Supplementary Information for

Practical and selective hydroboration of aldehydes and ketones in air catalysed by an iron(II) coordination polymer

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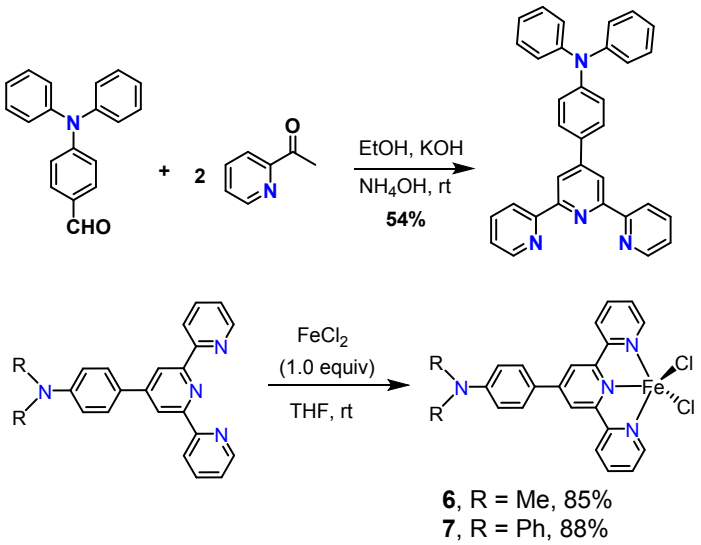
Experimental Details



Scheme S1. The synthetic procedure for **6** and **7**.

Synthesis of 4′-(4-diphenylamino)phenyl-2,2′;6′,2″-terpyridine. In a 250 cm^3 round-bottom flask, 2-acetylpyridine (1.21 g, 10.0 mmol) was added to a solution of 4-dimethylaminobenzaldehyde (1.37 g, 5.0 mmol) in EtOH (50 cm^3). KOH pellets (0.56 g, 10 mmol) were then added, followed by aqueous NH_3 (25%, 30 cm^3). The resulting orange solution was stirred at room temperature for 48 h, during which time organge-yellow suspension formed. The solid was collected by filtration, washed with EtOH and dried in vacuo over P_2O_5. Yellow-orange solid was isolated. Yield: 1.28 g (54%). FT-IR (solid, cm^{-1}): 1570s, 1488s, 1321m, 1271s, 1216m, 1173m, 1049s, 991s, 792s, 753s, 694s, 617m. ^{1}H NMR (500 MHz, Chloroform-*d*) δ 8.76 (d, *J* = 4.8 Hz, 2H), 8.73-8.67 (m, 2H), 8.25 – 8.20 (m, 2H), 7.93 (s, 2H), 7.60 (d, *J* = 8.5 Hz, 3H), 7.52 (t, *J* = 6.2 Hz, 2H), 7.30 (dd, *J* = 8.5, 7.3 Hz, 4H), 7.16 – 7.13 (m, 4H), 7.11 (t, *J* = 7.4 Hz, 3H), 7.02 (d, *J* = 8.7 Hz, 2H) ppm; ^{13}C NMR (126 MHz, Chloroform-*d*) δ 150.4, 146.8, 130.4, 129.6, 129.5, 128.0, 126.9, 125.9, 125.6, 124.2, 123.2, 121.3, 117.9 ppm.

Synthesis of Complex 6. In a 20 mL scintillation vial, 4′-(4-dimethylamino)phenyl-2,2′;6′,2″-terpyridine (352 mg, 1.00 mmol) was dissolved in THF (10 mL) and anhydrous $FeCl_2$ (125.9 mg, 1.00 mmol) was added in one portion. The resulting suspension was allowed to stir at room temperature for 16 h. The precipitate was filtered and washed with THF (3 × 2 mL), dried in vacuo over P_2O_5 overnight to give brown powder of **6**. Yield: 406 mg (85%). FT-IR (solid, cm^{-1}): 1588s, 1537s, 1473s, 1414m, 1364s, 1249m, 1210s, 1170s, 1066w, 1018m, 945w, 816m, 788s, 725w, 685w, 566m. Anal. Calcd. (%) for $C_{23}H_{20}Cl_2FeN_4$: C, 57.65; H, 4.21; N, 11.69. Found: C, 57.34; H, 4.19; N, 11.56. NMR spectroscopy is not recorded due to the paramagnetic nature of the complex.

Synthesis of Complex 7. In a 20 mL scintillation vial, 4′-(4-diphenylamino)phenyl-2,2′;6′,2″-terpyridine (476 mg, 1.00 mmol) was dissolved in THF (10 mL) and anhydrous $FeCl_2$ (125.9 mg, 1.00 mmol) was added in one portion. The resulting suspension was allowed to stir at room temperature for 16 h. The precipitate was filtered and washed with THF (3 × 2 mL), dried in vacuo over P_2O_5 overnight to give dark-brown powder of **7**. Yield: 530 mg (88%). FT-IR (solid, cm^{-1}): 1588s, 1537s, 1473s, 1414m, 1364s, 1249m, 1210s, 1170s, 1066w, 1018m, 945w, 816m, 788s, 725w, 685w, 566m. Anal. Calcd. (%) for

$C_{33}H_{24}Cl_2FeN_4$: C, 65.70; H, 4.01; N, 9.29. Found: C, 65.58; H, 3.92; N, 9.20. NMR spectroscopy is not recorded due to the paramagnetic nature of the complex.

Spectroscopic data for isolated products

Benzyl alcohol (***3a***).[1] Colorless oil. Yield: 99.5 mg (92%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.61 – 7.07 (m, 5H), 4.63 (s, 2H), 3.35 (br, 1H); ^{13}C NMR (151 MHz, $CDCl_3$) δ 140.9, 128.5, 127.5, 127.0, 64.9 ppm.

4-Chlorobenzyl alcohol (***3b***).[1] Colorless oil. Yield: 129.0 mg (91%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.33 (d, J = 8.5 Hz, 2H), 7.29 (d, J = 8.3 Hz, 2H), 4.66 (s, 2H), 1.78 (s, 1 H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 139.5, 133.7, 129.0, 128.6, 64.9 ppm.

4-Methoxybenzyl alcohol (***3c***).[1] Colorless oil. Yield: 103.5 mg (75%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.28 (d, J = 8.3 Hz, 2H), 6.89 (d, J = 8.3 Hz, 2H), 4.60 (s, 2H), 3.80 (s, 3H), 1.85 (s, 1H) ppm. ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.3, 133.2, 128.8, 114.0 , 65.1 , 55.4 ppm.

3,4-(Methylenedioxy)benzyl alcohol (***3d***).[1] Colorless oil. Yield: 143.1 mg (94%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.87 (s, 1H), 6.80 (d, J = 8.5 Hz, 2H), 5.95 (s, 2H), 4.58 (s, 2H), 1.65 (s, 1H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 147.8, 147.1, 134.8, 120.5, 108.2, 107.9, 101.0, 65.3 ppm.

2-Methylthiolbenzyl alcohol (***3e***).[1] Yellowish oil. Yield: 124.5 mg (81%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.32 (d, J = 7.5 Hz, 1H), 7.28 – 7.18 (m, 2H), 7.13 (dd, J = 7.9, 6.2 Hz, 1H), 4.70 (s, 2H), 2.44 (s, 3H), 2.05 (s, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 138.8, 136.7, 128.4, 128.0, 126.5, 125.5, 63.5, 16.1 ppm.

4-Trifluoromethylbenzyl alcohol (***3f***).[2] Yellowish oil. Yield: 158.0 mg (90%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.61 (d, J = 8.0 Hz, 2H), 7.47 (d, J = 8.0 Hz, 2H), 4.77 (s, 2H), 1.82 (br, 1H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 144.7, 129.9 (d, J = 32.0 Hz), 126.8, 125.5 (q, J = 3.4 Hz), 125.2, 123.1, 64.5 ppm.

4-Nitrobenzyl alcohol (***3g***).[1] Yellowish oil. Yield: 127.0 mg (83%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.17 (d, J = 8.8, 2H), 7.51 (d, J = 8.8 Hz, 2H), 4.81 (s, 2H), 2.43 (s, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 148.6, 147.4, 127.3, 124.0, 64.2 ppm.

Methyl 4-(hydroxymethyl)benzoate (***3h***).[2] Colorless oil. Yield: 139.5 mg (84%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 (d, J = 7.3 Hz, 2H), 7.41 (d, J = 7.9 Hz, 2H), 4.74 (s, 2H), 3.90 (s, 3H), 2.14 (br., 1H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.1, 146.1, 129.8, 129.2, 126.5, 64.6, 52.2 ppm.

1-Pyrenemethanol (***3i***).[3] Pale yellow solid. Yield: 197.0 mg (85%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.33 (dd, J = 9.2, 1.6 Hz, 1H), 8.19 (dd, J = 7.7, 3.7 Hz, 2H), 8.12 (dd, J = 8.6, 4.2 Hz, 2H), 8.07 – 8.02 (m, 2H), 8.01 (dd, J = 7.7, 3.5 Hz, 2H), 5.37 (s, 2H), 1.99 (s, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 133.9, 131.4, 130.9, 128.9, 128.0, 127.6, 127.5, 126.1, 125.4, 125.4, 125.0, 124.9, 124.8, 123.1, 64.0 ppm.

1,4-Benzenedimethanol (***3j***).[4] Colorless oil. Yield124.0 mg (90%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.37 (s, 4H), 4.70 (s, 4H), 1.62 (br., 2H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 140.6, 127.6, 65.5 ppm.

2-Thiophenemethanol (***3k***).[1] Yellowish oil. Yield: 104.6 mg (92%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.32 – 7.26 (m, 1H), 7.07 – 7.00 (m, 1H), 6.99 (m, 1H), 4.84 (s, 2H), 1.70 (s, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 144.0, 127.0, 125.8, 125.6, 60.2 ppm.

4-Pyridinemethanol (***3l***).[4] Yellowish oil. Yield: 99.2 mg (91%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.42 (br., 2H), 7.29 (d, *J* = 5.7 Hz, 2H), 4.72 (s, 2H), 4.29 (s, 1H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 151.5, 149.1, 121.3, 62.9 ppm. ^{1}H NMR (500 MHz, Chloroform-*d*)

Cinnamyl alcohol (***3m***).[1] Yellowish oil. Yield: 114.0 mg (85%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.41 (d, *J* = 8.5 Hz, 2H), 7.38 – 7.32 (m, 2H), 7.32 – 7.26 (m, 1H), 6.64 (d, *J* = 16.0 Hz, 1H), 6.42 – 6.34 (m, 1H), 4.33 (d, *J* = 5.7 Hz, 2H), 2.56 (s, 1H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 136.9, 131.2, 128.82, 128.75, 127.9, 126.7, 63.7 ppm.

*1-Phenylethanol (**5a**).*[1] Colorless oil. Yield: 116.0 mg (95%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.36 – 7.24 (m, 4H), 7.22 – 7.18 (m, 1H), 4.83 (q, *J* = 6.5 Hz, 1H), 1.73 (s, 1H), 1.43 (d, *J* = 6.5 Hz, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 145.9, 128.6, 127.6, 125.5, 70.6, 25.3 ppm.

*2-Methyl-1-phenylpropanol (**5b**).*[1] Colorless oil. Yield: 127.5 mg (85%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 – 7.13 (m, 5H), 4.27 (d, *J* = 6.9 Hz, 1H), 1.94 – 1.83 (m, 1H), 1.81 (s, 1H), 0.92 (d, *J* = 6.7 Hz, 3H), 0.72 (d, *J* = 6.8 Hz, 3H) ppm; ^{13}C NMR (101 MHz, $CDCl_3$) δ 143.7, 128.2, 127.4, 126.6, 80.1, 35.3, 19.0, 18.3 ppm.

*1-(4-Chlorophenyl)ethanol (**5c**).*[1] Colorless oil. Yield: 140.2 mg (90%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.31 (d, *J* = 1.7 Hz, 4H), 4.88 (q, *J* = 6.5 Hz, 1H), 1.85 (br, 1H), 1.47 (d, *J* = 6.5 Hz, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 144.4, 133.2, 128.7, 126.9, 69.9, 25.4 ppm.

*1-(4-Methoxyphenyl)ethanol (**5d**).*[1] Yellowish oil. Yield: 133.7 mg (88%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.25 (d, *J* = 9.4 Hz, 2H), 6.84 (d, *J* = 9.0 Hz, 2H), 4.78 (q, *J* = 6.5 Hz, 1 H), 3.76 (s, 3H), 2.29 (br, 1H), 1.42 (d, *J* = 6.9 Hz, 3 H) ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ 158.9, 138.1, 126.7, 113.8, 69.9, 55.3, 25.1 ppm.

*1-(4-Nitrophenyl)ethanol (**5e**).*[2] Yellowish oil. Yield: 150.2 mg (90%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.13 (d, *J* = 9.0 Hz, 2H), 7.50 (d, *J* = 9.0 Hz, 2H), 4.97 (q, *J* = 6.6 Hz, 1H), 2.58 (br., 1H), 1.47 (d, *J* = 7.1 Hz, 3H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 153.3, 147.1, 126.2, 123.7, 69.4, 25.4 ppm.

*1-(4-Trifluoromethylphenyl)ethanol (**5f**).*[2] Yellowish oil. Yield: 156.0 mg (82%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.68 – 7.56 (m, 2H), 7.56 – 7.43 (m, 2H), 4.97 (q, *J* = 6.5 Hz, 1H), 1.91 (s, 1H), 1.50 (d, *J* = 6.6 Hz, 3H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 150.0, 129.9 (q, *J* = 32.2 Hz), 126.0, 125.8 (q, *J* = 3.7 Hz), 124.5(q, *J* = 272.0 Hz), 70.2, 25.7 ppm.

*1-Cyclopropyl phenylmethanol (**5g**).*[1] Yellowish oil. Yield: 103.5 mg (70%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.43 (d, *J* = 8.1 Hz, 2H), 7.39-7.33 (m, 2H), 7.31 – 7.27 (m, 1H), 4.01 (d, *J* = 8.4 Hz, 1H), 2.02 (s, 1H), 1.23 (m, 1H), 0.65 (tt, *J* = 9.0, 5.1 Hz, 1H), 0.56 (tt, *J* = 8.6, 4.8 Hz, 1H), 0.48 (dq, *J* = 10.0, 5.0 Hz, 1H), 0.38 (ddt, *J* = 9.4, 5.7, 4.7 Hz, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 143.8, 128.4, 127.6, 126.0, 78.7, 19.3, 3.7, 2.9 ppm.

*1,2,3,4-Tetrahydronaphthalen-1-ol (**5h**).*[1] Yellowish oil. Yield: 105.0 mg (71%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.47 – 7.39 (m, 1H), 7.24 – 7.18 (m, 2H), 7.13 – 7.09 (m, 1H), 4.78 (t, *J* = 5.0 Hz, 1H), 2.84 (dt, *J* = 16.6, 5.6 Hz, 1H), 2.73 (ddd, *J* = 16.6, 8.2, 5.7 Hz, 1H), 2.04 – 1.94 (m, 2H), 1.91 (dtd, *J* = 13.3, 7.2,

6.6, 3.7 Hz, 1H), 1.87 (s, 1H), 1.83 – 1.72 (m, 1H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 138.8, 137.1, 129.0, 128.7, 127.6, 126.2, 68.1, 32.3, 29.3, 18.8 ppm.

*1-(2-Naphthalyl)ethanol (**5i**).*[3] Pale yellow solid. Yield: 144.5 mg (84%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.01 – 7.68 (m, 4H), 7.60 – 7.39 (m, 3H), 5.14 – 5.04 (m, 1H), 1.97 (br, 1H), 1.67 – 1.50 (m, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 143.3, 133.4, 133.0, 128.4, 128.1, 128.0, 127.8, 126.3, 125.9, 123.9, 70.7, 25.3 ppm.

*1-(Ferrocenyl)ethanol (**5j**).*[5] Orange solid. Yield: 209.1 mg (91%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.46 (br., 1H), 4.12 (t, *J* = 11.2 Hz, 9H), 1.83 (br., 1H), 1.48 – 1.26 (m, 3H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 95.0, 68.6, 68.1, 68.1, 66.4, 65.7, 23.8 ppm.

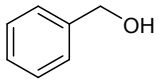
*(E)-4-phenylbut-3-en-2-ol (**5k**).*[6] Yellowish oil. Yield: 91.5 mg (62%). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.42 – 7.36 (m, 2H), 7.32 (ddd, *J* = 7.7, 6.8, 1.3 Hz, 2H), 7.26 – 7.21 (m, 1H), 6.61 – 6.53 (m, 1H), 6.27 (dd, *J* = 15.9, 6.4 Hz, 1H), 4.50 (t, *J* = 6.4 Hz, 1H), 1.61 (s, 1H), 1.38 (d, *J* = 6.4 Hz, 3H) ppm; ^{13}C NMR (151 MHz, $CDCl_3$) δ 136.7, 133.6, 129.4, 128.6, 127.6, 126.5, 69.0, 23.4 ppm.

*1-(3-Pyridyl)ethanol (**5l**).*[7] Yellowish oil. Yield: 113.2 mg (92%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.48 (s, 1H), 8.40 (d, *J* = 4.6 Hz, 1H), 7.73 (dt, *J* = 7.9, 2.0 Hz, 1H), 7.26 (dd, *J* = 7.8, 4.9 Hz, 1H), 4.91 (q, *J* = 6.5 Hz, 1H), 3.66 (s, 1H), 1.49 (d, *J* = 6.5 Hz, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.2, 147.1, 141.6, 133.6, 123.7, 67.8, 25.3 ppm.

4-Acetylbenzyl alcohol (***9***).[1] Colorless oil. Yield: 129.0 mg (86%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 8.3 Hz, 2H), 7.43 (d, *J* = 8.2 Hz, 2H), 4.76 (s, 2H), 2.66 (s, 1H), 2.58 (s, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 198.2, 146.4, 136.3, 128.7, 126.7, 64.6, 26.7 ppm.

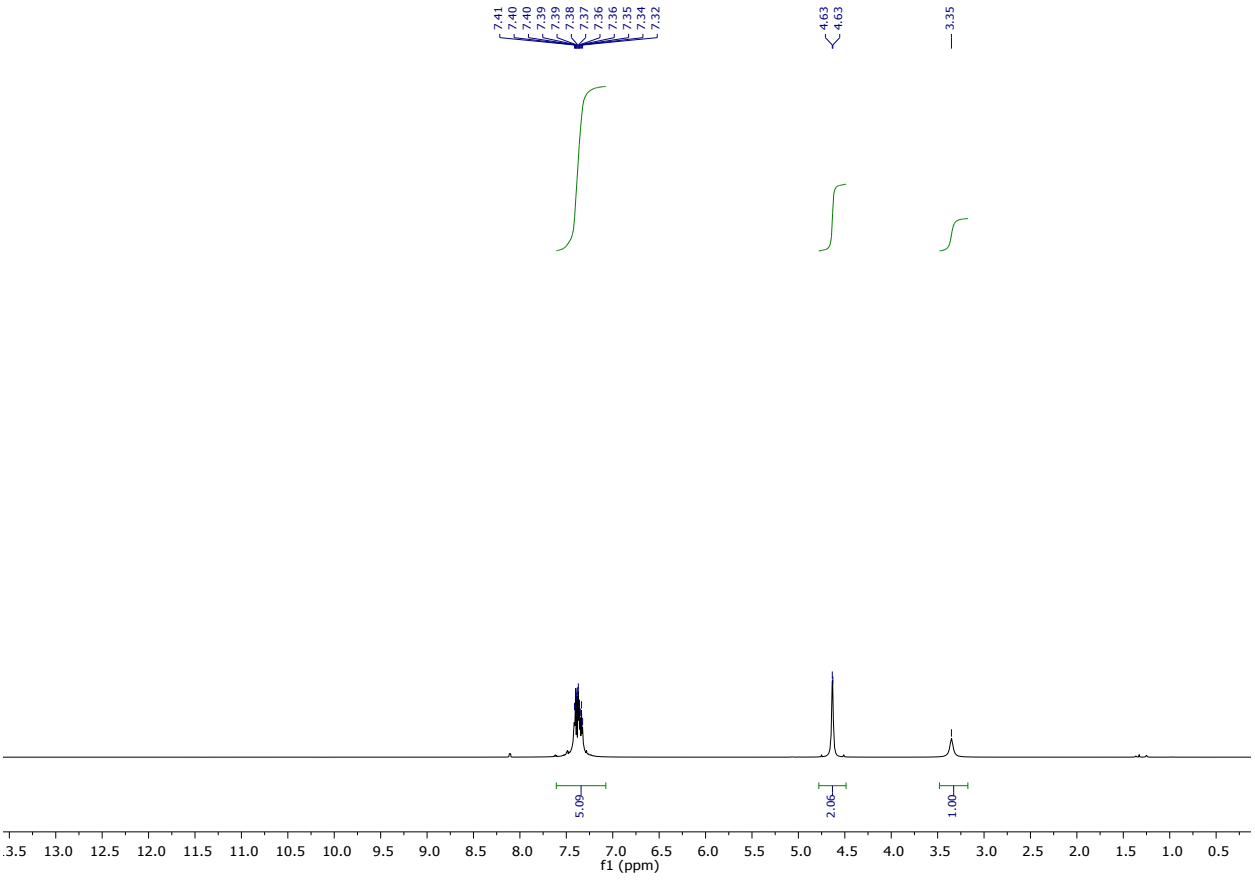
1-Catalysed Hydroboration of Rotenone in Air. In a fume hood, precatalyst **1** (2.7 mg, 2.5 μmol, 0.5 mol% based on the [Fe(**L**)$_2$Cl$_2$] unit) and KO^{t}Bu (1.1 mg, 10 μmol) was loaded in a 3.8 mL glass vial equipped with a stir bar and THF (1 mL) was then added. The vial was open to air and rotenone (197 mg, 0.5 mmol) and pinacolborane (129 mg, 1.0 mmol) were charged to the vial. The reaction mixture was allowed to stir in air at room temperature for 4 h. After completion of the reaction, the crude reaction mixture was subjected to a column chromatography on SiO_2 using ethyl acetate/hexane (1/10) as an eluent. The isolated product **6** was characterized by ^{1}H and ^{13}C NMR spectroscopies. While solid. Yield: 150.5 mg (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.04 (d, *J* = 8.1 Hz, 1H), 6.69 (s, 1H), 6.44 (d, *J* = 8.3 Hz, 2H), 5.20 (t, *J* = 8.9 Hz, 1H), 5.09 (dt, *J* = 1.9, 1.0 Hz, 1H), 4.91 (dt, *J* = 3.3, 1.5 Hz, 2H), 4.85 – 4.78 (m, 1H), 4.61 (dd, *J* = 11.4, 9.8 Hz, 1H), 4.22 (ddd, *J* = 9.8, 5.2, 1.4 Hz, 1H), 3.84 (d, *J* = 10.7 Hz, 6H), 3.38 (ddd, *J* = 5.8, 4.0, 1.3 Hz, 1H), 3.29 (dd, *J* = 15.6, 9.7 Hz, 1H), 2.95 (dd, *J* = 15.7, 8.1 Hz, 1H), 1.85 (s, 1H), 1.78 (t, *J* = 1.1 Hz, 3H) ppm; ^{13}C NMR (126 MHz, $CDCl_3$) δ 161.8, 149.6, 149.3, 143.8, 143.8, 130.4, 113.9, 112.8, 112.0, 111.3, 108.8, 102.7, 100.7, 86.6, 69.2, 66.3, 65.0, 56.5, 55.9, 38.1, 32.0, 17.3 ppm.

