

## Ruthenium catalyzed keto directed site selective C-H activation of 2-aryl tetrahydroquinolines

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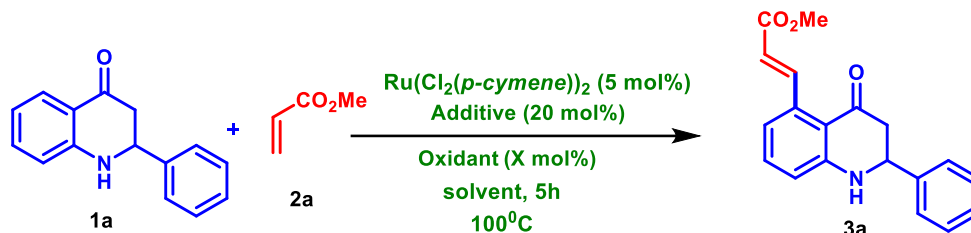
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**Table 1.** Optimization of the reactions condition<sup>a</sup>

S. No.	Catalyst (5 mol%)	Oxidant (mol%)	Additive (20 mol%)	Solvent	Yield <sup>b</sup> %
1.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(30)$	$\text{AgSbF}_6$	1,4 Dioxane	54
2.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2 \cdot \text{H}_2\text{O}(50)$	$\text{AgSbF}_6$	1,4 Dioxane	37
3.	<b><math>[\text{RuCl}_2(p\text{-cymene})]_2</math></b>	<b><math>\text{Cu}(\text{OAc})_2(50)</math></b>	<b><math>\text{AgSbF}_6</math></b>	<b>DCE</b>	94
4.	-	$\text{Cu}(\text{OAc})_2(50)$	$\text{AgSbF}_6$	DCE	NR
5.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(50)$	-	DCE	NR
6.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2 \cdot \text{H}_2\text{O}(50)$	$\text{AgSbF}_6$	DCE	73
7.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(30)$	$\text{AgSbF}_6$	DCE	86
8 <sup>c</sup> .	$[\text{RuCl}_2(p\text{-cymene})]_2$	-	$\text{AgSbF}_6$	DCE	38
9.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{AgOAc}$ (100)	$\text{AgSbF}_6$	DCE	27
10.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(50)$	$\text{KPF}_6$	DCE	NR
11.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(50)$	$\text{AgSbF}_6$	Toluene	NR
12.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(50)$	$\text{AgSbF}_6$	THF	NR
13.	$[\text{RuCl}_2(p\text{-cymene})]_2$	$\text{Cu}(\text{OAc})_2(50)$	$\text{AgSbF}_6$	TCE	NR
14 <sup>d</sup>	$[\text{RuCl}_2(p\text{-cymene})]_2$	-	$\text{AgSbF}_6$	DCE	NR

<sup>a</sup>Reaction conditions: **1a** (0.2 mmol), **2a** (0.4 mmol),  $[\text{Ru}(p\text{-cymene})\text{Cl}_2]_2$  (5 mol%),  $\text{Cu}(\text{OAc})_2$  (50 Mol%),  $\text{AgSbF}_6$  (20 mol%), DCE solvent at 100 °C, 5 h. <sup>b</sup>Isolated Yields. <sup>c</sup>Under an air. <sup>d</sup>Under  $\text{N}_2$  atmosphere.

## 2. Experimental Procedures:

General Remarks: Commercial reagents were used without further purification. Melting points are uncorrected. For compounds <sup>1</sup>H NMR (400 MHz,  $\text{CDCl}_3$ ) and <sup>13</sup>C NMR (100 MHz,  $\text{CDCl}_3$ ) spectra were recorded in deuteriochloroform ( $\text{CDCl}_3$ ) on a Bruker 400 MHz spectrometer using tetramethylsilane (TMS,  $\delta = 0$ ) as an internal standard at room temperature. Mass spectra were recorded on Agilent 1200 LC/MS-6110 mass spectrometer. Spectral data and copy of <sup>1</sup>H, <sup>13</sup>C NMR spectra of all compounds (**3a-u**) and (**5a-b**), (**12a-d**), **13** are listed below. Aza flavanones are prepared from known literature procedure<sup>13</sup>.

