Supporting Information

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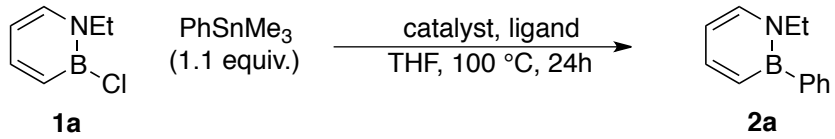
General

All oxygen- and moisture-sensitive manipulations were carried out under an inert atmosphere using either standard Schlenk techniques or a glove box. Tetrahydrofuran, diethyl ether, dichloromethane, and pentane were purified by passing through a neutral alumina column under argon. Toluene was refluxed with sodium/benzophenone overnight and distilled. All other chemicals and solvents were purchased and used as received. ^{1}H NMR spectra were recorded on a Varian Unity/Inova 300, Varian Inova 500 or Unity/Inova 600 spectrometer at ambient temperature. ^{11}B NMR spectra were recorded on a Varian Unity/Inova 300 spectrometer at ambient temperature. ^{13}C NMR spectra were recorded on a Unity/Inova 600 or Varian Inova 500 spectrometer at ambient temperature. ^{31}P NMR spectra were recorded on a Varian Inova 500 spectrometer at ambient temperature. ^{11}B NMR chemical shifts were externally referenced to $BF_3 \cdot Et_2O$ (δ 0). ^{19}F NMR chemical shifts were not referenced. ^{31}P NMR chemical shifts were externally referenced to 1% H_3PO_4 in D_2O (δ 0).

Catalyst Survey (Table 1)



1a **2a**

General Procedure. To a 4 mL pressure vessel was added *N*-ethyl-2-chloro-1,2-azaborine **1a**[1] (52 mg, 0.368 mmol), trimethyl(phenyl)tin (98 mg, 0.405 mmol), the catalyst, ligand and 2.0 mL THF. The vessel was sealed and heated to 100 ºC for 24h. The reaction was then cooled to room temperature, diluted with Et_2O to 10 mL, and *n*-hexadecane (100 μL) as the GC internal standard was added. The yield was determined by GC analysis, and reported as the average of two trials.

Entry 1: The general procedure was followed, no catalyst was added. GC analysis indicated no product formation.

Entry 2: The general procedure was followed, using $Pd(PPh_3)_4$ (21 mg, 0.018 mmol). GC analysis indicated no product formation.

Entry 3: The general procedure was followed, using $Pd_2(dba)_3$ (8.0 mg, 0.009 mmol) and PCy_3 (10 mg, 0.037 mmol). GC analysis indicated no product formation.

Entry 4: The general procedure was followed, using $Pd_2(dba)_3$ (8.0 mg, 0.009 mmol) and *rac*-BINAP (11 mg, 0.018 mmol). GC analysis indicated no product formation.

Entry 5: The general procedure was followed, using $[Ir(cod)Cl]_2$ (6.0 mg, 0.009 mmol). GC analysis indicated the formation of **2a** in <5% yield.

Entry 6: The general procedure was followed, using $Rh(PPh_3)_3Cl$ (17 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 18% yield.

Entry 7: The general procedure was followed, using $[Rh(cod)Cl]_2$ (4.5 mg, 0.009 mmol). GC analysis indicated the formation of **2a** in 43% yield.

Entry 8: The general procedure was followed, using $[Rh(cod)_2]BF_4$ (7.5 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 42% yield.

Entry 9: The general procedure was followed, using $[Rh(nbd)Cl]_2$ (4.2 mg, 0.009 mmol). GC

analysis indicated the formation of **2a** in 71% yield.

Entry 10: The general procedure was followed, using $[Rh(nbd)_2]BF_4$ (7 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 67% yield.

Entry 11: The general procedure was followed, using $Rh(cod)(dppb)BF_4$ (15 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 22% yield.

Entry 12: To a 20 mL vial was added chlorobis(ethylene)rhodium dimer (3.5 mg, 0.009 mmol) and *rac*-BINAP (11 mg, 0.018 mmol) followed by 2.0 mL THF. The solution was stirred for 15 min then transferred to a 4 mL pressure vessel containing **1a** (52 mg, 0.368 mmol) and trimethyl(phenyl)tin (98 mg, 0.405 mmol). The reaction was heated to 100 ºC for 24h then cooled to room temperature, diluted with 10 mL of Et_2O, and *n*-hexadecane (100 μL) as the internal standard was added. GC analysis indicated the formation of **2a** in 83% yield.

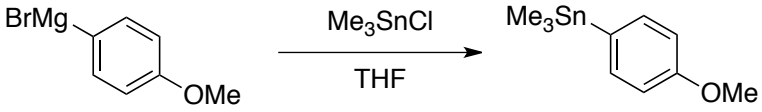
Entry 13: The procedure for entry 12 was followed using *p*-tolBINAP (12 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 91% yield.

Entry 14: The procedure for entry 12 was followed using BIPHEP (9.6 mg, 0.018 mmol). GC analysis indicated the formation of **2a** in 95% yield.

Entry 15: The procedure for entry 12 was followed using chlorobis(ethylene)rhodium dimer (1.4 mg, 0.0036 mmol) and BIPHEP (3.8 mg, 0.0072 mmol). GC analysis indicated the formation of **2a** in 89% yield.

Preparation of Arylstannanes

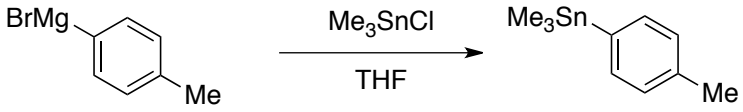
(4-Methoxyphenyl)trimethylstannane (S1) [CAS 940-00-1]:



S1

To a solution of trimethyltin chloride (1.71 g, 8.58 mmol) in THF (50 mL) was added 4-methoxyphenylmagnesium bromide (17.0 mmol, 0.5M in THF) at rt. The solution was stirred at 60 ºC for 1h then cooled to rt. The reaction was quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20 mL). The combined organic extracts were shaken with brine (50 mL) and dried over Na_2SO_4. After removal of volatiles under reduced pressure the crude material was purified by fractional distillation (1.47 g, 63% yield). ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.45 (d, J = 8.4 Hz, 2H), 6.97 (d, J = 8.4 Hz, 2H), 3.85 (s, 3H), 0.31 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.92, 136.91, 132.43, 114.03, 55.03, -9.48; HRMS (EI+) calcd for $C_{10}H_{16}OSn$ (M^+) 272.02231, found 272.02265.

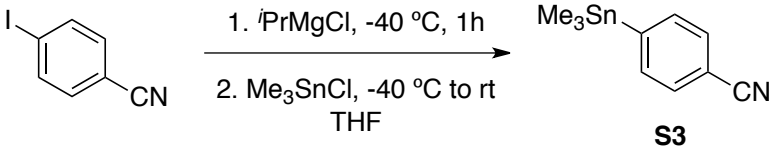
(4-Methylphenyl)trimethylstannane (S2) [CAS 937-12-2]:



S2

To a solution of trimethyltin chloride (2.0 g, 10.0 mmol) in THF (10 mL) was added *p*-tolylmagnesium bromide (11.0 mmol, 1.0M in THF). The solution was stirred at rt for 3h then quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20 mL). The combined extracts were shaken with brine (50 mL) and dried over Na_2SO_4. After removal of volatiles under reduced pressure the crude material was purified by distillation (30 ºC, 150 mTorr) (1.34 g, 48% yield). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.43 (d, J = 7.7 Hz, 2H), 7.22 (d, J = 7.7 Hz, 2H), 2.38 (s, 3H), 0.31 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 138.27, 137.98, 135.81, 128.94, 21.40, -9.58; HRMS (EI+) calcd for $C_{10}H_{16}Sn$ (M^+) 256.02740, found 256.02639.

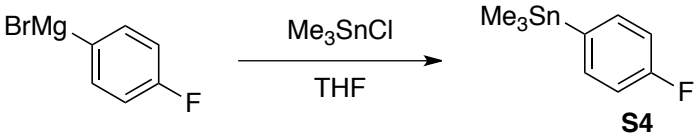
(4-Cyanophenyl)trimethylstannane (S3) [CAS 58666-77-6]:



S3

To 4-iodobenzonitrile (2.00 g, 8.7 mmol) in THF (30 mL) at -40 ºC was added isopropylmagnesium chloride (9.6 mmol, 2M in Et_2O). After 1h at -40 ºC trimethyltin chloride was added (2.09 g, 9.6 mmol) and the reaction was allowed to warm to rt. The reaction was quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20 mL). The combined extracts were shaken with brine (50 mL) and dried over Na_2SO_4. The volatiles were removed under reduced pressure. (2.20 g, 95% yield) ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.64-7.59 (m, 4H), 0.36 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.26, 136.30, 130.85, 119.13, 111.84, -9.49; HRMS (EI+) calcd for $C_{10}H_{13}NSn$ (M^+) 267.00700, found 267.00648.

(4-Fluorophenyl)trimethylstannane (S4) [CAS 14101-14-5]:

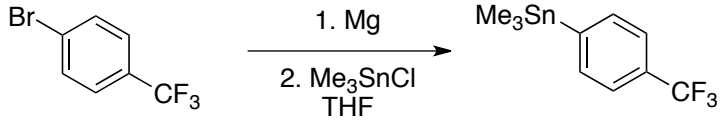


S4

To a solution of trimethyltin chloride (2.0 g, 10.0 mmol) in THF was added (4-fluorophenyl)magnesium bromide (11.0 mmol, 2.0M in Et_2O). The solution was stirred at rt for 3h then quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20mL). The combined extracts were shaken with brine (50 mL) and dried over Na_2SO_4. After removal of volatiles under reduced pressure crude material was purified by silica gel chromatography (1% EtOAc/hexanes) (v/v). (0.98 g, 38% yield)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.47 (dd, J = 8.3, 6.5 Hz, 2H), 7.08 (dd, J = 9.5 Hz, 8.3 Hz, 2H), 0.32 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 163.33 (d, J = 246.6 Hz), 137.27 (d, J = 6.7 Hz), 137.08, 115.18 (d, J = 19.1 Hz), -9.46; ^{19}F NMR (282 MHz, $CDCl_3$) δ -113.32; HRMS (EI+) calcd for $C_9H_{13}FSn$ (M^+) 260.00233, found 260.00192.

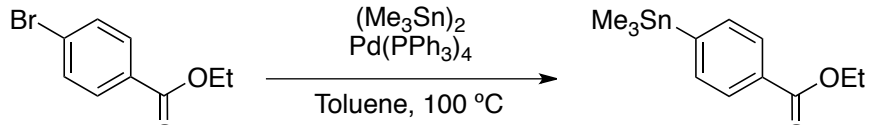
(4-Trifluoromethylphenyl)trimethylstannane (S5) [CAS 17315-40-1]:



S5

To a vigorously stirring suspension of magnesium turnings (0.55 g, 23.0 mmol) in THF (40 mL) was added 4-bromobenzotrifluoride (4.0 g, 17.8 mmol) and 4 drops of 1,2-dibromoethane. The reaction was brought to reflux for 16h. After cooling to rt, trimethyltin chloride (1.77 g, 8.88 mmol) was added and the solution was refluxed for 2h. The reaction was cooled to rt and quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20 mL). The combined extracts were shaken with brine (50 mL) and dried over Na_2SO_4. Volatiles were removed under reduced pressure and crude material was purified by silica gel chromatography (hexanes) (0.80 g, 15%). ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.74-7.48 (m, 4H), 0.36 (s, 9H); ^{19}F NMR (282 MHz, $CDCl_3$) δ -62.85. These spectroscopic data correspond to previously reported data.[2]

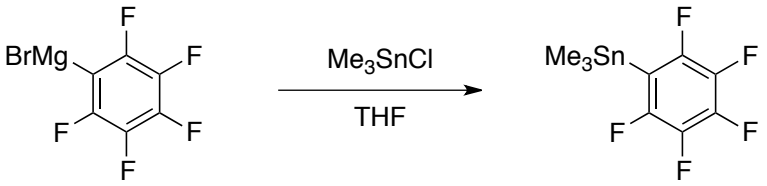
Ethyl 4-(trimethylstannyl)benzoate (S6) [CAS 69849-40-7]:



S6

To ethyl 4-bromobenzoate (1.0 g, 5.4 mmol) in 15 mL toluene was added tetrakis(triphenylphosphine)palladium (0.31 g, 0.27 mmol), and hexamethylditin (2.29 g, 7.0 mmol). The solution was brought to 100 ºC for 24h then cooled to rt. After removal of volatiles under reduced pressure the crude material was purified by silica gel chromatography (5% EtOAc/hexanes) (v/v) (0.64 g, 47% yield). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 (d, J = 8.1 Hz, 2H), 7.60 (d, J = 8.1 Hz, 2H), 4.40 (q, J = 7.2 Hz, 2H), 1.42 (t, J = 7.1 Hz, 3H), 0.35 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 166.94, 149.44, 135.73, 130.19, 128.48, 60.85, 14.35, -9.53; HRMS (EI+) calcd for $C_{12}H_{18}O_2Sn$ (M^+) 314.03288, found 314.03348.

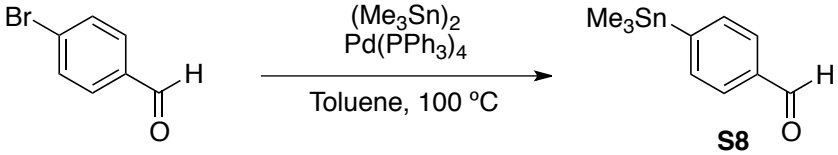
(Pentafluorophenyl)trimethyltin (S7) [CAS 1015-53-8]:



S7

To a solution of trimethyltin chloride (2.0 g, 10.0 mmol) in THF (10 mL) was added pentafluorophenylmagnesium bromide (11.0 mmol, 0.5M in THF). The solution was stirred at rt for 1h then quenched with saturated NH_4Cl and extracted with Et_2O (3 x 20 mL). The combined extracts were shaken with brine (50 mL) and dried over Na_2SO_4. After removal of volatiles under reduced pressure the crude material was purified by distillation (35-45 ºC, 150 mTorr) (2.16 g, 30% yield). ^{1}H NMR (500 MHz, $CDCl_3$) δ 0.50 (s, 1H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 150.48-147.07 (m), 143.26-139.85 (m), 138.55-135.08 (m), 112.05-109.70 (m), -7.57 (t, J = 2.4 Hz); ^{19}F NMR (471 MHz, $CDCl_3$) δ -121.64 (m, 2F), -152.82 (tt, J = 19.4, 2.1 Hz, 1F), -160.70 (m, 2F); HRMS (EI+) calcd for $C_9H_9F_5Sn$ (M^+) 331.96464, found 331.96403.

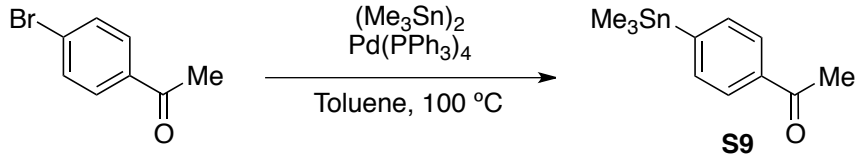
(4-Formylphenyl)trimethylstannane (S8) [CAS 65488-26-8]:



S8

To a solution of 4-bromobenzaldehyde (1.0 g, 5.4 mmol) in toluene (20 mL) was added tetrakis(triphenylphosphine)palladium (0.31 g, 0.27 mmol), and hexamethylditin (2.29 g, 7.0 mmol). The solution was brought to 100 ºC for 24h then cooled to rt. Volatiles were removed under reduced pressure and the crude material was passed through a plug of silica gel (10% EtOAc/hexanes) (v/v). Distillation provided **S7** (0.60 g, 41% yield). ^{1}H NMR (500 MHz, $CDCl_3$) δ 10.03 (s, 1H), 7.84 (d, J = 7.9 Hz, 2H), 7.71 (d, J = 7.9 Hz, 2H), 0.37 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 192.76, 152.43, 136.36, 136.11, 128.59, -9.49; HRMS (EI+) calcd for $C_{10}H_{14}OSn$ (M^+) 270.00667, found 270.00533.

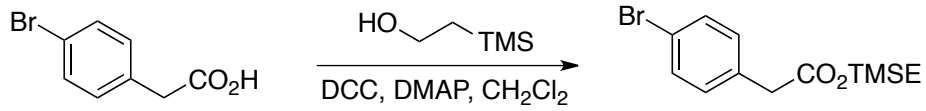
(4-Acetylphenyl)trimethylstannane (S9) [CAS 58666-79-8]:



S9

To a solution of 4-bromoacetophenone (1.0 g, 5.4 mmol) in toluene (15 mL) was added tetrakis(triphenylphosphine)palladium (0.31 g, 0.27 mmol), and hexamethylditin (2.29 g, 7.0 mmol). The solution was brought to 100 ºC for 24h then cooled to rt. After removal of volatiles under reduced pressure the crude material was purified by silica gel chromatography (10% EtOAc/hexanes) (v/v) (1.22 g, 66% yield). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, J = 8.1 Hz, 2H), 7.64 (d, J = 8.0 Hz, 2H), 2.62 (s, 3H), 0.35 (s, 9H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.49, 150.18, 136.80, 136.01, 127.22, 26.57, -9.53; HRMS (EI+) calcd for $C_{11}H_{16}OSn$ (M^+) 284.02231, found 284.02317.

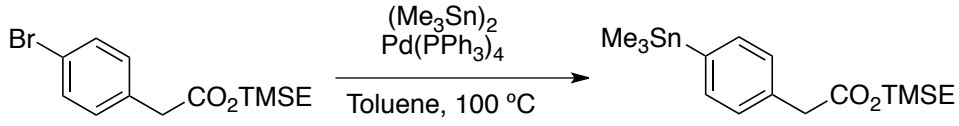
(2-Trimethylsilyl)ethyl 4-bromophenylacetate (S10) [CAS 483334-56-1]:



S10

To a solution of 4-bromophenylacetic acid (2.00 g, 9.32 mmol) in CH_2Cl_2 (40 mL) was added 4-dimethylaminopyridine (56 mg, 0.48 mmol), *N,N′*-dicyclohexylcarbodiimide (2.12 g, 10.2 mmol) and 2-(trimethylsilyl)ethanol (2.20 g, 18.6 mmol). The reaction was stirred at rt for 14h. The crude material was filtered through a medium porosity frit and volatiles were removed under reduced pressure. Purification by silica gel chromatography (5% EtOAc/hexanes) (v/v) provided **S10** (2.50 g, 85% yield). ^{1}H NMR (500 MHz, CD_2Cl_2) δ 7.50 (d, J = 8.3 Hz, 2H), 7.21 (d, J = 8.4 Hz, 2H), 4.31-4.13 (m, 2H), 3.59 (s, 2H), 1.13-0.93 (m, 2H), 0.07 (s, 9H); ^{13}C NMR (126 MHz, CD_2Cl_2) δ 170.93, 133.60, 131.46, 131.12, 120.77, 63.15, 40.75, 17.16, -1.89; HRMS (EI+) calcd for $C_{13}H_{19}BrO_2Si$ (M^+) 314.03377, found 314.03434.

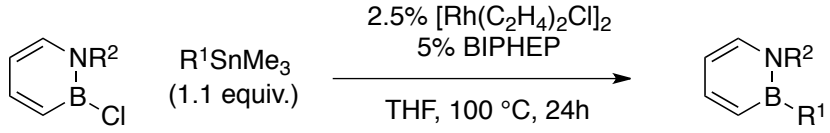
(2-Trimethylsilyl)ethyl (4-trimethylstannyl)phenylacetate (3):



S10 **3**

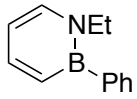
To **S10** (1.00 g, 3.17 mmol) in 15 mL toluene was added tetrakis(triphenylphosphine)palladium (0.37 g, 0.32 mmol), and hexamethylditin (2.08 g, 6.34 mmol). The solution was brought to 100 ºC for 24h then cooled to rt. After removal of volatiles under reduced pressure the crude material was purified by silica gel chromatography (1% EtOAc/hexanes) (v/v) (0.49 g, 39% yield). ^{1}H NMR (500 MHz, CD_2Cl_2) δ 7.50 (d, J = 7.7 Hz, 2H), 7.28 (d, J = 7.4 Hz, 2H), 4.24-4.18 (m, 2H), 3.61 (s, 2H), 1.08-0.99 (m, 2H), 0.32 (s 9H), 0.08 (s, 9H); ^{13}C NMR (126 MHz, CD_2Cl_2) δ 178.57, 147.69, 142.95, 141.43, 135.94, 69.98, 48.37, 24.22, 5.15, -2.97; HRMS (EI+) calcd for $C_{16}H_{28}O_2SiSn$ (M^+) 400.08806, found 400.08763.

Substrate scope (Table 2)



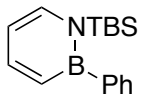
General procedure. To a 20 mL vial was added chlorobis(ethylene)rhodium dimer (7.0 mg, 0.018 mmol) and BIPHEP (19 mg, 0.037 mmol) followed by 2.0 mL THF. The solution was stirred for 15min, then transferred to a 15 mL pressure vessel containing **1a** (104 mg, 0.736 mmol) and the arylstannane (0.810 mmol) in 2.0 mL THF. The vessel was sealed and heated at 100 ºC for 24h. The reaction was allowed to cool to room temperature, and volatiles were removed under reduced pressure. Purification of crude material by silica gel chromatography (ether/pentane) provides the product.

Compound 2a:



The general procedure was followed using trimethyl(phenyl)tin (196 mg, 0.810 mmol) (107 mg, 79% yield). A duplicate reaction gave 74% yield. ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.80 (m, 1H), 7.70 (m, 2H) 7.58-7.24 (m, 4H), 6.98 (dd, *J* = 10.8, 1.7 Hz, 1H), 6.57 (td, *J* = 6.6, 1.6 Hz, 1H), 4.01 (q, *J* = 7.2 Hz, 2H), 1.44 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (126 MHz, CD_2Cl_2) δ 142.64, 142 (br), 138.23, 132.82, 131 (br), 127.69, 127.36, 111.55, 48.35, 18.35; ^{11}B NMR (96 MHz) δ 35.32. These spectroscopic data correspond to previously reported data.[1]

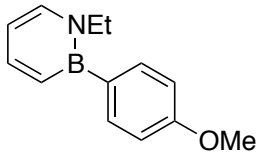
Compound 2b:



To a 20 mL vial was added chlorobis(ethylene)rhodium dimer (4.3 mg, 0.011 mmol) and BIPHEP (11 mg, 0.021 mmol) followed by 1.0 mL THF. The solution was stirred for 15 min then transferred to a 15 mL pressure vessel containing *N*-TBS-2-chloro-1,2-azaborine **1b**[3] (100 mg, 0.44 mmol) and trimethyl(phenyl)tin (116 mg, 0.48 mmol) in 1.0 mL THF. The pressure vessel was sealed and heated at 100 ºC for 24h. The reaction was allowed to cool to

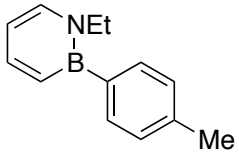
room temperature, and volatiles were removed under reduced pressure. Purification of crude material by silica gel chromatography (ether/pentane) provides **2b** (90 mg, 76% yield). A duplicate reaction gave 74% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 7.66 (dd, *J* = 10.8 Hz, 6.3 Hz, 1H), 7.51 (d, *J* = 6.8 Hz, 1H), 7.45 (m, 2H), 7.34 (m, 3H), 6.73 (d, *J* = 10.9 Hz, 1H), 6.51 (m, 1H), 0.98 (s, 9H), 0.13 (s, 6H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 146 (br), 142.84, 138.26, 133 (br), 132.00, 126.67, 126.55, 111.84, 26.74, 18.86, -2.26; ^{11}B NMR (96 MHz) δ 38.04; HRMS (EI+) calcd for $C_{16}H_{24}BNSi$ (M^+) 269.17711, found 269.17646.

Compound 2c:



The general procedure was followed using (4-methoxyphenyl)trimethylstannane (**S1**) (219 mg, 0.810 mmol) (125 mg, 80%) A duplicate reaction gave 75% yield. ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.69 (m, 1H), 7.56 (m, 2H), 7.37 (d, *J* = 6.6 Hz, 1H), 7.03 (m, 2H), 6.87 (m 1H), 6.46 (td, *J* = 6.6 Hz, 1.6Hz, 1H), 3.96 (q, *J* = 7.2 Hz, 2H), 3.90 (s, 3H), 1.40 (t, *J* =7.2 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 158.68, 141.67, 137.58, 133.63, 133 (br), 131 (br), 112.62, 110.51, 54.30, 47.50, 17.59; ^{11}B NMR (96 MHz) δ 35.71; HRMS (EI+) calcd for $C_{13}H_{16}BNO$ (M^+) 213.13250, found 213.13230.

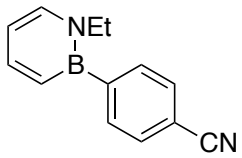
Compound 2d:



The general procedure was followed using (4-methylphenyl)trimethylstannane (**S2**) (206 mg, 0.810 mmol) (102 mg, 70% yield). A duplicate reaction gave 77% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 7.67 (dd, *J* = 10.7 Hz, 6.5 Hz, 1H), 7.49 (d, *J* = 7.7 Hz, 2H), 7.35 (d, 1H, *J* = 6.8 Hz, 1H), 7.27 (d, *J* = 7.5 Hz, 2H), 6.84 (d, *J* = 10.9 Hz, 1H), 6.45 (t, *J* = 6.6 Hz, 1H), 3.92 (q, *J* = 7.2 Hz, 2H), 2.43 (s, 3H), 1.36 (t, *J* = 7.2Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 141.72, 138 (br), 137.51, 136.31, 132.16, 131 (br), 127.71, 110.59, 47.55, 20.47, 17.60; ^{11}B

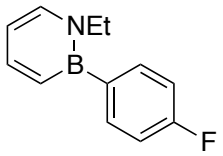
NMR (96 MHz) δ 35.76; HRMS (EI+) calcd for $C_{13}H_{16}BN$ (M^+) 197.13758, found 197.13710.

Compound 2e:



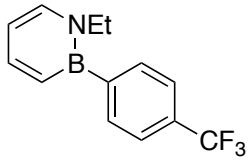
The general procedure was followed using (4-cyanophenyl)trimethylstannane (**S3**) (215 mg, 0.810 mmol) (81% yield). A duplicate reaction gave 80% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 7.69 (m, 5H), 7.41 (d, *J* = 4.4 Hz, 1H), 6.84 (dd, *J* = 10.8 Hz, 0.9 Hz, 1H), 6.54 (dt, *J* = 1.5 Hz *J* = 6.7 Hz, 1H), 3.89 (q, *J* = 7.0 Hz, 2H), 1.35 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 148 (br), 143.20, 138.32, 133.15, 130.98, 131 (br), 119.32, 112.21, 110.89, 48.46, 18.25; ^{11}B NMR (96 MHz) δ 35.10; HRMS (EI+) calcd for $C_{13}H_{13}BN_2$ (M^+) 208.11719, found 208.11641.

Compound 2f:



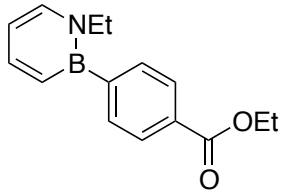
The general procedure was followed using (4-fluorophenyl)trimethylstannane (**S4**) (210 mg, 0.810 mmol) (122 mg, 78% yield). A duplicate reaction gave 77% yield. ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.71 (m, 1H), 7.59 (dd, *J* = 8.3 Hz, 6.3 Hz, 2H), 7.39 (d, *J* = 6.7 Hz, 1H), 7.17 (m, *2*H), 6.85 (m, 1H), 6.50 (m, 1H), 3.92 (q, *J* = 7.2 Hz, 2H), 1.37 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 162.8 (d, *J* = 245 Hz), 142.64, 138.21, 134.5 (d, *J* = 7.3 Hz), 131 (br), 114.4 (d, *J* = 19.6 Hz) 111.53, 48.22, 18.17 (one C bonded to B was not observed); ^{11}B NMR (96 MHz) δ 35.45; ^{19}F NMR (282 MHz) δ -115.6 (m); HRMS (EI+) calcd for $C_{12}H_{13}BFN$ (M^+) 201.11251, found 201.11244.

Compound 2g:



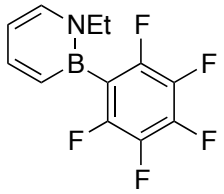
The general procedure was followed using (4-trifluoromethylphenyl)-trimethylstannane (**S5**) (250 mg, 0.810 mmol) (95 mg, 51% yield). A duplicate reaction gave 61% yield. ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.73 (m, 5H), 7.42 (d, *J* = 6.7 Hz, 1H), 6.87 (dd, *J* = 10.8 Hz, 1.7 Hz, 1H), 6.56 (dt, *J* = 6.6 Hz, 1.6 Hz, 1H), 3.91 (q, *J* = 7.0 Hz, 2H), 1.37 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 147 (br), 142.95, 138.19, 132.86, 131(br), 128.97 (q, *J* = 32 Hz), 124.70 (q, *J* = 272 Hz), 124.04 (q, *J* = 4.0 Hz), 111.91, 48.37, 18.15; ^{11}B NMR (96 MHz) δ 35.45; ^{19}F NMR (282 MHz) δ -62.75 (s); HRMS (EI+) calcd for $C_{13}H_{13}BF_3N$ (M^+) 251.10932, found 251.10905.

Compound 2h:



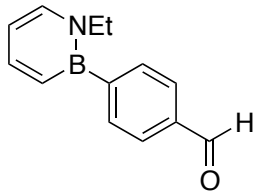
The general procedure was followed using ethyl 4-(trimethylstannyl)benzoate (**S6**) (254 mg, 0.810 mmol) (132 mg, 70% yield). A duplicate reaction gave 80% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 8.06 (d, *J* = 8.3 Hz, 2H), 7.68 (dd, *J* = 10.8 Hz, 6.5 Hz, 1H), 7.63 (d, *J* = 8.1 Hz, 2H), 7.35 (d, *J* = 6.8 Hz, 1H), 6.81 (d, *J* = 10.8 Hz, 1H), 6.48 (td, *J* = 6.6 Hz, 1.4 Hz, 1H), 4.39 (q, *J* = 7.1 Hz, 2H), 3.85 (q, *J* = 7.2 Hz, 2H), 1.42 (t, *J* = 7.1 Hz, 3H), 1.30 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 166.70, 147 (br), 142.81, 138.20, 132.55, 131 (br), 129.32, 128.30, 111.78, 60.72, 48.40, 18.17, 14.14; ^{11}B NMR (96 MHz) δ 35.30; HRMS (EI+) calcd for $C_{15}H_{18}BNO_2$ (M^+) 255.14306, found 255.14276.

Compound 2i:



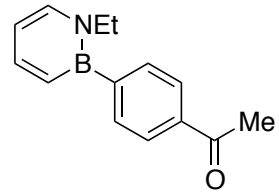
The general procedure was followed using (pentafluorophenyl)trimethyltin (**S7**) (300 mg, 0.810 mmol) and a reaction time of 48h (77 mg, 38% yield). A duplicate reaction gave 41% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 7.73 (dd, *J* = 10.5 Hz, 6.7 Hz, 1H), 7.47 (d, *J* = 6.7 Hz, 1H), 6.82 (d, *J* =10.8 Hz, 1H), 6.59 (td, *J* = 6.7 Hz, 1.4Hz, 1H), 3.74 (q, *J* = 7.3 Hz, 2H), 1.28 (t, *J* =7.3 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 146.1 (m, *J* = 242 Hz), 143.42; 140.8 (m, *J* = 252 Hz), 138.65, 137.3 (m, *J* = 250 Hz), 130 (br), 113.17, 49.53, 17.62 (one C bonded to B was not observed); ^{11}B NMR (96 MHz) δ 31.45; ^{19}F NMR (282 MHz) δ -131.8(m, 2F), -156.0 (m, 1F), -163.2 (m, 2F); HRMS (EI+) calcd for $C_{12}H_9BF_5N$ (M^+) 273.07483, found 273.07504.

Compound 2j:



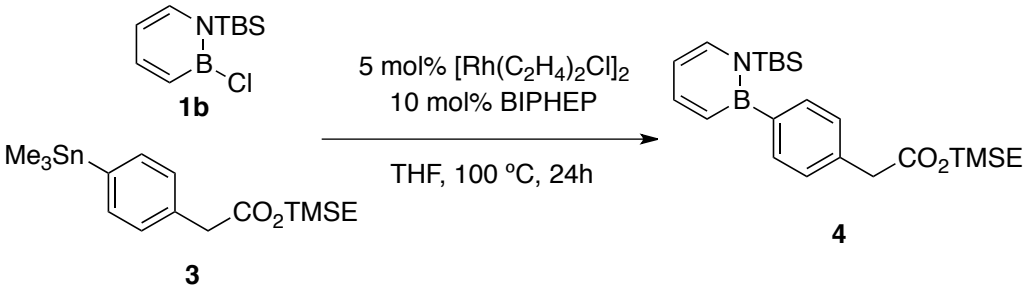
The general procedure was followed using (4-formylphenyl)trimethylstannane (**S8**) (218 mg, 0.810 mmol) (65 mg, 41% yield). A duplicate reaction gave 38% yield. ^{1}H NMR (300 MHz, CD_2Cl_2) δ 10.09 (s, 1H), 7.94 (d, *J* = 8.2 Hz, 2H), 7.74 (m, 3H), 7.41 (d, *J* = 4.4 Hz, 1H), 6.84 (dd, *J* = 10.8 Hz, 0.9 Hz, 1H), 6.54 (t, *J* = 6.4 Hz, 1H), 3.89 (q, *J* = 7.2 Hz, 2H), 1.35 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 191.82, 149 (br), 142.31, 137.60, 134.75, 132.46, 130 (br), 127.88, 111.31, 47.81, 17.53; ^{11}B NMR (96 MHz) δ 35.45; HRMS (EI+) calcd for $C_{13}H_{14}BNO$ (M^+) 211.11685, found 211.11616.

Compound 2k:



The general procedure was followed using (4-acetylphenyl)trimethylstannane (**S9**) (229 mg, 0.810 mmol) (109 mg, 66% yield). A duplicate reaction gave 66% yield. ^{1}H NMR (600 MHz, CD_2Cl_2) δ 7.99 (d, *J* = 7.9 Hz, 2H), 7.68 (m, 3H), 7.37 (d, *J* = 6.7 Hz, 1H), 6.82 (d, *J* =10.8 Hz, 1H), 6.49 (t, *J* = 6.5 Hz, 1H), 3.86 (q, *J* = 7.2 Hz, 2H), 2.63 (s, 3H), 1.32 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, CD_2Cl_2) δ 197.99, 148 (br), 142.88, 138.26, 136.00, 132.79, 131 (br), 127.18, 111.87, 48.43, 26.42, 18.22; ^{11}B NMR (96 MHz) δ 35.45; HRMS (EI+) calcd for $C_{14}H_{16}BNO$ (M^+) 225.13250, found 225.13320.

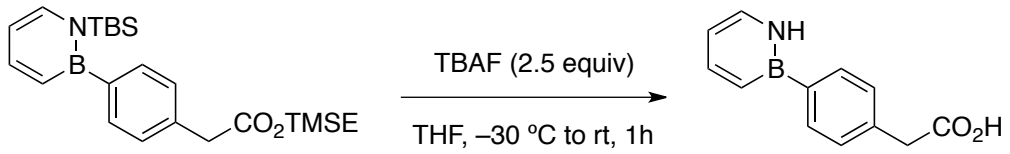
Compound 4:



To a 20 mL vial was added chlorobis(ethylene)rhodium dimer (8.0 mg, 0.02 mmol) and BIPHEP (21 mg, 0.04 mmol), followed by 2.0 mL THF. The solution was stirred for 15 min, then transferred to a 15 mL pressure vessel containing **1b** (100 mg, 0.44 mmol) and **3** (160 mg, 0.40 mmol) in 2.0 mL THF. The pressure vessel was sealed and heated at 100 ºC for 24h. The reaction was allowed to cool to room temperature, and volatiles were removed under reduced pressure. Purification of crude material by silica gel chromatography (ether/pentane) provides the product. (77% yield based on **3**). ^{1}H NMR (500 MHz, CD_2Cl_2) δ 7.65 (dd, *J* = 11.0, 6.3 Hz, 1H), 7.49 (d, *J* = 6.7 Hz, 1H), 7.38 (d, *J* = 7.3 Hz, 2H), 7.25 (d, *J* = 7.5 Hz, 2H), 6.70 (d, *J* = 10.9 Hz, 1H), 6.49 (t, *J* = 6.6 Hz, 1H), 4.25 (t, *J* = 8.7 Hz, 2H), 3.66 (s, 2H), 1.05 (t, *J* = 8.8 Hz, 2H), 0.94 (s, 9H), 0.10 (s, 15H). ^{13}C NMR (126 MHz, CD_2Cl_2) δ 171.72, 144 (br), 142.83, 138.32z, 132.75, 132.18, 127.59, 111.82, 62.83, 41.47, 26.69, 18.82, 17.23,

-1.79, -2.23 (one C bonded to B was not observed); ^{11}B NMR (96 MHz) δ 38.88; HRMS (EI+) calcd for $C_{23}H_{39}BNO_2Si_2$ $(M+H)^+$ 428.2612, found 428.2608.

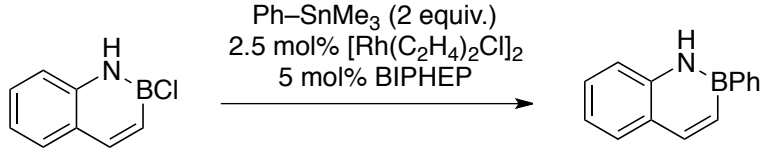
BN Felbinac (5):



4 **5**

To a 20 mL vial was added **4** (43 mg, 0.10 mmol), TBAF (1.0 mL, 0.25M in THF) and 2.0 mL THF at –30 ºC. The solution was stirred and brought to room temperature over 1h. Volatiles were removed under reduced pressure. Purification of crude material by silica gel chromatography using CH_2Cl_2/MeOH/AcOH 95:4:1 (v/v) as the eluent affords the title compound as a white solid (88% yield). ^{1}H NMR (300 MHz, $(CD_3)_2CO$) δ 9.96 (br s, 1H), 7.88 (d, *J* = 7.4 Hz, 2H), 7.76 (dd, *J* = 11.2, 6.5 Hz, 1H), 7.55 (t, *J* = 7.2 Hz, 1H), 7.38 (d, *J* = 7.5 Hz, 2H), 7.18 (d, *J* = 11.2 Hz, 1H), 6.40 (dt, *J* = 7.1, 3.7 Hz, 1H), 3.67 (s, 2H); the COOH is not observed; ^{13}C NMR (126 MHz, $(CD_3)_2CO$) δ 171.93, 144.32, 135.45, 134.93, 132.46, 128.98, 127.6 (br) 110.44, 40.50 (one C bonded to B was not observed); ^{11}B NMR (96 MHz) δ 34.17; HRMS (EI+) calcd for $C_{12}H_{13}BNO_2$ $(M+H)^+$ 214.1039, found 214.1031.

Compound 7 (Equation 1) [CAS 24341-84-2]:



6 **7**

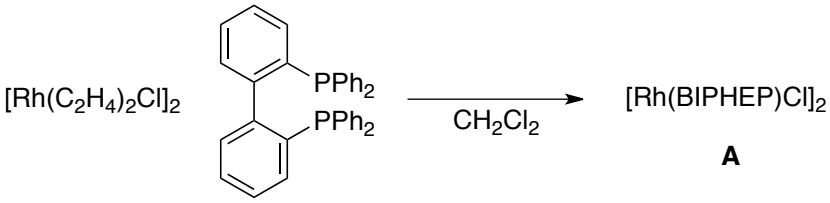
To a 10 mL vial was added chlorobis(ethylene)rhodium dimer (3.0 mg, 0.0077 mmol) and BIPHEP (8.0 mg, 0.015 mmol) then 1.0 mL THF. The solution was stirred for 15 min then transferred to a 8 mL pressure vessel containing 2-chloro-1,2-benzazaborine **6**[4] (50 mg, 0.31 mmol) and trimethyl(phenyl)stannane (147 mg, 0.61 mmol) in 1.0 mL THF. The vessel was sealed and heated at 100 ºC for 24h. The reaction was allowed to cool to room temperature, and volatiles were removed under reduced pressure. Purification of crude material by silica

gel chromatography (ether/pentane) provides the product (43 mg, 69% yield). A duplicate reaction gave 72% yield.

^{1}H NMR (500 MHz, CD_2Cl_2) δ 8.32 (br s, 1H), 8.21 (d, *J* = 11.5 Hz, 1H), 7.99 (dd, *J* = 7.3, 2.0 Hz, 2H), 7.73 (d, *J* = 7.8 Hz, 1H), 7.52 (m, 4H), 7.44 (d, *J* = 8.1 Hz, 1H), 7.34 (dd, *J* = 11.5, 2.0 Hz, 1H), 7.26 (t, *J* = 7.4 Hz, 1H; ^{13}C NMR (126 MHz, CD_2Cl_2) δ 145.51, 140.22, 132.68, 129.67, 129.38, 128.45, 128.19, 125.70, 121.09, 118.26; the signals for the carbon atoms connected to boron are not observed; ^{11}B NMR (96 MHz, CD_2Cl_2) δ 33.55. These spectroscopic data correspond to previously reported data.[5]

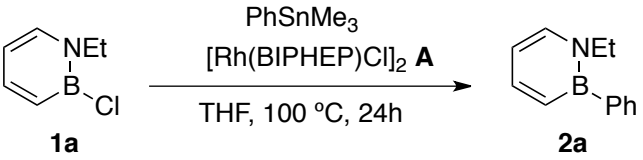
Mechanistic Studies

[Rh(BIPHEP)Cl]$_2$ (A):



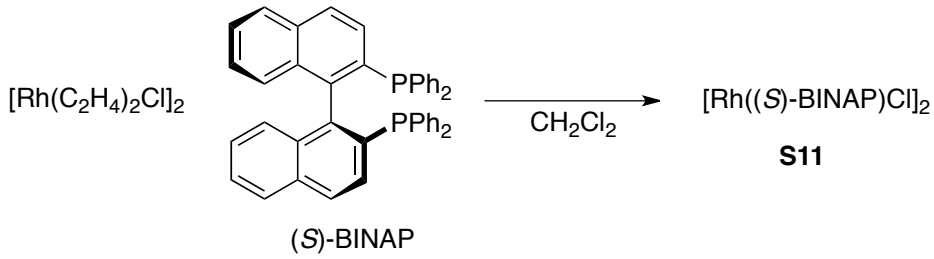
To a vial containing BIPHEP (549 mg, 1.05 mmol) suspended in 7.0 mL CH_2Cl_2 was added $[Rh(C_2H_4)_2Cl]_2$ (200 mg, 0.525 mmol) in 5.0 mL CH_2Cl_2. The solution was stirred for 18h then volatiles were removed under reduced pressure to give the title compound as a red powder (694 mg, 99% yield). ^{1}H NMR (500 MHz, C_6D_6) δ 8.16 (br, 8H), 8.07 (br s, 8H), 7.12 (br, 4H), 7.04 (t, J = 7.5 Hz, 8H), 6.96 (dt, J = 16.9 Hz, 7.4 Hz, 8H), 6.90 (t, J = 7.5 Hz, 8H), 6.69 (t, J = 7.5 Hz, 4H), 6.59 (t, J = 7.7 Hz, 4H), 6.38 (d, J = 7.6 Hz, 4H); ^{31}P NMR (202 MHz, C_6D_6) δ 46.46 (d, J_{Rh-P} = 193.3 Hz).

Complex A as a Catalyst in Arylstannane Addition Reaction (Equation 2):



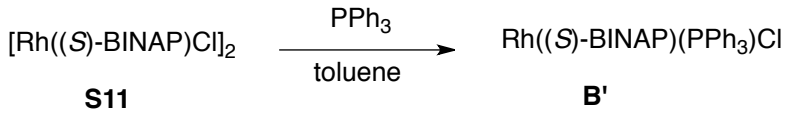
To a 15 mL pressure vessel was added [Rh(BIPHEP)Cl]$_2$ (**A**) (12 mg, 0.009 mmol), **1a** (52 mg, 0.368 mmol) and trimethyl(phenyl)tin (98 mg, 0.405 mmol) and 2.0 mL THF. The reaction was heated to 100 ºC for 24h. At the conclusion of the reaction, the mixture was cooled to room temperature, diluted with Et_2O to 10 mL, and then *n*-hexadecane (100 μL) as the GC internal standard was added. GC analysis indicated the formation of **2a** in 85% yield.

[Rh((*S*)-BINAP)Cl]$_2$ (S11) [CAS 130629-66-2]:



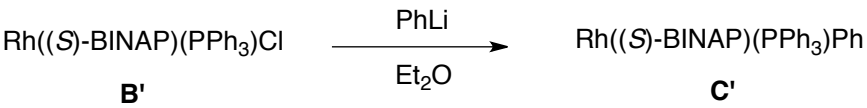
Complex **S11** was prepared according to a published procedure.[6] A 20 mL vial was charged with (*S*)-BINAP (0.500 g, 0.803 mmol) and 7.0 mL CH_2Cl_2. Chlorobis(ethylene)rhodium dimer (153 mg, 0.401 mmol) in 5.0 mL CH_2Cl_2 was added and the deep red solution was stirred for 3h at room temperature. The solvent was removed under reduced pressure to give the title compound (583 mg, 96% yield). ^{1}H NMR (500 MHz, C_6D_6) δ 8.30 (br, 8H), 7.98 (br, 8H), 7.24 (d, J = 8.3 Hz, 4H), 7.19 (d, J = 8.7 Hz, 4H), 7.04 (t, J = 7.6 Hz, 8H), 6.99 (ddd, J = 8.1 Hz, 6.3 Hz, 1.5 Hz, 3H), 6.96 (t, J = 7.3 Hz, 4H), 6.71-6.62 (m, 8H), 6.57 (t, J = 7.4 Hz, 4H), 6.53- 6.43 (m, 8H); ^{31}P NMR (202 MHz, C_6D_6) δ 48.76 (d, J_{Rh-P} = 195.7 Hz). These spectroscopic data correspond to previously reported data.[6]

Rh((*S*)-BINAP)(PPh$_3$)Cl (B') [CAS 434314-08-6]:



Complex **B'** was prepared according to a published procedure.[6] To a 20 mL vial containing **S11** (583 mg, 0.383 mmol) in toluene (10 mL) was added triphenylphosphine (201 mg, 0.766 mmol). The solution was stirred at room temperature for 2h. The solvent was removed under a stream of N_2, and the crude material was triturated with cold Et_2O (10 mL) to give the title compound as a red powder (468 mg, 60% yield). ^{1}H NMR (500 MHz, C_6D_6) δ 8.37-8.19 (m, 4H), 8.06 (br, 2H), 7.79 (m, 8H), 7.68 (t, J = 6.2 Hz, 1H), 7.32-7.15 (m, 7H), 6.96 (t, J = 7.5 Hz, 1H), 6.94-6.73 (m, 14H), 6.57-6.39 (m, 7H), 6.32 (t, J = 7.4 Hz, 1H) 6.2 (br, 2H); ^{31}P NMR (202 MHz, C_6D_6) δ 49.38 (ddd, J_{Rh-P} = 185 Hz, J_{PP-cis} = 44 Hz, J_{PP-cis} = 35 Hz), 30.3 (ddd, $J_{PP-trans}$ = 375 Hz, J_{Rh-P} = 145 Hz, J_{PP-cis} = 44 Hz), 28.05 (ddd, $J_{PP-trans}$ = 375 Hz, J_{Rh-P} = 143 Hz, J_{PP-cis} = 35 Hz). These spectroscopic data correspond to previously reported data.[6]

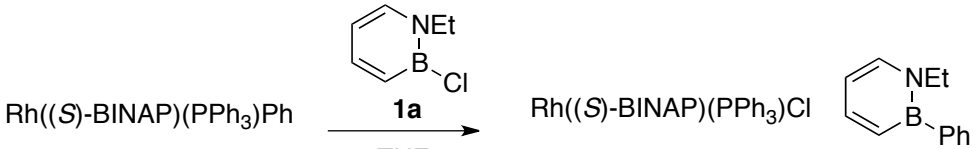
Rh((*S*)-BINAP)(PPh_3)Ph (C') [CAS 434314-09-7]:



B' **C'**

Complex **C'** was prepared according to a published procedure.[6] To a suspension of **B'** (250 mg, 0.244 mmol) in Et_2O (40 mL) at 0 ºC was added phenyllithium (0.230 mL, 0.415 mmol, 1.8 M in Bu_2O). The solution was slowly warmed to room temperature over 18h. The red solution was filtered through an acrodisc and passed through a plug of neutral alumina with Et_2O. Volatiles were removed under reduced pressure to provide **C'** as a red powder (184 mg, 71%). ^{1}H NMR (500 MHz, C_6D_6) δ 8.41 (dd, J = 8.7 Hz, 6.6 Hz, 1H), 8.21 (t, J = 8.0 Hz, 2H), 7.83 (m, 3H), 7.53- 7.39 (m, 10H), 7.47-7.35 (m, 3H), 7.31 (d, J = 8.2 Hz, 1H), 7.26 (d, J = 8.1 Hz, 1H), 7.21-7.16 (m, 2H), 7.16-7.05 (m, 6H), 6.91-6.83 (m, 10H), 6.57-6.48 (m, 4H), 6.42-6.27 (m, 9H); ^{31}P NMR (202 MHz, C_6D_6) δ 32.14 (ddd, $J_{Rh\text{-}P}$ = 121 Hz, $J_{PP\text{-}cis}$ = 39 Hz, $J_{PP\text{-}cis}$ = 30 Hz), 29.55 (ddd, $J_{PP\text{-}trans}$ = 325 Hz, $J_{Rh\text{-}P}$ = 170 Hz, $J_{PP\text{-}cis}$ = 29 Hz), 26.27 (ddd, $J_{PP\text{-}trans}$ = 325 Hz, $J_{Rh\text{-}P}$ = 178 Hz, $J_{PP\text{-}cis}$ = 39 Hz). These spectroscopic data correspond to previously reported data.[6]

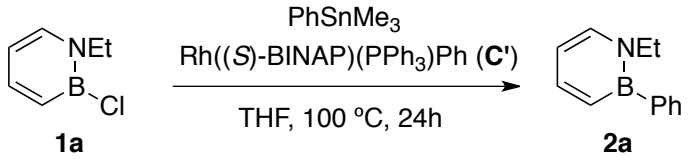
Reaction of C' and 1a (Figure 2)



C' **B'** **2a**

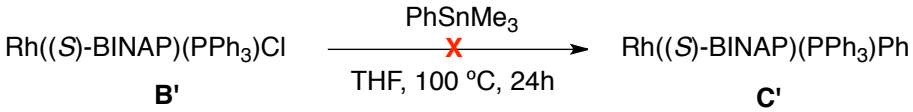
To a J-Young tube was added **C'** (48 mg, 0.045 mmol), **1a** (32 mg, 0.225 mmol) and THF-*d*8 (1.1 mL). The reaction was followed by ^{31}P NMR (202 MHz, 25 ºC). Conversion to **B'** was complete at 1h at room temperature. Unreacted **1a** and formation of **2a** was observed by ^{1}H and ^{11}B NMR.

