

# Carbonylative Suzuki Couplings of Aryl Bromides with Boronic Acid Derivatives under Base-Free Conditions

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## Supporting Information

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# Experimental Procedures and Characterization Data for Novel Compounds in Tables 2 and 3 and Scheme 2

**General Materials and Methods.** All purchased chemicals were used as received without further purification. Flash chromatography was carried out on silica gel 60 (230–400 mesh). The chemical shifts are reported in ppm relative to solvent residual peak.  $^1\text{H}$  NMR spectra were recorded at 400 MHz,  $^{13}\text{C}$  NMR spectra were recorded at 100 MHz, and  $^{19}\text{F}$  NMR spectra were recorded at 376.8 MHz. MS spectra were recorded on a LC TOF (ES) apparatus.

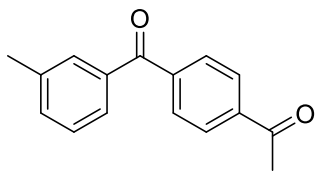
**General Method for the Preparation of Sodium Aryltrihydroxyborates.** The aryl trihydroxyborates were prepared by following the procedure described by Whitehead *et al.*<sup>1</sup>

**General Method for the Preparation of Aryl DABO Boronates.** The aryl trihydroxyborates were prepared by following the procedure described by Rychnovsky *et al.*<sup>2</sup>

**General Method A.** Aryl halide (0.50 mmol, 1.0 equiv), sodium aryltrihydroxyborate (0.55 mmol, 1.1 equiv),  $\text{Pd}(\text{acac})_2$  (0.025 mmol, 0.05 equiv) and CataCXium AHI (0.1 equiv, 0.05 mmol) were added to chamber A of a COware system. 9-Methyl-fluorene-9-carbonyl chloride (1.25 mmol, 2.5 equiv),  $\text{P}(\text{tBu})_3\text{HBF}_4$  (0.0625 mmol, 0.125 equiv), and  $\text{Pd}(\text{dba})_2$  (0.0625 mmol, 0.125 equiv) were added to chamber B. Both chambers were fitted with a Teflon-sealed screw-cap and the atmosphere was evacuated and filled with argon three times. To both chambers was added toluene (3.0 mL) by a syringe. Finally, DIPEA (1.875 mmol, 3.75 equiv) was added to chamber B, and both reaction chambers were heated overnight at 80 °C. The crude reaction mixture of chamber A was evaporated onto silica gel and purified by flash column chromatography to yield the desired product.

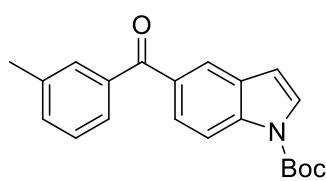
**General Method B.** In a glovebox under argon atmosphere, aryl halide (0.50 mmol, 1.0 equiv), aryl DABO boronate (0.55 mmol, 1.1 equiv),  $\text{Pd}(\text{acac})_2$  (0.025 mmol, 0.05 equiv) and CataCXium AHI (0.1 equiv, 0.05 mmol) were added to chamber A of a COware system. 9-Methyl-fluorene-9-carbonyl chloride (1.25 mmol, 2.5 equiv),  $\text{P}(\text{tBu})_3\text{HBF}_4$  (0.125 mmol, 0.25 equiv), and  $\text{Pd}(\text{dba})_2$  (0.0625 mmol, 0.125 equiv) were added to chamber B. To chamber A was added toluene (3.0 mL) and  $\text{H}_2\text{O}$  (0.3 mL). To chamber B was added DMF (3 mL). Finally, DIPEA (1.875 mmol, 3.75 equiv) was added to chamber B, and both chambers were fitted with a Teflon-sealed screw-cap. The reaction was left to stir for 10 minutes at rt, after which both reaction chambers were heated overnight at 80 °C. The crude reaction mixture of chamber A was evaporated onto silica gel and purified by flash column chromatography to yield the desired product.

Compounds in **Table 2**, entries **1<sup>3</sup>**, **2<sup>4</sup>**, **3<sup>5</sup>**, **5<sup>6</sup>**, **6<sup>7</sup>**, **7<sup>8</sup>**, **9<sup>9</sup>**, and **Table 3**, entries **1<sup>10</sup>** and **4<sup>11</sup>** have previously been reported in the literature and HRMS and <sup>1</sup>H NMR spectra were in agreement. <sup>1</sup>H-NMR spectra are found on p. 18.



**1-(4-(3-Methylbenzoyl)phenyl)ethan-1-one (Table 2, entry 4).** The title compound was prepared by following general method A using 4-bromoacetophenone (0.50 mmol, 99.5 mg) and sodium trihydroxy(*m*-tolyl)borate (0.55 mmol, 96.8 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 83% yield (98.9 mg).

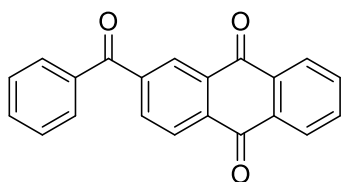
<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm) 8.06 (d, *J* = 8.55 Hz, 2H), 7.86 (d, *J* = 8.62 Hz, 2H), 7.63 (s, 1H), 7.57 (d, *J* = 7.41 Hz, 1H), 7.43 (d, *J* = 7.55, 1H), 7.38 (t, *J* = 7.55 Hz, 1H), 2.67 (s, 3H), 2.42 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm) 197.7, 196.3, 141.7, 139.7, 138.6, 137.1, 133.9, 130.6, 130.2 (2C), 128.4, 128.3 (2C), 127.6, 27.0, 21.5. HRMS [M+H<sup>+</sup>] C<sub>16</sub>H<sub>14</sub>O<sub>2</sub>; calculated: 239.1067, found: 239.1065.



**tert-Butyl 5-(3-methylbenzoyl)-1H-indole-1-carboxylate (Table 2, entry 8).**

The title compound was prepared by following general method A using *tert*-butyl 5-bromo-1H-indole-1-carboxylate (0.50 mmol, 148.1 mg) and sodium trihydroxy(*m*-tolyl)borate (0.55 mmol, 96.8 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as viscous oil in 81% yield (135.8 mg).

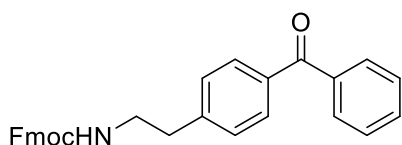
<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm). 8.23 (d, *J* = 8.5 Hz, 1H), 8.05 (d, *J* = 1.5 Hz, 1H), 7.82 (dd, *J* = 1.7 Hz, *J* = 8.7 Hz, 1H), 7.67 (d, *J* = 3.8 Hz, 1H), 7.63 (s, 1H), 7.58 (d, *J* = 7.3 Hz, 1H), 7.35-7.41 (m, 2H), 6.65 (d, *J* = 3.7 Hz, 1H), 2.43 (s, 3H), 1.69 (s, 9H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm) 198.0, 150.0, 138.9, 138.6, 133.3, 132.9, 130.9, 130.6, 130.3, 128.5, 127.8, 127.7, 126.9, 124.5, 115.2, 108.2, 84.6, 28.0 (3C), 21.2. HRMS [M+H<sup>+</sup>] C<sub>21</sub>H<sub>22</sub>NO<sub>3</sub>; calculated: 336.1594, found: 336.1596.



**2-Benzoylanthracene-9,10-dione (Table 3, entry 2).** The title compound was prepared by following general method B using 2-bromoanthracene-9,10-dione (0.50 mmol, 142.1 mg) and phenyl DABO boronate (0.55 mmol, 105.1 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 44% yield (68.7 mg).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm). 8.66 (d, *J* = 1.8 Hz, 1H), 8.46 (d, *J* = 8.1 Hz, 1H), 8.33-8.38 (m, 2H), 8.22 (dd, *J* = 1.8 Hz, *J* = 8.0 Hz, 1H), 7.83-7.88 (m, 4H), 7.64-7.69 (m, 1H), 7.52-7.56 (m, 2H). <sup>13</sup>C NMR

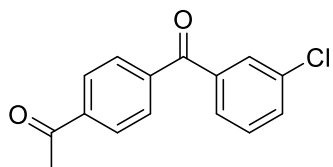
(100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm) 195.1, 182.6, 182.4, 142.5, 136.4, 135.4, 134.6, 134.5, 134.4, 133.5, 133.4, 133.4, 133.3, 130.1 (2C), 128.7 (2C), 128.6, 127.6, 127.5, 127.4. HRMS [M+H<sup>+</sup>] C<sub>21</sub>H<sub>13</sub>O<sub>3</sub>; calculated: 313.0859, found: 313.0861.



**(9H-Fluoren-9-yl)methyl (4-benzoylphenethyl)carbamate (Table 3, entry 3).** The title compound was prepared by following general method B using (9H-fluoren-9-yl)methyl (4-bromophenethyl)carbamate (0.50 mmol, 211.2 mg) and phenyl DABO boronate (0.55 mmol, 105.1 mg).

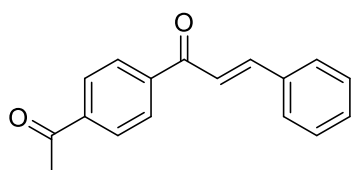
The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 75% yield (167.8 mg).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm). Complex <sup>1</sup>H NMR spectrum due to rotamers. 7.75-7.80 (m, 6H), 7.57-7.61 (m, 3H), 7.48 (t, *J* = 7.6 Hz, 2H), 7.40 (t, *J* = 7.7 Hz, 2H), 7.27-7.33 (m, 4H), 4.82 (bs, 1H), 4.58 (bs) + 4.44 (d, *J* = 6.8 Hz, 2H), 4.21 (t, *J* = 6.8 Hz, 1H), 3.50 (q, *J* = 6.5 Hz) + 3.29 (bs, 2H), 2.91 (t, *J* = 6.7 Hz) + 2.65 (bs, 2H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm) 196.5, 156.4, 144.0 (2C), 143.9, 141.5, 137.8, 136.1, 132.5 (2C), 130.7 (2C), 130.1 (2C), 128.9 (2C), 128.4 (2C), 127.8 (2C), 127.2 (2C), 125.1 (2C), 120.1 (2C), 66.7, 47.4, 42.1, 36.3. HRMS [M+H<sup>+</sup>] C<sub>30</sub>H<sub>26</sub>NO<sub>3</sub>; calculated: 448.1907, found: 448.1911.



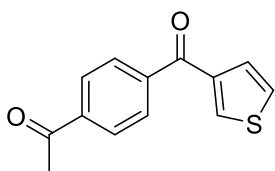
**1-(4-(3-Chlorobenzoyl)phenyl)ethan-1-one (Table 3, entry 5).** The title compound was prepared by following general method B using 4-bromoacetophenone (0.50 mmol, 99.5 mg) and m-chlorophenyl DABO boronate (0.55 mmol, 124.0 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 74% yield (167.8 mg).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm) 8.07 (d, *J* = 8.9 Hz, 2H), 7.85 (d, *J* = 8.3 Hz, 2H), 7.78 (s, 1H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.59 (d, *J* = 8.0 Hz, 1H), 7.45 (t, *J* = 8.0 Hz, 1H), 2.67 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm) 197.5, 194.5, 140.6, 139.9, 138.6, 134.9, 133.0, 130.1, 123.0, 129.9, 128.4, 128.2, 27.0. HRMS [M+H<sup>+</sup>] C<sub>15</sub>H<sub>12</sub>ClO<sub>2</sub>; calculated: 259.0520, found: 259.0521.



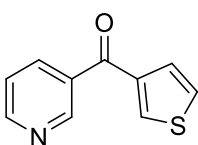
**(E)-1-(4-Acetylphenyl)-3-phenylprop-2-en-1-one (Table 3, entry 6).** The title compound was prepared by following general method B using 4-bromoacetophenone (0.50 mmol, 99.5 mg) and (*E*)-2-styryl DABO boronate (0.55 mmol, 119.4 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 95% yield (118.9 mg).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 8.08 (s, 4H), 7.83 (d,  $J=15.8$  Hz, 1H), 7.65-7.67 (m, 2H), 7.51 (d,  $J=15.8$  Hz, 1H), 7.43-7.49 (m, 3H), 2.67 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 197.7, 190.2, 146.0, 141.8, 140.0, 134.8, 131.1, 129.2 (2C), 128.8 (2C), 128.7 (2C), 128.6 (2C), 122.0, 27.0. HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{17}\text{H}_{15}\text{O}_2$ ; calculated: 251.1067, found: 251.1069.



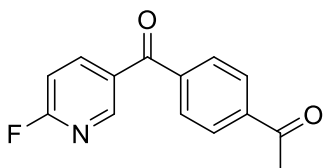
**1-(4-(Thiophene-3-carbonyl)phenyl)ethan-1-one (Table 3, entry 7).** The title compound was prepared by following general method B using 4-bromoacetophenone (0.50 mmol, 99.5 mg) and 2-(thiophen-3-yl) DABO boronate (0.55 mmol, 108.4 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 74% yield (85.2 mg).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 8.06 (d,  $J=8.1$  Hz, 2H), 7.94 (d,  $J=2.9$  Hz, 1H), 7.91 (d,  $J=8.1$  Hz, 2H), 7.61 (d,  $J=5.0$  Hz, 1H), 7.41 (dd,  $J=2.9$  Hz,  $J=5.0$  Hz, 1H), 2.67 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 197.6, 189.3, 142.4, 141.1, 139.7, 134.7, 129.5 (2C), 128.5, 128.4 (2C), 126.8, 27.0. HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{13}\text{H}_{11}\text{O}_2\text{S}$ ; calculated: 231.0474, found: 231.0474.



