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### **Synthesis of Indole-2-carboxylate Derivatives via Palladium-catalyzed Aerobic Amination of Aryl C–H Bonds**

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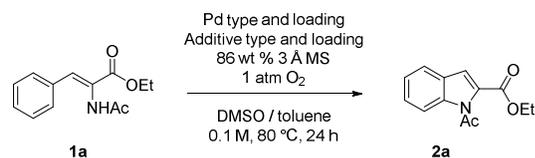
## 1) Reagents and Instrumentation

Reagents were purchased from commercial sources unless otherwise indicated. Substrates were synthesized according to the literature<sup>1</sup> from commercially-available benzaldehyde starting materials. Pd(OAc)<sub>2</sub> (>99.9% trace metals basis, catalog number 520764) was purchased from Sigma Aldrich and was used as is. 3 Å molecular sieves of different types and suppliers (see Table 4) were used as is without any further drying. Oxygen (99.6% ProSpec, catalog number OX 2.6-RB) was purchased from Praxair and used as is.

LCMS analyses were conducted on an Agilent 1200 SL equipped with an Agilent 6130 Mass Spec detector using ESI positive mode. High-resolution mass spectra were obtained via infusion using a LTQ Discovery Orbitrap. The source used was either ESI or APCI and the analysis was performed in positive mode with data reported in m/z. NMR spectra were acquired on Fourier Bruker 300 MHz or 500 MHz instruments. Chemical shifts were reported in ppm relative to residual solvent peaks (CDCl<sub>3</sub> = 7.26 ppm for <sup>1</sup>H and 77.16 ppm for <sup>13</sup>C; DMSO-*d*<sub>6</sub> = 2.50 ppm for <sup>1</sup>H and 128.06 ppm for <sup>13</sup>C). Coupling constants were reported in Hz. Flash column chromatography was performed on a Teledyne ISCO CombiFlash® Rf system.

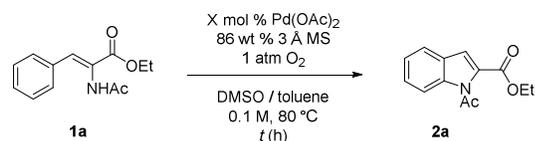
## 2) Optimization Information

Table 1. Pd Type and Additive Optimization



entry	Pd type	Pd amount	additive type	additive amount	SM LC area %	Product LC area %
1	Pd(TFA) <sub>2</sub>	7.5 mol %	None	None	85.5	<b>14.5</b>
2	Pd(OH) <sub>2</sub>	7.5 mol %	None	None	100.0	<b>0.0</b>
3	[PdCl(C <sub>3</sub> H <sub>5</sub> ) <sub>2</sub> ] <sub>2</sub>	7.5 mol %	None	None	100.0	<b>0.0</b>
4	PdCl <sub>2</sub>	7.5 mol %	None	None	96.4	<b>3.7</b>
5	PdCl <sub>2</sub> [P(cy) <sub>3</sub> ] <sub>2</sub>	7.5 mol %	None	None	100.0	<b>0.0</b>
6	Pd(dba) <sub>2</sub>	7.5 mol %	None	None	44.3	<b>47.1</b>
7	Pd <sub>2</sub> (dba) <sub>3</sub>	7.5 mol %	None	None	32.5	<b>56.8</b>
8	Pd(OAc) <sub>2</sub>	7.5 mol %	None	None	1.9	<b>92.6</b>
9	Pd(OAc) <sub>2</sub>	0 mol %	None	None	100.0	<b>0.0</b>
10	Pd(OAc) <sub>2</sub>	2.5 mol %	None	None	37.5	<b>41.8</b>
11	Pd(OAc) <sub>2</sub>	5 mol %	None	None	34.9	<b>60.4</b>
12	Pd(OAc) <sub>2</sub>	10 mol %	None	None	0.0	<b>92.4</b>
13	Pd(OAc) <sub>2</sub>	7.5 mol %	PivOH	5 mol %	6.1	<b>89.1</b>
14	Pd(OAc) <sub>2</sub>	7.5 mol %	AcOH	5 mol %	0.9	<b>95.4</b>
15	Pd(OAc) <sub>2</sub>	7.5 mol %	water	5 mol %	1.2	<b>95.9</b>
16	Pd(OAc) <sub>2</sub>	7.5 mol %	KOAc	5 mol %	70.5	<b>18.9</b>
17	Pd(OAc) <sub>2</sub>	7.5 mol %	Bipy	7.5 mol %	98.7	<b>0.0</b>
18	Pd(OAc) <sub>2</sub>	7.5 mol %	pyridine	15 mol %	45.8	<b>52.8</b>
19	Pd(OAc) <sub>2</sub>	7.5 mol %	TMG	5 mol %	95.5	<b>4.3</b>
20	Pd(OAc) <sub>2</sub>	7.5 mol %	2,5-lutidine	15 mol %	58.0	<b>41.3</b>
21	Pd(OAc) <sub>2</sub>	7.5 mol %	picolinic acid	15 mol %	100.0	<b>0.0</b>
22	Pd(OAc) <sub>2</sub>	7.5 mol %	N-acetyl leucine	15 mol %	55.7	<b>0.0</b>
23	Pd(OAc) <sub>2</sub>	7.5 mol %	N-Boc- <i>tert</i> -leucine	15 mol %	47.1	<b>18.3</b>

Table 2. Reaction Rate (see Figure 1)



time (h)	7.5 mol % Pd		10 mol % Pd	
	SM LC area %	Product LC area %	SM LC area %	Product LC area %
4	73.3	<b>17.5</b>	68.0	<b>21.3</b>
7	59.6	<b>29.8</b>	57.8	<b>35.6</b>
8	57.6	<b>35.8</b>	48.2	<b>44.3</b>

16	16.1	<b>79.2</b>	18.0	<b>79.5</b>
18	5.7	<b>88.5</b>	9.4	<b>87.2</b>
20	2.8	<b>93.3</b>	4.9	<b>90.7</b>
23	1.4	<b>95.3</b>	6.5	<b>90.6</b>
24	1.9	<b>92.6</b>	0.0	<b>92.4</b>

Figure 1. Reaction Rate (see Table 2)

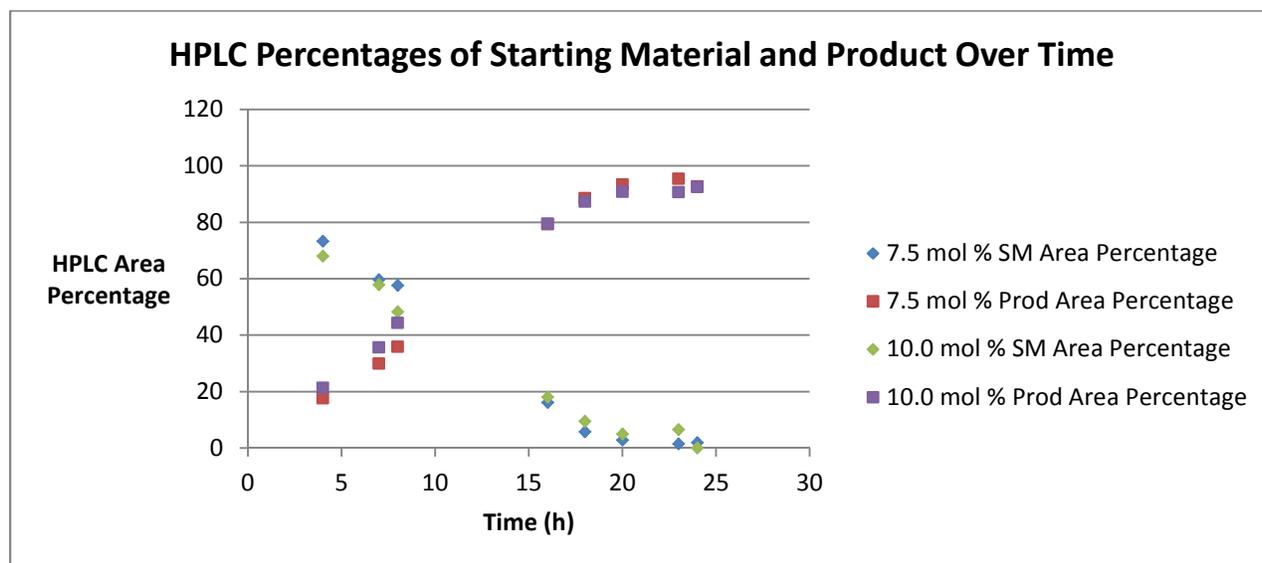
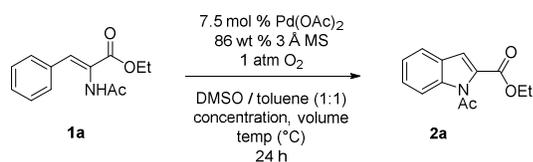
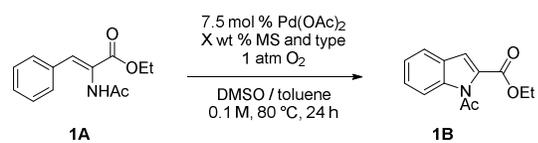


Table 3. Concentration, Volume, and Temperature Optimization



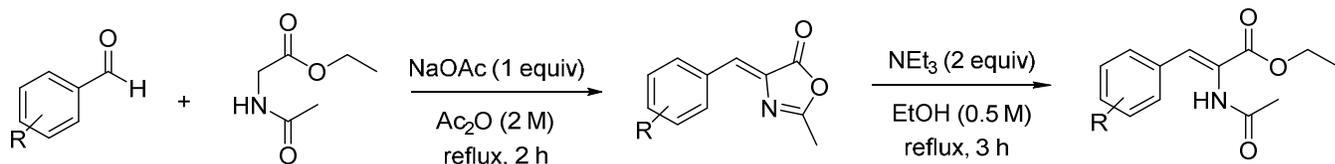
entry	concn (M)	vol (mL)	SM (mg)	temp	SM LC area %	Product LC area %
1	0.2	2.1	50	80 °C	27.9	<b>65.6</b>
2	0.2	4.3	100	80 °C	1.9	<b>92.6</b>
3	0.2	8.6	200	80 °C	1.0	<b>97.0</b>
4	0.1	8.6	100	80 °C	0.0	<b>97.6</b>
5	0.1	4.3	50	80 °C	0.0	<b>99.5</b>
6	0.2	4.3	100	80 °C	1.9	<b>92.6</b>
7	0.5	4.3	250	80 °C	70.4	<b>28.7</b>
8	1	4.3	500	80 °C	46.2	<b>43.0</b>
9	0.2	4.3	100	100 °C	6.8	<b>86.6</b>
10	0.2	4.3	100	120 °C	31.5	<b>54.9</b>

Table 4. Molecular Sieve Optimization



entry	MS wt %	brand	type	size (Å)	SM LC area %	<b>Product LC area %</b>
1	100	Fluka	Powder	3	19.6	<b>75.2</b>
2	86	Fluka	Powder	3	1.9	<b>92.6</b>
3	71	Fluka	Powder	3	6.2	<b>87.1</b>
4	54	Fluka	Powder	3	14.8	<b>78.5</b>
5	43	Fluka	Powder	3	15.8	<b>74.3</b>
6	34	Fluka	Powder	3	41.3	<b>54.9</b>
7	86	Alfa Aesar	Powder	3	37.9	<b>55.3</b>
8	86	Aldrich	Bead	3	38.2	<b>56.6</b>
9	86	Alfa Aesar	Pellet	3	58.2	<b>39.2</b>
10	86	Aldrich	Bead	4	86.3	<b>12.6</b>

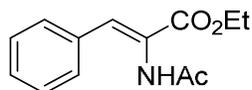
## Representative Procedure for Synthesis of ethyl (Z)-2-acetamido-3-phenyl-prop-2-enoate derivatives<sup>1</sup>



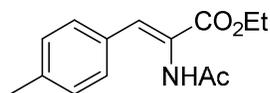
Representative procedure on a 27 g scale with R=H (**1a**): To a 250 mL three-neck round bottom flask with stir bar was added the benzaldehyde substrate (27.2 g, 256.3 mmol), N-acetylglycine (30.3 g, 256.3 mmol, 100 mol%), sodium acetate (21.2 g, 256.3 mmol, 100 mol%), and acetic anhydride (128 mL). The flask was fitted with a reflux condenser, degassed, and back-filled with nitrogen gas. This purging cycle was repeated three times. The reaction was stirred at 400 rpm and heated to 140 °C to reflux for 2 hours. The resulting dark solution was then cooled to 23 °C overnight resulting in solidified crude material. This crude was then broken apart with a spatula and isolated by filtration. The flask was rinsed with water (300 mL) to transfer residual solids and the washed crude filter cake was then transferred to a round bottom flask and suspended in ethanol (150 mL). Residual water was removed by evaporating ethanol under reduced pressure to dryness. The crude solid product was charged with ethanol (423 mL) and triethylamine (71.4 mL, 200 mol%) then heated to 100 °C to reflux for 3 hours. After the reaction had cooled to room temperature, the solvent was evaporated and the solid was dissolved in a minimum amount of dichloromethane. The solution was filtered through silica packed funnel to remove triethylamine, and the filtrate was dry loaded onto silica column and flashed with appropriate mobile phase. The purified product was dissolved in a minimum amount of solvent (typically methanol) and heated to 40 °C until the solids were fully dissolved. Once the mixture was a homogenous solution, the flask was charged with activated charcoal (20 wt%) and allowed to stir at 40 °C for 2 hours. Once the decolorized solution had cooled to 23 °C, the mixture was filtered through Celite<sup>®</sup> and the filtrate was concentrated under reduced pressure. A minimum amount of isopropyl acetate (50 mL) was added to the off-white solids and the mixture was heated to 80 °C until the material completely dissolved. An equivalent amount (corresponding to the amount of IPAc used; 50 mL) of heptane (typically the anti-solvent) was added slowly to the solution at 80 °C to crystallize the material. After cooling to room temperature overnight, the resulting precipitate was filtered off and the residue in the flask was washed with 1:1 IPAc:heptane (100 mL; or, in other cases, a 1:1 ratio of the listed recrystallization solvents). The pure product was dried in a vacuum oven overnight (16 hours) at 40 °C with a slight nitrogen sweep to give an off-white crystalline solid **1a**, 22.8 g (38.2% yield).

<sup>1</sup> Humphrey, C. E.; Furegati, M.; Laumen, K.; La Vecchia, L.; Leutert, T.; Müller-Hartweg, J. C. D.; Vögtle, M. *Org. Process Res. Dev.* **2007**, *11*, 1069-1075.

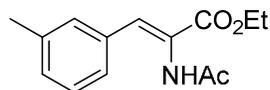
## Characterization



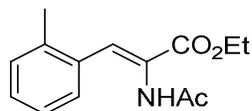
Ethyl (*Z*)-2-acetamido-3-phenylacrylate, R=H, compd **1a**. The general procedure was followed with benzaldehyde (27.2 g, 256 mmol). The crude product was flashed with a 40-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (82 mL). Obtained 22.8 g white solid as product (38.2 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.65 (s, 1H), 7.75 – 7.59 (m, 2H), 7.51 – 7.31 (m, 3H), 7.17 (s, 1H), 4.17 (q, *J* = 7.1 Hz, 2H), 2.01 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.37, 165.00, 133.42, 130.61, 129.73, 129.20, 128.58, 126.99, 60.72, 40.28, 40.01, 39.72, 39.45, 39.17, 38.89, 38.61, 22.34, 14.05. **HRMS (ESI+)** calculated for C<sub>13</sub>H<sub>15</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 234.1125; found 234.1125.



Ethyl (*Z*)-2-acetamido-3-(*p*-tolyl)acrylate, R=*p*-Me, compd **1b**. The general procedure was followed with 4-methylbenzaldehyde (10.0 g, 80.7 mmol). The crude product was flashed with a 40-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (80 mL). Obtained 3.2 g white solid as product (15.9 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.57 (s, 1H), 7.53 (d, *J* = 8.1 Hz, 1H), 7.22 (d, *J* = 7.9 Hz, 1H), 7.15 (s, 1H), 4.16 (q, *J* = 7.1 Hz, 1H), 2.32 (s, 2H), 2.00 (s, 2H), 1.23 (t, *J* = 7.1 Hz, 2H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.26, 165.04, 139.09, 131.03, 130.62, 129.77, 129.17, 126.07, 60.63, 40.28, 40.01, 39.73, 39.45, 39.17, 38.89, 38.62, 22.36, 20.91, 14.06. **HRMS (ESI+)** calculated for C<sub>14</sub>H<sub>17</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 248.1281; found 248.1271.

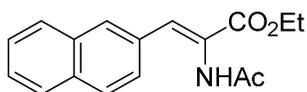


Ethyl (*Z*)-2-acetamido-3-(*m*-tolyl)acrylate, R=*m*-Me, compd **1c**. The general procedure was followed with 3-methylbenzaldehyde (2.0 g, 16.7 mmol). The crude product was flashed with a 0-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (12 mL). Obtained 2.1 g white solid as product (4.8 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.58 (s, 1H), 7.53 (d, *J* = 8.0 Hz, 1H), 7.22 (d, *J* = 8.0 Hz, 1H), 7.15 (s, 1H), 4.16 (q, *J* = 7.0 Hz, 1H), 2.32 (s, 2H), 2.00 (s, 2H), 1.23 (t, *J* = 7.1 Hz, 2H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.26, 165.05, 139.09, 131.02, 130.62, 129.77, 129.17, 126.07, 60.63, 22.36, 20.91, 14.06. **HRMS (ESI+)** calculated for C<sub>14</sub>H<sub>17</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 248.1281; found 248.1272.

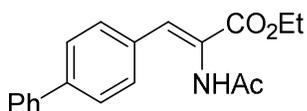


Ethyl (*Z*)-2-acetamido-3-(*o*-tolyl)acrylate, R=*o*-Me, compd **1d**. The general procedure was followed with 2-methylbenzaldehyde (2.0 g, 16.7 mmol). The crude product was flashed with a 0-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (30

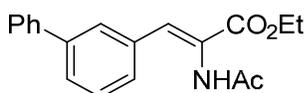
mL). Obtained 0.90 g white solid as product (21.9 % yield).  $^1\text{H NMR}$  (300 MHz,  $\text{DMSO-}d_6$ )  $\delta$  9.50 (s, 1H), 7.46 (d,  $J = 6.5$  Hz, 1H), 7.29 – 7.15 (m, 3H), 4.17 (q,  $J = 7.1$  Hz, 2H), 2.27 (s, 3H), 1.92 (s, 3H), 1.24 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C NMR}$  (75 MHz,  $\text{DMSO-}d_6$ )  $\delta$  169.36, 164.94, 136.94, 132.59, 130.12, 128.67, 128.38, 128.24, 128.02, 125.79, 60.71, 22.18, 19.49, 14.01. **HRMS (ESI+)** calculated for  $\text{C}_{14}\text{H}_{17}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 248.1281; found 248.1272.



Ethyl (*Z*)-2-acetamido-3-(naphthalen-2-yl)acrylate, compd **1e**. The general procedure was followed with naphthalene-2-carbaldehyde (3.2 g, 20.0 mmol). The crude product was flashed with a 40-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (48 mL). Obtained 2.8 g white solid as product (48.1 % yield).  $^1\text{H NMR}$  (300 MHz,  $\text{DMSO-}d_6$ )  $\delta$  9.81 – 9.74 (m, 1H), 8.18 (d,  $J = 1.7$  Hz, 1H), 8.03 – 7.87 (m, 3H), 7.80 (dd,  $J = 8.6, 1.7$  Hz, 1H), 7.56 (dp,  $J = 6.8, 4.7, 3.9$  Hz, 2H), 7.35 (s, 1H), 4.22 (q,  $J = 7.1$  Hz, 2H), 2.08 (s, 3H), 1.27 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C NMR}$  (75 MHz,  $\text{DMSO-}d_6$ )  $\delta$  169.45, 165.05, 132.94, 132.70, 131.14, 130.55, 130.11, 128.38, 127.94, 127.46, 127.20, 127.09, 126.54, 126.35, 60.80, 40.30, 40.03, 39.75, 39.47, 39.19, 38.91, 38.63, 22.46, 14.09. **HRMS (ESI+)** calculated for  $\text{C}_{17}\text{H}_{17}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 284.1281; found 284.1275.

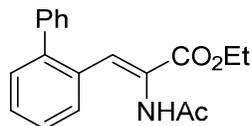


Ethyl (*Z*)-3-([1,1'-biphenyl]-4-yl)-2-acetamidoacrylate, from  $\text{R} = p\text{-Ph}$ , compd **1f**. The general procedure was followed with 4-phenylbenzaldehyde (10.0 g, 54.3 mmol). The crude product was flashed with a 0-5% DCM: MeOH gradient mobile phase. The material was recrystallized from IPAc (170 mL). Obtained 5.9 g white solid as product (35.3 % yield).  $^1\text{H NMR}$  (300 MHz,  $\text{DMSO-}d_6$ )  $\delta$  9.76 – 9.69 (m, 1H), 7.78 – 7.71 (m, 4H), 7.81 – 7.66 (m, 2H), 7.57 – 7.43 (m, 2H), 7.45 – 7.33 (m, 1H), 7.23 (d,  $J = 1.2$  Hz, 1H), 4.19 (q,  $J = 7.1$  Hz, 2H), 2.06 (s, 3H), 1.26 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C NMR}$  (75 MHz,  $\text{DMSO-}d_6$ )  $\delta$  169.37, 165.01, 140.68, 139.19, 132.59, 130.41, 130.17, 128.99, 127.83, 126.98, 126.70, 126.59, 60.76, 40.29, 40.01, 39.74, 39.46, 39.18, 38.90, 38.63, 22.42, 14.08. **HRMS (ESI+)** calculated for  $\text{C}_{19}\text{H}_{19}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 310.1438; found 310.1434.

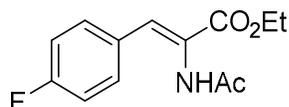


Ethyl (*Z*)-3-([1,1'-biphenyl]-3-yl)-2-acetamidoacrylate,  $\text{R} = m\text{-Ph}$ , compd **1g**. The general procedure was followed with 3-phenylbenzaldehyde (2.0 mL, 12.3 mmol). The crude product was flashed with a 0-60% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (30 mL). Obtained 2.0 g white solid as product (52.6 % yield).  $^1\text{H NMR}$  (300 MHz,  $\text{DMSO-}d_6$ )  $\delta$  9.76 – 9.69 (m, 1H), 7.78 – 7.71 (m, 4H), 7.81 – 7.66 (m, 2H), 7.57 – 7.43 (m, 2H), 7.45 – 7.33 (m, 1H), 7.23 (d,  $J = 1.2$  Hz, 1H), 4.19 (q,  $J = 7.1$  Hz, 2H), 2.06 (s, 3H), 1.26 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C NMR}$  (75 MHz,  $\text{DMSO-}d_6$ )  $\delta$  169.33, 164.98, 140.39, 139.66, 134.06, 130.54,

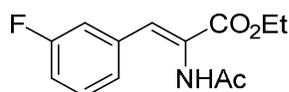
129.22, 128.96, 128.68, 128.12, 127.66, 127.50, 127.31, 126.68, 60.78, 22.35, 14.07. **HRMS (ESI+)** calculated for C<sub>19</sub>H<sub>19</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 310.1438; found 310.1433.



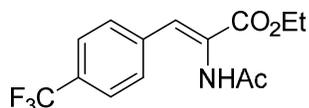
Ethyl (*Z*)-3-([1,1'-biphenyl]-2-yl)-2-acetamidoacrylate, R=*o*-Ph, compd **1h**. The general procedure was followed with 2-phenylbenzaldehyde (2.2 mL, 14 mmol). The crude product was flashed with a 0-60% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (33 mL). Obtained 0.63 g white solid as product (14.6 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.67 – 9.60 (m, 1H), 7.66 (dt, *J* = 5.3, 1.6 Hz, 1H), 7.55 – 7.32 (m, 8H), 6.94 (s, 1H), 4.10 (q, *J* = 7.1 Hz, 2H), 1.96 (s, 3H), 1.14 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.17, 164.78, 141.61, 139.80, 131.71, 130.72, 129.74, 129.46, 129.02, 128.58, 128.25, 127.57, 127.32, 60.65, 22.37, 13.95. **HRMS (ESI+)** calculated for C<sub>19</sub>H<sub>19</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 310.1438; found 310.1435.



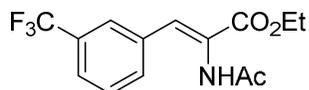
Ethyl (*Z*)-2-acetamido-3-(4-fluorophenyl)acrylate, R=*p*-F, compd **1i**. The general procedure was followed with 4-fluorobenzaldehyde (5.0 g, 40.3 mmol). The crude product was flashed with a 60-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (75 mL) to give 5.1 g white solid as product (50.0 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.63 (s, 1H), 7.78 – 7.64 (m, 2H), 7.33 – 7.21 (m, 2H), 7.19 (s, 1H), 4.18 (q, *J* = 7.1 Hz, 2H), 2.02 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.39, 164.94, 162.23 (d, *J* = 247.8 Hz), 132.02 (d, *J* = 8.4 Hz), 130.00, 129.63, 126.62, 115.53 (d, *J* = 21.5 Hz), 60.74, 22.35, 14.02. **HRMS (ESI+)** calculated for C<sub>13</sub>H<sub>14</sub>FNO<sub>3</sub> ([M + H]<sup>+</sup>), 252.1030; found 252.1023.



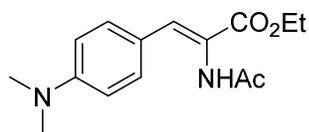
Ethyl (*Z*)-2-acetamido-3-(3-fluorophenyl)acrylate, R=*m*-F, compd **1j**. The general procedure was followed with 3-fluorobenzaldehyde (5.0 g, 40.3 mmol). The crude product was flashed with a 0-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (75 mL) to obtain 3.2 g of white solid as product (31.9 % yield). **<sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>)** δ 9.72 (s, 1H), 7.57 – 7.39 (m, 3H), 7.30 – 7.17 (m, 1H), 7.14 (s, 1H), 4.18 (q, *J* = 7.0 Hz, 2H), 2.02 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>)** δ 169.39, 164.80, 161.98 (d, *J* = 243.3 Hz), 135.73 (d, *J* = 8.2 Hz), 130.46 (d, *J* = 8.5 Hz), 128.76, 128.14, 125.97, 116.01, 115.73 (d, *J* = 4.9 Hz), 60.85, 22.32, 14.00. **HRMS (ESI+)** calculated for C<sub>13</sub>H<sub>14</sub>FNO<sub>3</sub> ([M + H]<sup>+</sup>), 252.1030; found 252.1026.



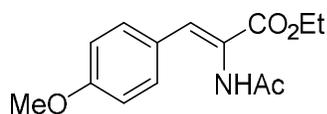
Ethyl (Z)-2-acetamido-3-(4-(trifluoromethyl)phenyl)acrylate, R= *p*-CF<sub>3</sub>, compd **1k**. The general procedure was followed with 4-(trifluoromethyl)benzaldehyde (5.0 g, 28.7 mmol). The crude product was flashed with a 0-60% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (82 mL). Obtained 5.2 g white solid as product (60.6 % yield). <sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>) δ 9.79 (s, 1H), 7.82 (d, *J* = 8.5 Hz, 2H), 7.77 (d, *J* = 8.5 Hz, 2H), 7.18 (s, 1H), 4.20 (q, *J* = 7.1 Hz, 2H), 2.02 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>) δ 169.38, 164.71, 137.68, 130.11, 129.11, 128.8, (q, *J* = 32.2 Hz), 127.89, 125.27 (q, *J* = 4.0 Hz), 124.0 (q, *J* = 274.1 Hz) 60.94, 22.33, 13.95. HRMS (ESI+) calculated for C<sub>14</sub>H<sub>14</sub>F<sub>3</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 302.0999; found 302.0992.



Ethyl (Z)-2-acetamido-3-(3-(trifluoromethyl)phenyl)acrylate, R=*m*-CF<sub>3</sub>, compd **1l**. The general procedure was followed with 3-(trifluoromethyl)benzaldehyde (5.0 g, 28.7 mmol). The crude product was flashed with a 0-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (75 mL). Obtained 3.4 g white solid as product (38.7 % yield). <sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>) δ 9.78 (s, 1H), 7.97 (s, 1H), 7.92 (d, *J* = 7.7 Hz, 1H), 7.72 (d, *J* = 7.8 Hz, 1H), 7.66 (t, *J* = 7.7 Hz, 1H), 7.28 (s, 1H), 4.21 (q, *J* = 7.0 Hz, 2H), 2.01 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>) δ 169.29, 164.68, 134.59, 133.29, 129.58, 129.4 (q, *J* = 31.5 Hz), 128.74, 128.39, 125.89, 125.35, 124.0, (q, *J* = 273.0 Hz), 122.16, 60.92, 22.24, 13.96. HRMS (ESI+) calculated for C<sub>14</sub>H<sub>14</sub>F<sub>3</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 302.0999; found 302.0990.

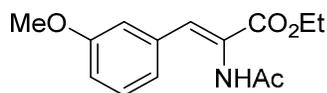


Ethyl (Z)-2-acetamido-3-(4-(dimethylamino)phenyl)acrylate, R=*p*-NMe<sub>2</sub>, compd **1m**. The general procedure was followed with 4-(dimethylamino)benzaldehyde (5.0 g, 33.5 mmol). The crude product was flashed with a 0-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (82 mL). Obtained 0.70 g white solid as product (7.6 % yield). <sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>) δ 9.35 (s, 1H), 7.52 (d, *J* = 8.8 Hz, 2H), 7.19 (s, 1H), 6.70 (d, *J* = 8.7 Hz, 2H), 4.13 (q, *J* = 7.1 Hz, 2H), 2.96 (s, 1H), 2.95 (s, 6H), 2.00 (s, 3H), 1.22 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (75 MHz, DMSO-*d*<sub>6</sub>) δ 169.06, 165.36, 150.84, 133.34, 131.64, 121.53, 120.63, 111.52, 60.25, 39.58, 22.47, 14.19. HRMS (ESI+) calculated for C<sub>15</sub>H<sub>20</sub>N<sub>2</sub>O<sub>3</sub> ([M + H]<sup>+</sup>), 277.1547; found 277.1543.

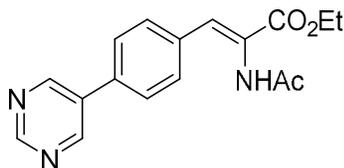


Ethyl (Z)-2-acetamido-3-(4-methoxyphenyl)acrylate, R=*p*-OMe, cpd **1n**. The general procedure was followed with 4-(methoxy)benzaldehyde (1.6 mL, 13 mmol). The crude product was flashed with a 0-60% heptane: IPAc gradient mobile phase. The material was recrystallized from MTBE (80 mL). Obtained 0.49 g white solid as product (14.0 % yield). <sup>1</sup>H NMR (300 MHz, DMSO-*d*<sub>6</sub>) δ 9.51 (s, 1H), 7.63 (d, *J* = 8.7 Hz, 2H), 7.19 (s, 1H), 6.99 (d, *J* = 8.8 Hz, 2H), 4.16 (q, *J* = 7.2

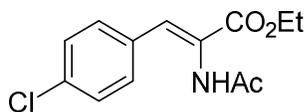
Hz, 2H), 3.79 (s, 3H), 2.01 (s, 3H), 1.23 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz, DMSO- $d_6$ )  $\delta$  169.26, 165.14, 160.07, 131.64, 131.43, 125.88, 124.54, 114.05, 60.54, 55.20, 22.39, 14.09. HRMS (ESI+) calculated for  $\text{C}_{14}\text{H}_{17}\text{NO}_4$  ( $[\text{M} + \text{H}]^+$ ), 264.1230; found 264.1225.



