Supporting Information

A Mild Catalytic Synthesis of 2-Oxazolines via Oxetane Ring-Opening: Rapid Access to A Diverse Family of Natural Products

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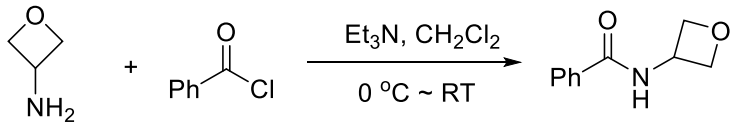
Table of Contents

I. General Information

Flash column chromatography was performed over silica gel (200-300 mesh) purchased from Qindao Puke Co., China. All air or moisture sensitive reactions were conducted in oven-dried glassware under nitrogen atmosphere using anhydrous solvents. Anhydrous toluene, acetonitrile, dichloromethane, chloroform, methanol, and tetrahydrofuran were purified by the Innovative® solvent purification system. ^{1}H, ^{13}C, and ^{19}F NMR spectra were collected on a Bruker AV 400 MHz NMR spectrometer using residue solvent peaks as an internal standard (^{1}H NMR: $CDCl_3$ at 7.26 ppm, DMSO-d_6 at 2.50 ppm, acetone-d_6 at 2.05 ppm; ^{13}C NMR: $CDCl_3$ at 77.0 ppm, DMSO-d_6 at 39.5 ppm, acetone-d_6 at 29.8 ppm). Mass spectra were collected on an Agilent GC/MS 5975C system, a MALDI Micro MX mass spectrometer, or an API QSTAR XL System. IR spectra were recorded on Bruker TENSOR 27 spectrometer and reported in terms of frequency of absorption (cm^{-1}).

II. Synthesis of the Oxetane Substrates



1a

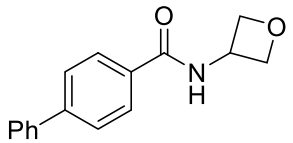
***N*-(Oxetan-3-yl)benzamide (1a).** At 0 °C, to a stirred solution of oxetan-3-amine (731 mg, 10.0 mmol) and trimethylamine (2.8 mL, 20.0 mmol) in anhydrous CH_2Cl_2 (20 mL) was added dropwise a solution of benzoyl chloride (1.69 g, 12.0 mmol) in anhydrous CH_2Cl_2 (10 mL). The mixture was allowed to warm to room temperature spontaneously. After stirring for 6 h, the mixture was quenched with saturated NH_4Cl aqueous solution (20 mL) and diluted with CH_2Cl_2 (60 mL). The organic layer was separated, washed with water (2×20 mL) and brine (20 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1a** (95% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82–7.77 (m, 2H), 7.53–7.49 (m, 1H), 7.44–7.40 (m, 2H), 6.96 (br s, 1H), 5.25–5.20 (m, 1H), 5.00 (dd, J_1 = 6.8 Hz, J_2 = 2.8 Hz, 2H), 4.60 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 167.1, 133.7, 131.8, 128.6, 127.0, 78.4, 45.3 ppm.

IR (thin film) 3297, 3071, 2961, 2877, 1642, 1547, 1293, 1192, 969, 884, 701 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{12}NO_2$ $[M + H]^+$: 178.0868, Found: 178.0875.



1b

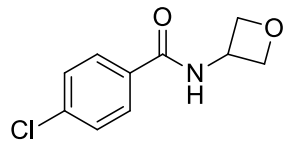
***N*-(oxetan-3-yl)-(1,1'-biphenyl)-4-carboxamide (1b)** was prepared by following the same procedure for the synthesis of **1a** (84% yield, white solid).

^{1}H NMR (400 MHz, DMSO-d_6) δ 9.14 (d, J = 6.4 Hz, 1H), 7.99 (d, J = 8.4 Hz, 2H), 7.79 (d, J = 8.4 Hz, 2H), 7.74 (d, J = 7.2 Hz, 2H), 7.50 (t, J = 7.6 Hz, 2H), 7.43–7.39 (m, 1H), 5.08–5.00 (m, 1H), 4.79 (dd, J_1 = 7.2 Hz, J_2 = 6.4 Hz, 2H), 4.62 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, DMSO-d_6) δ 165.6, 142.9, 139.1, 132.6, 129.0, 128.1, 128.0, 126.8, 126.5, 76.9, 44.6 ppm.

IR (thin film) 3445, 3277, 2959, 2813, 1632, 1534, 967, 849, 746, 699 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{16}NO_2$ $[M + H]^+$: 254.1181, Found: 254.1178.



1c

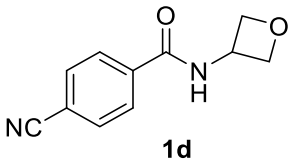
4-Chloro-*N*-(oxetan-3-yl)benzamide (1c) was prepared by following the same procedure for the synthesis of **1a** (92% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, J = 8.0 Hz, 2H), 7.40 (d, J = 8.0 Hz, 2H), 7.01 (br s, 1H), 5.24–5.19 (m, 1H), 5.00 (t, J = 7.2 Hz, 2H), 4.60 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.1, 138.2, 132.0, 128.9, 128.4, 78.4, 45.4 ppm.

IR (thin film) 3277, 3075, 2950, 2876, 1637, 1539, 1184, 1084, 967, 715, 674 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}ClNO_2$ $[M + H]^+$: 212.0478, Found: 212.0470.



1d

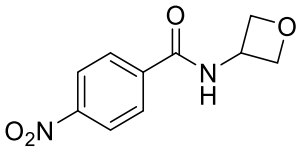
4-Cyano-*N*-(oxetan-3-yl)benzamide (1d) was prepared by following the same procedure for the synthesis of **1a** (92% yield, white solid).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.59 (br s, 1H), 8.10–8.07 (m, 2H), 7.91–7.88 (m, 2H), 5.21–5.12 (m, 1H), 4.85 (t, J = 7.2 Hz, 2H), 4.65 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, acetone-d_6) δ 165.7, 139.3, 133.3, 129.1, 118.9, 115.7, 78.2, 46.4, ppm.

IR (thin film) 3440, 2222, 1632, 957, 739, 671 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{11}N_2O_2$ $[M + H]^+$: 203.0821, Found: 203.0818.



1e

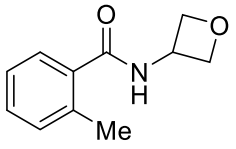
4-Nitro-*N*-(oxetan-3-yl)benzamide (1e) was prepared by following the same procedure for the synthesis of **1a** (90% yield, pale yellow solid).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.69 (br s, 1H), 8.31 (dd, J_1 = 7.2 Hz, J_2 = 2.0 Hz, 2H), 8.15 (dd, J_1 = 7.2 Hz, J_2 = 2.0 Hz, 2H), 5.22–5.13 (m, 1H), 4.86 (t, J = 7.2 Hz, 2H), 4.66 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, acetone-d_6) δ 165.5, 150.6, 140.9, 129.7, 124.4, 78.2, 46.4 ppm.

IR (thin film) 3446, 1637, 1515, 1341, 1279, 963, 756, 705 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}N_2O_4$ $[M + H]^+$: 223.0719, Found: 223.0716.



1f

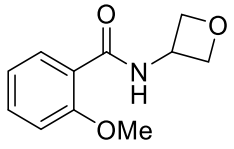
2-Methyl-*N*-(oxetan-3-yl)benzamide (1f) was prepared by following the same procedure for the synthesis of **1a** (87% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36–7.31 (m, 2H), 7.23–7.18 (m, 2H), 6.46 (br s, 1H), 5.24–5.15 (m, 1H), 4.99 (t, J = 7.2 Hz, 2H), 4.55 (t, J = 6.4 Hz, 2H), 2.42 (s, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.5, 136.3, 135.4, 131.2, 130.3, 126.6, 125.8, 78.5, 45.0, 19.8 ppm.

IR (thin film) 3453, 3279, 2951, 2879, 1642, 1539, 1290, 1188, 977, 889, 733 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_2$ $[M + H]^+$: 192.1025, Found: 192.1034.



1g

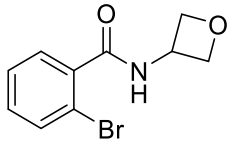
2-Methoxy-*N*-(oxetan-3-yl)benzamide (1g) was prepared by following the same procedure for the synthesis of **1a** (95% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.39 (br s, 1H), 8.16 (dd, J_1 = 8.0 Hz, J_2 = 2.0 Hz, 1H), 7.46 (td, J_1 = 4.4 Hz, J_2 = 2.0 Hz, 1H), 7.08 (t, J = 7.6 Hz, 1H), 6.99 (d, J = 8.4 Hz, 1H), 5.28–5.20 (m, 1H), 5.01 (t, J = 7.2 Hz, 2H), 4.61 (t, J = 6.8 Hz, 2H), 4.00 (s, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.8, 157.5, 133.2, 132.3, 121.4, 120.6, 111.3, 78.8, 56.0, 44.9 ppm.

IR (thin film) 3379, 2963, 2884, 1638, 1537, 1480, 1300, 1246, 1019, 965, 759 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_3$ $[M + H]^+$: 208.0974, Found: 208.0973.



1h

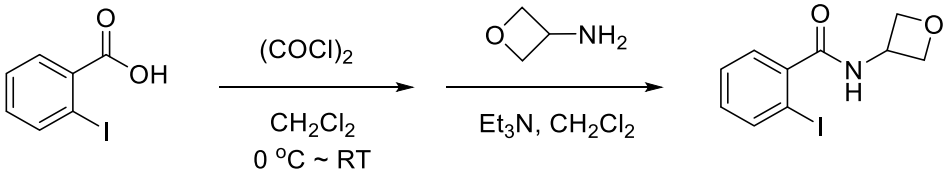
2-Bromo-*N*-(oxetan-3-yl)benzamide (1h) was prepared by following the same procedure for the synthesis of **1a (**93% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dd, J_1 = 8.0 Hz, J_2 = 1.2 Hz, 1H), 7.49 (dd, J_1 = 7.6 Hz, J_2 = 2.0 Hz, 1H), 7.35 (td, J_1 = 7.6 Hz, J_2 = 1.2 Hz, 1H), 7.29 (td, J_1 = 7.6 Hz, J_2 = 2.0 Hz, 1H), 6.81 (br s, 1H), 5.22–5.15 (m, 1H), 4.97 (t, J = 7.2 Hz, 2H), 4.59 (t, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 136.9, 133.4, 131.6, 129.6, 127.6, 119.2, 78.1, 45.2 ppm.

IR (thin film) 3269, 3068, 2947, 2875, 1648, 1540, 1364, 1540, 1364, 1313, 1023, 979, 891, 735, 685 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}BrNO_2$ $[M + H]^+$: 255.9973, Found: 255.9970.



1i

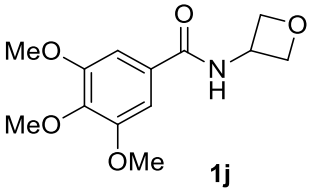
2-Iodo-*N*-(oxetan-3-yl)benzamide (1i). At 0 °C, to a stirred solution of 2-iodobenzoic acid (1.49 g, 6.0 mmol) and DMF (10 μL) in anhydrous CH_2Cl_2 (20 mL) was added dropwise oxalyl chloride (767 μL, 9.0 mmol). After stirring at room temperature overnight, the mixture was concentrated to give the desired crude acyl chloride. Next, at 0 °C, to a stirred solution of oxetan-3-amine (439 mg, 6.0 mmol) and trimethylamine (1.3 mL, 9.0 mmol) in anhydrous CH_2Cl_2 (20 mL) was added dropwise a solution of the crude acyl chloride in anhydrous CH_2Cl_2 (10 mL). The mixture was then allowed to warm to room temperature spontaneously. After stirring for 6 h, the mixture was quenched with saturated NH_4Cl aqueous solution (15 mL) and diluted with CH_2Cl_2 (40 mL). The organic layer was separated, washed with water (2×20 mL) and brine (20 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1i** (88% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, J = 8.0 Hz, 1H), 7.38–7.34 (m, 2H), 7.12–7.08 (m, 1H), 6.69 (br s, 1H), 5.21–5.12 (m, 1H), 4.95 (t, J = 7.2 Hz, 2H), 4.61 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.8, 141.3, 139.8, 131.4, 128.2, 128.2, 92.3, 78.0, 45.2 ppm.

IR (thin film) 3285, 3063, 2960, 2880, 1642, 1536, 1298, 1016, 967, 885, 747 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}INO_2$ $[M + H]^+$: 303.9834, Found: 303.9841.



1j

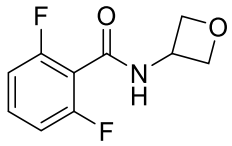
3,4,5-Trimethoxy-*N*-(oxetan-3-yl)benzamide (1j) was prepared by following the same procedure for the synthesis of **1a** (72% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.00 (s, 2H), 6.97 (br s, 1H), 5.22–5.17 (m, 1H), 4.99 (t, J = 7.2 Hz, 2H), 4.60 (t, J = 6.4 Hz, 2H), 3.86 (s, 9H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 153.2, 141.1, 129.0, 104.4, 78.4, 60.9, 56.2, 45.4 ppm.

IR (thin film) 3445, 2954, 2885, 2839, 1638, 1586, 1499, 1339, 1237, 1126, 968, 872 cm^{-1}.

HRMS (CI+) Calcd for $C_{13}H_{18}NO_5$ $[M + H]^+$: 268.1185, Found: 268.1190.



1k

2,6-Difluoro-*N*-(oxetan-3-yl)benzamide (1k) was prepared by following the same procedure for the synthesis of **1a** (75% yield, white solid).

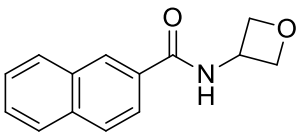
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41−7.34 (m, 1H), 6.97−6.92 (m, 2H), 6.80 (br s, 1H), 5.26−5.17 (m, 1H), 4.97 (t, J = 7.2 Hz, 2H), 4.57 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.0 (dd, J_1 = 251.0 Hz, J_2 = 6.6 Hz), 159.9, 132.0 (t like, J = 10.2 Hz), 113.5 (t like, J = 19.3 Hz), 111.9 (dt, J_1 = 20.1 Hz, J_2 = 2.7 Hz), 78.2, 45.2 ppm.

^{19}F NMR (376.5 MHz, $CDCl_3$) δ −112.1 ppm.

IR (thin film) 3260, 3074, 2965, 2875, 1632, 1560, 1470, 1238, 1009, 973, 885, 794 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{10}F_2NO_2$ $[M + H]^+$: 214.0680, Found: 214.0686.



1l

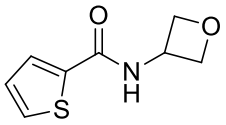
***N*-(Oxetan-3-yl)-2-naphthamide (1l)** was prepared by following the same procedure for the synthesis of **1a** (97% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 1H), 7.90–7.82 (m, 4H), 7.59–7.52 (m, 2H), 7.06 (br s, 1H), 5.34–5.26 (m, 1H), 5.04 (t, J = 7.2 Hz, 2H), 4.67 (t, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 167.2, 134.9, 132.5, 130.9, 128.9, 128.6, 127.9, 127.8, 127.6, 126.9, 123.4, 78.6, 45.4 ppm.

IR (thin film) 3446, 3248, 3060, 2965, 2881, 1621, 1545, 1301, 1033, 823, 772, 728 cm^{-1}.

HRMS (CI+) Calcd for $C_{14}H_{14}NO_2$ $[M + H]^+$: 228.1025, Found: 228.1026.



1m

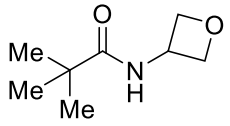
***N*-(Oxetan-3-yl)thiophene-2-carboxamide (1m)** was prepared by following the same procedure for the synthesis of **1a** (90% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (dd, J_1 = 3.6 Hz, J_2 = 0.8 Hz, 1H), 7.49 (dd, J_1 = 4.8 Hz, J_2 = 0.8 Hz, 1H), 7.07 (dd, J_1 = 4.8 Hz, J_2 = 3.6 Hz, 1H), 7.05 (br s, 1H), 5.24–5.17 (m, 1H), 4.97 (t, J = 7.2 Hz, 2H), 4.62 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.5, 138.1, 130.6, 128.6, 127.7, 78.3, 45.2 ppm.

IR (thin film) 3286, 3083, 2959, 2870, 1626, 1555, 1316, 1184, 958, 868, 723, 673 cm^{-1}.

HRMS (CI+) Calcd for $C_8H_{10}NO_2S$ $[M + H]^+$: 184.0432, Found: 184.0440.



1n

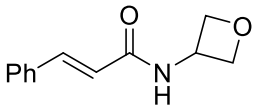
***N*-(Oxetan-3-yl)pivalamide (1n)** was prepared by following the same procedure for the synthesis of **1a** (76% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.24 (br s, 1H), 5.01–4.89 (m, 3H), 4.45 (t, J = 6.4 Hz, 2H), 1.19 (s, 9H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 178.2, 78.5, 44.9, 38.5, 27.4 ppm.

IR (thin film) 3305, 3051, 2969, 2876, 1633, 1529, 1220, 970, 735, 642 cm^{-1}.

HRMS (CI+) Calcd for $C_8H_{16}NO_2$ $[M + H]^+$: 158.1181, Found: 158.1180.



1o

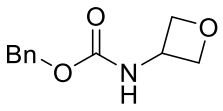
***N*-(Oxetan-3-yl)cinnamamide (1o)** was prepared by following the same procedure for the synthesis of **1a** (89% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, J = 14.6 Hz, 1H), 7.50–7.45 (m, 2H), 7.36–7.34 (m, 3H), 6.61 (br s, 1H), 6.45 (d, J = 14.6 Hz, 1H), 5.23–5.16 (m, 1H), 4.98 (t, J = 7.2 Hz, 2H), 4.58 (t, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.5, 142.0, 134.5, 129.9, 128.8, 127.8, 119.7, 78.5, 44.9 ppm.

IR (thin film) 3445, 3274, 2954, 2875, 1624, 1561, 1355, 1232, 978, 860, 728, 675 cm^{-1}.

HRMS (CI+) Calcd for $C_{12}H_{14}NO_2$ $[M + H]^+$: 204.1025, Found: 204.1024.



1p

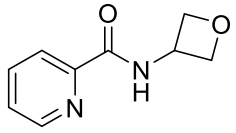
Benzyl oxetan-3-ylcarbamate (1p) was prepared by following the same procedure for the synthesis of **1a** (75% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37–7.31 (m, 5H), 5.58 (br s, 1H), 5.10 (s, 2H), 4.87 (br s, 3H), 4.49 (br s, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 155.3, 136.1, 128.5, 128.2, 128.1, 78.6, 66.9, 46.1 ppm.

IR (thin film) 3516, 3310, 3067, 2960, 2881, 1704, 1541, 1262, 1045, 971, 743, 699 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_3$ $[M + H]^+$: 208.0974, Found: 208.0976.



1t

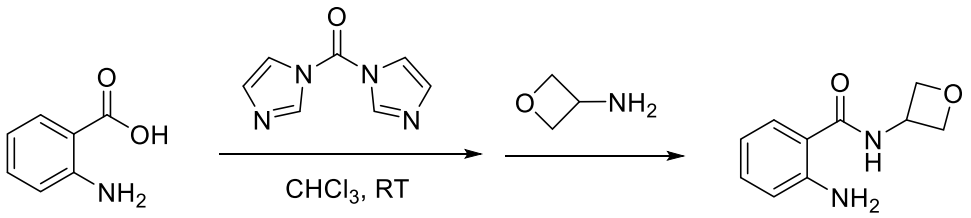
***N*-(Oxetan-3-yl)picolinamide (1t)** was prepared by following the same procedure for the synthesis of **1i** (64% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (d, J = 4.4 Hz, 2H), 8.17 (d, J = 7.6 Hz, 1H), 7.85 (td, J_1 = 8.0 Hz, J_2 = 1.6 Hz, 1H), 7.47–7.44 (m, 1H), 5.31–5.24 (m, 1H), 5.00 (t, J = 7.2 Hz, 2H), 4.68 (t, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 163.8, 149.2, 148.1, 137.5, 126.5, 122.3, 78.5, 44.5 ppm.

IR (thin film) 3448, 3333, 3056, 2953, 2885, 1658, 1528, 967, 752, 692 cm^{-1}.

HRMS (CI+) Calcd for $C_9H_{11}N_2O_2$ $[M + H]^+$: 179.0821, Found: 179.0815.



1q

2-Amino-*N*-(oxetan-3-yl)benzamide (1q). A mixture of 2-aminobenzoic acid (823 mg, 6.0 mmol) and 1,1'-carbonyldiimidazole (973 mg, 6.0 mmol) in chloroform (20 mL) was stirred at room temperature for 1 h. Then, a solution of oxetan-3-amine (439 mg, 6.0 mmol) in chloroform (5 mL) was added dropwise. After stirring overnight, the mixture was diluted with CH_2Cl_2 (40 mL), washed with water (2×20 mL) and brine (20 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure.

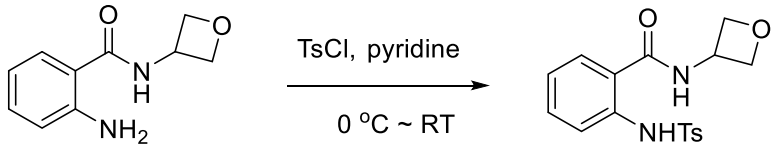
The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1q** (63% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36 (dd, J_1 = 7.6 Hz, J_2 = 1.2 Hz, 1H), 7.23 (td, J_1 = 6.8 Hz, J_2 = 1.6 Hz, 1H), 6.69–6.65 (m, 2H), 6.60 (br s, 1H), 5.54 (br s, 2H), 5.22–5.13 (m, 1H), 5.00 (t, J = 7.2 Hz, 2H), 4.59 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.9, 148.9, 132.8, 127.1, 117.5, 116.7, 114.9, 78.6, 45.0 ppm.

IR (thin film) 3453, 3256, 2945, 1625, 1530, 1258, 970, 731, 681 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{13}N_2O_2$ $[M + H]^+$: 193.0977, Found: 193.0979.



1q **1r**

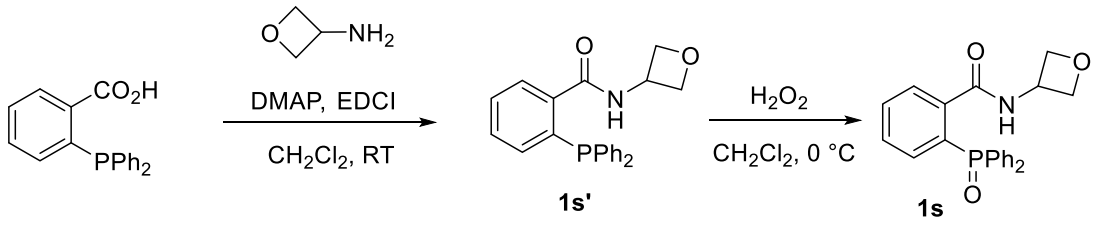
2-(4-Methylphenylsulfonamido)-*N*-(oxetan-3-yl)benzamide (1r). At 0 °C, to a stirred solution of **1q** (288 mg, 1.5 mmol) in anhydrous pyridine (5 mL) was added *p*-tosyl chloride (343 mg, 1.8 mmol) in three portions. After stirring at room temperature overnight, the mixture was diluted with ethyl acetate (30 mL), and washed with HCl aqueous solution (2 M, 2×15 mL), water (15 mL), and brine (15 mL). The organic layer was dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1r** (88% yield, white solid).

^{1}H NMR (400 MHz, acetone-d_6) δ 11.16 (s, 1H), 8.51 (br s, 1H), 7.73 (dd, J_1 = 8.0 Hz, J_2 = 1.2 Hz, 1H), 7.69–7.62 (m, 3H), 7.48 (td, J_1 = 7.6 Hz, J_2 = 1.6 Hz, 1H), 7.30 (dd, J_1 = 8.8 Hz, J_2 = 0.8 Hz, 2H), 7.12 (td, J_1 = 7.6 Hz, J_2 = 0.8 Hz, 1H), 5.08–5.04 (m, 1H), 4.83 (t, J = 7.2 Hz, 2H), 4.58 (t, J = 6.8 Hz, 2H), 2.34 (s, 3H) ppm.

^{13}C NMR (100 MHz, acetone-d_6) δ 169.1, 144.8, 140.2, 137.7, 133.6, 130.6, 128.9, 128.0, 124.5, 122.0, 121.8, 77.9, 46.2, 21.5 ppm.

IR (thin film) 3410, 2964, 2883, 1635, 1537, 1332, 1264, 1158, 934, 760 cm^{-1}.

HRMS (CI+) Calcd for $C_{17}H_{19}N_2O_4S$ $[M + H]^+$: 347.1066, Found: 347.1042.



2-(Diphenylphosphino)-*N*-(oxetan-3-yl)benzamide (1s'). To a stirred solution of 2-(diphenylphosphino)benzoic acid (306 mg, 1.0 mmol), EDCI (230 mg, 1.2 mmol), and DMAP (6.1 mg, 5 mol%) in anhydrous CH_2Cl_2 (10 mL) was added a solution of oxetan-3-amine (81 mg, 1.1 mmol) in anhydrous CH_2Cl_2 (2 mL). After stirring at room temperature overnight, the mixture was quenched with saturated NH_4Cl aqueous solution (5 mL) and diluted with CH_2Cl_2 (10 mL). The organic layer was separated, washed with water (2×10 mL) and brine (10 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1s'** (78% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63–7.60 (m, 1H), 7.39–7.27 (m, 12H), 6.96–6.93 (m, 1H), 6.67 (br s, 1H), 5.06–4.97 (m, 1H), 4.79 (t, J = 7.2 Hz, 2H), 4.29 (t, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 140.3 (d, J = 24.3 Hz), 136.4 (d, J = 9.9 Hz), 135.8 (d, J = 20.1 Hz), 133.88 (d, J = 20.0 Hz), 133.93, 130.5, 129.1, 128.8, 128.7 (d, J = 7.2 Hz), 128.2, 128.1, 78.0, 45.0 ppm.

IR (thin film) 3265, 3058, 2962, 2877, 1642, 1537, 1298, 971, 744, 696 cm^{-1}.

HRMS (CI+) Calcd for $C_{22}H_{21}NO_2P$ $[M + H]^+$: 362.1310, Found: 362.1315.

2-(Diphenylphosphoryl)-*N*-(oxetan-3-yl)benzamide (1s). At 0 °C, to a stirred solution of 2-(diphenylphosphino)-*N*-(oxetan-3-yl)benzamide **1s'** (222 mg, 0.62 mmol) in CH_2Cl_2 (5 mL) was added 35% H_2O_2 (0.5 mL). After stirring at 0 °C for 1 hour, the mixture was quenched with saturated $Na_2S_2O_3$ aqueous solution (2 mL) and diluted with CH_2Cl_2 (10 mL). The organic layer was separated, washed with water (2×10 mL)

and brine (10 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by flash column chromatography (DCM/MeOH = 20:1) to afford **1s** (196 mg, 85% yield, white solid).

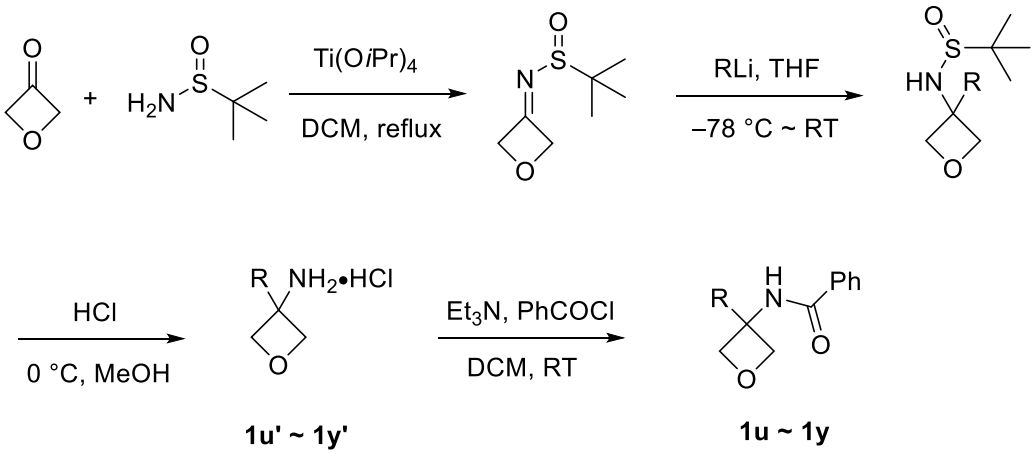
^{1}H NMR (400 MHz, $CDCl_3$) δ 9.65 (d, J = 4.8 Hz, 1H), 8.03 (q, J = 4.0 Hz, 1H), 7.69–7.36 (m, 12H), 7.04 (dd, J_1 = 14.4 Hz, J_2 = 7.6 Hz, 1H), 4.69–4.54 (m, 3H), 4.34 (t, J = 6.0 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8 (d, J = 14.8 Hz), 140.2 (d, J = 31.2 Hz), 133.4 (d, J = 47.6 Hz), 132.7 (d, J = 8.4 Hz), 132.6 (d, J = 10.8 Hz), 132.1 (d, J = 37.6 Hz), 131.7 (d, J = 39.2 Hz), 131.4, 130.3 (d, J = 23.2 Hz), 130.1, 129.6, 128.9 (d, J = 49.2 Hz), 128.6, 77.3, 45.3 ppm.

^{31}P NMR (162 MHz, $CDCl_3$) δ 36.51 ppm.

IR (thin film) 3230, 3056, 2960, 2878, 1650, 1543, 1437, 1302, 1118, 722, 693 cm^{-1}.

HRMS (CI+) Calcd for $C_{22}H_{21}NO_3P$ $[M + H]^+$: 378.1259, Found: 378.1265.



The precursors **1u′** ~ **1y′** were synthesized according to the reported procedure.[1] Their spectroscopic data were consistent with those reported in the literature. The starting materials **1u** ~ **1y** were synthesized by following the same procedure for the synthesis of **1i**.

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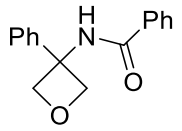
[1] P. J. Hamzik and J. D. Brubaker, *Org. Lett.* **2010**, *12*, 1116−1119.



1u

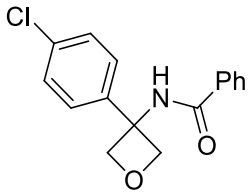
***N*-(3-Phenyloxetan-3-yl)benzamide (1u)** was prepared from **1u′** by following the same procedure for the synthesis of **1a** (65% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, J = 7.2 Hz, 2H), 7.57–7.49 (m, 3H), 7.46–7.34 (m, 4H), 7.33–7.24 (m, 1H), 7.17 (s, 1H), 5.10 (d, J = 6.8 Hz, 2H), 4.95 (d, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6, 141.3, 133.6, 132.0, 128.7 (2C), 127.6, 127.0, 124.8, 83.0, 59.2 ppm.

IR (thin film) 3300, 2960, 1636, 1527, 1489, 1265, 982, 732, 698 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{16}NO_2$ $[M + H]^+$: 254.1181, Found: 254.1183.



1v

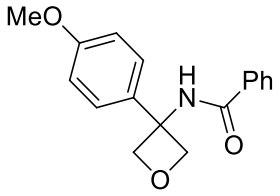
***N*-(3-(4-Chlorophenyl)oxetan-3-yl)benzamide (1v)** was prepared from **1v′** by following the same procedure for the synthesis of **1a** (75% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 7.2 Hz, 2H), 7.55 (t, J = 7.6 Hz, 1H), 7.50–7.39 (m, 4H), 7.33 (d, J = 8.4 Hz, 2H), 7.16 (s, 1H), 5.07 (d, J = 6.8 Hz, 2H), 4.90 (d, J = 6.8 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6, 139.9, 133.5, 133.3, 132.1, 128.8, 128.7, 127.0, 126.3, 82.9, 58.9 ppm

IR (thin film) 3283, 2960, 1633, 1526, 1484, 1310, 1098, 980, 826, 734, 692 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{15}ClNO_2$ $[M + H]^+$: 288.0791, Found: 288.0790.



1w

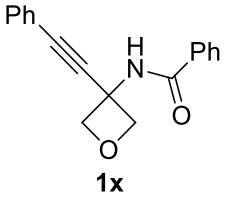
***N*-(3-(4-Methoxyphenyl)oxetan-3-yl)benzamide (1w)** was prepared from **1w′** by following the same procedure for the synthesis of **1a** (82% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 7.2 Hz, 2H), 7.53–7.36 (m, 5H), 7.28–7.22 (m, 1H), 6.88 (d, J = 6.4 Hz, 2H), 5.08 (d, J = 6.4 Hz, 2H), 4.91 (d, J = 6.4 Hz, 2H), 3.79 (s, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6, 158.9, 133.7, 133.5, 131.9, 128.6, 127.0, 126.1, 114.0, 83.0, 58.9, 55.3 ppm.

IR (thin film) 3318, 2956, 1628, 1531, 1478, 1248, 1030, 982, 735, 715 cm^{-1}.

HRMS (CI+) Calcd for $C_{17}H_{18}NO_3$ $[M + H]^+$: 284.1287, Found: 284.1276.



1x

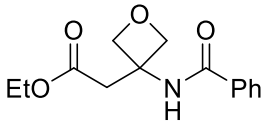
***N*-(3-(Phenylethynyl)oxetan-3-yl)benzamide (1x)** was prepared from **1x′** by following the same procedure for the synthesis of **1a** (78% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, J = 7.2 Hz, 2H), 7.55–7.24 (m, 8H), 7.14 (s, 1H), 5.05 (d, J = 6.4 Hz, 2H), 5.00 (d, J = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 133.4, 132.0, 131.8, 128.6, 128.5, 128.2, 127.1, 122.2, 87.7, 84.4, 81.7, 50.4 ppm.

IR (thin film) 3289, 2957, 1636, 1520, 1487, 1293, 985, 756, 699 cm^{-1}.

HRMS (CI+) Calcd for $C_{18}H_{16}NO_2$ $[M + H]^+$: 278.1181, Found: 278.1168.



1y

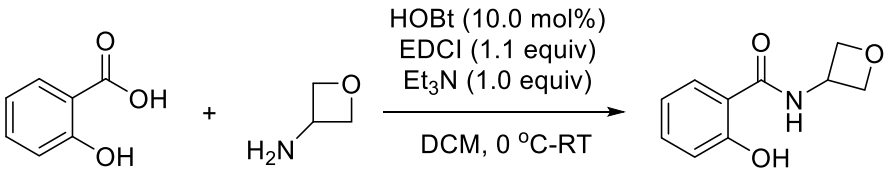
Ethyl 2-(3-Benzamidooxetan-3-yl)acetate (1y) was prepared from **1y'** by following the same procedure for the synthesis of **1a** (74% yield, yellow oil).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76–7.70 (m, 2H), 7.52–7.43 (m, 1H), 7.42–7.33 (m, 2H), 7.18 (s, 1H), 4.84 (d, J = 7.2 Hz, 2H), 4.61 (d, J = 7.2 Hz, 2H), 4.08 (q, J = 7.2 Hz , 2H), 3.27 (s, 2H), 1.20 (t, J = 7.2 Hz, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 171.2, 166.6, 133.6, 131.7, 128.5, 126.9, 80.2, 60.7, 54.5, 39.7, 14.0 ppm.

IR (thin film) 3305, 2979, 1726, 1638, 1524, 1482, 1196, 1027, 731, 692 cm^{-1}.

HRMS (CI+) Calcd for $C_{14}H_{18}NO_4$ $[M + H]^+$: 264.1236, Found: 264.1228.



1z

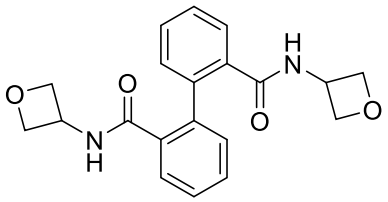
2-Hydroxy-*N*-(oxetan-3-yl)benzamide (1z). At 0 °C, to a solution of oxetan-3-amine (2.0 mL, 28.6 mmol), salicylic acid (3.60 g, 26 mmol), HOBt (354 mg, 2.6 mmol), and Et_3N (3.6 mL, 26 mmol) in CH_2Cl_2 (75 mL) was added a solution of EDCI (5.48 g, 28.6 mmol) in CH_2Cl_2 (75 mL). After stirring at 6 °C for 12 h, CH_2Cl_2 was removed in vacuo and the residue was dissolved in EtOAc (100 mL). The resulting solution was washed with an aqueous solution of HCl (80 mL, 1 M), a saturated aqueous solution of $NaHCO_3$ (2 × 100 mL), and brine (100 mL), dried over Na_2SO_4 and concentrated. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1z** (4.1 g, 82% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 12.0 (s, 1H), 7.46-7.38 (m, 2H), 7.01-6.85 (m, 3H), 5.25-5.15 (m, 1H), 5.03 (t, J = 7.2 Hz, 2H), 4.64 (t, J = 6.4 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.7, 161.6, 134.7, 125.5, 118.8, 118.7, 113.6, 78.1, 45.0 ppm.

IR (thin film) 3329, 2960, 2882, 1635, 1593, 1545, 1493, 1378, 1231, 955 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{12}NO_3$ $[M + H]^+$: 194.0812, Found: 194.0811.



3a

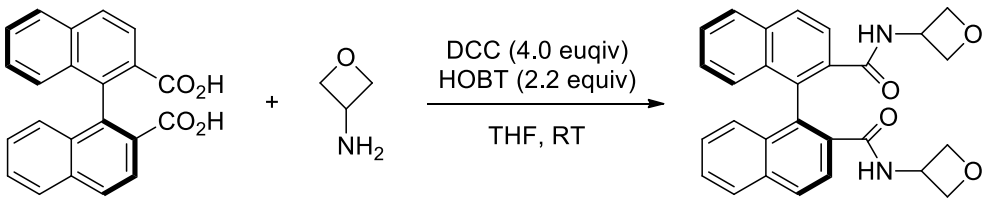
***N*²,*N*²′-Di(oxetan-3-yl)-[1,1'-biphenyl]-2,2'-dicarboxamide (3a)** was prepared by following the same procedure for the synthesis of **1i** (white solid, 80% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10-7.98 (m, 2H), 7.58-7.52 (m, 2H), 7.45-7.34 (m, 4H), 7.10-7.01 (m, 2H), 4.97-4.88 (m, 2H), 4.82-4.74 (m, 2H), 4.73-4.66 (m, 2H), 4.34 (t, J = 6.4 Hz 2H), 3.98 (t, J = 6.4 Hz 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.6, 138.9, 135.5, 129.9, 129.4, 128.1, 126.9, 78.0, 77.9, 44.8 ppm.

IR (thin film) 3490, 3242, 3056, 2960, 2876, 1634, 1545, 1484, 1329, 972, 879, 758, 731 cm^{-1}.

HRMS (CI+) Calcd for $C_{20}H_{21}N_2O_4$ $[M + H]^+$: 353.1501, Found: 353.1495.



3b

(*S*)-*N*²,*N*²′-Di(oxetan-3-yl)-[1,1'-binaphthalene]-2,2'-dicarboxamide (3b). To a stirred solution of (*S*)-[1,1'-binaphthalene]-2,2'-dicarboxylic acid (513 mg, 1.5 mmol), DCC (810 mg, 6.0 mmol), and HOBT (680 mg, 3.3 mmol) in anhydrous THF (20 mL) was added a solution of oxetan-3-amine (243 mg, 3.3 mmol) in anhydrous THF (4 mL). After stirring at room temperature overnight, the mixture was quenched with

saturated NH_4Cl aqueous solution (10 mL) and diluted with CH_2Cl_2 (20 mL). The layers were separated, and the organic layer was washed with water (2×20 mL) and brine (20 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by flash column chromatography (1→3% MeOH in DCM) to afford the pure amide **3b** (500 mg, 73% yield, white solid).

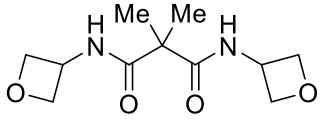
$[\alpha]_D^{25}$ = –250.0 (*c* 1.0, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 8.4 Hz, 2H), 7.93 (d, *J* = 8.4 Hz, 2H), 7.78 (d, *J* = 8.0 Hz, 2H), 7.69 (d, *J* = 8.4 Hz, 2H), 7.52 (td, J_1 = 7.2 Hz, J_2 = 0.8 Hz, 2H), 7.32 (td, J_1 = 8.4 Hz, J_2 = 1.2 Hz, 2H), 7.21 (d, *J* = 8.4 Hz, 2H), 4.53 (t, *J* = 6.8 Hz, 2H), 4.52 (t, *J* = 6.8 Hz, 2H), 3.85 (t, *J* = 6.4 Hz, 2H), 3.76 (t, *J* = 6.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.9, 134.5, 134.0, 133.0, 132.1, 129.2, 128.9, 127.5, 127.4, 126.2, 123.4, 77.8, 44.5 ppm.

IR (thin film) 3238, 3055, 2958, 2875, 1636, 1549, 971 cm^{-1}.

HRMS (CI+) Calcd for $C_{28}H_{25}N_2O_4$ $[M + H]^+$: 453.1809, Found: 453.1806.



3c

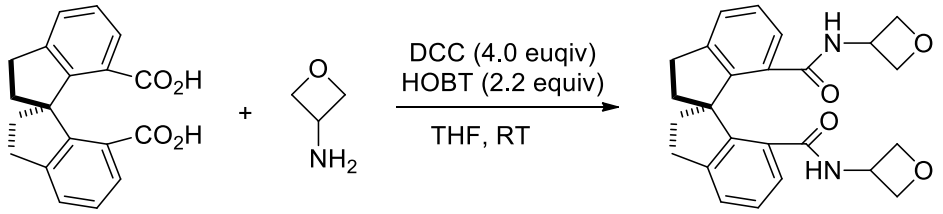
2,2-Dimethyl-*N*^{1},*N*^{3}-di(oxetan-3-yl)malonamide (3c) was prepared by following the same procedure for the synthesis of **1i** (white solid, 25% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.19 (d, *J* = 4.8 Hz, 2H), 5.01-4.87 (m, 6H), 4.47 (t, *J* = 6.4 Hz, 4H), 1.47 (s, 6H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 173.1, 78.1, 49.0, 45.1, 23.9 ppm.

IR (thin film) 3292, 3039, 2968, 2873, 1633, 1519, 1274, 1206, 970 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{19}N_2O_4$ $[M + H]^+$: 243.1339, Found: 243.1355.



3d

(*R*)-*N*^{7},*N*$^{7'}$-Di(oxetan-3-yl)-2,2',3,3'-tetrahydro-1,1'-spirobi[indene]-7,7'-dicarboxamide (3d). To a stirred solution of (*R*)-2,2',3,3'-tetrahydro-1,1'-spirobi[indene]-7,7'-dicarboxylic acid (185 mg, 0.6 mmol), DCC (495 mg, 2.4 mmol), and HOBT (270 mg, 1.32 mmol) in anhydrous THF (10 mL) was added oxetan-3-amine (96 mg, 1.32 mmol) in anhydrous THF (2 mL). After stirring at room temperature overnight, the mixture was quenched with saturated NH_4Cl aqueous solution (5 mL) and diluted with CH_2Cl_2 (10 mL). The layers were separated, and the organic layer was washed with water (2×10 mL) and brine (10 mL), dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by flash column chromatography (1→3% MeOH in DCM) to afford the pure amide **3d** (253 mg, 95% yield, white solid).

$[\alpha]_D^{25}$ = +73.5 (*c* 1.0, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32–7.19 (m, 6H), 7.08 (d, *J* = 7.2 Hz, 2H), 4.67 (t, *J* = 6.8 Hz, 2H), 4.60-4.46 (m, 4H), 4.19 (t, *J* = 6.0 Hz, 2H), 3.89 (d, *J* = 6.0 Hz, 2H), 3.09-2.94 (m, 4H), 2.50-2.38 (m, 2H), 2.37-2.27 (m, 2H) ppm.

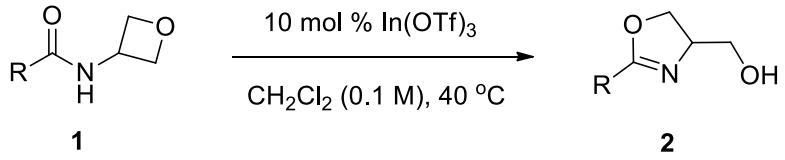
^{13}C NMR (100 MHz, $CDCl_3$) δ 170.0, 144.7, 144.6, 133.7, 127.2, 125.8, 125.7, 77.4, 61.4, 44.6, 40.1, 30.5 ppm.

IR (thin film) 3245, 3058, 2932, 1637, 1538, 1268, 1113, 968 cm^{-1}.

HRMS (CI+) Calcd for $C_{25}H_{27}N_2O_4$ $[M + H]^+$: 419.1965, Found: 419.1979.

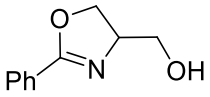
III. Catalytic Synthesis of Oxazolines

General Procedure A.



1 **2**

At room temperature under N_2, to a solution of oxetane **1** (0.50 mmol) in dichloromethane (5.0 mL) was added indium(III) trifluoromethanesulfonate (28.1 mg, 10 mol%). The mixture was heated to 40 °C and kept stirring at the same temperature for a specified period of time before it was quenched with an aqueous solution of NaOH (3 mL, 10% solution) and stirred for 10 min. The mixture was then diluted with water (5 mL), and extracted with dichloromethane (2×15 mL). The combined organic layers were washed with water and brine, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography to afford the desired oxazoline **2**.



2a

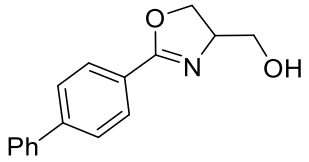
(2-Phenyl-4,5-dihydrooxazol-4-yl)methanol (2a) was prepared from oxetane **1a** (reaction time: 24 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes→EtOAc, 82.6 mg, white solid, 93% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (d, J = 8.4 Hz, 2H), 7.43–7.38 (m, 1H), 7.30 (t, J = 7.6 Hz, 2H), 4.44–4.38 (m, 1H), 3.37–4.30 (m, 2H), 4.08 (br s, 1H), 3.92 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.64 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.4, 131.4, 128.2, 128.1, 127.0, 69.2, 67.9, 63.5 ppm.

IR (thin film) 3380, 2912, 1645, 1455, 1363, 1100, 1060, 967, 695 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{12}NO_2$ $[M + H]^+$: 178.0868, Found: 178.0866.



2b

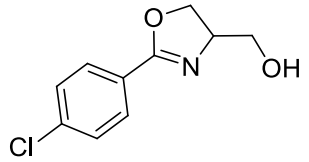
(2-([1,1'-Biphenyl]-4-yl)-4,5-dihydrooxazol-4-yl)methanol (2b) was prepared from oxetane **1k** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 5% MeOH in dichloromethane, 111.5 mg, white solid, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (d, J = 8.4 Hz, 2H), 7.61–7.56 (m, 4H), 7.46 (t, J = 7.6 Hz, 2H), 7.38 (t, J = 7.2 Hz, 1H), 4.53–4.36 (m, 3H), 4.00 (dd, J_1 = 11.6 Hz, J_2 = 2.8 Hz, 1H), 3.69 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.31 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.4, 144.2, 140.1, 128.9, 128.8, 127.9, 127.1, 126.9, 126.0, 69.2, 68.1, 63.9 ppm.

IR (thin film) 3419, 1638, 1480, 1400, 1371, 1094, 1068, 979, 848, 737, 690 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{16}NO_2$ $[M + H]^+$: 254.1181, Found: 254.1187.



2c

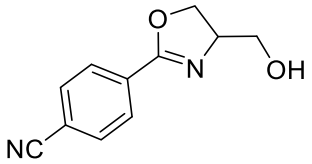
(2-(4-Chlorophenyl)-4,5-dihydrooxazol-4-yl)methanol (2c) was prepared from oxetane **1c** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 97.6 mg, white solid, 92% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, J = 8.4 Hz, 2H), 7.31 (d, J = 8.8 Hz, 2H), 4.49 (dd, J_1 = 8.8 Hz, J_2 = 6.4 Hz, 1H), 4.44–4.34 (m, 2H), 3.97 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.65 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.24 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.7, 137.8, 129.7, 128.6, 125.5, 69.4, 68.0, 63.6 ppm.

IR (thin film) 3428, 3034, 2905, 1639, 1403, 1355, 1266, 1085, 958, 837, 732 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}ClNO_2$ $[M + H]^+$: 212.0478, Found: 212.0481.



2d

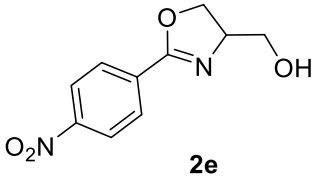
4-(4-(Hydroxymethyl)-4,5-dihydrooxazol-2-yl)benzonitrile (2d) was prepared from oxetane **1f** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 89.4 mg, white solid, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (d, J = 8.4 Hz, 2H), 7.62 (d, J = 8.4 Hz, 2H), 4.52 (dd, J_1 = 8.8 Hz, J_2 = 6.4 Hz, 1H), 4.47–4.37 (m, 2H), 3.97 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.67 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.15 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 163.8, 132.0, 131.1, 128.8, 118.0, 114.9, 69.6, 68.2, 63.4 ppm.

IR (thin film) 3429, 2915, 2228, 1641, 1408, 1361, 1091, 963, 852, 675 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{11}N_2O_2$ $[M + H]^+$: 203.0821, Found: 203.0820.



2e

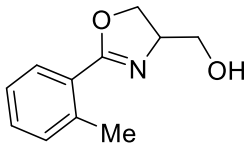
(2-(4-Nitrophenyl)-4,5-dihydrooxazol-4-yl)methanol (2e) was prepared from oxetane **1g** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 5% MeOH in dichloromethane, 100.1 mg, white solid, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (d, J = 8.8 Hz, 2H), 8.05 (d, J = 8.8 Hz, 2H), 4.57 (dd, J_1 = 9.6 Hz, J_2 = 7.2 Hz, 1H), 4.52–4.47 (m, 1H), 4.43 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.99 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.70 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 2.79 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 163.7, 149.6, 132.8, 129.4, 123.5, 69.7, 68.3, 63.6 ppm.

IR (thin film) 3406, 3236, 2924, 1649, 1600, 1522, 1346, 1265, 1093, 860, 693 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}N_2O_4$ $[M + H]^+$: 223.0719, Found: 223.0716.



2f

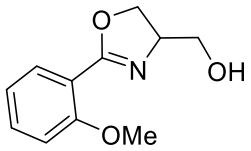
(2-(*o*-Tolyl)-4,5-dihydrooxazol-4-yl)methanol (2f) was prepared from oxetane **1h** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes→EtOAc, 86.4 mg, colorless oil, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 (d, J = 8.0 Hz, 1H), 7.33–7.29 (m, 1H), 7.20–7.16 (m, 2H), 4.40–4.34 (m, 2H), 4.25–4.18 (m, 1H), 3.78 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.61 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.56 (br s, 1H), 2.49 (s, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.2, 138.4, 131.0, 130.6, 129.7, 126.8, 125.5, 68.9, 68.1, 63.9, 21.4 ppm.

IR (thin film) 3411, 2926, 1728, 1641, 1456, 1356, 1255, 1047, 965, 732 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_2$ $[M + H]^+$: 192.1025, Found: 192.1033.



2g

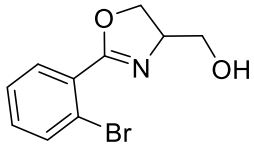
(2-(2-Methoxyphenyl)-4,5-dihydrooxazol-4-yl)methanol (2g) was prepared from oxetane **1i** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 86.1 mg, colorless oil, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 (d, J = 8.0 Hz, 1H), 7.42–7.37 (m, 1H), 6.95–6.92 (m, 2H), 4.44–4.38 (m, 2H), 4.23 (t, J = 6.4 Hz, 1H), 3.89–3.84 (m, 4H), 3.63 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.56 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.0, 158.3, 132.5, 131.1, 120.2, 116.4, 111.5, 68.7, 68.3, 64.0, 55.8 ppm.

IR (thin film) 3455, 2939, 2844, 1720, 1641, 1538, 1490, 1360, 1249, 1050, 968 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_3$ $[M + H]^+$: 208.0974, Found: 208.0976.



2h

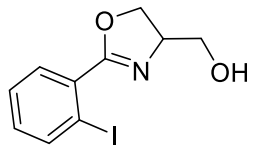
(2-(2-Bromophenyl)-4,5-dihydrooxazol-4-yl)methanol (2h) was prepared from oxetane **1d** (reaction time: 30 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 108.9 mg, white solid, 85% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61–7.59 (m, 2H), 7.33–7.23 (m, 2H), 4.47–4.37 (m, 2H), 4.28 (t, J = 6.0 Hz, 1H), 3.81 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.62 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.32 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.8, 133.6, 131.8, 131.1, 129.4, 127.1, 121.6, 69.7, 68.2, 63.7 ppm.

IR (thin film) 3392, 2928, 1653, 1472, 1433, 1360, 1106, 1035, 956, 762 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}BrNO_2$ $[M + H]^+$: 255.9973, Found: 255.9976.



2i

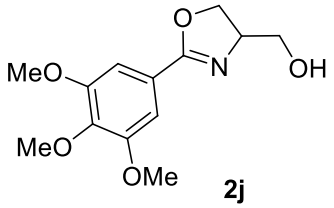
(2-(2-Iodophenyl)-4,5-dihydrooxazol-4-yl)methanol (2i) was prepared from oxetane **1e** (reaction time: 48 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 122.6 mg, white solid, 81% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (d, J = 7.6 Hz, 1H), 7.59 (dd, J_1 = 7.6 Hz, J_2 = 1.6 Hz, 1H), 7.37 (td, J_1 = 7.6 Hz, J_2 = 1.2 Hz, 1H), 7.12 (td, J_1 = 7.6 Hz, J_2 = 1.6 Hz, 1H), 4.52–4.45 (m, 2H), 4.35–4.32 (m, 1H), 3.92 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.67 (dd, J_1 = 11.6 Hz, J_2 = 4.4 Hz, 1H), 2.61 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.0, 140.3, 133.2, 131.8, 130.5, 127.9, 94.8, 69.7, 68.3, 64.0 ppm.

IR (thin film) 3378, 2927, 1729, 1653, 1469, 1429, 1359, 1246, 1103, 1045, 955, 760 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}INO_2$ $[M + H]^+$: 303.9834, Found: 303.9832.



2j

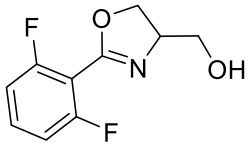
(2-(3,4,5-Trimethoxyphenyl)-4,5-dihydrooxazol-4-yl)methanol (2j) was prepared from oxetane **1j** (reaction time: 16 h) according to the General Procedure A (purification by flash column chromatography: 5% MeOH in dichloromethane, 115.0 mg, white solid, 86% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.03 (s, 2H), 4.46–4.43 (m, 1H), 4.41–4.33 (m, 2H), 4.24 (br s, 1H), 4.00 (dd, J_1 = 11.6 Hz, J_2 = 2.8 Hz, 1H), 3.83 (s, 9H), 3.63 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.3, 152.7, 140.7, 121.9, 105.4, 69.2, 67.8, 63.3, 60.8, 56.0 ppm.

IR (thin film) 3382, 2941, 2842, 1643, 1588, 1505, 1463, 1371, 1234, 1123, 989, 855 cm^{-1}.

HRMS (CI+) Calcd for $C_{13}H_{18}NO_5$ $[M + H]^+$: 268.1185, Found: 268.1178.



2k

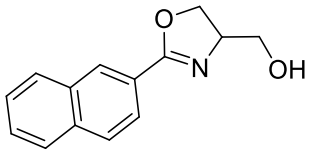
(2-(2,6-Difluorophenyl)-4,5-dihydrooxazol-4-yl)methanol (2k) was prepared from oxetane **1b** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 93.2 mg, white solid, 87% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40–7.35 (m, 1H), 6.93 (td, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 2H), 4.51–4.43 (m, 2H), 4.36–4.31 (m, 1H), 3.86 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.66 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 2.95 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ161.0 (dd, J_1 = 254.6 Hz, J_2 = 5.8 Hz), 158.1, 132.4 (t like, J = 10.4 Hz), 111.9 (dt, J_1 = 20.2 Hz, J_2 = 2.5 Hz), 106.9 (t like, J = 17.4 Hz), 69.5, 68.2, 63.7 ppm.

IR (thin film) 3407, 2913, 1663, 1473, 1358, 1247, 1106, 1055, 1011, 795 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{10}F_2NO_2$ $[M + H]^+$: 214.0680, Found: 214.0675.



2l

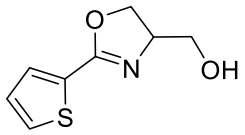
(2-(Naphthalen-2-yl)-4,5-dihydrooxazol-4-yl)methanol (2l) was prepared from oxetane **1l** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 102.3 mg, white solid, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 (s, 1H), 7.87 (dd, J_1 = 8.4 Hz, J_2 = 1.2 Hz , 1H), 7.79 (d, J = 8.0 Hz, 1H), 7.69 (t, J = 8.4 Hz, 2H), 7.52 (t, J = 7.2 Hz, 1H), 7.42 (t, J = 7.6 Hz, 1H), 4.53–4.43 (m, 3H), 4.06 (dd, J_1 = 12.0 Hz, J_2 = 2.0 Hz, 1H), 3.87 (br s, 1H), 3.72 (dd, J_1 = 12.0 Hz, J_2 = 2.8 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.7, 134.6, 132.4, 129.0, 128.9, 127.9, 127.6 (2C), 126.4, 124.5, 124.1, 69.3, 68.0, 63.6 ppm.

IR (thin film) 3446, 2866, 1640, 1472, 1375, 1103, 1067, 966, 750 cm^{-1}.

HRMS (CI+) Calcd for $C_{14}H_{14}NO_2$ $[M + H]^+$: 228.1025, Found: 228.1022.



2m

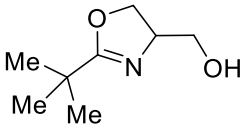
(2-(Thiophen-2-yl)-4,5-dihydrooxazol-4-yl)methanol (2m) was prepared from oxetane **1m** (reaction time: 36 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes→EtOAc, 82.4 mg, colorless oil, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dd, J_1 = 3.6 Hz, J_2 = 1.2 Hz, 1H), 7.43 (dd, J_1 = 5.2 Hz, J_2 = 1.2 Hz, 1H), 7.03 (dd, J_1 = 5.2 Hz, J_2 = 3.6 Hz, 1H), 4.48 (dd, J_1 = 8.8 Hz, J_2 = 6.4 Hz, 1H), 4.43–4.34 (m, 2H), 3.94 (dd, J_1 = 11.6 Hz, J_2 = 3.2 Hz, 1H), 3.66 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 3.01 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.1, 130.8, 130.1, 129.6, 127.5, 69.7, 68.1, 63.5 ppm.

IR (thin film) 3375, 3104, 2919, 1642, 1525, 1430, 1372, 1061, 1032, 954, 851, 721 cm^{-1}.

HRMS (CI+) Calcd for $C_8H_{10}NO_2S$ $[M + H]^+$: 184.0432, Found: 184.0440.



2n

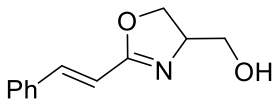
(2-(*tert*-Butyl)-4,5-dihydrooxazol-4-yl)methanol (2n) was prepared from oxetane **1o** (reaction time: 24 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes→EtOAc, 73.9 mg, colorless oil, 94% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.26 (dd, J_1 = 9.6 Hz, J_2 = 7.6 Hz , 1H), 4.19–4.13 (m, 1H), 4.05 (t like, J = 7.6 Hz, 1H), 3.69 (dd, J_1 = 11.2 Hz, J_2 = 4.4 Hz , 1H), 3.54 (dd, J_1 = 11.2 Hz, J_2 = 4.8 Hz , 1H), 3.38 (br s, 1H), 1.18 (s, 9H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 176.2, 69.5, 67.4, 64.1, 33.3, 27.8 ppm.

IR (thin film) 3383, 2972, 2919, 1645, 1473, 1358, 1153, 1052, 977 cm^{-1}.

HRMS (CI+) Calcd for $C_8H_{16}NO_2$ $[M + H]^+$: 158.1181, Found: 158.1186.



2o

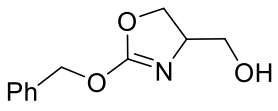
(*E*)-(2-Styryl-4,5-dihydrooxazol-4-yl)methanol (2o) was prepared from oxetane **1n** in DCE with 20 mol% of $In(OTf)_3$ at 60 °C according to the General Procedure A (reaction time: 24 h, purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 100.4 mg, white solid, 99% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35–7.29 (m, 5H), 7.24 (d, J = 16.4 Hz, 1H), 6.54 (d, J = 16.0 Hz, 1H), 4.47 (br s, 1H), 4.43–4.29 (m, 3H), 3.92 (d, J = 10.0 Hz, 1H), 3.62 (d, J_1 = 9.6 Hz, J_2 = 2.0 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 140.6, 134.9, 129.5, 128.7, 127.5, 114.3, 68.9, 67.8, 63.3 ppm.

IR (thin film) 3410, 2909, 1653, 1607, 1370, 1264, 1053, 984, 760, 690 cm^{-1}.

HRMS (CI+) Calcd for $C_{12}H_{14}NO_2$ $[M + H]^+$: 204.1025, Found: 204.1031.



2p

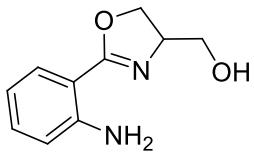
(2-(Benzyloxy)-4,5-dihydrooxazol-4-yl)methanol (2p) was prepared from oxetane **1p** (reaction time: 24 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes, 85.2 mg, colorless oil, 82% yield). The reaction was quenched with Et_3N (0.5 mL) instead of aqueous solution of NaOH.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36–7.28 (m, 5H), 6.61 (br s, 1H), 4.51 (s, 2H), 4.39 (t, J = 8.8 Hz, 1H), 4.12 (dd, J_1 = 8.8 Hz, J_2 = 4.8 Hz, 1H), 4.01–3.95 (m, 1H), 3.44 (dd, J_1 = 6.4 Hz, J_2 = 1.2 Hz, 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 159.9, 137.3, 128.3, 127.8, 127.6, 73.3, 71.3, 67.2, 51.7 ppm.

IR (thin film) 3291, 2916, 2864, 1753, 1411, 1233, 1108, 1031, 939, 745, 703 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{14}NO_3$ $[M + H]^+$: 208.0974, Found: 208.0971.



2q

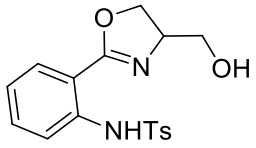
(2-(2-Aminophenyl)-4,5-dihydrooxazol-4-yl)methanol (2q) was prepared from oxetane **1q** (reaction time: 18 h) according to the General Procedure A (purification by flash column chromatography: 50% EtOAc in hexanes→EtOAc, 86.3 mg, pale yellow oil, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (d, J = 8.4 Hz, 1H), 7.20 (td, J_1 = 7.6 Hz, J_2 = 1.6 Hz , 1H), 6.69–6.65 (m, 2H), 4.85 (br s, 3H), 4.46–4.40 (m, 1H), 4.33 (dd, J_1 = 8.0 Hz, J_2 = 4.0 Hz, 1H), 4.18 (t, J = 8.0 Hz, 1H), 3.82 (dd, J_1 = 11.6 Hz, J_2 = 4.0 Hz, 1H), 3.61 (dd, J_1 = 11.2 Hz, J_2 = 4.4 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.4, 148.4, 132.3, 129.7, 116.3, 115.8, 108.9, 68.0, 67.5, 64.2 ppm.

IR (thin film) 3376, 2934, 1633, 1524, 1257, 1160, 1100, 1047, 971, 749, 693 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{13}N_2O_2$ $[M + H]^+$: 193.0977, Found: 193.0976.



2r

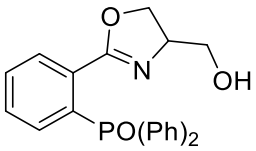
***N*-(2-(4-(Hydroxymethyl)-4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzenesulfonamide (2r)** was prepared from oxetane **1r** (reaction time: 24 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 161.3 mg, white solid, 93% yield). The reaction was quenched with Et_3N (0.5 mL) instead of aqueous solution of NaOH.

^{1}H NMR (400 MHz, $CDCl_3$) δ 12.1 (br s, 1H), 7.74–7.71 (m, 3H), 7.65 (d, J = 8.4 Hz, 1H), 7.35 (td, J_1 = 8.4 Hz, J_2 = 1.6 Hz , 1H), 7.19 (d, J = 8.4 Hz, 2H), 7.01 (td, J_1 = 8.0 Hz, J_2 = 0.8 Hz , 1H), 4.53–4.48 (m, 1H), 4.40 (dd, J_1 = 9.6 Hz, J_2 = 8.0 Hz, 1H), 4.28 (t, J = 8.0 Hz, 1H), 3.87 (dd, J_1 = 11.6 Hz, J_2 = 4.4 Hz, 1H), 3.73 (dd, J_1 = 11.2 Hz, J_2 = 4.0 Hz, 1H), 2.35 (s, 3H), 2.15 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.1, 143.7, 139.1, 136.7, 132.6, 129.5 (2C), 127.0, 122.6, 118.3, 113.5, 68.3, 67.7, 63.9, 21.4 ppm.

IR (thin film) 3527, 2916, 1634, 1593, 1502, 1335, 1269, 1159, 1058, 952, 762 cm^{-1}.

HRMS (CI+) Calcd for $C_{17}H_{19}N_2O_4S$ $[M + H]^+$: 347.1066, Found: 347.1076.



2s

(2-(4-(Hydroxymethyl)-4,5-dihydrooxazol-2-yl)phenyl)diphenylphosphine oxide (2s) was prepared from oxetane **1s** (0.3 mmol scale) in DCE with 10 mol% of $In(OTf)_3$ at 60 °C according to the General Procedure A (reaction time: 48 h, purification by flash column chromatography: DCM/MeOH = 25/1, 79 mg, white solid, 70% yield).

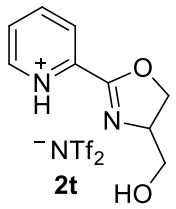
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82-7.75 (m, 1H), 7.70-7.34 (m, 12H), 7.09 (dd, J_1 = 14.0 Hz, J_2 = 7.6 Hz, 1H), 5.53 (brs, 1H), 4.60-4.53 (m, 1H), 4.34-4.25 (m, 1H), 4.21-4.13 (m, 1H), 3.89-3.82 (m, 1H), 3.47-3.40 (m, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 163.8, 133.4 (d, J = 48.4 Hz), 133.8 (d, J = 139.6 Hz), 133.2 (d, J = 20.8 Hz), 132.7 (d, J = 134.8 Hz), 132.2 (d, J = 38.0 Hz), 132.0, 131.8 (dd, J_1 = 16.8, J_2 = 11.2 Hz), 131.5 (d, J = 10.4 Hz), 130.9 (d, J = 40.4 Hz), 130.6 (d, J = 34.0 Hz), 129.5 (d, J = 50.4 Hz), 128.5 (d, J = 9.2 Hz), 128.4 (d, J = 12.8 Hz), 69.4, 69.0, 63.5 ppm.

IR (thin film) 3290, 2926, 1663, 1588, 1482, 1437, 1354, 1177, 1111, 1043, 721, 694 cm^{-1}.

^{31}P NMR (162 MHz, $CDCl_3$) δ 33.54 ppm.

HRMS (CI+) Calcd for $C_{22}H_{21}N_2O_3P$ $[M + H]^+$: 378.1259, Found: 378.1242.



2t

2-(4-(Hydroxymethyl)-4,5-dihydrooxazol-2-yl)pyridin-1-ium bis((trifluoromethyl) sulfonyl)amide (2t) was prepared from oxetane **1t** in DCM with one equivalent of $HNTf_2$ at 40 °C according to the General Procedure A (reaction time: 12 h, purification by flash column chromatography: DCM/MeOH = 10:1, 115 mg, oil, 50% yield).

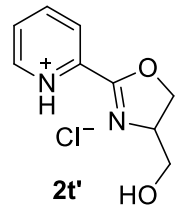
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67-8.61 (m, 1H), 7.96-7.90 (m, 1H), 7.77-7.69 (m, 1H), 7.39-7.32 (m, 1H), 4.60-4.38 (m, 3H), 3.97 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz 1H), 3.70 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.3, 149.7, 146.1, 136.7, 125.7, 123.9, 69.9, 68.4, 63.9 ppm.

^{19}F NMR (376 MHz, $CDCl_3$) δ –78.88 ppm.

IR (thin film) 3314, 2906, 1734, 1642, 1583, 1470, 1362, 1105, 1043, 959, 800, 724, 678 cm^{-1}.

HRMS (CI+) Calcd for $C_9H_{11}N_2O_2$ $[M – NTf_2]^+$: 179.0821, Found: 179.0831.



2t'

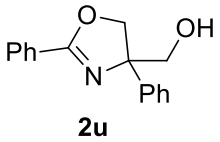
2-(4-(Hydroxymethyl)-4,5-dihydrooxazol-2-yl)pyridin-1-ium chloride (2t') was prepared from oxetane **1t** in DCE with 2.5 equivalents of HCl (4 M in MeOH) in place of $In(OTf)_3$ at 60 °C according to the General Procedure A (reaction time: 72 h, purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 43 mg, oil, 48% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57-8.45 (m, 2H), 8.16 (d, J = 7.6 Hz 1H), 7.88-7.80 (m, 1H), 7.47-7.40 (m, 1H), 4.48-4.38 (m, 1H), 4.02-3.93 (m, 1H), 3.92-3.76 (m, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.6, 149.2, 148.2, 137.4, 126.5, 122.4, 61.8, 51.8, 43.9 ppm.

IR (thin film) 3368, 2954, 1662, 1580, 1517, 1464, 1045, 906, 725, 698 cm^{-1}.

HRMS (CI+) Calcd for $C_9H_{12}ClN_2O_2$ $[M + H]^+$: 215.0593, Found: 215.0596.



2u

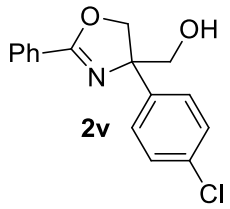
(2,4-Diphenyl-4,5-dihydrooxazol-4-yl)methanol (2u) was prepared from oxetane **1u** (reaction time: 22 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 117 mg, white solid, 92% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06-7.97 (m, 2H), 7.52 (t, J = 7.2 Hz, 1H), 7.49-7.34 (m, 6H), 7.32-7.26 (m, 1H), 4.87 (d, J = 8.0 Hz 1H), 4.54 (d, J = 8.0 Hz, 1H), 3.94 (d, J = 11.6 Hz, 1H), 3.76 (d, J = 11.6 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.1, 143.6, 131.7, 128.6, 128.5, 128.3, 127.4, 127.0, 125.7, 80.0, 75.3, 68.8 ppm.

IR (thin film) 3179, 2896, 1645, 1579, 1493, 1083, 978, 764, 693 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{16}NO_2$ $[M + H]^+$: 254.1181, Found: 254.1187.



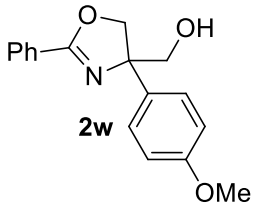
(4-(4-Chlorophenyl)-2-phenyl-4,5-dihydrooxazol-4-yl)methanol (2v) was prepared from oxetane **1v** (reaction time: 22 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 138 mg, white solid, 96% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94-7.88 (m, 2H), 7.47 (t, J = 7.2 Hz, 1H), 7.42-7.28 (m, 6H), 4.86 (d, J = 8.0 Hz 1H), 4.46 (d, J = 8.0 Hz, 1H), 3.89 (d, J = 11.6 Hz, 1H), 3.70 (d, J = 11.6 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 142.2, 133.3, 131.7, 128.7, 128.5, 128.3, 127.2, 126.9, 77.7, 75.1, 68.7 ppm.

IR (thin film) 3211, 2896, 1649, 1571, 1493, 1400, 1067, 977, 689 cm^{-1}.

HRMS (CI+) Calcd for $C_{16}H_{15}ClNO_2$ $[M + H]^+$: 288.0791, Found: 288.0785.



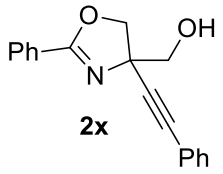
(4-(4-Methoxyphenyl)-2-phenyl-4,5-dihydrooxazol-4-yl)methanol (2w) was prepared from oxetane **1w** (reaction time: 22 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 151 mg, white solid, 95% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97-7.90 (m, 2H), 7.48 (t, J = 7.2 Hz, 1H), 7.41-7.28 (m, 4H), 6.92-6.86 (m, 2H), 4.86 (d, J = 8.0 Hz 1H), 4.50 (d, J = 8.0 Hz, 1H), 3.93 (d, J = 12.0 Hz, 1H), 3.79 (s, 3H), 3.72 (d, J = 12.0 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 165.0, 158.8, 135.7, 131.6, 128.5, 128.3, 127.0, 126.8, 114.0, 77.5, 75.5, 68.8, 55.3 ppm.

IR (thin film) 3196, 2957, 1642, 1579, 1510, 1450, 1244, 1025, 734, 692 cm^{-1}.

HRMS (CI+) Calcd for $C_{17}H_{18}NO_3$ $[M + H]^+$: 284.1287, Found: 284.1284.



2x

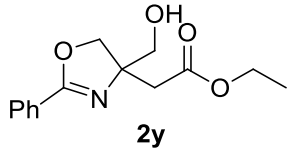
(2-Phenyl-4-(phenylethynyl)-4,5-dihydrooxazol-4-yl)methanol (2x) was prepared from oxetane **1x** (reaction time: 22 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 134 mg, white solid, 97% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03-7.95 (m, 2H), 7.52-7.36 (m, 5H), 7.34-7.26 (m, 3H), 4.69 (d, J = 8.0 Hz 1H), 4.62 (d, J = 8.0 Hz, 1H), 4.03 (d, J = 11.6 Hz, 1H), 3.79 (d, J = 11.6 Hz, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.3, 131.9, 131.8, 128.6, 128.5, 128.3, 128.2, 126.7, 122.2, 88.1, 85.7, 74.8, 70.2, 67.2 ppm.

IR (thin film) 3237, 2902, 1642, 1578, 1490, 1449, 1062, 755, 687 cm^{-1}.

HRMS (CI+) Calcd for $C_{18}H_{16}NO_2$ $[M + H]^+$: 278.1181, Found: 278.1178.



2y

Ethyl 2-(4-(hydroxymethyl)-2-phenyl-4,5-dihydrooxazol-4-yl)acetate (2y) was prepared from oxetane **1y** (reaction time: 22 h) according to the General Procedure A (purification by flash column chromatography: 67% EtOAc in hexanes→EtOAc, 103 mg, yellow oil, 79% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85-7.80 (m, 2H), 7.44 (t, J = 7.2 Hz, 1H), 7.37-7.30 (m, 2H), 4.48 (dd, J_1 = 13.6 Hz, J_2 = 8.8 Hz 2H), 4.10 (q, J = 7.2 Hz, 2H), 3.82 (d, J = 11.6 Hz,

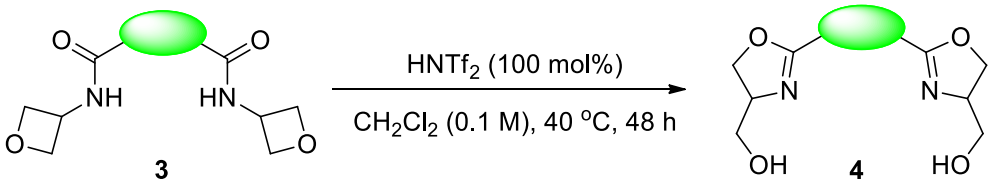
1H), 3.65 (d, *J* = 11.6 Hz, 1H), 2.81 (d, *J* = 15.6 Hz, 1H), 2.66 (d, *J* = 15.6 Hz, 1H), 1.20 (t, *J* = 7.2 Hz, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 165.1, 131.6, 128.4, 128.2, 127.0, 73.20, 73.1, 67.0, 60.7, 40.9, 14.1 ppm.

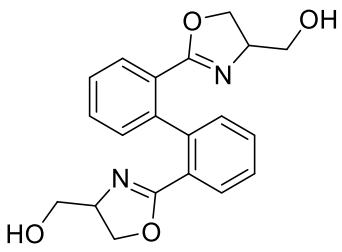
IR (thin film) 3300, 2982, 1727, 1643, 1580, 1497, 1466, 1450, 1026, 974, 732, 697 cm^{-1}.

HRMS (CI+) Calcd for $C_{14}H_{18}NO_4$ $[M + H]^+$: 264.1236, Found: 264.1225.

General Procedure B.



To a solution of oxetane **3** (0.50 mmol) in dichloromethane (5.0 mL) was added triflimide (141 mg, 100 mol%). After stirring at 40 °C for 48 h, the reaction was quenched with an aqueous solution of NaOH (3 mL, 10%) followed by stirring for 10 min. The mixture was then diluted with water (5 mL) and extracted with dichloromethane (2×15 mL). The combined extracts were washed with water and brine, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography to afford the desired oxazoline **4**.



4a

[1,1'-Biphenyl]-2,2'-diylbis(4,5-dihydrooxazole-2,4-diyl))dimethanol (4a) was prepared from oxetane **3a** (reaction time: 72 h) according to the General Procedure A (purification by flash column chromatography: DCM/MeOH = 30:1, 89 mg, white solid, 50% yield, > 20:1 *dr*).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58-7.48 (m, 4H), 7.46-7.36 (m, 4H), 4.23-4.01 (m, 6H), 3.90 (t, J = 8.0 Hz, 2H), 3.60 (dd, J_1 = 12.8 Hz, J_2 = 2.8 Hz, 2H) ppm.

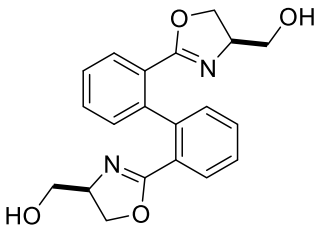
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 140.1, 130.3, 129.3 (2C), 128.5, 127.8, 68.7, 67.8, 61.4 ppm.

IR (thin film) 3216, 2902, 1653, 1598, 1497, 1468, 1444, 1356, 1110, 1038, 953, 771, 732, 698 cm^{-1}.

HRMS (CI+) Calcd for $C_{20}H_{21}N_2O_4$ $[M + H]^+$: 353.1501, Found: 353.1495.

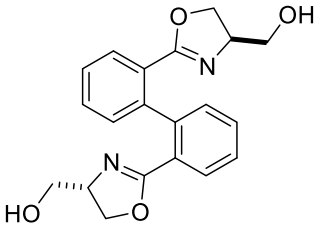
Notes to determination of the relative stereochemistry:

The following two possible isomers regarding relative stereochemistry are possible. (±)-**4a** and *meso*-**4a** both have symmetry and thus degeneracy are expected for both structures. Therefore, both structures are possible for this product.



(±)-**4a**

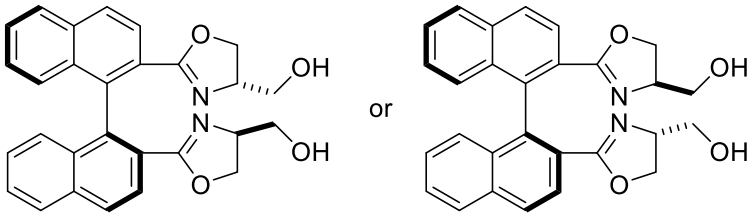
C_2 symmetry



meso-**4a**

plane symmetry

Degeneracy expected for NMR spectra for both structures



(S_a,4*S*,4'*S*)-**4b** (S_a,4*R*,4'*R*)-**4b**

((4*S*,4'*S*)/(4*R*,4'*R*)-((*S*)-[1,1'-Binaphthalene]-2,2'-diyl)bis(4,5-dihydrooxazole-2,4-diyl))dimethanol (4b) was prepared from oxetane **3b** according to the general procedure B (purification by flash column chromatography: DCM/MeOH = 100:1 → 50:1, 99.6 mg, white solid, 44% yield, single isomer). [2]

$[\alpha]_D^{25}$ = +63.0 (c 1.0, $CHCl_3$).

^{1}H NMR (400 MHz, acetone-d_6) δ 8.08 (t, J = 8.8 Hz 4H), 7.69 (d, J = 8.4 Hz 2H), 7.63-7.56 (m, 2H), 7.41-7.35 (m, 2H), 7.24 (d, J = 8.4 Hz 2H), 4.17-4.10 (m, 2H), 3.95 (dd, J_1 = 10.0 Hz, J_2 = 8.0 Hz 2H), 3.85 (dd, J_1 = 12.4 Hz, J_2 = 2.0 Hz 2H), 3.54 (t, J = 8.0 Hz 2H), 3.21 (dd, J_1 = 12.4 Hz, J_2 = 3.2 Hz 2H) ppm.

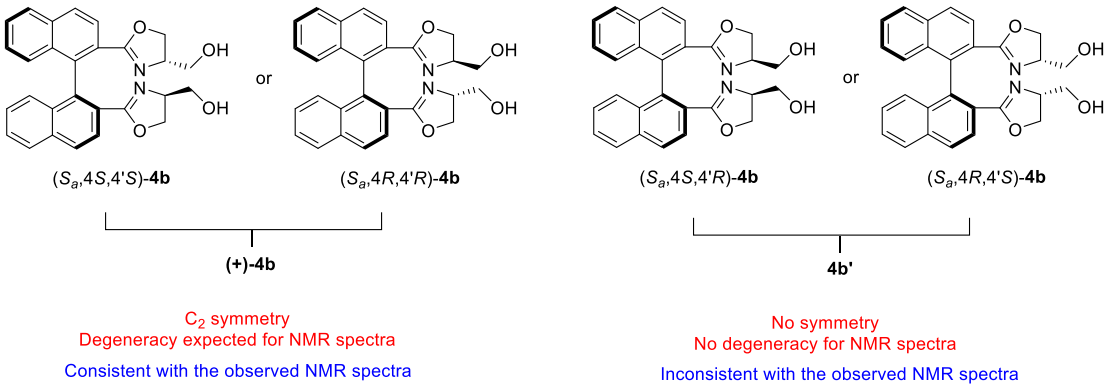
^{13}C NMR (100 MHz, acetone-d_6) δ 168.3, 136.4, 134.3, 133.1, 128.8, 128.5, 127.8, 127.6, 127.5, 127.2, 126.5, 69.0, 68.4, 61.5 ppm.

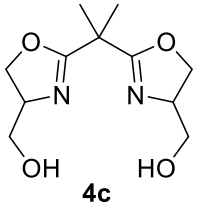
IR (thin film) 3181, 2929, 2863, 1653, 1328, 1193, 1134, 1055, 975 cm^{-1}.

HRMS (CI+) Calcd for $C_{28}H_{25}N_2O_4$ $[M + H]^+$: 453.1814, Found: 453.1809.

Notes to determination of the relative stereochemistry:

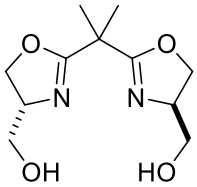
There are four possible diastereomers for **4b**: (S_a, 4*S*, 4'*S*), (S_a, 4*R*, 4'*R*), (S_a, 4*S*, 4'*R*) and (S_a, 4*S*, 4'*R*). The former two structures have C_2-symmetry and thus degeneracy should be expected from the NMR spectra, particularly ^{13}C NMR spectra. For the latter two, there is no symmetry and their NMR spectra should have more peaks.





4c

(2,2'-(Propane-2,2-diyl)bis(4,5-dihydrooxazole-4,2-diyl))dimethanol (4c) was prepared from oxetane **3c** according to the general procedure B (purification by flash column chromatography: DCM/MeOH = 20:1 → 12:1, 115 mg, white solid, 95% yield, 1:1 *dr*). The two diastereomers can be separated on silica gel.



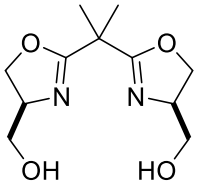
(±)-**4c**

^{1}H NMR (400 MHz, acetone-d_6) δ 4.36-4.28 (m, 2H), 4.18-4.16 (m, 4H), 3.67-3.60 (m, 2H), 3.53 (dd, J_1 = 10.8 Hz, J_2 = 4.4 Hz, 2H), 1.46 (s, 6H) ppm.

^{13}C NMR (100 MHz, acetone-d_6) δ 170.9, 70.4, 68.1, 64.3, 39.4, 24.0 ppm.

IR (thin film) 3282,2986, 2938, 1651, 1470, 1352, 1265, 1192, 1120, 1059, 976 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{19}N_2O_4$ $[M + H]^+$: 243.1345, Found: 243.1350.



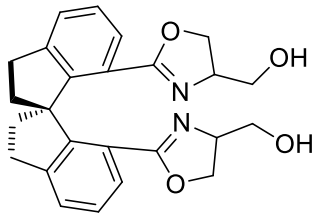
meso-**4c**

^{1}H NMR (400 MHz, acetone-d_6) δ 4.34-4.26 (m, 2H), 4.24-4.14 (m, 4H), 3.58 (dd, J_1 = 10.8 Hz, J_2 = 4.0 Hz, 2H), 3.52 (dd, J_1 = 11.2 Hz, J_2 = 4.0 Hz, 2H), 1.48 (s, 3H), 1.42 (s, 3H) ppm.

^{13}C NMR (100 MHz, acetone-d_6) δ 170.7, 70.4, 67.9, 64.3, 39.2, 24.6, 23.0 ppm.

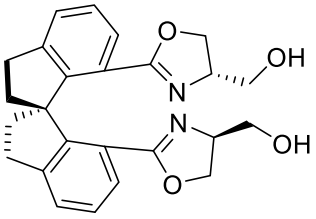
IR (thin film) 3279, 2989, 2941, 1651, 1470, 1348, 1266, 1190, 1130, 1056, 977 cm^{-1}.

HRMS (CI+) Calcd for $C_{11}H_{19}N_2O_4$ $[M + H]^+$: 243.1345, Found: 243.1350.

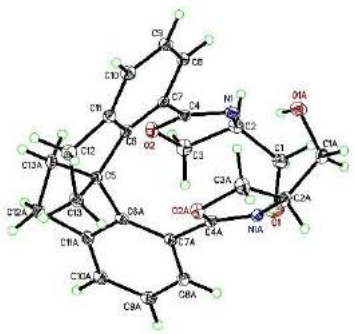


4d

(2,2'-((*R*)-2,2',3,3'-Tetrahydro-1,1'-spirobi[indene]-7,7'-diyl)bis(4,5-dihydrooxazole-4,2-diyl))dimethanol (4d) was prepared from oxetane **3d** in DCM with one equivalent of $HNTf_2$ at 40 °C according to the general procedure B (reaction time: 48 h, purification by flash column chromatography: DCM/MeOH = 30:1 → 20:1, 183 mg, white solid, 89% yield, 1:1 *dr*). The two diastereomers can be separated on silica gel.



(R_a,4*S*,4'*S*)-**4d**



(R_a,4*S*,4′*S*)-((2,2',3,3'-Tetrahydro-1,1'-spirobi[indene]-7,7'-diyl)bis(4,5-dihydrooxazole-2,4-diyl))dimethanol.

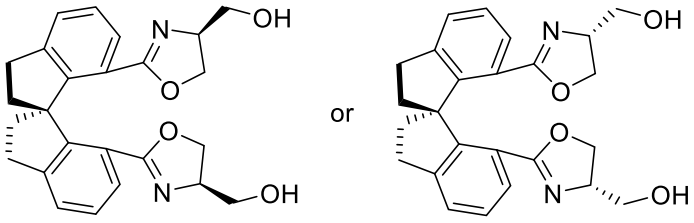
$[\alpha]_D^{25}$ = +215.0 (*c* 1.0, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 7.6 Hz, 2H), 7.41 (d, *J* = 7.6 Hz, 2H), 7.25 (t, *J* = 7.6 Hz, 2H), 5.83 (br s, 2H), 4.09 (d, *J* = 13.6 Hz, 2H), 4.06-3.96 (m, 4H), 3.31 (dd, J_1 = 12.4 Hz, J_2 = 2.8 Hz, 2H), 3.13-2.92 (m, 6H), 2.47-2.36 (m, 2H), 2.27 (dd, J_1 = 11.6 Hz, J_2 = 6.8 Hz 2H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 148.1, 144.7, 130.5, 127.7, 126.3, 122.2, 68.4, 67.1, 62.6, 60.9, 38.5, 30.4 ppm.

