Supporting Information

Click-Alkynylation of N- and P- Nucleophiles by Oxidative Cross-Coupling with Alkynylcopper Reagents: A General Synthesis of Ynamides and Alkynylphosphonates

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General Information

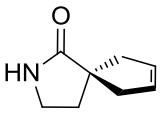
All solvents were reagent grade. Dimethylformamide, acetonitrile and *N,N,N',N'*-tetramethylethylenediamine were freshly distilled from calcium hydride. THF and toluene were freshly distilled from sodium/benzophenone under argon. All other reagents were used as supplied.

Reactions were magnetically stirred. Flash chromatography was performed with silica gel 60 (particle size 35-70 μm) supplied by SDS. Yields refer to chromatographically and spectroscopically pure compounds.

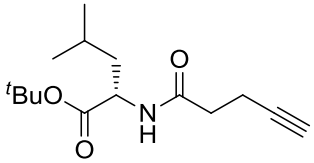
Proton NMR spectra were recorded using an internal deuterium lock at ambient temperature on a Bruker 300 MHz spectrometer. Internal references of δ_H 7.26 was used for $CDCl_3$. Data are presented as follows: chemical shift (in ppm on the δ scale relative to $\delta_{TMS} = 0$), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, quint. = quintuplet, hept. = heptuplet, m = multiplet, br. = broad, app. = apparent), coupling constant (*J*/Hz) and integration. Resonances that are either partially or fully obscured are denoted obscured (obs.). Carbon-13 NMR spectra were recorded at 75 MHz. Internal references of δ_C 77.16 was used for $CDCl_3$. Phosphorus-31 NMR spectra were recorded at 121 MHz.

Optical rotations were recorded on a Perkin Elmer 341 polarimeter at 365 or 589 nm and reported as follows: $[\alpha]_{365}^{20}$ or $[\alpha]_{D}^{20}$, concentration (*c* in g/100 mL), and solvent. Melting points were recorded on a Buchi B-545. Infrared spectra were recorded on a Nicolet iS 10 (SMART iTR diamond ATR) spectrophotometer. High-resolution mass-spectra were obtained on a Waters Xevo Qtof spectrometer. Elemental analyses were obtained by combustion analysis (for C,H,N) and by inductively coupled plasma atomic emission spectroscopy (for Cu).

Experimental Procedures and Characterization Data for Unreported Starting materials

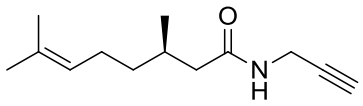


2-Azaspiro[4.4]non-7-en-1-one. A 100 mL round bottom flask was charged with 3,3-diallylpyrrolidin-2-one (800 mg, 4.8 mmol). The flask was fitted with a condenser, evacuated under high vacuum and backfilled with argon. Dry and degassed toluene (50 mL) and benzylidene[1,3-bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]dichloro-(tricyclohexylphosphine)ruthenium (Grubbs' second generation catalyst, 75 mg, 0.09 mmol) were successively added and the resulting purple reaction mixture was refluxed overnight. The reaction mixture was cooled to rt, concentrated and directly purified by flash chromatography over silica gel (EtOAc) to give the desired spirocyclic lactam (660 mg, 4.8 mmol, quant.) as a greyish solid. Mp: 133 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.08 (br. s, 1H), 5.64 (s, 2H), 3.31 (t, J = 6.7 Hz, 2H), 2.80 (d, J = 14.6 Hz, 2H), 2.29 (d, J = 14.5 Hz, 2H), 2.08 (t, J = 6.6 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 183.5, 128.6, 49.0, 43.3, 39.6, 38.0; IR (ATR) ν_{max} 3180, 3057, 2907, 2166, 2016, 1677, 1436, 1369, 1294, 1223, 801, 671, 632 cm^{-1}; ESIMS (positive mode): 138.1; ESIHRMS *m/z* calcd for $C_8H_{12}NO$ $[M+H]^+$ 138.0919, found 138.0918.



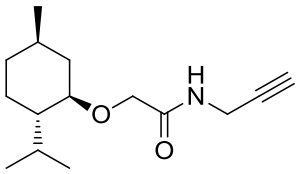
(*S*)-5-[(1-*tert*-Butoxy-4-methyl-1-oxopentan-2-yl)amino]-5-oxopent-1-yne. To a solution of (*S*)-leucine *tert*-butyl ester hydrochloride (2.4 g, 10.5 mmol) and pent-4-ynoic acid (981 mg, 10.0 mmol) in DMF (30 mL) was added 1-hydroxybenzotriazole (HOBt, 1.5 g, 11.1 mmol). 1-(3-Dimethylaminopropyl)-3-ethyl-carbodiimide hydrochloride (EDC, 1.9 g, 10.0 mmol) and *N*-methyl-morpholine (1.4 mL, 12.7 mmol) were next added at 0 °C and the solution was stirred for 16 hours while progressively warmed to rt. The yellow reaction mixture was quenched with

water and diluted with ethyl acetate. The aqueous layer was extracted with ethyl acetate and the combined organic layers were successively washed with a 1M HCl aqueous solution, 1M NaOH aqueous solution and brine, dried over $MgSO_4$, filtered and concentrated to give the desired leucine derivative (2.6 g, 9.8 mmol, 99%) as a pale yellow oil which can be used in the next step without further purification. $[\alpha]_{365}^{20}$ +16 (*c* 1.5, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ 6.52 (br. d, *J* = 8.3 Hz, 1H), 4.45 (dt, *J* = 8.7 and 5.4 Hz, 1H), 2.46-2.30 (m, 4H), 1.89 (t, *J* = 2.3 Hz, 1H), 1.66-1.39 (m, 3H), 1.36 (s, 9H), 0.83 (d, *J* = 6.3 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 172.6, 170.6, 82.9, 81.8, 69.2, 51.2, 41.8, 35.0, 27.9, 24.8, 22.7, 22.0, 14.7; IR (ATR) ν_{max} 3306, 2955, 2128, 1740, 1645, 1547, 1369, 1247, 1140, 845, 746, 632 cm^{-1}; ESIMS (positive mode): 290.2, 234.1, 212.1, 166.1, 132.1; ESIHRMS *m/z* calcd for $C_{15}H_{25}NO_3Na$ $[M+Na]^+$ 290.1732, found 290.1742.



(*R*)-3-(3,7-Dimethyloct-6-enamido)prop-1-yne. To a solution of (*R*)-citronellic acid (1.0 g, 5.9 mmol) in THF (15 mL) were successively added *N*-methylmorpholine (770 µL, 7.0 mmol) and, after 5 minutes, isobutylchloroformate (775 µL, 7.0 mmol) at -78 °C. The resulting white slurry was stirred at -78 °C for 5 minutes and propargylamine (970 µL, 14.1 mmol) was slowly added. The reaction mixture was then warmed to rt over 1 hour and quenched by addition of a 1M HCl aqueous solution. The aqueous layer was extracted with ethyl acetate, combined organic layers were successively washed with 1M NaOH and brine, dried over $MgSO_4$, filtered and concentrated. The crude residue was purified by flash chromatography over silica gel (EtOAc/petroleum ether: 2/8) to give the desired amide (954 mg, 4.6 mmol, 78%) as a white solid. Mp: 57 °C; $[\alpha]_D^{20}$ 0 (*c* 0.5, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ 6.03 (br. s, 1H), 5.05 (t, *J* = 7.1 Hz, 1H), 4.02 (dd, *J* = 5.3 and 2.5 Hz, 2H), 2.25-2.16 (m, 2H), 2.02-1.91 (m, 4H), 1.65 (s, 3H), 1.57 (s, 3H), 1.38-1.28 (m, 1H), 1.23-1.13 (m, 1H), 0.91 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 172.5, 131.6, 124.4, 79.8, 71.5, 44.2, 37.0, 30.5, 29.1, 25.8, 25.5, 19.6, 17.7; IR (ATR) ν_{max} 3290, 2967, 2904, 2182, 2020, 1637, 1535, 1448, 1373, 1262, 1223, 1065, 896,

682, 655, 608 cm^{-1}; ESIMS (positive mode): 209.2, 208.2, 153.1; ESIHRMS *m/z* calcd for $C_{13}H_{22}NO$ $[M+H]^+$ 208.1701, found 208.1703.



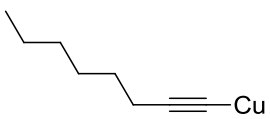
(1*R*,3*R*,4*S*)-Menthoxyacetic acid propargylamide. To a solution of (1*R*,3*R*,4*S*)-menthoxyacetic acid (2.1 g, 10.0 mmol) in THF (25 mL) were successively added *N*-methylmorpholine (1.3 mL, 12.0 mmol) and, after 5 minutes, isobutylchloroformate (1.6 mL, 12.0 mmol) at -78 °C. The resulting white slurry was stirred at -78 °C for 5 minutes and propargylamine (1.6 mL, 24.0 mmol) was slowly added. The reaction mixture was then warmed to rt over 1 hour and quenched by addition of a 1M HCl aqueous solution. The aqueous layer was extracted with ethyl acetate, combined organic layers were successively washed with 1M NaOH and brine, dried over $MgSO_4$, filtered and concentrated. The crude residue was purified by flash chromatography over silica gel (EtOAc/petroleum ether: 1/9) to give the desired amide (1.9 g, 7.6 mmol, 76%) as a colorless oil. $[\alpha]_D^{20}$ -83 (*c* 1.2, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ 6.76 (br. s, 1H), 4.00 (A of AB syst., *J* = 2.9 Hz, 1H), 3.98 (B of AB syst., *J* = 2.9 Hz, 1H), 3.98 (A' of A'B' syst., *J* = 15.2 Hz, 1H), 3.78 (B' of A'B' syst., *J* = 15.2 Hz, 1H), 3.05 (td, *J* = 10.6 and 4.1 Hz, 1H), 2.17 (t, *J* = 2.5 Hz, 1H), 2.03 (hept d, *J* = 7.0 and 2.7 Hz, 1H), 1.98-1.93 (m, 1H), 1.59-1.52 (m, 2H), 1.32-1.15 (m, 2H), 0.96-0.71 (obs. m, 3H), 0.82 (d, *J* = 7.0 Hz, 6H), 0.68 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.0, 80.4, 79.3, 71.4, 67.6, 47.9, 40.0, 34.2, 31.3, 28.3, 25.9, 23.1, 22.1, 20.8, 16.1; IR (ATR) ν_{max} 3432, 3314, 2955, 2915, 2872, 2135, 1665, 1511, 1448, 1239, 1105, 655 cm^{-1}; ESIMS (positive mode): 252.2, 114.1; ESIHRMS *m/z* calcd for $C_{15}H_{26}NO_2$ $[M+H]^+$ 252.1964, found 252.1961.

Experimental Procedures and Characterization Data for Alkynylcopper Reagents

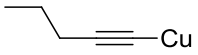
General procedure for the synthesis of alkynylcopper reagents:

- **Method A using copper iodide in aqueous ammonia and ethanol.** To a solution of copper iodide (3.8 g, 20.0 mmol) in a mixture of ammonium hydroxide (28% NH_3 solution, 50 mL) and ethanol (30 mL) was added the alkyne (10.0 mmol) dropwise. The deep blue reaction mixture was stirred overnight at room temperature under argon and the yellow precipitate was collected by filtration and successively washed with ammonium hydroxide (10% NH_3 solution, 3x50 mL), water (3x50 mL), ethanol (3x50 mL), and diethyl ether (3x50 mL). The bright yellow solid was then dried under high vacuum overnight to afford the desired polymeric alkynylcopper reagent which was used without further purification.

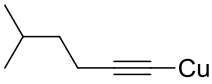
- **Method B using copper iodide and potassium carbonate in DMF.** To a suspension of copper iodide (762 mg, 4.0 mmol) in DMF (15 mL) was added a solution of the alkyne (4.0 mmol) in DMF (5 mL) *via* cannula and under argon. Finely powdered potassium carbonate (1.1 g, 8.0 mmol) was then added at rt and the resulting slurry was stirred under argon for 2 hours, slowly turning into a bright yellow and thick suspension of copper acetylide which was then collected by filtration and successively washed with ammonium hydroxide (10% NH_3 solution, 2x10 mL), water (2x10 mL), absolute ethanol (2x10 mL), and diethyl ether (2x10 mL). The bright yellow solid was then dried under high vacuum overnight to afford the desired polymeric alkynylcopper reagent.



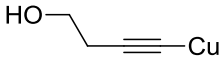
Oct-1-yn-1-ylcopper. This compound was obtained according to method A; Yield: 66%. Anal. Calcd for $C_8H_{13}Cu$: C, 55.63; H, 7.59; Cu, 36.79. Found: C, 55.31; H, 7.29; Cu, 36.69.



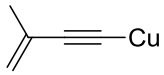
Pent-1-yn-1-ylcopper. This compound was obtained according to method A; Yield: 66%. Anal. Calcd for C_5H_7Cu: C, 45.96; H, 5.40; Cu, 47.94. Found: C, 45.36; H, 5.26; Cu, 48.64.



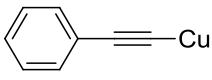
(5-Methylhex-1-yn-1-yl)copper. This compound was obtained according to method A; Yield: 64%. Anal. Calcd for $C_7H_{11}Cu$: C, 52.97; H, 6.99; Cu, 40.04. Found: C, 52.95; H, 6.73; Cu, 40.08.



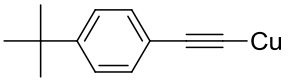
(4-Hydroxybut-1-yn-1-yl)copper. This compound was obtained according to method A; Yield: 28%. Anal. Calcd for C_4H_5CuO: C, 36.22; H, 3.80; Cu, 47.91. Found: C, 35.92; H, 3.62; Cu, 48.15.



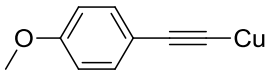
(3-Methylbut-3-en-1-yn-1-yl)copper. This compound was obtained according to method A; Yield: 12%. Anal. Calcd for C_5H_5Cu: C, 46.68; H, 3.92; Cu, 49.40. Found: C, 46.67; H, 3.86; Cu, 48.31.



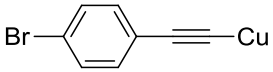
(Phenylethynyl)copper. This compound, which is also commercially available, was obtained according to method A; Yield: 59%. Anal. Calcd for C_8H_5Cu: C, 58.35; H, 3.06; Cu, 38.59. Found: C, 58.02; H, 3.08; Cu, 37.99.



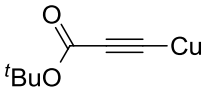
[(4-*tert*-Butylphenyl)ethynyl]copper. This compound was obtained according to method A; Yield: 43%. Anal. Calcd for $C_{12}H_{13}Cu$: C, 65.28; H, 5.94; Cu, 28.78. Found: C, 64.28; H, 5.84; Cu, 28.01.



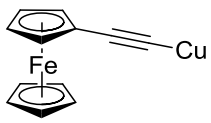
[(4-Methoxyphenyl)ethynyl]copper. This compound was obtained according to method A; Yield: 38%. Anal. Calcd for C_9H_7CuO: C, 55.52; H, 3.62; Cu, 32.64. Found: C, 55.45; H, 3.57; Cu, 31.86.



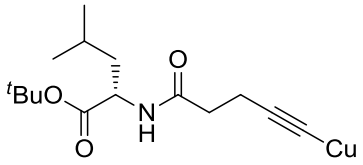
[(4-Bromophenyl)ethynyl]copper. This compound was obtained according to method A; Yield: 57%. Anal. Calcd for C_8H_4BrCu: C, 39.45; H, 1.66; Cu, 26.09. Found: C, 40.34; H, 1.76; Cu, 25.19.



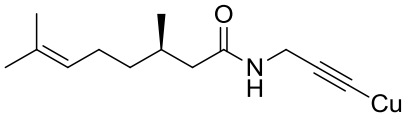
[(*tert*-Butoxycarbonyl)ethynyl]copper. This compound was obtained according to method A; Yield: 62%. Anal. Calcd for $C_7H_9CuO_2$: C, 44.56; H, 4.81; Cu, 33.68. Found: C, 44.79; H, 4.67; Cu, 33.21.



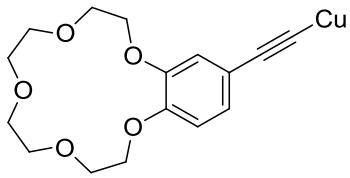
(Ferrocenylethynyl)copper. This compound was obtained according to method A; Yield: 97%. Anal. Calcd for $C_{12}H_9CuFe$: C, 52.87; H, 3.33; Cu, 23.31. Found: C, 53.02; H, 3.18; Cu, 22.97.



(*S*)-{5-[(1-*tert*-Butoxy-4-methyl-1-oxopentan-2-yl)amino]-5-oxopent-1-yn-1-yl}copper. This compound was obtained according to method B; Yield: 91%. Anal. Calcd for $C_{15}H_{24}CuNO_3$: C, 54.61; H, 7.33; Cu, 19.26; N, 4.25. Found: C, 54.82; H, 7.15; Cu, 18.94; N, 3.99.

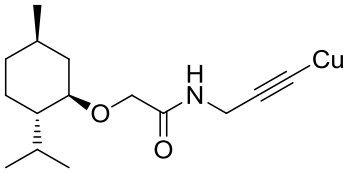


(*R*)-[3-(3,7-Dimethyloct-6-enamido)prop-1-yn-1-yl]copper. This compound was obtained according to method B; Yield: 94%. Anal. Calcd for $C_{13}H_{20}CuNO$: C, 57.86; H, 7.47; Cu, 23.55; N, 5.19. Found: C, 57.76; H, 7.25; Cu, 23.25; N, 5.37.

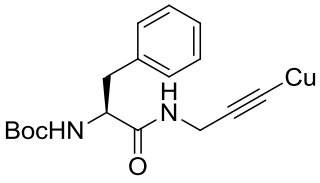


[(2,3,5,6,8,9,11,12-Octahydrobenzo[*b*][1,4,7,10,13]pentaoxacyclopentadecin-15-yl)ethynyl] copper. This compound has been previously reported.[S1]

[S1] Vasilevsky, S. F.; Krivenko, O. L. ; Gorelik, V. R.; Alabugin, I. V. *Tetrahedron* **2008**, *64*, 8807.



(1*R*,3*R*,4*S*)-[(Menthoxyacetamido)prop-1-yn-1-yl]copper. This compound was obtained according to method B; Yield: 76%. Anal. Calcd for $C_{15}H_{24}CuNO_2$: C, 57.39; H, 7.71; Cu, 20.24; N, 4.46. Found: C, 57.33; H, 7.63; Cu, 20.01; N, 4.51.



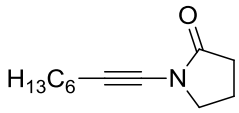
(*S*)-{3-[2-(*tert*-Butoxycarbonylamino)-3-phenylpropanamido]-prop-1-yn-1-yl}copper. This compound was obtained according to method B; Yield: 86%. Anal. Calcd for $C_{17}H_{21}CuN_2O_3$: C, 55.95; H, 5.80; Cu, 17.41; N, 7.68. Found: C, 56.08; H, 6.02; Cu, 16.99; N, 7.75.

Experimental Procedures and Characterization Data:

Ynamides from Alkynylcopper Reagents

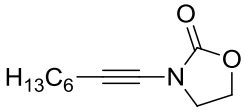
General procedure for the synthesis of ynamides from alkynylcopper reagents.

A 5 mL round bottom flask was successively charged with the nitrogen nucleophile (8.0 mmol), the alkynylcopper reagent (2.0 mmol) and acetonitrile (4 mL). The resulting bright yellow slurry was then treated with *N,N,N',N'*-tetramethylethylenediamine (300 µL, 2.0 mmol) and the reaction mixture was vigorously stirred at room temperature and under an atmosphere of oxygen (balloon). After complete disappearance of the alkynylcopper reagent (complete dissolution to a deep blue homogeneous reaction mixture: typically 24-48h), the crude reaction mixture was concentrated under vacuum and the residue was finally purified by flash chromatography over silica gel to afford the desired ynamide.



7a

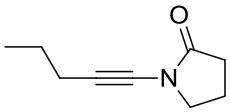
1-(Oct-1-yn-1-yl)pyrrolidin-2-one 7a. This compound has been previously reported.[S2] Yield: 93% (92% on a 1.9 g scale).



7b

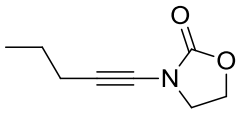
3-(Oct-1-yn-1-yl)oxazolidin-2-one 7b. This compound has been previously reported.[S3] Yield: 86% (91% on a 2.0 g scale).

[S2] Wei, L-L; Mulder, J. A.; Xiong, H.; Zificsak, C. A.; Douglas, C. J.; Hsung, R. P. *Tetrahedron* **2001**, 57, 459.



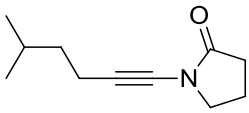
10a

1-(Pent-1-yn-1-yl)pyrrolidin-2-one 10a. Yield: 84% (82% on a 12.4 g scale). Pale yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.60 (t, J = 7.5 Hz, 2H), 2.36 (t, J = 8.1 Hz, 2H), 2.25 (t, J = 7.2 Hz, 2H), 1.54-1.43 (m, 2H), 1.53-1.46 (m, 2H), 0.92 (t, J = 7.2 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.1, 72.4, 71.5, 50.1, 29.6, 22.3, 20.5, 18.6, 13.4; IR (ATR) ν_{max} 2963, 2261, 1716, 1390, 1298, 1211, 1089, 639 cm^{-1}; ESIMS (positive mode): 152.1, 124.1; ESIHRMS *m/z* calcd for $C_9H_{14}NO$ $[M+H]^+$ 152.1076, found 152.1075.



10b

3-(Pent-1-yn-1-yl)oxazolidin-2-one 10b. Yield: 71%. Yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.37 (t, J = 8.0 Hz, 2H), 3.83 (t, J = 7.0 Hz, 2H), 2.21 (t, J = 7.1 Hz, 2H), 1.48 (tq, J = 7.3 and 7.2 Hz, 2H), 0.92 (t, J = 7.3 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.7, 70.7, 70.2, 63.0, 47.0, 22.1, 20.2, 13.4; IR (ATR) ν_{max} 2963, 2257, 1756, 1409, 1215, 1117, 1034 cm^{-1}; ESIMS (positive mode): 154.1, 140.0, 129.0, 114.0, 110.1; ESIHRMS *m/z* calcd for $C_8H_{12}NO_2$ $[M+H]^+$ 154.0868, found 154.0863.

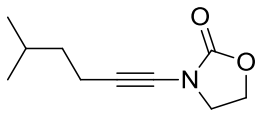


11a

1-(5-Methylhex-1-yn-1-yl)pyrrolidin-2-one 11a. Yield: 70%. Yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.57 (t, J = 7.0 Hz, 2H), 2.33 (t, J = 9.0 Hz, 2H), 2.25 (t, J = 8.0 Hz, 2H), 2.06-1.95

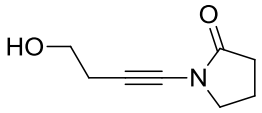
[S3] Jouvin, K.; Couty, F.; Evano, G. *Org. Lett.* **2010**, *12*, 3272.

(m, 2H), 1.66-1.55 (m, 1H), 1.40-1.27 (m, 2H), 0.80 (d, J = 6.6 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.6, 73.1, 71.7, 50.6, 38.3, 30.0, 27.7, 22.6, 19.1, 17.0; IR (ATR) ν_{max} 2963, 2252, 1716, 1460, 1393, 1290, 1215, 1081 cm^{-1}; ESIMS (positive mode): 180.1, 149.0, 125.1, 124.1; ESIHRMS *m/z* calcd for $C_{11}H_{18}NO$ $[M+H]^+$ 180.1386, found 180.1388.



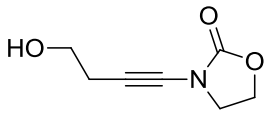
11b

3-(5-Methylhex-1-yn-1-yl)oxazolidin-2-one 11b. Yield: 50%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.37 (t, J = 7.9 Hz, 2H), 3.81 (t, J = 8.2 Hz, 2H), 2.24 (t, J = 7.4 Hz, 2H), 1.66-1.55 (app. sept., J = 6.7 Hz, 1H), 1.40-1.32 (dt, J = 7.4 and 7.1 Hz, 2H), 0.82 (d, J = 7.5 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.7, 71.1, 70.0, 62.9, 47.0, 37.7, 27.1, 22.1, 16.3; IR (ATR) ν_{max} 2957, 2923, 2864, 2272, 1760, 1480, 1412, 1203, 1105, 1030, 750 cm^{-1}; ESIMS (positive mode): 182.1, 129.0, 126.1; ESIHRMS *m/z* calcd for $C_{10}H_{16}NO_2$ $[M+H]^+$ 182.1181, found 182.1176.



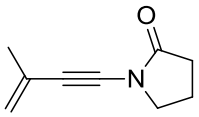
12a

1-(4-Hydroxybut-1-yn-1-yl)pyrrolidin-2-one 12a. Yield: 68%. Yellow solid; Mp: 58 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.66 (t, J = 6.4 Hz, 2H), 3.60 (t, J = 7.1 Hz, 2H), 3.53 (br. s, 1H), 2.52 (t, J = 6.9 Hz, 2H), 2.36 (t, J = 7.2 Hz, 2H), 2.05 (tt, J = 7.5 and 7.5 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.9, 72.7, 70.0, 61.1, 50.1, 29.8, 23.1, 18.8; IR (ATR) ν_{max} 3428, 2963, 2896, 2257, 1700, 1397, 1219, 1046 cm^{-1}; ESIMS (positive mode): 154.1, 149.0; ESIHRMS *m/z* calcd for $C_8H_{12}NO_2$ $[M+H]^+$ 154.0865, found 154.0868.



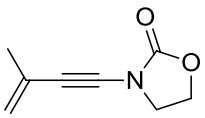
12b

3-(4-Hydroxybut-1-yn-1-yl)oxazolidin-2-one 12b. Yield: 57%. Pale orange oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.31 (t, J = 6.6 Hz, 2H), 3.79 (t, J = 7.8 Hz, 2H), 3.69 (br. s, 1H), 3.57 (t, J = 6.6 Hz, 2H), 2.42 (t, J = 6.3 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 157.0, 71.0, 68.1, 63.2, 60.6, 46.7, 22.4; IR (ATR) ν_{max} 3412, 2959, 2904, 2268, 1744, 1416, 1203, 1034 cm^{-1}; ESIMS (positive mode): 178.0, 173.0, 149.0; ESIHRMS *m/z* calcd for $C_7H_{10}NO_3$ $[M+H]^+$ 178.0480, found 178.0485.



13a

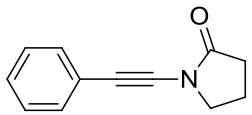
1-(3-Methylbut-3-en-1-yn-1-yl)pyrrolidin-2-one 13a. Yield: 38%. Orange oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 5.21 (br. s, 1H), 5.13 (br. s, 1H), 3.64 (t, J = 10.5 Hz, 2H), 2.40 (t, J = 8.0 Hz, 2H), 2.10 (tt, J = 7.5 and 7.5 Hz, 2H), 1.87 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.2, 126.5, 120.8, 80.1, 74.3, 50.6, 30.1, 24.1, 19.2; IR (ATR) ν_{max} 2959, 2927, 2249, 1767, 1677, 1412, 1191, 1065, 730, 639 cm^{-1}; ESIMS (positive mode): 150.1; ESIHRMS *m/z* calcd for $C_9H_{12}NO$ $[M+H]^+$ 150.0920, found 150.0919.



13b

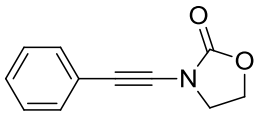
3-(3-Methylbut-3-en-1-yn-1-yl)oxazolidin-2-one 13b. Yield: 43%. Sticky colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 5.20 (br. s, 1H), 5.14 (br. s, 1H), 4.40 (t, J = 9.0 Hz, 2H), 3.89 (t, J = 8.1 Hz, 2H), 1.85 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.2, 125.8, 121.2, 78.5, 72.5, 63.3,

47.2, 23.6; IR (ATR) ν_{max} 2982, 2237, 1755, 1428, 1231, 1109, 1030 cm^{-1}; ESIMS (positive mode): 152.1, 151.1, 150.8, 148.5, 147.2; ESIHRMS *m/z* calcd for $C_8H_{10}NO_2$ $[M+H]^+$ 152.0712, found 152.0702.



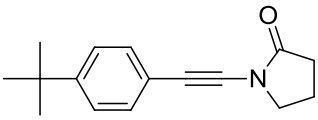
14a

1-(Phenylethynyl)pyrrolidin-2-one 14a. This compound has been previously reported.[S4] Yield: 76%.



14b

3-(Phenylethynyl)oxazolidin-2-one 14b. This compound has been previously reported[S4] Yield: 58% (60% on a 2.2 g scale).

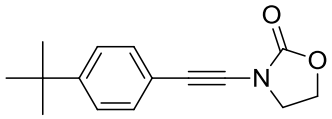


15a

1-[(4-*tert*-Butylphenyl)ethynyl]pyrrolidin-2-one 15a. Yield: 50%. Sticky colorless oil; ^1H NMR (300 MHz, $CDCl_3$): δ 7.39 (d, J = 8.4 Hz, 2H), 7.32 (d, J = 8.7 Hz, 2H), 3.78 (t, J = 7.2 Hz, 2H), 2.49 (t, J = 8.1 Hz, 2H), 2.17 (tt, J = 7.7 Hz, 2H), 1.31 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.4, 151.8, 132.4, 125.9, 120.1, 80.4, 73.3, 50.9, 35.4, 31.8, 30.4, 18.9; IR (ATR)

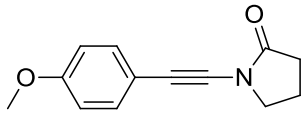
[S4] Jouvin, K.; Couty, F.; Evano, G. *Org. Lett.* **2010**, *12*, 3272.

ν_{max} 3677, 2947, 2896, 2241, 1712, 1401, 1231, 1069 cm^{-1}; ESIMS (positive mode): 242.2, 241.1, 226.1, 140.0; ESIHRMS *m/z* calcd for $C_{16}H_{20}NO$ $[M+H]^+$ 242.1548, found 242.1545.



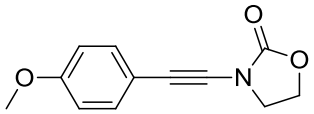
15b

3-[(4-*tert*-Butylphenyl)ethynyl]oxazolidin-2-one 15b. This compound has been previously reported.[S5] Yield: 37%.



16a

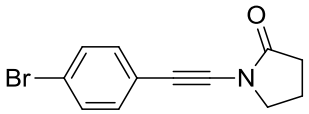
1-[(4-Methoxyphenyl)ethynyl]pyrrolidin-2-one 16a. This compound has been previously reported.[S6] Yield: 96%.



16b

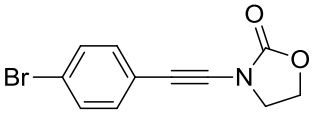
3-[(4-Methoxyphenyl)ethynyl]oxazolidin-2-one 16b. This compound has been previously reported.[S7] Yield: 80%.

[S5] Dooleweerdt, K.; Birkedal, H.; Skrydstrup, T.; Ruhland, T. *J. Org. Chem.* **2008**, *73*, 9447.
[S6] Coste, A.; Karthikeyan, G.; Couty, F.; Evano, G. *Angew. Chem. Int. Ed.* **2009**, *48*, 4381.
[S7] Hamada, T.; Ye, X.; Stahl, S. S. *J. Am. Chem. Soc.* **2008**, *130*, 833.



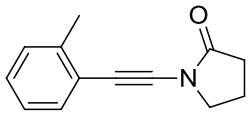
17a

1-[(4-Bromophenyl)ethynyl]pyrrolidin-2-one 17a. Yield: 61%. White solid; Mp: 88 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.38 (d, J = 10.2 Hz, 2H), 7,25 (d, J = 9.0 Hz, 2H), 3.72 (t, J = 7.2 Hz, 2H), 2.43 (t, J = 8.4 Hz, 2H), 2.18-2.07 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.1, 133.2, 131.8, 122.3, 121.9, 81.8, 72.0, 50.3, 30.0, 19.2; IR (ATR) ν_{max} 2986, 2900, 2237, 1720, 1400, 1207, 1144, 1073 cm^{-1}; ESIMS (positive mode): 266.0, 263.0, 187.0, 173.0, 149.0, 129.0, 111.0; ESIHRMS *m/z* calcd for $C_{12}H_{11}BrNO$ $[M+H]^+$ 264.0029, found 264.0024.



17b

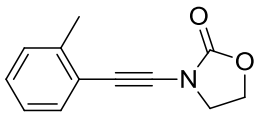
3-[(4-Bromophenyl)ethynyl]oxazolidin-2-one 17b. Yield: 58%. White solid; Mp: 154 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.39 (d, J = 8.4 Hz, 2H), 7,24 (d, J = 8.7 Hz, 2H), 4.45 (t, J = 7.8 Hz, 2H), 3.96 (t, J = 8.1 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.1, 133.2, 131.8, 122.7, 121.5, 80.3, 70.6, 63.4, 47.2; IR (ATR) ν_{max} 2982, 2904, 2241, 1740, 1397, 1239, 1065 cm^{-1}; ESIMS (positive mode): 266.0, 265.0, 224.0, 187.0, 173.0, 149.0, 140.0; ESIHRMS *m/z* calcd for $C_{11}H_9BrNO_2$ $[M+H]^+$ 265.9817, found 265.9821.



18a

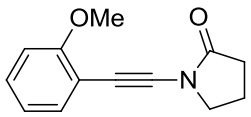
1-[(2-Tolyl)ethynyl]pyrrolidin-2-one 18a. Yield: 55%. White solid; Mp: 93 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.40 (d, J = 7.3 Hz, 1H), 7,19-7.17 (m, 2H), 7.15-7.08 (m, 1H), 3.78 (t, J = 7.1 Hz, 2H), 2.48 (t, J = 7.7 Hz, 2H), 2.44 (s, 3H), 2.17 (app. quint., J = 7.7 Hz, 2H); ^{13}C NMR (75

MHz, $CDCl_3$): δ 175.8, 139.8, 131.6, 129.4, 127.9, 125.5, 122.5, 84.4, 71.6, 50.3, 29.8, 20.9, 18.9; IR (ATR) ν_{max} 2989, 2897, 2235, 1707, 1393, 1221, 1110, 1062, 761 cm^{-1}; ESIMS (positive mode): 222.1, 200.1, 201.1, 129.0; ESIHRMS *m/z* calcd for $C_{13}H_{14}NO$ $[M+H]^+$ 200.1075, found 200.1075.



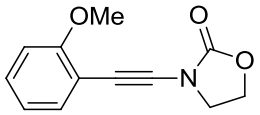
18b

3-[(2-Tolyl)ethynyl]oxazolidin-2-one 18b. Yield: 59%. White solid; Mp: 104 °C; ^1H NMR (300 MHz, $CDCl_3$): δ 7.39 (d, *J* = 7.4 Hz, 1H), 7,21-7.18 (m, 2H), 7,16-7.09 (m, 1H), 4.46 (t, *J* = 8.0 Hz, 2H), 3.98 (t, *J* = 8.0 Hz, 2H), 2.43 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.0, 139.9, 131.6, 129.5, 128.2, 125.6, 122.0, 82.9, 70.1, 63.1, 47.2, 20.8; IR (ATR) ν_{max} 2993, 2909, 2247, 1746, 1473, 1446, 1404, 1209, 1194, 1110, 1025, 746 cm^{-1}; ESIMS (positive mode): 224.1, 202.1, 149.0, 129.0; ESIHRMS *m/z* calcd for $C_{12}H_{12}NO_2$ $[M+H]^+$ 202.0868, found 202.0866.



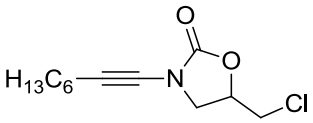
19a

1-[(2-Methoxyphenyl)ethynyl]pyrrolidin-2-one 19a. Yield: 62%. White solid; Mp: 95 °C; ^1H NMR (300 MHz, $CDCl_3$): δ 7.41 (dd, *J* = 7.5 and 1.6 Hz, 1H), 7,25 (td, *J* = 7.9 and 1.7 Hz, 1H), 6.90-6.83 (m, 2H), 3.85 (s, 3H), 3.78 (t, *J* = 7.1 Hz, 2H), 2.45 (t, *J* = 7.7 Hz, 2H), 2.14 (app. quint., *J* = 7.7 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 175.8, 159.8, 133.7, 129.5, 120.4, 111.7, 110.5, 84.1, 68.7, 55.8, 50.2, 29.7, 18.9; IR (ATR) ν_{max} 2970, 2901, 2243, 1711, 1397, 1247, 1117, 1012, 754 cm^{-1}; ESIMS (positive mode): 238.1, 216.1, 213.1, 131.1; ESIHRMS *m/z* calcd for $C_{13}H_{14}NO_2$ $[M+H]^+$ 216.1025, found 216.1026.



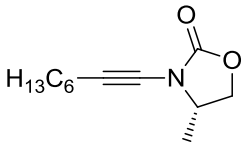
19b

3-[(2-Methoxyphenyl)ethynyl]oxazolidin-2-one 19b. Yield: 75%. Yellow solid; Mp: 87 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.39 (dd, *J* = 7.5 and 1.7 Hz, 1H), 7,26 (td, *J* = 7.9 and 1.7 Hz, 1H), 6.87 (t, *J* = 7.5 Hz, 1H), 6.84 (d, *J* = 8.4 Hz, 1H), 4.42 (t, *J* = 7.6 Hz, 2H), 3.96 (t, *J* = 7.6 Hz, 2H), 3.83 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 159.9, 156.0, 133.7, 129.8, 120.4, 111.2, 110.6, 82.6, 67.3, 63.2, 55.7, 47.1; IR (ATR) ν_{max} 2917, 2832, 2254, 1757, 1596, 1569, 1492, 1408, 1250, 1188, 1163, 1112, 1071, 1018, 746 cm^{-1}; ESIMS (positive mode): 435.2, 240.1, 218.1, 174.1, 146.1, 131.1; ESIHRMS *m/z* calcd for $C_{12}H_{12}NO_3$ $[M+H]^+$ 218.0817, found 218.0816.



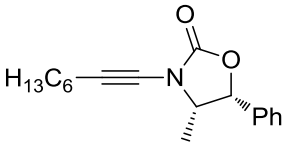
21

5-(Chloromethyl)-3-(oct-1-yn-1-yl)oxazolidin-2-one 21. Yield: 71%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.84-4.76 (m, 1H), 3.93 (A of ABX syst, *J* = 9.0 and 9.0 Hz, 1H), 3.73-3.65 (m, 3H), 2.24 (t, *J* = 7.0 Hz, 2H), 1.47 (app quint., *J* = 7.4 Hz, 2H), 1.37-1.20 (m, 6H), 0.84 (t, *J* = 6.6 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 155.5, 72.5, 71.4, 69.5, 49.6, 44.4, 31.3, 28.7, 28.5, 22.5, 18.3, 14.0; IR (ATR) ν_{max} 2967, 2927, 2268, 1764, 1420, 1223, 1113, 1050, 742 cm^{-1}; ESIMS (positive mode): 301.1, 244.1, 183.0, 142.0, 111.0; ESIHRMS *m/z* calcd for $C_{12}H_{19}ClNO_2$ $[M+H]^+$ 244.1104, found 244.1109.



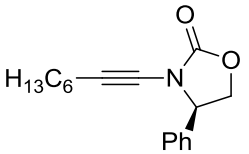
22

(*S*)-4-Methyl-3-(oct-1-yn-1-yl)oxazolidin-2-one 22. This compound has been previously reported.[S8] Yield: 61%.



23

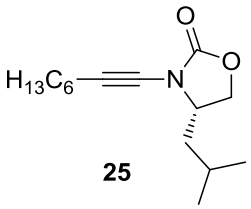
(4*S*,5*R*)-4-Methyl-3-(oct-1-yn-1-yl)-5-phenyloxazolidin-2-one 23. Yield: 72%. Sticky colorless oil; $[\alpha]_D^{20}$ -6 (*c* 1.0, $CHCl_3$); ^1H NMR (300 MHz, $CDCl_3$): δ 7.39-7.34 (m, 3H), 7.27-7.23 (m, 2H), 5.68 (d, *J* = 8.1 Hz, 1H), 4.29 (dq, *J* = 8.1 and 6.6 Hz, 1H), 2.31 (t, *J* = 6.9 Hz, 2H), 1.57-1.47 (m, 2H), 1.41-1.26 (m, 6H), 0.90 (t, *J* = 6.6 Hz, 3H), 0.87 (t, *J* = 6.6 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.1, 134.2, 128.9, 128.7, 126.0, 79.5, 72.3, 69.1, 58.1, 31.3, 28.8, 28.6, 22.6, 18.5, 14.8, 14.0; IR (ATR) ν_{max} 2931, 2253, 1760, 1405, 1188, 1125 cm^{-1}; ESIMS (positive mode): 286.2, 242.2, 215.2, 172.1, 118.1; ESIHRMS *m/z* calcd for $C_{18}H_{24}NO_2$ $[M+H]^+$ 286.1807, found 286.1809.



24

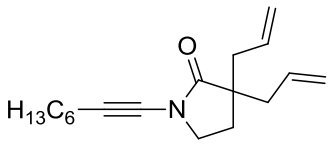
(*R*)-3-(Oct-1-yn-1-yl)-4-phenyloxazolidin-2-one 24. This compound has been previously reported.[S9] Yield: 28%.