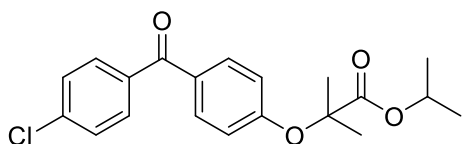
**Pyridin-3-yl(thiophen-3-yl)methanone (Table 3, entry 8).** The title compound was prepared by following general method B using 3-bromopyridine (0.50 mmol, 79.0 mg) and 2-(thiophen-3-yl) DABO boronate (0.55 mmol, 108.4 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as a colorless solid in 73% yield (69.1 mg).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 9.07 (s, 1H), 8.82 (d,  $J=4.0$  Hz, 1H), 8.15 (d,  $J=8.4$  Hz, 1H), 7.98 (s, 1H), 7.62 (d,  $J=5.1$  Hz, 1H), 7.42-7.48 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 188.1, 153.0, 150.4, 140.9, 136.7, 134.7, 134.3, 128.4, 127.0, 123.6. HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{10}\text{H}_8\text{NOS}$ ; calculated: 190.0321, found: 190.0322.



**1-(4-(6-Fluoronicotinoyl)phenyl)ethan-1-one (Table 3, entry 9).** The title compound was prepared by following general method B using 4-bromoacetophenone (0.50 mmol, 99.5 mg) and 2-(6-fluoropyridin-3-yl) DABO boronate (0.55 mmol, 115.5 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as an off white solid in 29% yield (35.3 mg).

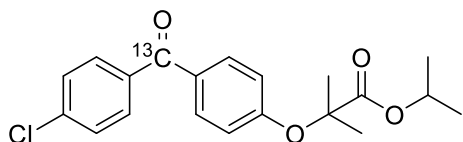
$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 8.63 (s, 1H), 8.29 (dt,  $J= 2.5$  Hz,  $J= 8.0$  Hz, 1H), 8.08 (d,  $J= 8.0$  Hz, 2H), 7.85 (d,  $J= 8.1$  Hz, 2H), 7.09 (dd,  $J= 2.9$  Hz,  $J= 8.5$  Hz, 1H), 2.66 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 197.3, 192.7, 165.6 (d,  $J_{\text{C-F}}= 245$  Hz), 150.7 (d,  $J= 17$  Hz), 143.0 (d,  $J= 9$  Hz), 140.3 (d,  $J= 9$  Hz), 131.1 (d,  $J= 4$  Hz), 130.0 (2C), 128.6 (2C), 110.1 (d,  $J= 37$  Hz), 27.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) -60.29. HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{14}\text{H}_{11}\text{FNO}_2$ ; calculated: 244.0768, found: 244.0769.



**Isopropyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Fenofibrate) (Scheme 2).** The title compound was prepared by following general method B using isopropyl 2-(4-bromophenoxy)-2-methylpropanoate (0.50 mmol,

150.6 mg) and 2-(4-chlorophenyl) DABO boronate (0.55 mmol, 124.0 mg). The title compound was isolated by column chromatography (ethyl acetate in pentanes) as an off white solid in 83% yield (149.7 mg).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 7.73 (d,  $J= 8.7$  Hz, 2H), 7.69 (d,  $J= 8.5$  Hz, 2H), 7.44 (d,  $J= 8.6$  Hz, 2H), 6.86 (d,  $J= 8.9$  Hz, 2H), 5.09 (sept,  $J= 6.2$  Hz, 1H), 1.66 (s, 6H), 1.20 (d,  $J= 6.3$  Hz, 6H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 194.3, 173.2, 159.9, 138.5, 136.6, 132.1 (2C), 131.3 (2C), 130.3, 128.7 (2C), 117.4 (2C), 79.6, 69.5, 25.5 (2C), 21.7 (2C). HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{20}\text{H}_{22}\text{ClO}_4$ ; calculated: 361.1201, found: 361.1202.



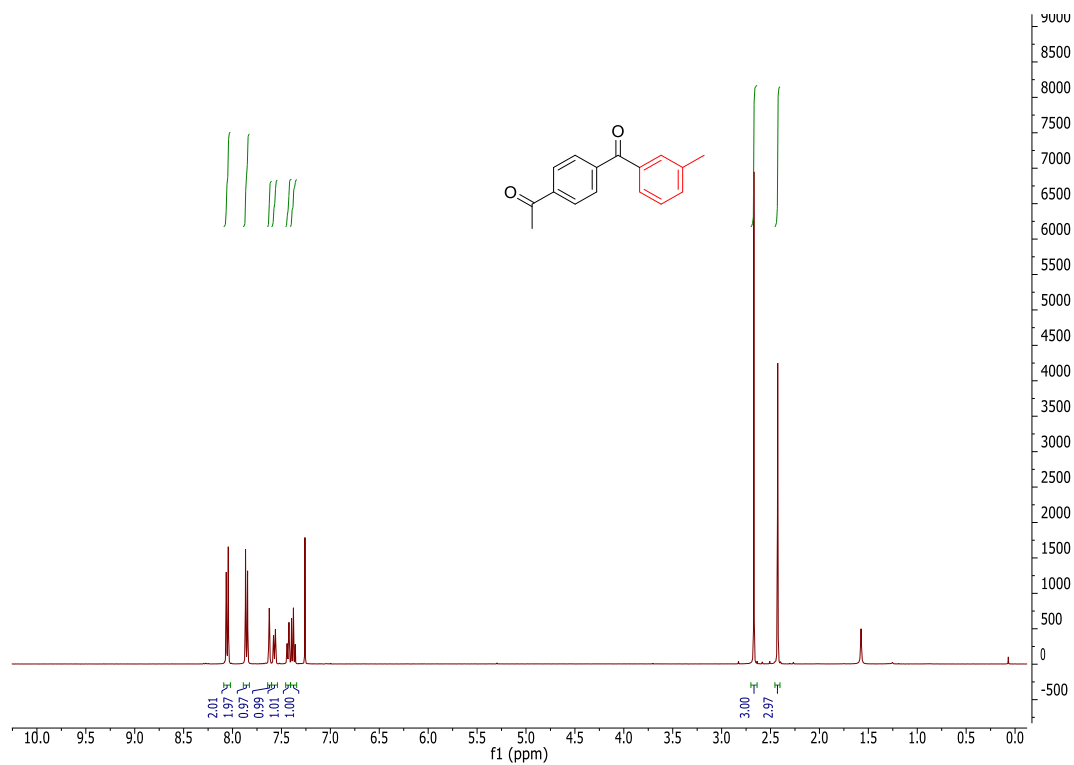
**$^{13}\text{C}$  Labeled isopropyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Fenofibrate) (Scheme 2).** The title compound was prepared by following general method B using isopropyl 2-(4-bromophenoxy)-2-methylpropanoate (0.50 mmol, 150.6 mg) and 2-

(4-chlorophenyl) DABO boronate (0.55 mmol, 124.0 mg). The  $^{13}\text{C}$ -labeled version of COgen was employed in chamber B of the COware (1.25 mmol, 304.6 mg) The title compound was isolated by column chromatography (ethyl acetate in pentanes) as an off white solid in 81% yield (146.5 mg).

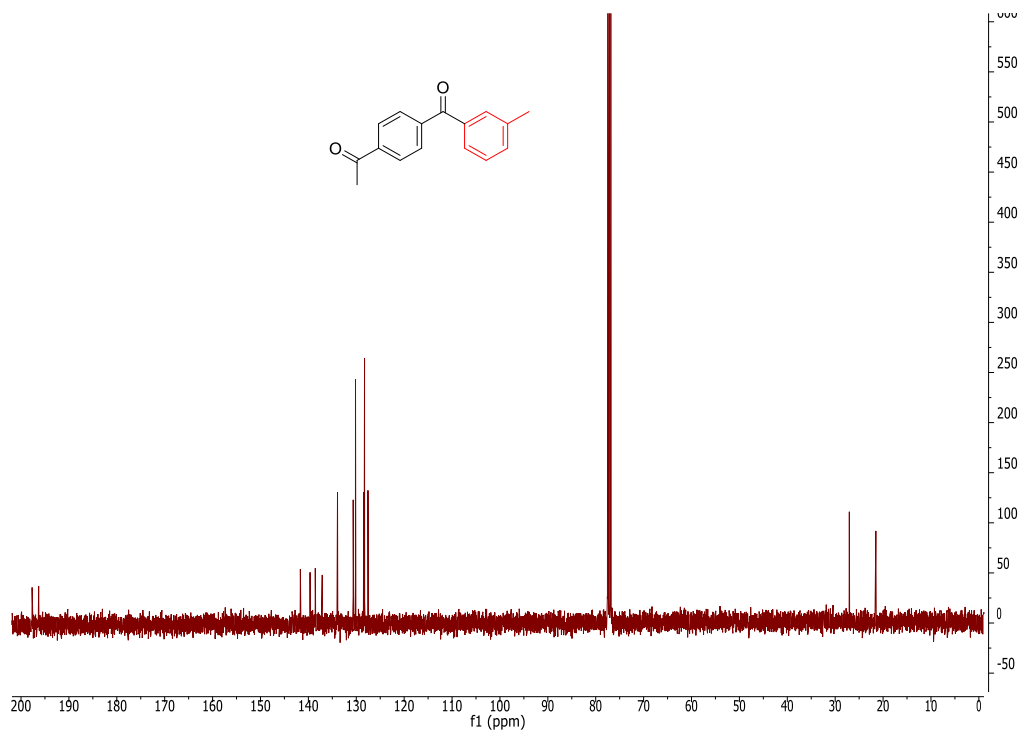
$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 7.73 (d,  $J= 8.7$  Hz, 2H), 7.69 (d,  $J= 8.5$  Hz, 2H), 7.44 (d,  $J= 8.6$  Hz, 2H), 6.86 (d,  $J= 8.9$  Hz, 2H), 5.09 (sept,  $J= 6.2$  Hz, 1H), 1.66 (s, 6H), 1.20 (d,  $J= 6.3$  Hz, 6H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm) 194.3 ( $^{13}\text{C}$ ), 173.2, 159.9, 138.5, 136.6 (d,  $J= 55$  Hz), 132.1 (d,  $J= 3$  Hz, 2C), 131.3 (d,  $J= 2$  Hz, 2C), 130.3 (d,  $J= 57$  Hz), 128.7 (d,  $J= 4$  Hz, 2C), 117.4 (d,  $J= 4$  Hz, 2C), 79.6, 69.5, 25.5 (2C), 21.7 (2C). HRMS  $[\text{M}+\text{H}^+]$   $\text{C}_{19}^{13}\text{CH}_{22}\text{ClO}_4$ ; calculated: 362.1235, found: 362.1237.

## NMR Spectra of Novel Compounds

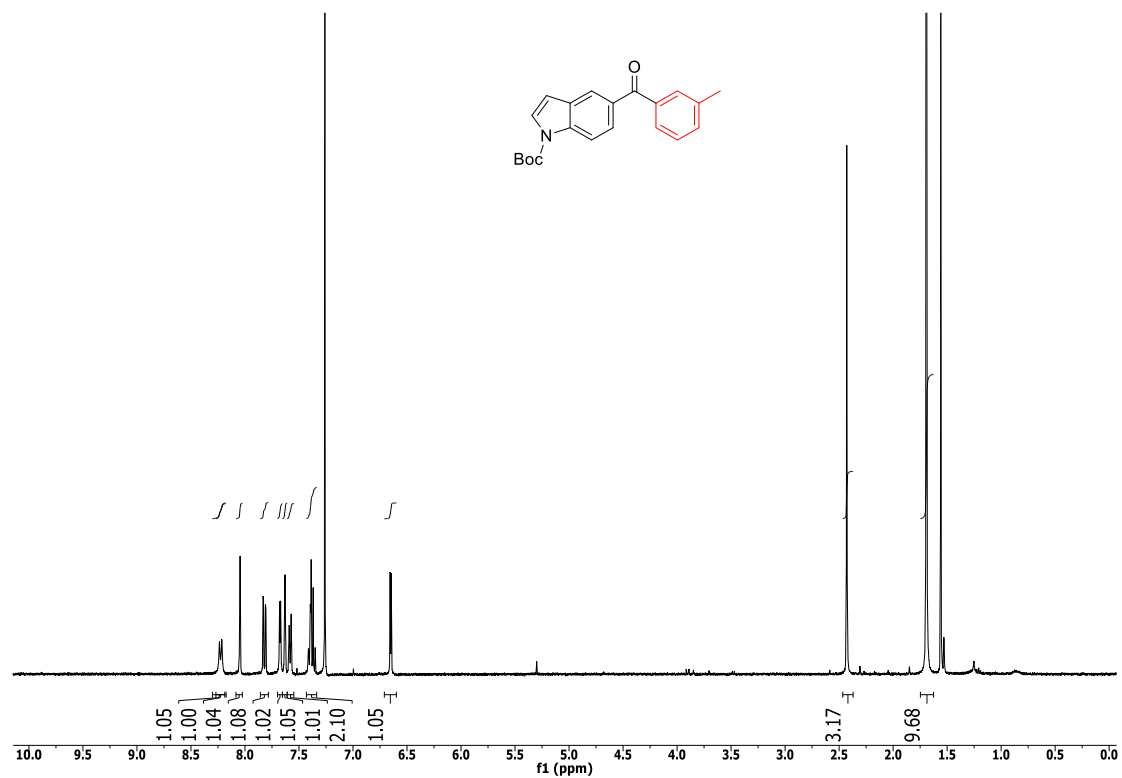
### $^1\text{H}$ NMR of 1-(4-(3-Methylbenzoyl)phenyl)ethan-1-one (Table 2, entry 4)