IR (thin film) 3221,2931, 2851, 1641, 1447, 1353, 1271, 1113, 1062, 952 cm^{-1}.

HRMS (CI+) Calcd for $C_{25}H_{27}N_2O_4$ $[M + H]^+$: 419.1971, Found: 419.1955.



(R_a,4*S*,4'*R*)-**4d** (R_a,4*R*,4'*S*)-**4d**

(R_a,4*S*,4′*R*)/(R_a,4*R*,4′*S*)-((2,2',3,3'-tetrahydro-1,1'-spirobi[indene]-7,7'-diyl) bis(4,5-dihydrooxazole-2,4-diyl))dimethanol.[2]

$[\alpha]_D^{25}$ = +177.6 (*c* 1.0, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64 (d, *J* = 7.6 Hz, 1H), 7.51 (d, *J* = 7.6 Hz, 1H), 7.38 (t like, *J* = 6.8 Hz, 2H), 7.64 (td, J_1 = 7.6 Hz, J_2 = 2.0 Hz, 2H), 4.06-3.99 (m, 1H), 3.97-3.85 (m, 4H), 3.40-3.30 (m, 2H), 3.27 (dd, J_1 = 12.0 Hz, J_2 = 4.0 Hz, 1H), 3.15-2.87 (m, 6H), 2.54-2.41 (m, 2H), 2.32-2.20 (m, 2H) ppm.

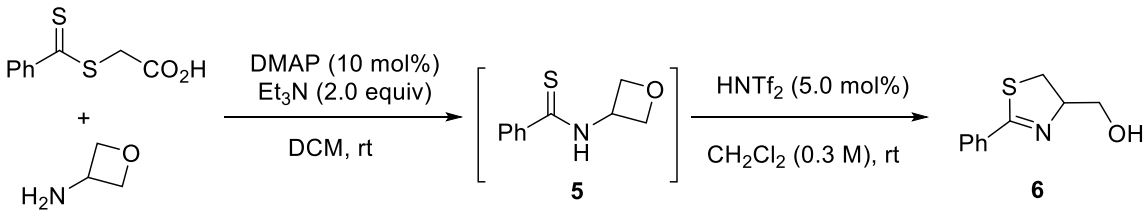
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 166.0, 148.5, 148.3, 145.3, 144.6, 128.9, 128.7, 127.3, 127.2, 126.2, 126.1, 123.4, 122.7, 68.8, 68.3, 67.3, 66.9, 63.7, 62.9, 62.3, 38.3, 38.2, 30.5, 30.4 ppm.

IR (thin film) 3256, 2939, 1643, 1363, 1267, 1113, 1055, 978 cm^{-1}.

HRMS (CI+) Calcd for $C_{25}H_{27}N_2O_4$ $[M + H]^+$: 419.1971, Found: 419.1973.

Notes to determination of the relative stereochemistry:

X-Ray crystallography confirmed the relative stereochemistry of one diastereomer. For the other diastereomer, similar to the case of **4b**, the absence of degeneracy in ^{13}C NMR indicated that both (R_a,4*S*,4′*R*) and (R_a,4*R*,4′*S*) are possible.



(2-Phenyl-4,5-dihydrothiazol-4-yl)methanol (**6**). At 0 °C, to a solution of oxetan-3-amine (0.23 mL, 3.3 mmol), DMAP (36.4 mg, 0.3 mmol), and Et_3N (0.83 mL, 6.0 mmol) in CH_2Cl_2 (10 mL) was added 2-((phenylcarbonothioyl)thio)acetic acid (636 mg, 3.0 mmol). After stirring at room temperature for 12 h, the resulting solution was washed with a saturated aqueous solution of NH_4Cl (20 mL). The layers were separated. Then the organic layer was treated with triflimide (42 mg, 5.0 mol%). After stirring for another 12 h, the reaction was quenched with an aqueous solution of $NaHCO_3$ (20 mL, 10%). The mixture was stirred for 10 min and then diluted with water (30 mL). The layers were separated, and the organic layer was extracted with dichloromethane (2×30 mL). The combined organic layers were washed with water and brine, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1a** (422 mg, 73% yield, yellow solid).

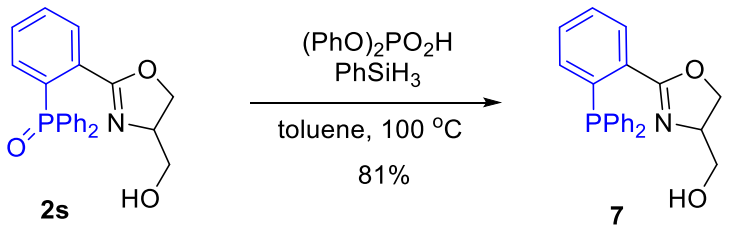
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 7.2 Hz, 2H), 7.50-7.44 (m, 1H), 7.39 (t, J = 8.0 Hz, 2H), 4.84-4.73 (m, 1H), 4.03 (dd, J_1 = 11.2 Hz, J_2 = 4.8 Hz, 1H), 3.79 (dd, J_1 = 11.2 Hz, J_2 = 45.6 Hz, 1H), 3.43 (dd, J_1 = 10.8 Hz, J_2 = 0.8 Hz, 1H), 3.32 (dd, J_1 = 10.8 Hz, J_2 = 1.2 Hz, 1H), 3.09 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 170.3, 132.6, 131.6, 128.5, 128.4, 79.0, 64.3, 34.3 ppm.

IR (thin film) 3351, 2935, 2869, 1600, 1488, 1444, 1317, 1260, 1054, 947 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{12}NOS$ $[M + H]^+$: 194.0634, Found: 194.0644.

IV. Product Derivatizations and Utility



(2-(2-(Diphenylphosphino)phenyl)-4,5-dihydrooxazol-4-yl)methanol (7). Under Ar, to an oven-dried 5-mL charged with $(PhO)_2PO_2H$ (5.1 mg, 0.02 mmol) and **2s** (75.5 mg, 0.2 mmol) were added dry toluene (1 mL) and $PhSiH_3$ (75 μL, 0.6 mmol). The mixture was stirred at 100 °C for overnight before it was cooled to 0 °C. Methanolic KOH (2 mL, 3N) was added slowly, and then the mixture was stirred vigorously for 3 h at room temperature. Next, water (3 mL) was added and the mixture was extracted by ethyl acetate. The organic layer was washed by an aqueous solution of HCl (1 M, 5 mL) followed by a saturated aqueous $NaHCO_3$ solution (5 mL). The organic layer was then dried over Na_2SO_4 and concentrated. The residue was purified by silica gel column chromatography (hexanes/EtOAc = 2:1) to give phosphine **7** as a white solid (61.0 mg, 81% yield).

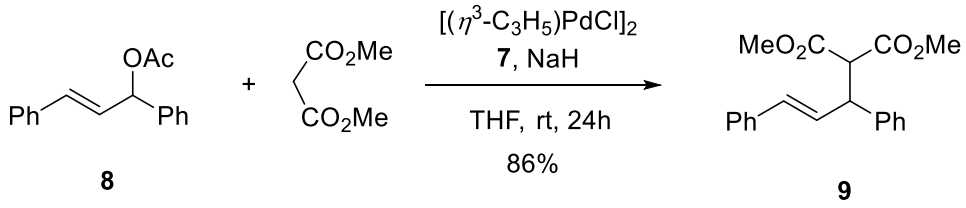
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93-7.87 (m, 1H), 7.42-7.24 (m, 12H), 6.97-6.92 (m, 1H), 4.38-4.28 (m, 2H), 4.17 (t, J = 6.4 Hz, 1H), 3.67 (dd, J_1 = 11.6 Hz, J_2 = 2.8 Hz, 1H), 3.30 (dd, J_1 = 11.6 Hz, J_2 = 3.6 Hz, 1H), 1.82 (br s, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.4 (d, J = 2.0 Hz), 138.8 (d, J = 22.0 Hz), 138.3 (d, J = 7.0 Hz), 137.4 (d, J = 9.0 Hz), 134.3 (d, J = 21.0 Hz), 133.3 (d, J = 20.0 Hz), 131.4 (d, J = 20.0 Hz), 130.7, 129.6 (d, J = 3.0 Hz), 128.7 (d, J = 12.6 Hz), 128.5 (d, J = 7.4 Hz), 128.3, 68.8, 68.4, 64.0 ppm.

^{31}P NMR (162 MHz, $CDCl_3$) δ –6.59 ppm.

IR (thin film) 3350, 3056, 2928, 1648, 1472, 1433, 1354, 1263, 1099, 1040 cm^{-1}.

HRMS (CI+) Calcd for $C_{22}H_{21}NO_2P$ $[M + H]^+$: 362.1310, Found: 362.1310.



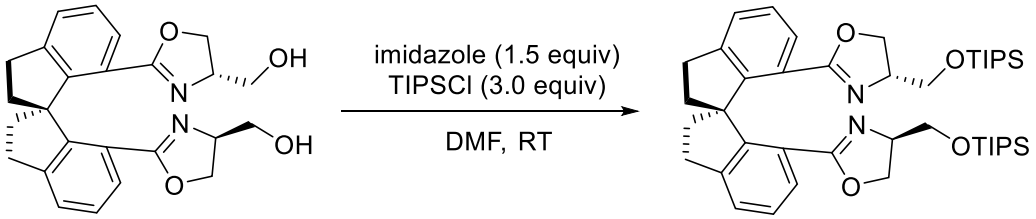
(*E*)-Dimethyl 2-(1,3-diphenylallyl)malonate (9). This procedure was based on literature.[2] Ligand **7** (3.7 mg, 0.01 mmol), [(η3-C_3H_5)-PdCl]$_2$ (1.9 mg, 0.005 mmol), and (*E*)-1,3-diphenylallyl acetate **8** (51.0 mg, 0.20 mmol) were dissolved in THF (1 mL), and stirred for 1 h at room temperature. In a separate flask, dimethyl malonate (55 μL, 0.48 mmol) was added dropwise to a suspension of NaH (19.0 mg, 0.48 mmol, 60% in mineral oil) in THF (2 mL). This suspension was cooled to 0 °C, and the above-prepared solution of electrophile was added slowly. The mixture was stirred at room temperature for 24 h and filtered through a pad of silica, which was washed with EtOAc. The filtrate was concentrated and then purified by flash chromatography on silica gel (hexanes/EtOAc = 20:1 to 15:1) to give product **9** as a colorless oil (55.9 mg, 86% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35-7.18 (m, 10H), 7.49 (d, J = 15.6 Hz, 1H), 6.34 (dd, J_1 = 16.0 Hz, J_2 = 8.8 Hz, 1H), 4.28 (dd, J_1 = 10.8 Hz, J_2 = 8.4 Hz, 1H), 3.97 (d, J = 10.8 Hz, 1H), 3.71 (s, 3H), 3.53 (s, 3H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.2, 167.7, 140.1, 136.8, 131.8, 129.1, 128.7, 128.4, 127.8, 127.5, 127.1, 126.4, 57.6, 52.6, 52.4, 29.2 ppm.

This product is a known compound. The characterization data match the literature.[2]

[2]. H. Aït-Haddou, O. Hoarau, D. Cramailÿe, F. Pezet, J. C. Daran and G. G. A. Balavoine, *Chem. Eur. J.* **2004**, *10*, 699–707.



(+)-**4d** **10**

(*R*)-7,7'-Bis((*S*)-4-(((triisopropylsilyl)oxy)methyl)-4,5-dihydro oxazol-2-yl)-2,2',3,3'-tetrahydro-1,1'-spirobi[indene] (10). To a solution of **4d** (70.5 mg, 0.17 mmol, 1.0 equiv) in DMF (2.0 mL) were sequentially added imidazole (47.3 mg, 0.68 mmol, 4.0 equiv) and TIPSCl (150 μL, 0.68 mmol, 4.0 equiv). The reaction mixture was stirred at room temperature overnight. Then, water (5 mL) and Et_2O (10 mL) were added. The layers was separated and the aqueous layer was extracted with Et_2O (2 × 10 mL). The combined organic layers were washed with brine, dried over Na_2SO_4, and concentrated under reduced pressure. The residue was purified by flash column chromatography (5% ether in hexanes) to give the desired **10** (87.0 mg, 70% yield).

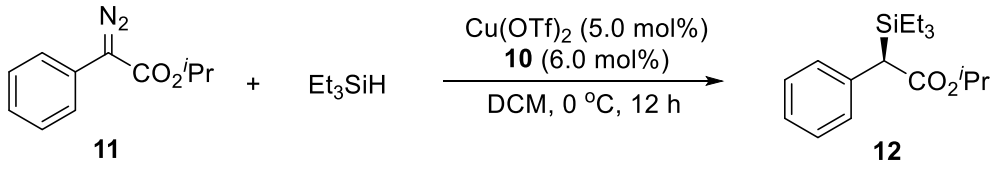
$[\alpha]_D^{25}$ = +77.3 (*c* 1.0, $CHCl_3$).

^{1}H NMR (400MHz, $CDCl_3$) δ 7.51 (d, J = 6.8 Hz, 2H), 7.32 (d, J = 7.6 Hz, 2H), 7.16-7.10 (m, 2H), 4.02-3.92 (m, 2H), 3.81 (dd, J_1 = 9.6 Hz, J_2 = 4.0 Hz, 2H), 3.77-3.66 (m, 2H), 3.36-3.20 (m, 4H), 3.12-2.92 (m, 4H), 2.65 (dd, J_1 = 20.4 Hz, J_2 = 10.8 Hz, 2H), 2.24 (dd, J_1 = 11.6 Hz, J_2 = 7.2 Hz, 2H), 1.07-0.95 (m, 42H).

^{13}C NMR (101MHz, $CDCl_3$) δ 164.4, 149.0, 145.3, 127.9, 126.5, 126.4, 125.8, 70.9, 68.3, 66.0, 63.0, 38.6, 30.7, 17.9, 11.9 ppm.

IR (thin film) 2937, 2863, 1649, 1461, 1355, 1284, 1250, 1102, 985 cm^{-1}.

HRMS (CI+) Calcd for $C_{43}H_{66}N_2O_4Si_2$ $[M]^+$: 730.4561, Found: 730.4573.



Isopropyl (*R*)-2-phenyl-2-(triethylsilyl)acetate (12). This procedure was based on literature.[3] Under N_2, $Cu(OTf)_2$ (1.8 mg, 5.0 μmol) and **10** (4.4 mg, 6.0 μmol) were dissolved in CH_2Cl_2 (1.5 mL) in a 2-dram vial. The mixture was stirred at 0 °C for 10 min. Next, a solution of 2-diazo-2-phenyl acetates **11** (20.5 mg, 0.1 mmol) and triethylsilane (64 μL, 0.4 mmol) in CH_2Cl_2 (0.5 mL) was injected into the reaction mixture. The reaction mixture was stirred at 40 °C for 12 h and then cooled to room temperature and concentrated under reduced pressure. The residue was purified by flash chromatography on silica gel (hexanes/ether = 50:1) to afford the pure product **12** (24.2 mg, 83% yield, 84:16 er, colorless oil).

$[\alpha]_D^{25}$ = +8.8 (*c* 1.0, $CHCl_3$).

HPLC analysis of the product: Daicel CHIRALPAK OD-H column; 0.05% *i*-PrOH in hexanes; 1.0 mL/min; retention times: 7.0 min (major), 20.0 min (minor).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.33 (m, 2H), 7.30-7.24 (m, 2H), 7.16 (t like, *J* = 7.2 Hz, 1H), 5.07-4.96 (m, 1H), 3.48 (s, 1H), 1.27 (d, *J* = 6.0 Hz, 3H), 1.23 (d, *J* = 6.4 Hz, 3H), 0.91 (t, *J* = 8.0 Hz, 9H), 0.67-0.52 (m, 6H).

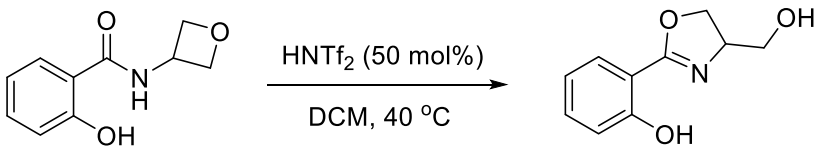
^{13}C NMR (100 MHz, $CDCl_3$) δ 172.7, 136.8, 128.5, 128.0, 125.4, 67.6, 43.0, 22.1, 21.9, 7.1, 2.7 ppm.

IR (thin film) 2955, 2807, 1711, 1265, 1152, 1105 cm^{-1}.

HRMS (CI+) Calcd for $C_{17}H_{28}O_2Si$ $[M]^+$: 292.1859, Found: 292.1859.

[3]. Y.-Z. Zhang, S.-F. Zhu, L.-X. Wang and Q.-L. Zhou, *Angew. Chem. Int. Ed.* **2008**, *47*, 8496–8498.

V. Synthesis of Diverse Natural Products.



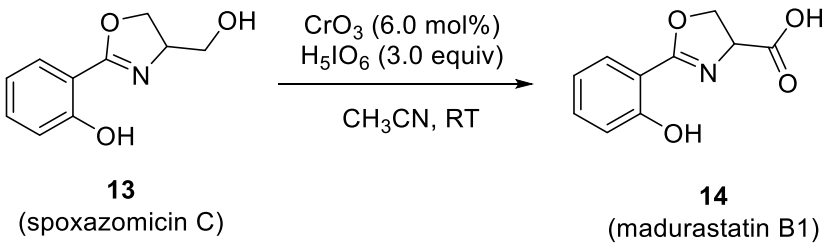
Spoxazomicin C (13). To a solution of oxetane **1z** (1.93 g, 10.0 mmol) in dichloromethane (50 mL) was added triflimide (1.47 g, 50 mol%). After stirring at 40 °C for 48 h, the reaction was quenched with an aqueous solution of $NaHCO_3$ (30 mL, 10%) followed by stirring for 10 min. The mixture was then diluted with water (50 mL). The layers were separated and the organic layer was extracted with dichloromethane (2×50 mL). The combined organic layers were washed with water and brine, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The residue was purified by simple recrystallization (hexanes and diethyl ether) to afford the pure amide **1a** (1.63 g, 85% yield, white solid).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (dd, J_1 = 8.0 Hz, J_2 = 4.0 Hz, 1H), 7.40-7.34 (m, 1H), 7.00 (dd, J_1 = 12.0 Hz, J_2 = 4.0 Hz, 1H), 6.87 (t, J = 8.0 Hz, 1H), 4.52-4.43 (m, 2H), 4.38-4.29 (m, 1H), 3.91-3.82 (m, 1H), 3.73-3.64 (m, 1H) ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 159.7, 133.6, 128.2, 118.8, 116.7, 110.4, 68.5, 66.8, 63.9 ppm.

IR (thin film) 3409, 2935, 1638, 1490, 1367, 1259, 1063, 958 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}NO_3$ $[M]^+$: 193.0739, Found: 193.0748.



Madurastatin B1 (14). At room temperature, to a solution of alcohol **13** (96.3 mg, 0.5 mmol) in CH_3CN (2 mL) was added a solution of H_5IO_6 (351.6 mg, 1.5 mmol) and CrO_3 (3.3 mg, 0.03 mmol) in CH_3CN (4.0 mL) over a period of 15 min, and the mixture was allowed to stir for 30 min. It was diluted with water (2 mL) and extracted with ethyl acetate (3 × 5 mL). The combined organic layers were washed with brine, dried over $MgSO_4$, and concentrated to give pure product **14** (72.6 mg, 75% yield, yellow solid).

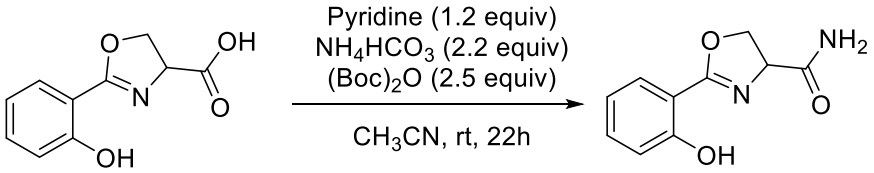
This product is a known compound. The characterization data match the literature.[4]

^{1}H NMR (400 MHz, MeOD-d_4) δ 7.67 (d, J = 7.6 Hz, 1H), 7.40 (t, J = 7.6 Hz, 1H), 6.95 (d, J = 8.0 Hz, 1H), 6.88 (d, J = 7.6 Hz, 1H), 5.02-4.85 (1H, covered with H_2O peak), 4.64 (d, J = 4.4 Hz, 2H) ppm.

^{13}C NMR (100 MHz, MeOD-d_4) δ 173.8, 168.8, 161.1, 135.2, 129.5, 120.0, 117.7, 111.2, 70.7, 68.1 ppm.

IR (thin film) 2955, 1729, 1632, 1487, 1446, 1369, 1258, 1084 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_9NO_4$ $[M]^+$: 207.0532, Found: 207.0533.



14
(madurastatin B1)

15
(spoxazomicin D)

Spoxazomicin D (15). At room temperature, to a solution of acid **14** (31.7 mg, 0.15 mmol), NH_4HCO_3 (26.3 mg, 0.33 mmol) and $(Boc)_2O$ (81.8 mg, 0.375 mmol) in

[4] K. A. Shaaban, M. A. Saunders, Y. Zhang, T. Tran, S. I. Elshahawi, L. V. Ponomareva, X. Wang, J. Zhang, G. C. Copley, M. Sunkara, M. K. Kharel, A. J. Morris, J. C. Hower, M. S. Tremblay, M. A. Prendergast and J. S. Thorson, *J. Nat. Prod.* **2017**, *80*, 2−11.

CH_3CN (1 mL) was added pyridine (14.5 μL, 0.18 mmol). The mixture was allowed to stir at room temperature for 22 h before it was diluted with water (2 mL). The mixture was extracted with ethyl acetate (3 × 5 mL). The combined organic layers were washed with brine, dried over $MgSO_4$, and concentrated. The residue was purified by flash column chromatography (hexanes and ethyl acetate) to afford the amide **15** (25.6 mg, 83% yield, white solid).

This product is a known compound. The characterization data match the literature.[5]

^{1}H NMR (400 MHz, $CDCl_3$) δ 11.46 (br s, 1H), 7.68 (dd, J_1 = 8.0 Hz, J_2 = 1.6 Hz, 1H), 7.43 (td, J_1 = 8.4 Hz, J_2 = 1.6 Hz, 1H), 7.02 (d, J_1 = 8.4 Hz, 1H), 6.91(t, J = 7.6 Hz, 1H), 6.48 (br s, 1H), 6.03 (br s, 1H), 4.94 (dd, J_1 = 10.4 Hz, J_2 = 8.4 Hz, 1H), 4.68 (dd, J_1 = 10.0 Hz, J_2 = 8.8 Hz, 2H), ppm.

^{13}C NMR (100 MHz, $CDCl_3$) δ 173.2, 168.0, 159.7, 134.4, 128.6, 119.2, 116.9, 109.8, 69.6, 67.6 ppm.

IR (thin film) 3323, 3183, 1674, 1637, 1488, 1366, 1254, 1156, 1074, 958 cm^{-1}.

HRMS (CI+) Calcd for $C_{10}H_{11}N_2O_3$ $[M + H]^+$: 207.0764, Found: 207.0778.

[5] K. M. Nelson, C. E. Salomon and C. C. Aldrich, *J. Nat. Prod.* **2012**, *75*, 1037−1043.

VI. Product Structure Determination

The structure and stereochemistry of products **2s** and **4d** were determined by X-ray diffraction. The X-ray data of **2s** (CCDC 1908430) and **4d** (CCDC 1908431) have been deposited at the Cambridge Crystallographic Data Center.

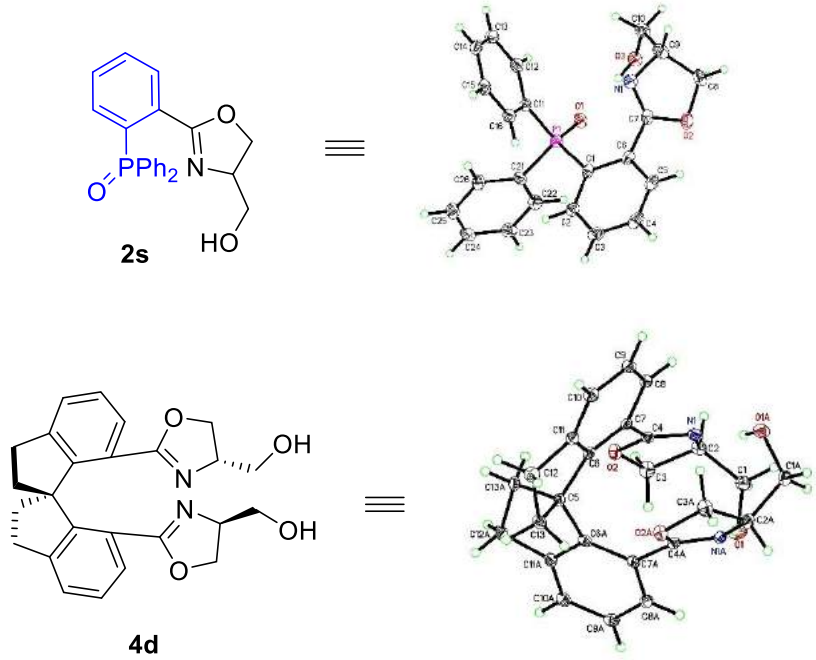


Table S1. Crystal data and structure refinement for 2s.

Identification code	**2s**
Empirical formula	$C_{22}H_{20}NO_3P$
Formula weight	377.36
Temperature/K	100.01(10)
Crystal system	monoclinic
Space group	$P2_1$
a/Å	9.5956(3)
b/Å	9.7344(4)
c/Å	10.4231(4)
α/°	90
β/°	93.158(3)
γ/°	90
Volume/Å^3	972.12(6)
Z	2

ρ_{calc}g/cm^3	1.289
μ/mm^{-1}	1.431
F(000)	396.0
Crystal size/mm^3	0.2 × 0.03 × 0.02
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	8.496 to 134.976
Index ranges	$-11 \leq h \leq 11$, $-9 \leq k \leq 11$, $-12 \leq l \leq 12$
Reflections collected	5136
Independent reflections	2411 [R_{int} = 0.0327, R_{sigma} = 0.0434]
Data/restraints/parameters	2411/1/245
Completeness to theta = 66.5°	99.1%
Goodness-of-fit on F^2	1.002
Final R indexes [I>=2σ (I)]	R_1 = 0.0327, wR_2 = 0.0757
Final R indexes [all data]	R_1 = 0.0366, wR_2 = 0.0770
Largest diff. peak/hole / e Å^{-3}	0.34/-0.19
Flack parameter	0.01(3)

Table S2. Fractional Atomic Coordinates (×10^4) and Equivalent Isotropic Displacement Parameters (Å^2×10^3) for 2s. U_{eq} is defined as 1/3 of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
P1	2647.5(6)	3212.1(7)	3460.4(6)	19.29(16)
O1	2186(2)	1857(2)	2933(2)	24.9(5)
O2	5752(2)	617(2)	1995(2)	30.5(5)
O3	2331(2)	163(2)	917(2)	26.3(5)
N1	4471(2)	2329(3)	1050(2)	24.1(5)
C1	4495(3)	3320(3)	3934(2)	20.8(5)
C2	4925(3)	4041(3)	5039(3)	25.0(6)
C3	6325(3)	4140(3)	5443(3)	29.9(7)
C4	7320(3)	3476(4)	4747(3)	32.8(8)
C5	6915(3)	2735(3)	3659(3)	28.3(7)
C6	5507(3)	2658(3)	3227(3)	21.4(6)
C7	5180(3)	1892(3)	2021(3)	21.5(6)
C8	5370(3)	83(4)	715(3)	31.1(7)
C9	4426(3)	1203(4)	101(3)	28.8(7)
C10	2918(3)	738(4)	-180(3)	30.4(7)
C11	2269(3)	4632(3)	2382(3)	21.9(6)

C12	1263(3)	4435(3)	1374(3)	26.1(6)
C13	922(3)	5520(4)	548(3)	32.3(7)
C14	1572(3)	6779(4)	706(3)	30.1(7)
C15	2563(3)	6975(4)	1722(3)	27.7(6)
C16	2916(3)	5905(3)	2542(3)	23.8(6)
C21	1747(3)	3561(3)	4913(3)	23.2(7)
C22	1603(3)	2459(4)	5747(3)	28.3(7)
C23	875(3)	2622(4)	6855(3)	30.7(7)
C24	310(3)	3901(4)	7127(3)	27.6(7)
C25	460(3)	4988(4)	6307(3)	28.1(7)
C26	1176(3)	4825(3)	5187(3)	25.0(6)

Table S3. Anisotropic Displacement Parameters ($Å^2×10^3$) for 2s. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
P1	14.9(3)	21.0(3)	22.2(3)	-1.3(3)	2.6(2)	-0.6(3)
O1	19.2(9)	27.8(11)	28.2(11)	-3.6(9)	6.0(8)	-2.7(8)
O2	27.4(11)	26.0(12)	38.0(12)	-4.6(10)	0.2(9)	7.4(9)
O3	23.0(9)	27.8(12)	28.5(11)	-3.7(9)	3.7(8)	-3.1(8)
N1	20.7(11)	26.5(14)	25.4(12)	1.7(10)	4.3(9)	-2.1(9)
C1	20.4(12)	16.8(13)	25.2(12)	4.3(13)	1.4(10)	1.8(12)
C2	24.9(14)	22.1(16)	27.7(14)	1.9(13)	-0.3(11)	2.2(12)
C3	29.8(15)	29.6(17)	29.2(15)	-0.9(13)	-7.9(12)	-4.6(13)
C4	19.8(13)	36(2)	41.3(17)	2.7(14)	-8.5(12)	-0.3(12)
C5	17.1(13)	30.0(17)	37.4(17)	3.4(13)	-1.2(12)	1.7(12)
C6	18.5(12)	18.5(13)	27.1(15)	4.7(12)	1.0(11)	-1.3(11)
C7	14.7(12)	21.3(15)	29.3(14)	2.7(12)	7.2(10)	-0.6(11)
C8	25.2(14)	33.0(18)	36.0(16)	-9.9(14)	9.7(12)	-0.4(13)
C9	28.4(15)	34.2(18)	24.4(14)	-2.0(14)	7.4(12)	-7.4(13)
C10	28.8(15)	36.3(19)	25.7(14)	-5.5(13)	-0.8(12)	-4.2(14)
C11	17.2(12)	26.0(15)	22.8(13)	0.8(12)	3.2(10)	4.3(11)
C12	17.9(13)	30.6(17)	29.8(15)	-6.4(13)	1.7(11)	-0.4(11)
C13	22.7(14)	47(2)	26.5(15)	-6.4(14)	-0.9(11)	10.7(14)
C14	27.8(14)	37.3(19)	25.5(14)	4.9(14)	4.9(12)	13.3(14)
C15	22.9(13)	29.0(17)	31.9(16)	2.6(14)	8.7(12)	2.7(13)
C16	17.6(12)	28.5(17)	25.4(14)	-2.5(12)	2.9(11)	-0.4(11)
C21	15.2(11)	32.2(19)	22.3(13)	-6.0(11)	3.2(10)	-1.5(10)
C22	27.3(14)	28.6(17)	29.1(16)	-0.3(13)	2.2(12)	1.6(12)
C23	29.5(15)	37.7(18)	25.0(16)	2.0(14)	2.2(12)	-2.5(14)

C24	18.3(13)	39.9(19)	24.8(14)	-8.6(14)	3.9(11)	-6.2(13)
C25	14.8(12)	33.4(17)	36.3(16)	-7.4(14)	3.6(11)	1.5(12)
C26	18.0(12)	25.2(15)	32.1(15)	-1.2(13)	3.4(11)	-1.6(11)

Table S4. Bond Lengths for 2s.

Atom	Atom	Length/Å	Atom	Atom	Length/Å
P1	O1	1.487(2)	C6	C7	1.481(4)
P1	C1	1.817(3)	C8	C9	1.535(5)
P1	C11	1.806(3)	C9	C10	1.529(4)
P1	C21	1.816(3)	C11	C12	1.400(4)
O2	C7	1.358(4)	C11	C16	1.392(4)
O2	C8	1.460(4)	C12	C13	1.390(5)
O3	C10	1.418(4)	C13	C14	1.382(5)
N1	C7	1.261(4)	C14	C15	1.396(5)
N1	C9	1.475(4)	C15	C16	1.378(5)
C1	C2	1.392(4)	C21	C22	1.392(5)
C1	C6	1.406(4)	C21	C26	1.383(4)
C2	C3	1.389(4)	C22	C23	1.391(5)
C3	C4	1.390(5)	C23	C24	1.393(5)
C4	C5	1.382(5)	C24	C25	1.373(5)
C5	C6	1.402(4)	C25	C26	1.396(4)

Table S5. Bond Angles for 2s.

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
O1	P1	C1	114.69(13)	O2	C8	C9	103.9(2)
O1	P1	C11	113.78(13)	N1	C9	C8	104.7(2)
O1	P1	C21	109.17(13)	N1	C9	C10	109.9(2)
C11	P1	C1	106.54(13)	C10	C9	C8	113.6(3)
C11	P1	C21	106.70(13)	O3	C10	C9	112.1(2)
C21	P1	C1	105.36(12)	C12	C11	P1	118.0(2)
C7	O2	C8	105.2(2)	C16	C11	P1	122.2(2)
C7	N1	C9	106.4(3)	C16	C11	C12	119.8(3)
C2	C1	P1	119.6(2)	C13	C12	C11	119.3(3)
C2	C1	C6	118.9(2)	C14	C13	C12	120.7(3)
C6	C1	P1	121.5(2)	C13	C14	C15	119.7(3)
C3	C2	C1	121.6(3)	C16	C15	C14	120.1(3)
C2	C3	C4	119.4(3)	C15	C16	C11	120.4(3)

C5	C4	C3	120.0(3)	C22	C21	P1	116.4(2)
C4	C5	C6	120.9(3)	C26	C21	P1	123.4(2)
C1	C6	C7	123.7(2)	C26	C21	C22	120.1(3)
C5	C6	C1	119.2(3)	C23	C22	C21	120.2(3)
C5	C6	C7	117.0(3)	C22	C23	C24	119.3(3)
O2	C7	C6	114.2(2)	C25	C24	C23	120.4(3)
N1	C7	O2	119.6(3)	C24	C25	C26	120.4(3)
N1	C7	C6	126.2(3)	C21	C26	C25	119.6(3)

Table S6. Hydrogen Bonds for 2s.

D	H	A	d(D-H)/Å	d(H-A)/Å	d(D-A)/Å	D-H-A/°
O3	H3	O1	0.84	1.85	2.681(3)	170.6

Table S7. Torsion Angles for 2s.

A	B	C	D	Angle/°	A	B	C	D	Angle/°
P1	C1	C2	C3	179.4(2)	C5	C6	C7	N1	-127.5(3)
P1	C1	C6	C5	-177.9(2)	C6	C1	C2	C3	1.2(5)
P1	C1	C6	C7	3.4(4)	C7	O2	C8	C9	-4.1(3)
P1	C11	C12	C13	178.3(2)	C7	N1	C9	C8	-4.6(3)
P1	C11	C16	C15	-177.8(2)	C7	N1	C9	C10	117.8(3)
P1	C21	C22	C23	-177.3(2)	C8	O2	C7	N1	1.4(3)
P1	C21	C26	C25	177.8(2)	C8	O2	C7	C6	-177.0(2)
O1	P1	C1	C2	-141.2(2)	C8	C9	C10	O3	52.6(4)
O1	P1	C1	C6	37.0(3)	C9	N1	C7	O2	2.2(3)
O1	P1	C11	C12	18.4(3)	C9	N1	C7	C6	-179.7(3)
O1	P1	C11	C16	-163.1(2)	C11	P1	C1	C2	92.0(3)
O1	P1	C21	C22	41.2(2)	C11	P1	C1	C6	-89.8(3)
O1	P1	C21	C26	-136.4(2)	C11	P1	C21	C22	164.6(2)
O2	C8	C9	N1	5.2(3)	C11	P1	C21	C26	-13.1(3)
O2	C8	C9	C10	-114.7(3)	C11	C12	C13	C14	0.6(5)
N1	C9	C10	O3	-64.3(3)	C12	C11	C16	C15	0.7(4)
C1	P1	C11	C12	145.8(2)	C12	C13	C14	C15	-1.3(5)
C1	P1	C11	C16	-35.7(3)	C13	C14	C15	C16	1.7(5)
C1	P1	C21	C22	-82.4(2)	C14	C15	C16	C11	-1.4(4)
C1	P1	C21	C26	99.9(2)	C16	C11	C12	C13	-0.3(4)
C1	C2	C3	C4	-1.6(5)	C21	P1	C1	C2	-21.1(3)
C1	C6	C7	O2	-130.5(3)	C21	P1	C1	C6	157.1(2)

C1	C6	C7	N1	51.2(4)	C21	P1	C11	C12	-102.1(2)
C2	C1	C6	C5	0.4(4)	C21	P1	C11	C16	76.4(3)
C2	C1	C6	C7	-178.4(3)	C21	C22	C23	C24	-0.8(5)
C2	C3	C4	C5	0.5(5)	C22	C21	C26	C25	0.3(4)
C3	C4	C5	C6	1.0(5)	C22	C23	C24	C25	0.5(5)
C4	C5	C6	C1	-1.4(5)	C23	C24	C25	C26	0.3(4)
C4	C5	C6	C7	177.4(3)	C24	C25	C26	C21	-0.6(4)
C5	C6	C7	O2	50.7(4)	C26	C21	C22	C23	0.5(4)

Table S8. Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for 2s.

Atom	***x***	***y***	***z***	**U(eq)**
H3	2359	744	1514	40
H2	4245	4476	5528	30
H3A	6600	4656	6187	36
H4	8280	3531	5020	39
H5	7599	2272	3196	34
H8A	4862	-799	768	37
H8B	6208	-58	218	37
H9	4825	1529	-711	35
H10A	2349	1535	-481	36
H10B	2891	47	-878	36
H12	819	3569	1255	31
H13	233	5393	-133	39
H14	1346	7509	126	36
H15	2993	7848	1847	33
H16	3606	6037	3220	29
H22	2003	1594	5560	34
H23	765	1869	7421	37
H24	-183	4021	7885	33
H25	74	5857	6503	34
H26	1270	5576	4617	30

Table S9. Crystal data and structure refinement for 4d.

Identification code	**4d**
Empirical formula	$C_{25}H_{26}N_2O_4$
Formula weight	418.48

Temperature/K	100.00(10)
Crystal system	monoclinic
Space group	C2
a/Å	12.1435(3)
b/Å	10.3089(2)
c/Å	8.5206(2)
α/°	90
β/°	106.293(3)
γ/°	90
Volume/Å^3	1023.82(5)
Z	2
ρ_{calc}g/cm^3	1.357
μ/mm^{-1}	0.747
F(000)	444.0
Crystal size/mm^3	0.2 × 0.2 × 0.18
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	11.46 to 134.992
Index ranges	-9 ≤ h ≤ 14, -12 ≤ k ≤ 7, -9 ≤ l ≤ 10
Reflections collected	1521
Independent reflections	1226 [R_{int} = 0.0055, R_{sigma} = 0.0103]
Data/restraints/parameters	1226/1/142
Goodness-of-fit on F^2	1.026
Final R indexes [I>=2σ (I)]	R_1 = 0.0230, wR_2 = 0.0610
Final R indexes [all data]	R_1 = 0.0233, wR_2 = 0.0612
Largest diff. peak/hole / e Å^{-3}	0.15/-0.15
Flack parameter	0.11(7)

Table S10. Fractional Atomic Coordinates (×10^4) and Equivalent Isotropic Displacement Parameters (Å^2×10^3) for 4d. U_{eq} is defined as 1/3 of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
O1	4171.3(10)	-1283.0(14)	2385.4(14)	23.8(3)
O2	6252.3(10)	1689.4(12)	3399.9(13)	18.0(3)
N1	6294.0(11)	-158.0(15)	4838.4(16)	15.0(3)
C1	5323.6(14)	-1663.7(19)	2600(2)	21.1(4)
C2	6196.5(15)	-586.0(19)	3145(2)	18.1(4)
C3	5928.0(16)	671(2)	2162(2)	21.0(4)
C4	6332.5(13)	1073.4(18)	4834.9(19)	13.2(4)
C5	5000	3754(3)	5000	14.3(5)
C6	5866.0(14)	3025.8(17)	6354.3(19)	13.8(4)

C7	6483.8(13)	1891.5(17)	6311.4(19)	13.7(4)
C8	7271.1(14)	1456.8(17)	7752(2)	15.5(4)
C9	7457.7(14)	2150.4(18)	9193(2)	17.4(4)
C10	6845.0(14)	3281.8(18)	9242(2)	18.3(4)
C11	6043.6(13)	3703.9(18)	7831(2)	16.6(4)
C12	5298.5(15)	4892.8(19)	7607(2)	20.7(4)
C13	4374.1(14)	4614.3(18)	5984.7(19)	17.6(4)

Table S11. Anisotropic Displacement Parameters ($Å^2×10^3$) for 4d. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
O1	19.5(6)	30.4(8)	20.1(6)	-9.8(6)	3.0(5)	-0.7(6)
O2	24.8(7)	16.2(7)	13.2(5)	0.4(5)	5.9(5)	-0.8(5)
N1	14.0(7)	15.1(7)	15.2(7)	-1.2(5)	2.8(5)	1.8(6)
C1	21.2(8)	18.6(9)	22.5(8)	-5.8(8)	4.2(7)	2.3(7)
C2	18.8(8)	20(1)	16.2(7)	-3.5(7)	6.2(6)	3.2(7)
C3	27.3(9)	22.3(10)	14.2(8)	-2.5(7)	7.2(7)	-1.3(8)
C4	11.1(8)	14.8(9)	13.9(8)	1.9(7)	4.0(6)	0.9(6)
C5	15.5(10)	11.7(12)	14.9(10)	0	3.0(9)	0
C6	13.7(7)	14.4(9)	13.0(7)	0.3(6)	3.2(6)	-4.1(6)
C7	12.7(7)	13.7(9)	14.9(7)	0.9(7)	4.2(6)	-3.3(7)
C8	14.7(7)	14.9(9)	17.1(7)	2.4(6)	4.8(6)	-0.3(6)
C9	16.7(8)	20.3(9)	13.5(7)	4.2(6)	1.2(6)	-1.5(7)
C10	19.9(8)	20.7(10)	13.2(7)	-1.8(7)	2.8(7)	-2.2(7)
C11	16.0(8)	16.0(9)	17.8(8)	-1.1(7)	4.5(6)	-2.0(7)
C12	23.6(8)	18.6(10)	16.9(8)	-6.3(7)	0.7(7)	1.3(7)
C13	19.8(8)	14.2(9)	16.7(8)	-2.3(7)	1.8(7)	3.1(7)

Table S12. Bond Lengths for 4d.

Atom	Atom	Length/Å	Atom	Atom	Length/Å
O1	C1	1.415(2)	C5	C13	1.558(2)
O2	C3	1.462(2)	C5	$C13^1$	1.558(2)
O2	C4	1.357(2)	C6	C7	1.395(3)
N1	C2	1.482(2)	C6	C11	1.402(2)
N1	C4	1.270(2)	C7	C8	1.401(2)
C1	C2	1.516(3)	C8	C9	1.384(2)
C2	C3	1.527(3)	C9	C10	1.390(3)

C4	C7	1.483(2)	C10	C11	1.388(2)
C5	C6[1]	1.523(2)	C11	C12	1.503(3)
C5	C6	1.523(2)	C12	C13	1.543(2)

[1]1-X,+Y,1-Z

Table S13. Bond Angles for 4d.

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C4	O2	C3	104.51(13)	C13	C5	C13[1]	110.6(2)
C4	N1	C2	106.75(15)	C7	C6	C5	130.93(15)
O1	C1	C2	114.69(15)	C7	C6	C11	119.53(15)
N1	C2	C1	111.98(14)	C11	C6	C5	109.50(15)
N1	C2	C3	103.16(14)	C6	C7	C4	124.02(15)
C1	C2	C3	115.50(15)	C6	C7	C8	119.00(15)
O2	C3	C2	103.95(12)	C8	C7	C4	116.95(15)
O2	C4	C7	117.32(15)	C9	C8	C7	120.92(15)
N1	C4	O2	118.45(15)	C8	C9	C10	120.28(15)
N1	C4	C7	124.22(15)	C11	C10	C9	119.23(15)
C6[1]	C5	C6	121.0(2)	C6	C11	C12	110.92(14)
C6[1]	C5	C13	110.56(8)	C10	C11	C6	121.00(16)
C6	C5	C13	102.13(9)	C10	C11	C12	128.05(15)
C6[1]	C5	C13[1]	102.13(9)	C11	C12	C13	102.86(14)
C6	C5	C13[1]	110.56(8)	C12	C13	C5	104.24(12)

[1]1-X,+Y,1-Z

Table S14. Hydrogen Bonds for 4d.

D	H	A	d(D-H)/Å	d(H-A)/Å	d(D-A)/Å	D-H-A/°
O1	H1	N1[1]	0.84	2.00	2.8302(19)	169.9

[1]1-X,+Y,1-Z

Table S15. Torsion Angles for 4d.

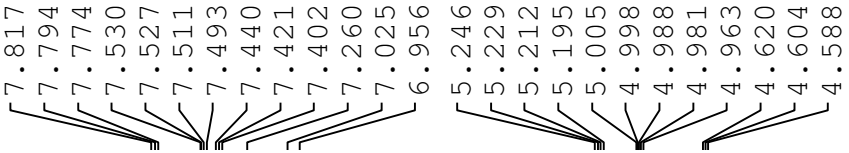
A	B	C	D	Angle/°	A	B	C	D	Angle/°
O1	C1	C2	N1	68.64(19)	C6[1]	C5	C6	C11	-143.94(13)
O1	C1	C2	C3	-49.1(2)	C6	C5	C13	C12	30.96(18)

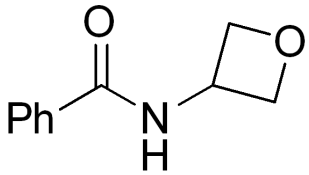
O2	C4	C7	C6	44.1(2)	C6[1]	C5	C13	C12	160.95(15)
O2	C4	C7	C8	-138.17(15)	C6	C7	C8	C9	-1.4(2)
N1	C2	C3	O2	17.12(15)	C6	C11	C12	C13	18.04(19)
N1	C4	C7	C6	-137.13(17)	C7	C6	C11	C10	1.6(2)
N1	C4	C7	C8	40.6(2)	C7	C6	C11	C12	179.84(15)
C1	C2	C3	O2	139.63(14)	C7	C8	C9	C10	1.4(2)
C2	N1	C4	O2	1.6(2)	C8	C9	C10	C11	0.2(2)
C2	N1	C4	C7	-177.10(14)	C9	C10	C11	C6	-1.7(2)
C3	O2	C4	N1	10.01(19)	C9	C10	C11	C12	-179.58(17)
C3	O2	C4	C7	-171.19(14)	C10	C11	C12	C13	-163.86(17)
C4	O2	C3	C2	-16.31(15)	C11	C6	C7	C4	177.60(15)
C4	N1	C2	C1	-136.77(16)	C11	C6	C7	C8	0.0(2)
C4	N1	C2	C3	-11.93(17)	C11	C12	C13	C5	-30.05(18)
C4	C7	C8	C9	-179.25(15)	C13	C5	C6	C7	161.61(17)
C5	C6	C7	C4	-4.9(3)	C13[1]	C5	C6	C7	-80.7(2)
C5	C6	C7	C8	177.41(15)	C13	C5	C6	C11	-20.73(18)
C5	C6	C11	C10	-176.37(14)	C13[1]	C5	C6	C11	96.94(16)
C5	C6	C11	C12	1.88(18)	C13[1]	C5	C13	C12	-86.70(13)
C6[1]	C5	C6	C7	38.40(15)					

[1]1-X,+Y,1-Z

Table S16. Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for 4d.

Atom	*x*	*y*	*z*	U(eq)
H1	4093	-1014	3278	36
H1A	5394	-2021	1555	25
H1B	5512	-2369	3422	25
H2	6962	-911	3096	22
H3A	6382	734	1366	25
H3B	5102	725	1568	25
H8	7682	675	7739	19
H9	8007	1852	10154	21
H10	6973	3760	10230	22
H12A	5741	5684	7523	25
H12B	4952	4996	8521	25
H13A	4096	5430	5392	21
H13B	3714	4147	6185	21





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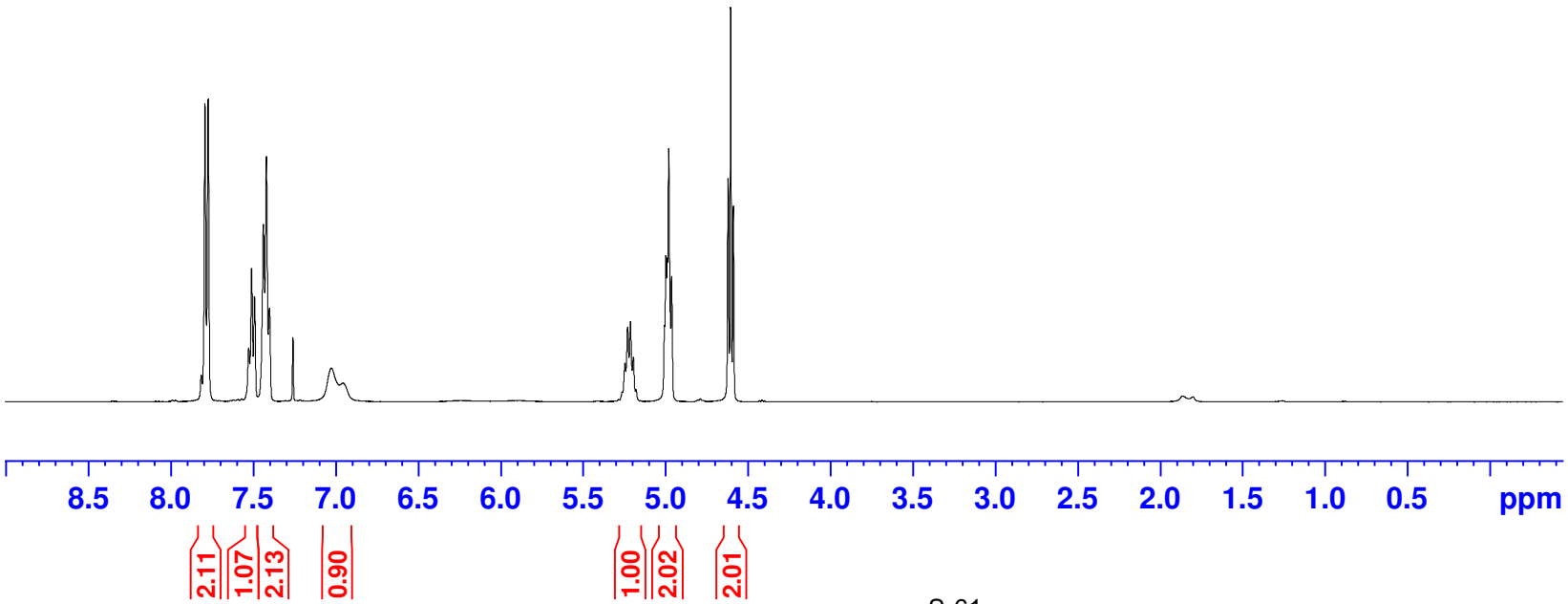


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EXPNO                       1
PROCNO                      1

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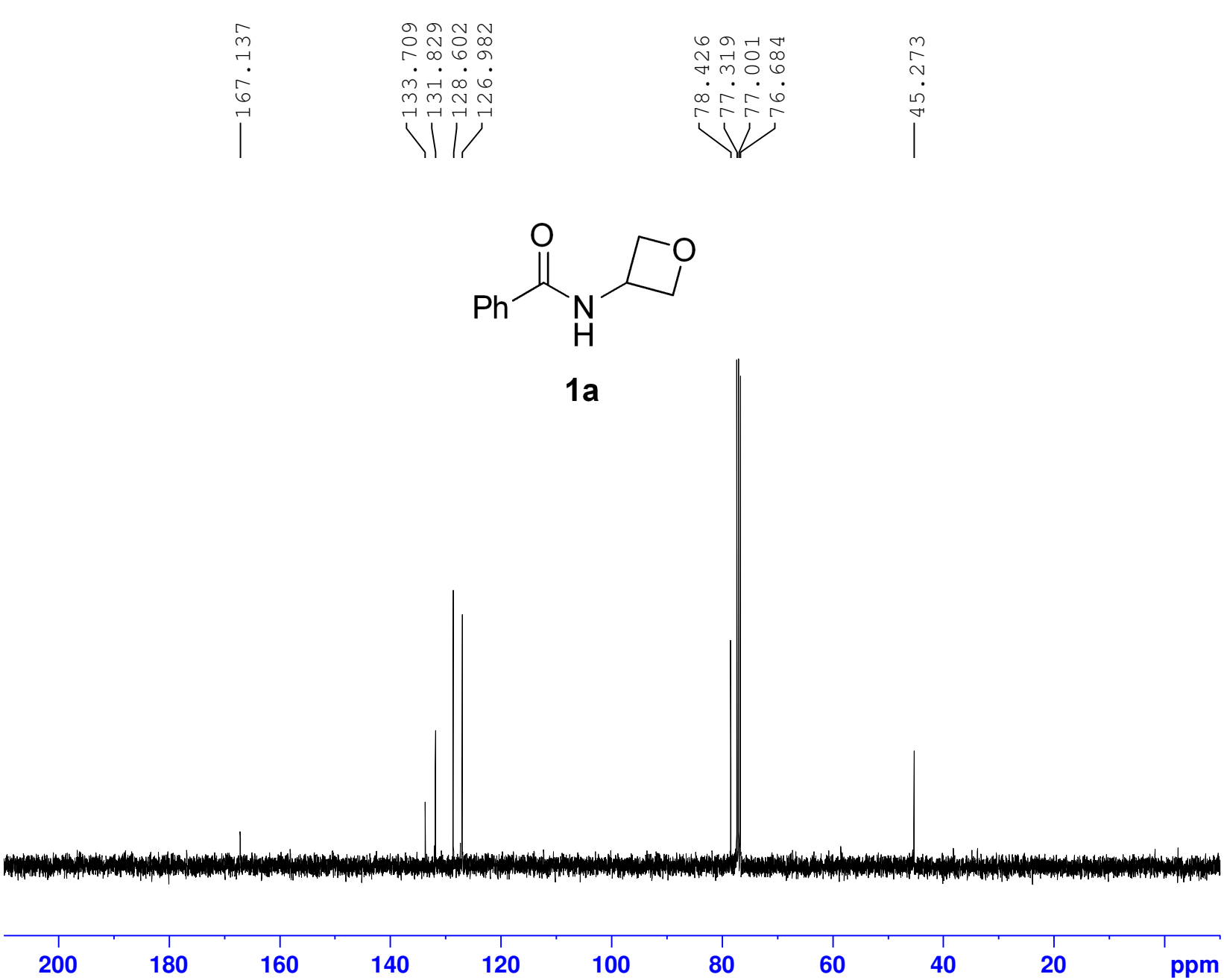
Time                   20.05
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          4
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     82.92
DW                    62.400 usec
DE                     6.50 usec
TE                    301.8 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300090 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

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Current Data Parameters
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EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160120
Time               20.08
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   28
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                302.2 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127736 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
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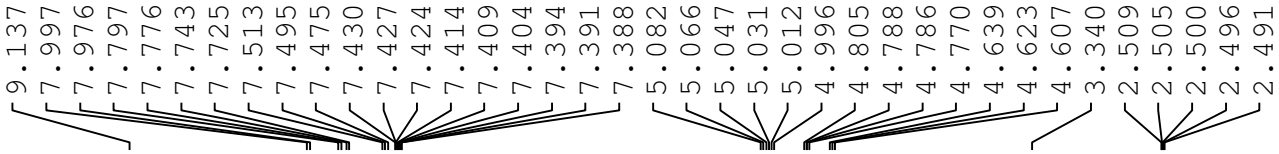

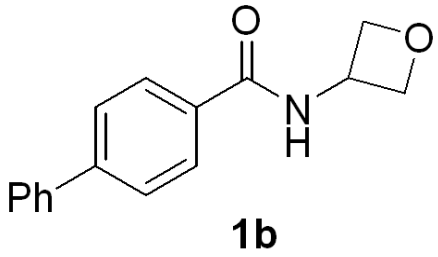

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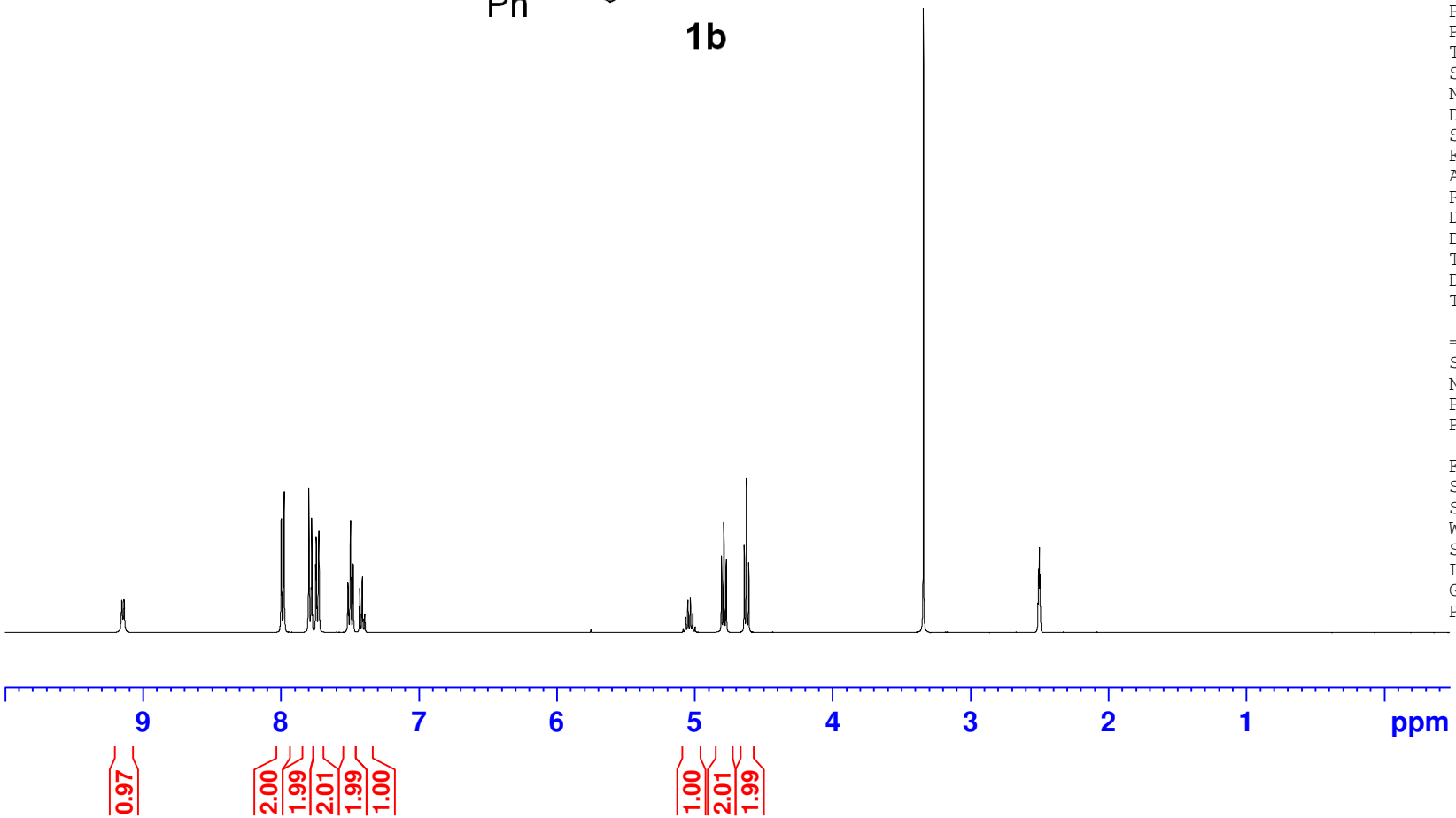


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Current Data Parameters
NAME                  YW-1724
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20160812
Time                  22.20
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        6
DS                        0
SWH                8012.820 Hz
FIDRES            0.122266 Hz
AQ                4.0894465 sec
RG                   112.31
DW                   62.400 usec
DE                    6.50 usec
TE                   299.7 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300027 MHz
WDW                      EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```

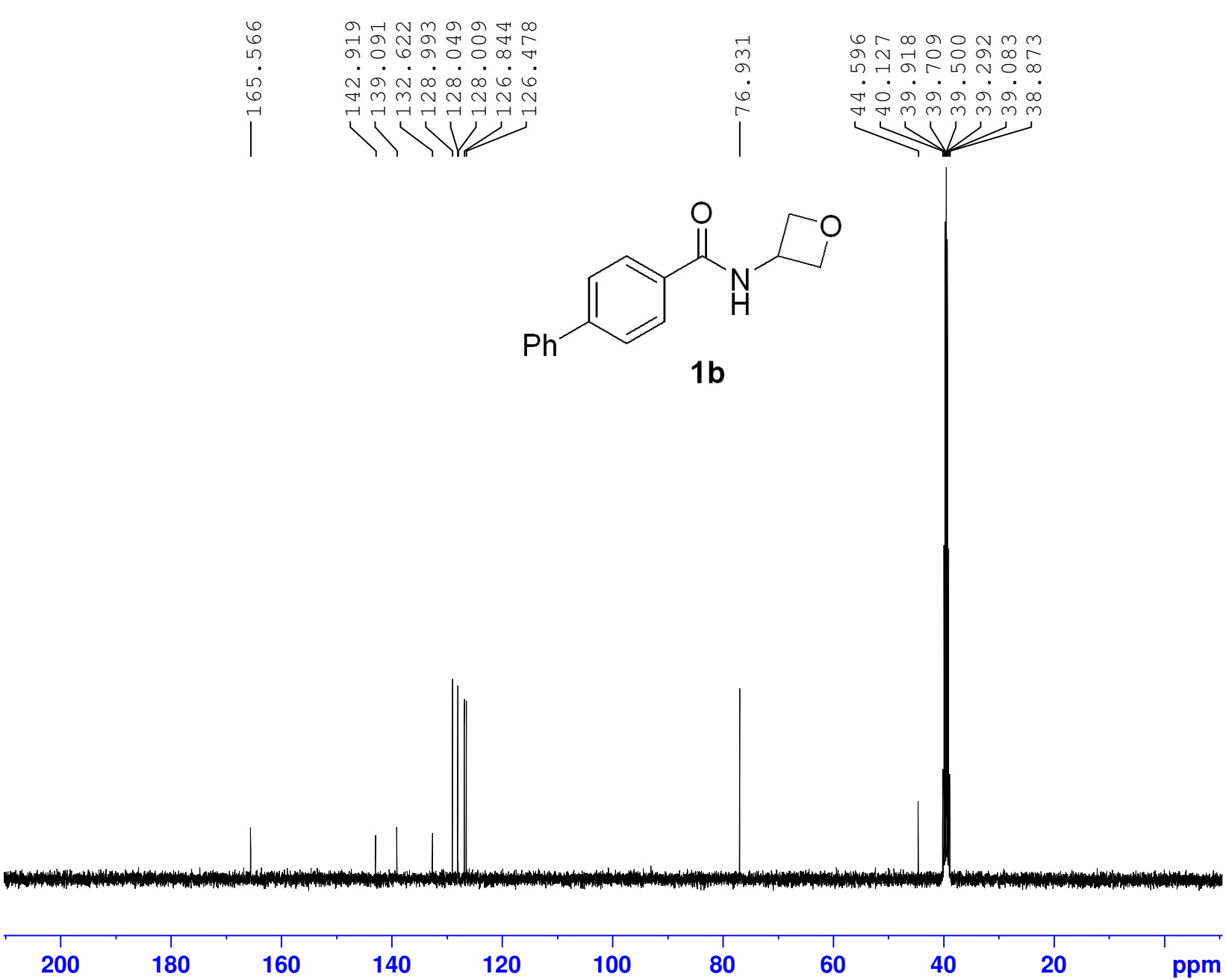


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Current Data Parameters
NAME      YW-1724-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160812
Time               22.25
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT             DMSO
NS                    82
DS                     0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                300.7 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                  13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                  1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6128192 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

7.735
7.715
7.410
7.390
7.262
7.011

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5.219
5.202
5.186
5.018
5.001
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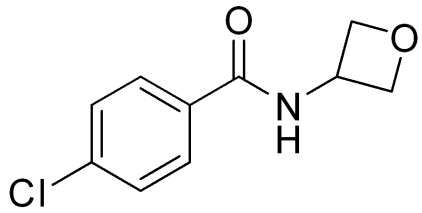
4.618
4.603
4.587



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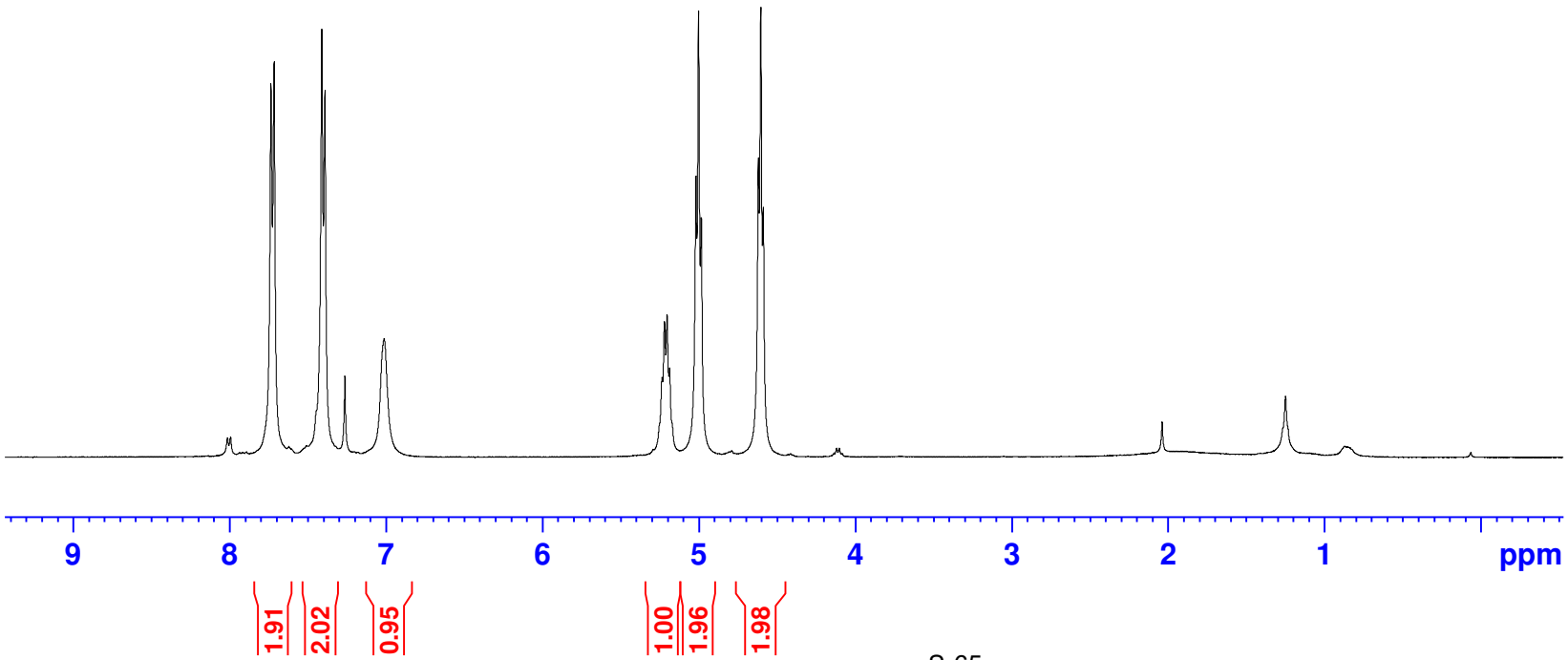


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Current Data Parameters
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EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20150319
Time                      15.26
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                    zg30
TD                        65536
SOLVENT                   CDCl3
NS                            9
DS                            2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        103.52
DW                        62.400 usec
DE                         6.50 usec
TE                        295.9 K
D1                    1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                        65536
SF                  400.1300082 MHz
WDW                         EM
SSB                 0
LB                        0.30 Hz
GB                  0
PC                        1.00
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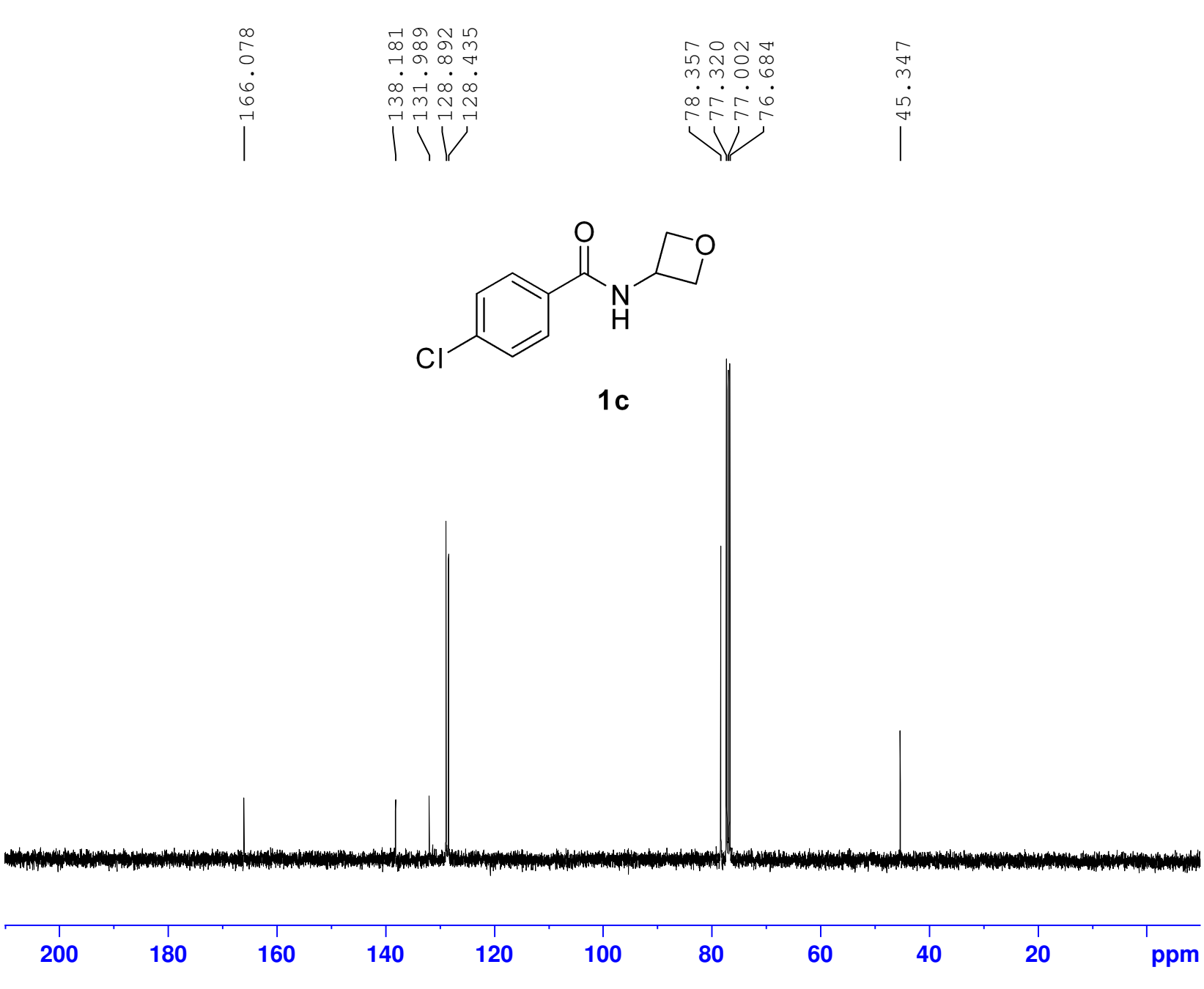


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Current Data Parameters
NAME                 lzw2079-C
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150319
Time                     15.32
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                          82
DS                           2
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      196.92
DW                      20.800 usec
DE                       6.50 usec
TE                      297.0 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                          32768
SF                  100.6127737 MHz
WDW                            EM
SSB          0
LB                        1.00 Hz
GB           0
PC                        1.40
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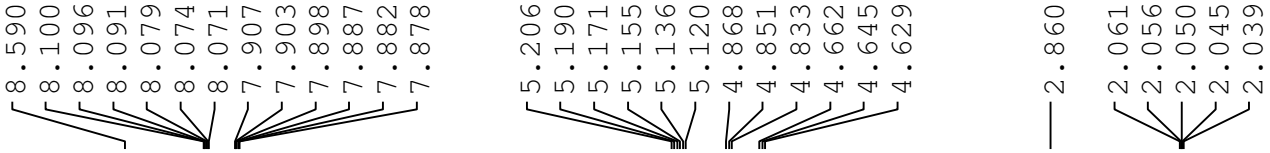

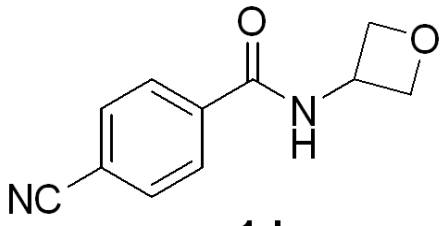

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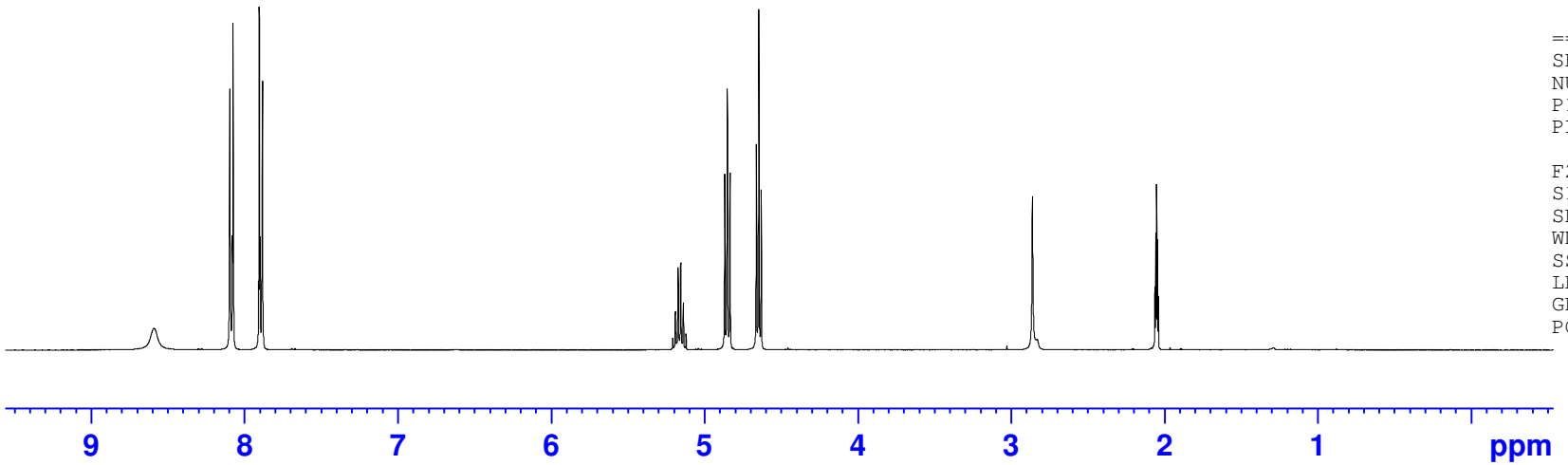


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Current Data Parameters
NAME       YW-(LZW2068B)
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                9.39
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT          Acetone
NS                    16
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                300.4 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300067 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
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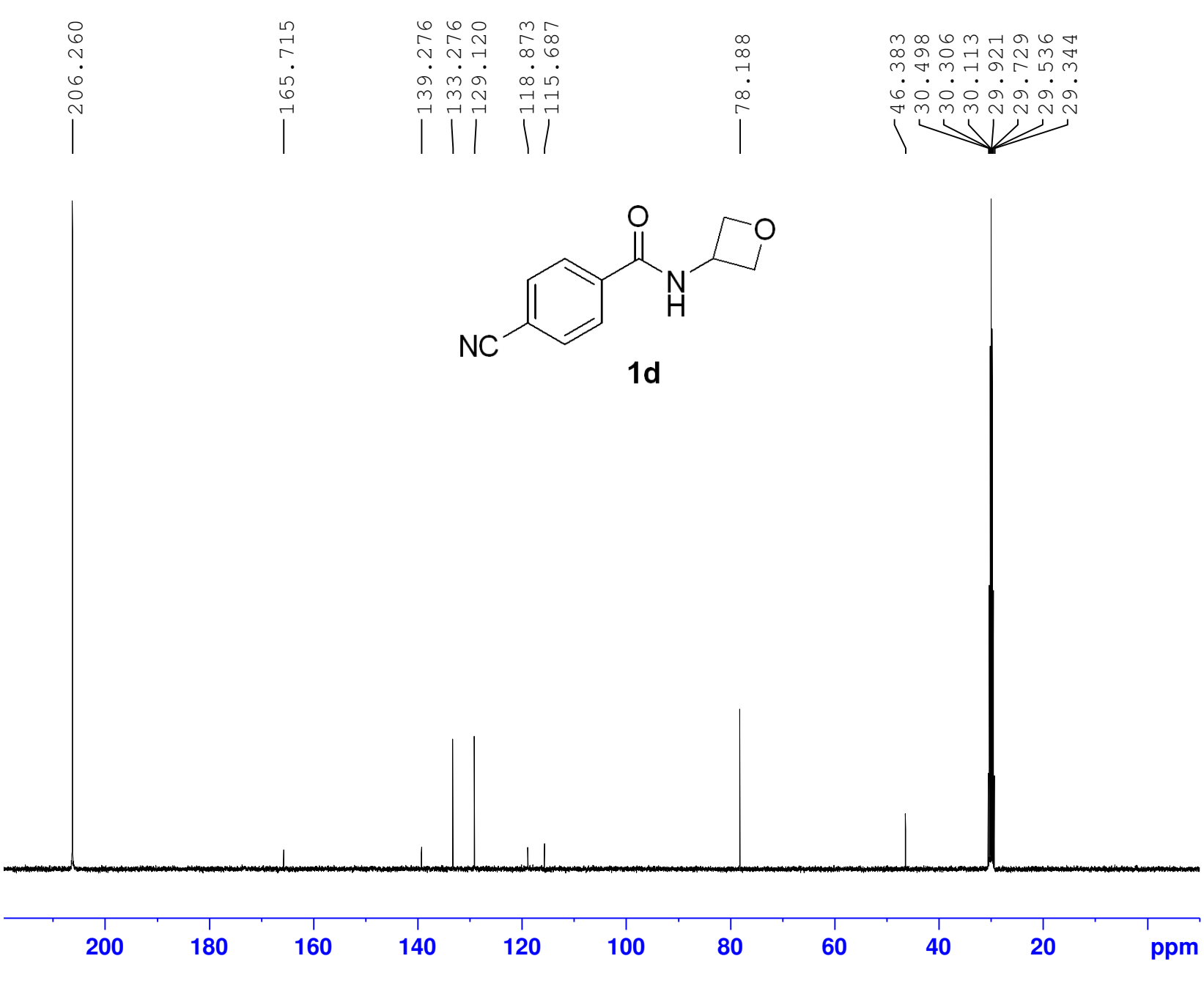


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Current Data Parameters
NAME      YW-(LZW2068B)-carbon
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_              20160813
Time                   9.47
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG              zgpg30
TD                    65536
SOLVENT           Acetone
NS                      129
DS                        0
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                1.3631488 sec
RG                   196.92
DW                   20.800 usec
DE                    6.50 usec
TE                   301.2 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           100.6228298 MHz
NUC1                    13C
P1                    9.70 usec
PLW1           46.98899841 W

======== CHANNEL f2 ========
SFO2           400.1316005 MHz
NUC2                    1H
CPDPRG[2           waltz16
PCPD2                90.00 usec
PLW2           11.99499989 W
PLW12           0.34213999 W
PLW13           0.27713001 W

F2 - Processing parameters
SI                    32768
SF             100.6126695 MHz
WDW                      EM
SSB          0
LB                    1.00 Hz
GB           0
PC                    1.40
```
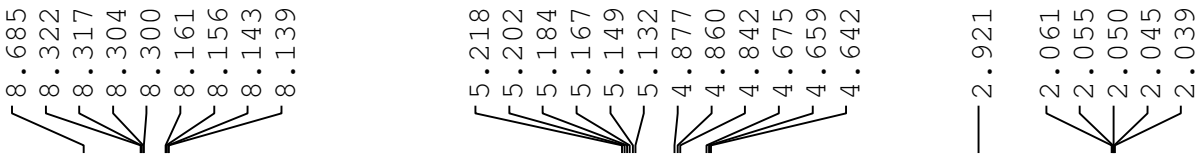
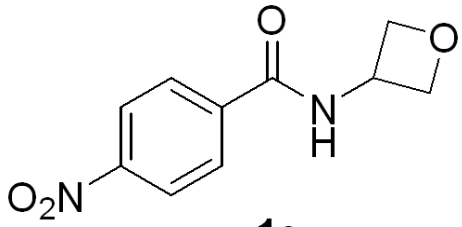
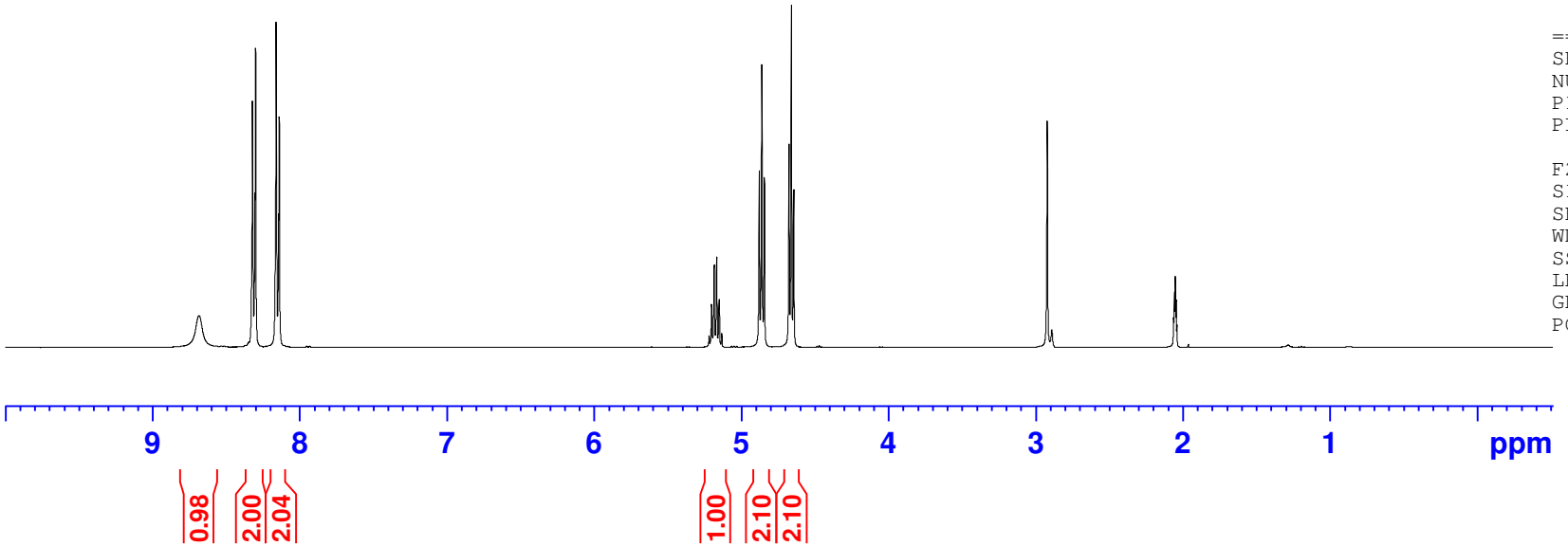
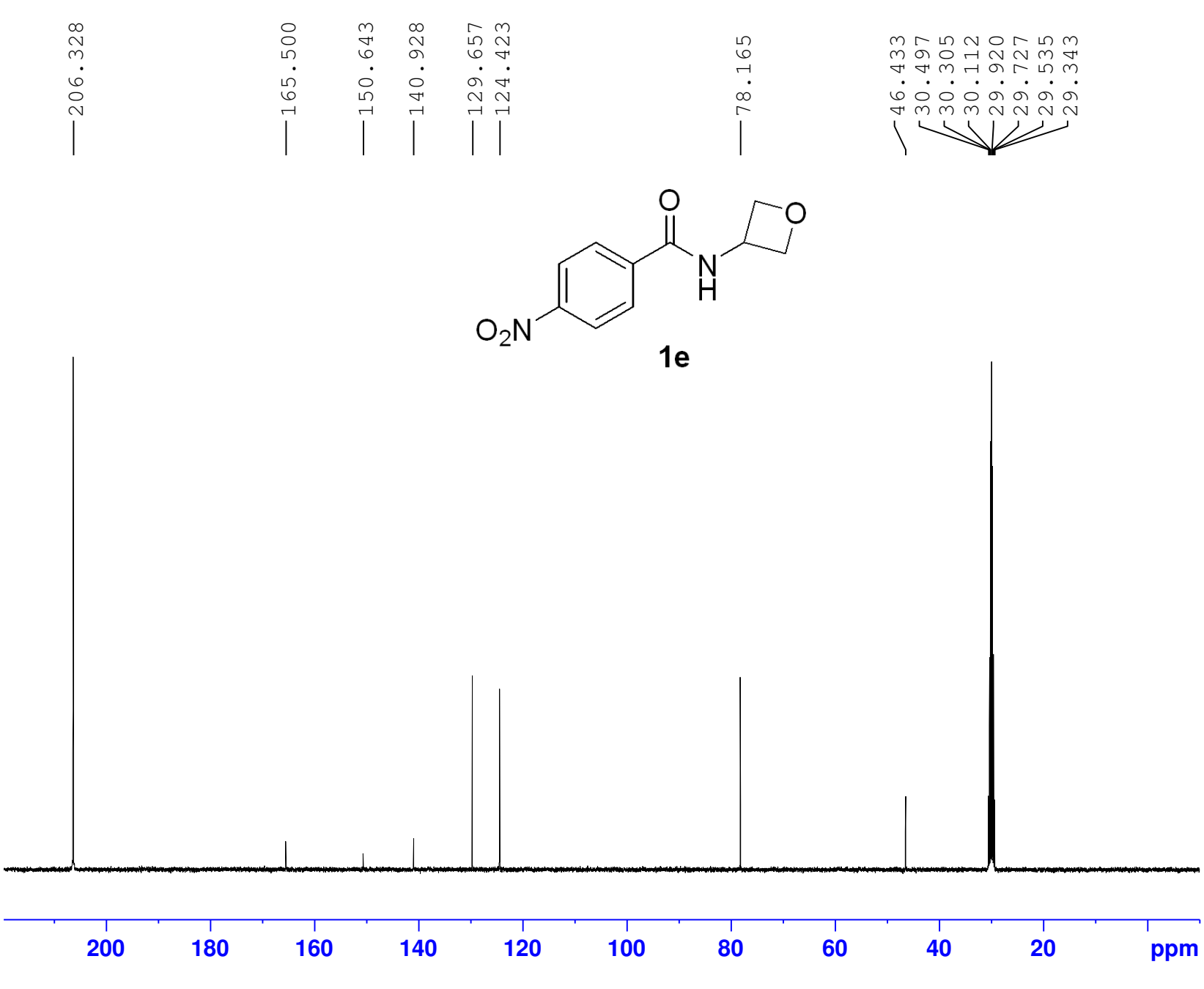





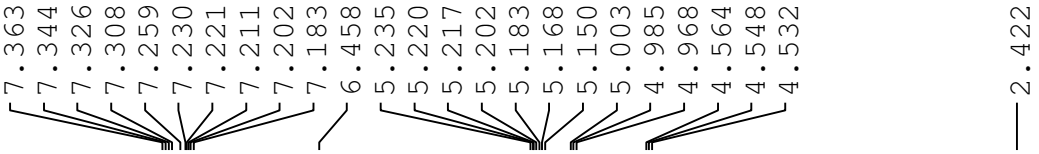
1e

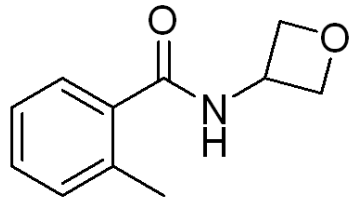



