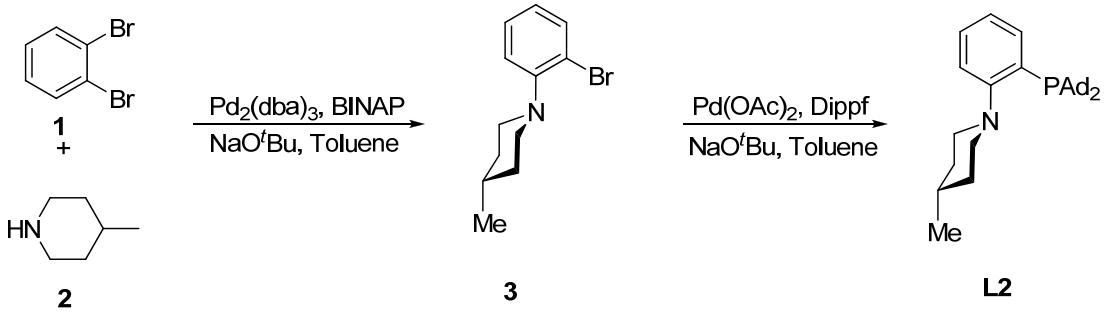
General. Ethyl acetate (ACS grade), hexanes (ACS grade), diethyl ether (ACS grade) and anhydrous 1, 2-dichloroethane (HPLC grade) were purchased from Fisher Scientific and used without further purification. Chlorobenzene (HPLC grade) was purchased from Acros without further purification. Methylene chloride and tetrahydrofuran were purified using MBraun Solvent Purifier. Commercially available reagents were used without further purification. Reactions were monitored by thin layer chromatography (TLC) using Sorbent Technologies' pre-coated silica gel plates. Flash column chromatography was performed over Sorbent Technologies' silica gel (230-400 mesh). ^{1}H NMR and ^{13}C NMR spectra were recorded on Varian 400 MHz, 500 MHz and 600 MHz spectrometers using residue solvent peaks as internal standards. 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 Micromass $QTOF_2$ Quadrupole/Time-of-Flight Tandem mass spectrometer using electron spray ionization or Waters GCT Premier time-of-flight mass spectrometer with a field ionization (FI) ion source.

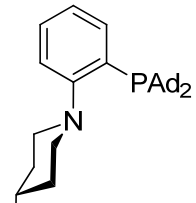
Ligands synthesis and Characterization:



In a Schlenk tube, it was charged with reagents: Pd_2dba_3 (46 mg, 5 mol% Pd), BINAP (93 mg, 7.5 mol %), NaO^{t}Bu (231 mg, 2.4 mmol, 1.2 equiv), 1,2-dibromobenzene **1** (2.0 mmol), and 4-methylpiperidine **2** (2.0 mmol, 1.0 equiv). Toluene (5 mL) and stir bar were added. Then, the reaction system was stirred in an oil bath at 80 °C for 15h under N_2. Upon completion, the mixture was concentrated and the residue was purified by chromatography on silica gel (eluent: hexanes/ethyl acetate) to afford the desired product **3** in 65% yield.

In a Schlenk tube, $Pd(OAc)_2$ (typically 3 mol%) and DiPPF [1,1'-bis(diisopropylphosphino)ferrocene; Pd:L ~ 1:1.2] , di(1-adamantyl)phosphine (1.2mmol) and NaO^{t}Bu(1.44mmol), followed by the addition of the aryl halide **3**(1.2mmol) in 6mL toluene; the Schlenk tube was then degassed twice. The resulting mixture was heated at 110 ºC until

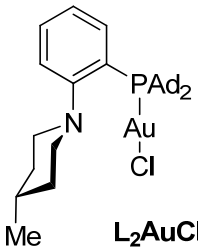
complete consumption of the phosphine was achieved, as judged on the basis of ^{31}P NMR data. The solution was then cooled and filtered through a plug of silica, which in turn was washed with CH_2Cl_2. Removal of the solvent from the combined eluent afforded product in 65% yield that was further purified by recrystallization or by washing with appropriate solvents (*vide infra*). All ligands were worked up in air and were found to be stable when handled on the bench top.



L2

L_2 Prepared by the coupling of $(1\text{-Ad})_2PH$ and *1-(2-bromophenyl)-4-methylpiperidine* via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 65% yield as a white solid. ^1H NMR ($CDCl_3$): ^1H NMR (500 MHz, Chloroform-d) δ 7.68 (dt, J = 7.6, 1.3 Hz, 1H), 7.28 – 7.24 (m, 1H), 7.05 (ddd, J = 8.0, 4.5, 1.2 Hz, 1H), 6.99 (td, J = 7.4, 1.2 Hz, 1H), 3.26 (d, J = 10.0 Hz, 2H), 2.61 (t, J = 10.6 Hz, 2H), 1.99 – 1.86 (m, 18H), 1.70-1.66 (m, 12H), 1.61 (d, J = 8.6 Hz, 2H), 1.48 – 1.40 (m, 3H), 0.99 (d, J = 5.4 Hz, 3H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.97 (d, J_{PC} = 21.1 Hz), 137.27 (d, J_{PC} = 3.2 Hz), 131.49 (d, J_{PC} = 26.8 Hz), 129.09 , 121.37 , 120.22 (d, J_{PC} = 3.7 Hz), 54.00 (d, J_{PC} = 5.7 Hz), 41.88 (d, J_{PC} = 13.5 Hz), 37.12 , 36.65 (d, J_{PC} = 27.8 Hz), 34.47 , 30.75 , 28.98 (d, J_{PC} = 8.4 Hz), 22.10 . ^{31}P NMR (162 MHz, Chloroform-d) δ 21.67. IR(cm^{-1}): 2847,1581,1452,1380,1342,1300,1262,1215, 918, 767. MS (ESI/$[M+H]^+$): 476.35.

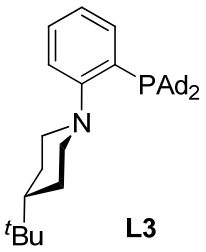
Synthesis and Characterization of Gold Complexes:



L_2AuCl

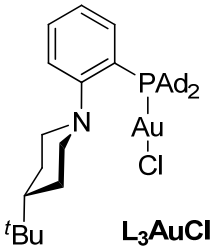
This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^1H NMR (500 MHz, Chloroform-d) δ 7.78 – 7.71 (m, 1H), 7.60 – 7.51 (m, 2H), 7.29-7.26 (m, 1H), 2.89 – 2.70 (m, 4H), 2.37 (qd, J = 12.2, 4.4 Hz, 2H), 2.20 (d, J = 11.6 Hz, 6H), 2.15 – 2.07 (m, 6H), 2.02 – 1.93 (m, 6H), 1.67 (s, 12H), 1.61 – 1.45 (m, 3H), 1.10 (d, J = 6.4 Hz, 3H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.82 (d,

J_{PC} = 7.0 Hz), 134.89 , 132.27 , 126.69 (d, J_{PC} = 4.8 Hz), 124.31 (d, J_{PC} = 6.7 Hz), 122.31 (d, J_{PC} = 47.4 Hz), 56.11 , 42.14 (d, J_{PC} = 3.1 Hz), 41.88 (d, J_{PC} = 23.6 Hz), 36.31 (d, J_{PC} = 1.3 Hz), 33.35 , 31.06 , 28.58 (d, J_{PC} = 9.9 Hz), 21.29 . ^{31}P NMR (162 MHz, Chloroform-d) δ 53.71. IR (cm^{-1}):2906, 2850, 1451, 1301, 1262, 935. MS (ESI/$[M+Na]^+$) :730.21.



L3

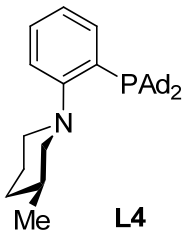
L_3 Prepared by the coupling of $(1\text{-Ad})_2$PH and *1-(2-bromophenyl)-4-tert-butylpiperidine* via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 52% yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.68 (d, J = 7.5 Hz, 1H), 7.31 – 7.21 (m, 1H), 7.03 (dd, J = 7.9, 4.5 Hz, 1H), 6.98 (t, J = 7.4 Hz, 1H), 3.39 (d, J = 9.6 Hz, 2H), 2.56 (t, J = 10.9 Hz, 2H), 2.00 – 1.86 (m, 18H), 1.68-1.63 (m, 14H), 1.50 (qd, J = 12.2, 3.6 Hz, 2H), 1.06 (ddd, J = 12.4, 9.0, 3.5 Hz, 1H), 0.91 (s, 9H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.83 (d, J_{PC} = 21.0 Hz), 137.27 (d, J_{PC} = 3.1 Hz), 131.36 (d, J_{PC} = 27.3 Hz), 129.08 , 121.26 , 120.01 (d, J_{PC} = 3.8 Hz), 54.65 (d, J_{PC} = 6.2 Hz), 46.50 , 41.92 (d, J_{PC} = 13.5 Hz), 37.13 , 36.70 (d, J_{PC} = 27.9 Hz), 32.30 , 28.99 (d, J_{PC} = 8.4 Hz), 27.51 , 26.98 . ^{31}P NMR (162 MHz, Chloroform-d) δ 21.59. IR(cm^{-1}):2901, 2847, 1580, 1449, 1301, 1277, 1245, 1047, 937. MS (ESI/$[M+H]^+$):518.38.



L_3AuCl

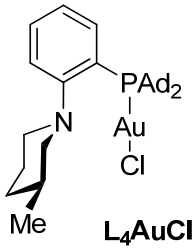
This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.75 (t, J = 7.3 Hz, 1H), 7.62 (dd, J = 8.1, 4.6 Hz, 1H), 7.55 (t, J = 7.4 Hz, 1H), 7.27 (t, J = 7.4 Hz,, 1H), 2.94 (d, J = 10.9 Hz, 2H), 2.76 (t, J = 10.6 Hz, 2H), 2.25 – 2.17 (m, 8H), 2.13-2.11 (m, 6H), 1.99-1.97 (m, 6H), 1.70-1.64 (m, 14H), 1.11 (t, J = 11.9 Hz, 1H), 0.97 (s, 9H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.89 (d, J_{PC} = 7.2 Hz), 134.88 , 132.29 , 127.02 (d, J_{PC} = 5.0 Hz), 124.31 (d, J_{PC} = 6.8 Hz), 122.25 (d, J_{PC} = 46.7 Hz), 56.97 , 47.90 , 42.16 (d, J_{PC} = 3.1 Hz), 41.90

(d, J_{PC} = 23.9 Hz), 36.32 , 32.66 , 28.60 (d, J_{PC}= 9.9 Hz), 27.98 , 27.06 . ^{31}P NMR (162 MHz, Chloroform-d) δ 53.27. IR (cm^{-1}): 2905, 2852, 1471, 1450, 1307, 1138, 974. MS (ESI/$[M+Na]^+$): 772.26.



L4

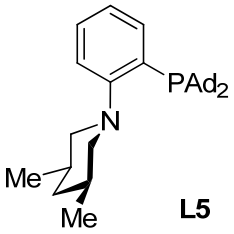
L_4 Prepared by the coupling of $(1\text{-Ad})_2$PH and *1-(2-bromophenyl)-3-methylpiperidine* via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 57% yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.67 (d, *J* = 7.6 Hz, 1H), 7.26(td, *J* = 7.6, 1.2 Hz, 1H), 7.02 (ddd, *J* = 8.0, 4.5, 1.1 Hz, 1H), 6.98 (td, *J* = 7.4, 1.2 Hz, 1H), 3.25 – 3.16 (m, 2H), 2.54 (td, *J* = 11.2, 2.4 Hz, 1H), 2.21 (t, *J* = 10.5 Hz, 1H), 2.00 – 1.85 (m, 19H), 1.81 – 1.71 (m, 2H), 1.70 – 1.61 (m, 13H), 1.01 – 0.90 (m, 1H), 0.88 (d, *J* = 6.7 Hz, 3H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.99 (d, J_{PC} = 20.9 Hz), 137.33 (d, J_{PC} = 3.2 Hz), 131.35 (d, J_{PC} = 26.9 Hz), 129.12 , 121.29 (d, J_{PC} = 0.8 Hz), 120.11 (d, J_{PC} = 3.7 Hz), 62.02 (d, J_{PC} = 5.4 Hz), 54.10 (d, J_{PC} = 5.7 Hz), 41.92 (t, J_{PC} = 13.9 Hz), 37.13 , 36.67 (dd, J_{PC} = 27.8, 4.1 Hz), 32.98 , 30.94 , 28.97 (dd, J_{PC} = 8.4, 1.1 Hz), 25.65 , 19.71 . ^{31}P NMR (162 MHz, Chloroform-d) δ 21.55. IR(cm^{-1}): 2901, 2847, 1580, 1450, 1301, 1263, 1222, 1063, 990, 738. MS (ESI/$[M+H]^+$):476.34.



L_4AuCl

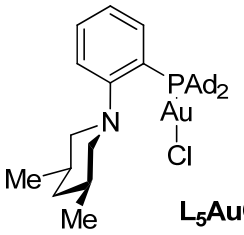
This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.75 (t, *J* = 7.3 Hz, 1H), 7.59 – 7.51 (m, 2H), 7.31 – 7.25 (m, 1H), 2.82 (d, *J* = 8.3 Hz, 1H), 2.77 – 2.60 (m, 4H), 2.34 (t, *J* = 10.6 Hz, 1H), 2.21-2.19 (m, 6H), 2.15 – 2.07 (m, 6H), 1.98-1.93 (m, 7H), 1.67-1.61 (m, 13H), 1.02 – 0.90 (m, 1H), 0.84 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.73 (d, J_{PC} = 7.0 Hz), 134.89 , 132.31 (d, J_{PC} = 1.7 Hz), 126.70 (d, J_{PC} = 4.8 Hz), 124.29 (d, J_{PC} = 6.7 Hz), 122.16 (d, J_{PC} = 47.3 Hz), 63.69 , 55.84 , 42.14 (dd, J_{PC} = 8.5, 3.1 Hz), 41.80 (d, J_{PC} = 4.9 Hz), 36.31 , 32.97 , 29.86 , 28.59 (d, *J* = 9.9 Hz), 25.17 , 20.21 . ^{31}P

NMR (162 MHz, Chloroform-d) δ 53.69. IR(cm^{-1}): 2905, 2850, 1451, 1344, 1262, 971, 775, 735. MS (ESI/$[M+Na]^+$) : 730.22.



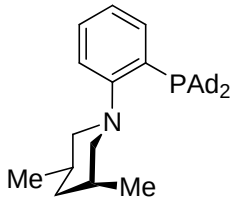
L5

L_5 Prepared by the coupling of $(1\text{-Ad})_2PH$ and *Cis-1-(2-bromophenyl)-3,5-dimethylpiperidine* via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 68% yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.67 (d, J = 7.5 Hz, 1H), 7.26 (q, J = 7.6, 5.8 Hz, 1H), 7.03 – 6.95 (m, 2H), 3.25 (d, J = 9.1 Hz, 2H), 2.11 (t, J = 10.7 Hz, 2H), 1.97-1.89 (m, 20H), 1.77 (d, J = 12.7 Hz, 2H), 1.67 (br, 12H), 0.86 (d, J = 6.6 Hz, 6H), 0.61 (q, J = 12.1 Hz, 1H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.66 (d, J_{PC} = 20.9 Hz), 137.39 (d, J_{PC}= 3.2 Hz), 131.11 (d, J_{PC} = 26.7 Hz), 129.12 , 121.17, 119.98 (d, J_{PC} = 3.7 Hz), 61.57 (d, J_{PC} = 5.8 Hz), 42.19 , 41.95 (d, J_{PC} = 13.6 Hz), 37.13 , 36.67 (d, J_{PC} = 27.8 Hz), 30.96 , 28.97 (d, J_{PC} = 8.4 Hz), 19.57 . ^{31}P NMR (162 MHz, Chloroform-d) δ 21.76. IR (cm^{-1}): 2902, 2847, 1370, 1455, 1284, 970. MS (ESI/$[M+H]^+$): 490.39.



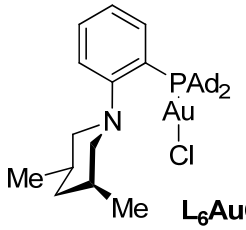
L_5AuCl

This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.75 (t, J = 7.3 Hz, 1H), 7.55 – 7.53 (m, 2H), 7.29-7.26 (m, 1H), 2.74 (d, J = 7.5 Hz, 4H), 2.31 – 2.16 (m, 8H), 2.12 (br, 6H), 1.98 (br, 6H), 1.92 (d, J = 12.6 Hz, 1H), 1.70-1.65 (br, 12H), 0.85 (d, J = 6.2 Hz, 6H), 0.63 (q, J = 11.6 Hz, 1H). ^{13}C NMR (126 MHz, Chloroform-d) δ 160.50 (d, J_{PC} = 7.1 Hz), 134.90 , 132.30 , 126.62 (d, J_{PC} = 4.9 Hz), 124.28 (d, J_{PC} = 6.8 Hz), 122.10 (d, J_{PC} = 47.0 Hz), 63.28 , 42.13 (d, J_{PC} = 3.1 Hz), 42.03 , 41.91 (d, J_{PC} = 23.6 Hz), 36.31, 29.80, 28.59 (d, J_{PC} = 9.9 Hz), 20.01. ^{31}P NMR (162 MHz, Chloroform-d) δ 53.65. IR (cm^{-1}): 2906, 2850, 1455, 1344, 1329, 1262, 972, 774, 735. HRMS calculated for $[C_{33}H_{48}AuClNNaP]^+$:744.2776, found 744.2763.



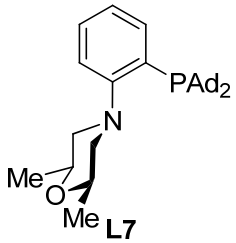
L6

L_6 Prepared by the coupling of $(1\text{-Ad})_2$PH and *trans-1-(2-bromophenyl)-3,5-dimethylpiperidine* via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 52% yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.69 (d, J = 7.5 Hz, 1H), 7.27 (t, J = 7.4 Hz, 1H), 7.04 (dd, J = 7.4, 4.7 Hz, 1H), 6.99 (t, J = 7.3 Hz, 1H), 3.08 (d, J = 9.4 Hz, 2H), 2.48 (br, 2H), 2.10 (dd, J = 9.7, 6.1 Hz, 2H), 2.04 – 1.79 (m, 19H), 1.69 (s, 6H), 1.64 (s, 6H), 1.56 (br, 1H), 1.36 (t, J = 5.6 Hz, 2H), 1.03 (d, J = 6.7 Hz, 6H). ^{13}C NMR (126 MHz, Chloroform-d) δ 161.44 (d, J_{PC} = 21.3 Hz), 137.61 (d, J_{PC} = 2.8 Hz), 131.24 (d, J_{PC} = 27.8 Hz), 129.23 , 121.30 , 120.07 (d, J_{PC} = 3.9 Hz), 42.35 (d, J_{PC} = 14.0 Hz), 41.77 (d, J_{PC} = 13.7 Hz), 39.20 , 37.13 (d, J_{PC} = 2.6 Hz), 36.72 (d, J_{PC} = 26.3 Hz), 28.97 (t, J_{PC} = 8.9 Hz), 27.74 , 19.54 (d, J_{PC} = 2.0 Hz). ^{31}P NMR (162 MHz, Chloroform-d) δ 19.56. IR (cm^{-1}): 2861, 2847, 1619, 1452, 1276, 1220, 774, 735. MS (ESI/[M+H]$^+$): 490.38.



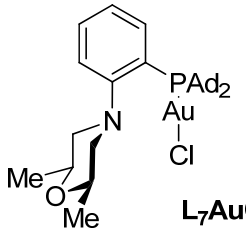
L_6AuCl

This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (600 MHz, Chloroform-d) δ 7.76 (t, J = 7.6 Hz, 1H), 7.60 (dd, J = 8.1, 4.7 Hz, 1H), 7.53 (t, J = 7.6 Hz, 1H), 7.24 (t, J = 7.6 Hz, 1H), 3.07 – 3.00 (m, 3H), 2.53 (d, J = 10.9 Hz, 1H), 2.32 (br, 3H), 2.26 (br, 3H), 2.16-2.14 (m, 3H), 2.04-1.98 (m, 11H), 1.75-1.73 (m, 3H), 1.69-1.66 (m, 9H), 1.48 (d, J = 7.2 Hz, 3H), 1.20 (td, J = 12.6, 4.7 Hz, 1H), 0.89-0.84 (m, 4H). ^{13}C NMR (151 MHz, Chloroform-d) δ 161.42 (d, J_{PC} = 6.7 Hz), 135.13 , 132.26 , 126.68 (d, J_{PC} = 5.7 Hz), 123.92 (d, J_{PC} = 6.9 Hz), 122.02 (d, J_{PC} = 45.5 Hz), 65.64 , 59.89 , 43.12 , 42.97 (d, J_{PC} = 2.8 Hz), 41.76 (d, J_{PC} = 24.4 Hz), 41.50 , 38.56 , 36.38 , 29.75 , 28.86 (d, J_{PC} = 9.8 Hz), 28.45 (d, J_{PC} = 9.8 Hz), 25.56 , 19.93 (d, J_{PC} = 10.6 Hz). ^{31}P NMR (162 MHz, Chloroform-d) δ 54.27. IR(cm^{-1}): 2905, 2850, 1455, 1395, 1301, 1201, 1216, 1057, 972, 793, 754. MS (ESI/[M+Na]$^+$):744.22.



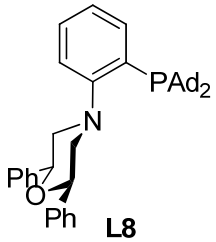
L7

L_7 Prepared by the coupling of $(1\text{-Ad})_2$PH and *cis* -4-(2-bromophenyl)-2,6-dimethylmorpholine via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 69 % yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.69 (d, J = 7.4 Hz, 1H), 7.28(t, J = 7.4 Hz ,1H), 7.06 – 6.99 (m, 2H), 3.90 (ddt, J = 8.8, 6.2, 3.3 Hz, 2H), 3.22 (d, J = 12.0 Hz, 2H), 2.43 (t, J = 10.6 Hz, 2H), 1.93 (dd, J = 24.5, 13.2 Hz, 18H), 1.67 (br, 12H), 1.19 (d, J = 6.3 Hz, 6H). ^{13}C NMR (126 MHz, Chloroform-d) δ 159.20 (d, J_{PC} = 20.5 Hz), 137.58 (d, J_{PC} = 3.0 Hz), 130.96 (d, J_{PC} = 27.3 Hz), 129.38 , 121.85 , 119.91 (d, J_{PC} = 3.8 Hz), 71.71 , 59.17 (d, J_{PC} = 5.8 Hz), 41.97 (d, J_{PC} = 13.3 Hz), 37.07 , 36.80 (d, J_{PC} = 27.2 Hz), 28.92 (d, J_{PC} = 8.5 Hz), 19.08 . ^{31}P NMR (162 MHz, Chloroform-d) δ 20.59. IR(cm^{-1}): 2901, 2847, 1458, 1356, 1309, 1279, 1246, 1154, 1021, 752. MS (ESI/$[M+H]^+$): 492.36.



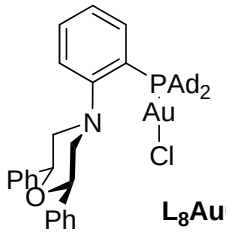
L_7AuCl

This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.77 (t, J = 7.4 Hz, 1H), 7.59 – 7.57 (m, 2H), 7.32 (dt, J = 5.7, 2.7 Hz, 1H), 4.73 (ddt, J = 8.7, 6.2, 3.1 Hz, 2H), 2.69 (dd, J = 11.2, 1.7 Hz, 2H), 2.56 (t, J = 10.5 Hz, 2H), 2.21-2.19 (m, 6H), 2.14 – 2.07 (m, 6H), 1.99 (br, 6H), 1.68 (br, 12H), 1.17 (d, J = 6.2 Hz, 6H). ^{13}C NMR (126 MHz, Chloroform-d) δ 159.03 (d, J_{PC} = 7.1 Hz), 135.07, 132.61 , 127.13 (d, J_{PC} = 4.9 Hz), 124.80 (d, J_{PC} = 6.7 Hz), 122.41 (d, J_{PC} = 46.6 Hz), 70.07 , 60.61 , 42.19 (d, J_{PC} = 3.0 Hz), 42.01 (d, J_{PC} = 23.6 Hz), 36.26 , 28.58 (d, J_{PC} = 9.9 Hz), 19.41 . ^{31}P NMR (162 MHz, Chloroform-d) δ 53.68. IR (cm^{-1}): 2905, 2851, 1450, 1300, 1140, 1078, 974. HRMS calculated for $[C_{32}H_{46}AuClNNaOP]^+$: 746.2569, found 746.2560.



L8

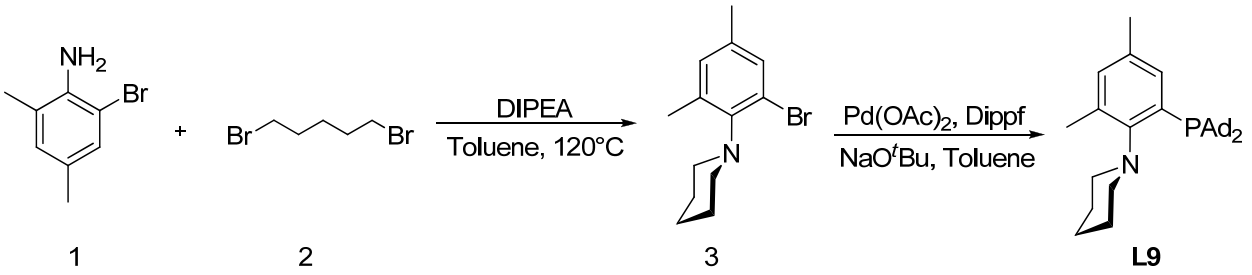
L_8 Prepared by the coupling of $(1\text{-Ad})_2$PH and *Cis*-4-(2-bromophenyl)-2,6-diphenylmorpholine via the standard procedure employing 3 mol% Pd and 3.6 mol% ligand in 63 % yield as a white solid. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.73 (d, J = 7.6 Hz, 1H), 7.55 (d, J = 7.5 Hz, 4H), 7.39 (t, J = 7.6 Hz, 4H), 7.30 (t, J = 7.3 Hz, 2H), 7.27 – 7.23 (m, 1H), 7.04 (t, J = 7.4 Hz, 1H), 6.97 (dd, J = 7.9, 4.4 Hz, 1H), 5.08 (d, J = 8.3 Hz, 2H), 3.58 (d, J = 11.9 Hz, 2H), 2.80 (t, J = 10.8 Hz, 2H), 2.03 (q, J = 12.2 Hz, 12H), 1.94 (br, 6H), 1.72 (br, 12H). ^{13}C NMR (126 MHz, Chloroform-d) δ 158.76 (d, J_{PC} = 20.6 Hz), 140.83 , 137.62 (d, J_{PC} = 3.1 Hz), 130.98 (d, J_{PC} = 27.1 Hz), 129.44 , 128.20 , 127.44 , 126.02 , 122.12 , 119.92 (d, J_{PC} = 3.8 Hz), 78.09 , 59.98 (d, J_{PC} = 6.1 Hz), 42.08 (d, J_{PC} = 13.3 Hz), 37.11 , 36.93 (d, J_{PC} = 26.9 Hz), 28.97 (d, J_{PC} = 8.5 Hz). ^{31}P NMR (162 MHz, Chloroform-d) δ 20.84. IR (cm^{-1}):2909, 2846, 1732, 1450, 1347, 1223, 1104, 971. MS (ESI/$[M+H]^+$): 616.42.



L_8AuCl

This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.79 (t, J = 7.3 Hz, 1H), 7.62 – 7.58 (m, 1H), 7.55 (d, J = 7.3 Hz, 5H), 7.34 (t, J = 7.5 Hz, 4H), 7.27 (d, J = 6.9 Hz, 3H), 5.91 (d, J = 8.1 Hz, 2H), 3.08 – 2.90 (m, 4H), 2.33 – 2.15 (m, 12H), 2.02 (br, 6H), 1.71 (br, 12H). ^{13}C NMR (126 MHz, Chloroform-d) δ 158.52 (d, J_{PC} = 7.0 Hz), 140.62 , 135.18 (d, J_{PC} = 1.5 Hz), 132.59 (d, J_{PC} = 1.6 Hz), 128.16 , 127.56 , 127.01 (d, J_{PC} = 5.0 Hz), 126.46 , 124.96 (d, J_{PC} = 6.7 Hz), 122.49 (d, J_{PC} = 45.8 Hz), 76.39 , 60.93 , 42.26 (d, J_{PC} = 2.6 Hz), 42.09 , 36.31 , 28.62 (d, J_{PC} = 9.9 Hz). ^{31}P NMR (162 MHz, Chloroform-d) δ 54.06. IR (cm^{-1}):2905, 2859, 1474, 1450, 1347, 1304, 1097, 758. MS (ESI/$[M+Na]^+$): 870.24.

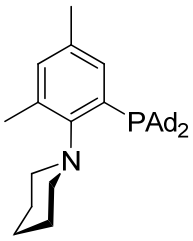
General procedure for Synthesis L9:



1 2 3 **L9**

In a 100mL Schlenk tube, it was charged with reagents: 2-bromo-4,6-dimethylaniline(1.98 g, 10.0 mmol), 1,5-dibromopentane(3.45g, 15 mmol), Diisopropylethylamine (2.54 g, 20 mmol), NaI (150 mg, 1 mmol) in 50 mL toluene and the reaction system was stirred in an oil bath at 120°C for 15h. Upon completion, the mixture was concentrated and the residue was purified by chromatography on silica gel (eluent: hexanes/ethyl acetate) to afford the desired product **3** in 50% yield.

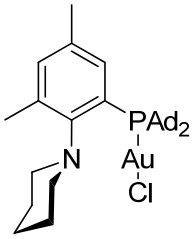
In a 25mL Schlenk tube, $Pd(OAc)_2$ (typically 3 mol %) and DiPPF (1,1'-bis(diisopropylphosphino)ferrocene; Pd:L = 1:1.2) , di(1-adamantyl)phosphine (1.5mmol) and NaO^tBu(1.8 mmol), followed by the addition of the aryl halide **3**(1.5mmol) in 8 mL toluene; the Schlenk tube was then degassed twice. The resulting mixture was heated at 110 ºC until complete consumption of the phosphine was achieved, as judged on the basis of ^{31}P NMR data. The solution was then cooled and filtered through a plug of silica, which in turn was washed with CH_2Cl_2. Removal of the solvent from the combined eluent afforded **L9** in 45% yield that was further purified by washing with EtOAc.



L9

^1H NMR (500 MHz, Chloroform-d) δ 7.34 (s, 1H), 6.99 (s, 1H), 3.29 (dd, J = 13.4, 5.5 Hz, 2H), 2.97 – 2.86 (m, 2H), δ 2.30 (s, 3H), 2.29 (s, 3H), 2.02 – 1.98 (m, 6H), 1.88-1.86(m, 12H), 1.76 – 1.62 (m, 14H), 1.61 – 1.50 (m, 4H). ^{13}C NMR (126 MHz, Chloroform-d) δ 156.16 (d, J_{PC} = 25.2 Hz), 137.55 (d, J_{PC} = 5.8 Hz), 135.91 (d, J_{PC} = 2.3 Hz), 135.15 (d, J_{PC} = 27.0 Hz), 132.60 , 131.77 , 52.99 (d, J_{PC} = 7.5 Hz), 42.19 (d, J_{PC} = 13.6 Hz), 37.08, 37.03 (d, J_{PC} = 27.7 Hz), 28.99 (d, J_{PC} = 8.5 Hz), 26.74 , 24.69 , 21.00 , 20.30 (d, J_{PC} = 1.4 Hz). ^{31}P NMR (162 MHz,

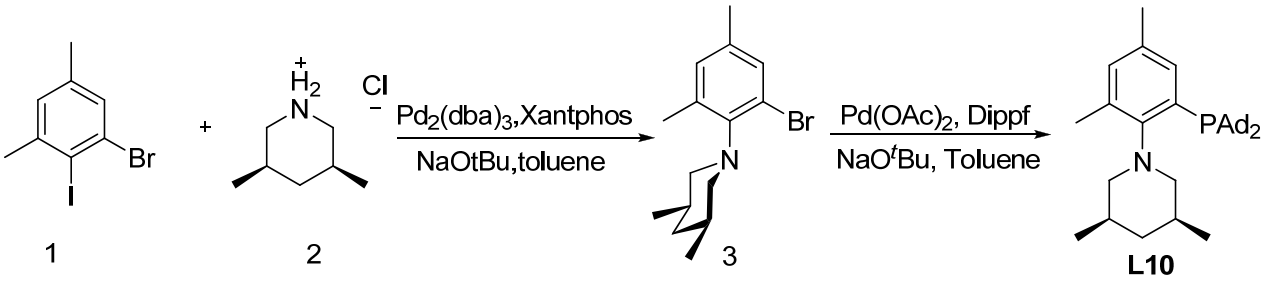
Chloroform-d) δ 21.74. IR(cm^{-1}): 2865, 2847, 450, 1277, 1219, 1124, 971.MS (ESI/[M+H] $^{+}$): 490.41.



L_9AuCl

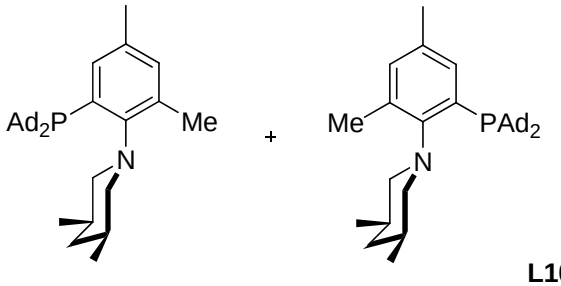
This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.37 (dd, J = 7.1, 1.6 Hz, 1H), 7.11 (s, 1H), 3.30 (td, J = 11.2, 2.9 Hz, 2H), 2.85 – 2.70 (m, 4H), 2.49 (s, 3H), 2.35 (s, 3H), 2.26 – 2.10 (m, 12H), 2.03 – 1.93 (m, 7H), 1.72 – 1.57 (m, 14H), 1.37-1.29 (m, 1H). ^{13}C NMR (126 MHz, Chloroform-d) δ 153.45 (d, J_{PC} = 6.5 Hz), 139.98 (d, J_{PC} = 4.4 Hz), 137.48 (d, J_{PC} = 1.8 Hz), 133.73 (d, J_{PC} = 2.6 Hz), 133.34 (d, J_{PC} = 7.8 Hz), 124.09 (d, J_{PC} = 49.6 Hz), 50.29 , 42.39 (d, J_{PC} = 3.3 Hz), 42.34 (d, J_{PC} = 22.7 Hz), 36.38 (d, J_{PC} = 1.2 Hz), 28.71 (d, J_{PC} = 9.8 Hz), 25.30 , 23.62 , 21.51 (d, J_{PC} = 1.1 Hz), 20.96 . ^{31}P NMR (162 MHz, Chloroform-d) δ 59.83. IR (cm^{-1}):2906, 2847, 1450, 1344, 1304, 1224, 1107, 973. HRMS calculated for $[C_{33}H_{48}AuClNNaP]^{+}$:744.2776, found 744.2770.

General procedure for Synthesis L10.



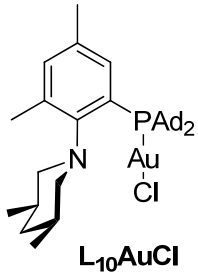
In a 25mL Schlenk tube, $Pd_2(dba)_3$ (typically 2.5 mol %) and Xantphos (10 mol %), Cis-3,5-dimethylpiperidinium chloride (2 mmol) and NaO^tBu(4.8 mmol), followed by the addition of the aryl halide **1**(2 mmol) in 10 mL toluene; the Schlenk tube was then degassed twice. The resulting mixture was heated at 100 ºC for 12h under N_2. The solution was then cooled and filtered through a plug of silica, the mixture was then concentrated and the residue was purified by chromatography on silica gel to give 1-(2-bromo-4,6-dimethylphenyl)-3,5-dimethylpiperidine **3** in 10 % yield.

The procedure for the synthesis Ligand 10 is the same as the synthesis L9.



L10

^{1}H NMR (500 MHz, Chloroform-d) δ 7.34 (d, *J* = 16.6 Hz, 1H), [7.05 (s), 6.88 (s), 1H] 3.07 (t, *J* = 10.9 Hz, 1H), 2.90 – 2.85 (m, 1H), 2.75 (d, *J* = 9.2 Hz, 1H), 2.60 (t, *J* = 10.6 Hz, 1H), 2.30 (s, 3H), [2.26 (s), 2.25 (s), 3H], 2.13 – 2.07 (m, 1H), 2.04 – 1.82 (m, 18H), 1.74-1.59 (m, 14H), 0.84 (d, *J* = 6.3 Hz, 3H), 0.80 (d, *J* = 6.6 Hz, 3H), [0.76 (*J* = 12.0 Hz), 0.61 (q, *J* = 12.0 Hz),1H]. ^{13}C NMR (126 MHz, Chloroform-*d*) δ 156.30 (d, J_{PC} = 26.7 Hz), 154.77 (d, J_{PC} = 23.8 Hz), 138.19 (d, J_{PC} = 8.2 Hz), 136.64 , 136.40 , 135.86 (d, J_{PC} = 21.3 Hz), 135.28 , 134.70 (d, J_{PC} = 30.8 Hz), 133.00 , 132.28 , 131.88 , 131.68 , 60.84 , 60.76 , 58.90 , 43.41 (d, J_{PC} = 9.9 Hz), 42.77 , 42.49 , 42.34 (d, J_{PC} = 13.0 Hz), 42.02 (d, J_{PC} = 14.3 Hz), 37.33 (d, J_{PC} = 26.1 Hz), 37.15 , 37.04 , 36.75 , 36.57 (d, J_{PC} = 29.4 Hz), 32.56 , 30.30 , 29.70 , 28.98 (d, J_{PC} = 8.5 Hz), 21.00 (d, J_{PC} = 2.9 Hz), 20.25 (d, J_{PC} = 18.6 Hz), 19.36 (d, J_{PC} = 19.2 Hz). ^{31}P NMR (162 MHz, Chloroform-d) δ 21.86, 21.59. IR (cm^{-1}):2902, 2847, 1451, 1376, 1342, 1223, 961, 858, 751. MS (ESI/[M+H]$^{+}$):518.36 .

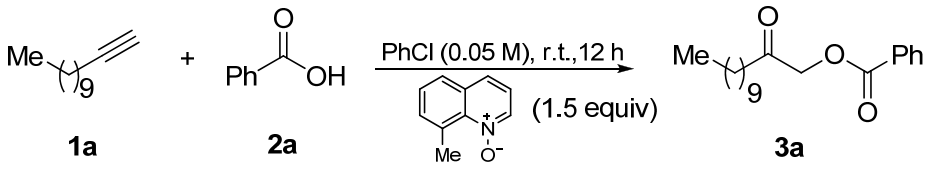


L_{10}AuCl

This complex was prepared quantitatively by stirring the ligand with an equivalent of Me_2SAuCl followed by simple concentration under vacuum. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.38 (d, *J* = 6.9 Hz, 1H), 7.10 (s, 1H), 2.91 (dd, *J* = 10.2, 4.8 Hz, 2H), 2.82 – 2.69 (m, 4H), 2.45 (s, 3H), 2.34 (s, 3H), 2.23 – 2.11 (m, 12H), 1.99 (br, 6H), 1.91 (d, *J* = 12.7 Hz, 1H), 1.71-1.65 (m, 13H), 0.85 (s, 3H), 0.84 (s, 3H), 0.66 (q, *J* = 12.0 Hz, 1H). ^{13}C NMR (126 MHz, Chloroform-d) δ 152.90 (d, J_{PC} = 6.3 Hz), 139.97 (d, J_{PC} = 4.5 Hz), 137.51 , 133.78 , 133.33 (d, J_{PC} = 7.7 Hz), 123.97 (d, J_{PC} = 49.5 Hz), 57.45 , 42.52 – 42.24 (m), 41.65 , 36.37 , 29.87 , 28.72 (d, J_{PC} = 9.8

Hz), 21.56 , 20.94 , 20.18 . ^{31}P NMR (162 MHz, Chloroform-d) δ 59.64. IR(cm^{-1}):2906, 2851, 1452, 1301, 1225, 972, 734. HRMS calculated for [$C_{35}H_{52}AuClNNaP$]$^{+}$:772.3089, found 772.3111.

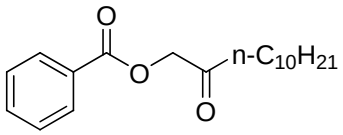
Condition A: General procedure for gold-catalyzed synthesis of α-carboxymethyl ketones:



1a **2a** **3a**

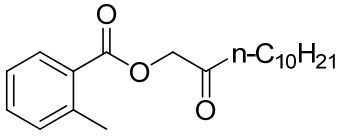
To a 3 dram vial containing 2 mL of chlorobenzene were added sequentially a carboxylic acid (0.2 mmol), an alkyne (0.26 mmol), L_5AuCl (0.01 mmol) and $NaBAr^F_4$ (0.02 mmol). The resulting mixture was stirred at room temperature. To this vial a solution of 8-methylquinoline *N*-oxide (47.7 mg, 0.3 mmol) in 4 mL of chlorobenzene was then added via a syringe pump in 12 h. Upon completion, the reaction mixture was concentrated under vacuum. The residue was purified by chromatography on silica gel (eluent: hexanes /ethyl acetate) to afford the desired product **3**.

2-Oxododecyl benzoate 3a



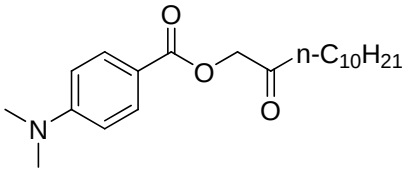
The compound **3a** was prepared in 96% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.10 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.60 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.51 – 7.43 (m, 2H), 4.88 (s, 2H), 2.50 (t, *J* = 7.4 Hz, 2H), 1.64 (p, *J* = 7.5 Hz, 2H), 1.27 (d, *J* = 19.9 Hz, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.17, 165.86, 133.37, 129.86, 129.27, 128.45, 68.38, 38.93, 31.86, 29.52, 29.41, 29.33, 29.27, 29.15, 23.29, 22.65, 14.09. IR (cm^{-1}): 2878, 2849, 1732, 1720, 1625, 1602, 1450, 1413, 1281, 1090, 720. MS (ESI) (M+Na$^+$): 327.23.

2-Oxododecyl 2-methylbenzoate 3b



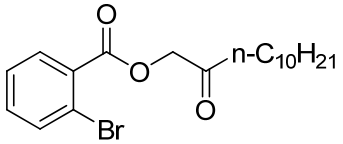
The compound **3b** was prepared in 94% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.93 (dd, *J* = 8.1, 1.4 Hz, 1H), 7.35 (td, *J* = 7.5, 1.4 Hz, 1H), 7.19 (ddd, *J* = 7.2, 3.7, 2.0 Hz, 2H), 4.79 (s, 2H), 2.54 (s, 3H), 2.42 (t, *J* = 7.4 Hz, 2H), 1.64 – 1.50 (m, 2H), 1.29 – 1.12 (m, 14H), 0.81 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 204.16, 166.69, 140.64, 132.36, 131.69, 130.81, 125.75, 68.18, 38.92, 31.86, 29.52, 29.41, 29.33, 29.27, 29.15, 23.29, 22.65, 21.67, 14.09. IR (cm^{-1}): 2882, 2855, 1725, 1604, 1578, 1459, 1378, 1256, 1143, 1082, 905, 738. MS (ESI) ($M+Na^+$): 341.26.

2-Oxododecyl 4-(dimethylamino)benzoate 3c



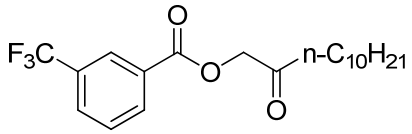
The compound **3c** was prepared in 96% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.27 – 7.65 (m, 2H), 6.80 – 6.51 (m, 2H), 4.80 (s, 2H), 3.06 (s, 6H), 2.49 (t, *J* = 7.4 Hz, 2H), 1.62 (q, *J* = 7.2 Hz, 2H), 1.27 (d, *J* = 15.2 Hz, 14H), 0.88 (t, *J* = 6.7 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 205.49, 166.13, 153.51, 131.64, 115.96, 110.83, 68.02, 40.09, 38.93, 31.88, 29.54, 29.43, 29.36, 29.29, 29.18, 23.27, 22.66, 14.10. IR (cm^{-1}): 2878, 2849, 1727, 1715, 1702, 1648, 1619, 1501, 1464, 1439, 1375, 1287, 1191. MS (ESI) ($M+Na^+$): 370.25.

2-Oxododecyl 2-bromobenzoate 3d



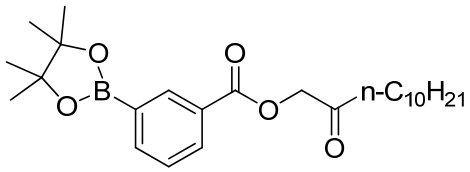
The compound **3d** was prepared in 91% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.95 (dd, *J* = 7.5, 2.0 Hz, 1H), 7.68 (dd, *J* = 7.7, 1.3 Hz, 1H), 7.43 – 7.31 (m, 2H), 4.89 (s, 2H), 2.50 (t, *J* = 7.4 Hz, 2H), 1.65 (p, *J* = 7.4 Hz, 2H), 1.27 (d, *J* = 19.7 Hz, 14H), 0.88 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.58, 165.26, 134.44, 132.98, 131.82, 131.12, 127.23, 121.99, 68.60, 38.99, 31.87, 29.53, 29.41, 29.33, 29.29, 29.15, 23.27, 22.67, 14.10. IR (cm^{-1}): 2855, 2758, 1732, 1591, 1468, 1377, 1292, 1251, 1029, 926, 745. MS (ESI) ($M+Na^+$): 405.16.

2-Oxododecyl 3-(trifluoromethyl)benzoate 3e



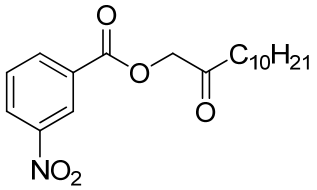
The compound **3e** was prepared in 92% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.36 (s, 1H), 8.28 (d, *J* = 7.8 Hz, 1H), 7.85 (d, *J* = 7.8 Hz, 1H), 7.61 (t, *J* = 7.8 Hz, 1H), 4.93 (s, 2H), 2.49 (t, *J* = 7.4 Hz, 2H), 1.65 (p, *J* = 7.3 Hz, 2H), 1.43 – 1.10 (m, 14H), 0.88 (t, *J* = 6.8 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.29, 164.58, 133.06, 131.30, 131.04, 130.16, 129.87, 129.85, 129.15, 126.81, 126.77, 124.65, 122.49, 68.60, 38.87, 31.86, 29.51, 29.40, 29.31, 29.26, 29.13, 23.34, 22.64, 14.07. IR (cm^{-1}): 2883, 2851, 1725, 1546, 1468, 1413, 1341, 1302, 1257, 1170, 1123, 1089, 919, 823. MS (ESI) ($M+Na^{+}$): 395.20.

2-Oxododecyl 3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzoate 3f



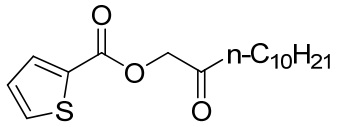
The compound **3f** was prepared in 66% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.53 (s, 1H), 8.17 (dt, *J* = 7.8, 1.6 Hz, 1H), 8.01 (dt, *J* = 7.4, 1.2 Hz, 1H), 7.47 (t, *J* = 7.6 Hz, 1H), 4.88 (s, 2H), 2.49 (t, *J* = 7.4 Hz, 2H), 1.66 – 1.59 (m, 2H), 1.35 (s, 12H), 1.29-1.25 (m, 14H), 0.87 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.26, 165.94, 139.60, 136.17, 132.53, 128.64, 128.44, 127.87, 84.10, 68.36, 38.89, 31.86, 29.52, 29.41, 29.33, 29.27, 29.14, 24.86, 23.29, 22.65, 14.09. IR (cm^{-1}): 2881, 2855, 1830, 1726, 1523, 1362, 1253, 1201, 1144, 906. MS (ESI) ($M+Na^{+}$): 453.25.

2-oxododecyl 3-nitrobenzoate 3g



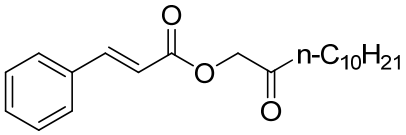
The compound **3g** was prepared in 68% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 9.11 – 8.77 (m, 1H), 8.67 – 8.24 (m, 2H), 7.68 (t, *J* = 8.0 Hz, 1H), 4.96 (s, 2H), 2.49 (t, *J* = 7.4 Hz, 2H), 1.75 – 1.59 (m, 2H), 1.27 (d, *J* = 17.8 Hz, 14H), 0.87 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 202.86, 163.80, 148.29, 135.49, 131.06, 129.72, 127.76, 124.87, 68.78, 38.86, 31.85, 29.51, 29.39, 29.31, 29.26, 29.12, 23.35, 22.64, 14.08. IR (cm^{-1}): 2919, 2850, 1742, 1726, 1644, 1618, 1530, 1482, 1471, 1413, 1346, 1302, 1268, 1147, 773, 718. Ms (ESI) ($M+Na^+$): 372.21.

2-Oxododecyl thiophene-2-carboxylate 3h



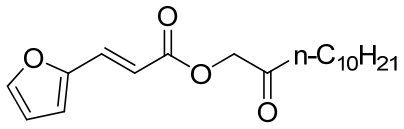
The compound **3h** was prepared in 90% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.88 (dd, *J* = 3.8, 1.3 Hz, 1H), 7.61 (dd, *J* = 5.0, 1.3 Hz, 1H), 7.13 (dd, *J* = 5.0, 3.8 Hz, 1H), 4.84 (s, 2H), 2.48 (t, *J* = 7.4 Hz, 2H), 1.63 (p, *J* = 7.4 Hz, 2H), 1.39 – 1.16 (m, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.02, 161.38, 134.25, 133.09, 132.50, 127.89, 68.34, 38.88, 31.86, 29.52, 29.40, 29.33, 29.27, 29.14, 23.27, 22.66, 14.10. IR (cm^{-1}): 2923, 2849, 1725, 1707, 1525, 1418, 1404, 1368, 1268, 1122, 1089, 998, 966. MS (ESI) ($M+Na^+$): 333.19.

2-Oxododecyl cinnamate 3i



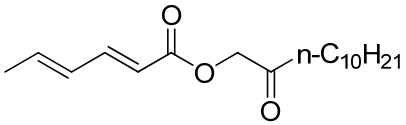
The compound **3i** was prepared in 94% yield according to the general procedure (eluents: ethyl acetate : hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.77 (d, *J* = 16.0 Hz, 1H), 7.55 (dd, *J* = 6.6, 3.0 Hz, 2H), 7.44 – 7.37 (m, 3H), 6.54 (d, *J* = 16.0 Hz, 1H), 4.78 (s, 2H), 2.46 (t, *J* = 7.5 Hz, 2H), 1.63 (p, *J* = 7.4 Hz, 2H), 1.37 – 1.16 (m, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.31, 166.12, 146.14, 134.15, 130.54, 128.90, 128.20, 116.84, 68.03, 38.88, 31.86, 29.52, 29.40, 29.32, 29.27, 29.14, 23.32, 22.65, 14.08. IR (cm^{-1}): 2920, 2850, 1717, 1665, 1641, 1518, 1447, 1413, 1317, 1258, 1181, 863, 766. MS (ESI) ($M+Na^+$): 353.25.

(*E*)-2-Oxododecyl 3-(furan-2-yl)acrylate 3j



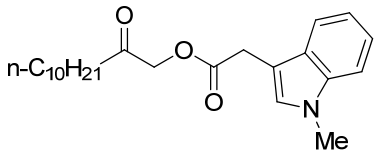
The compound **3j** was prepared in 97% yield according to the general procedure (eluents: ethyl acetate : hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.64 – 7.40 (m, 1H), 6.65 (d, *J* = 3.4 Hz, 2H), 6.48 (dd, *J* = 3.1, 1.6 Hz, 1H), 6.40 (d, *J* = 15.7 Hz, 1H), 4.75 (s, 2H), 2.45 (t, *J* = 7.5 Hz, 2H), 1.61 (q, *J* = 7.2 Hz, 2H), 1.29-1.26 (m, 14H), 0.88 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.43, 166.18, 150.73, 145.04, 132.23, 115.39, 114.42, 112.36, 68.02, 38.86, 31.86, 29.52, 29.41, 29.32, 29.27, 29.13, 23.28, 22.65, 14.08. IR (cm^{-1}): 2881, 2851, 1705, 1664, 1638, 1542, 1211, 1112. MS (ESI) ($M+Na^{+}$): 343.23.