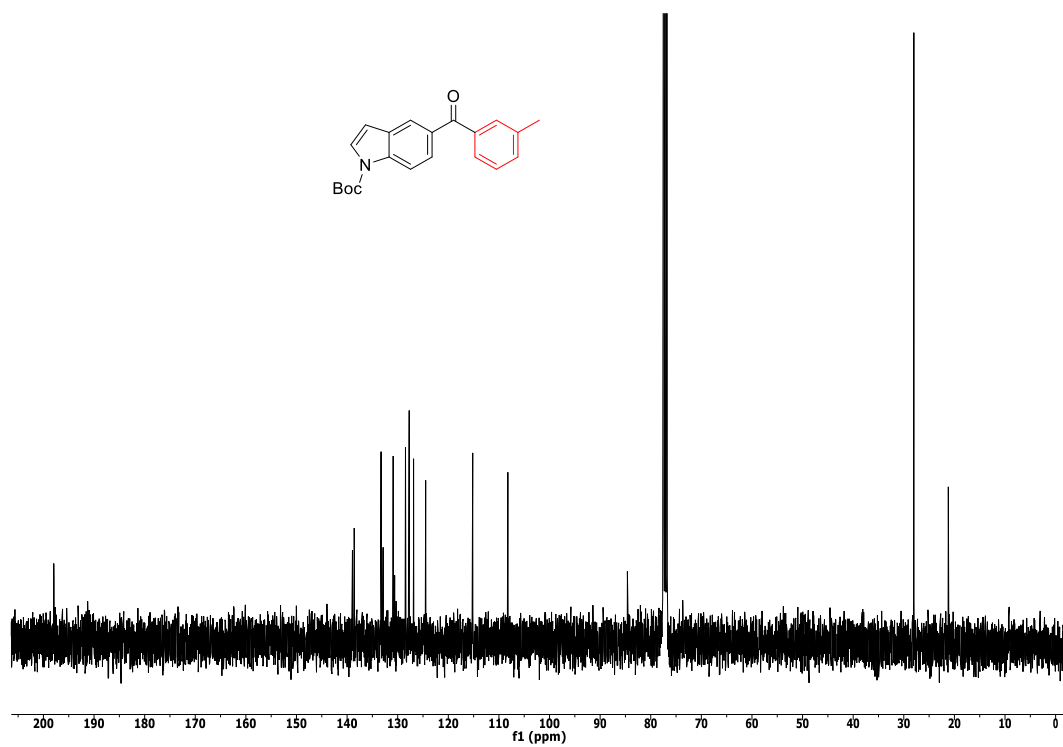
### $^{13}\text{C}$ NMR of 1-(4-(3-Methylbenzoyl)phenyl)ethan-1-one (Table 2, entry 4)



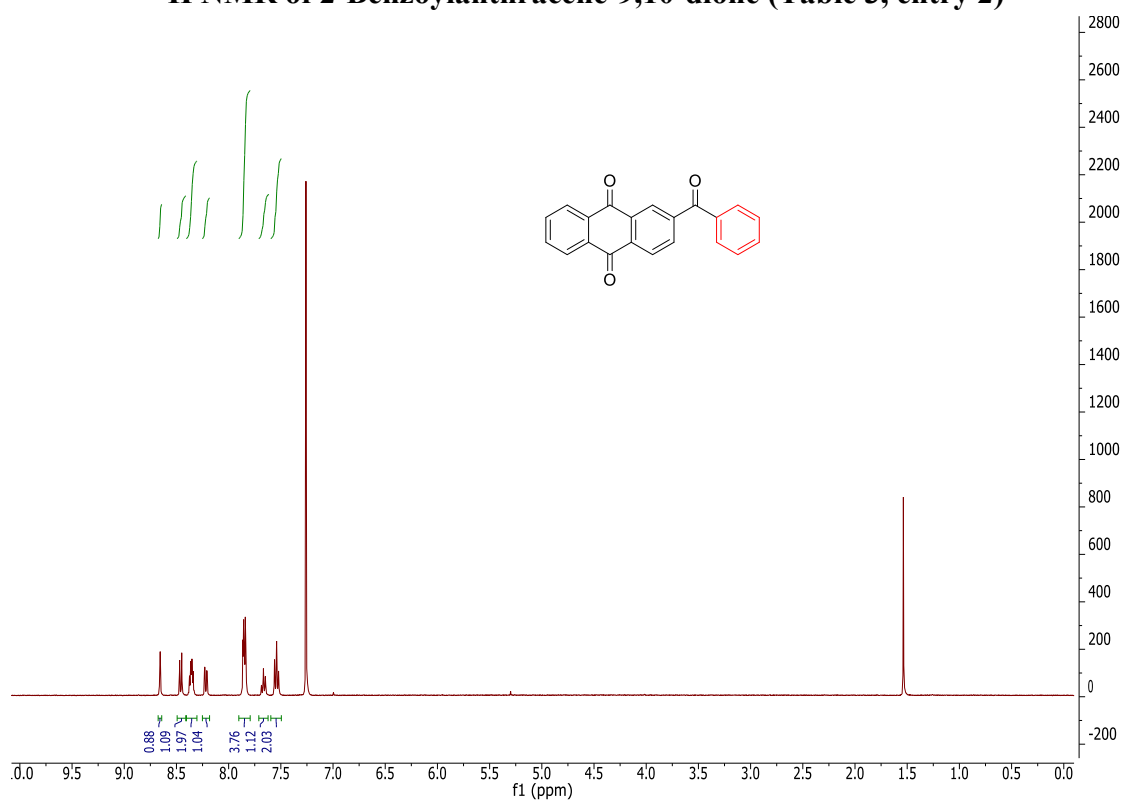
**<sup>1</sup>H NMR of *tert*-Butyl 5-(3-methylbenzoyl)-1*H*-indole-1-carboxylate (Table 2, entry 8)**



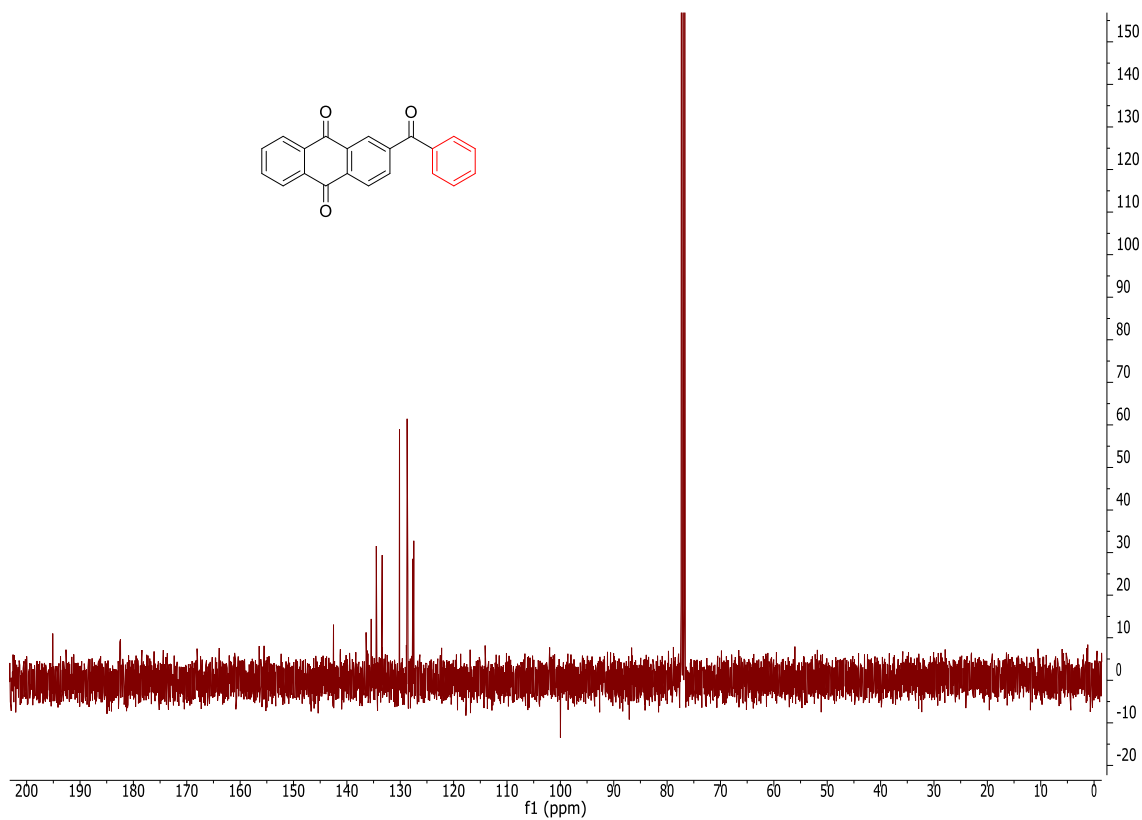
**<sup>13</sup>C NMR of *tert*-Butyl 5-(3-methylbenzoyl)-1*H*-indole-1-carboxylate (Table 2, entry 8)**



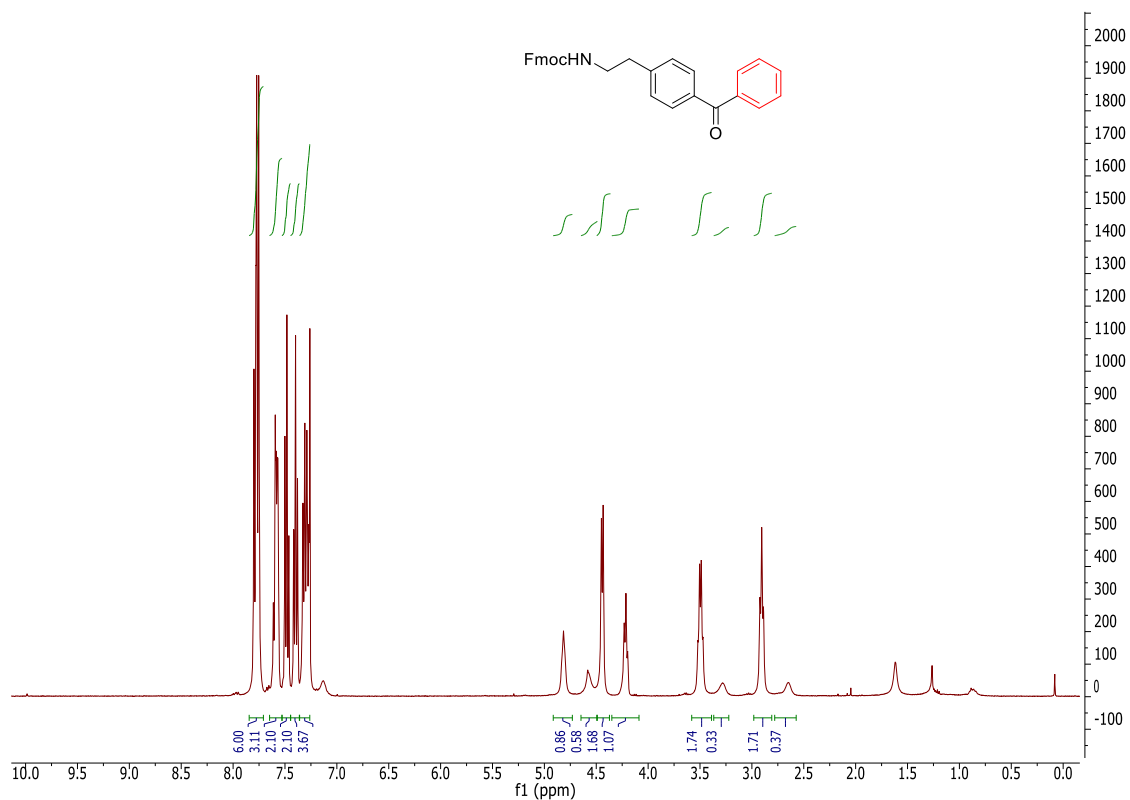
### <sup>1</sup>H NMR of 2-Benzoylanthracene-9,10-dione (Table 3, entry 2)



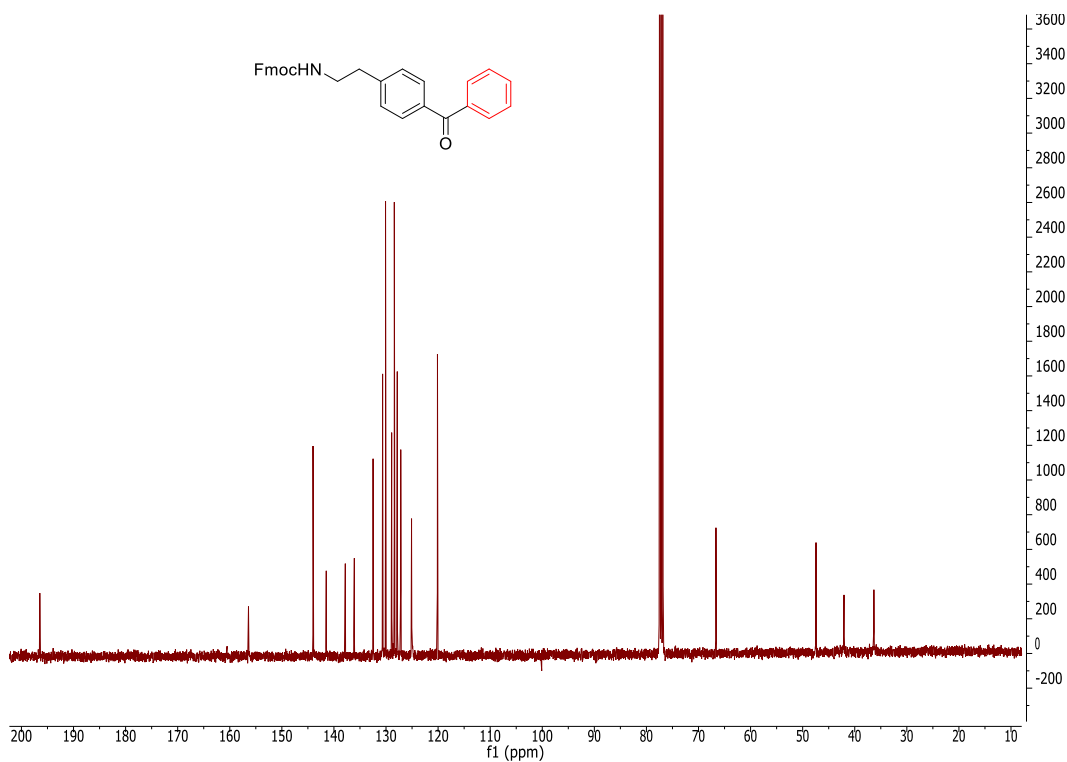
### <sup>13</sup>C NMR of 2-Benzoylanthracene-9,10-dione (Table 3, entry 2)