Copies of NMR spectra for isolated products:

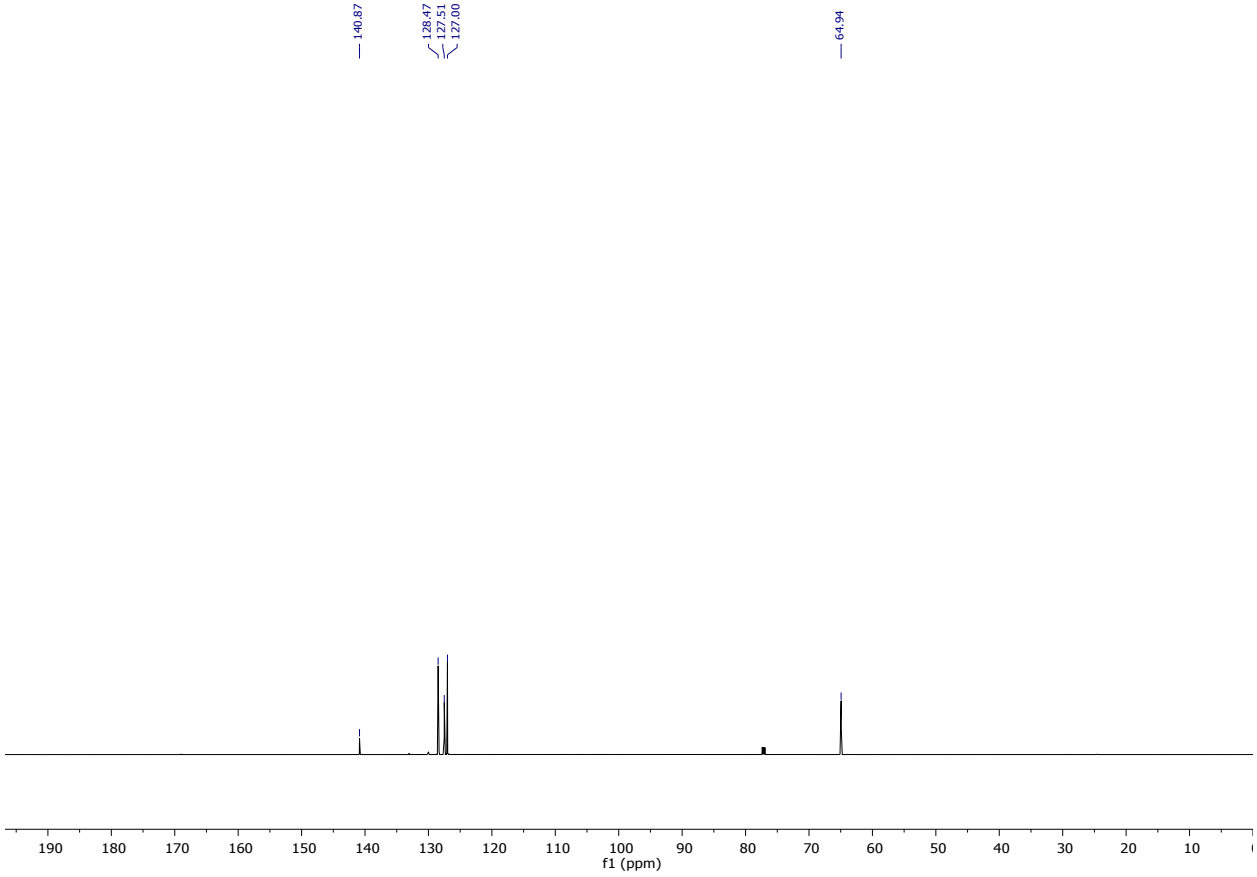


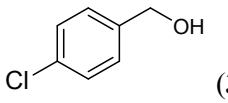
(**3a**)

^{1}H NMR (600 MHz, $CDCl_3$):



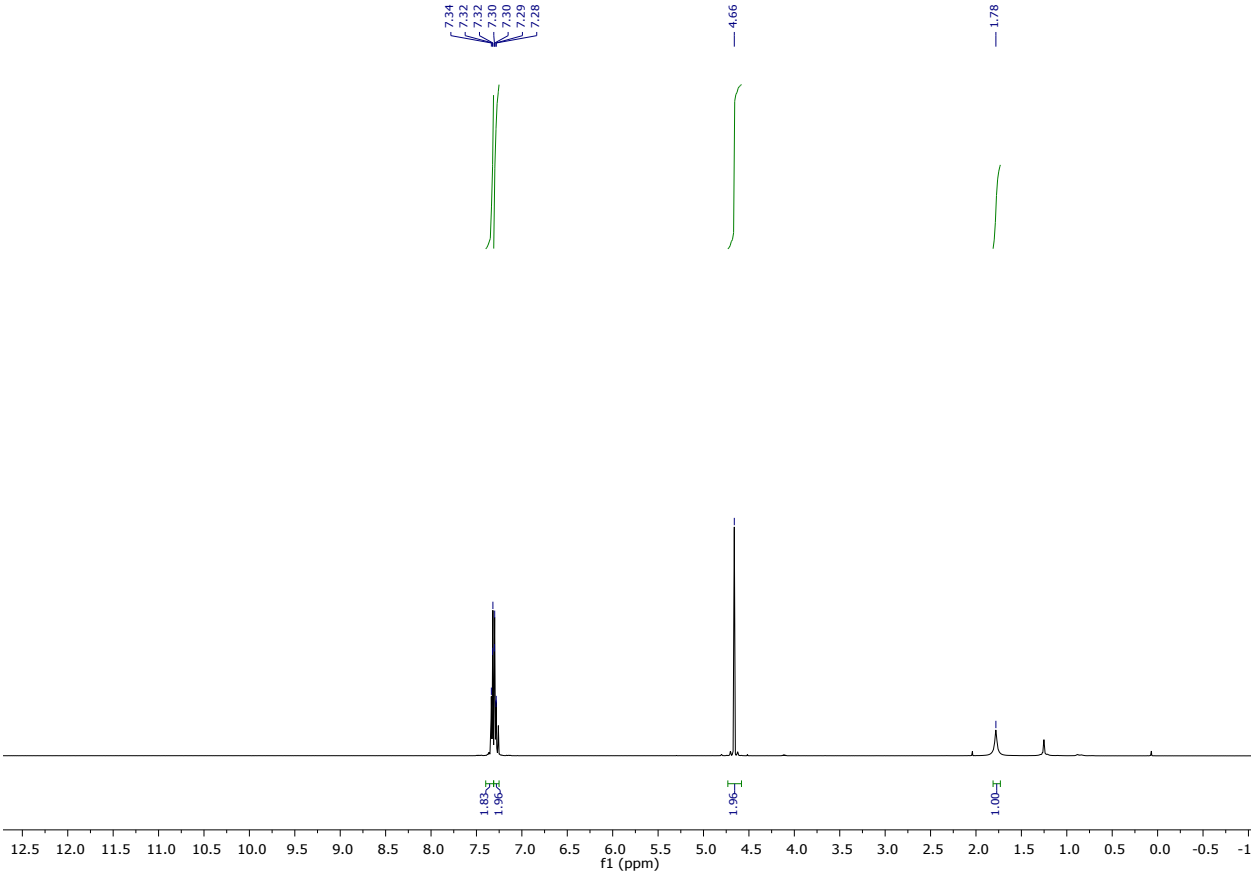
^{13}C NMR (151 MHz, $CDCl_3$):



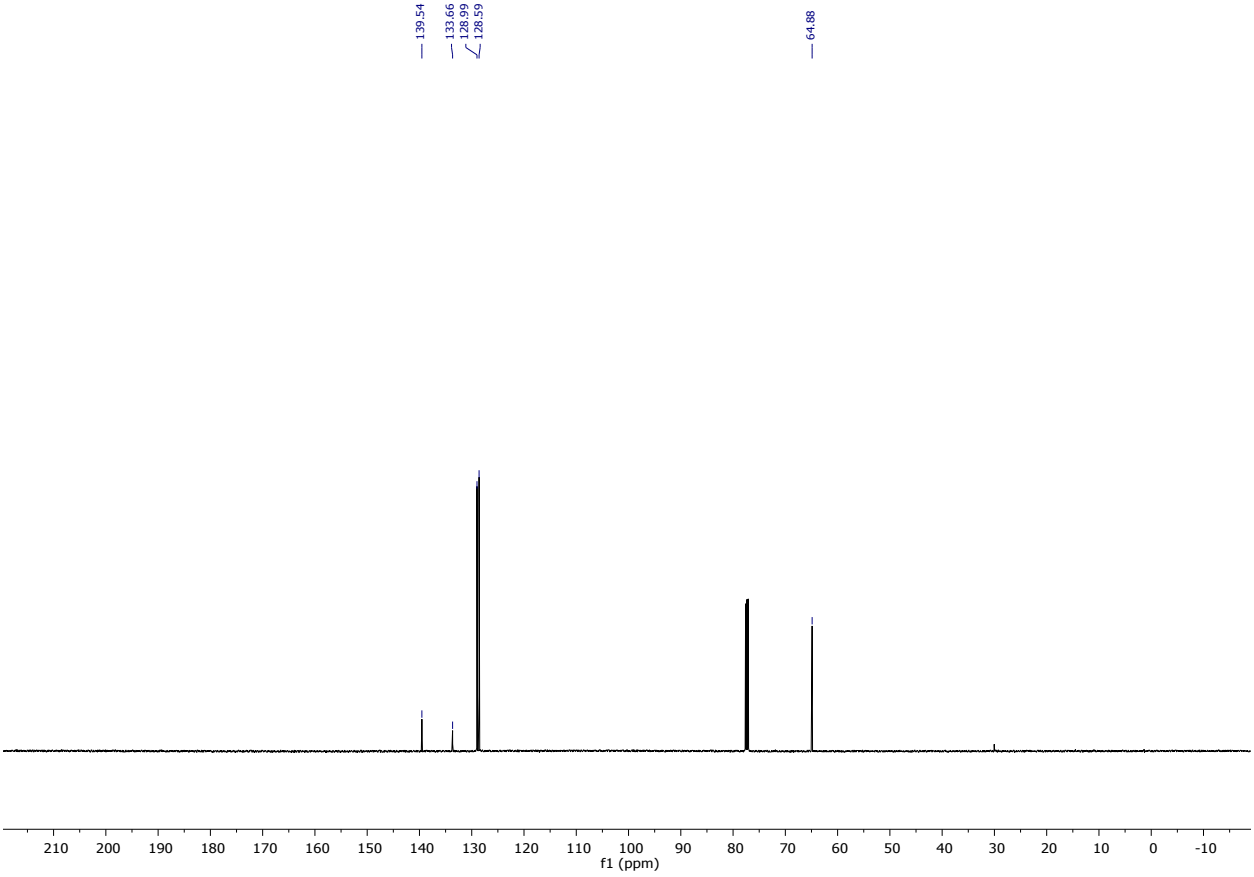


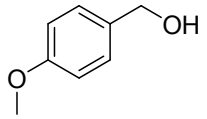
(**3b**)

^{1}H NMR (500 MHz, $CDCl_3$):



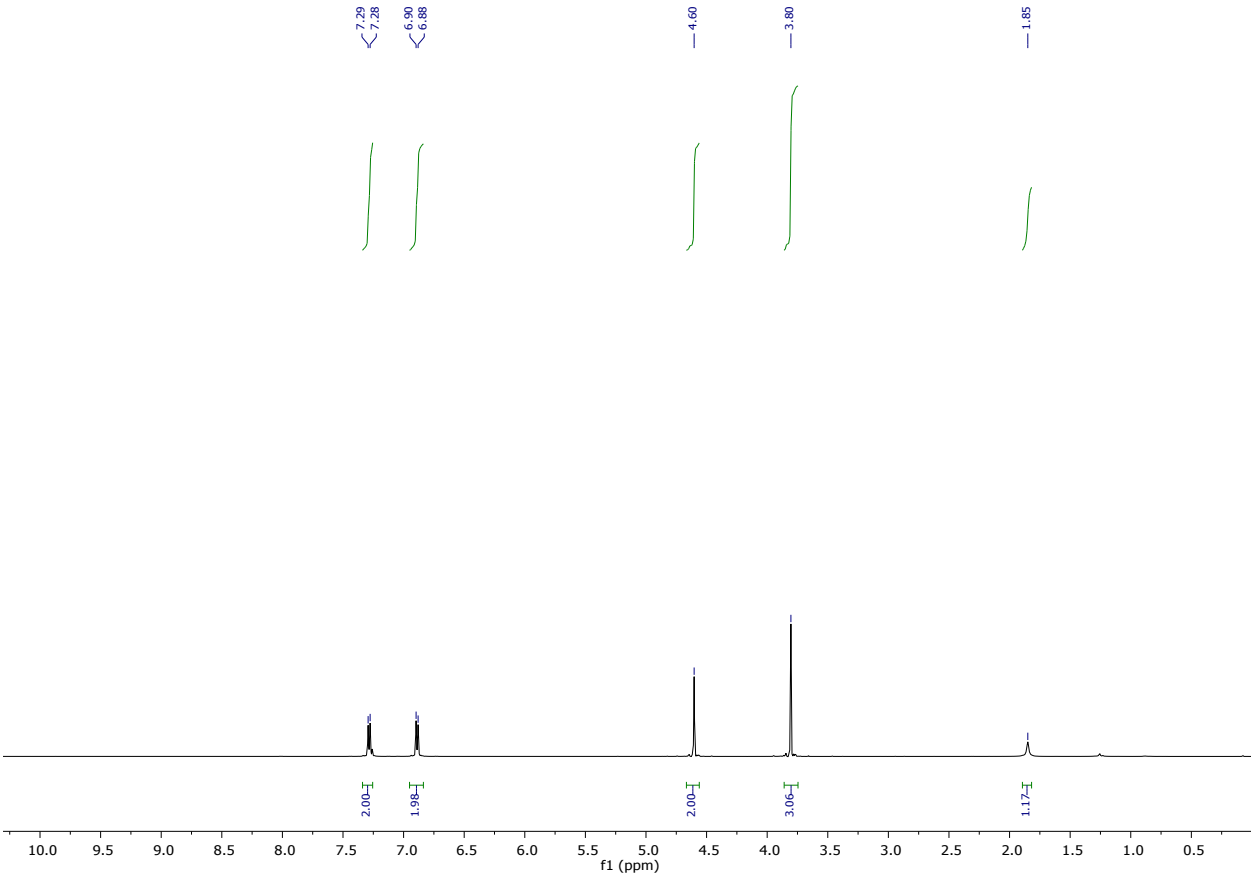
^{13}C NMR (126 MHz, $CDCl_3$):



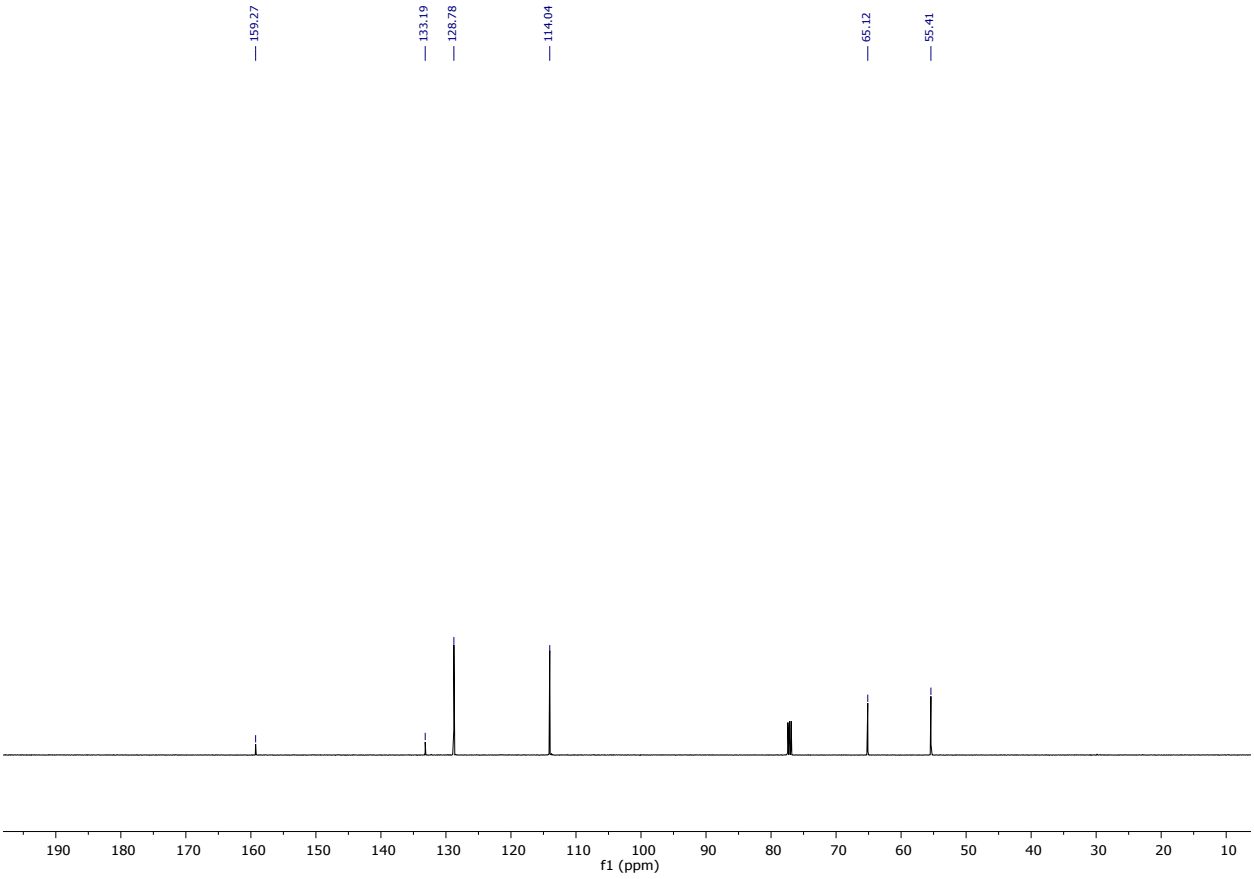


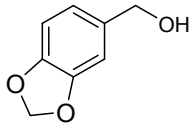
(**3c**)

^{1}H NMR (500 MHz, $CDCl_3$):



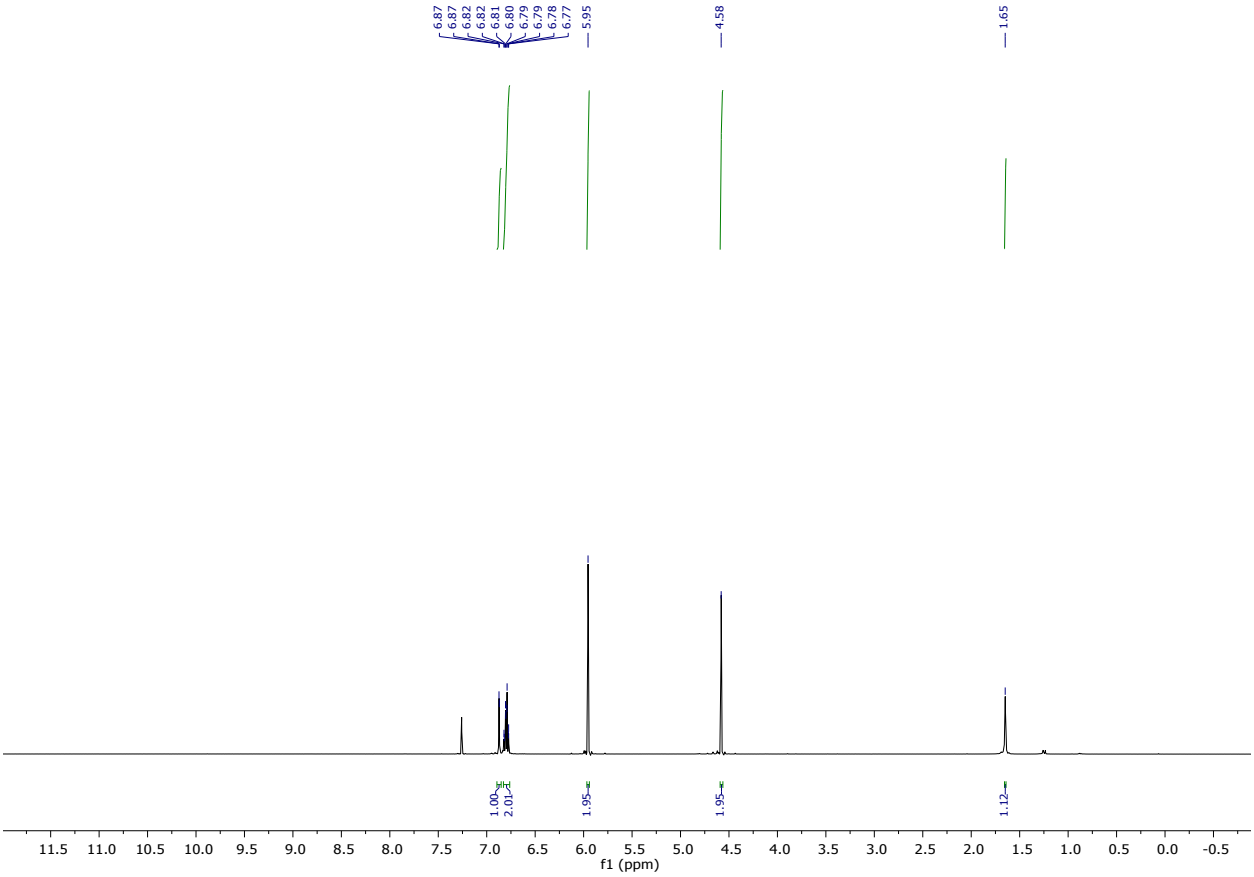
^{13}C NMR (126 MHz, $CDCl_3$):



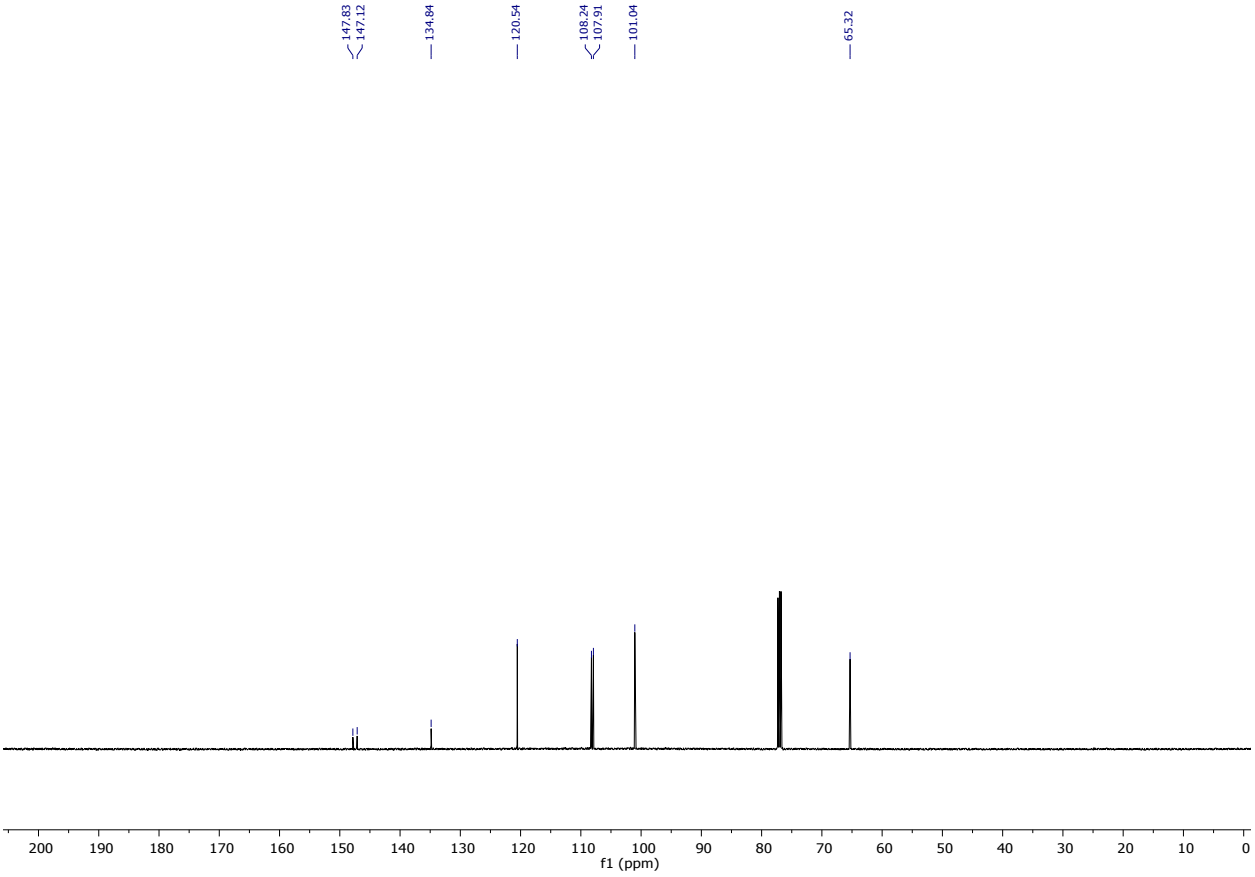


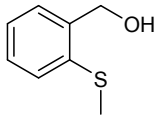
(**3d**)

^{1}H NMR (500 MHz, $CDCl_3$):



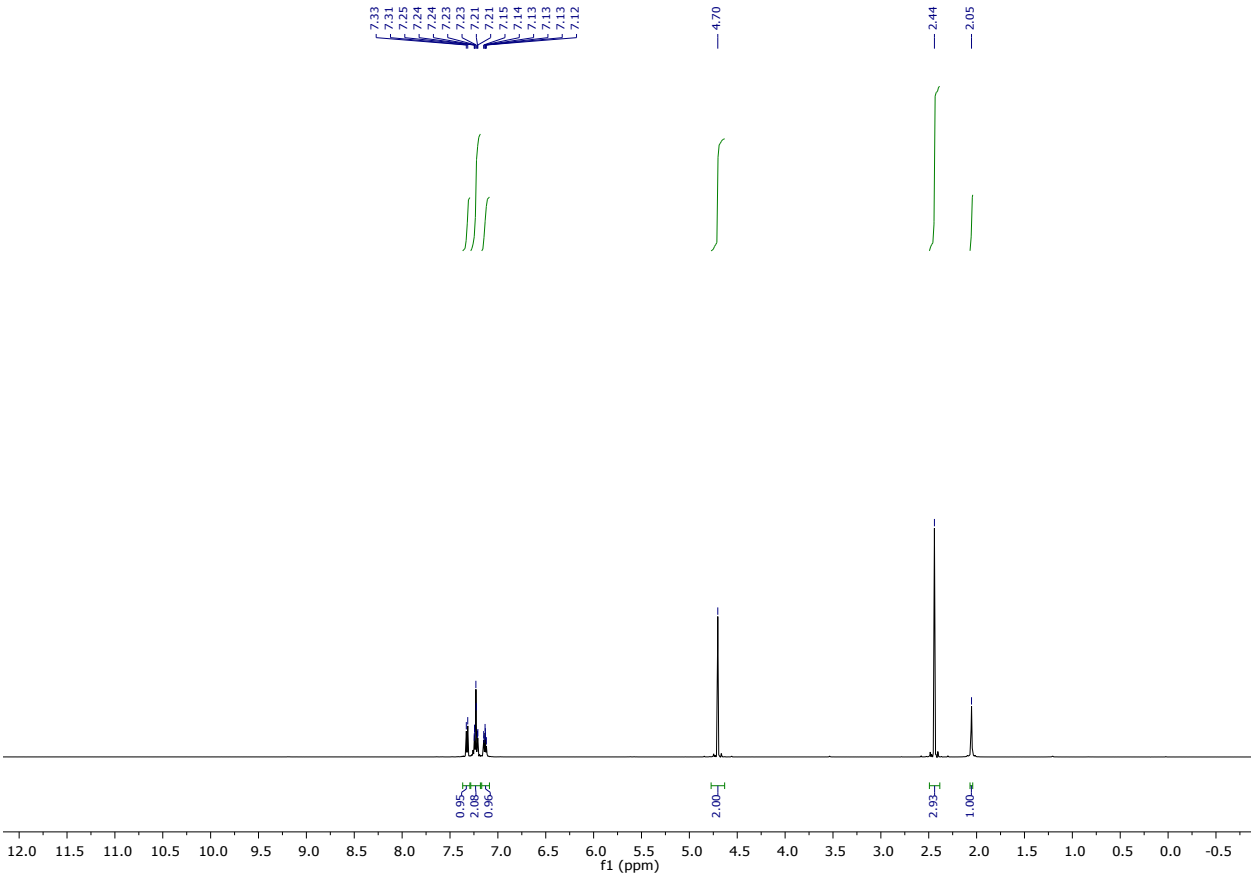
^{13}C NMR (126 MHz, $CDCl_3$):