[S8] Yao, B.; Liang, Z.; Niu, T.; Zhang, Y. *J. Org. Chem.* **2009**, *74*, 4630.



25

(*S*)-4-*iso*-Butyl-3-(oct-1-yn-1-yl)oxazolidin-2-one 25. Yield: 20%. Pale yellow oil; $[\alpha]_D^{20}$ +49 (*c* 0.8, $CHCl_3$); ^1H NMR (300 MHz, $CDCl_3$): δ 4.51-4.43 (m, 1H), 4.01-3.95 (m, 2H), 2.31 (t, *J* = 6.9 Hz, 2H), 1.92-1.83 (m, 1H), 1.79-1.70 (m, 1H), 1.57-1.47 (m, 2H), 1.44-1.24 (m, 7H), 0.96 (d, *J* = 6.7 Hz, 3H), 0.94 (d, *J* = 6.5 Hz, 3H), 0.82 (t, *J* = 6.8 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 156.4, 72.5, 69.2, 69.1, 56.3, 41.9, 31.3, 28.7, 28.5, 24.5, 23.1, 22.6, 22.2, 18.5, 14.1; IR (ATR) ν_{max} 2963, 2923, 2864, 2264, 1771, 1468, 1409, 1196, 1109, 750 cm^{-1}; ESIMS (positive mode): 252.2, 196.1, 144.1; ESIHRMS *m/z* calcd for $C_{15}H_{26}NO_2$ $[M+H]^+$ 252.1964, found 252.1965.



26

3,3-Diallyl-1-(oct-1-yn-1-yl)pyrrolidin-2-one 26. Yield: 82%. Colorless oil; ^1H NMR (300 MHz, $CDCl_3$): δ 5.63-5.50 (m, 2H), 4.97-4.92 (m, 4H), 3.31 (t, *J* = 7.1 Hz, 2H), 2.21 (dd, *J* = 13.8 and 6.6, 2H), 2.19 (t, *J* = 6.1 Hz, 2H), 2.03 (dd, *J* = 13.7 and 8.3 Hz, 2H), 1.82 (t, *J* = 7.3 Hz, 2H), 1.36 (app. quint., *J* = 7.1 Hz, 2H), 1.27-1.10 (m, 6H), 0.72 (t, *J* = 6.7 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 178.3, 132.9, 118.8, 71.8, 71.4, 47.0, 46.4, 41.1, 31.1, 28.6, 28.3, 27.2, 22.2, 18.3, 13.8; IR (ATR) ν_{max} 2959, 2935, 2261, 1712, 1397, 1219, 1085, 912 cm^{-1}; ESIMS (positive mode): 547.4, 296.2, 274.2, 204.1; ESIHRMS *m/z* calcd for $C_{18}H_{28}NO$ $[M+H]^+$ 274.2171, found 274.2173.

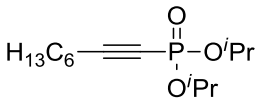
[S9] Frederick, M. O.; Mulder, J. A.; Tracey, M. R.; Hsung, R. P.; Huang, J.; Kurtz, K. C. M.; Shen, L.; Douglas, C. J. *J. Am. Chem. Soc.* **2003**, *125*, 2368.

Experimental Procedures and Characterization Data:

Alkynylphosphonates from Alkynylcopper Reagents

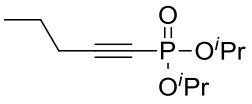
General procedure for the synthesis of alkynylphosphonates from alkynylcopper reagents.

A 5 mL round bottom flask was successively charged with dialkylphosphite (8.0 mmol), the alkynylcopper reagent (2.0 mmol) and DMF (4 mL). The resulting bright yellow slurry was then treated with *N*-methylimidazole (315 µL, 4.0 mmol) and the reaction mixture was vigorously stirred at room temperature and under an atmosphere of oxygen (balloon). After complete disappearance of the alkynylcopper reagent (complete dissolution to a deep blue homogeneous reaction mixture: typically 12-24h), the reaction was diluted with an aqueous mixture of saturated ammonium chloride and 28% ammonium hydroxide (1:1 solution) and extracted with diethyl ether. Combined organic layers were washed with brine, dried over $MgSO_4$ and concentrated. The crude residue was finally purified by flash chromatography over silica gel to give the desired alkynylphosphonate.



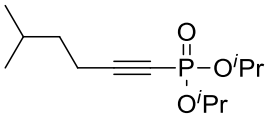
30

Diisopropyl (oct-1-yn-1-yl)phosphonate 30. Yield: 85% (91% on a 2.5 g scale). Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.51-4.34 (m, 2H), 2.01 (dt, J = 6.6 Hz and $J_{H\text{-}P}$ = 4.8 Hz, 2H), 1.25 (tt, J = 7.8 and 7.2 Hz, 2H), 1.11-0.96 (m, 6H), 1.02 (d, J = 6.6 Hz, 12H), 0.56 (t, J = 6.3 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 102.5 (d, $J_{C\text{-}P}$ = 52.5 Hz), 71.5 (d, $J_{C\text{-}P}$ = 300.0 Hz), 71.0 (d, $J_{C\text{-}P}$ = 22.5 Hz), 30.7, 28.1, 27.0, 23.4 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.2 (d, $J_{C\text{-}P}$ = 4.9 Hz), 22.1, 18.8, 13.5; ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.6; IR (ATR) ν_{max} 2979, 2213, 1377, 1257, 983 cm^{-1}; ESIMS (positive mode): 275.2, 191.1, 110.0; ESIHRMS *m/z* calcd for $C_{14}H_{28}O_3P$ $[M+H]^+$ 275.1776, found 275.1778.



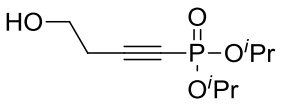
31

Diisopropyl (pent-1-yn-1-yl)phosphonate 31. Yield: 86% (92% on a 16.0 g scale). Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.67-4.60 (m, 2H), 2.24 (dt, J = 6.9 Hz and $J_{H\text{-}P}$ = 4.2 Hz, 2H), 1.53 (tq, J = 7.5 and 7.2 Hz, 2H), 1.28 (d, J = 7.2 Hz, 12H), 0.93 (t, J = 6.6 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 102.1 (d, $J_{C\text{-}P}$ = 52.5 Hz), 72.2 (d, $J_{C\text{-}P}$ = 300.0 Hz), 72.0 (d, $J_{C\text{-}P}$ = 5.3 Hz), 24.4 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.7 (d, $J_{C\text{-}P}$ = 4.8 Hz), 21.3, 21.2, 13.3; ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.7; IR (ATR) ν_{max} 2982, 2205, 1385, 1255, 981 cm^{-1}; ESIMS (positive mode): 233.1, 191.1, 149.0; ESIHRMS *m/z* calcd for $C_{11}H_{22}O_3P$ $[M+H]^+$ 233.1307, found 233.1305.



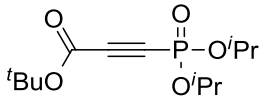
32

Diisopropyl (5-methylhex-1-yn-1-yl)phosphonate 32 Yield: 96%. Pale yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.67-4.60 (m, 2H), 2.26 (dt, J = 6.3 Hz and $J_{H\text{-}P}$ = 4.5 Hz, 2H), 1.61 (app. sept., J = 6.6 Hz, 1H), 1.39 (dt, J = 7.2 and 6.9 Hz, 2H), 1.28 (d, J = 6.3 Hz, 12H), 0.82 (d, J = 6.6 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 102.3 (d, $J_{C\text{-}P}$ = 52.5 Hz), 72.0 (d, $J_{C\text{-}P}$ = 6.0 Hz), 71.9 (d, $J_{C\text{-}P}$ = 300.0 Hz), 36.4, 27.4, 24.0 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.7 (d, $J_{C\text{-}P}$ = 4.8 Hz), 22.2, 17.4; ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.7; IR (ATR) ν_{max} 2982, 2197, 1381, 1257, 984 cm^{-1}; ESIMS (positive mode): 261.2, 219.1, 177.1; ESIHRMS *m/z* calcd for $C_{13}H_{26}O_3P$ $[M+H]^+$ 261.1620, found 261.1621.



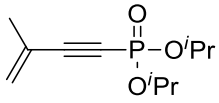
33

Diisopropyl (4-hydroxybut-1-yn-1-yl)phosphonate 33. Yield: 35%. Pale yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.68-4.61 (m, 2H), 3.72 (t, J = 6.6 Hz, 2H), 2.55 (td, J = 6.3 Hz and $J_{H\text{-}P}$ = 1.8 Hz, 2H), 1.30 (d, J = 6.0 Hz, 12H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 100.0 (d, $J_{C\text{-}P}$ = 53.3 Hz), 73.0 (d, $J_{C\text{-}P}$ = 300.0 Hz), 72.6 (d, $J_{C\text{-}P}$ = 6.0 Hz), 60.0, 24.0 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.7 (d, $J_{C\text{-}P}$ = 4.9 Hz), 23.7; ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.7; IR (ATR) ν_{max} 3405, 2986, 2197, 1381, 1241, 984 cm^{-1}; ESIMS (positive mode): 235.1, 151.0, 133.0, 121.0; ESIHRMS *m/z* calcd for $C_{10}H_{20}O_3P$ $[M+H]^+$ 235.1099, found 235.1100.



34

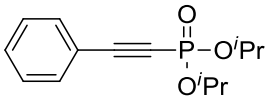
Diisopropyl (*tert*-butoxycarbonylethynyl)phosphonate 34. Yield: 48%. Orange-brown oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.67-4.60 (m, 2H), 1.38 (s, 9H), 1.26 (d, J = 6.3 Hz, 12H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 150.6, 87.4 (d, $J_{C\text{-}P}$ = 45.8 Hz), 85.4, 74.0 (d, $J_{C\text{-}P}$ = 285.0 Hz), 73.4 (d, $J_{C\text{-}P}$ = 5.3 Hz), 28.0, 23.9 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.6 (d, $J_{C\text{-}P}$ = 4.9 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -11.6; IR (ATR) ν_{max} 2975, 1708, 1369, 1255, 1151, 983 cm^{-1}; ESIMS (positive mode): 291.1, 257.1, 193.0, 151.0; ESIHRMS *m/z* calcd for $C_{13}H_{24}O_5P$ $[M+H]^+$ 291.1361, found 291.1359.



35

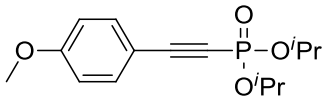
Diisopropyl (3-methylbut-3-en-1-yn-1-yl)phosphonate 35. Yield: 88%. Pale yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 5.45 (br. s, 1H), 5.39 (br. s, 1H), 4.67-4.59 (m, 2H), 1.81 (s, 3H), 1.26 (d, J = 6.3 Hz, 12H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 127.5, 124.5, 99.3 (d, $J_{C\text{-}P}$ = 51.8 Hz), 78.8 (d, $J_{C\text{-}P}$ = 300.0 Hz), 72.2 (d, $J_{C\text{-}P}$ = 6.0 Hz), 23.9 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.7 (d, $J_{C\text{-}P}$ = 4.8 Hz),

22.1; ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.6; IR (ATR) ν_{max} 2979, 2182, 1377, 1258, 983 cm^{-1}; ESIMS (positive mode): 231.1, 189.1, 147.0; ESIHRMS *m/z* calcd for $C_{11}H_{20}O_3P$ $[M+H]^+$ 231.1150, found 231.1145.



36

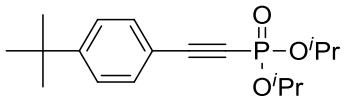
Diisopropyl (phenylethynyl)phosphonate 36. This compound has been previously reported.[S10] Yield: 71% (97% on a 2.6 g scale).



37

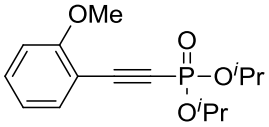
Diisopropyl [(4-methoxyphenyl)ethynyl]phosphonate 37. Yield: 58%. Pale yellow oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.45 (d, J = 9.0 Hz, 2H), 6.84 (d, J = 8.7 Hz, 2H), 4.80-4.72 (m, 2H), 3.79 (s, 3H), 1.37 (d, J = 6.0 Hz, 12H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 161.6, 134.5, 114.5, 111.9, 99.0 (d, $J_{C\text{-}P}$ = 52.5 Hz), 79.2 (d, $J_{C\text{-}P}$ = 247.5 Hz), 72.1 (d, $J_{C\text{-}P}$ = 5.3 Hz), 55.4, 24.1 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.9 (d, $J_{C\text{-}P}$ = 4.9 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.1; IR (ATR) ν_{max} 2975, 2186, 1507, 1251, 981 cm^{-1}; ESIMS (positive mode): 297.1, 255.1, 213.0; ESIHRMS *m/z* calcd for $C_{15}H_{22}O_3P$ $[M+H]^+$ 297.1256, found 297.1259.

[S10] Gao, Y.; Wang, G.; Chen, L.; Xu, P.; Zhao, Y.; Zhou, Y.; Han, L.-B. *J. Am. Chem. Soc.* **2009**, *131*, 7956.



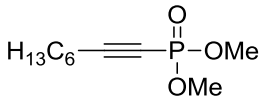
38

Diisopropyl [(4-*tert*-butylphenyl)ethynyl]phosphonate 38. Yield: 56%. Pale yellow solid; Mp: 65 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.47 (d, J = 8.4 Hz, 2H), 7.37 (d, J = 8.7 Hz, 2H), 4.84-4.73 (m, 2H), 1.38 (d, J = 6.0 Hz, 12H), 1.29 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 154.5, 132.6, 125.9, 117.0, 98.9 (d, $J_{C\text{-}P}$ = 53.3 Hz), 79.6 (d, $J_{C\text{-}P}$ = 292.5 Hz), 72.5 (d, $J_{C\text{-}P}$ = 6.0 Hz), 35.3, 31.3, 24.2 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.9 (d, $J_{C\text{-}P}$ = 4.8 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.1; IR (ATR) ν_{max} 2967, 2178, 1255, 990 cm^{-1}; ESIMS (positive mode): 323.2, 281.1, 239.1, 149.0; ESIHRMS *m/z* calcd for $C_{18}H_{28}O_3P$ $[M+H]^+$ 323.1776, found 323.1774.



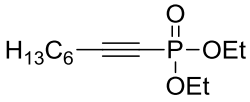
39

Diisopropyl [(2-methoxyphenyl)ethynyl]phosphonate 39. Yield: 93%. Yellow solid; Mp: 49 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.40-7.28 (m, 2H), 6.90-6.79 (m, 2H), 4.80-4.68 (m, 2H), 3.77 (s, 3H), 1.33 (d, J = 6.1 Hz, 6H), 1.32 (d, J = 5.9 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 161.4 (d, $J_{C\text{-}P}$ = 1.7 Hz), 134.1, 132.1, 120.3, 110.7, 109.0 (d, $J_{C\text{-}P}$ = 5.6 Hz), 95.4 (d, $J_{C\text{-}P}$ = 53.0 Hz), 83.4 (d, $J_{C\text{-}P}$ = 296.1 Hz), 72.1 (d, $J_{C\text{-}P}$ = 5.6 Hz), 55.6, 23.8 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.5 (d, $J_{C\text{-}P}$ = 4.8 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.2 (t, J = 9.0 Hz); IR (ATR) ν_{max} 2978, 2181, 1596, 1485, 1259, 1245, 1160, 983, 888, 854, 747 cm^{-1}; ESIMS (positive mode): 319.1, 297.1, 213.0; ESIHRMS *m/z* calcd for $C_{15}H_{22}O_4P$ $[M+H]^+$ 297.1256, found 297.1257.



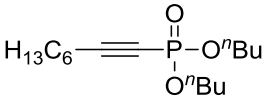
40

Dimethyl (oct-1-yn-1-yl)phosphonate 40. Yield: 65%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.46 (d, $J_{H\text{-}P}$ = 12.3 Hz, 6H), 2.07 (dt, J = 6.3 Hz and $J_{H\text{-}P}$ = 4.8 Hz, 2H), 1.28 (tt, J = 7.8 and 6.9 Hz, 2H), 1.14-0.97 (m, 6H), 0.59 (t, J = 6.6 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 103.8 (d, $J_{C\text{-}P}$ = 51.8 Hz), 68.6 (d, $J_{C\text{-}P}$ = 300.0 Hz), 52.7 (d, $J_{C\text{-}P}$ = 6.0 Hz), 30.6, 28.0, 27.0, 22.1, 18.8, 13.6; ^{31}P NMR (121 MHz, $CDCl_3$): δ -3.2; IR (ATR) ν_{max} 2951, 2201, 1456, 1264, 1026 cm^{-1}; ESIMS (positive mode): 219.1, 173.0, 112.0; ESIHRMS *m/z* calcd for $C_{10}H_{20}O_3P$ $[M+H]^+$ 219.1150, found 219.1147.



41

Diethyl (oct-1-yn-1-yl)phosphonate 41. This compound has been previously reported.[S11] Yield: 83% (96% on a 2.4 g scale).

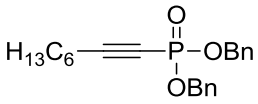


42

Dibutyl (oct-1-yn-1-yl)phosphonate 42. Yield: 87%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): 3.99 (td, J = 6.6 Hz and $J_{H\text{-}P}$ = 6.6 Hz, 4H), 2.26 (dt, J = 6.0 Hz and $J_{H\text{-}P}$ = 4.5 Hz, 2H), 1.65-1.56 (m, 4H), 1.55-1.45 (m, 2H), 1.41-1.28 (m, 6H), 1.26-1.18 (m, 4H), 0.86 (t, J = 7.3 Hz, 3H), 0.83 (t, J = 7.2 Hz, 3H), 0.81 (t, J = 7.0 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 103.1 (d, $J_{C\text{-}P}$ = 52.5 Hz), 70.3 (d, $J_{C\text{-}P}$ = 292.5 Hz), 66.5 (d, $J_{C\text{-}P}$ = 5.3 Hz), 32.1 (d, $J_{C\text{-}P}$ = 7.0 Hz), 31.1, 28.3, 27.3, 22.4, 19.1, 18.7, 13.9, 13.5; ^{31}P NMR (121 MHz, $CDCl_3$): δ -3.4; IR (ATR) ν_{max} 2959,

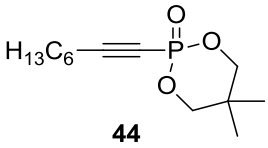
[S11] Mavel, G.; Favelier R. *J. Chim. Phys.* **1967**, *64*, 627.

2201, 1247, 1020 cm^{-1}; ESIMS (positive mode): 303.2, 247.1, 191.1; ESIHRMS *m/z* calcd for $C_{16}H_{32}O_3P$ $[M+H]^+$ 303.2089, found 303.2090.



43

Dibenzyl (oct-1-yn-1-yl)phosphonate 43. Yield: 37%. Colorless oil; ^1H NMR (300 MHz, $CDCl_3$): 7.30-7.20 (m, 10H), 4.99 (d, J_{H-P}= 8.7 Hz, 4H), 2.20 (dt, J = 6.3 Hz and J_{H-P} = 4.5 Hz, 2H), 1.43 (tt, J = 7.5 and 6.6 Hz, 2H), 1.30-1.13 (m, 6H), 0.81 (t, J = 6.6 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 135.7, 128.5, 127.6, 127.0, 104.4 (d, J_{C-P} = 53.3 Hz), 70.3 (d, J_{C-P} = 292.5 Hz), 68.3 (d, J_{C-P} = 5.3 Hz), 31.2, 28.5, 27.3, 22.4, 19.2, 14.0, ^{31}P NMR (121 MHz, $CDCl_3$): δ -5.5; IR (ATR) ν_{max} 2923, 2205, 1452, 1260, 990 cm^{-1}; ESIMS (positive mode): 371.18, 275.2, 191.1, 110.0; ESIHRMS *m/z* calcd for $C_{22}H_{28}O_3P$ $[M+H]^+$ 371.1776, found 371.1774.



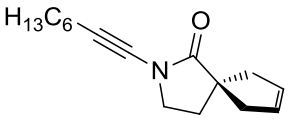
44

5,5-Dimethyl-2-(oct-1-yn-1-yl)-1,3,2-dioxaphosphinane 2-oxide 44. This compound has been previously reported.[S12] Yield: 39%.

[S12] Sajna, K. V.; Srinivas, V.; Kumara Swamy, K. C. *Adv. Synth. Catal.* **2010**, *352*, 3069.

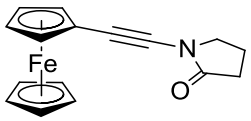
Experimental Procedures and Characterization Data:

Complex Ynamides and Alkynylphosphonates



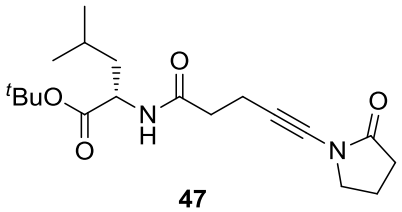
45

2-(Oct-1-yn-1-yl)-2-azaspiro[4.4]non-7-en-1-one 45. Yield: 80%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): δ 5.63 (s, 2H), 3.58 (t, J = 6.7 Hz, 2H), 2.84 (d, J = 14.7 Hz, 2H), 2.32 (t, J = 7.0 Hz, 2H), 2.28 (d, J = 14.8 Hz, 2H), 2.05 (t, J = 6.8 Hz, 2H), 1.54 (app. quint., J = 7.9 Hz, 2H), 1.41-1.22 (m, 6H), 0.88 (t, J = 6.7 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 180.4, 128.3, 72.3, 72.0, 48.9, 47.5, 43.7, 36.0, 31.4, 29.0, 28.7, 22.6, 18.7, 14.2; IR (ATR) ν_{max} 2923, 2260, 1724, 1393, 1298, 1207, 1038, 671 cm^{-1}; ESIMS (positive mode): 491.4, 268.2, 246.2, 176.1, 138.1; ESIHRMS *m/z* calcd for $C_{16}H_{24}NO$ $[M+H]^+$ 246.1858, found 246.1857.



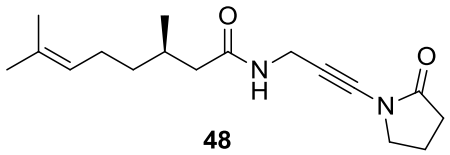
46

1-(Ferrocenylethynyl)pyrrolidin-2-one 46. Yield: 87%. Bright orange solid; Mp: 129 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.39 (s, 2H), 4.18 (s, 5H), 4.15 (s, 2H), 3.67 (t, J = 7.1 Hz, 2H), 2.40 (t, J = 8.0 Hz, 2H), 2.08 (app. quint., J = 7.5 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 175.8, 76.4, 71.7, 71.0, 70.0, 68.7, 64.3, 50.1, 29.7, 18.7; IR (ATR) ν_{max} 2979, 2892, 2241, 1712, 1385, 1219, 1061, 817 cm^{-1}; ESIMS (positive mode): 294.1, 293.1; ESIHRMS *m/z* calcd for $C_{16}H_{15}NOFe$ $[M]^+$ 293.0503, found 293.0506.



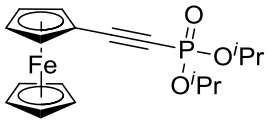
47

(*S*)-5-[(1-*tert*-Butoxy-4-methyl-1-oxopentan-2-yl)amino]-5-oxo-1-(2-oxopyrrolidin-1-yl)-pent-1-yne 47. Yield: 90%. Brown oil; $[\alpha]_D^{20}$-3 (*c* 0.9, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ 6.14 (br. d, *J* = 8.1 Hz, 1H), 4.51 (dt, *J* = 11.9 and 6.3 Hz, 1H), 3.62 (t, *J* = 7.1 Hz, 2H), 2.65 (t, *J* = 7.0 Hz, 2H), 2.43 (t, *J* = 7.1 Hz, 2H), 2.39 (t, *J* = 8.2 Hz, 2H), 2.08 (app. quint., *J* = 7.5 Hz, 2H), 1.69-1.46 (m, 3H), 1.43 (s, 9H), 0.91 (d, *J* = 6.2 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.0, 172.2, 170.7, 81.4, 72.2, 70.9, 51.1, 49.7, 41.5, 35.5, 29.4, 27.8, 24.7, 22.6, 21.9, 18.5, 14.9; IR (ATR) ν_{max} 3294, 2967, 2908, 2363, 1724, 1665, 1535, 1373, 1255, 1144, 1065, 730 cm^{-1}; ESIMS (positive mode): 723.4, 374.2, 373.2, 351.2, 295.2, 182.1; ESIHRMS *m/z* calcd for $C_{19}H_{31}N_2O_4$ $[M+H]^+$ 351.2284, found 351.2286.



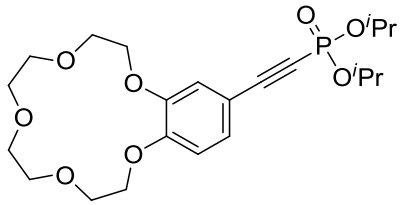
48

(*R*)-3-(3,7-Dimethyloct-6-enamido)-1-(2-oxopyrrolidin-1-yl)-prop-1-yne 48. Yield: 84%. White solid; Mp: 84 °C; $[\alpha]_D^{20}$-1 (*c* 0.9, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ 6.43 (br. t, *J* = 4.7 Hz, 1H), 4.95 (br. t, *J* = 5.9 Hz, 1H), 4.06 (d, *J* = 5.2 Hz, 2H), 3.54 (t, *J* = 7.1 Hz, 2H), 2.29 (t, *J* = 7.9 Hz, 2H), 2.09 (app. quint, *J* = 9.3 Hz, 1H), 2.00 (app. quint., *J* = 7.6 Hz, 2H), 1.93-1.81 (m, 4H), 1.54 (s, 3H), 1.46 (s, 3H), 1.28-1.19 (m, 1H), 1.12-1.02 (m, 1H), 0.80 (d, *J* = 6.1 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 176.3, 172.2, 131.1, 124.2, 73.8, 68.6, 49.7, 43.8, 36.7, 30.2, 29.4, 29.0, 25.5, 25.3, 19.3, 18.6, 17.5; IR (ATR) ν_{max} 3278, 2967, 2900, 2261, 1728, 1649, 1535, 1401, 1223, 1069, 888, 730 cm^{-1}; ESIMS (positive mode): 313.2, 291.2, 140.1; ESIHRMS *m/z* calcd for $C_{17}H_{27}N_2O_2$ $[M+H]^+$ 291.2073, found 291.2076.



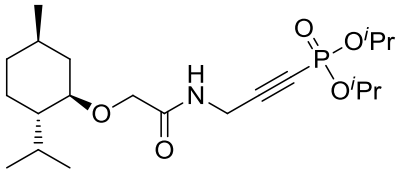
49

Diisopropyl (ferrocenylethynyl)phosphonate 49. Yield: 71%. Orange-brown solid; Mp: 47 °C; ^{1}H NMR (300 MHz, $CDCl_3$): 4.65-4.58 (m, 2H), 4.38 (app. t, J = 1.8 Hz, 2H), 4.14 (t, J = 1.9 Hz, 2H), 4.07 (s, 5H), 1.25 (d, J = 6.3 Hz, 6H), 1.24 (d, J = 6.3 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 99.4 (d, $J_{C\text{-}P}$ = 54.5 Hz), 76.0 (d, $J_{C\text{-}P}$ = 300.6 Hz), 72.1 (d, $J_{C\text{-}P}$ = 1.6 Hz), 71.6 (d, $J_{C\text{-}P}$ = 5.5 Hz), 70.0, 69.8, 59.9 (d, $J_{C\text{-}P}$ = 5.7 Hz), 23.6 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.4 (d, $J_{C\text{-}P}$ = 4.8 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -8.0; IR (ATR) ν_{max} 2982, 2896, 2158, 1385, 1255, 1058, 983, 927, 793 cm^{-1}; ESIMS (positive mode): 398.1, 397.1, 375.1, 374.1, 333.0, 291.0; ESIHRMS *m/z* calcd for $C_{18}H_{23}O_3PFe$ $[M]^+$ 374.0734, found 374.0732.



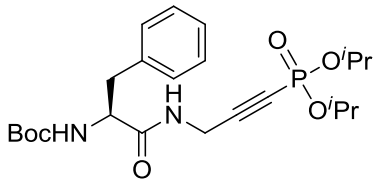
50

Diisopropyl [(2,3,5,6,8,9,11,12-octahydrobenzo[b][1,4,7,10,13]pentaoxacyclopentadecin-15-yl)ethynyl]phosphonate 50. Yield: 34%. Colorless oil; ^{1}H NMR (300 MHz, $CDCl_3$): 7.08 (dd, J = 8.3 and 1.6 Hz, 1H), 6.94 (d, J = 1.7 Hz, 1H), 6.73 (d, J = 8.3 Hz, 1H), 4.78-4.67 (m, 2H), 4.09-4.03 (m, 4H), 3.85-3.82 (m, 4H), 3.68 (s, 8H), 1.33 (d, J = 6.2 Hz, 6H), 1.32 (d, J = 6.1 Hz, 6H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 151.5, 148.7, 126.9, 117.3, 113.0, 111.9, 98.9 (d, $J_{C\text{-}P}$ = 53.3 Hz), 78.5 (d, $J_{C\text{-}P}$ = 299.0 Hz), 72.2 (d, $J_{C\text{-}P}$ = 5.5 Hz), 71.1, 70.4, 70.3, 69.3, 69.2, 69.0, 68.7, 24.0 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.7 (d, $J_{C\text{-}P}$ = 4.9 Hz); ^{31}P NMR (121 MHz, $CDCl_3$): δ -7.8; IR (ATR) ν_{max} 2982, 2896, 2178, 1511, 1247, 1136, 987, 793, 726 cm^{-1}; ESIMS (positive mode): 480.2, 479.2, 457.2, 373.1; ESIHRMS *m/z* calcd for $C_{22}H_{34}O_8P$ $[M+H]^+$ 457.1991, found 457.1994.



51

(1*R*,3*R*,4*S*)-Diisopropyl (menthoxyacetamido)prop-1-yn-1-ylphosphonate 51. Yield: 76%. Colorless oil; $[\alpha]_D^{20}$ -37 (*c* 0.8, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): 6.79 (br. t, *J* = 5.4 Hz, 1H), 4.63-4.56 (m, 2H), 4.09 (A of AB syst., *J* = 4.2 Hz, 1H), 4.08 (B of AB syst., *J* = 4.2 Hz, 1H), 3.95 (A' of A'B' syst., *J* = 15.2 Hz, 1H), 3.74 (B' of A'B' syst., *J* = 15.2 Hz, 1H), 3.02 (td, *J* = 10.6 and 4.1 Hz, 1H), 1.99 (hept. d, *J* = 7.0 and 2.7 Hz, 1H), 1.94-1.88 (m, 1H), 1.55-1.48 (m, 2H), 1.31-1.10 (obs. m, 2H), 1.22 (d, *J* = 6.3 Hz, 12H), 0.91-0.69 (obs. m, 3H), 0.79 (d, *J* = 6.5 Hz, 6H), 0.65 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.0, 95.1 (d, $J_{C\text{-}P}$ = 50.6 Hz), 80.2, 74.4 (d, $J_{C\text{-}P}$ = 293.8 Hz), 72.2 (d, $J_{C\text{-}P}$ = 5.6 Hz), 67.4, 47.8, 39.8, 34.1, 31.2, 28.5 (d, $J_{C\text{-}P}$ = 4.5 Hz), 25.8, 23.8 (d, $J_{C\text{-}P}$ = 4.3 Hz), 23.6 (d, $J_{C\text{-}P}$ = 4.5 Hz), 23.0, 22.0, 20.8, 16.0; ^{31}P NMR (121 MHz, $CDCl_3$): δ -9.9 (quint, *J* = 6.3 Hz); IR (ATR) ν_{max} 2971, 2919, 2209, 1677, 1519, 1381, 1255, 1105, 983, 774 cm^{-1}; ESIMS (positive mode): 853.5, 438.2, 416.3, 374.2, 236.1, 194.0; ESIHRMS *m/z* calcd for $C_{21}H_{39}NO_5P$ $[M+H]^+$ 416.2566, found 416.2561.



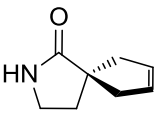
52

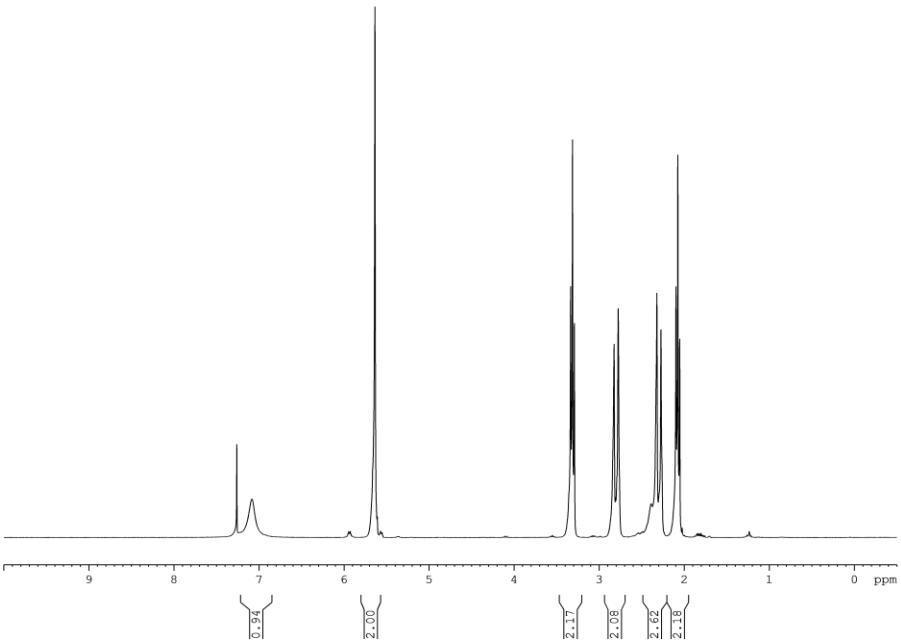
(*S*)-Diisopropyl {3-[2-(*tert*-Butoxycarbonylamino)-3-phenylpropanamido]-prop-1-yn-1-yl}-phosphonate 52. Yield: 79%. Pale yellow oil; $[\alpha]_D^{20}$ -2 (*c* 0.9, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): 7.42 (br. t, *J* = 5.5 Hz, 1H), 7.26-7.10 (m, 5H), 5.31 (d, *J* = 8.1 Hz, 1H), 4.76-4.56 (m, 2H), 4.42-4.27 (br. m, 1H), 4.13-3.92 (br. m, 2H), 3.08 (A of ABX syst., *J* = 13.7 and 5.8 Hz, 1H), 2.89 (br. B of ABX syst., *J* = 13.2 and 6.4 Hz, 1H), 1.31-1.24 (m, 21H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 171.4, 155.3, 136.5, 129.3 128.4, 126.7, 95.9 (d, $J_{C\text{-}P}$ = 50.9 Hz), 77.8 (d, $J_{C\text{-}P}$ = 298.0 Hz), 74.1 (d, $J_{C\text{-}P}$ = 5.7 Hz), 72.4, 55.3, 38.6, 29.1 (d, $J_{C\text{-}P}$ = 4.4 Hz), 28.2, 23.8 (d, $J_{C\text{-}P}$ =

4.5 Hz), 23.6 (d, $J_{C\text{-}P}$ = 4.7 Hz),; ^{31}P NMR (121 MHz, $CDCl_3$): δ -9.8; IR (ATR) ν_{max} 3278, 2986, 2217, 1681,1499, 1365, 1254, 1168, 990, 742 cm^{-1}; ESIMS (positive mode): 489.2, 467.2, 411.2, 367.2, 325.1; ESIHRMS *m/z* calcd for $C_{23}H_{36}N_2O_6P$ $[M+H]^+$ 467.2311, found 467.2310.

