Electronic Supplementary Material (ESI) for New Journal of Chemistry.


*Supplementary information*

# Chiral Discrimination of β-Telluride Carboxylic Acids by NMR Spectroscopy

Marcio S. Silva* and Daniel Pietrobom

Centro de Ciências Naturais e Humanas (CCNH), Universidade Federal do ABC, Av. dos Estados 5001, 09210-180 Santo André-SP, Brazil.

email*: s.marcio@ufabc.edu.br*

***Table of Contents***

**Experimental Considerations**

Analytical thin-layer chromatography (TLC) was performed by using aluminum-backed silica plates coated with a 0.25 mm thickness of silica gel 60 F254 (Merck), visualized with an ultraviolet light (λ = 254 nm), followed by exposure to p-anisaldehyde solution, or vanillin solution and heating.

Standard chromatographic purification methods were followed using 35-70 mm (240-400 mesh) silica gel purchased from Sigma Aldrich®.

Deuterated solvents (99.9% purity with 0.03 % vv of TMS) were purchased from Sigma Aldrich®.

Optical rotations were determined on a Perkin Elmer 341 polarimeter.

IR spectra were obtained on a Bruker Tensor II IR spectrometer as KBr pellets.

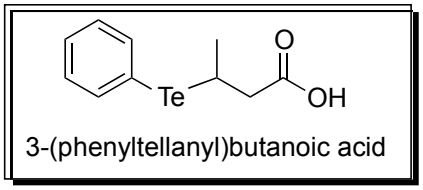
Either 300 MHz or 500 MHz acquired the NMR spectra. The model of NMR equipment – 300MHz Avance III Bruker equipped with a direct BBO probe (broad-band-observed) and 500MHz. Avance III Bruker equipped with an inverse TXI probe (triple-resonance-inversed). The $^{1}H$ NMR chemical shifts are reported in parts per million (ppm) relative to tetramethylsilane (TMS) peak ($\delta$ 0.0 ppm). The data are reported as follows: chemical shift ($\delta$), multiplicity (s = singlet, s = broad singlet, d = doublet, t = triplet, q = quadruplet, qt = quintet, st = sextuplet, m = multiplet), features of signal (br = broad, ap = apparent) and coupling constant (*J*) in Hertz and integrated intensity. The $^{13}C$ NMR chemical shifts were reported at either 75 or 125 MHz and are reported in ppm relative to $CDCl_3$ signal ($\delta$□77.0 ppm). The $^{125}Te$ NMR chemical shifts are reported in ppm relative to internal standard $C_6H_5TeTeC_6H_5$ (422 ppm).

High-resolution mass spectra (HRMS) were acquired using a Bruker Daltonics MicroTOF instrument, operating electrospray ionization (ESI) mode with ion mass/charge (m/z) ratios as values in atomic mass units.

**Typical Procedure for the Lactone Ring Opening Reaction**

The organochalcogenide (S, Se and Te) acids were synthesized and characterized as recently described.[1] To a dry two-necked 50 mL round-bottomed flask equipped with magnetic stirring, reflux condenser, and a rubber septum under nitrogen, was added elemental tellurium, selenium or sulfur (4.0 mmol) previously dried overnight in an oven at 100 °C. Then dry tetrahydrofuran (15 mL) was added. To the stirred suspension was added the respective organometallic compound (*n*-butyllithium or phenylmagnesium chloride). The mixture was then stirred by 30 minutes and the lactone (2.6mmol) was added all at once. The reaction was monitored by gas chromatography. After 1 h at room temperature the reaction medium was diluted with AcOEt (20 mL) and washed with saturated solution of $NH_4Cl$ (15 mL). The phases were separated and the aqueous phase was extracted with AcOEt (2 x 20 mL). The organic phase was dried over $MgSO_4$ and the solvents were evaporated under reduced pressure. The residue was purified by flash column chromatography eluting first with hexane to remove alkyl or aryl byproducts and then with hexane/AcOEt (8:2) to remove the product.

Spectral dada of compound **1a**:

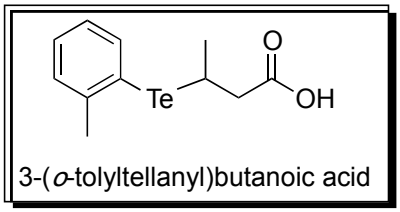



3-(phenyltellanyl)butanoic acid

Red oil, 88 % yield. **$^1$H NMR** (500MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 7.82-7.84 (m, 2H); 7.32-7.36 (m, 1H); 7.22-7.26 (m, 2H); 3.65 (st, *J* = 7.15 Hz, 1H); 2.86 (dd, *J* = 6.75 Hz and 16.4 Hz, 1H); 2.82 (dd, *J* = 7.7 Hz and 16.4 Hz, 1H); 1.64 (d, *J* = 7.15 Hz, 3H). **$^{13}$C NMR** (75MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 178.0, 140.8, 129.2, 128.4, 111.2, 44.5, 24.2, 14.2. **$^{125}$Te NMR** (94.74 MHz, $CDCl_3$, 25 $^o$C, $C_6H_5TeTeH_5C_6$ standard $\delta$ ppm 422): 709.4. **IR (cm$^{-1}$)**: 3064, 1954, 1881, 1573, 1140, 1107, 1074, 1017, 998, 930, 908, 655, 613, 484, 455. **HR-MS**: Calculated value: 293.9899; Found value [$M^+$]: 294.9912.

[1] (a) Silva, M. S.; Dos Santos, A. A.; Comasseto, J. V. *Tetrahedron Lett.* **2009**, *50*, 6498-6501; Node, M.; Nishide, K.; Ochiai, M.; Fuji, K.; Fujita, E. *J. Org. Chem.* **1981**, *46*, 5163-5166; (c) Liotta, D.; Sunay, U.; Santiesteban, E.; Markiewicz, W. *J. Org. Chem.* **1981**, *46*, 2605-2610; (d) Menezes, P. H.; Gonçalves, S. M. C.; Hallwass, F.; Silva, R. O.; Bieber, L. W.; Simas, A. M. *Org. Lett.* **2003**, *5*, 1601-1604.

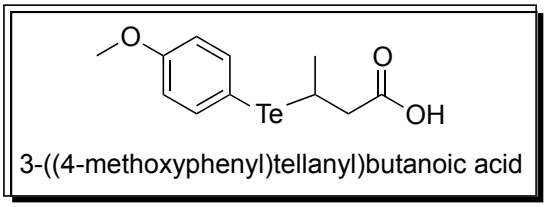
Spectral dada of compound **1b**:




3-(*o*-tolyltellanyl)butanoic acid

Red oil, 91 % yield. **$^{1}$H NMR** (300MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 7.81 (d, $J$ = 7.44 Hz, 1H); 7.20-7.29 (m, 2H); 7.02 (dt, $J$ = 1.47 Hz, and 7.44 Hz, 1H); 3.70 (st, $J$ = 7.14 Hz, 1H); 2.85 (m, 1H); 2.83 (d, $J$ = 1.89 Hz, 1H); 2.51 (s, 3H); 1.64 (d, $J$ = 7.11 Hz, 3H). **$^{13}$C NMR** (75MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 178.3, 143.8, 140.6, 129.0, 128.9, 126.6, 116.3, 44.5, 27.6, 24.0, 14.0. **IR (cm$^{-1}$)**: 3053, 2862, 2731, 2627, 1565, 1341, 1075, 1049, 989, 931, 909, 796, 705, 648, 603, 539, 477, 403. **HR-MS**: Calculated value: 308.0056; Found value [$M^+$ + 1]: 309.011.

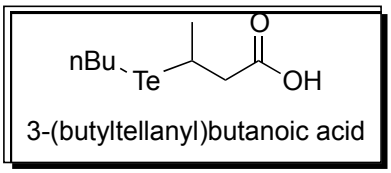
Spectral dada of compound **1c**:




3-((4-methoxyphenyl)tellanyl)butanoic acid

Red crystals, 79 % yield. **$^{1}$H NMR** (300MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 7.74 (dd, $J$ = 2.07 Hz and 6.63 Hz, 2H); 6.78 (dd, $J$ = 2.07 Hz and 6.63 Hz, 2H); 3.56 (st, $J$ = 7.14 Hz, 1H); 2.80 (d, $J$ = 0.63 Hz and 1.44 Hz, 1H); 1.59 (d, $J$ = 7.14 Hz, 3H). **$^{13}$C NMR** (75MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 178.1, 160.2, 143.0, 115.1, 100.3, 55.1, 44.5, 24.1, 13.9. **IR (cm$^{-1}$)**: 3433, 3016, 2857, 2732, 2066, 1967, 1835, 1563, 1461, 1397, 1340, 1133, 1102, 1064, 997, 911, 886, 789, 622, 588, 496, 418. **HR-MS**: Calculated value: 324.0005; Found value [$M^+$ + 1]: 325.9976.

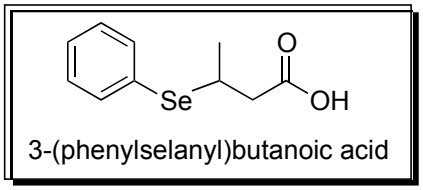
Spectral dada of compound **1d**:




3-(butyltellanyl)butanoic acid

Red oil, 68 % yield. **$^1$H NMR** (500MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 3.48 (st, $J$ = 7.15 Hz, 1H); 2.86 (tap, $J$ = 6.65 Hz, 2H); 2.73 (dtap, $J$ = 7.4 and 3.1 Hz, 2H); 1.78 (qt, $J$ = 7.45 Hz, 2H); 1.68 (d, $J$ = 7.2 Hz, 3H); 1.38 (st, $J$ = 7.45 Hz, 2H); 0.92 (t, $J$ = 7.45 Hz, 3H). **$^{13}$C NMR** (75MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 178.3, 45.4, 34.4, 25.3, 24.9, 13.4, 8.5, 3.5. **IR (cm$^{-1}$)**: 2926, 2730, 1164, 1105, 1074, 990, 889, 769, 604, 496. **HR-MS**: Calculated value: 274.0212; Found value [$M^+$ + 1]: 275.0156.

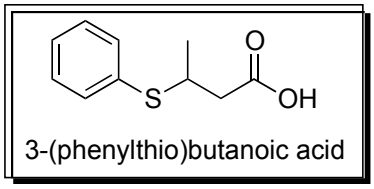
Spectral dada of compound **1e**:



3-(phenylselanyl)butanoic acid

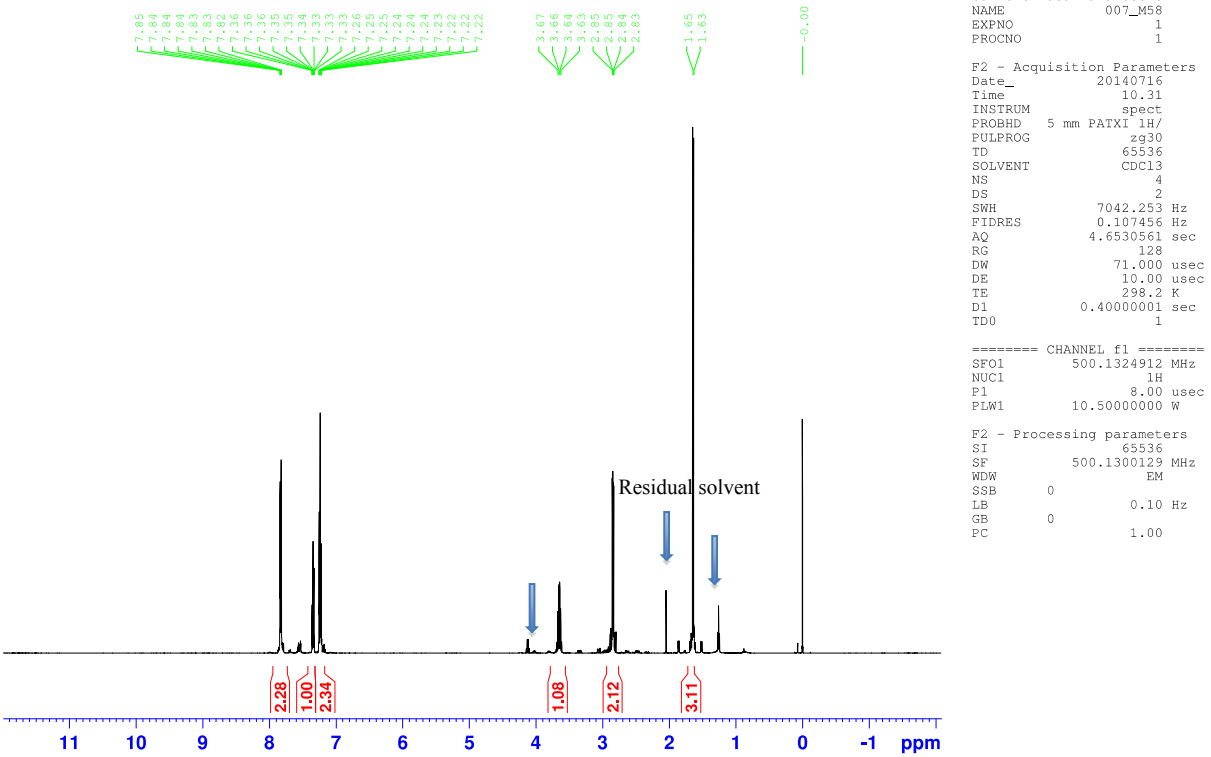
Yellow oil, 83 % yield. **$^1$H NMR** (500MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 7.57-7.59 (m, 2H); 7.25-7.31 (m, 3H); 3.62 (st, $J$ = 6.85 Hz,1H); 2.73 (dd, $J$ = 6.3 Hz and 16.1 Hz, 1H); 2.61 (dd, $J$ = 4.0 Hz and 16.1 Hz, 1H); 1.46 (d, $J$ = 6.9 Hz, 3H). **$^{13}$C NMR** (75MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 177.5, 135.7, 129.1, 128.1, 127.8, 42.4, 33.2, 21.8. **IR (cm$^{-1}$)**: 3071, 2731, 1952, 1880, 1605, 1595, 1499, 1377, 1110, 931, 813, 671, 471. **HR-MS**: Calculated value: 244.0002; Found value [$M^+$ + 1]: 245.9987.

Spectral dada of compound **1f**:



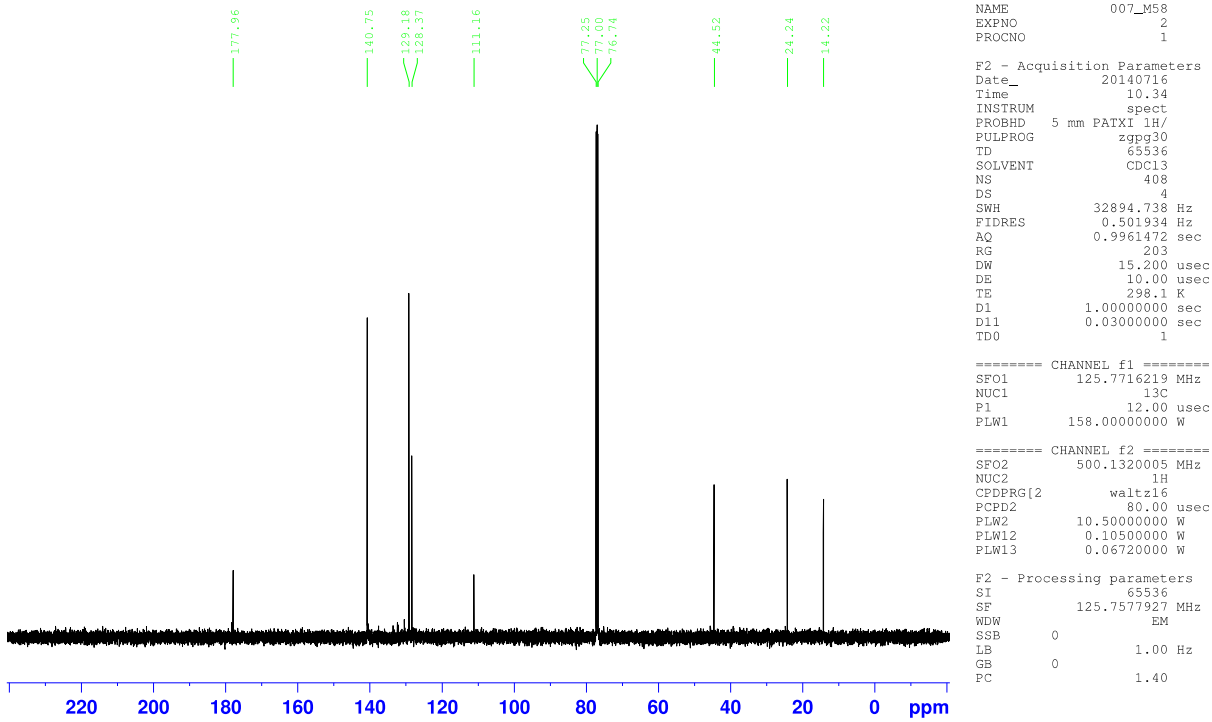
3-(phenylthio)butanoic acid

Pale yellow oil, 71 % yield. **$^1$H NMR** (500MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 7.43-7.46 (m, 2H); 7.26-7.33 (m, 3H); 3.6 (st, $J$ = 6.8 Hz, 1H); 2.69 (dd, $J$ = 15.95 and 5.9 Hz, 1H); 2.48 (dd, $J$ = 15.95 and 8.45 Hz, 1H); 1.36 (d, $J$ = 6.8 Hz, 3H). **$^{13}$C NMR** (125MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 176.6, 133.5, 133.1, 129.0, 126.7, 41.4, 39.2, 20.8. **IR (cm$^{-1}$)**: 3074, 2872, 2669, 1584, 1477, 1377, 1179, 1092, 1069, 1001, 931, 649, 521, 483. **HR-MS**: Calculated value: 196.0558; Found value [$M^+$ + 1]: 197.0582.



