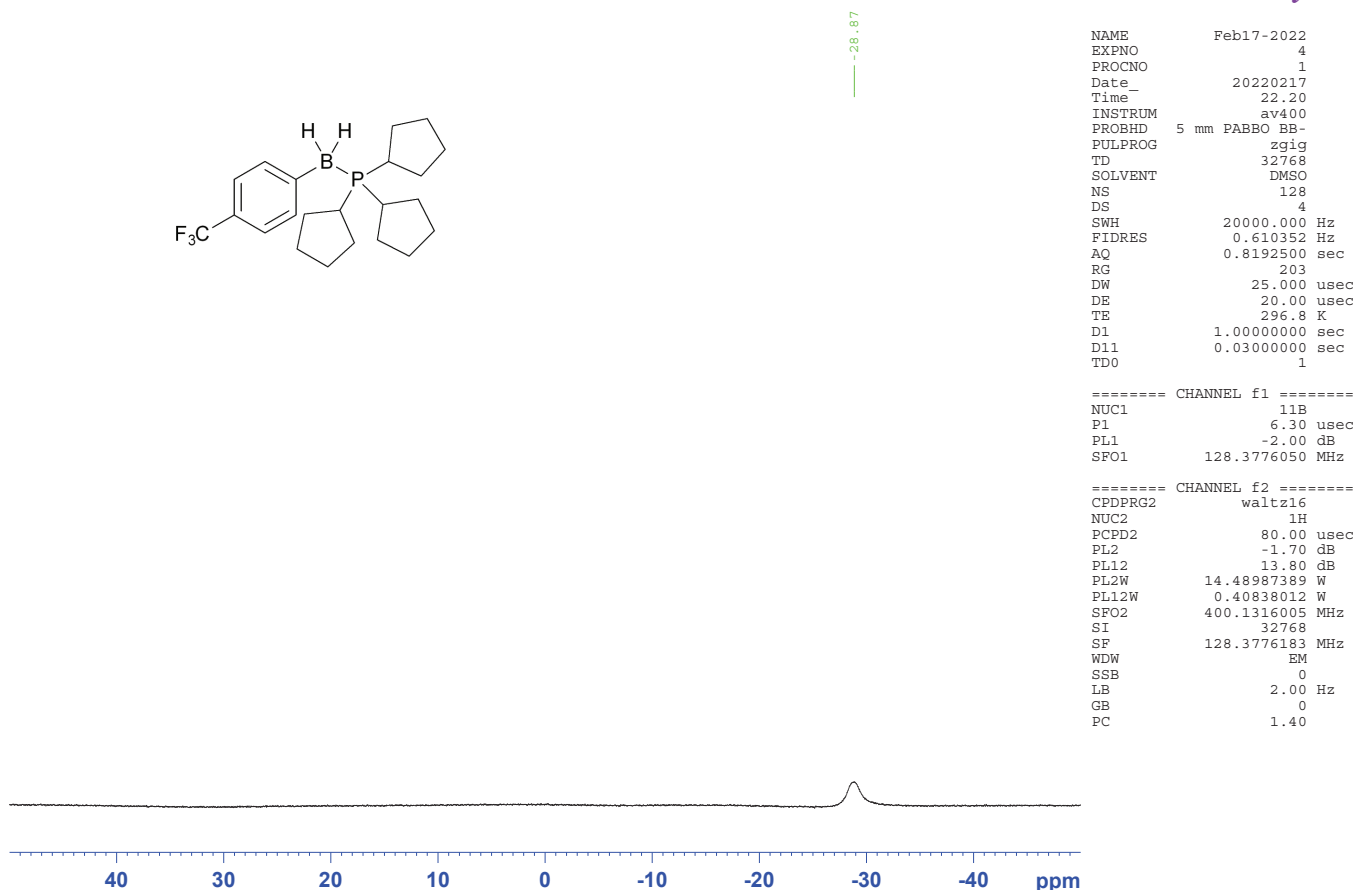
4CF3PhBH2P (cyclopentyl) 3

IBB-nmr Analysis

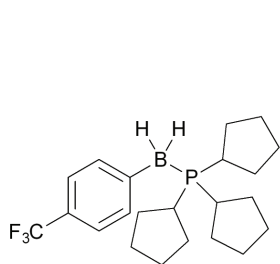


4-CF3PhBH2P (cyclopentyl) 3

IBB-nmr Analysis



4-CF₃PhBH₂P(cyclopentyl)₃



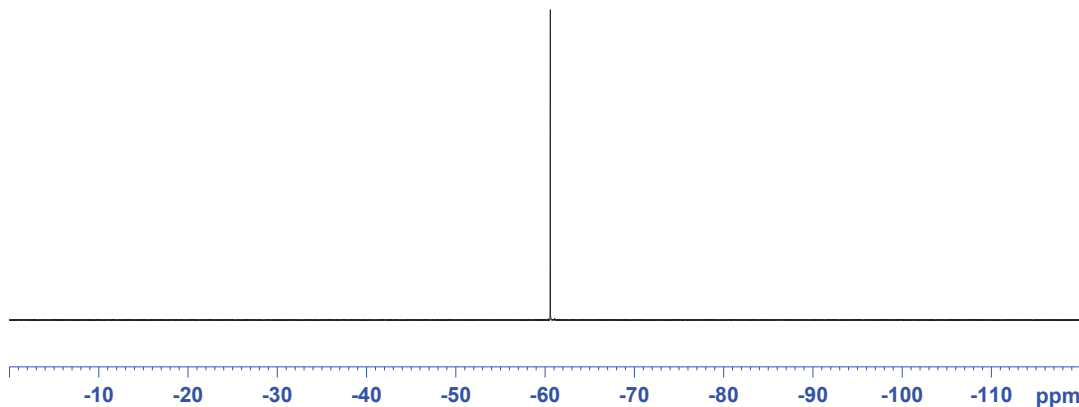
-60.58
-60.58
-60.59

IBB-nmr Analysis

```
NAME      Feb17-2022
EXPNO     5
PROCNO    1
Date_     20220217
Time      22.23
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD        131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         296.4 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

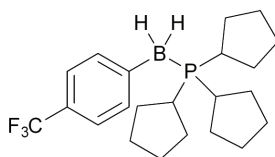
```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```