(2*E*,4*E*)-2-Oxododecyl hexa-2,4-dienoate 3k



The compound **3k** was prepared in 93% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 7.33 (dd, *J* = 15.4, 10.0 Hz, 1H), 6.39 – 6.05 (m, 2H), 5.87 (d, *J* = 15.7 Hz, 1H), 4.70 (s, 2H), 2.43 (t, *J* = 7.5 Hz, 2H), 1.87 (d, *J* = 5.8 Hz, 3H), 1.61 (q, *J* = 7.3 Hz, 2H), 1.29-1.26 (m, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.56, 166.39, 146.43, 140.30, 129.69, 117.58, 67.84, 38.84, 31.86, 29.52, 29.40, 29.31, 29.27, 29.13, 23.28, 22.65, 18.67, 14.08. IR (cm^{-1}): 2880, 2849, 1720, 1649, 1624, 1462, 1410, 1331, 1244, 1149, 1129, 994. MS (ESI) ($M+Na^{+}$): 317.25.

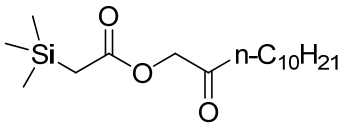
2-oxododecyl 2-(1-methyl-1H-indol-3-yl)acetate 3l



The compound **3l** was prepared in 90 % yield according to the condition A.^{1}H NMR (600 MHz, Chloroform-d) δ 7.62 (d, *J* = 7.9 Hz, 1H), 7.30 (d, *J* = 8.2 Hz, 1H), 7.24 (t, *J* = 7.6 Hz, 1H), 7.14 (t, *J* = 7.4 Hz, 1H), 7.09 (s, 1H), 4.66 (s, 2H), 3.90 (s, 2H), 3.77 (s, 3H), 2.34 (t, *J* = 7.5 Hz, 2H), 1.69 – 1.48 (m, 2H), 1.30-1.25 (m, 14H), 0.89 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.24, 171.30, 136.83, 127.81, 127.58, 121.77, 119.19, 118.85, 109.24, 106.21, 68.17, 38.78,

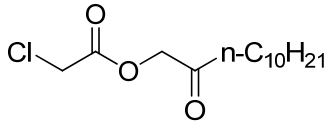
32.66, 31.85, 30.73, 29.50, 29.38, 29.27, 29.04, 23.18, 22.64, 14.08. IR(cm^{-1}):2926, 2855, 1732, 1468, 1376, 1134, 739. MS (ESI/$[M+Na]^+$):394.27.

2-Oxododecyl 2-(trimethylsilyl)acetate 3m



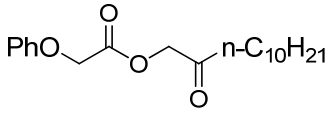
The compound **3m** was prepared in 92% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 4.60 (s, 2H), 2.39 (t, *J* = 7.5 Hz, 2H), 1.98 (s, 2H), 1.59 (p, *J* = 7.4 Hz, 2H), 1.32 – 1.17 (m, 14H), 0.87 (t, *J* = 7.0 Hz, 3H), 0.16 (s, 9H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 204.23, 172.12, 67.61, 38.85, 31.85, 29.51, 29.39, 29.30, 29.26, 29.12, 26.53, 23.27, 22.64, 14.08, -1.44. IR (cm^{-1}): 2882, 2856, 1728, 1546, 1418, 1392, 1241, 1111, 1090, 856. MS (ESI) ($M+Na^+$): 337.16.

2-Oxododecyl 2-chloroacetate 3n



The compound **3n** was prepared in 80% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 4.76 (s, 2H), 4.19 (s, 2H), 2.42 (t, *J* = 7.4 Hz, 2H), 1.61 (p, *J* = 7.4 Hz, 2H), 1.35 – 1.16 (m, 14H), 0.87 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 202.64, 166.73, 68.88, 40.40, 38.79, 31.86, 29.52, 29.39, 29.29, 29.27, 29.09, 23.28, 22.66, 14.09. IR (cm^{-1}): 2883, 2850, 1723, 1137. MS (ESI) ($M+Na^+$): 299.17.

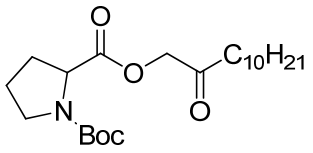
2-oxododecyl 2-phenoxyacetate 3o



The compound **3o** was prepared in 78 % yield according to the condition A.^{1}H NMR (600 MHz, Chloroform-d) δ 7.31 (t, *J* = 8.0 Hz, 2H), 7.00 (t, *J* = 7.4 Hz, 1H), 6.97 – 6.94 (m, 2H), 4.77 (s, 4H), 2.39 (t, *J* = 7.4 Hz, 2H), 1.67 – 1.51 (m, 2H), 1.31-1.26 (m, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 202.96, 168.43, 157.68, 129.58, 121.84, 114.64, 68.21, 64.99,

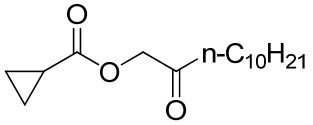
38.80, 31.86, 29.52, 29.39, 29.29, 29.27, 29.09, 23.28, 22.66, 14.09. IR(cm^{-1}):2921, 2851, 1766, 1723, 1600, 1497, 1253, 1195, 1089, 753. MS (ESI/$[M+Na]^+$):357.22.

1-tert-butyl 2-(2-oxododecyl) pyrrolidine-1,2-dicarboxylate 3p



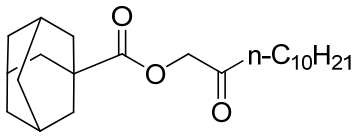
The compound **3o** was prepared in 54% yield according to the condition A.^{1}H NMR (500 MHz, Chloroform-d) δ [4.83 (d, *J* = 16.7 Hz, 4.54 (d, *J* = 16.7 Hz), 1H], 4.74 – 4.62 (m, 1H), [4.41 (dd, *J* = 7.4, 4.9 Hz, 4.33 (dd, *J* = 8.6, 4.0 Hz,), 1H], 3.54 (dddd, *J* = 20.6, 10.4, 8.0, 4.6 Hz, 1H), 3.41 (ddt, *J* = 34.8, 10.3, 7.5 Hz, 1H), 2.40 (td, *J* = 7.4, 3.3 Hz, 2H), 2.35 – 2.16 (m, 2H), 2.01 (ddq, *J* = 22.1, 16.3, 7.6 Hz, 1H), 1.89 (tdd, *J* = 12.3, 9.4, 4.5 Hz, 1H), 1.59 (q, *J* = 7.2 Hz, 2H), [1.45 (s), 1.41 (s), 9H], 1.29-1.25 (m, 14H), 0.87 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.10, 203.26, 172.49, 172.39, 154.45, 153.75, 79.94, 79.84, 68.12, 67.81, 58.91, 58.61, 46.61, 46.32, 38.80, 38.76, 31.85, 30.98, 30.02, 29.51, 29.39, 29.30, 29.27, 29.10, 28.41, 28.29, 24.29, 23.52, 23.25, 23.19, 22.65, 14.08. IR (cm^{-1}): 3110, 2927, 1698, 1607, 1551, 1434, 1398, 1323, 1214, 876, 863. Ms (ESI) ($M+Na^+$): 420.30.

2-Oxododecyl cyclopropanecarboxylate 3q



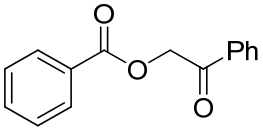
The compound **3q** was prepared in 91% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 4.64 (s, 2H), 2.40 (t, *J* = 7.4 Hz, 2H), 1.77 – 1.70 (m, 1H), 1.59 (p, *J* = 7.3 Hz, 2H), 1.34 – 1.20 (m, 14H), 1.10 – 1.04 (m, 2H), 0.96 – 0.90 (m, 2H), 0.87 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.34, 174.19, 67.90, 38.81, 31.86, 29.52, 29.40, 29.31, 29.27, 29.13, 23.26, 22.65, 14.08, 12.59, 8.87. IR (cm^{-1}): 2957, 2922, 2850, 1735, 1730, 1722, 1644, 1466, 1418, 1391, 1201, 1174, 1130, 1093. MS (ESI) ($M+Na^+$): 291.22.

2-Oxododecyl admantanecarboxylate 3r



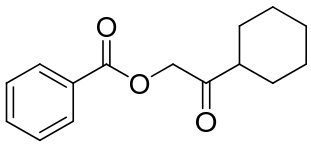
The compound **3r** was prepared in 80% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 4.60 (s, 2H), 2.39 (t, *J* = 7.4 Hz, 2H), 2.03 (s, 3H), 1.95 (s, 6H), 1.79 – 1.66 (m, 6H), 1.58 (q, *J* = 7.0 Hz, 2H), 1.29-1.24 (m, 14H), 0.87 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 204.49, 176.87, 67.67, 40.66, 38.79, 38.75, 36.42, 31.85, 29.51, 29.38, 29.32, 29.25, 29.13, 27.86, 23.17, 22.64, 14.07. IR (cm^{-1}): 2878, 2854, 1730, 1594, 1454, 1415, 1377, 1269, 1233, 1185, 1108, 1077. MS (ESI) ($M+Na^{+}$): 385.32.

2-Oxo-2-phenylethyl benzoate 3s



The compound **3s** was prepared in 93% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.21– 8.11 (m, 2H), 8.02 – 7.94 (m, 2H), 7.67– 7.57 (m, 2H), 7.55– 7.43 (m, 4H), 5.58 (s, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 192.07, 166.02, 134.29, 133.87, 133.33, 129.95, 129.39, 128.87, 128.42, 127.81, 66.44. IR (cm^{-1}): 1720, 1701, 1607, 1583, 1450, 1420, 1375, 1318, 1282, 1125, 1021, 961, 800, 759, 715. MS (ESI) ($M+Na^{+}$): 263.05.

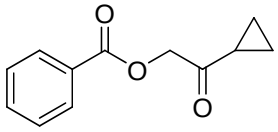
2-Cyclohexyl-2-oxoethyl benzoate 3t



The compound **3t** was prepared in 92% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.09 (dd, *J* = 8.4, 1.3 Hz, 2H), 7.63 – 7.51 (m, 1H), 7.45 (t, *J* = 7.7 Hz, 2H), 4.96 (s, 2H), 2.51 (tt, *J* = 11.4, 3.5 Hz, 1H), 1.95 –

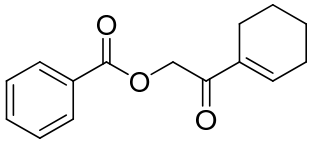
1.87 (m, 2H), 1.81 (dt, *J* = 11.9, 3.1 Hz, 2H), 1.68 (dtd, *J* = 11.0, 3.4, 1.8 Hz, 1H), 1.45 (qd, *J* = 12.7, 12.3, 3.1 Hz, 2H), 1.28 (dddd, *J* = 25.2, 15.0, 12.1, 8.9 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 206.30, 165.87, 133.28, 129.83, 129.35, 128.40, 67.12, 47.41, 28.16, 25.67, 25.46. IR (cm^{-1}): 2872, 2852, 1765, 1720, 1446, 1416, 1340, 1280, 1133, 1068, 914, 744, 712. MS (ESI) ($M+Na^+$): 269.08.

2-Cyclopropyl-2-oxoethyl benzoate 3u



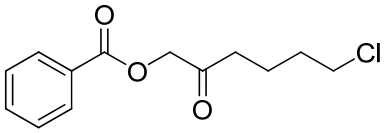
The compound **3u** was prepared in 95% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.11 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.62 – 7.54 (m, 1H), 7.50 – 7.40 (m, 2H), 5.05 (s, 2H), 2.04 (tt, *J* = 7.9, 4.5 Hz, 1H), 1.27 – 1.07 (m, 2H), 0.99 (dq, *J* = 7.4, 3.7 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.77, 165.82, 133.32, 129.85, 129.29, 128.40, 68.77, 17.22, 11.41. IR (cm^{-1}): 1637, 1602, 1543, 1452, 1406, 1394, 1276, 1069, 1024, 993, 711. MS (ESI) ($M+K^+$): 243.01.

2-Cyclohexenyl-2-oxoethyl benzoate 3v



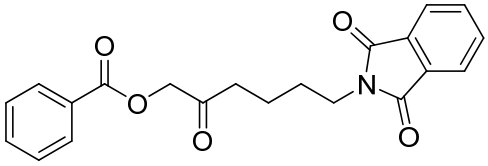
The compound **3v** was prepared in 94% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.11 (dd, *J* = 8.3, 1.3 Hz, 2H), 7.57 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.50 – 7.38 (m, 2H), 6.93 (p, *J* = 2.1 Hz, 1H), 5.27 (s, 2H), 2.27 (dq, *J* = 6.2, 4.2, 3.1 Hz, 4H), 1.65 (ddtt, *J* = 11.5, 9.2, 6.0, 2.4 Hz, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 192.45, 166.15, 140.69, 137.28, 133.17, 129.89, 129.59, 128.35, 65.57, 26.04, 22.83, 21.66, 21.46. IR (cm^{-1}): 2753, 1727, 1708, 1685, 1637, 1602, 1585, 1451, 1426, 1316, 1281, 1213, 1120, 1072, 708. MS (ESI) ($M+Na^+$): 267.05.

6-Chloro-2-oxohexyl benzoate 3w



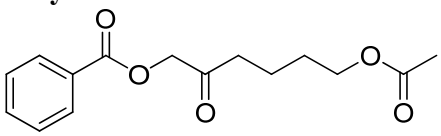
The compound **3w** was prepared in 90% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.09 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.59 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.53 – 7.41 (m, 2H), 4.88 (s, 2H), 3.58 – 3.48 (m, 2H), 2.61 – 2.48 (m, 2H), 1.86 – 1.73 (m, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.47, 165.84, 133.44, 129.83, 129.10, 128.47, 68.34, 44.49, 37.82, 31.70, 20.45. IR (cm^{-1}): 3065, 2938, 1722, 1633, 1602, 1591, 1585, 1452, 1417, 1316, 1275, 1178, 1128, 1094, 917, 713. MS (ESI) ($M+Na^+$): 277.04.

6-(1,3-Dioxoisoindolin-2-yl)-2-oxohexyl benzoate 3x



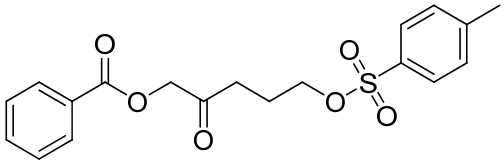
The compound **3x** was prepared in 90% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:4). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.08 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.83 (dd, *J* = 5.4, 3.1 Hz, 2H), 7.70 (dd, *J* = 5.5, 3.0 Hz, 2H), 7.58 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.50 – 7.41 (m, 2H), 4.88 (s, 2H), 3.70 (t, *J* = 6.8 Hz, 2H), 2.58 (t, *J* = 7.0 Hz, 2H), 1.72 (dddt, *J* = 12.2, 10.5, 5.0, 2.6 Hz, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.47, 168.35, 165.83, 133.90, 133.39, 132.05, 129.86, 129.18, 128.45, 123.21, 68.39, 38.02, 37.34, 27.88, 20.23. IR (cm^{-1}): 2937, 2662, 1771, 1759, 1715, 1625, 1602, 1452, 1437, 1364, 1278, 1120, 1043, 913, 713. MS (ESI) ($M+Na^+$): 388.08.

6-Acetoxy-2-oxohexyl benzoate 3y



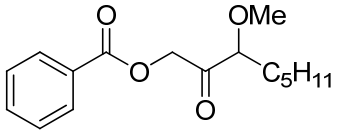
The compound **3y** was prepared in 92% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:6). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.13 – 8.00 (m, 2H), 7.69 – 7.54 (m, 1H), 7.48 – 7.39 (m, 2H), 4.87 (s, 2H), 4.06 (t, *J* = 6.2 Hz, 2H), 2.54 (t, *J* = 7.1 Hz, 2H), 2.03 (s, 3H), 1.80 – 1.62 (m, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 203.58, 171.07, 165.84, 133.43, 129.83, 129.12, 128.46, 68.36, 63.90, 38.15, 27.93, 20.90, 19.62. IR (cm^{-1}): 2662, 1725, 1629, 1602, 1585, 1453, 1417, 1368, 1316, 1277, 1248, 1114, 1044, 1027, 980, 714. MS (ESI) ($M+Na^+$): 301.07.

2-Oxo-5-(tosyloxy)pentyl benzoate 3z



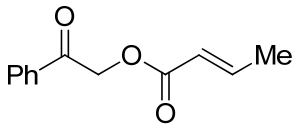
The compound **3z** was prepared in 76% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:8). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.08 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.80 – 7.72 (m, 2H), 7.60 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.51 – 7.42 (m, 2H), 7.32 (d, *J* = 8.0 Hz, 2H), 4.82 (s, 2H), 4.07 (t, *J* = 6.0 Hz, 2H), 2.62 (t, *J* = 6.9 Hz, 2H), 2.43 (s, 3H), 2.02 – 1.93 (m, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 202.83, 165.78, 144.88, 133.48, 132.81, 129.87, 129.83, 129.02, 128.48, 127.82, 69.27, 68.30, 34.26, 22.39, 21.59. IR (cm^{-1}): 2931, 1720, 1638, 1600, 1584, 1493, 1452, 1415, 1366, 1315, 1276, 1172, 1098, 1030, 993, 982, 712. MS (ESI) ($M+Na^{+}$): 399.04.

3-Methoxy-2-oxooctyl benzoate 3aa



The compound **3aa** was prepared in 59% yield according to the general procedure (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 8.09 (dt, *J* = 8.4, 1.5 Hz, 2H), 7.58 (tt, *J* = 7.1, 1.3 Hz, 1H), 7.49 – 7.42 (m, 2H), 5.33 – 4.89 (m, 2H), 3.78 (t, *J* = 6.2 Hz, 1H), 3.46 (s, 3H), 1.94 – 1.66 (m, 2H), 1.42 (dtd, *J* = 13.8, 8.0, 7.3, 3.9 Hz, 2H), 1.31 (qq, *J* = 7.9, 4.6, 3.8 Hz, 4H), 0.89 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 205.41, 165.92, 133.27, 129.85, 129.35, 128.39, 86.22, 66.67, 58.51, 31.82, 31.56, 24.43, 22.42, 13.96. IR (cm^{-1}): 2886, 2862, 1726, 1636, 1603, 1453, 1408, 1367, 1316, 1277, 1102, 1072, 866, 712. MS (ESI) ($M+Na^{+}$): 301.12.

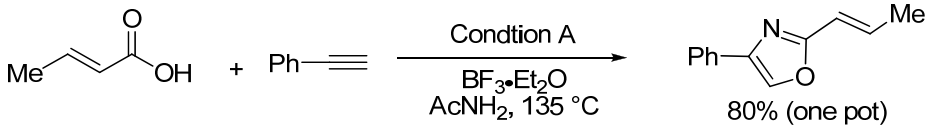
(*E*)-2-oxo-2-phenylethyl but-2-enoate (3ab)



The compound **3ab** was prepared in 93% yield according to the condition A. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.95 – 7.89 (m, 2H), 7.61 (t, *J* = 7.4 Hz, 1H), 7.49 (t, *J* = 7.7 Hz, 2H), 7.18 – 7.05 (m, 1H), 6.01 (dd, *J* = 15.6, 1.7 Hz, 1H), 5.39 (s, 2H), 1.93 (dd, *J* = 6.9, 1.6 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 192.33, 165.72, 146.38, 134.30, 133.80, 128.82, 127.78, 121.69,

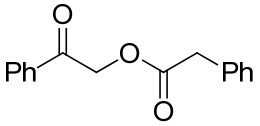
65.81, 18.13. IR (cm^{-1}): 2943, 1742, 1707, 1659, 1451, 1373, 1180, 1107, 969, 758. MS (ESI/ $[M+Na]^+$):227.07

Condition B: General procedure for synthesis (*E*)-4-phenyl-2-(prop-1-enyl)oxazole 4 in one pot.



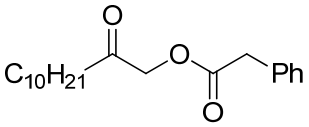
To a 3 dram vial containing 2 mL of chlorobenzene were added sequentially a crotonic acid(0.2 mmol), an alkyne (0.26 mmol), L_5AuCl (0.01 mmol) and $NaBAr^F_4$ (0.02 mmol). The resulting mixture was stirred at room temperature. To this vial a solution of 8-methylquinoline *N*-oxide (47.7 mg, 0.3 mmol) in 4 mL of chlorobenzene was then added via a syringe pump in 12 h. Then acetamide (2 mmol) with $BF_3 \cdot Et_2O$ (2 mmol) was added into the vial and the reaction system was stirred at 135 °C. Upon the completion by TLC, the reaction mixture was concentrated under vacuum. The residue was purified by chromatography on silica gel (eluent: hexanes /ethyl acetate) to afford the desired product (*E*)-4-phenyl-2-(prop-1-enyl)oxazole **4** in 80% yield. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.80 (s, 1H), 7.73 (d, *J* = 7.1 Hz, 2H), 7.40 (t, *J* = 7.6 Hz, 2H), 7.33 – 7.29 (m, 1H), 6.79 (dd, *J* = 15.9, 6.9 Hz, 1H), 6.37 (dd, *J* = 15.9, 1.7 Hz, 1H), 1.96 (dd, *J* = 6.9, 1.7 Hz, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 161.46, 141.36, 135.51, 132.55, 131.12, 128.67, 127.95, 125.46, 117.87, 18.46. IR (cm^{-1}): 3099, 2933, 1442, 1346, 1068, 961, 756. GCMS (*m*/*z*):185.

2-oxo-2-phenylethyl 2-phenylacetate 3ac



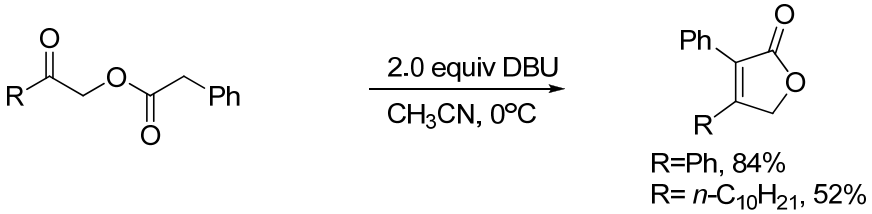
The compound **3ac** was prepared in 88 % yield according to the condition A. ^{1}H NMR (600 MHz, Chloroform-d) δ 7.92 – 7.87 (m, 2H), 7.60 (t, *J* = 7.4 Hz, 1H), 7.48 (t, *J* = 7.7 Hz, 2H), 7.37 – 7.33 (m, 4H), 7.30-7.28 (m, 1H), 5.35 (s, 2H), 3.83 (s, 2H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 191.98, 171.01, 134.17, 133.85, 133.56, 129.40, 128.83, 128.59, 127.75, 127.19, 66.34, 40.86. IR (cm^{-1}): 1745, 1704, 1589, 1450, 1226, 1152, 978. MS (ESI/$[M+Na]^+$):277.08

2-oxododecyl 2-phenylacetate 3ad



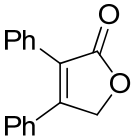
The compound **3ad** was prepared in 85 % yield according to the condition A. ^{1}H NMR (600 MHz, Chloroform-d) δ 7.36 – 7.31 (m, 4H), 7.30 – 7.26 (m, 1H), 4.65 (s, 2H), 3.75 (s, 2H), 2.34 (t, *J* = 7.5 Hz, 2H), 1.57 (dd, *J* = 12.9, 5.8 Hz, 2H), 1.31-1.25 (m, 14H), 0.88 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 203.96, 170.83, 133.46, 129.32, 128.60, 127.23, 68.23, 40.85, 38.79, 31.86, 29.52, 29.40, 29.27, 29.08, 23.21, 22.65, 14.09. IR (cm^{-1}): 2926, 2855, 1734, 1497, 1456, 1244, 1158. MS (ESI/[M+Na]$^{+}$): 341.22.

Condition C: General procedure for synthesis 3-phenylfuran-2(5H)-one from 2-oxo-2-ethyl 2-phenylacetates



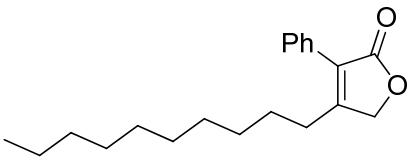
A solution of 1,8-Diazabicycloundec-7-ene(DBU) (61mg, 0.4 mmol, 2 equiv) in CH_3CN (0.5 mL) was added drop wise to a stirred solution of 2-oxo-2-ethyl 2-phenylacetate (50.8 mg, 0.2 mmol) in CH_3CN (1 mL) at 0 ºC. The mixture was stirred at 0 ºC for 5 min, then TLC shows that it has done. Then water was added and extracted with ethyl acetate (3 x 10 mL). The combined extracts were washed with water, and dried over sodium sulfate. Removal of the solvent *in vacuo* gave a residue, which was purified by silica gel column chromatography using ethyl acetate-hexane (1:10, v/v) as eluent to afford 3,4-diphenylfuran-2(5H)-one (39.6mg, 84%).

3,4-diphenylfuran-2(5*H*)-one 6



^{1}H NMR (600 MHz, Chloroform-d) δ 7.46 – 7.28 (m, 10H), 5.18 (s, 2H). ^{13}C NMR (151 MHz, cdcl$_3$) *δ* 173.40, 156.05, 130.83, 130.57, 130.13, 129.24, 128.98, 128.78, 128.66, 127.46, 126.17, 70.55. IR (cm^{-1}): 2922, 1752, 1447, 1340, 1037, 1064, 975, 788. MS (ESI/[M+Na]$^{+}$):259.08.

4-decyl-3-phenylfuran-2(5*H*)-one 7



The compound **7** was prepared in 52 % yield according to the condition C. Time 2h. ^{1}H NMR (500 MHz, Chloroform-d) δ 7.46-7.43 (m, 4H), 7.38 (m, 1H), 4.83 (s, 2H), 2.67 – 2.55 (m, 2H), 1.59 – 1.50 (m, 2H), 1.37 – 1.21 (m, 14H), 0.88 (t, J = 7.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 173.53, 162.19, 130.03, 128.86, 128.51, 128.41, 126.57, 71.14, 31.84, 29.70, 29.54, 29.49, 29.40, 29.25, 29.16, 27.91, 27.72, 22.65, 14.09. IR (cm^{-1}): 2926, 2855, 1761, 1500, 1446, 1128, 1036, 789. MS (ESI/$[M+Na]^+$): 323.19.

Abstract

Experimental

Crystal data

$C_{35}H_{52}AuCl_5NP$
$M_r = 891.96$
Triclinic, $P\overline{1}$
$a = 10.1842$ (7) Å
$b = 12.352$ (1) Å
$c = 15.6495$ (11) Å
$\alpha = 103.871$ (4)°
$\beta = 93.006$ (4)°
$\gamma = 109.440$ (4)°
$V = 1783.4$ (2) Å^3
$Z = 2$
Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
$\mu = 4.57$ mm^{-1}
$T = 100$ K
0.30 × 0.20 × 0.05 mm

Data collection

Bruker Kappa Apex diffractometer
Absorption correction: Multi-scan *SADABS*
$T_{min} = 0.440$, $T_{max} = 0.746$
20907 measured reflections
10930 independent reflections
9219 reflections with $I > 2\sigma(I)$
$R_{int} = 0.046$

Refinement

$R[F^2 > 2\sigma(F^2)] = 0.053$
$wR(F^2) = 0.140$
$S = 1.01$
10930 reflections
399 parameters
1 restraint
H-atom parameters constrained
$\Delta\rho_{max} = 5.57$ e Å^{-3}
$\Delta\rho_{min} = -5.71$ e Å^{-3}

Program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008).

References

NOT FOUND

supplementary materials

Experimental

(dayton_0m)

Crystal data

$C_{35}H_{52}AuCl_5NP$
$M_r = 891.96$
Triclinic, $P\overline{1}$
$a = 10.1842$ (7) Å
$b = 12.352$ (1) Å
$c = 15.6495$ (11) Å
$\alpha = 103.871$ (4)°
$\beta = 93.006$ (4)°
$\gamma = 109.440$ (4)°
$V = 1783.4$ (2) Å^3
$Z = 2$
$F(000) = 896$
$D_x = 1.661$ Mg m^{-3}
Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
$\mu = 4.57$ mm^{-1}
$T = 100$ K
Plate, Colorless
0.30 × 0.20 × 0.05 mm

Data collection

Bruker Kappa Apex diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
ω scan
Absorption correction: Multi-scan *SADABS*
$T_{min} = 0.440$, $T_{max} = 0.746$
20907 measured reflections
10930 independent reflections
9219 reflections with $I > 2\sigma(I)$
$R_{int} = 0.046$
$\theta_{max} = 30.8°$, $\theta_{min} = 1.4°$
$h = -13 \rightarrow 14$
$k = -17 \rightarrow 15$
$l = -22 \rightarrow 21$

Refinement

Refinement on F^2
Least-squares matrix: Full
$R[F^2 > 2\sigma(F^2)] = 0.053$
$wR(F^2) = 0.140$
$S = 1.01$
10930 reflections
399 parameters
1 restraint
Primary atom site location: Structure-invariant direct methods
Secondary atom site location: Difference Fourier map
Hydrogen site location: Inferred from neighbouring sites
H-atom parameters constrained
$w = 1/[\sigma^2(F_o^2) + (0.0876P)^2 + 3.8471P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max} = 0.002$
$\Delta\rho_{max} = 5.57$ e Å^{-3}
$\Delta\rho_{min} = -5.71$ e Å^{-3}

Special details

Geometry. All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds involving l.s. planes.

Refinement. Refinement of F^2 against ALL reflections. The weighted R-factor wR and goodness of fit S are based on F^2, conventional R-factors R are based on F, with F set to zero for negative F^2. The threshold expression of $F^2 > 2$sigma(F^2) is used only for calculating R-factors(gt) etc. and is not relevant to the choice of reflections for refinement. R-factors based on F^2 are statistically about twice as large as those based on F, and R- factors based on ALL data will be even larger.

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²)

	x	*y*	*z*	U_{iso}*/U_{eq}	Occ. (<1)
Au1	1.112082 (17)	0.700140 (16)	0.256942 (11)	0.01466 (7)	
C1	0.7999 (5)	0.6815 (4)	0.3381 (3)	0.0137 (8)	
C2	0.6531 (5)	0.6539 (4)	0.3314 (3)	0.0160 (9)	
H2	0.6017	0.6384	0.2761	0.019*	
C3	0.5831 (5)	0.6494 (5)	0.4049 (3)	0.0180 (9)	
H3	0.4860	0.6294	0.3986	0.022*	
C4	0.6596 (5)	0.6750 (5)	0.4880 (3)	0.0191 (10)	
H4	0.6137	0.6706	0.5376	0.023*	
C5	0.8047 (5)	0.7071 (5)	0.4966 (3)	0.0178 (9)	
H5	0.8557	0.7273	0.5527	0.021*	
C6	0.8758 (5)	0.7097 (4)	0.4230 (3)	0.0139 (8)	
C7	1.0696 (5)	0.6646 (4)	0.4803 (3)	0.0151 (9)	
H7A	1.0225	0.5821	0.4461	0.018*	
H7B	1.0401	0.6735	0.5387	0.018*	
C8	1.2286 (5)	0.6936 (4)	0.4902 (3)	0.0159 (9)	
H8	1.2566	0.6777	0.4309	0.019*	
C9	1.3035 (5)	0.8250 (5)	0.5381 (3)	0.0189 (10)	
H9A	1.4042	0.8447	0.5397	0.023*	
H9B	1.2840	0.8397	0.5990	0.023*	
C10	1.2571 (5)	0.9050 (5)	0.4928 (3)	0.0178 (9)	
H10	1.2833	0.8934	0.4328	0.021*	
C11	1.0971 (5)	0.8680 (4)	0.4848 (3)	0.0163 (9)	
H11A	1.0698	0.8815	0.5438	0.020*	
H11B	1.0668	0.9171	0.4541	0.020*	
C12	1.2669 (6)	0.6141 (6)	0.5404 (4)	0.0257 (11)	
H12A	1.3667	0.6321	0.5462	0.039*	
H12B	1.2193	0.5319	0.5082	0.039*	
H12C	1.2387	0.6282	0.5984	0.039*	
C13	1.3273 (6)	1.0368 (5)	0.5431 (4)	0.0247 (11)	
H13A	1.2990	1.0504	0.6011	0.037*	
H13B	1.2995	1.0845	0.5109	0.037*	
H13C	1.4277	1.0584	0.5490	0.037*	
C14	0.7834 (5)	0.5222 (4)	0.1584 (3)	0.0144 (8)	
C15	0.8766 (6)	0.4927 (5)	0.0873 (3)	0.0196 (10)	
H15A	0.8907	0.5474	0.0504	0.024*	
H15B	0.9679	0.5030	0.1166	0.024*	
C16	0.6388 (5)	0.5028 (5)	0.1090 (3)	0.0194 (10)	
H16A	0.5782	0.5205	0.1518	0.023*	
H16B	0.6506	0.5565	0.0714	0.023*	
C17	0.7637 (6)	0.4333 (5)	0.2158 (3)	0.0192 (10)	
H17A	0.8543	0.4443	0.2466	0.023*	
H17B	0.7041	0.4485	0.2600	0.023*	
C18	0.6963 (6)	0.3048 (5)	0.1566 (4)	0.0226 (11)	
H18	0.6841	0.2495	0.1937	0.027*	
C19	0.7894 (6)	0.2780 (5)	0.0868 (4)	0.0245 (11)	
H19A	0.8810	0.2884	0.1159	0.029*	
H19B	0.7467	0.1961	0.0506	0.029*	
C20	0.8060 (6)	0.3631 (5)	0.0284 (4)	0.0222 (10)	
H20	0.8657	0.3466	−0.0164	0.027*	
C21	0.6619 (6)	0.3470 (5)	−0.0185 (4)	0.0247 (11)	
H21A	0.6733	0.4011	−0.0556	0.030*	

H21B	0.6177	0.2659	−0.0562	0.030*	
C22	0.5701 (6)	0.3727 (5)	0.0515 (4)	0.0239 (11)	
H22	0.4774	0.3614	0.0218	0.029*	
C23	0.5525 (6)	0.2878 (5)	0.1097 (4)	0.0258 (11)	
H23A	0.5081	0.2061	0.0734	0.031*	
H23B	0.4925	0.3034	0.1535	0.031*	
C24	0.9571 (5)	0.9173 (4)	0.2673 (3)	0.0165 (9)	
H24A	0.9173	0.9198	0.3224	0.020*	
H24B	1.0520	0.9180	0.2784	0.020*	
C25	0.8666 (5)	0.8012 (4)	0.1950 (3)	0.0137 (8)	
C26	0.7161 (5)	0.8041 (4)	0.1805 (3)	0.0162 (9)	
H26A	0.6561	0.7319	0.1365	0.019*	
H26B	0.6767	0.8078	0.2357	0.019*	
C27	0.7222 (5)	0.9141 (5)	0.1484 (4)	0.0197 (10)	
H27	0.6267	0.9145	0.1378	0.024*	
C28	0.8118 (6)	1.0275 (5)	0.2199 (4)	0.0199 (10)	
H28A	0.7709	1.0309	0.2746	0.024*	
H28B	0.8144	1.0971	0.2007	0.024*	
C29	0.9611 (6)	1.0271 (5)	0.2360 (3)	0.0194 (10)	
H29	1.0186	1.0998	0.2819	0.023*	
C30	1.0254 (6)	1.0235 (5)	0.1502 (4)	0.0214 (10)	
H30A	1.1205	1.0244	0.1605	0.026*	
H30B	1.0295	1.0933	0.1308	0.026*	
C31	0.9359 (6)	0.9098 (5)	0.0776 (3)	0.0183 (9)	
H31	0.9773	0.9078	0.0224	0.022*	
C32	0.7869 (6)	0.9101 (5)	0.0618 (3)	0.0202 (10)	
H32A	0.7295	0.8389	0.0160	0.024*	
H32B	0.7894	0.9791	0.0417	0.024*	
C33	0.9306 (5)	0.7999 (5)	0.1081 (3)	0.0169 (9)	
H33A	1.0250	0.7987	0.1173	0.020*	
H33B	0.8744	0.7283	0.0623	0.020*	
C34	0.4367 (8)	0.0249 (7)	0.2474 (5)	0.0371 (15)	
H34A	0.5380	0.0653	0.2580	0.045*	
H34B	0.4156	−0.0464	0.2679	0.045*	
C35	0.2546 (8)	0.4180 (6)	0.2400 (4)	0.0371 (15)	
Cl1	1.34888 (12)	0.72730 (12)	0.26741 (8)	0.0209 (2)	
Cl2	0.37839 (18)	−0.01667 (15)	0.13308 (10)	0.0338 (3)	
Cl3	0.3586 (2)	0.1191 (3)	0.30921 (13)	0.0678 (8)	
Cl5	0.1081 (3)	0.38231 (19)	0.29787 (12)	0.0420 (4)	0.90
Cl6	0.3403 (11)	0.3452 (11)	0.2835 (7)	0.052 (2)	0.20
Cl7	0.20566 (18)	0.36354 (16)	0.12498 (10)	0.0296 (3)	0.90
N	1.0267 (4)	0.7418 (4)	0.4360 (3)	0.0138 (7)	
P	0.88228 (12)	0.67502 (11)	0.23616 (8)	0.0121 (2)	

Atomic displacement parameters (Å²)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Au1	0.00833 (9)	0.01778 (10)	0.01339 (9)	0.00242 (6)	−0.00293 (6)	0.00028 (6)
C1	0.0055 (17)	0.017 (2)	0.0116 (18)	−0.0011 (16)	−0.0004 (14)	−0.0003 (16)
C2	0.0094 (19)	0.019 (2)	0.0142 (19)	0.0019 (17)	−0.0044 (16)	−0.0004 (17)
C3	0.012 (2)	0.020 (2)	0.019 (2)	0.0042 (18)	0.0005 (17)	0.0025 (18)
C4	0.015 (2)	0.026 (3)	0.015 (2)	0.0084 (19)	0.0006 (17)	0.0023 (18)
C5	0.013 (2)	0.022 (2)	0.0127 (19)	0.0021 (18)	−0.0032 (16)	0.0013 (17)
C6	0.0104 (19)	0.011 (2)	0.016 (2)	0.0022 (16)	−0.0030 (16)	−0.0007 (16)

C7	0.0104 (19)	0.014 (2)	0.017 (2)	0.0021 (16)	−0.0022 (16)	0.0007 (16)
C8	0.0078 (19)	0.019 (2)	0.017 (2)	0.0027 (17)	−0.0011 (16)	0.0030 (17)
C9	0.010 (2)	0.023 (2)	0.017 (2)	0.0008 (18)	−0.0028 (16)	0.0025 (18)
C10	0.015 (2)	0.017 (2)	0.015 (2)	0.0019 (18)	−0.0029 (17)	−0.0001 (17)
C11	0.012 (2)	0.017 (2)	0.016 (2)	0.0017 (17)	−0.0035 (16)	0.0014 (17)
C12	0.014 (2)	0.030 (3)	0.035 (3)	0.008 (2)	0.001 (2)	0.014 (2)
C13	0.019 (2)	0.019 (3)	0.027 (3)	−0.001 (2)	0.000 (2)	0.001 (2)
C14	0.0118 (19)	0.012 (2)	0.0152 (19)	0.0009 (16)	−0.0012 (16)	0.0016 (16)
C15	0.016 (2)	0.017 (2)	0.017 (2)	0.0004 (18)	0.0008 (17)	−0.0025 (18)
C16	0.012 (2)	0.020 (2)	0.018 (2)	0.0013 (18)	−0.0086 (17)	−0.0014 (18)
C17	0.017 (2)	0.018 (2)	0.016 (2)	0.0033 (19)	−0.0033 (18)	0.0007 (18)
C18	0.023 (3)	0.013 (2)	0.024 (2)	−0.0001 (19)	−0.004 (2)	0.0024 (19)
C19	0.019 (2)	0.017 (2)	0.026 (3)	0.0014 (19)	−0.006 (2)	−0.004 (2)
C20	0.023 (3)	0.014 (2)	0.019 (2)	−0.0001 (19)	0.0005 (19)	−0.0038 (18)
C21	0.027 (3)	0.018 (2)	0.018 (2)	−0.001 (2)	−0.009 (2)	−0.0007 (19)
C22	0.018 (2)	0.020 (2)	0.024 (2)	0.003 (2)	−0.013 (2)	−0.003 (2)
C23	0.016 (2)	0.020 (3)	0.030 (3)	−0.002 (2)	−0.005 (2)	0.001 (2)
C24	0.013 (2)	0.015 (2)	0.015 (2)	0.0002 (17)	−0.0056 (16)	0.0005 (16)
C25	0.0114 (19)	0.015 (2)	0.0099 (17)	0.0014 (16)	−0.0037 (15)	0.0009 (15)
C26	0.012 (2)	0.015 (2)	0.020 (2)	0.0048 (17)	−0.0036 (17)	0.0023 (17)
C27	0.012 (2)	0.023 (2)	0.023 (2)	0.0067 (19)	−0.0043 (18)	0.0029 (19)
C28	0.019 (2)	0.017 (2)	0.021 (2)	0.0078 (19)	−0.0005 (19)	−0.0005 (18)
C29	0.020 (2)	0.021 (2)	0.014 (2)	0.007 (2)	−0.0038 (18)	−0.0004 (17)
C30	0.017 (2)	0.017 (2)	0.024 (2)	−0.0001 (19)	−0.0040 (19)	0.0041 (19)
C31	0.020 (2)	0.017 (2)	0.014 (2)	0.0030 (19)	0.0006 (17)	0.0027 (17)
C32	0.019 (2)	0.021 (2)	0.016 (2)	0.0039 (19)	−0.0056 (18)	0.0024 (18)
C33	0.018 (2)	0.020 (2)	0.0114 (19)	0.0076 (18)	−0.0002 (16)	0.0011 (17)
C34	0.035 (3)	0.035 (3)	0.033 (3)	0.008 (3)	−0.008 (3)	0.003 (3)
C35	0.035 (3)	0.039 (4)	0.027 (3)	0.009 (3)	−0.009 (3)	−0.002 (3)
Cl1	0.0106 (5)	0.0310 (7)	0.0198 (5)	0.0073 (5)	−0.0007 (4)	0.0052 (5)
Cl2	0.0334 (8)	0.0402 (8)	0.0269 (7)	0.0192 (7)	−0.0008 (6)	−0.0004 (6)
Cl3	0.0350 (9)	0.1043 (19)	0.0369 (9)	0.0315 (11)	−0.0156 (8)	−0.0350 (11)
Cl5	0.0626 (13)	0.0465 (11)	0.0223 (7)	0.0231 (10)	0.0129 (8)	0.0129 (7)
Cl6	0.043 (5)	0.082 (8)	0.040 (5)	0.029 (5)	0.009 (4)	0.020 (5)
Cl7	0.0287 (8)	0.0355 (8)	0.0168 (6)	0.0052 (6)	0.0007 (5)	0.0025 (6)
N	0.0095 (17)	0.0145 (18)	0.0124 (16)	0.0014 (14)	−0.0036 (13)	0.0001 (14)
P	0.0078 (5)	0.0132 (5)	0.0106 (5)	0.0009 (4)	−0.0028 (4)	−0.0002 (4)

Geometric parameters (Å, º)

Au1—P	2.2512 (12)	C18—C19	1.531 (8)
Au1—Cl1	2.3128 (12)	C18—H18	0.9800
C1—C6	1.405 (6)	C19—C20	1.526 (9)
C1—C2	1.411 (6)	C19—H19A	0.9700
C1—P	1.838 (5)	C19—H19B	0.9700
C2—C3	1.387 (7)	C20—C21	1.534 (8)
C2—H2	0.9300	C20—H20	0.9800
C3—C4	1.389 (7)	C21—C22	1.521 (9)
C3—H3	0.9300	C21—H21A	0.9700
C4—C5	1.387 (7)	C21—H21B	0.9700
C4—H4	0.9300	C22—C23	1.521 (9)
C5—C6	1.393 (7)	C22—H22	0.9800
C5—H5	0.9300	C23—H23A	0.9700
C6—N	1.444 (6)	C23—H23B	0.9700

C7—N	1.464 (6)	C24—C29	1.537 (8)
C7—C8	1.528 (7)	C24—C25	1.555 (6)
C7—H7A	0.9700	C24—H24A	0.9700
C7—H7B	0.9700	C24—H24B	0.9700
C8—C9	1.519 (7)	C25—C33	1.537 (7)
C8—C12	1.526 (8)	C25—C26	1.551 (7)
C8—H8	0.9800	C25—P	1.872 (5)
C9—C10	1.522 (8)	C26—C27	1.541 (7)
C9—H9A	0.9700	C26—H26A	0.9700
C9—H9B	0.9700	C26—H26B	0.9700
C10—C13	1.528 (7)	C27—C28	1.529 (7)
C10—C11	1.528 (7)	C27—C32	1.535 (8)
C10—H10	0.9800	C27—H27	0.9800
C11—N	1.468 (6)	C28—C29	1.530 (7)
C11—H11A	0.9700	C28—H28A	0.9700
C11—H11B	0.9700	C28—H28B	0.9700
C12—H12A	0.9600	C29—C30	1.522 (8)
C12—H12B	0.9600	C29—H29	0.9800
C12—H12C	0.9600	C30—C31	1.539 (7)
C13—H13A	0.9600	C30—H30A	0.9700
C13—H13B	0.9600	C30—H30B	0.9700
C13—H13C	0.9600	C31—C32	1.527 (8)
C14—C16	1.543 (7)	C31—C33	1.528 (7)
C14—C17	1.548 (7)	C31—H31	0.9800
C14—C15	1.556 (7)	C32—H32A	0.9700
C14—P	1.887 (5)	C32—H32B	0.9700
C15—C20	1.545 (7)	C33—H33A	0.9700
C15—H15A	0.9700	C33—H33B	0.9700
C15—H15B	0.9700	C34—Cl2	1.750 (7)
C16—C22	1.540 (7)	C34—Cl3	1.755 (8)
C16—H16A	0.9700	C34—H34A	0.9700
C16—H16B	0.9700	C34—H34B	0.9700
C17—C18	1.534 (7)	C35—Cl6	1.669 (8)
C17—H17A	0.9700	C35—Cl7	1.744 (7)
C17—H17B	0.9700	C35—Cl5	1.771 (8)
C18—C23	1.529 (8)		

P—Au1—Cl1	175.65 (4)	C19—C20—H20	109.3
C6—C1—C2	117.9 (4)	C21—C20—H20	109.3
C6—C1—P	123.1 (3)	C15—C20—H20	109.3
C2—C1—P	119.0 (3)	C22—C21—C20	108.9 (4)
C3—C2—C1	121.9 (4)	C22—C21—H21A	109.9
C3—C2—H2	119.1	C20—C21—H21A	109.9
C1—C2—H2	119.1	C22—C21—H21B	109.9
C2—C3—C4	119.4 (5)	C20—C21—H21B	109.9
C2—C3—H3	120.3	H21A—C21—H21B	108.3
C4—C3—H3	120.3	C21—C22—C23	109.8 (5)
C5—C4—C3	119.6 (5)	C21—C22—C16	109.5 (5)
C5—C4—H4	120.2	C23—C22—C16	110.0 (5)
C3—C4—H4	120.2	C21—C22—H22	109.2
C4—C5—C6	121.5 (4)	C23—C22—H22	109.2
C4—C5—H5	119.3	C16—C22—H22	109.2
C6—C5—H5	119.3	C22—C23—C18	109.8 (5)
C5—C6—C1	119.7 (4)	C22—C23—H23A	109.7

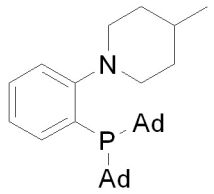
245	C5—C6—N	118.9 (4)	C18—C23—H23A	109.7
246	C1—C6—N	121.5 (4)	C22—C23—H23B	109.7
247	N—C7—C8	112.3 (4)	C18—C23—H23B	109.7
248	N—C7—H7A	109.1	H23A—C23—H23B	108.2
249	C8—C7—H7A	109.1	C29—C24—C25	109.9 (4)
250	N—C7—H7B	109.1	C29—C24—H24A	109.7
251	C8—C7—H7B	109.1	C25—C24—H24A	109.7
252	H7A—C7—H7B	107.9	C29—C24—H24B	109.7
253	C9—C8—C12	111.4 (4)	C25—C24—H24B	109.7
254	C9—C8—C7	109.4 (4)	H24A—C24—H24B	108.2
255	C12—C8—C7	109.6 (4)	C33—C25—C26	109.5 (4)
256	C9—C8—H8	108.8	C33—C25—C24	108.7 (4)
257	C12—C8—H8	108.8	C26—C25—C24	107.5 (4)
258	C7—C8—H8	108.8	C33—C25—P	108.7 (3)
259	C8—C9—C10	111.9 (4)	C26—C25—P	116.2 (3)
260	C8—C9—H9A	109.2	C24—C25—P	105.9 (3)
261	C10—C9—H9A	109.2	C27—C26—C25	109.5 (4)
262	C8—C9—H9B	109.2	C27—C26—H26A	109.8
263	C10—C9—H9B	109.2	C25—C26—H26A	109.8
264	H9A—C9—H9B	107.9	C27—C26—H26B	109.8
265	C9—C10—C13	112.0 (4)	C25—C26—H26B	109.8
266	C9—C10—C11	109.1 (4)	H26A—C26—H26B	108.2
267	C13—C10—C11	110.3 (4)	C28—C27—C32	109.4 (4)
268	C9—C10—H10	108.5	C28—C27—C26	109.4 (4)
269	C13—C10—H10	108.5	C32—C27—C26	110.2 (4)
270	C11—C10—H10	108.5	C28—C27—H27	109.3
271	N—C11—C10	111.4 (4)	C32—C27—H27	109.3
272	N—C11—H11A	109.3	C26—C27—H27	109.3
273	C10—C11—H11A	109.3	C27—C28—C29	109.3 (4)
274	N—C11—H11B	109.3	C27—C28—H28A	109.8
275	C10—C11—H11B	109.3	C29—C28—H28A	109.8
276	H11A—C11—H11B	108.0	C27—C28—H28B	109.8
277	C8—C12—H12A	109.5	C29—C28—H28B	109.8
278	C8—C12—H12B	109.5	H28A—C28—H28B	108.3
279	H12A—C12—H12B	109.5	C30—C29—C28	109.6 (4)
280	C8—C12—H12C	109.5	C30—C29—C24	109.4 (4)
281	H12A—C12—H12C	109.5	C28—C29—C24	109.8 (4)
282	H12B—C12—H12C	109.5	C30—C29—H29	109.3
283	C10—C13—H13A	109.5	C28—C29—H29	109.3
284	C10—C13—H13B	109.5	C24—C29—H29	109.3
285	H13A—C13—H13B	109.5	C29—C30—C31	109.8 (4)
286	C10—C13—H13C	109.5	C29—C30—H30A	109.7
287	H13A—C13—H13C	109.5	C31—C30—H30A	109.7
288	H13B—C13—H13C	109.5	C29—C30—H30B	109.7
289	C16—C14—C17	109.1 (4)	C31—C30—H30B	109.7
290	C16—C14—C15	107.7 (4)	H30A—C30—H30B	108.2
291	C17—C14—C15	107.8 (4)	C32—C31—C33	109.3 (4)
292	C16—C14—P	116.9 (3)	C32—C31—C30	109.0 (4)
293	C17—C14—P	106.1 (3)	C33—C31—C30	109.6 (4)
294	C15—C14—P	108.9 (3)	C32—C31—H31	109.7
295	C20—C15—C14	110.5 (4)	C33—C31—H31	109.7
296	C20—C15—H15A	109.5	C30—C31—H31	109.7
297	C14—C15—H15A	109.5	C31—C32—C27	109.7 (4)
298	C20—C15—H15B	109.5	C31—C32—H32A	109.7