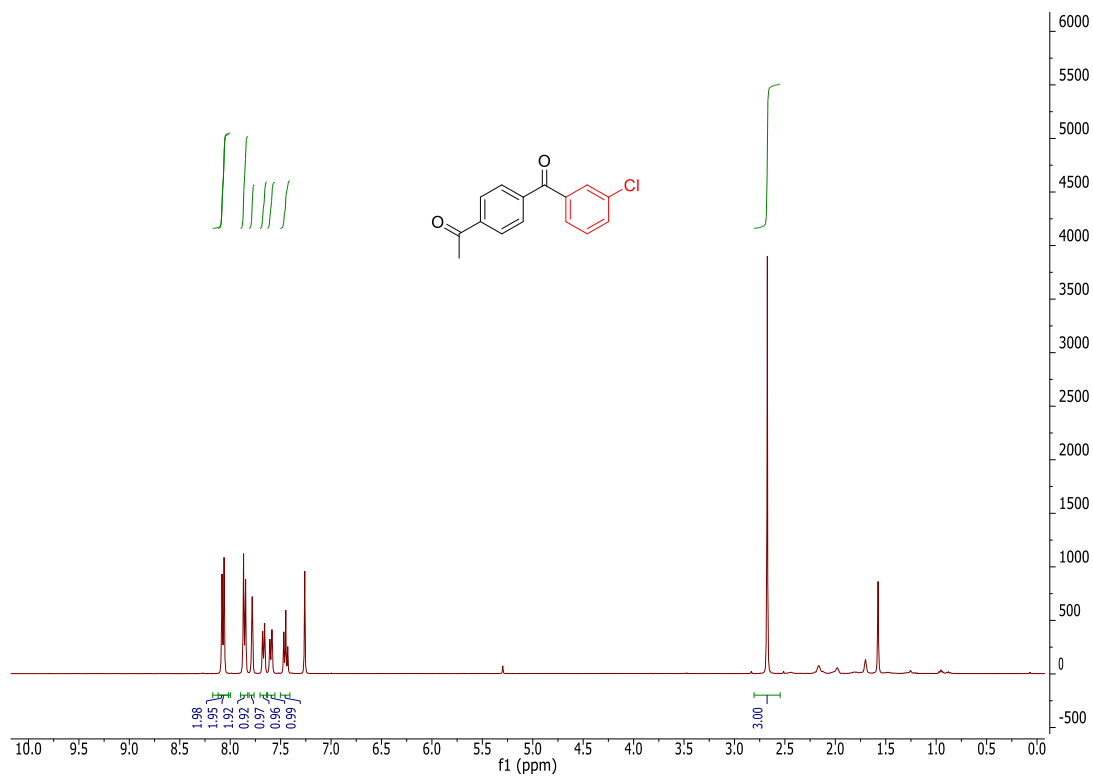
**<sup>1</sup>H NMR of (9H-Fluoren-9-yl)methyl (4-benzoylphenethyl)carbamate (Table 3, entry 3)**



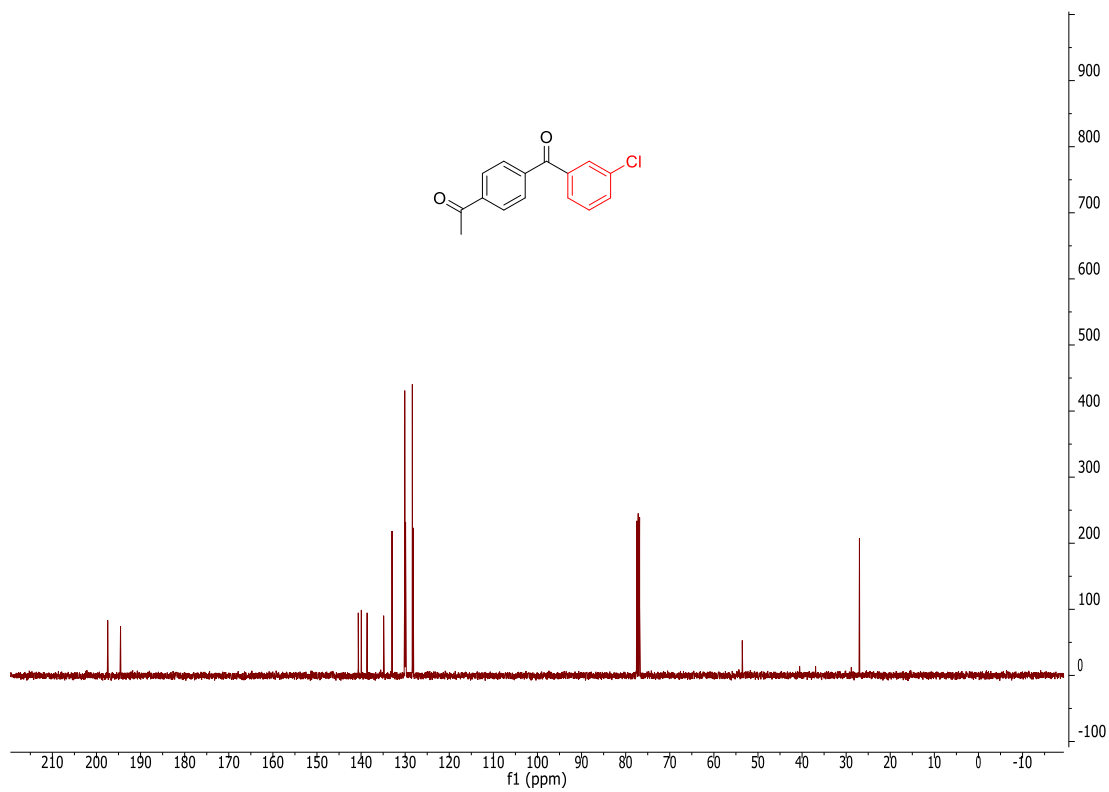
**<sup>13</sup>C NMR of (9H-Fluoren-9-yl)methyl (4-benzoylphenethyl)carbamate (Table 3, entry 3)**



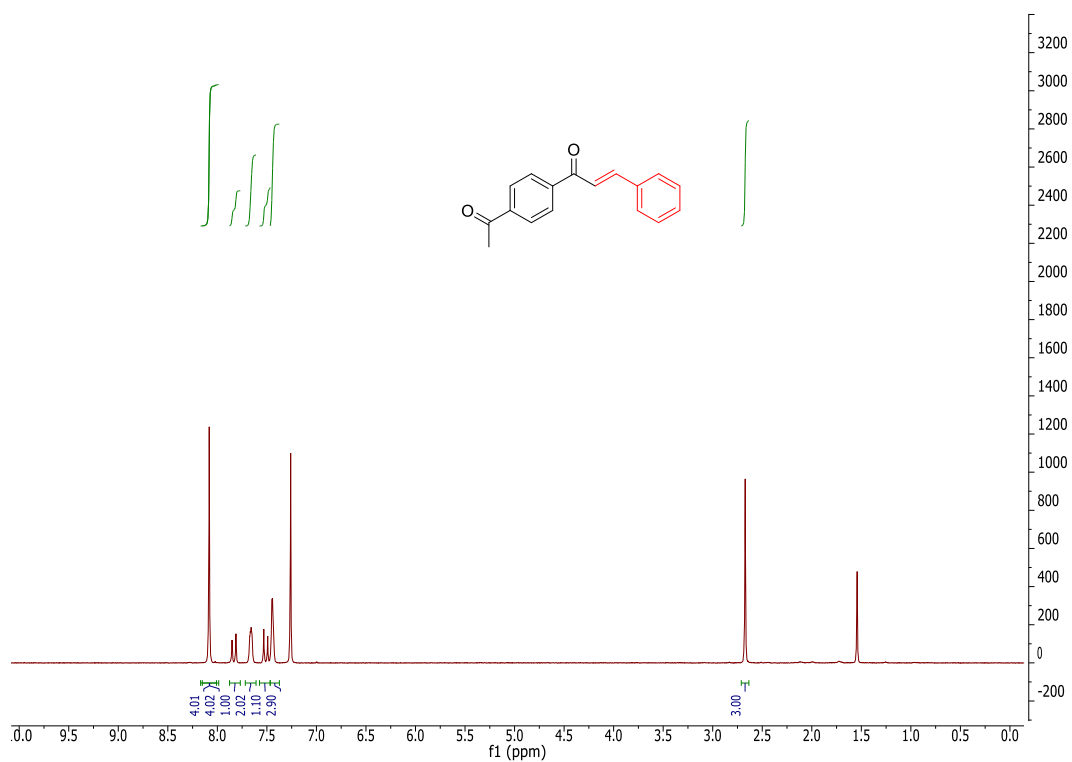
**<sup>1</sup>H NMR of 1-(4-(3-Chlorobenzoyl)phenyl)ethan-1-one (Table 3, entry 5)**



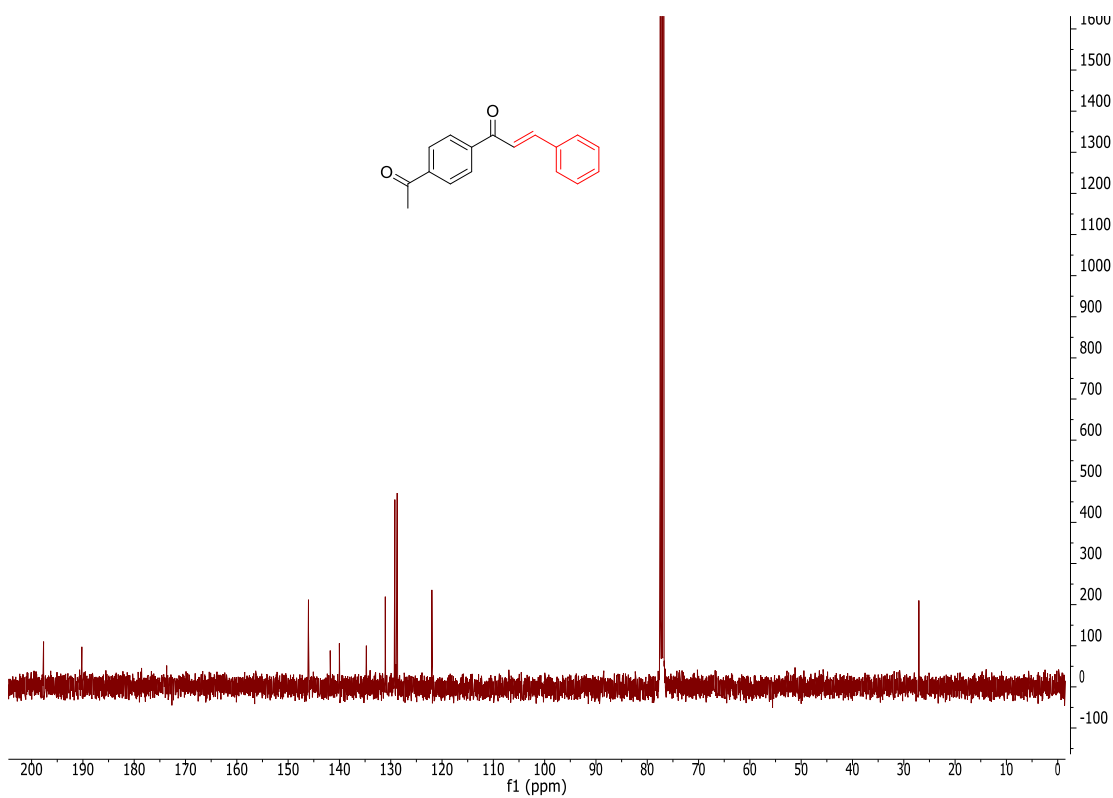
**<sup>13</sup>C NMR of 1-(4-(3-Chlorobenzoyl)phenyl)ethan-1-one (Table 3, entry 5)**



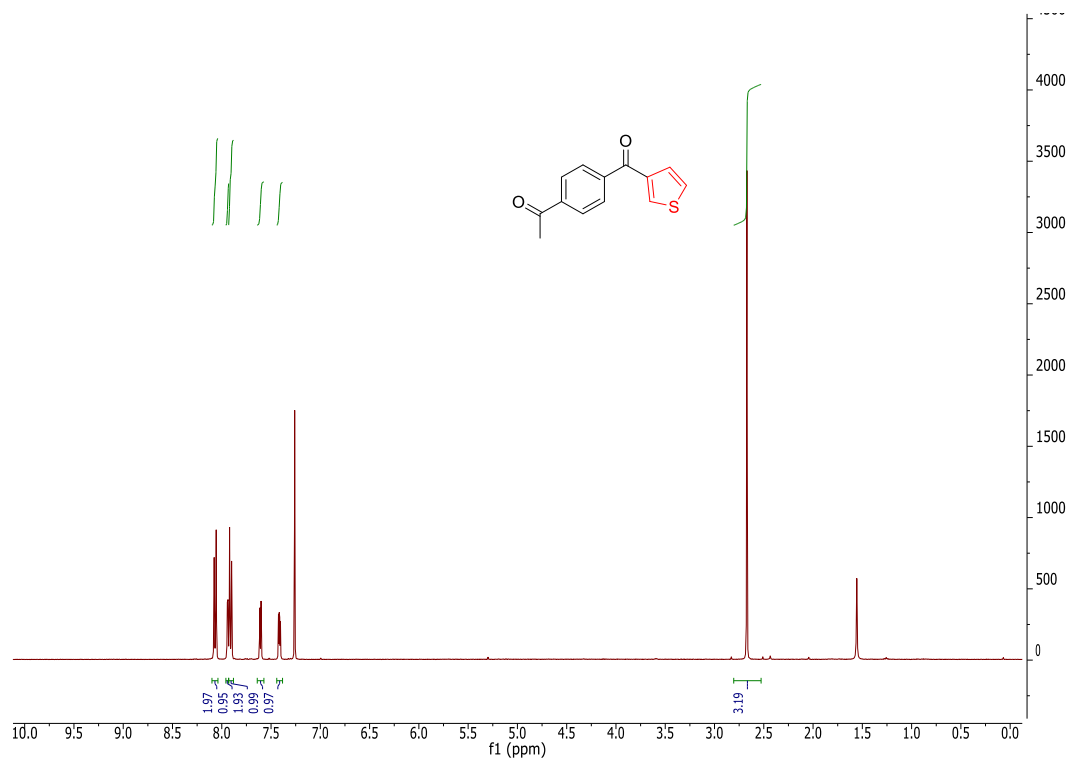
**<sup>1</sup>H NMR of (*E*)-1-(4-Acetylphenyl)-3-phenylprop-2-en-1-one (Table 3, entry 6)**



