Supporting Information for

Poly(ethylene glycol) dimethyl ether mediated oxidative scission of aromatic olefins to carbonyl compounds by molecular oxygen

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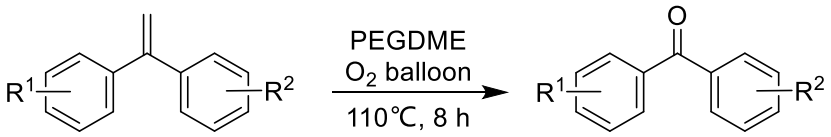
1. General information

Unless otherwise noted, all reagents, catalysts and solvents were purchased from commercial suppliers and used without further purification. Column chromatography was performed with silica gel (200-300 mesh). NMR spectra were recorded on Bruker AVANCE III (400 MHz) spectrometers. $CDCl_3$ was the solvent used for the NMR analysis, with tetramethylsilane as the internal standard. Chemical shifts were reported upfield to TMS (0.00 ppm) for ^1H NMR and relative to $CDCl_3$ (77.0 ppm) for ^{13}C NMR. HPLC analysis was conducted on an Agilent 1200 Series instrument with $5C_{18}$-MS-II Packed Column (4.6 mm I.D. × 250 mm). The substrates were prepared according to reported method [1] or commercially available.

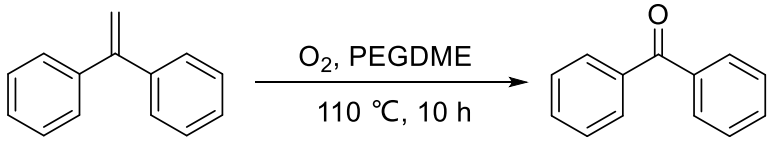
2. General procedure for oxidative scission of aromatic olefin



1 **2**

The corresponding aromatic olefin **1** (0.5 mmol), PEGDME (1 mL) were added to a 10 mL Schlenk tube. The tube was evacuated and filled with oxygen three times. The mixture was stirred at 110 °C for 8 hours under O_2 atmosphere using a balloon. After cooling, the mixture was subjected to silica gel column chromatography (PE: EA = 15:1) to give the product **2**.

3. Gram-scale synthesis of 2a

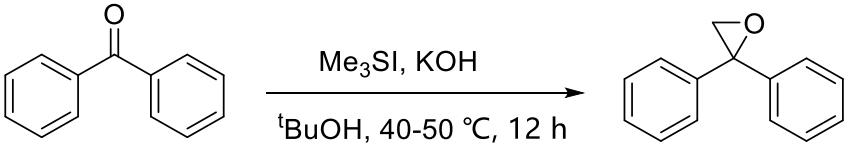


1a: 1.80 g

2a
1.75 g, 96% yield

The *gem*-diphenylethylene (**1a**, 1.80 g, 10 mmol), PEGDME (20 mL) were added to a 50 mL of round-bottomed flask equipped with a three-way jointer. The flask was then evacuated and filled with oxygen three times. The mixture was stirred at 110 °C for 10 hours under O_2 atmosphere using a balloon. After cooling, the mixture was subjected to silica gel column chromatography (PE: EA = 15:1) to give the product **2a** (1.75 g, 96% yield).

4. Synthesis of compound 3a [2]

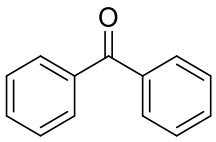


2a **3a**

To a stirred solution of benzophenone **2a** (0.91 g, 5 mmol) in tertiary butanol (6.2 mL) was added portionwise trimethylsulfonium iodide (2.04 g, 10 mmol) and crushed potassium hydroxide (1.7 g, 30 mmol) subsequently at 30 °C. The resulting mixture was heated to 40-50 °C and stirred for 12 h. After the reaction was complete, tertiary butanol was removed. The residue was dissolved in a mixture of water (10 mL) and dichloromethane (20 mL). After phase separation, aqueous phase was extracted with dichloromethane (2 × 5 mL). The combined organic phase was washed with water (2 × 10 mL), saturated brine (10 mL), and dried over Na_2SO_4. After removal of the solvent, **3a** was obtained, which was used for the subsequent oxidative scission directly.

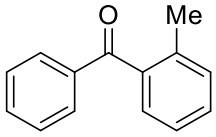
5. Analytical data of the products

Benzophenone (**2a**, CAS: 119-61-9[3])



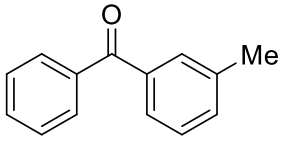
White solid; 99% yield (90.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.86-7.84 (m, 4H), 7.66-7.62 (m, 2H), 7.55-7.51 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.8, 137.6, 132.5, 130.1, 128.3.

2-Methylbenzophenone (**2b**, CAS: 131-58-8[3])



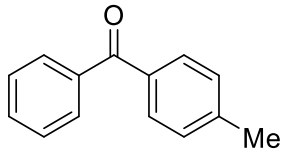
Colorless liquid; 98% yield (95.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.86-7.84 (m, 2H), 7.65-7.61 (m, 1H), 7.52-7.42 (m, 3H), 7.37-7.28 (m, 3H), 2.38 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 198.7, 138.6, 137.7, 136.8, 133.2, 131.0, 130.3, 130.2, 128.6, 128.5, 125.2, 20.0.

3-Methylbenzophenone (**2c**, CAS: 643-65-2[3])



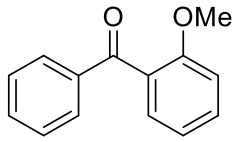
Colorless oil; 98% yield (96.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.86-7.84 (m, 2H), 7.68 (s, 1H), 7.65-7.61 (m, 2H), 7.52 (t, J = 7.6 Hz, 2H), 7.46-7.38 (m, 2H), 2.47(s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 197.0, 138.2, 137.8, 137.7, 133.2, 132.4, 130.5, 130.1, 128.3, 128.1, 127.4, 21.4.

4-Methylbenzophenone (**2d**, CAS: 134-84-9[3])



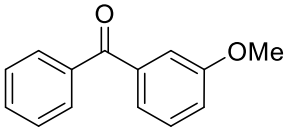
White solid; 98% yield (96.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.84-7.82 (m, 2H), 7.78 (d, J = 8.0 Hz, 2H), 7.64-7.60 (m, 1H), 7.54-7.50 (m, 2H), 7.33 (d, J = 7.6 Hz, 2H), 2.49 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.6, 143.3, 137.9, 134.9, 132.2, 130.4, 123.0, 129.0, 128.3, 21.7.

2-Methoxybenzophenone (**2e**, CAS: 2553-04-0[3])



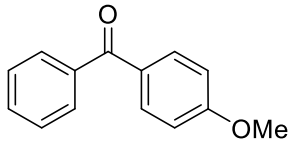
Colorless oil; 99% yield (105.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.87-7.85 (m, 2H), 7.61-7.57 (m, 1H), 7.53-7.45 (m, 3H), 7.40 (dd, J_1 = 7.2 Hz, J_2 = 1.6 Hz, 1H), 7.10-7.03 (m, 2H), 3.76 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.5, 157.4, 137.8, 133.0, 131.9, 129.9, 129.6, 128.8, 128.3, 120.5, 111.5, 55.6.

3-Methoxybenzophenone (**2f**, CAS: 6136-67-0[4])



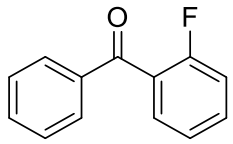
Colorless oil; 98% yield (104.0 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.86-7.84 (m, 2H), 7.66-7.61 (m, 1H), 7.55-7.51 (m, 2H), 7.45-7.37 (m, 3H), 7.20-7.17 (m, 1H), 3.91 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.6, 159.6, 138.9, 137.6, 132.5, 130.1, 129.3, 128.3, 122.9, 118.9, 114.3, 55.5.

4-Methoxybenzophenone (**2g**, CAS: 611-94-9[3])



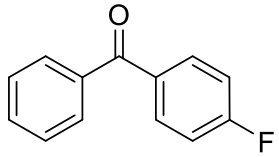
Colorless oil; 99% yield (105.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.89-7.86 (m, 2H), 7.82-7.79 (m, 2H), 7.63-7.59 (m, 1H), 7.54-7.50 (m, 2H), 7.03-6.99 (m, 2H), 3.93 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.6, 163.2, 138.3, 132.6, 131.9, 130.2, 129.8, 128.2, 113.6, 55.5.

2-Fluorobenzophenone (**2h**, CAS: 342-24-5[3])



Colorless oil; 91% yield (91.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.89 (d, J = 8.0 Hz, 2H), 7.67-7.50 (m, 5H), 7.31 (td, J_1 = 7.6 Hz, J_2 = 0.8 Hz, 1H), 7.23-7.18 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 193.5, 160.1 (d, J = 250.8 Hz), 137.4, 133.5, 133.1 (d, J = 8.3 Hz), 130.8 (d, J = 2.9 Hz), 129.8, 128.5, 127.0 (d, J = 14.7 Hz), 124.3 (d, J = 3.6 Hz), 116.3 (d, J = 21.6 Hz). **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -111.0.

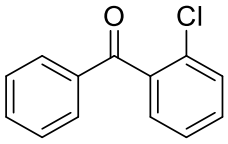
4-Fluorobenzophenone (**2i**, CAS: 345-83-5[3])



Yellow oil; 99% yield (99.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.91-7.86 (m, 2H), 7.82-7.80 (m, 2H), 7.63 (tt, J_1 = 6.8 Hz, J_2 = 1.3 Hz, 1H), 7.55-7.51 (m, 2H), 7.23-7.17 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ

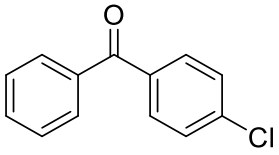
= 195.3, 165.4 (d, *J* = 252.6 Hz), 137.5, 133.8 (d, *J* = 3.0 Hz), 132.7 (d, *J* = 9.1 Hz), 132.5, 129.9, 128.4, 115.5 (d, *J* = 21.7 Hz). **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -105.89.

2-Chlorobenzophenone (**2j**, CAS: 5162-03-8[3])



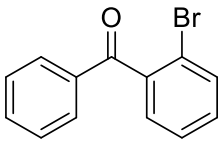
Colorless oil; 91% yield (98.6 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.87-7.85 (m, 2H), 7.67-7.63 (m, 1H), 7.53-7.46 (m, 4H), 7.44-7.41 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.4, 138.6, 136.5, 133.8, 131.3, 131.2, 130.1, 130.1, 129.2, 128.6, 126.7.

4-Chlorobenzophenone (**2k**, CAS: 134-85-0[3])



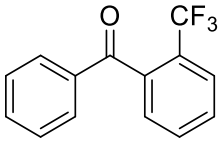
White solid; 97% yield (105.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.83-7.79 (m, 4H), 7.67-7.63 (m, 1H), 7.56-7.49 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.6, 138.9, 137.2, 135.9, 132.7, 131.5, 130.0, 128. 7, 128.4.

2-Bromobenzophenone (**2l**, CAS: 13047-06-8[3])



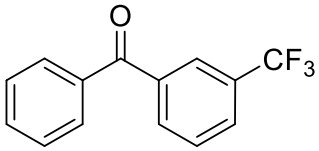
Colorless oil; 90% yield (117.5 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.87-7.85 (m, 2H), 7.71-7.63 (m, 2H), 7.53-7.45 (m, 3H), 7.43-7.38 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.9, 140.7, 136.1, 133.8, 133.2, 131.2, 130.3, 129.0, 128.7, 127.2, 119.6.

2-(TrifluoroMethyl)benzophenone (**2m**, CAS: 727-99-1[3])



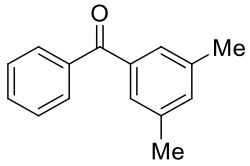
White solid; 73% yield (103.8 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.84-7.82 (m, 3H), 7.68-7.63 (m, 3H), 7.53-7.49 (m, 2H), 7.45-7.42 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.6, 138.3, 136.4, 133.9, 131.4, 130.3, 129.8, 128.6, 128.1, 126.7 (q, *J* = 4.6 Hz), 125.0, 122.3(q, *J* = 272.3 Hz); **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -57.99.

3-(TrifluoroMethyl)benzophenone (**2n**, CAS: 728-81-4[5])



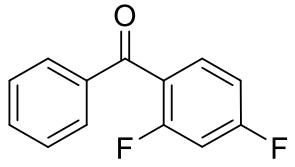
White solid; 99% yield (123.9 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.11 (s, 1H), 8.03 (d, *J* = 8 Hz, 1H), 7.90 (d, *J* = 7.6 Hz, 1H), 7.86-7.83 (m, 2H), 7.70-7.66 (m, 2H), 7.58-7.55 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 195.3, 138.3, 136.7, 133.2, 133.1, 130.8, 130.1, 129.0, 128.9 (q, *J* = 3.0 Hz), 128.6, 126.7 (q, *J* = 3.7 Hz), 125.1 (q, *J* = 271.0 Hz); **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -62.70.

(3,5-Dimethylphenyl)(phenyl)methanone (**2o**, CAS: 13319-70-5[6])



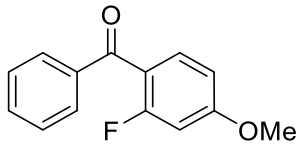
Colorless oil; 99% yield (104.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.85-7.83 (m, 2H), 7.65-7.61 (m, 1H), 7.54-7.51 (m, 2H), 7.45 (s, 2H), 7.27 (s, 1H), 2.42(s, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 197.3, 138.0, 137.9, 137.7, 134.1, 132.3, 130.1, 128.3 127.9, 21.3.

2,4-Difluorobenzophenone (**2p**, CAS: 85068-35-5[6])



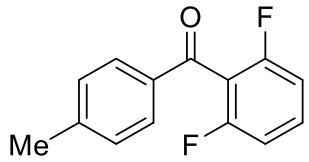
White solid; 90% yield (98.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.87-7.84 (m, 2H), 7.68-7.62 (m, 2H), 7.54-7.51 (m, 2H), 7.08-7.03 (m, 1H), 6.95 (ddd, J_1 = 10.0 Hz, J_2 = 8.8 Hz, J_3 = 2.4 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 192.4, 166.2 (dd, J = 253.1Hz, 11.6 Hz), 162.2 (dd, J = 254.4Hz, 11.7 Hz), 137.4, 133.5, 132.5 (dd, J = 10.2 Hz, 4.3 Hz), 129.7, 128.5, 123.3 (dd, J = 14.6 Hz, 3.8 Hz), 111.9 (dd, J = 21.4 Hz, 3.7 Hz), 104.7 (t, J = 25.4 Hz); **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -103.7 (d, J = 10.4 Hz), -105.8 (d, J = 10.4 Hz).

(2-Fluoro-4-methoxyphenyl)(phenyl)methanone (**2q**, CAS: 1156360-90-5[7])



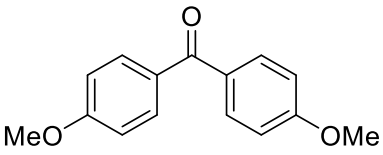
White solid; 90% yield (103.6 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.85-7.83 (m, 2H), 7.64-7.60 (m, 2H), 7.52-7.49 (m, 2H), 6.83 (dd, J_1 = 8.6 Hz, J_2 = 2.4 Hz, 1H), 6.71 (dd, J_1 = 12.0 Hz, J_2 = 2.4 Hz, 1H), 3.92 (s, 3H).; **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 192.9, 163.9 (d, J = 11.2 Hz), 163.2 (d, J = 252.6 Hz), 138.3, 132.9, 132.7 (d, J = 4.4 Hz), 129.6 (d, J = 1.3 Hz), 128.3, 119.3 (d, J = 13.8 Hz), 110.3 (d, J = 2.9 Hz), 101.9 (d, J = 25.6 Hz), 55.9.

(2,6-Difluorophenyl)(p-tolyl)methanone (**2r**, known compound[8])



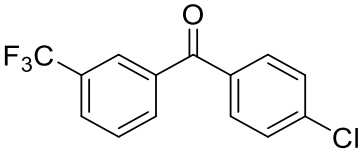
Colourless oil; 86% yield (99.9 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.81 (d, J = 8.0 Hz, 2H), 7.48 (tt, J_1 = 8.4 Hz, J_2 = 6.4 Hz, 1H), 7.33 (d, J = 8.0 Hz, 2H), 7.07-7.01 (m, 2H), 2.48 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 188.5, 161.0 (d, J = 249.6 Hz), 158.5 (d, J = 249.9 Hz), 145.4, 134.5, 131.7 (t, J = 9.8 Hz), 129.8, 129.5, 117.3, 112.0 (d, J = 25.1 Hz), 111.9 (dd, J = 18.0 Hz, 4.1 Hz), 21.9; **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -111.9.

4,4'-Dimethoxybenzophenone (**2s**, CAS: 90-96-0[9])



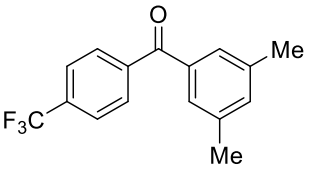
White solid; 95% yield (113.9 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.85-7.81 (m, 4H), 7.02-6.98 (m, 4H), 3.93 (s, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 194.5, 162.9, 132.3, 130.8, 113.5, 55.5.

(4-Chlorophenyl)(3-(trifluoromethyl)phenyl)methanone (**2t**, CAS: 91503-65-0[10])



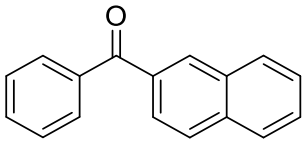
White solid; 97% yield (138.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.08 (s, 1H), 7.99 (d, J = 7.6 Hz, 1H), 7.91 (d, J = 7.6 Hz, 1H), 7.81-7.78 (m, 2H), 7.69 (t, J = 8.0 Hz, 1H), 7.56-7.52(m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 194.0, 139.6, 137.9, 135.0, 133.0, 131.4, 131.0 (q, J =32.9 Hz), 129.1, 129.1, 129.0, 126.6 (q, J = 3.8 Hz), 125.0 (q, J = 270.9 Hz). **^{19}F NMR** ($CDCl_3$, 376 MHz): δ -62.8.

3,5-Dimethyl-4'-(trifluoromethyl)benzophenone (**2u**, known compound[11])



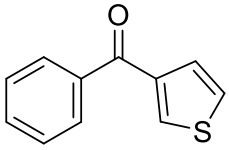
Colorless oil; 99% yield (137.7 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.92 (d, J = 8.0 Hz, 2H), 7.79 (d, J = 8.4 Hz, 2H), 7.44 (s, 2H), 7.30 (s, 1H), 2.43 (s, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.0, 141.1, 138.3, 136.9, 134.8, 133.6 (q, J = 32.5 Hz), 130.1, 127.9, 125.3 (q, J = 3.7 Hz), 122.4 (q, J = 271.0 Hz), 21.24.

2-Naphthyl Phenyl Ketone (**2v**, CAS: 644-13-3[12])



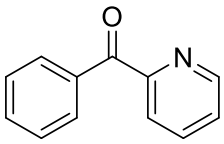
White solid; 81% yield (95.0 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.32 (s, 1H), 8.00-7.96 (m, 4H), 7.92-7.90 (m, 2H), 7.69-7.64 (m, 2H), 7.62-7.55 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 196.8, 137.9, 135.3, 134.8, 132.4, 132.3, 131.9, 130.2, 130.1, 129.5, 128.4, 128.3, 127.8, 126.8, 125.8.

3-Benzoylthiophene (**2w**, CAS: 6453-99-2[6])



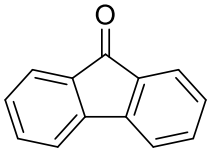
Yellow oil; 60% yield (56.5 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.97 (dd, J_1 = 2.8 Hz, J_2 = 1.2 Hz, 1H), 7.90-7.88 (m, 2H), 7.66-7.61 (m, 2H), 7.53 (t, J = 7.6 Hz, 2H), 7.43(dd, J_1 = 5.0 Hz, J_2 = 2.8 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 190.1, 141.3, 138.6, 134.0, 132.4, 129.4, 128.6, 128.4, 126.3.

2-Benzoylpyridine (**2x**, CAS: 91-02-1[9])



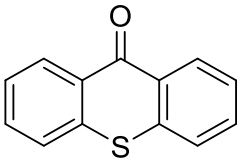
Slightly yellow solid; 95% yield (87.1 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.71 (d, J = 4.8 Hz, 1H), 8.09-8.02 (m, 3H), 7.90-7.85 (m, 1H), 7.61-7.56 (m, 1H), 7.50-7.45 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 193.9, 155.0, 148.6, 137.1, 136.3, 132.9, 131.0, 128.2, 126.2, 124.6.

9-Fluorenone (**2y**, CAS: 486-25-9[12])



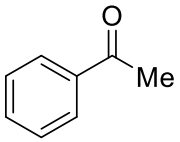
Yellow solid; 87% yield (78.7 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.68 (d, J = 7.2 Hz, 2H), 7.53-7.48 (m, 4H), 7.31 (td, J_1 = 7.2 Hz, J_2 = 1.6 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 193.9, 144.4, 134.7, 134.1, 129.1, 124.3, 120.3.

Thioxanthen-9-one (**2z**, CAS: 492-22-8[12])



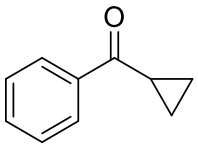
Pale yellow solid; 85% yield (90.2 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.65 (dd, J_1 = 8.0 Hz, J_2 = 1.2 Hz, 2H), 7.67-7.59 (m, 4H), 7.53-7.49 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 180.0, 137.3, 132.3, 129.9, 129.2, 126.3, 126.0.

Acetophenone (**2aa**, CAS: 98-86-2[13])



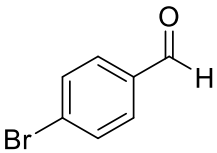
Colourless oil; 99% yield (59.5 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 7.93-7.91 (m, 2H), 7.52 (tt, J_1 = 6.8 Hz, J_2 = 1.2 Hz, 1H), 7.44-7.40 (m, 1H), 2.55 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 198.0, 137.1, 133.1, 128.5, 128.3, 26.5.

Cyclopropyl Phenyl Ketone (**2ab**, CAS: 3481-02-5[13])



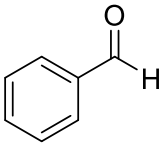
Colourless oil; 93% yield (68.0 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 8.05-8.03 (m, 2H), 7.59-7.55 (m, 1H), 7.50-7.46 (m, 2H), 2.72-2.66 (m, 1H), 1.29-1.24 (m, 2H), 1.07-1.03 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 200.6, 138.0, 132.7, 128.5, 128.0, 17.1, 11.7.

4-Bromobenzaldehyde (**2ac**, CAS: 1122-91-4[13])



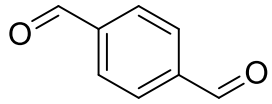
White solid; 92% and 89% yield. **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 10.02-10.01 (m, 1H), 7.80-7.77 (m, 2H), 7.54-7.51 (m, 2H), 7.74-7.71 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 191.1, 135.1, 132.5, 131.0, 129.8.

Benzaldehyde (**2ad**, CAS: 100-52-7[13])



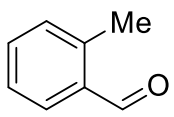
Colorless liquid; 95% and 90% yield. **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 10.00-9.99 (m, 1H), 7.86-7.84 (m, 2H), 7.61-7.57 (m, 1H), 7.51-7.47 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 192.3, 136.4, 134.4, 129.7, 129.0.

Terephthalaldehyde (**2ae** CAS: 623-27-8[14])



White solid; 83% yield (55.4 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 10.18-10.17 (m, 2H), 8.10-8.09 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 191.5, 140.0, 130.2.

2-Methylbenzaldehyde (**2ae'**, CAS: 529-20-4[14])



Colorless liquid; 82% yield (49.4 mg). **^{1}H NMR** (400 MHz, $CDCl_3$): δ = 10.28 (s, 1H), 7.81 (d, J = 7.6 Hz, 1H), 7.49 (td, J_1 = 7.2 Hz, J_2 = 1.2 Hz, 1H), 7.37 (t, J = 7.6 Hz, 1H), 7.27 (d, J = 7.6 Hz, 1H), 2.68(s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ = 192.8, 140.6, 134.1, 133.7, 132.1, 131.8, 126.3, 19.6.