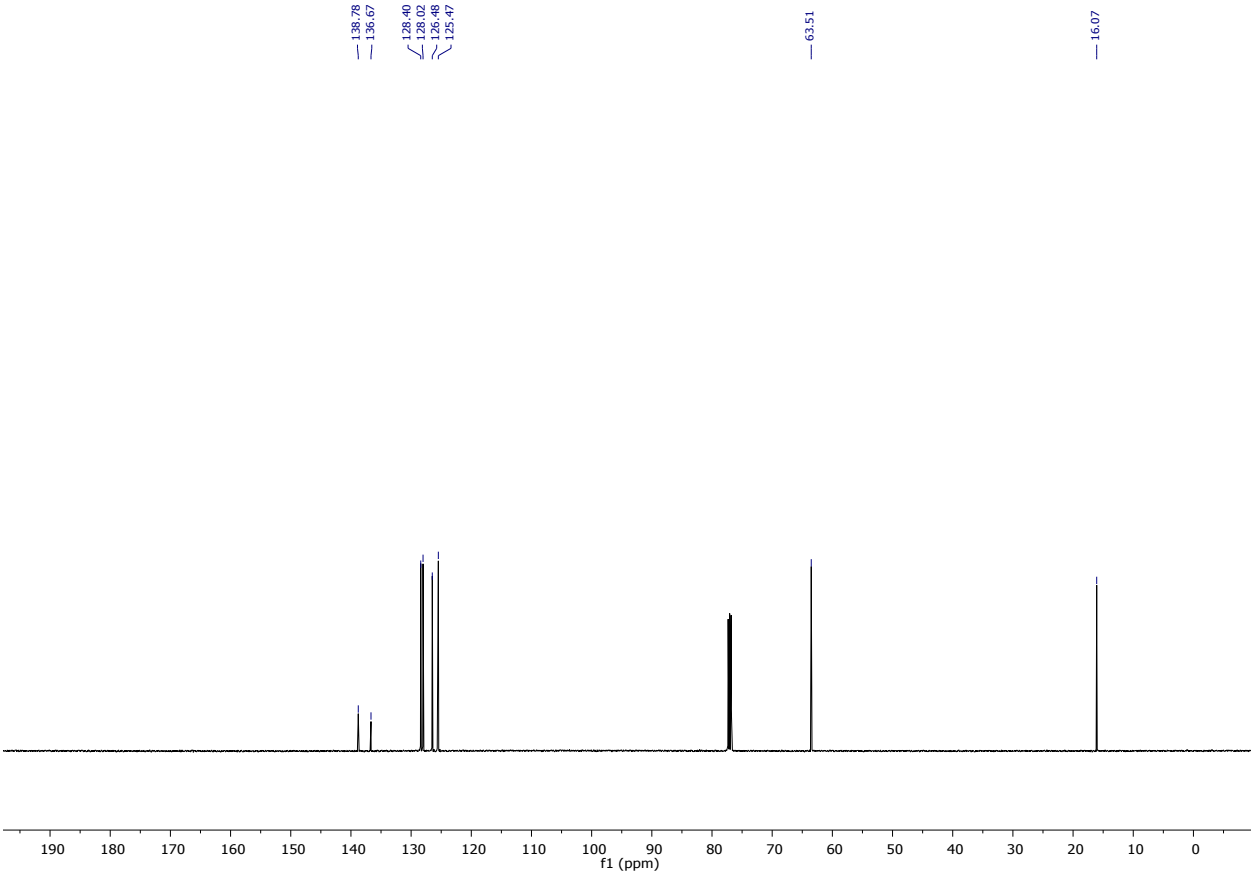


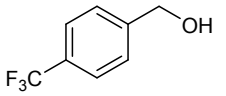
(**3e**)

^{1}H NMR (500 MHz, $CDCl_3$):



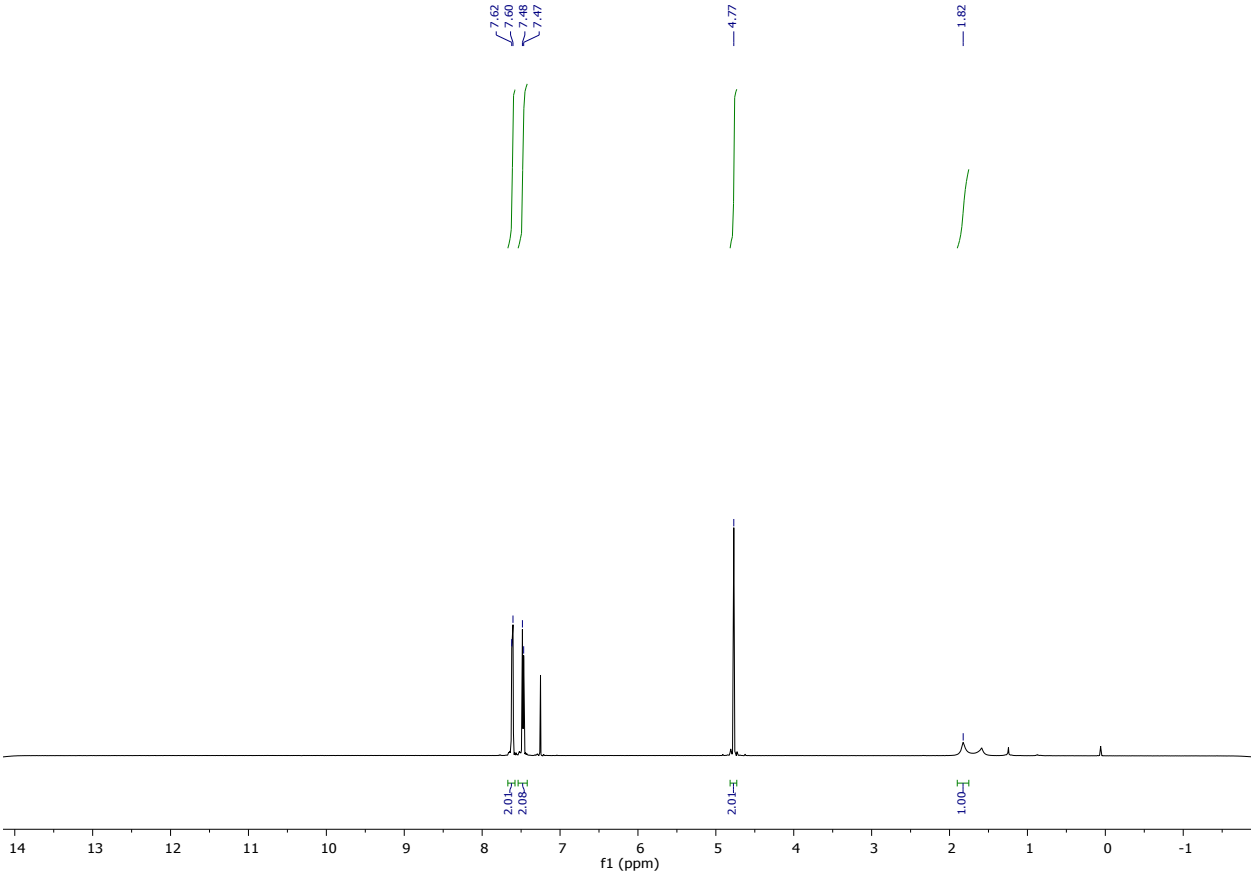
^{13}C NMR (126 MHz, $CDCl_3$):



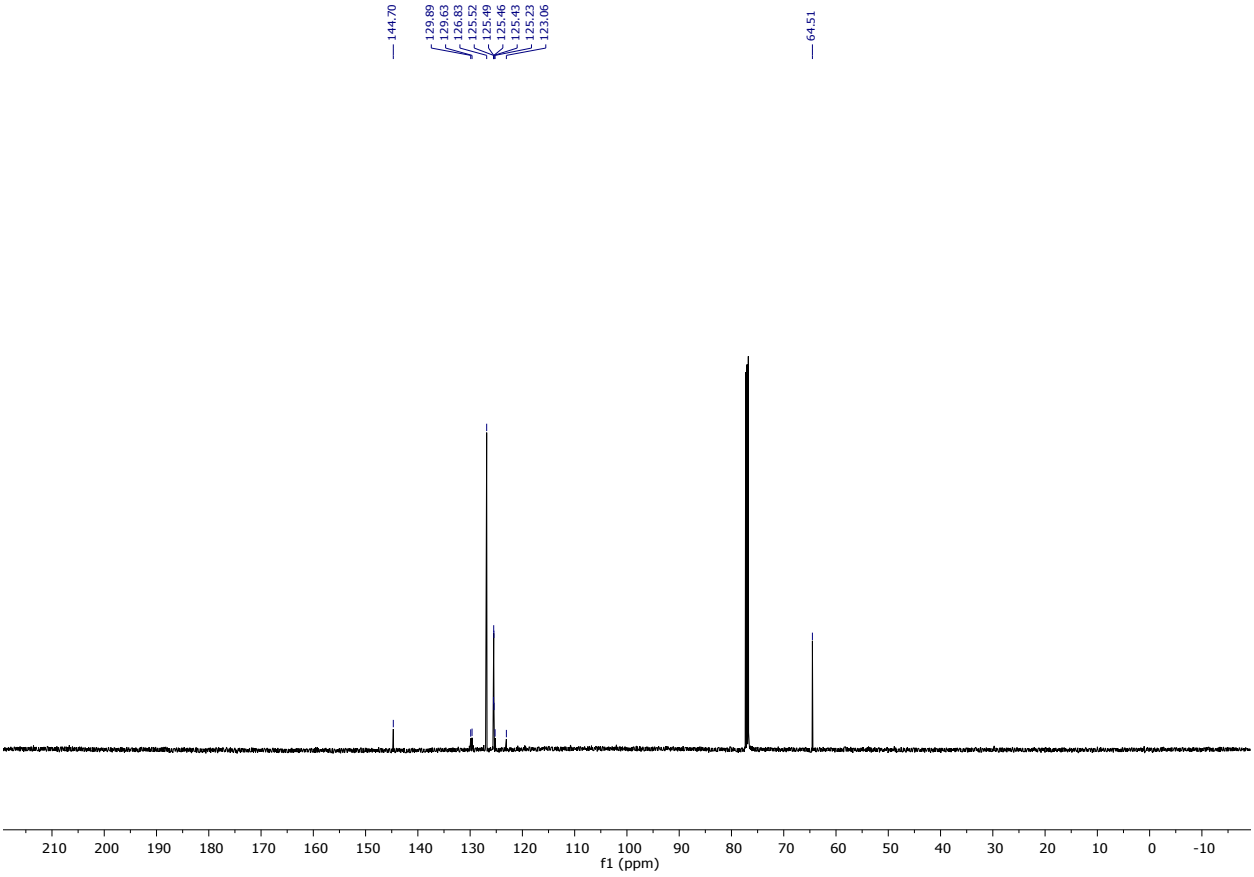


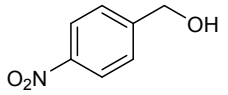
(**3f**)

^{1}H NMR (500 MHz, $CDCl_3$):



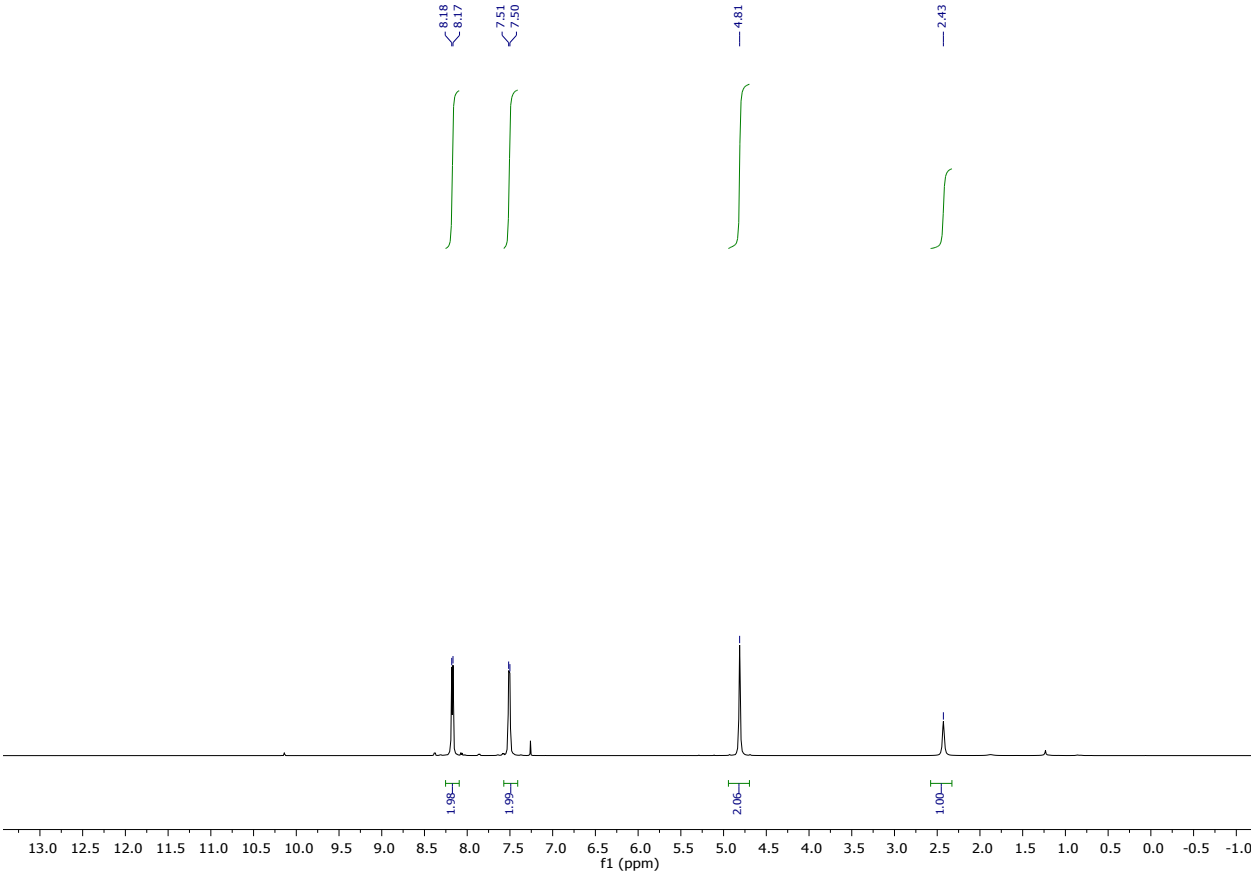
^{13}C NMR (126 MHz, $CDCl_3$):



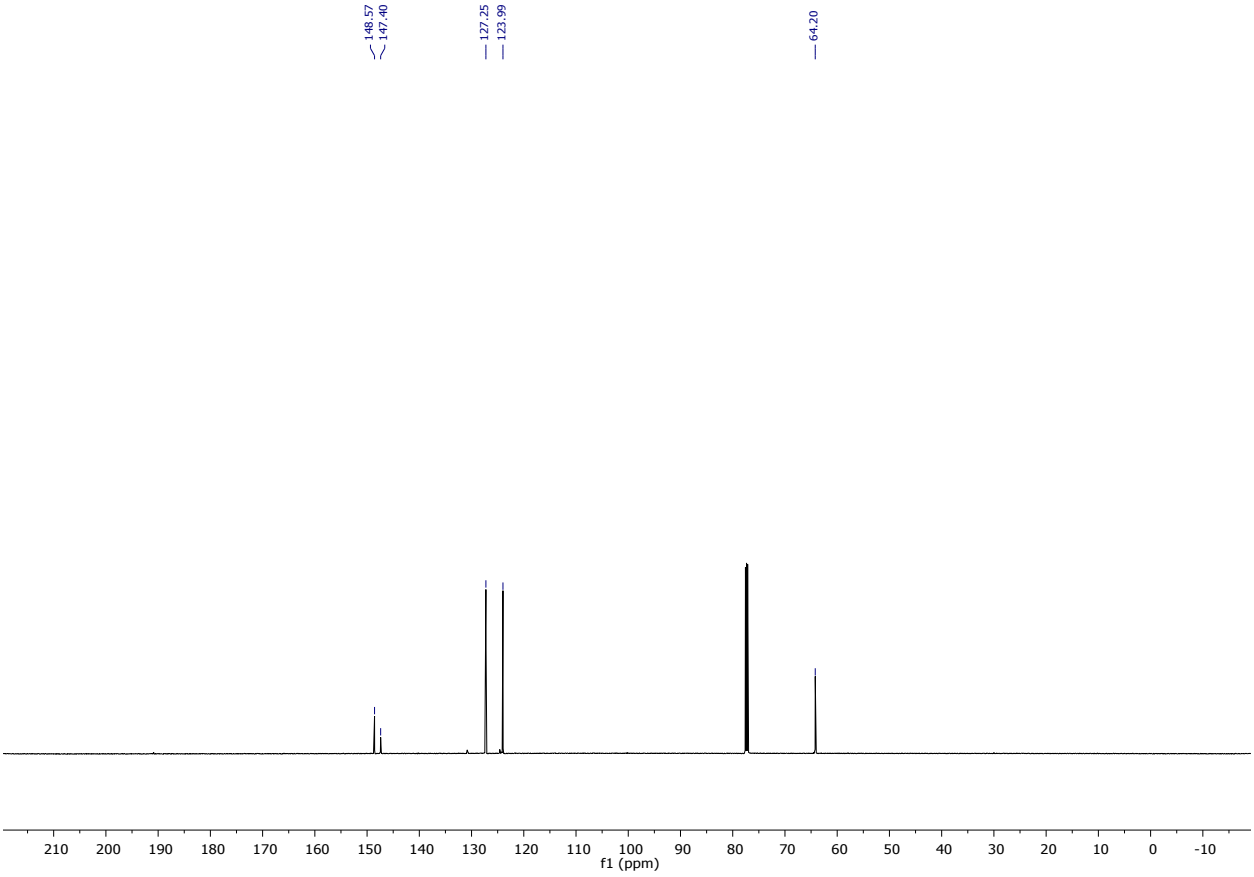


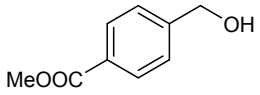
(**3g**)

^{1}H NMR (600 MHz, $CDCl_3$):



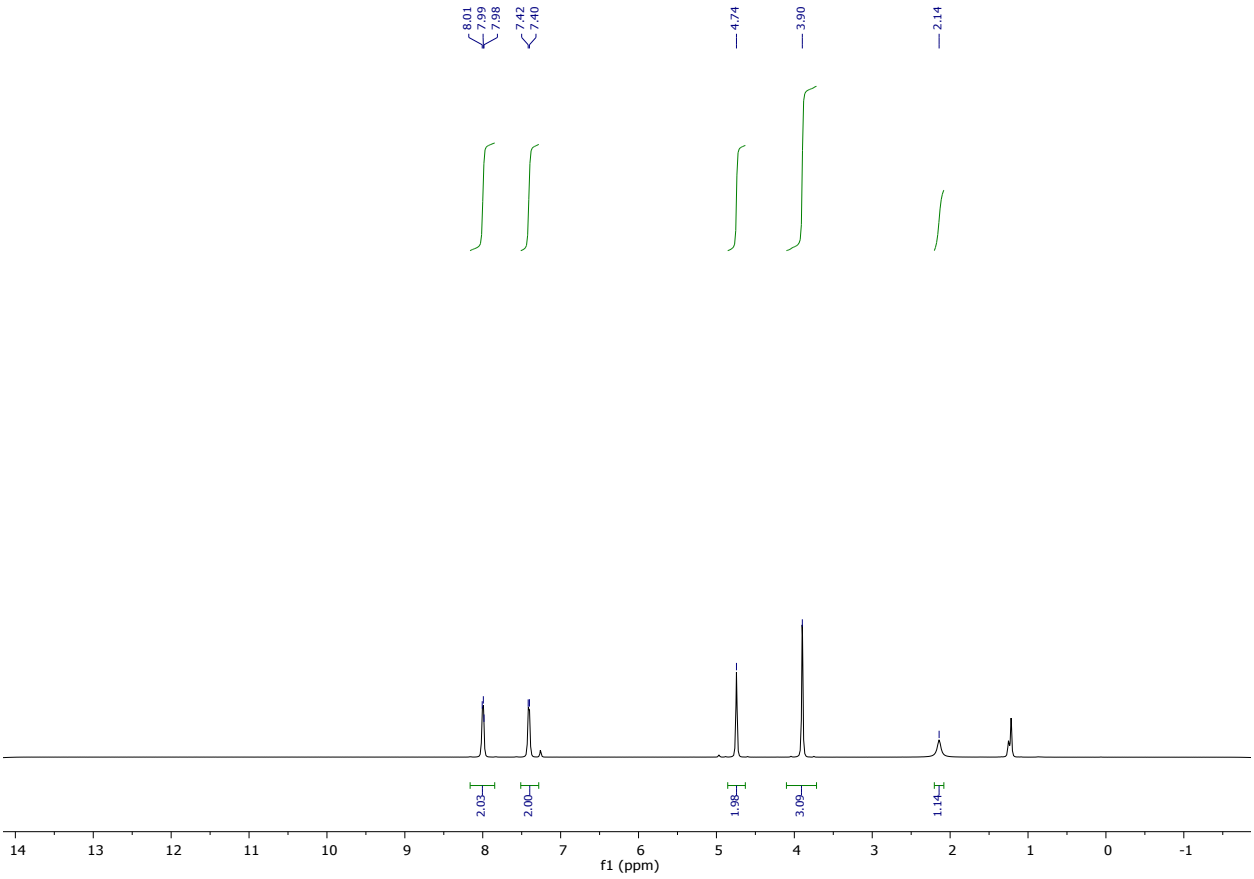
^{13}C NMR (151 MHz, $CDCl_3$):



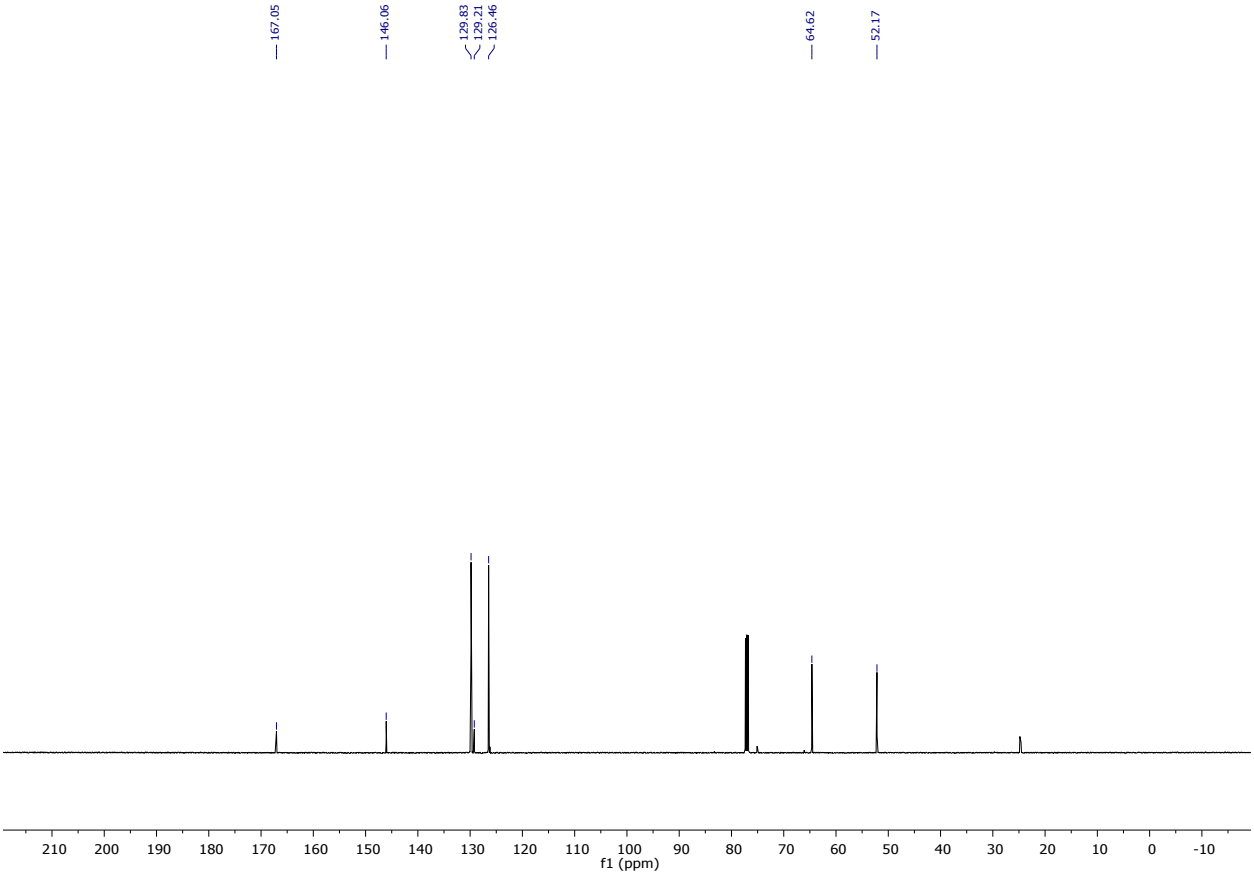


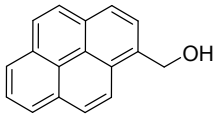
(**3h**)

^{1}H NMR (500 MHz, $CDCl_3$):



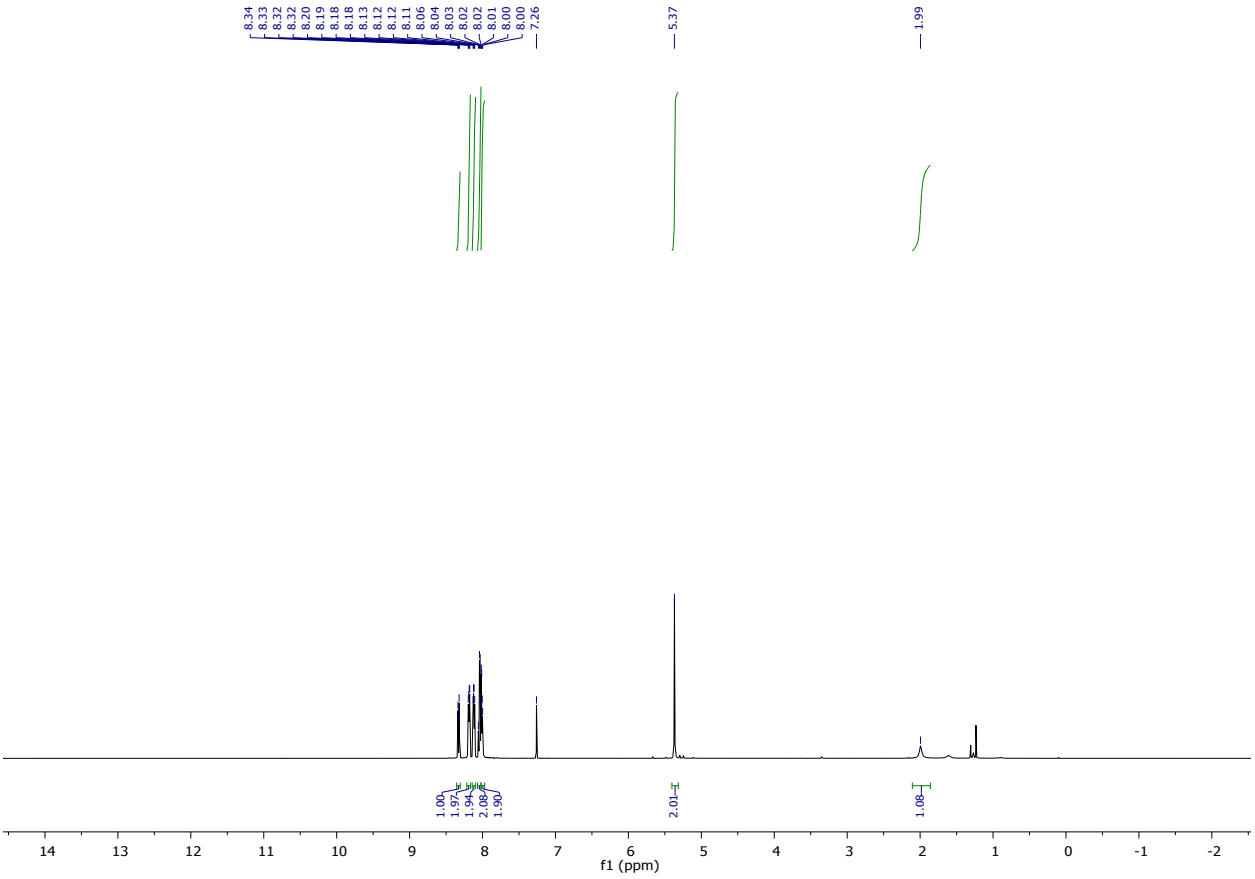
^{13}C NMR (126 MHz, $CDCl_3$):