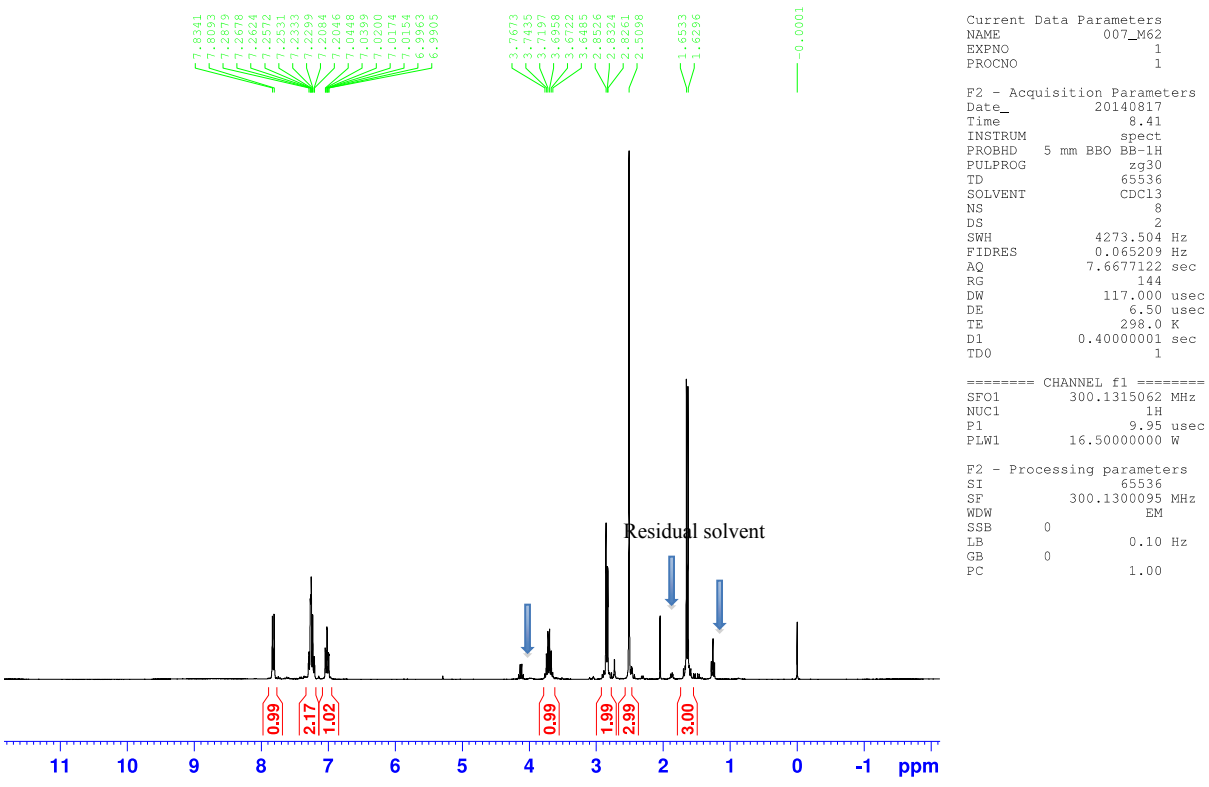

```
Current Data Parameters
NAME                  007_M58
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140716
Time                  10.31
INSTRUM               spect
PROBHD    5 mm PATXI 1H/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        4
DS                        2
SWH                7042.253 Hz
FIDRES            0.107456 Hz
AQ                4.6530561 sec
RG                      128
DW                   71.000 usec
DE                   10.00 usec
TE                   298.2 K
D1                0.40000001 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            500.1324912 MHz
NUC1                    1H
P1                   8.00 usec
PLW1           10.50000000 W

F2 - Processing parameters
SI                    65536
SF              500.1300129 MHz
WDW                     EM
SSB          0
LB                   0.10 Hz
GB           0
PC                   1.00
```

**Figure S1:** $^{1}$H NMR spectrum of organochalcogenide acid **1a** in $CDCl_3$ at 25 $^{o}$C



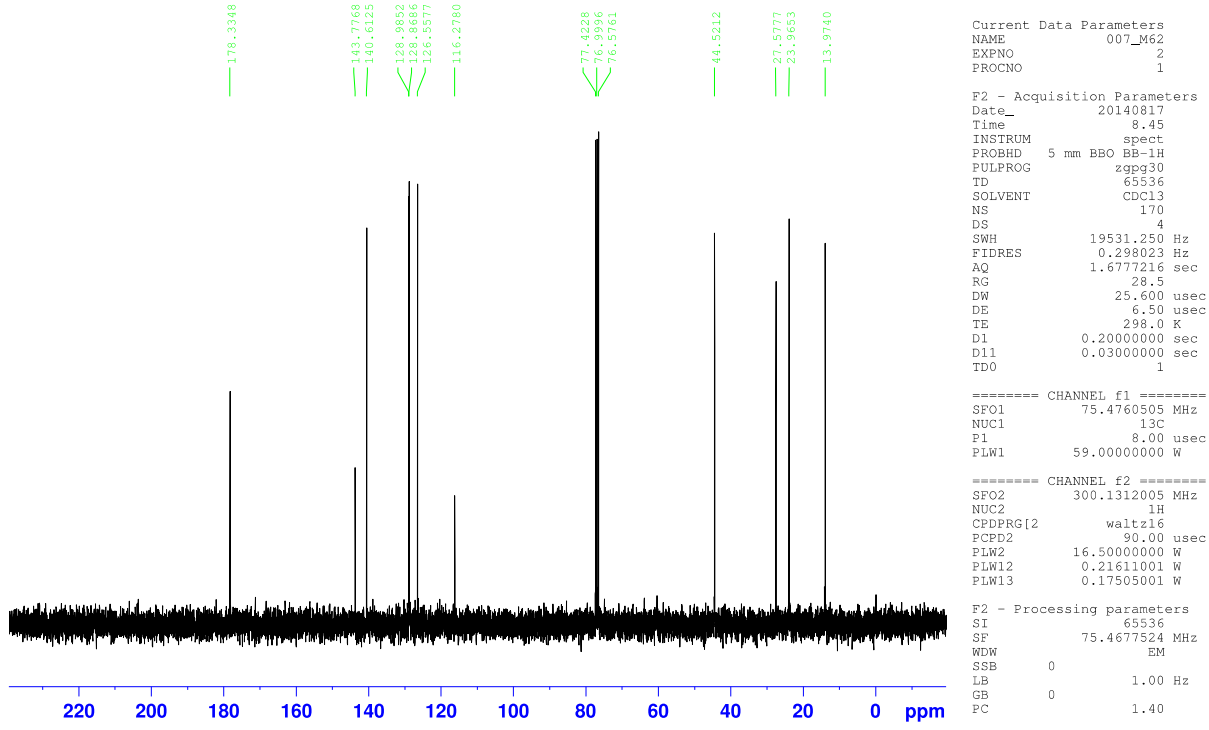

```
Current Data Parameters
NAME                  007_M58
EXPNO                       2
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140716
Time                  10.34
INSTRUM               spect
PROBHD    5 mm PATXI 1H/
PULPROG             zgpg30
TD                    65536
SOLVENT               CDCl3
NS                      408
DS                        4
SWH               32894.738 Hz
FIDRES            0.501934 Hz
AQ                0.9961472 sec
RG                      203
DW                   15.200 usec
DE                   10.00 usec
TE                   298.1 K
D1                1.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            125.7716219 MHz
NUC1                    13C
P1                   12.00 usec
PLW1          158.00000000 W

======== CHANNEL f2 ========
SFO2            500.1320005 MHz
NUC2                    1H
CPDPRG[2             waltz16
PCPD2                80.00 usec
PLW2           10.50000000 W
PLW12           0.10500000 W
PLW13           0.06720000 W

F2 - Processing parameters
SI                    65536
SF              125.7577927 MHz
WDW                     EM
SSB          0
LB                   1.00 Hz
GB           0
PC                   1.40
```

**Figure S2:** $^{13}$C NMR spectrum of organochalcogenide acid **1a** in $CDCl_3$ at 25 $^{o}$C




```
Current Data Parameters
NAME                  007_M62
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_                20140817
Time                     8.41
INSTRUM                 spect
PROBHD    5 mm BBO BB-1H
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          8
DS                          2
SWH                 4273.504 Hz
FIDRES              0.065209 Hz
AQ                 7.6677122 sec
RG                        144
DW                  117.000 usec
DE                    6.50 usec
TE                    298.0 K
D1                 0.40000001 sec
TD0                         1

======== CHANNEL f1 ========
SFO1               300.1315062 MHz
NUC1                       1H
P1                       9.95 usec
PLW1               16.50000000 W

F2 - Processing parameters
SI                         65536
SF                 300.1300095 MHz
WDW                          EM
SSB          0
LB                       0.10 Hz
GB           0
PC                       1.00
```