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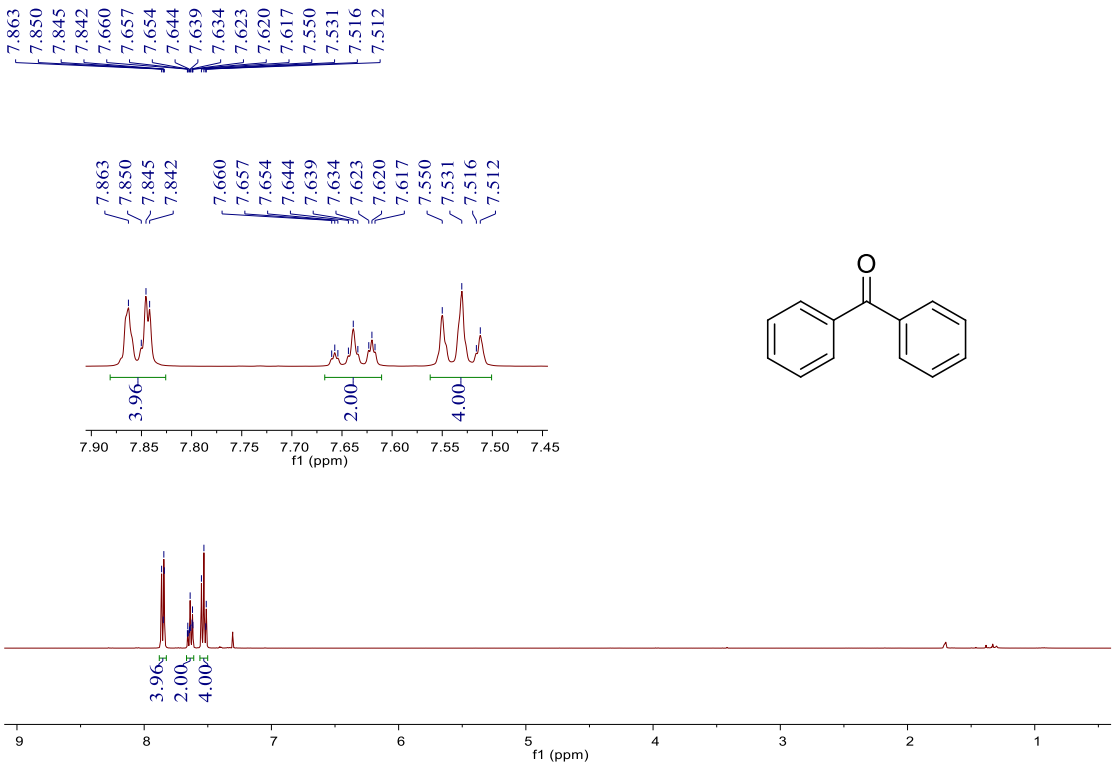
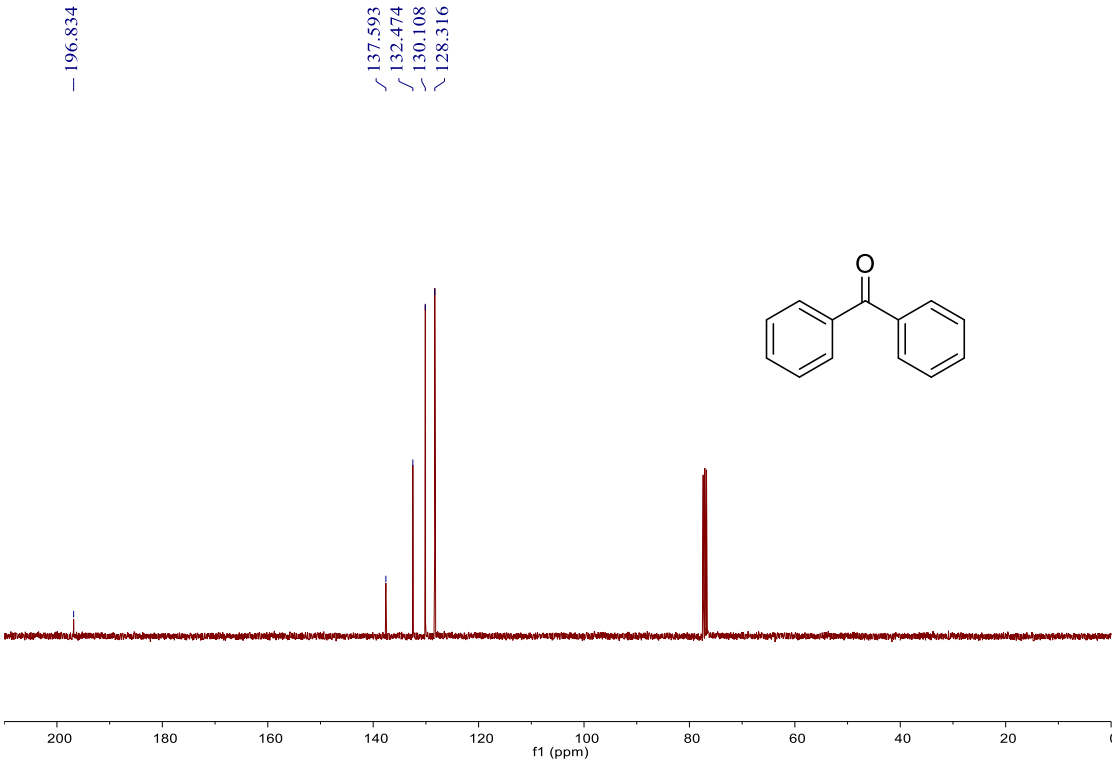
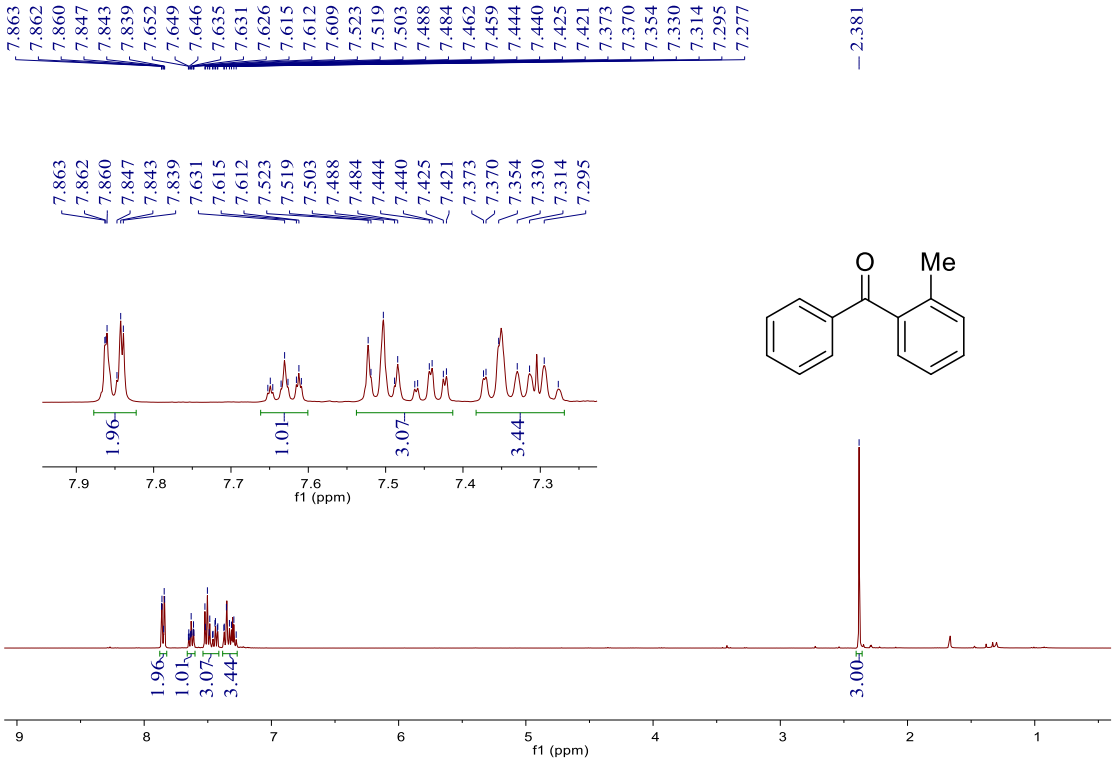
6. NMR spectra of the products