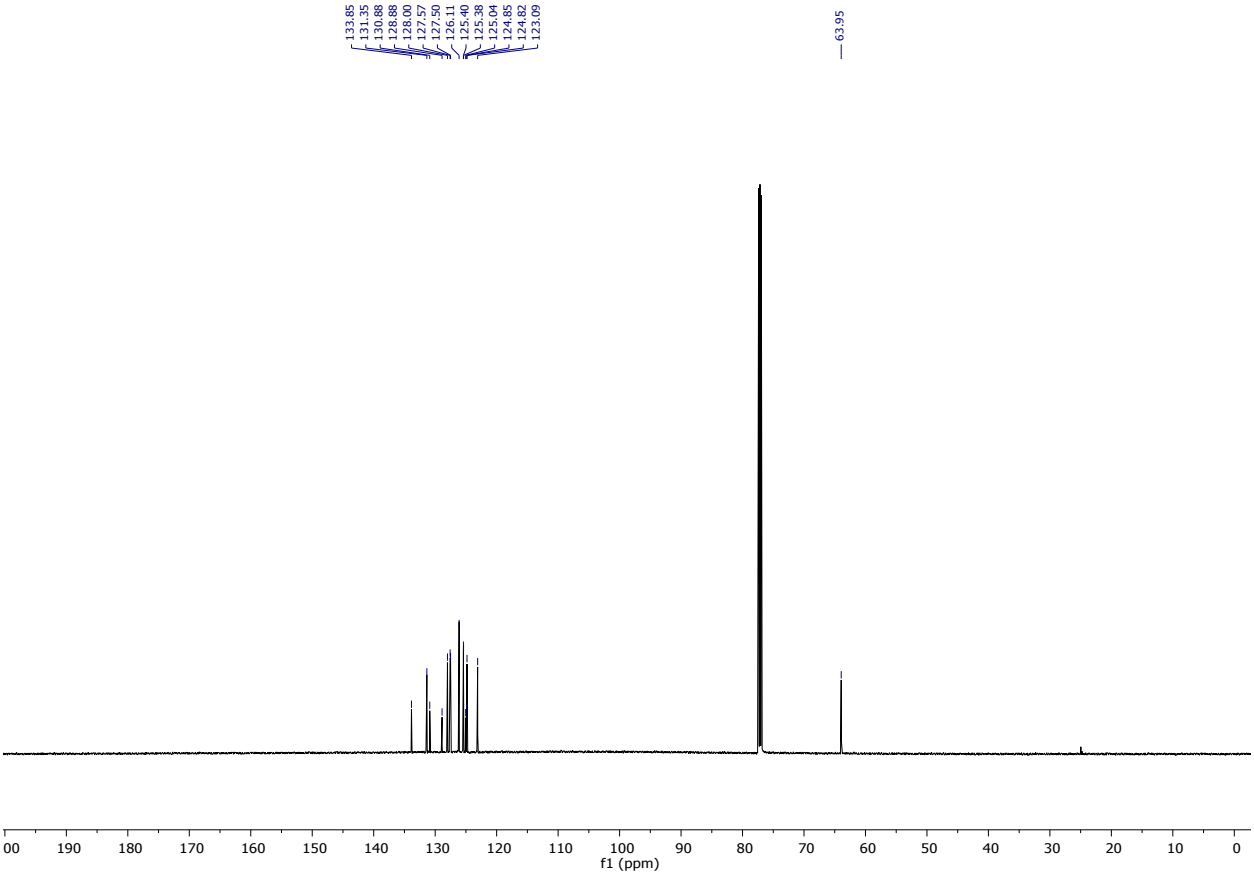


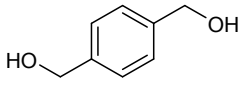
(**3i**)

^{1}H NMR (600 MHz, $CDCl_3$):



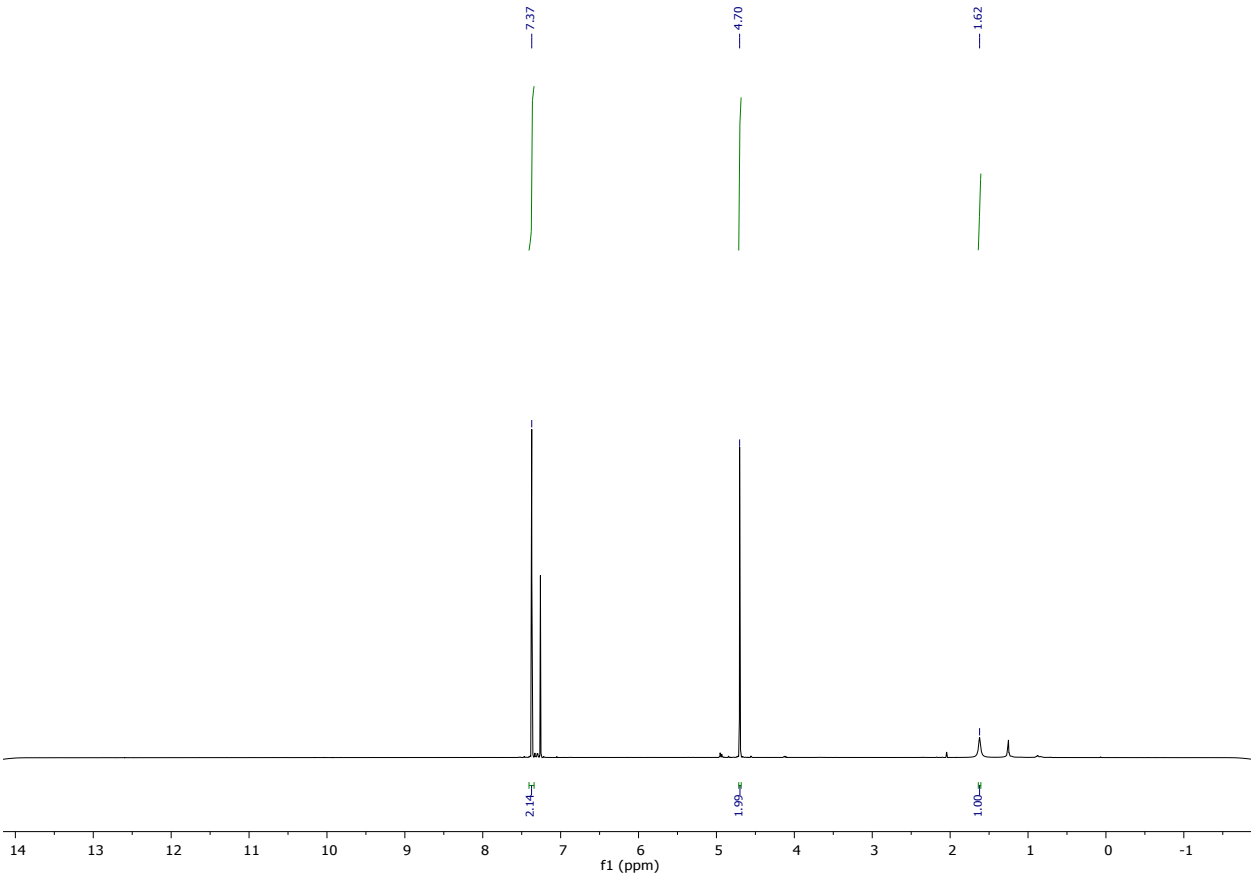
^{13}C NMR (151 MHz, $CDCl_3$):



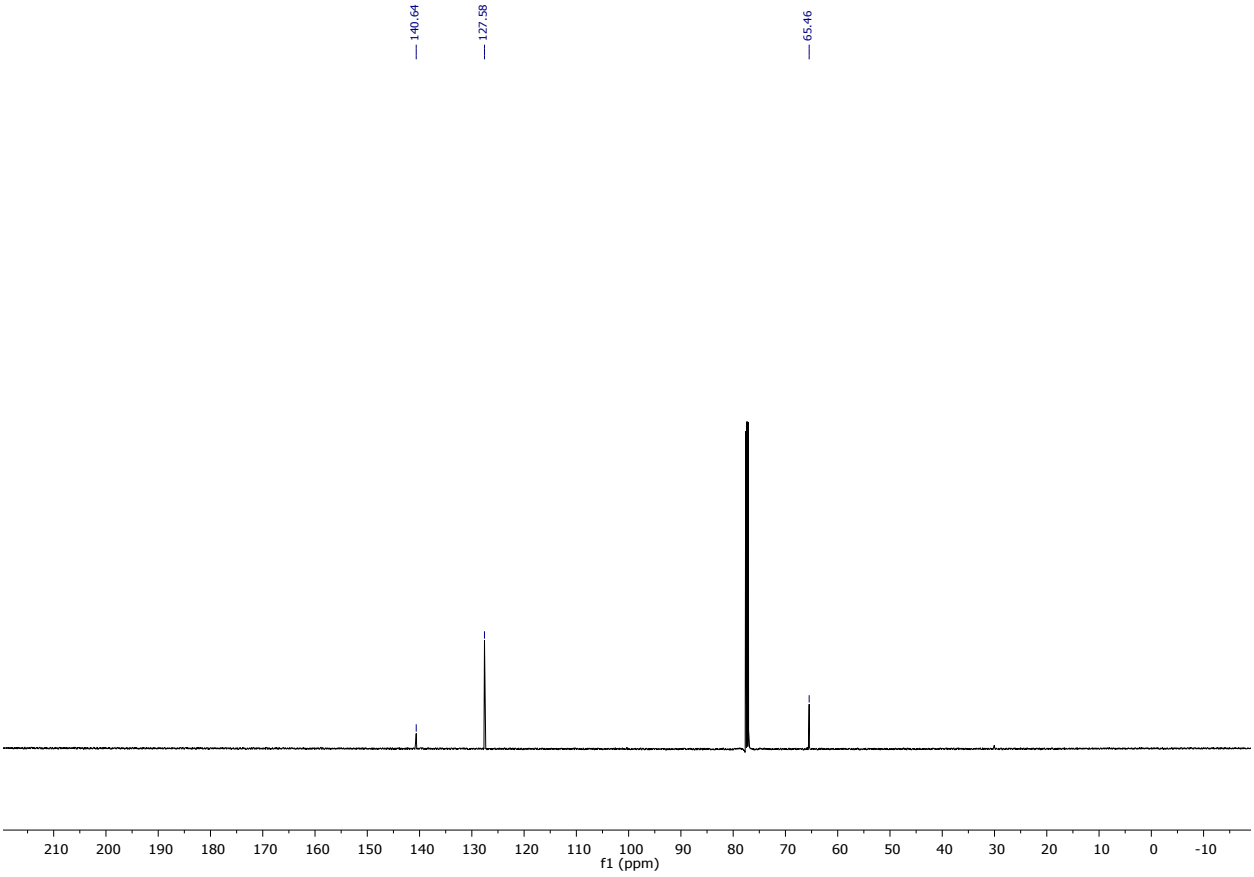


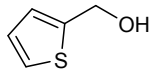
(**3j**)

^{1}H NMR (500 MHz, $CDCl_3$):



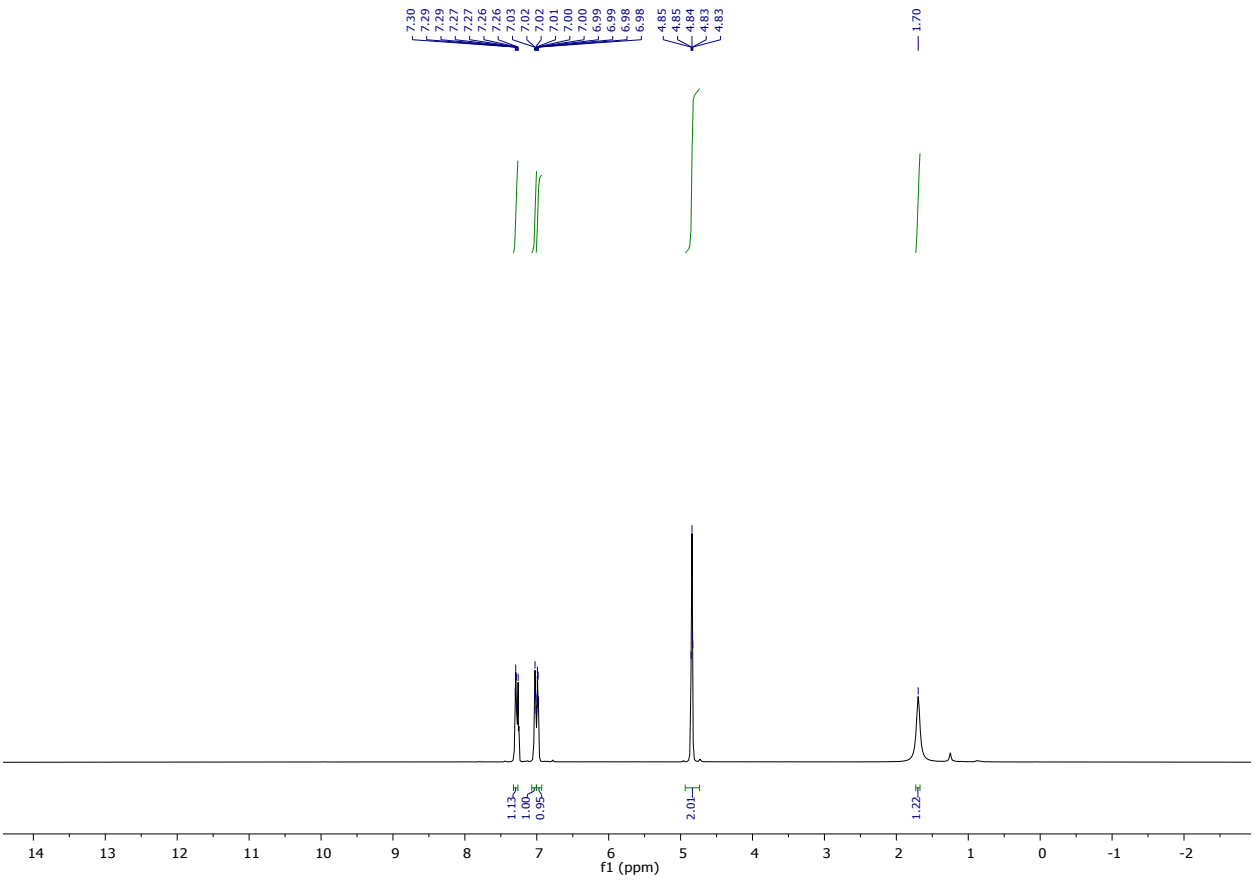
^{13}C NMR (126 MHz, $CDCl_3$):



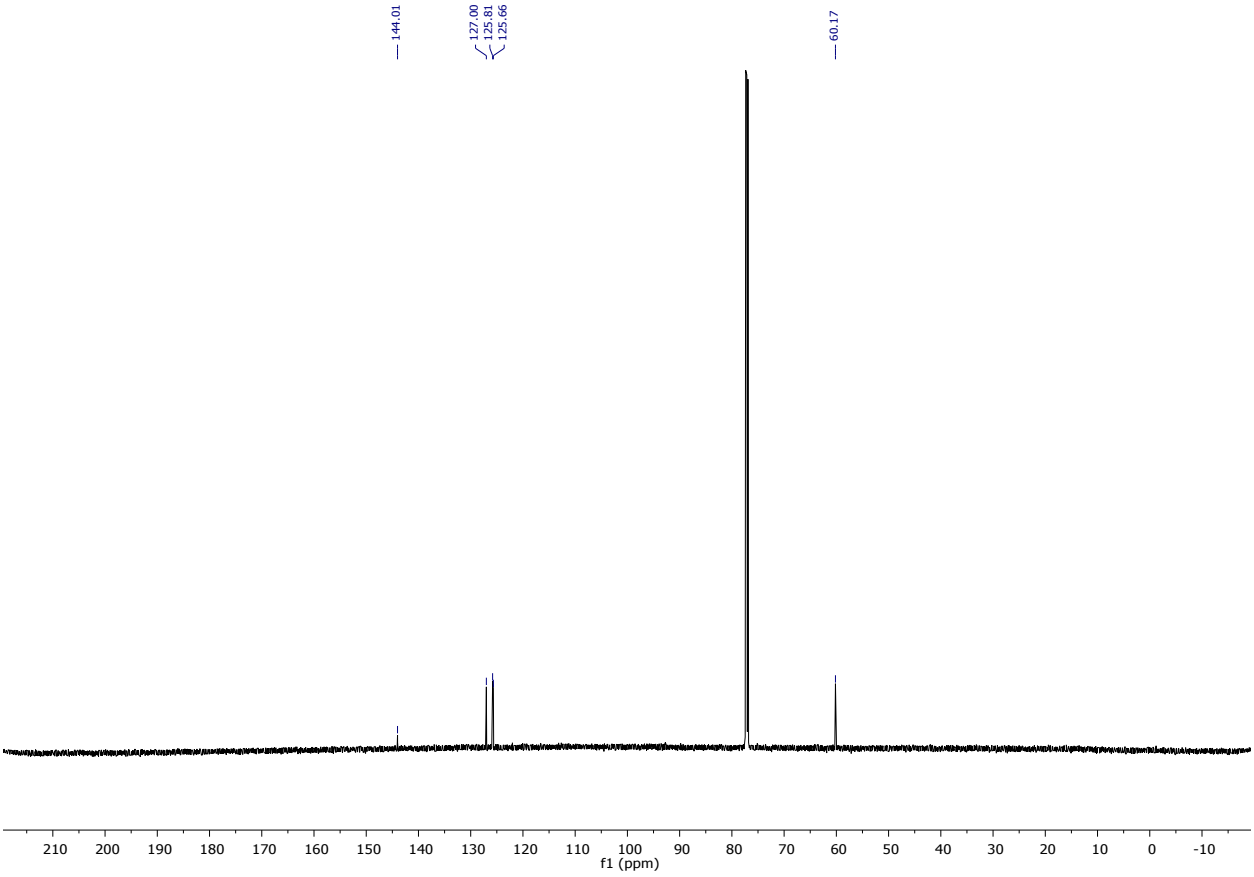


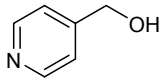
(**3k**)

^{1}H NMR (600 MHz, $CDCl_3$):



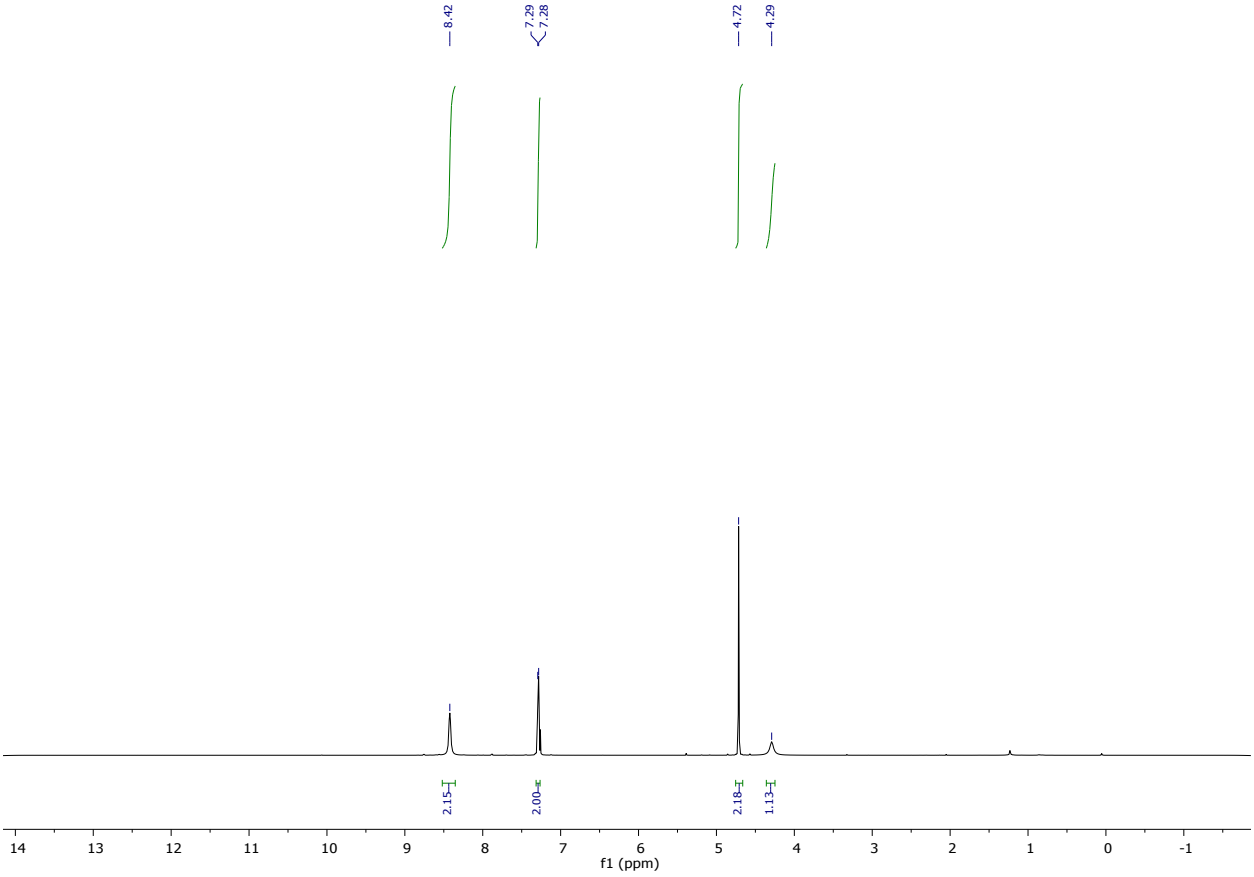
^{13}C NMR (151 MHz, $CDCl_3$):



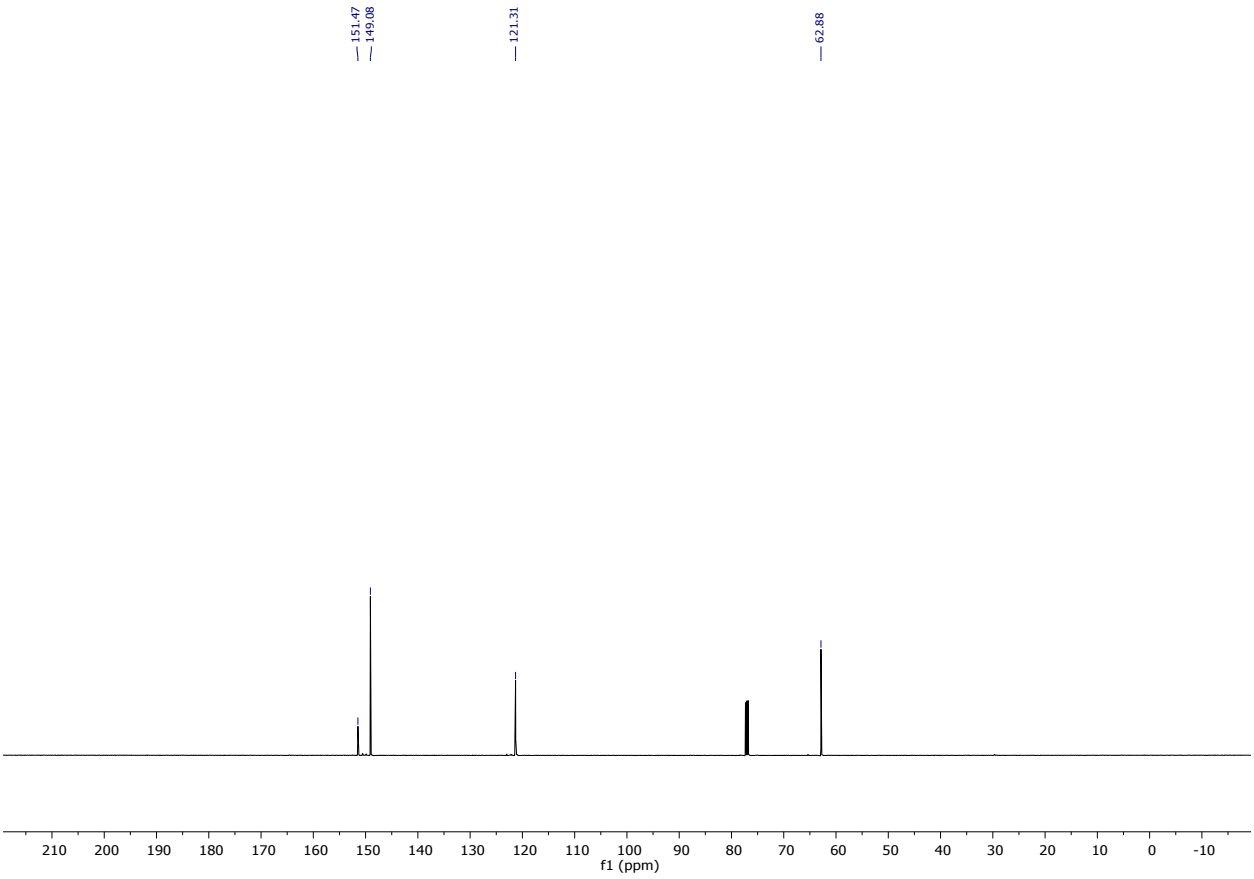


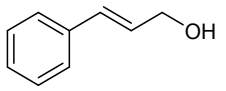
(**3l**)

^{1}H NMR (500 MHz, $CDCl_3$):