**Figure S3:** $^{1}$H NMR spectrum of organochalcogenide acid **1b** in $CDCl_3$ at 25 °C




```
Current Data Parameters
NAME                  007_M62
EXPNO                       2
PROCNO                      1

F2 - Acquisition Parameters
Date_                20140817
Time                     8.45
INSTRUM                 spect
PROBHD    5 mm BBO BB-1H
PULPROG               zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        170
DS                          4
SWH                19531.250 Hz
FIDRES              0.298023 Hz
AQ                 1.6777216 sec
RG                       28.5
DW                   25.600 usec
DE                    6.50 usec
TE                    298.0 K
D1                 0.20000000 sec
D11                0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1                75.4760505 MHz
NUC1                       13C
P1                       8.00 usec
PLW1               59.00000000 W

======== CHANNEL f2 ========
SFO2               300.1312005 MHz
NUC2                       1H
CPDPRG[2                waltz16
PCPD2                   90.00 usec
PLW2               16.50000000 W
PLW12               0.21611001 W
PLW13               0.17505001 W

F2 - Processing parameters
SI                         65536
SF                  75.4677524 MHz
WDW                          EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

**Figure S4:** $^{13}$C NMR spectrum of organochalcogenide acid **1b** in $CDCl_3$ at 25 °C

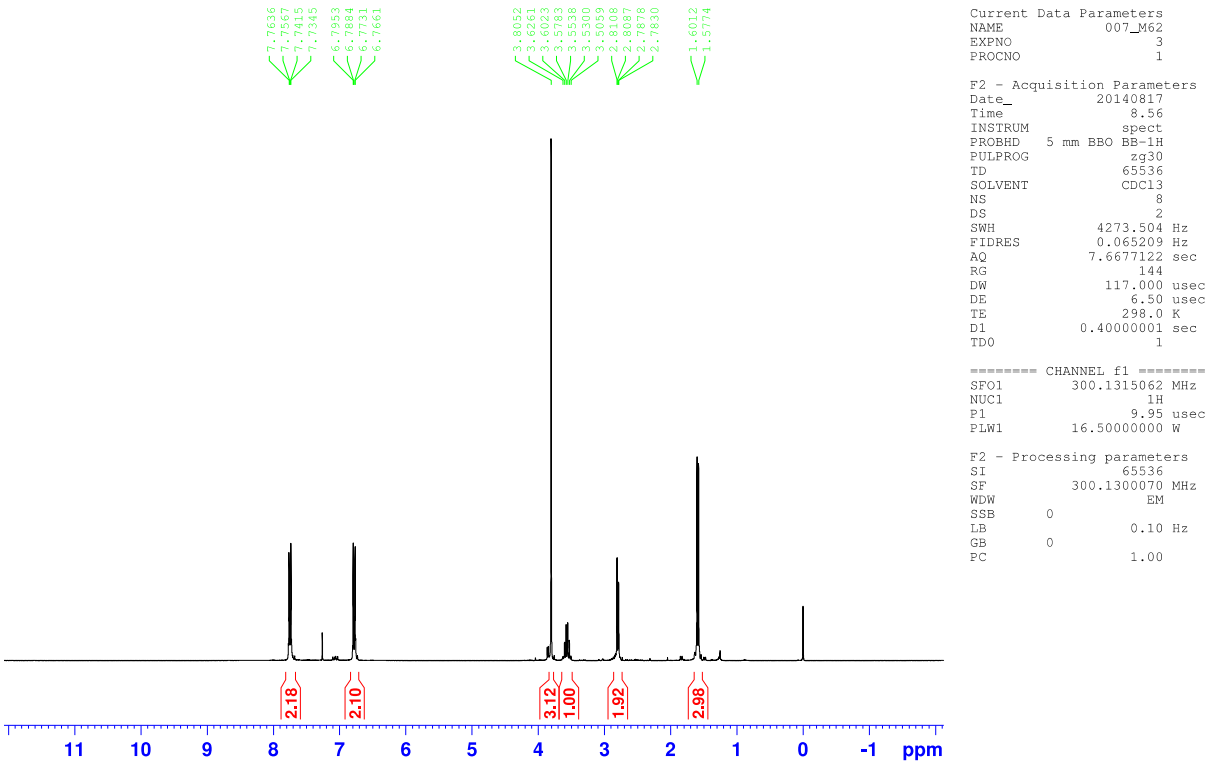



**Figure S5:** $^{1}$H NMR spectrum of organochalcogenide acid **1c** in $CDCl_3$ at 25 °C

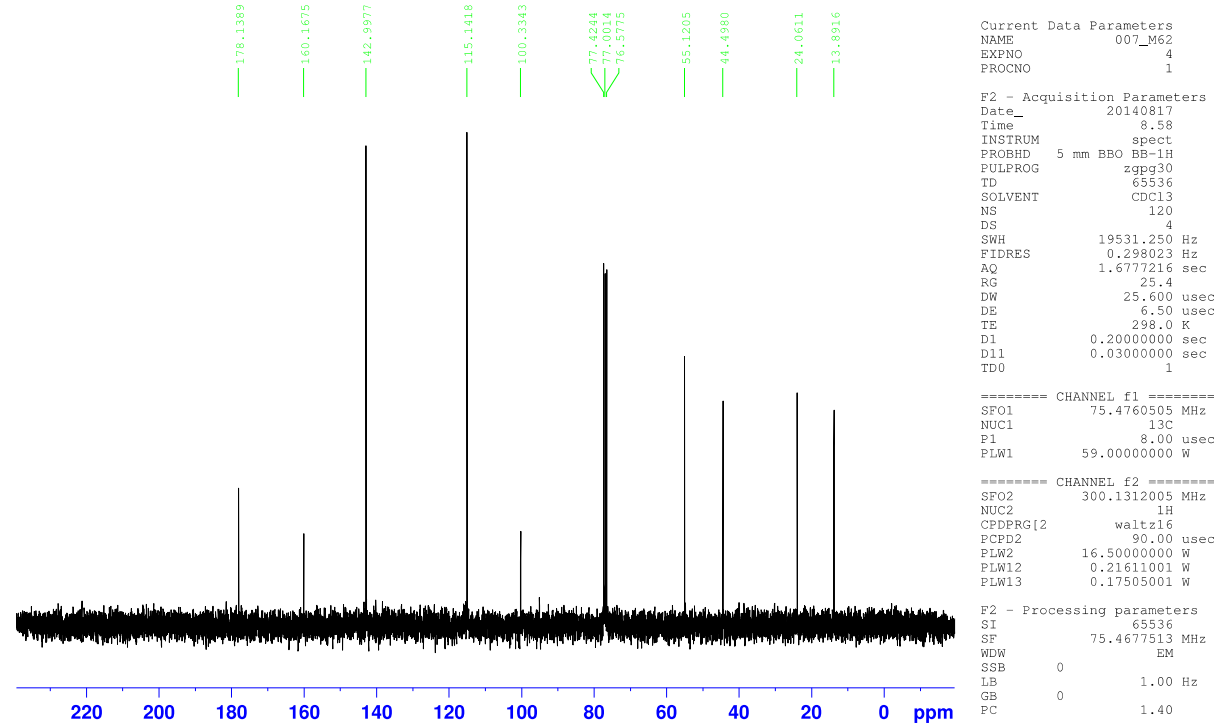



**Figure S6:** $^{13}$C NMR spectrum of organochalcogenide acid **1c** in $CDCl_3$ at 25 °C

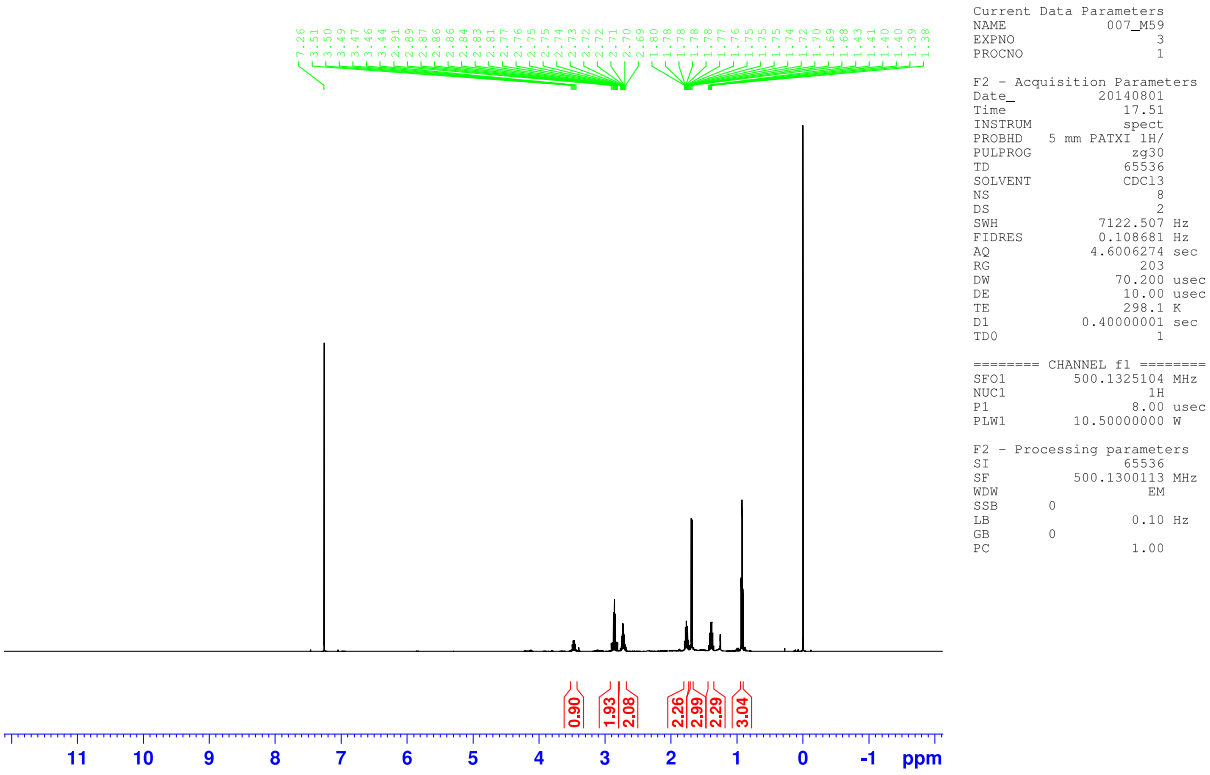



**Figure S7:** $^{1}$H NMR spectrum of organochalcogenide acid **1d** in $CDCl_3$ at 25 °C

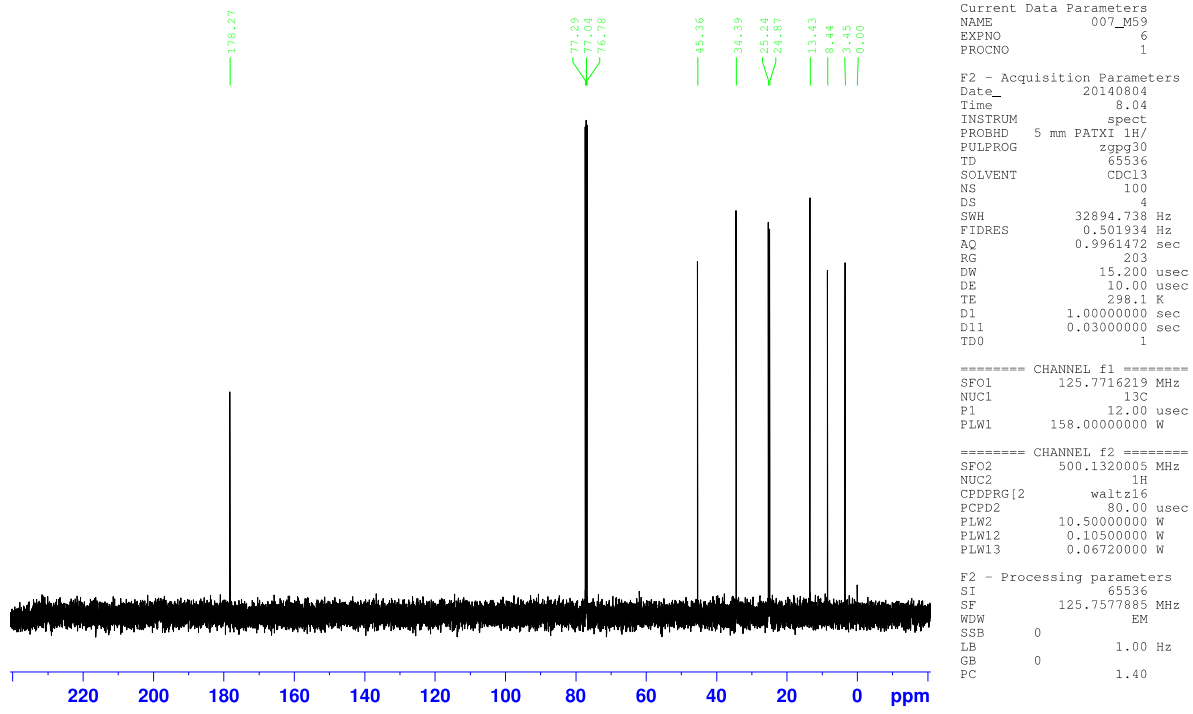
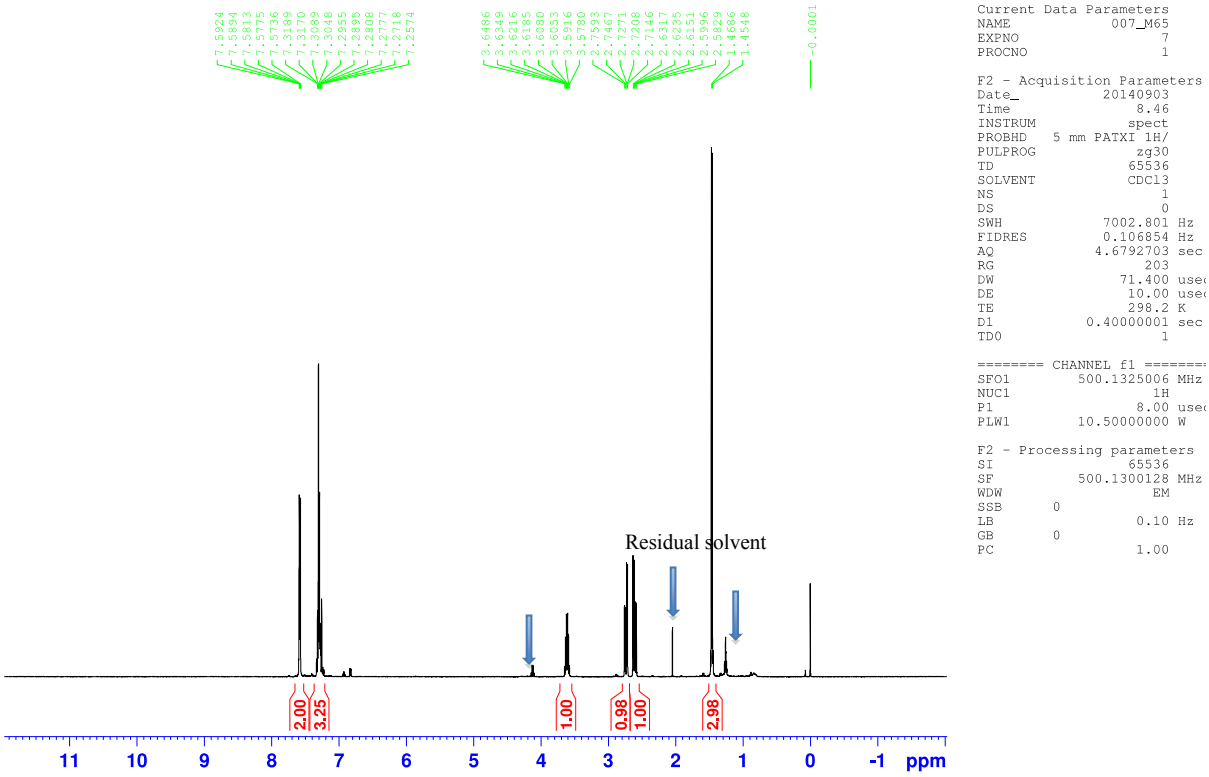
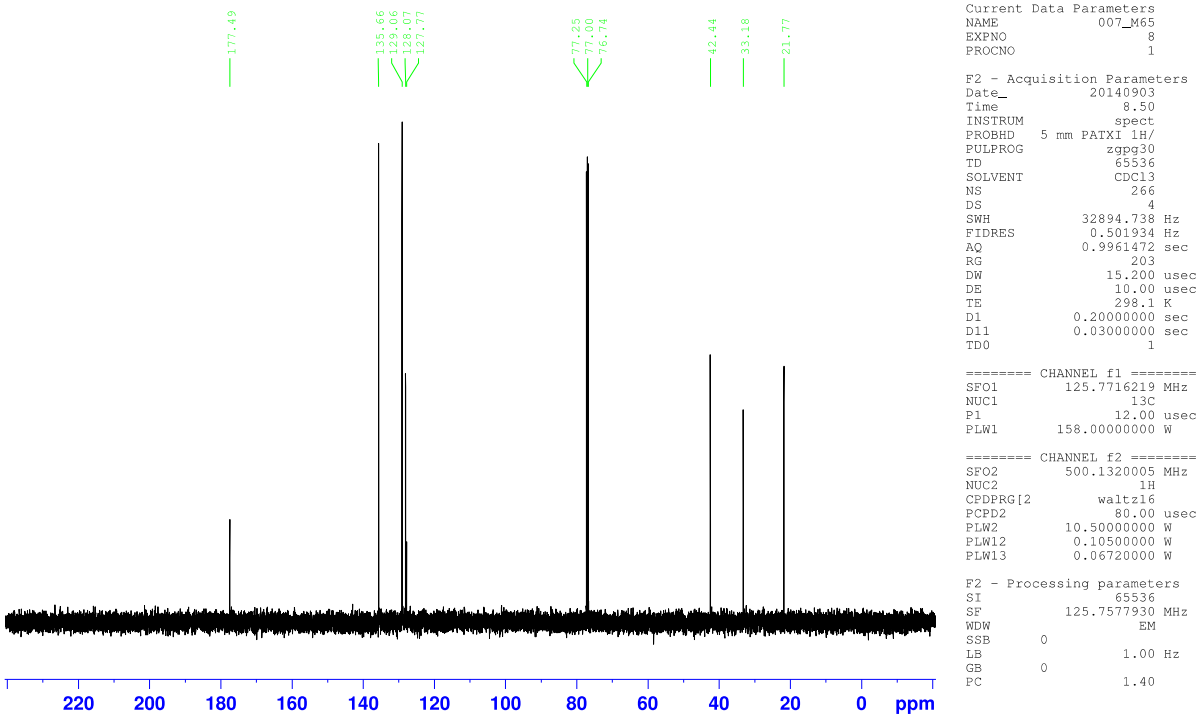



**Figure S8:** $^{13}$C NMR spectrum of organochalcogenide acid **1d** in $CDCl_3$ at 25 °C



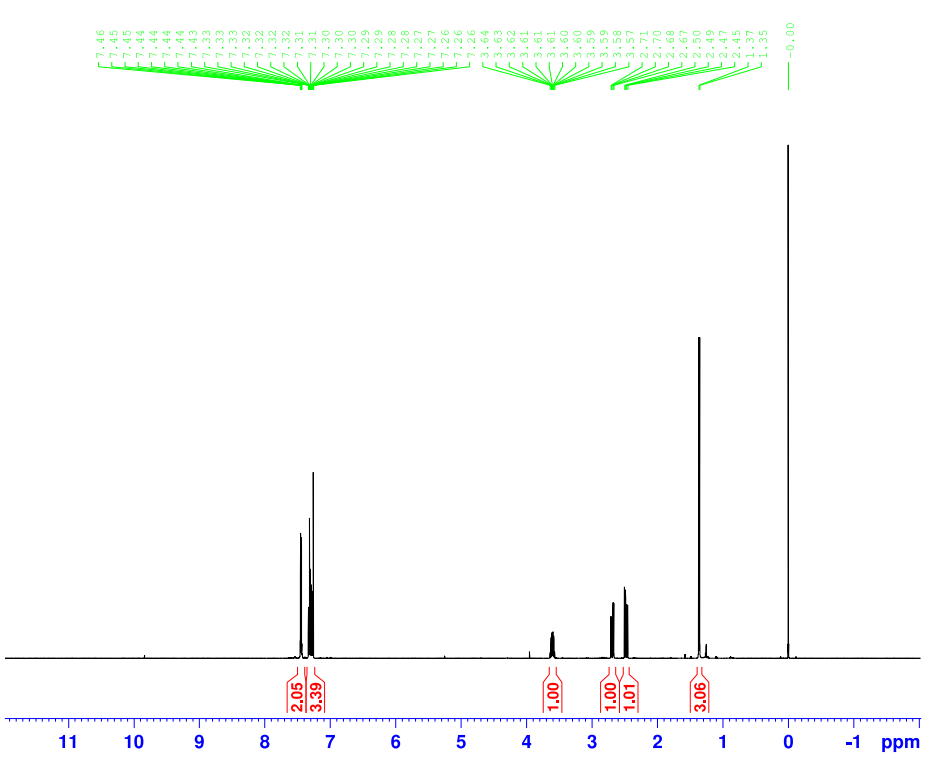

```
Current Data Parameters
NAME                  007_M65
EXPNO                       7
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140903
Time                    8.46
INSTRUM                spect
PROBHD    5 mm PATXI 1H/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          1
DS                          0
SWH                7002.801 Hz
FIDRES            0.106854 Hz
AQ                4.6792703 sec
RG                        203
DW                   71.400 use
DE                   10.00 use
TE                   298.2 K
D1              0.40000001 sec
TD0                         1

======== CHANNEL f1 ========
SFO1           500.1325006 MHz
NUC1                     1H
P1                    8.00 use
PLW1          10.50000000 W

F2 - Processing parameters
SI                     65536
SF             500.1300128 MHz
WDW                       EM
SSB         0
LB                    0.10 Hz
GB          0
PC                    1.00
```

**Figure S9:** $^{1}$H NMR spectrum of organochalcogenide acid **1e** in $CDCl_3$ at 25 °C



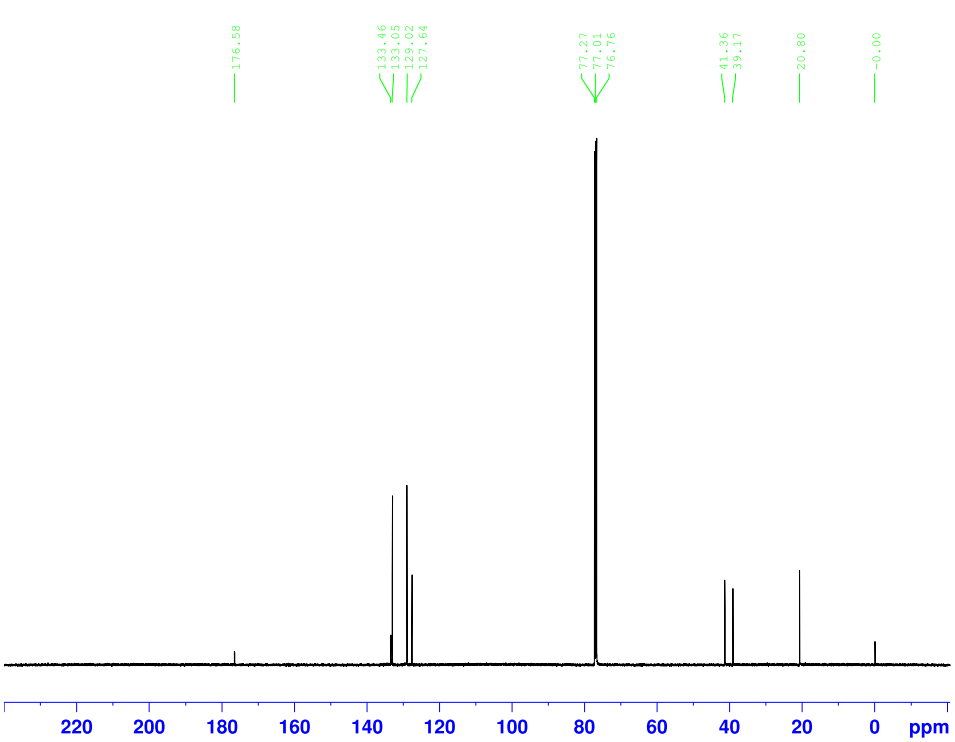

```
Current Data Parameters
NAME                  007_M65
EXPNO                       8
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140903
Time                    8.50
INSTRUM                spect
PROBHD    5 mm PATXI 1H/
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        266
DS                          4
SWH               32894.738 Hz
FIDRES            0.501934 Hz
AQ                0.9961472 sec
RG                        203
DW                  15.200 usec
DE                   10.00 usec
TE                   298.1 K
D1              0.20000000 sec
D11             0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1           125.7716219 MHz
NUC1                     13C
P1                   12.00 usec
PLW1         158.00000000 W

======== CHANNEL f2 ========
SFO2           500.1320005 MHz
NUC2                     1H
CPDPRG[2            waltz16
PCPD2                80.00 usec
PLW2          10.50000000 W
PLW12          0.10500000 W
PLW13          0.06720000 W

F2 - Processing parameters
SI                     65536
SF             125.7577930 MHz
WDW                       EM
SSB         0
LB                    1.00 Hz
GB          0
PC                    1.40
```

**Figure S10:** $^{13}$C NMR spectrum of organochalcogenide acid **1e** in $CDCl_3$ at 25 °C




```
Current Data Parameters
NAME                  007_M57
EXPNO                       3
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140714
Time                  17.50
INSTRUM               spect
PROBHD    5 mm PATXI 1H/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        8
DS                        2
SWH                7002.801 Hz
FIDRES             0.106854 Hz
AQ                4.6792703 sec
RG                      203
DW                   71.400 usec
DE                   10.00 usec
TE                   298.2 K
D1                0.40000001 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            500.1325006 MHz
NUC1                    1H
P1                    8.00 usec
PLW1           10.50000000 W

F2 - Processing parameters
SI                    65536
SF              500.1300125 MHz
WDW                     EM
SSB       0
LB                    0.10 Hz
GB        0
PC                    1.00
```

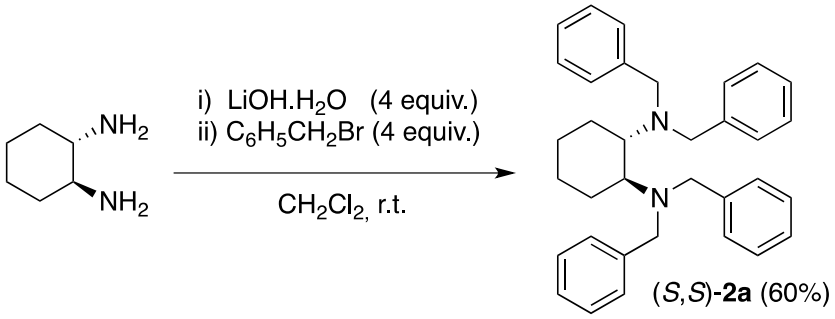
**Figure S11:** $^{1}$H NMR spectrum of organochalcogenide acid **1f** in $CDCl_3$ at 25 °C