Complex C' as a Catalyst in Arylstannane Addition Reaction (Equation 3)



To a 15 mL pressure vessel was added **C'** (31 mg, 0.029 mmol), **1a** (82 mg, 0.58 mmol), trimethyl(phenyl)tin (154 mg, 0.64 mmol) and 2.0 mL THF. The reaction was sealed and heated at 100 ºC for 24h. At the conclusion of the reaction, the mixture was cooled to room temperature, diluted to 10 mL with Et_2O, and *n*-hexadecane (100 μL) as the GC internal standard was added. GC analysis indicated the formation of **2a** in 62% yield.

Attempted Regeneration of C' by Trimethyl(phenyl)tin



To a 15 mL pressure vessel was added **B'** (30 mg, 0.029 mmol), trimethyl(phenyl)tin (154 mg, 0.64 mmol) and 2.0 mL THF. The reaction was heated at 100 ºC for 24h, then cooled to room temperature. The solution was concentrated *in vacuo* to 0.5 mL. ^{31}P NMR analysis indicated no formation of **C'**.

Kinetic Studies by Reaction Calorimetry

General Experimental Procedure for Reaction Calorimetry

Reactions were performed in a Setaram C80 Calvet calorimeter with Setsoft 2000 software. In a glove box, a stainless steel mixing cell (approx. volume 4.6 mL) was charged with **1b** (82 mg, 0.36 mmol) and trimethyl(phenyl)tin (181 mg, 0.750 mmol) and toluene to give a 1.0 mL solution. To the upper chamber was added 1.0 mL $[Rh(BIPHEP)Cl]_2$ (**A**) solution (18 mM in toluene). The reference cell was left empty under air. Both cells were loaded into the calorimeter at 100 ºC and the heat flow was allowed to equilibrate (approx. 2h). Data collection was initiated, and both plungers were depressed. Heat flow measurements were recorded every 6s. Data collection was halted when heat flow reached equilibrium.

The thermodynamic heat of reaction was obtained through integration of the complete heat flow versus time curve and moles of limiting substrate by equation (1).

$$\Delta H_{rxn} = \frac{\int_0^{\infty} q \, dt}{\text{mol}} \tag{1}$$

Heat flow is directly related to rate through equation (2).

$$\text{heat flow} = q = (\Delta H_{rxn})(\text{volume})(\text{rate}) \tag{2}$$

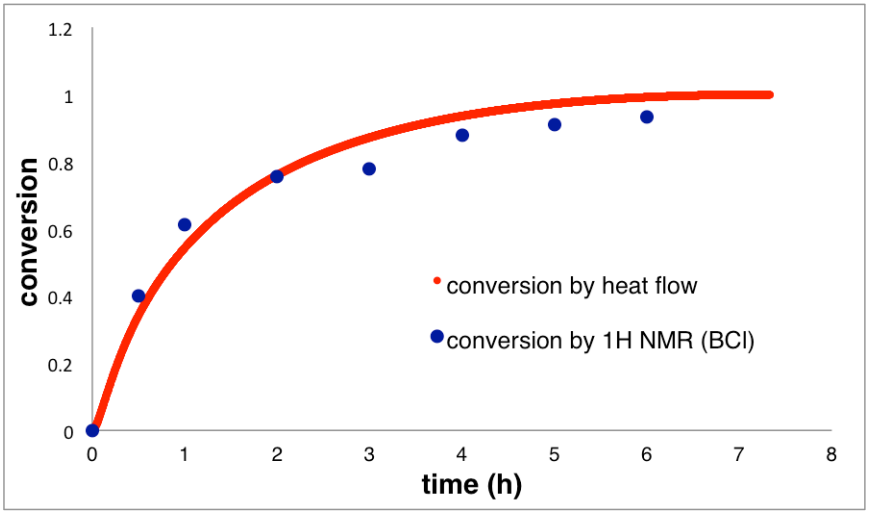
Integration of the heat flow curve from t=0 to t=t divided by the complete area under the curve provides conversion (equation (3)).

$$(\text{Conv})_t = \frac{\text{area to time t}}{\text{total area}} = \frac{\int_0^{t} q \, dt}{\int_0^{\infty} q \, dt} \tag{3}$$

Conversion by ^{1}H NMR Experiment

In a glovebox, a 20 mL scintillation vial flask was charged with **1b** ([BCl]) (164 mg, 0.720 mmol), trimethyl(phenyl)tin (361 mg, 1.50 mmol), Rh catalyst **A** ([Rh(BIPHEP)Cl]$_2$) (24 mg, 0.018 mmol) and 4,4'-di-*tert*-butylbiphenyl (96 mg, 0.36 mmol) as an internal standard. Toluene was added to give 4.0 mL of solution ([BCl]=0.18M, [PhSn]=0.38M, $[Rh]_{total}$ = 9mM). Six 0.5 mL aliquots were transferred to J-Young NMR tubes. The tubes were sealed and brought to 100 ºC. Results are shown in Figure S1.

Figure S1. Verification of heat flow conversion data by ^{1}H NMR.



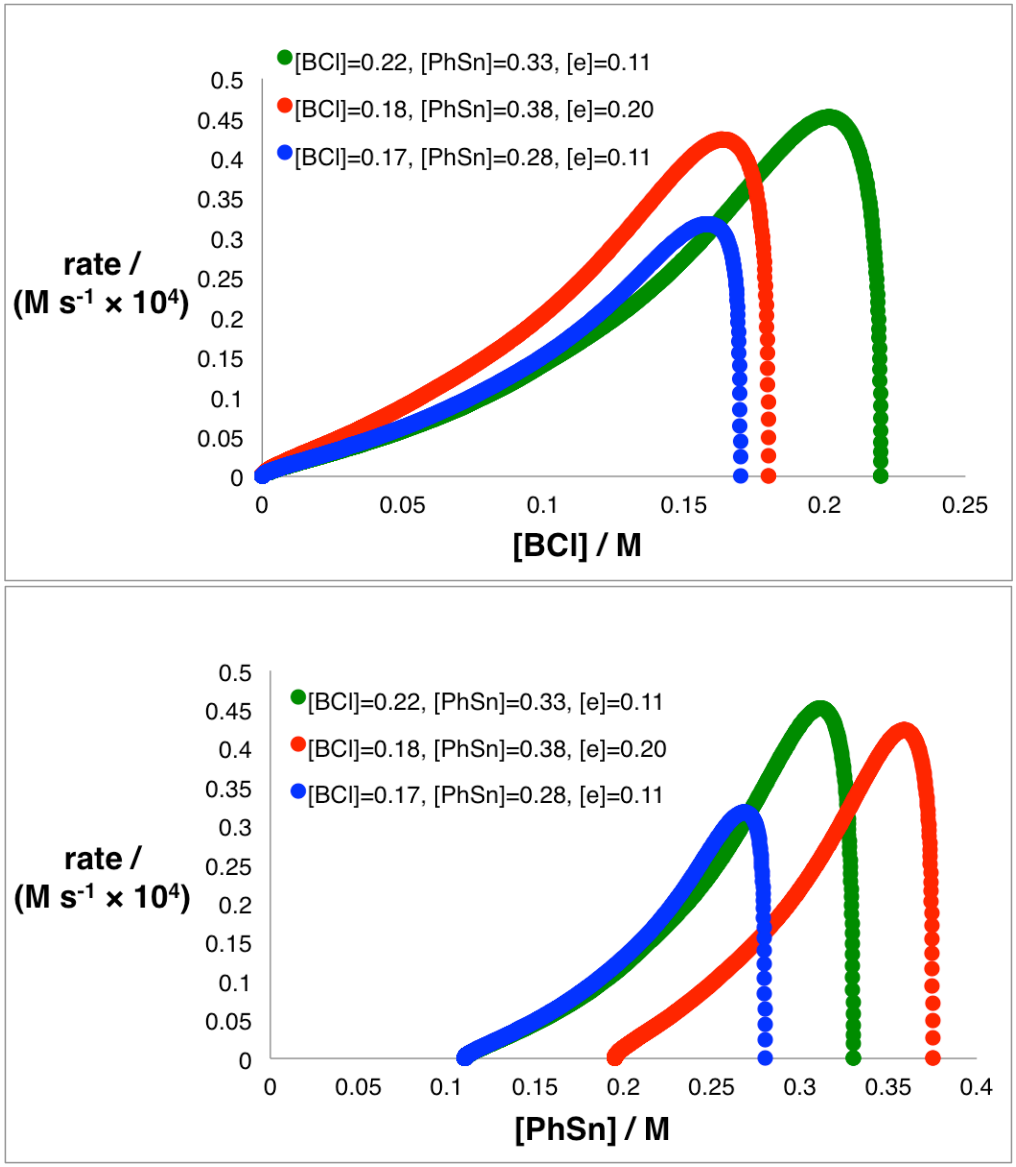
Reaction Progress Kinetic Analysis

The method of reaction progress kinetic analysis developed by D.G. Blackmond and coworkers was followed.[7]

Same ["excess"] Experiments

Reactions ran at the same ["excess"] showed overlay in rate vs. [BCl] rate vs. [PhSn] (Figure S2) indicating negligible catalyst degradation or product inhibition.

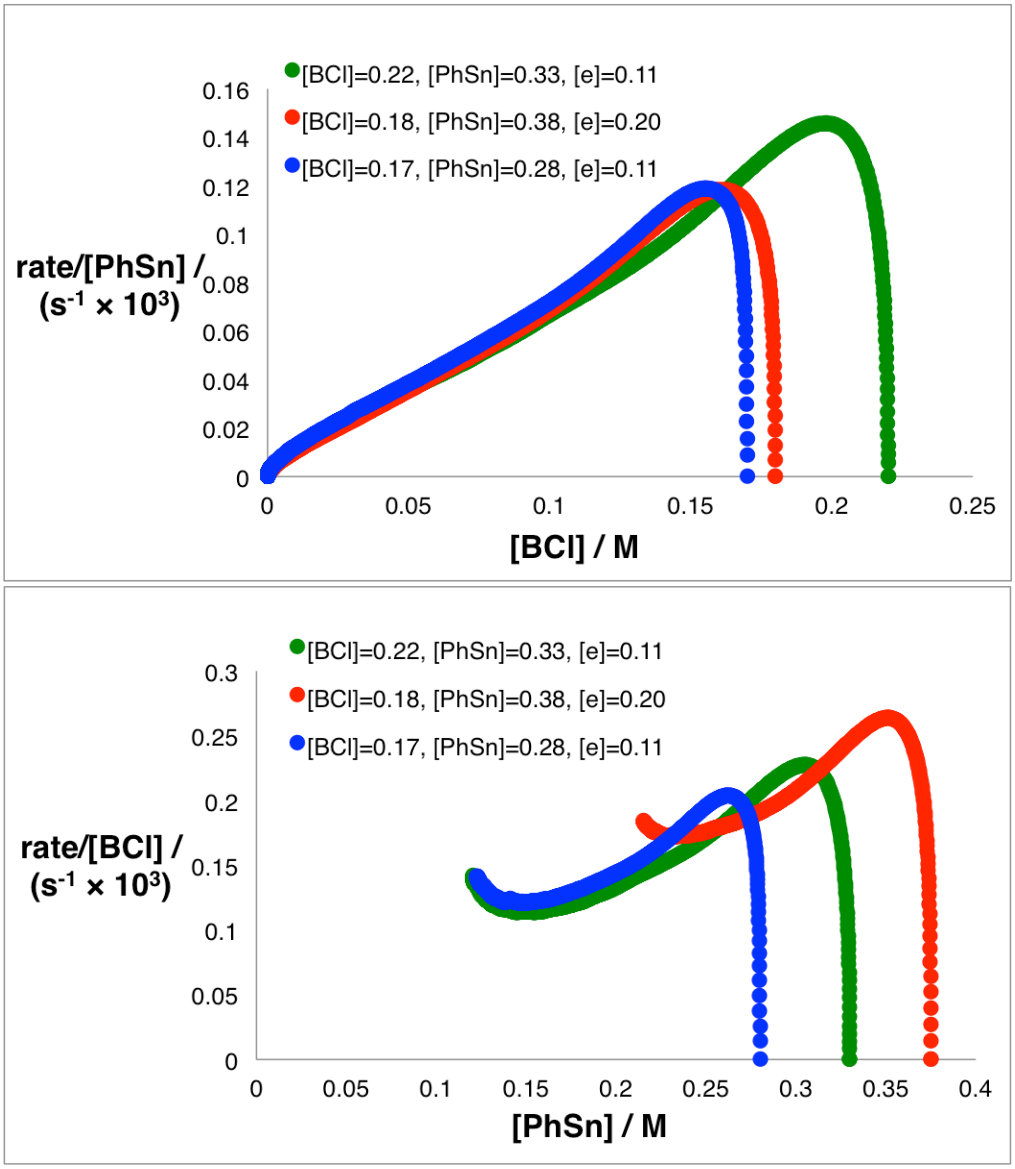
Figure S2. Same ["excess"] experiments.



Different ["excess"] Experiments (Figure S3)

Reactions ran at different ["excess"] showed overlay when rate/[PhSn] versus [BCl] and rate/[BCl] versus [PhSn] (Figure S3) were plotted. This confirms first order behavior in both reactants.

Figure S3. Different ["excess"] plots. Determination of the reaction order with respect to [BCl] and [PhSn].



Reaction Order In $[Rh]_{total}$

Plots of rate versus [BCl] and rate/$[Rh]_{total}$ versus [BCl] (Figure S4) showed no overlay. A plot of rate/$[Rh]_{total}^{1/2}$ vs. [BCl] showed overlay (Figure S5) evident of half order kinetics in $[Rh]_{total}$.

Figure S4. Plots to determine reaction order with respect to $[Rh]_{total}$.

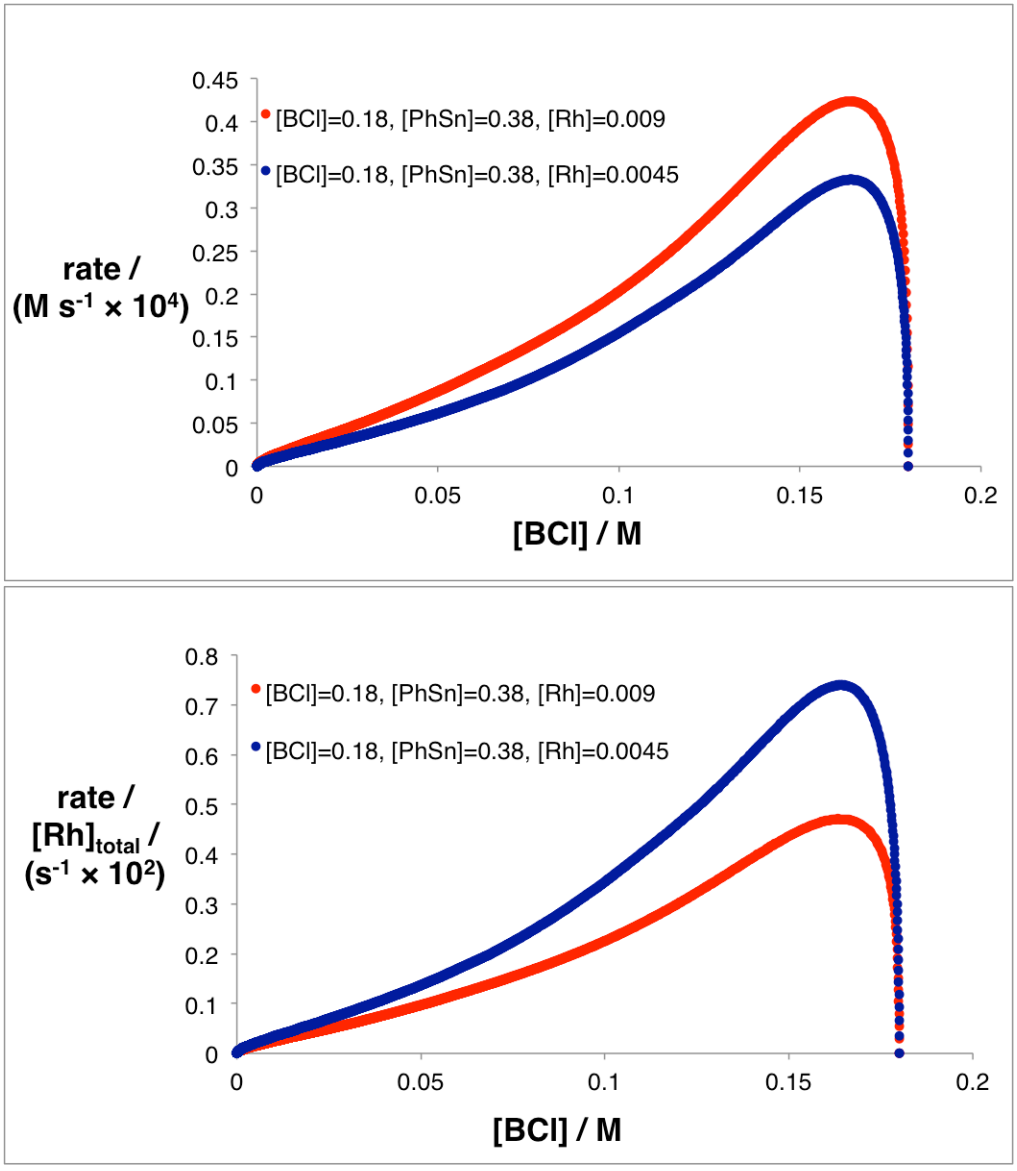
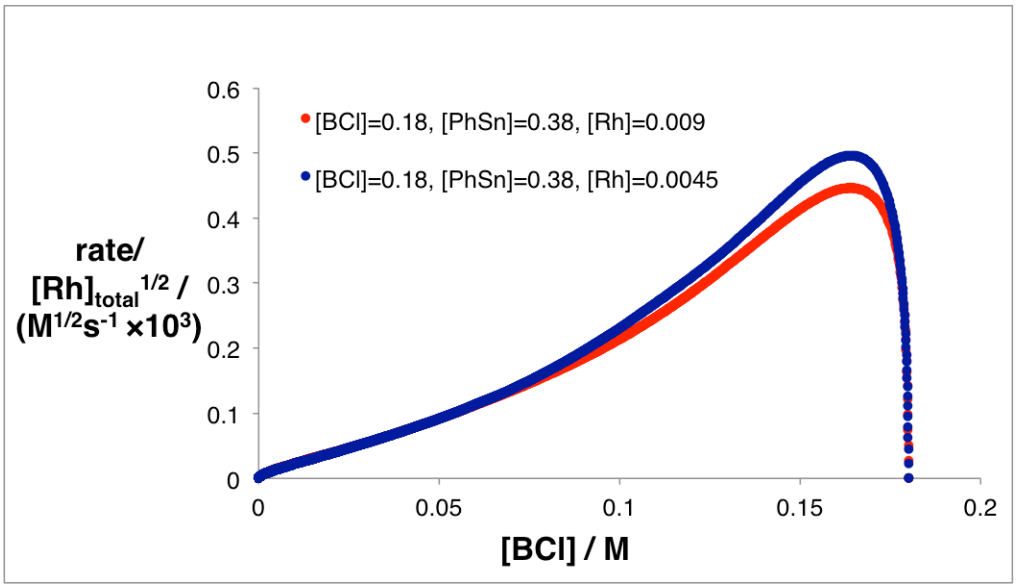


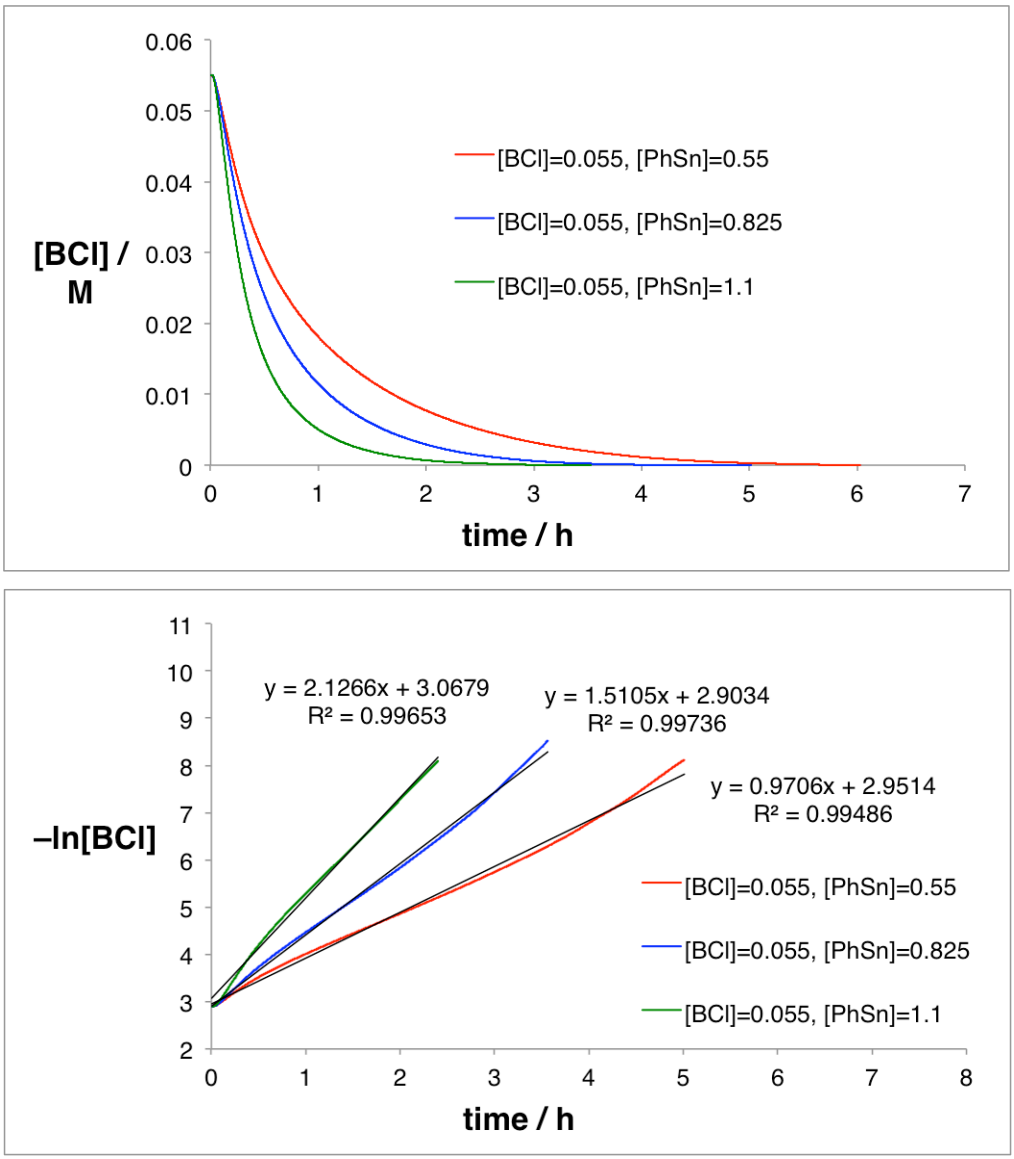
Figure S5. Determination of reaction order with respect to $[Rh]_{total}$.



Pseudo-First Order Experiments

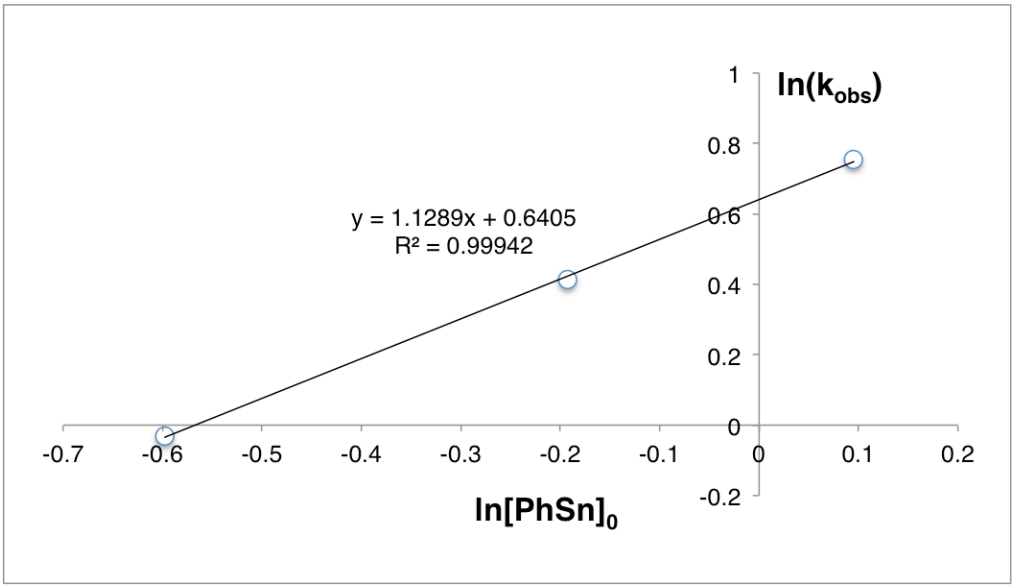
The general procedure for reaction calorimetry was followed. Plots of [BCl] versus time and –ln[BCl] versus time are shown in Figure S6. Under pseudo-first order conditions, the slope of the –ln[BCl] versus time plot is k_{obs}. Further, the linear nature of the pseudo-first order plot indicates first order behavior in [BCl].

Figure S6. Plots under pseudo-first order conditions.



First order kinetics in [PhSn] is supported by a plot of $\ln(k_{obs})$ versus $\ln[PhSn]_0$ (slope =1.1289) (See Figure S7).

Figure S7. Determination of the reaction order in [PhSn] under pseudo-first order reaction conditions.



Modeling to Experimental Data

The empirical rate equation is shown in equation (4). Good fits between experimental rate data and calculated rate were found when k'=7.39×10^{-3}. The fitted data is plotted in Figure S8. Goodness of fit is shown in Table S1.

$$\text{rate} = k'[\text{BCl}][\text{PhSn}][\text{Rh}]_{\text{total}}^{1/2} \quad (4)$$

Figure S8. Fitted rate data.

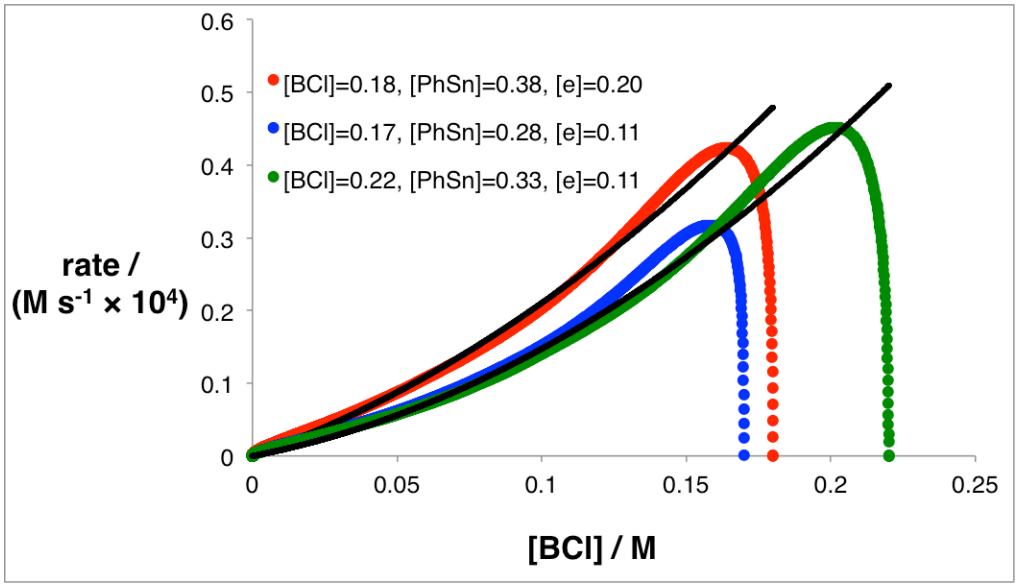
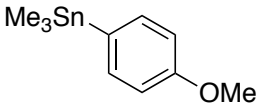


Table S1. Goodness of fit for calculated rates in Figure S8.

experiment	R^2 (0 to 85% conv.)
[BCl]=0.17, [PhSn]=0.28, [e]=0.11	0.984
[BCl]=0.18, [PhSn]=0.38, [e]=0.20	0.994
[BCl]=0.22, [PhSn]=0.33, [e]=0.11	0.945

References

(1) Marwitz, A. J. V.; Abbey, E. R.; Jenkins, J. T.; Zakharov, L. N.; Liu, S.-Y. *Org. Lett.* **2007**, *9*, 4905–4908.
(2) Hayashi, T.; Ishigedani, M. *Tetrahedron* **2001**, *57*, 2589–2595.
(3) Marwitz, A. J. V.; Matus, M. H.; Zakharov, L. N.; Dixon, D. A.; Liu, S.-Y. *Angew. Chem. Int. Ed.* **2009**, *48*, 973–977.
(4) Dewar, M.; Dietz, R. *J. Chem. Soc.* **1959**, 2728–2730.
(5) Pan, J.; Kampf, J. W.; Ashe, A. J. *Organometallics* **2009**, *28*, 506–511.
(6) Hayashi, T.; Takahashi, M.; Takaya, Y.; Ogasawara, M. *J. Am. Chem. Soc.* **2002**, *124*, 5052–5058.
(7) Blackmond, D. G. *Angew. Chem. Int. Ed.* **2005**, *44*, 4302–4320.



S1

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 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

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 Total time 1 minute
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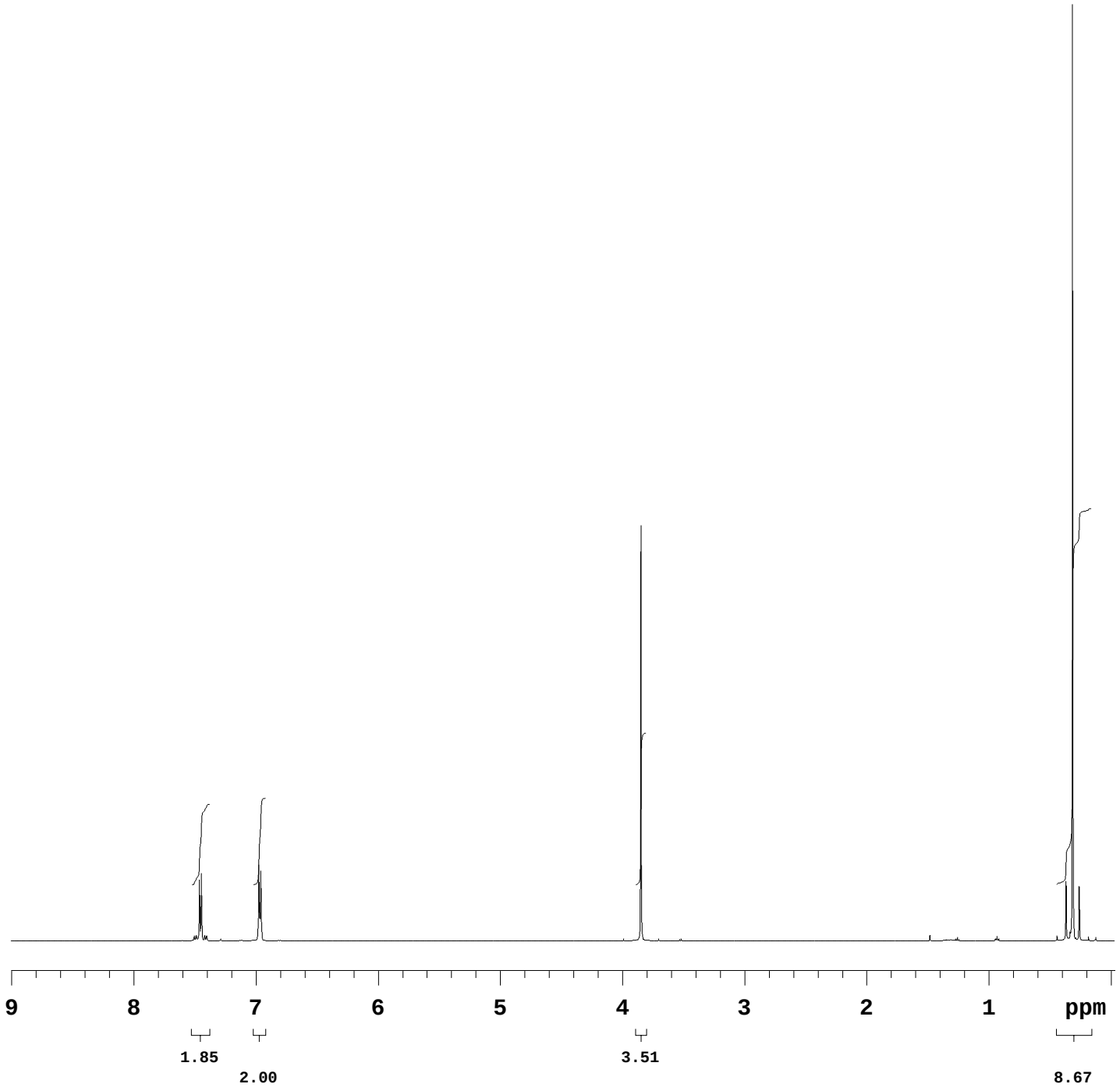

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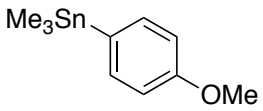

S1

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 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

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 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 168 repetitions

OBSERVE C13, 125.7513123
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 continuously on
 WALTZ-16 modulated

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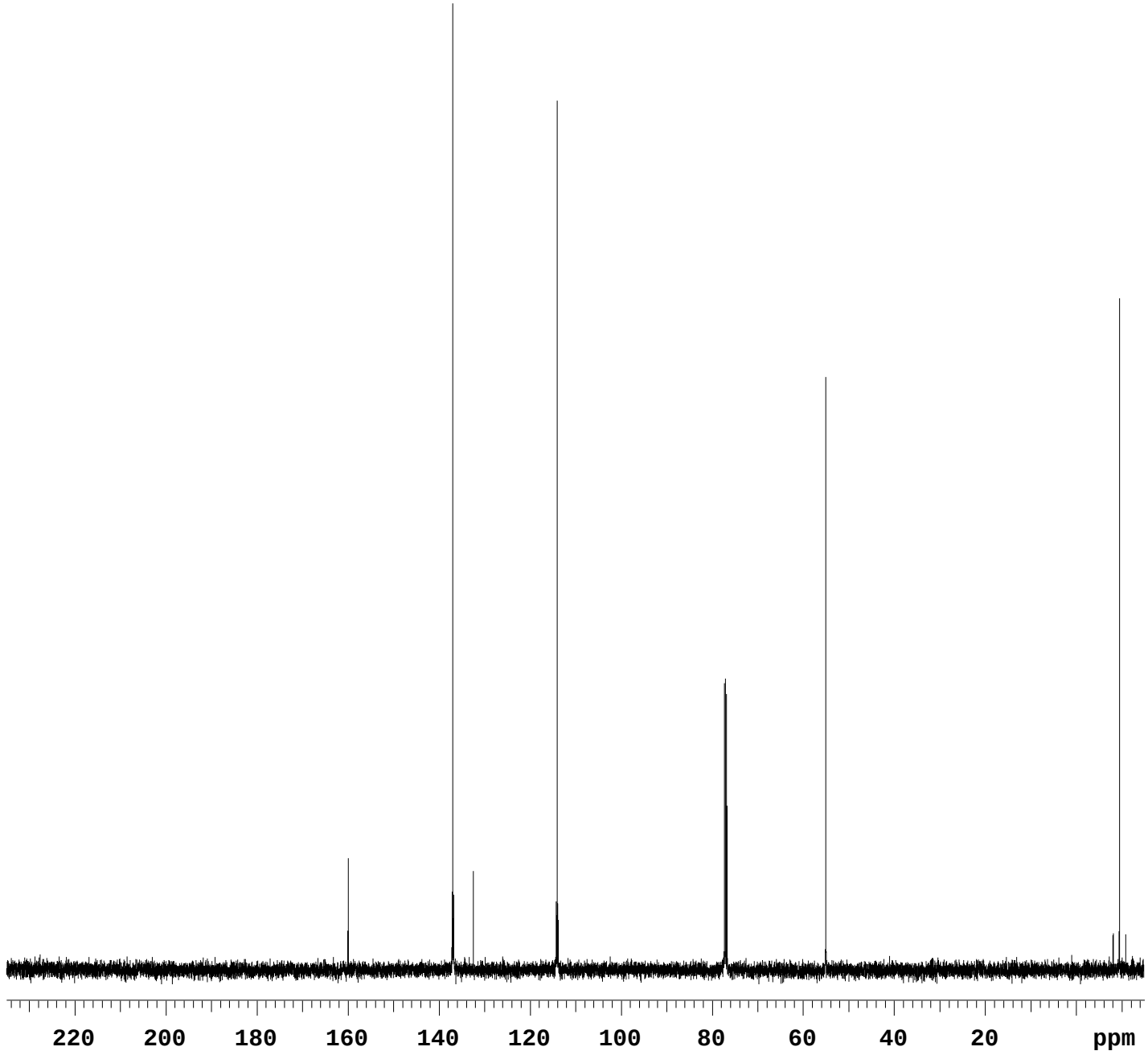

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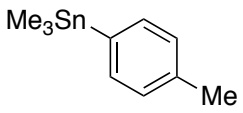

S2

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 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
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 Pulse 45.0 degrees
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DATA PROCESSING
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 Total time 1 minute
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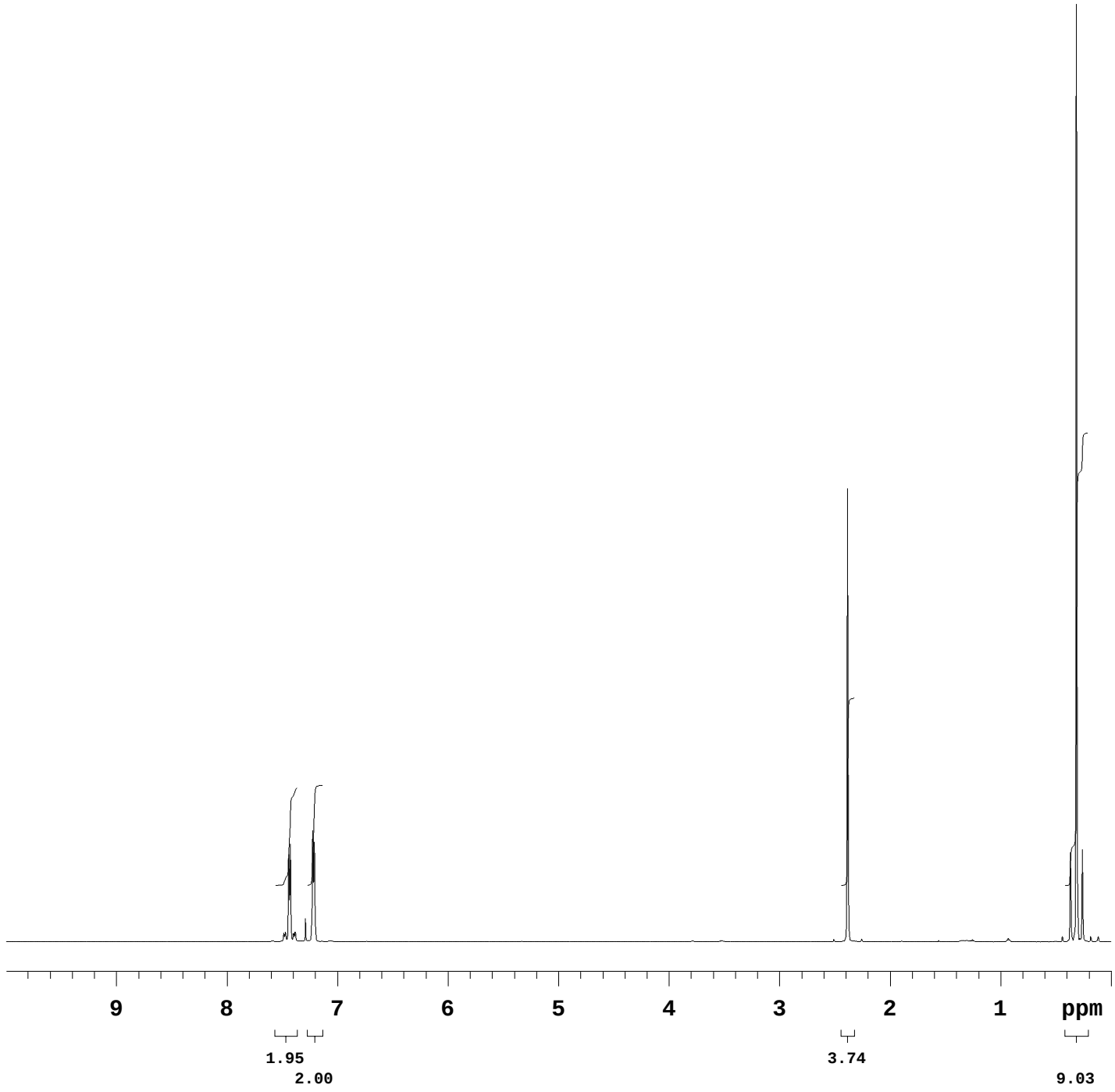

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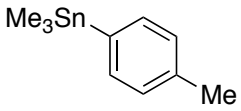

S2

UO Inova-500 Carbon-13

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 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 156 repetitions

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DECOUPLE H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

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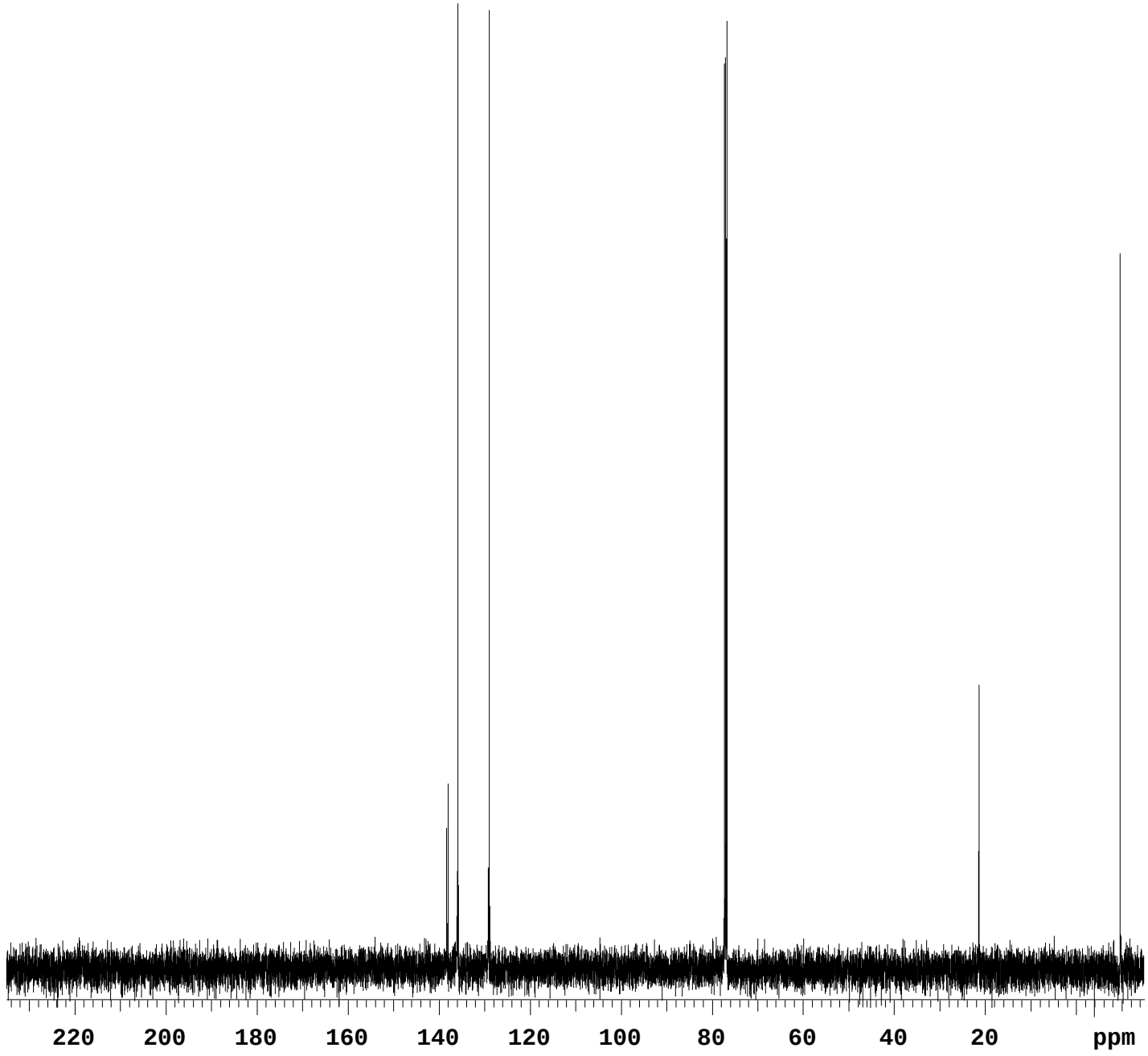
 Total time 5 minutes



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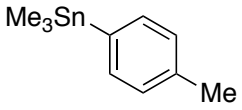