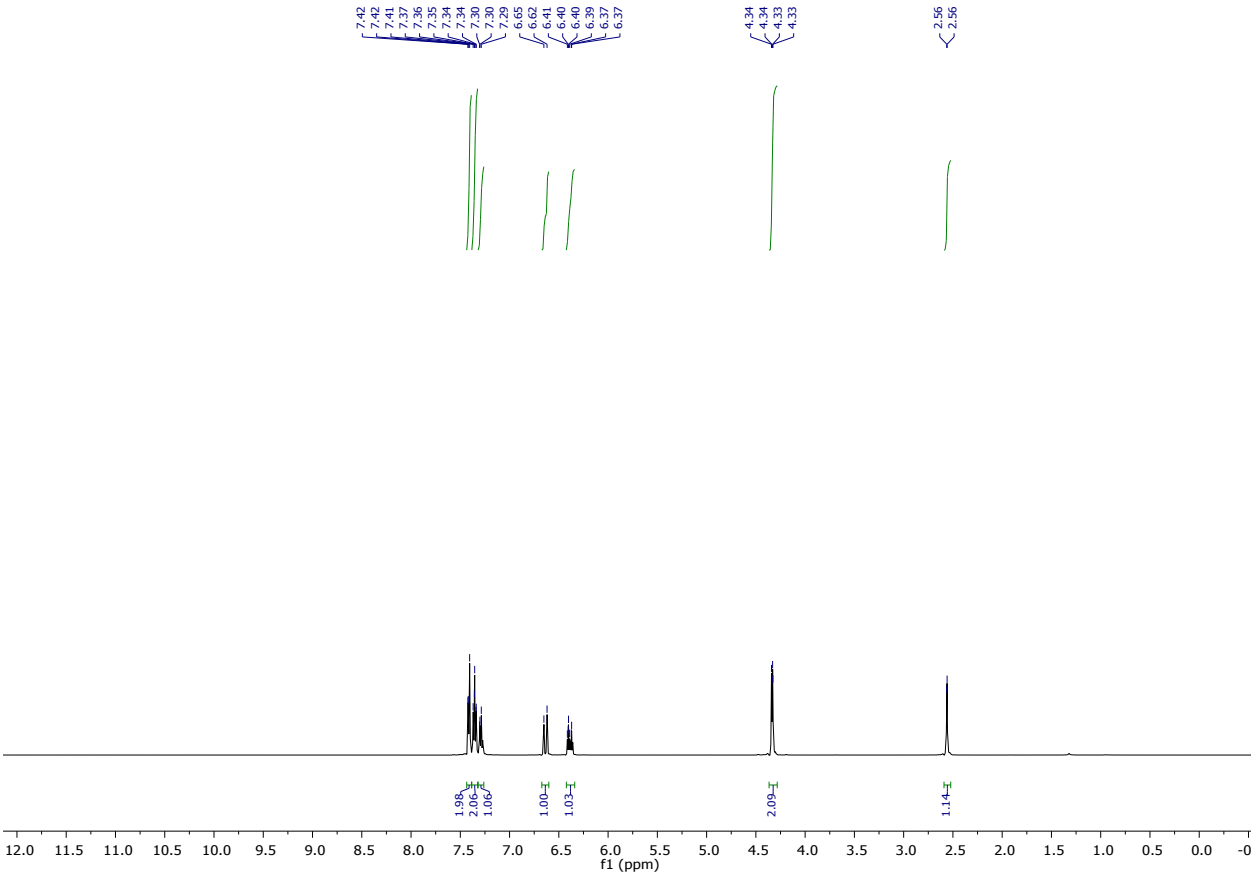
^{13}C NMR (126 MHz, $CDCl_3$):



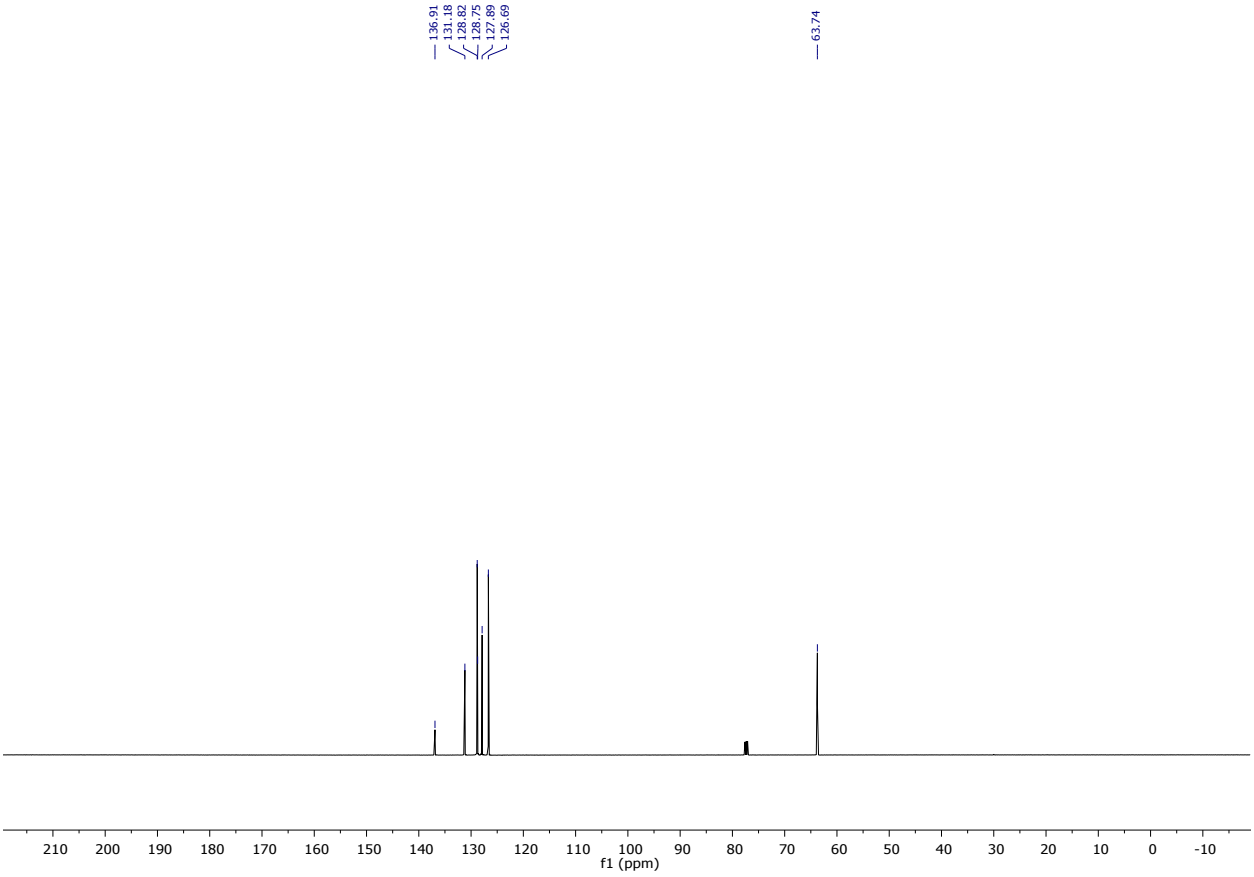


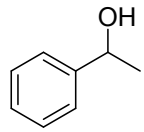
(**3m**)

^{1}H NMR (500 MHz, $CDCl_3$):



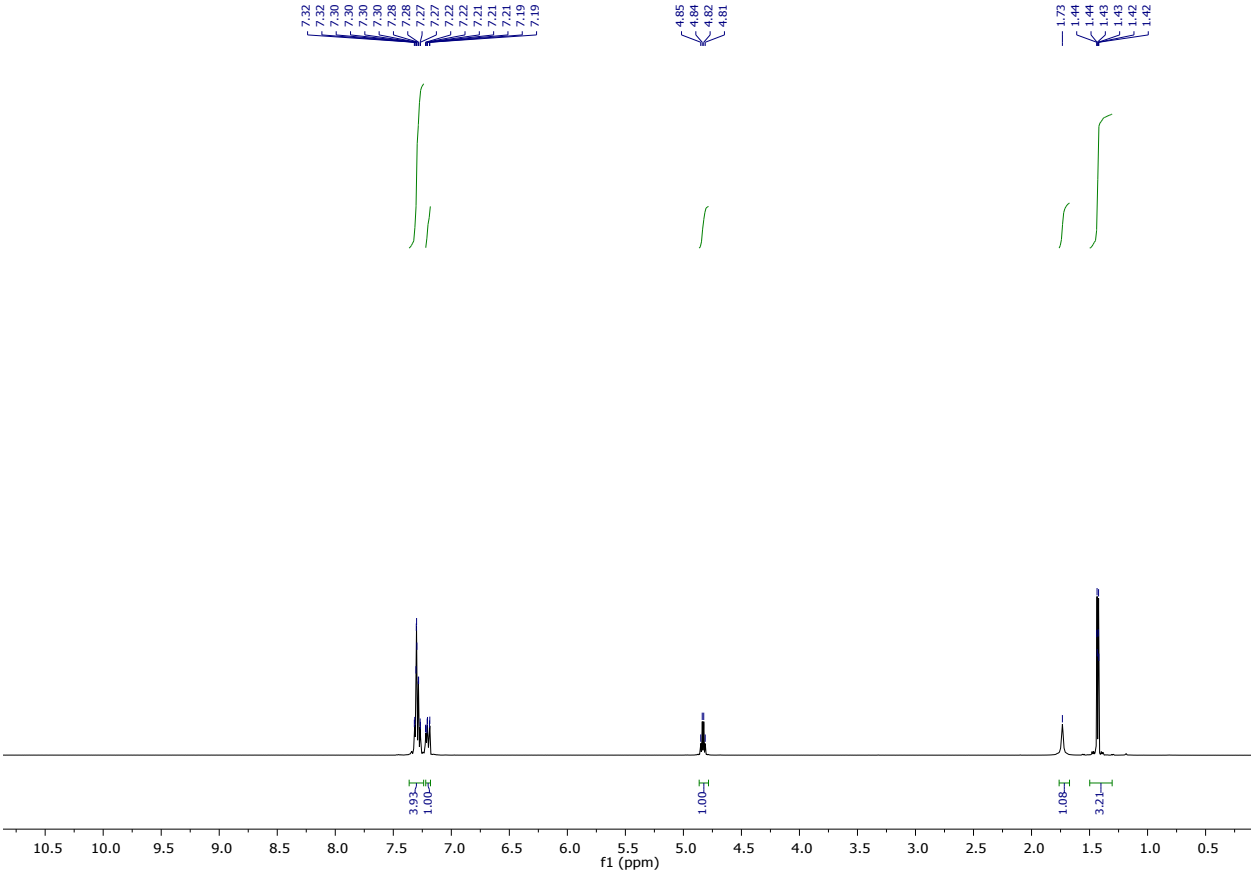
^{13}C NMR (126 MHz, $CDCl_3$):



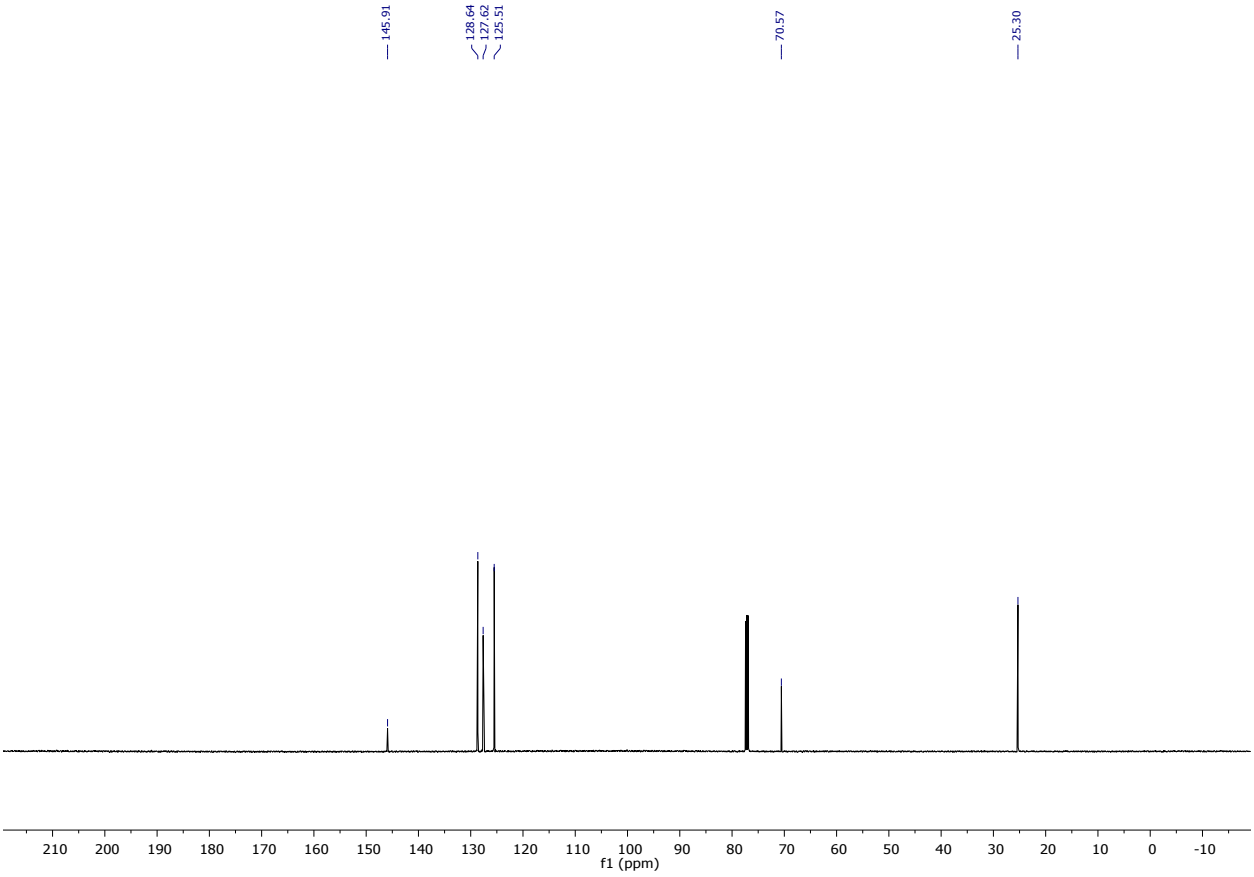


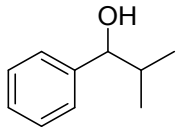
(**5a**)

^{1}H NMR (500 MHz, $CDCl_3$):



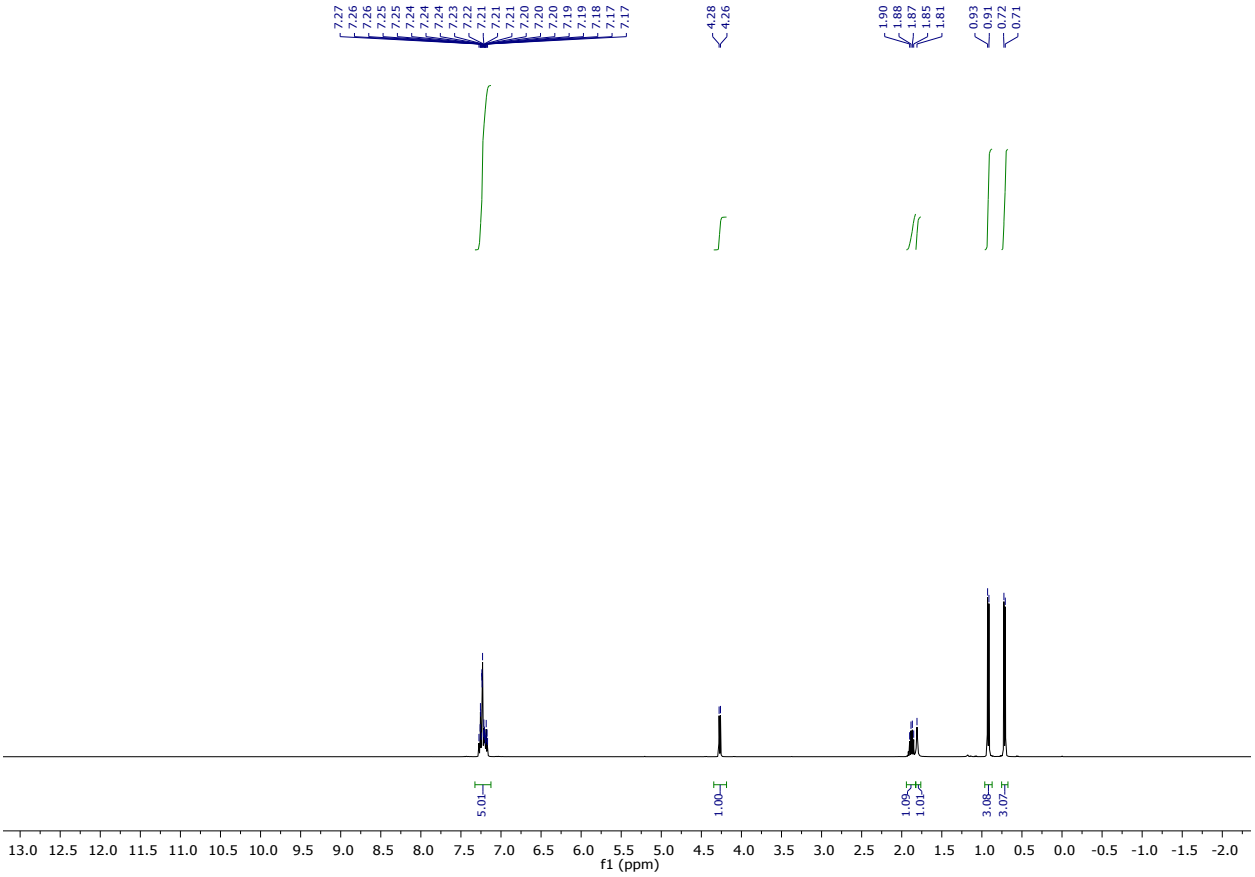
^{13}C NMR (126 MHz, $CDCl_3$):



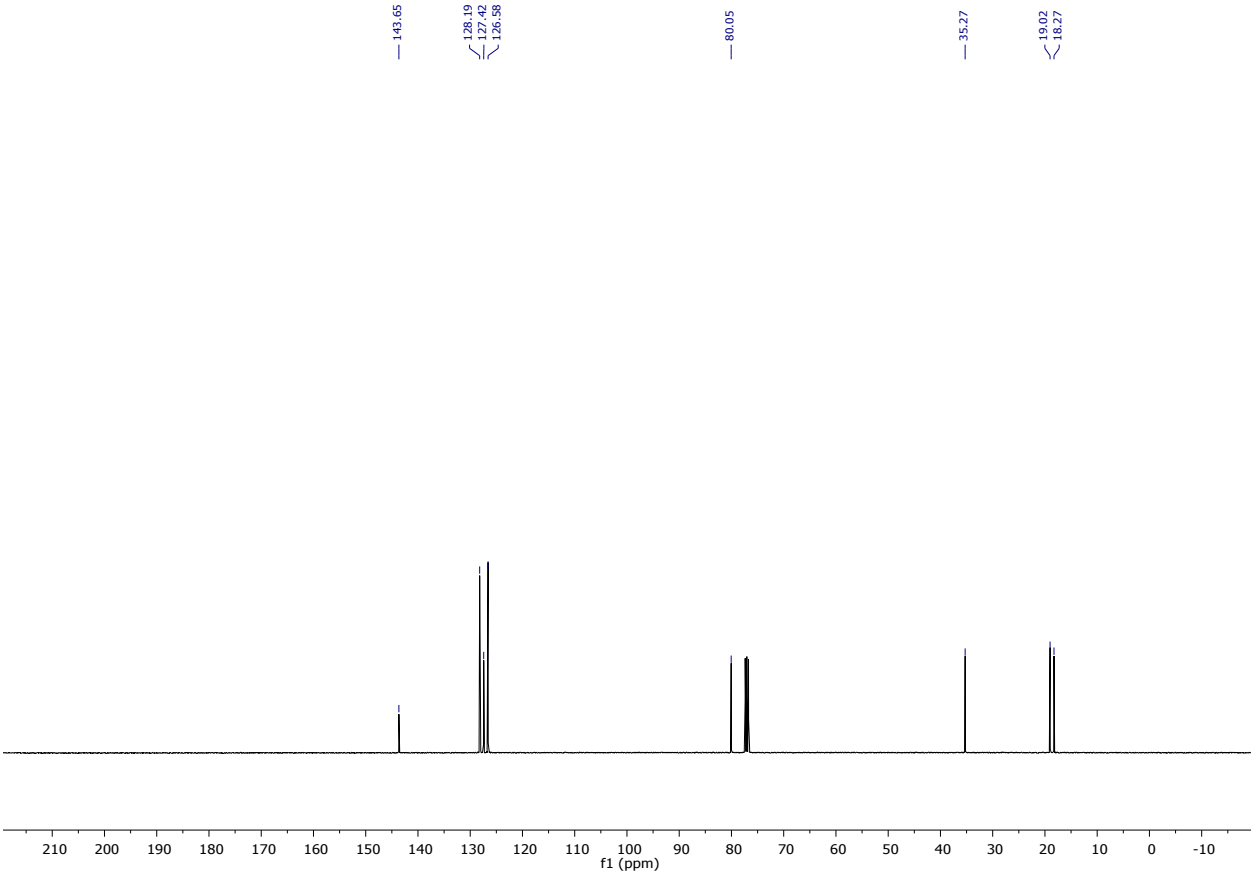


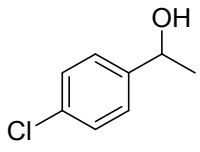
(**5b**)

^{1}H NMR (400 MHz, $CDCl_3$):



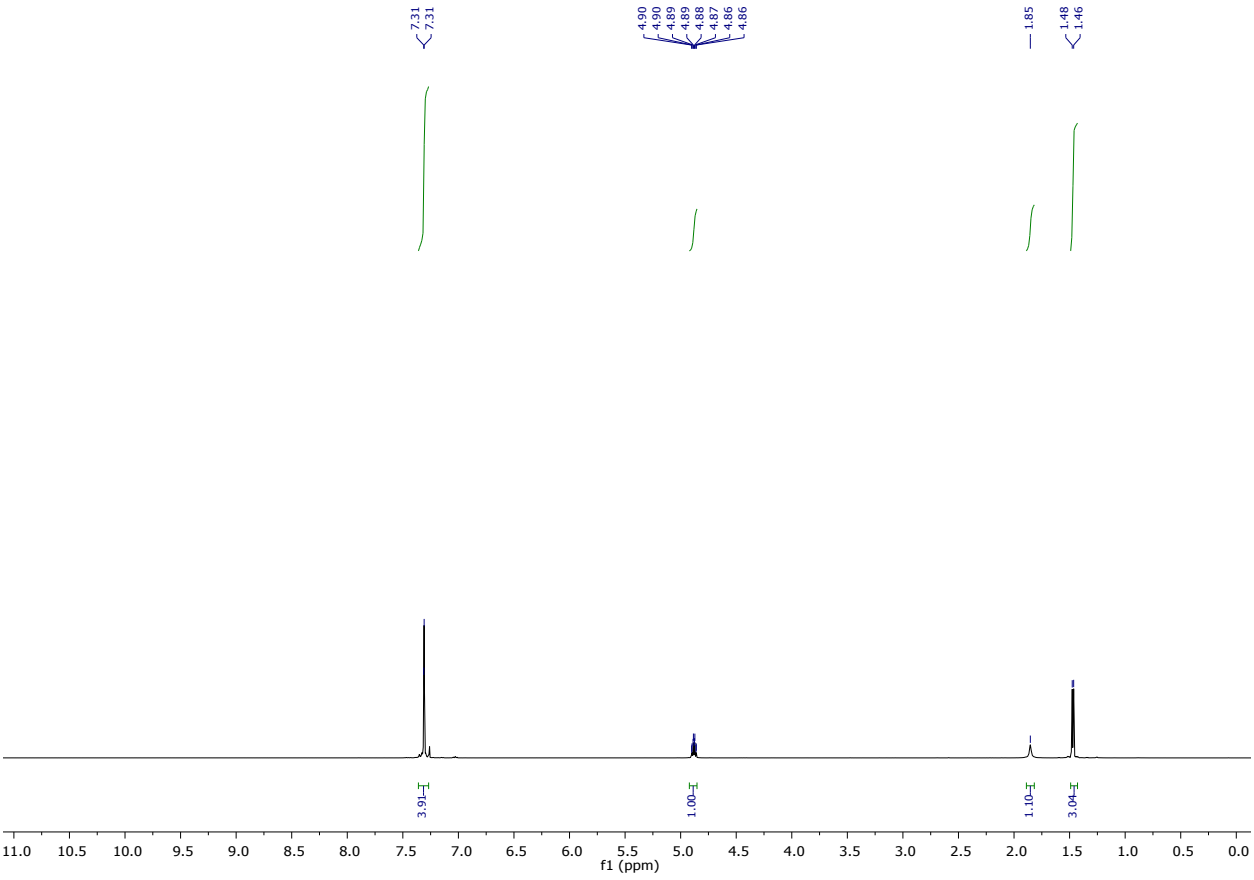
^{13}C NMR (101 MHz, $CDCl_3$):



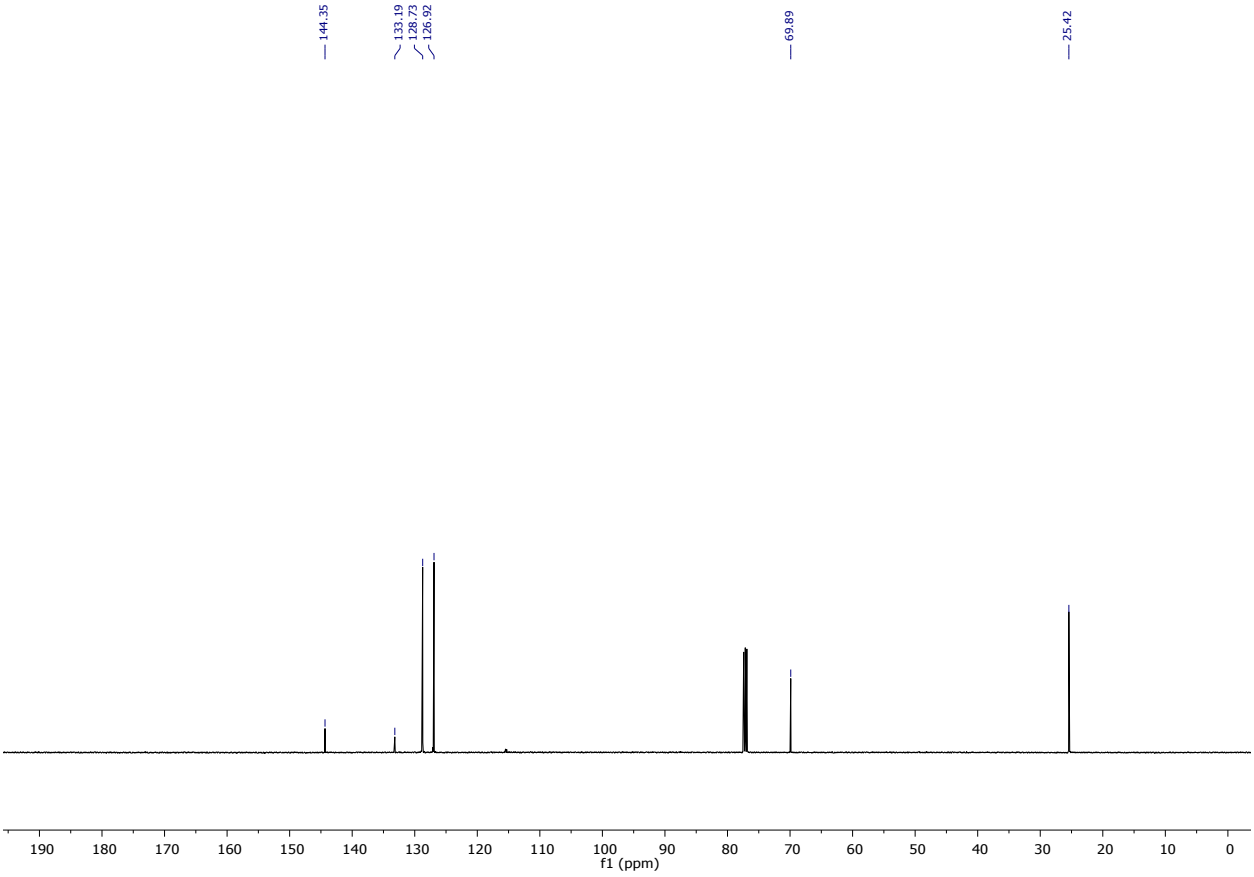


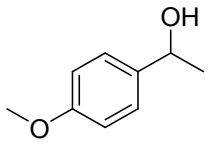
(**5c**)