```
Current Data Parameters
NAME                  007_M57
EXPNO                       4
PROCNO                      1

F2 - Acquisition Parameters
Date_              20140714
Time                  17.53
INSTRUM               spect
PROBHD    5 mm PATXI 1H/
PULPROG              zgpg30
TD                    65536
SOLVENT               CDCl3
NS                    30988
DS                        4
SWH               32894.738 Hz
FIDRES             0.501934 Hz
AQ                0.9961472 sec
RG                      203
DW                   15.200 usec
DE                   10.00 usec
TE                   298.1 K
D1                0.50000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            125.7716219 MHz
NUC1                    13C
P1                   12.00 usec
PLW1          158.00000000 W

======== CHANNEL f2 ========
SFO2            500.1320005 MHz
NUC2                    1H
CPDPRG[2             waltz16
PCPD2                80.00 usec
PLW2           10.50000000 W
PLW12           0.10500000 W
PLW13           0.06720000 W

F2 - Processing parameters
SI                    65536
SF              125.7577891 MHz
WDW                     EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

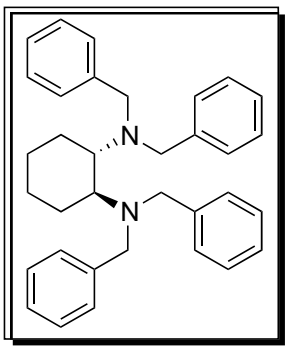
**Figure S12:** $^{13}$C NMR spectrum of organochalcogenide acid **1f** in $CDCl_3$ at 25 °C

**Typical procedure for the synthesis of tetrabenzyl cyclohexyl-1,2-diamine**




The tetrabenzyl cyclohexyl-1,2-diamine **2a** was synthesized and characterized as recently described.[2] The cyclohexyl-1,2-diamine (1.0 mmol) was added to 50 mL round-bottomed flask equipped with magnetic stirring, 25 mL of $CH_2Cl_2$ and a rubber septum under nitrogen. Afterward, the $LiOH.H_2O$ (4.0 mmol) and benzyl bromide (4.0 mmol) were added to the flask. The solution was stirred for a further 8 hours. Water (10 mL) was added. The aqueous layer was washed with dichloro-methane (2 x 50 mL) and the combined organic extracts were dried over $MgSO_4$ and concentrated under reduced pressure. The residue was purified by flash column chromatography hexan/AcOEt (9:1).

Spectral dada of compound **2a**:




*(1S,2S)-N1,N1,N2,N2-tetrabenzylcyclohexane-1,2-diamine*

White crystals, 60 % yield. **$^1$H NMR** (500 MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 7.37-7.39 (m, 8H); 7.18-7.24 (m, 12H); 3.73 (d, $J$ = 13.85 Hz, 4H); 3.33 (d, $J$ = 13.85 Hz, 4H); 2.66-2.67 (m, 2H); 2.05-2.07 (m, 2H); 1.67-1.69 (m, 2H); 0.97-01.07 (m, 4H). **$^{13}$C NMR** (125 MHz, $CDCl_3$, 25 $^o$C, TMS, $\delta$ ppm): 140.6, 128.9, 128.0, 58.2, 53.2, 25.9, 24.9. **HR-MS**: calculated value: 474.3035; found value [$M^+$ + 1]: 475.2982.

[2] Arjan, H.; Boyd, E.; Coumbarides, G. S.; Eames, J.; Jones, R. V. H.; Stenson, R. A.; Suggate, M. J. *Tetrahedron Lett.* **2005**, *46*, 1921-1925.

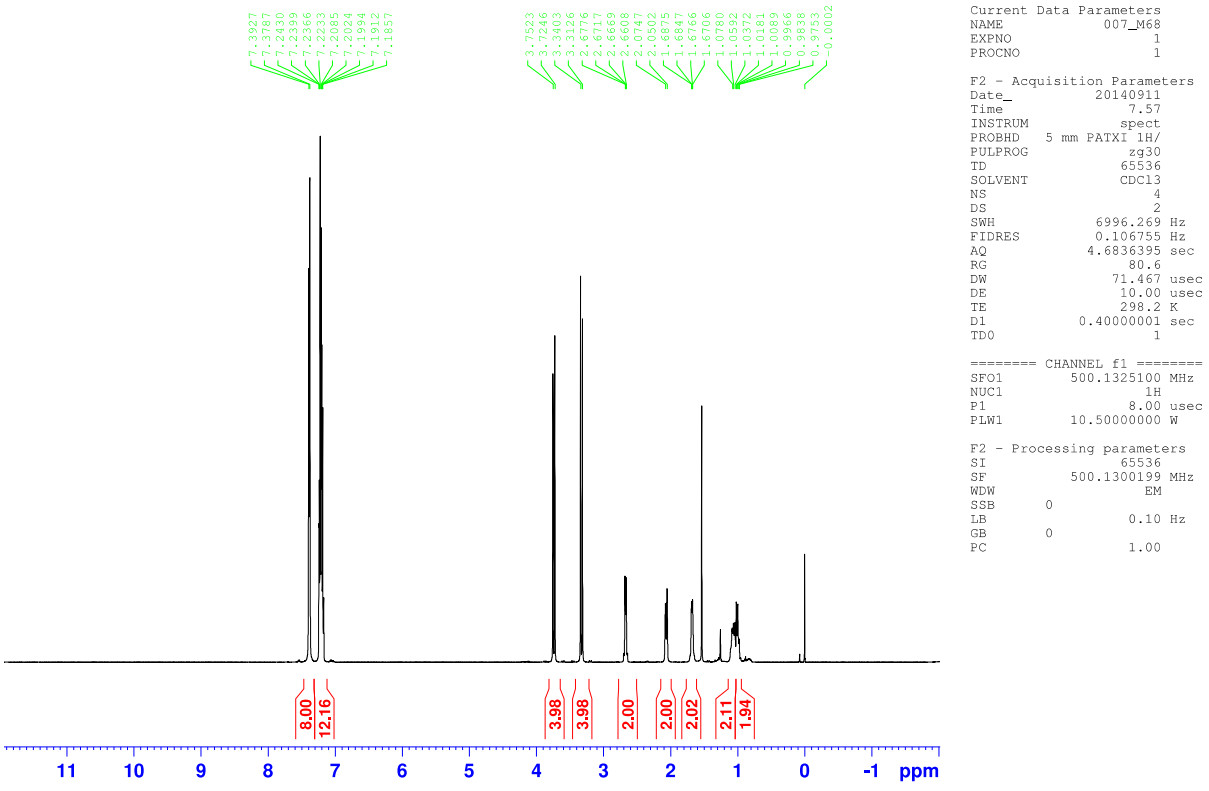



**Figure S13:** $^{1}$H NMR spectrum of tetrabenzyl cyclohexyl-1,2-diamine **2a** in $CDCl_3$ at 25 $^{o}$C

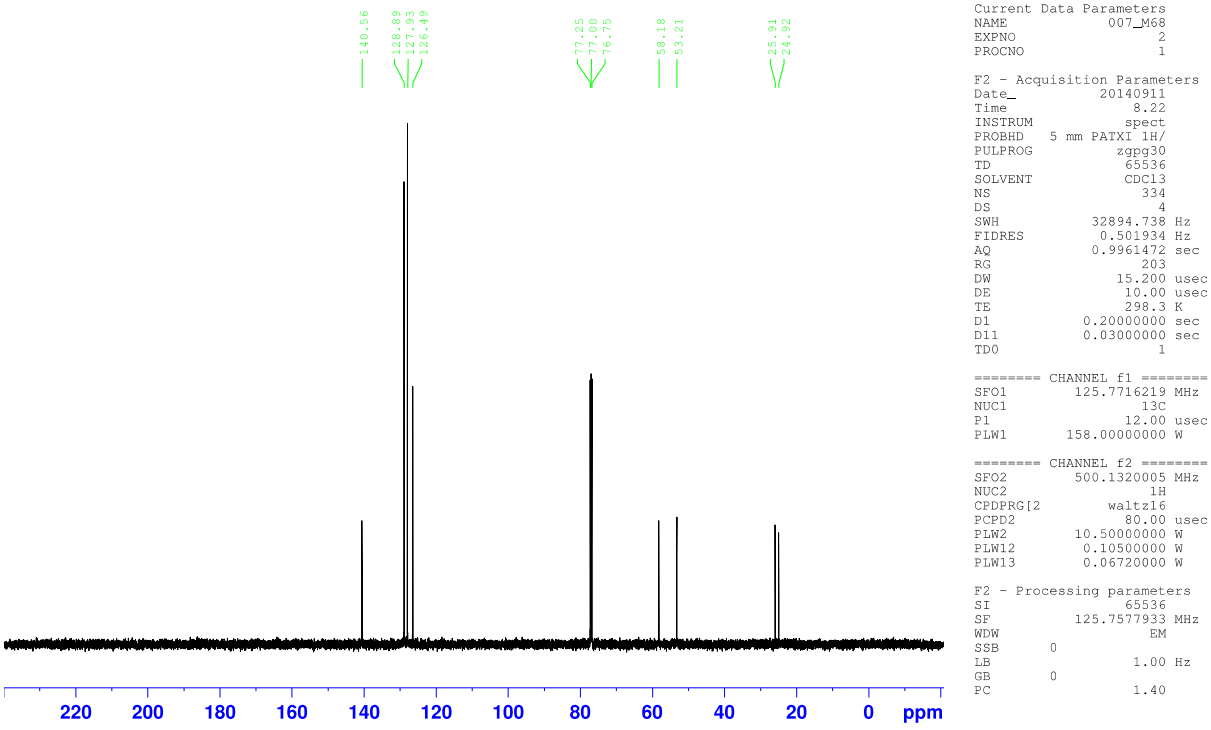
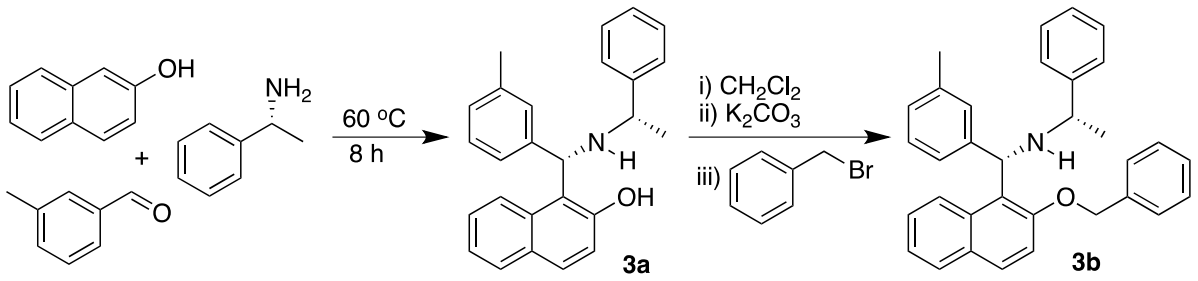


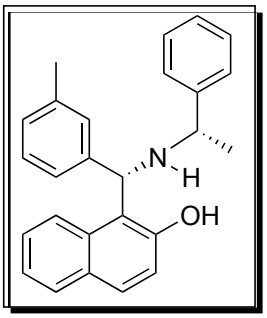

**Figure S14:** $^{13}$C NMR spectrum of tetrabenzyl cyclohexyl-1,2-diamine **2a** in $CDCl_3$ at 25 $^{o}$C

**Typical procedure for the syntheses of 1,3-aminonaphthols**




The 1,3 aminonaphthols **3** were synthesized and characterized as recently described.[3] A mixture of 2-naphthol (2.0 mmol), aldehyde (2.4 mmol), and chiral amine (2.1 mmol) was stirred at 60 °C under nitrogen atmosphere. After stirring at reflux for 8 h (monitored by TLC), EtOH (5 mL) was added to the reaction mixture at room temperature. The crystals were collected, washed with EtOH (3 x 3 mL), and purified by crystallization from EtOAc/hexane to give the pure compounds.

Spectral dada of compound **3a**:

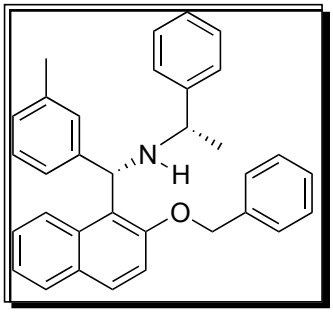



*1-((S)-(((S)-1-phenylethyl)amino)(m-tolyl)methyl)naphthalen-2-ol*

White crystals, 67 % yield. M.p. 170-171 °C. $[\alpha]^{20}_{D}$ + 197 (c 1.00, $CHCl_3$). **$^1$H NMR** (500 MHz, $CDCl_3$, 25 °C, TMS, $\delta$ ppm): 13.73 (sbr, 1H); 7.69-7.72 (m, 2H); 7.32-7.39 (m, 4H); 7.15-7.22 (m, 5H); 7.10 (tap, $J$ = 7.8 Hz, 1H); 6.96-6.97 (m, 3H); 5.40 (s, 1H); 3.87 (sbr, 1H); 2.21 (s, 3H); 1.47 (d, $J$ = 6.85 Hz, 3H); **$^{13}$C NMR** (125 MHz, $CDCl_3$, 25 °C, TMS, $\delta$ ppm): 157.2; 143.1; 141.5; 138.7; 132.6; 129.6; 128.9; 128.7; 128.6; 128.5; 128.2; 127.8; 126.7; 126.3; 124.7; 122.3; 121.1; 120.0; 113.2; 60.3; 56.6; 22.9; 21.4. **IR (KBr)**: $\nu$ 3437, 3341, 3053, 2910, 2861, 1746, 1623, 1492, 1452, 1239, 916, 903, 857, 762, 621, 569, 538, 482 cm$^{-1}$. **HR-MS**: calculated value: 367.1936; found value [$M^+$ + 1]: 368.1982.

[3] Dimitrov, V.; Shivachev, B.; Nikolova, R.; Chimov, A.; Kirilova, M. T.; Tzvetkova, P.; Kostova, K.; Marinova, M. *Tetrahedron: Asymmetry* **2013**, *24*, 1453-1466.

Spectral dada of compound **3b**:



*(S)-N-((S)-(2-(benzyloxy)naphthalen-1-yl)(m-tolyl)methyl)-1-phenylethanamine*

Colorless crystals, 63 % yield. M.p. 110-111 $^{o}$C. $[\alpha]^{20}_{D}$ + 53.3 (c 1.00, $CHCl_3$). **$^{1}$H NMR** (500 MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 7.76 (tap, *J* = 6.70 Hz, 2H); 7.13-7.37 (m, 15H); 7.06 (tap, *J* = 7.55, 1H); 7.00-7.02 (m, 2H); 6.94 (dap, *J* = 7.35 Hz, 1H); 5.63 (sbr, 1H); 5.03 (d, *J* = 11.65 Hz, 1H); 4.81 (d, *J* = 11.65 Hz, 1H); 3.60 (q, *J* = 6.50 Hz, 1H); 2.22 (s, 3H); 1.19 (d, *J* = 6.55 Hz, 3H); **$^{13}$C NMR** (125 MHz, $CDCl_3$, 25 $^{o}$C, TMS, $\delta$ ppm): 154.6, 146.4, 145.1, 137.4, 137.0, 129.1, 128.7, 128.6, 128.5, 128.4, 128.3, 128.0, 127.9, 127.8, 127.6, 127.5, 127.4, 127.3, 126.8, 126.7, 126.5, 125.9, 124.0, 123.6, 115.0, 71.1, 55.8, 26.0, 21.7. **IR (KBr)**: *v* 3437, 3341, 3028, 2969, 2861, 1959, 1866, 1807, 1746, 1384, 1329, 1310, 1168, 963, 934, 916, 903, 621, 569, 538, 522, 490, 437, 429 cm$^{-1}$. **HR-MS**: calculated value: 457.2406; found value [M + 1]: 458.2332.