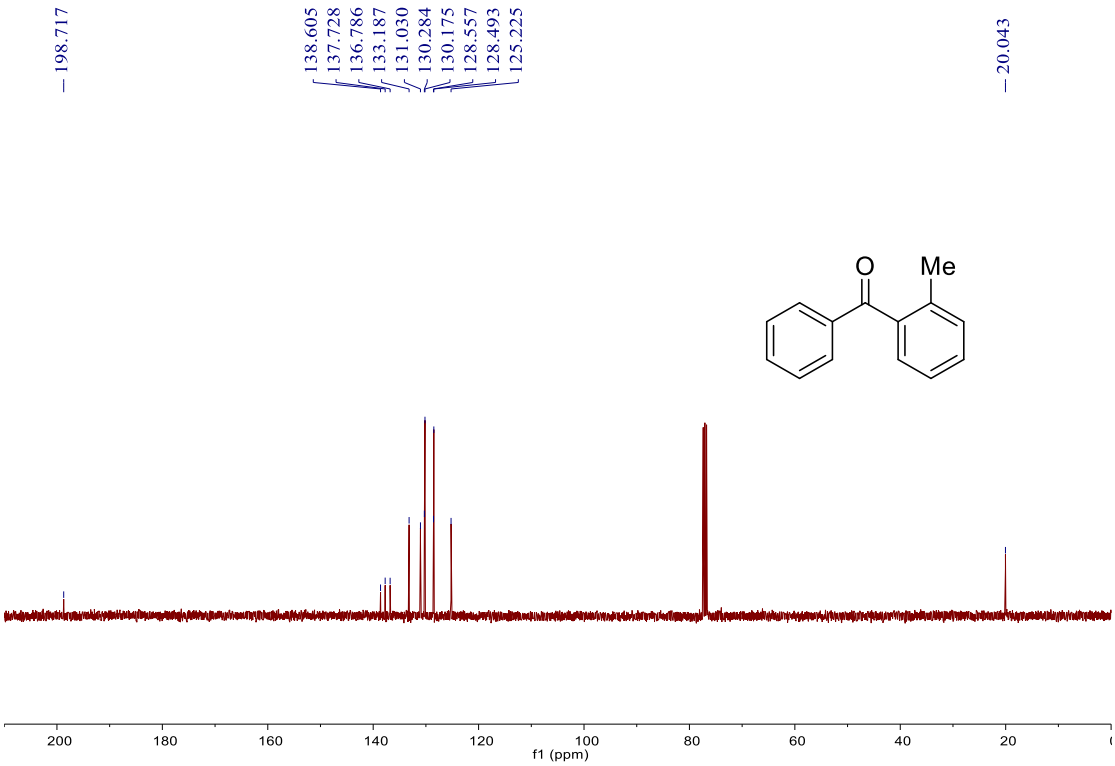
^{1}H & ^{13}C NMR of 2a



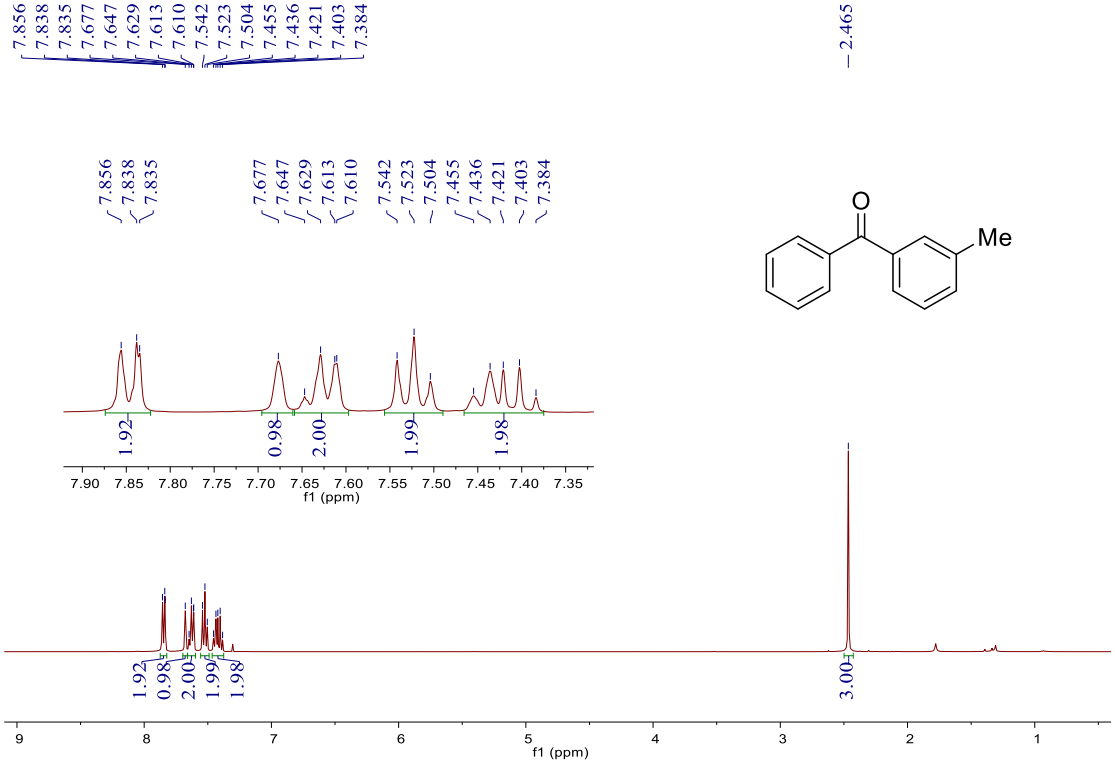


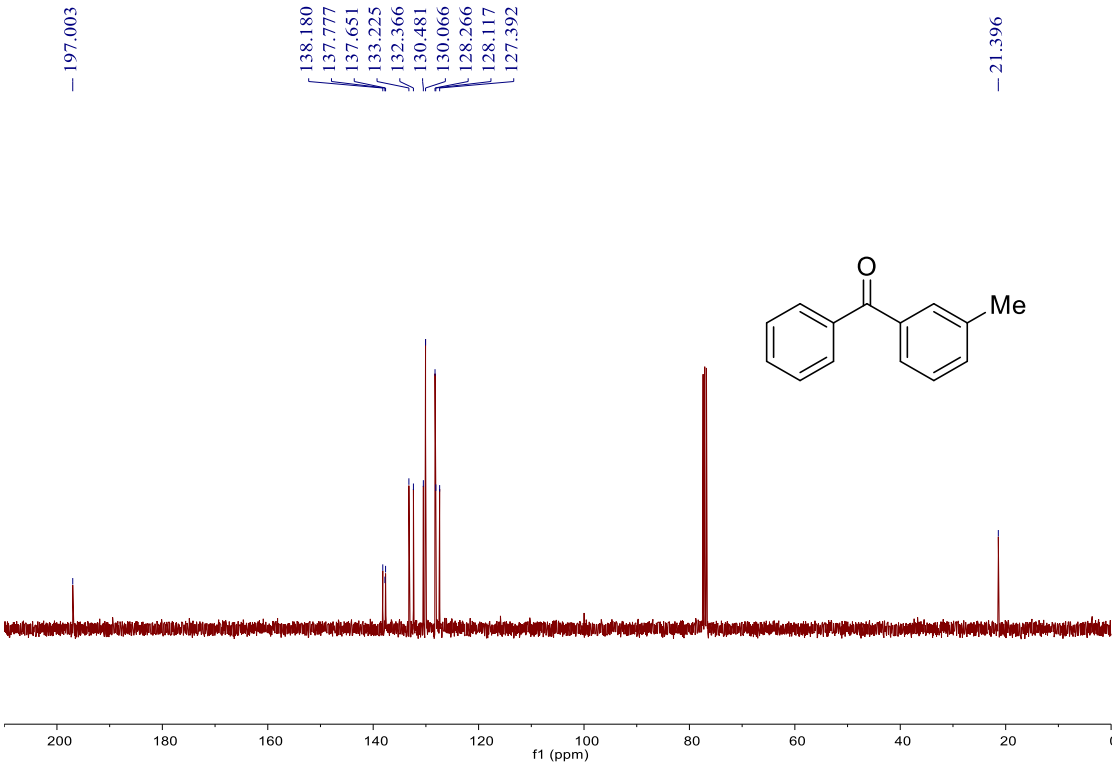
^{1}H & ^{13}C NMR of 2b



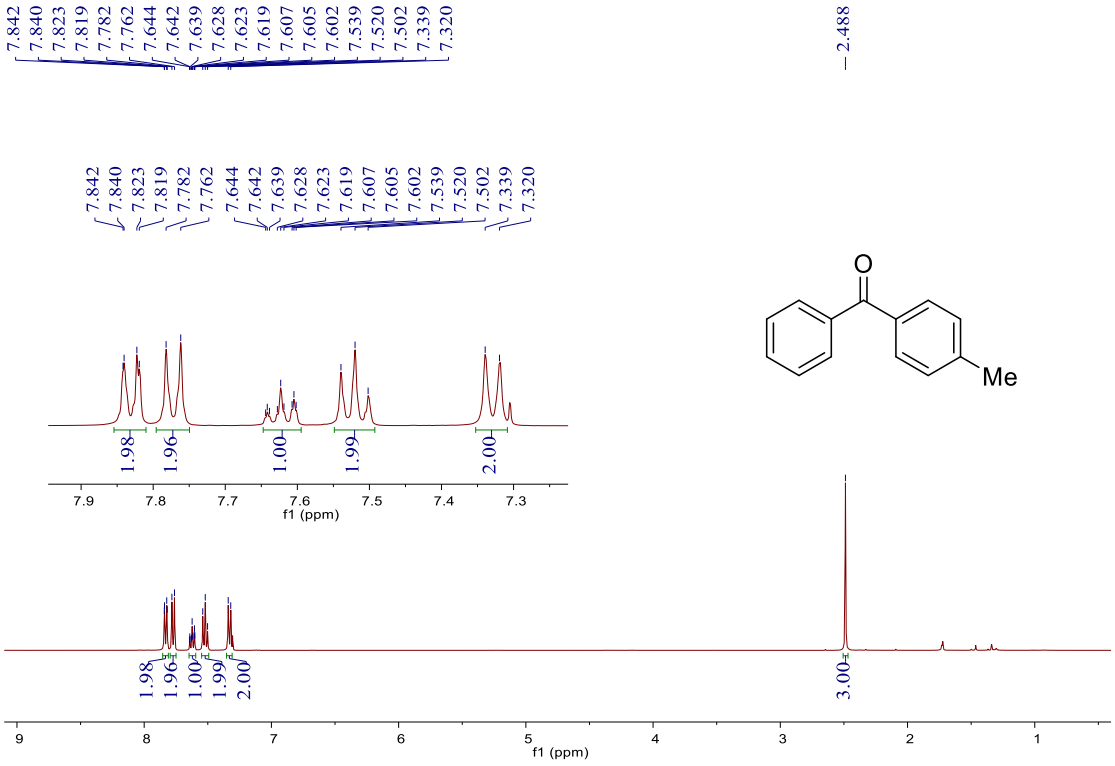


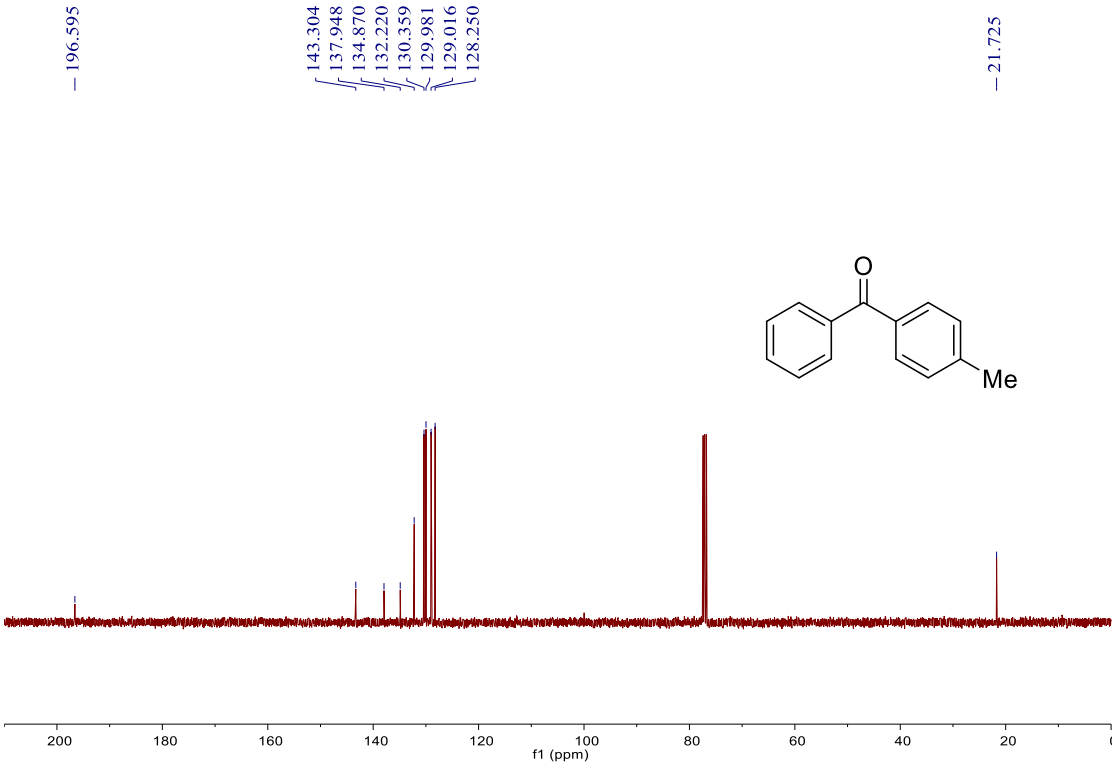
^{1}H & ^{13}C NMR of 2c



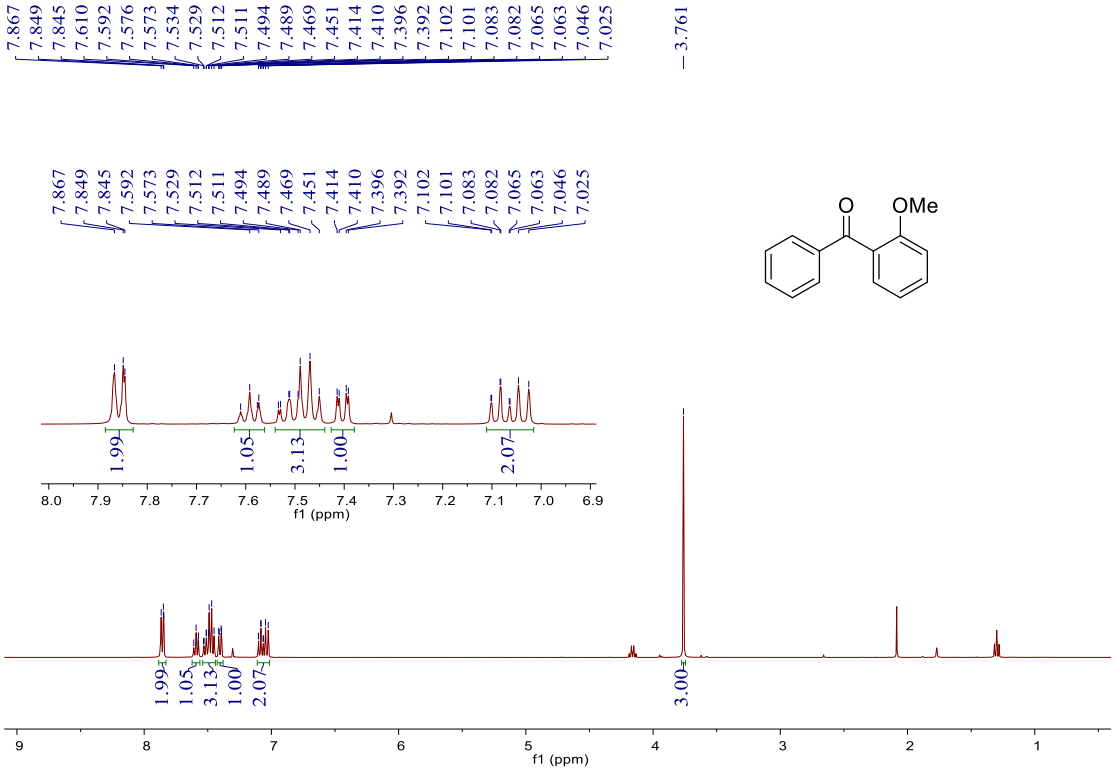


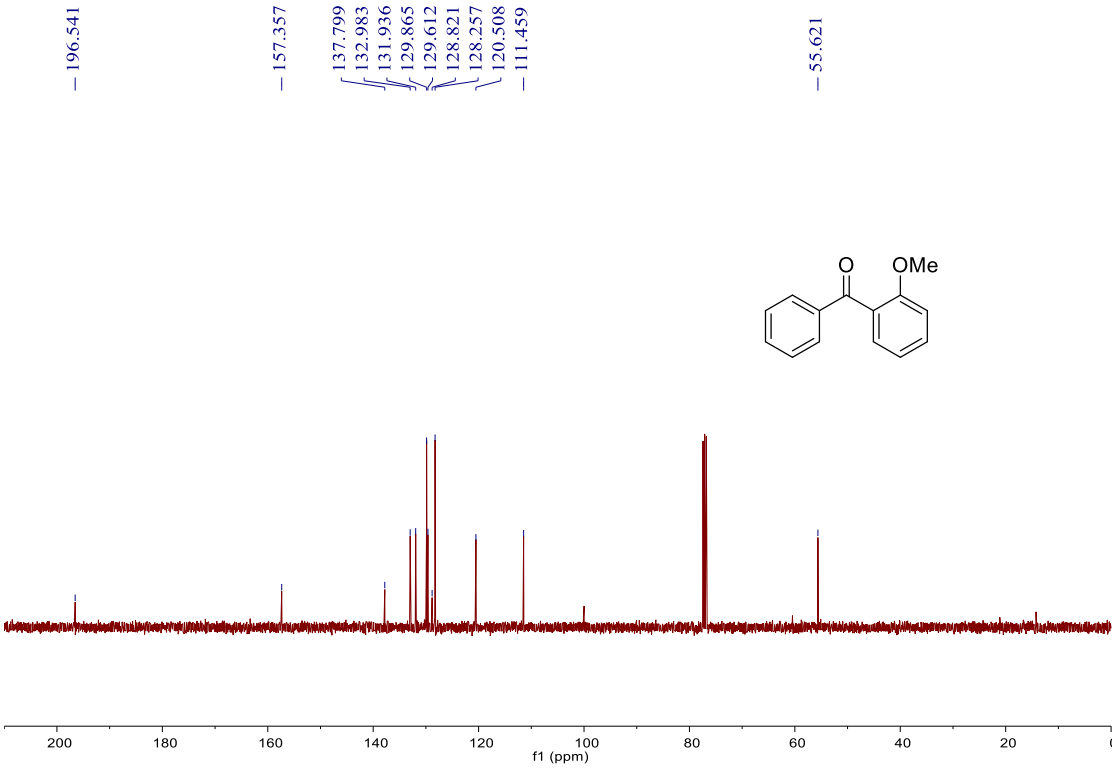
^{1}H & ^{13}C NMR of 2d



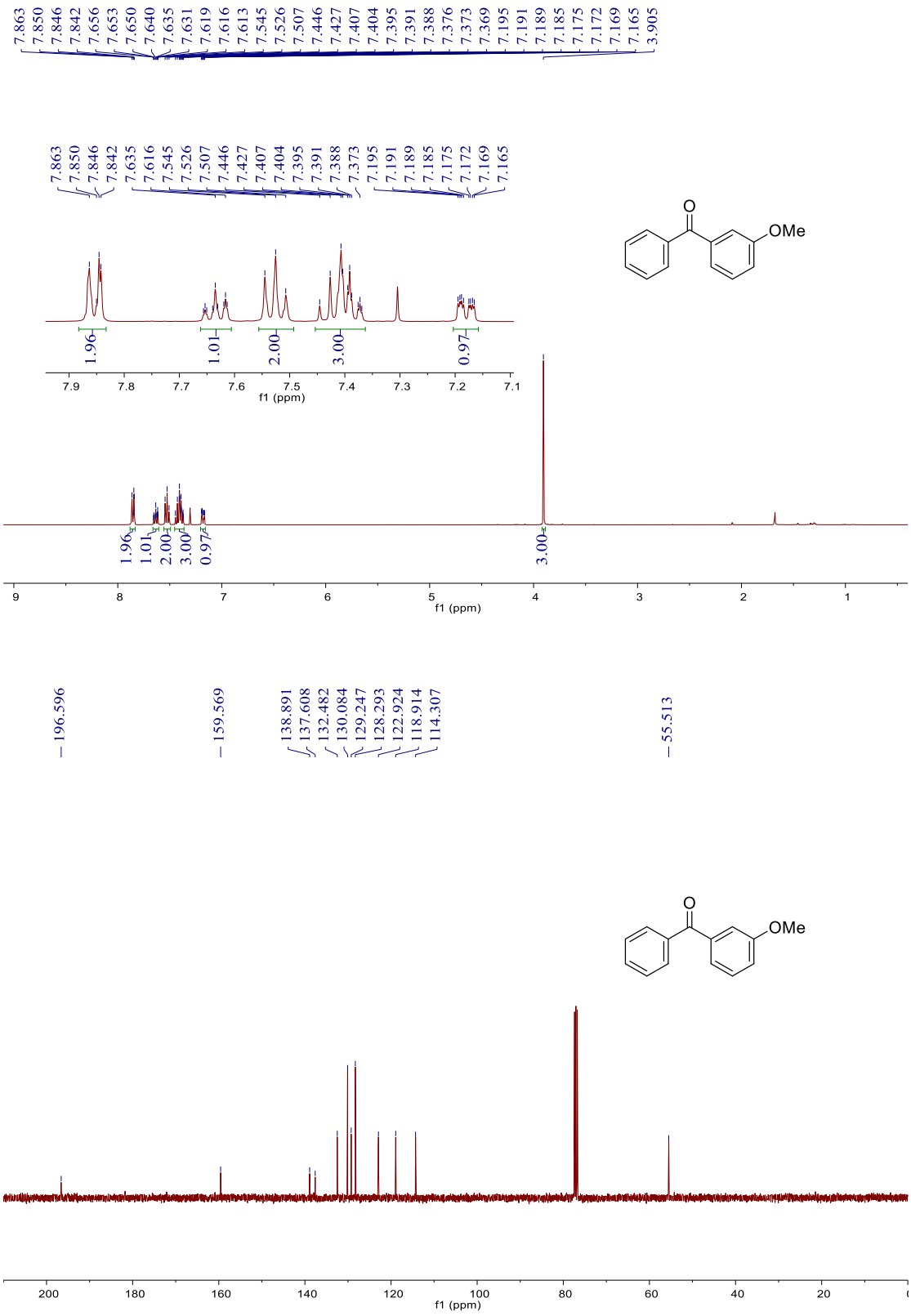


^{1}H & ^{13}C & ^{19}F NMR of 2e

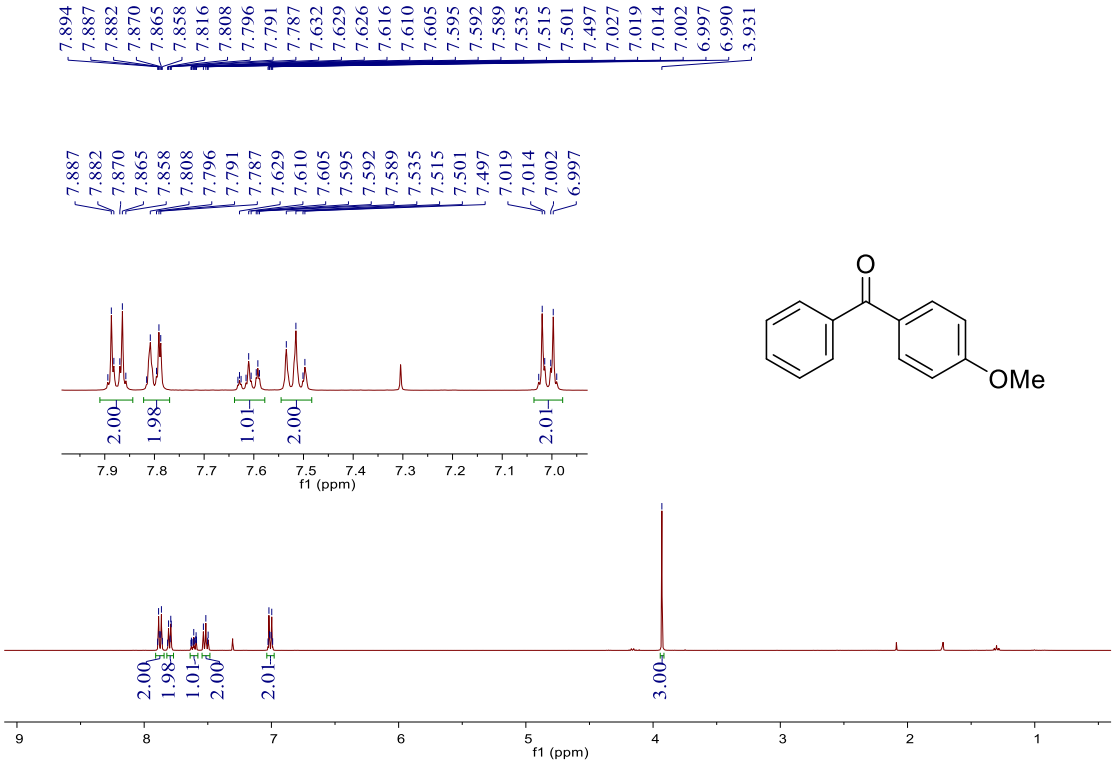


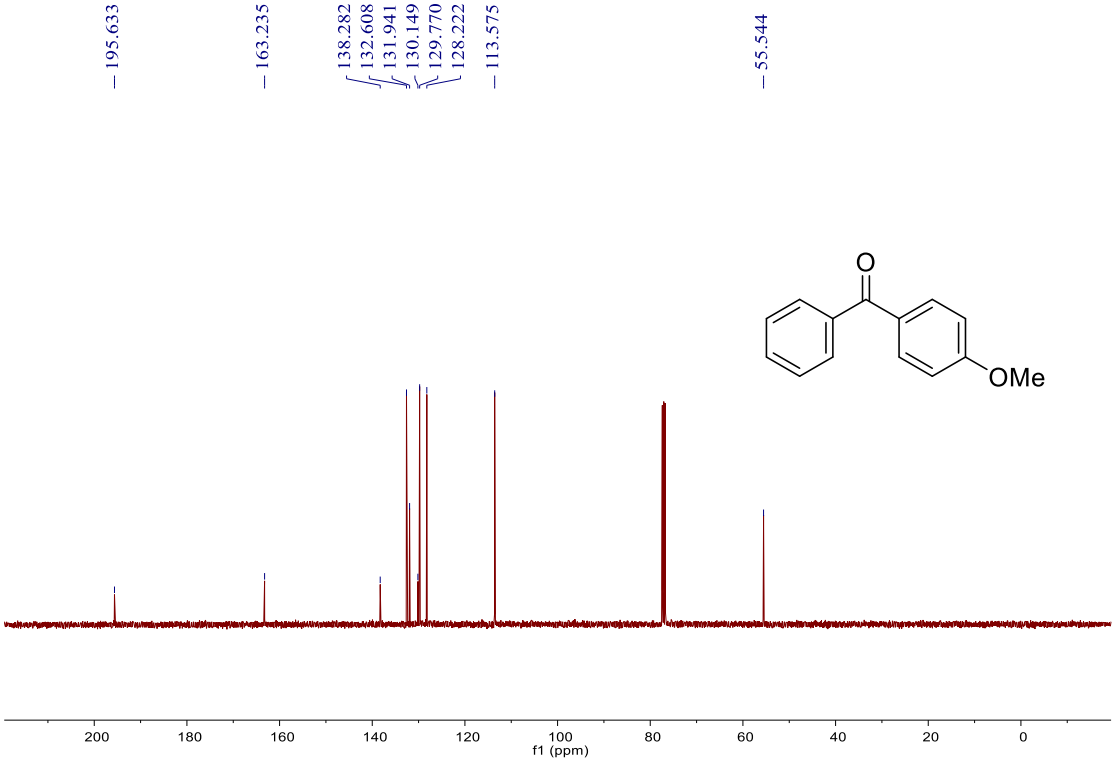


^{1}H & ^{13}C NMR of 2f

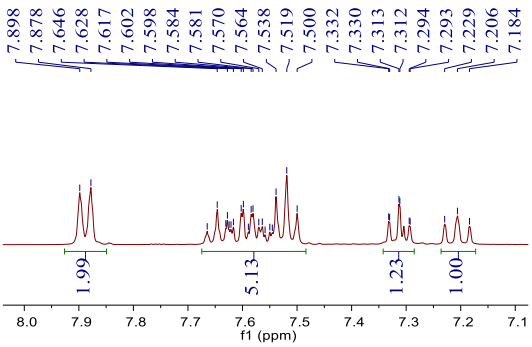


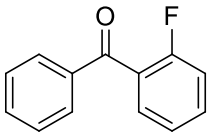
^{1}H & ^{13}C NMR of 2g

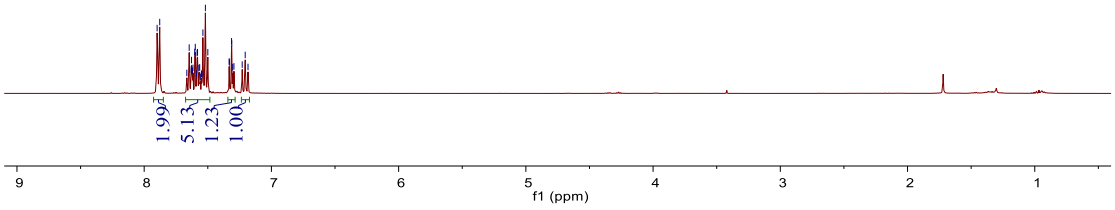