^{1}H NMR (500 MHz, $CDCl_3$):



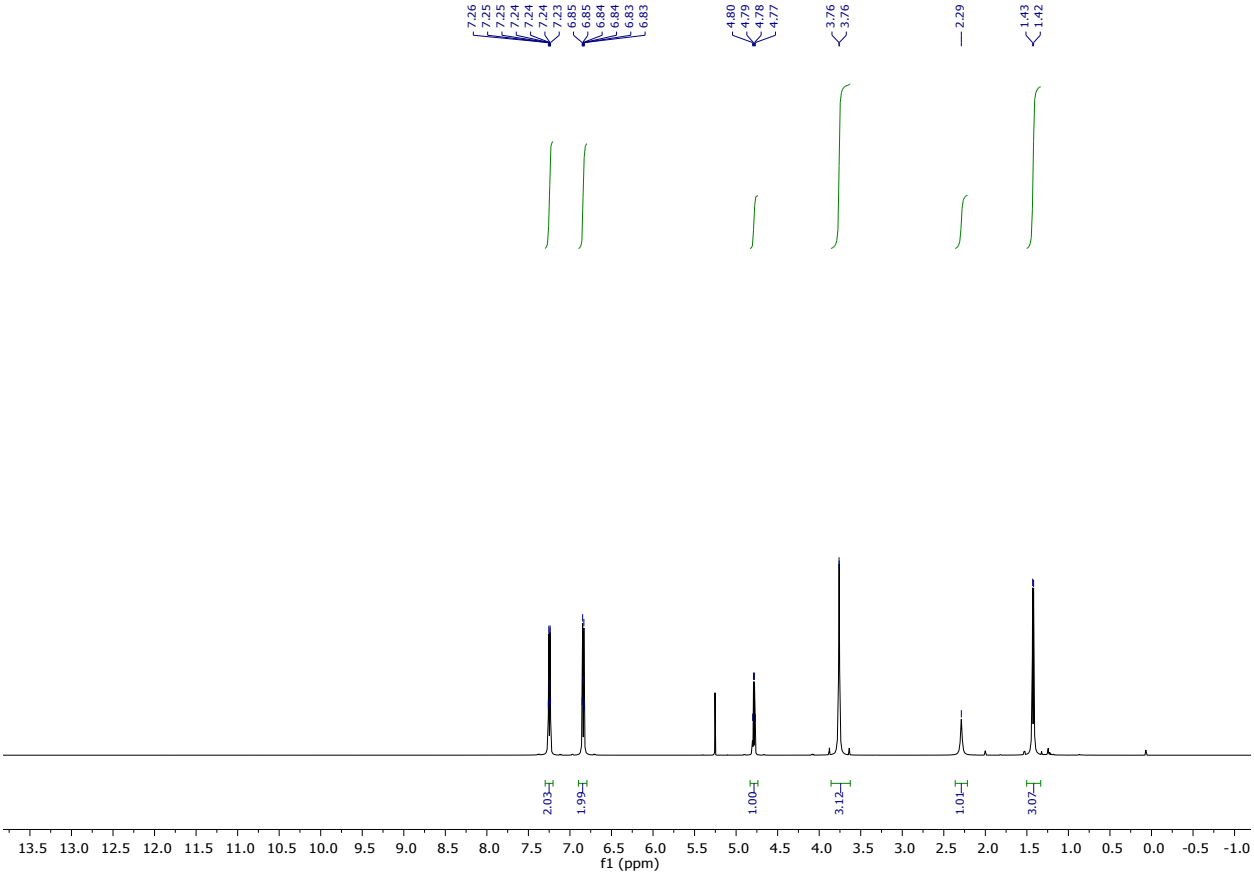
^{13}C NMR (126 MHz, $CDCl_3$):



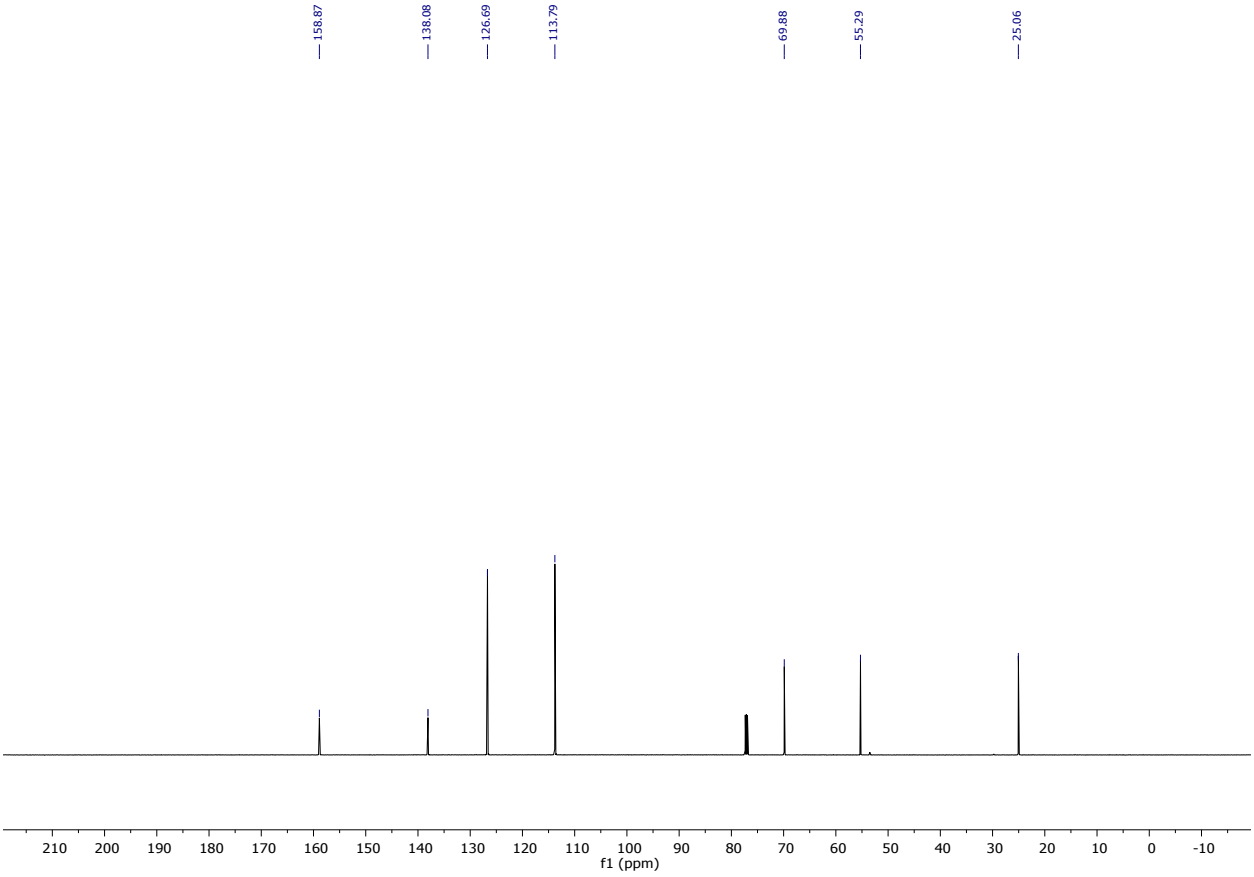


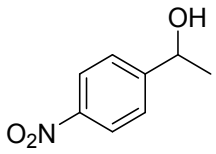
(**5d**)

^{1}H NMR (600 MHz, $CDCl_3$):



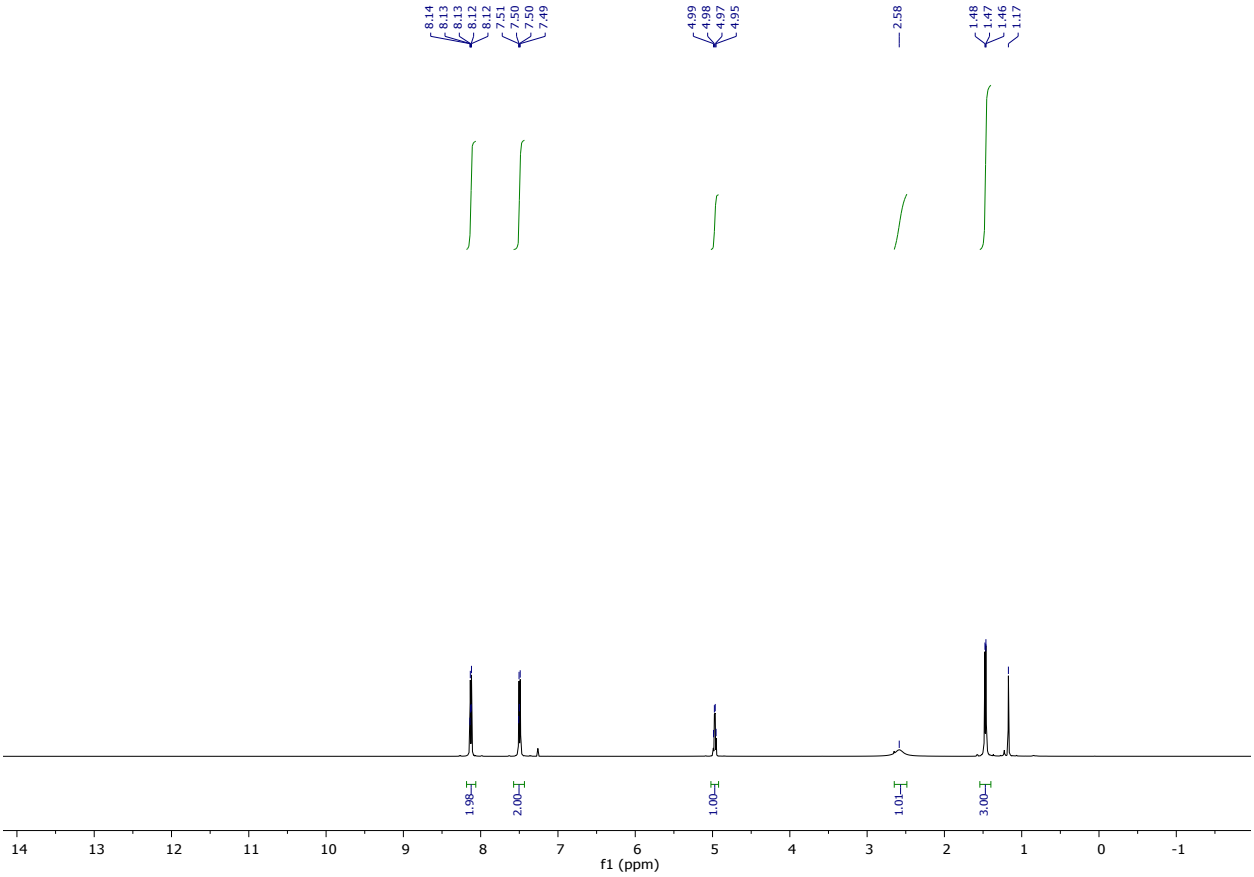
^{13}C NMR (151 MHz, $CDCl_3$):



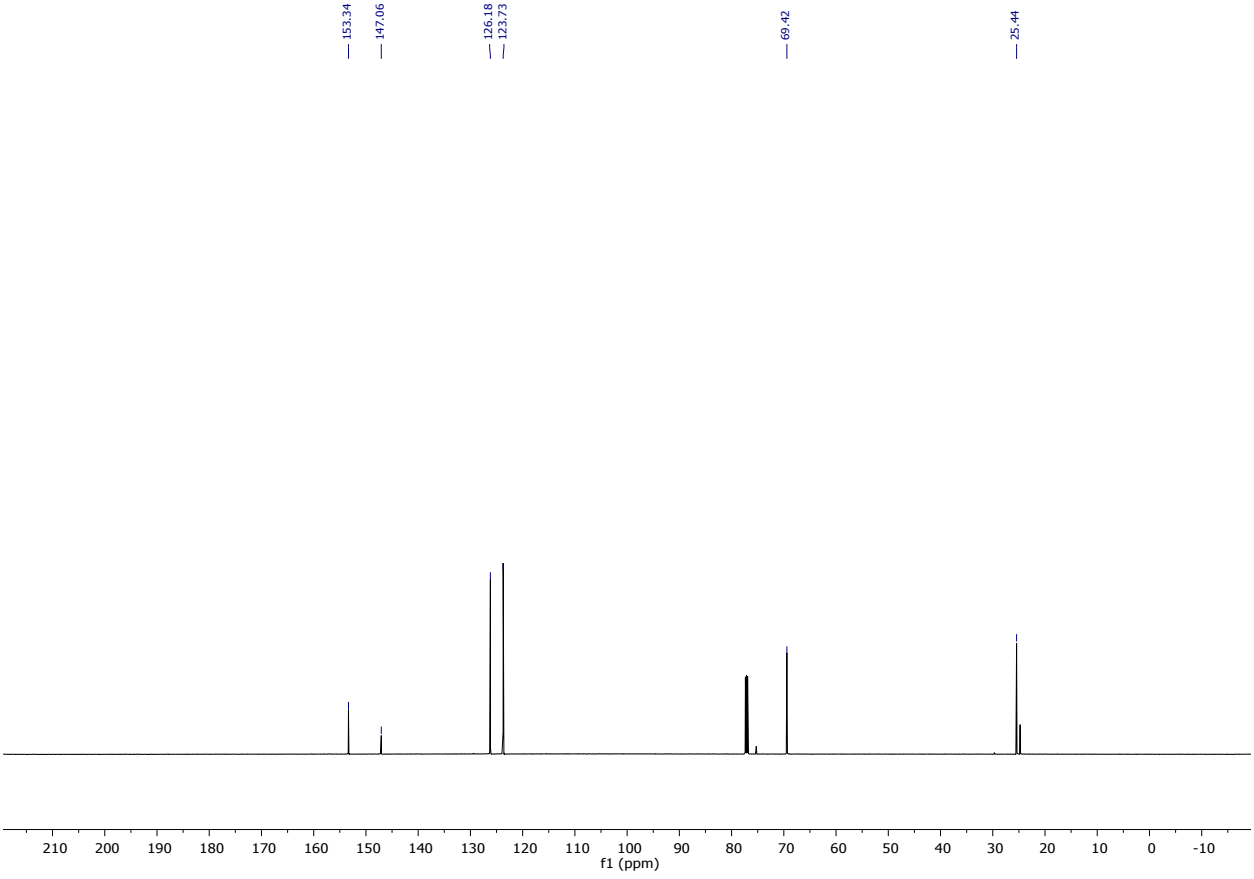


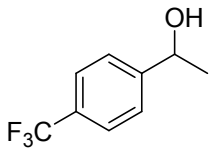
(**5e**)

^{1}H NMR (600 MHz, $CDCl_3$):



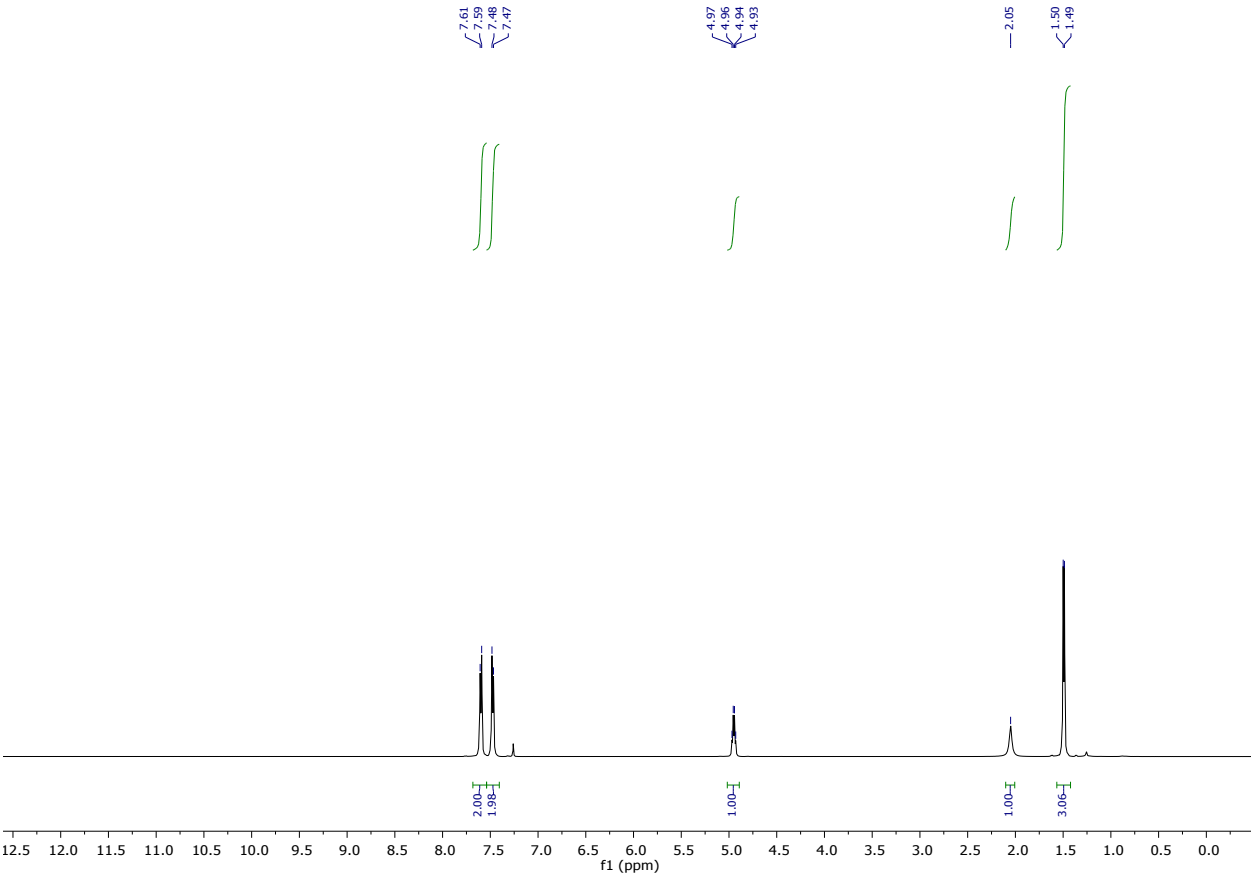
^{13}C NMR (151 MHz, $CDCl_3$):



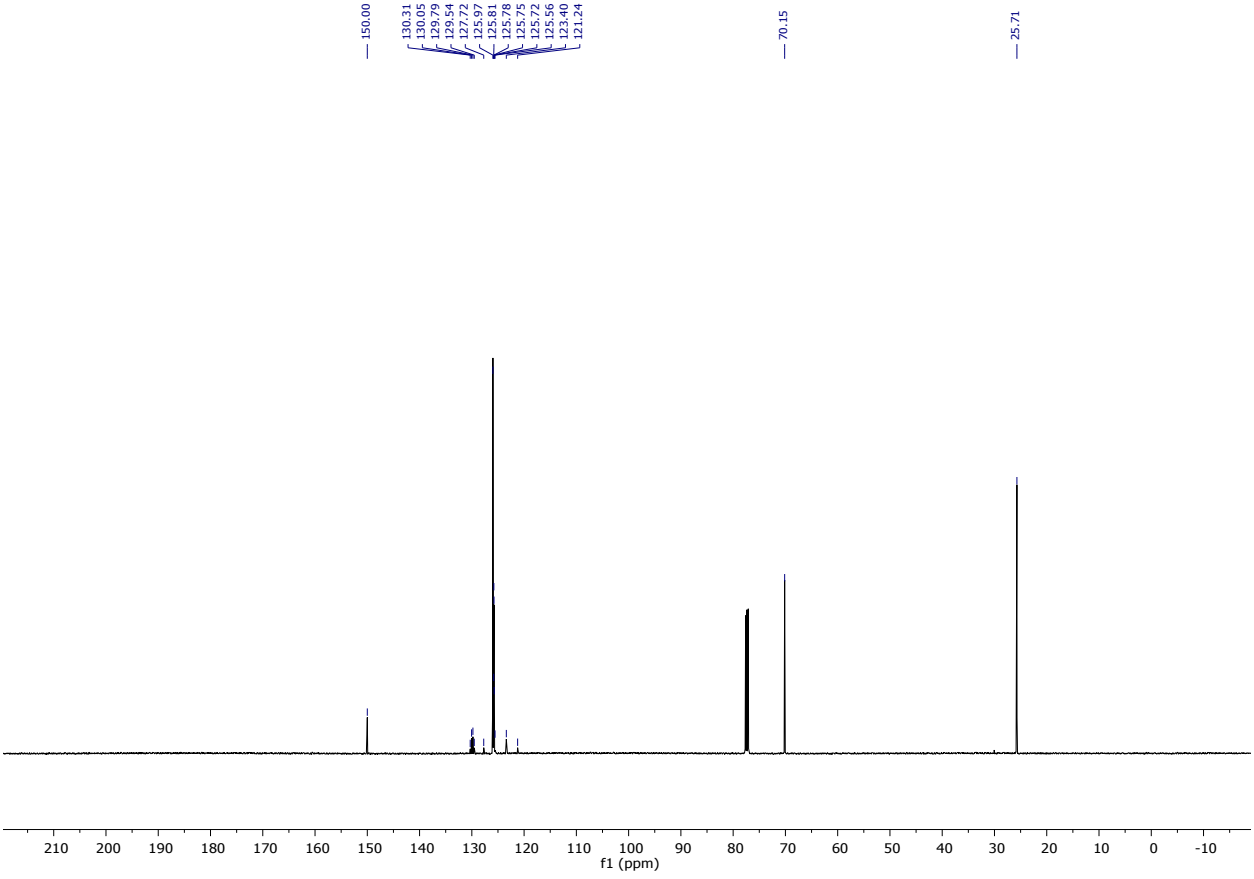


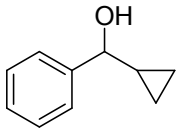
(**5f**)

^{1}H NMR (500 MHz, $CDCl_3$):



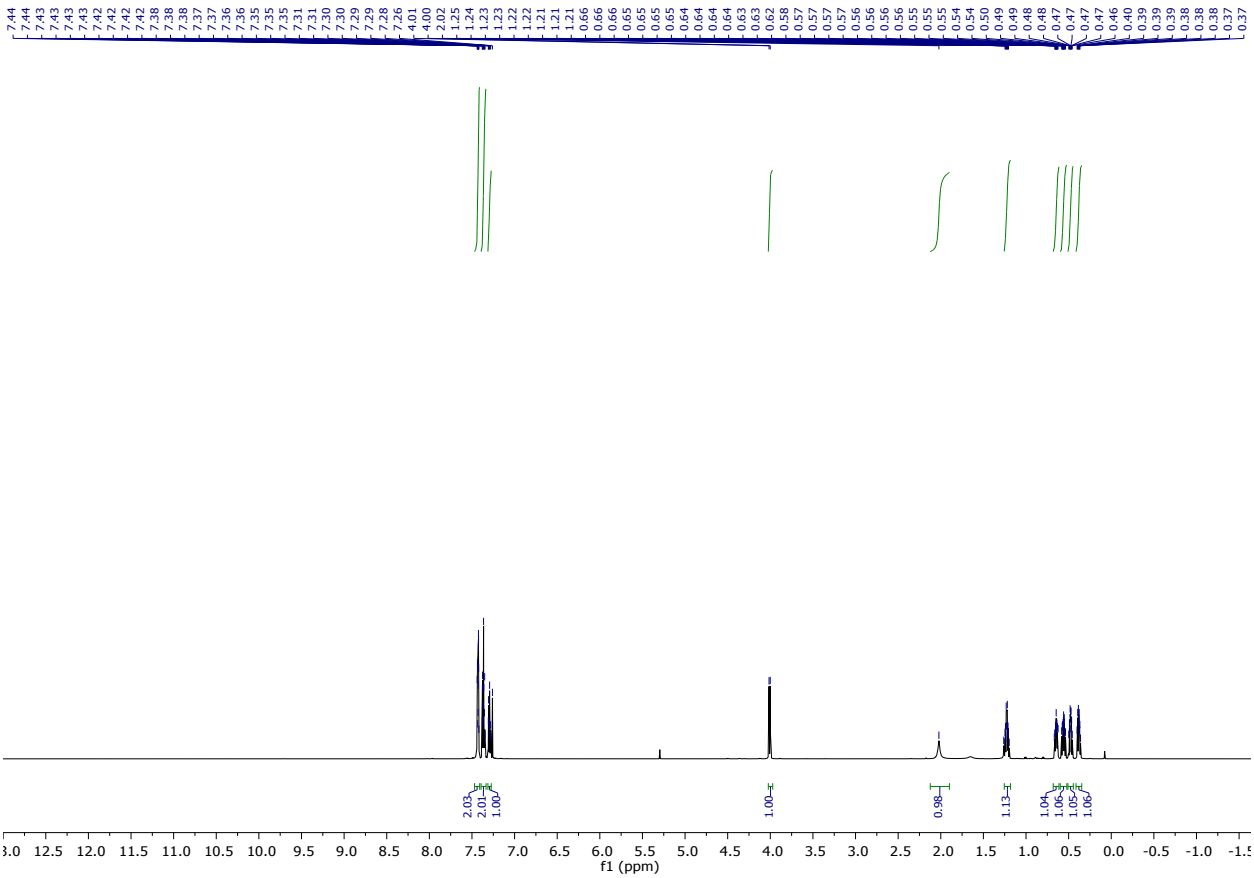
^{13}C NMR (126 MHz, $CDCl_3$):