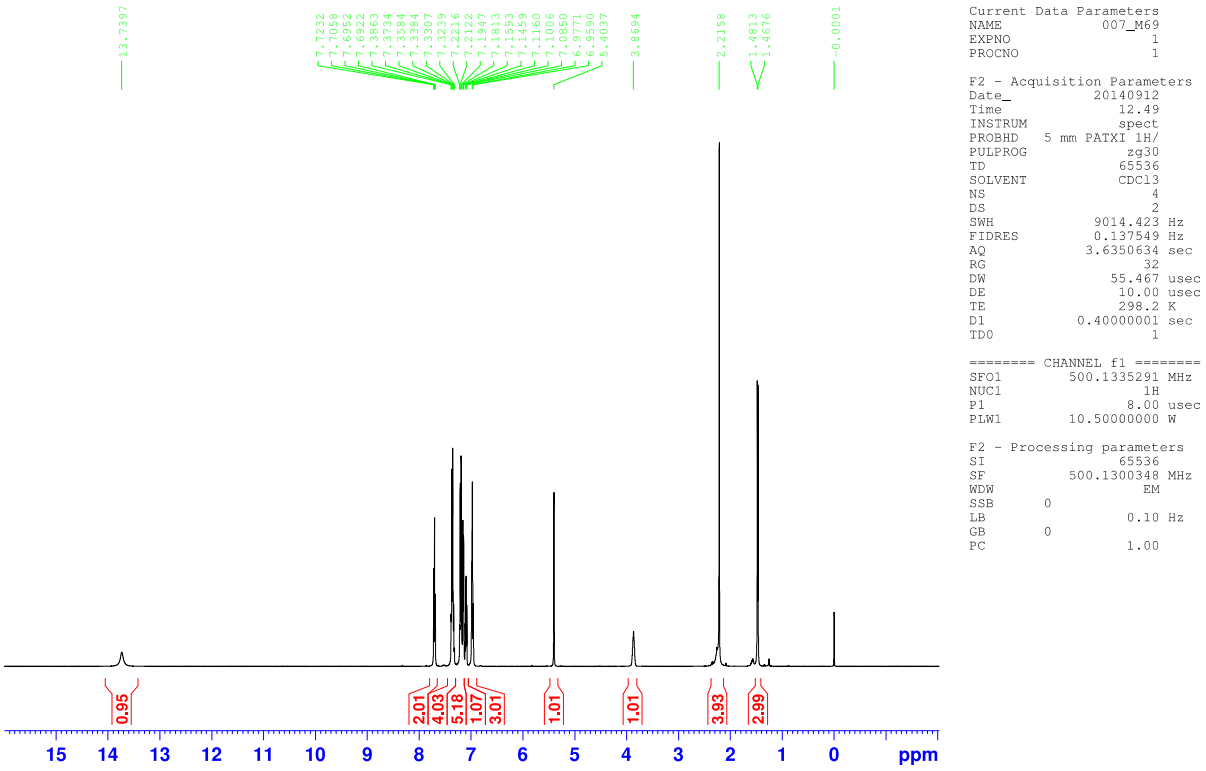



**Figure S15:** $^{1}$H NMR spectrum of 1,3-aminonaphthol **3a** in $CDCl_3$ at 25 $^{o}$C

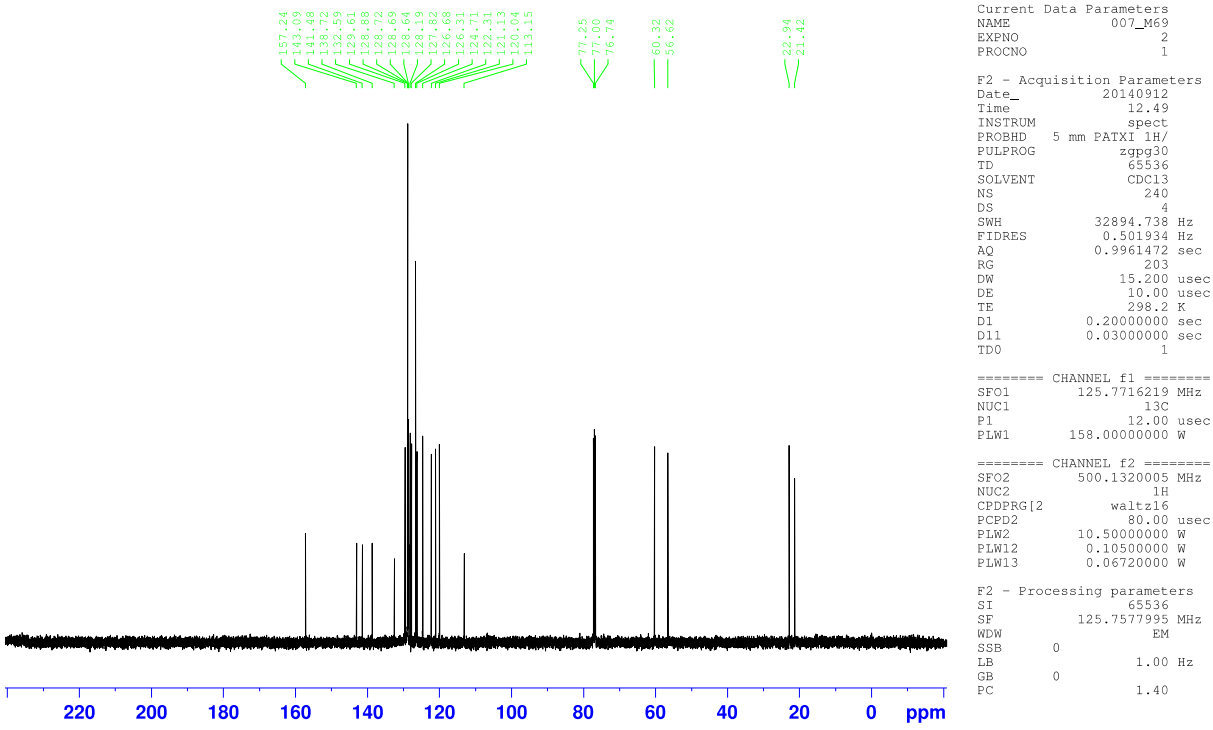



**Figure S16:** $^{13}$C NMR spectrum of 1,3-aminonaphthol **3a** in $CDCl_3$ at 25 $^{o}$C

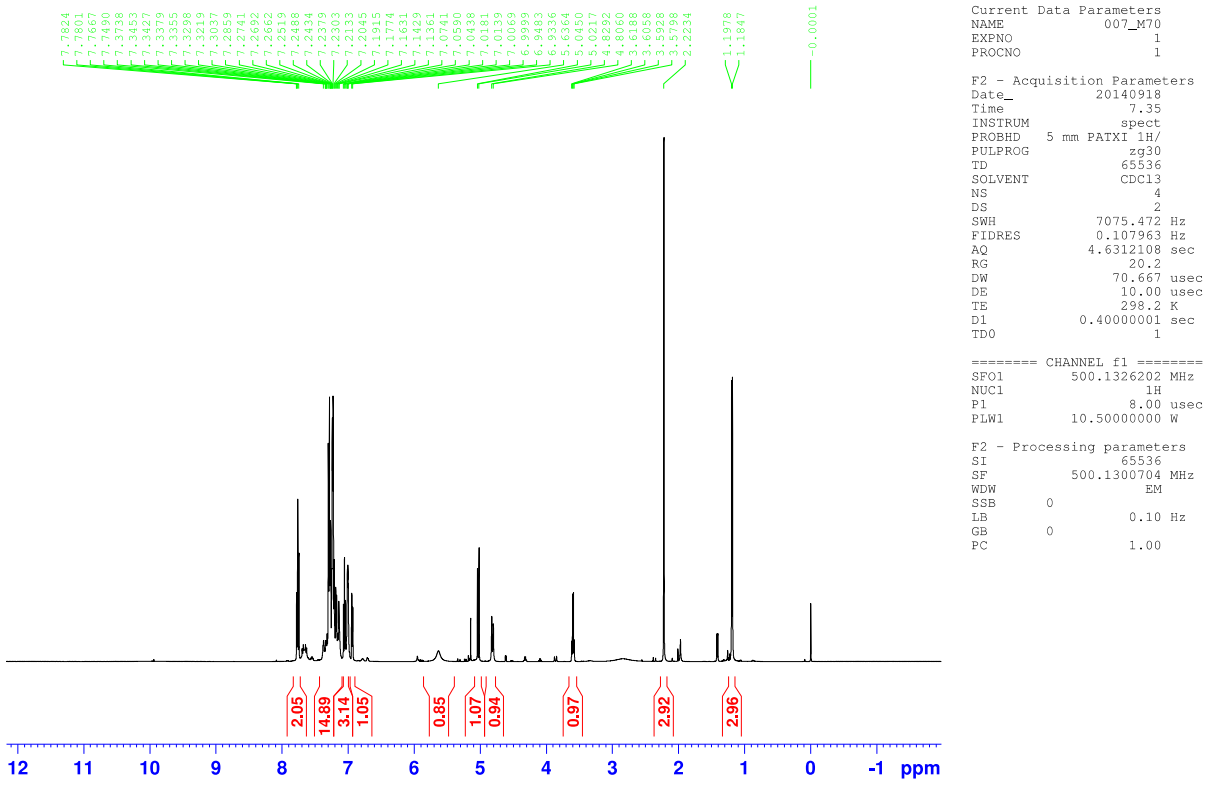



**Figure S17:** $^{1}$H NMR spectrum of *O*-alkyl-1,3-aminonaphthol **3b** in $CDCl_3$ at 25 °C

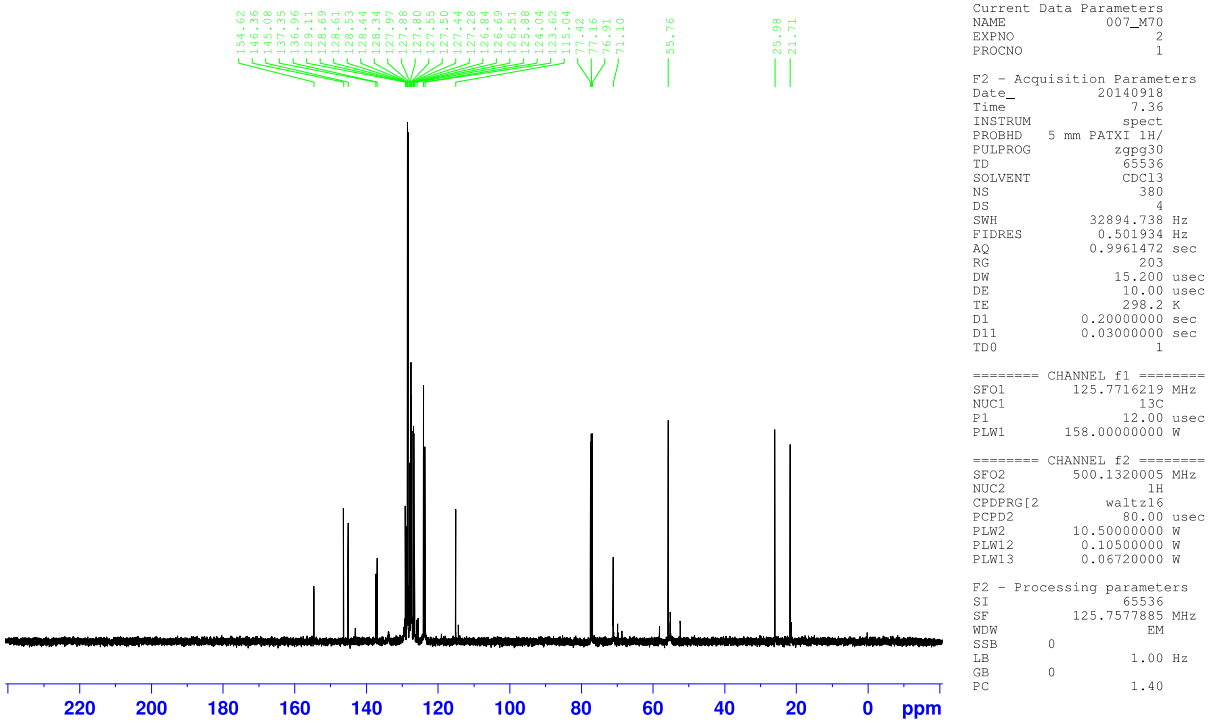
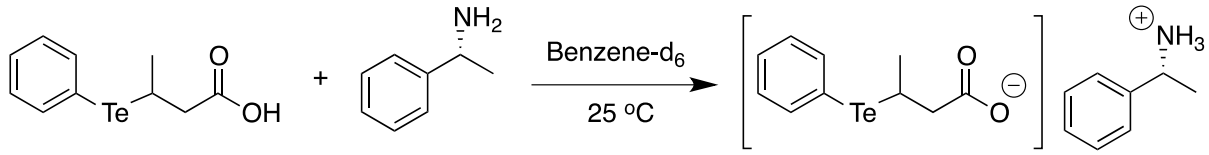



**Figure S18:** $^{13}$C NMR spectrum of *O*-alkyl-1,3-aminonaphthol **3b** in $CDCl_3$ at 25 °C

**Typical procedure for $^{1}$H-NMR chiral discrimination**

The $^{1}$H NMR spectra were recorded at 500 MHz using 4 scans and 4.7 seconds of acquisition time at 25 ºC probe temperature. For processing the NMR spectra was used 0.1 of line broadening and 64K of sized of fid. Samples for NMR spectroscopy were prepared by weighing and dissolving the appropriate amount of substrate in the respective deuterated solvent to prepare a 10 mM solution. The solutions were shaken for 2 minutes for equilibration time.