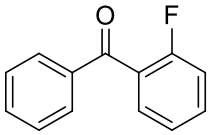


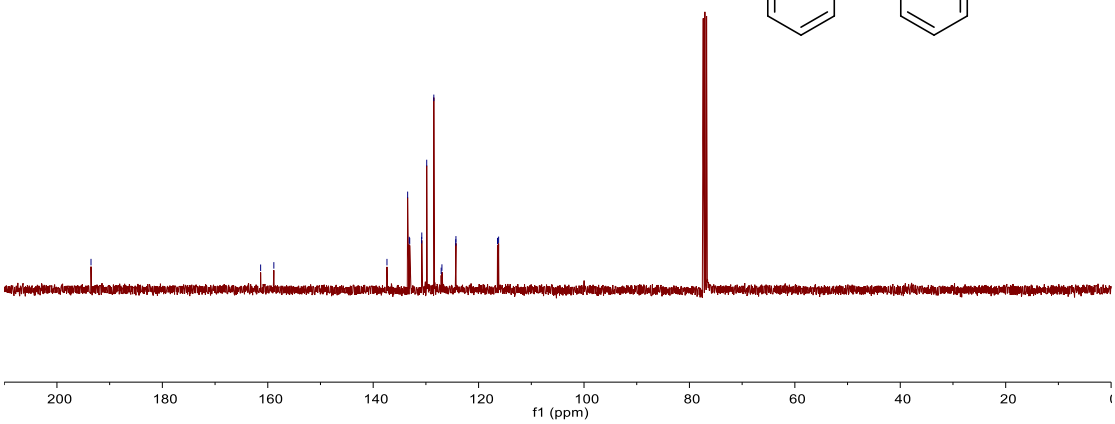
^{1}H & ^{13}C & ^{19}F NMR of 2h

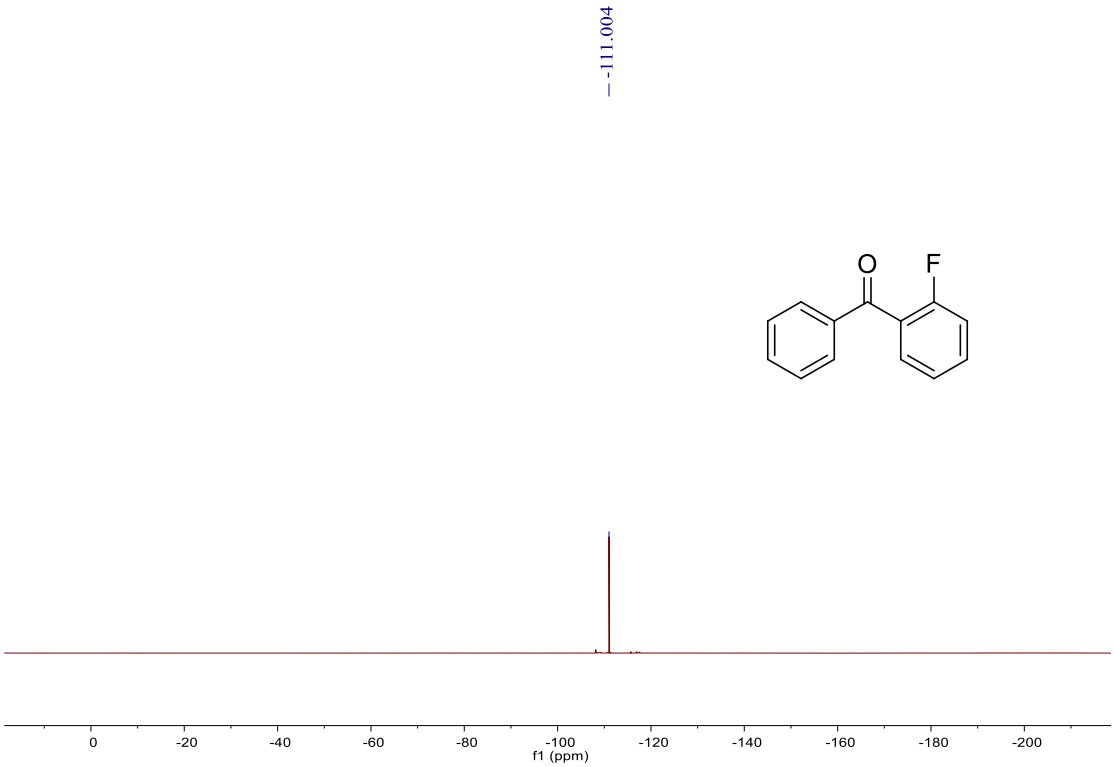




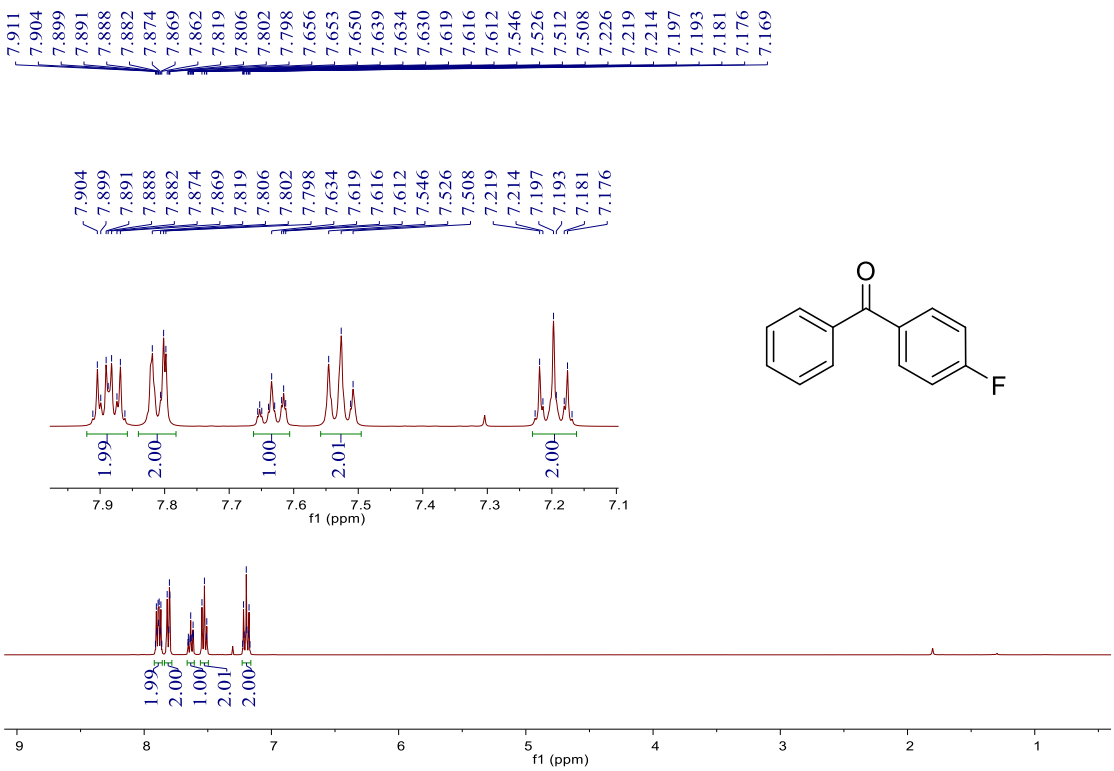


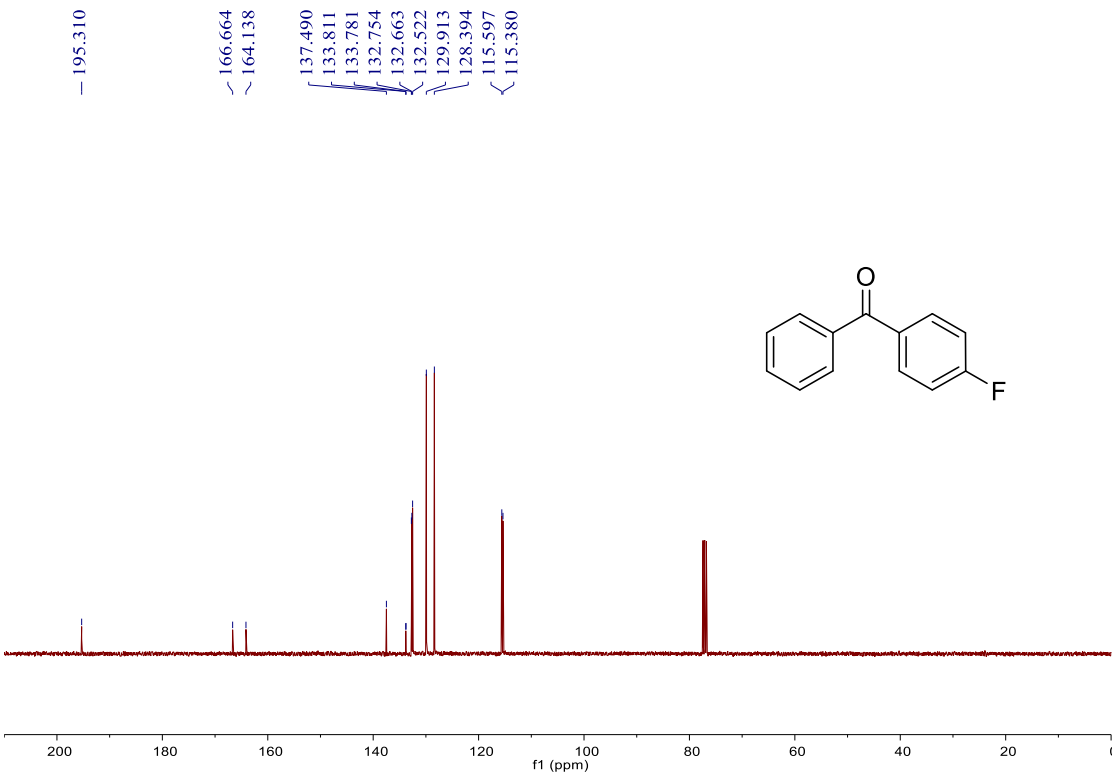






^{1}H & ^{13}C & ^{19}F NMR of 2i

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200
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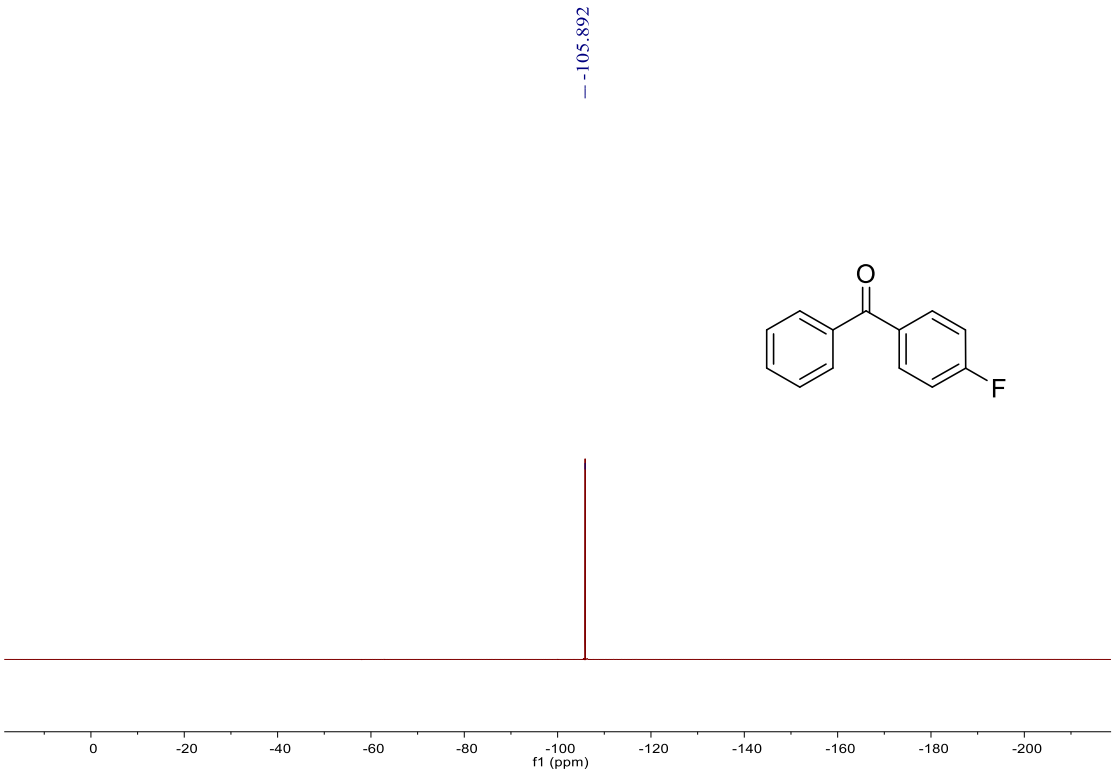
120
100
80
60
40
20
f1 (ppm)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0
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-180
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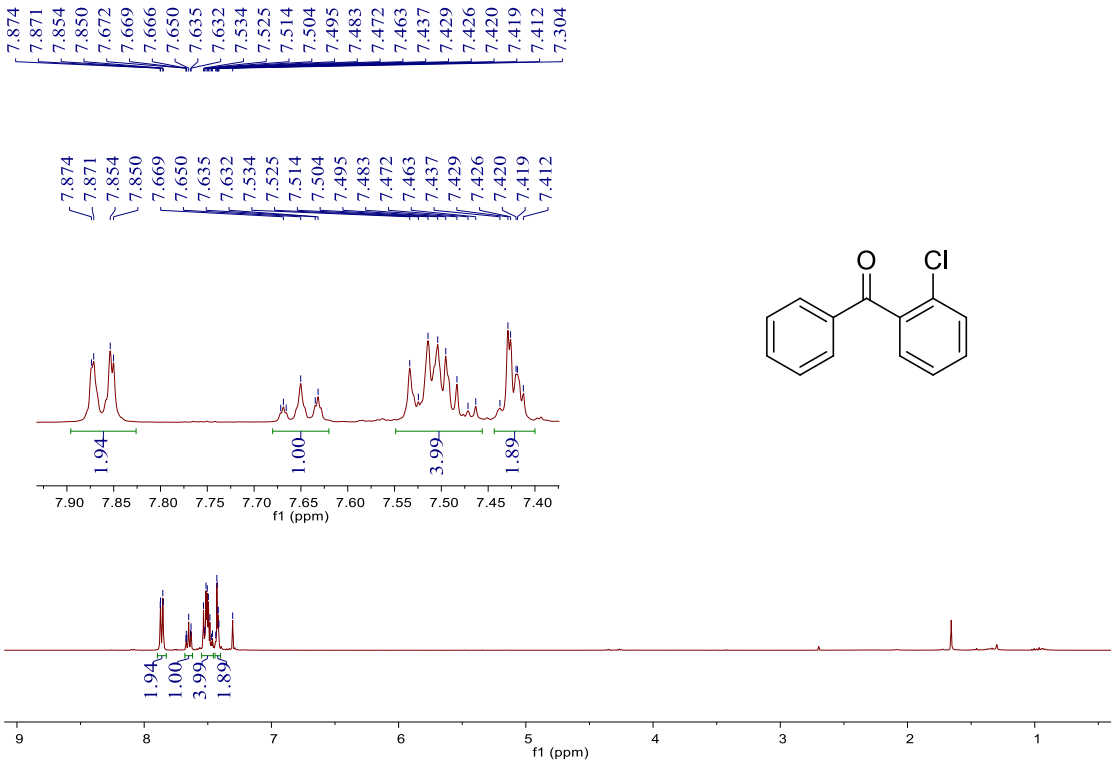
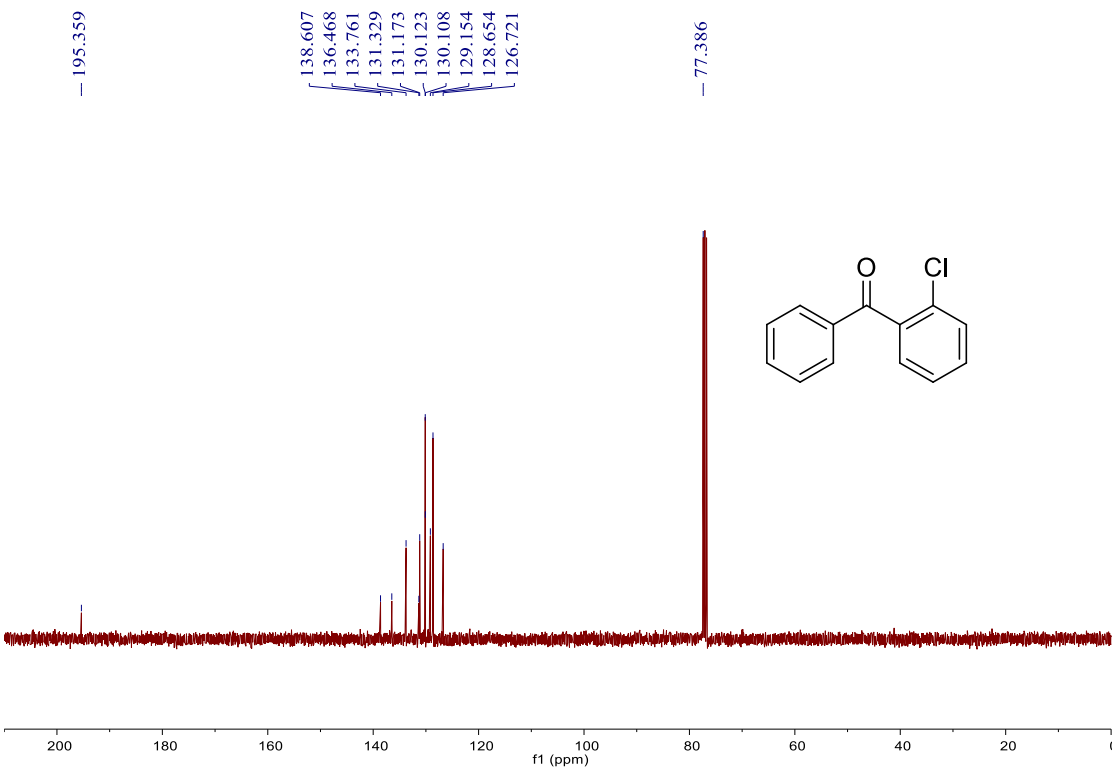
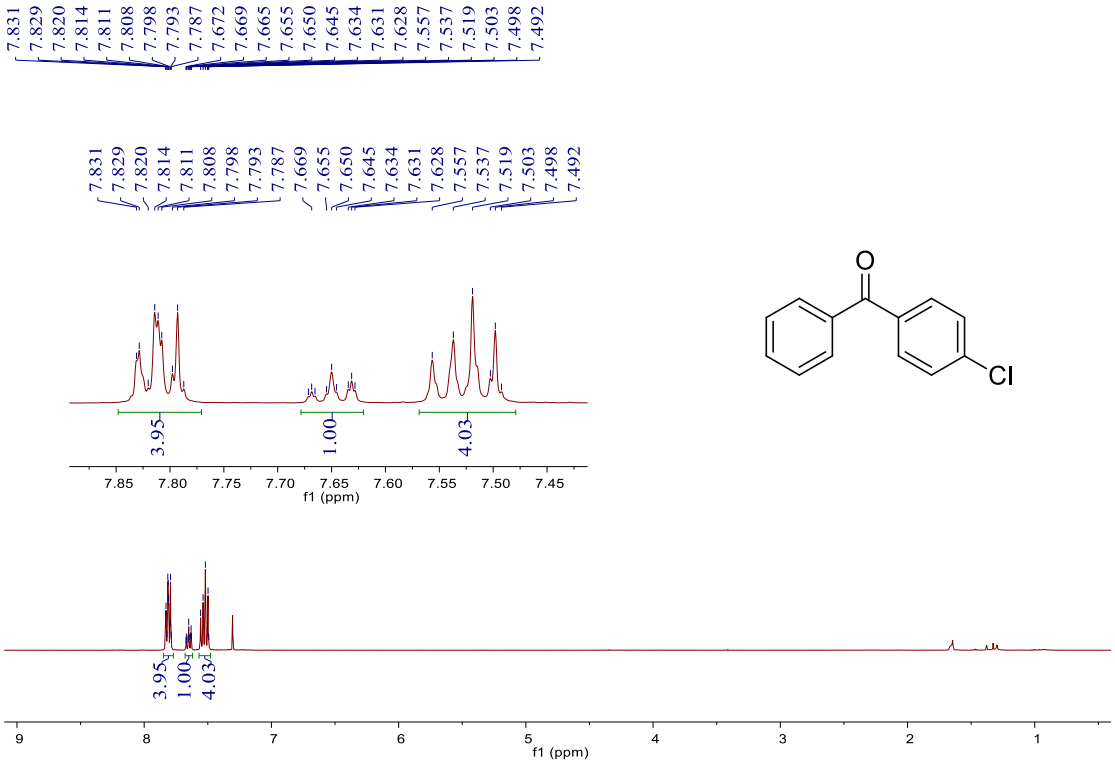
f1 (ppm)