C14—C15—H15B	109.5	C27—C32—H32A	109.7
H15A—C15—H15B	108.1	C31—C32—H32B	109.7
C22—C16—C14	110.2 (4)	C27—C32—H32B	109.7
C22—C16—H16A	109.6	H32A—C32—H32B	108.2
C14—C16—H16A	109.6	C31—C33—C25	110.7 (4)
C22—C16—H16B	109.6	C31—C33—H33A	109.5
C14—C16—H16B	109.6	C25—C33—H33A	109.5
H16A—C16—H16B	108.1	C31—C33—H33B	109.5
C18—C17—C14	110.0 (4)	C25—C33—H33B	109.5
C18—C17—H17A	109.7	H33A—C33—H33B	108.1
C14—C17—H17A	109.7	Cl2—C34—Cl3	112.8 (4)
C18—C17—H17B	109.7	Cl2—C34—H34A	109.0
C14—C17—H17B	109.7	Cl3—C34—H34A	109.0
H17A—C17—H17B	108.2	Cl2—C34—H34B	109.0
C23—C18—C19	109.3 (5)	Cl3—C34—H34B	109.0
C23—C18—C17	109.2 (5)	H34A—C34—H34B	107.8
C19—C18—C17	110.7 (4)	Cl6—C35—Cl7	114.1 (5)
C23—C18—H18	109.2	Cl6—C35—Cl5	96.4 (5)
C19—C18—H18	109.2	Cl7—C35—Cl5	112.0 (4)
C17—C18—H18	109.2	C6—N—C7	111.8 (4)
C20—C19—C18	108.9 (5)	C6—N—C11	111.2 (4)
C20—C19—H19A	109.9	C7—N—C11	111.1 (4)
C18—C19—H19A	109.9	C1—P—C25	105.6 (2)
C20—C19—H19B	109.9	C1—P—C14	106.2 (2)
C18—C19—H19B	109.9	C25—P—C14	114.3 (2)
H19A—C19—H19B	108.3	C1—P—Au1	114.29 (15)
C19—C20—C21	110.4 (5)	C25—P—Au1	107.81 (16)
C19—C20—C15	108.9 (4)	C14—P—Au1	108.69 (16)
C21—C20—C15	109.6 (5)		

C6—C1—C2—C3	−2.7 (7)	C32—C27—C28—C29	−60.0 (6)
P—C1—C2—C3	175.6 (4)	C26—C27—C28—C29	60.7 (6)
C1—C2—C3—C4	1.3 (8)	C27—C28—C29—C30	60.2 (6)
C2—C3—C4—C5	1.3 (8)	C27—C28—C29—C24	−60.0 (6)
C3—C4—C5—C6	−2.6 (8)	C25—C24—C29—C30	−60.0 (5)
C4—C5—C6—C1	1.2 (8)	C25—C24—C29—C28	60.3 (5)
C4—C5—C6—N	−178.9 (5)	C28—C29—C30—C31	−60.2 (6)
C2—C1—C6—C5	1.4 (7)	C24—C29—C30—C31	60.3 (5)
P—C1—C6—C5	−176.9 (4)	C29—C30—C31—C32	59.7 (6)
C2—C1—C6—N	−178.4 (4)	C29—C30—C31—C33	−59.8 (6)
P—C1—C6—N	3.3 (7)	C33—C31—C32—C27	60.2 (5)
N—C7—C8—C9	55.0 (5)	C30—C31—C32—C27	−59.6 (6)
N—C7—C8—C12	177.4 (4)	C28—C27—C32—C31	60.2 (6)
C12—C8—C9—C10	−175.3 (4)	C26—C27—C32—C31	−60.0 (5)
C7—C8—C9—C10	−53.9 (6)	C32—C31—C33—C25	−60.0 (5)
C8—C9—C10—C13	177.5 (4)	C30—C31—C33—C25	59.3 (5)
C8—C9—C10—C11	55.1 (5)	C26—C25—C33—C31	58.7 (5)
C9—C10—C11—N	−57.1 (5)	C24—C25—C33—C31	−58.5 (5)
C13—C10—C11—N	179.5 (4)	P—C25—C33—C31	−173.4 (3)
C16—C14—C15—C20	−58.3 (6)	C5—C6—N—C7	56.2 (6)
C17—C14—C15—C20	59.3 (5)	C1—C6—N—C7	−123.9 (5)
P—C14—C15—C20	174.0 (4)	C5—C6—N—C11	−68.5 (6)
C17—C14—C16—C22	−57.5 (6)	C1—C6—N—C11	111.3 (5)
C15—C14—C16—C22	59.3 (6)	C8—C7—N—C6	177.1 (4)

P—C14—C16—C22	−177.8 (4)	C8—C7—N—C11	−58.1 (5)
C16—C14—C17—C18	58.6 (5)	C10—C11—N—C6	−175.8 (4)
C15—C14—C17—C18	−58.1 (5)	C10—C11—N—C7	59.1 (5)
P—C14—C17—C18	−174.6 (4)	C6—C1—P—C25	−113.2 (4)
C14—C17—C18—C23	−60.4 (6)	C2—C1—P—C25	68.5 (4)
C14—C17—C18—C19	60.0 (6)	C6—C1—P—C14	125.0 (4)
C23—C18—C19—C20	59.6 (5)	C2—C1—P—C14	−53.3 (5)
C17—C18—C19—C20	−60.7 (6)	C6—C1—P—Au1	5.1 (5)
C18—C19—C20—C21	−59.9 (5)	C2—C1—P—Au1	−173.1 (3)
C18—C19—C20—C15	60.5 (6)	C33—C25—P—C1	−178.7 (3)
C14—C15—C20—C19	−61.3 (6)	C26—C25—P—C1	−54.6 (4)
C14—C15—C20—C21	59.6 (6)	C24—C25—P—C1	64.6 (4)
C19—C20—C21—C22	59.7 (6)	C33—C25—P—C14	−62.3 (4)
C15—C20—C21—C22	−60.3 (6)	C26—C25—P—C14	61.8 (4)
C20—C21—C22—C23	−59.5 (6)	C24—C25—P—C14	−178.9 (3)
C20—C21—C22—C16	61.3 (6)	C33—C25—P—Au1	58.7 (3)
C14—C16—C22—C21	−62.0 (6)	C26—C25—P—Au1	−177.2 (3)
C14—C16—C22—C23	58.7 (6)	C24—C25—P—Au1	−58.0 (3)
C21—C22—C23—C18	60.5 (6)	C16—C14—P—C1	77.9 (4)
C16—C22—C23—C18	−60.1 (6)	C17—C14—P—C1	−44.0 (4)
C19—C18—C23—C22	−60.3 (6)	C15—C14—P—C1	−159.8 (3)
C17—C18—C23—C22	60.9 (6)	C16—C14—P—C25	−38.2 (4)
C29—C24—C25—C33	58.7 (5)	C17—C14—P—C25	−160.1 (3)
C29—C24—C25—C26	−59.9 (5)	C15—C14—P—C25	84.1 (4)
C29—C24—C25—P	175.3 (3)	C16—C14—P—Au1	−158.7 (3)
C33—C25—C26—C27	−57.4 (5)	C17—C14—P—Au1	79.5 (3)
C24—C25—C26—C27	60.6 (5)	C15—C14—P—Au1	−36.4 (4)
P—C25—C26—C27	179.0 (3)	Cl1—Au1—P—C1	−168.9 (6)
C25—C26—C27—C28	−61.9 (5)	Cl1—Au1—P—C25	−51.8 (6)
C25—C26—C27—C32	58.4 (5)	Cl1—Au1—P—C14	72.6 (6)

Title jkg-IV-80-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86



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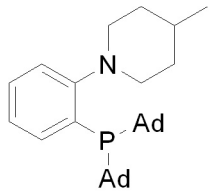
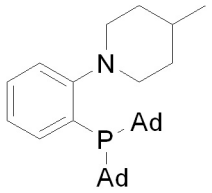
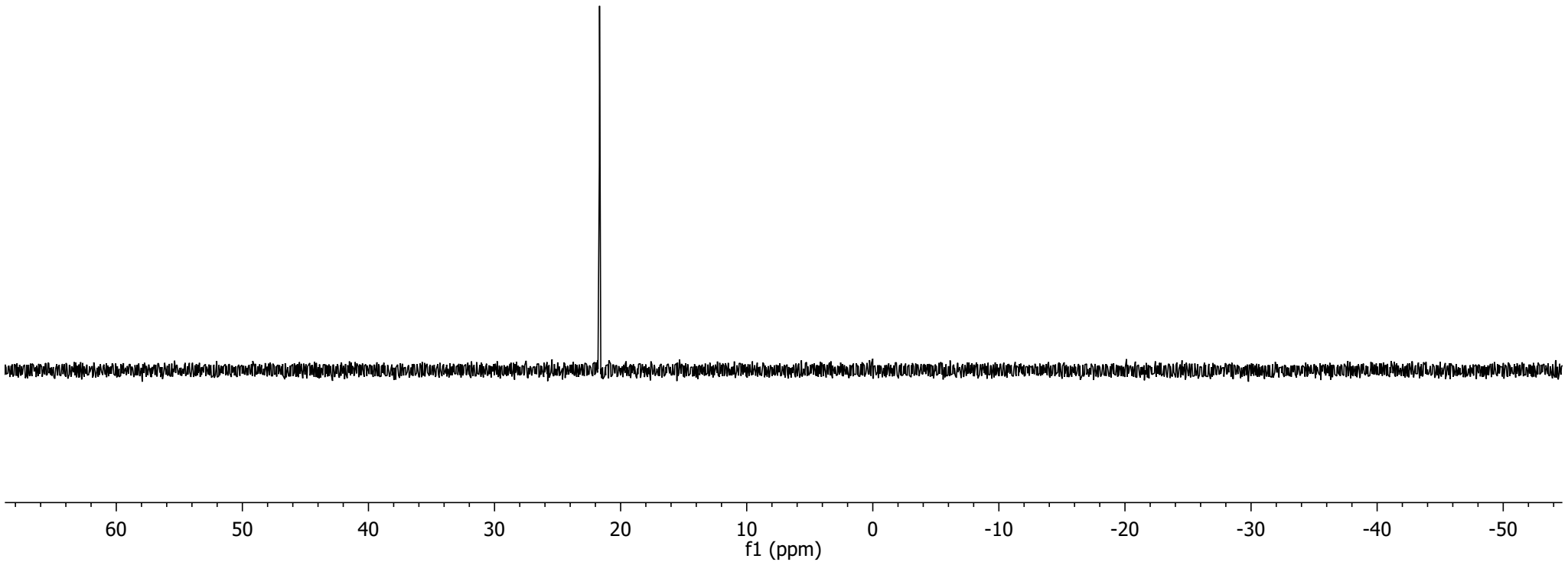
f1 (ppm)

Title jkg-IV-80-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70

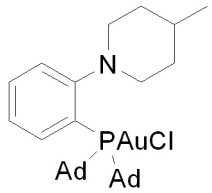


Title jkg-IV-80-P31
Solvent cdcl3
Spectrometer Frequency 161.90

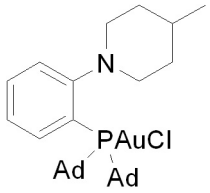




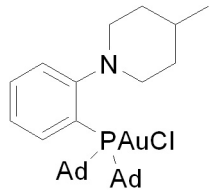
Title jkg-IV-81A-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86

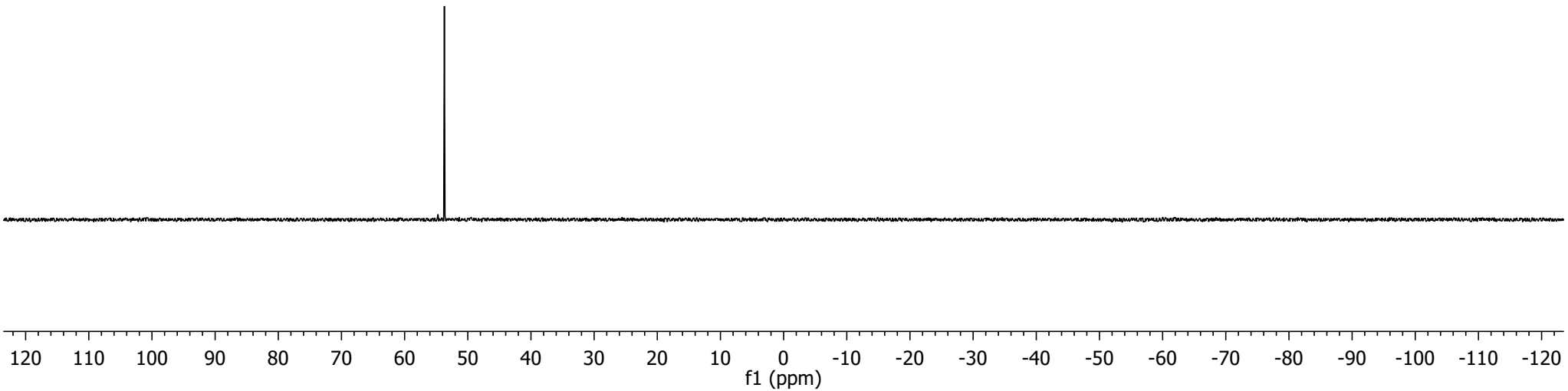


Title jkg-IV-81A-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

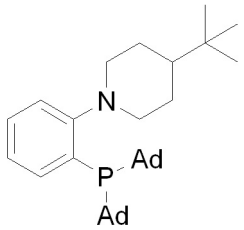


Title jkg-IV-81-P31
Solvent cdcl3
Spectrometer Frequency 161.90

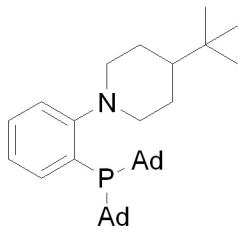




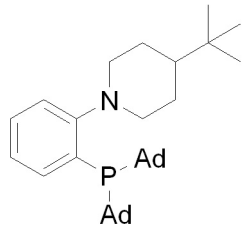
Title jkg-V-64B-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86

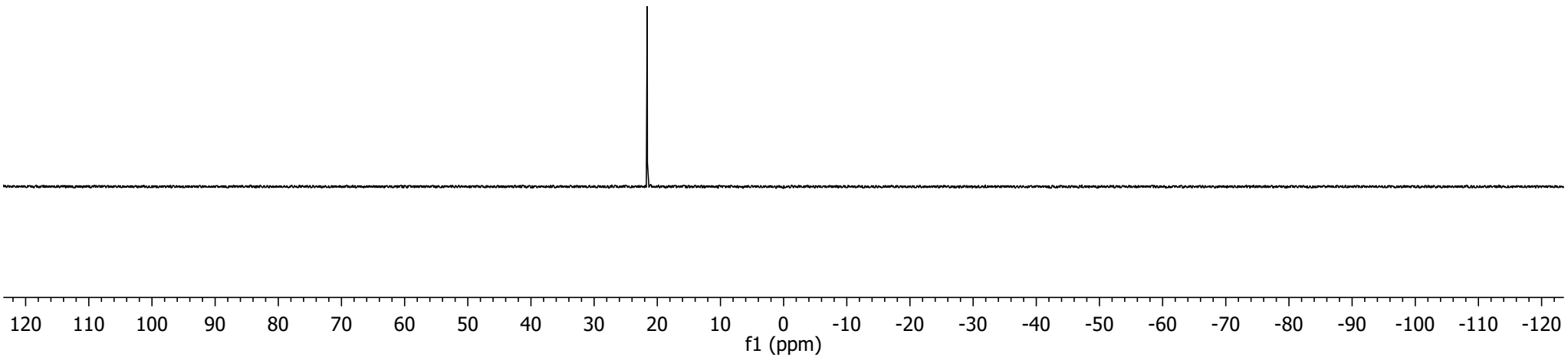


Title jkg-V-64B-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70

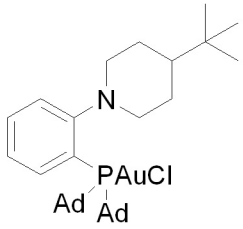


Title jkg-V-64B-ligand-P31
Solvent cdcl3
Spectrometer Frequency 161.90

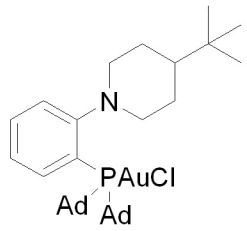




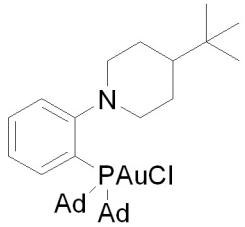
Title jkg-V-5A-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86

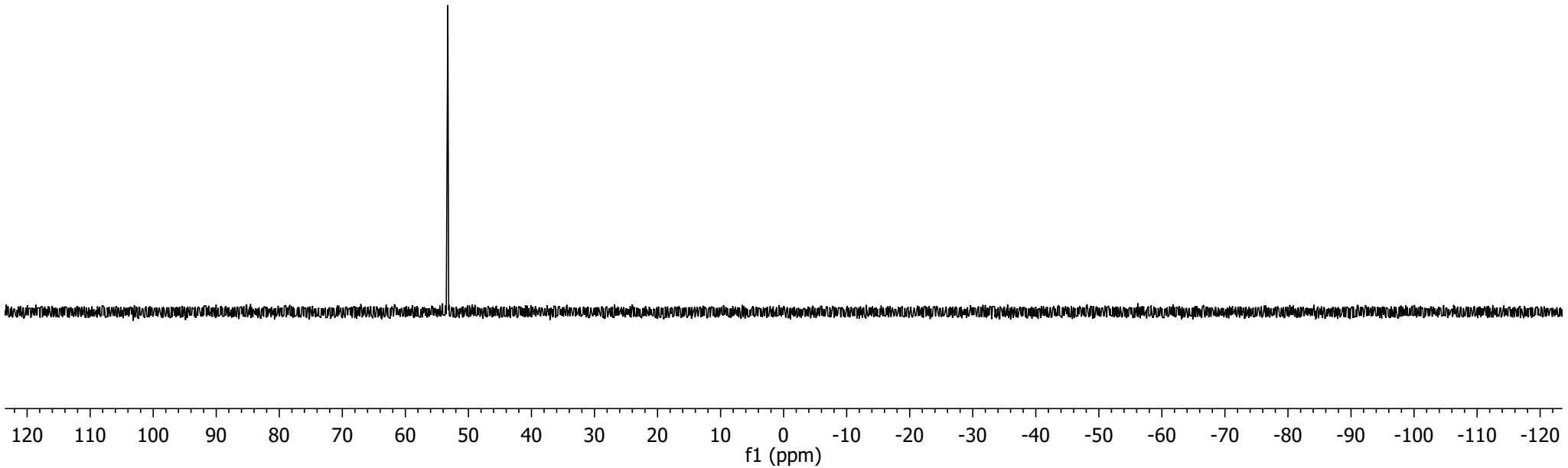


Title jkg-V-5A-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

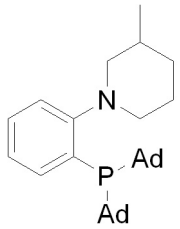


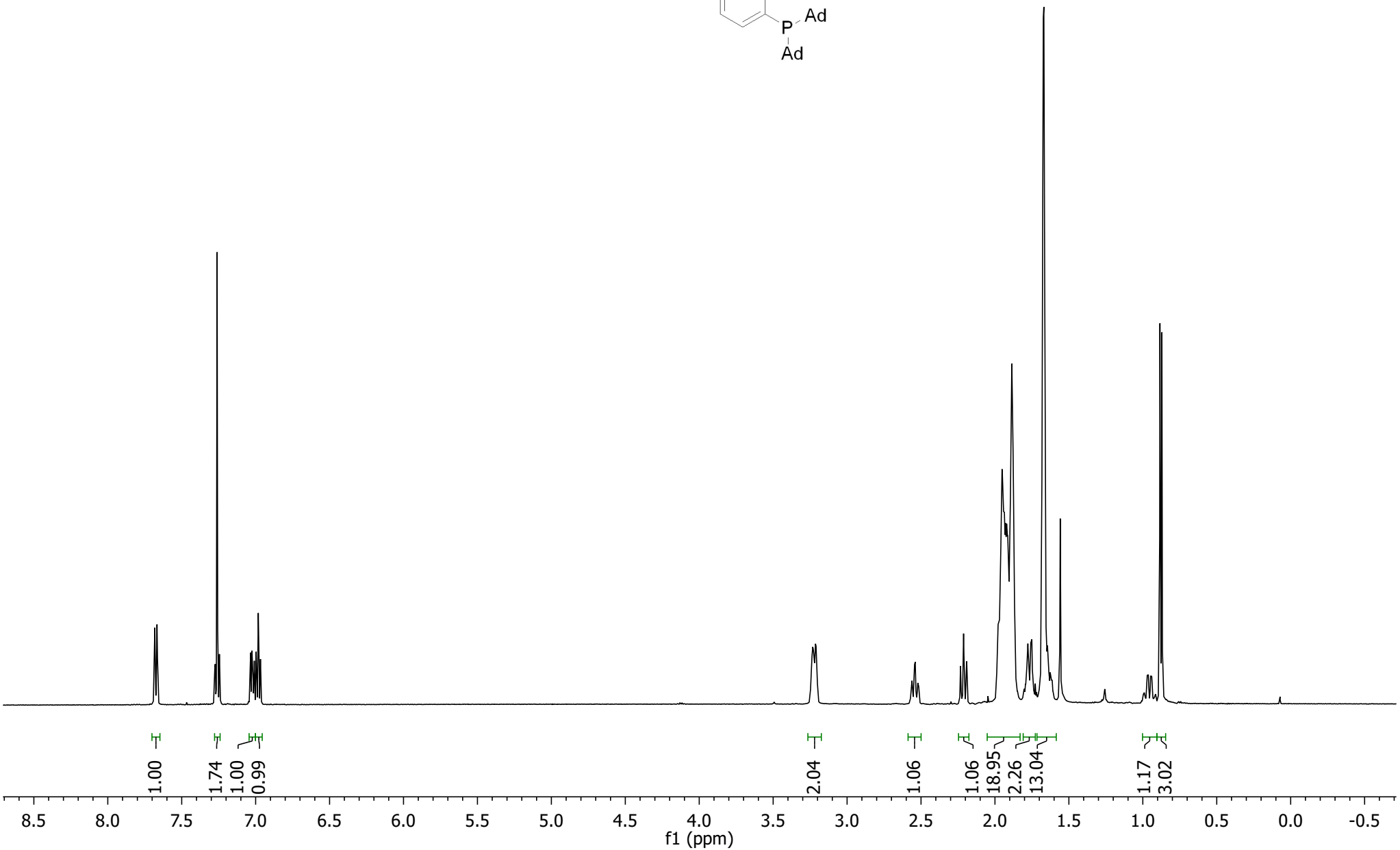
Title jkg-V-5A-P31-LAuCl
Solvent cdcl3
Spectrometer Frequency 161.90



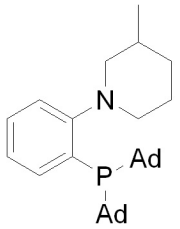


Title jkg-IV-138B-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86





Title jkg-IV-138B-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70



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Solvent cdcl3
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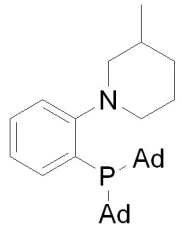
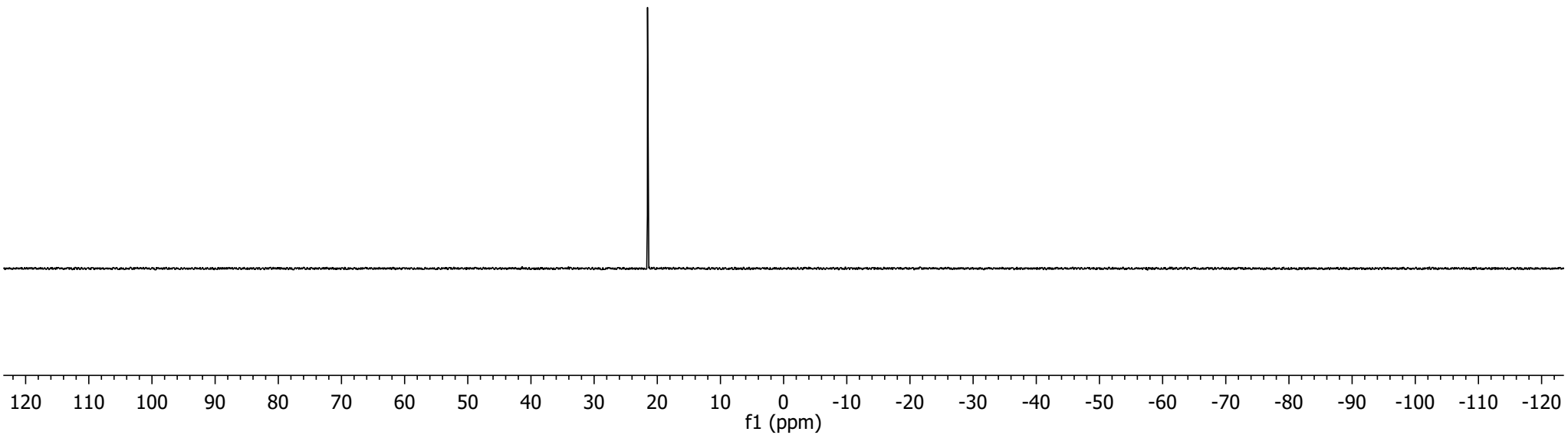
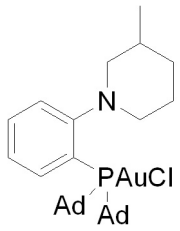




Title jkg-IV-140A-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86



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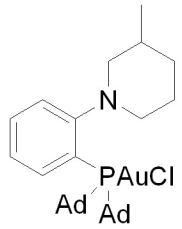
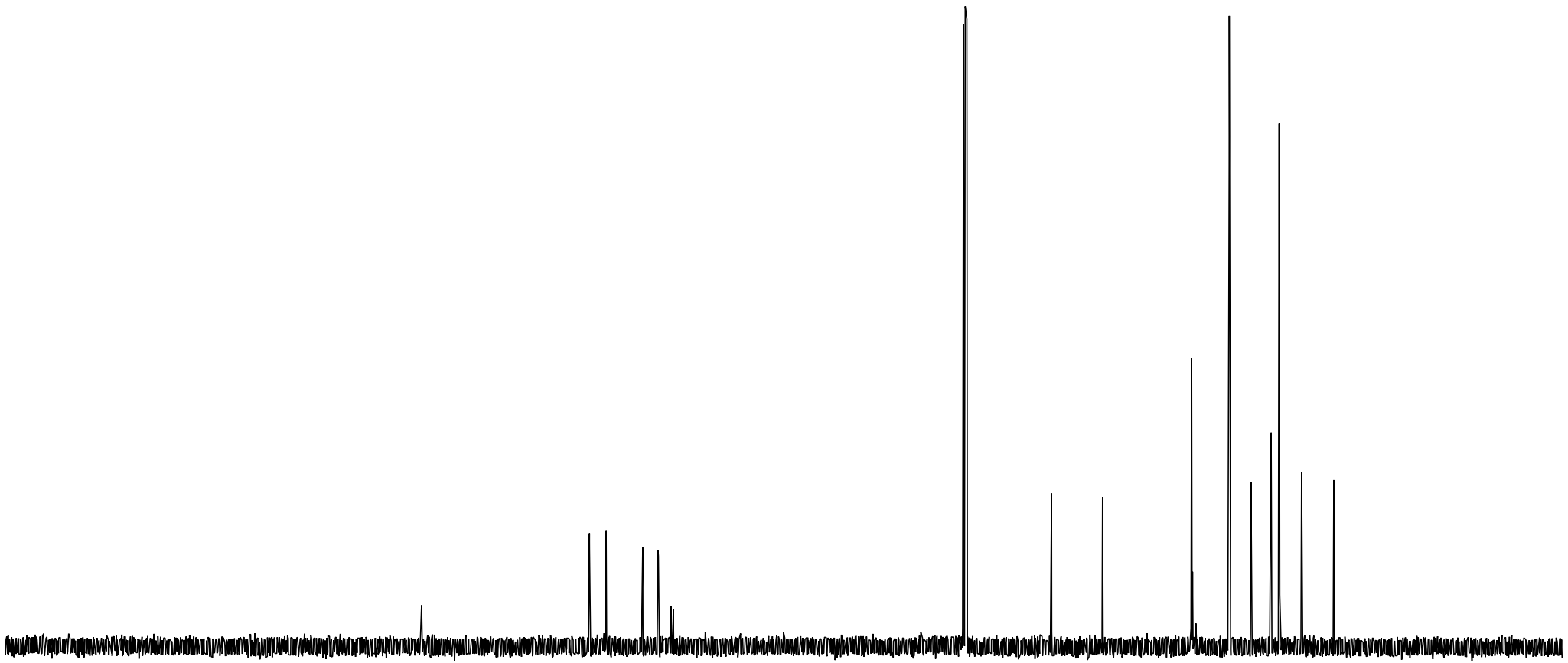
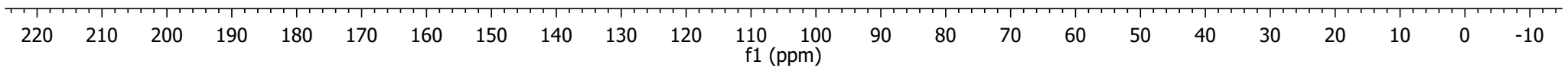
f1 (ppm)

Title jkg-IV-140A-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

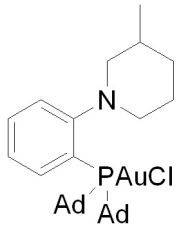


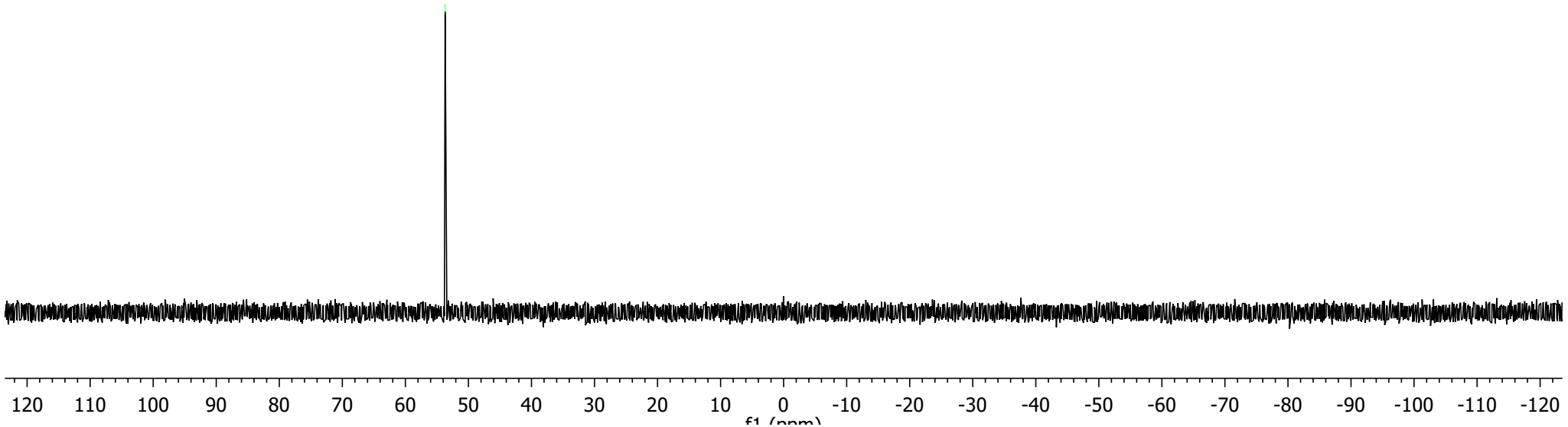




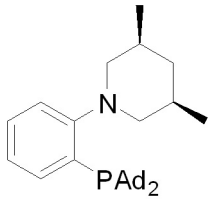
Title jkg-IV-140B-LAuCl-P31
Solvent cdcl3
Spectrometer Frequency 161.90

53.69

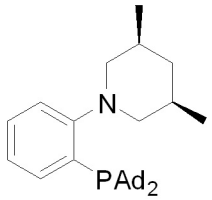


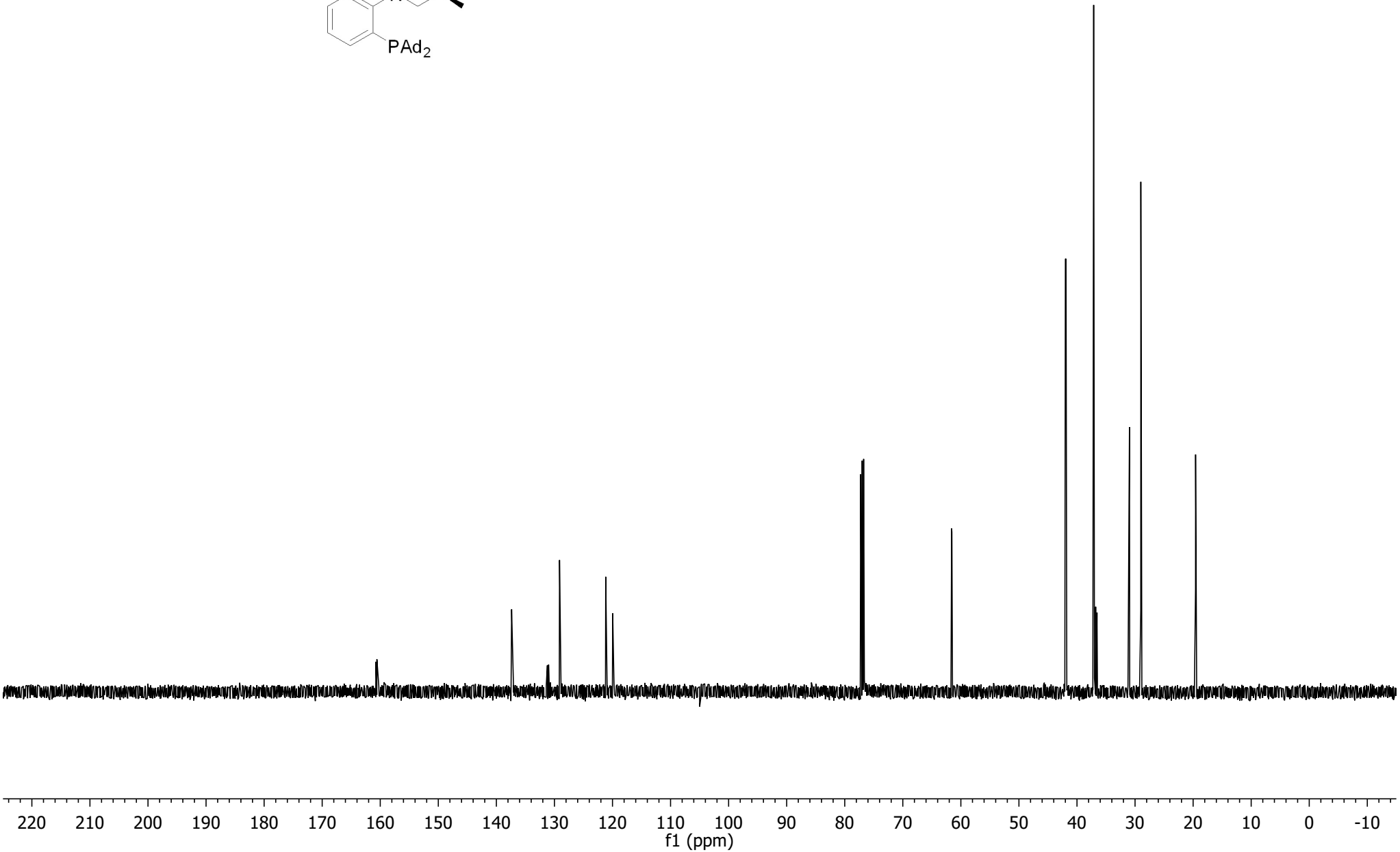


Title jkg-V-21B-Ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86



Title jkg-V-21B-Ligand-C13
Solvent CDCl3
Spectrometer Frequency 125.70





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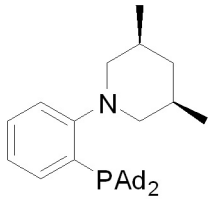
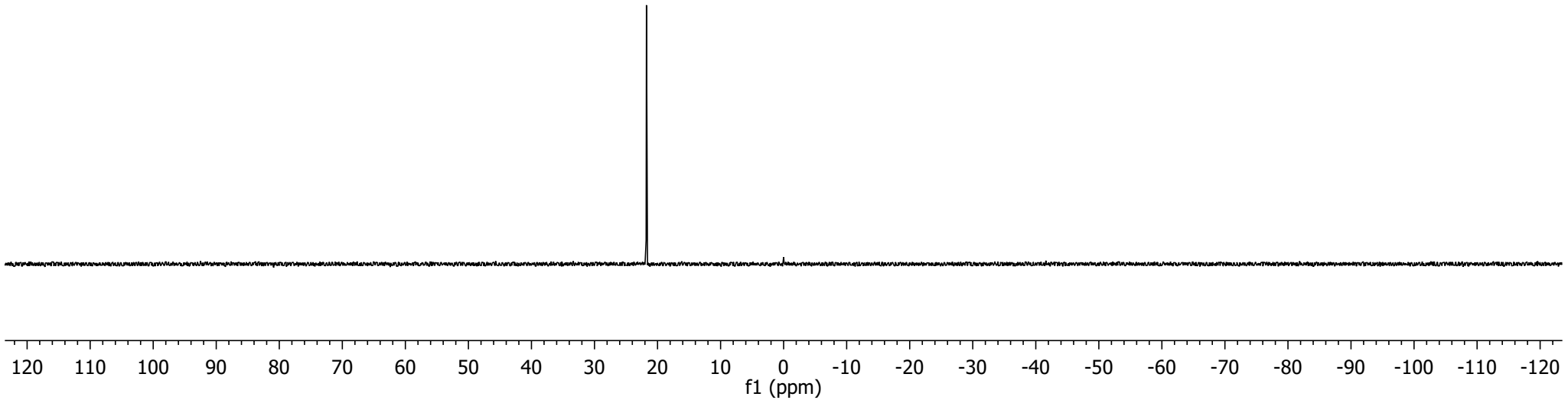
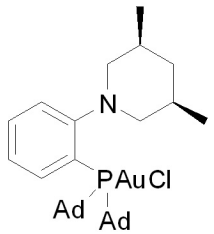
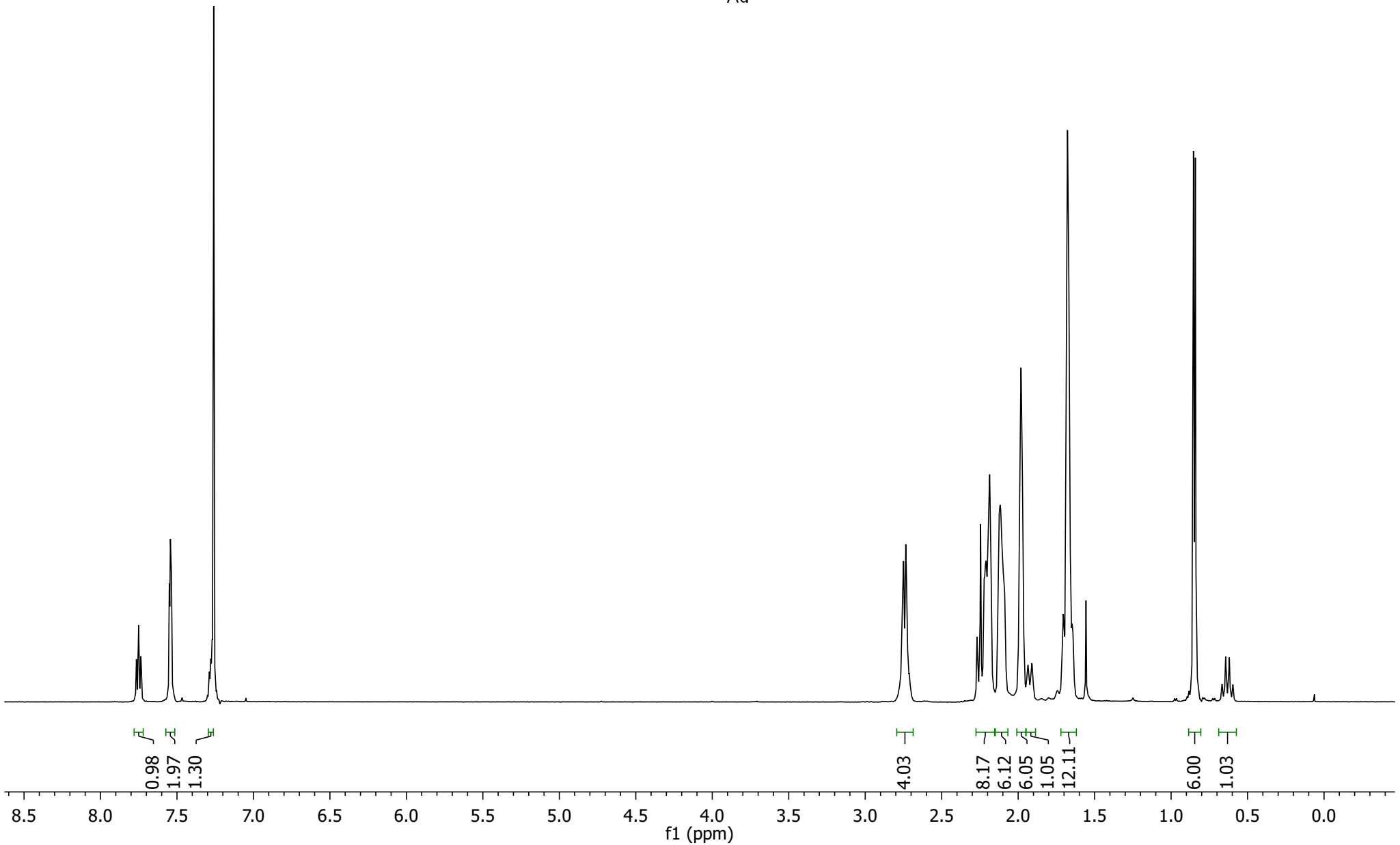
Solvent cdcl3
Spectrometer Frequency 161.90





Title jkg-V-25-1-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86





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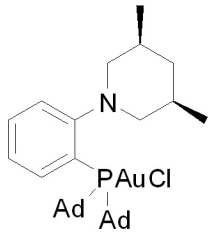
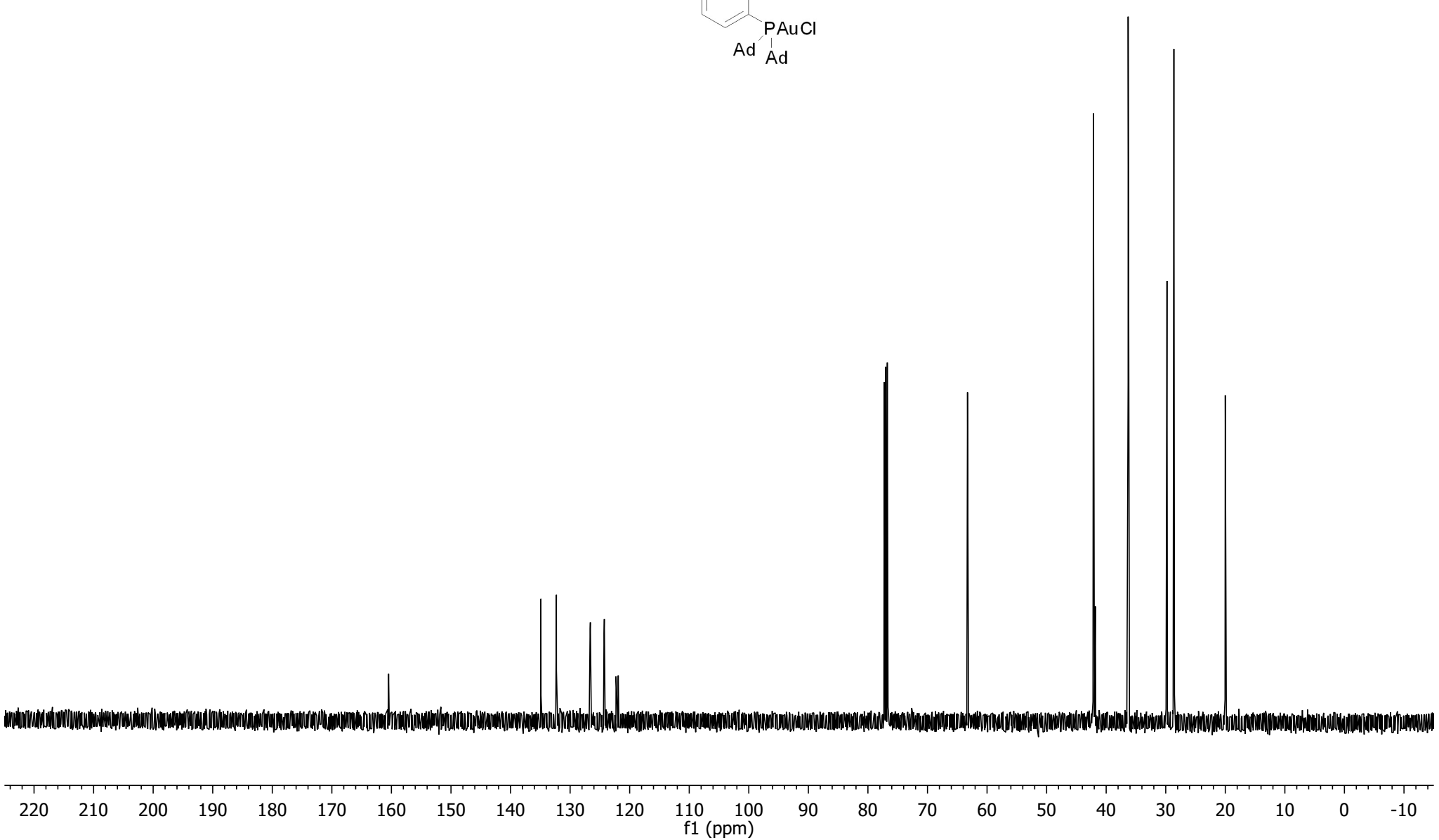
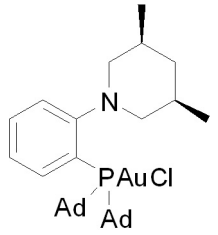
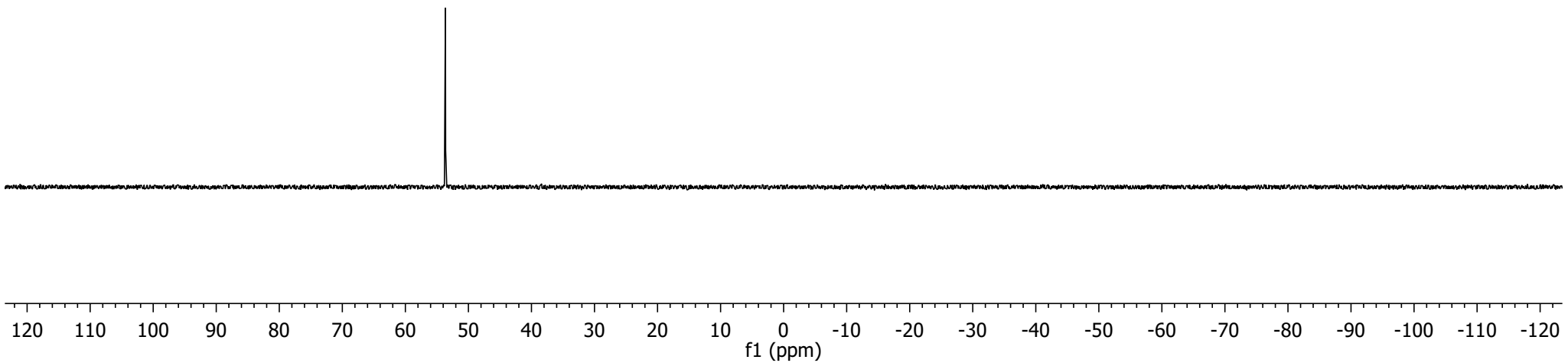
Solvent CDCl3
Spectrometer Frequency 125.70



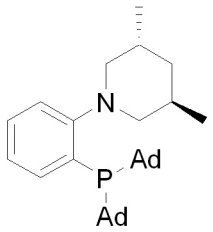


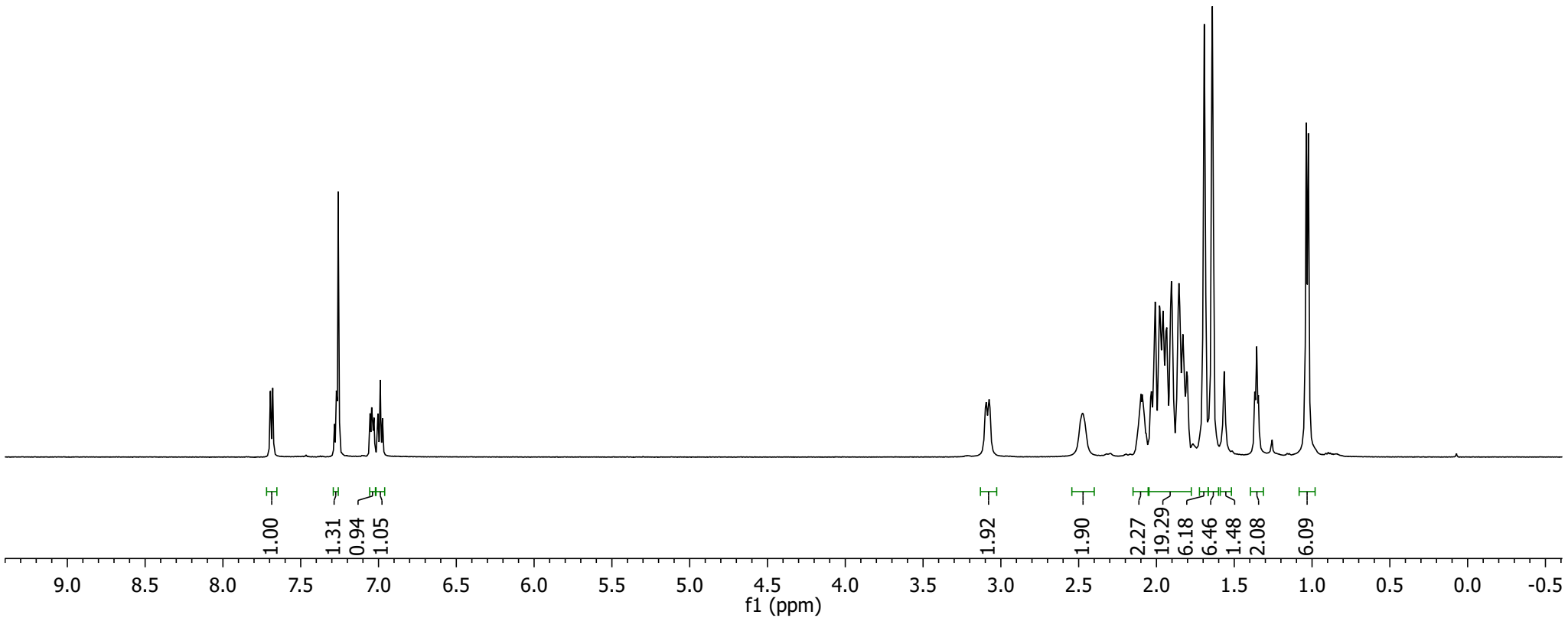
Title jkg-V-25-1-LAuCl-P31
Solvent cdcl3
Spectrometer Frequency 161.90



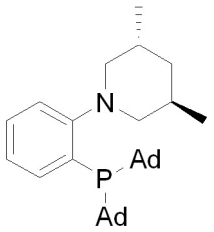


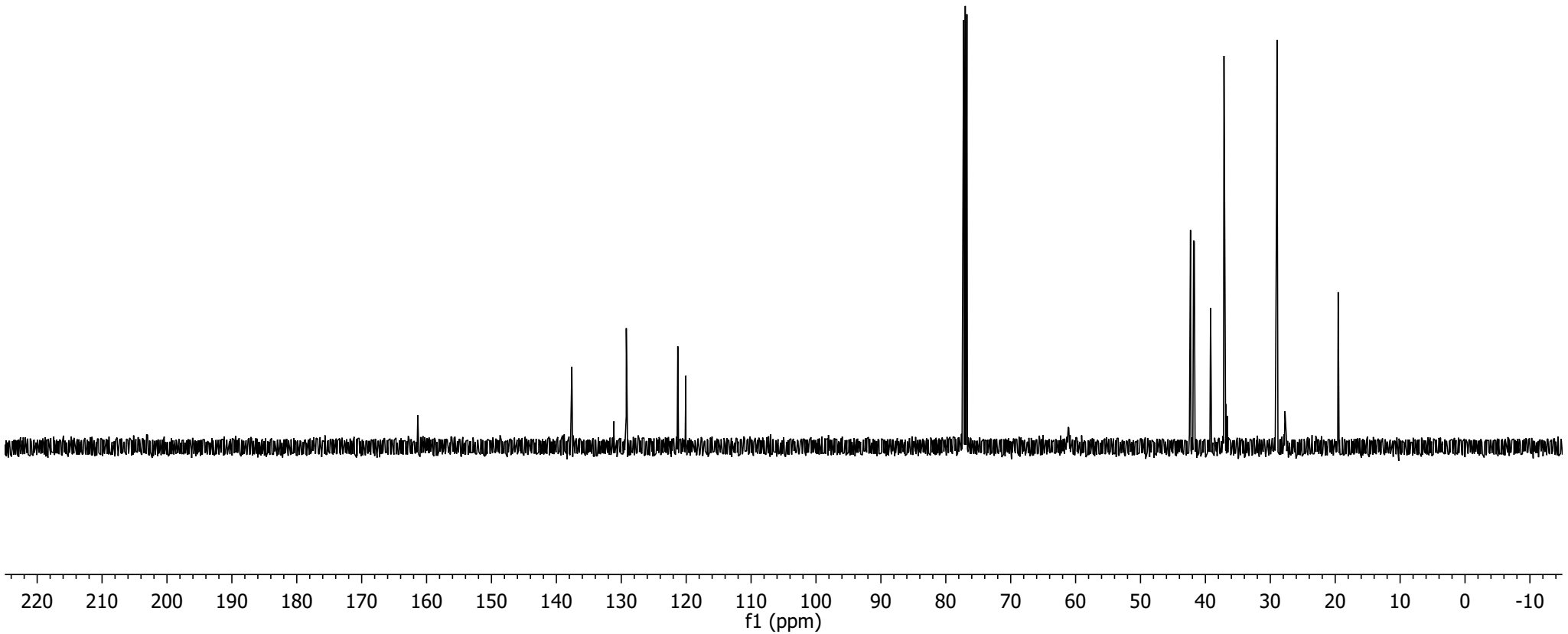
Title jkg-IV-113-Ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86