4-CF₃PhBH₂P(cyclopentyl)₃

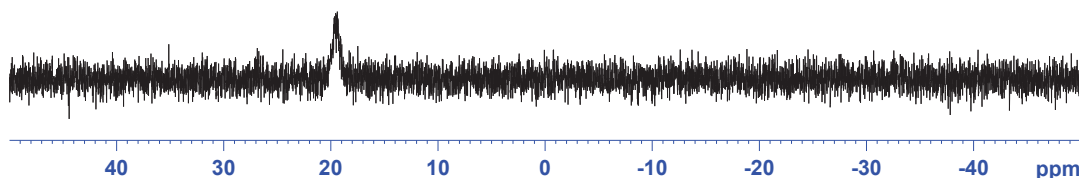
19.39



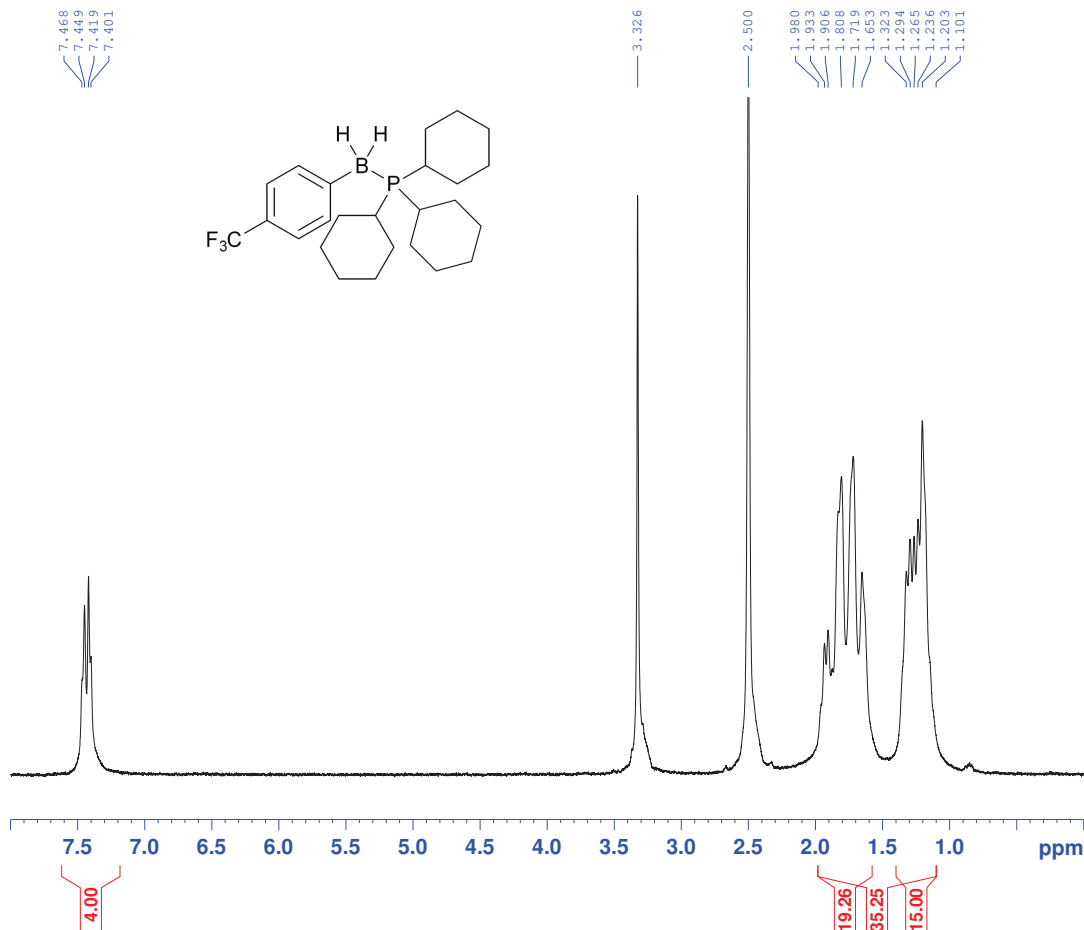
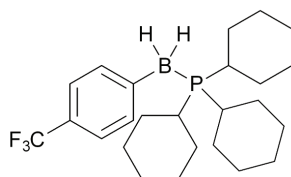
IBB-nmr Analysis

```
NAME      Feb17-2022
EXPNO     3
PROCNO    1
Date_     20220217
Time      22.12
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS         8
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         296.3 K
D1         2.00000000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1        -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```



B-4-(Trifluoromethyl)phenyl tricyclohexylphosphine–borane (37)



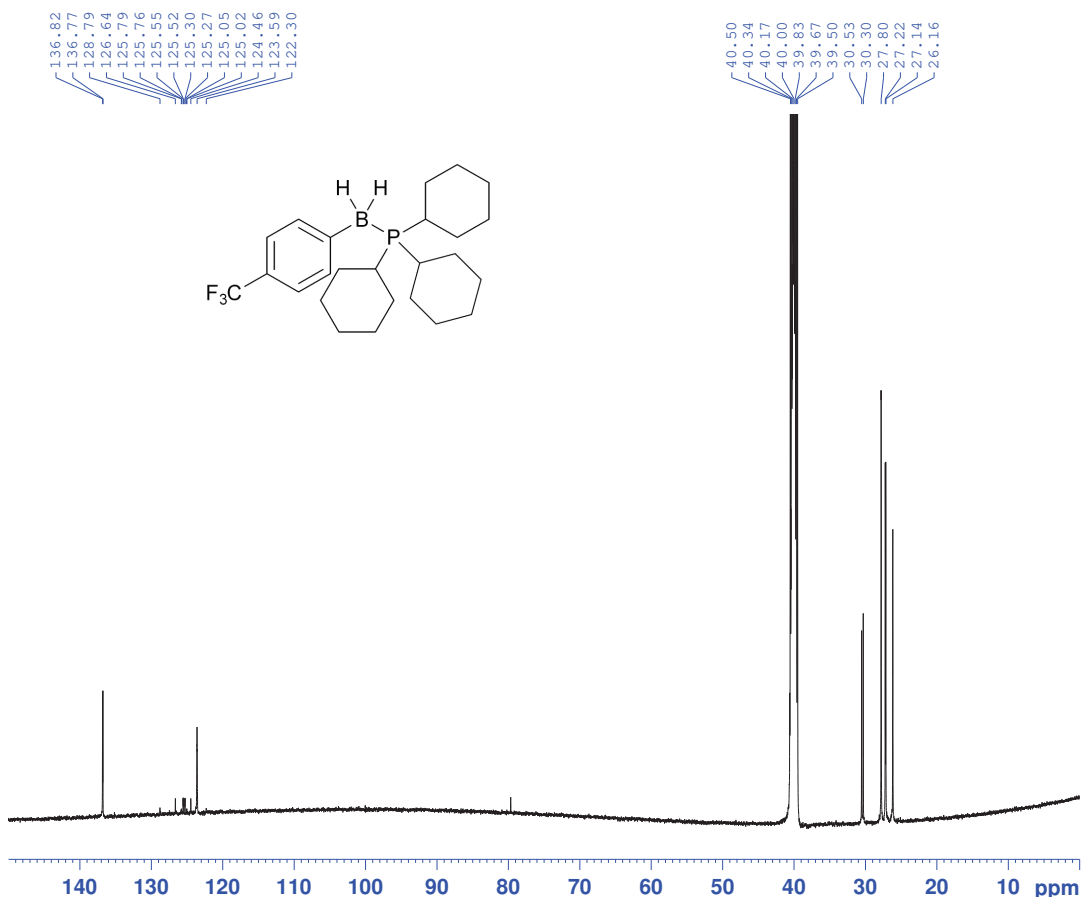
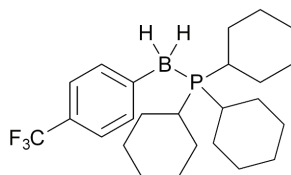
NAME	Apr07-2022
EXPNO	10
PROCNO	1
Date_	20220407
Time	23.20
INSTRUM	av400
PULPROG	5 mm PABBO BB-
TD	zg30
SOLVENT	65536
NS	DMSO
DS	16
SWH	2
FIDRES	8223.685 Hz
AQ	0.125483 Hz
RG	3.9846387 sec
DW	203
DE	60.800 usec
TE	6.50 usec
D1	296.1 K
TD0	1.00000000 sec
	1

```

===== CHANNEL f1 =====
NUC1                      1H
P1                        14.00 usec
PL                        -1.80 dB
PL1W                      14.82738590 W
SFO1                      400.1324710 MHz
SI                        32768
SF                        400.1300035 MHz
WDW                        EM
SSB                        0
LB                        0.30 Hz
GB                        0
PC                        1.00

```

Country	Population (millions)
Japan	136.82
France	136.77
Germany	128.79
Italy	126.64
Spain	125.79
United Kingdom	125.76
Sweden	125.55
Canada	125.52
United States	125.30
China	125.27
India	125.05
South Korea	125.02
Brazil	124.46
Russia	123.59
South Africa	122.30



NAME	Mar06-2024		
EXPNO	9		
PROCNO	1		
Date_	20240306		
Time	5.01		
INSTRUM	av500		
PROBHD	5 mm	CPDCH	13C
PULPROG	zgpg30		
TD	65536		
SOLVENT	DMSO		
NS	2048		
DS	4		
SWH	30030.029	Hz	
FIDRES	0.458222	Hz	
AQ	1.0912410	sec	
RG	57		
DW	16.650	usec	
DE	20.00	usec	
TE	297.9	K	
D1	2.00000000	sec	
D11	0.03000000	sec	
TD0	1		