S2

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 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
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 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
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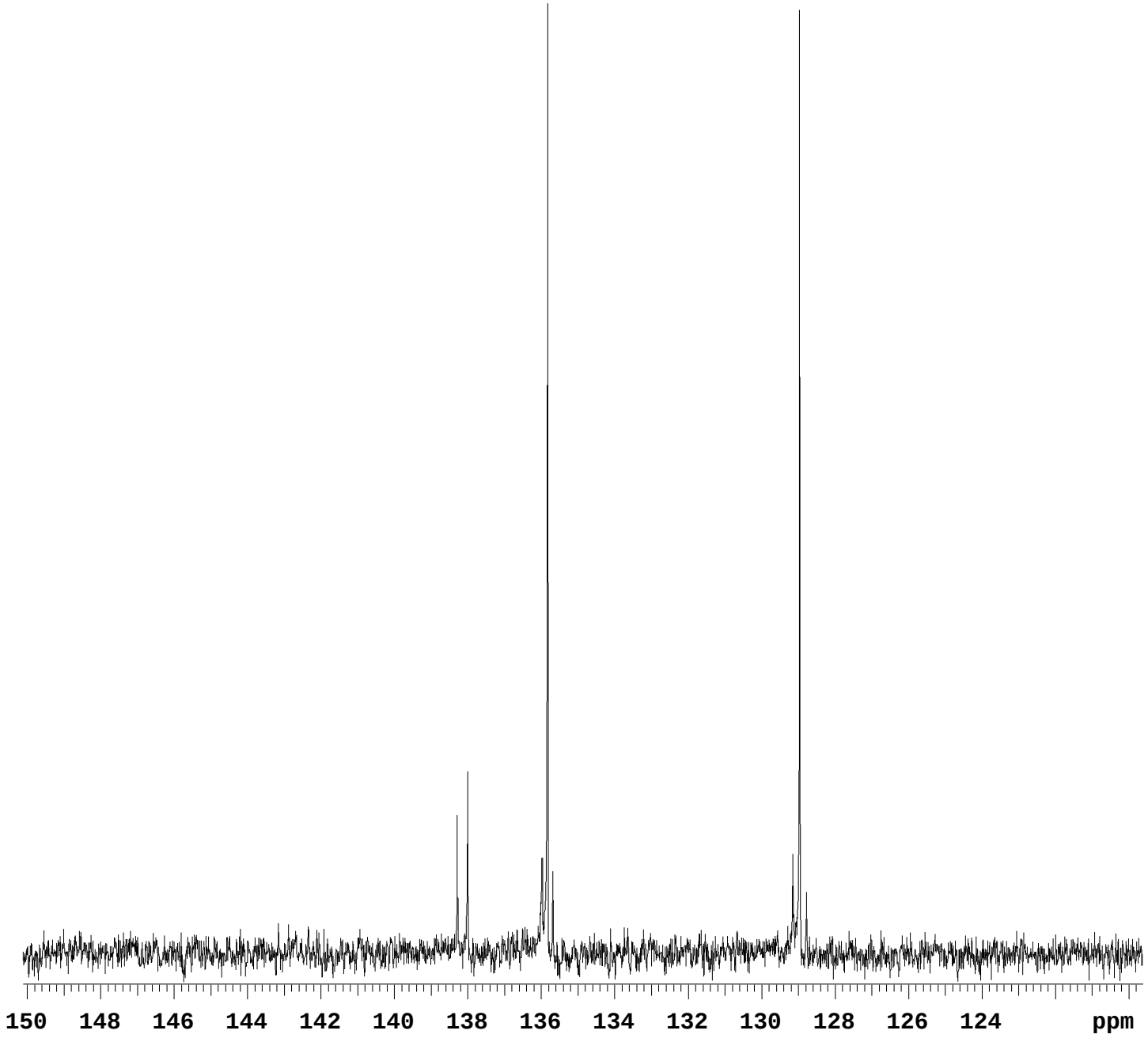
 FT size 65536
 Total time 5 minutes



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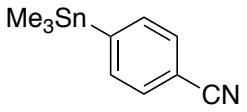

S3

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 Operator: ger
 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1042443

DATA PROCESSING
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 Total time 1 minute
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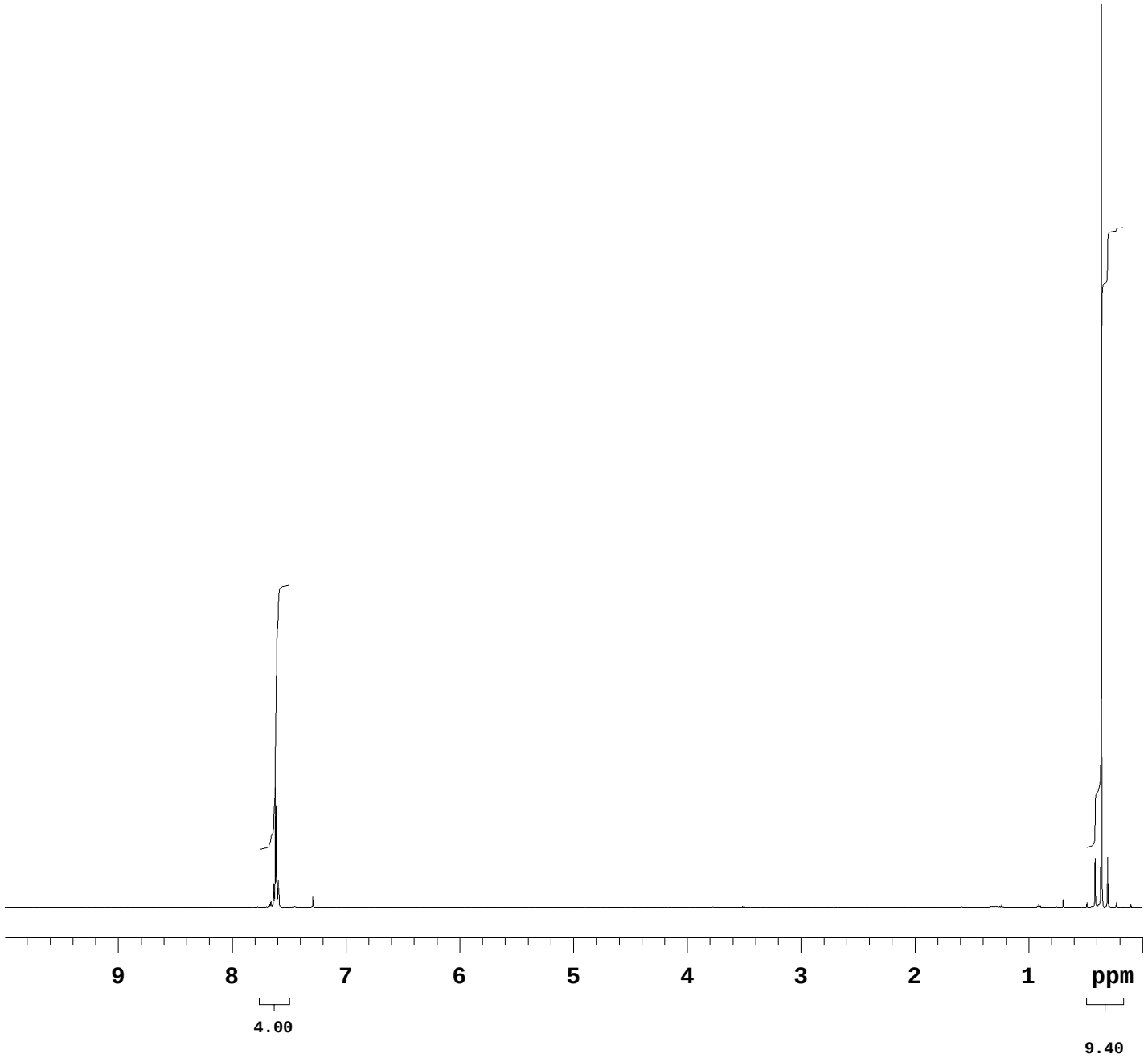

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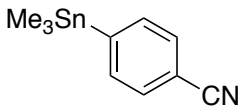

S3

UO Inova-500 Carbon-13

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 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

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 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
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OBSERVE C13, 125.7513123
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 WALTZ-16 modulated

DATA PROCESSING
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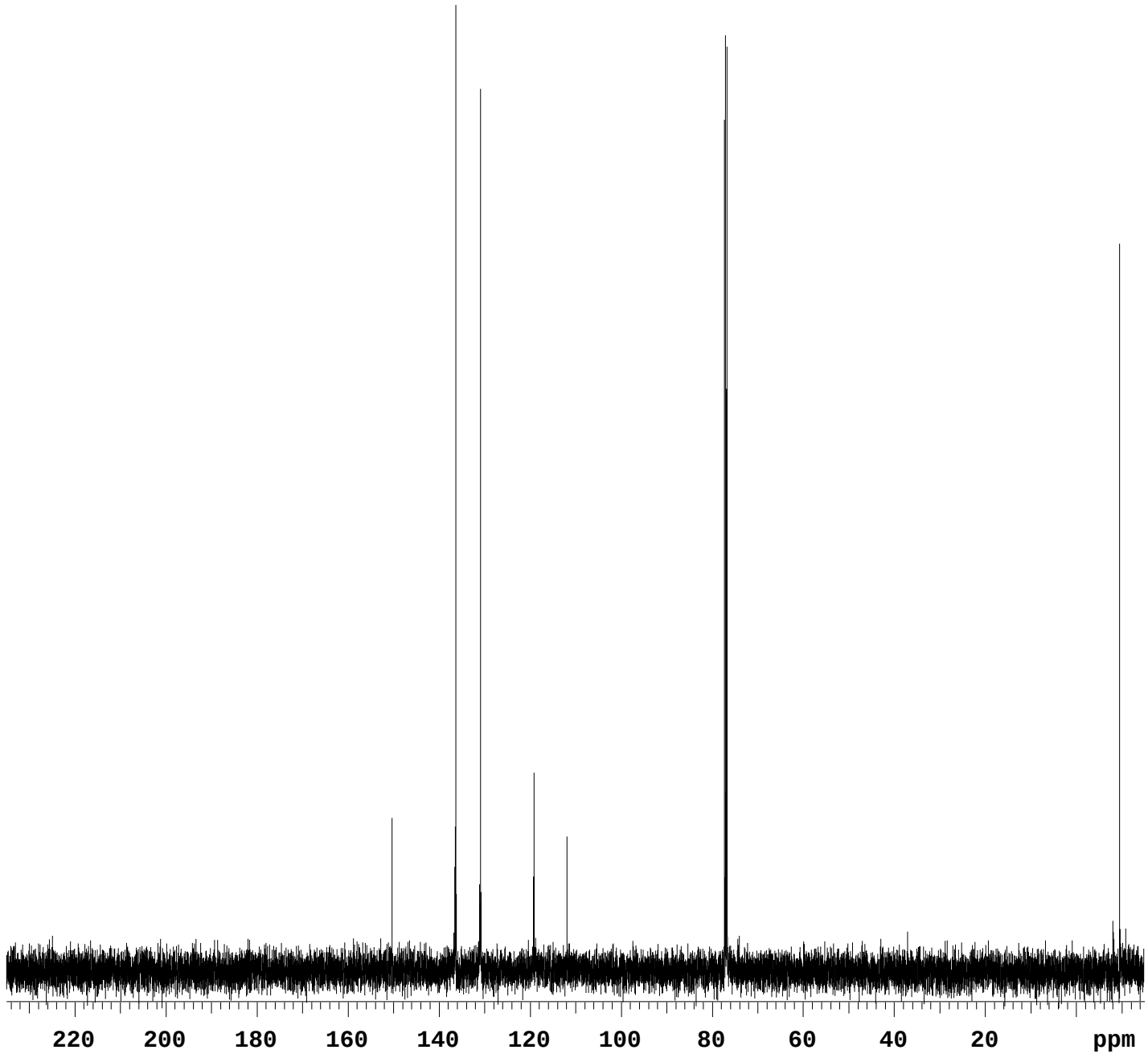

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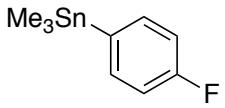

S4

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PULSE SEQUENCE
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 Pulse 45.0 degrees
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DATA PROCESSING
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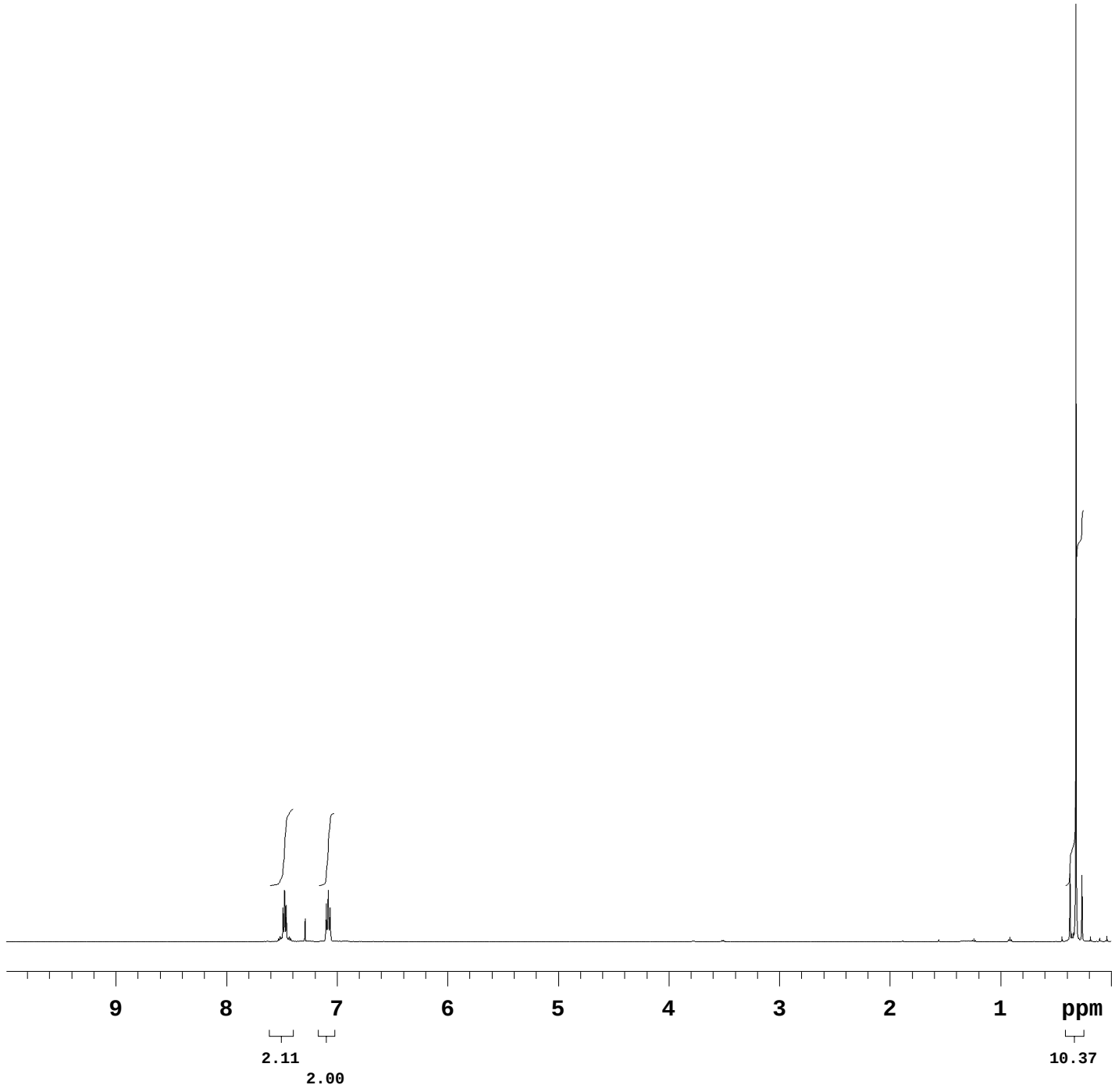

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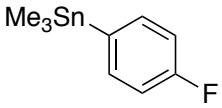

S4

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 Operator: ger
 File: C
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PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
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OBSERVE  C13, 125.7513123
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 continuously on
 WALTZ-16 modulated

DATA PROCESSING
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 Total time 17 minutes
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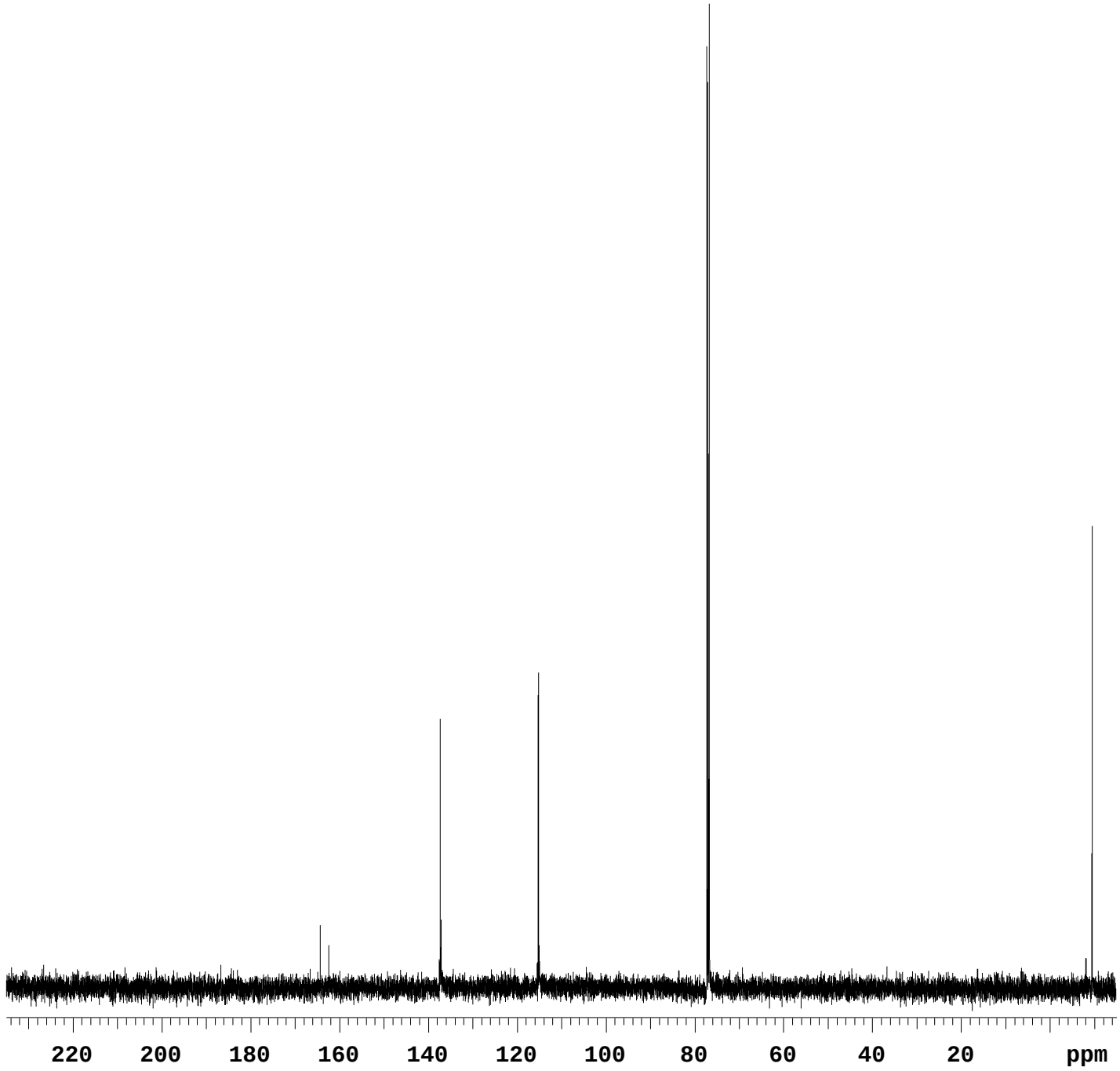

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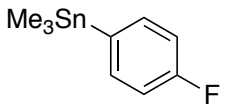
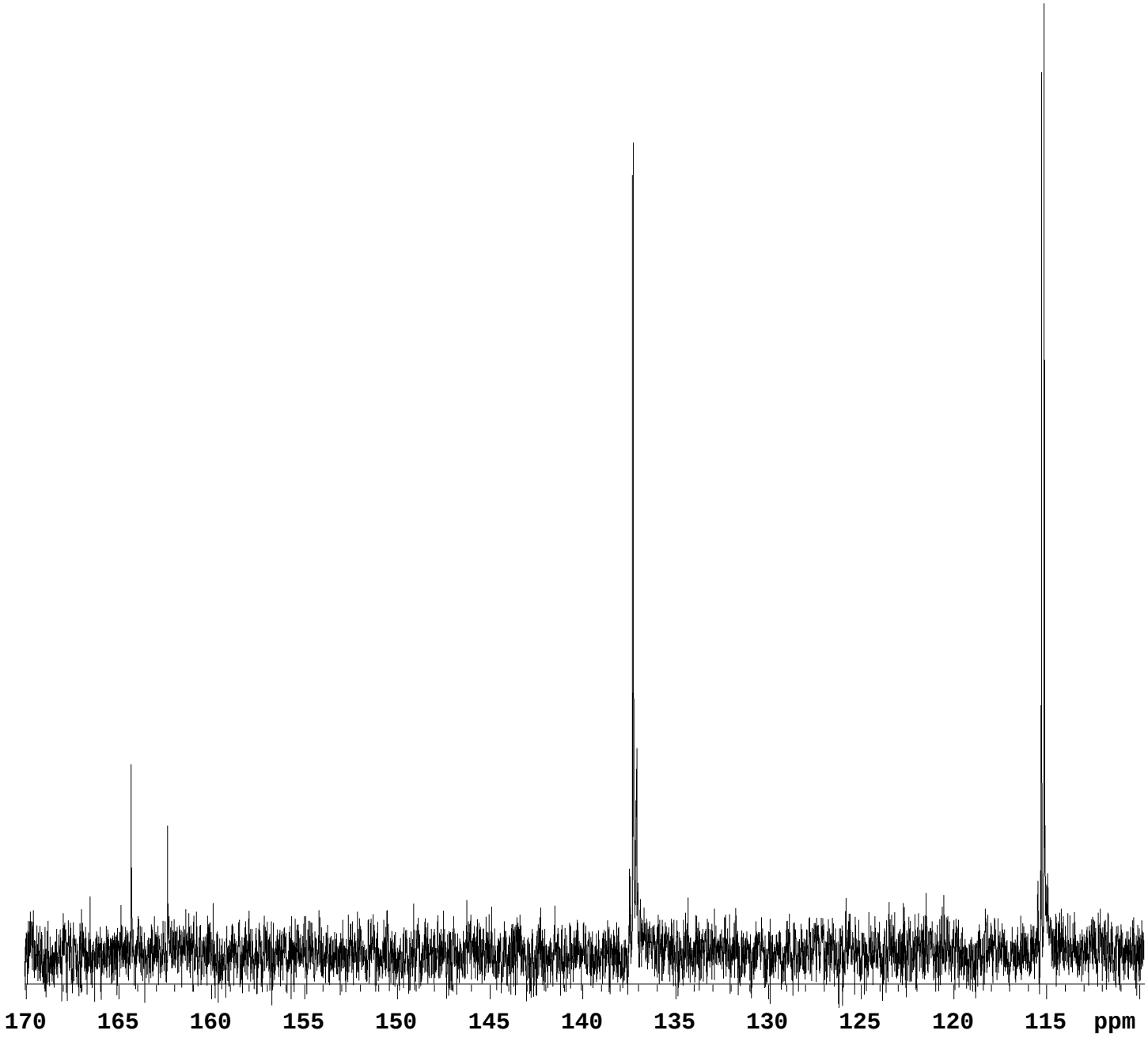
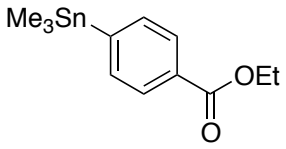


S4

```
UO Inova-500  Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 524 repetitions

OBSERVE  C13, 125.7513123
DECOUPLE  H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 17 minutes
```

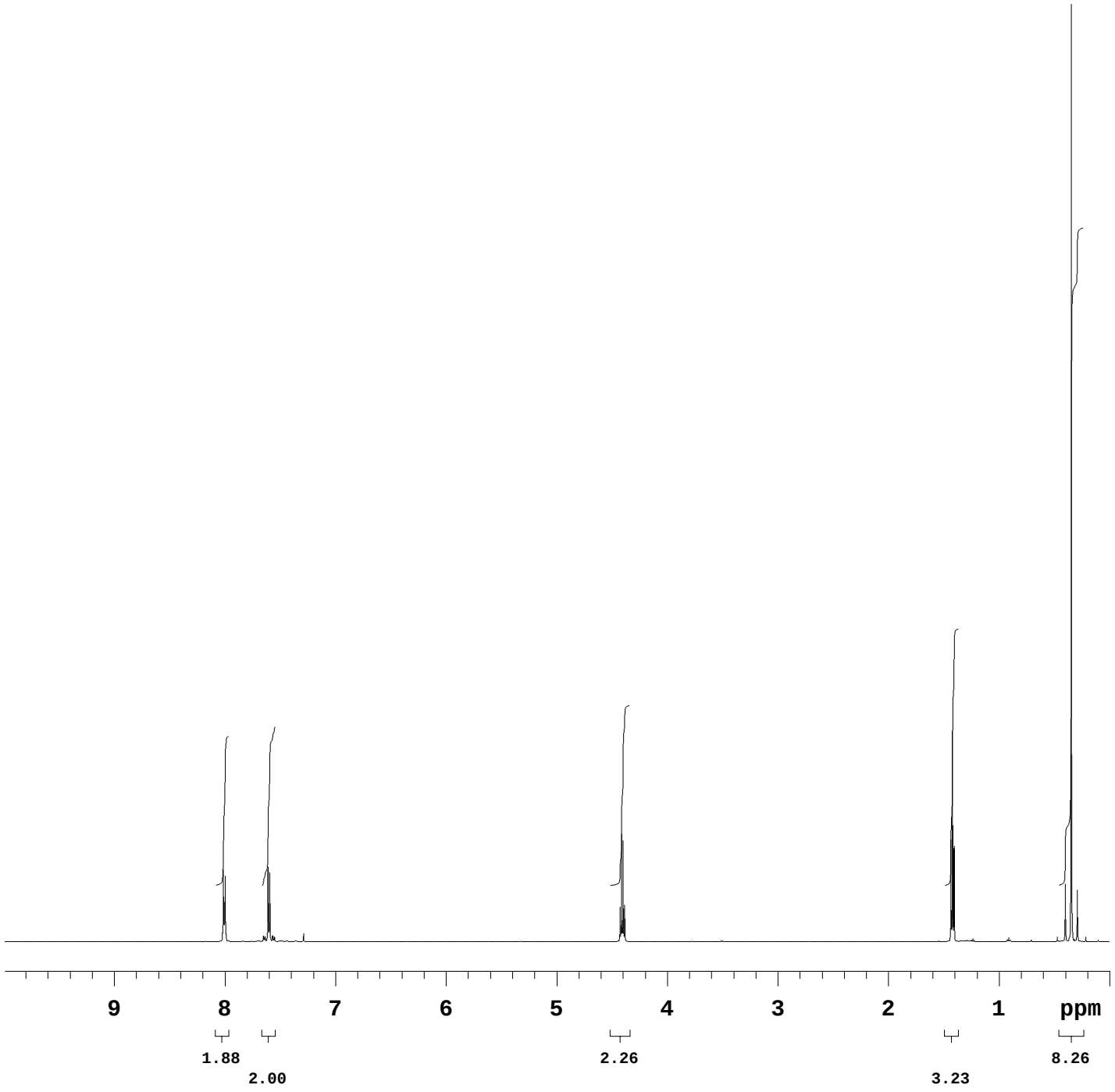


Archive dir: | File: C

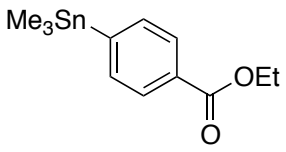


S6

```
UO Inova-500 standard 1H

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1042443

DATA PROCESSING
 FT size 32768
 Total time 1 minute
```



Archive dir: | File: H



S6

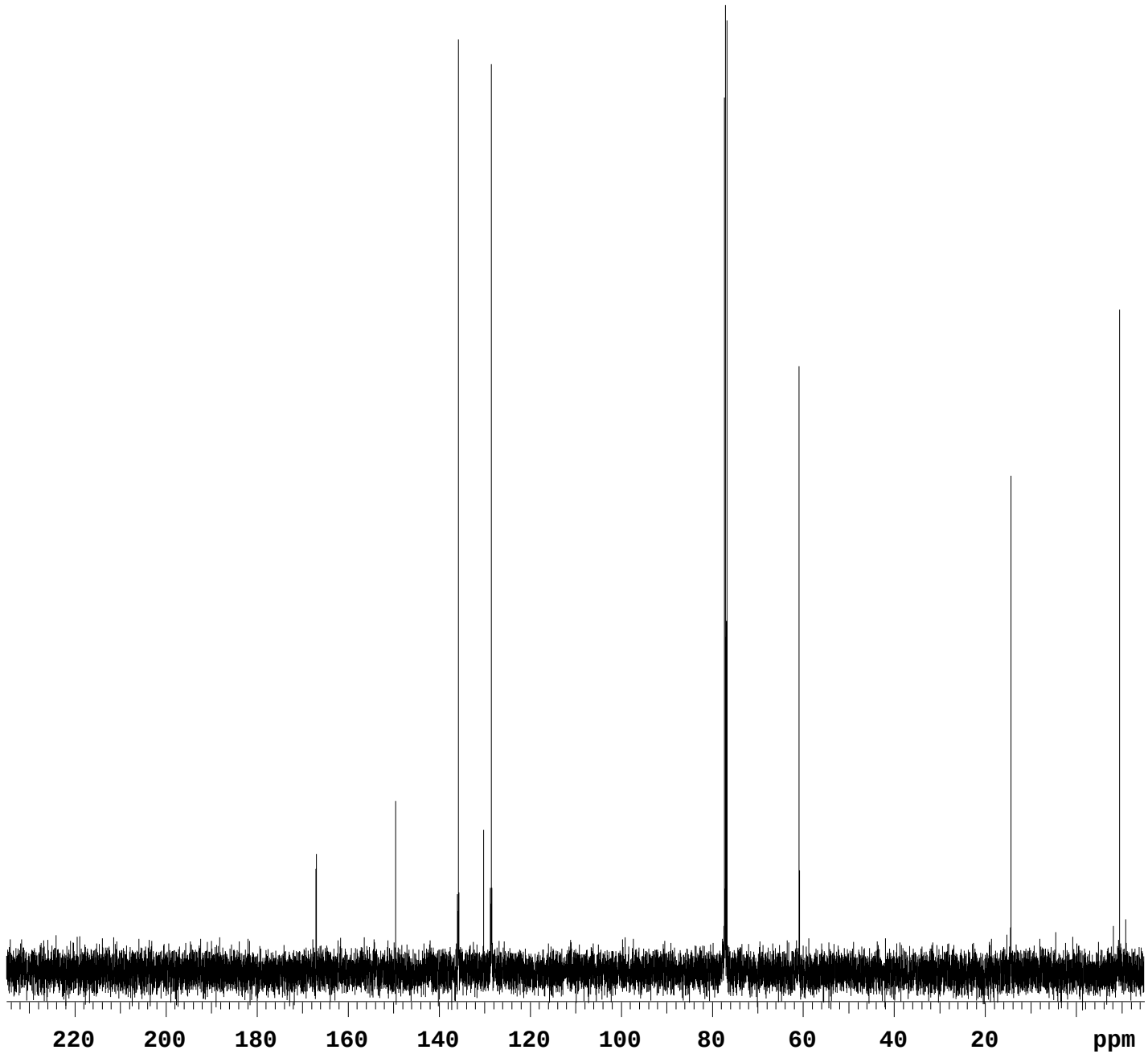
UO Inova-500 Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

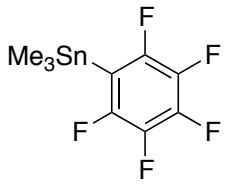
PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 212 repetitions

OBSERVE C13, 125.7513123
DECOUPLE H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 7 minutes

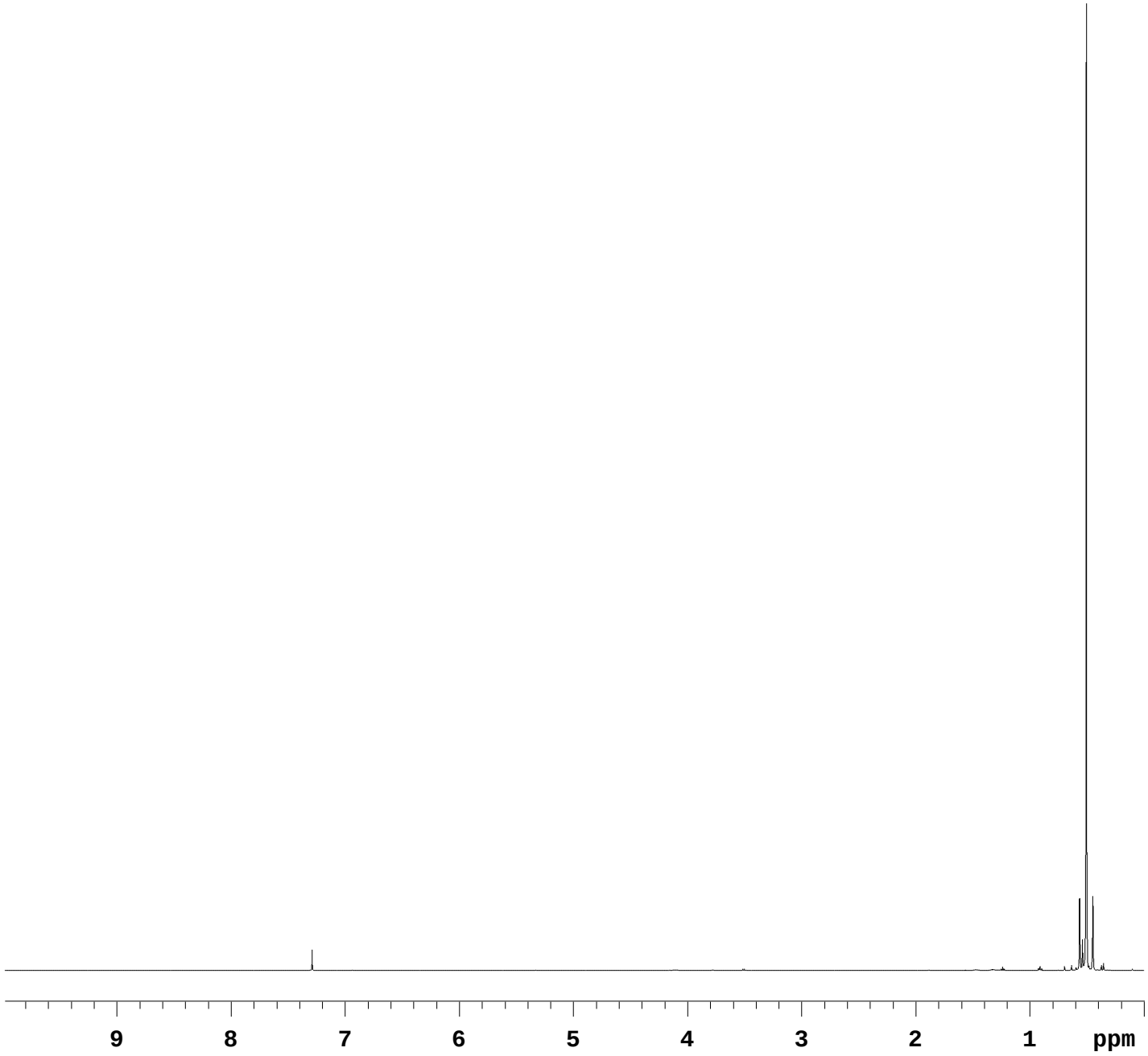


Archive dir: File: C

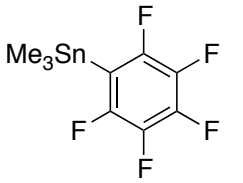


S7

```
UO Inova-500 standard 1H

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1042443

DATA PROCESSING
 FT size 32768
 Total time 1 minute
```



Archive dir: | File: H



S7

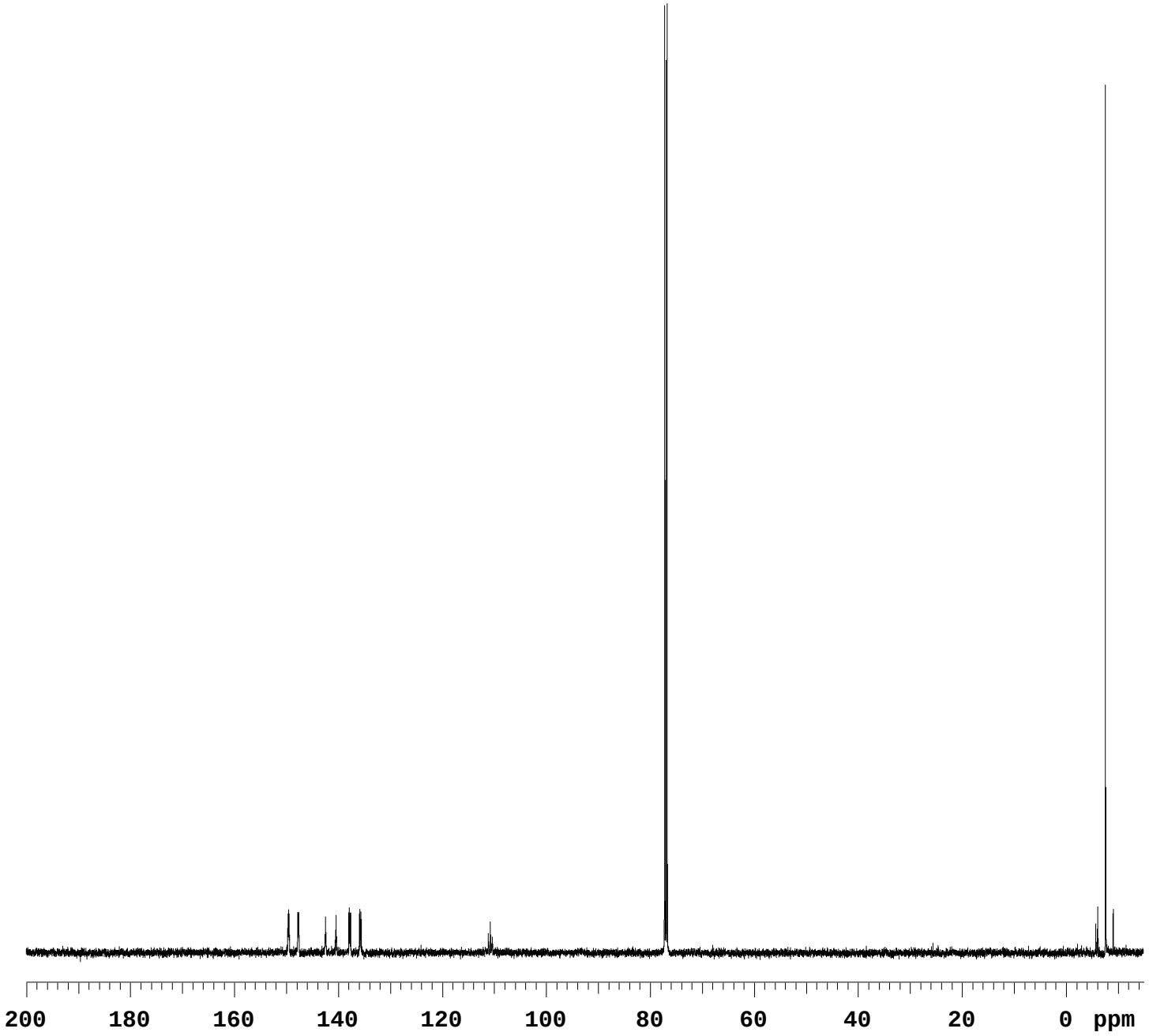
UO Inova-500 Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

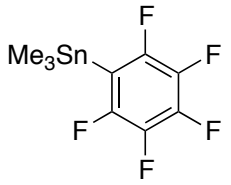
PULSE SEQUENCE
 Relax. delay 2.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 1316 repetitions

OBSERVE C13, 125.7513123
DECOUPLE H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 65 minutes

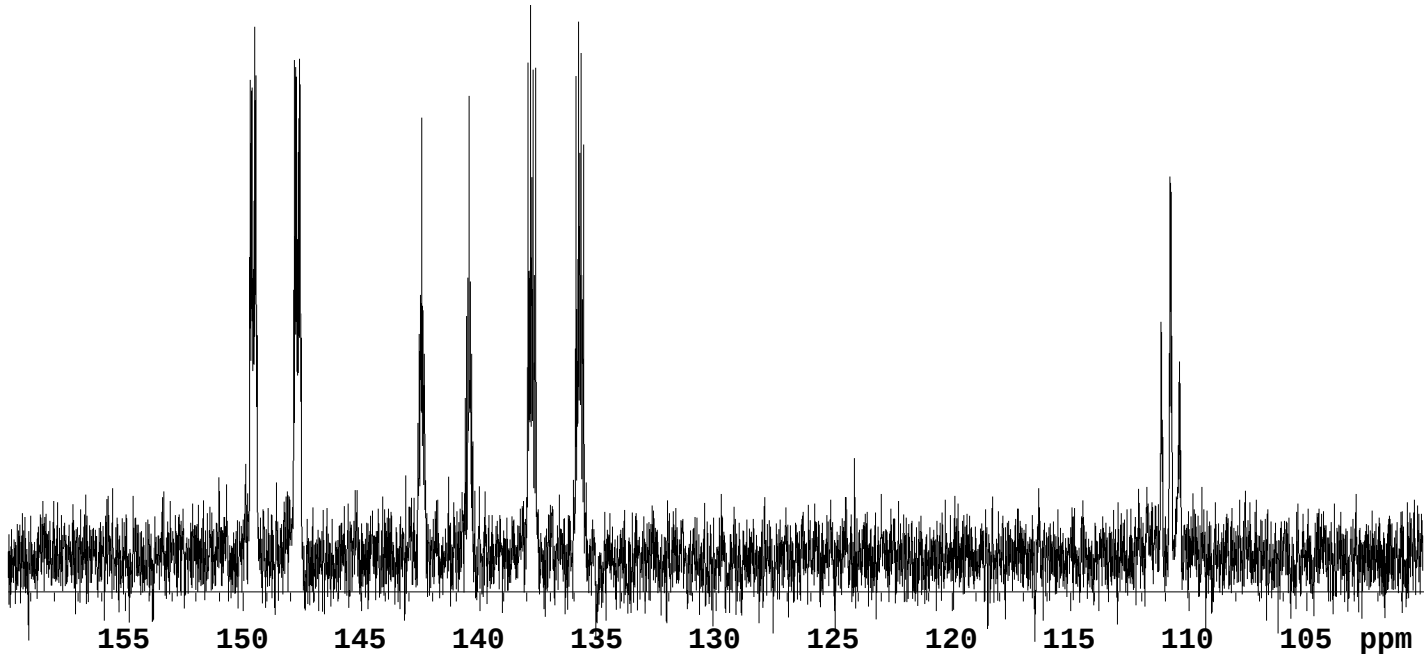


Archive dir: File: C

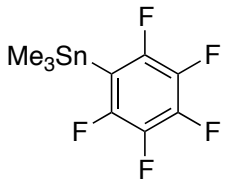


S7

```
UO Inova-500  Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 2.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 1316 repetitions

OBSERVE  C13, 125.7513123
DECOUPLE  H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 65 minutes
```



Archive dir:	File: C



S7

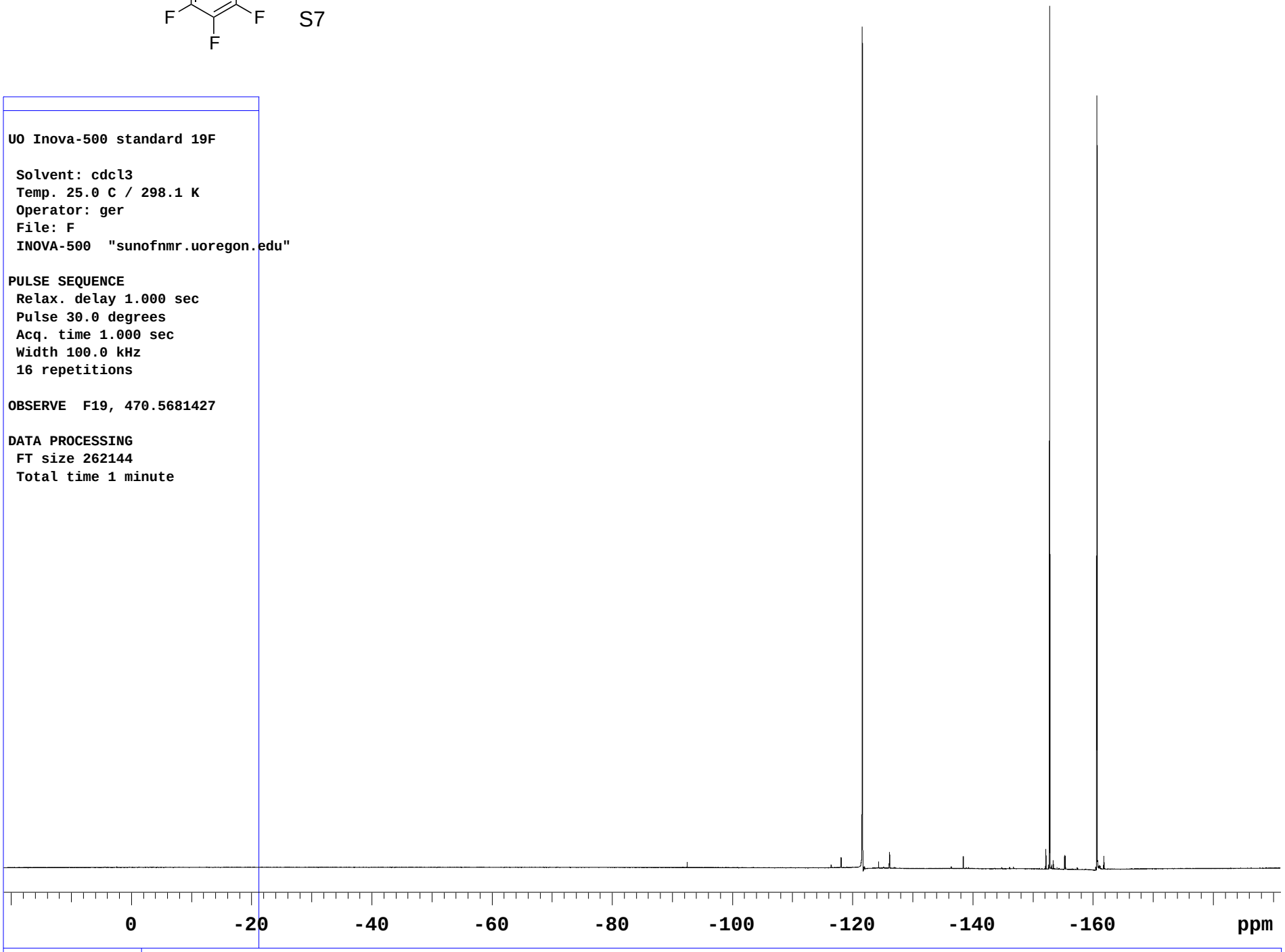
UO Inova-500 standard 19F

Solvent: cdcl3
Temp. 25.0 C / 298.1 K
Operator: ger
File: F
INOVA-500 "sunofnmr.uoregon.edu"

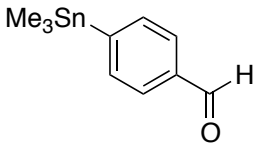
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 30.0 degrees
Acq. time 1.000 sec
Width 100.0 kHz
16 repetitions