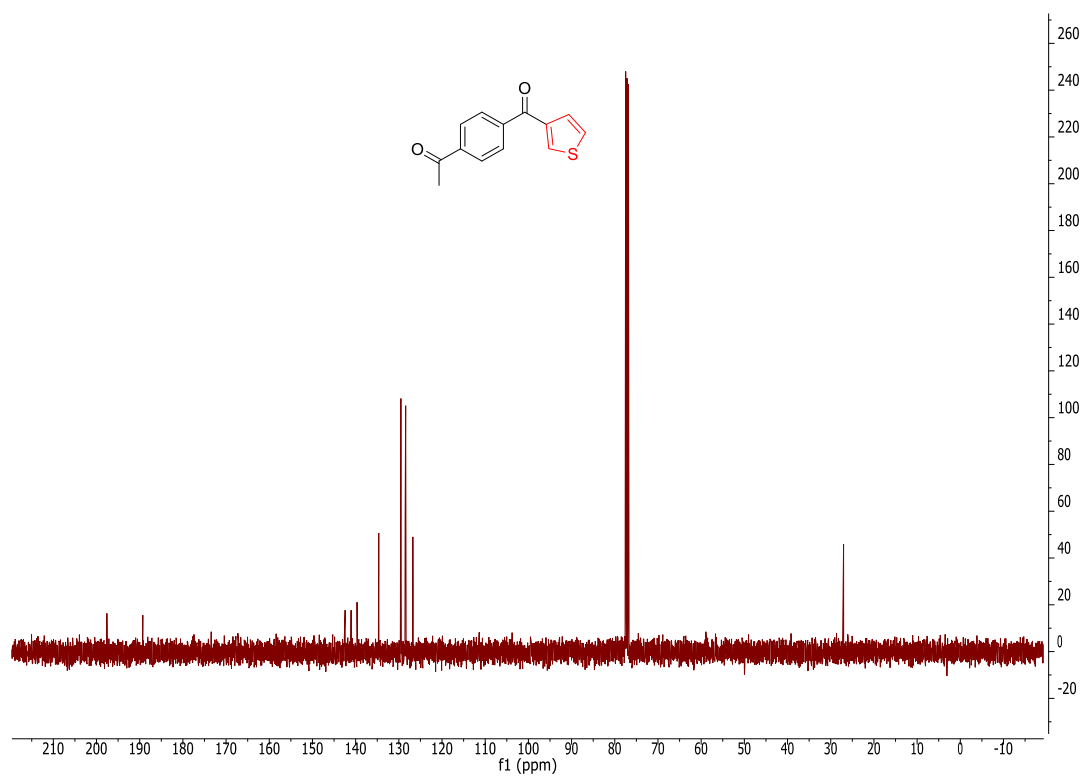
**<sup>13</sup>C NMR of (*E*)-1-(4-Acetylphenyl)-3-phenylprop-2-en-1-one (Table 3, entry 6)**



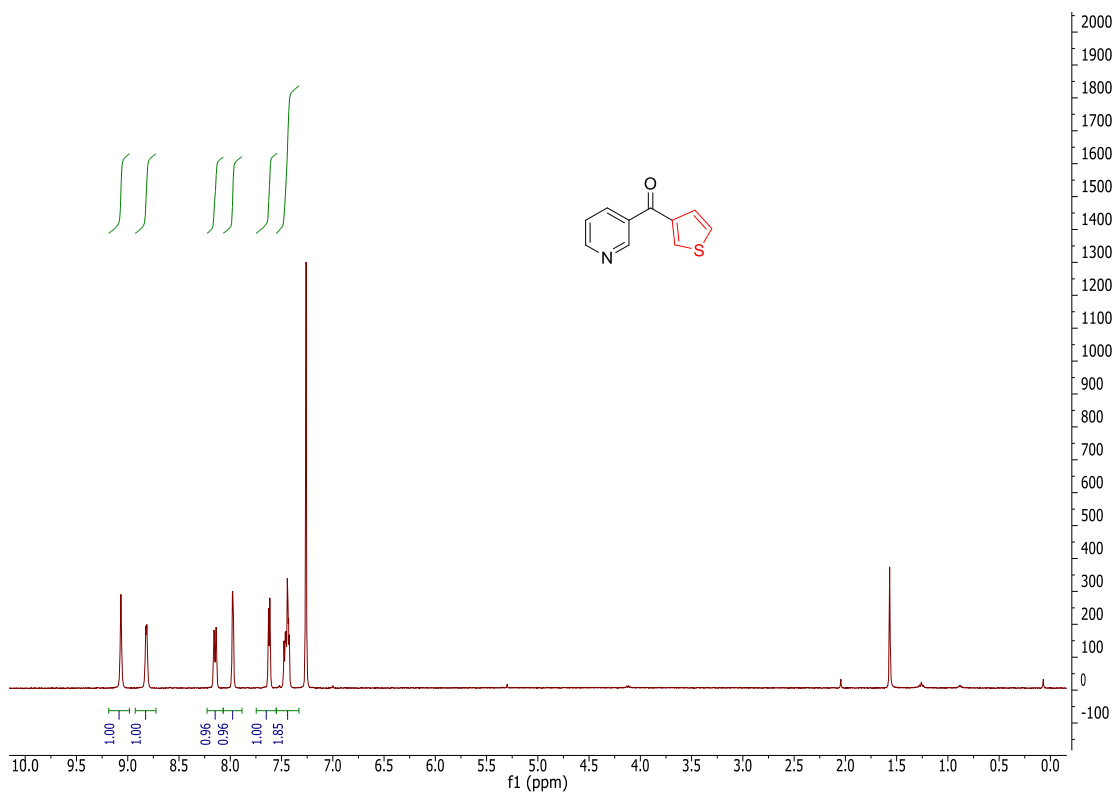
**<sup>1</sup>H NMR of 1-(4-(Thiophene-3-carbonyl)phenyl)ethan-1-one (Table 3, entry 7)**



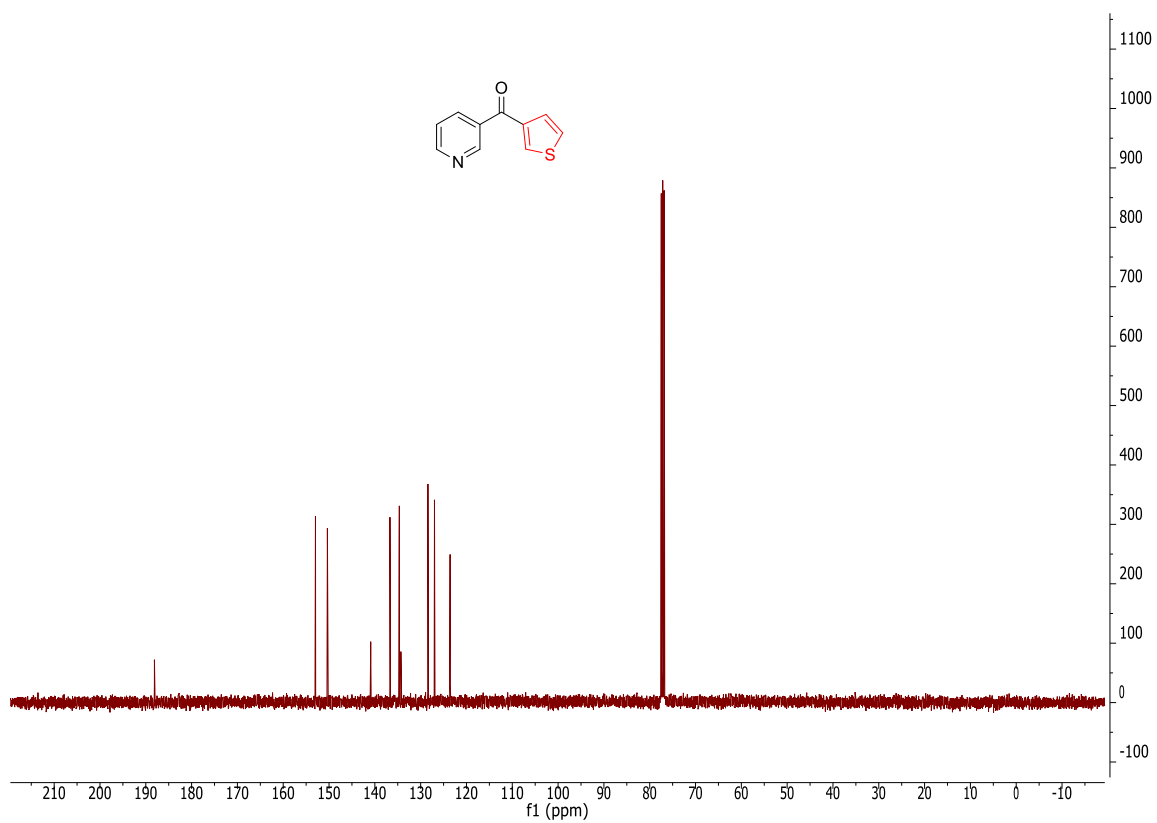
**<sup>13</sup>C NMR of 1-(4-(Thiophene-3-carbonyl)phenyl)ethan-1-one (Table 3, entry 7)**



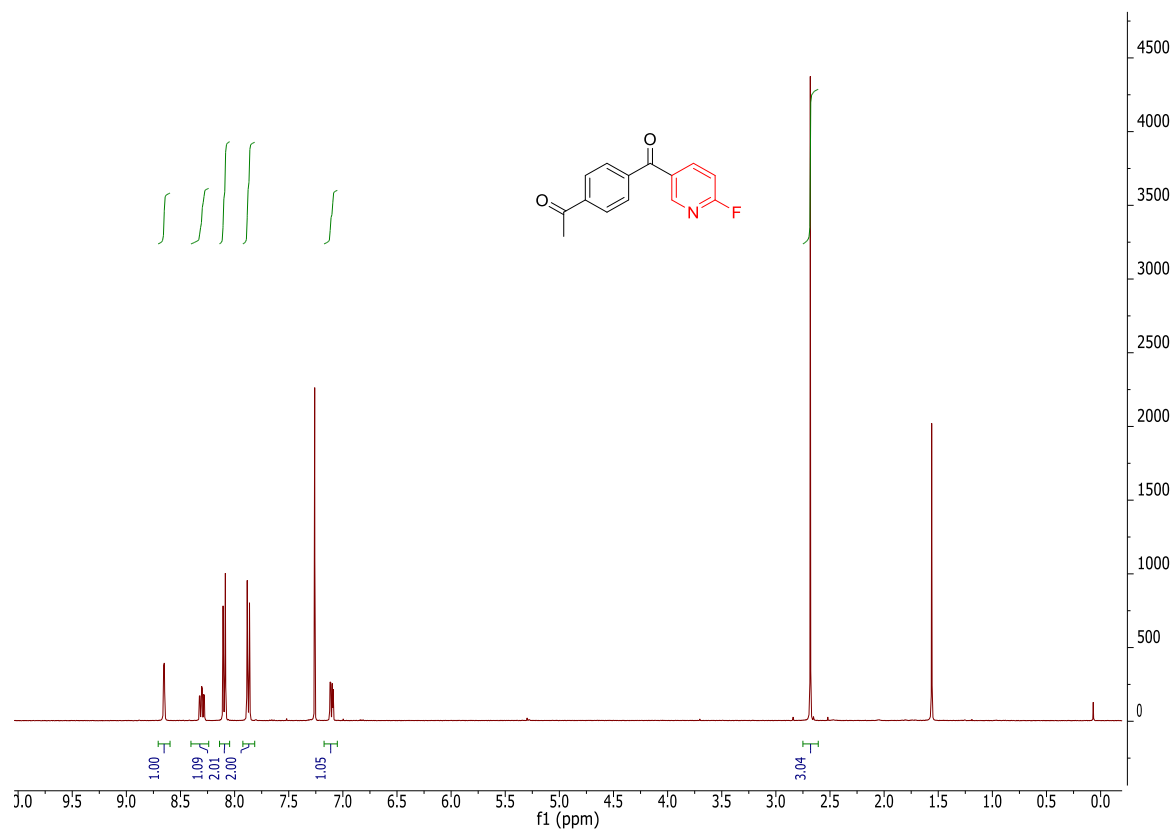
### <sup>1</sup>H NMR of Pyridin-3-yl(thiophen-3-yl)methanone (Table 3, entry 8)