### Typical procedure for olefinic coupling of 2-aryl tetrahydroquinoline with methylacrylate:

To an oven dried pressure tube placed with substituted 2-phenyl tetrahydroquinoline (**1a**) (0.2 mmol), alkene (**2a**) (0.4 mmol),  $[\text{RuCl}_2(p\text{-cymene})]_2$  (5 Mol-%),  $\text{AgSbF}_6$  (20 Mol-%) and

Cu(OAc)<sub>2</sub> (50 mol%) was added DCE (2 mL). The pressure tube was purged with nitrogen gas three times. The reaction mixture was stirred at 100 °C for 5hr. After accomplishment of the reaction as shown by TLC, the crude reaction mixture was diluted with CH<sub>2</sub>Cl<sub>2</sub>, filtered over celite pad. The filtrate was concentrated under reduced pressure and purified by column chromatography (10%, EtOAc / hexanes) to provide the desired pure product (**3a**) in good 94% yield.

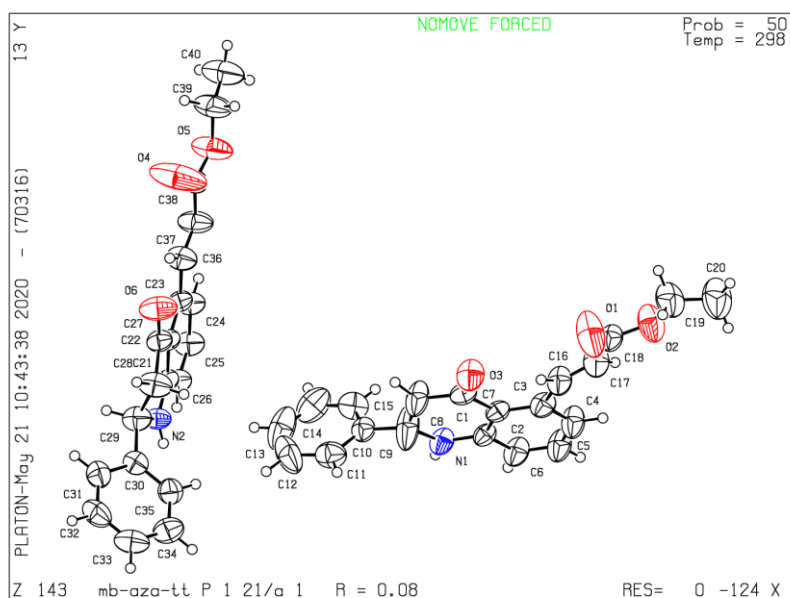
**General procedure for synthesis of alkyl (*E*)-3-(4-methoxy-2-arylquinolin-5-yl)acrylate<sup>14</sup>**

**12a-d:** A stirred mixture of methyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl)acrylate (1 equiv.) and iodine (1 equiv.) in methanol was refluxed for 12h and then allowed to cool to room temperature and the product was purified through column chromatography using 10% EtOAc / hexane

**Procedure for synthesis of methyl 3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl)propanoate **13**:**

In round bottom flask, methyl (*E*)-3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl)acrylate **3o** (50 mg) was taken and added zinc powder (3 equiv.), acetic acid solvent (3ml). After adding all the components, the round bottom flask was kept on a preheated oil bath (120°C) for 24h. After accomplishment of the reaction as shown by TLC, the crude reaction mixture was diluted with DCM and filtered over celite pad. The filtrate was concentrated under reduced pressure and purified by column chromatography using 10% EtOAc / hexanes.

### 3. X-ray Analysis



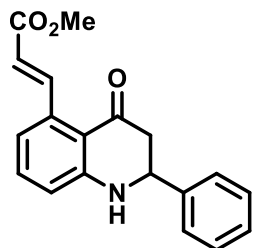
#### Ethyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl)acrylate (**3b**)

Identification code	MB-AZA-TT
Empirical formula	C <sub>40</sub> H <sub>36</sub> N <sub>2</sub> O <sub>6</sub>
Formula weight	640.71
Temperature/K	298
Crystal system	monoclinic
Space group	P2 <sub>1</sub> /a
a/Å	14.1749(9)
b/Å	16.1144(8)
c/Å	14.9624(11)
α/°	90.00
β/°	91.976(6)
γ/°	90.00
Volume/Å <sup>3</sup>	3415.7(4)
Z	4
ρ <sub>calc</sub> /cm <sup>3</sup>	1.246
μ/mm <sup>-1</sup>	0.084
F(000)	1352.0
Crystal size/mm <sup>3</sup>	0.64 × 0.44 × 0.4
Radiation	MoKα (λ = 0.71073)
2θ range for data collection/°	8.06 to 58.4
Index ranges	-19 ≤ h ≤ 18, -21 ≤ k ≤ 20, -18 ≤ l ≤ 19
Reflections collected	17071
Independent reflections	7844 [R <sub>int</sub> = 0.0409, R <sub>sigma</sub> = 0.0760]