```
===== CHANNEL f1 =====
NUC1                13C
P1                  10.00 usec
PL1                 -5.00 dB
PL1W                14.29790783 W
SFO1                125.7703643 MHz
```

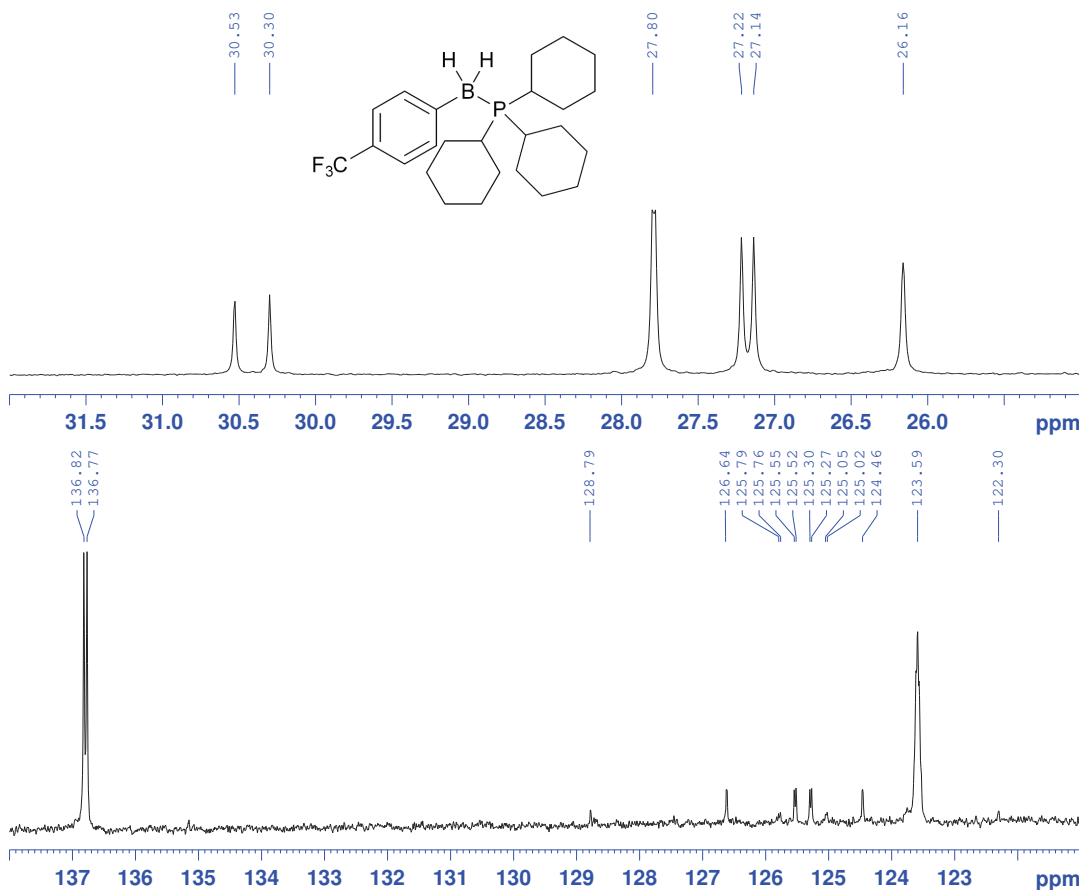
```

===== CHANNEL f2 =====
CPDRPG2          waitz16
NUC2              1H
PL2              80.00      usec
PL2              -4.00      dB
PL12             14.06      dB
PL13             17.00      dB
PL2W             6.30957365 W
PL12W            0.09862794 W
PL13W            0.05011872 W
SF02             500.1320005 MHz
SI               32768
SF              125.7577867 MHz
WDW              EM
SSB              0
LB               1.00      Hz
GB               0
PC               0.30

```

4CF3PhBH2P (cyclohexyl) 3

IBB-nmr Analysis



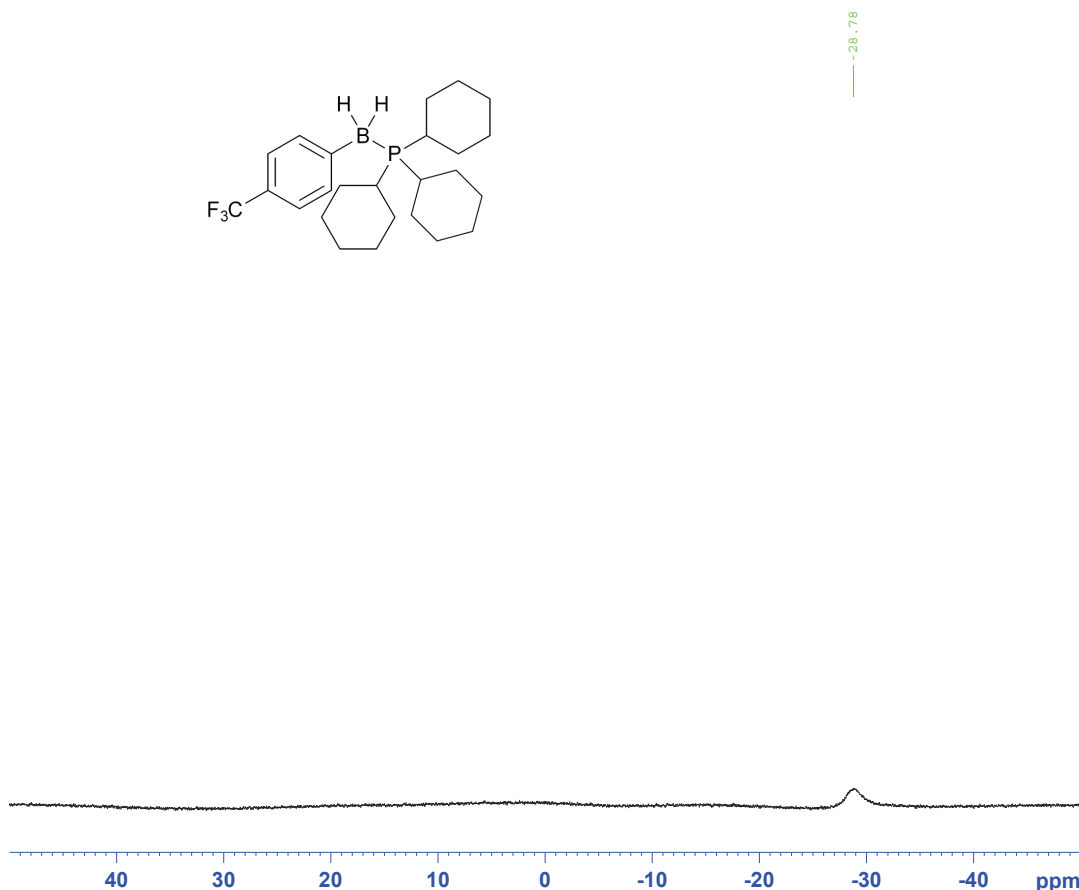
NAME Mar06-2024
 EXPNO 9
 PROCNO 1
 Date_ 20240306
 Time 5.01
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 2048
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 57
 DW 16.650 usec
 DE 20.00 usec
 TE 297.9 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577867 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P (cyclohexyl) 3

IBB-nmr Analysis

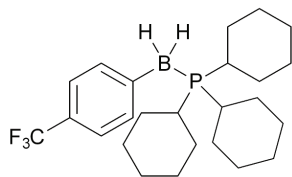


NAME Mar27-2022
 EXPNO 5
 PROCNO 1
 Date_ 20220327
 Time 22.54
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 296.1 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

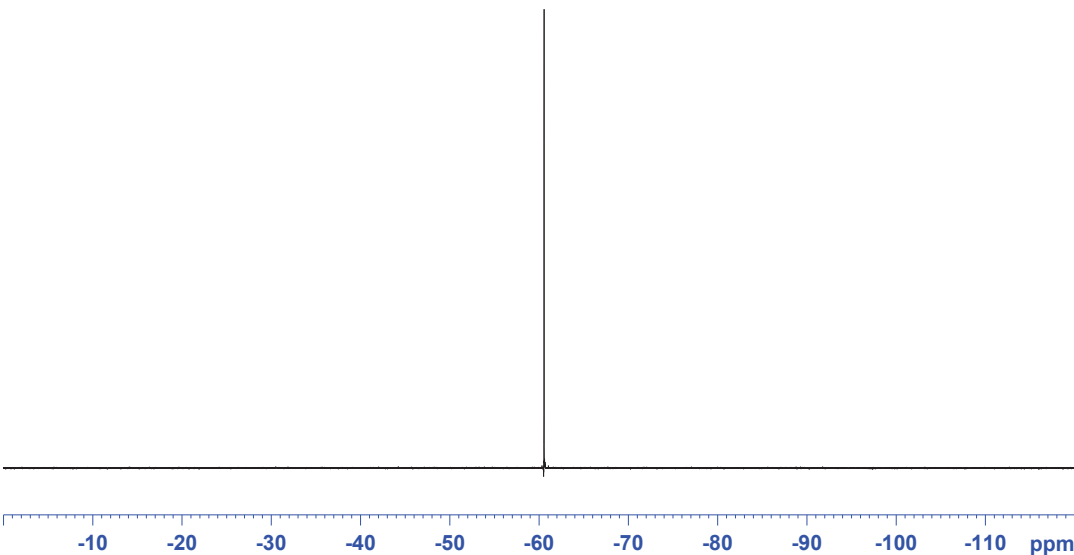
===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF3PhBH2P(cyclohexyl)3



-60.56
-60.56



IBB-nmr Analysis