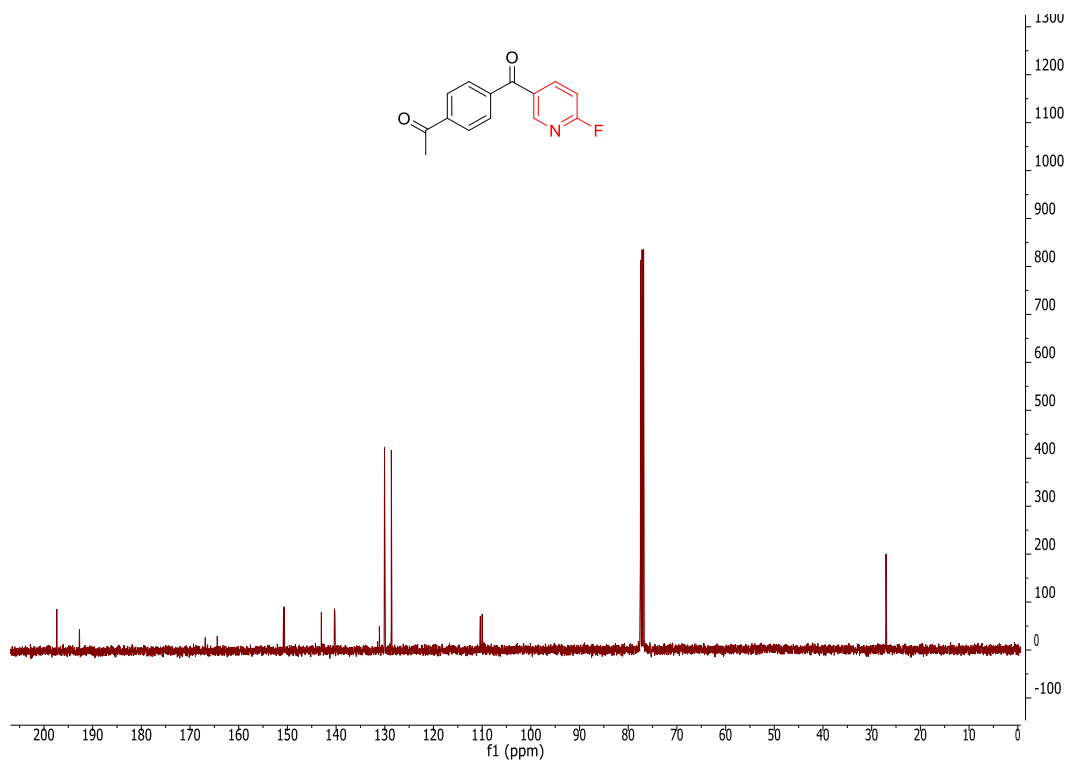
### <sup>13</sup>C NMR of Pyridin-3-yl(thiophen-3-yl)methanone (Table 3, entry 8)



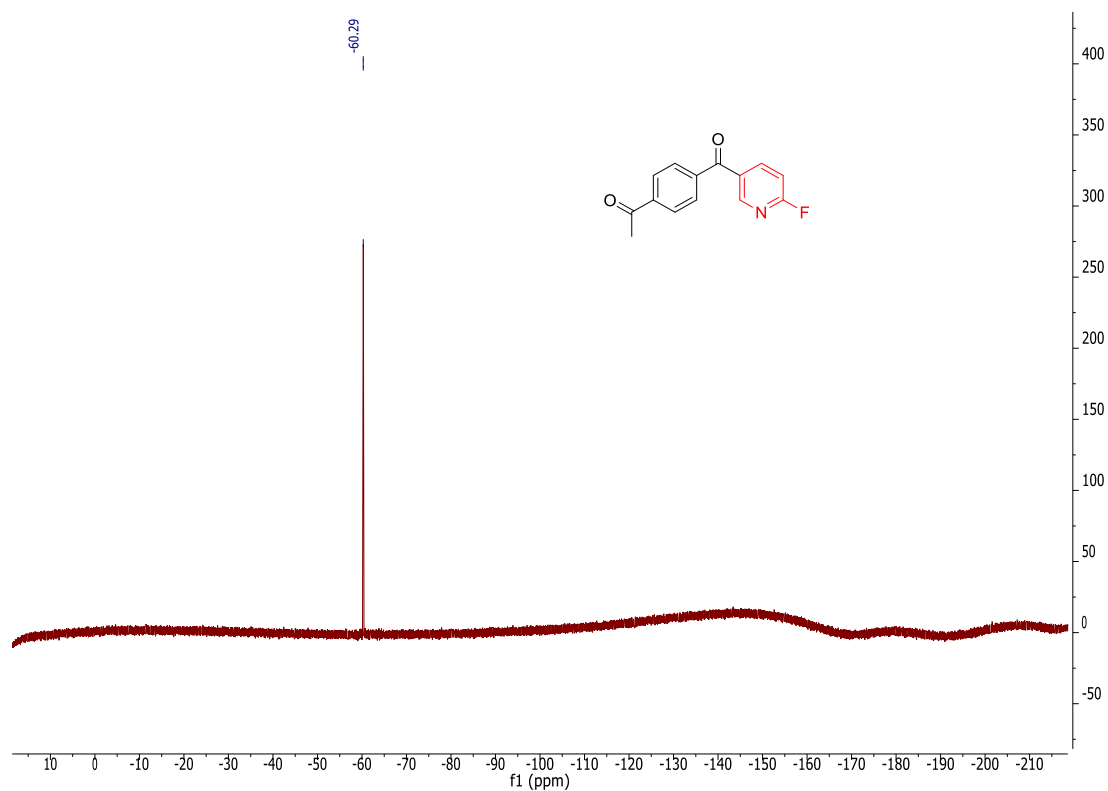
**<sup>1</sup>H NMR of 1-(4-(6-Fluoronicotinoyl)phenyl)ethan-1-one (Table 3, entry 9)**



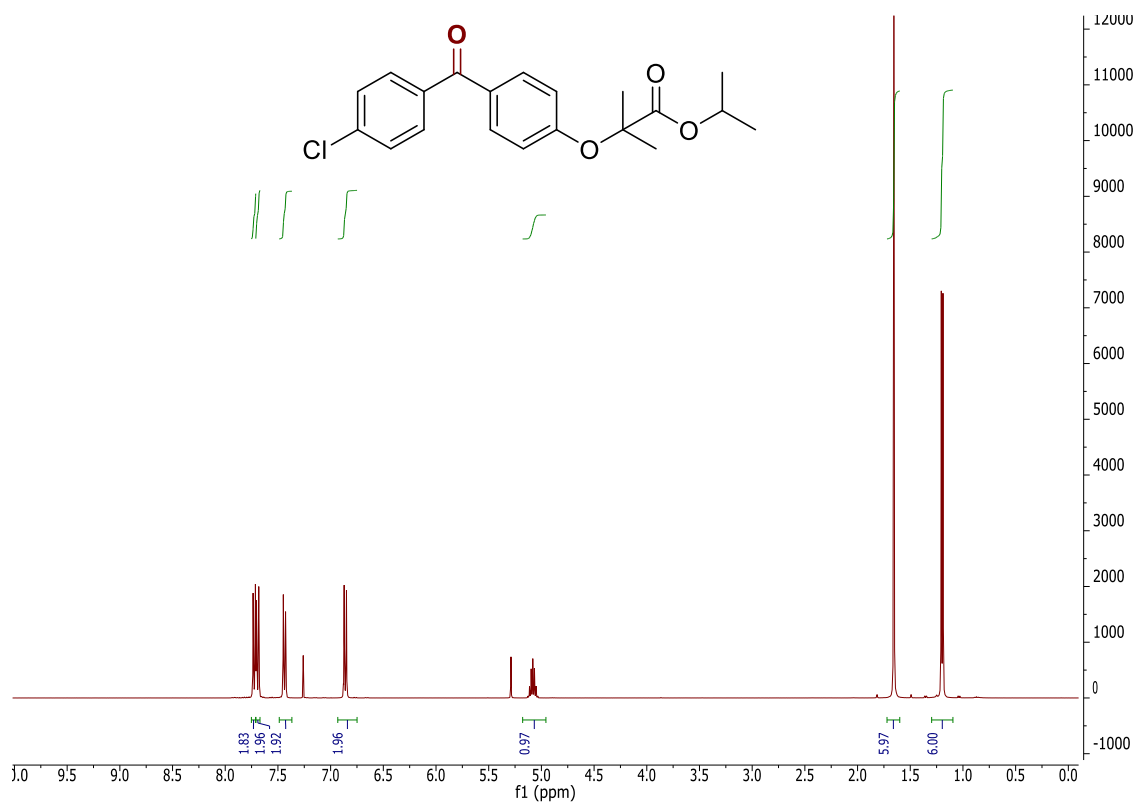
**<sup>13</sup>C NMR of 1-(4-(6-Fluoronicotinoyl)phenyl)ethan-1-one (Table 3, entry 9)**



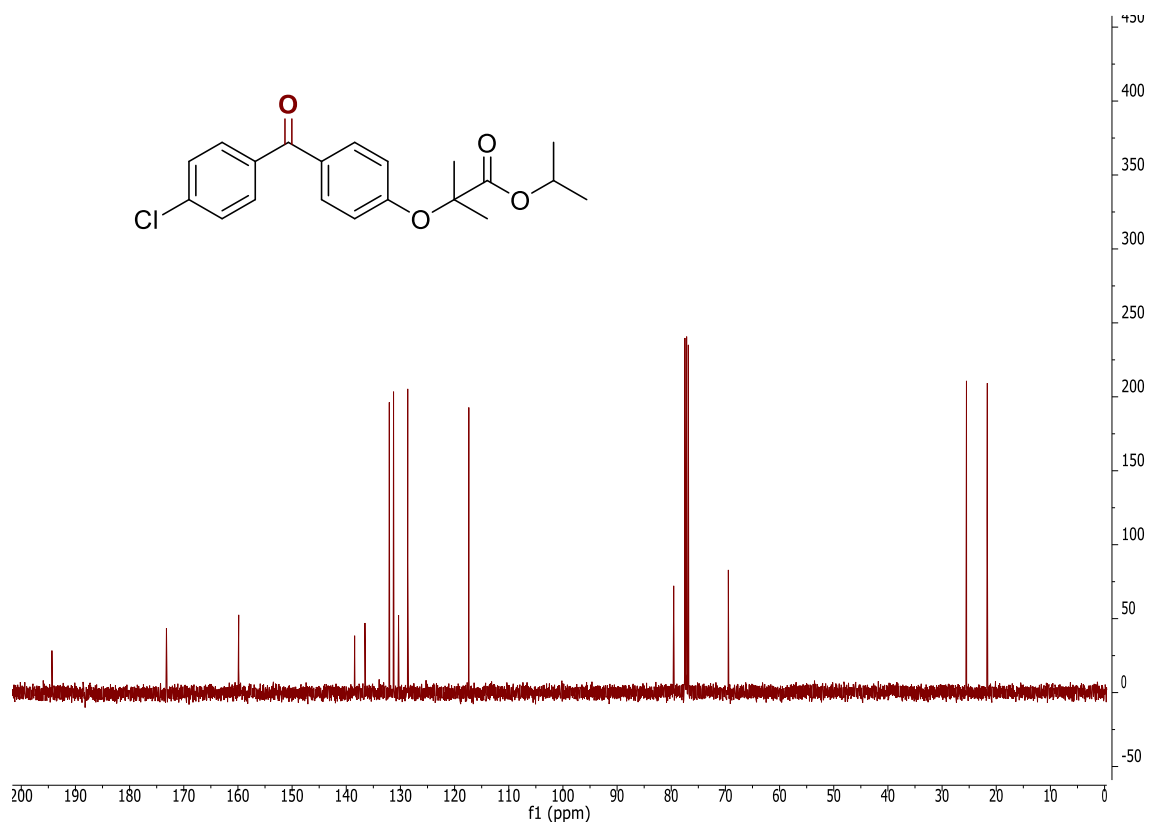
**<sup>19</sup>F NMR of 1-(4-(6-Fluoronicotinoyl)phenyl)ethan-1-one (Table 3, entry 9)**



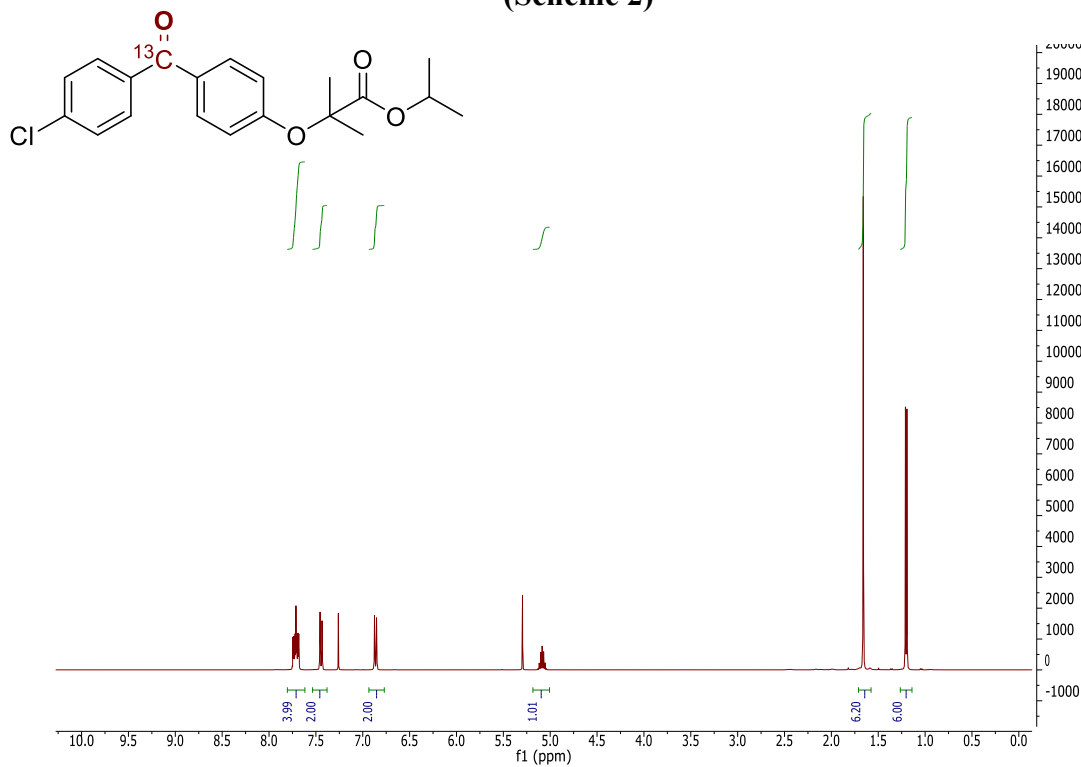
**<sup>1</sup>H NMR of Isopropyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Scheme 2)**