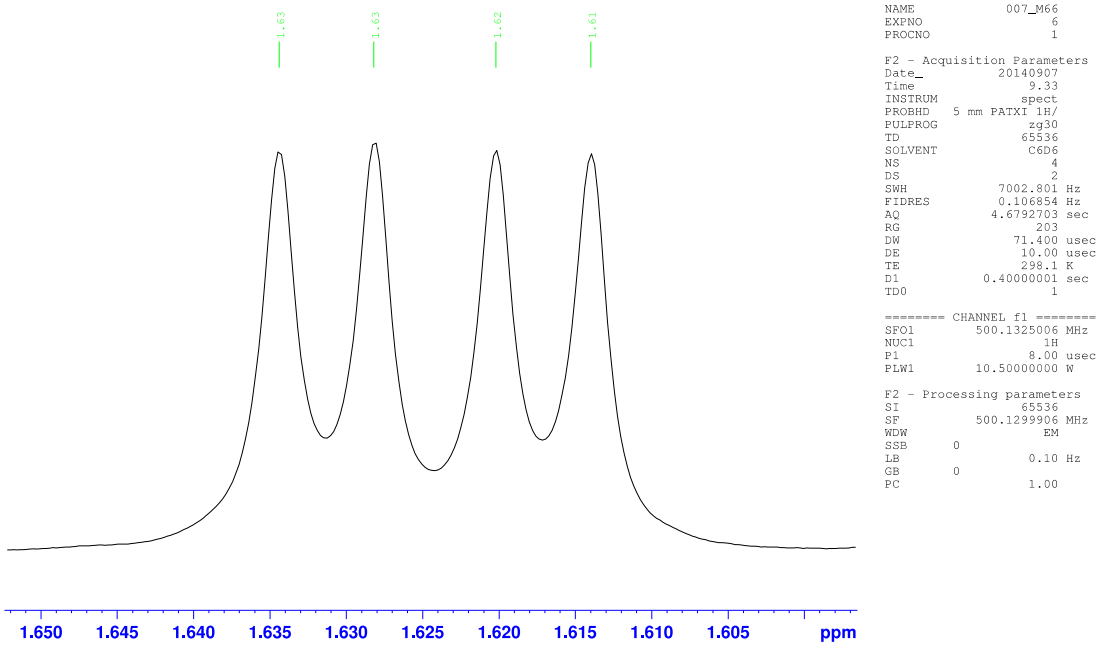




**Figure S19:** $^{1}$H NMR spectrum for chiral discrimination of **1a** in benzene-$d_6$ at 25 ºC

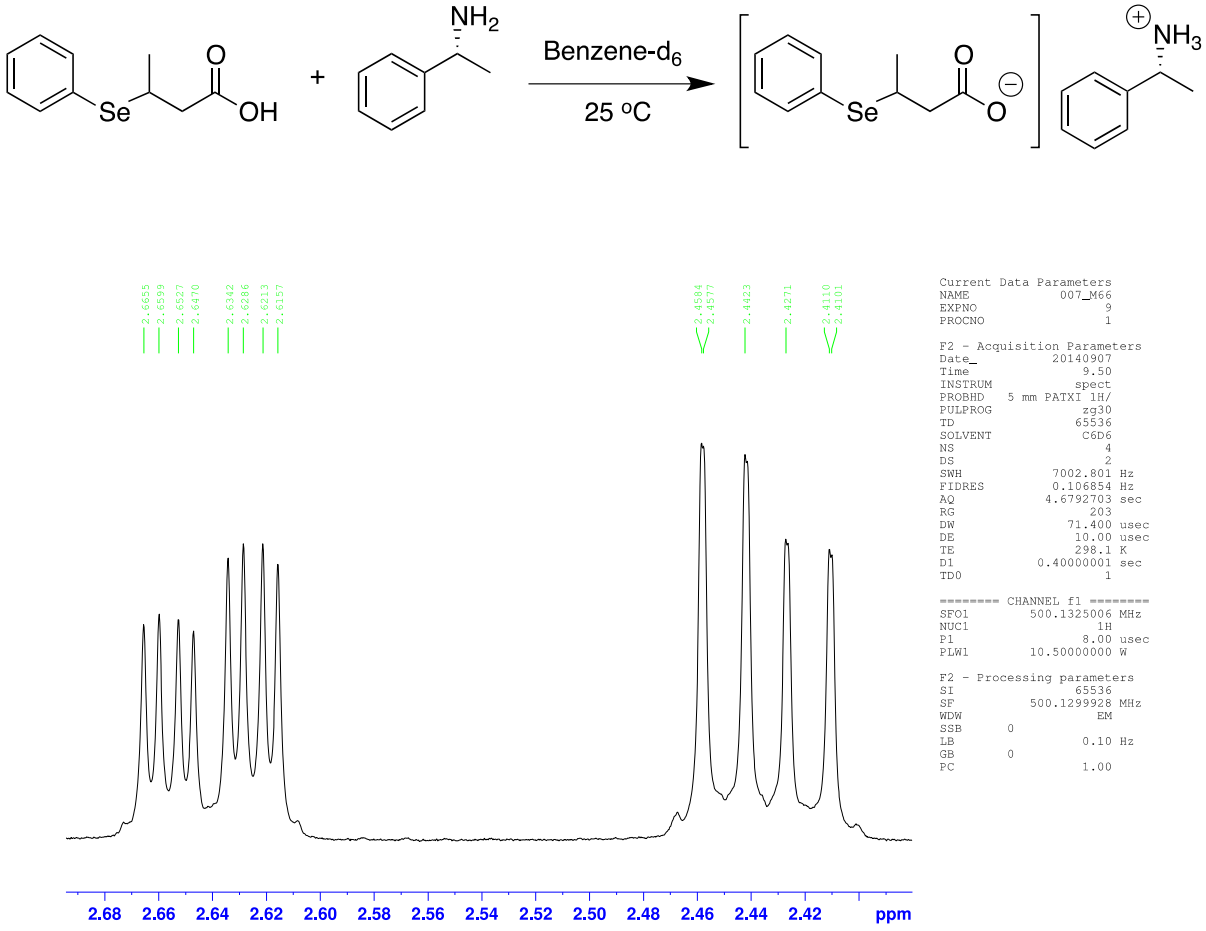



**Figure S20:** $^{1}$H NMR spectrum for chiral discrimination of **1e** in Benzene-$d_6$ at 25 °C

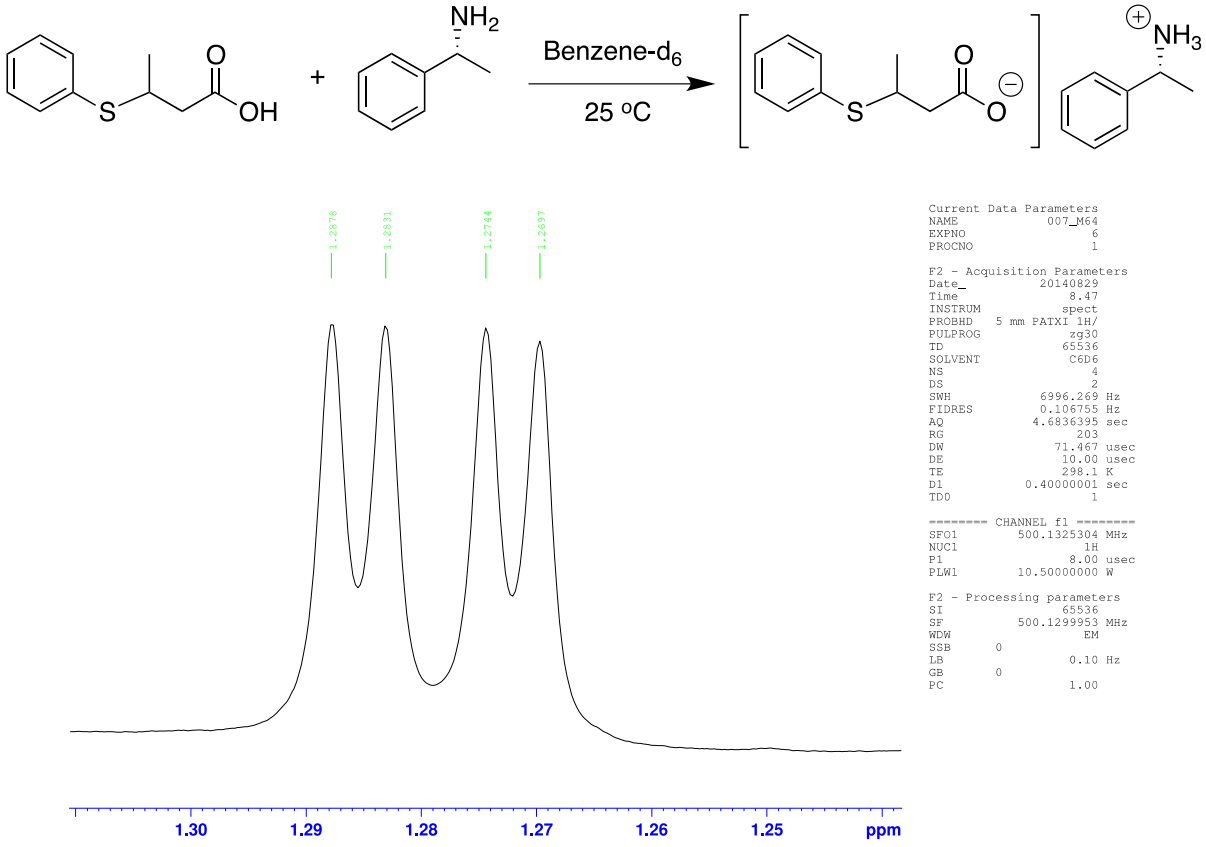



**Figure S21:** $^{1}$H NMR spectrum for chiral discrimination of **1f** in Benzene-$d_6$ at 25 °C

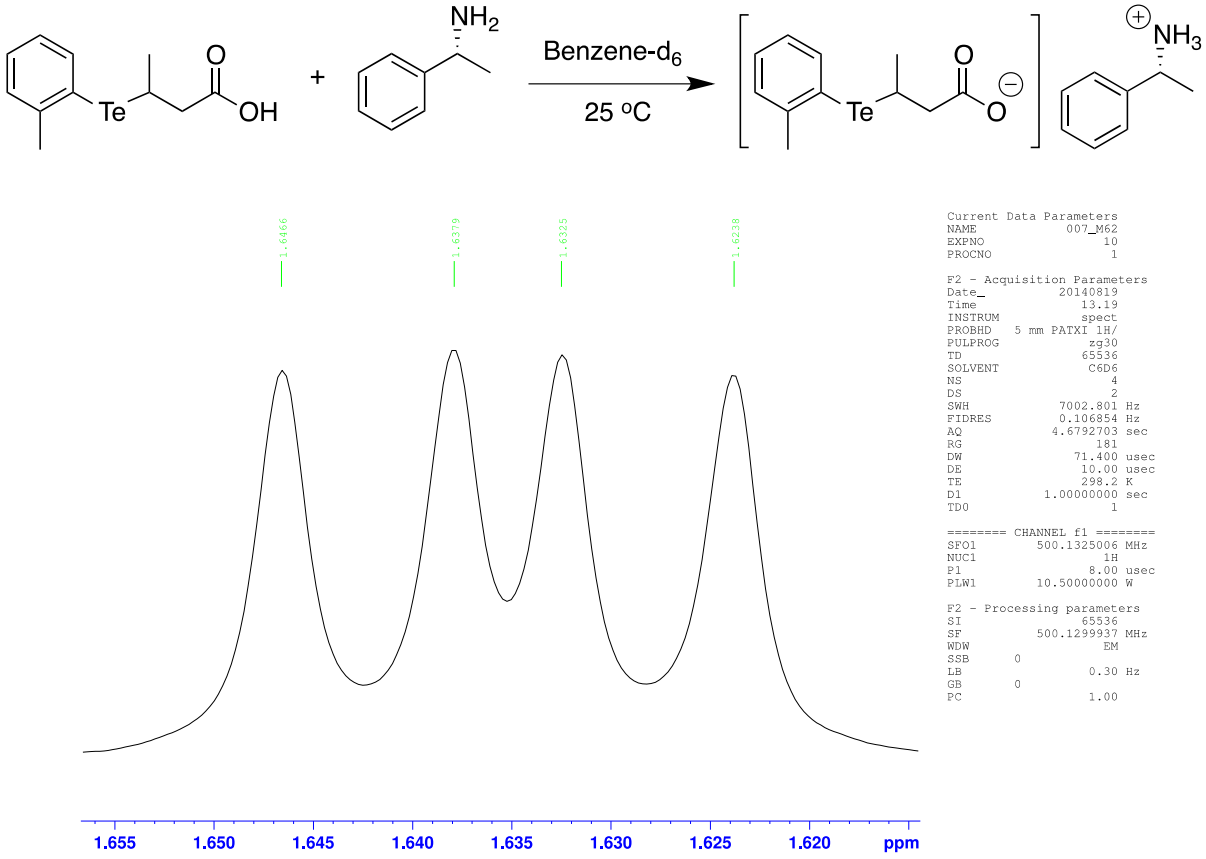



**Figure S22:** $^{1}$H NMR spectrum for chiral discrimination of **1b** in Benzene-$d_6$ at 25 °C

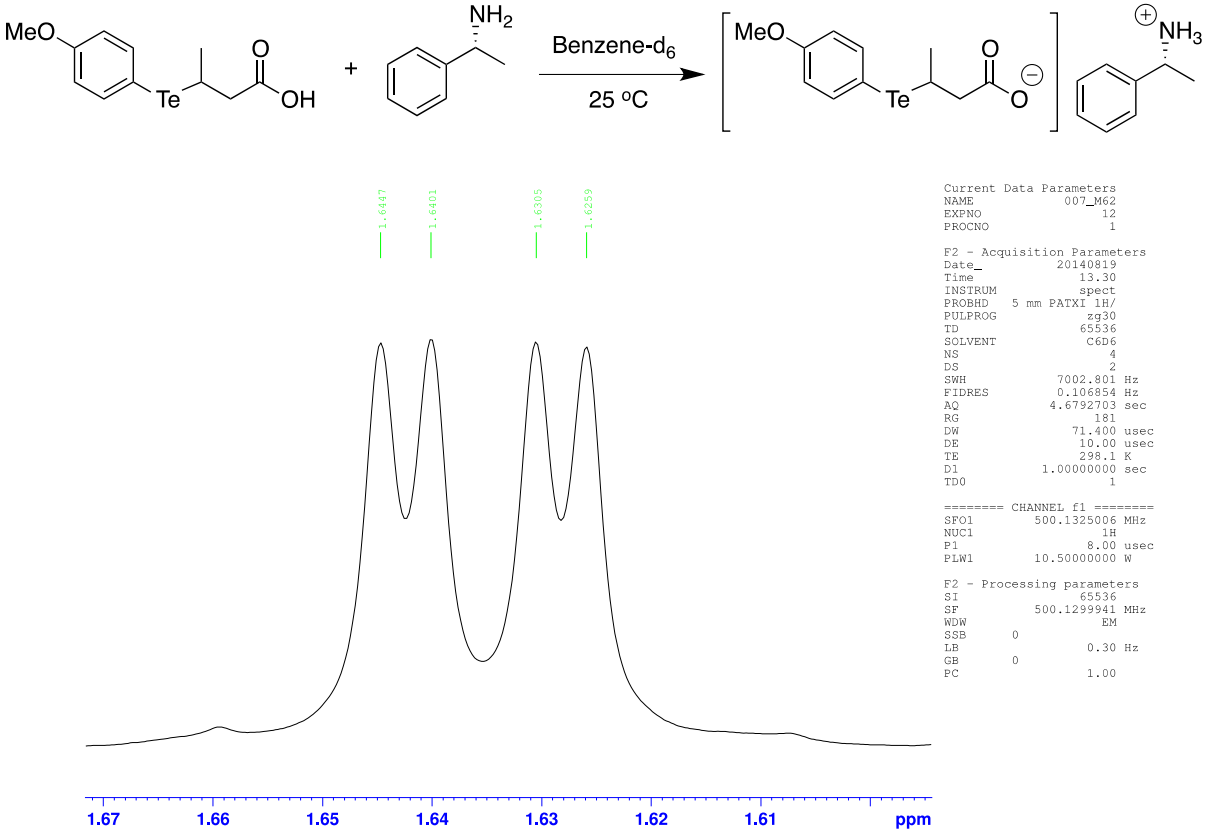



**Figure S23:** $^{1}$H NMR spectrum for chiral discrimination of **1c** in Benzene-$d_6$ at 25 °C

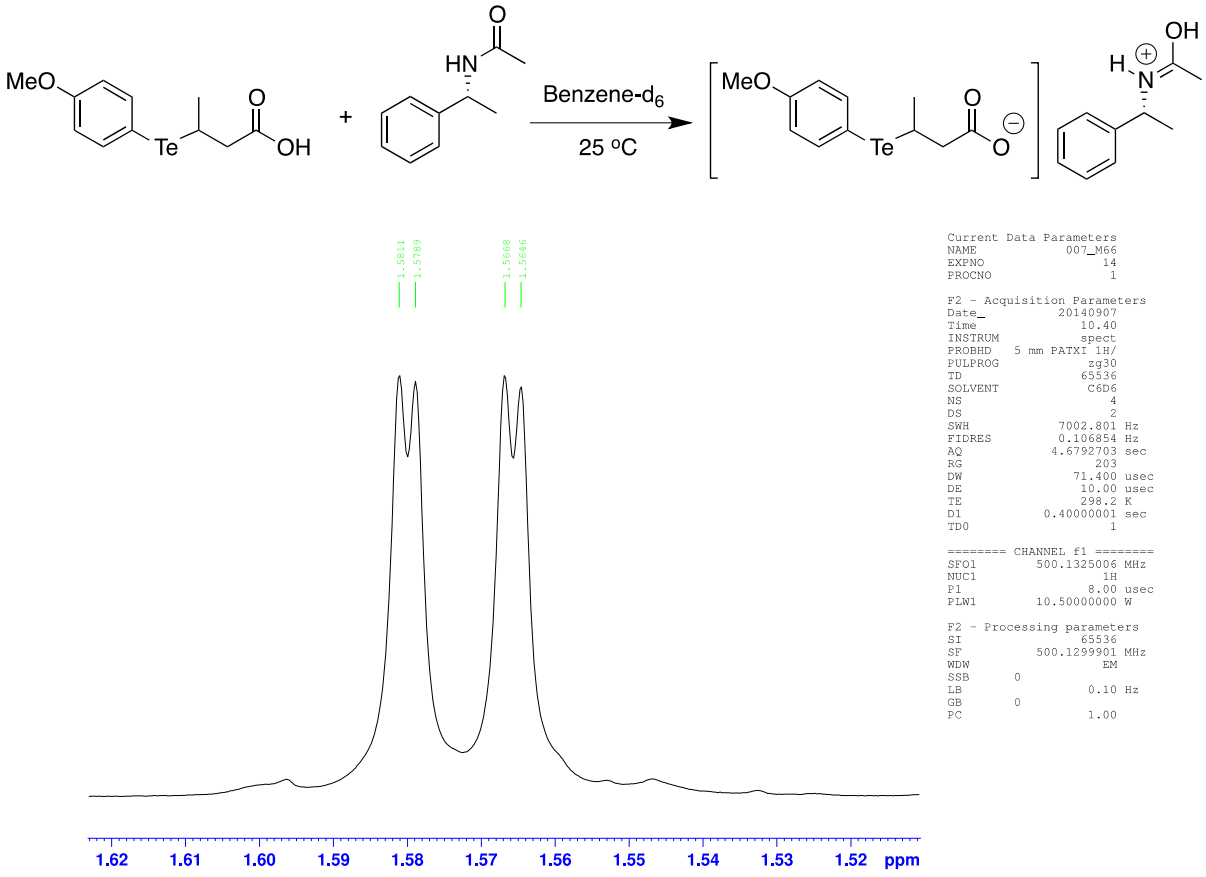



**Figure S24:** $^{1}$H NMR spectrum for chiral discrimination of **1c** in Benzene-$d_6$ at 25 $^{o}$C

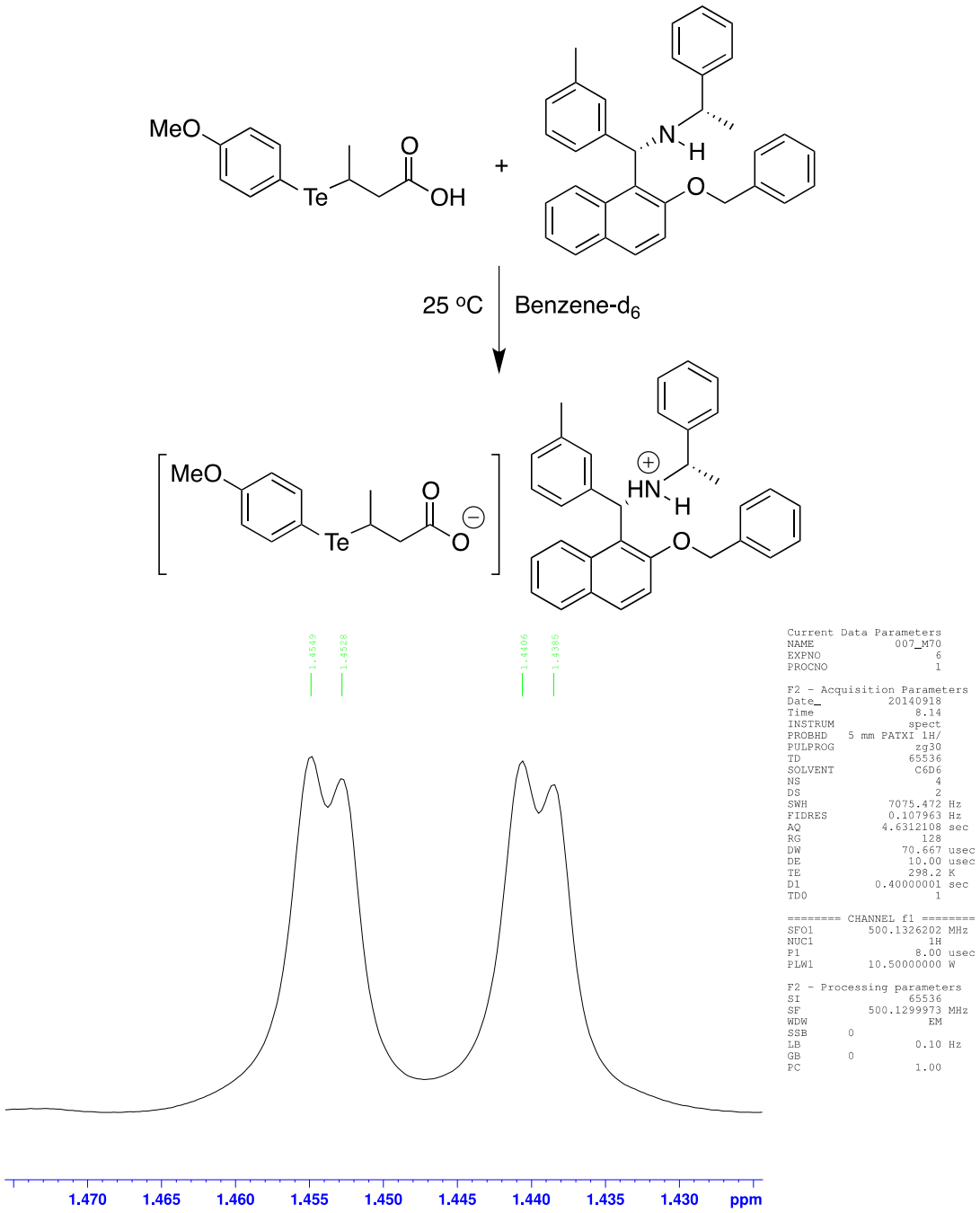



**Figure S25:** $^{1}$H NMR spectrum for chiral discrimination of **1c** in Benzene-$d_6$ at 25 °C

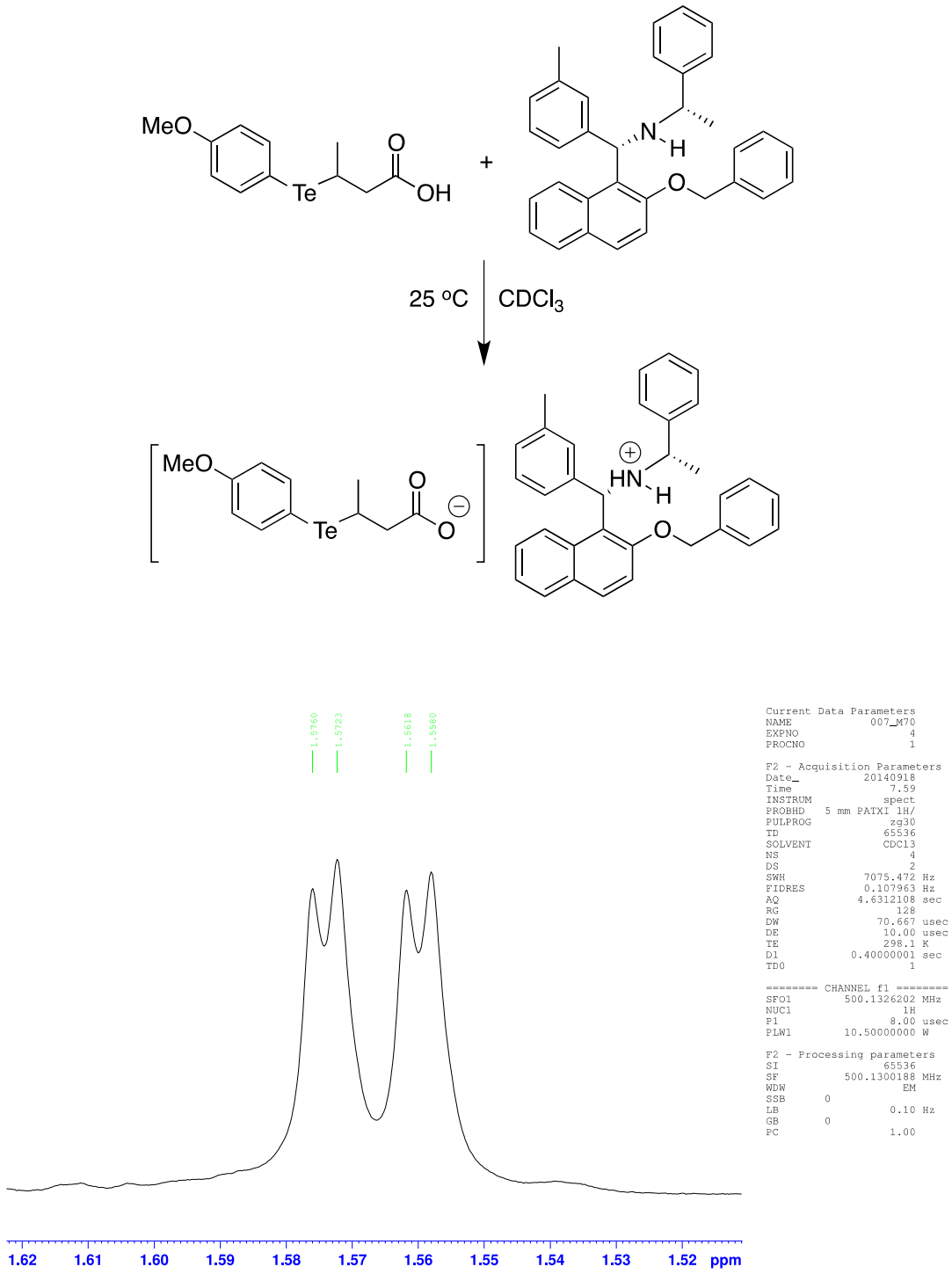



**Figure S26:** $^{1}$H NMR spectrum for chiral discrimination of **1c** in $CDCl_3$ at 25 °C

**Table S1:** $^{1}$H NMR chiral discrimination of organotellurocarboxylic acid **1c** with aminonaphthols **3a** and **3b**.[a]

| Entry | CSA | Solvent | Signal | $\Delta\delta$ (ppm) | $\Delta\Delta\delta$ (ppm) | $\Delta\Delta\delta$ (Hz) |
|---|---|---|---|---|---|---|
| 1 | **3a** | $CDCl_3$ | ---- | ---- | ---- | ---- |
| 2 | **3a** | Benzene-$d_6$ | ---- | ---- | ---- | ---- |