OBSERVE F19, 470.5681427

DATA PROCESSING
FT size 262144
Total time 1 minute



Archive dir: File: F



S8

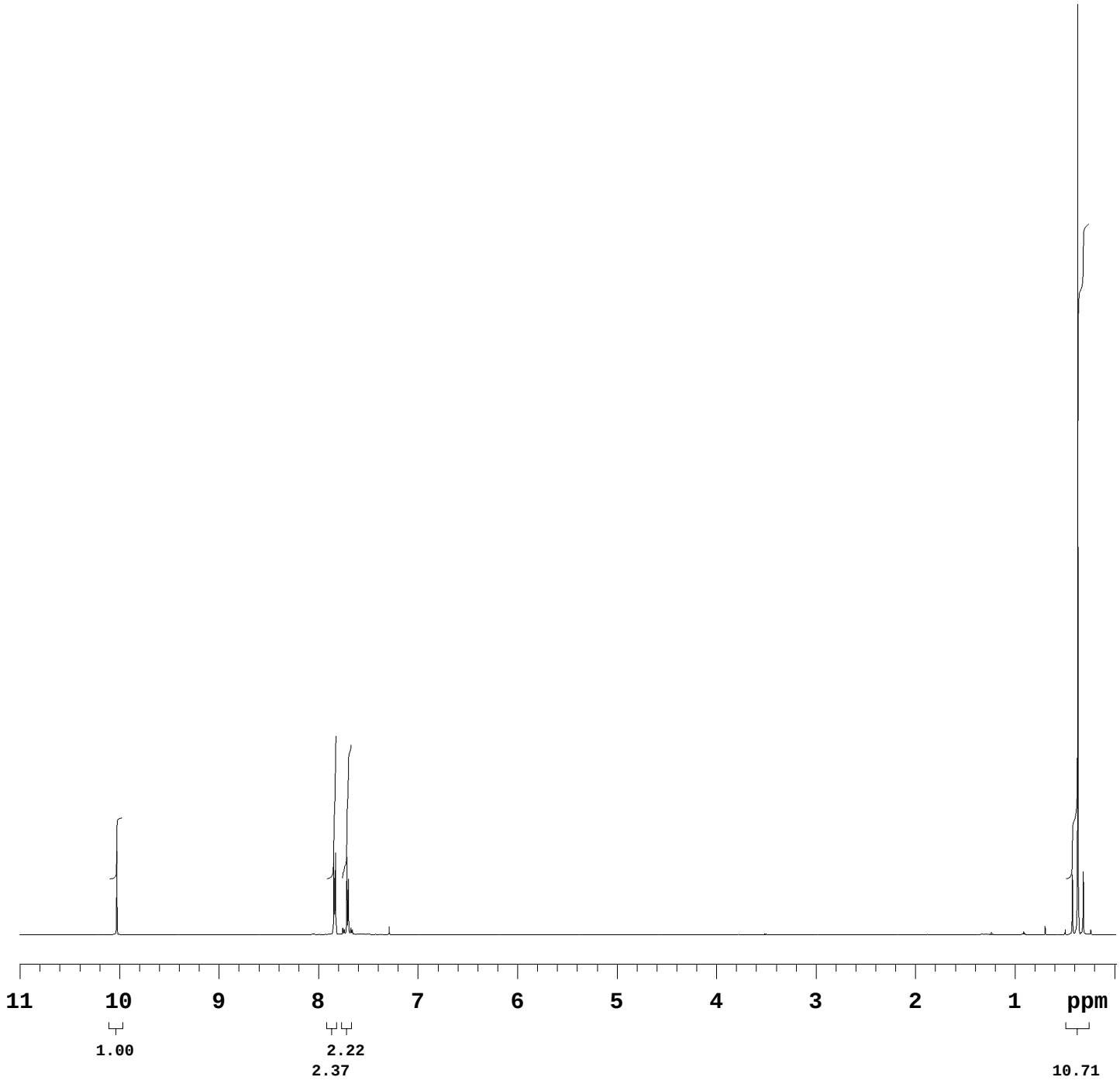
UO Inova-500 standard 1H

Solvent: cdcl3
Temp. 25.0 C / 298.1 K
Operator: ger
File: H
INOVA-500 "sunofnmr.uoregon.edu"

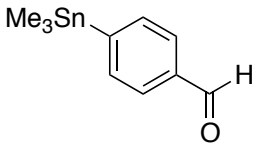
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.048 sec
Width 8001.6 Hz
8 repetitions

OBSERVE H1, 500.1042443

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: File: H



S8

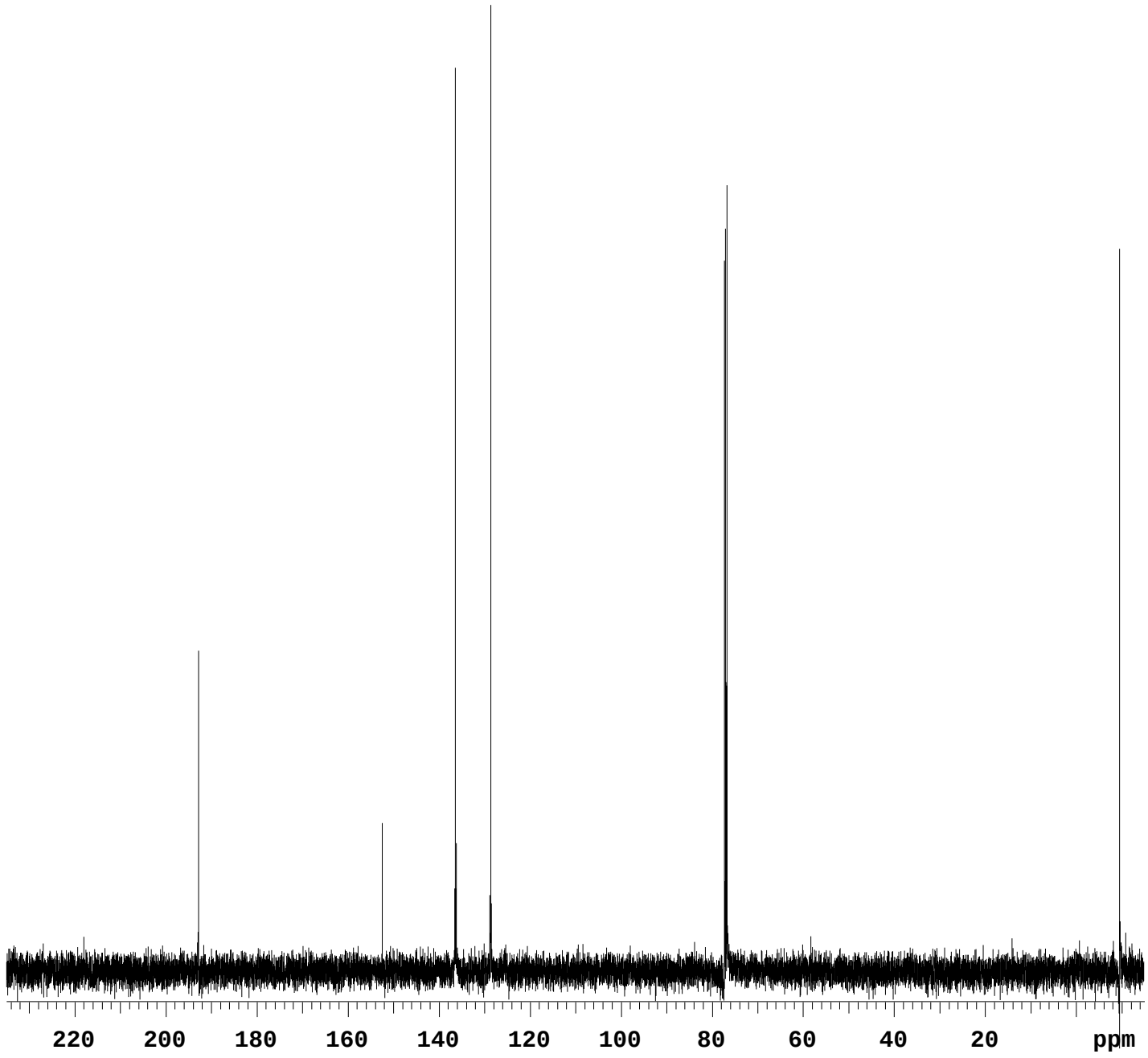
UO Inova-500 Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

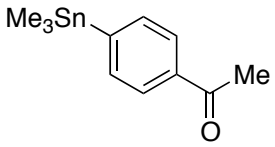
PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 208 repetitions

OBSERVE C13, 125.7513123
DECOUPLE H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 6 minutes

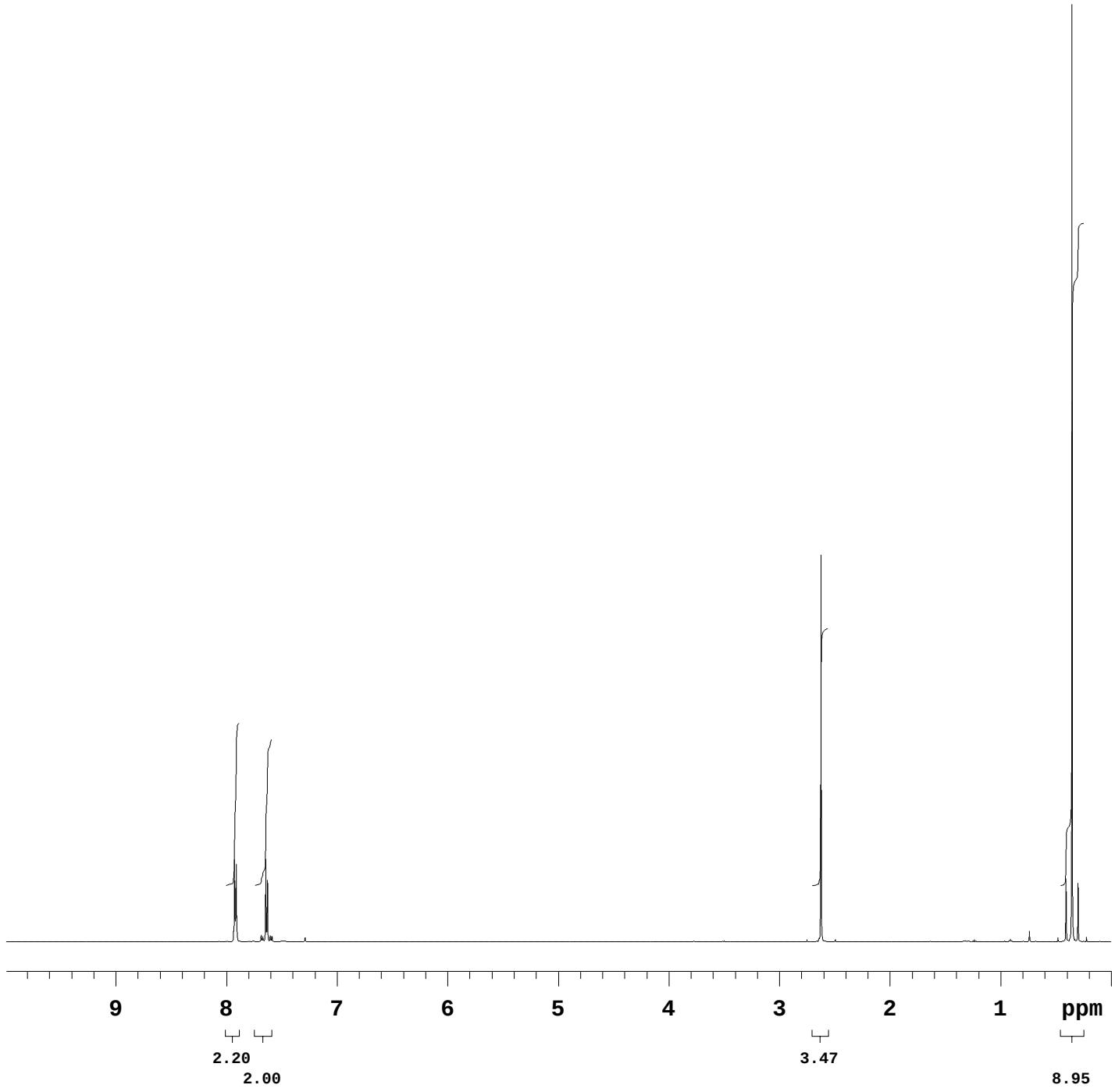


Archive dir: File: C

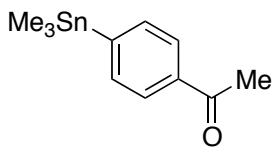


S9

```
UO Inova-500 standard 1H

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1042443

DATA PROCESSING
 FT size 32768
 Total time 1 minute
```

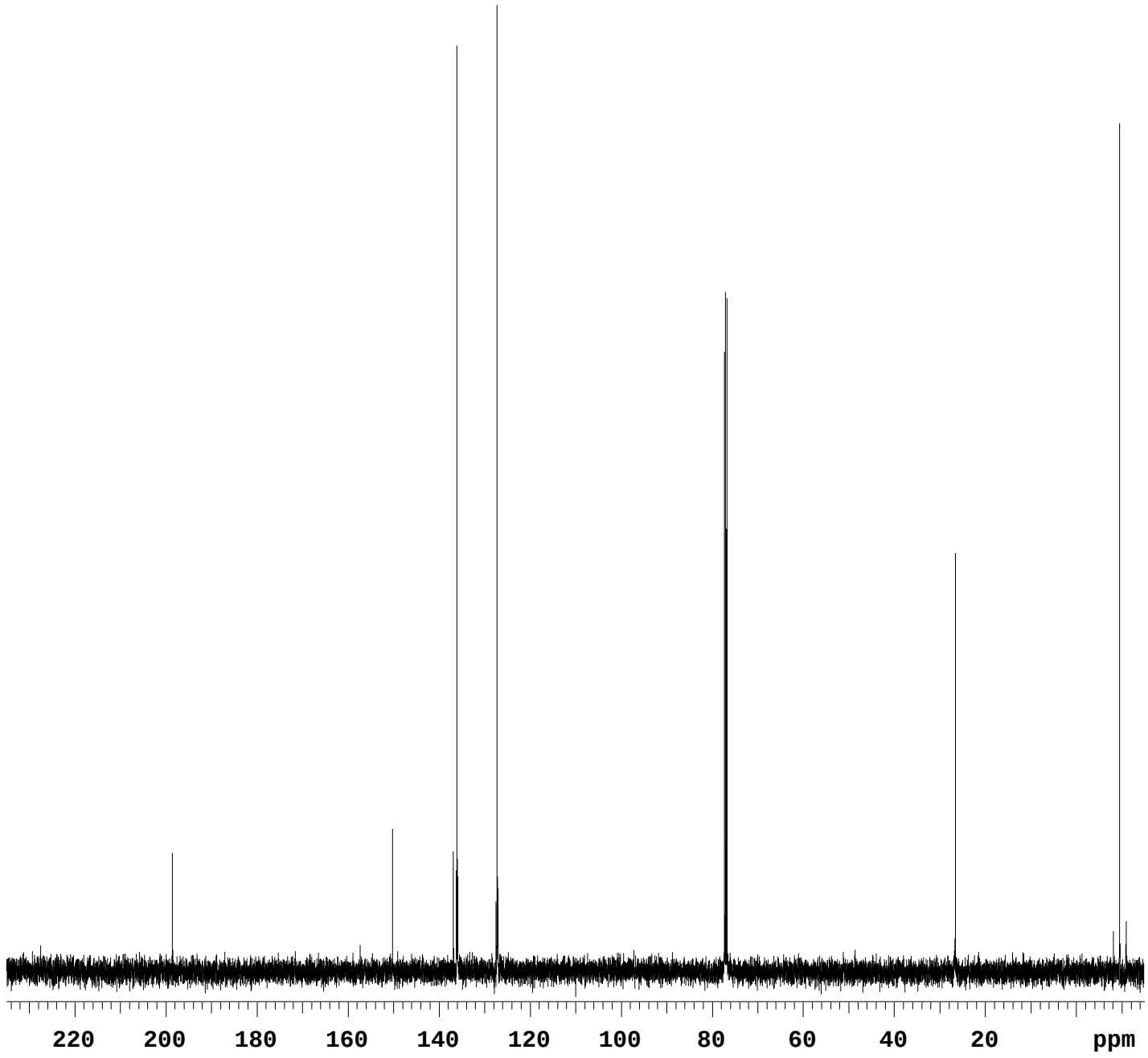


Archive dir: | File: H

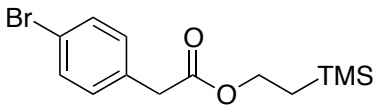


S9

```
UO Inova-500  Carbon-13

 Solvent: cdcl3
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 284 repetitions

OBSERVE  C13, 125.7513123
DECOUPLE  H1, 500.1067449
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 9 minutes
```

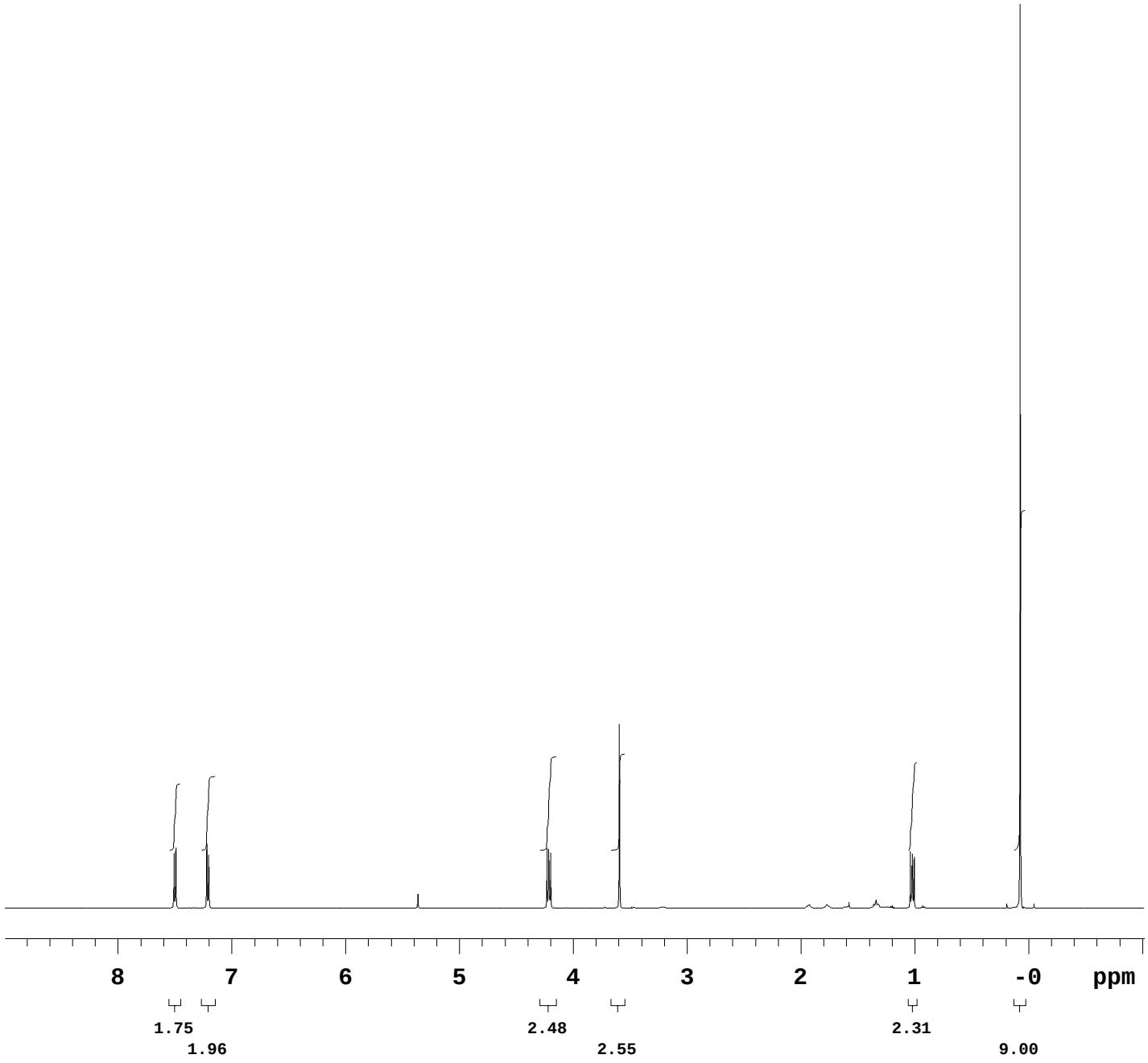


Archive dir:	File: C

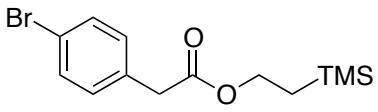


S10

```
UO Inova-500 standard 1H

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: H
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1052045

DATA PROCESSING
 FT size 32768
 Total time 1 minute
```

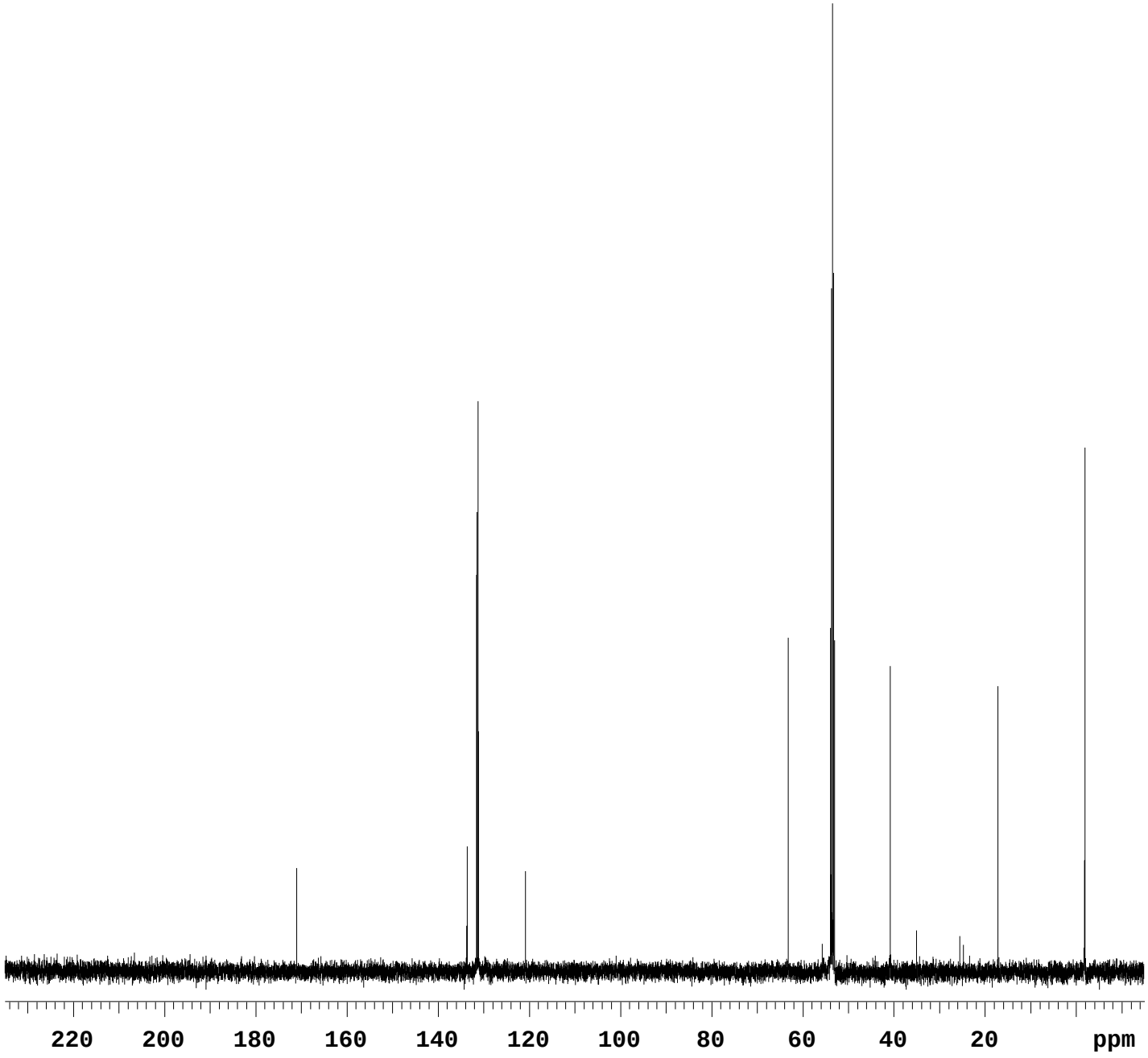


Archive dir: | File: H

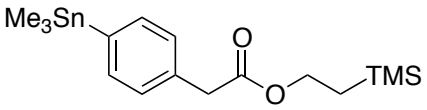


S10

```
UO Inova-500  Carbon-13

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 264 repetitions

OBSERVE  C13, 125.7515537
DECOUPLE  H1, 500.1077051
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 8 minutes
```



Archive dir: | File: C



3

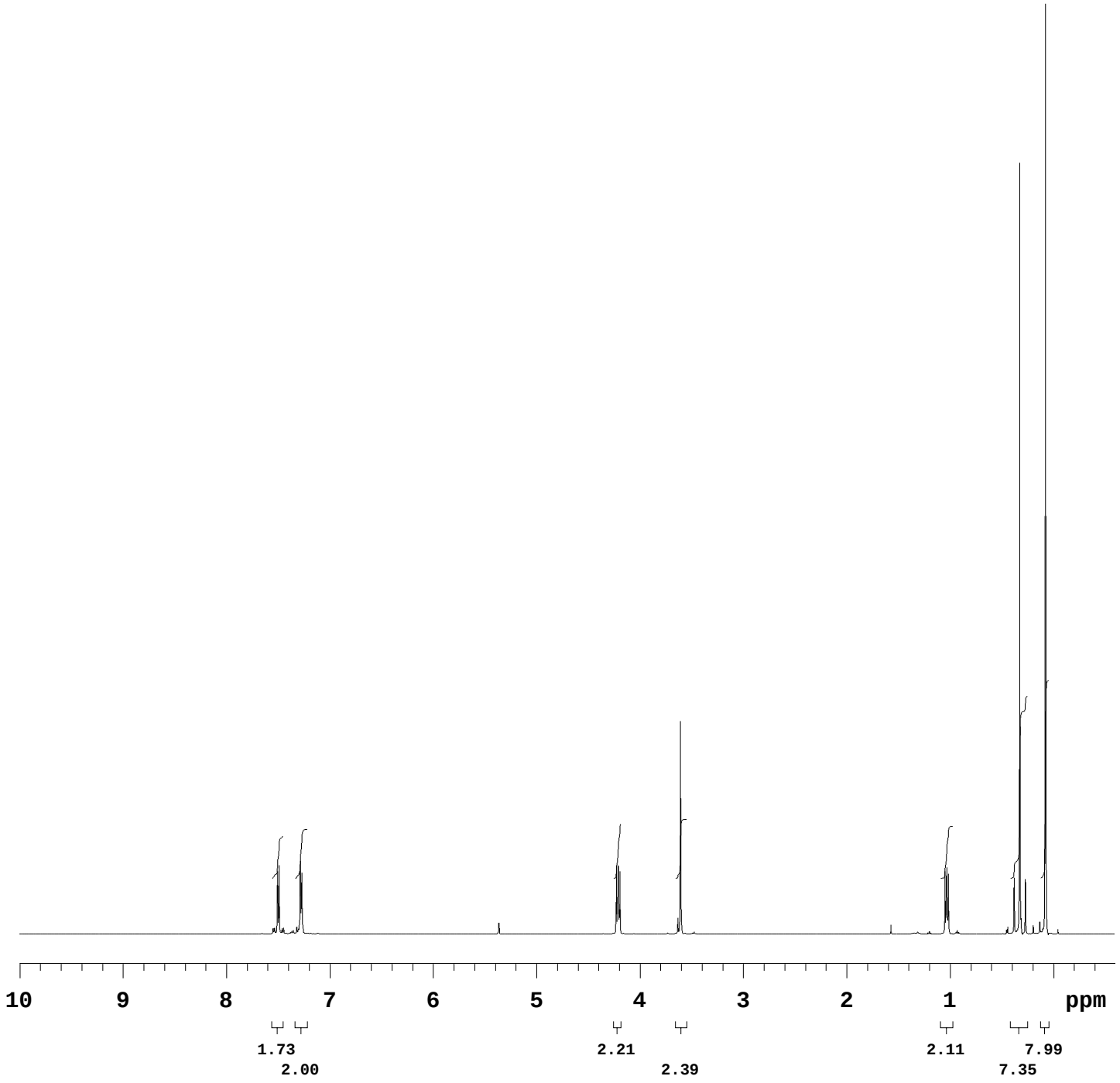
UO Inova-500 standard 1H

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: H
INOVA-500 "sunofnmr.uoregon.edu"

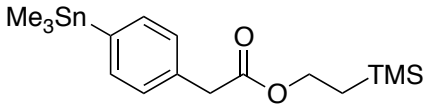
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 2.048 sec
Width 8001.6 Hz
8 repetitions

OBSERVE H1, 500.1052045

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: | File: H



3

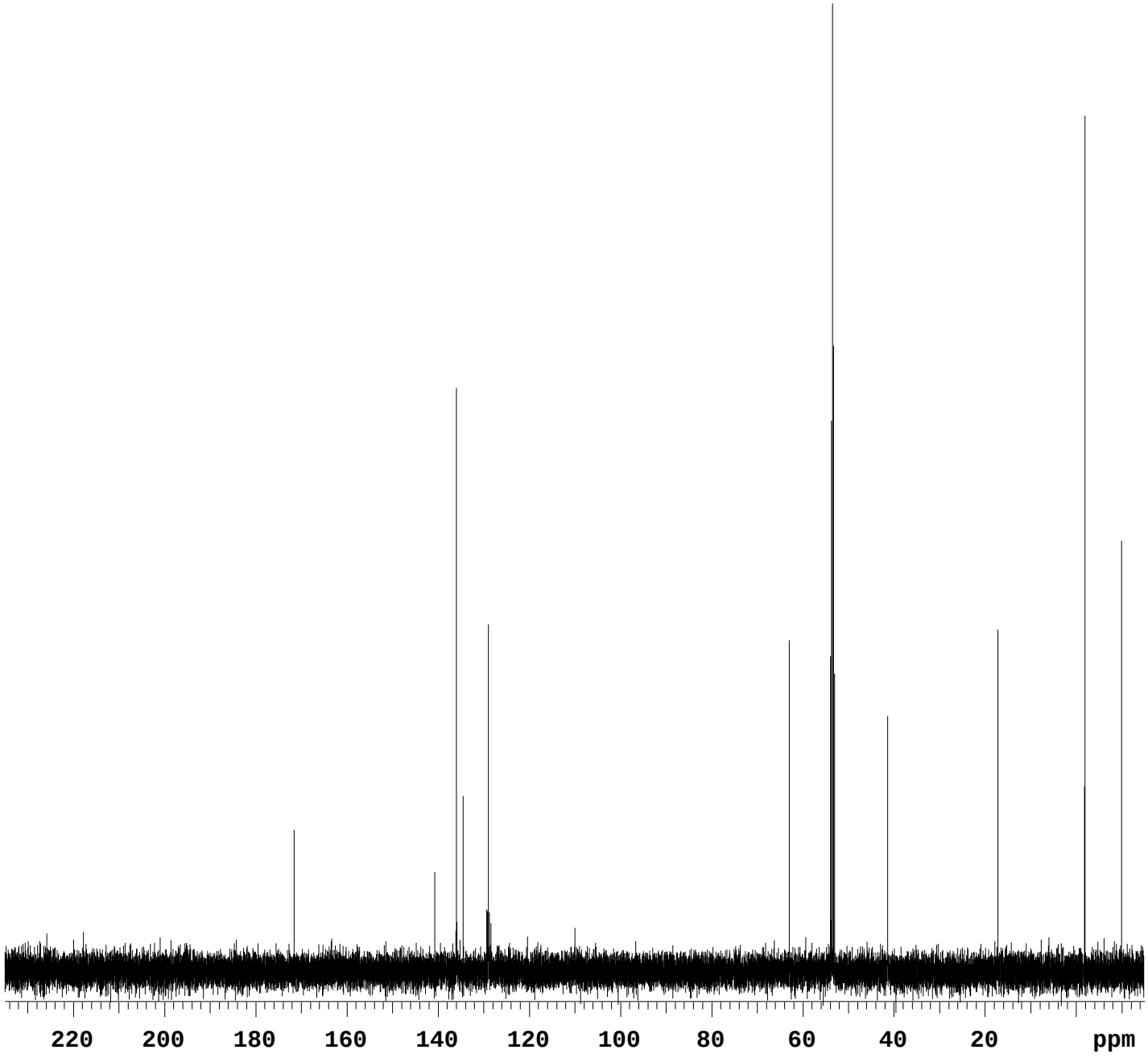
UO Inova-500 standard 1H

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: C
INOVA-500 "sunofnmr.uoregon.edu"

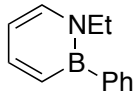
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 31434.2 Hz
380 repetitions

OBSERVE C13, 125.7515537
DECOUPLE H1, 500.1077051
Power 39 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
FT size 65536
Total time 12 minutes



Archive dir: | File: C



2a

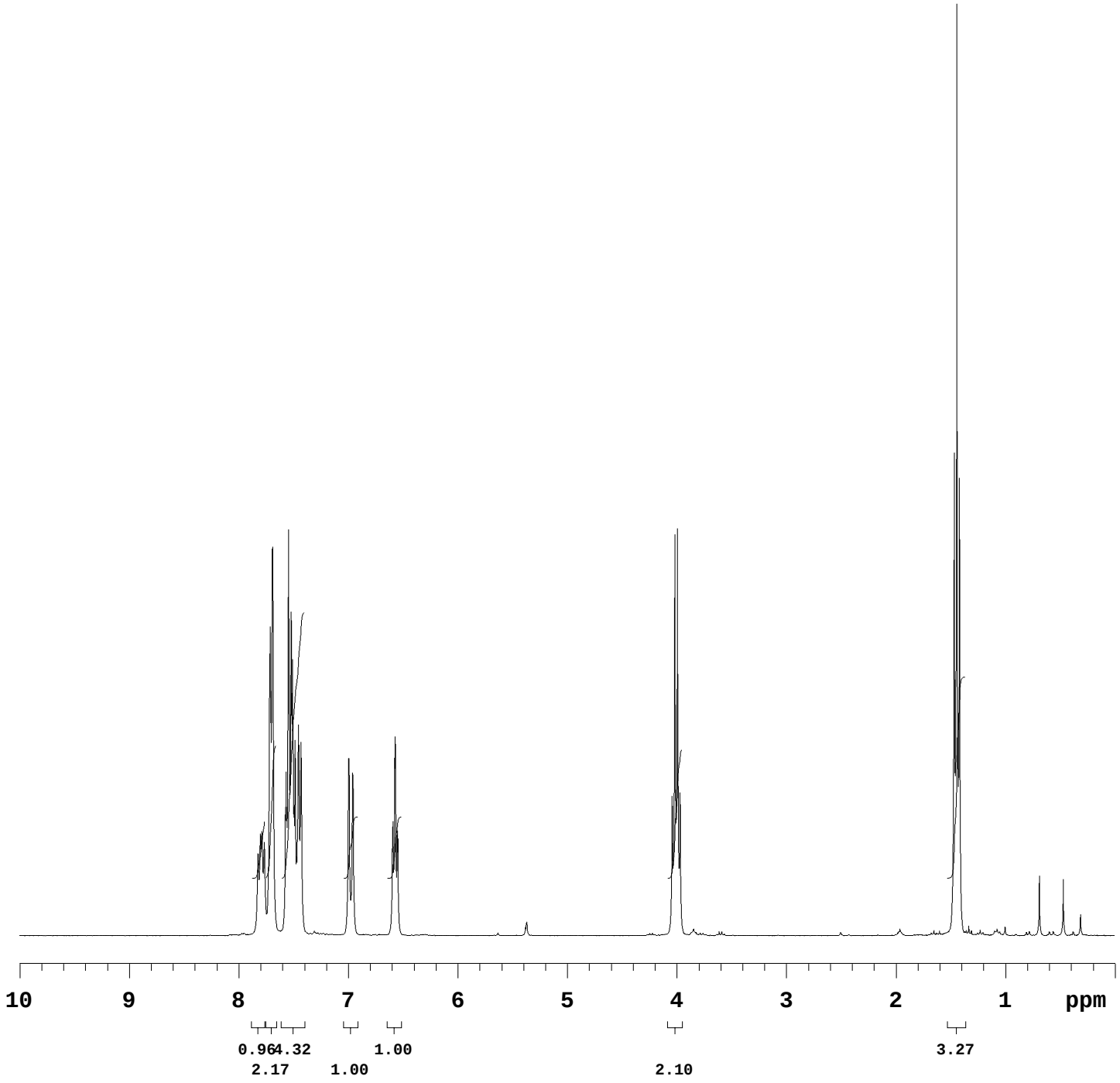
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: H
INOVA-500 "sunofnmr.uoregon.edu"

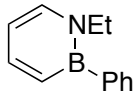
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4800.8 Hz
8 repetitions

OBSERVE H1, 300.0510060

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: | File: H



2a

INDEX	FREQUENCY	PPM	HEIGHT
1	3452.2	35.860	159.0

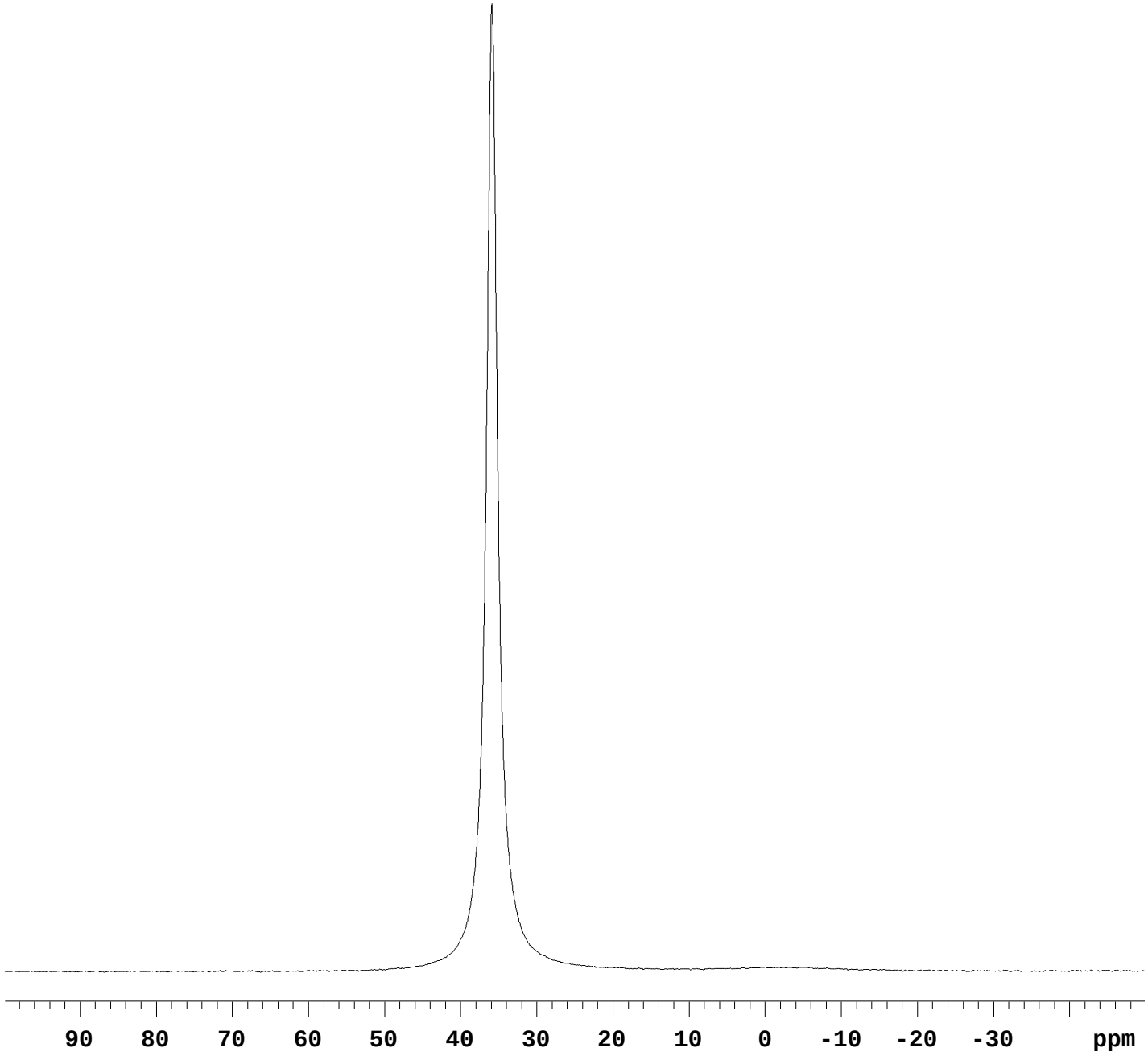
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: B
INOVA-500 "sunofnmr.uoregon.edu"

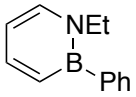
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
40 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

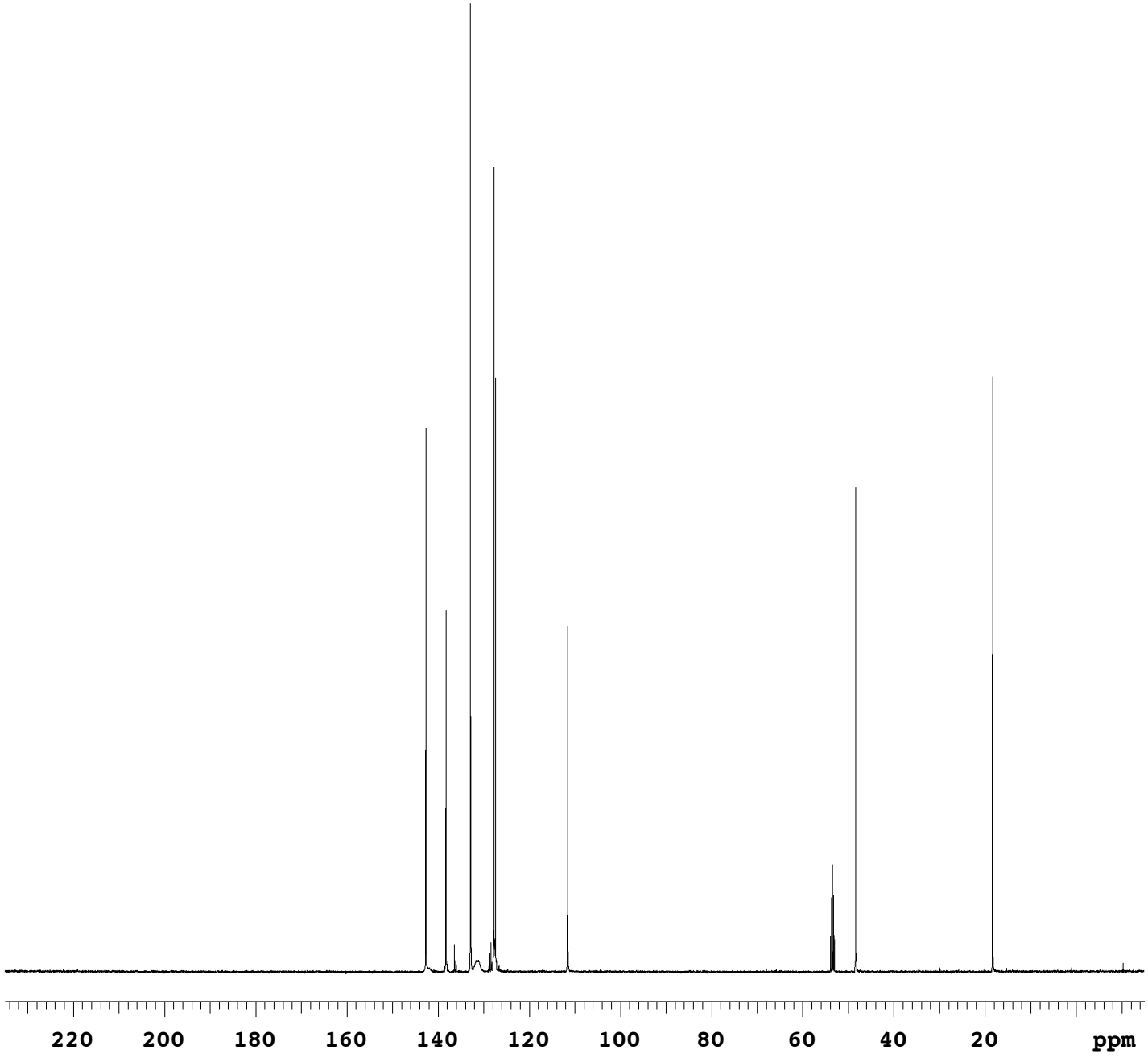


Archive dir: File: B

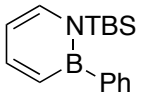


2a

```
UO Inova-500 standard 1H

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 284 repetitions

OBSERVE  C13, 125.7515537
DECOUPLE  H1, 500.1077051
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 9 minutes
```

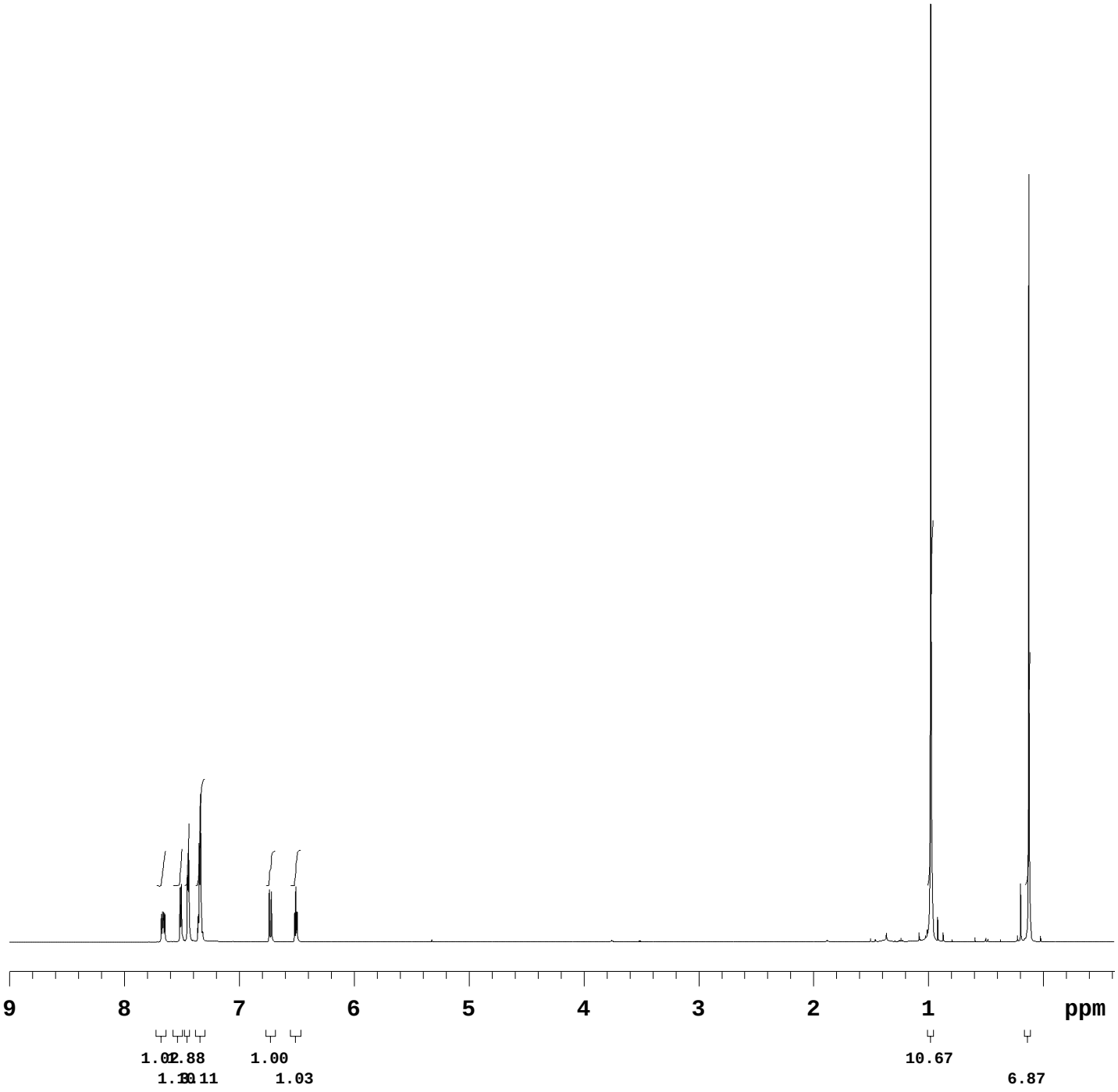


Archive dir:	File: C

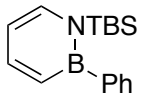


2b

```
UO VNMRS-600
{CH-ColdProbe} 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: NTBS_BPh_H
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 3.000 sec
 Width 9615.4 Hz
 8 repetitions

OBSERVE   H1, 599.9795419

DATA PROCESSING
 FT size 65536
 Total time 1 minute
```