Ethyl (*Z*)-2-acetamido-3-(3-methoxyphenyl)acrylate,  $\text{R} = m\text{-OMe}$ , cpd **1o**. The general procedure was followed with 3-(methoxy)benzaldehyde (4.5 mL, 36.7 mmol). The crude product was flashed with a 0-5% DCM: MeOH gradient mobile phase. The material was recrystallized from MTBE (90 mL). Obtained 2.8 g white solid as product (29.2 % yield).  $^1\text{H}$  NMR (300 MHz, DMSO- $d_6$ )  $\delta$  9.67 (s, 1H), 7.33 (t,  $J = 7.9$  Hz, 1H), 7.27 – 7.17 (m, 2H), 7.14 (s, 1H), 6.96 (dd,  $J = 8.2, 2.4$  Hz, 1H), 4.17 (q,  $J = 7.1$  Hz, 2H), 3.77 (s, 3H), 2.01 (s, 3H), 1.24 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz, DMSO- $d_6$ )  $\delta$  169.28, 164.95, 159.13, 134.65, 130.47, 129.58, 127.19, 122.25, 115.14, 114.64, 60.73, 54.99, 22.28, 14.03. HRMS (ESI+) calculated for  $\text{C}_{14}\text{H}_{17}\text{NO}_4$  ( $[\text{M} + \text{H}]^+$ ), 264.1230; found 264.1225.

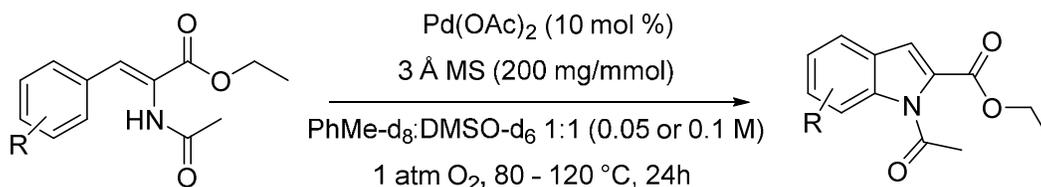


Ethyl (*Z*)-2-acetamido-3-(4-(pyrimidin-5-yl)phenyl)acrylate,  $\text{R} = p\text{-5-Pyr}$ , compd **1p**. The general procedure was followed with 4-(pyrimidin-5-yl)benzaldehyde (5.03 g, 26.5 mmol). The crude product was flashed with a 0-100% DCM: MeOH gradient mobile phase. The material was recrystallized from DCM (50 mL). Obtained 4.1 g white solid as product (50.2 % yield).  $^1\text{H}$  NMR (300 MHz, DMSO- $d_6$ )  $\delta$  9.69 (s, 1H), 9.20 (d,  $J = 3.1$  Hz, 5H), 7.89 (d,  $J = 8.5$  Hz, 2H), 7.79 (d,  $J = 8.4$  Hz, 2H), 7.22 (s, 1H), 4.19 (q,  $J = 7.1$  Hz, 2H), 2.03 (s, 3H), 1.26 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz, DMSO- $d_6$ )  $\delta$  169.32, 164.91, 157.42, 154.64, 134.18, 134.05, 132.39, 130.51, 129.68, 127.66, 126.92, 60.81, 22.40, 14.06. HRMS (ESI+) calculated for  $\text{C}_{17}\text{H}_{17}\text{N}_3\text{O}_3$  ( $[\text{M} + \text{H}]^+$ ), 312.1343; found 312.1341.



Ethyl (*Z*)-2-acetamido-3-(4-chlorophenyl)acrylate,  $\text{R} = p\text{-Cl}$ , compd **1q**. The general procedure was followed with 4-chlorobenzaldehyde (10.0 g, 69.01 mmol). The crude product was flashed with a 30-100% heptane: IPAc gradient mobile phase. The material was recrystallized from IPAc (200 mL). Obtained 10.4 g white solid as product (56.1 % yield).  $^1\text{H}$  NMR (300 MHz, DMSO- $d_6$ )  $\delta$  9.60 (s, 1H), 7.71 – 7.59 (m, 2H), 7.54 – 7.41 (m, 2H), 7.14 (s, 1H), 4.17 (q,  $J = 7.1$  Hz, 2H), 1.99 (s, 3H), 1.24 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz, DMSO- $d_6$ )  $\delta$  169.29, 164.83, 133.60, 132.39, 131.35, 129.11, 128.57, 127.52, 60.81, 22.39, 14.02. HRMS (ESI+) calculated for  $\text{C}_{13}\text{H}_{14}\text{ClNO}_3$  ( $[\text{M} + \text{H}]^+$ ), 268.0735; found 268.0729.

## Representative Procedure for Aryl C-H Amination to form indole-2-carboxylates



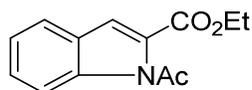
Representative procedure for post-reaction NMR analysis on a 100 mg scale with R=H: A 20 mL reaction vial with Teflon septa screw cap was charged with Pd(OAc)<sub>2</sub> (9.63 mg, 0.043 mmol, 10 mol%), 3 Å molecular sieve powder from Fluka (86 mg, 86 wt%), along with 100 mg (0.43 mmol) substrate. DMSO-*d*<sub>6</sub> (4.3 mL) and toluene-*d*<sub>8</sub> (4.3 mL) were added. Using a double-layered balloon filled with oxygen gas and a loose screw cap, oxygen was bubbled through the mixture for 2.5 min allowing gas to escape through the loose cap. The cap was then sealed with the balloon attached and placed on the outer layer of the circular heating plate rack at 80 °C. After stirring at 250 rpm for 24 h, the mixture was cooled to room temperature and phenyltrimethylsilane (65.1 mg, 0.43 mmol, 100 mol%) was added as internal standard for <sup>1</sup>H-NMR spectroscopic analysis and yield determination.

## General Procedure for Purification of the Amination Product with Acetyl Group

The reaction mixture was filtered through a pad of Celite<sup>®</sup> and the pad rinsed with 10 mL ethyl acetate. The solution was diluted with 10 mL of DI water then extracted with 10 mL of ethyl acetate three times. The organic extracts were combined and washed with 10 mL of 5M NaCl to remove residual water. The organic layer was then concentrated under reduced pressure then dissolved in a small amount of DCM. This solution was injected wet onto the column then flashed with a 0-30% heptane: IPAc gradient mobile phase using the Teledyne ISCO CombiFlash<sup>®</sup> Rf system. The product was collected and concentrated *in vacuo*.

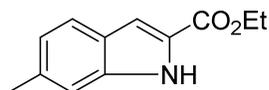
## General Procedure for Purification of the Amination Product without Acetyl Group

The reaction mixture was filtered over a pad of Celite<sup>®</sup> and the pad rinsed with toluene (4.3 mL). The filtrate was collected in a 40 mL reaction vial and combined with potassium carbonate (118.5 mg, 0.86 mmol, 200 mol%) and deionized water (61.9 μL, 3.43 mmol, 800 mol%). The mixture was reacted at 90 °C for 16 h. Upon cleavage of the acetyl group, the solution was diluted with 10 mL of deionized water then extracted with 10 mL of ethyl acetate three times. The extractions were combined and washed with 10 mL of 5M NaCl. The organic layer was concentrated under reduced pressure then dissolved in a small amount of DCM. This solution was injected wet onto the column then flashed with a 0-30% heptane: IPAc gradient mobile phase using the Teledyne ISCO CombiFlash<sup>®</sup> Rf system. The product was collected and concentrated *in vacuo*.

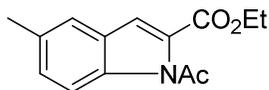


Ethyl 1-acetyl-1H-indole-2-carboxylate, from R=H, compd **2a**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-phenylacrylate (100 mg, 0.43 mmol) at 80 °C. Obtained 94.1 mg light yellow liquid as product (94.9 % yield). <sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>) δ 7.77

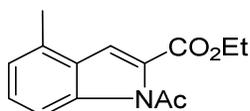
(d,  $J = 8.5$  Hz, 1H), 7.54 – 7.48 (m, 1H), 7.25 (ddd,  $J = 8.5, 7.1, 1.3$  Hz, 1H), 7.20 (s, 1H), 7.13 – 7.06 (m, 1H), 4.12 (q,  $J = 7.1$  Hz, 2H), 2.38 (s, 3H), 1.11 (t,  $J = 7.1$  Hz, 3H)  $^{13}\text{C}$  NMR (126 MHz, DMSO- $d_6$ )  $\delta$  171.28, 161.80, 137.70, 130.21, 127.99, 127.50, 124.07, 123.16, 117.30, 115.01, 61.95, 27.22, 14.38. HRMS (ESI+) calculated for  $\text{C}_{13}\text{H}_{14}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 232.0968; found 232.0963.



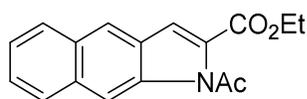
Ethyl 6-methyl-1H-indole-2-carboxylate, from R=*p*-Me, compd **3b**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(*p*-tolyl)acrylate (106 mg, 0.43 mmol) at 80 °C. Obtained 58.5 mg white solid as product (67.1 % yield).  $^1\text{H}$  NMR (500 MHz, Chloroform-*d*)  $\delta$  9.06 (s, 1H), 7.55 (d,  $J = 8.2$  Hz, 1H), 7.18 (s, 2H), 7.00 – 6.95 (m, 1H), 4.41 (q,  $J = 7.1$  Hz, 2H), 2.46 (s, 3H), 1.41 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (126 MHz, Chloroform-*d*)  $\delta$  162.30, 137.46, 135.55, 126.91, 125.39, 122.91, 122.18, 111.58, 108.67, 60.96, 22.04, 14.46. HRMS (ESI+) calculated for  $\text{C}_{12}\text{H}_{14}\text{NO}_2$  ( $[\text{M} + \text{H}]^+$ ), 204.1019; found 204.1012.



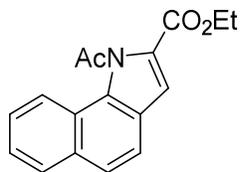
Ethyl 1-acetyl-5-methyl-1H-indole-2-carboxylate, from R=*m*-Me, compd **2c**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(*m*-tolyl)acrylate (106 mg, 0.43 mmol) at 100 °C. Obtained 81.0 mg clear liquid as product (77.0 % yield).  $^1\text{H}$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$  7.89 (d,  $J = 8.6$  Hz, 1H), 7.52 – 7.47 (m, 1H), 7.34 (s, 1H), 7.29 (dd,  $J = 8.7, 1.7$  Hz, 1H), 4.35 (q,  $J = 7.1$  Hz, 2H), 2.59 (s, 3H), 2.40 (s, 3H), 1.34 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (126 MHz, DMSO- $d_6$ )  $\delta$  171.07, 161.84, 136.07, 133.21, 130.25, 129.42, 127.72, 122.61, 117.14, 114.79, 61.89, 27.12, 21.15, 14.41. HRMS (ESI+) calculated for  $\text{C}_{14}\text{H}_{16}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 246.1125; found 246.1118.



Ethyl 1-acetyl-4-methyl-1H-indole-2-carboxylate, from R=*o*-Me, compd **2d**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(*o*-tolyl)acrylate (106 mg, 0.43 mmol) at 80 °C. Obtained 89.5 mg clear liquid as product (85.1 % yield).  $^1\text{H}$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$  7.81 (d,  $J = 8.5$  Hz, 1H), 7.50 (s, 1H), 7.36 (dd,  $J = 8.5, 7.3$  Hz, 1H), 7.12 (d,  $J = 7.3$  Hz, 1H), 4.36 (q,  $J = 7.1$  Hz, 2H), 2.61 (s, 3H), 2.52 (s, 3H), 1.35 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (126 MHz, DMSO- $d_6$ )  $\delta$  171.41, 161.83, 137.66, 132.61, 129.57, 128.15, 127.17, 124.21, 116.01, 112.42, 61.91, 27.29, 18.45, 14.44. HRMS (ESI+) calculated for  $\text{C}_{14}\text{H}_{16}\text{NO}_3$  ( $[\text{M} + \text{H}]^+$ ), 246.1125; found 246.1118.



Isomer 1

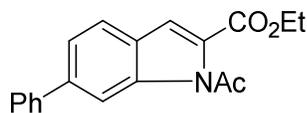


Isomer 2

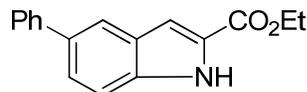
Ethyl 1-acetyl-1*H*-benzo[*f*]indole-2-carboxylate (isomer 1, compd **2e**) and ethyl 1-acetyl-1*H*-benzo[*g*]indole-2-carboxylate (isomer 2, compd **2e'**) from R=2-naphthyl substitution. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(naphthalen-2-yl)acrylate (121.4 mg, 0.43 mmol) at 100 °C. The ratio of product isomers as determined by <sup>1</sup>H NMR was 3:5 Isomer 1:Isomer 2. Obtained a combined 78.1 mg (one isomer is white-yellow solid and one isomer is yellow oil) as product (61.5 % yield).

Isomer 1: <sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>) δ 8.59 (s, 1H), 8.30 (s, 1H), 8.10 (d, *J* = 8.2 Hz, 1H), 8.04 (d, *J* = 8.2 Hz, 1H), 7.57 (s, 1H), 7.56 – 7.52 (m, 1H), 7.52 – 7.47 (m, 1H), 4.39 (q, *J* = 7.1 Hz, 2H), 2.68 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>) δ 170.50, 161.97, 136.48, 133.58, 133.02, 130.48, 128.86, 128.60, 128.35, 126.43, 125.36, 121.66, 117.33, 112.24, 62.17, 26.97, 14.42. HRMS (ESI+) calculated for C<sub>17</sub>H<sub>16</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 282.1125; found 282.1111.

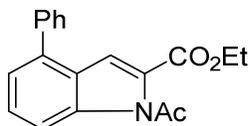
Isomer 2: <sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>) δ 8.09 – 7.98 (m, 2H), 7.79 (d, *J* = 8.6 Hz, 1H), 7.70 (d, *J* = 8.7 Hz, 1H), 7.67 – 7.56 (m, 2H), 7.54 (s, 1H), 4.37 (q, *J* = 7.1 Hz, 2H), 2.86 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>) δ 178.24, 161.08, 133.12, 131.41, 129.95, 127.11, 126.87, 126.47, 124.17, 124.14, 121.60, 121.50, 121.42, 113.17, 61.78, 30.30, 14.55. HRMS (ESI+) calculated for C<sub>17</sub>H<sub>16</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 282.1125; found 282.1113.



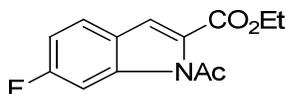
Ethyl 1-acetyl-6-phenyl-1*H*-indole-2-carboxylate, from R=*p*-Ph, compd **2f**. The general procedure was followed with ethyl (*Z*)-3-([1,1'-biphenyl]-4-yl)-2-acetamidoacrylate (132.6 mg, 0.43 mmol) at 80 °C. Obtained 113.9 mg white-yellow liquid as product (86.5 % yield). <sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>) δ 7.98 (d, *J* = 1.4 Hz, 1H), 7.58 (d, *J* = 8.2 Hz, 1H), 7.52 – 7.45 (m, 2H), 7.39 (dd, *J* = 8.2, 1.6 Hz, 1H), 7.27 (t, *J* = 7.6 Hz, 2H), 7.24 (s, 1H), 7.21 – 7.13 (m, 1H), 4.13 (q, *J* = 7.1 Hz, 2H), 2.42 (s, 3H), 1.11 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>) δ 171.53, 161.70, 140.89, 140.37, 138.39, 130.65, 129.51, 128.12, 127.58, 126.81, 123.62, 123.44, 117.22, 113.08, 62.00, 27.37, 14.45. HRMS (ESI+) calculated for C<sub>19</sub>H<sub>18</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 308.1281; found 308.1267.



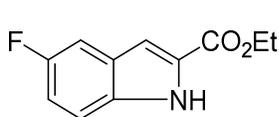
Ethyl 5-phenyl-1*H*-indole-2-carboxylate, from R=*m*-Ph, compd **3g**. The general procedure was followed with ethyl (*Z*)-3-([1,1'-biphenyl]-3-yl)-2-acetamidoacrylate (132.6 mg, 0.43 mmol) at 80 °C. Obtained 90.5 mg white solid as product (79.6 % yield). **<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** δ 9.07 (s, 1H), 7.88 (d, *J* = 1.6 Hz, 1H), 7.66 – 7.59 (m, 2H), 7.58 (dd, *J* = 8.7, 1.7 Hz, 1H), 7.48 (d, *J* = 8.6 Hz, 1H), 7.44 (t, *J* = 7.6 Hz, 2H), 7.38 – 7.30 (m, 1H), 7.27 (s, 1H), 4.43 (q, *J* = 7.1 Hz, 2H), 1.43 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** δ 162.01, 141.86, 136.31, 134.37, 128.75, 128.14, 128.03, 127.33, 126.70, 125.41, 120.84, 112.15, 108.95, 61.15, 14.43. **HRMS (APCI+)** calculated for C<sub>17</sub>H<sub>16</sub>NO<sub>2</sub> ([M + H]<sup>+</sup>), 266.1176; found 266.1166.



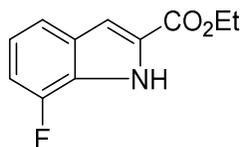
Ethyl 1-acetyl-4-phenyl-1*H*-indole-2-carboxylate, from R=*o*-Ph, compd **2h**. The general procedure was followed with ethyl (*Z*)-3-([1,1'-biphenyl]-2-yl)-2-acetamidoacrylate (132.6 mg, 0.43 mmol) at 80 °C. Obtained 114.1 mg white-yellow liquid as product (86.6 % yield). **<sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>)** δ 8.01 (d, *J* = 8.4 Hz, 1H), 7.61 – 7.48 (m, 6H), 7.47 – 7.41 (m, 1H), 7.36 (dd, *J* = 7.4, 0.8 Hz, 1H), 7.33 (s, 1H), 4.33 (q, *J* = 7.1 Hz, 2H), 2.63 (s, 3H), 1.31 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>)** δ 171.55, 161.62, 139.22, 138.25, 136.28, 130.57, 129.39, 129.03, 128.43, 128.26, 125.28, 123.69, 115.77, 114.00, 62.07, 27.42, 14.39. **HRMS (ESI+)** calculated for C<sub>19</sub>H<sub>18</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 308.1281; found 308.1267.



Ethyl 1-acetyl-6-fluoro-1*H*-indole-2-carboxylate, from R=*p*-F, compd **2i**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-fluorophenyl)acrylate (107.7 mg, 0.43 mmol) at 80 °C. Obtained 59.6 mg clear liquid as product (55.8 % yield). **<sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>)** δ 7.82 – 7.73 (m, 2H), 7.47 (s, 1H), 7.23 (td, *J* = 9.0, 2.3 Hz, 1H), 4.36 (q, *J* = 7.1 Hz, 2H), 2.61 (s, 3H), 1.35 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>)** δ 171.44, 162.42 (d, *J* = 242.1 Hz), 161.43, 138.11 (d, *J* = 13.2 Hz), 130.69 (d, *J* = 4.2 Hz), 124.79 (d, *J* = 10.5 Hz), 124.07, 117.44, 112.74 (d, *J* = 24.5 Hz), 101.99 (d, *J* = 28.7 Hz), 62.01, 27.15, 14.40. **HRMS (ESI+)** calculated for C<sub>13</sub>H<sub>13</sub>FNO<sub>3</sub> ([M + H]<sup>+</sup>), 250.0874; found 250.0866.



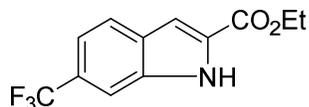
Isomer 1



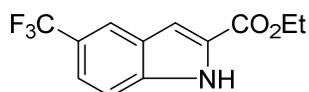
Isomer 2

Ethyl 5-fluoro-1*H*-indole-2-carboxylate (isomer 1, compd **3j**) and ethyl 7-fluoro-1*H*-indole-2-carboxylate (isomer 2, compd **3j'**) from R=*m*-F. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(3-fluorophenyl)acrylate (107.7 mg, 0.43 mmol) at 120 °C. Obtained 73.8 mg white solid as product (83.1 % yield). The ratio of 4-substituted to 7-substituted isomers was 4:3.

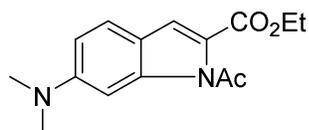
**<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** 5-fluoro isomer, compd **3j** δ 7.48 (dt, *J* = 7.2, 0.9 Hz, 1H), 7.34 (dd, *J* = 9.2, 2.5 Hz, 1H), 7.20 (dd, *J* = 2.1, 1.0 Hz, 1H), 7.09 (m, 1H); 7-fluoro isomer, compd **3j'** δ 7.38 (dd, *J* = 9.0, 4.4 Hz, 1H), 7.27 (dd, *J* = 3.3, 2.2 Hz, 1H), 7.12 (dt, *J* = 9.1, 2.5 Hz, 1H), 7.05 (m, 1H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** for combined Isomers 1 and 2 δ 162.03, 161.81, 159.07, 149.66 (d, *J* = 246.1 Hz), 133.57, 130.84 (d, *J* = 5.0 Hz), 129.01, 128.40, 127.61 (d, *J* = 10.4 Hz), 125.77, 120.86 (d, *J* = 5.9 Hz), 118.24 (d, *J* = 3.8 Hz), 114.40 (d, *J* = 26.9 Hz), 112.87 (d, *J* = 9.6 Hz), 109.53 (d, *J* = 15.8 Hz), 109.01, 108.39 (d, *J* = 5.4 Hz), 106.72 (d, *J* = 23.2 Hz), 61.36, 61.28, 14.38. **HRMS (APCI+)** calculated for C<sub>11</sub>H<sub>11</sub>FNO<sub>2</sub> ([M + H]<sup>+</sup>), 208.0768; found 208.0768.



Ethyl 6-(trifluoromethyl)-1*H*-indole-2-carboxylate, from R=*p*-CF<sub>3</sub>, compd **3k**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-(trifluoromethyl)phenyl)acrylate (129.2 mg, 0.43 mmol) at 100 °C. Obtained 49.1 mg white-brown solid as product (44.6 % yield). **<sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>)** δ 12.39 (s, 1H), 7.90 (d, *J* = 8.4 Hz, 1H), 7.81 (s, 1H), 7.37 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.28 (dd, 1H), 4.40 (q, *J* = 7.1 Hz, 2H), 1.38 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>)** δ 161.35, 136.35, 130.72, 129.57, 125.37 (q, *J* = 271.6 Hz), 125.18 (q, *J* = 31.3 Hz), 123.77, 116.54 (q, *J* = 3.3 Hz), 110.37, 107.93, 61.33, 39.86, 39.69, 14.64. **HRMS (ESI+)** calculated for C<sub>12</sub>H<sub>11</sub>F<sub>3</sub>NO<sub>2</sub> ([M + H]<sup>+</sup>), 258.0736; found 258.0729.

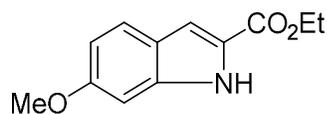


Ethyl 5-(trifluoromethyl)-1*H*-indole-2-carboxylate, from R=*m*-CF<sub>3</sub>, compd **3l**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(3-(trifluoromethyl)phenyl)acrylate (129.2 mg, 0.43 mmol) at 80 °C. Obtained 39.6 mg white solid as product (35.9 % yield). **<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** δ 9.58 (s, 1H), 8.00 (s, 1H), 7.57 – 7.48 (m, 2H), 7.30 (s, 1H), 4.46 (q, *J* = 7.1 Hz, 2H), 1.45 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** δ 161.93, 137.99, 129.19, 126.64, 124.94 (q, *J* = 271.6 Hz), 123.29 (q, *J* = 32.1 Hz), 121.77 (q, *J* = 3.5 Hz), 120.49 (q, *J* = 4.3 Hz), 112.45, 109.24, 61.52, 14.35. **HRMS (ESI+)** calculated for C<sub>12</sub>H<sub>11</sub>F<sub>3</sub>NO<sub>2</sub> ([M + H]<sup>+</sup>), 258.0736; found 258.0724.

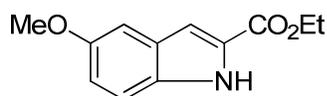


Ethyl 1-acetyl-6-(dimethylamino)-1*H*-indole-2-carboxylate, from R=*p*-NMe<sub>2</sub>, compd **2m**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-(dimethylamino)phenyl)acrylate (118.4 mg, 0.43 mmol) at 80 °C. Obtained 58.8 mg yellow liquid as product (50.0 % yield). **<sup>1</sup>H NMR (500 MHz, DMSO-*d*<sub>6</sub>)** δ 7.27 (d, *J* = 8.8 Hz, 1H), 7.13 (s, 1H), 7.03 (d, *J* = 2.2 Hz, 1H), 6.61 (dd, *J* = 8.8, 2.3 Hz, 1H), 4.07 (q, *J* = 7.1 Hz, 2H), 2.75 (s, 6H), 2.28 (s, 3H), 1.08 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, DMSO-*d*<sub>6</sub>)** δ 172.06,

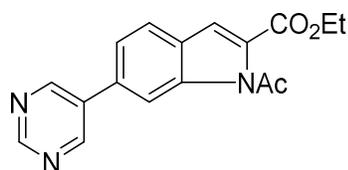
161.60, 151.62, 140.91, 126.55, 123.60, 119.97, 117.48, 111.66, 96.23, 61.35, 40.75, 27.45, 14.56. **HRMS (ESI+)** calculated for C<sub>15</sub>H<sub>19</sub>N<sub>2</sub>O<sub>3</sub> ([M + H]<sup>+</sup>), 275.1390; found 275.1380.



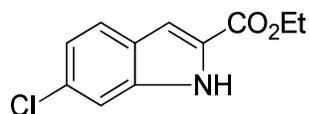
Ethyl 6-methoxy-1*H*-indole-2-carboxylate, from R=*p*-OMe, compd **3n**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-(methoxy)phenyl)acrylate (112.9 mg, 0.43 mmol) at 80 °C. Obtained 55.4 mg white solid as product (58.9 % yield). **<sup>1</sup>H NMR (500 MHz, Acetone-*d*<sub>6</sub>)** δ 10.68 (s, 1H), 7.55 (d, *J* = 8.8 Hz, 1H), 7.12 (dd, *J* = 2.2, 0.9 Hz, 1H), 7.01 (d, *J* = 2.2 Hz, 1H), 6.78 (dd, *J* = 8.8, 2.3 Hz, 1H), 4.33 (q, *J* = 7.1 Hz, 2H), 3.82 (s, 3H), 1.35 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Acetone-*d*<sub>6</sub>)** δ 161.31, 158.71, 138.66, 126.69, 122.89, 121.72, 111.99, 108.22, 93.88, 60.07, 54.72, 13.84. **HRMS (APCI+)** calculated for C<sub>12</sub>H<sub>14</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 220.0968; found 220.0958.



Ethyl 5-methoxy-1*H*-indole-2-carboxylate, from R=*m*-OMe, compd **3o**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(3-(methoxy)phenyl)acrylate (112.9 mg, 0.43 mmol) at 100 °C. Obtained 62.3 mg dark yellow solid as product (66.2 % yield). **<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** δ 9.06 (s, 1H), 7.31 (d, *J* = 9.0 Hz, 1H), 7.14 (d, *J* = 2.2 Hz, 1H), 7.07 (d, *J* = 2.4 Hz, 1H), 6.99 (dd, *J* = 8.9, 2.4 Hz, 1H), 4.41 (q, *J* = 7.1 Hz, 2H), 3.85 (s, 3H), 1.41 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** δ 162.06, 154.68, 132.26, 127.87, 116.96, 112.81, 108.19, 102.51, 60.99, 55.70, 29.72, 14.43. **HRMS (ESI+)** calculated for C<sub>12</sub>H<sub>14</sub>NO<sub>3</sub> ([M + H]<sup>+</sup>), 220.0968; found 220.0962.

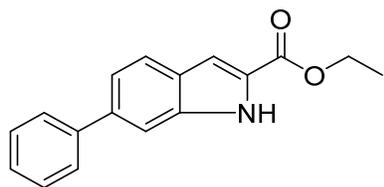
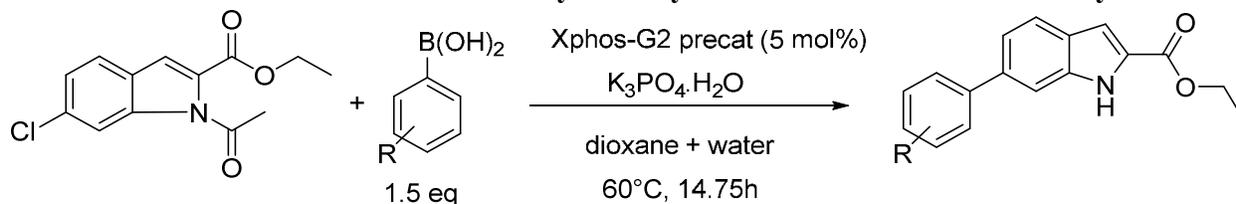


Ethyl 1-acetyl-6-(pyrimidin-5-yl)-1*H*-indole-2-carboxylate, from R=*p*-pyrimidine, compd **2p**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-(pyrimidin-5-yl)phenyl)acrylate (133.5 mg, 0.43 mmol) at 100 °C. Obtained 78.4 mg white-yellow solid as product (59.1 % yield). **<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** δ 9.22 (s, 1H), 9.01 (s, 2H), 8.42 (d, *J* = 1.4 Hz, 1H), 7.76 (d, *J* = 8.2 Hz, 1H), 7.50 (dd, *J* = 8.2, 1.6 Hz, 1H), 7.38 (s, 1H), 4.44 (q, *J* = 7.2 Hz, 2H), 2.65 (s, 3H), 1.44 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** δ 171.15, 161.31, 157.50, 155.14, 139.00, 134.45, 133.93, 130.80, 127.34, 123.36, 122.77, 117.74, 114.00, 61.96, 27.29, 14.24. **HRMS (ESI+)** calculated for C<sub>17</sub>H<sub>16</sub>N<sub>3</sub>O<sub>3</sub> ([M + H]<sup>+</sup>), 310.1186; found 310.1174.

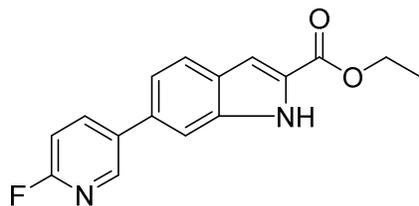


Ethyl 6-chloro-1*H*-indole-2-carboxylate, from R=*p*-Cl, compd **3q**. The general procedure was followed with ethyl (*Z*)-2-acetamido-3-(4-(chloro)phenyl)acrylate (114.8 mg, 0.43 mmol) at 80 °C. Obtained 60.1 mg white solid as product (62.7 % yield). <sup>1</sup>H NMR (500 MHz, Chloroform-*d*) δ 9.07 (s, 1H), 7.60 (d, *J* = 8.5 Hz, 1H), 7.42 (s, 1H), 7.20 (d, *J* = 2.0 Hz, 1H), 7.12 (dd, *J* = 8.6, 1.8 Hz, 1H), 4.43 (q, *J* = 7.1 Hz, 2H), 1.42 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (126 MHz, Chloroform-*d*) δ 161.80, 137.02, 131.27, 128.22, 126.02, 123.53, 121.87, 111.70, 108.61, 61.26, 14.40. HRMS (APCI+) calculated for C<sub>11</sub>H<sub>11</sub>ClNO<sub>2</sub> ([M + H]<sup>+</sup>), 224.0473; found 224.0464.