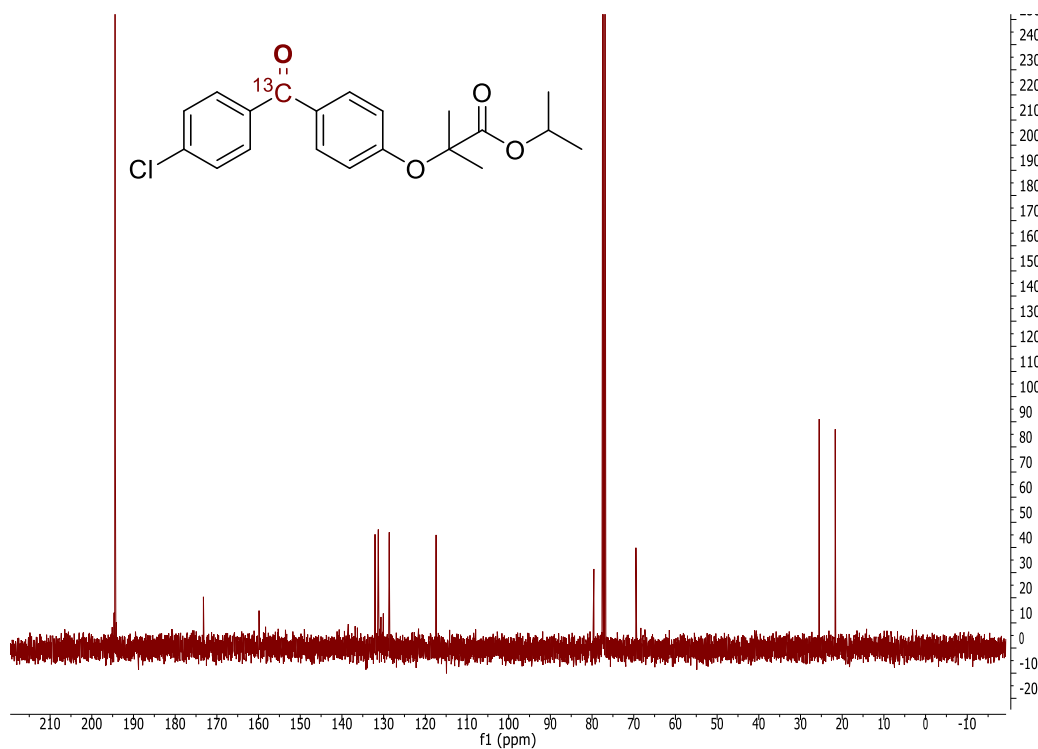
### $^{13}\text{C}$ NMR of Isopropyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Scheme 2)



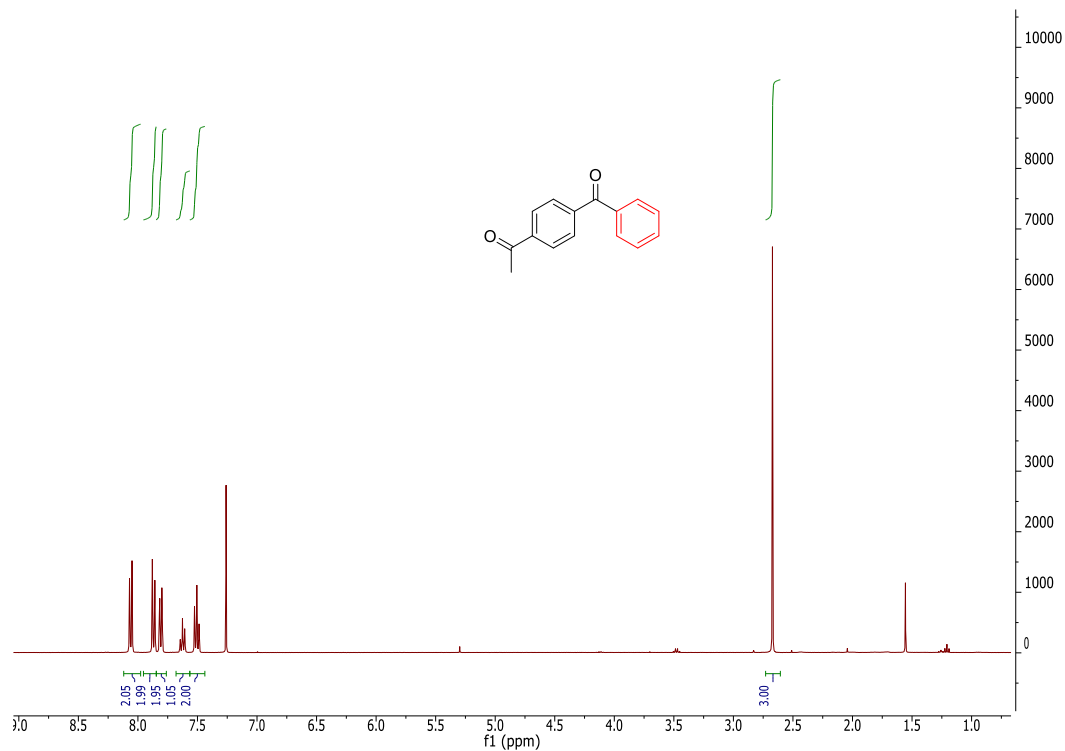
### $^1\text{H}$ NMR of [ $^{13}\text{C}$ ] Labeled *i*-propyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Scheme 2)



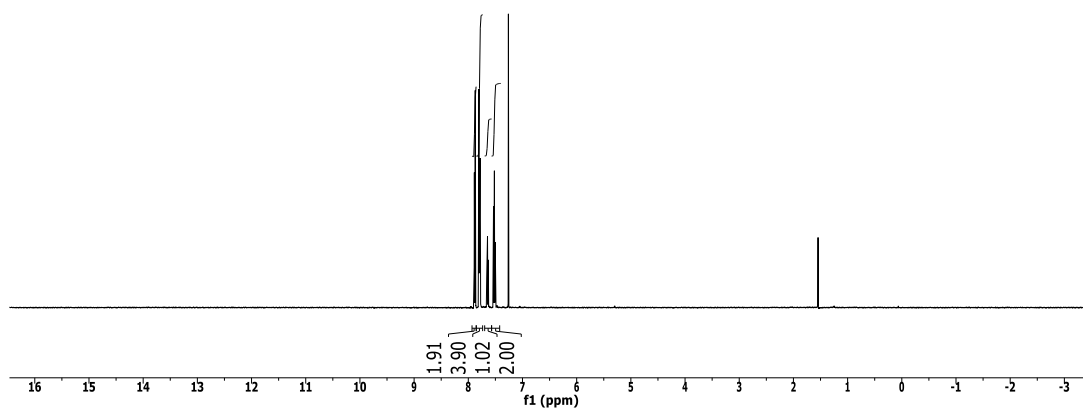
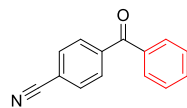
### $^{13}\text{C}$ NMR of [ $^{13}\text{C}$ ] Labeled *i*-propyl 2-(4-(4-chlorobenzoyl)phenoxy)-2-methylpropanoate (Scheme 2)



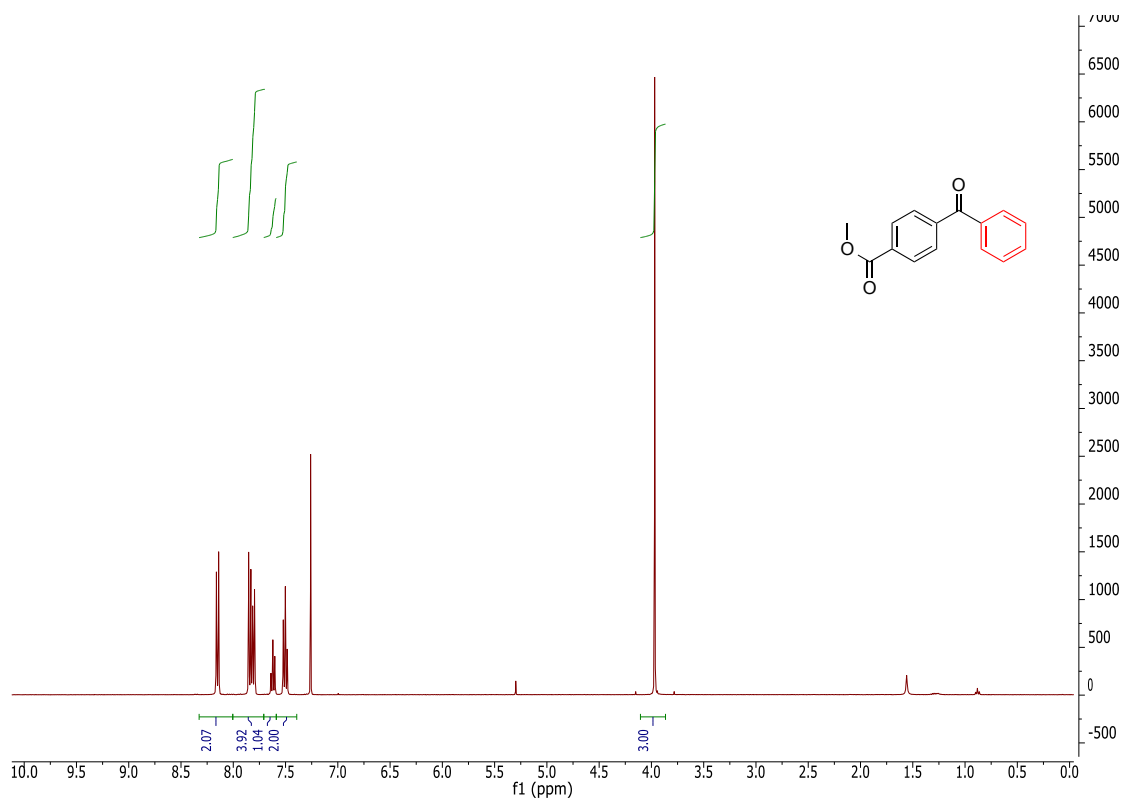
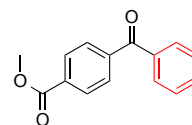
### $^1\text{H}$ NMR Spectra of Known Compounds 1-(4-Benzoylphenyl)ethan-1-one (Table 3, entry 2)



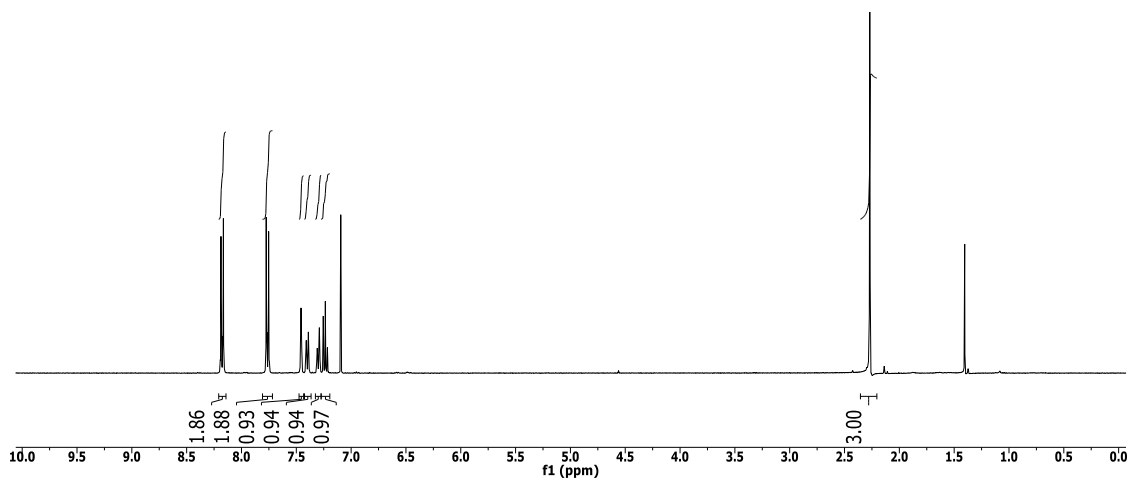
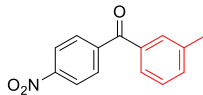
### 4-Benzoylbenzonitrile (Table 2, entry 1)