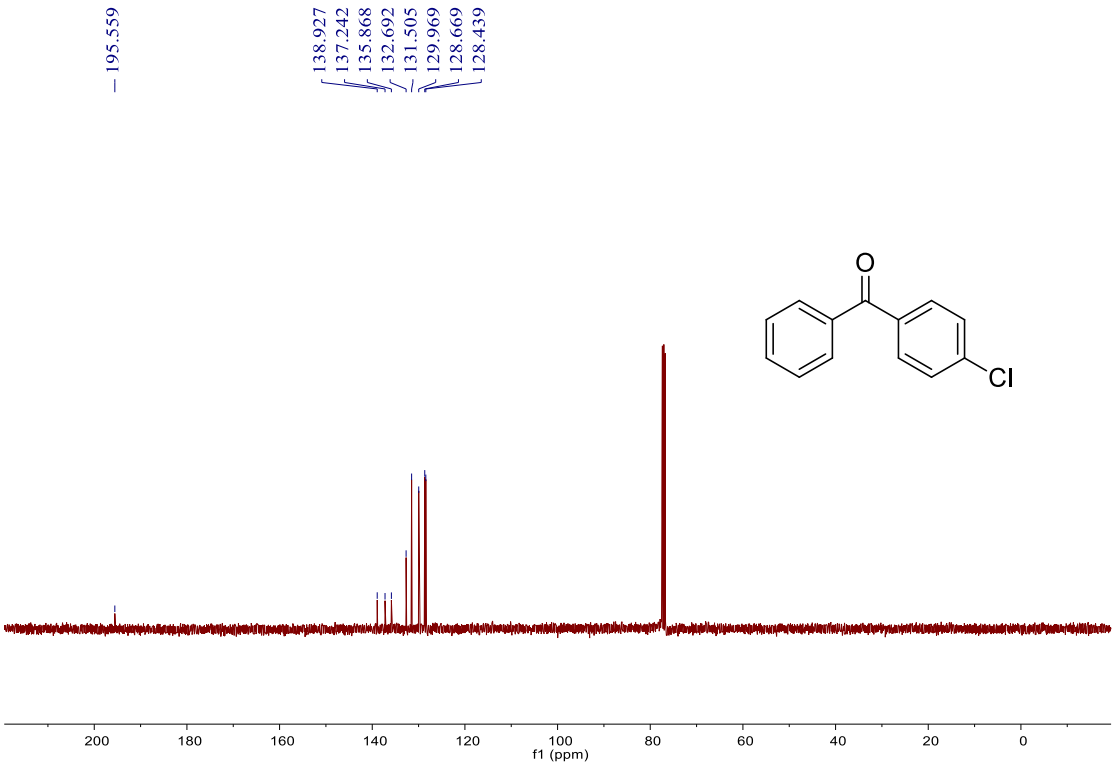
^{1}H & ^{13}C NMR of 2j



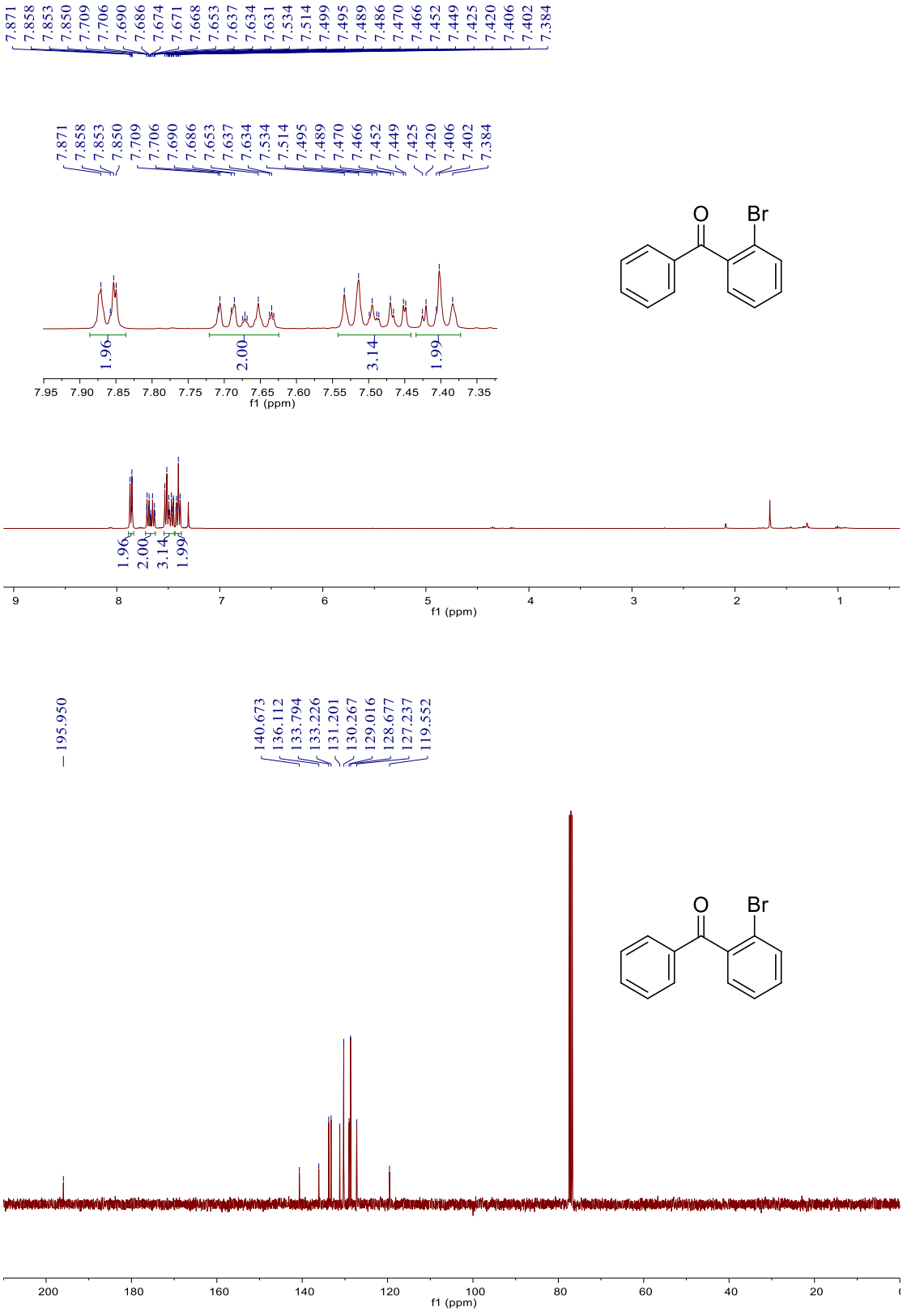


^{1}H & ^{13}C NMR of 2k

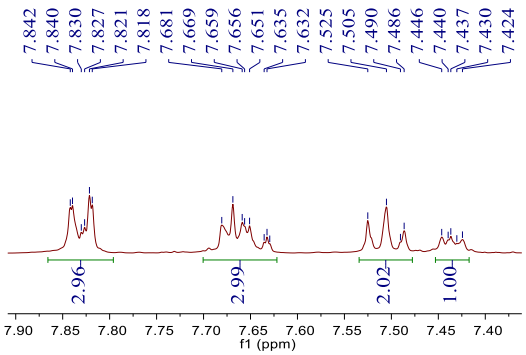


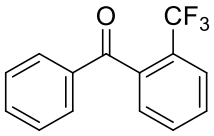


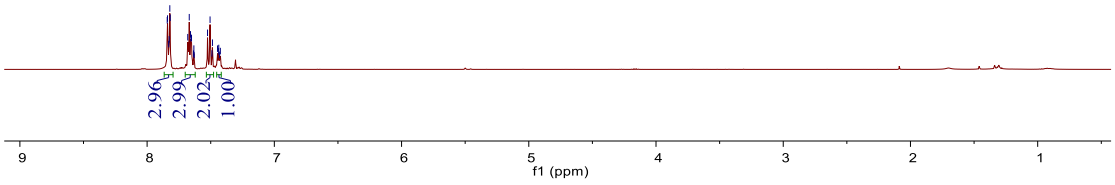
^{1}H & ^{13}C NMR of 2l

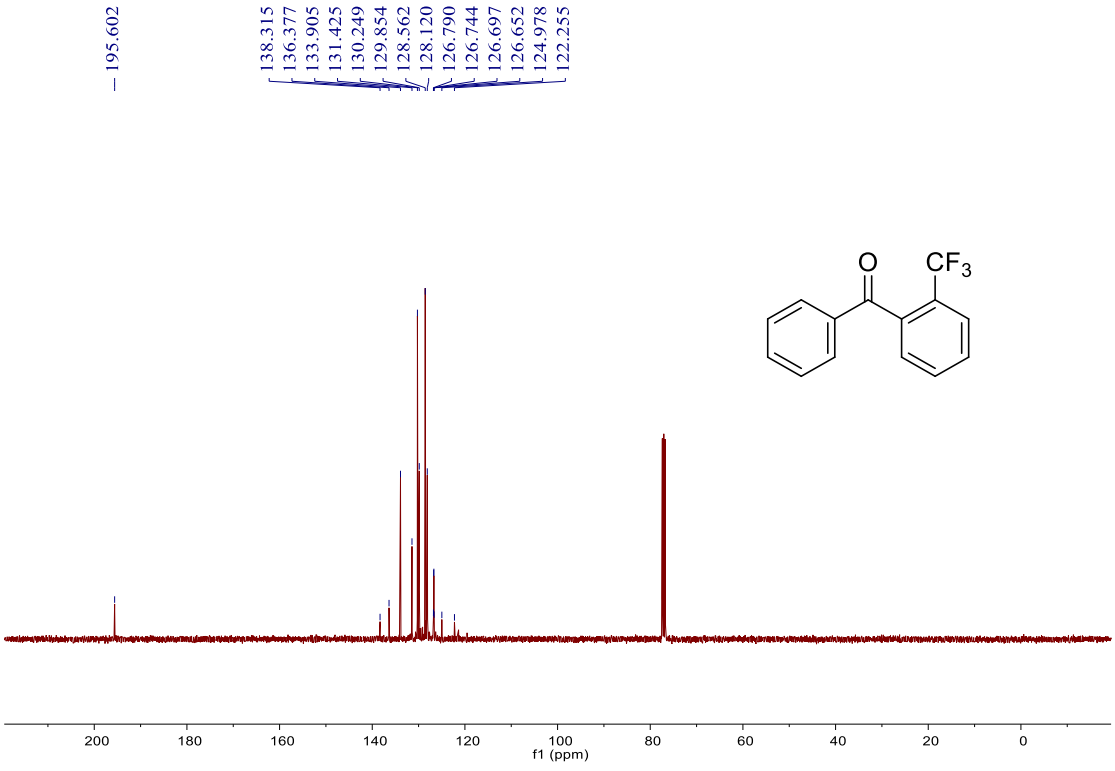


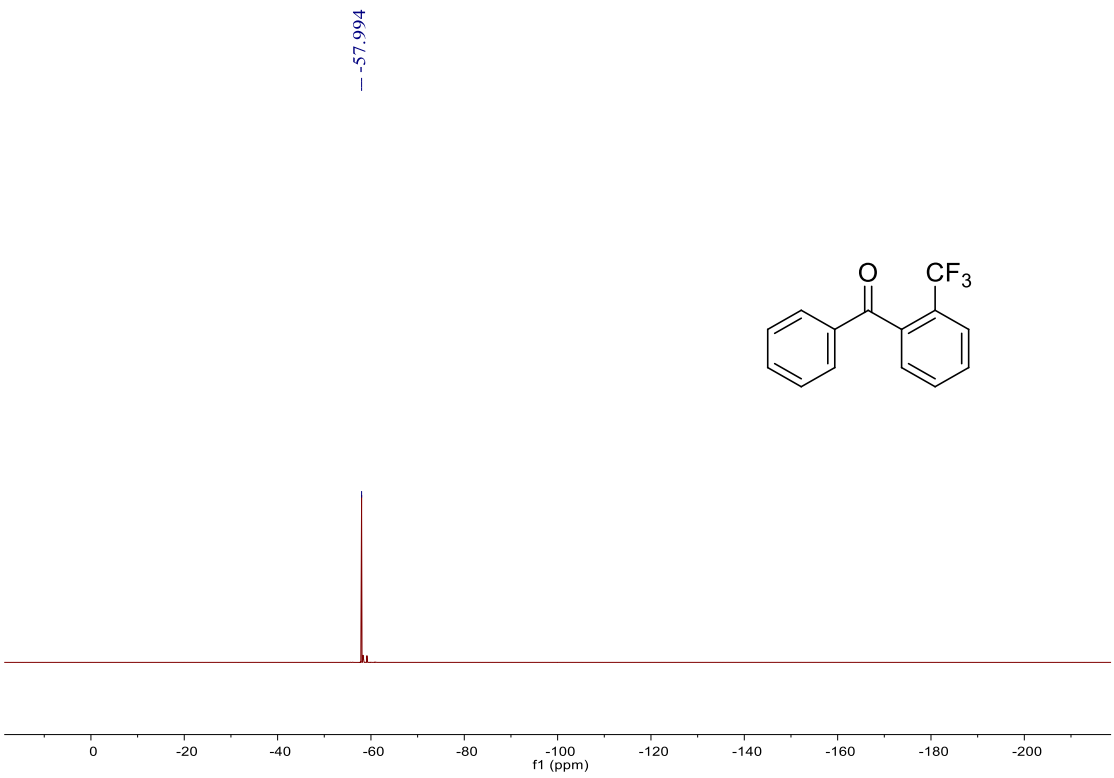
^{1}H & ^{13}C & ^{19}F NMR of 2m



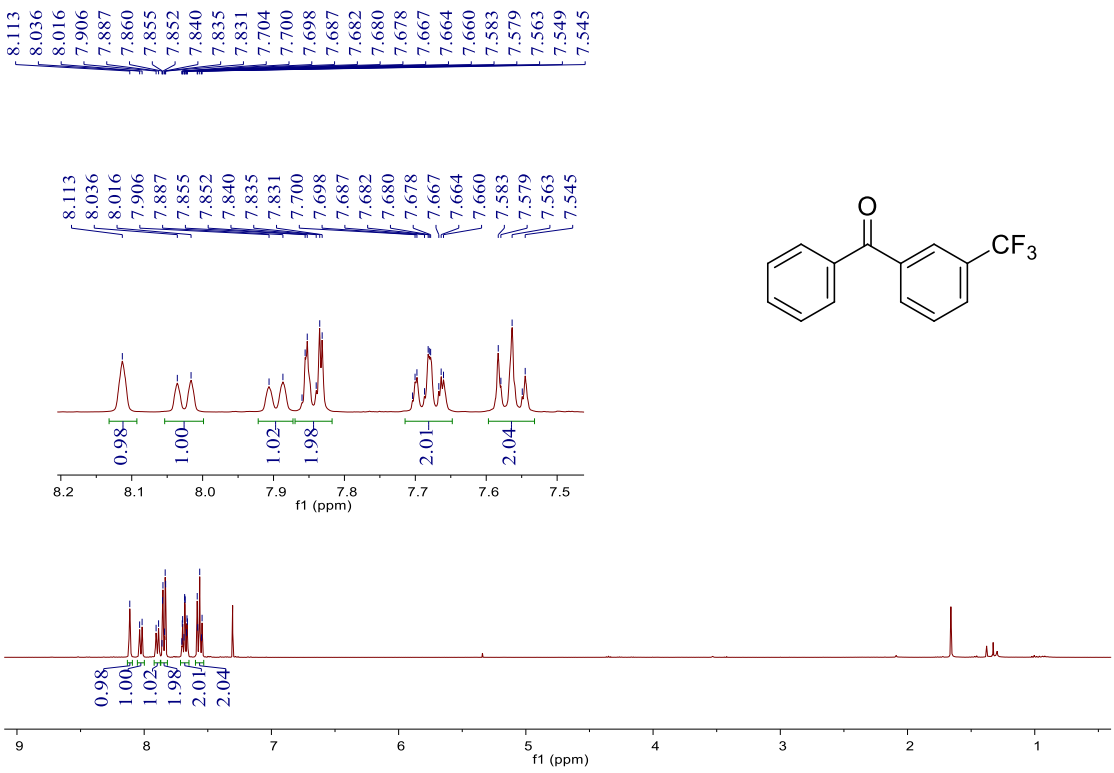


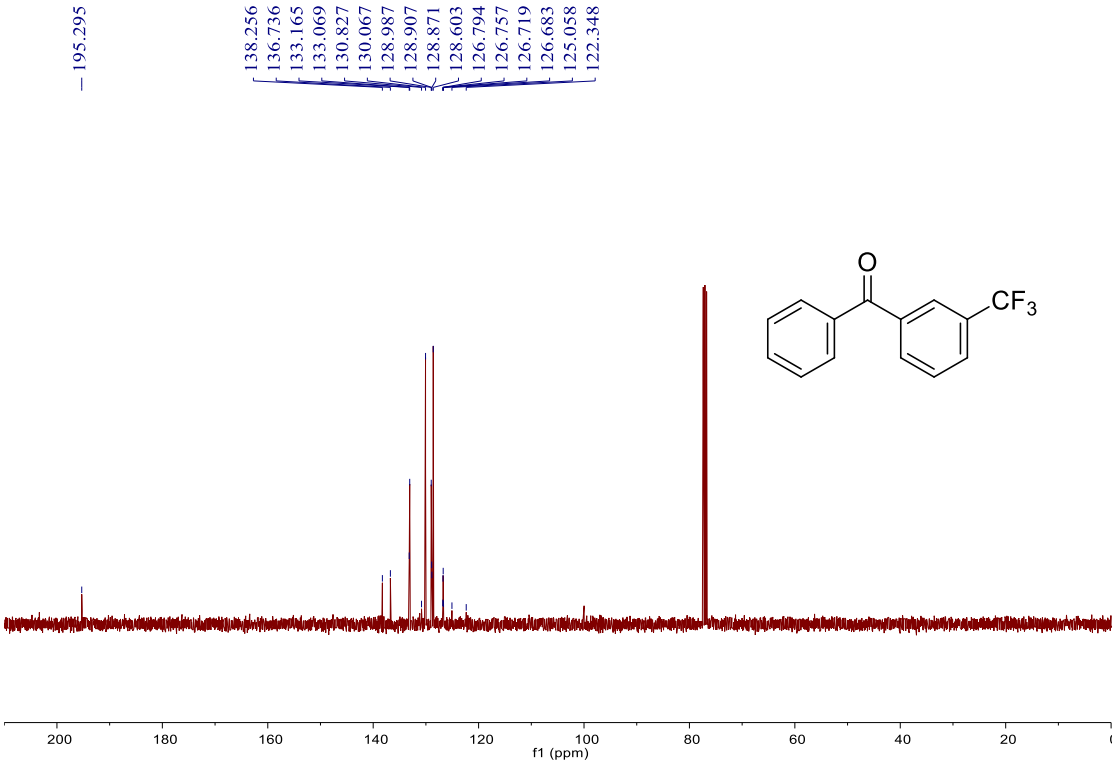






^{1}H & ^{13}C & ^{19}F NMR of 2n

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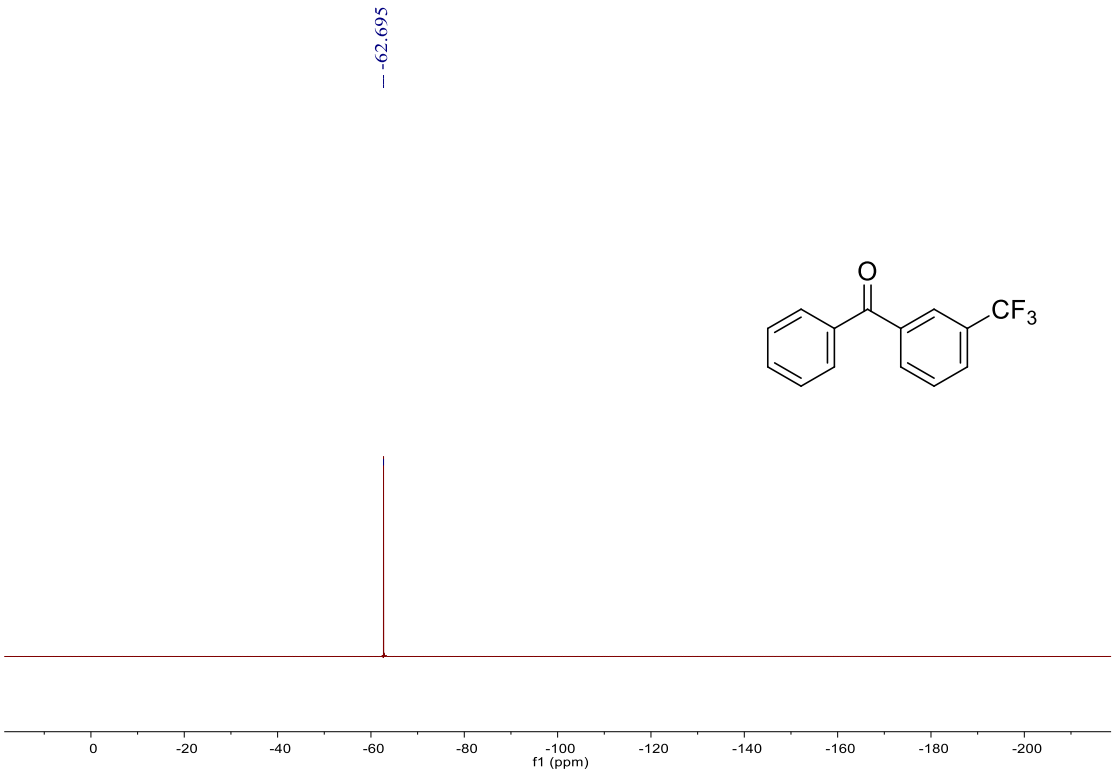
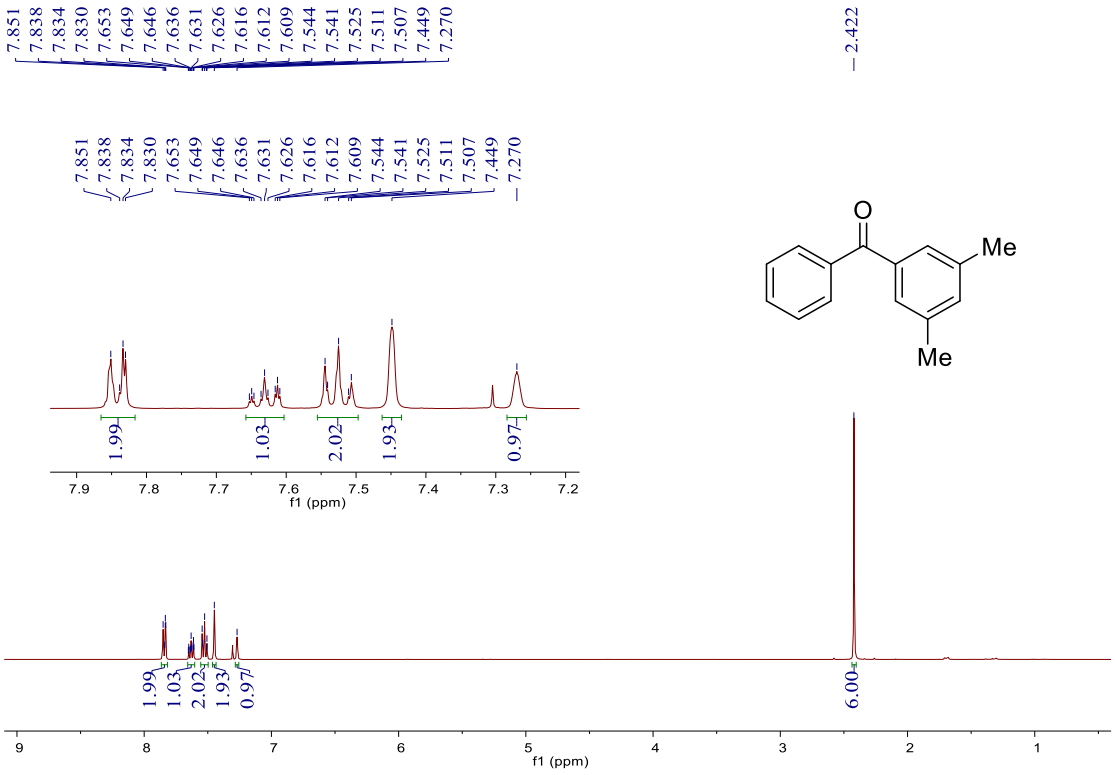
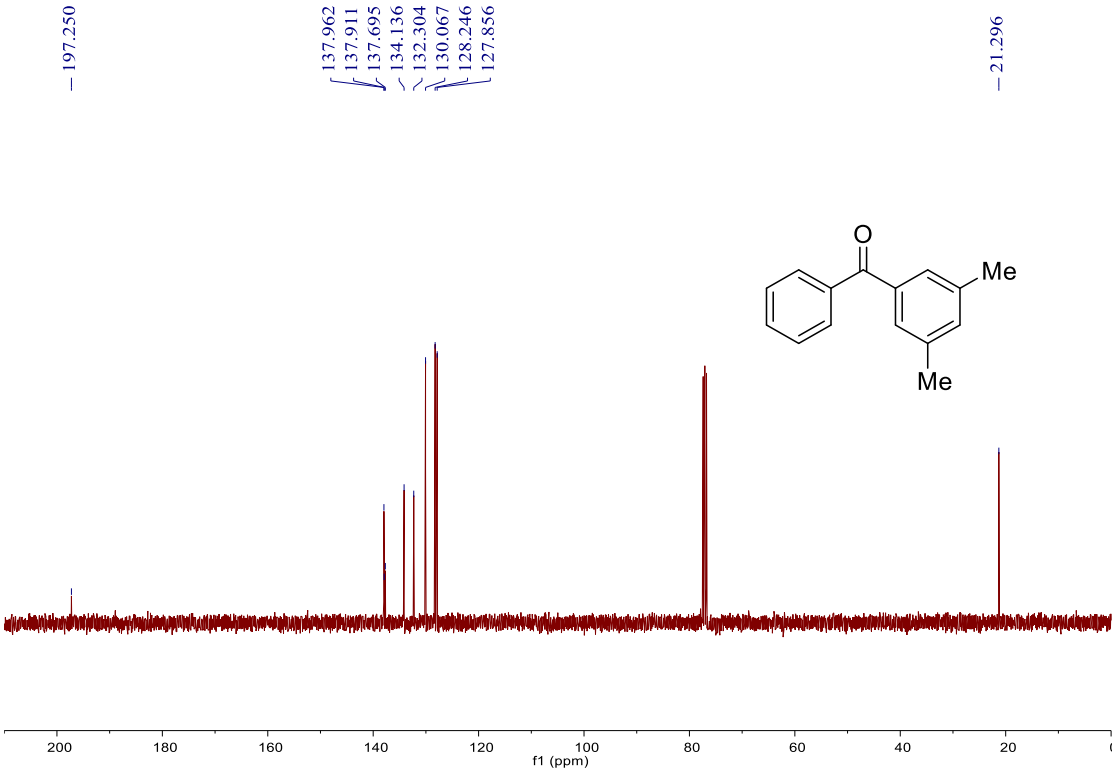
138.256
136.736
133.165
133.069
130.827
130.067
128.987
128.907
128.871
128.603
126.794
126.757
126.719
126.683
125.058
122.348
O
CF3
200
180
160
140
120
100
80
60
40
20
f1 (ppm)

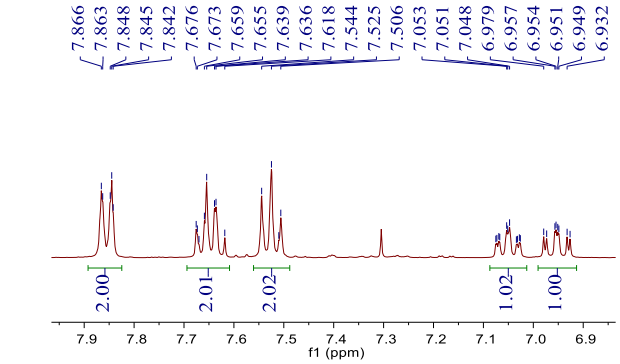

-62.695
O
CF3
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
f1 (ppm)

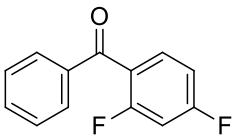
^{1}H & ^{13}C NMR of 2o

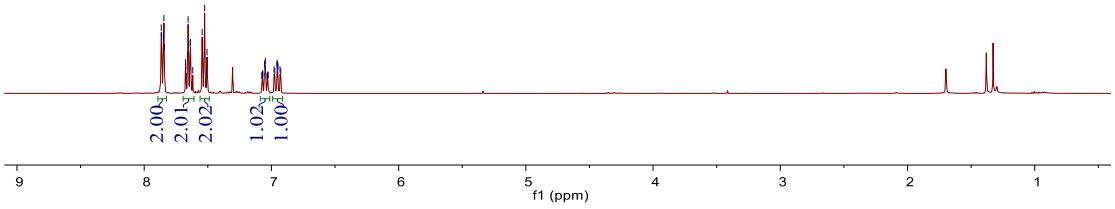


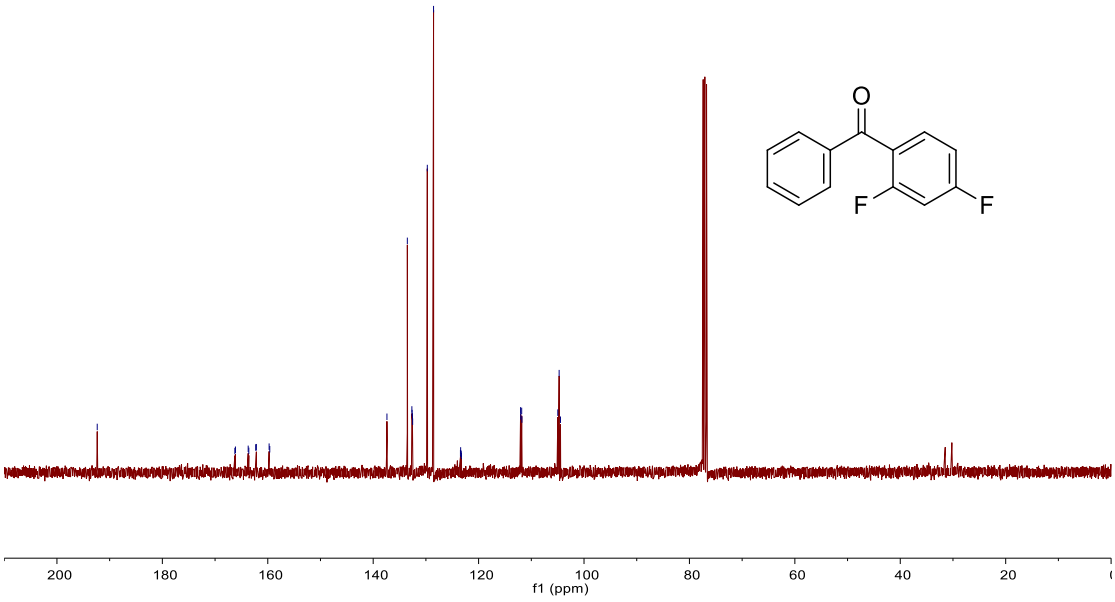


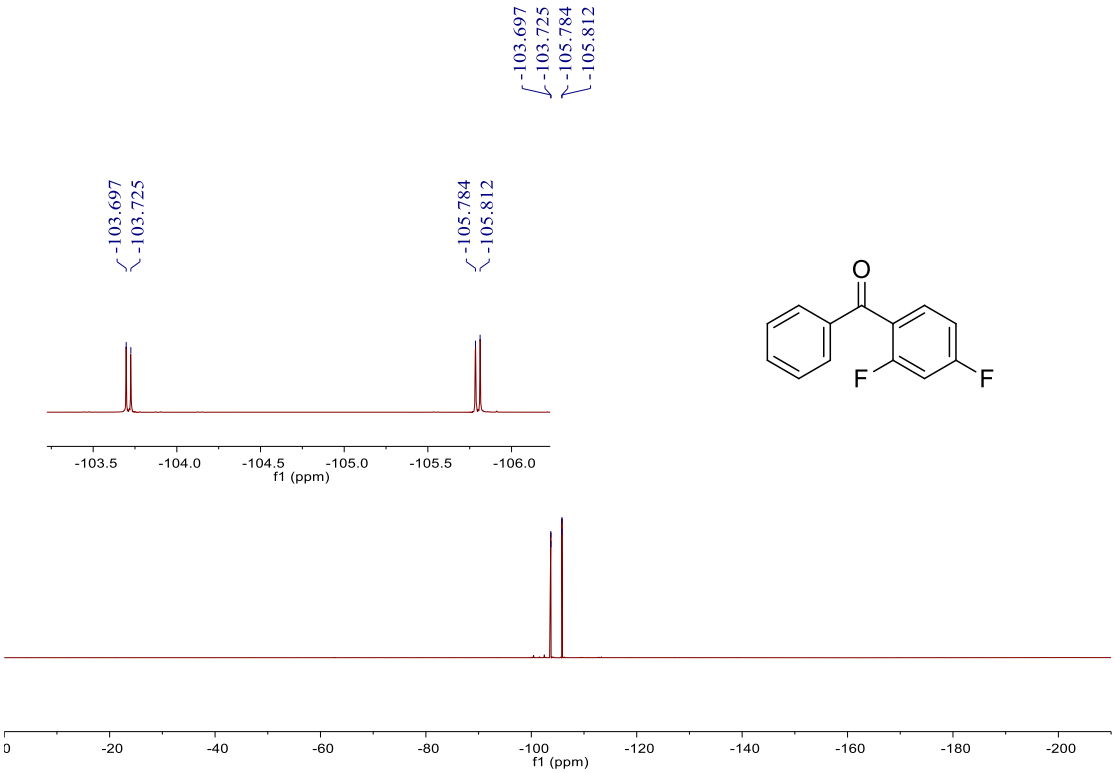
^{1}H & ^{13}C & ^{19}F NMR of 2p



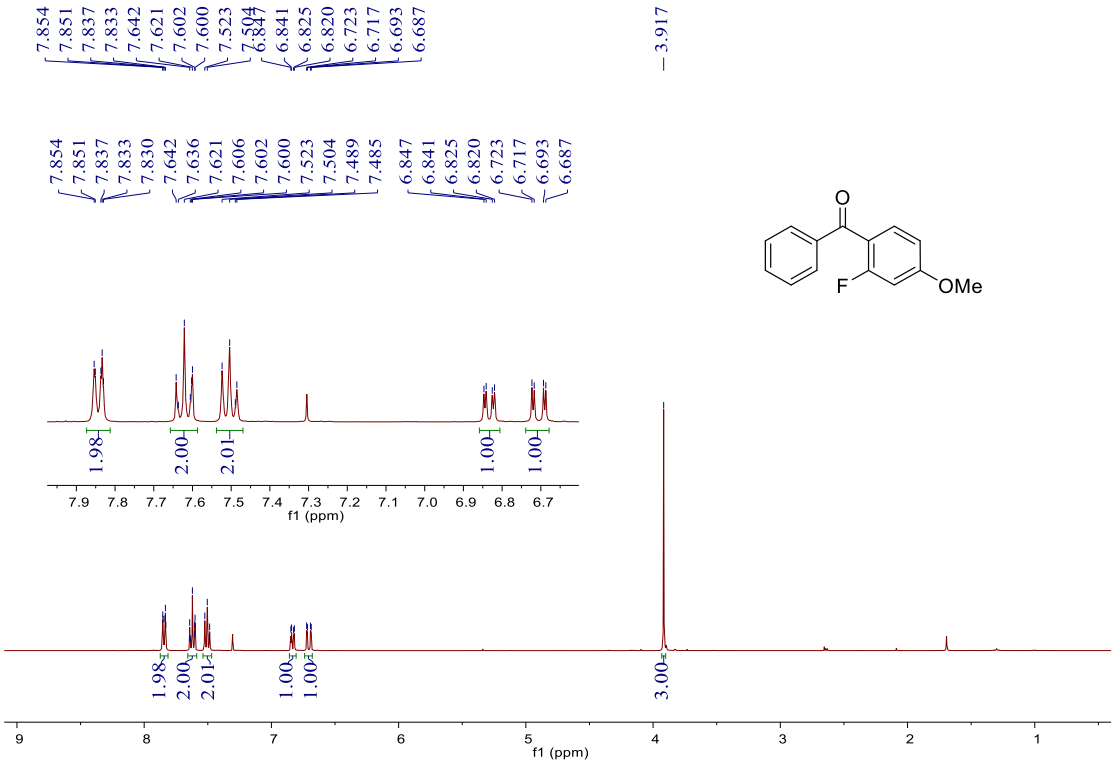


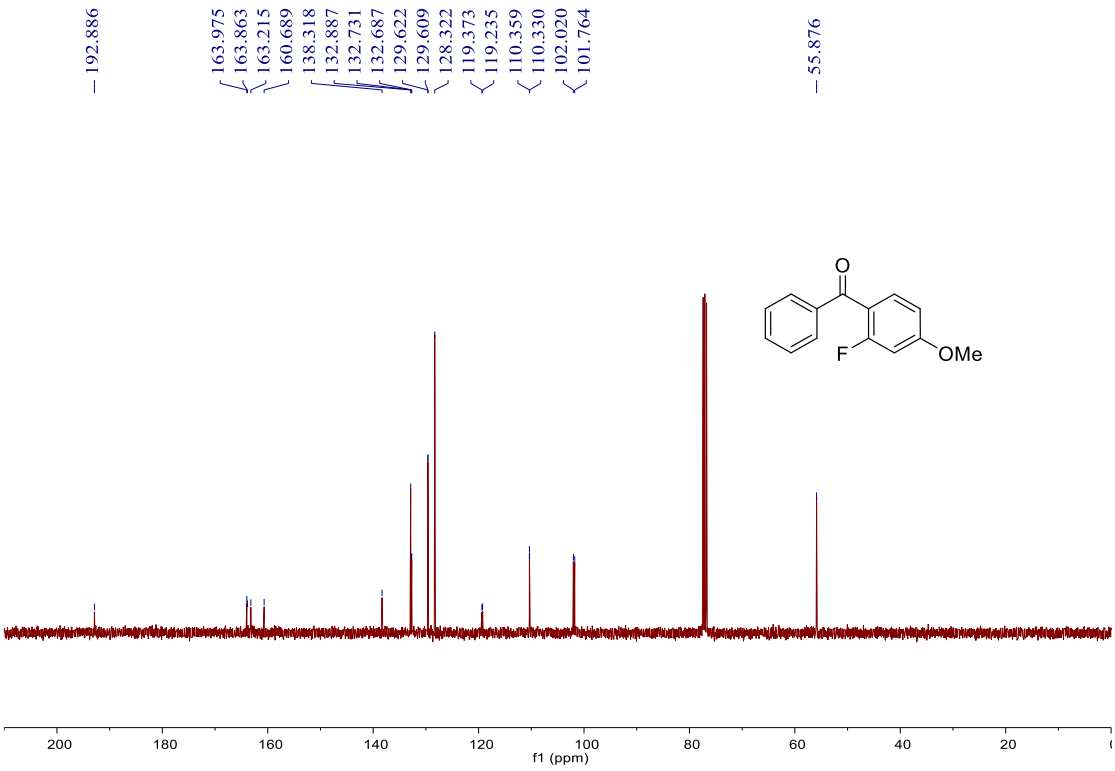




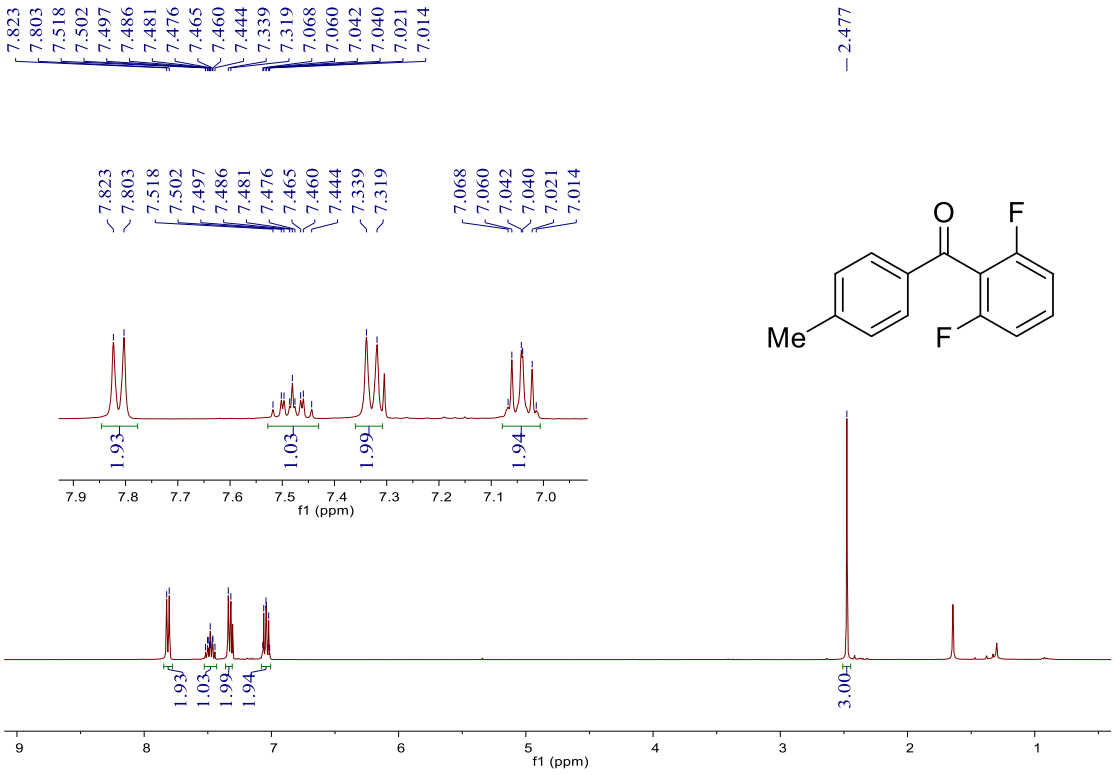


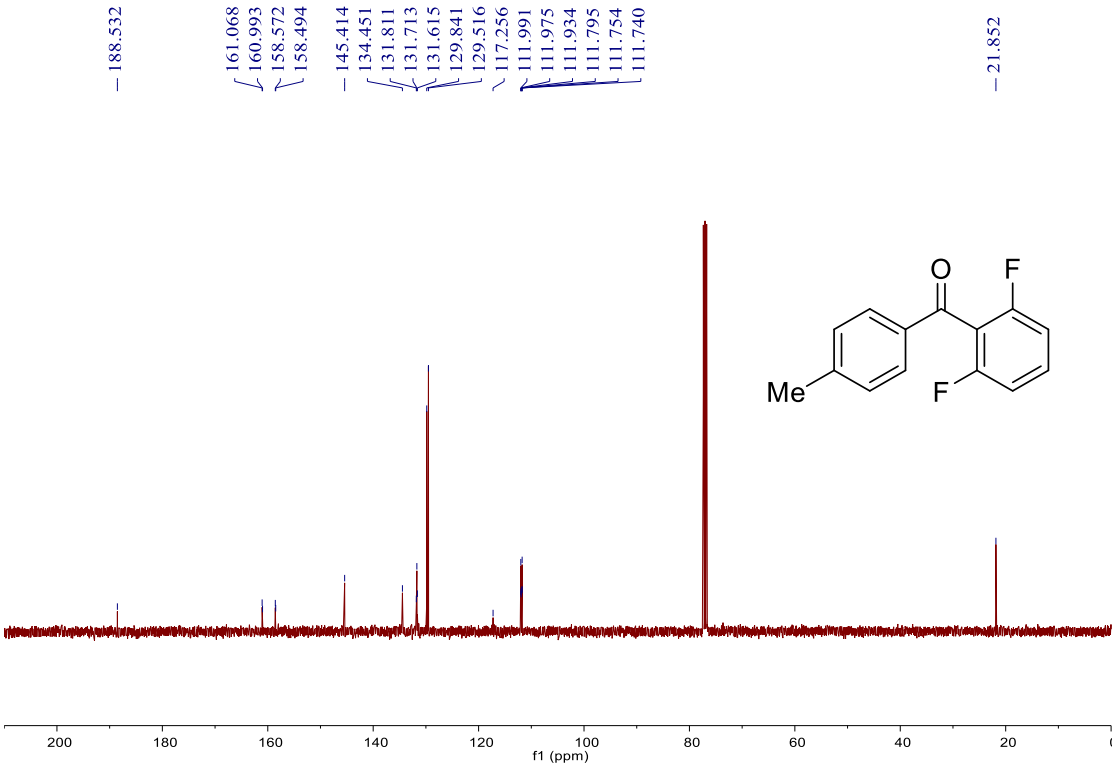
^{1}H & ^{13}C NMR of 2q





^{1}H & ^{13}C & ^{19}F NMR of 2r

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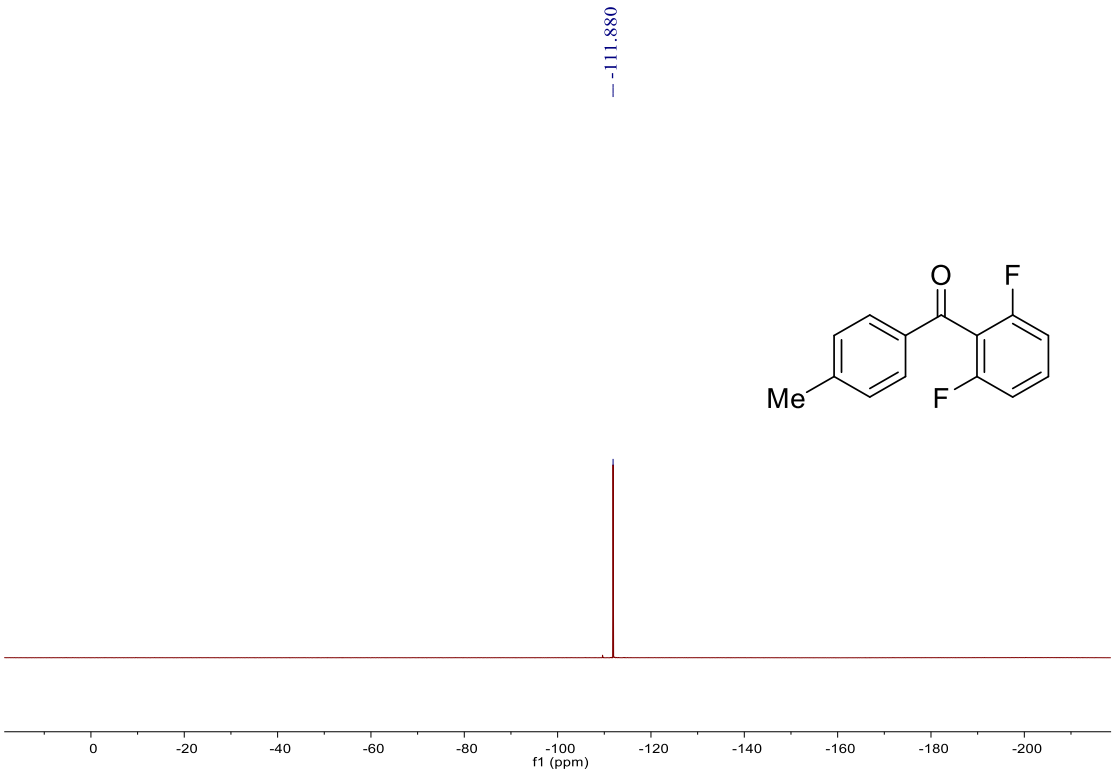
161.068
160.993
158.572
158.494
145.414
134.451
131.811
131.713
131.615
129.841
129.516
117.256
111.991
111.975
111.934
111.795
111.754
111.740
21.852
O
F
Me
F
200
180
160
140
120
100
80
60
40
20
f1 (ppm)