Supporting Information

^{1}H and ^{13}C NMR spectra



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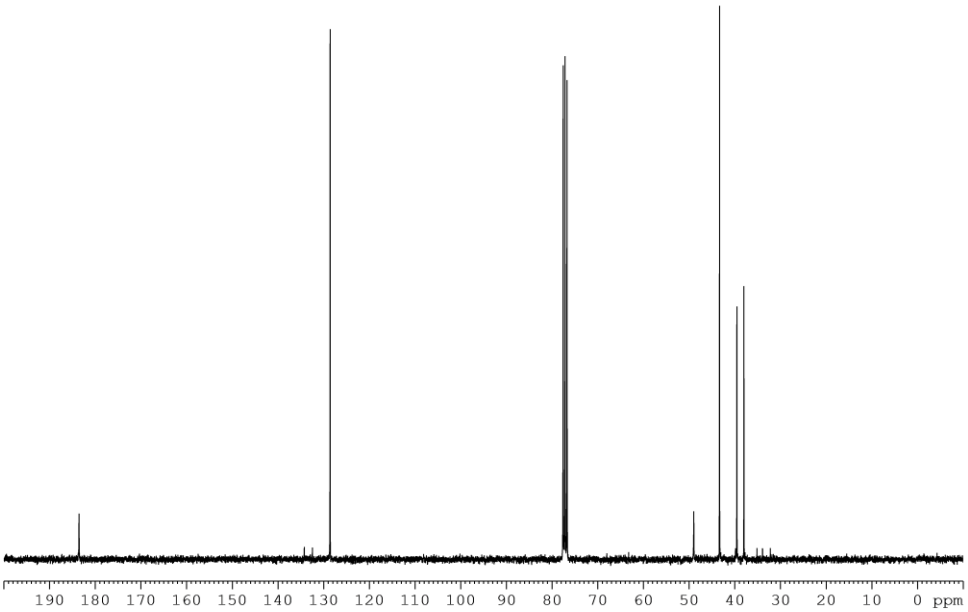


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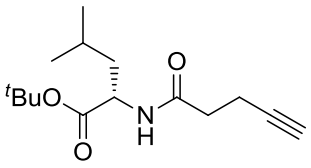
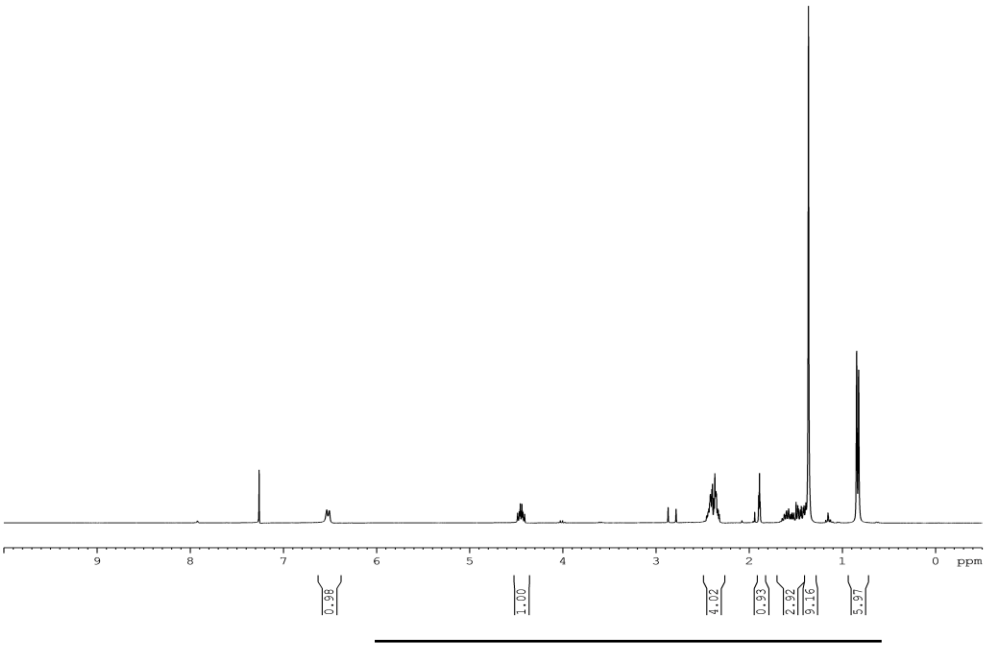
WDW                     EM
SSB                      0
LB                    1.00 Hz
GB                       0
PC                    1.40

1D NMR plot parameters
CX                   20.00 cm
CY                    7.47 cm
F1P                 200.000 ppm
F1                15093.55 Hz
F2P                -10.000 ppm
F2                 -754.68 Hz
PPMCM             10.50000 ppm/cm
HZCM             792.41132 Hz/cm
```





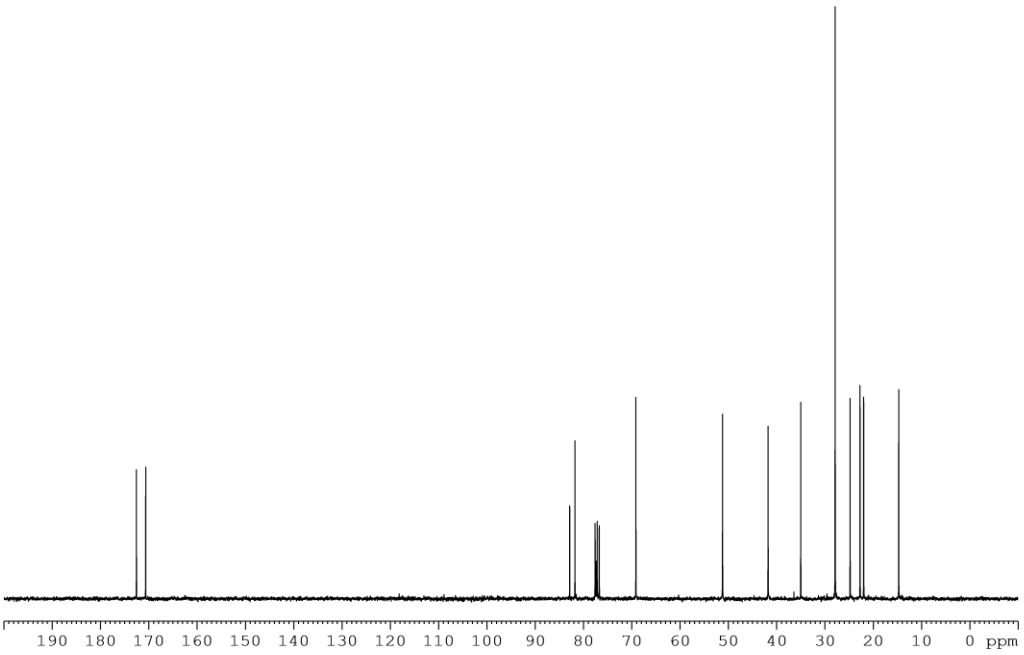

```
Current Data Parameters
NAME                  fc35g100
EXPNO                       30
PROCNO                       1

F2 - Acquisition Parameters
Date_              20110901
Time                   12.04
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                       16
DS                        0
SWH                6313.131 Hz
FIDRES             0.192661 Hz
AQ                 2.5952756 sec
RG                      28.5
DW                   79.200 usec
DE                    6.50 usec
TE                   294.4 K
D1                1.00000000 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     6.20 usec
PL1                    0.00 dB
SFO1           300.1328512 MHz

F2 - Processing parameters
SI                    32768
SF             300.1300055 MHz
WDW                      EM
SSB                       0
LB                     0.10 Hz
GB                        0
PC                     1.00

1D NMR plot parameters
CX                    20.00 cm
CY                    61.05 cm
F1P                    2.696 ppm
F1                   809.12 Hz
F2P                    0.415 ppm
F2                   124.46 Hz
PPMCM                0.11406 ppm/cm
HZCM                34.23280 Hz/cm
```




```
Current Data Parameters
NAME                  fc35g100
EXPNO                       51
PROCNO                       1

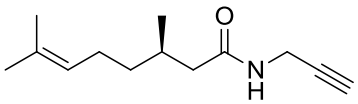
F2 - Acquisition Parameters
Date_              20110901
Time                   12.28
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG              zgpg30
TD                    65536
SOLVENT               CDCl3
NS                      200
DS                        4
SWH               17985.611 Hz
FIDRES             0.274439 Hz
AQ                 1.8219508 sec
RG                    1625.5
DW                   27.800 usec
DE                   10.00 usec
TE                   294.7 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

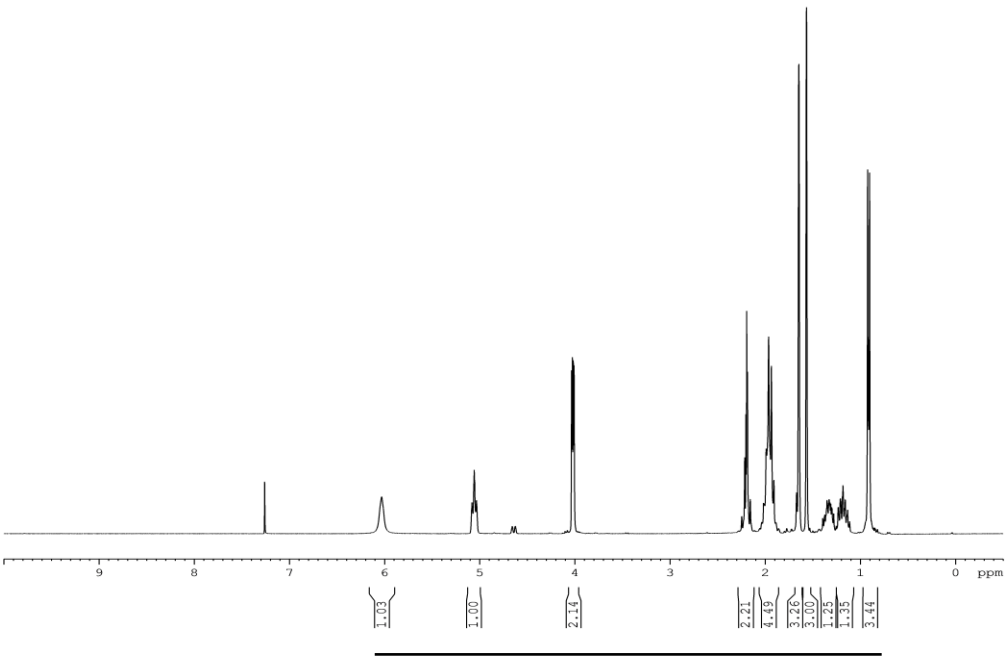
======== CHANNEL f1 ========
NUC1                     13C
P1                     9.00 usec
PL1                   -6.00 dB
SFO1           75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  22.00 dB
PL13                  22.00 dB
SFO2           300.1312005 MHz

F2 - Processing parameters
SI                    32768
SF             75.4677482 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40

1D NMR plot parameters
CX                    20.00 cm
CY                     9.38 cm
F1P                  200.000 ppm
F1                 15093.55 Hz
F2P                 -10.000 ppm
F2                  -754.68 Hz
PPMCM               10.50000 ppm/cm
HZCM               792.41138 Hz/cm
```



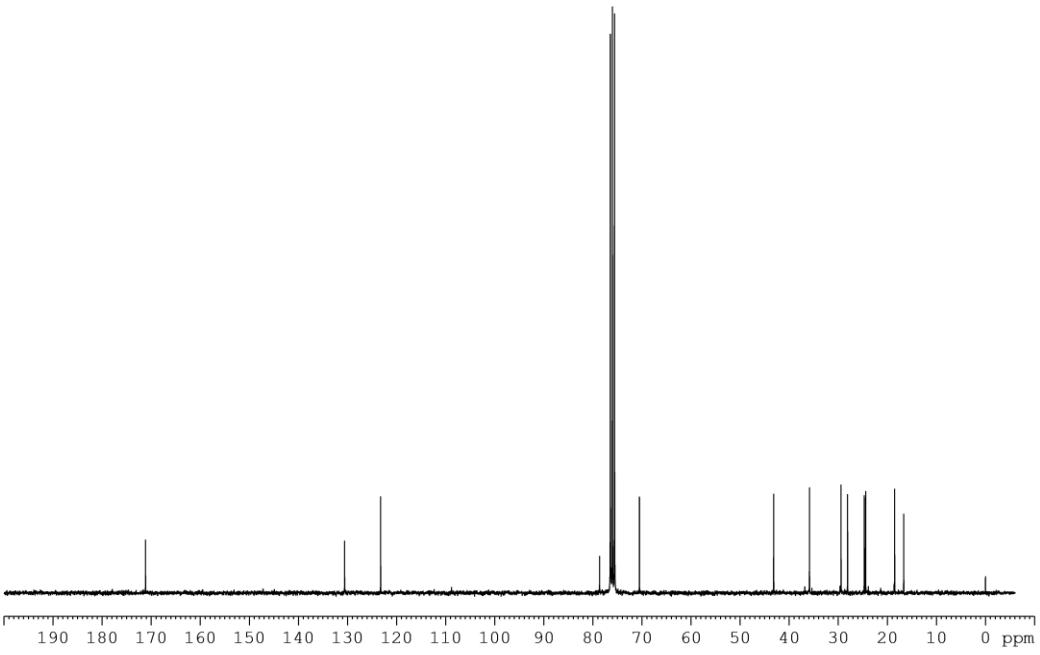



```
Current Data Parameters
NAME                  fc35kj618
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110901
Time_                     7.18
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                          57
DW                       79.200 usec
DE                        6.50 usec
TE                       294.5 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                  300.1300061 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00
```



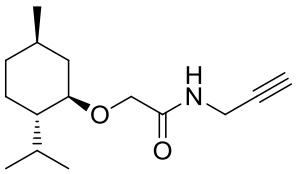

```
Current Data Parameters
NAME              fc46kj618bis
EXPNO                       11
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20111115
Time_                    20.28
INSTRUM                  spect
PROBHD    5 mm QNP 1H/13
PULPROG                zgpg30
TD                       32768
SOLVENT                  CDCl3
NS                        2048
DS                           4
SWH                  18115.941 Hz
FIDRES                0.552855 Hz
AQ                    0.9044468 sec
RG                      11585.2
DW                       27.600 usec
DE                        10.00 usec
TE                       294.9 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                        5.10 usec
PL1                      -6.00 dB
SFO1                75.4764278 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                      -6.00 dB
PL12                      15.80 dB
PL13                      15.80 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                  75.4678261 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```

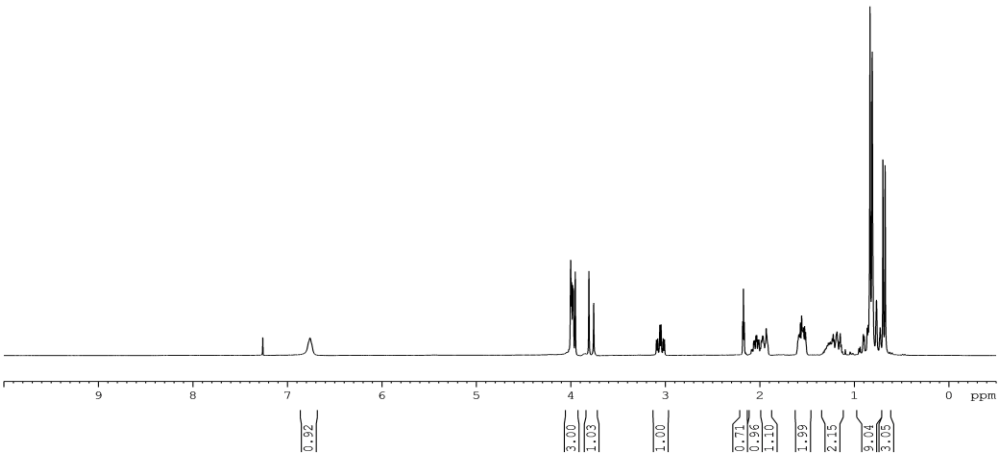



```
Current Data Parameters
NAME                  fc35G101
EXPNO                       22
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110901
Time                   10.09
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       25.4
DW                    79.200 usec
DE                     6.50 usec
TE                    294.5 K
D1                1.00000000 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300057 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```




```
Current Data Parameters
NAME                  fc35G101
EXPNO                       20
PROCNO                       1

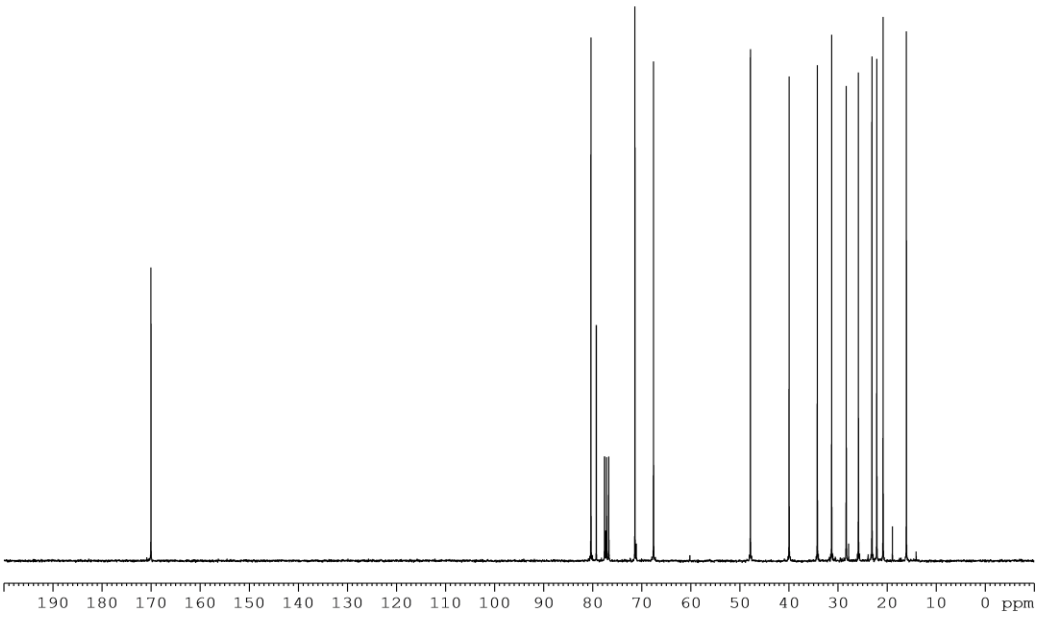
F2 - Acquisition Parameters
Date_               20110901
Time                    9.50
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        2000
DS                           4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                      1625.5
DW                    27.800 usec
DE                     10.00 usec
TE                    294.7 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

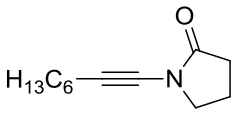
======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2            300.1312005 MHz

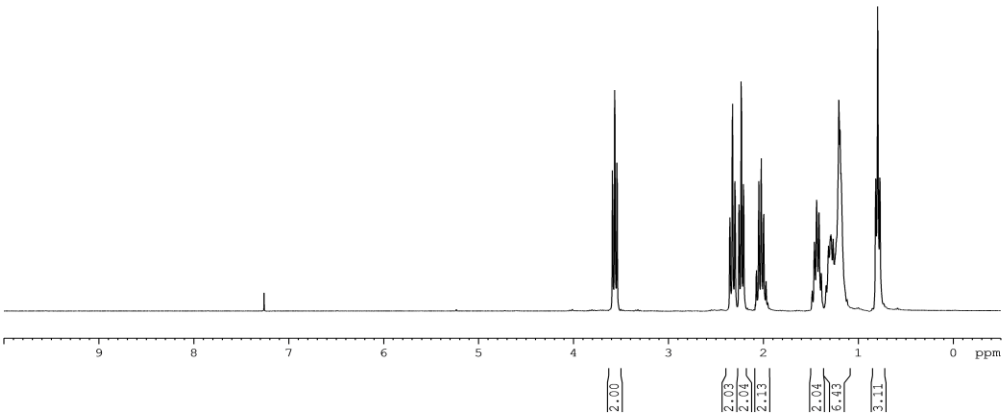
F2 - Processing parameters
SI                         32768
SF                75.4677515 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                      20.00 cm
CY                       5.45 cm
F1P                    200.000 ppm
F1                   15093.55 Hz
F2P                    -10.000 ppm
F2                    -754.68 Hz
PPMCM                10.50000 ppm/cm
HZCM                792.41138 Hz/cm
```





7a



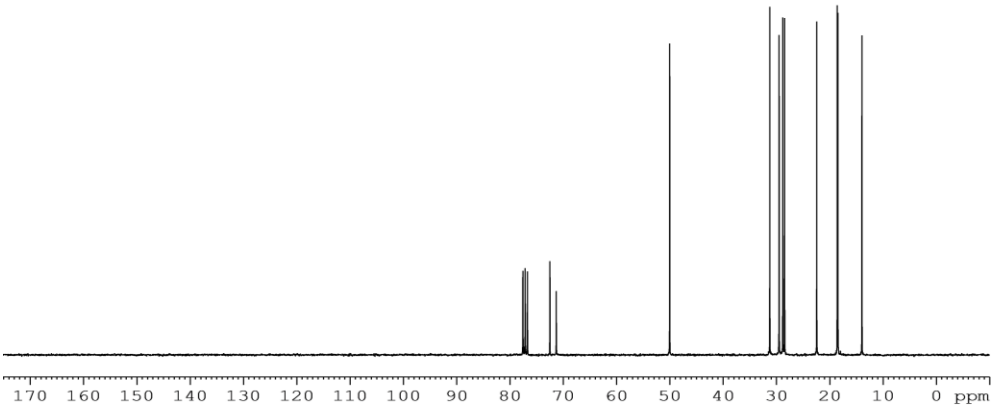

```
Current Data Parameters
NAME                  fc12ge28a
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110325
Time                      7.30
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                         35.9
DW                       79.200 usec
DE                        6.50 usec
TE                       293.4 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                  300.1300061 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00

1D NMR plot parameters
CX                       20.00 cm
CY                        8.60 cm
F1P                     10.000 ppm
F1                     3001.30 Hz
F2P                     -0.500 ppm
F2                     -150.06 Hz
PPMCM                  0.52500 ppm/cm
HZCM                 157.56825 Hz/cm
```



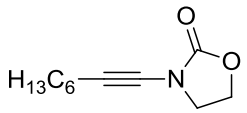

```
Current Data Parameters
NAME                  fc12ge28a
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110325
Time                      7.11
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        2000
DS                           4
SWH                  17985.611 Hz
FIDRES                0.274439 Hz
AQ                    1.8219508 sec
RG                       1625.5
DW                       27.800 usec
DE                       10.00 usec
TE                       293.5 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

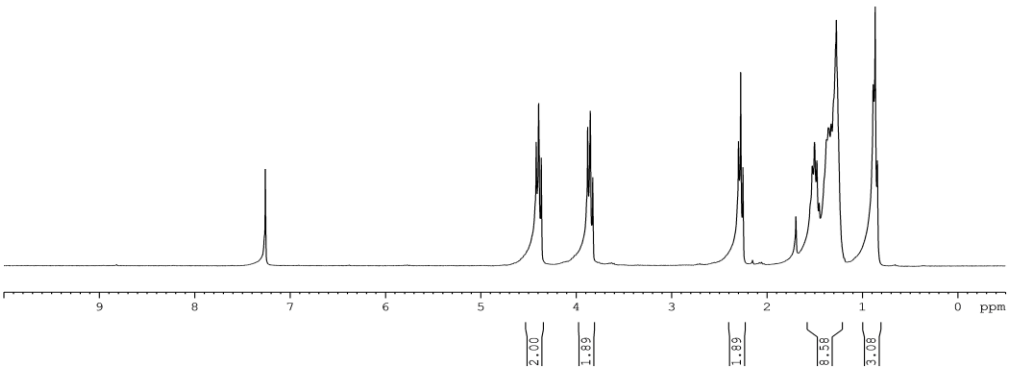
======== CHANNEL f1 ========
NUC1                        13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                  75.4677498 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```



7b

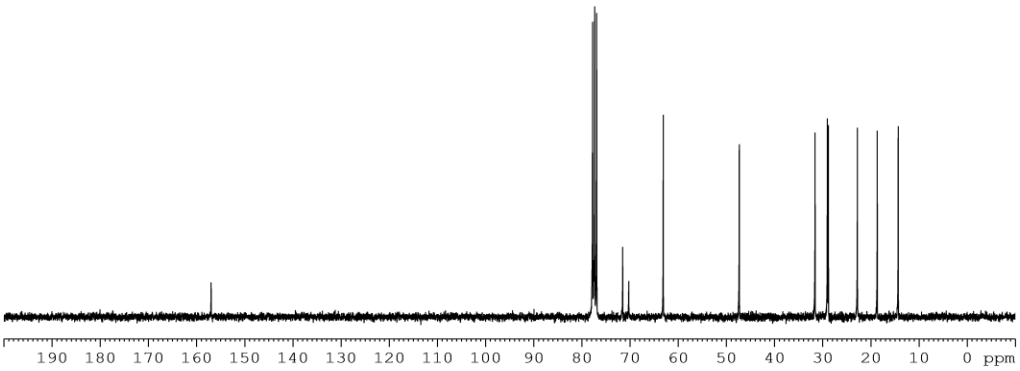



```
Current Data Parameters
NAME                  fc28ge027
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110714
Time                      2.31
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                         128
DW                      79.200 usec
DE                       6.50 usec
TE                      294.5 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                           32768
SF                  300.1300049 MHz
WDW                             EM
SSB                              0
LB                            0.10 Hz
GB                               0
PC                            1.00
```



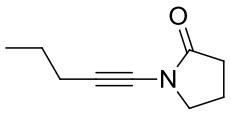

```
Current Data Parameters
NAME                  fc28ge027
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110714
Time                      2.12
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        2048
DS                           4
SWH                  17985.611 Hz
FIDRES                0.274439 Hz
AQ                    1.8219508 sec
RG                       1824.6
DW                       27.800 usec
DE                       10.00 usec
TE                      294.6 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                           32768
SF                  75.4677271 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```



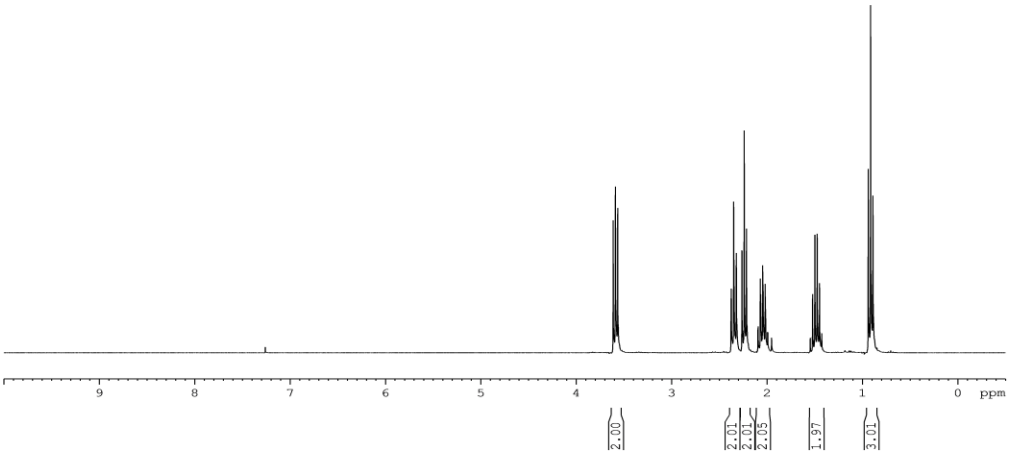
10a

```
Current Data Parameters
NAME          fc14ge030b
EXPNO                 12
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110408
Time               9.57
INSTRUM           spect
PROBHD    5 mm BBI 1H-BB
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                   15
DS                    0
SWH            6313.131 Hz
FIDRES         0.192661 Hz
AQ             2.5952756 sec
RG                 80.6
DW               79.200 usec
DE                6.50 usec
TE                294.2 K
D1            1.00000000 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                  6.20 usec
PL1                 0.00 dB
SFO1         300.1328512 MHz

F2 - Processing parameters
SI                32768
SF          300.1300063 MHz
WDW                  EM
SSB                   0
LB                 0.10 Hz
GB                    0
PC                 1.00
```



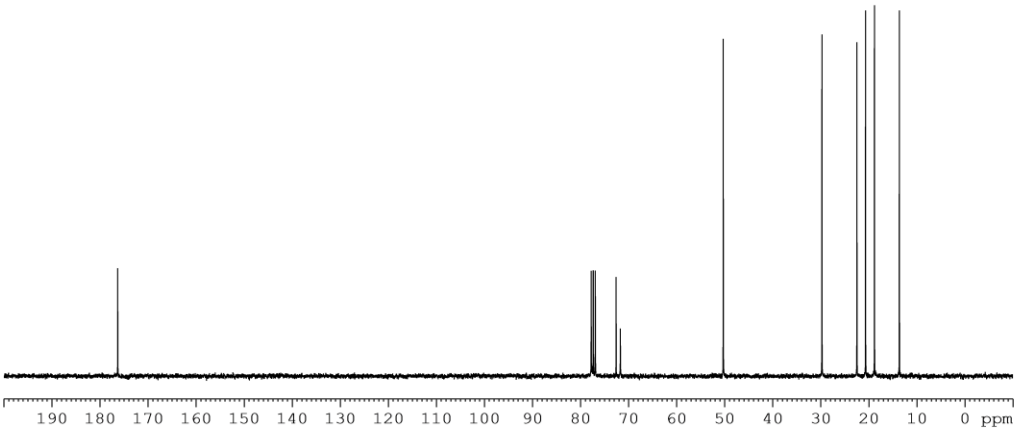

```
Current Data Parameters
NAME          fc14ge030b
EXPNO                 10
PROCNO                 1

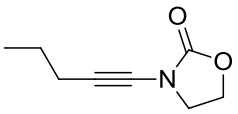
F2 - Acquisition Parameters
Date_           20110408
Time               7.25
INSTRUM           spect
PROBHD    5 mm BBI 1H-BB
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1024
DS                    4
SWH           17985.611 Hz
FIDRES         0.274439 Hz
AQ             1.8219508 sec
RG                1625.5
DW               27.800 usec
DE               10.00 usec
TE                294.2 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.00 usec
PL1                -6.00 dB
SFO1         75.4752953 MHz

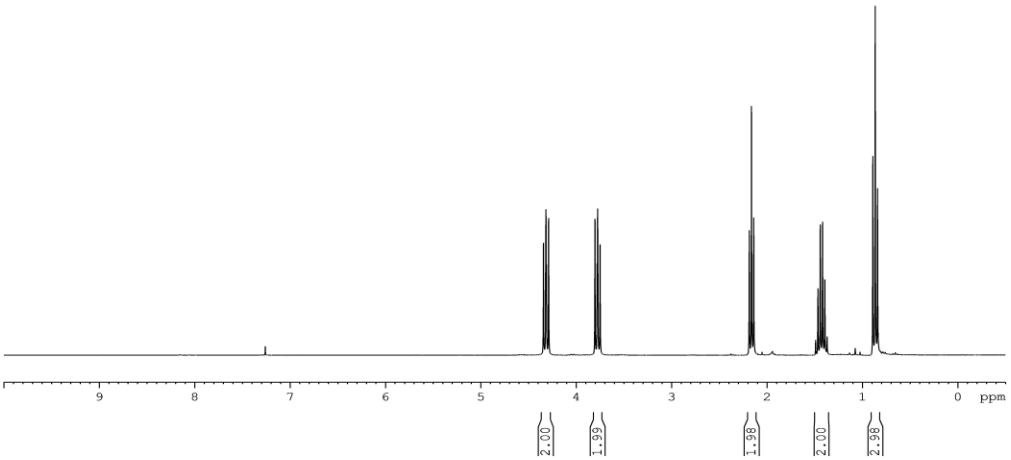
======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               22.00 dB
PL13               22.00 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI                32768
SF          75.4677320 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```





10b

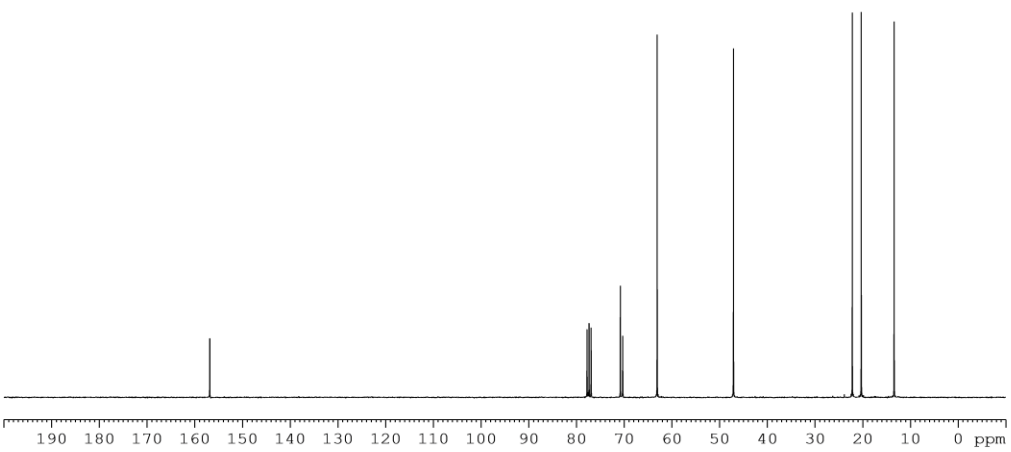



```
Current Data Parameters
NAME                 FC12GE029B
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110326
Time                   14.09
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       35.9
DW                     79.200 usec
DE                      6.50 usec
TE                     293.7 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300057 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



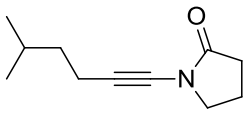

```
Current Data Parameters
NAME                 FC12GE029B
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110326
Time                   13.50
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2048
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     293.8 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677430 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



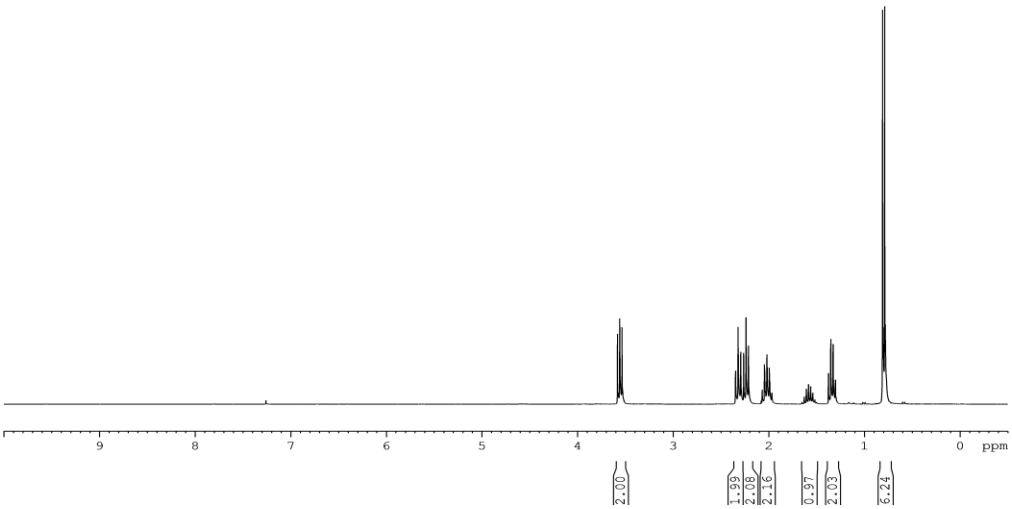
11a

```
Current Data Parameters
NAME                 fcl4ge030c
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110408
Time                    9.21
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       40.3
DW                     79.200 usec
DE                      6.50 usec
TE                     294.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                      6.20 usec
PL1                     0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300063 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



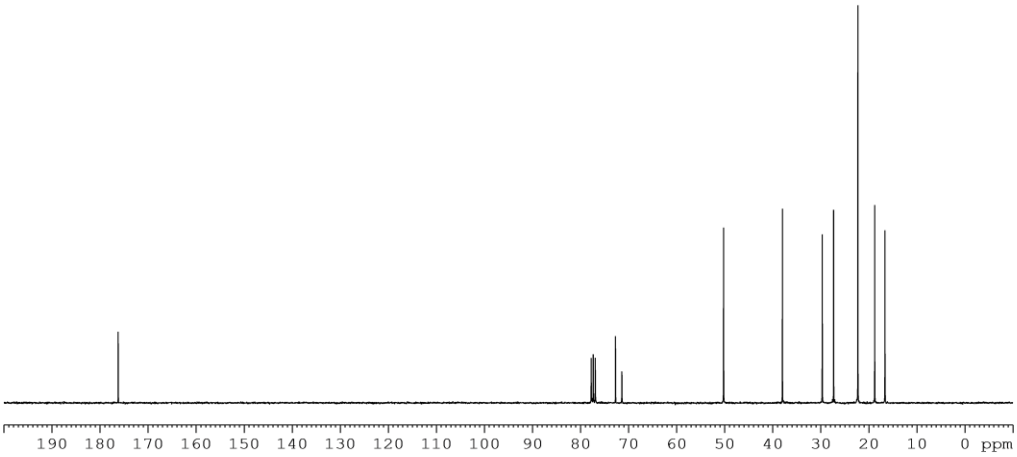

```
Current Data Parameters
NAME                 fcl4ge030c
EXPNO                        10
PROCNO                        1

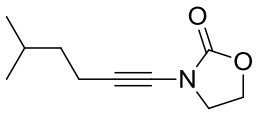
F2 - Acquisition Parameters
Date_               20110408
Time                    9.02
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG              zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     294.2 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                      9.00 usec
PL1                    -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   22.00 dB
PL13                   22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677347 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```





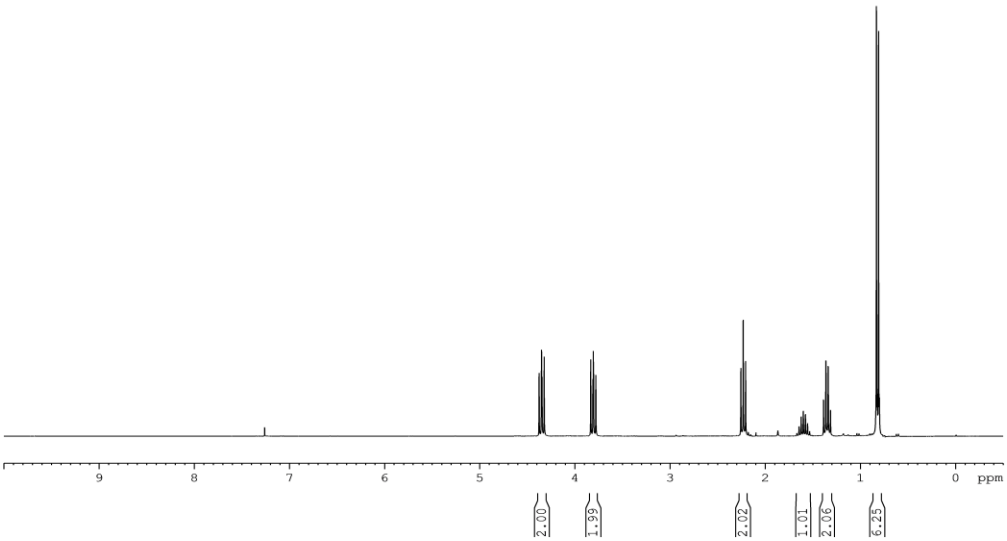
11b

```
Current Data Parameters
NAME                  fc13ge29d
EXPNO                        22
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110330
Time                      6.12
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                        40.3
DW                      79.200 usec
DE                        6.50 usec
TE                      293.5 K
D1                   1.00000000 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                  300.1300059 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00
```



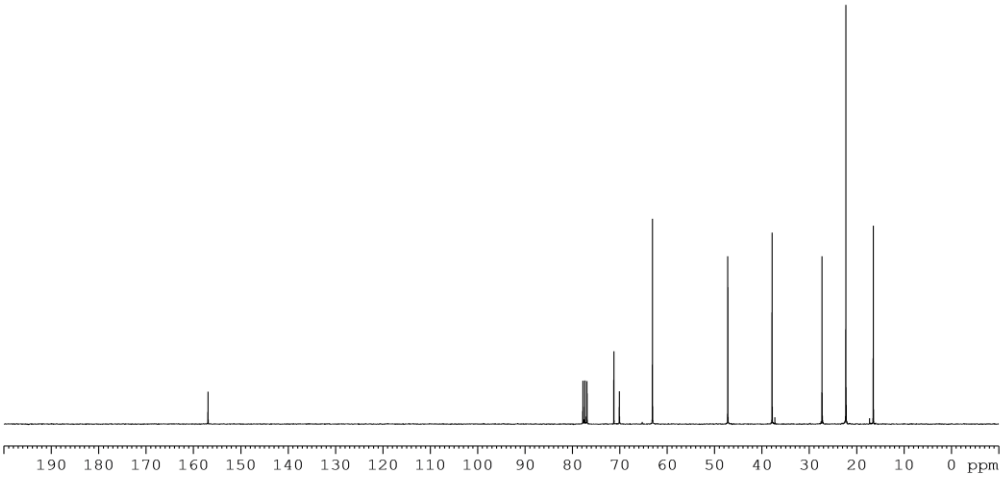

```
Current Data Parameters
NAME                  fc13ge29d
EXPNO                        20
PROCNO                        1

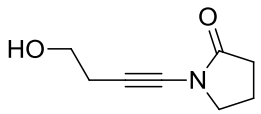
F2 - Acquisition Parameters
Date_                 20110330
Time                      5.54
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        2000
DS                           4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1625.5
DW                      27.800 usec
DE                      10.00 usec
TE                      293.6 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

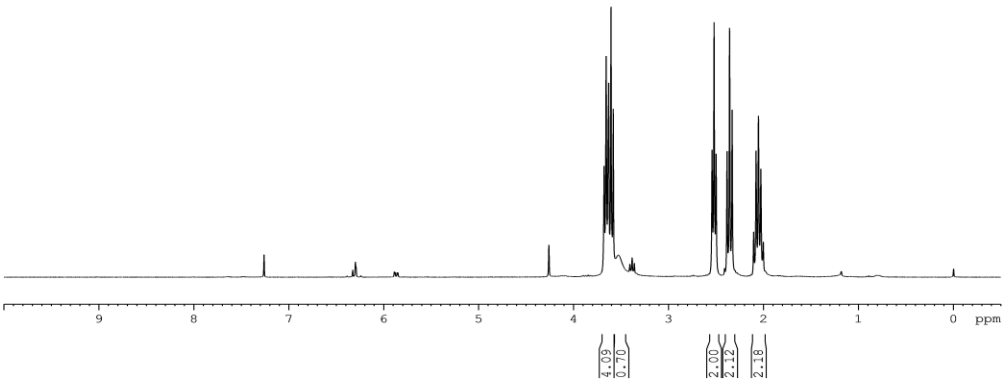
======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                  75.4677353 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```





12a

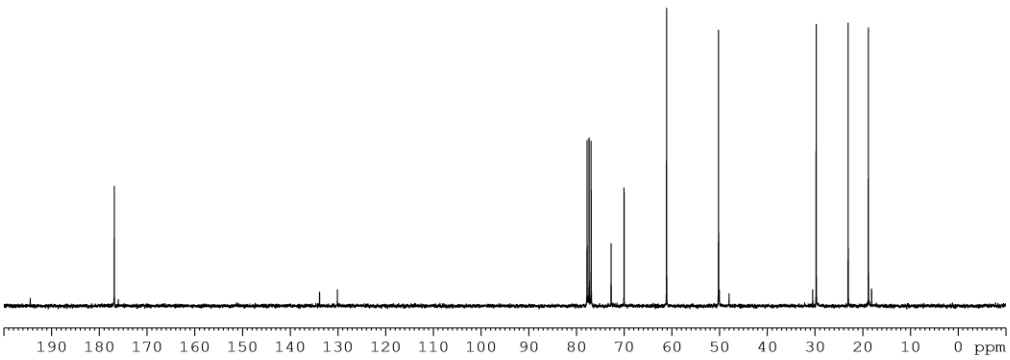



```
Current Data Parameters
NAME                  FC21GE030I
EXPNO                         10
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110525
Time                      18.37
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                    zg30
TD                        32768
SOLVENT                   CDCl3
NS                           16
DS                            0
SWH                    6313.131 Hz
FIDRES                 0.192661 Hz
AQ                    2.5952756 sec
RG                           64
DW                       79.200 usec
DE                        6.50 usec
TE                       294.0 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                        32768
SF                  300.1300057 MHz
WDW                          EM
SSB                           0
LB                         0.10 Hz
GB                            0
PC                         1.00
```



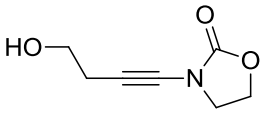

```
Current Data Parameters
NAME                  FC21GE030I
EXPNO                         11
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110525
Time                      19.46
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                         1024
DS                            4
SWH                   17985.611 Hz
FIDRES                 0.274439 Hz
AQ                    1.8219508 sec
RG                       1625.5
DW                       27.800 usec
DE                       10.00 usec
TE                       294.3 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                        32768
SF                  75.4677336 MHz
WDW                          EM
SSB                           0
LB                         1.00 Hz
GB                            0
PC                         1.40
```



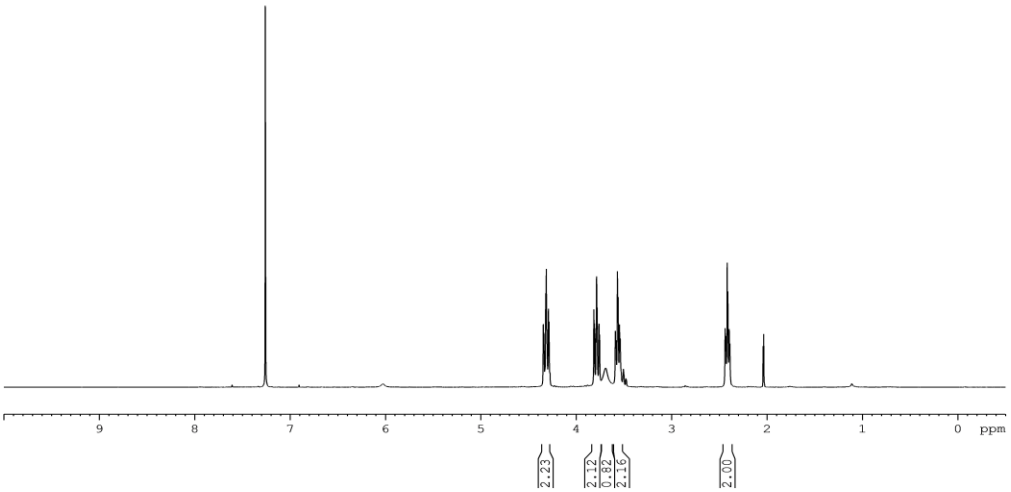
12b

```
Current Data Parameters
NAME                 FC16JH43C
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110424
Time                    1.52
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       35.9
DW                     79.200 usec
DE                      6.50 usec
TE                     294.3 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