```

NAME      Mar27-2022
EXPNO     3
PROCNO    1
Date_     20220327
Time      22.42
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD         131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         295.6 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
  
```

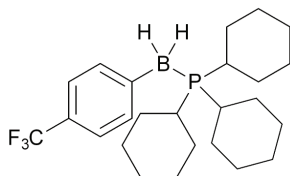
```

===== CHANNEL f1 =====
NUC1      19F
P1        19.50 usec
PL1       -4.00 dB
PL1W      16.40489006 W
SFO1      376.4607164 MHz
  
```

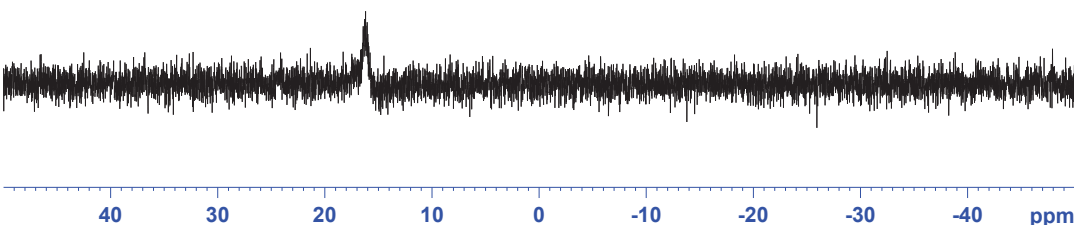
```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     112.00 usec
PL2       -4.00 dB
PL12      18.00 dB
PL2W      24.60733604 W
PL12W     0.15526180 W
SFO2      400.1316005 MHz
SI         65536
SF         376.4984617 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

4CF3PhBH2P(cyclohexyl)3



16.20



IBB-nmr Analysis

```

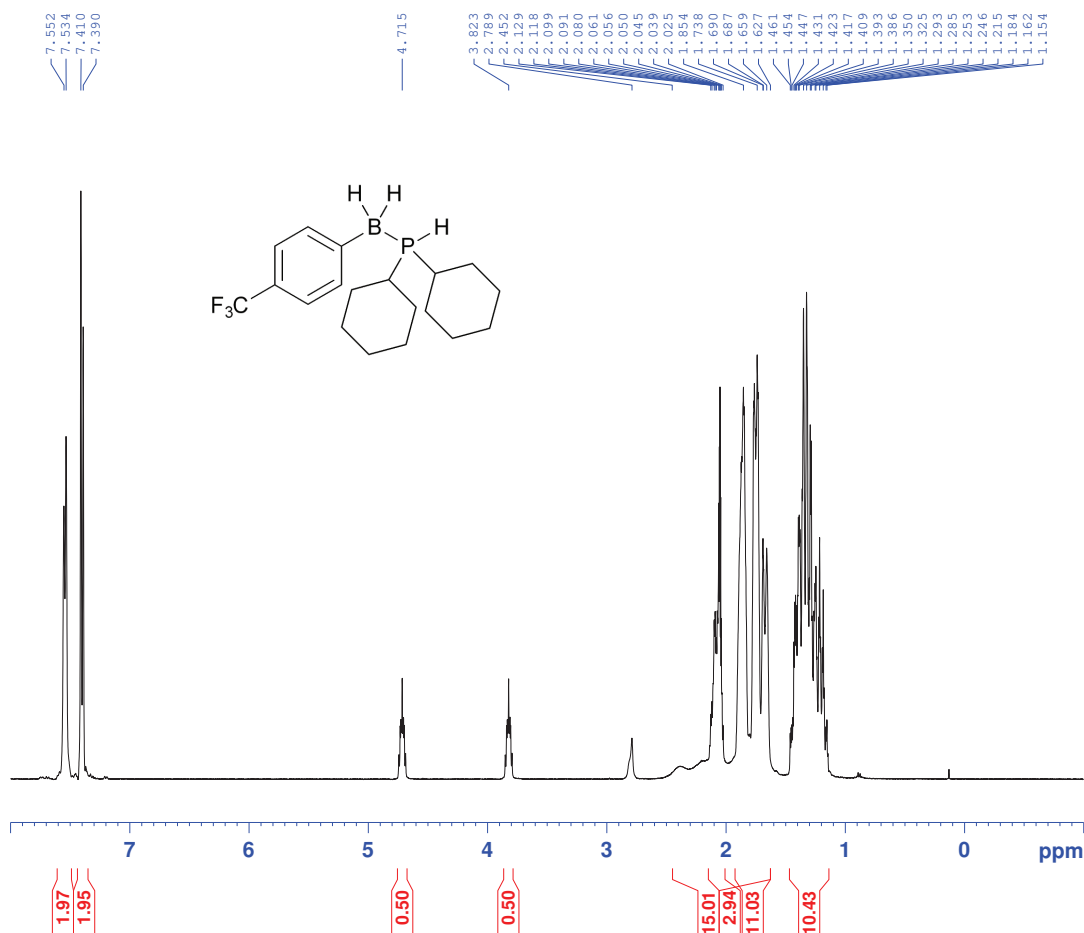
NAME      Mar27-2022
EXPNO     4
PROCNO    1
Date_     20220327
Time      22.46
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         16
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         295.5 K
D1         2.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      31P
P1        10.00 usec
PL1       -0.70 dB
PL1W      30.10233498 W
SFO1      161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

B-4-(Trifluoromethyl)phenyl dicyclohexylphosphine–borane (38)

IBB-nmr Analysis



NAME	Aug8-2023
EXPNO	1
PROCNO	1
Date_	20230808
Time	8.22
INSTRUM	av400
PULPROG	zgpg30
TD	65536
SOLVENT	Acetone
NS	4
DS	2
SWH	8223.685 Hz
FIDRES	0.125483 Hz
AQ	3.9846387 sec
RG	57
DW	60.800 usec
DE	6.50 usec
TE	297.4 K
D1	1.00000000 sec
TD0	1

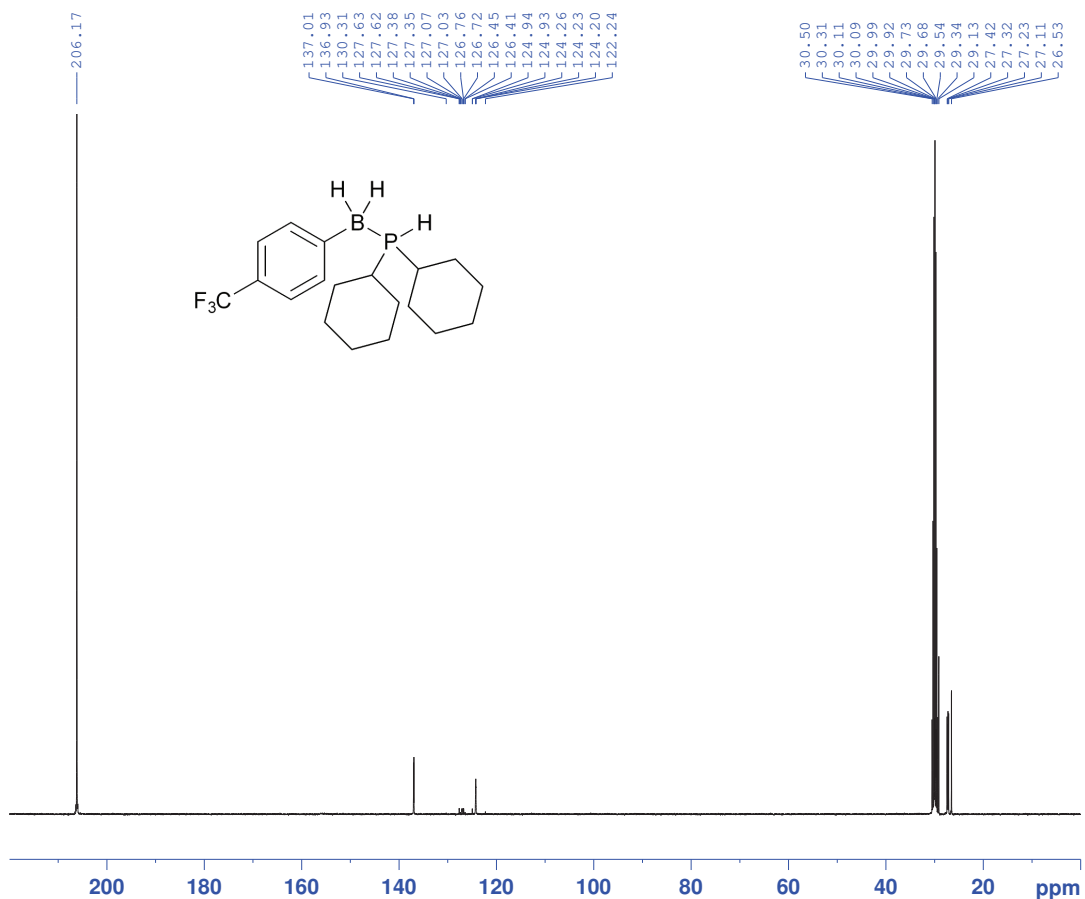
```