```
Current Data Parameters
NAME       YW-(LZW2068A)
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                9.50
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT          Acetone
NS                     5
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 62.93
DW                62.400 usec
DE                 6.50 usec
TE                300.3 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300065 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

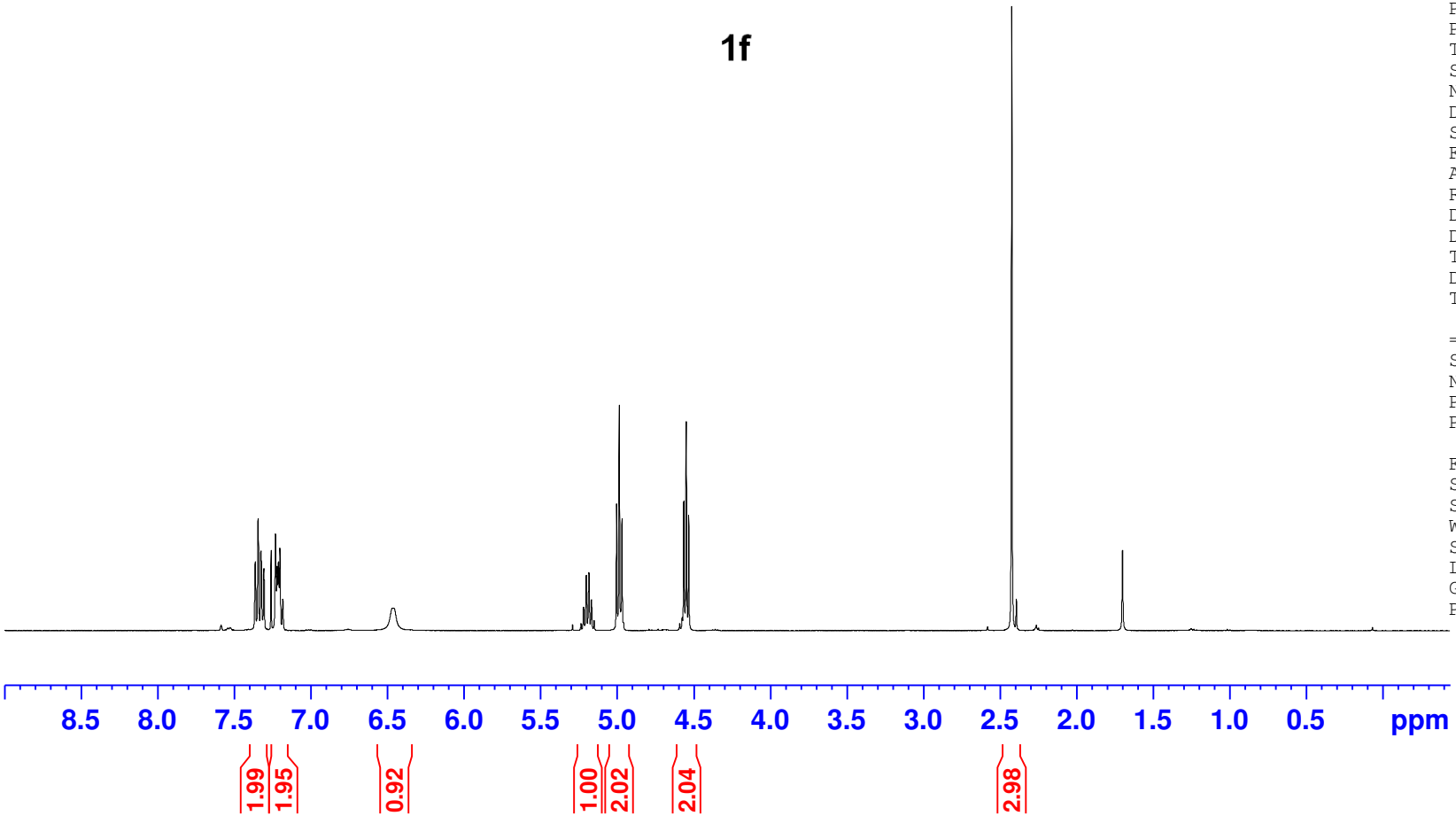



```
Current Data Parameters
NAME      YW-(LZW2068A)-carbon
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_              20160813
Time                   9.59
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG              zgpg30
TD                    65536
SOLVENT             Acetone
NS                      137
DS                        0
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631488 sec
RG                    196.92
DW                    20.800 usec
DE                     6.50 usec
TE                    300.9 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            100.6228298 MHz
NUC1                    13C
P1                     9.70 usec
PLW1           46.98899841 W

======== CHANNEL f2 ========
SFO2            400.1316005 MHz
NUC2                    1H
CPDPRG[2           waltz16
PCPD2                 90.00 usec
PLW2           11.99499989 W
PLW12           0.34213999 W
PLW13           0.27713001 W

F2 - Processing parameters
SI                    32768
SF              100.6126702 MHz
WDW                     EM
SSB          0
LB                     1.00 Hz
GB           0
PC                     1.40
```

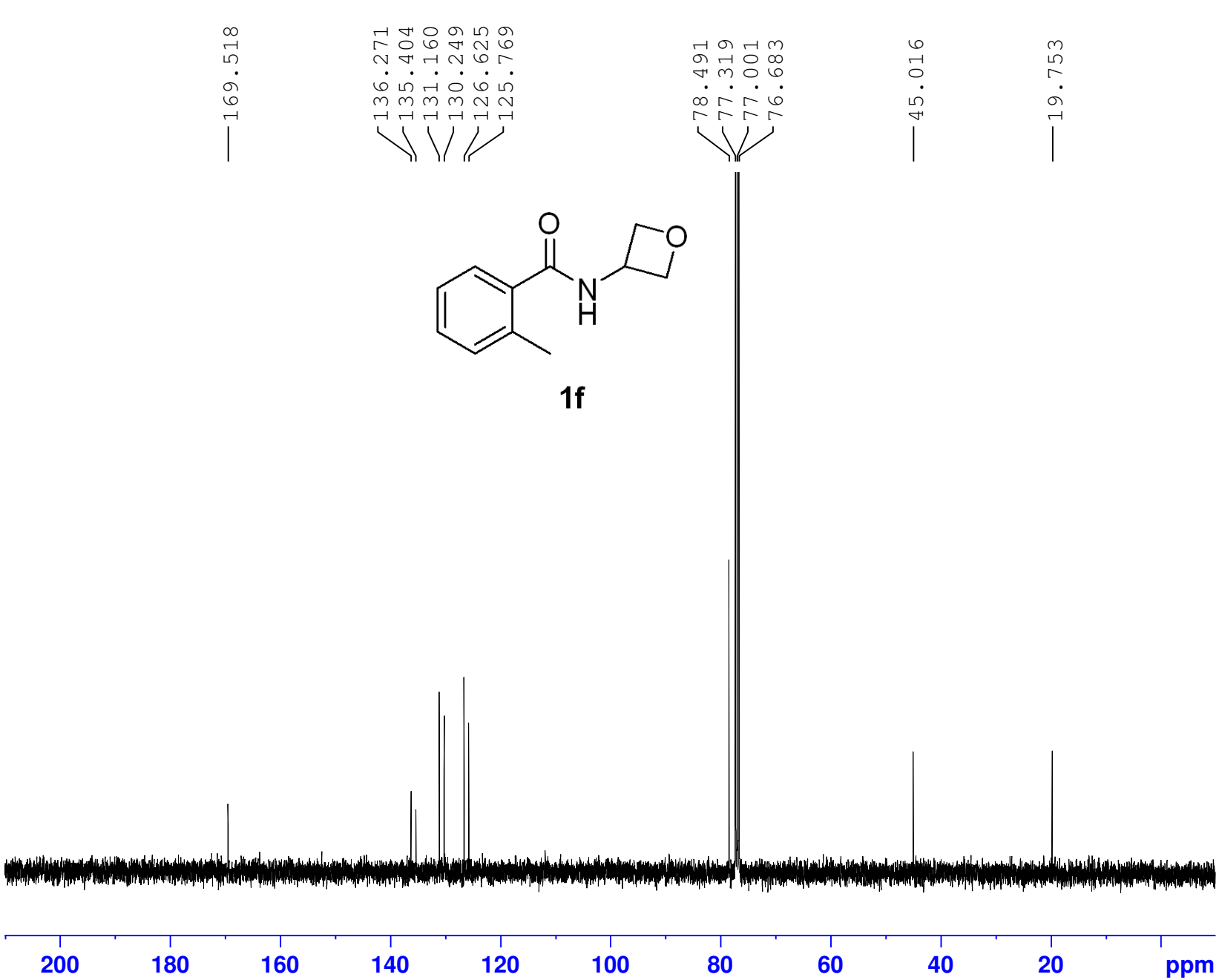




1f




```
Current Data Parameters
NAME                 lzw2058-h
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150310
Time                   20.57
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                         5
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     112.31
DW                     62.400 usec
DE                      6.50 usec
TE                     298.0 K
D1                  1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                     14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300095 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



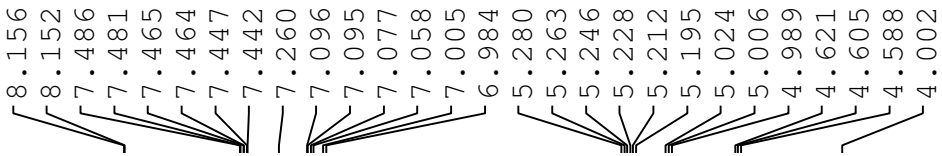
Current Data Parameters
NAME lzw2058-c
EXPNO 1
PROCNO 1

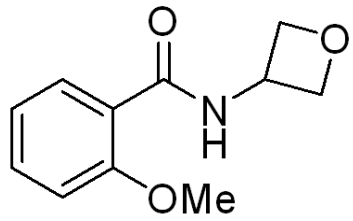
F2 - Acquisition Parameters
Date_ 20150310
Time 21.00
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 34
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

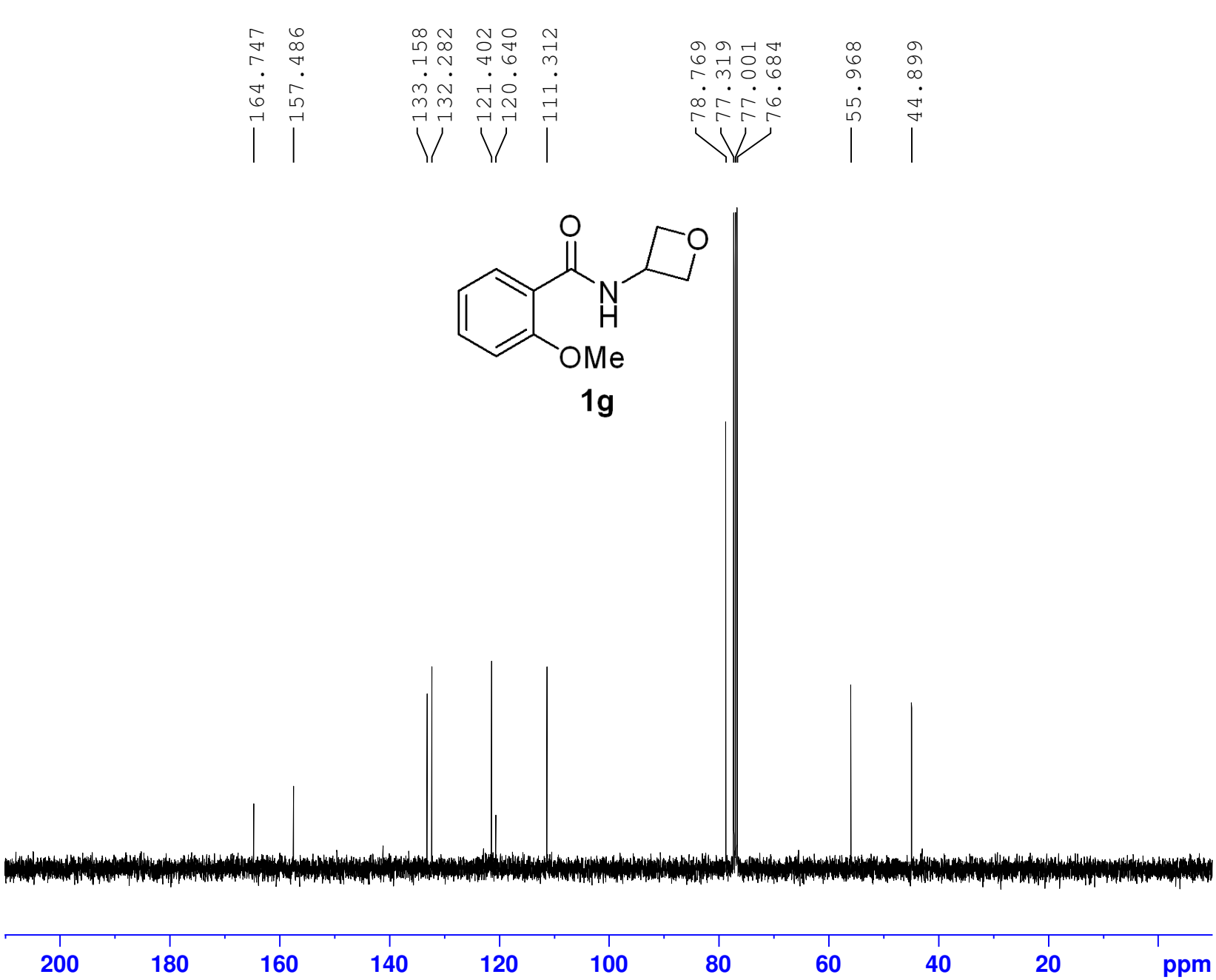
F2 - Processing parameters
SI 32768
SF 100.6127729 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



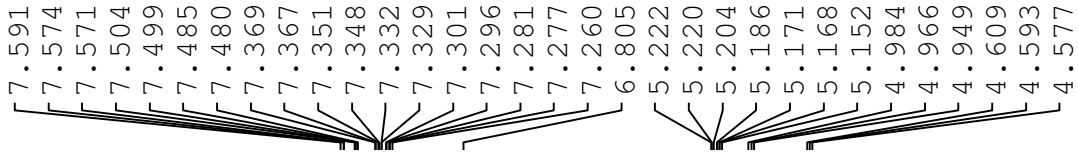


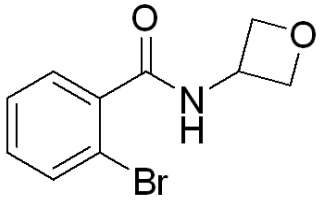
1g


```
Current Data Parameters
NAME                  lzw2052
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20150307
Time                   20.55
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        11
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     82.92
DW                    62.400 usec
DE                     6.50 usec
TE                    297.5 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300092 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

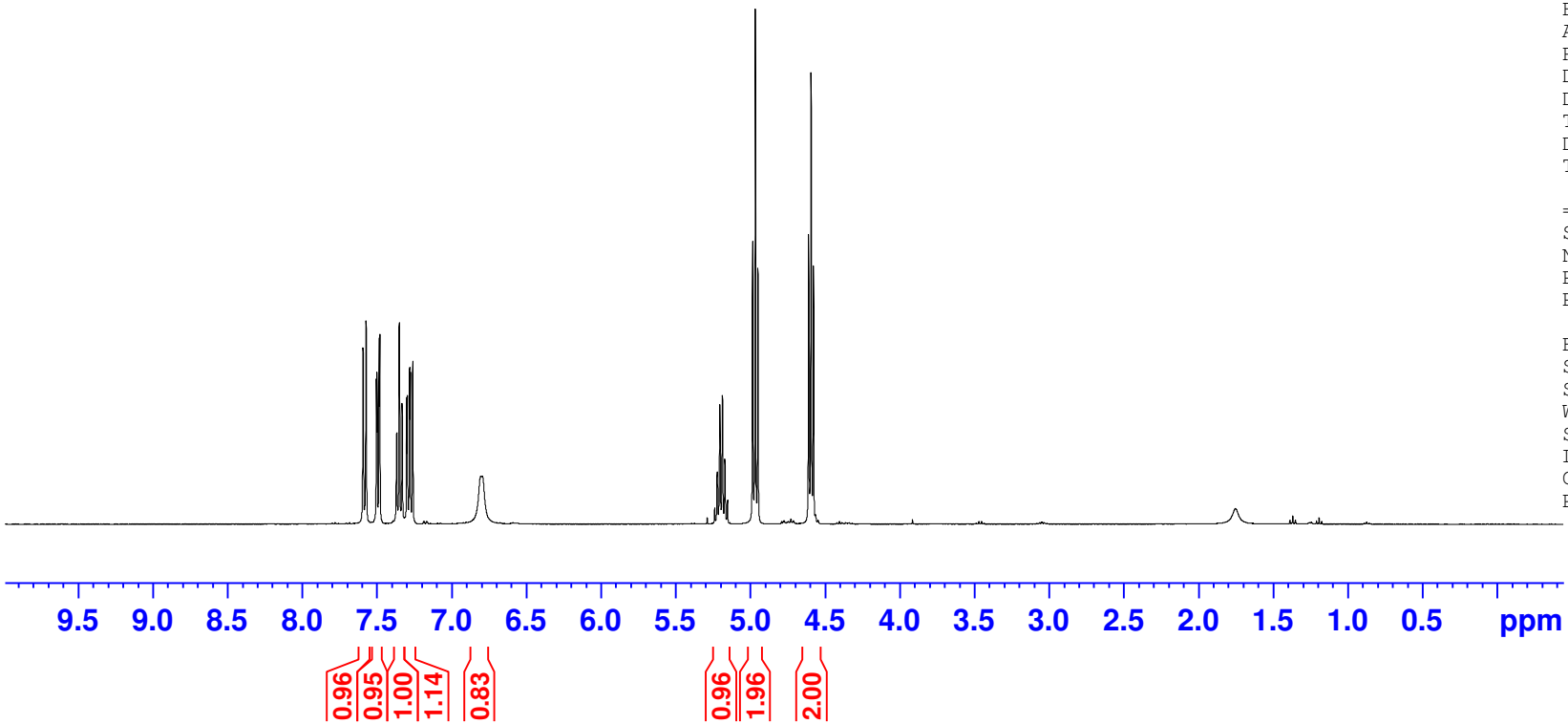



```
Current Data Parameters
NAME            lzw2052-c
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_            20150307
Time                20.57
INSTRUM             spect
PROBHD   5 mm PABBO BB/
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     17
DS                      2
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ             1.3631488 sec
RG                 196.92
DW                 20.800 usec
DE                  6.50 usec
TE                 298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                  32768
SF           100.6127753 MHz
WDW                    EM
SSB       0
LB                  1.00 Hz
GB        0
PC                  1.40
```

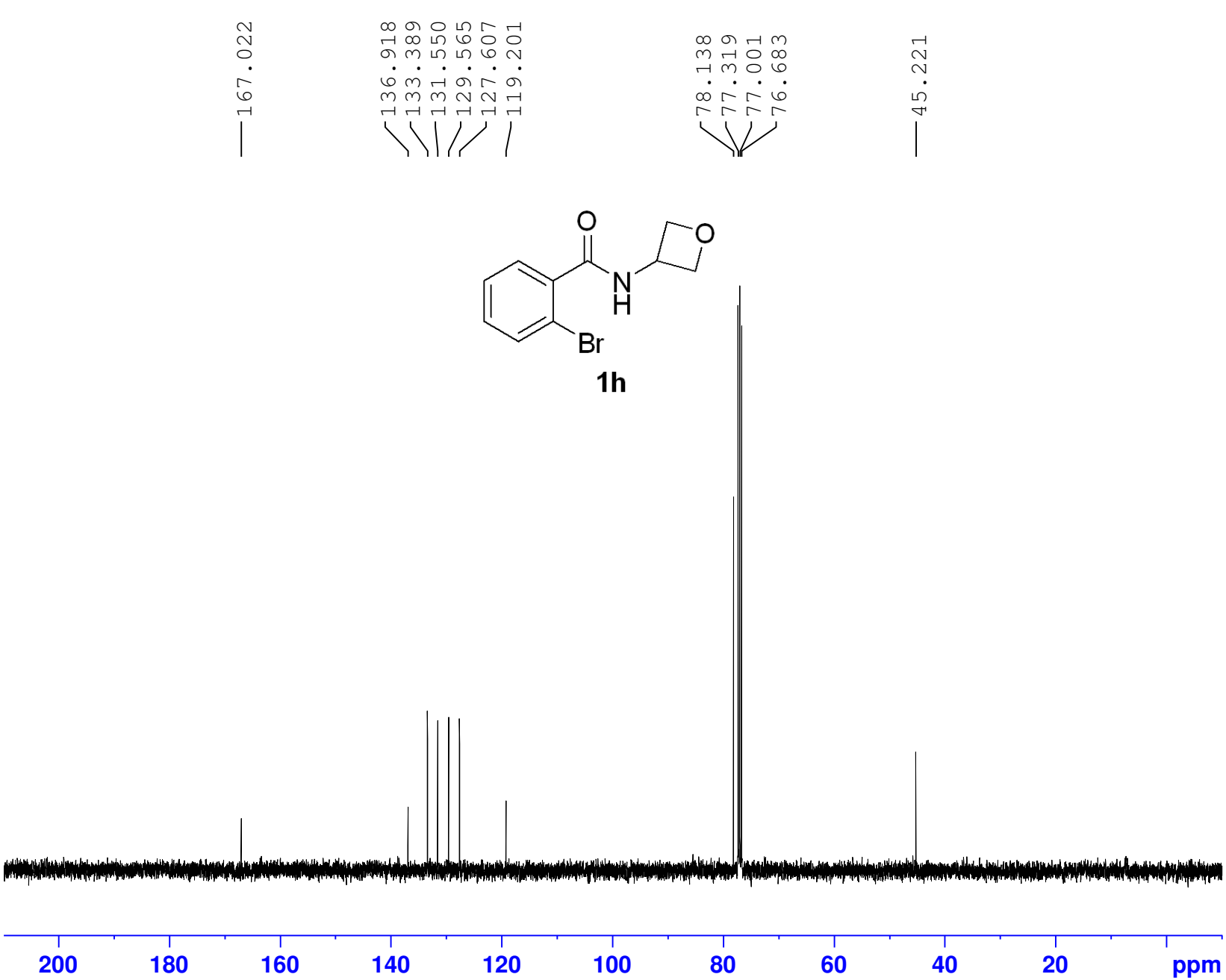




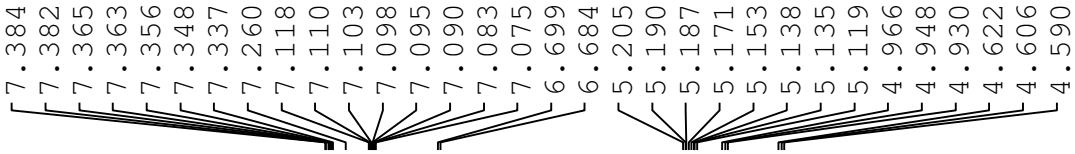
1h

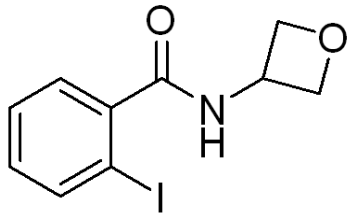



```
Current Data Parameters
NAME                  YW-1691
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160319
Time                   20.02
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        14
DS                         0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     88.84
DW                    62.400 usec
DE                     6.50 usec
TE                    297.8 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300093 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

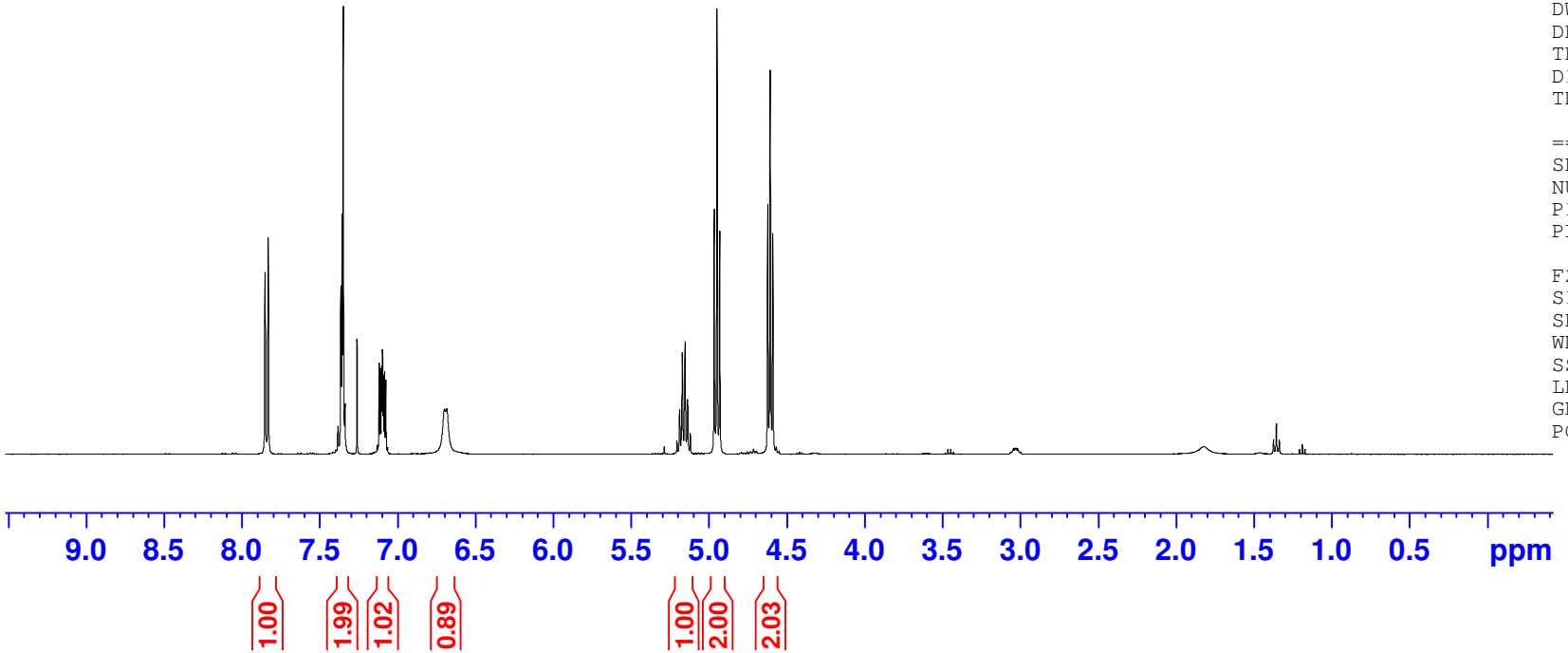



```
Current Data Parameters
NAME      YW-1691-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160319
Time               20.04
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   30
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                298.6 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127744 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

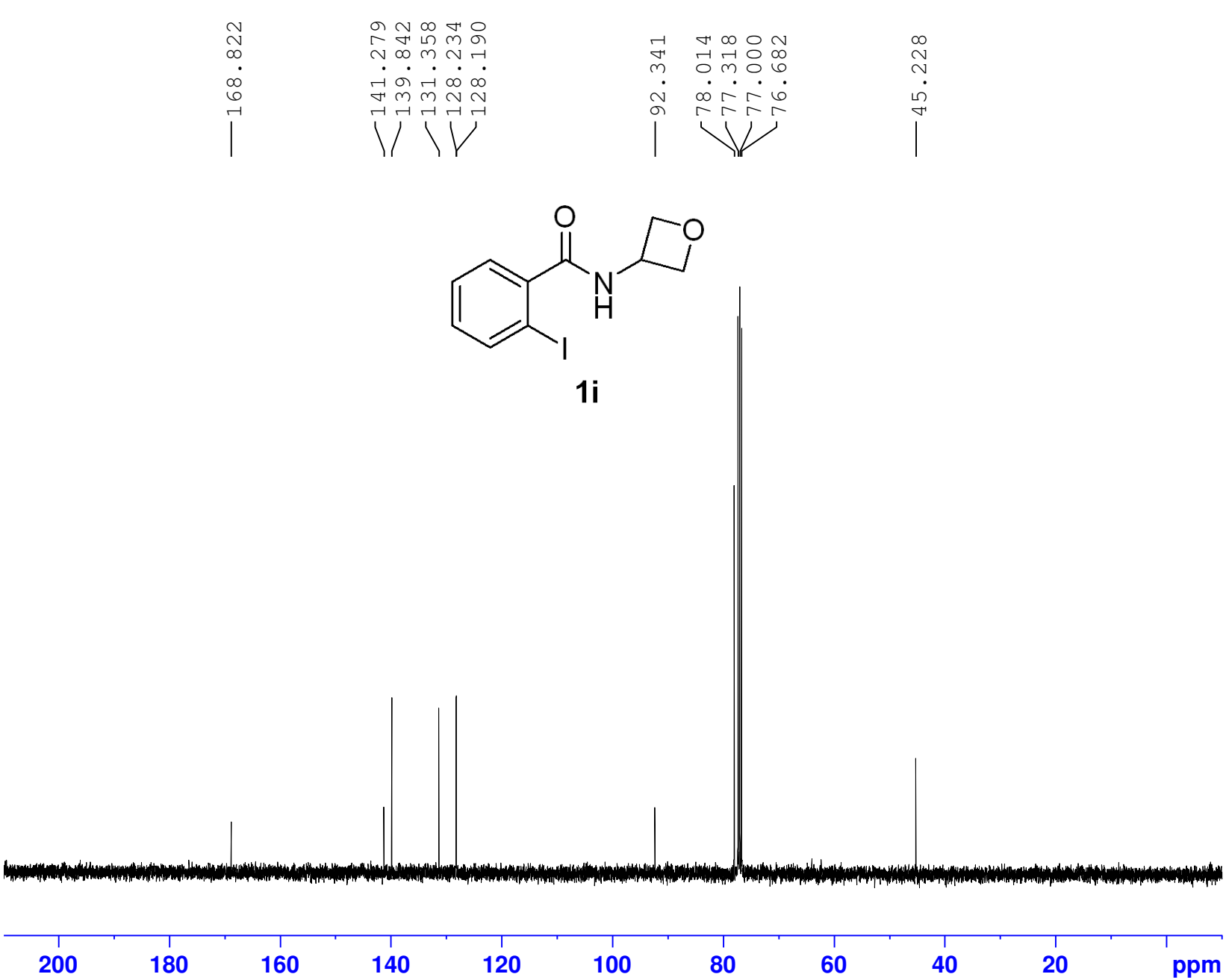




1i




```
Current Data Parameters
NAME                  YW-1693
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160323
Time                   20.22
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          4
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                      88.84
DW                     62.400 usec
DE                      6.50 usec
TE                     297.4 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300094 MHz
WDW                          EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



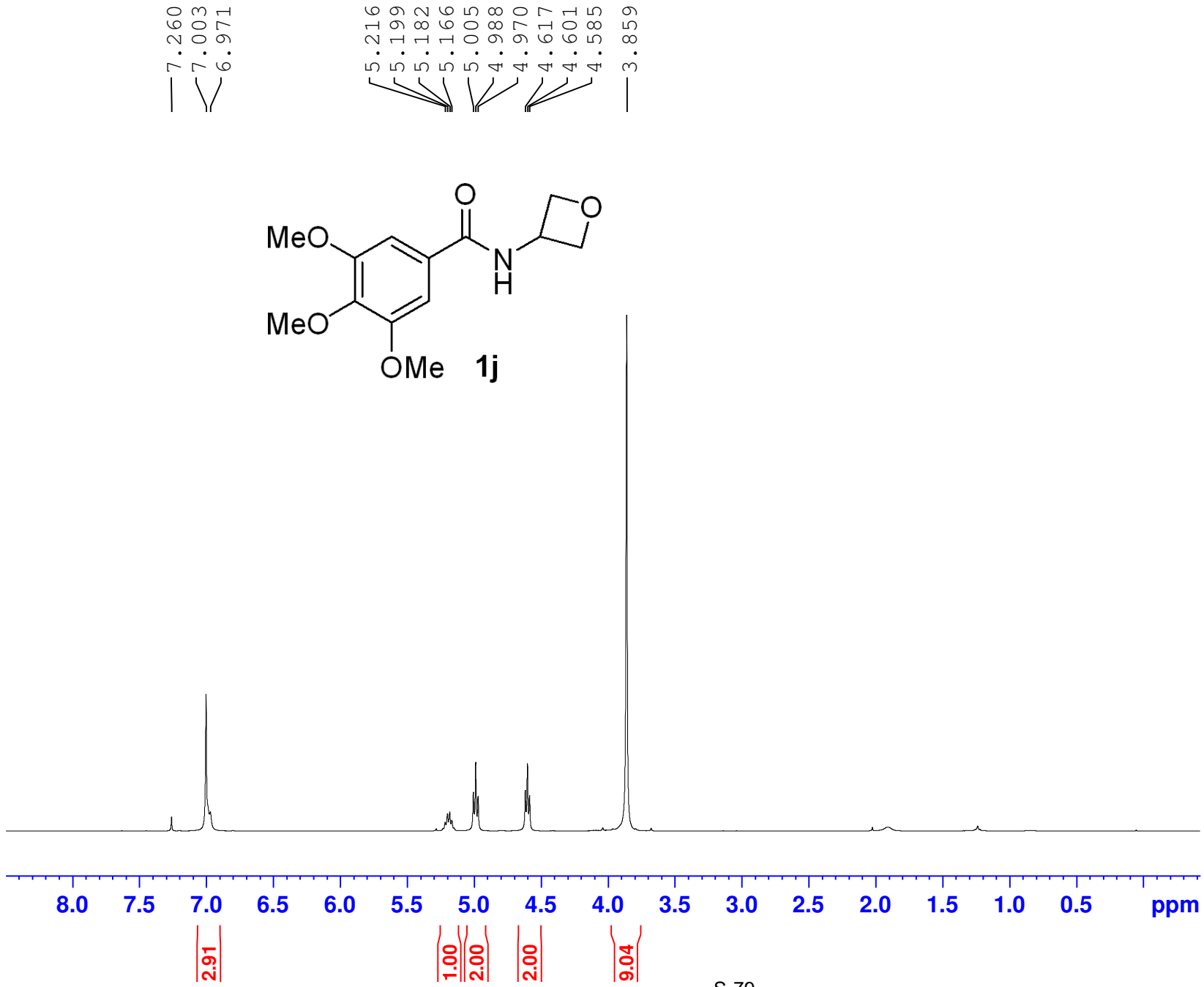
Current Data Parameters
NAME YW-1693-carbon
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160323
Time 20.24
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 34
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127758 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

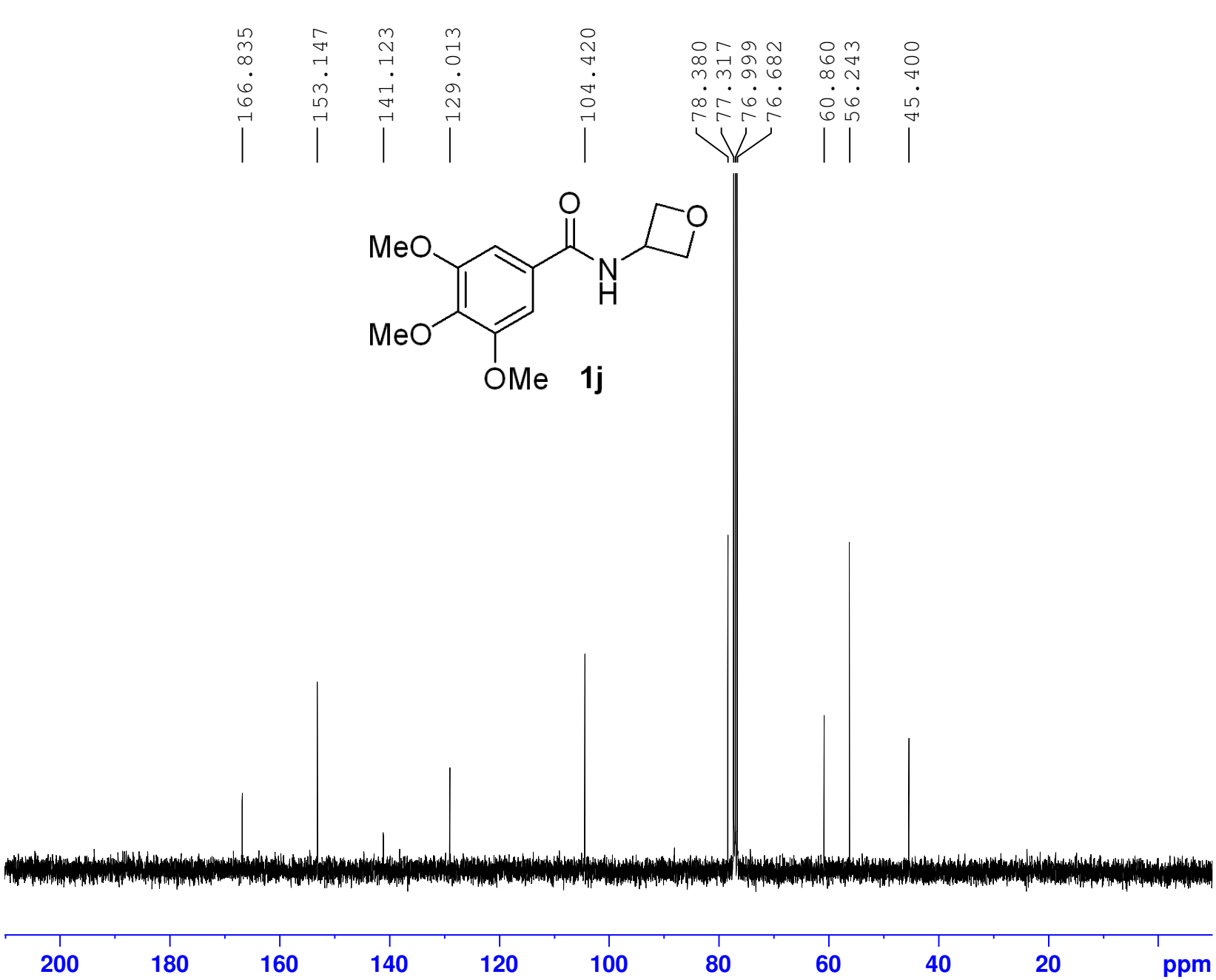


Current Data Parameters
NAME lzw2051-h
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150307
Time 14.31
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 70.97
DW 62.400 usec
DE 6.50 usec
TE 296.4 K
D1 1.00000000 sec
TD0 1

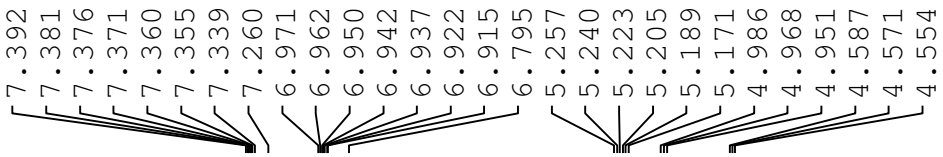
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W

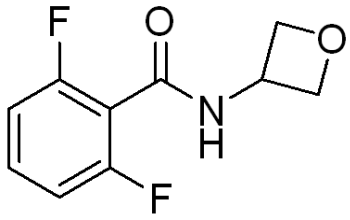
F2 - Processing parameters
SI 65536
SF 400.1300089 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



BRUKER

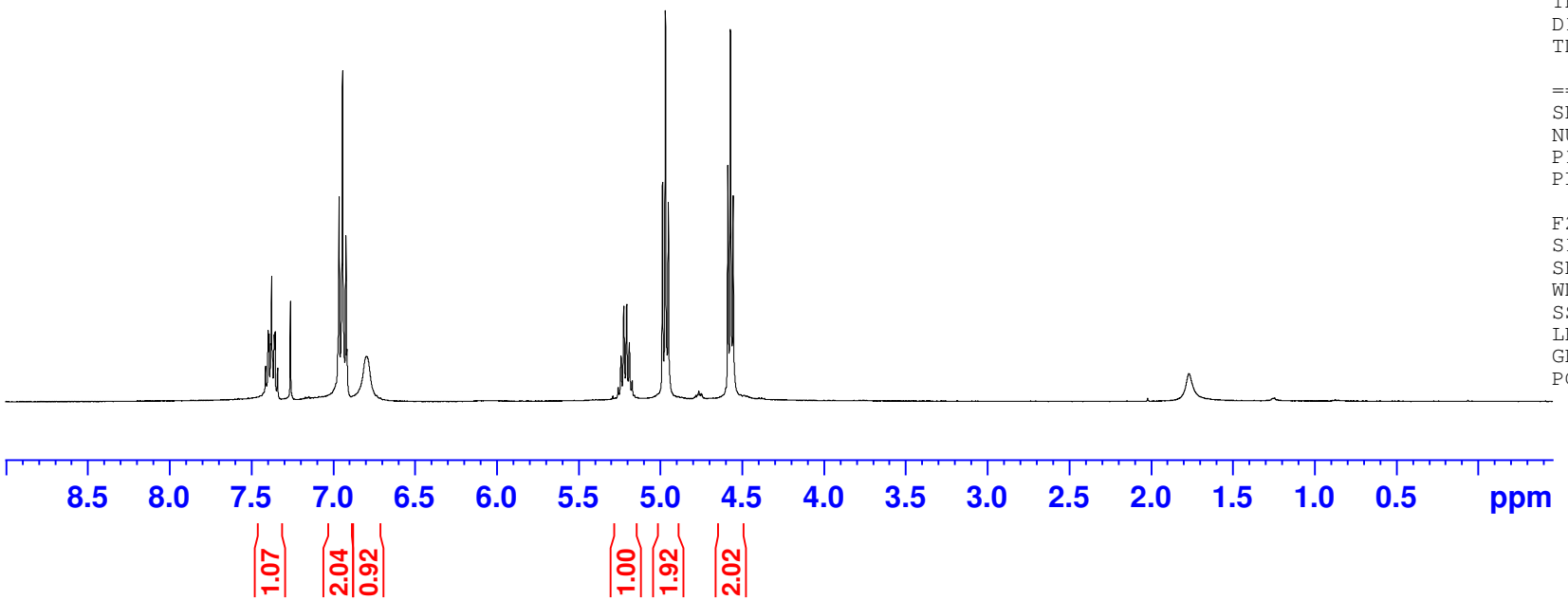
```
Current Data Parameters
NAME            lzw2051-c
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_            20150307
Time                14.34
INSTRUM             spect
PROBHD   5 mm PABBO BB/
PULPROG           zgpg30
TD                 65536
SOLVENT             CDCl3
NS                     29
DS                      2
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.1 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                  32768
SF           100.6127754 MHz
WDW                    EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

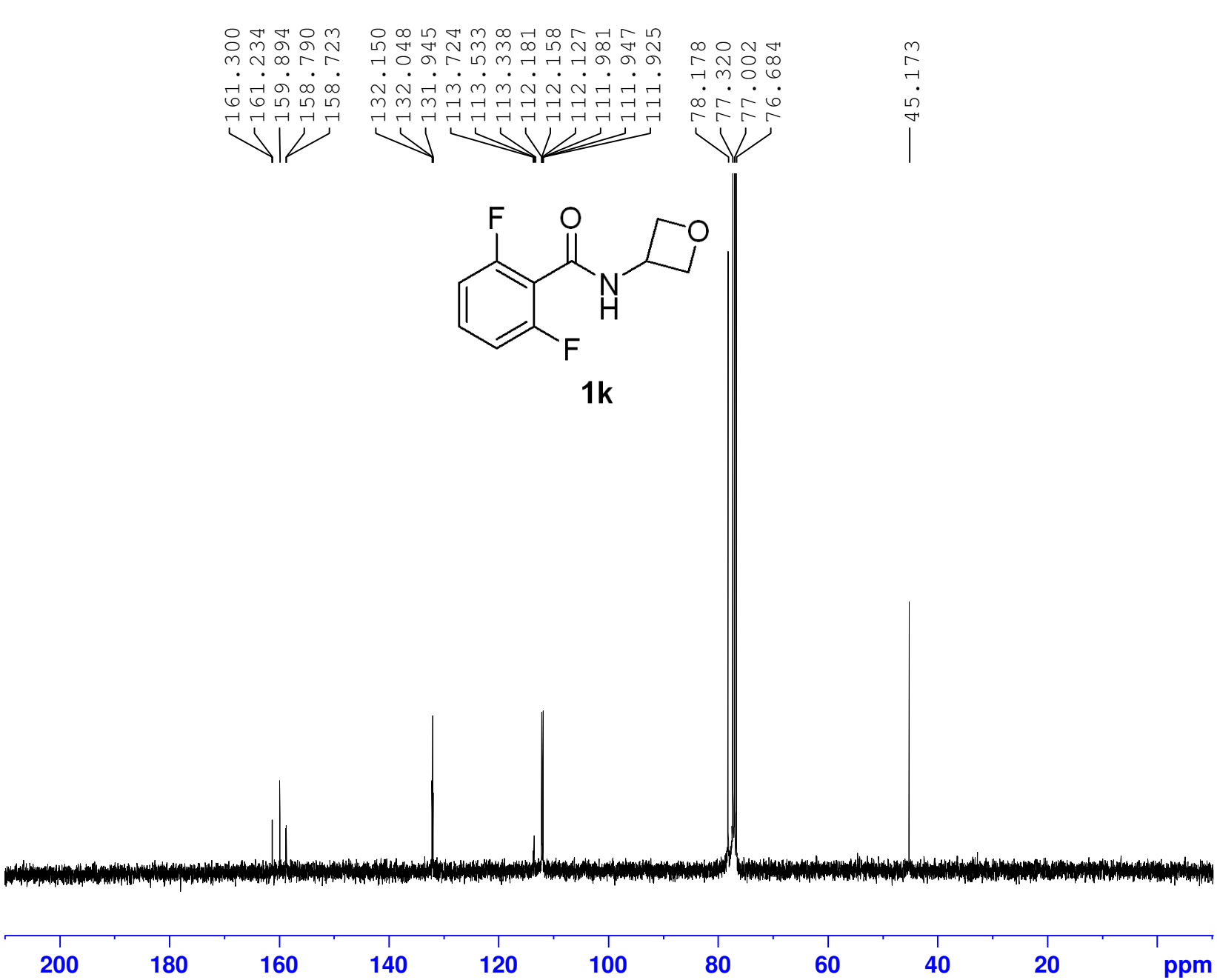




1k

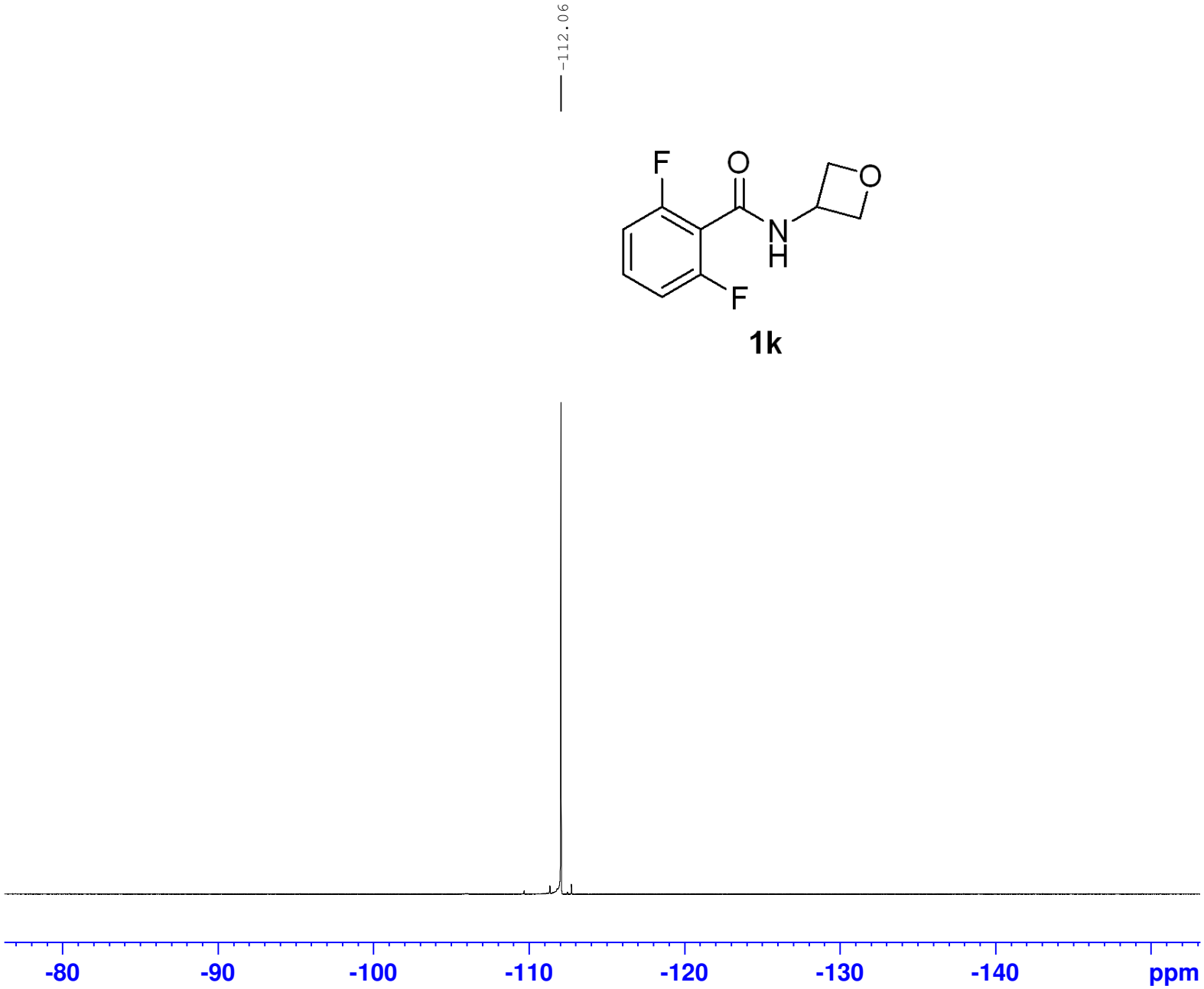
```
Current Data Parameters
NAME        YW-(LZW2019)
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                9.09
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     5
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 88.84
DW                62.400 usec
DE                 6.50 usec
TE                301.7 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300089 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



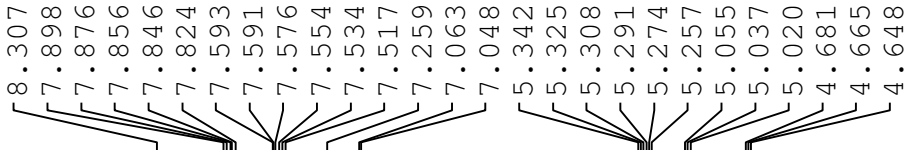


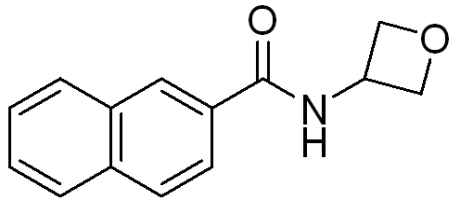
BRUKER

```
Current Data Parameters
NAME      YW-(LZW2019)-carbon
EXPNO                      1
PROCNO                     1

F2 - Acquisition Parameters
Date_           20160813
Time               9.26
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  240
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                301.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127716 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

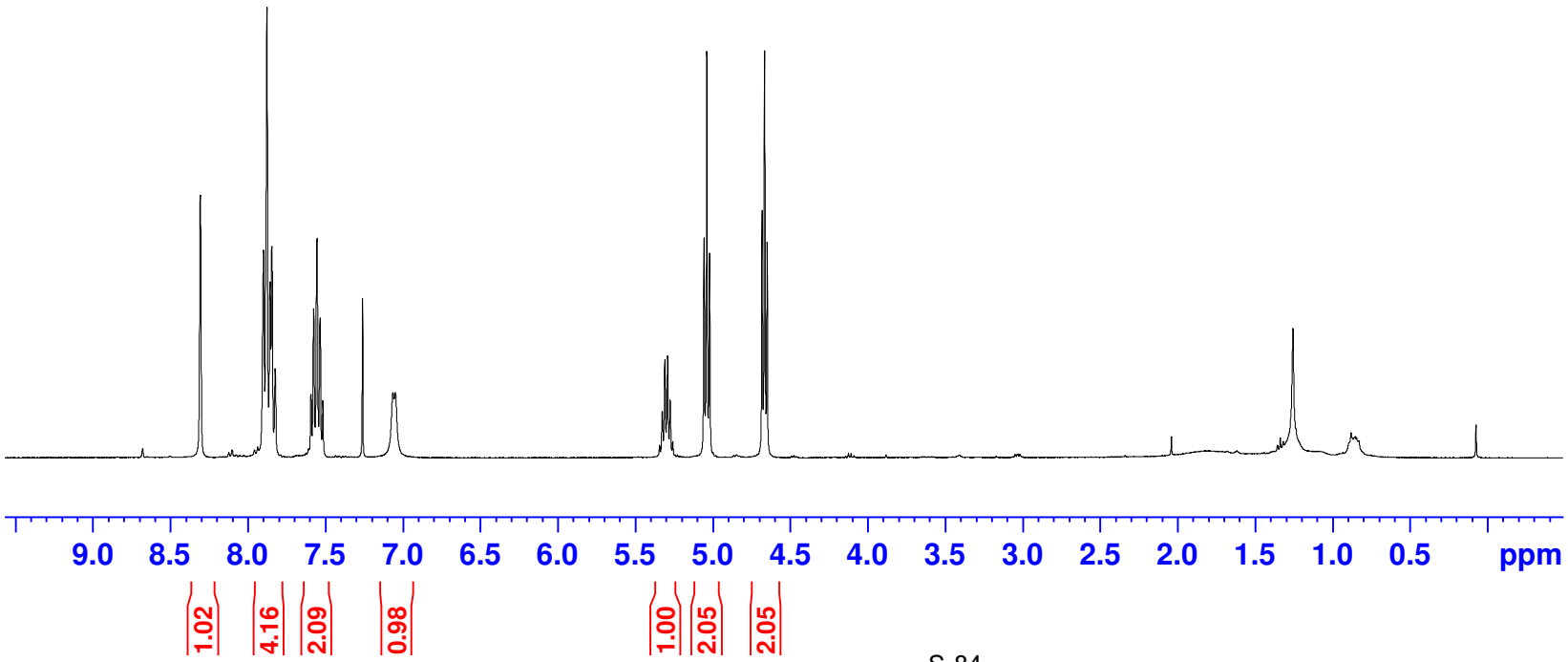



```
Current Data Parameters
NAME      YW-(LZW2019)-19F
EXPNO                    1
PROCNO                   1

F2 - Acquisition Parameters
Date_           20160813
Time               10.05
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG           zgflqn
TD                131072
SOLVENT             CDCl3
NS                     16
DS                      0
SWH            89285.711 Hz
FIDRES          0.681196 Hz
AQ             0.7340032 sec
RG                196.92
DW                 5.600 usec
DE                 6.50 usec
TE                299.8 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         376.4607164 MHz
NUC1                19F
P1                14.70 usec
PLW1         15.99600029 W

F2 - Processing parameters
SI                 65536
SF           376.4983660 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

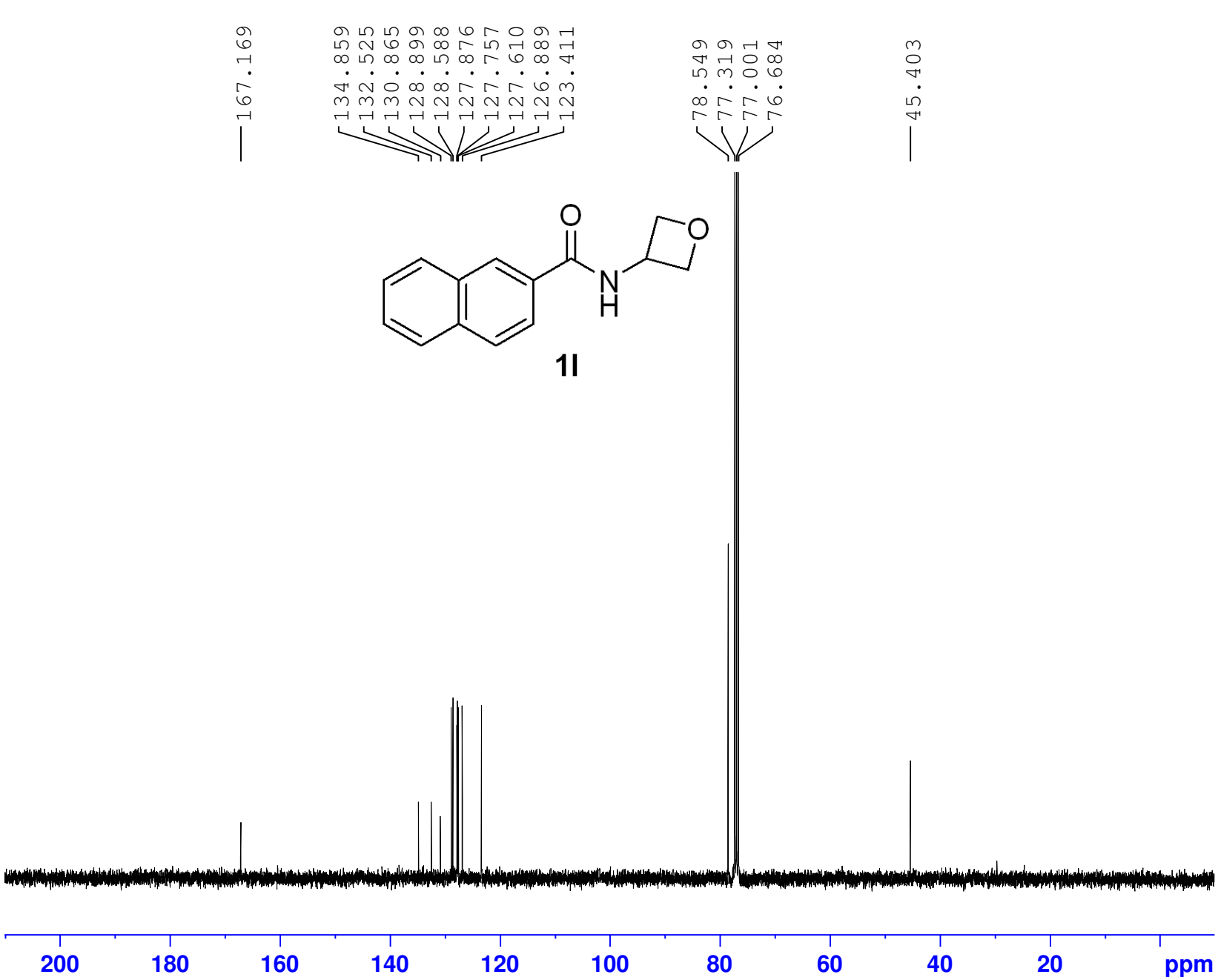




1l




```
Current Data Parameters
NAME            lzw2060-h
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_            20150310
Time                21.06
INSTRUM             spect
PROBHD    5 mm PABBO BB/
PULPROG              zg30
TD                  65536
SOLVENT             CDCl3
NS                      6
DS                      2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894465 sec
RG                  112.31
DW                  62.400 usec
DE                   6.50 usec
TE                  297.7 K
D1             1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                  14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                  65536
SF           400.1300095 MHz
WDW                    EM
SSB       0
LB                  0.30 Hz
GB        0
PC                  1.00
```



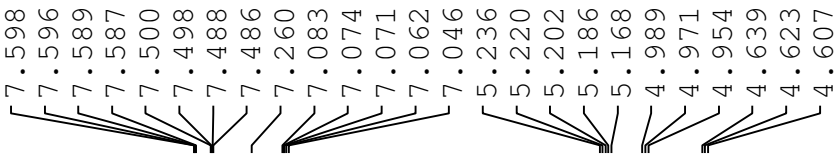
Current Data Parameters
NAME lzw2060-c
EXPNO 1
PROCNO 1

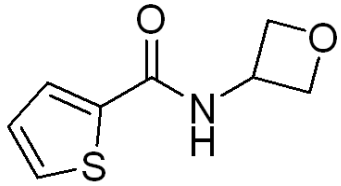
F2 - Acquisition Parameters
Date_ 20150310
Time 21.15
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 122
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.5 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

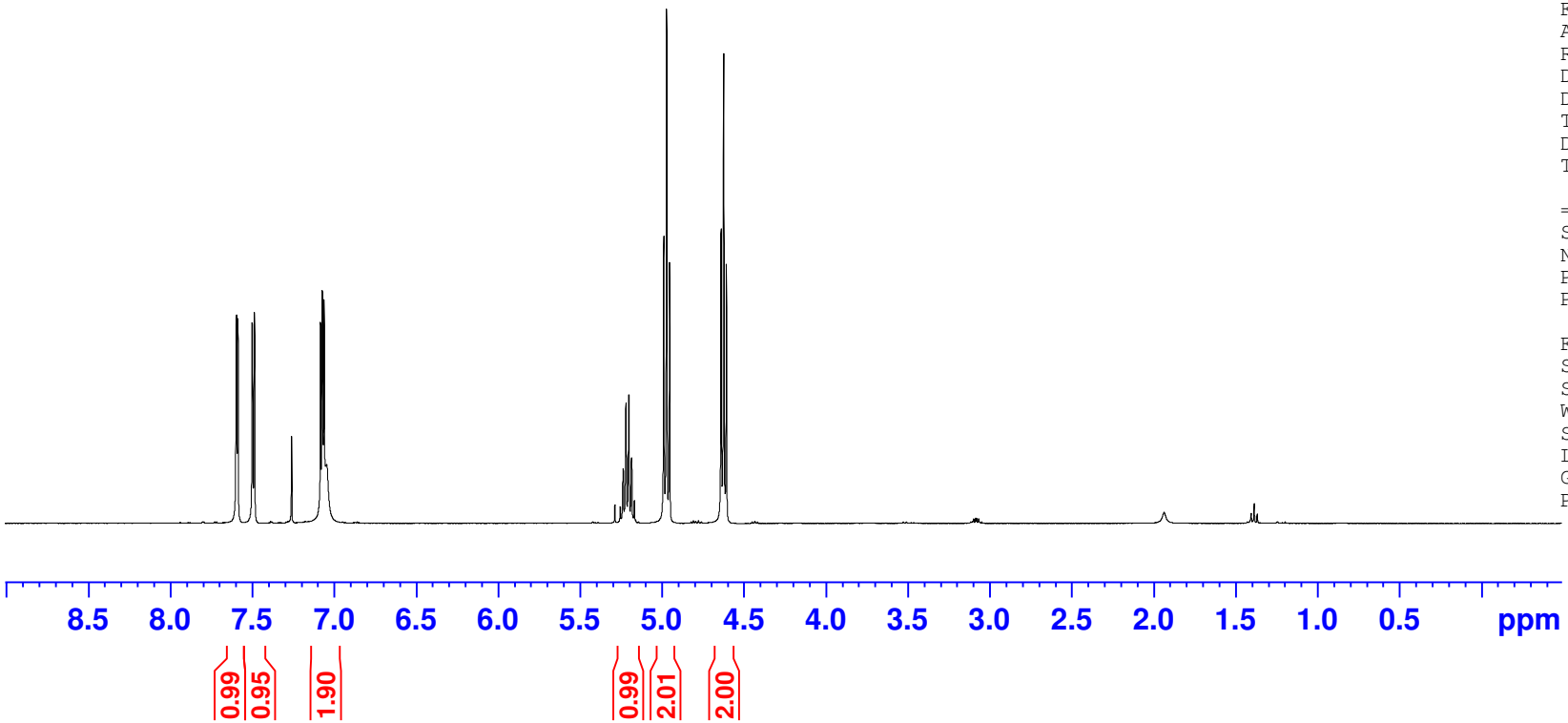
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

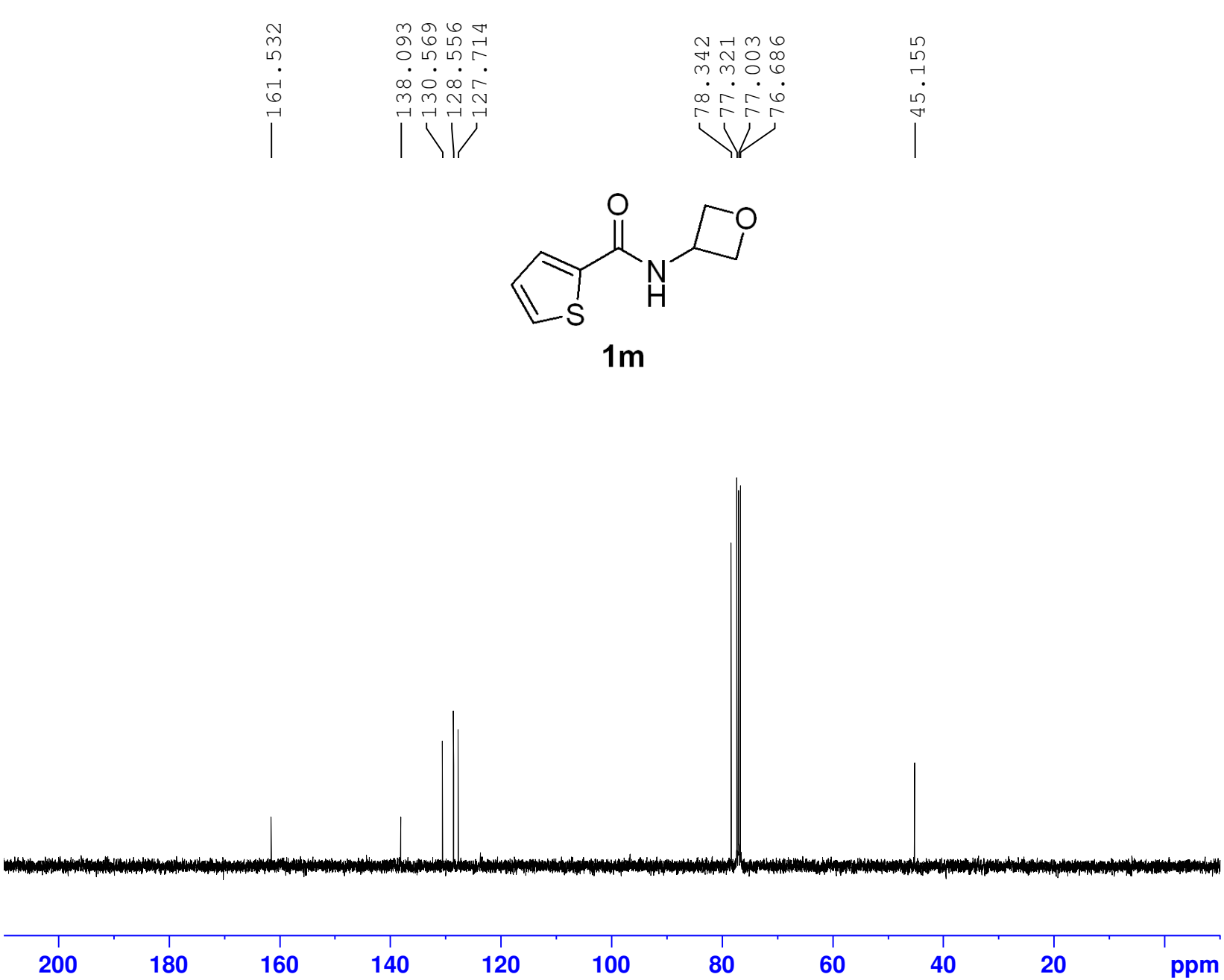




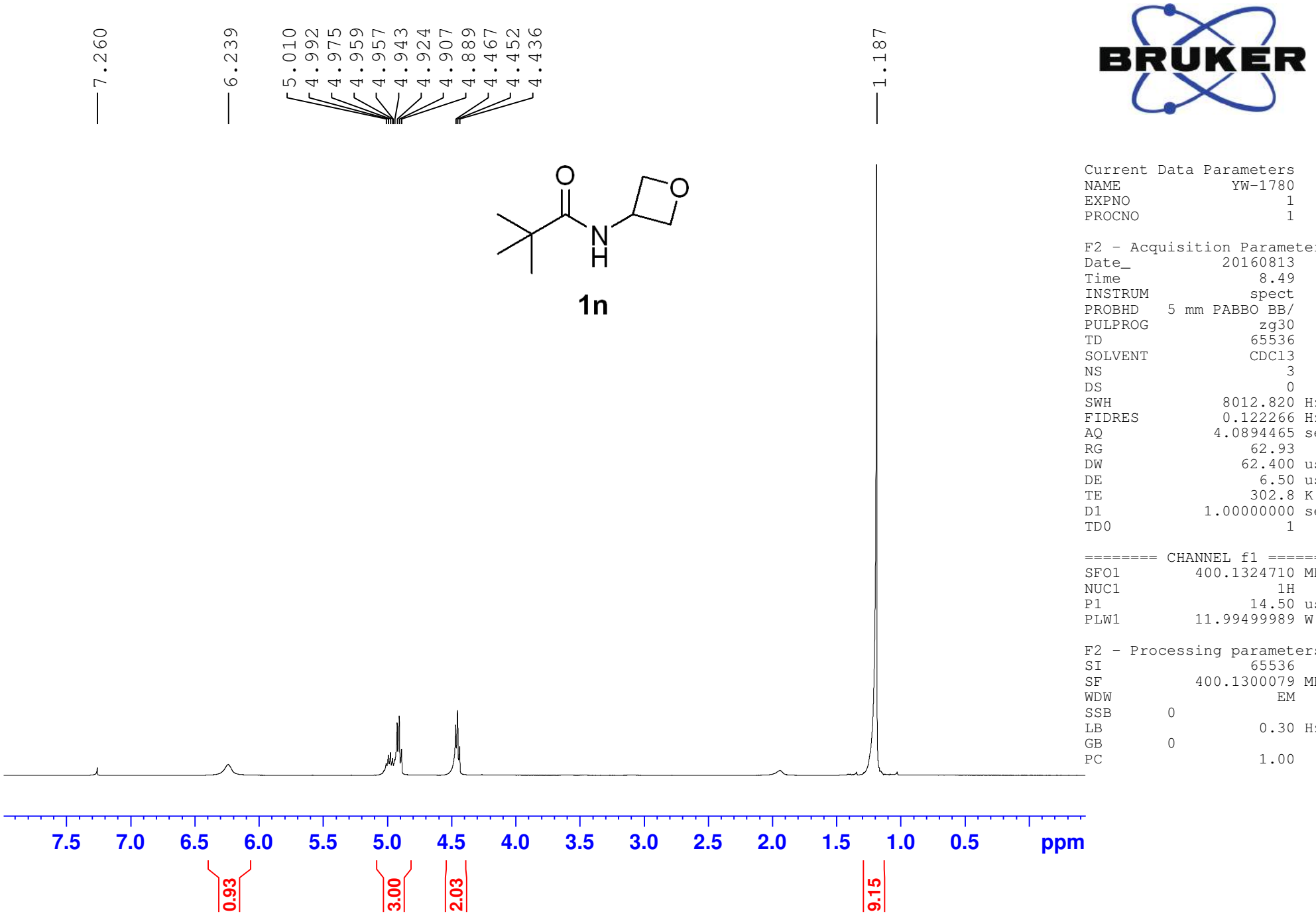
1m



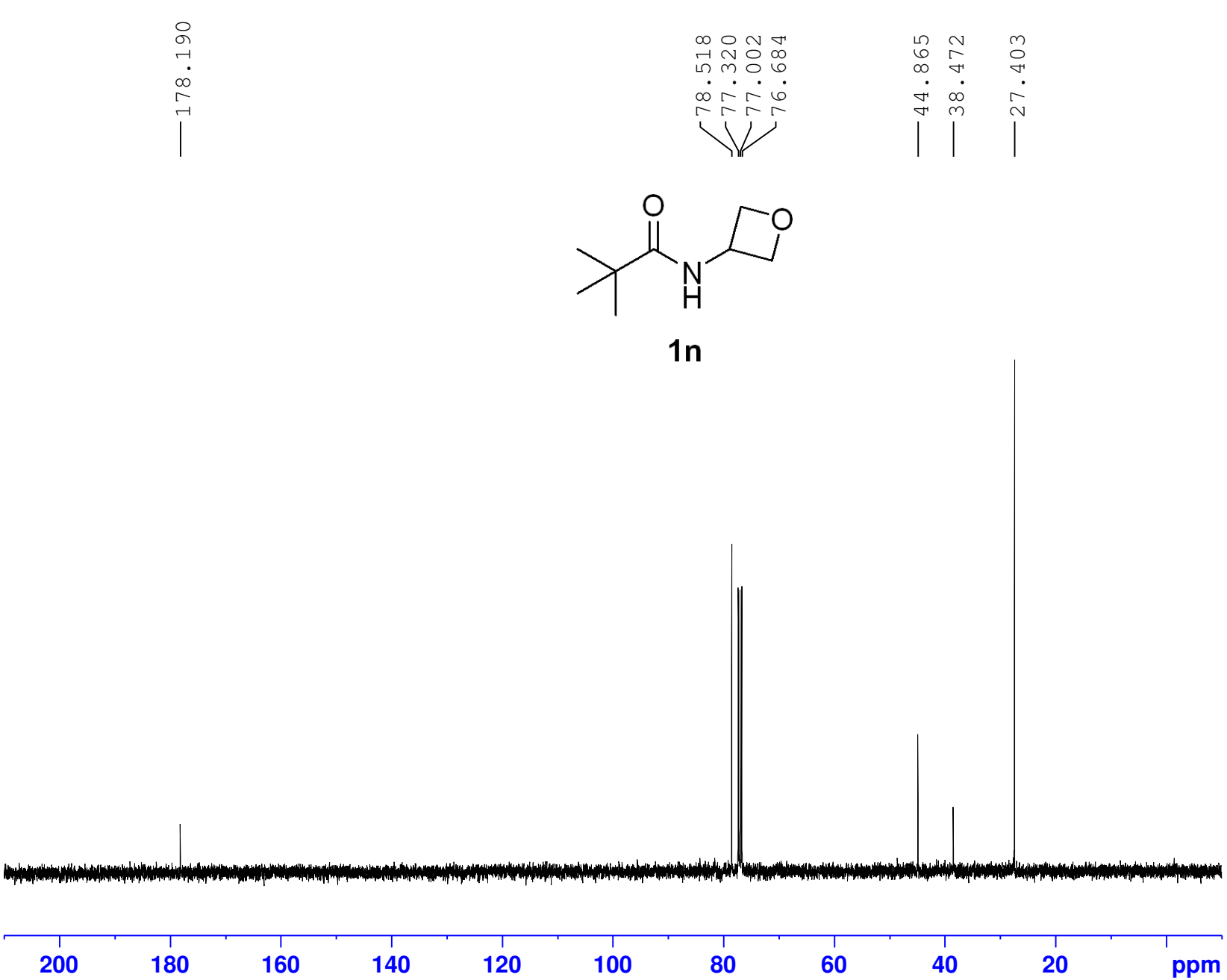

```
Current Data Parameters
NAME                  YW-1777
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160512
Time                   18.35
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          7
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     103.52
DW                     62.400 usec
DE                      6.50 usec
TE                     296.5 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300093 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



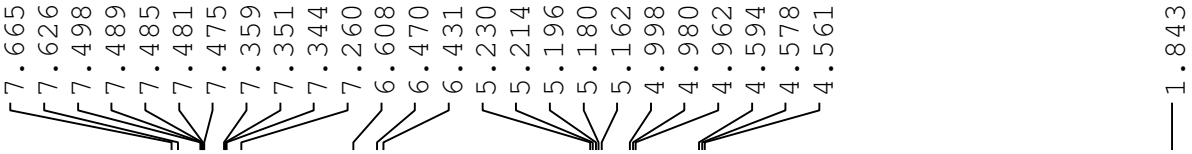

```
Current Data Parameters
NAME      YW-1777-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160512
Time               18.37
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   22
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.1 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127758 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

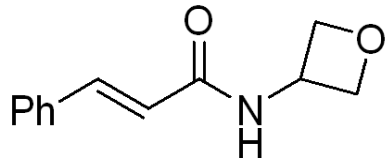



```
Current Data Parameters
NAME                  YW-1780
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160813
Time                    8.49
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          3
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                      62.93
DW                     62.400 usec
DE                      6.50 usec
TE                     302.8 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300079 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

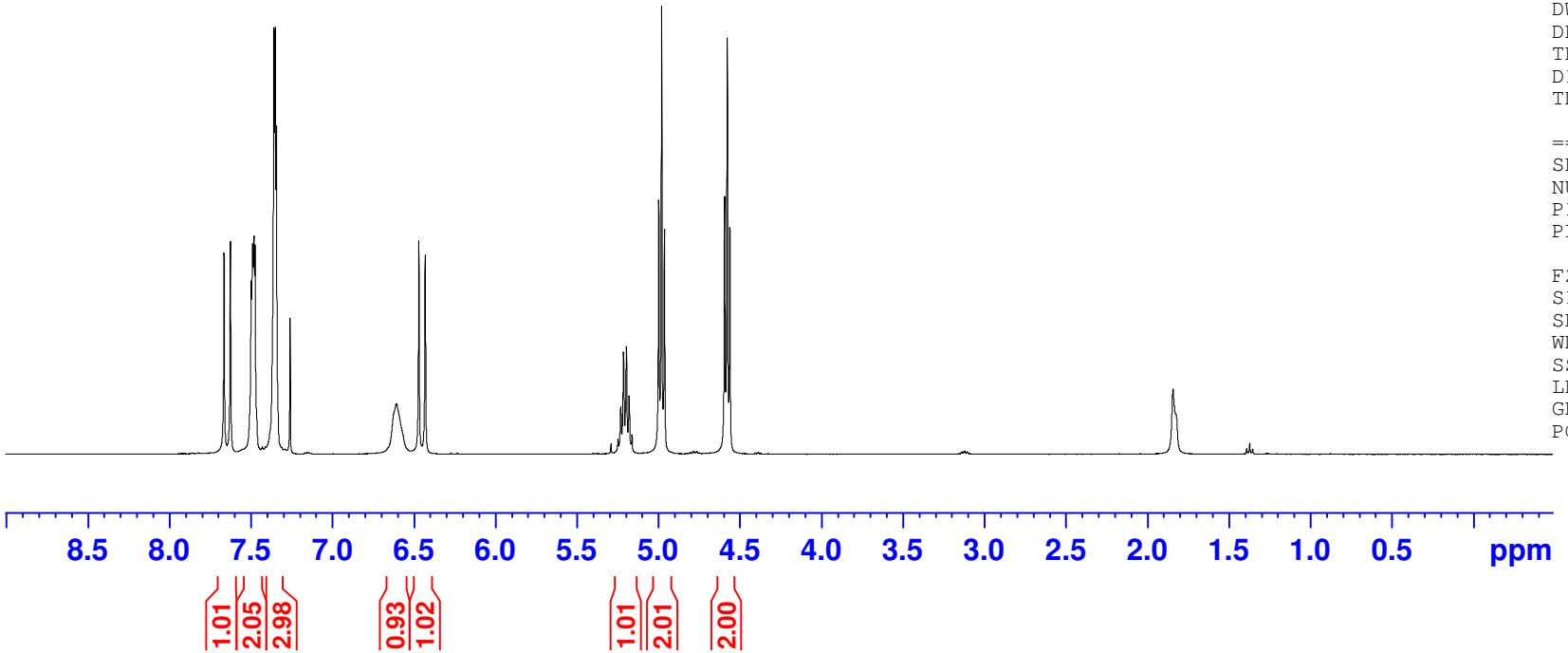



```
Current Data Parameters
NAME      YW-1780-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                8.52
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   39
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE                303.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2            90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                32768
SF           100.6127737 MHz
WDW                  EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

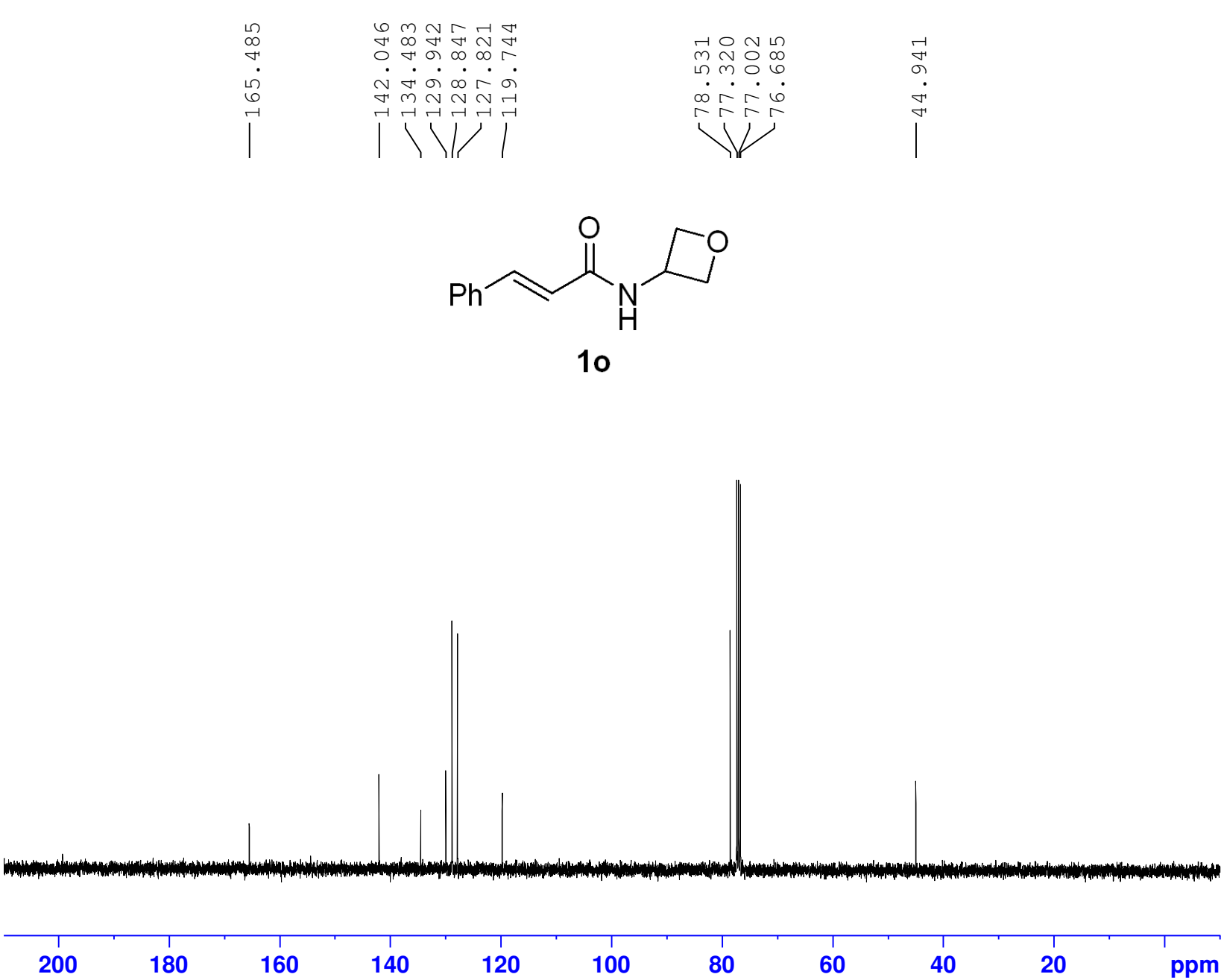




1o




```
Current Data Parameters
NAME                  YW-1905
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20160809
Time                   15.16
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                     88.84
DW                    62.400 usec
DE                     6.50 usec
TE                    298.7 K
D1                 1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1            400.1324710 MHz
NUC1                       1H
P1                     14.50 usec
PLW1            11.99499989 W

F2 - Processing parameters
SI                         65536
SF              400.1300093 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



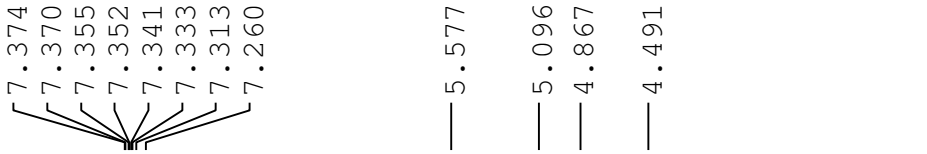
Current Data Parameters
NAME YW-1905-carbon
EXPNO 1
PROCNO 1

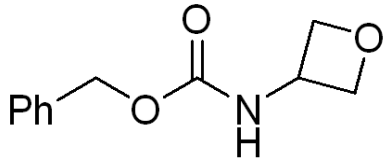
F2 - Acquisition Parameters
Date_ 20160809
Time 15.19
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 52
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 299.6 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

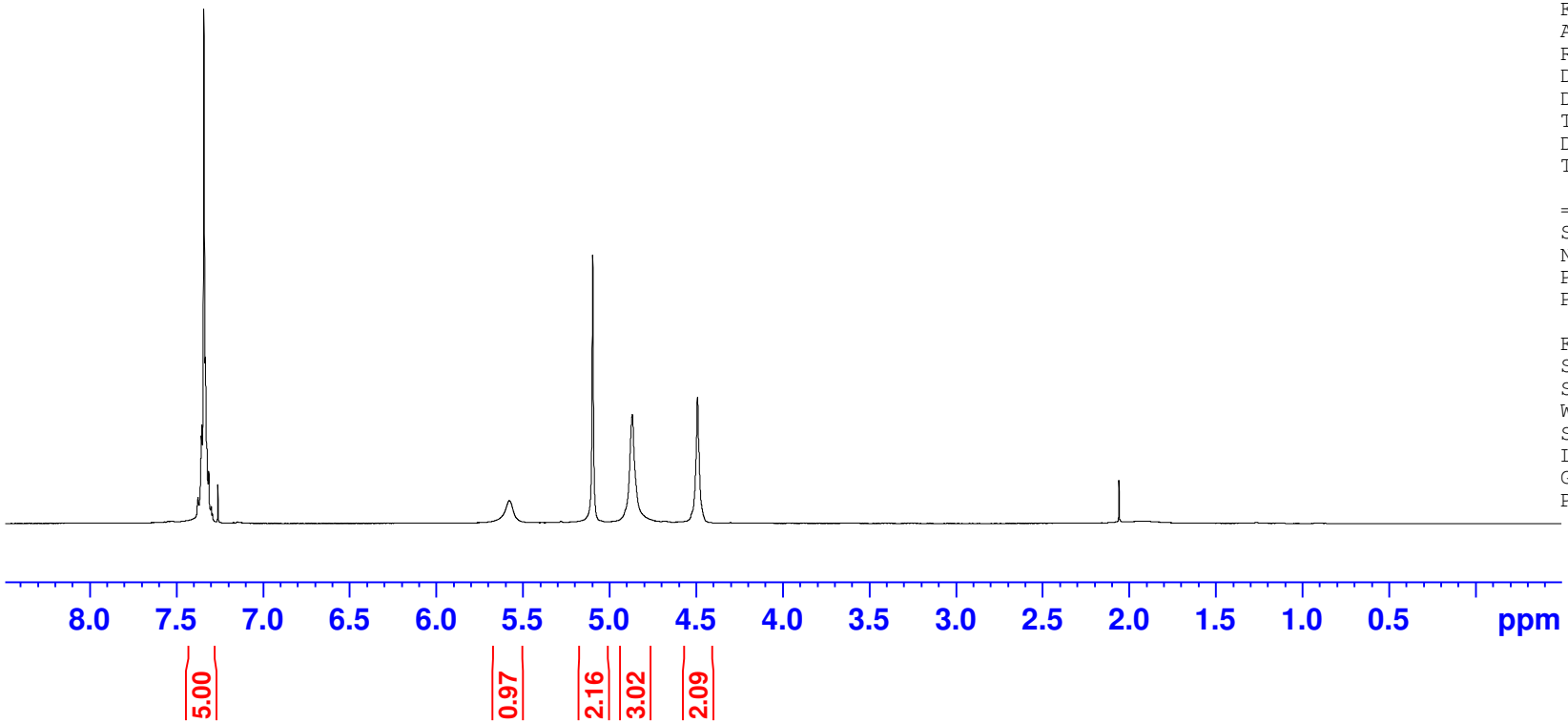
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127736 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