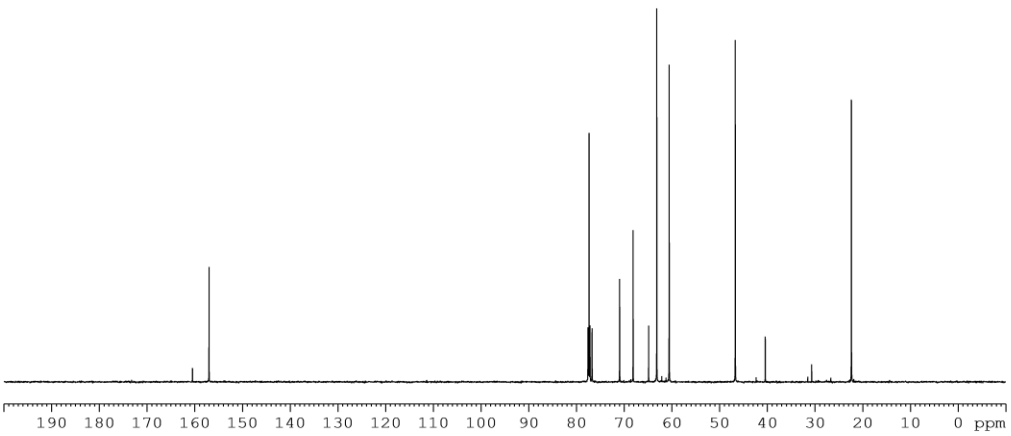

```
Current Data Parameters
NAME                 FC16JH43C
EXPNO                       11
PROCNO                       1

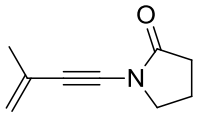
F2 - Acquisition Parameters
Date_               20110424
Time                    3.00
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     294.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

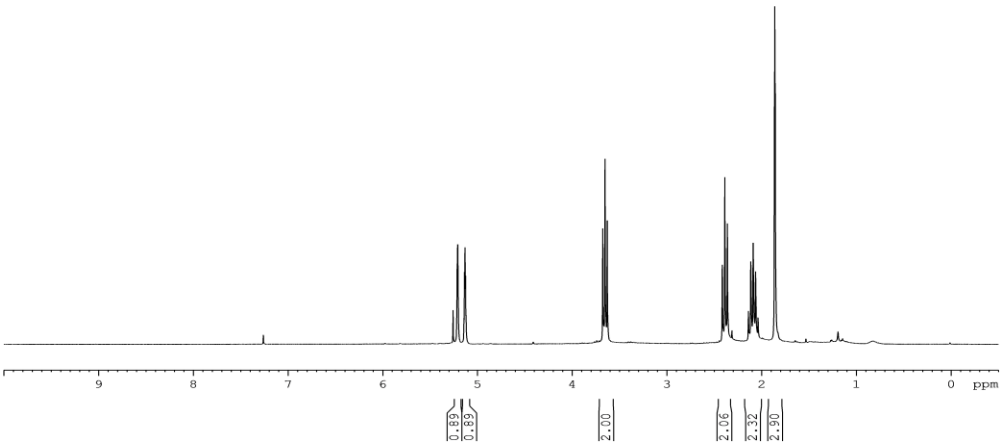
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677616 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```





13a

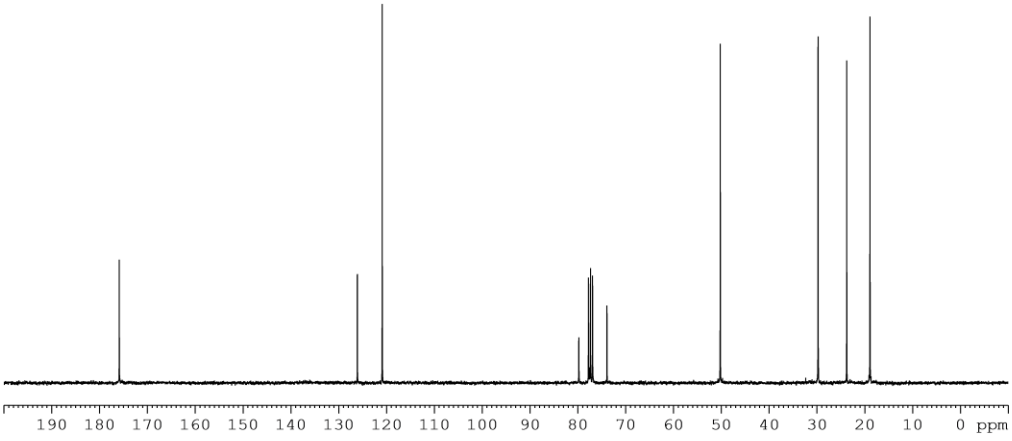



```
Current Data Parameters
NAME          fc14ge030d
EXPNO                 20
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110411
Time_              12.38
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    16
DS                     0
SWH             6313.131 Hz
FIDRES          0.192661 Hz
AQ             2.5952756 sec
RG                  80.6
DW                79.200 usec
DE                 6.50 usec
TE                294.1 K
D1             1.00000000 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                  6.20 usec
PL1                 0.00 dB
SFO1          300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF            300.1300057 MHz
WDW                   EM
SSB                    0
LB                  0.10 Hz
GB                     0
PC                  1.00
```



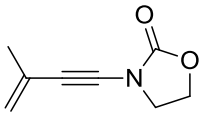

```
Current Data Parameters
NAME          fc14ge030d
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110408
Time_              13.33
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                  1500
DS                     4
SWH            17985.611 Hz
FIDRES          0.274439 Hz
AQ             1.8219508 sec
RG                1625.5
DW                27.800 usec
DE                10.00 usec
TE                294.4 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

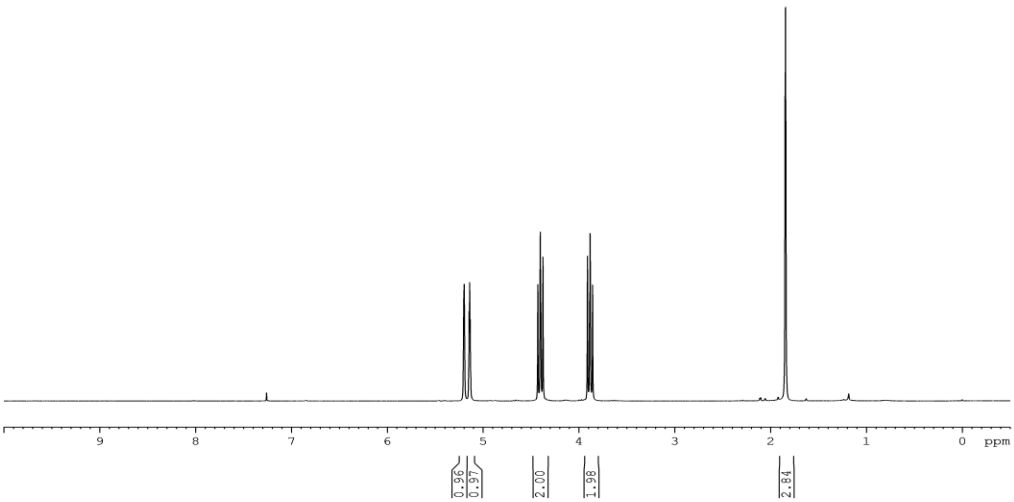
======== CHANNEL f1 ========
NUC1                 13C
P1                  9.00 usec
PL1                -6.00 dB
SFO1          75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               22.00 dB
PL13               22.00 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF            75.4677364 MHz
WDW                   EM
SSB                    0
LB                  1.00 Hz
GB                     0
PC                  1.40
```



13b

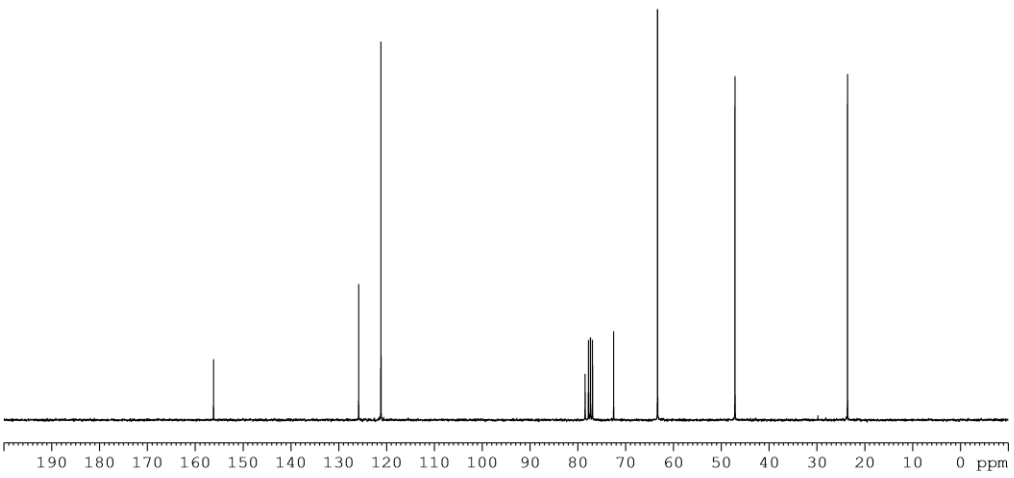



```
Current Data Parameters
NAME                  FC16JH43A
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110424
Time                      5.39
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                          57
DW                     79.200 usec
DE                      6.50 usec
TE                      294.1 K
D1                 1.00000000 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                 300.1300059 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00
```



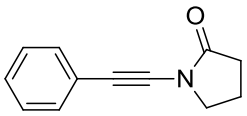

```
Current Data Parameters
NAME                  FC16JH43A
EXPNO                        11
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110424
Time                      6.48
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        1024
DS                           4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1448.2
DW                     27.800 usec
DE                      10.00 usec
TE                      294.3 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

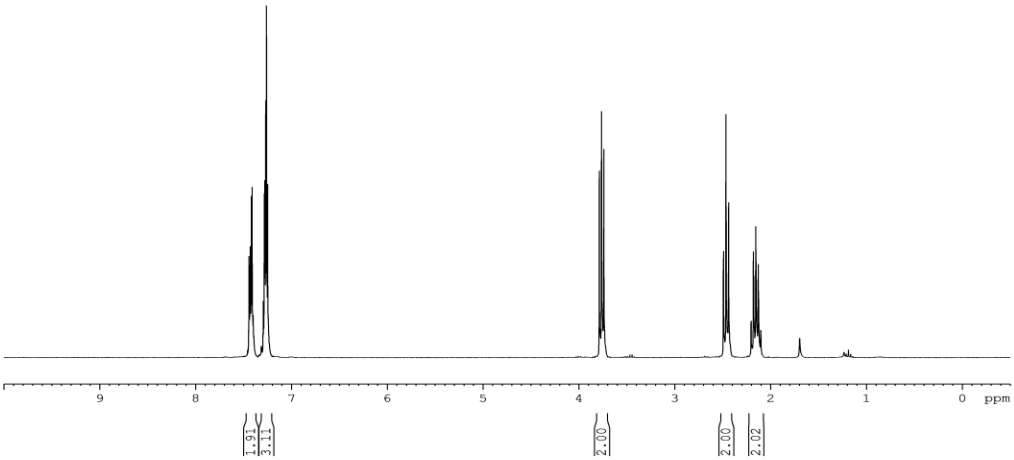
======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2              300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                 75.4677364 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```



14a

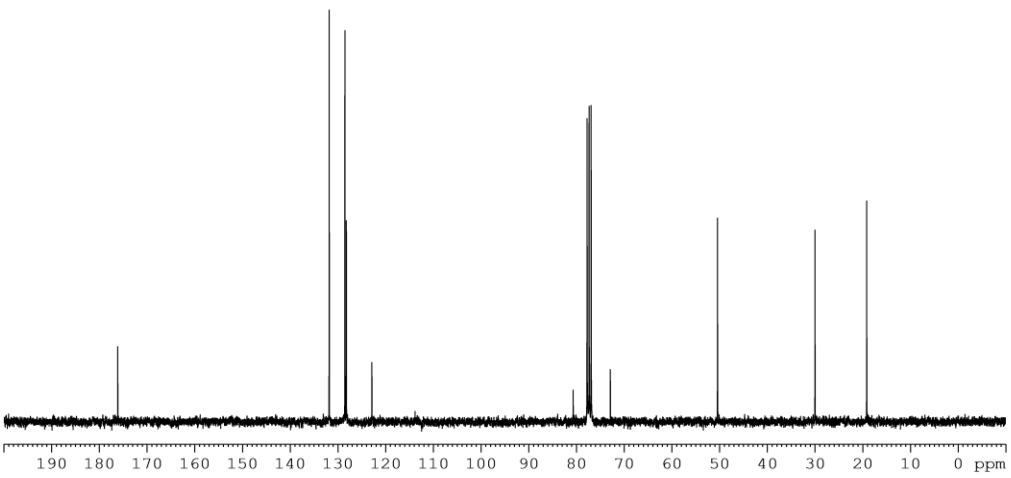



```
Current Data Parameters
NAME                 fc14ge030a
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110408
Time                     6.07
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zg30
TD                      32768
SOLVENT                 CDC13
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                       287.4
DW                     79.200 usec
DE                      6.50 usec
TE                      294.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                 300.1300097 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00
```



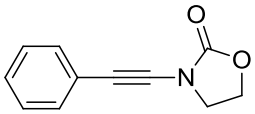

```
Current Data Parameters
NAME                 fc14ge030a
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110408
Time                     5.48
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                      65536
SOLVENT                 CDC13
NS                       1024
DS                          4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1625.5
DW                     27.800 usec
DE                      10.00 usec
TE                      294.3 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

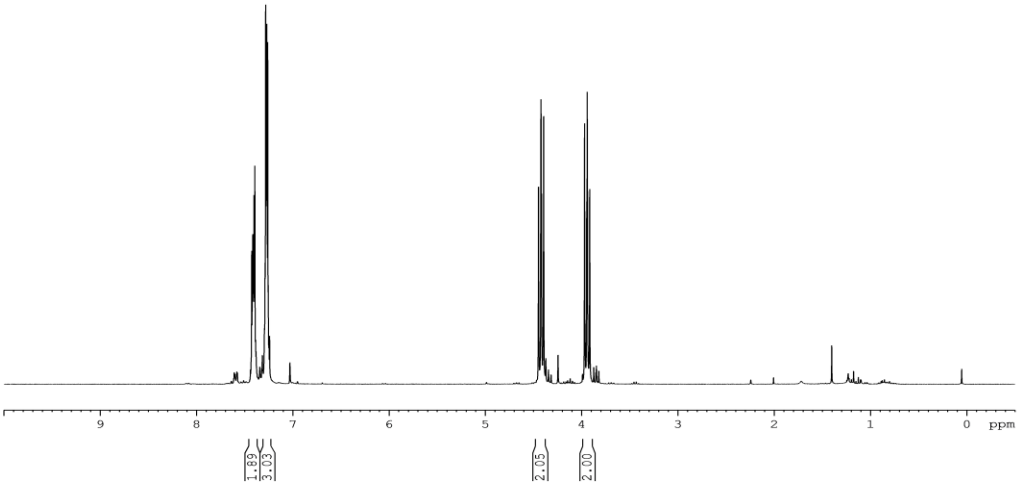
======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2              300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                 75.4677271 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```



14b

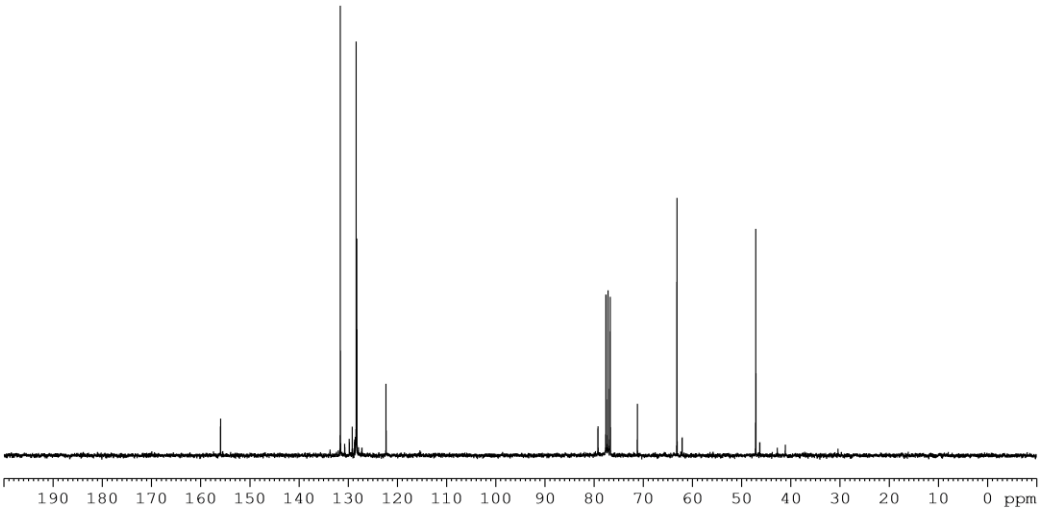



```
Current Data Parameters
NAME       fc26g020PhOxa
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20090625
Time_              16.57
INSTRUM            spect
PROBHD   5 mm QNP 1H/13
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    16
DS                     0
SWH             6313.131 Hz
FIDRES          0.192661 Hz
AQ             2.5952756 sec
RG                 228.1
DW                79.200 usec
DE                 6.50 usec
TE                296.2 K
D1             1.00000000 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                  6.70 usec
PL1                -6.00 dB
SFO1         300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF          300.1300211 MHz
WDW                   EM
SSB                    0
LB                  0.10 Hz
GB                     0
PC                  1.00
```



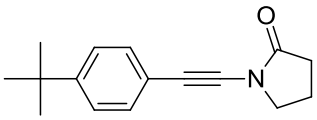

```
Current Data Parameters
NAME       fc26g020PhOxa
EXPNO                  2
PROCNO                 1

F2 - Acquisition Parameters
Date_           20090625
Time_              17.16
INSTRUM            spect
PROBHD   5 mm QNP 1H/13
PULPROG          zgpg30
TD                 65536
SOLVENT            CDCl3
NS                   382
DS                     4
SWH            17985.611 Hz
FIDRES          0.2744439 Hz
AQ             1.8219508 sec
RG                 16384
DW                27.800 usec
DE                10.00 usec
TE                296.1 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

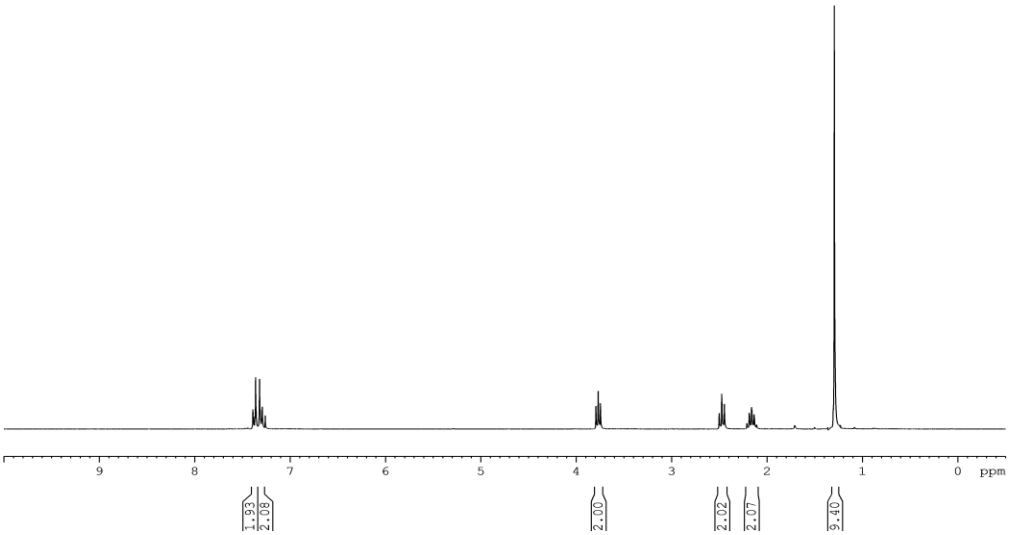
======== CHANNEL f1 ========
NUC1                 13C
P1                  5.70 usec
PL1                -6.00 dB
SFO1         75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                -6.00 dB
PL12               15.80 dB
PL13               15.80 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF          75.4677490 MHz
WDW                   EM
SSB                    0
LB                  1.00 Hz
GB                     0
PC                  1.40
```



15a

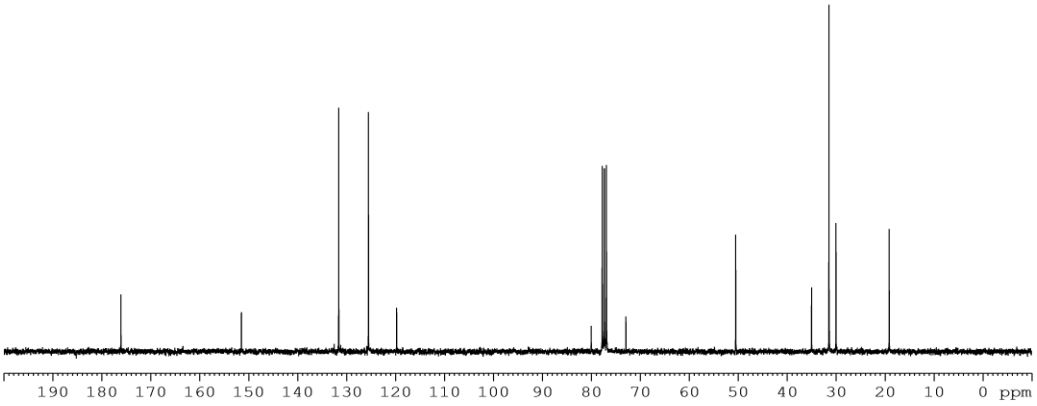



```
Current Data Parameters
NAME          FC15GE030f
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110412
Time                5.24
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    16
DS                     0
SWH             6313.131 Hz
FIDRES          0.192661 Hz
AQ              2.5952756 sec
RG                   181
DW                79.200 usec
DE                 6.50 usec
TE                293.7 K
D1             1.00000000 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                 6.20 usec
PL1                0.00 dB
SFO1         300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF          300.1300061 MHz
WDW                   EM
SSB                    0
LB                 0.10 Hz
GB                     0
PC                 1.00
```



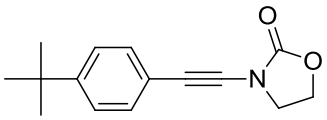

```
Current Data Parameters
NAME          FC15GE030f
EXPNO                 20
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110412
Time                6.32
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                  1024
DS                     4
SWH            17985.611 Hz
FIDRES          0.274439 Hz
AQ              1.8219508 sec
RG                1625.5
DW                27.800 usec
DE                10.00 usec
TE                293.8 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

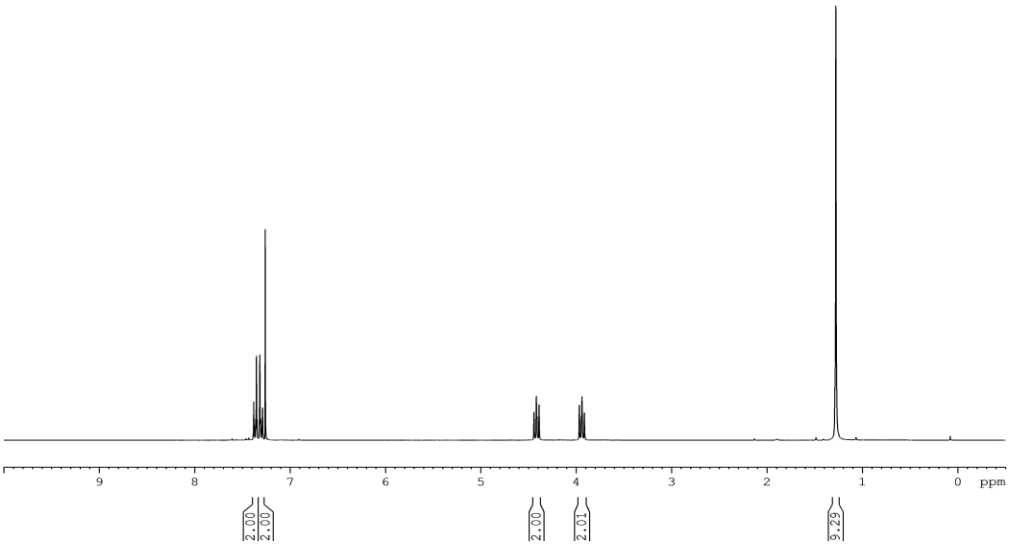
======== CHANNEL f1 ========
NUC1                 13C
P1                 9.00 usec
PL1               -6.00 dB
SFO1          75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                0.00 dB
PL12              22.00 dB
PL13              22.00 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF          75.4677260 MHz
WDW                   EM
SSB                    0
LB                 1.00 Hz
GB                     0
PC                 1.40
```



15b

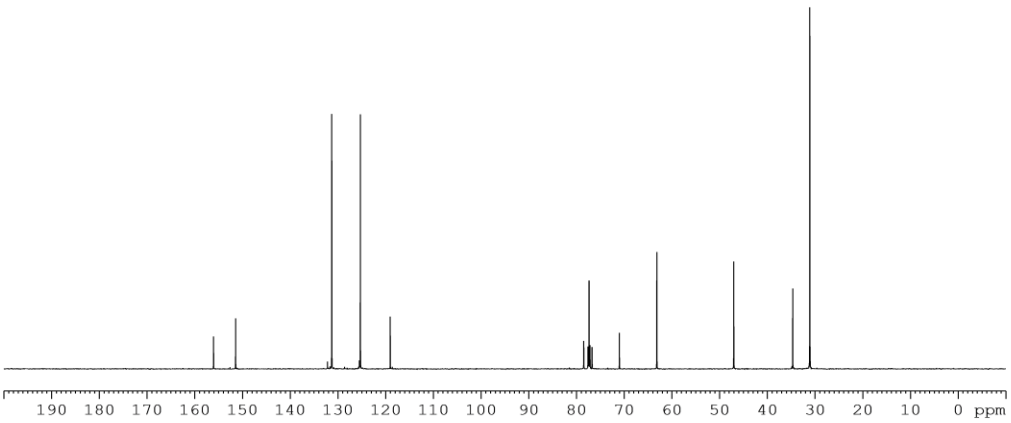



```
Current Data Parameters
NAME                  FC16JH43B
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110424
Time                    3.45
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       35.9
DW                     79.200 usec
DE                      6.50 usec
TE                     294.2 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300057 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



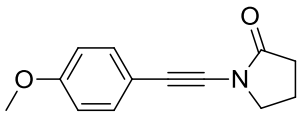

```
Current Data Parameters
NAME                  FC16JH43B
EXPNO                        11
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110424
Time                    4.52
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     294.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677539 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



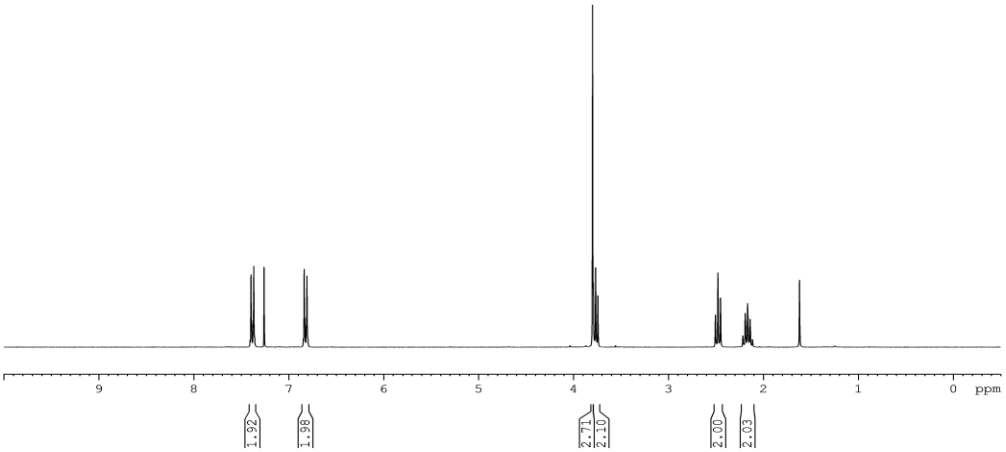
16a

```
Current Data Parameters
NAME                 fc28ge030g
EXPNO                        30
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110714
Time                     5.29
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zg30
TD                      32768
SOLVENT                 CDCl3
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                  2.5952756 sec
RG                      645.1
DW                     79.200 usec
DE                      6.50 usec
TE                     294.4 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                      32768
SF               300.1300061 MHz
WDW                        EM
SSB                         0
LB                       0.10 Hz
GB                          0
PC                       1.00
```



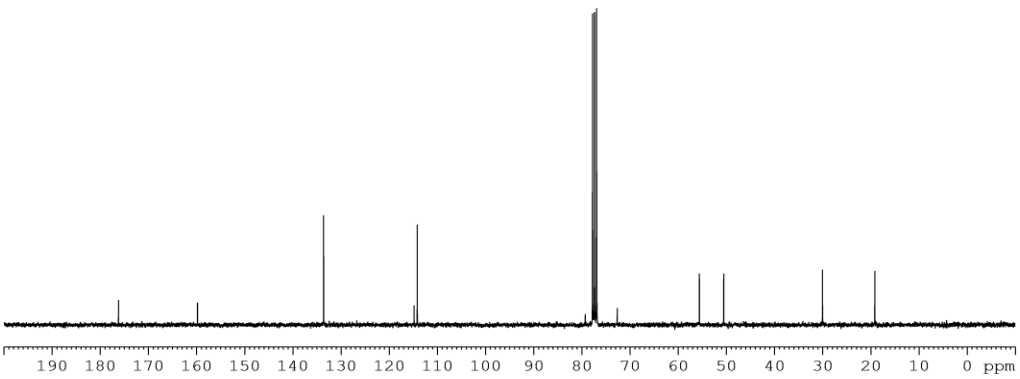

```
Current Data Parameters
NAME                 fc28ge030g
EXPNO                        10
PROCNO                        1

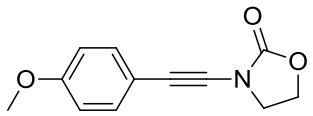
F2 - Acquisition Parameters
Date_               20110714
Time                     5.10
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                      65536
SOLVENT                 CDCl3
NS                       2048
DS                          4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     294.5 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                      32768
SF               75.4708455 MHz
WDW                        EM
SSB                         0
LB                       1.00 Hz
GB                          0
PC                       1.40
```





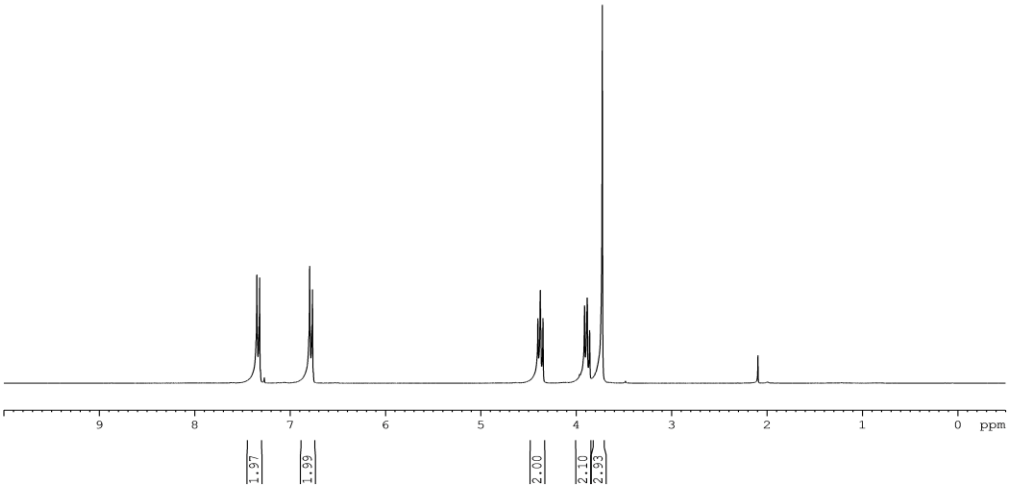
16b

```
Current Data Parameters
NAME                 FC16JH43E
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110423
Time                   20.55
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       45.3
DW                     79.200 usec
DE                      6.50 usec
TE                     294.5 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300015 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



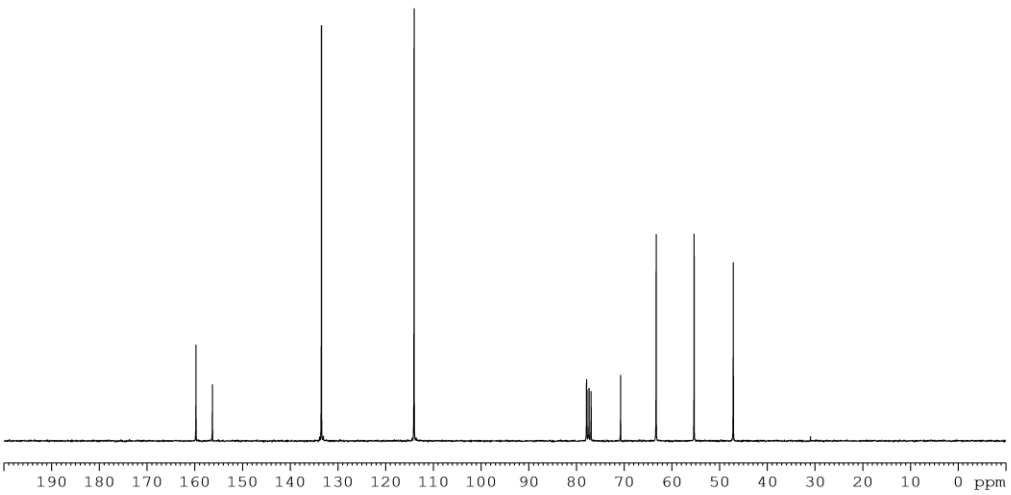

```
Current Data Parameters
NAME                 FC16JH43E
EXPNO                       11
PROCNO                       1

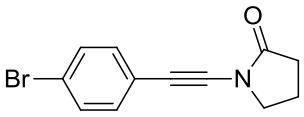
F2 - Acquisition Parameters
Date_               20110423
Time                   22.04
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG               zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                      10.00 usec
TE                     294.6 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

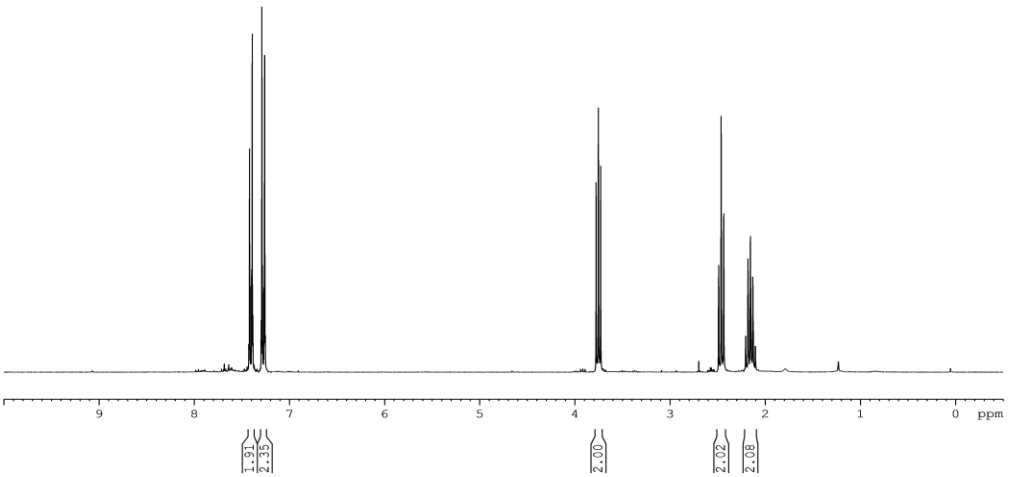
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677446 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```





17a

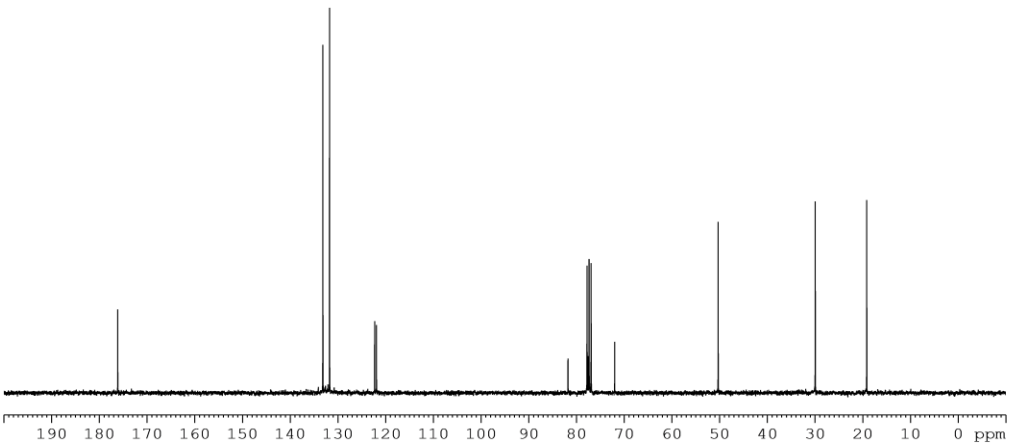



```
Current Data Parameters
NAME                 FC15GE030E
EXPNO                        20
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110417
Time                   17.53
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES                0.192661 Hz
AQ                 2.5952756 sec
RG                       181
DW                    79.200 usec
DE                     6.50 usec
TE                    293.5 K
D1                 1.00000000 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     6.20 usec
PL1                    0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                        32768
SF                300.1300063 MHz
WDW                       EM
SSB                        0
LB                     0.10 Hz
GB                         0
PC                     1.00
```



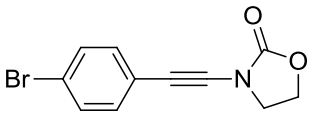

```
Current Data Parameters
NAME                 FC15GE030E
EXPNO                        21
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110417
Time                   19.00
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES                0.274439 Hz
AQ                 1.8219508 sec
RG                    1625.5
DW                    27.800 usec
DE                     10.00 usec
TE                    293.8 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

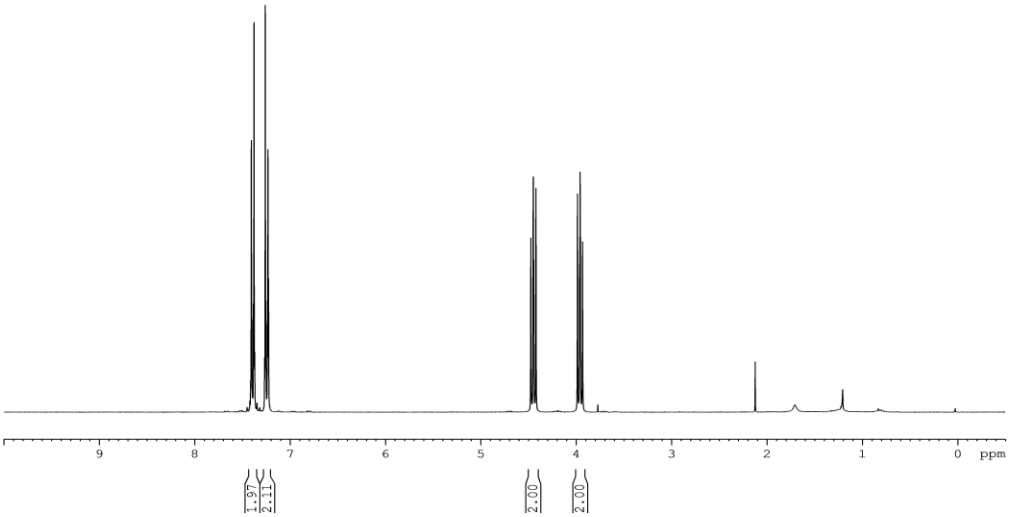
======== CHANNEL f1 ========
NUC1                     13C
P1                     9.00 usec
PL1                   -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  22.00 dB
PL13                  22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                        32768
SF                75.4677287 MHz
WDW                       EM
SSB                        0
LB                     1.00 Hz
GB                         0
PC                     1.40
```



17b

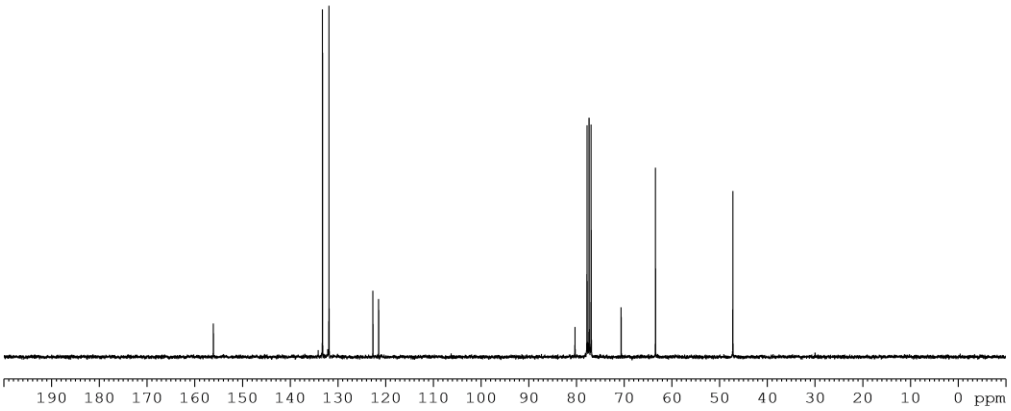



```
Current Data Parameters
NAME                  FC16JH43D
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_              20110423
Time               22.53
INSTRUM            spect
PROBHD    5 mm BBI 1H-BB
PULPROG            zg30
TD                 32768
SOLVENT            CDCl3
NS                 16
DS                 0
SWH                6313.131 Hz
FIDRES             0.192661 Hz
AQ                 2.5952756 sec
RG                 256
DW                 79.200 usec
DE                 6.50 usec
TE                 294.4 K
D1                 1.00000000 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