-111.880
O
F
Me
F
0
-20
-40
-60
-80
-100
-120
-140
-160
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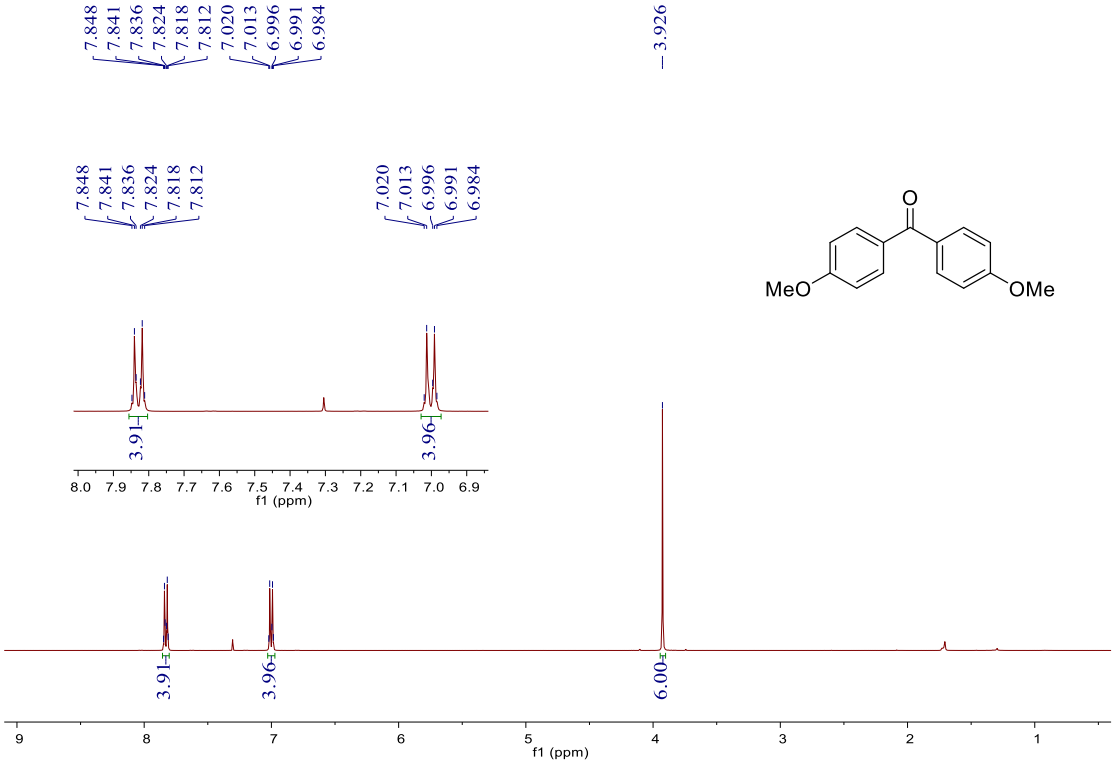
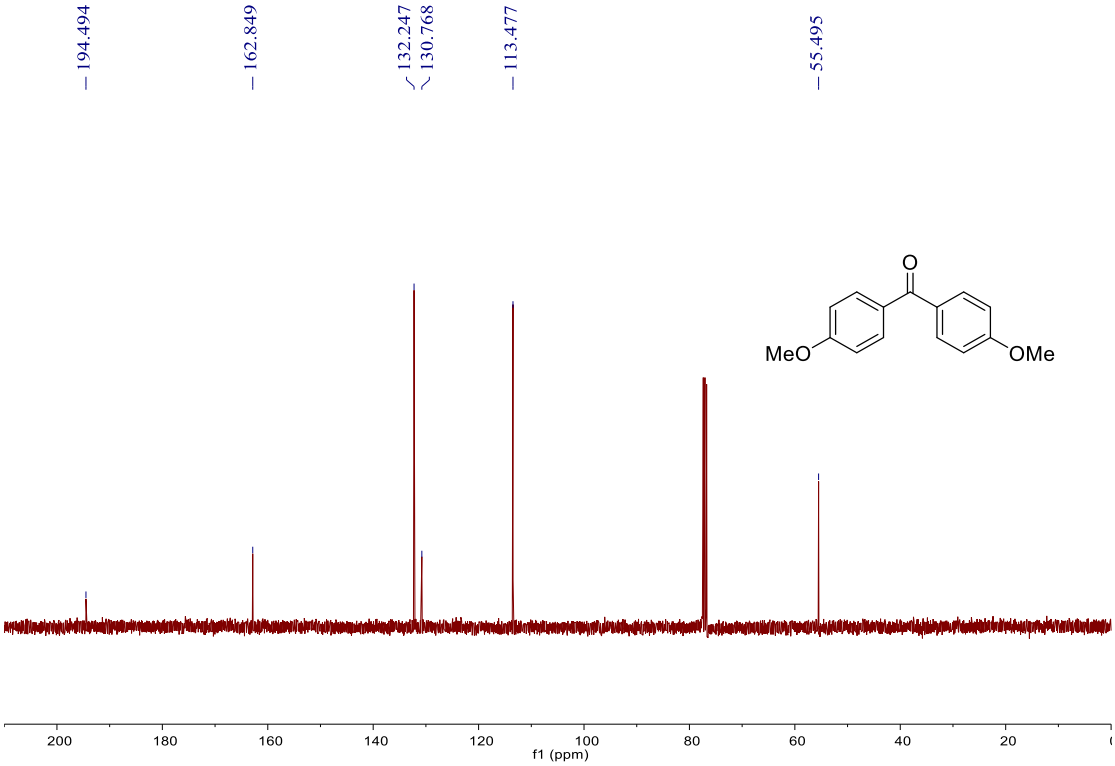
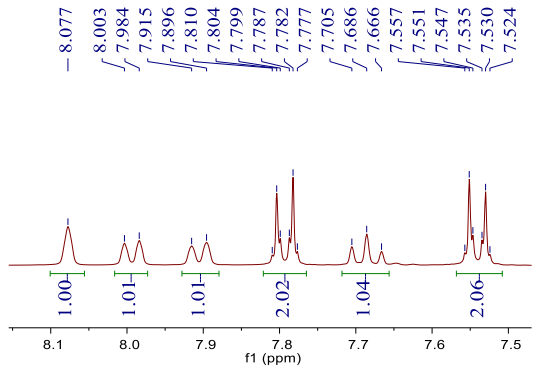
-200
f1 (ppm)