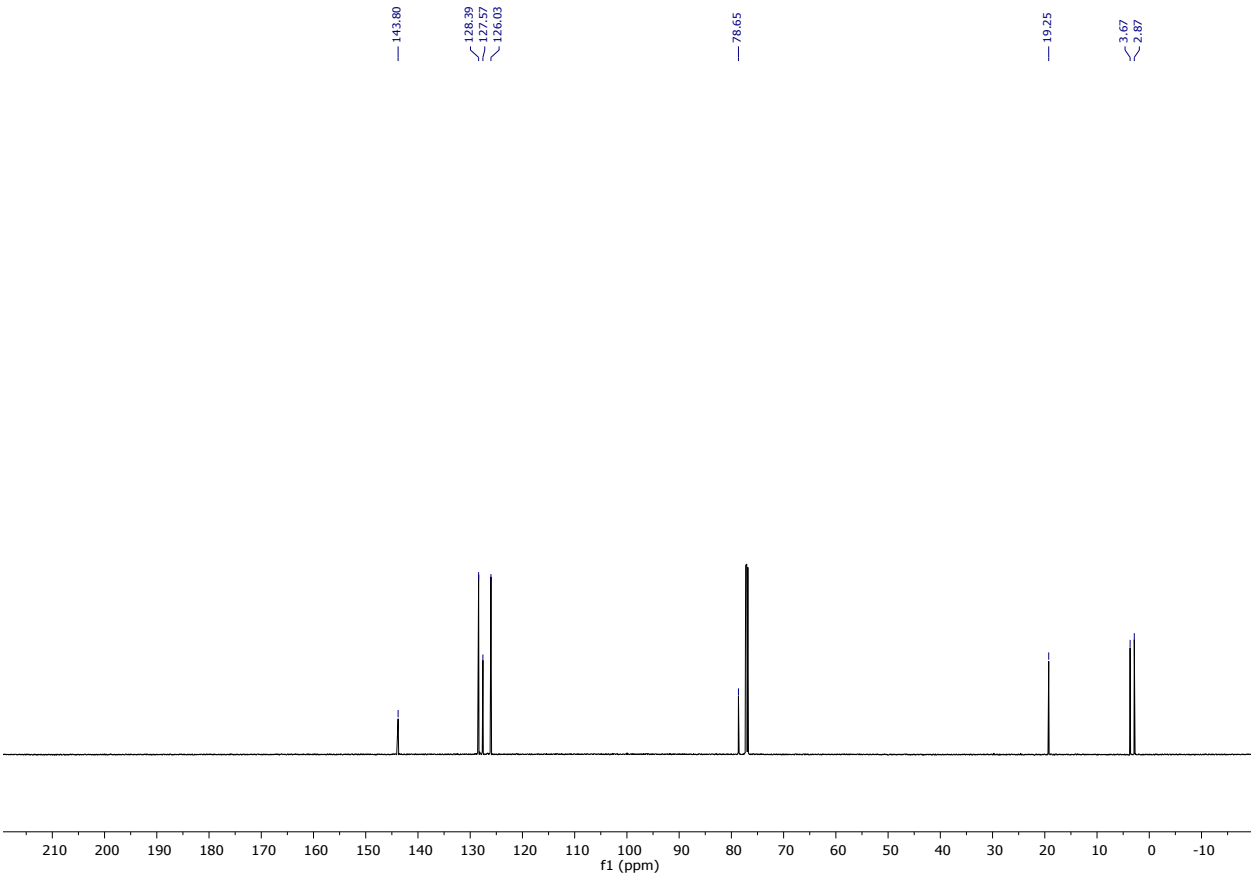


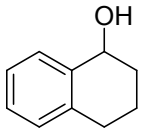
(**5g**)

^{1}H NMR (600 MHz, $CDCl_3$):



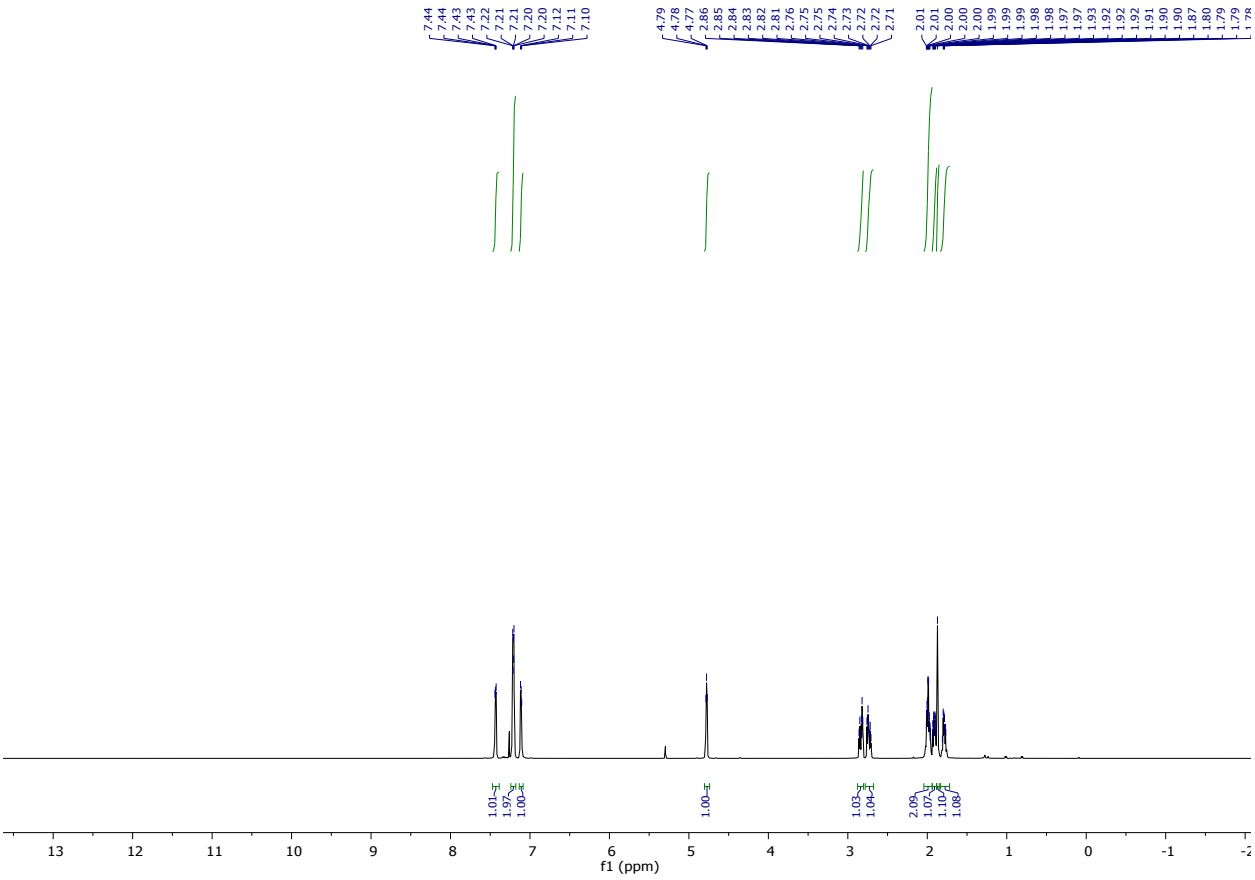
^{13}C NMR (151 MHz, $CDCl_3$):



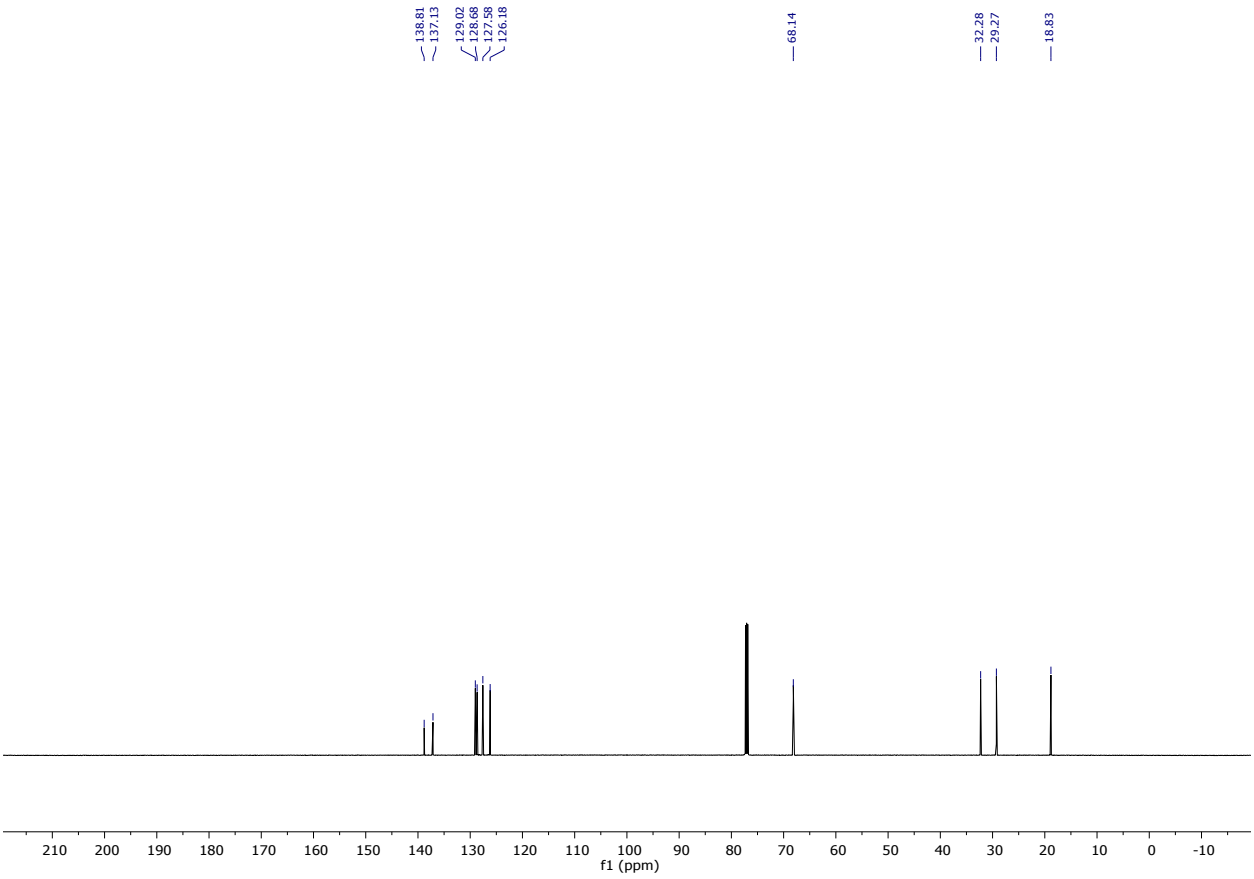


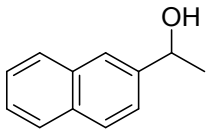
(**5h**)

^{1}H NMR (600 MHz, $CDCl_3$):



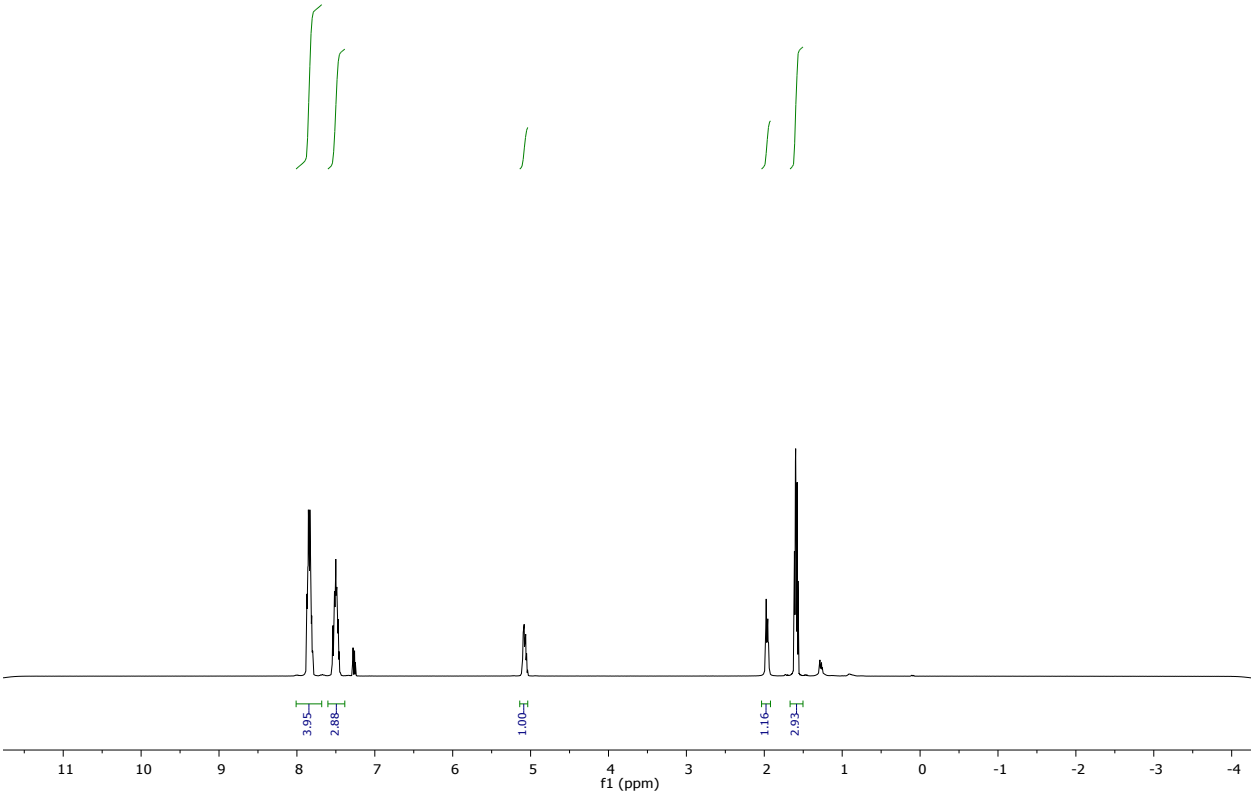
^{13}C NMR (151 MHz, $CDCl_3$):



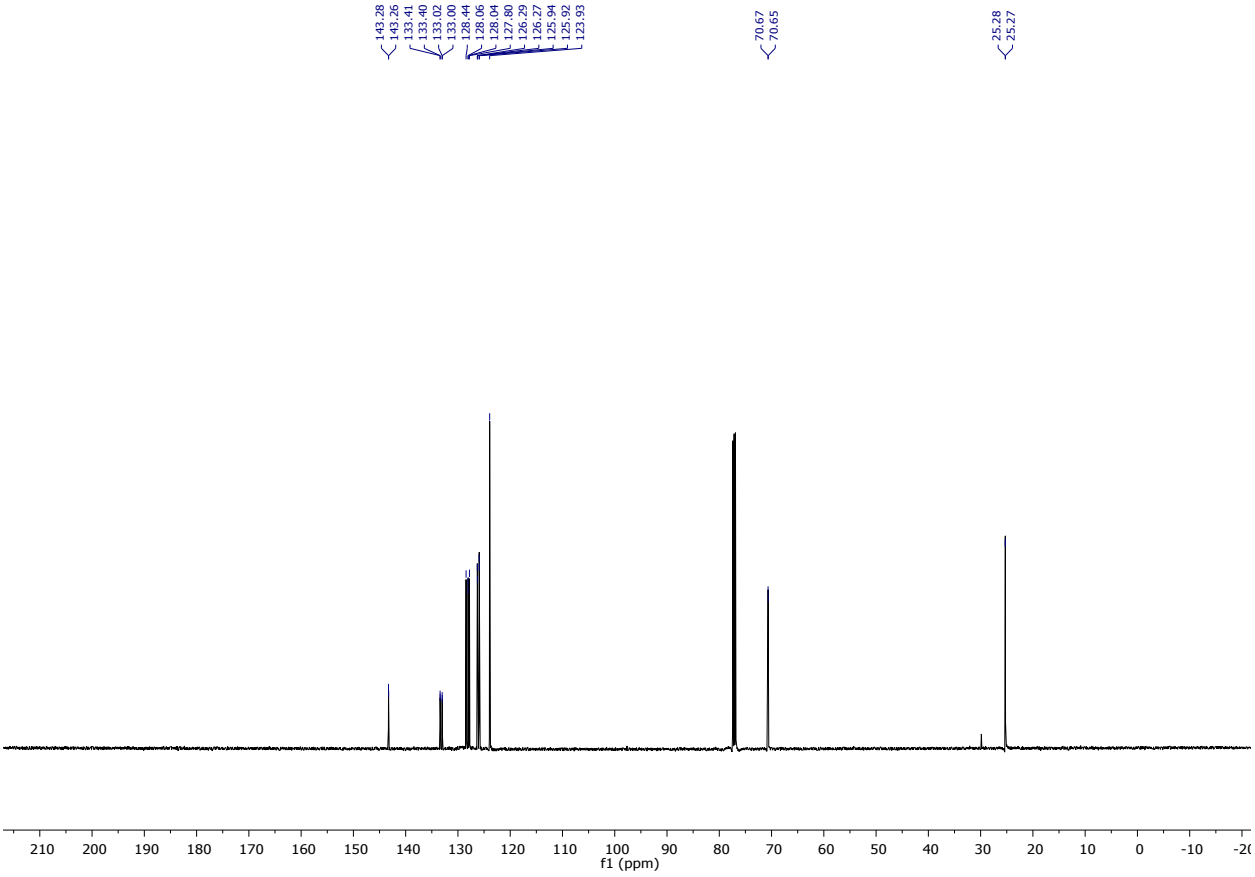


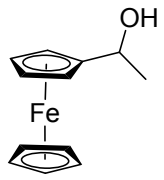
(**5i**)

^{1}H NMR (500 MHz, $CDCl_3$):



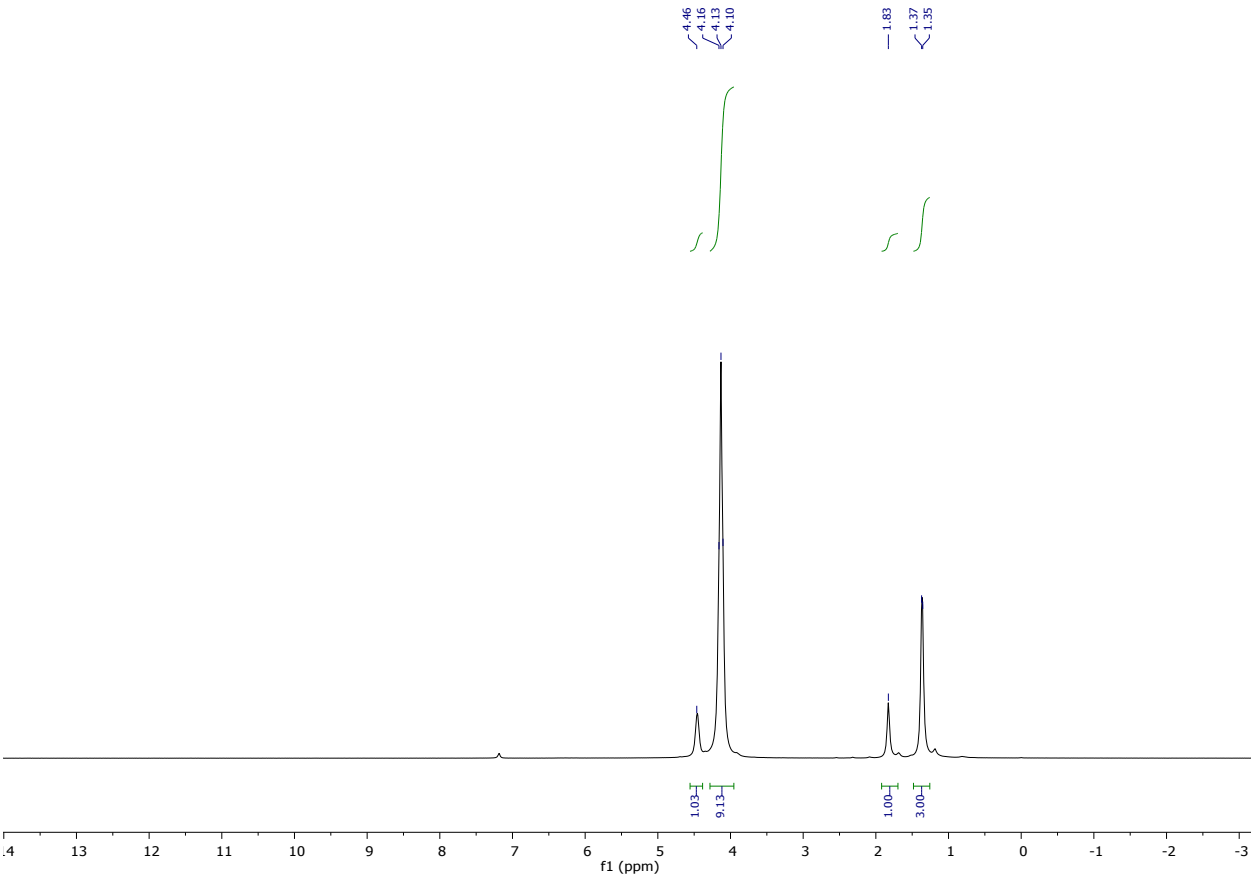
^{13}C NMR (126 MHz, $CDCl_3$):



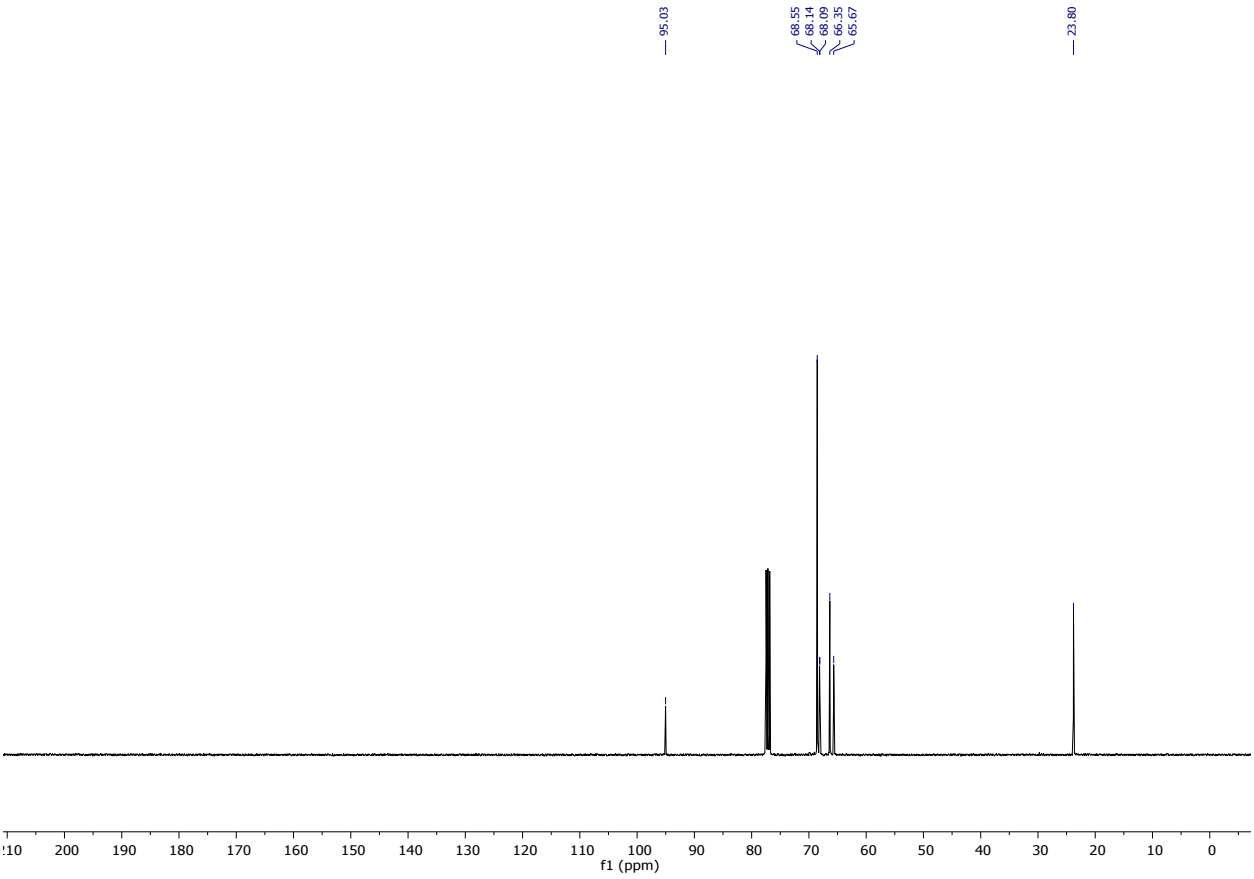


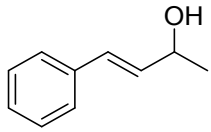
(**5j**)

^{1}H NMR (400 MHz, $CDCl_3$):



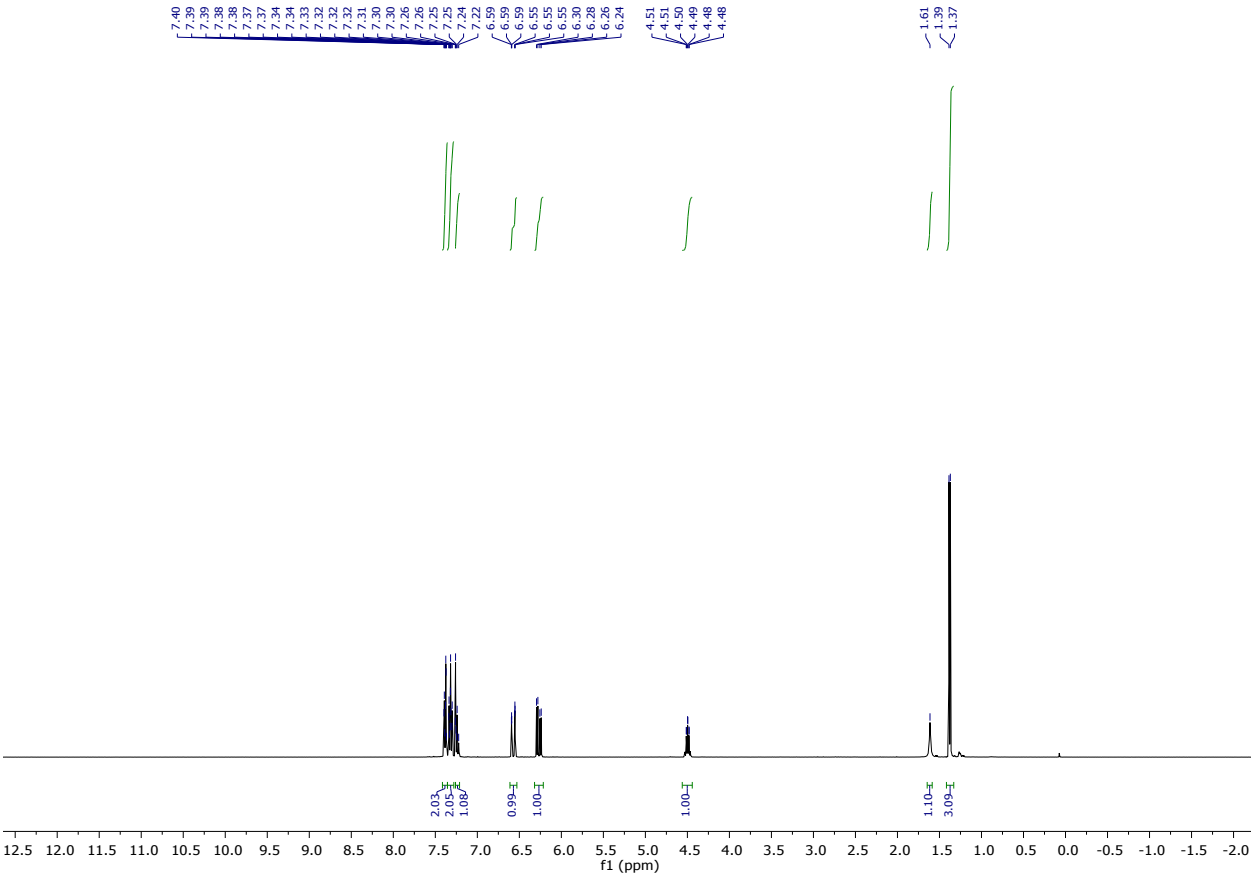
^{13}C NMR (101 MHz, $CDCl_3$):