| 3 | **3a** | DMSO-$d_6$ | ---- | ---- | ---- | ---- |
| 4 | **3b** | Benzene-$d_6$ | 2 | + 0.030 | 0.0021 | 1.05 |
| 5 | **3b** | $CDCl_3$ | 2 | - 0.024 | 0.0037 | 1.85 |
| 6 | **3b** | DMSO-$d_6$ | ---- | ---- | ---- | ---- |

[a] An equimolecular amount of aminonaphthol **3** and carboxylic acid **1c** were diluted in the respective deuterated solvent (10 mM) at 25 $^{o}$C.

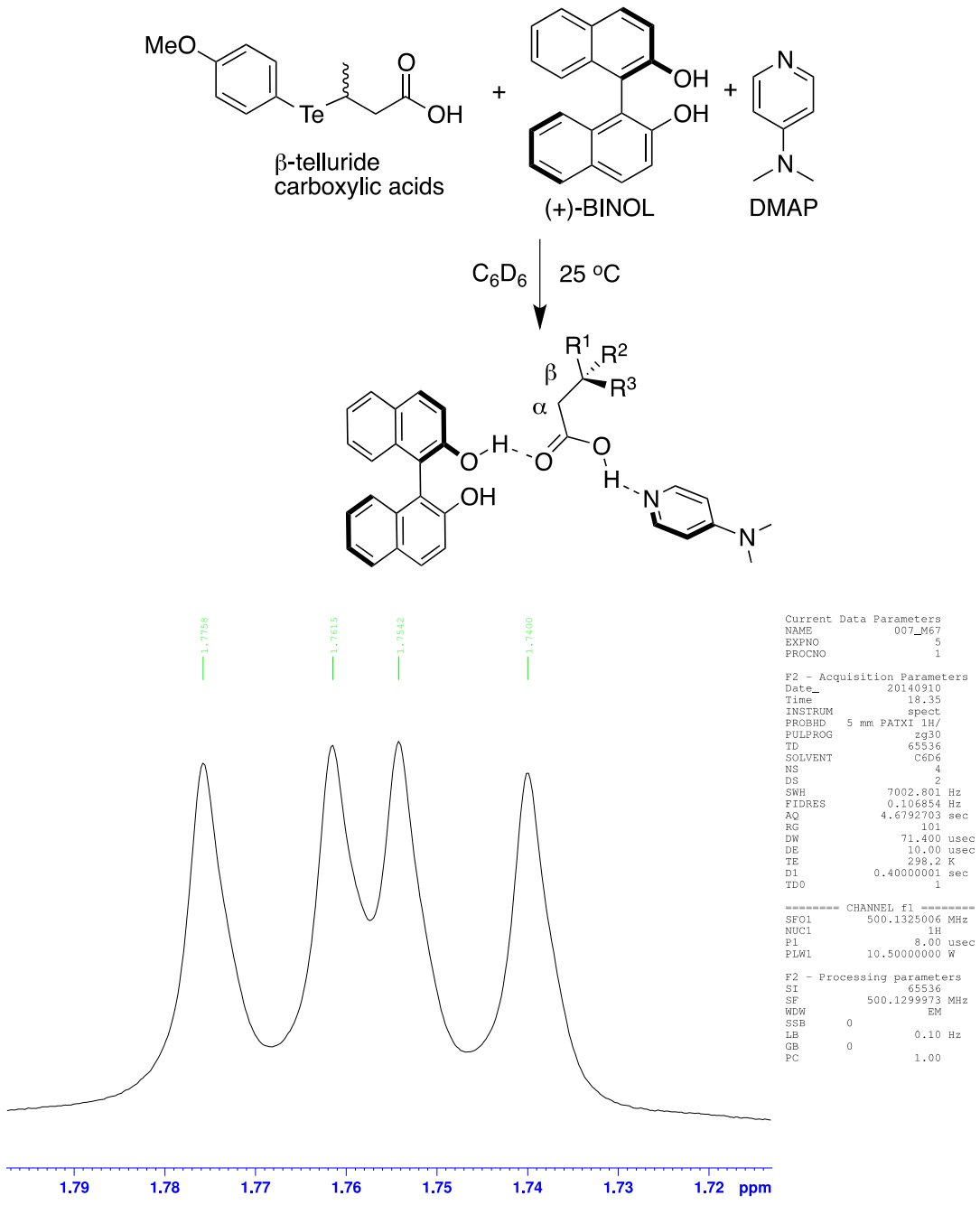



**Figure S27:** $^{1}$H NMR spectrum for chiral discrimination of **1c** in benzene-$d_6$ at 25 °C

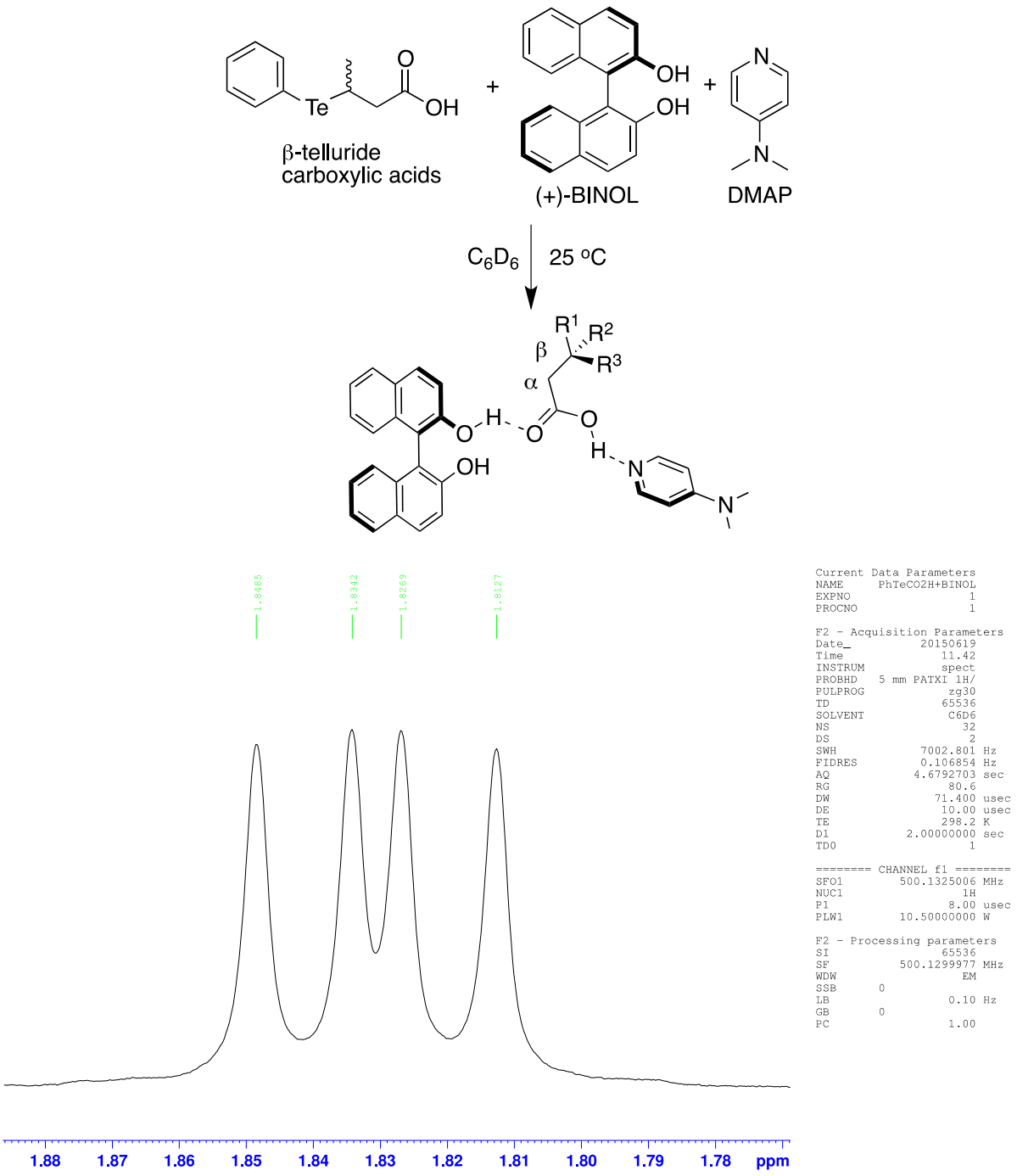
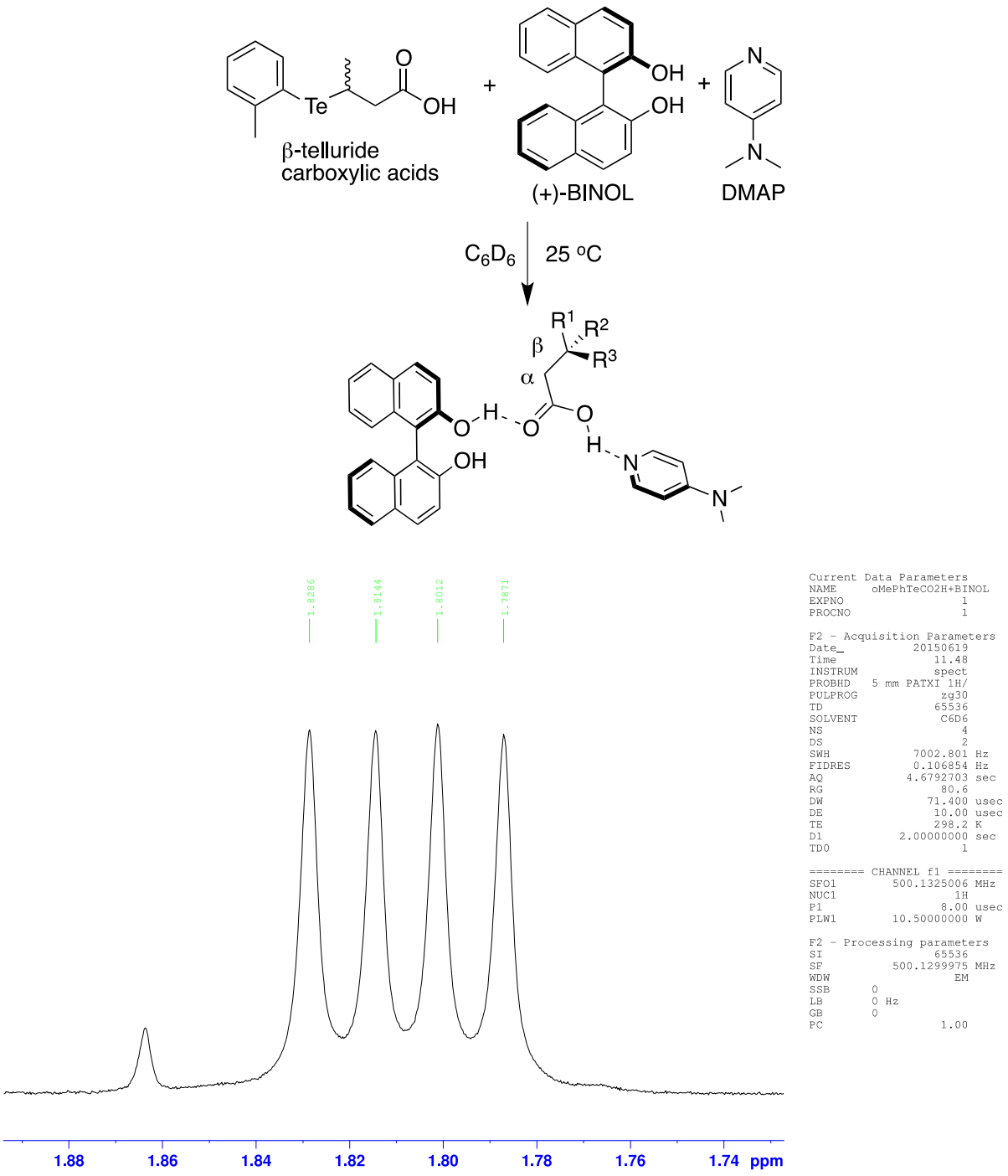



**Figure S28:** $^{1}$H NMR spectrum for chiral discrimination of **1a** in benzene-$d_6$ at 25 °C




```
Current Data Parameters
NAME      oMePhTeCO2H+BINOL
EXPNO                     1
PROCNO                    1

F2 - Acquisition Parameters
Date_           20150619
Time              11.48
INSTRUM           spect
PROBHD   5 mm PATXI 1H/
PULPROG           zg30
TD               65536
SOLVENT           C6D6
NS                   4
DS                   2
SWH           7002.801 Hz
FIDRES        0.106854 Hz
AQ            4.6792703 sec
RG                80.6
DW              71.400 usec
DE              10.00 usec
TE              298.2 K
D1           2.00000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        500.1325006 MHz
NUC1                1H
P1                8.00 usec
PLW1       10.50000000 W

F2 - Processing parameters
SI               65536
SF          500.1299975 MHz
WDW                 EM
SSB       0
LB        0 Hz
GB        0
PC                1.00
```