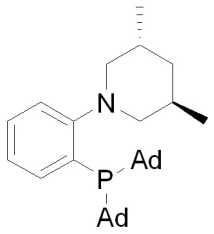


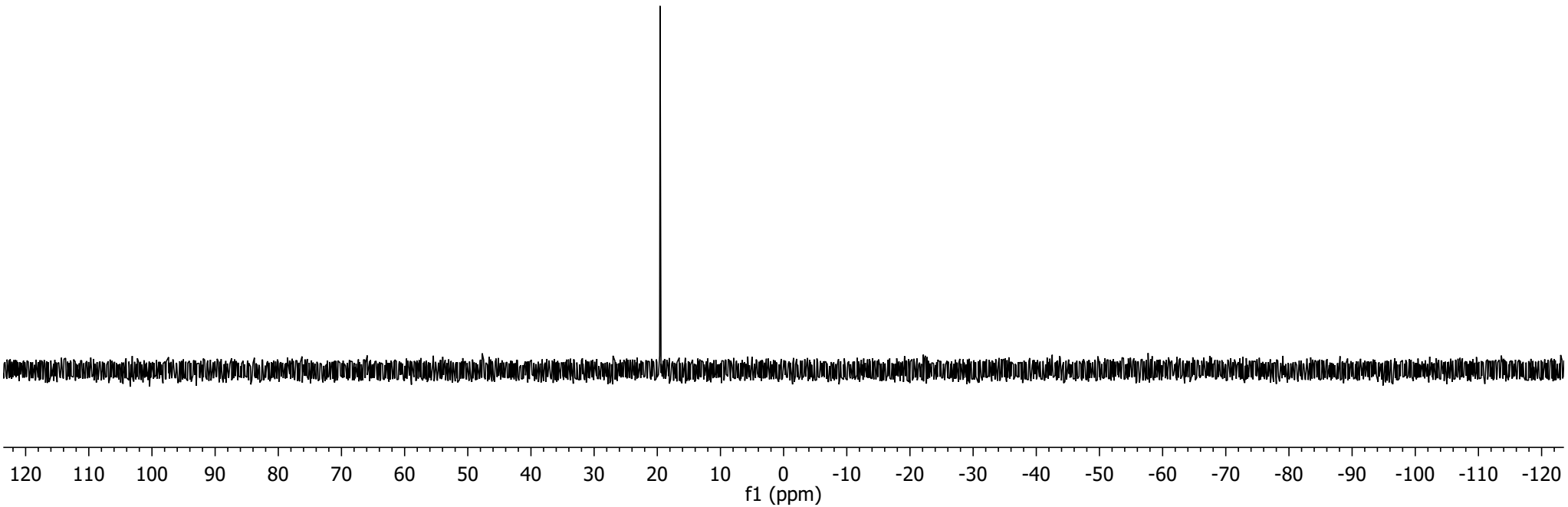
Title jkg-IV-113-Ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70

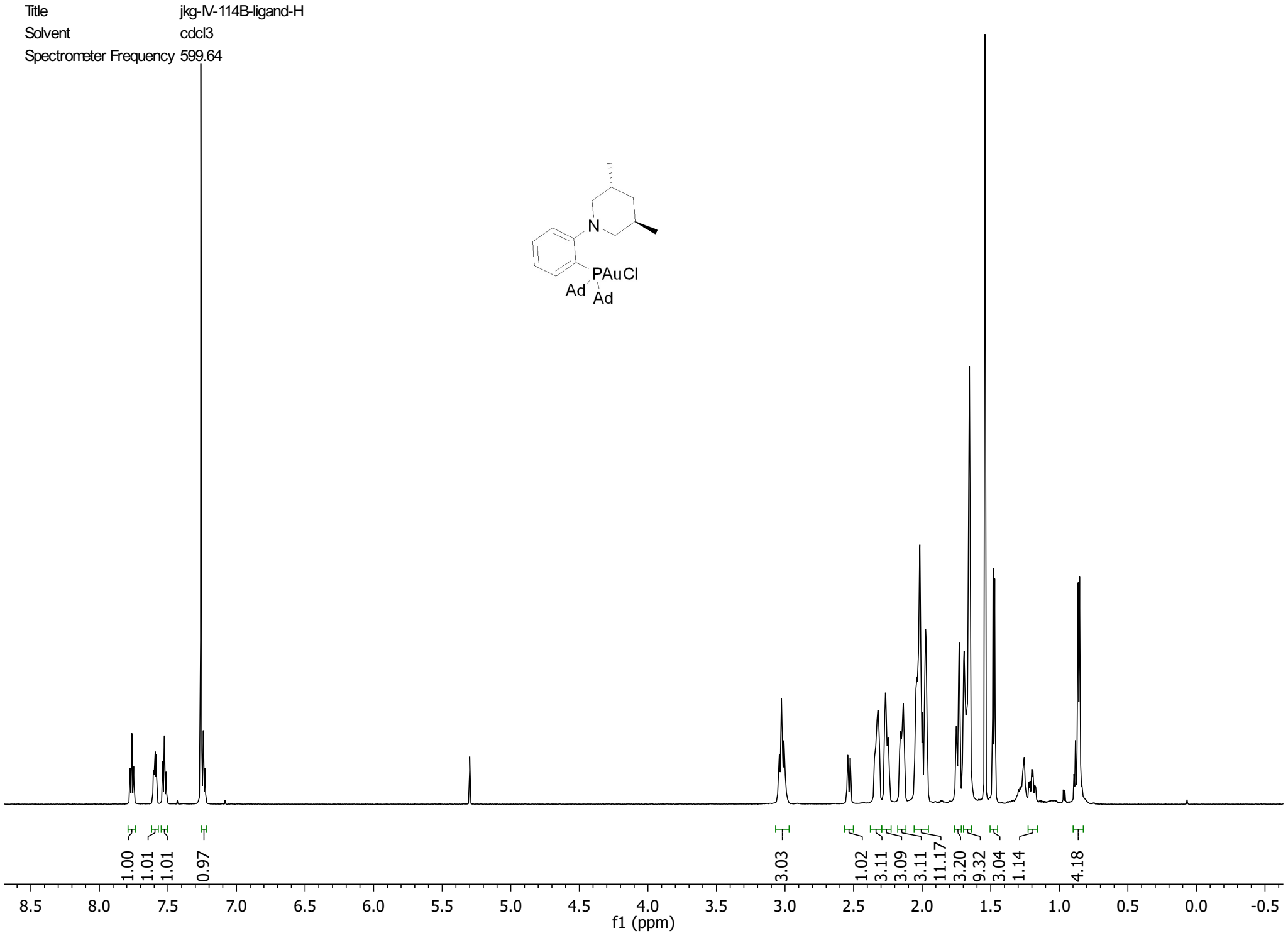




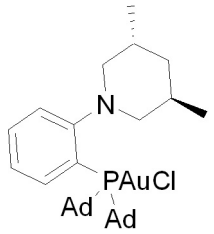
Title jkg-IV-113b-P31
Solvent cdcl3
Spectrometer Frequency 161.90



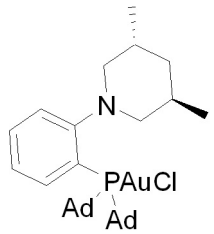


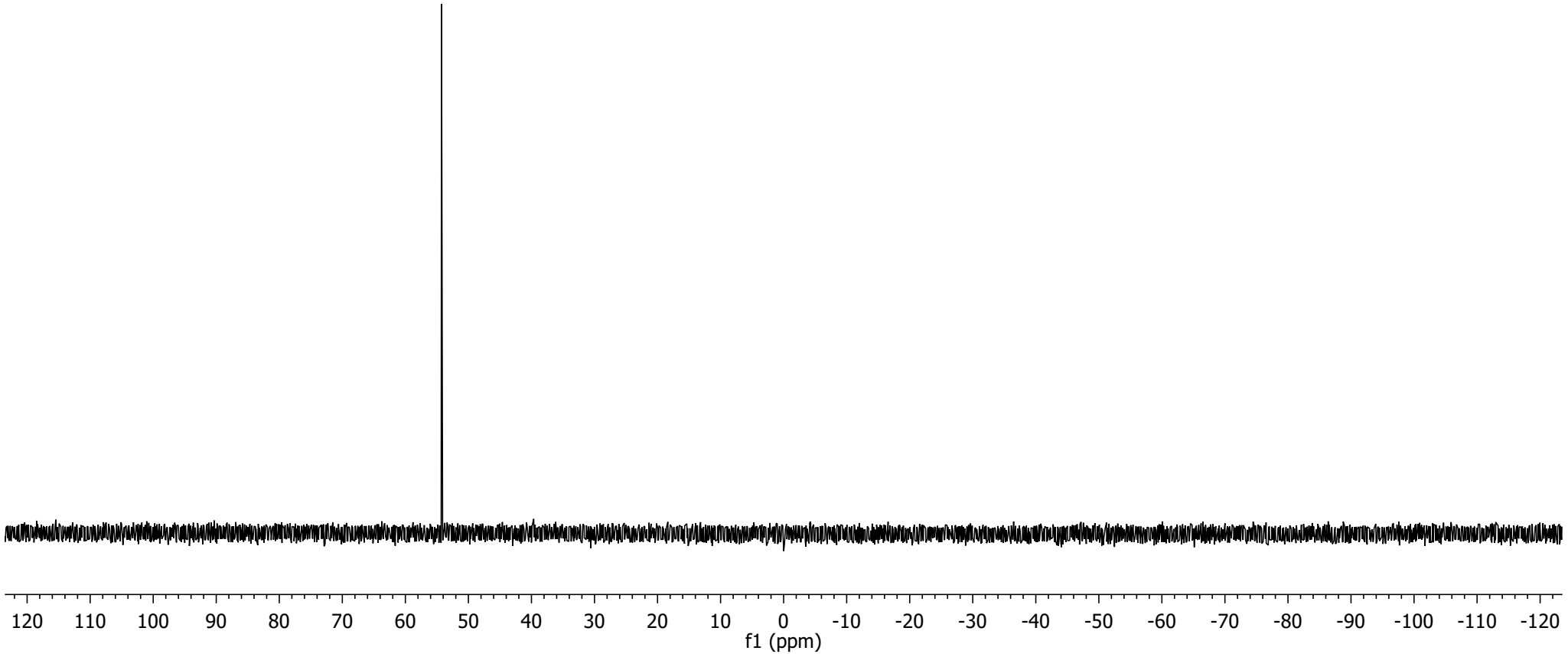

Title jkg-IV-114B-ligand-H
Solvent cdcl3
Spectrometer Frequency 599.64
N
PAuCl
Ad
Ad
1.00
1.01
1.01
0.97
3.03
1.02
3.11
3.09
3.11
11.17
3.20
9.32
3.04
1.14
4.18
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

Title jkg-IV-114B-ligand-C
Solvent cdcl3
Spectrometer Frequency 150.79

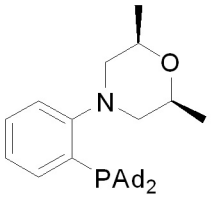


Title jkg-IV-114b-P31
Solvent cdcl3
Spectrometer Frequency 161.90

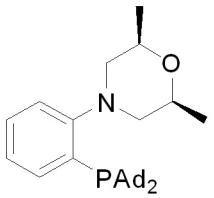




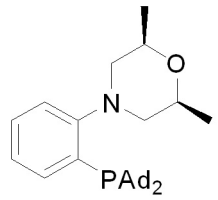
Title jkg-IV-84-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86

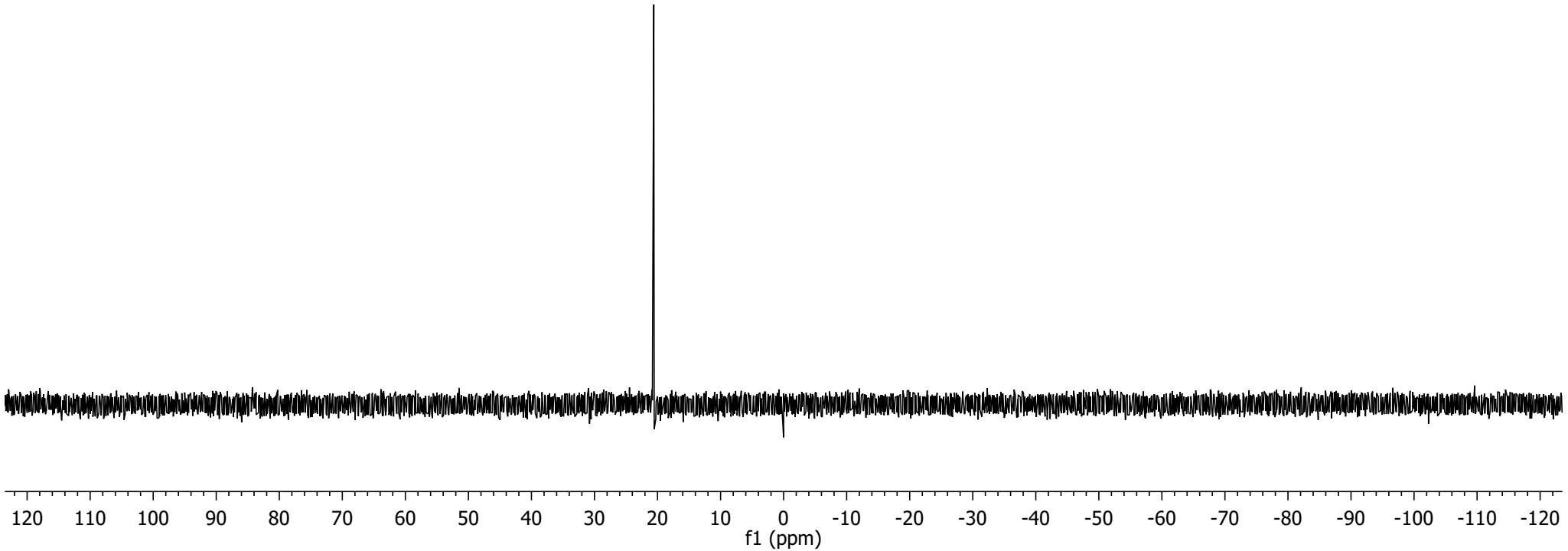


Title jkg-IV-84-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70

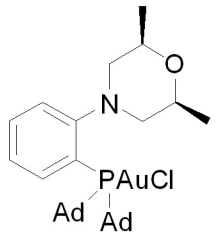


Title jkg-IV-84B-P31
Solvent cdcl3
Spectrometer Frequency 161.90





Title jkg-IV-85-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86

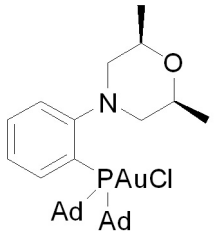


1.00 2.02 0.99 2.00 2.00 2.01 6.09 6.16 6.15 12.09 6.01

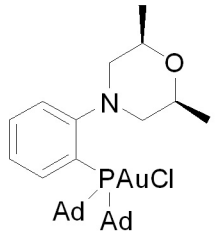
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0

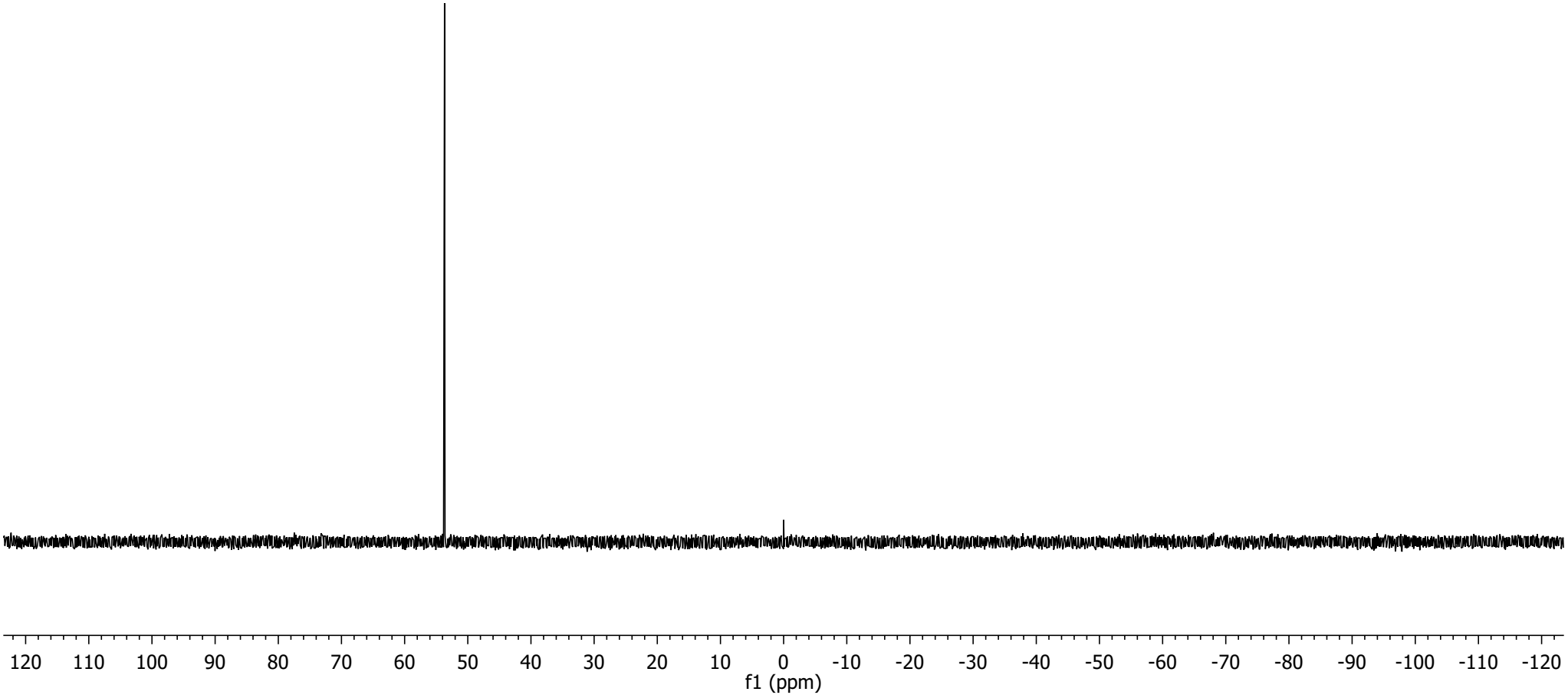
f1 (ppm)

Title jkg-IV-85-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

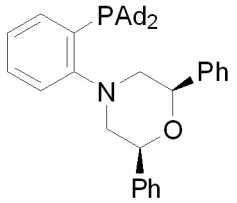


Title jkg-IV-85-P31
Solvent cdcl3
Spectrometer Frequency 161.90





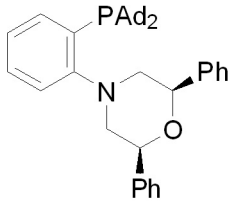
Title jkg-IV-108-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86

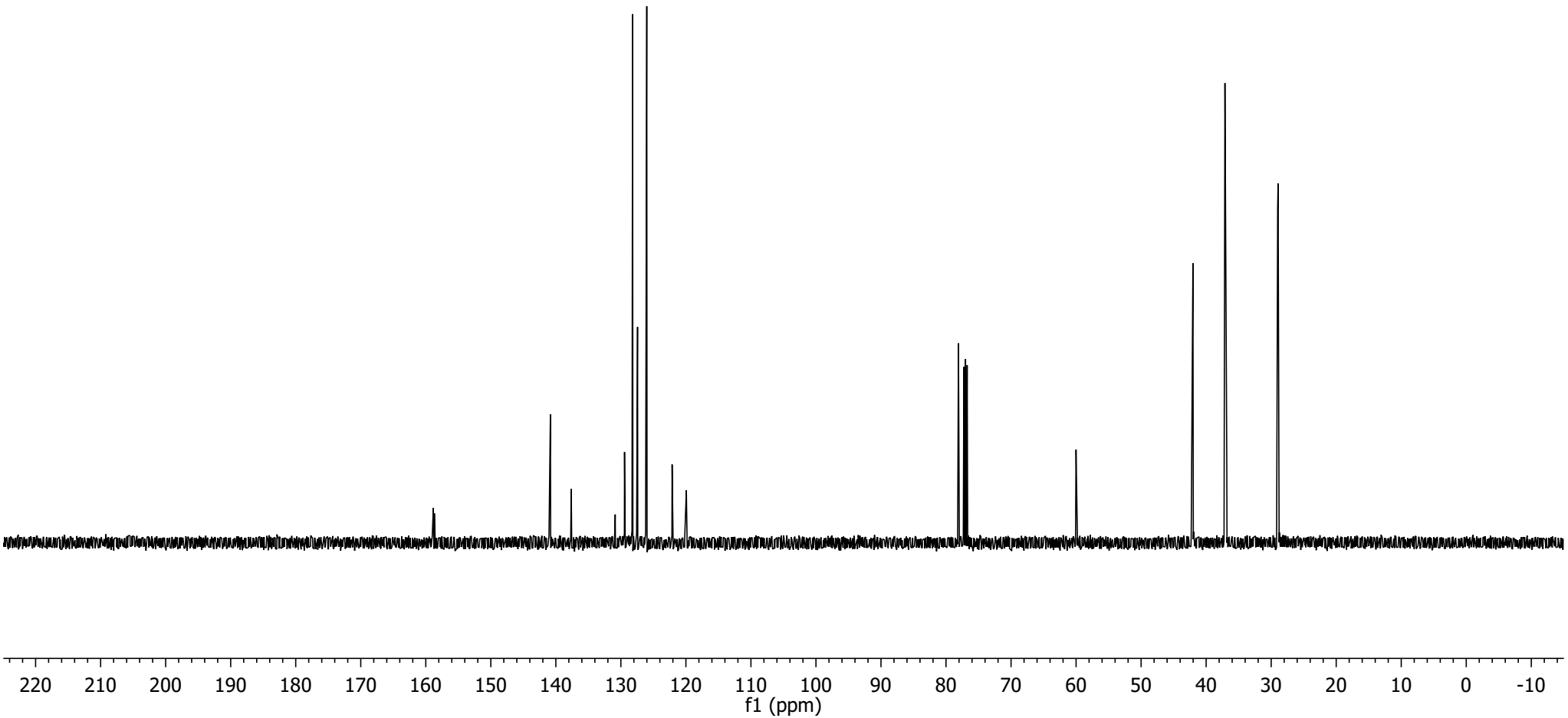


1.00 3.96 4.02 1.96 1.74 1.10 1.08 2.08 2.01 1.96 11.86 6.17 12.20

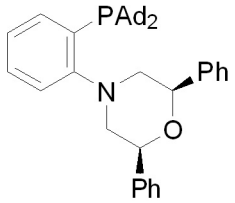
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0
f1 (ppm)

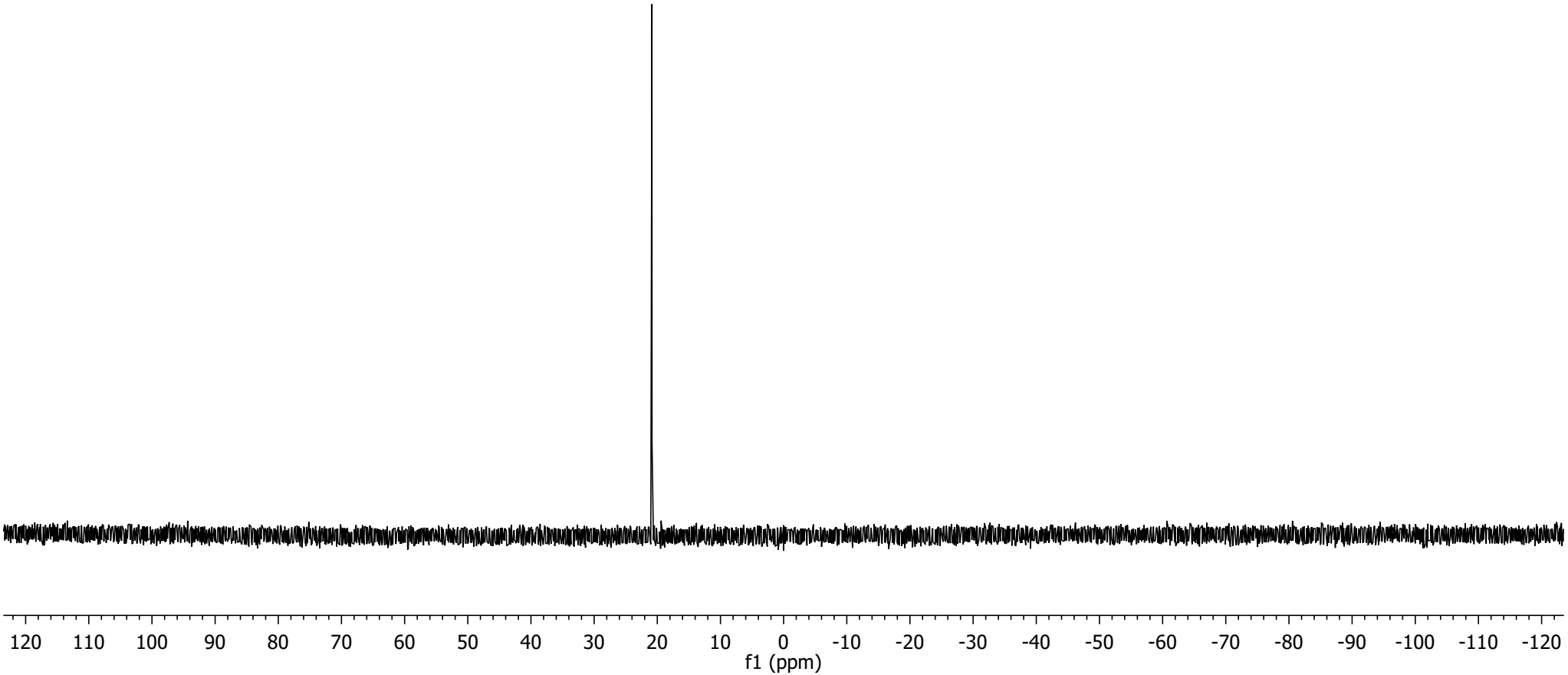
Title jkg-IV-108-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70



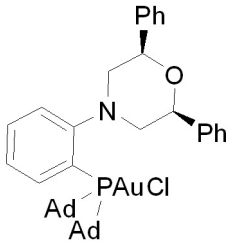


Title jkg-IV-108B-ligand-P31
Solvent cdcl3
Spectrometer Frequency 161.90





Title jkg-IV-110-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86

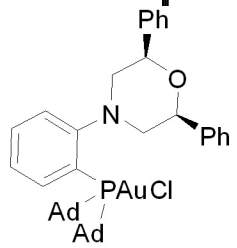


1.00 1.03 4.71 4.26 4.61 1.92 3.84 11.93 6.15 12.08

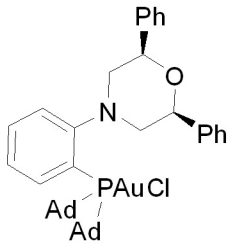
8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0

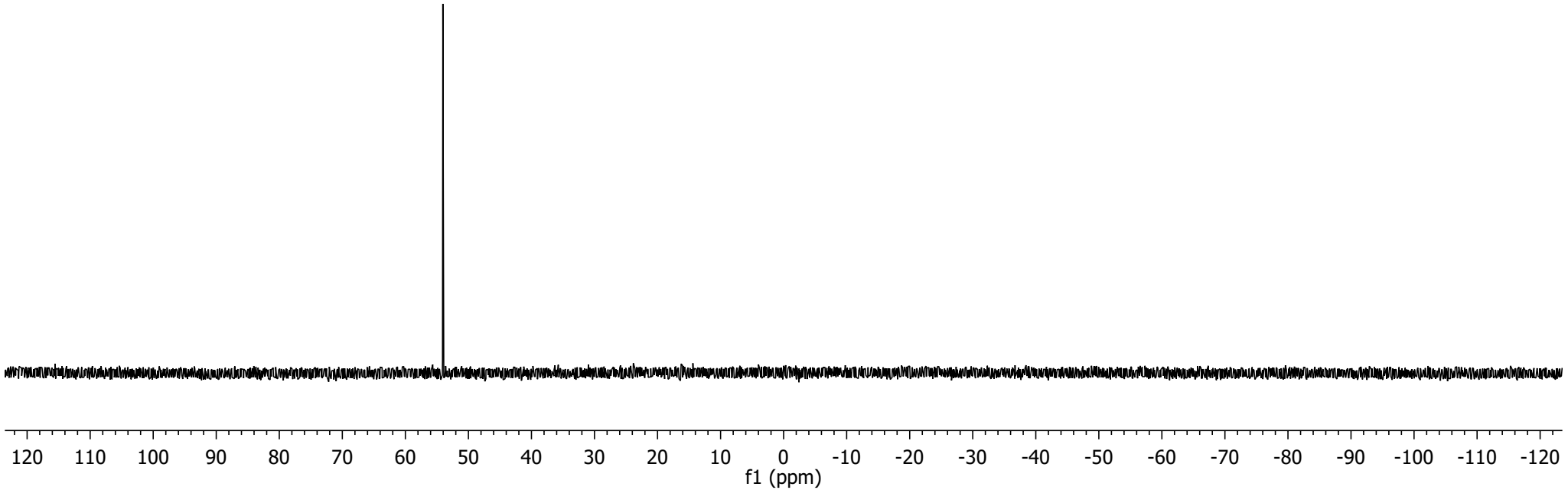
f1 (ppm)

Title jkg-IV-110-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

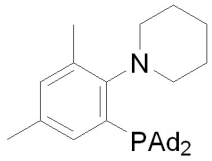


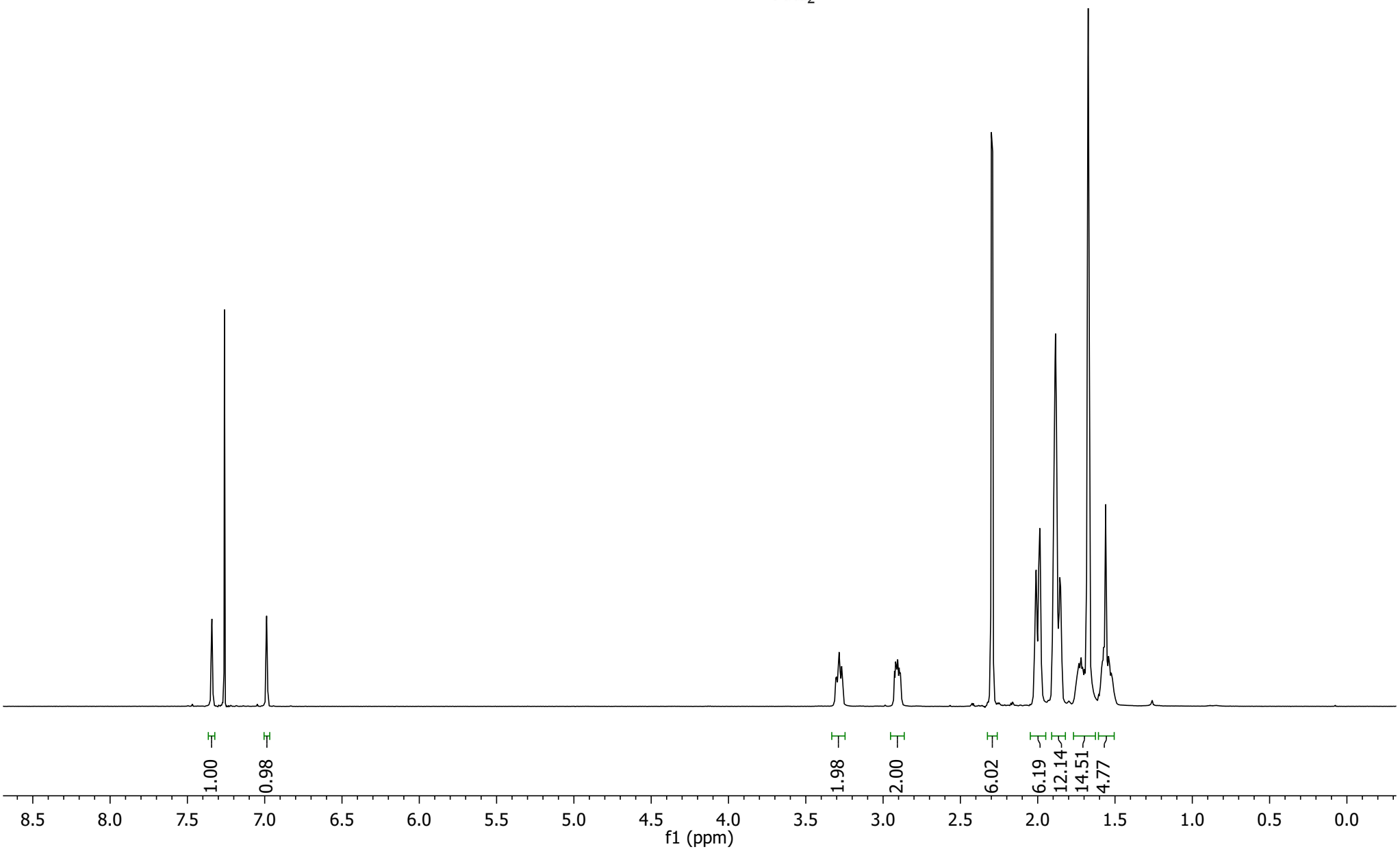
Title jkg-IV-110A-LAuCl-P31
Solvent cdcl3
Spectrometer Frequency 161.90



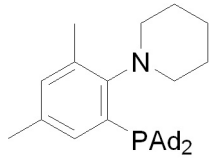


Title jkg-V-54-ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86

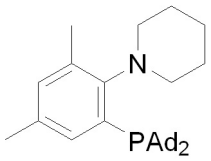


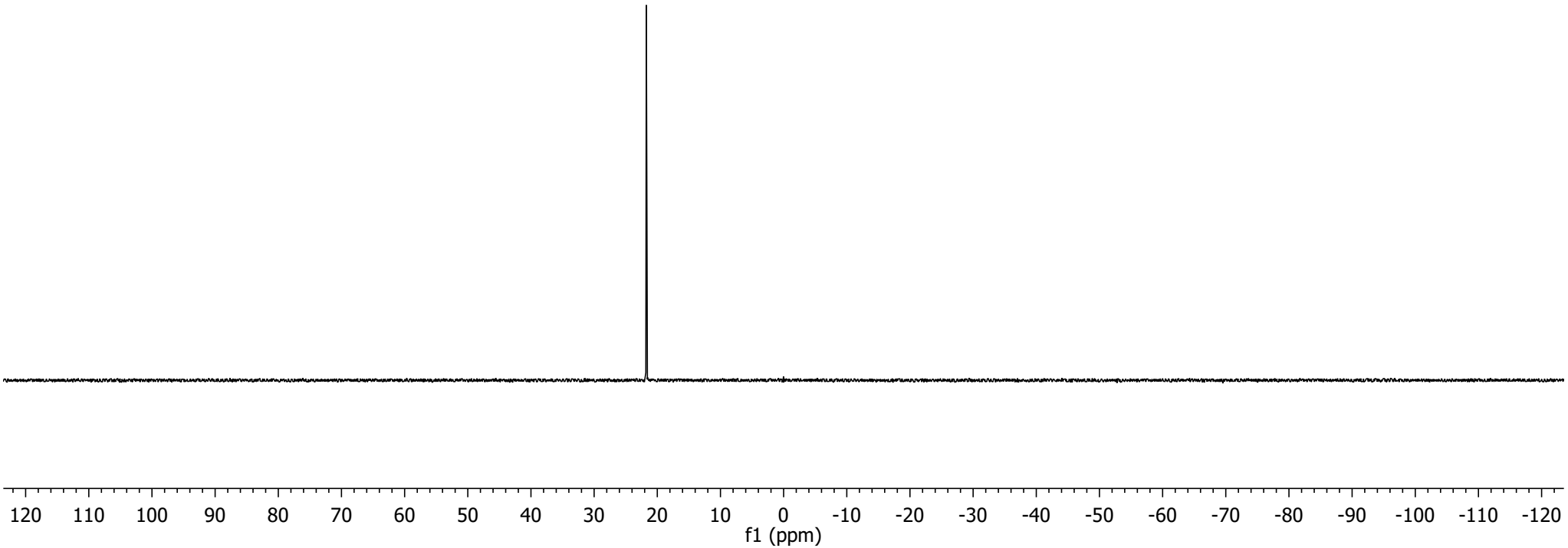


Title jkg-V-54-ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70

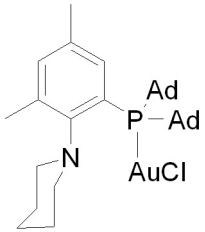


Title jkg-V-54-ligand-P31
Solvent cdcl3
Spectrometer Frequency 161.90





Title jkg-V-54B-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86

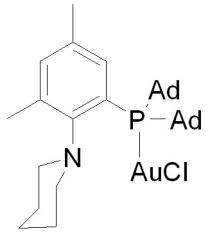


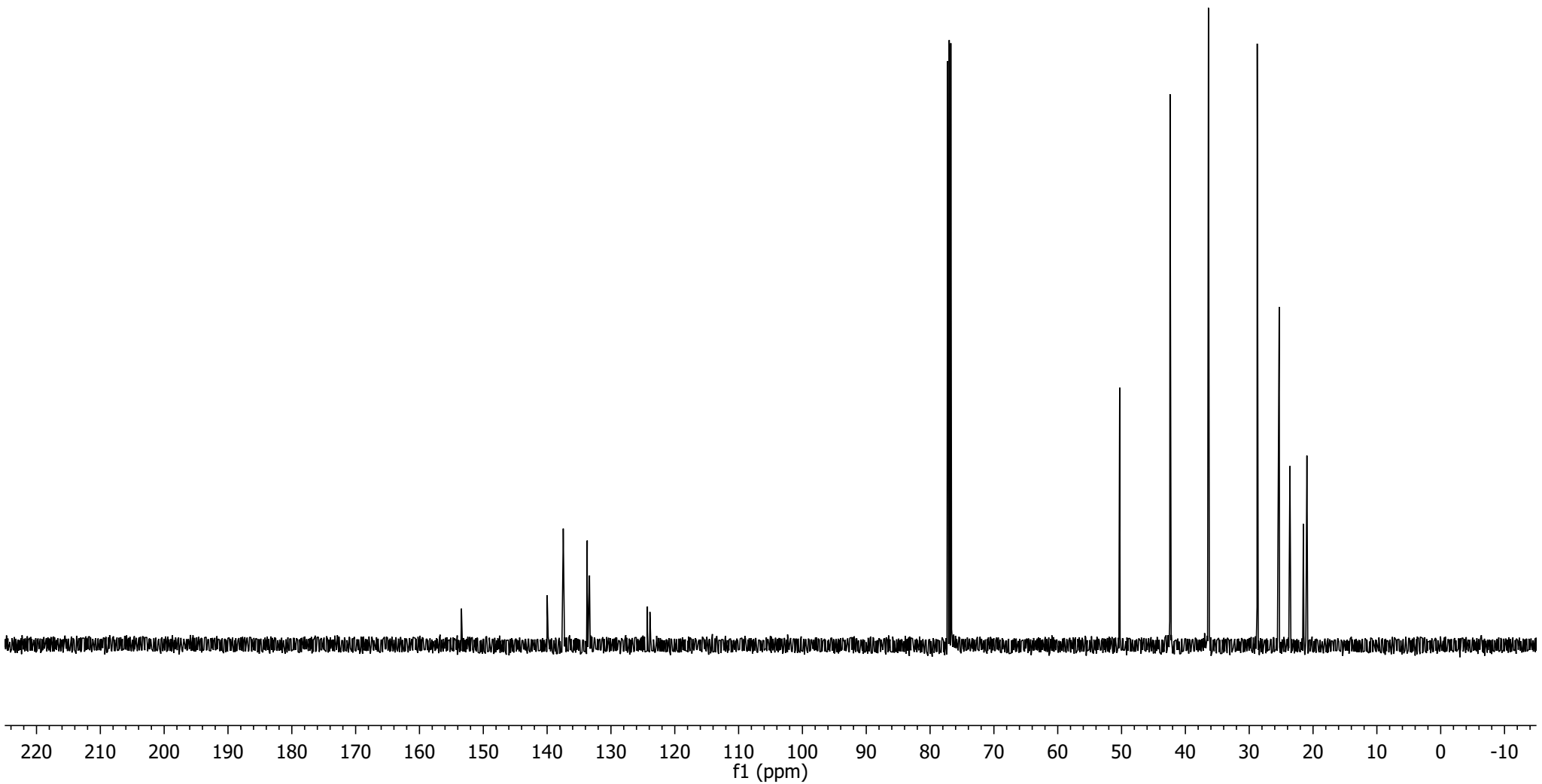
0.97 1.00 2.00 4.04 3.00 3.03 12.17 7.06 14.04 1.02

8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5

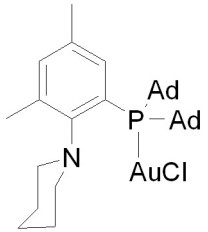
f1 (ppm)

Title jkg-V-54B-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70

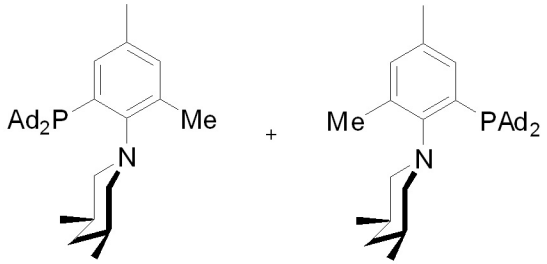




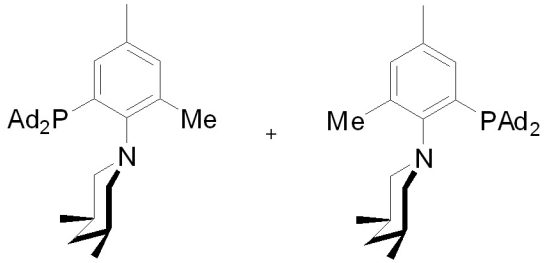
Title jkg-V-554B-LAuCl-P31
Solvent cdcl3
Spectrometer Frequency 161.90



Title jkg-V-66A-Ligand-H
Solvent CDCl3
Spectrometer Frequency 499.86

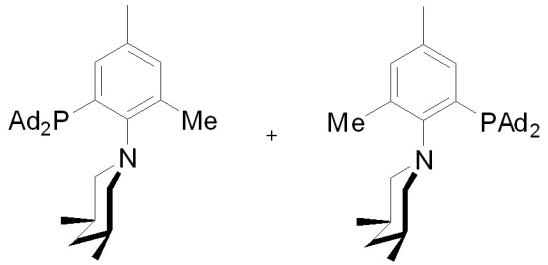


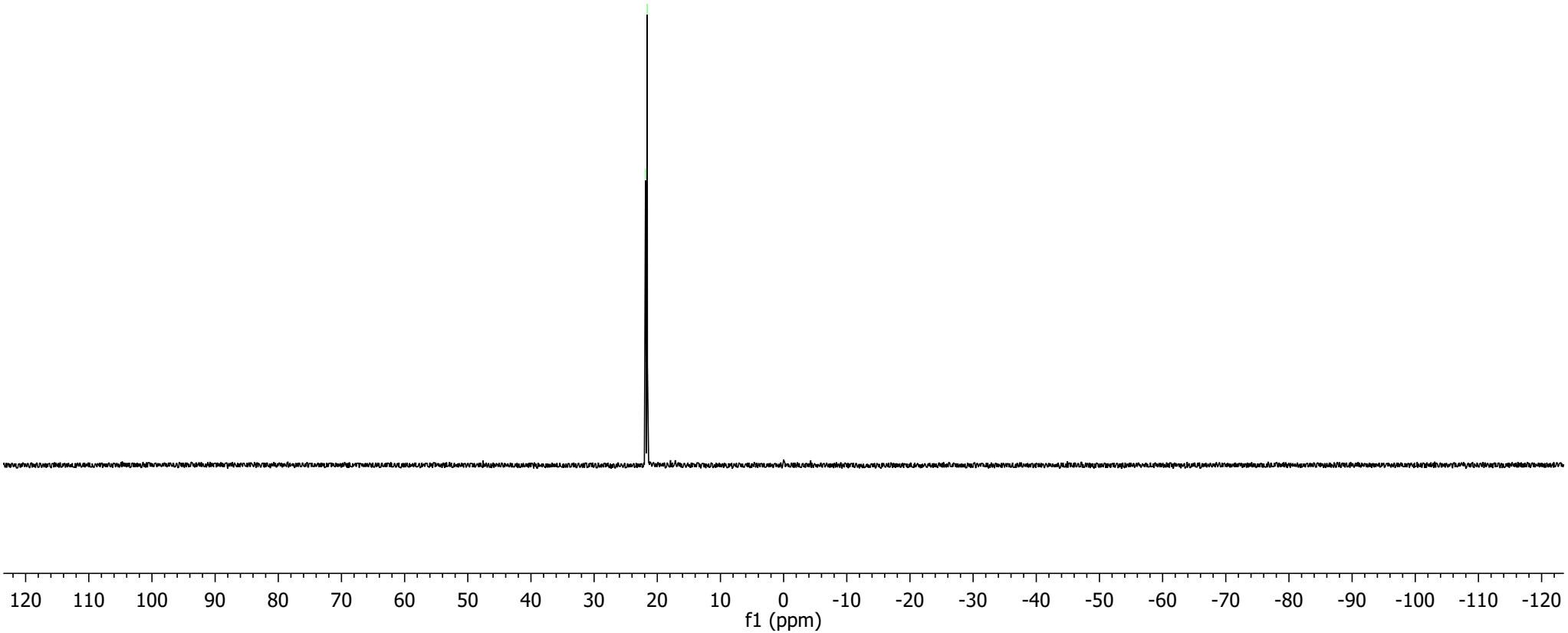
Title jkg-V-66A-Ligand-C
Solvent CDCl3
Spectrometer Frequency 125.70



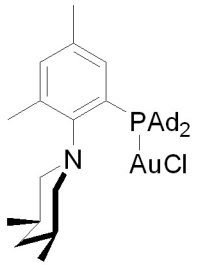
21.86
21.59

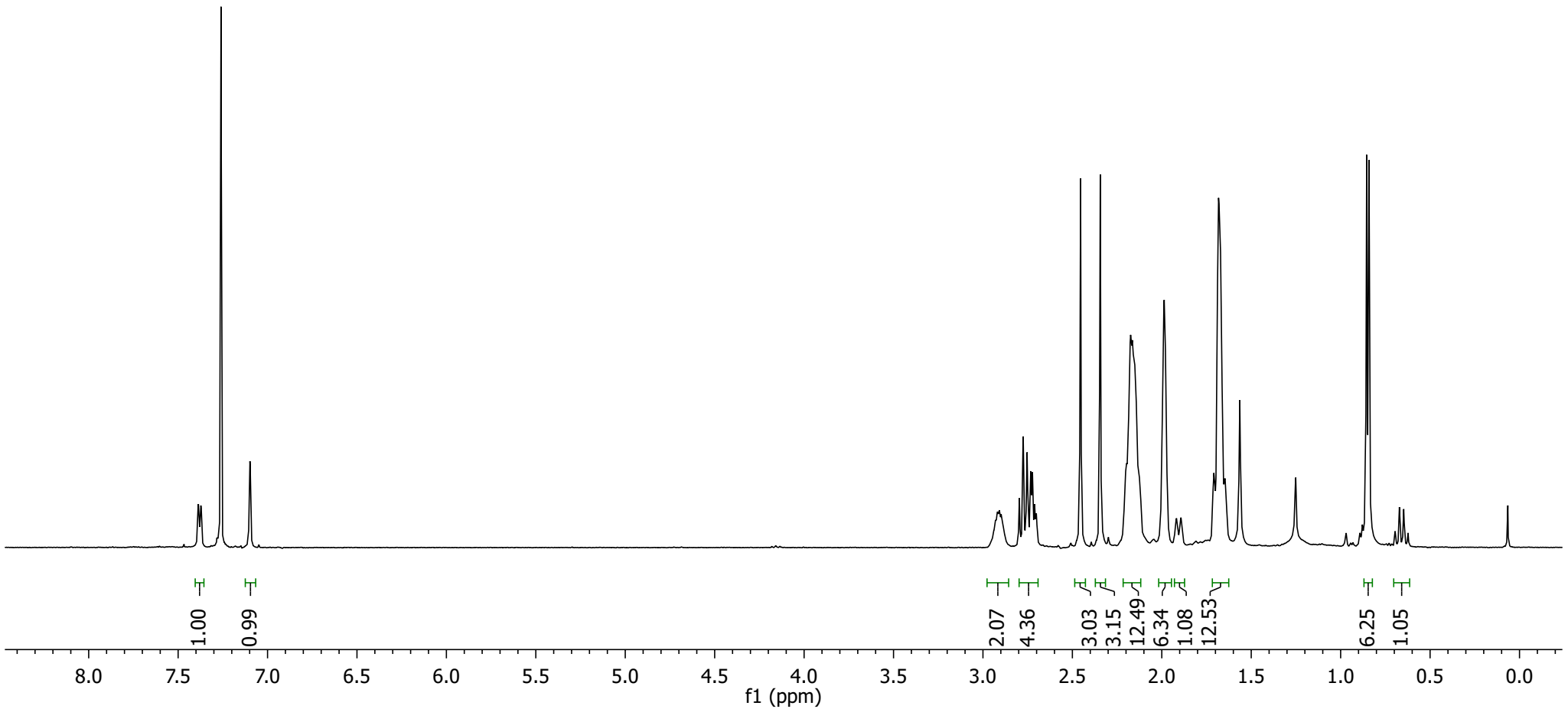
Title jkg-V-66A-Ligand-P31
Solvent cdcl3
Spectrometer Frequency 161.90



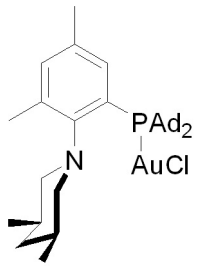


Title jkg-V-67-LAuCl-H
Solvent CDCl3
Spectrometer Frequency 499.86



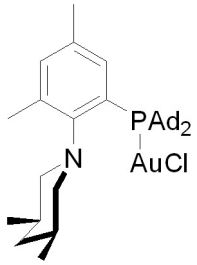


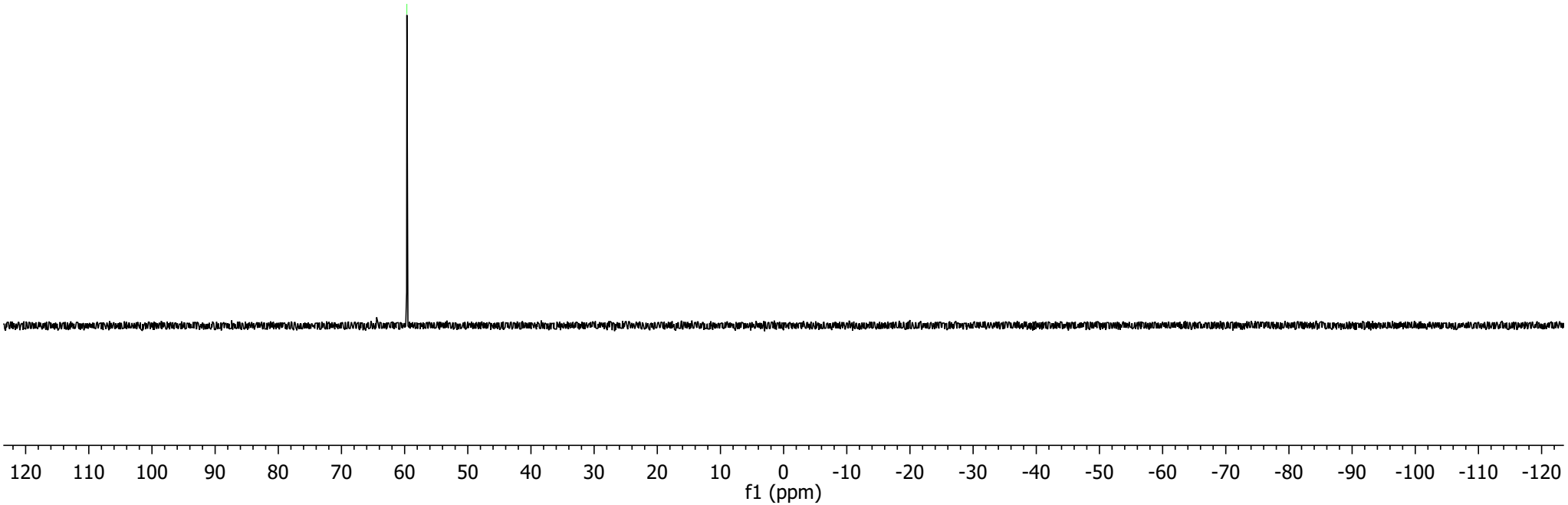
Title jkg-V-67-LAuCl-C
Solvent CDCl3
Spectrometer Frequency 125.70