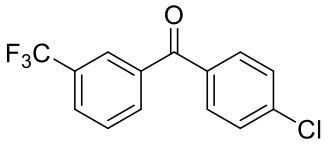
^{1}H & ^{13}C NMR of 2s

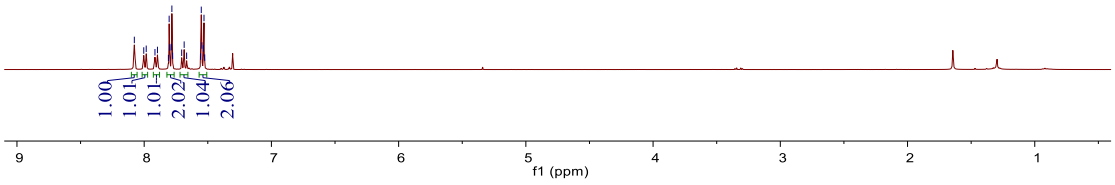


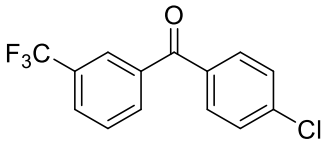


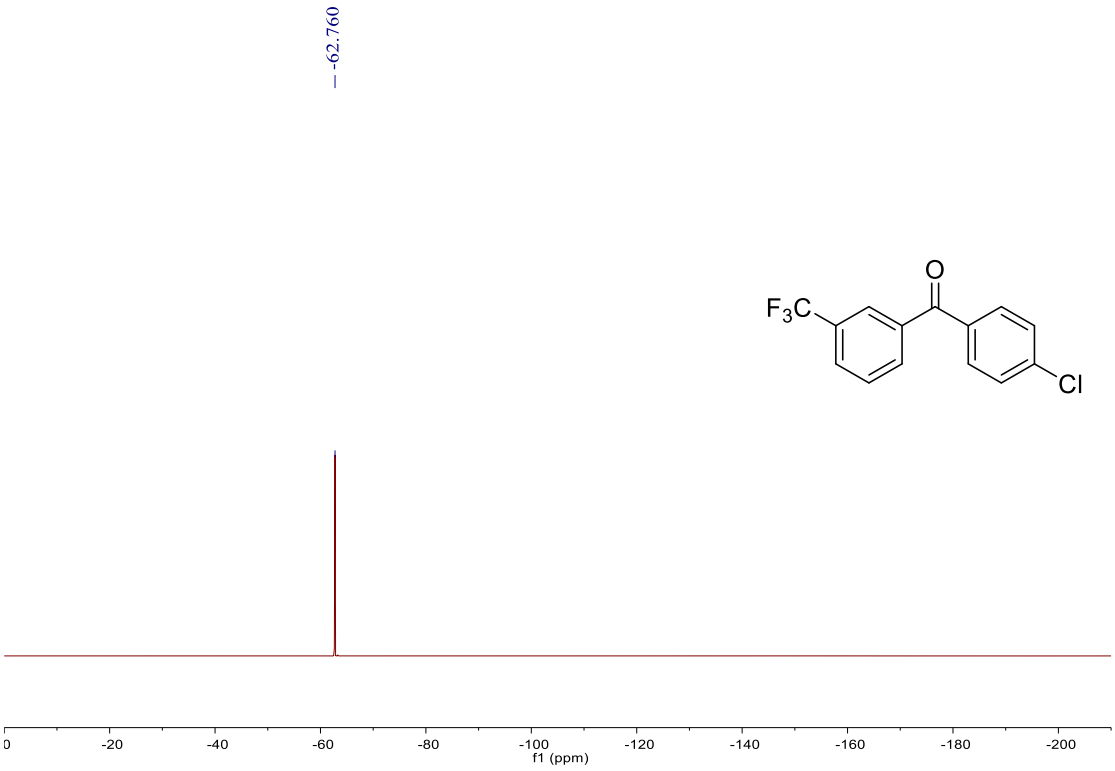
^{1}H & ^{13}C & ^{19}F NMR of 2t



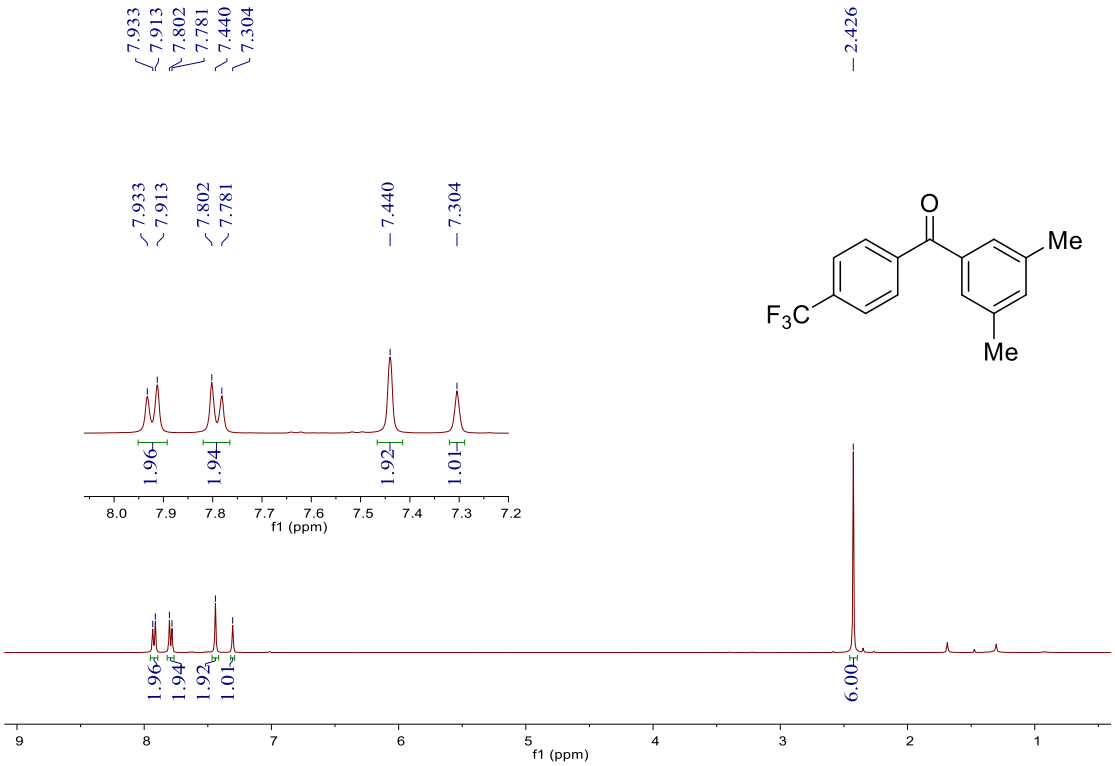


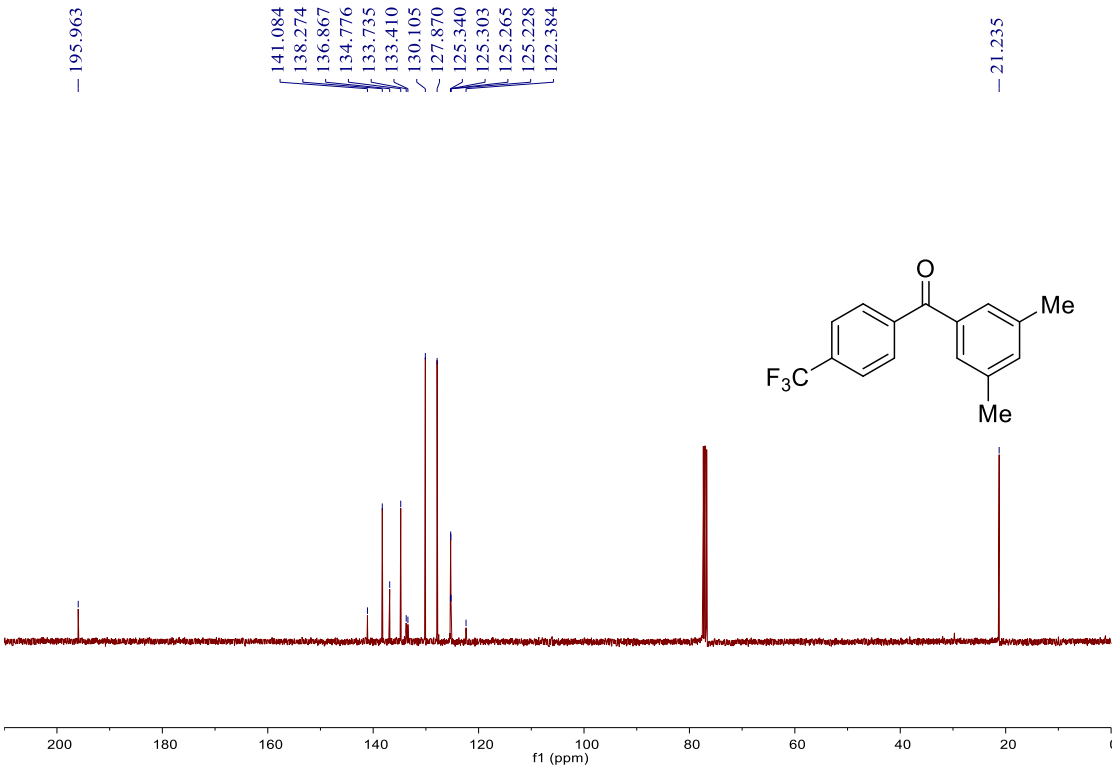




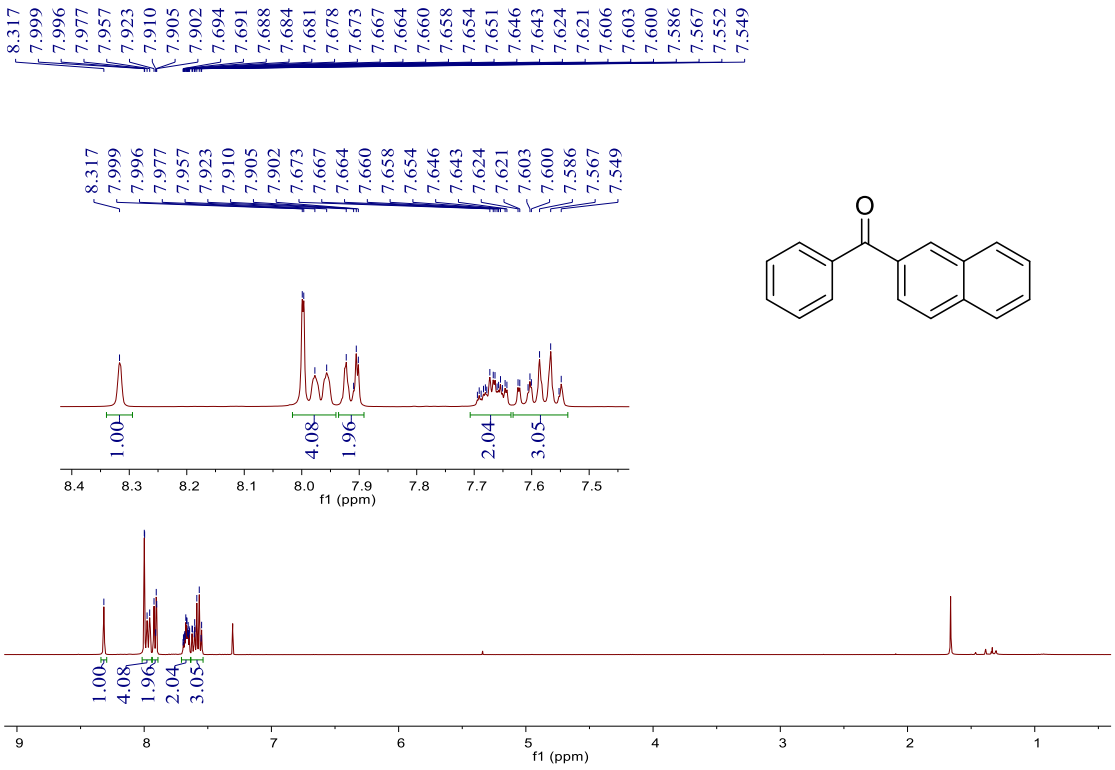


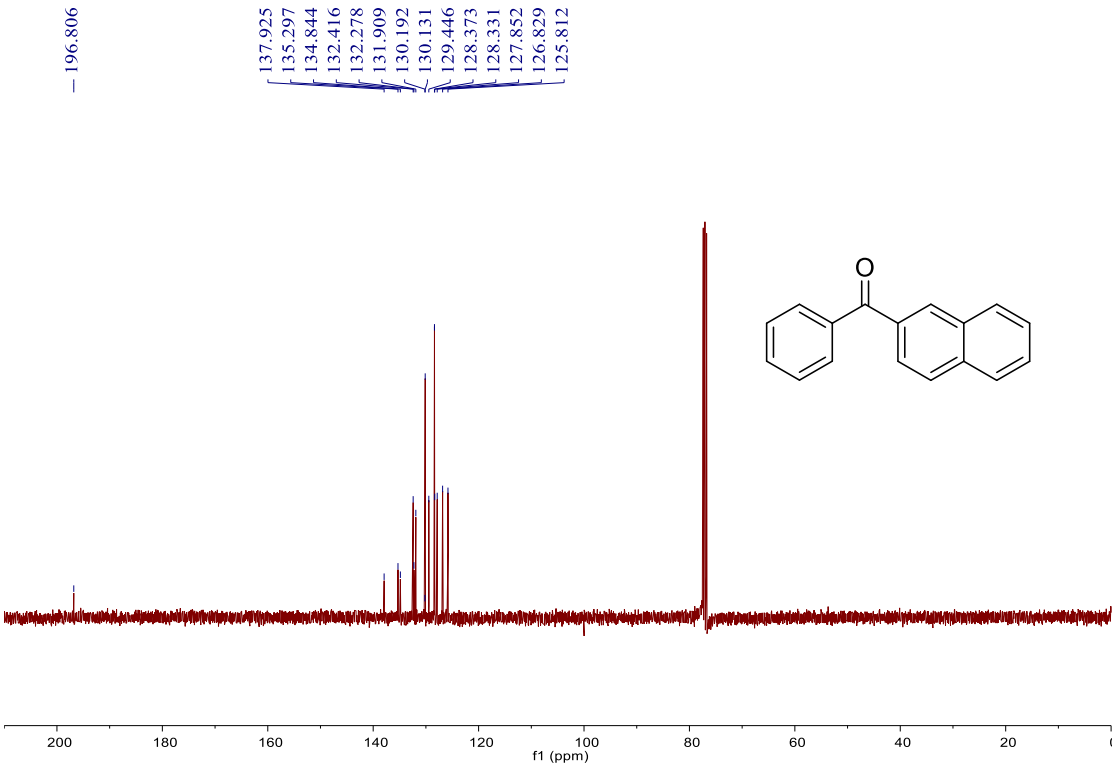
^{1}H & ^{13}C NMR of 2u



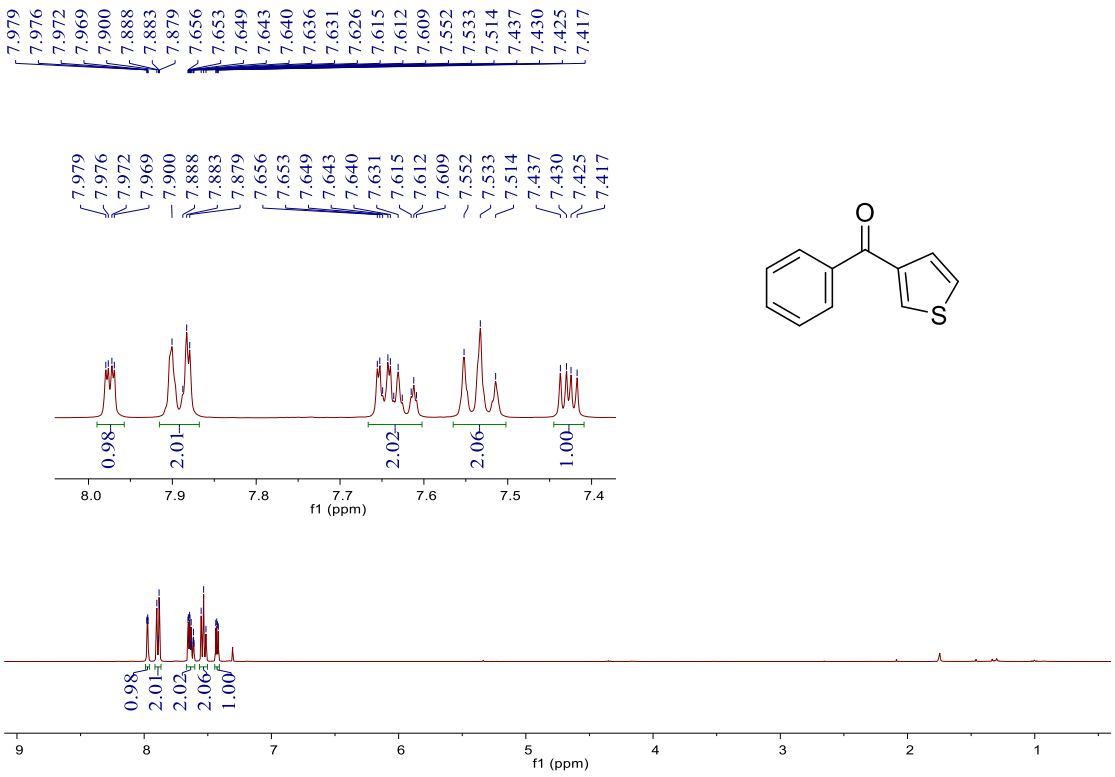


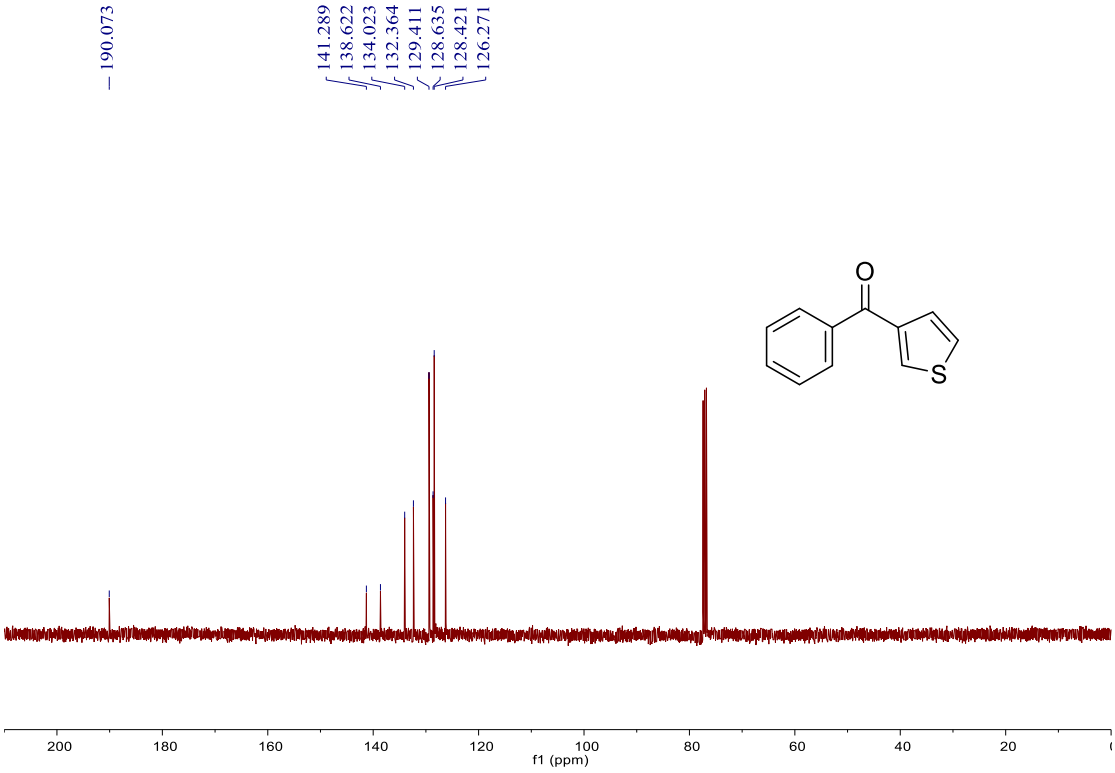
^{1}H & ^{13}C NMR of 2v



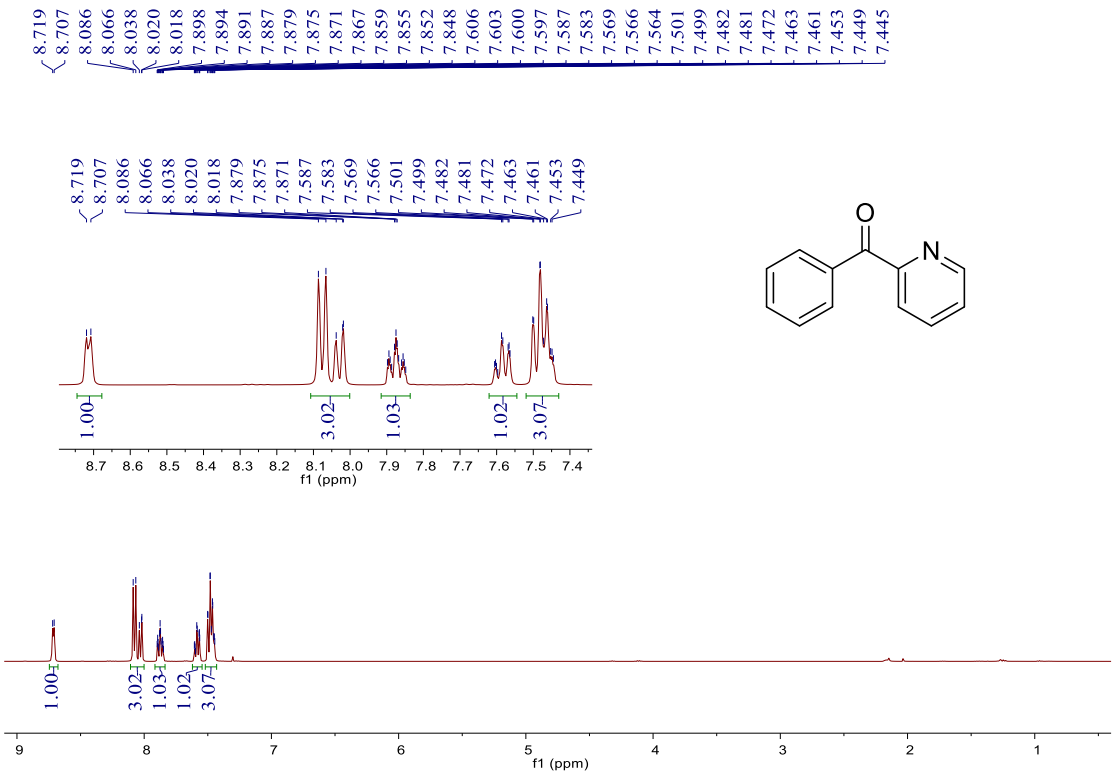


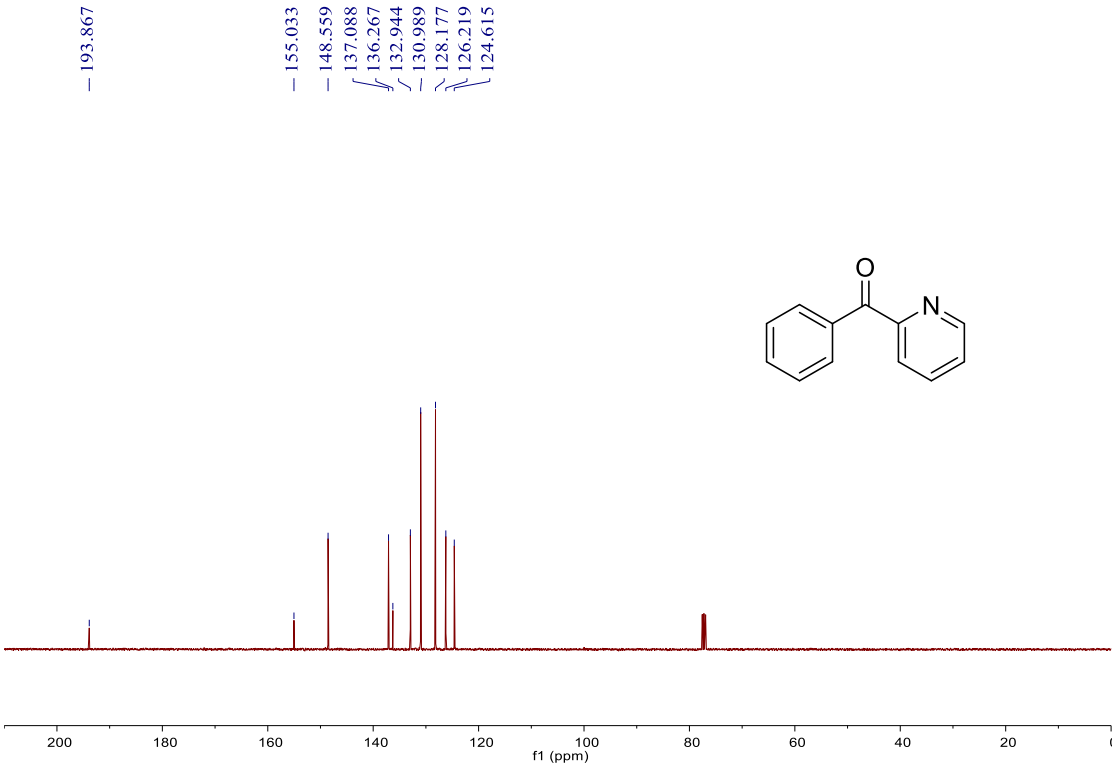
^{1}H & ^{13}C NMR of 2w



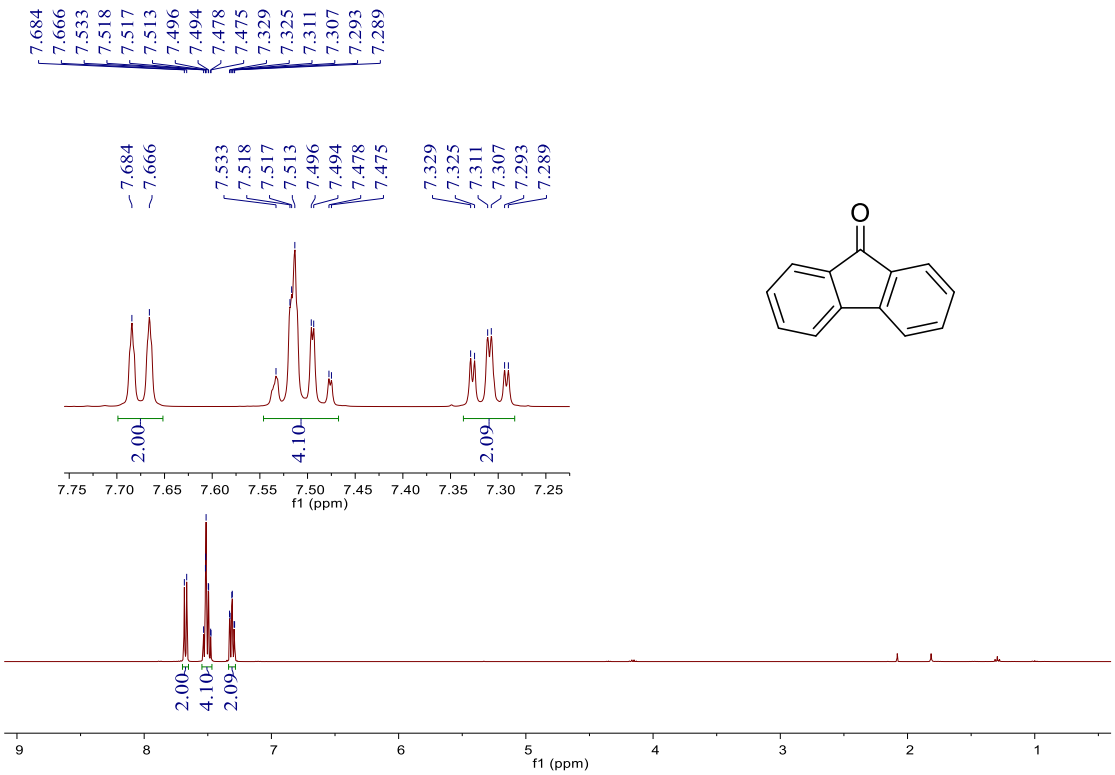


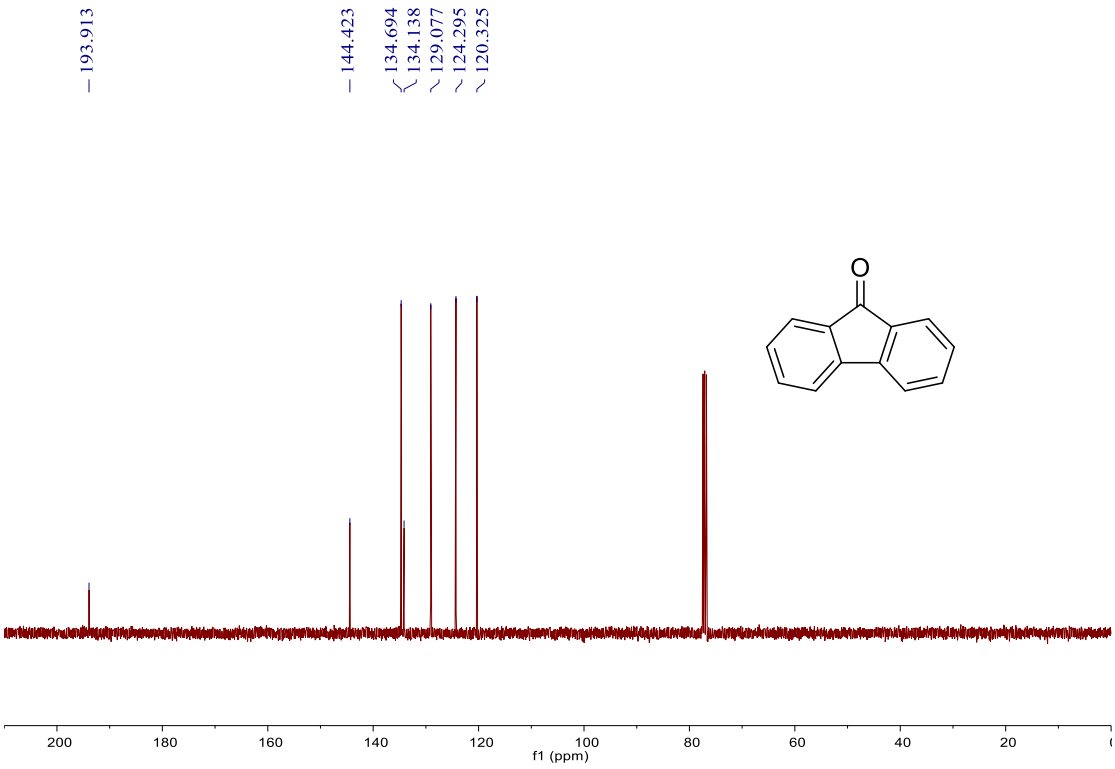
^{1}H & ^{13}C NMR of 2x



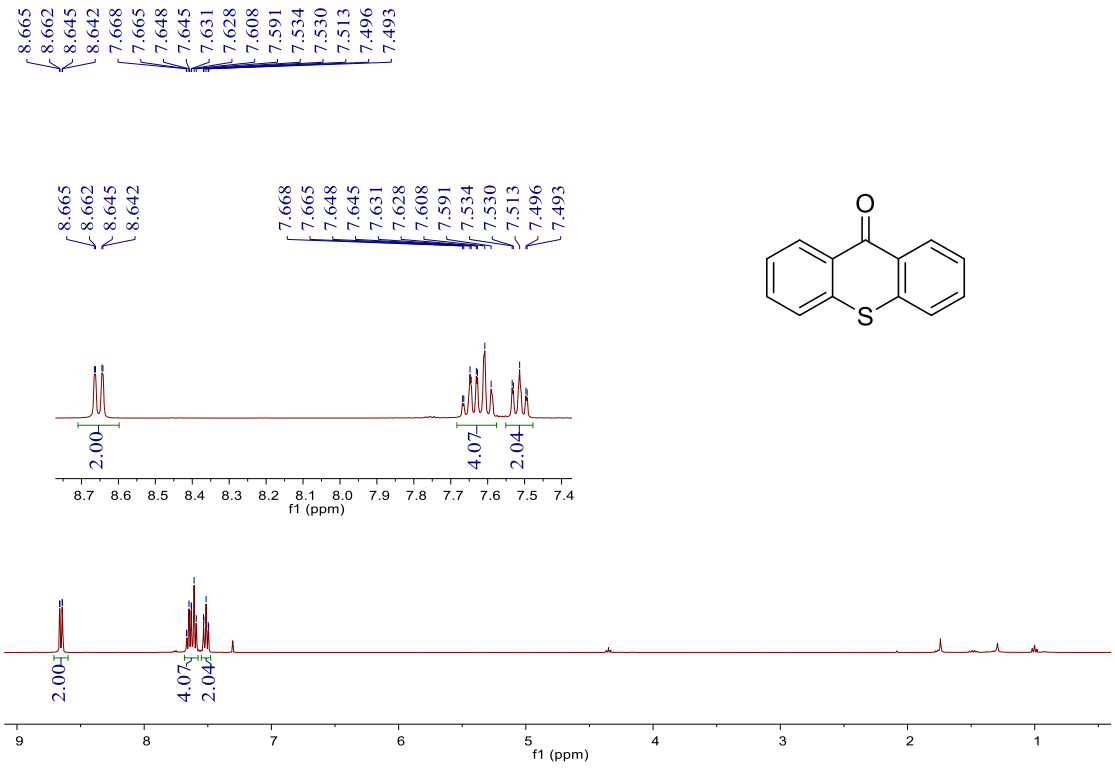


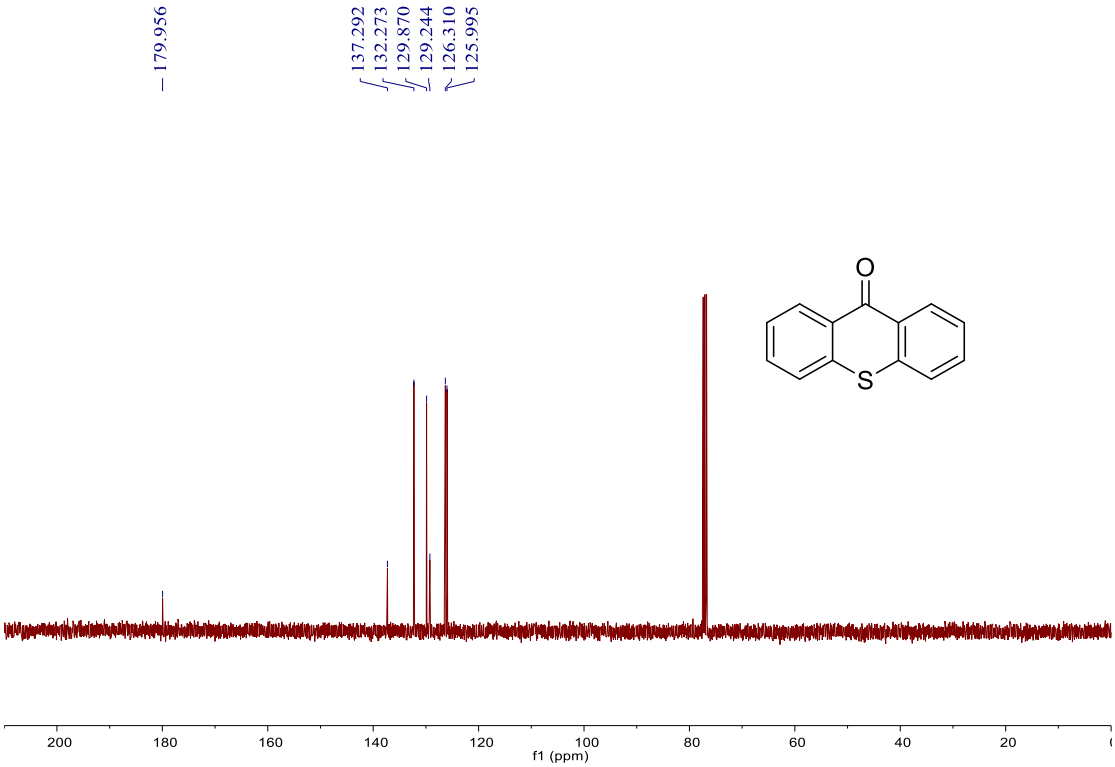
^{1}H & ^{13}C NMR of 2y