#### Procedures for Suzuki Reaction with ethyl 1-acetyl-6-chloro-1*H*-indole-2-carboxylate



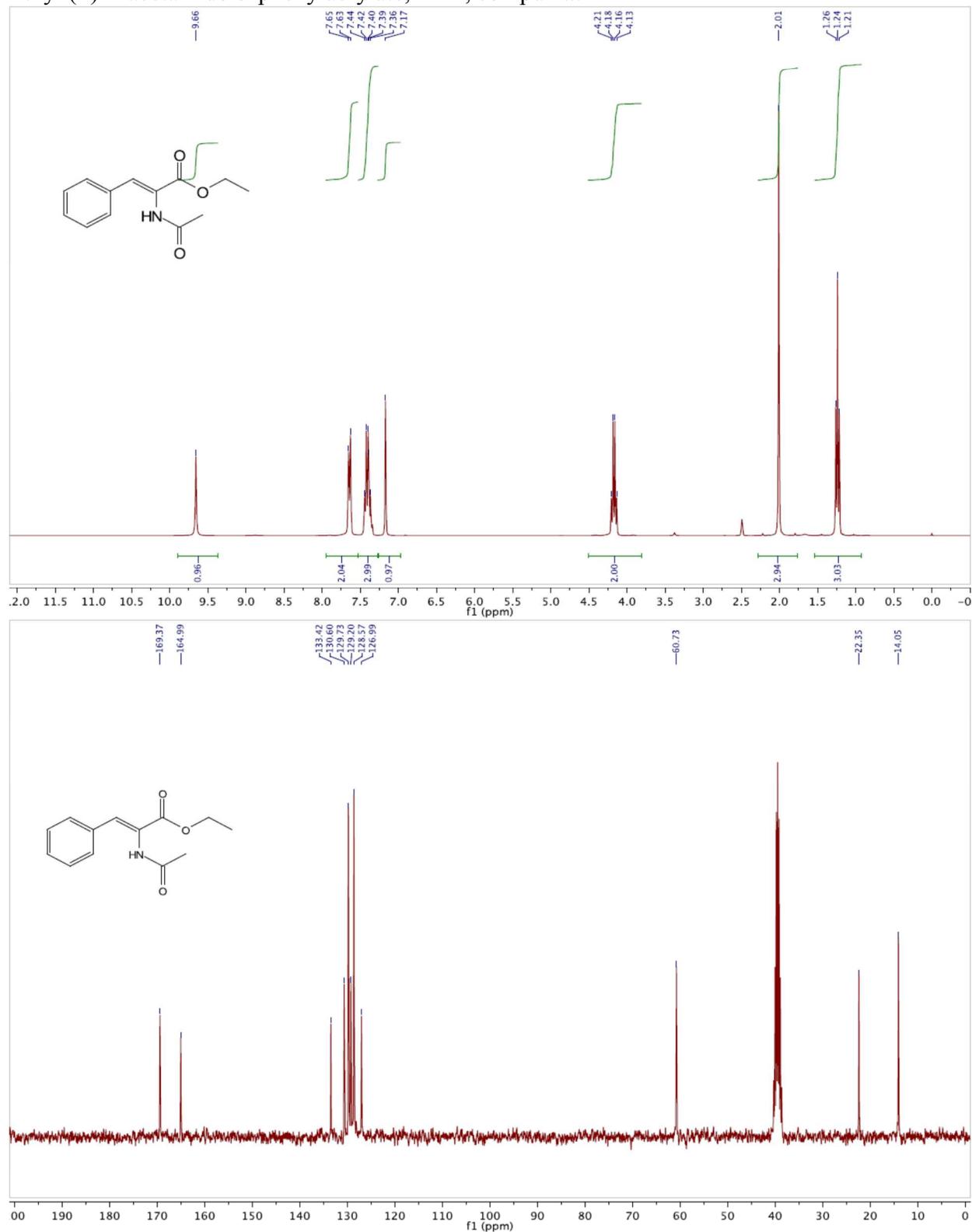
Ethyl 6-phenyl-1*H*-indole-2-carboxylate, compd **3f**. Ethyl 1-acetyl-6-chloro-1*H*-indole-2-carboxylate (100 mg, 0.38 mmol), phenylboronic acid (72.5 mg, 0.56 mmol, 150 mol%), Xphos-Pd-G2 precatalyst (15.1 mg, 0.019 mmol, 5 mol%), and potassium phosphate tribasic monohydrate (182.0 mg, 0.79 mmol, 210 mol%) were combined in a 20 mL vial, then degassed by evacuating and back-filling with N<sub>2</sub> gas three times. 1,4-dioxane (1.5 mL) and water (0.3 mL) were added via syringe to the solids under nitrogen. The vial was placed in a heating block at 60°C for 15 h. After cooling to room temperature, the reaction mixture was filtered over a pad of Celite® and washed with EtOAc (5 mL). The solvents were evaporated under vacuum and the crude product was dissolved in a small amount of DCM. This solution was injected wet onto the column then flashed with a 0-30% heptane: IPAc gradient mobile phase using the Teledyne ISCO CombiFlash® Rf system. The product was collected and concentrated in vacuo to deliver 72.8 mg white solid as product (72.9 % yield). <sup>1</sup>H NMR (500 MHz, Chloroform-*d*) δ 9.48 (s, 1H), 7.79 (d, *J* = 8.3 Hz, 1H), 7.69 (d, 2H), 7.67 (s, 1H), 7.51 (t, *J* = 7.6 Hz, 2H), 7.49 – 7.46 (m, 1H), 7.45 – 7.36 (m, 1H), 7.31 (dd, *J* = 2.1, 1.0 Hz, 1H), 4.50 (q, *J* = 7.1 Hz, 2H), 1.48 (t, *J* = 7.2 Hz, 3H). <sup>13</sup>C NMR (126 MHz, Chloroform-*d*) δ 162.25, 141.74, 138.75, 137.61, 128.84, 128.04, 127.42, 127.17, 126.82, 122.82, 120.92, 110.28, 108.59, 61.17, 14.47. HRMS (ESI+) calculated for C<sub>17</sub>H<sub>15</sub>NO<sub>2</sub> ([M + H]<sup>+</sup>), 266.1176; found 266.1165.



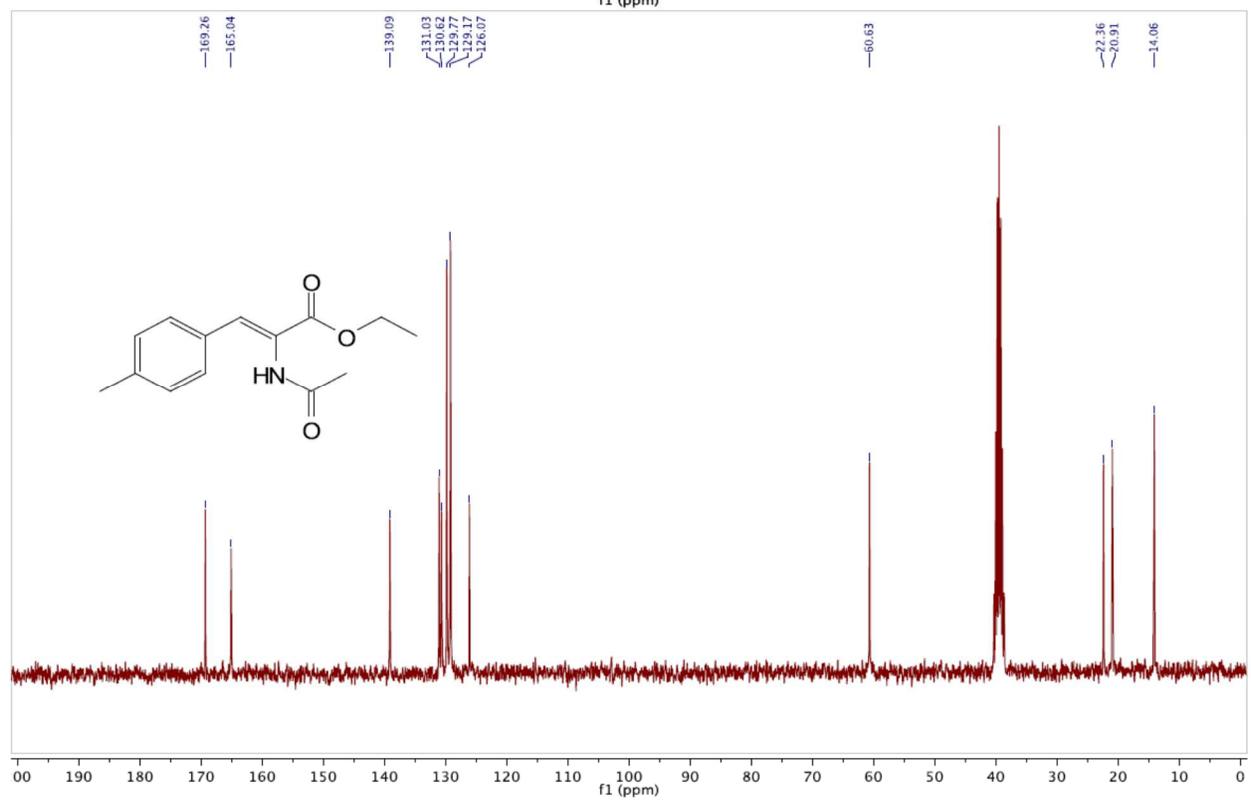
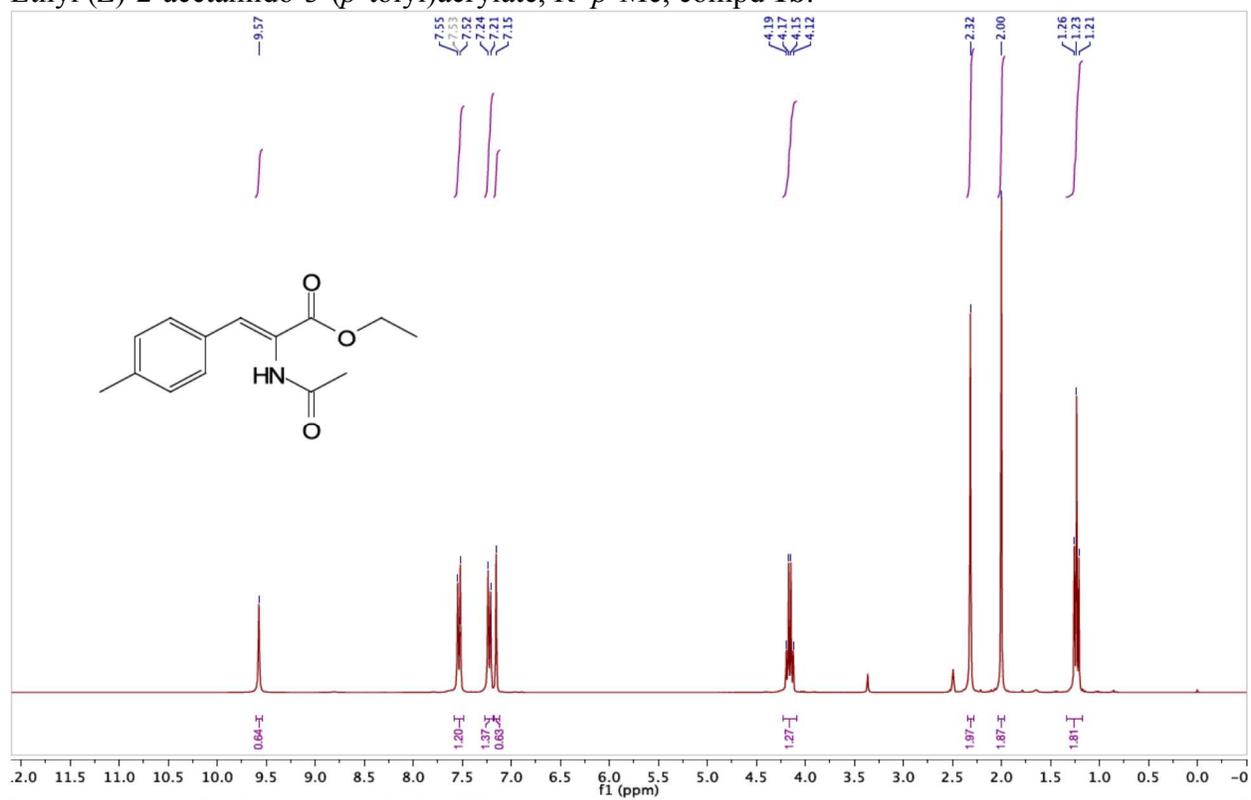
Ethyl 6-(6-fluoropyridin-3-yl)-1*H*-indole-2-carboxylate, compd **3t**. Ethyl 1-acetyl-6-chloro-1*H*-indole-2-carboxylate (50.0 mg, 0.19 mmol), 2-fluoropyridine-5-boronic acid (39.8 mg, 0.28 mmol, 150 mol%), Xphos-Pd-G2 precatalyst (15.1 mg, 0.0094 mmol, 5 mol%), and potassium phosphate tribasic monohydrate (182.0 mg, 0.79 mmol, 420 mol%) were placed in a 20 mL vial, degassed by evacuation and back-filling with N<sub>2</sub> gas three times. 1,4-dioxane (1.5 mL) and water (0.9 mL) were added under nitrogen and the vial heated at 60°C for 15 h. After cooling to room temperature, the reaction mixture was filtered through Celite® and washed with EtOAc (5 mL). Solvents were evaporated under vacuum and the crude product dissolved in minimal DCM. This solution was injected wet onto the column then flashed with a 0-30% heptane: IPAc gradient on the Teledyne ISCO CombiFlash® Rf. The product was collected and concentrated to deliver 43.3 mg white solid as product (80.9 % yield). **<sup>1</sup>H NMR (500 MHz, Chloroform-*d*)** δ 9.37 (s, 1H), 8.40 (d, *J* = 2.5 Hz, 1H), 7.93 (ddd, *J* = 8.0, 2.6 Hz, 1H), 7.69 (d, *J* = 8.3 Hz, 1H), 7.50 (d, *J* = 1.5 Hz, 1H), 7.24 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.18 (s, 1H), 6.93 (dd, *J* = 8.5, 2.9 Hz, 1H), 4.36 (q, *J* = 7.2 Hz, 2H), 1.35 (t, *J* = 7.1 Hz, 3H). **<sup>13</sup>C NMR (126 MHz, Chloroform-*d*)** δ 163.01 (d, *J* = 239.0 Hz), 161.95, 145.91 (d, *J* = 14.6 Hz), 139.94 (d, *J* = 7.9 Hz), 137.31, 135.41 (d, *J* = 3.1 Hz), 133.88, 128.60, 127.31, 123.35, 120.37, 110.31, 109.47 (d, *J* = 37.4 Hz), 108.48, 61.26, 14.42. **HRMS (APCI+)** calculated for C<sub>16</sub>H<sub>13</sub>FN<sub>2</sub>O<sub>2</sub> ([M + H]<sup>+</sup>), 285.1034; found 285.1028.

# $^1\text{H}$ and $^{13}\text{C}$ NMR spectra of compounds

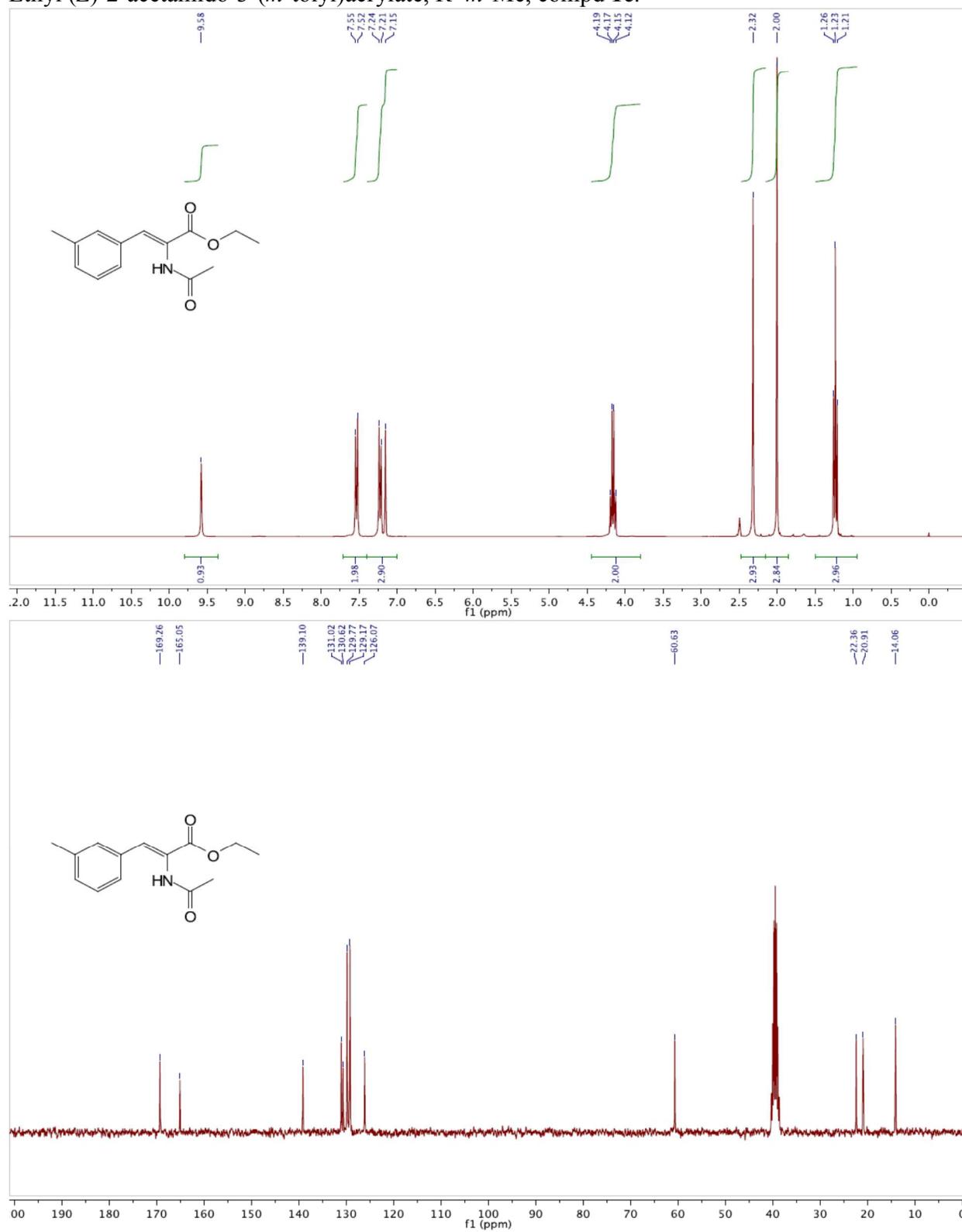
Ethyl (Z)-2-acetamido-3-phenylacrylate, R=H, compd **1a**.



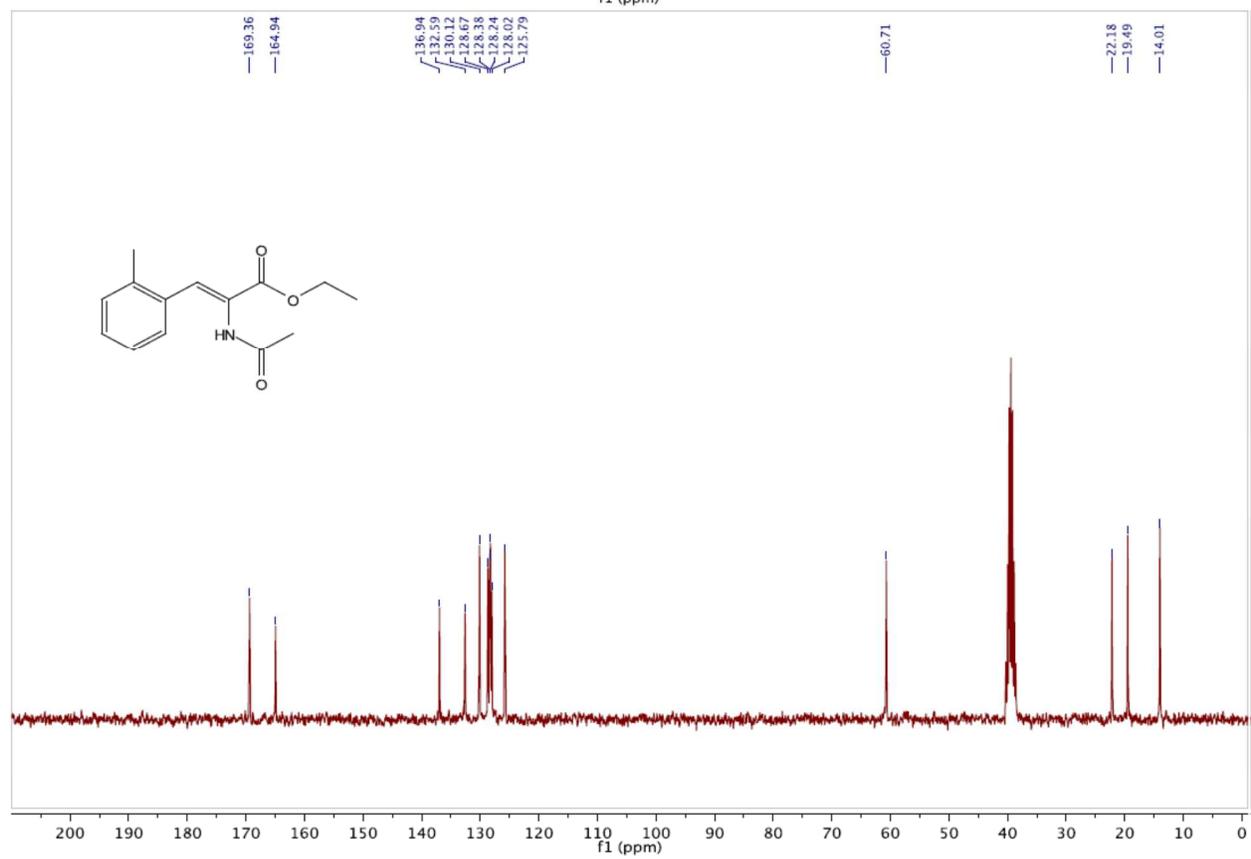
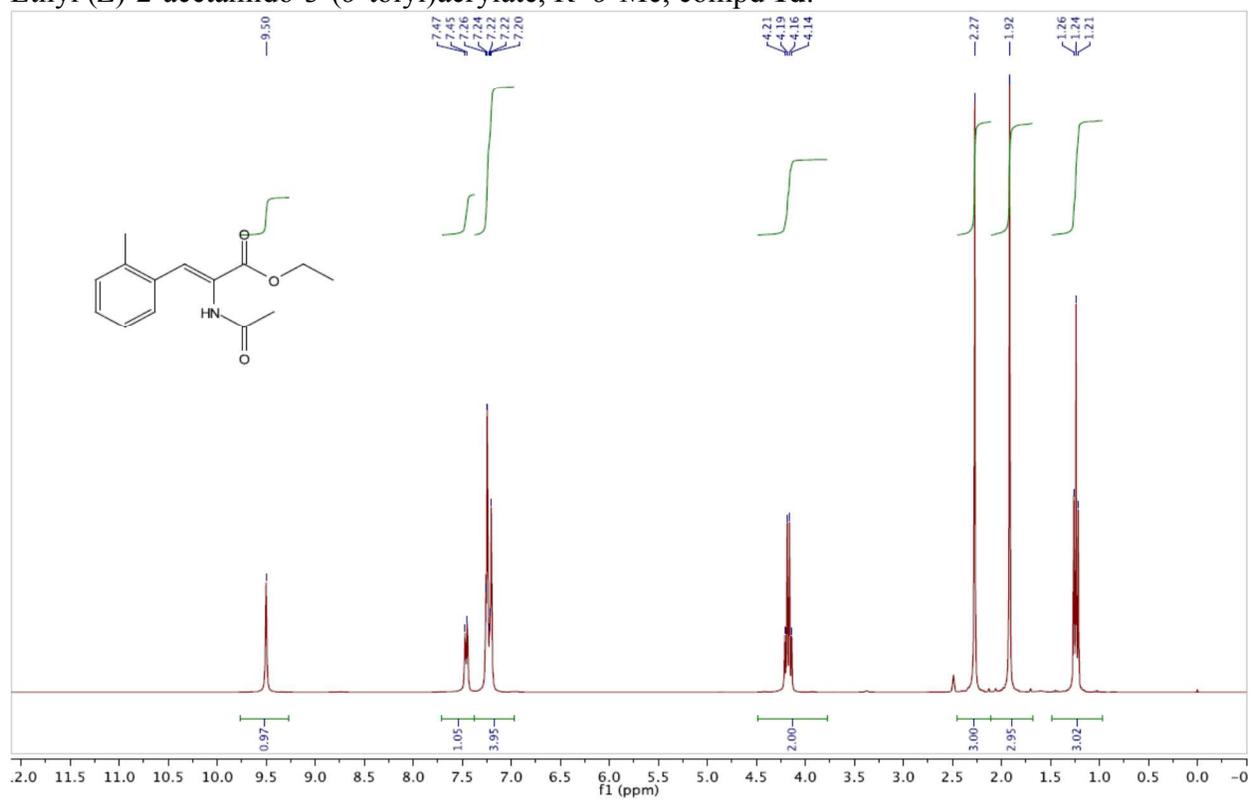
Ethyl (Z)-2-acetamido-3-(p-tolyl)acrylate, R=p-Me, compd **1b**.



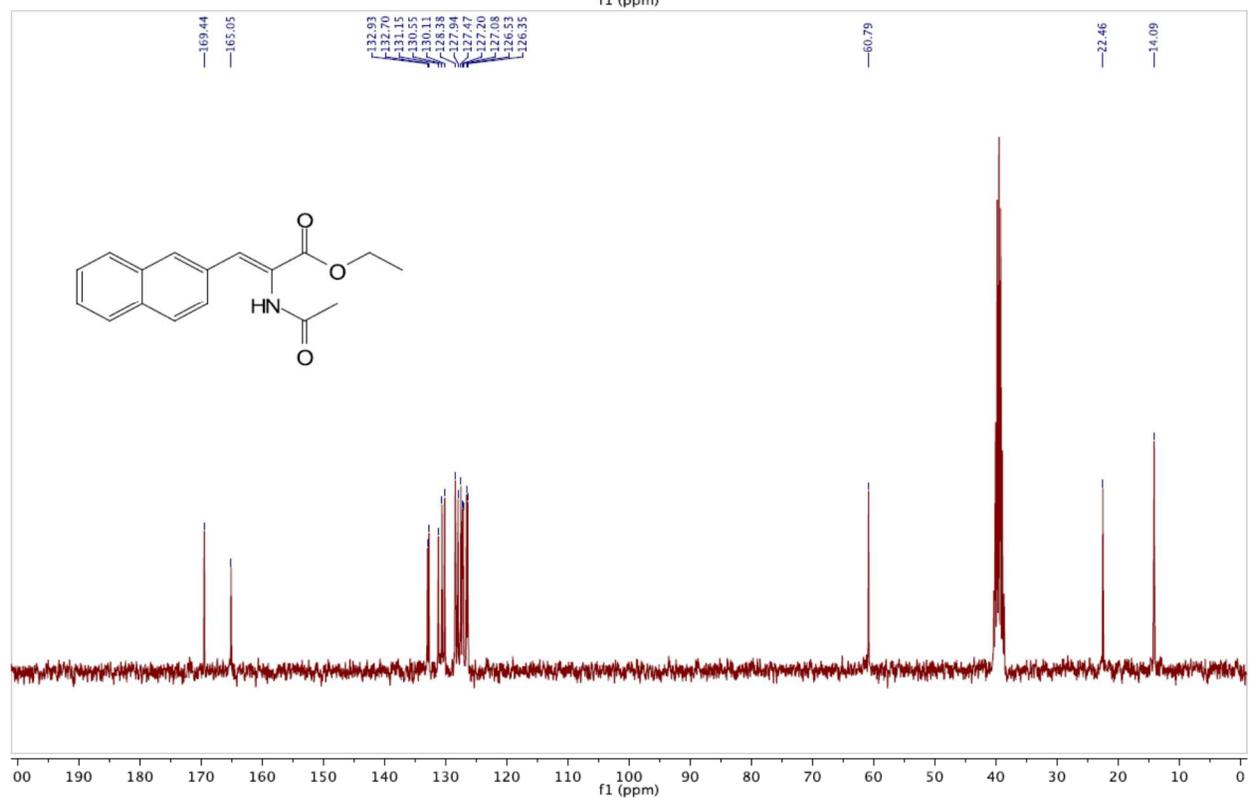
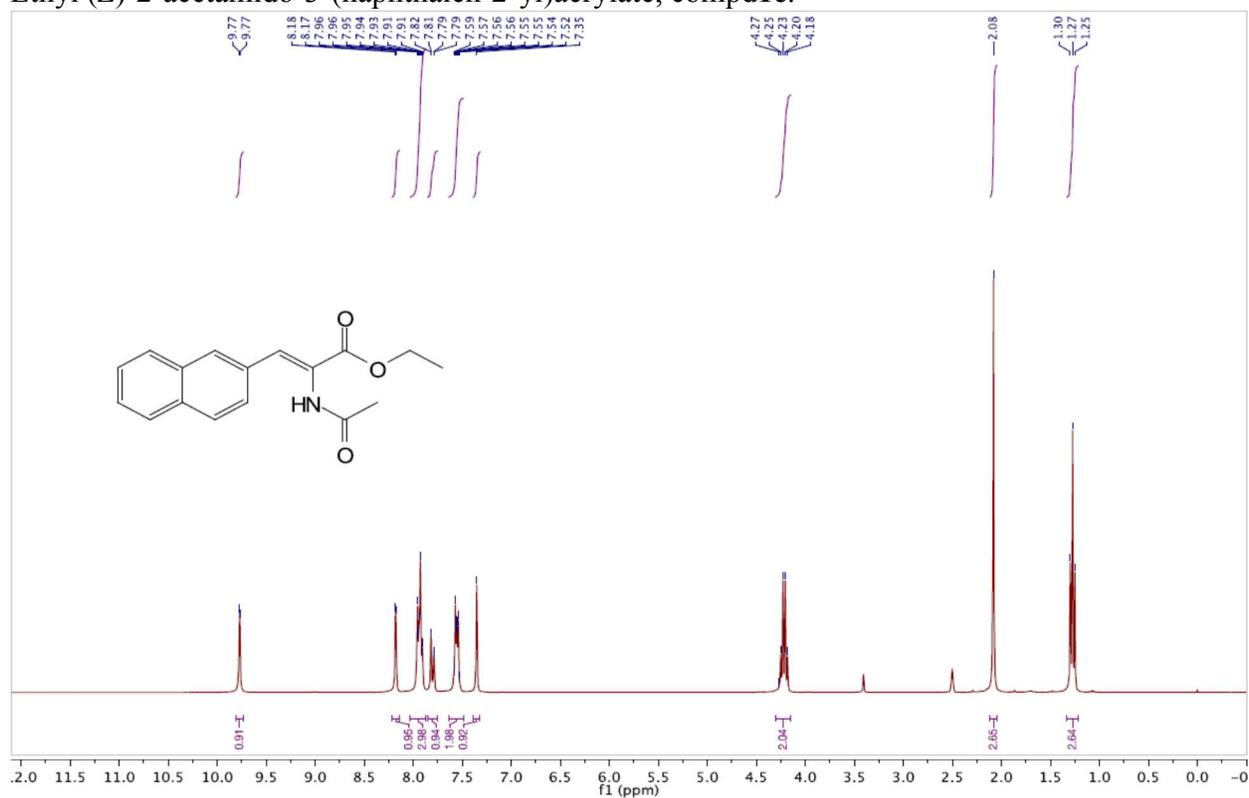
Ethyl (Z)-2-acetamido-3-(*m*-tolyl)acrylate, R=*m*-Me, compd **1c**.