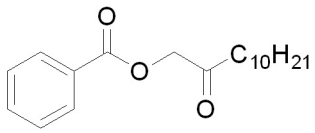
59.64

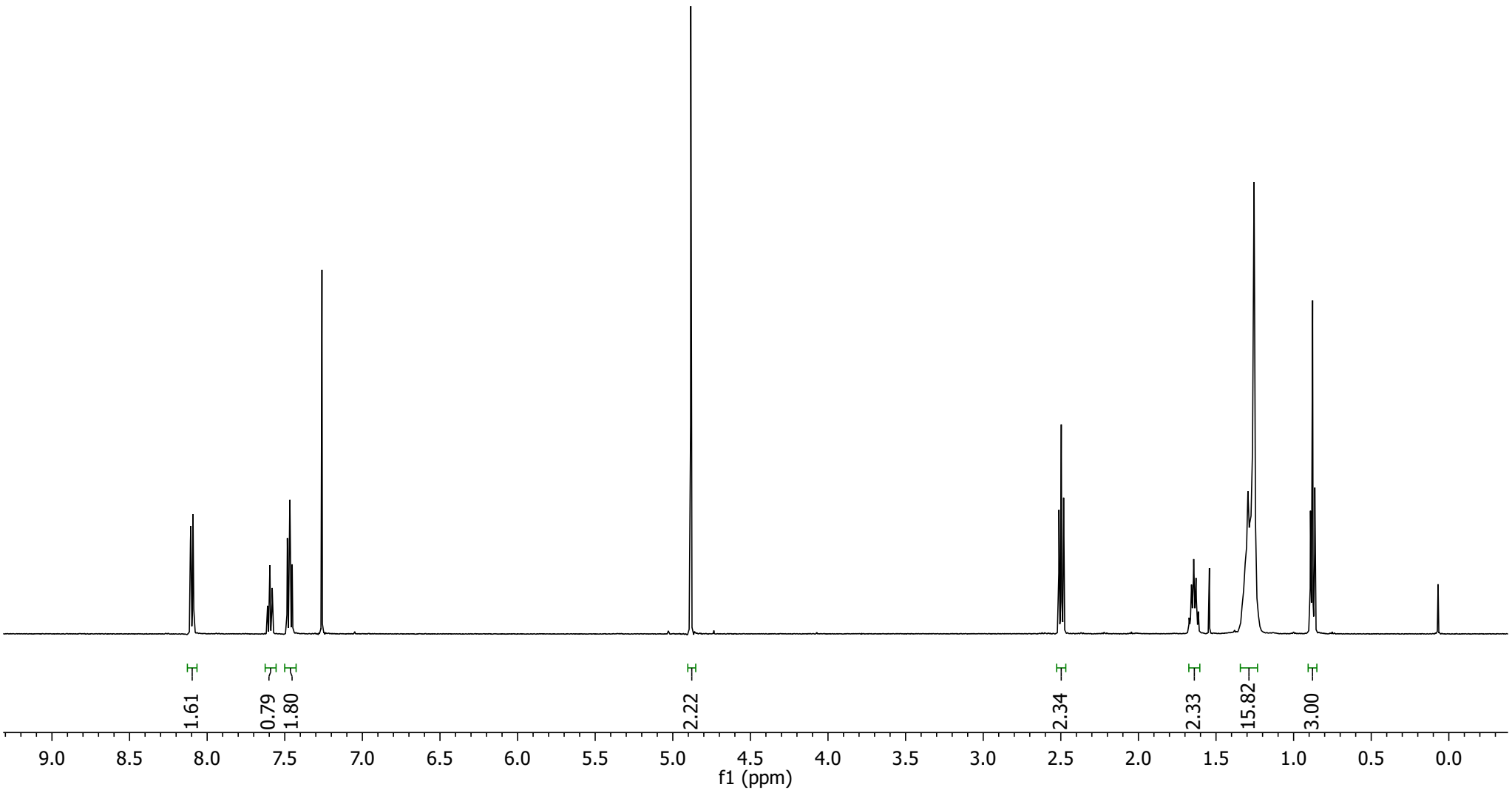
Title jkg-V-67V-P31
Solvent cdcl3
Spectrometer Frequency 161.90

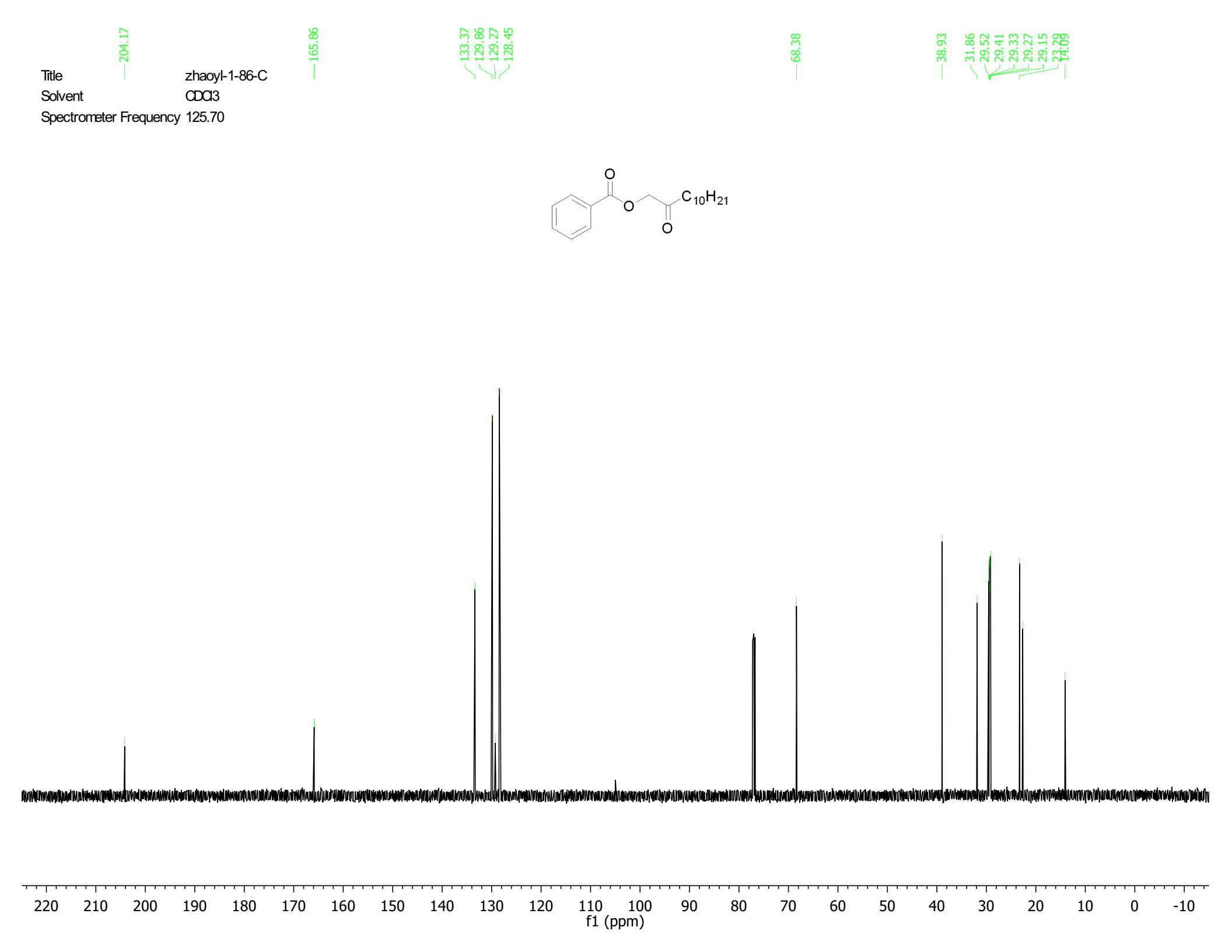




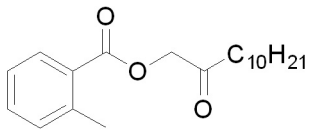
Title zhaoyl-1-856
Solvent CDCl3
Spectrometer Frequency 499.86

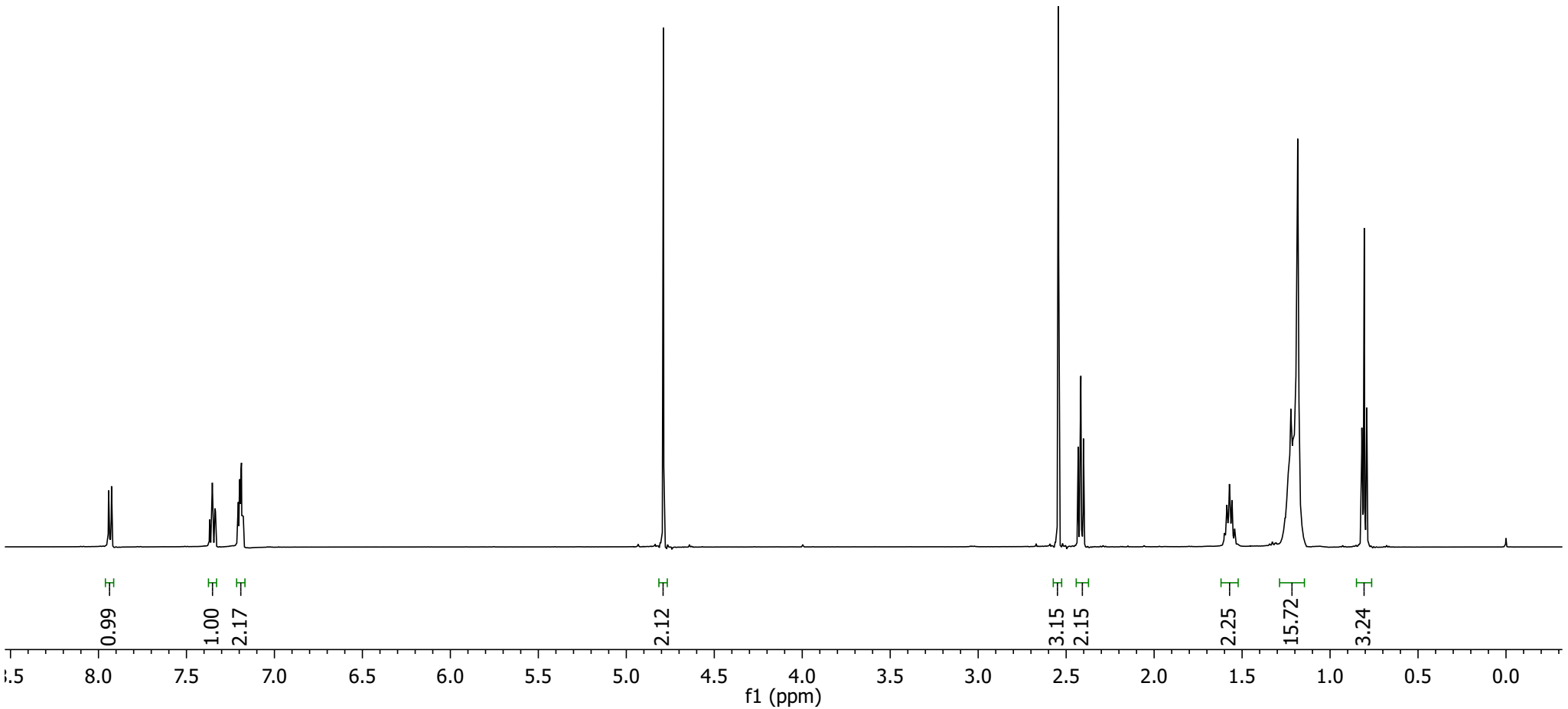


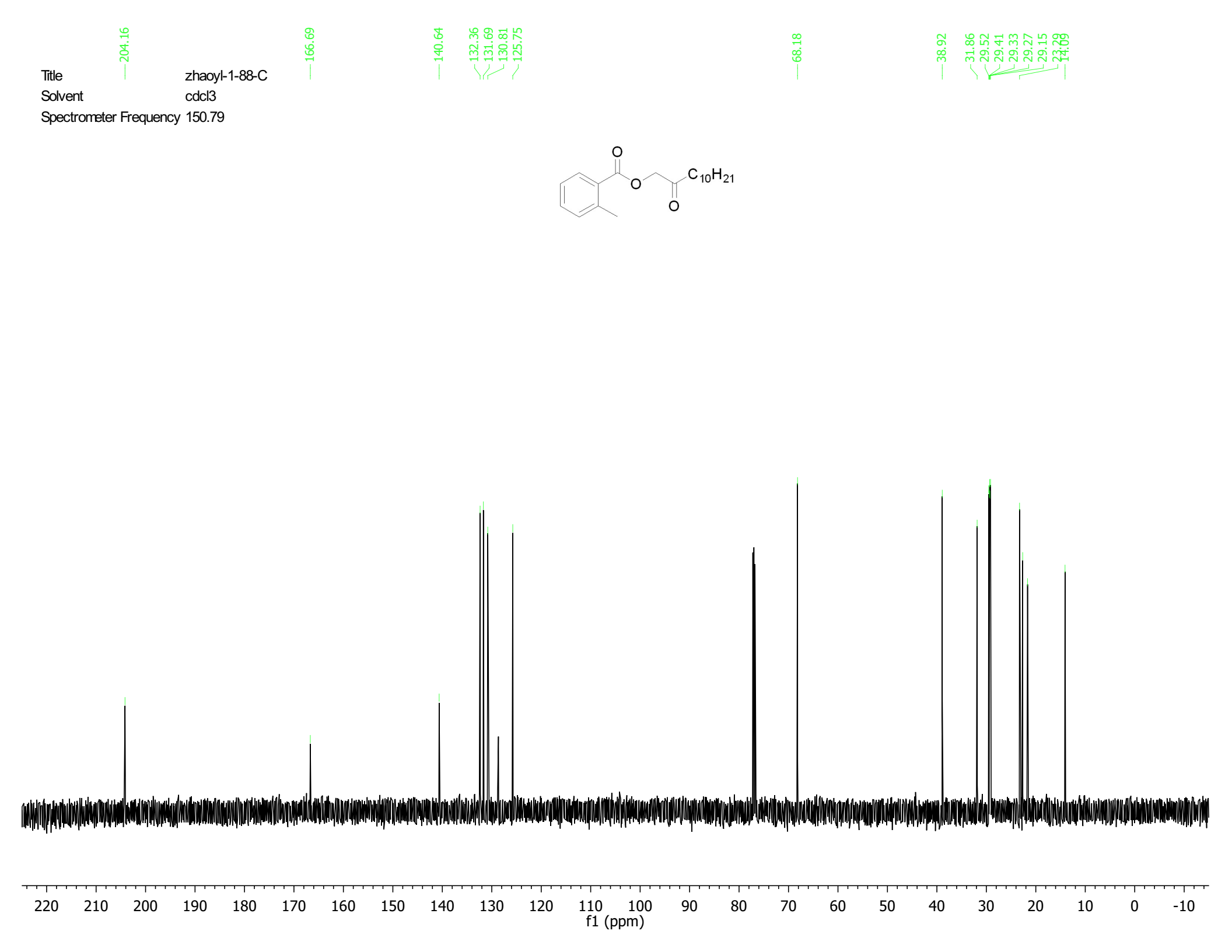



204.17
165.86
133.37
129.86
129.27
128.45
68.38
38.93
31.86
29.52
29.41
29.33
29.27
29.15
23.29
14.09
Title zhaoyl-1-86-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

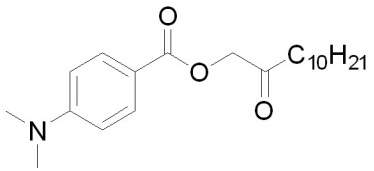
Title zhaoyl-1-88-1
Solvent CDCl3
Spectrometer Frequency 499.86

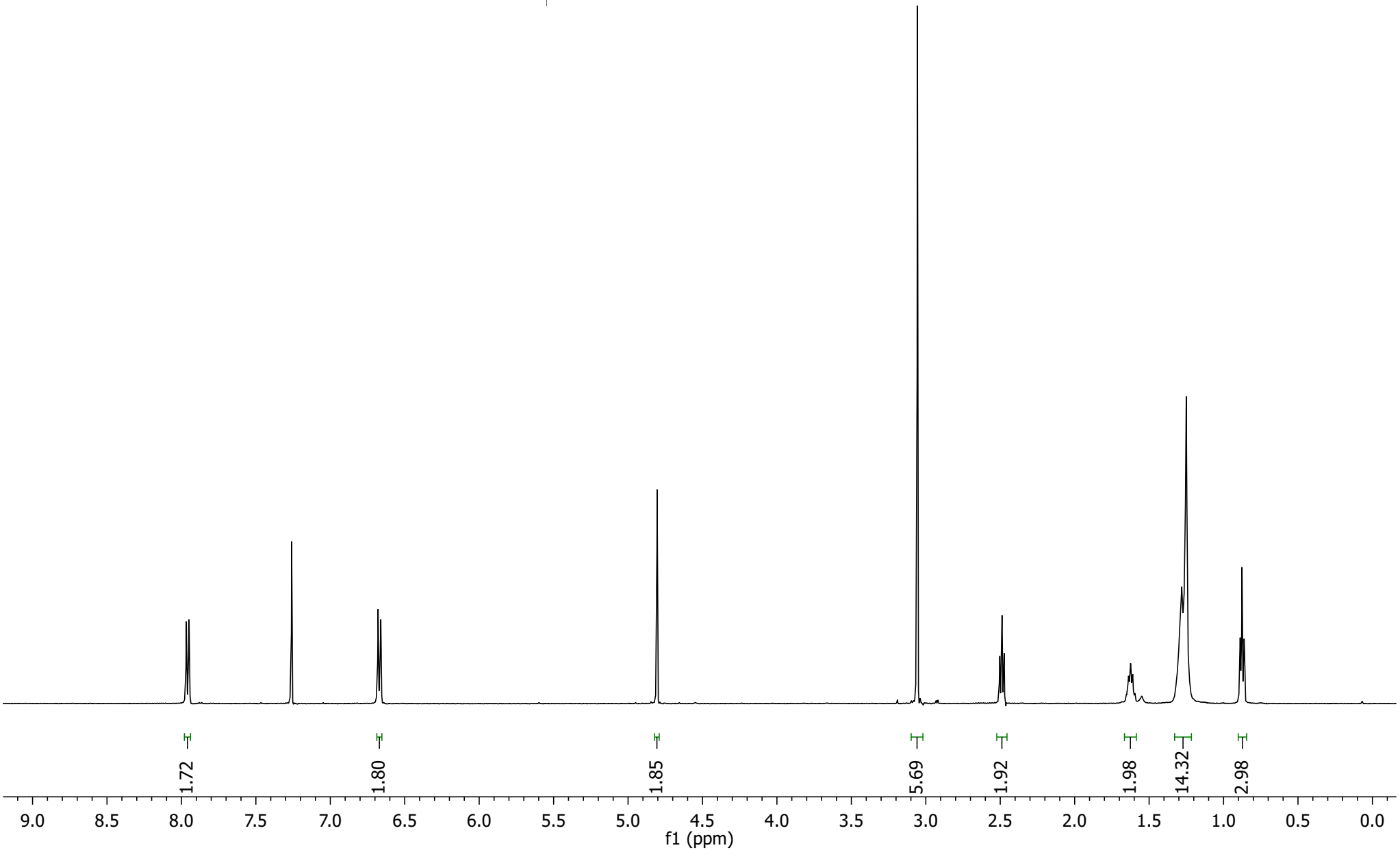





204.16
166.69
140.64
132.36
131.69
130.81
125.75
68.18
38.92
31.86
29.52
29.41
29.33
29.27
29.15
23.29
14.09
Title zhaoyl-1-88-C
Solvent cdcl3
Spectrometer Frequency 150.79
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

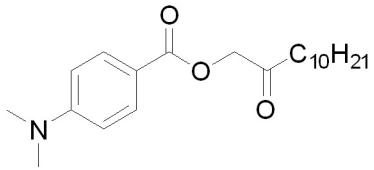
Title zhaoyl-1-83
Solvent CDCl3
Spectrometer Frequency 499.86

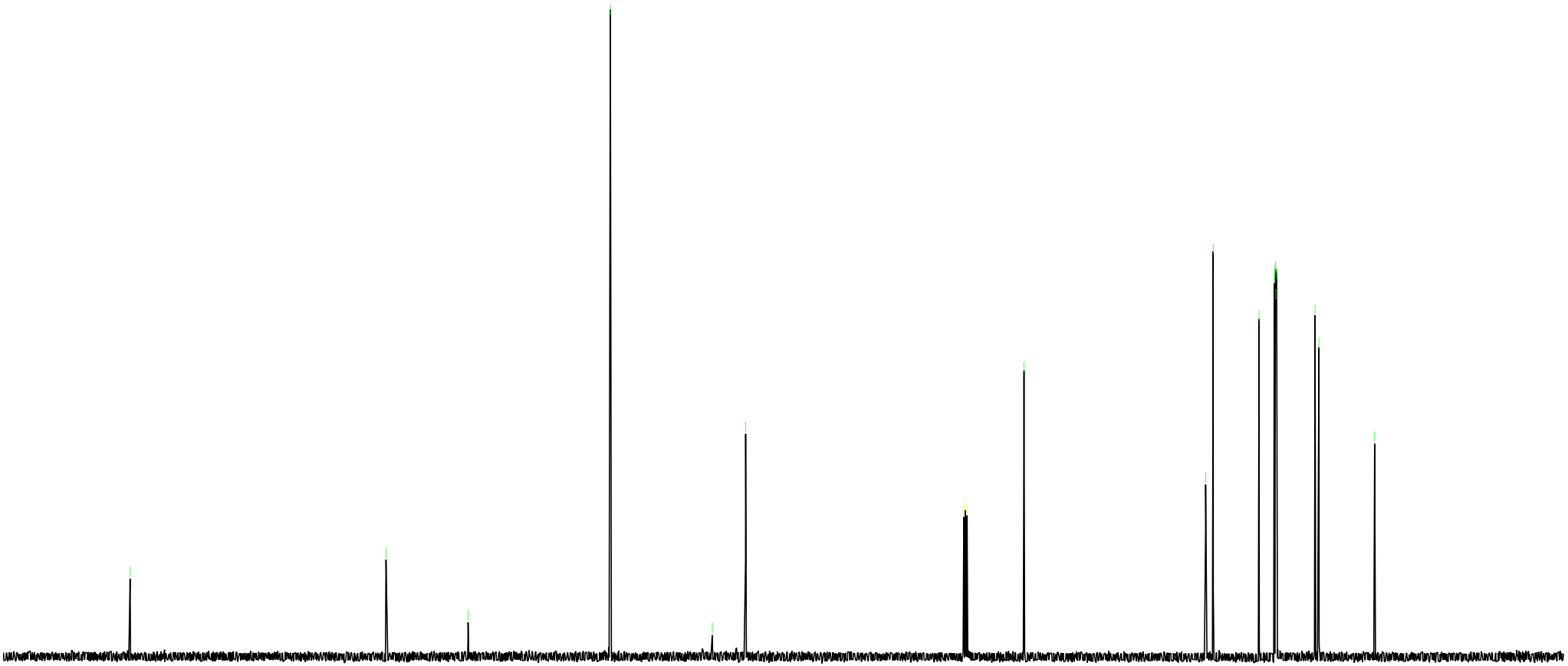




Title zhaoyl-1-83-C
Solvent CDCl3
Spectrometer Frequency 125.70

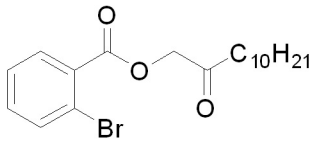
205.49
166.13
153.51
131.64
115.96
110.83
77.28 CDCl3
77.03 CDCl3
76.78 CDCl3
68.02
40.09
38.93
29.43
29.36
29.19
29.17
23.27
22.66
14.10

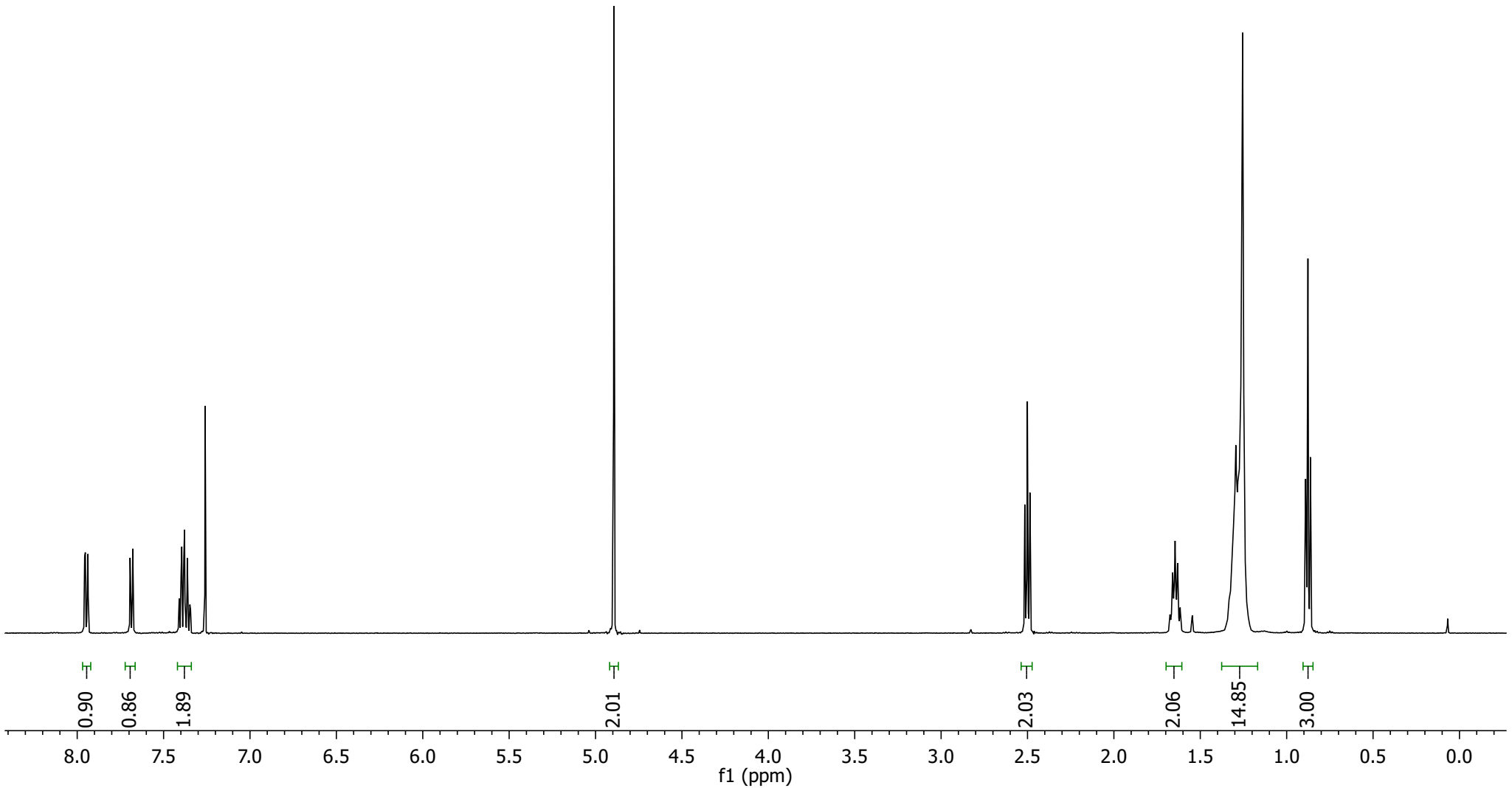


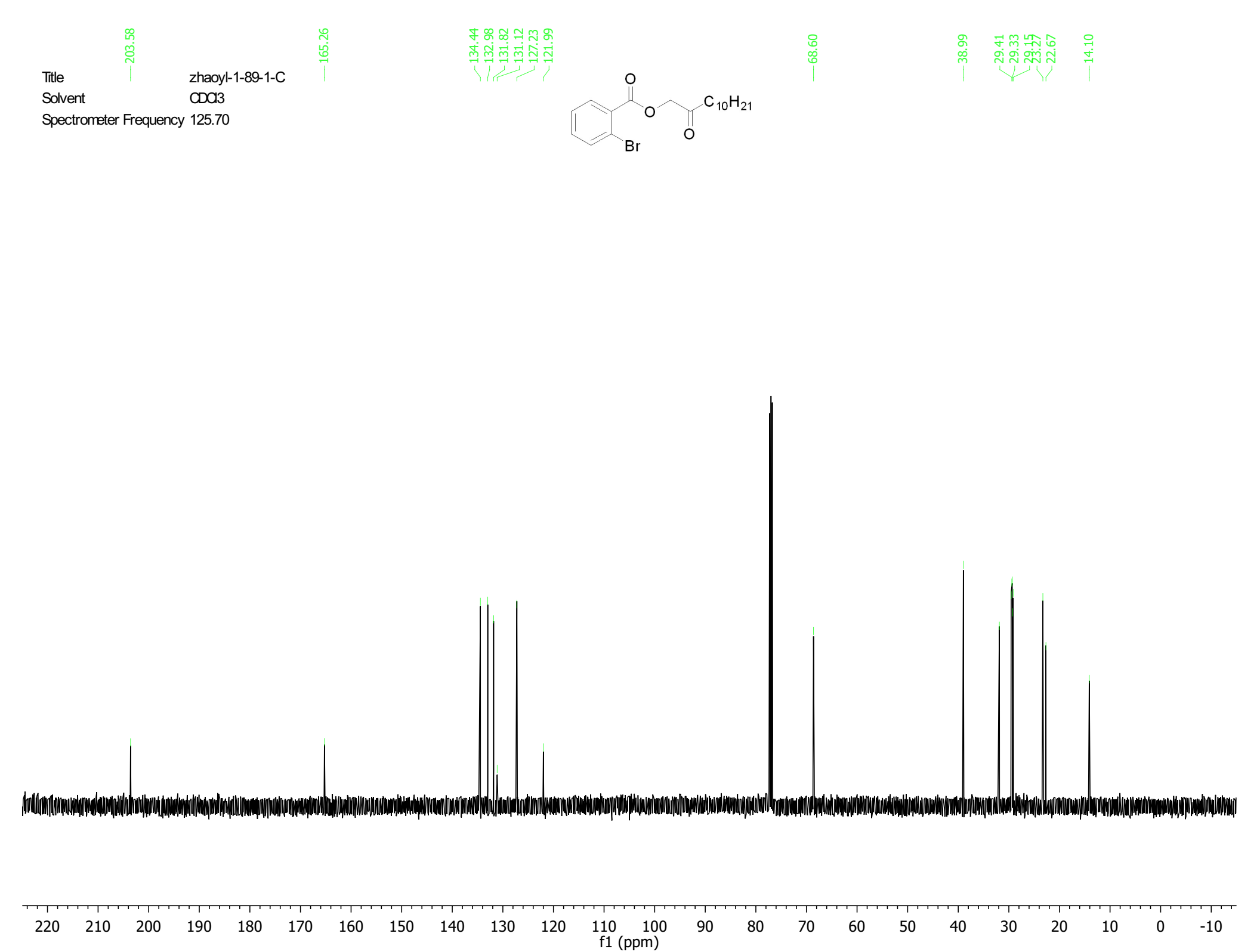


220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

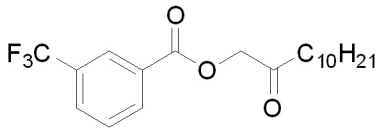
Title zhaoyl-1-89-1
Solvent CDCl3
Spectrometer Frequency 499.86

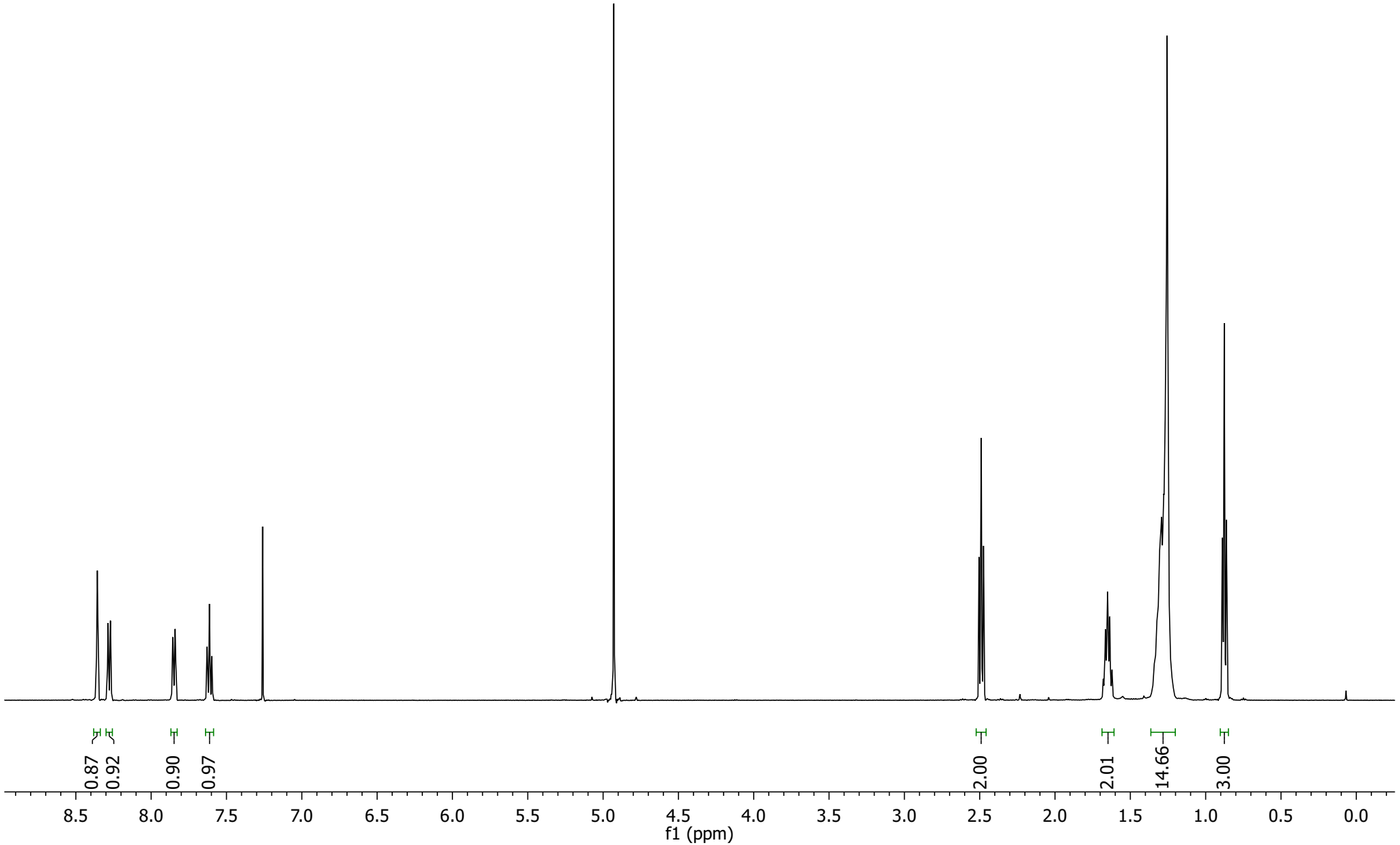


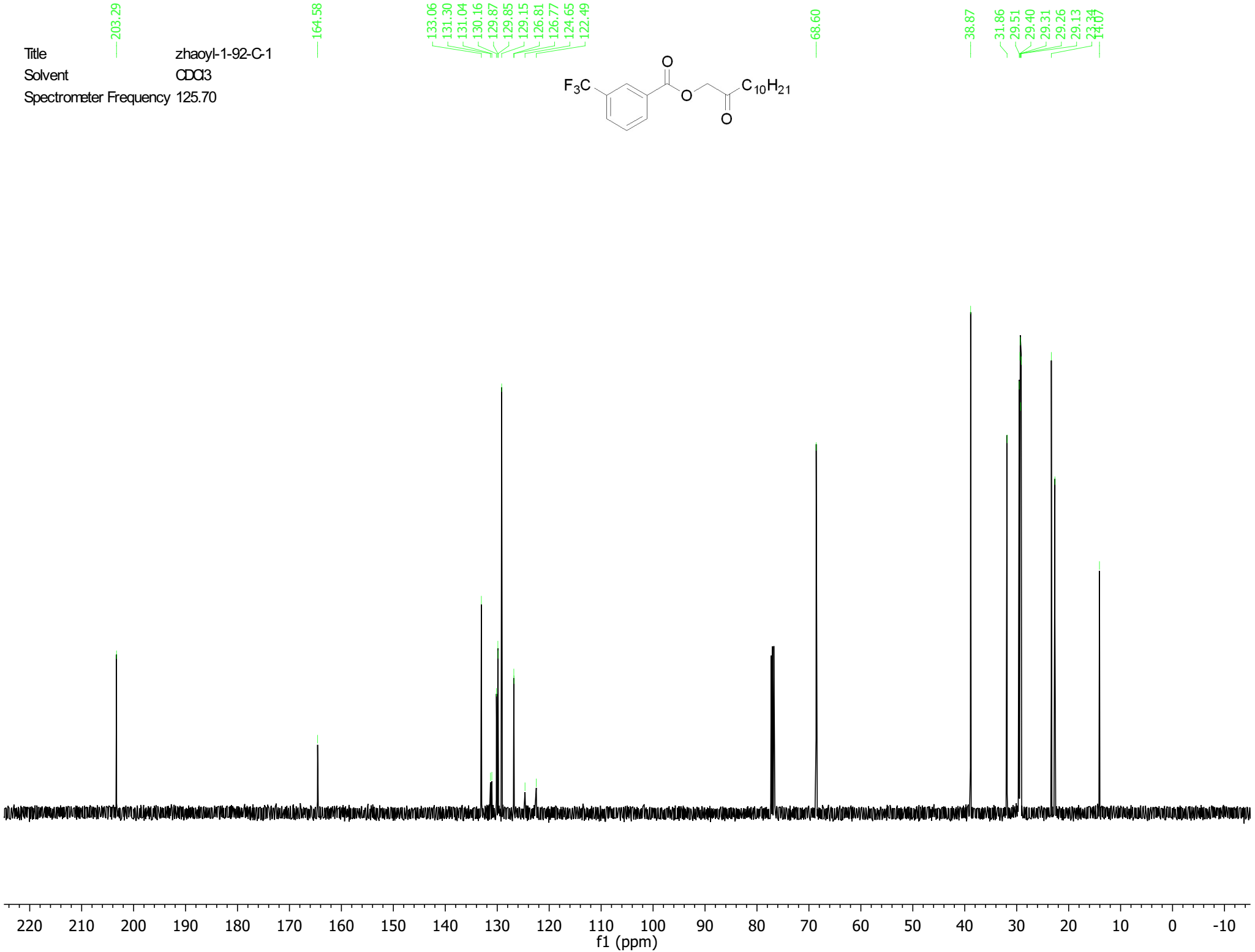



203.58
165.26
134.44
132.98
131.82
131.12
127.23
121.99
68.60
38.99
29.41
29.33
29.15
23.27
22.67
14.10
Title zhaoyl-1-89-1-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
$C_{10}H_{21}$
Br
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

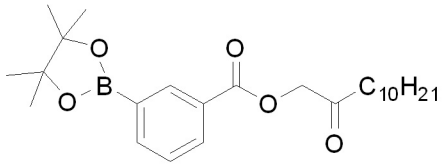
Title zhaoyl-1-92
Solvent CDCl3
Spectrometer Frequency 499.86

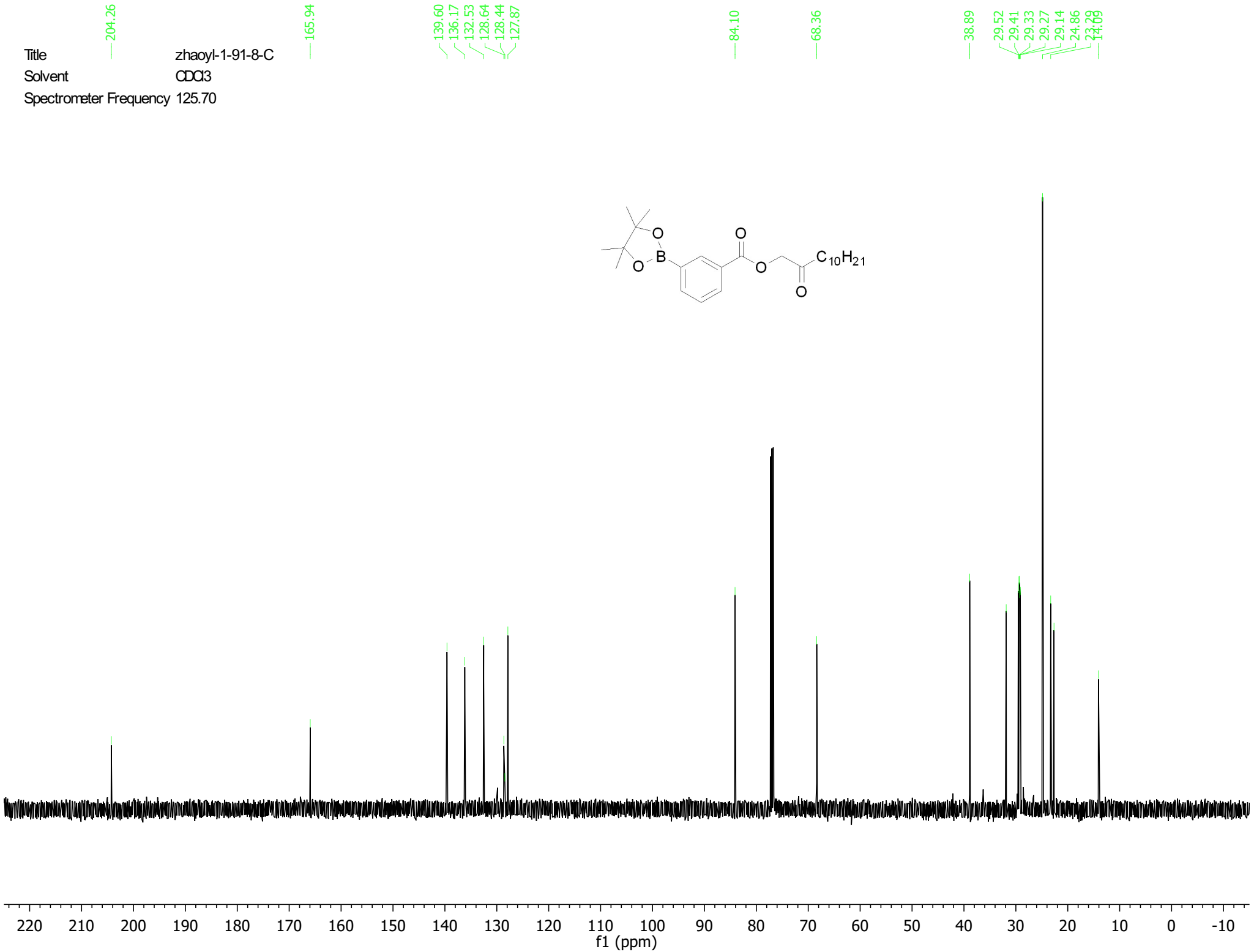




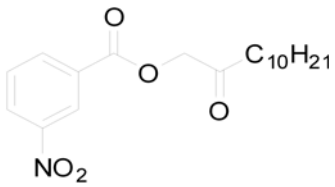

203.29
164.58
133.06
131.30
131.04
130.16
129.87
129.85
129.15
126.81
126.77
124.65
122.49
68.60
38.87
31.86
29.51
29.40
29.31
29.26
29.13
23.34
14.07
Title zhaoyl-1-92-C-1
Solvent CDCl3
Spectrometer Frequency 125.70
F3C
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

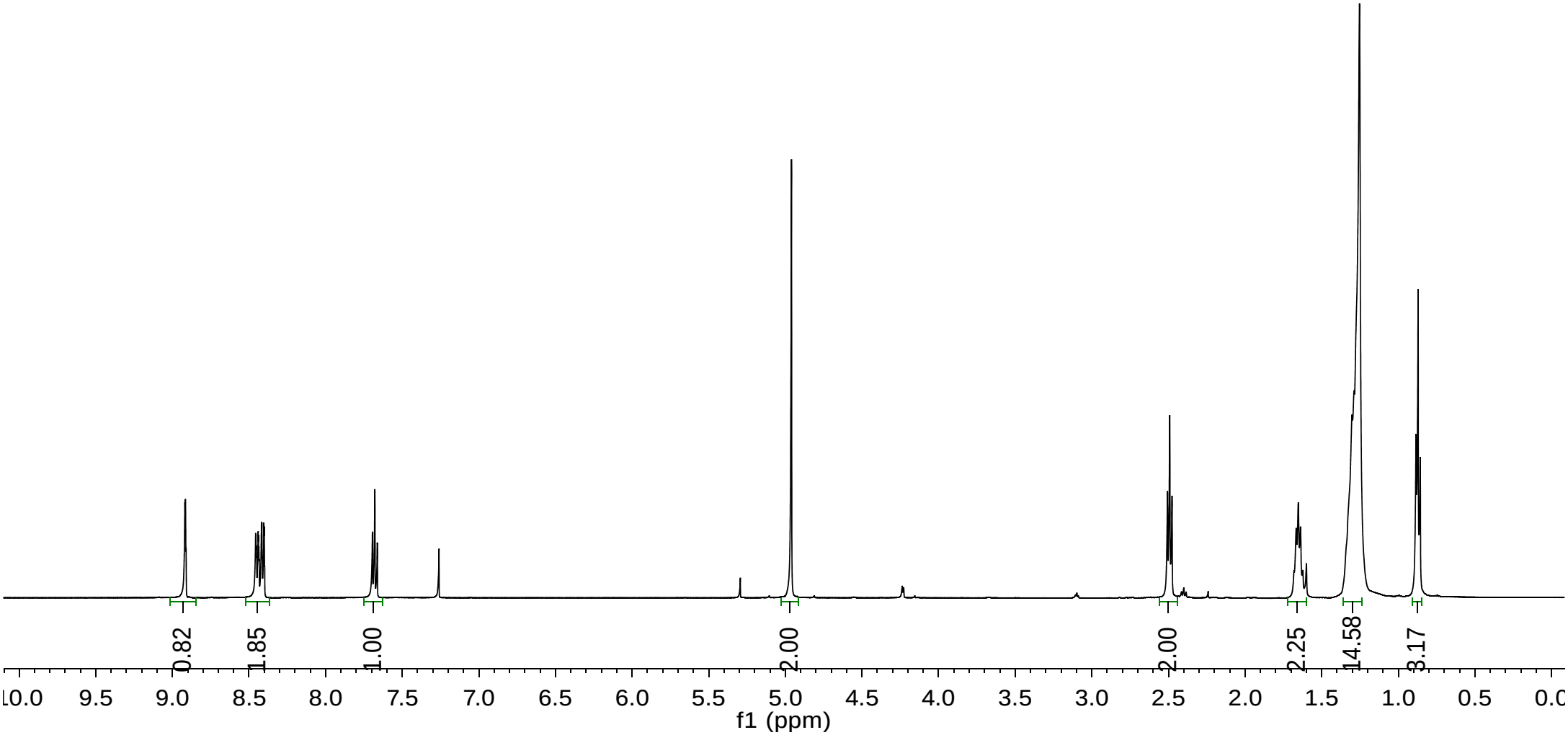
Title zhaoyl-1-91-8
Solvent CDCl3
Spectrometer Frequency 499.86



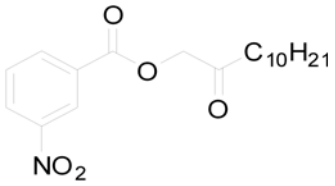

204.26
165.94
139.60
136.17
132.53
128.64
128.44
127.87
84.10
68.36
38.89
29.52
29.41
29.33
29.27
29.14
24.86
23.29
14.09
Title zhaoyl-1-91-8-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
B
O
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

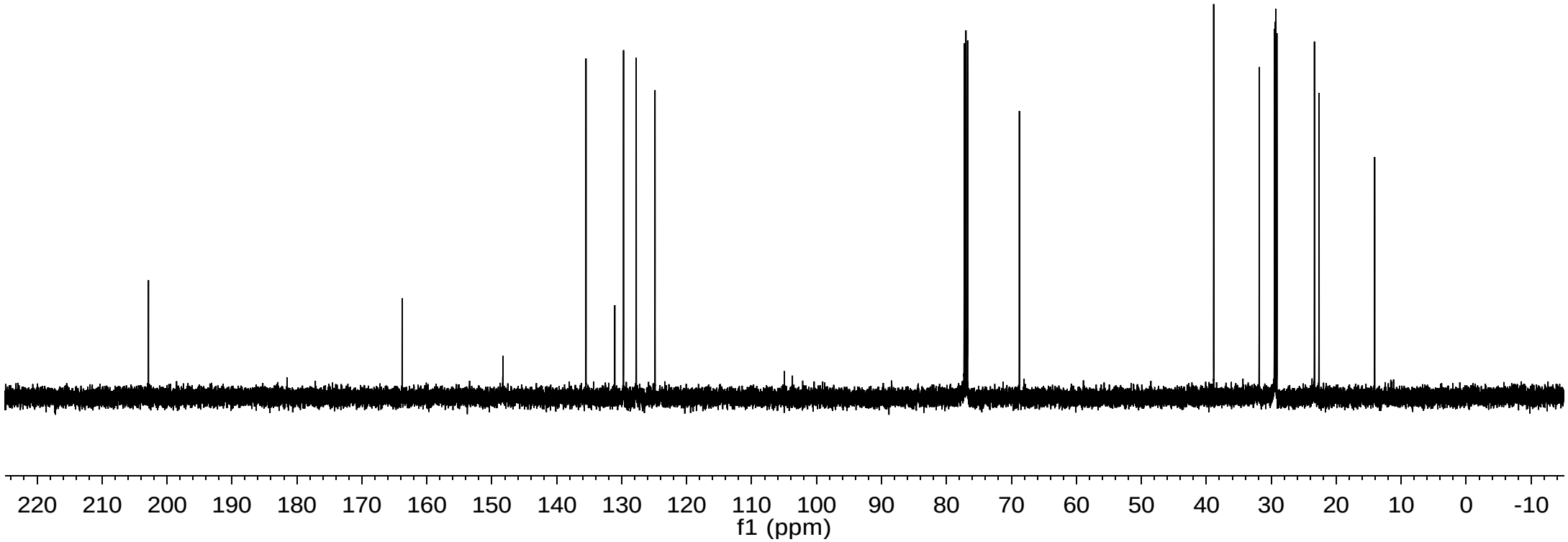
Title	zhaoyl-1-126-1
Solvent	CDCl3
Number of Scans	8
Relaxation Delay	5.0000
Acquisition Date	2013-03-31T15:34:42
Spectrometer Frequency	499.86