===== CHANNEL f1 =====
NUC1                1H
P1                  14.00 usec
PL                  -1.80 dB
PL1W                14.82738590 W
SFO1                400.1324710 MHz
SI                  32768
SF                  400.1300067 MHz
WDW                  EM
SSB                  0
LB                   0.30 Hz
GB                   0
PC                   1.00

```

4CF₃PhBH₂PH(cyclohexyl)₂

IBB-nmr Analysis



NAME	Aug8-2023		
EXPNO	2		
PROCNO	1		
Date_	20230808		
Time	9.27		
INSTRUM	av400		
PROBHD	5 mm	PABBO BB-	
PULPROG	zgpg30		
TD	65536		
SOLVENT	Acetone		
NS	1024		
DS	2		
SWH	24038.461	Hz	
FIDRES	0.366798	Hz	
AQ	1.3631988		sec
RG	128		
DW	20.800		usec
DE	6.50		usec
TE	298.7	K	
D1	2.00000000		sec
D11	0.03000000		sec
TD0	1		

```
===== CHANNEL f1 =====
NUC1              13C
P1                9.00 usec
PL1              -3.00 dB
PL1W             73.17333984 W
SFO1             100.6228298 Mhz
```

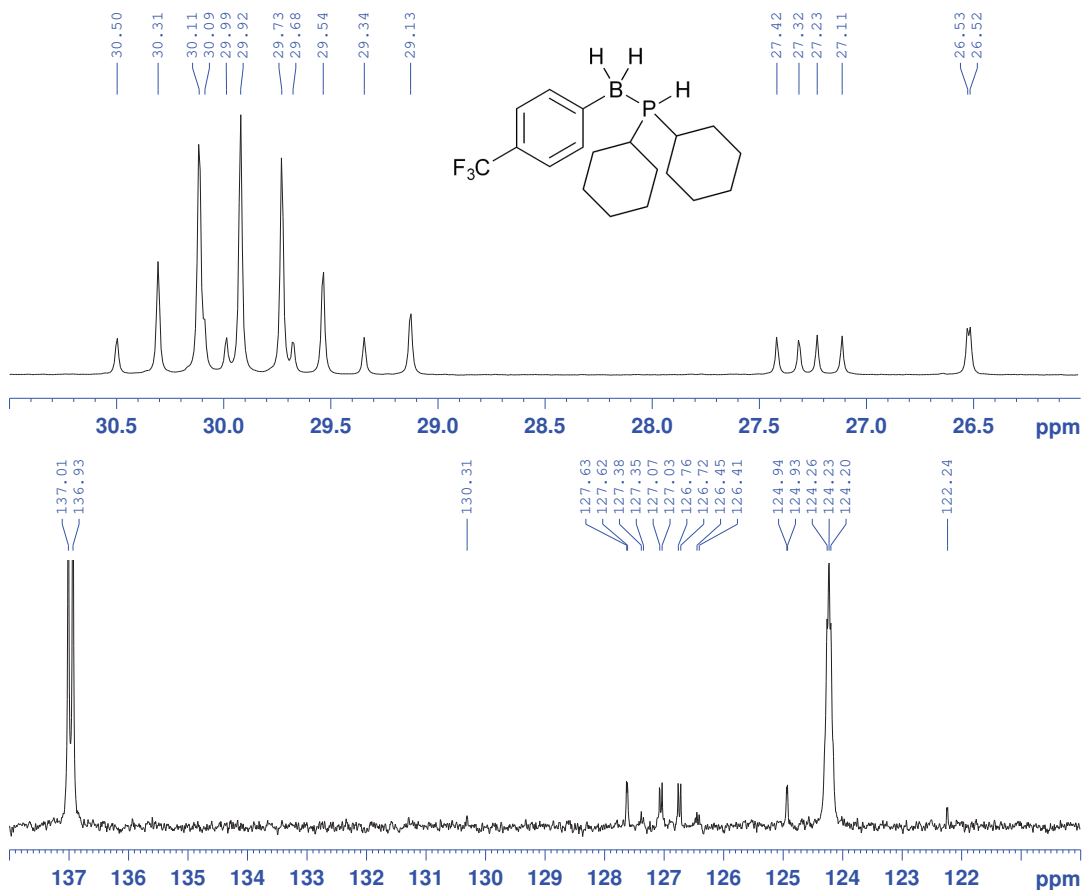
```