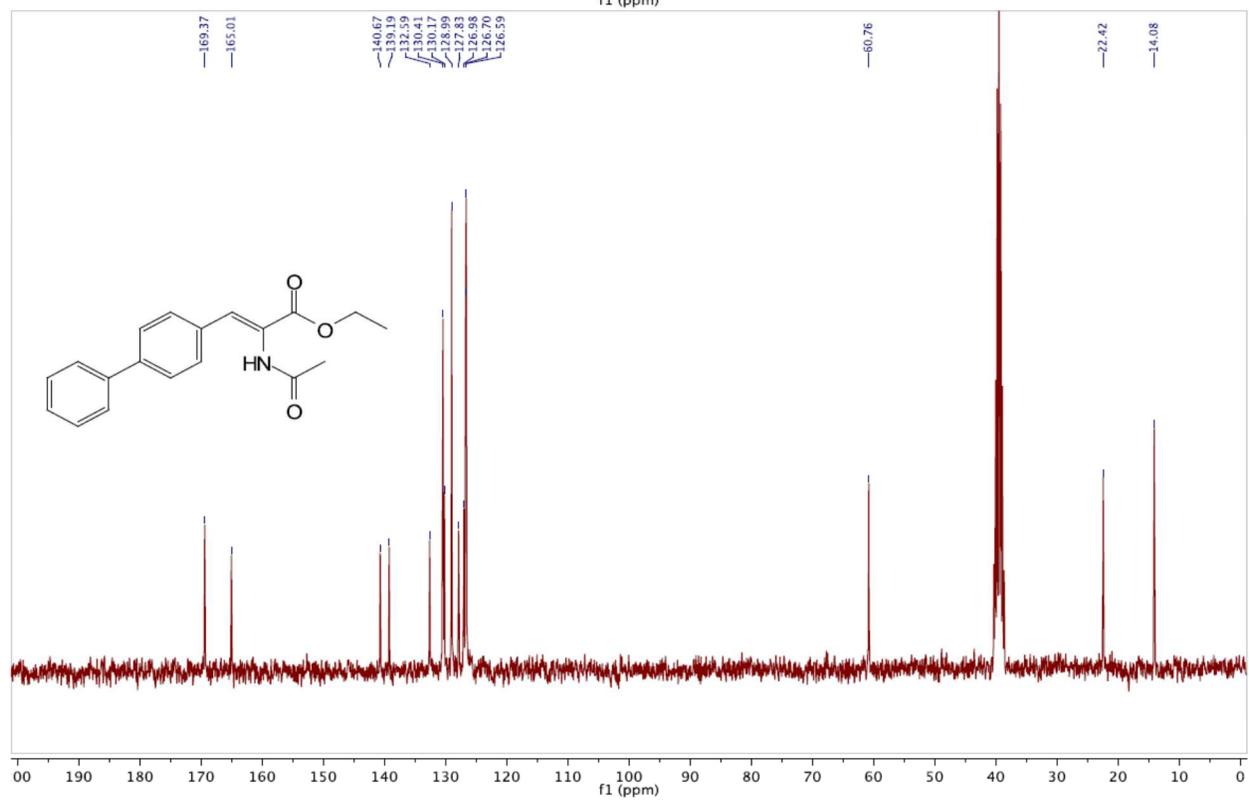
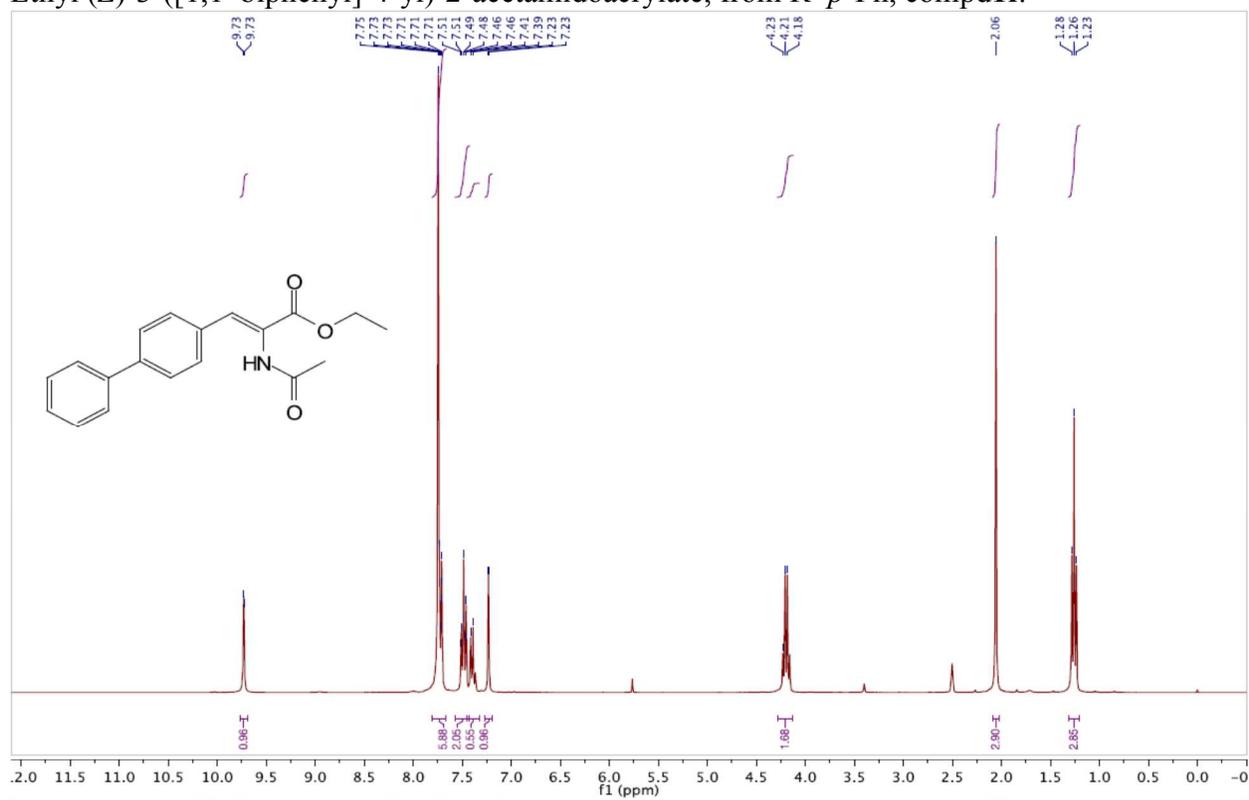
Ethyl (Z)-2-acetamido-3-(*o*-tolyl)acrylate, R=*o*-Me, compd **1d**.



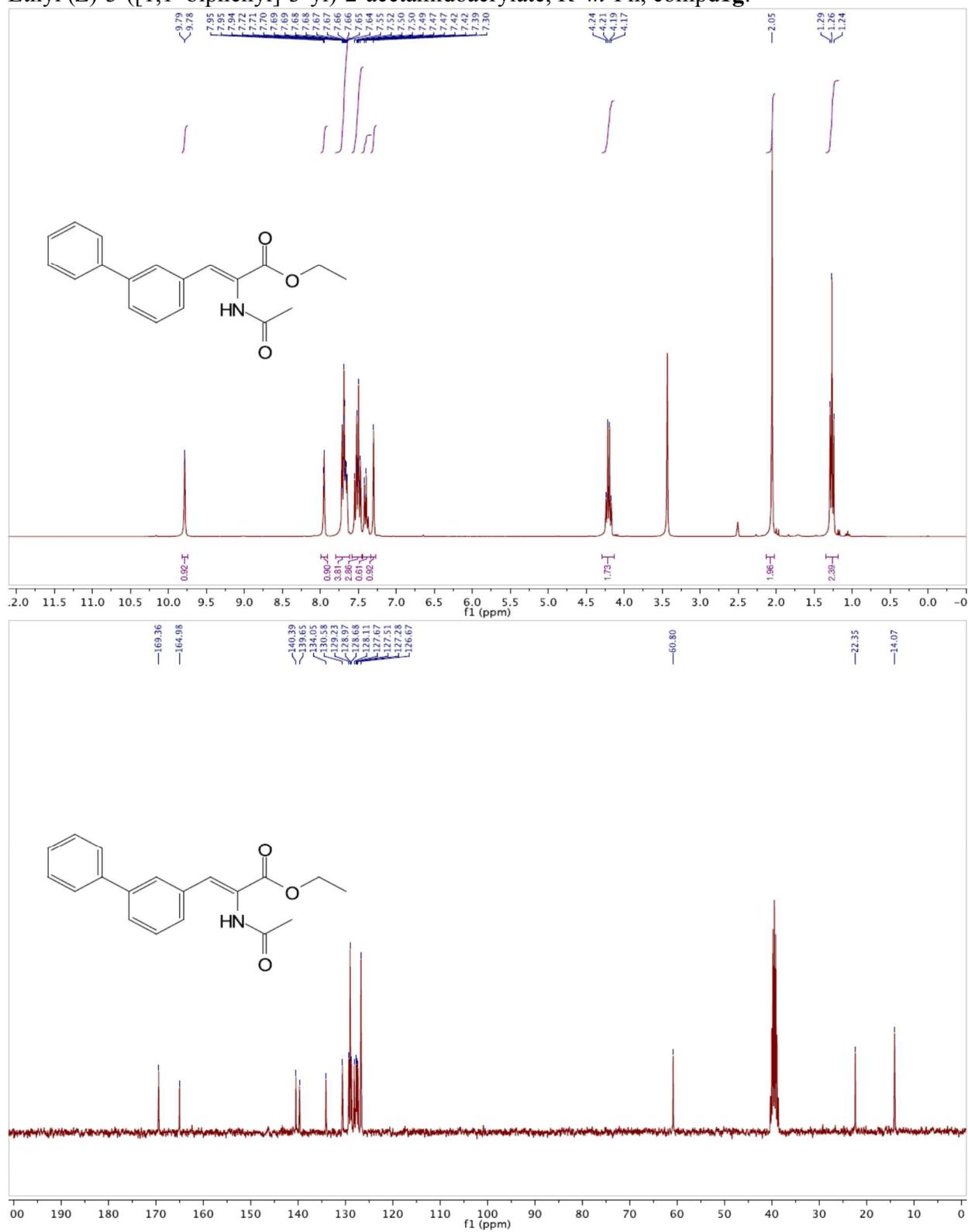
Ethyl (Z)-2-acetamido-3-(naphthalen-2-yl)acrylate, compd1e.



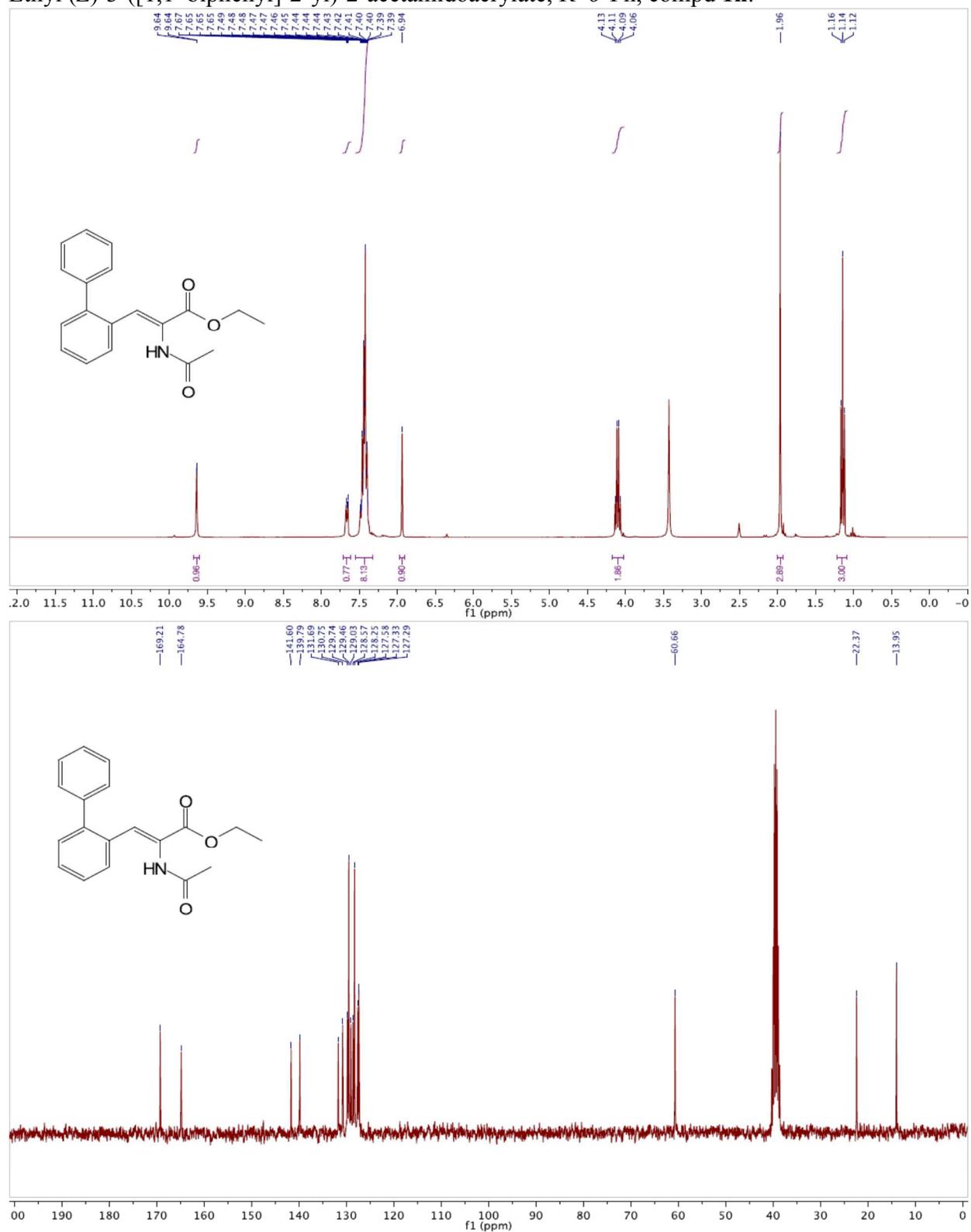
Ethyl (Z)-3-([1,1'-biphenyl]-4-yl)-2-acetamidoacrylate, from R=*p*-Ph, compd**1f**.



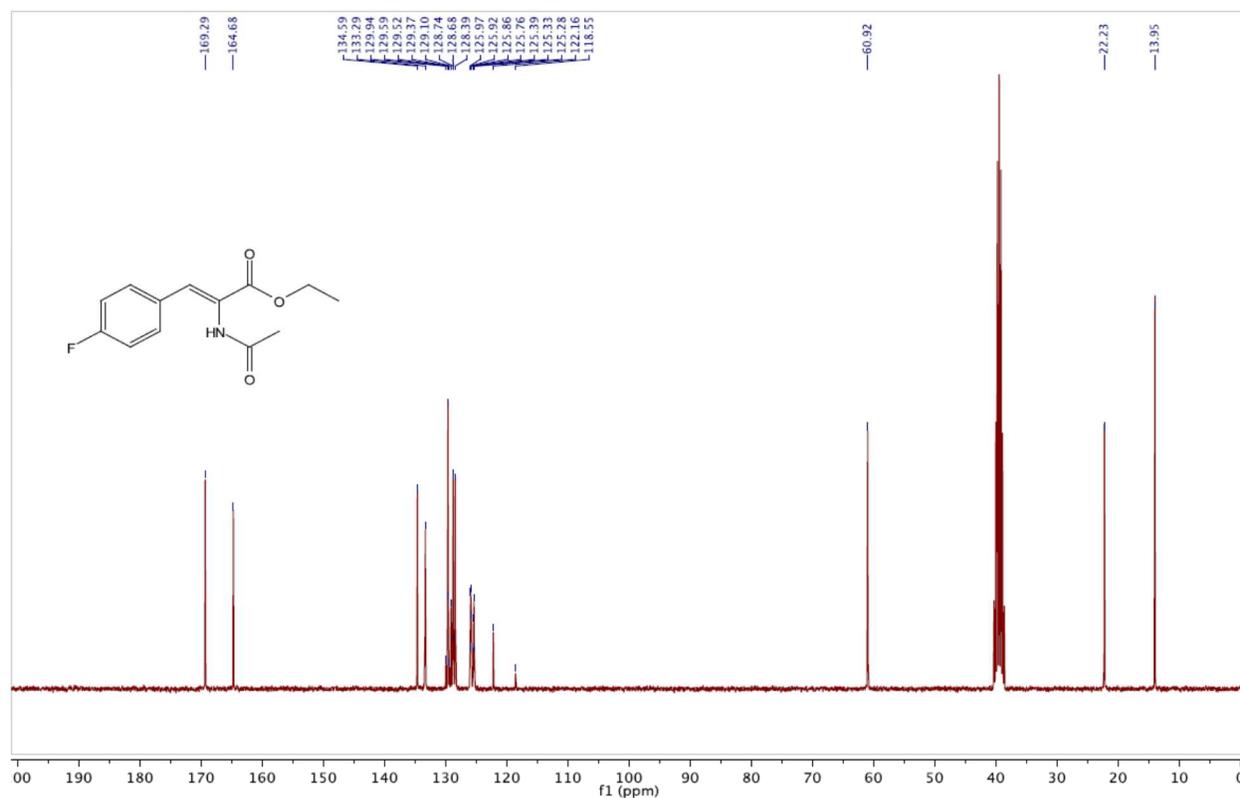
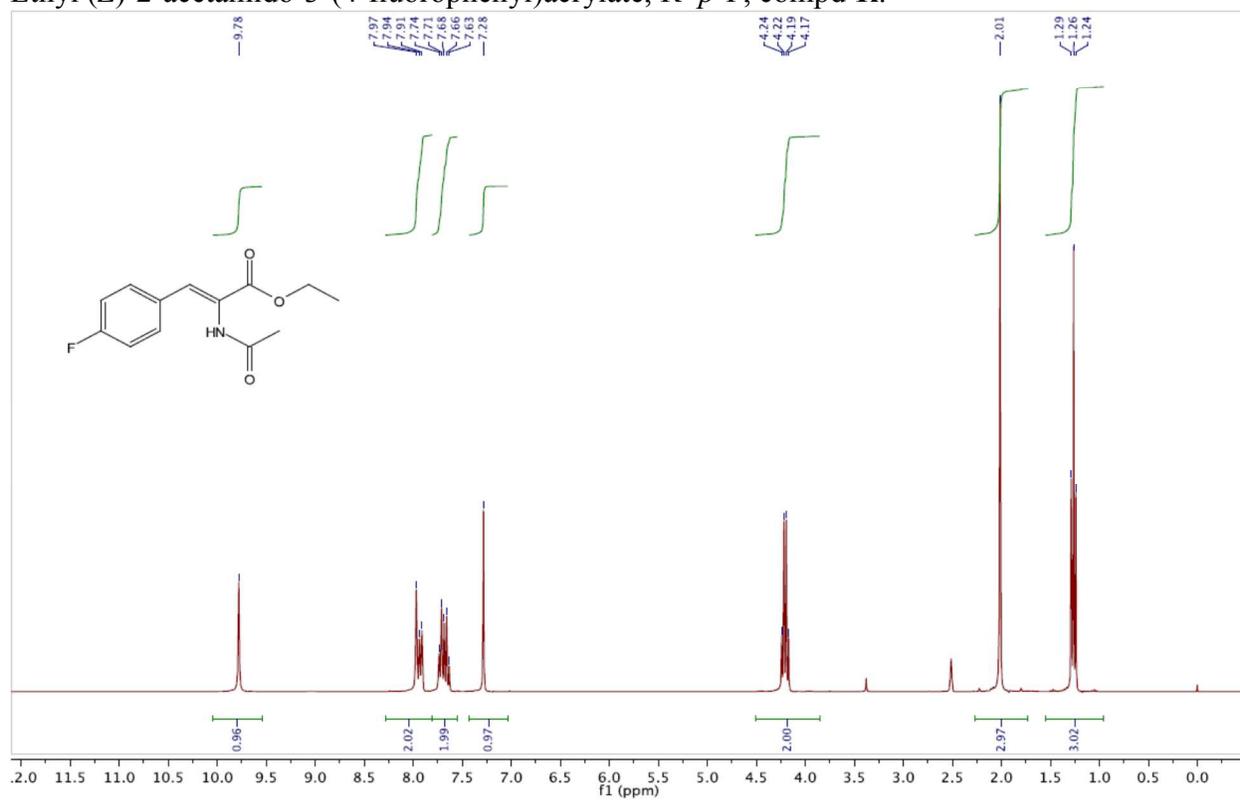
Ethyl (Z)-3-([1,1'-biphenyl]-3-yl)-2-acetamidoacrylate, R=*m*-Ph, compd1g.



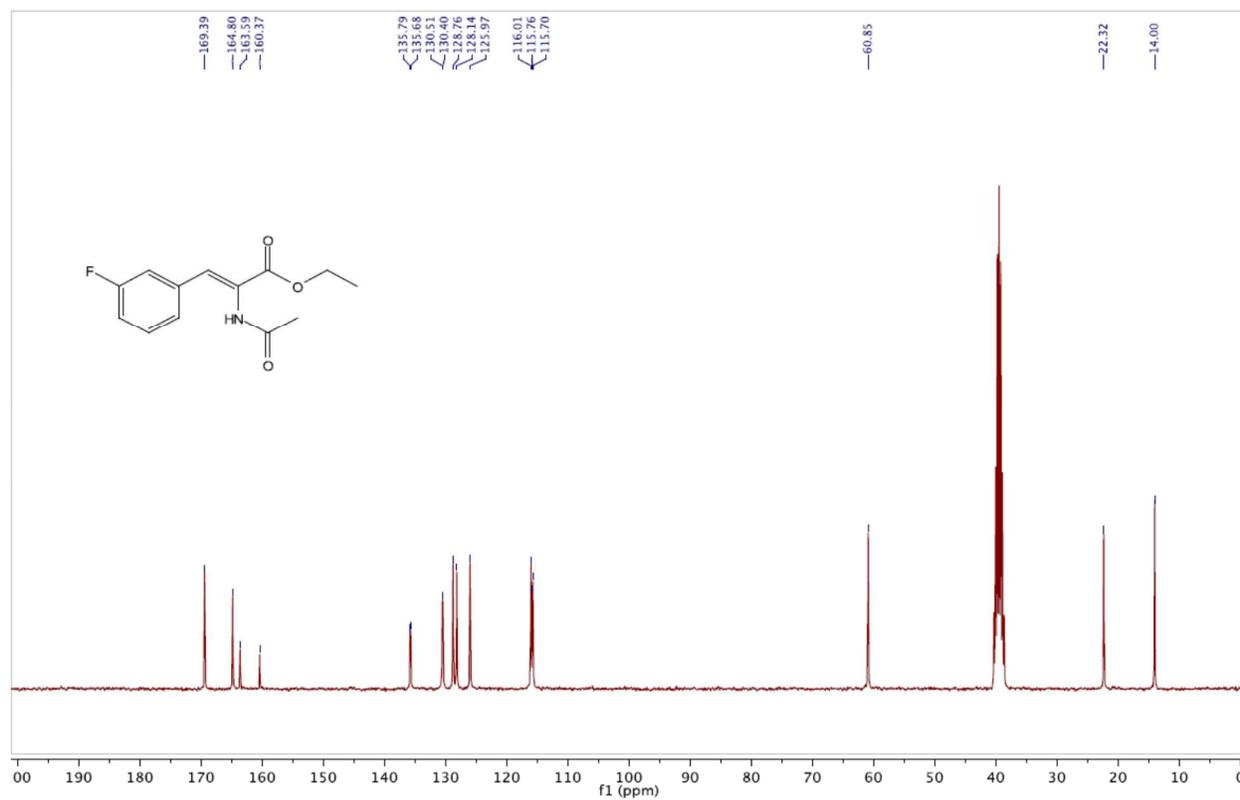
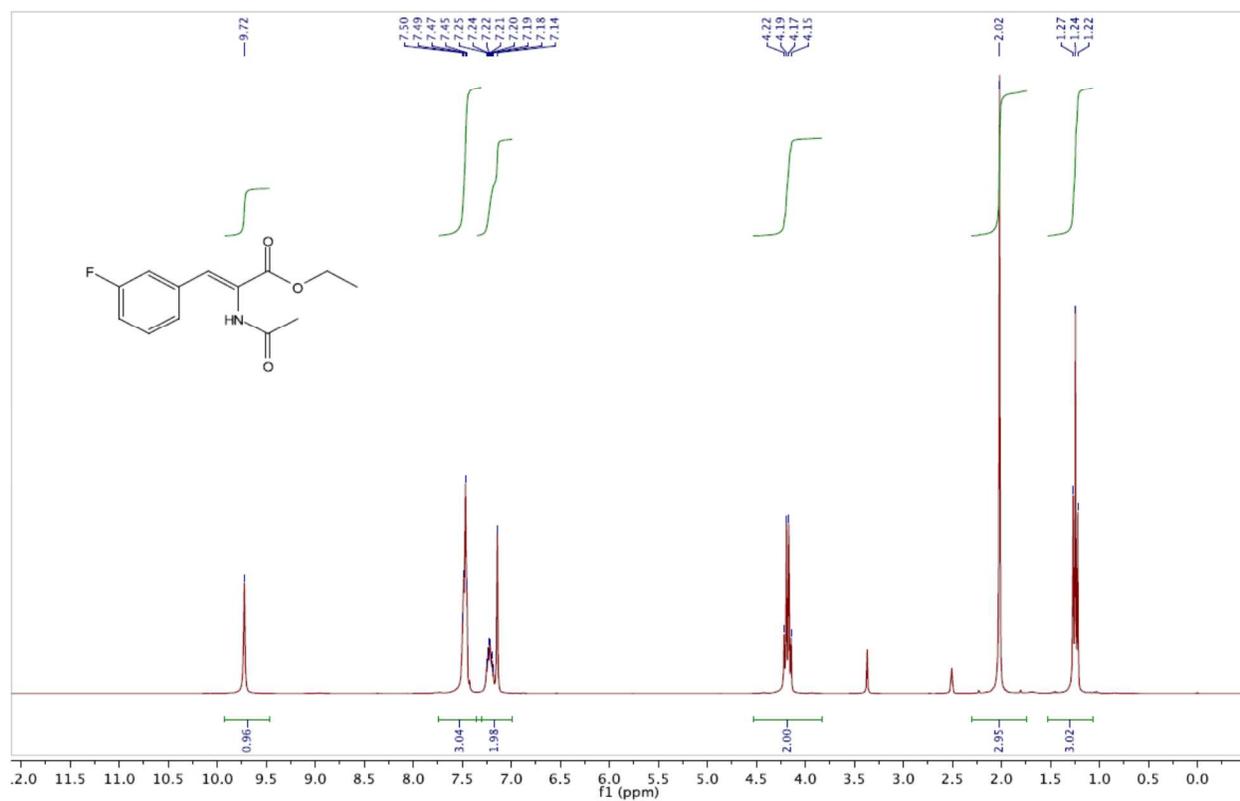
Ethyl (Z)-3-([1,1'-biphenyl]-2-yl)-2-acetamidoacrylate, R=*o*-Ph, compd **1h**.



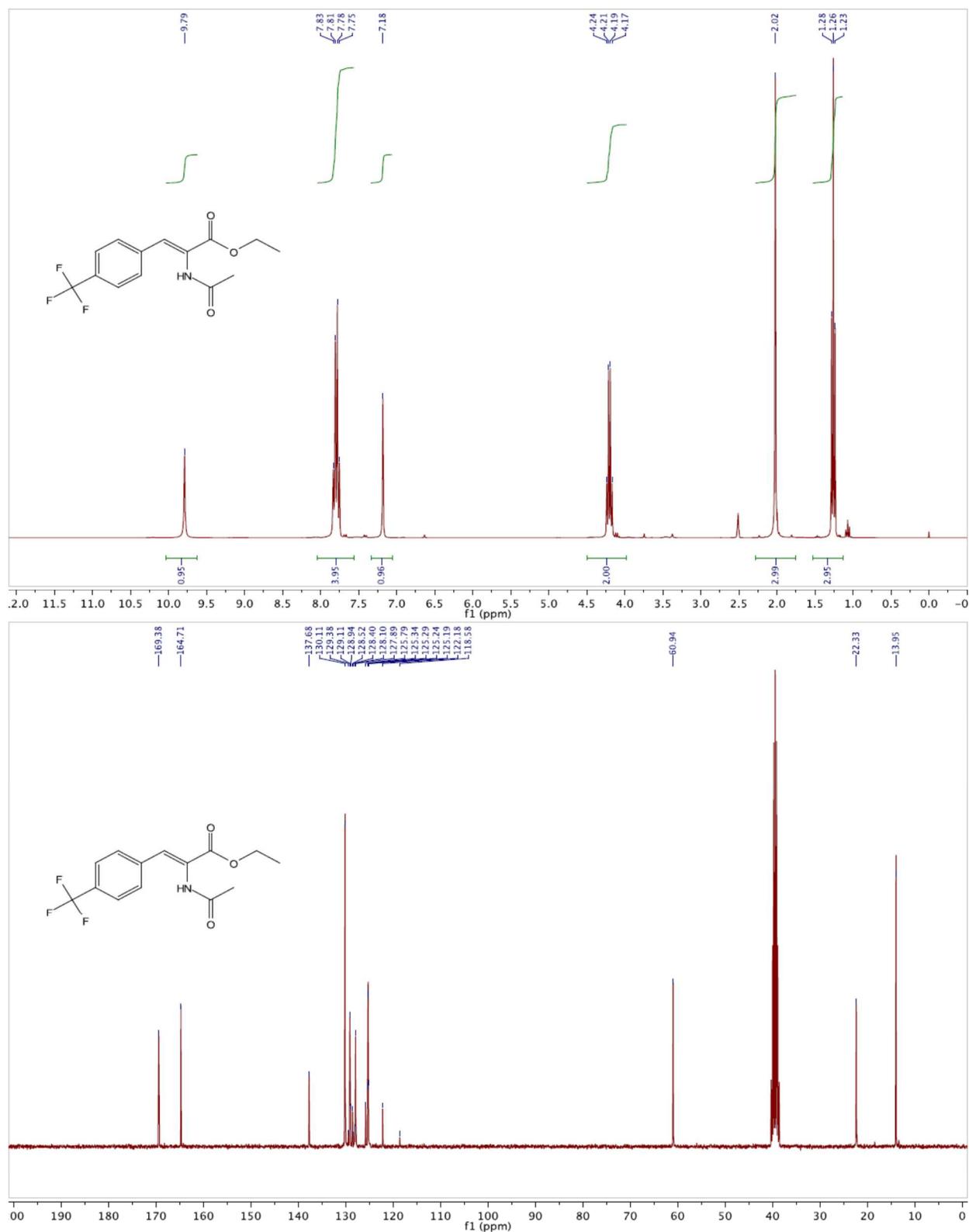
Ethyl (Z)-2-acetamido-3-(4-fluorophenyl)acrylate, R=p-F, compd **1i**.