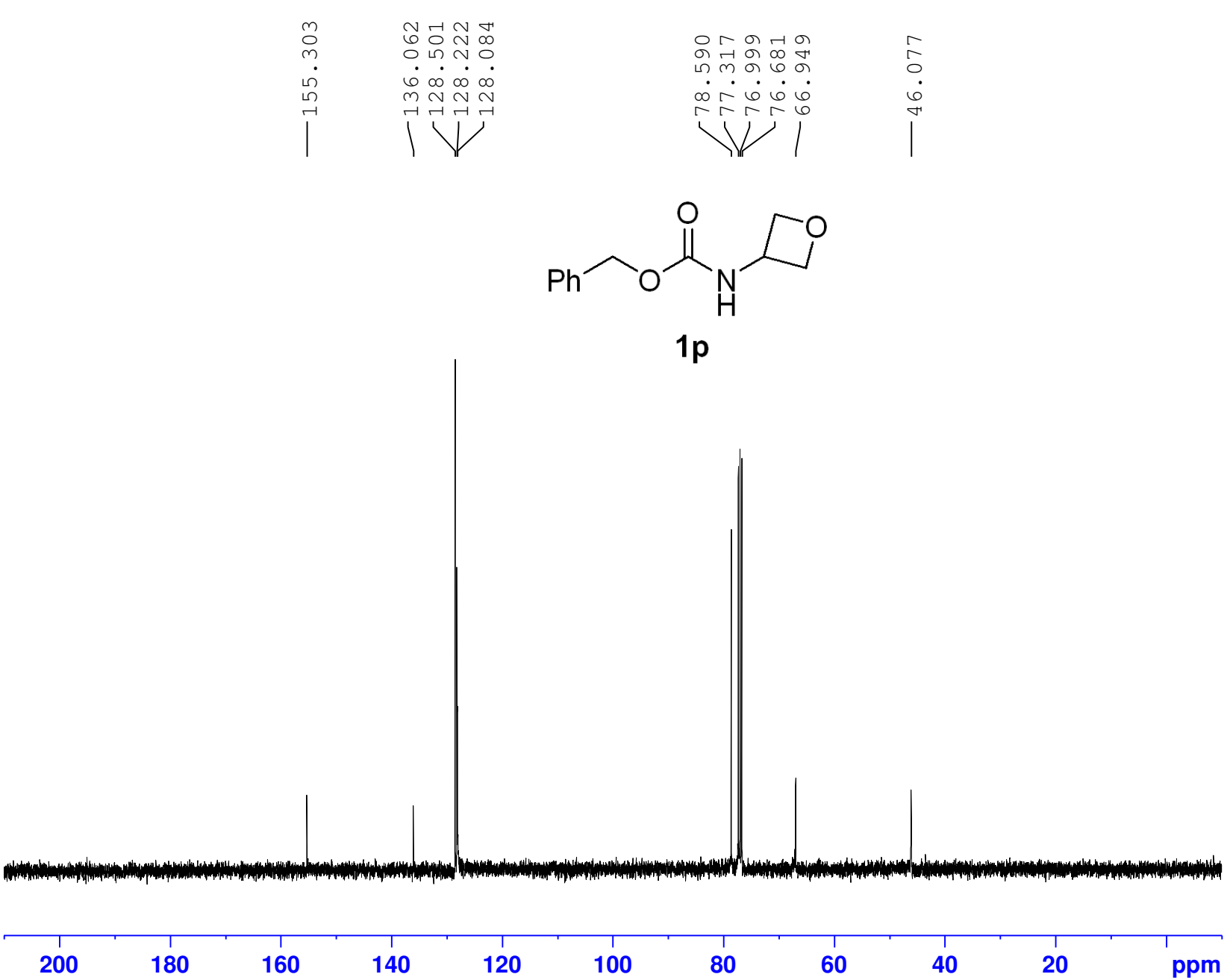




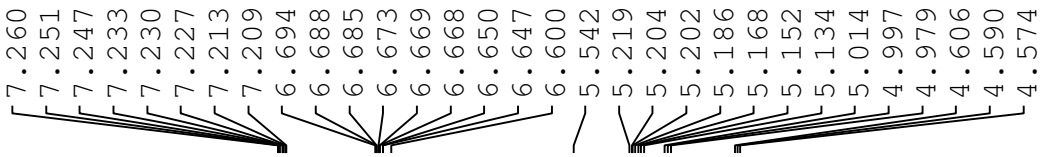
1p

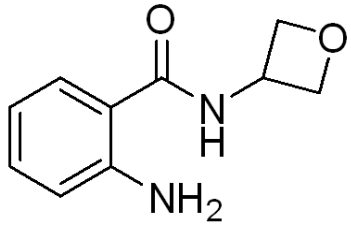



```
Current Data Parameters
NAME                  YW-1750
EXPNO                       3
PROCNO                      1

F2 - Acquisition Parameters
Date_              20160813
Time                   8.56
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        4
DS                        0
SWH               8012.820 Hz
FIDRES               0.122266 Hz
AQ                4.0894465 sec
RG                    54.81
DW                  62.400 usec
DE                   6.50 usec
TE                  302.3 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                     1H
P1                    14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300093 MHz
WDW                     EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```

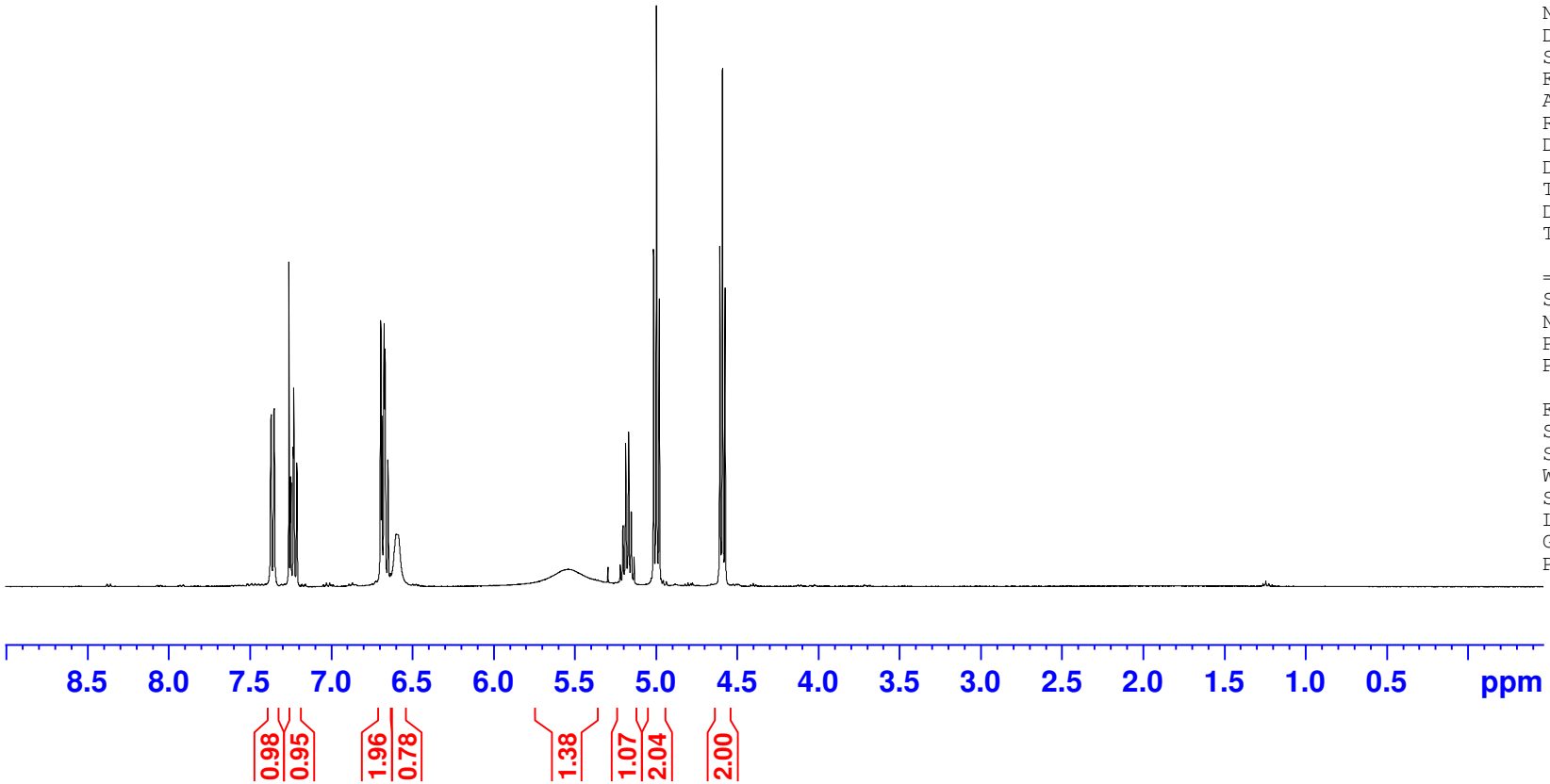



```
Current Data Parameters
NAME      YW-1750-carbon
EXPNO                  3
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                9.01
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   45
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                302.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127773 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

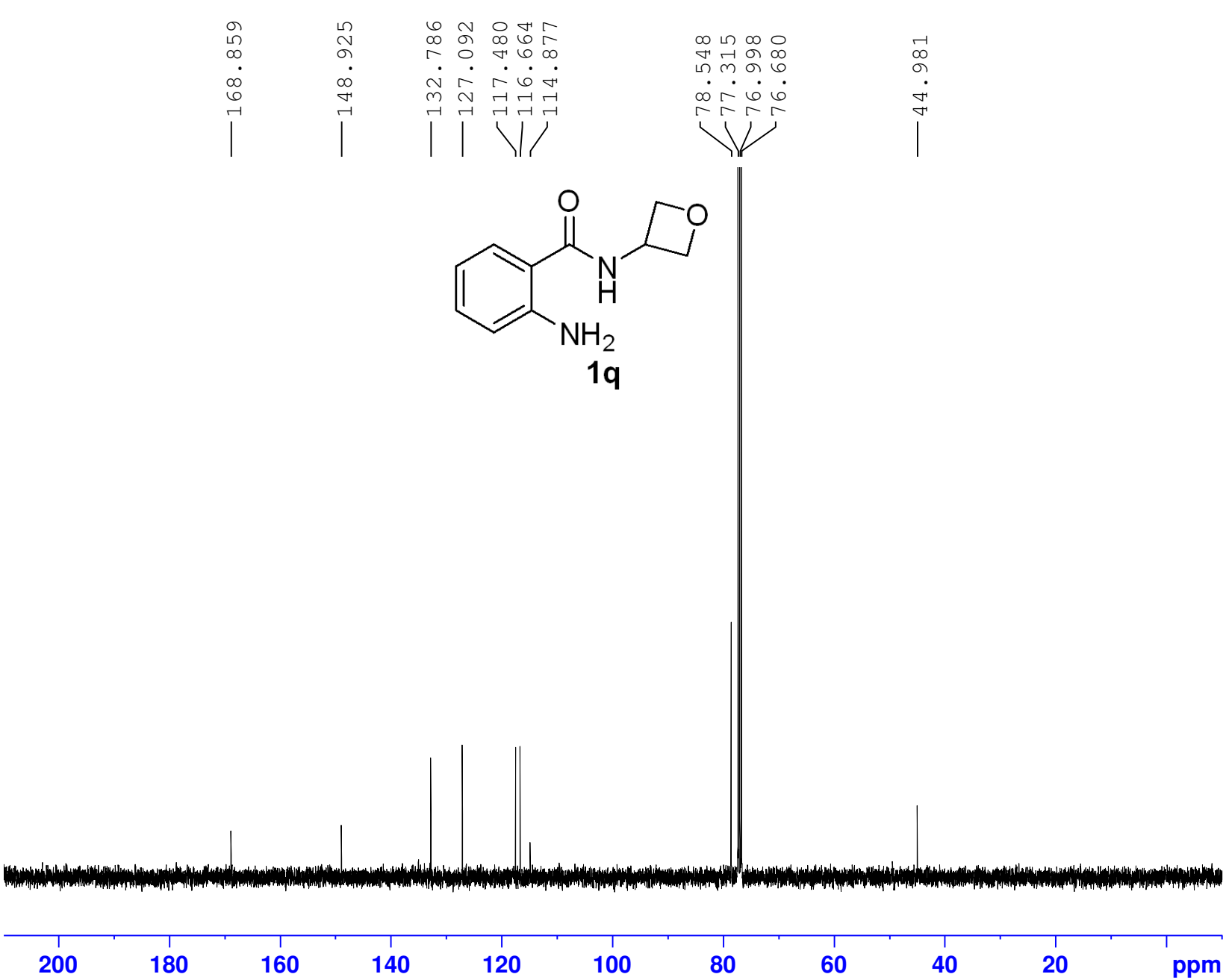




1q




```
Current Data Parameters
NAME                  YW-1688
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160319
Time                   20.16
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        11
DS                         0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     112.31
DW                     62.400 usec
DE                      6.50 usec
TE                     298.0 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300095 MHz
WDW                           EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



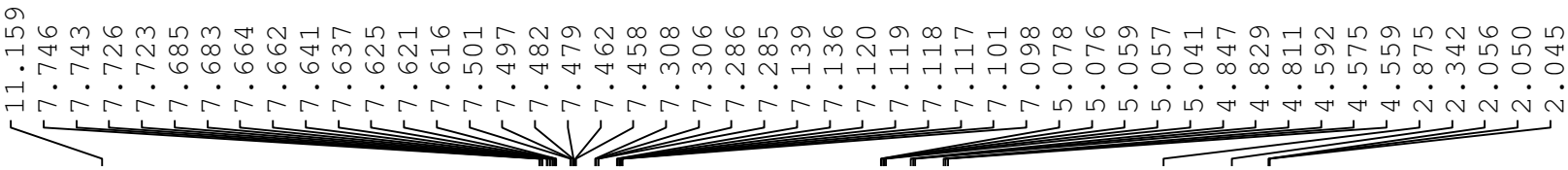
Current Data Parameters
NAME YW-1688-carbon
EXPNO 1
PROCNO 1

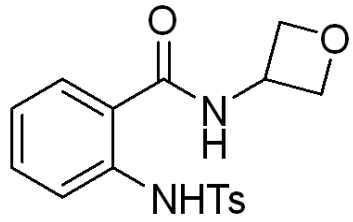
F2 - Acquisition Parameters
Date_ 20160319
Time 20.20
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 63
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.8 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

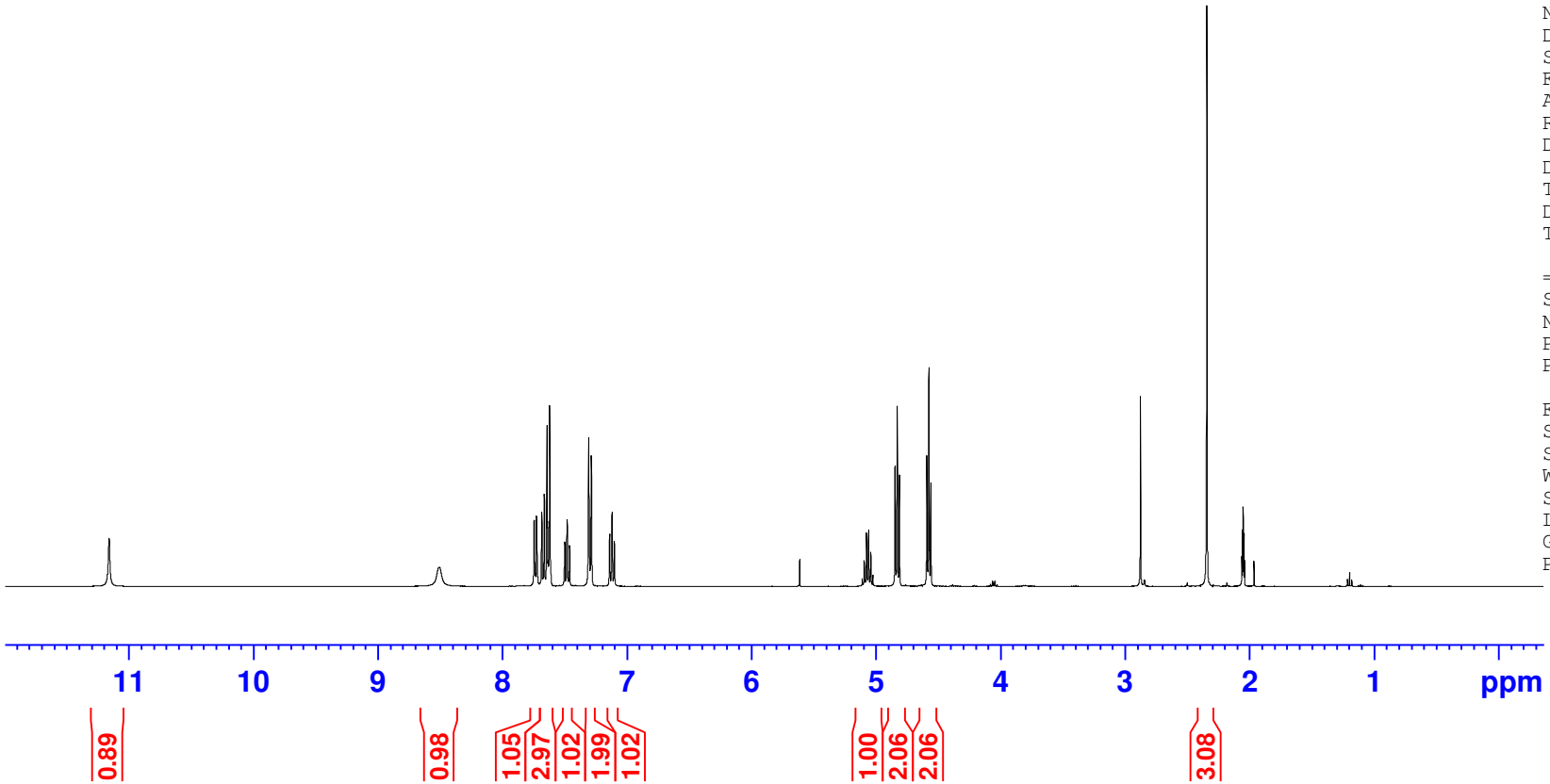
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127721 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

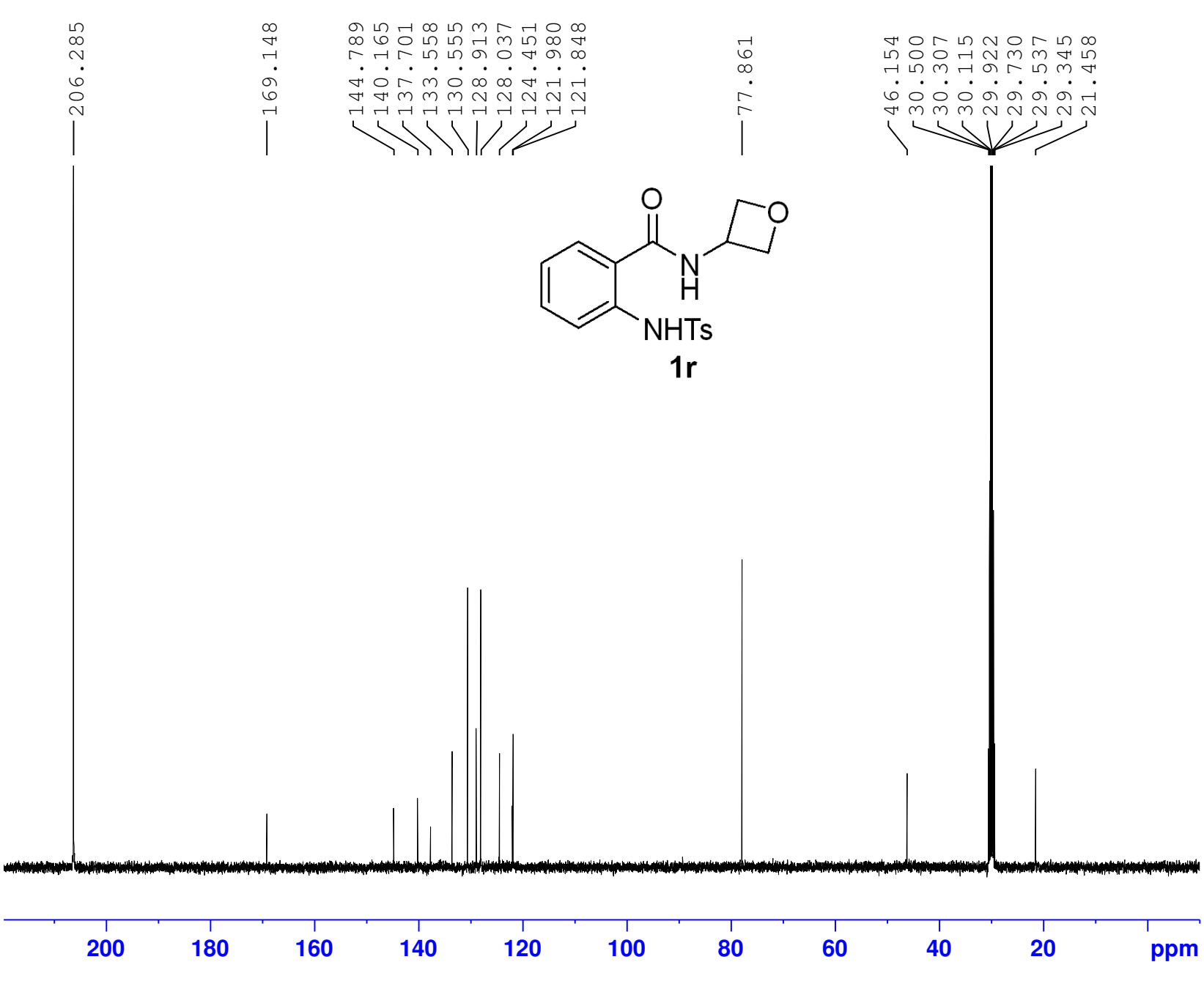




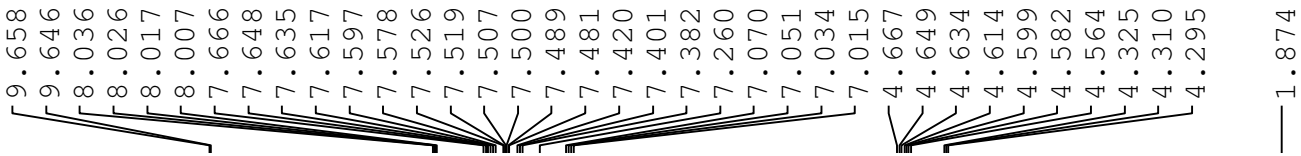
1r

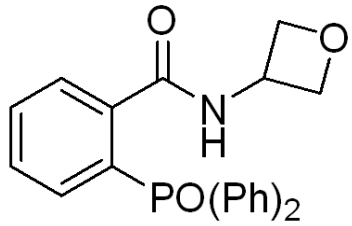



```
Current Data Parameters
NAME                  YW-1701
EXPNO                       2
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160813
Time                    9.31
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT              Acetone
NS                          4
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                      49.32
DW                     62.400 usec
DE                      6.50 usec
TE                     300.7 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300067 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

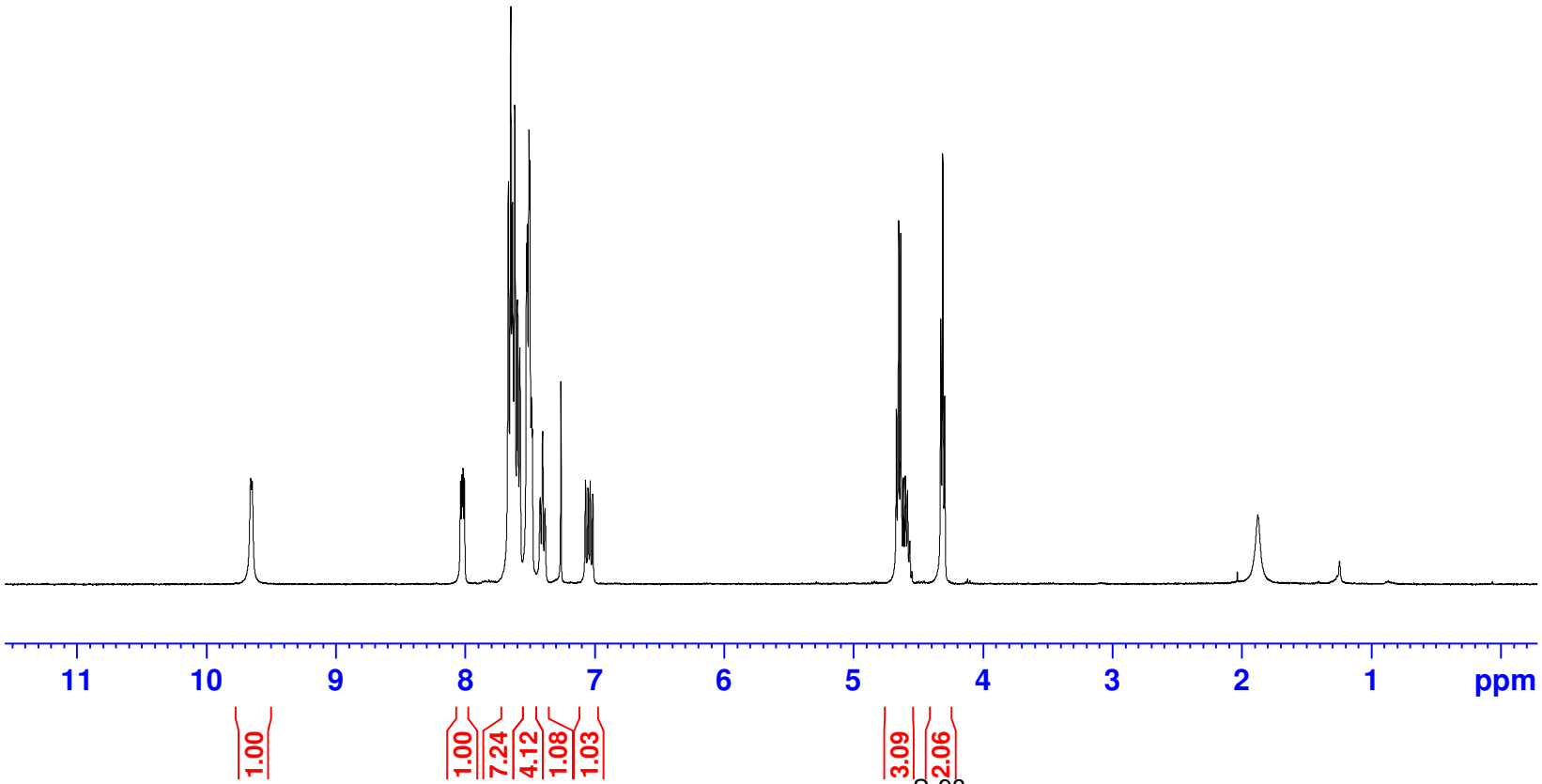



```
Current Data Parameters
NAME      YW-1701-carbon
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160813
Time                9.35
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT         Acetone
NS                   58
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                301.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                  13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                  1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6126725 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

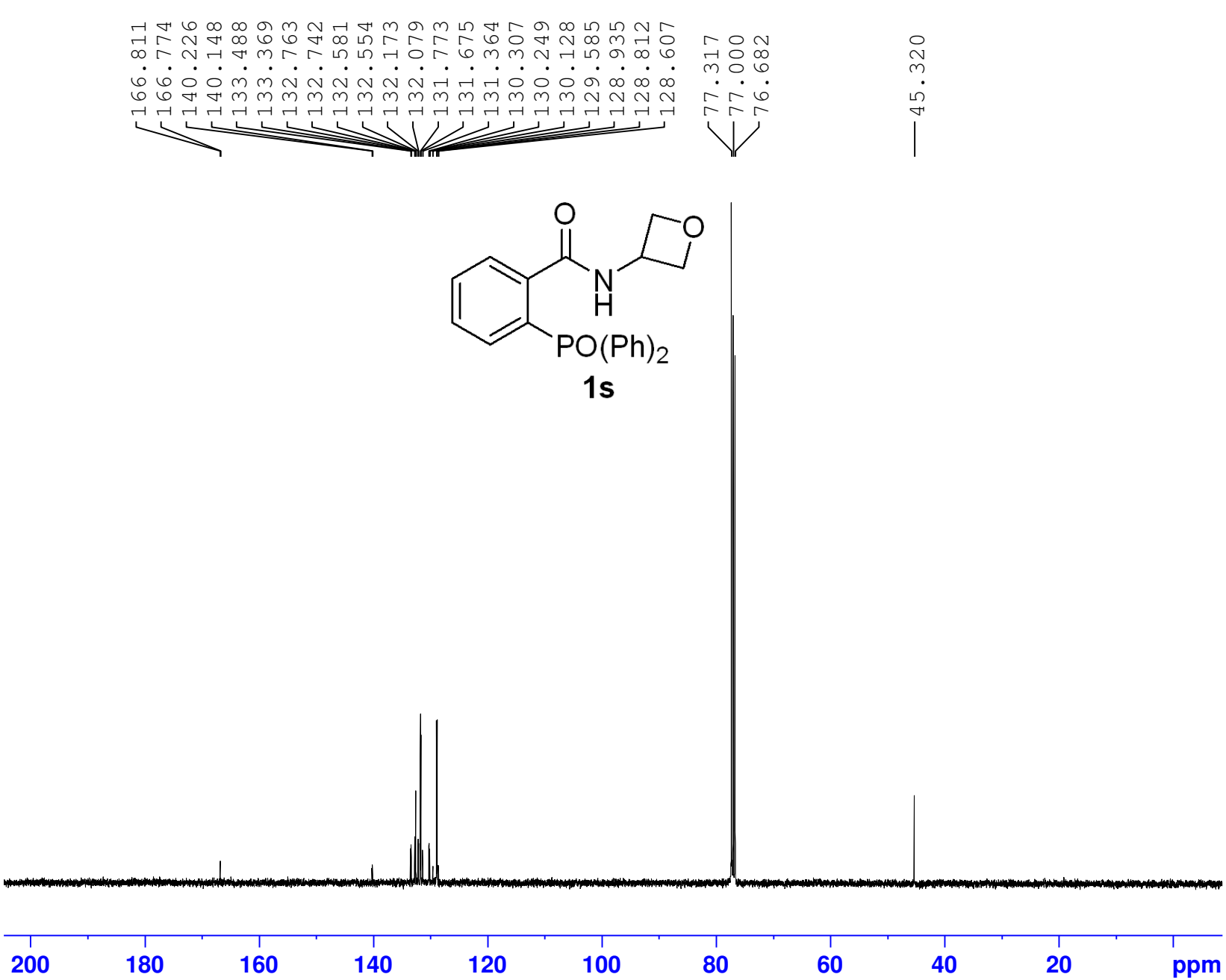




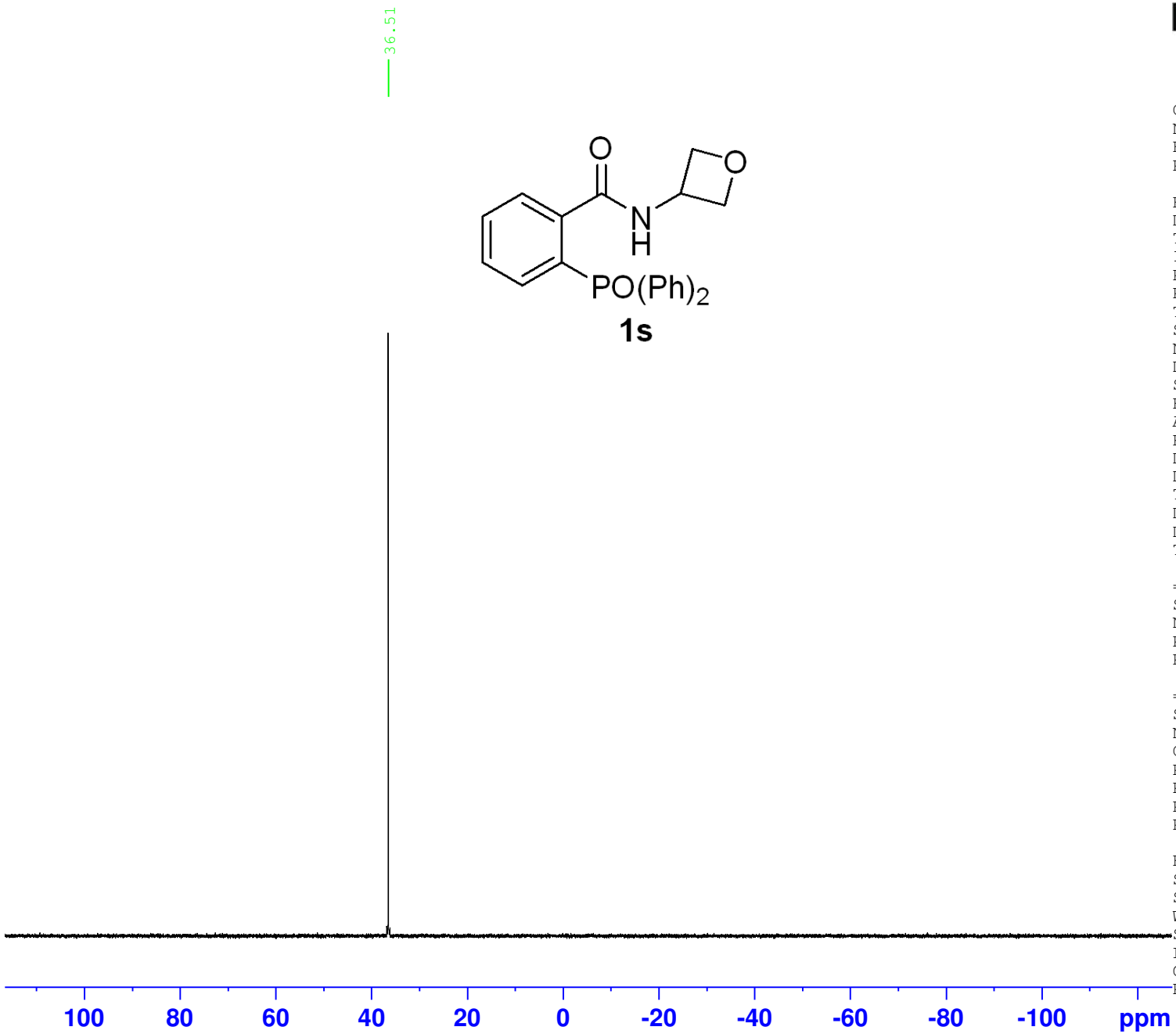
1s



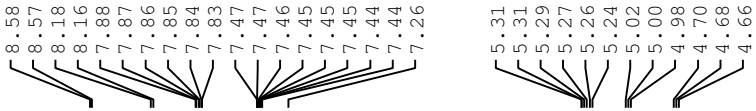

```
Current Data Parameters
NAME                  czl-2-6
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20170822
Time                  16.00
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        4
DS                        2
SWH               8012.820 Hz
FIDRES            0.122266 Hz
AQ                4.0894465 sec
RG                   187.77
DW                   62.400 usec
DE                    6.50 usec
TE                   296.4 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                    1H
P1                   14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300101 MHz
WDW                     EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```

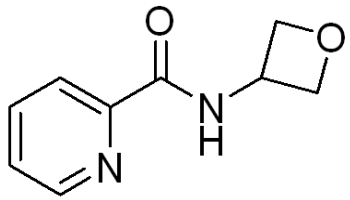



```
Current Data Parameters
NAME                  czl-2-6
EXPNO                       2
PROCNO                      1

F2 - Acquisition Parameters
Date_               20170822
Time                   16.06
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zgpg30
TD                      65536
SOLVENT                 CDCl3
NS                        200
DS                          2
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     196.92
DW                     20.800 usec
DE                      6.50 usec
TE                     297.4 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1               100.6228298 MHz
NUC1                       13C
P1                       9.70 usec
PLW1               46.98899841 W

======== CHANNEL f2 ========
SFO2               400.1316005 MHz
NUC2                       1H
CPDPRG[2              waltz16
PCPD2                   90.00 usec
PLW2               11.99499989 W
PLW12               0.34213999 W
PLW13               0.27713001 W

F2 - Processing parameters
SI                         32768
SF                 100.6127736 MHz
WDW                          EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```



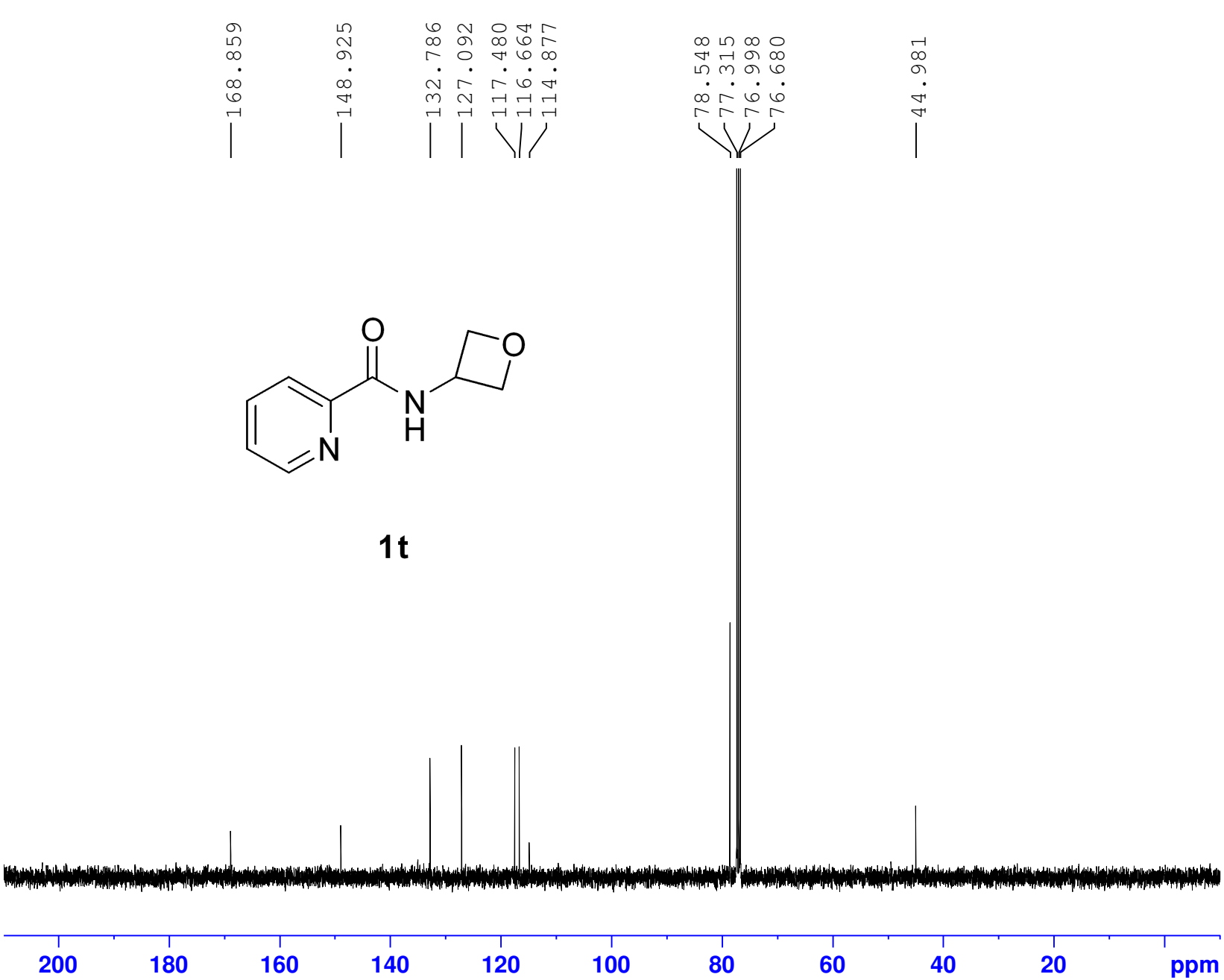

```
Current Data Parameters
NAME                 czl-2-6
EXPNO                      3
PROCNO                     1

F2 - Acquisition Parameters
Date_               20170822
Time                   16.15
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        32
DS                         4
SWH                64102.563 Hz
FIDRES              0.978127 Hz
AQ                  0.5111808 sec
RG                     196.92
DW                     7.800 usec
DE                     6.50 usec
TE                     297.1 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             161.9674942 MHz
NUC1                     31P
P1                    14.70 usec
PLW1             11.99499989 W

======== CHANNEL f2 ========
SFO2             400.1316005 MHz
NUC2                     1H
CPDPRG[2              waltz16
PCPD2                 90.00 usec
PLW2             11.99499989 W
PLW12             0.34213999 W
PLW13             0.27713001 W

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





1t


```
Current Data Parameters
NAME                  YW-1668
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20160319
Time                  20.07
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        8
DS                        0
SWH               8012.820 Hz
FIDRES            0.122266 Hz
AQ               4.0894465 sec
RG                   103.52
DW                   62.400 usec
DE                    6.50 usec
TE                   297.9 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                    1H
P1                   14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300094 MHz
WDW                     EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```



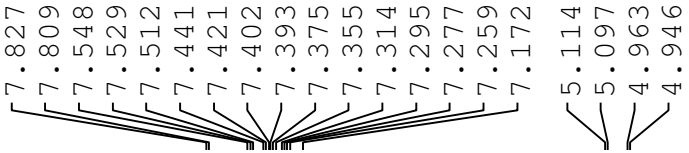
Current Data Parameters
NAME YW-1688-carbon
EXPNO 1
PROCNO 1

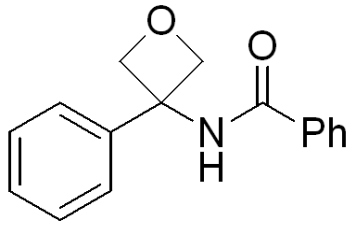
F2 - Acquisition Parameters
Date_ 20160319
Time 20.20
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 63
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.8 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

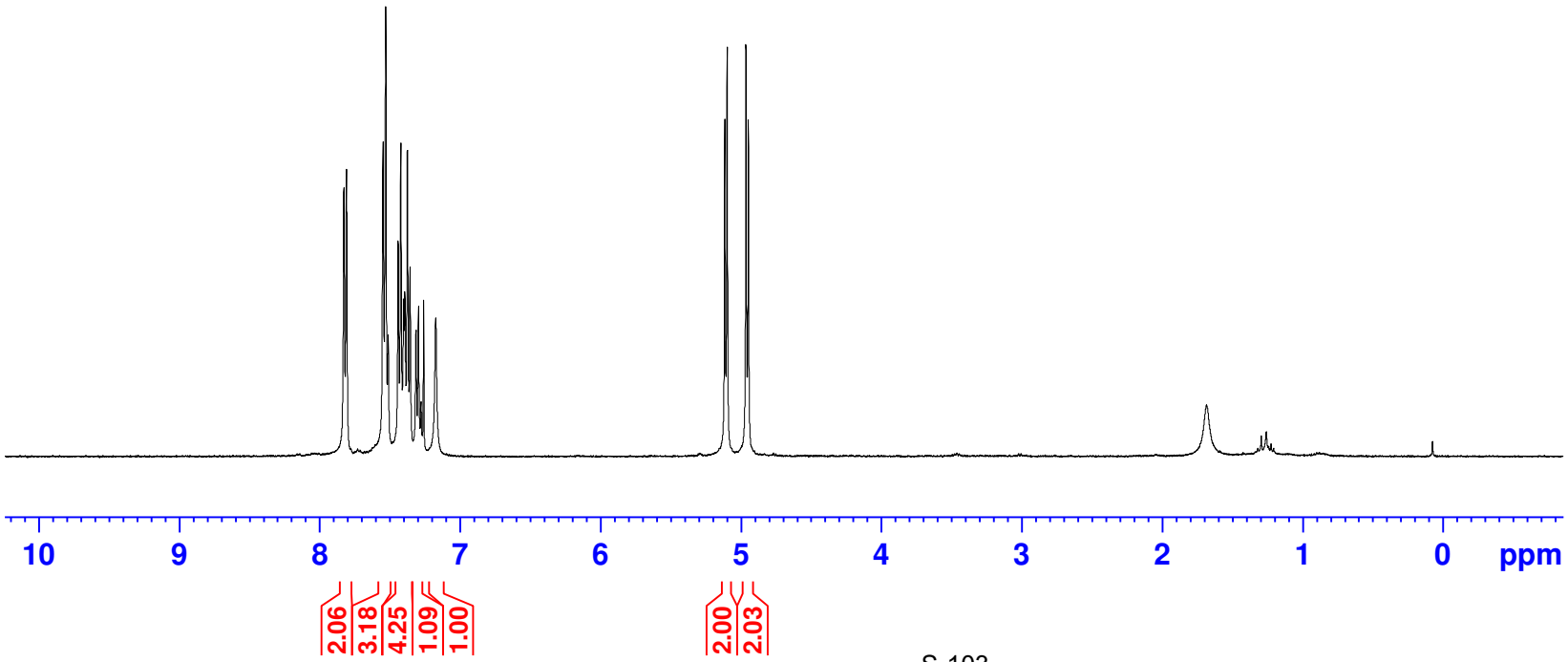
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127721 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

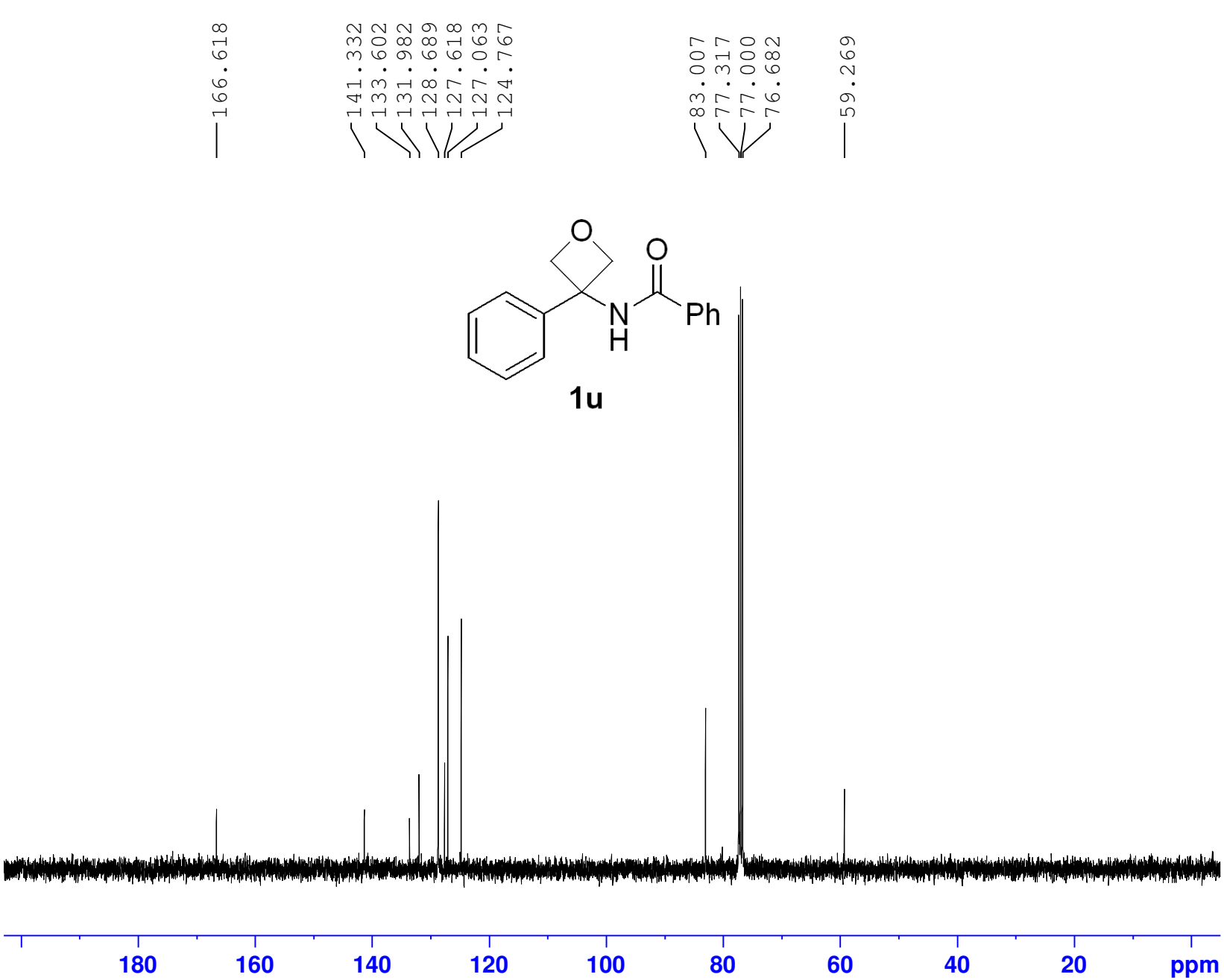




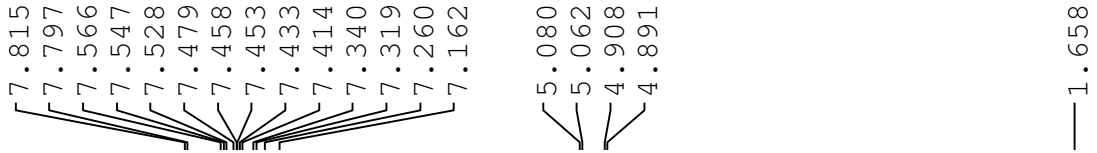
1u

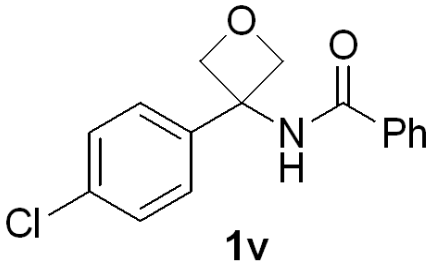



```
Current Data Parameters
NAME                  czl-1-180
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20170731
Time                      13.01
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                    zg30
TD                        65536
SOLVENT                   CDCl3
NS                            4
DS                            2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        187.77
DW                        62.400 usec
DE                         6.50 usec
TE                        297.4 K
D1                  1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                        65536
SF                  400.1300105 MHz
WDW                         EM
SSB                0
LB                        0.30 Hz
GB                 0
PC                        1.00
```

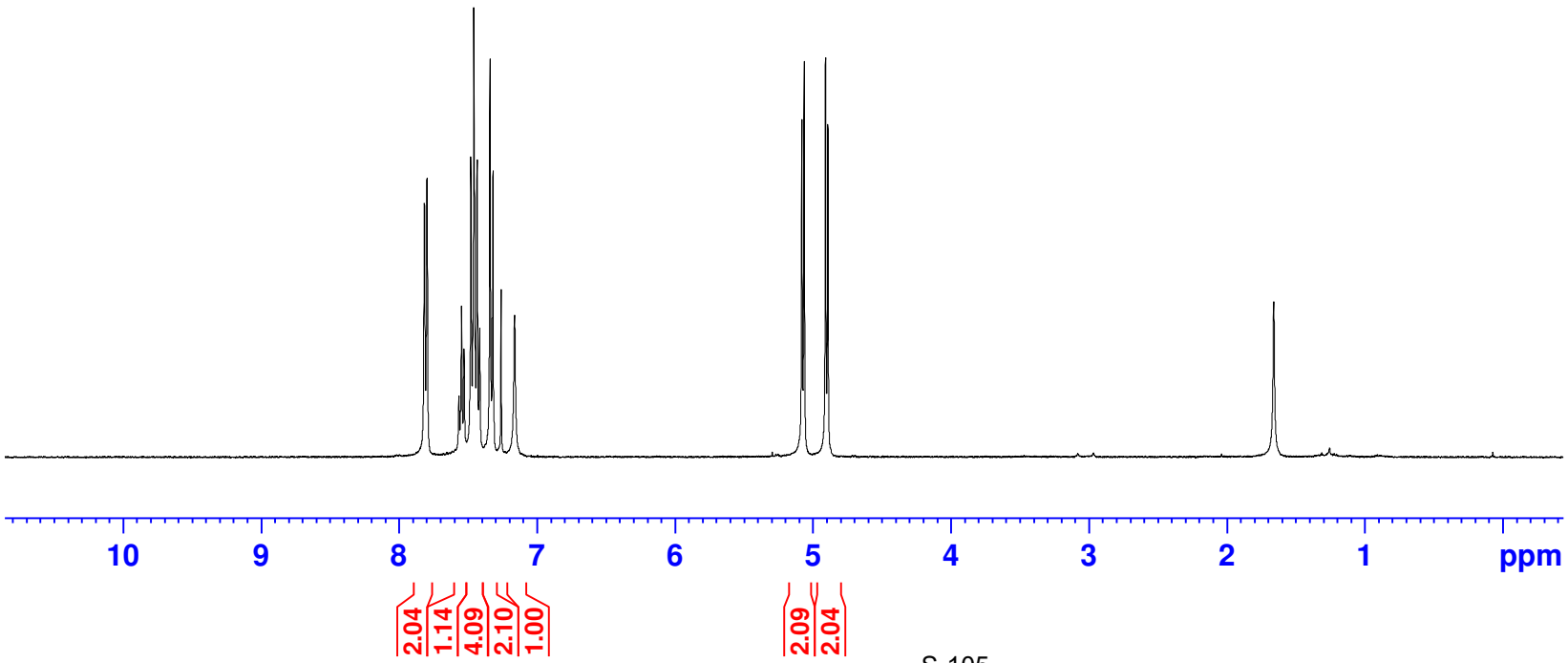



```
Current Data Parameters
NAME                 czl-1-180
EXPNO                        2
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20170731
Time                     13.17
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                          80
DS                           2
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      196.92
DW                      20.800 usec
DE                       6.50 usec
TE                      297.9 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                          32768
SF                  100.6127736 MHz
WDW                            EM
SSB                 0
LB                        1.00 Hz
GB                  0
PC                        1.40
```

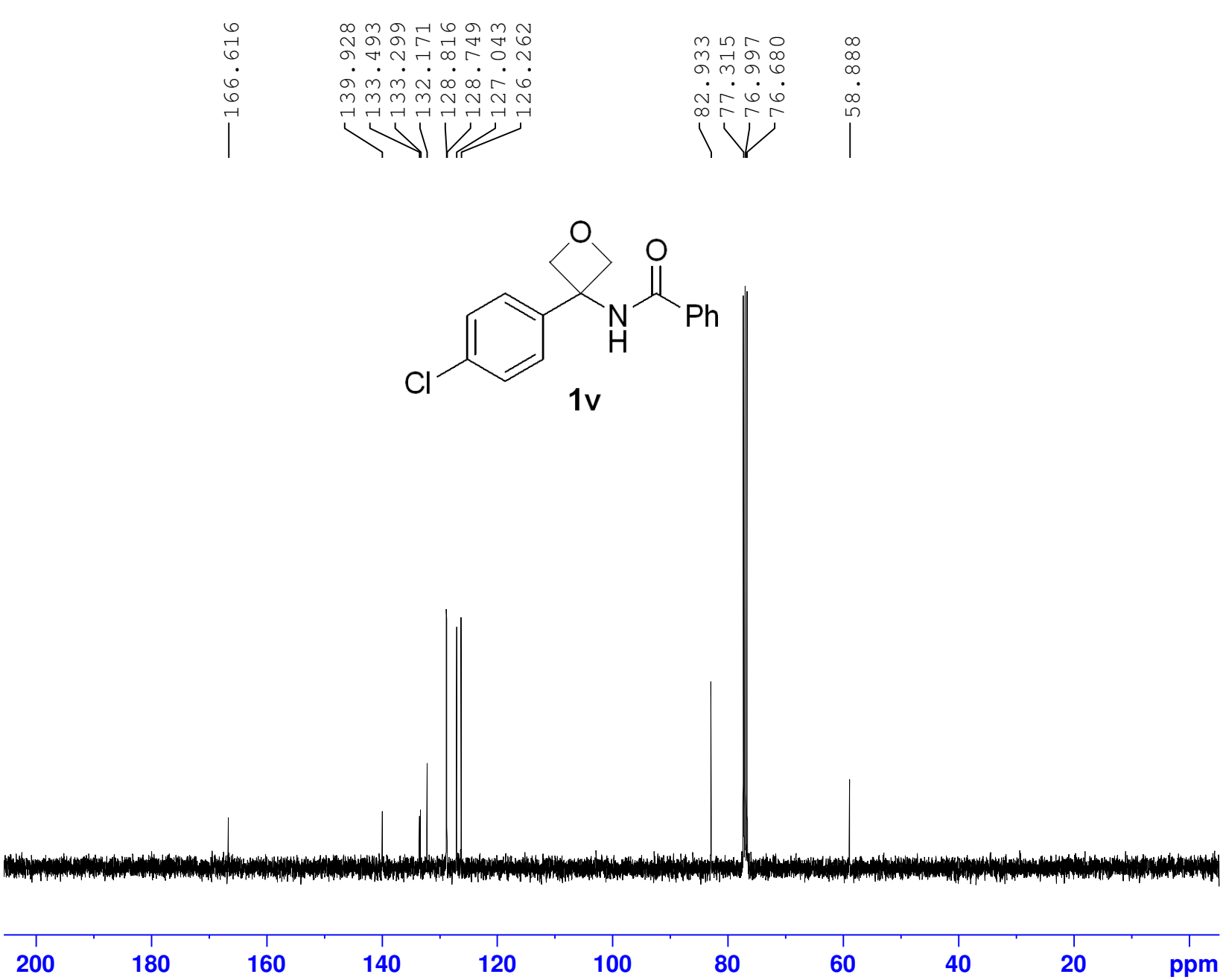




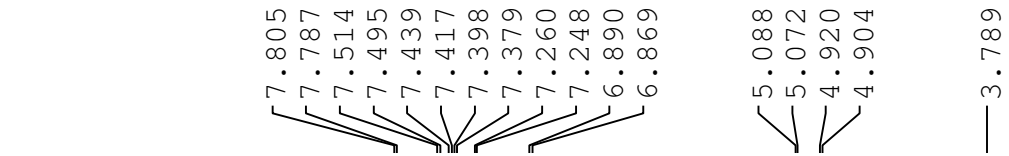
1v

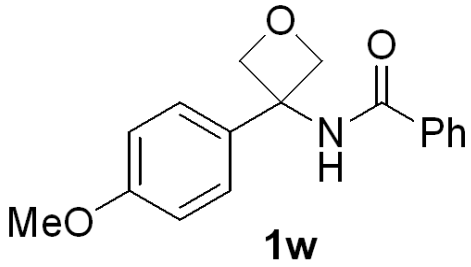



```
Current Data Parameters
NAME                 czl-1-181
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20170731
Time                     13.03
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           4
DS                           2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                      187.77
DW                      62.400 usec
DE                       6.50 usec
TE                      297.3 K
D1                   1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1               400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1               11.99499989 W

F2 - Processing parameters
SI                           65536
SF                 400.1300104 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

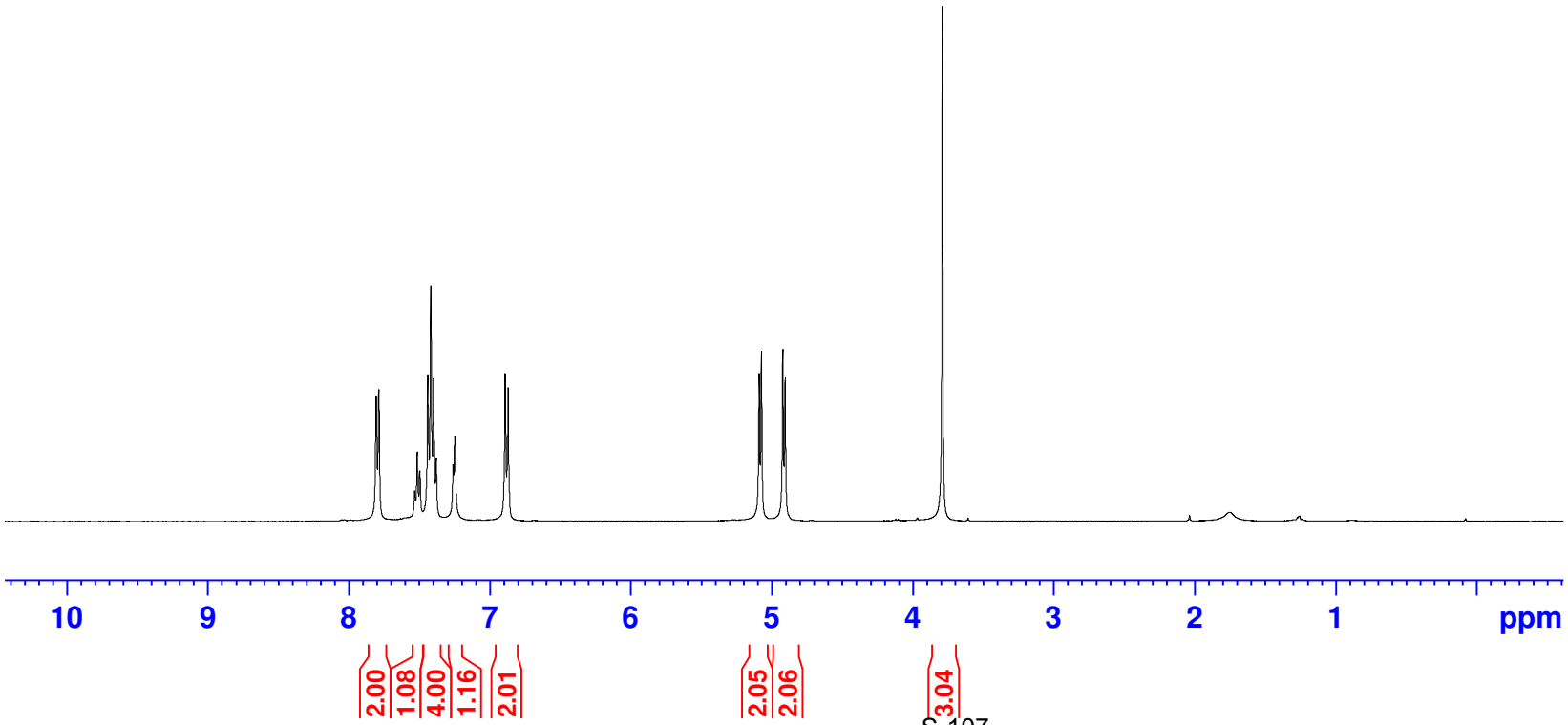



```
Current Data Parameters
NAME                  czl-1-181
EXPNO                         2
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20170731
Time                      13.22
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                          100
DS                            2
SWH                  24038.461 Hz
FIDRES                0.366798 Hz
AQ                    1.3631488 sec
RG                       196.92
DW                       20.800 usec
DE                        6.50 usec
TE                       298.0 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                        32768
SF                  100.6127734 MHz
WDW                         EM
SSB                  0
LB                        1.00 Hz
GB                   0
PC                        1.40
```

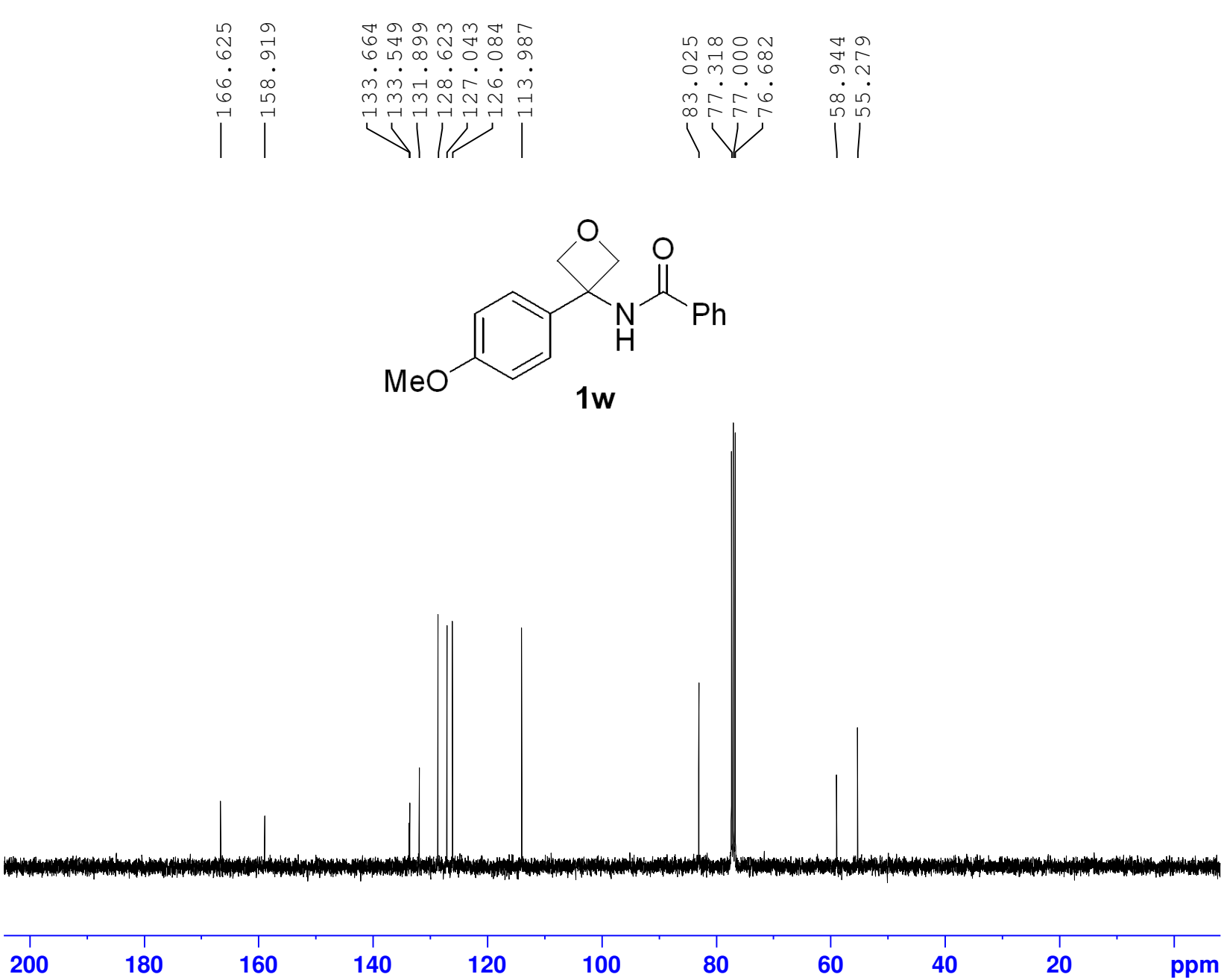




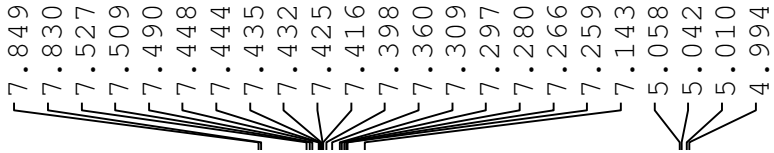
1w

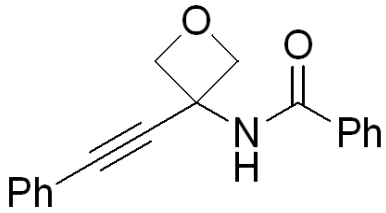



```
Current Data Parameters
NAME                 czl-1-183
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20170801
Time                     20.01
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           4
DS                           2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                       88.84
DW                     62.400 usec
DE                      6.50 usec
TE                      297.3 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                           65536
SF                400.1300102 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```




```
Current Data Parameters
NAME                  czl-1-183
EXPNO                         2
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20170801
Time                      20.04
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                           40
DS                            2
SWH                  24038.461 Hz
FIDRES                0.366798 Hz
AQ                    1.3631488 sec
RG                       196.92
DW                       20.800 usec
DE                        6.50 usec
TE                       298.0 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                        32768
SF                  100.6127751 MHz
WDW                         EM
SSB                  0
LB                        1.00 Hz
GB                   0
PC                        1.40
```





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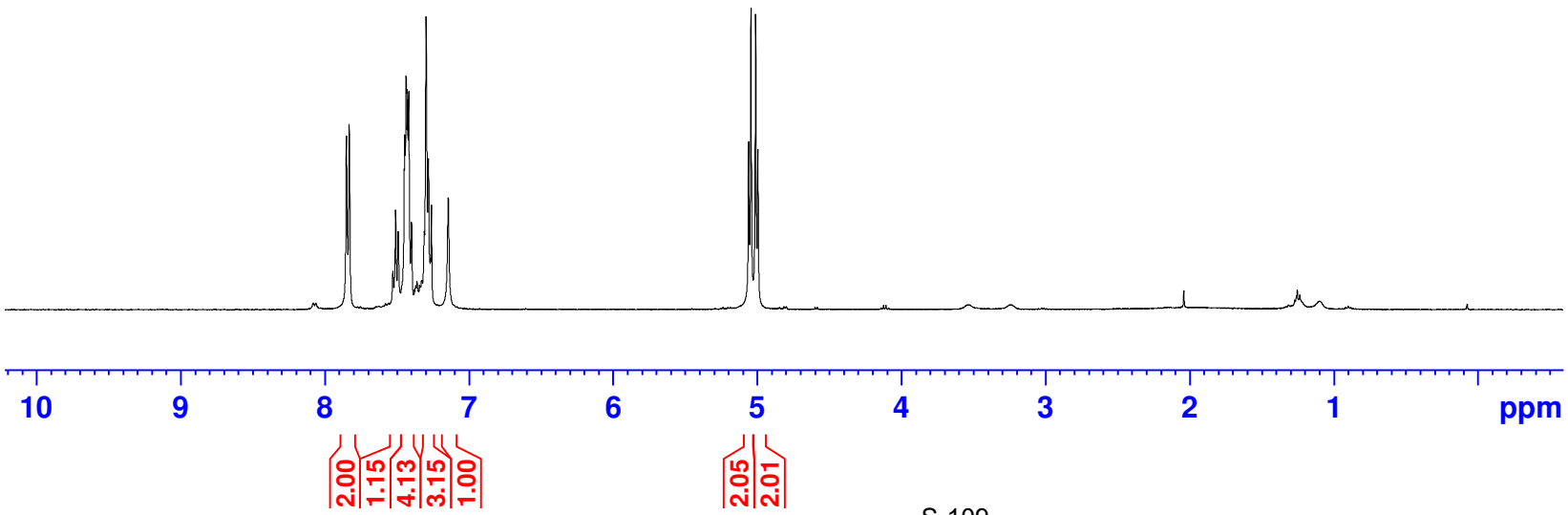
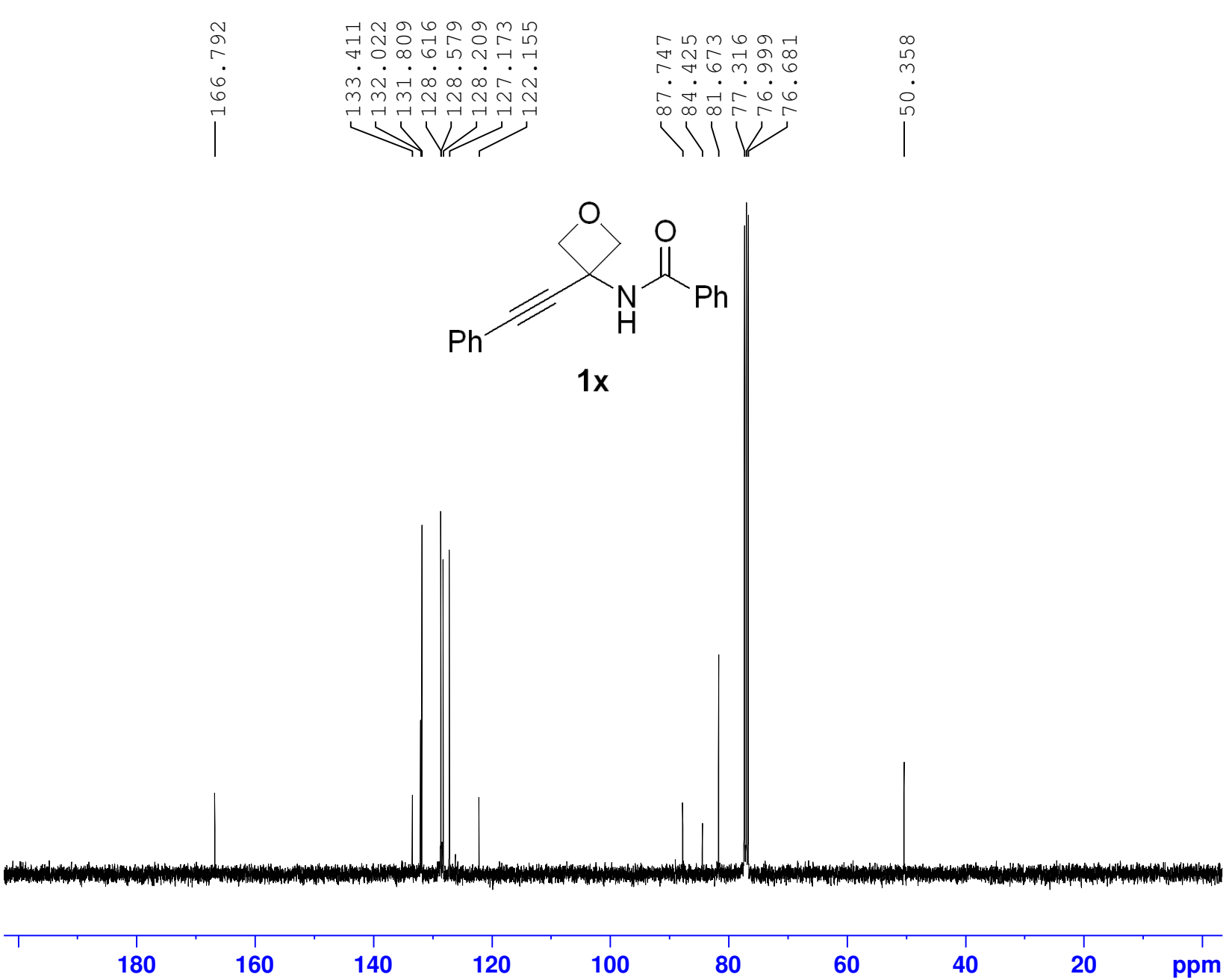
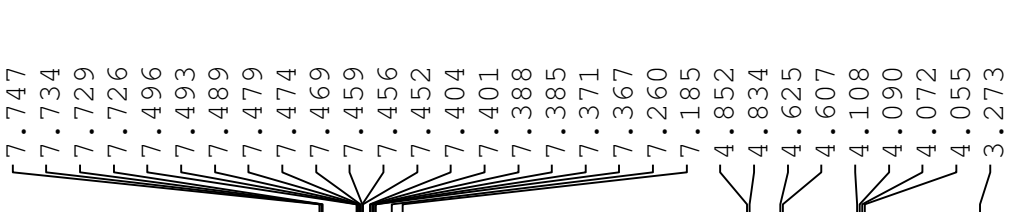
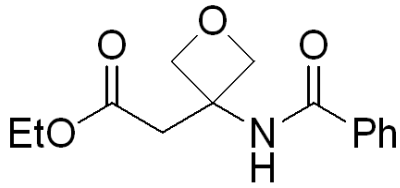



```
Current Data Parameters
NAME                  czl-1-182
EXPNO                         1
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20170731
Time                      13.06
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                    zg30
TD                        65536
SOLVENT                   CDCl3
NS                            4
DS                            2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894465 sec
RG                        187.77
DW                        62.400 usec
DE                         6.50 usec
TE                        297.4 K
D1                    1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                        14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                        65536
SF                  400.1300105 MHz
WDW                         EM
SSB                0
LB                         0.30 Hz
GB                 0
PC                         1.00
```

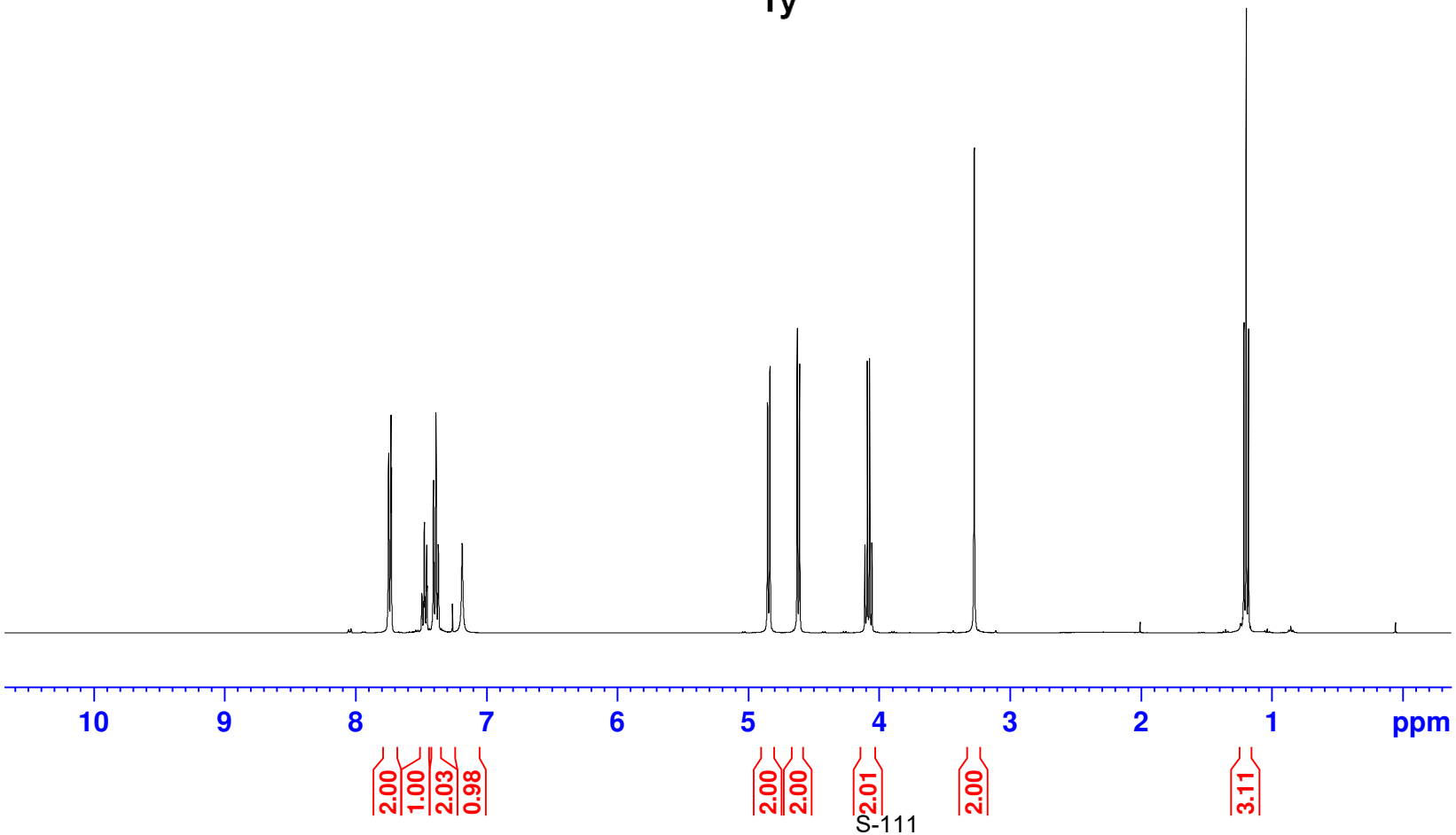



```
Current Data Parameters
NAME                 czl-1-182
EXPNO                        2
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20170731
Time                     13.13
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                         100
DS                           2
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      196.92
DW                      20.800 usec
DE                       6.50 usec
TE                      297.9 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                          32768
SF                  100.6127743 MHz
WDW                            EM
SSB                 0
LB                        1.00 Hz
GB                  0
PC                        1.40
```

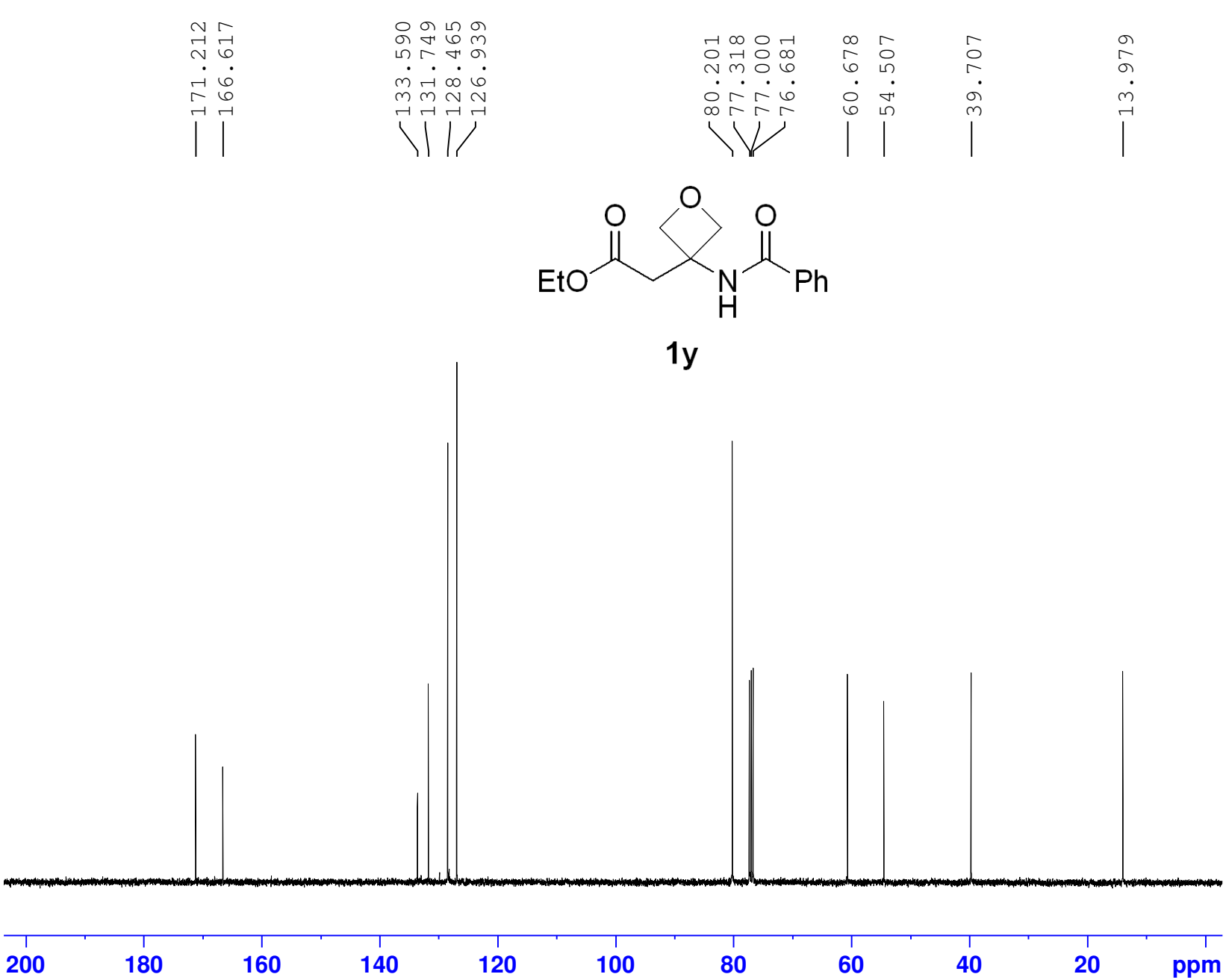




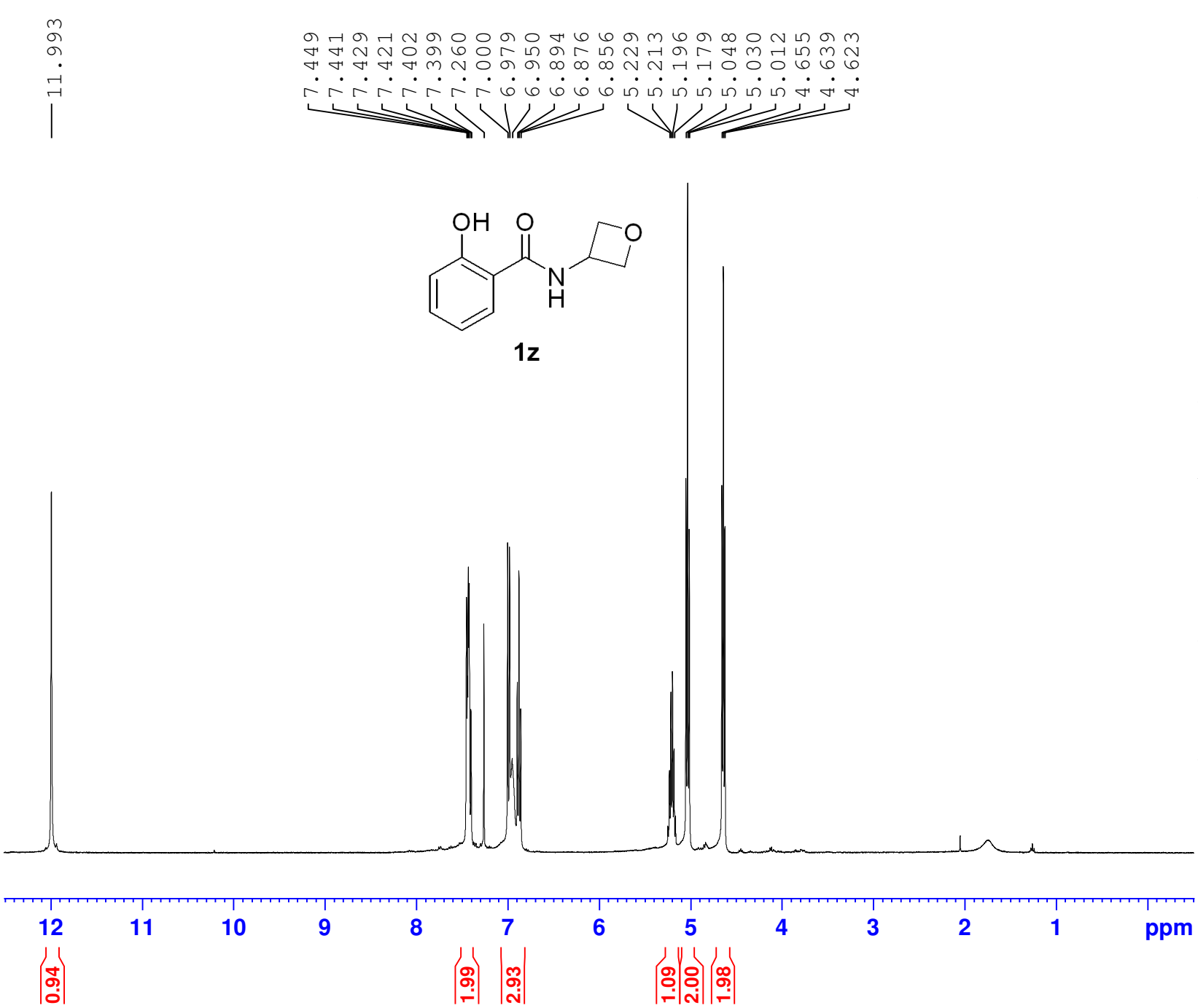
1y



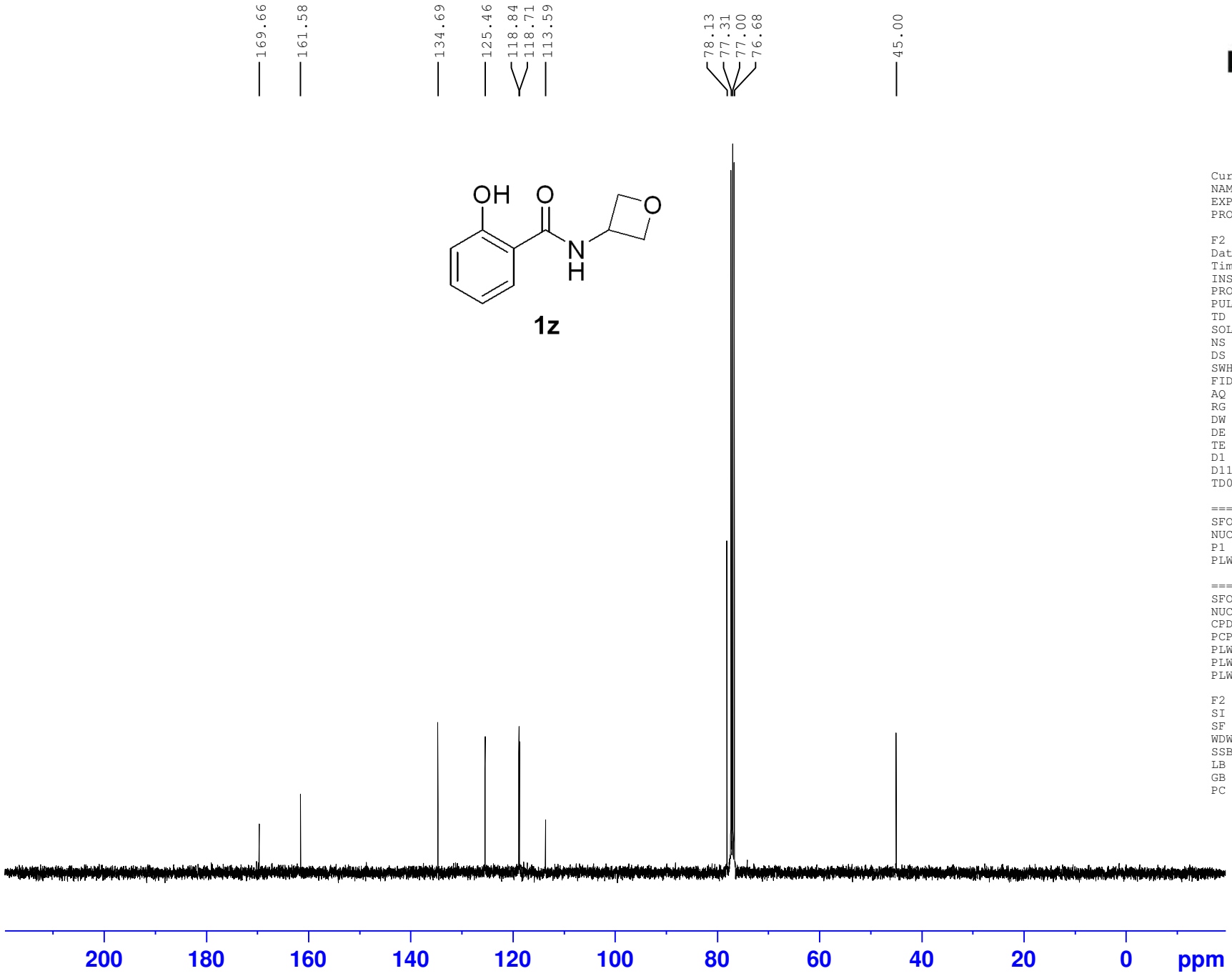

```
Current Data Parameters
NAME                 czl-1-186
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20170802
Time                     13.44
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           4
DS                           2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                       54.81
DW                      62.400 usec
DE                       6.50 usec
TE                      299.0 K
D1                   1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1               400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1               11.99499989 W

F2 - Processing parameters
SI                           65536
SF                 400.1300100 MHz
WDW                            EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```



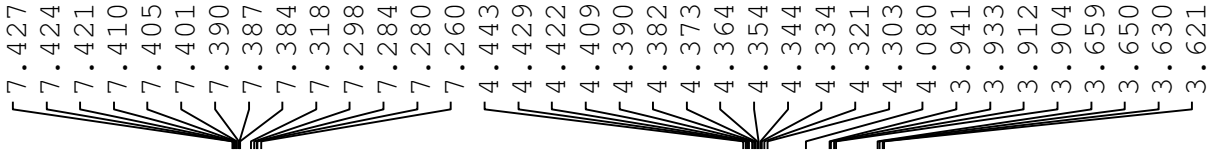

```
Current Data Parameters
NAME                  czl-1-186
EXPNO                         2
PROCNO                        1

F2 - Acquisition Parameters
Date_                  20170802
Time                      13.49
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                          400
DS                            2
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                       196.92
DW                       20.800 usec
DE                        6.50 usec
TE                       299.1 K
D1                  2.00000000 sec
D11                 0.03000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                100.6228298 MHz
NUC1                        13C
P1                        9.70 usec
PLW1                46.98899841 W

======== CHANNEL f2 ========
SFO2                400.1316005 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                11.99499989 W
PLW12                0.34213999 W
PLW13                0.27713001 W

F2 - Processing parameters
SI                        32768
SF                  100.6127808 MHz
WDW                         EM
SSB                 0
LB                        1.00 Hz
GB                  0
PC                        1.40
```

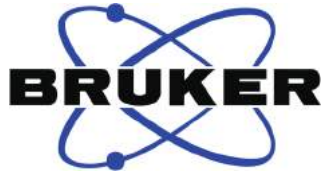


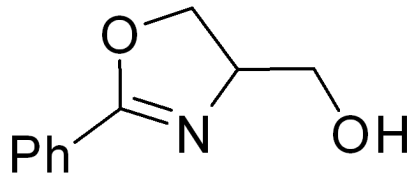

```
Current Data Parameters
NAME      hh-3-140-h-crude
EXPNO                    1
PROCNO                   1

F2 - Acquisition Parameters
Date_           20190701
Time              13.53
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    6
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                103.52
DW                62.400 usec
DE                 6.50 usec
TE                294.5 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300103 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```




```
Current Data Parameters
NAME      hh-3-140-c-crude
EXPNO                    2
PROCNO                   1

F2 - Acquisition Parameters
Date_           20190701
Time               14.11
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  166
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               295.7 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                 32768
SF          100.6127739 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

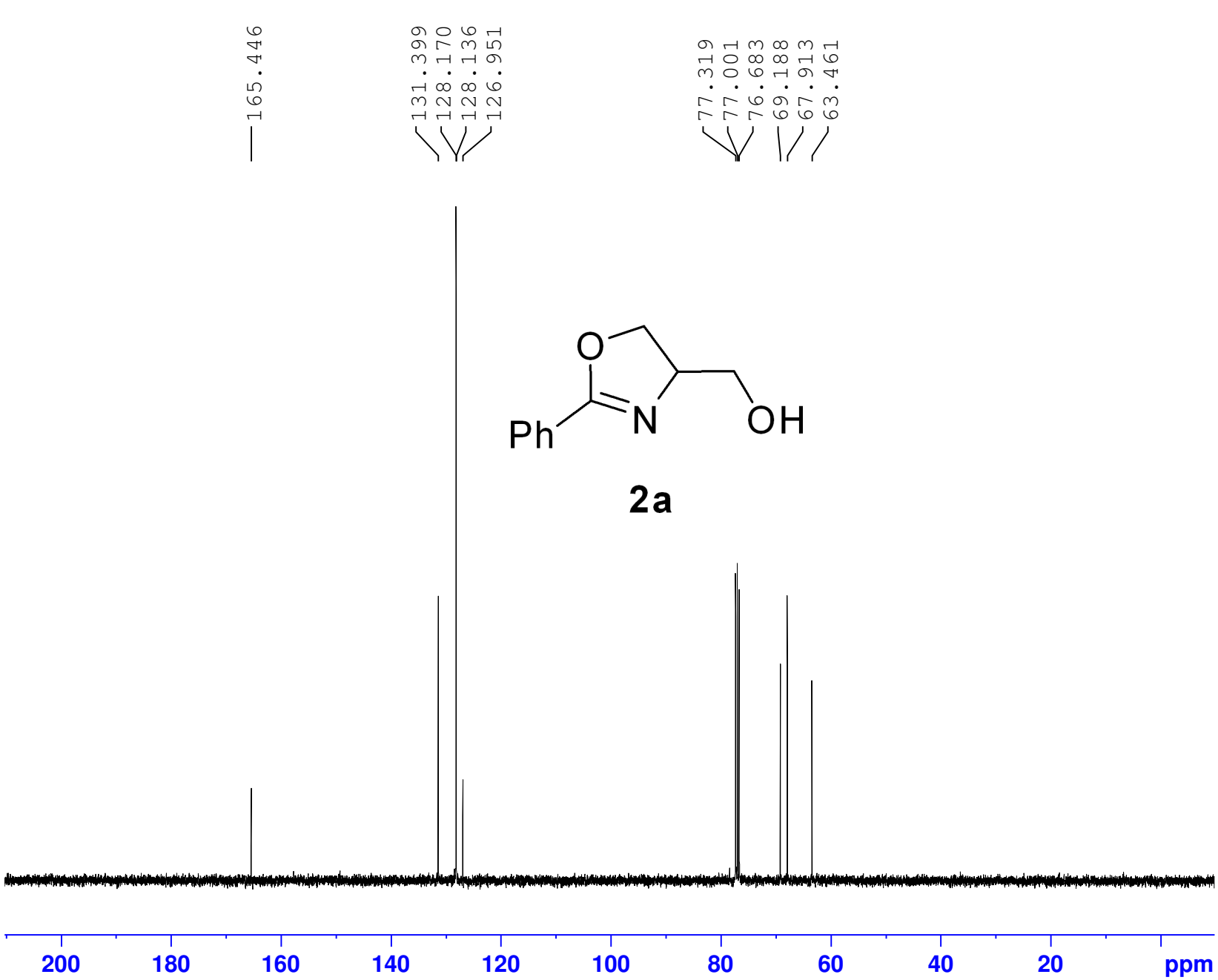






2a


```
Current Data Parameters
NAME                  YW-1722
EXPNO                       1
PROCNO                      2

F2 - Acquisition Parameters
Date_               20160413
Time                   14.34
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          4
DS                          0
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                     34.77
DW                    62.400 usec
DE                     6.50 usec
TE                    296.6 K
D1                 1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1            400.1324710 MHz
NUC1                       1H
P1                     14.50 usec
PLW1            11.99499989 W

F2 - Processing parameters
SI                         65536
SF              400.1300091 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



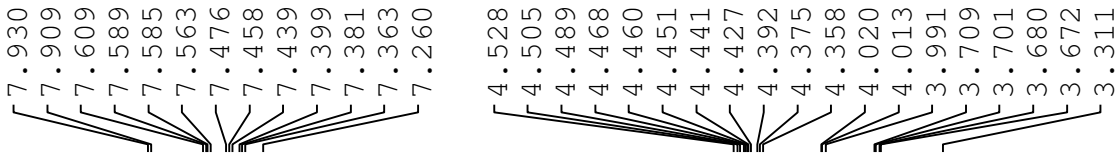
Current Data Parameters
NAME YW-1722-carbon
EXPNO 2
PROCNO 2

F2 - Acquisition Parameters
Date_ 20160413
Time 14.40
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 21
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.3 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

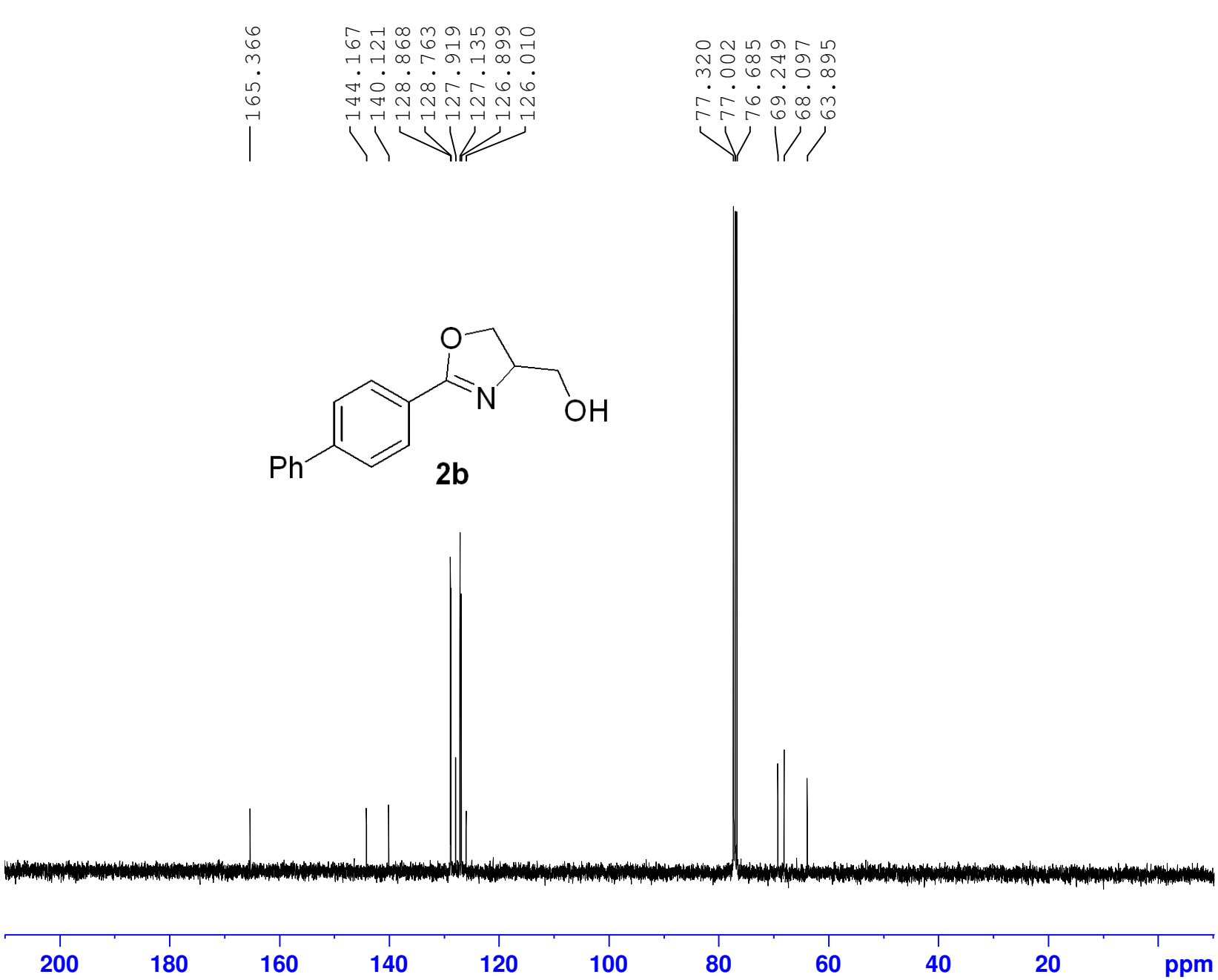
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127795 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

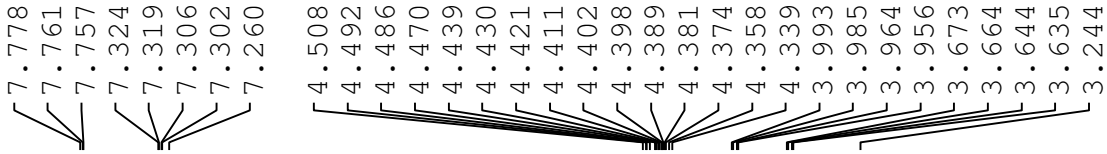


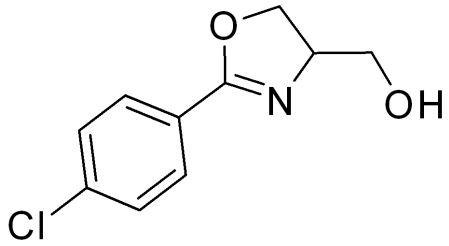
2b


```
Current Data Parameters
NAME      YW-1735D-carbon
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160415
Time               19.39
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     6
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 103.52
DW                 62.400 usec
DE                  6.50 usec
TE                 296.7 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300092 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

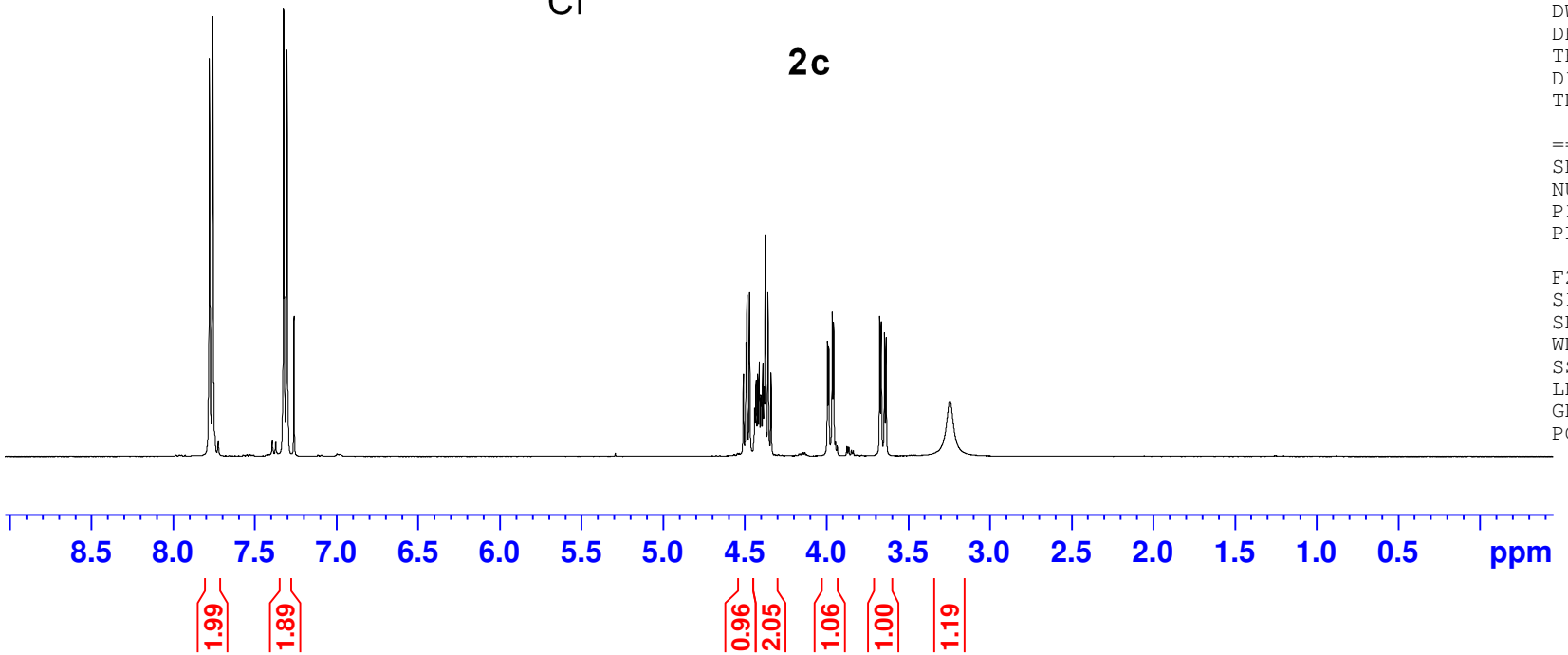



```
Current Data Parameters
NAME      YW-1735D-carbon
EXPNO                   2
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160415
Time               19.49
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  162
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                  32768
SF           100.6127722 MHz
WDW                    EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

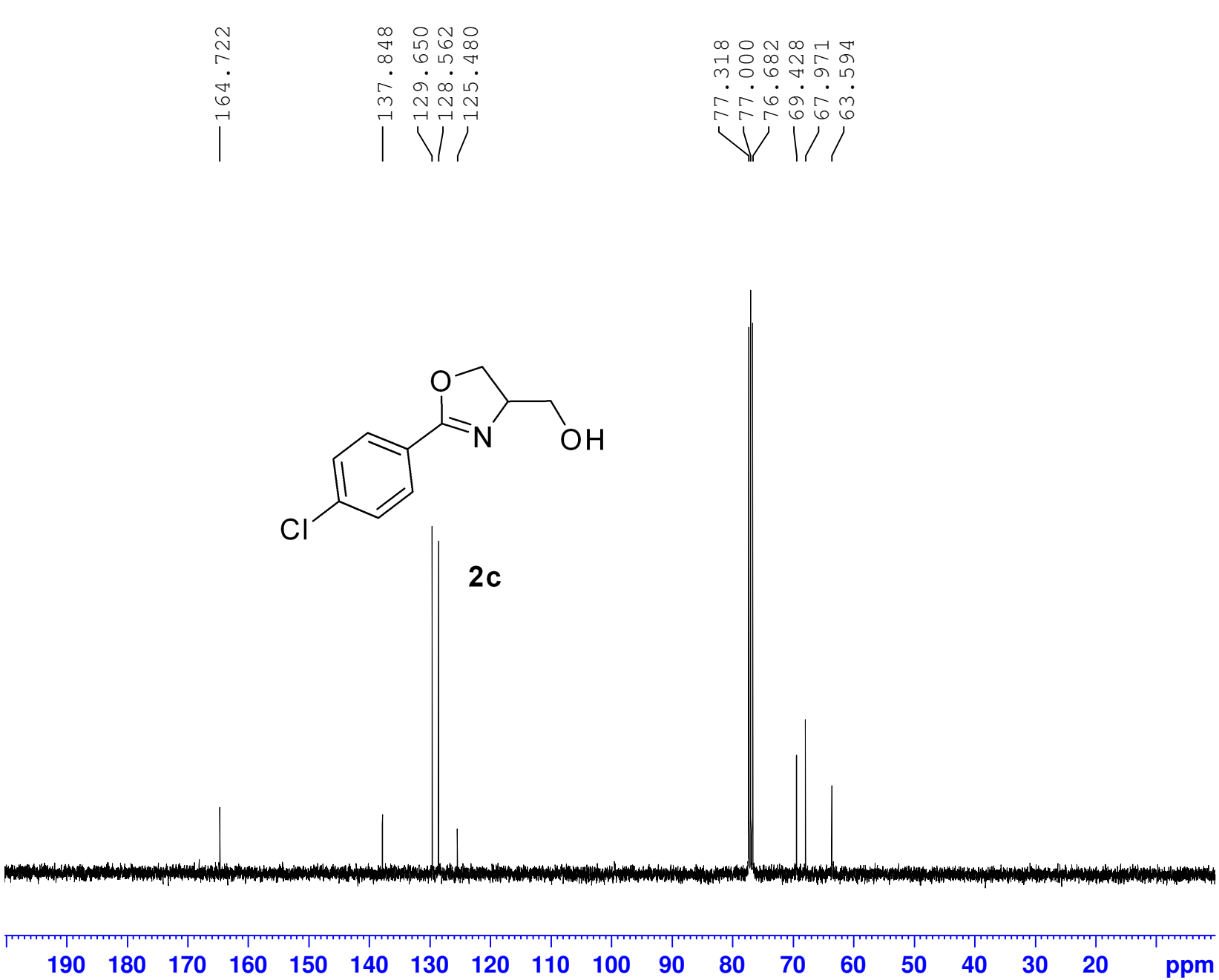




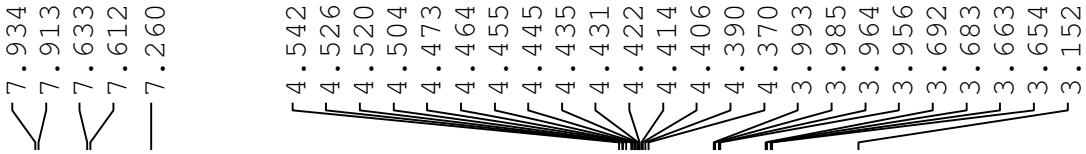
2c




```
Current Data Parameters
NAME                  YW-1736A
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160416
Time                     10.11
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          0
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                      112.31
DW                      62.400 usec
DE                       6.50 usec
TE                      298.3 K
D1                   1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1               400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1               11.99499989 W

F2 - Processing parameters
SI                      65536
SF                 400.1300094 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```




```
Current Data Parameters
NAME      YW-1736A-carbon
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160416
Time               10.17
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   75
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                299.1 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127714 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

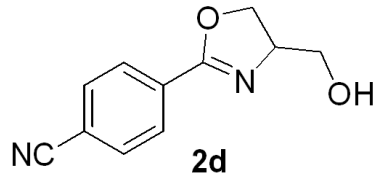


Current Data Parameters
NAME YW-1736B
EXPNO 1
PROCNO 1

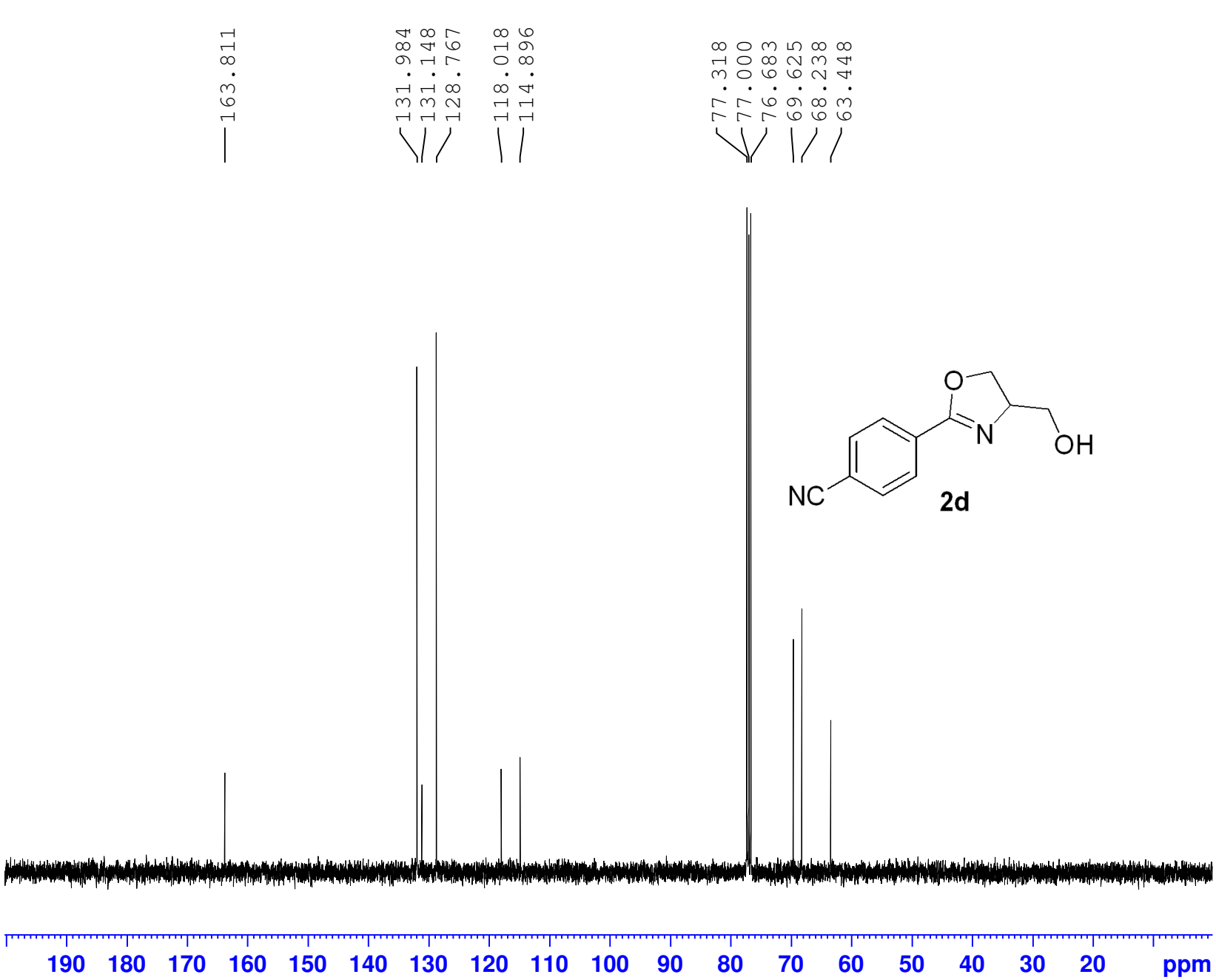
F2 - Acquisition Parameters
Date_ 20160416
Time 10.19
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 3
DS 0
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 103.52
DW 62.400 usec
DE 6.50 usec
TE 298.3 K
D1 1.00000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W

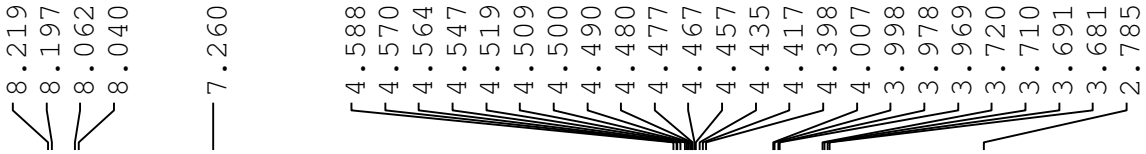
F2 - Processing parameters
SI 65536
SF 400.1300094 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

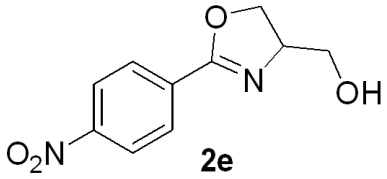


2d

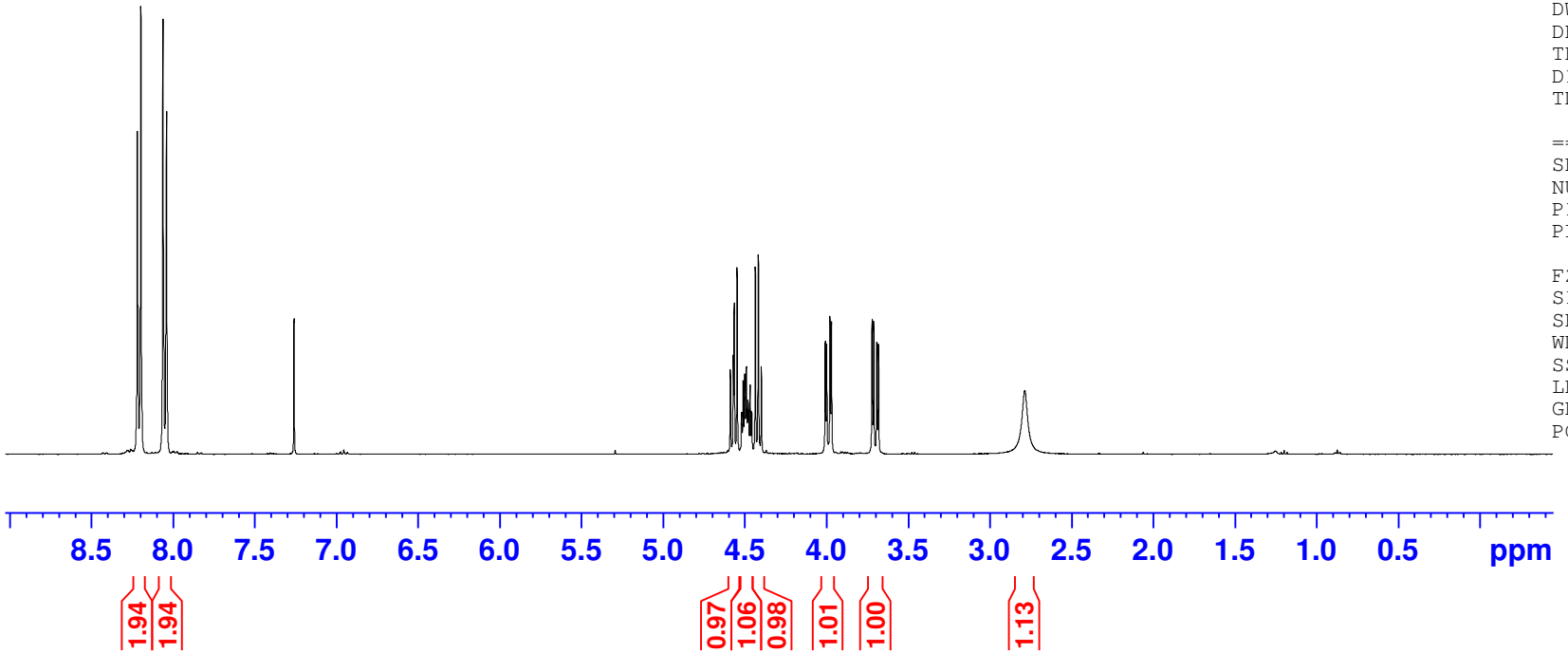



```
Current Data Parameters
NAME      YW-1736B-carbon
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160416
Time               10.22
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   37
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                299.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127747 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

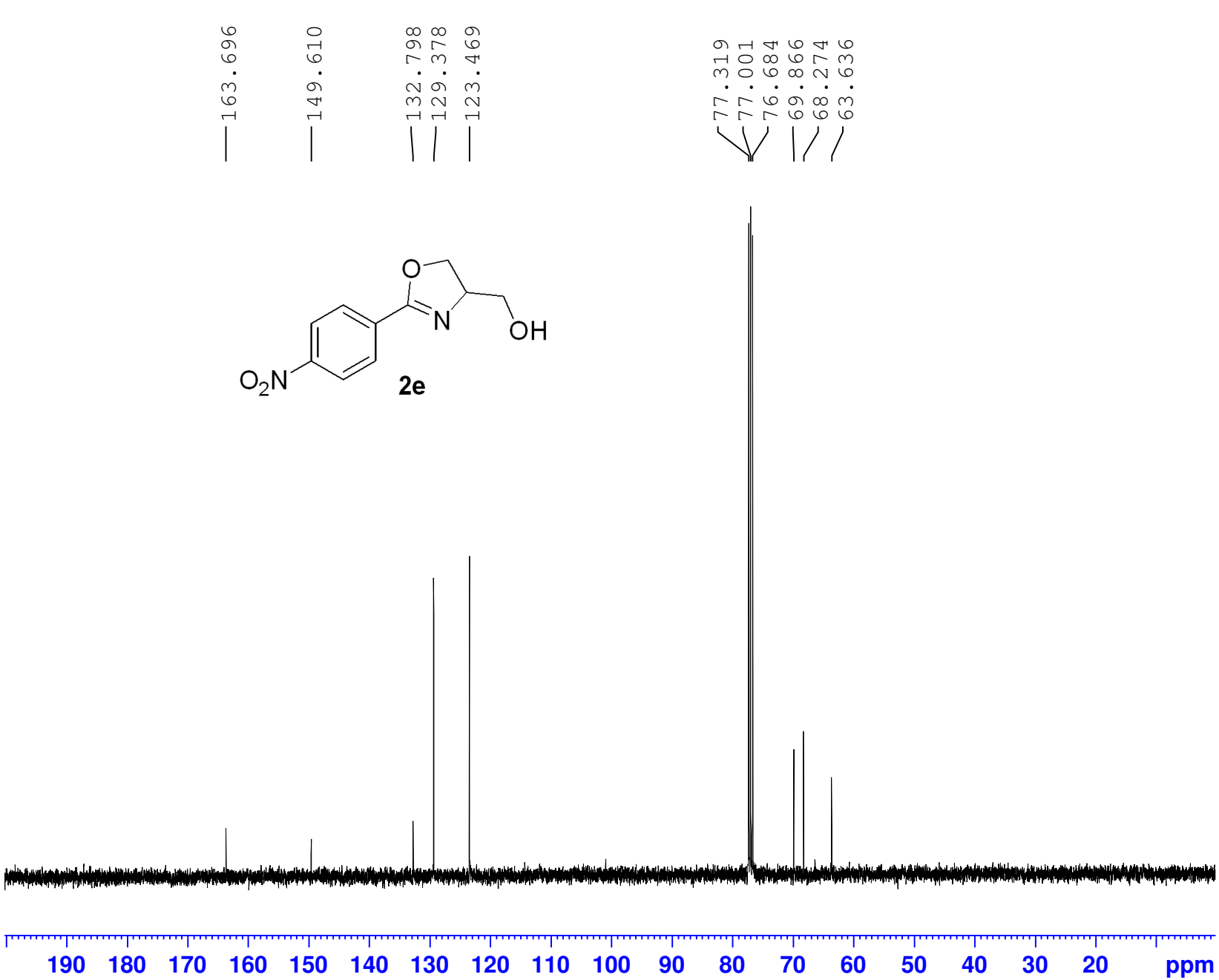




2e




```
Current Data Parameters
NAME                  YW-1738B
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160418
Time                     21.06
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           7
DS                           0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     112.31
DW                     62.400 usec
DE                      6.50 usec
TE                     296.6 K
D1                  1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                           65536
SF                400.1300095 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```



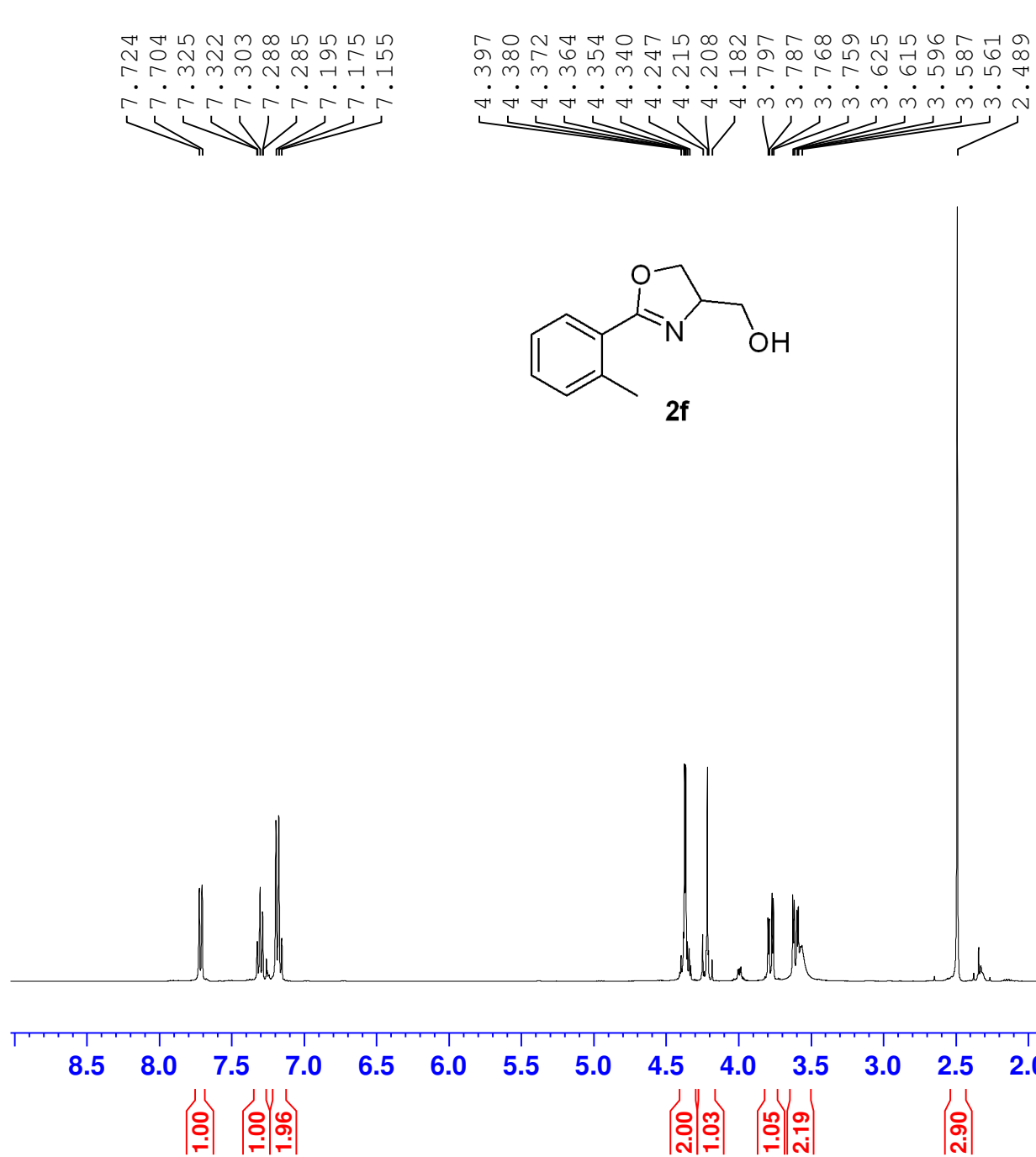
Current Data Parameters
NAME YW-1738B-carbon
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160418
Time 21.10
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 65
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.6 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

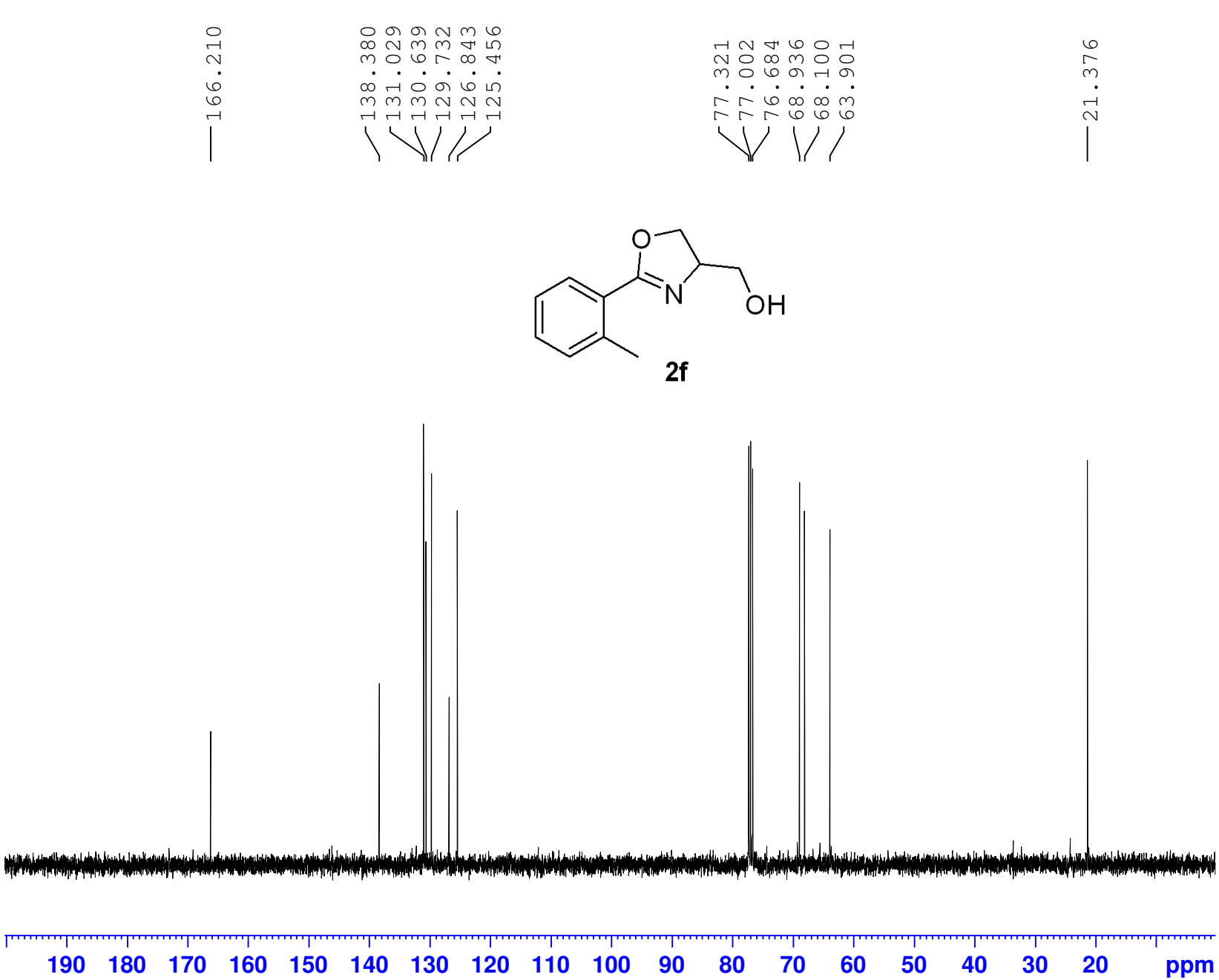
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127722 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40




```
Current Data Parameters
NAME                  YW-1735A
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160416
Time                     20.10
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           3
DS                           0
SWH                 8012.820 Hz
FIDRES                0.122266 Hz
AQ                  4.0894465 sec
RG                       27.78
DW                     62.400 usec
DE                      6.50 usec
TE                      298.6 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1               400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1               11.99499989 W

F2 - Processing parameters
SI                           65536
SF                 400.1300091 MHz
WDW                             EM
SSB          0
LB                        0.30 Hz
GB           0
PC                        1.00
```



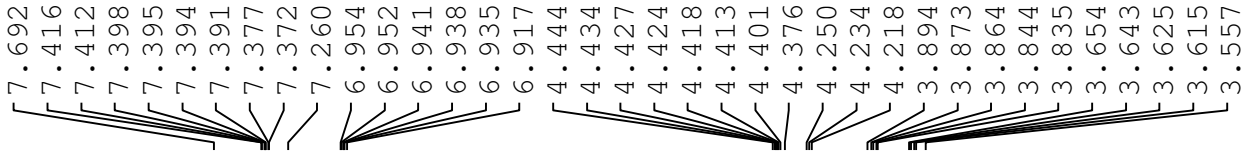
Current Data Parameters
NAME YW-1735A-carbon
EXPNO 1
PROCNO 1

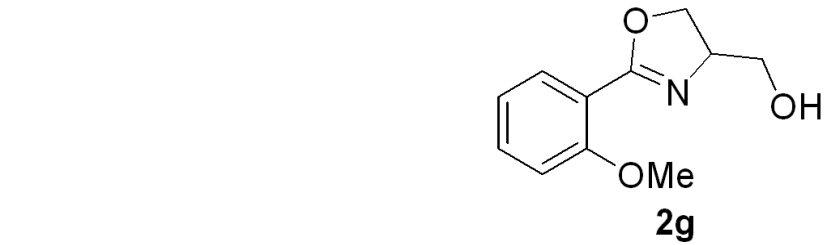
F2 - Acquisition Parameters
Date_ 20160416
Time 20.12
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 9
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.9 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

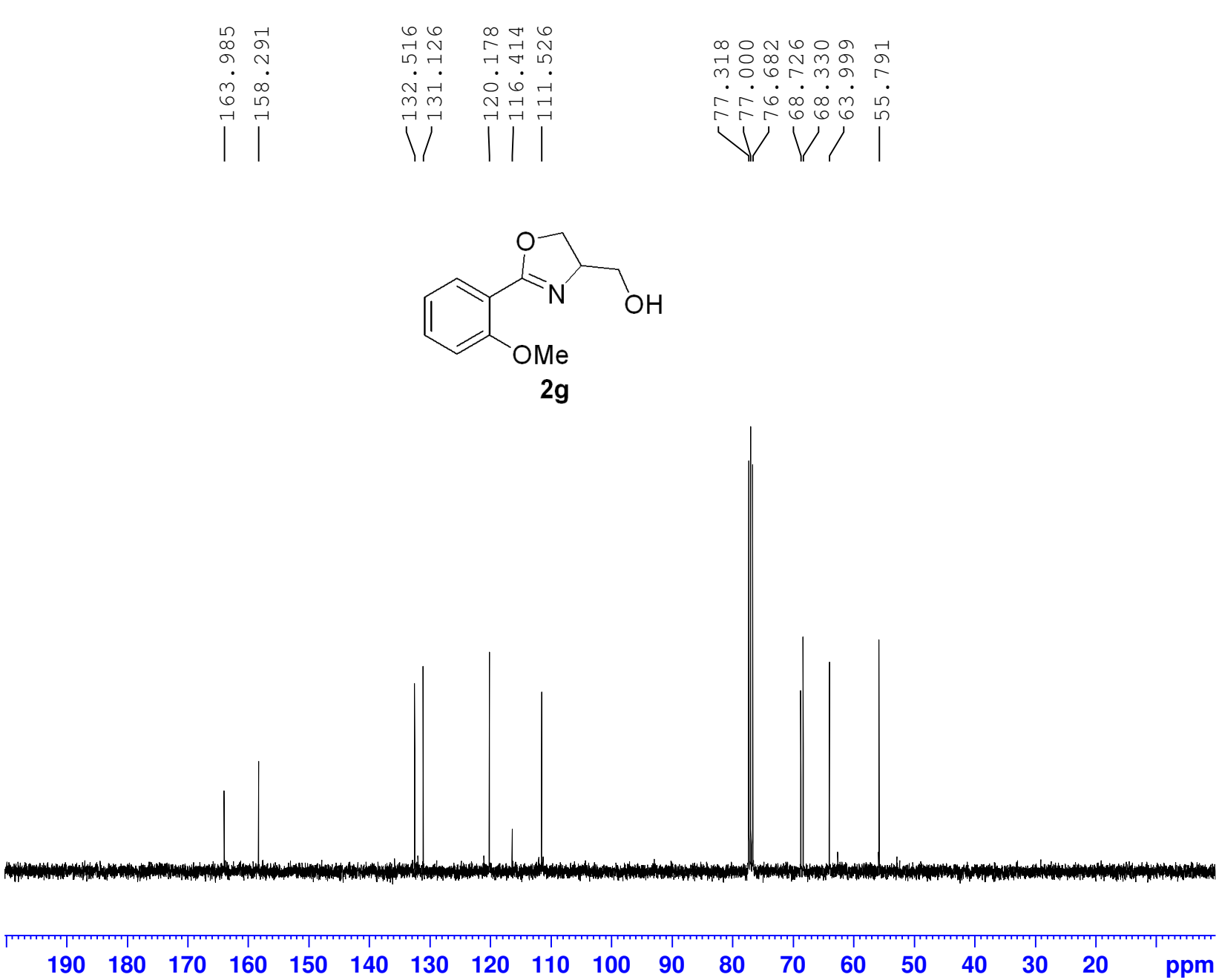
F2 - Processing parameters
SI 32768
SF 100.6127831 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



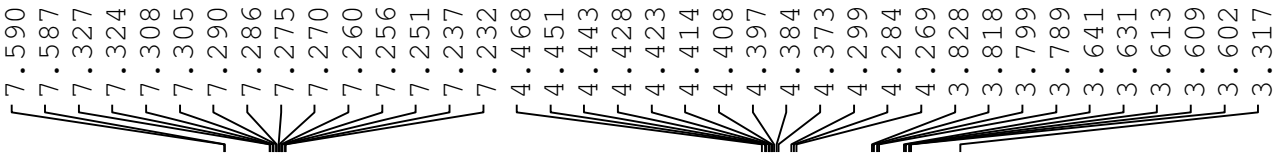


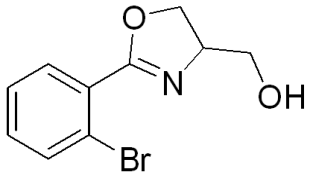
2g


```
Current Data Parameters
NAME                  YW-1735B
EXPNO                        2
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160416
Time                     10.04
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           4
DS                           0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                       49.32
DW                     62.400 usec
DE                      6.50 usec
TE                      298.5 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                           65536
SF                400.1300093 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

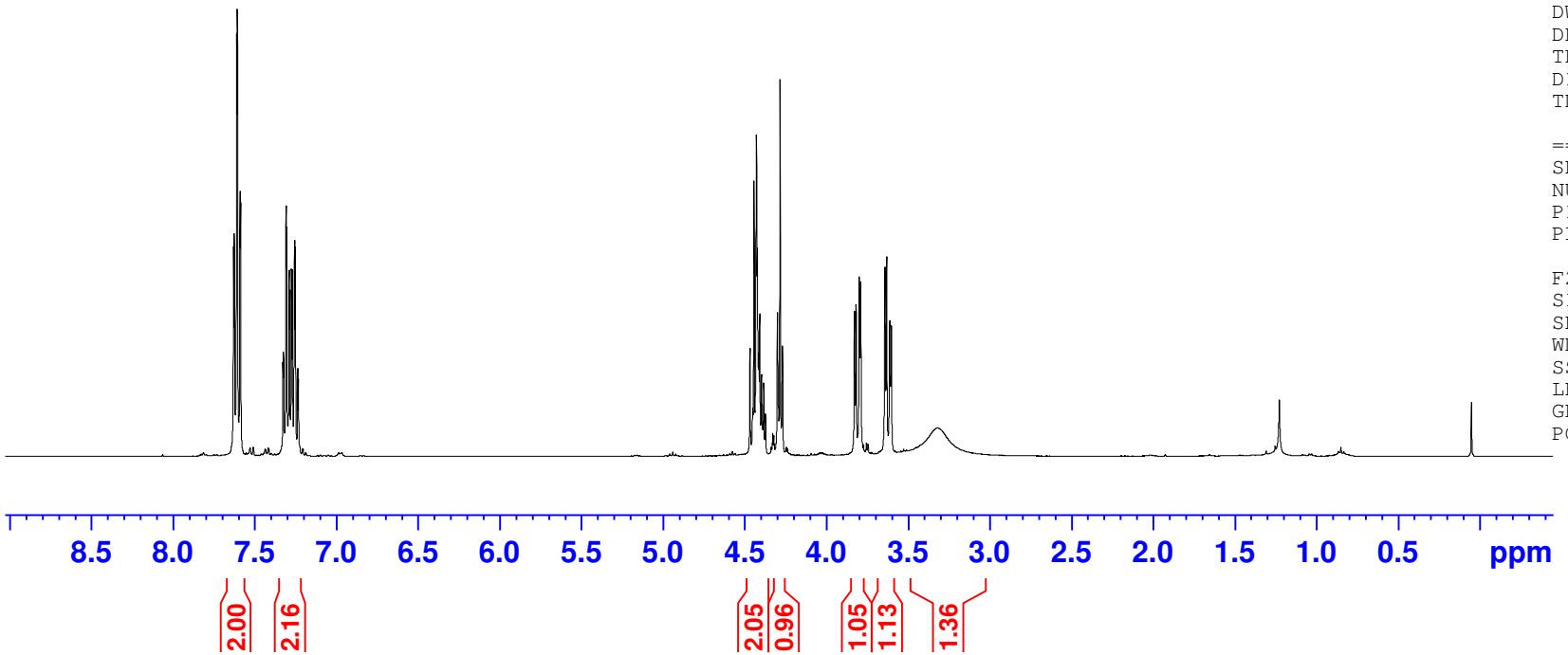



```
Current Data Parameters
NAME      YW-1735B-carbon
EXPNO                   2
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160416
Time               10.06
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   26
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                299.1 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127780 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

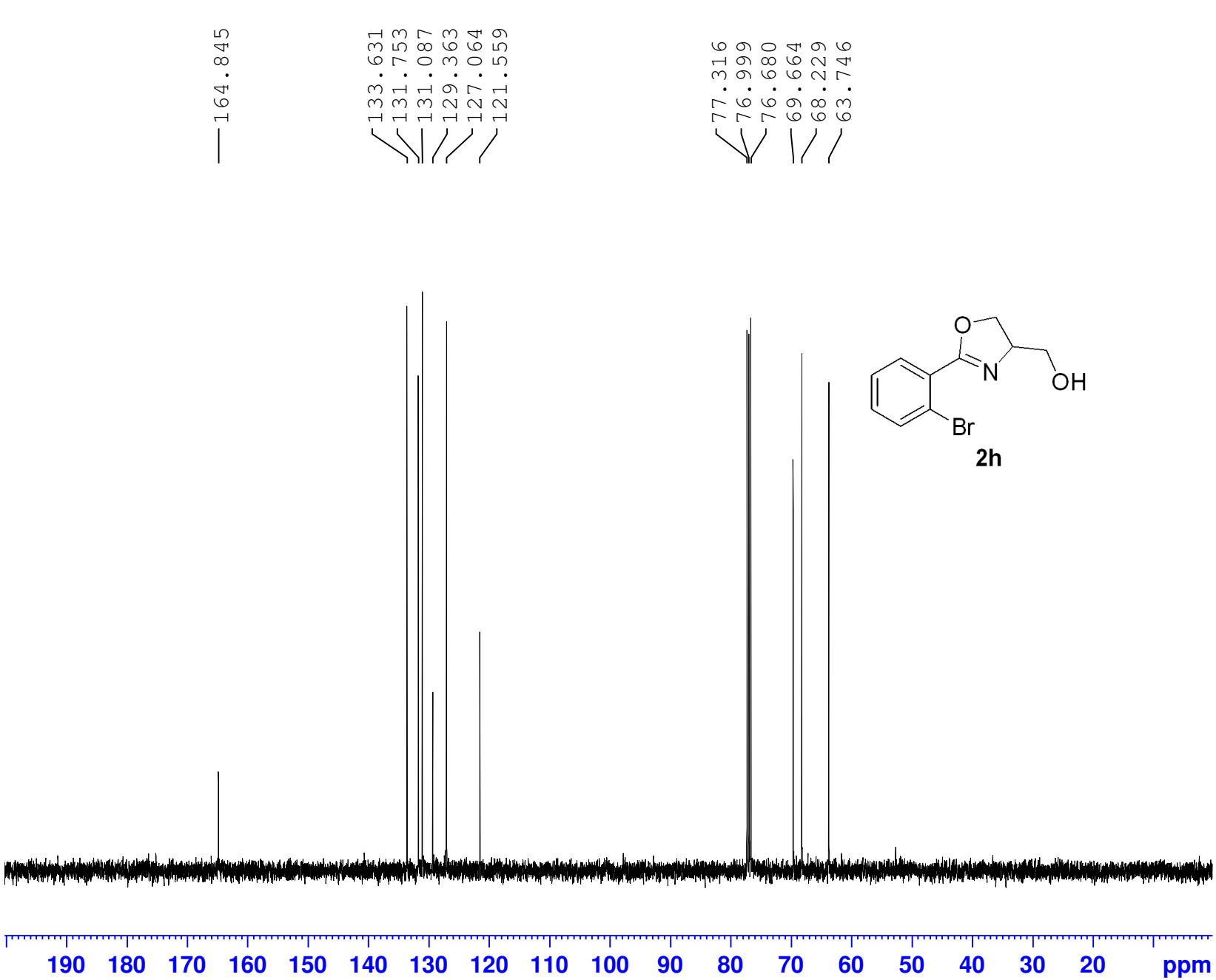




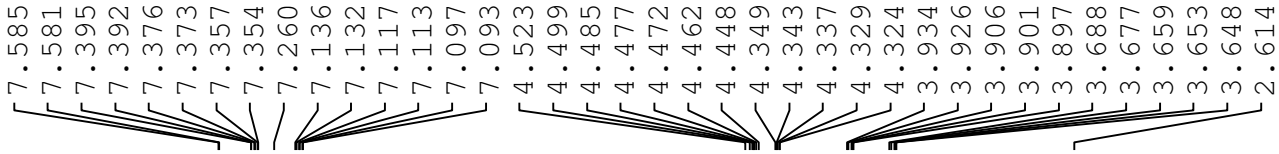
2h

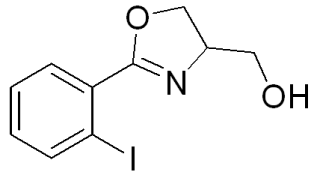



```
Current Data Parameters
NAME                  YW-1726A
EXPNO                        1
PROCNO                       2

F2 - Acquisition Parameters
Date_                 20160413
Time                     14.43
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           3
DS                           0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                       39.46
DW                     62.400 usec
DE                      6.50 usec
TE                     296.7 K
D1                  1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                           65536
SF                400.1300092 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

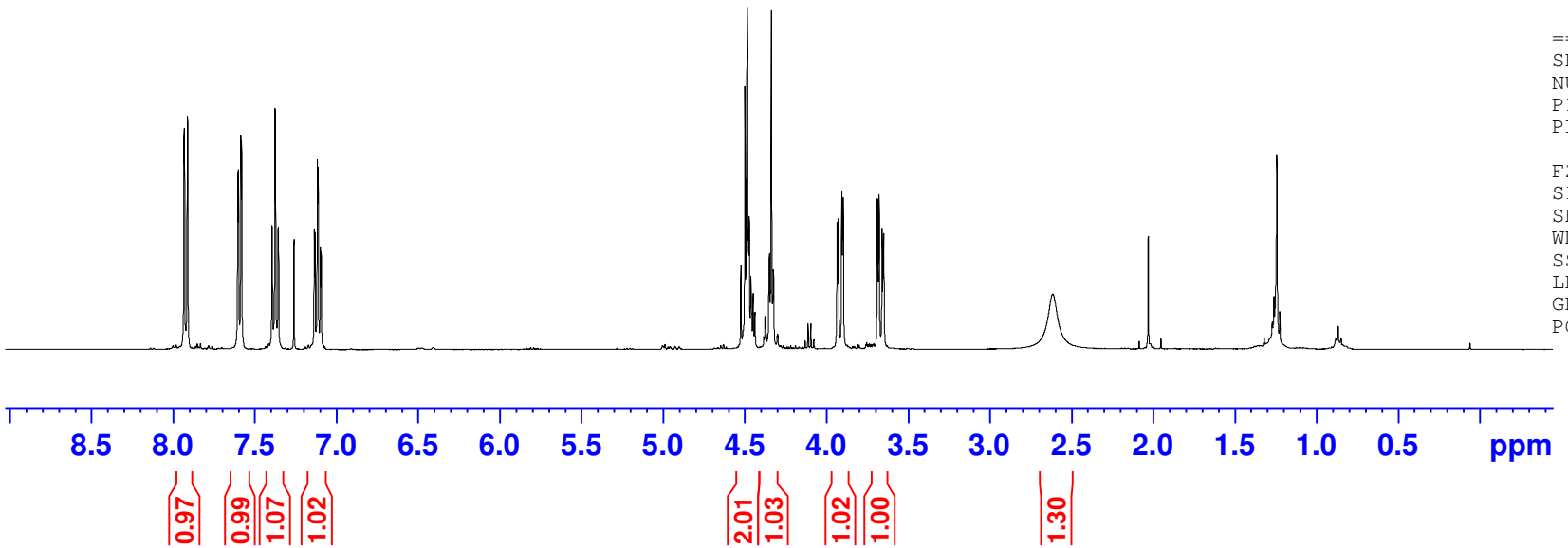



```
Current Data Parameters
NAME      YW-1726A-carbon
EXPNO                   1
PROCNO                  2

F2 - Acquisition Parameters
Date_           20160413
Time               14.44
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   22
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127830 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

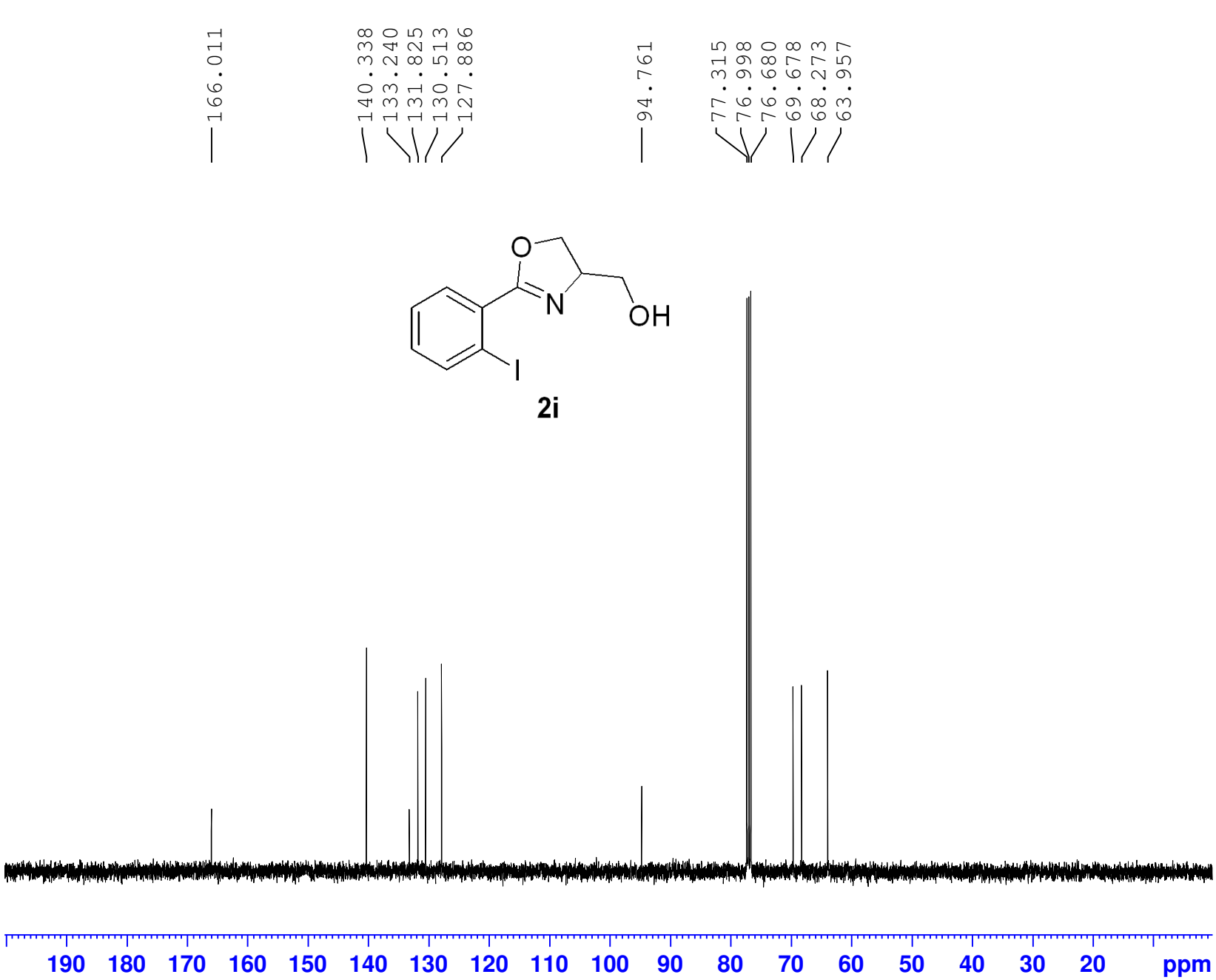




2i




```
Current Data Parameters
NAME                  YW-1726B
EXPNO                        3
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160414
Time                     20.05
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         11
DS                          0
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                       70.97
DW                     62.400 usec
DE                      6.50 usec
TE                      296.5 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1              400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1              11.99499989 W

F2 - Processing parameters
SI                      65536
SF                400.1300094 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```



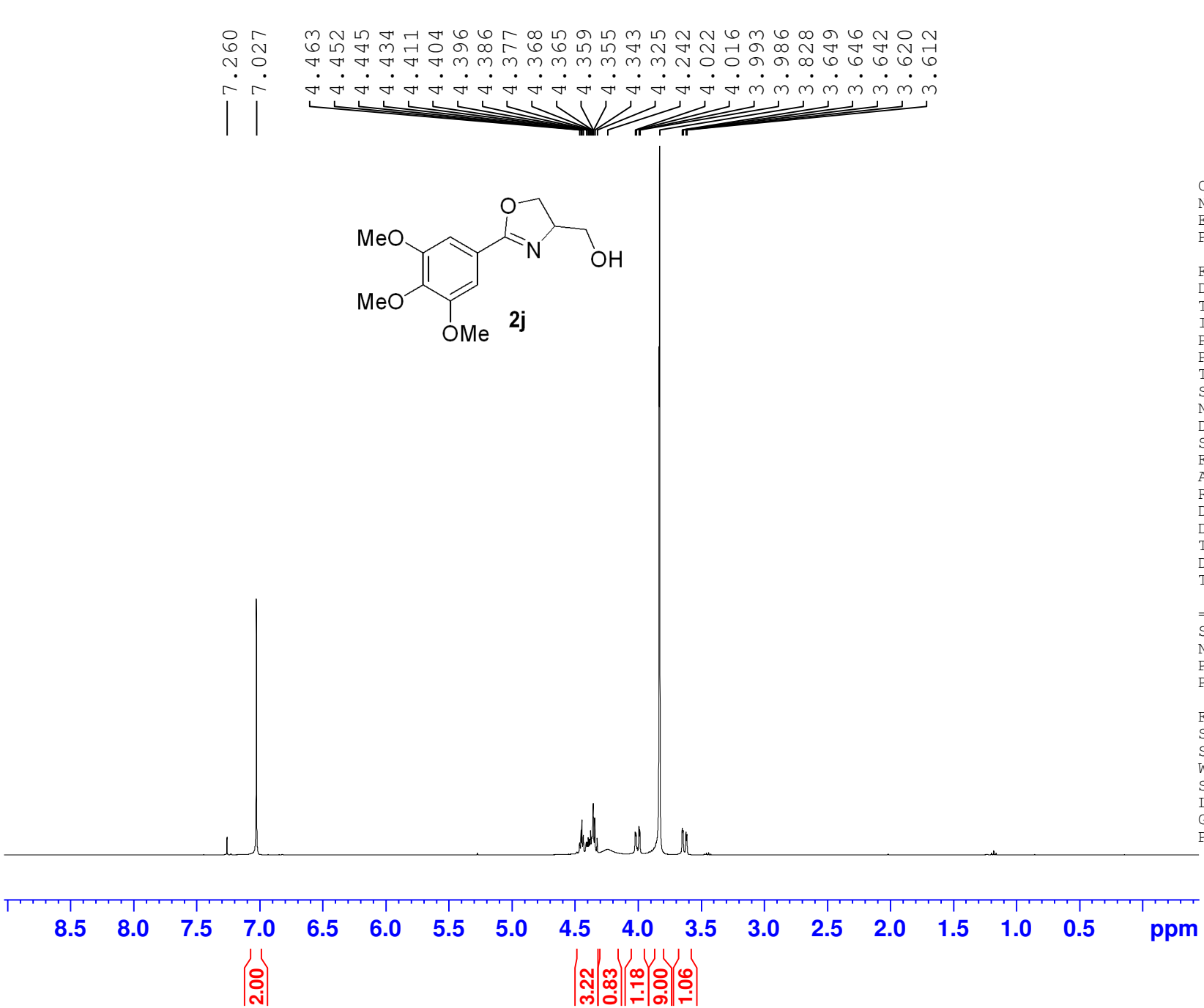
Current Data Parameters
NAME YW-1726B-carbon
EXPNO 4
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160414
Time 20.09
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 29
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

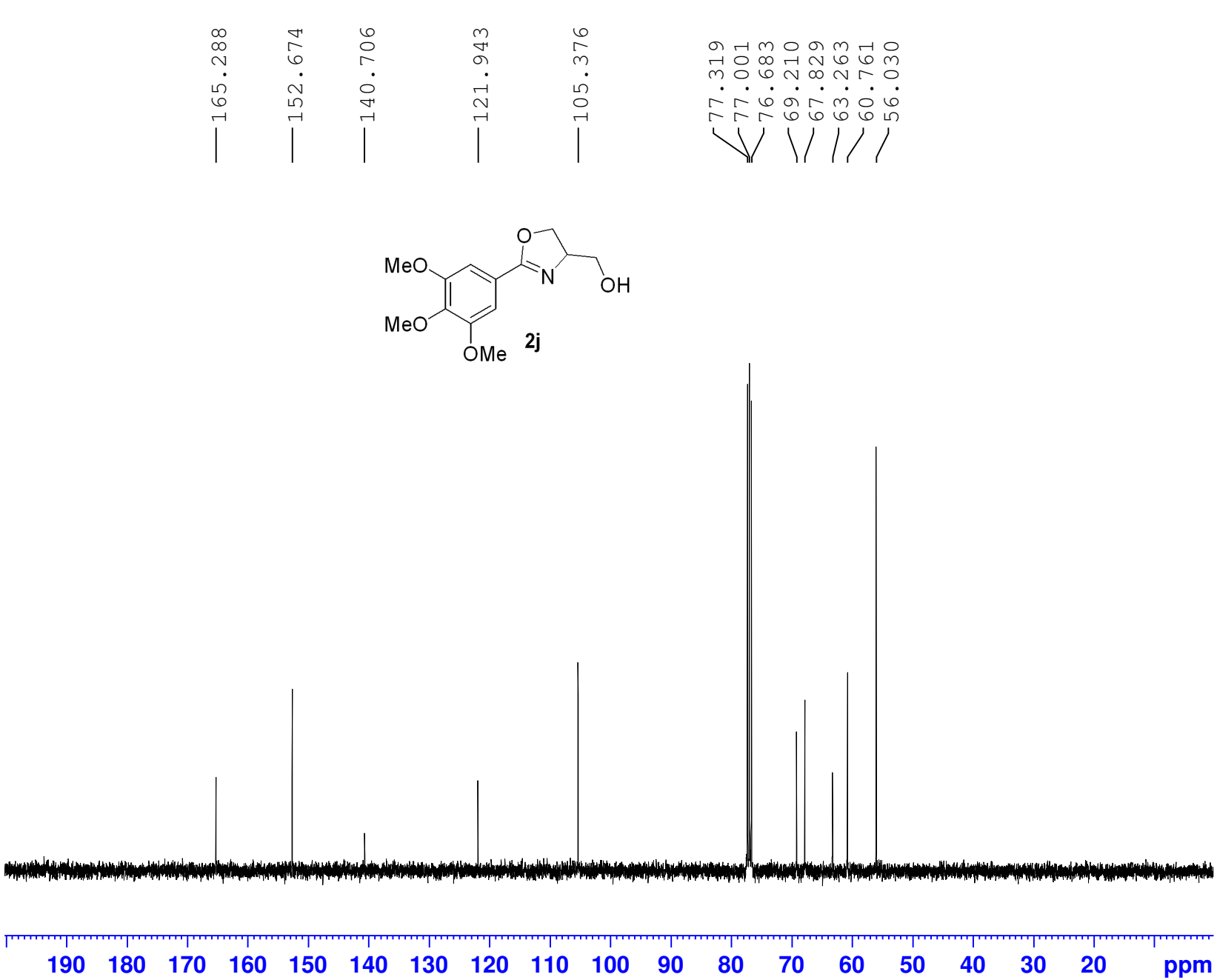
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127766 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40




```
Current Data Parameters
NAME                  YW-1735C
EXPNO                        3
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160415
Time                     14.45
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                  CDCl3
NS                           4
DS                           0
SWH                   8012.820 Hz
FIDRES                0.122266 Hz
AQ                    4.0894465 sec
RG                       49.32
DW                      62.400 usec
DE                       6.50 usec
TE                      296.8 K
D1                    1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1                11.99499989 W

F2 - Processing parameters
SI                           65536
SF                  400.1300092 MHz
WDW                            EM
SSB                 0
LB                        0.30 Hz
GB                  0
PC                        1.00
```



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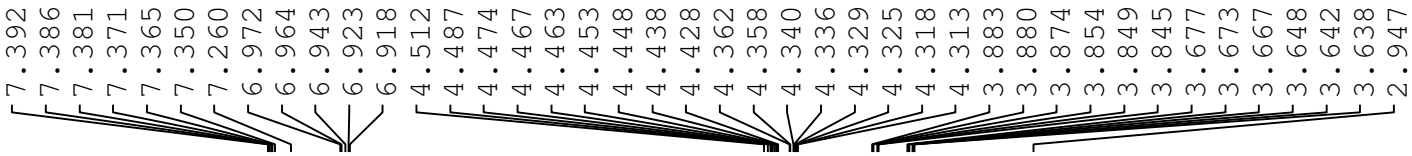
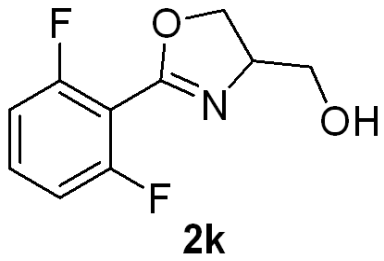
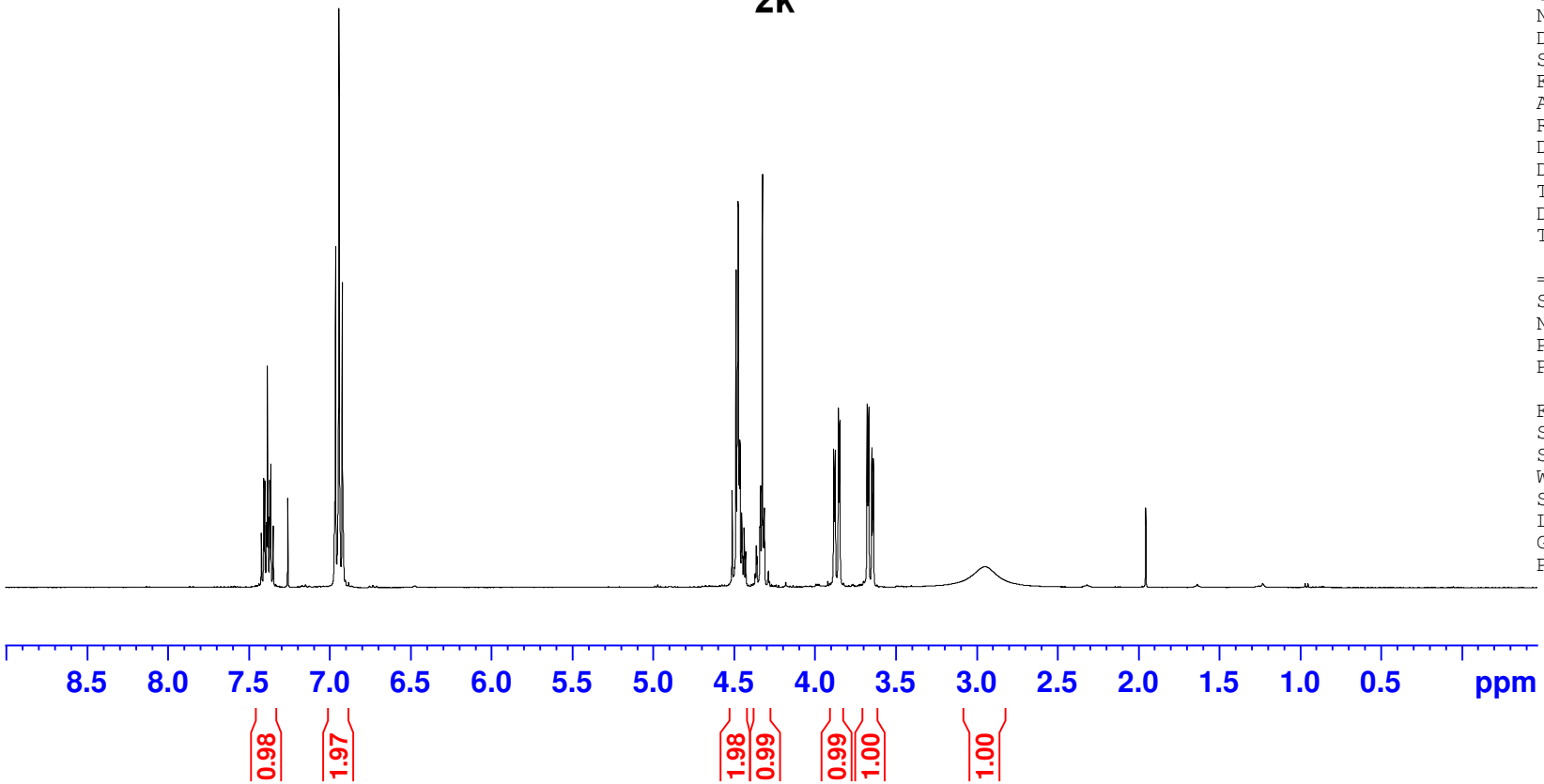
```
Current Data Parameters
NAME      YW-1735C-carbon
EXPNO                   3
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160415
Time               14.48
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   37
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.6 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127758 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

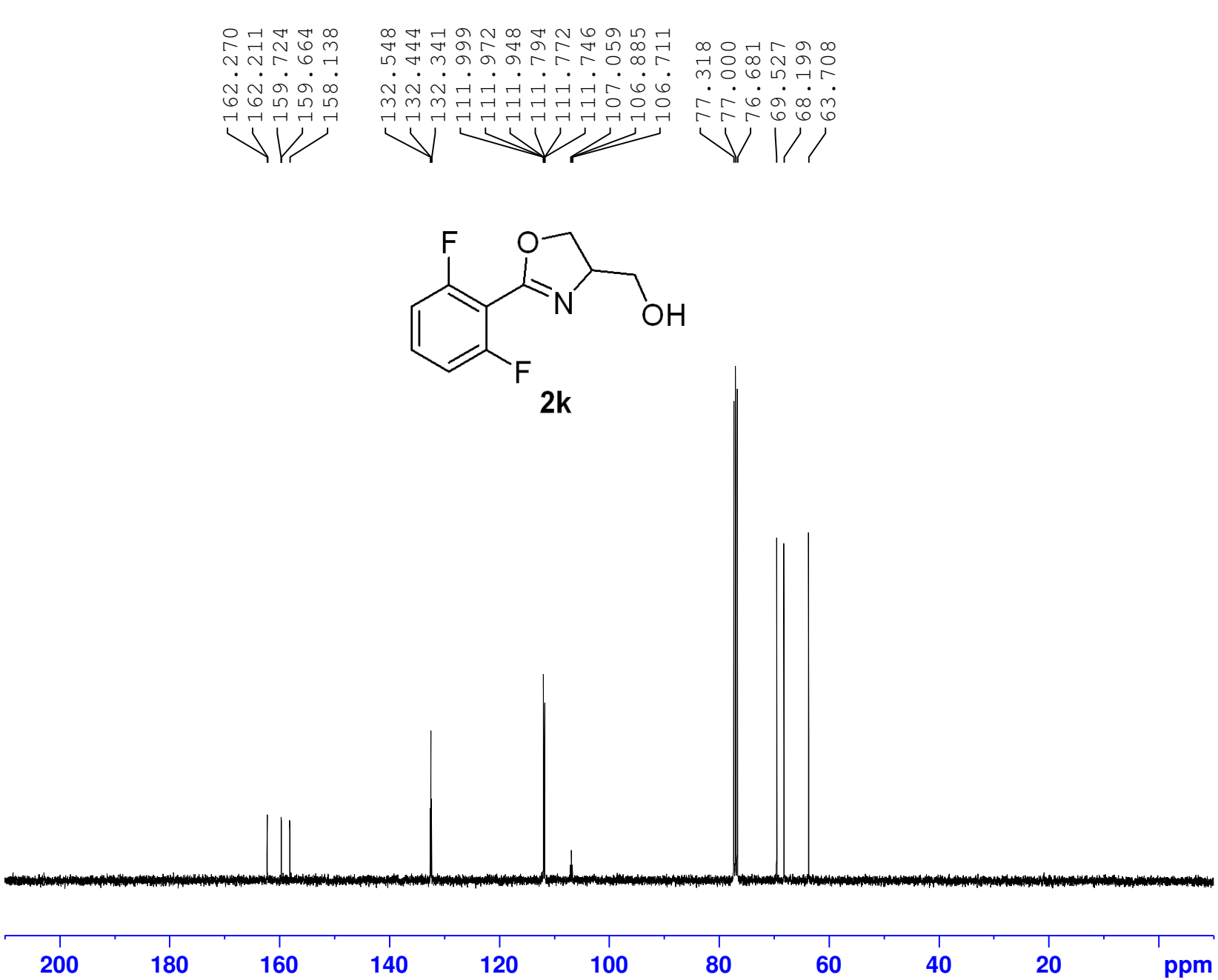




2k




```
Current Data Parameters
NAME                  YW-1738
EXPNO                       3
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160419
Time                   14.39
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          4
DS                          0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     62.93
DW                     62.400 usec
DE                      6.50 usec
TE                     296.5 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300094 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



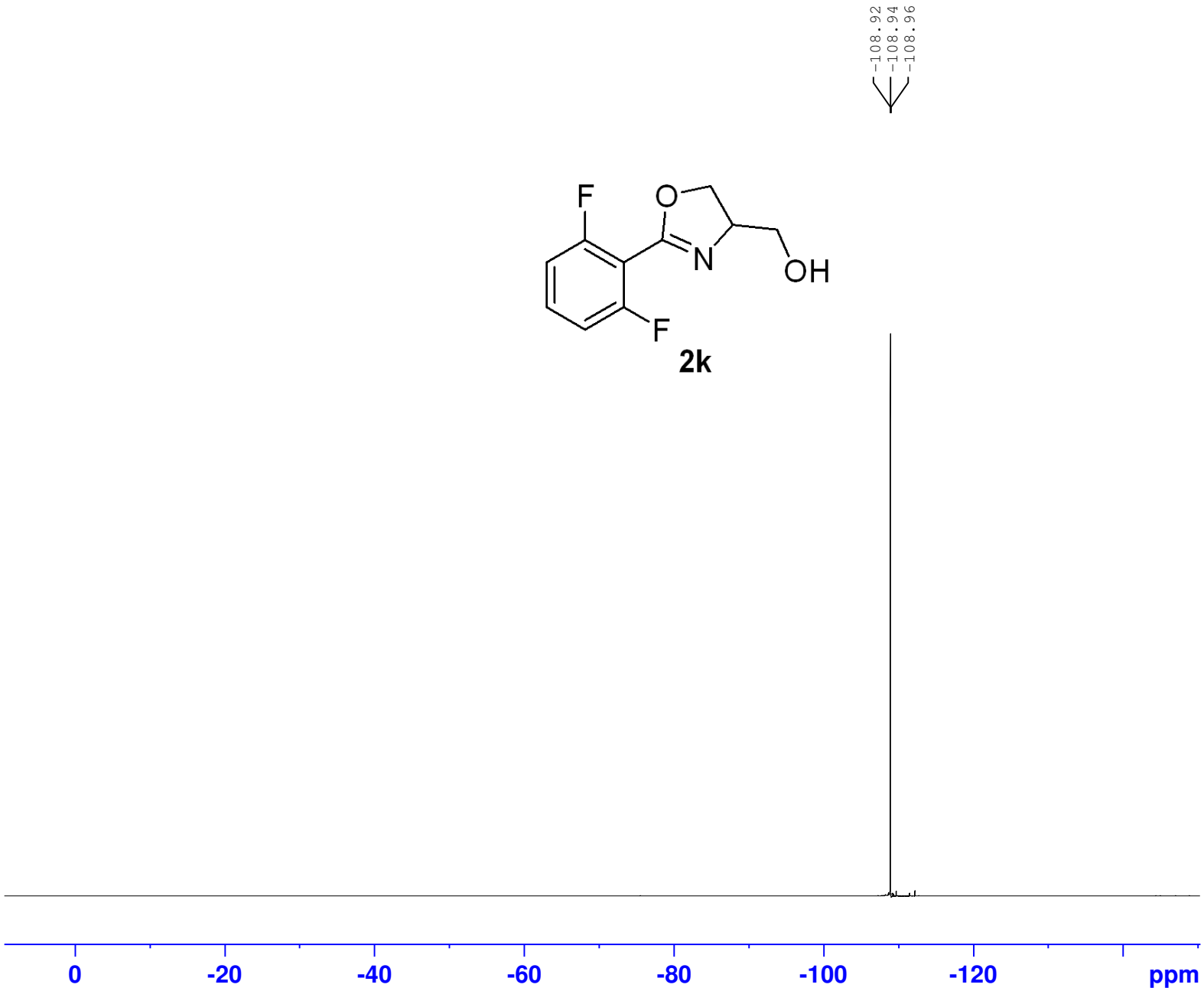
Current Data Parameters
NAME YW-1738-carbon
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160419
Time 14.48
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 144
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

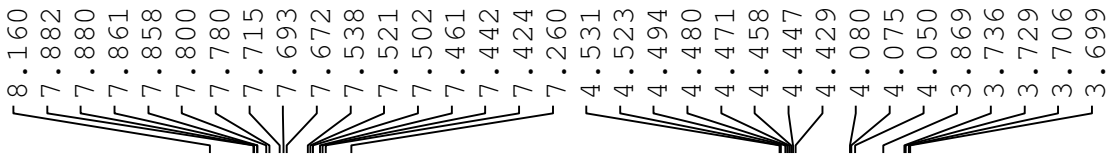
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

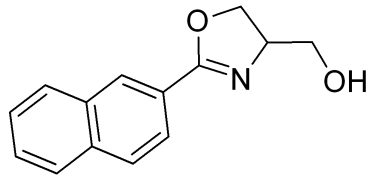
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127758 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

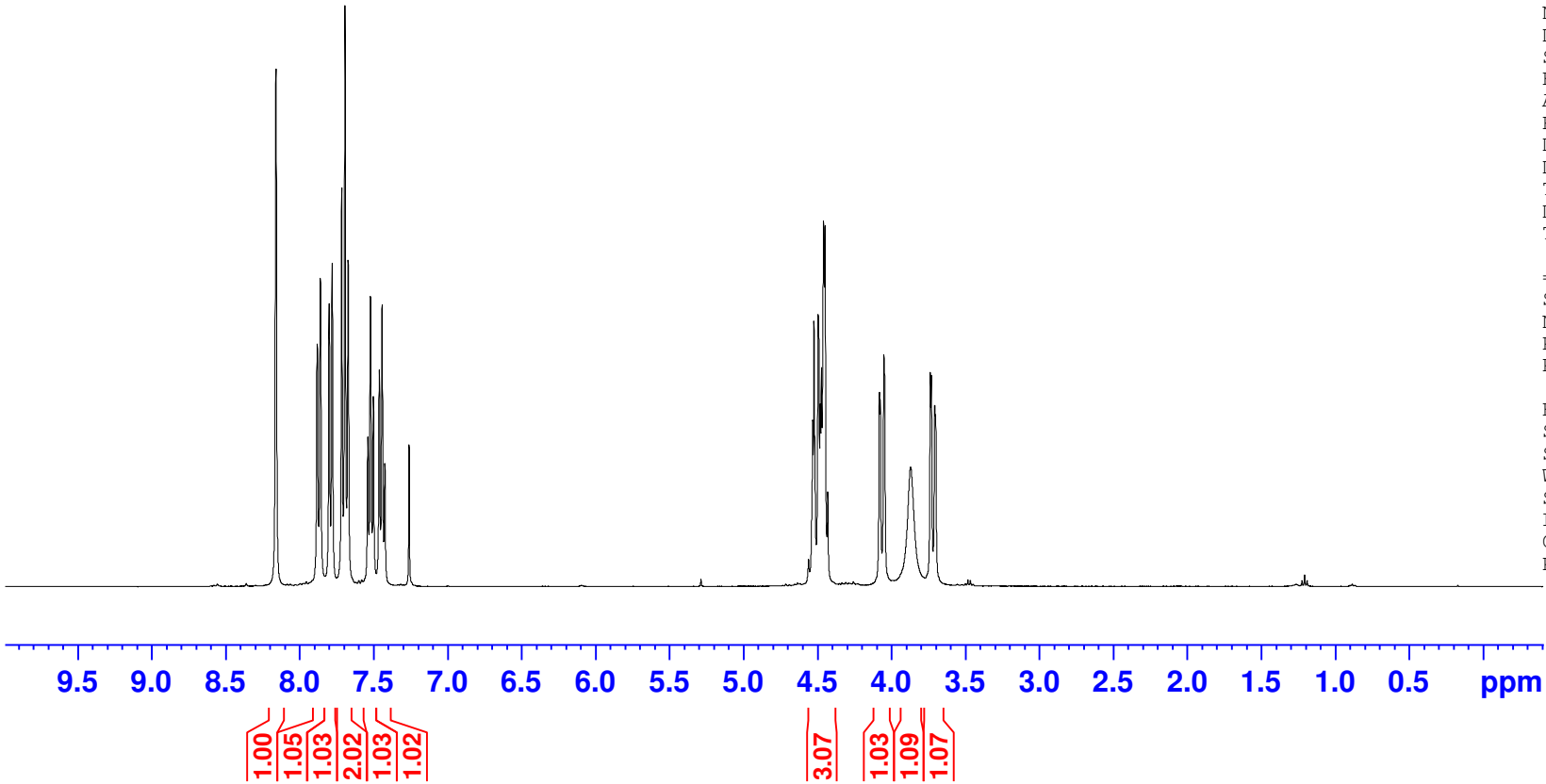



```
Current Data Parameters
NAME         YW-1738-19F
EXPNO                  3
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160419
Time               14.52
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgflqn
TD                131072
SOLVENT            CDCl3
NS                    11
DS                     0
SWH            89285.711 Hz
FIDRES          0.681196 Hz
AQ             0.7340032 sec
RG                196.92
DW                 5.600 usec
DE                 6.50 usec
TE                296.7 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         376.4607164 MHz
NUC1                19F
P1                14.70 usec
PLW1         15.99600029 W

F2 - Processing parameters
SI                 65536
SF           376.4983660 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

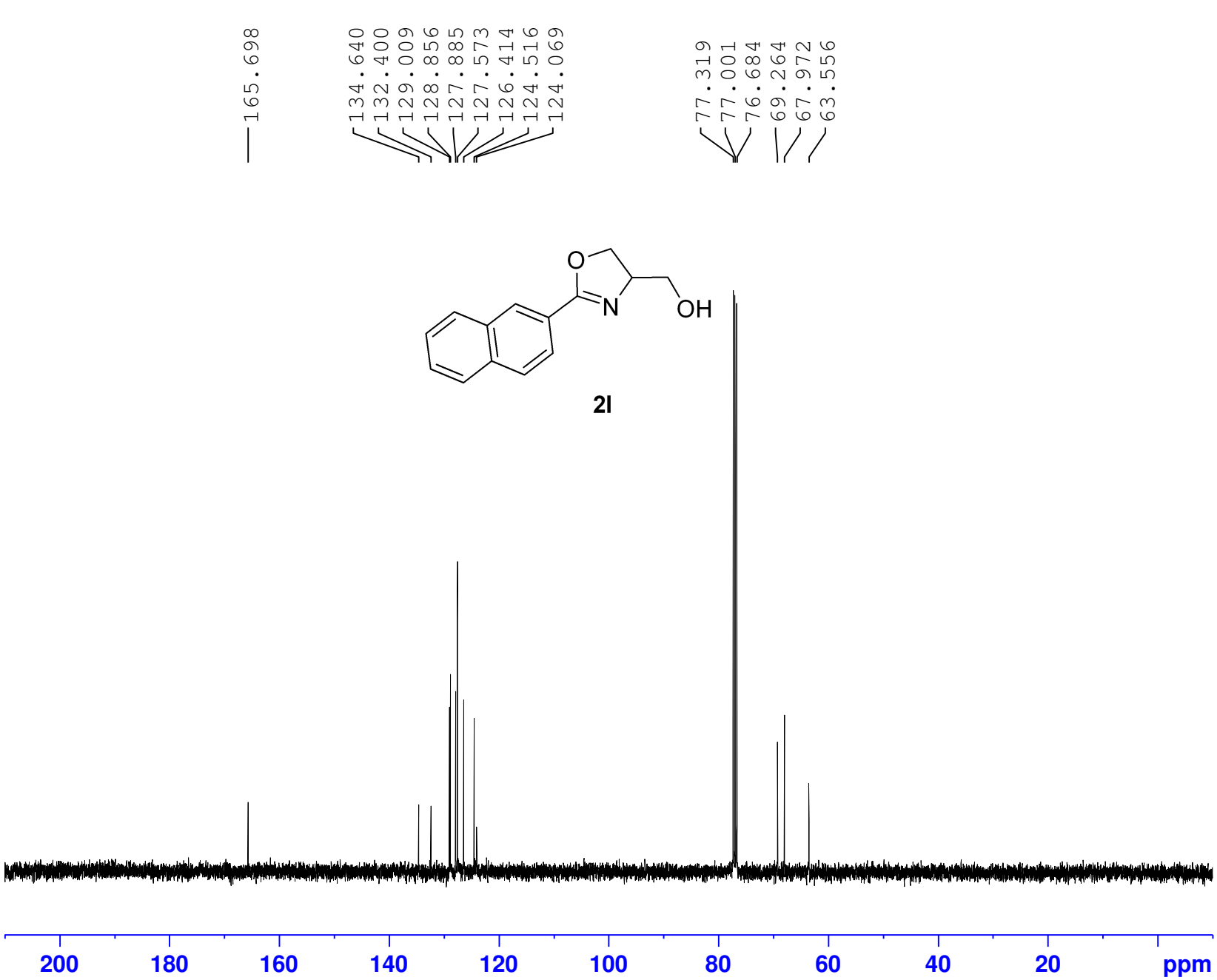




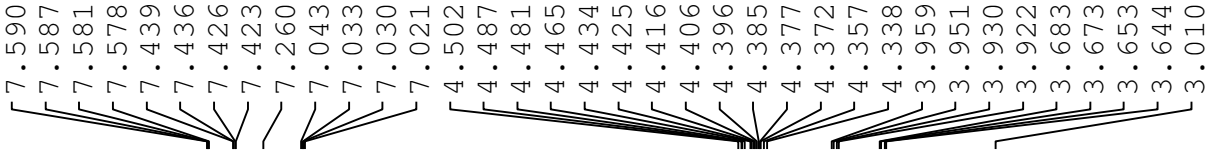
2l

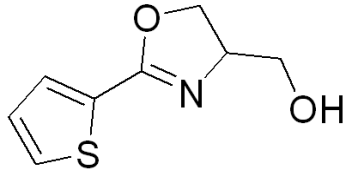



```
Current Data Parameters
NAME                  YW-1728
EXPNO                       3
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160414
Time                   20.12
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     82.92
DW                    62.400 usec
DE                     6.50 usec
TE                    296.5 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300094 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

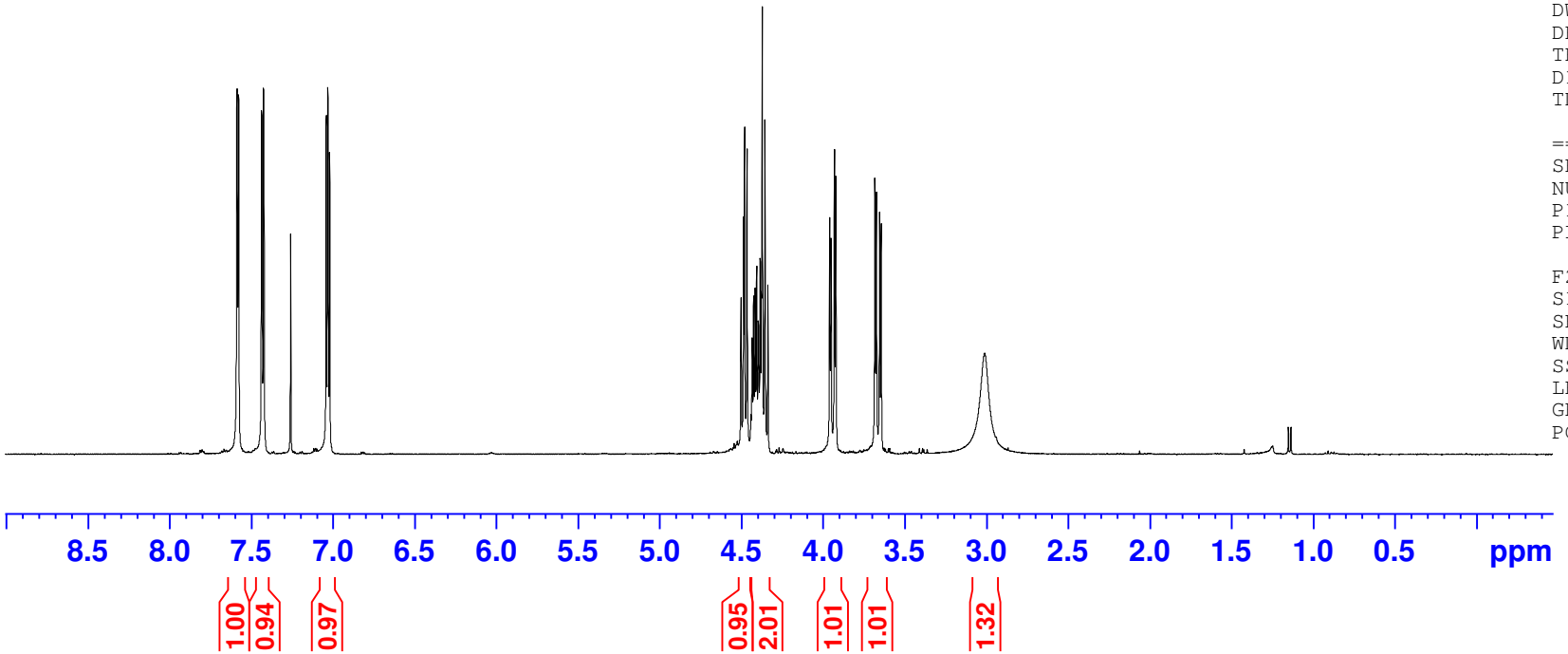



```
Current Data Parameters
NAME      YW-1728-carbon
EXPNO                  3
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160414
Time               20.16
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   36
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127744 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

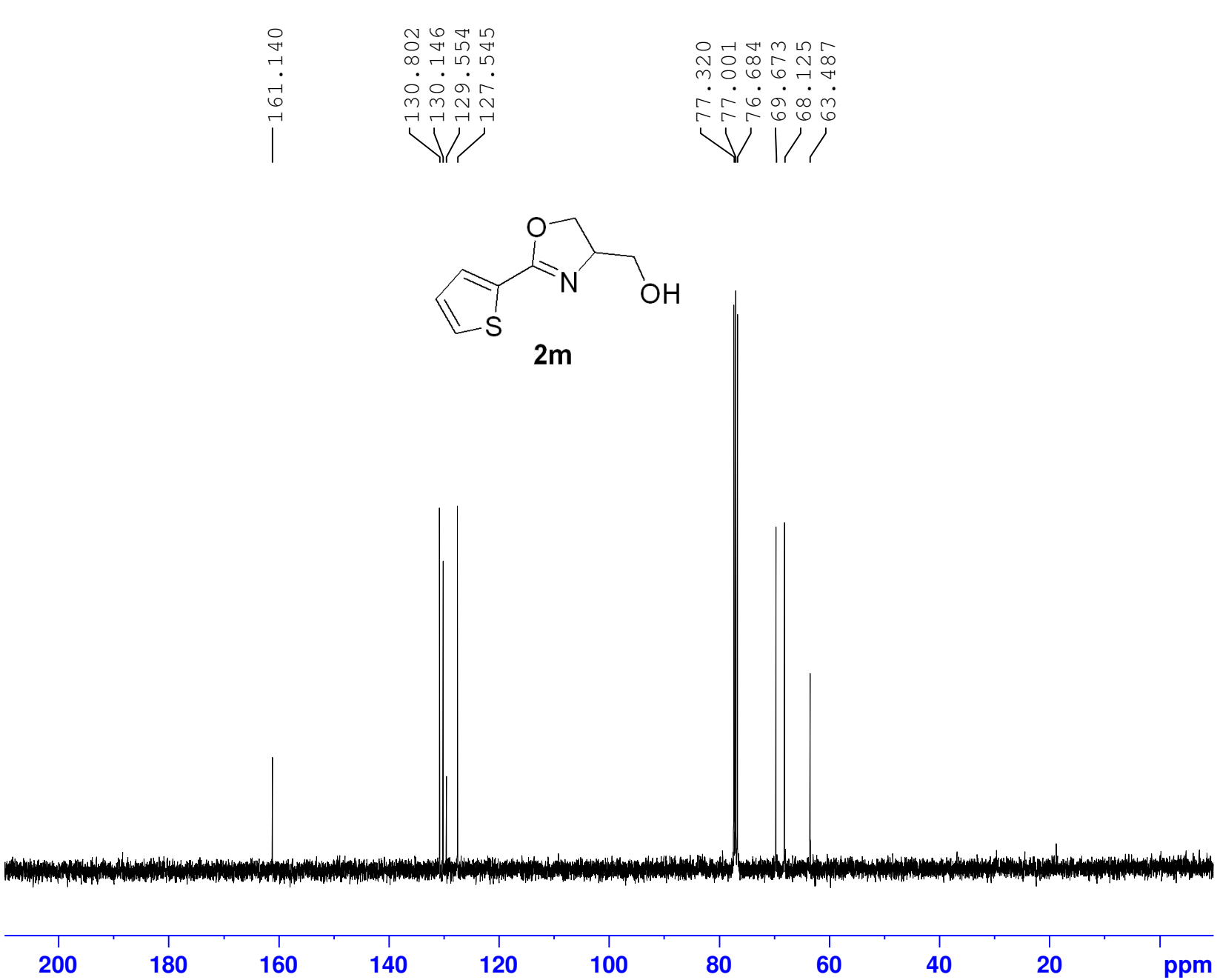




2m




```
Current Data Parameters
NAME                  YW-1782
EXPNO                       4
PROCNO                      1

F2 - Acquisition Parameters
Date_              20160801
Time                   20.10
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          3
DS                          0
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894465 sec
RG                    126.97
DW                    62.400 usec
DE                     6.50 usec
TE                    299.0 K
D1                 1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1            400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1            11.99499989 W

F2 - Processing parameters
SI                         65536
SF              400.1300094 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```



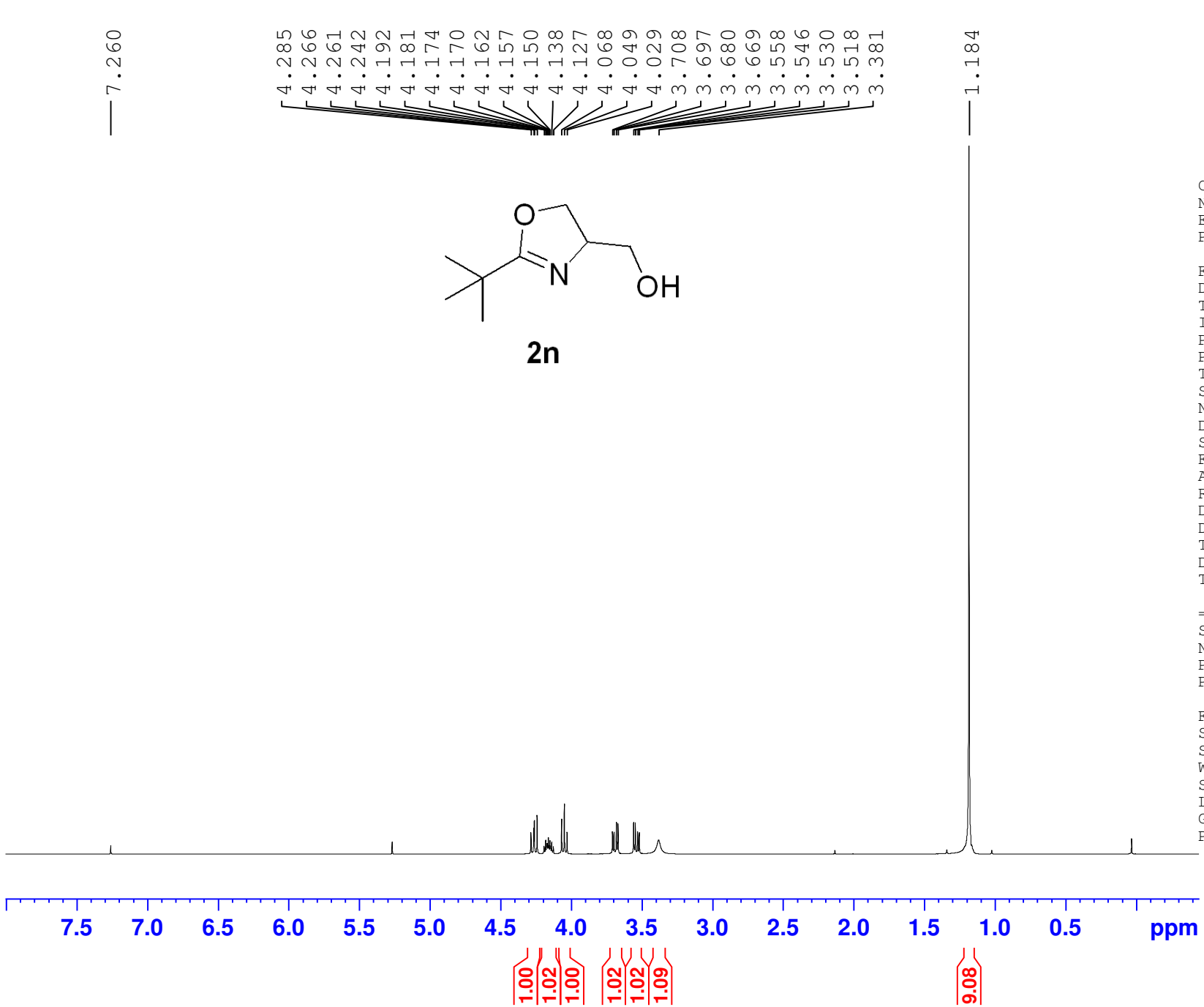
Current Data Parameters
NAME YW-1782-carbon
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160730
Time 20.52
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 48
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 300.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

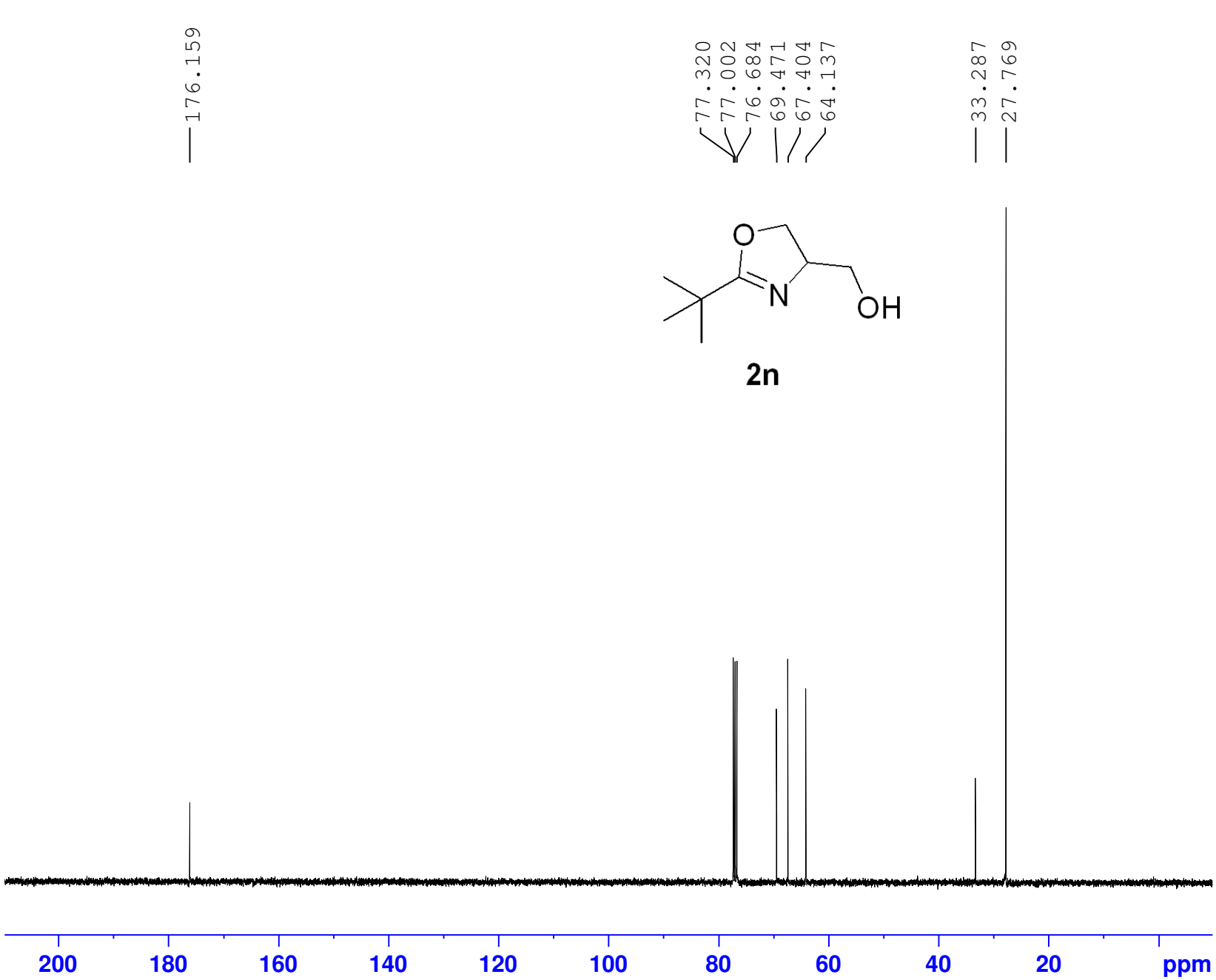
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

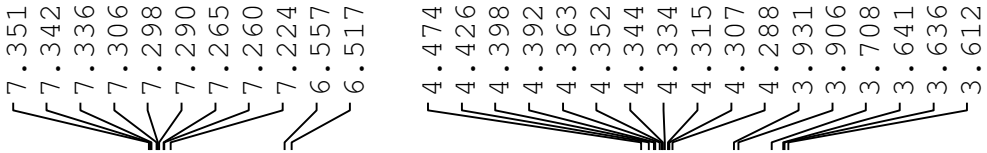
F2 - Processing parameters
SI 32768
SF 100.6127751 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

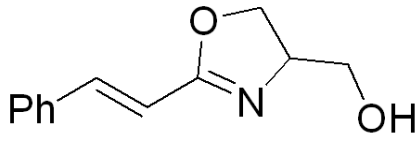



```
Current Data Parameters
NAME                  YW-1783
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_               20160802
Time                   15.54
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        10
DS                         0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                     34.77
DW                    62.400 usec
DE                     6.50 usec
TE                     298.8 K
D1                1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                     14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                         65536
SF               400.1300094 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

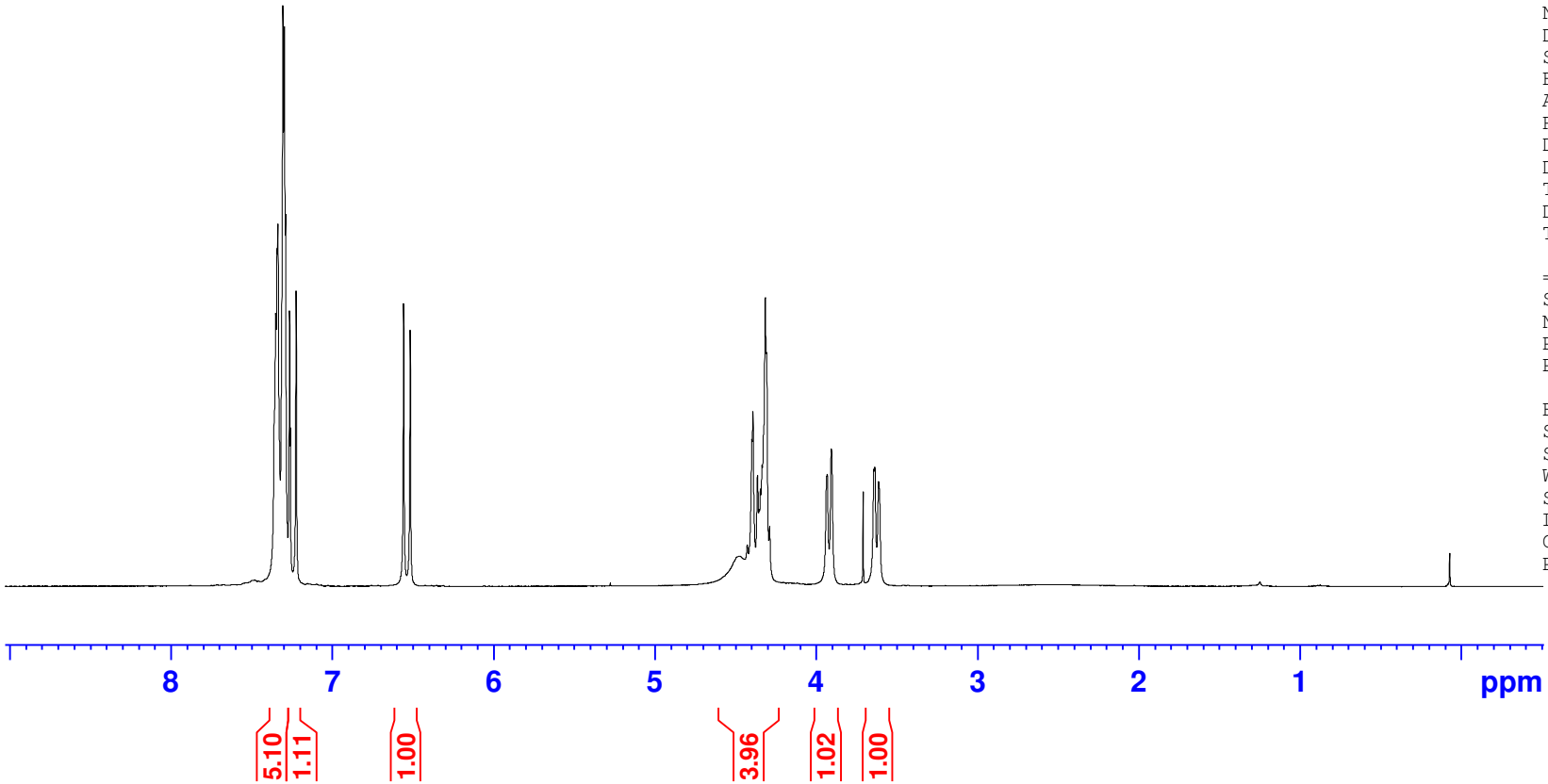



```
Current Data Parameters
NAME      YW-1783-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160802
Time               15.56
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   34
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                299.6 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127737 MHz
WDW                  EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

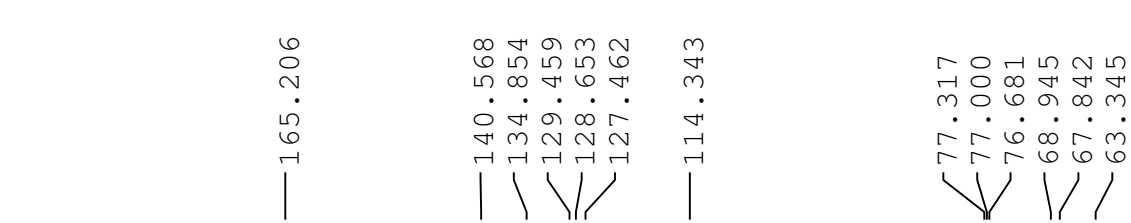


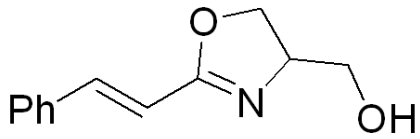


2o

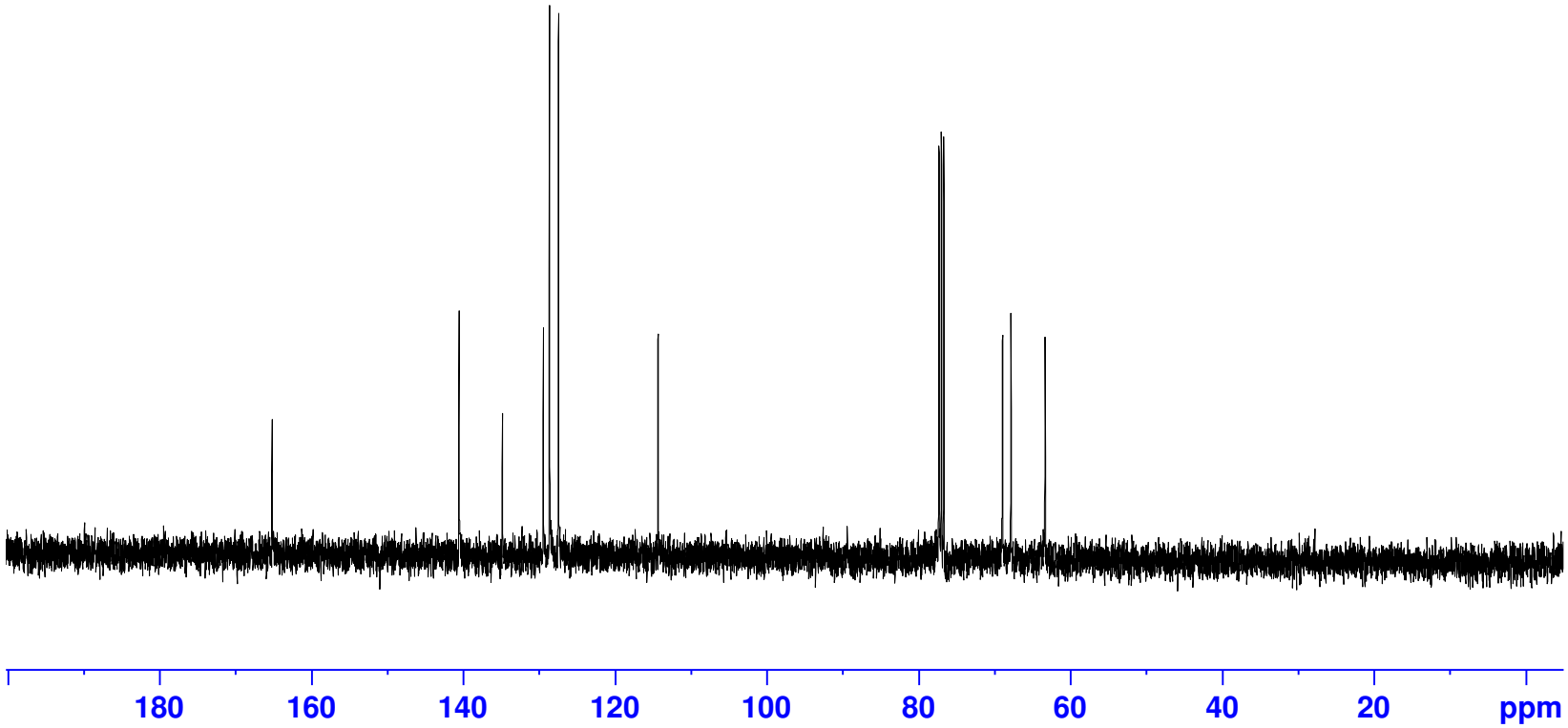



```
Current Data Parameters
NAME                  YW-1907B
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160811
Time                     10.52
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           3
DS                           0
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                       49.32
DW                     62.400 usec
DE                      6.50 usec
TE                      299.3 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1               400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1               11.99499989 W

F2 - Processing parameters
SI                           65536
SF                 400.1300095 MHz
WDW                             EM
SSB          0
LB                        0.30 Hz
GB           0
PC                        1.00
```

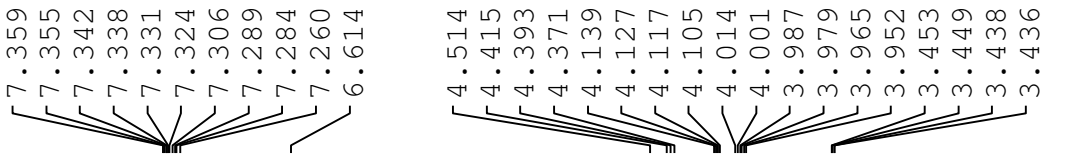


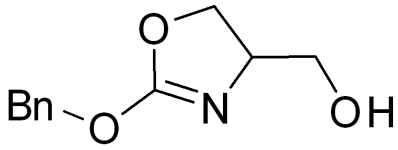


2o

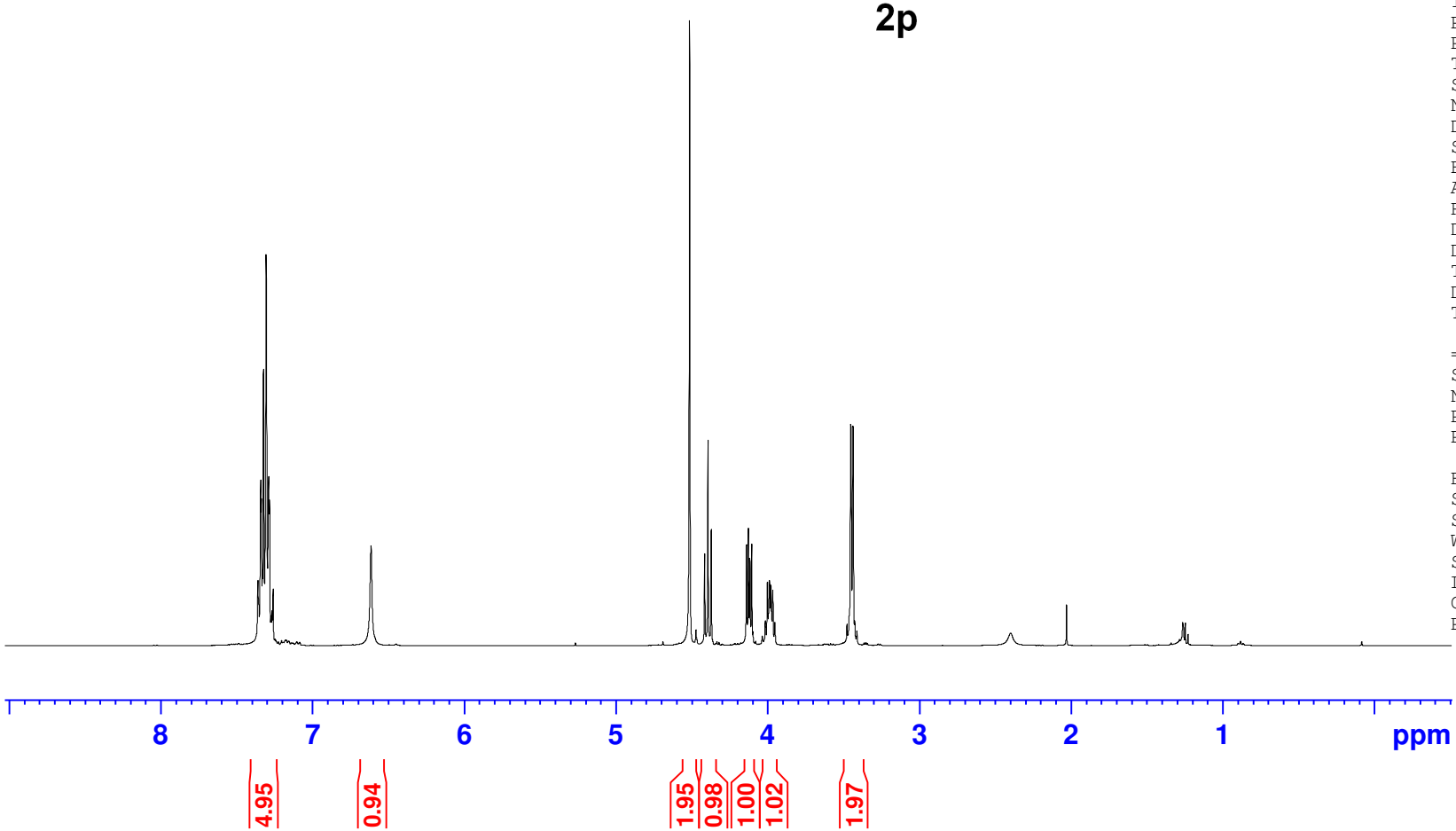



```
Current Data Parameters
NAME      YW-1907B-carbon
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20160811
Time               13.00
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   31
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                299.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127767 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

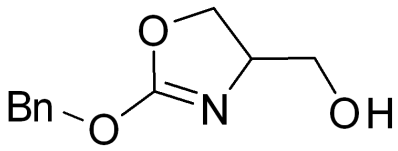




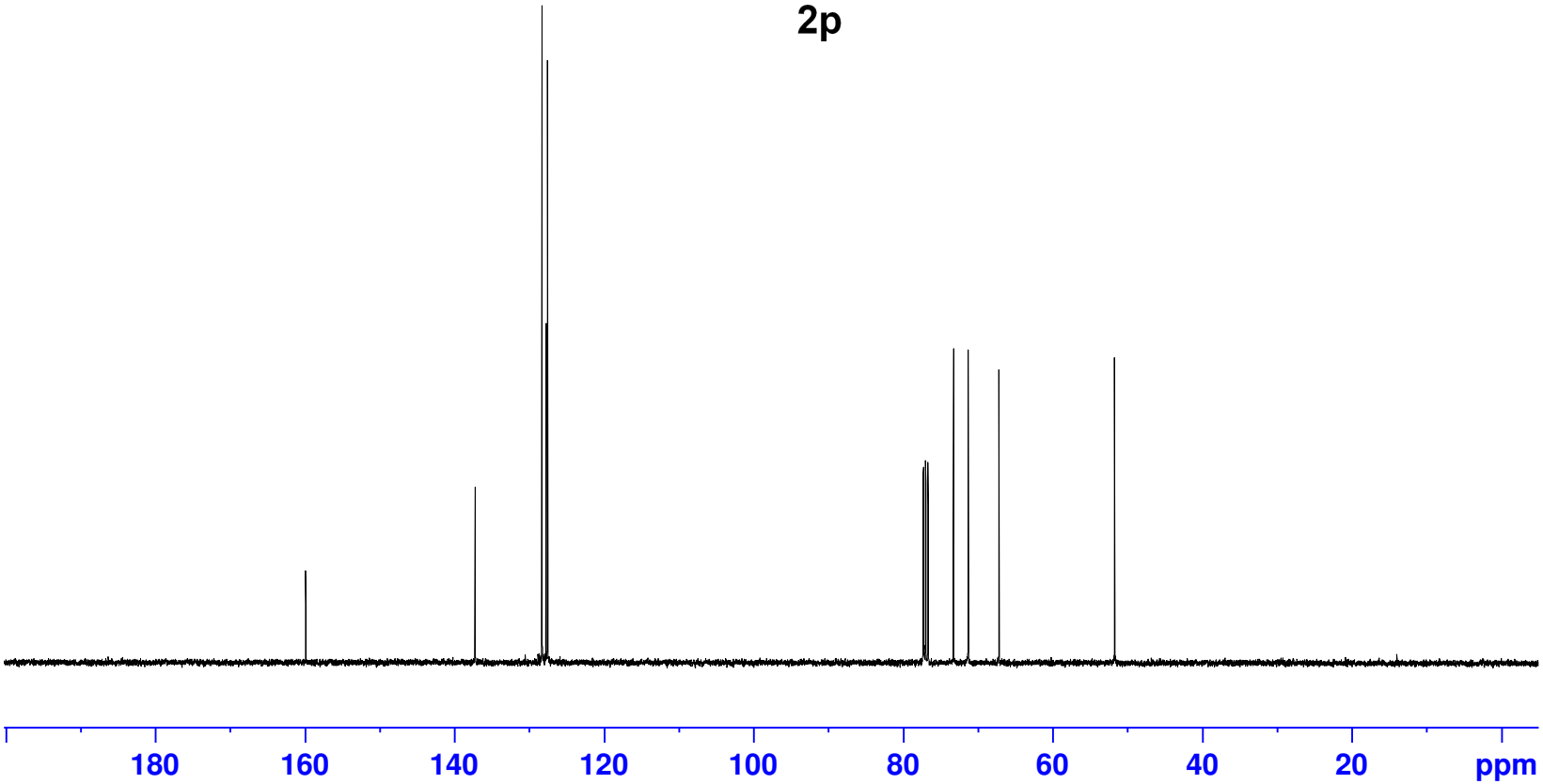
2p



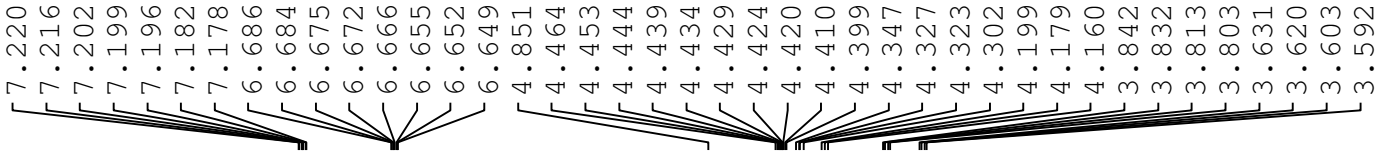

```
Current Data Parameters
NAME                  YW-1761A
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160504
Time                     18.41
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           8
DS                           0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                       25.32
DW                     62.400 usec
DE                      6.50 usec
TE                      296.0 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                       65536
SF               400.1300091 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                       1.00
```

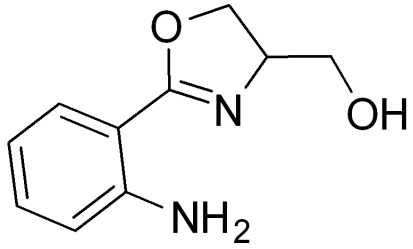


2p

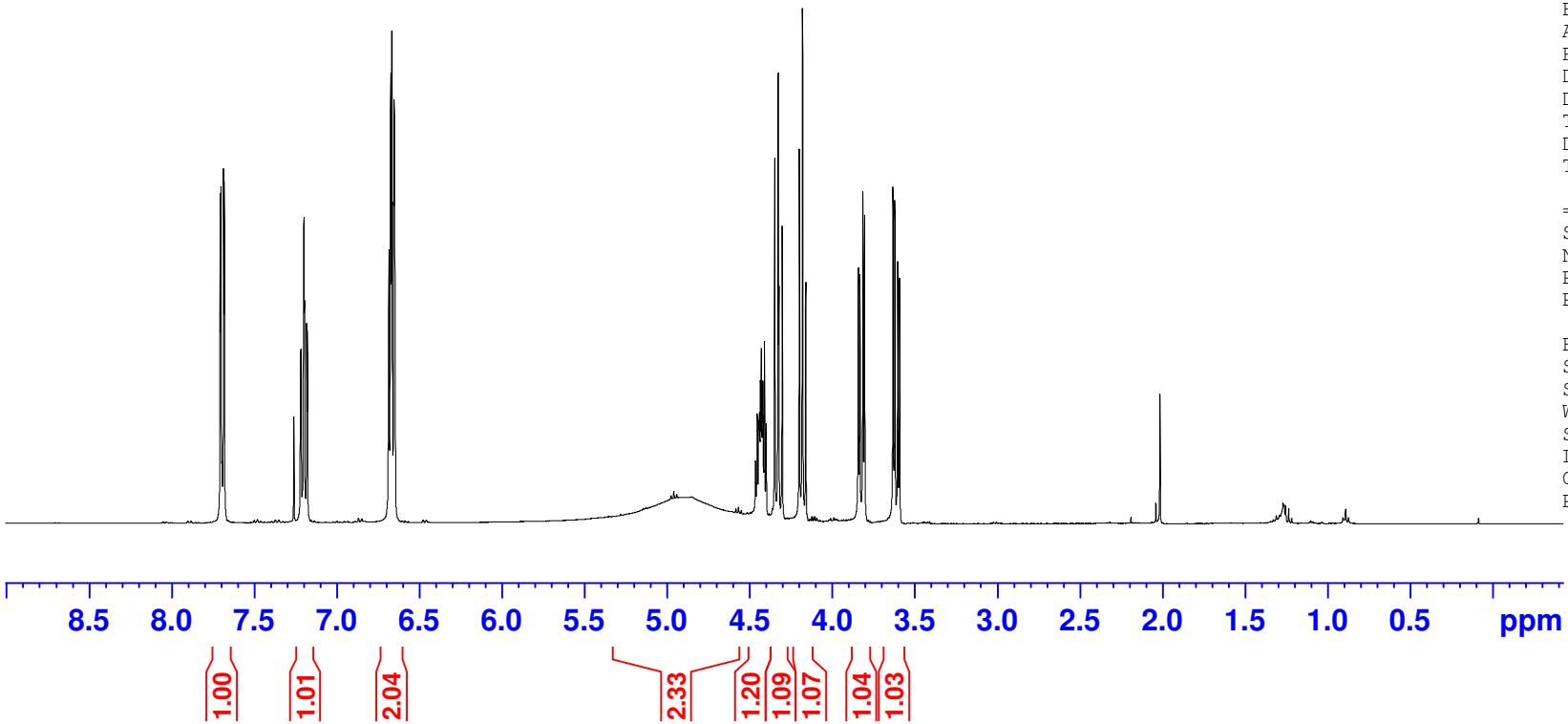



```
Current Data Parameters
NAME      YW-1761A-carbon
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160504
Time               18.45
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   48
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127912 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

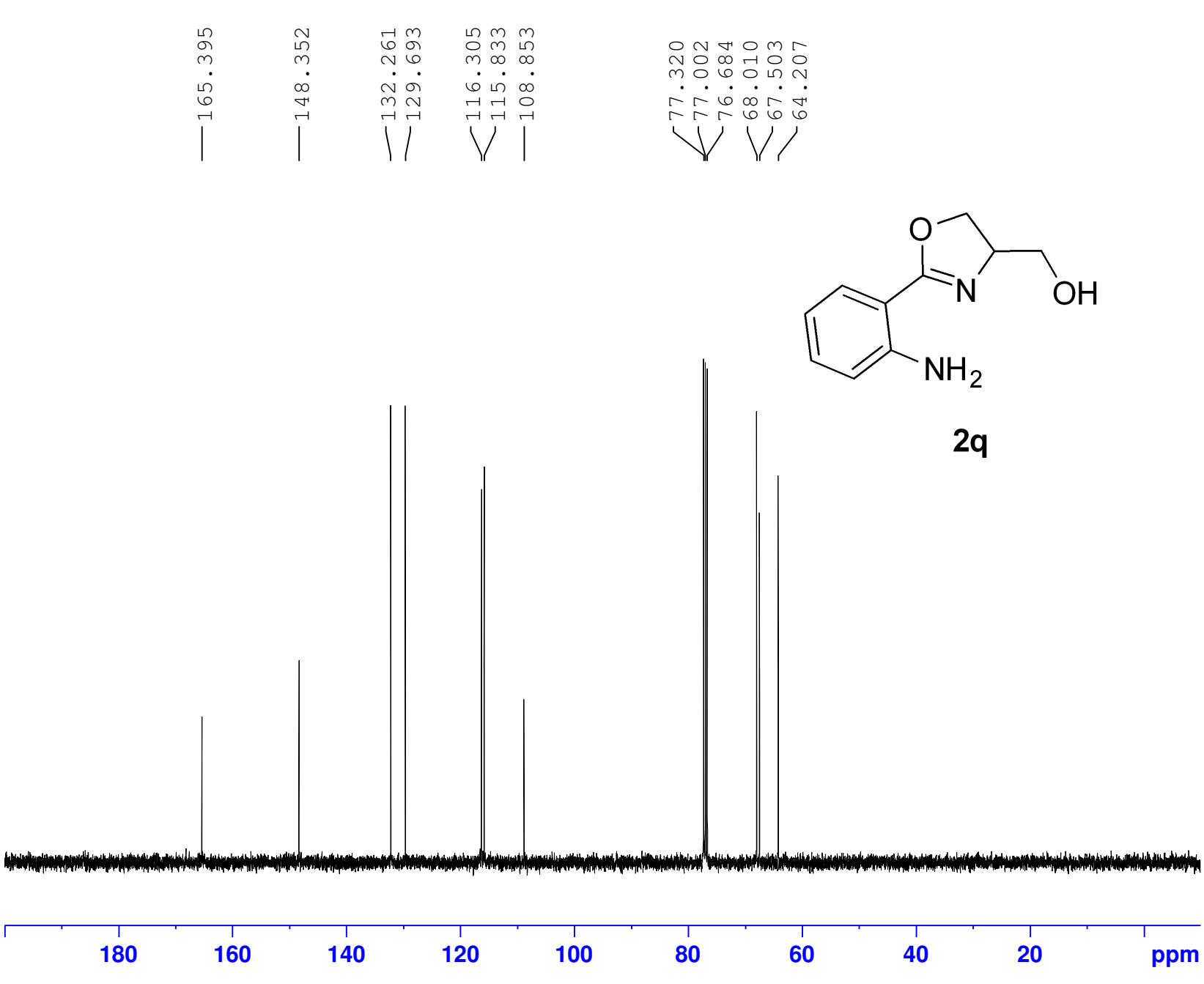




2q




```
Current Data Parameters
NAME                  YW-1742A
EXPNO                        4
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160420
Time                     20.02
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           5
DS                           0
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894465 sec
RG                       45.67
DW                     62.400 usec
DE                      6.50 usec
TE                      297.3 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1              400.1324710 MHz
NUC1                        1H
P1                       14.50 usec
PLW1              11.99499989 W

F2 - Processing parameters
SI                          65536
SF                400.1300093 MHz
WDW                         EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```



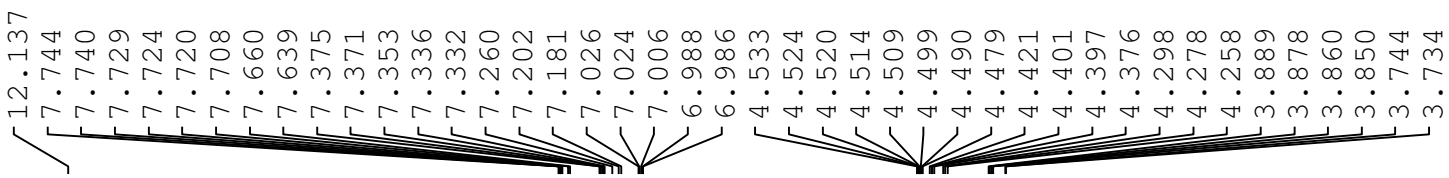
Current Data Parameters
NAME YW-1742A-carbon
EXPNO 4
PROCNO 1

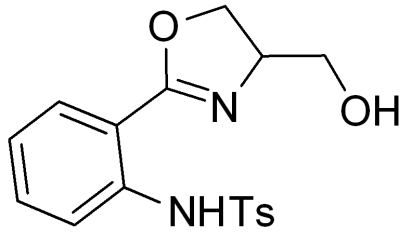
F2 - Acquisition Parameters
Date_ 20160420
Time 20.05
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 32
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

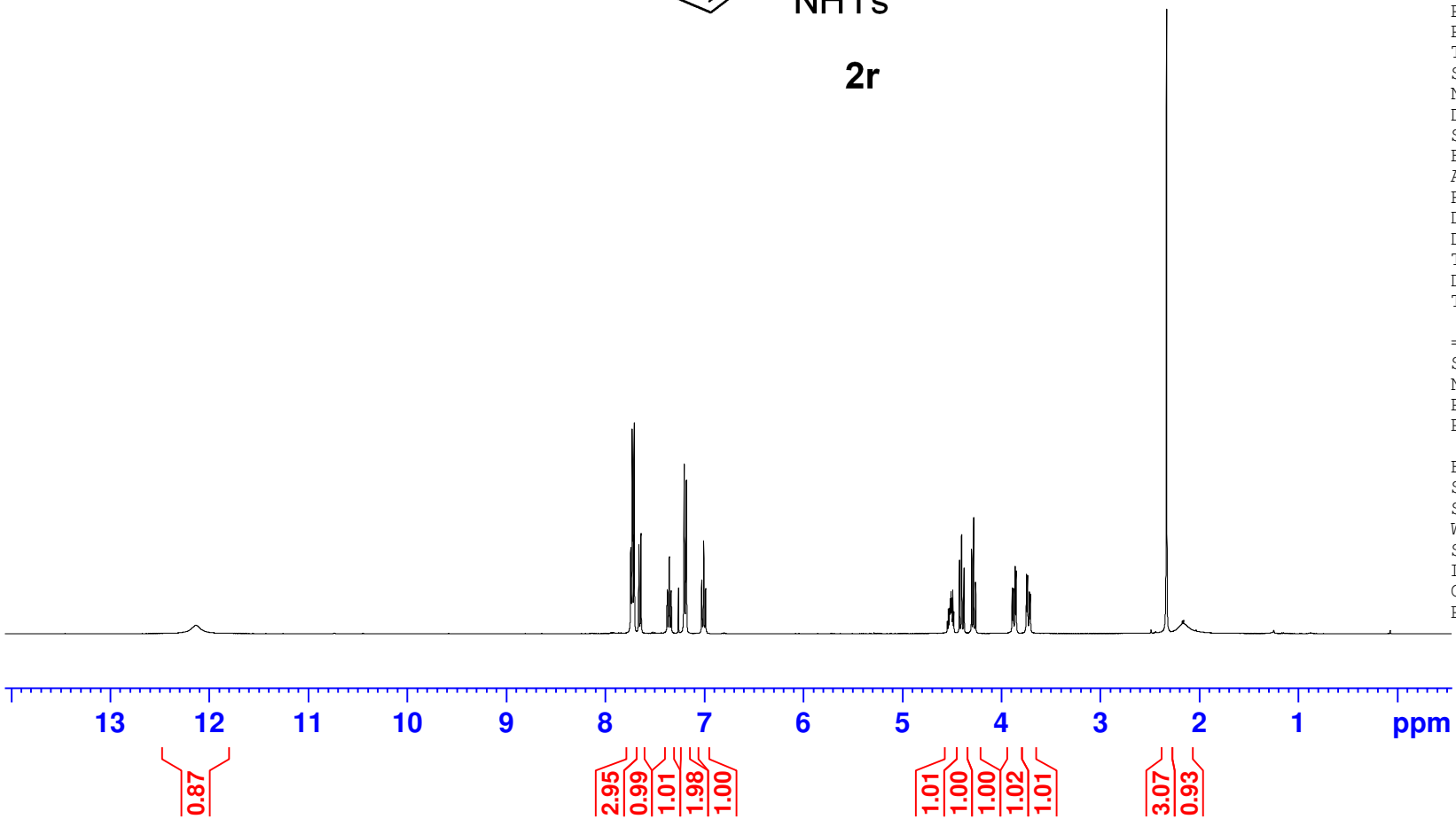
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127810 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

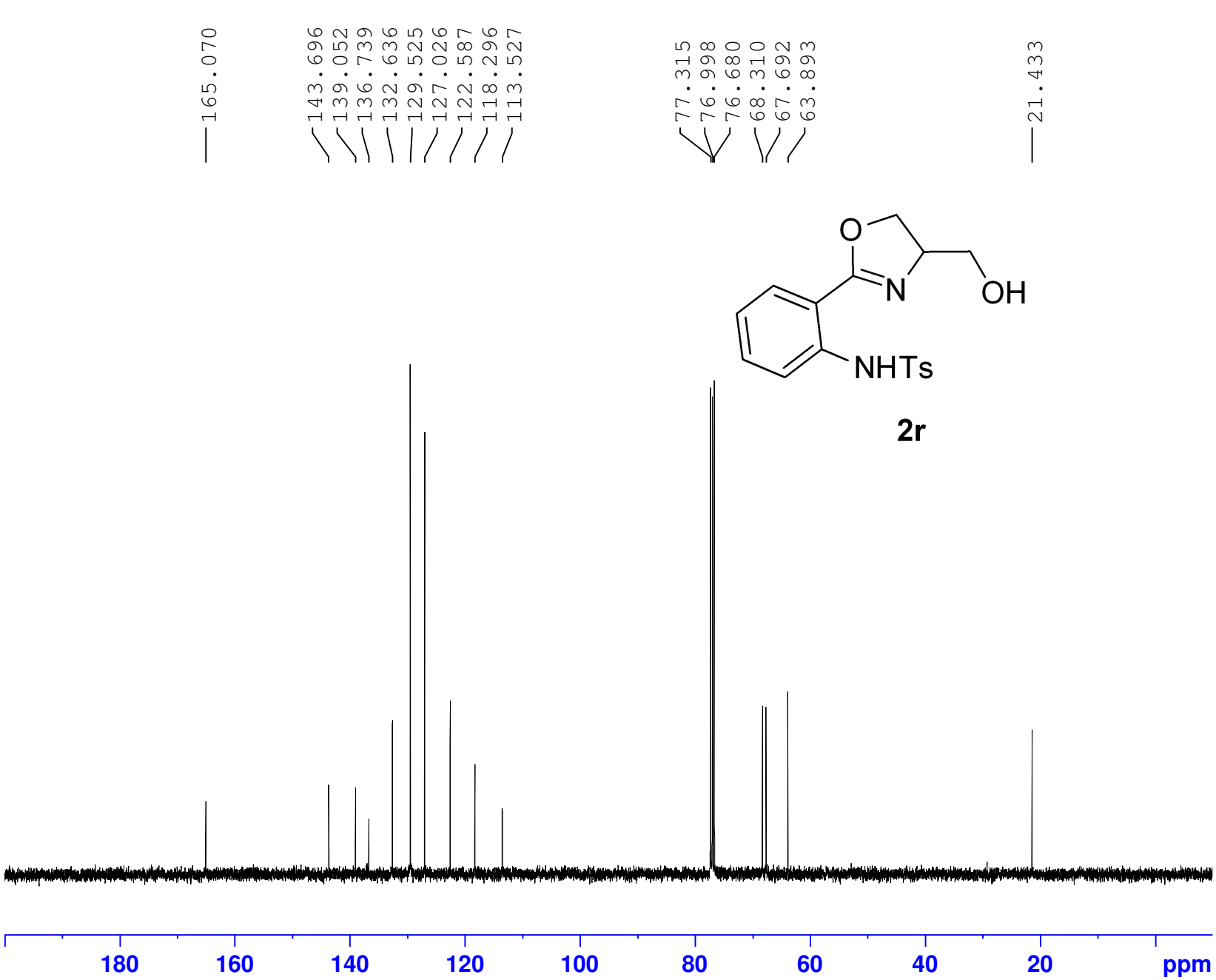




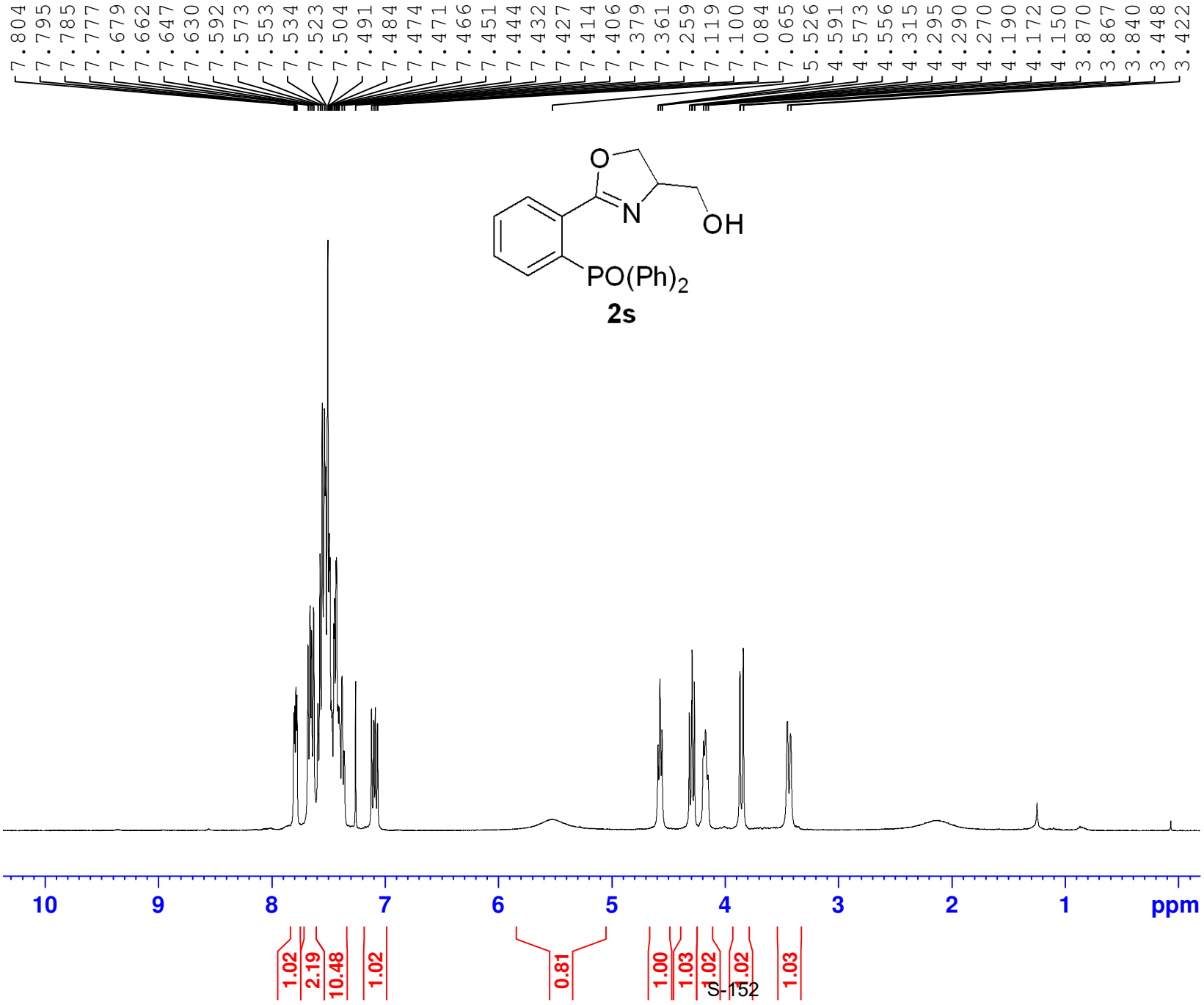
2r



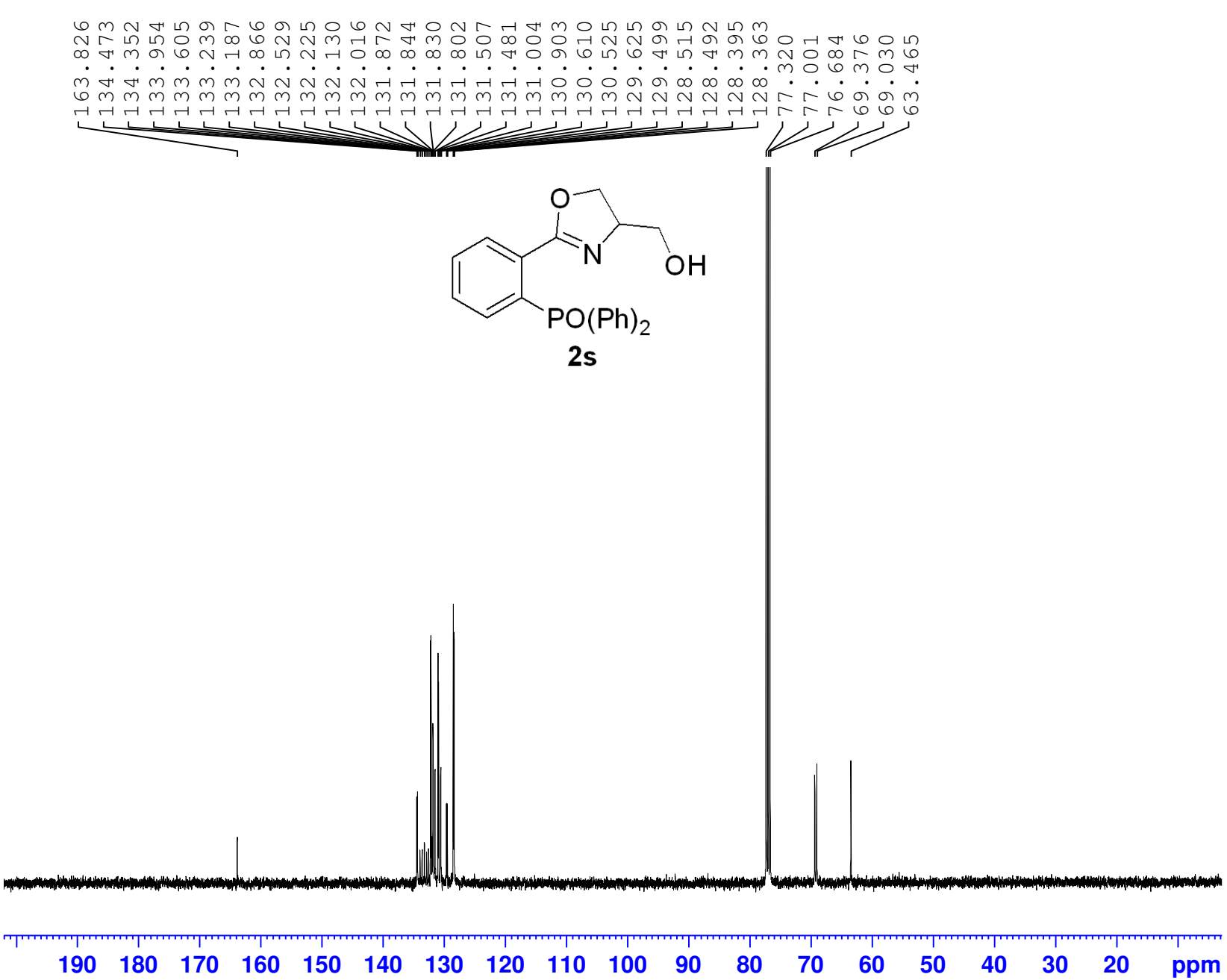

```
Current Data Parameters
NAME                  YW-1742B
EXPNO                        1
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20160422
Time                     20.23
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                           3
DS                           0
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894465 sec
RG                       54.81
DW                     62.400 usec
DE                      6.50 usec
TE                      296.4 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1             400.1324710 MHz
NUC1                       1H
P1                      14.50 usec
PLW1             11.99499989 W

F2 - Processing parameters
SI                           65536
SF                400.1300094 MHz
WDW                             EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```



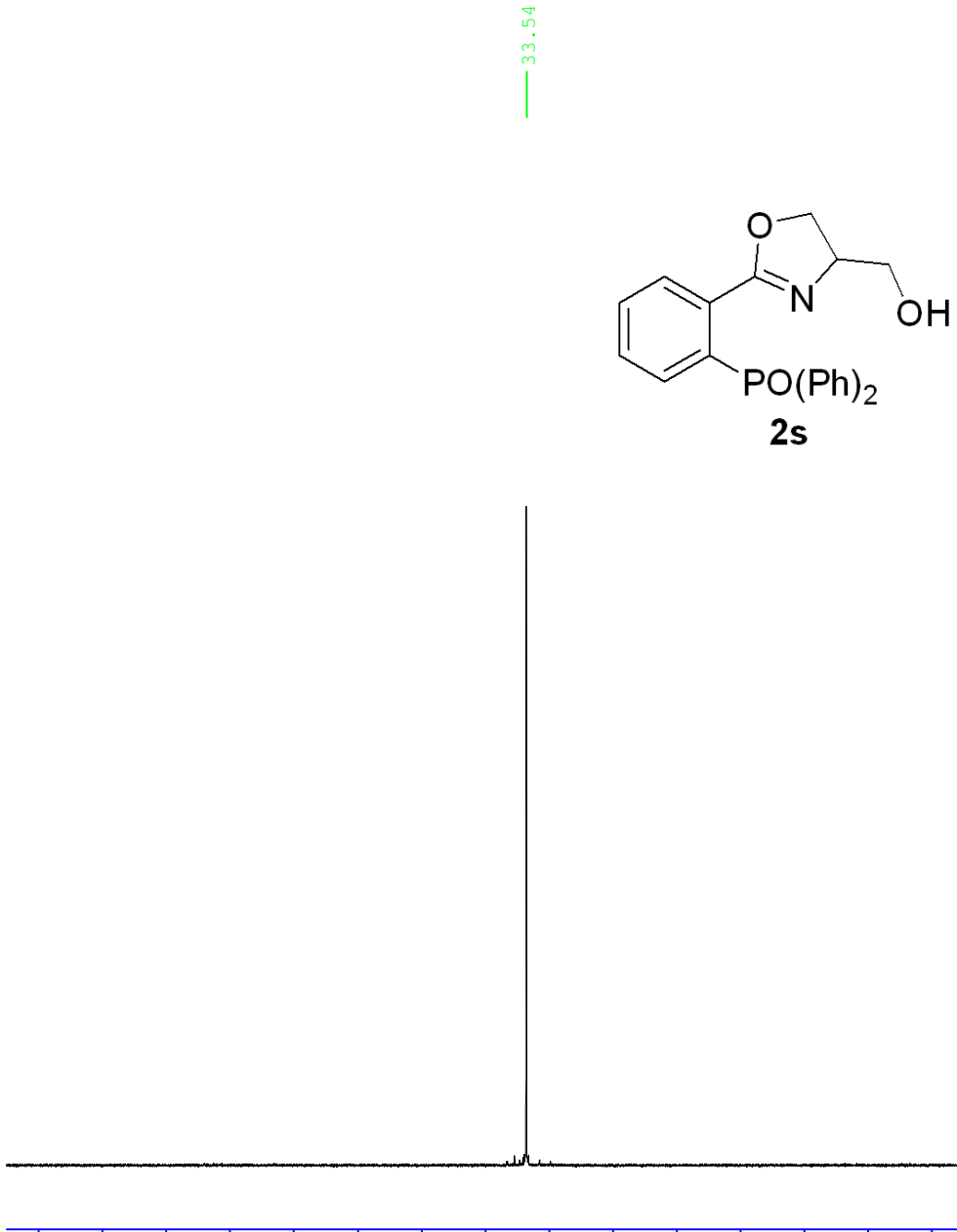

```
Current Data Parameters
NAME      YW-1742B-carbon
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20160422
Time               20.27
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   50
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127765 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```



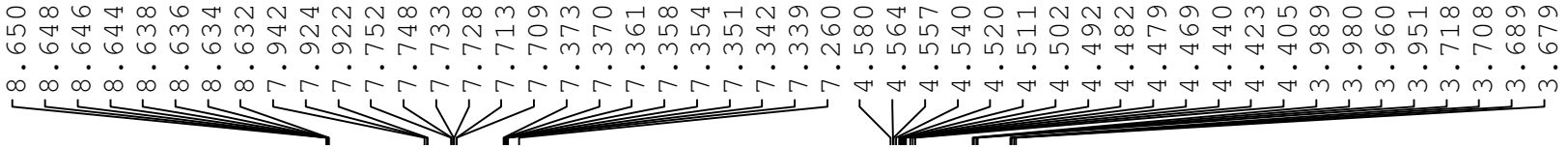

```
Current Data Parameters
NAME        czl-2-8-HNMR
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170825
Time               14.03
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 70.97
DW                62.400 usec
DE                 6.50 usec
TE                295.7 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300107 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

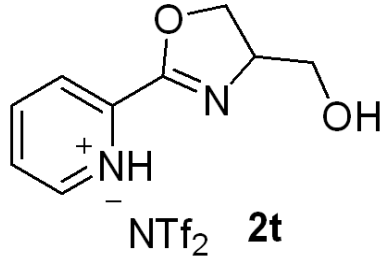



```
Current Data Parameters
NAME        czl-2-8-CNMR
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170825
Time               14.11
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  415
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.2 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127773 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```




```
Current Data Parameters
NAME       czl-2-8-PNMR
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170825
Time              14.33
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                   32
DS                    4
SWH           64102.563 Hz
FIDRES         0.978127 Hz
AQ            0.5111808 sec
RG               196.92
DW                7.800 usec
DE                6.50 usec
TE                296.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        161.9674942 MHz
NUC1                31P
P1                14.70 usec
PLW1        11.99499989 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

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





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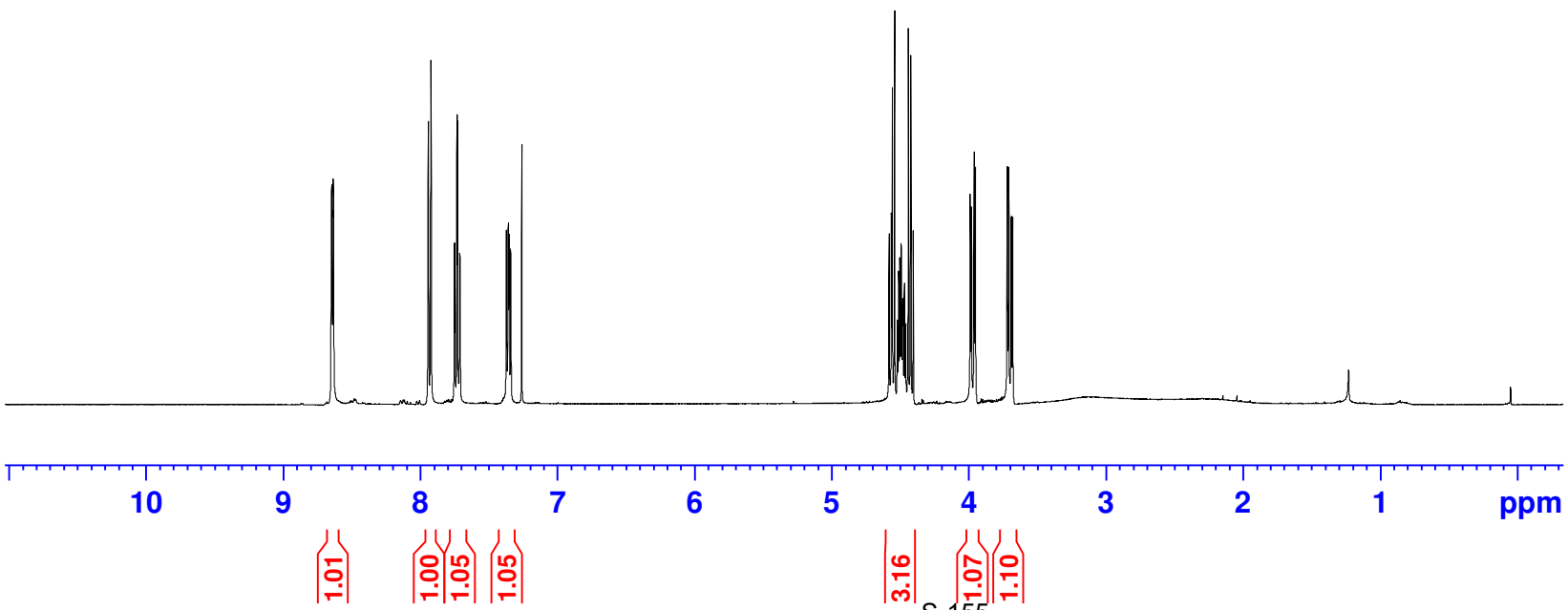
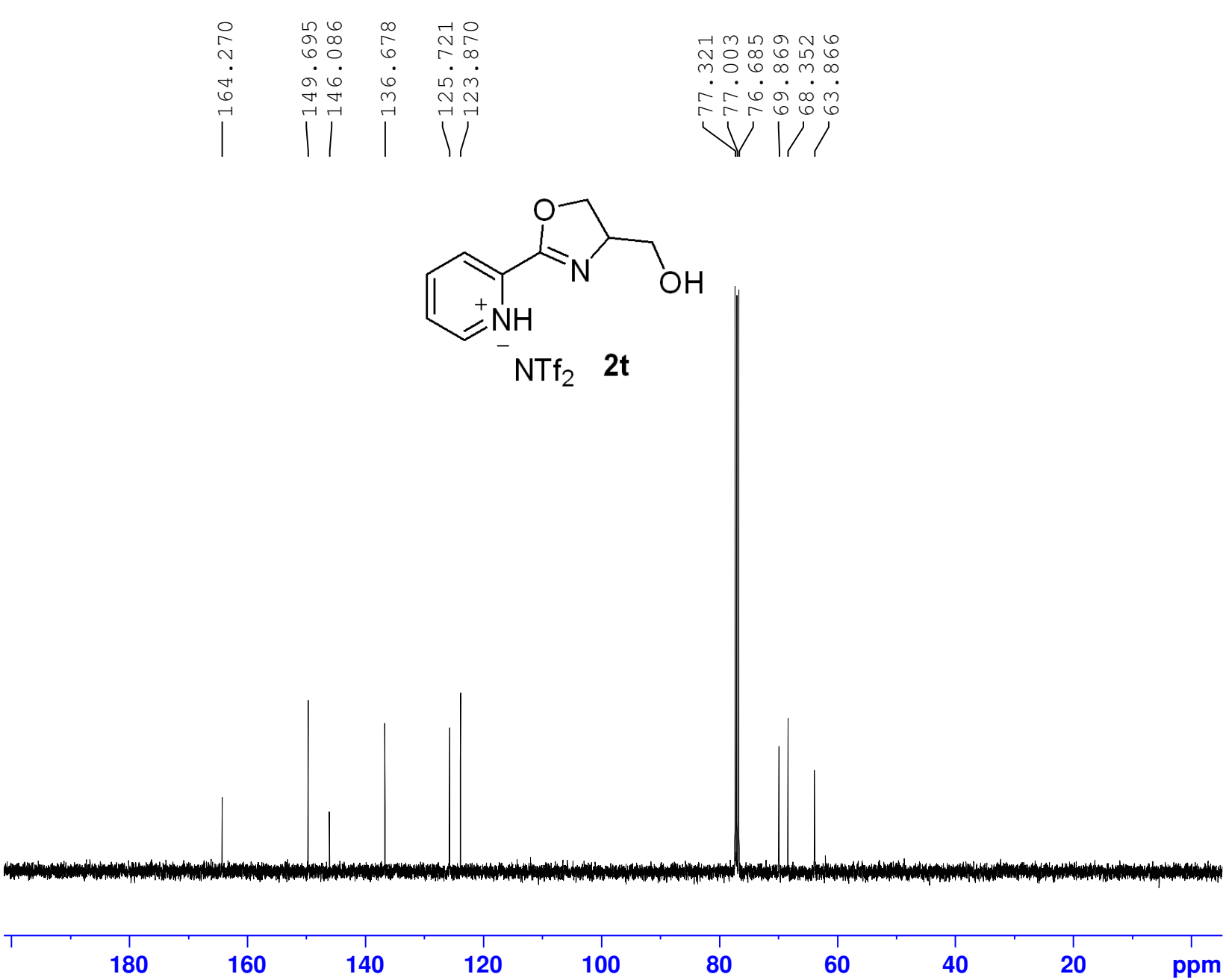
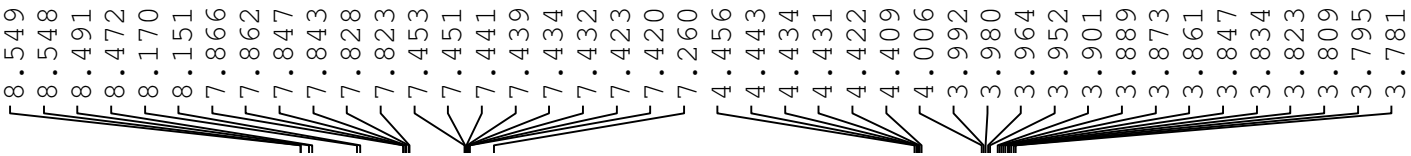
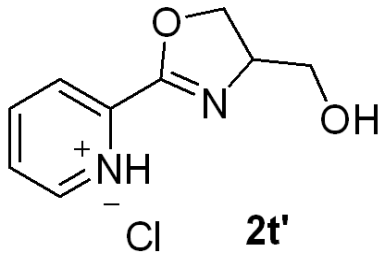



```
Current Data Parameters
NAME      czl-2-7-second
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170823
Time               16.41
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 88.84
DW                62.400 usec
DE                 6.50 usec
TE                296.2 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF          400.1300102 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

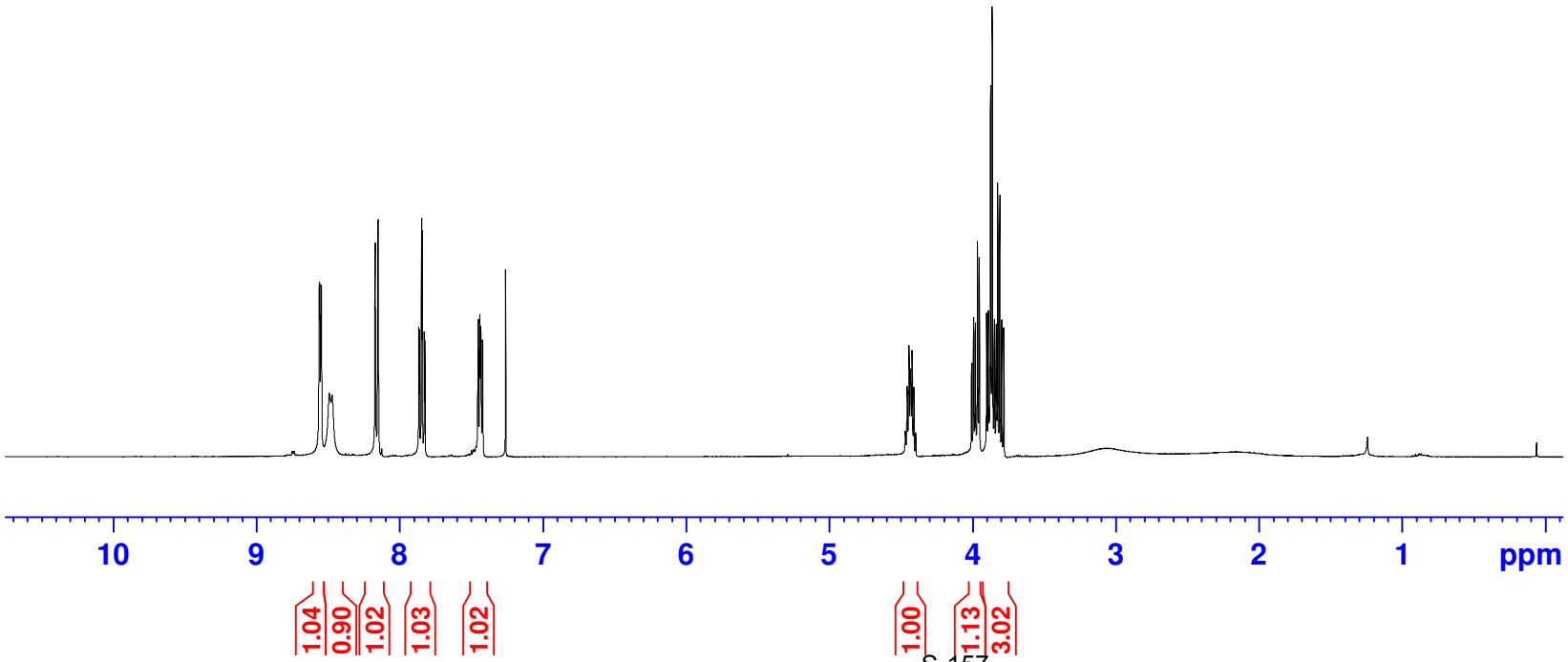



```
Current Data Parameters
NAME      czl-2-7-second
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170823
Time               16.44
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   62
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.7 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127751 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

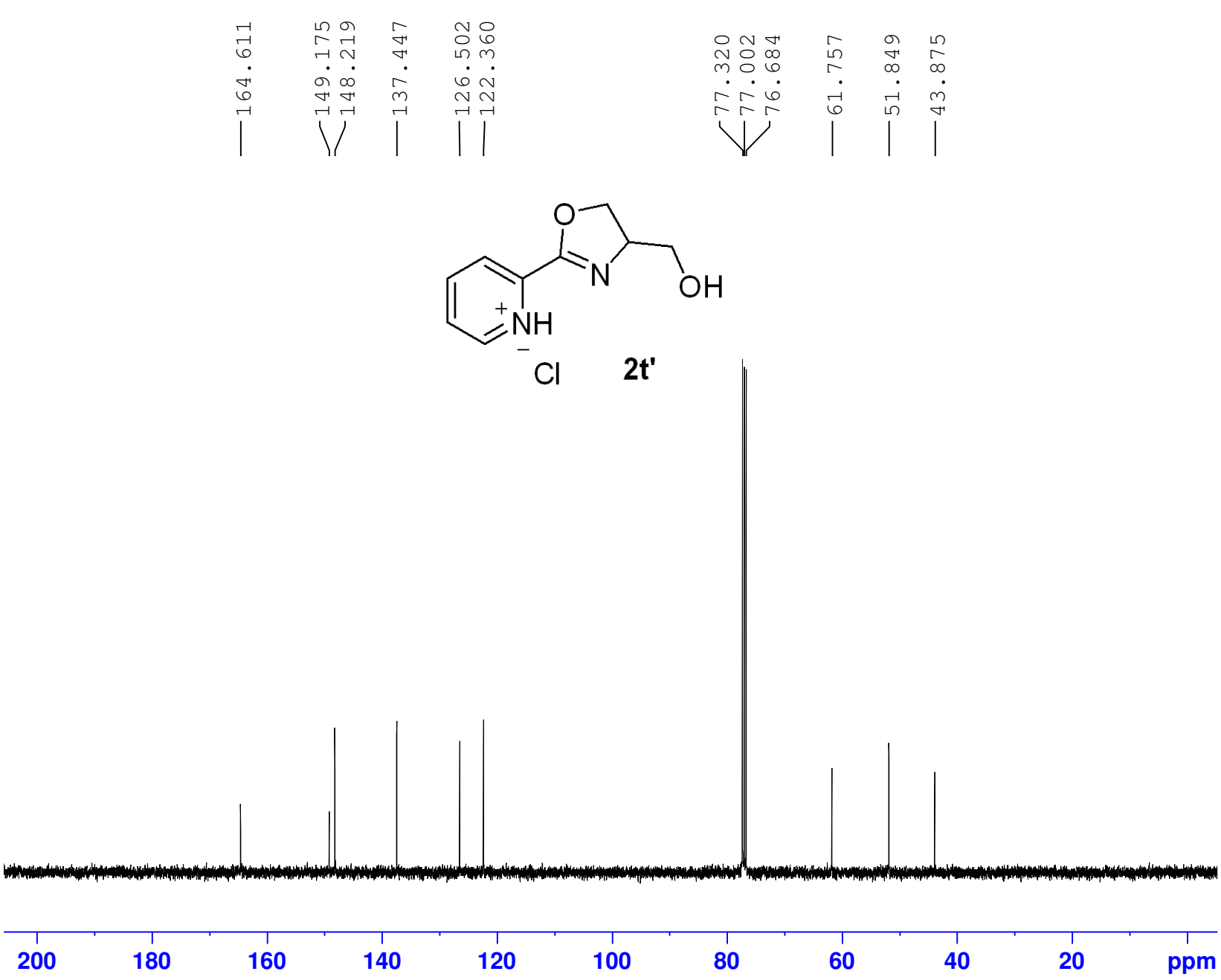




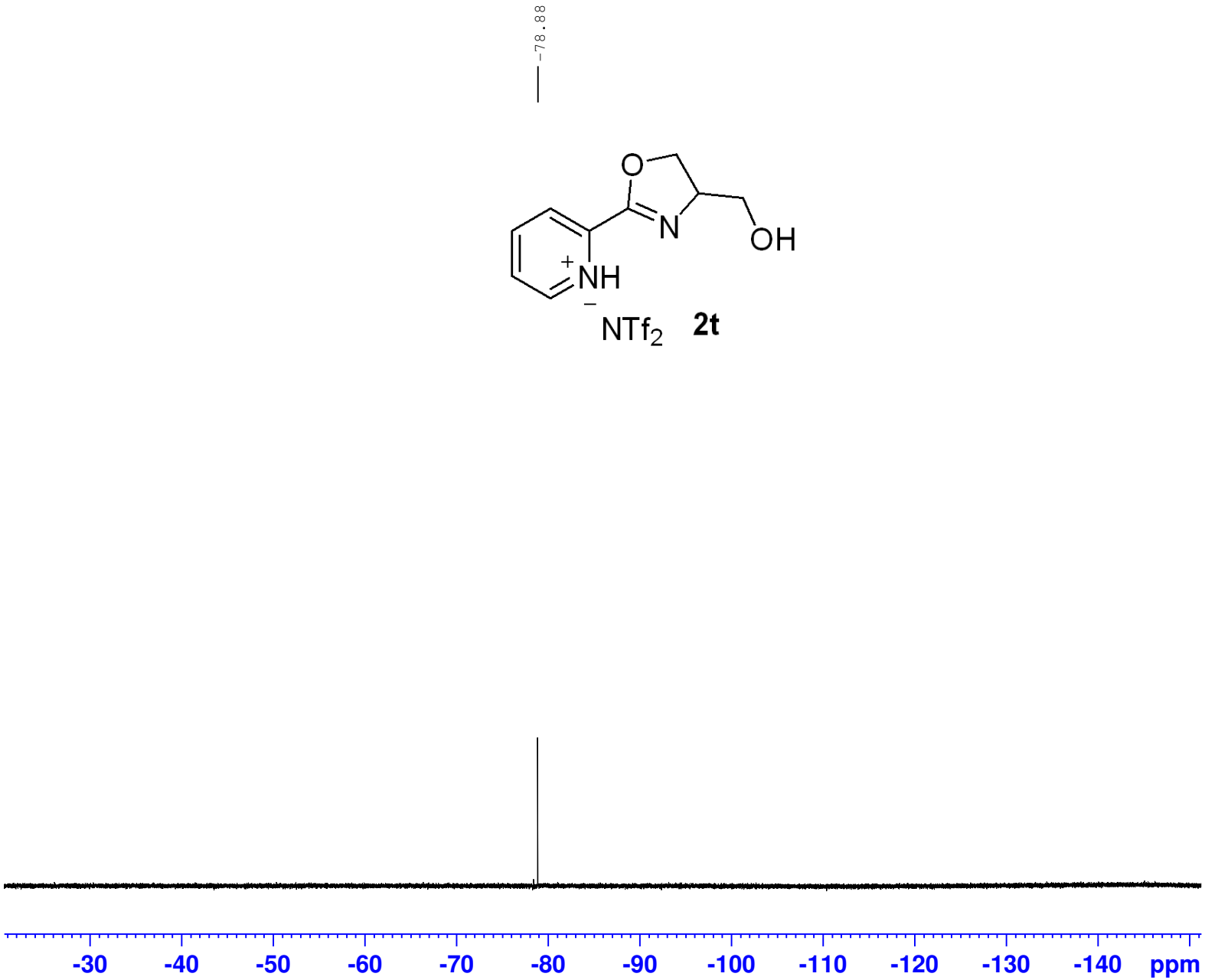
2t'



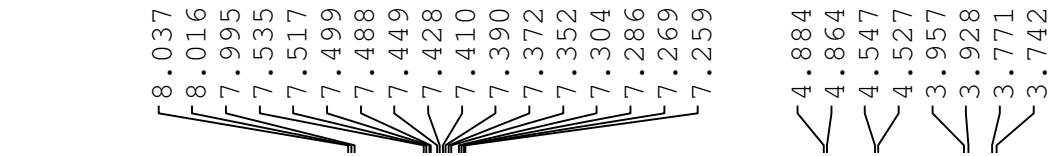

```
Current Data Parameters
NAME      czl-2-4-second
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170823
Time               16.35
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 103.52
DW                 62.400 usec
DE                  6.50 usec
TE                 296.3 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300102 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

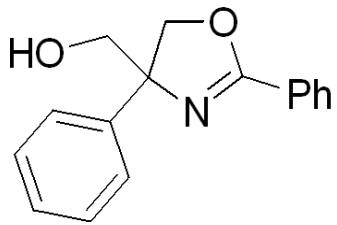



```
Current Data Parameters
NAME      czl-2-4-second
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170823
Time               16.54
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   87
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                32768
SF           100.6127737 MHz
WDW                  EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

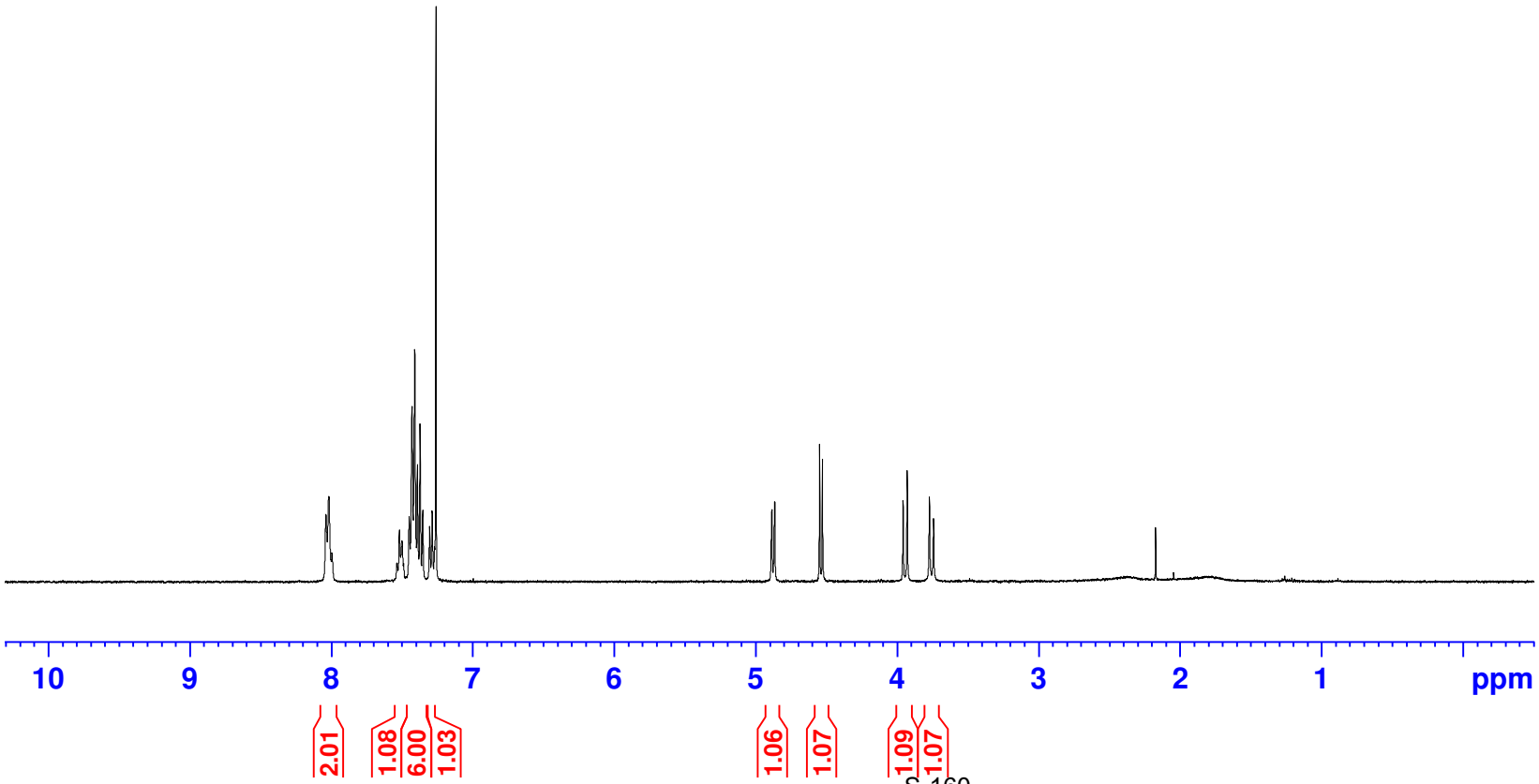



```
Current Data Parameters
NAME      czl-2-7-second
EXPNO                  3
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170823
Time               16.47
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG           zgflqn
TD                131072
SOLVENT             CDCl3
NS                     16
DS                      4
SWH            89285.711 Hz
FIDRES          0.681196 Hz
AQ             0.7340032 sec
RG                196.92
DW                 5.600 usec
DE                 6.50 usec
TE                296.3 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         376.4607164 MHz
NUC1                19F
P1                 14.70 usec
PLW1         15.99600029 W

F2 - Processing parameters
SI                 65536
SF           376.4983660 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

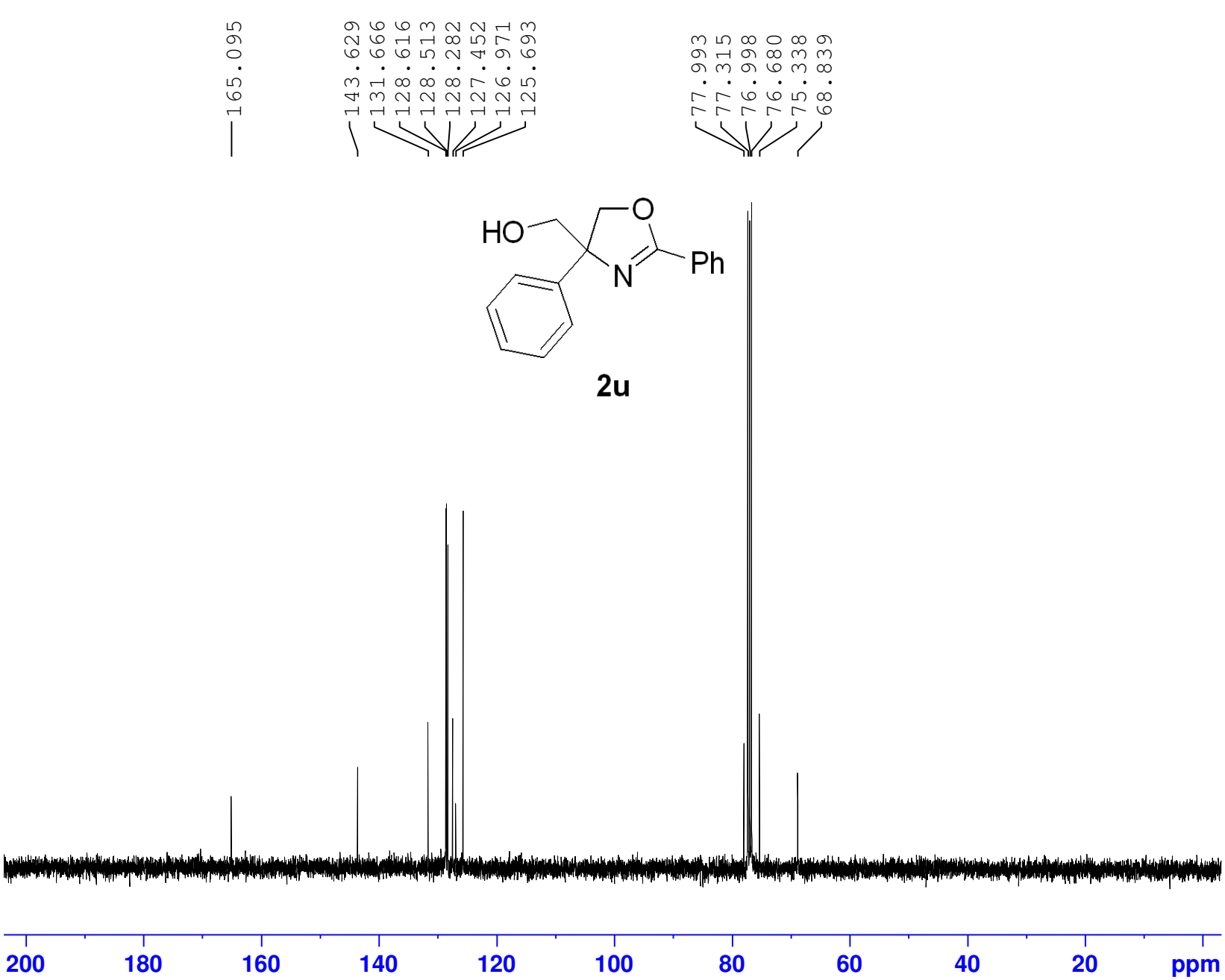




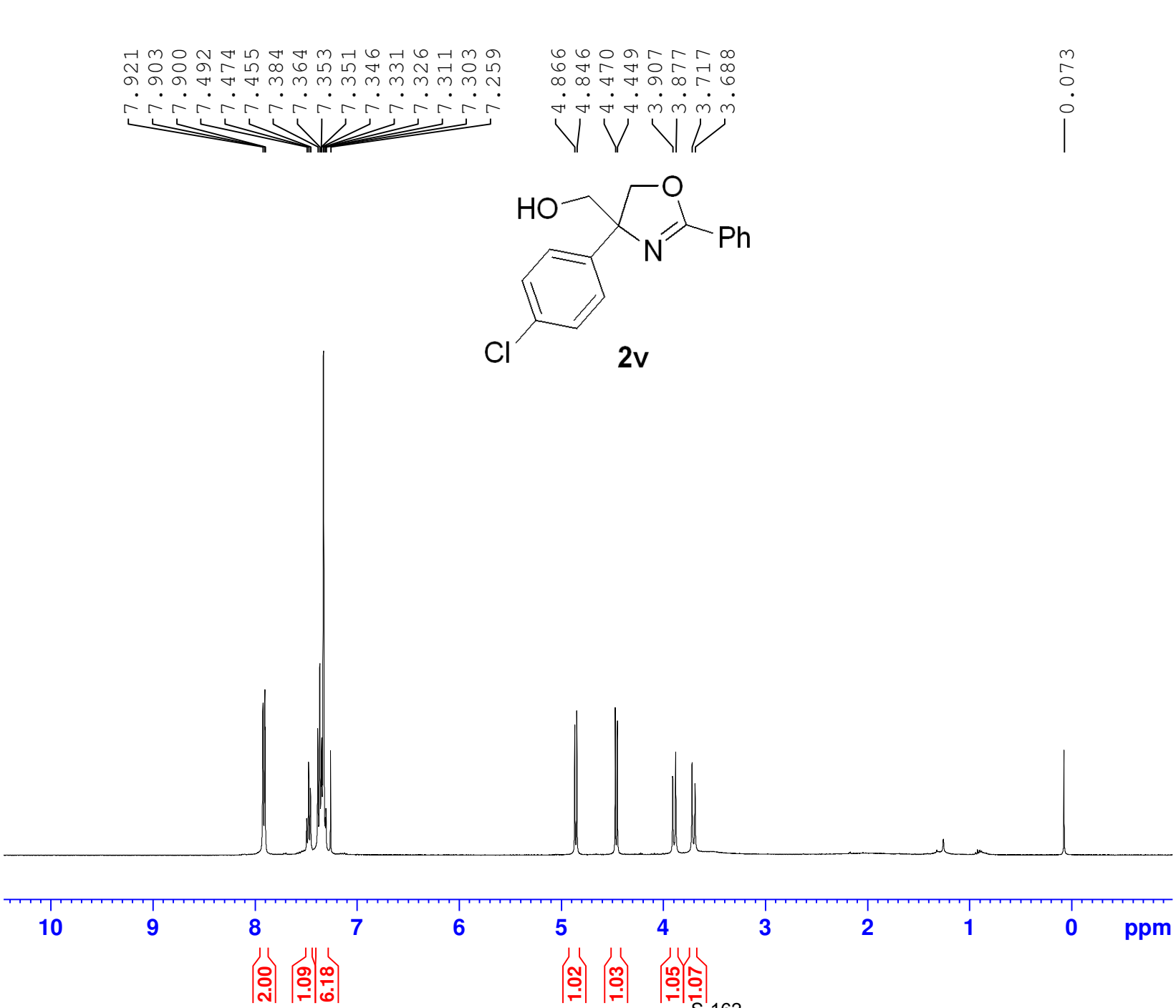
2u




```
Current Data Parameters
NAME       czl-1-188-A H
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              16.17
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                196.92
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300104 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```




```
Current Data Parameters
NAME       czl-1-188A- C
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170805
Time               12.36
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   18
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                298.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127736 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

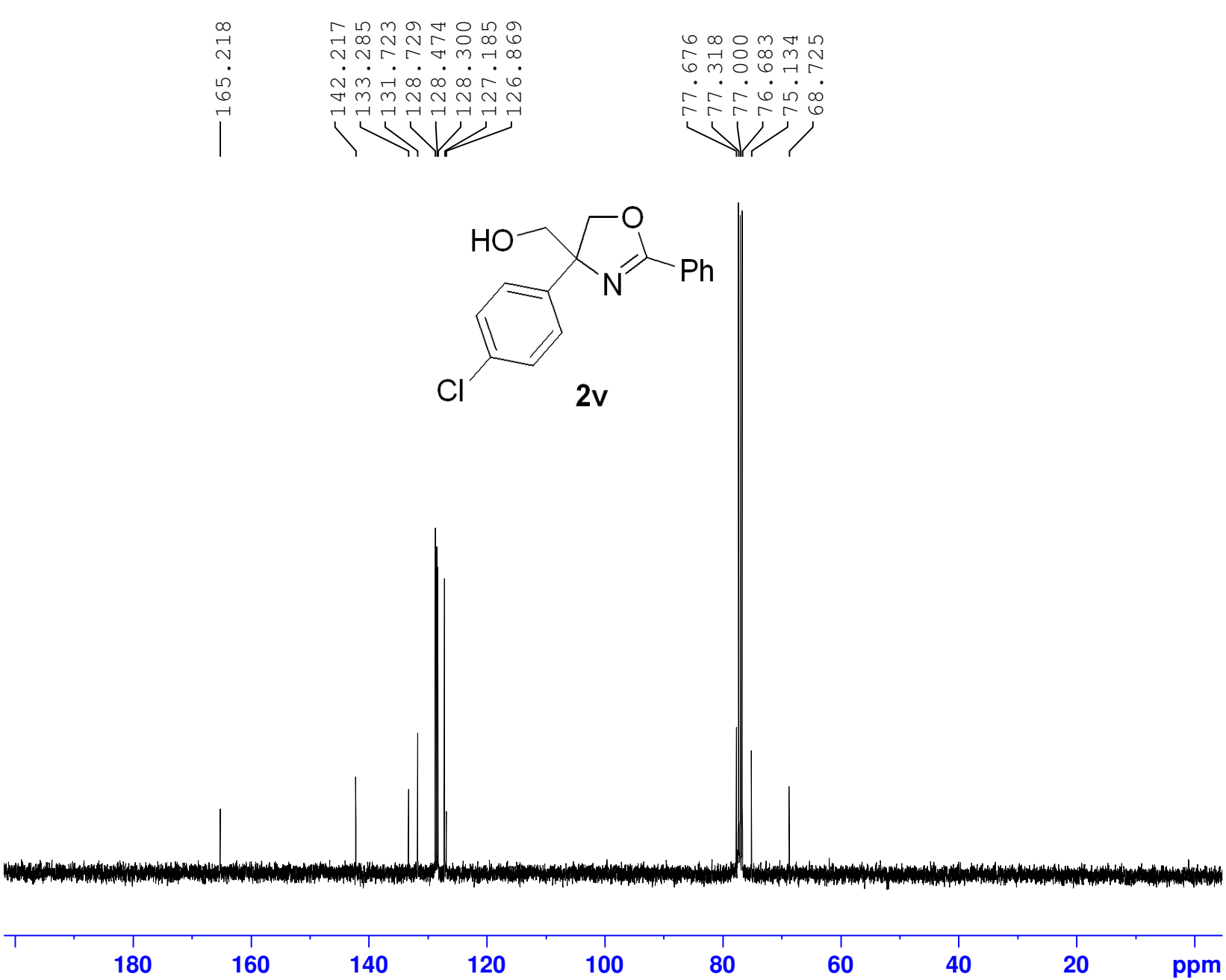


Current Data Parameters
NAME czl-1-188-B H
EXPNO 1
PROCNO 1

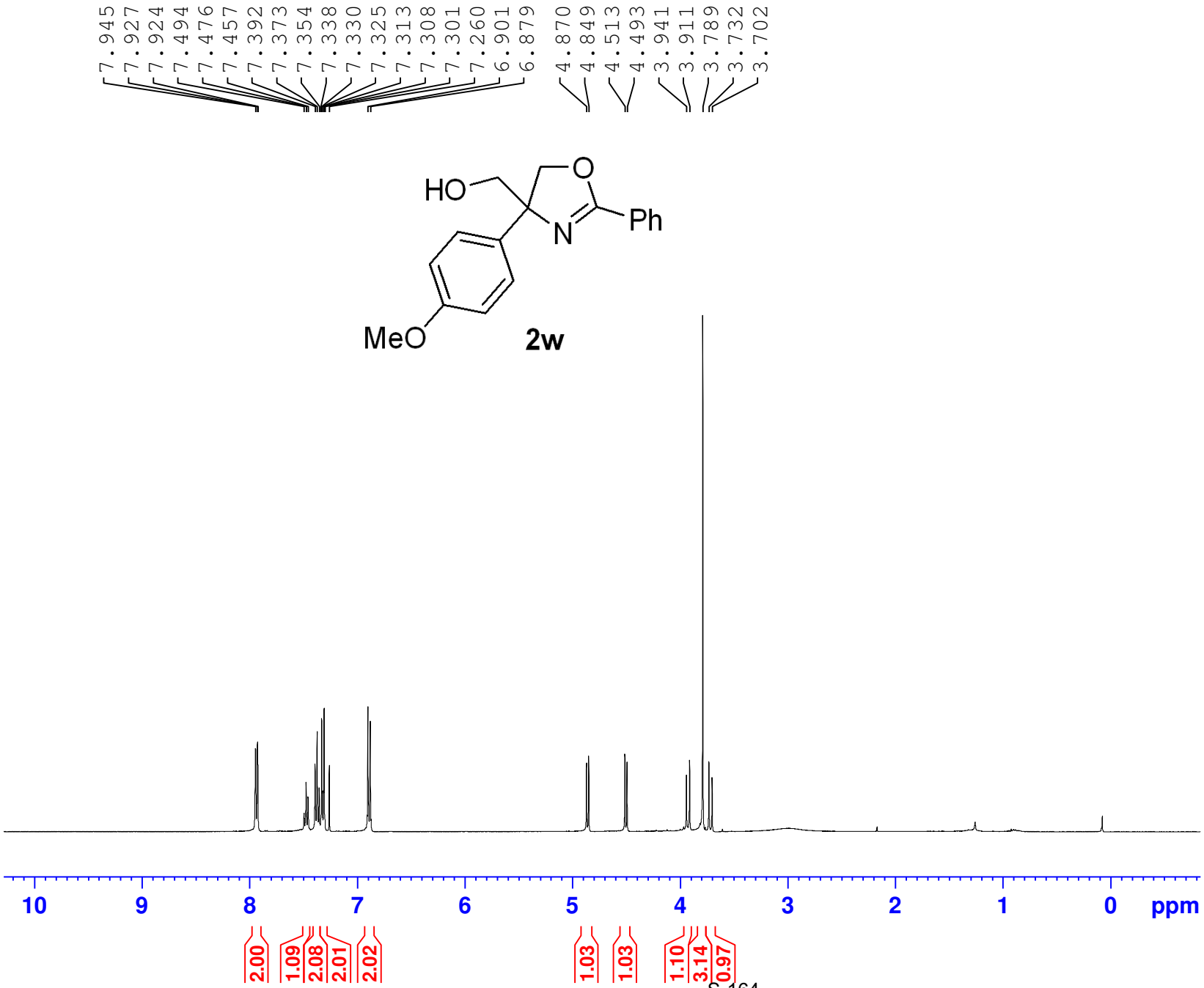
F2 - Acquisition Parameters
Date_ 20170805
Time 16.21
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 4
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 187.77
DW 62.400 usec
DE 6.50 usec
TE 296.1 K
D1 1.00000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W

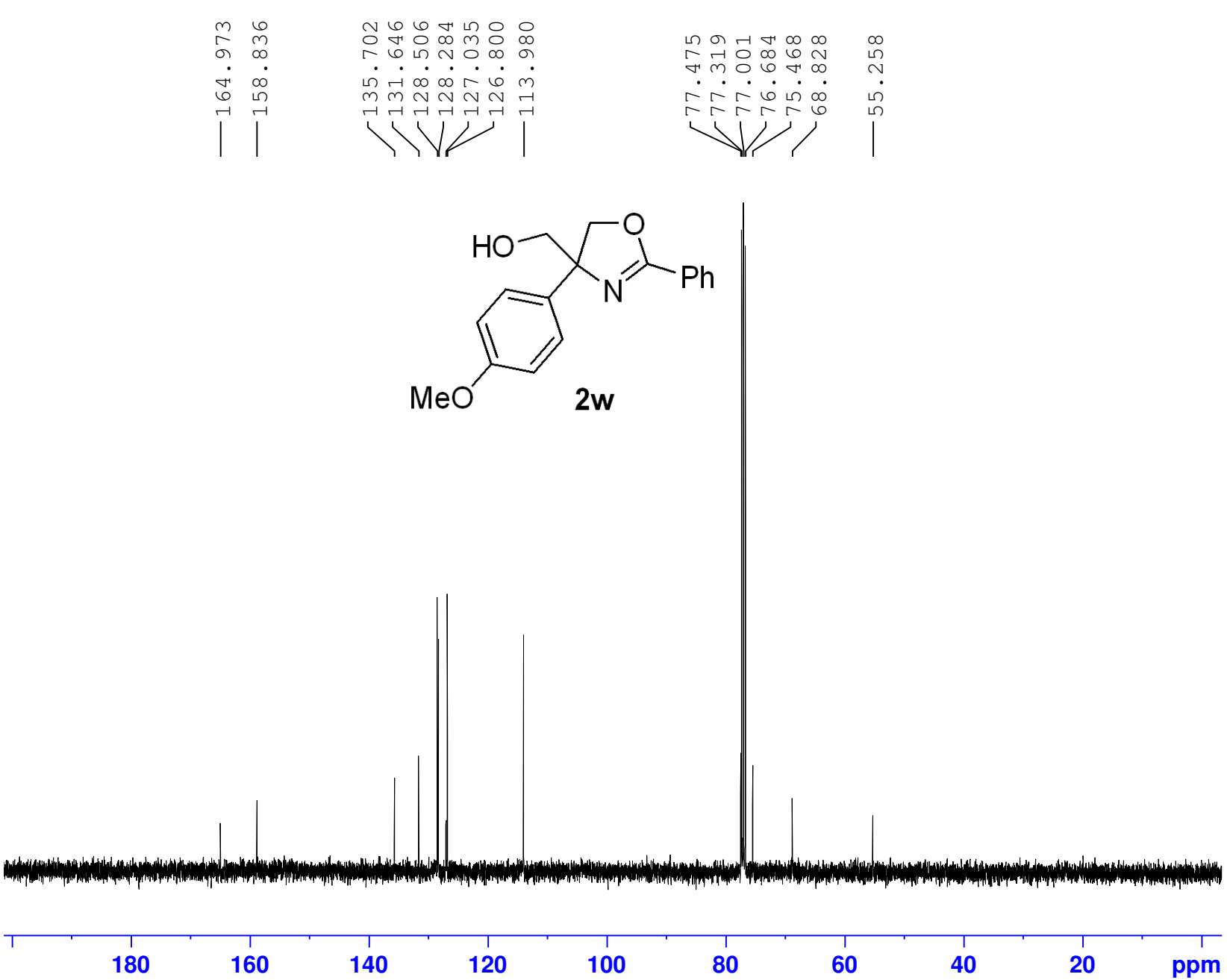
F2 - Processing parameters
SI 65536
SF 400.1300107 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



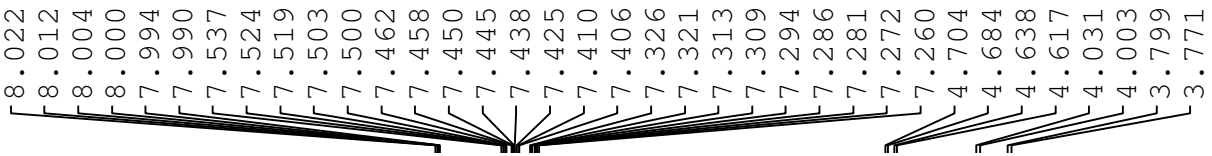

```
Current Data Parameters
NAME       czl-1-188B- C
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170805
Time               10.44
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   62
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127732 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

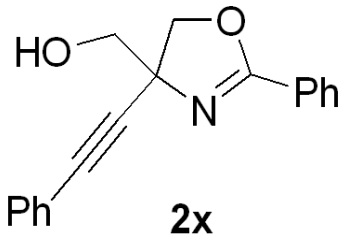



```
Current Data Parameters
NAME       czl-1-188-C H
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              16.24
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                187.77
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300102 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

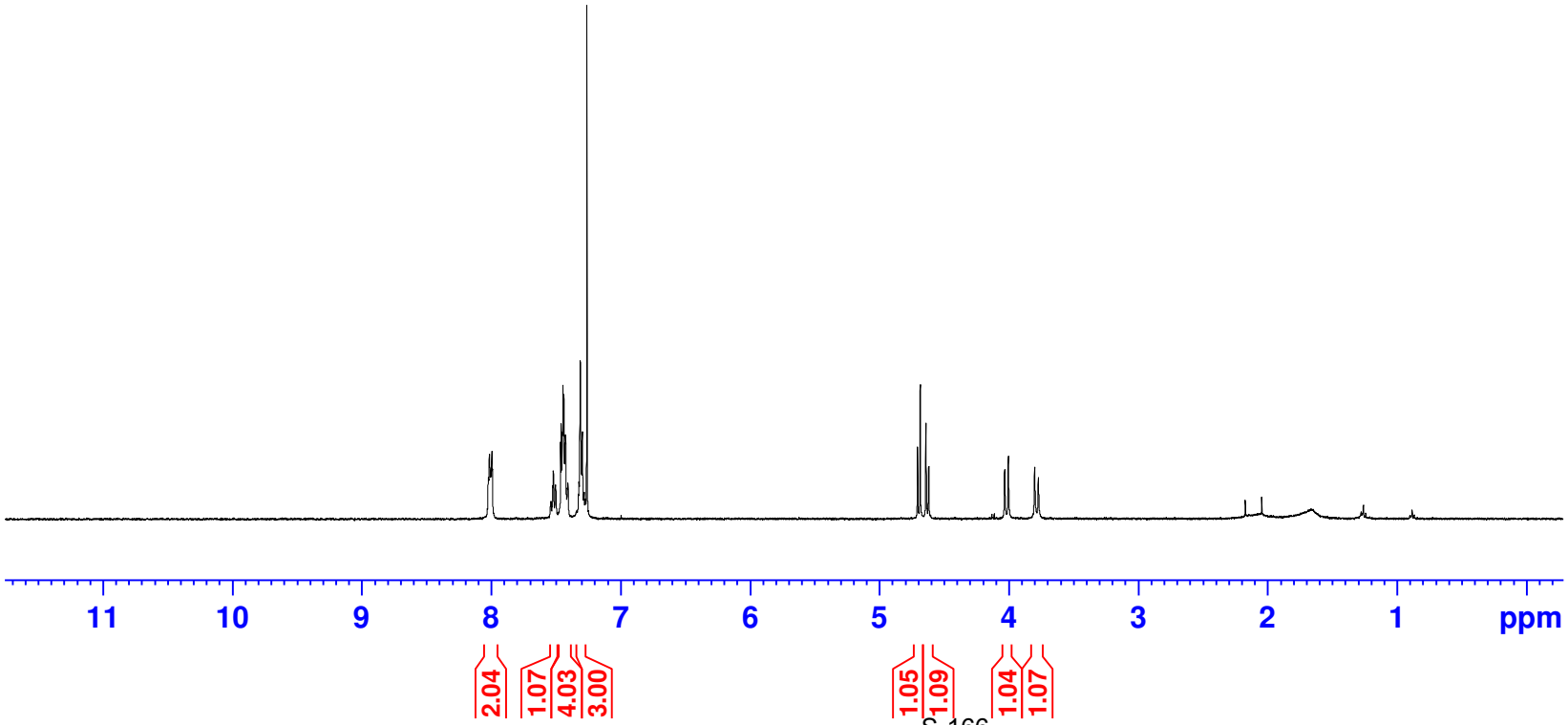



```
Current Data Parameters
NAME       czl-1-188C- C
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170805
Time               10.34
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   51
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127729 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

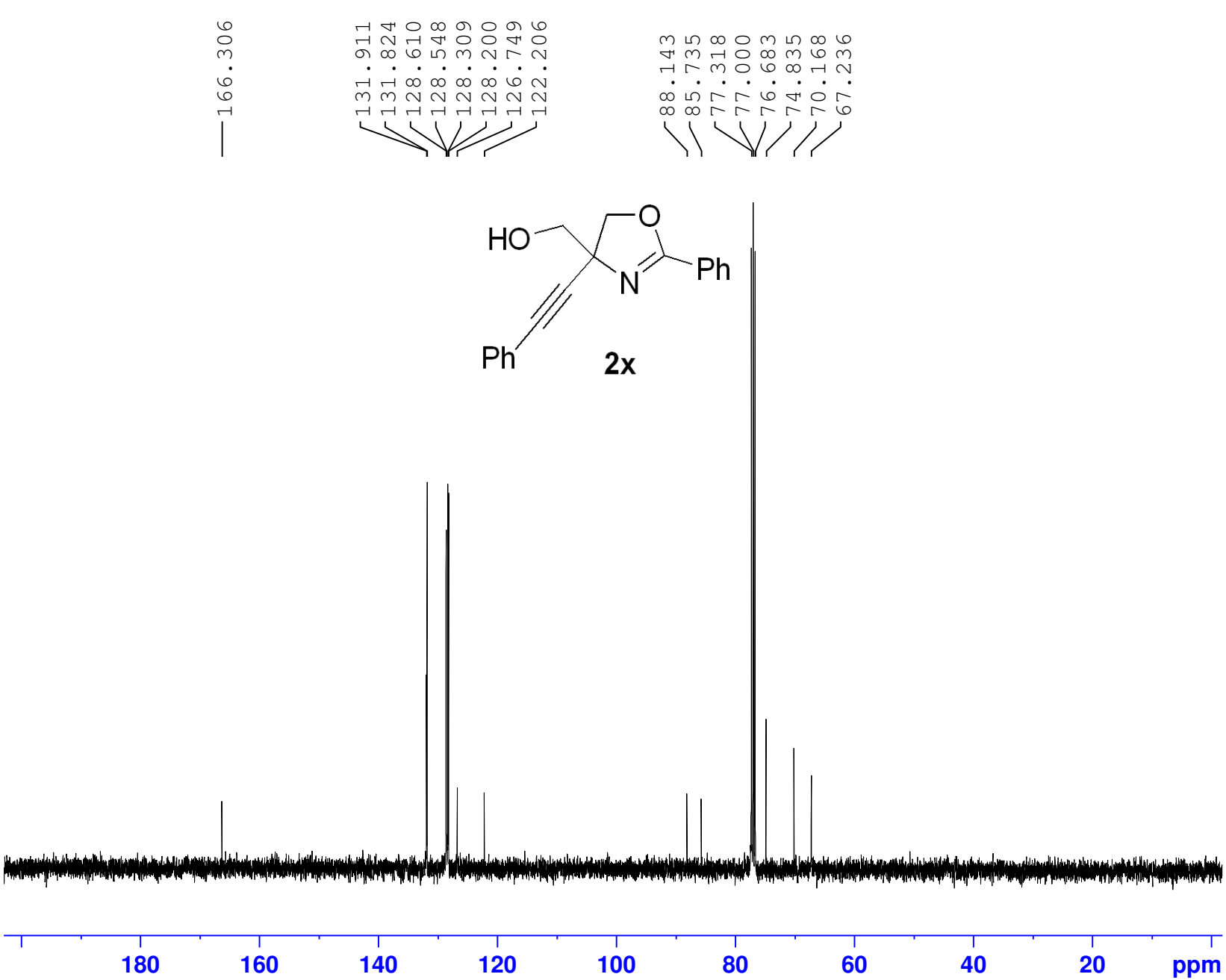




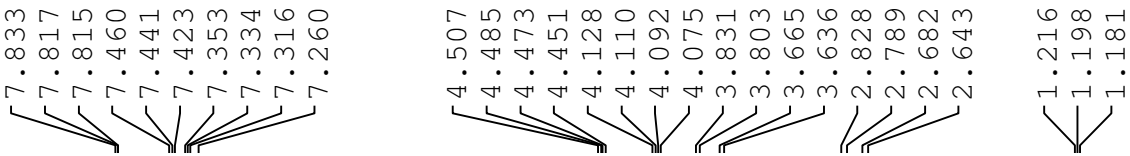
2x

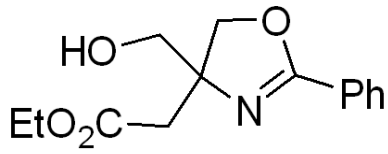



```
Current Data Parameters
NAME       czl-1-188-D H
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              16.27
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                196.92
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300102 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

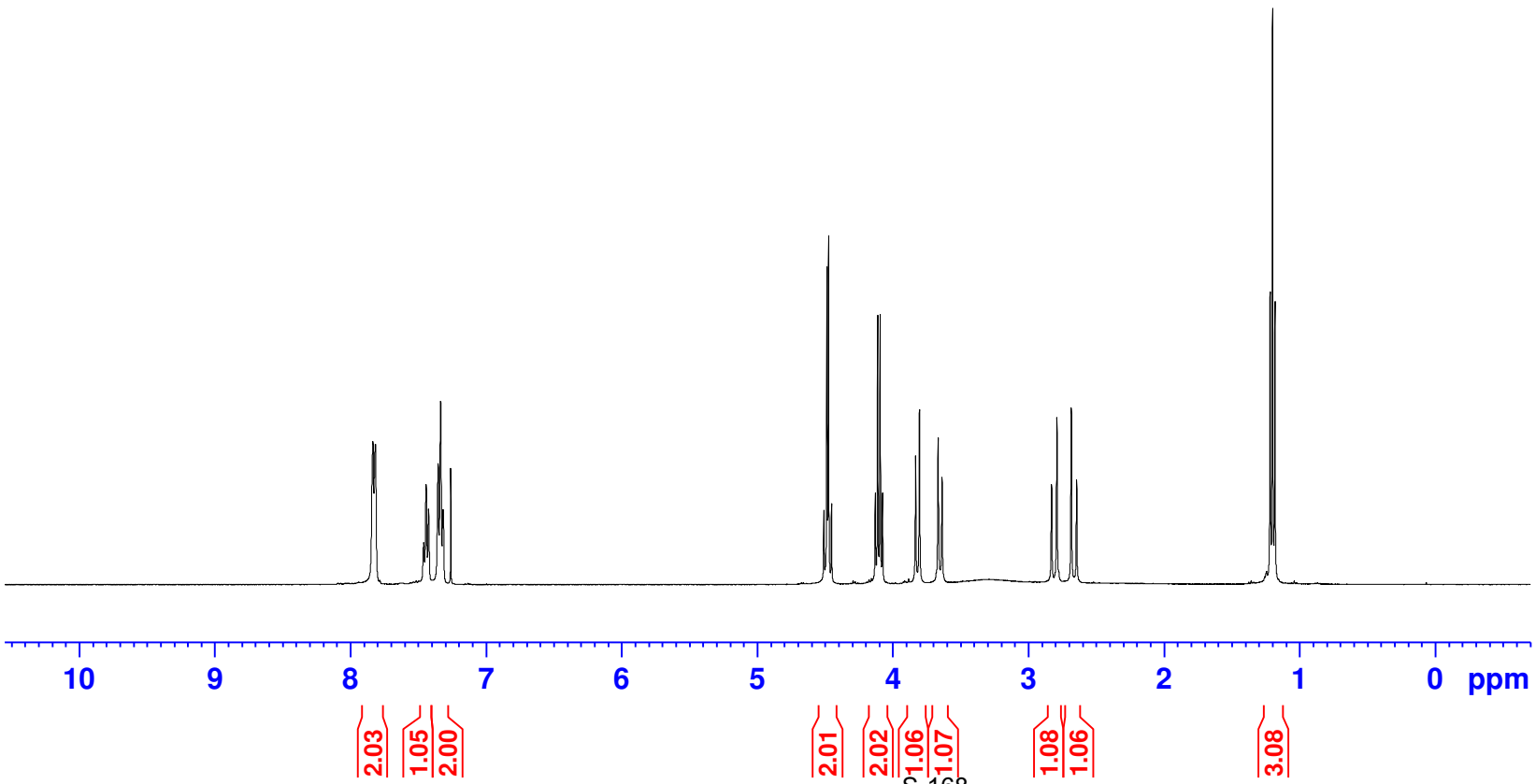



```
Current Data Parameters
NAME        czl-1-188D C
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              10.29
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                   50
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                 32768
SF           100.6127743 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

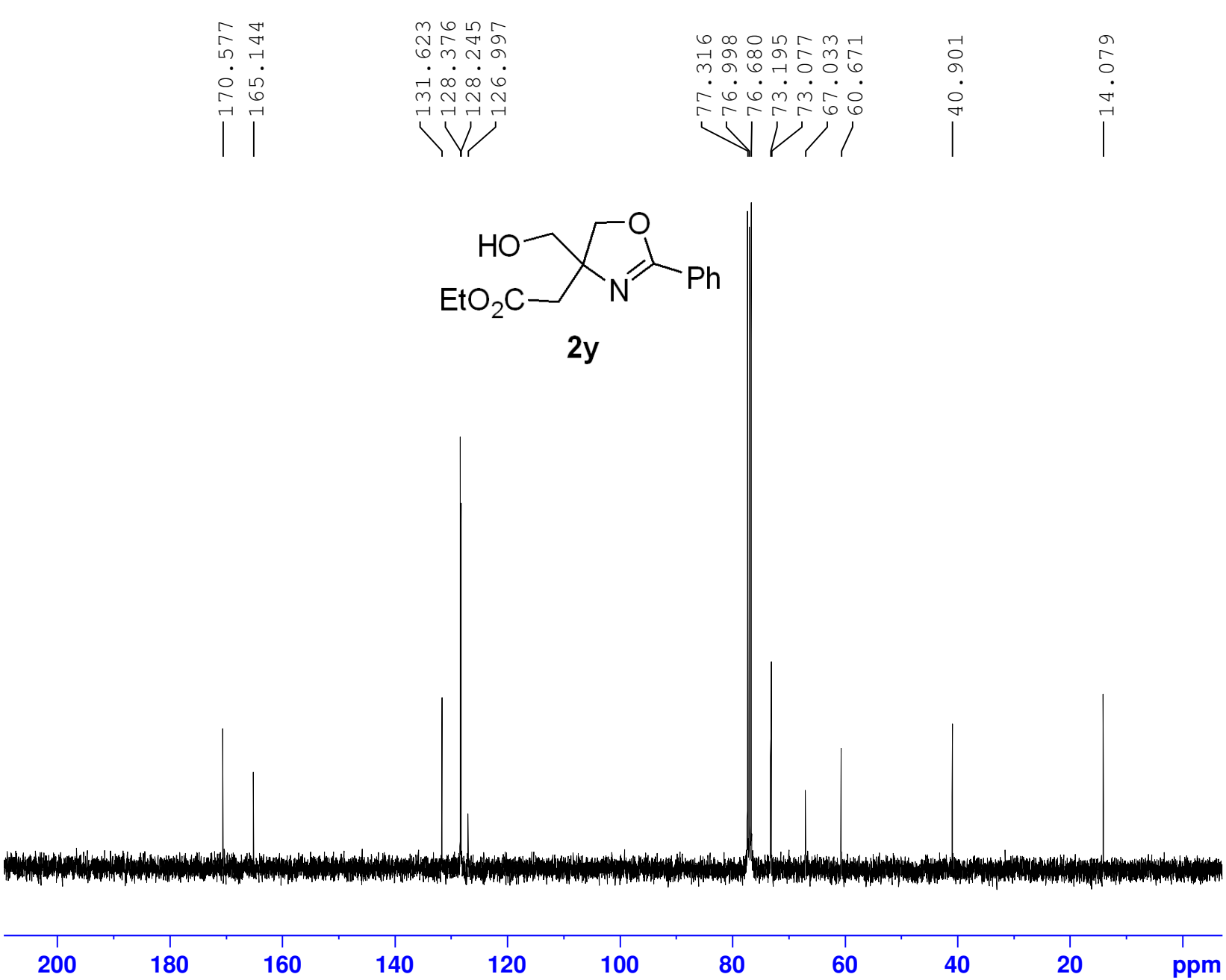




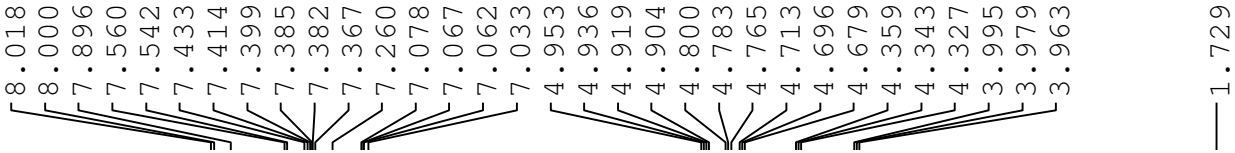
2y

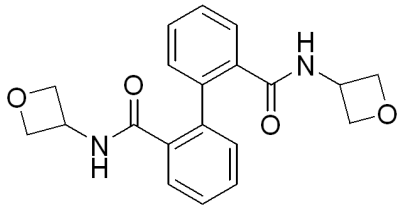



```
Current Data Parameters
NAME       czl-1-188-E H
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              16.31
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                187.77
DW                62.400 usec
DE                 6.50 usec
TE                296.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                 1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                65536
SF           400.1300103 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

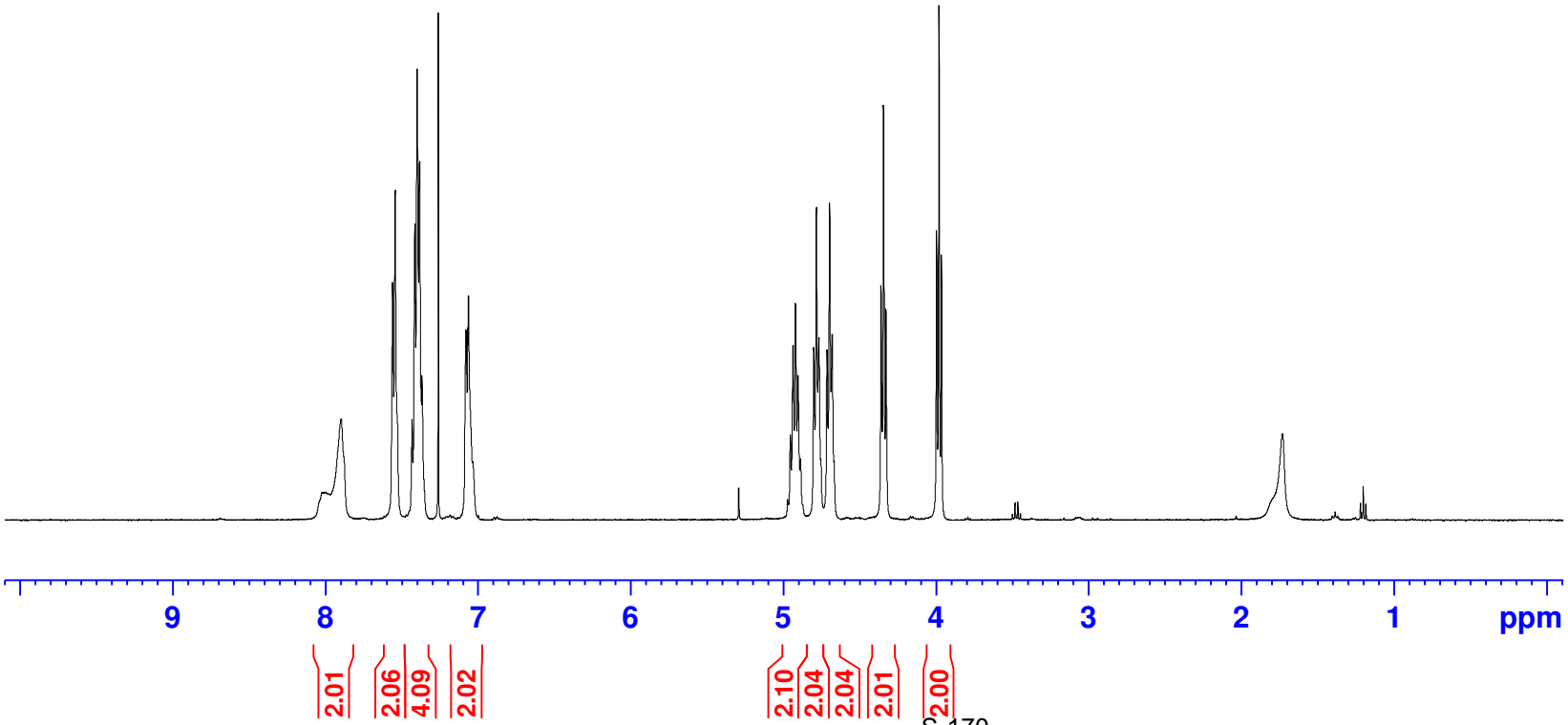



```
Current Data Parameters
NAME       czl-1-188E C
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20170805
Time              10.16
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   60
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                297.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2         waltz16
PCPD2              90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                32768
SF           100.6127735 MHz
WDW                  EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

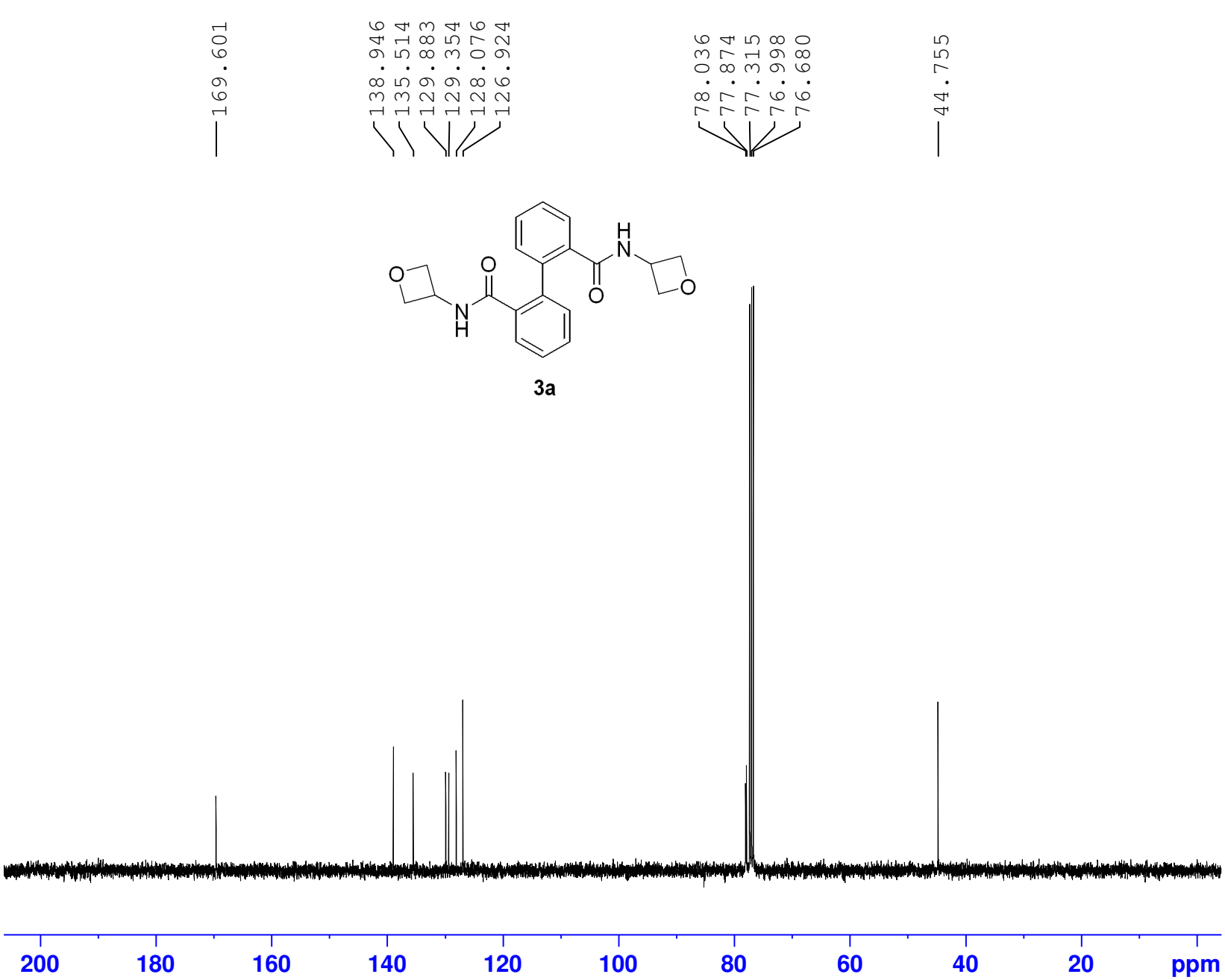




3a




```
Current Data Parameters
NAME          czl-2-5-SM
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20170826
Time               10.11
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                297.2 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300102 MHz
WDW                  EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



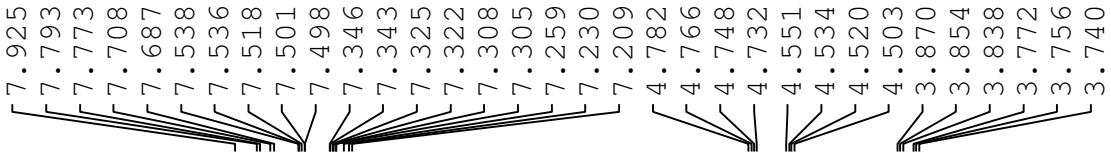
Current Data Parameters
NAME czl-2-5-SM
EXPNO 2
PROCNO 1

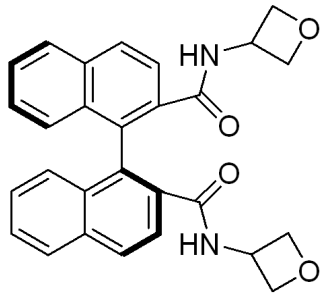
F2 - Acquisition Parameters
Date_ 20170826
Time 10.20
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 107
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.5 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

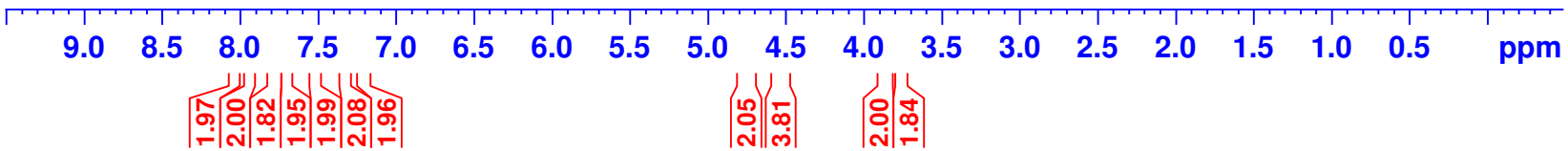
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

F2 - Processing parameters
SI 32768
SF 100.6127737 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

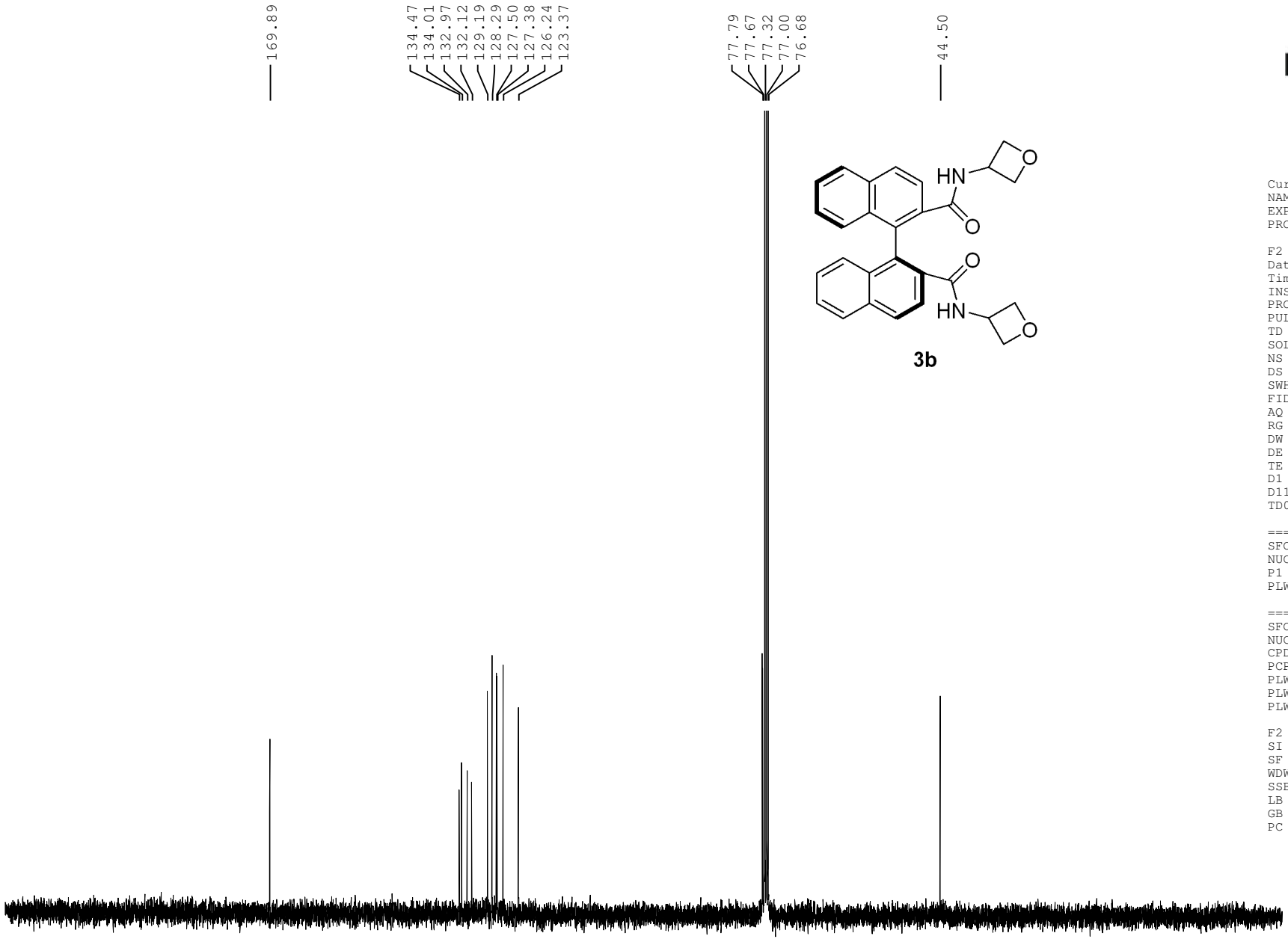




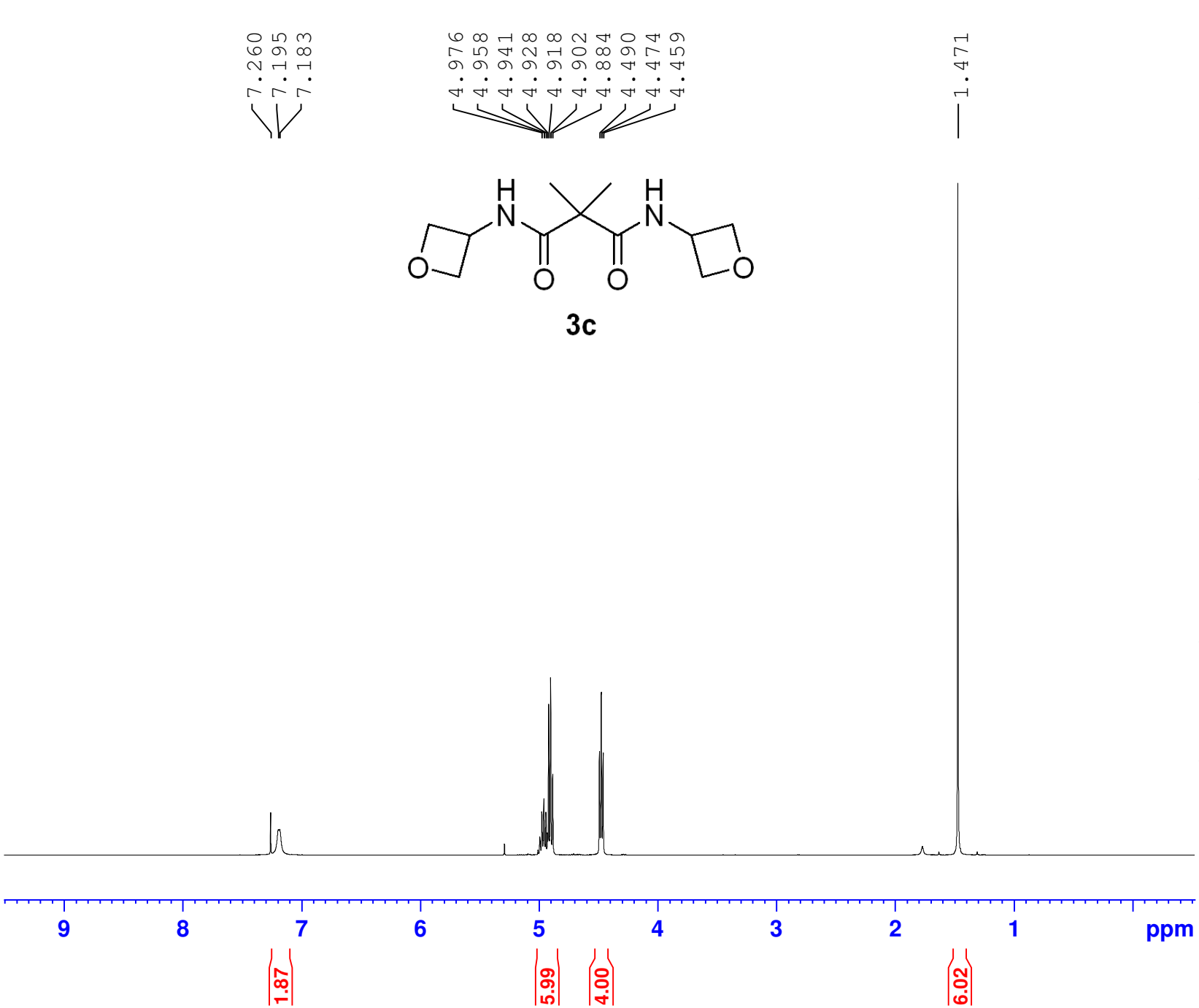
3b



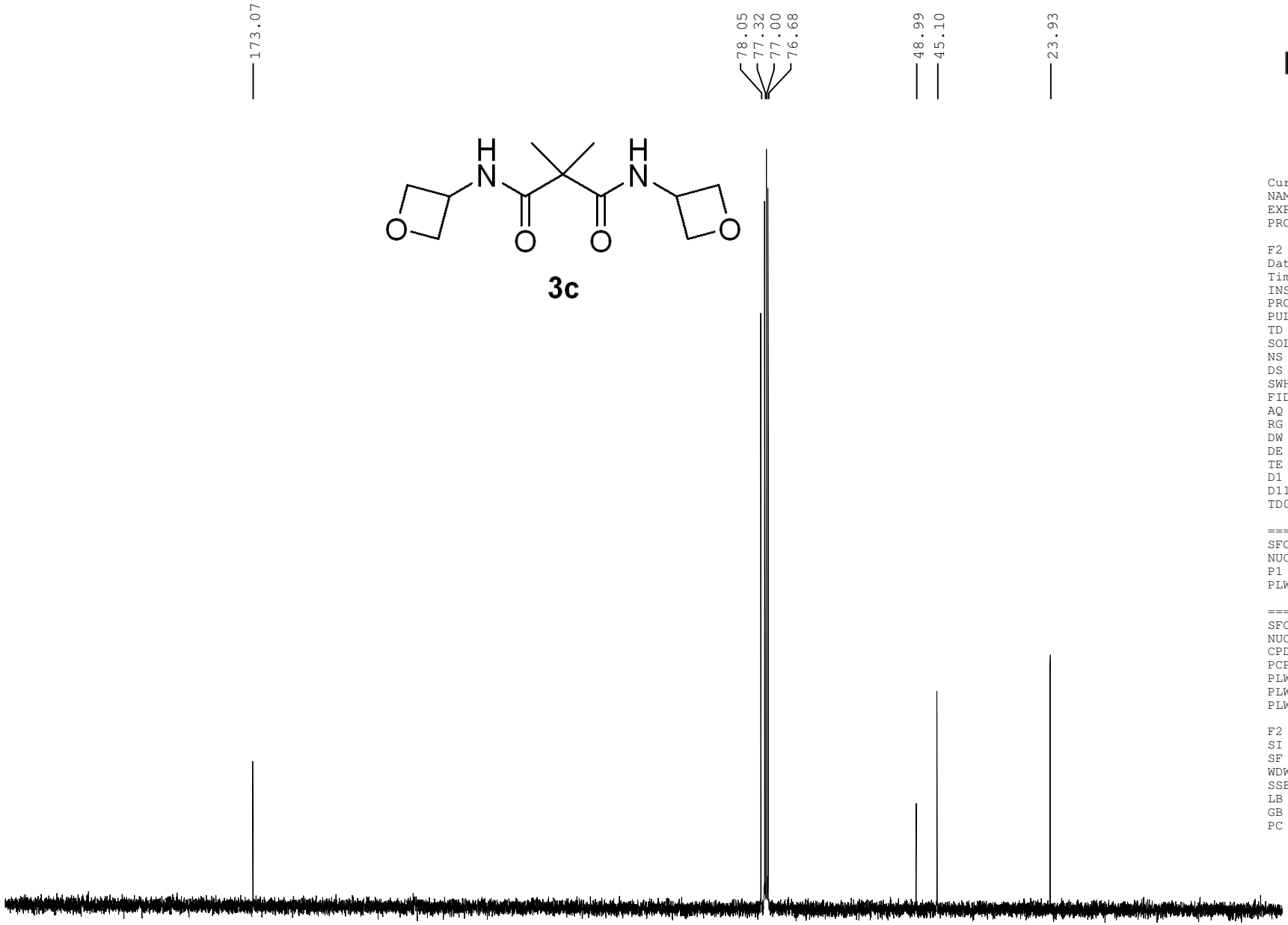

```
Current Data Parameters
NAME      hh-3-410b-h-fr1
EXPNO                   2
PROCNO                  1

F2 - Acquisition Parameters
Date_           20190411
Time               13.31
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 142.88
DW                 62.400 usec
DE                  6.50 usec
TE                 297.9 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300106 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```




```
Current Data Parameters
NAME      hh-3-410c-c-fr1
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20190411
Time               10.13
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  135
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               299.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                 32768
SF          100.6127729 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```




```
Current Data Parameters
NAME      hh-3-410a-h-fr1
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190411
Time               9.57
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     6
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                298.4 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300103 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



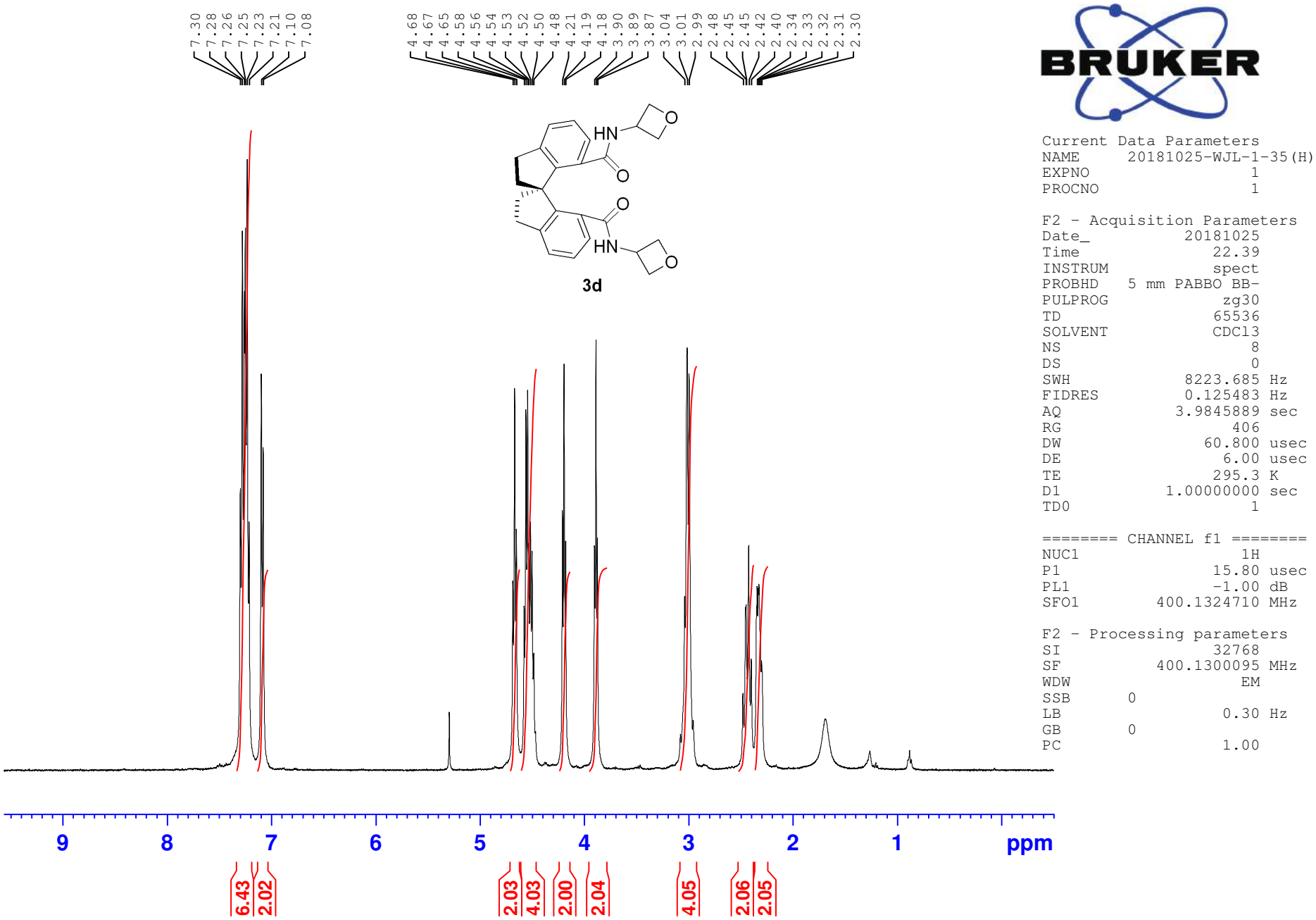
Current Data Parameters
NAME hh-3-410a-c-fr1
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20190411
Time 10.01
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 75
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 299.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

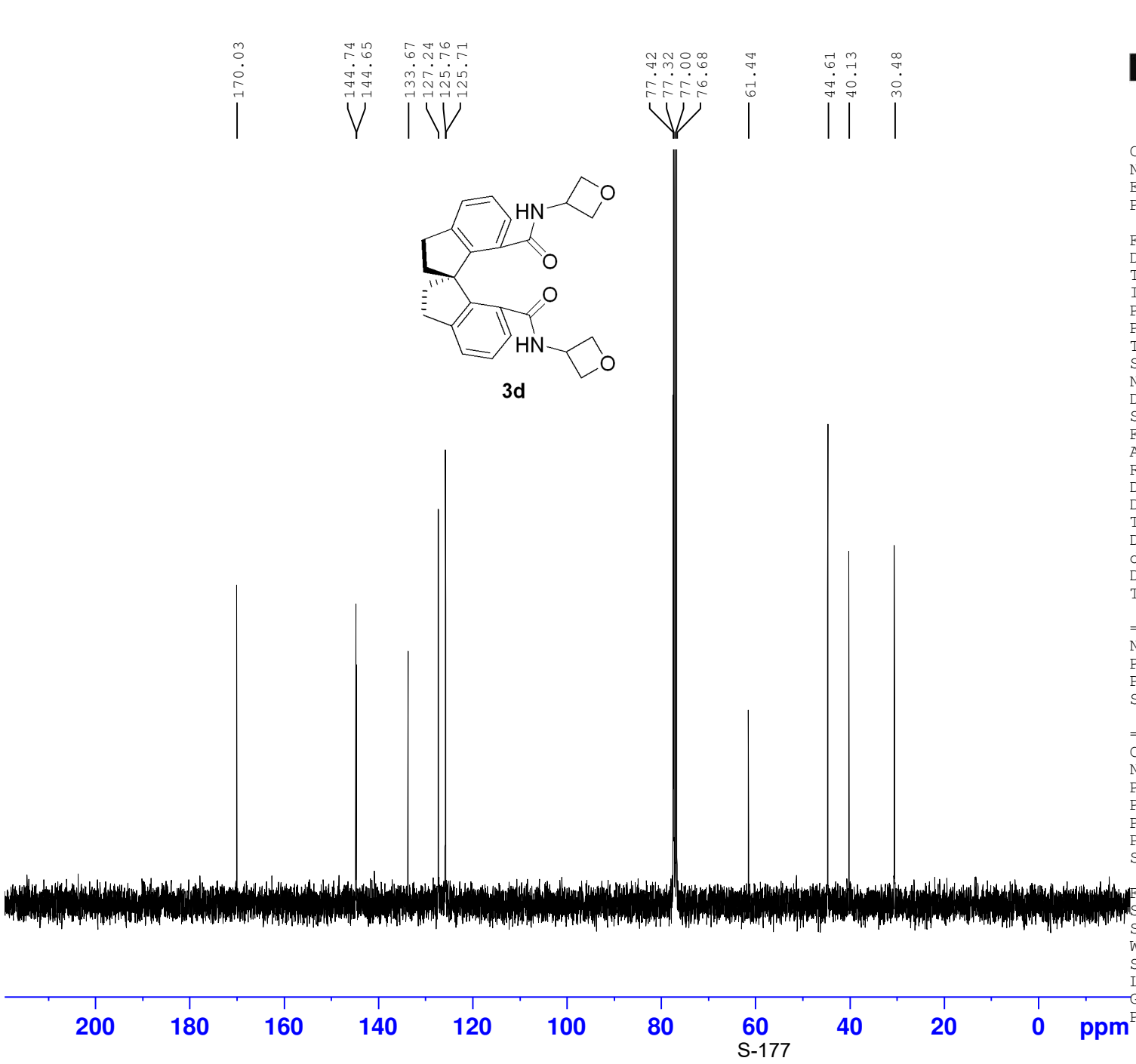
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

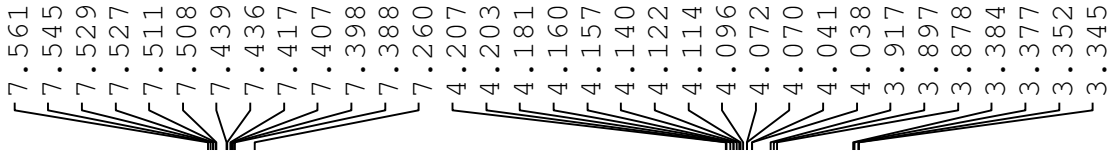
F2 - Processing parameters
SI 32768
SF 100.6127728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

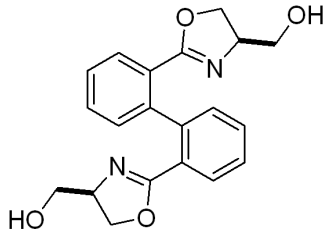



```
Current Data Parameters
NAME      20181025-WJL-1-35(H)
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_            20181025
Time                22.39
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  65536
SOLVENT             CDCl3
NS                      8
DS                      0
SWH              8223.685 Hz
FIDRES           0.125483 Hz
AQ             3.9845889 sec
RG                    406
DW                 60.800 usec
DE                  6.00 usec
TE                 295.3 K
D1           1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                 15.80 usec
PL1                -1.00 dB
SFO1         400.1324710 MHz

F2 - Processing parameters
SI                  32768
SF           400.1300095 MHz
WDW                    EM
SSB       0
LB                  0.30 Hz
GB        0
PC                  1.00
```

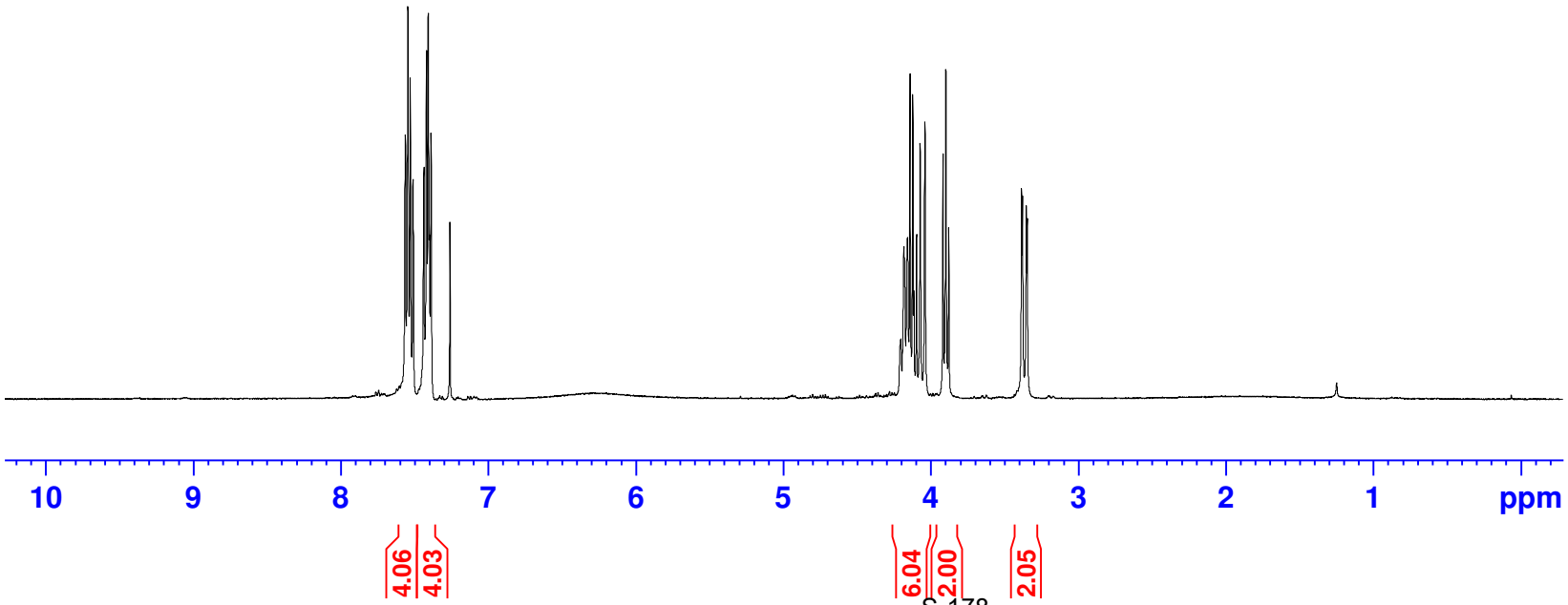



```
Current Data Parameters
NAME      20181025-WJL-1-35
EXPNO                    2
PROCNO                   1

F2 - Acquisition Parameters
Date_           20181025
Time               22.13
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  112
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG                 90.5
DW               20.800 usec
DE                6.00 usec
TE                295.5 K
D1           2.00000000 sec
d11          0.03000000 sec
DELTA        1.89999998 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 8.60 usec
PL1               -3.00 dB
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG[2         waltz16
NUC2                 1H
PCPD2             80.00 usec
PL12              14.39 dB
PL13              18.00 dB
PL2               -1.00 dB
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                  32768
SF          100.6127792 MHz
WDW                    EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

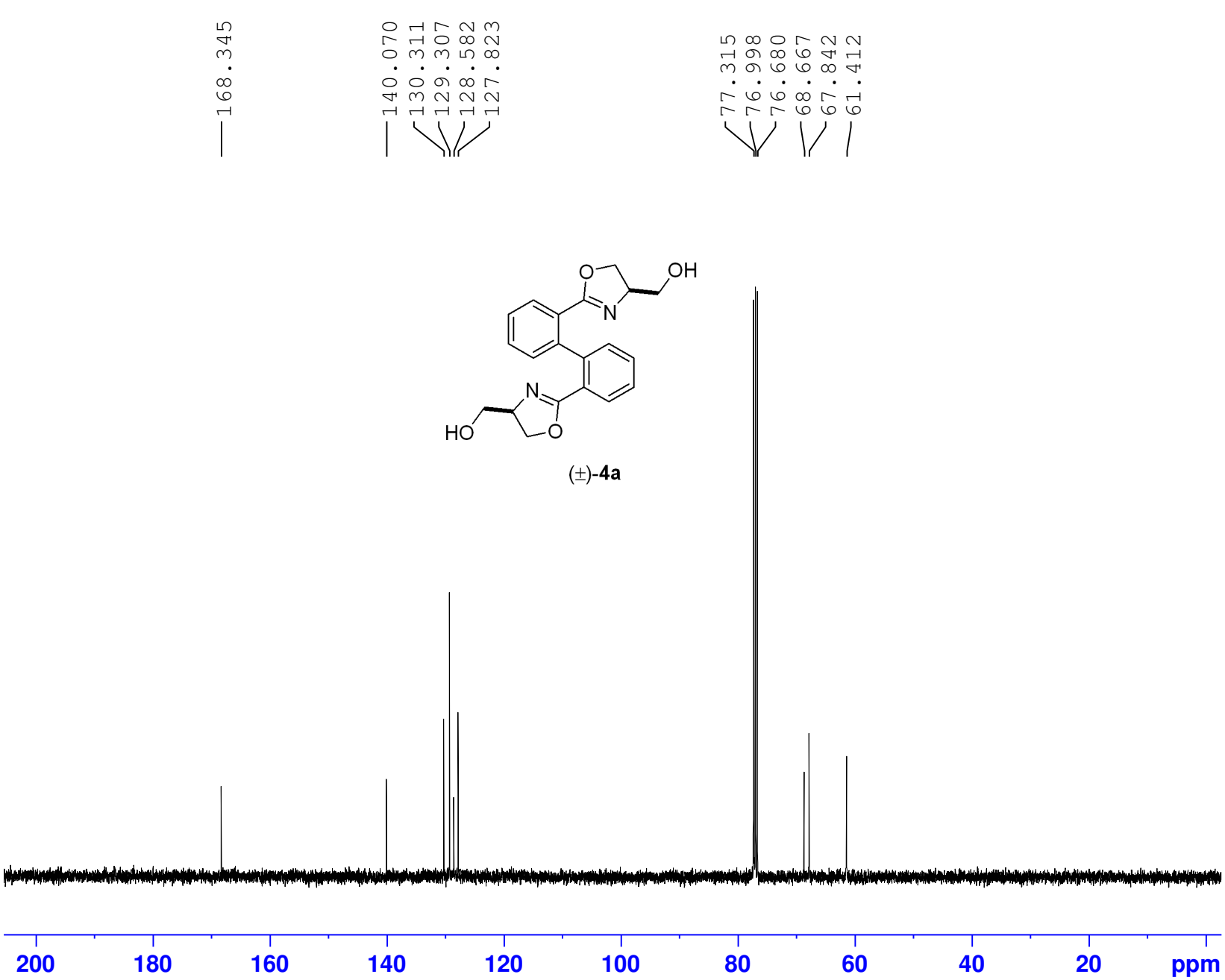




(±)-**4a**




```
Current Data Parameters
NAME                  czl-2-5
EXPNO                       1
PROCNO                      1

F2 - Acquisition Parameters
Date_              20170826
Time                  10.02
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        4
DS                        2
SWH               8012.820 Hz
FIDRES               0.122266 Hz
AQ                4.0894465 sec
RG                   187.77
DW                   62.400 usec
DE                    6.50 usec
TE                   297.5 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1           400.1324710 MHz
NUC1                    1H
P1                   14.50 usec
PLW1           11.99499989 W

F2 - Processing parameters
SI                    65536
SF             400.1300105 MHz
WDW                     EM
SSB       0
LB                    0.30 Hz
GB        0
PC                    1.00
```



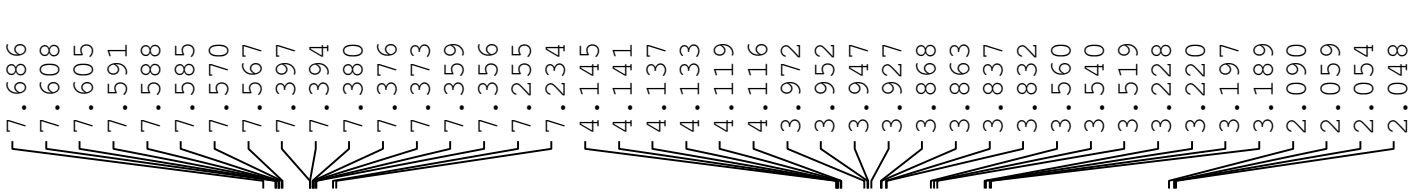
Current Data Parameters
NAME czl-2-5
EXPNO 2
PROCNO 1

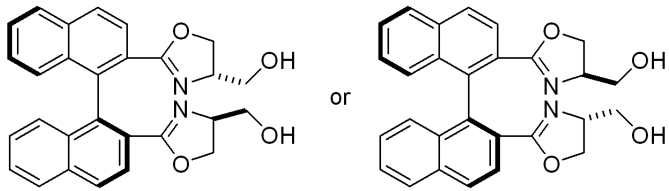
F2 - Acquisition Parameters
Date_ 20170826
Time 10.07
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 78
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 297.8 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W

======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W

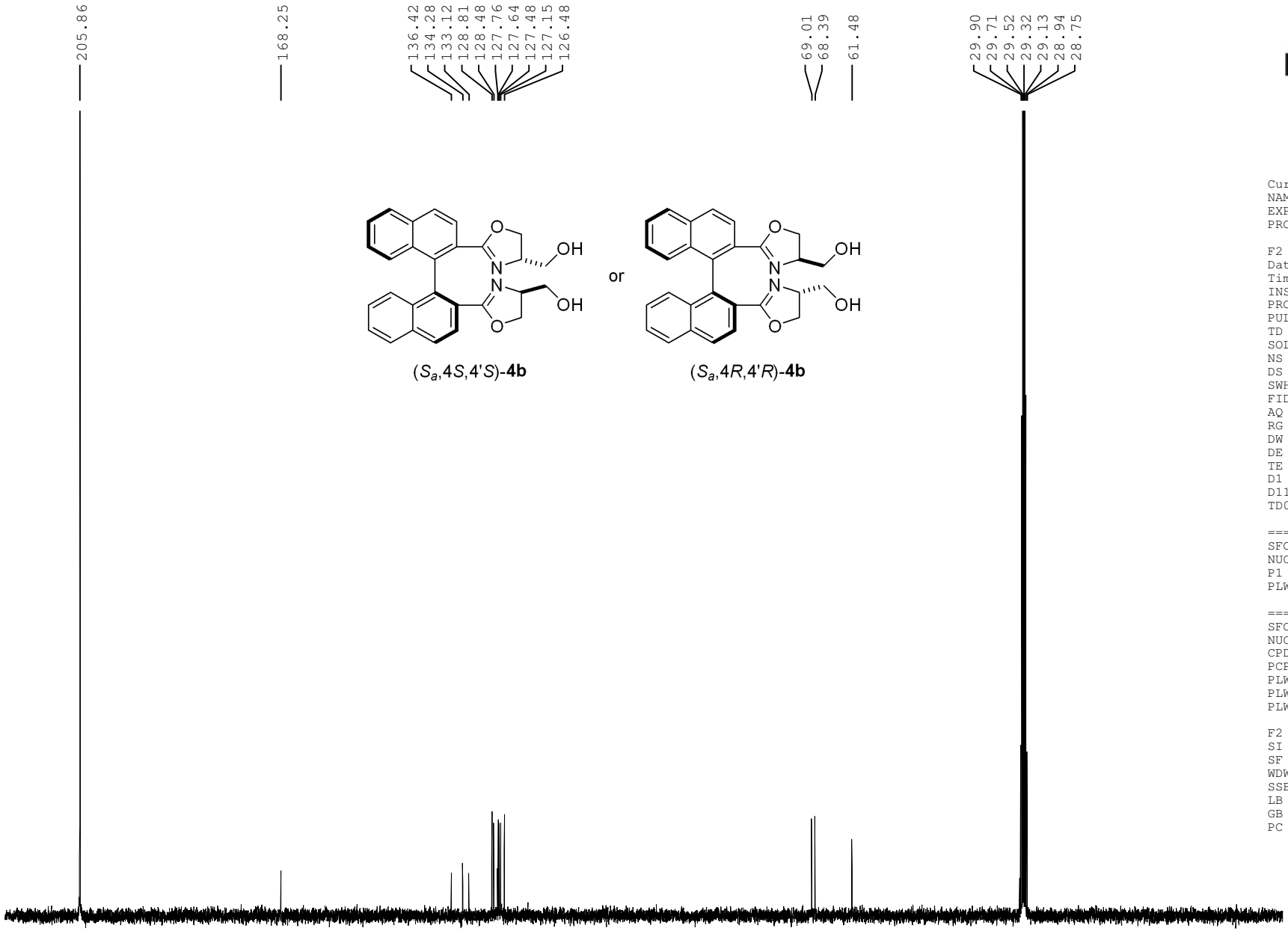
F2 - Processing parameters
SI 32768
SF 100.6127736 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40





(S_a,4*S*,4'*S*)-**4b** or (S_a,4*R*,4'*R*)-**4b**

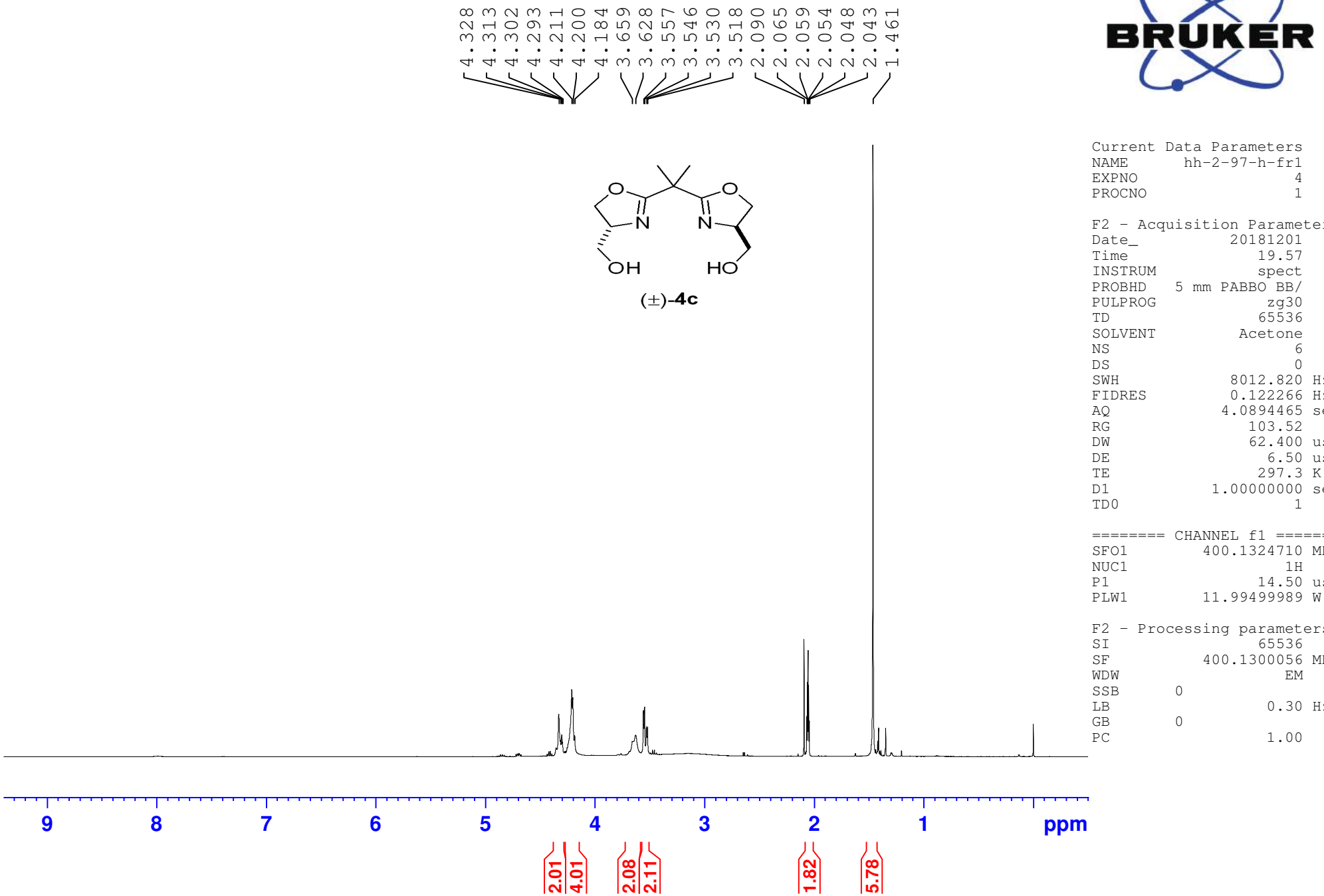

```
Current Data Parameters
NAME      hh-2-97B-h-fr1
EXPNO                 3
PROCNO                1

F2 - Acquisition Parameters
Date_          20181201
Time              10.06
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT         Acetone
NS                    6
DS                    0
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                88.84
DW               62.400 usec
DE                6.50 usec
TE                298.0 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300056 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



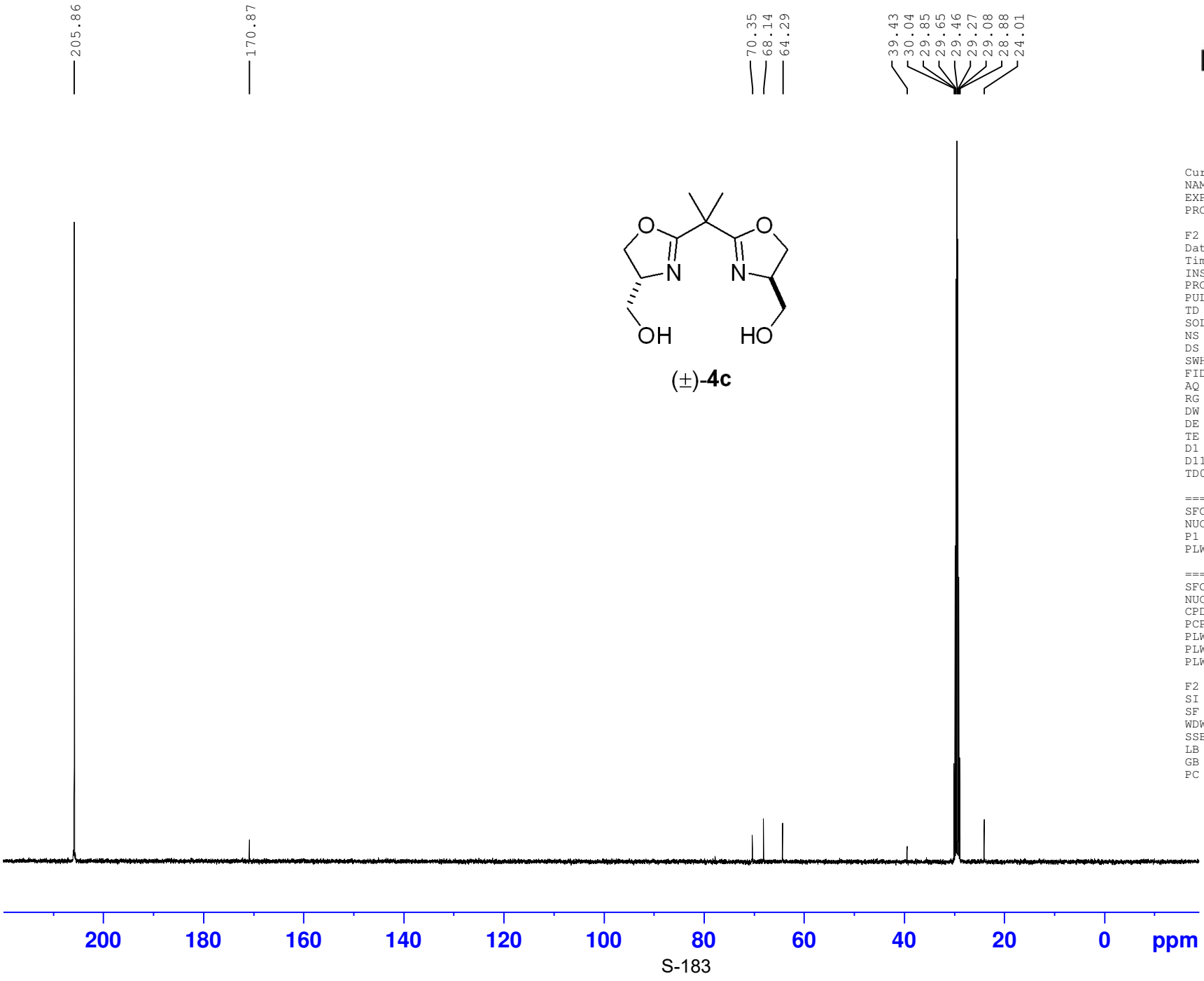
(S_a,4*S*,4'*S*)-**4b**

(S_a,4*R*,4'*R*)-**4b**

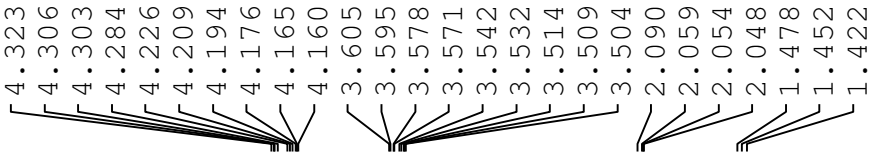
```
Current Data Parameters
NAME      hh-2-97B-c-fr1
EXPNO                 4
PROCNO                1

F2 - Acquisition Parameters
Date_          20181201
Time              10.29
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT        Acetone
NS                  38
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               298.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127344 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

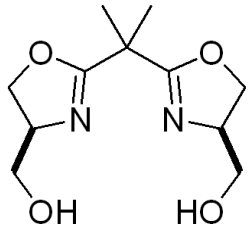



```
Current Data Parameters
NAME       hh-2-97-h-fr1
EXPNO                  4
PROCNO                 1

F2 - Acquisition Parameters
Date_           20181201
Time               19.57
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT          Acetone
NS                     6
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 103.52
DW                 62.400 usec
DE                  6.50 usec
TE                 297.3 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300056 MHz
WDW                  EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



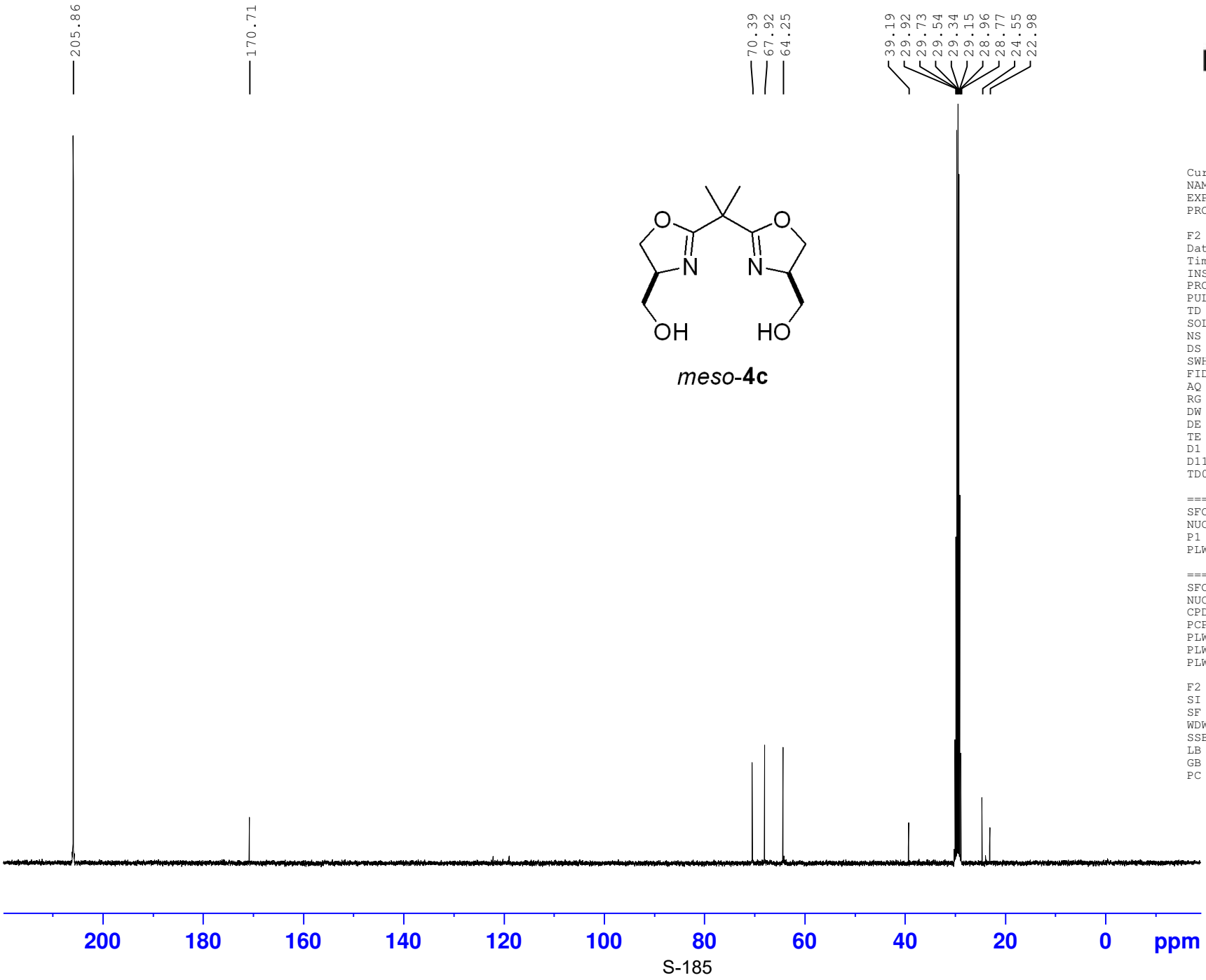

```
Current Data Parameters
NAME      hh-2-97-c-fr1
EXPNO                 4
PROCNO                1

F2 - Acquisition Parameters
Date_          20181201
Time              20.14
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT        Acetone
NS                 244
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               298.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127172 MHz
WDW                EM
SSB       0
LB               1.00 Hz
GB        0
PC               1.40
```



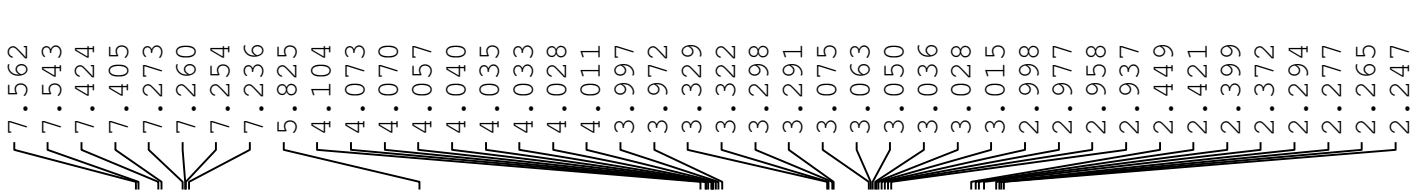


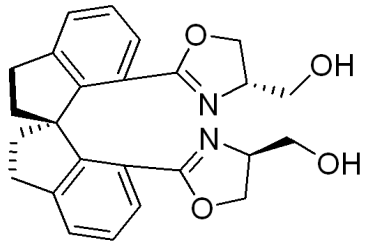
meso-**4c**


```
Current Data Parameters
NAME       hh-2-97-h-fr2
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20181201
Time               14.14
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT          Acetone
NS                     5
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 82.92
DW                62.400 usec
DE                 6.50 usec
TE                295.9 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300056 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

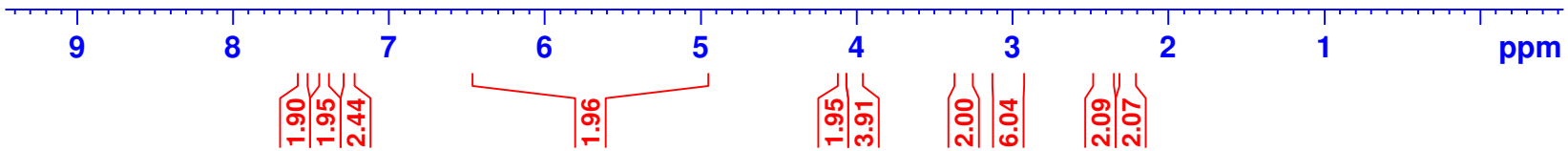



```
Current Data Parameters
NAME      hh-2-97-c-fr2
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20181201
Time              14.26
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT        Acetone
NS                 200
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127317 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

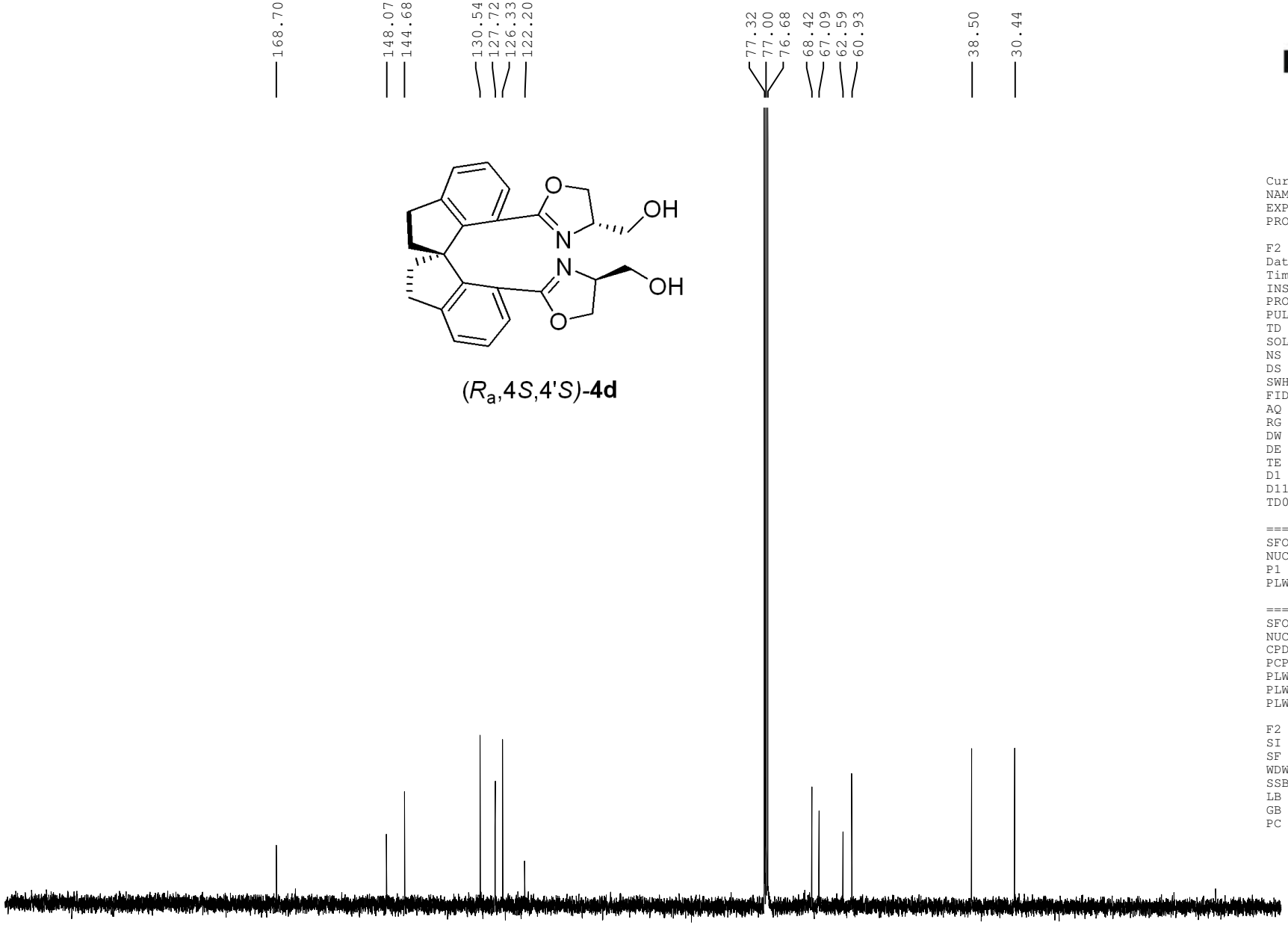




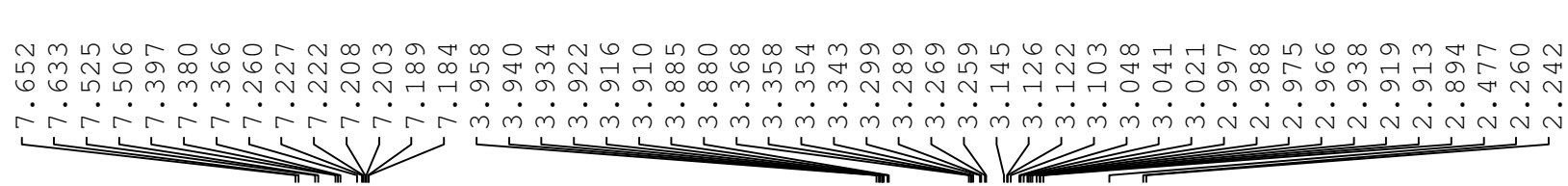
(R_a,4*S*,4'*S*)-**4d**

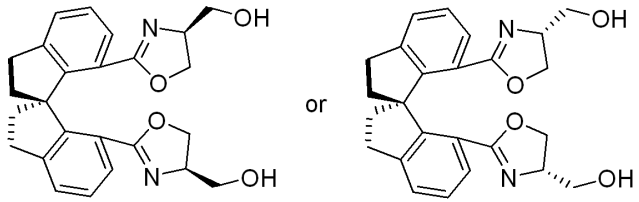



```
Current Data Parameters
NAME      hh-2-106A-h-fr1
EXPNO                   2
PROCNO                  1

F2 - Acquisition Parameters
Date_           20181203
Time               19.16
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                142.88
DW                62.400 usec
DE                 6.50 usec
TE                295.5 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300102 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



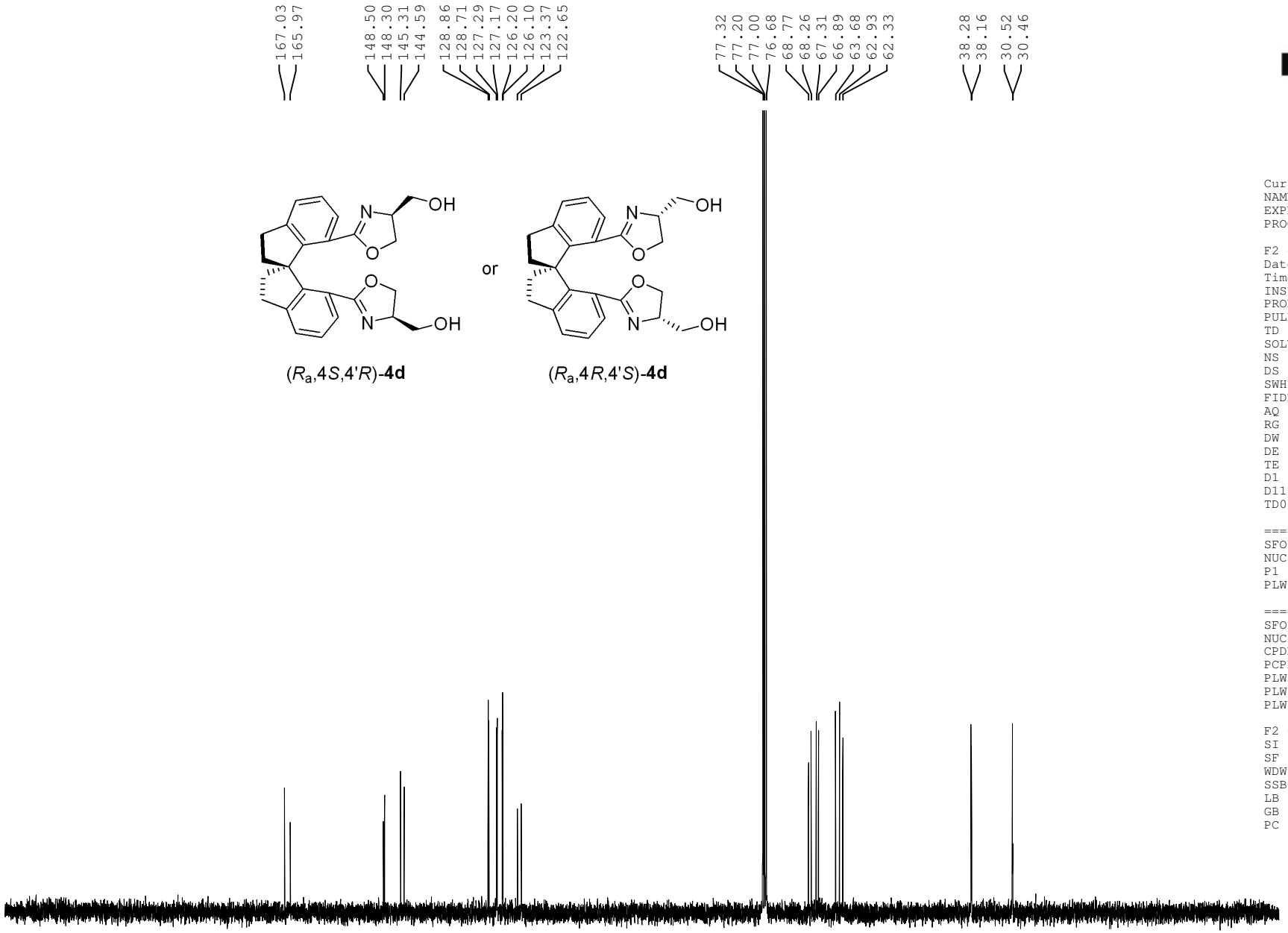

```
Current Data Parameters
NAME      hh-2-106A-c-fr1
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20181203
Time               19.23
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  110
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW              20.800 usec
DE               6.50 usec
TE               296.6 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1               9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2           90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                 32768
SF          100.6127722 MHz
WDW                EM
SSB       0
LB              1.00 Hz
GB        0
PC              1.40
```





(R_a,4*S*,4'*R*)-**4d** (R_a,4*R*,4'*S*)-**4d**

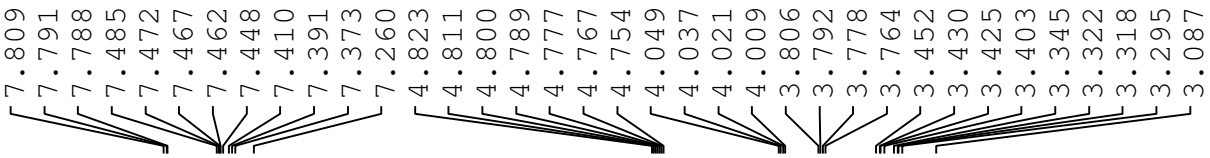

```
Current Data Parameters
NAME      hh-2-106A-h-fr2
EXPNO                   5
PROCNO                  1

F2 - Acquisition Parameters
Date_           20181208
Time               12.59
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     5
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 82.92
DW                62.400 usec
DE                 6.50 usec
TE                295.6 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300101 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

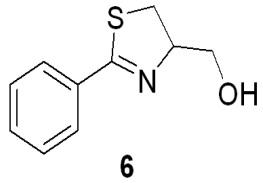


(R_a,4*S*,4'*R*)-**4d**

(R_a,4*R*,4'*S*)-**4d**

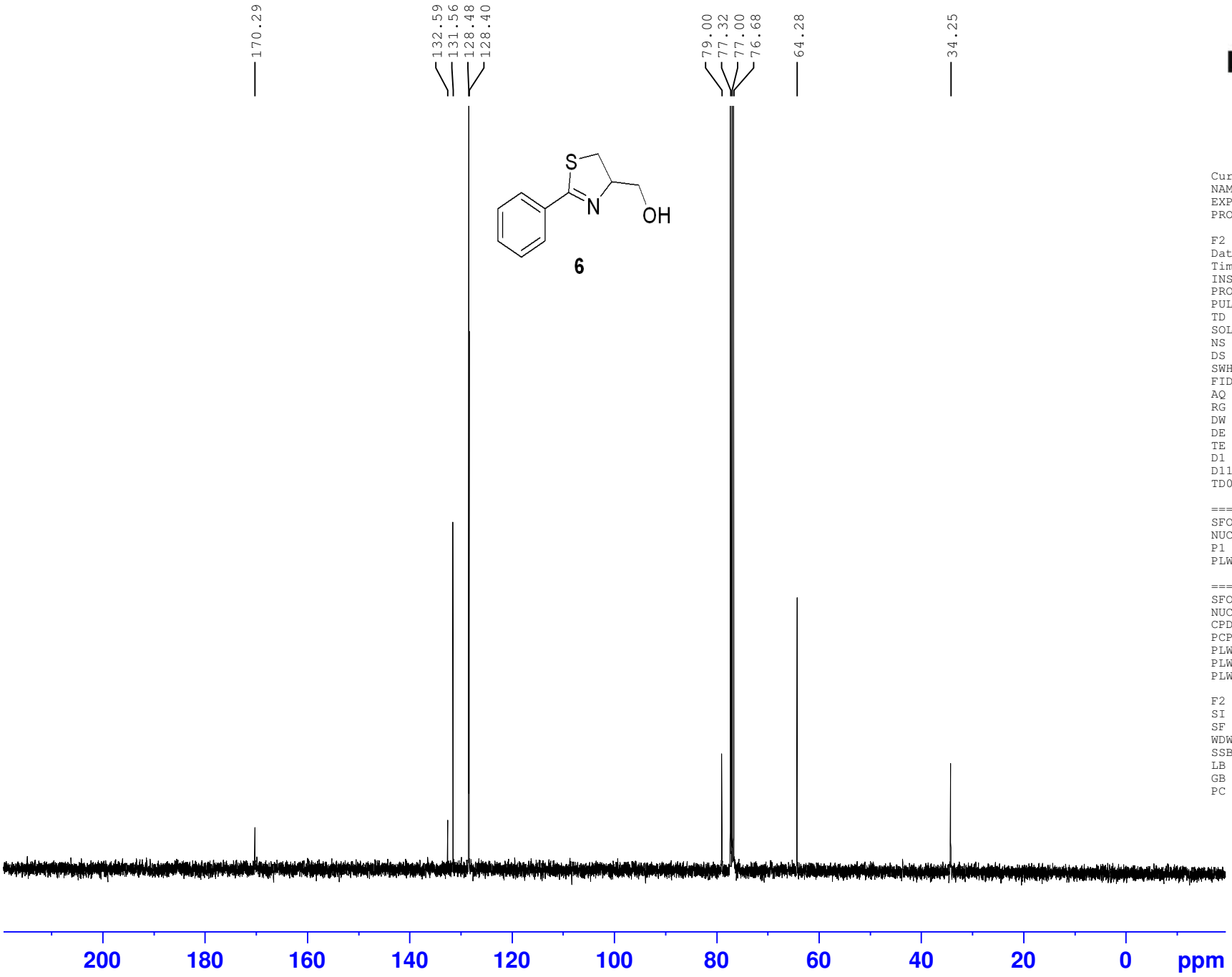
```
Current Data Parameters
NAME      hh-2-106A-c-fr2
EXPNO                   5
PROCNO                  1

F2 - Acquisition Parameters
Date_           20181208
Time               13.09
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  159
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                196.92
DW                20.800 usec
DE                 6.50 usec
TE                296.6 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                 13C
P1                 9.70 usec
PLW1         46.98899841 W

======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                 1H
CPDPRG[2          waltz16
PCPD2             90.00 usec
PLW2         11.99499989 W
PLW12         0.34213999 W
PLW13         0.27713001 W

F2 - Processing parameters
SI                  32768
SF           100.6127743 MHz
WDW                    EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```



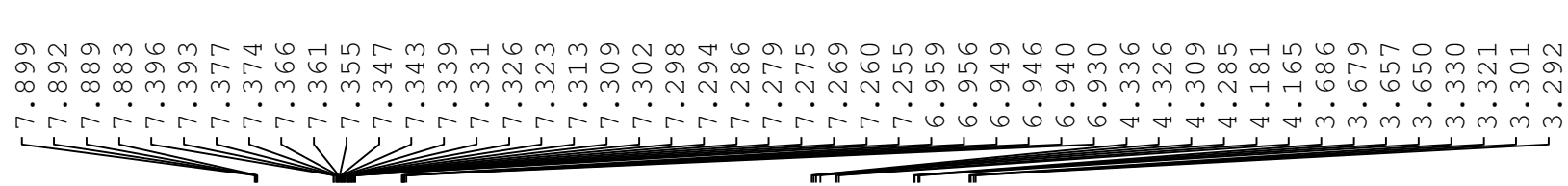


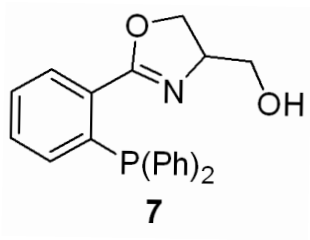
6


```
Current Data Parameters
NAME      hh-3-149-h-fr1
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190704
Time               15.43
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    10
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 103.52
DW                 62.400 usec
DE                  6.50 usec
TE                 295.4 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300101 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



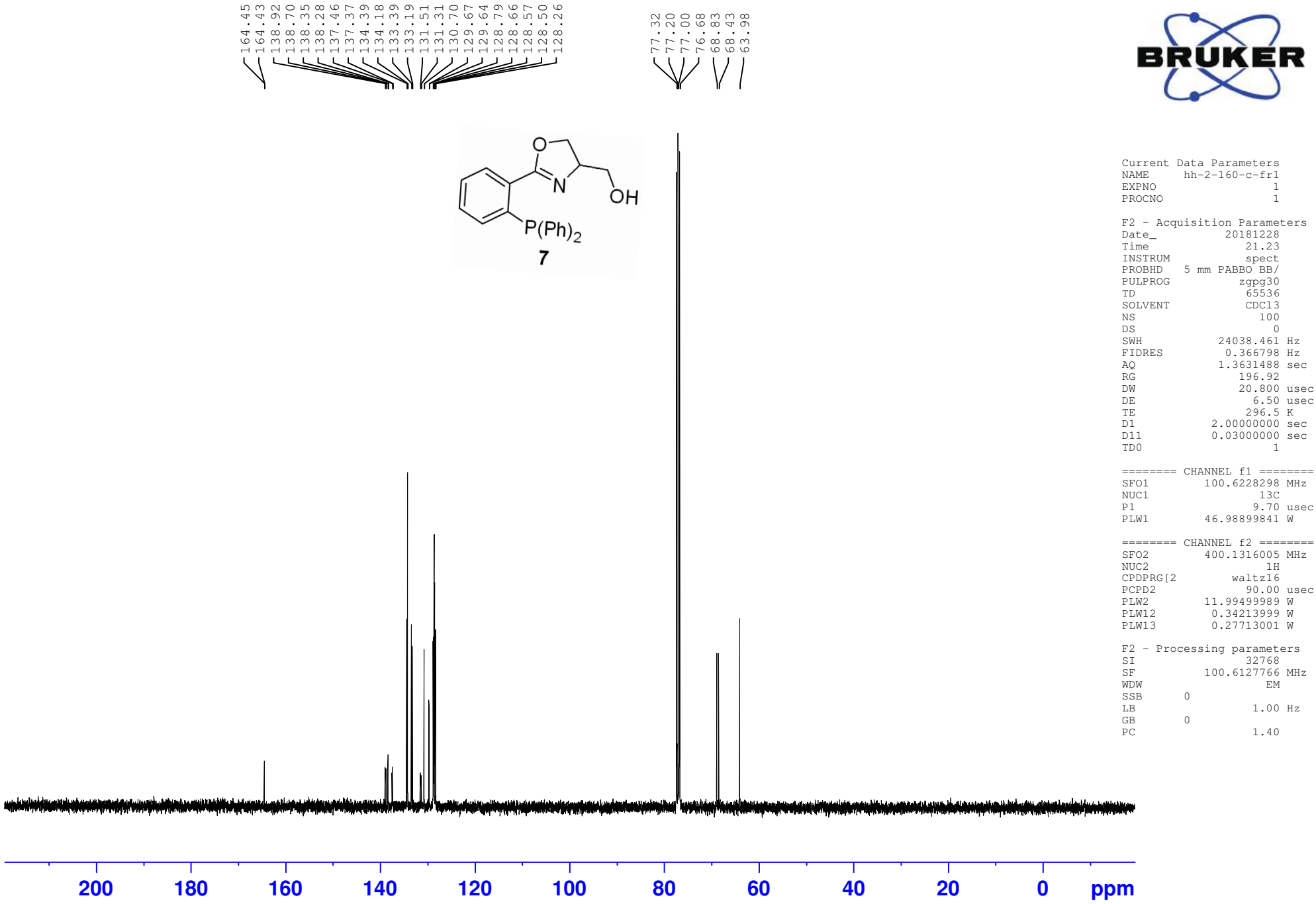

```
Current Data Parameters
NAME      hh-3-149-c-fr1
EXPNO                 4
PROCNO                1

F2 - Acquisition Parameters
Date_          20190704
Time              15.56
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                 119
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127751 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```





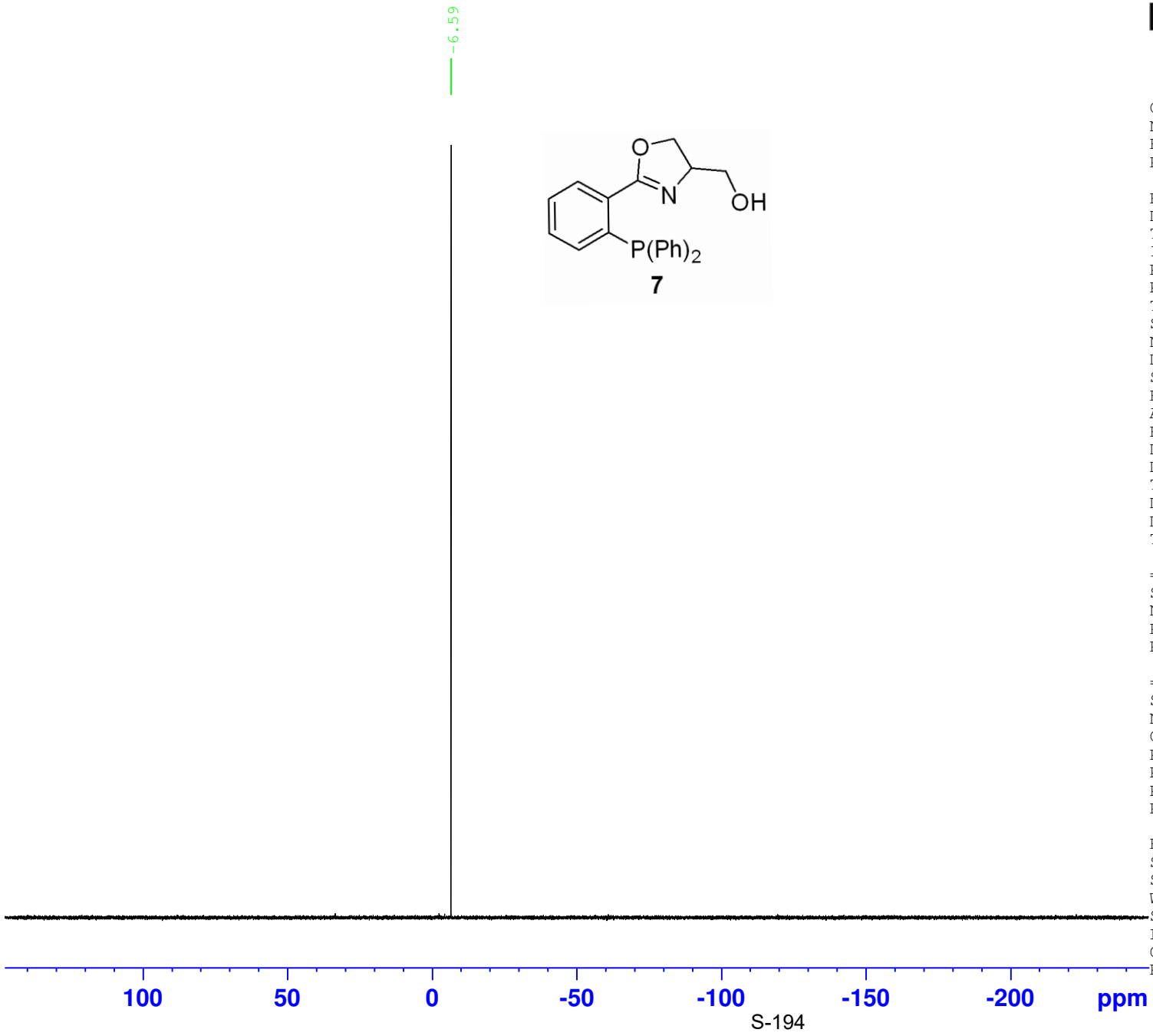
7


```
Current Data Parameters
NAME      hh-2-160-h-fr1
EXPNO                 2
PROCNO                1

F2 - Acquisition Parameters
Date_          20181229
Time              13.25
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    4
DS                    0
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                39.46
DW               62.400 usec
DE                6.50 usec
TE                295.4 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300103 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

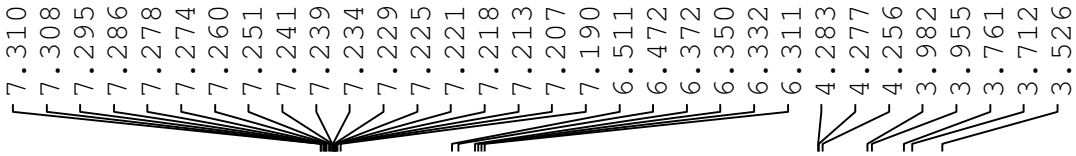


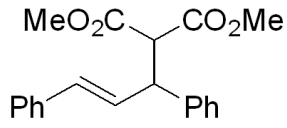
BRUKER

```
Current Data Parameters
NAME      hh-2-160-c-fr1
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20181228
Time              21.23
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                 100
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ           1.3631488 sec
RG              196.92
DW              20.800 usec
DE               6.50 usec
TE              296.5 K
D1          2.00000000 sec
D11         0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1               9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127766 MHz
WDW                EM
SSB       0
LB               1.00 Hz
GB        0
PC               1.40
```



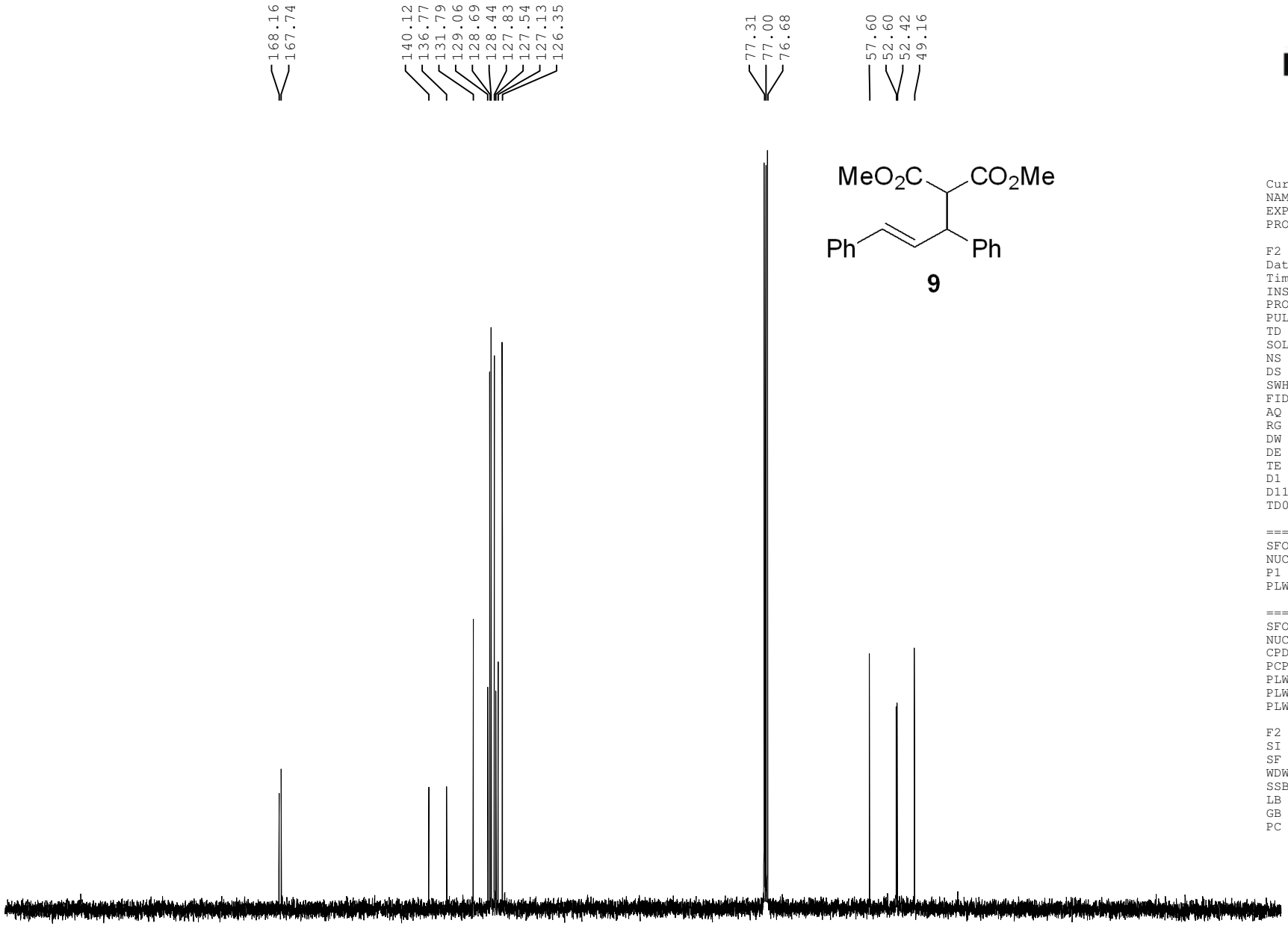

```
Current Data Parameters
NAME      hh-2-160-p-fr1
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20181229
Time              13.28
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                    1
DS                    0
SWH           64102.563 Hz
FIDRES         0.978127 Hz
AQ            0.5111808 sec
RG               196.92
DW                7.800 usec
DE                6.50 usec
TE                295.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        161.9674942 MHz
NUC1                31P
P1                14.70 usec
PLW1        11.99499989 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

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



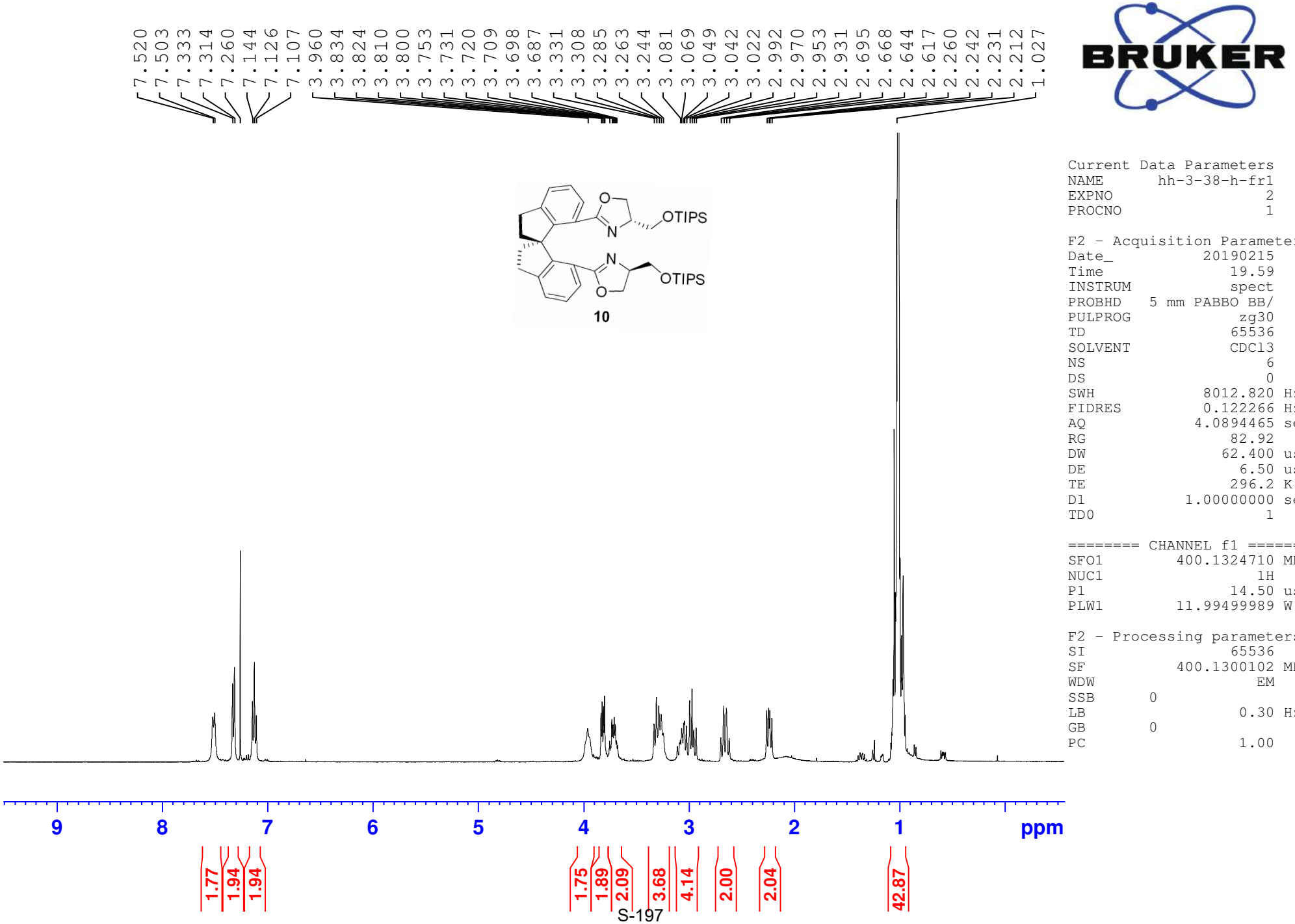


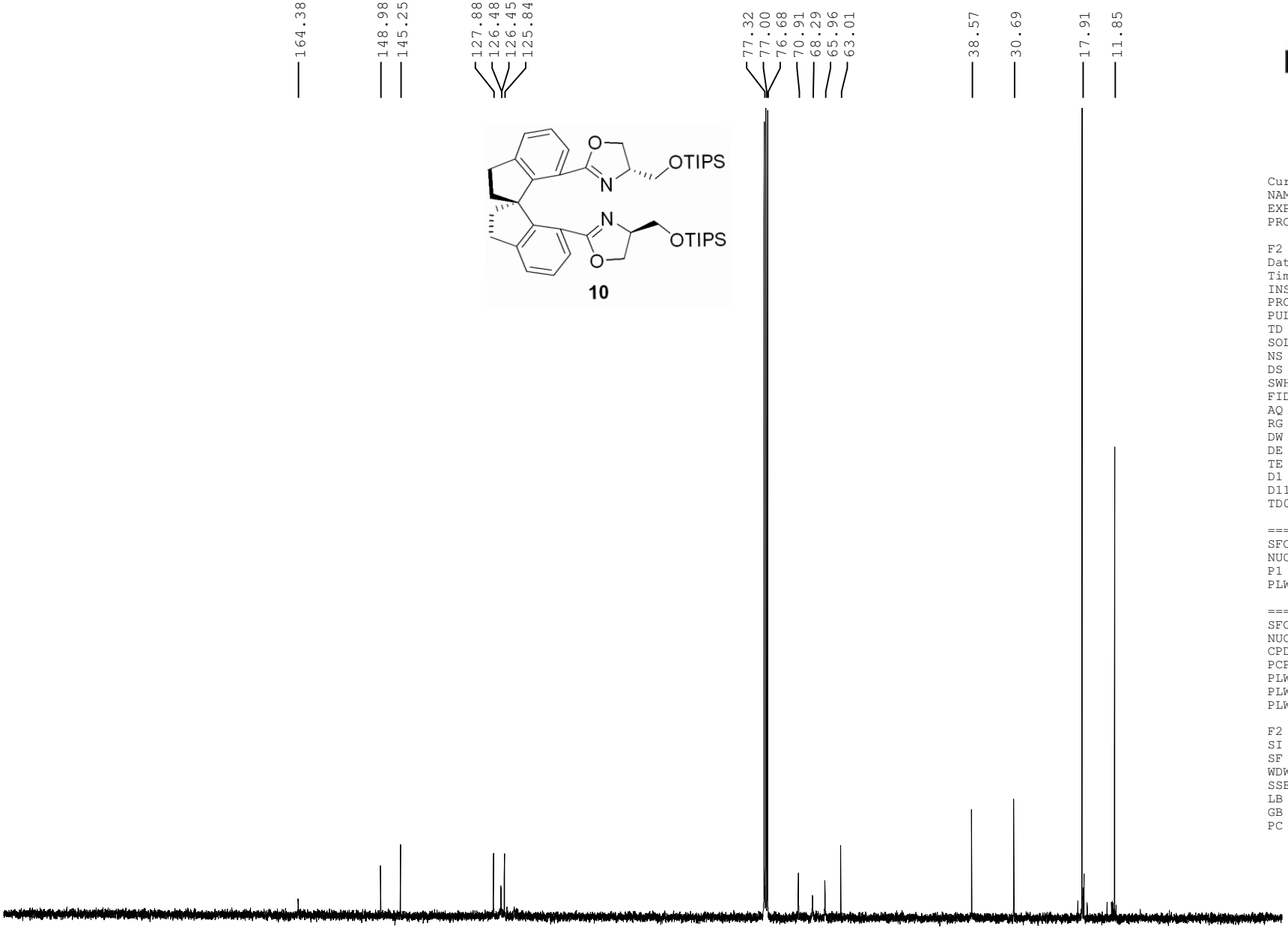
9


```
Current Data Parameters
NAME      hh-2-185-h-fr1
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190109
Time               16.08
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     6
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                 70.97
DW                62.400 usec
DE                 6.50 usec
TE                295.4 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                 14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300102 MHz
WDW                  EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

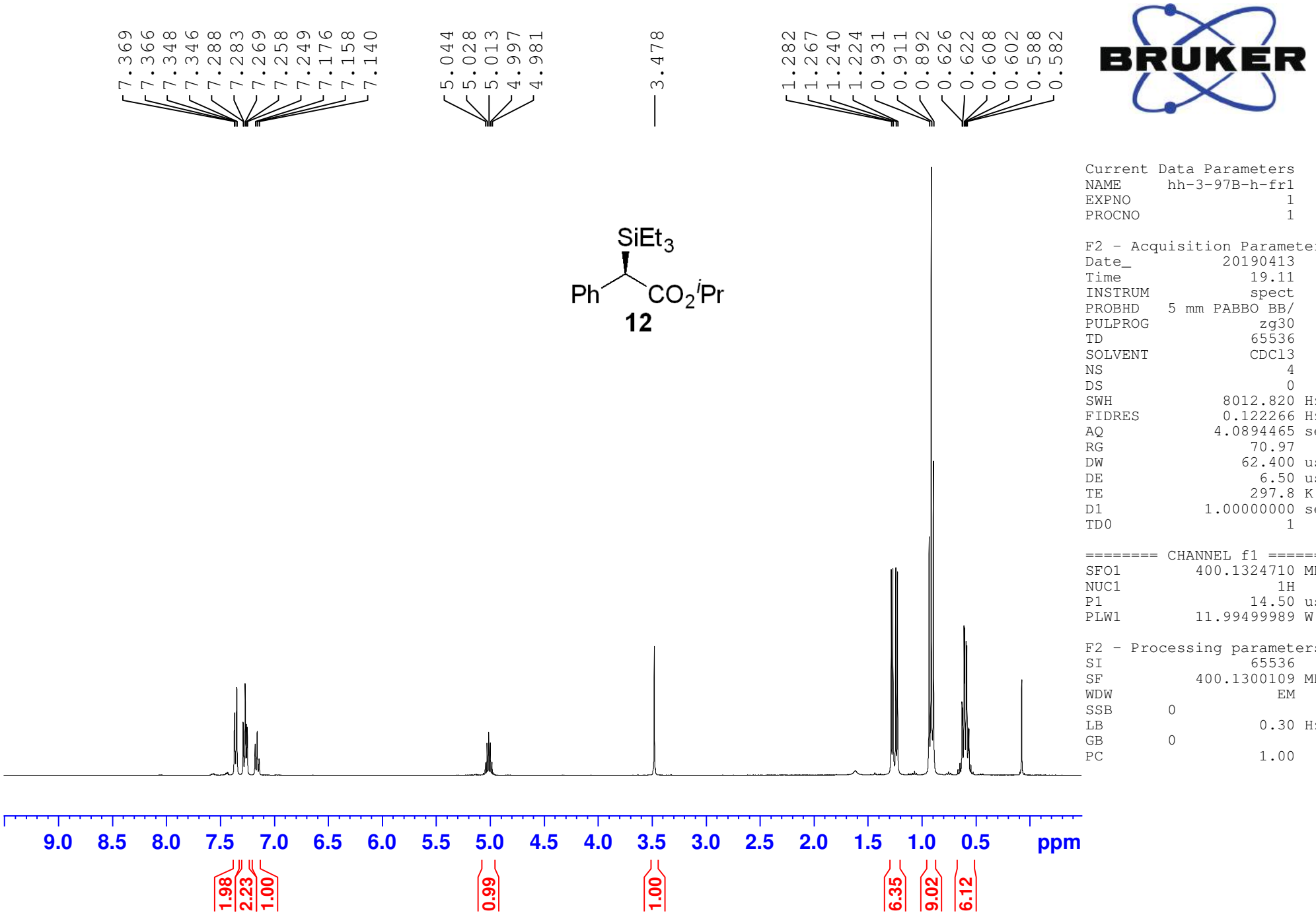


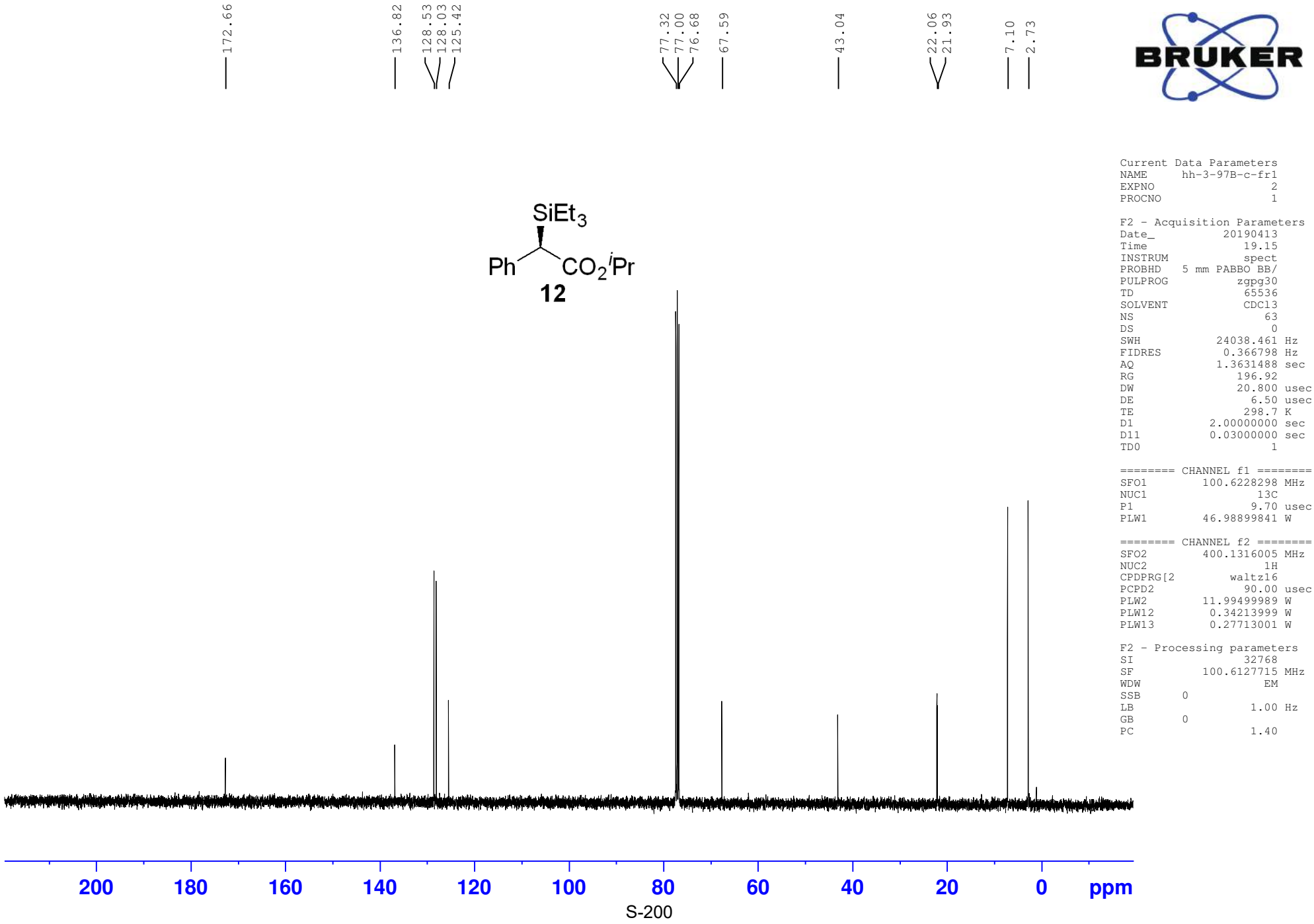

```
Current Data Parameters
NAME      hh-2-185-c-fr1
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20190109
Time              20.11
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                  66
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.1 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127758 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

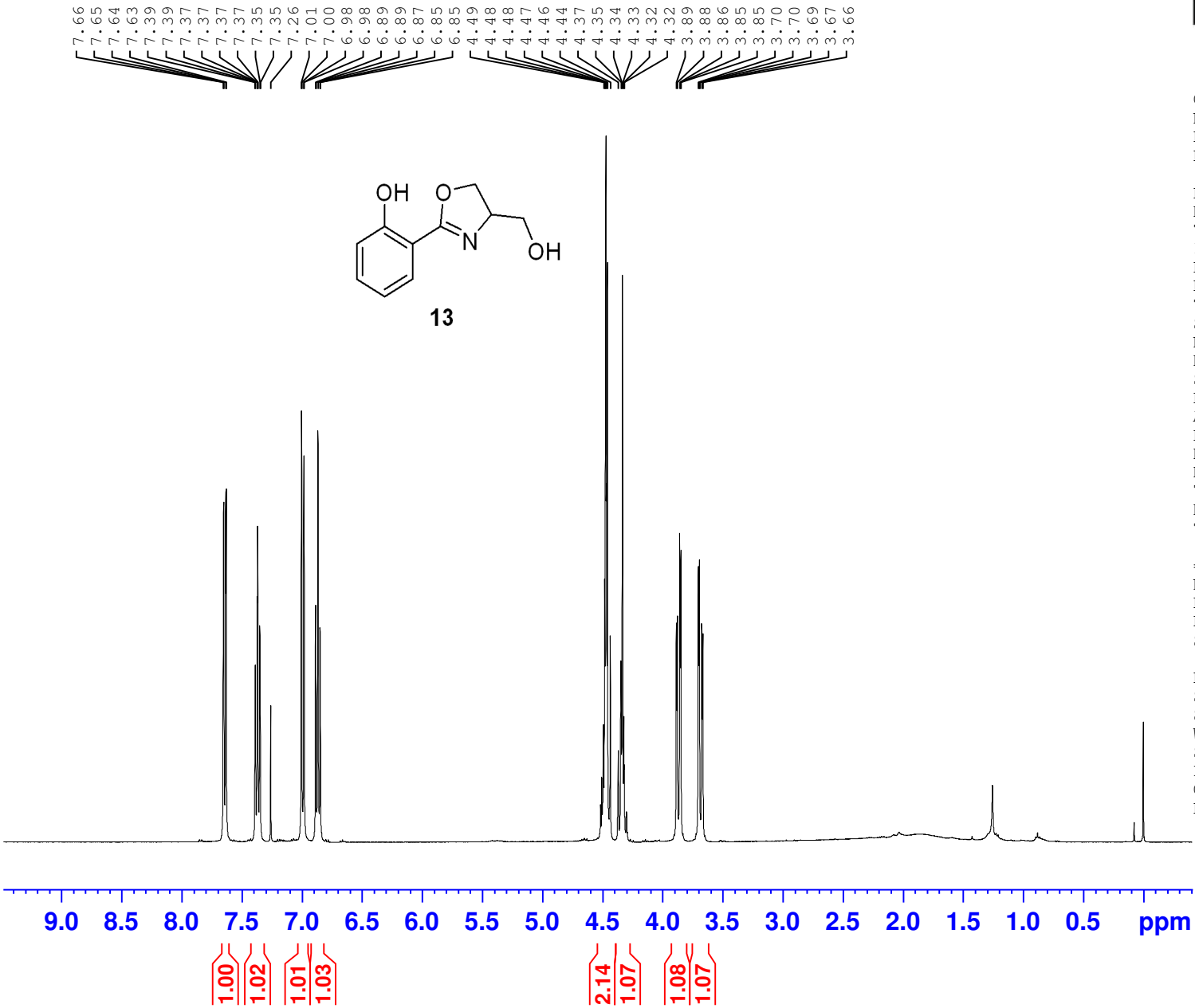

7.520
7.503
7.333
7.314
7.260
7.144
7.126
7.107
3.960
3.834
3.824
3.810
3.800
3.753
3.731
3.720
3.709
3.698
3.687
3.331
3.308
3.285
3.263
3.244
3.081
3.069
3.049
3.042
3.022
2.992
2.970
2.953
2.931
2.695
2.668
2.644
2.617
2.260
2.242
2.231
2.212
1.027
OTIPS
OTIPS
10
Current Data Parameters
NAME hh-3-38-h-fr1
EXPNO 2
PROCNO 1
F2 - Acquisition Parameters
Date_ 20190215
Time 19.59
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 6
DS 0
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 82.92
DW 62.400 usec
DE 6.50 usec
TE 296.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W
F2 - Processing parameters
SI 65536
SF 400.1300102 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9
8
7
6
5
4
3
2
1
ppm
1.77
1.94
1.94
1.75
1.89
2.09
3.68
4.14
2.00
2.04
42.87



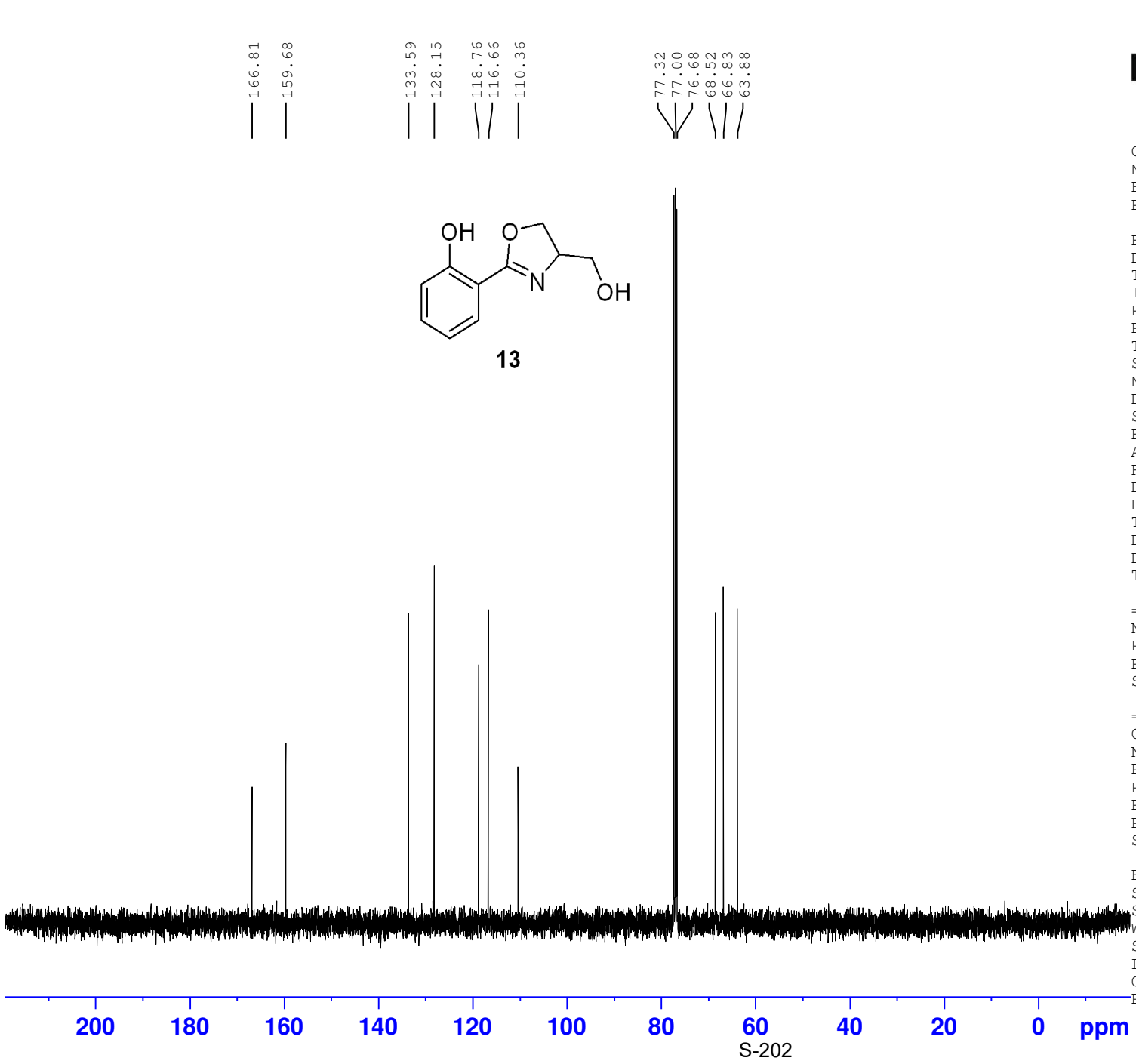

```
Current Data Parameters
NAME      hh-3-38-c-fr1
EXPNO                 2
PROCNO                1

F2 - Acquisition Parameters
Date_          20190216
Time              12.50
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                 426
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               297.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127714 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```


7.369
7.366
7.348
7.346
7.288
7.283
7.269
7.258
7.249
7.176
7.158
7.140
5.044
5.028
5.013
4.997
4.981
3.478
1.282
1.267
1.240
1.224
0.931
0.911
0.892
0.626
0.622
0.608
0.602
0.588
0.582
SiEt3
Ph
CO2iPr
12
Current Data Parameters
NAME hh-3-97B-h-fr1
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20190413
Time 19.11
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 4
DS 0
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894465 sec
RG 70.97
DW 62.400 usec
DE 6.50 usec
TE 297.8 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 400.1324710 MHz
NUC1 1H
P1 14.50 usec
PLW1 11.99499989 W
F2 - Processing parameters
SI 65536
SF 400.1300109 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 ppm
1.98
2.23
1.00
0.99
1.00
6.35
9.02
6.12

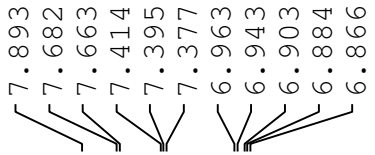

172.66
136.82
128.53
128.03
125.42
77.32
77.00
76.68
67.59
43.04
22.06
21.93
7.10
2.73
SiEt3
Ph
CO2iPr
12
Current Data Parameters
NAME hh-3-97B-c-fr1
EXPNO 2
PROCNO 1
F2 - Acquisition Parameters
Date_ 20190413
Time 19.15
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 63
DS 0
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 196.92
DW 20.800 usec
DE 6.50 usec
TE 298.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 100.6228298 MHz
NUC1 13C
P1 9.70 usec
PLW1 46.98899841 W
======== CHANNEL f2 ========
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 90.00 usec
PLW2 11.99499989 W
PLW12 0.34213999 W
PLW13 0.27713001 W
F2 - Processing parameters
SI 32768
SF 100.6127715 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200
180
160
140
120
100
80
60
40
20
0
ppm

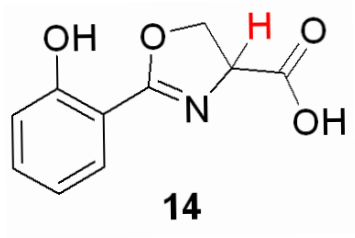


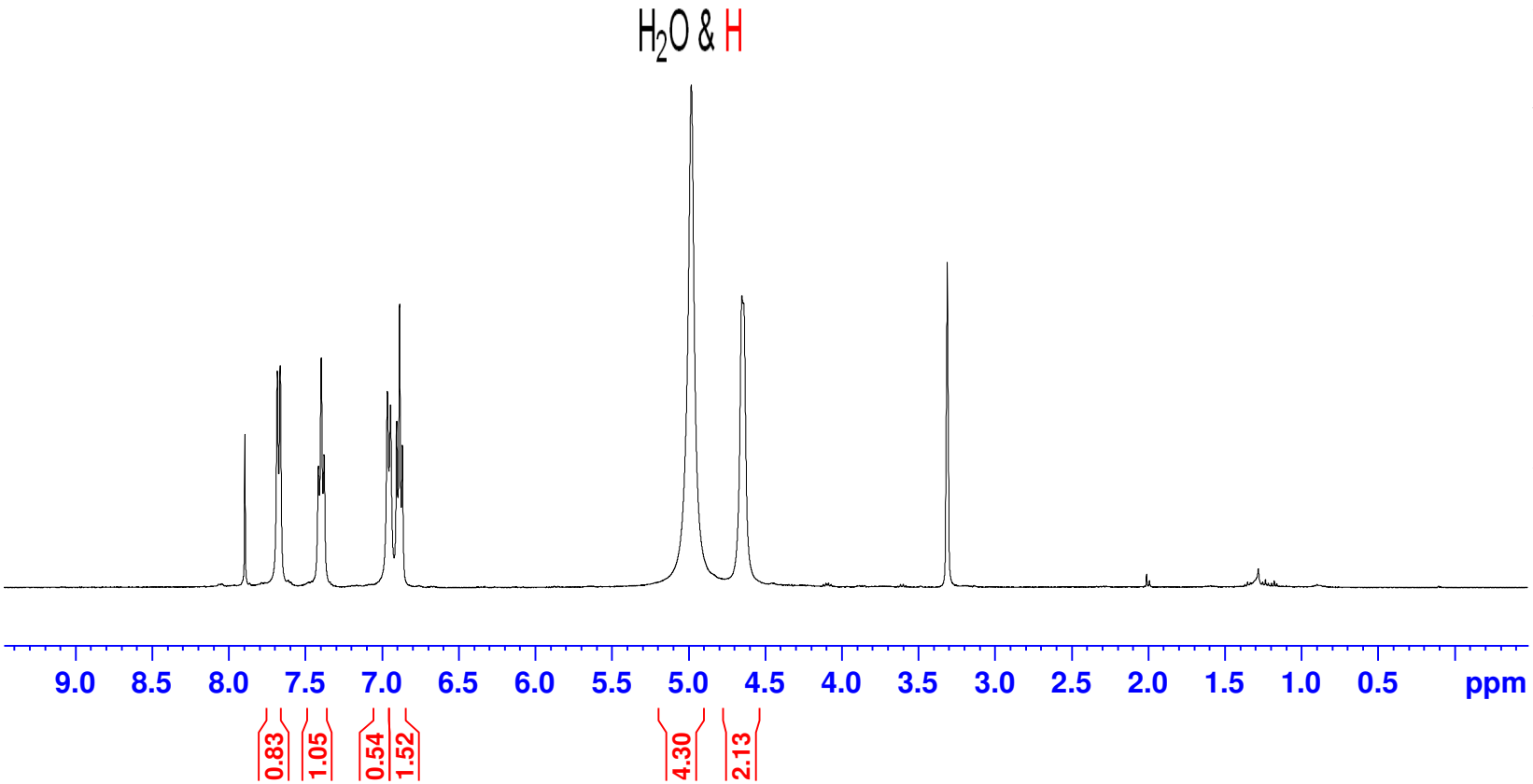

```
Current Data Parameters
NAME       hh-1-6-h-fr1
EXPNO                 7
PROCNO                1

F2 - Acquisition Parameters
Date_          20190624
Time               8.49
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    8
DS                    2
SWH            8012.820 Hz
FIDRES         0.244532 Hz
AQ            2.0447233 sec
RG               100.49
DW               62.400 usec
DE                6.50 usec
TE               295.4 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                 9.90 usec
PLW1        23.00000000 W
SFO1        400.1932015 MHz

F2 - Processing parameters
SI                65536
SF          400.1900151 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                0.50
```



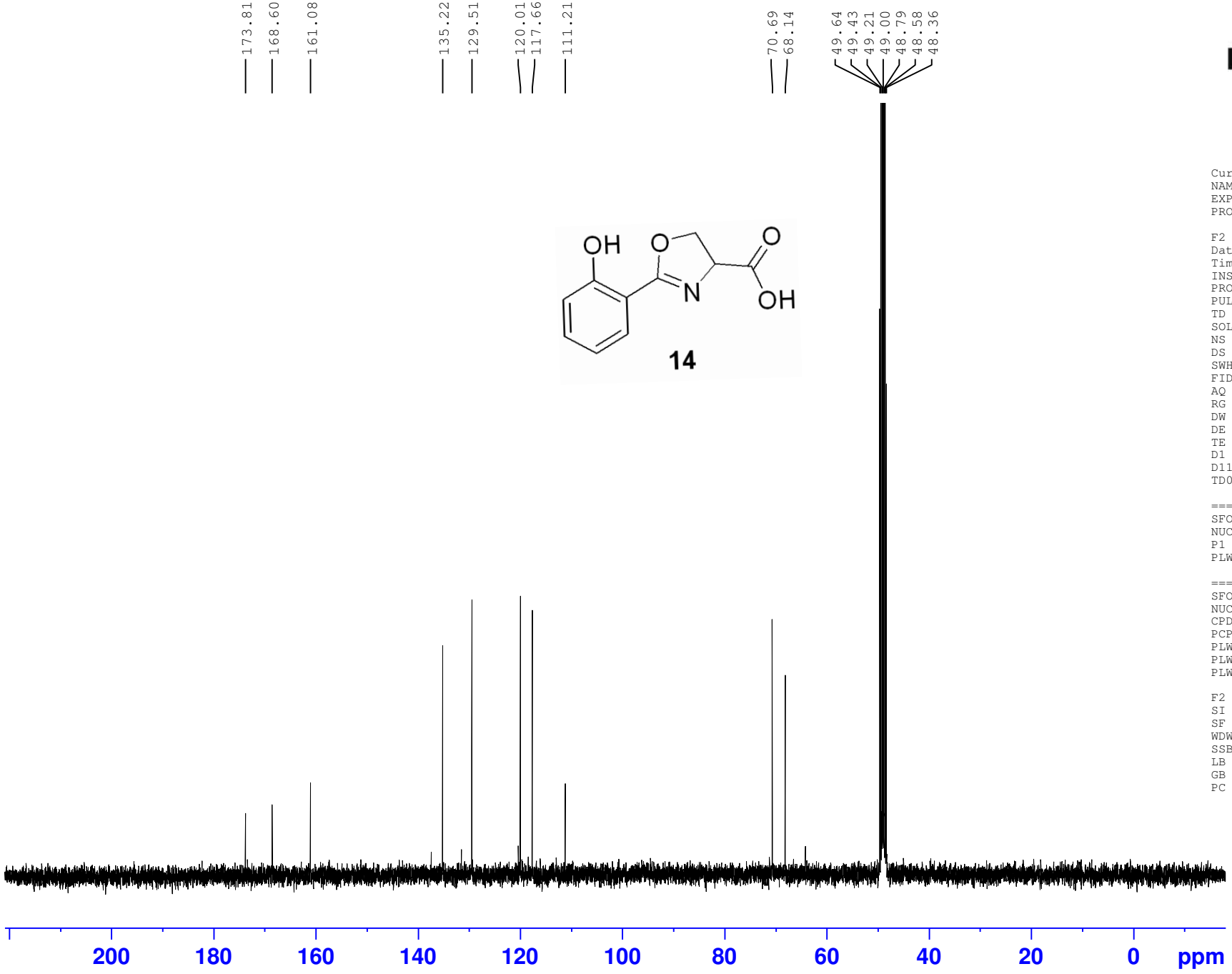

```
Current Data Parameters
NAME       hh-1-6-c-fr1
EXPNO                 8
PROCNO                1

F2 - Acquisition Parameters
Date_          20190624
Time               8.54
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD              65536
SOLVENT         CDCl3
NS                 31
DS                  4
SWH         24038.461 Hz
FIDRES       0.366798 Hz
AQ           1.3631488 sec
RG              193.13
DW              20.800 usec
DE               6.50 usec
TE              295.8 K
D1          2.00000000 sec
D11         0.03000000 sec
TD0                1

======== CHANNEL f1 ========
NUC1              13C
P1               9.90 usec
PLW1       53.00000000 W
SFO1      100.6379178 MHz

======== CHANNEL f2 ========
CPDPRG[2       waltz16
NUC2              1H
PCPD2            90.00 usec
PLW2       14.00000000 W
PLW12       0.35839999 W
PLW13       0.29030001 W
SFO2      400.1916008 MHz

F2 - Processing parameters
SI                32768
SF         100.6278646 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```



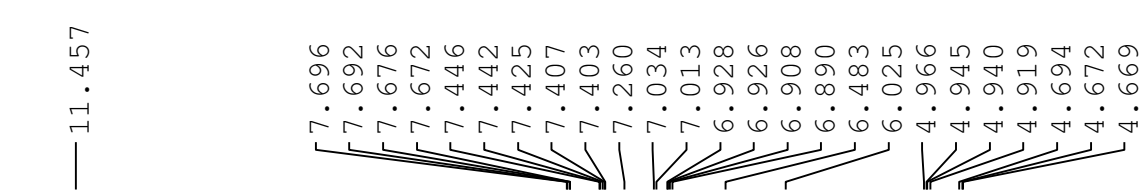


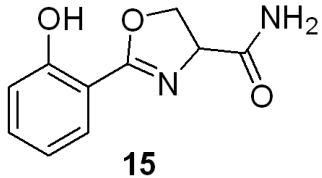



```
Current Data Parameters
NAME      hh-3-151-h-fr1
EXPNO                 2
PROCNO                1

F2 - Acquisition Parameters
Date_          20190705
Time              14.45
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG            zg30
TD                65536
SOLVENT            MeOD
NS                    6
DS                    0
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894465 sec
RG                112.31
DW                62.400 usec
DE                 6.50 usec
TE                295.0 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                1H
P1                14.50 usec
PLW1        11.99499989 W

F2 - Processing parameters
SI                65536
SF          400.1300082 MHz
WDW                 EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



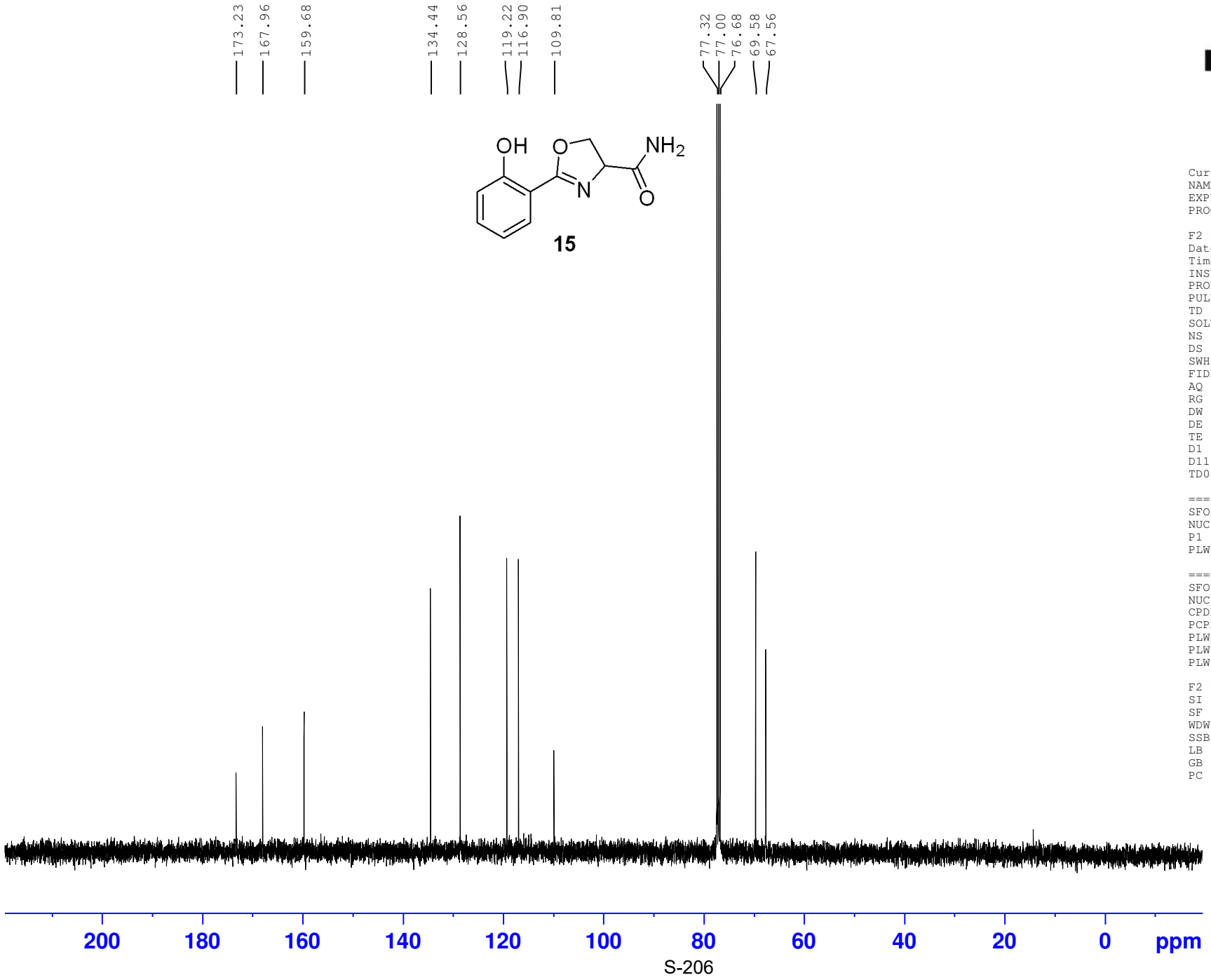

```
Current Data Parameters
NAME      hh-3-151-c-crude
EXPNO                    2
PROCNO                   1

F2 - Acquisition Parameters
Date_           20190708
Time              20.29
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT             MeOD
NS                  231
DS                    0
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                13C
P1                 9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6126285 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```





15


```
Current Data Parameters
NAME      hh-3-161-h-fr1
EXPNO                   1
PROCNO                  1

F2 - Acquisition Parameters
Date_           20190711
Time               19.09
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                     4
DS                     0
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894465 sec
RG                142.88
DW                62.400 usec
DE                 6.50 usec
TE                295.2 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.50 usec
PLW1         11.99499989 W

F2 - Processing parameters
SI                 65536
SF           400.1300102 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```




```
Current Data Parameters
NAME      hh-3-161-c-fr1
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20190711
Time              19.19
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                 150
DS                   0
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG               196.92
DW               20.800 usec
DE                6.50 usec
TE               296.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1               13C
P1                9.70 usec
PLW1        46.98899841 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        11.99499989 W
PLW12        0.34213999 W
PLW13        0.27713001 W

F2 - Processing parameters
SI                32768
SF          100.6127736 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```