======== CHANNEL f1 ========
NUC1               1H
P1                 6.20 usec
PL1                0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF                 300.1300165 MHz
WDW                EM
SSB                0
LB                 0.10 Hz
GB                 0
PC                 1.00
```



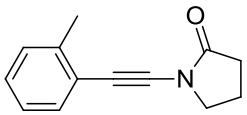

```
Current Data Parameters
NAME                  FC16JH43D
EXPNO                        11
PROCNO                        1

F2 - Acquisition Parameters
Date_              20110424
Time               1.07
INSTRUM            spect
PROBHD    5 mm BBI 1H-BB
PULPROG            zgpg30
TD                 65536
SOLVENT            CDCl3
NS                 2048
DS                 4
SWH                17985.611 Hz
FIDRES             0.274439 Hz
AQ                 1.8219508 sec
RG                 1625.5
DW                 27.800 usec
DE                 10.00 usec
TE                 294.5 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

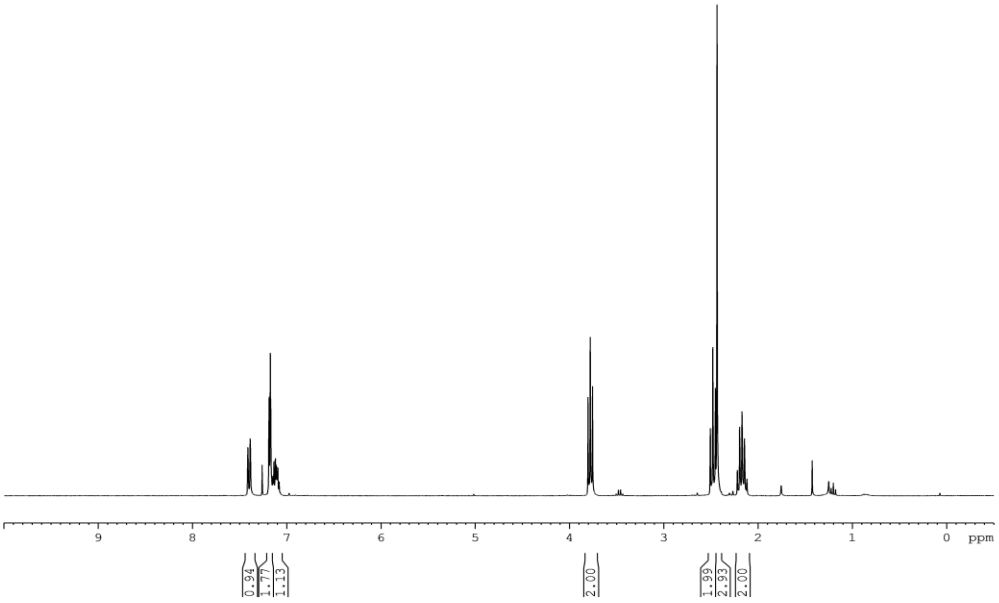
======== CHANNEL f1 ========
NUC1               13C
P1                 9.00 usec
PL1                -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2               1H
PCPD2              80.00 usec
PL2                0.00 dB
PL12               22.00 dB
PL13               22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF                 75.4677276 MHz
WDW                EM
SSB                0
LB                 1.00 Hz
GB                 0
PC                 1.40
```



18a



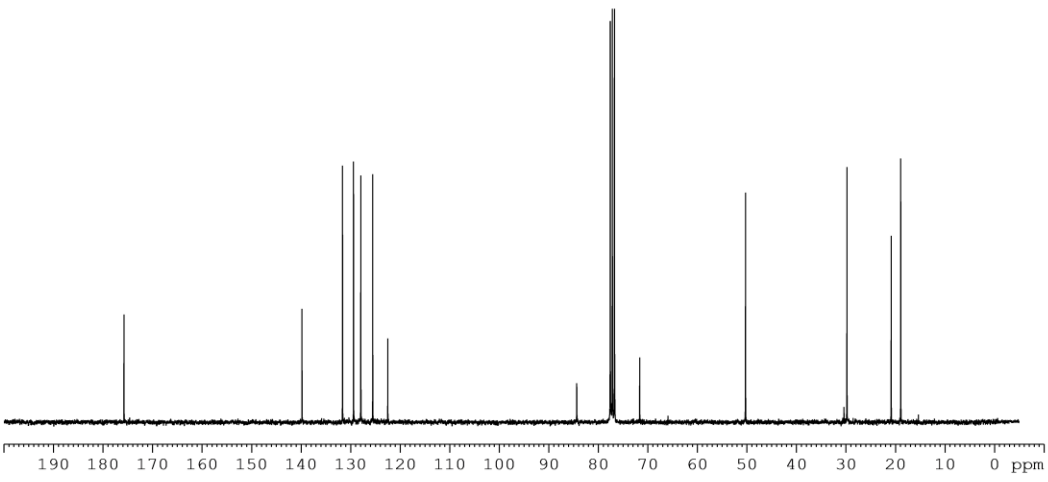

```
Current Data Parameters
NAME                 fc47kj722c
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20111125
Time                    1.32
INSTRUM                 spect
PROBHD    5 mm QNP 1H/13
PULPROG                 zg30
TD                     16384
SOLVENT                CDCl3
NS                        16
DS                         2
SWH                 4194.631 Hz
FIDRES              0.256020 Hz
AQ                  1.9530228 sec
RG                      287.4
DW                    119.200 usec
DE                      6.50 usec
TE                     294.4 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.50 usec
PL1                     -6.00 dB
SFO1             300.1319508 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                          20.00 cm
CY                          14.59 cm
F1P                         7.844 ppm
F1                       2354.35 Hz
F2P                         6.808 ppm
F2                       2043.15 Hz
PPMCM                    0.05185 ppm/cm
HZCM                    15.56033 Hz/cm
```




```
Current Data Parameters
NAME                 fc47kj722c
EXPNO                        10
PROCNO                        1

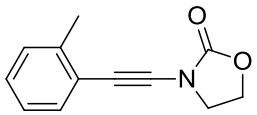
F2 - Acquisition Parameters
Date_               20111125
Time                    1.15
INSTRUM                 spect
PROBHD    5 mm QNP 1H/13
PULPROG                zgpg30
TD                     32768
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                18115.941 Hz
FIDRES              0.552855 Hz
AQ                  0.9044468 sec
RG                     16384
DW                    27.600 usec
DE                     10.00 usec
TE                     294.7 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       5.10 usec
PL1                     -6.00 dB
SFO1             75.4764278 MHz

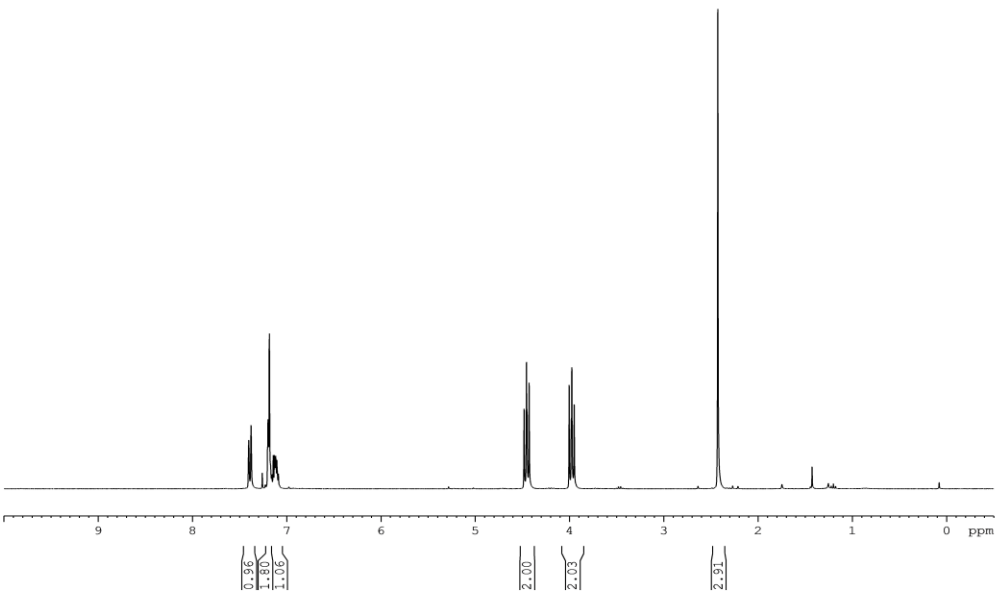
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                     -6.00 dB
PL12                    15.80 dB
PL13                    15.80 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677437 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                          20.00 cm
CY                           6.77 cm
F1P                       200.000 ppm
F1                      15093.55 Hz
F2P                       -10.000 ppm
F2                       -754.68 Hz
PPMCM                    10.50000 ppm/cm
HZCM                    792.41132 Hz/cm
```



18b



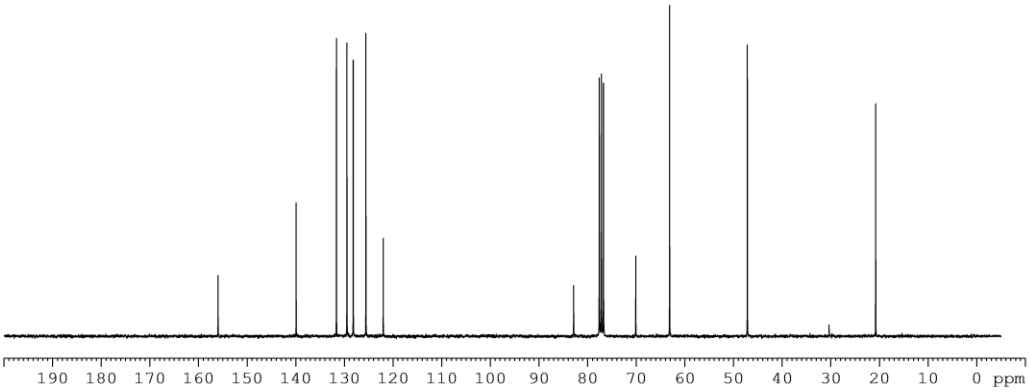

```
Current Data Parameters
NAME                 fc47kj722f
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20111123
Time                     13.00
INSTRUM                  spect
PROBHD    5 mm QNP 1H/13
PULPROG                   zg30
TD                       16384
SOLVENT                  CDCl3
NS                          16
DS                           2
SWH                 4194.631 Hz
FIDRES              0.256020 Hz
AQ                  1.9530228 sec
RG                       203.2
DW                     119.200 usec
DE                       6.50 usec
TE                      294.4 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.50 usec
PL1                     -6.00 dB
SFO1             300.1319508 MHz

F2 - Processing parameters
SI                       32768
SF                300.1300062 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00

1D NMR plot parameters
CX                       20.00 cm
CY                       12.98 cm
F1P                       7.803 ppm
F1                     2341.85 Hz
F2P                       6.661 ppm
F2                     1999.04 Hz
PPMCM                  0.05711 ppm/cm
HZCM                  17.14047 Hz/cm
```




```
Current Data Parameters
NAME                 fc47kj722f
EXPNO                        10
PROCNO                        1

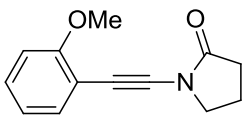
F2 - Acquisition Parameters
Date_               20111123
Time                     12.43
INSTRUM                  spect
PROBHD    5 mm QNP 1H/13
PULPROG                zgpg30
TD                       32768
SOLVENT                  CDCl3
NS                        1024
DS                           4
SWH                18115.941 Hz
FIDRES              0.552855 Hz
AQ                  0.9044468 sec
RG                     11585.2
DW                     27.600 usec
DE                      10.00 usec
TE                      294.7 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       5.10 usec
PL1                     -6.00 dB
SFO1             75.4764278 MHz

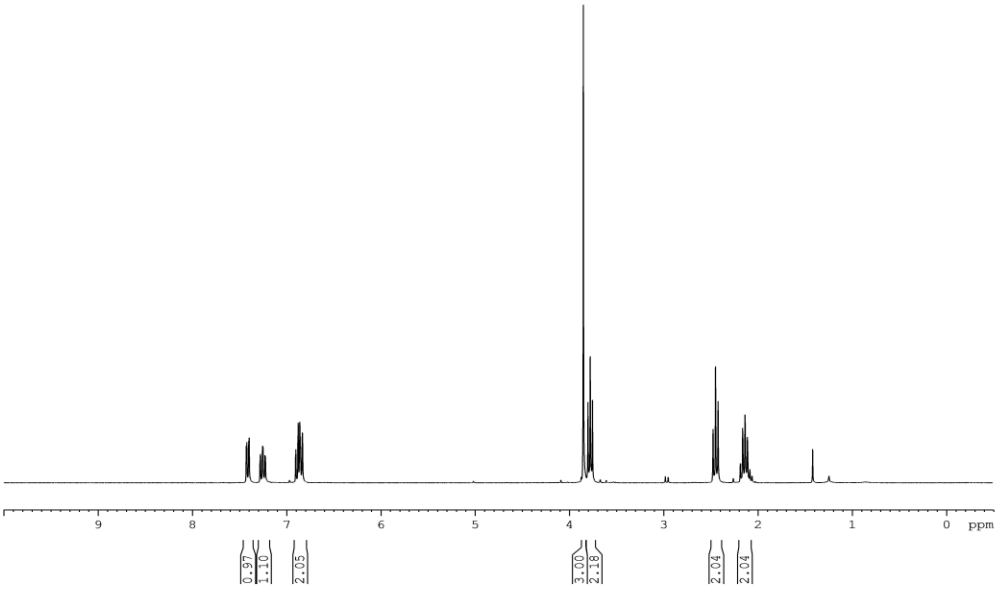
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                     -6.00 dB
PL12                    15.80 dB
PL13                    15.80 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                75.4677475 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40

1D NMR plot parameters
CX                       20.00 cm
CY                        6.57 cm
F1P                     200.000 ppm
F1                    15093.55 Hz
F2P                    -10.000 ppm
F2                     -754.68 Hz
PPMCM                 10.50000 ppm/cm
HZCM                 792.41138 Hz/cm
```



19a



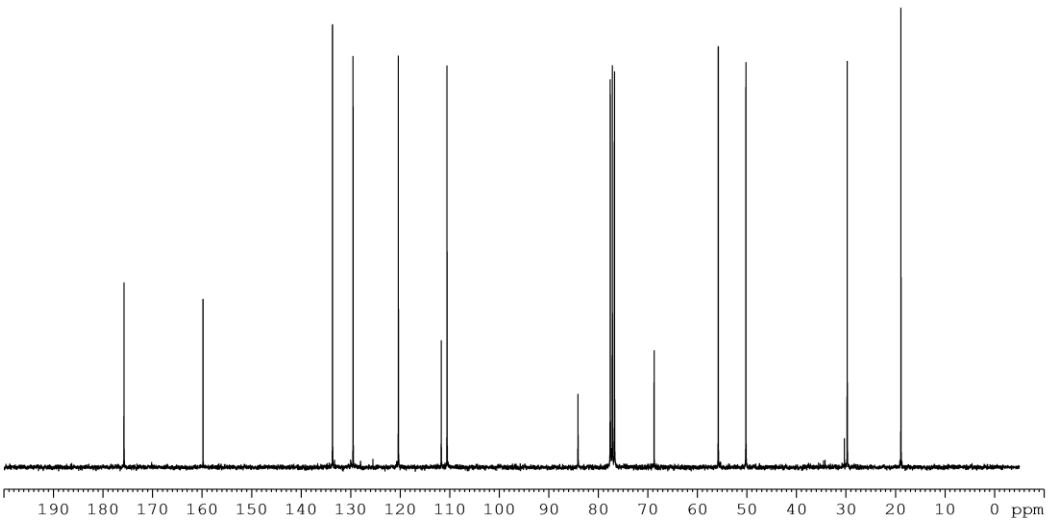

```
Current Data Parameters
NAME            fc47kj722a
EXPNO                   10
PROCNO                   1

F2 - Acquisition Parameters
Date_            20111123
Time                23.43
INSTRUM             spect
PROBHD   5 mm QNP 1H/13
PULPROG              zg30
TD                  16384
SOLVENT             CDCl3
NS                     16
DS                      2
SWH              4194.631 Hz
FIDRES           0.256020 Hz
AQ               1.9530228 sec
RG                    181
DW                119.200 usec
DE                  6.50 usec
TE                294.3 K
D1               1.00000000 sec
MCREST           0.00000000 sec
MCWRK            0.01500000 sec

======== CHANNEL f1 ========
NUC1                   1H
P1                   6.50 usec
PL1                 -6.00 dB
SFO1          300.1319508 MHz

F2 - Processing parameters
SI                  32768
SF            300.1300000 MHz
WDW                    EM
SSB                     0
LB                   0.10 Hz
GB                      0
PC                   1.00

1D NMR plot parameters
CX                  20.00 cm
CY                   9.70 cm
F1P                10.000 ppm
F1                3001.30 Hz
F2P                -0.500 ppm
F2                -150.06 Hz
PPMCM             0.52500 ppm/cm
HZCM            157.56825 Hz/cm
```




```
Current Data Parameters
NAME            fc47kj722a
EXPNO                   14
PROCNO                   1

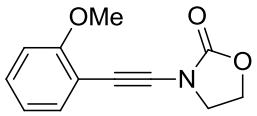
F2 - Acquisition Parameters
Date_            20111124
Time                 3.31
INSTRUM             spect
PROBHD   5 mm QNP 1H/13
PULPROG           zgpg30
TD                  32768
SOLVENT             CDCl3
NS                   1024
DS                      4
SWH             18115.941 Hz
FIDRES           0.552855 Hz
AQ               0.9044468 sec
RG                  16384
DW                27.600 usec
DE                  10.00 usec
TE                294.7 K
D1               2.00000000 sec
d11              0.03000000 sec
DELTA            1.89999998 sec
MCREST           0.00000000 sec
MCWRK            0.01500000 sec

======== CHANNEL f1 ========
NUC1                  13C
P1                   5.10 usec
PL1                 -6.00 dB
SFO1          75.4764278 MHz

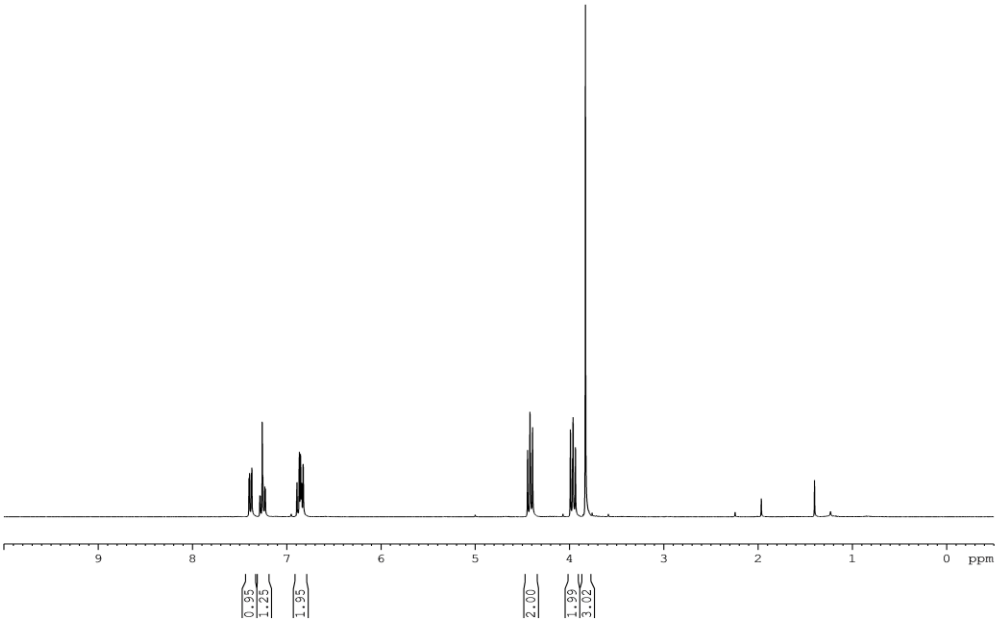
======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2                80.00 usec
PL2                  -6.00 dB
PL12                 15.80 dB
PL13                 15.80 dB
SFO2          300.1312005 MHz

F2 - Processing parameters
SI                  32768
SF            75.4677487 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40

1D NMR plot parameters
CX                  20.00 cm
CY                   7.32 cm
F1P                200.000 ppm
F1               15093.55 Hz
F2P                -10.000 ppm
F2                -754.68 Hz
PPMCM            10.50000 ppm/cm
HZCM            792.41144 Hz/cm
```



19b



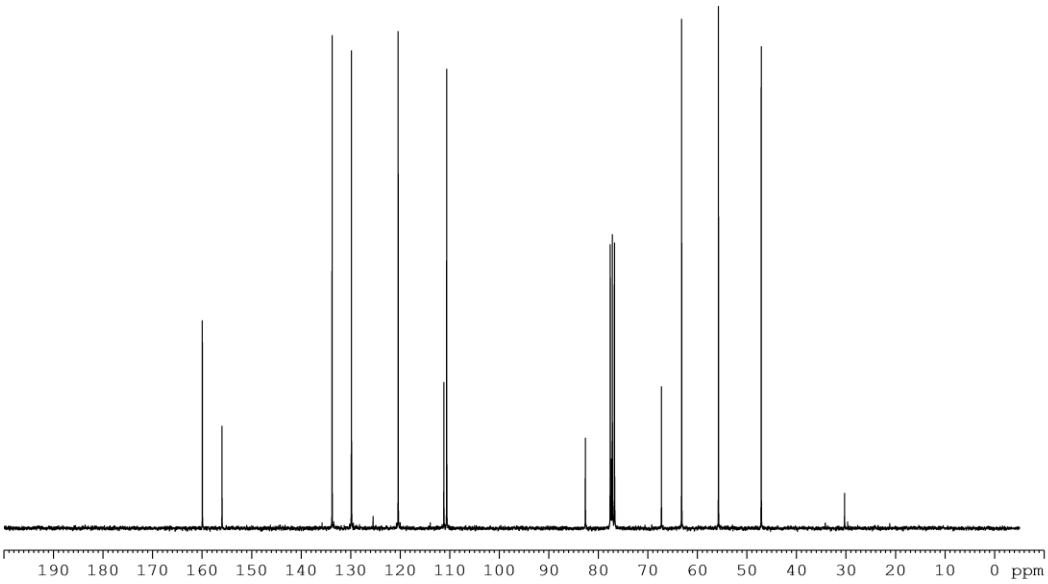

```
Current Data Parameters
NAME            fc47kj722d
EXPNO                   12
PROCNO                   1

F2 - Acquisition Parameters
Date_           20111125
Time_               3.19
INSTRUM             spect
PROBHD   5 mm QNP 1H/13
PULPROG              zg30
TD                  16384
SOLVENT             CDCl3
NS                     16
DS                      2
SWH              4194.631 Hz
FIDRES           0.256020 Hz
AQ               1.9530228 sec
RG                   161.3
DW                 119.200 usec
DE                   6.50 usec
TE                  294.4 K
D1               1.00000000 sec
MCREST           0.00000000 sec
MCWRK            0.01500000 sec

======== CHANNEL f1 ========
NUC1                    1H
P1                   6.50 usec
PL1                 -6.00 dB
SFO1          300.1319508 MHz

F2 - Processing parameters
SI                  32768
SF            300.1300060 MHz
WDW                    EM
SSB                     0
LB                   0.10 Hz
GB                      0
PC                   1.00

1D NMR plot parameters
CX                  20.00 cm
CY                  19.76 cm
F1P                 7.881 ppm
F1                2365.37 Hz
F2P                 6.611 ppm
F2                1984.18 Hz
PPMCM             0.06350 ppm/cm
HZCM             19.05916 Hz/cm
```




```
Current Data Parameters
NAME            fc47kj722d
EXPNO                   10
PROCNO                   1

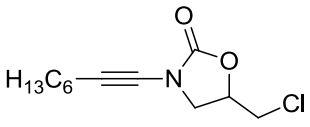
F2 - Acquisition Parameters
Date_           20111125
Time_               3.02
INSTRUM             spect
PROBHD   5 mm QNP 1H/13
PULPROG            zgpg30
TD                  32768
SOLVENT             CDCl3
NS                   1024
DS                      4
SWH             18115.941 Hz
FIDRES           0.552855 Hz
AQ               0.9044468 sec
RG                  16384
DW                 27.600 usec
DE                 10.00 usec
TE                  294.7 K
D1               2.00000000 sec
d11              0.03000000 sec
DELTA            1.89999998 sec
MCREST           0.00000000 sec
MCWRK            0.01500000 sec

======== CHANNEL f1 ========
NUC1                   13C
P1                   5.10 usec
PL1                 -6.00 dB
SFO1          75.4764278 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                    1H
PCPD2                80.00 usec
PL2                  -6.00 dB
PL12                 15.80 dB
PL13                 15.80 dB
SFO2          300.1312005 MHz

F2 - Processing parameters
SI                  32768
SF            75.4677514 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40

1D NMR plot parameters
CX                  20.00 cm
CY                   8.02 cm
F1P                200.000 ppm
F1               15093.55 Hz
F2P                -10.000 ppm
F2                -754.68 Hz
PPMCM             10.50000 ppm/cm
HZCM             792.41138 Hz/cm
```



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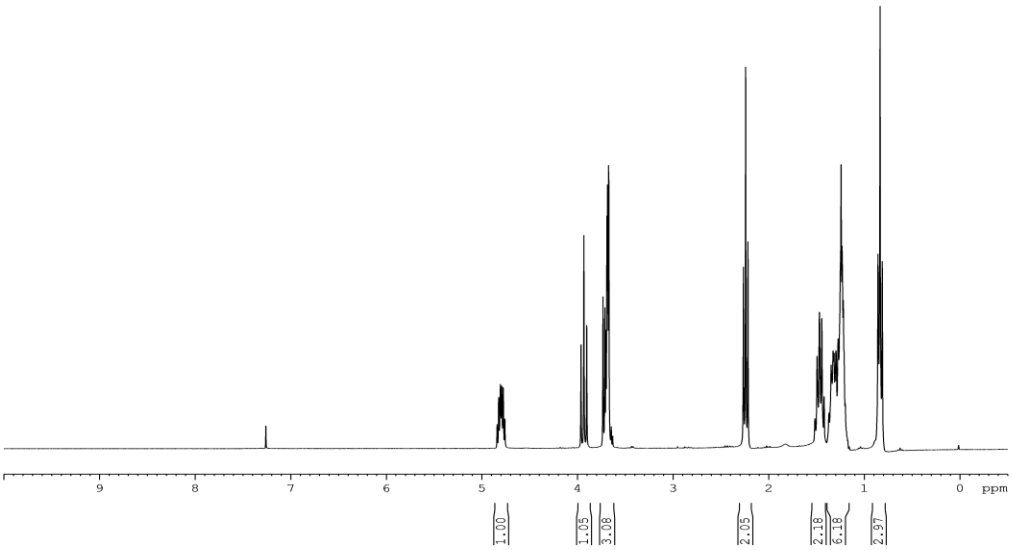


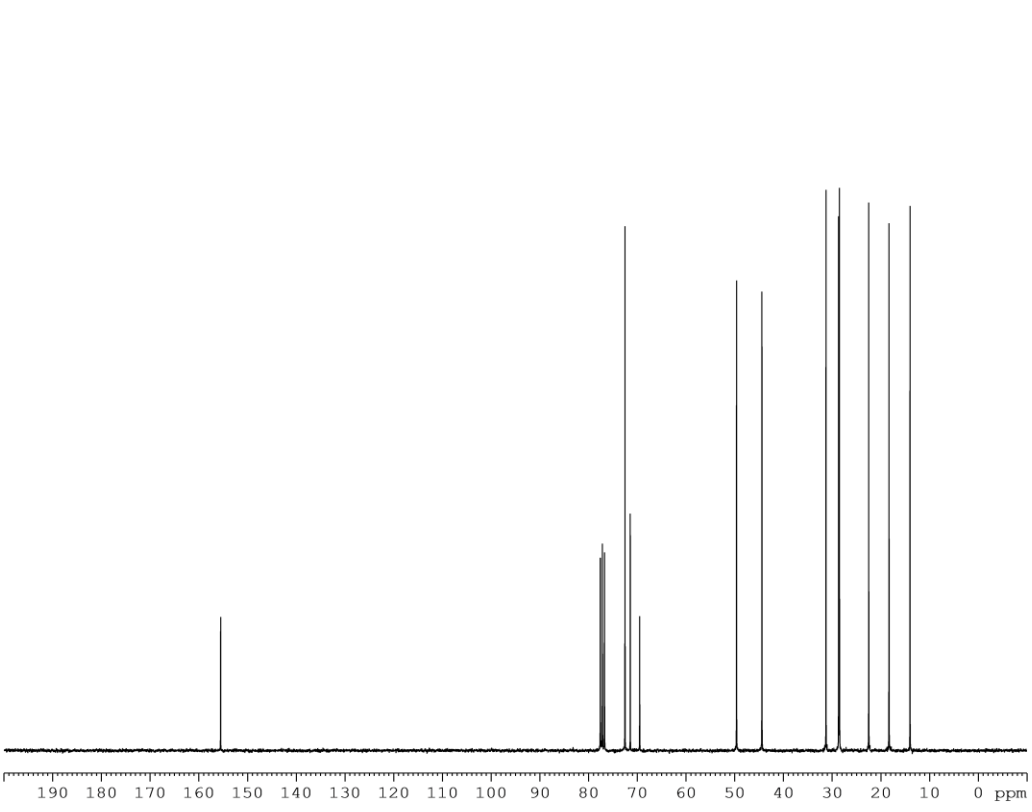

```
Current Data Parameters
NAME                 fc35g106B
EXPNO                       12
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110902
Time                    3.52
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       40.3
DW                     79.200 usec
DE                      6.50 usec
TE                     295.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300057 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                          7.86 cm
F1P                       10.000 ppm
F1                      3001.30 Hz
F2P                      -0.500 ppm
F2                      -150.06 Hz
PPMCM                    0.52500 ppm/cm
HZCM                   157.56825 Hz/cm
```




```
Current Data Parameters
NAME                 fc35g106B
EXPNO                       10
PROCNO                       1

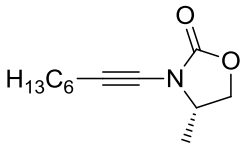
F2 - Acquisition Parameters
Date_               20110902
Time                    3.34
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2000
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     295.3 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677487 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                          8.52 cm
F1P                      200.000 ppm
F1                     15093.55 Hz
F2P                      -10.000 ppm
F2                      -754.68 Hz
PPMCM                   10.50000 ppm/cm
HZCM                   792.41138 Hz/cm
```



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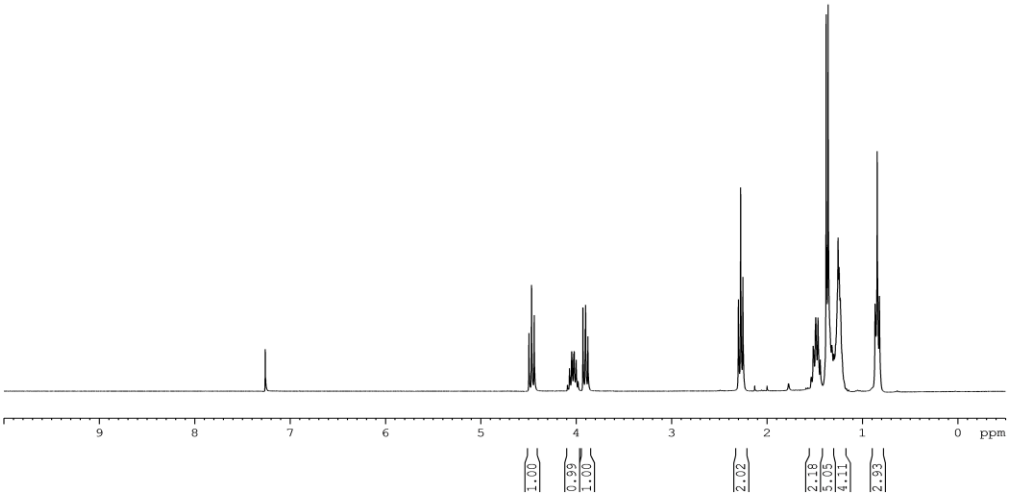
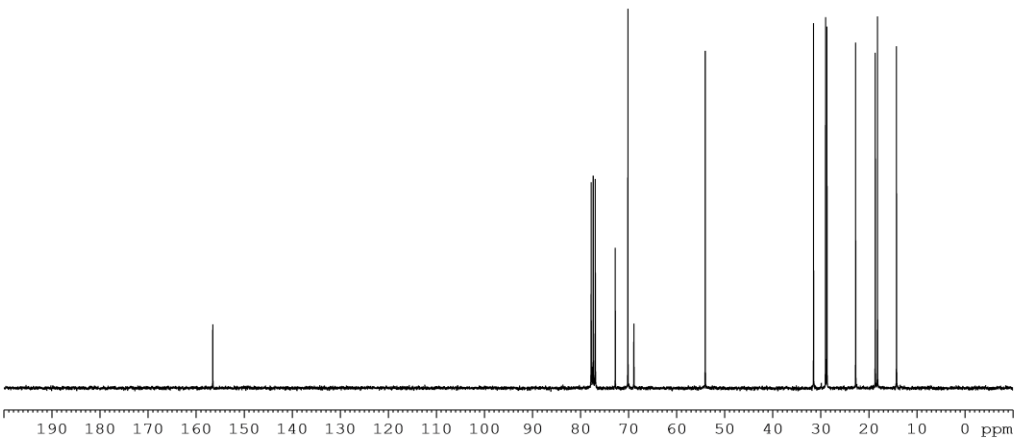



```
Current Data Parameters
NAME                 fc22jh075
EXPNO                       12
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110602
Time                   22.07
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       50.8
DW                     79.200 usec
DE                      6.50 usec
TE                     294.4 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300061 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



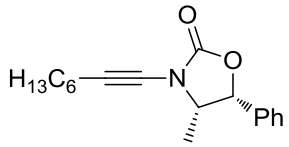

```
Current Data Parameters
NAME                 fc22jh075
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110602
Time                   21.46
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2048
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     294.6 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677303 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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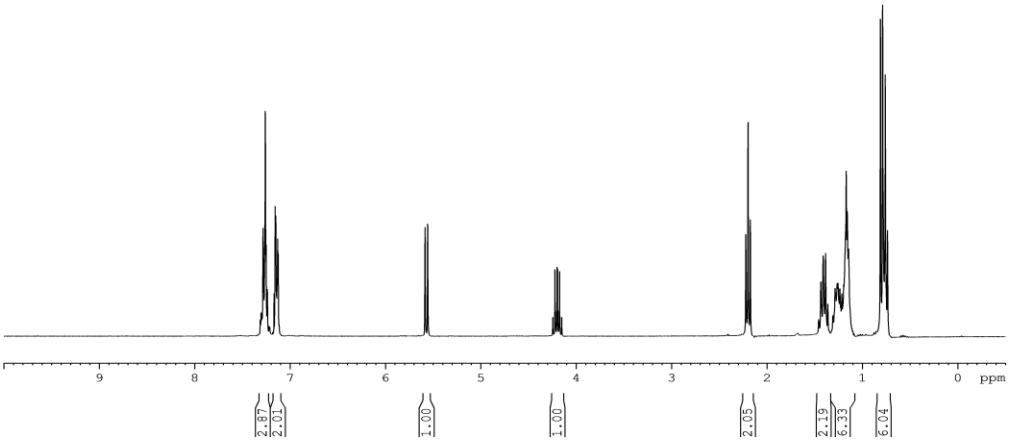
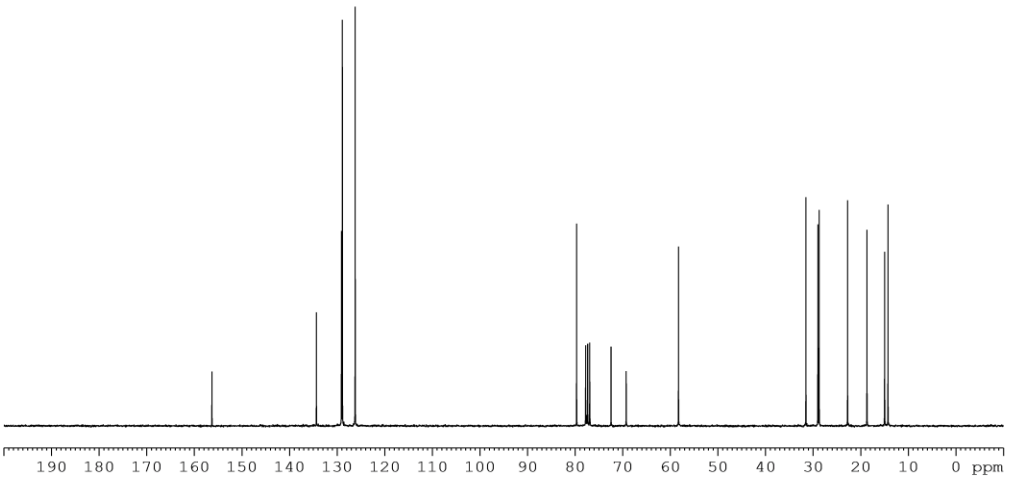



```
Current Data Parameters
NAME                 fc12ge28b
EXPNO                       12
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110325
Time                    1.44
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       50.8
DW                     79.200 usec
DE                      6.50 usec
TE                     293.5 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300746 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00
```



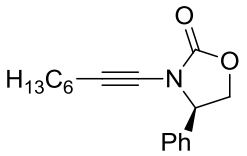

```
Current Data Parameters
NAME                 fc12ge28b
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110325
Time                    1.25
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2000
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                      10.00 usec
TE                     293.7 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677309 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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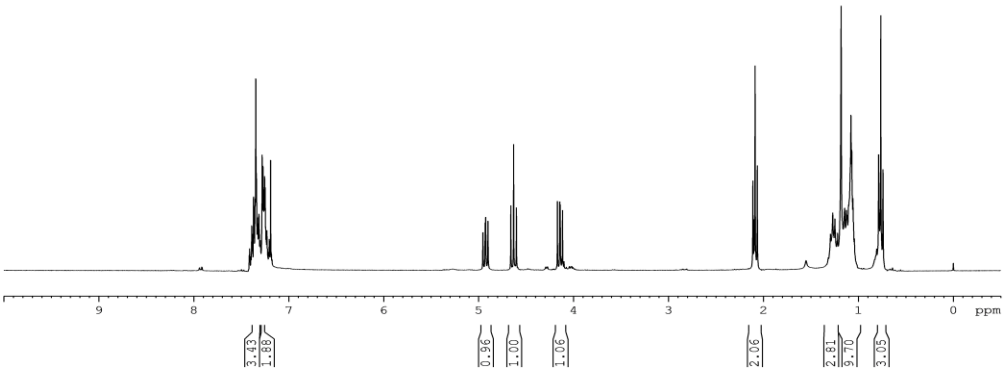
```
Current Data Parameters
NAME                 FC12GE028D
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110326
Time_                    5.57
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                      203.2
DW                   79.200 usec
DE                    6.50 usec
TE                    293.7 K
D1                1.00000000 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     6.20 usec
PL1                    0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                        32768
SF                300.1300268 MHz
WDW                          EM
SSB                           0
LB                         0.10 Hz
GB                            0
PC                         1.00
```



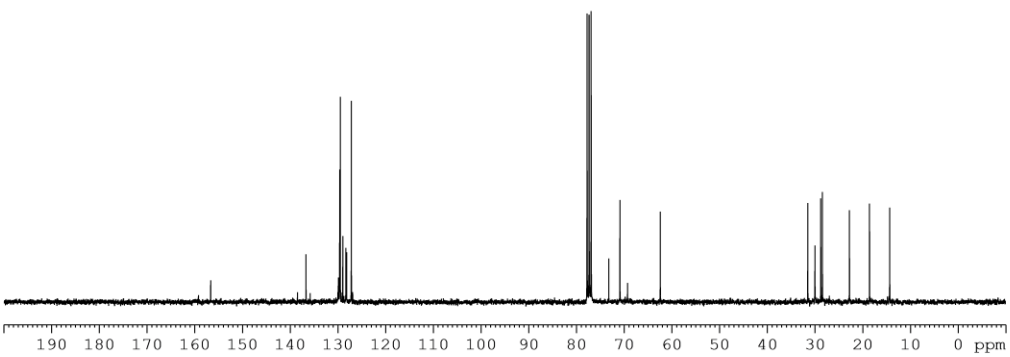

```
Current Data Parameters
NAME                 FC12GE028D
EXPNO                        10
PROCNO                        1

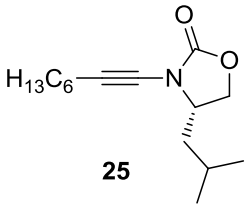
F2 - Acquisition Parameters
Date_               20110326
Time_                    5.38
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG               zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        2048
DS                           4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1448.2
DW                   27.800 usec
DE                    10.00 usec
TE                    293.9 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                     13C
P1                     9.00 usec
PL1                   -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  22.00 dB
PL13                  22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                        32768
SF                75.4677260 MHz
WDW                          EM
SSB                           0
LB                         1.00 Hz
GB                            0
PC                         1.40
```