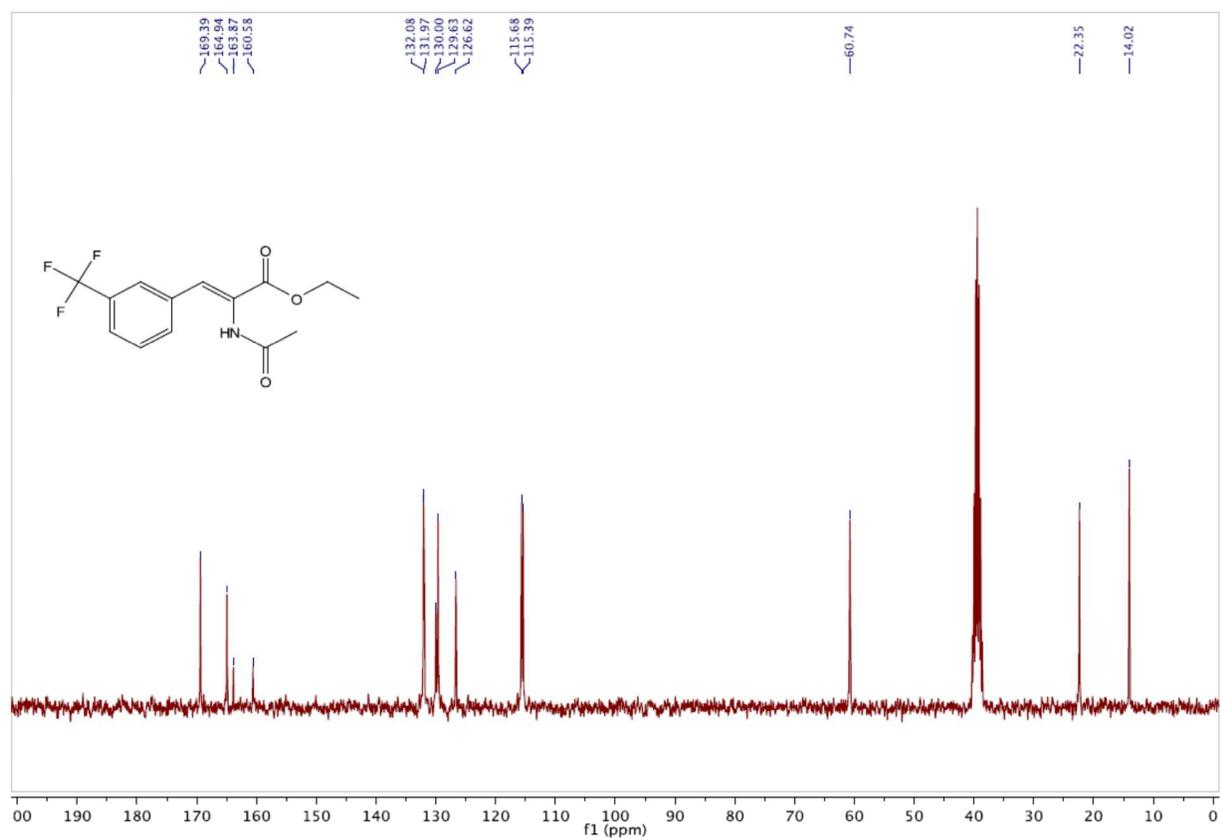
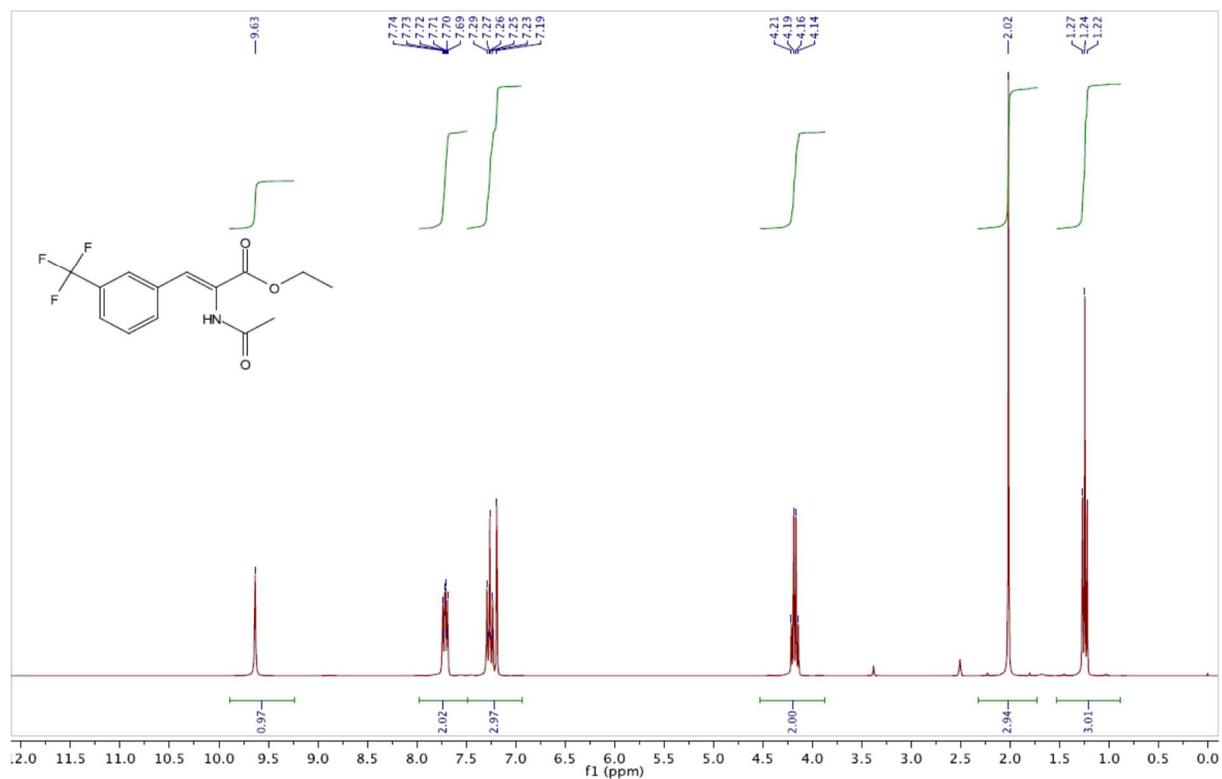
Ethyl (Z)-2-acetamido-3-(3-fluorophenyl)acrylate, R=*m*-F, compd1j.



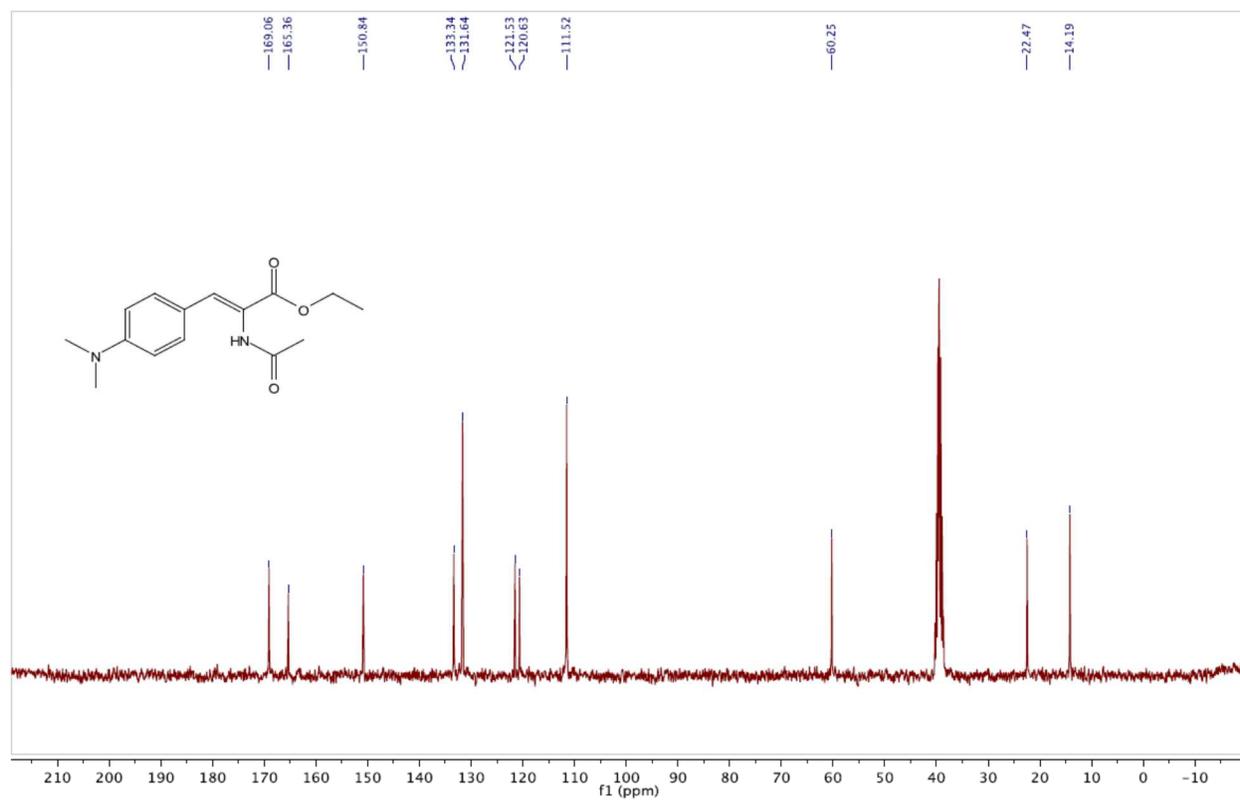
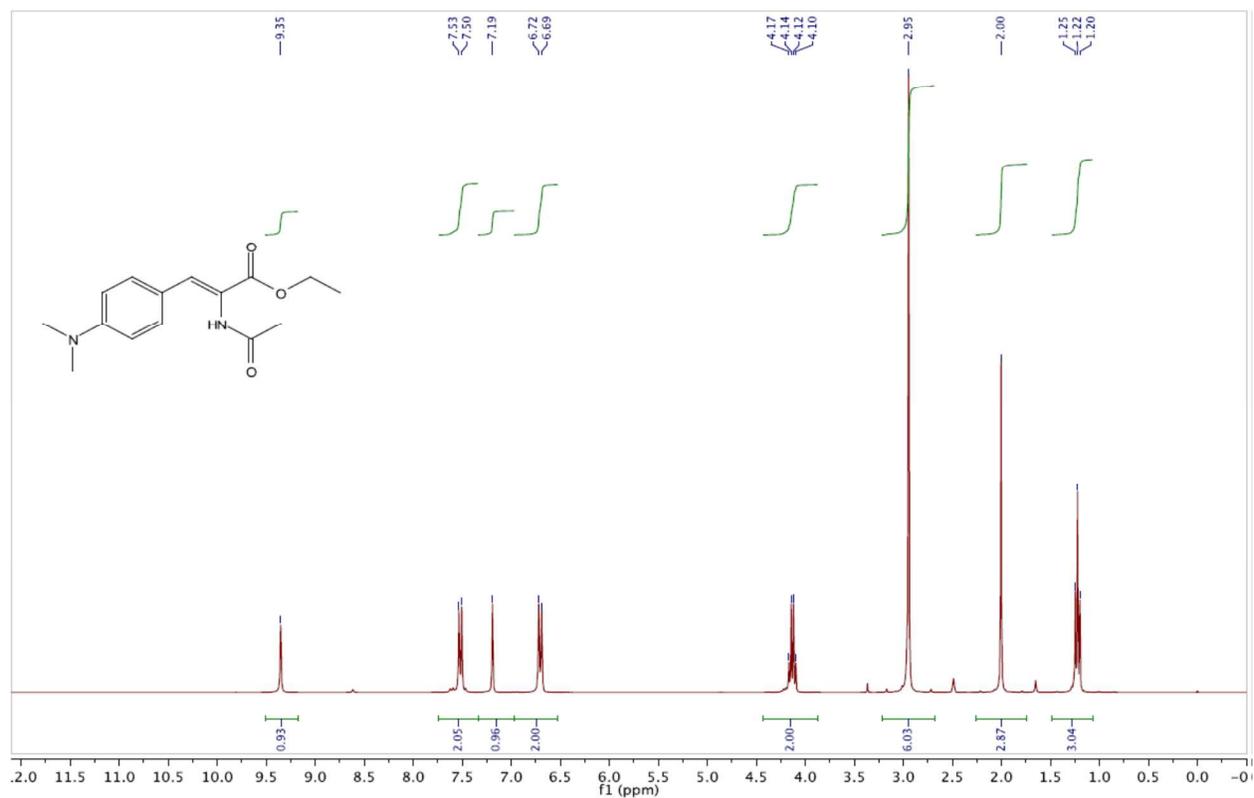
Ethyl (Z)-2-acetamido-3-(4-(trifluoromethyl)phenyl)acrylate, R= *p*-CF<sub>3</sub>, compd **1k**.



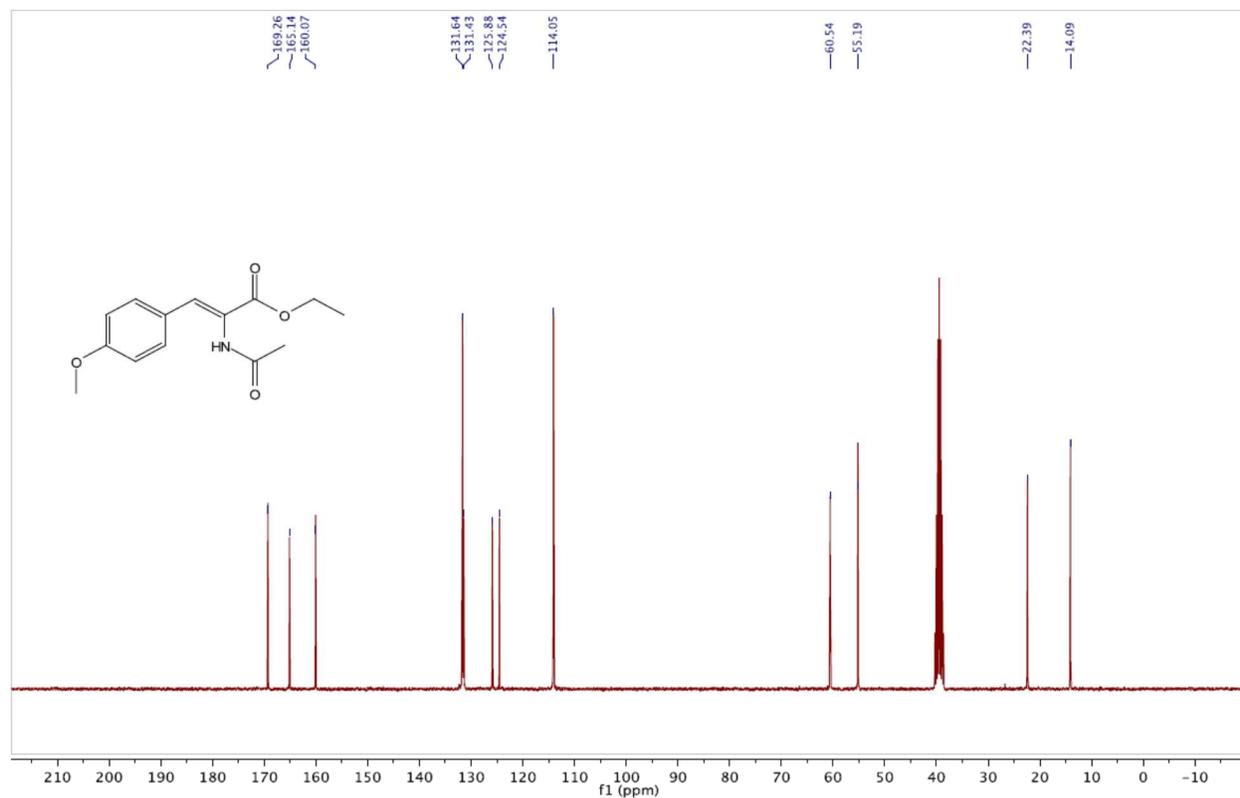
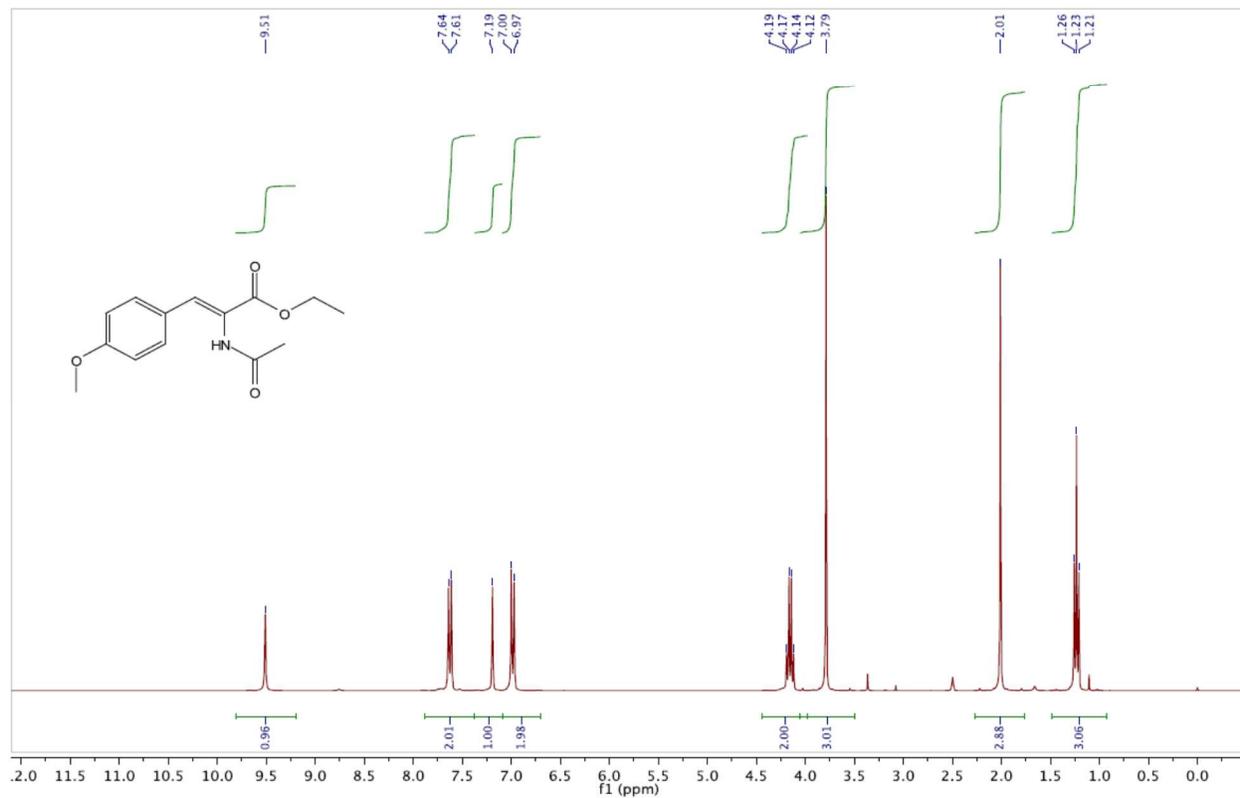
Ethyl (Z)-2-acetamido-3-(3-(trifluoromethyl)phenyl)acrylate, R=*m*-CF<sub>3</sub>, compd **11**.



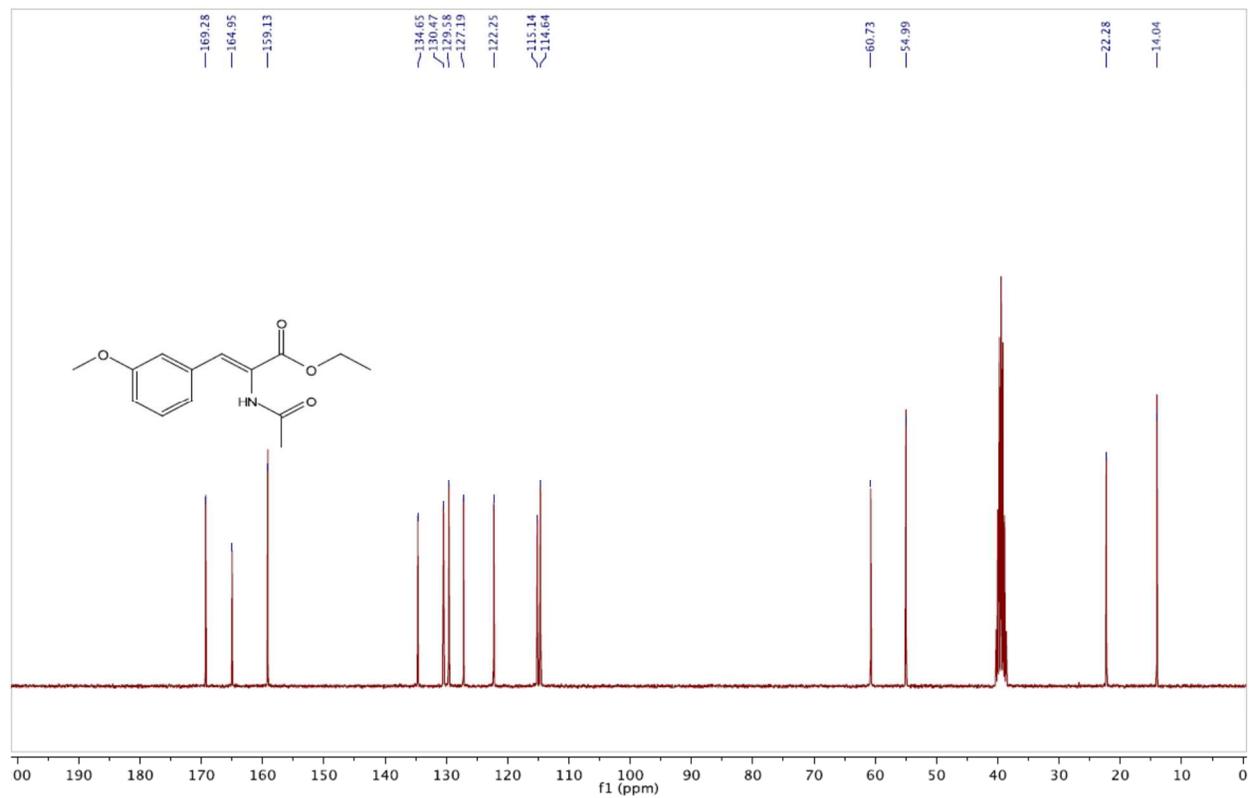
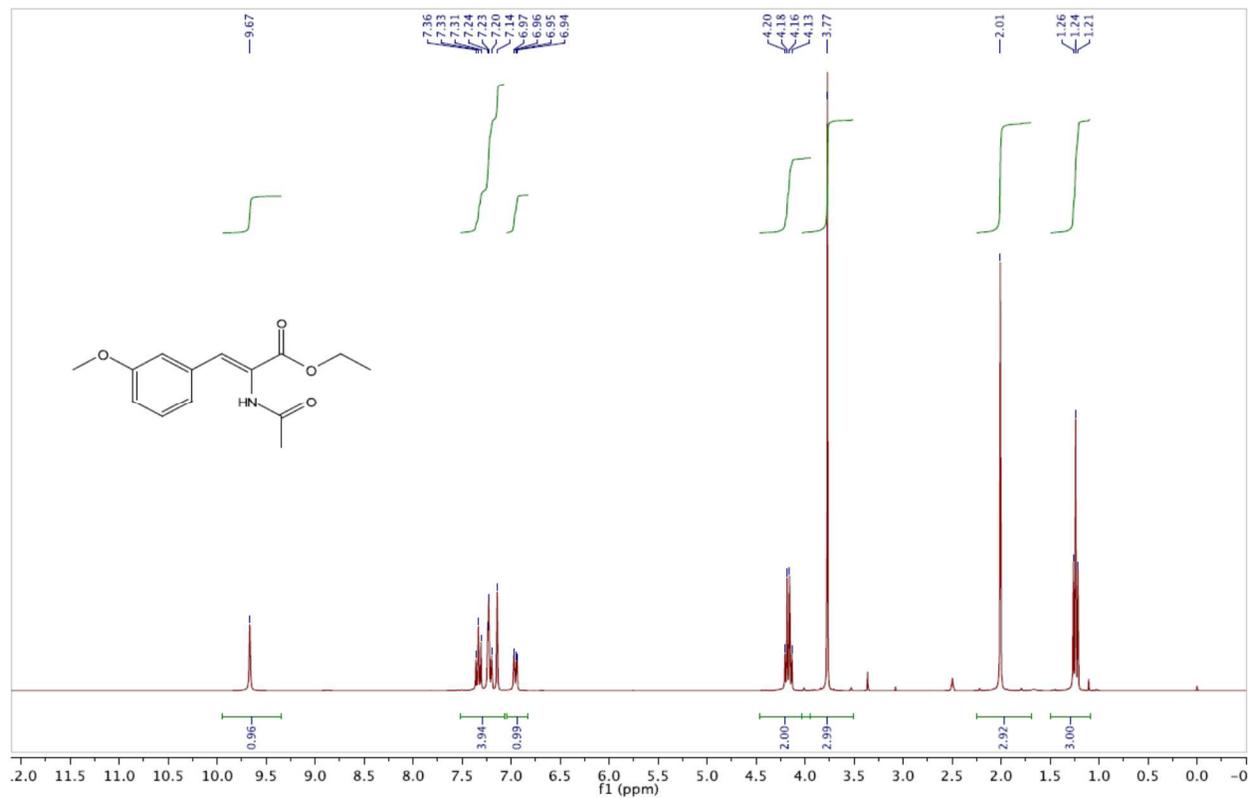
Ethyl (Z)-2-acetamido-3-(4-(dimethylamino)phenyl)acrylate, R=*p*-NMe<sub>2</sub>, compd **1m**.



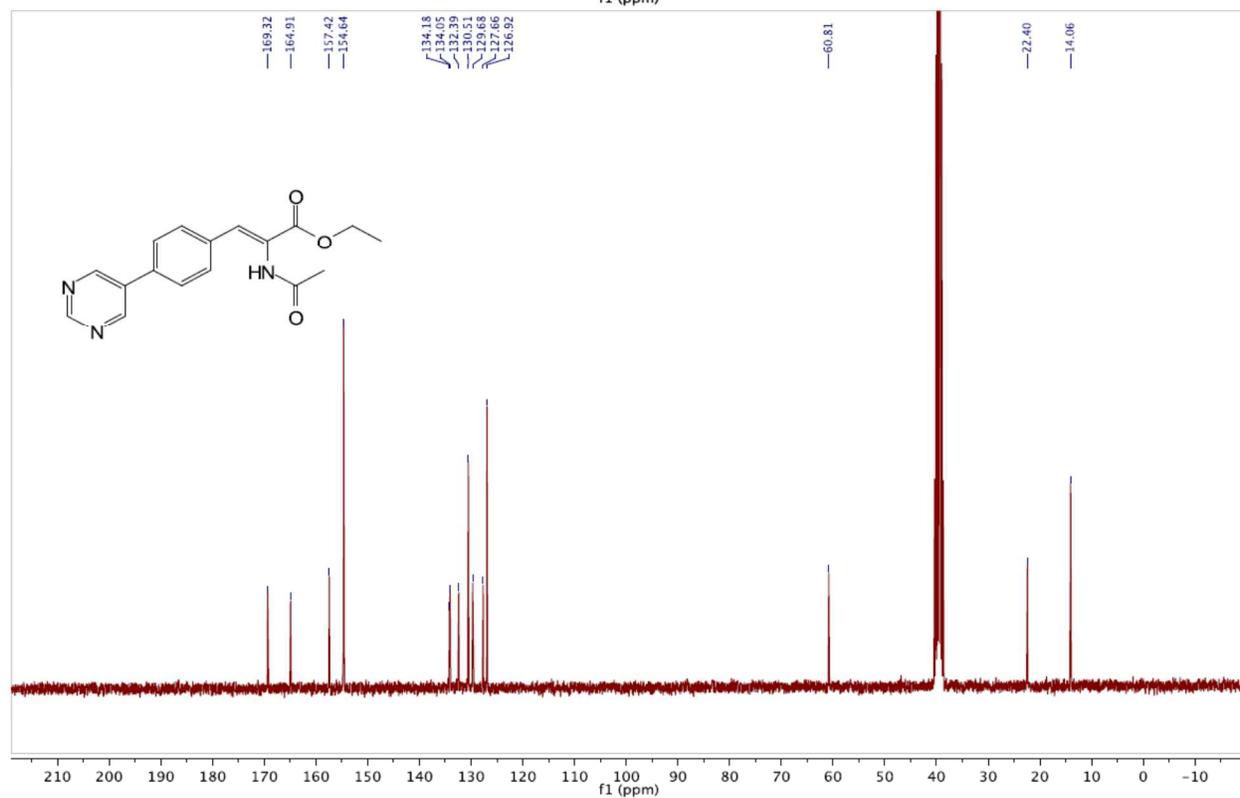
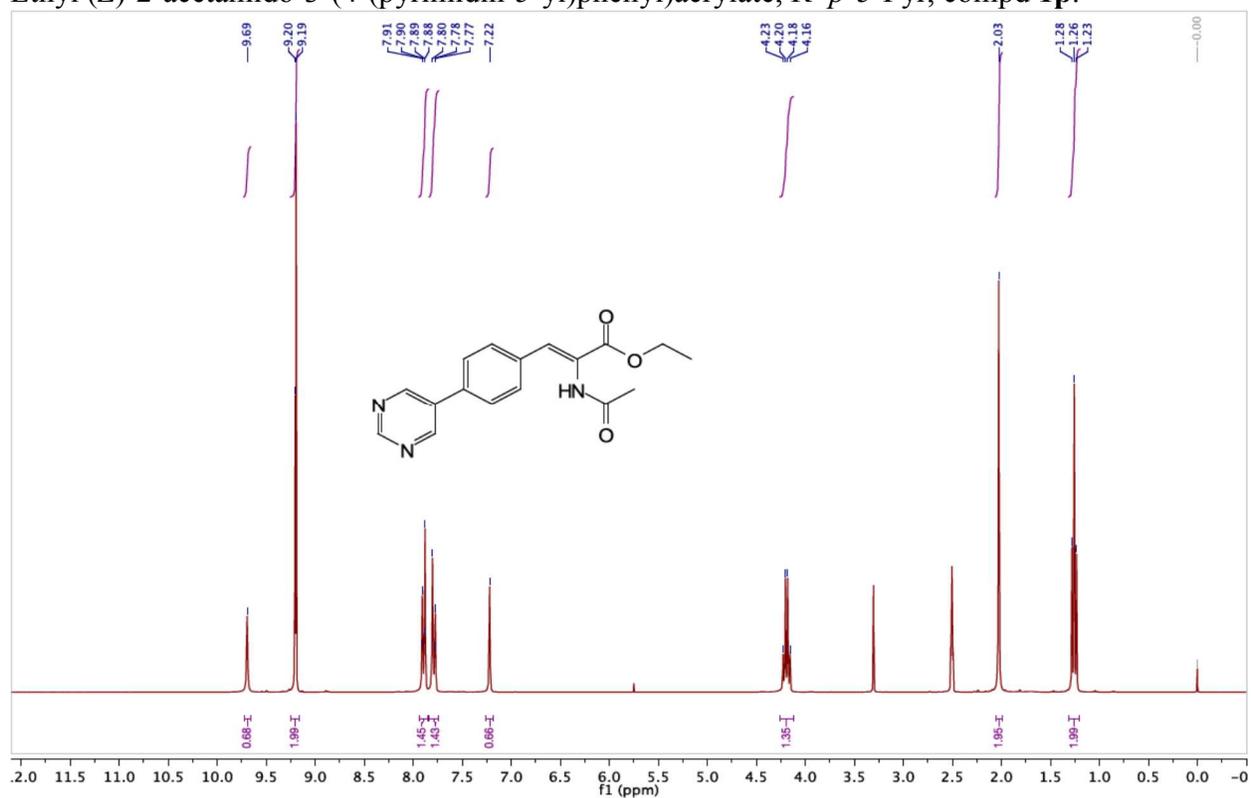
Ethyl (Z)-2-acetamido-3-(4-methoxyphenyl)acrylate, R=*p*-OMe, compd **1n**.