**Figure S29:** $^{1}$H NMR spectrum for chiral discrimination of **1b** in benzene-$d_6$ at 25 °C

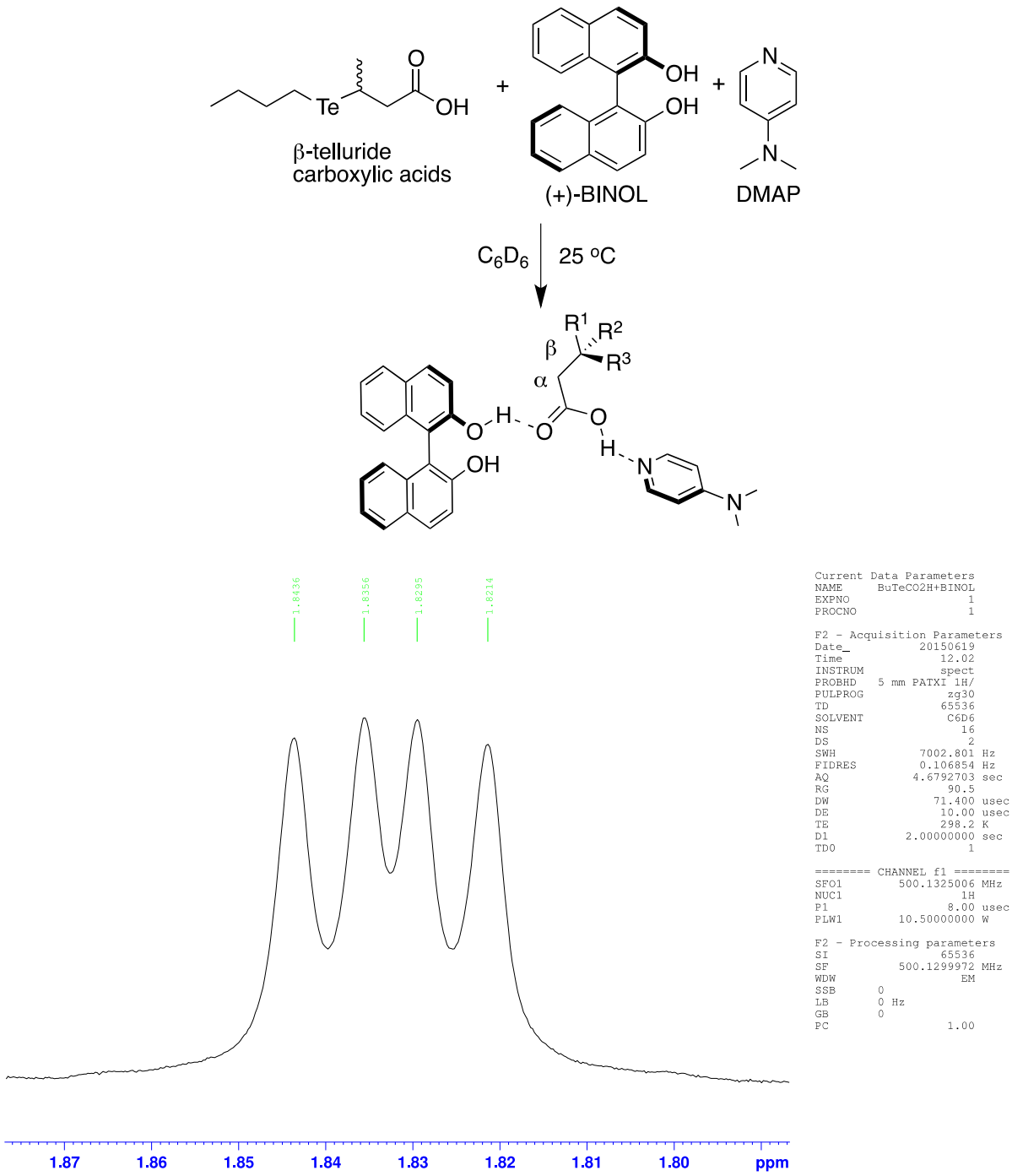



**Figure S30:** $^{1}$H NMR spectrum for chiral discrimination of **1d** in benzene-$d_6$ at 25 °C

## Typical procedure for $^{125}$Te-NMR chiral discrimination

The $^{125}$Te NMR spectra were recorded at 94.79 MHz using 128 scans and 0.087 seconds of acquisition time at 25 °C probe temperature. For processing the NMR spectra was used 3.0 of line broadening and 64K of sized of fid. Samples for NMR spectroscopy were prepared by weighing and dissolving the appropriate amount of substrate in the respective deuterated solvent to prepare a 20 mM solution. The solutions were shaken for 2 minutes for equilibration time.

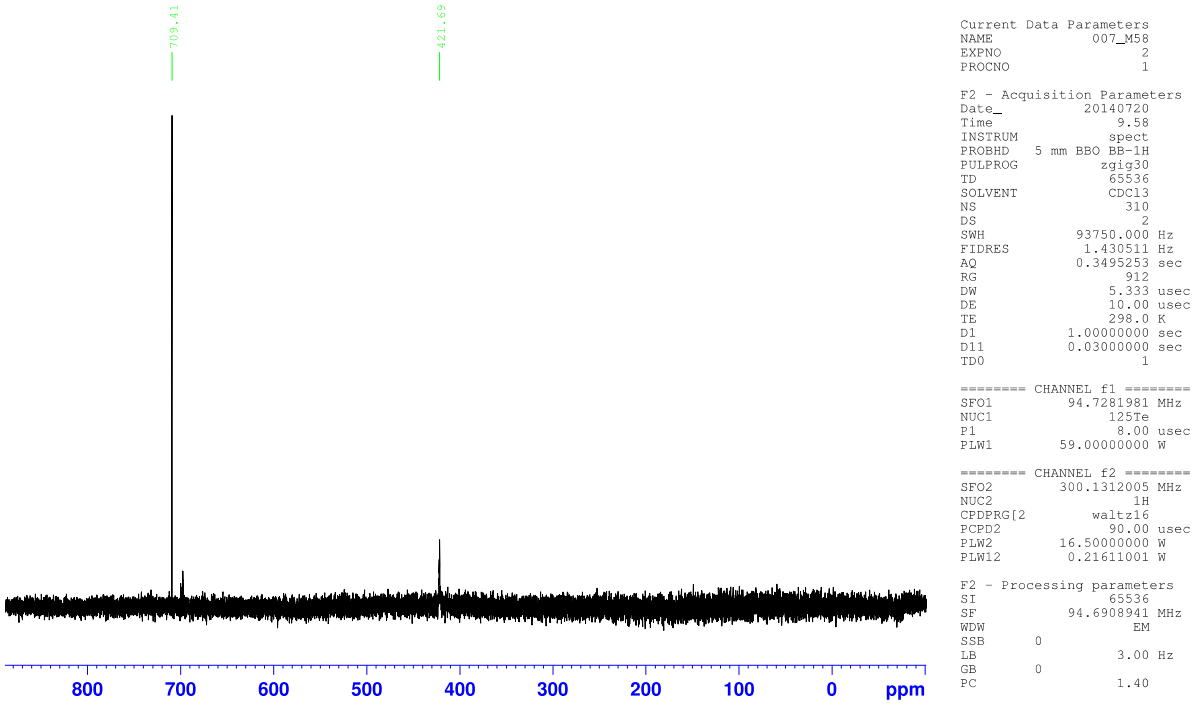



**Figure S31:** $^{125}$Te NMR spectrum of organochalcogenide **1a** in $CDCl_3$ at 25 °C

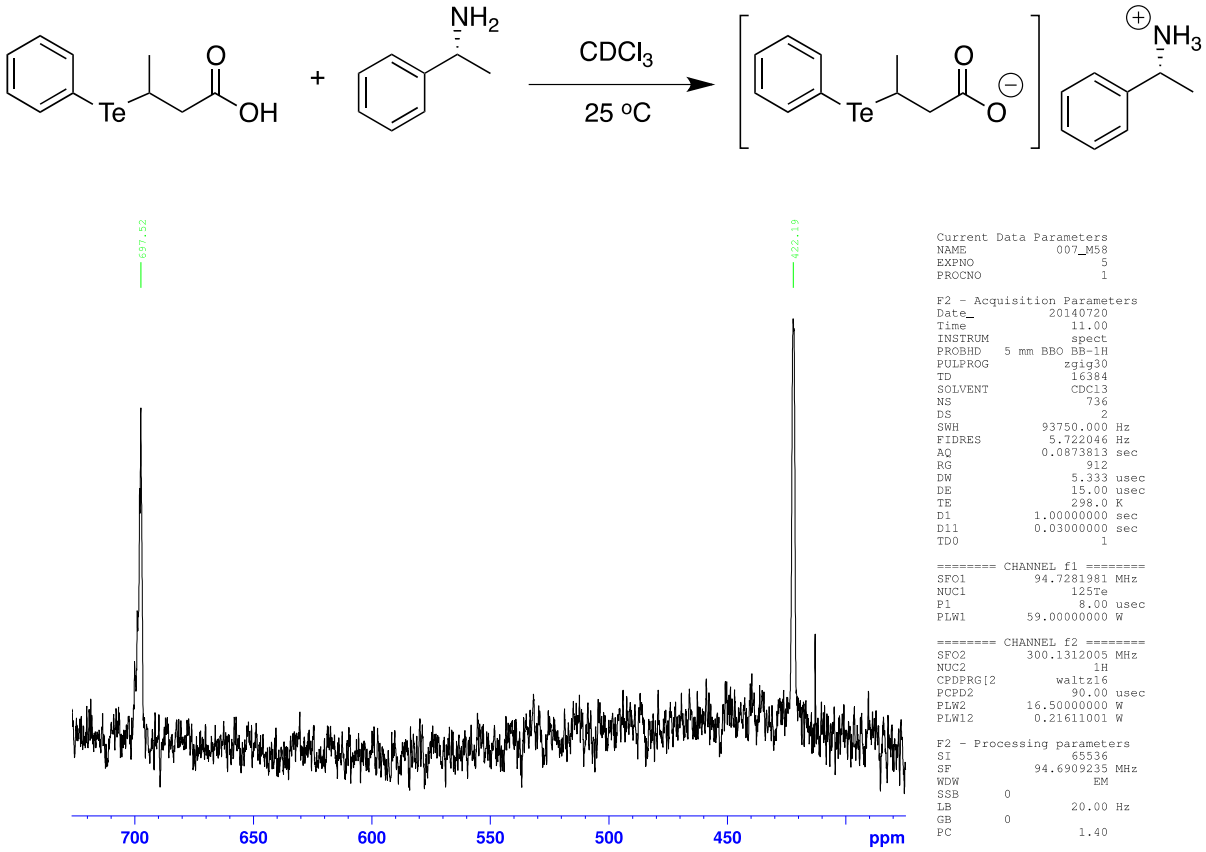
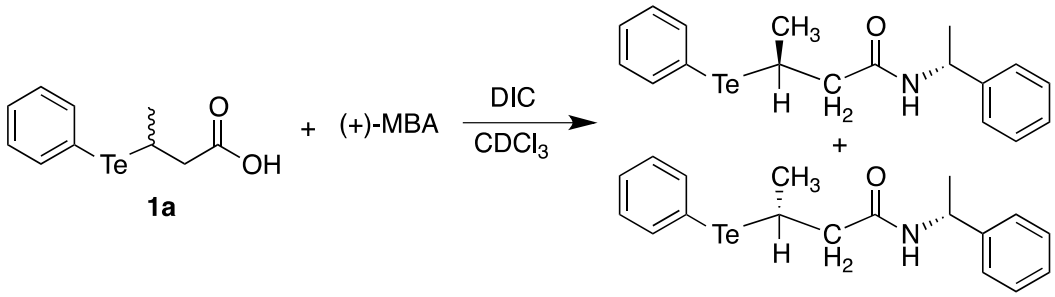



**Figure S32:** $^{125}$Te NMR spectrum for chiral discrimination of **1a** with 0.8 equiv. of chiral probe in $CDCl_3$ at 25 °C



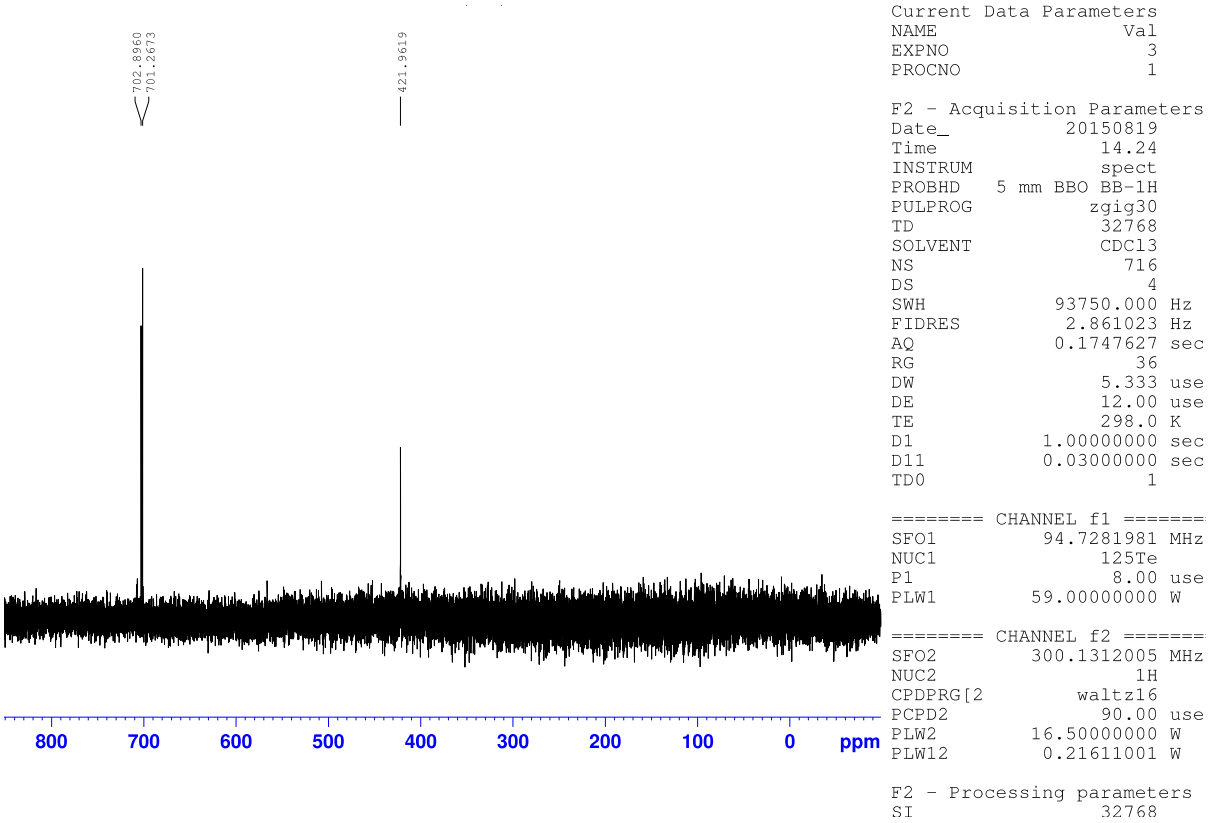




**Figure S33:** $^{125}$Te NMR spectrum for chiral discrimination of **1a** by reaction with (+)-MBA and DIC in $CDCl_3$ at 25°C.

**Deconvolution of diastereomers peaks of $^{1}$H NMR spectrum**

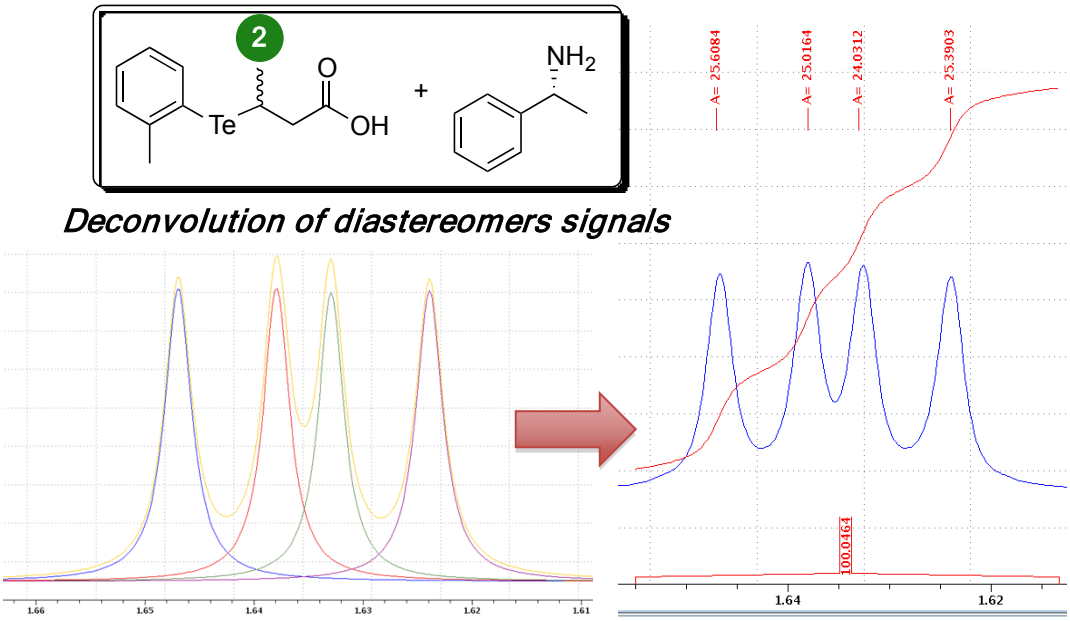



**Figure S34:** Deconvolution of diastereomers peaks of $^{1}$H NMR spectrum for chiral discrimination of **1b** in Benzene-$d_6$ at 25 $^{o}$C.