===== CHANNEL f2 =====
CPDRPG2          waltz16
NUG2              1H
PCFD2            80.00 usec
FL2              -1.70 dB
PL12             13.80 dB
PL13             13.80 dB
PL2W             14.48987389 W
PL12W            0.40838012 W
PL13W            0.40838012 W
SF02             400.1316005 MHz
SI               32768
SF              100.6126702 MHz
WDW              EM
SSB              0
LB               1.00 Hz
GB               0
PC               0.30

```

4CF3PhBH2PH(cyclohexyl)2

IBB-nmr Analysis



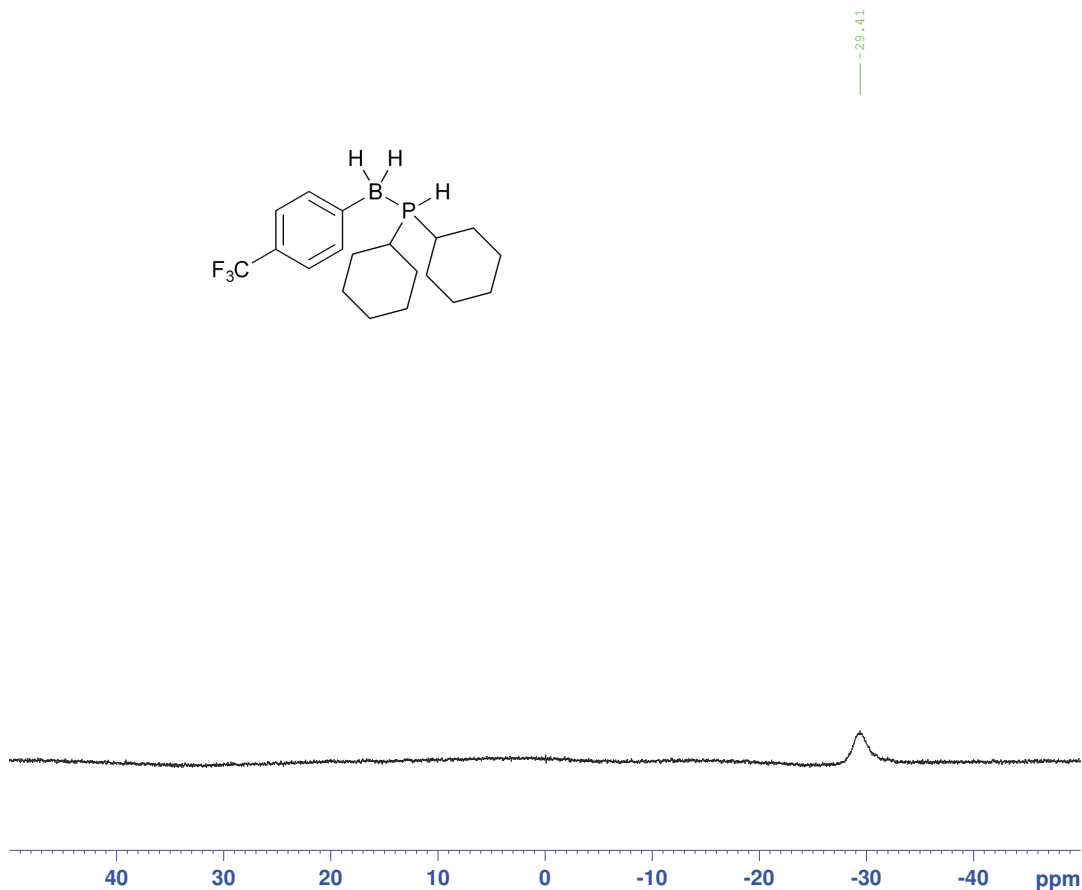
NAME Aug8-2023
 EXPNO 2
 PROCNO 1
 Date_ 20230808
 Time 9.27
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgpg30
 TD 65536
 SOLVENT Acetone
 NS 1024
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.366798 Hz
 AQ 1.3631988 sec
 RG 128
 DW 20.800 usec
 DE 6.50 usec
 TE 298.7 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.00 usec
 PL1 -3.00 dB
 PL1W 73.17333984 W
 SFO1 100.6228298 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL13 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 PL13W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 100.6126702 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2PH(cyclohexyl)2

IBB-nmr Analysis



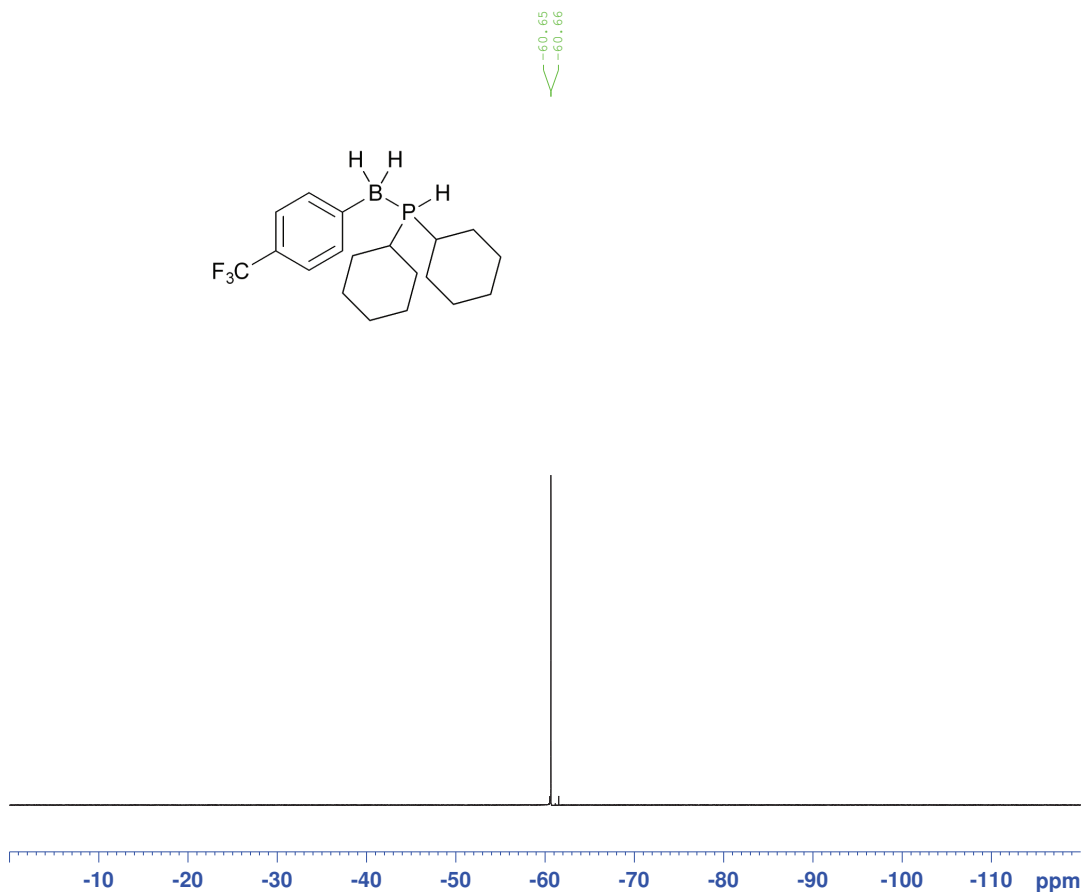
NAME Jul22-2023
 EXPNO 5
 PROCNO 1
 Date_ 20230722
 Time 16.33
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.5 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

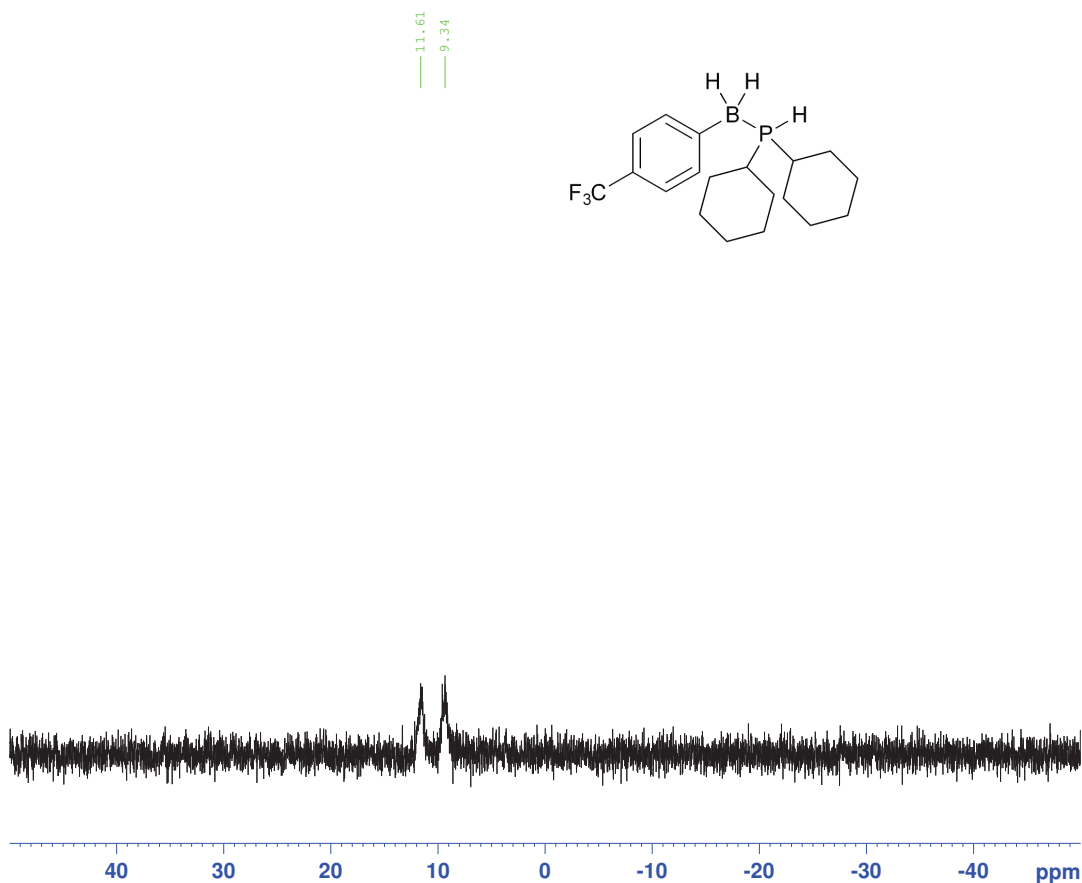
4-CF₃PhBH₂PH(cyclohexyl)₂

IBB-nmr Analysis



4CF₃PhBH₂PH(cyclohexyl)₂

IBB-nmr Analysis



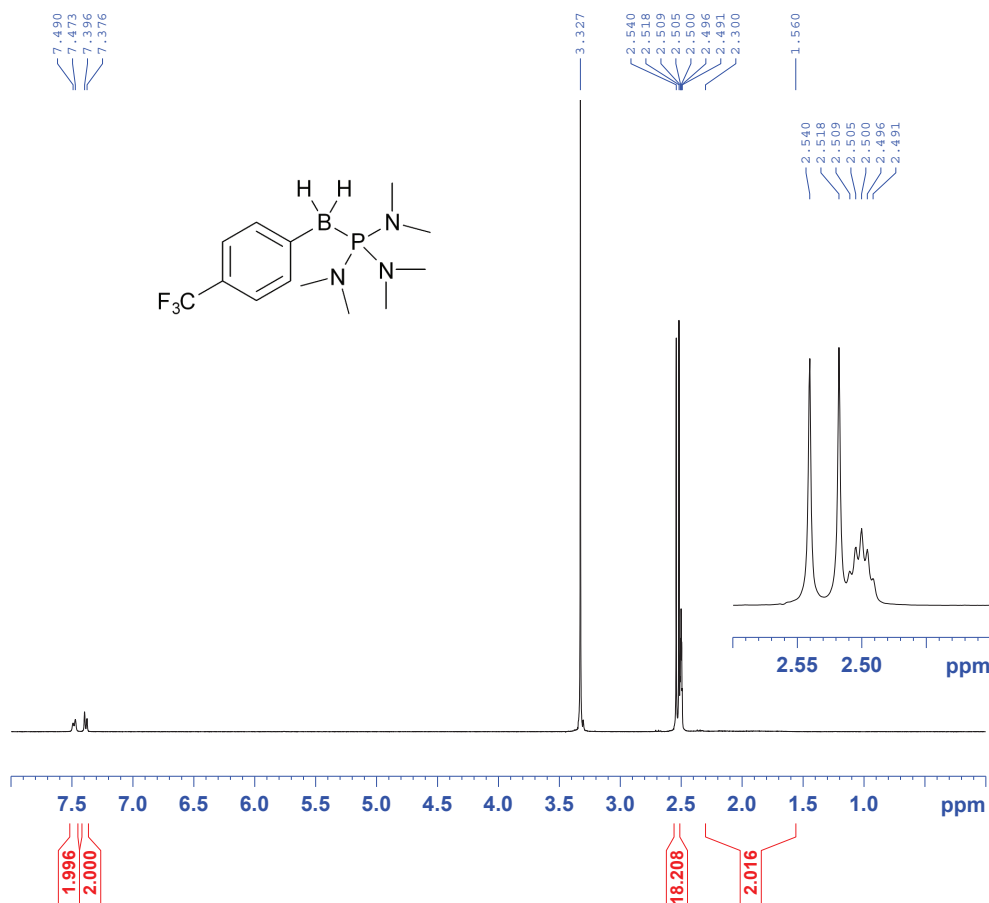
4CF₃PhBH₂P(NMe₂)₃

B-4-(Trifluoromethyl)phenyl tris(dimethylamino)phosphine-borane (39)

IBB-nmr Analysis

NAME July17-2022
 EXPNO 1
 PROCNO 1
 Date_ 20220717
 Time 17.57
 INSTRUM av400
 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 203
 DW 60.800 usec
 DE 6.50 usec
 TE 297.0 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 -1.80 dB
 PL1W 14.82738590 W
 SFO1 400.1324710 MHz