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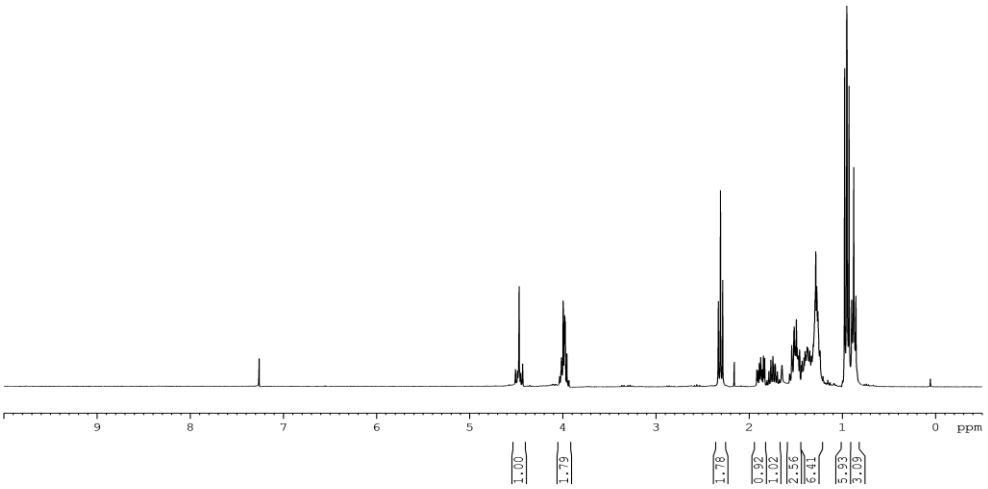


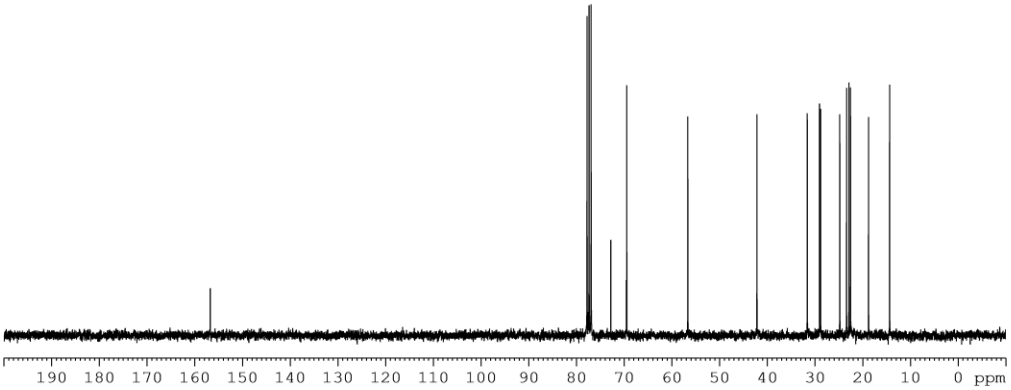

```
Current Data Parameters
NAME          FC12GE028E
EXPNO                 12
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110326
Time                8.43
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    16
DS                     0
SWH             6313.131 Hz
FIDRES          0.192661 Hz
AQ              2.5952756 sec
RG                 161.3
DW                79.200 usec
DE                 6.50 usec
TE                293.7 K
D1             1.00000000 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

======== CHANNEL f1 ========
NUC1                  1H
P1                  6.20 usec
PL1                 0.00 dB
SFO1         300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF           300.1300059 MHz
WDW                   EM
SSB                    0
LB                  0.10 Hz
GB                     0
PC                  1.00

1D NMR plot parameters
CX                 20.00 cm
CY                 14.42 cm
F1P                2.469 ppm
F1                740.89 Hz
F2P                2.134 ppm
F2                640.55 Hz
PPMCM           0.01672 ppm/cm
HZCM            5.01695 Hz/cm
```



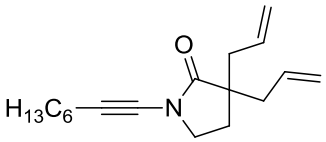

```
Current Data Parameters
NAME          FC12GE028E
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110326
Time                8.22
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                  2048
DS                     4
SWH            17985.611 Hz
FIDRES          0.274439 Hz
AQ              1.8219508 sec
RG                1625.5
DW                27.800 usec
DE                10.00 usec
TE                293.8 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
MCREST         0.00000000 sec
MCWRK          0.01500000 sec

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.00 usec
PL1                -6.00 dB
SFO1         75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               22.00 dB
PL13               22.00 dB
SFO2        300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF           75.4677243 MHz
WDW                   EM
SSB                    0
LB                  1.00 Hz
GB                     0
PC                  1.40
```



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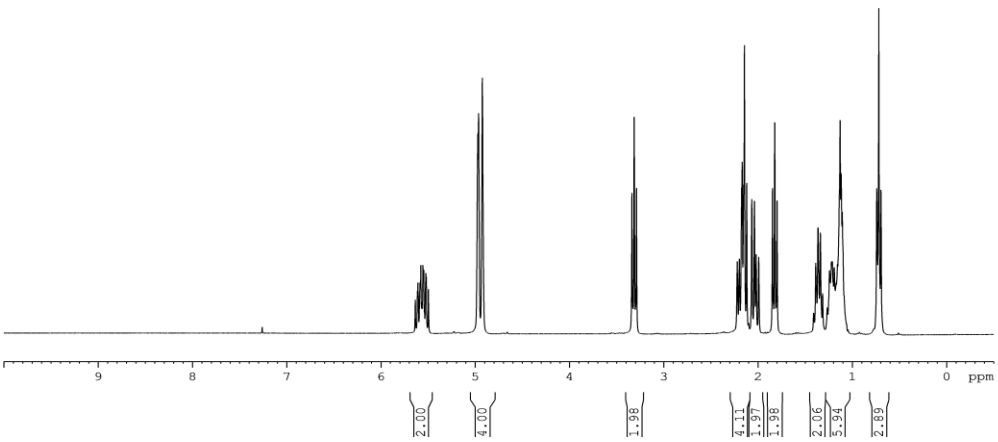


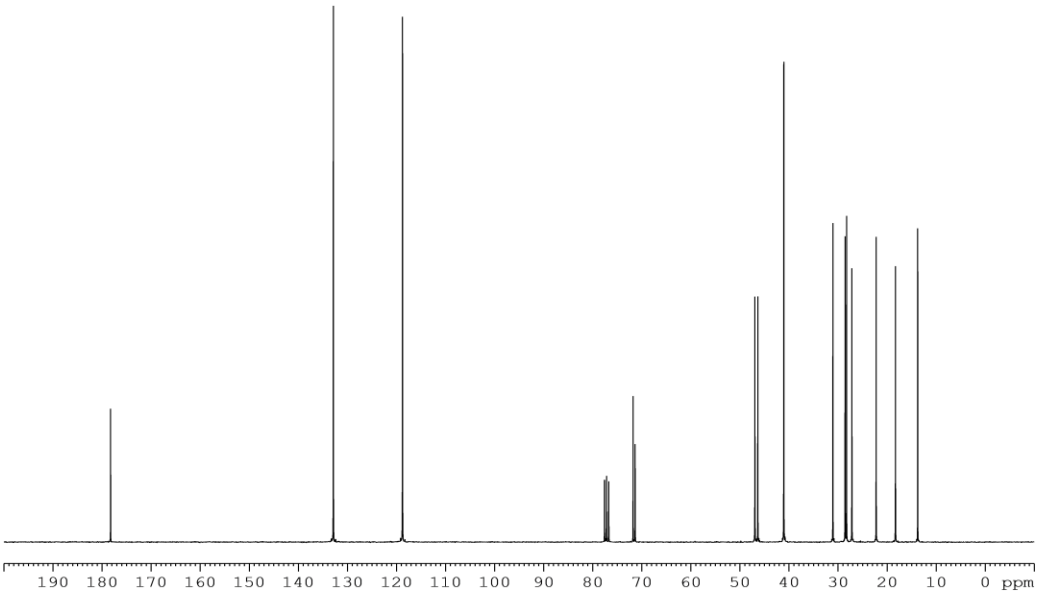

```
Current Data Parameters
NAME                 fc35g106A
EXPNO                       12
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110901
Time                    21.22
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                        18
DW                     79.200 usec
DE                      6.50 usec
TE                     295.2 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                      6.20 usec
PL1                     0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                     32768
SF                300.1300053 MHz
WDW                       EM
SSB                        0
LB                      0.10 Hz
GB                         0
PC                      1.00

1D NMR plot parameters
CX                     20.00 cm
CY                     10.18 cm
F1P                    2.816 ppm
F1                    845.24 Hz
F2P                   -0.028 ppm
F2                     -8.42 Hz
PPMCM                0.14221 ppm/cm
HZCM                42.68278 Hz/cm
```




```
Current Data Parameters
NAME                 fc35g106A
EXPNO                       10
PROCNO                       1

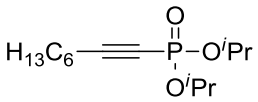
F2 - Acquisition Parameters
Date_               20110901
Time                    21.04
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2000
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     295.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                      9.00 usec
PL1                    -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   22.00 dB
PL13                   22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                     32768
SF                75.4677592 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40

1D NMR plot parameters
CX                     20.00 cm
CY                      8.51 cm
F1P                  200.000 ppm
F1                 15093.55 Hz
F2P                 -10.000 ppm
F2                  -754.68 Hz
PPMCM               10.50000 ppm/cm
HZCM               792.41144 Hz/cm
```



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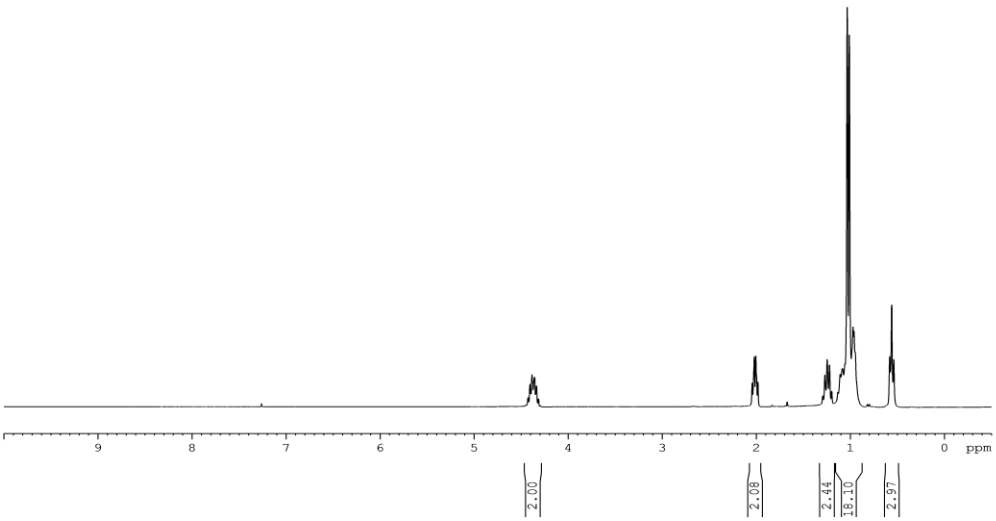


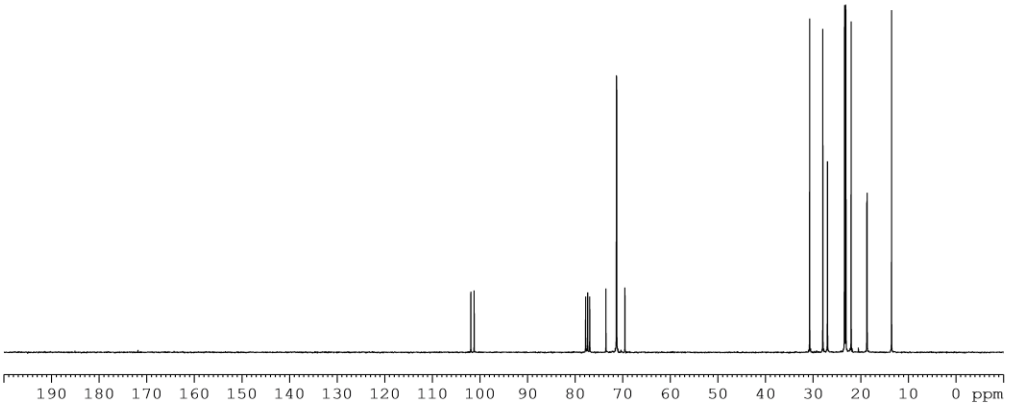

```
Current Data Parameters
NAME                 FC23JH085
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110611
Time                   21.47
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                        16
DW                    79.200 usec
DE                     6.50 usec
TE                    294.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300051 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        1.345 ppm
F1                       403.56 Hz
F2P                        0.465 ppm
F2                       139.62 Hz
PPMCM                    0.04397 ppm/cm
HZCM                    13.19710 Hz/cm
```



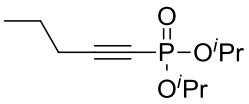

```
Current Data Parameters
NAME                 FC23JH085
EXPNO                       11
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110611
Time                   22.54
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG              zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                    27.800 usec
DE                     10.00 usec
TE                    294.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677556 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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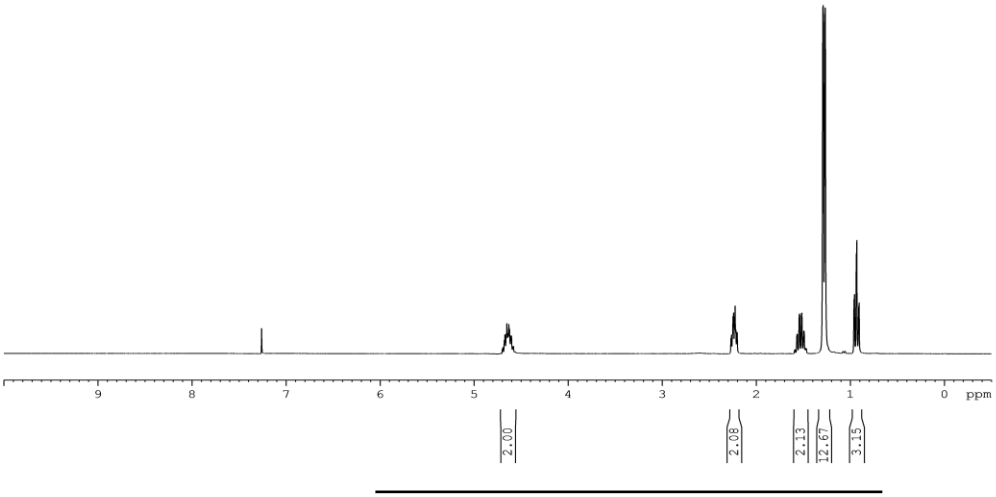


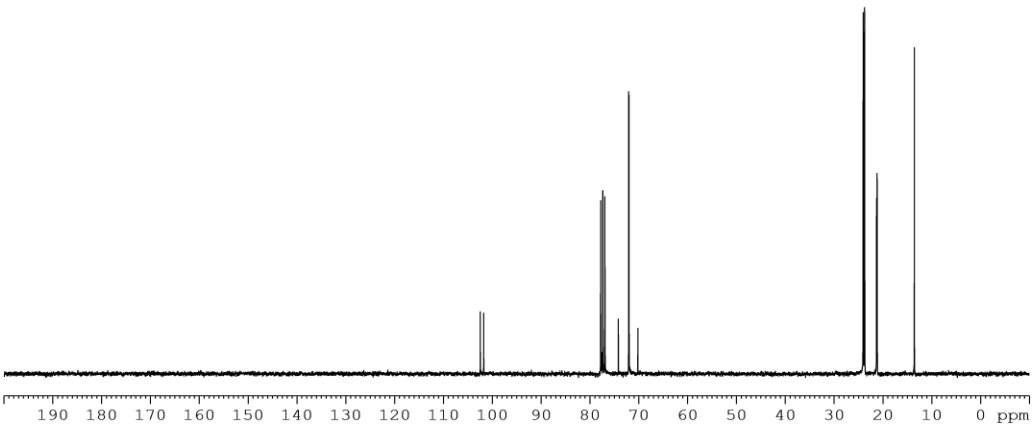

```
Current Data Parameters
NAME                 FC19KJ493E
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110516
Time                    0.02
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       45.3
DW                     79.200 usec
DE                      6.50 usec
TE                     293.3 K
D1                1.00000000 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        2.363 ppm
F1                        709.35 Hz
F2P                        0.765 ppm
F2                        229.73 Hz
PPMCM                   0.07990 ppm/cm
HZCM                   23.98110 Hz/cm
```




```
Current Data Parameters
NAME                 FC19KJ493E
EXPNO                        11
PROCNO                        1

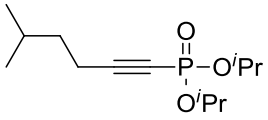
F2 - Acquisition Parameters
Date_               20110516
Time                    1.10
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG              zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     293.5 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
MCREST            0.00000000 sec
MCWRK             0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677309 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                      200.000 ppm
F1                     15093.55 Hz
F2P                     -10.000 ppm
F2                      -754.68 Hz
PPMCM                  10.50000 ppm/cm
HZCM                  792.41113 Hz/cm
```



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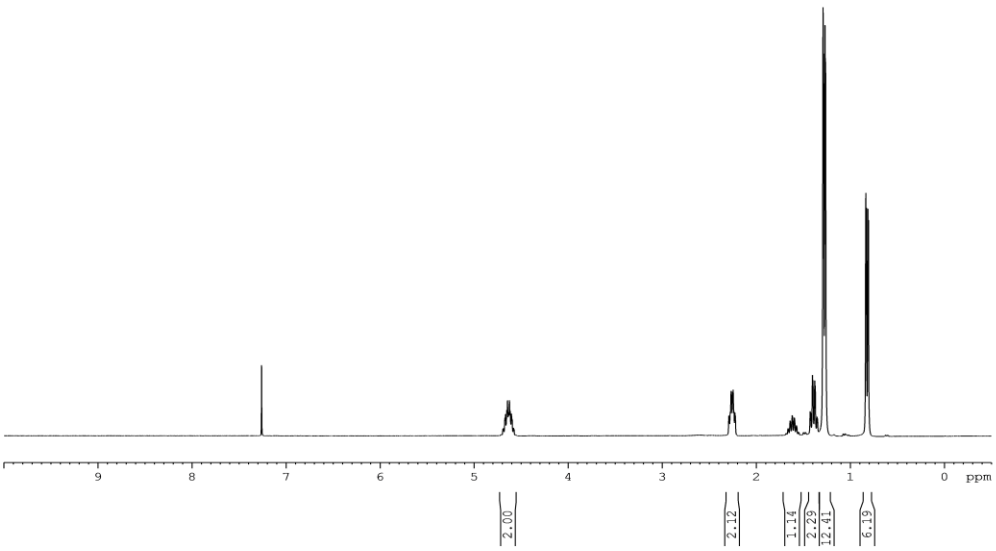


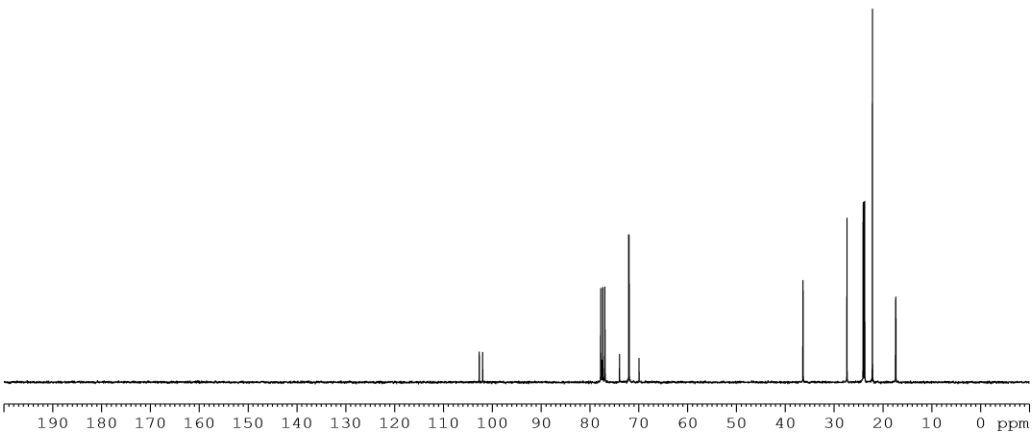

```
Current Data Parameters
NAME                 FC19KJ439C
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110516
Time                    3.54
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       40.3
DW                     79.200 usec
DE                      6.50 usec
TE                     293.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        2.443 ppm
F1                        733.35 Hz
F2P                        0.640 ppm
F2                        192.13 Hz
PPMCM                   0.09016 ppm/cm
HZCM                   27.06114 Hz/cm
```




```
Current Data Parameters
NAME                 FC19KJ439C
EXPNO                        11
PROCNO                        1

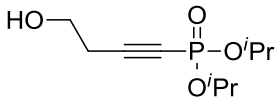
F2 - Acquisition Parameters
Date_               20110516
Time                    5.03
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                      1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     293.3 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

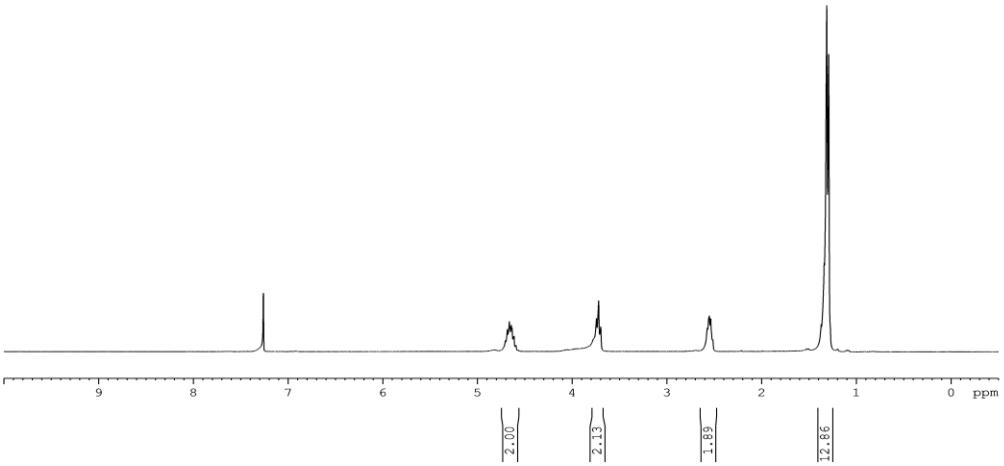
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677309 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                      200.000 ppm
F1                     15093.55 Hz
F2P                     -10.000 ppm
F2                      -754.68 Hz
PPMCM                  10.50000 ppm/cm
HZCM                  792.41113 Hz/cm
```



33



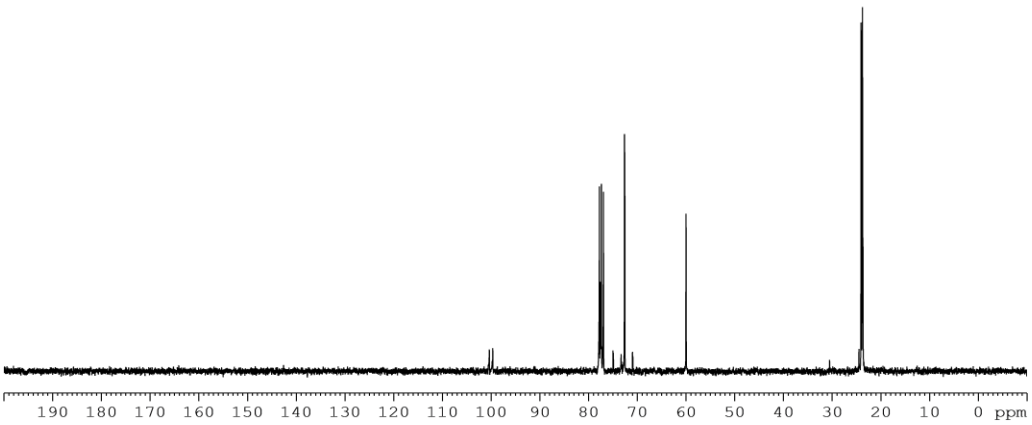

```
Current Data Parameters
NAME                 FC23KJ493D
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110611
Time_                    1.28
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zg30
TD                      32768
SOLVENT                 CDC13
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                         57
DW                      79.200 usec
DE                       6.50 usec
TE                      294.1 K
D1                   1.00000000 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                      32768
SF                 300.1300049 MHz
WDW                        EM
SSB                         0
LB                       0.10 Hz
GB                          0
PC                       1.00

1D NMR plot parameters
CX                      20.00 cm
CY                      12.50 cm
F1P                    10.000 ppm
F1                   3001.30 Hz
F2P                    -0.500 ppm
F2                   -150.06 Hz
PPMCM                 0.52500 ppm/cm
HZCM                157.56825 Hz/cm
```




```
Current Data Parameters
NAME                 FC23KJ493D
EXPNO                        11
PROCNO                        1

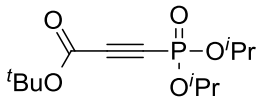
F2 - Acquisition Parameters
Date_               20110611
Time_                    2.35
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                      65536
SOLVENT                 CDCl3
NS                       1024
DS                          4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1625.5
DW                      27.800 usec
DE                      10.00 usec
TE                      294.3 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                      32768
SF                 75.4677293 MHz
WDW                        EM
SSB                         0
LB                       1.00 Hz
GB                          0
PC                       1.40

1D NMR plot parameters
CX                      20.00 cm
CY                      12.50 cm
F1P                    200.000 ppm
F1                   15093.55 Hz
F2P                   -10.000 ppm
F2                    -754.68 Hz
PPMCM                10.50000 ppm/cm
HZCM                792.41113 Hz/cm
```



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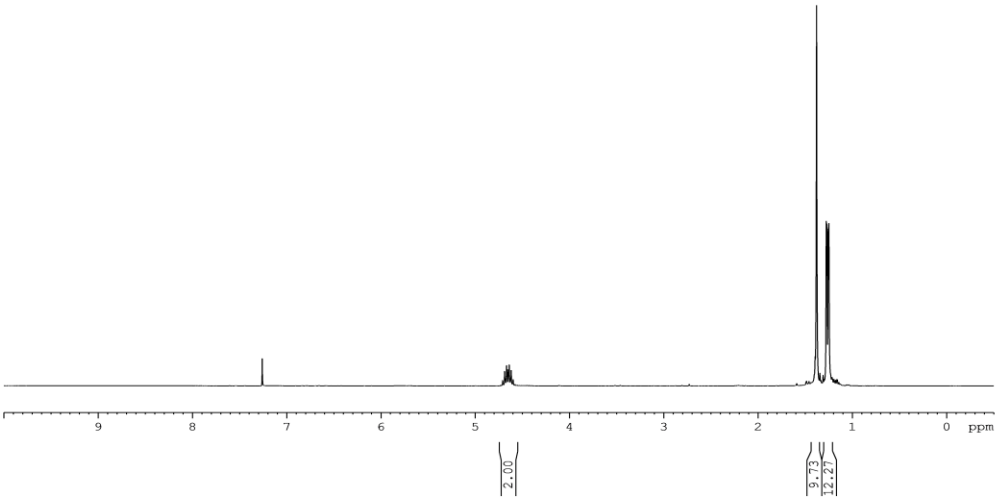


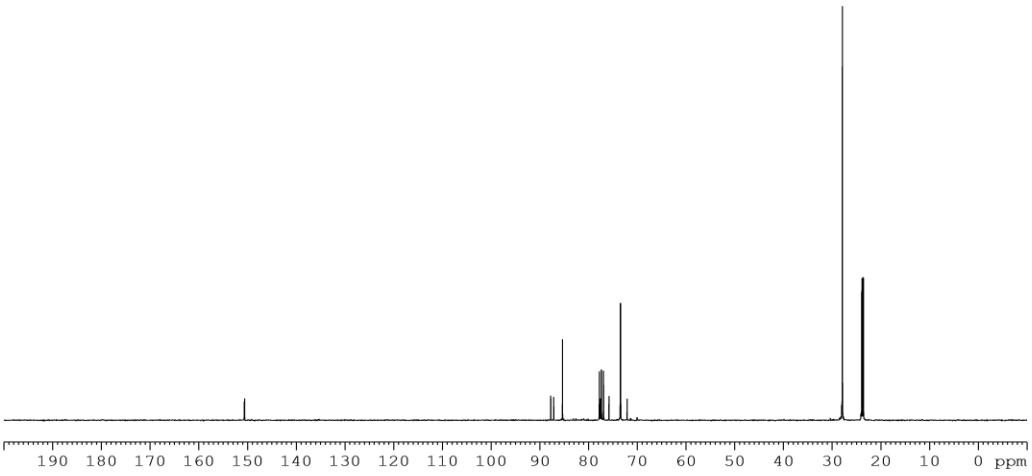

```
Current Data Parameters
NAME                 FC21JH070
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110528
Time                    5.51
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       28.5
DW                     79.200 usec
DE                      6.50 usec
TE                     293.6 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300055 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        1.665 ppm
F1                       499.59 Hz
F2P                        0.995 ppm
F2                       298.59 Hz
PPMCM                    0.03349 ppm/cm
HZCM                    10.04991 Hz/cm
```




```
Current Data Parameters
NAME                 FC21JH070
EXPNO                       11
PROCNO                       1

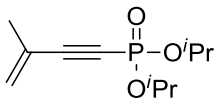
F2 - Acquisition Parameters
Date_               20110528
Time                    6.43
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                       768
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     293.8 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677353 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                      200.000 ppm
F1                     15093.55 Hz
F2P                      -10.000 ppm
F2                      -754.68 Hz
PPMCM                   10.50000 ppm/cm
HZCM                   792.41119 Hz/cm
```



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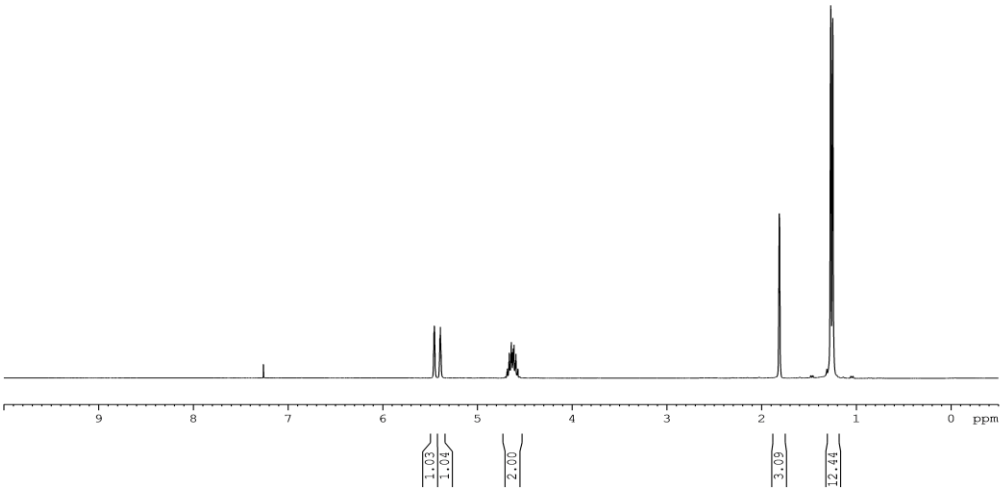


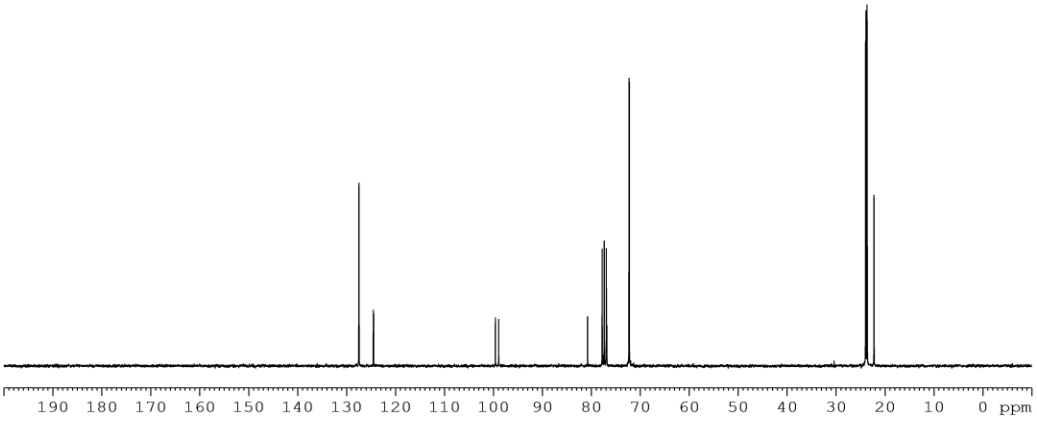

```
Current Data Parameters
NAME                  FC19KJ496A
EXPNO                         10
PROCNO                         1

F2 - Acquisition Parameters
Date_                   20110513
Time                       18.45
INSTRUM                    spect
PROBHD    5 mm BBI 1H-BB
PULPROG                     zg30
TD                         32768
SOLVENT                    CDCl3
NS                            16
DS                             0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                         35.9
DW                       79.200 usec
DE                        6.50 usec
TE                       293.9 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                          1H
P1                         6.20 usec
PL1                        0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                  300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        2.213 ppm
F1                       664.16 Hz
F2P                        0.928 ppm
F2                       278.55 Hz
PPMCM                  0.06424 ppm/cm
HZCM                  19.28017 Hz/cm
```




```
Current Data Parameters
NAME                  FC19KJ496A
EXPNO                         11
PROCNO                         1

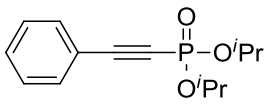
F2 - Acquisition Parameters
Date_                   20110513
Time                       19.53
INSTRUM                    spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zgpg30
TD                         65536
SOLVENT                    CDCl3
NS                          1024
DS                             4
SWH                  17985.611 Hz
FIDRES                0.274439 Hz
AQ                    1.8219508 sec
RG                        1625.5
DW                       27.800 usec
DE                       10.00 usec
TE                       294.0 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         13C
P1                         9.00 usec
PL1                       -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                          1H
PCPD2                     80.00 usec
PL2                        0.00 dB
PL12                      22.00 dB
PL13                      22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                  75.4677342 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                      200.000 ppm
F1                     15093.55 Hz
F2P                      -10.000 ppm
F2                       -754.68 Hz
PPMCM                  10.50000 ppm/cm
HZCM                  792.41119 Hz/cm
```



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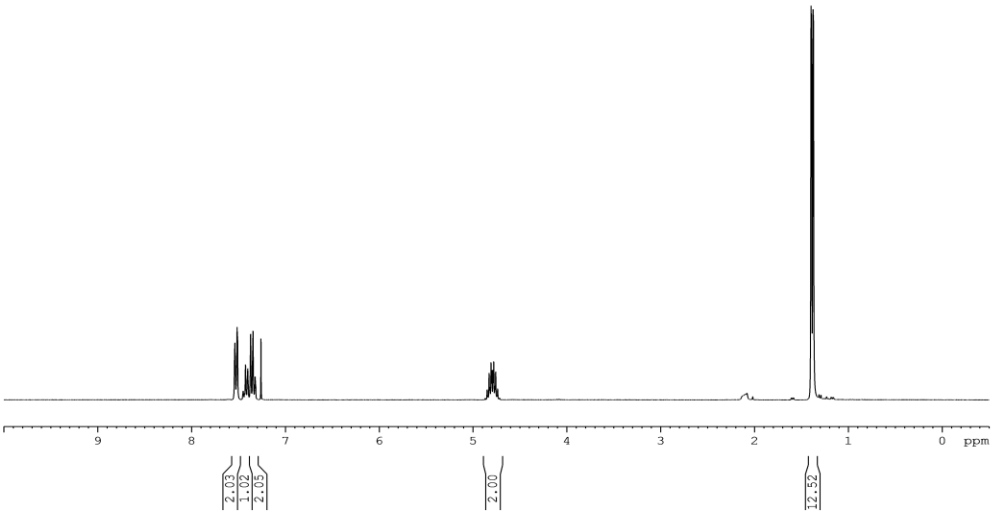


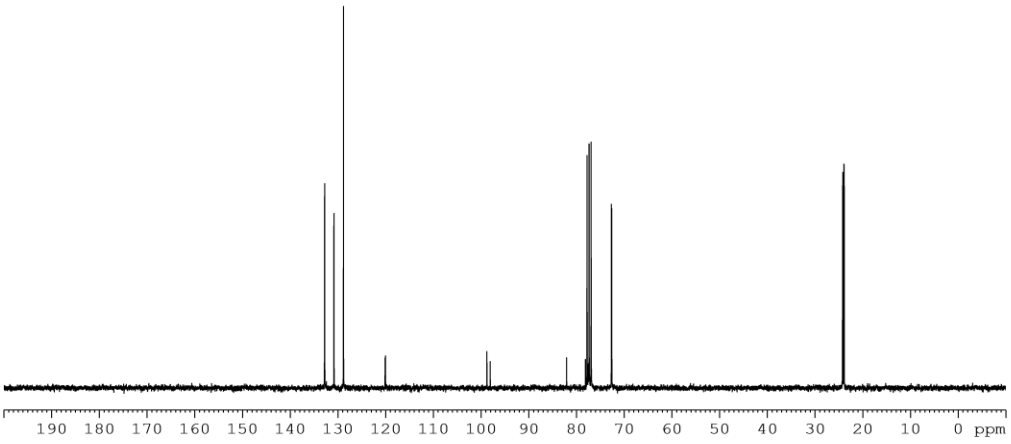

```
Current Data Parameters
NAME                  FC19KJ493A
EXPNO                         10
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110516
Time                       5.51
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                         90.5
DW                       79.200 usec
DE                         6.50 usec
TE                        293.1 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                         6.20 usec
PL1                        0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                           32768
SF                    300.1300059 MHz
WDW                             EM
SSB                              0
LB                            0.10 Hz
GB                               0
PC                            1.00

1D NMR plot parameters
CX                           20.00 cm
CY                           12.50 cm
F1P                          1.544 ppm
F1                         463.35 Hz
F2P                          1.220 ppm
F2                         366.13 Hz
PPMCM                     0.01620 ppm/cm
HZCM                      4.86100 Hz/cm
```



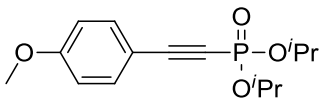

```
Current Data Parameters
NAME                  FC19KJ493A
EXPNO                         11
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110516
Time                       7.00
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        1024
DS                           4
SWH                  17985.611 Hz
FIDRES                0.274439 Hz
AQ                    1.8219508 sec
RG                       1824.6
DW                       27.800 usec
DE                        10.00 usec
TE                        293.3 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                         9.00 usec
PL1                       -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                     80.00 usec
PL2                        0.00 dB
PL12                      22.00 dB
PL13                      22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                           32768
SF                    75.4677276 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```



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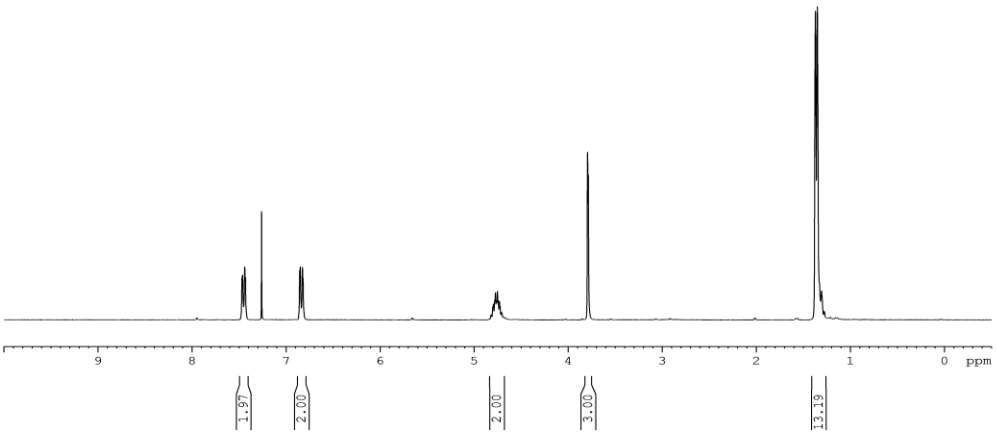


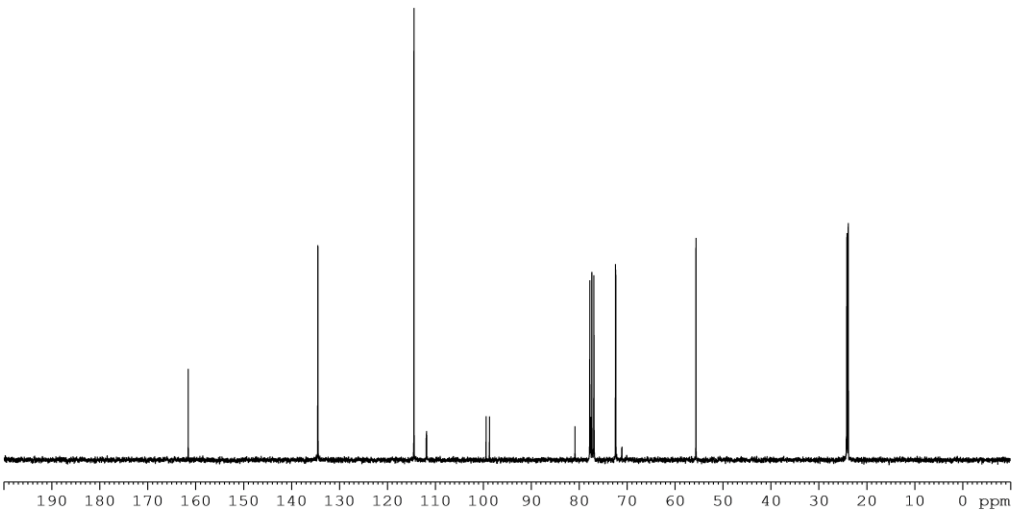

```
Current Data Parameters
NAME          FC19KJ493B
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110514
Time              18.50
INSTRUM           spect
PROBHD    5 mm BBI 1H-BB
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                  16
DS                   0
SWH           6313.131 Hz
FIDRES        0.192661 Hz
AQ            2.5952756 sec
RG                  64
DW              79.200 usec
DE               6.50 usec
TE              293.5 K
D1            1.00000000 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                1H
P1               6.20 usec
PL1              0.00 dB
SFO1        300.1328512 MHz

F2 - Processing parameters
SI                 32768
SF          300.1300059 MHz
WDW                EM
SSB                 0
LB               0.10 Hz
GB                  0
PC               1.00

1D NMR plot parameters
CX              20.00 cm
CY              12.50 cm
F1P              2.316 ppm
F1             695.19 Hz
F2P              0.995 ppm
F2             298.51 Hz
PPMCM          0.06608 ppm/cm
HZCM          19.83381 Hz/cm
```