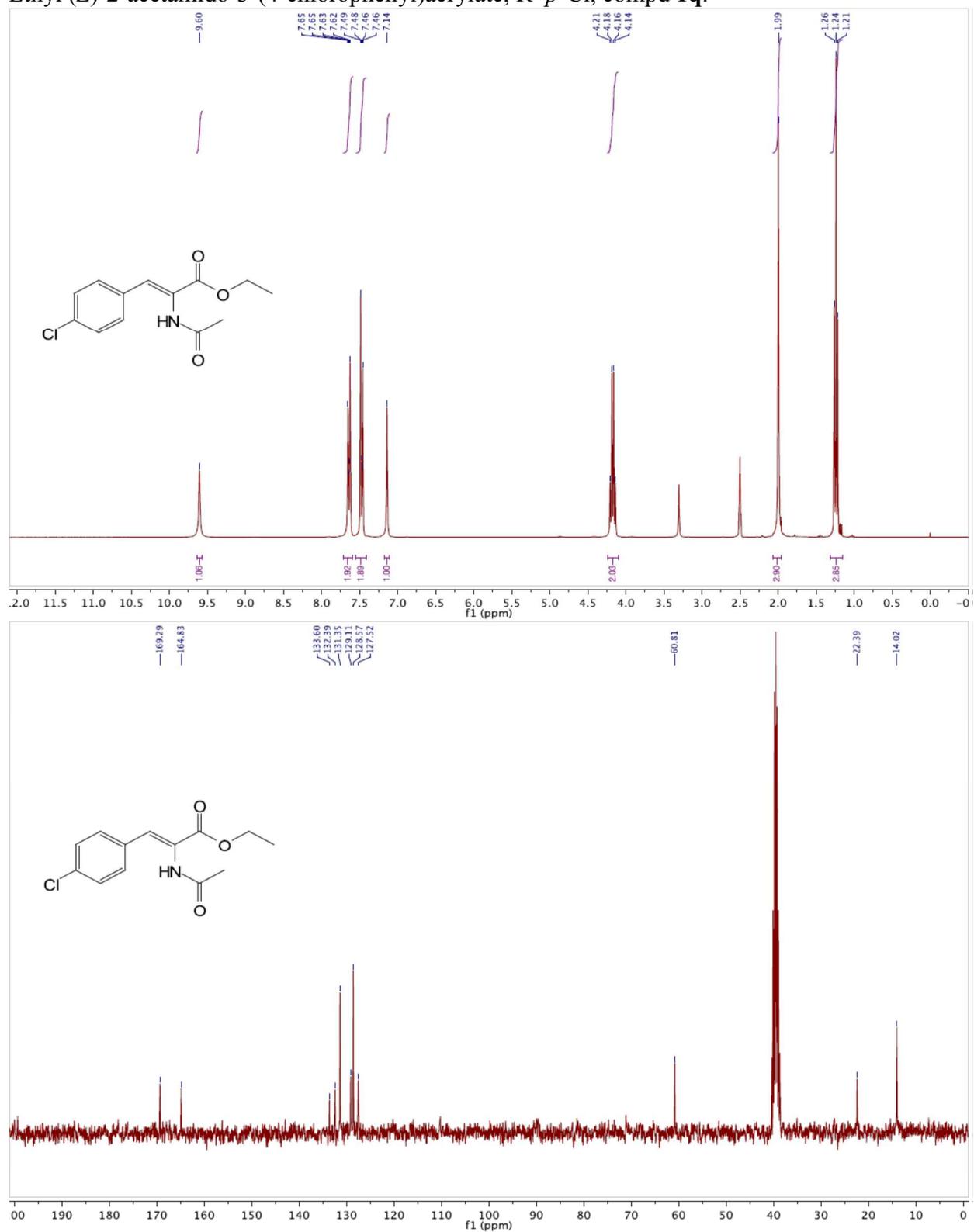
Ethyl (Z)-2-acetamido-3-(3-methoxyphenyl)acrylate, R=*m*-OMe, compd **10**.



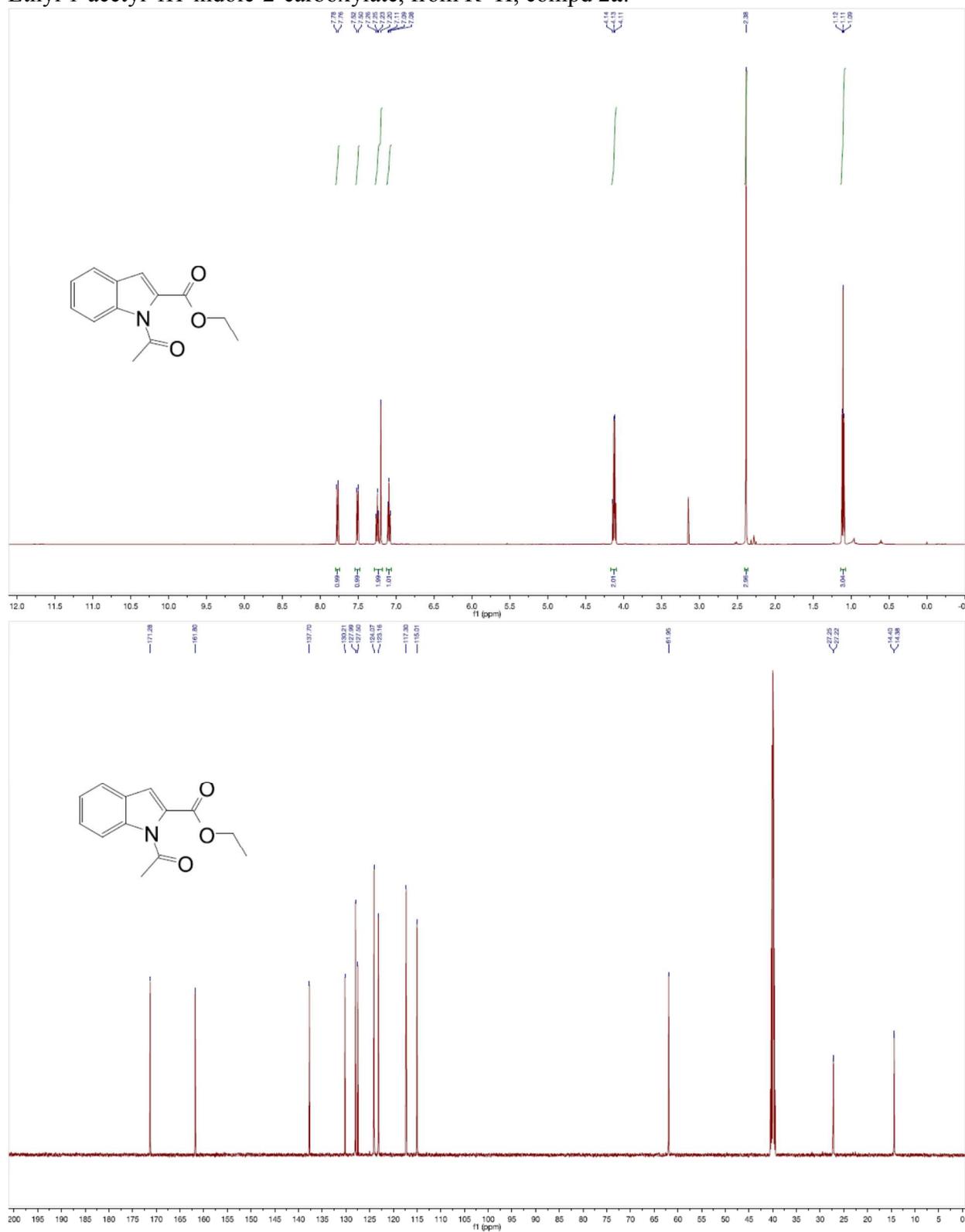
Ethyl (Z)-2-acetamido-3-(4-(pyrimidin-5-yl)phenyl)acrylate, R=*p*-5-Pyr, compd **1p**.



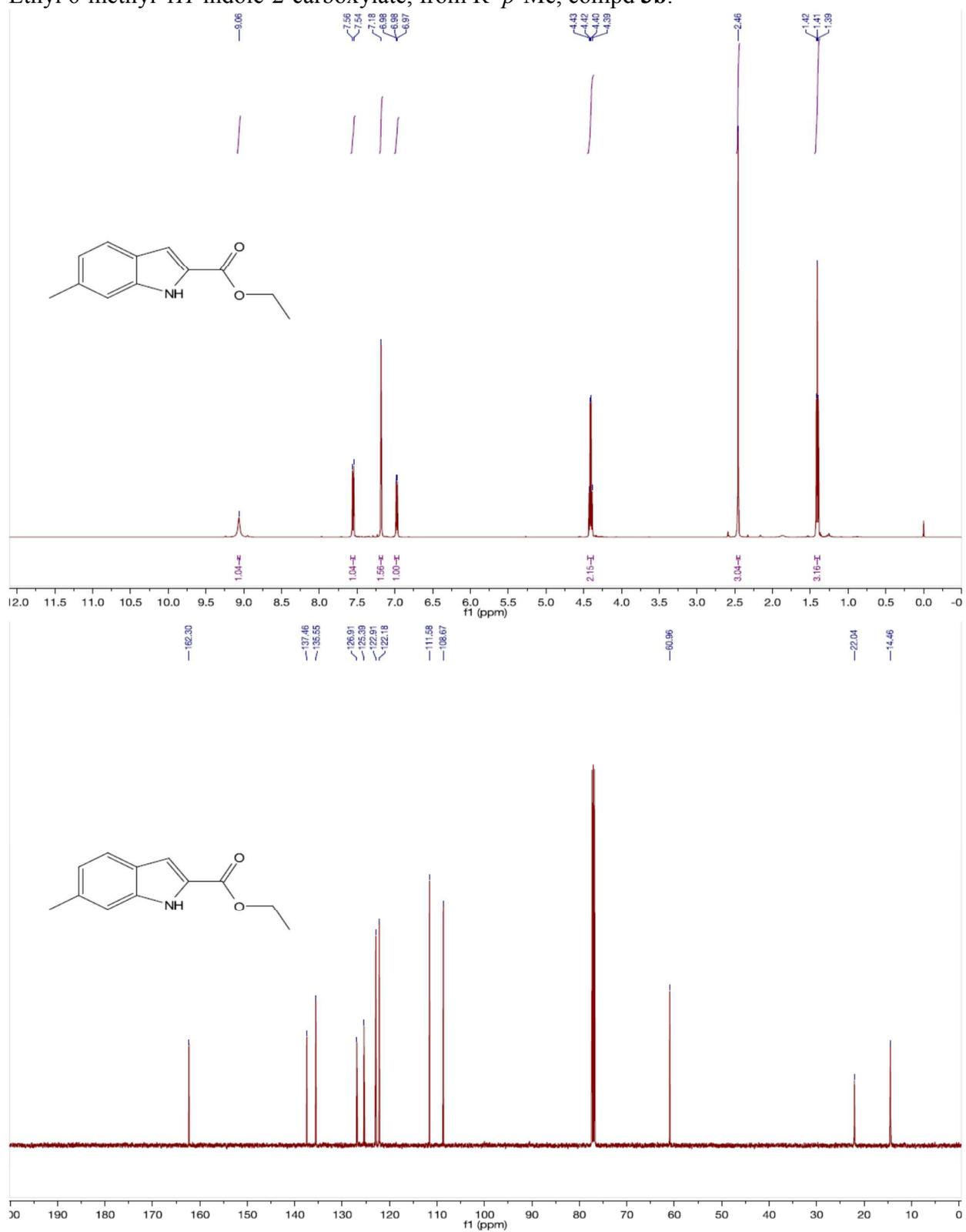
Ethyl (Z)-2-acetamido-3-(4-chlorophenyl)acrylate, R=p-Cl, compd **1q**.



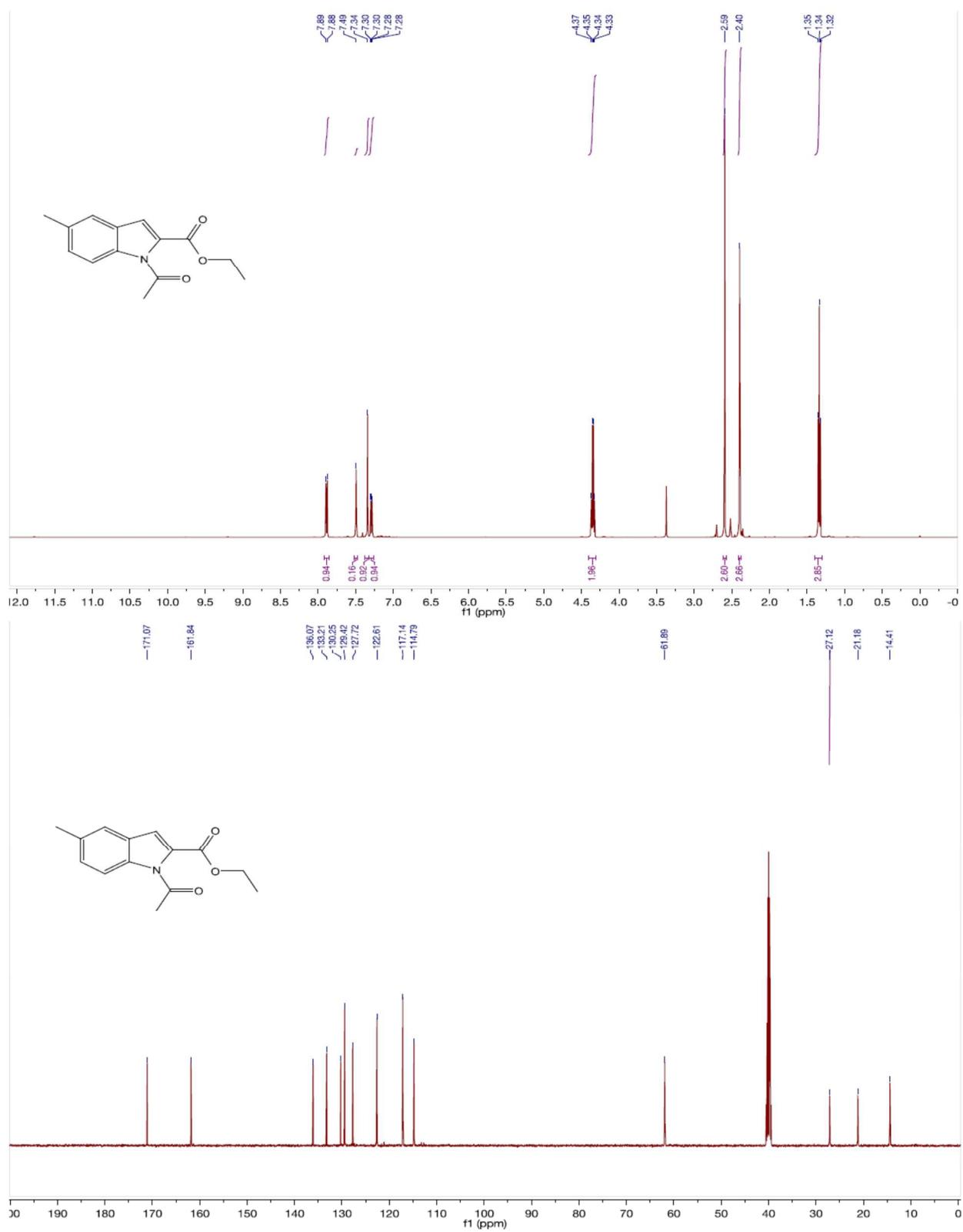
Ethyl 1-acetyl-1*H*-indole-2-carboxylate, from R=H, compd **2a**.



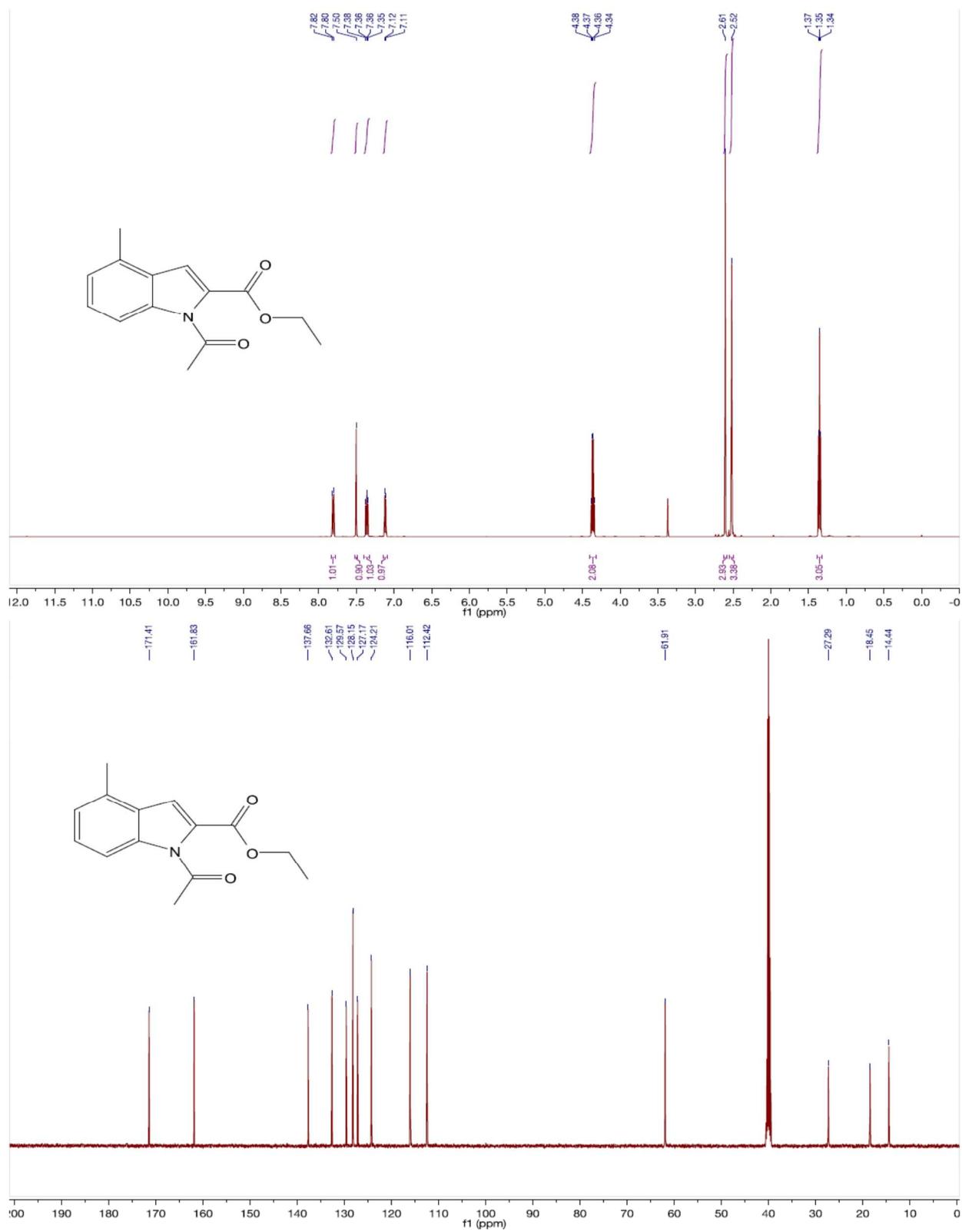
Ethyl 6-methyl-1*H*-indole-2-carboxylate, from R=*p*-Me, compd **3b**.



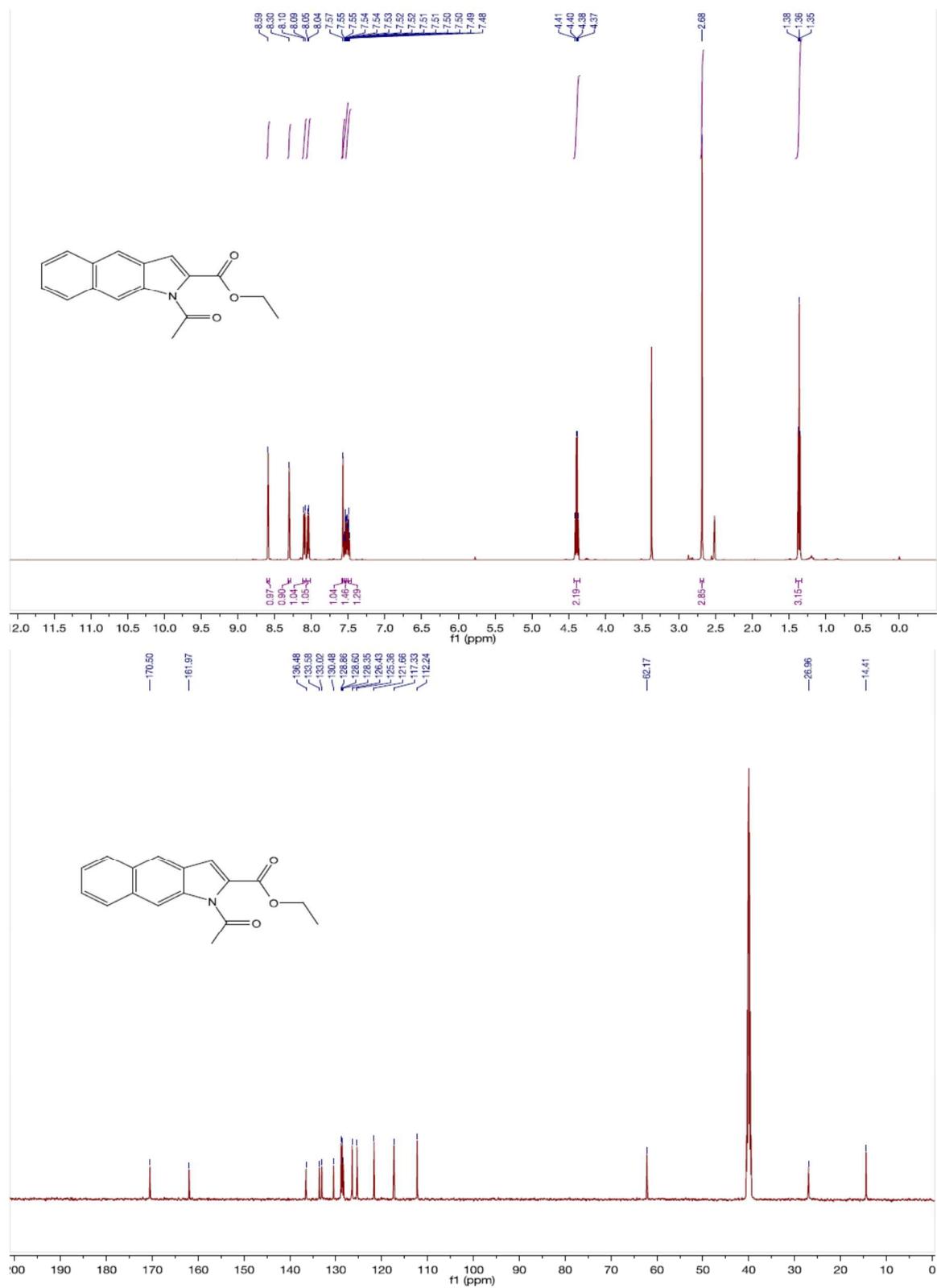
Ethyl 1-acetyl-5-methyl-1*H*-indole-2-carboxylate, from R=*m*-Me, compd **2c**.

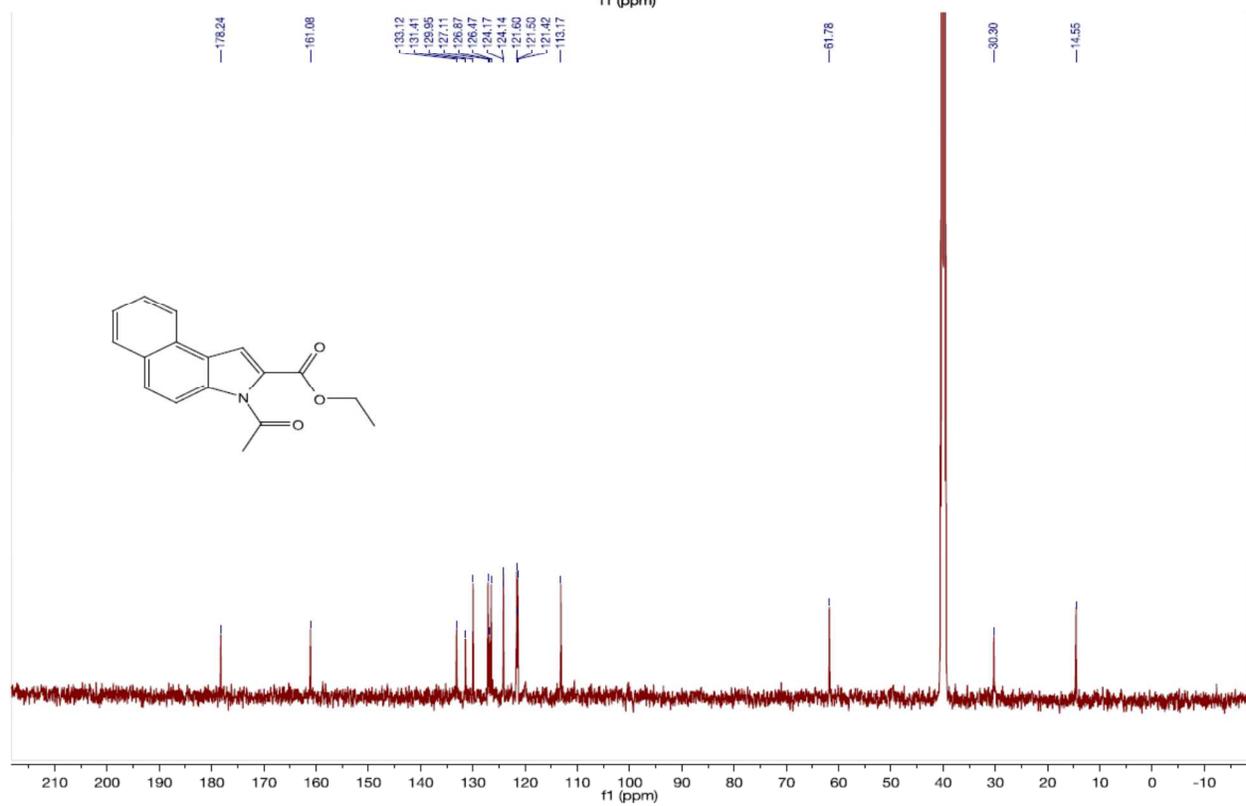
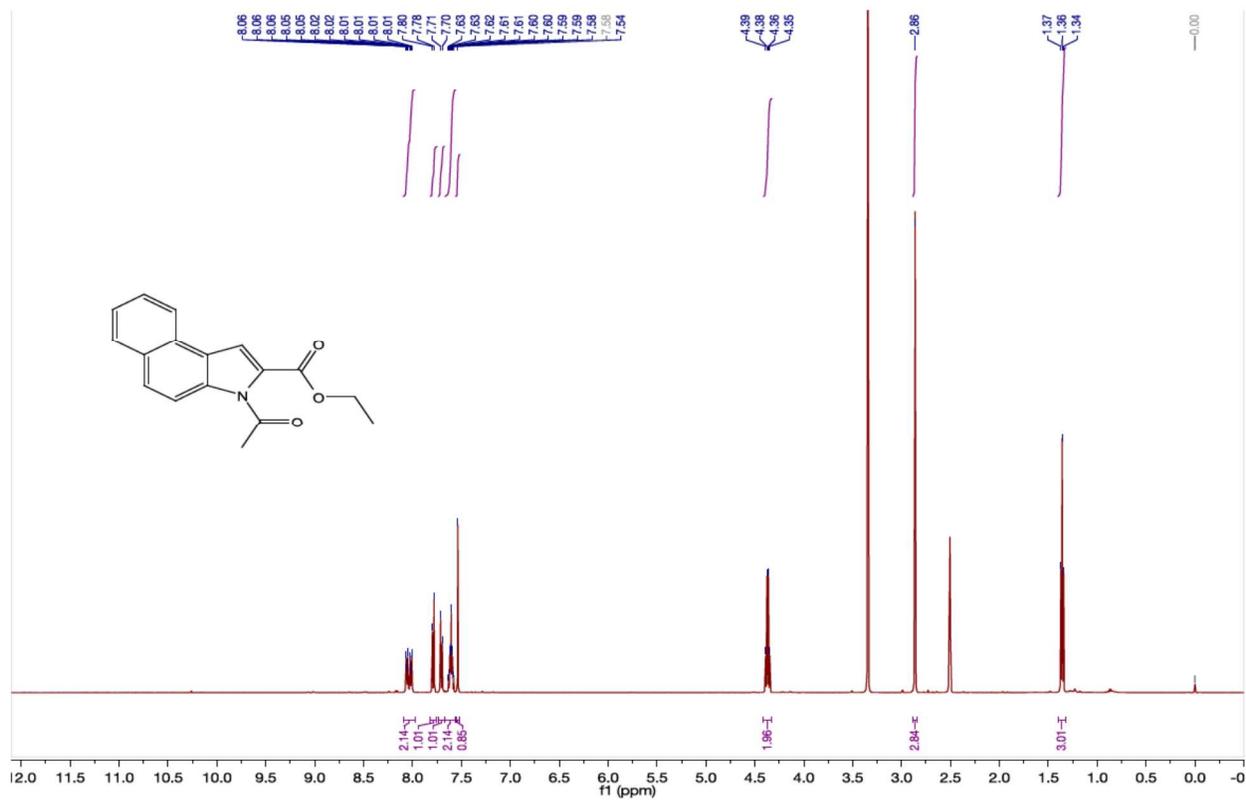


Ethyl 1-acetyl-4-methyl-1*H*-indole-2-carboxylate, from R=*o*-Me, compd **2d**.

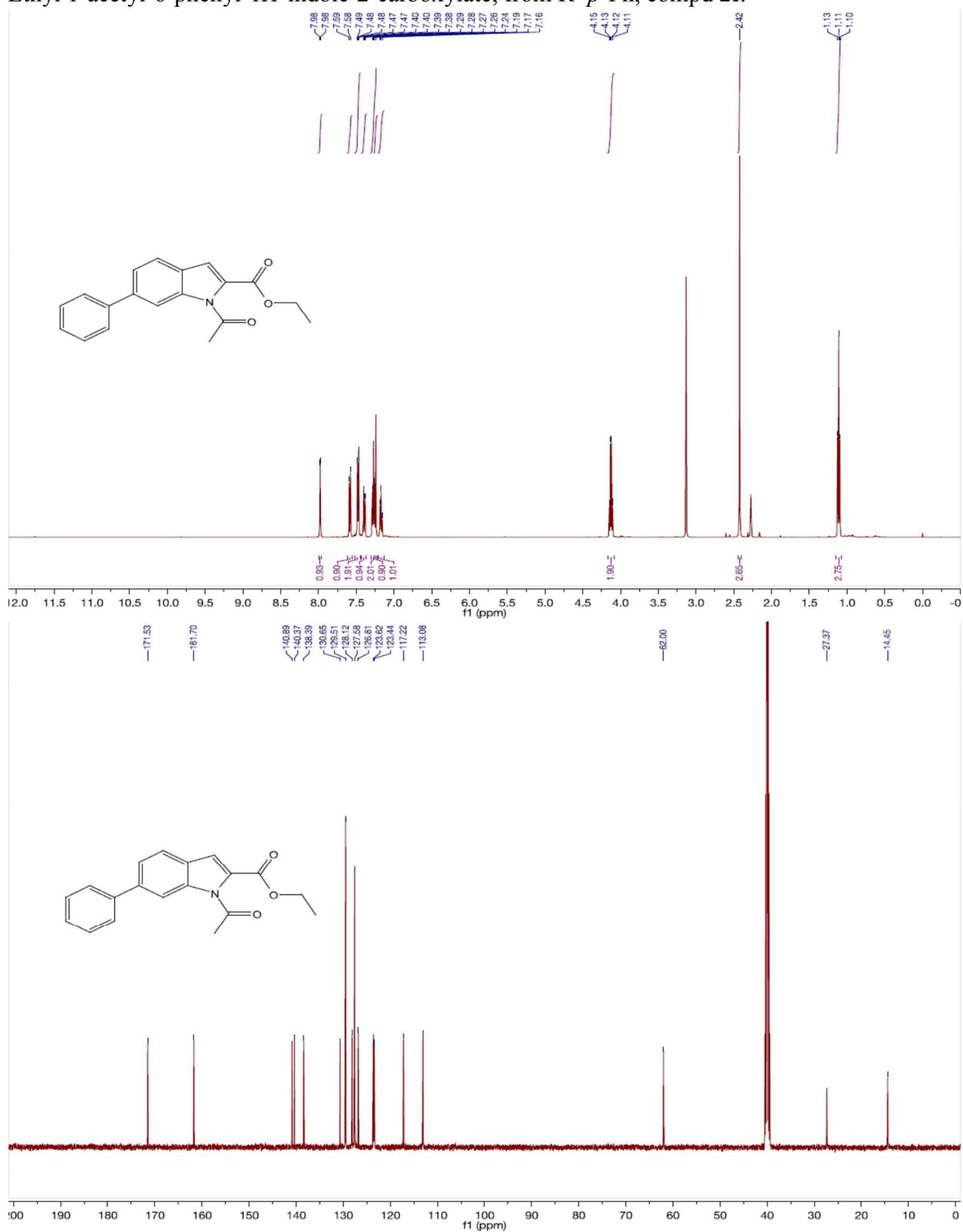


Ethyl 1-acetyl-1*H*-benzo[*f*]indole-2-carboxylate (isomer 1, compd **2e**) and ethyl 1-acetyl-1*H*-benzo[*g*]indole-2-carboxylate (isomer 2, compd **2e'**) from R=2-naphthyl substitution.

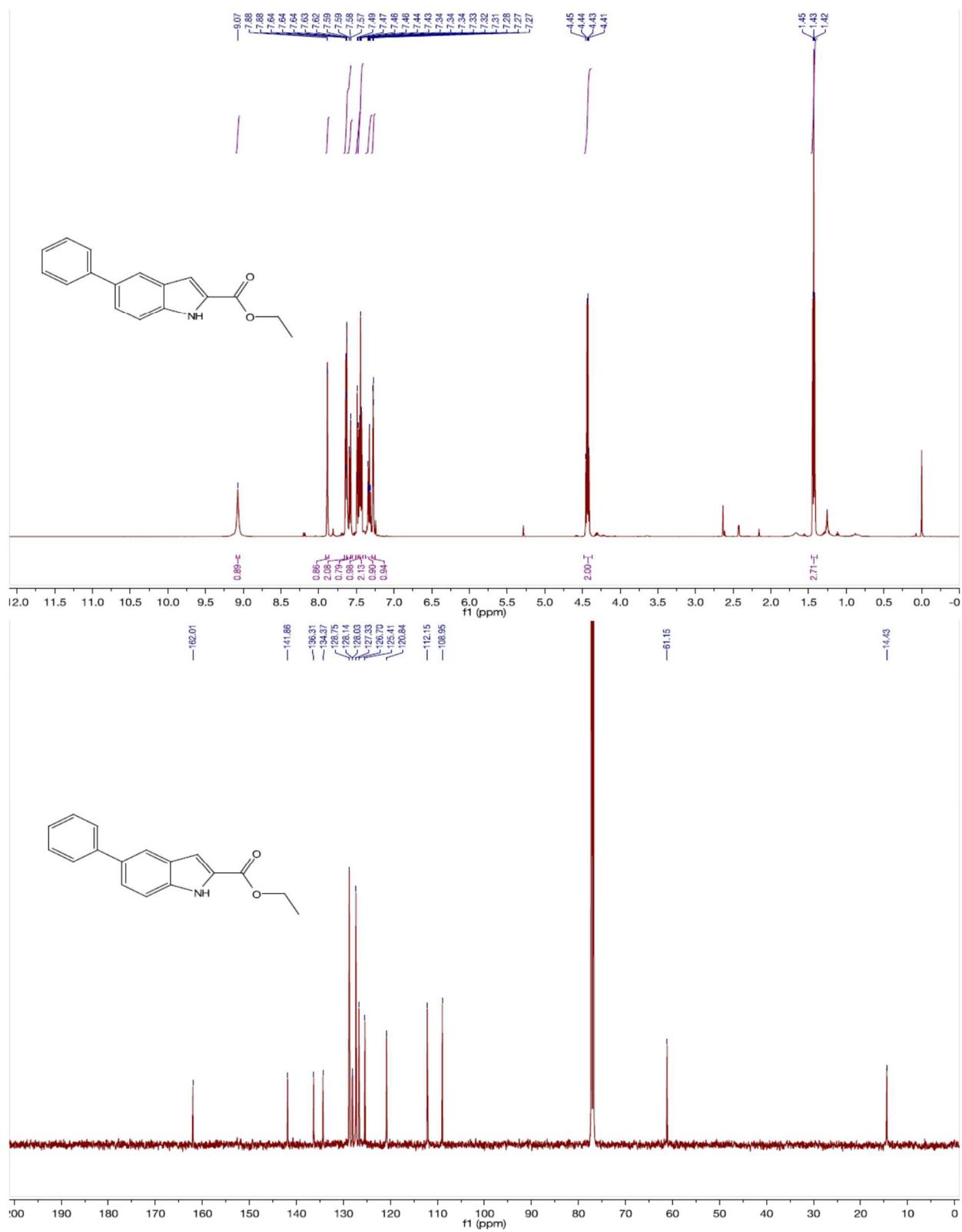




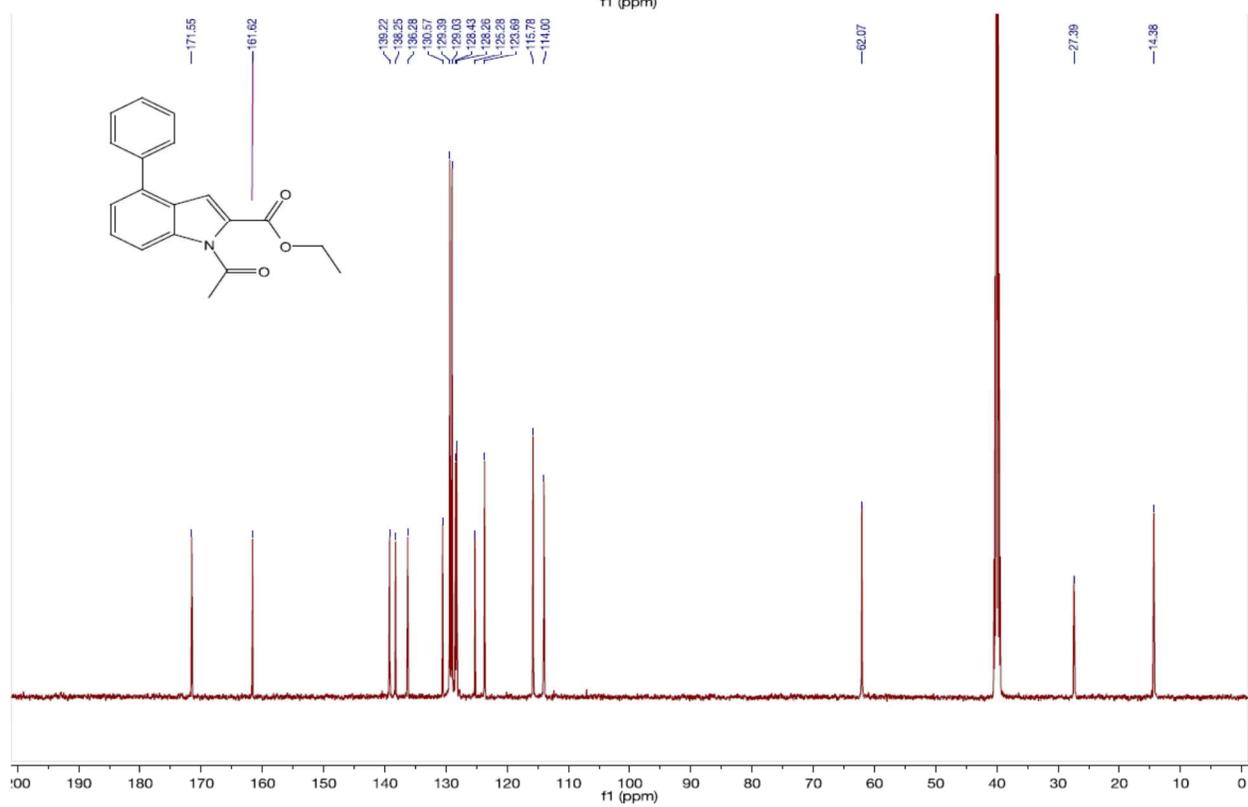
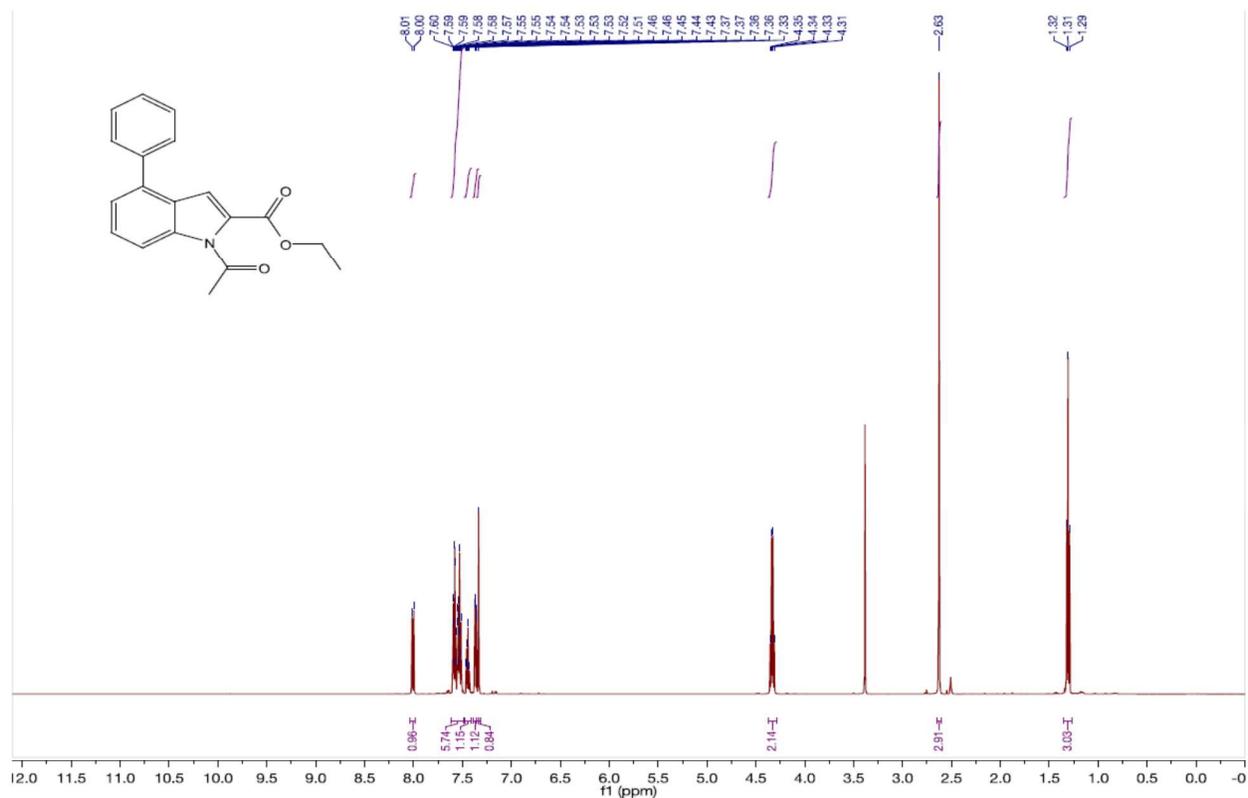
Ethyl 1-acetyl-6-phenyl-1*H*-indole-2-carboxylate, from R=*p*-Ph, compd **2f**.



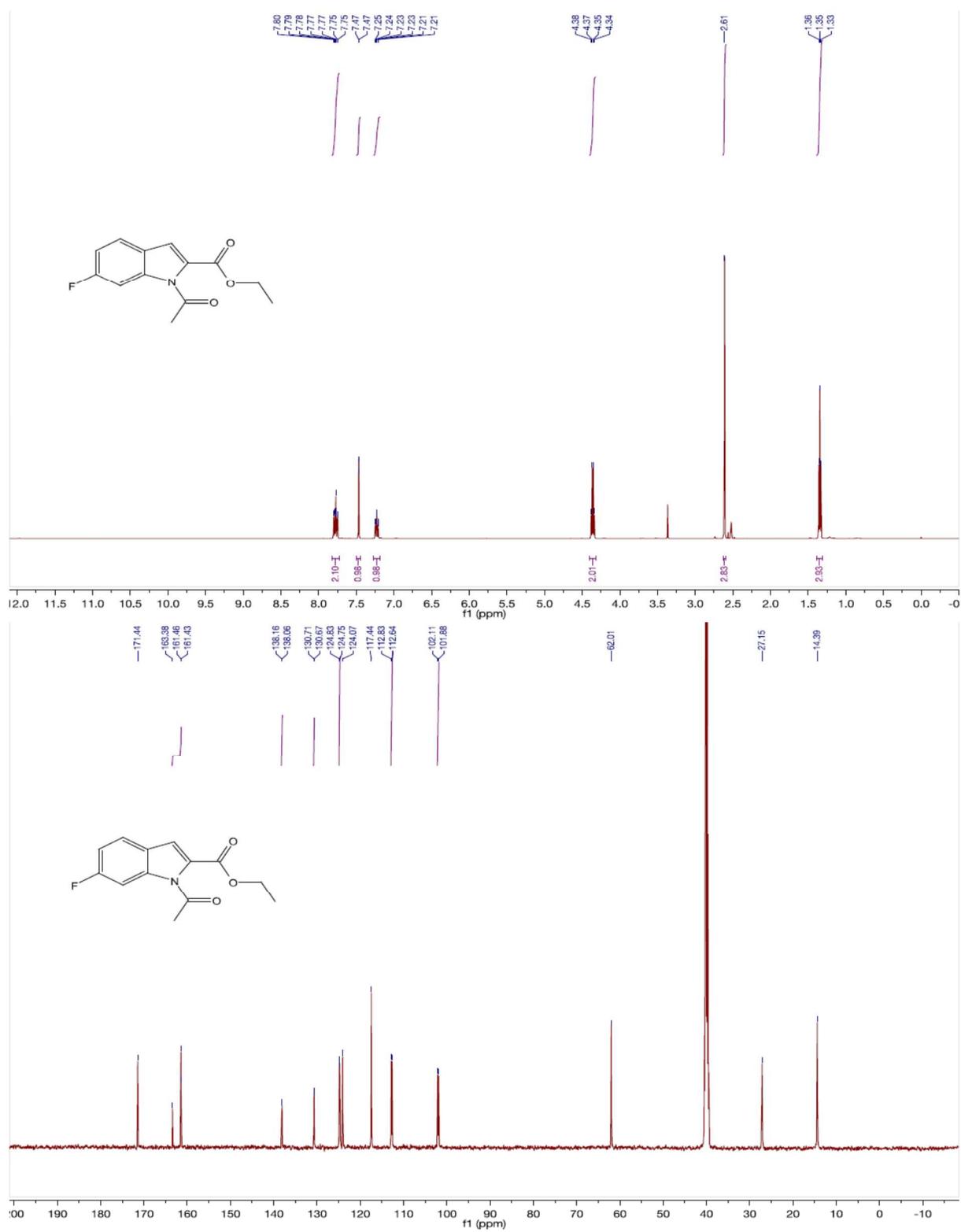
Ethyl 5-phenyl-1*H*-indole-2-carboxylate, from R=*m*-Ph, compd **3g**.



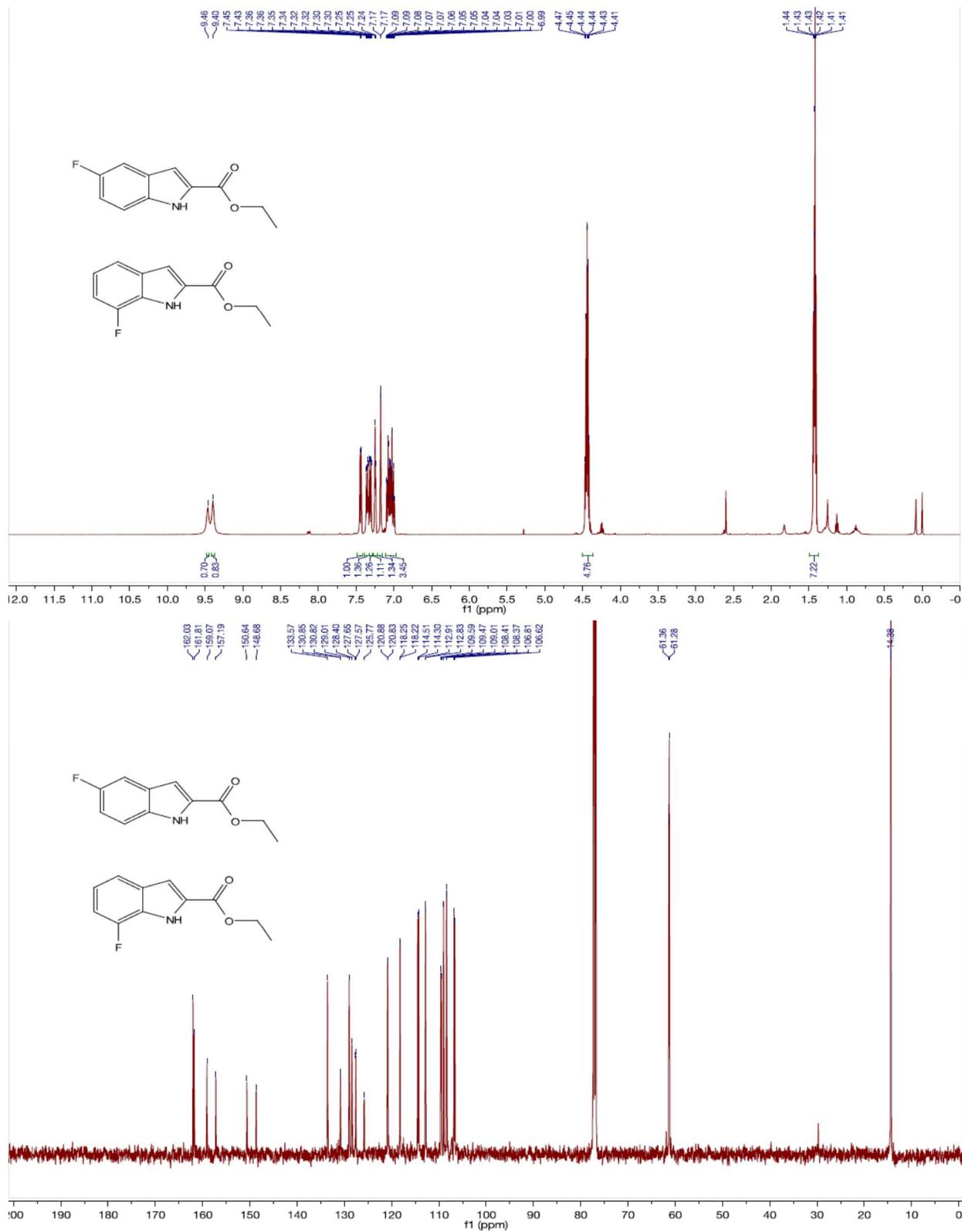
Ethyl 1-acetyl-4-phenyl-1*H*-indole-2-carboxylate, from R=*o*-Ph, compd **2h**.



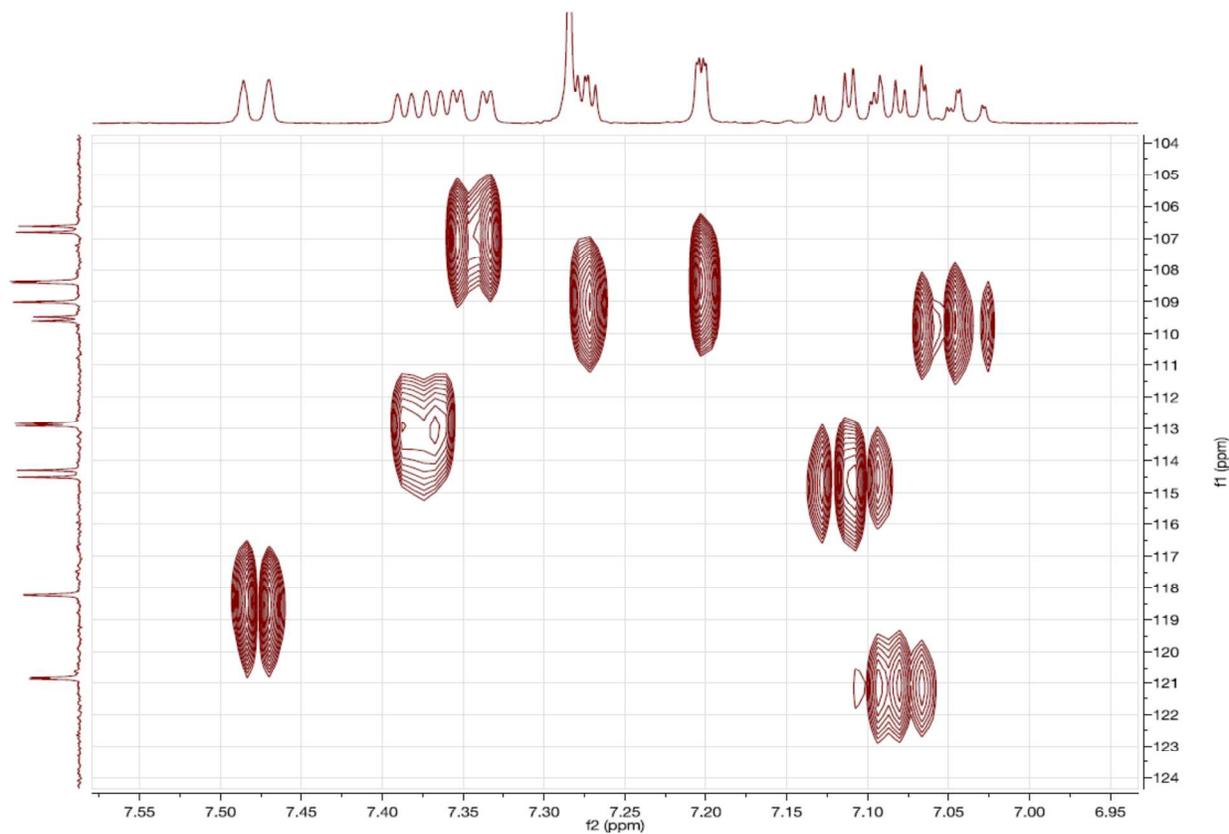
Ethyl 1-acetyl-6-fluoro-1*H*-indole-2-carboxylate, from R=*p*-F, compd **2i**.



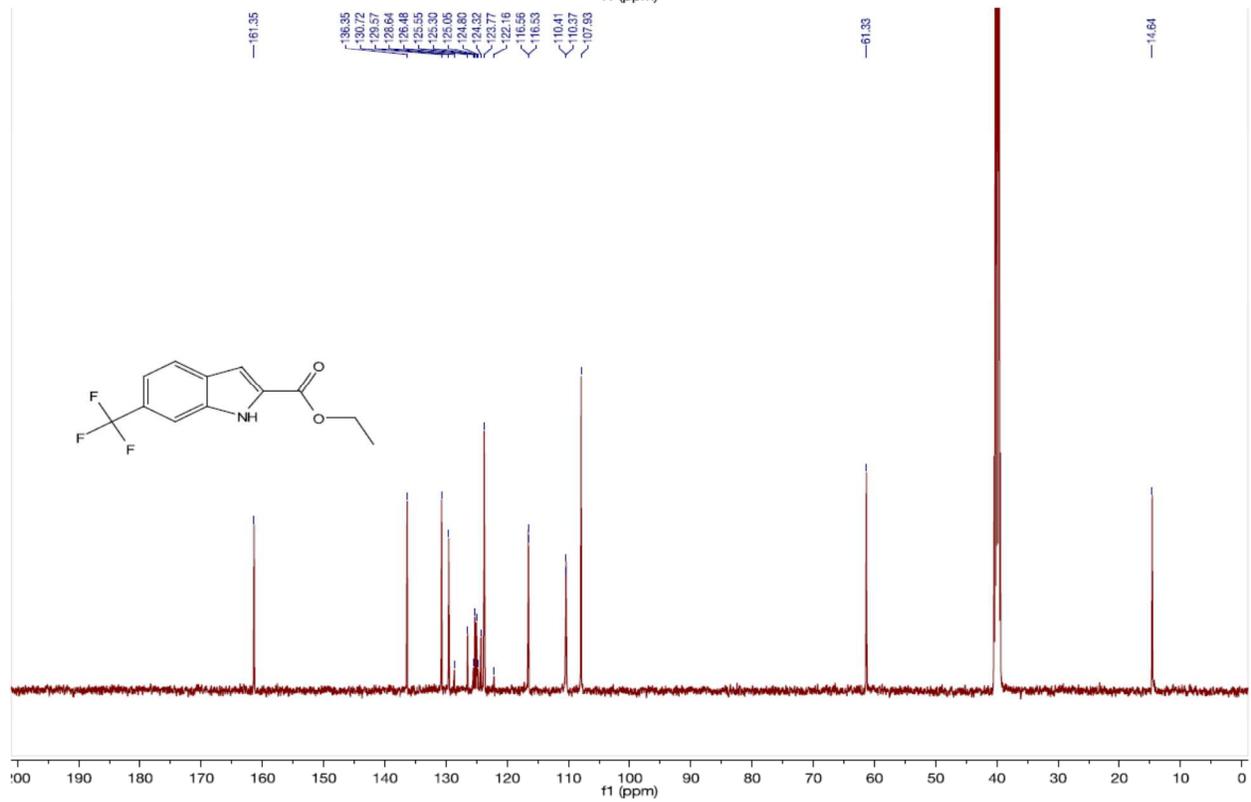
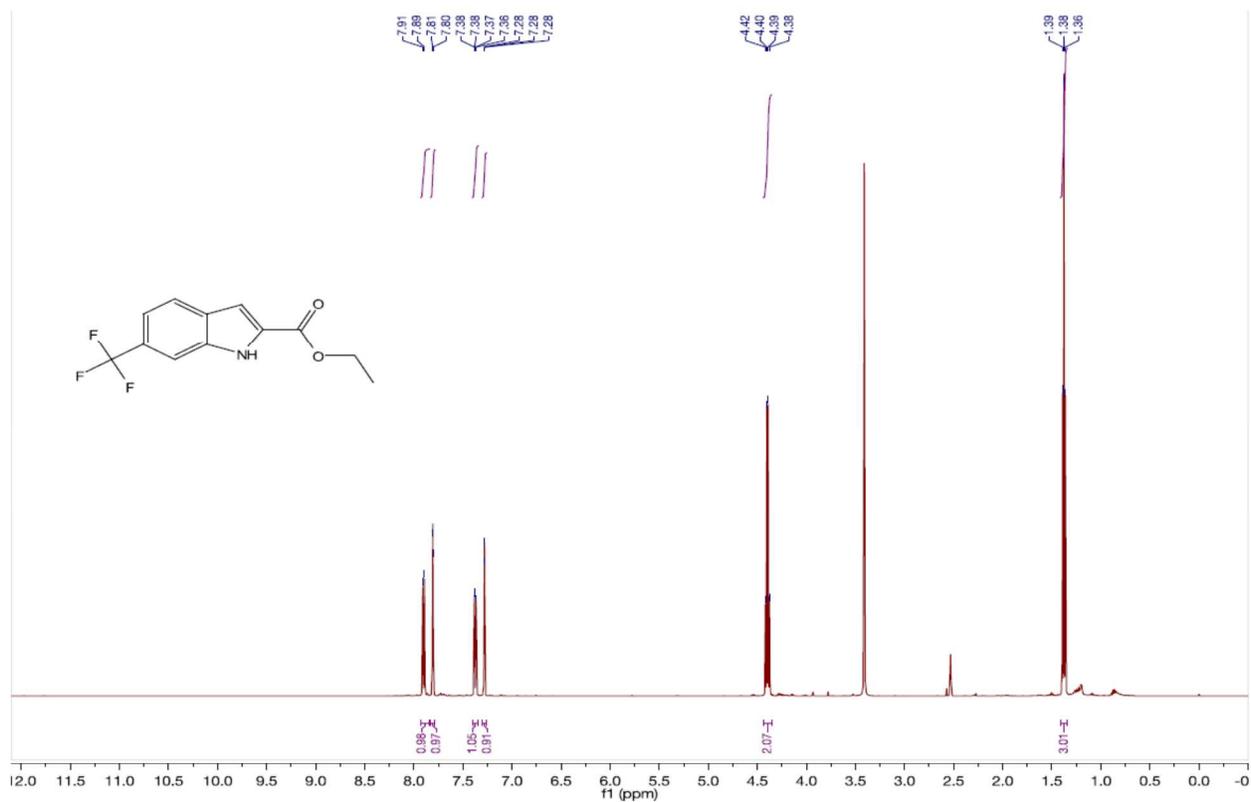
Ethyl 5-fluoro-1*H*-indole-2-carboxylate (isomer 1, compd **3j**) and ethyl 7-fluoro-1*H*-indole-2-carboxylate (isomer 2, compd **3j'**) from R=*m*-F.



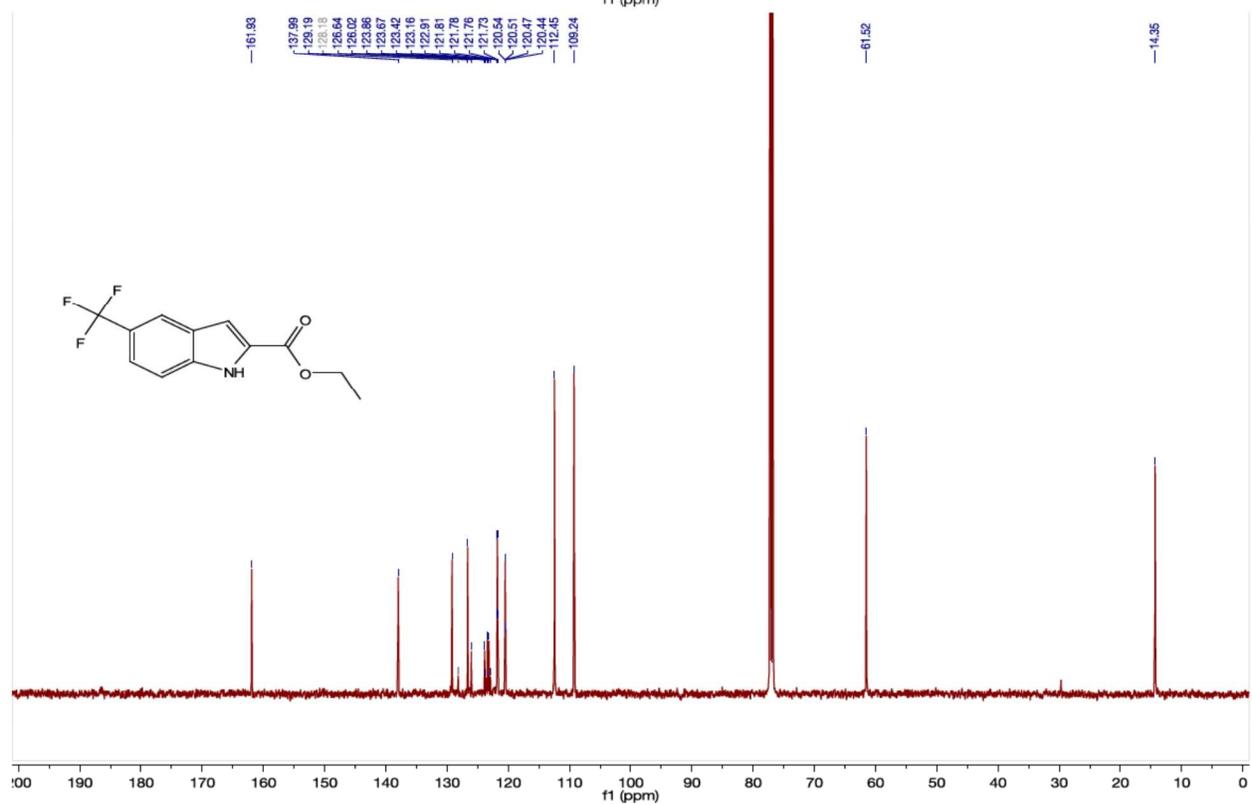
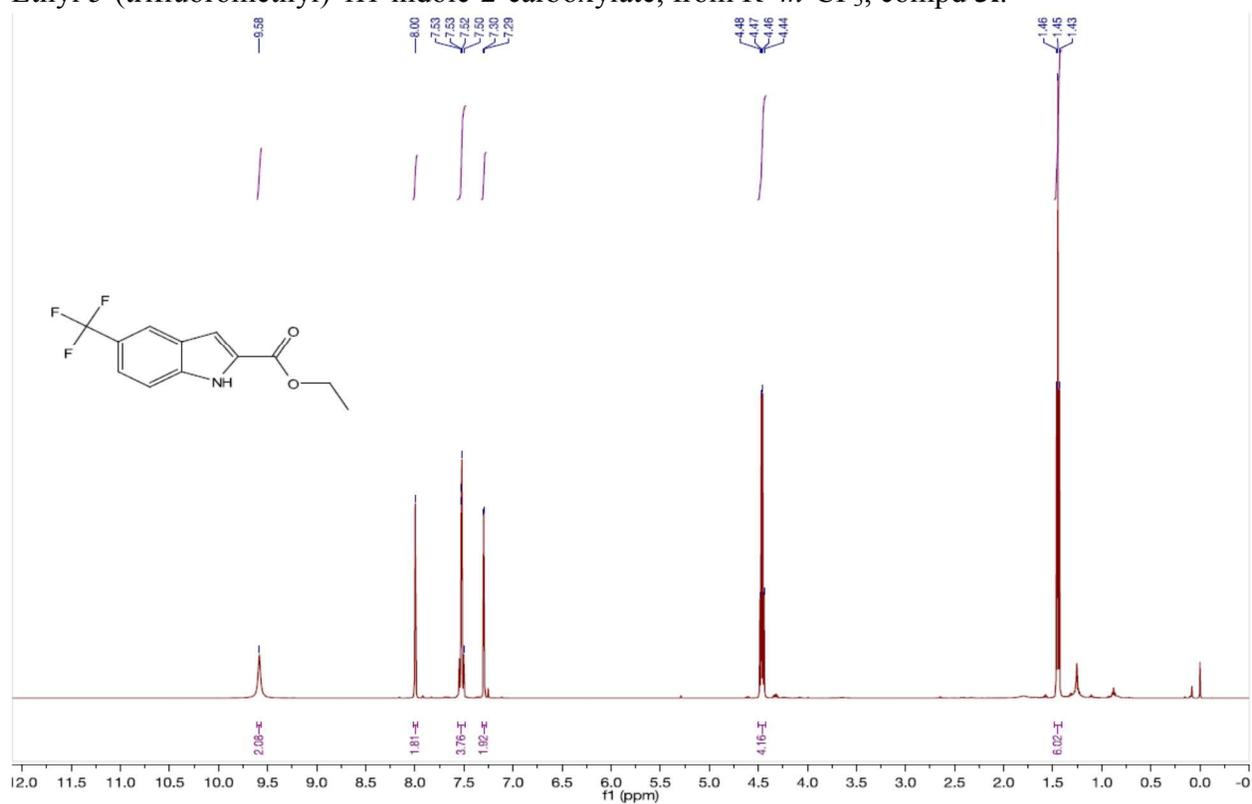
HSQC for ethyl 5-fluoro-1*H*-indole-2-carboxylate (isomer 1, compd **3j**) and ethyl 7-fluoro-1*H*-indole-2-carboxylate (isomer 2, compd **3j'**) from R=*m*-F.



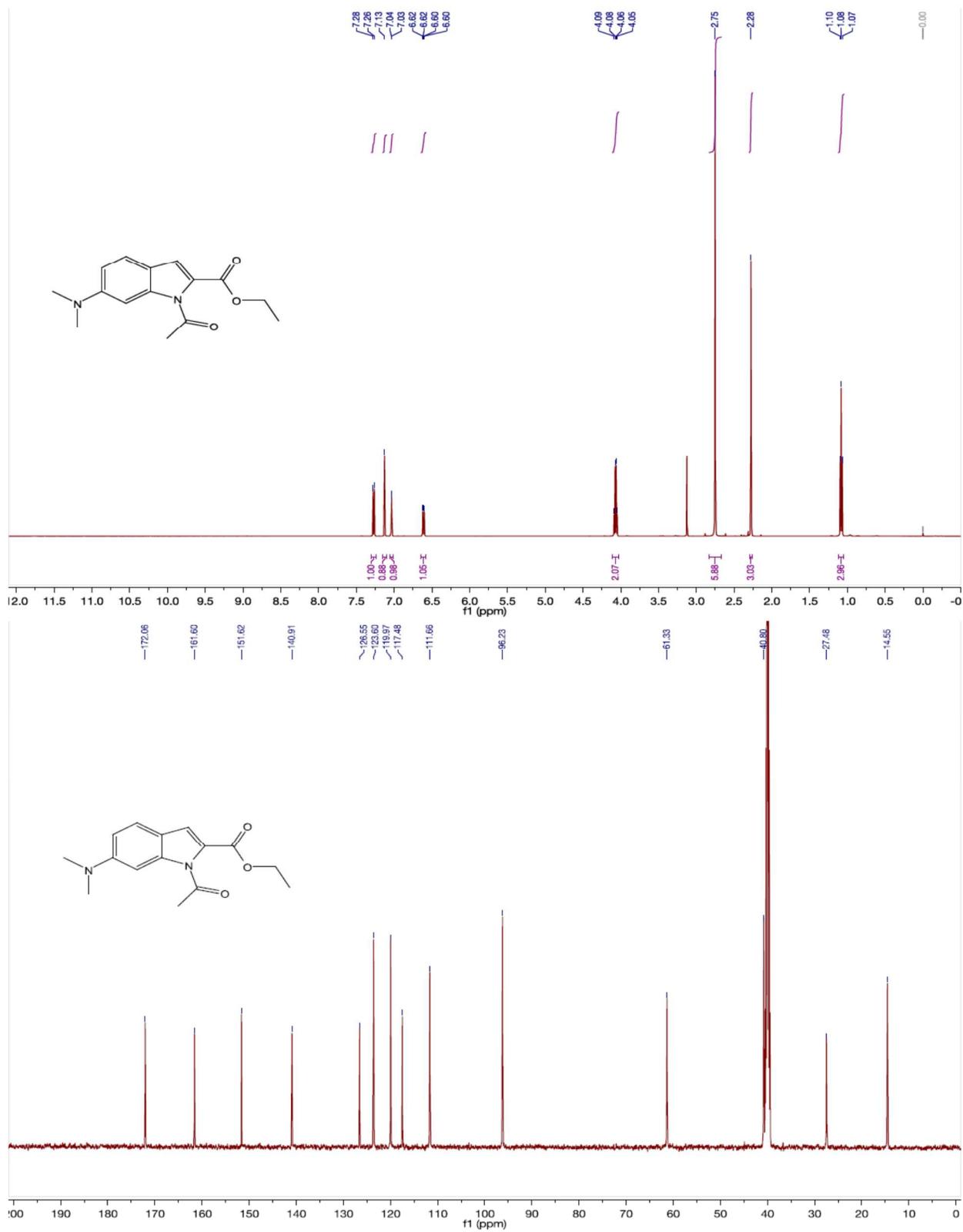
Ethyl 6-(trifluoromethyl)-1*H*-indole-2-carboxylate, from R=*p*-CF<sub>3</sub>, compd **3k**.



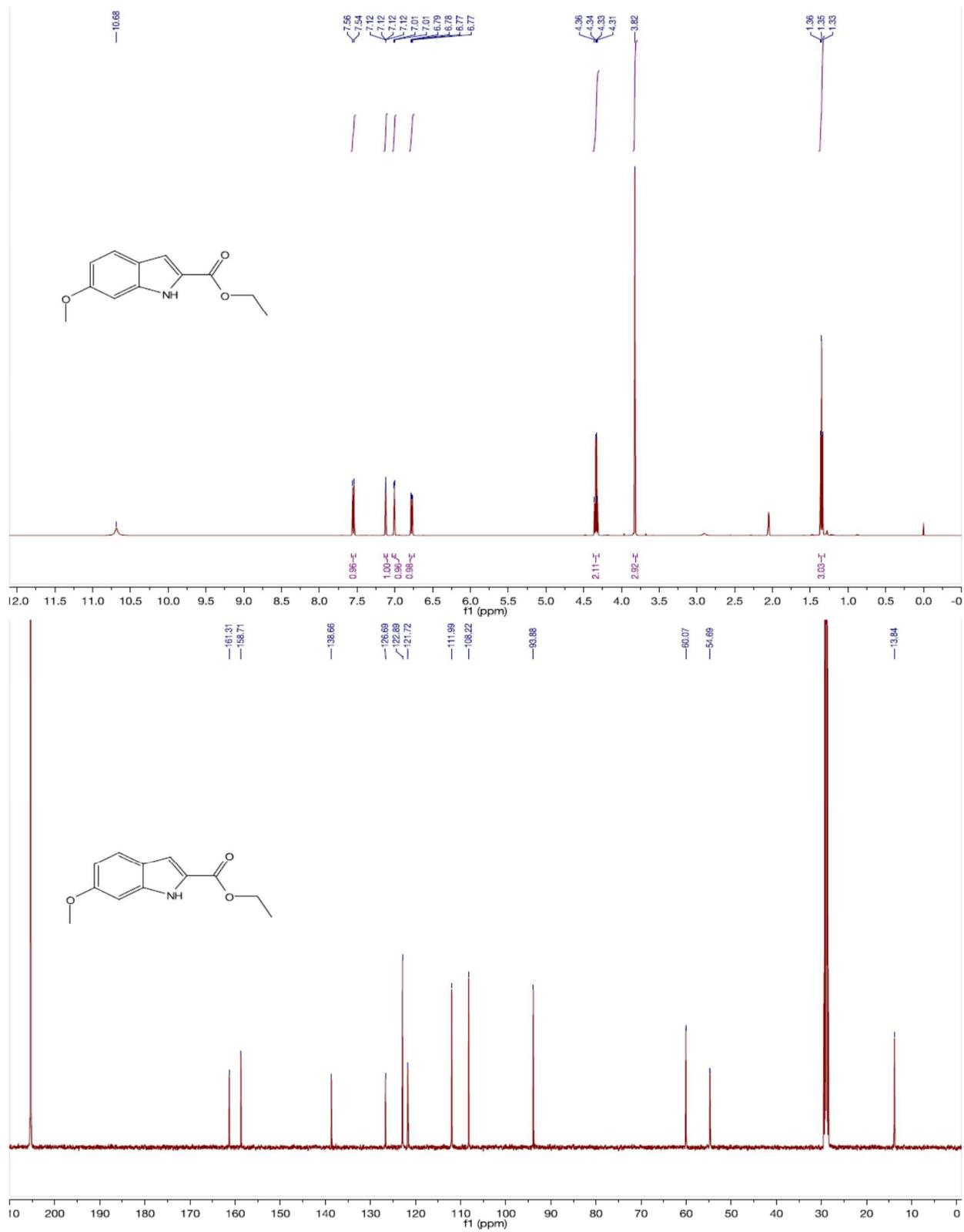
Ethyl 5-(trifluoromethyl)-1*H*-indole-2-carboxylate, from R=*m*-CF<sub>3</sub>, compd 31.



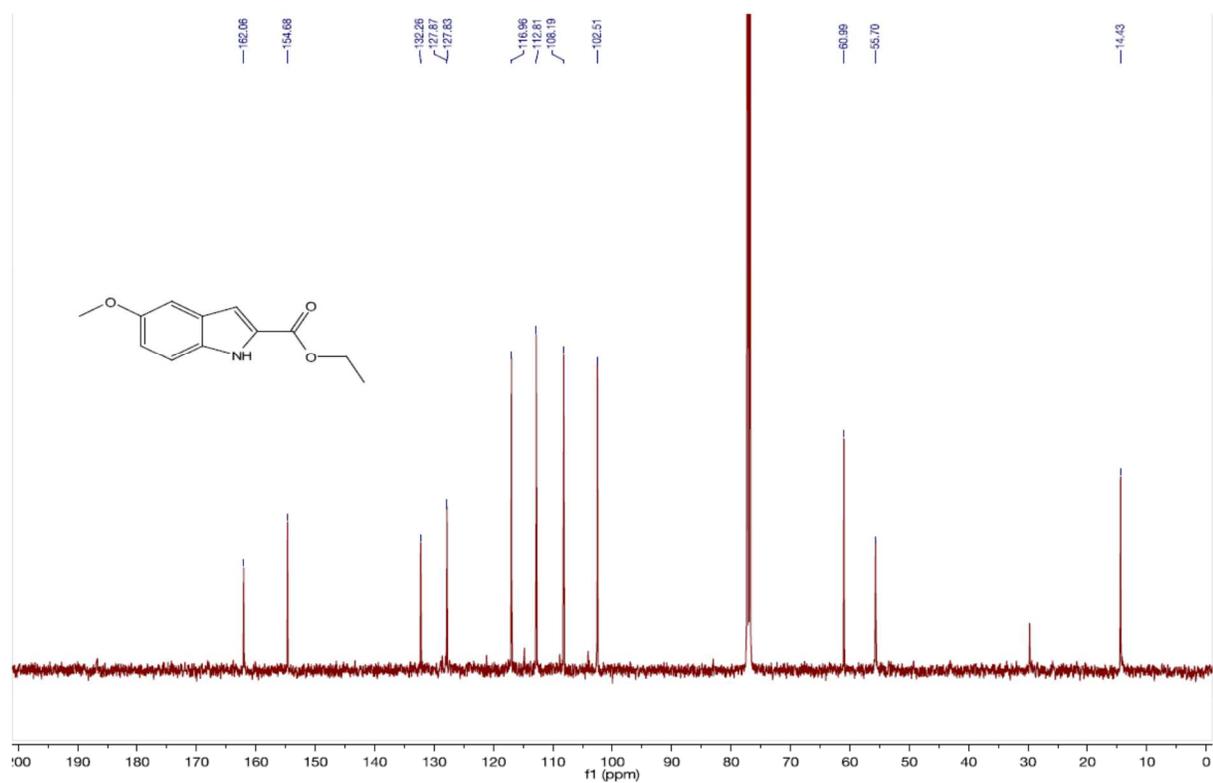
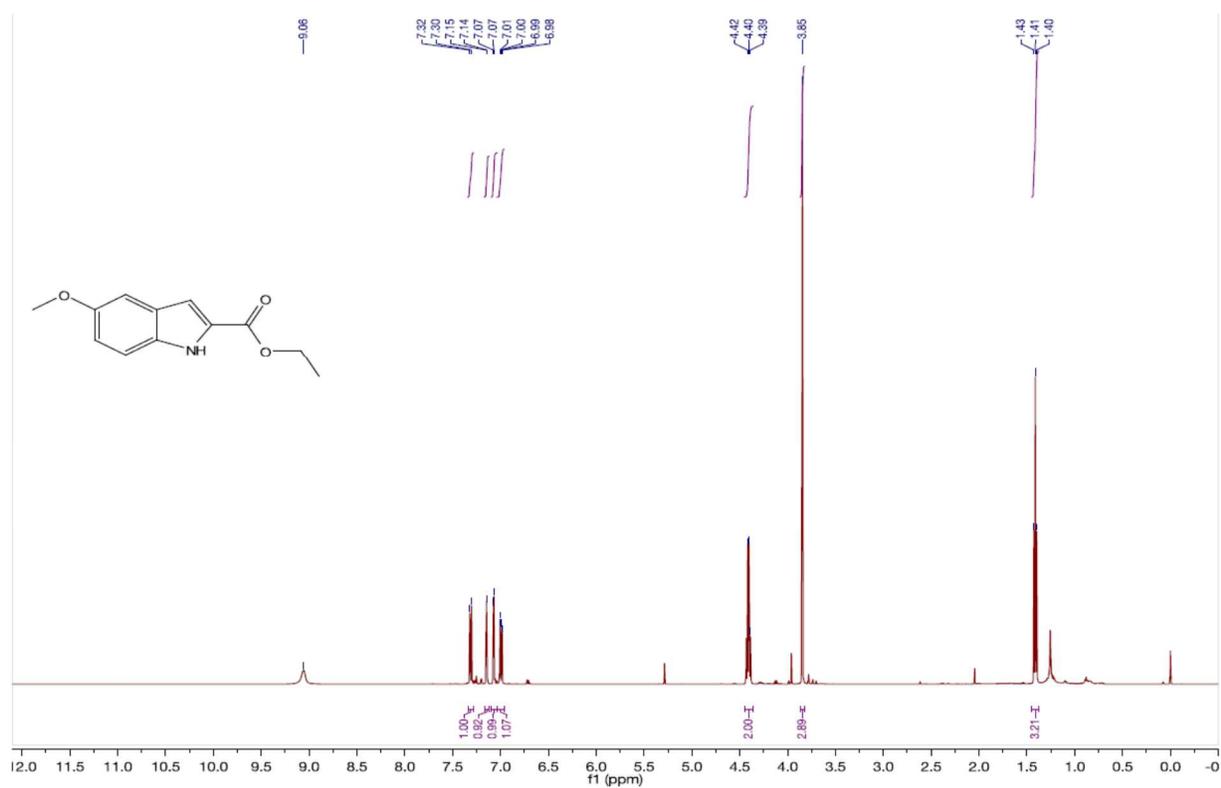
Ethyl 1-acetyl-6-(dimethylamino)-1*H*-indole-2-carboxylate, from R=*p*-NMe<sub>2</sub>, compd **2m**.



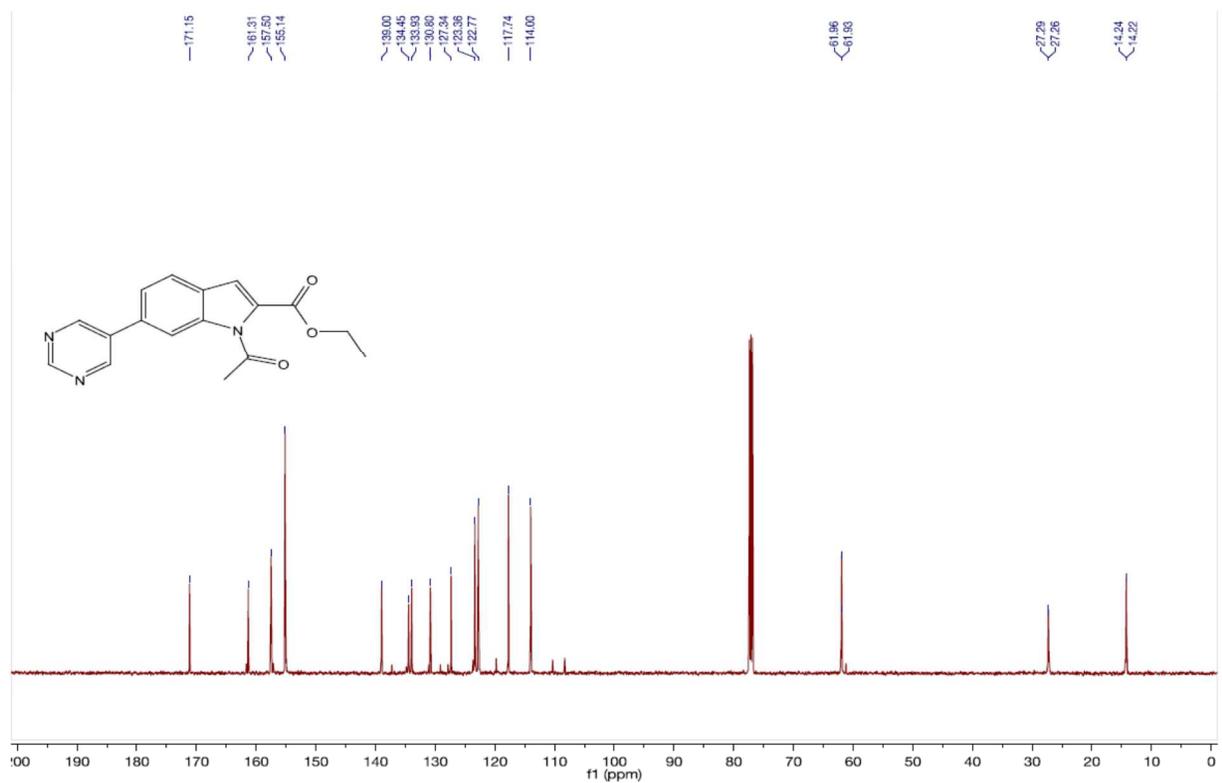
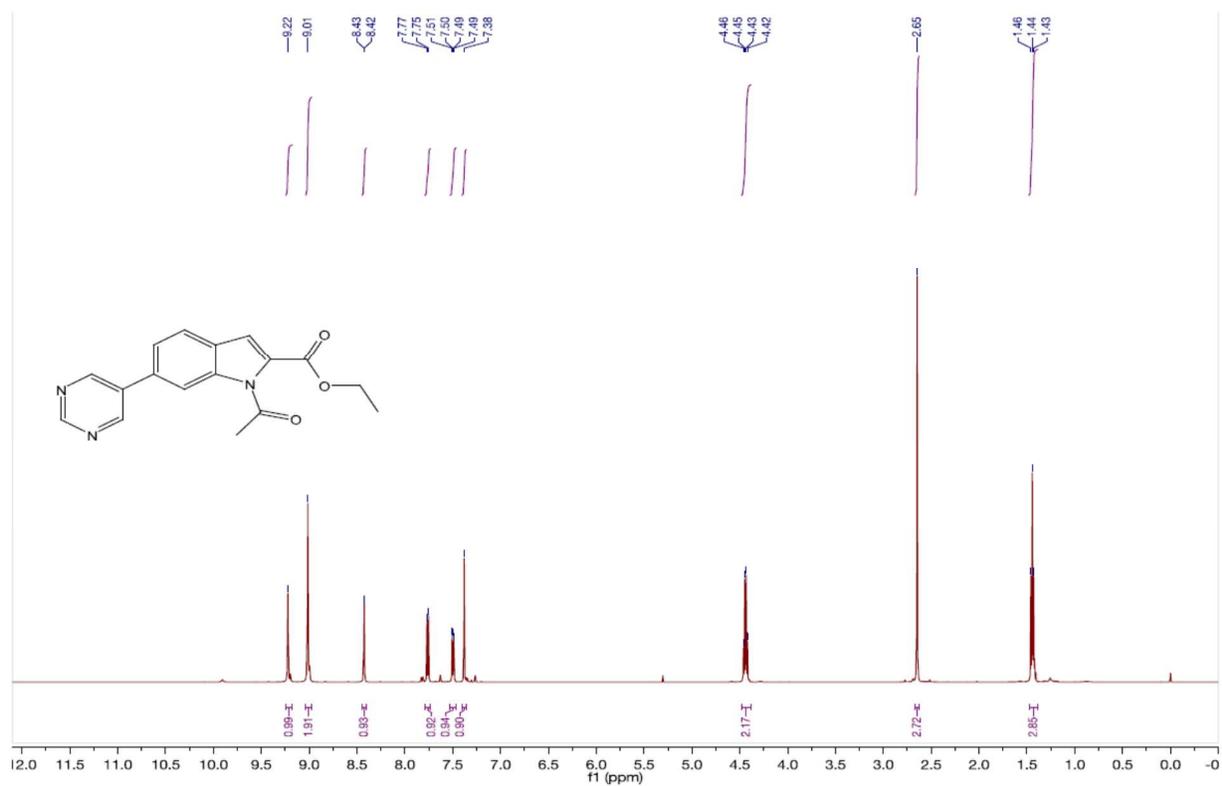
Ethyl 6-methoxy-1*H*-indole-2-carboxylate, from R=*p*-OMe, compd **3n**.



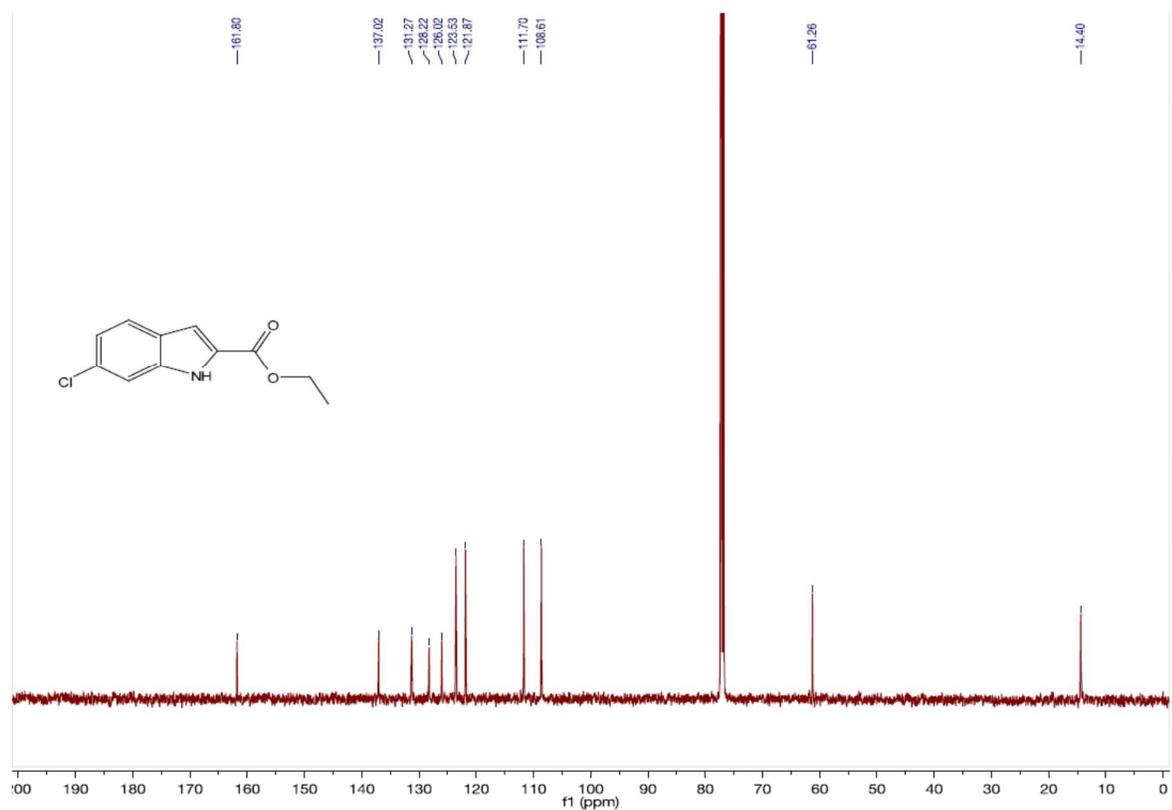
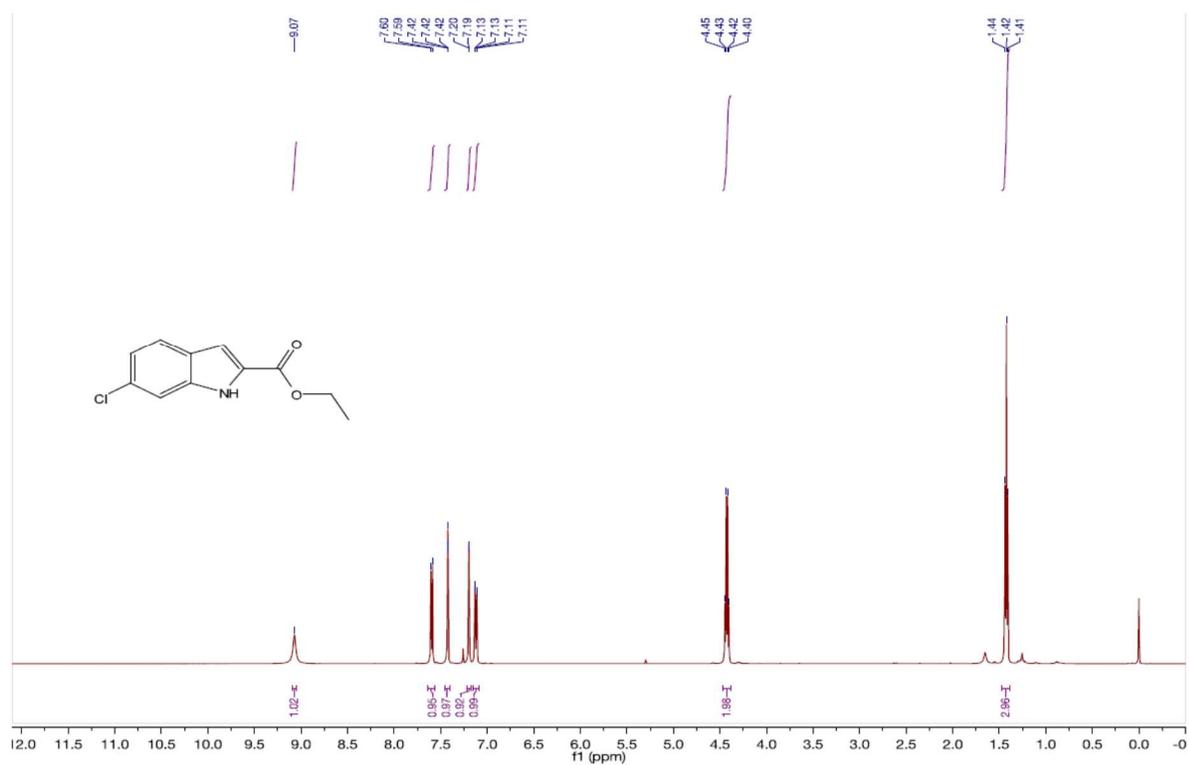
Ethyl 5-methoxy-1*H*-indole-2-carboxylate, from R=*m*-OMe, compd **3o**.



Ethyl 1-acetyl-6-(pyrimidin-5-yl)-1*H*-indole-2-carboxylate, from R=*p*-pyrimidine, compd **2p**.



Ethyl 6-chloro-1*H*-indole-2-carboxylate, from R=*p*-Cl, compd **3q**.



Ethyl 6-phenyl-1H-indole-2-carboxylate, compd 3f.