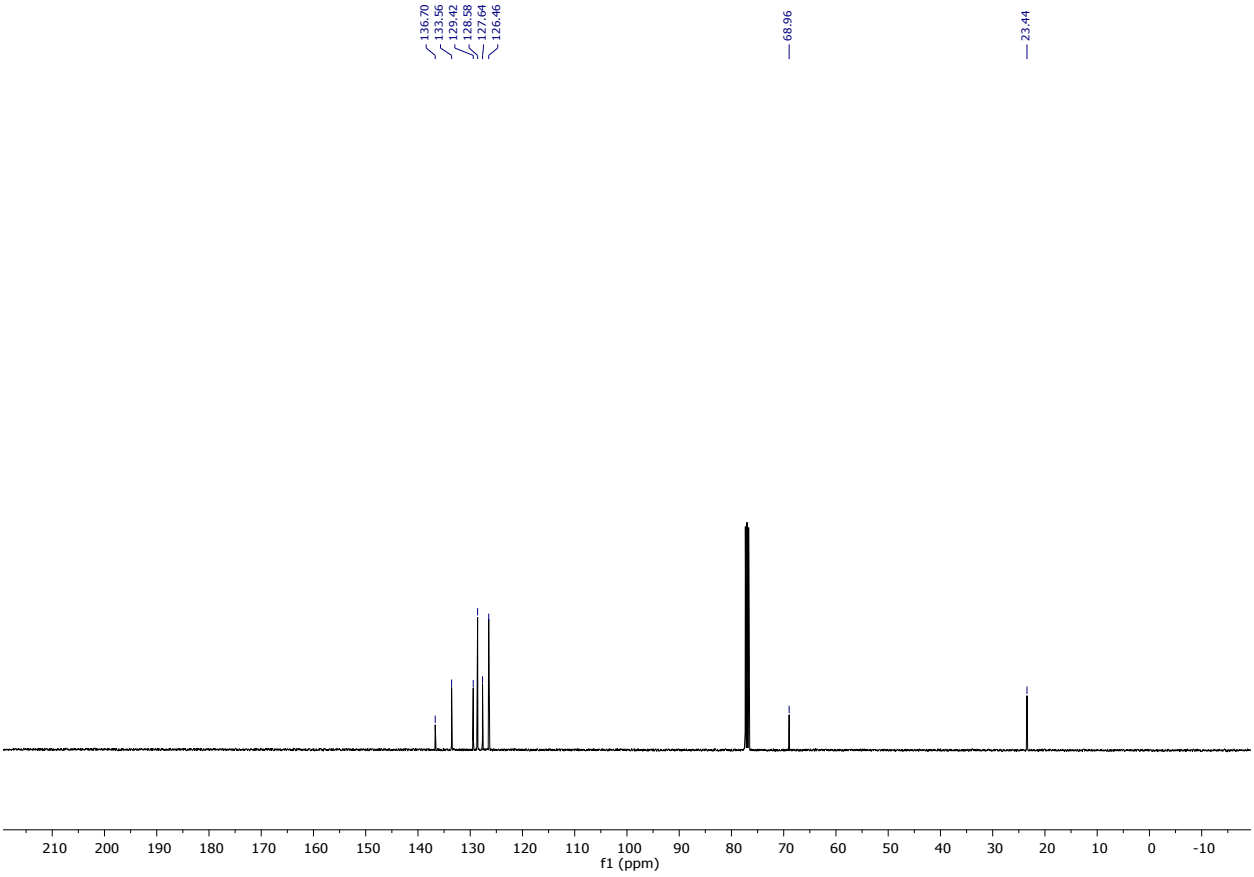


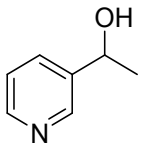
(**5k**)

^{1}H NMR (400 MHz, $CDCl_3$):



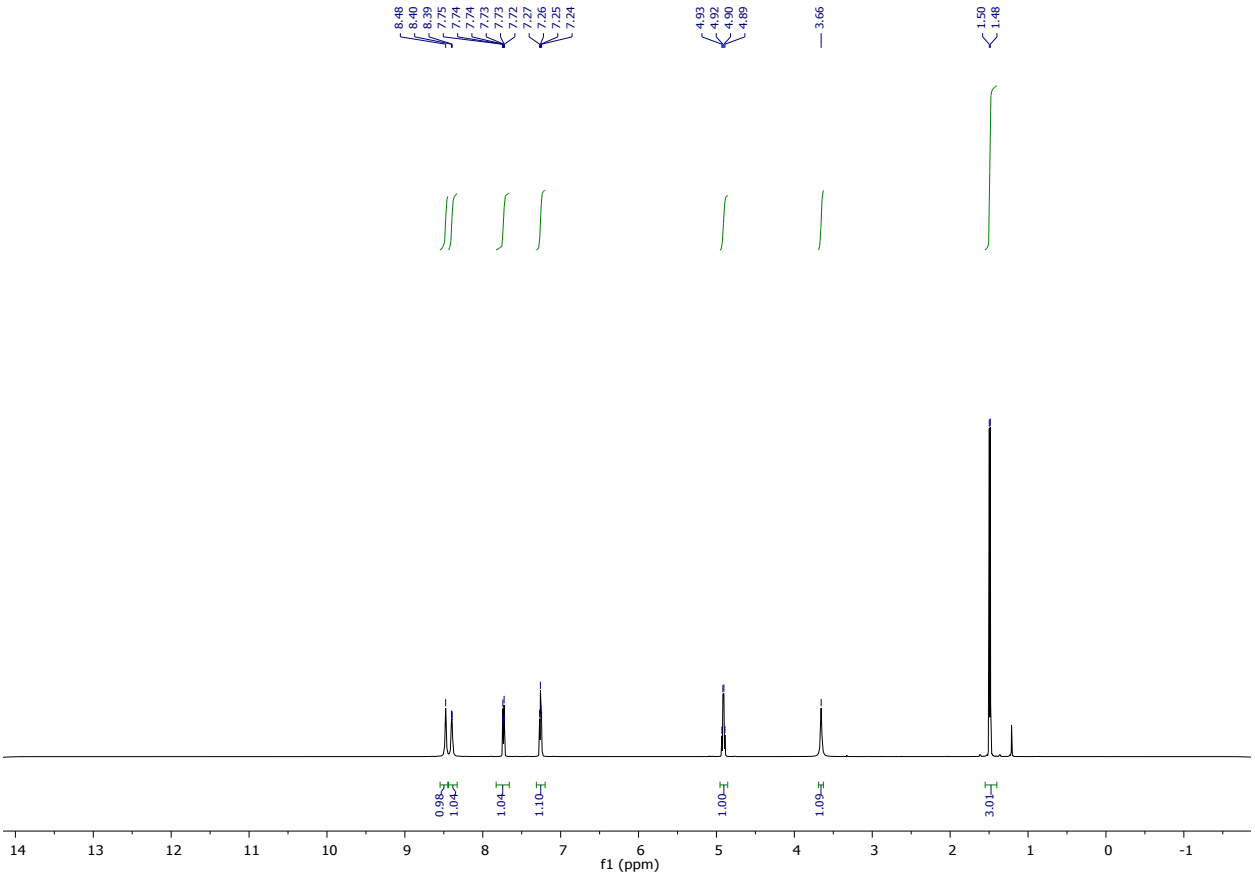
^{13}C NMR (101 MHz, $CDCl_3$):



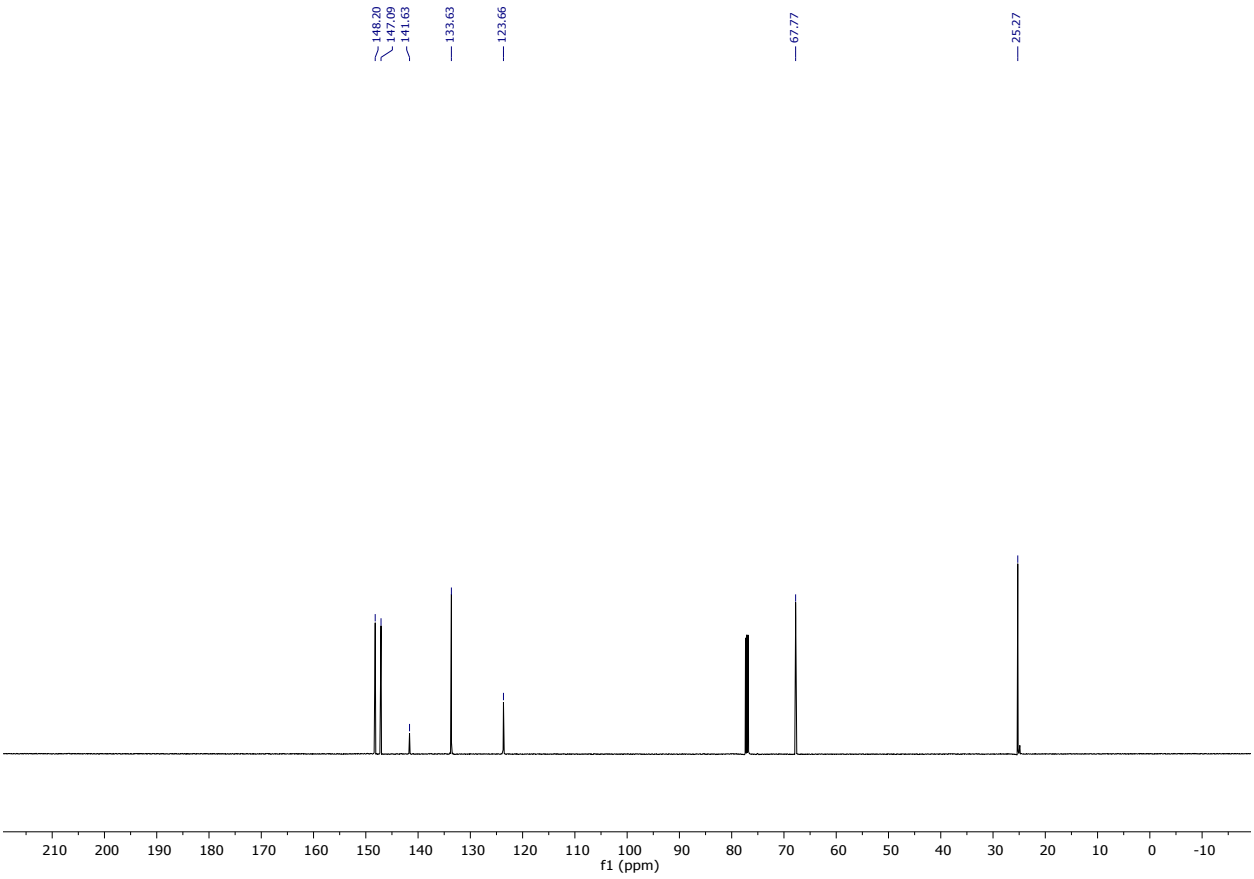


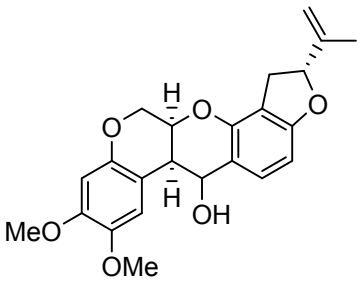
(**5l**)

^{1}H NMR (500 MHz, $CDCl_3$):



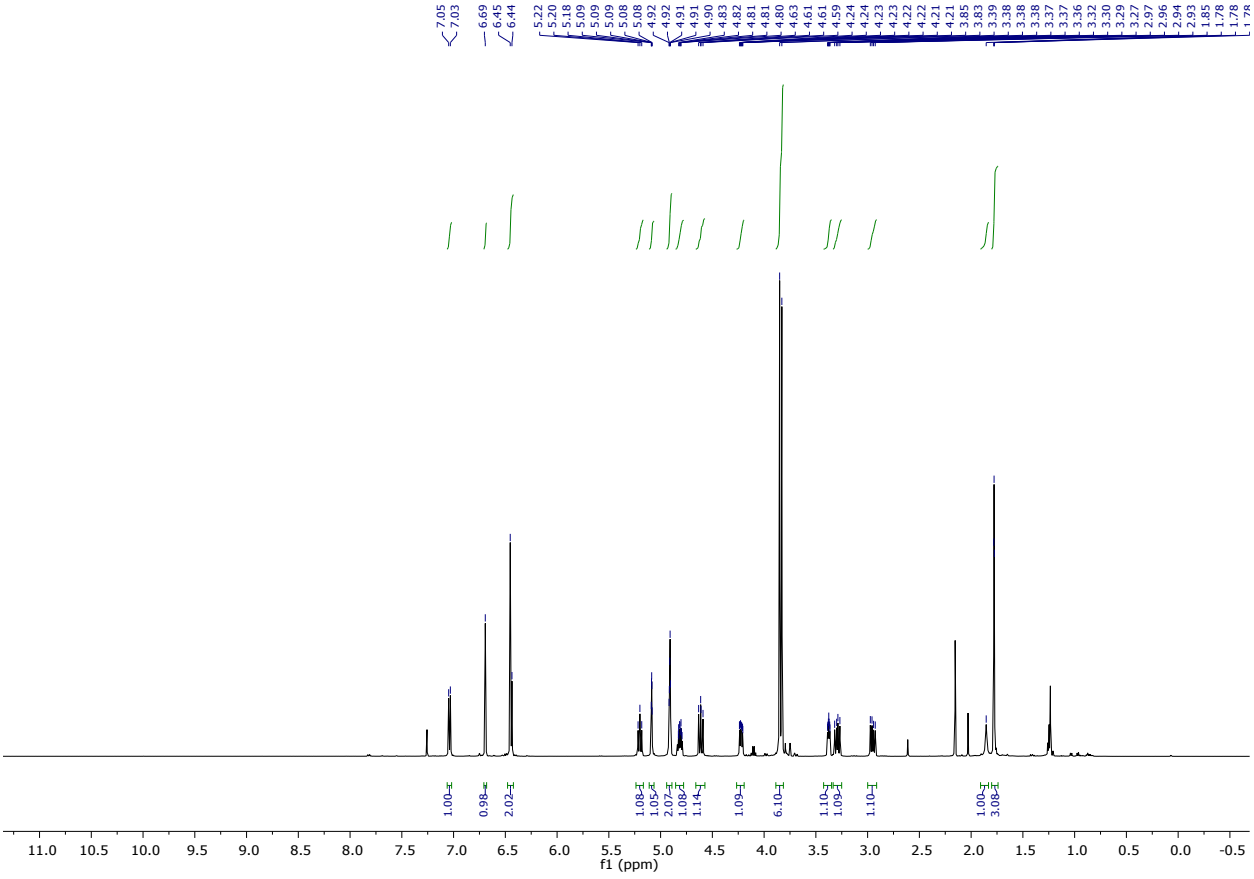
^{13}C NMR (126 MHz, $CDCl_3$):



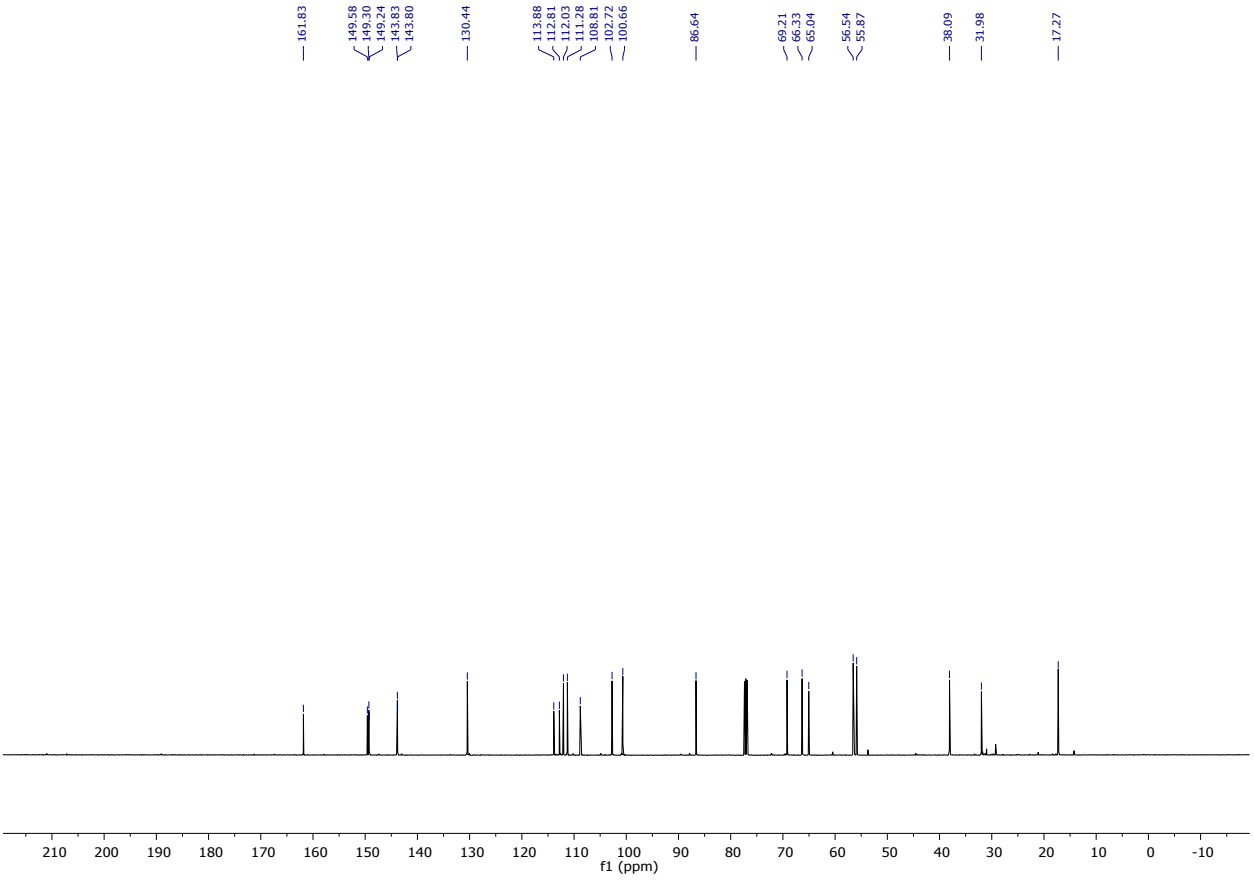


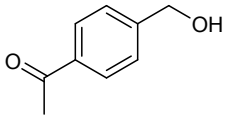
(**6**)

^{1}H NMR (500 MHz, $CDCl_3$):



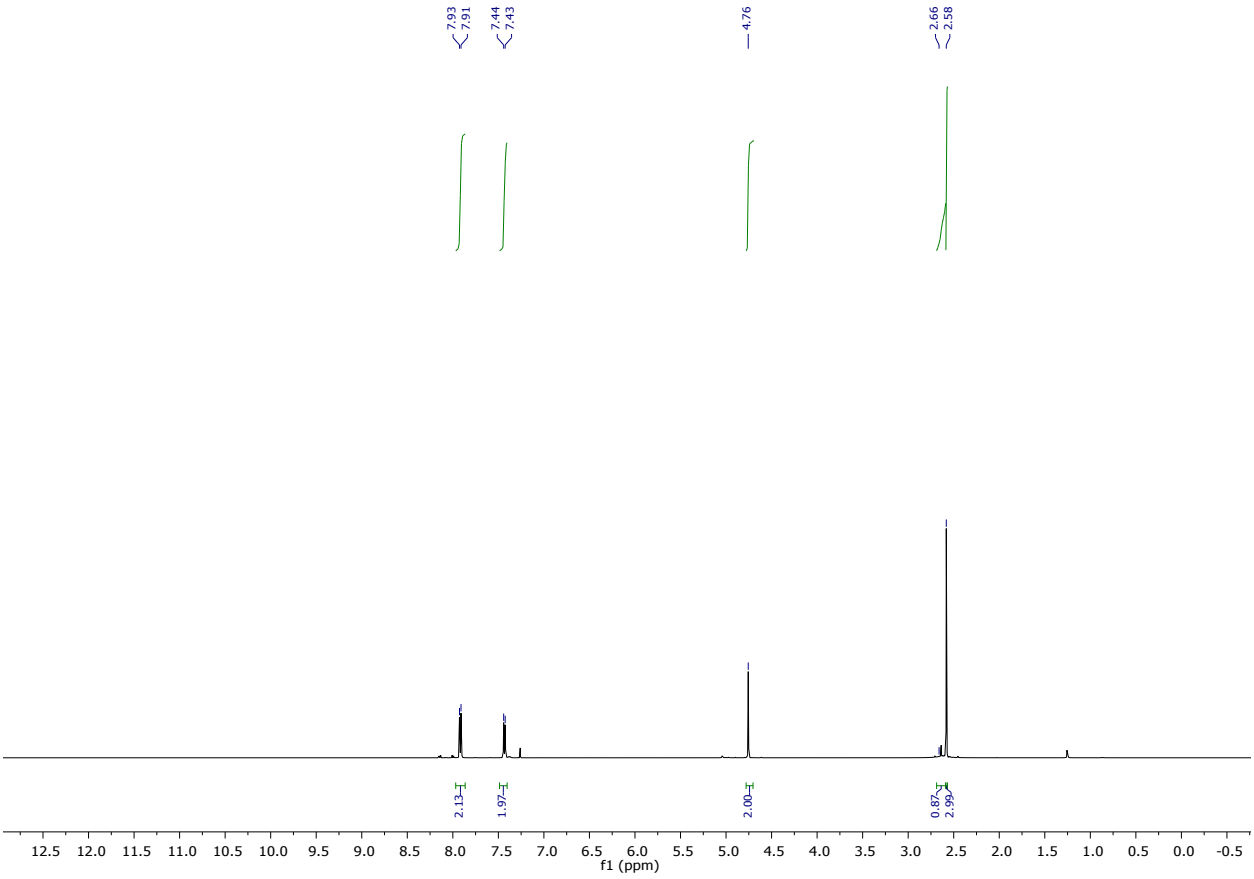
^{13}C NMR (126 MHz, $CDCl_3$):



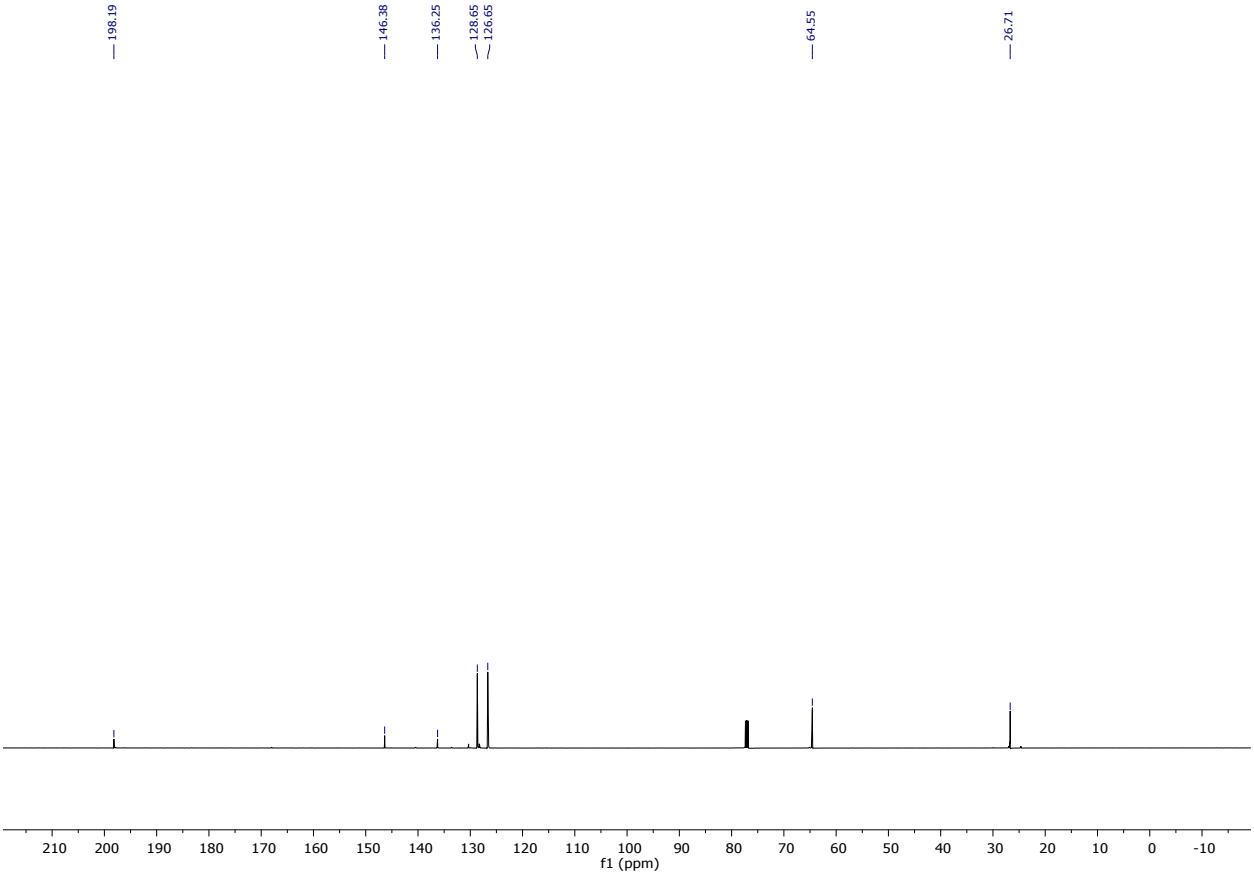


(**9**)

^{1}H NMR (500 MHz, $CDCl_3$):



^{13}C NMR (126 MHz, $CDCl_3$):



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