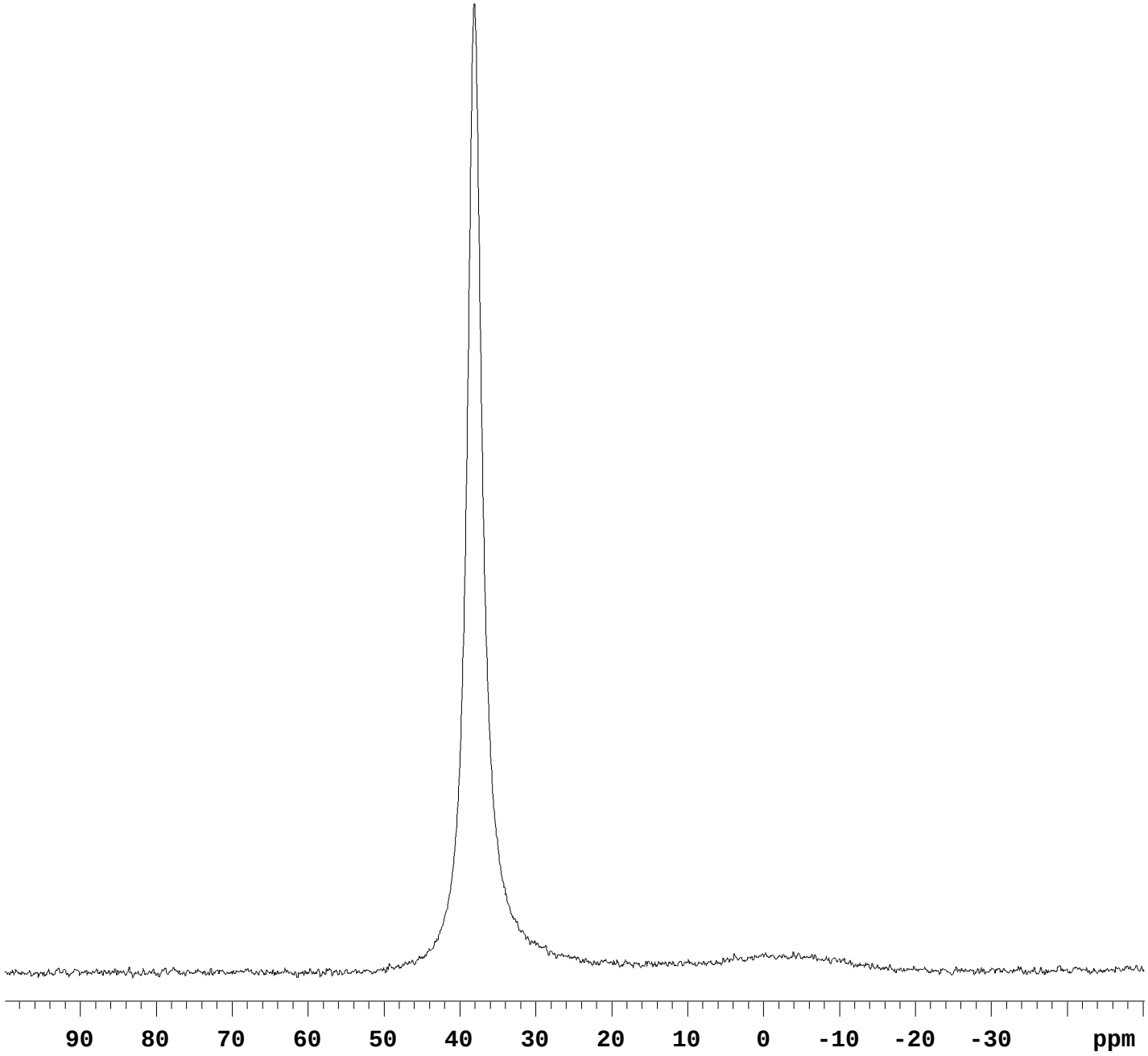


Archive dir: | File: NTBS_BPh_H



2b

INDEX	FREQUENCY	PPM	HEIGHT
1	3662.2	38.041	159.0



UO Inova-300-North
Boron-11

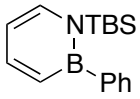
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: NTBS_BPh_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
80 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: NTBS_BPh_B



2b

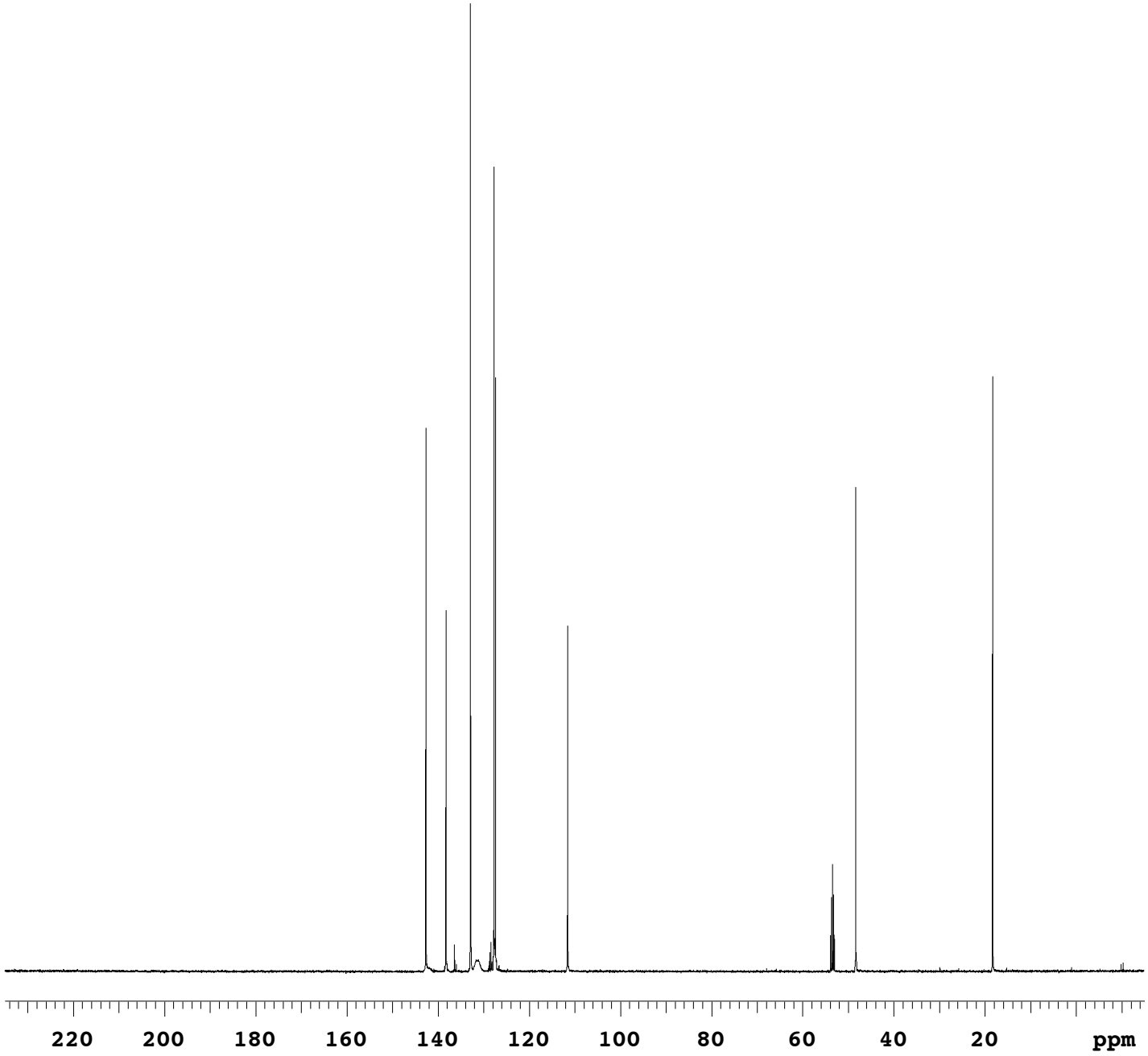
UO Inova-500 standard 1H

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: C
INOVA-500 "sunofnmr.uoregon.edu"

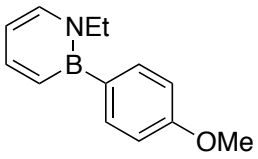
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 31434.2 Hz
284 repetitions

OBSERVE C13, 125.7515537
DECOUPLE H1, 500.1077051
Power 39 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 9 minutes



Archive dir: File: C



2c

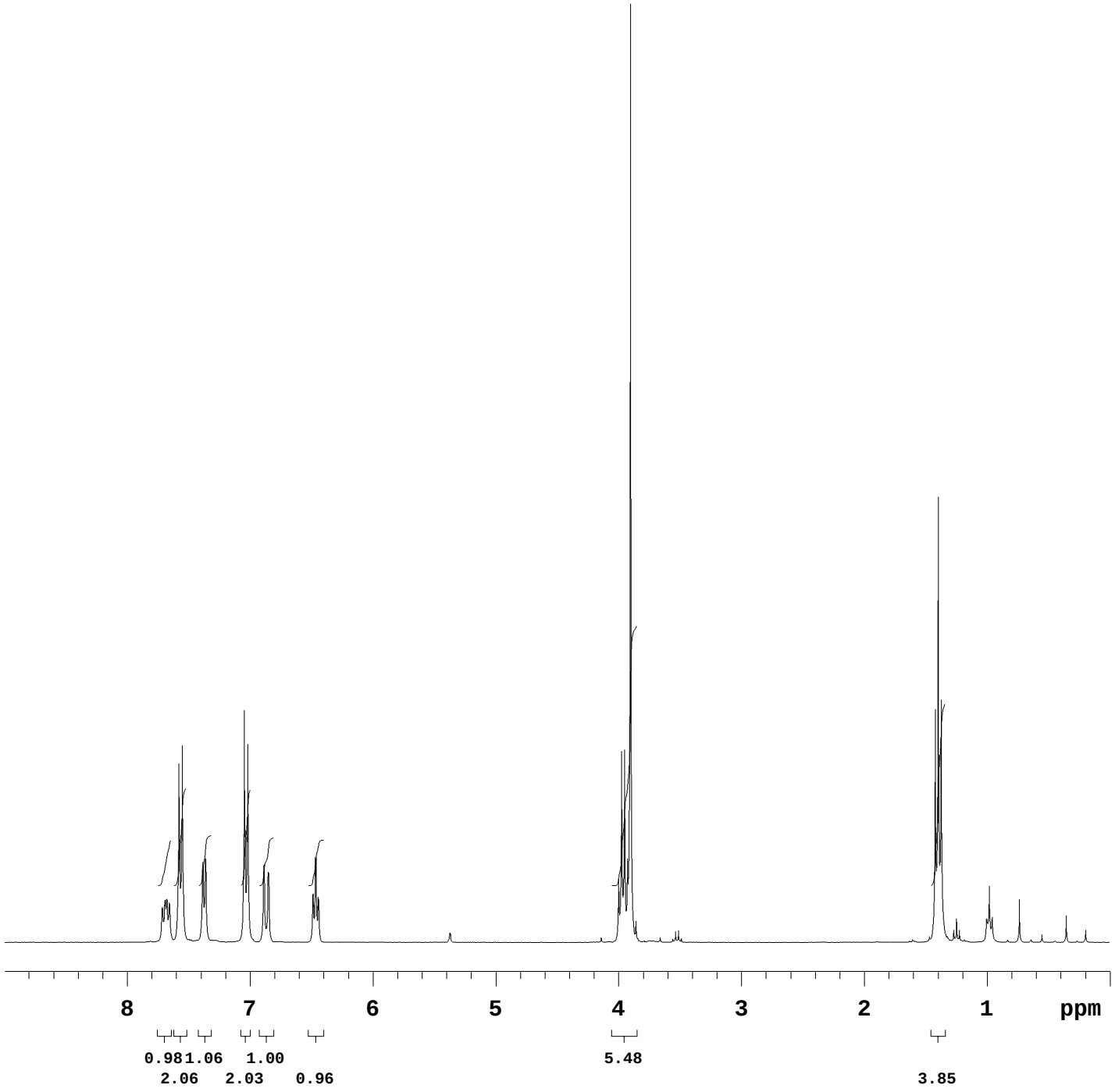
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-OMe_H_300
INOVA-500 "sunofnmr.uoregon.edu"

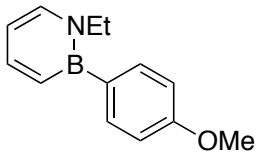
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4800.8 Hz
8 repetitions

OBSERVE H1, 300.0510060

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: | File: 4-OMe_H_300



2c

INDEX	FREQUENCY	PPM	HEIGHT
1	3437.5	35.708	159.0

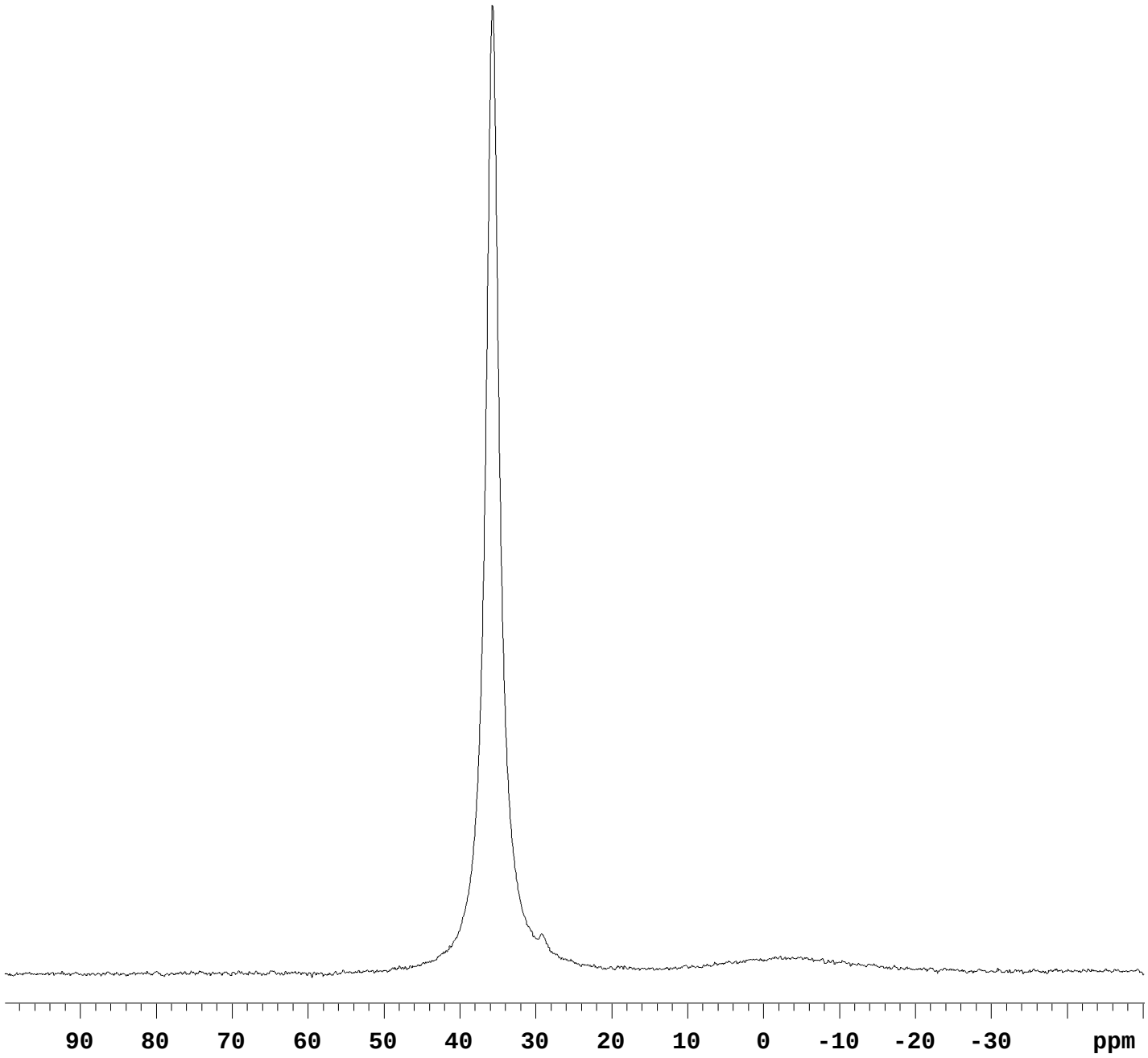
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-OMe_B
INOVA-500 "sunofnmr.uoregon.edu"

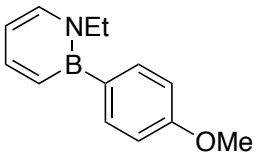
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
88 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

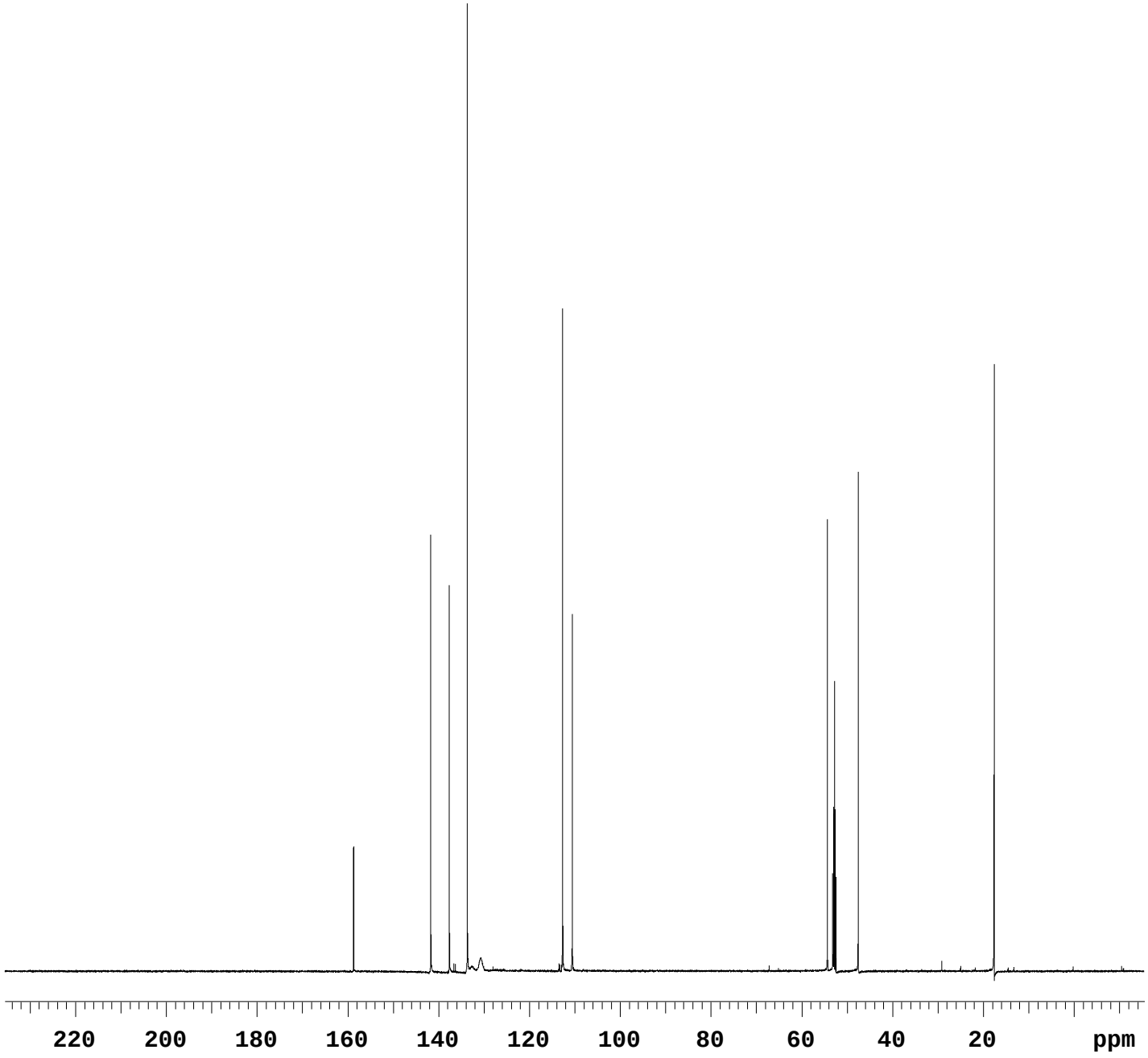


Archive dir: | File: 4-OMe_B

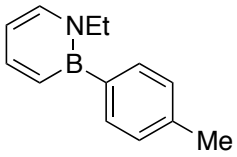


2c

```
STANDARD 1H OBSERVE -
profile

 Solvent: d2o
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-OMe_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 48 repetitions

OBSERVE  C13, 150.8650739
DECOUPLE  H1, 599.9829318
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 1 minutes
```

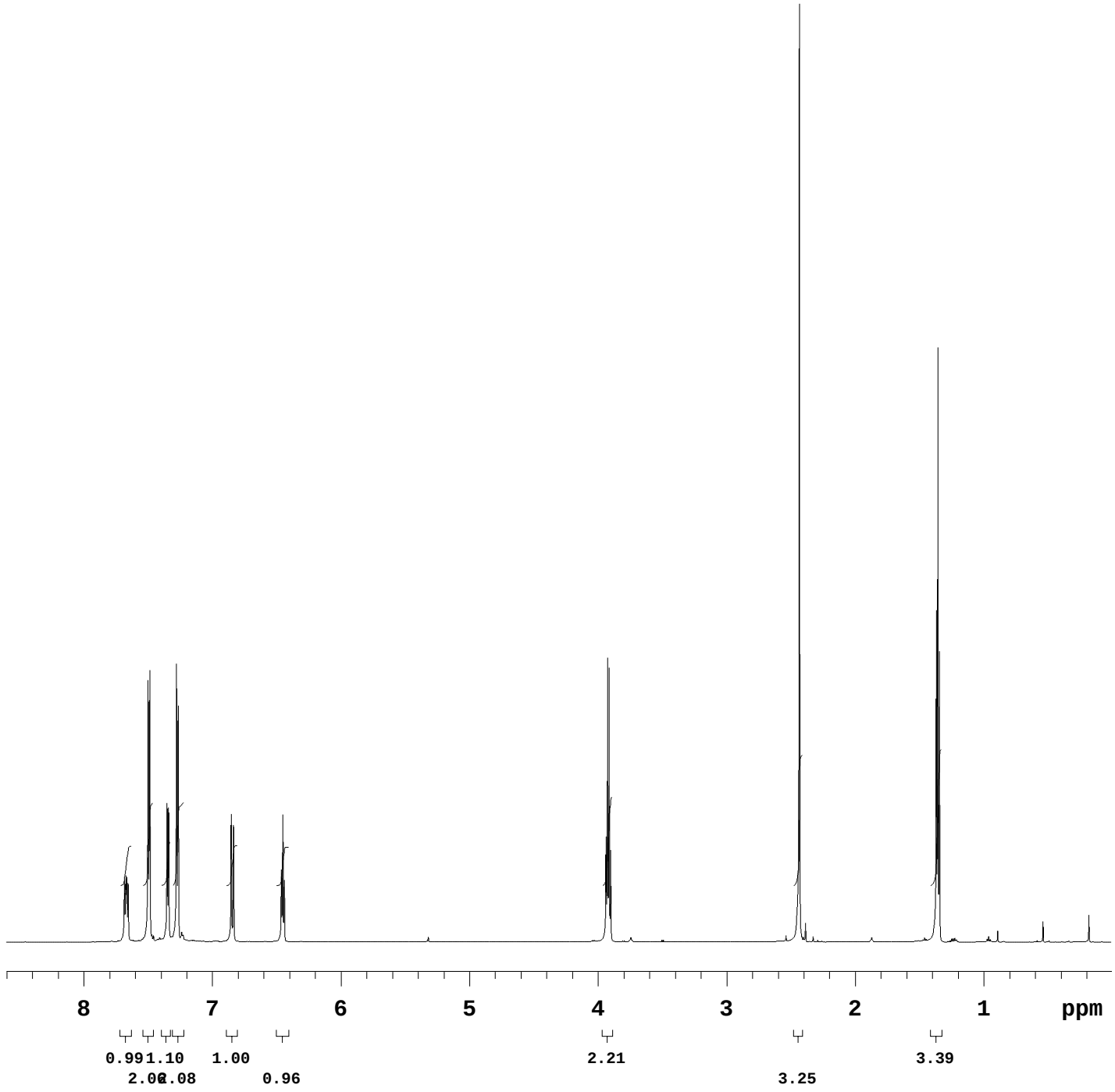


Archive dir: | File: 4-OMe_C

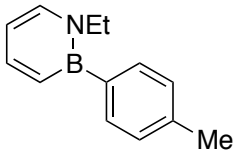


2d

```
STANDARD 1H OBSERVE -
profile

 Solvent: d2o
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-Me_H
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 3.000 sec
 Width 9615.4 Hz
 8 repetitions

OBSERVE   H1, 599.9795438

DATA PROCESSING
 FT size 65536
 Total time 1 minute
```

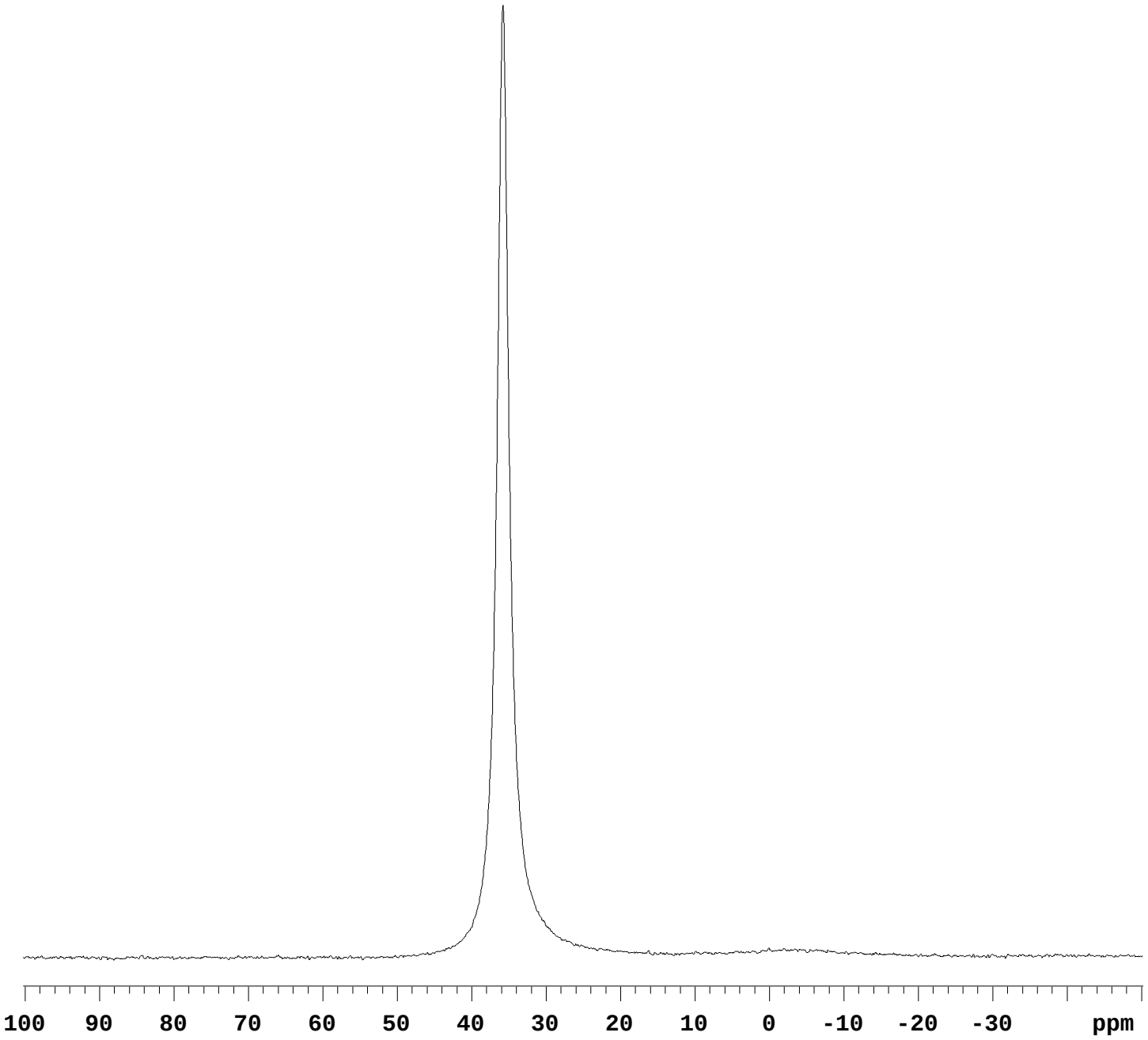


Archive dir: | File: 4-Me_H



2d

INDEX	FREQUENCY	PPM	HEIGHT
1	3442.4	35.759	159.0



UO Inova-300-North
Boron-11

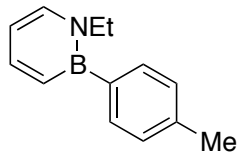
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-Me_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
80 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: 4-Me_B



2d

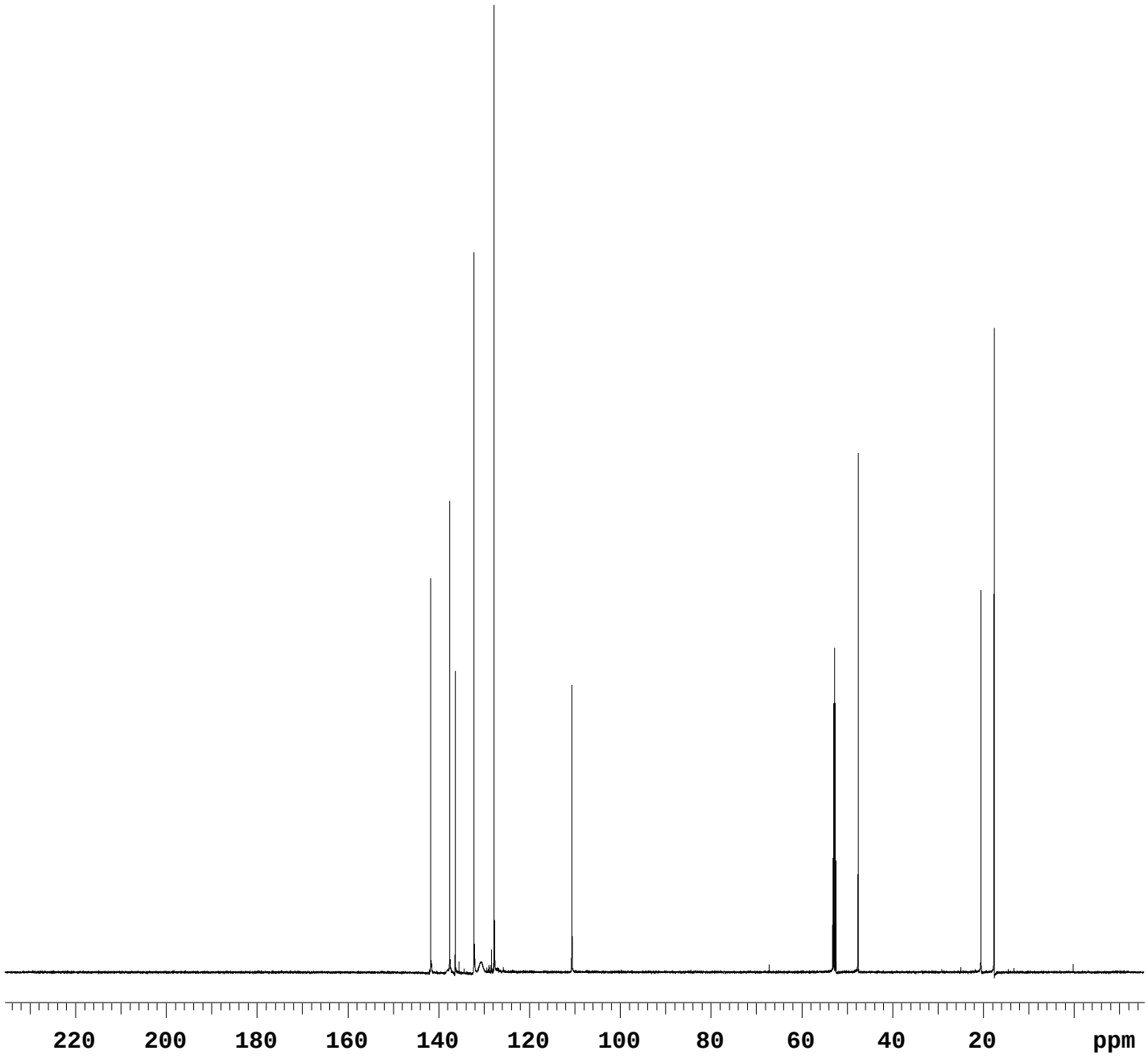
STANDARD 1H OBSERVE -
profile

Solvent: d2o
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-Me_C
VNMRS-500 "sunofnmr.uoregon.edu"

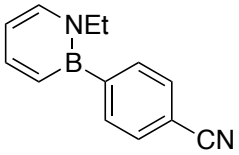
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
52 repetitions

OBSERVE C13, 150.8650739
DECOUPLE H1, 599.9829318
Power 41 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 minutes



Archive dir: | **File: 4-Me_C**



2e

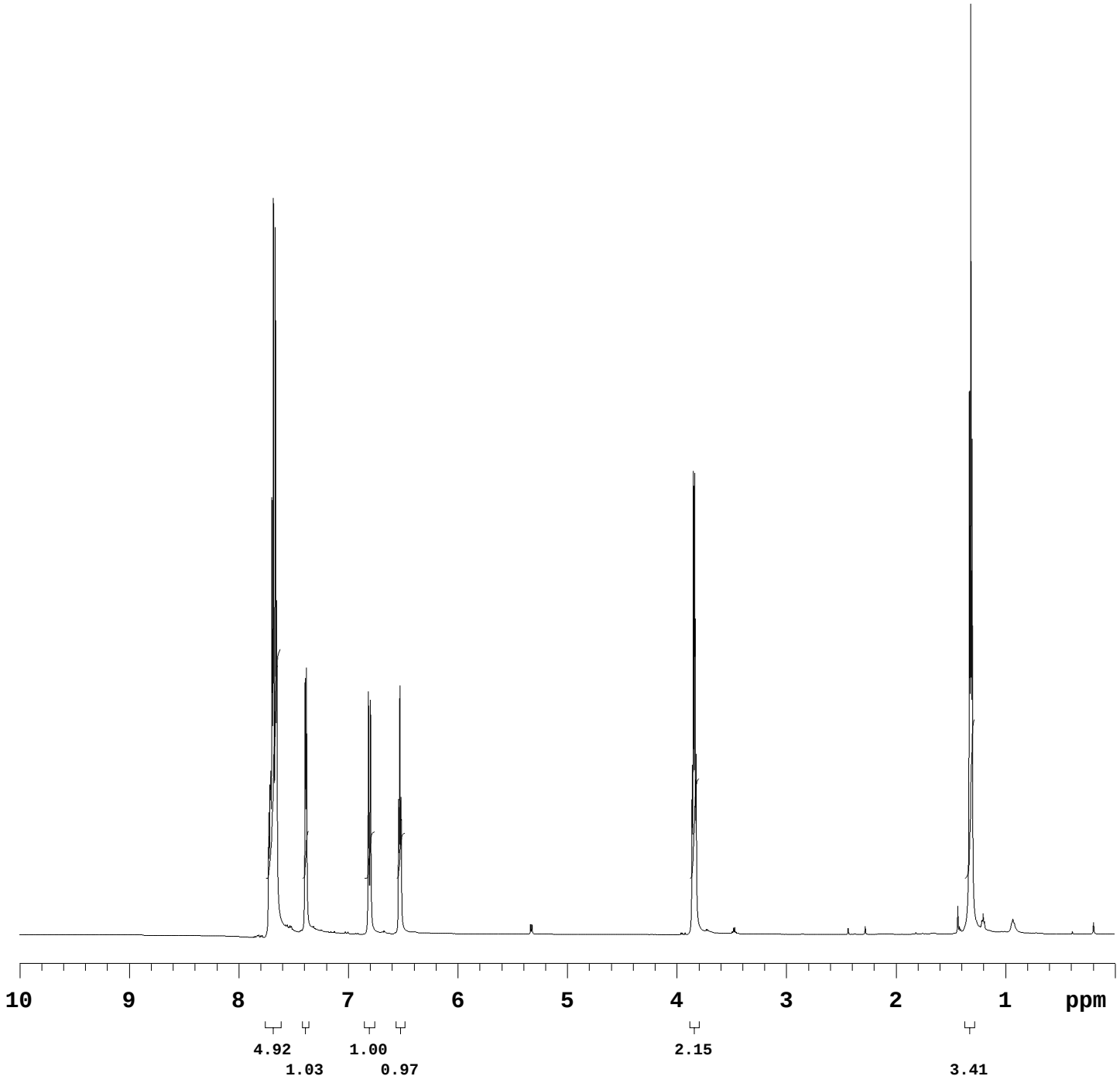
UO VNMRS-600
CH-ColdProbe 1H-observe

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CN_H
VNMRS-500 "sunofnmr.uoregon.edu"

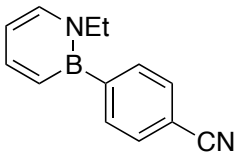
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 9615.4 Hz
8 repetitions

OBSERVE H1, 599.9795419

DATA PROCESSING
FT size 65536
Total time 1 minute



Archive dir: File: 4-CN_H



2e

INDEX	FREQUENCY	PPM	HEIGHT
1	3379.0	35.099	159.0

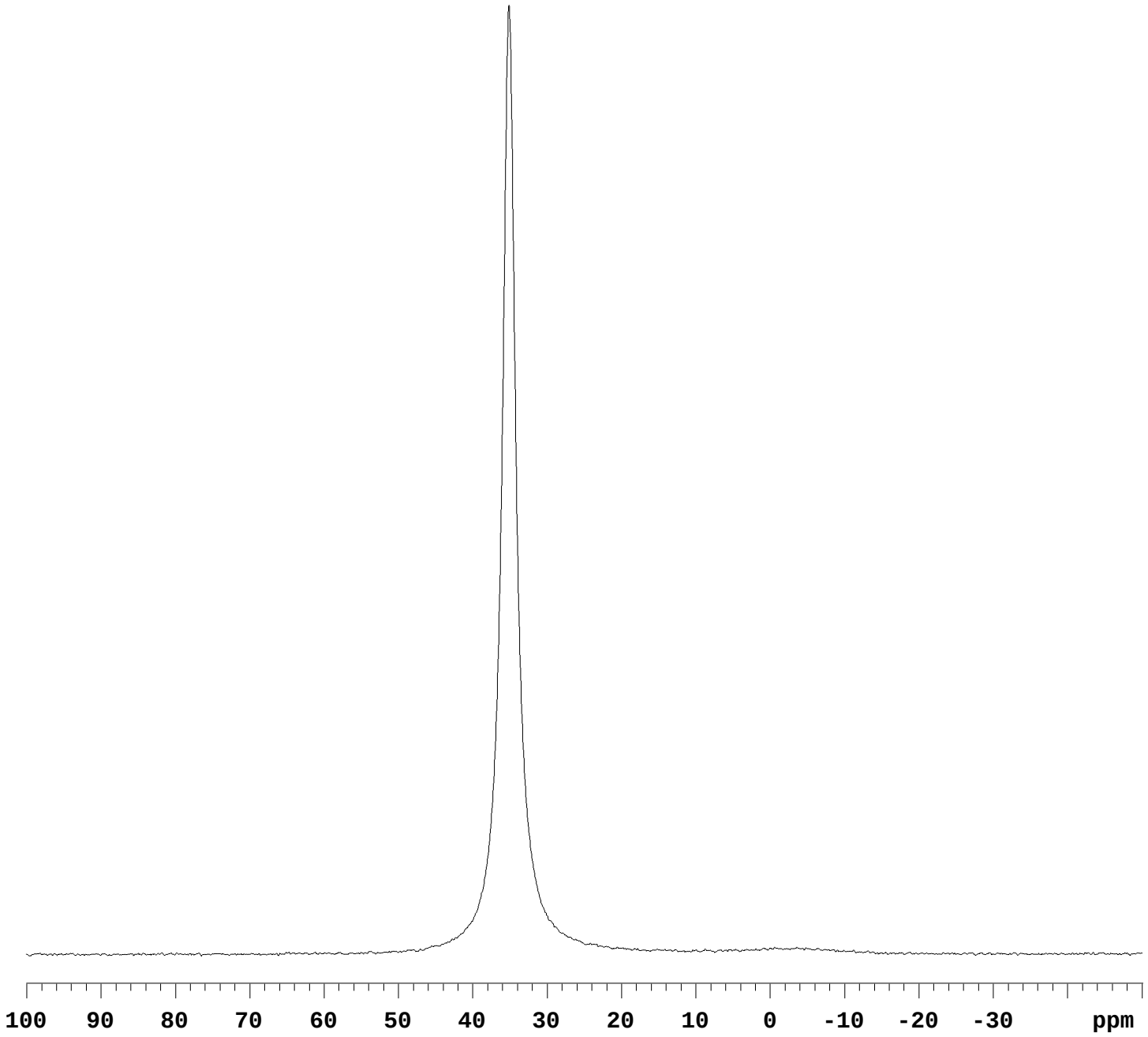
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CN_B
INOVA-500 "sunofnmr.uoregon.edu"

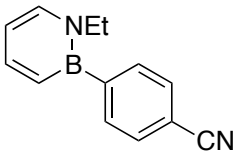
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
80 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute



Archive dir: | File: 4-CN_B



2e

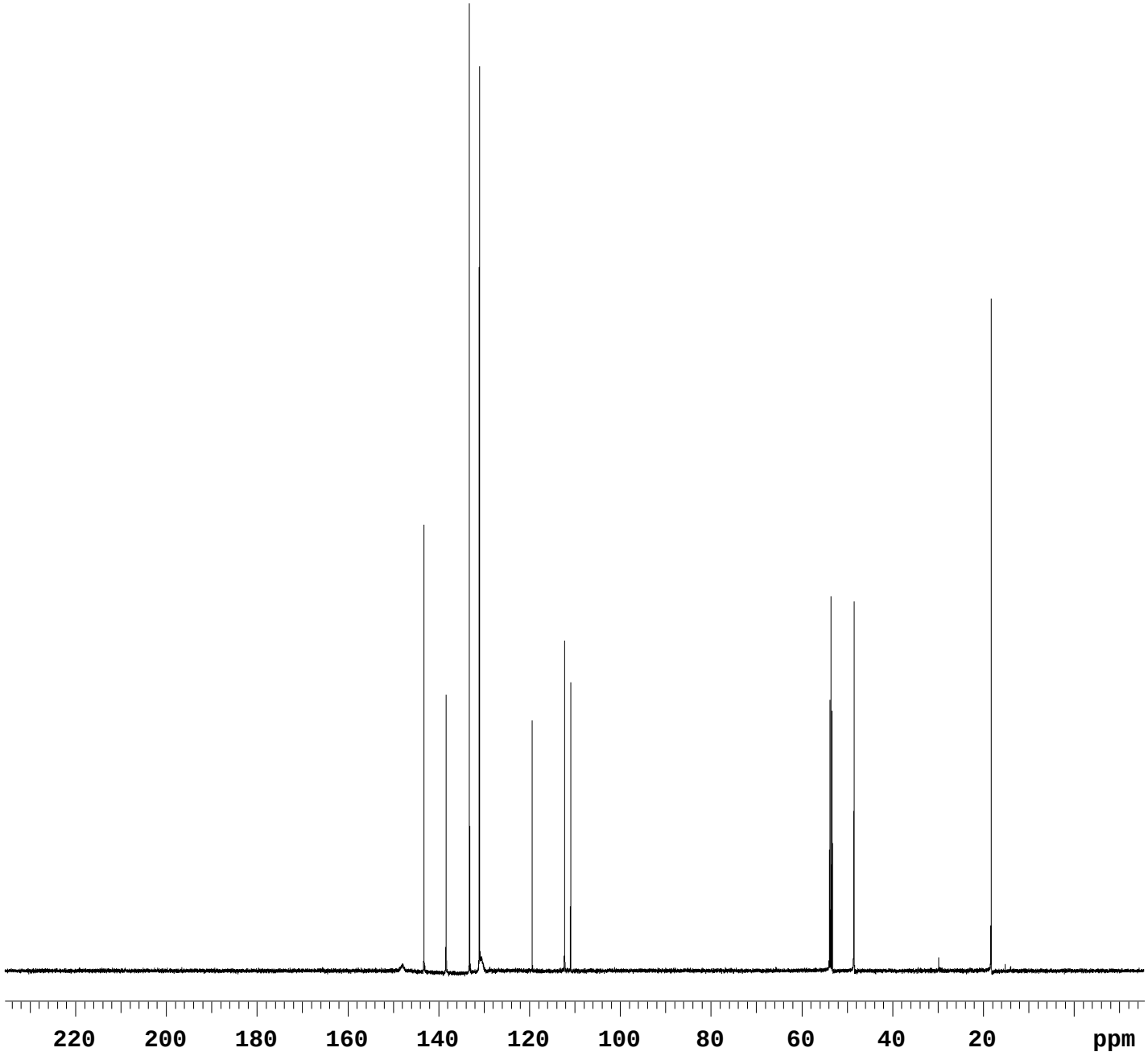
UO VNMRS-600
CH-ColdProbe 1H-observe

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CN_C
VNMRS-500 "sunofnmr.uoregon.edu"

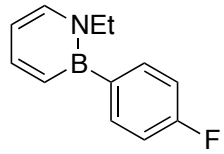
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
40 repetitions

OBSERVE C13, 150.8649758
DECOUPLE H1, 599.9825418
Power 41 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 minute



Archive dir: File: 4-CN_C



2f

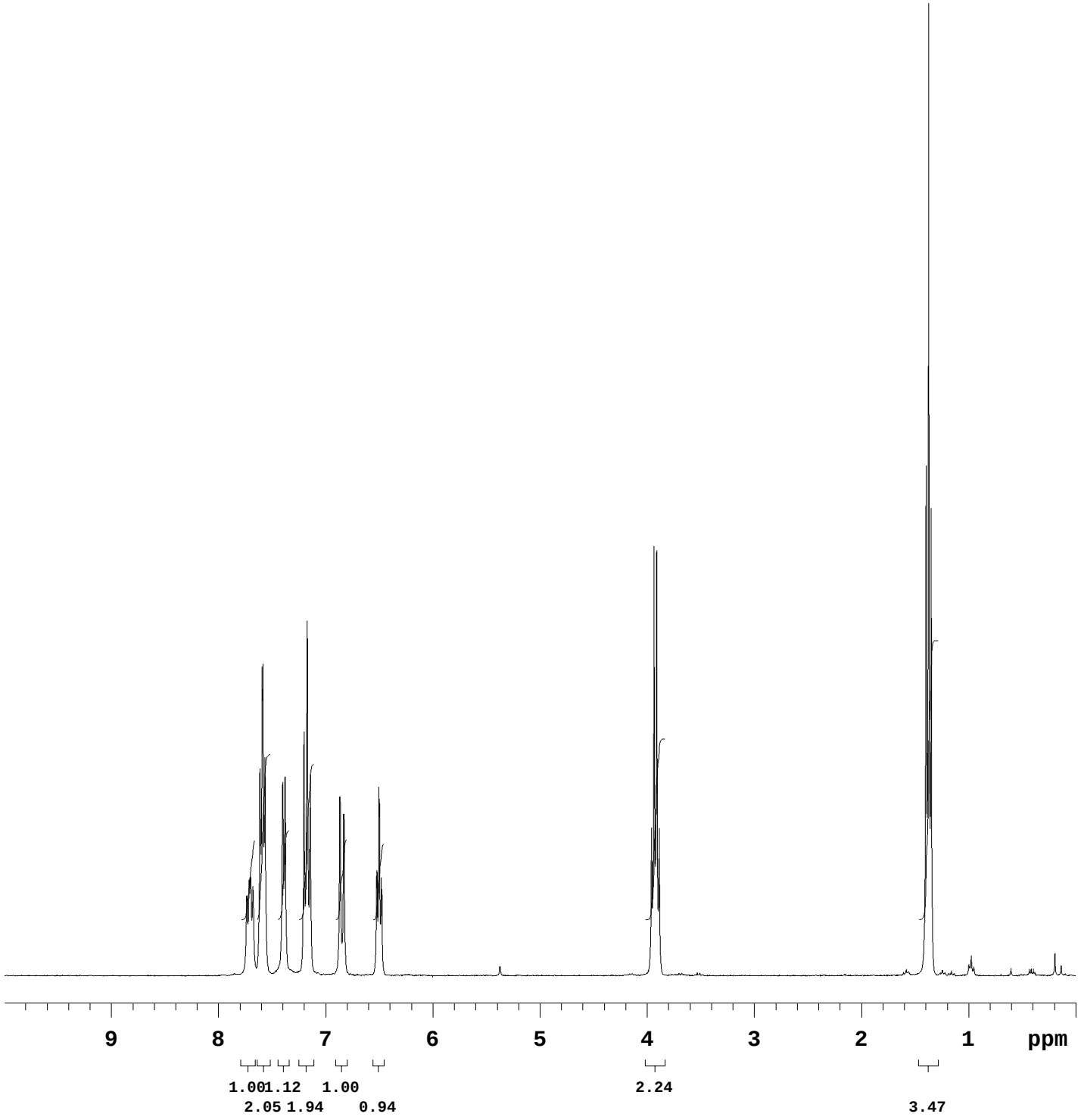
UO Inova-300-North
Fluorine-19

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-fluoro_H_300
INOVA-500 "sunofnmr.uoregon.edu"