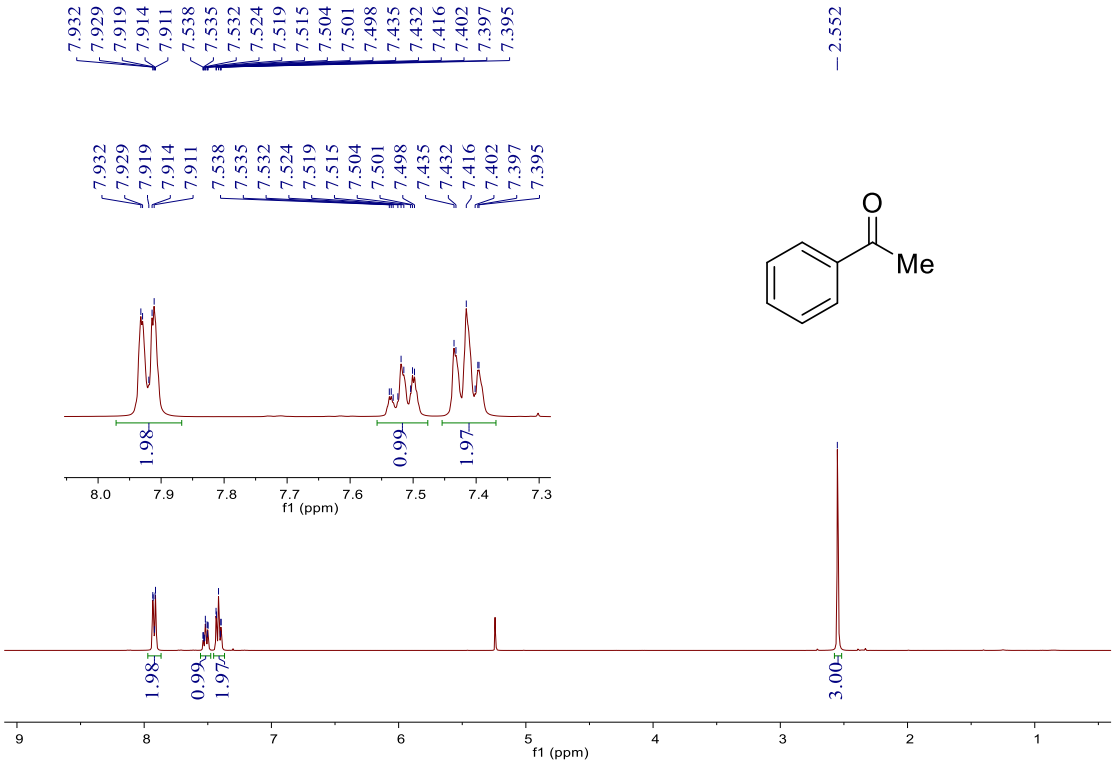


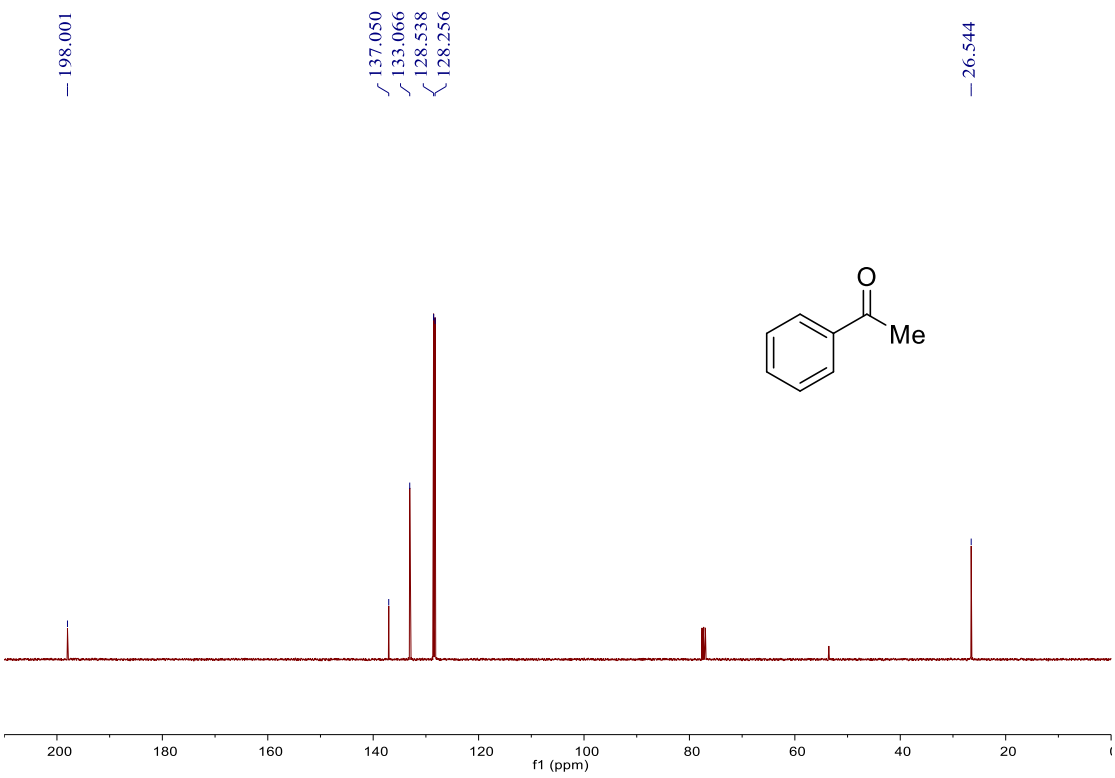
^{1}H & ^{13}C NMR of 2z



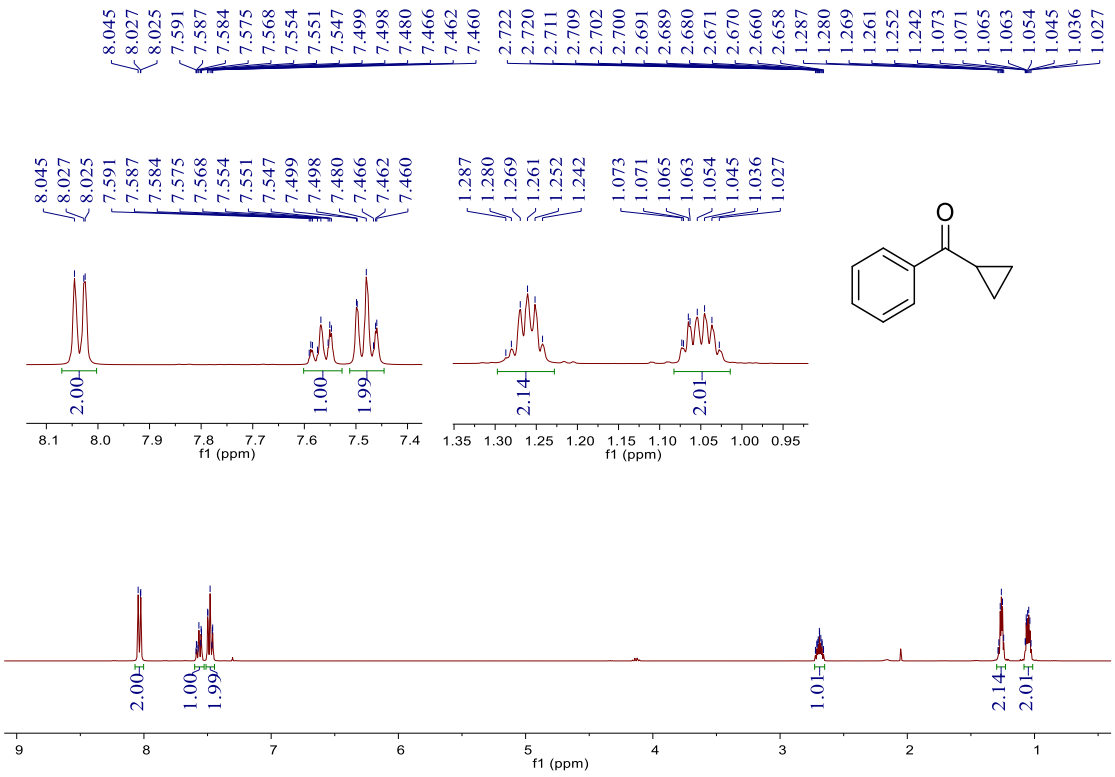


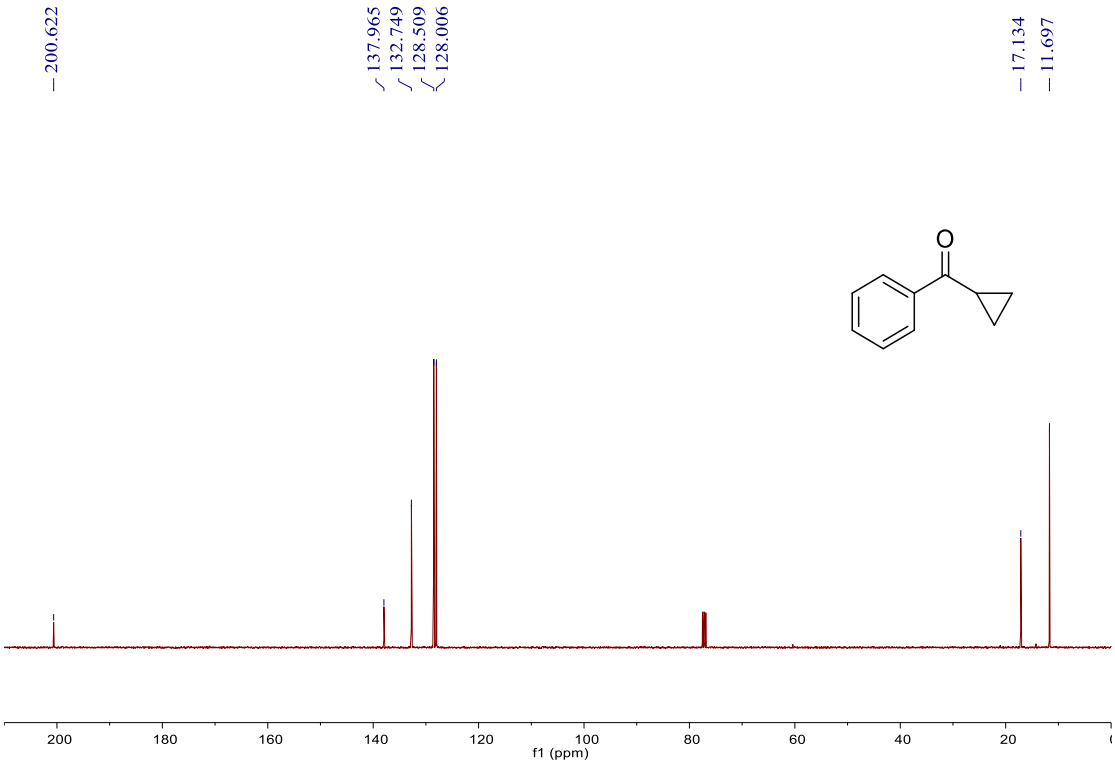
^{1}H & ^{13}C NMR of 2aa



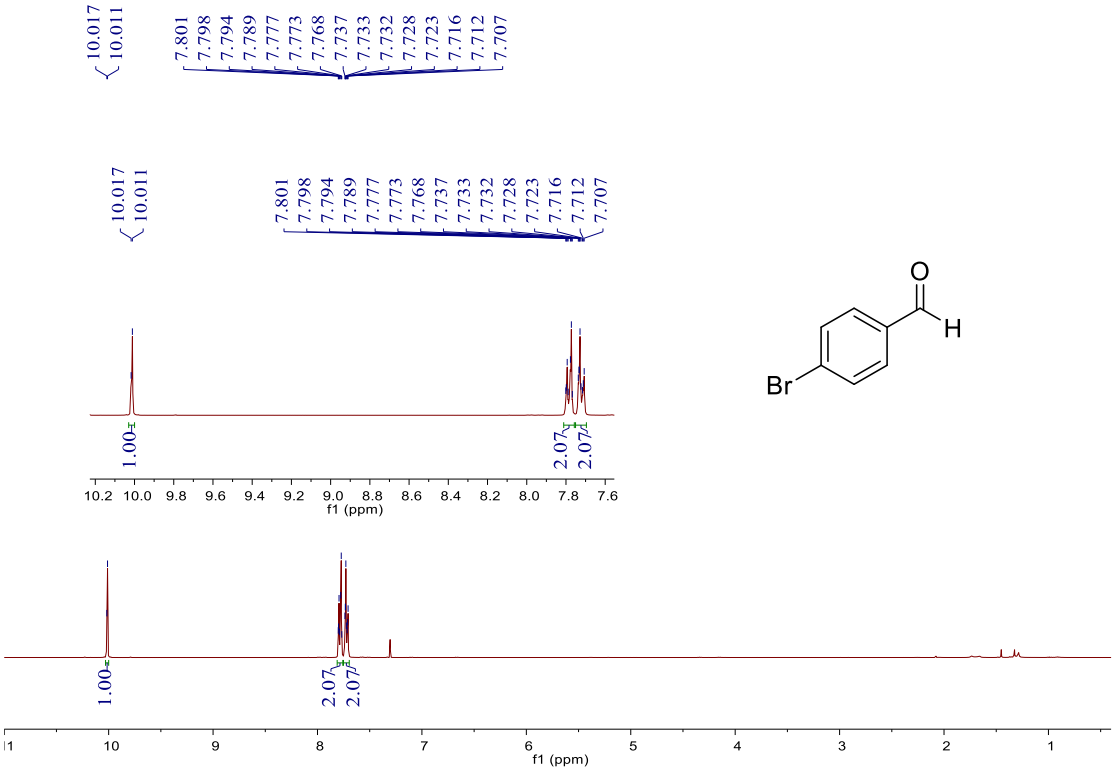


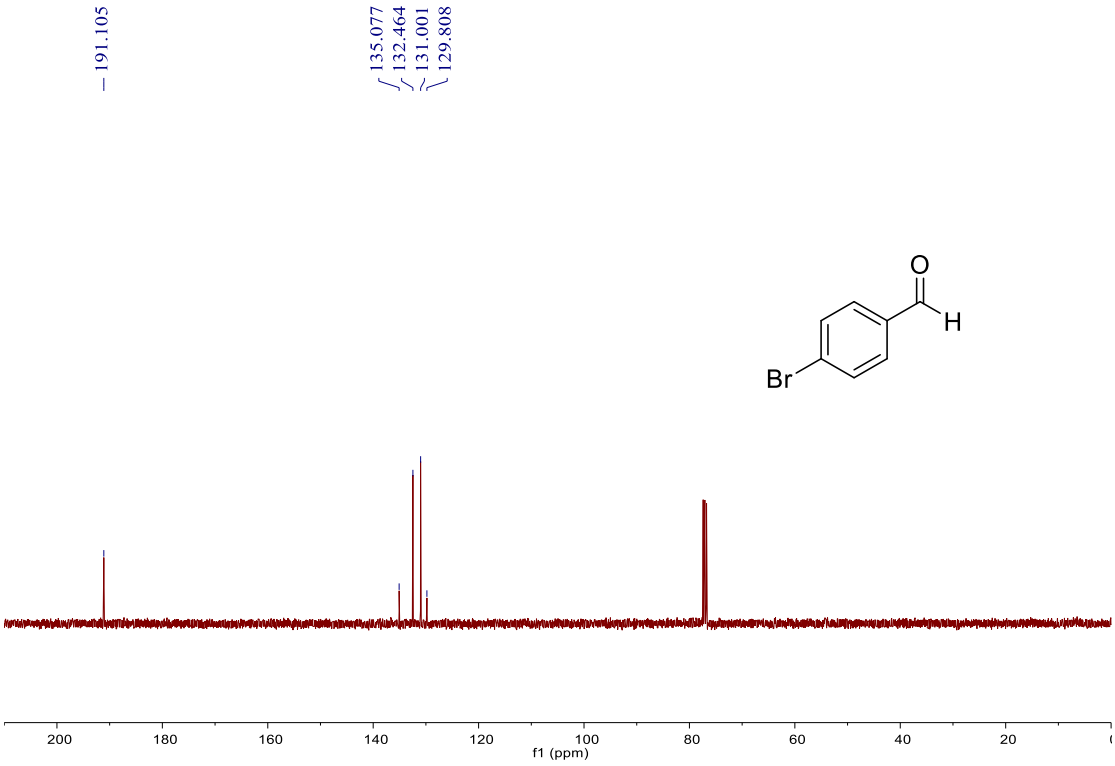
^{1}H & ^{13}C NMR of 2ab



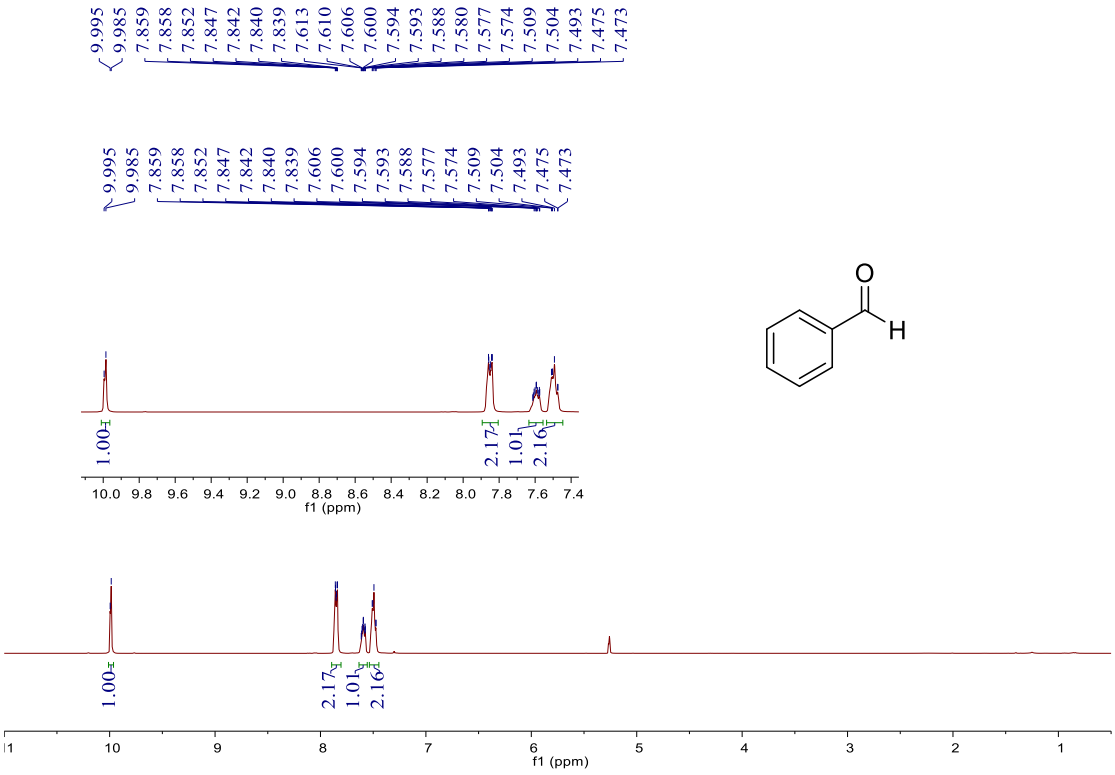


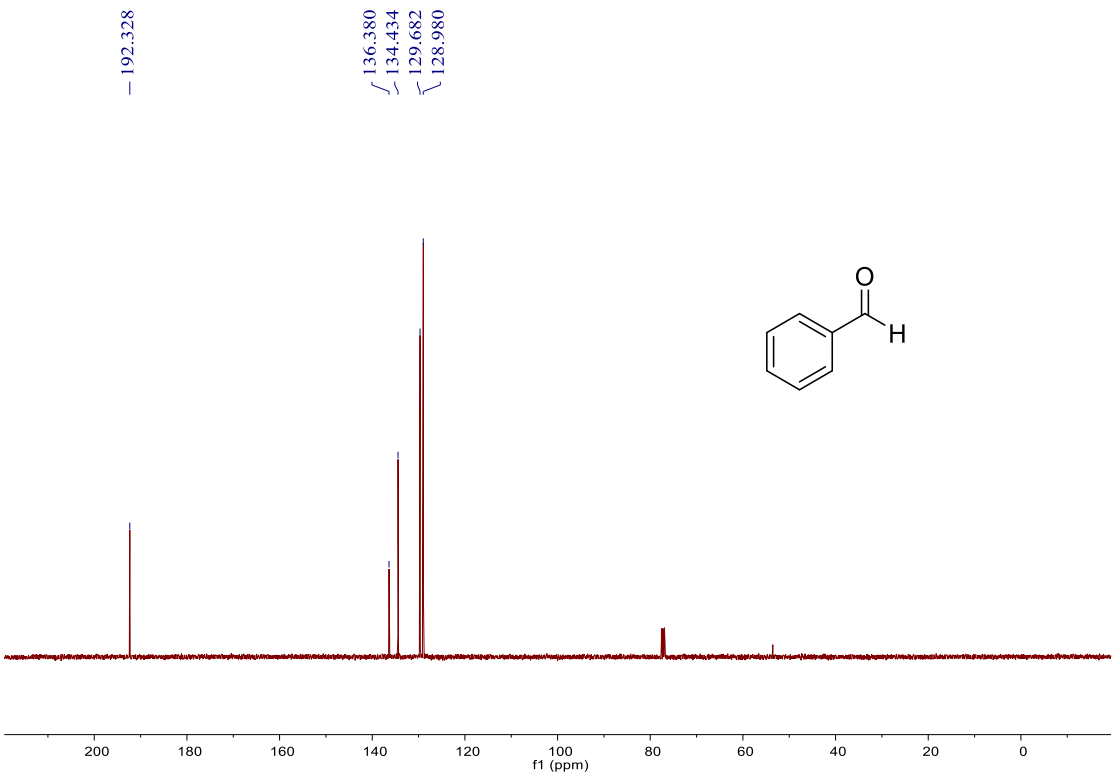
^{1}H & ^{13}C NMR of 2ac



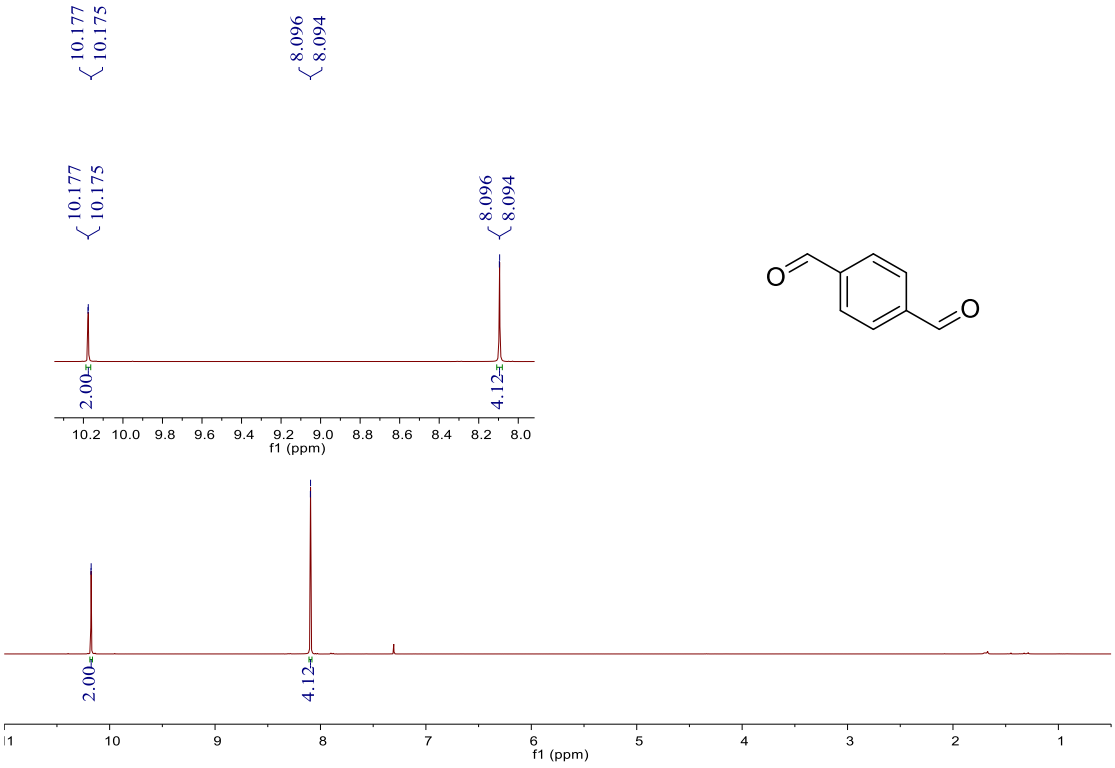


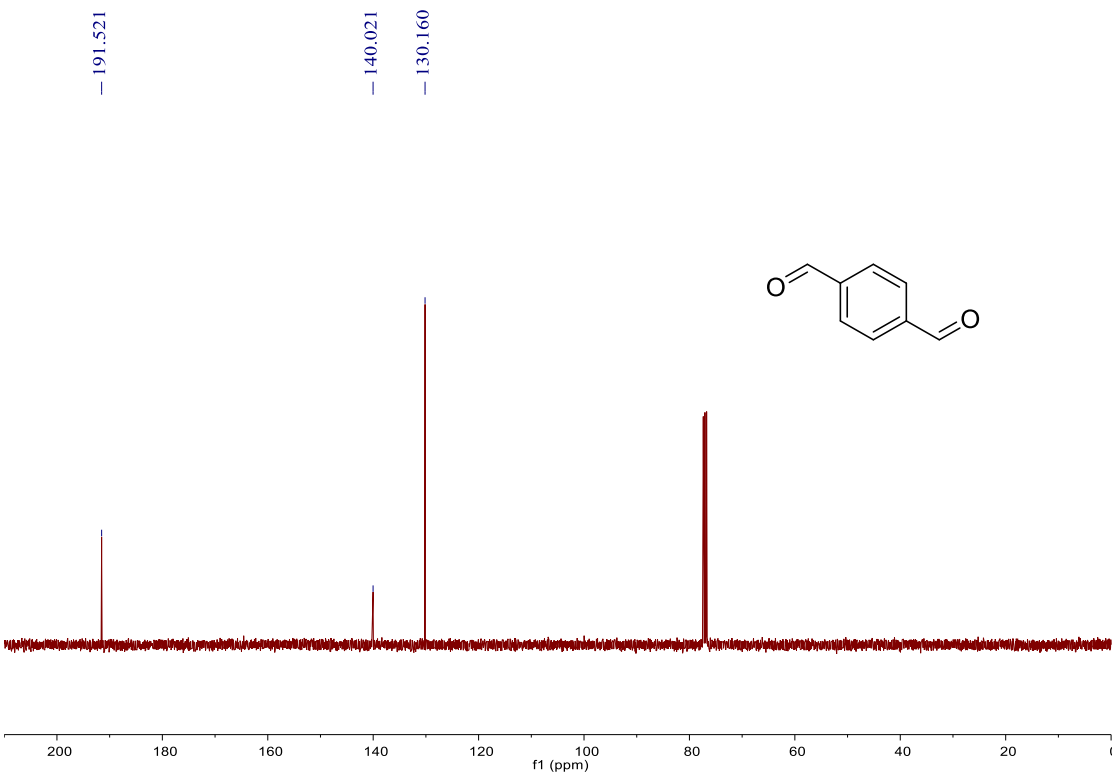
^{1}H & ^{13}C NMR of 2ad



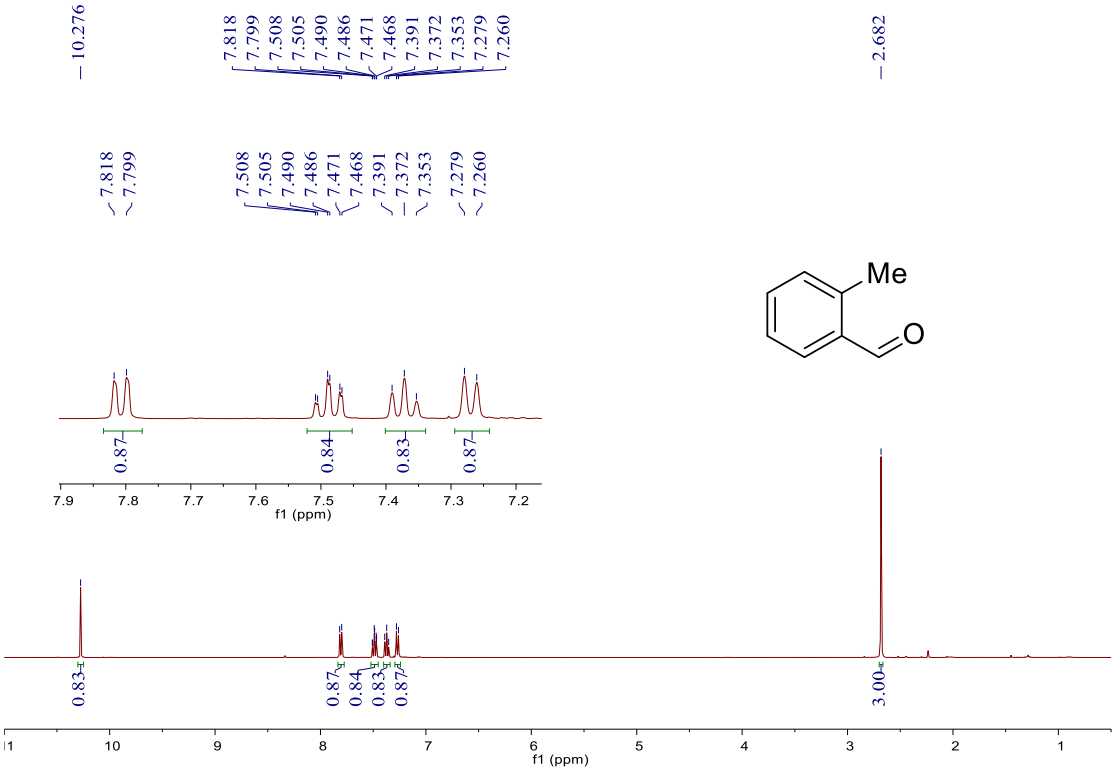


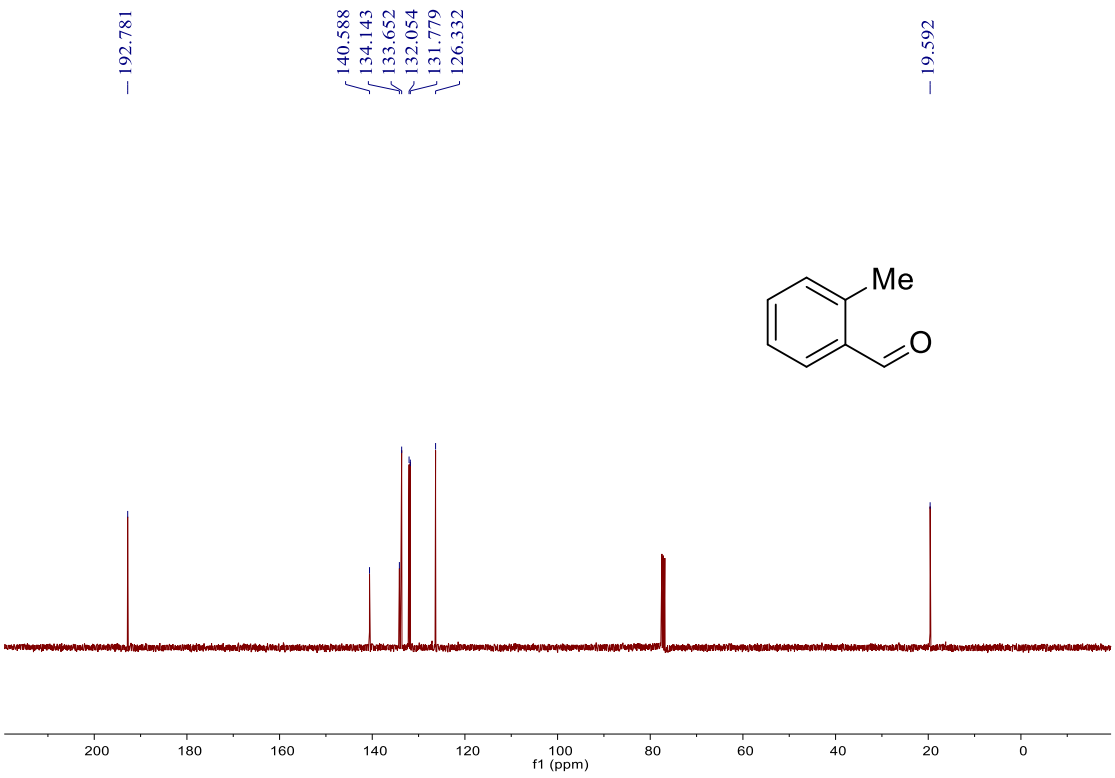
^{1}H & ^{13}C NMR of 2ae





^{1}H & ^{13}C NMR of 2ae'

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132.054
131.779
126.332
19.592
Me
O
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180
160
140
120
100
80
60
40
20
0
f1 (ppm)