Data/restraints/parameters 7844/0/436  
Goodness-of-fit on  $F^2$  1.049  
Final R indexes [ $I \geq 2\sigma(I)$ ]  $R_1 = 0.0821$ ,  $wR_2 = 0.2130$   
Final R indexes [all data]  $R_1 = 0.1631$ ,  $wR_2 = 0.2654$   
Largest diff. peak/hole /  $e \text{ \AA}^{-3}$  0.36/-0.30

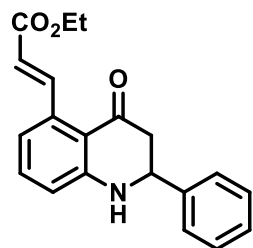
#### 4. Spectroscopic Data

##### Methyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (**3a**):



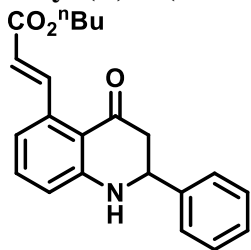
Yellow color solid, Yield (94%), M.P: (120-122 °C),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.48 (d,  $J = 15.8$  Hz, 1H), 7.38 – 7.28 (m, 5H), 7.21 (dd,  $J = 13.7, 5.9$  Hz, 1H), 6.73 (d,  $J = 7.4$  Hz, 1H), 6.69 (d,  $J = 8.2$  Hz, 1H), 6.09 (d,  $J = 15.8$  Hz, 1H), 4.70 – 4.66 (m, 1H), 4.65 (brs, 1H), 3.72 (s, 3H), 2.87 – 2.67 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  194.23, 167.39, 152.58, 146.74, 140.76, 138.31, 134.60, 129.14, 128.67, 126.69, 120.00, 118.77, 117.65, 116.46, 57.98, 51.80, 47.30; HRMS (ESI): calc. for  $[(\text{C}_{19}\text{H}_{17}\text{NO}_3)]$  (M+H) 307.1291, measured 307.1208

##### Ethyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (**3b**):



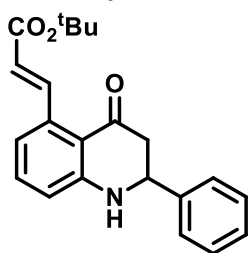
Yellow color solid, Yield: (91%), M.P: (118-119 °C),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.55 (d,  $J = 15.8$  Hz, 1H), 7.45 – 7.34 (m, 5H), 7.31 – 7.27 (m, 1H), 6.81 (d,  $J = 7.4$  Hz, 1H), 6.76 (d,  $J = 8.2$  Hz, 1H), 6.16 (d,  $J = 15.8$  Hz, 1H), 4.75 (dd,  $J = 13.7, 3.9$  Hz, 1H), 4.71 (brs, 1H), 4.25 (q,  $J = 7.1$  Hz, 2H), 2.95 – 2.75 (m, 2H), 1.33 (t,  $J = 7.1$  Hz, 3H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  194.23, 166.98, 152.57, 146.46, 140.77, 138.42, 134.59, 129.14, 128.66, 126.69, 120.48, 118.81, 117.58, 116.46, 60.57, 57.98, 47.34, 14.46; HRMS (ESI): calc. for  $[(\text{C}_{20}\text{H}_{19}\text{NO}_3)]$  (M+H) 322.1460, measured 322.1443

**Butyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3c):**



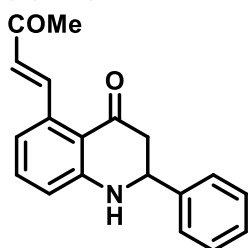
Yellow color semi-solid, Yield (93%),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.55 (d,  $J = 15.8$  Hz, 1H), 7.45-7.29 (m, 6H), 6.82 (d,  $J = 7.4$  Hz, 1H), 6.76 (d,  $J = 8.1$  Hz, 1H), 6.17 (d,  $J = 15.8$  Hz, 1H), 4.76 - 4.73 (m, 1H), 4.72 (brs, 1H), 4.20 (t,  $J = 6.7$  Hz, 2H), 2.94-2.75 (m, 2H), 1.71– 1.41 (m, 4H), 0.96 (t,  $J = 7.4$  Hz, 3H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  194.22, 167.08, 152.57, 146.44, 140.78, 138.43, 134.57, 129.13, 128.69, 128.65, 126.68, 120.47, 118.81, 117.57, 116.45, 115.21, 64.50, 57.97, 47.34, 30.87, 19.32, 13.90; HRMS (ESI): calc. for  $[(\text{C}_{22}\text{H}_{23}\text{NO}_3)]$  (M+H) 350.1751, measured 350.1756