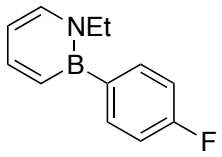
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4800.8 Hz
8 repetitions

OBSERVE H1, 300.0510060

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: File: 4-fluoro_H_300



2f

INDEX	FREQUENCY	PPM	HEIGHT
1	3413.1	35.454	159.0

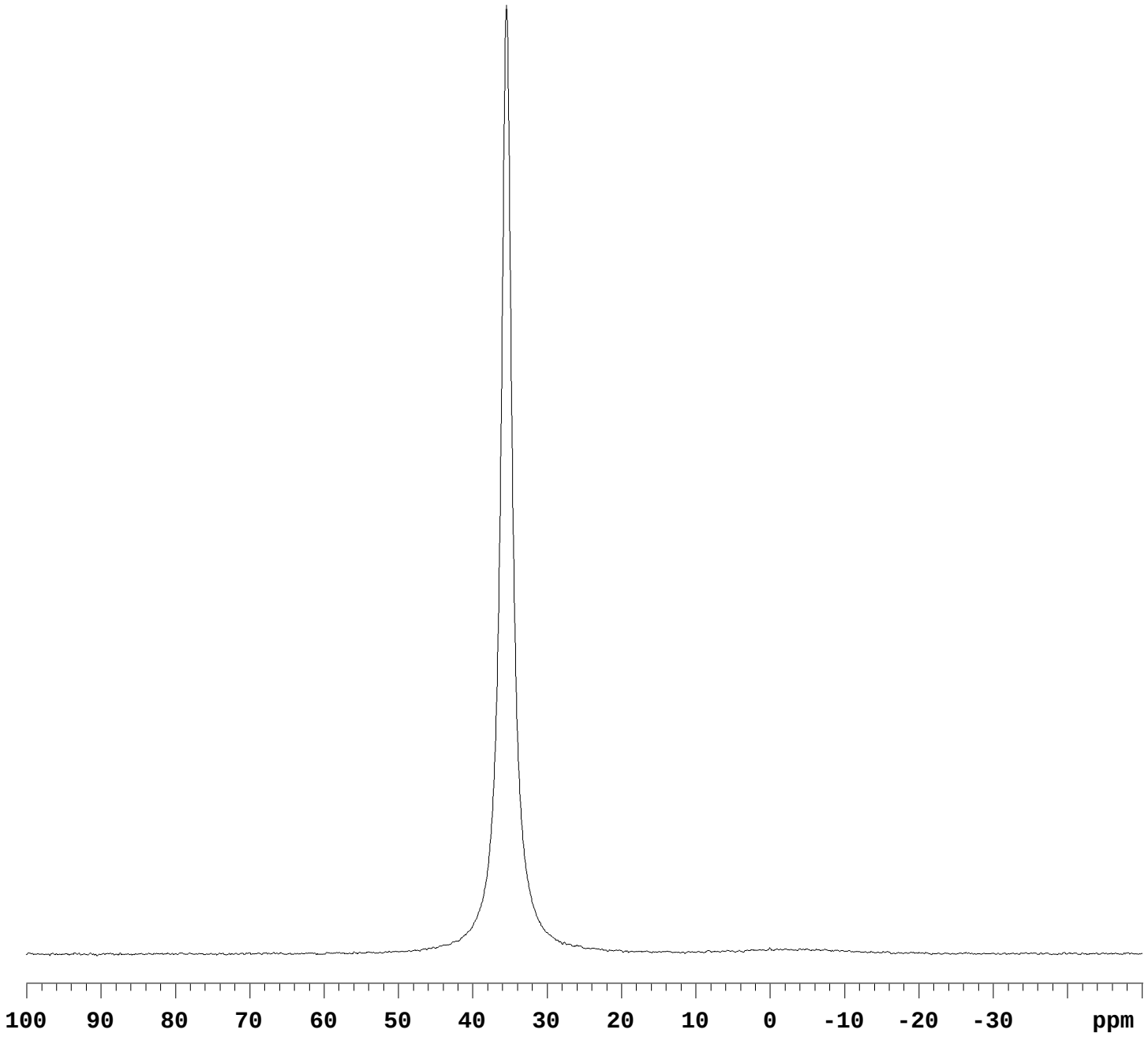
UO Inova-300-North
Boron-11

Solvent: cdcl3
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-fluoro_B
INOVA-500 "sunofnmr.uoregon.edu"

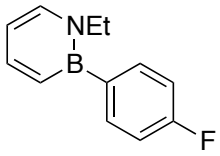
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
96 repetitions

OBSERVE B11, 96.2681019

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

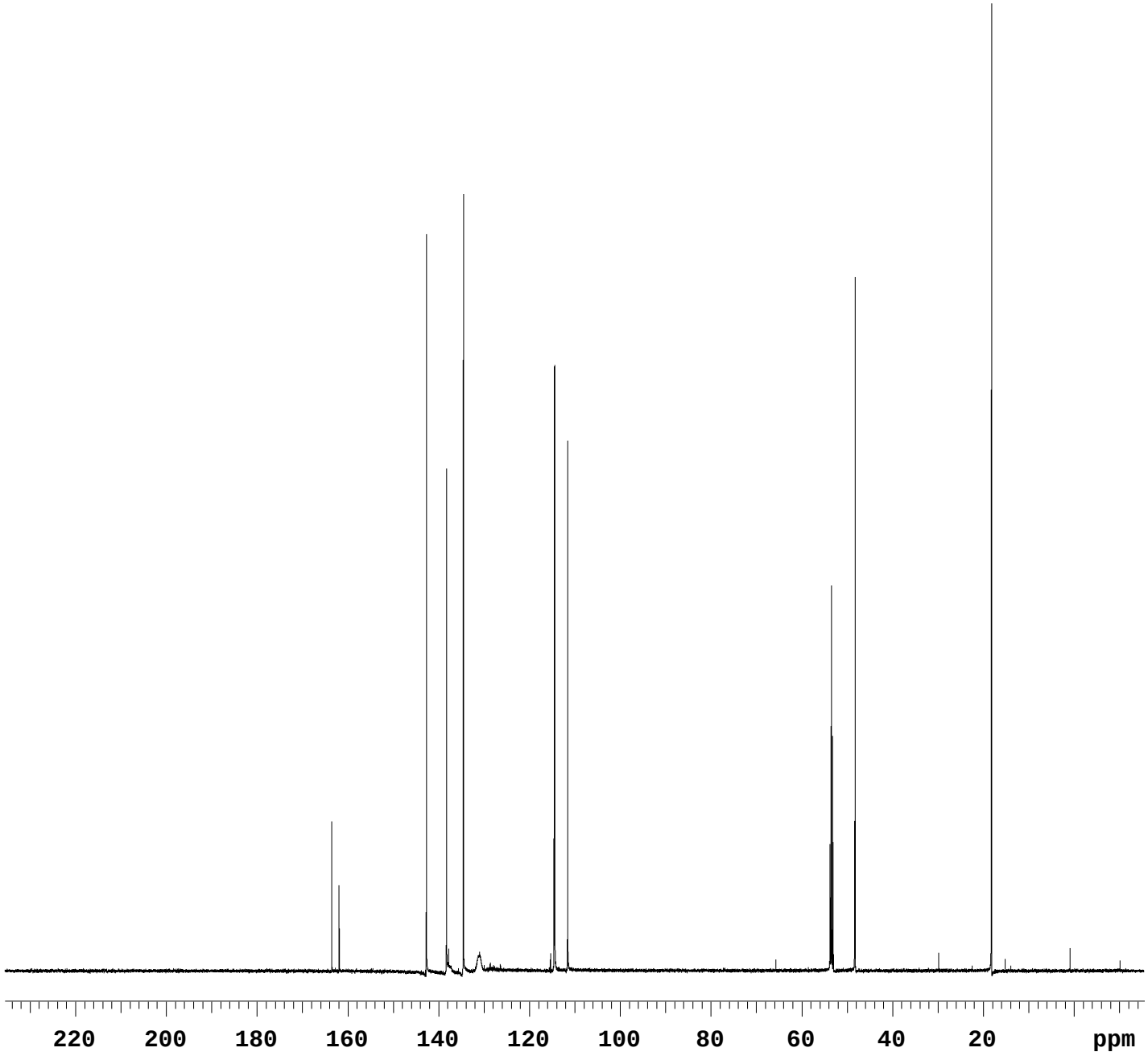


Archive dir: File: 4-fluoro_B

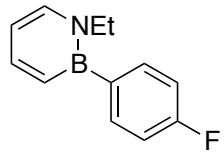


2f

```
UO VNMRS-600
_CH-ColdProbe_ 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-fluoro_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 40 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 1 minute
```



Archive dir: | File: 4-fluoro_C



2f

INDEX	FREQUENCY	PPM	HEIGHT
1	-32634.4	-115.589	41.9
2	-32640.5	-115.611	91.9
3	-32643.5	-115.622	105.1
4	-32650.4	-115.646	167.4
5	-32656.5	-115.668	109.1
6	-32659.5	-115.679	99.5
7	-32665.6	-115.700	46.4

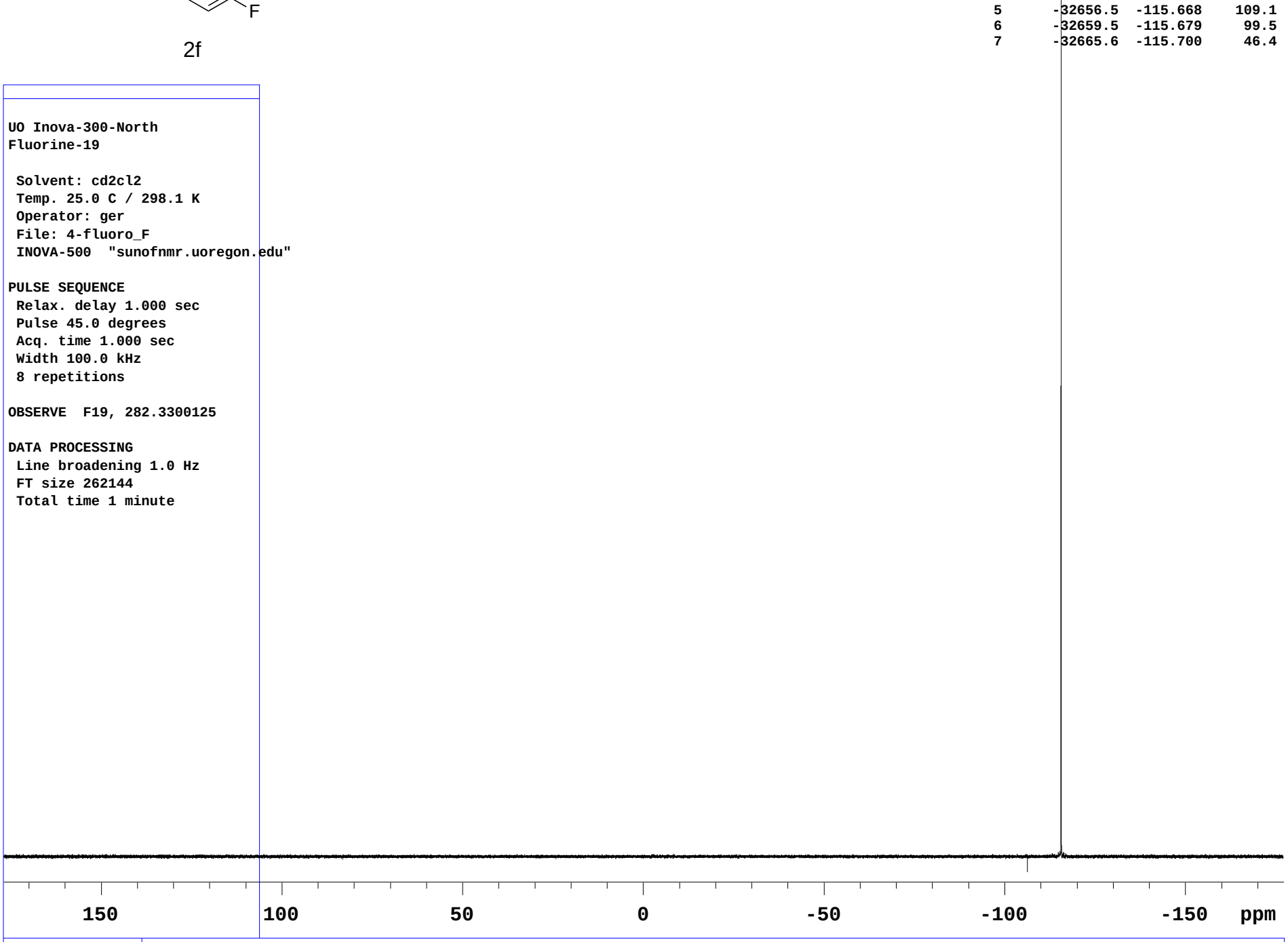
UO Inova-300-North
Fluorine-19

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-fluoro_F
INOVA-500 "sunofnmr.uoregon.edu"

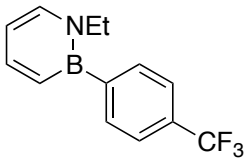
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 100.0 kHz
8 repetitions

OBSERVE F19, 282.3300125

DATA PROCESSING
Line broadening 1.0 Hz
FT size 262144
Total time 1 minute



Archive dir: File: 4-fluoro_F



2g

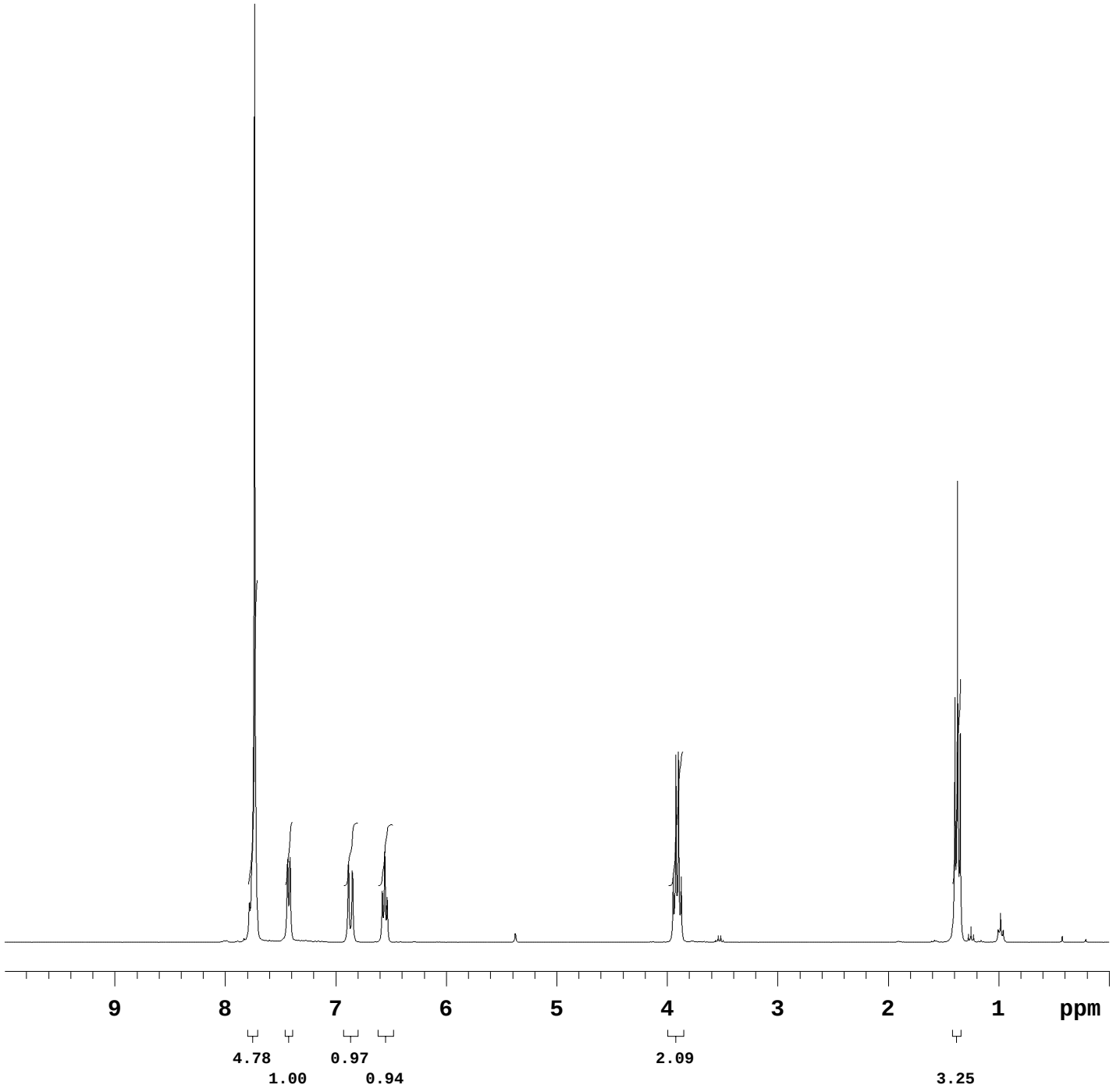
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CF3_H_300
INOVA-500 "sunofnmr.uoregon.edu"

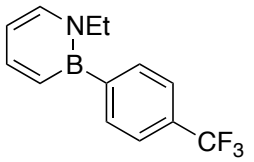
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4800.8 Hz
8 repetitions

OBSERVE H1, 300.0510060

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: File: 4-CF3_H_300



2g

INDEX	FREQUENCY	PPM	HEIGHT
1	3413.1	35.454	159.0

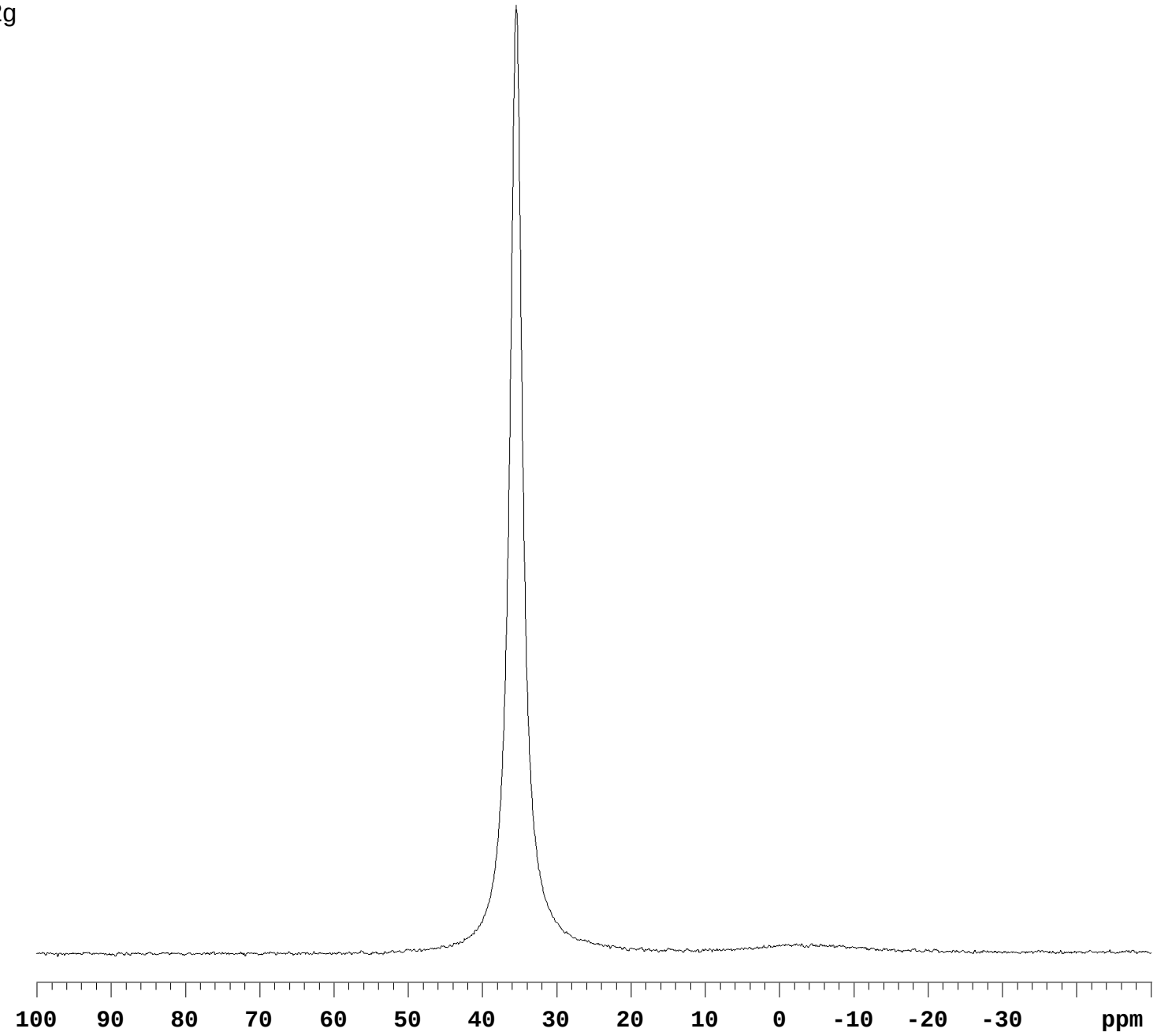
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CF3_B
INOVA-500 "sunofnmr.uoregon.edu"

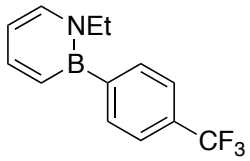
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
80 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

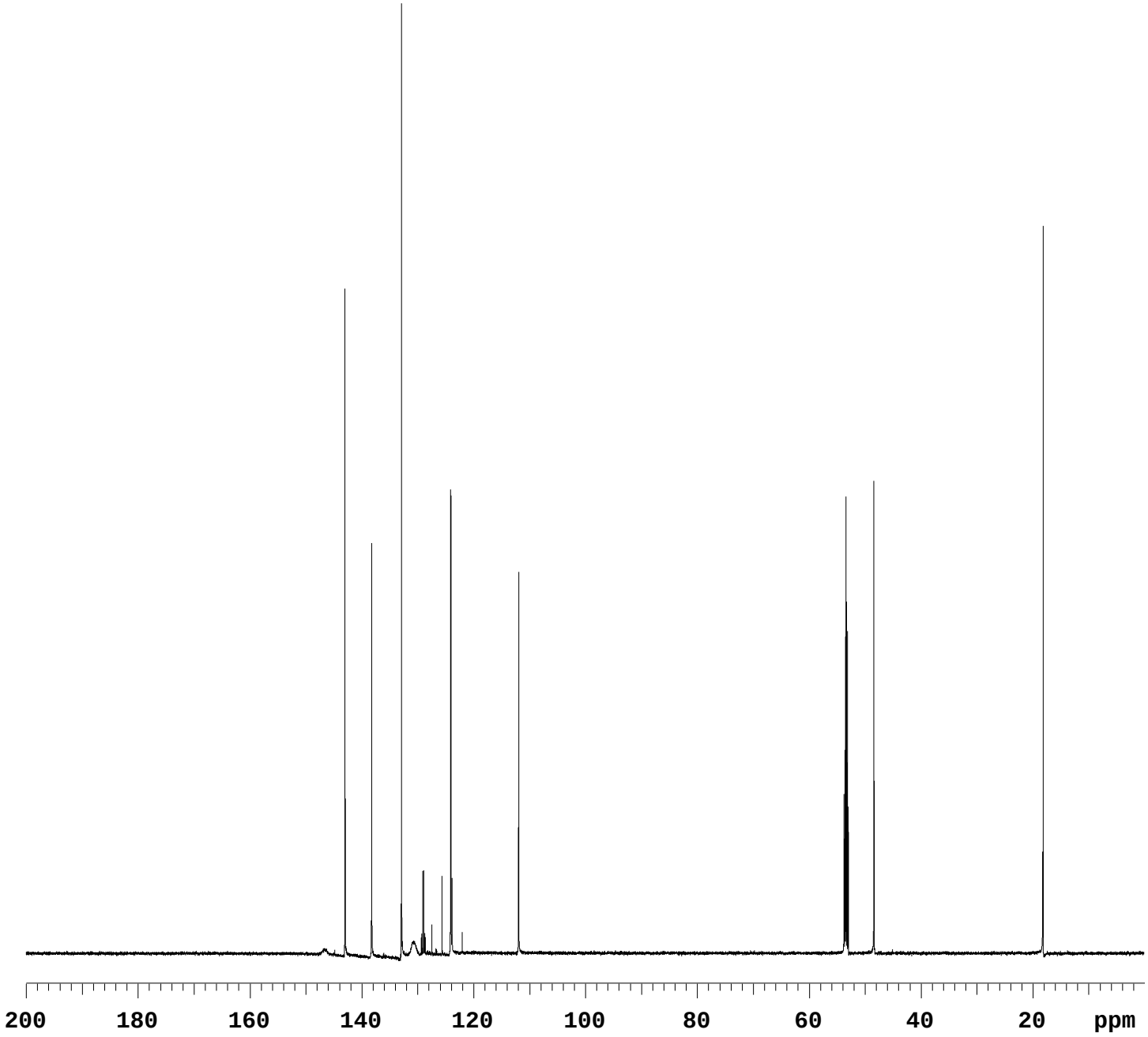


Archive dir: | File: 4-CF3_B

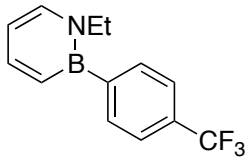


2g

```
UO VNMRS-600
_CH-ColdProbe_ 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-CF3_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 56 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 1 minutes
```

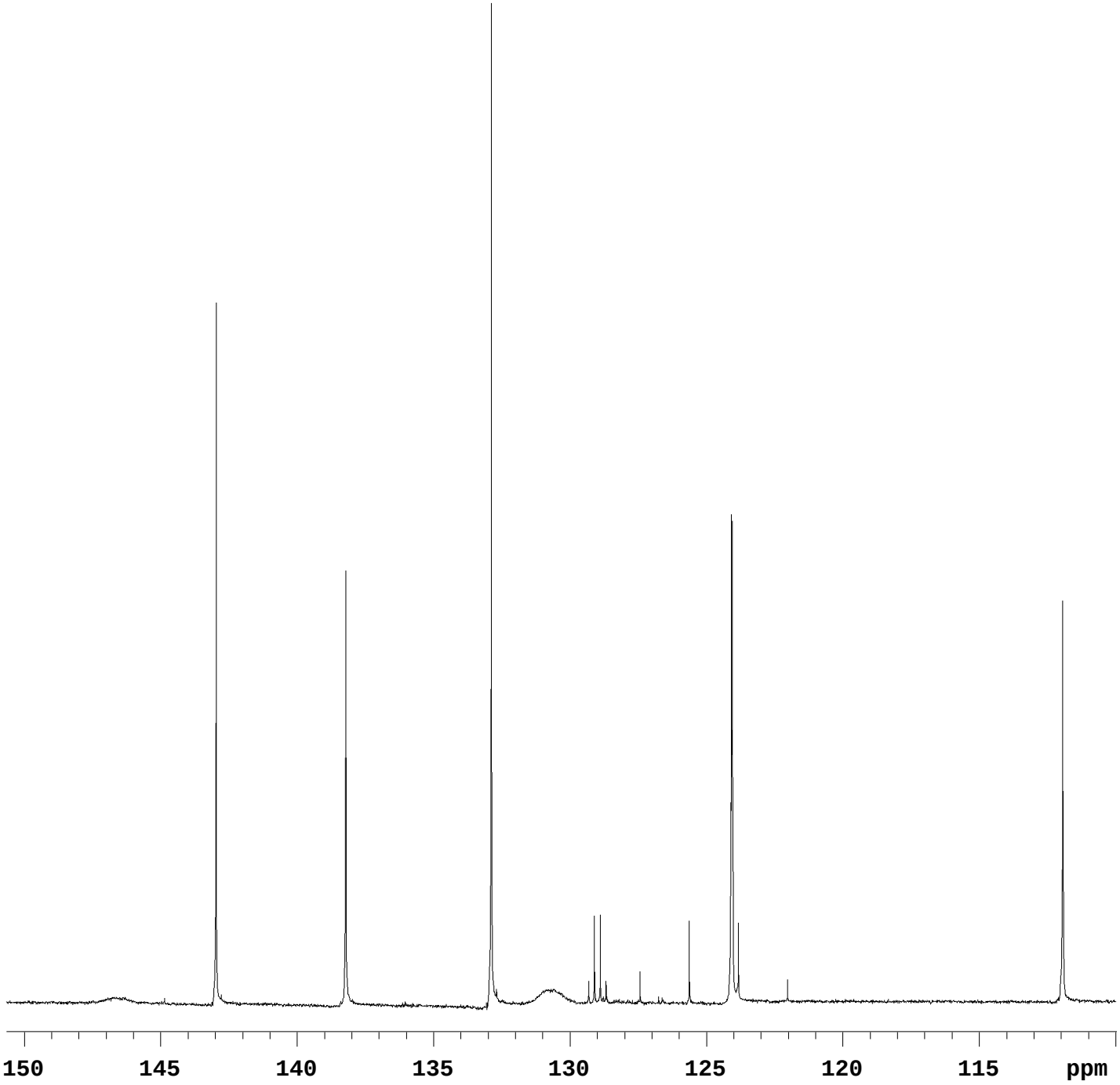


Archive dir: | File: 4-CF3_C

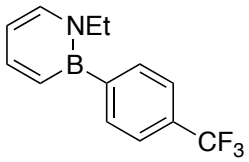


2g

```
UO VNMRS-600
_CH-ColdProbe_ 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-CF3_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 56 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 1 minutes
```



Archive dir:	File: 4-CF3_C



2g

INDEX	FREQUENCY	PPM	HEIGHT
1	-17716.6	-62.751	167.4

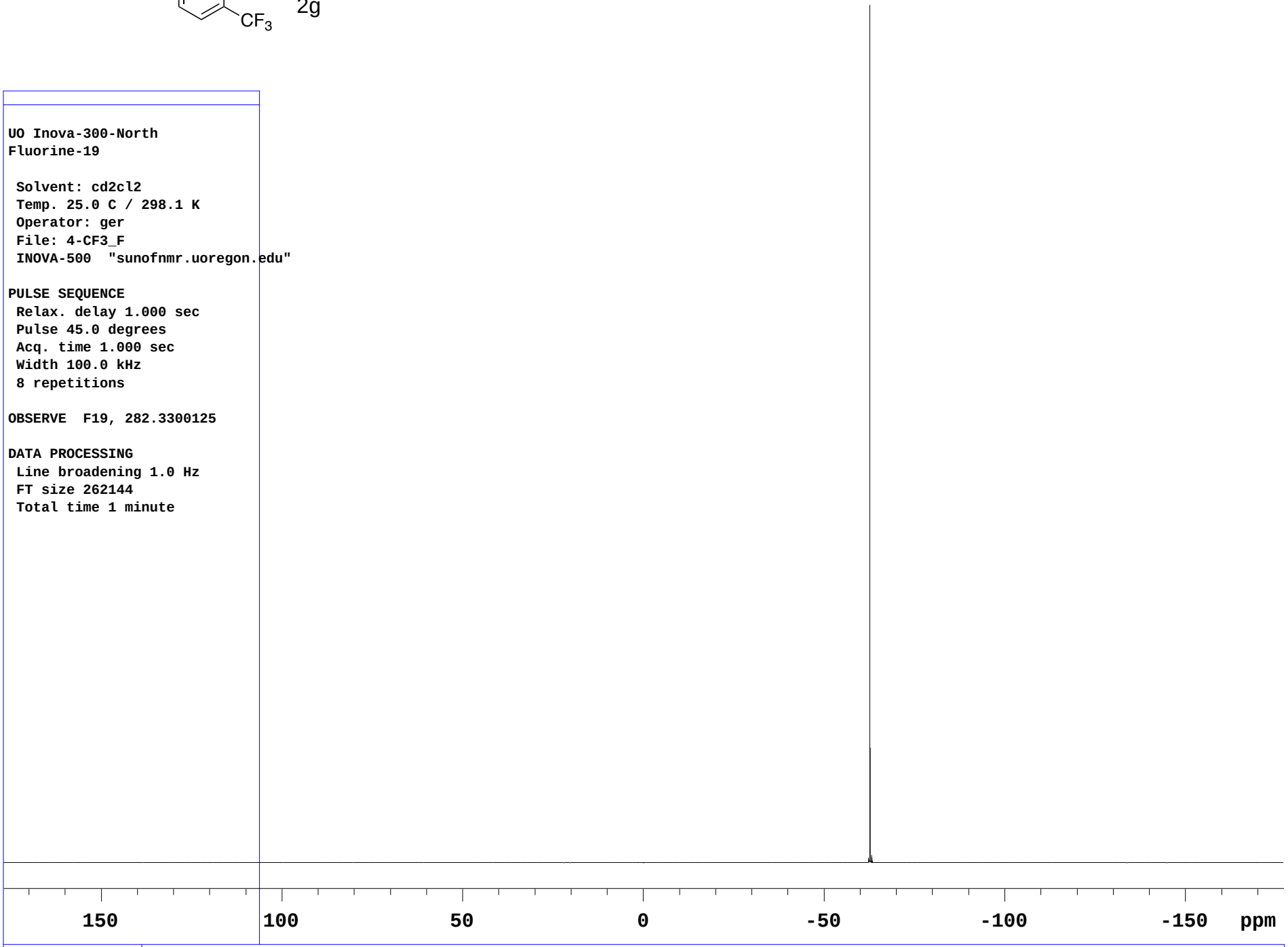
UO Inova-300-North
Fluorine-19

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CF3_F
INOVA-500 "sunofnmr.uoregon.edu"

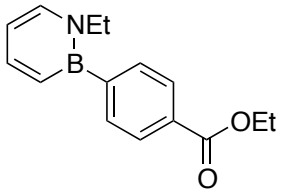
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 100.0 kHz
8 repetitions

OBSERVE F19, 282.3300125

DATA PROCESSING
Line broadening 1.0 Hz
FT size 262144
Total time 1 minute

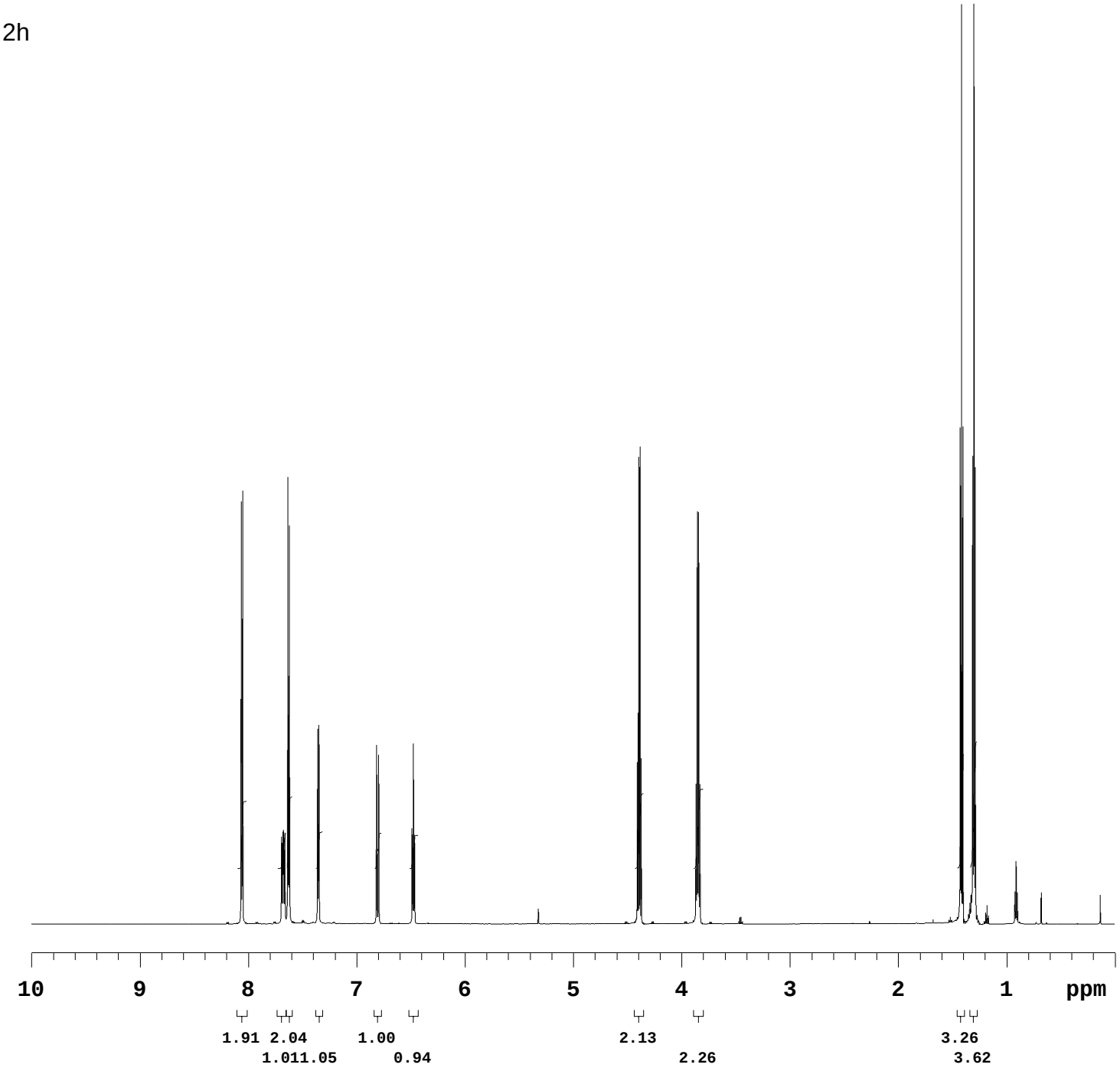


Archive dir: File: 4-CF3_F

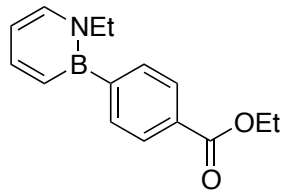


2h

```
UO VNMRS-600
{CH-ColdProbe} 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-CO2Et_H
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 3.000 sec
 Width 9615.4 Hz
 8 repetitions

OBSERVE   H1, 599.9795419

DATA PROCESSING
 FT size 65536
 Total time 1 minute
```



Archive dir:	File: 4-CO2Et_H



2h

INDEX	FREQUENCY	PPM	HEIGHT
1	3398.5	35.302	159.0

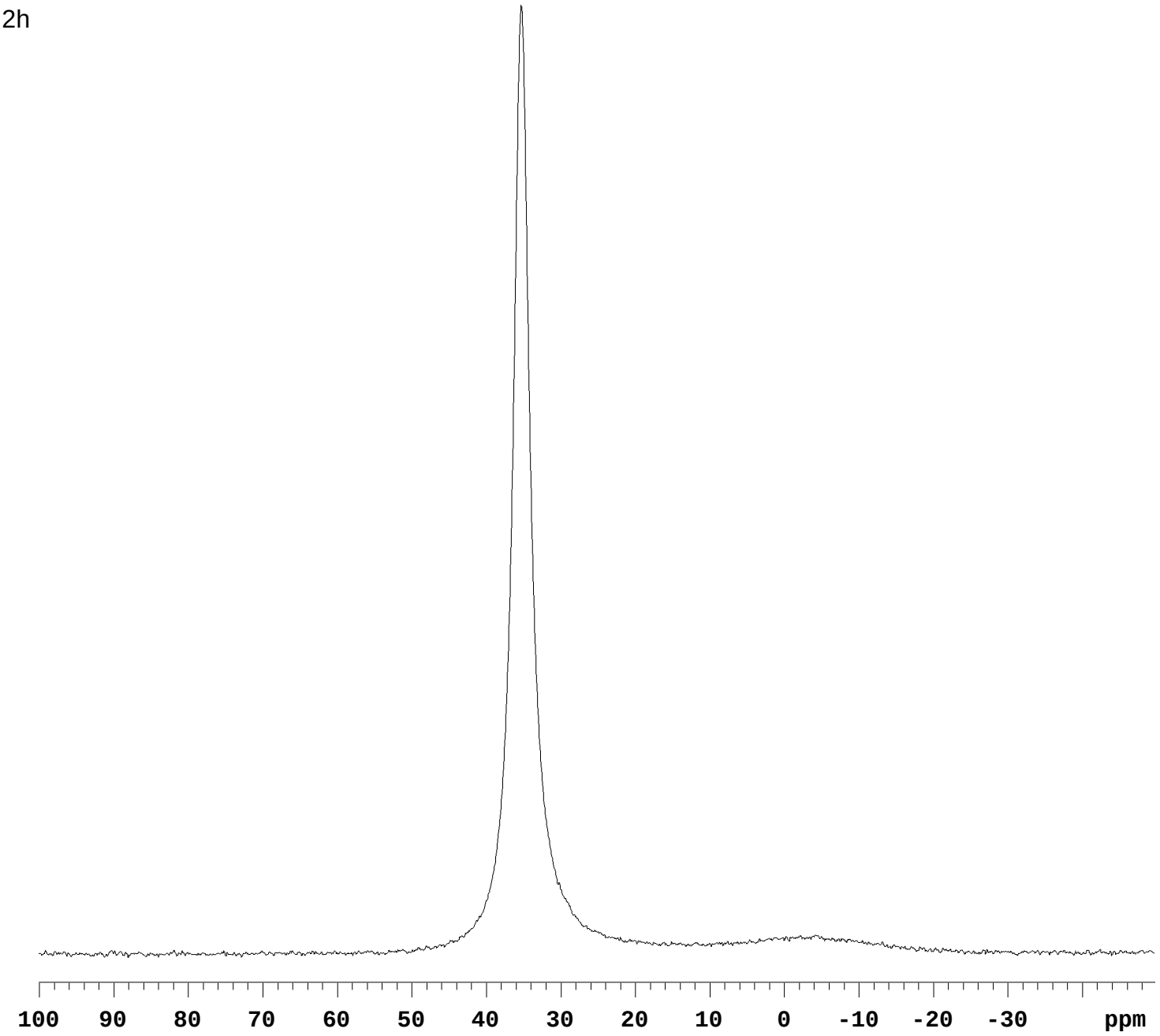
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CO2Et_B
INOVA-500 "sunofnmr.uoregon.edu"

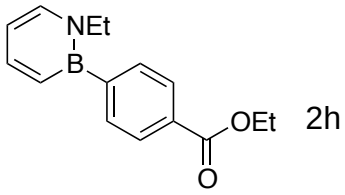
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
96 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute



Archive dir: | File: 4-CO2Et_B



2h

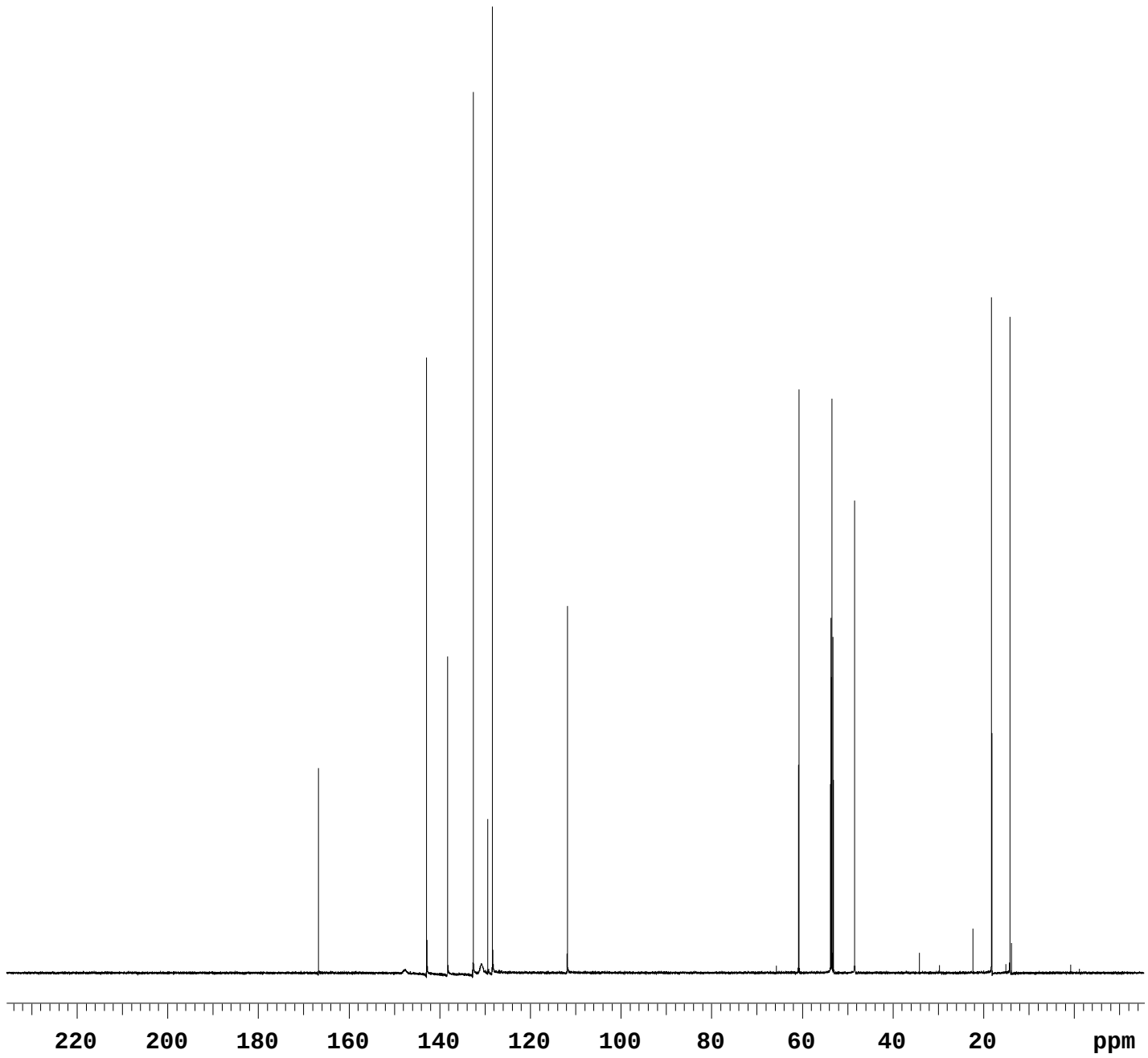
UO VNMRS-600
CH-ColdProbe 1H-observe

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-CO2Et_C
VNMRS-500 "sunofnmr.uoregon.edu"

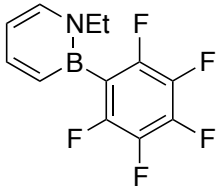
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
52 repetitions

OBSERVE C13, 150.8649758
DECOUPLE H1, 599.9825418
Power 41 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 minutes