 SI 32768
 SF 400.1300036 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

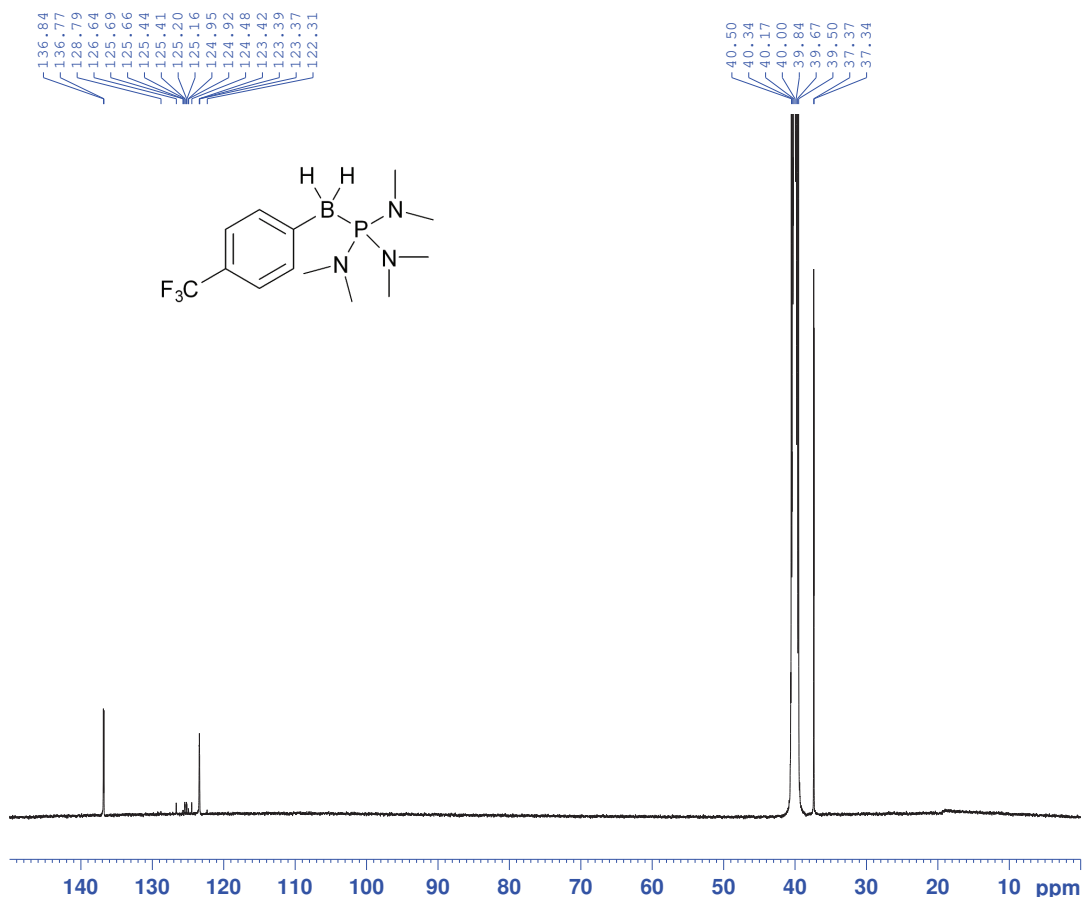
4CF₃PhBH₂P(NMe₂)₃

IBB-nmr Analysis

NAME July18-2022
 EXPNO 7
 PROCNO 1
 Date_ 20220718
 Time 15.23
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 4096
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

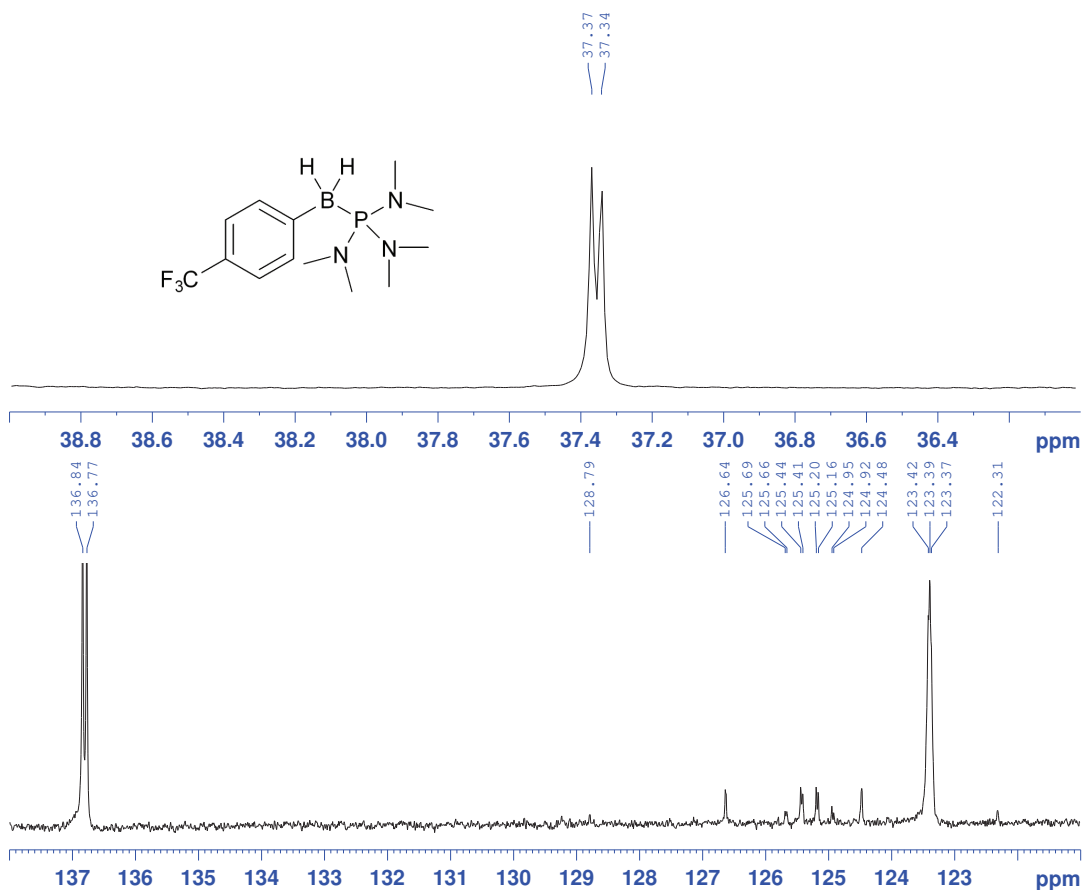
===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577857 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30



4CF3PhBH2P (NMe2) 3

IBB-nmr Analysis



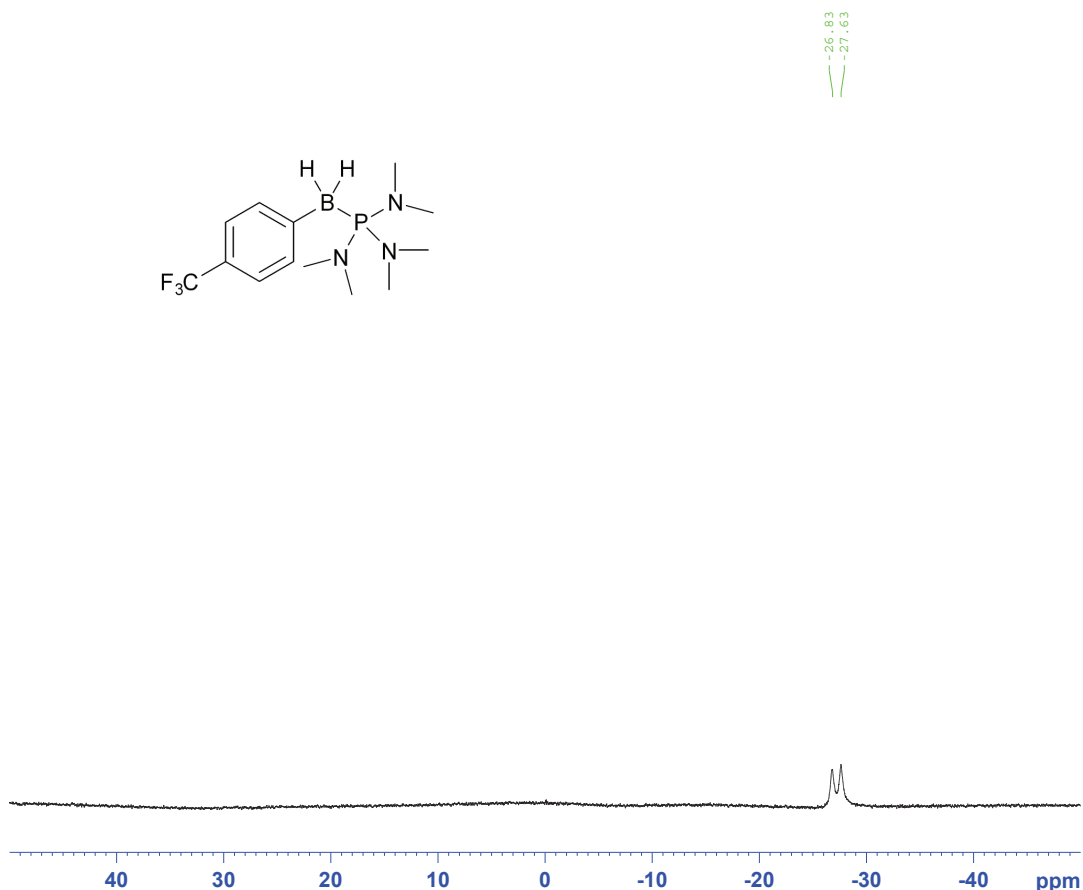
NAME July18-2022
 EXPNO 7
 PROCNO 1
 Date_ 20220718
 Time 15.23
 INSTRUM av500
 PROBHD 5 mm CPDCH 13C
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 4096
 DS 4
 SWH 30030.029 Hz
 FIDRES 0.458222 Hz
 AQ 1.0912410 sec
 RG 90.5
 DW 16.650 usec
 DE 20.00 usec
 TE 298.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 10.00 usec
 PL1 -5.00 dB
 PL1W 14.29790783 W
 SFO1 125.7703643 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -4.00 dB
 PL12 14.06 dB
 PL13 17.00 dB
 PL2W 6.30957365 W
 PL12W 0.09862794 W
 PL13W 0.05011872 W
 SFO2 500.1320005 MHz
 SI 32768
 SF 125.7577857 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 0.30

4CF3PhBH2P (NMe2) 3

IBB-nmr Analysis

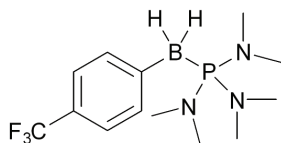


NAME July17-2022
 EXPNO 3
 PROCNO 1
 Date_ 20220717
 Time 18.08
 INSTRUM av400
 PROBHD 5 mm PABBO BB-
 PULPROG zgig
 TD 32768
 SOLVENT DMSO
 NS 128
 DS 4
 SWH 20000.000 Hz
 FIDRES 0.610352 Hz
 AQ 0.8192500 sec
 RG 203
 DW 25.000 usec
 DE 20.00 usec
 TE 297.6 K
 D1 1.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 11B
 P1 6.30 usec
 PL1 -2.00 dB
 SFO1 128.3776050 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.70 dB
 PL12 13.80 dB
 PL2W 14.48987389 W
 PL12W 0.40838012 W
 SFO2 400.1316005 MHz
 SI 32768
 SF 128.3776183 MHz
 WDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

4CF₃PhBH₂P(NMe₂)₃



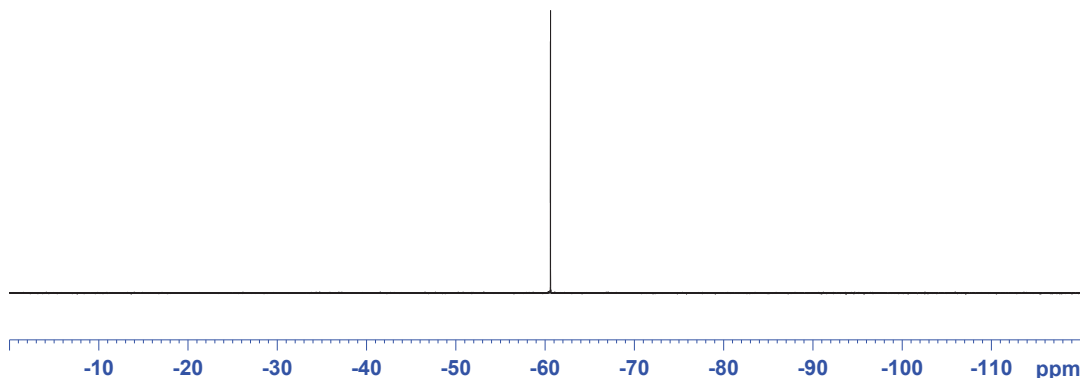
-60.60
-60.61

IBB-nmr Analysis