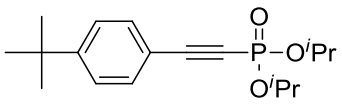

```
Current Data Parameters
NAME          FC19KJ493B
EXPNO                 11
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110514
Time              19.59
INSTRUM           spect
PROBHD    5 mm BBI 1H-BB
PULPROG          zgpg30
TD               65536
SOLVENT          CDCl3
NS                1024
DS                   4
SWH          17985.611 Hz
FIDRES        0.274439 Hz
AQ            1.8219508 sec
RG               1625.5
DW              27.800 usec
DE              10.00 usec
TE              293.8 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                13C
P1               9.00 usec
PL1             -6.00 dB
SFO1         75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                1H
PCPD2            80.00 usec
PL2              0.00 dB
PL12            22.00 dB
PL13            22.00 dB
SFO2        300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF          75.4677292 MHz
WDW                EM
SSB                 0
LB               1.00 Hz
GB                  0
PC               1.40
```



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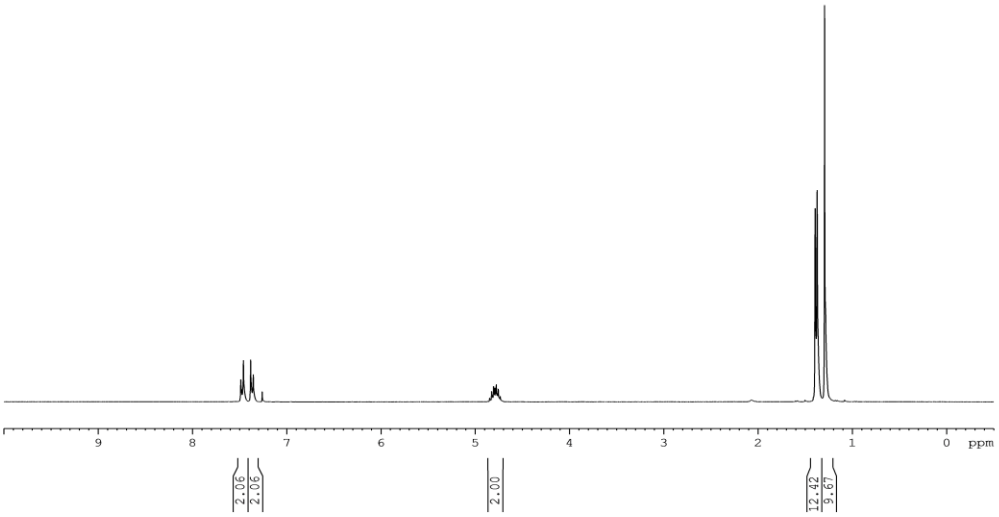


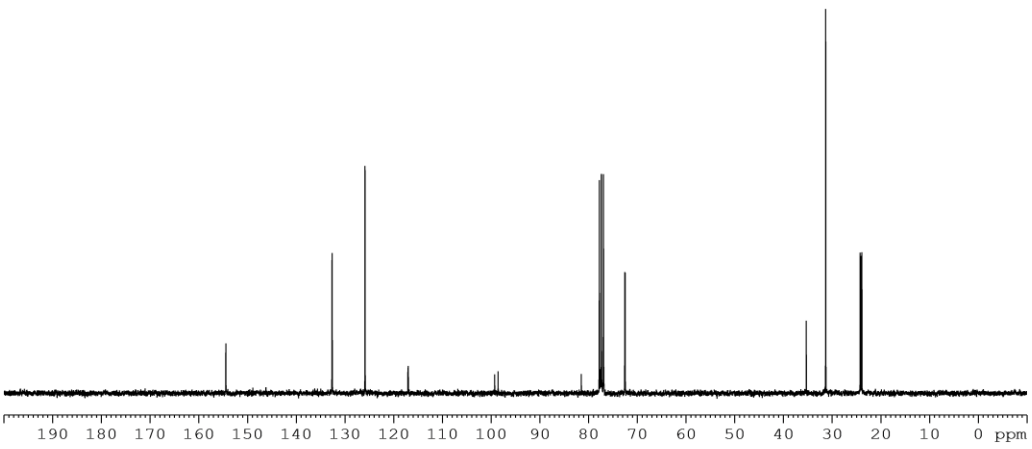

```
Current Data Parameters
NAME                  FC23JH062
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110611
Time                     23.39
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                   6313.131 Hz
FIDRES                0.192661 Hz
AQ                    2.5952756 sec
RG                         80.6
DW                       79.200 usec
DE                         6.50 usec
TE                        294.1 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                         6.20 usec
PL1                        0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                           32768
SF                    300.1300063 MHz
WDW                             EM
SSB                              0
LB                            0.10 Hz
GB                               0
PC                            1.00

1D NMR plot parameters
CX                           20.00 cm
CY                           12.50 cm
F1P                          1.508 ppm
F1                         452.47 Hz
F2P                          1.174 ppm
F2                         352.32 Hz
PPMCM                     0.01668 ppm/cm
HZCM                      5.00767 Hz/cm
```




```
Current Data Parameters
NAME                  FC23JH062
EXPNO                        11
PROCNO                        1

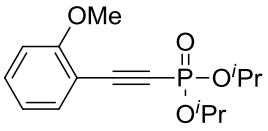
F2 - Acquisition Parameters
Date_                 20110612
Time                      0.46
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        1024
DS                           4
SWH                  17985.611 Hz
FIDRES                0.274439 Hz
AQ                    1.8219508 sec
RG                        1625.5
DW                       27.800 usec
DE                        10.00 usec
TE                        294.3 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                         9.00 usec
PL1                       -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                         1H
PCPD2                     80.00 usec
PL2                        0.00 dB
PL12                      22.00 dB
PL13                      22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                           32768
SF                    75.4677265 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40

1D NMR plot parameters
CX                           20.00 cm
CY                           12.50 cm
F1P                         200.000 ppm
F1                        15093.55 Hz
F2P                         -10.000 ppm
F2                          -754.68 Hz
PPMCM                     10.50000 ppm/cm
HZCM                     792.41113 Hz/cm
```



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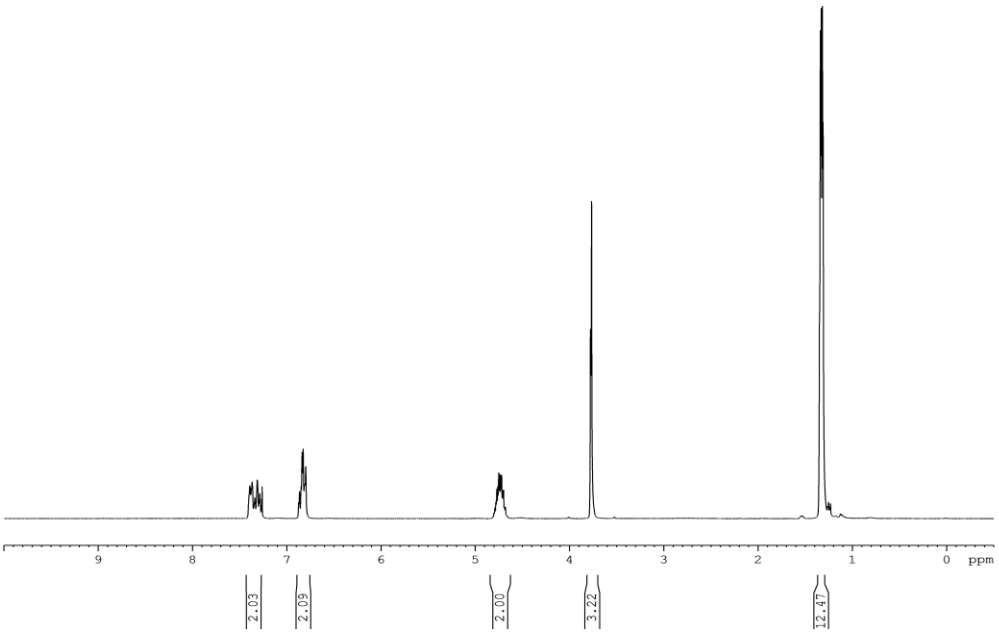


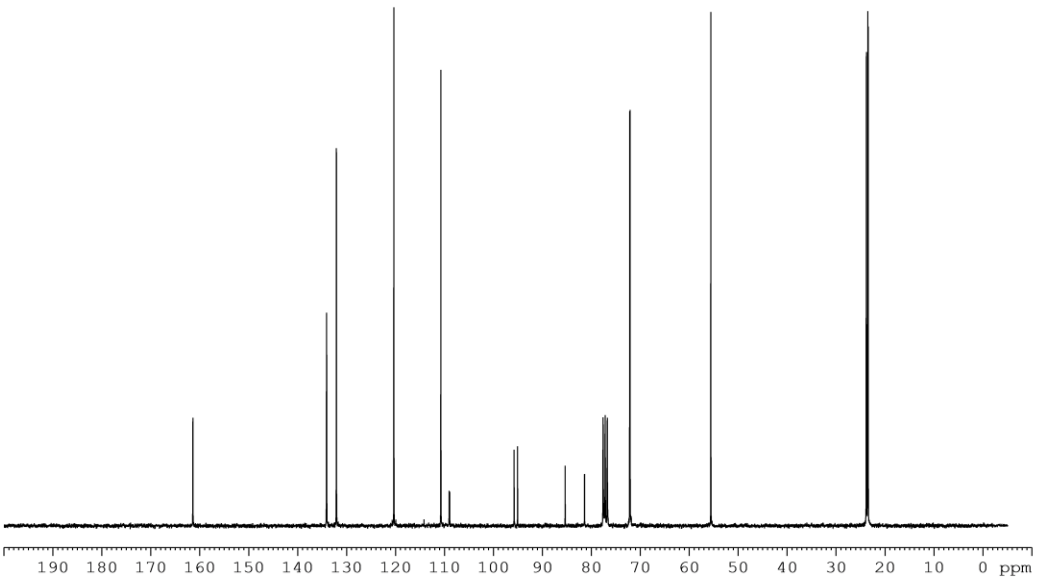

```
Current Data Parameters
NAME                 fc47kj723a
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20111125
Time                    6.52
INSTRUM                spect
PROBHD    5 mm QNP 1H/13
PULPROG                 zg30
TD                     16384
SOLVENT                CDCl3
NS                        16
DS                         2
SWH                 4194.631 Hz
FIDRES                0.256020 Hz
AQ                    1.9530228 sec
RG                         64
DW                    119.200 usec
DE                      6.50 usec
TE                     294.3 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                      6.50 usec
PL1                    -6.00 dB
SFO1               300.1319508 MHz

F2 - Processing parameters
SI                      32768
SF                 300.1300050 MHz
WDW                        EM
SSB                         0
LB                       0.10 Hz
GB                          0
PC                       1.00

1D NMR plot parameters
CX                      20.00 cm
CY                      21.35 cm
F1P                     7.625 ppm
F1                   2288.63 Hz
F2P                     4.490 ppm
F2                   1347.56 Hz
PPMCM                 0.15678 ppm/cm
HZCM                 47.05340 Hz/cm
```




```
Current Data Parameters
NAME                 fc47kj723a
EXPNO                        10
PROCNO                        1

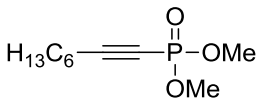
F2 - Acquisition Parameters
Date_               20111125
Time                    6.35
INSTRUM                spect
PROBHD    5 mm QNP 1H/13
PULPROG             zgpg30
TD                     32768
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                18115.941 Hz
FIDRES                0.552855 Hz
AQ                    0.9044468 sec
RG                     11585.2
DW                    27.600 usec
DE                      10.00 usec
TE                     294.6 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                      5.10 usec
PL1                    -6.00 dB
SFO1               75.4764278 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                    -6.00 dB
PL12                   15.80 dB
PL13                   15.80 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                      32768
SF                 75.4677514 MHz
WDW                        EM
SSB                         0
LB                       1.00 Hz
GB                          0
PC                       1.40

1D NMR plot parameters
CX                      20.00 cm
CY                       7.16 cm
F1P                   122.095 ppm
F1                   9214.24 Hz
F2P                    64.702 ppm
F2                   4882.90 Hz
PPMCM                 2.86966 ppm/cm
HZCM                216.56683 Hz/cm
```



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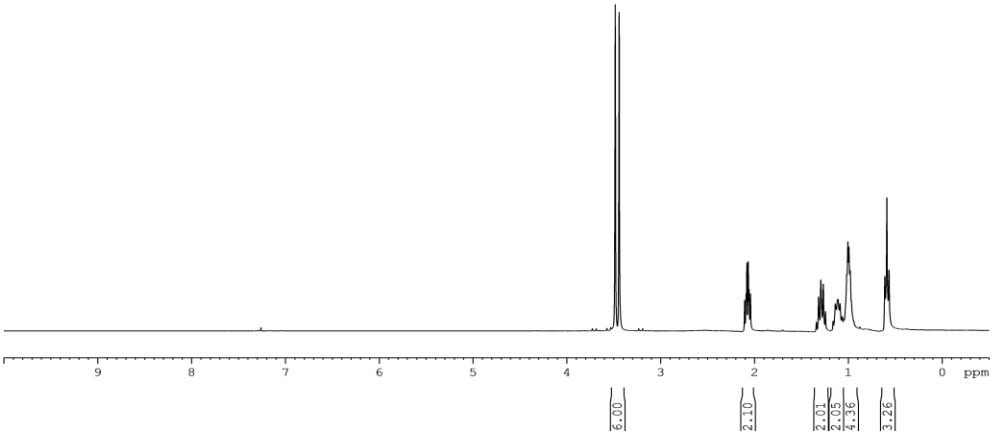


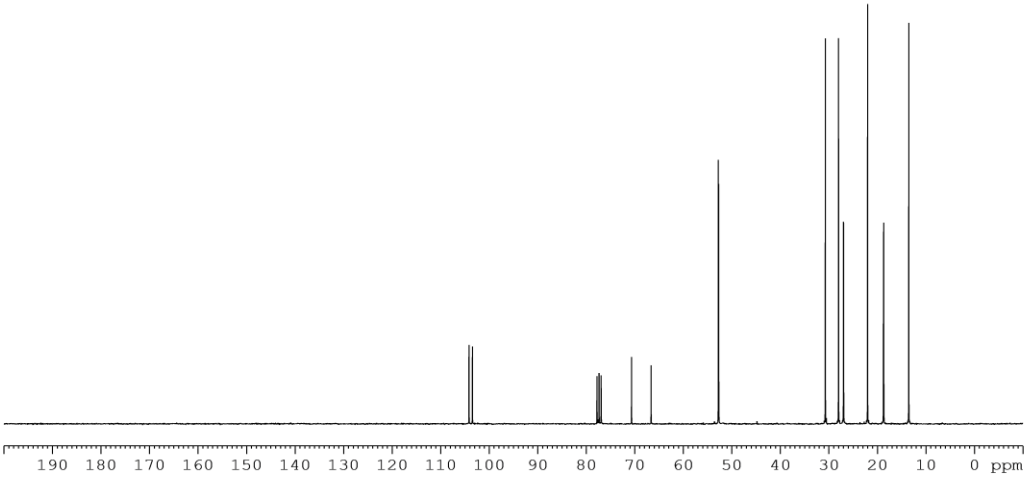

```
Current Data Parameters
NAME            FC25JH097A
EXPNO                   10
PROCNO                   1

F2 - Acquisition Parameters
Date_            20110626
Time                13.38
INSTRUM             spect
PROBHD   5 mm BBI 1H-BB
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     16
DS                      0
SWH              6313.131 Hz
FIDRES           0.192661 Hz
AQ               2.5952756 sec
RG                   20.2
DW                 79.200 usec
DE                  6.50 usec
TE                 295.2 K
D1              1.00000000 sec
MCREST          0.00000000 sec
MCWRK           0.01500000 sec

======== CHANNEL f1 ========
NUC1                   1H
P1                   6.20 usec
PL1                  0.00 dB
SFO1          300.1328512 MHz

F2 - Processing parameters
SI                  32768
SF            300.1300051 MHz
WDW                    EM
SSB                     0
LB                   0.10 Hz
GB                      0
PC                   1.00

1D NMR plot parameters
CX                  20.00 cm
CY                  12.50 cm
F1P                 1.449 ppm
F1                 435.01 Hz
F2P                 0.393 ppm
F2                 118.01 Hz
PPMCM             0.05281 ppm/cm
HZCM             15.85004 Hz/cm
```




```
Current Data Parameters
NAME            FC25JH097A
EXPNO                   11
PROCNO                   1

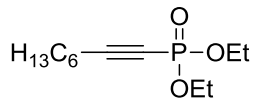
F2 - Acquisition Parameters
Date_            20110626
Time                14.45
INSTRUM             spect
PROBHD   5 mm BBI 1H-BB
PULPROG           zgpg30
TD                  65536
SOLVENT             CDCl3
NS                   1024
DS                      4
SWH             17985.611 Hz
FIDRES           0.274439 Hz
AQ               1.8219508 sec
RG                   2048
DW                 27.800 usec
DE                 10.00 usec
TE                 295.5 K
D1              2.00000000 sec
d11             0.03000000 sec
DELTA           1.89999998 sec
MCREST          0.00000000 sec
MCWRK           0.01500000 sec

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.00 usec
PL1                 -6.00 dB
SFO1          75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                22.00 dB
PL13                22.00 dB
SFO2          300.1312005 MHz

F2 - Processing parameters
SI                  32768
SF            75.4677550 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40

1D NMR plot parameters
CX                  20.00 cm
CY                  12.50 cm
F1P                200.000 ppm
F1               15093.55 Hz
F2P                -10.000 ppm
F2                 -754.68 Hz
PPMCM            10.50000 ppm/cm
HZCM            792.41144 Hz/cm
```



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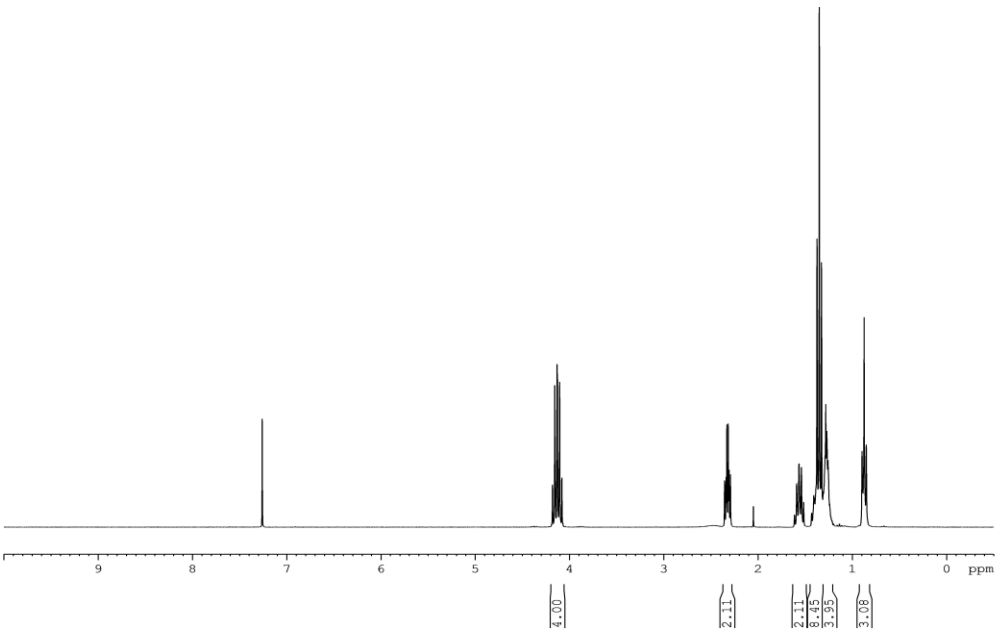


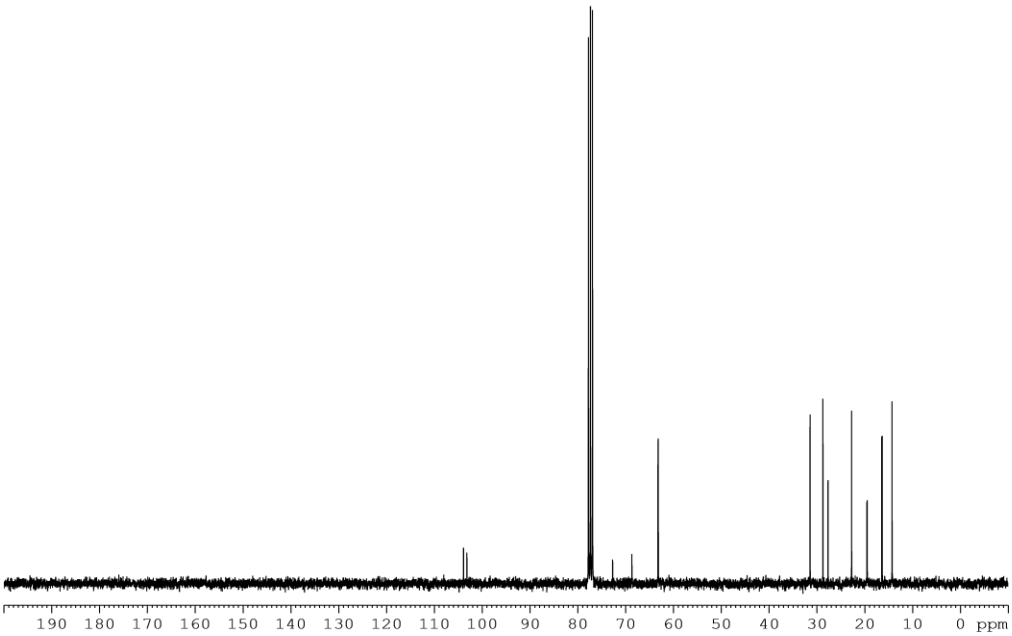

```
Current Data Parameters
NAME                  FC19KJ492A
EXPNO                         10
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110515
Time                      22.06
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                    zg30
TD                        32768
SOLVENT                   CDCl3
NS                           16
DS                            0
SWH                    6313.131 Hz
FIDRES                 0.192661 Hz
AQ                    2.5952756 sec
RG                        228.1
DW                       79.200 usec
DE                        6.50 usec
TE                       293.4 K
D1                    1.00000000 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                         1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                        32768
SF                  300.1300061 MHz
WDW                          EM
SSB                           0
LB                         0.10 Hz
GB                            0
PC                         1.00

1D NMR plot parameters
CX                        20.00 cm
CY                        12.50 cm
F1P                       1.792 ppm
F1                       537.86 Hz
F2P                       0.624 ppm
F2                       187.38 Hz
PPMCM                  0.05839 ppm/cm
HZCM                  17.52399 Hz/cm
```



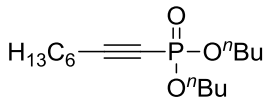

```
Current Data Parameters
NAME                  FC19KJ492A
EXPNO                         11
PROCNO                         1

F2 - Acquisition Parameters
Date_                  20110515
Time                      23.15
INSTRUM                   spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                         1024
DS                            4
SWH                   17985.611 Hz
FIDRES                 0.274439 Hz
AQ                    1.8219508 sec
RG                       1625.5
DW                       27.800 usec
DE                       10.00 usec
TE                       293.6 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
MCREST                0.00000000 sec
MCWRK                 0.01500000 sec

======== CHANNEL f1 ========
NUC1                        13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                         1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                        32768
SF                  75.4677249 MHz
WDW                          EM
SSB                           0
LB                         1.00 Hz
GB                            0
PC                         1.40
```



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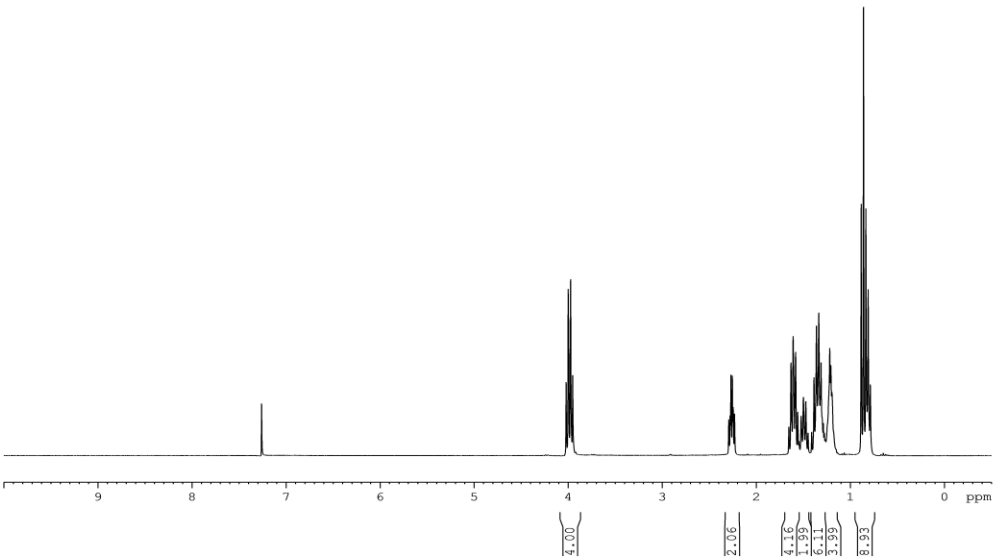


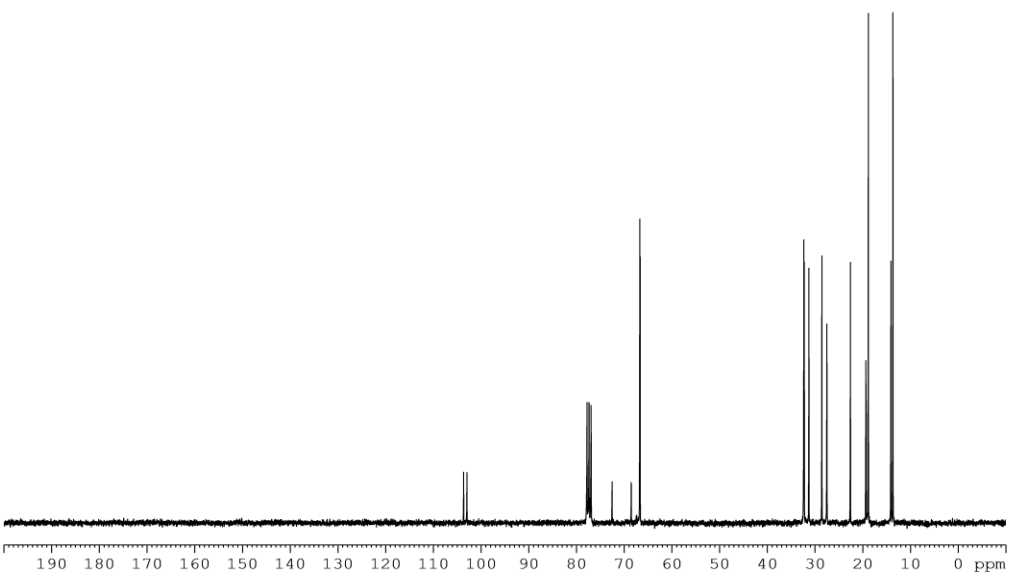

```
Current Data Parameters
NAME                 fc30kj492b
EXPNO                       301
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110725
Time_                   10.19
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                  DMSO
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                         32
DW                      79.200 usec
DE                       6.50 usec
TE                      294.5 K
D1                   1.00000000 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.80 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                 300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                         1.117 ppm
F1                        335.29 Hz
F2P                         0.520 ppm
F2                        155.95 Hz
PPMCM                    0.02988 ppm/cm
HZCM                     8.96741 Hz/cm
```



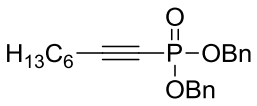

```
Current Data Parameters
NAME                 FC19KJ492B
EXPNO                       11
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110514
Time_                   10.52
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                     65536
SOLVENT                  CDC13
NS                        1024
DS                           4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1448.2
DW                      27.800 usec
DE                      10.00 usec
TE                      293.5 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                 75.4677320 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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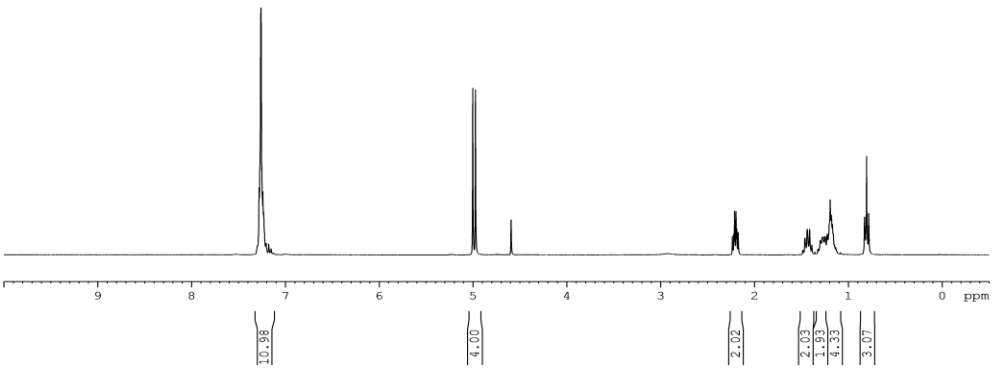


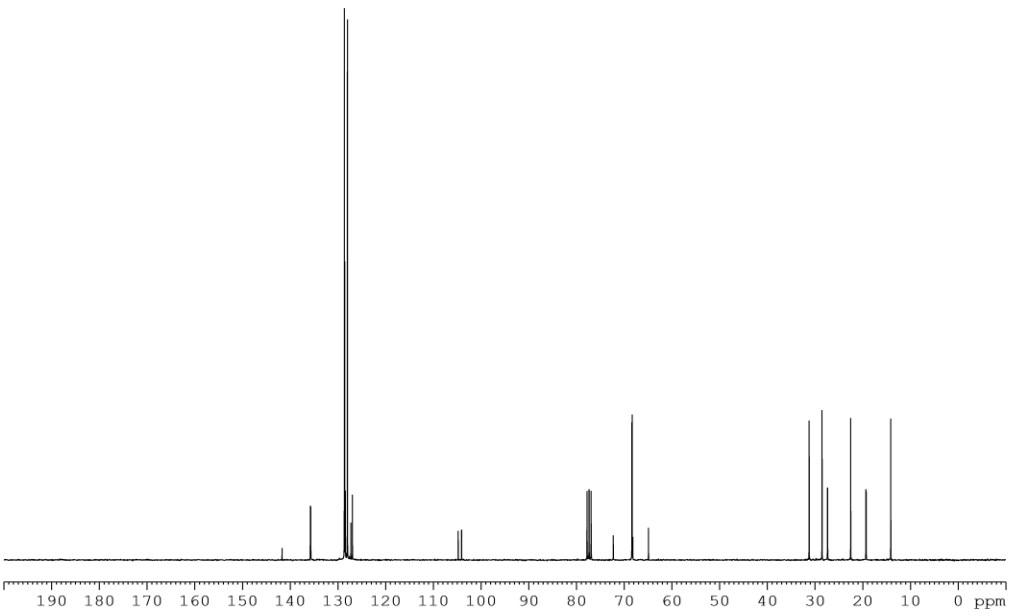

```
Current Data Parameters
NAME                 FC25JH097B
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110624
Time                   16.45
INSTRUM                spect
PROBHD     5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       35.9
DW                     79.200 usec
DE                      6.50 usec
TE                     294.3 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                  300.1300302 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                         1.556 ppm
F1                        467.13 Hz
F2P                         0.685 ppm
F2                        205.69 Hz
PPMCM                   0.04355 ppm/cm
HZCM                   13.07202 Hz/cm
```



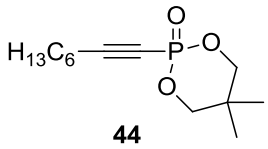

```
Current Data Parameters
NAME                 FC25JH097B
EXPNO                        11
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110624
Time                   17.53
INSTRUM                spect
PROBHD     5 mm BBI 1H-BB
PULPROG              zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     294.6 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                  75.4677424 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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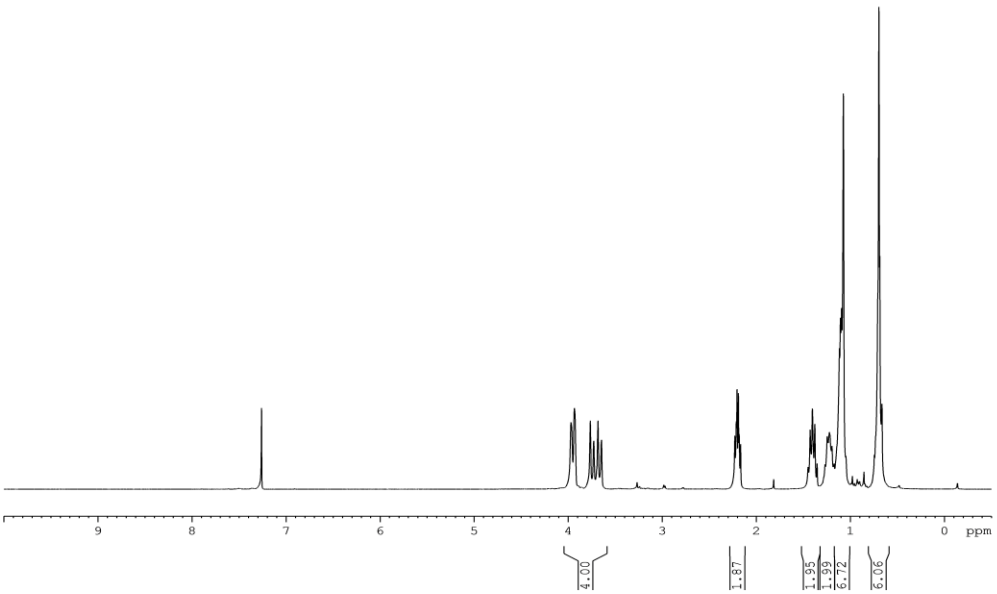


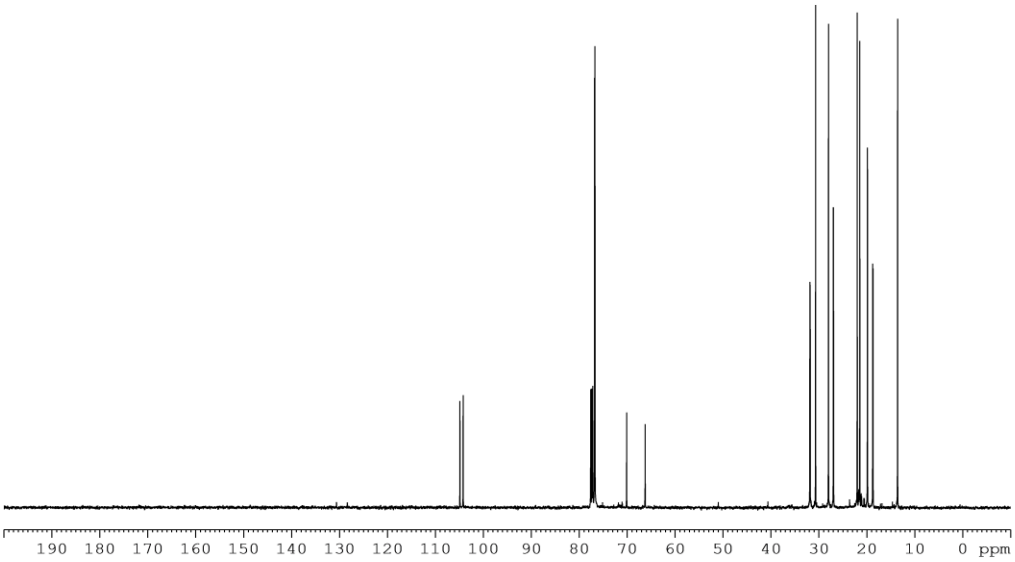

```
Current Data Parameters
NAME                 fc24kj539
EXPNO                       12
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110617
Time_                   2.48
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       22.6
DW                     79.200 usec
DE                      6.50 usec
TE                     294.9 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300043 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         12.50 cm
F1P                        1.508 ppm
F1                        452.65 Hz
F2P                        0.571 ppm
F2                        171.48 Hz
PPMCM                   0.04684 ppm/cm
HZCM                   14.05832 Hz/cm
```



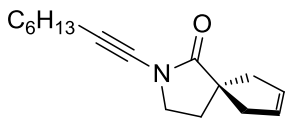

```
Current Data Parameters
NAME                 fc24kj539
EXPNO                       10
PROCNO                       1

F2 - Acquisition Parameters
Date_               20110617
Time_                   2.30
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      1024
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     295.0 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2            300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677677 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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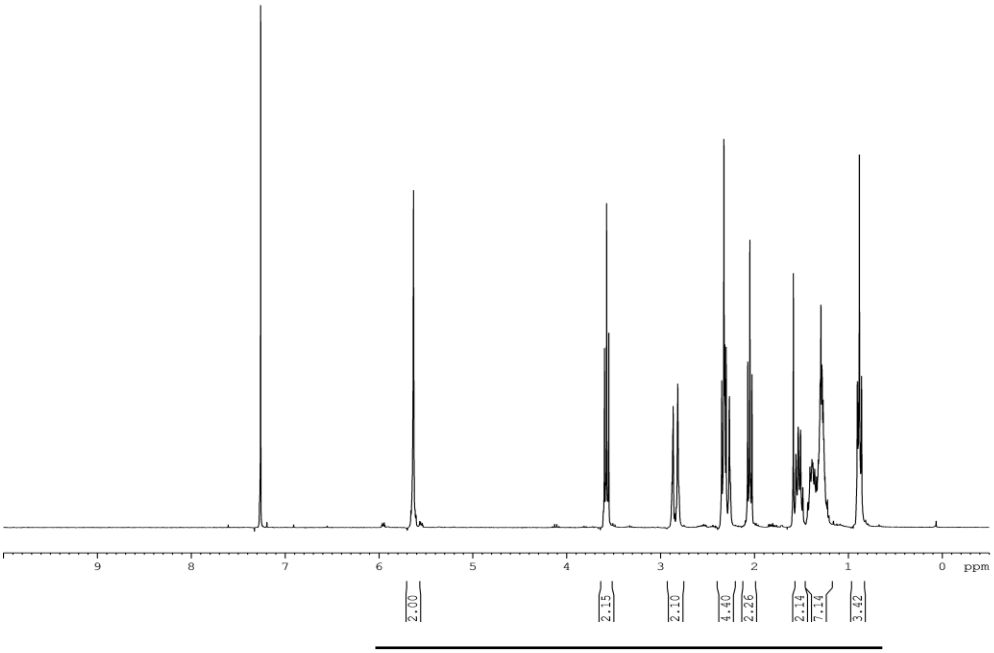


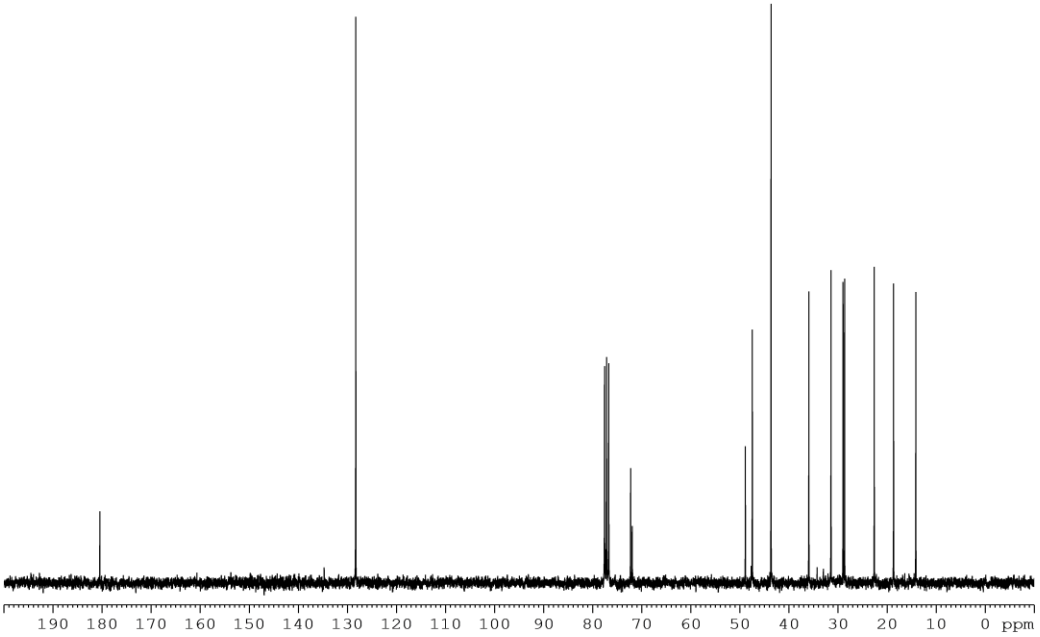