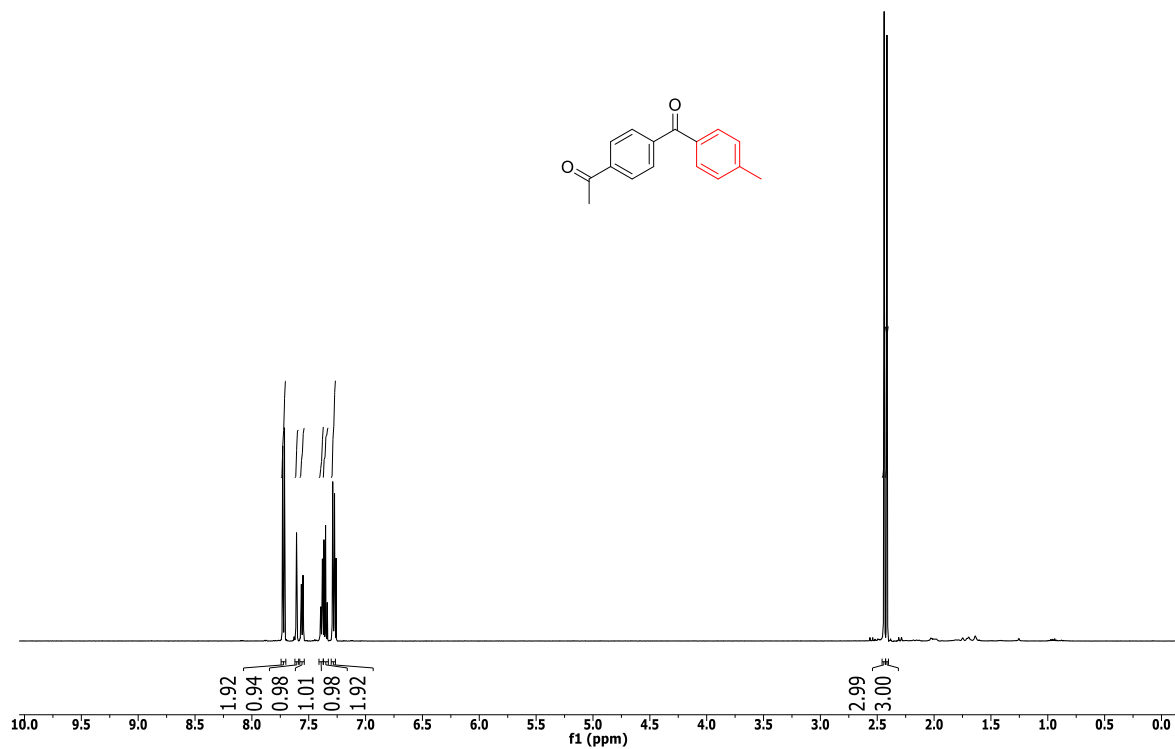
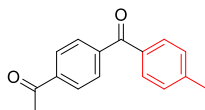
### Methyl 4-benzoylbenzoate (Table 2, entry 2)



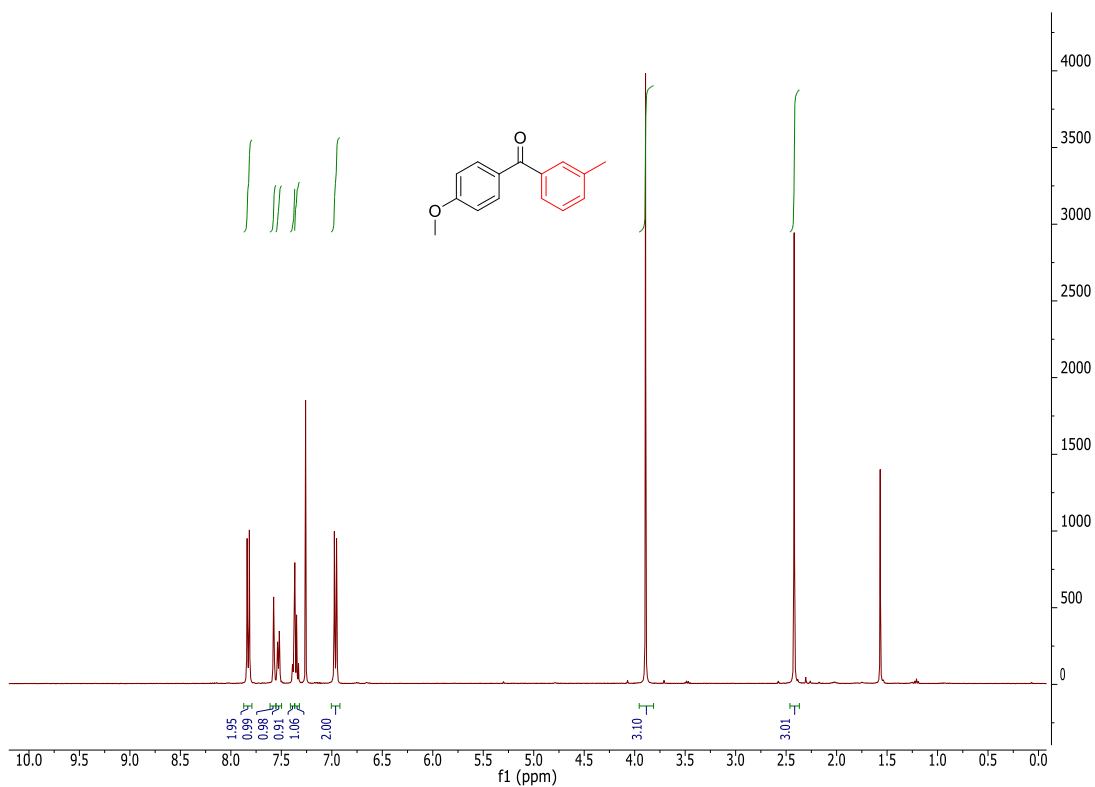
(4-Nitrophenyl)(*m*-tolyl)methanone (Table 2, entry 3)



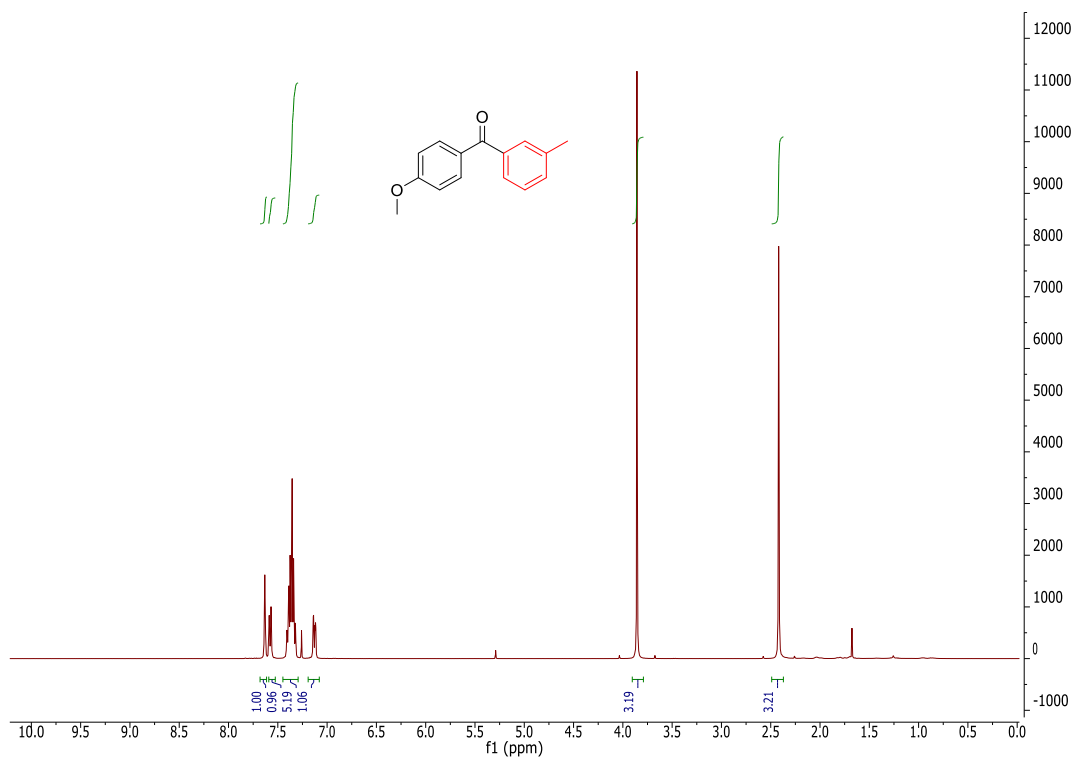
1-(4-(4-Methylbenzoyl)phenyl)ethan-1-one (Table 2, entry 5)



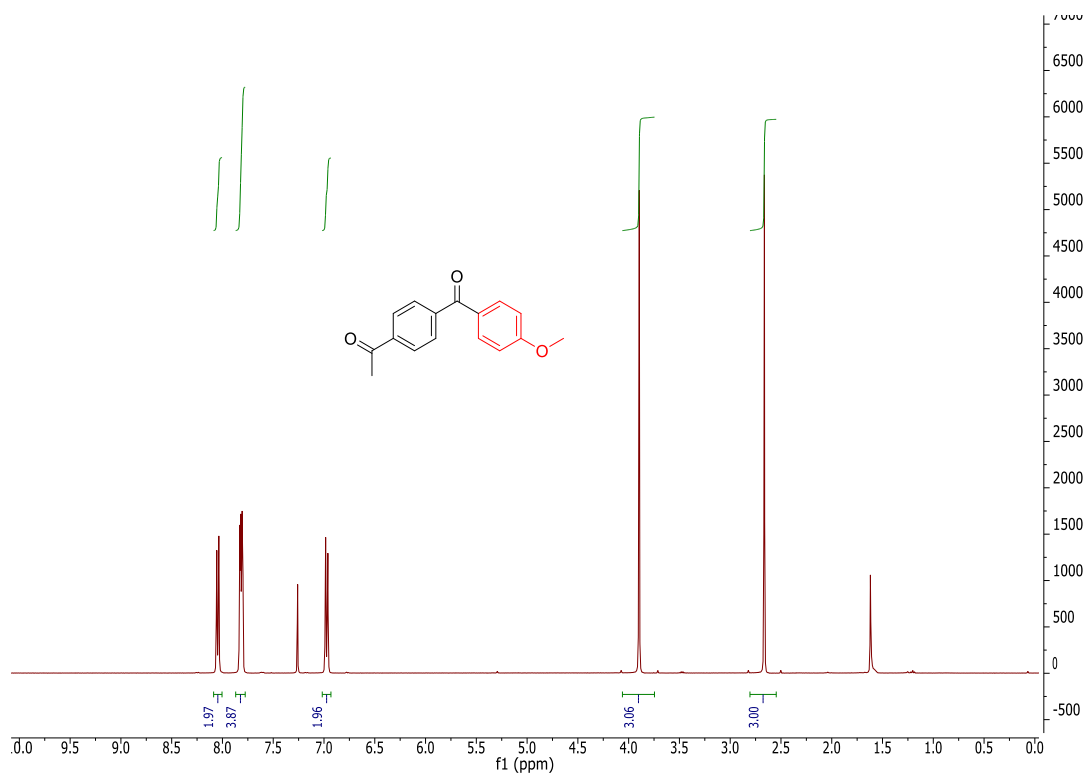
**(4-Methoxyphenyl)(*m*-tolyl)methanone (Table 2, entry 6)**



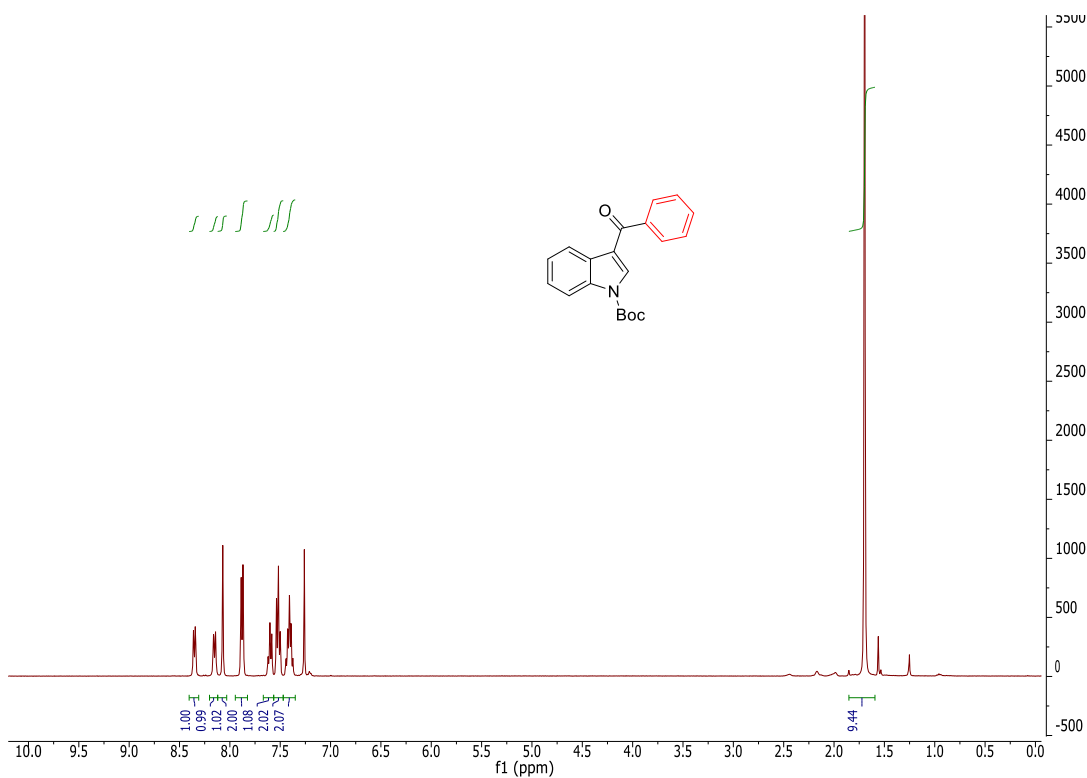
**(3-Methoxyphenyl)(*m*-tolyl)methanone (Table 2, entry 7)**



**1-(4-(4-Methoxybenzoyl)phenyl)ethan-1-one (Table 2, entry 9)**



***tert*-Butyl 3-benzoyl-1*H*-indole-1-carboxylate (Table 3, entry 4)**



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- <sup>11</sup> Wang, L.; Shao, Y.; Liu, Y. *Org. Lett.*, **2012**, *14*, 3978.