```
NAME      July17-2022
EXPNO     2
PROCNO    1
Date_     20220717
Time      18.01
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zgfhigqn
TD        131072
SOLVENT   DMSO
NS         8
DS         4
SWH        89285.711 Hz
FIDRES     0.681196 Hz
AQ         0.7340532 sec
RG         203
DW         5.600 usec
DE         6.50 usec
TE         297.1 K
D1         1.00000000 sec
D11        0.03000000 sec
D12        0.00002000 sec
TD0        1
```

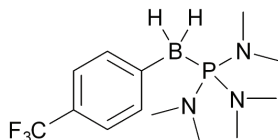
```
===== CHANNEL f1 =====
NUC1       19F
P1         19.50 usec
PL1        -4.00 dB
PL1W       16.40489006 W
SFO1       376.4607164 MHz
```

```
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      112.00 usec
PL2         -4.00 dB
PL12        18.00 dB
PL2W       24.60733604 W
PL12W      0.15526180 W
SFO2       400.1316005 MHz
SI          65536
SF         376.4984617 MHz
WDW         EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
```



4CF₃PhBH₂P(NMe₂)₃

92.49



IBB-nmr Analysis

```
NAME      July17-2022
EXPNO     5
PROCNO    1
Date_     20220717
Time      18.18
INSTRUM   av400
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS         128
DS         4
SWH        64102.563 Hz
FIDRES     0.978127 Hz
AQ         0.5112308 sec
RG         203
DW         7.800 usec
DE         6.50 usec
TE         297.1 K
D1         2.00000000 sec
TD0        1
```

```
===== CHANNEL f1 =====
NUC1       31P
P1         10.00 usec
PL1         -0.70 dB
PL1W       30.10233498 W
SFO1       161.9674942 MHz
SI         32768
SF         161.9754962 MHz
WDW         EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
```