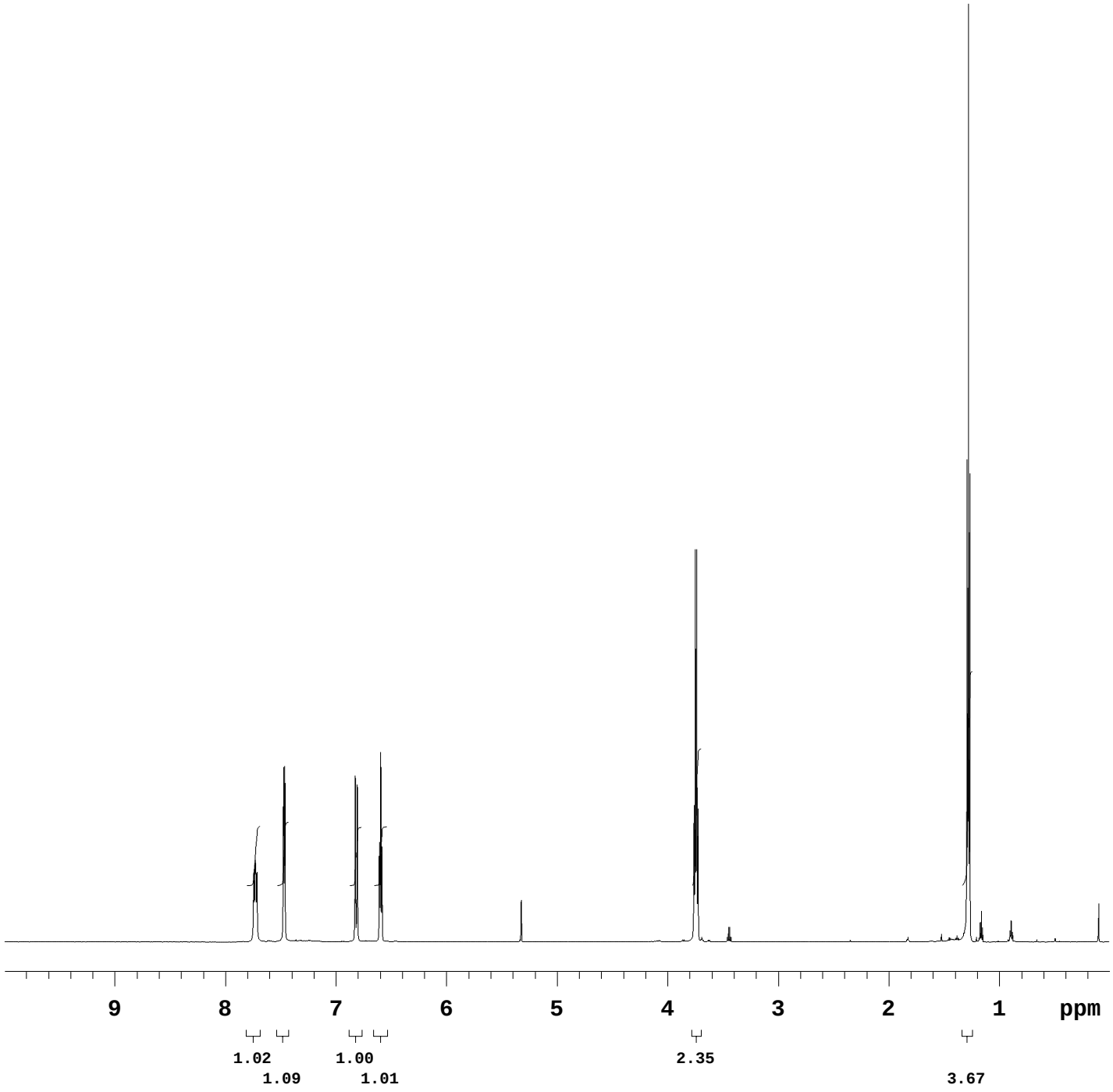


Archive dir: File: 4-CO2Et_C

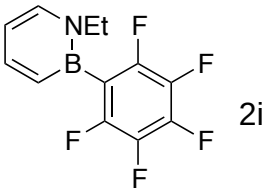


2i

```
UO VNMRS-600
{CH-ColdProbe} 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C6F5_H
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 3.000 sec
 Width 9615.4 Hz
 8 repetitions

OBSERVE   H1, 599.9795419

DATA PROCESSING
 FT size 65536
 Total time 1 minute
```

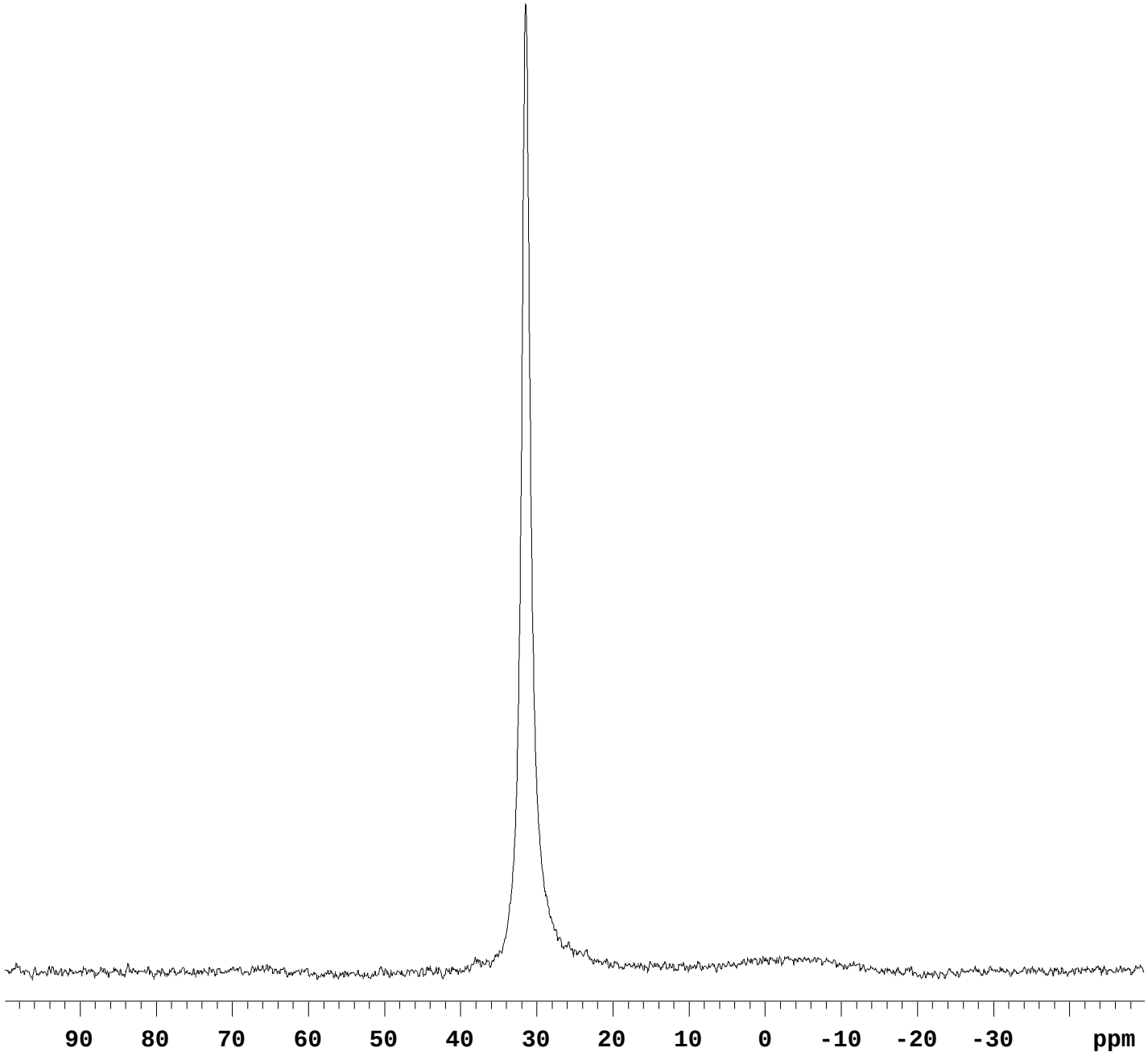


Archive dir: | File: C6F5_H



2i

INDEX	FREQUENCY	PPM	HEIGHT
1	3027.4	31.447	159.0



UO Inova-300-North
Boron-11

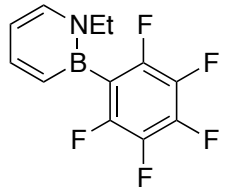
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: C6F5_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
24 repetitions

OBSERVE B11, 96.2682868

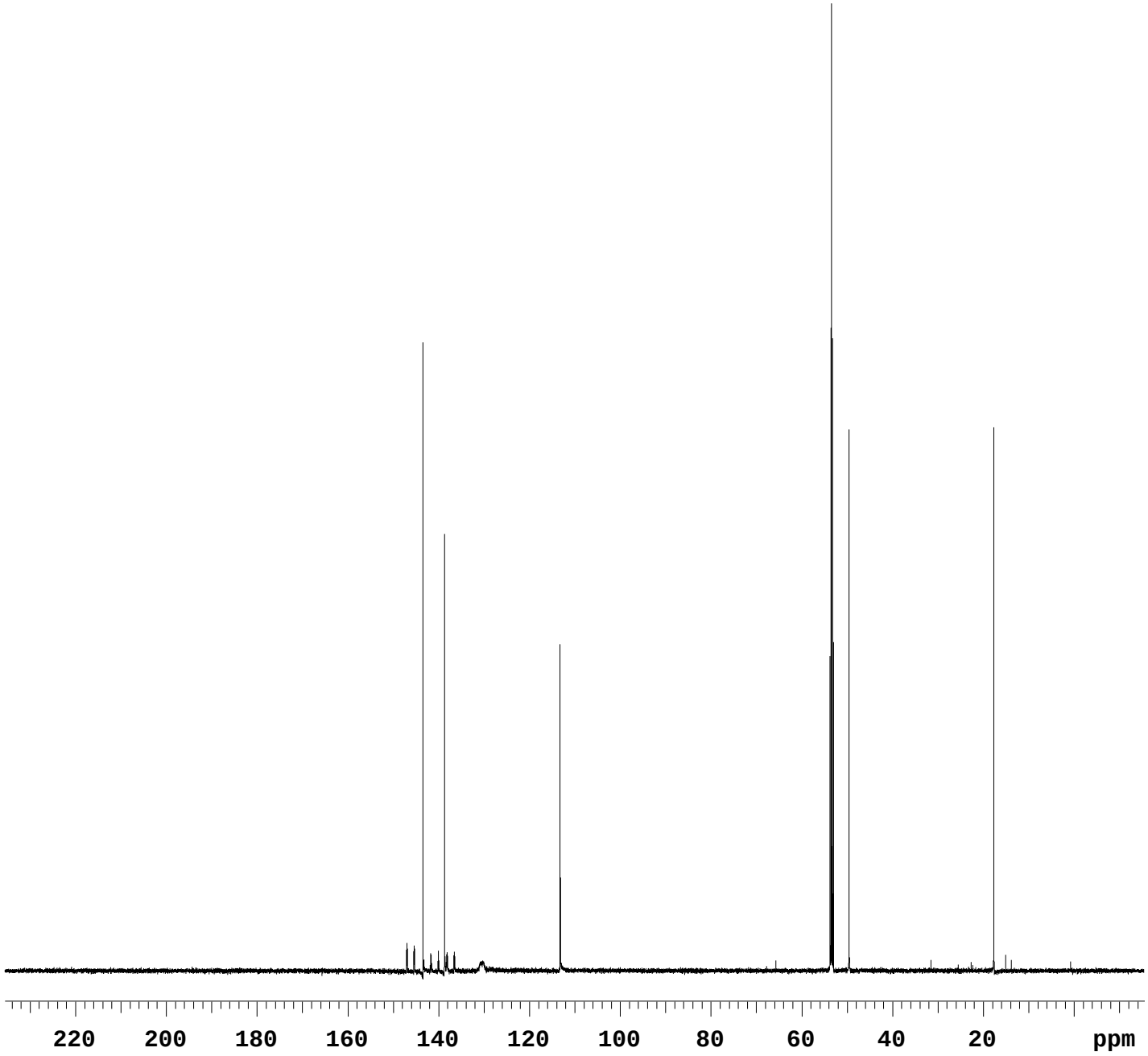
DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: C6F5_B

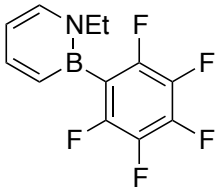


2i

```
UO VNMRS-600
_CH-ColdProbe_ 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C6F5_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 80 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 2 minutes
```

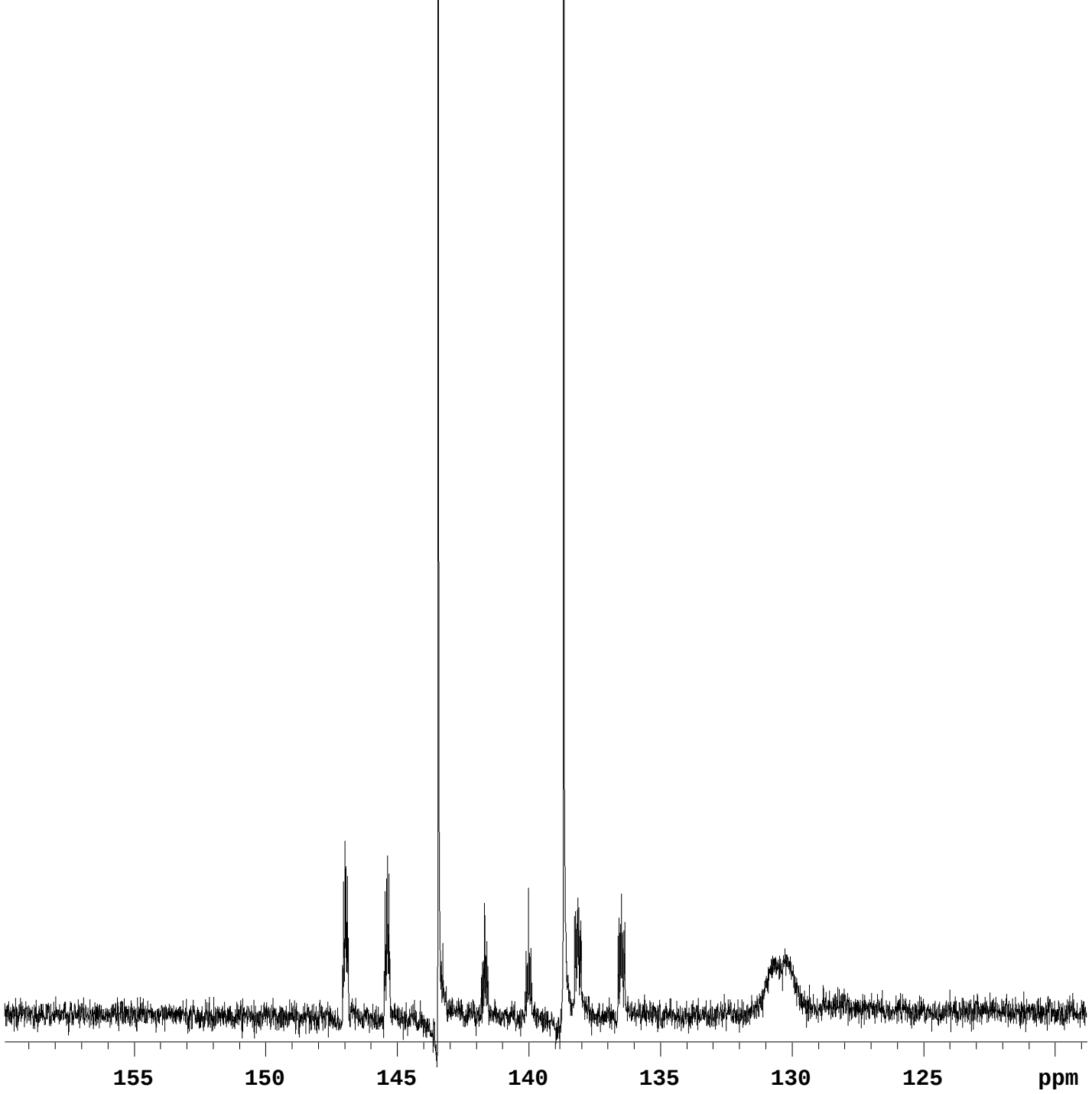


Archive dir: | File: C6F5_C

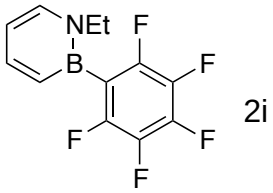


2i

```
UO VNMRS-600
_CH-ColdProbe_ 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C6F5_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 80 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 2 minutes
```



Archive dir: | File: C6F5_C



2i

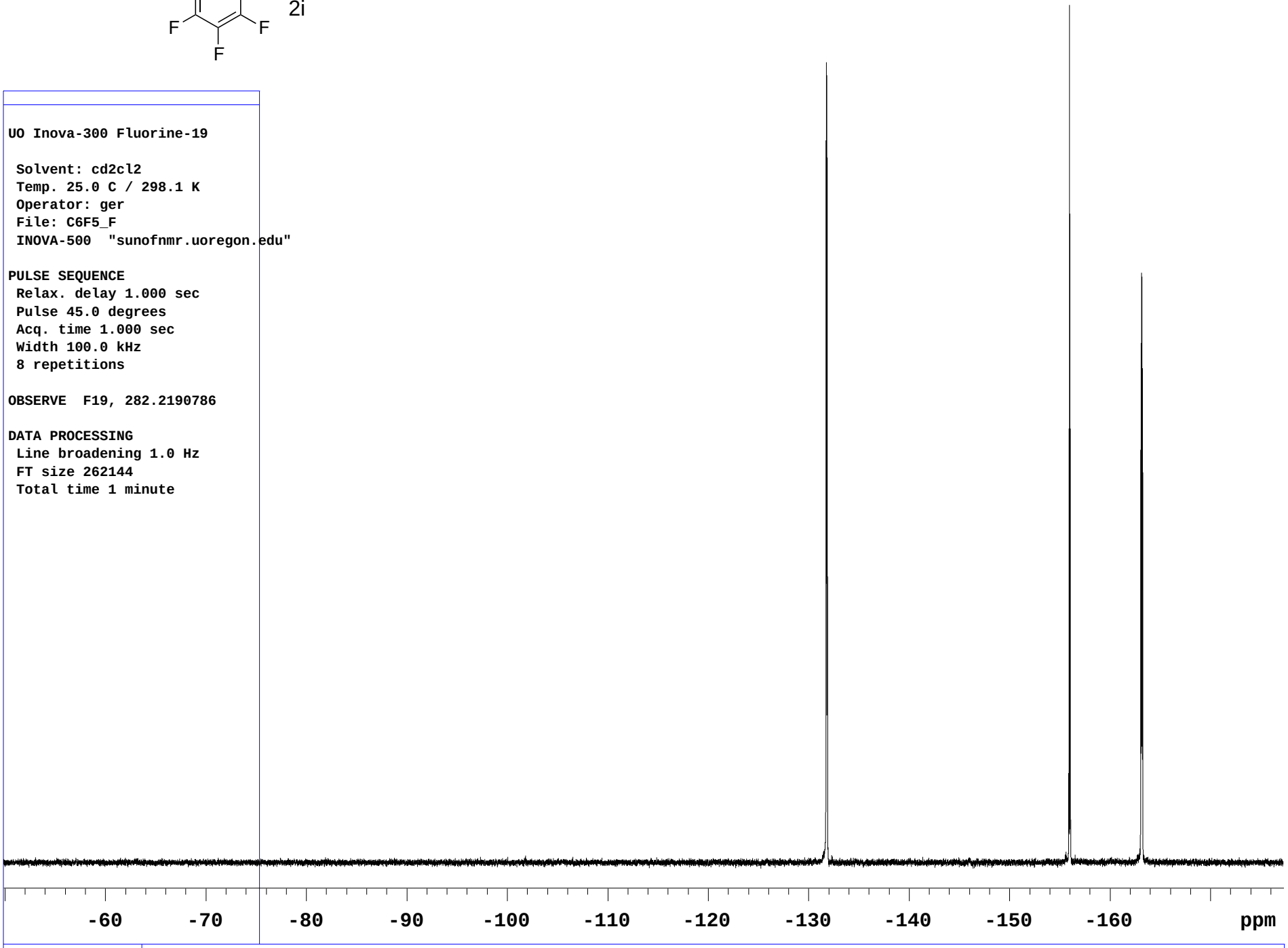
UO Inova-300 Fluorine-19

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: C6F5_F
INOVA-500 "sunofnmr.uoregon.edu"

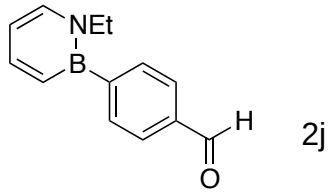
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 100.0 kHz
8 repetitions

OBSERVE F19, 282.2190786

DATA PROCESSING
Line broadening 1.0 Hz
FT size 262144
Total time 1 minute



Archive dir: File: C6F5_F



2j

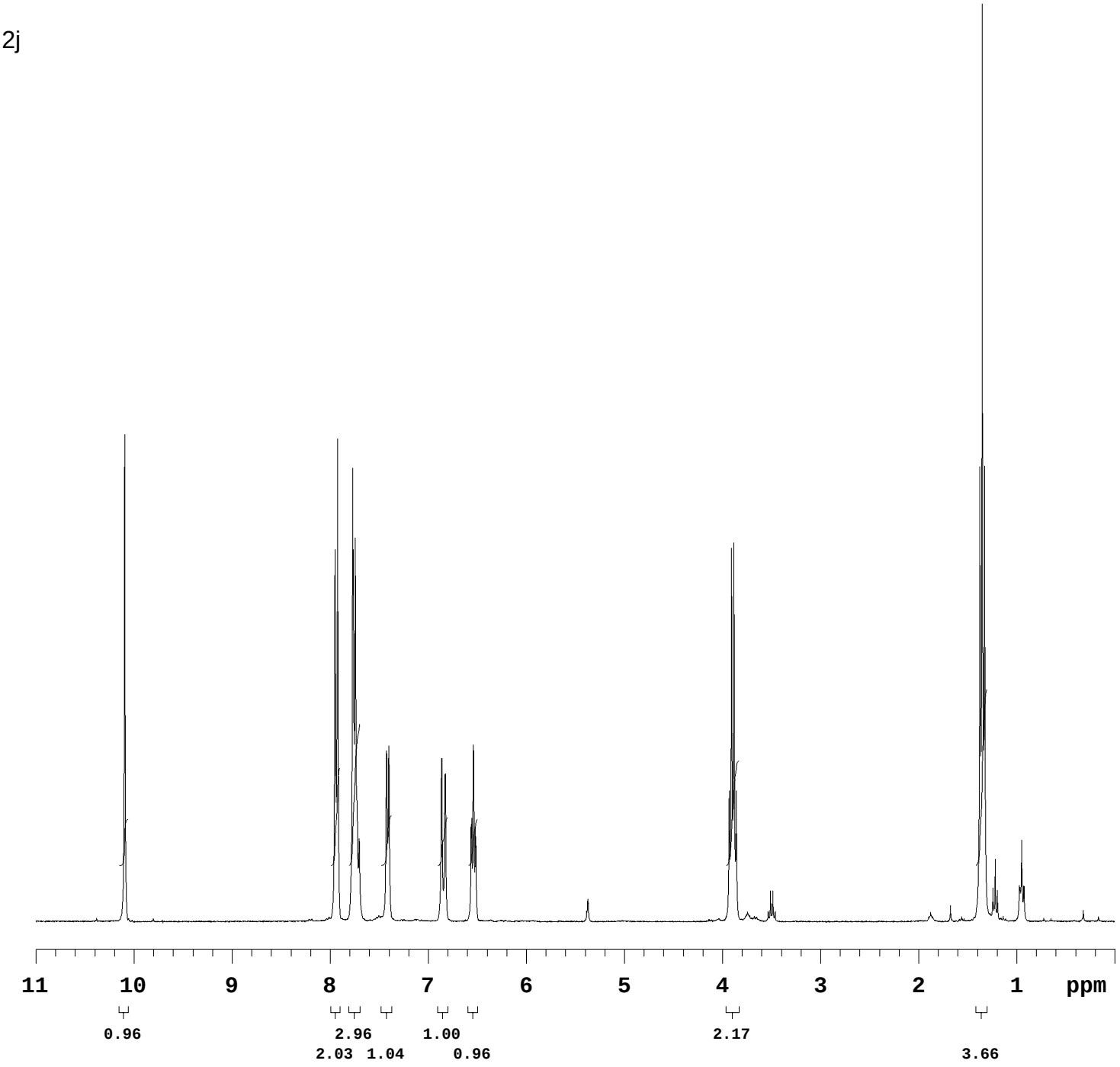
UO Inova-300-North
Boron-11

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-formyl_H_300
INOVA-500 "sunofnmr.uoregon.edu"

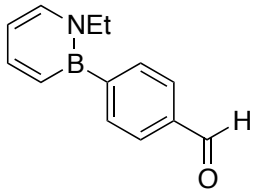
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4800.8 Hz
8 repetitions

OBSERVE H1, 300.0510060

DATA PROCESSING
FT size 32768
Total time 1 minute

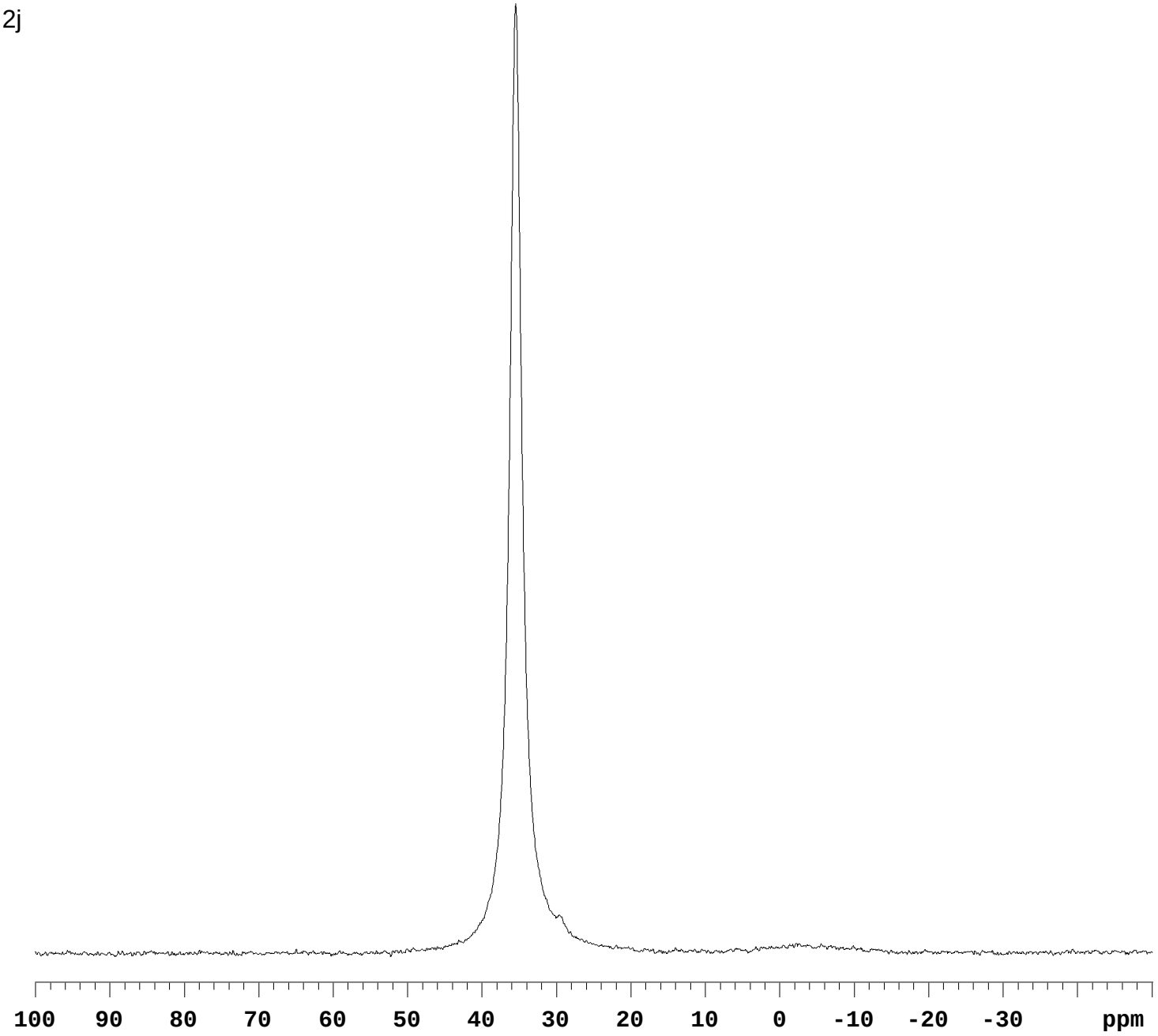


Archive dir: File: 4-formyl_H_300



2j

INDEX	FREQUENCY	PPM	HEIGHT
1	3413.1	35.454	159.0



UO Inova-300-North
Boron-11

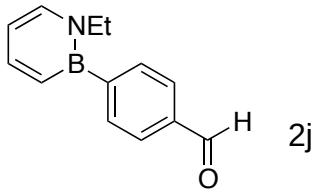
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-formyl_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
96 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: 4-formyl_B



2j

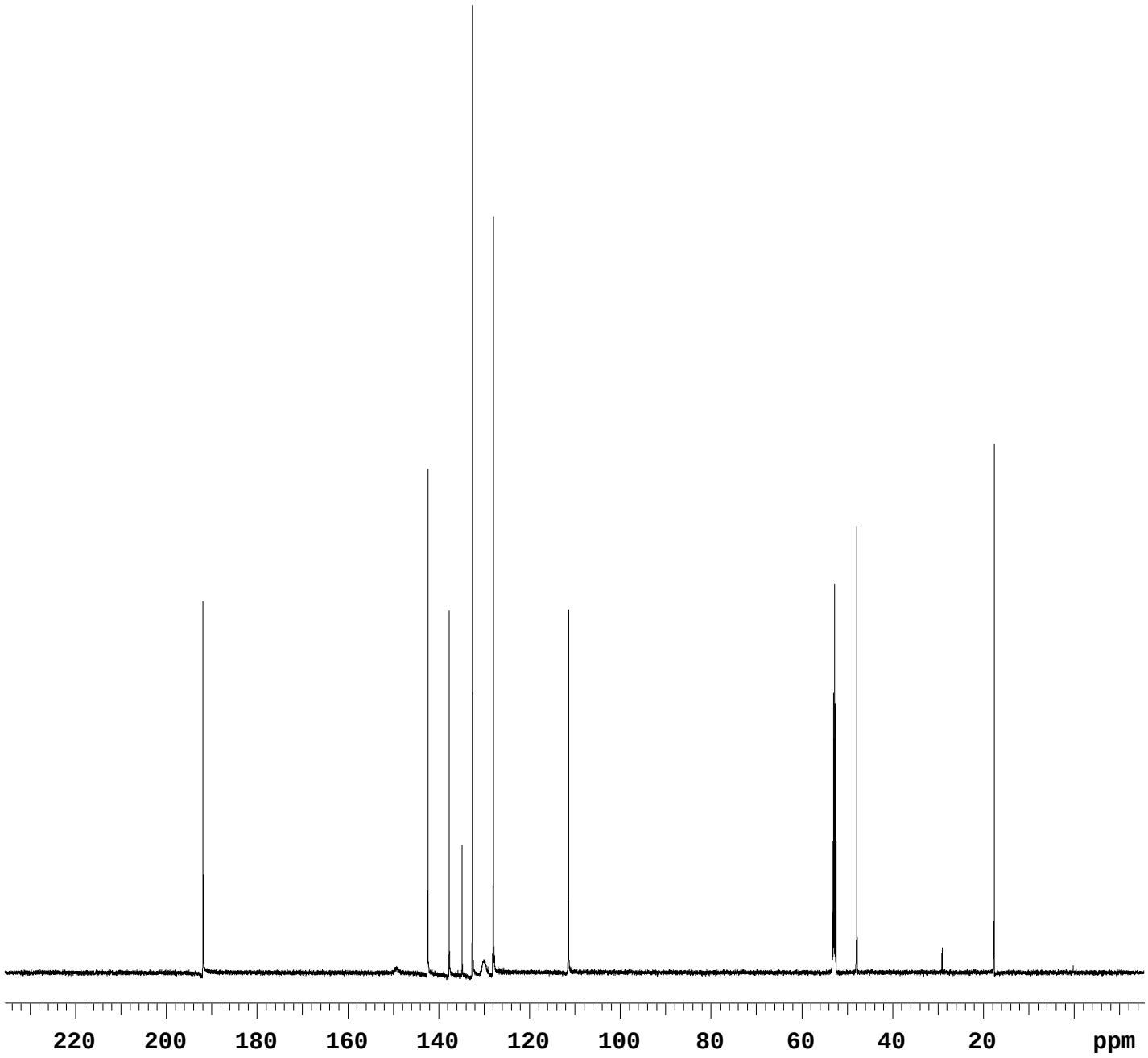
STANDARD 1H OBSERVE -
profile

Solvent: d2o
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-formyl_C
VNMRS-500 "sunofnmr.uoregon.edu"

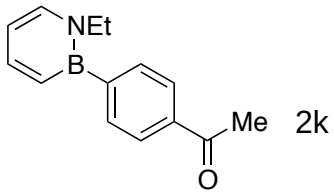
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 0.865 sec
Width 37878.8 Hz
40 repetitions

OBSERVE C13, 150.8650739
DECOUPLE H1, 599.9829318
Power 41 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 0.5 Hz
FT size 65536
Total time 1 minute

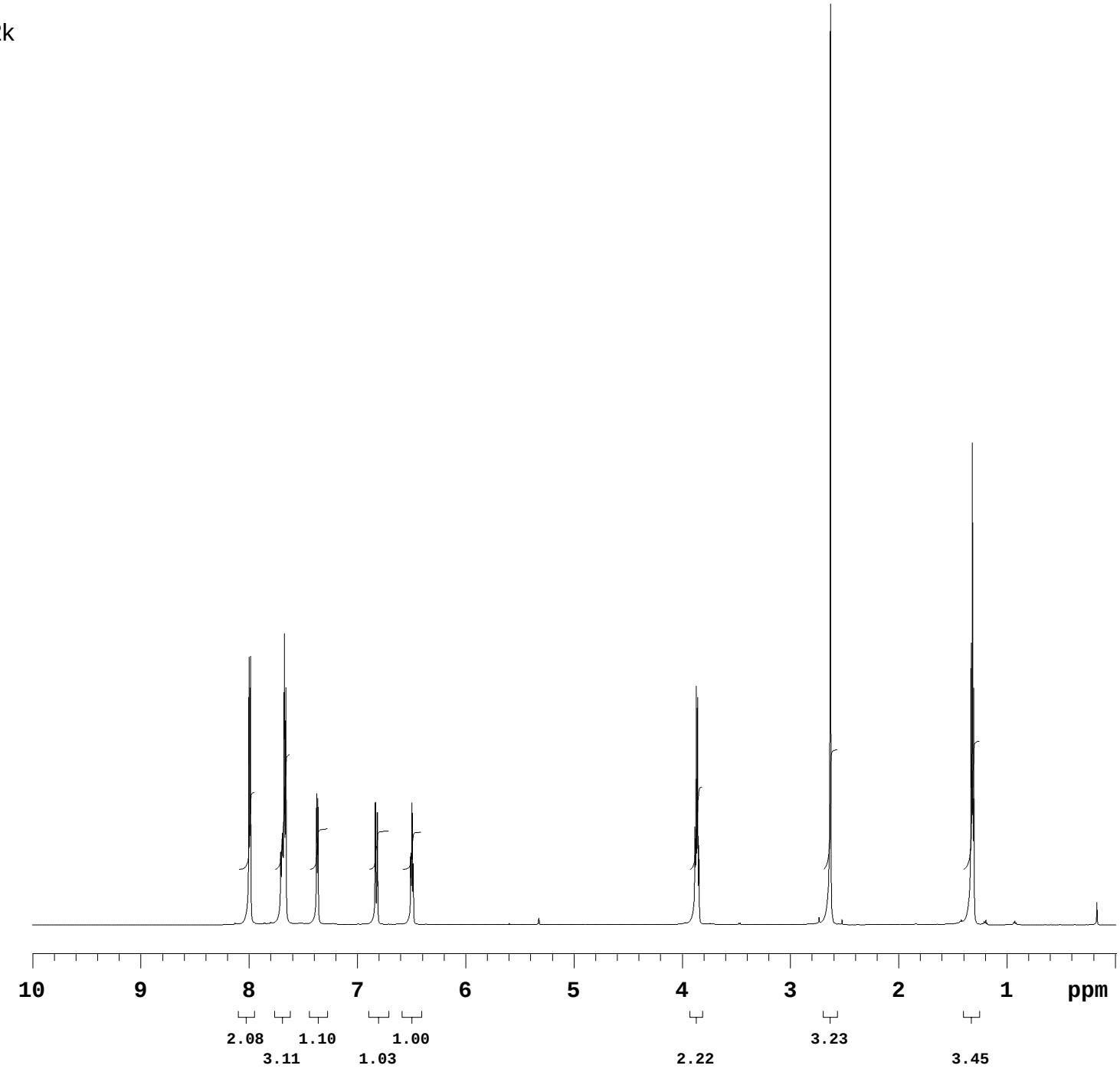


Archive dir: File: 4-formyl_C

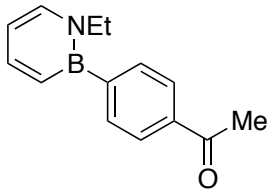


2k

```
UO VNMRS-600
{CH-ColdProbe} 1H-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-Ac_H
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 3.000 sec
 Width 9615.4 Hz
 8 repetitions

OBSERVE   H1, 599.9795419

DATA PROCESSING
 FT size 65536
 Total time 1 minute
```

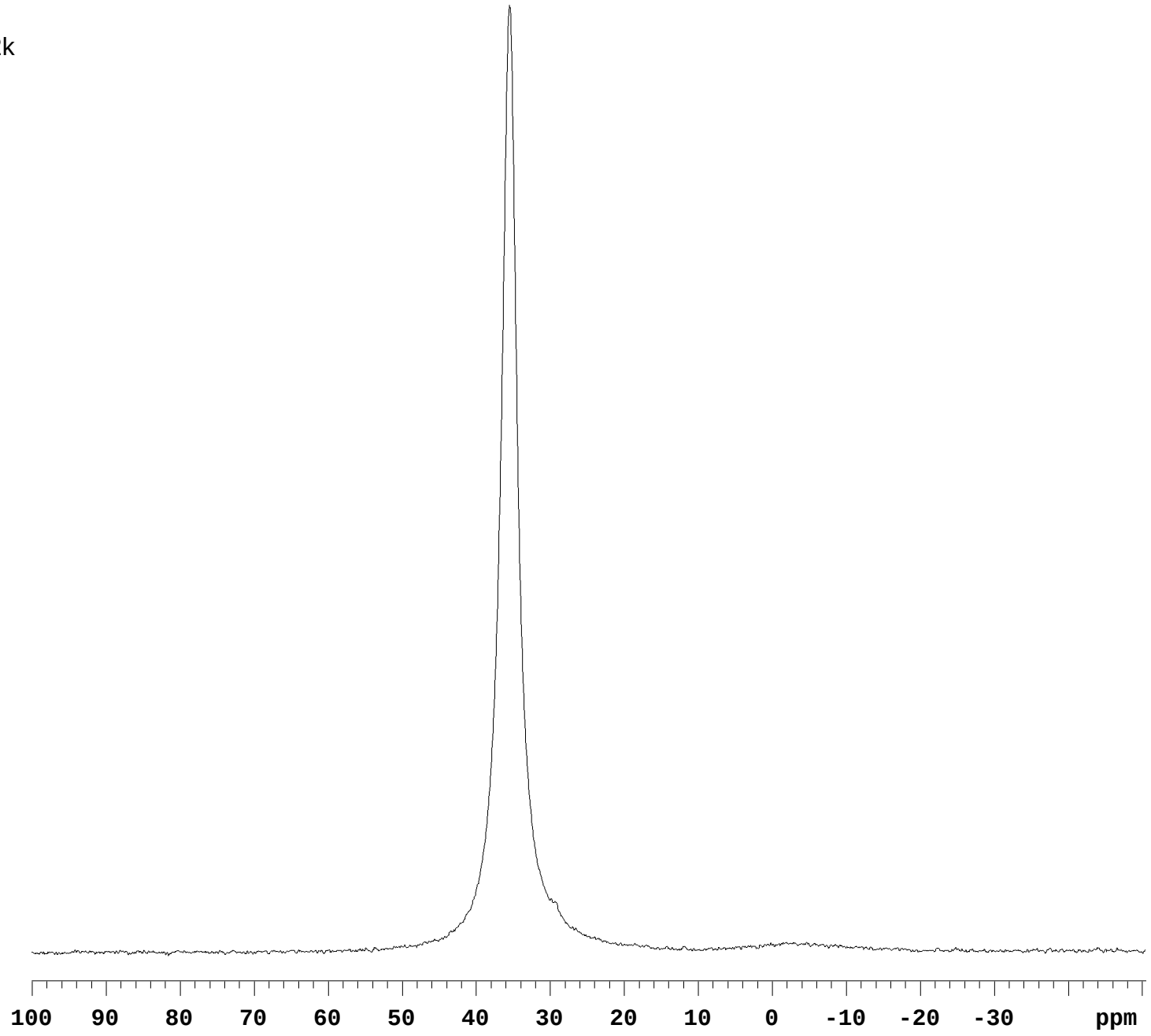


Archive dir: | File: 4-Ac_H



2k

INDEX	FREQUENCY	PPM	HEIGHT
1	3413.1	35.454	159.0



UO Inova-300-North
Boron-11

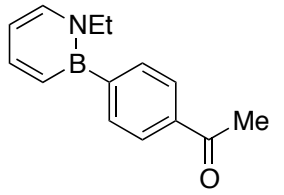
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: 4-Ac_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
88 repetitions

OBSERVE B11, 96.2682868

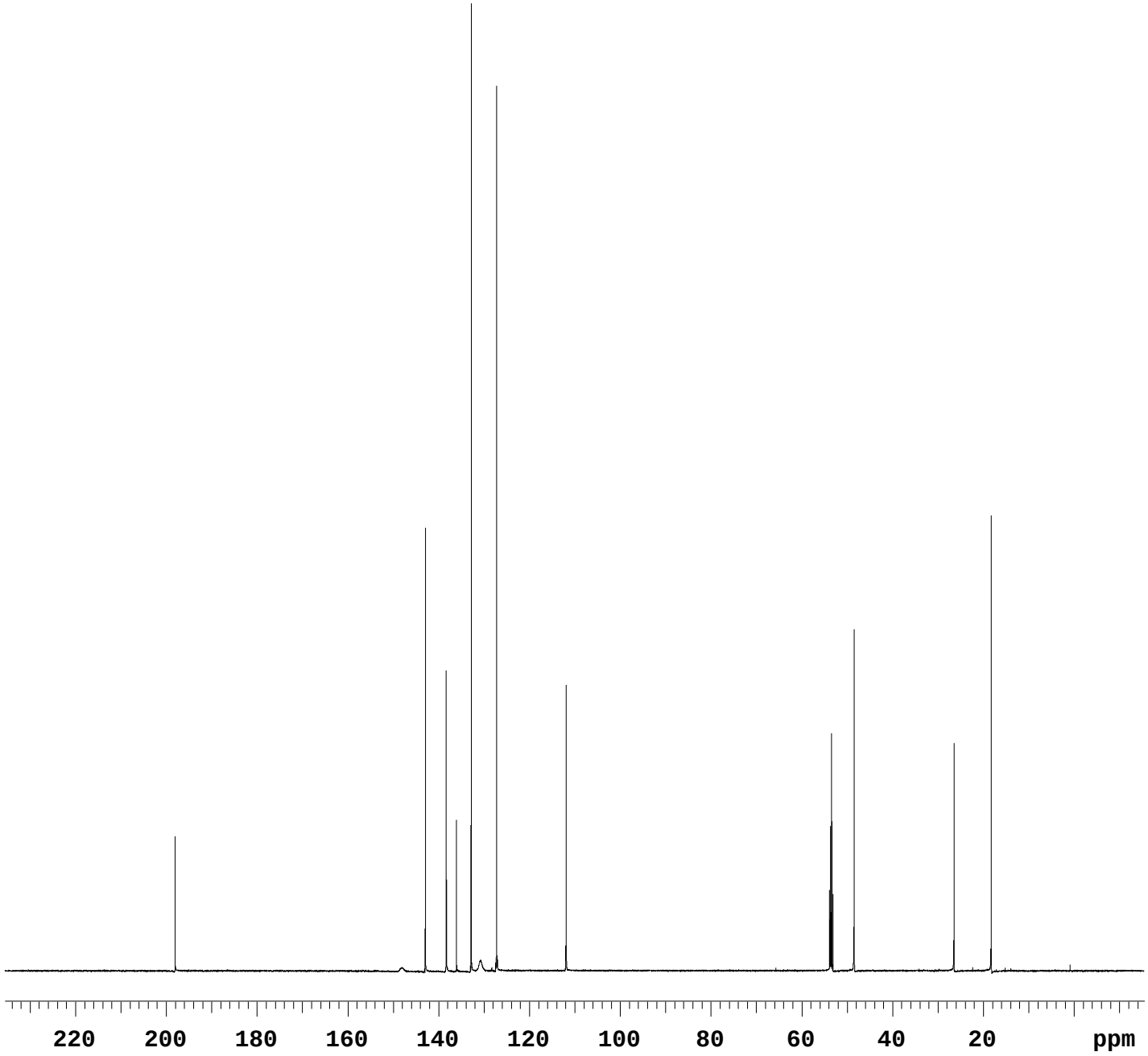
DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: 4-Ac_B

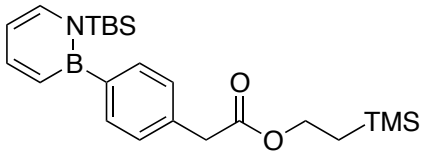


2k

```
UO VNMRS-600
{CH-ColdProbe}
13C-observe

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: 4-Ac_C
 VNMRS-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 0.865 sec
 Width 37878.8 Hz
 60 repetitions

OBSERVE  C13, 150.8649758
DECOUPLE  H1, 599.9825418
 Power 41 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 65536
 Total time 1 minutes
```



Archive dir:	File: 4-Ac_C



4

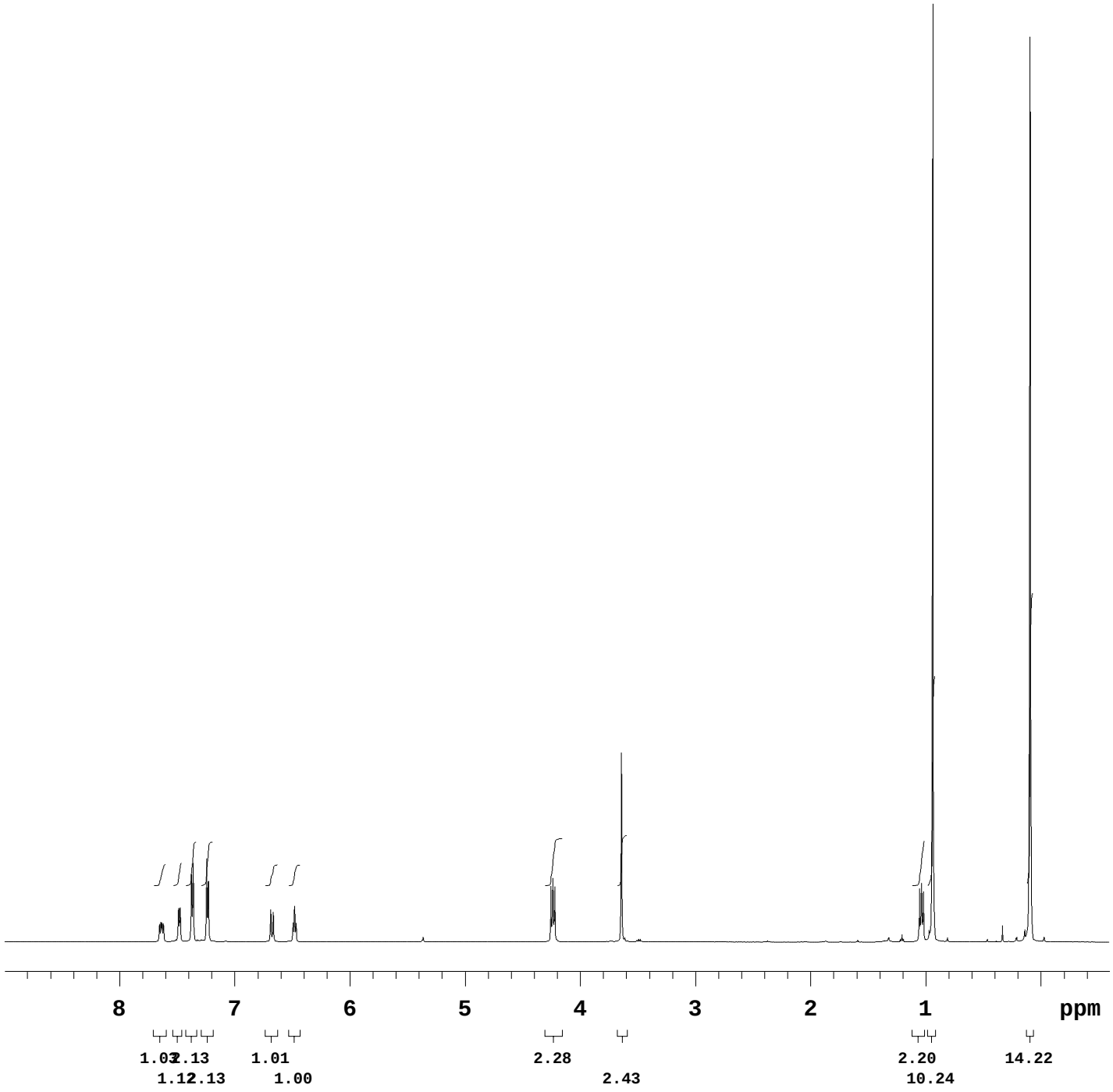
UO Inova-500 Carbon-13

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: H
 INOVA-500 "sunofnmr.uoregon.edu"