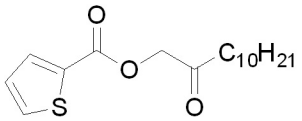


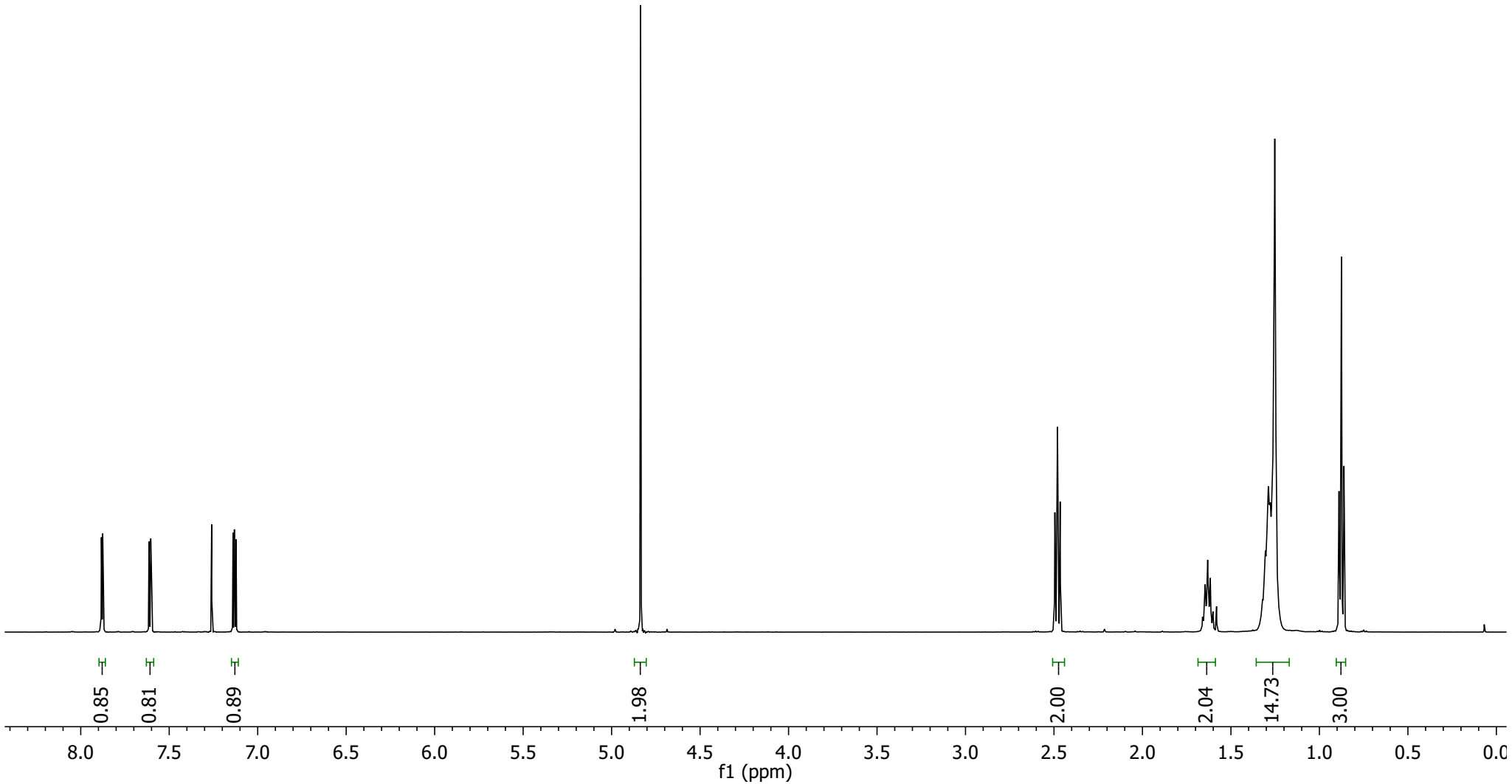
Title	zhaoyl-1-126-1-C13
Solvent	CDCl3
Number of Scans	124
Relaxation Delay	1.0000
Acquisition Date	2013-03-31T15:37:03
Spectrometer Frequency	125.70

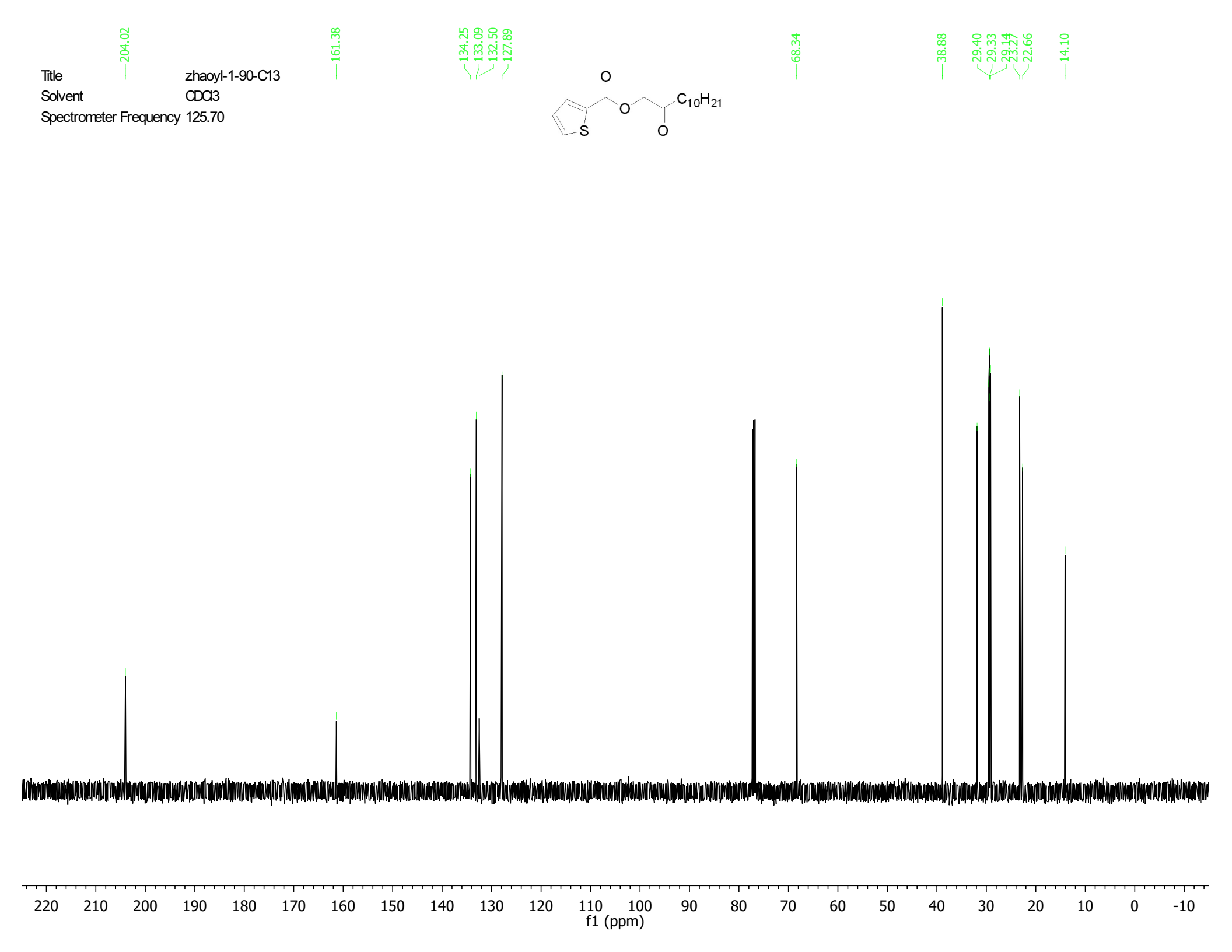




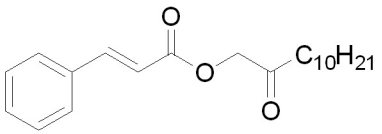
Title zhaoyl-1-90
Solvent CDCl3
Spectrometer Frequency 499.86

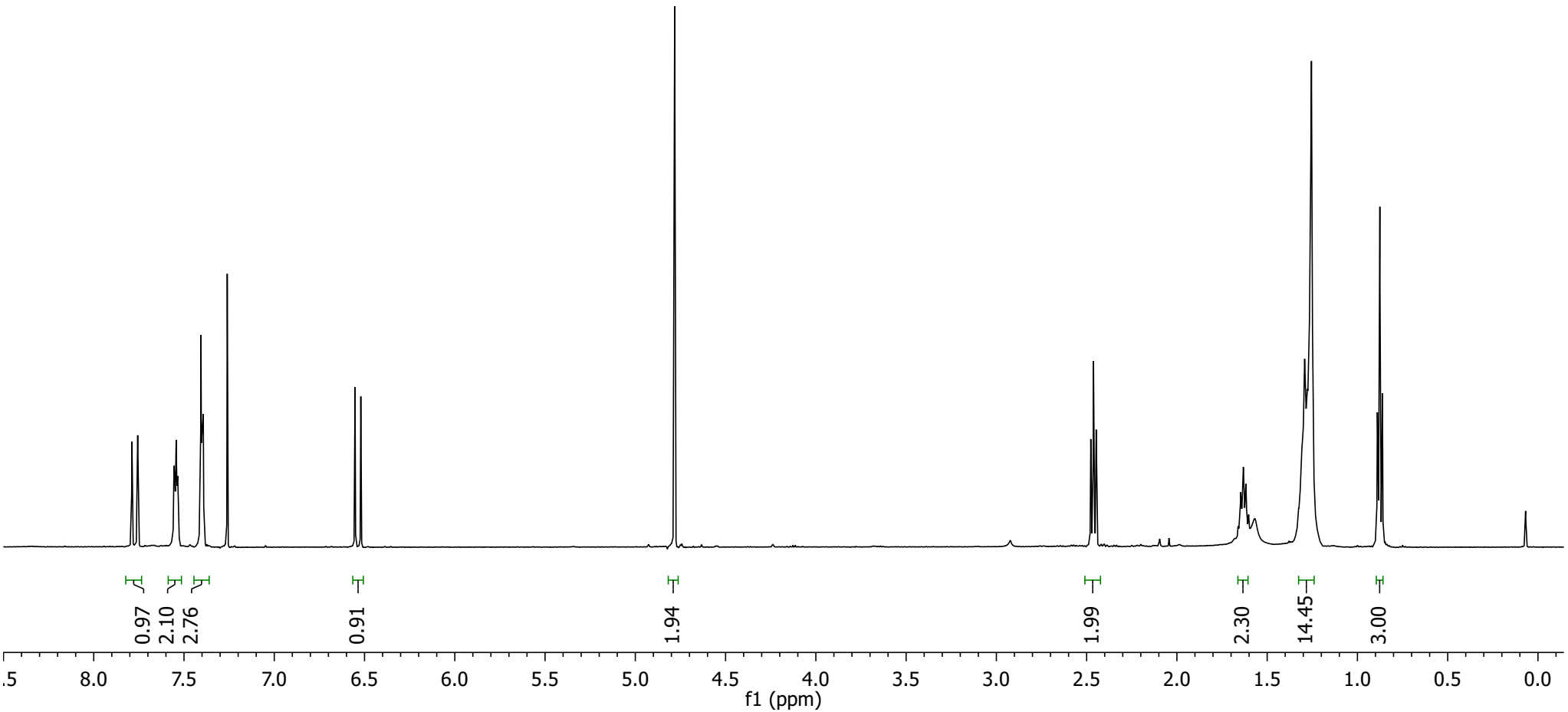


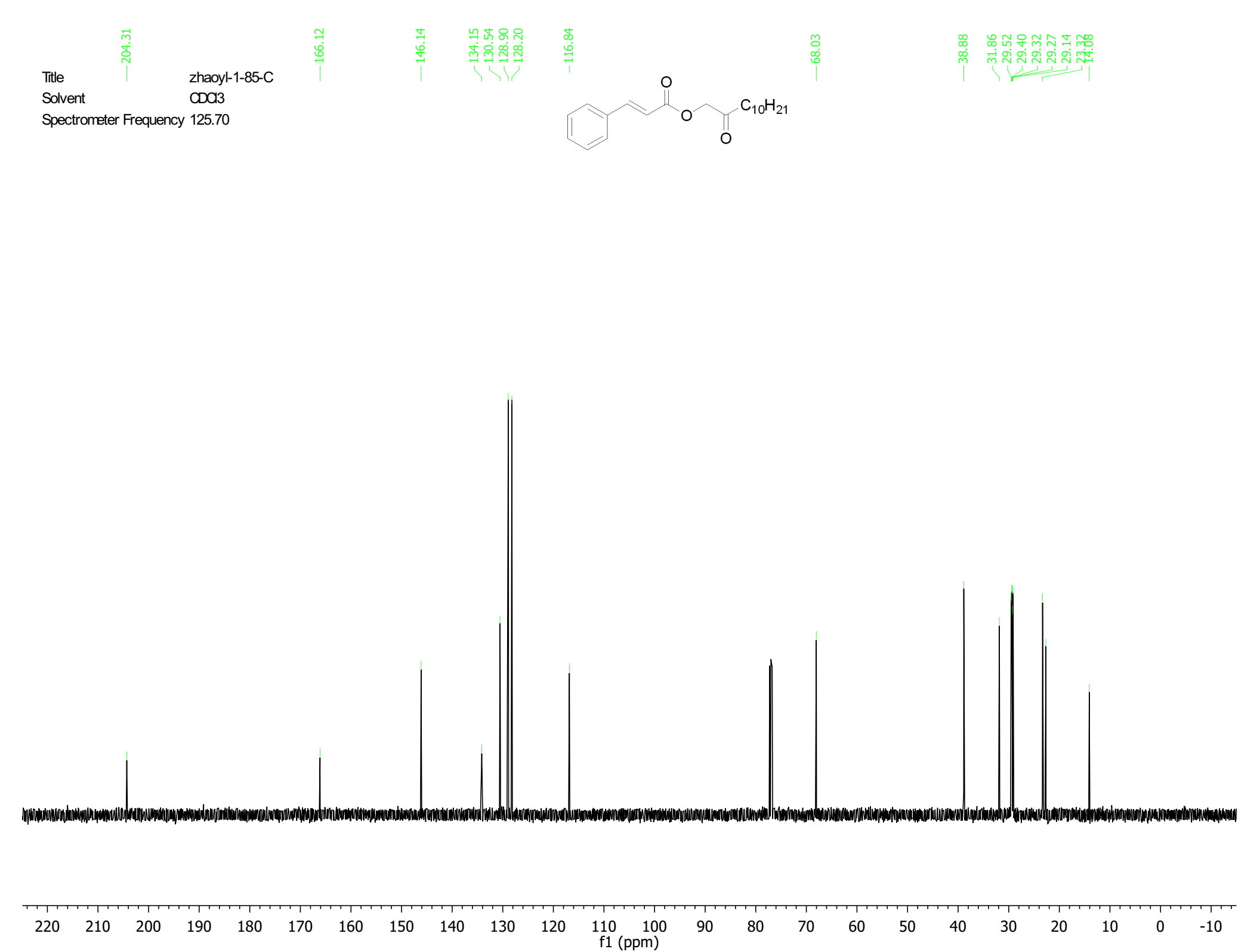



204.02
161.38
134.25
133.09
132.50
127.89
68.34
38.88
29.40
29.33
29.14
23.27
22.66
14.10
Title zhaoyl-1-90-C13
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
S
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

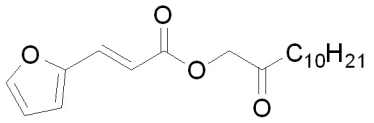
Title zhaoyl-1-85
Solvent CDCl3
Spectrometer Frequency 499.86

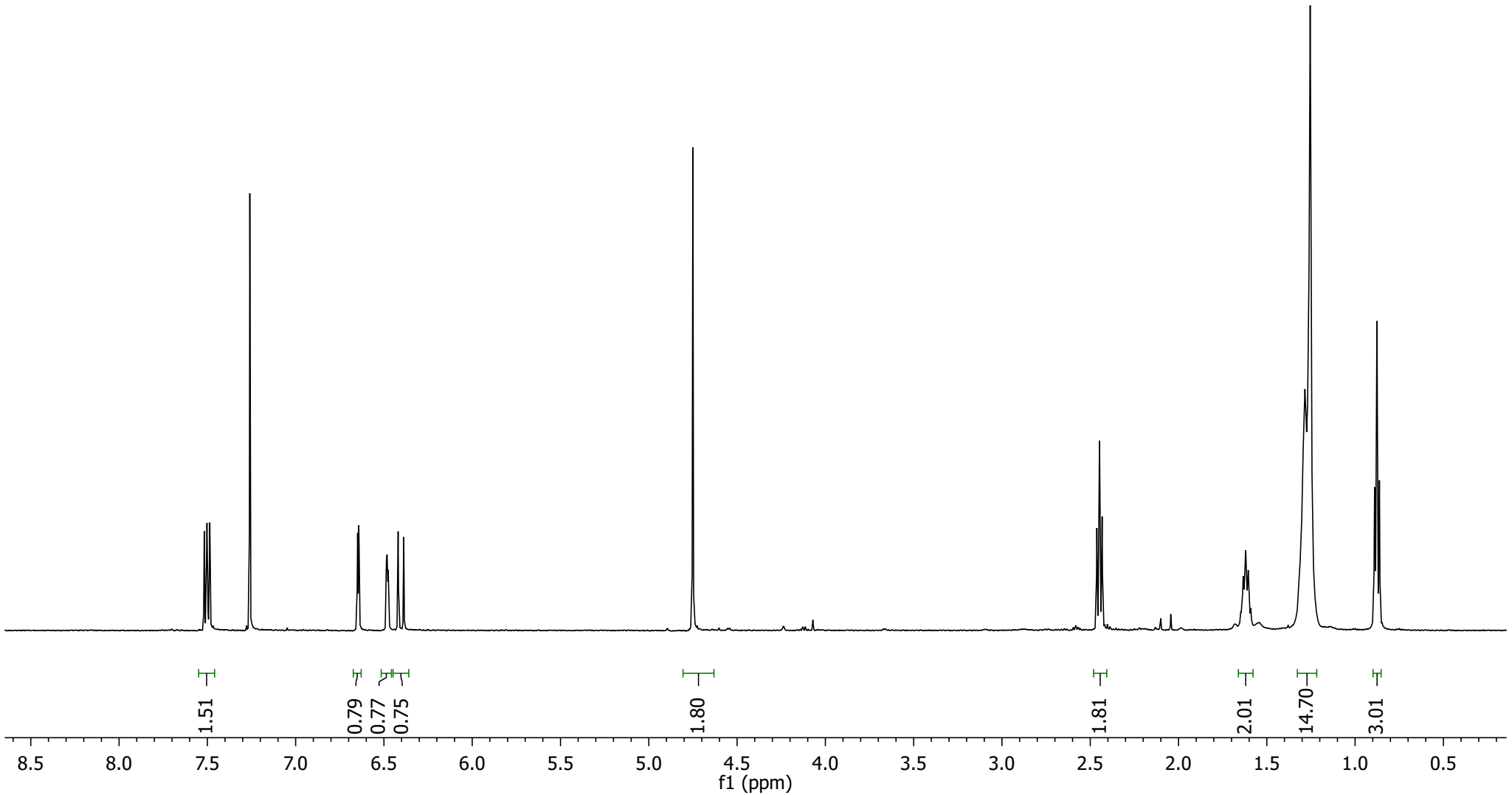




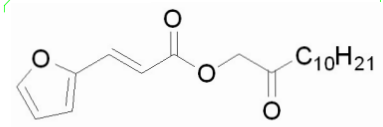

204.31
166.12
146.14
134.15
130.54
128.90
128.20
116.84
68.03
38.88
31.86
29.52
29.40
29.32
29.27
29.14
23.32
14.08
Title zhaoyl-1-85-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Title zhaoyl-1-82
Solvent CDCl3
Spectrometer Frequency 499.86

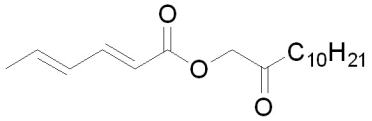


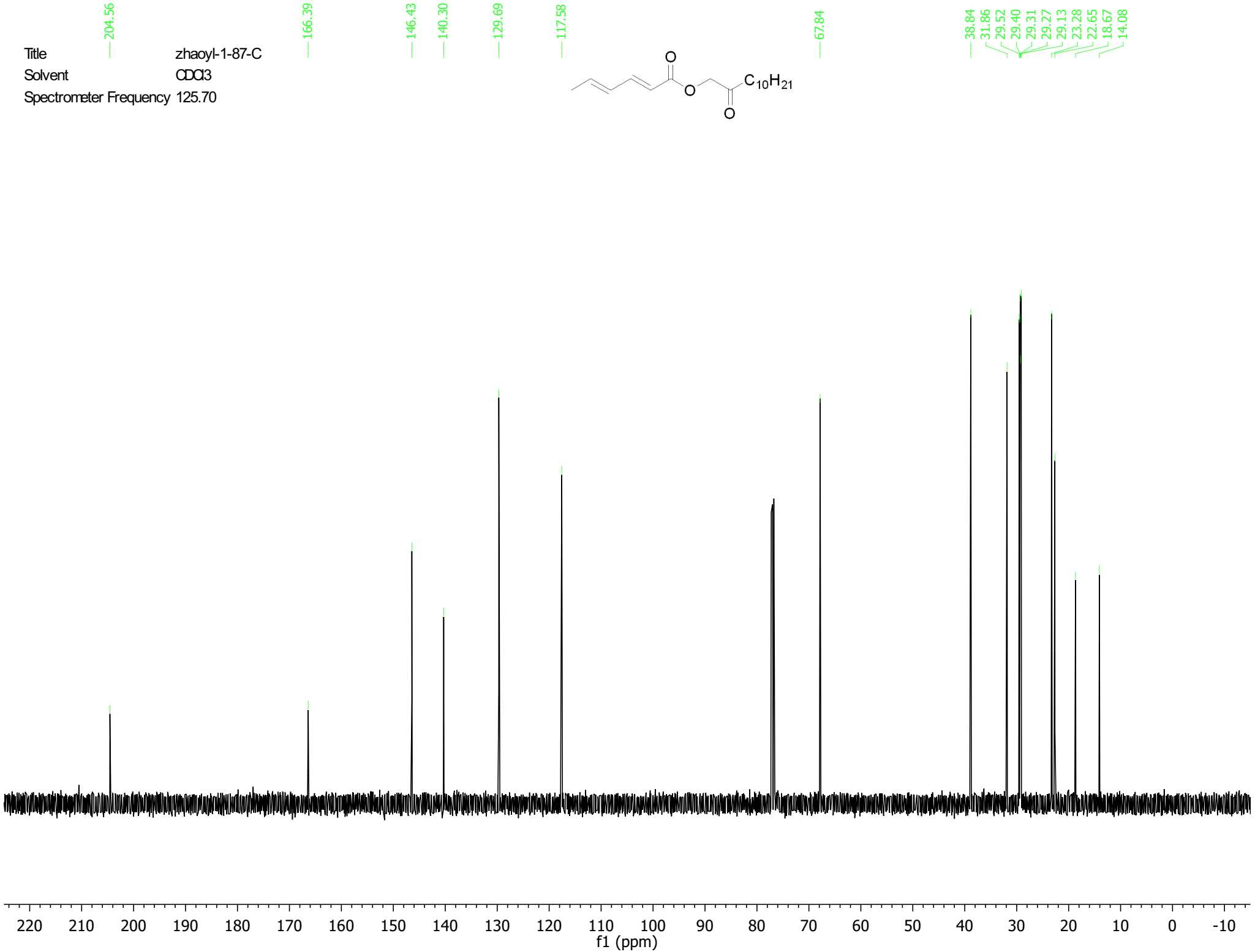


Title zhaoyl-1-82-C
Solvent CDCl3
Spectrometer Frequency 125.70

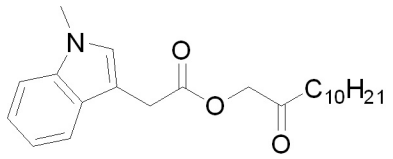


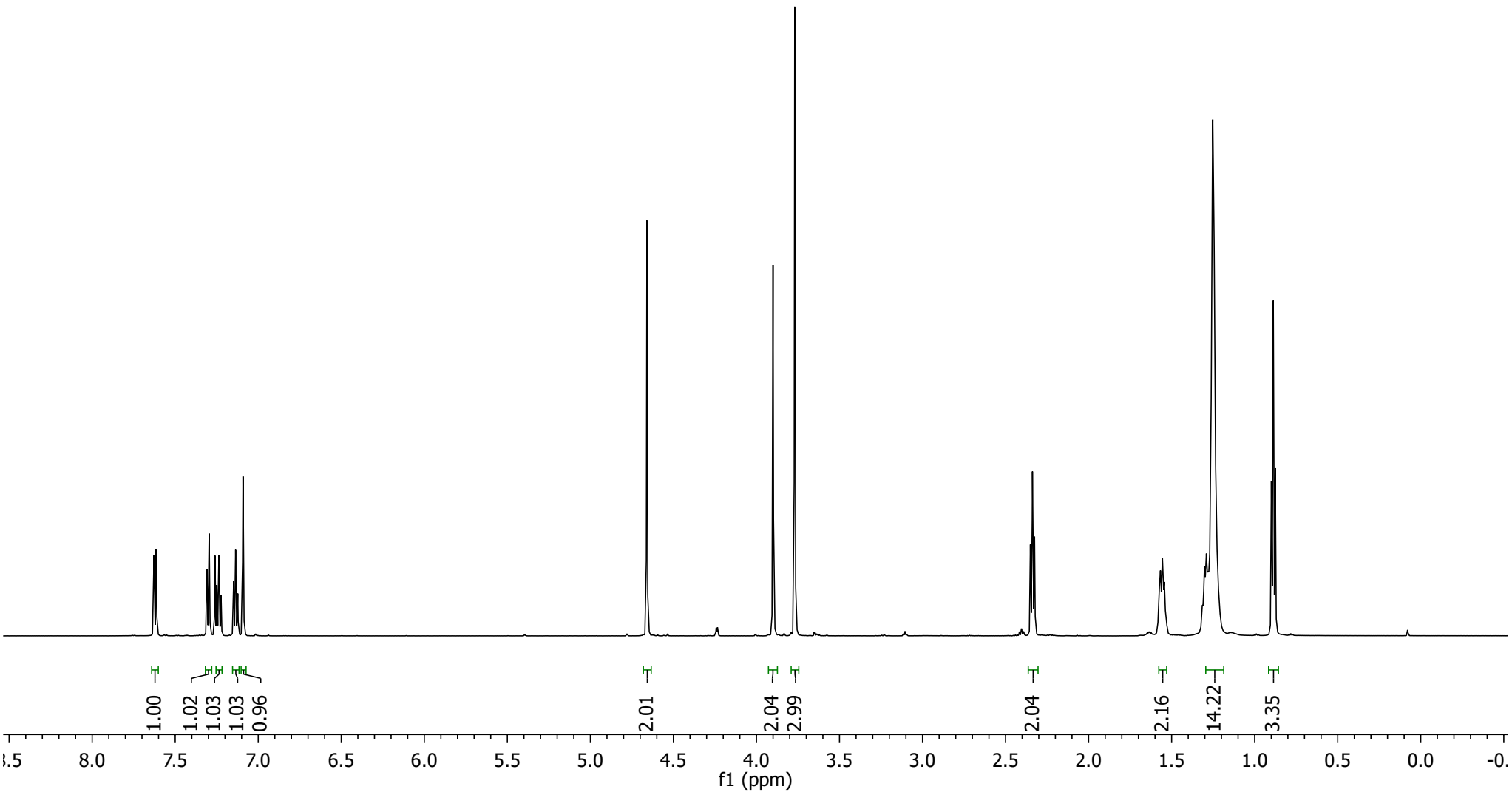
Title zhaoyl-1-87
Solvent CDCl3
Spectrometer Frequency 499.86




204.56
166.39
146.43
140.30
129.69
117.58
67.84
38.84
31.86
29.52
29.40
29.31
29.27
29.13
23.28
22.65
18.67
14.08
Title zhaoyl-1-87-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
C10H21
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

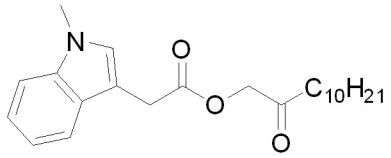
Title jkg-IV-152B-P-H
Solvent cdcl3
Spectrometer Frequency 599.64

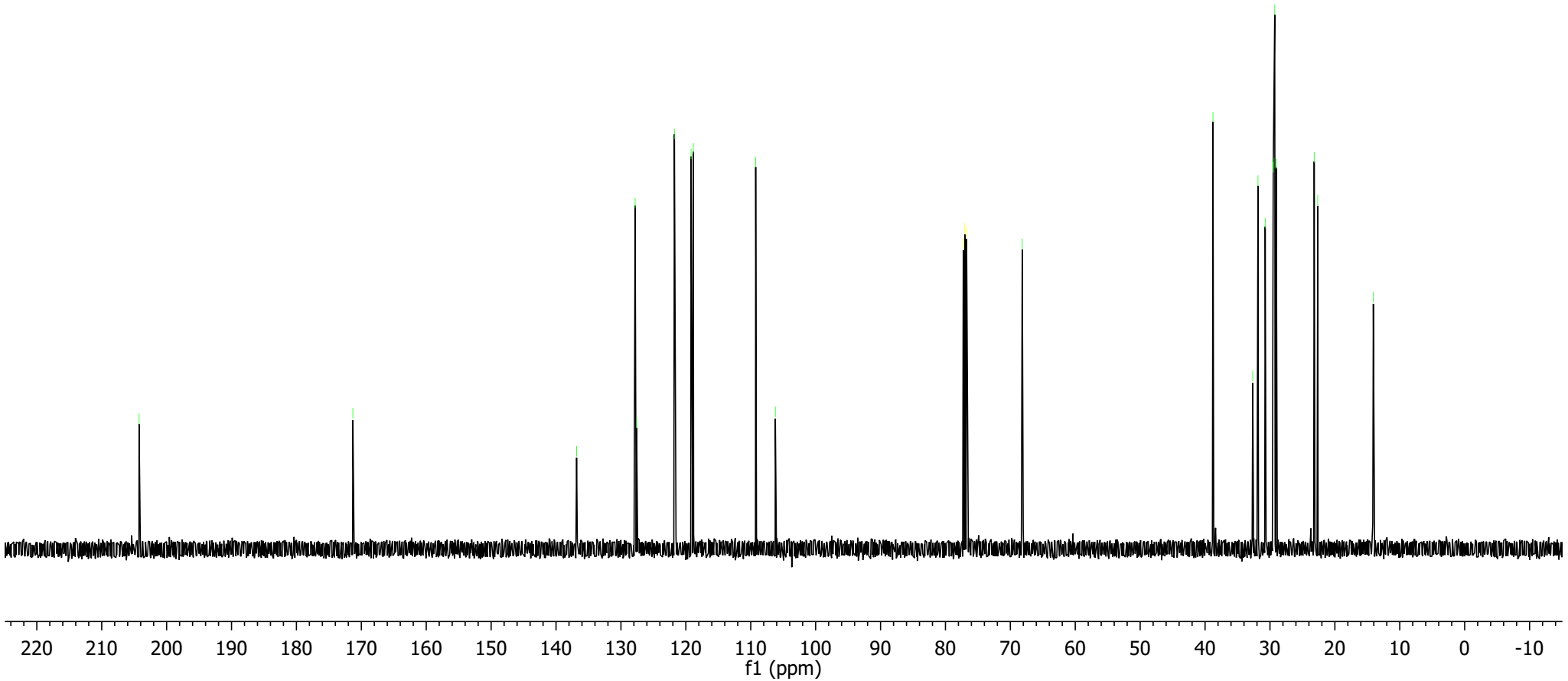




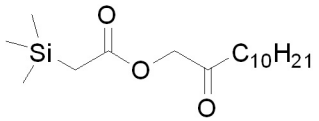
Title jkg-IV-152B-p-C
Solvent CDCl3
Spectrometer Frequency 125.70

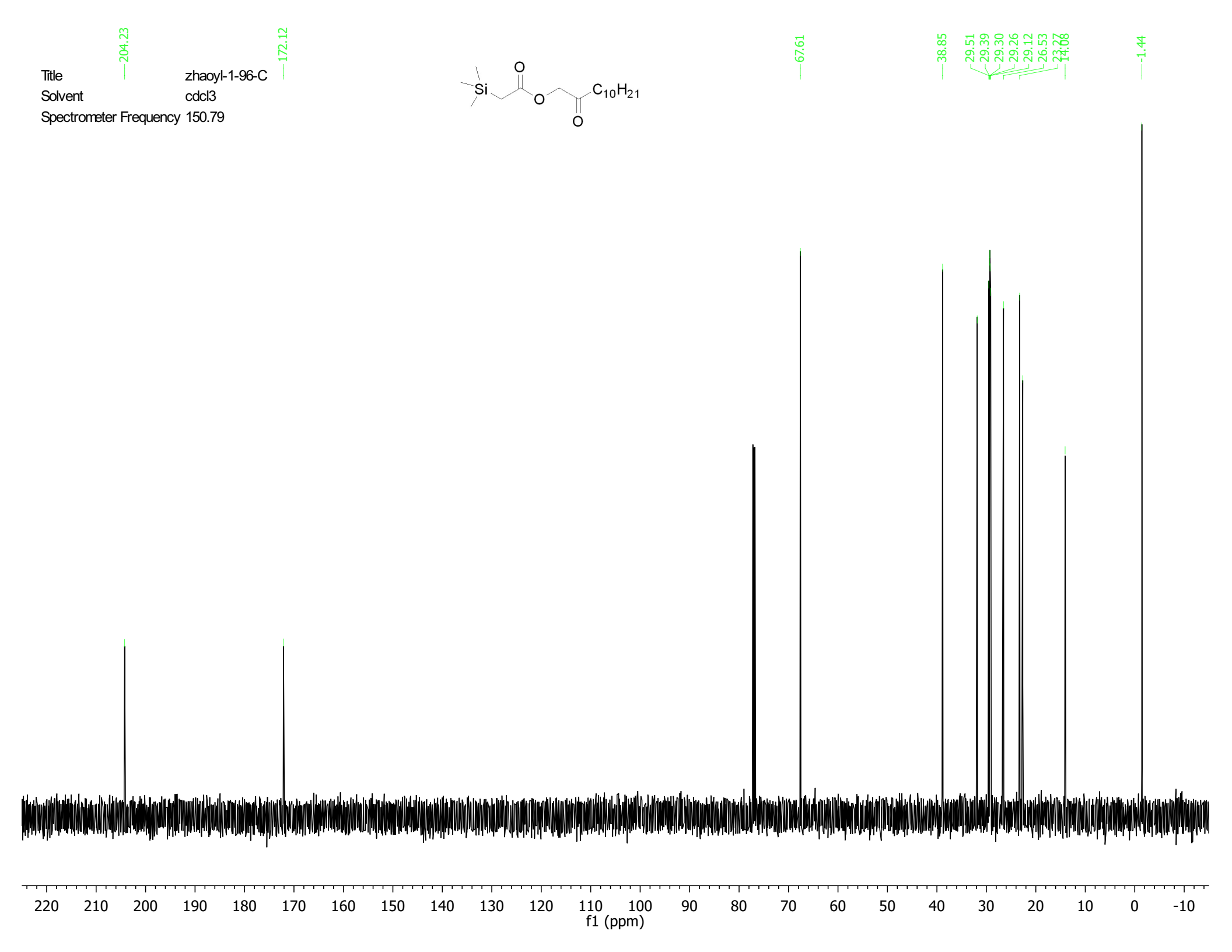
204.24
171.30
136.83
127.81
127.58
121.77
119.19
118.85
109.24
106.21
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
68.17
38.78
31.85
29.50
29.38
29.27
29.04
23.18
22.64
14.08



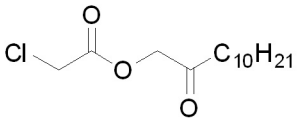


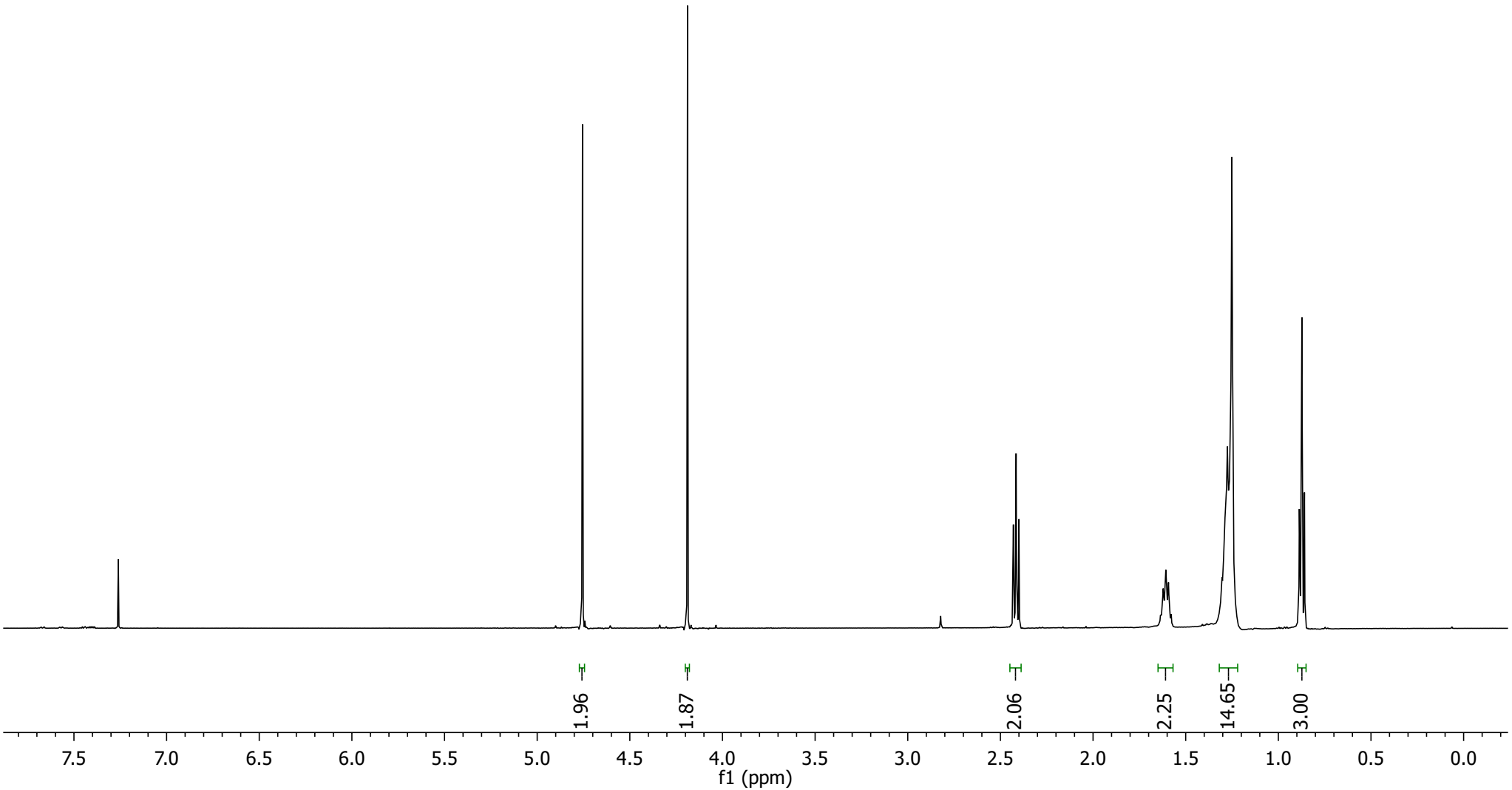
Title zhaoyl-1-96
Solvent cdcl3
Spectrometer Frequency 599.64




204.23
172.12
67.61
38.85
29.51
29.39
29.30
29.26
29.12
26.53
23.27
14.08
-1.44
Title zhaoyl-1-96-C
Solvent cdcl3
Spectrometer Frequency 150.79
Si
O
O
O
$C_{10}H_{21}$
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

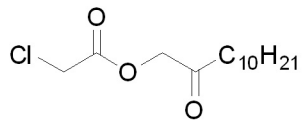
Title zhaoyl-1-93-2
Solvent CDCl3
Spectrometer Frequency 499.86

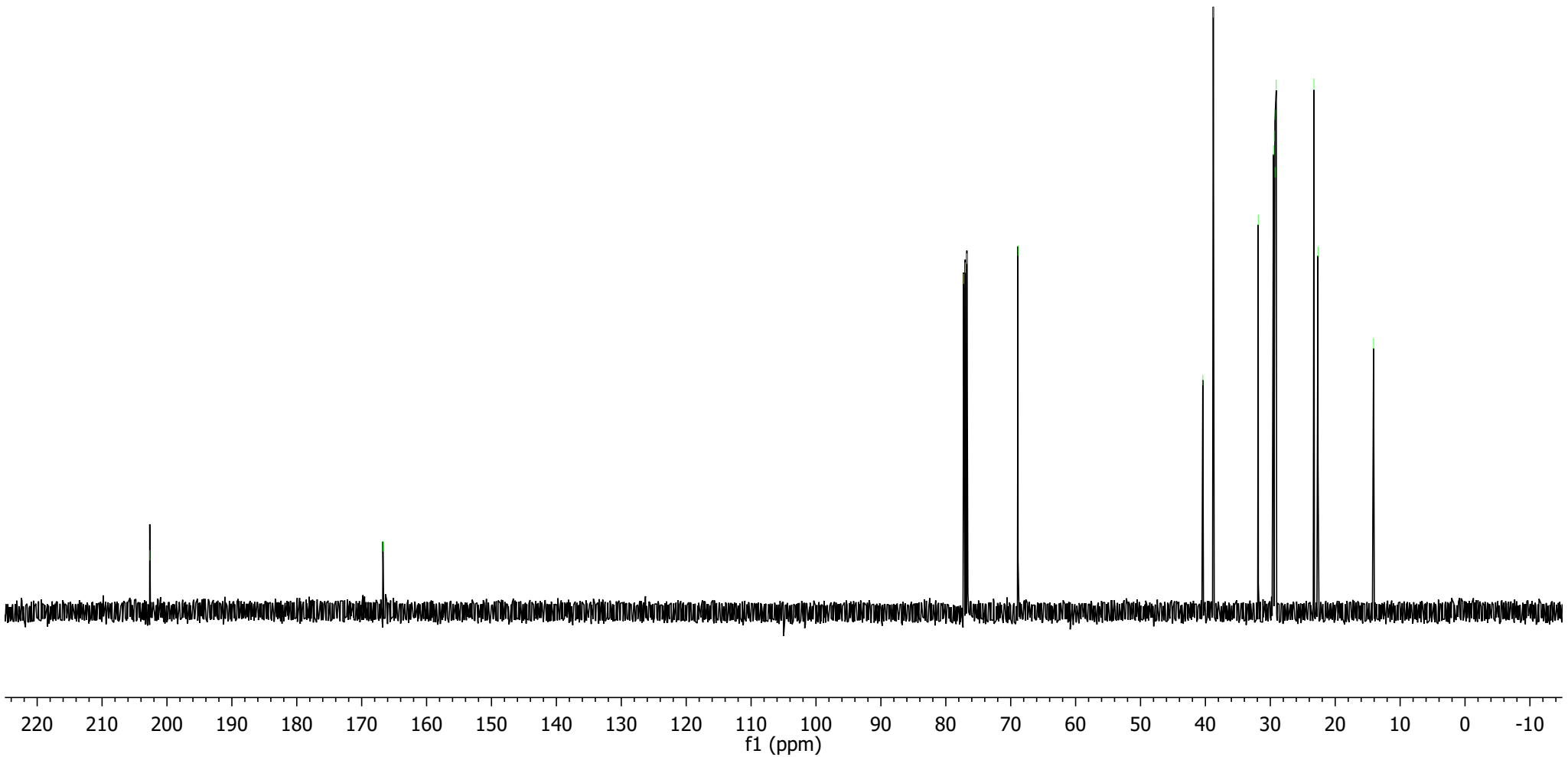




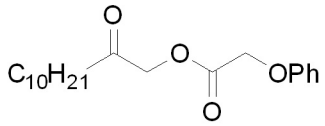
Title zhaoyl-1-93-C
Solvent CDCl3
Spectrometer Frequency 125.70

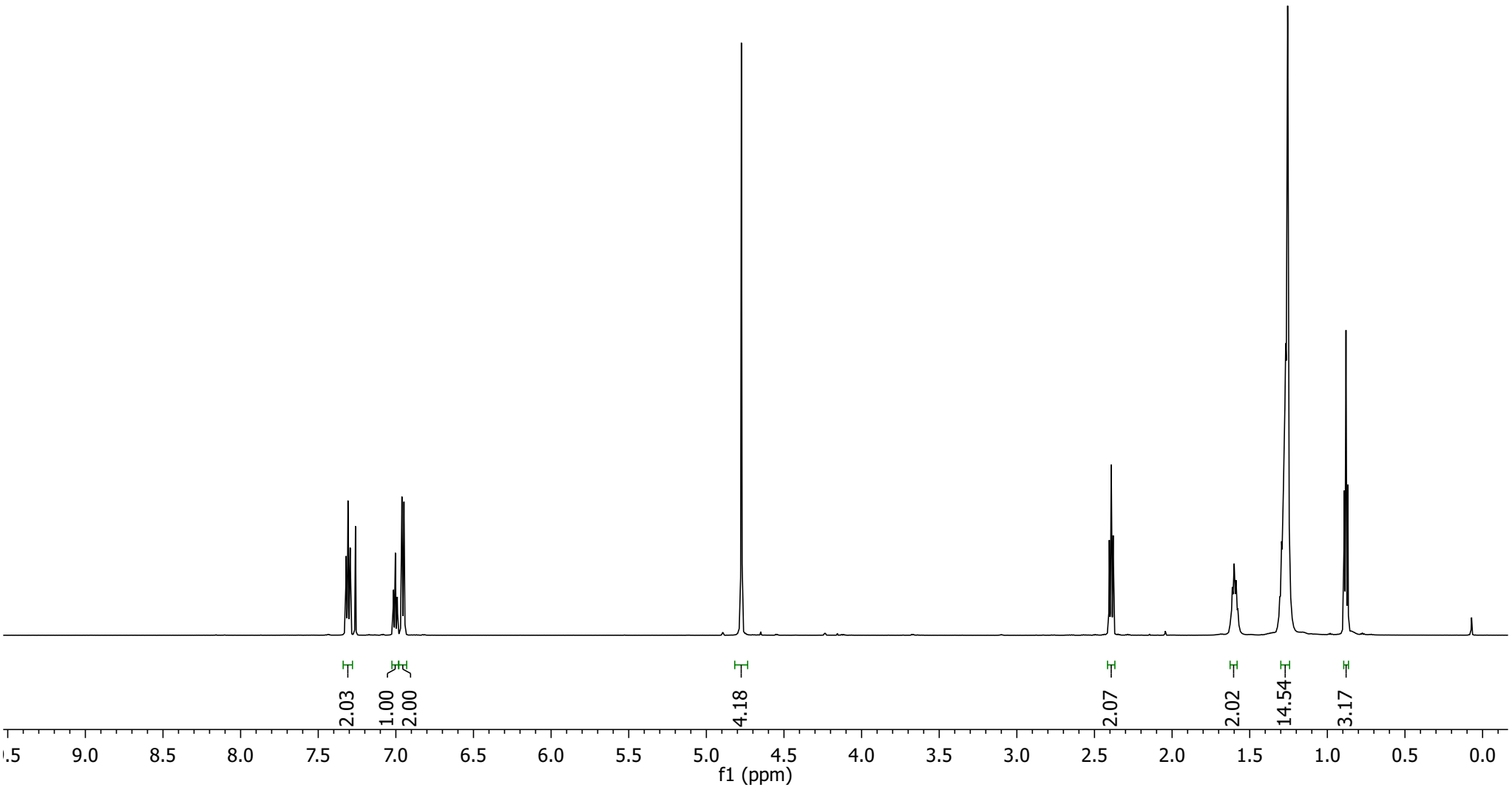
202.64
166.73
77.26 CDCl3
77.00 CDCl3
76.75 CDCl3
68.88
40.40
38.79
31.86
29.52
29.39
29.29
29.27
29.09
23.28
14.09





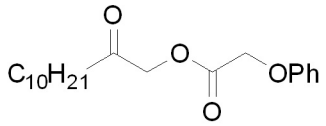
Title jkg-IV-148A-H
Solvent cdcl3
Spectrometer Frequency 599.64

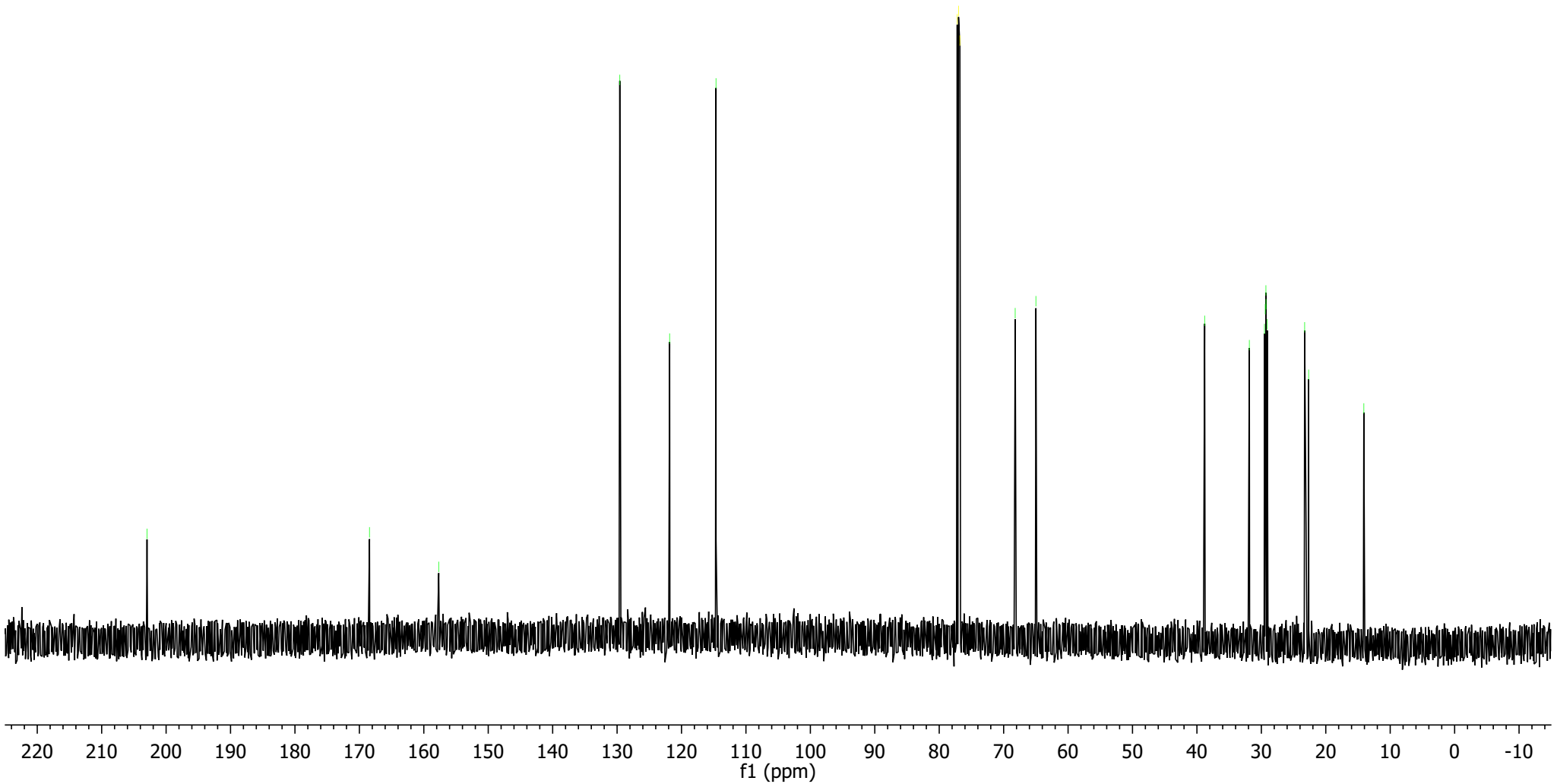




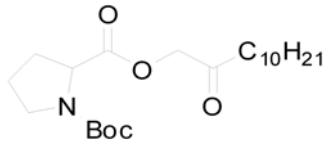
Title jkg-IV-148A-C
Solvent cdcl3
Spectrometer Frequency 150.79

202.96 168.43 157.68 129.58 121.84 114.64 77.21 cdcl3 77.00 cdcl3 76.79 cdcl3 68.21 64.99 38.80 31.86 29.52 29.39 29.29 29.27 29.09 23.28 14.09

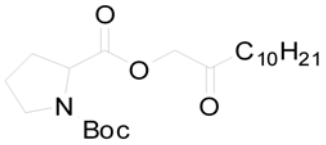




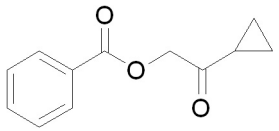
Title	zhaoyl-1-111
Solvent	CDCl3
Number of Scans	8
Relaxation Delay	5.0000
Acquisition Date	2013-02-13T14:11:18
Spectrometer Frequency	499.86

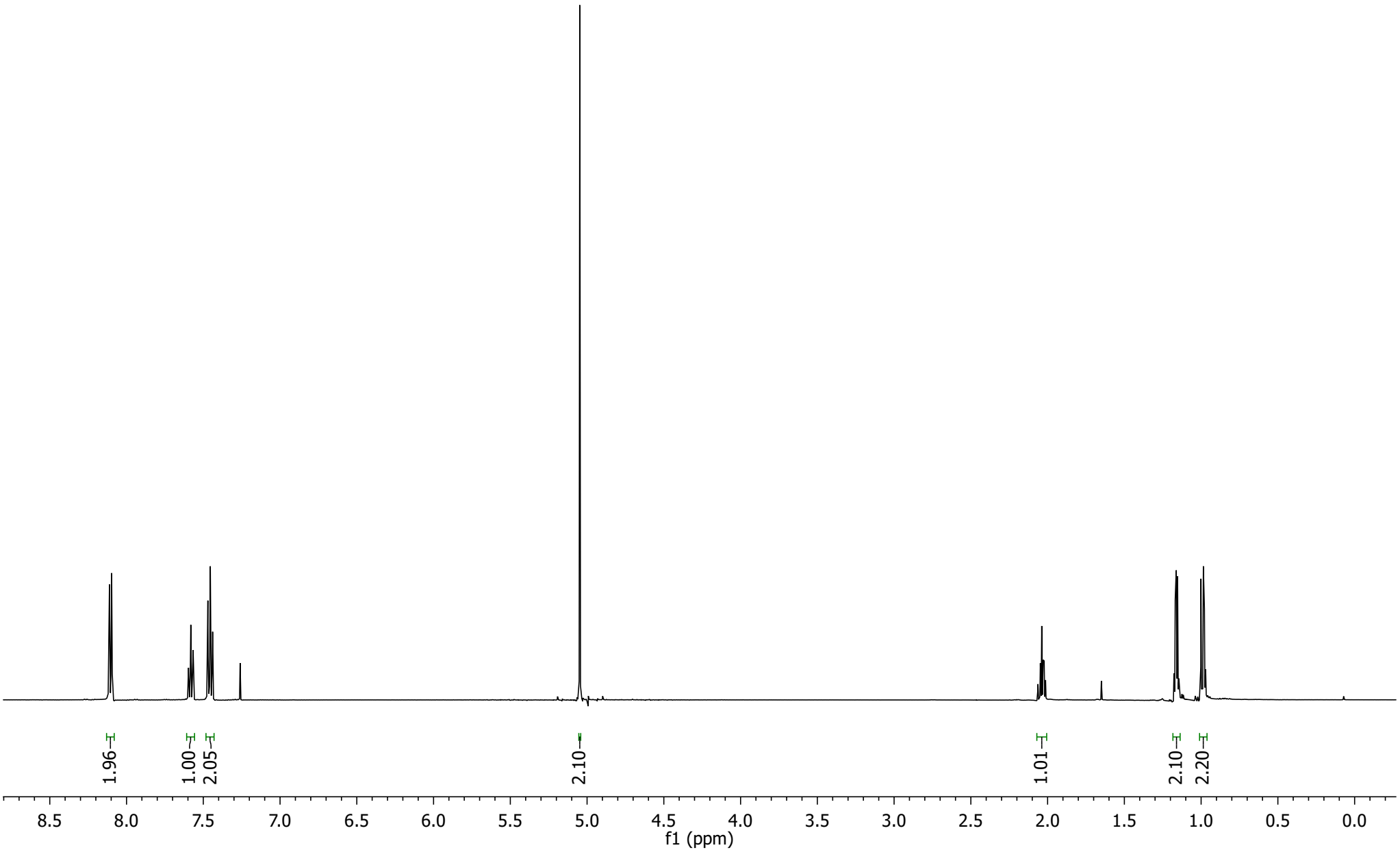


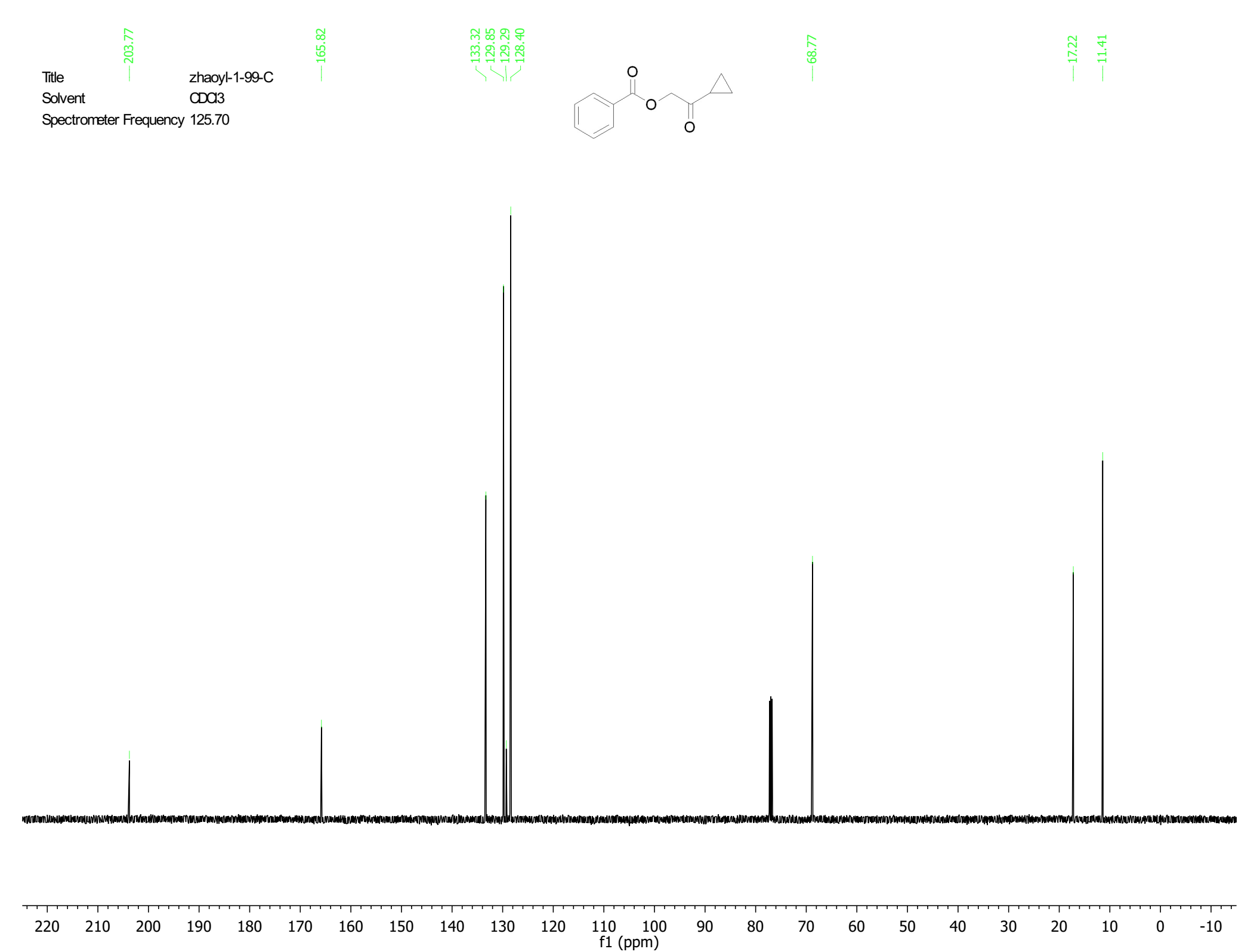
Title	zhaoyl-1-111-C
Solvent	CDCl3
Number of Scans	408
Relaxation Delay	1.0000
Acquisition Date	2011-02-18T15:19:08
Spectrometer Frequency	125.70



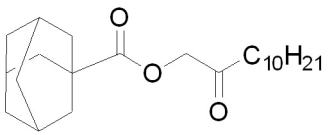
Title zhaoyl-1-99
Solvent CDCl3
Spectrometer Frequency 499.86

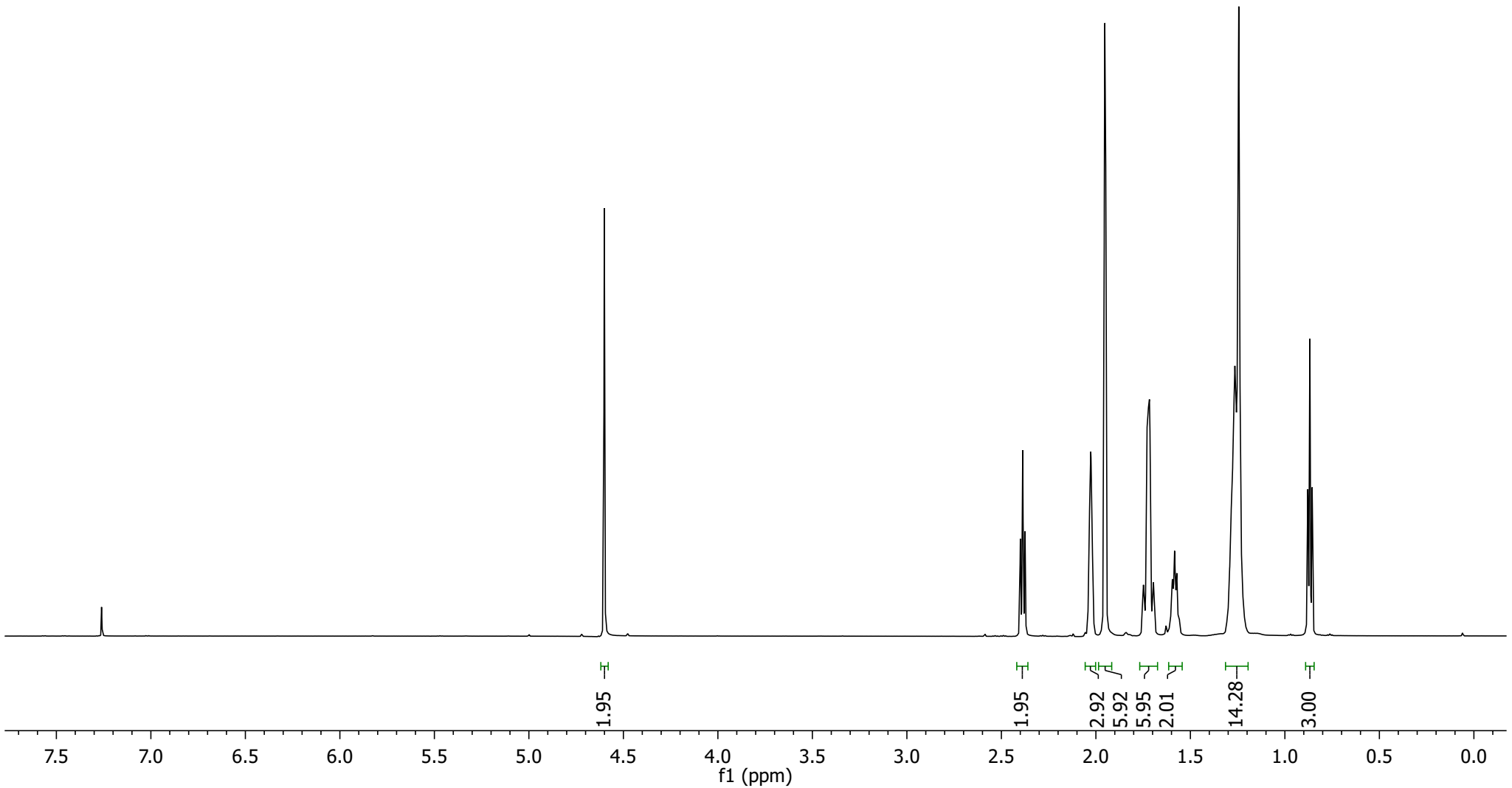




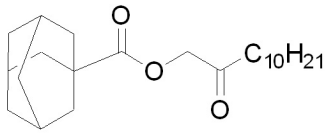

203.77
165.82
133.32
129.85
129.29
128.40
68.77
17.22
11.41
Title zhaoyl-1-99-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Title zhaoyl-1-95
Solvent cdcl3
Spectrometer Frequency 599.64

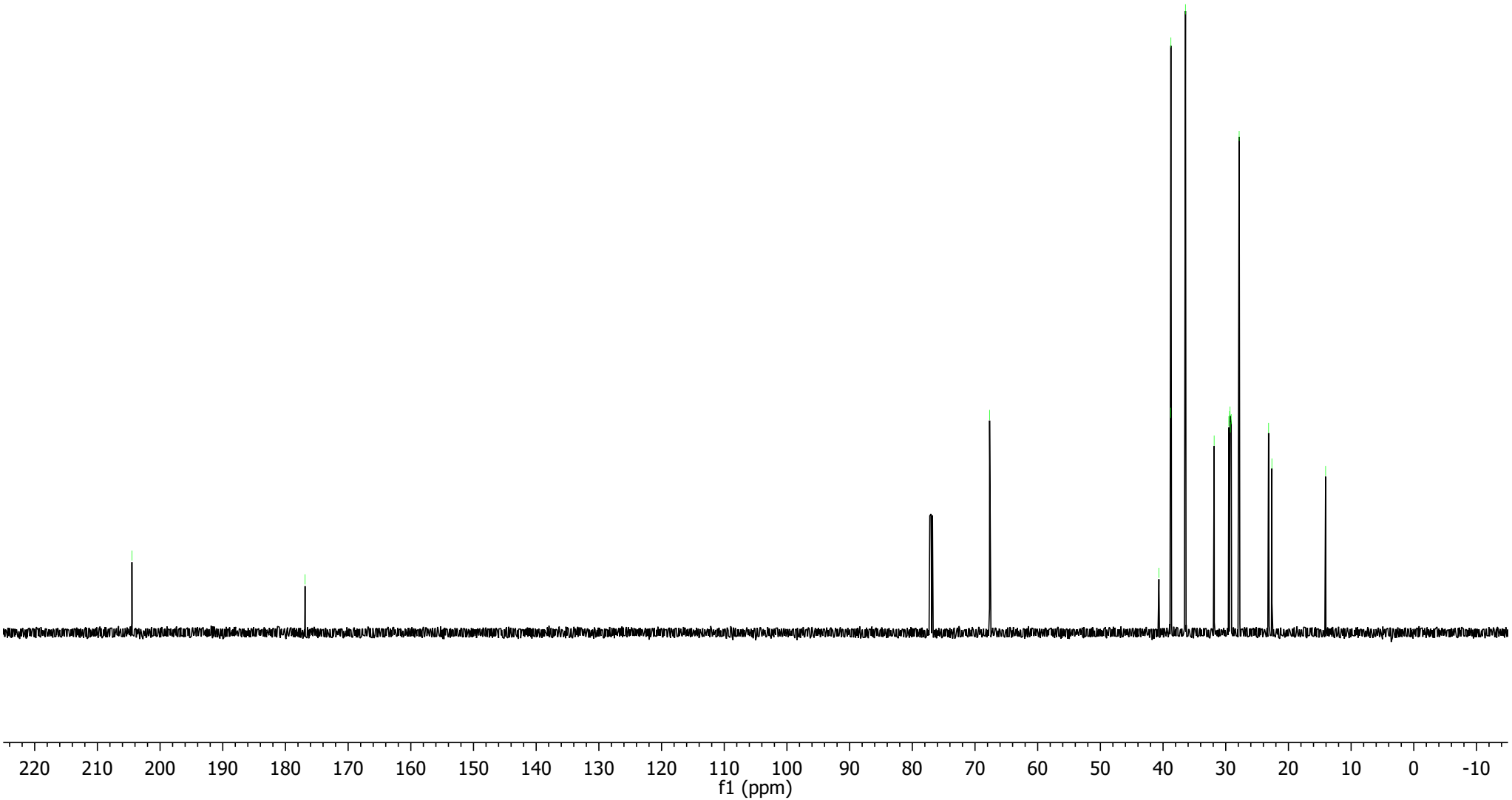




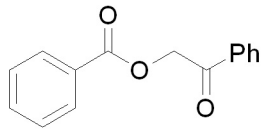
Title zhaoyl-1-95-C
Solvent cdcl3
Spectrometer Frequency 150.79

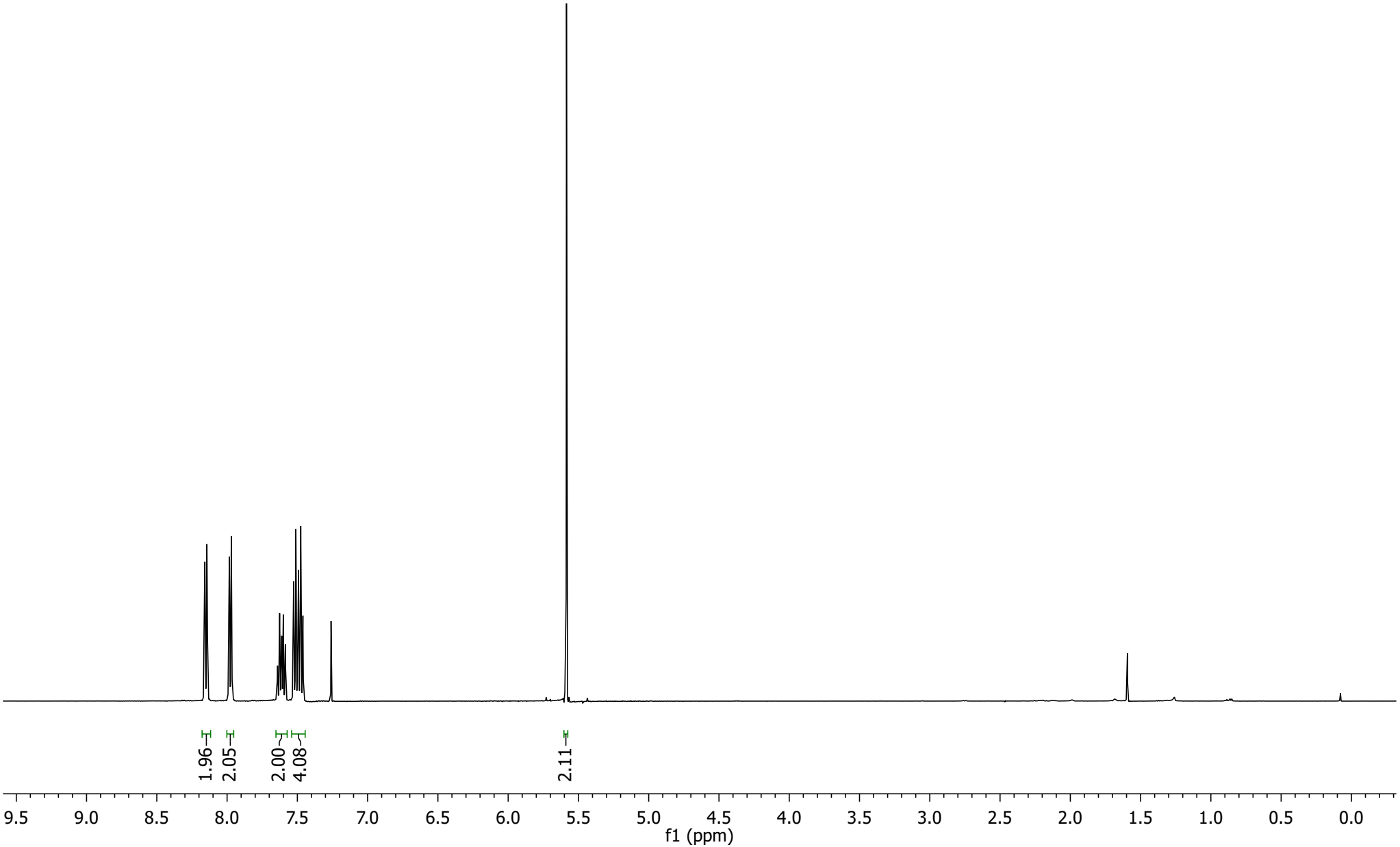


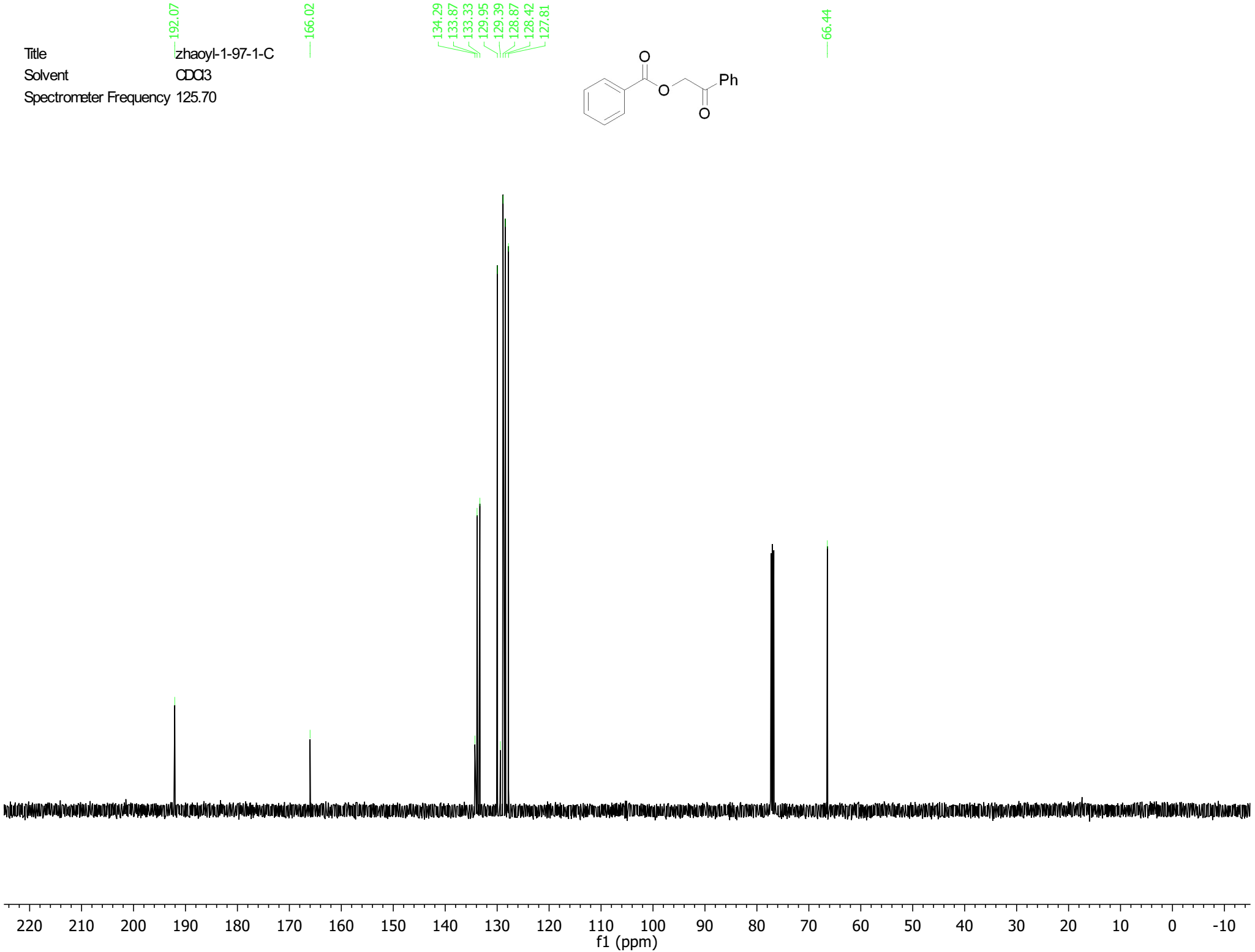
204.49
176.87
67.67
40.66
38.79
38.75
36.42
31.85
29.51
29.38
29.32
29.25
29.13
27.86
23.17
22.64
14.07



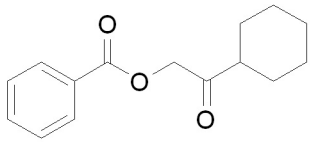
Title zhaoyl-1-97-1
Solvent CDCl3
Spectrometer Frequency 499.86

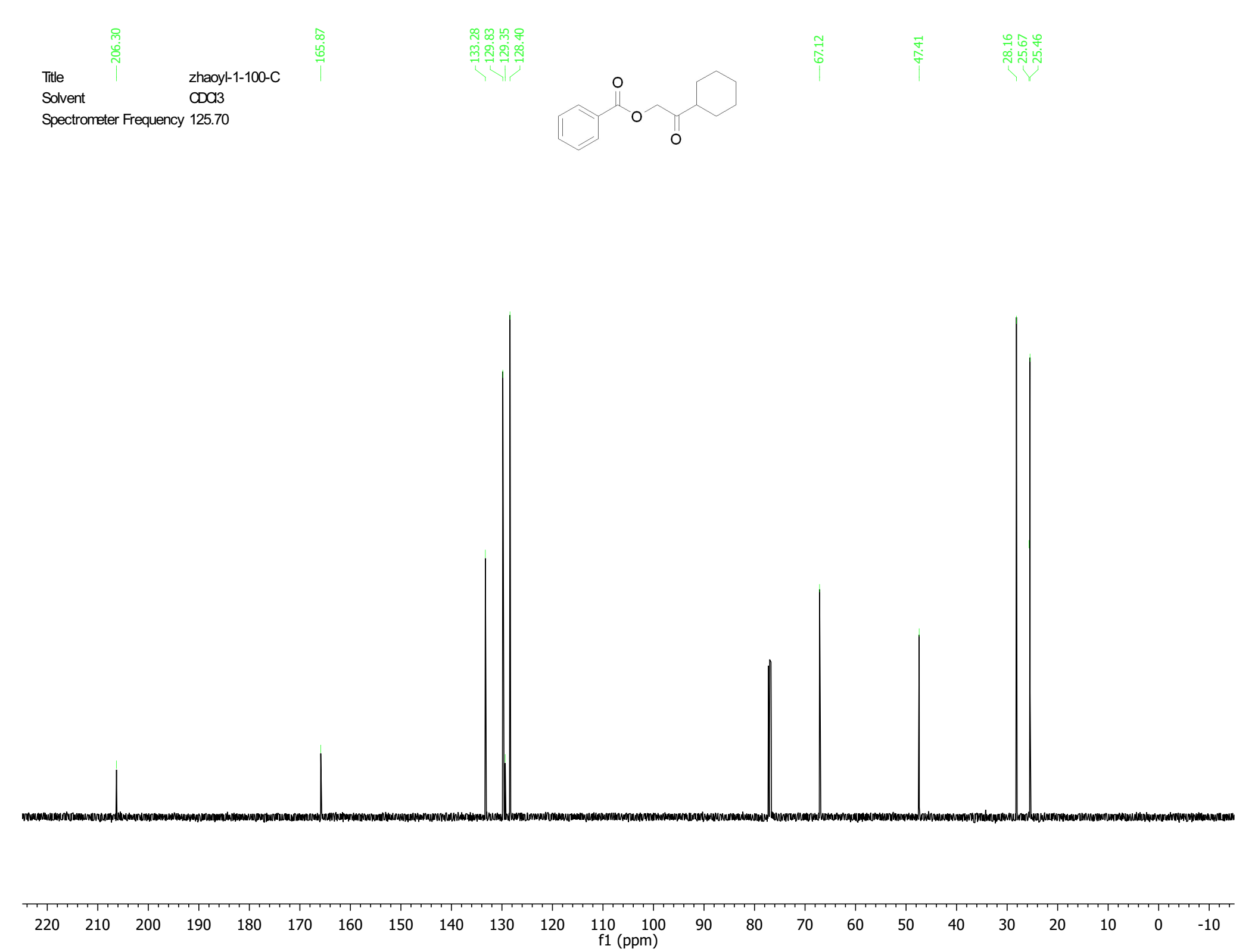




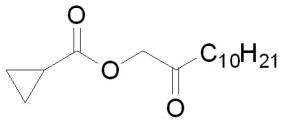

192.07
166.02
134.29
133.87
133.33
129.95
129.39
128.87
128.42
127.81
66.44
Title zhaoyl-1-97-1-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
Ph
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

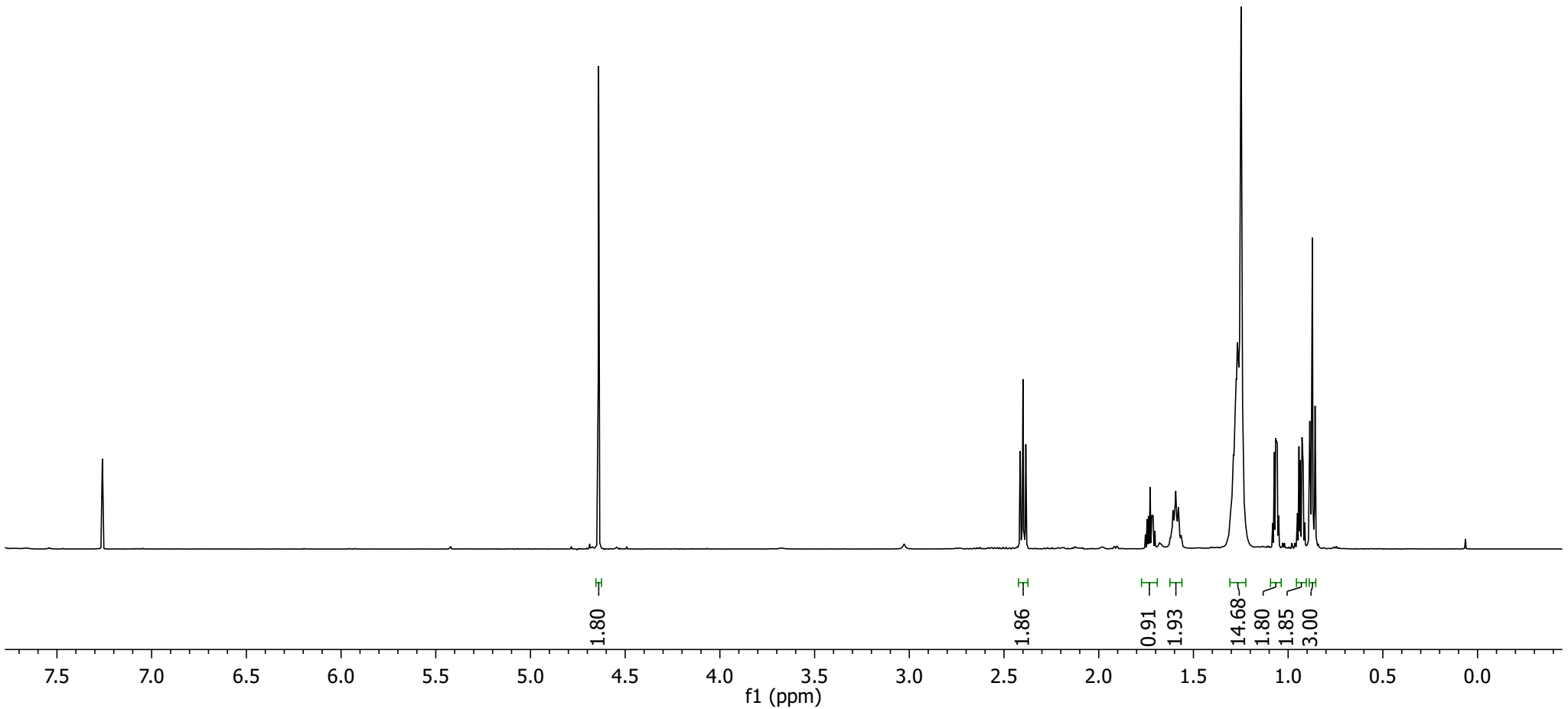
Title zhaoyl-1-100-1
Solvent CDCl3
Spectrometer Frequency 499.86



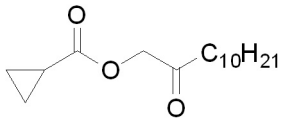

206.30
165.87
133.28
129.83
129.35
128.40
67.12
47.41
28.16
25.67
25.46
Title zhaoyl-1-100-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
O
O
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Title zhaoyl-1-94-1
Solvent CDCl3
Spectrometer Frequency 499.86

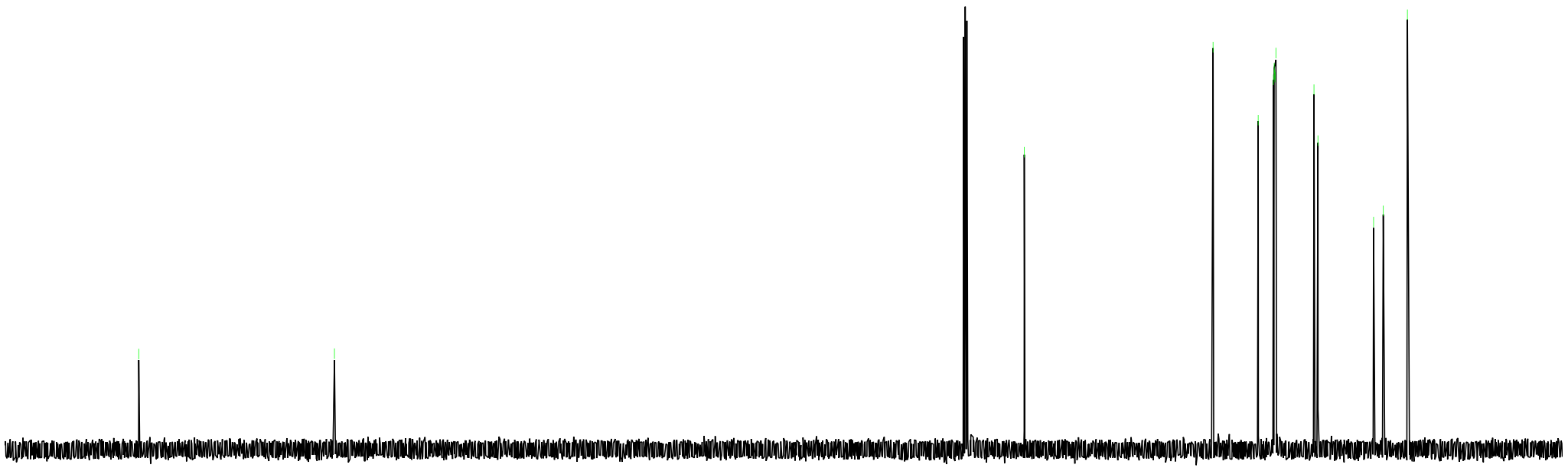


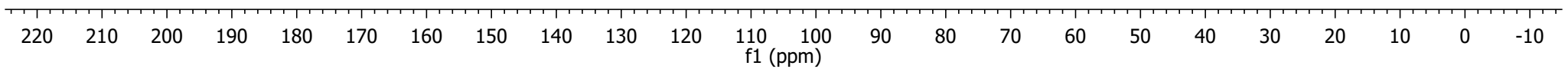


Title zhaoyl-1-94-C
Solvent CDCl3
Spectrometer Frequency 125.70

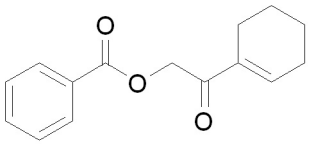


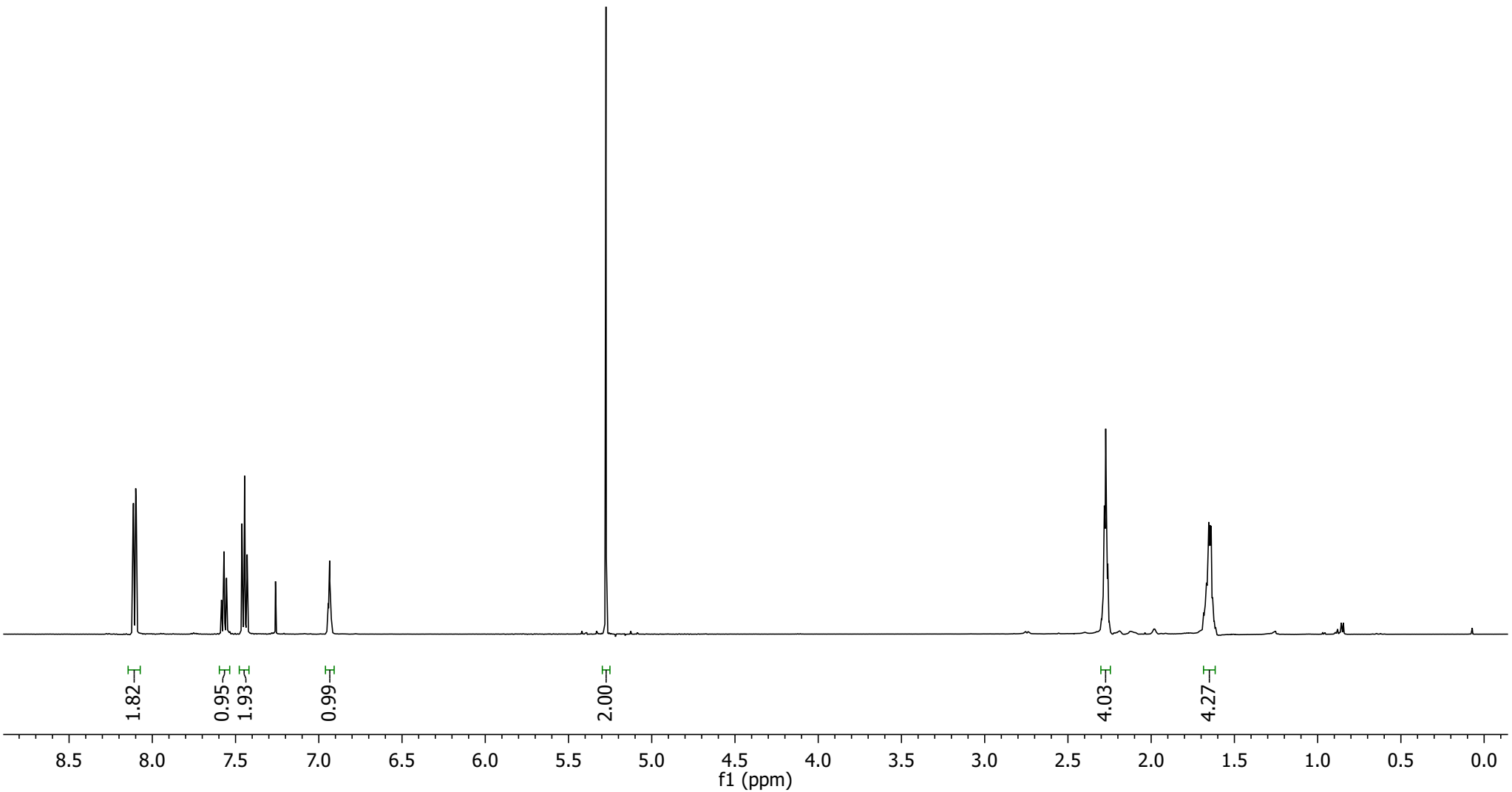
204.34
174.19
67.90
38.81
31.86
29.52
29.40
29.31
29.27
29.13
23.26
14.08
12.59
8.87





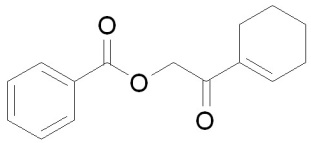
Title zhaoyl-1-198-2
Solvent CDCl3
Spectrometer Frequency 499.86

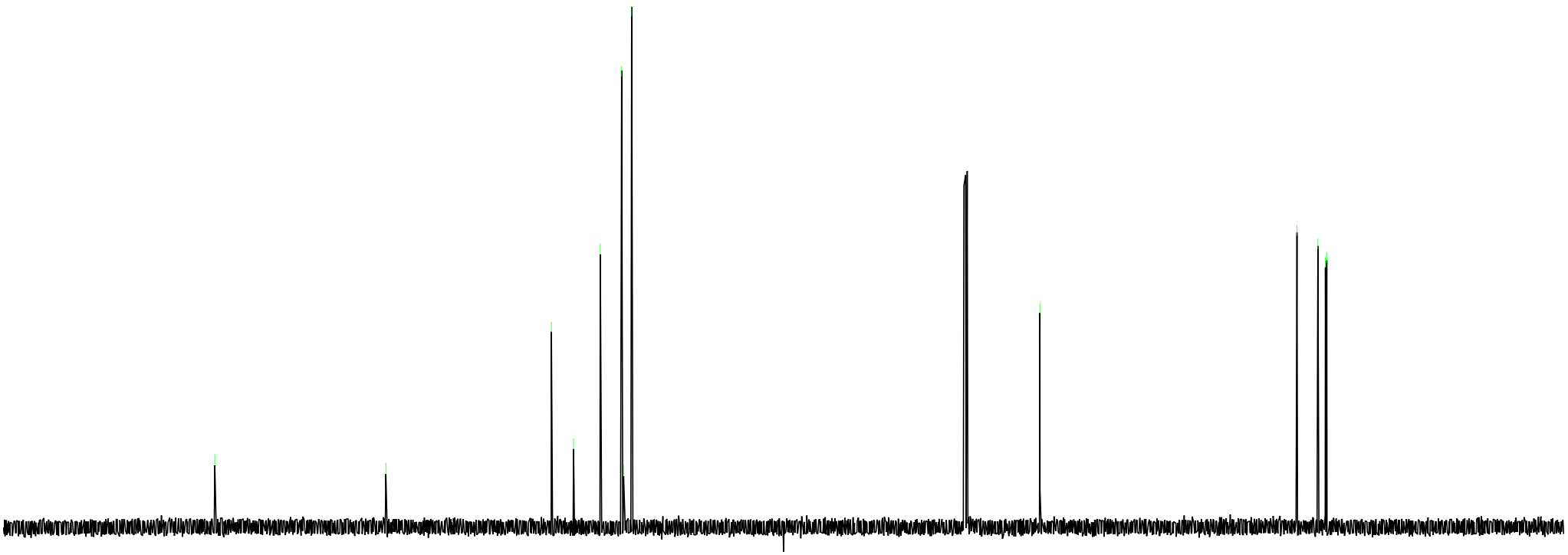




Title zhaoyl-1-98-C
Solvent CDCl3
Spectrometer Frequency 125.70

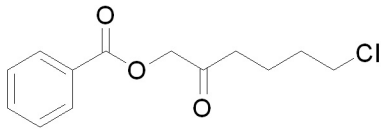
192.45 166.15 140.69 137.28 133.17 129.89 129.59 128.35 65.57 26.04 22.83 21.66 21.46

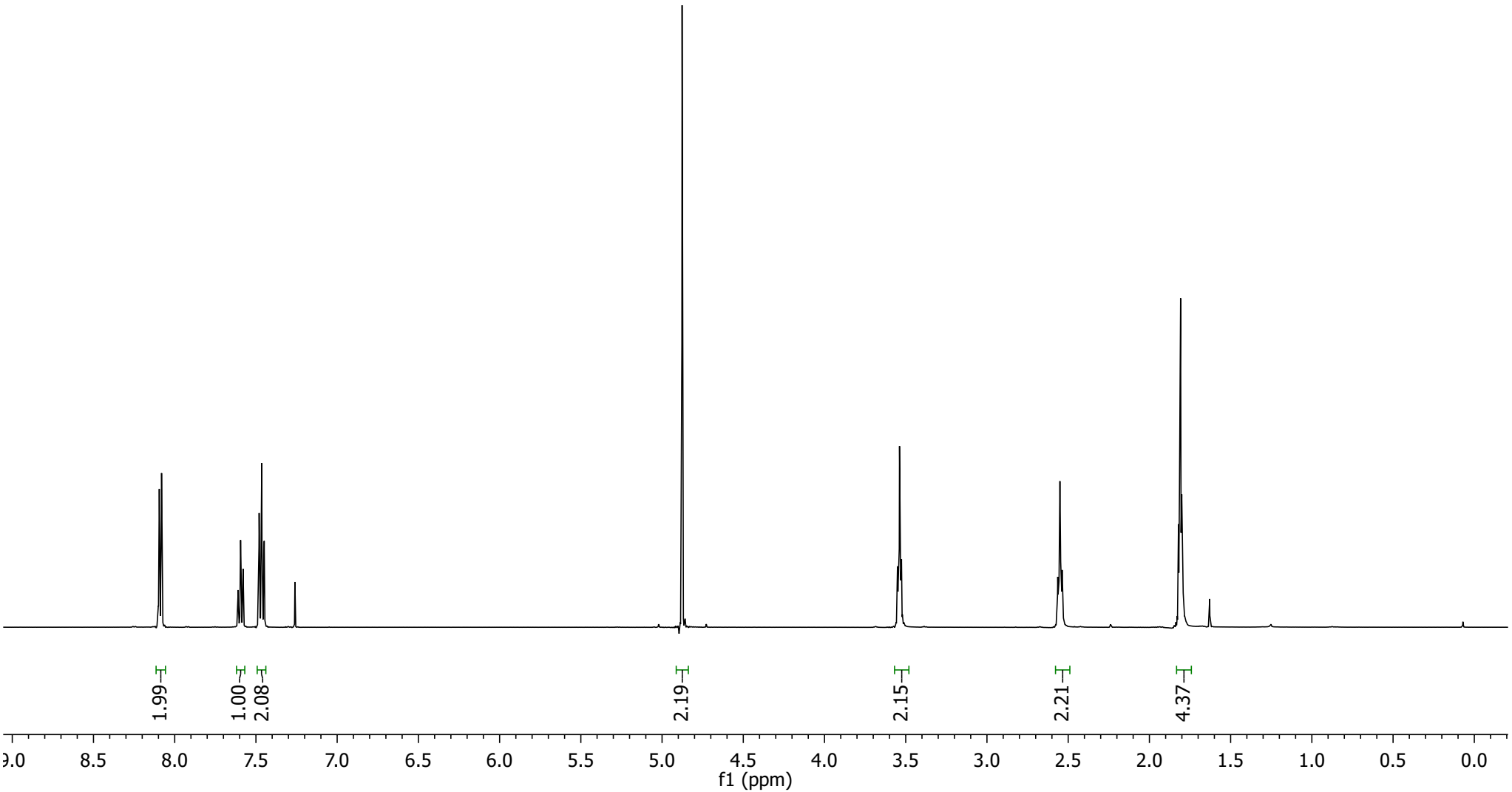




220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

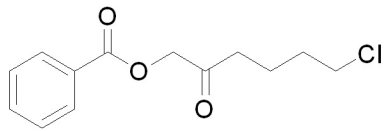
Title zhaoyl-1-101
Solvent CDCl3
Spectrometer Frequency 499.86

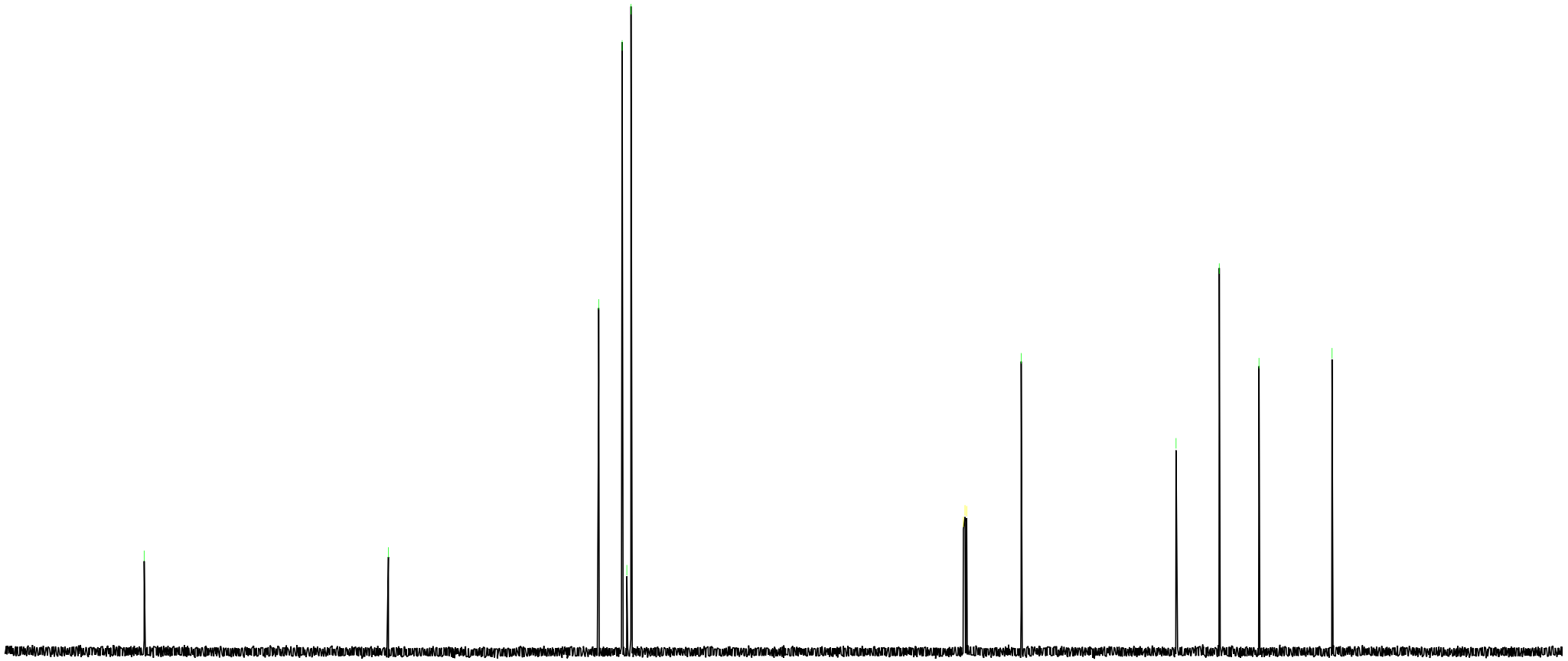




Title zhaoyl-1-101-C
Solvent CDCl3
Spectrometer Frequency 125.70

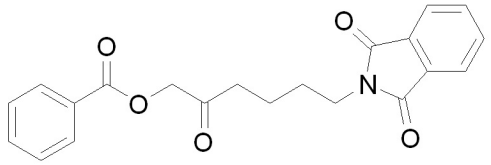
203.47
165.84
133.44
129.83
129.10
128.47
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
68.34
44.49
37.82
31.70
20.45

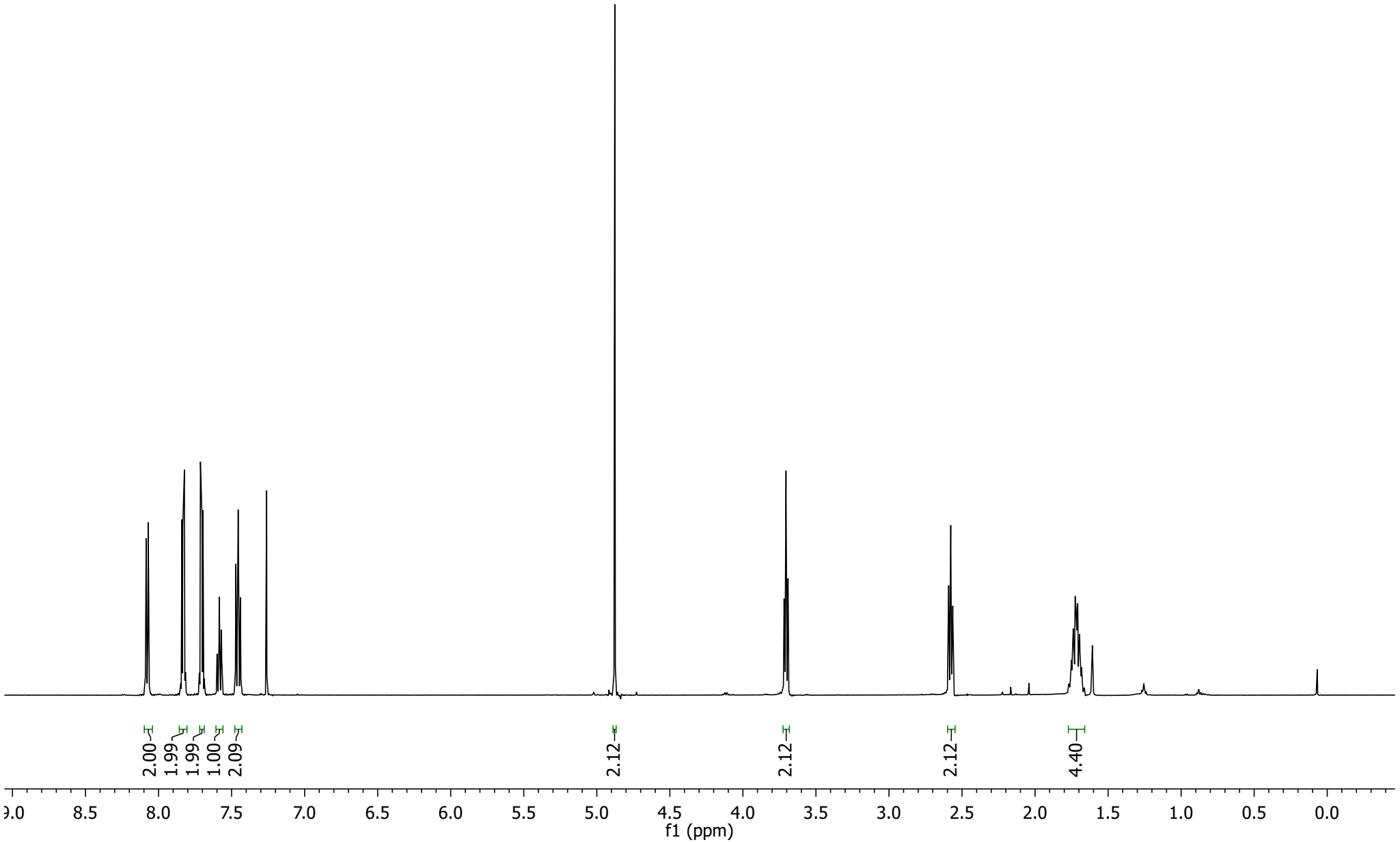




220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

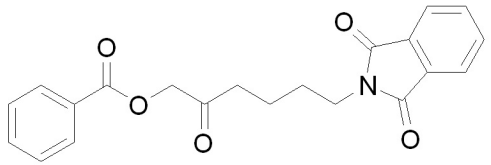
Title zhaoyl-1-102
Solvent CDCl3
Spectrometer Frequency 499.86

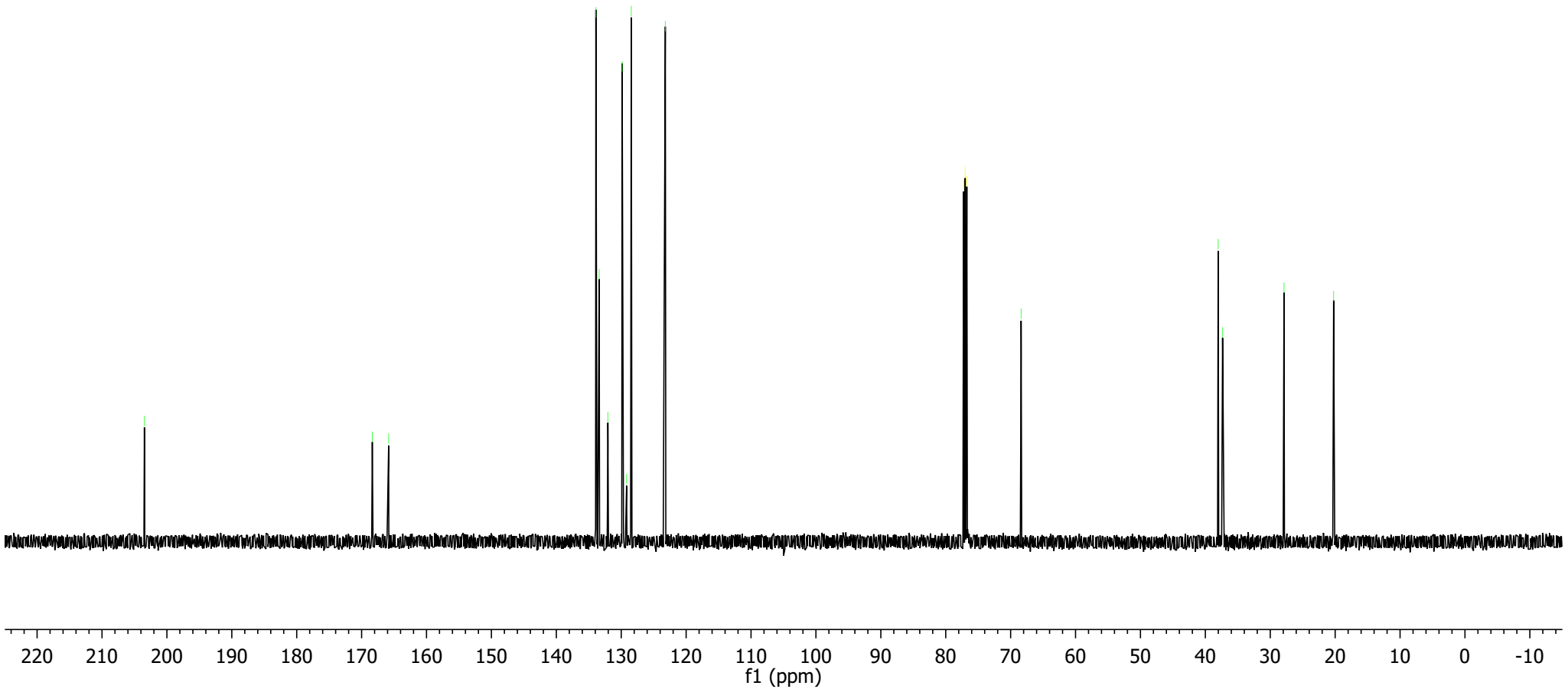




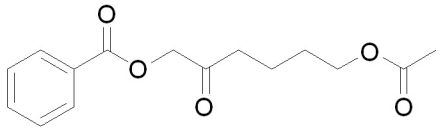
Title zhaoyl-1-102-C
Solvent CDCl3
Spectrometer Frequency 125.70

203.47
168.35
165.83
133.90
133.39
132.05
129.86
129.18
128.45
123.21
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
68.39
38.02
37.34
27.88
20.23



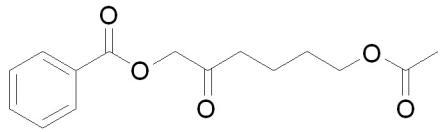


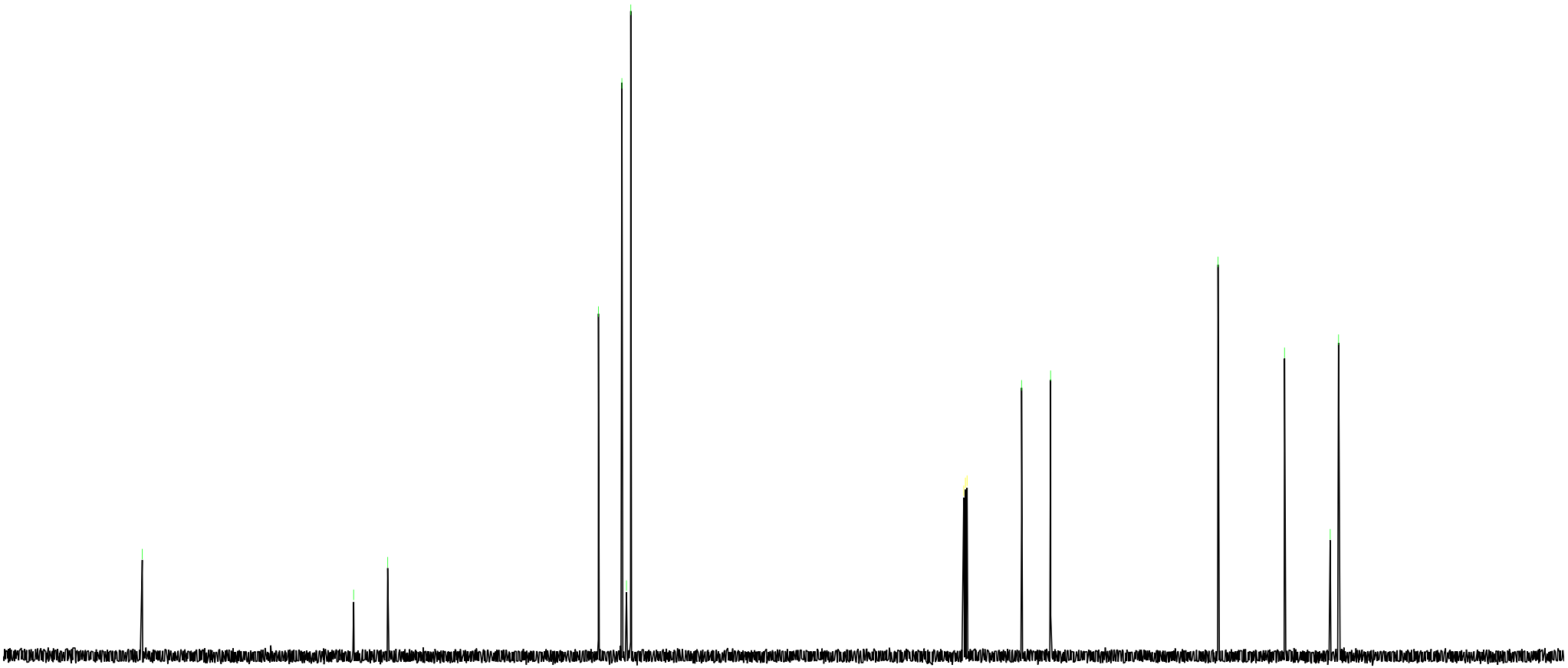
Title zhaoyl-1-108
Solvent CDCl3
Spectrometer Frequency 499.86



Title zhaoyl-1-108-C
Solvent CDCl3
Spectrometer Frequency 125.70

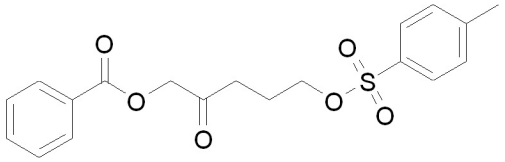
203.58 171.07 165.84 133.43 129.83 129.12 128.46 77.25 CDCl3 77.00 CDCl3 76.75 CDCl3 68.36 63.90 38.15 27.93 20.90 19.62

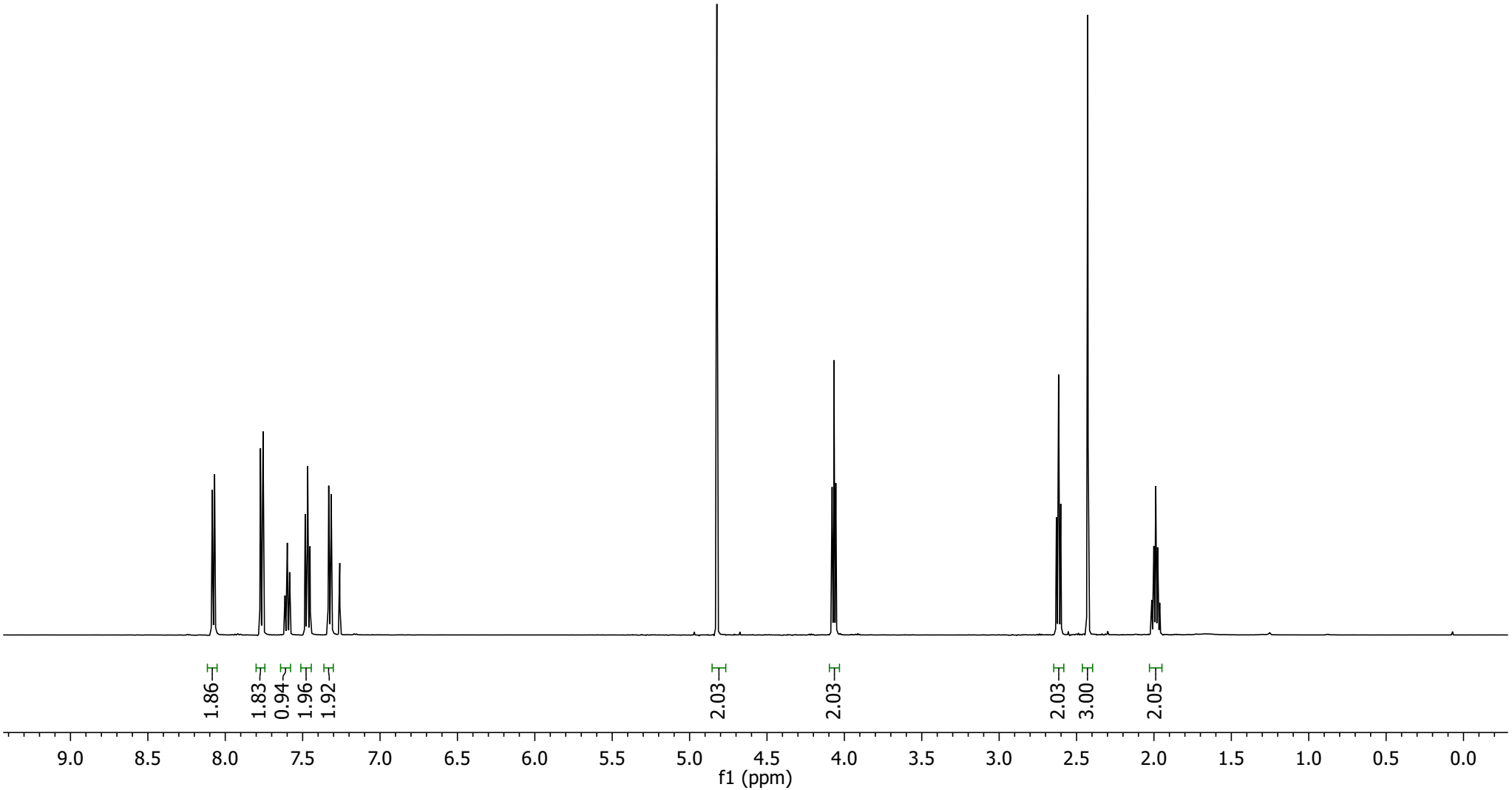




220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

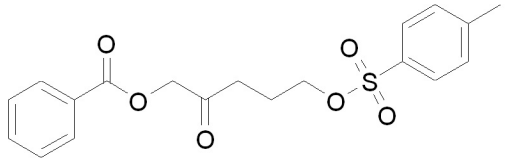
Title zhaoyl-1-105
Solvent CDCl3
Spectrometer Frequency 499.86

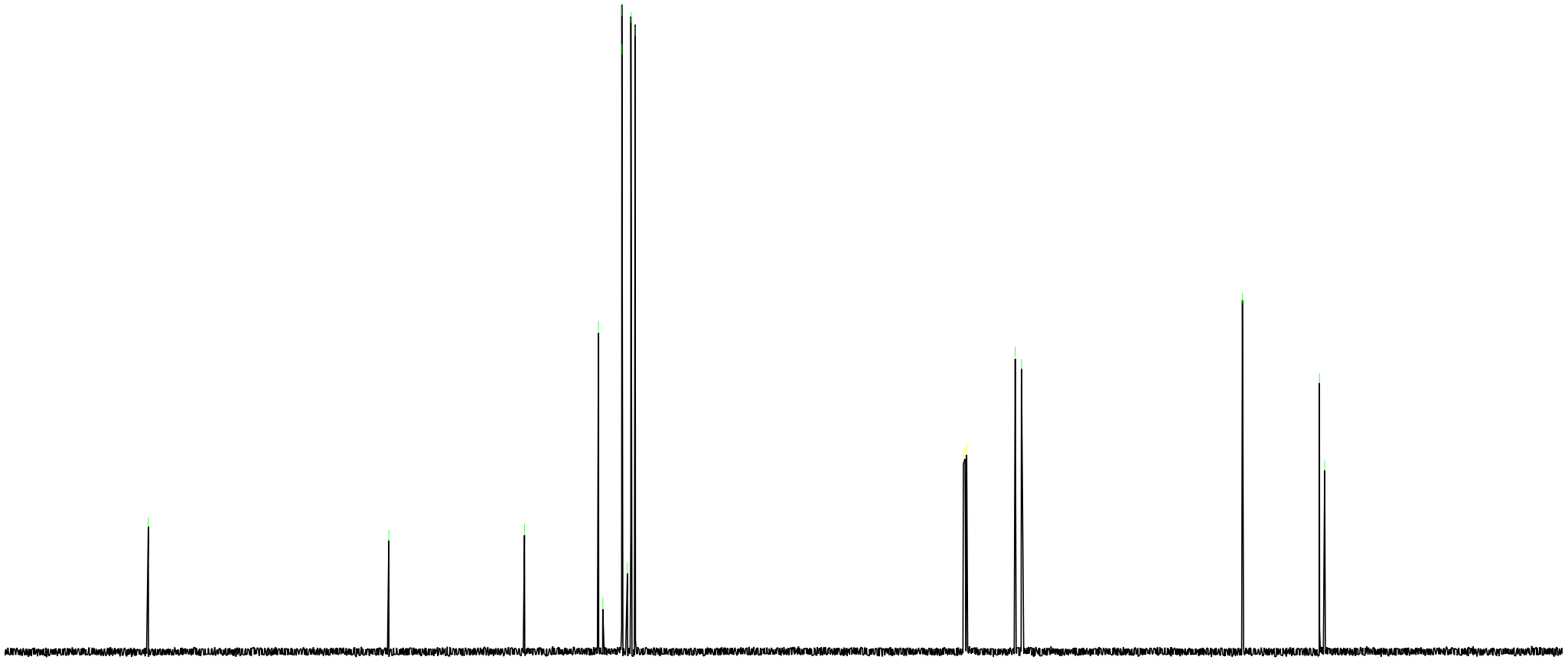




Title zhaoyl-1-105-C
Solvent CDCl3
Spectrometer Frequency 125.70

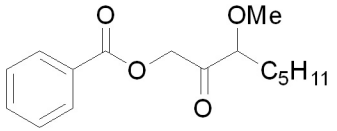
202.83
165.78
144.88
133.48
132.81
129.87
129.83
129.02
128.48
127.82
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
69.27
68.30
34.26
22.39
21.59

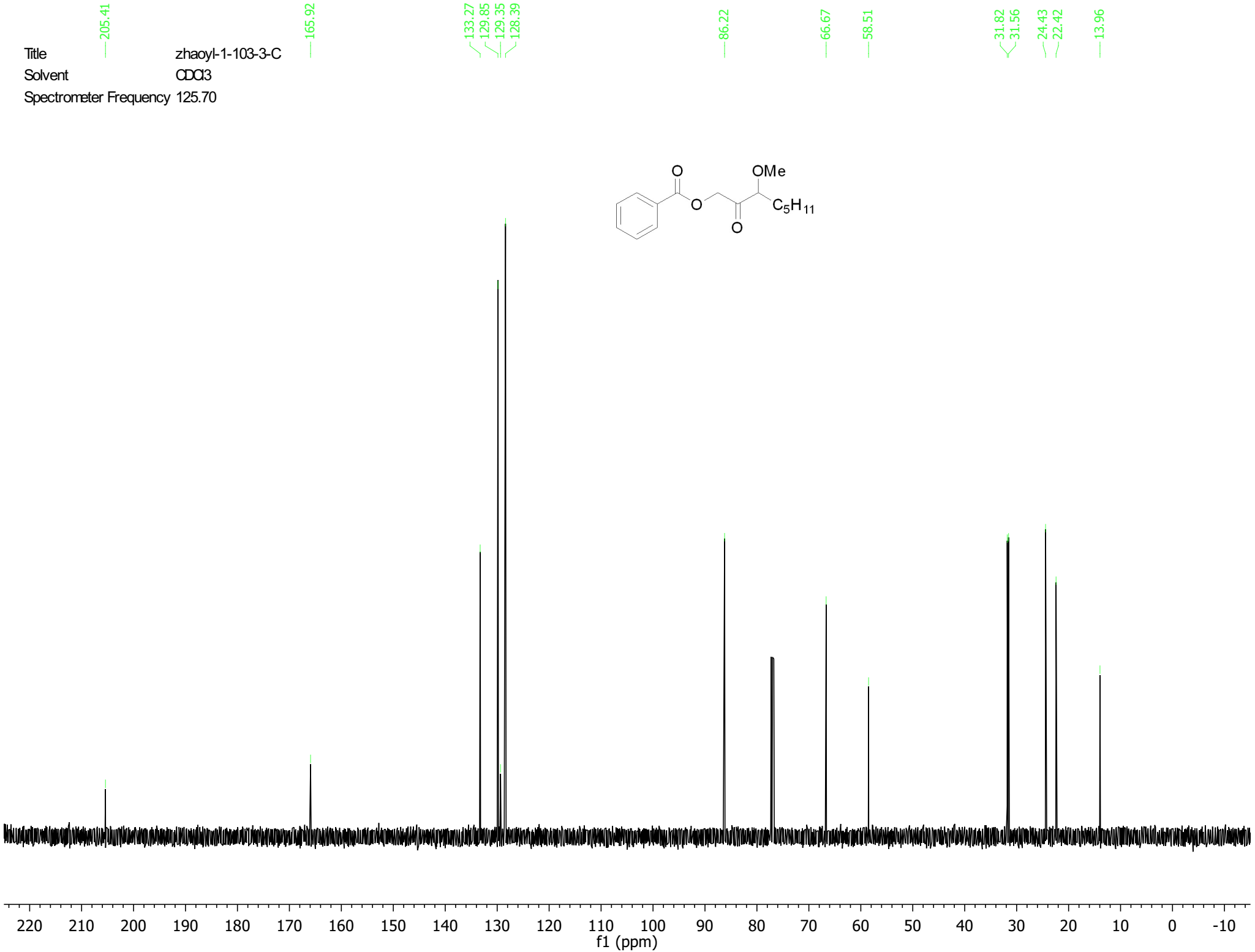




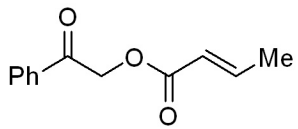
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Title zhaoyl-1-103-3
Solvent CDCl3
Spectrometer Frequency 499.86



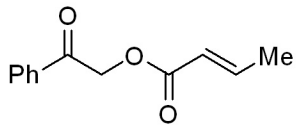

205.41
165.92
133.27
129.85
129.35
128.39
86.22
66.67
58.51
31.82
31.56
24.43
22.42
13.96
Title zhaoyl-1-103-3-C
Solvent CDCl3
Spectrometer Frequency 125.70
O
OMe
O
C_5H_{11}
O
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

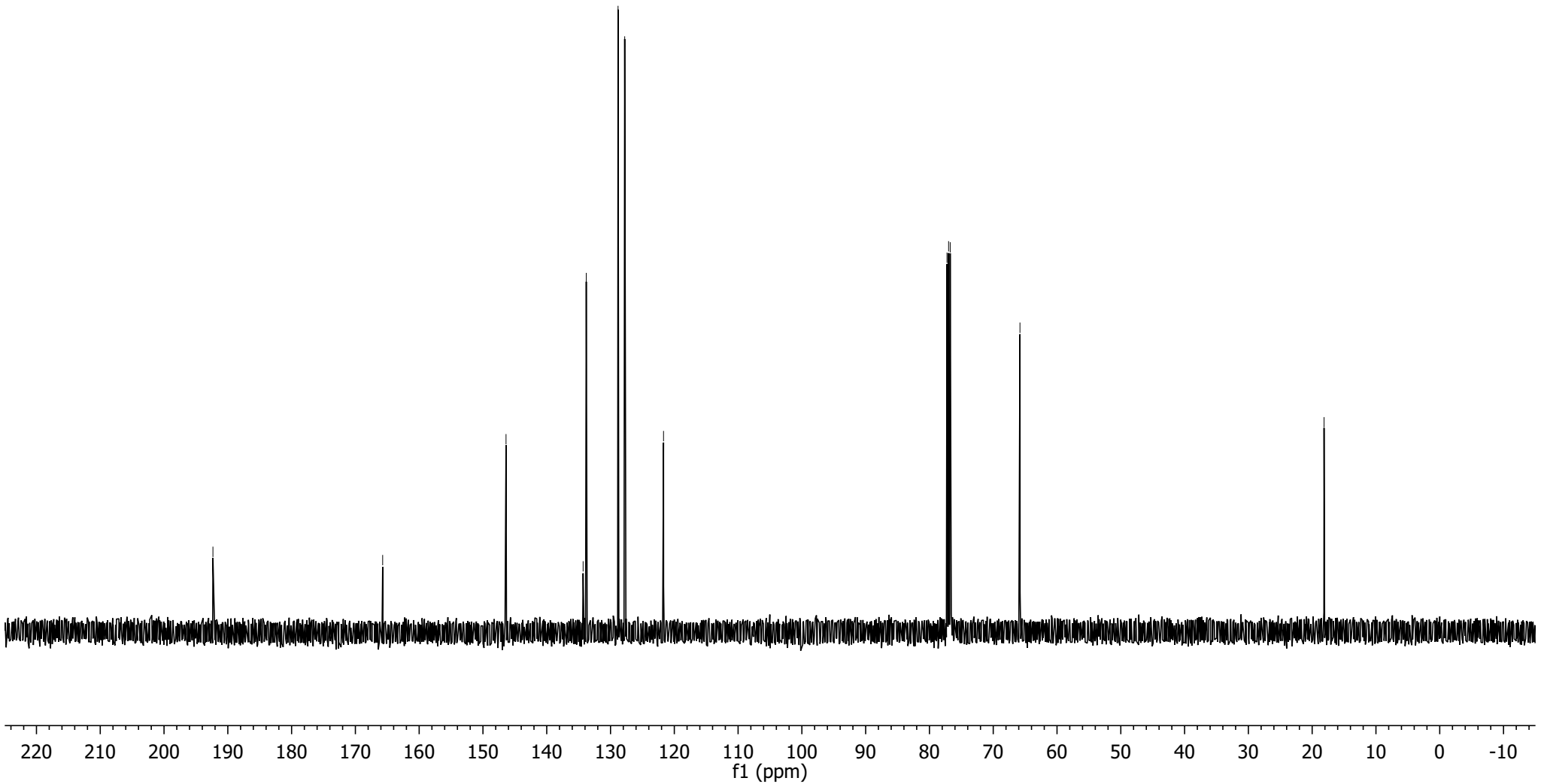
Title jkg-V-35-H
Solvent CDCl3
Spectrometer Frequency 499.86



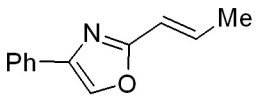
Title jkg-V-35-C
Solvent CDCl3
Spectrometer Frequency 125.70

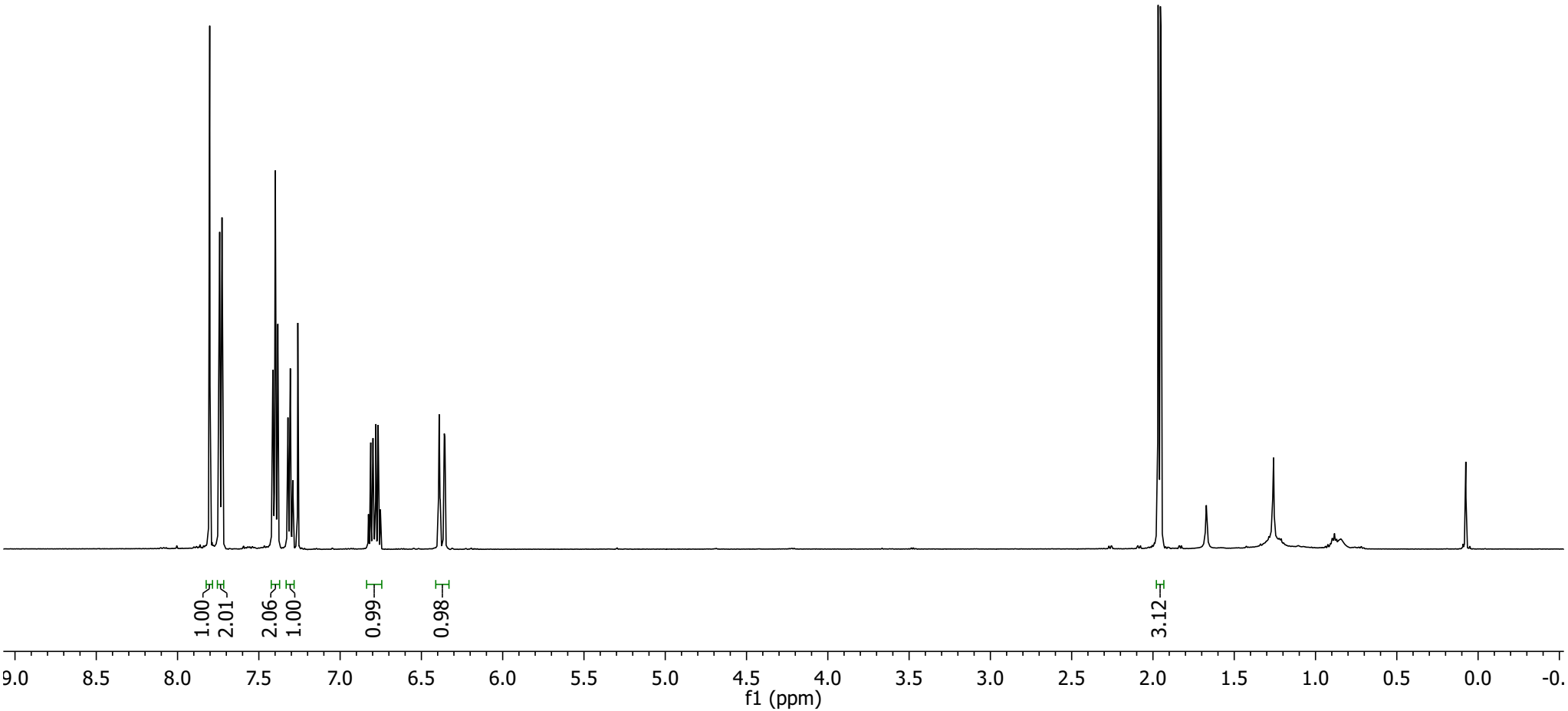
192.33
165.72
146.38
134.30
133.80
128.82
127.78
121.69
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
65.81
18.13





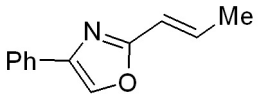
Title jkg-V-33A-P-H
Solvent CDCl3
Spectrometer Frequency 499.86



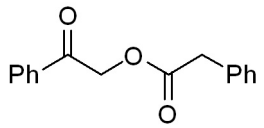


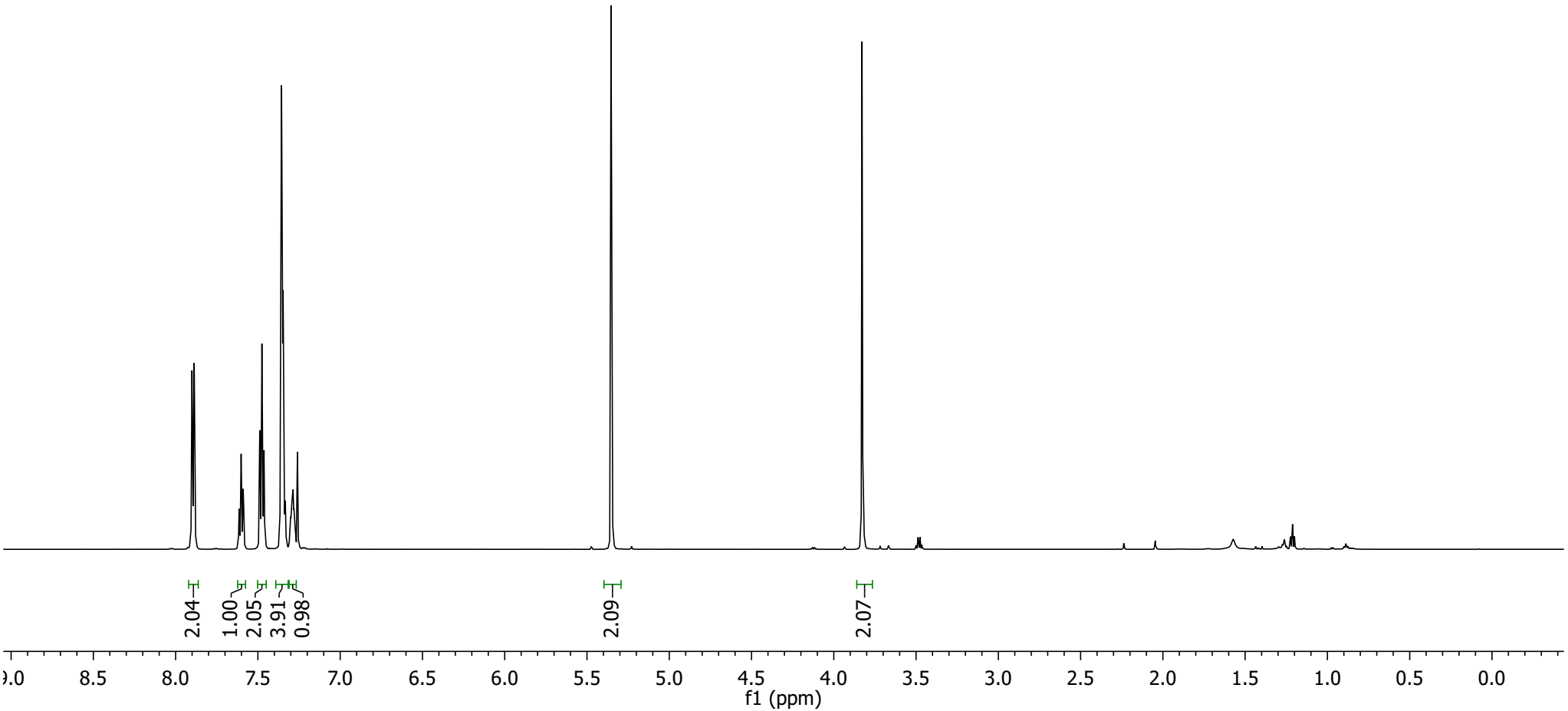
Title jkg-V-33b-C
Solvent cdcl3
Spectrometer Frequency 150.79

161.46
141.36
135.51
132.55
131.12
128.67
127.95
125.46
117.87
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
18.46

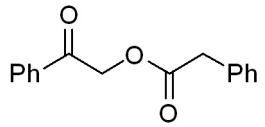


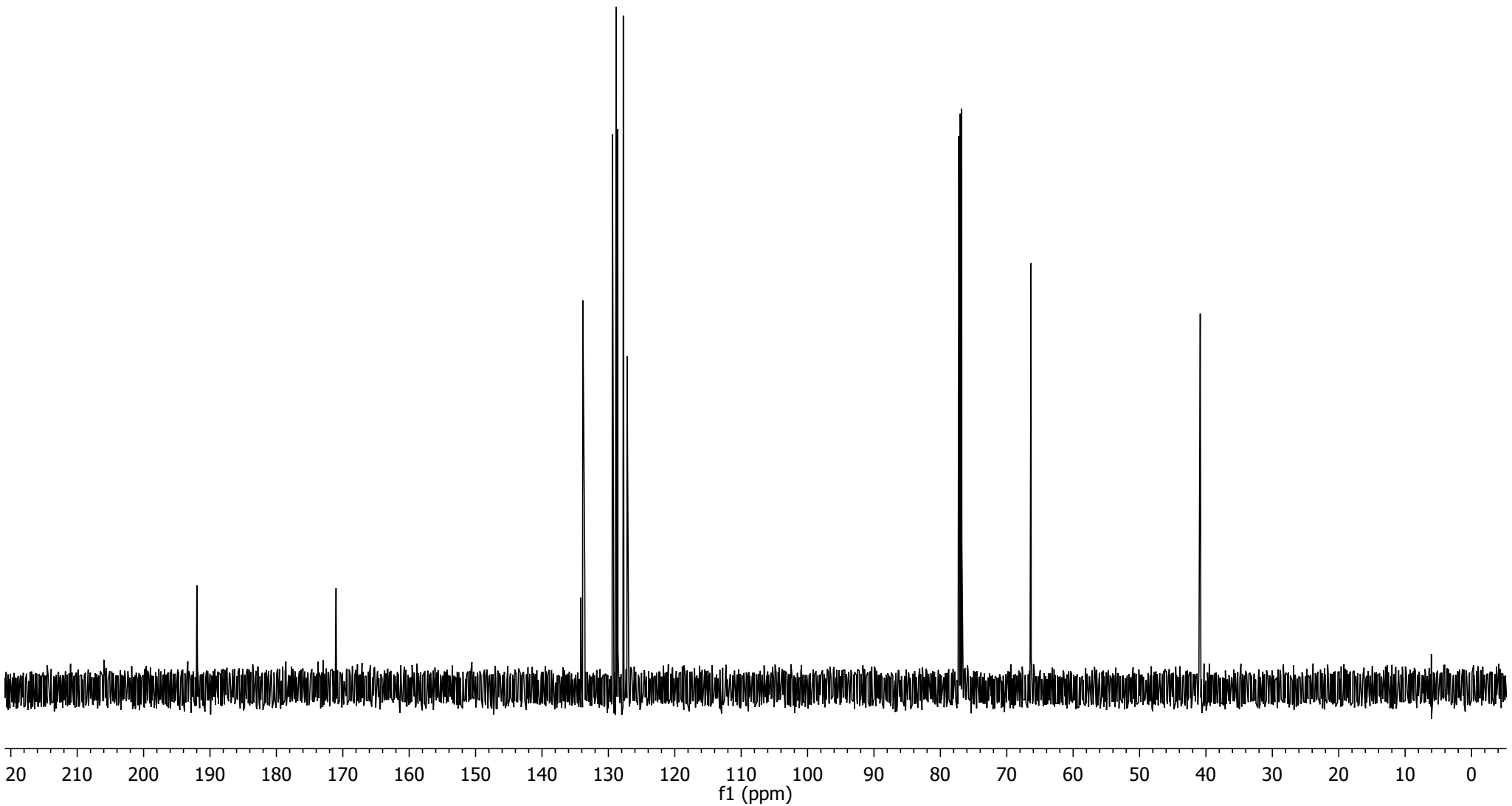
Title jkg-V-26C-H
Solvent cdcl3
Spectrometer Frequency 599.64



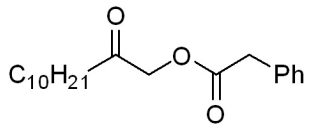


Title jkg-V-26C-C
Solvent cdcl3
Spectrometer Frequency 150.79



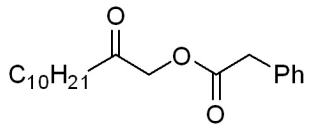


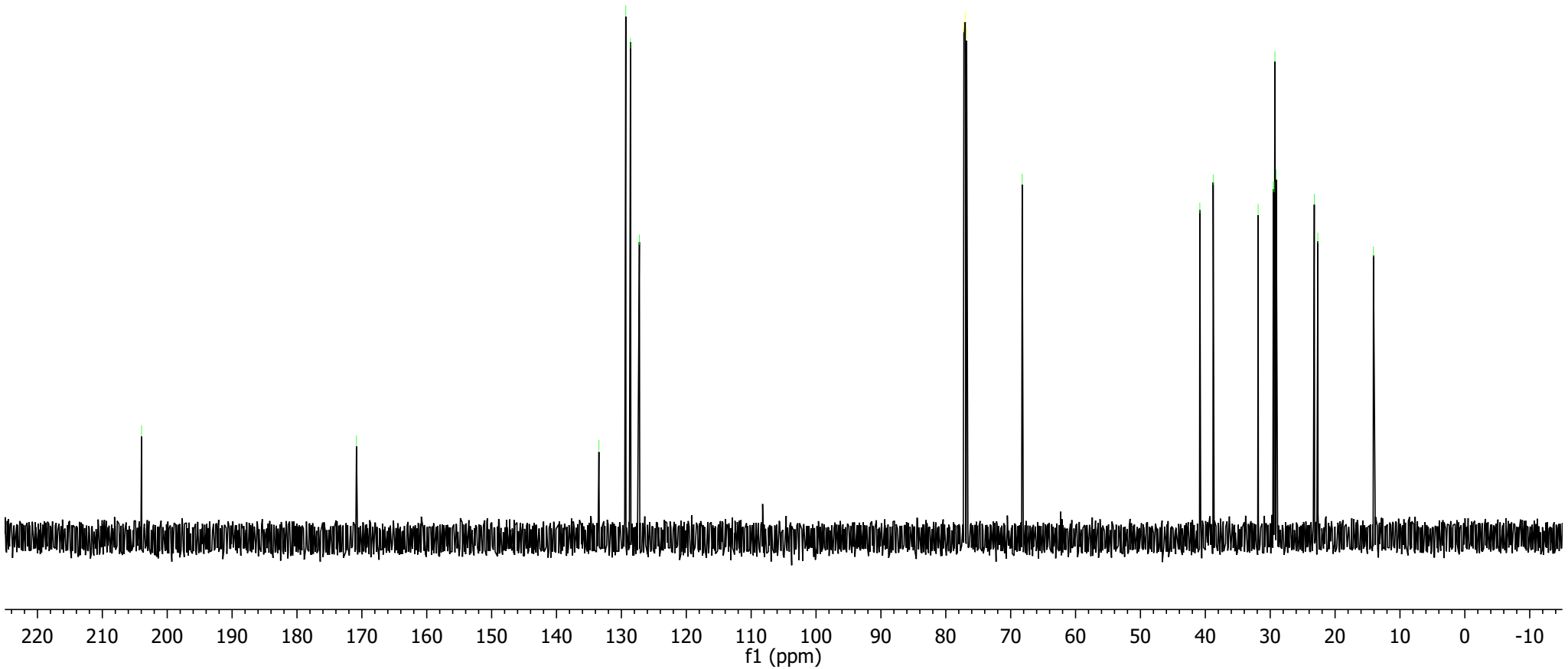
Title jkg-V-36-SM-H
Solvent cdcl3
Spectrometer Frequency 599.64



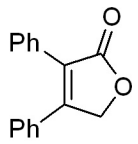
Title jkg-V-36-SM-C
Solvent cdcl3
Spectrometer Frequency 150.79

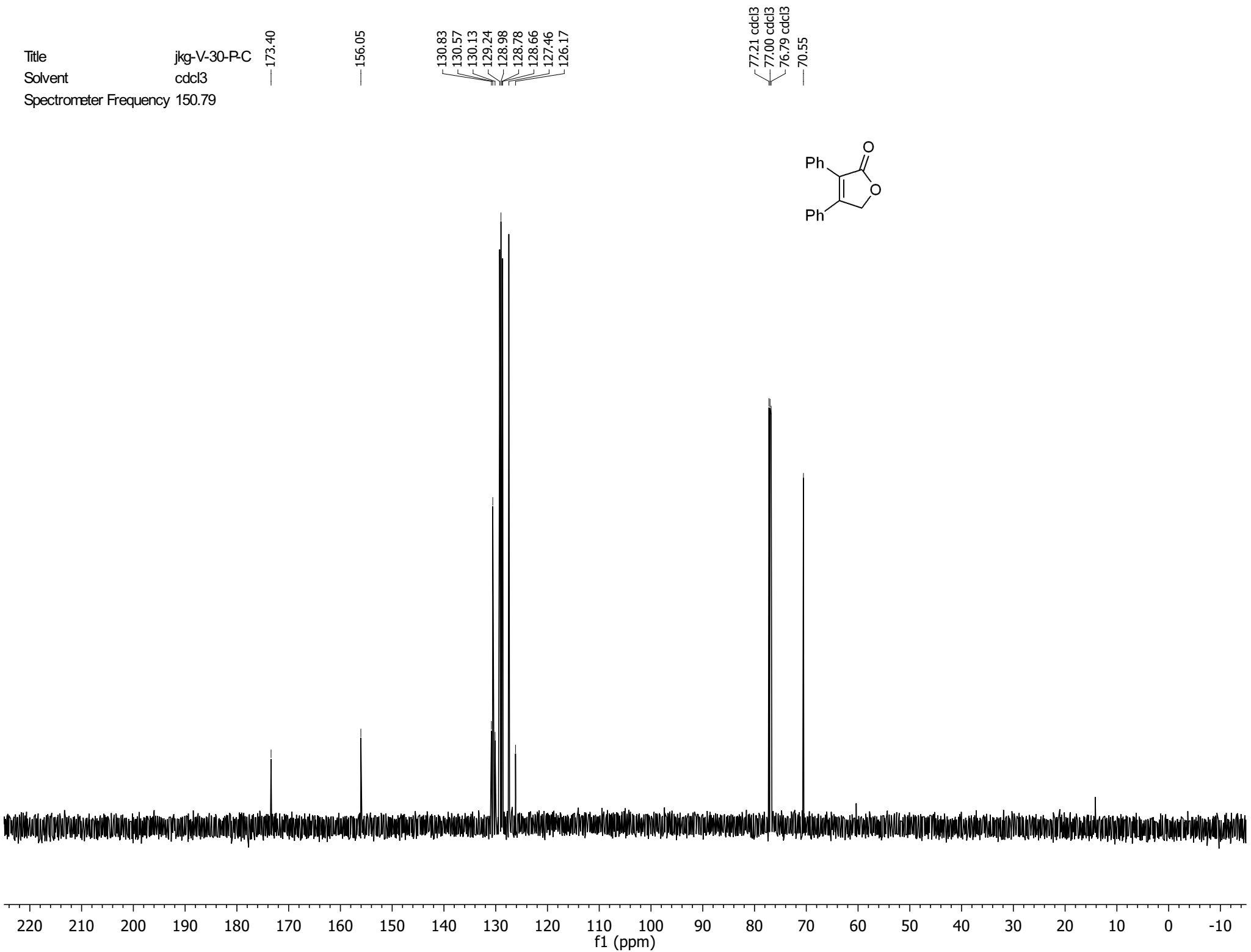
203.96 170.83 133.46 129.32 128.60 127.23 77.21 cdcl3 77.00 cdcl3 76.79 cdcl3 68.23 40.85 38.79 29.52 29.27 29.08 23.21 22.65 14.09



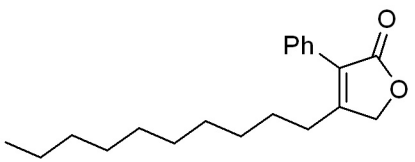


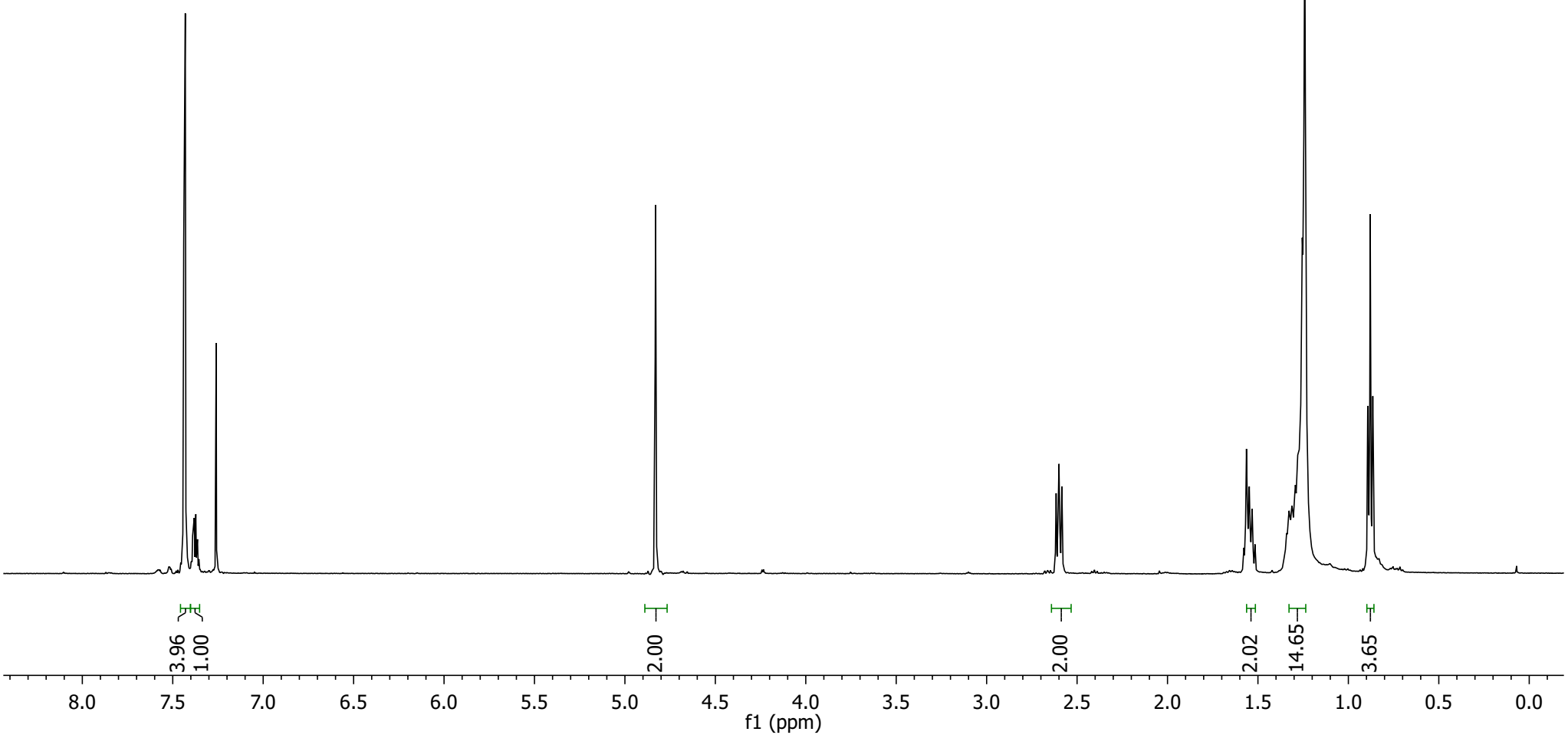
Title jkg-V-30-P-H
Solvent cdcl3
Spectrometer Frequency 599.64

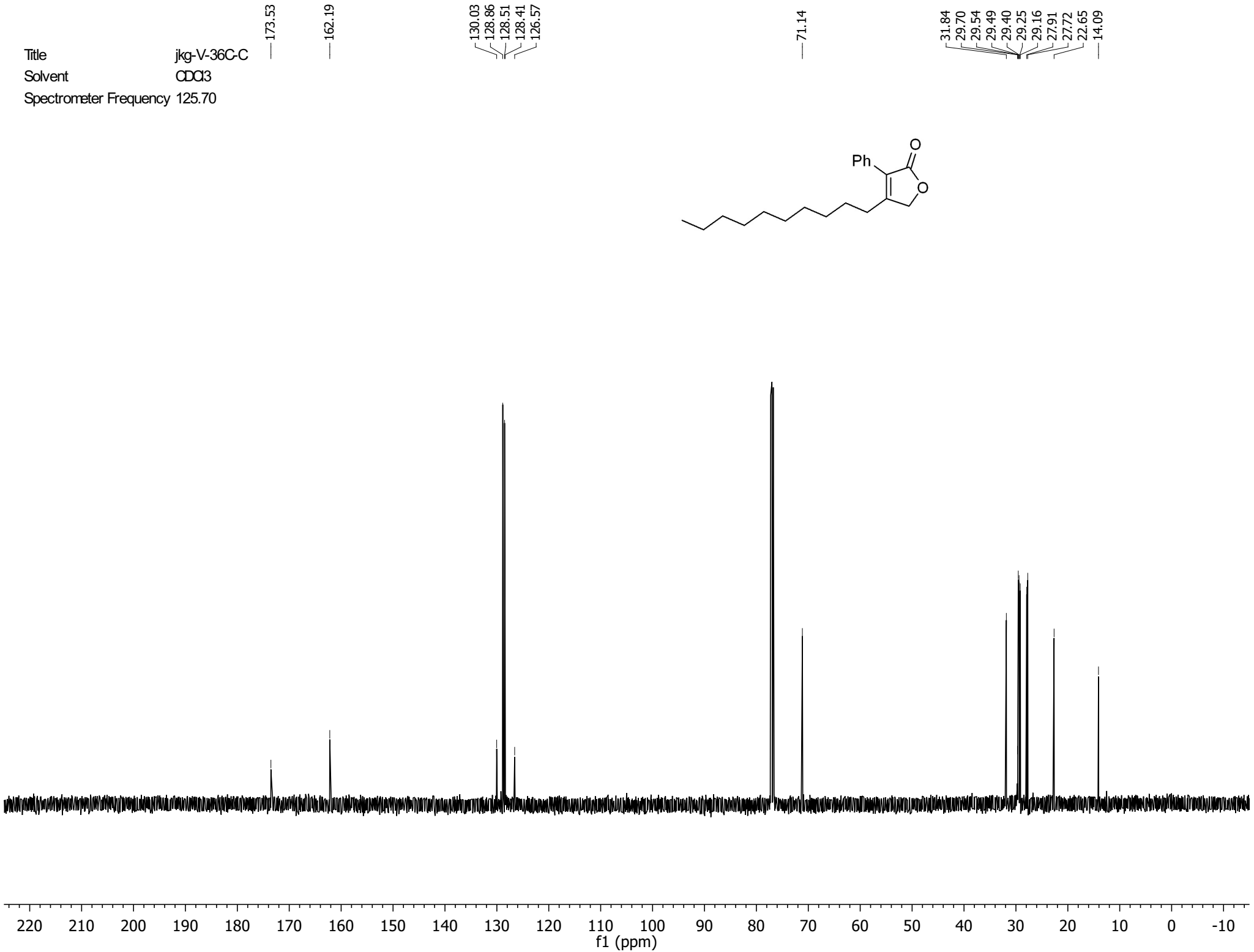



Title jkg-V-30-P-C
Solvent cdcl3
Spectrometer Frequency 150.79
173.40
156.05
130.83
130.57
130.13
129.24
128.98
128.78
128.66
127.46
126.17
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
70.55
Ph
Ph
O
O
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Title jkg-V-36C-H
Solvent CDCl3
Spectrometer Frequency 499.86






173.53
162.19
130.03
128.86
128.51
128.41
126.57
71.14
31.84
29.70
29.54
29.49
29.40
29.25
29.16
27.91
27.72
22.65
14.09
Title jkg-V-36C-C
Solvent CDCl3
Spectrometer Frequency 125.70
Ph
O
O
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)