```
Current Data Parameters
NAME                 fc37kj625
EXPNO                      301
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20110912
Time                     18.00
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zg30
TD                      32768
SOLVENT                  DMSO
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                       456.1
DW                     79.200 usec
DE                      6.50 usec
TE                      295.1 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.80 usec
PL1                      0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                  300.1300059 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                          9.66 cm
F1P                        3.056 ppm
F1                        917.27 Hz
F2P                        0.199 ppm
F2                         59.78 Hz
PPMCM                    0.14285 ppm/cm
HZCM                    42.87449 Hz/cm
```




```
Current Data Parameters
NAME                 fc37kj625
EXPNO                       10
PROCNO                       1

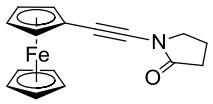
F2 - Acquisition Parameters
Date_                 20110913
Time                      8.28
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                      65536
SOLVENT                  CDCl3
NS                         699
DS                           4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                       1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                      294.9 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                  75.4677416 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         10.02 cm
F1P                       200.000 ppm
F1                      15093.55 Hz
F2P                      -10.000 ppm
F2                       -754.68 Hz
PPMCM                  10.50000 ppm/cm
HZCM                  792.41132 Hz/cm
```



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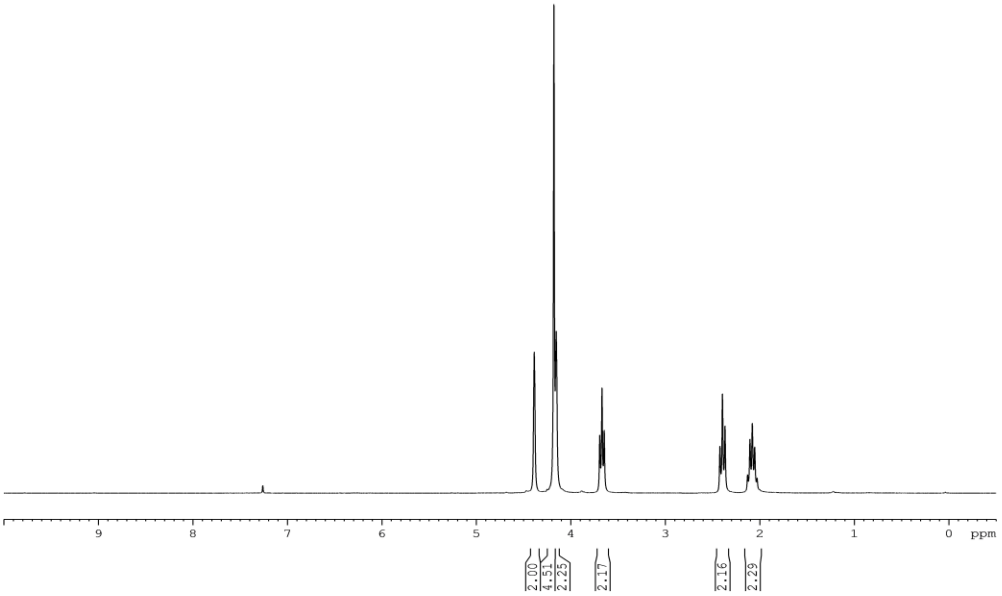


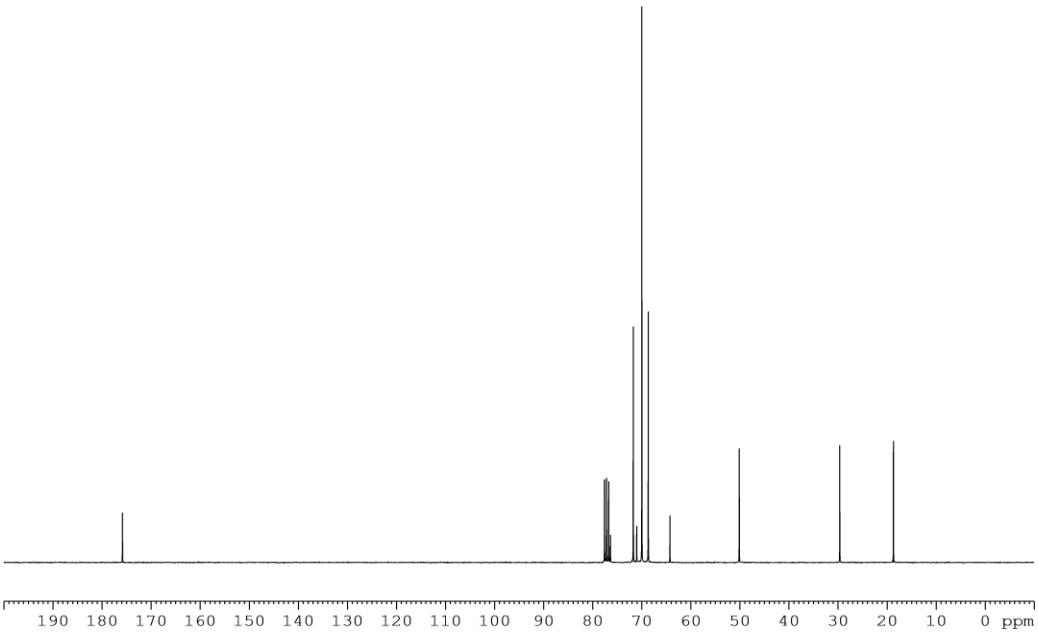

```
Current Data Parameters
NAME                 fc35g104EN
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_                 20110902
Time                     17.02
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                   zg30
TD                       32768
SOLVENT                  CDCl3
NS                          16
DS                           0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                          57
DW                     79.200 usec
DE                      6.50 usec
TE                     295.8 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                       32768
SF                 300.1300057 MHz
WDW                         EM
SSB                          0
LB                        0.10 Hz
GB                           0
PC                        1.00

1D NMR plot parameters
CX                       20.00 cm
CY                        9.65 cm
F1P                     10.000 ppm
F1                    3001.30 Hz
F2P                     -0.500 ppm
F2                    -150.06 Hz
PPMCM                 0.52500 ppm/cm
HZCM                157.56825 Hz/cm
```




```
Current Data Parameters
NAME                 fc35g104EN
EXPNO                        10
PROCNO                        1

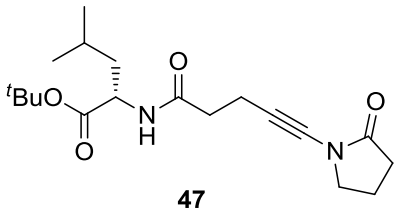
F2 - Acquisition Parameters
Date_                 20110902
Time                     16.43
INSTRUM                  spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                        2000
DS                           4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                       1625.5
DW                     27.800 usec
DE                     10.00 usec
TE                     295.9 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2               300.1312005 MHz

F2 - Processing parameters
SI                       32768
SF                 75.4677526 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40

1D NMR plot parameters
CX                       20.00 cm
CY                        9.78 cm
F1P                    200.000 ppm
F1                   15093.55 Hz
F2P                    -10.000 ppm
F2                    -754.68 Hz
PPMCM                10.50000 ppm/cm
HZCM               792.41138 Hz/cm
```



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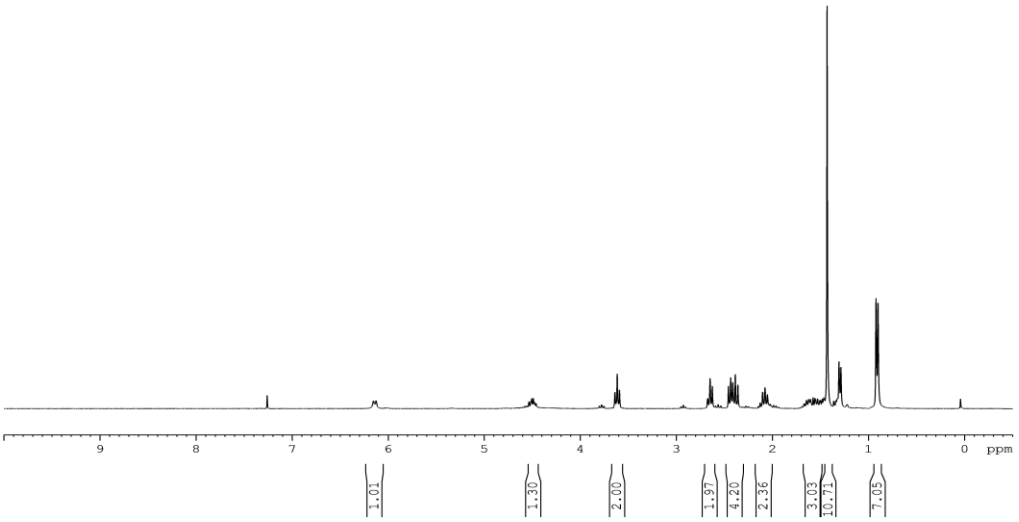
```
Current Data Parameters
NAME      fc42kjge104cn bis
EXPNO                  300
PROCNO                   1

F2 - Acquisition Parameters
Date_           20111021
Time               13.36
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG            zg30
TD                16384
SOLVENT            DMSO
NS                   16
DS                    2
SWH           4194.631 Hz
FIDRES        0.256020 Hz
AQ            1.9530228 sec
RG                  114
DW              119.200 usec
DE                6.50 usec
TE                294.9 K
D1            1.00000000 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                 1H
P1                6.90 usec
PL1               0.00 dB
SFO1        300.1319508 MHz

F2 - Processing parameters
SI                32768
SF          300.1300060 MHz
WDW                  EM
SSB                   0
LB                 0.10 Hz
GB                    0
PC                 1.00
```




```
Current Data Parameters
NAME          fc35g104CN
EXPNO                 12
PROCNO                 1

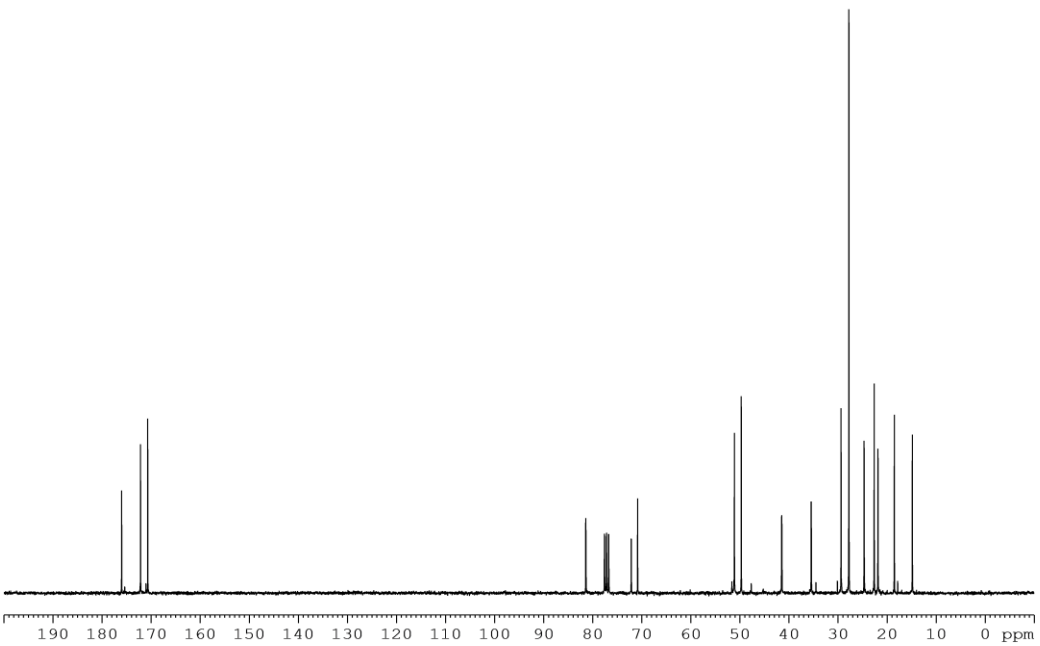
F2 - Acquisition Parameters
Date_           20110902
Time               18.41
INSTRUM            spect
PROBHD   5 mm BBI 1H-BB
PULPROG          zgpg30
TD                65536
SOLVENT            CDC13
NS                 1024
DS                    4
SWH           17985.611 Hz
FIDRES        0.274439 Hz
AQ            1.8219508 sec
RG                1448.2
DW                27.800 usec
DE                10.00 usec
TE                296.0 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

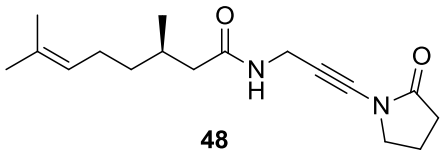
======== CHANNEL f1 ========
NUC1                13C
P1                9.00 usec
PL1               -6.00 dB
SFO1         75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             22.00 dB
PL13             22.00 dB
SFO2        300.1312005 MHz

F2 - Processing parameters
SI                32768
SF          75.4677548 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40

1D NMR plot parameters
CX                20.00 cm
CY                11.61 cm
F1P              215.000 ppm
F1             16225.57 Hz
F2P               -5.000 ppm
F2              -377.34 Hz
PPMCM          11.00000 ppm/cm
HZCM          830.14526 Hz/cm
```





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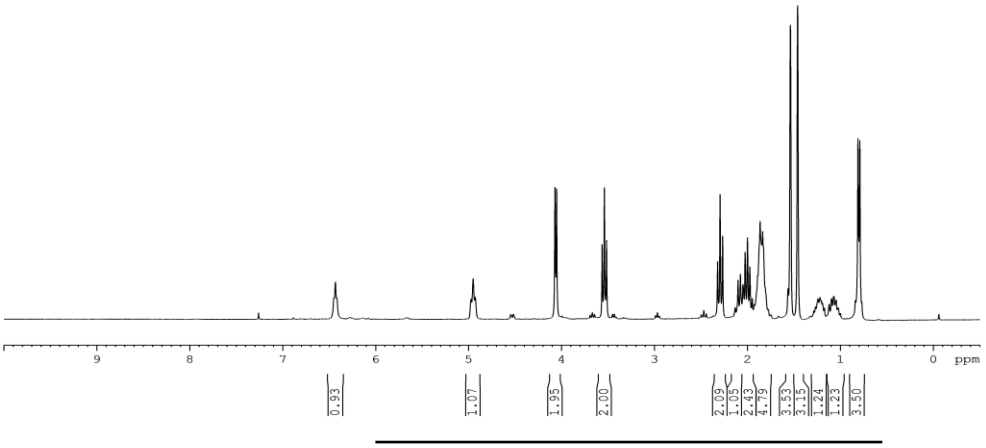


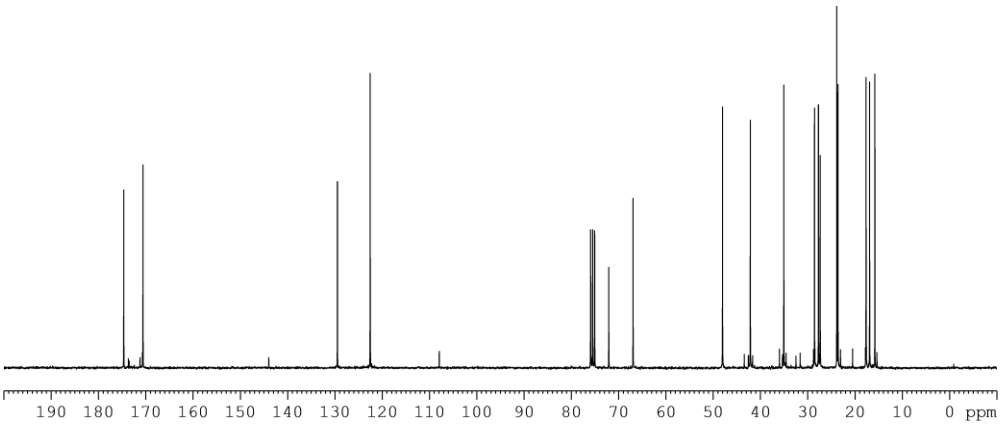

```
Current Data Parameters
NAME                 fc35g104CA
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110901
Time                    18.32
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       28.5
DW                     79.200 usec
DE                      6.50 usec
TE                     295.2 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1               300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300055 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         22.73 cm
F1P                        10.000 ppm
F1                       3001.30 Hz
F2P                       -0.500 ppm
F2                       -150.06 Hz
PPMCM                     0.52500 ppm/cm
HZCM                    157.56825 Hz/cm
```



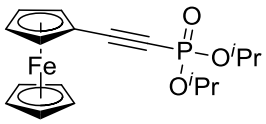

```
Current Data Parameters
NAME                 fc35g104CA
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110901
Time                    18.13
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG               zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2000
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                     27.800 usec
DE                     10.00 usec
TE                     295.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1               75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2              300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4678816 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



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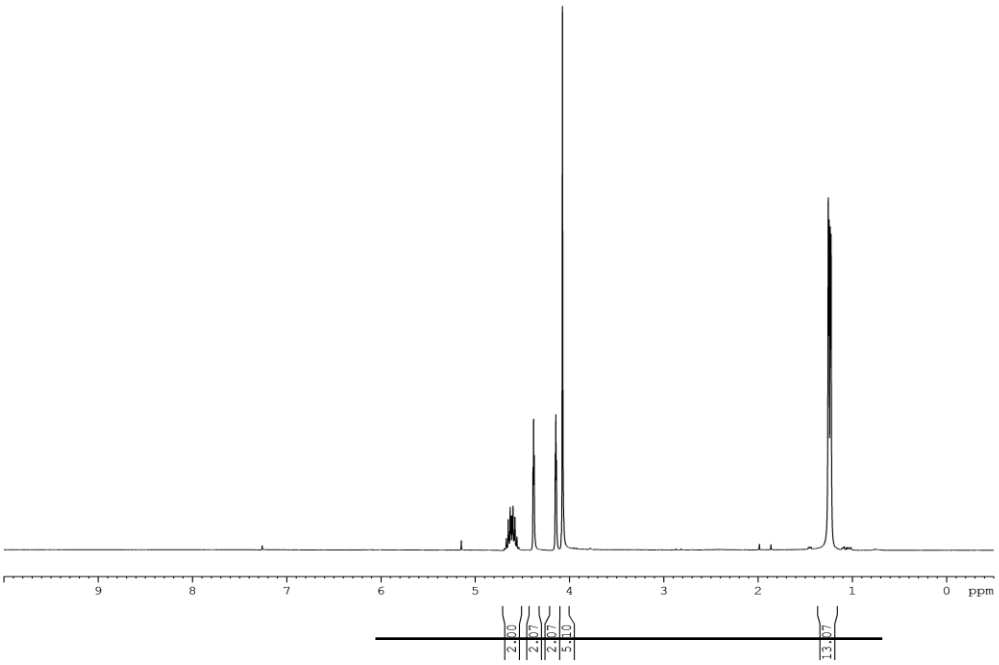


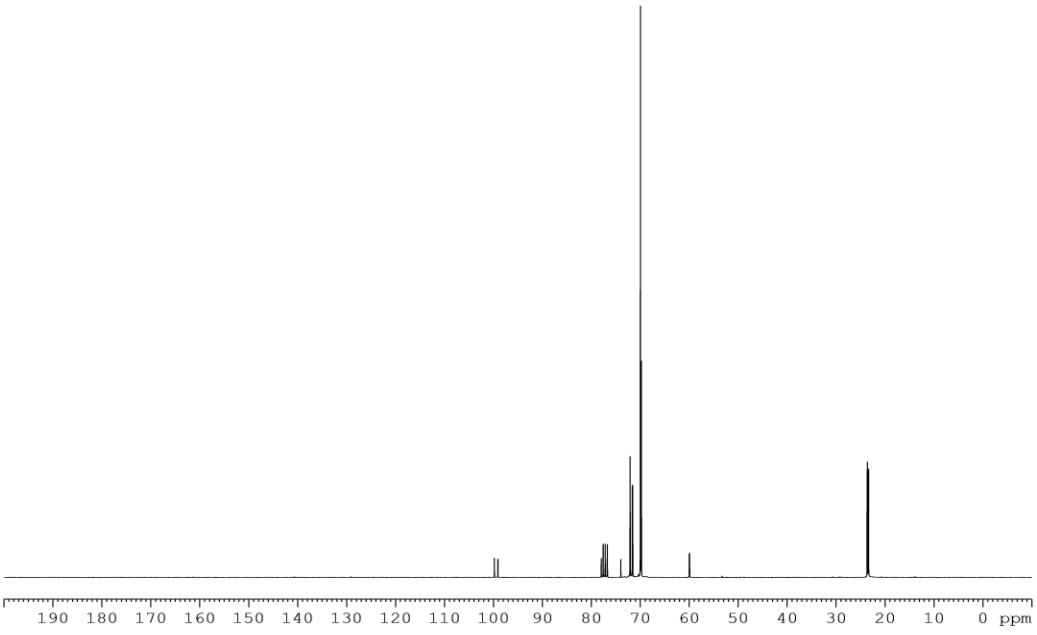

```
Current Data Parameters
NAME                 fc35g106EP
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110903
Time                   23.11
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                       25.4
DW                     79.200 usec
DE                      6.50 usec
TE                     296.3 K
D1                  1.00000000 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                       1H
P1                       6.20 usec
PL1                      0.00 dB
SFO1             300.1328512 MHz

F2 - Processing parameters
SI                         32768
SF                300.1300053 MHz
WDW                           EM
SSB                            0
LB                          0.10 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
CY                         11.43 cm
F1P                        1.445 ppm
F1                       433.60 Hz
F2P                        1.074 ppm
F2                       322.34 Hz
PPMCM                    0.01854 ppm/cm
HZCM                     5.56340 Hz/cm
```




```
Current Data Parameters
NAME                 fc35g106EP
EXPNO                        10
PROCNO                        1

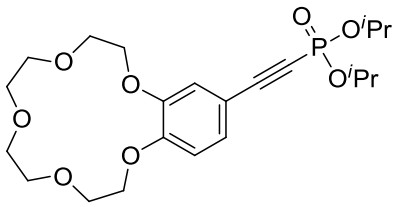
F2 - Acquisition Parameters
Date_               20110903
Time                   22.52
INSTRUM                spect
PROBHD    5 mm BBI 1H-BB
PULPROG             zgpg30
TD                     65536
SOLVENT                CDCl3
NS                        3000
DS                           4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                      1290.2
DW                     27.800 usec
DE                     10.00 usec
TE                     296.5 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
MCREST              0.00000000 sec
MCWRK               0.01500000 sec

======== CHANNEL f1 ========
NUC1                      13C
P1                       9.00 usec
PL1                     -6.00 dB
SFO1             75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    22.00 dB
PL13                    22.00 dB
SFO2             300.1312005 MHz

F2 - Processing parameters
SI                         32768
SF                75.4677646 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40

1D NMR plot parameters
CX                         20.00 cm
CY                         44.06 cm
F1P                       28.937 ppm
F1                      2183.83 Hz
F2P                        17.637 ppm
F2                      1331.02 Hz
PPMCM                    0.56502 ppm/cm
HZCM                    42.64077 Hz/cm
```



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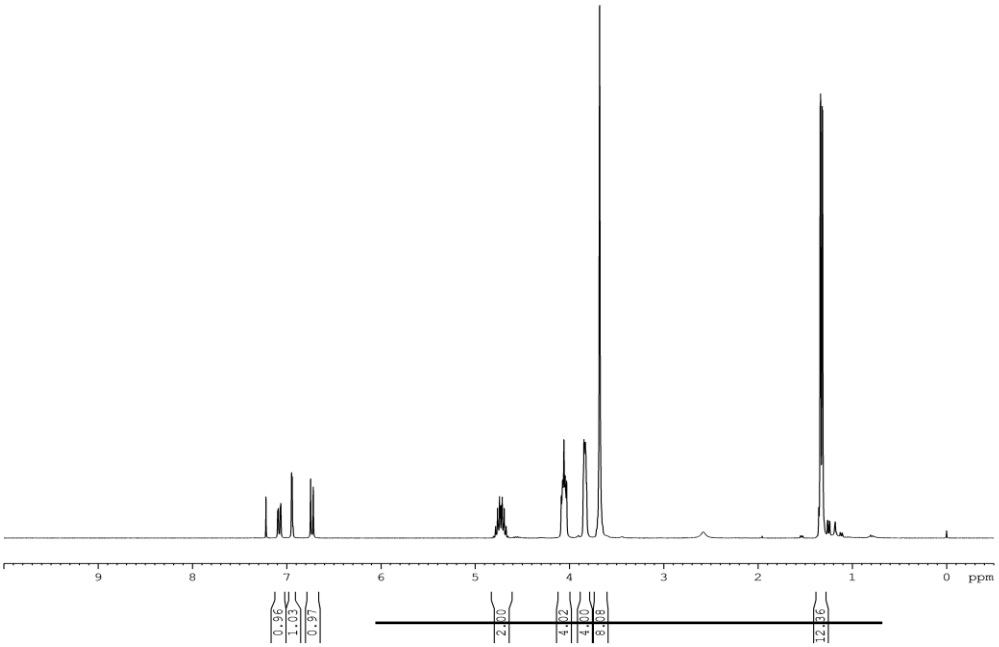


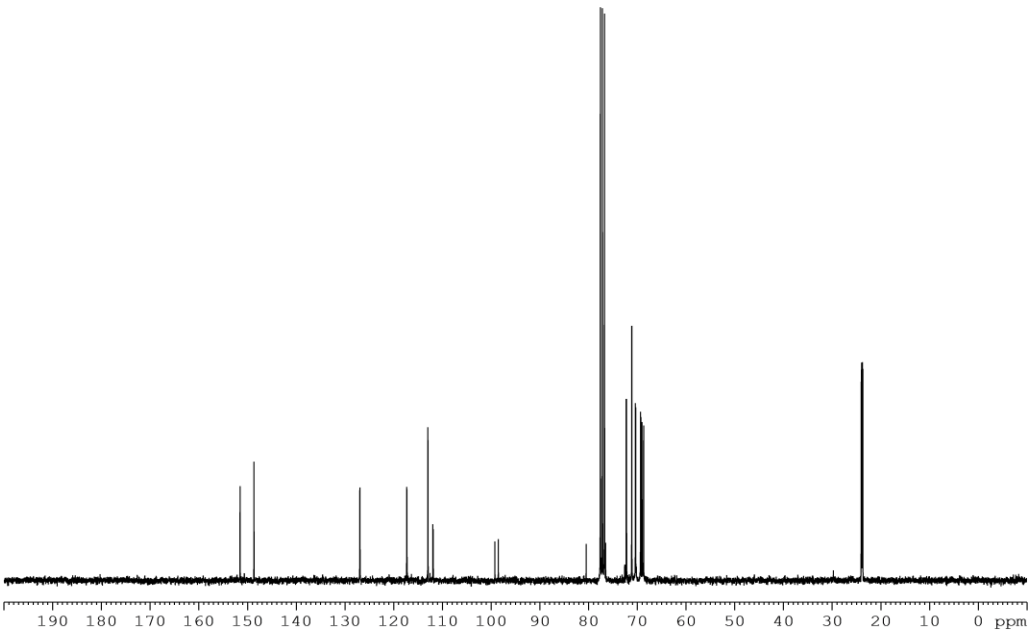
```
Current Data Parameters
NAME          fc37kj634b
EXPNO                 12
PROCNO                 1

F2 - Acquisition Parameters
Date_           20110916
Time               7.02
INSTRUM           spect
PROBHD   5 mm BBI 1H-BB
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                  16
DS                   0
SWH           6313.131 Hz
FIDRES        0.192661 Hz
AQ            2.5952756 sec
RG                80.6
DW              79.200 usec
DE               6.50 usec
TE              294.1 K
D1            1.00000000 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1                1H
P1                6.20 usec
PL1               0.00 dB
SFO1       300.1328512 MHz

F2 - Processing parameters
SI               32768
SF          300.1300177 MHz
WDW                 EM
SSB                  0
LB                0.10 Hz
GB                   0
PC                1.00

1D NMR plot parameters
CX               20.00 cm
CY               26.89 cm
F1P               4.905 ppm
F1             1472.26 Hz
F2P               3.501 ppm
F2             1050.62 Hz
PPMCM         0.07024 ppm/cm
HZCM         21.08218 Hz/cm
```



```
Current Data Parameters
NAME          fc37kj634b
EXPNO                 10
PROCNO                 1

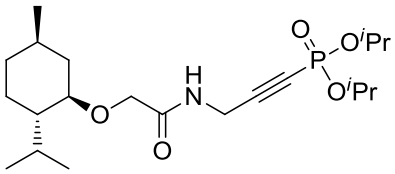
F2 - Acquisition Parameters
Date_           20110916
Time               6.44
INSTRUM           spect
PROBHD   5 mm BBI 1H-BB
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                2000
DS                   4
SWH           17985.611 Hz
FIDRES        0.274439 Hz
AQ            1.8219508 sec
RG                2048
DW              27.800 usec
DE              10.00 usec
TE              294.2 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
MCREST        0.00000000 sec
MCWRK         0.01500000 sec

======== CHANNEL f1 ========
NUC1               13C
P1                9.00 usec
PL1              -6.00 dB
SFO1       75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             22.00 dB
PL13             22.00 dB
SFO2       300.1312005 MHz

F2 - Processing parameters
SI               32768
SF          75.4677438 MHz
WDW                 EM
SSB                  0
LB                1.00 Hz
GB                   0
PC                1.40

1D NMR plot parameters
CX               20.00 cm
CY                8.75 cm
F1P             200.000 ppm
F1            15093.55 Hz
F2P            -10.000 ppm
F2             -754.68 Hz
PPMCM         10.50000 ppm/cm
HZCM         792.41132 Hz/cm
```



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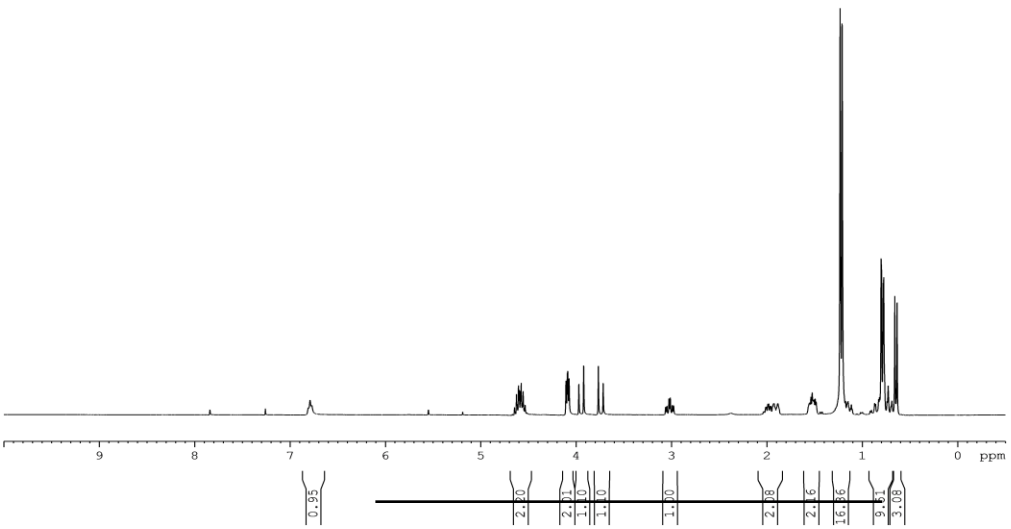


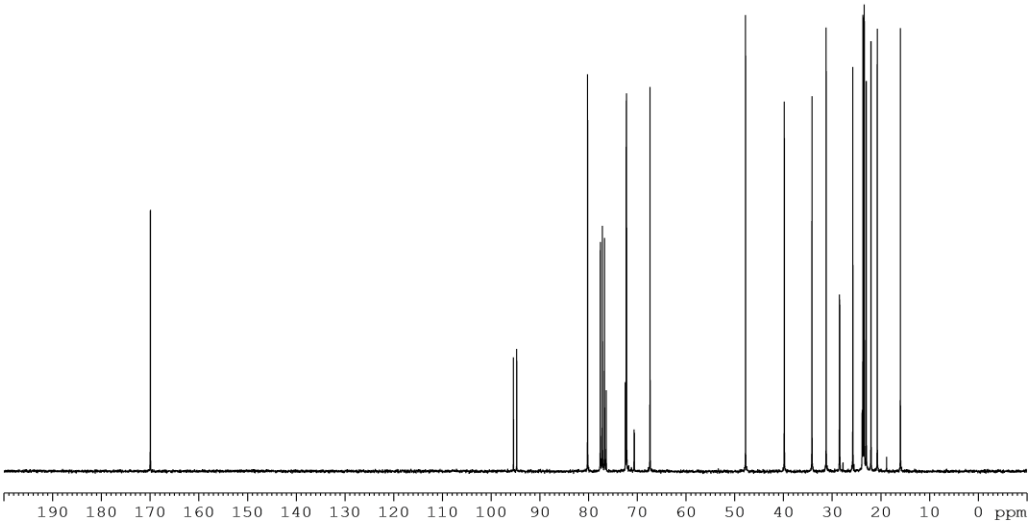
```
Current Data Parameters
NAME                 fc35g106AP
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110904
Time_                    2.51
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                  zg30
TD                      32768
SOLVENT                 CDCl3
NS                         16
DS                          0
SWH                  6313.131 Hz
FIDRES               0.192661 Hz
AQ                   2.5952756 sec
RG                        28.5
DW                      79.200 usec
DE                       6.50 usec
TE                      296.2 K
D1                   1.00000000 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                        1H
P1                        6.20 usec
PL1                       0.00 dB
SFO1                300.1328512 MHz

F2 - Processing parameters
SI                      32768
SF                  300.1300059 MHz
WDW                        EM
SSB                         0
LB                       0.10 Hz
GB                          0
PC                       1.00

1D NMR plot parameters
CX                      20.00 cm
CY                      58.28 cm
F1P                      2.643 ppm
F1                     793.10 Hz
F2P                      0.373 ppm
F2                     111.92 Hz
PPMCM                 0.11348 ppm/cm
HZCM                 34.05870 Hz/cm
```



```
Current Data Parameters
NAME                 fc35g106AP
EXPNO                        10
PROCNO                        1

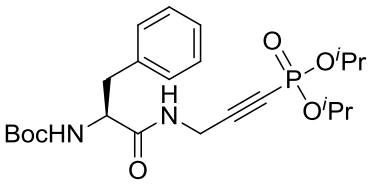
F2 - Acquisition Parameters
Date_               20110904
Time_                    2.32
INSTRUM                 spect
PROBHD    5 mm BBI 1H-BB
PULPROG                zgpg30
TD                      65536
SOLVENT                 CDCl3
NS                       3000
DS                          4
SWH                 17985.611 Hz
FIDRES               0.274439 Hz
AQ                   1.8219508 sec
RG                      1290.2
DW                      27.800 usec
DE                      10.00 usec
TE                      296.4 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
MCREST               0.00000000 sec
MCWRK                0.01500000 sec

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.00 usec
PL1                      -6.00 dB
SFO1                75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    80.00 usec
PL2                       0.00 dB
PL12                     22.00 dB
PL13                     22.00 dB
SFO2                300.1312005 MHz

F2 - Processing parameters
SI                      32768
SF                  75.4677537 MHz
WDW                        EM
SSB                         0
LB                       1.00 Hz
GB                          0
PC                       1.40

1D NMR plot parameters
CX                      20.00 cm
CY                       8.22 cm
F1P                    200.000 ppm
F1                   15093.55 Hz
F2P                   -10.000 ppm
F2                    -754.68 Hz
PPMCM                10.50000 ppm/cm
HZCM                792.41138 Hz/cm
```



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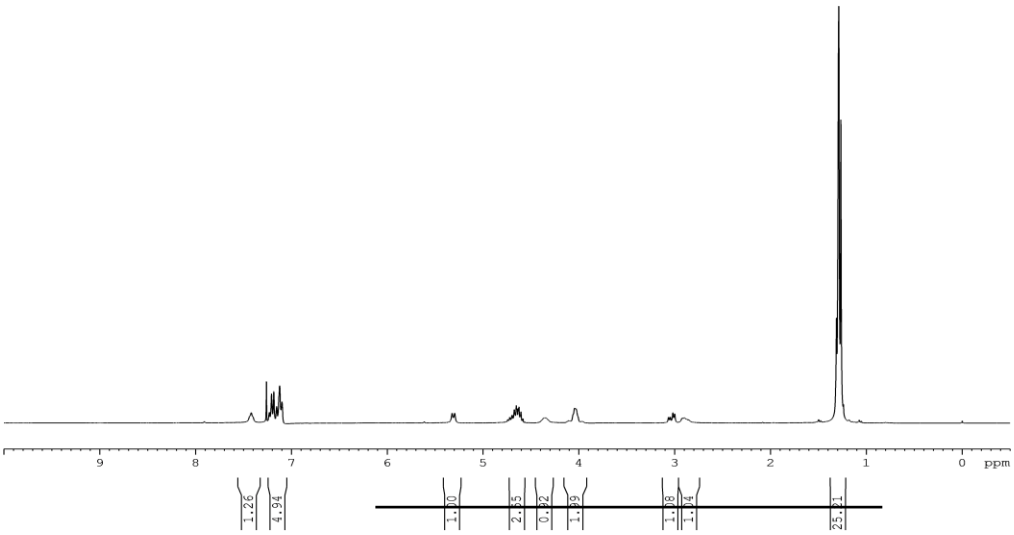


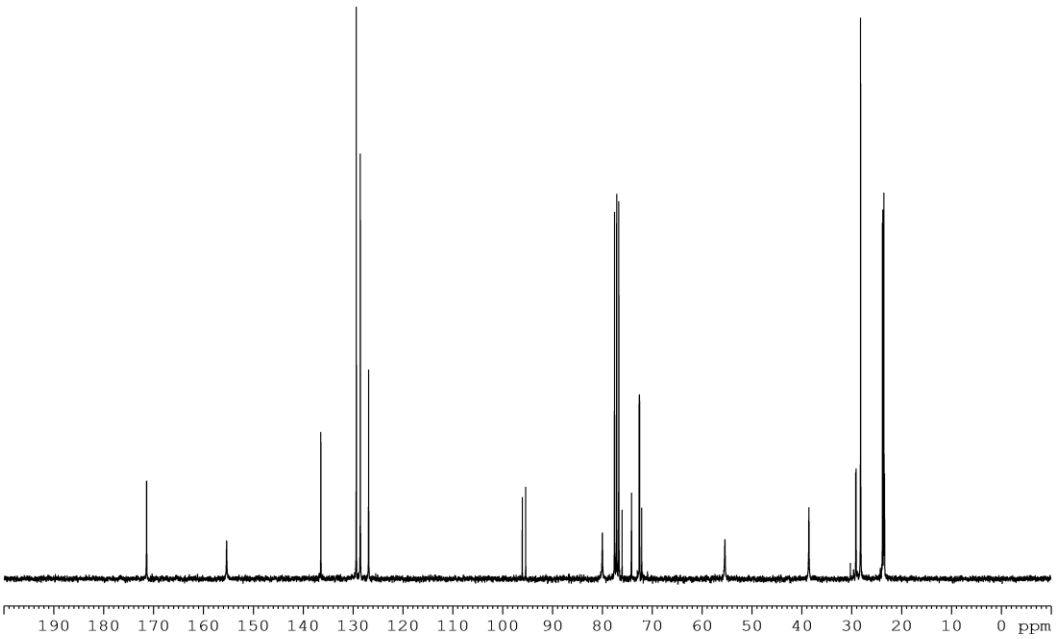

```
Current Data Parameters
NAME                 fc37kj634a
EXPNO                        12
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110916
Time                    4.07
INSTRUM                spect
PROBHD   5 mm BBI 1H-BB
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        16
DS                         0
SWH                 6313.131 Hz
FIDRES              0.192661 Hz
AQ                  2.5952756 sec
RG                        32
DW                    79.200 usec
DE                     6.50 usec
TE                    294.1 K
D1                 1.00000000 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     6.20 usec
PL1                    0.00 dB
SFO1              300.1328512 MHz

F2 - Processing parameters
SI                     32768
SF                300.1300053 MHz
WDW                       EM
SSB                        0
LB                      0.10 Hz
GB                         0
PC                      1.00

1D NMR plot parameters
CX                     20.00 cm
CY                     11.01 cm
F1P                   10.000 ppm
F1                  3001.30 Hz
F2P                   -0.500 ppm
F2                  -150.06 Hz
PPMCM                 0.52500 ppm/cm
HZCM                157.56825 Hz/cm
```




```
Current Data Parameters
NAME                 fc39kj634a
EXPNO                        10
PROCNO                        1

F2 - Acquisition Parameters
Date_               20110928
Time                    2.02
INSTRUM                spect
PROBHD   5 mm BBI 1H-BB
PULPROG              zgpg30
TD                     65536
SOLVENT                CDCl3
NS                      2000
DS                         4
SWH                17985.611 Hz
FIDRES              0.274439 Hz
AQ                  1.8219508 sec
RG                     1824.6
DW                    27.800 usec
DE                    10.00 usec
TE                    295.0 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
MCREST             0.00000000 sec
MCWRK              0.01500000 sec

======== CHANNEL f1 ========
NUC1                     13C
P1                     9.00 usec
PL1                   -6.00 dB
SFO1              75.4752953 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  22.00 dB
PL13                  22.00 dB
SFO2              300.1312005 MHz

F2 - Processing parameters
SI                     32768
SF                75.4677490 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40

1D NMR plot parameters
CX                     20.00 cm
CY                      9.83 cm
F1P                   61.351 ppm
F1                  4629.99 Hz
F2P                   14.575 ppm
F2                  1099.96 Hz
PPMCM                 2.33877 ppm/cm
HZCM                176.50180 Hz/cm
```