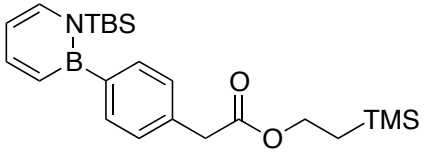
PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1052045

DATA PROCESSING
 FT size 32768
 Total time 1 minute



Archive dir: File: H



4

INDEX	FREQUENCY	PPM	HEIGHT
1	3818.4	39.664	159.0

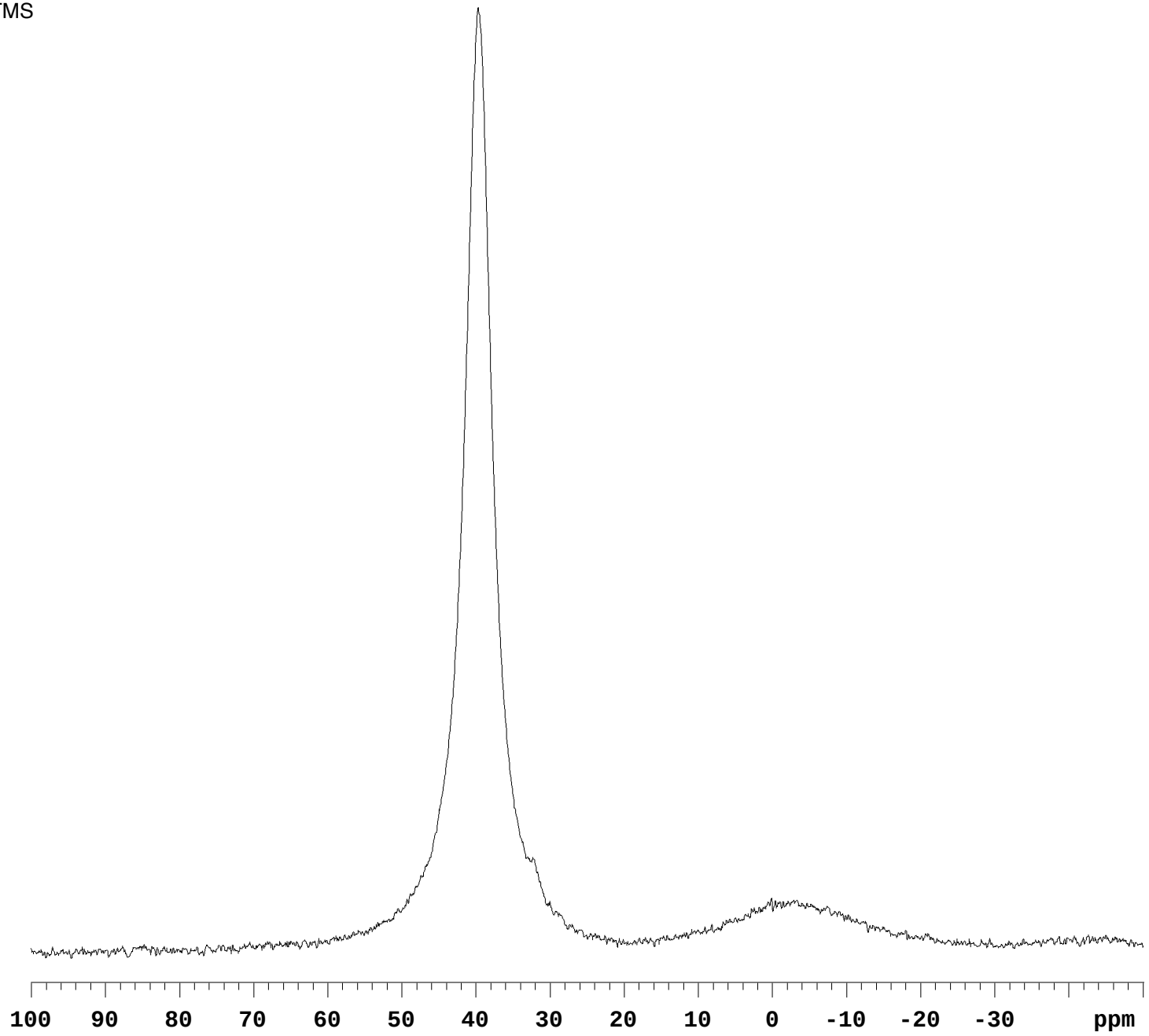
UO Inova-300-North
Boron-11

Solvent: c6d6
Temp. 25.0 C / 298.1 K
Operator: ger
File:
INOVA-500 "sunofnmr.uoregon.edu"

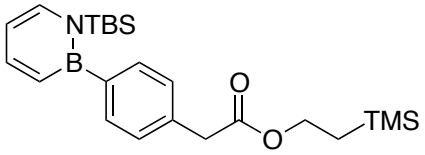
PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
128 repetitions

OBSERVE B11, 96.2681106

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute



Archive dir: File:



4

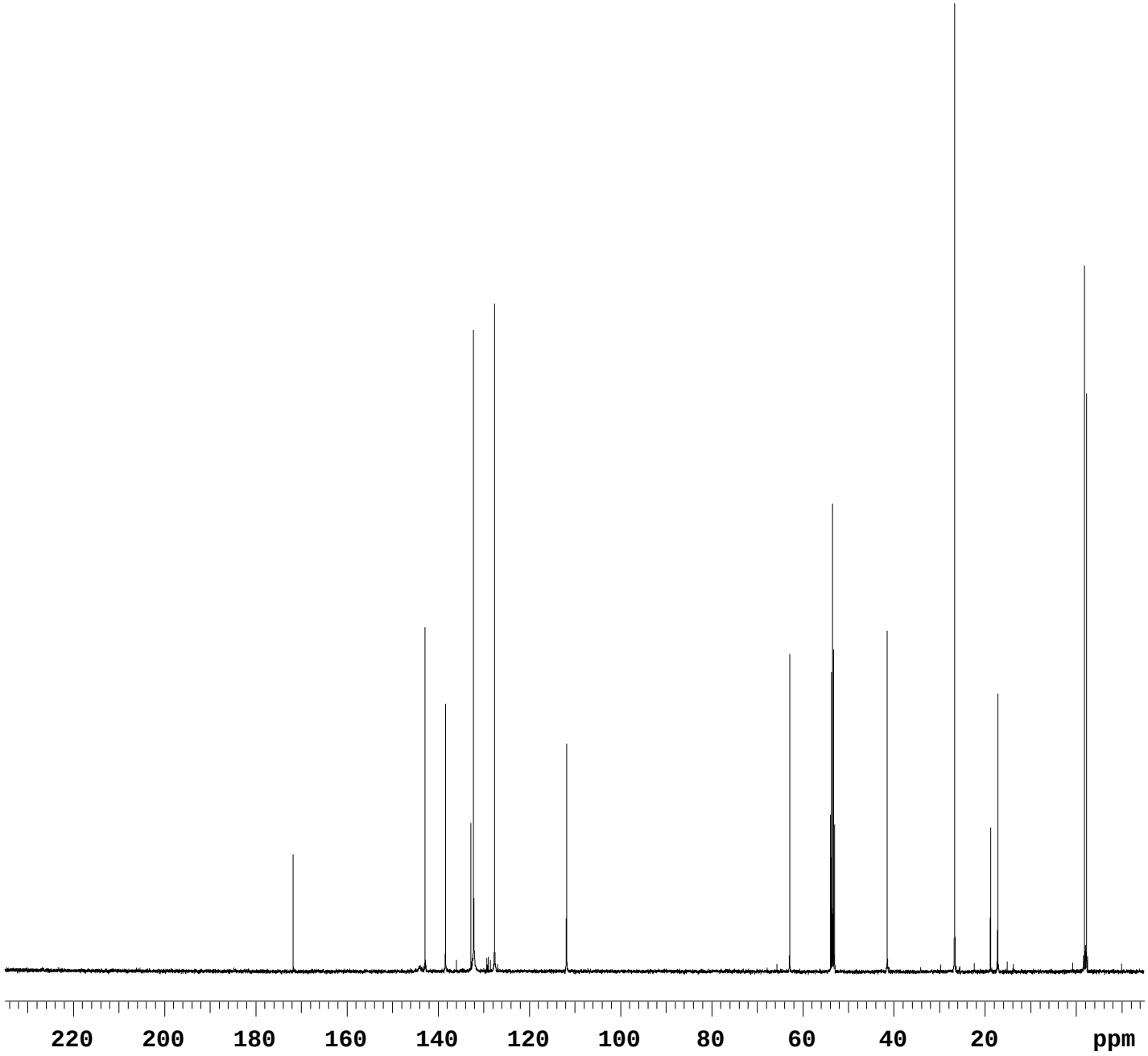
UO Inova-500 Carbon-13

 Solvent: cd2cl2
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File: C
 INOVA-500 "sunofnmr.uoregon.edu"

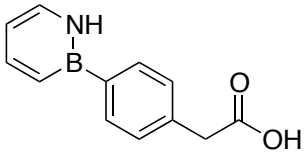
PULSE SEQUENCE
 Relax. delay 2.000 sec
 Pulse 45.0 degrees
 Acq. time 1.000 sec
 Width 31434.2 Hz
 2188 repetitions

OBSERVE C13, 125.7515537
DECOUPLE H1, 500.1077051
 Power 39 dB
 continuously on
 WALTZ-16 modulated

DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 109 minutes



Archive dir: File: C



5

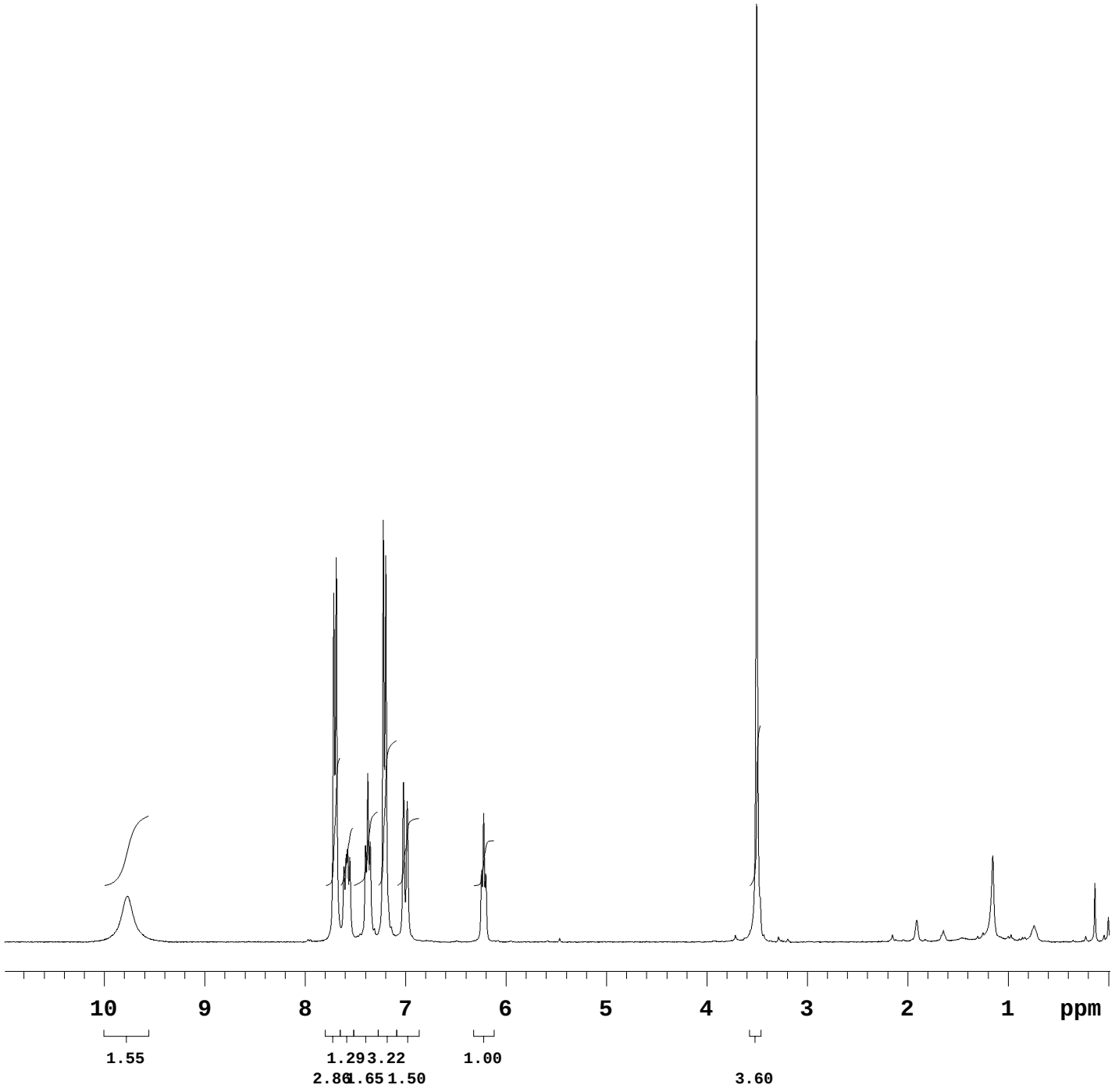
UO Inova-300 Standard-1H

Solvent: acetone
Ambient temperature
Operator: ger
File: H
INOVA-500 "hotwax.uoregon.edu"

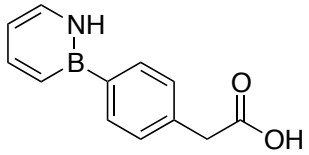
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.000 sec
Width 4799.0 Hz
8 repetitions

OBSERVE H1, 299.9341266

DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 1 minute

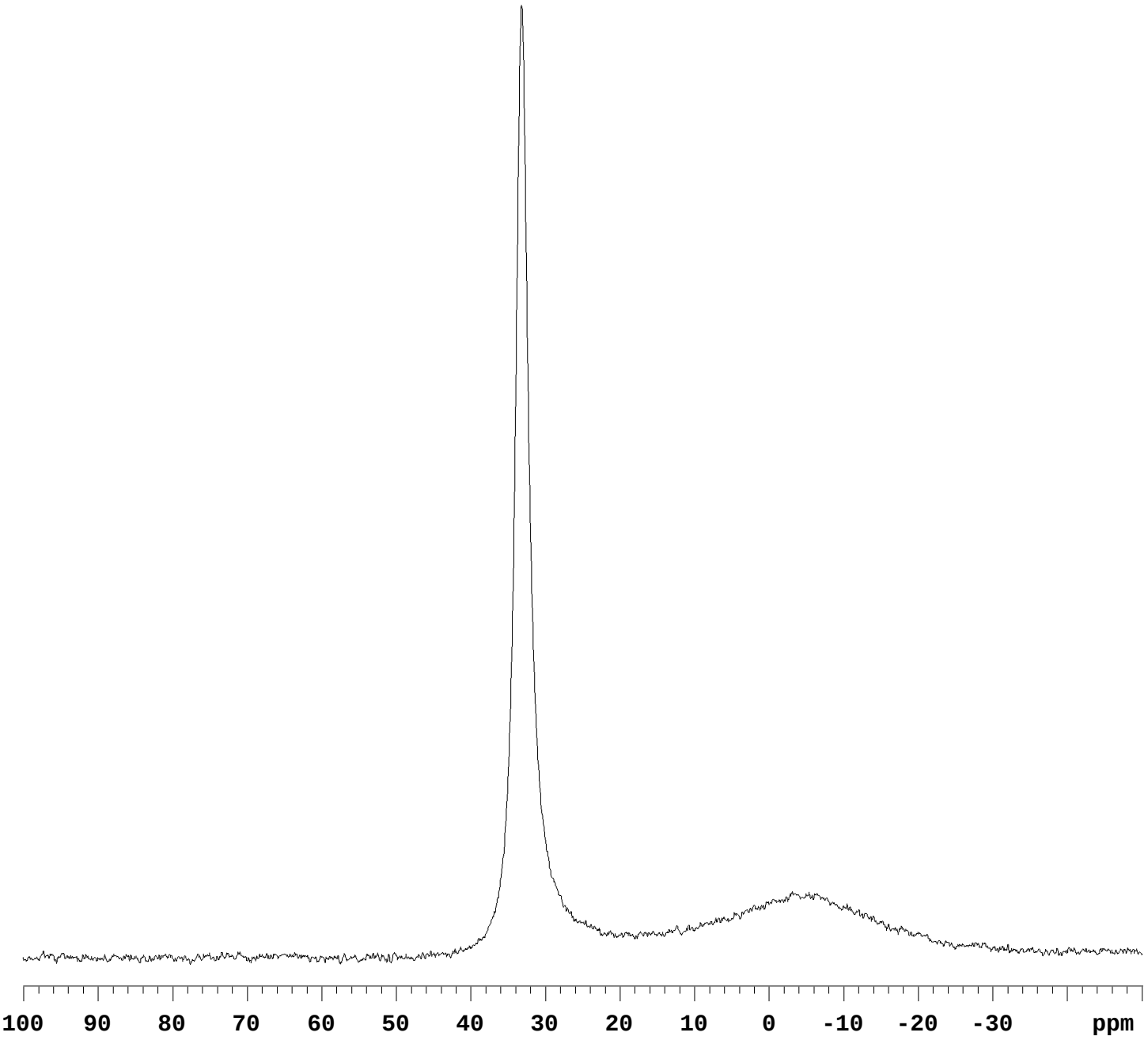


Archive dir: | File: H



5

INDEX	FREQUENCY	PPM	HEIGHT
1	3193.4	33.172	159.0



UO Inova-300-North
Boron-11

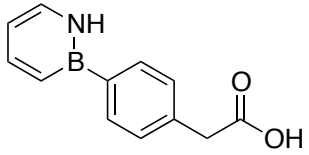
Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 100.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
120 repetitions

OBSERVE B11, 96.2682868

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: B



5

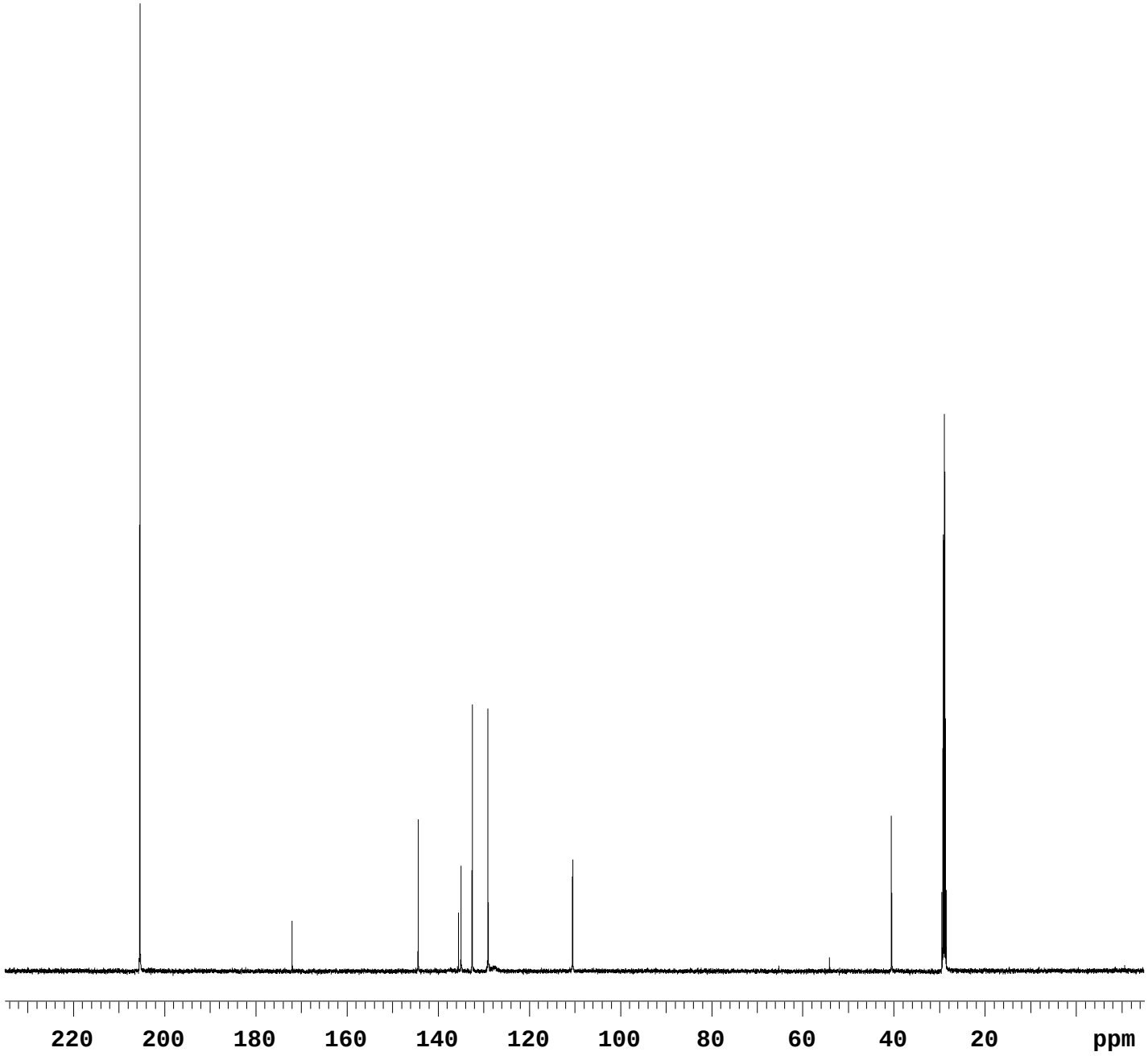
UO Inova-500 standard 1H

Solvent: acetone
Temp. 25.0 C / 298.1 K
Operator: ger
File: C
INOVA-500 "sunofnmr.uoregon.edu"

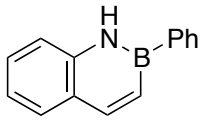
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 31434.2 Hz
600 repetitions

OBSERVE C13, 125.7519649
DECOUPLE H1, 500.1093404
Power 39 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 20 minutes



Archive dir: | File: C



7

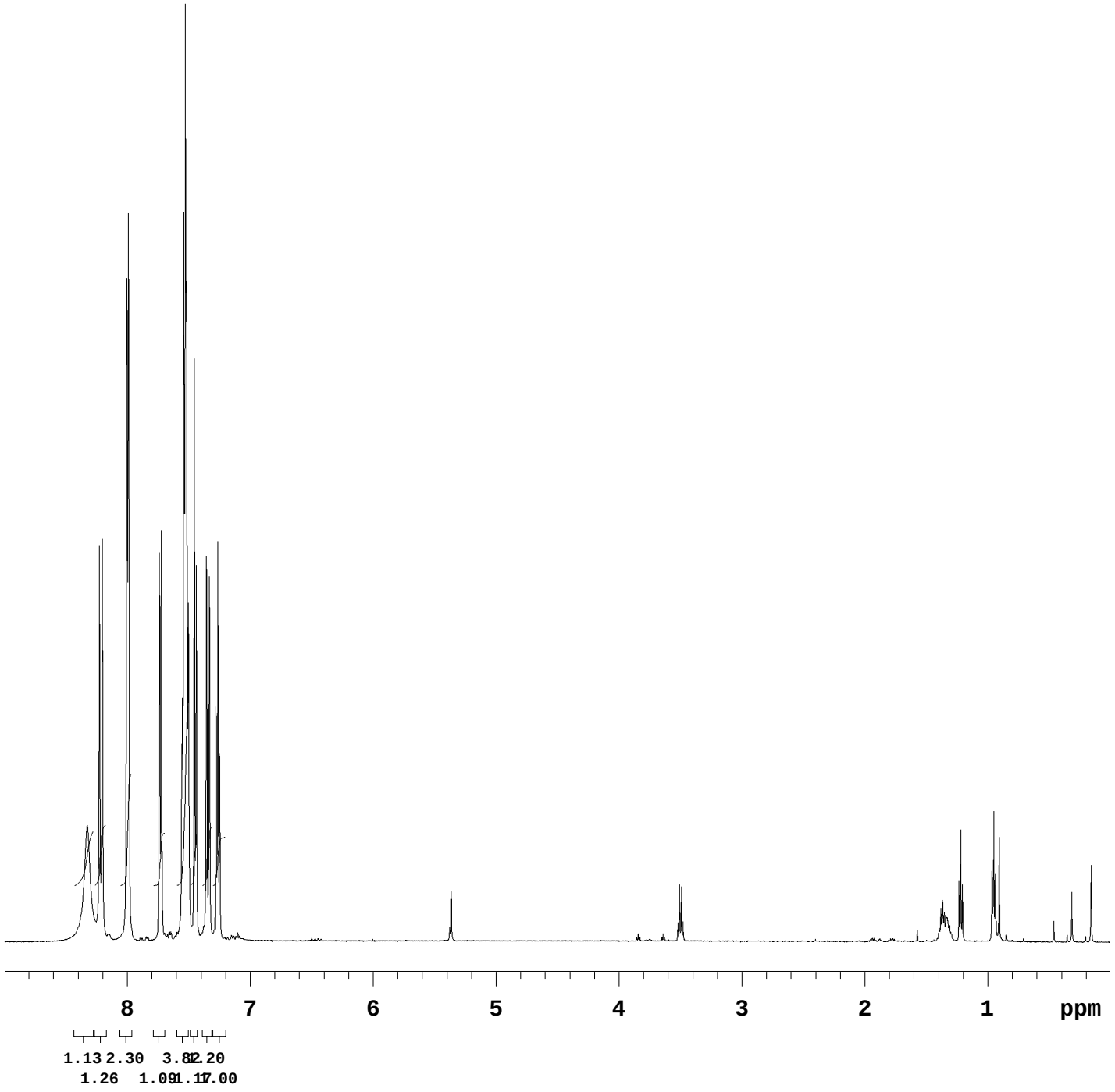
UO Inova-500 standard 1H

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: GER-3-191-3_H
INOVA-500 "sunofnmr.uoregon.edu"

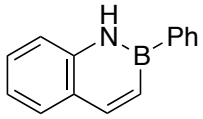
PULSE SEQUENCE
Relax. delay 2.000 sec
Pulse 45.0 degrees
Acq. time 2.048 sec
Width 8001.6 Hz
8 repetitions

OBSERVE H1, 500.1052045

DATA PROCESSING
FT size 32768
Total time 1 minute



Archive dir: | File: GER-3-191-3_H



7

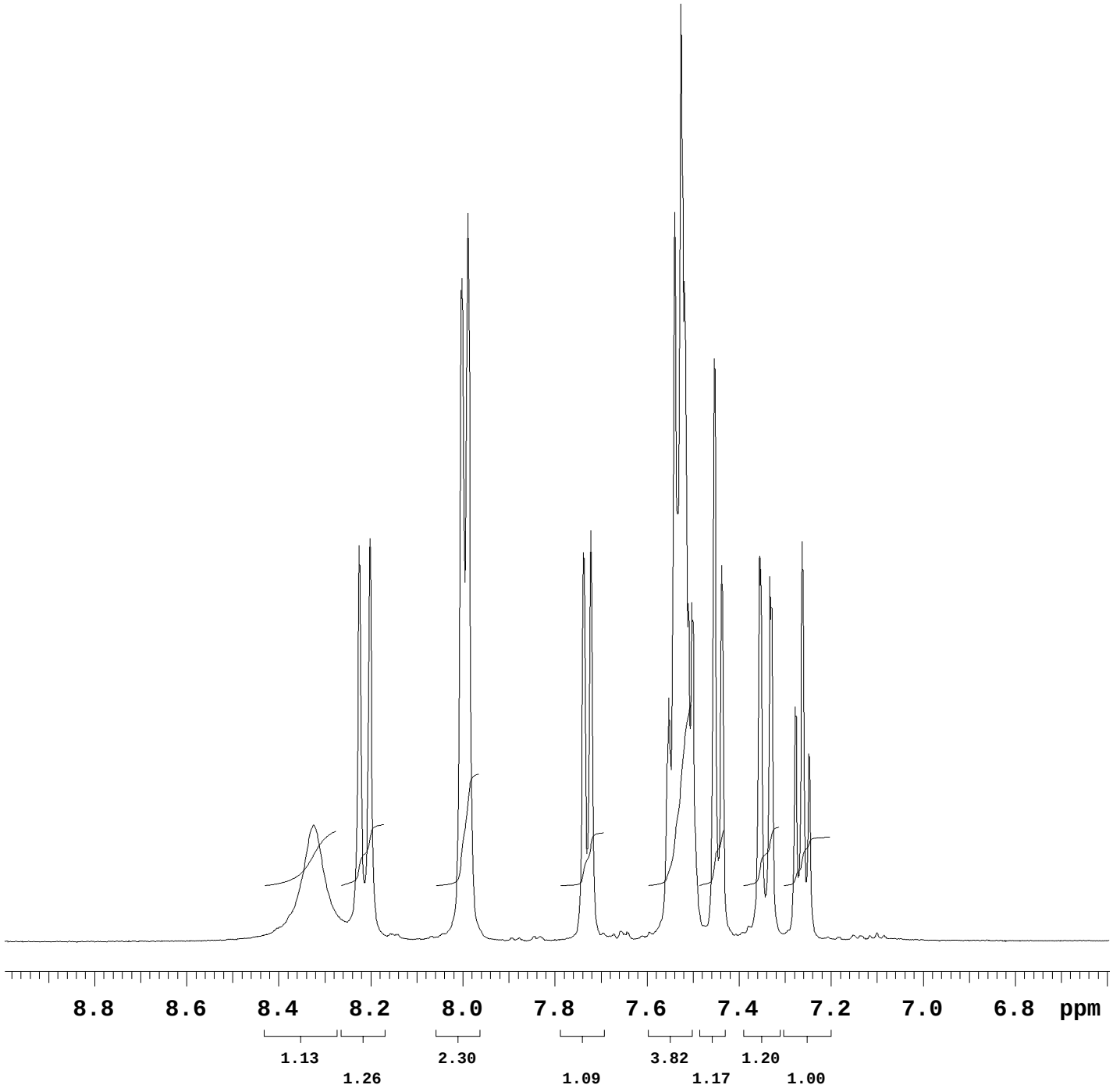
UO Inova-500 standard 1H

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: GER-3-191-3_H
INOVA-500 "sunofnmr.uoregon.edu"

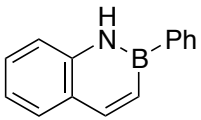
PULSE SEQUENCE
Relax. delay 2.000 sec
Pulse 45.0 degrees
Acq. time 2.048 sec
Width 8001.6 Hz
8 repetitions

OBSERVE H1, 500.1052045

DATA PROCESSING
FT size 32768
Total time 1 minute

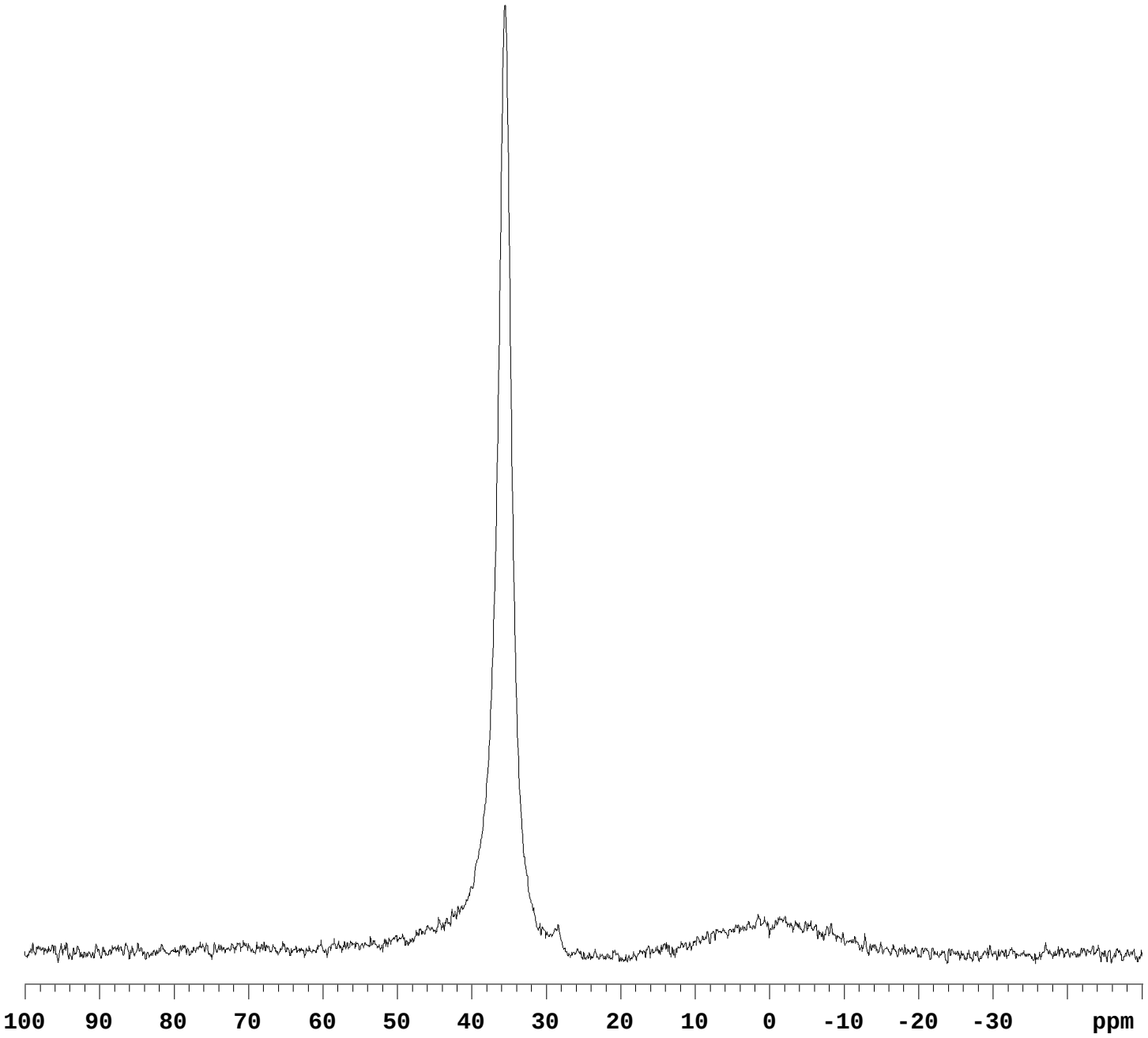


Archive dir: | File: GER-3-191-3_H



7

INDEX	FREQUENCY	PPM	HEIGHT
1	3418.0	35.505	159.0



UO Inova-300-North
Boron-11

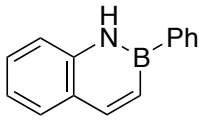
Solvent: toluene
Temp. 25.0 C / 298.1 K
Operator: ger
File: GER-3-191-2_B
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 0.200 sec
Pulse 90.0 degrees
Acq. time 0.200 sec
Width 40000.0 Hz
80 repetitions

OBSERVE B11, 96.2681164

DATA PROCESSING
Line broadening 10.0 Hz
FT size 16384
Total time 1 minute

Archive dir: | File: GER-3-191-2_B



7

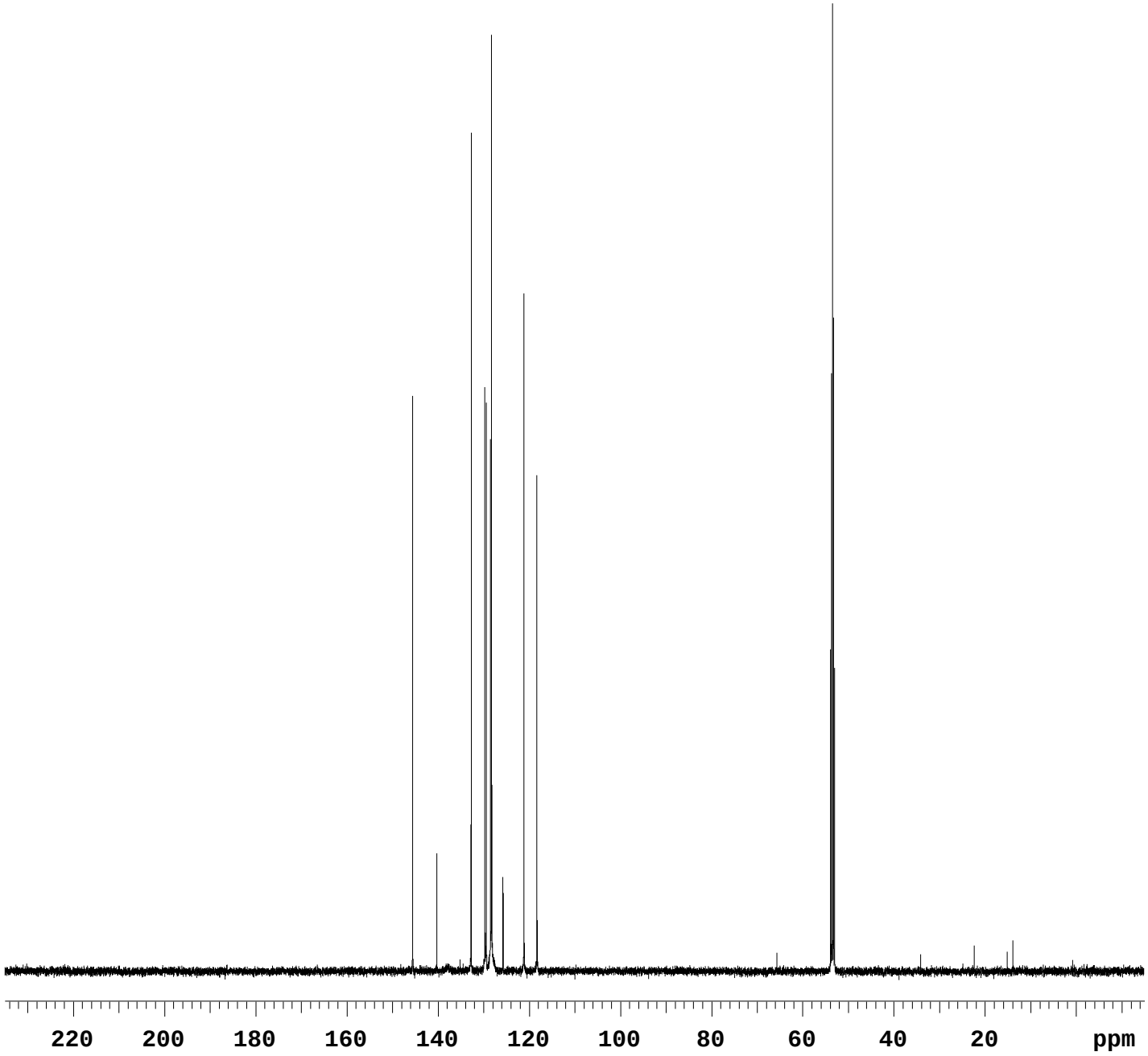
UO Inova-500 Carbon-13

Solvent: cd2cl2
Temp. 25.0 C / 298.1 K
Operator: ger
File: GER-3-191-3_C
INOVA-500 "sunofnmr.uoregon.edu"

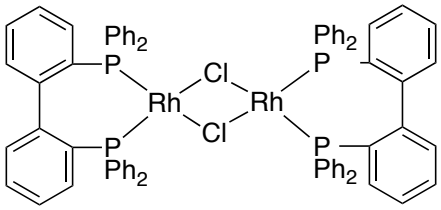
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 31434.2 Hz
1436 repetitions

OBSERVE C13, 125.7515537
DECOUPLE H1, 500.1077051
Power 39 dB
continuously on
WALTZ-16 modulated

DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 47 minutes

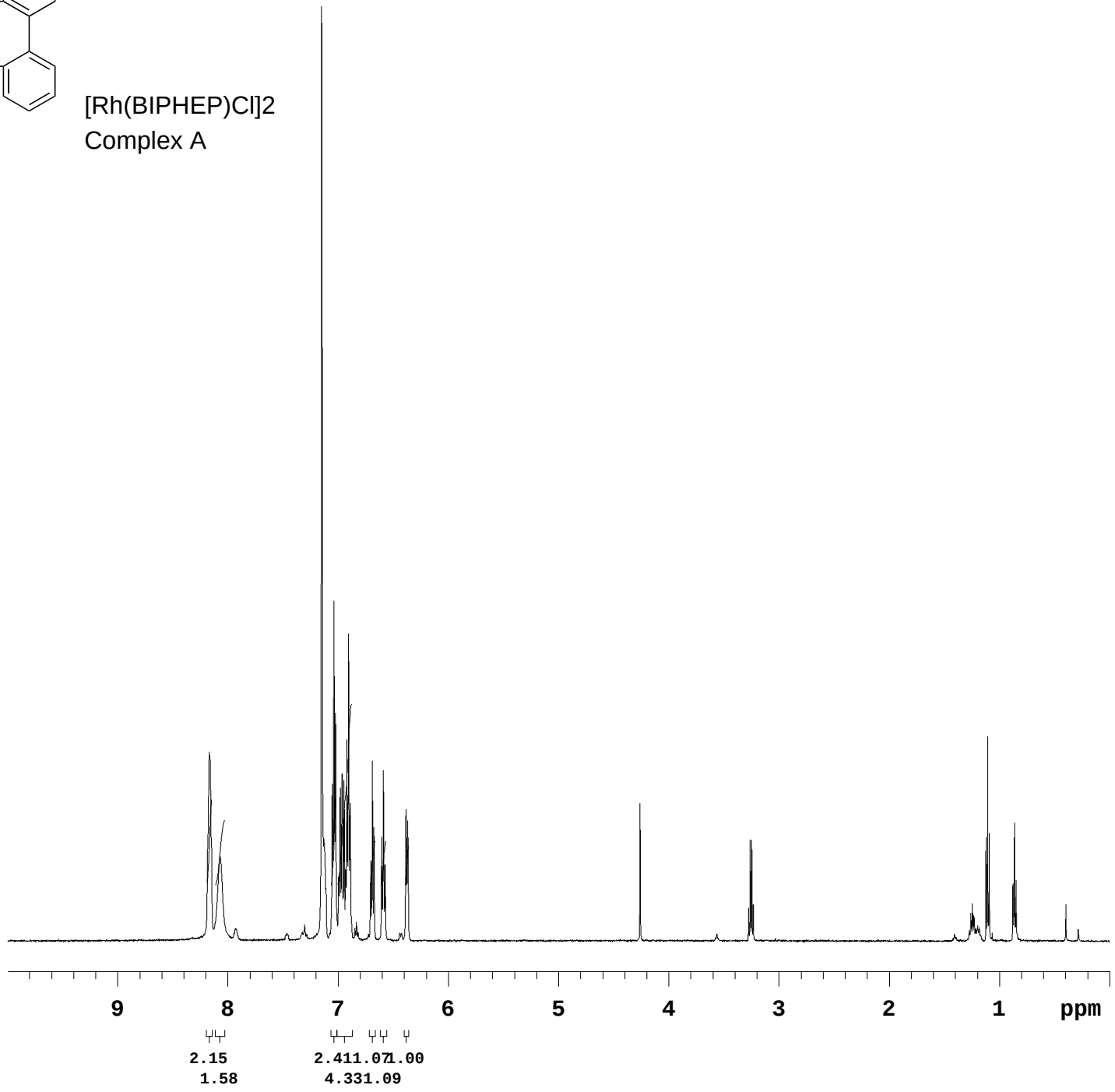


Archive dir: | File: GER-3-191-3_C

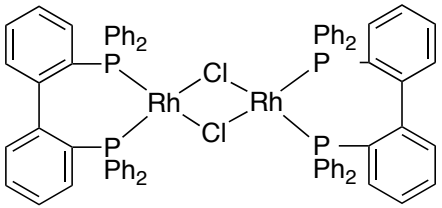


[Rh(BIPHEP)Cl]2
Complex A

```
UO Inova-500 standard 1H

 Solvent: c6d6
 Temp. 25.0 C / 298.1 K
 Operator: ger
 File:
 INOVA-500  "sunofnmr.uoregon.edu"

PULSE SEQUENCE
 Relax. delay 1.000 sec
 Pulse 45.0 degrees
 Acq. time 2.048 sec
 Width 8001.6 Hz
 8 repetitions

OBSERVE   H1, 500.1042894

DATA PROCESSING
 FT size 32768
 Total time 1 minute
```



Archive dir:	File:



[Rh(BIPHEP)Cl]2
Complex A

INDEX	FREQUENCY	PPM	HEIGHT
1	9503.7	46.945	84.7
2	9310.7	45.991	87.1

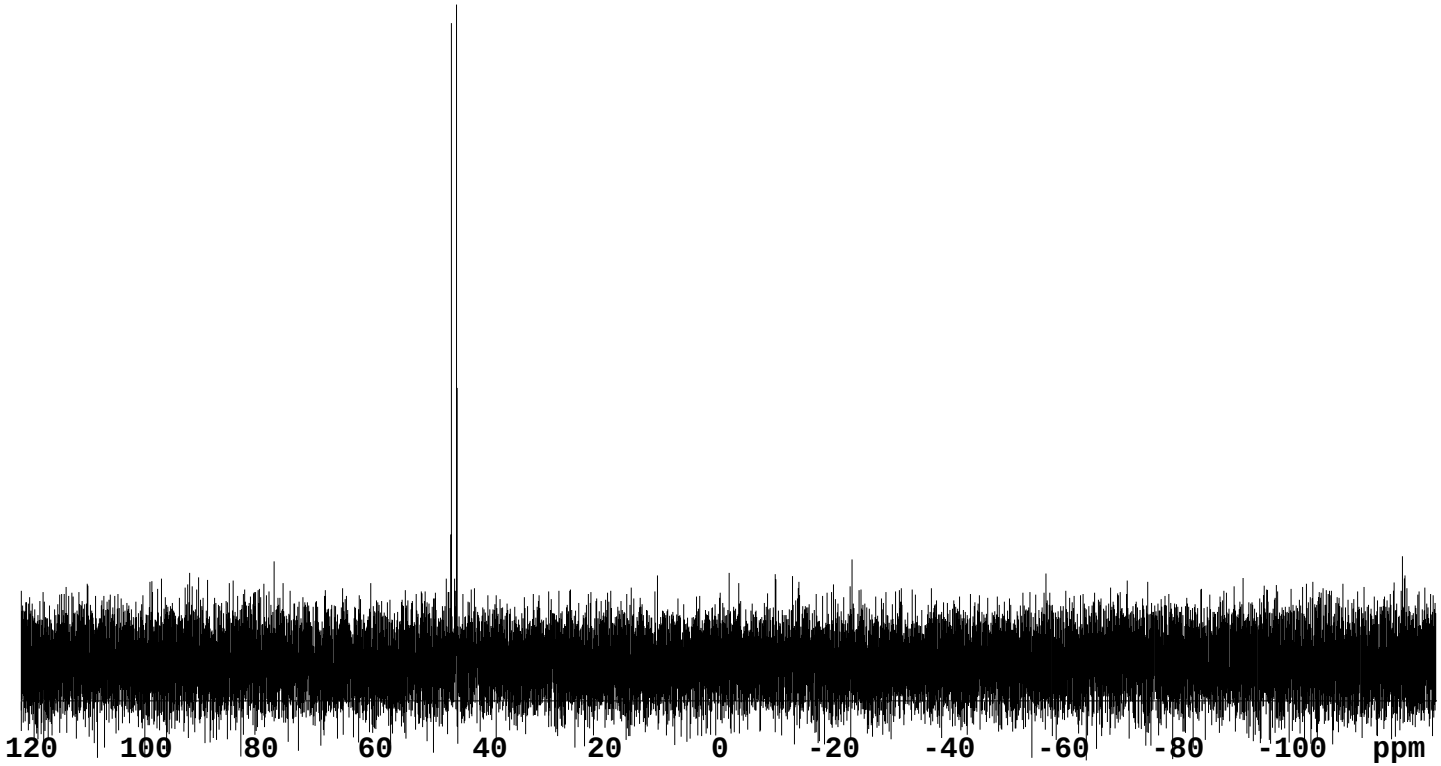
UO Inova-500 P31

Solvent: c6d6
Temp. 25.0 C / 298.1 K
Operator: ger
File:
INOVA-500 "sunofnmr.uoregon.edu"

PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 1.000 sec
Width 50000.0 Hz
64 repetitions

OBSERVE P31, 202.4459271
DECOUPLE H1, 500.1067899
Power 39 dB
on during acquisition
off during delay
WALTZ-16 modulated

DATA PROCESSING
Line broadening 1.0 Hz
FT size 131072
Total time 2 minutes



Archive dir: File: