Supporting Information

Combining Zn Ion Catalysis with Homogeneous Gold Catalysis: An Efficient Annulation Approach to *N*-Protected Indoles

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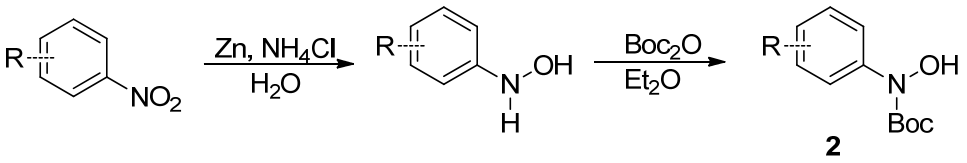
General. Ethyl acetate (ACS grade), hexanes (ACS grade), diethyl ether (ACS grade), were purchased from Fisher Scientific and used without further purification. Anhydrous toluene and 1,2-dichloroethane were bought from Acros and used directly. Commercially available reagents were used without further purification. Reactions were monitored by thin layer chromatography (TLC) using Silicycle precoated silica gel plates. Flash column chromatography was performed over Silicycle silica gel (230-400 mesh). ^{1}H NMR and ^{13}C NMR spectra were recorded on a Varian 500 MHz Unity plus spectrometer and a Varian 400 MHz spectrometer using residue solvent peaks as internal standards ($CDCl_3$, ^{1}H: 7.26 ppm; ^{13}C: 77.00 ppm), (CD_3SOCD_3, ^{1}H: 2.50 ppm; ^{13}C: 39.5 ppm). Infrared spectra were recorded with a Perkin Elmer FT-IR spectrum 2000 spectrometer and are reported in reciprocal centimeter (cm^{-1}). Mass spectra were recorded with Waters micromass ZQ detector using electrospray method.

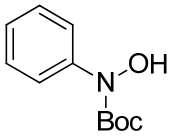
General Procedure A: preparation of *tert*-butyl hydroxy(aryl)carbamate



2

The precursor *N*-phenylhydroxylamine was synthesized according to literature procedures. [1] To a stirred mixture of nitrobenzene (21 mmol) and NH_4Cl (1.3 g, 24 mmol) in H_2O (40 mL) was slowly added zinc dust (90%, 3.08 g, 42 mmol) while maintaing the temperature below 60 □C. After 15 min's stirring, the reaction mixture was filtered while still warm and the solid was washed with hot water (10 mL). The filtrate was saturated with NaCl and cooled to 0 □C and the resulting solid was collected and dried. This crude *N*-phenylhydroxylamine was recrystallized from hexane-petroleum ether. To a solution of *N*-phenylhydroxylamine (10 mmol) in dry diethyl ether (50 mL) was added di-*t*-butyl dicarbonate (2.8 g, 10 mmol) at room temperature. After 12 h, the reaction was concentrated and the residue was purified through silica gel flash chromatography to give the desired product *tert*-butyl hydroxy(aryl)carbamate **2**.

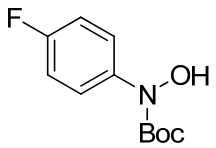
***tert*-Butyl hydroxy(phenyl)carbamate (2a)**



2a

This compound was known and prepared in 70% yield according to the general procedure A (eluents: ethyl acetate: hexanes = 1:20). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.67 (bs, 1H), 7.47 (dt, 2H, J_1 = 8.5 Hz, J_2 = 1.5 Hz), 7.35 (t, 2H, J = 8 Hz), 7.16 (t, 1H, J = 7.5 Hz), 1.52 (S, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 154.3, 140.7, 128.3, 125.1, 121.4, 83.4, 28.2; IR (neat): 3218, 2979, 2933, 1682, 1596, 1495, 1368, 1125.

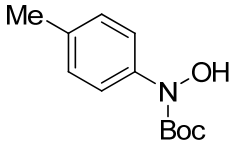
***tert*-Butyl 4-fluorophenyl(3ydroxyl)carbamate (2b)**



2b

This compound was prepared in 66% yield according to the general procedure A (eluents: ethyl acetate: hexanes = 1:15). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.26 (bs, 1H), 7.37 – 7.42 (m, 2H), 6.99 – 7.05 (m, 2H), 1.47 (s, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 160.2 (d, J = 243 Hz), 154.7, 137.1, 124.0 (d, J = 9 Hz), 115.1 (d, J = 23 Hz), 83.4, 28.2; IR (neat): 3238, 3232, 2980, 2934, 1695, 1683, 1507, 1369, 1230, 1126, 836; 250.09; HRMS (ES+) calculated for $[C_{11}H_{14}FNNaO_3]^+$: 250.0855, found: 250.0853.

***tert*-Butyl hydroxy(p-tolyl)carbamate (2c)**

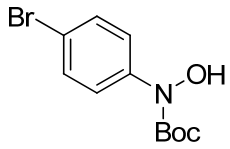


2c

This compound was known and prepared in 70% yield according to the general procedure A (eluents: ethyl acetate: hexanes = 1:15). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (bs, 1H), 7.32 (d, 2H, J = 8.8 Hz), 7.14 (d, 2H, J = 8Hz), 2.34 (s, 3H), 1.49 (s, 9H); ^{13}C NMR (100

MHz, $CDCl_3$) δ 154.5, 138.3, 135.1, 128.9, 121.9, 28.2, 20.9; IR (neat): 3194, 3130, 2975, 2925, 1694, 1667, 1509, 1367, 1161, 1122, 1106.

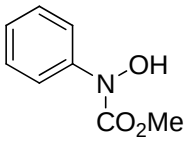
tert-Butyl 4-bromophenyl(hydroxy)carbamate (2d)



2d

This compound was prepared in 60% yield according to the general procedure A (eluents: ethyl acetate: hexanes = 1:25). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (bs, 1H), 7.44 (dt, 2H, J_1 = 9.2 Hz, J_2 = 2.4 Hz), 7.34 (dt, 2H, J_1 = 9.2 Hz, J_2 = 2.4 Hz), 1.50 (s, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 154.0, 139.9, 131.3, 122.7, 118.0, 83.9, 28.2; IR (neat): 3239, 2978, 2931, 1691, 1486, 1370, 1340, 1130; HRMS (ES+) calculated for $[C_{11}H_{14}BrNNaO_3]^+$: 310.0055, found: 310.0046.

Methyl hydroxy(phenyl)carbamate (2e)

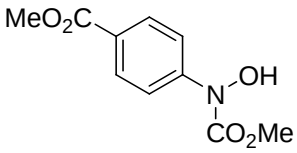


2e

This compound was known and prepared in 72% yield according to literature procedures. [2] ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.85 (bs, 1H), 7.47 – 7.49 (m, 2H), 7.37 (tt, 2H, J_1 = 8 Hz, J_2 = 2 Hz), 7.21 (tt, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 3.82 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.0, 140.5, 128.6, 126.0, 122.1, 53.8.

2f, 2g, 2h, 2i were prepared according to the literature procedures. [2] [3] [4]

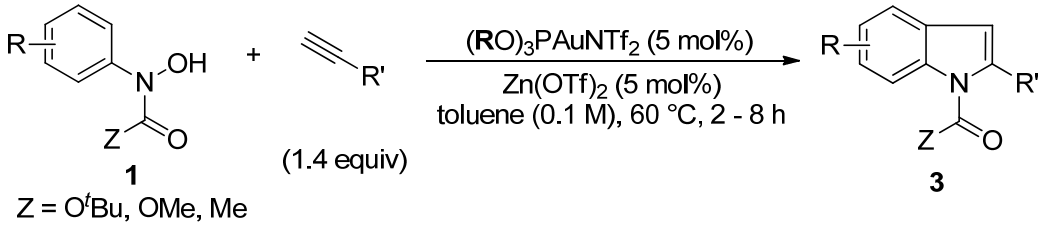
Methyl 4-(hydroxy(methoxycarbonyl)amino)benzoate (2g)



2g

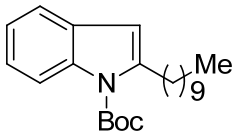
This compound was prepared in 70 % yield according to literature procedures. [2] (eluents: ethyl acetate: hexanes = 1:8). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 (d, 2H, *J* = 8.4 Hz), 7.60 (d, 2H, *J* = 8.8 Hz), 3.90 (s, 3H), 3.88 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 154.9, 144.3, 130.2, 126.0, 119.0, 54.1, 52.2; IR (neat): 3582, 3304, 3007, 2955, 2847, 1717, 1606, 1439, 1338, 1282, 1113; HRMS (ES+) calculated for $[C_{10}H_{11}NNaO_5]^+$: 248.0535, found: 248.0523.

General procedure B: preparation of *N*-protected-2-alkyl indoles 3



To a solution of *N*-protected hydroxylamine **2** (0.3 mmol, 1 equiv) in dry toluene (3 mL, 0.1 M) was added the coresponding alkyne (0.42 mmol, 1.4 equiv), $Zn(OTf)_2$ (0.015 mol%) and $(ArO)_3PAuNTf_2$ (Ar = 2,4-di-*tert*-butylphenyl, 0.015 mmol, 5 mol%) at room temperature. The reaction mixture was stirred at 60 ^{o}C for 2 – 8 h. Once the reaction finished by TLC, it was concentrated and the residue was purified through silica gel flash chromatography to give the desired product **3.**

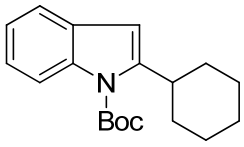
***tert*-Butyl 2-decyl-1*H*-indole-1-carboxylate (3a)**



3a

This compound was prepared in 90% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:80). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.12 (d, 1H, J = 8.5 Hz), 8.46 – 8.48 (d, 1H, J = 8 Hz), 7.19 – 7.27 (m, 2H), 6.36 (d, 1H, J = 1 Hz), 3.02 (t, 2H, J = 8 Hz), 1.69 – 1.74 (m, 11 H), 1.41 – 1.48 (m, 2H), 1.30 – 1.39 (m, 12H), 0.91 (t, 3H, J = 7 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.5, 142.5, 136.6, 129.3, 123.0, 122.4, 119.5, 115.5, 106.9, 83.5, 31.9, 30.2, 29.7, 29.6, 29.5, 29.4, 29.0, 28.3, 22.7, 14.2; IR (neat): 3051, 2954, 2925, 2854, 1734, 1454, 1369, 1327, 1166, 1118, 1086; HRMS (ES+) calculated for $[C_{23}H_{35}NNaO_2]^+$: 380.2565, found: 380.2562.

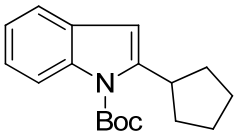
tert-Butyl 2-cyclohexyl-1*H*-indole-1-carboxylate (3b)



3b

This compound was prepared in 83% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (d, 1H, J = 8.0 Hz), 7.45 (dd, 1H, J_1 = 7.6 Hz, J_2 = 0.8 Hz), 7.15 – 7.23 (m, 2H), 6.37 (s, 1H), 3.35 (m, 1H, Hz), 2.10 (d, 1H, J = 12.8 Hz), 1.83 – 1.87 (m, 2H), 1.69 (s, 9H), 1.24 – 1.50 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.5, 147.9, 136.7, 129.4, 123.1, 122.4, 119.7, 115.5, 104.8, 83.5, 37.4, 33.7, 28.3, 26.7, 26.4; IR (neat): 2977, 2929, 2852, 1730, 1454, 1369, 1324, 1158, 1113, 1084; HRMS (ES+) calculated for $[C_{19}H_{25}NNaO_2]^+$: 322.1783, found: 322.1774.

tert-Butyl 2-cyclopentyl-1*H*-indole-1-carboxylate (3c)

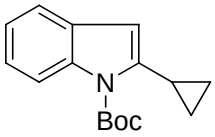


3c

This compound was prepared in 89% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (d, 1H, J = 8.0 Hz), 7.45 (dd, 1H, J_1 = 7.2 Hz, J_2 = 0.8 Hz), 7.16-7.24 (m, 2H), 6.37 (d, 1H, J = 0.8 Hz), 3.74

(m, 1H, J = 7.6 Hz), 2.13 – 2.17 (m, 2H), 1.71 – 1.77 (m, 2H), 1.56 – 1.70 (m, 13H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.5, 146.5, 136.8, 129.2, 123.1, 122.4, 119.7, 115.4, 104.6, 83.5, 39.4, 33.0, 28.2, 24.8. IR (neat): 3050, 2959, 2869, 2852, 1732, 1454, 1369, 1327, 1159, 1115, 1089; HRMS (ES+) calculated for $[C_{18}H_{23}NNaO_2]^+$: 308.1626, found: 308.1616.

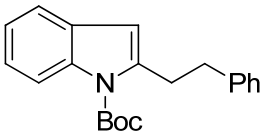
tert-Butyl 2-cyclopropyl-1*H*-indole-1-carboxylate (3d)



3d

This compound was prepared in 84% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (d, 1H, J = 8.0 Hz), 7.43 (dd, 1H, J_1 = 7.6 Hz, J_2 = 0.8 Hz), 7.17 – 7.24 (m, 2H), 6.24 (s, 1H), 2.34 – 2.40 (m, 1H), 1.70 (s, 9H), 0.94 – 1.00 (m, 2H), 0.72 – 0.78 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.6, 143.9, 136.8, 129.0, 123.3, 122.5, 119.8, 115.3, 105.6, 83.4, 28.3, 11.2, 7.6; IR (neat): 3050, 2979, 2930, 2851, 1730, 1454, 1369, 1335, 1165, 1118, 1096; HRMS (ES+) calculated for $[C_{16}H_{19}NO_2]^+$: 257.1416, found: 257.1425.

tert-Butyl 2-phenethyl-1*H*-indole-1-carboxylate (3e)

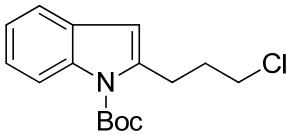


3e

This compound was prepared in 96% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (d, 1H, J = 8.4 Hz), 7.47 (dd, 1H, J_1 = 7.2 Hz, J_2 = 0.8 Hz), 7.21 – 7.34 (m, 7H), 6.38 (d, 1H, J = 0.8 Hz), 3.37 (d, 2H, J = 7.2 Hz), 3.05 (d, 2H, J = 7.2 Hz), 1.71 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.6, 141.7, 141.5, 136.5 129.3, 128.4, 128.3, 126.0, 123.3, 122.6, 119.8, 115.6, 107.4, 83.8, 35.3, 31.9, 28.4; IR (neat): 3051, 2977, 2925, 2851, 1732, 1460, 1369,

1328, 1158, 1115, 1086; HRMS (ES+) calculated for $[C_{21}H_{23}NNaO_2]^+$: 344.1626, found: 344.1623.

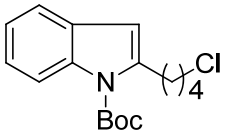
tert-Butyl 2-(3-chloropropyl)-1*H*-indole-1-carboxylate (3f)



3f

This compound was prepared in 87% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (d, 1H, J = 8.0 Hz 7.46 (dd, 1H, J_1 = 7.8 Hz, J_2 = 1.2 Hz), 7.19 – 7.25 (m, 2H), 6.40 (s, 1H), 3.62 (t, 2H, J = 6.4 Hz), 3.20 (t, 2H, J = 7.2 Hz), 2.10 – 2.25 (m, 2H), 1.70 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.4 140.1, 136.6, 129.1, 123.5, 122.7, 119.8, 115.6, 107.9, 83.9, 44.4, 31.7, 31.5, 30.6, 28.3, 27.3; IR (neat): 3050, 2977, 2925, 2851, 1732, 1460, 1369, 1328, 1158, 1115, 1086; HRMS (ES+) calculated for $[C_{16}H_{20}ClNNaO_2]^+$: 316.1080, found: 316.1085.

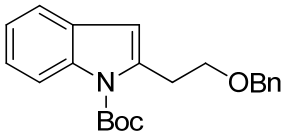
tert-Butyl 2-(4-chlorobutyl)-1*H*-indole-1-carboxylate (3g)



3g

This compound was prepared in 95% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (d, 1H, J = 8.4 Hz 7.45 (dd, 1H, J_1 = 6.8 Hz, J_2 = 1.6 Hz), 7.18 – 7.23 (m, 2H), 6.37 (s, 1H), 3.60 (t, 2H, J = 6.4 Hz), 3.20 (t, 2H, J = 6.8 Hz), 1.86 – 1.90 (m, 2H), 1.70 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.5, 141.5, 136.6, 129.2, 123.3, 122.6, 119.7, 115.6, 107.3, 83.8, 45.0, 32.3, 29.5, 28.3, 26.3; IR (neat): 3050, 2977, 2925, 2851, 1732, 1454, 1370, 1327, 1158, 1115, 1087; HRMS (ES+) calculated for $[C_{17}H_{22}ClNNaO_2]^+$: 330.1237, found: 330.1259.

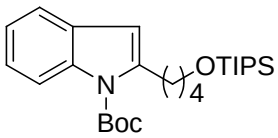
tert-Butyl 2-(2-(benzyloxy)ethyl)-1*H*-indole-1-carboxylate (3h)



3h

This compound was prepared in 83% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (d, 1H, J = 8.2 Hz 7.47 – 7.49 (m, 1H), 7.19 – 7.36 (m, 7H), 6.45 (d, 1H, J = 0.8 Hz), 4.59 (s, 2H), 3.83 (t, 2H, J = 7.2 Hz), 3.38 (td, 2H, J_1 = 6.4 Hz, J_2 = 0.8 Hz), 1.68 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.4, 138.4, 138.2, 136.5, 129.2, 128.3, 127.7, 127.5, 123.4, 122.6, 119.8, 115.5, 108.3, 83.8, 72.9, 69.0, 30.6, 28.1; IR (neat): 3050, 2977, 2930, 2858, 1732, 1454, 1370, 1328, 1158, 1118, 1092; HRMS (ES+) calculated for $[C_{22}H_{25}NNaO_3]^+$: 374.1732, found: 374.1732.

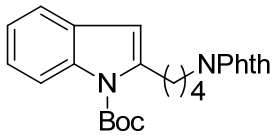
tert-Butyl 2-(4-((triisopropylsilyl)oxy)butyl)-1*H*-indole-1-carboxylate (3i)



3i

This compound was prepared in 78% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:200). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (dd, 1H, J_1 = 8.8 Hz, J_2 = 0.8 Hz), 7.35 – 7.37 (m, 1H), 7.08 – 7.16 (m, 2H), 6.28 (d, 1H, J = 0.8 Hz), 3.67 (t, 2H, J = 6.0 Hz), 2.95 (t, 2H, J = 7.6 Hz), 1.69 – 1.74 (m, 2H), 1.57 – 1.62 (m, 12H), 0.95 – 0.99 (m, 18H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.6, 142.3, 136.6, 129.4, 123.1, 122.5, 119.6, 115.5, 107.0, 83.6, 63.2, 32.7, 29.9, 28.2, 25.2, 18.0, 11.9; IR (neat): 3050, 2977, 2941, 2865, 1734, 1454, 1369, 1303, 1165, 1116, 1095; HRMS (ES+) calculated for $[C_{26}H_{43}NNaSiO_3]^+$: 468.2910, found: 468.2897.

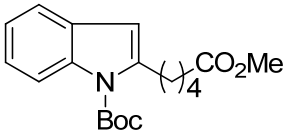
tert-Butyl 2-(4-(1,3-dioxoisoindolin-2-yl)butyl)-1*H*-indole-1-carboxylate (3j)



3j

This compound was prepared in 93% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:40). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (d, 1H, *J* = 8.0 Hz), 7.83 – 7.85 (m, 2H), 7.69-7.2 (m, 2H), 7.42-7.44 (m, 2H), 7.16-7.21 (m, 2H), 6.34 (s, 1H), 3.75 (t, 2H, *J* = 7.2 Hz), 3.04 (t, 2H, *J* = 7.2 Hz), 1.75-1.82 (m, 4H), 1.66 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 150.4, 141.5, 136.6, 133.8, 132.1, 129.2, 123.2, 123.1, 122.5, 119.7, 115.6, 107.3, 83.7, 37.9, 29.8, 28.4, 28.3, 26.3; IR (neat): 3050, 2977, 2925, 2851, 1707, 1460, 1369, 1328, 1158, 1116, 1086; HRMS (ES+) calculated for $[C_{25}H_{26}N_2NaO_4]^+$: 441.1790, found: 441.1784.

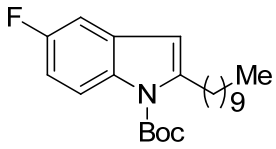
tert-Butyl 2-(5-methoxy-5-oxopentyl)-1*H*-indole-1-carboxylate (3k)



3k

This compound was prepared in 82% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:80). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.09 (d, 1H, *J* = 8.5 Hz), 7.17 – 7.23 (m, 2H), 6.36 (d, 1H, *J* = 0.5 Hz), 3.69 (s, 3H), 3.03 (t, 2H, *J* = 7.5 Hz), 2.40 (t, 2H, *J* = 7.5 Hz), 1.75 – 1.78 (m, 4H), 1.70 (s, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 173.9, 150.5, 141.7, 136.6, 129.3, 123.2, 122.6, 119.7, 115.5, 107.2, 83.7, 51.6, 34.0, 29 .9, 28.4, 28.3, 24.7; IR (neat): 3050, 2977, 2925, 2851, 1732, 1455, 1369, 1328, 1161, 1115, 1086; HRMS (ES+) calculated for $[C_{19}H_{25}NNaO_4]^+$: 354.1681, found: 354.1684.

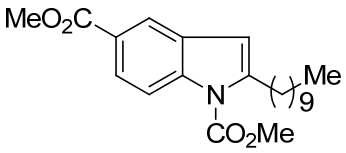
tert-Butyl 2-decyl-5-fluoro-1*H*-indole-1-carboxylate (3l)



3l

This compound was prepared in 94% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:80). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (dd, 1H, J_1 = 9.2 Hz, J_2 = 4.8 Hz), 7.09 (dd, 1H, J_1 = 8.8 Hz, J_2 = 2.8 Hz), 6.93 (td, 1H, J_1 = 8.8 Hz, J_2 = 2.4 Hz), 6.30 (s, 1H), 2.97 (t, 2H, J = 7.6 Hz), 1.68 (s, 9H), 1.21 – 1.44 (m, 16H), 0.89 (t, 3H, J = 7.2 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 160.1, 158.2, 150.3, 144.2, 132.9, 130.2 (d, J = 10.3 Hz), 116.4 (d, J = 9.0 Hz), 110.6 (d, J = 9.0 Hz), 106.6 (d, J = 3.4 Hz), 105.0 (d, J = 23.1 Hz), 83.8, 32.0, 30.4, 29.7, 29.6, 29.5, 29.48, 29.41, 28.9, 28.3, 22.8, 14.2; IR (neat): 3050, 2977, 2925, 2851, 1732, 1460, 1369, 1327, 1158, 1115, 1086; HRMS (ES+) calculated for $[C_{23}H_{34}NFO_2]^+$: 375.2574, found: 375.2570.

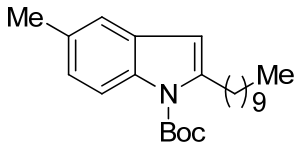
Dimethyl 2-decyl-1*H*-indole-1,5-dicarboxylate (3m)



3m

This compound was prepared in 80% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:40). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 (d, 1H, J = 1.6 Hz), 8.09(d, 1H, J = 8.8 Hz), 7.92 (dd, 1H, J_1 = 8.8 Hz, J_2 = 1.6 Hz), 7.42 (d, 1H, J = 0.8 Hz), 4.06 (s, 3H), 3.93 (s, 3H), 2.99 (t, 2H, J = 7.6 Hz), 1.67-1.71 (m, 2H), 1.27-1.42 (m, 14H), 0.88 (t, 3H, J = 6.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 152.2, 144.0, 139.1, 129.3, 124.8, 124.7, 121.9, 115.2, 107.7, 53.7, 52.0, 31.9, 29.9, 29.6, 29.5, 29.3, 28.6, 22.7, 14.1; IR (neat): 3050, 2977, 2925, 2851, 1732, 1707, 1441, 1369, 1328, 1158, 1115, 1086; HRMS (ES+) calculated for $[C_{22}H_{31}NNaO_4]^+$: 396.2151, found: 396.2153.

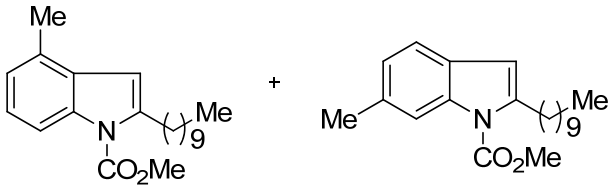
tert-Butyl 2-decyl-5-methyl-1*H*-indole-1-carboxylate (3n)



3n

This compound was prepared in 91% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, 1H, *J* = 8.8 Hz), 7.23-7.26 (m, 1H), 7.04 (d, 1H, *J* = 8.8 Hz), 6.27 (s, 1H), 2.98 (t, 2H, *J* = 7.6 Hz), 2.42 (s, 3H), 1.68-1.70 (m, 11H), 1.27-1.41 (m, 14H), 0.89 (t, 3H, *J* = 6.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.6, 142.6, 134.8, 131.9, 129.6, 124.3, 119.6, 115.2, 106.7, 83.4, 76.8, 43.9, 31.9, 30.3, 29.7, 29.6, 29.5, 29.48, 29.42, 29.0, 28.3, 22.8, 21.3, 14.2; IR (neat): 3050, 2977, 2925, 2851, 1732, 1460, 1369, 1327, 1158, 1116, 1086; HRMS (ES+) calculated for $[C_{24}H_{37}NNaO_2]^+$: 394.2722, found: 394.2713.

2-Decyl-4-methyl-indole-1-carboxylic acid methyl ester (3o) and
2-Decyl-6-methyl-indole- 1-carboxylic acid methyl ester (3o')

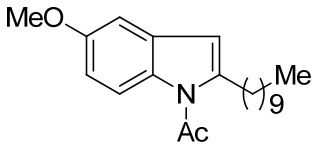


3o:3o' = 1.25:1

These two compounds were prepared as a pair of inseparable mixtures in 78% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). The position of the methyl group is determined by 1H nosey; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90-7.92 (m, 1H), 7.32 (d, 0.44 H, *J* = 8.4 Hz), 7.12-7.16 (m, 0.63H), 7.00-7.12 (m, 1H), 6.40 (d, 0.54 H, *J* = 0.4 Hz), 6.40 (d, 0.43 H, *J* = 0.8 Hz), 4.04 (s, 3H), 2.97-3.02 (m, 2H), 2.47-2.49 (m, 3H), 1.68-1.71 (m, 2H), 12.8-14.6 (m, 16H), 0.87.-0.90 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.6, 142.0, 141.8, 136.8, 136.1, 133.2, 129.0, 128.9, 127.2, 124.2, 123.4, 123.3, 119.3, 115.8, 113.1, 107.4, 105.9, 53.34, 53.31, 43.8, 31.9, 29.99, 29.91, 29.84, 29.62, 29.53, 29.47, 29.39, 29.35, 29.30, 29.17, 28.89, 28.79, 23.84, 22.69, 21.

98, 18.39, 14.117; IR (neat): 3050, 2977, 2925, 2851, 1732, 1460, 1369, 1328, 1158, 1115, 1086; HRMS (ES+) calculated for $[C_{21}H_{31}NO_2]^+$: 329.2355, found: 329.2362.

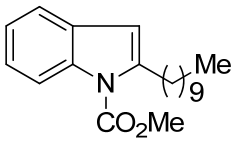
1-(2-Decyl-5-methoxy-1*H*-indol-1-yl)ethanone (3p)



3p

This compound was prepared in 80% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:100). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64 (d, 1H, J = 8.8 Hz), 6.95 (d, 1H, J = 2.8 Hz), 6.84 (dd, 1H, J_1 = 9.2 Hz, J_2 = 2.4 Hz), 6.34 (s, 1H), 3.85 (s, 3H), 2.97 (t, 2H, J = 7.6 Hz), 2.72 (s, 3H), 1.66 – 1.74 (m, 2H), 1.20 – 1.43 (m, 14H), 0.88 (t, 3H, J = 6.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.9, 155.9, 143.7, 131.04, 130.96, 115.7, 150.5, 11.5, 108.2, 102.9, 5.6, 31.9, 30.6, 29.6, 29.5, 29.3, 28.8, 27.5, 22.7, 14.2; IR (neat): 2995, 2925, 2853, 1704, 1614, 1478, 1371, 1308, 1206; HRMS (ES+) calculated for $[C_{21}H_{31}NNaO_2]^+$: 352.2252, found: 352.2241.

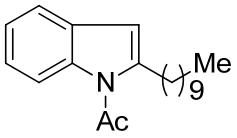
Methyl 2-decyl-1*H*-indole-1-carboxylate (3q)



3q

This compound was prepared in 81% yield according to the general procedure B (2 equiv of 1-dodecyne was used; reaction solvent was DCE; eluents: ethyl acetate: hexanes = 1:75). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (dd, 1H, J_1 = 8 Hz, J_1 = 0.8 Hz), 7.46 (dd, 1H, J_1 = 8 Hz, J_2 = 0.8 Hz), 7.19 – 7.27 (m, 2H), 6.38 (s, 1H), 4.05 (s, 3H), 3.00 (t, 2H, J = 7.6 Hz), 1.66 – 1.74 (m, 2H), 1.28 – 1.46 (m, 14H), 0.89 (t, 3H, J = 6.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.6, 142.6, 136.4, 129.5, 123.3, 122.9, 119.7, 115.5, 53.4, 31.9, 29.9, 29.6, 29.5, 29.3, 28.7, 22.7, 14.1; HRMS (ES+) calculated for $[C_{20}H_{29}NNaO_2]^+$: 338.2096, found: 338.2102.

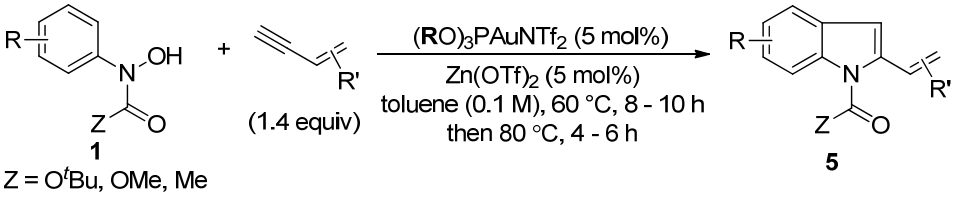
1-(2-decyl-1*H*-indol-1-yl)ethanone (3r)



3r

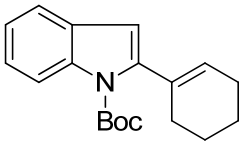
This compound was prepared in 90% yield according to the general procedure B (eluents: ethyl acetate: hexanes = 1:40). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, 1H, *J* = 8.0 Hz), 7.47-7.50 (m, 1H), 7.21-7.26 (m, 2H), 6.41 (d, 1H, *J* = 0.8 Hz), 2.99 (t, 2H, *J* = 7.2 Hz), 2.76 (s, 3H), 1.68-1.74 (m, 2H), 1.20-1.43 (m, 14H), 0.89 (t, 3H, *J* = 6.8 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.3, 143.0, 136.3, 129.9, 123.4, 122.9, 120.1, 114.7, 108.1, 31.9, 30.5, 29.6, 29.5, 29.3, 28.9, 27.7, 22.7, 14.1; IR (neat): 3050, 2954, 2925, 2851, 1707, 1460, 1369, 1301, 1208; HRMS (ES+) calculated for [$C_{20}H_{29}NNaO$] 322.2147, found: 322.2153.

General procedure C: preparation of *N*-protected-2-alkenyl indoles 5



To a solution of *N*-protected hydroxylamine **2** (0.3 mmol, 1 equiv) in dry toluene (3 mL, 0.1 M) was added the corresponding 1,3-enyne (0.42 mmol, 1.4 equiv), $Zn(OTf)_2$ (0.015 mmol, 5 mol%) and $(ArO)_3PAuNTf_2$ (Ar = 2,4-di-*tert*-butylphenyl, 0.015 mmol, 5 mol%) at room temperature. The reaction mixture was stirred at 60 ^{o}C for 8 – 10 h. Once TLC indicated there was no starting material left, the reaction was raised up to 80 ^{o}C, stirred for additional 4 - 8 h, and then concentrated. The residue was purified through silica gel flash chromatography to give the desired product **5**.

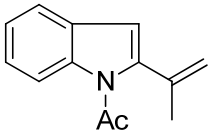
tert-Butyl 2-cyclohexenyl-1*H*-indole-1-carboxylate (5a)



5a

This compound was prepared in 83 % yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.09 (dd, 1H, J_1 = 8.5 Hz, J_2 = 1 Hz), 7.50 (d, 1H, J = 7.5 Hz), 7.26 – 7.29 (m, 1H), 7.21 (td, 1H, J_1 = 7.5 Hz, J_1 = 1 Hz), 6.39 (s, 1H), 5.89 – 5.92 (m, 1H), 2.27 – 2.30 (m, 2H), 2.21 – 2.25 (m, 2H), 1.78 – 1.83 (m, 2H), 1.70 – 1.75 (m, 2H), 1.67 (s, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.3, 143.7, 136.9, 132.5, 129.3, 126.5, 123.6, 122.6, 120.1, 115.1, 107.8, 83.4, 29.1, 28.2, 25.4, 22.7, 21.9; IR (neat): 3051, 2979, 2932, 2859, 2834, 1731, 1453, 1369, 1326, 1161, 1126; HRMS (ES+) calculated for $[C_{19}H_{23}NNaO_2]^+$: 320.1626, found: 320.1627.

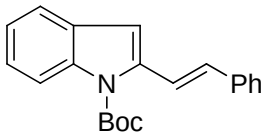
1-(2-(Prop-1-en-2-yl)-1*H*-indol-1-yl)ethanone (5b)



5b

This compound was prepared in 68% yield according to the general procedure C (2 equiv enyne was used; eluents: ethyl acetate: hexanes = 1:30). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.19 (ddd, 1H, J_1 = 8.5 Hz, J_2 = 2 Hz, J_3 = 1 Hz), 7.52 (ddd, 1H, J_1 = 8 Hz, J_2 = 2 Hz, J_3 = 1 Hz,), 7.31 – 7.34 (m, 1H), 7.24 – 7.27 (m, 1H), 6.56 (d, 1H, J = 1 Hz), 5.31 – 5.32 (m, 1H), 5.26 (s, 1H), 2.62 (s, 3H), 2.15 (dd, 3H, J_1 = 1.5 Hz, J_2 = 1 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 171.0, 141.6, 138.0, 137.3, 128.9, 124.8, 123.4, 120.4, 117.3, 115.3, 109.8, 26.8, 23.3; IR (neat): 3084, 3050, 2954, 2923, 2854, 1706, 1451, 1368, 1299, 1187; HRMS (ES+) calculated for $[C_{13}H_{13}NNaO]^+$: 222.0895, found: 222.0887.

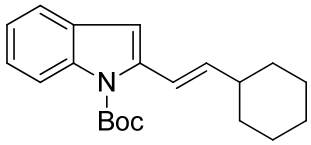
(E)-*tert*-Butyl 2-styryl-1*H*-indole-1-carboxylate (5c)



5c

This compound was prepared in 74% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1: 50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.15 (d, 1H, J = 8.5 Hz), 7.78 (d, 1H, J = 16.5 Hz), 7.56 (d, 3H, J = 7.5 Hz), 7.39 (t, 2H, J = 7.5 Hz), 7.28 – 7.32 (m, 2H), 7.24 – 7.27 (m, 1H), 7.08 (d, 1H, J = 16.5 Hz), 6.88 (S, 1H), 1.73 (S, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.5, 139.5, 137.1, 136.8, 130.5, 129.3, 128.6, 127.7, 126.6, 124.1, 122.9, 120.7, 120.2, 115.7, 106.7, 84.1, 28.4; IR (neat): 3058, 3023, 2976, 2931, 1730, 1450, 1370, 1327, 1157; HRMS (ES+) calculated for $[C_{21}H_{21}NNaO_2]^+$: 342.1470, found: 342.1468.

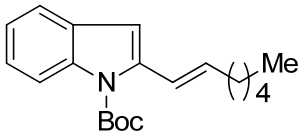
(E)-*tert*-Butyl 2-(2-cyclohexylvinyl)-1*H*-indole-1-carboxylate (5d)



5d

This compound was prepared in 90% yield according to the general procedure C (pent-2-en-4-yn-1-ylcyclohexane (E/Z> 30: 1) was used; eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.11 (d, 1H, J = 8.5 Hz), 8.48 (d, 1H, J = 8 Hz), 7.25 (td, 1H, J_1 = 7.5 HZ, J_2 = 1.5 Hz), 7.20 (td, 1H, J_1 = 7.5 Hz, J_2 = 1.0 Hz), 6.91 (d, 1H, J = 16 Hz), 6.64 (S, 1H), 6.16 (dd, 1H, J_1 = 15.5 Hz, J_2 = 2 Hz), 2.18 – 2.21 (m, 1H), 1.87 (dd, 1H, J_1 = 14 Hz, J_2 = 2 Hz), 1.80 (dt, 2H, J_1 = 13 Hz, J_2 = 3.5 Hz), 1.71 (S, 9H), 1.31 – 1.39 (m, 3H), 1.19 – 1.27 (m, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.5, 140.0, 139.1, 136.5, 129.4, 123.5, 122.7, 119.87, 119.81, 115.5, 105.8, 83.8, 41.2, 32.8, 28.4, 26.2, 26.1; IR (neat): 2927, 2853,1731, 1451, 1370, 1328, 1159; HRMS (ES+) calculated for $[C_{21}H_{27}NO_2]^+$: 325.2042, found: 325.2040.

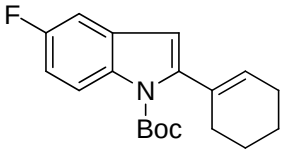
(E)-*tert*-Butyl 2-(hept-1-enyl)-1*H*-indole-1-carboxylate (5e)



5e

This compound was prepared in 86% yield (E/Z> 15: 1) according to the general procedure C (non-3-en-1-yne (E/Z = 9: 1) was used; eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.11 (d, 1H, J = 8 Hz), 7.49 (d, 1H, J = 8 Hz), 7.19 – 7.27 (m, 2H), 6.64 (s, 1H), 6.20 (dt, 1H, J_1 = 16 Hz, J_2 = 7 Hz), 2.24 – 2.29 (m, 2H), 1.71 (s, 9H), 1.51 – 1.57 (m, 2H), 1.36 – 1.40 (m, 4H), 0.94 (t, 3H, J = 7 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.5, 139.8, 136.4, 133.7, 129.4, 123.5, 122.7, 122.1, 119.9, 115.5, 105.9, 83.8, 33.1, 31.5, 28.9, 28.3, 22.6, 14.1; IR (neat): 3051, 2957, 2856, 1731, 1451, 1327, 1159, 1116, 962; HRMS (ES+) calculated for $[C_{20}H_{27}NO_2]^+$: 313.2042, found: 325.2041.

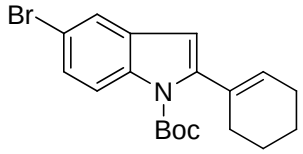
***tert*-Butyl 2-cyclohexenyl-5-fluoro-1*H*-indole-1-carboxylate (5f)**



5f

This compound was prepared in 75% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 (dd, 1H, J_1 = 8.8 Hz, J_2 = 4.4 Hz), 7.12 (dd, 1H, J_1 = 8.8 Hz, J_2 = 2.8 Hz), 6.97 (td, 1H, J_1 = 8.8 Hz, J_2 = 2.8 Hz), 6.31 (s,1H), 5.87 – 5.89 (m, 1H), 2.18 – 2.27 (m, 4H), 1.75 – 1.80 (m, 2H), 1.68 – 1.73 (m, 2H), 1.64 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.2 (d, J = 236 Hz), 150.1, 145.3, 133.2, 132.3, 130.1 (d, J = 11 Hz), 127.0, 116.1 (d, J = 11 Hz), 111.2 (d, J = 24 Hz), 107.5, 105.5 (d, J = 24 Hz), 83.7, 29.1, 28.1, 25.3, 22.6, 21.9; IR (neat): 2979, 2970, 2933, 2860, 2834, 1732, 1471, 1370, 1314, 1115; HRMS (ES+) calculated for $[C_{19}H_{22}NNaO_2]^+$: 338.1532, found: 338.1523.

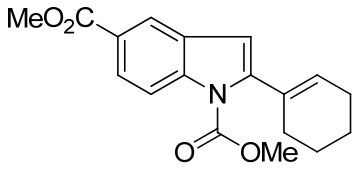
tert-Butyl 5-bromo-2-cyclohexenyl-1*H*-indole-1-carboxylate (5g)



5g

This compound was prepared in 65% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.93 (d, 1H, J = 9 Hz), 7.60 (d, 1H, J = 2 Hz), 7.33 (dd, 1H, J_1 =9 HZ, J_2 = 2 Hz), 6.29 (S, 1H), 5.87 – 5.89 (m, 1H), 2.23 – 2.26 (m, 2H), 2.18 – 2.22 (m, 2H), 1.75 – 1.79 (m, 2H), 1.68 – 1.72 (m, 2H), 1.64 (s, 9H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.9, 144.8, 135.6, 132.0, 131.0, 127.2, 126.3, 122.6, 116.6, 115.8, 106.9, 83.9, 29.1, 28.2, 25.4, 22.7, 21.9; IR (neat): 3111, 2965, 2932, 2859, 2834, 1733, 1446, 1348, 1155, 1013; HRMS (ES+) calculated for $[C_{19}H_{22}BrNNaO_2]^+$: 398.0732, found: 398.0738.

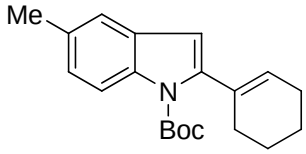
Dimethyl 2-cyclohexenyl-1*H*-indole-1,5-dicarboxylate (5h)



5h

This compound was prepared in 77% yield according to the general procedure C (reaction solvent: DCE; eluents: ethyl acetate: hexanes = 1:30). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 (d, 1H, J = 1.6 Hz), 8.10 (d, 1H, J = 8.8 Hz), 7.96 (dd, 1H, J_1 = 8.8 Hz, J_2 = 2 Hz), 6.43 (s, 1H), 5.87 – 5.89 (m, 1H), 4.02 (s, 3H), 3.93 (s, 3H), 2.19 – 2.22 (m,4H), 1.68 – 1.77 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 151.8, 144.8, 139.2, 132.1, 129.3, 127.9, 125.2, 124.9, 122.4, 115.1, 108.5, 53.8, 52.0, 29.3, 25.4, 22.7, 21.9; IR (neat): 3022, 2933, 2856, 1741, 1722, 1444, 1338, 1210; HRMS (ES+) calculated for $[C_{18}H_{19}NNaO_4]^+$: 336.1212, found: 336.1205.

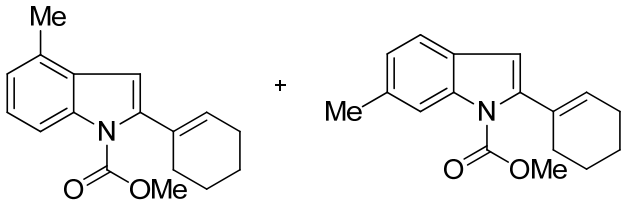
tert-Butyl 2-cyclohexenyl-5-methyl-1*H*-indole-1-carboxylate (5i)



5i

This compound was prepared in 80% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 (d, 1H, *J* = 8.4 Hz), 7.27 (s, 1H), 7.07 (d, 1H, *J* = 8.8 Hz), 6.29 (s, 1H), 5.87 – 5.89 (m, 1H), 2.42 (s, 3H), 2.23 – 2.26 (m, 2H), 2.19 – 2.21 (m, 2H), 1.75 – 1.81 (m, 2H), 1.67 – 1.73 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.3, 143.8, 135.1, 132.6, 132.0, 129.5, 126.3, 124.9, 120.1, 114.8, 107.6, 83.2, 29.1, 28.2, 25.3, 22.7, 21.9, 21.2; IR (neat): 2978, 2932, 2857, 2834,1731, 1474, 1352, 1134; HRMS (ES+) calculated for $[C_{20}H_{25}NNaO_2]^+$: 334.1783, found: 334.1779.

Methyl 2-cyclohexenyl-4-methyl-1*H*-indole-1-carboxylate (5j) and methyl 2-cyclohexenyl-6-methyl-1*H*-indole-1-carboxylate (5j')

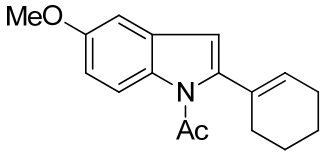


5j:5j' = (1.5 : 1)

These two compounds were prepared as a pair of inseparable mixtures in 71% yield according to the general procedure C (reaction solvent: DCE; eluents: ethyl acetate: hexanes = 1:40). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 – 7.94 (m, 0.75H), 7.37 (d, 0.39H, *J* = 8 Hz), 7.19 (t, 0.48H, *J* = 8 Hz), 7.03 – 7.07 (m, 0.83H), 6.45 (d, 0.47H, *J* = 0.8 Hz), 6.34 (d, 0.34H, *J* = 0.8 Hz), 5.86 – 5.91(m, 0.86H), 4.01 (s, 2.70H), 2.51 (s, 1.5H), 2.50 (s, 1.2H), 2.21 – 2.25 (m, 4H), 1.60 – 1.79 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.2, 152.1, 143.04, 142.95, 136.9, 136.2, 133.8, 132.7, 129.6, 129.0, 127.2, 127.0, 126.9, 124.3, 123.9, 123.4, 119.8, 115.6, 112.9, 108.2, 106.9, 53.50, 53.47, 29.42, 29.39, 25.4,

22.8, 22.1, 22.0, 18.4; IR (neat): 3025, 2931, 2856, 2834, 1734, 1441, 1327, 1129; HRMS (ES+) calculated for $[C_{17}H_{19}NNaO_2]^+$: 292.1313, found: 292.1293.

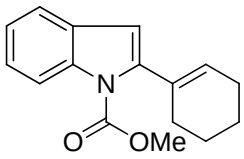
1-(2-(Cyclohex-1-en-1-yl)-5-methoxy-1*H*-indol-1-yl)ethanone (5k)



5k

This compound was prepared in 75% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:60). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 (d, 1H, J = 8.8 Hz), 6.95 (d, 1H, J = 2.8 Hz), 6.89 (dd, 1H, J_1 = 9.2 Hz, J_2 = 2.8 Hz), 6.36 (s, 1H), 5.94 – 5.97 (m, 1H), 3.84 (s, 3H), 2.55 (s, 3H), 2.26 – 2.30 (m, 2H), 2.20 – 2.25 (m, 2H), 1.75 – 1.81 (m, 2H), 1.68 – 1.73 (m, 2H); ^{13}C NMR (100MHz, $CDCl_3$) δ 170.9, 156.3, 143.1, 132.0, 130.0, 129.9, 116.7, 112.7, 109.1, 102.9, 55.7, 30.1, 26.1, 25.6, 22.7, 21.7; IR (neat): 2996, 2927, 2856, 2832, 1697, 1609, 1472, 1368, 1305, 1212, 1141; HRMS (ES+) calculated for $[C_{17}H_{19}NNaO_2]^+$: 292.1313, found: 292.1300.

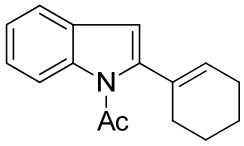
Methyl 2-cyclohexenyl-1*H*-indole-1-carboxylate (5l)



5l

This compound was prepared in 86% yield according to the general procedure C (reaction solvent: DCE, eluents: ethyl acetate: hexanes = 1:50). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.11 (d, 1H, J = 8.5 Hz), 7.50 (dt, 1H, J_1 =7.5 Hz, J_2 = 1 Hz), 7.22 – 7.31 (m, 2H), 6.40 (s, 1H), 5.88 – 5.90 (m, 1H), 4.09 (S, 3H), 2.22 – 2.27 (m, 4H), 1.72 – 1.75 (m, 2H), 1.77 – 1.81 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 125 152.0, 143.5, 136.4, 132.5, 129.5, 127.1, 123.8, 122.9, 120.2, 115.4, 108.3, 53.5, 29.4, 25.5, 22.8, 22.1; IR (neat): 3027, 2932, 2856, 2834, 1744, 1455, 1324, 1213; HRMS (ES+) calculated for $[C_{16}H_{17}NNaO_2]^+$: 278.1157, found: 278.1146.

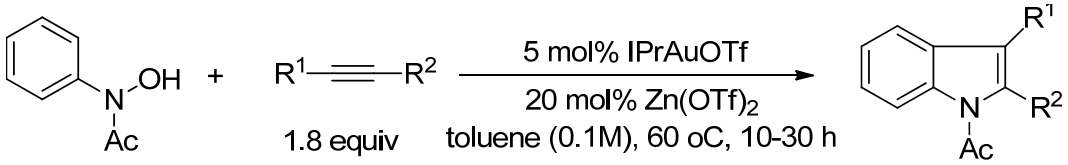
1-(2-Cyclohexenyl-1*H*-indol-1-yl)ethanone (5m)



5m

This compound was prepared in 92% yield according to the general procedure C (eluents: ethyl acetate: hexanes = 1:30). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.26 (d, 1H, J = 8.5 Hz), 7.50 (d, 1H, J = 7.5 Hz), 7.31 (td, 1H, J_1 = 7 Hz, J_2 = 1.5 Hz), 7.25 (td, 1H, J_1 = 7.5 Hz, J_2 = 1.5 Hz), 6.46 (S, 1H), 5.98 – 6.00 (m, 1H), 2.30 – 2.33 (m, 2H), 2.23 – 2.27 (m, 2H), 1.78 – 1.83 (m, 2H), 1.71 – 1.75 (m, 2H); ^{13}C NMR (125MHz, $CDCl_3$) δ 171.2, 142.3, 137.1, 131.8, 129.8, 129.0, 124.4, 123.3, 120.0, 115.6, 109.0, 30.0, 26.4, 25.6, 22.7, 21.8; IR (neat): 3049, 2930, 2857, 2834, 1701, 1450, 1367, 1303; HRMS (ES+) calculated for $[C_{16}H_{17}NNaO]^{+}$: 262.1208, found: 262.1195.

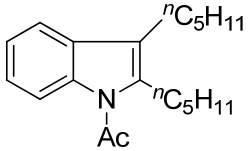
General procedure D: preparation of *N*-acetyl-2,3-disubstituted indoles 6



6

To a solution of **1c** (0.3 mmol, 1 equiv) in dry toluene (3 mL, 0.1 M) was added corresponding internal alkyne (0.54 mmol, 1.8 equiv), $Zn(OTf)_2$ (0.06 mmol, 20 mol%) and IPrAuOTf (0.015 mmol, 5 mol%) at room temperature. The reaction mixture was stirred at 60 ^{o}C for 10 - 30 h. Once TLC indicated there was no starting material left, the reaction was concentrated. The residue was purified through silica gel flash chromatography to give the desired product **6**.

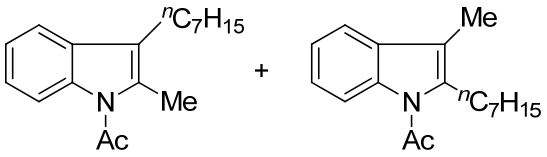
1-(2,3-dipentyl-1*H*-indol-1-yl)ethanone (6a)



6a

This compound was prepared in 74% yield according to the general procedure D. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 – 7.72 (m, 1H), 7.52 – 7.45 (m, 1H), 7.29 – 7.20 (m, 2H), 2.99 (t, *J* = 8.0 Hz, 2H), 2.77 (s, 3H), 2.65 (t, *J* = 8.0 Hz, 2H), 1.66 – 1.54 (m, 4H), 1.44 – 1.31 (m, 8H), 0.98 – 0.85 (m, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.00, 138.26, 135.60, 130.87, 123.27, 122.53, 120.10, 118.66, 114.45, 31.97, 31.91, 30.03, 29.91, 27.67, 27.01, 23.93, 22.56, 22.48, 14.04, 14.02; IR (neat): 2957, 2930, 2859, 1705, 1463, 1368, 1216; HRMS (ES+) calculated for $[C_{20}H_{29}NO]^+$: 299.2249, found: 299.2257.

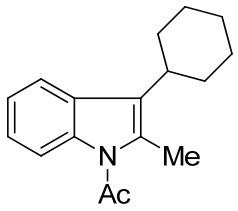
1-(3-heptyl-2-methyl-1H-indol-1-yl)ethanone (6b)



6b:6b' = 7.4:1

Compound **6b** was prepared in 61% yield [6] (regioselectivity 7.4: 1) according to the general procedure F and spectral data were in accordance with literature data [7]. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 – 7.93 (m, 1H), 7.49 – 7.44 (m, 1H), 7.28 – 7.21 (m, 2H), 2.73 (s, 3H), 2.64 (t, *J* = 7.5 Hz, 2H), 2.56 (s, 3H), 1.63 – 1.53 (m, 2H), 1.41 – 1.23 (m, 8H), 0.89 (dd, *J* = 7.1, 6.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.19, 135.70, 132.49, 130.64, 123.50, 122.74, 120.38, 118.24, 115.00, 31.84, 29.94, 29.56, 29.20, 29.15, 27.55, 23.87, 22.64, 14.38, 14.07; IR (neat): 2956, 2929, 2856, 1701, 1458, 1368, 1311, 1216745; HRMS (ES+) calculated for $[C_{18}H_{25}NO]^+$: 271.1926, found: 271.1948.

1-(3-Cyclohexyl-2-methyl-1*H*-indol-1-yl)ethanone (6c)

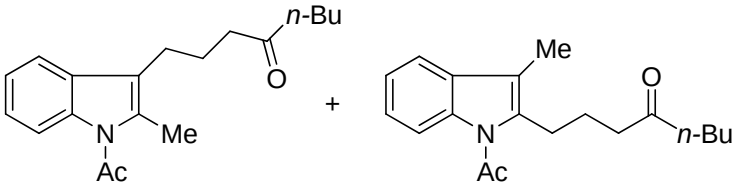


6c

This compound was prepared in 67% yield [6] (regioselectivity > 19: 1) according to the general procedure D. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.99 – 7.93 (m, 1H), 7.75 – 7.69 (m, 1H), 7.26 – 7.19 (m, 2H), 2.80 (tt, *J* = 12.4, 3.7 Hz, 1H), 2.73 (s, 3H), 2.58 (s, 3H), 2.02 –

1.86 (m, 4H), 1.86 – 1.79 (m, 1H), 1.79 – 1.71 (m, 2H), 1.49 – 1.31 (m, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.40, 135.99, 131.49, 129.44, 124.37, 123.11, 122.27, 119.95, 114.90, 36.45, 31.80, 27.74, 27.12, 26.22, 14.42.; IR (neat): 2928, 2853, 1699,1449, 1375, 1314, 1212, 1034, 756; HRMS (ES+) calculated for $[C_{17}H_{21}NO]^+$: 255.1623, found: 255.1628.

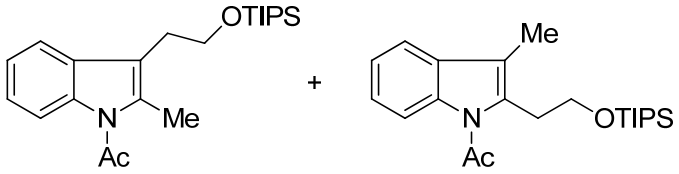
1-(1-Acetyl-2-methyl-1*H*-indol-3-yl)octan-4-one (6d)



6d:6d' = 6.8:1

Compound **6d** was prepared in 68% yield [6] (regioselectivity 6.8:1) according to the general procedure D. **6d:** ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.98 – 7.90 (m, 1H), 7.51 – 7.44 (m, 1H), 7.27 – 7.20 (m, 2H), 2.71 (s, 3H), 2.66 (t, *J* = 7.5 Hz, 2H), 2.55 (s, 3H), 2.44 (t, *J* = 7.0 Hz, 2H), 2.35 (t, *J* = 7.5 Hz, 2H), 1.90 – 1.81 (m, 2H), 1.57 – 1.48 (m, 3H), 1.32 – 1.23 (m, 2H), 0.91 – 0.86 (t, *J* = 7.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 210.87, 170.16, 135.61, 132.91, 130.40, 123.62, 122.84, 119.29, 118.20, 114.96, 42.51, 41.75, 27.51, 25.83, 23.60, 23.01, 22.27, 14.34, 13.79; IR (neat): 2958, 2933, 2873, 1707, 1458, 1369, 1311, 748; HRMS (ES+) calculated for $[C_{19}H_{25}NNaO_2]^+$: 322.1783, found: 322.1781.

1-(2-Methyl-3-(2-((triisopropylsilyl)oxy)ethyl)-1*H*-indol-1-yl)ethanone (6e)

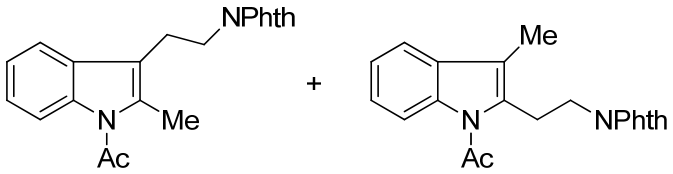


6e:6e' =6:1

Compound **6e** was prepared in 52% yield [6] (regioselectivity 6:1) according to the general procedure D. **6e:** ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 – 7.94 (m, 1H), 7.52 – 7.46 (m, 1H), 7.29 – 7.22 (m, 2H), 3.85 (t, *J* = 7.5 Hz, 2H), 2.95 (t, *J* = 7.3 Hz, 2H), 2.73 (s, 3H), 2.60 (s, 3H), 1.10 – 1.00 (m, 21H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.22, 135.68,

133.78, 130.65, 123.62, 122.85, 118.17, 116.76, 115.01, 62.91, 27.94, 27.54, 17.98, 17.93, 14.53, 11.92; IR (neat): 2944, 2867, 1704, 1463, 1367, 1310, 1102, 742; HRMS (ES+) calculated for $[C_{22}H_{35}NNaO_2Si]^+$: 396.2349, found: 396.2342.

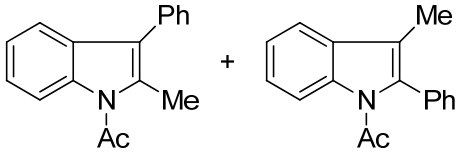
2-(2-(1-Acetyl-2-methyl-1*H*-indol-3-yl)ethyl)isoindoline-1,3-dione (6f)



6f:6f' = 16.6:1

Compound **6f** was prepared in 80% yield [6] (regioselectivity 16.6:1) according to the general procedure D. **6f:** ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.96 – 7.89 (m, 1H), 7.82 (m, 2H), 7.73 – 7.67 (m, 2H), 7.66 – 7.60 (m, 1H), 7.27 – 7.21 (m, 2H), 3.85 (t, *J* = 7.8 Hz, 2H), 3.02 (t, *J* = 7.8 Hz, 2H), 2.71 (s, 3H), 2.59 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.20, 168.15, 135.61, 134.03, 133.94, 132.04, 130.06, 123.87, 123.19, 123.11, 118.10, 115.90, 115.00, 37.29, 27.57, 23.19, 14.30; IR (neat): 3061, 2945, 1772, 1713, 1436, 1368, 1311, 1011, 722; HRMS (ES+) calculated for $[C_{21}H_{18}N_2O_3]^+$: 346.1317, found: 346.1321.

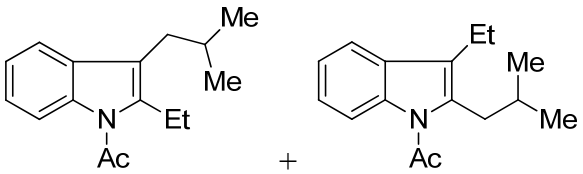
1-(2-Methyl-3-phenyl-1*H*-indol-1-yl)ethanone (6g)



6g:6g' = 8:1

Compound **6g** was prepared in 61% yield [6] (regioselectivity 8:1) according to the general procedure D. **6g:** ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.06 (d, *J* = 8.3 Hz, 1H), 7.51 (m, 3H), 7.45 (m, 2H), 7.44 – 7.38 (m, 1H), 7.35 – 7.30 (m, 1H), 7.28 – 7.22 (m, 1H), 2.80 (s, 3H), 2.63 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.47, 135.70, 133.45, 133.08, 130.11, 129.95, 128.53, 127.17, 124.07, 123.21, 122.49, 119.13, 115.04, 27.58, 15.25; IR (neat): 3052, 2929, 1701, 1367, 1309, 747; HRMS (ES+) calculated for $[C_{17}H_{15}NO]^+$: 249.1154, found: 249.1155.

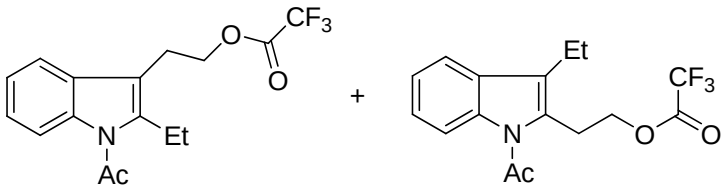
1-(2-Ethyl-3-isobutyl-1*H*-indol-1-yl)ethanone 6h + 1-(3-Ethyl-2-isobutyl-1*H*-indol-1-yl)ethanone (6h')



6h:6h' = 2.5:1

These compounds were prepared in 75 % overall yield (regioselectivity 2.5:1) according to the general procedure D. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 – 7.73 (m, 1H, 6m + 6m'), 7.55 – 7.51 (m, 1H, 6m'), 7.46 – 7.50 (m, 1H, 6m), 7.28 – 7.20 (m, 2H, 6m + 6m'), 3.05 (q, *J* = 7.3 Hz, 2H, 6m), 2.89 (d, *J* = 7.0 Hz, 2H, 6m'), 2.79 (s, 3H, 6m), 2.77 (s, 3H, 6m'), 2.70 (q, *J* = 7.5 Hz, 2H, 6m'), 2.54 (d, *J* = 7.4 Hz, 2H, 6m), 2.03 – 1.90 (m, 1H, 6m + 6m'), 1.26 – 1.20 (m, 3H, 6m + 6m'), 0.97 (d, *J* = 6.6 Hz, 6H, 6m), 0.93 (d, *J* = 6.7 Hz, 6H, 6m'); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.20, 169.93, 140.20, 136.63, 135.82, 135.54, 131.29, 130.43, 123.35, 123.27, 122.51, 122.49, 122.39, 119.04, 118.75, 114.43, 114.34, 35.60, 33.07, 29.20, 28.95, 27.75, 27.68, 22.84, 22.44, 20.36, 17.40, 14.63, 14.47; IR (neat): 2958, 2933, 2870, 1705, 1463, 1367, 1312, 1204, 743; HRMS (ES+) calculated for $[C_{16}H_{21}NO]^{+}$: 243.1623, found: 243.1631.

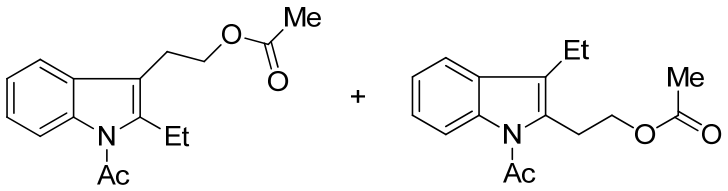
2-(1-Acetyl-2-ethyl-1*H*-indol-3-yl)ethyl 2,2,2-trifluoroacetate (6i)



6i:6i' = 10:1

These compounds were prepared in 65% overall yield (regioselectivity 10:1) according to the general procedure D. **6i:** ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 – 7.74 (m, 1H), 7.55 – 7.51 (m, 1H), 7.32 – 7.27 (m, 2H), 4.52 (t, *J* = 7.0 Hz, 2H), 3.15 (t, *J* = 7.0 Hz, 2H), 3.07 (q, *J* = 7.4 Hz, 2H), 2.80 (s, 3H), 1.25 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 169.91, 157.45, (q, *J* = 43.1 Hz)141.68, 135.43, 129.96, 123.88, 122.95, 118.16, 114.51, 113.08, 67.04, 27.62, 23.00, 20.27, 14.82; IR (neat): 2968, 2930, 1785, 1707, 1464, 1352, 745; HRMS (ES+) calculated for $[C_{16}H_{16}F_3NaNO_3]^{+}$: 350.0980, found: 350.0970.

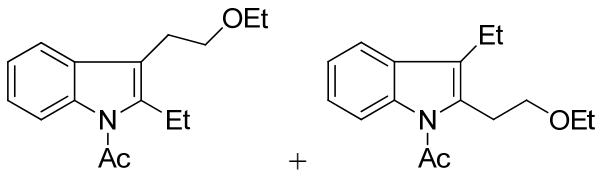
2-(1-Aacetyl-2-ethyl-1*H*-indol-3-yl)ethyl acetate (6j)



6j:6j' = 4.6:1

Thess compounds were prepared in 77 % overall yield (regioselectivity 4.6:1) according to the general procedure D. **6j:** ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 – 7.71 (m, 1H), 7.56 – 7.51 (m, 1H), 7.29 – 7.24 (m, 3H), 4.25 (t, *J* = 7.0 Hz, 2H), 3.06 (q, *J* = 7.0 Hz, 2H), 3.01 (t, *J* = 7.0 Hz, 2H), 2.79 (s, 3H), 2.04 (s, 3H), 1.24 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.98, 169.92, 141.20, 135.45, 130.47, 123.65, 122.80, 118.51, 114.77, 114.45, 77.25, 77.00, 76.75, 63.74, 27.66, 23.49, 20.99, 20.30, 14.90; IR (neat): 2968, 2937, 1739, 1704, 1464, 1368, 1312, 1241, 1034, 745; HRMS (ES+) calculated for $[C_{16}H_{19}NNaO_3]^+$: 296.1263, found: 296.1257.

1-(3-(2-Ethoxyethyl)-2-ethyl-1*H*-indol-1-yl)ethanone (6k) + 1-(2-(2-Ethoxyethyl)-3-ethyl-1*H*-indol-1-yl)ethanone (6k')

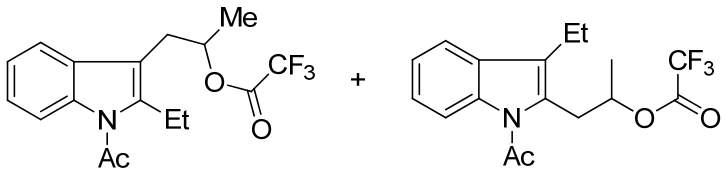


6k:6k' = 2:1

These compounds were prepared in 88 % overall yield (regioselectivity 2:1) according to the general procedure D. **6k:** ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.77 – 7.72 (m, 1H), 7.54 – 7.49 (m, 1H), 7.28 – 7.21 (m, 2H), 3.58 (t, *J* = 7.6 Hz, 2H), 3.55 – 3.47 (q, *J* = 7.6 Hz, 2H), 3.05 (q, *J* = 7.3 Hz, 2H), 2.96 (t, *J* = 7.6 Hz, 2H), 2.77 (s, 3H), 1.23 (t, *J* = 7.6 Hz, 3H), 1.21 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.88, 140.79, 135.47, 130.70, 123.46, 122.64, 118.53, 115.75, 114.44, 70.11, 66.30, 27.60, 24.71, 20.29, 15.18, 14.91; **6k'**: ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.73 – 7.67 (m, 1H), 7.51 (m, 1H), 7.28 – 7.21 (m, 2H), 3.65 (t, *J* = 7.0 Hz, 2H), 3.49 (q, *J* = 7.0 Hz, 2H), 3.30 (t, *J* = 7.0 Hz, 2H), 2.77 (s, 3H), 2.71 (q, *J* = 7.6 Hz, 2H), 1.22 (t, *J* = 7.6 Hz, 3H), 1.18 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (151 MHz, $CDCl_3$) δ 170.13, 135.55, 134.15, 130.44, 123.55, 123.13, 122.60,

118.79, 114.36, 70.26, 66.21, 27.84, 27.83, 17.10, 15.23, 14.81. IR (neat): 2973, 1935, 2872, 1702, 1463, 1368, 1310, 1108, 943; HRMS (ES+) calculated for $[C_{16}H_{21}NO_2]^+$: 259.1572, found: 259.1574.

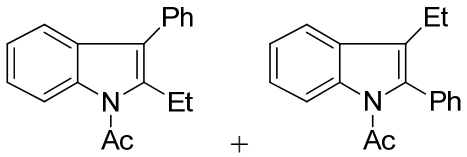
1-(1-Acetyl-2-ethyl-1*H*-indol-3-yl)propan-2-yl 2,2,2-trifluoroacetate (6l)



6l:6l' =12:1

These compounds were prepared in 69 % overall yield (regioselectivity 12:1) according to the general procedure D. **6l**: ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 – 7.71 (m, 1H), 7.59 – 7.52 (m, 1H), 7.33 – 7.24 (m, 2H), 5.34 (h, *J* = 6.4 Hz, 1H), 3.14 (dd, *J* = 14.4, 6.6 Hz, 1H), 3.08 (ddd, *J* = 14.6, 7.3, 2.9 Hz, 2H), 2.99 – 2.91 (dd, *J* = 14.4, 6.6 Hz, 1H), 2.80 (s, 3H), 1.40 (t, *J* = 7.0 Hz, 3H), 1.26 – 1.21 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 169.95, 157.06 (q, *J* = 41.8 Hz), 141.73, 135.43, 130.24, 123.83, 122.92, 118.64, 114.47 (q, *J* = 41.8 Hz), 114.40, 113.52, 75.85, 30.00, 27.66, 20.32, 19.39, 14.59; IR (neat): 2985, 2943, 1783, 1717, 1383, 1338, 1221, 1167, 778; HRMS (ES+) calculated for $[C_{17}H_{18}F_3NNaO_3]^+$: 364.1136, found: 364.1121.

1-(2-Ethyl-3-phenyl-1*H*-indol-1-yl)ethanone (6m) + 1-(3-Ethyl-2-phenyl-1*H*-indol-1-yl)ethanone (6m')

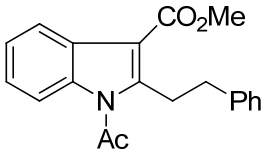


6m:6m' = 2.9:1

These compounds were prepared in 70 % overall yield (regioselectivity 2.9: 1) according to the general procedure D. **6m**: ^{1}H NMR (600 MHz, CDC_3) δ 7.83 (d, *J* = 8.4 Hz, 1H), 7.52 - 7.46 (m, 2H), 7.45 – 7.38 (m, 4H), 7.32 – 7.28 (m, 1H), 7.24 – 7.19 (m, 1H), 3.05 (q, *J* = 7.3 Hz, 2H), 2.85 (s, 3H), 1.23 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.27, 140.27, 135.50, 133.61, 130.53, 130.08, 128.56, 127.26, 123.89, 123.03, 121.98,

119.61, 114.45, 27.72, 20.76, 15.19; **6m':** ^{1}H NMR (600 MHz, cdcl$_3$) δ 8.45 (d, *J* = 8.3 Hz, 1H), 7.58 (d, *J* = 7.4 Hz, 1H), 7.51 – 7.45 (m, 3H), 7.42 – 7.36 (m, 3H), 7.34 – 7.30 (m, 1H), 2.56 (q, *J* = 7.6 Hz, 2H), 1.95 (s, 3H), 1.21 – 1.17 (t, *J* = 7.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.07, 136.95, 134.39, 133.59, 130.22, 129.27, 128.69, 128.57, 125.18, 124.30, 123.38, 118.71, 116.52, 27.65, 17.60, 14.95. IR (neat): 3054, 2974, 2935, 2875, 1706, 1454, 1314, 1209, 1186, 747; HRMS (ES+) calculated for $[C_{18}H_{17}NO]^+$: 263.1310, found: 263.1313.

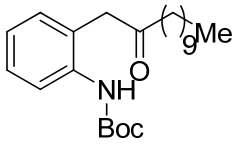
Methyl 1-acetyl-2-phenethyl-1*H*-indole-3-carboxylate (6n)



6n

This compound was prepared in 66 % yield [6] (regioselectivity > 19: 1) according to the general procedure D. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.23 – 8.15 (m, 1H), 7.67 – 7.59 (m, 1H), 7.37 – 7.29 (m, 6H), 7.25 – 7.19 (m, 1H), 3.99 (s, 3H), 3.74 – 3.67 (t, 2H), 3.07 – 3.00 (t, 2H), 2.76 (s, 3H).; ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.87, 165.30, 149.20, 141.34, 134.65, 128.61, 128.38, 127.50, 126.05, 124.17, 123.71, 122.14, 113.47, 110.35, 51.30, 36.05, 29.74, 27.62.; IR (neat): 3027, 2951, 2861, 1726, 1706, 1560, 1435, 1280, 1194, 1088, 751; HRMS (ES+) calculated for $[C_{20}H_{19}NnaO_3]^+$: 344.1263, found: 344.1269.

***tert*-Butyl 2-(2-oxododecyl)phenylcarbamate 8**



8

This coupound was obtained by quenching the reaction to prepare **3a** right after 20 min according to the general procedure B (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.72 (d, 1H, *J* = 8 Hz), 7.51 (bs, 1H), 7.17 – 7.21 (m, 1H), 7.06 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.5 Hz), 6.97 (td, 1H, J_1 = 7.5 Hz, J_2 = 1 Hz), 3.68 (s, 2H), 2.55 (t, 2H, *J* = 7.5 Hz), 1.53 – 1.58 (m, 2H), 1.52 (s, 9H), 1.20 – 1.30 (m, 14H), 0.87 (t, 3H, *J* =

7 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 210.5, 153.6, 137.4, 130.5, 128.2, 125.4, 124.1, 123.4, 80.2, 46.9, 42.7, 31.9, 29.5, 29.4, 29.31, 29.27, 29.0, 28.3, 23.5, 22.7, 14.1; IR (neat): 3340, 2954, 2925, 2854, 1731, 1708, 1452, 1239, 1159; HRMS (ES+) calculated for $[C_{23}H_{37}NNaO_3]^+$: 398.2671, found: 398.2667.

Reference:

1. D. A. Evans, H.-J. Song, K. R. Fandrick. *Org. Lett.* **2006**, *8*, 3351 – 3354.
2. A. Porzelle, N. C. O. Tomkinson, M. D. Woodrow. *Synlett*, **2009**, *5*, 798 – 802.
3. N. Boege, S. Krueger; M. Schroeder, C. Meier. *Synthesis*, **2007**, *24*, 3907 – 3914.
4. N. R. Ayyangar, K. C. Brahme, U. R. Kalkote, K.V. Srinivasan. *Synthesis*, **1984,** *11*, 938 – 941.
5. M. Novak, M. Pelecanou, L. Pollack. *J. Am. Chem. Soc.* **1986,** *108*, 112 – 120.
6. All the yields refer to major isomers if not specified.
7. Stuart, D. R.; Bertrand-Laperle, M.; Burgess, K. M. N.; Fagnou, K. *J. Am. Chem. Soc.* **2008**, *130*, 16474.

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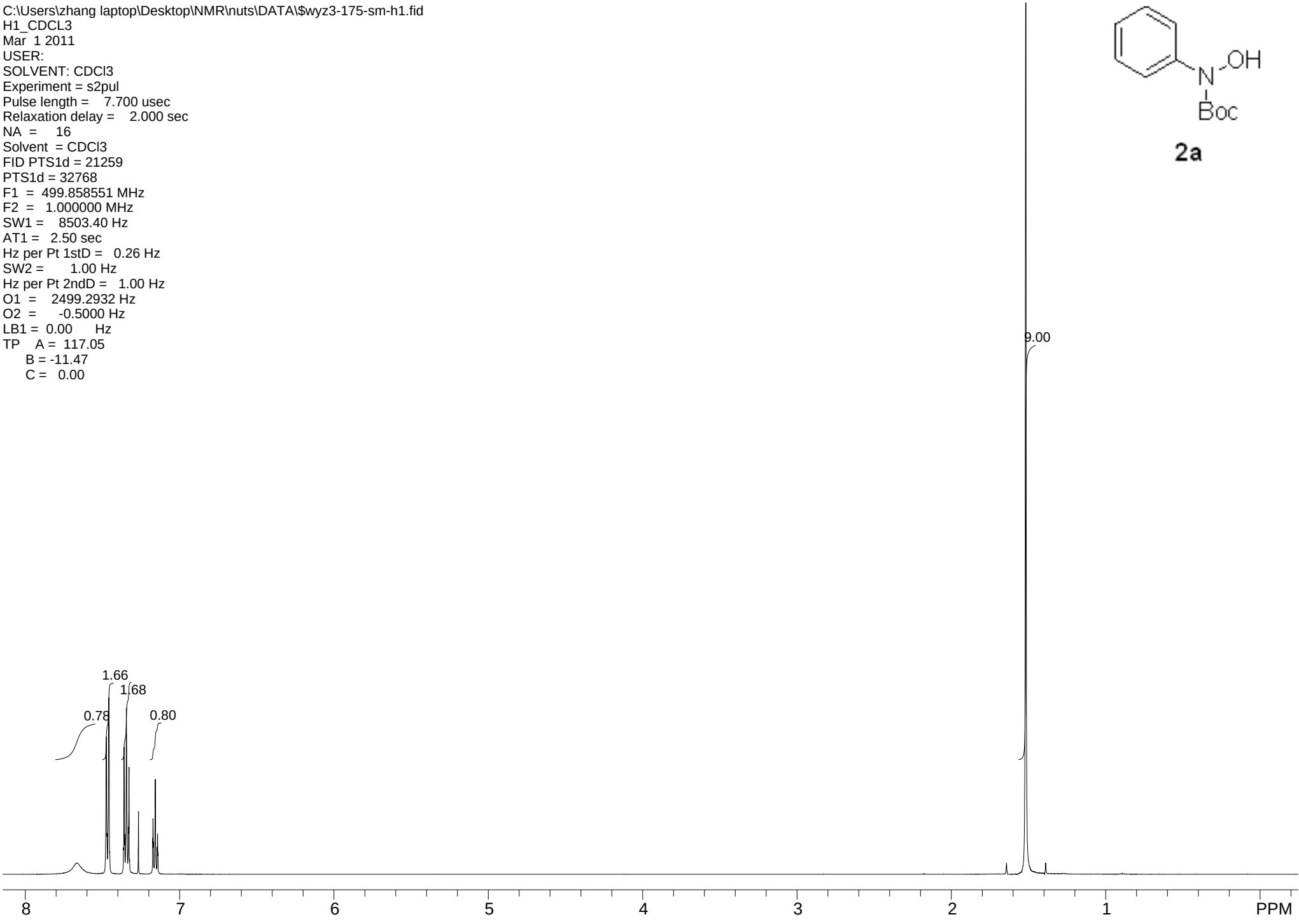
2a



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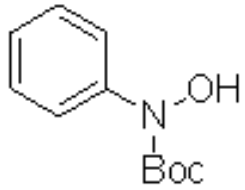
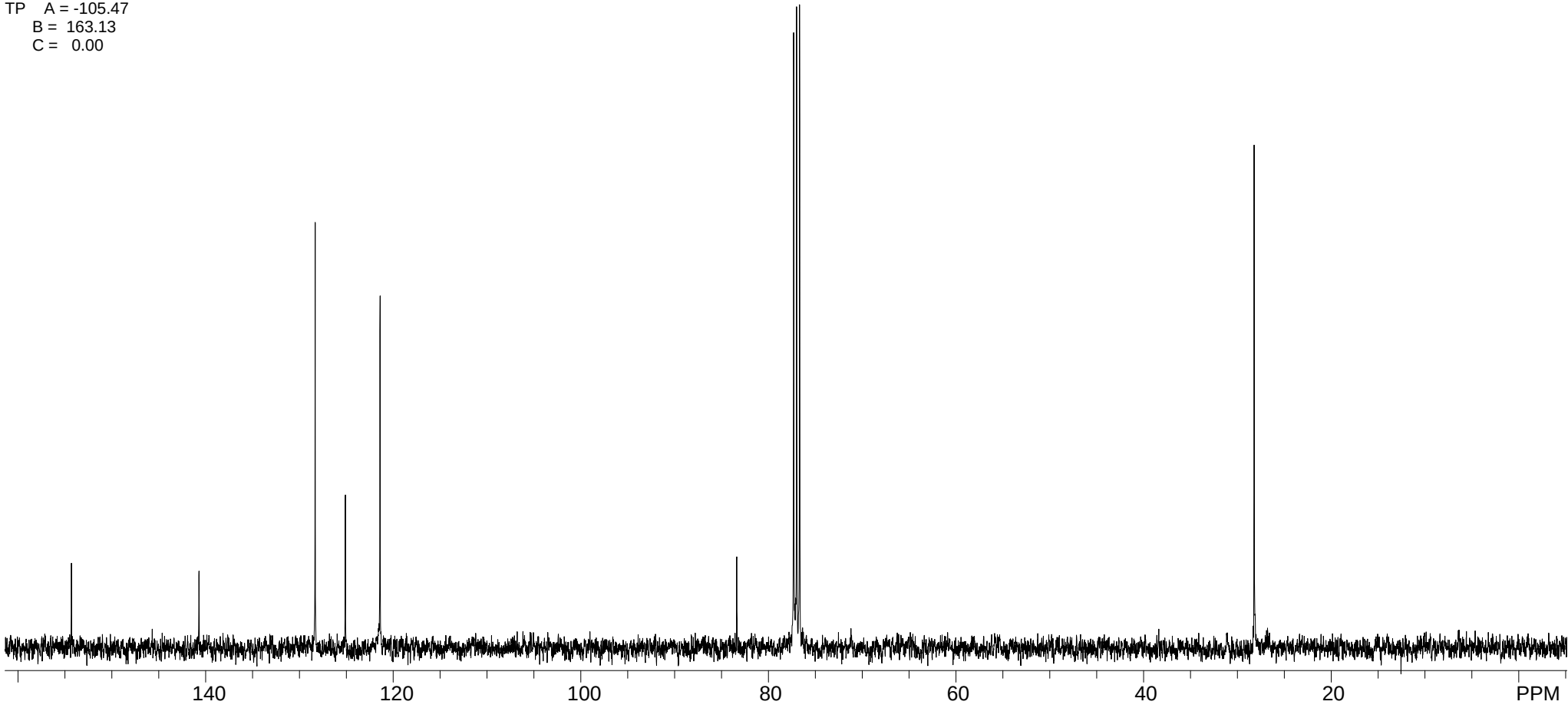


2a



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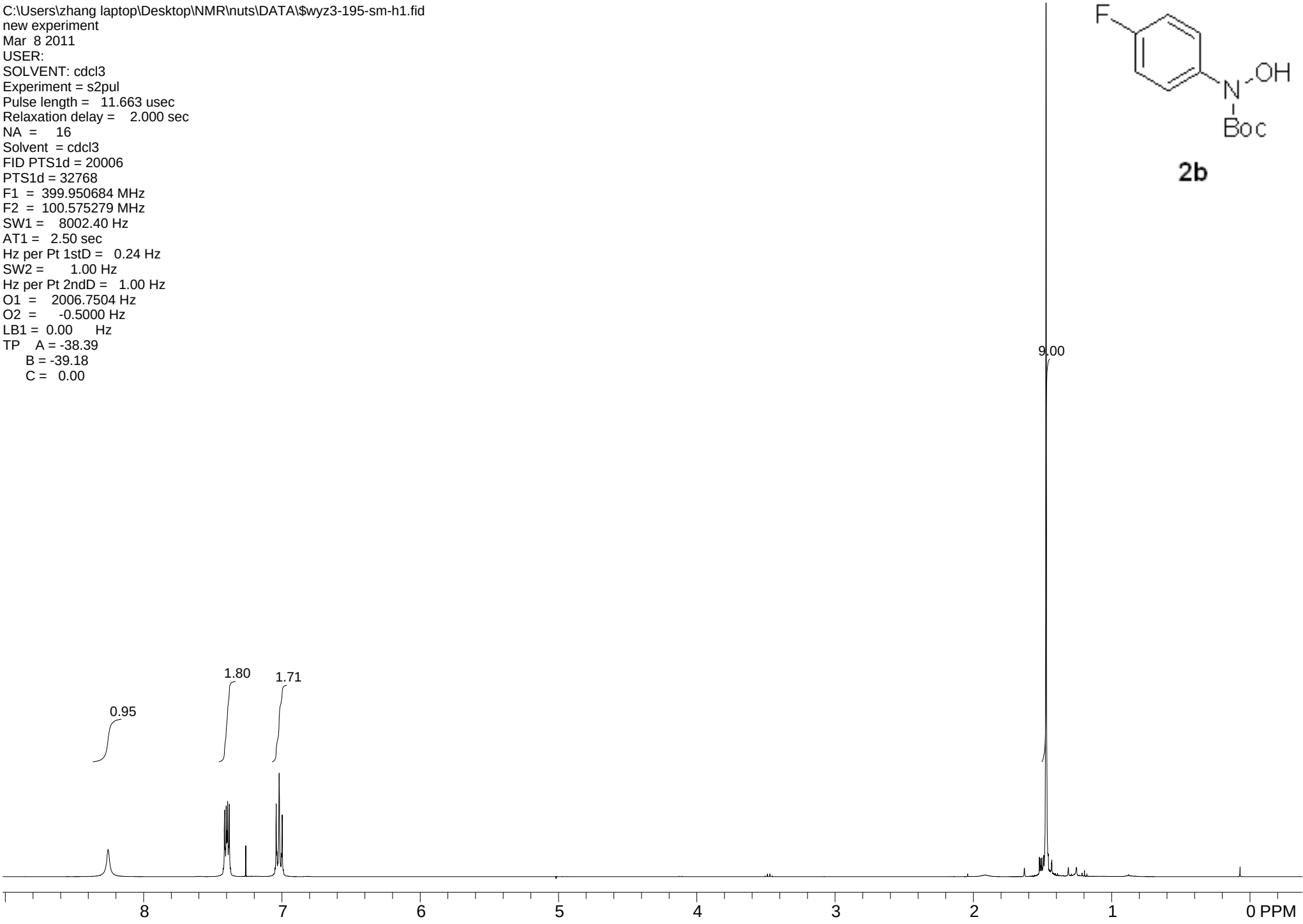
2b



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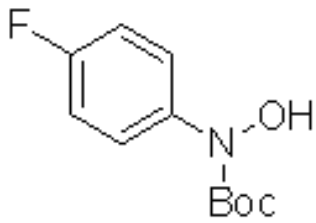
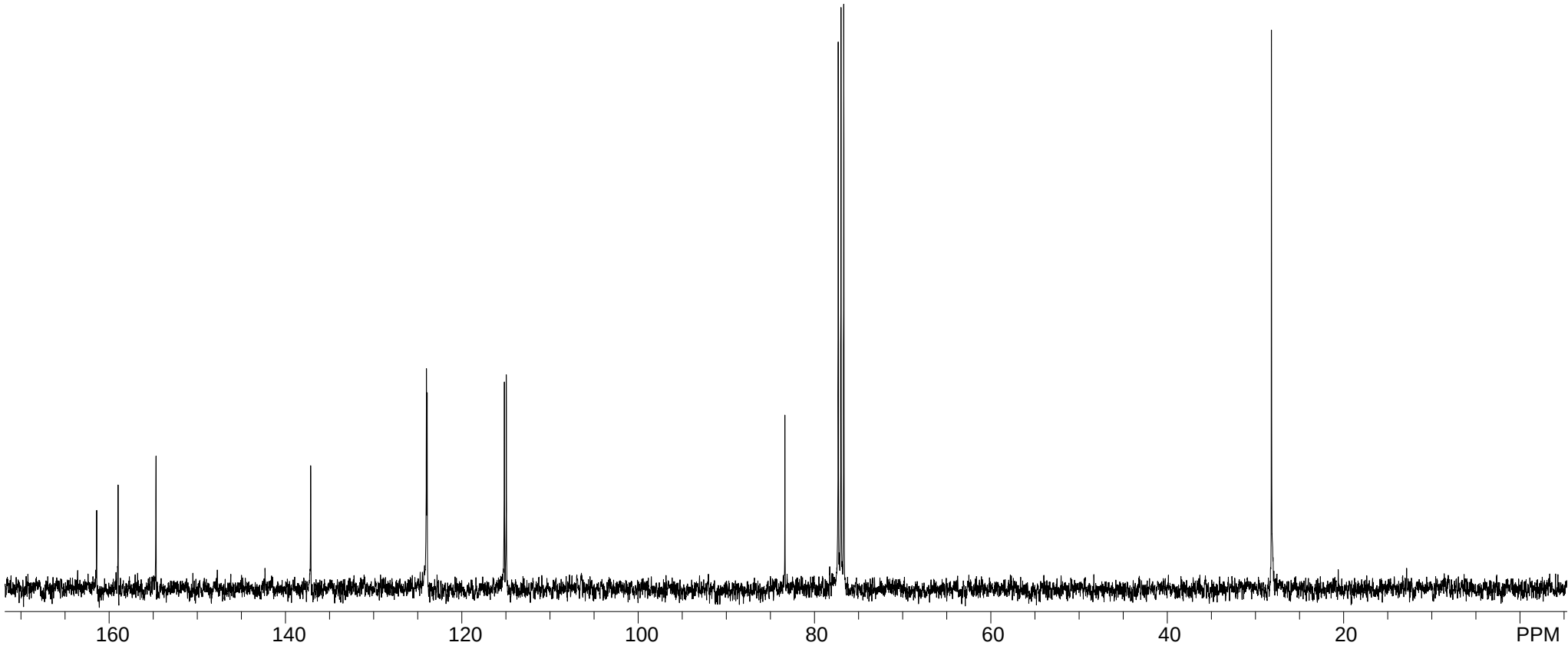


2b



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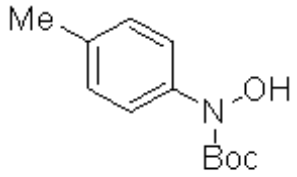
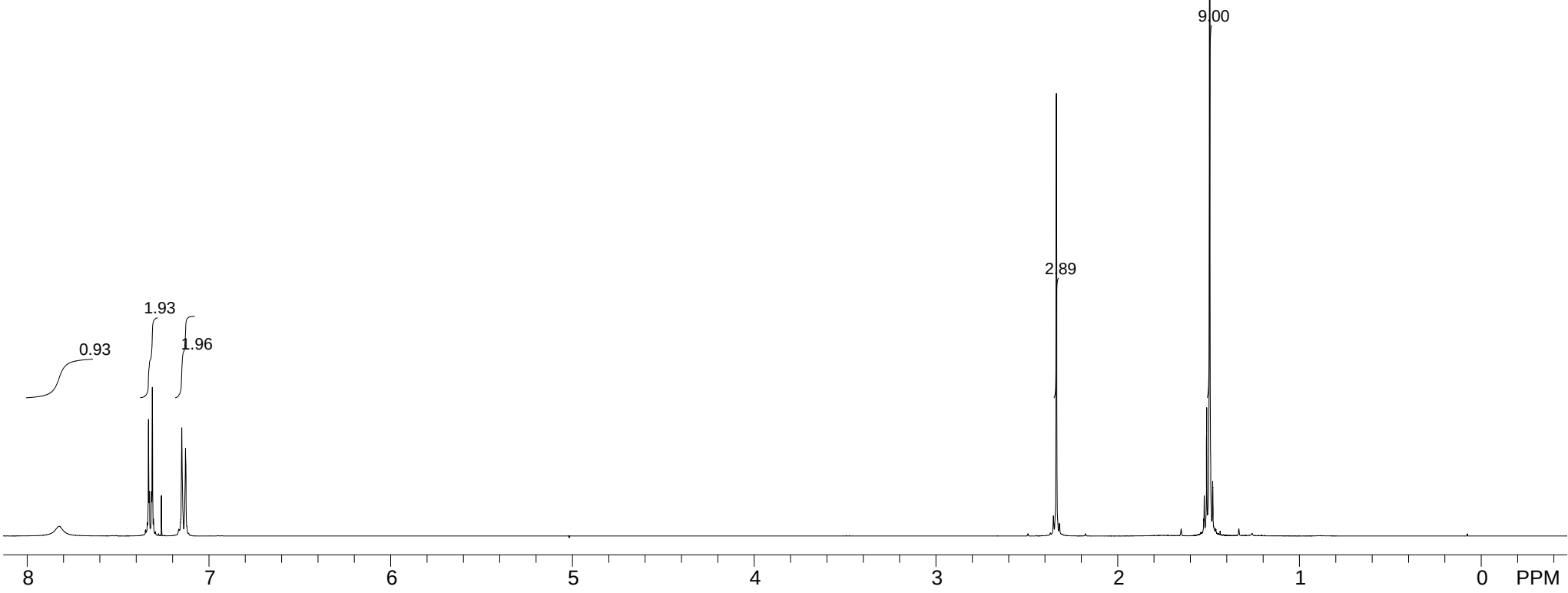


2c



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Mar 8 2011
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F2 = 399.949585 MHz
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SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
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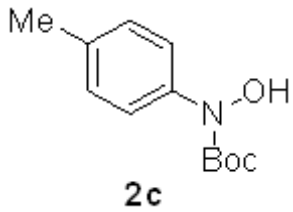
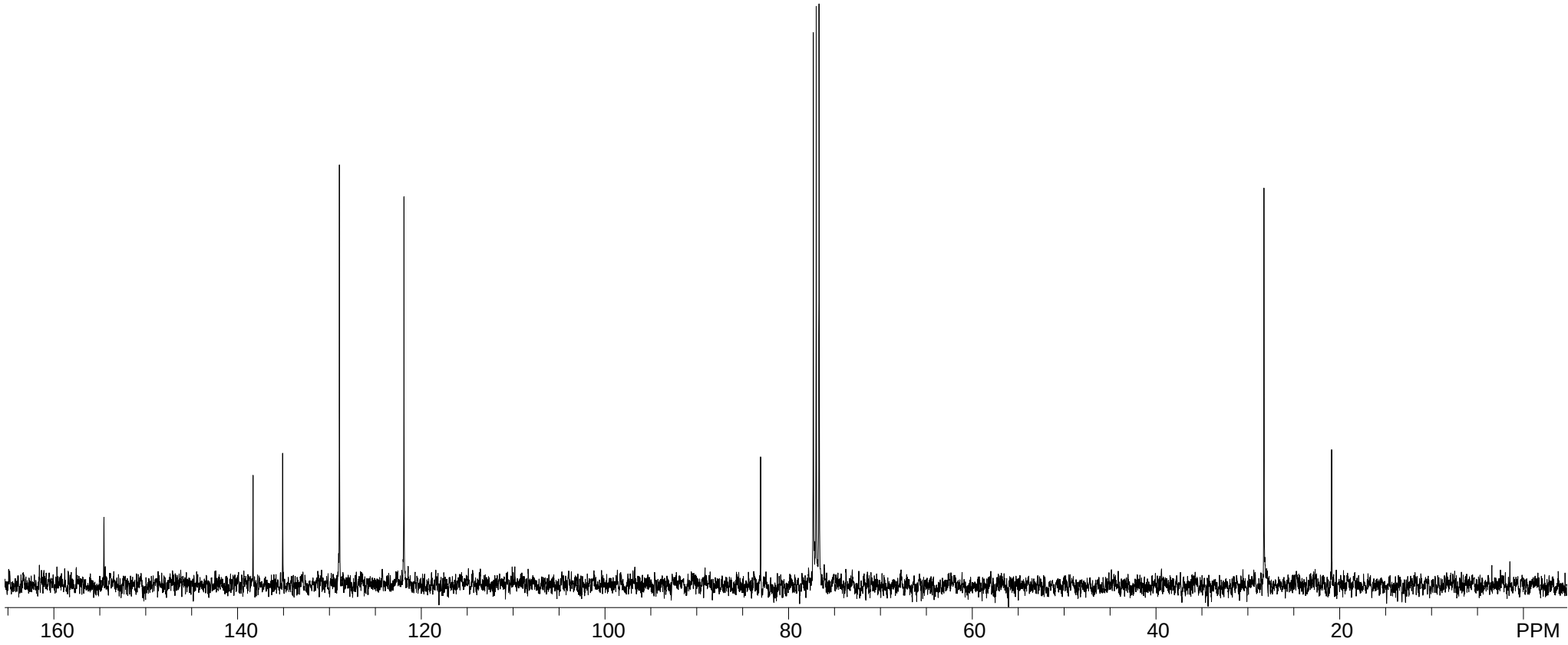


2c



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Hz per Pt 2ndD = 1.00 Hz
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O2 = -0.5000 Hz
LB1 = 0.00 Hz
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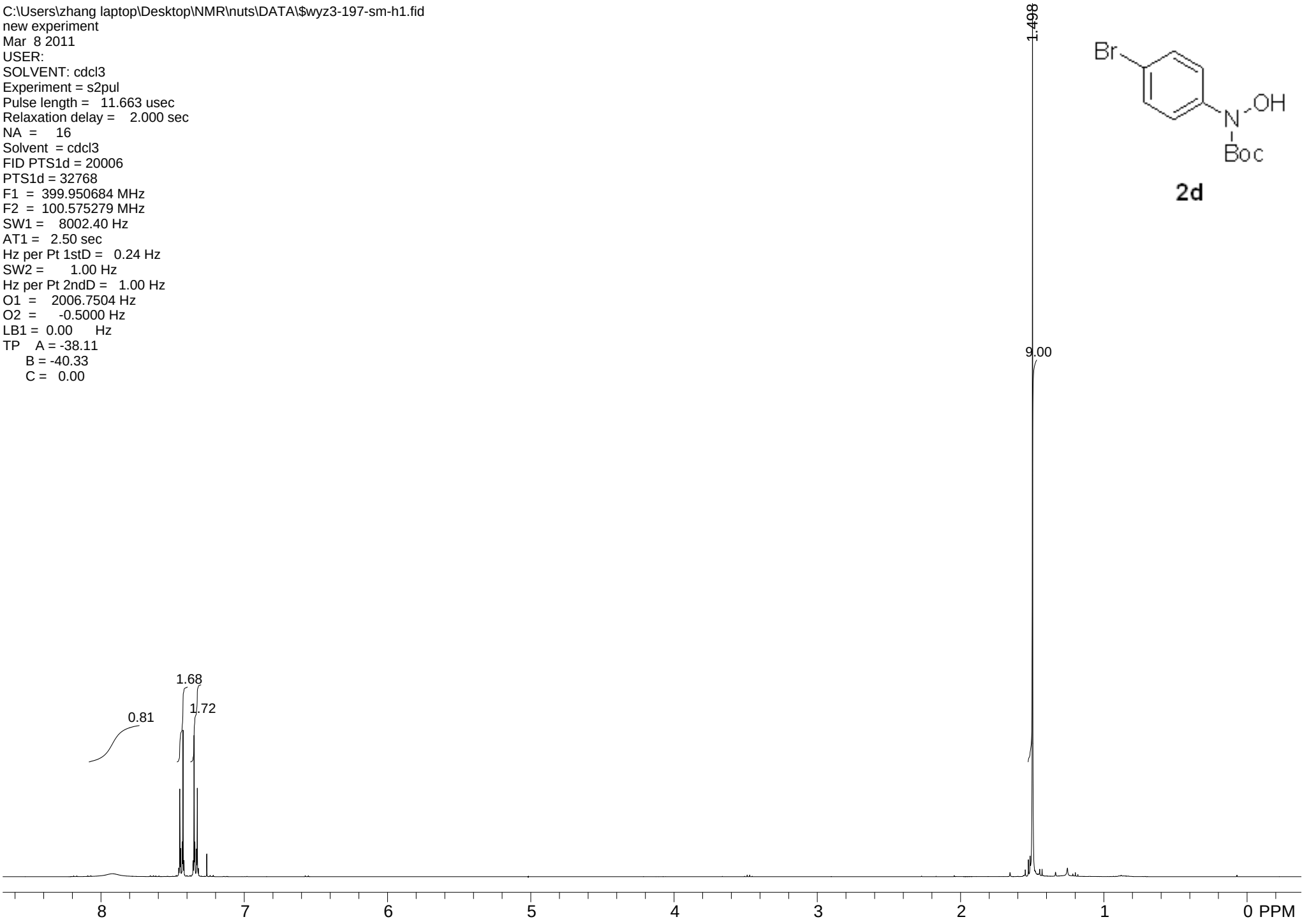
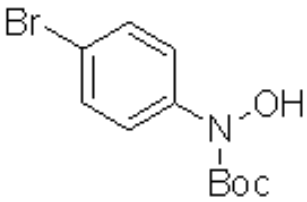
C = 0.00

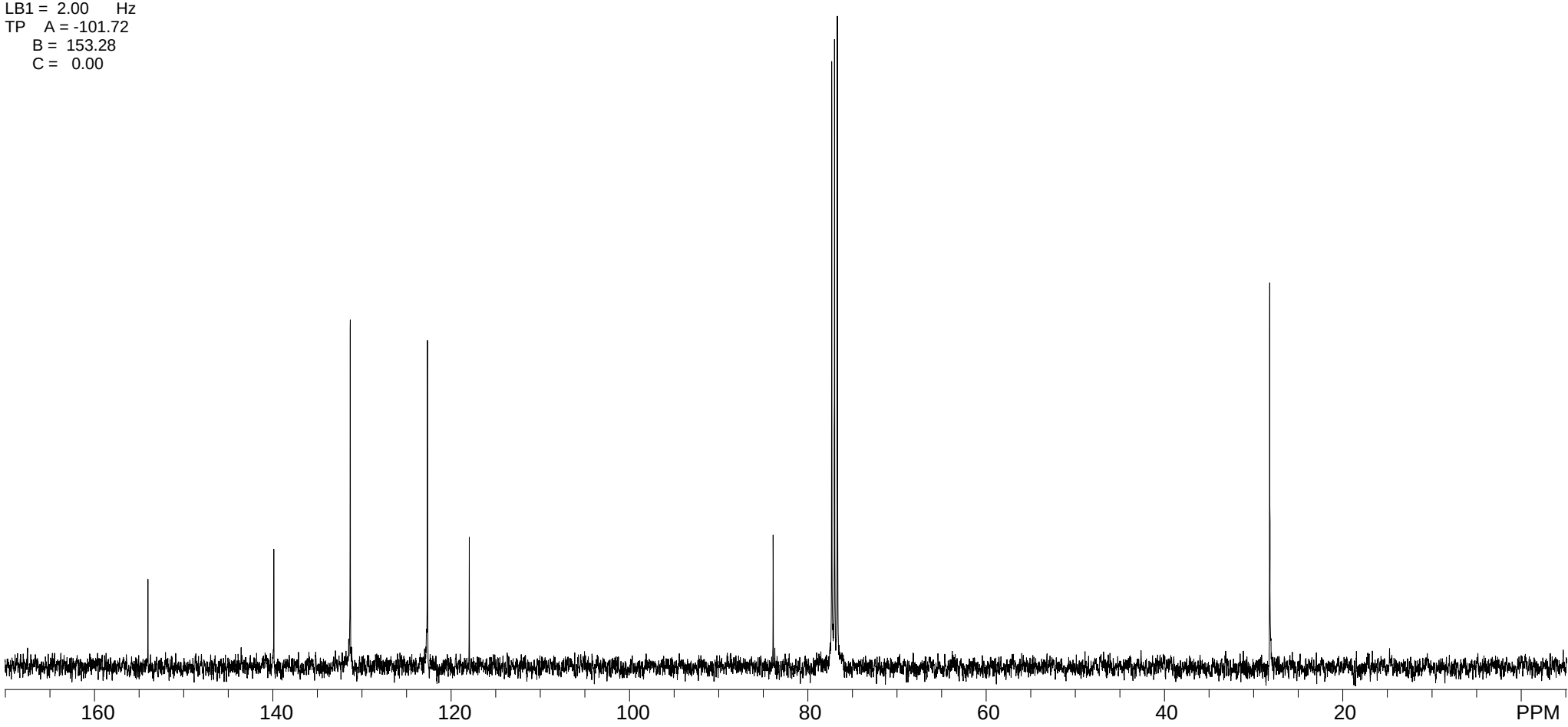
2d



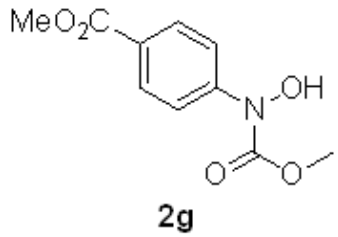
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-197-sm-c13.fid
Standard c13 run using qnp probe
Mar 8 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 88
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9529.8223 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -101.72
B = 153.28
C = 0.00



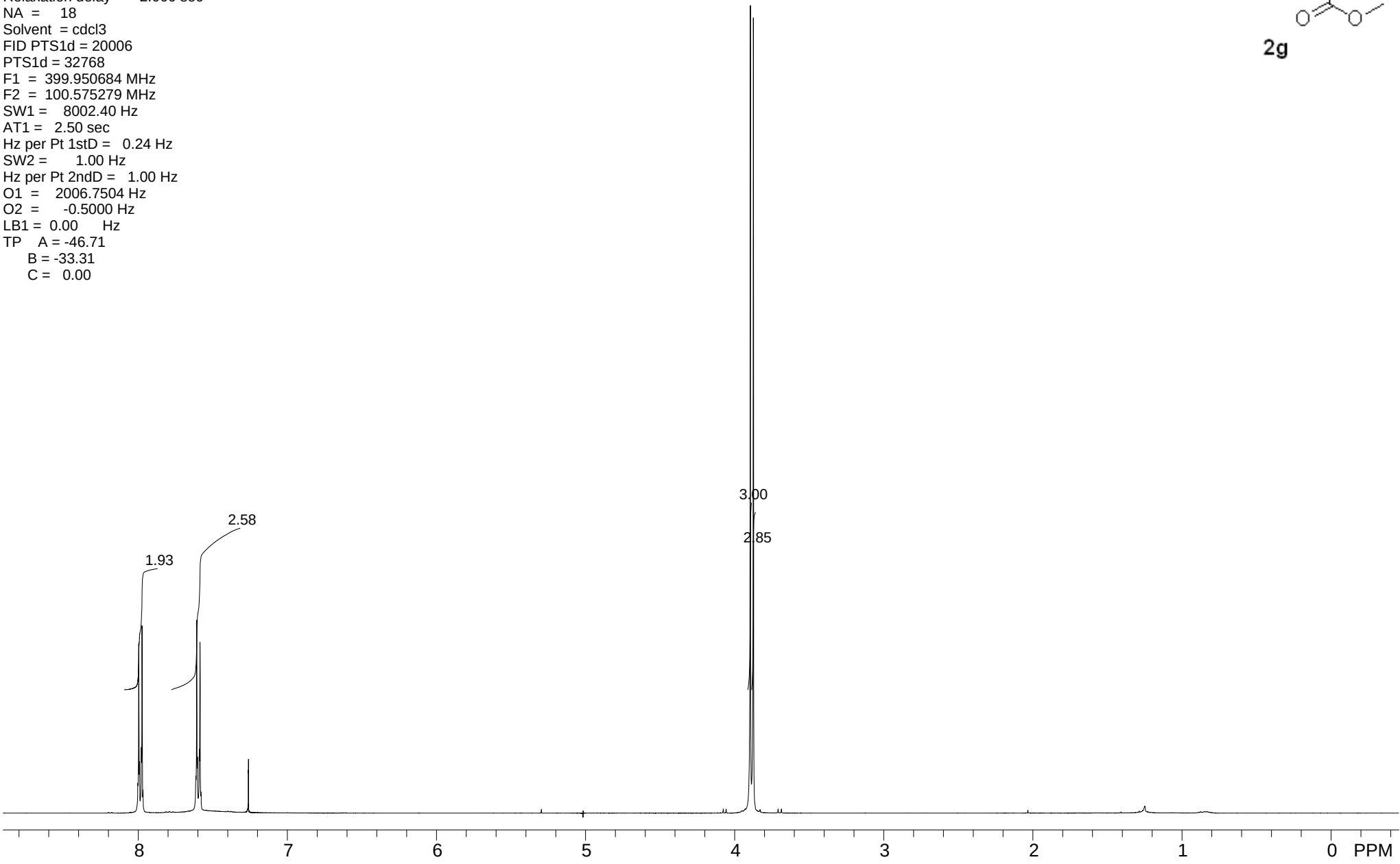
2d



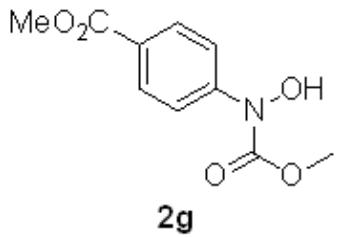
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-216-sm-h1.fid
new experiment
Mar 21 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 18
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -46.71
B = -33.31
C = 0.00



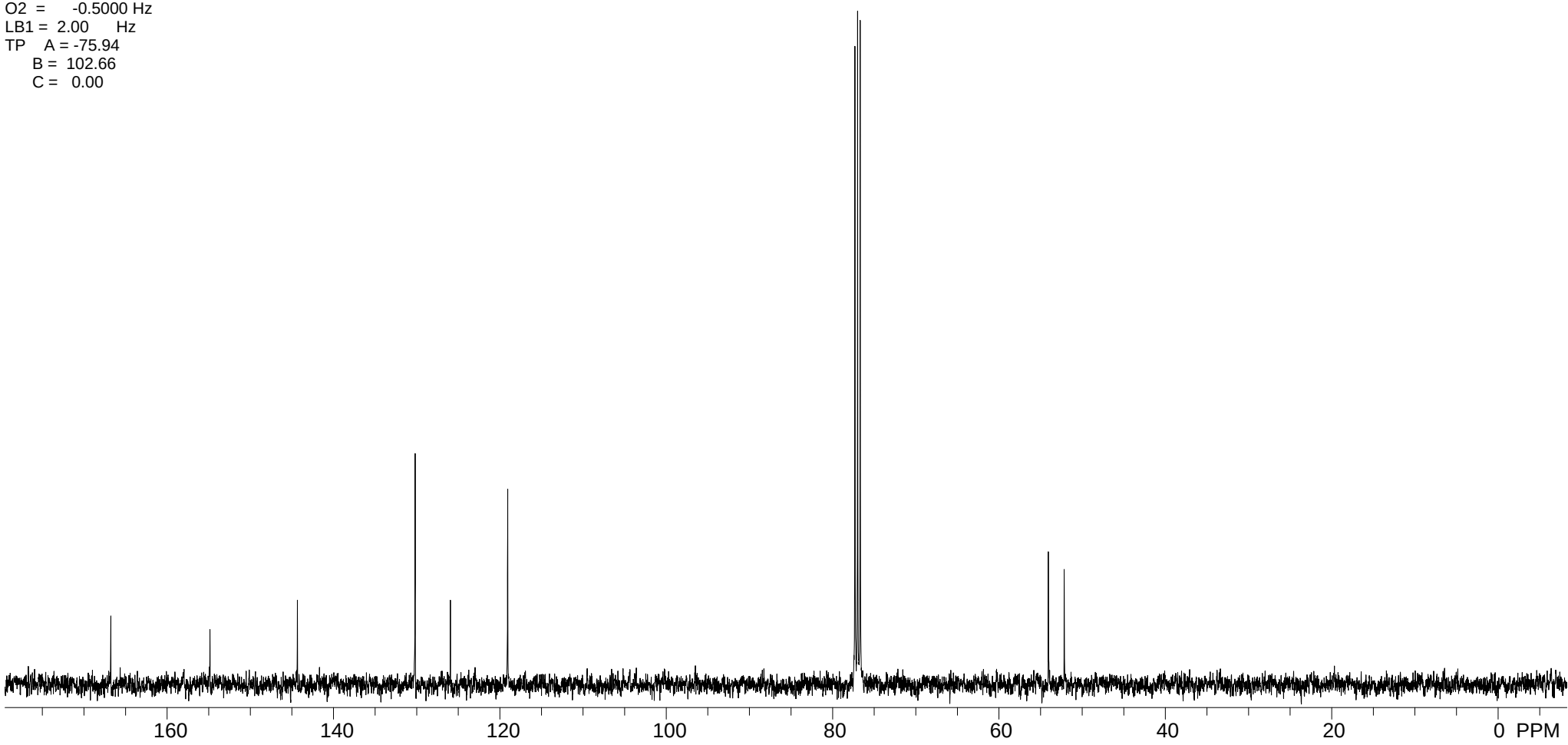
2g



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-216-sm-c13.fid
Standard c13 run using qnp probe
Mar 21 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 100
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9529.8223 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -75.94
B = 102.66
C = 0.00

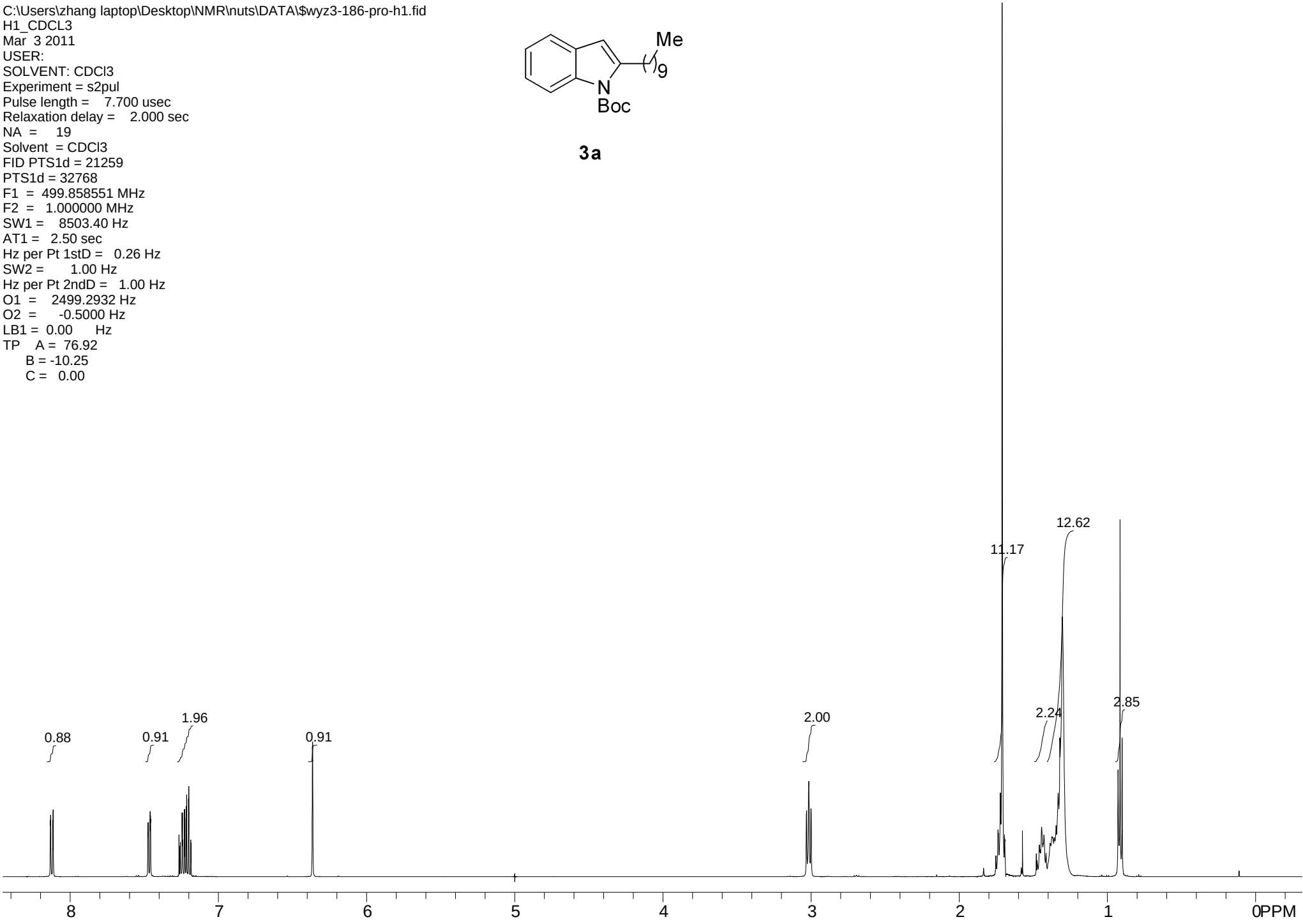


2g

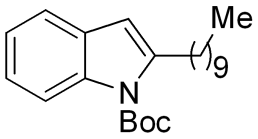


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-186-pro-h1.fid
H1_CDCL3
Mar 3 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 19
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 76.92
B = -10.25
C = 0.00

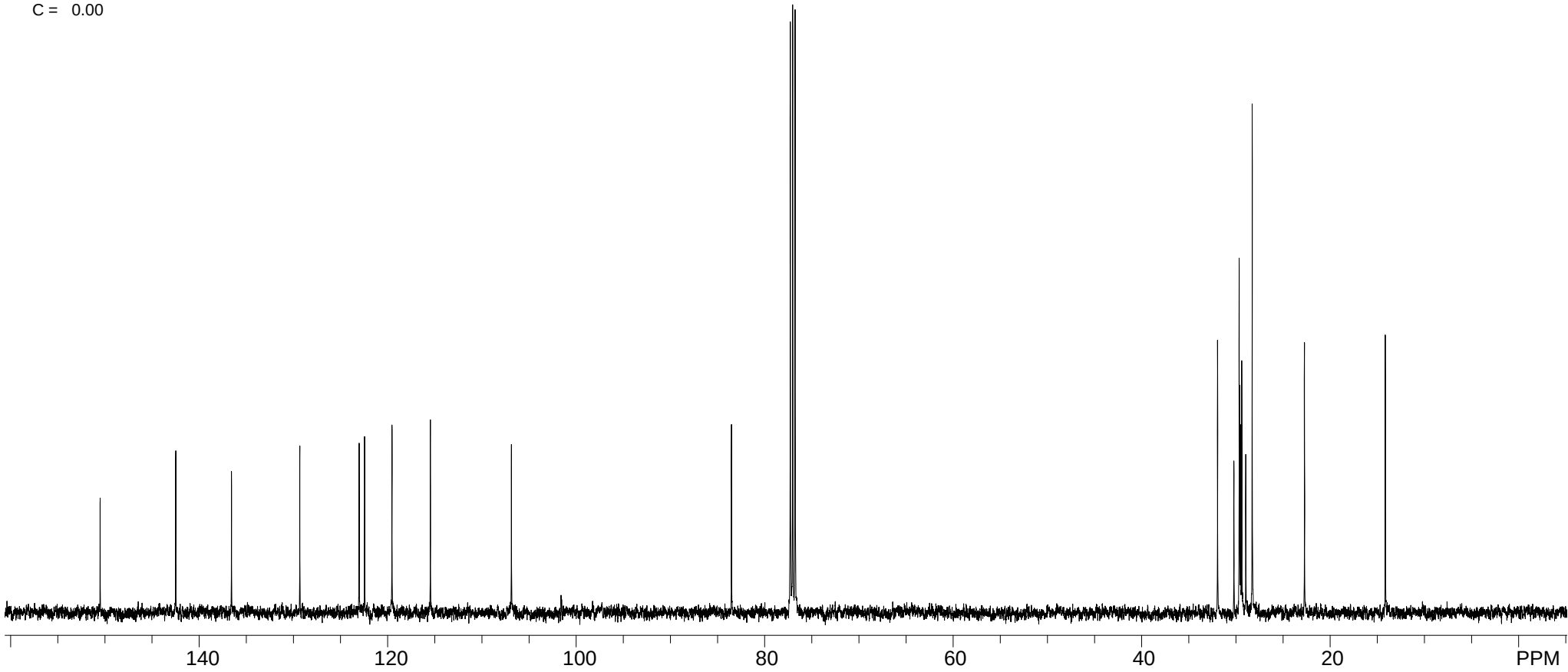
3a

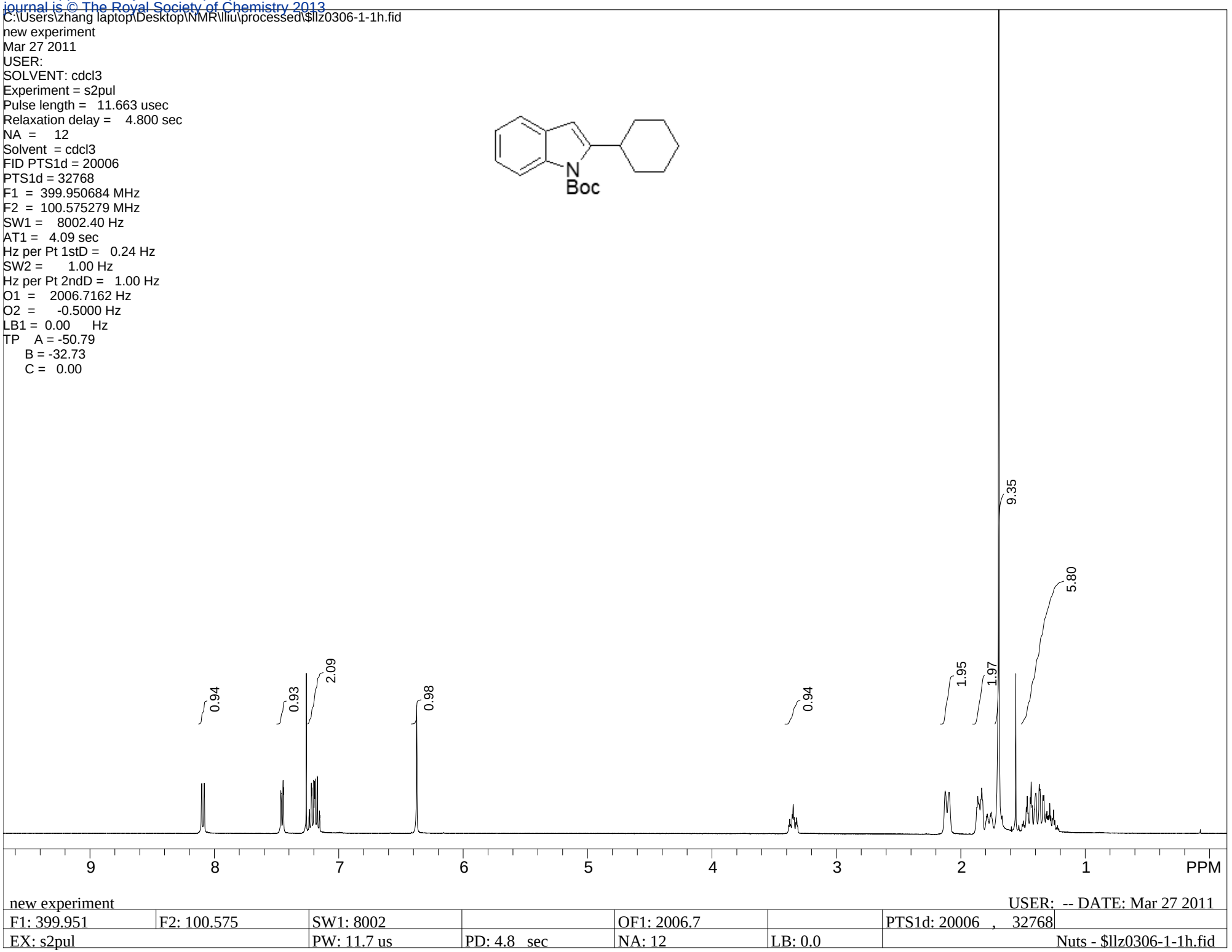


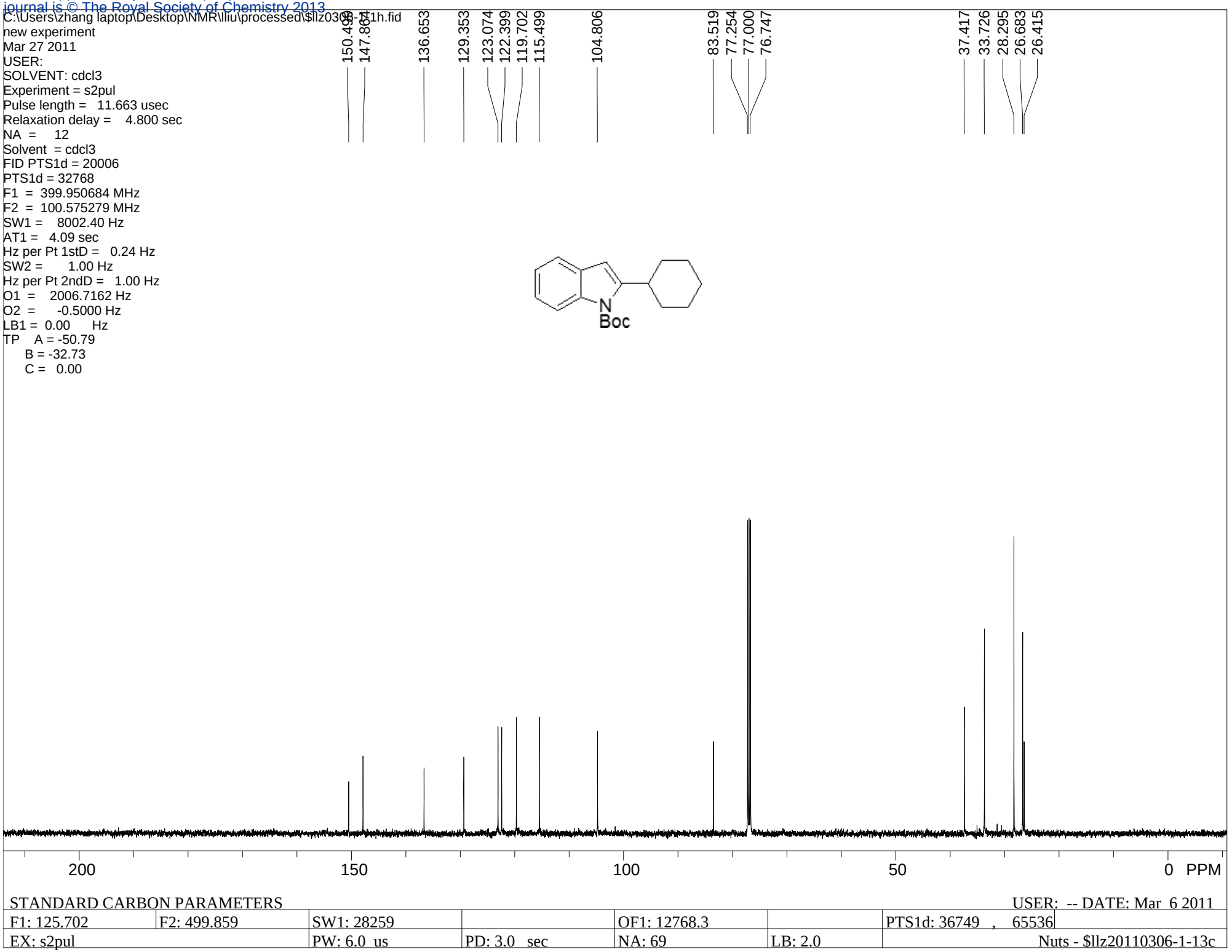
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-186-pro-c13.fid
STANDARD CARBON PARAMETERS
Mar 3 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 60
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12769.5205 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -245.63
B = 146.25
C = 0.00



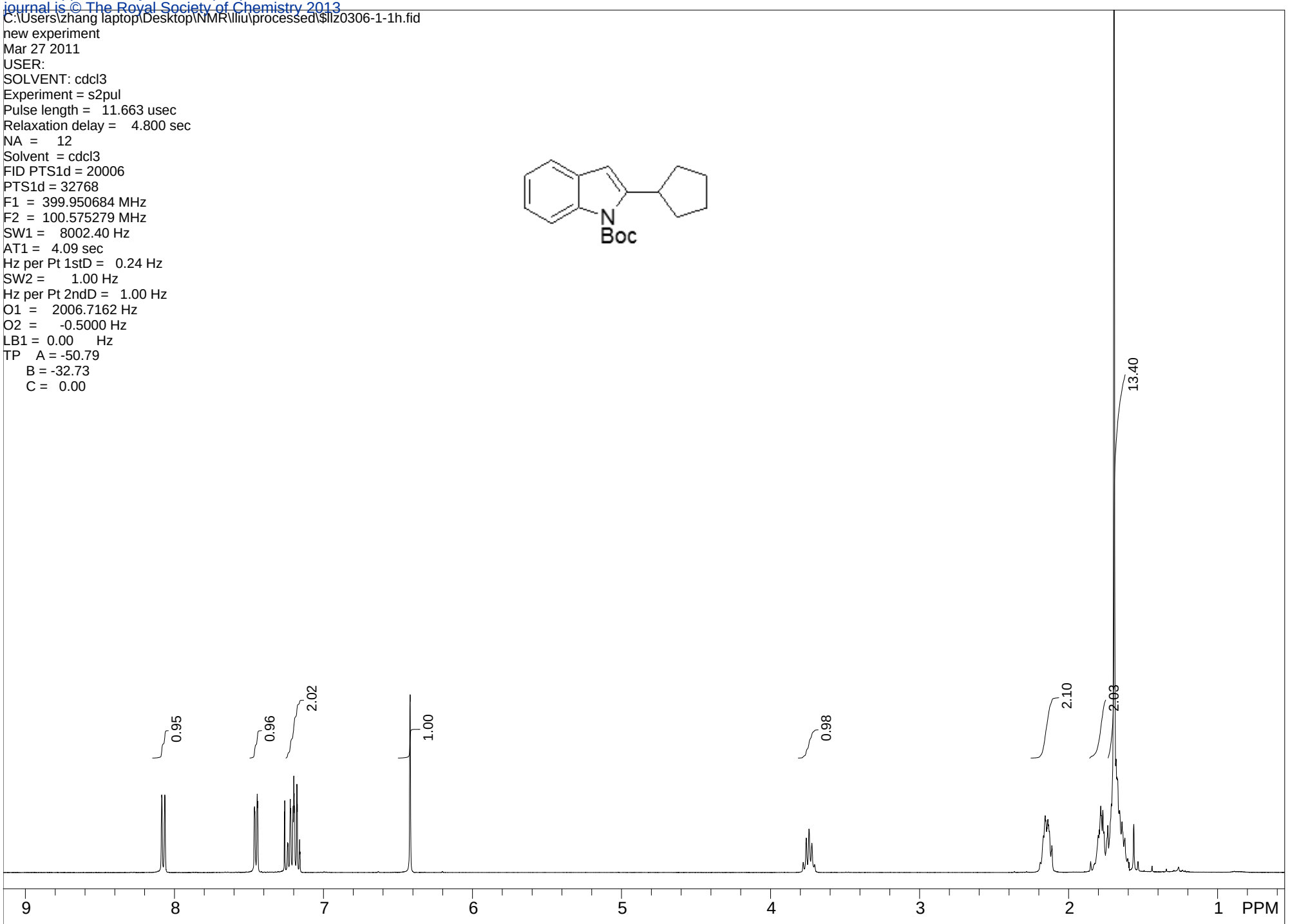
3a







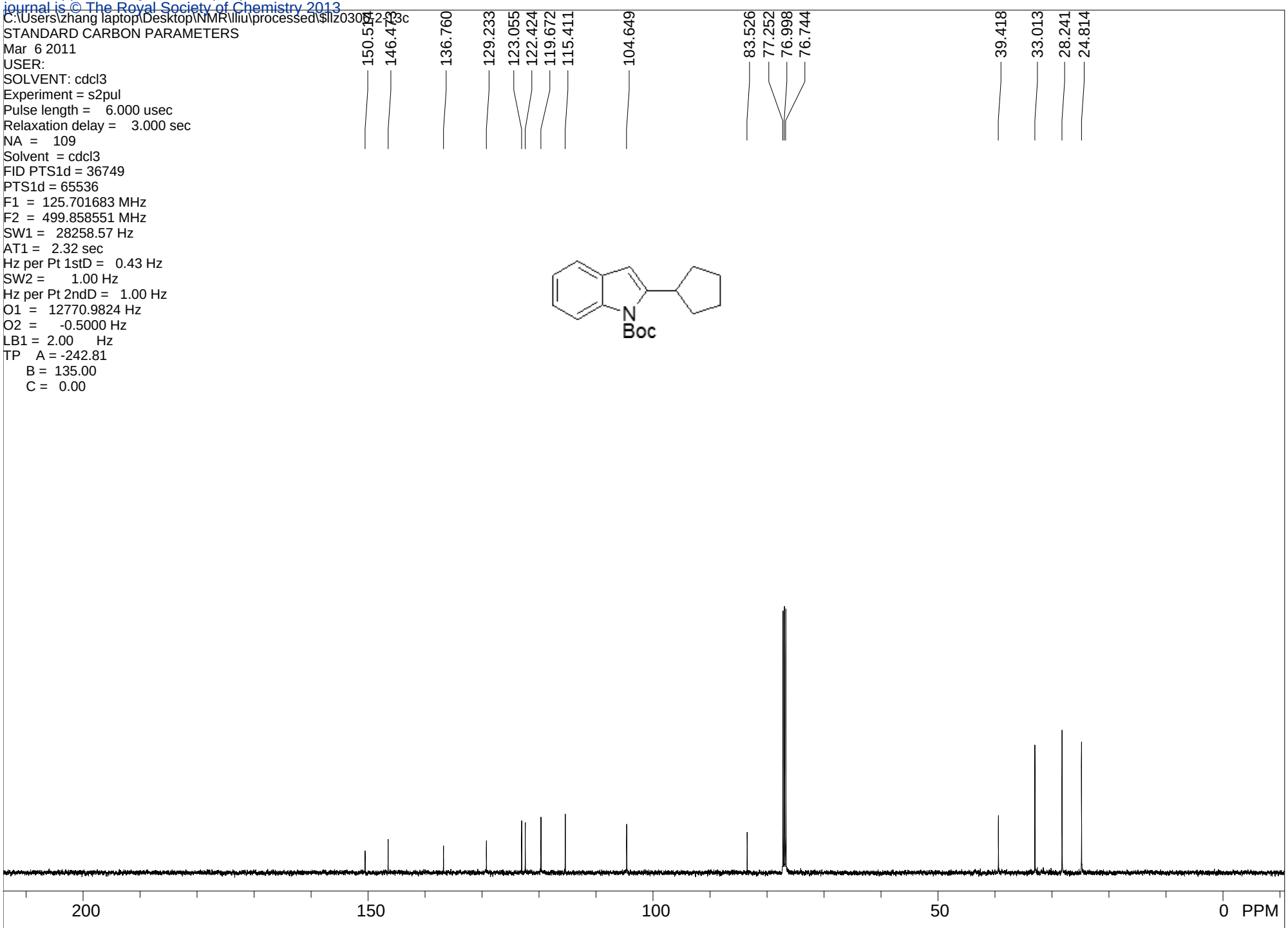
C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz0306-1-1h.fid
new experiment
Mar 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 12
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 4.09 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7162 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -50.79
B = -32.73
C = 0.00



new experiment USER: -- DATE: Mar 27 2011

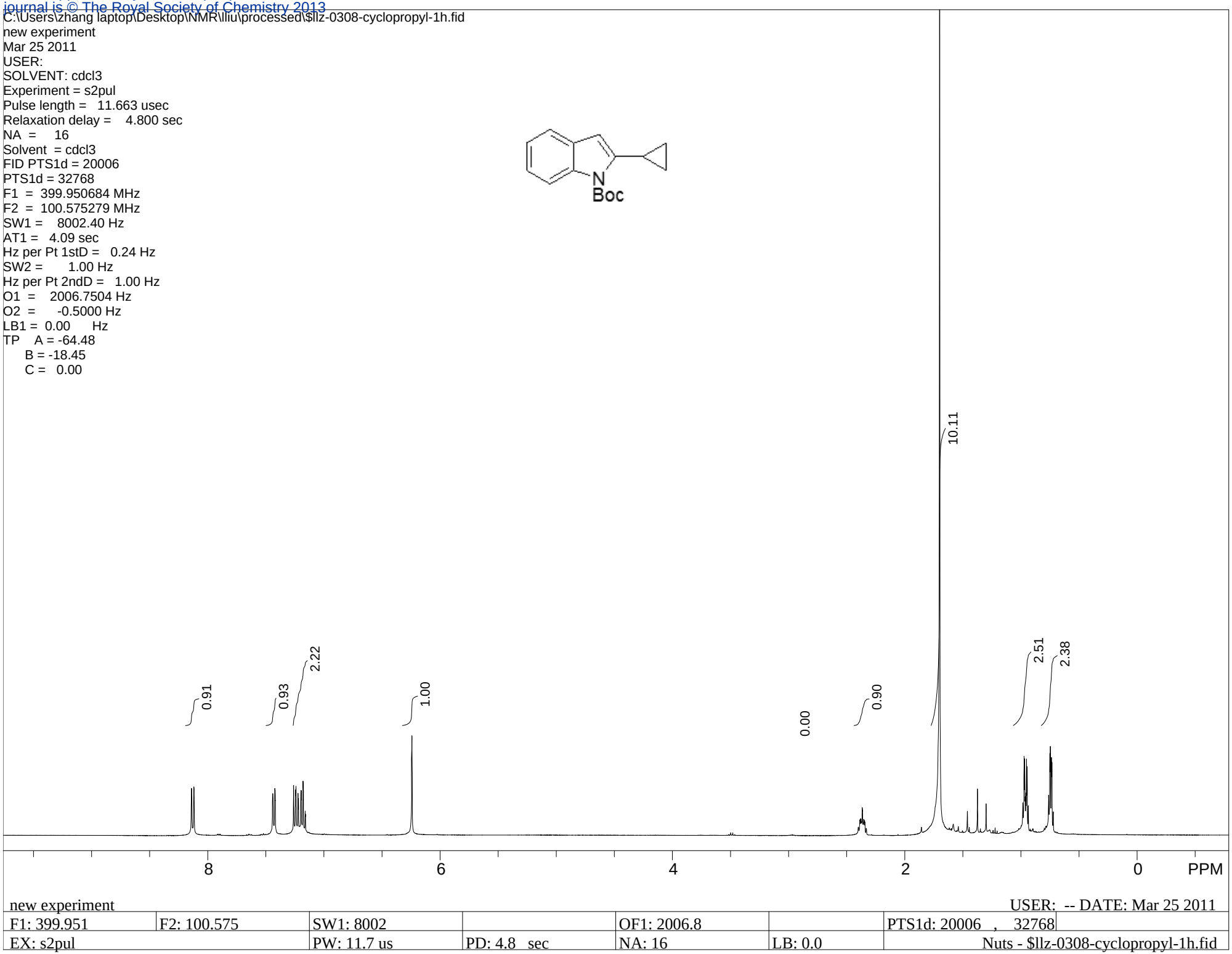
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.2		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz-0306-2-1h.fid

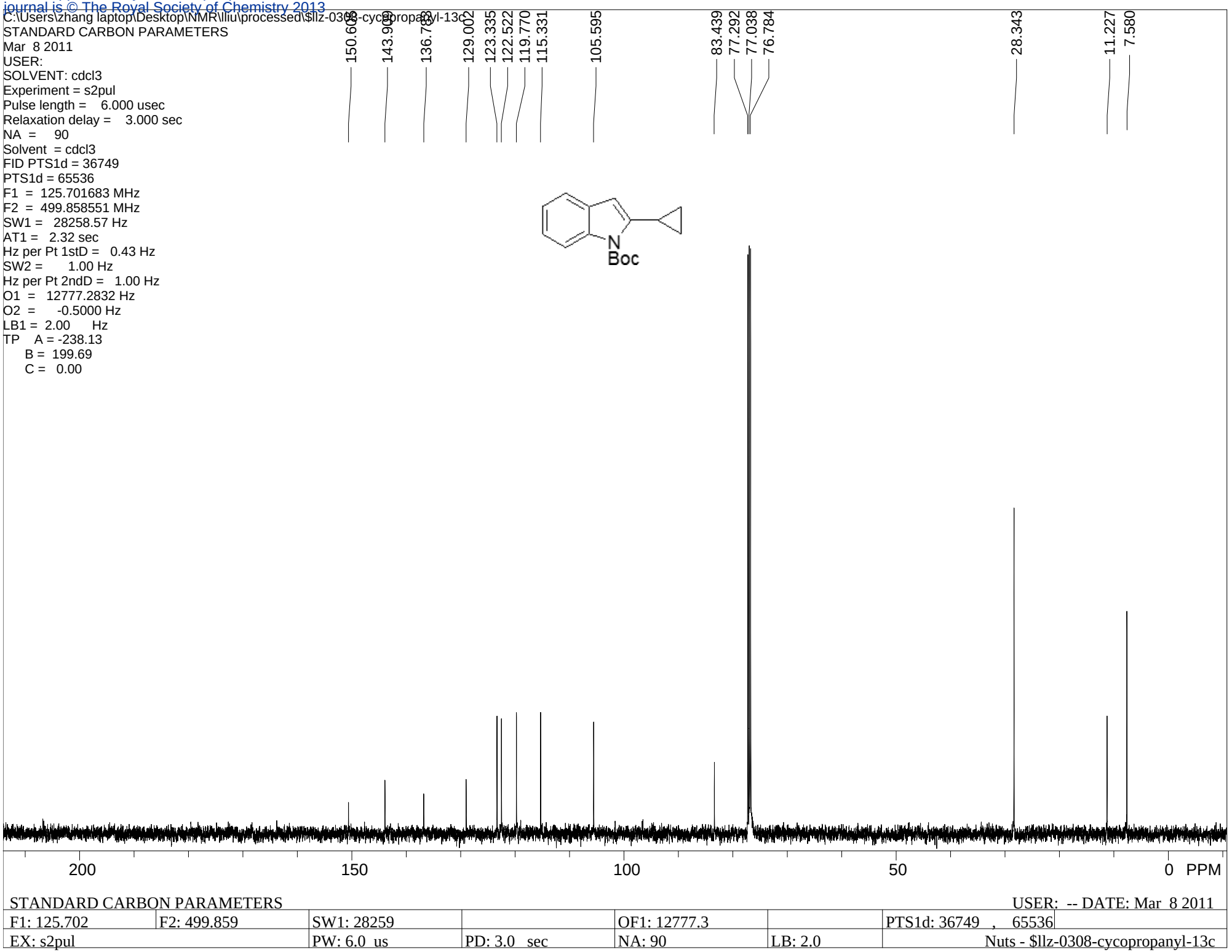
C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz0306-2-13c
STANDARD CARBON PARAMETERS
Mar 6 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 109
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12770.9824 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -242.81
B = 135.00
C = 0.00

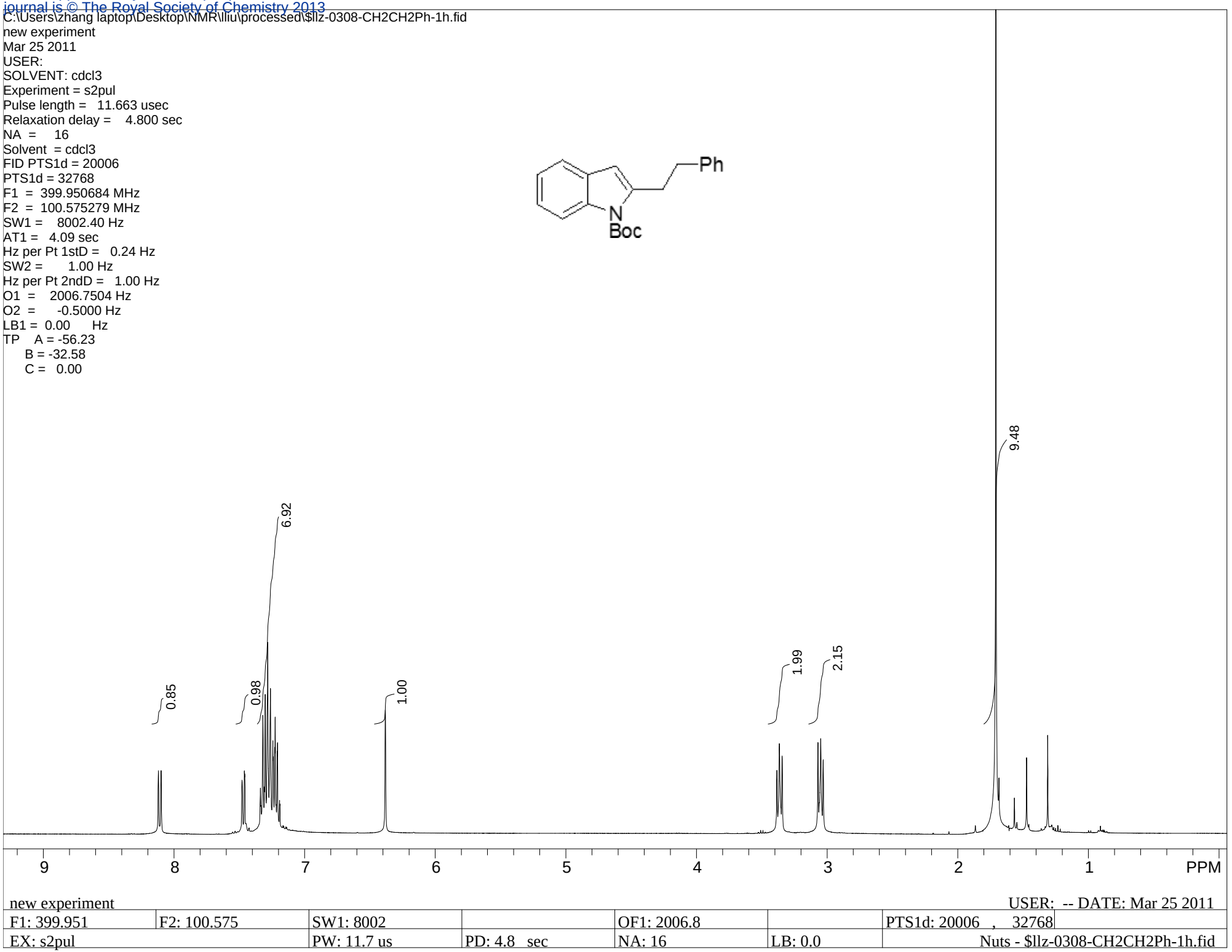


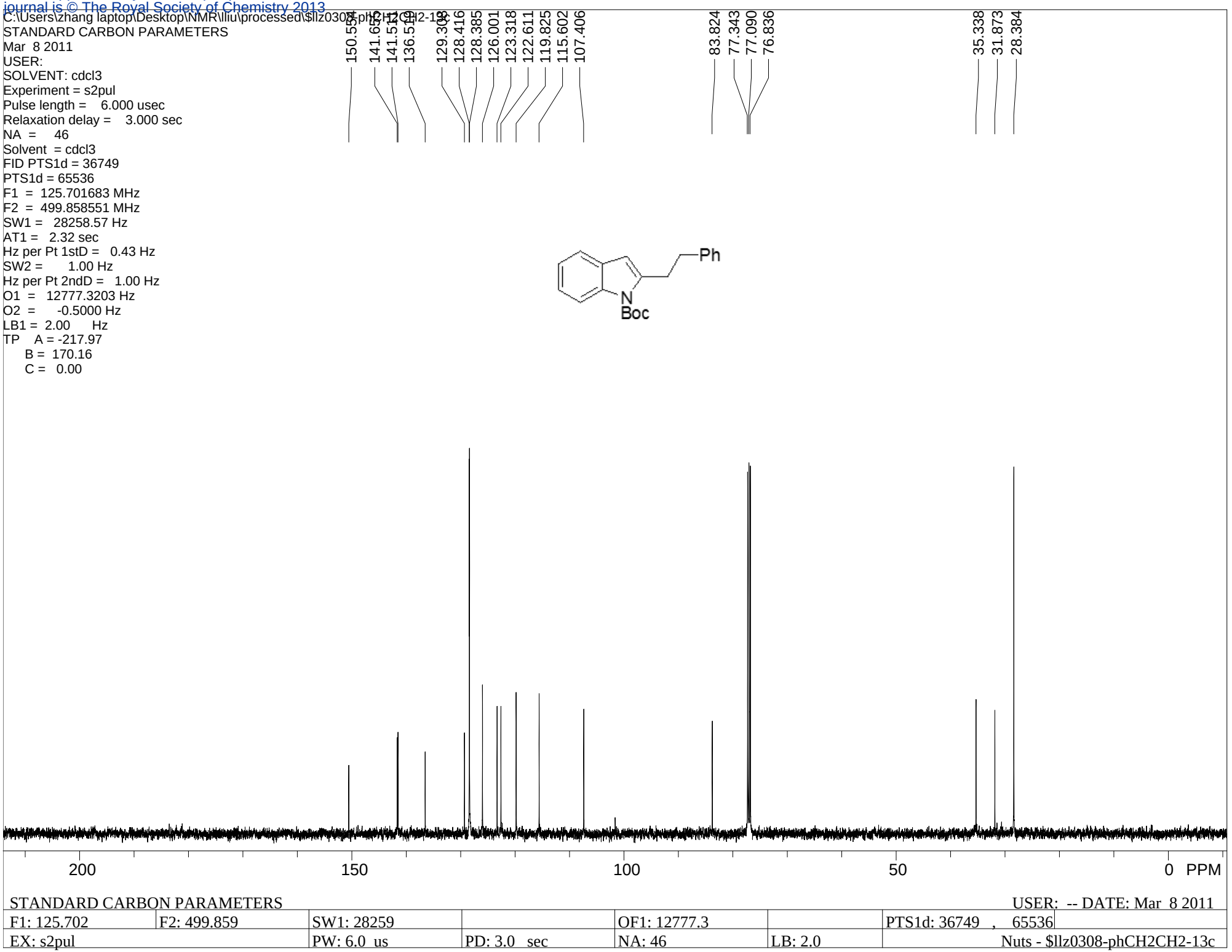
STANDARD CARBON PARAMETERS USER: -- DATE: Mar 6 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12771.0		PTS1d: 36749 , 65536	
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 109	LB: 2.0		Nuts - $llz0306-2-13c



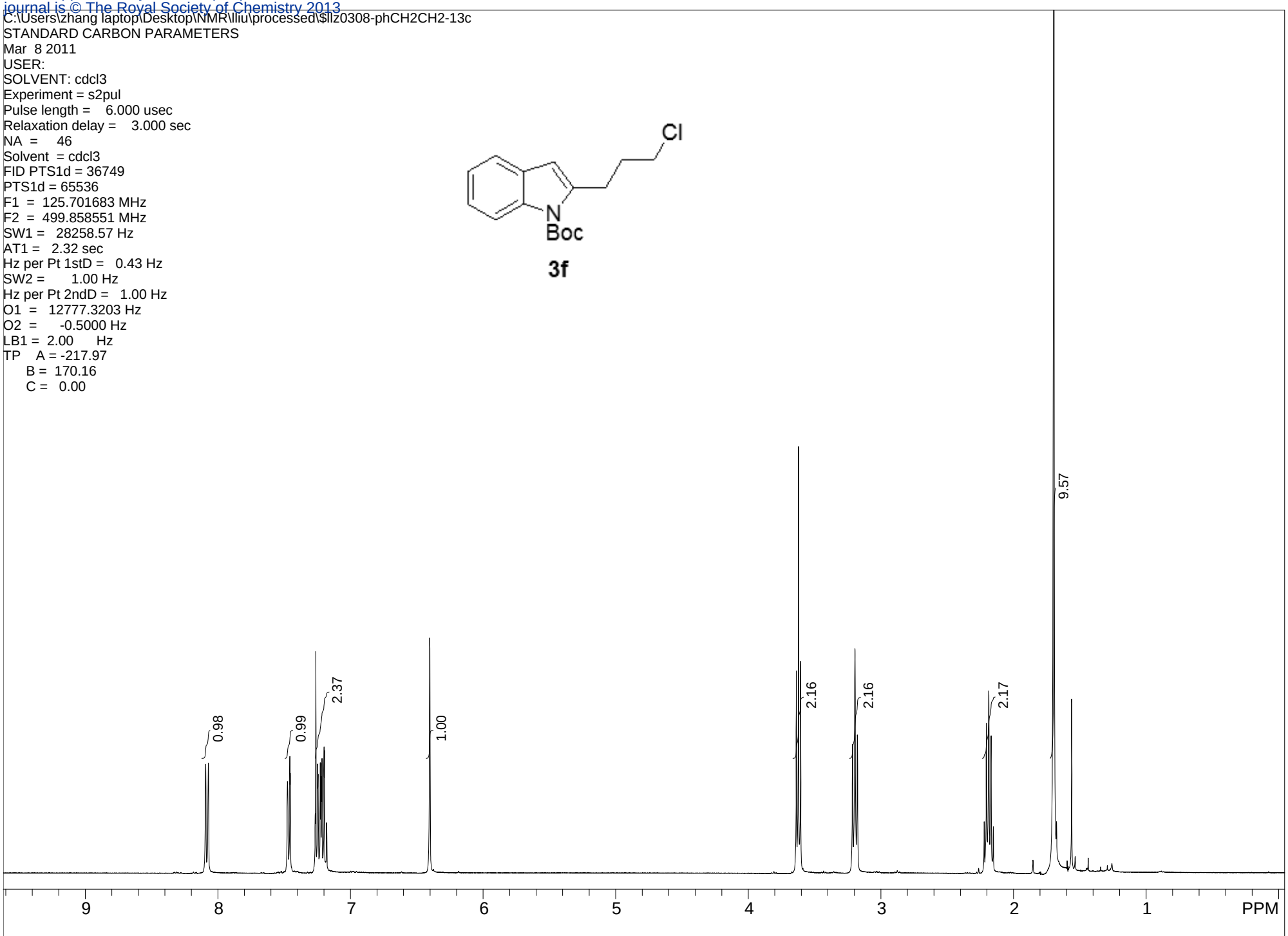






C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz0308-phCH2CH2-13c
STANDARD CARBON PARAMETERS
Mar 8 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 46
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.3203 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -217.97
B = 170.16
C = 0.00

3f

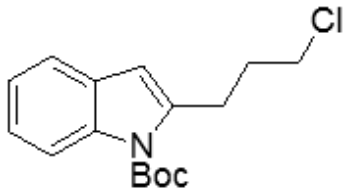


new experiment USER: -- DATE: Mar 27 2011

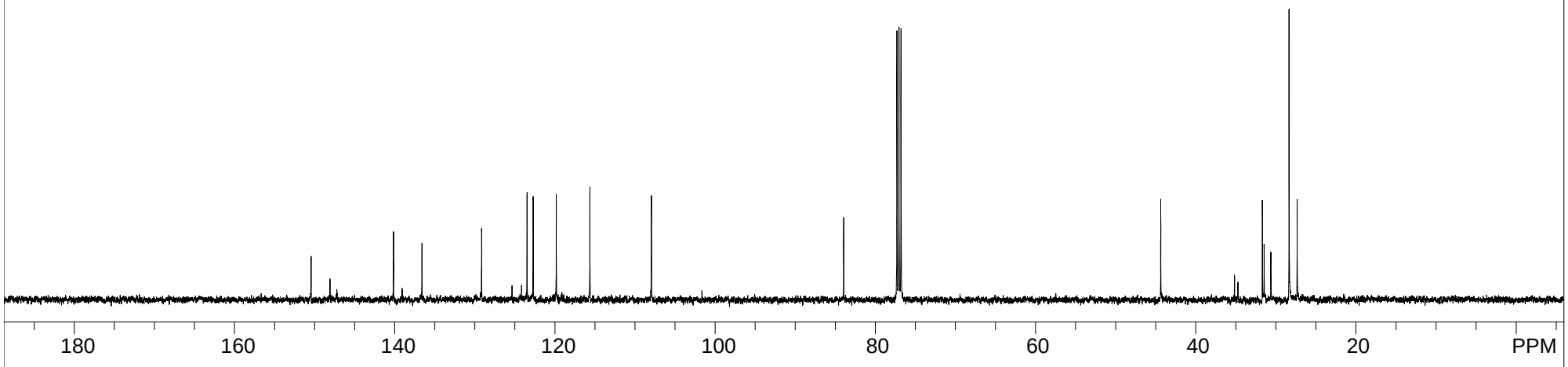
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.8		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz0307-C5-1h.fid

C:\Users\zhang laptop\Desktop\NMR\liu\processed\llz0307-C5-13c
STANDARD CARBON PARAMETERS
Mar 8 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 82
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -176.72
B = 104.06
C = 0.00

150.433 140.144 136.593 129.143 123.469 122.707 119.825 115.629 107.958 83.968 77.329 77.075 76.818 44.388 31.681 31.461 30.617 28.343 27.331

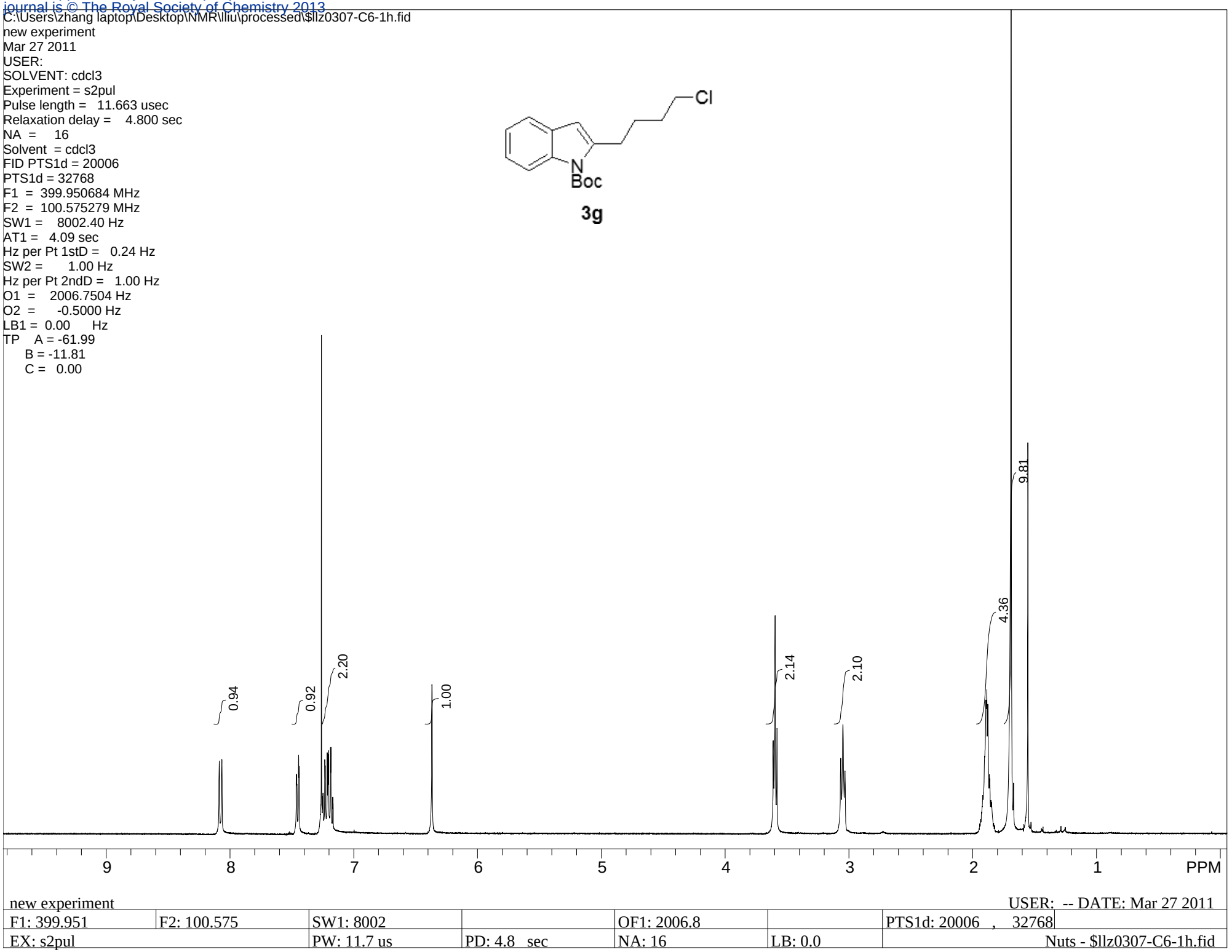


3f



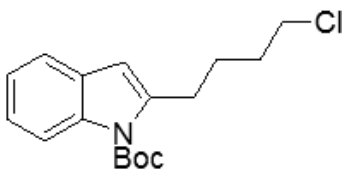
STANDARD CARBON PARAMETERS USER: -- DATE: Mar 8 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 82	LB: 2.0	Nuts - $llz0307-C5-13c



C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz0307-C6-13c
STANDARD CARBON PARAMETERS
Mar 8 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 136
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -183.28
B = 112.50
C = 0.00

150.502 141.486 136.550 129.222 123.294 122.611 119.715 115.575 107.337 83.806 77.295 77.041 76.787 44.985 32.298 29.454 28.332 26.260

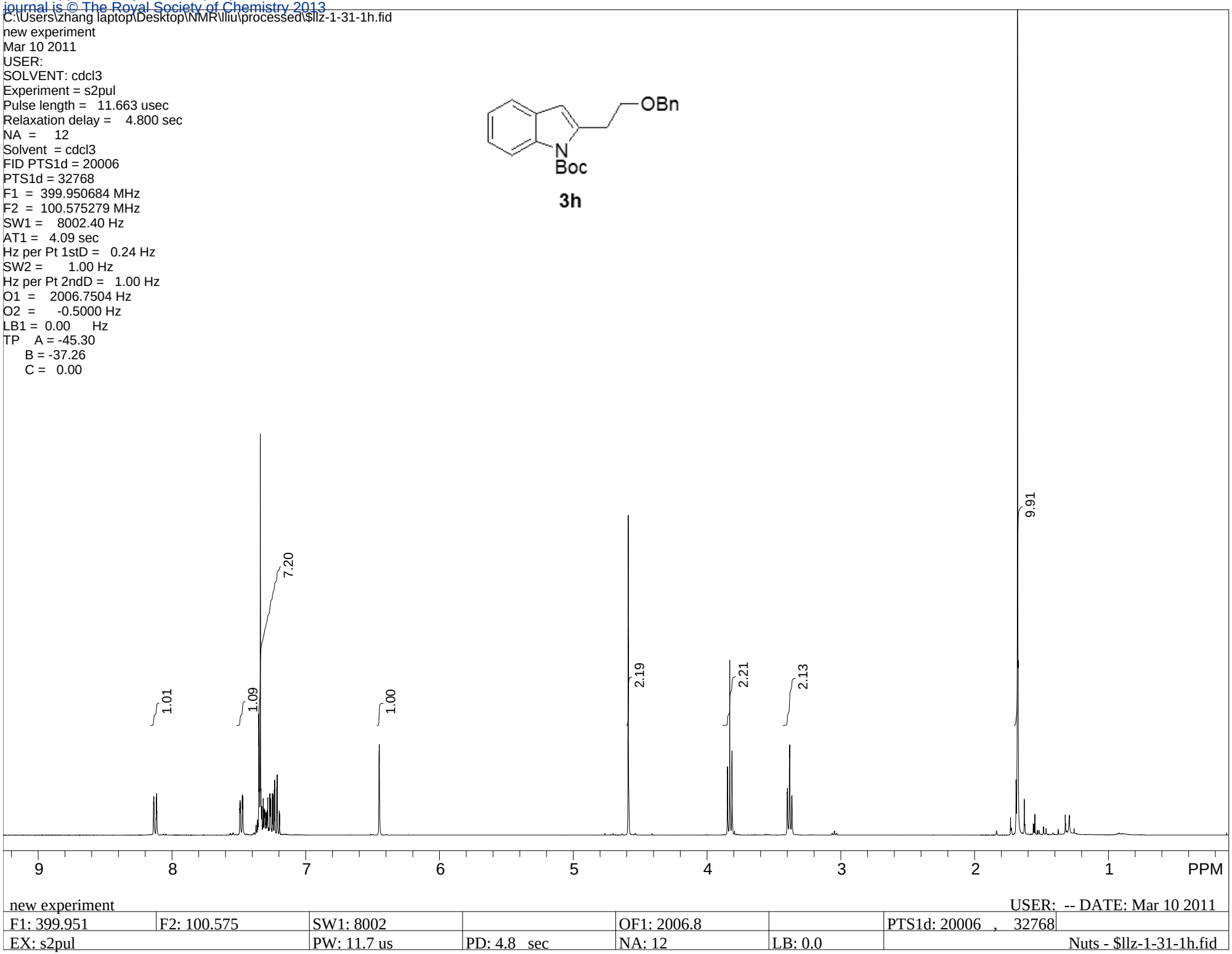


3g

200 150 100 50 0 PPM

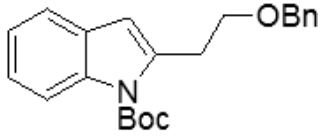
STANDARD CARBON PARAMETERS USER: -- DATE: Mar 8 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 136	LB: 2.0	Nuts - $llz0307-C6-13c

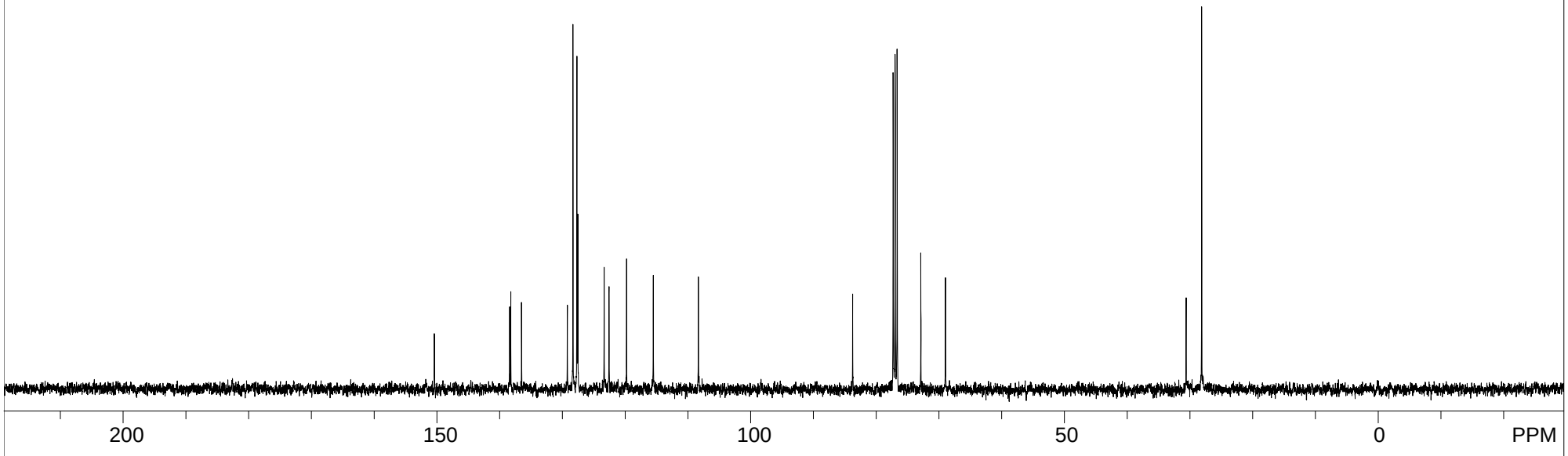


C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-31-13c.fid
Standard c13 run using qnp probe
Mar 10 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 100
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.66 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9525.1367 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -134.06
B = 199.69
C = 0.00

150.403 138.403 138.223 136.510 129.227 128.316 127.694 127.542 123.354 122.581 119.773 115.525 108.333 83.766 77.318 76.999 76.680 72.902 68.972 30.613 28.140

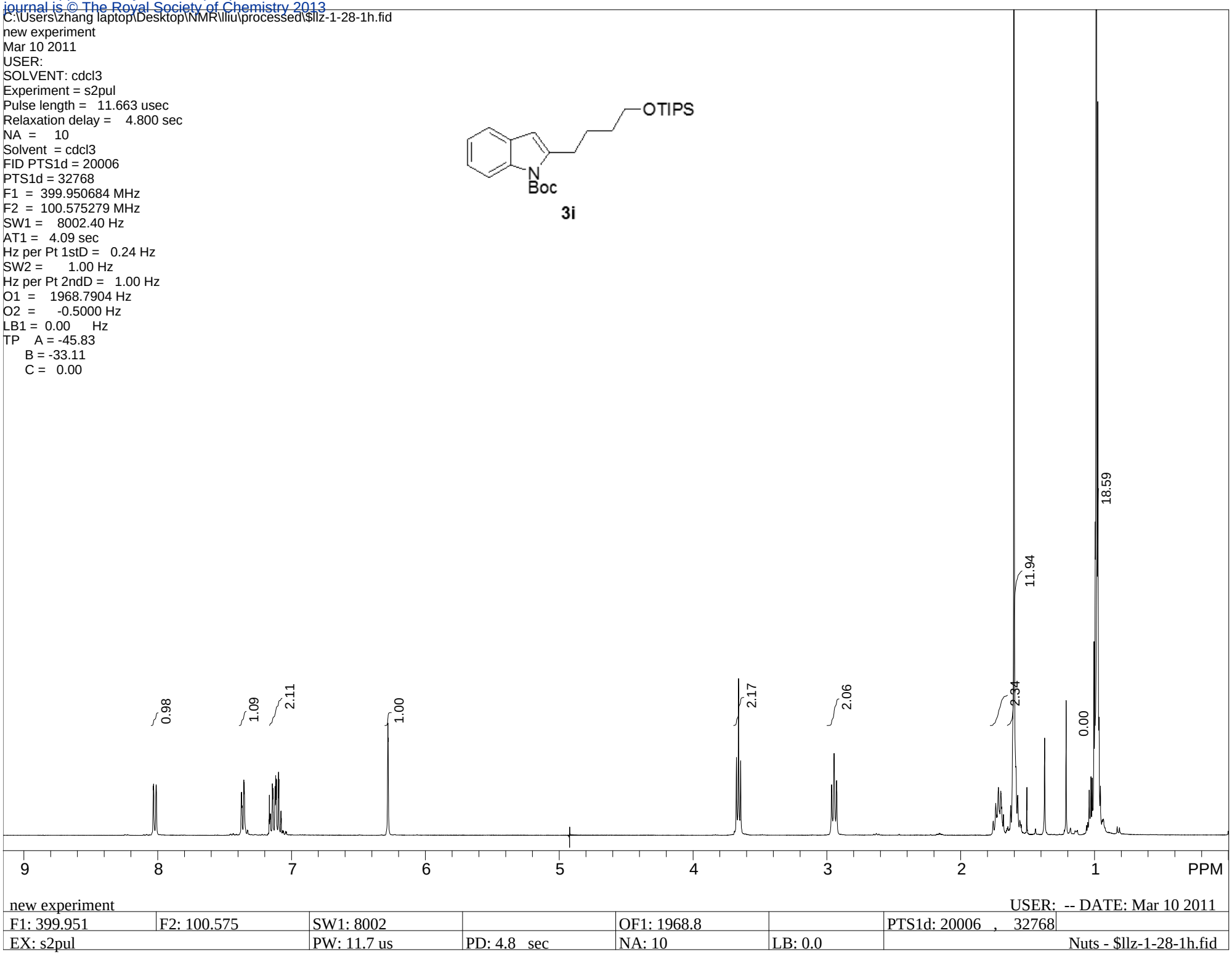


3h



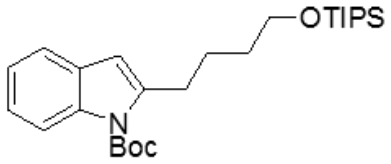
Standard c13 run using qnp probe USER: -- DATE: Mar 10 2011

F1: 100.577	F2: 399.950	SW1: 25000		OF1: 9525.1		PTS1d: 16000 , 16384	
EX: s2pul		PW: 9.5 us	PD: 5.0 sec	NA: 100	LB: 2.0		Nuts - $llz-1-31-13c.fid



C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-28-13c.fid
Standard c13 run using qnp probe
Mar 10 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 124
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.66 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9531.0605 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -107.34
B = 161.72
C = 0.00

150.576 142.287 136.630 129.346 123.110 122.503 119.605 115.523 107.041 83.552 77.316 76.997 76.678 63.219 32.720 29.989 28.214 25.225 18.017 11.963



3i

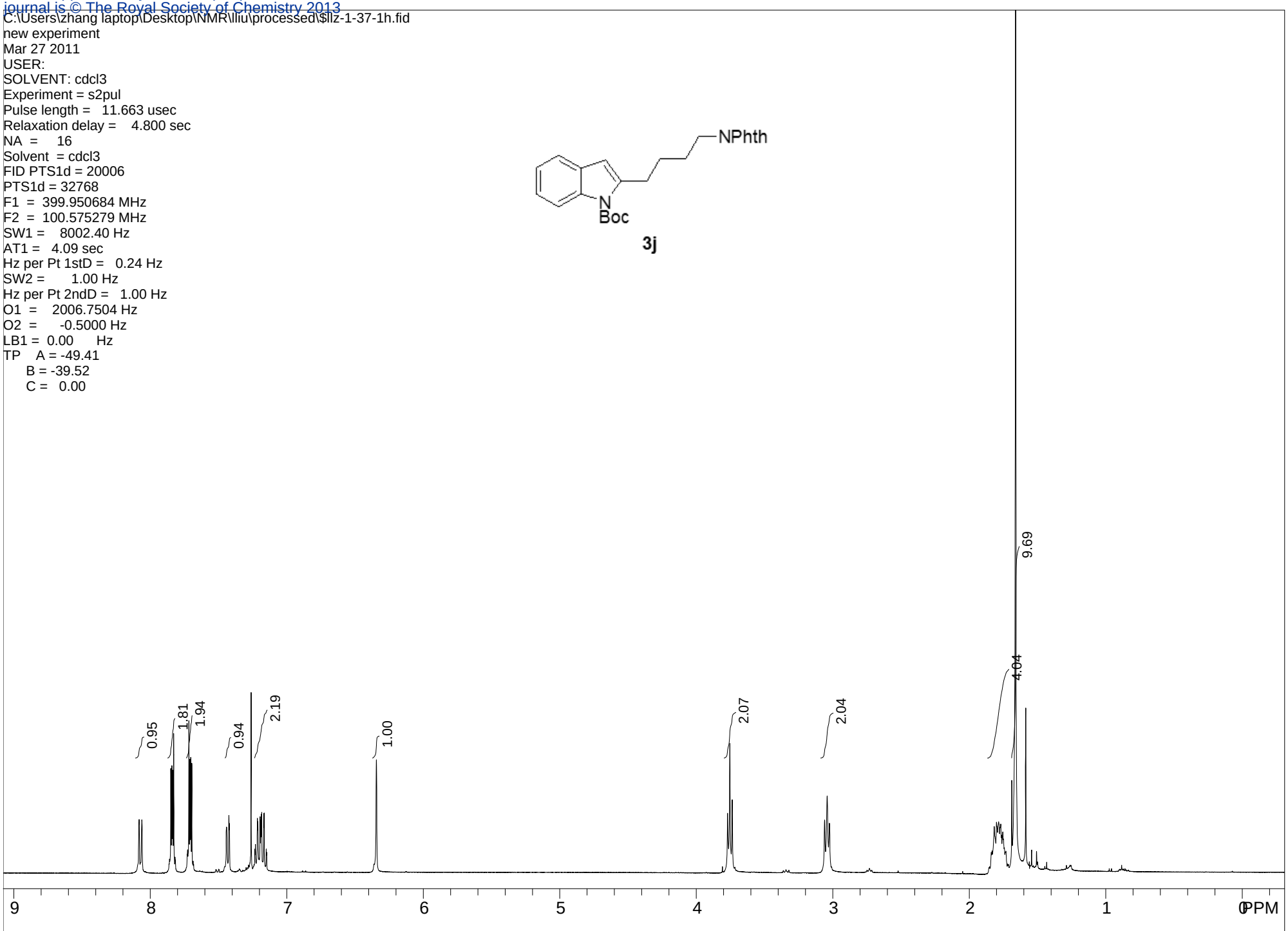
200 150 100 50 0 PPM

Standard c13 run using qnp probe USER: -- DATE: Mar 10 2011

F1: 100.577	F2: 399.950	SW1: 25000		OF1: 9531.1		PTS1d: 16000 , 16384	
EX: s2pul		PW: 9.5 us	PD: 5.0 sec	NA: 124	LB: 2.0		Nuts - $llz-1-28-13c.fid

C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-37-1h.fid
new experiment
Mar 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 16
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 4.09 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -49.41
B = -39.52
C = 0.00

3j

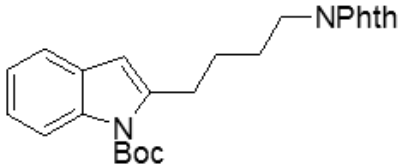


new experiment USER: -- DATE: Mar 27 2011

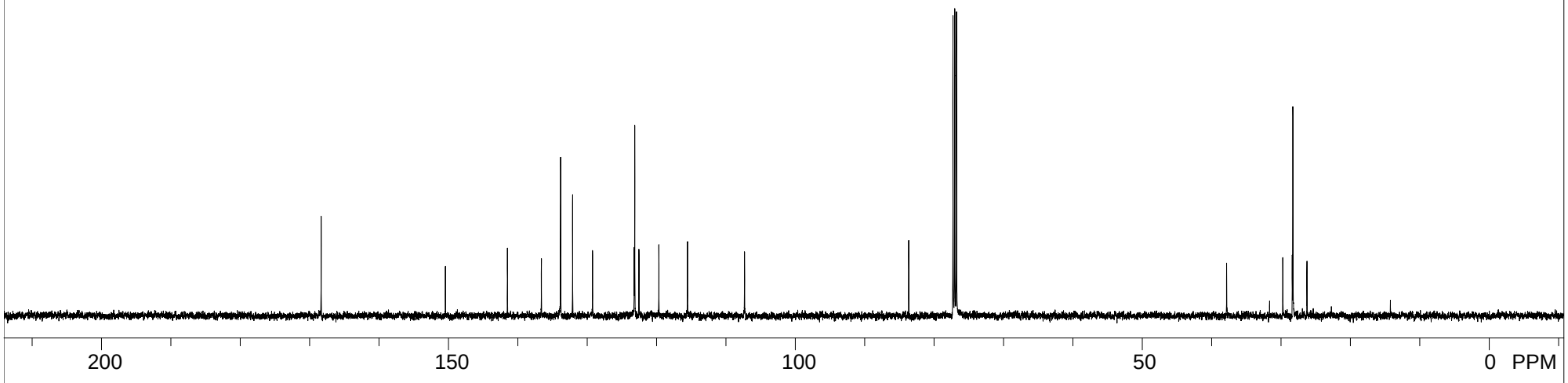
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.8		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz-1-37-1h.fid

C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-37-13c.fid
STANDARD CARBON PARAMETERS
Mar 14 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 64
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -233.91
B = 129.38
C = 0.00

168.340 150.439 141.486 136.594 133.833 132.100 129.232 123.225 123.153 122.549 119.681 115.557 107.344 83.707 77.333 77.079 76.825 37.863 29.753 28.387 28.298 26.264

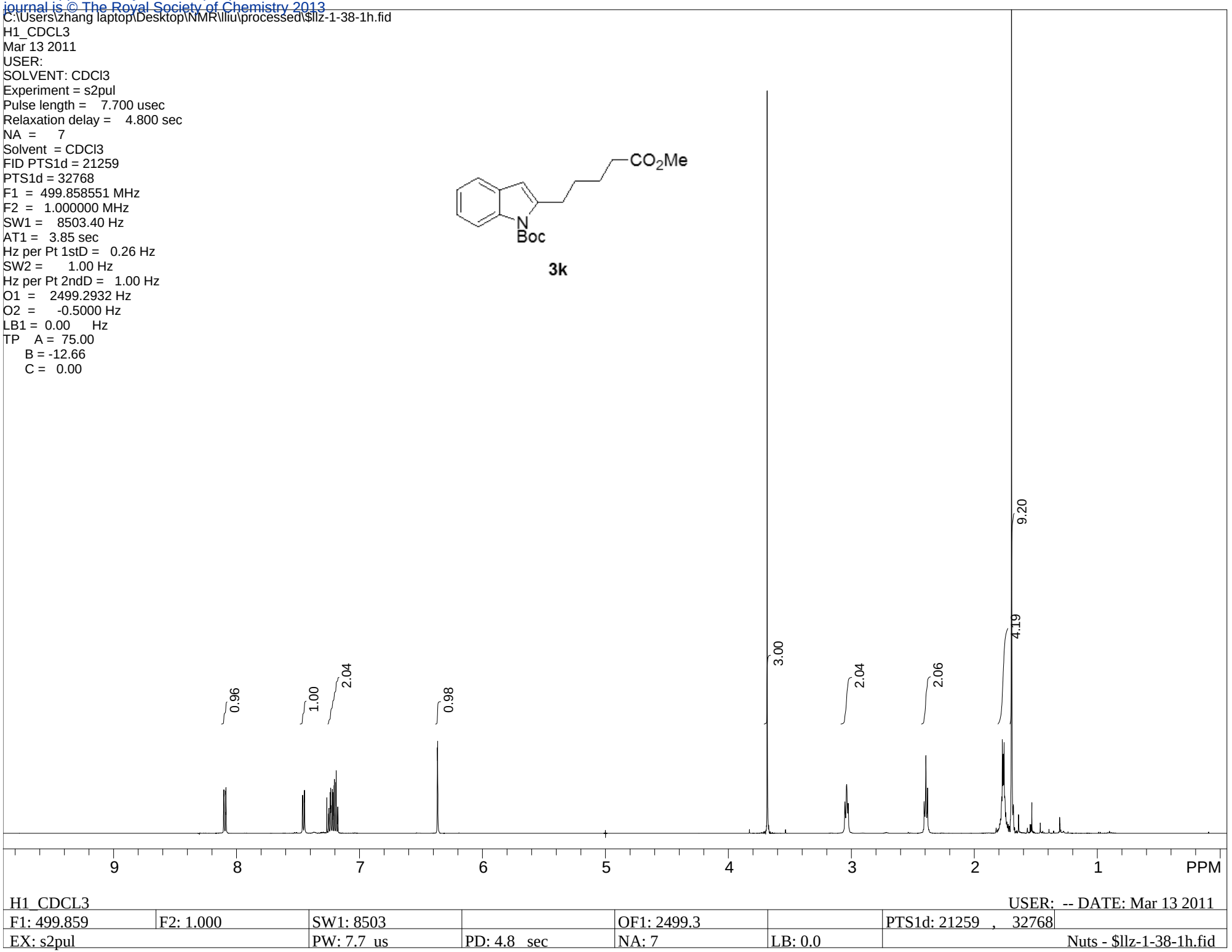


3j



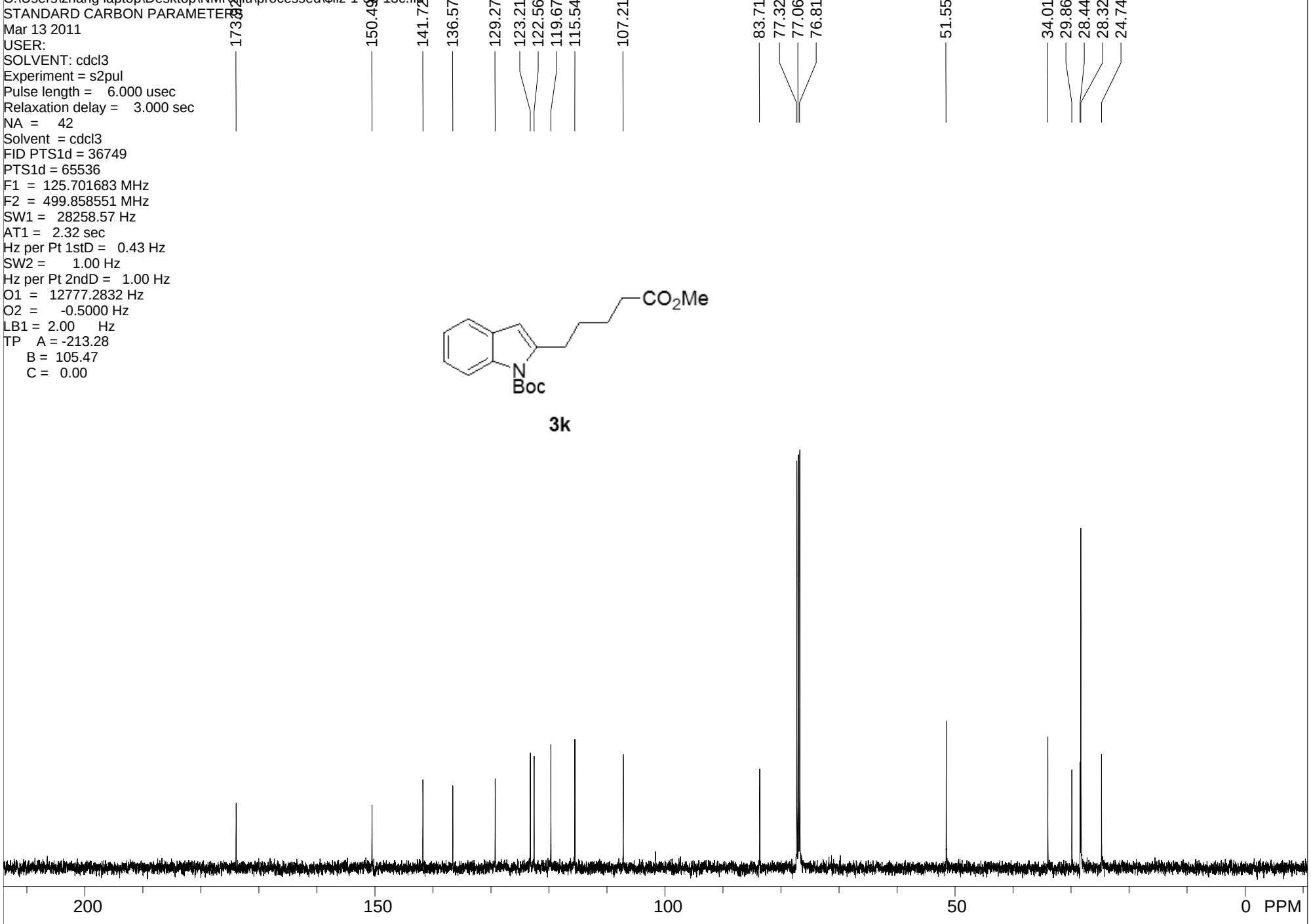
STANDARD CARBON PARAMETERS USER: -- DATE: Mar 14 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536	
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 64	LB: 2.0		Nuts - $llz-1-37-13c.fid



C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-38-13c.fid
STANDARD CARBON PARAMETERS
Mar 13 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 42
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -213.28
B = 105.47
C = 0.00

3k

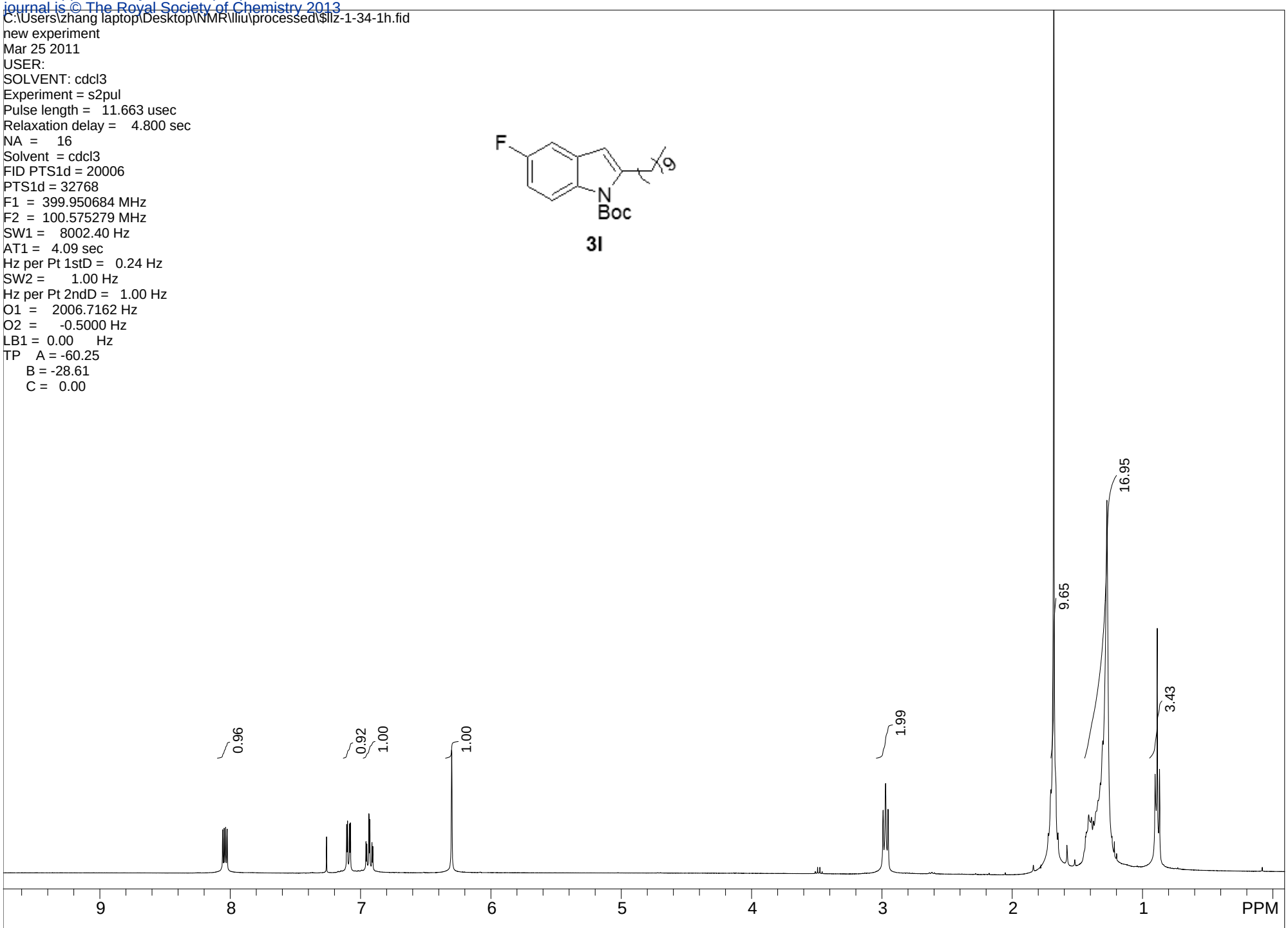


STANDARD CARBON PARAMETERS USER: -- DATE: Mar 13 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 42	LB: 2.0	Nuts - $llz-1-38-13c.fid

C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz-1-34-1h.fid
new experiment
Mar 25 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 16
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 4.09 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7162 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -60.25
B = -28.61
C = 0.00

3l

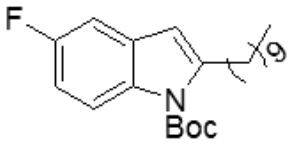


new experiment USER: -- DATE: Mar 25 2011

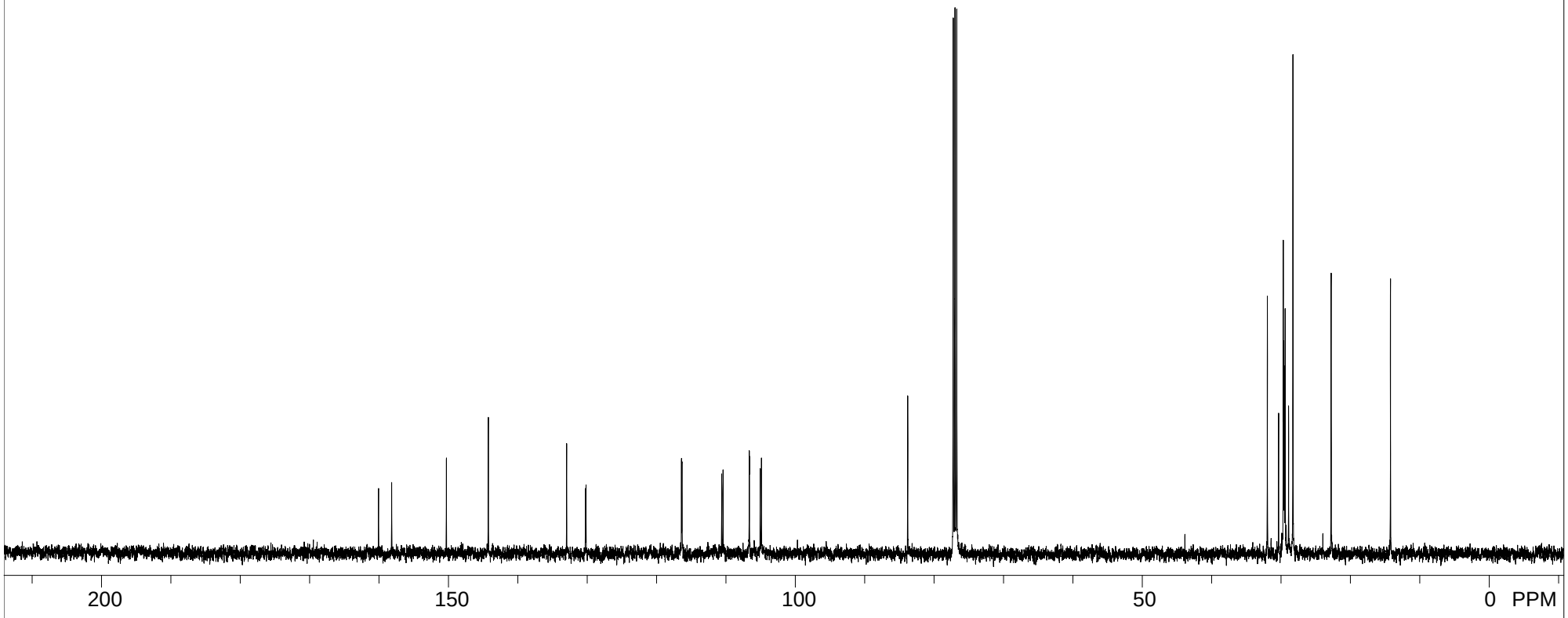
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.7		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz-1-34-1h.fid

C:\Users\zhang laptop\Desktop\NMR\liu\processed\$llz-1-34-13c.fid
STANDARD CARBON PARAMETERS
Mar 11 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 79
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -255.00
B = 157.50
C = 0.00

160.076 158.177 150.288 144.241 132.965 130.251 130.169 116.425 116.353 110.634 110.439 106.669 106.641 105.094 104.909 83.848 77.298 77.045 76.791 31.983 30.357 29.684 29.626 29.533 29.485 29.413 28.916 28.288 22.771 14.205



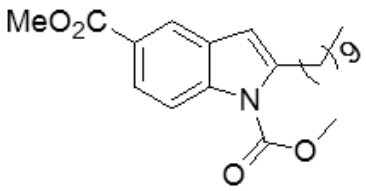
3l



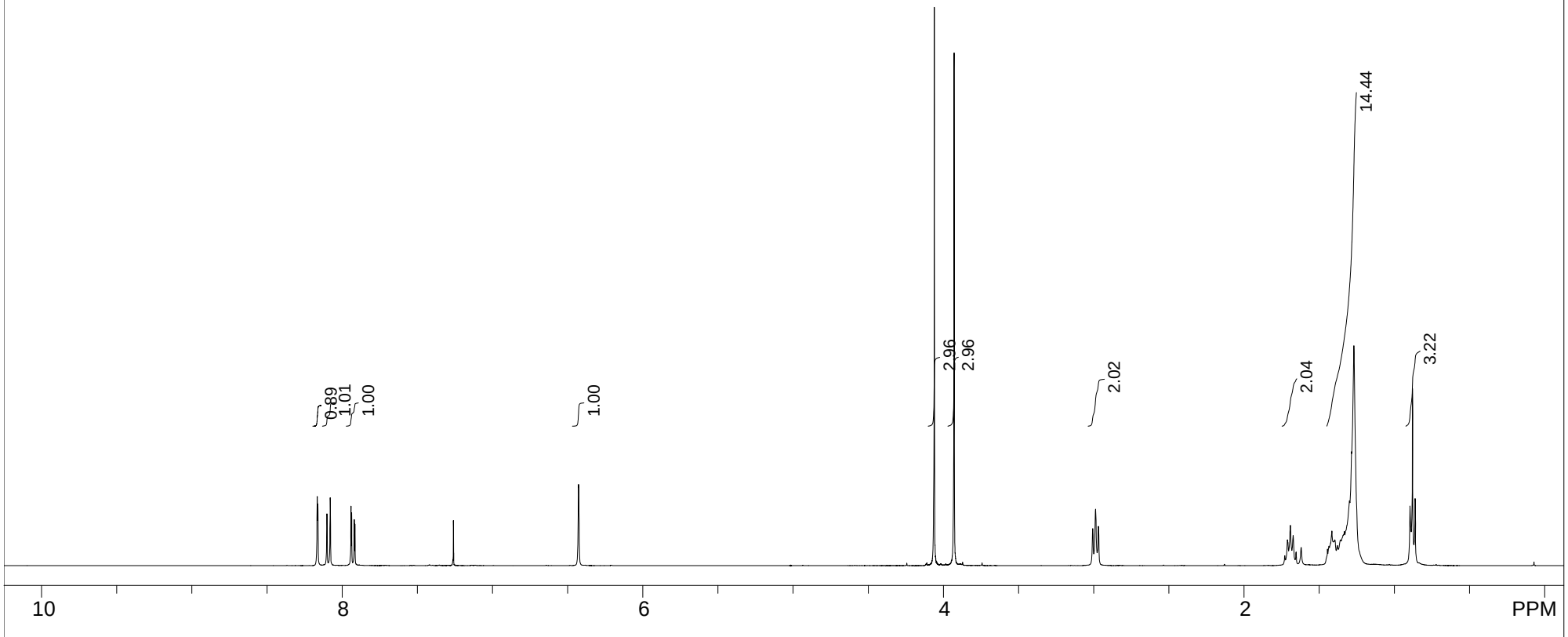
STANDARD CARBON PARAMETERS USER: -- DATE: Mar 11 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 79	LB: 2.0	Nuts - $llz-1-34-13c.fid

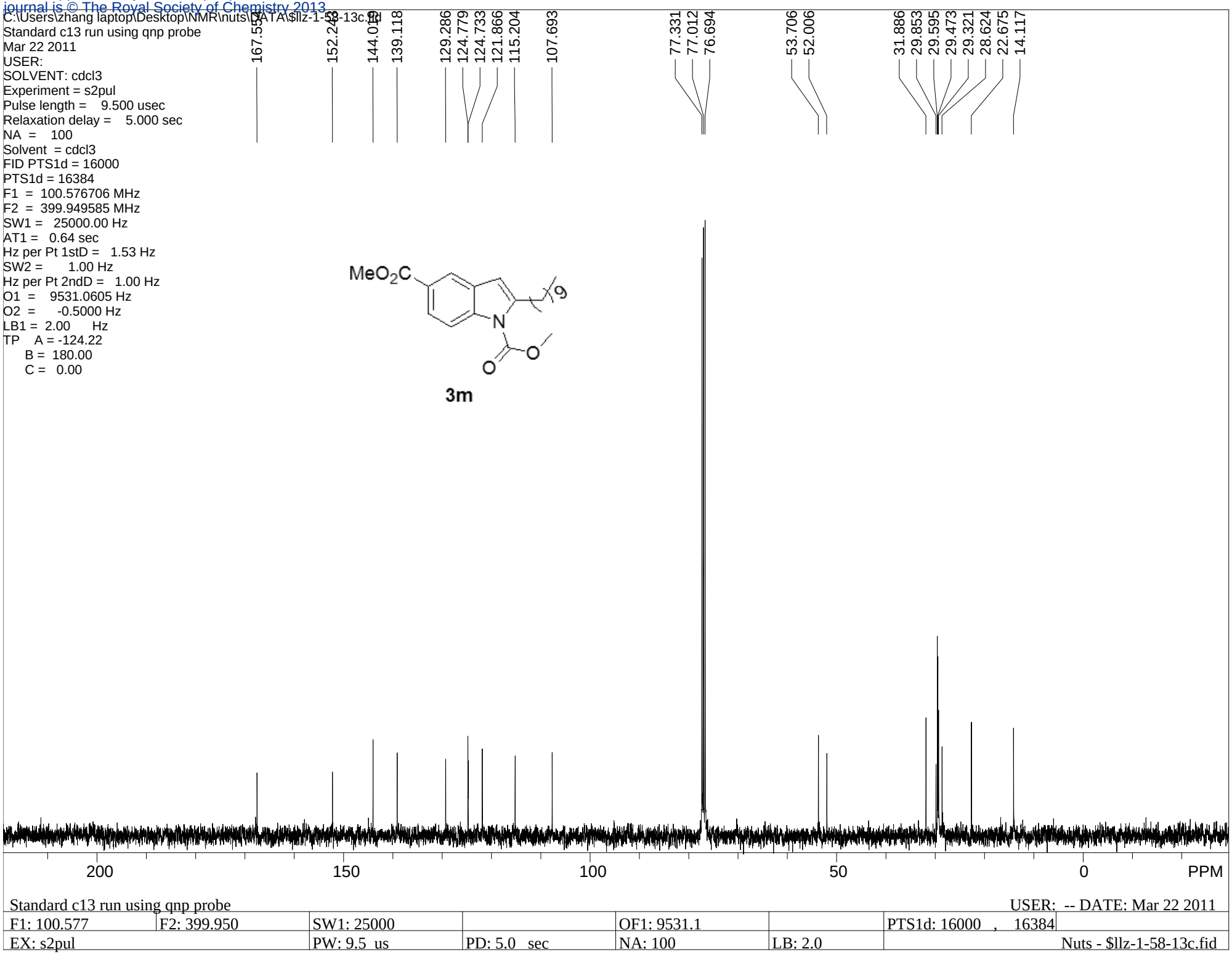
C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz-1-58-1h.fid
new experimentU
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 16
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.2362 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -48.69
B = -30.78
C = 0.00



3m

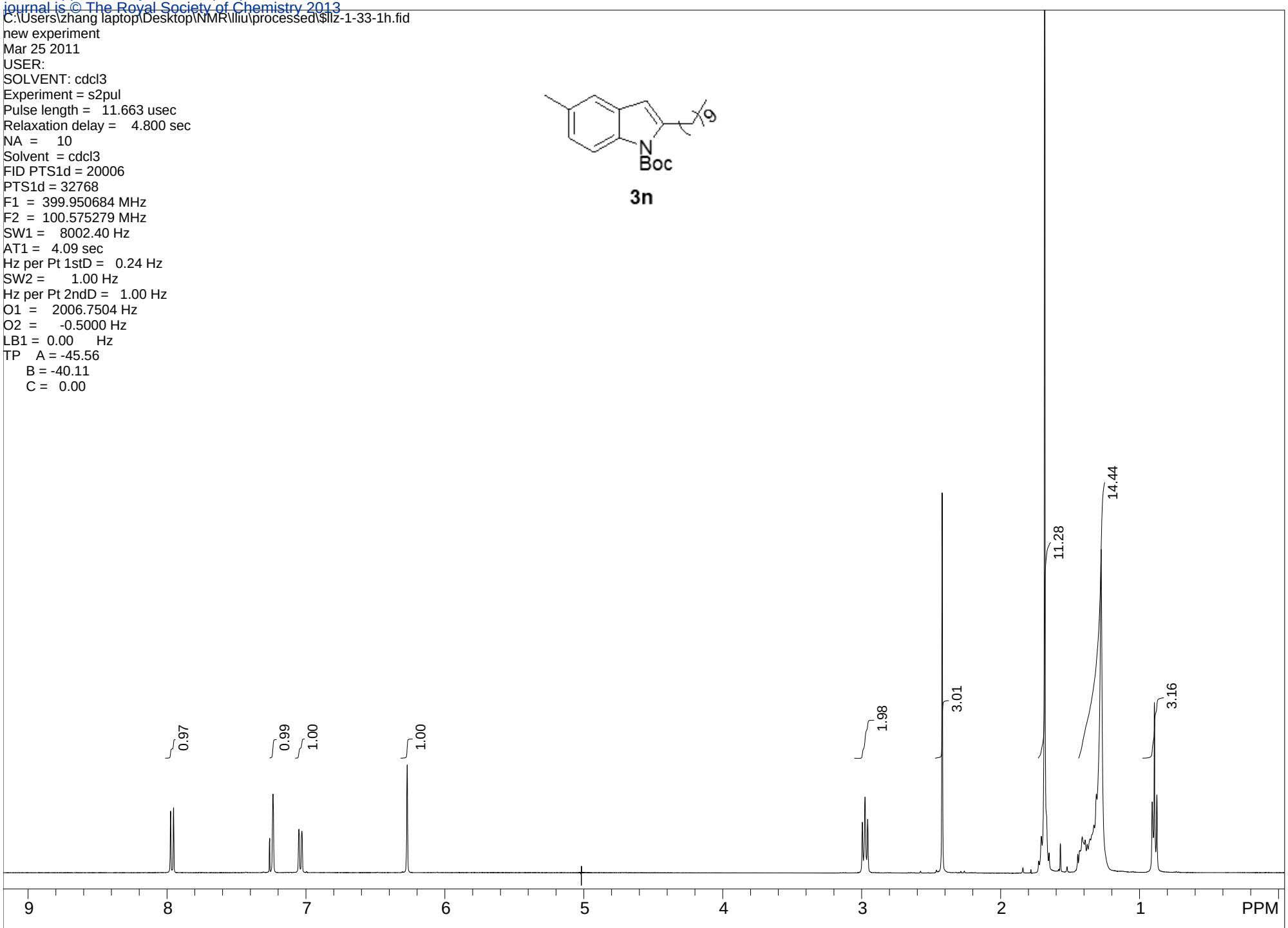


new experimentU						USER: -- DATE: Mar 22 2011	
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.2		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz-1-58-1h.fid



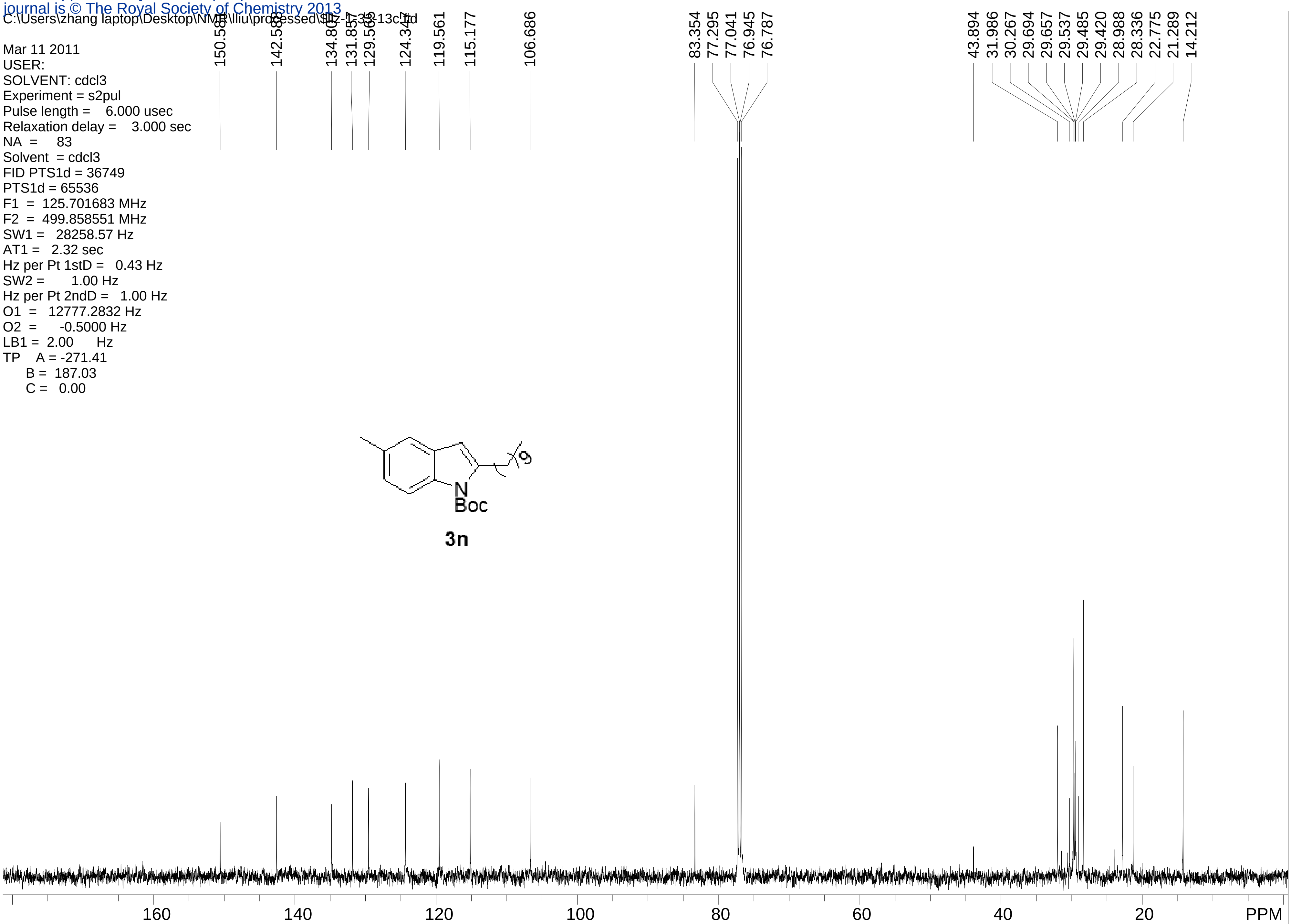
C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz-1-33-1h.fid
new experiment
Mar 25 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 10
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 4.09 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -45.56
B = -40.11
C = 0.00

3n

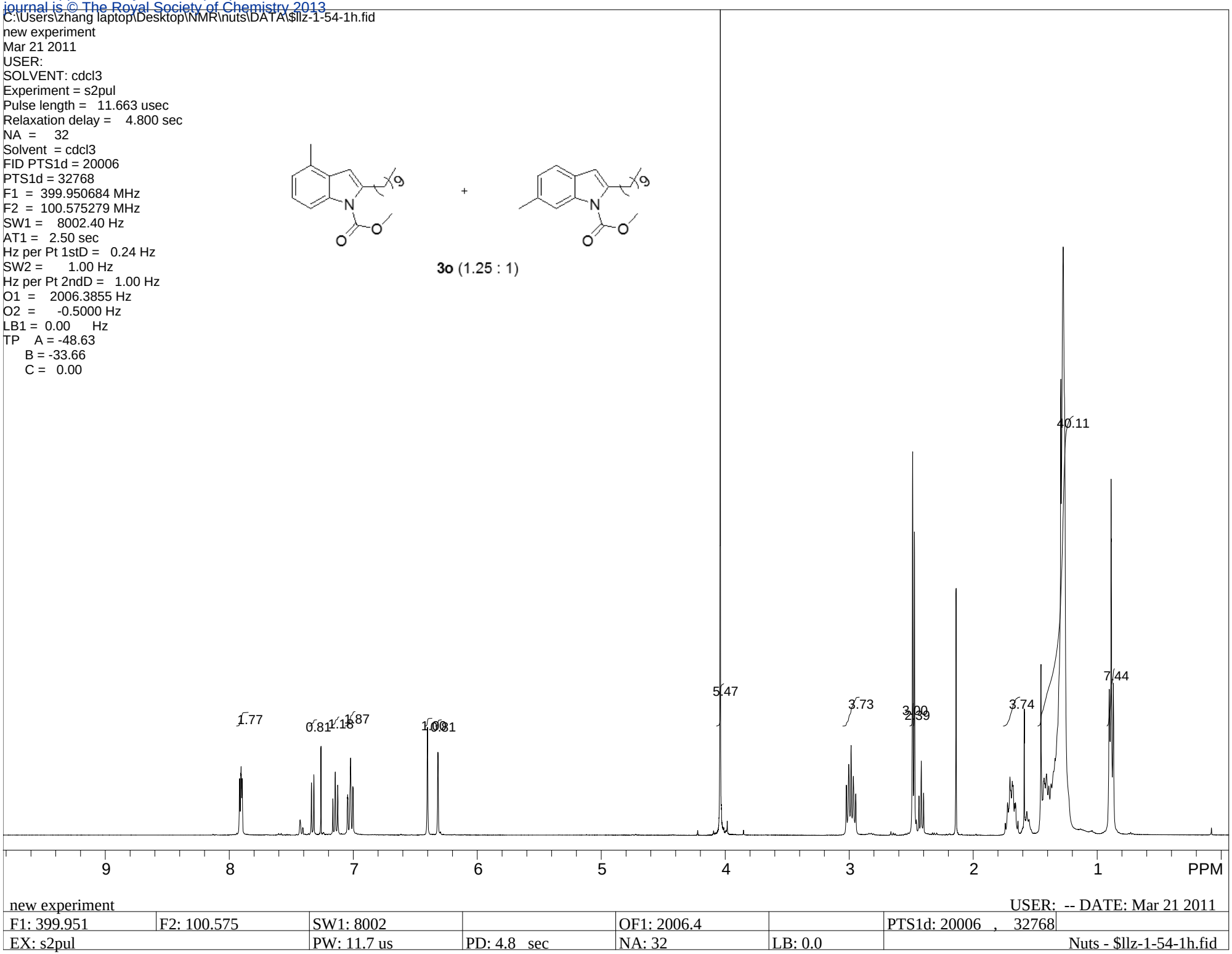


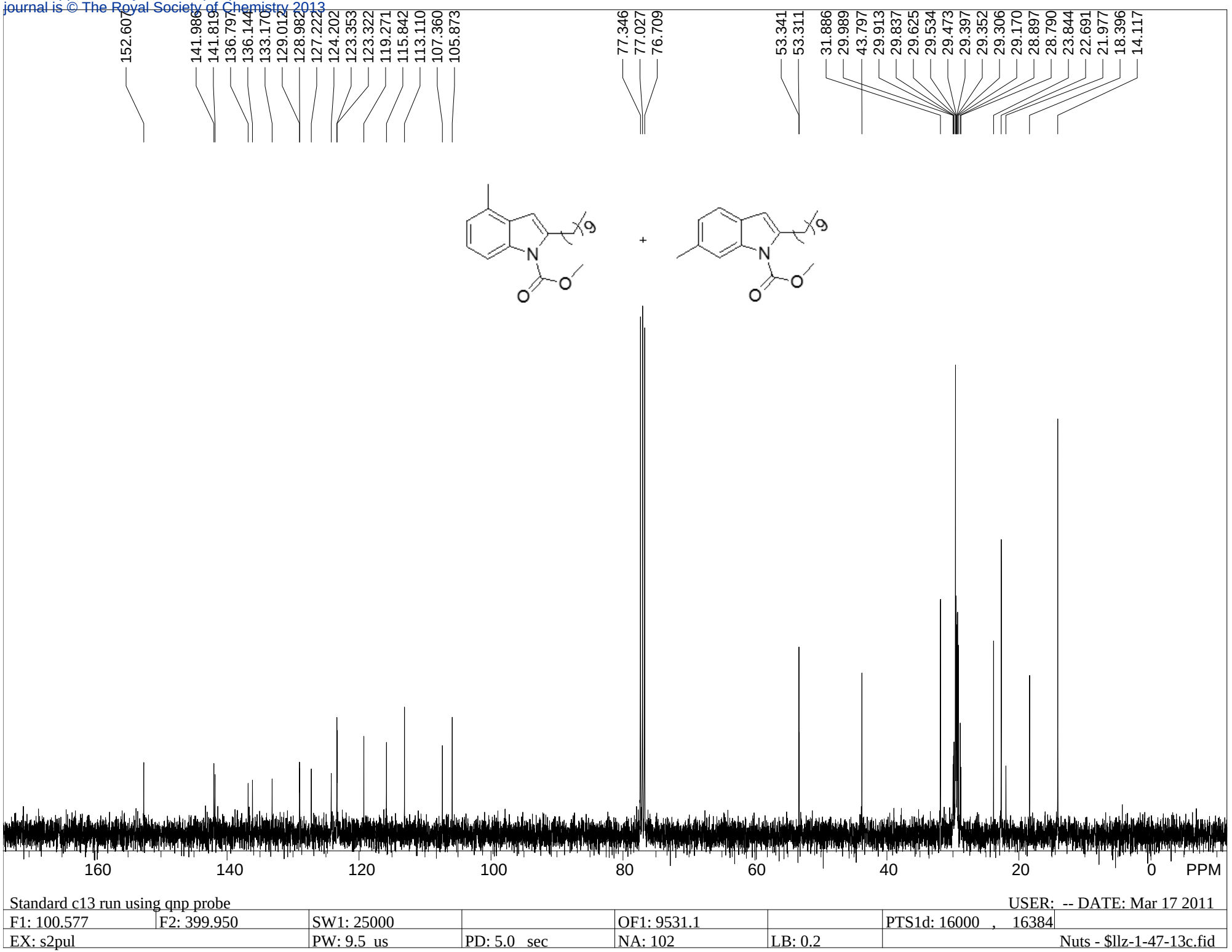
new experiment USER: -- DATE: Mar 25 2011

F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.8		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 10	LB: 0.0		Nuts - $llz-1-33-1h.fid


C:\Users\zhang laptop\Desktop\NMR\lliu\processed\$llz-1-33-13c.fid
Mar 11 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 83
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 2.32 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12777.2832 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -271.41
B = 187.03
C = 0.00
150.58
142.58
134.80
131.85
129.56
124.34
119.561
115.177
106.686
83.354
77.295
77.041
76.945
76.787
43.894
31.986
30.267
29.694
29.657
29.537
29.485
29.420
28.988
28.336
22.775
21.289
14.212
N
Boc
9
3n
160
140
120
100
80
60
40
20
PPM
USER: -- DATE: Mar 11 2011

F1: 125.702	F2: 499.859	SW1: 28259		OF1: 12777.3		PTS1d: 36749 , 65536	
EX: s2pul		PW: 6.0 us	PD: 3.0 sec	NA: 83	LB: 2.0		Nuts - $llz-1-33-13c.fid



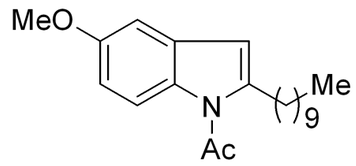


Standard c13 run using qnp probe USER: -- DATE: Mar 17 2011

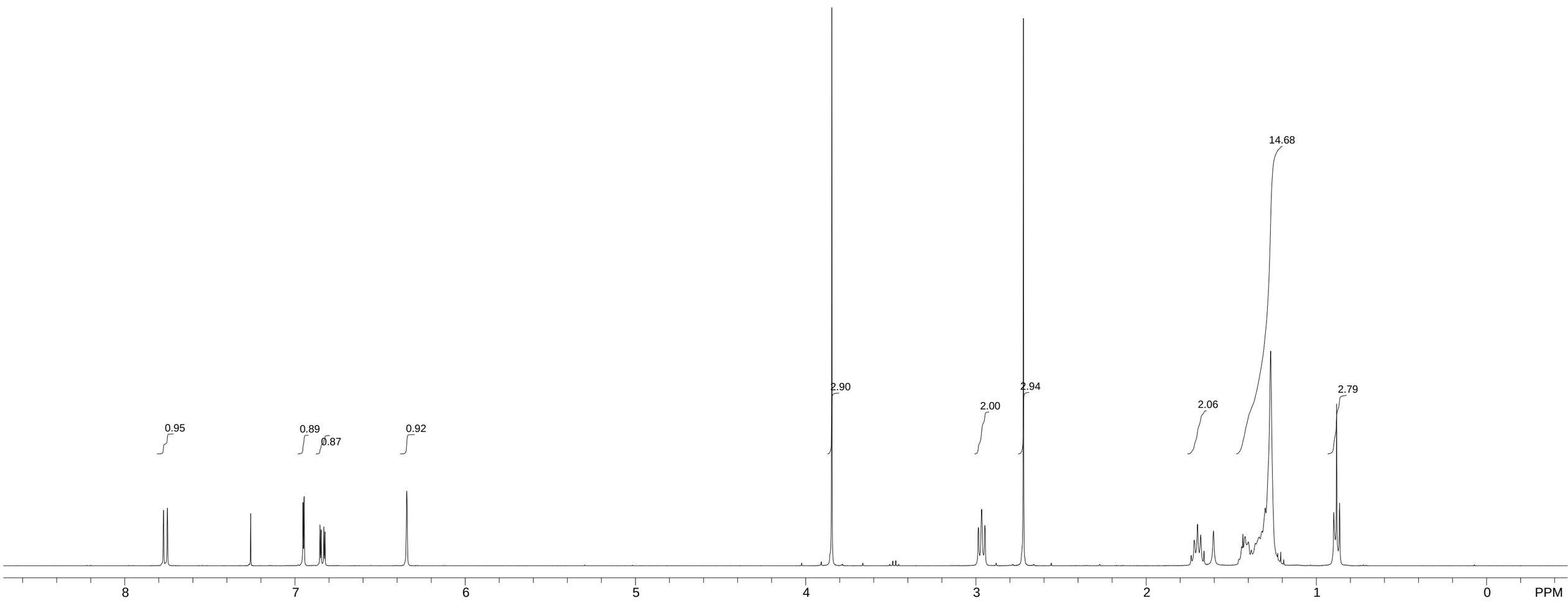
F1: 100.577	F2: 399.950	SW1: 25000		OF1: 9531.1		PTS1d: 16000 , 16384	
EX: s2pul		PW: 9.5 us	PD: 5.0 sec	NA: 102	LB: 0.2		Nuts - $llz-1-47-13c.fid

Electronic Supplementary Material (ESI) for Chemical Science

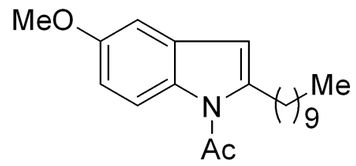
D:\Greenware\Ntus 20080731\DATA\$wyz3-238-pro-h1.fid
new experiment
Apr 17 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 16
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.2362 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -41.51
B = -36.92
C = 0.00



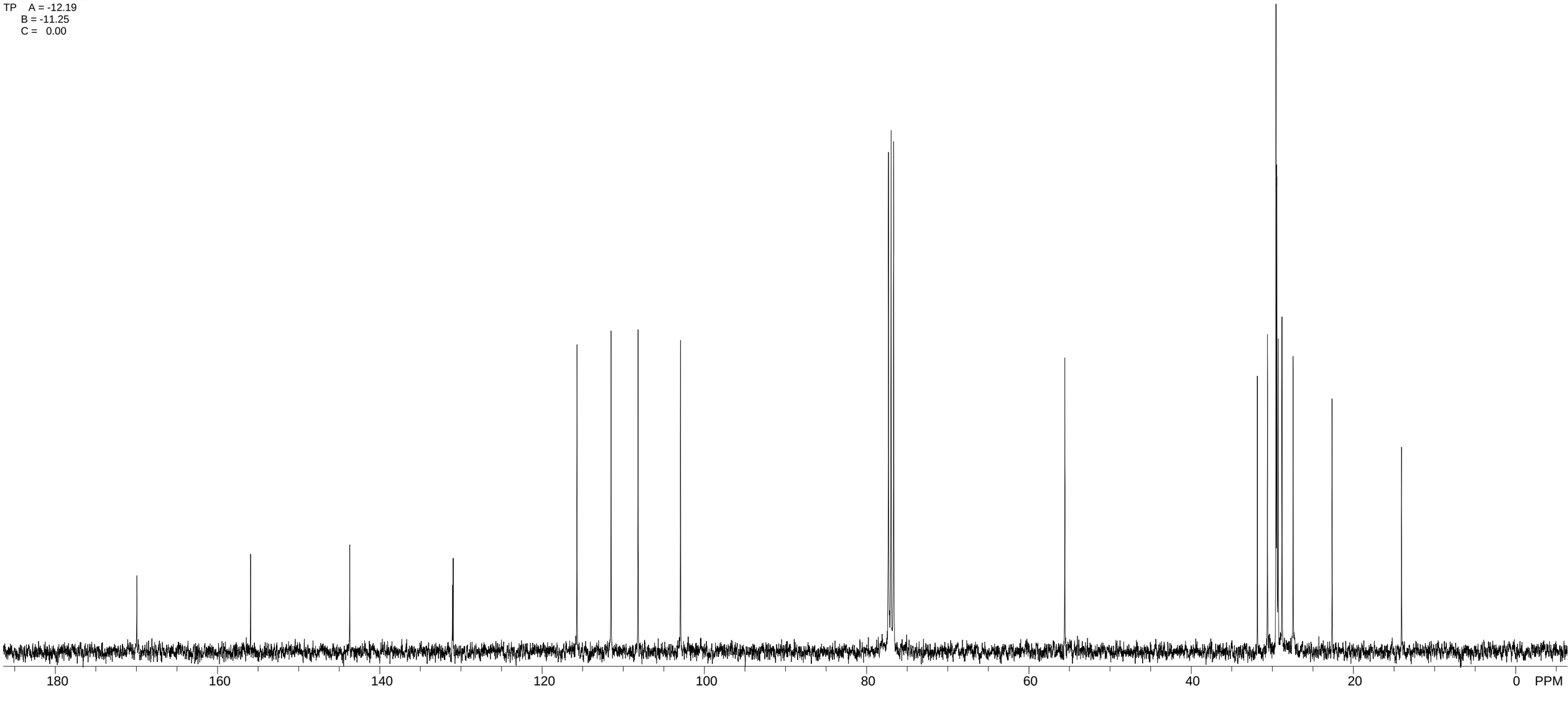
3p



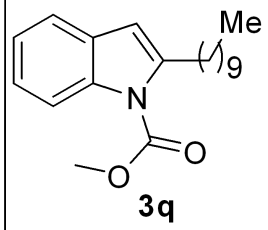
D:\Greenware\Ntus 20080731\DATA\$wyz3-238-pro-c13.fid
Standard c13 run using qnp probe
Apr 17 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 7.775 usec
Relaxation delay = 1.300 sec
NA = 560
Solvent = cdcl3
FID PTS1d = 28040
PTS1d = 32768
F1 = 100.577232 MHz
F2 = 399.950684 MHz
SW1 = 28040.66 Hz
AT1 = 1.00 sec
Hz per Pt 1stD = 0.86 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 10056.3604 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -12.19
B = -11.25
C = 0.00



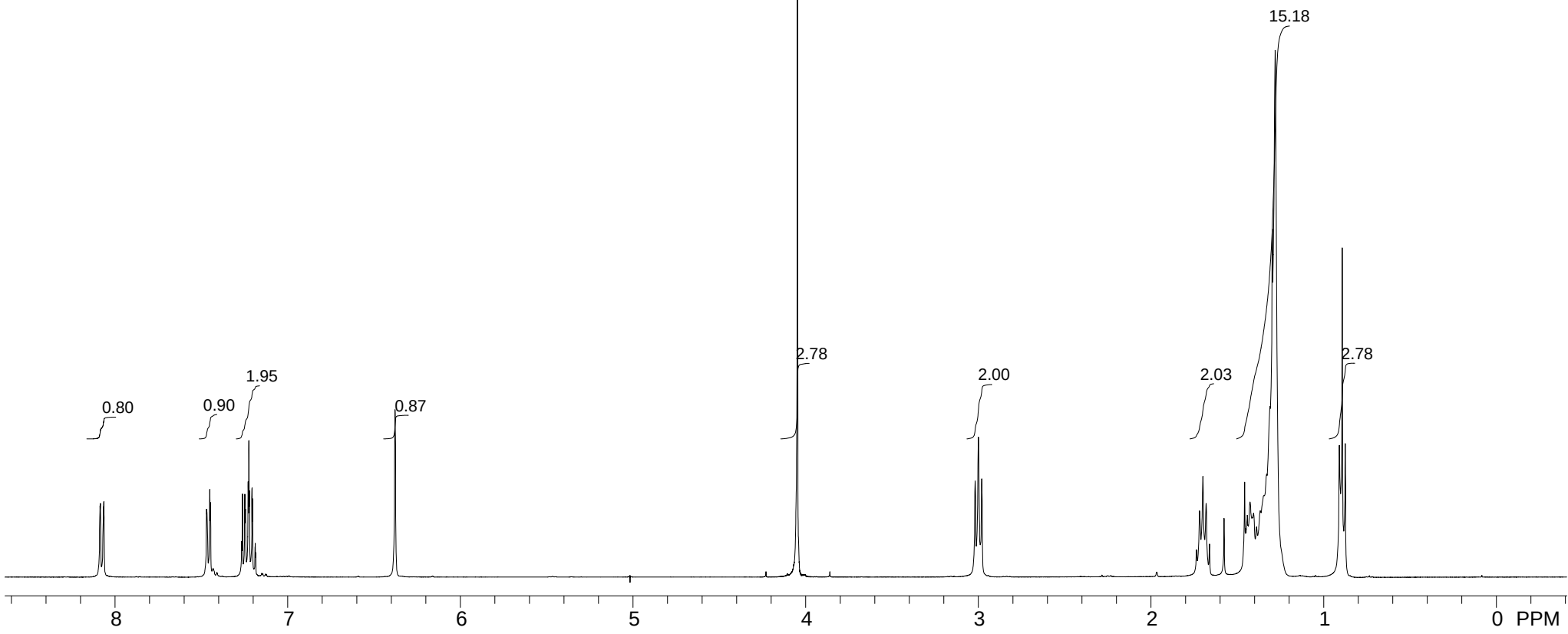
3p



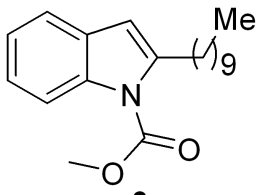
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-213-pro-h1.fid
new experiment
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 20
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -50.63
B = -26.20
C = 0.00



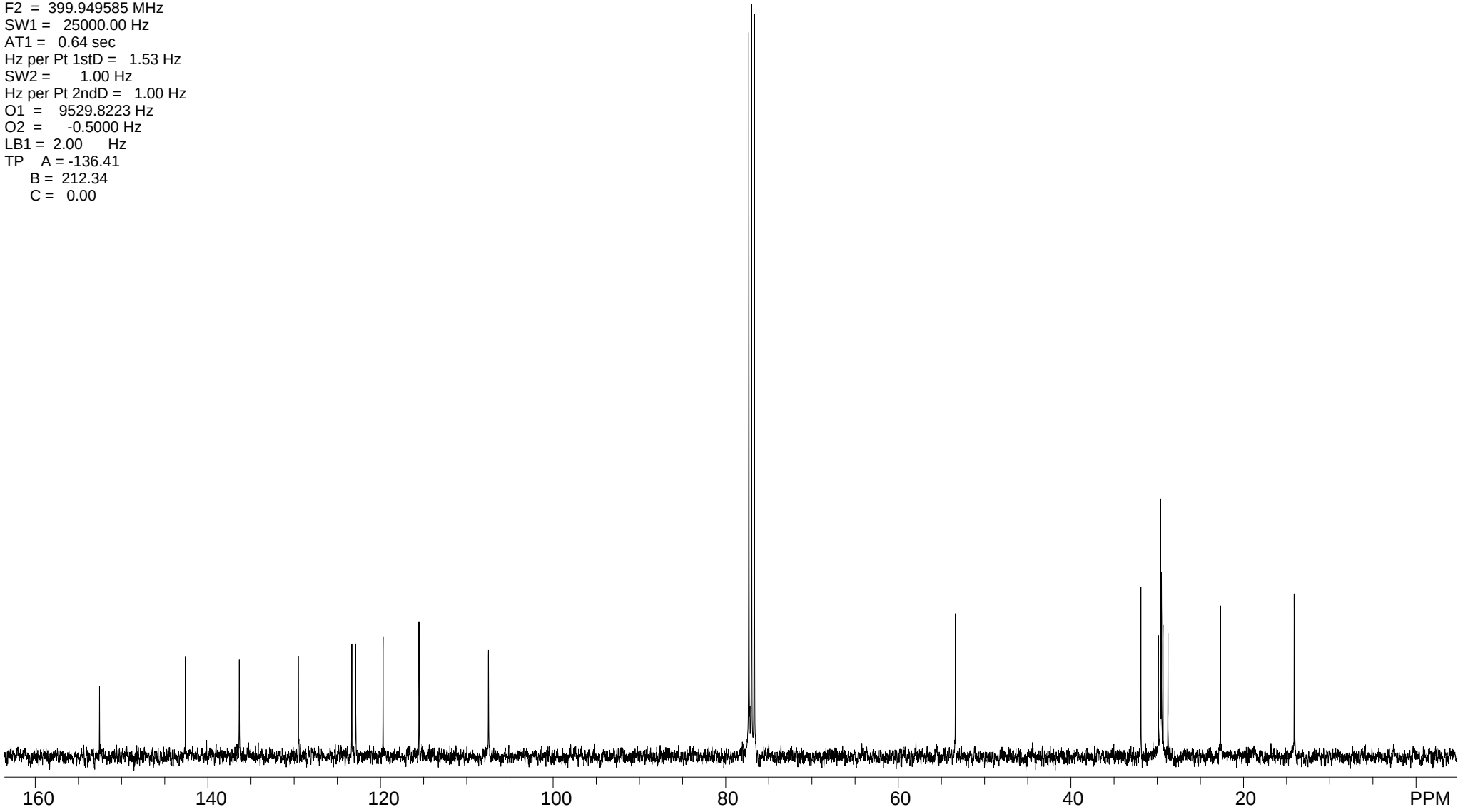
3q



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-213-pro-c13.fid
Standard c13 run using qnp probe
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 224
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9529.8223 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -136.41
B = 212.34
C = 0.00

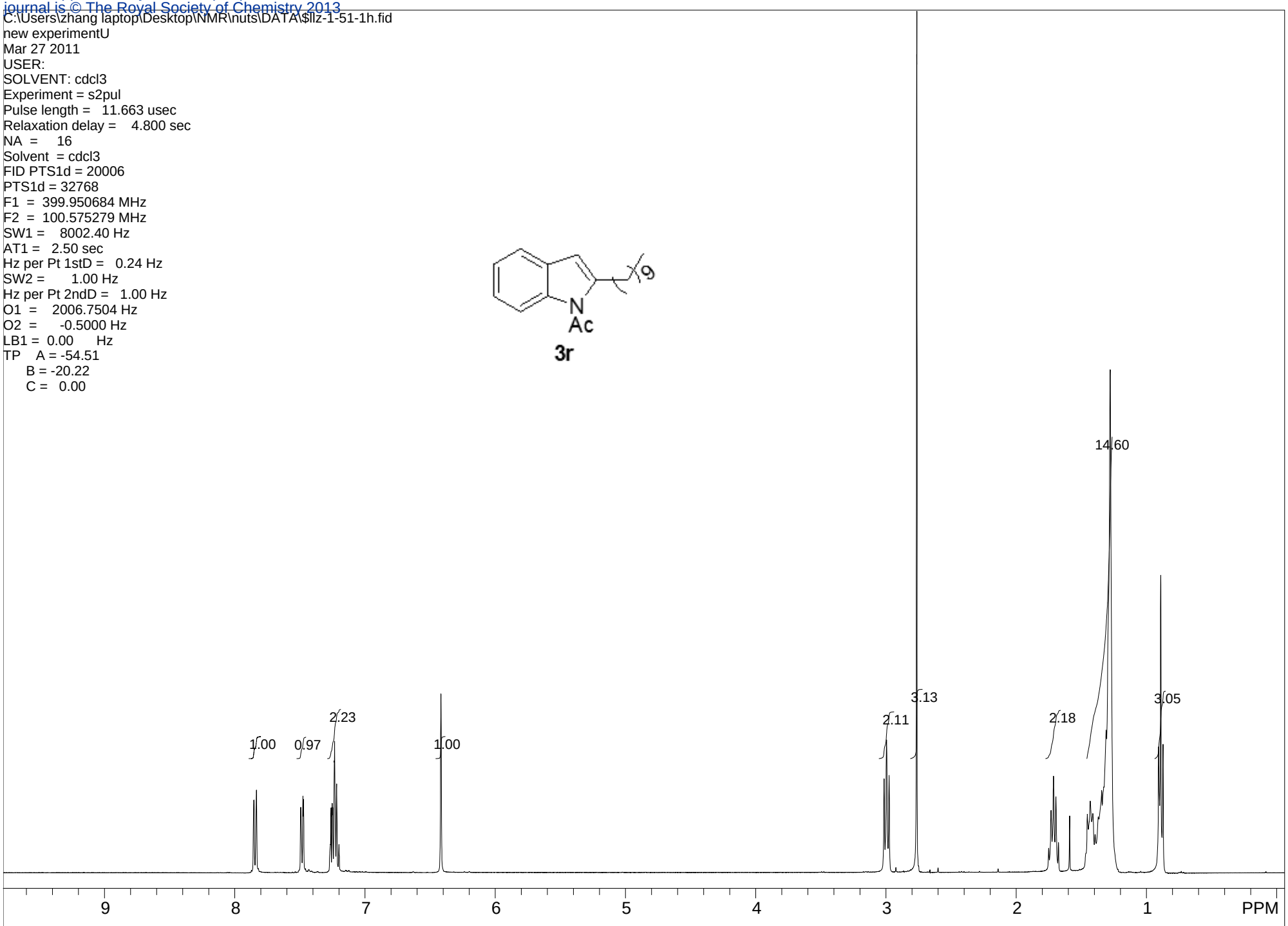


3q



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$llz-1-51-1h.fid
new experimentU
Mar 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 4.800 sec
NA = 16
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -54.51
B = -20.22
C = 0.00

3r

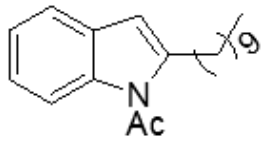


new experimentU USER: -- DATE: Mar 27 2011

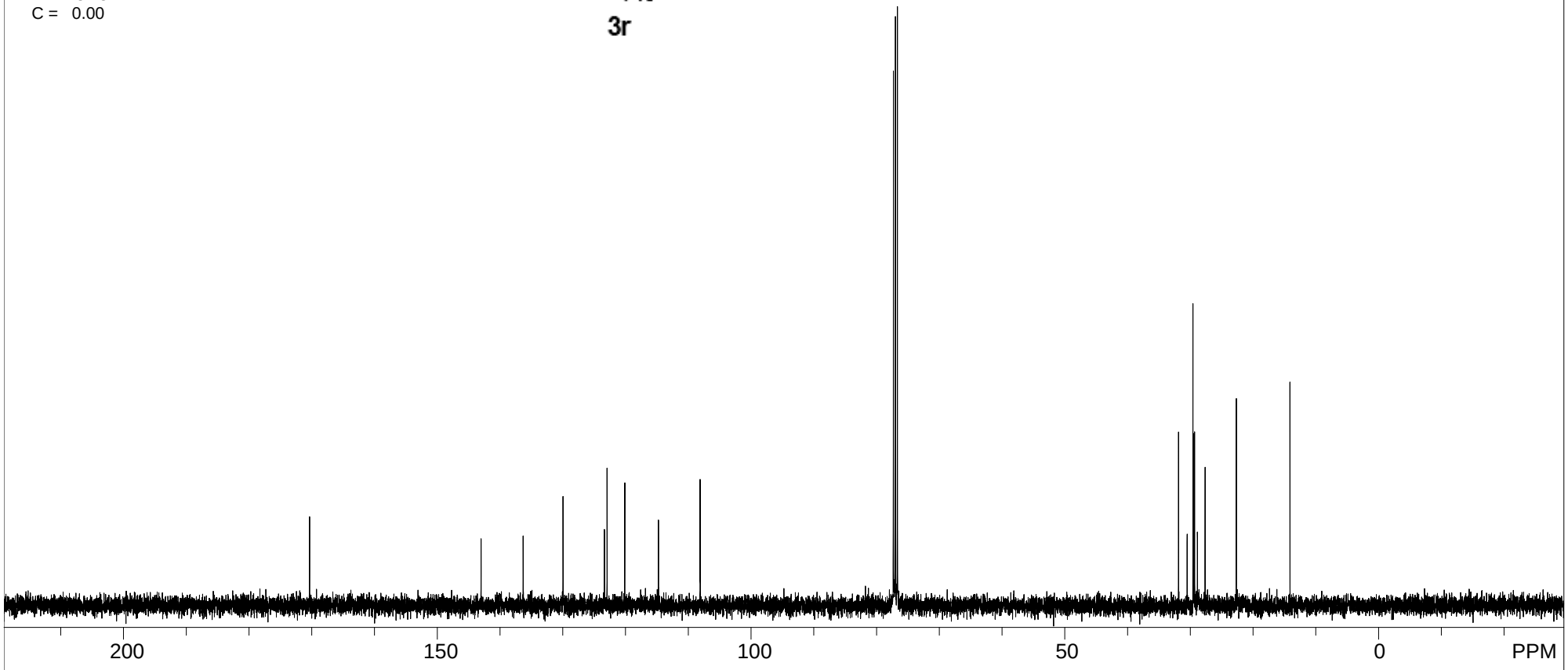
F1: 399.951	F2: 100.575	SW1: 8002		OF1: 2006.8		PTS1d: 20006 , 32768	
EX: s2pul		PW: 11.7 us	PD: 4.8 sec	NA: 16	LB: 0.0		Nuts - $llz-1-51-1h.fid

C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$llz-1-51-13c.fid
Standard c13 run using qnp probeU
Mar 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 223
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9531.0605 Hz
O2 = -0.5000 Hz
LB1 = 0.20 Hz
TP A = -129.38
B = 182.81
C = 0.00

170.340 143.013 136.311 129.953 123.368 122.943 120.121 114.749 108.118 77.331 77.012 76.694 31.886 30.505 29.595 29.504 29.321 28.881 27.652 22.675 14.117



3r

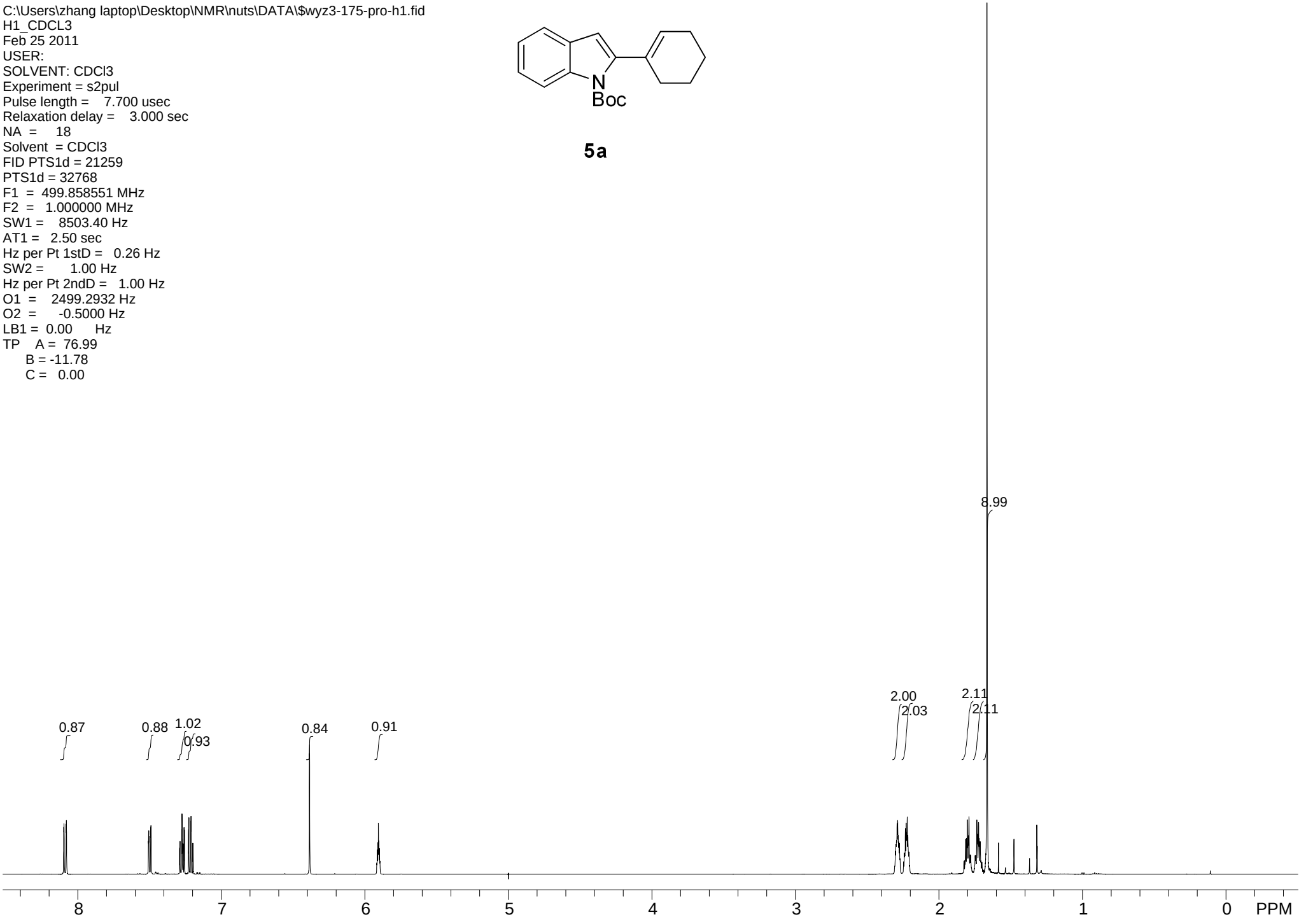


Standard c13 run using qnp probeU USER: -- DATE: Mar 27 2011

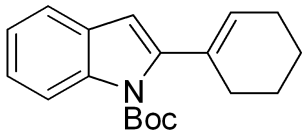
F1: 100.577	F2: 399.950	SW1: 25000		OF1: 9531.1		PTS1d: 16000 , 16384	
EX: s2pul		PW: 9.5 us	PD: 5.0 sec	NA: 223	LB: 0.2		Nuts - $llz-1-51-13c.fid

C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-175-pro-h1.fid
H1_CDCL3
Feb 25 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 3.000 sec
NA = 18
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 76.99
B = -11.78
C = 0.00

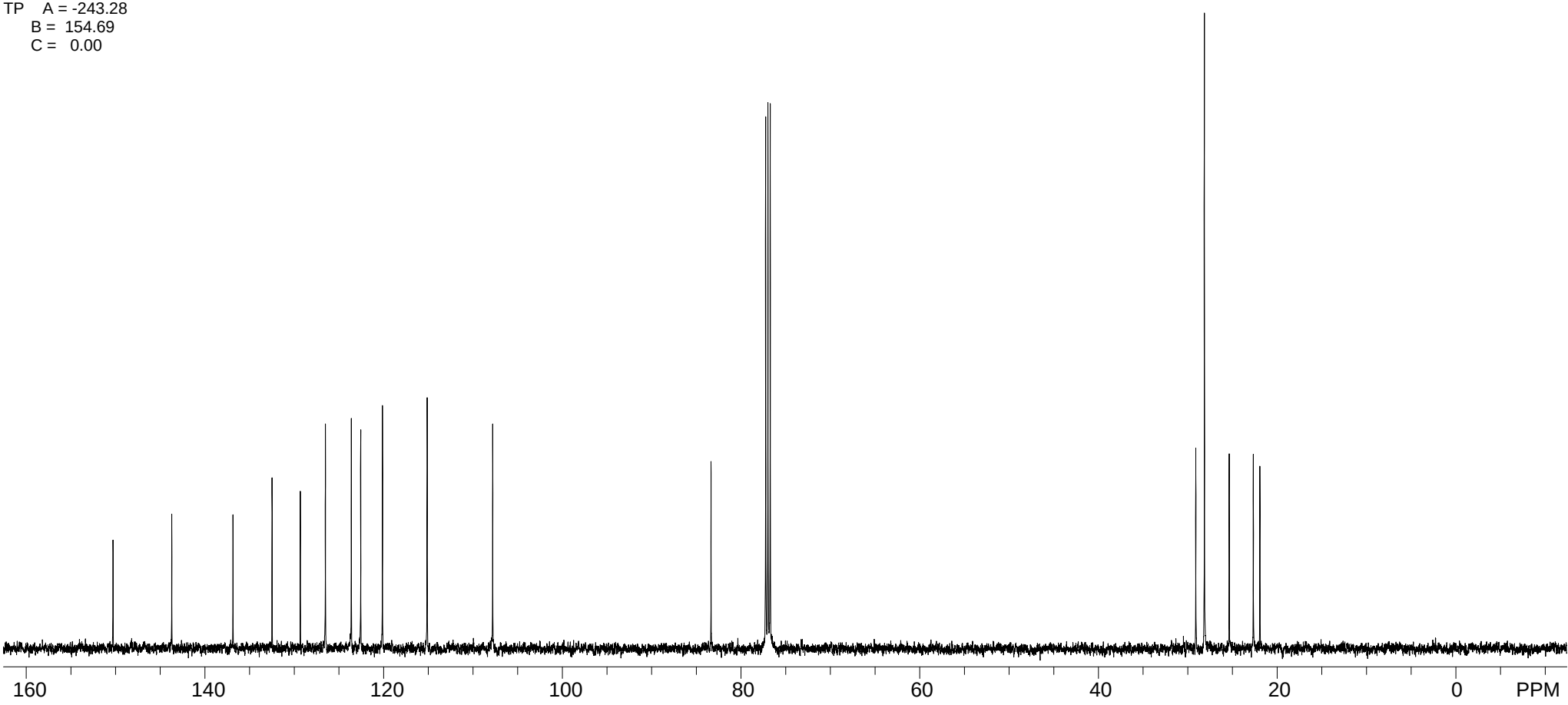
5a



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-175-pro-c13.fid
STANDARD CARBON PARAMETERS
Feb 25 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 96
Solvent = cdcl3
FID PTS1d = 42498
PTS1d = 65536
F1 = 125.702728 MHz
F2 = 499.858551 MHz
SW1 = 32679.74 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.50 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 13820.1719 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -243.28
B = 154.69
C = 0.00

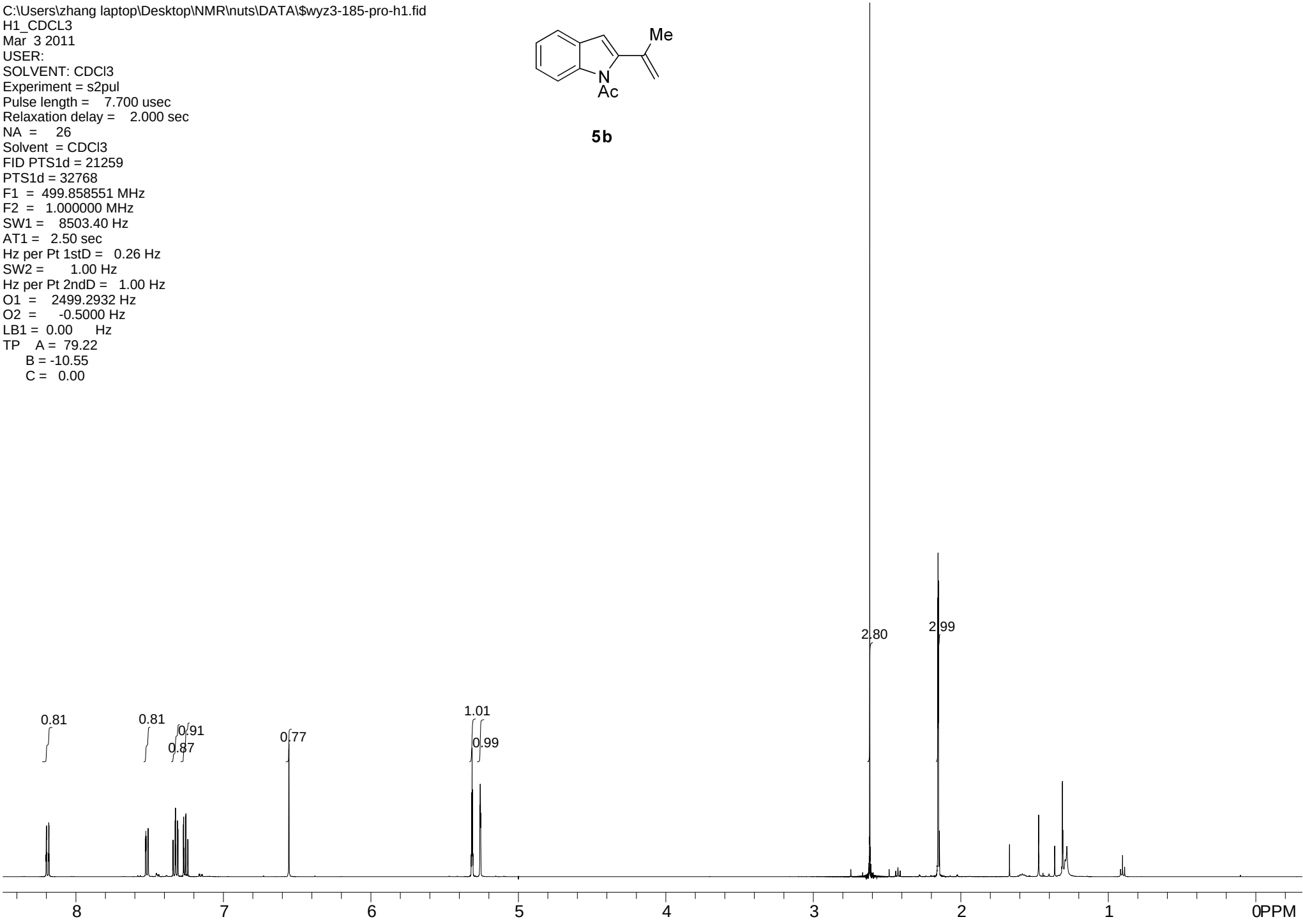


5a

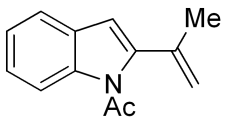


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-185-pro-h1.fid
H1_CDCL3
Mar 3 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 26
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 79.22
B = -10.55
C = 0.00

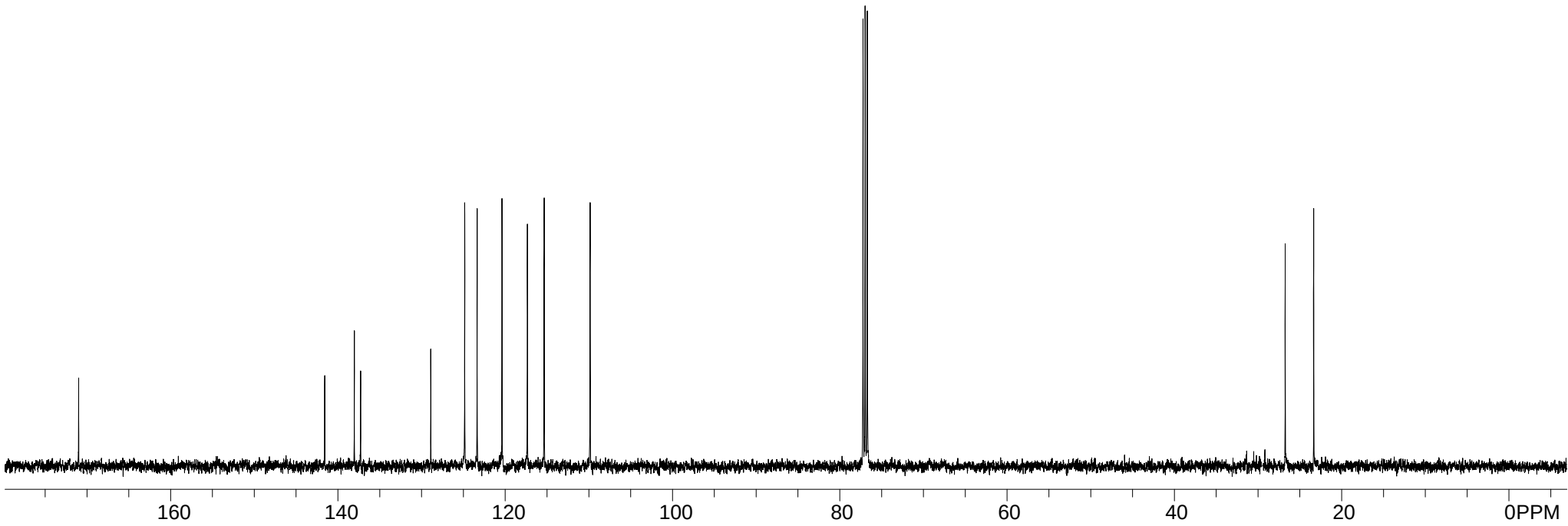
5b



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-185-pro-c13.fid
STANDARD CARBON PARAMETERS
Mar 3 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 40
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12766.0713 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -227.81
B = 127.97
C = 0.00

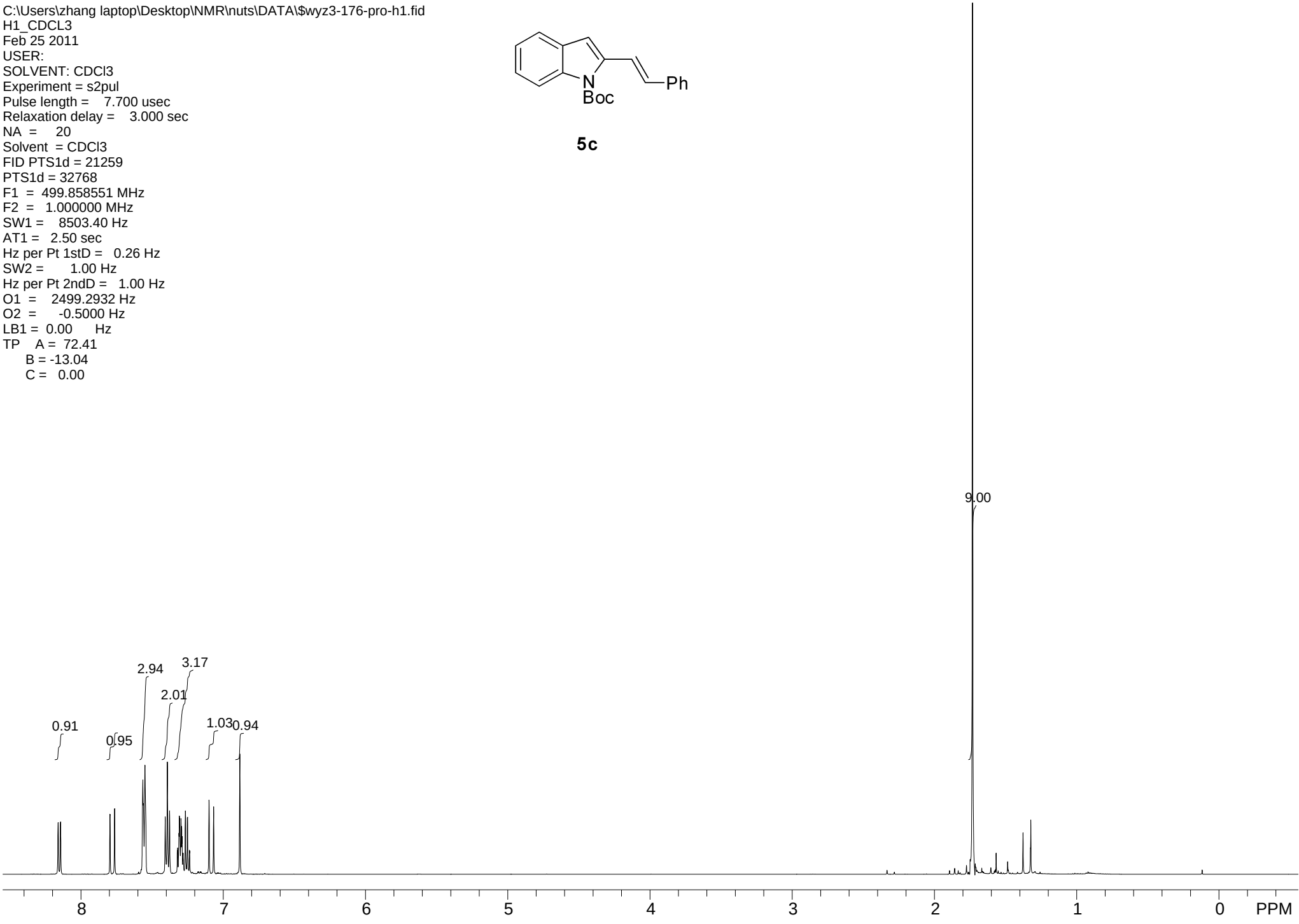


5b

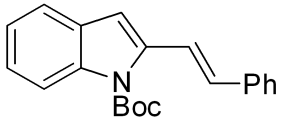


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-176-pro-h1.fid
H1_CDCL3
Feb 25 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 3.000 sec
NA = 20
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 72.41
B = -13.04
C = 0.00

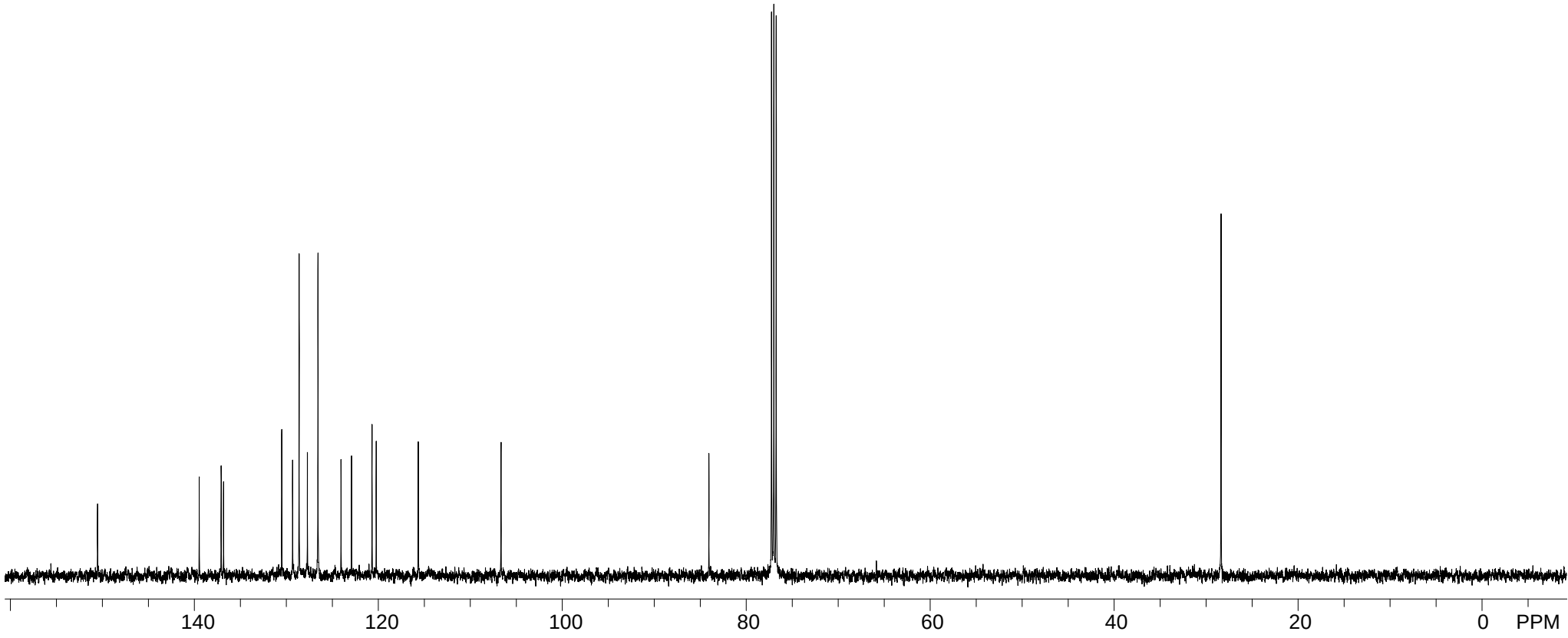
5c



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-176-pro-c13.fid
STANDARD CARBON PARAMETERS
Feb 25 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 60
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12768.2275 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -249.93
B = 170.13
C = 0.00

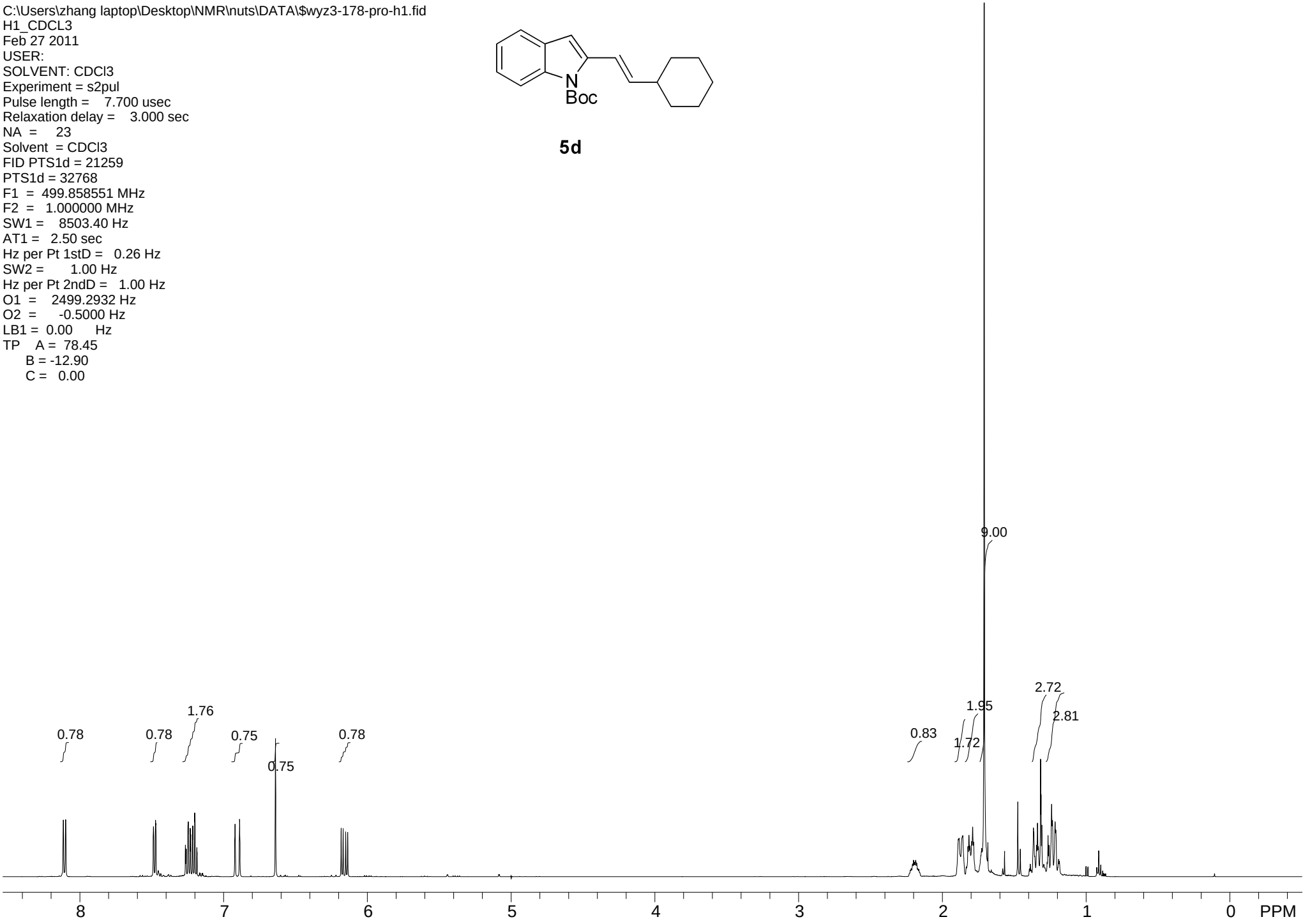


5c

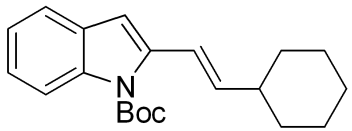


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-178-pro-h1.fid
H1_CDCL3
Feb 27 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 3.000 sec
NA = 23
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 78.45
B = -12.90
C = 0.00

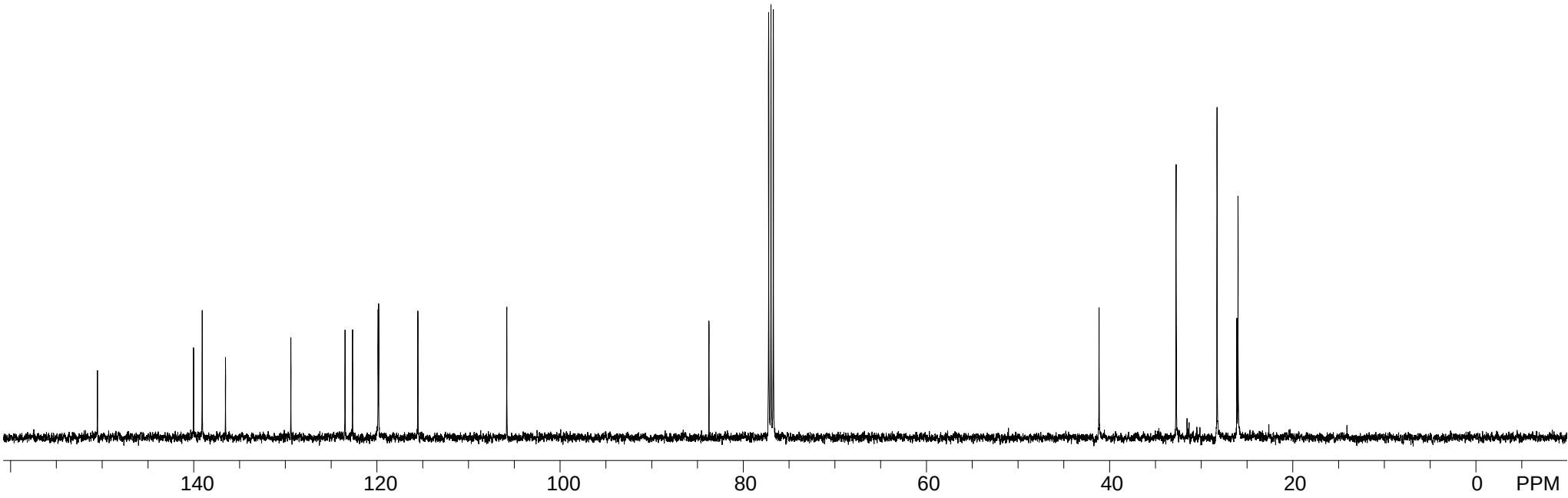
5d



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-178-pro-c13-1.fid
STANDARD CARBON PARAMETERS
Feb 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 52
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12769.0908 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -232.50
B = 135.00
C = 0.00

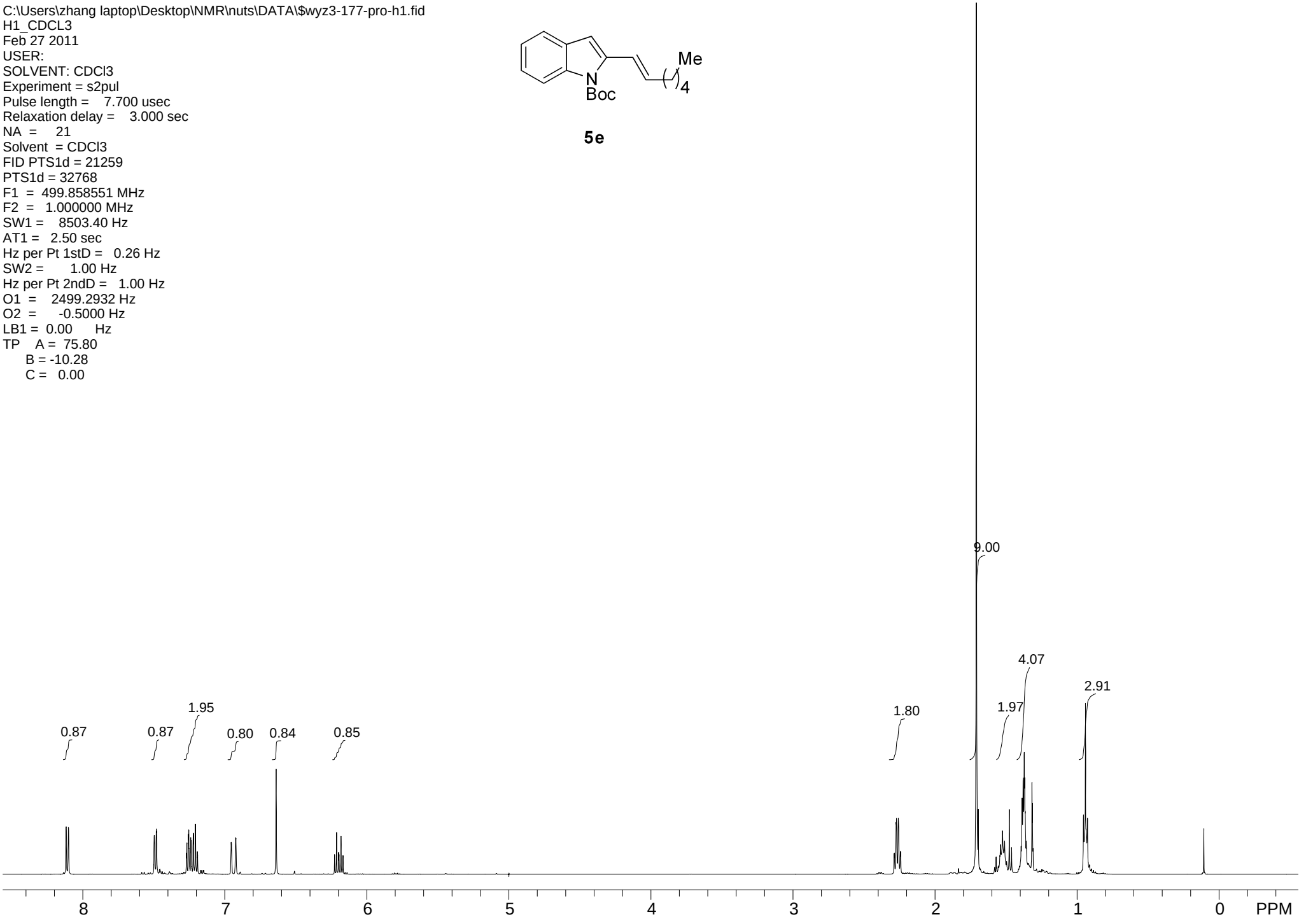


5d

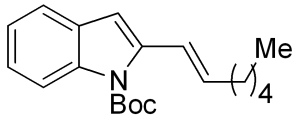


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-177-pro-h1.fid
H1_CDCL3
Feb 27 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 3.000 sec
NA = 21
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 75.80
B = -10.28
C = 0.00

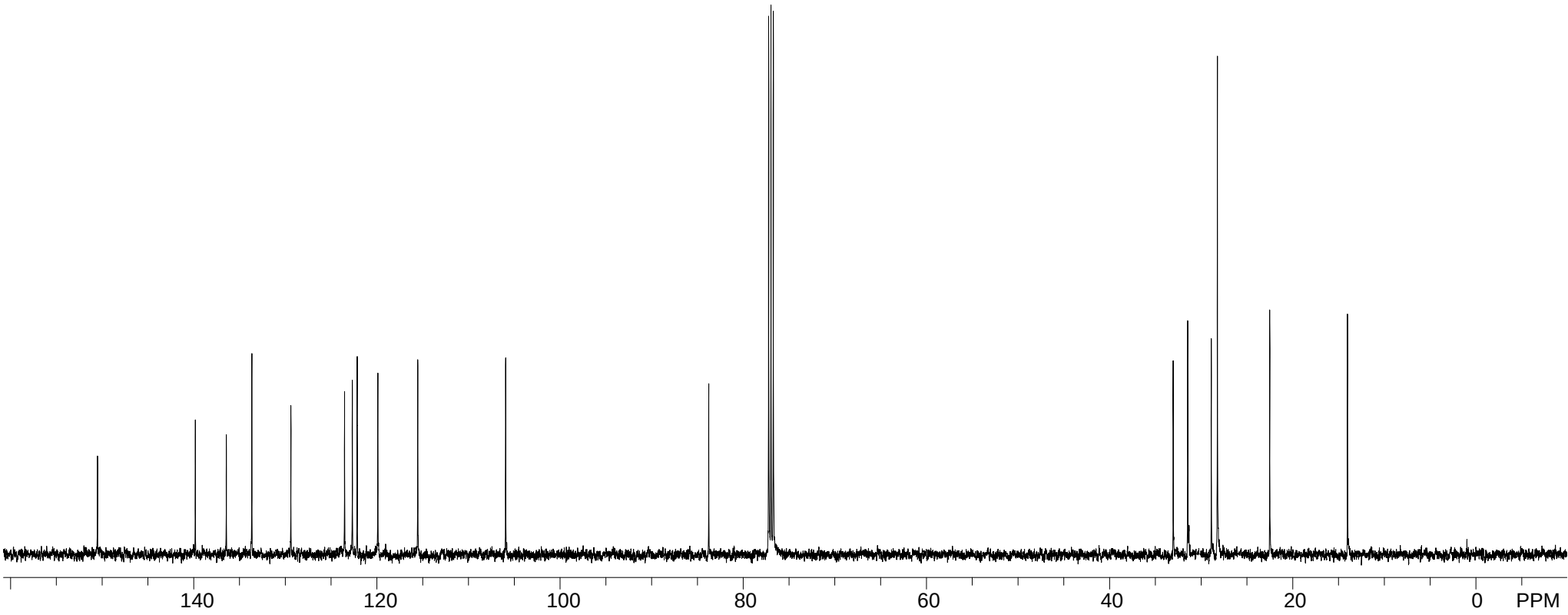
5e



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-177-pro-c13.fid
STANDARD CARBON PARAMETERS
Feb 27 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 88
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12768.6592 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -221.72
B = 123.75
C = 0.00

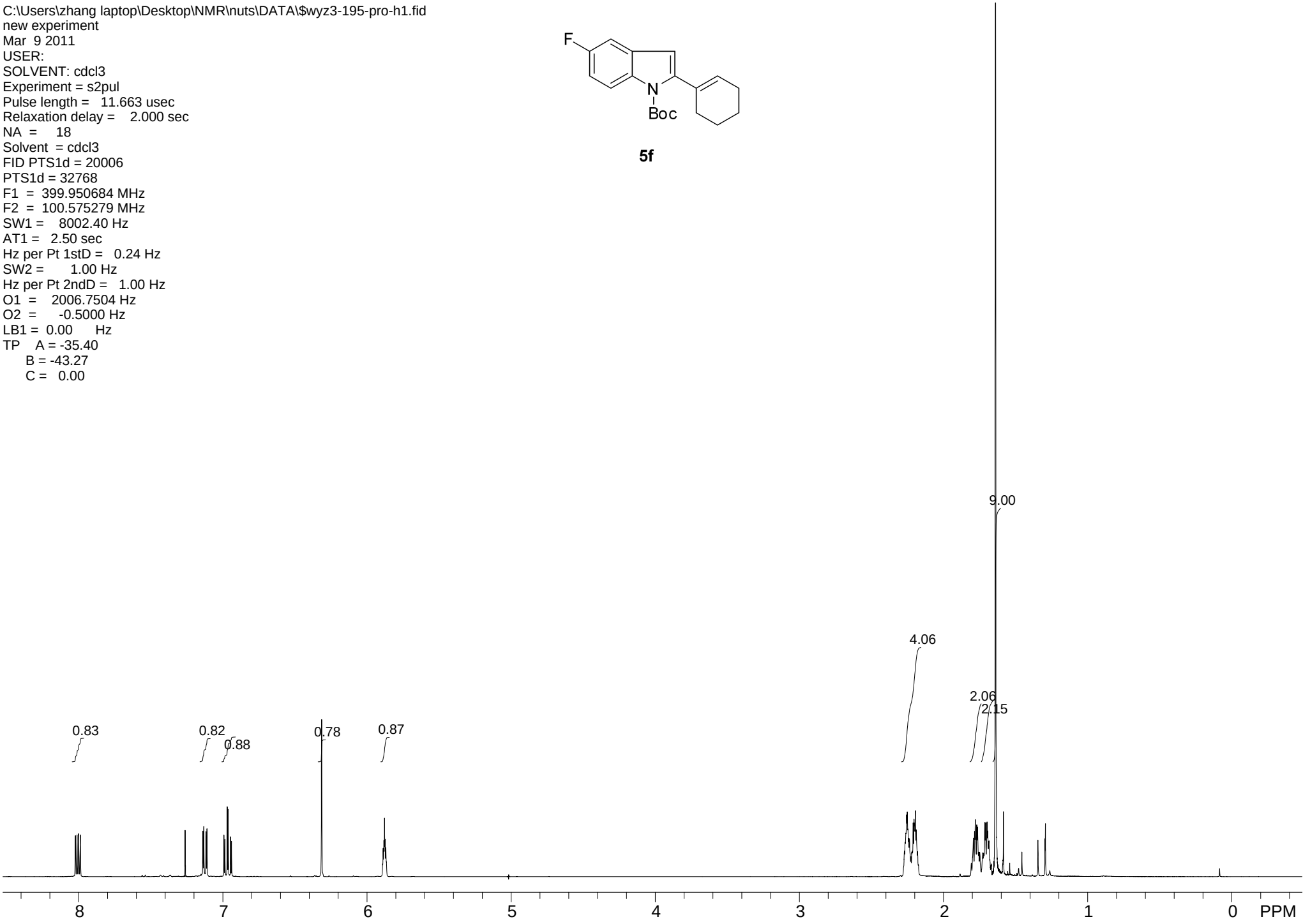


5e

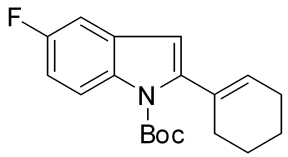


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-195-pro-h1.fid
new experiment
Mar 9 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 18
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -35.40
B = -43.27
C = 0.00

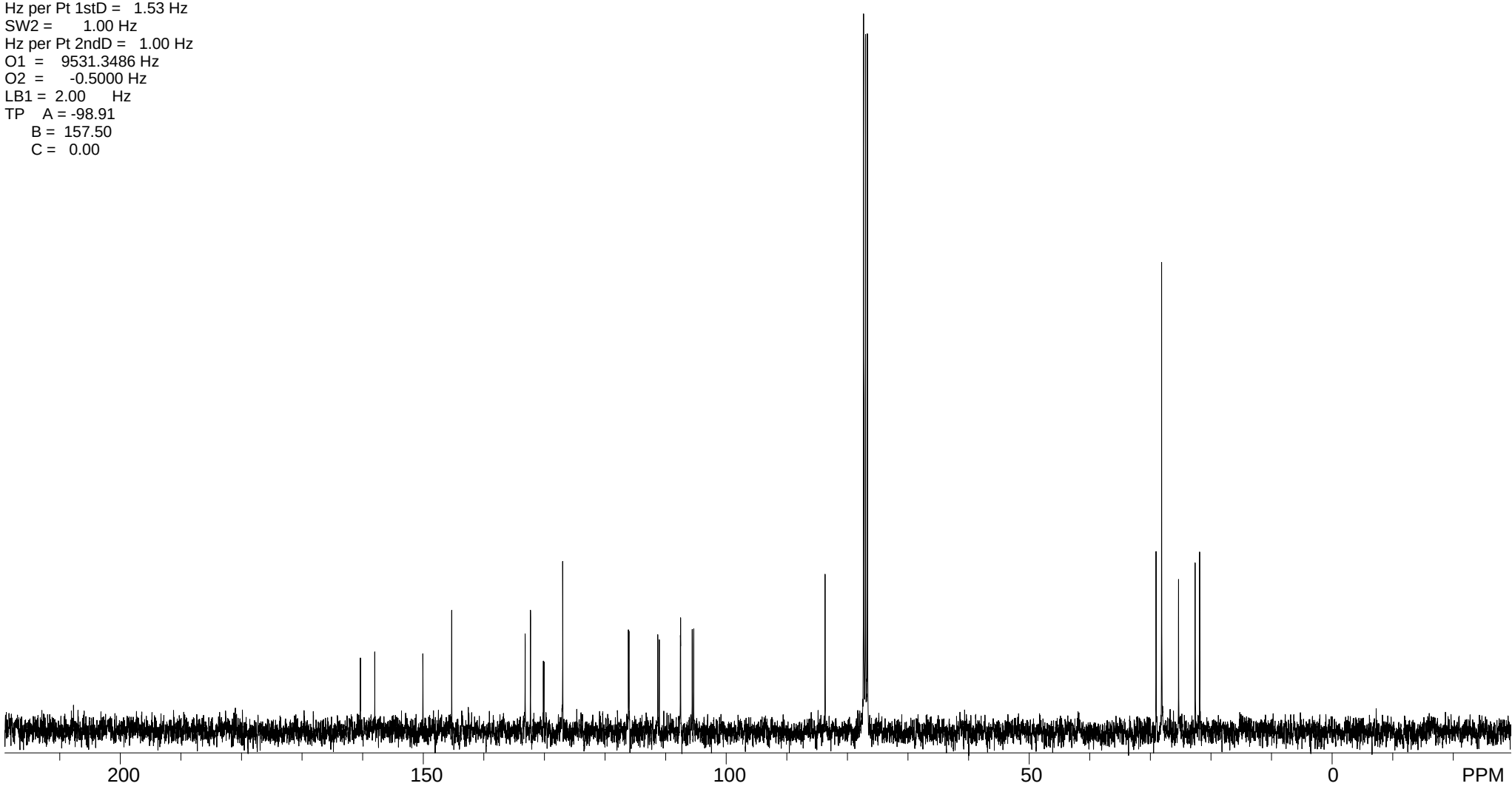
5f



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-195-pro-c13.fid
Standard c13 run using qnp probe
Mar 9 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 88
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9531.3486 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -98.91
B = 157.50
C = 0.00

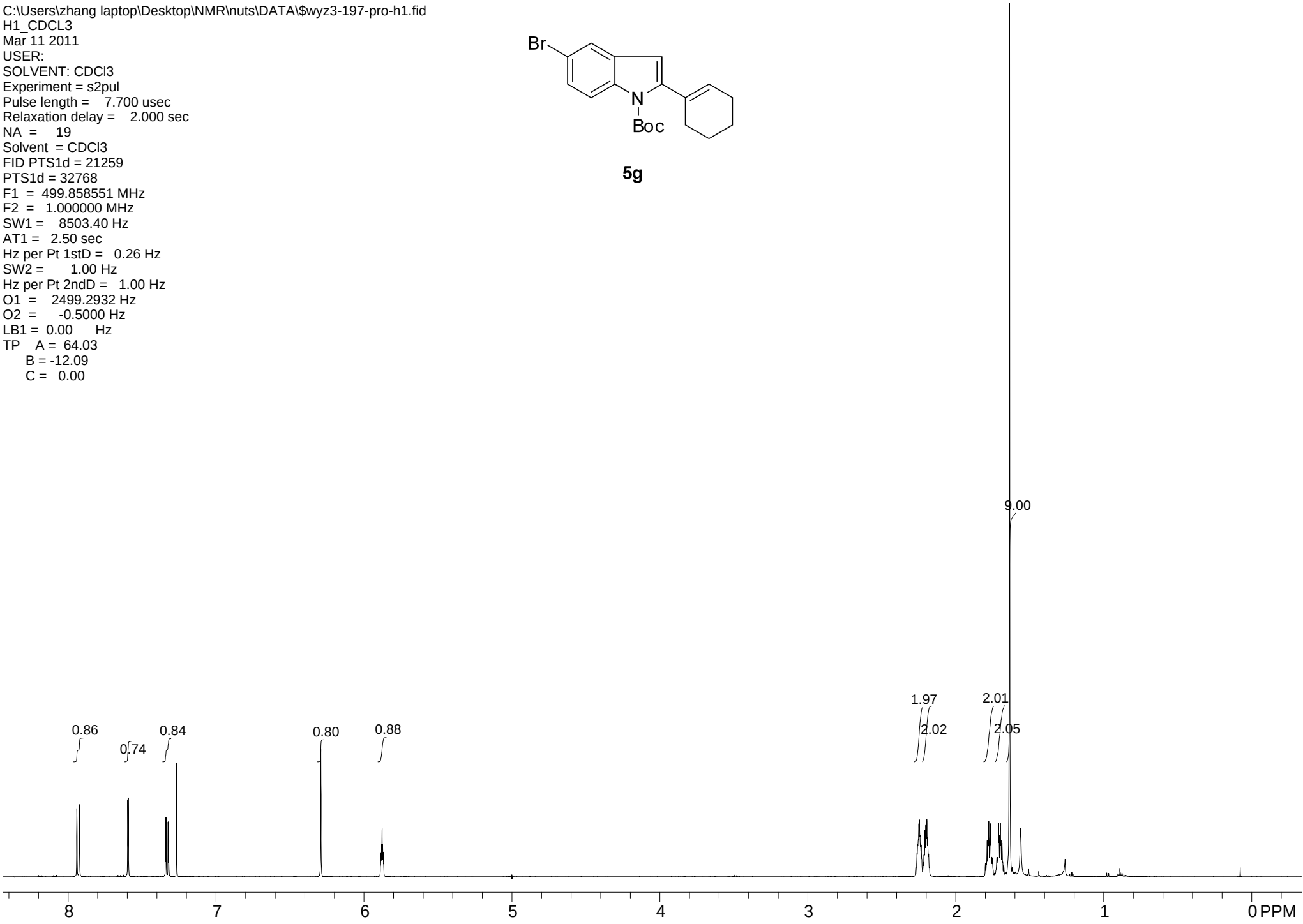


5f



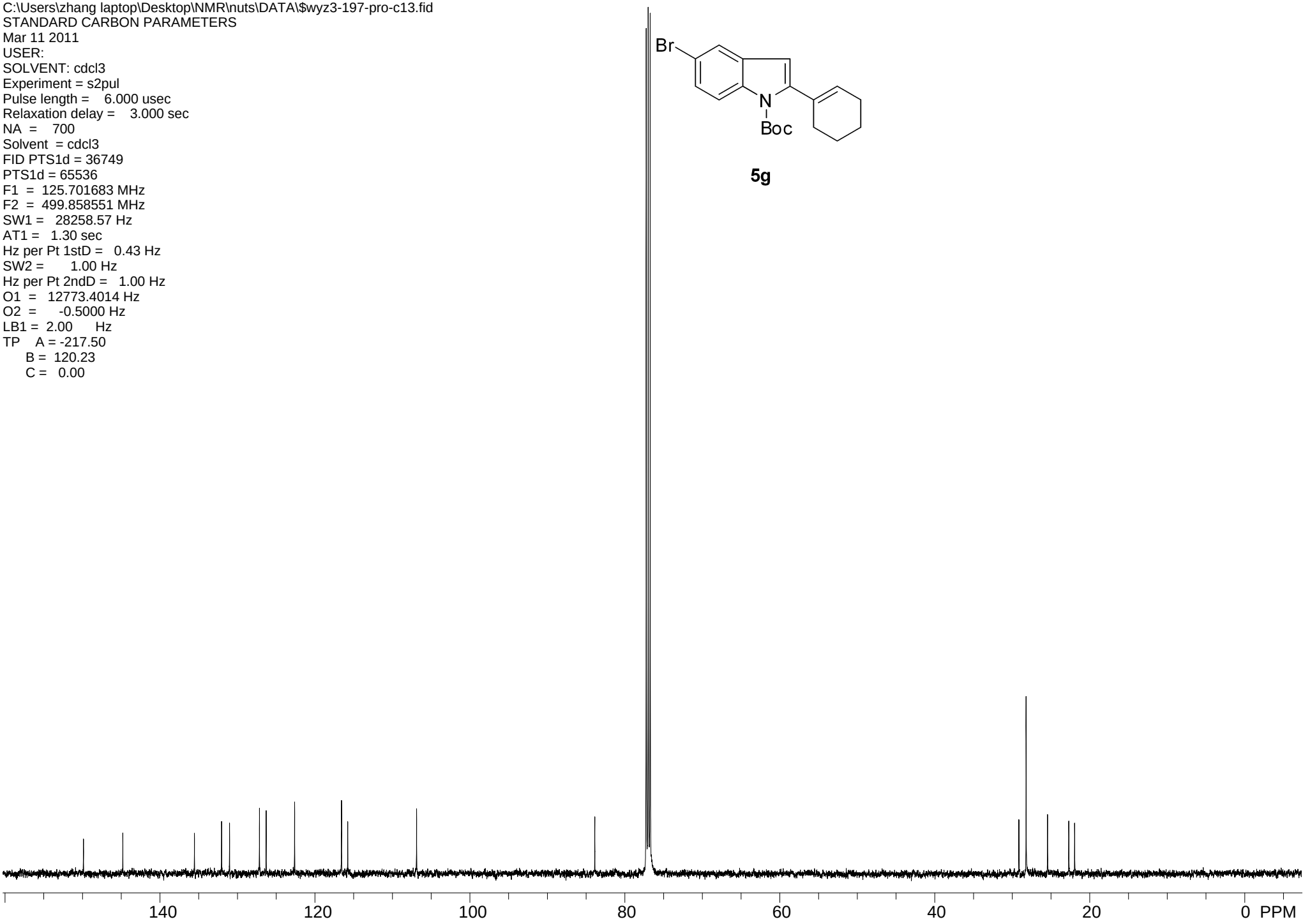
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-197-pro-h1.fid
H1_CDCL3
Mar 11 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 19
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 64.03
B = -12.09
C = 0.00

5g



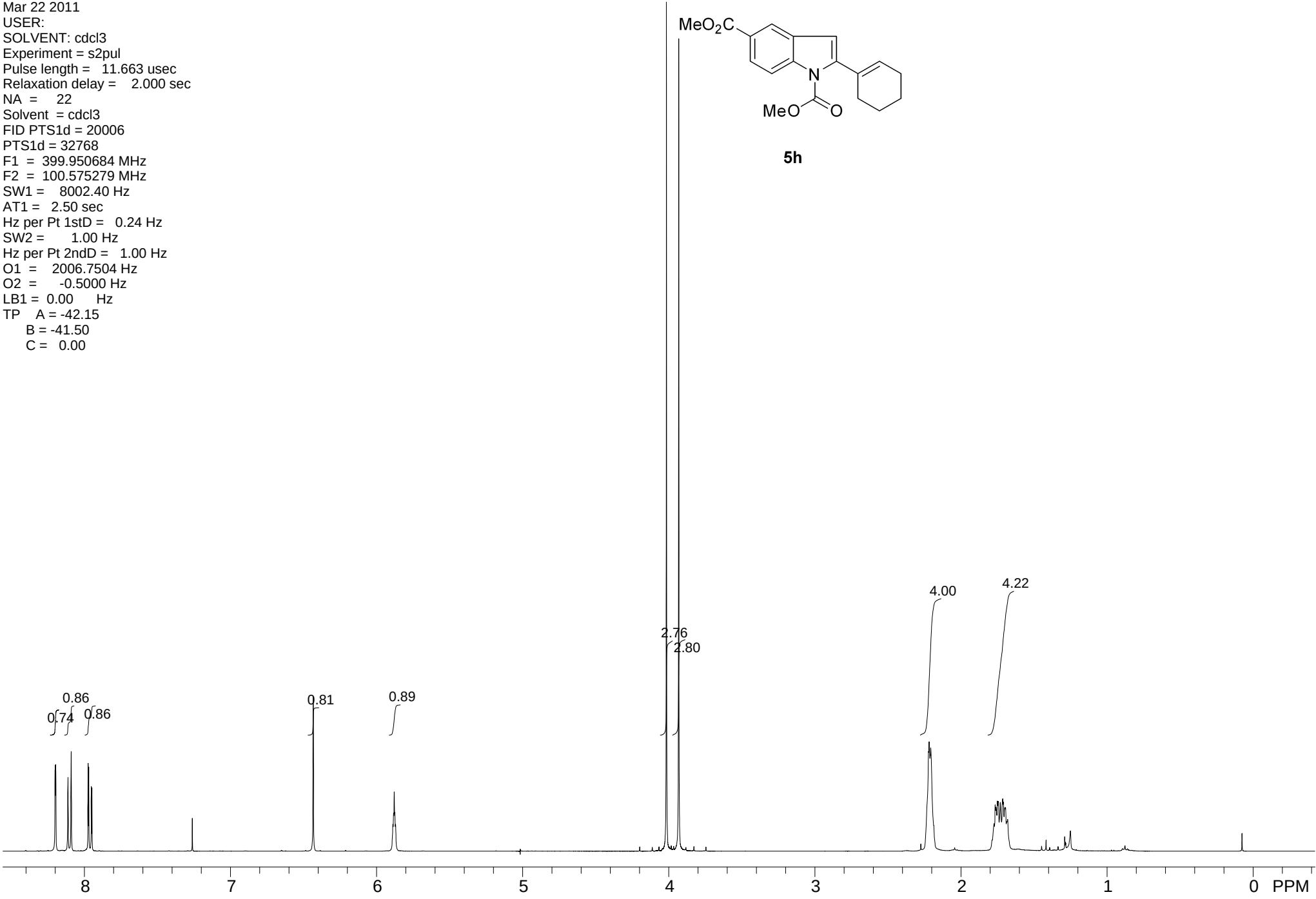
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-197-pro-c13.fid
STANDARD CARBON PARAMETERS
Mar 11 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 700
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12773.4014 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -217.50
B = 120.23
C = 0.00

5g

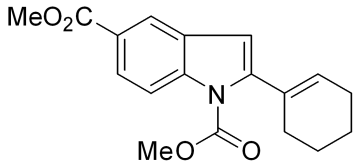


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-216-pro-h1.fid
new experiment
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 22
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -42.15
B = -41.50
C = 0.00

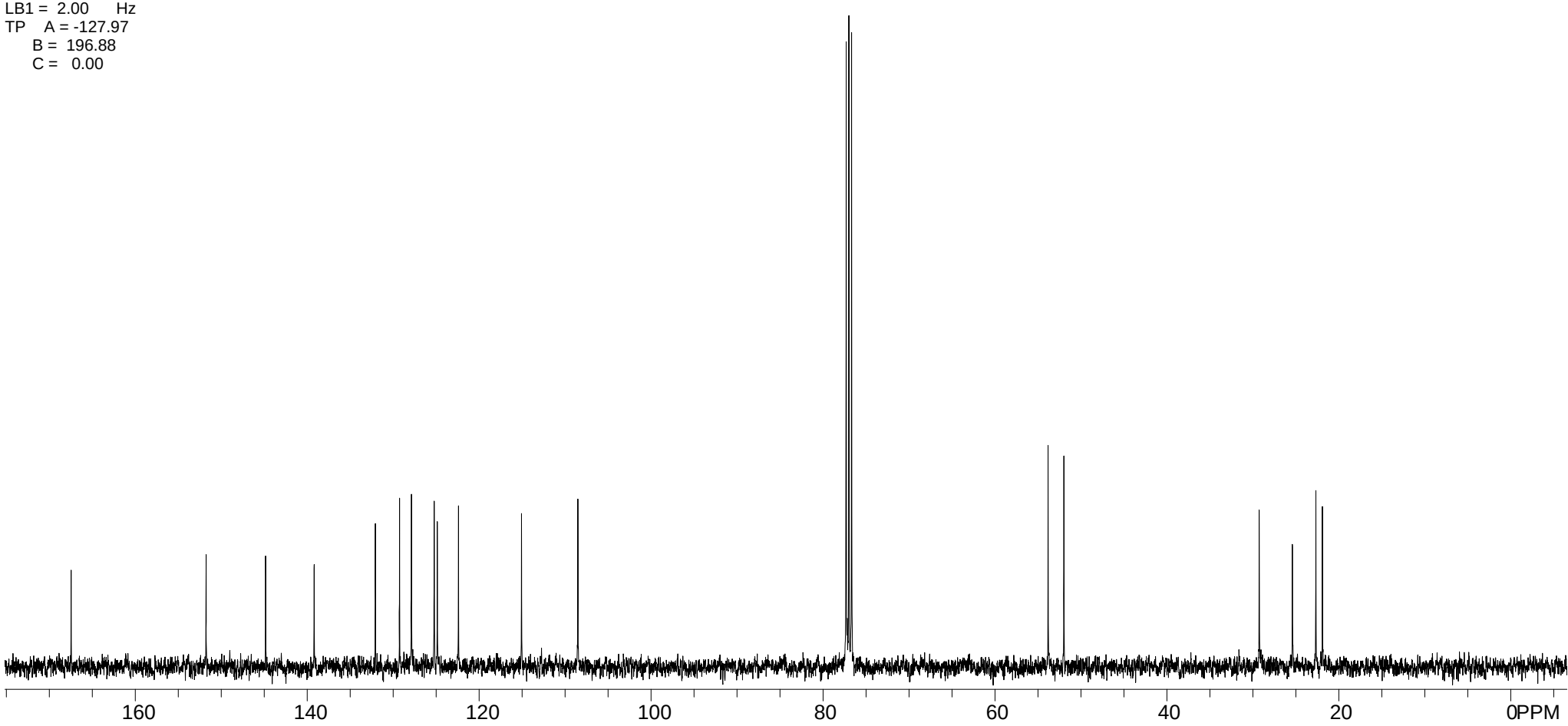
5h



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-216-pro-c13.fid
Standard c13 run using qnp probe
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 100
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9528.2969 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -127.97
B = 196.88
C = 0.00

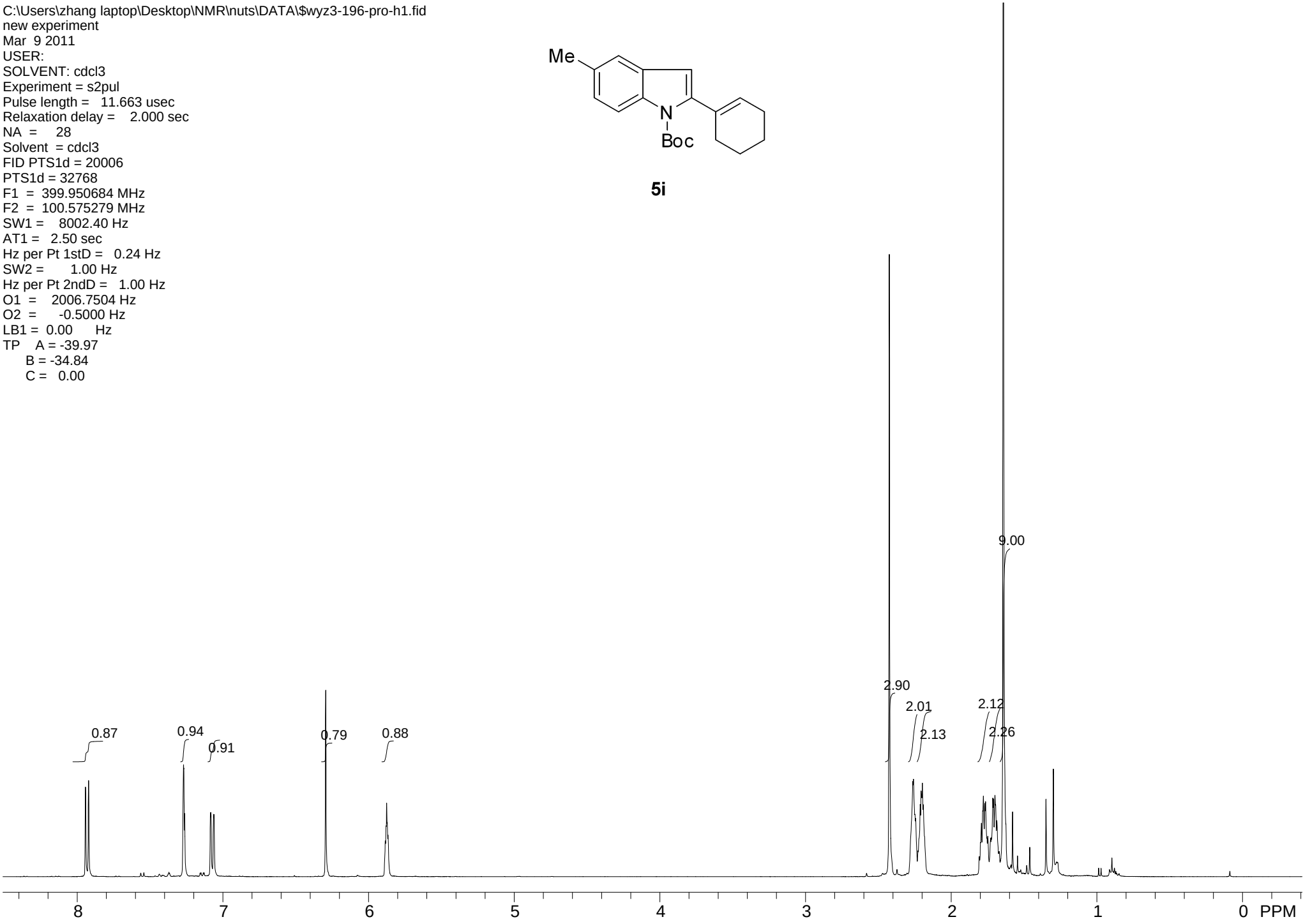


5h

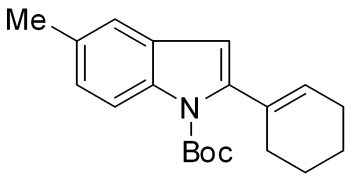


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-196-pro-h1.fid
new experiment
Mar 9 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 28
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -39.97
B = -34.84
C = 0.00

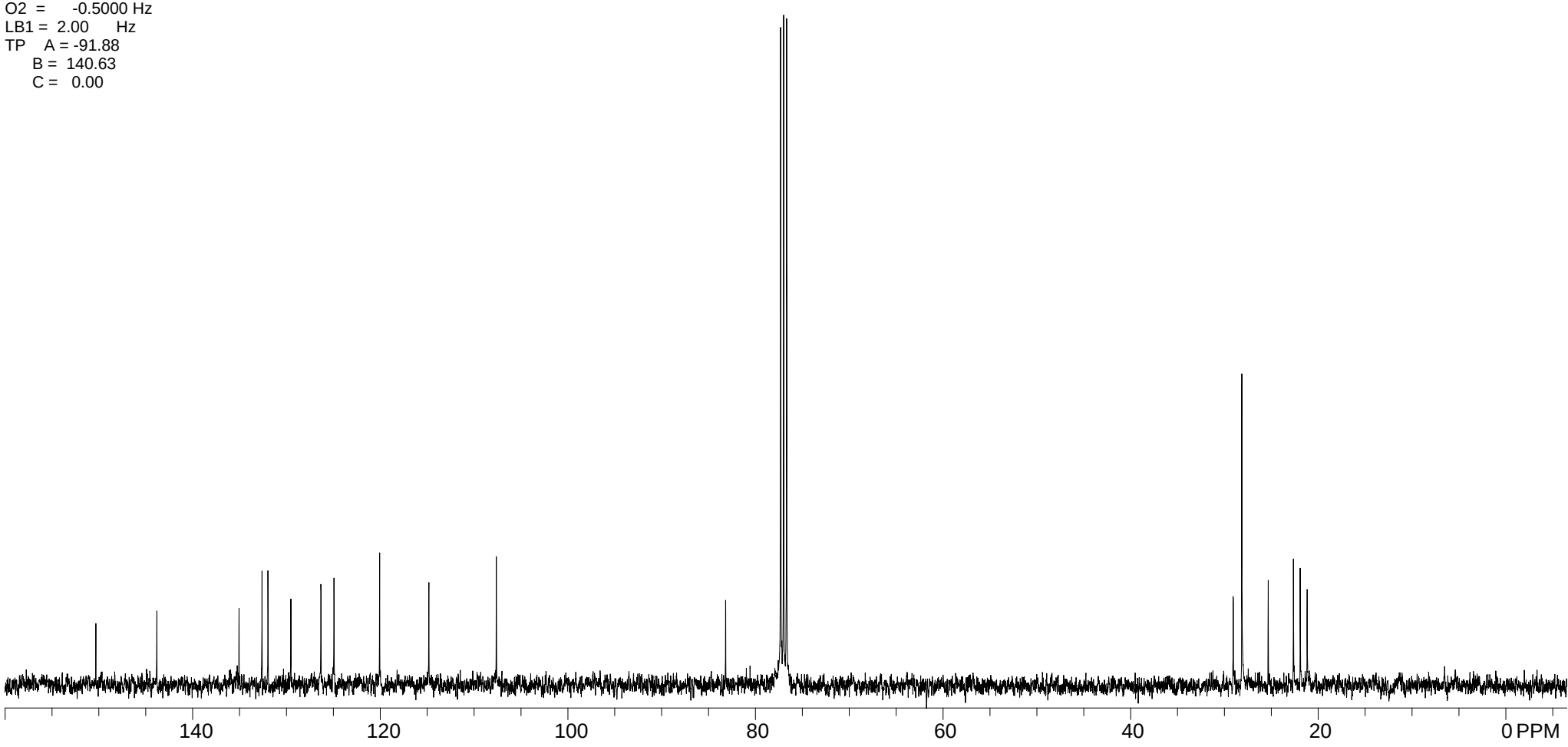
5i



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-196-pro-c13.fid
Standard c13 run using qnp probe
Mar 9 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 128
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9529.8262 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -91.88
B = 140.63
C = 0.00



5i

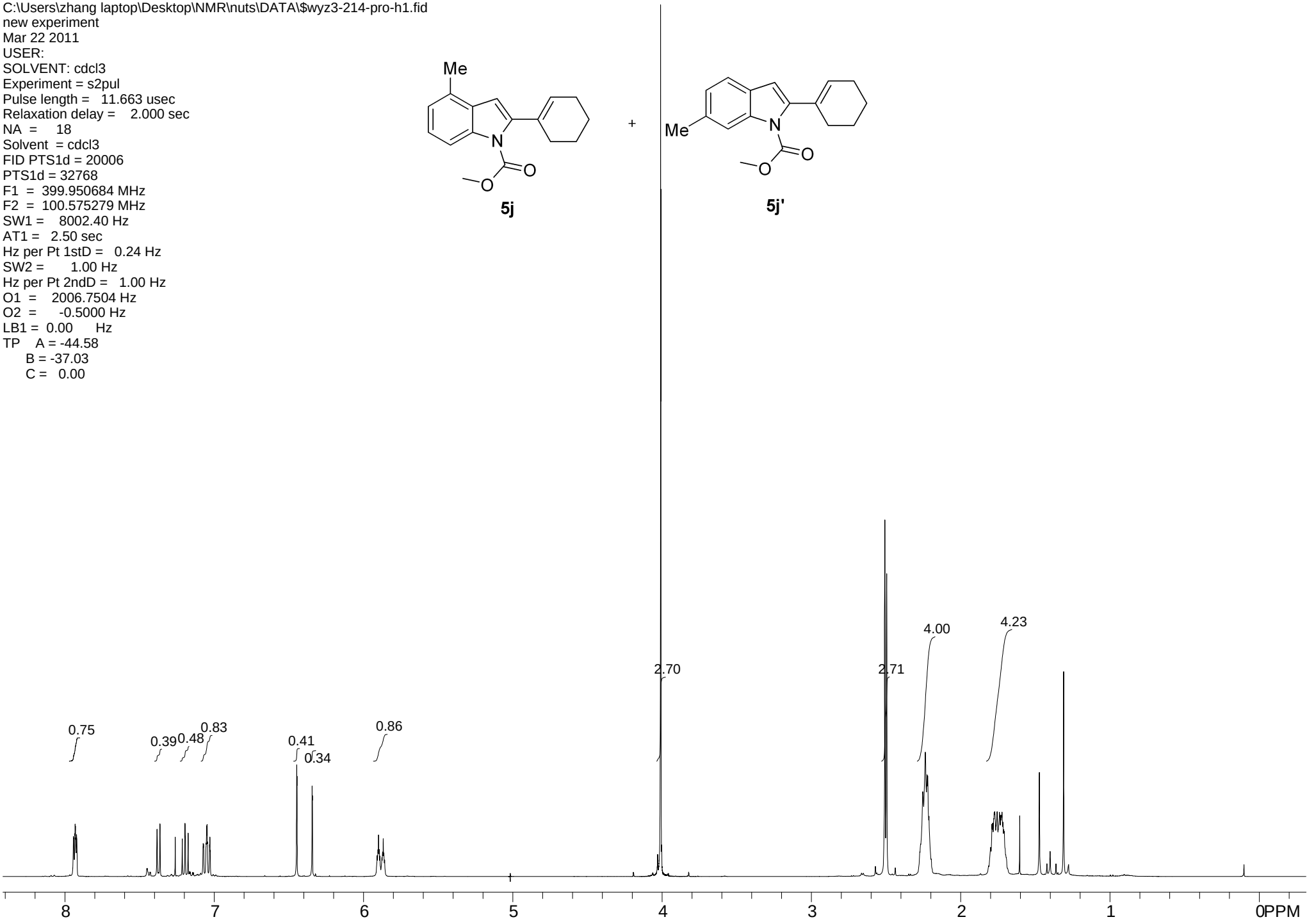


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-214-pro-h1.fid
new experiment
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 18
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.7504 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -44.58
B = -37.03
C = 0.00

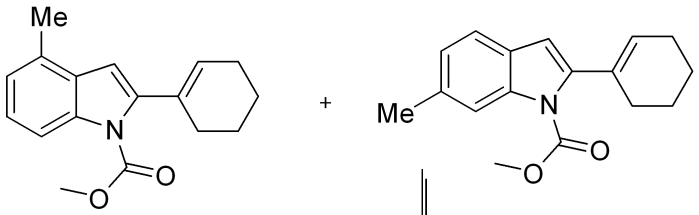
5j

+

5j'



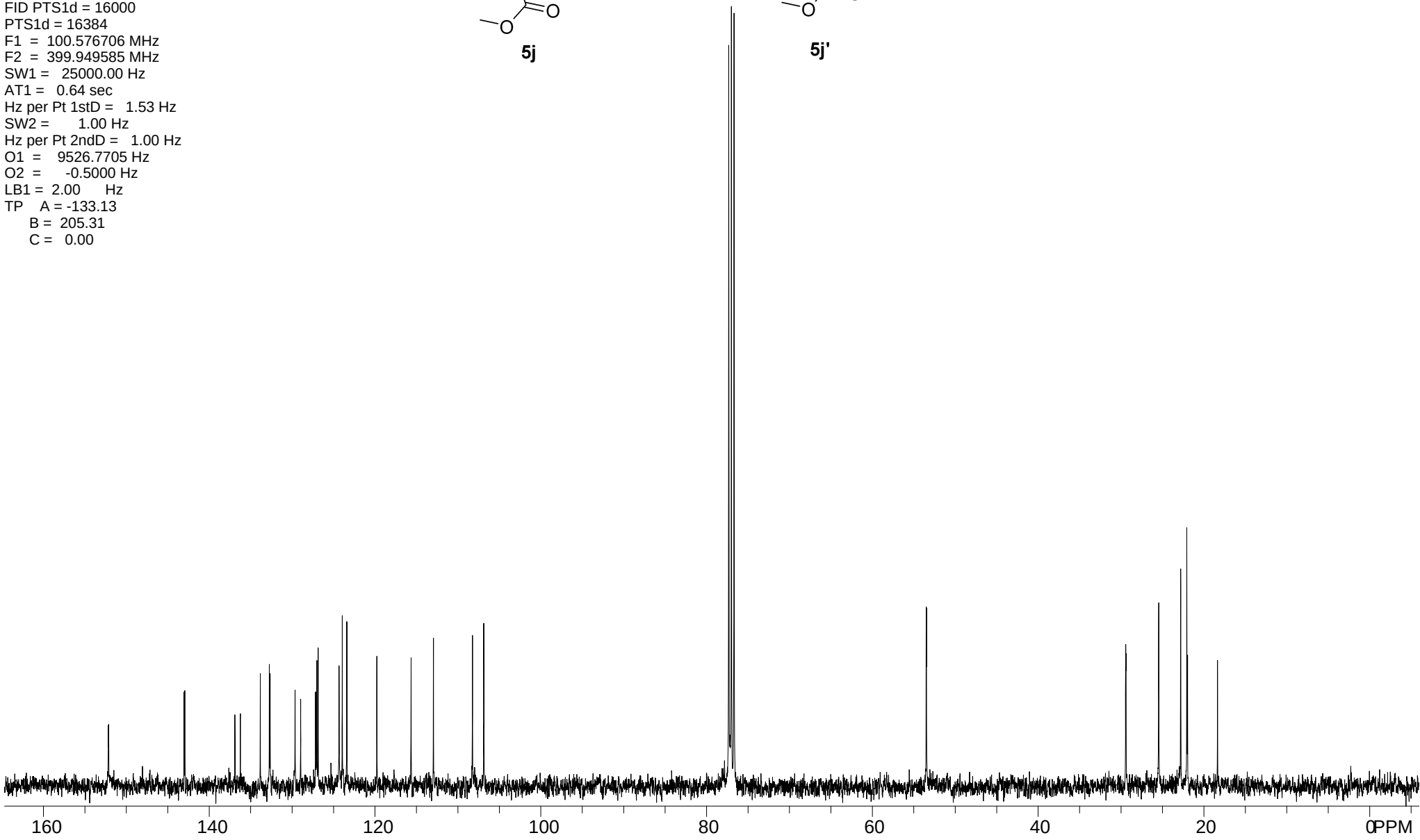
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-214-pro-c13.fid
Standard c13 run using qnp probe
Mar 22 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 9.500 usec
Relaxation delay = 5.000 sec
NA = 160
Solvent = cdcl3
FID PTS1d = 16000
PTS1d = 16384
F1 = 100.576706 MHz
F2 = 399.949585 MHz
SW1 = 25000.00 Hz
AT1 = 0.64 sec
Hz per Pt 1stD = 1.53 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 9526.7705 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -133.13
B = 205.31
C = 0.00



5j

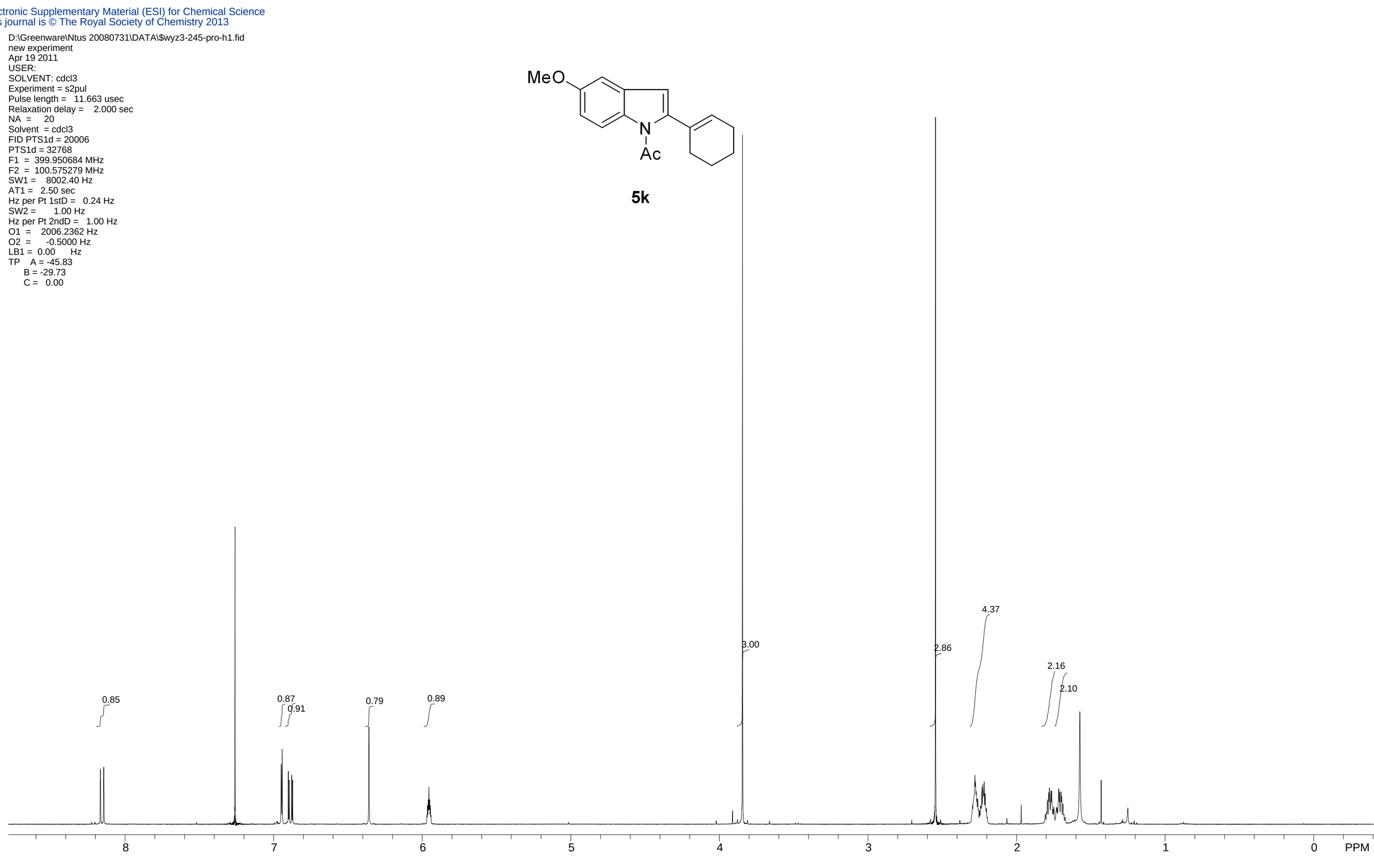
+

5j'

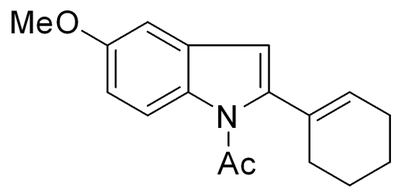


D:\Greenware\Ntus 20080731\DATA\$wyz3-245-pro-h1.fid
new experiment
Apr 19 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 11.663 usec
Relaxation delay = 2.000 sec
NA = 20
Solvent = cdcl3
FID PTS1d = 20006
PTS1d = 32768
F1 = 399.950684 MHz
F2 = 100.575279 MHz
SW1 = 8002.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.24 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2006.2362 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = -45.83
B = -29.73
C = 0.00

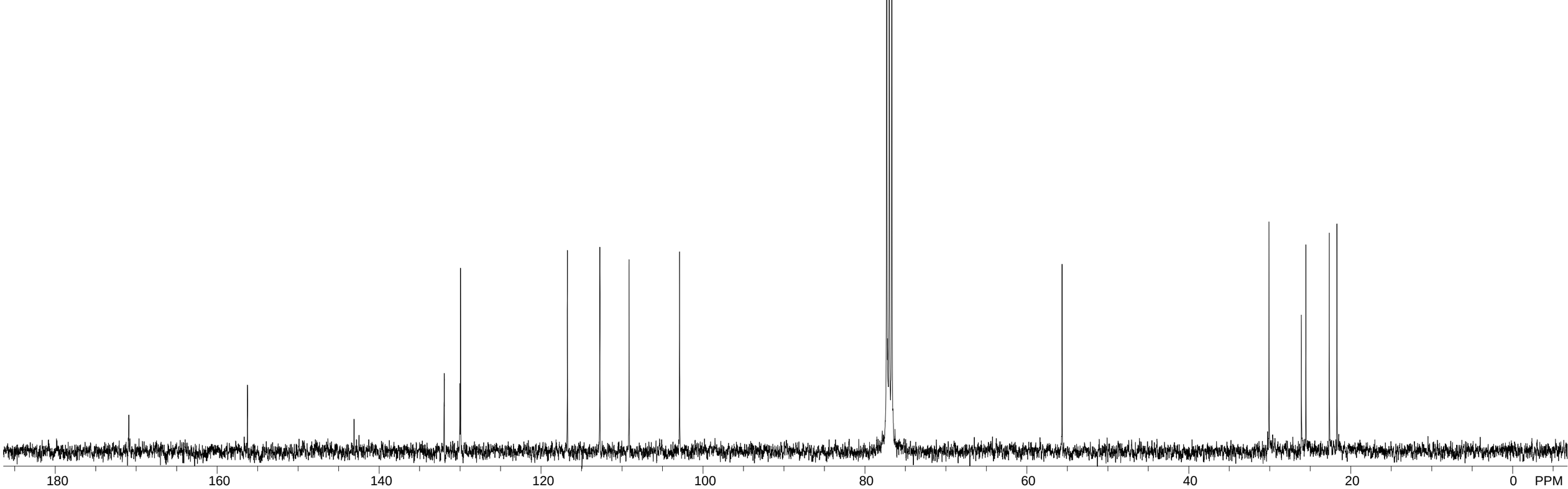
5k



D:\Greenware\Ntus 20080731\DATA\$wyz3-245-pro-c13.fid
Standard c13 run using qnp probe
Apr 19 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 7.775 usec
Relaxation delay = 1.300 sec
NA = 3300
Solvent = cdcl3
FID PTS1d = 28040
PTS1d = 32768
F1 = 100.577232 MHz
F2 = 399.950684 MHz
SW1 = 28040.66 Hz
AT1 = 1.00 sec
Hz per Pt 1stD = 0.86 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 10057.2168 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -8.44
B = -23.91
C = 0.00

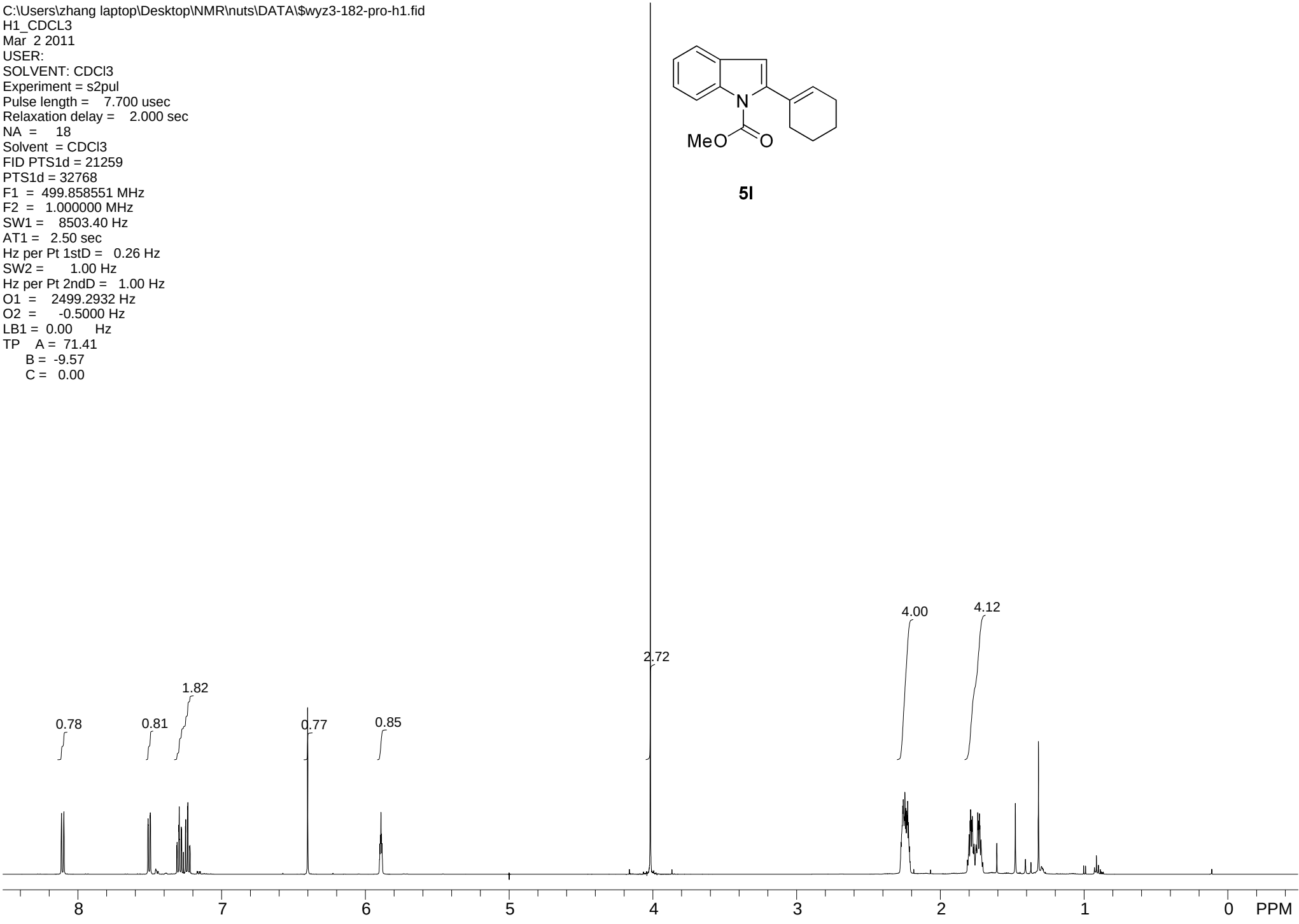


5k

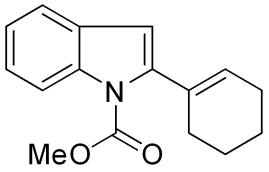


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-182-pro-h1.fid
H1_CDCL3
Mar 2 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 18
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 71.41
B = -9.57
C = 0.00

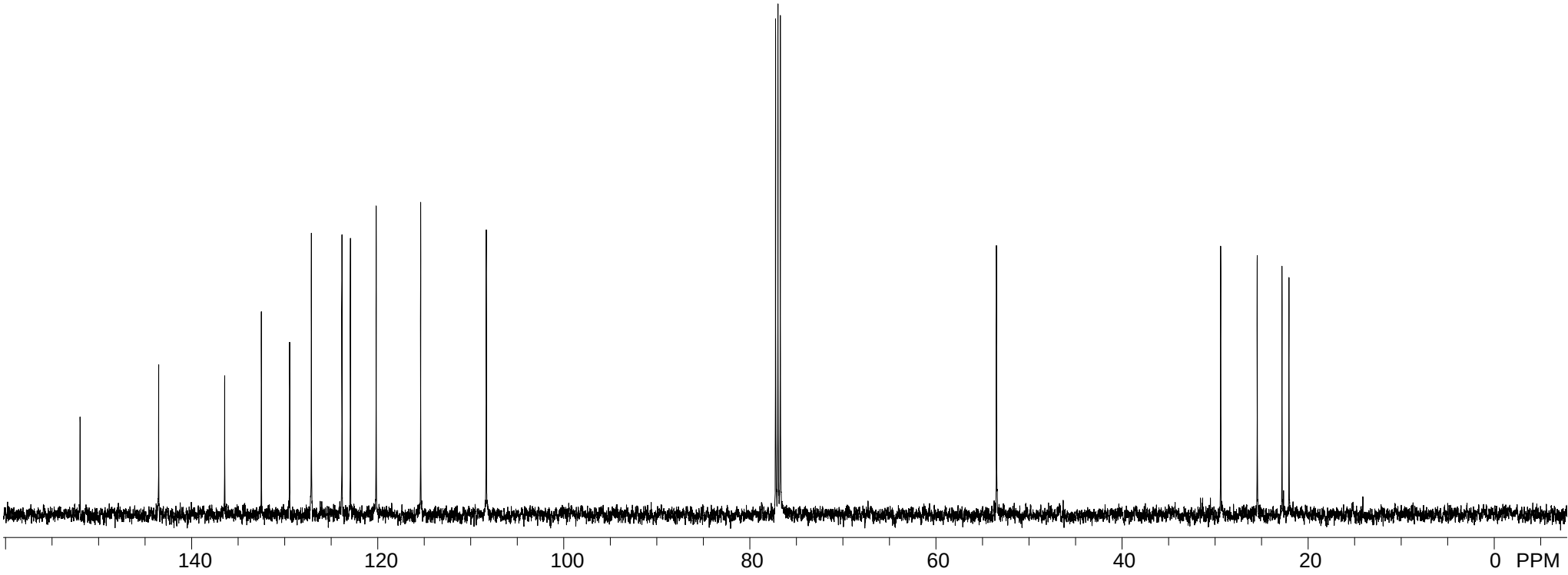
5l



C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-182-pro-c13-1.fid
STANDARD CARBON PARAMETERS
Mar 2 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 52
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12766.5020 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -190.31
B = 135.00
C = 0.00

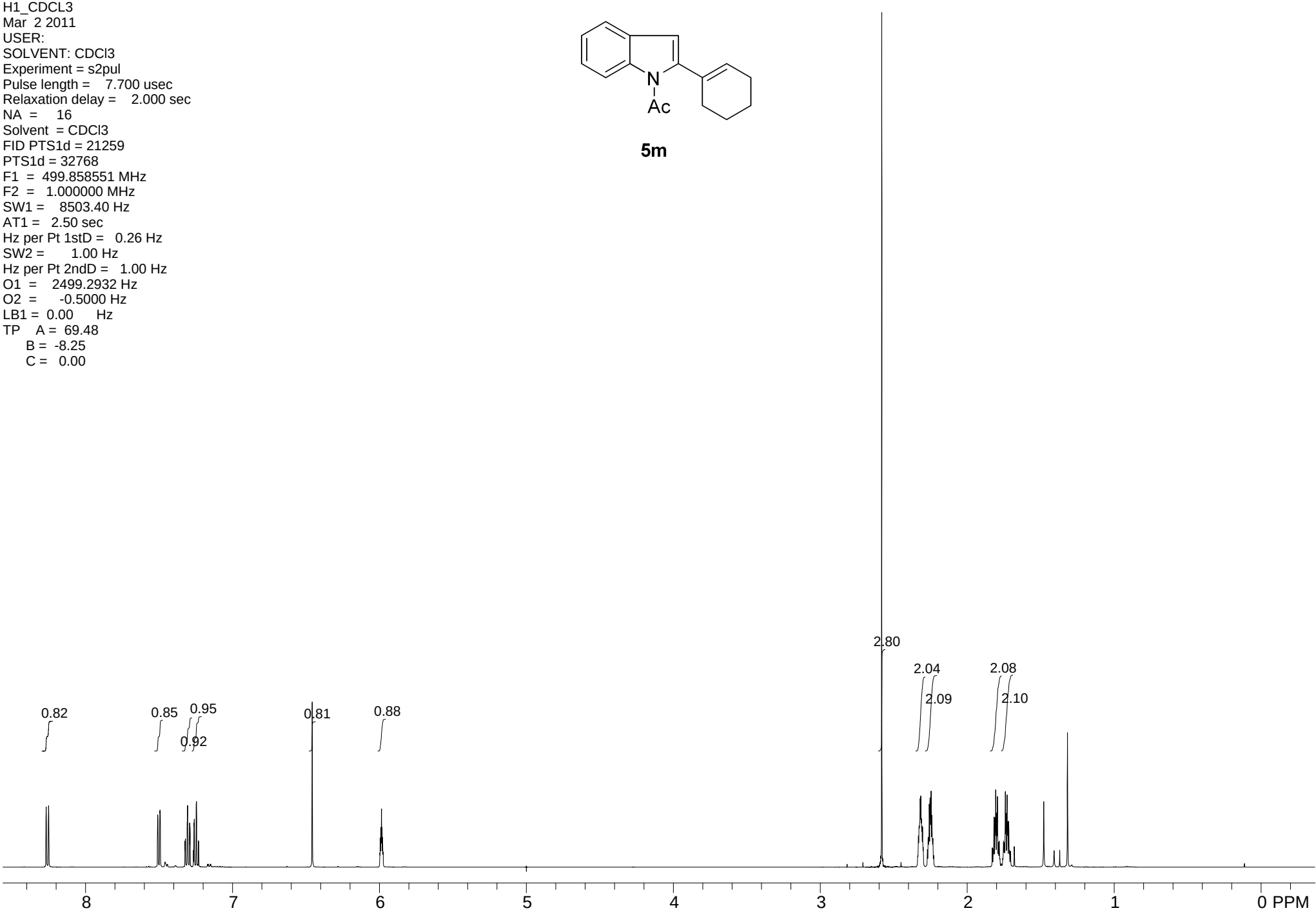


5l

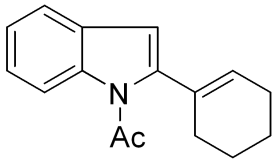


C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-183-pro-h1.fid
H1_CDCL3
Mar 2 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2499.2932 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 69.48
B = -8.25
C = 0.00

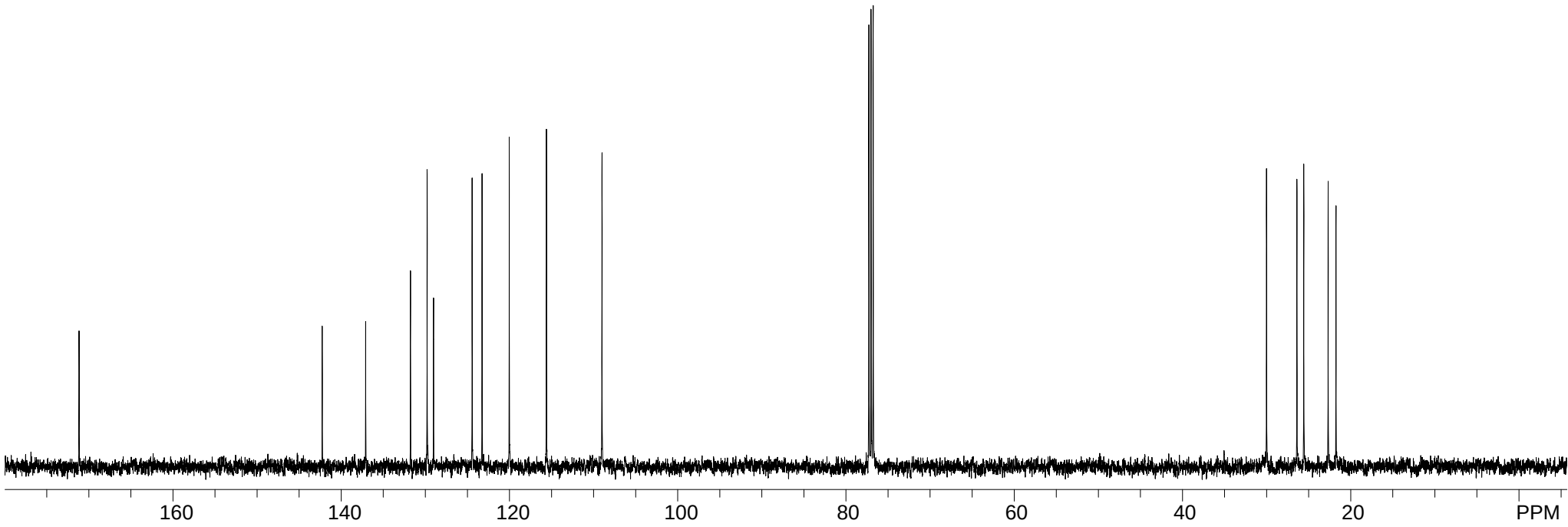
5m



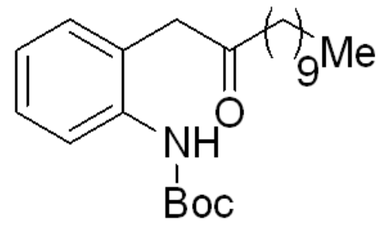
C:\Users\zhang laptop\Desktop\NMR\nuts\DATA\$wyz3-183-pro-c13.fid
STANDARD CARBON PARAMETERS
Mar 2 2011
USER:
SOLVENT: cdcl3
Experiment = s2pul
Pulse length = 6.000 usec
Relaxation delay = 3.000 sec
NA = 40
Solvent = cdcl3
FID PTS1d = 36749
PTS1d = 65536
F1 = 125.701683 MHz
F2 = 499.858551 MHz
SW1 = 28258.57 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.43 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12764.3457 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -202.50
B = 151.88
C = 0.00



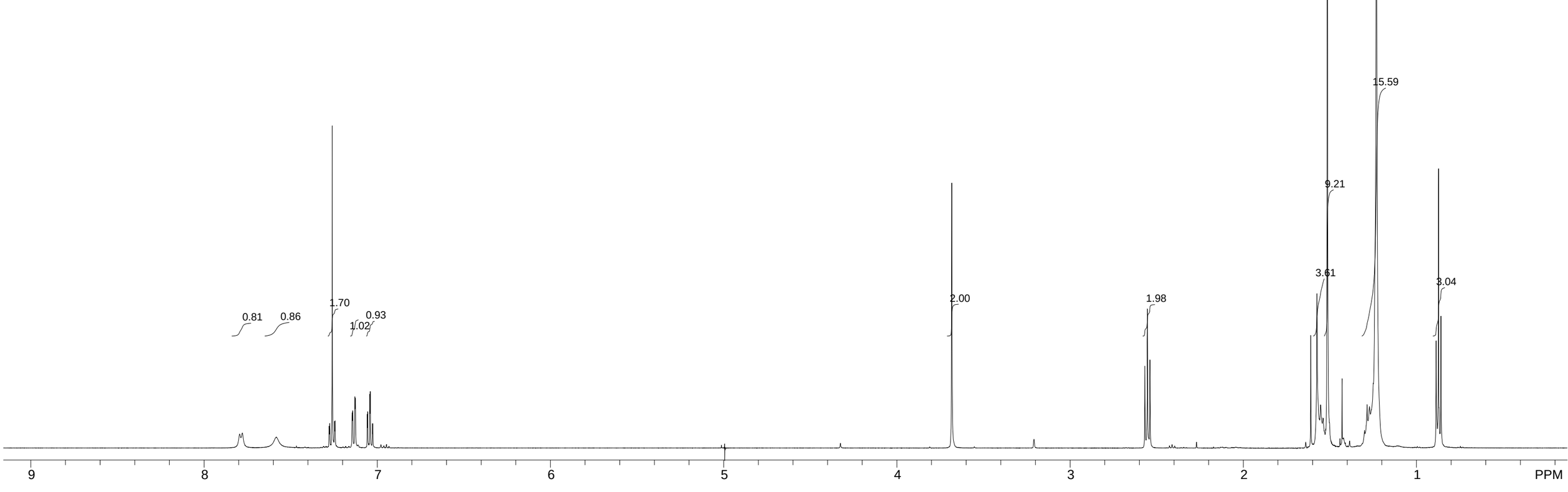
5m



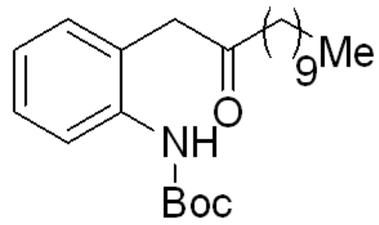
D:\Greenware\Ntus 20080731\DATA\$wyz3-228-interm-h1.fid
H1_CDCL3
Apr 4 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.700 usec
Relaxation delay = 2.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 21259
PTS1d = 32768
F1 = 499.858551 MHz
F2 = 1.000000 MHz
SW1 = 8503.40 Hz
AT1 = 2.50 sec
Hz per Pt 1stD = 0.26 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 2496.3191 Hz
O2 = -0.5000 Hz
LB1 = 0.00 Hz
TP A = 64.22
B = -11.95
C = 0.00



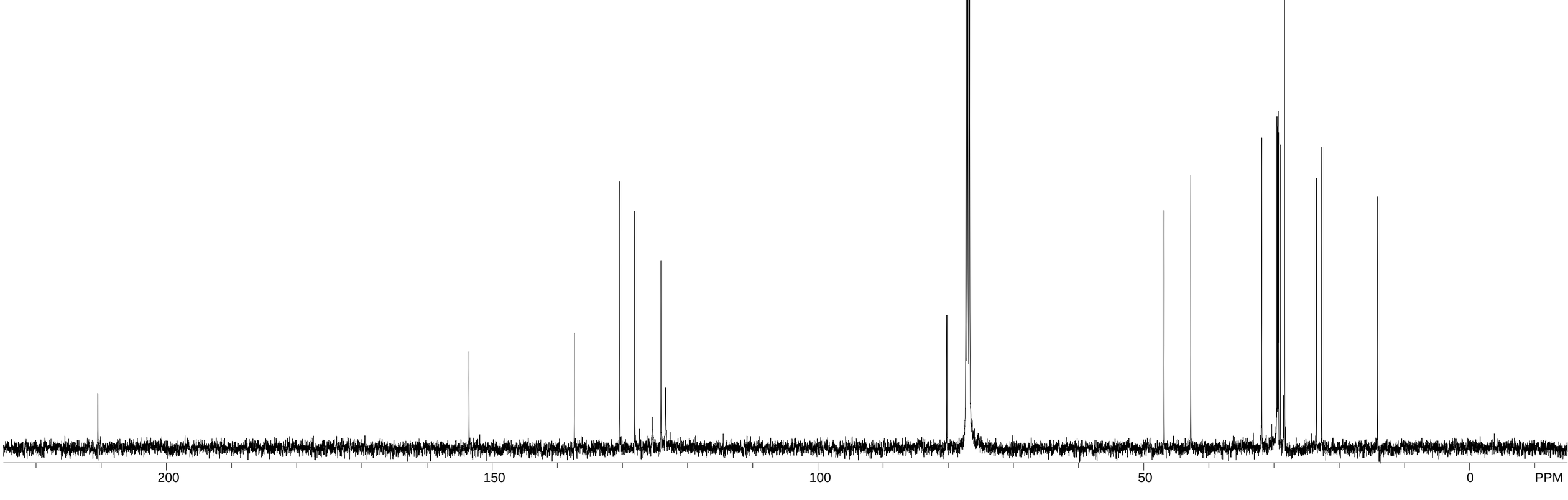
8



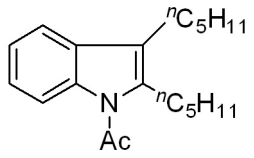
D:\Greenware\Ntus 20080731\DATA\$wyz3-228-interm-c13.fid
Std carbon;blank line
Apr 4 2011
USER:
SOLVENT: CDCl3
Experiment = s2pul
Pulse length = 7.000 usec
Relaxation delay = 5.000 sec
NA = 1364
Solvent = CDCl3
FID PTS1d = 39295
PTS1d = 65536
F1 = 125.702103 MHz
F2 = 499.858551 MHz
SW1 = 30165.91 Hz
AT1 = 1.30 sec
Hz per Pt 1stD = 0.46 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 13197.2871 Hz
O2 = -0.5000 Hz
LB1 = 2.00 Hz
TP A = -252.83
B = 166.41
C = 0.00



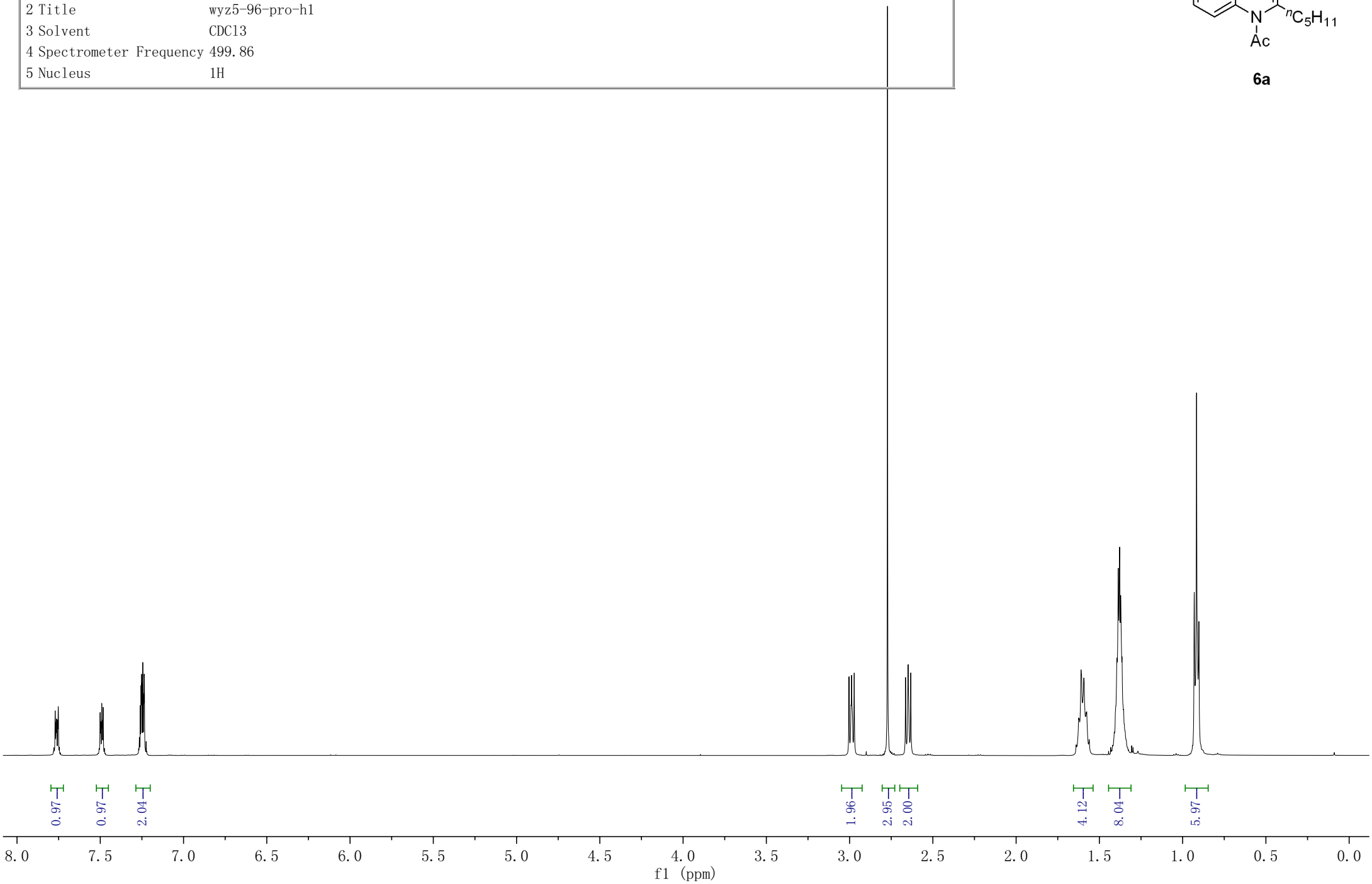
8



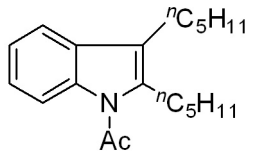
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-96-pro-h1.fid/ fid
2 Title	wyz5-96-pro-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



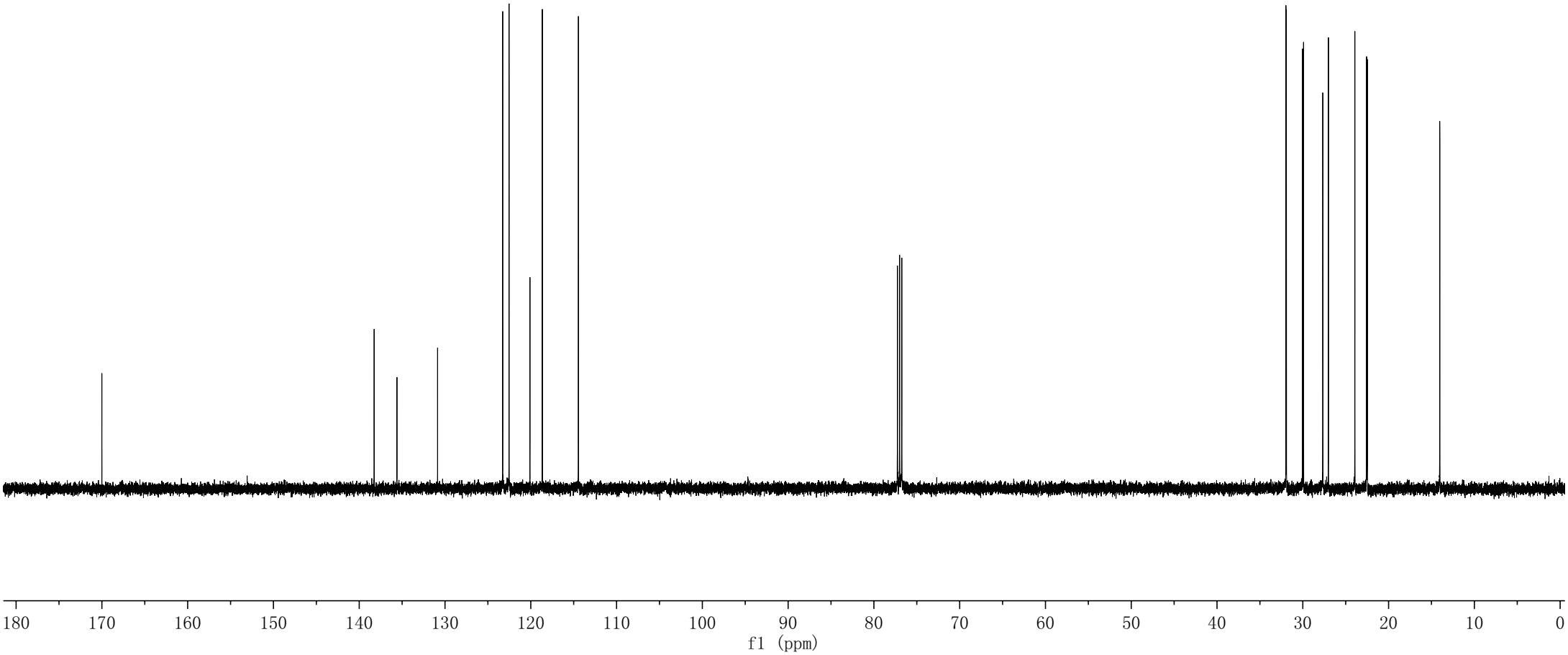
6a



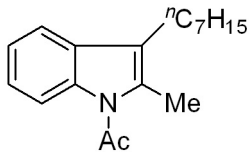
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-96-pro-c13.fid/ fid
2 Title	wyz5-96-pro-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



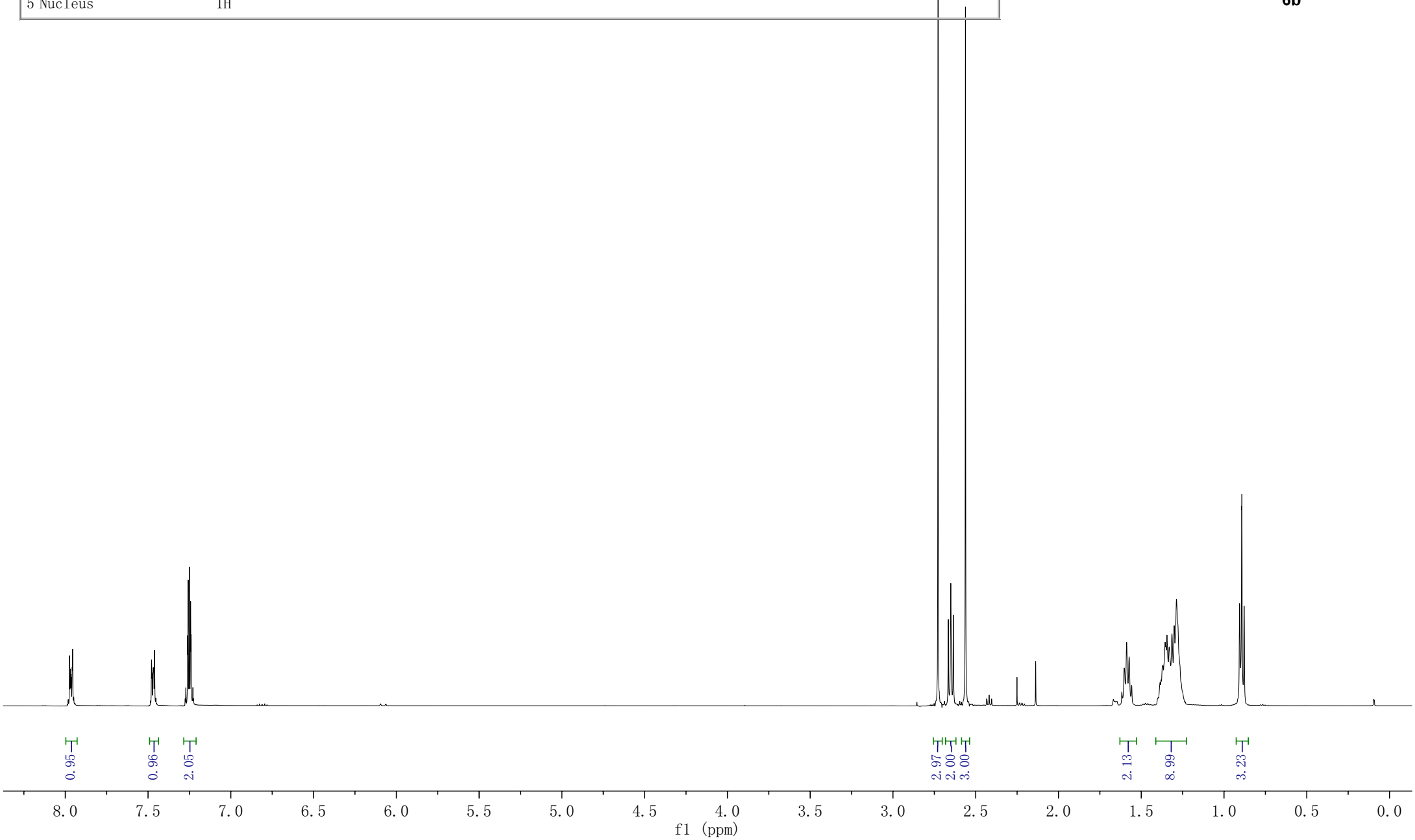
6a



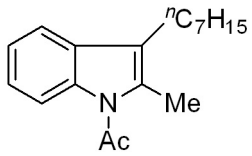
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-103-pro1-h1.fid/ fid
2 Title	wyz5-103-pro1-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



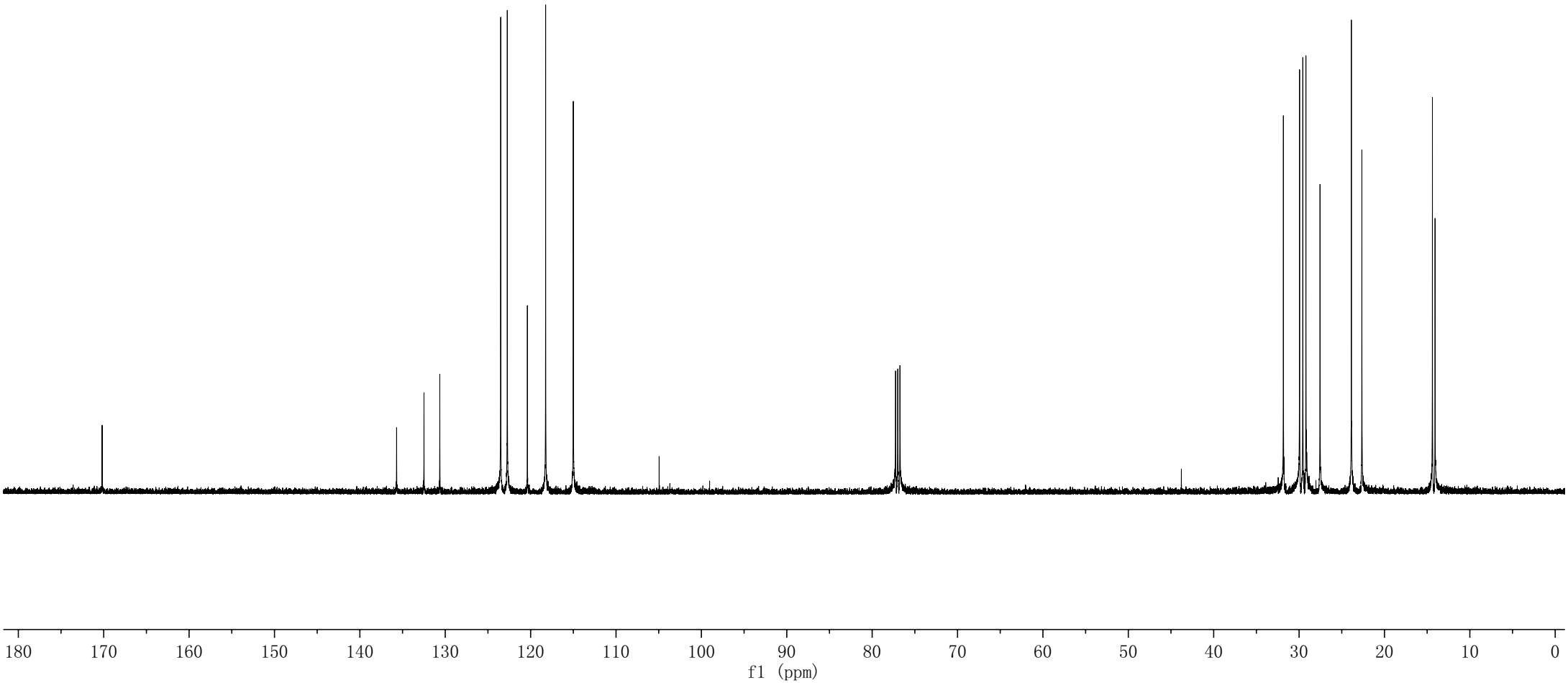
6b



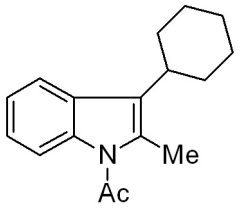
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-103-pro1-c13.fid/ fid
2 Title	wyz5-103-pro1-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



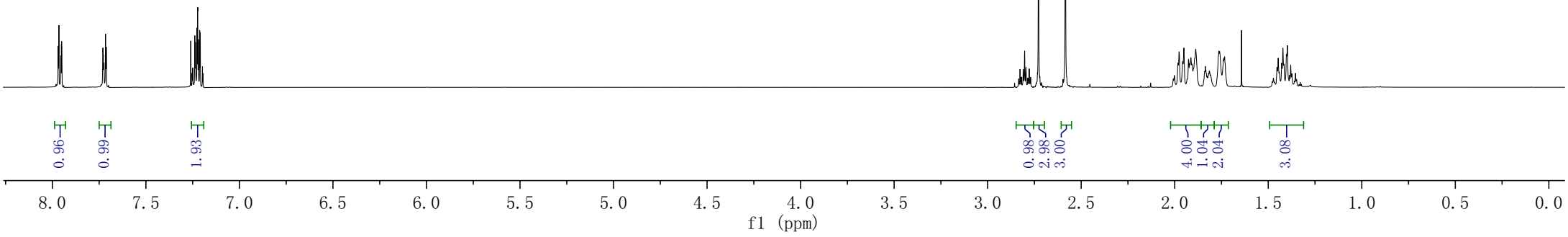
6b



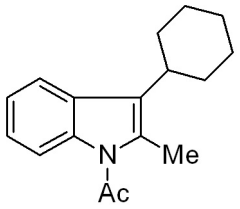
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-111-pro-h1.fid/ fid
2 Title	wyz5-111-pro-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



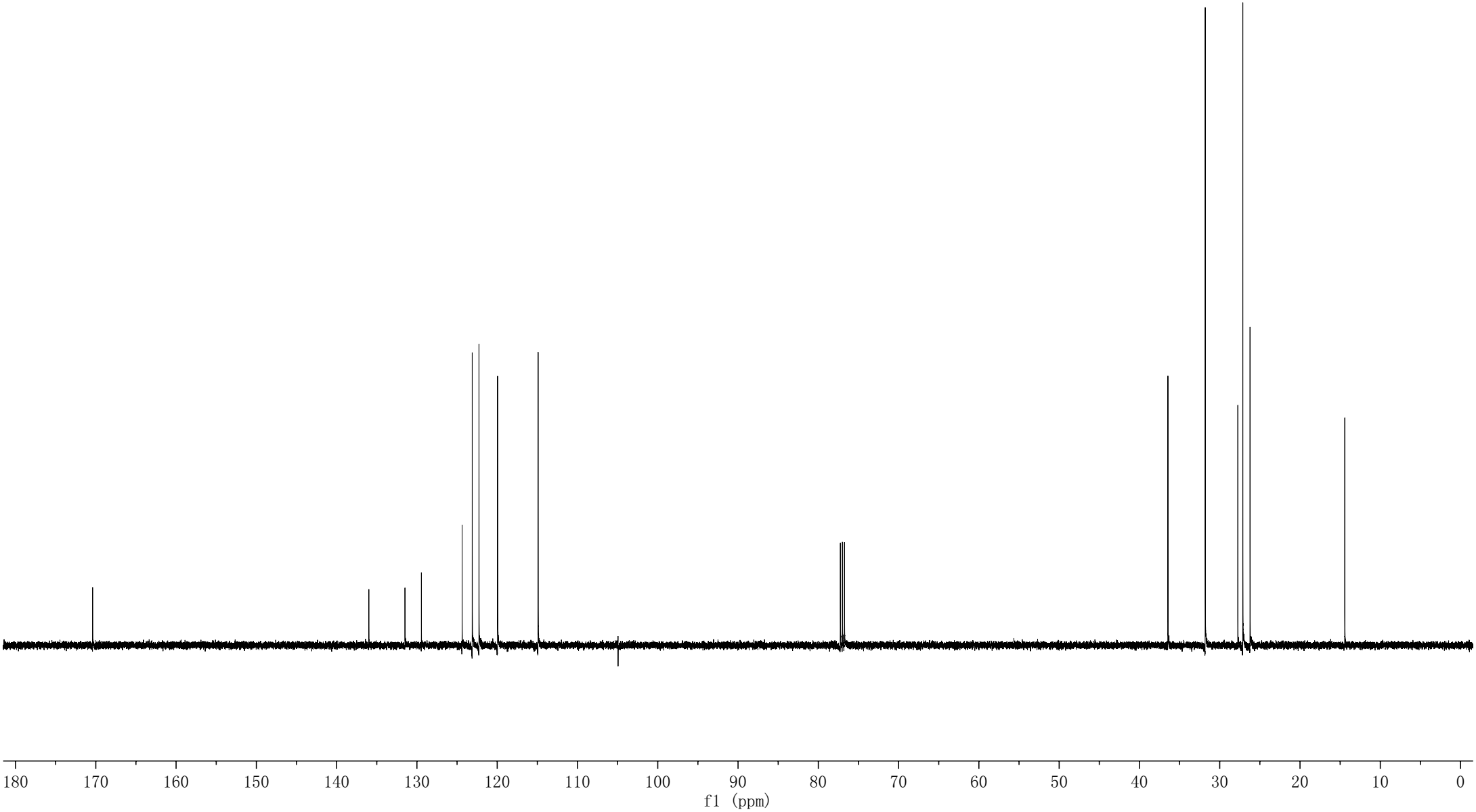
6c



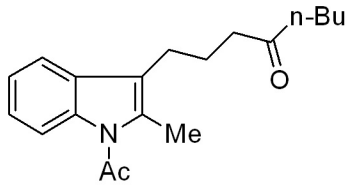
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-111-pro-c13.fid/ fid
2 Title	wyz5-111-pro-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



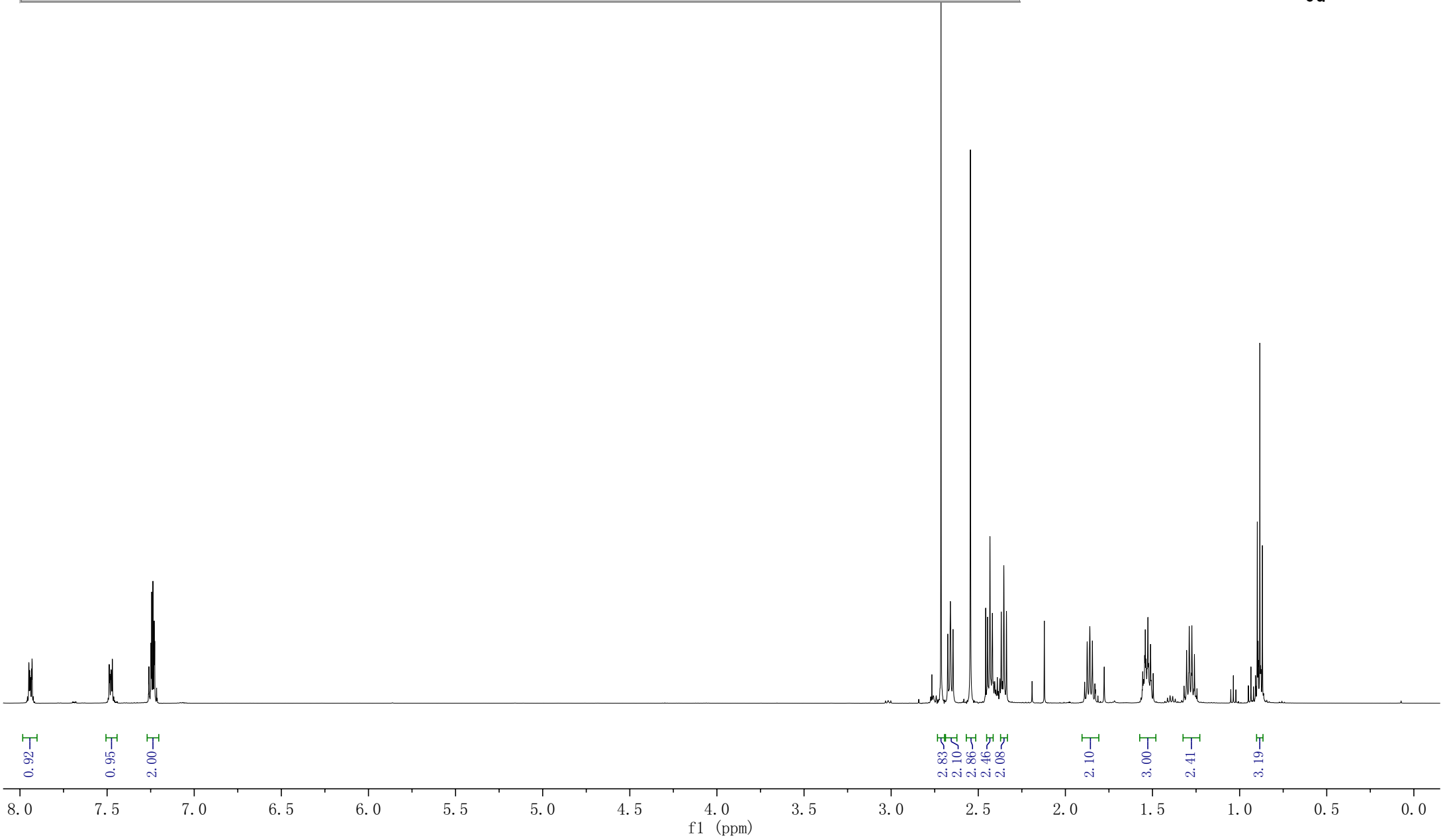
6c



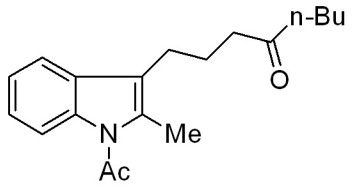
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-104-pro1-h1.fid/ fid
2 Title	wyz5-104-pro1-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



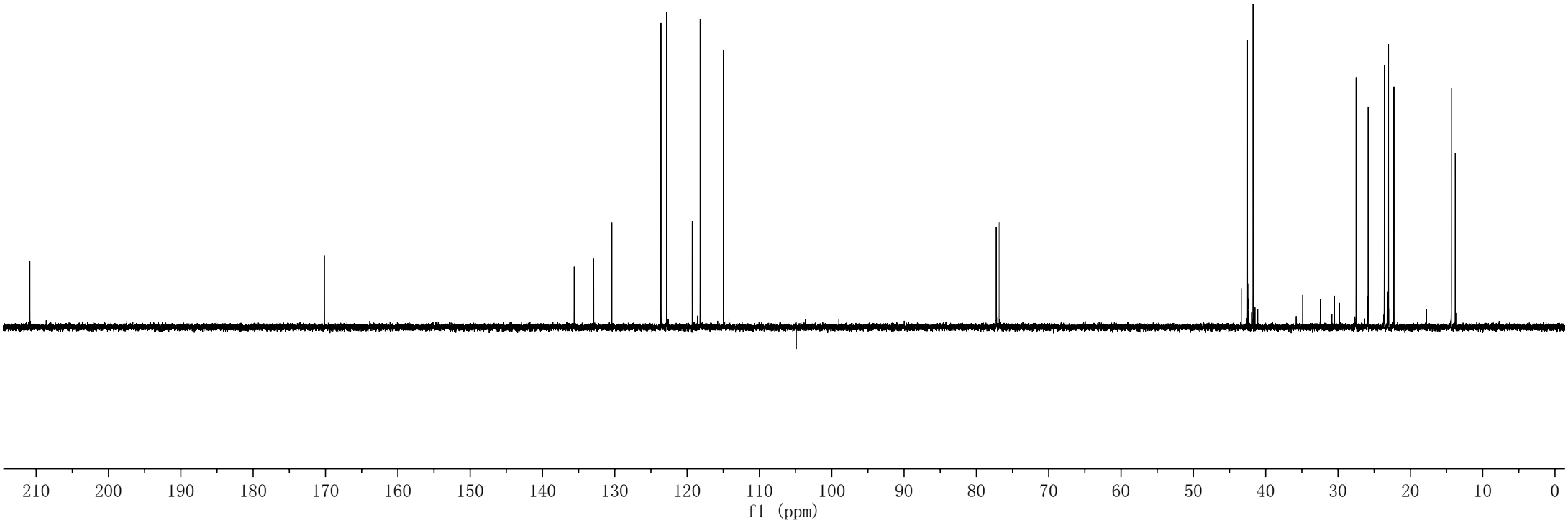
6d



Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-104-pro1-c13.fid/ fid
2 Title	wyz5-104-pro1-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C

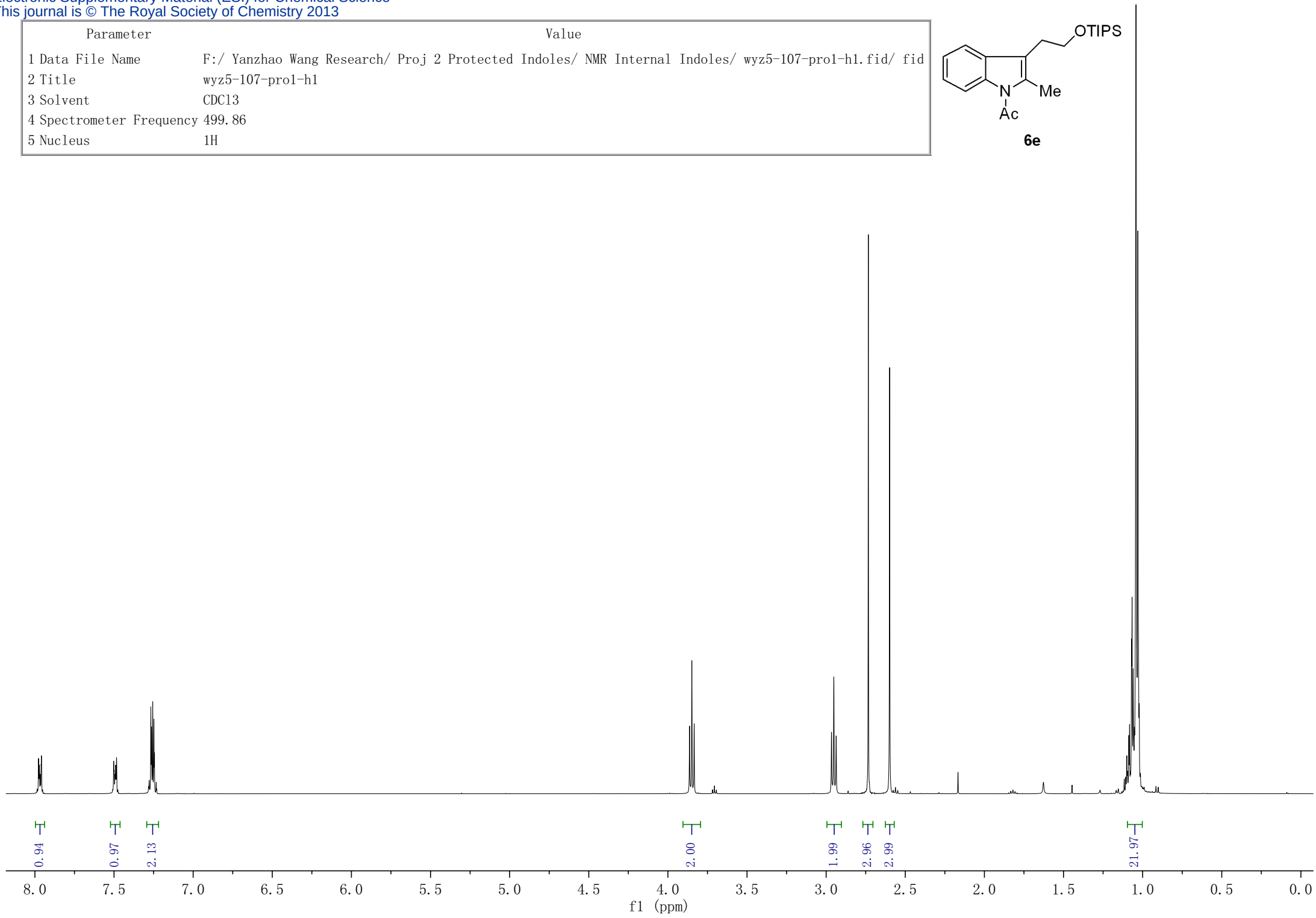


6d

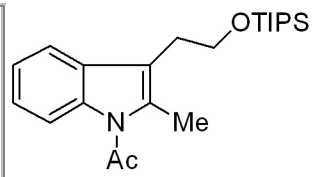


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-107-pro1-h1.fid/ fid
2 Title	wyz5-107-pro1-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H

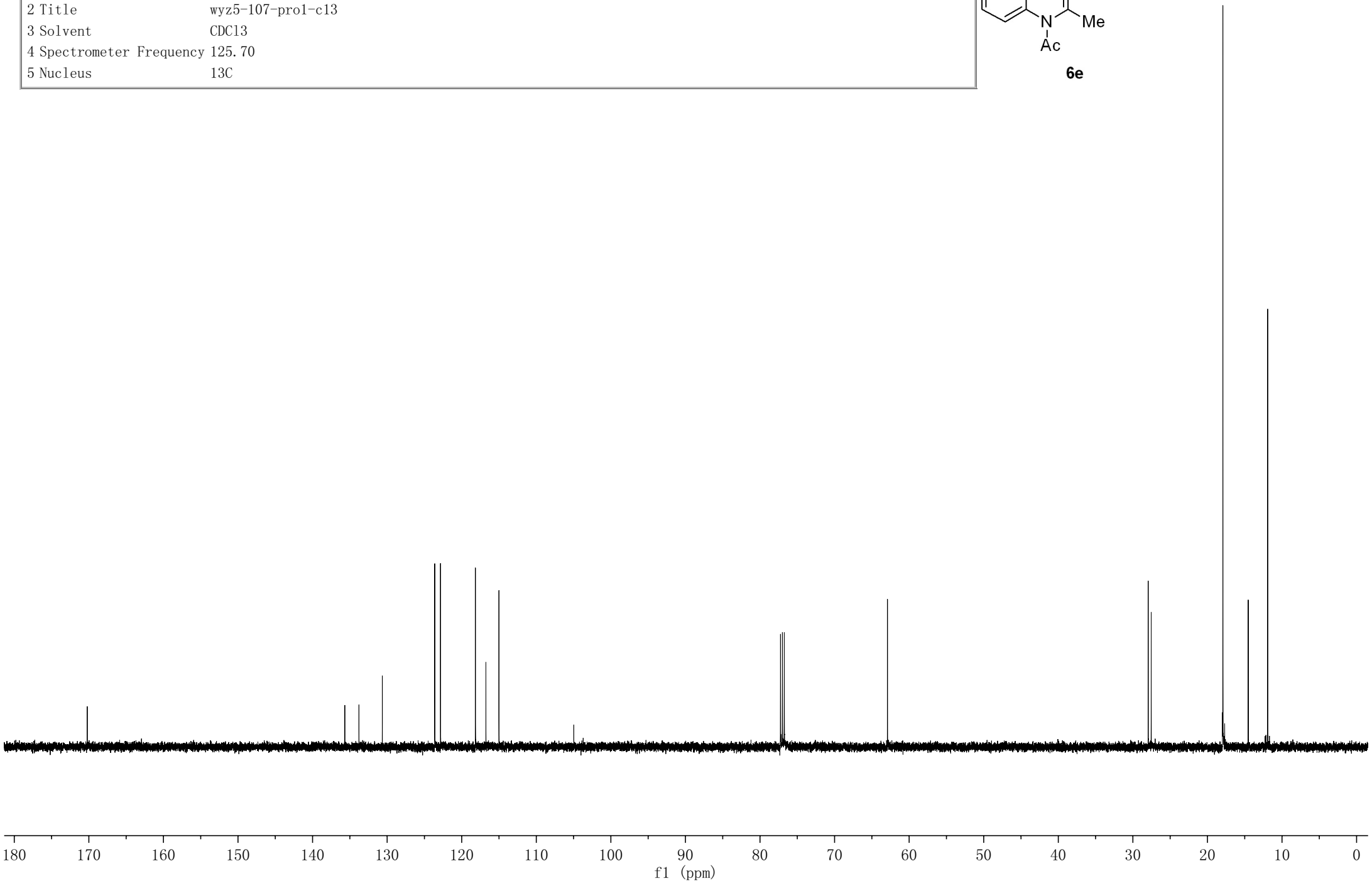
6e



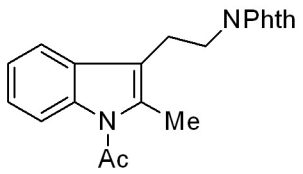
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-107-pro1-c13.fid/ fid
2 Title	wyz5-107-pro1-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



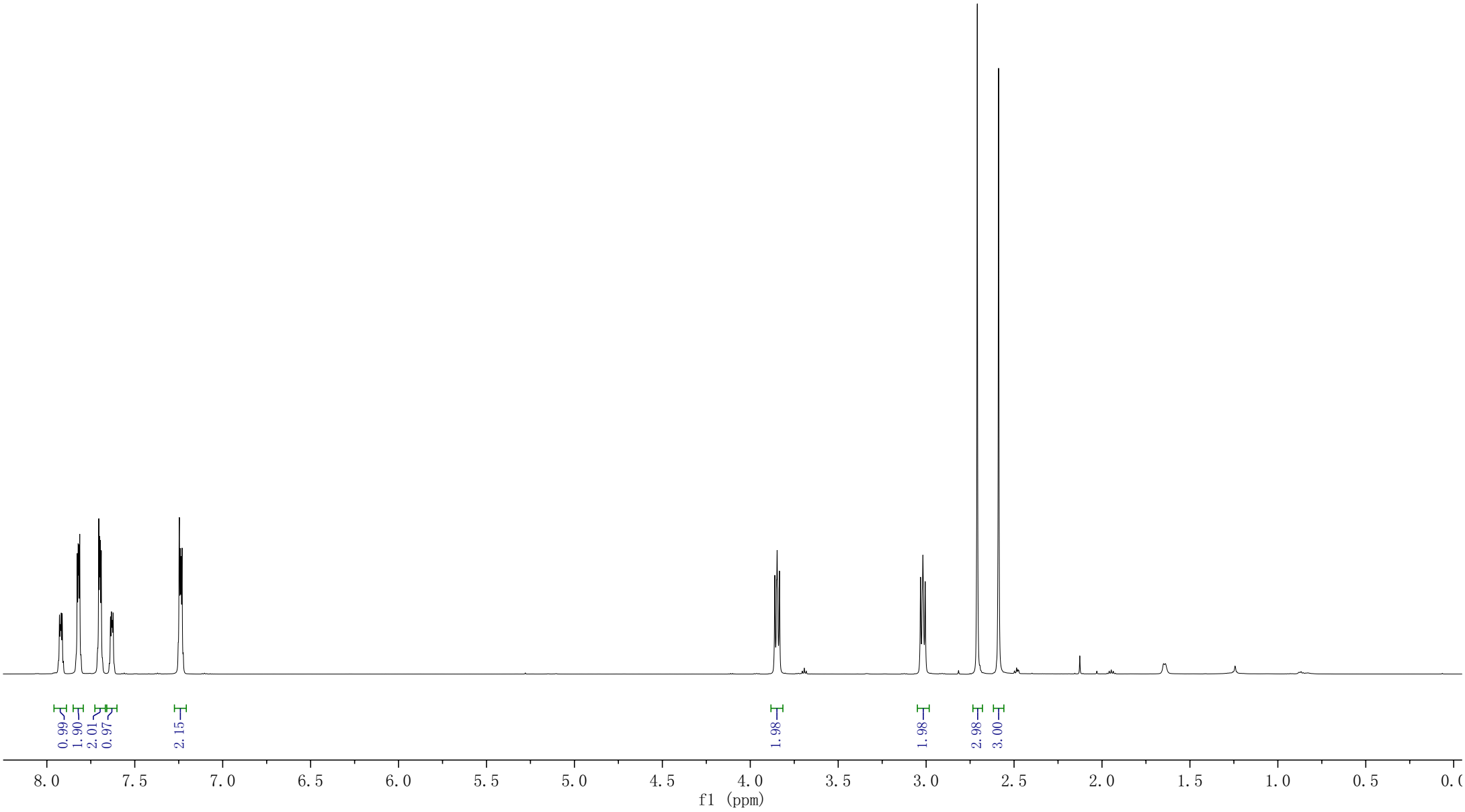
6e



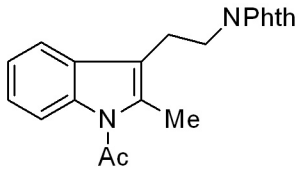
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-106-pro-h1.fid/ fid
2 Title	wyz5-106-pro-h1
3 Solvent	cdcl3
4 Spectrometer Frequency	599.63
5 Nucleus	1H



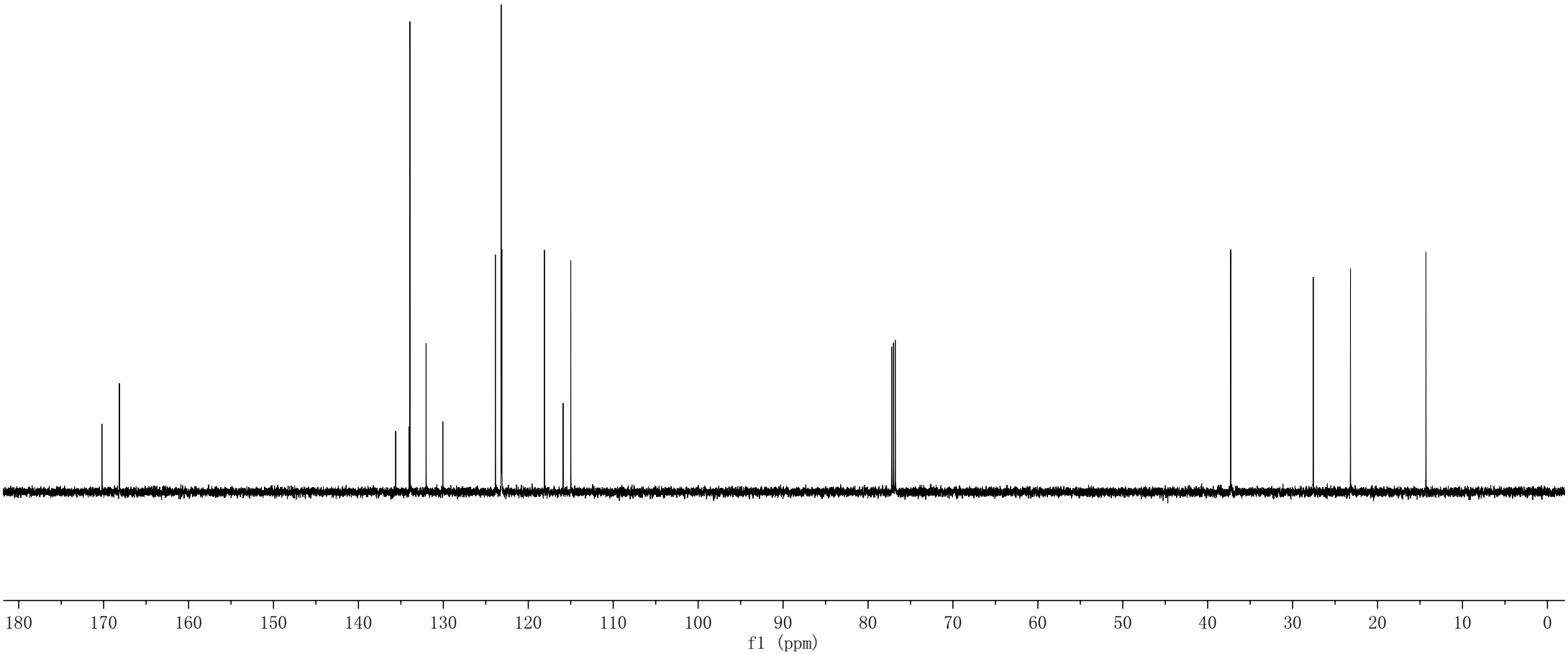
6f



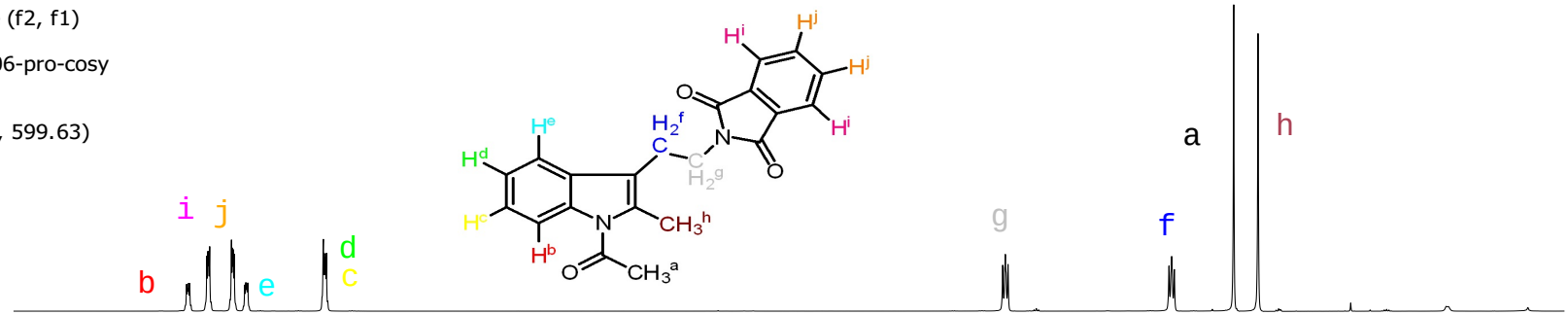
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-106-pro-c13.fid/ fid
2 Title	wyz5-106-pro-c13
3 Solvent	cdcl3
4 Spectrometer Frequency	150.79
5 Nucleus	13C

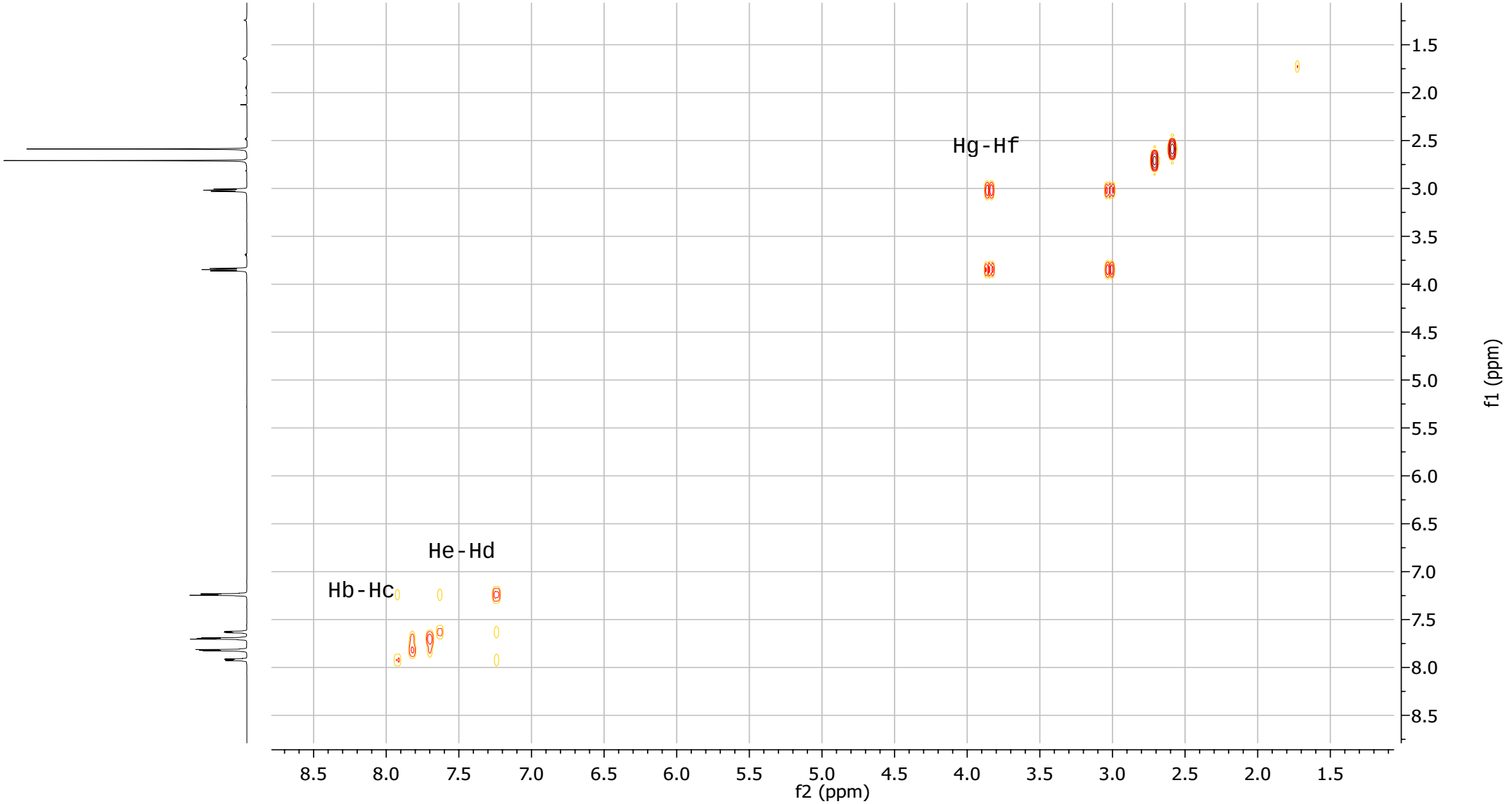


6f

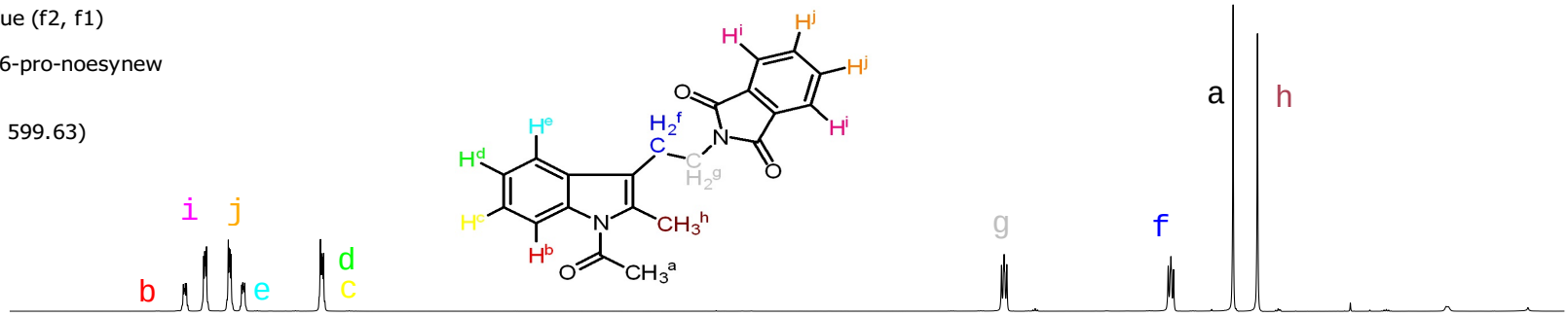


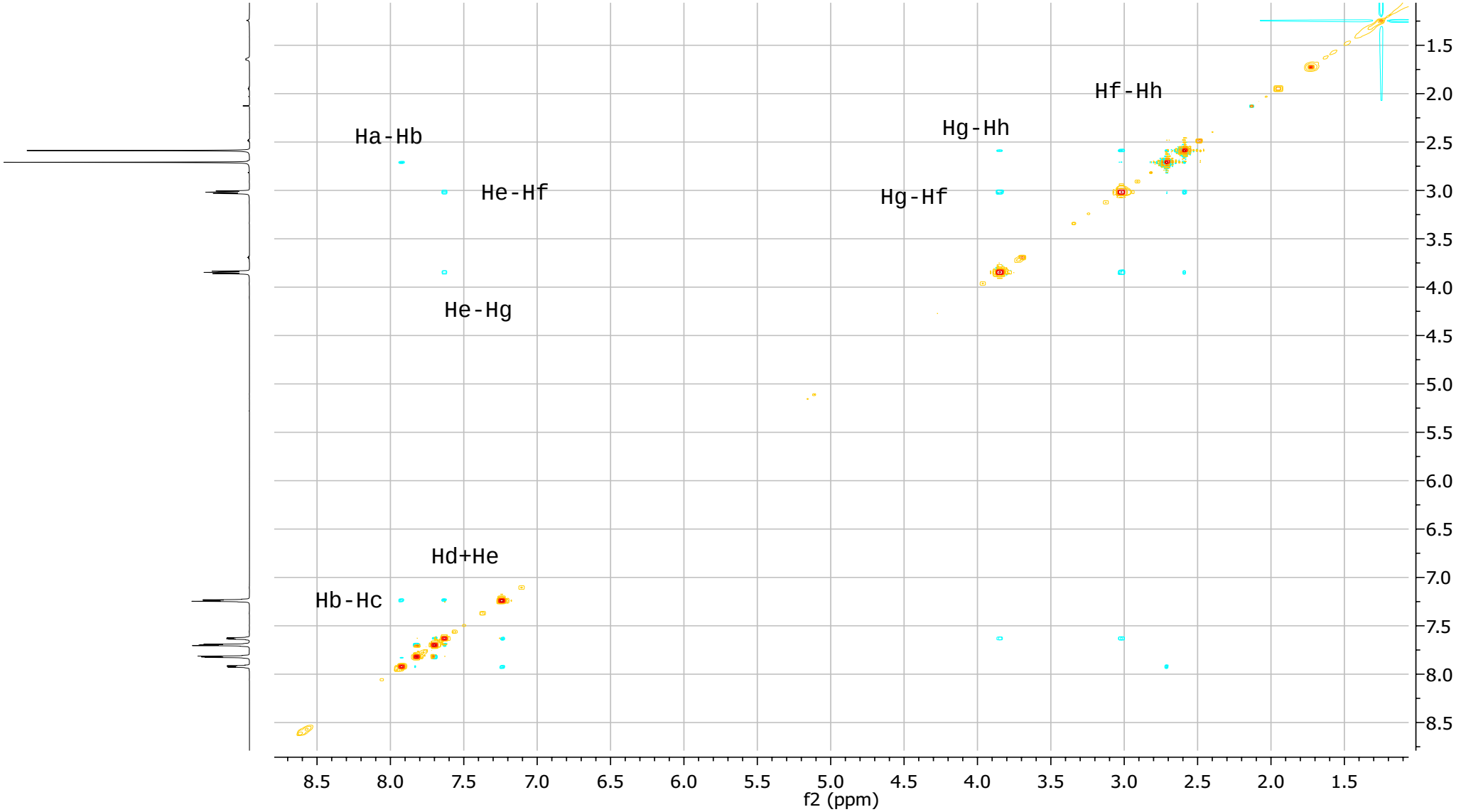
Parameter	Value (f2, f1)
1 Title	wyz5-106-pro-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)



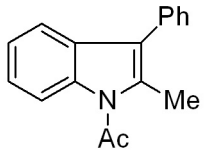


Parameter	Value (f2, f1)
1 Title	wyz5-106-pro-noesynew
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)





Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-101-pro1-h1.fid/ fid
2 Title	wyz5-101-pro1-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



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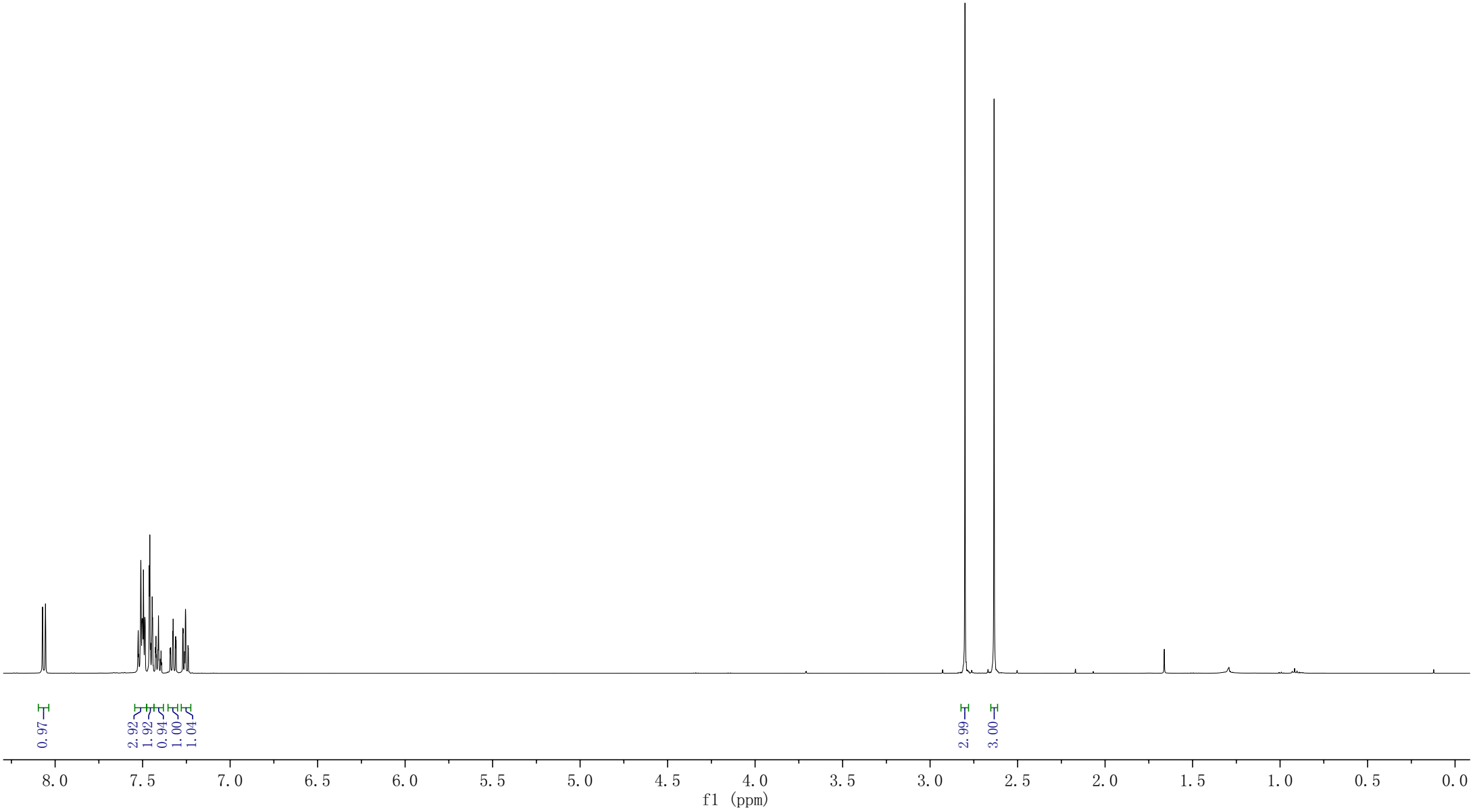
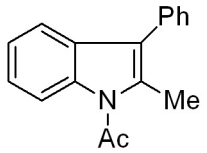


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-101-pro1-c13.fid/ fid
2 Title	wyz5-101-pro1-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



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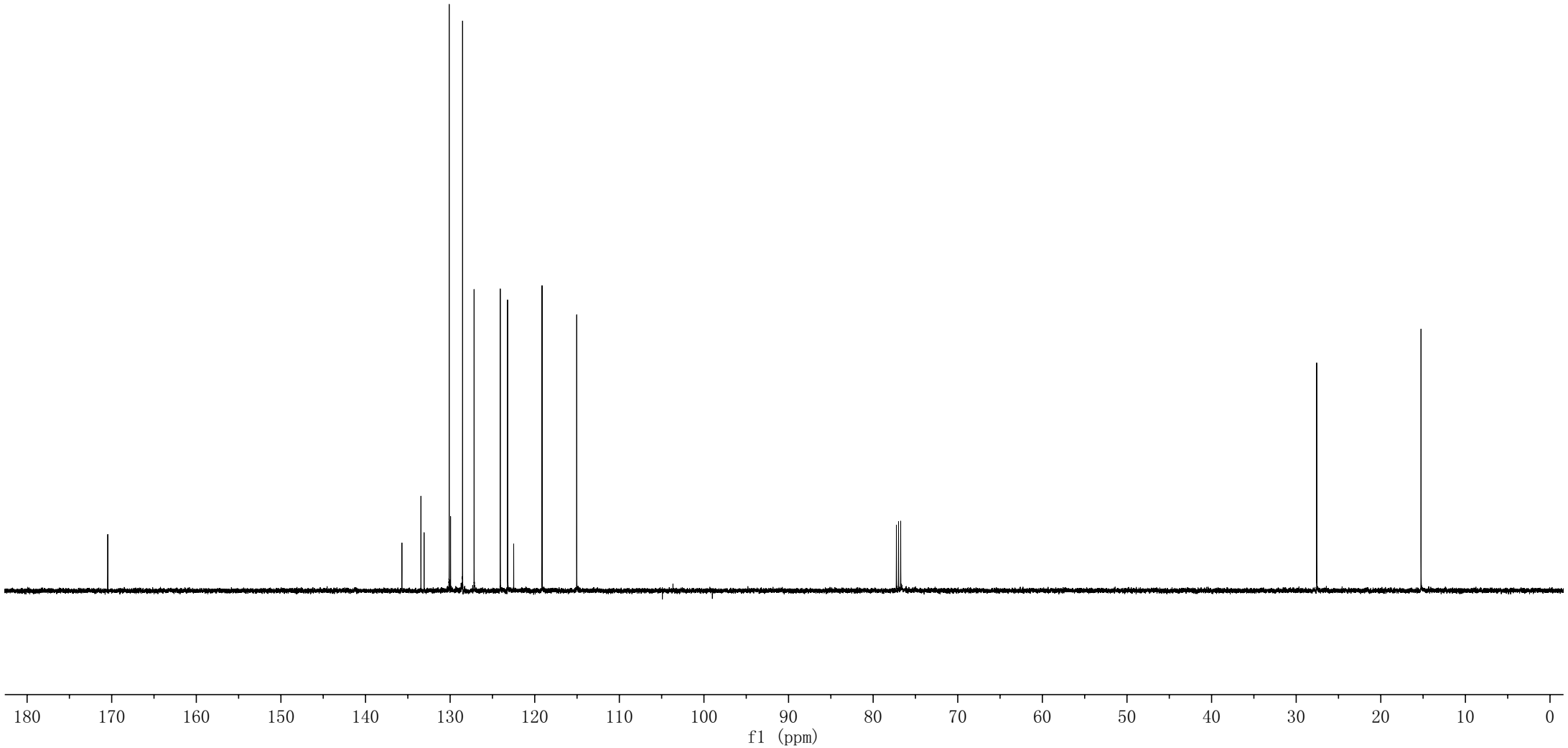
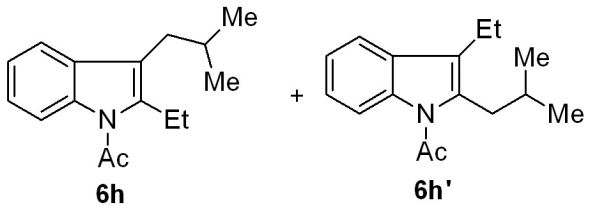
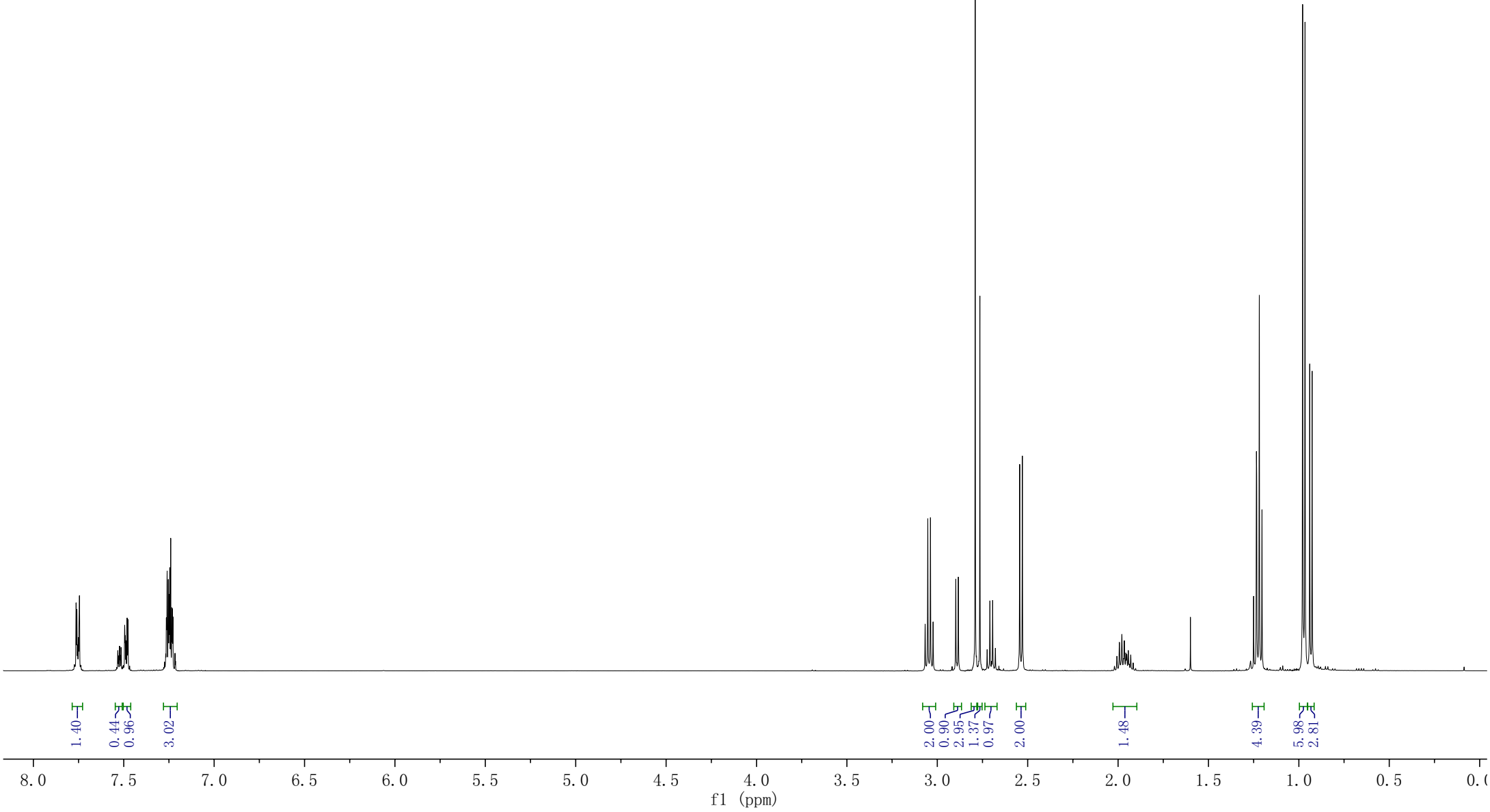
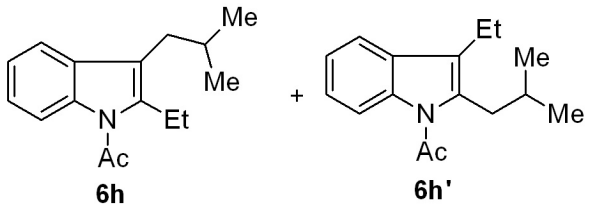


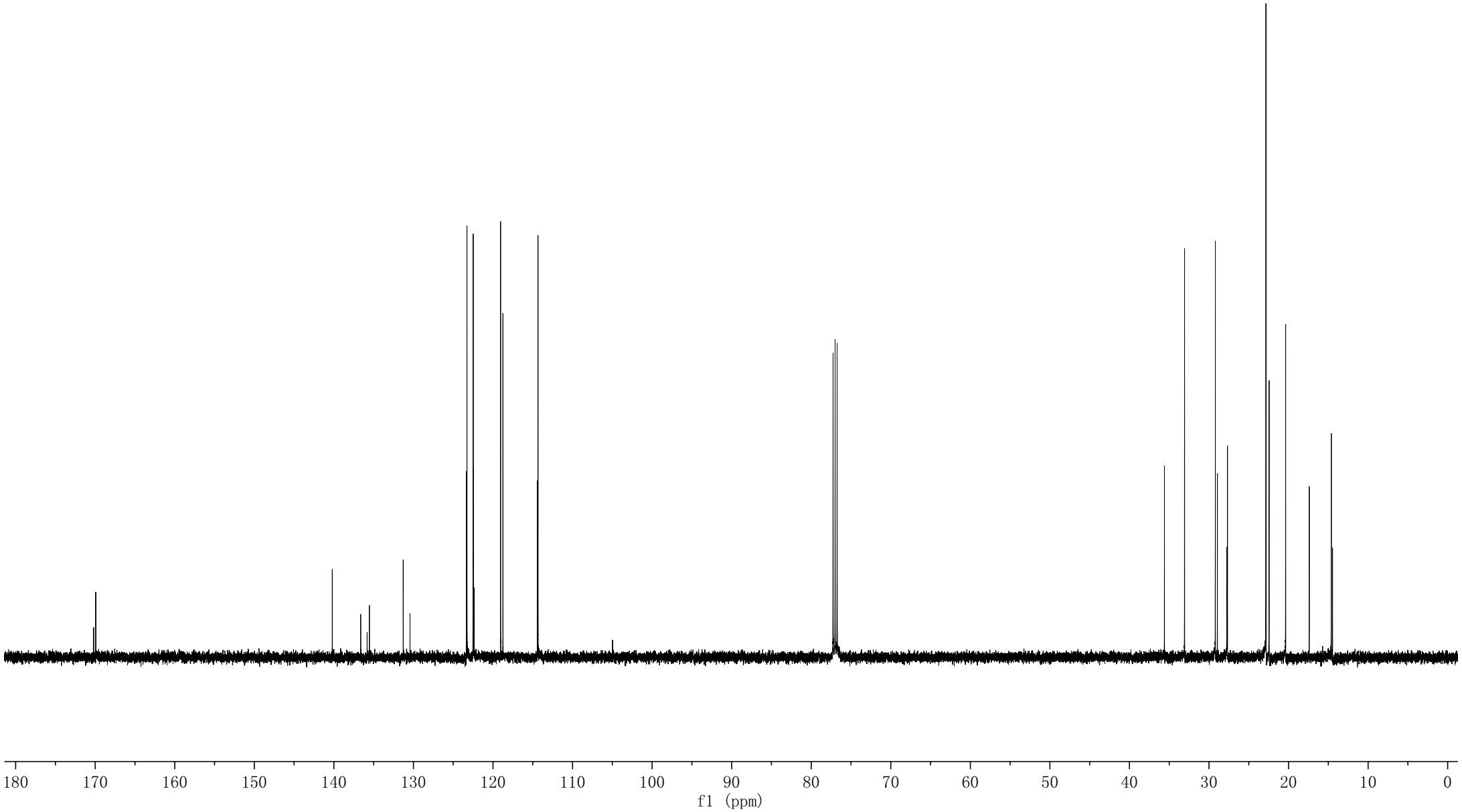
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-196-pro1-h1.fid/ fid
2 Title	wyz5-196-pro1-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



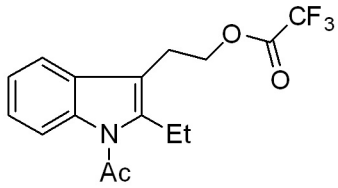


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-196-pro1-c13.fid/ fid
2 Title	wyz5-196-pro1-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C





Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-123-pro-h1.fid/ fid
2 Title	wyz5-123-pro-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



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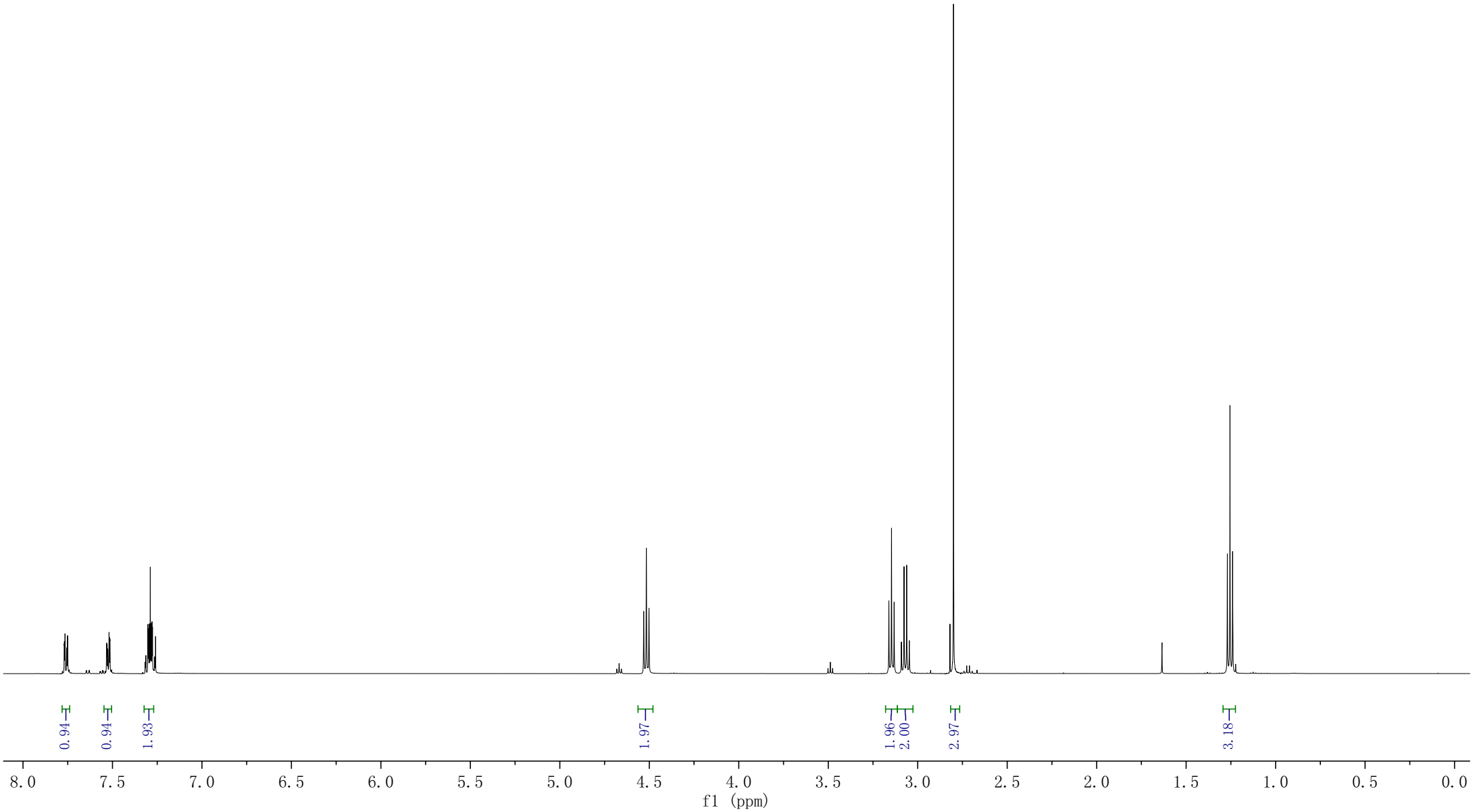
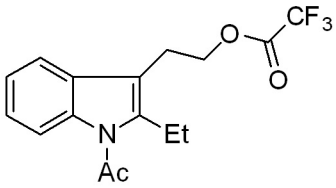


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-123-pro-c13.fid/ fid
2 Title	wyz5-123-pro-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



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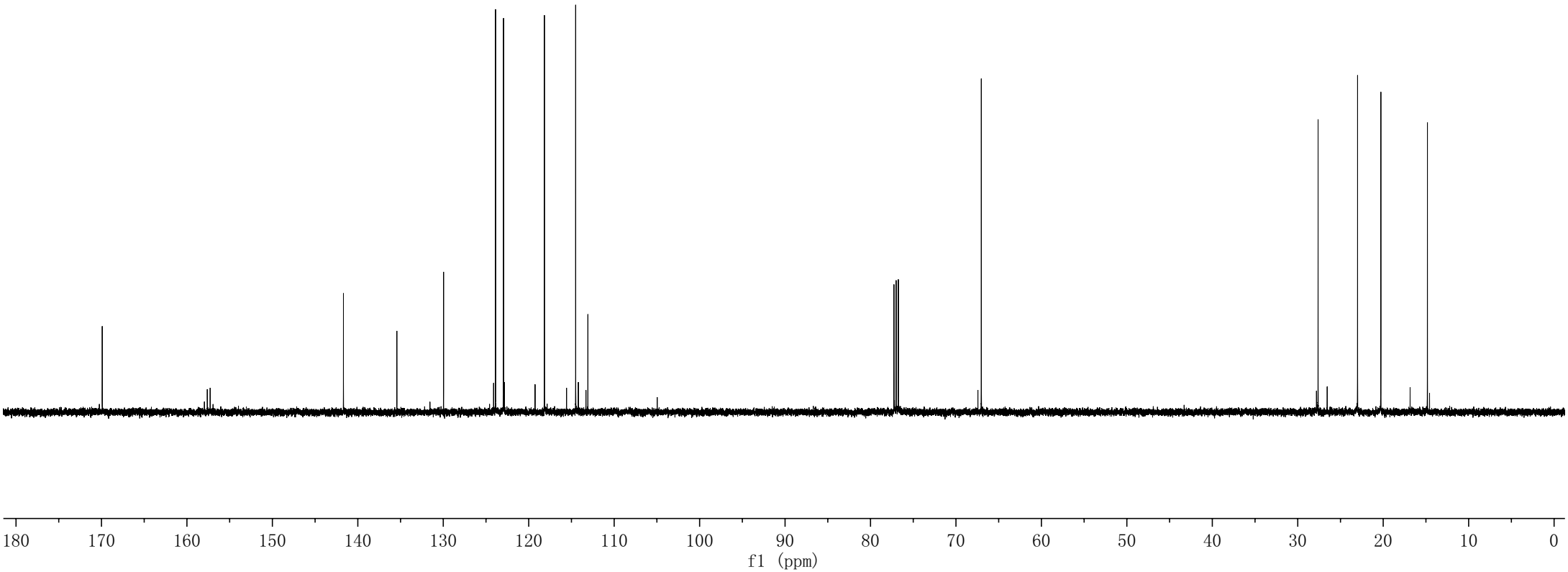
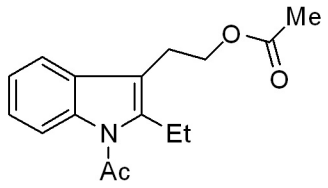


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-191-pro1-again.fid/ fid
2 Title	wyz5-191-pro1-again
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



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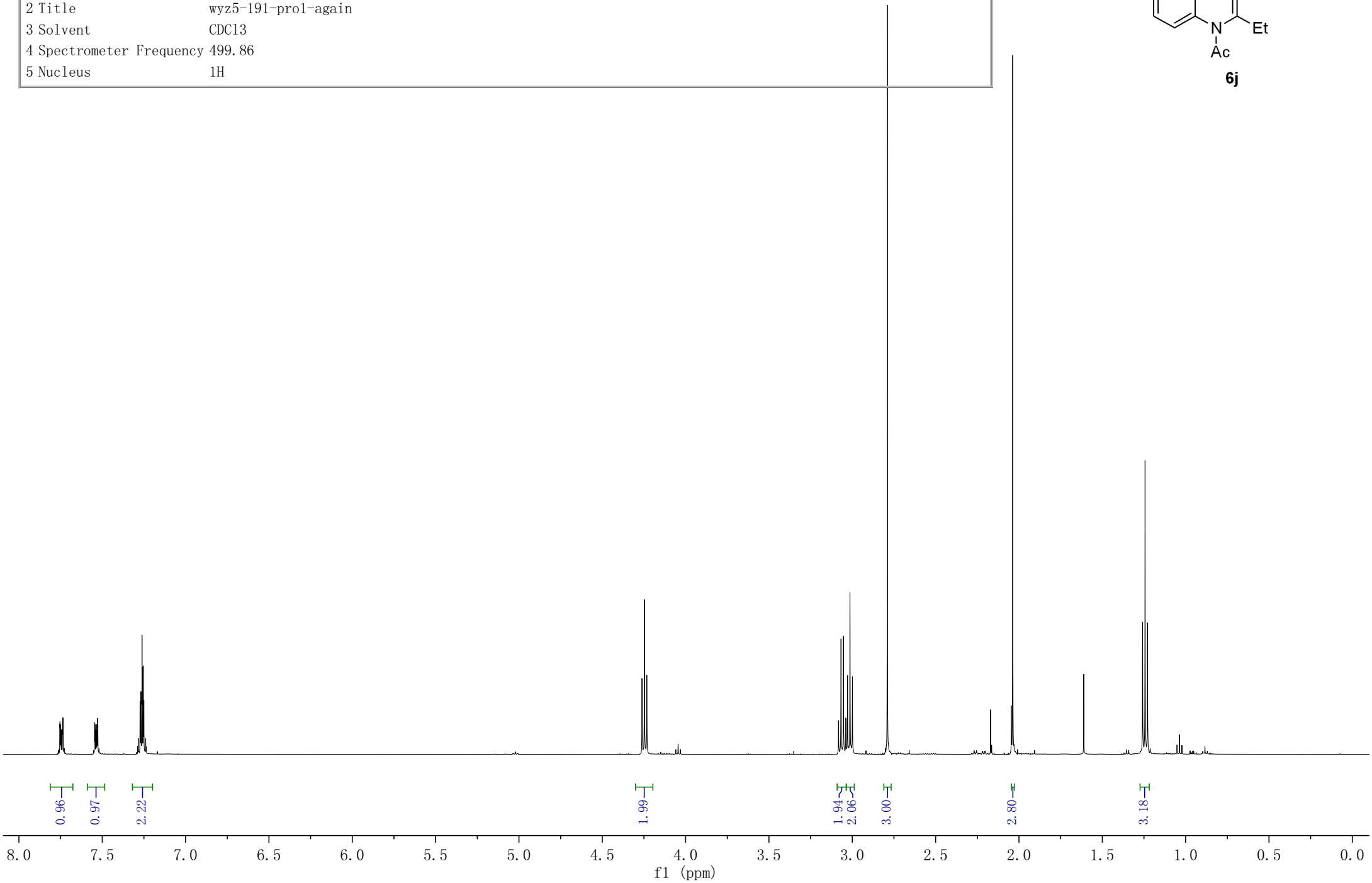
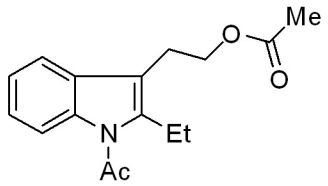


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-191-pro1-c13-again.fid/ fid
2 Title	wyz5-191-pro1-c13-again
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



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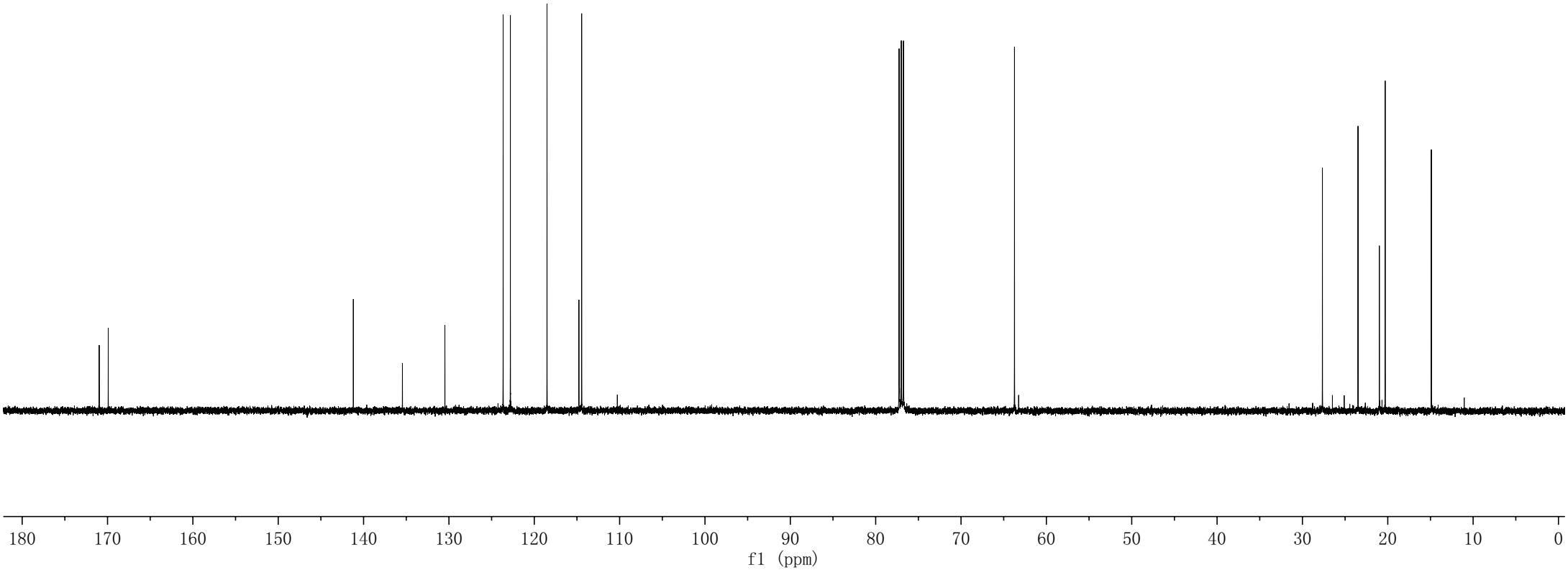
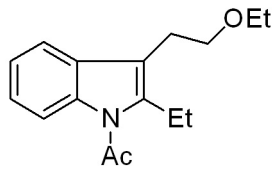


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-195-pro1-h1.fid/ fid
2 Title	wyz5-195-pro1-h1
3 Solvent	cdcl3
4 Spectrometer Frequency	599.63
5 Nucleus	1H



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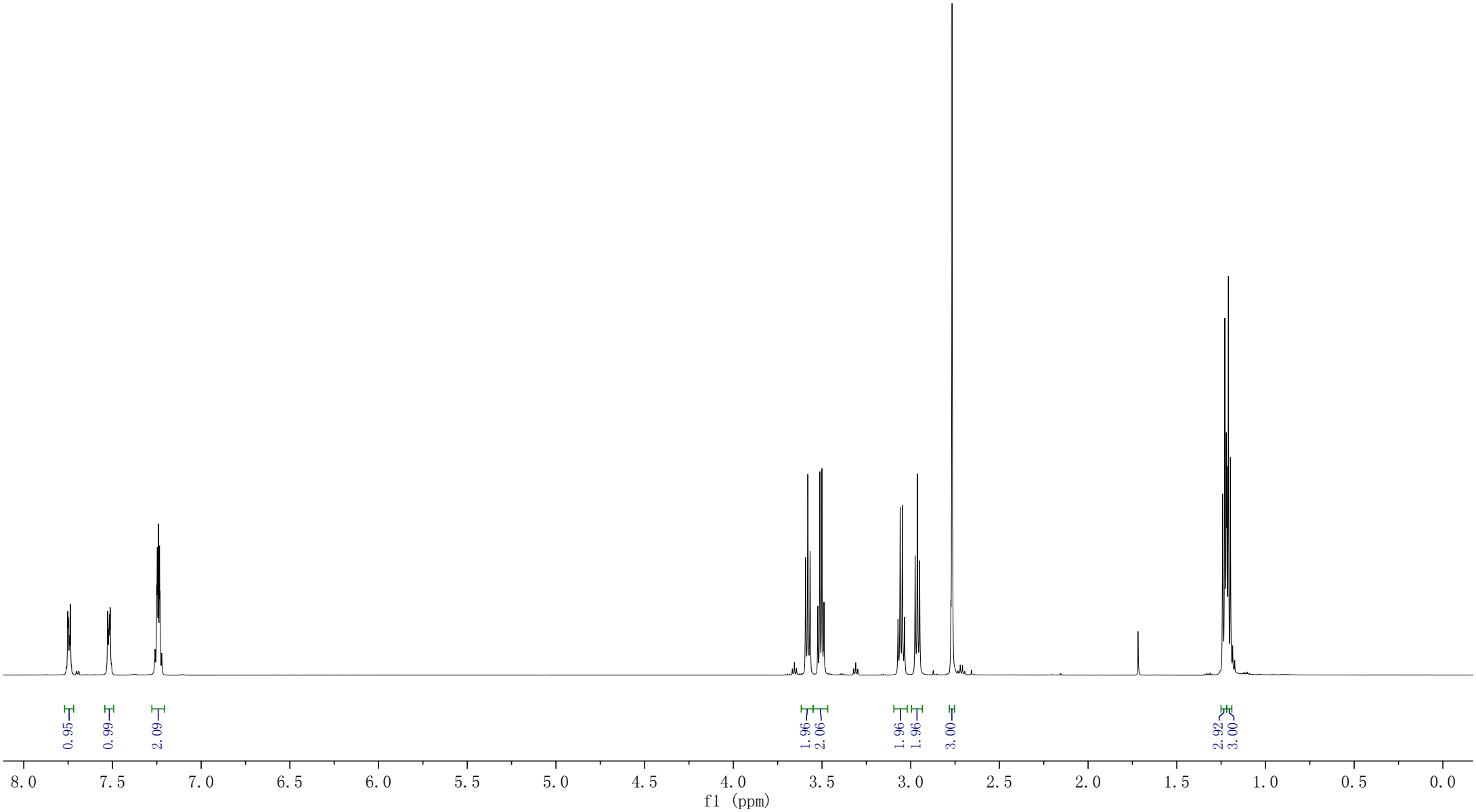
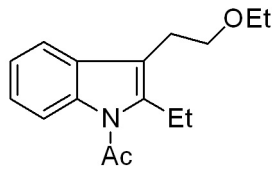


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-195-pro1-c13.fid/ fid
2 Title	wyz5-195-pro1-c13
3 Solvent	cdcl3
4 Spectrometer Frequency	150.79
5 Nucleus	13C



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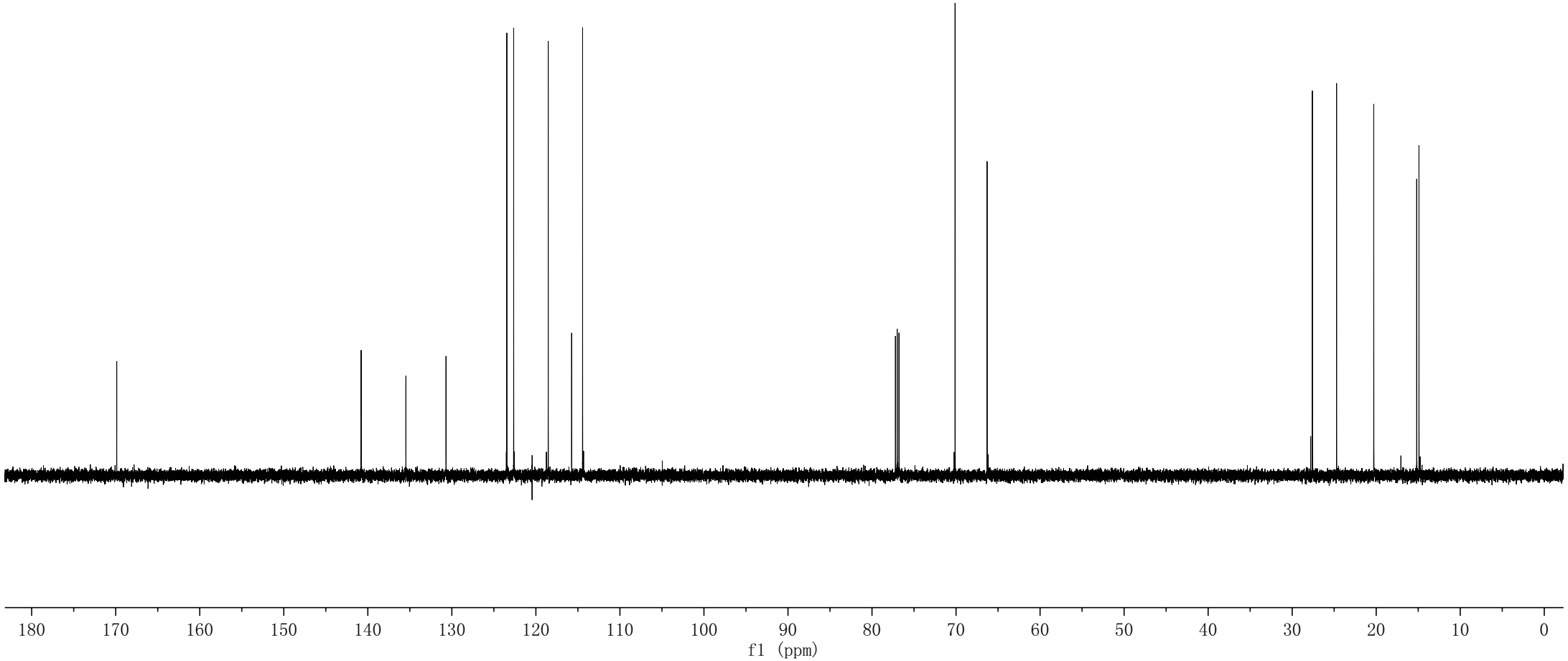
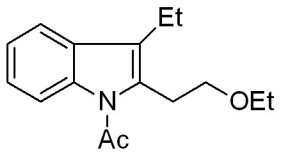


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-195-pro2-h1.fid/ fid
2 Title	wyz5-195-pro2-h1
3 Solvent	cdcl3
4 Spectrometer Frequency	599.63
5 Nucleus	1H



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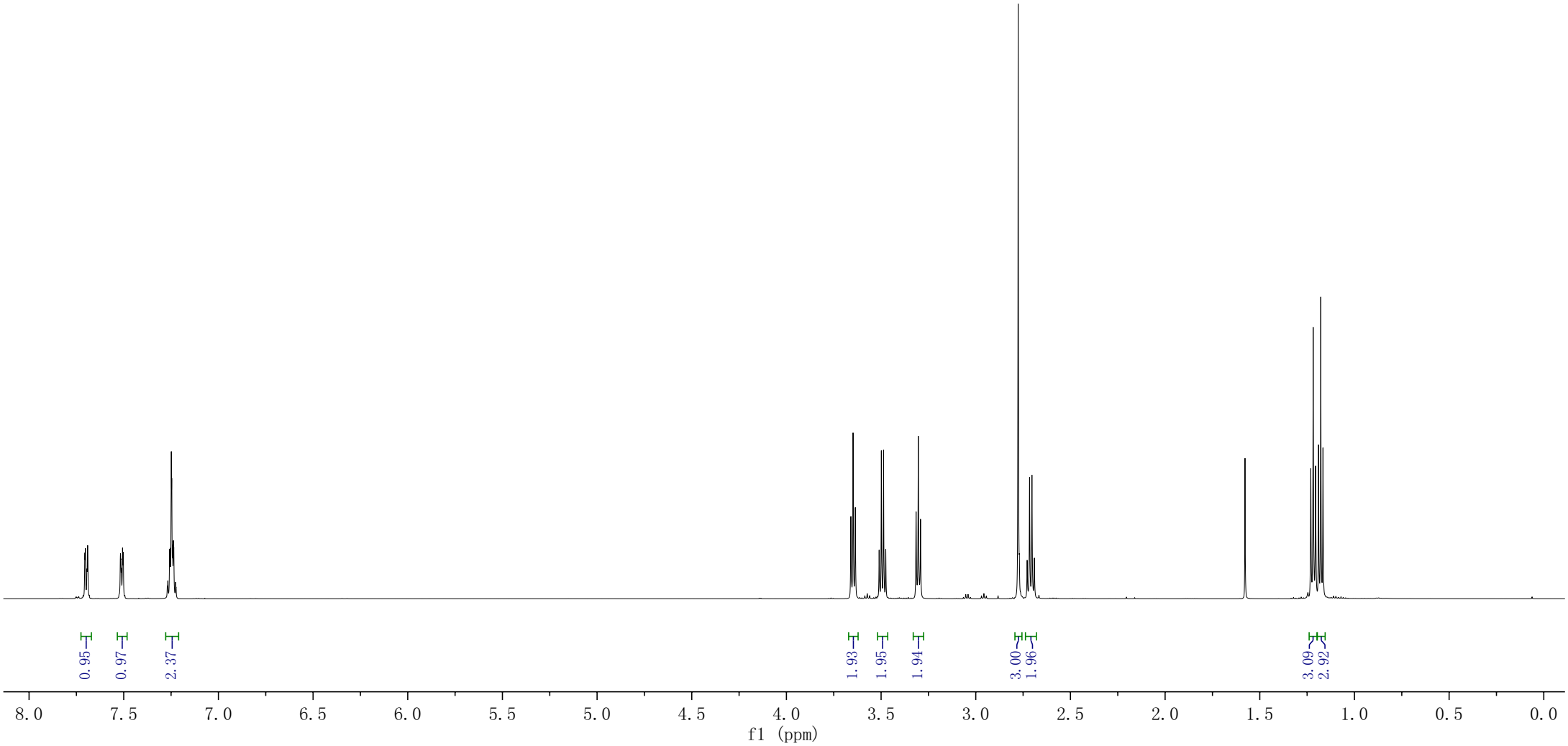
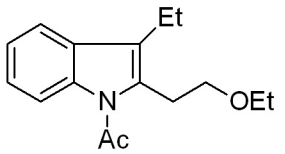
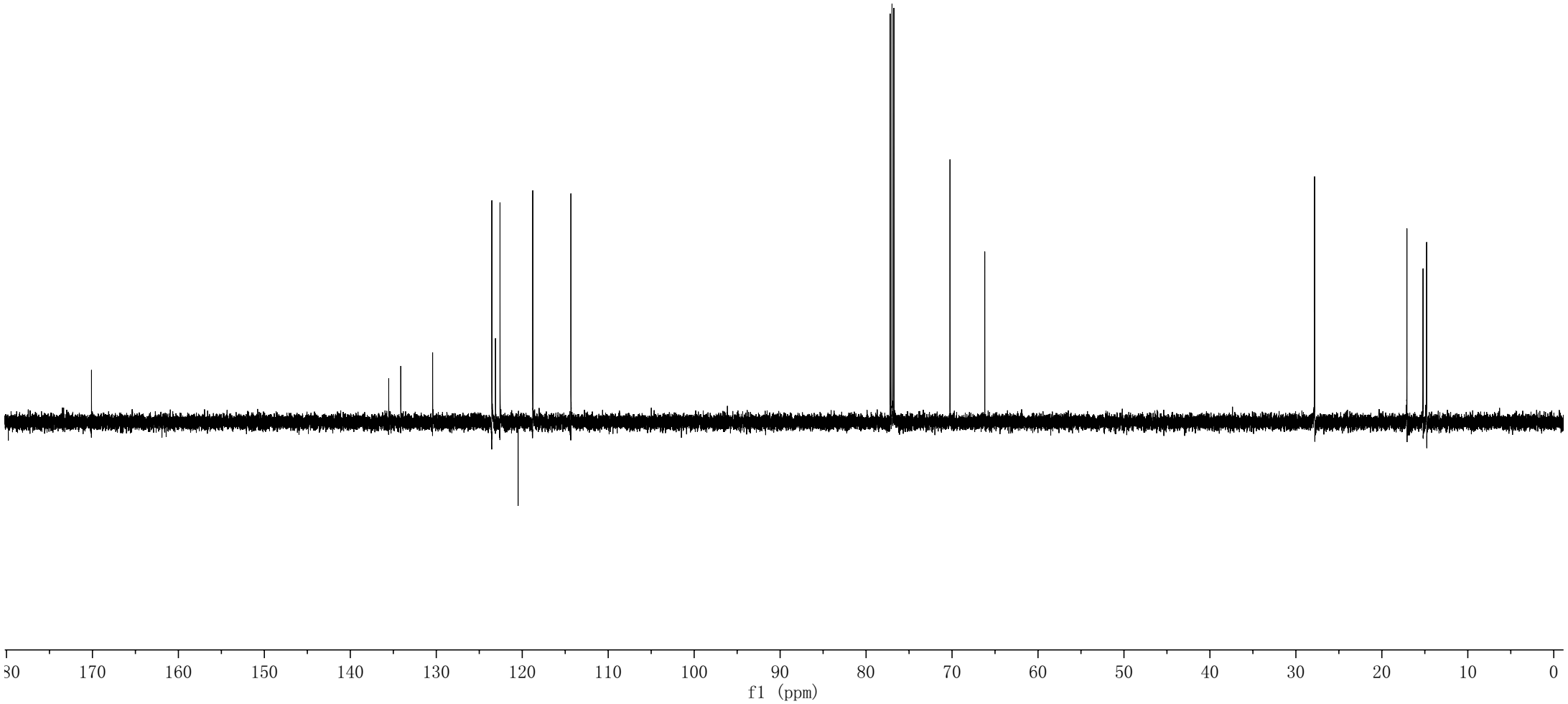


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-195-pro2-c13.fid/ fid
2 Title	wyz5-195-pro2-c13
3 Solvent	cdcl3
4 Spectrometer Frequency	150.79
5 Nucleus	13C

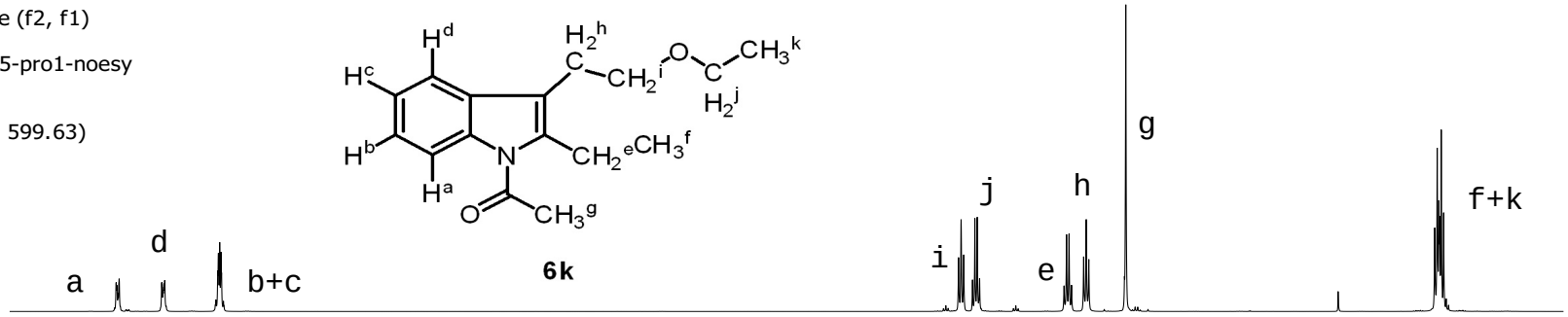


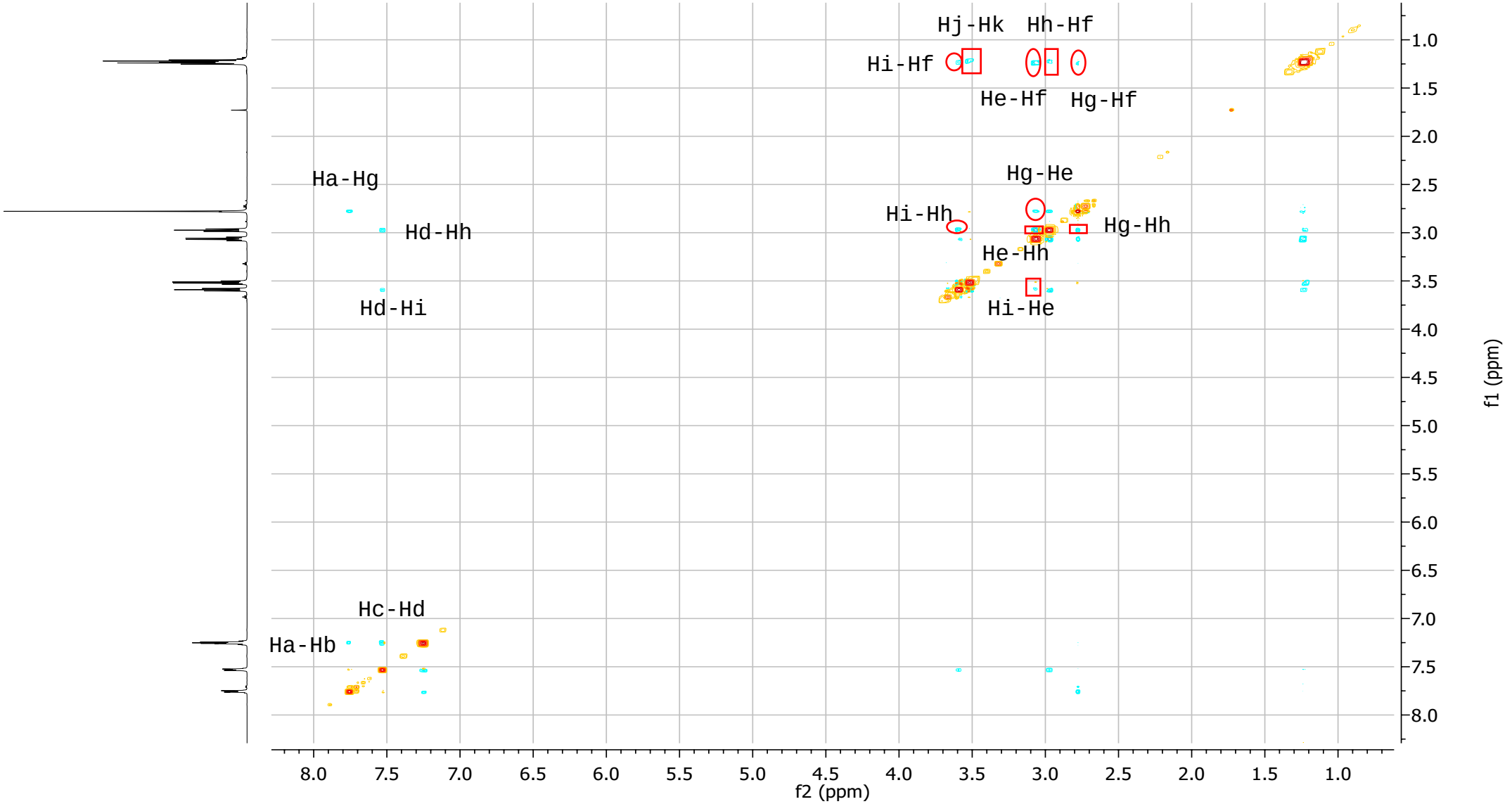
6k'



Parameter	Value (f2, f1)
1 Title	wyz5-195-pro1-noesy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)

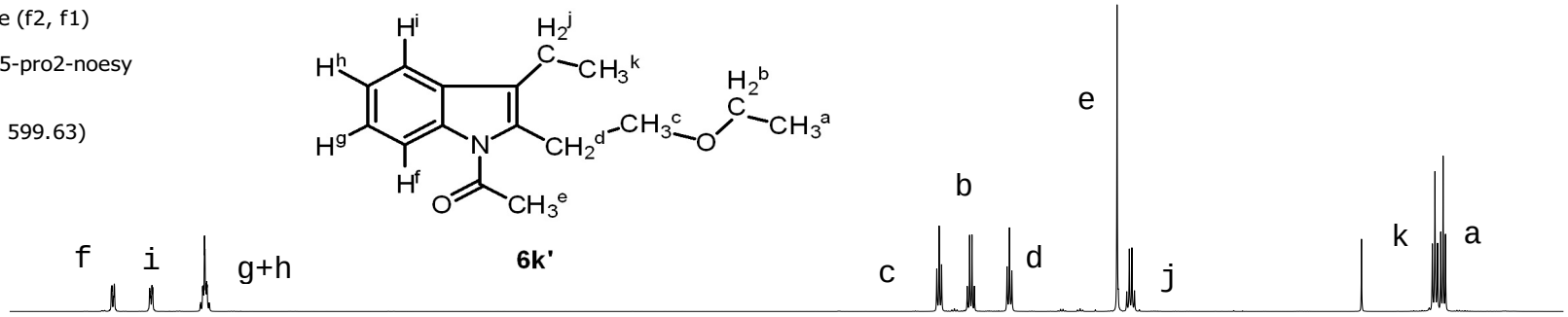
6k

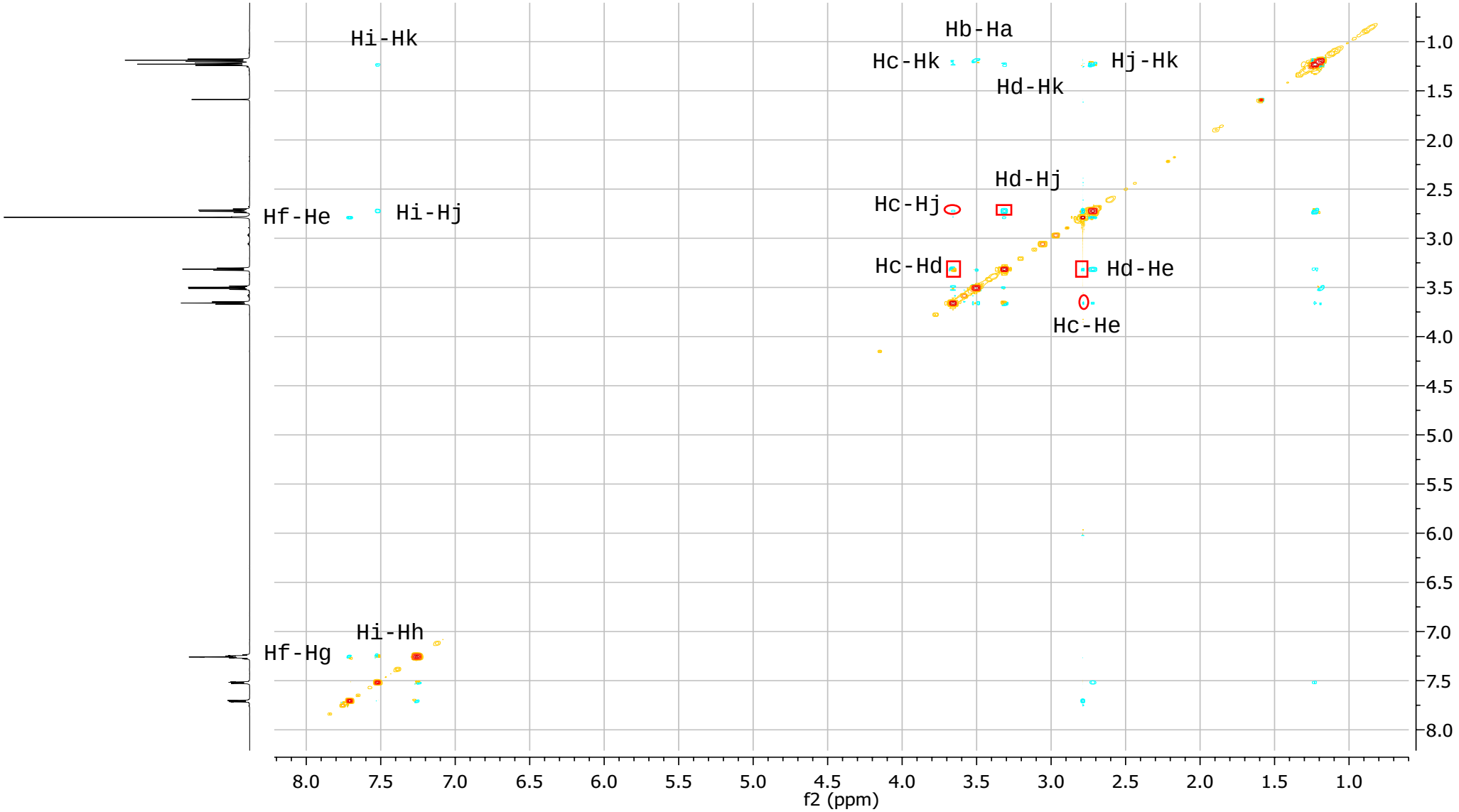




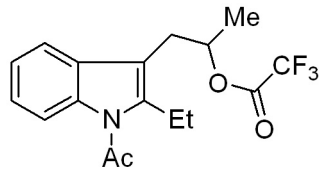
Parameter	Value (f2, f1)
1 Title	wyz5-195-pro2-noesy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)

6k'





Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-192-pro-h1-again.fid/ fid
2 Title	wyz5-192-pro-h1-again
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



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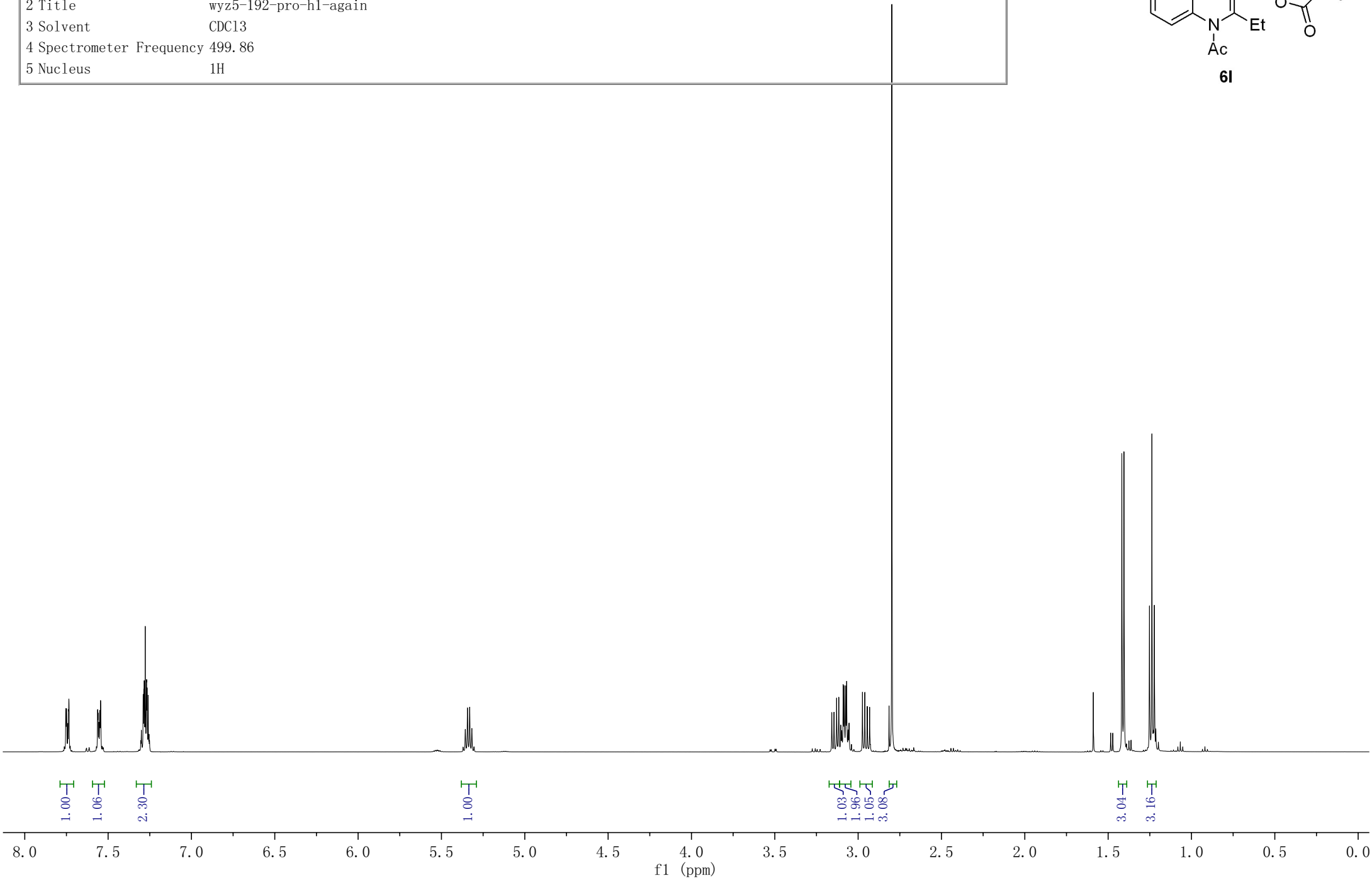
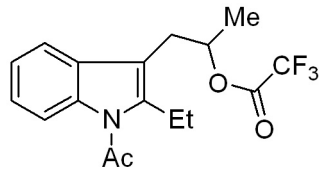


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-192-pro-c13-again-333.fid/ fid
2 Title	wyz5-192-pro-c13-again-333
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



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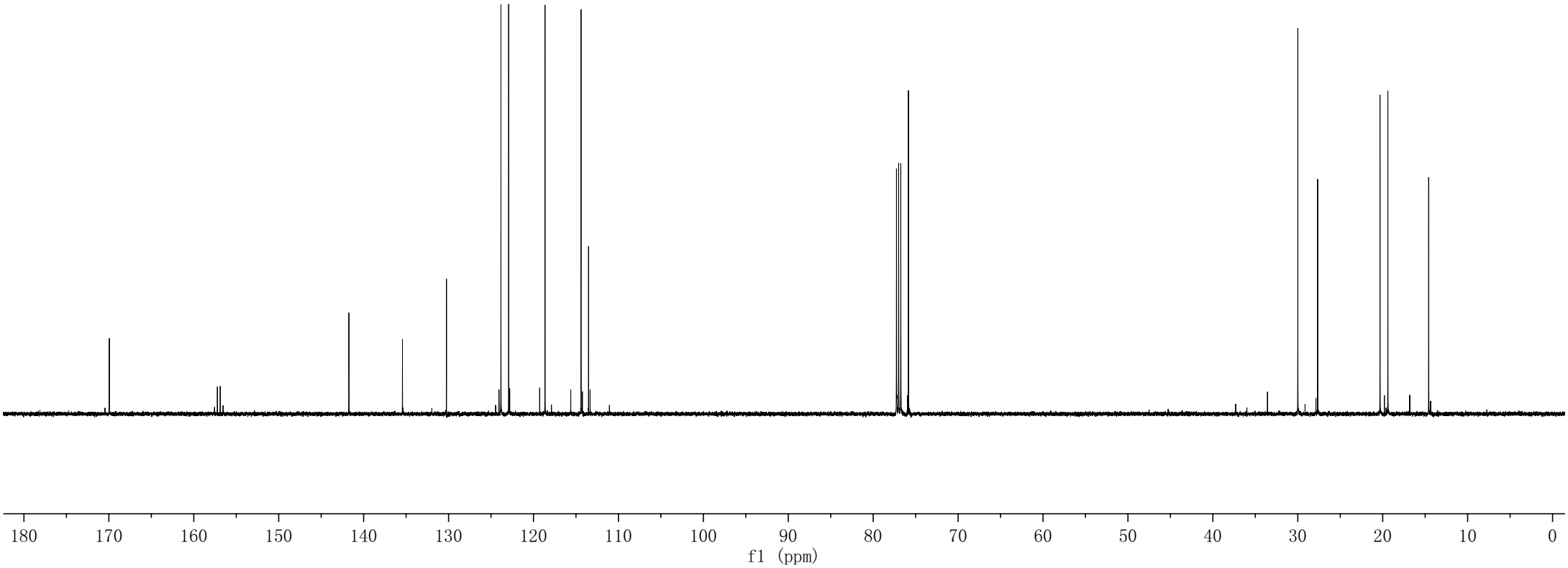
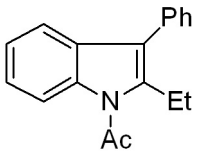
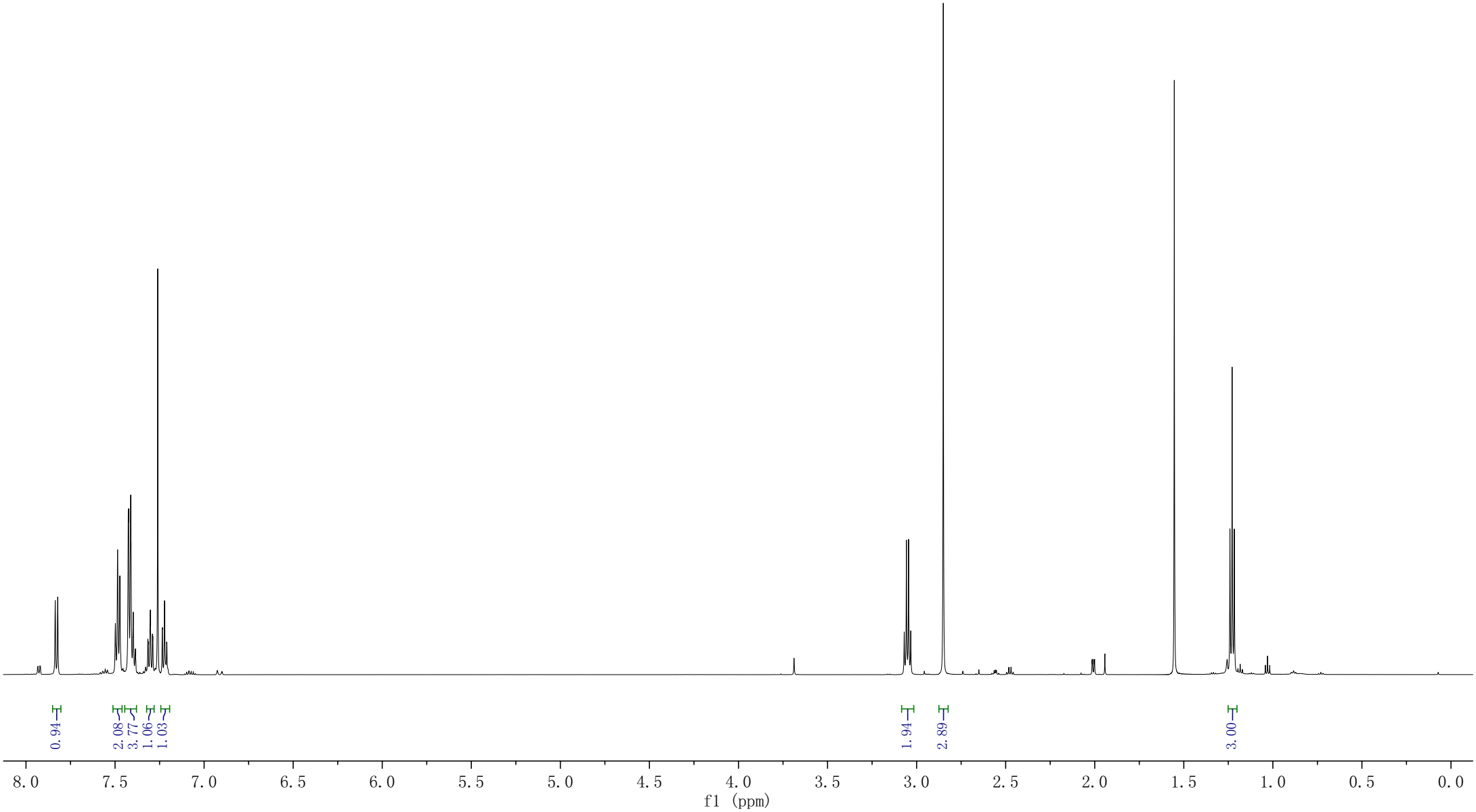


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-193-pro2-h1.fid/ fid
2 Title	wyz5-193-pro2-h1
3 Solvent	cdcl3
4 Spectrometer Frequency	599.63
5 Nucleus	1H

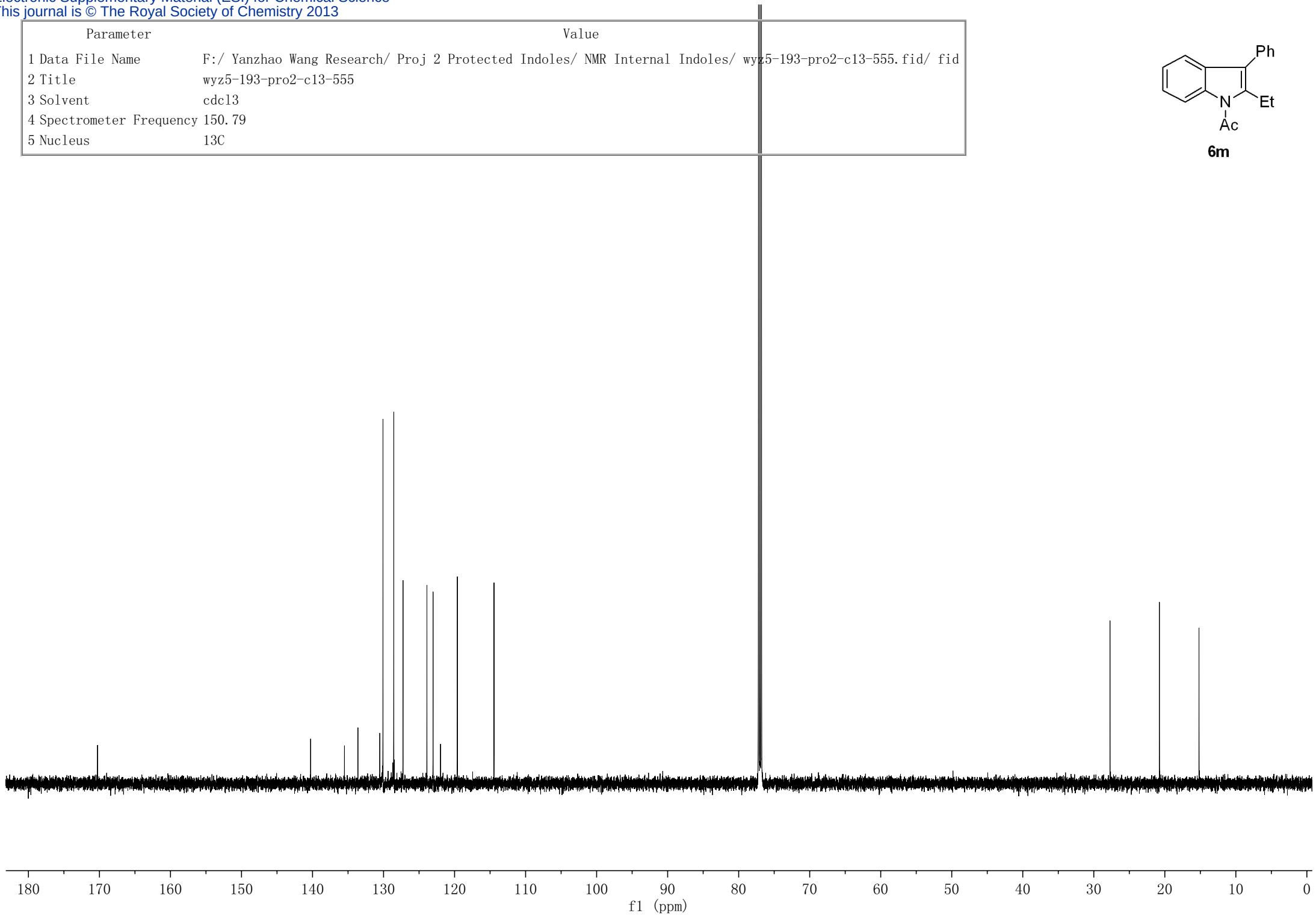


6m

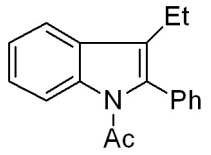


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-193-pro2-c13-555.fid/ fid
2 Title	wyz5-193-pro2-c13-555
3 Solvent	cdcl3
4 Spectrometer Frequency	150.79
5 Nucleus	13C

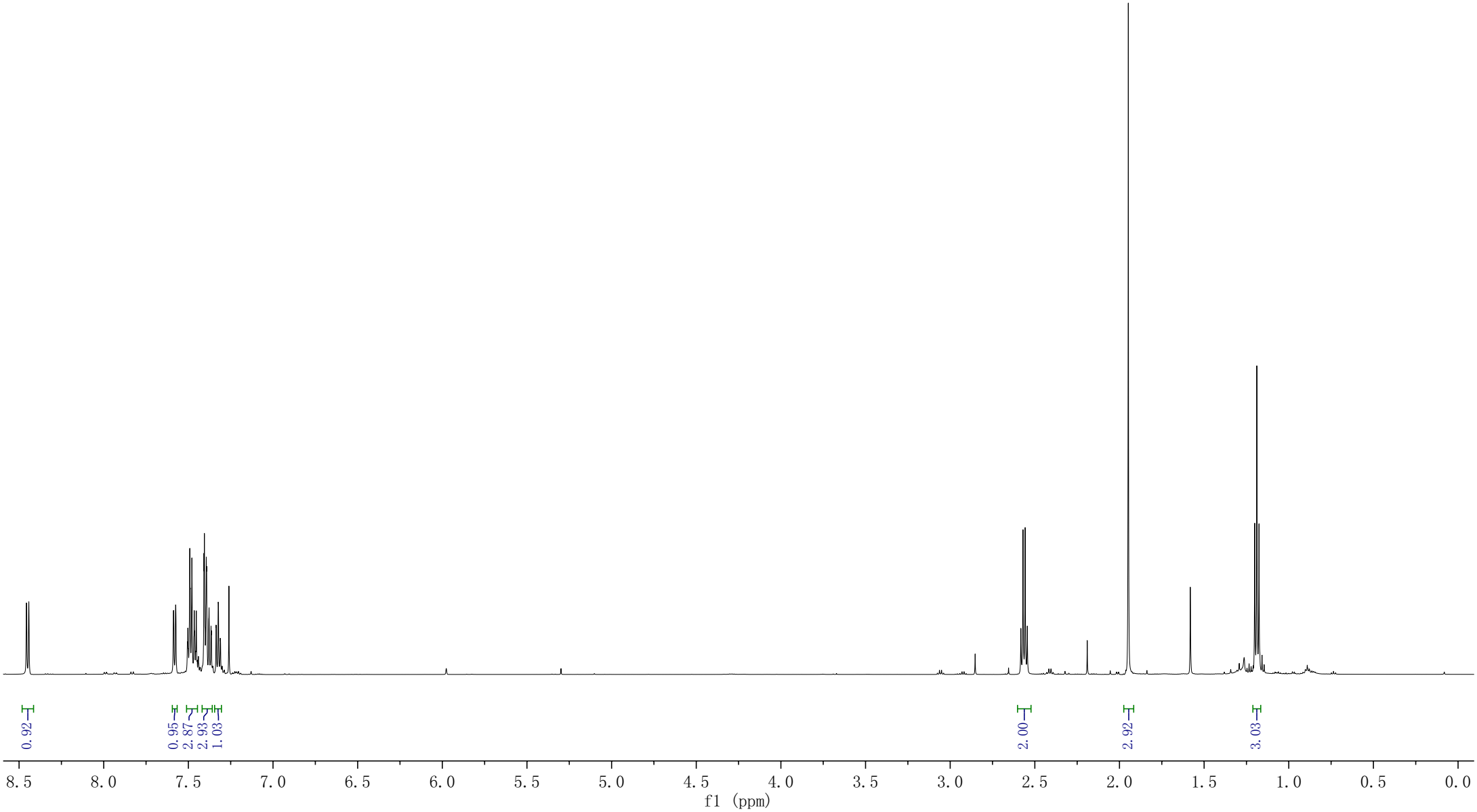
6m



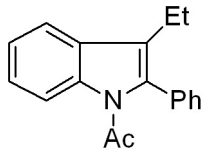
Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-193-pro1-h1.fid/ fid
2 Title	wyz5-193-pro1-h1
3 Solvent	cdcl3
4 Spectrometer Frequency	599.63
5 Nucleus	1H



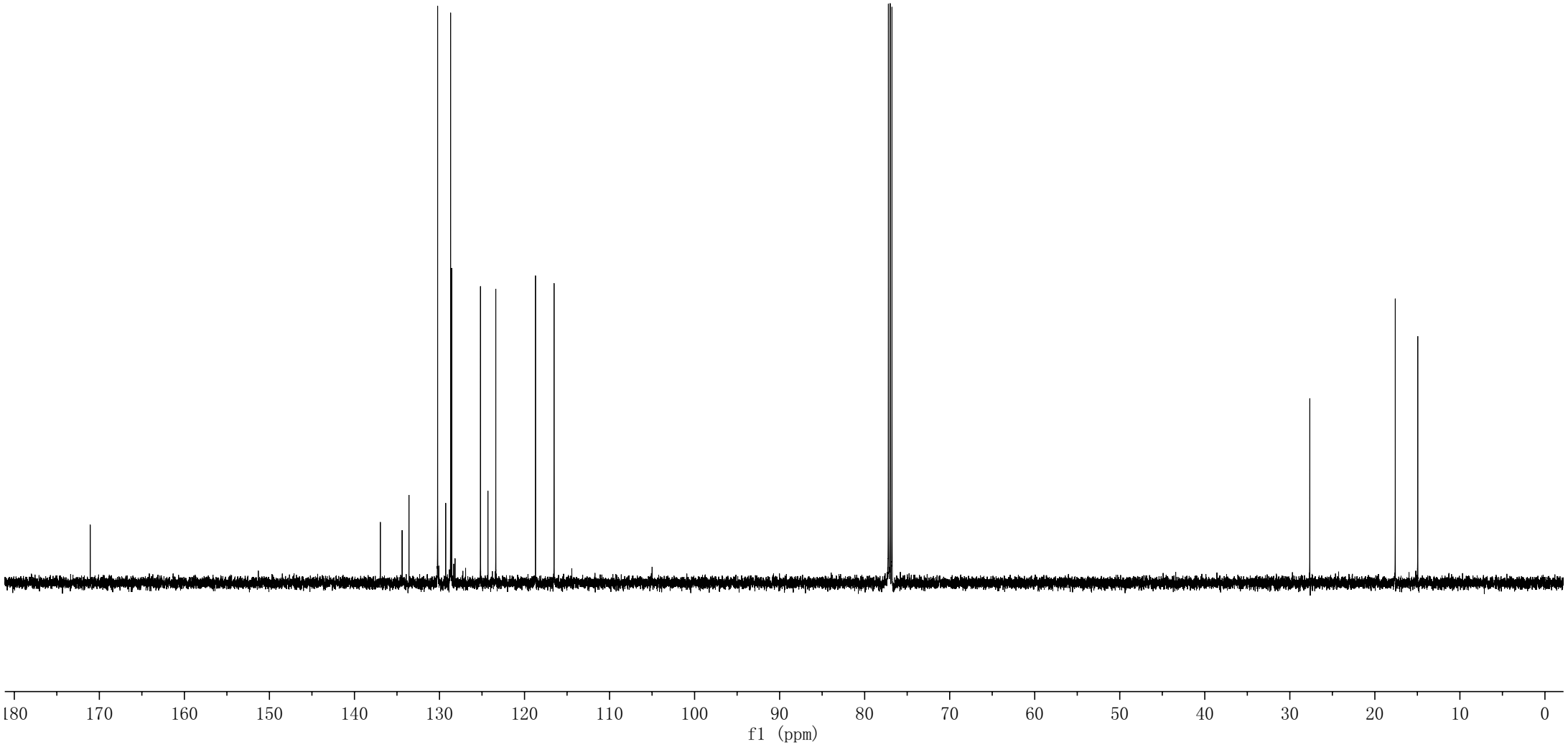
6m'



Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-193-pro1-c13.fid/ fid
2 Title	wyz5-193-pro1-c13
3 Solvent	cdcl3
4 Spectrometer Frequency	150.79
5 Nucleus	13C

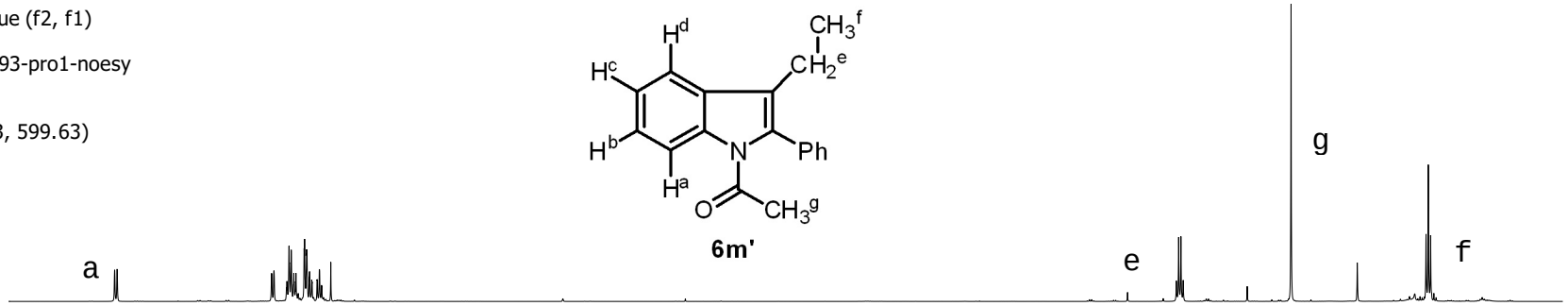


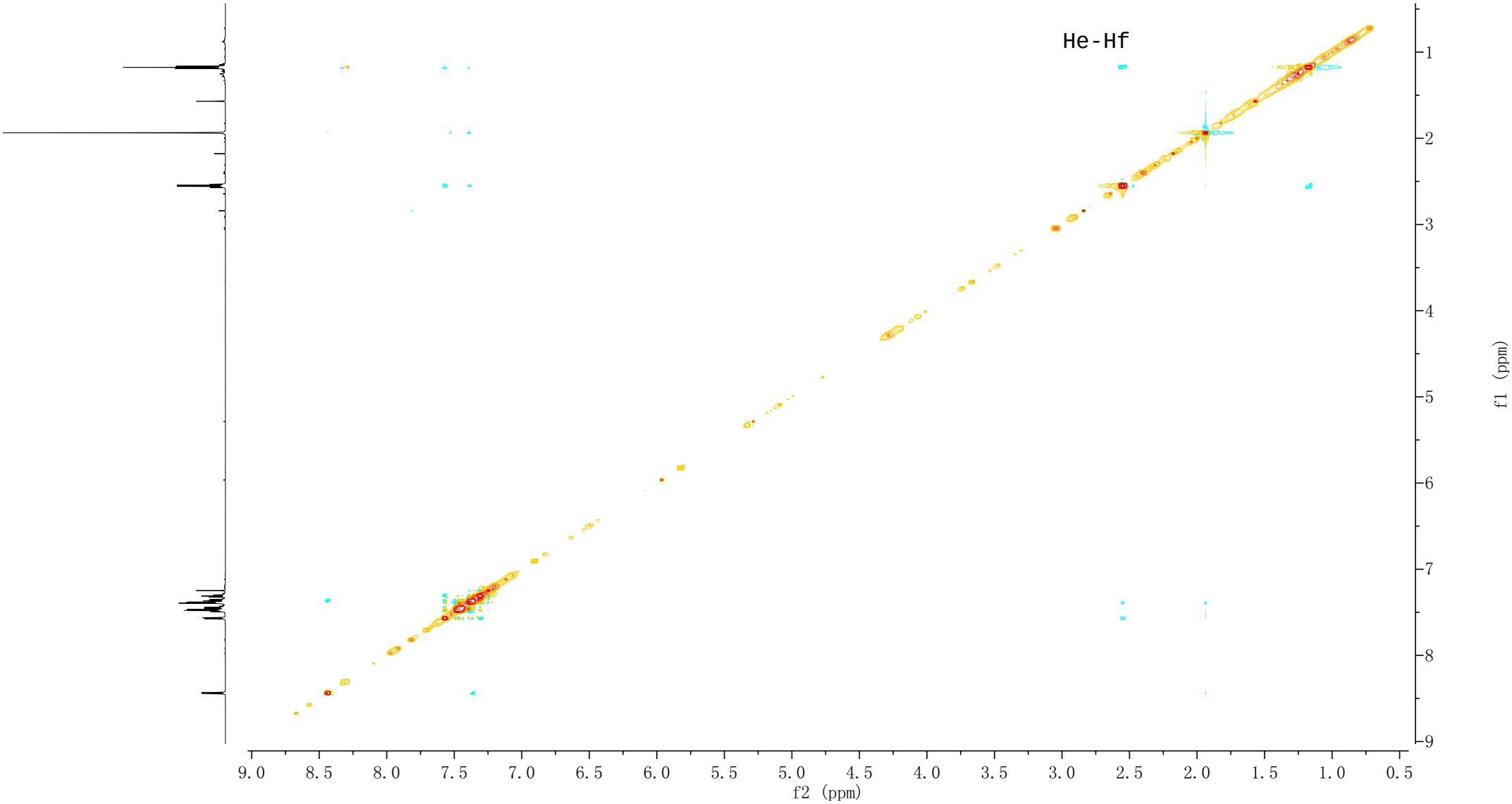
6m'



Parameter	Value (f2, f1)
1 Title	wyz5-193-pro1-noesy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)

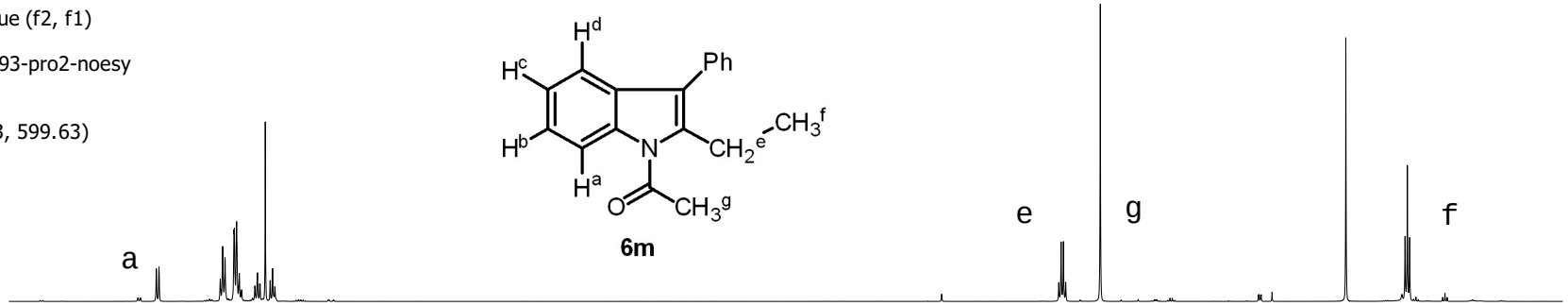
6m'

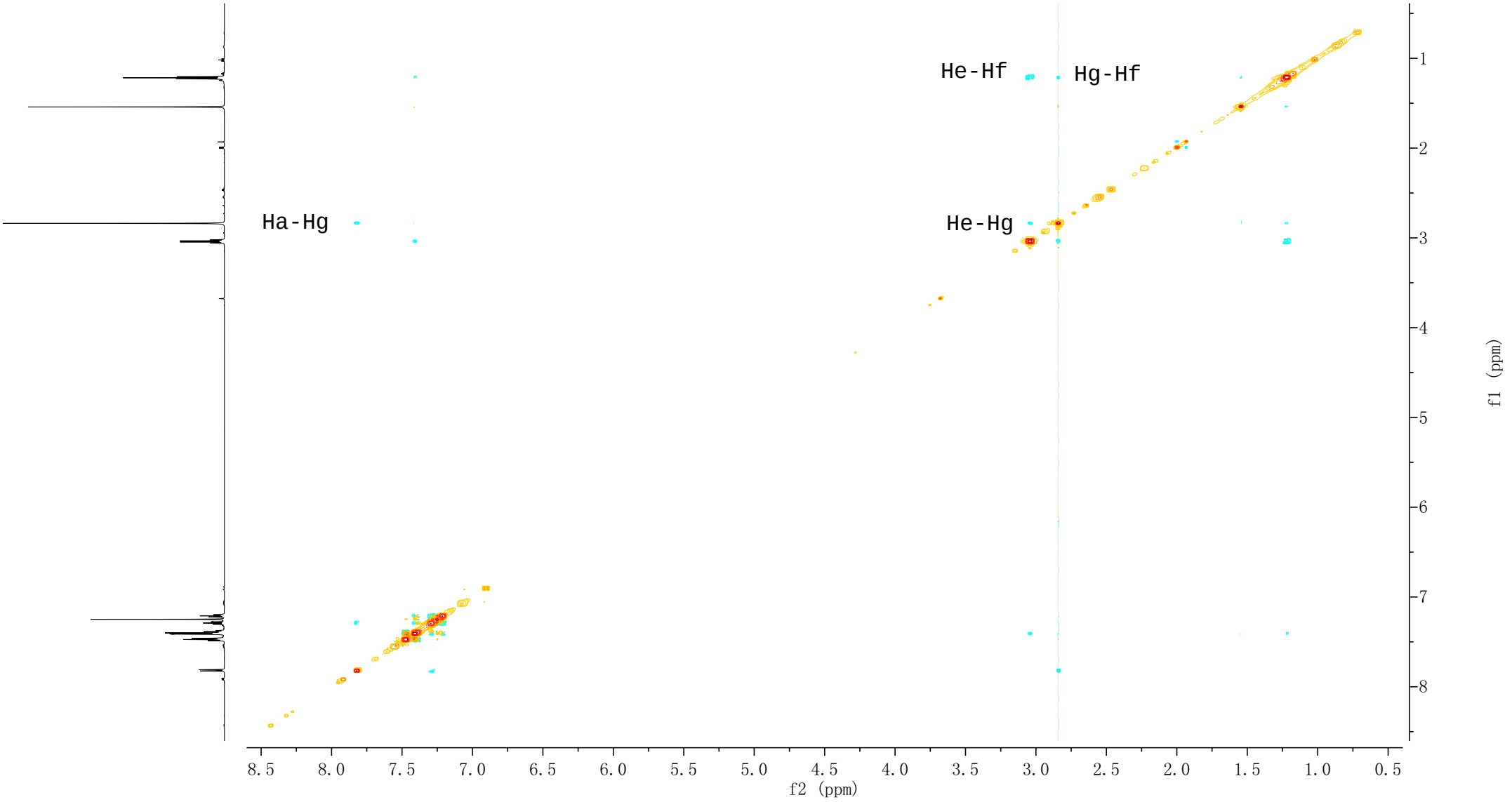




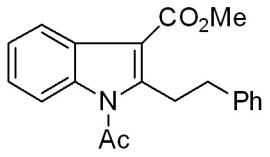
Parameter	Value (f2, f1)
1 Title	wyz5-193-pro2-noesy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)

6m





Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-102-pro-h1.fid/ fid
2 Title	wyz5-102-pro-h1
3 Solvent	CDCl3
4 Spectrometer Frequency	499.86
5 Nucleus	1H



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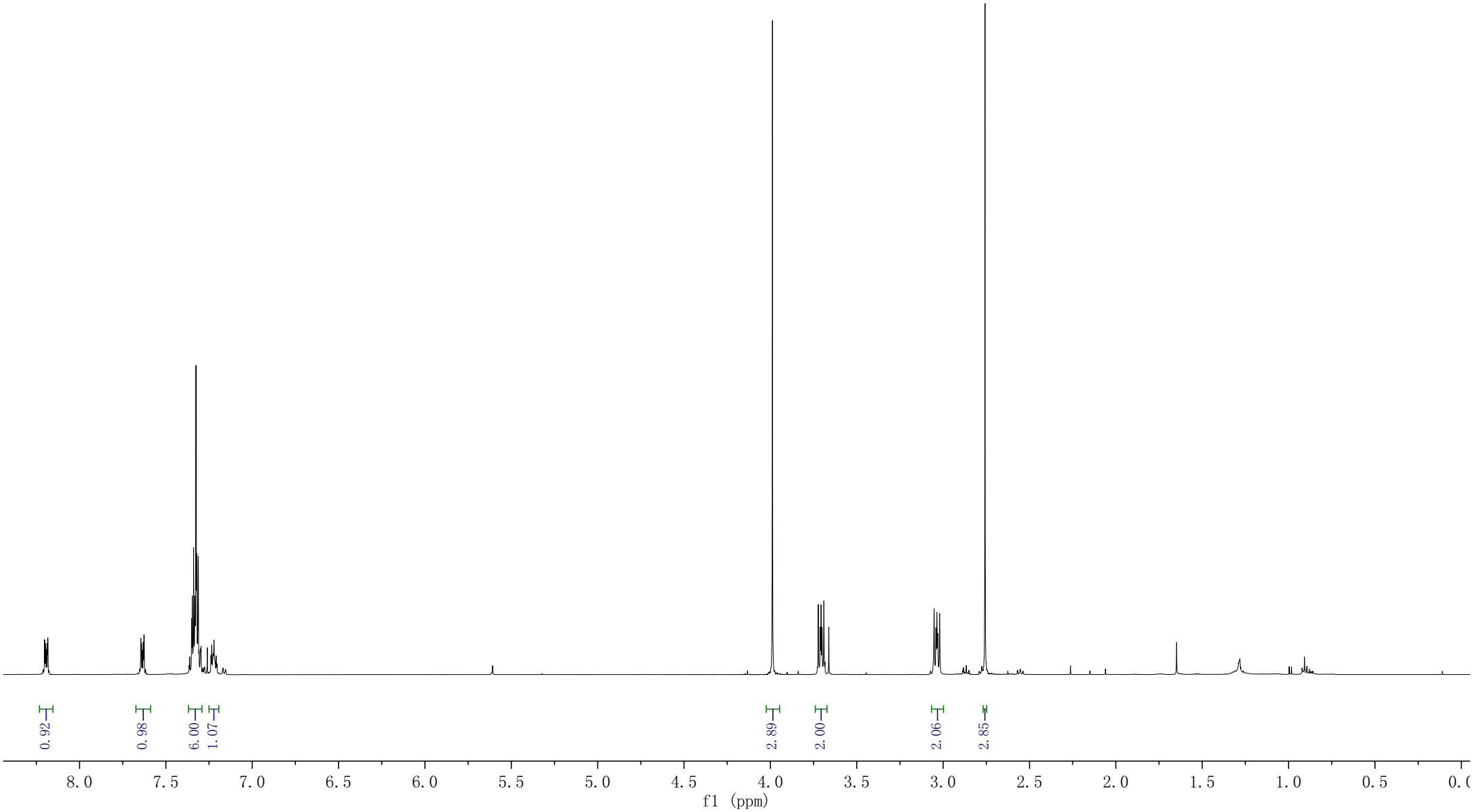
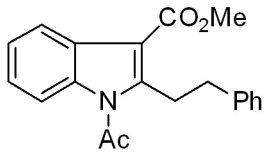


Parameter	Value
1 Data File Name	F:/ Yanzhao Wang Research/ Proj 2 Protected Indoles/ NMR Internal Indoles/ wyz5-102-pro-c13.fid/ fid
2 Title	wyz5-102-pro-c13
3 Solvent	CDCl3
4 Spectrometer Frequency	125.70
5 Nucleus	13C



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