***tert*-Butyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3d):**



Yellow color solid, Yield (88%), M.P: (125-126  $^{\circ}\text{C}$ ),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.47 (d,  $J = 15.8$  Hz, 1H), 7.45 – 7.33 (m, 5H), 7.29– 7.25 (m, 1H), 6.81 (d,  $J = 7.4$  Hz, 1H), 6.74 (d,  $J = 8.1$  Hz, 1H), 6.09 (d,  $J = 15.7$  Hz, 1H), 4.76 – 4.72 (m, 1H), 4.71 (brs, 1H), 2.93 – 2.74 (m, 2H), 1.53 (s, 9H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  194.23, 166.32, 152.57, 145.33, 140.83, 138.65, 134.53, 129.12, 128.63, 126.68, 122.42, 118.82, 117.38, 116.45, 80.45, 57.96, 47.39, 28.33; HRMS (ESI): calc. for  $[(\text{C}_{22}\text{H}_{23}\text{NO}_3)]$  (M+H) 350.1782, measured 350.1756

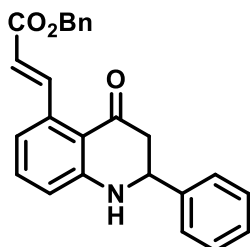
**(*E*)-5-(3-Oxobut-1-en-1-yl)-2-phenyl-2, 3-dihydroquinolin-4(1H)-one (3e):**



Yellow solid, Yield: (79%), M.P: (130-132  $^{\circ}\text{C}$ ),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.50 (d,  $J = 16.3$  Hz, 1H), 7.46-7.29 (m,  $J = 7.3$  Hz, 6H), 6.84 (d,  $J = 7.4$  Hz, 1H), 6.78 (d,  $J = 8.3$  Hz, 1H), 6.38 (d,  $J = 16.3$  Hz, 1H), 4.79 – 4.75 (m, 1H), 4.74 (brs, 1H), 2.98-2.77 (m, 2H), 2.43 (s, 3H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  199.88, 194.59, 152.75, 146.13, 140.65, 138.38, 134.73, 130.12, 129.17,

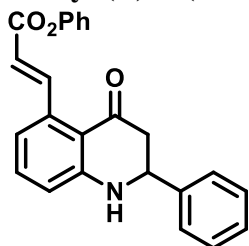
128.72, 126.67, 118.60, 117.88, 116.22, 57.93, 47.40, 26.50. HRMS (ESI): calc. for [(C<sub>19</sub>H<sub>17</sub>NO<sub>2</sub>)] (M+H) 292.1334, measured 292.1338

**Benzyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3f):**



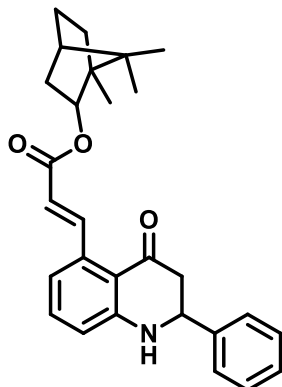
Yellow color liquid, Yield: (92%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.62 (d, *J* = 15.8 Hz, 1H), 7.42-7.28 (m, 11H), 6.80 (d, *J* = 7.4 Hz, 1H), 6.76 (d, *J* = 8.2 Hz, 1H), 6.21 (d, *J* = 15.8 Hz, 1H), 5.25 (s, 2H), 4.75 (s, 1H), 4.72 (d, *J* = 4 Hz, 1H), 2.94-2.75 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.20, 166.74, 152.58, 147.18, 140.74, 138.22, 136.30, 134.56, 129.10, 128.64, 128.30, 128.20, 126.67, 119.93, 118.76, 117.71, 116.40, 115.20, 66.30, 57.91, 47.26; HRMS (ESI): calc. for [(C<sub>25</sub>H<sub>21</sub>NO<sub>3</sub>)] (M+H) 384.1593, measured 384.1600

**Phenyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3g):**



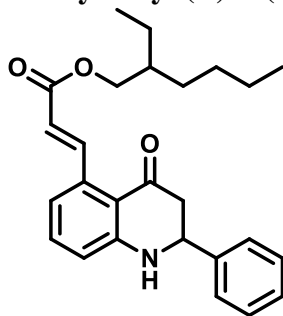
Yellow liquid, Yield: (84%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.74 (d, *J* = 15.8 Hz, 1H), 7.44 – 7.19 (m, 9H), 7.15 (dd, *J* = 5.3, 3.3 Hz, 2H), 6.85 (d, *J* = 7.4 Hz, 1H), 6.78 (d, *J* = 8.3 Hz, 1H), 6.33 (d, *J* = 15.8 Hz, 1H), 4.87 (brs, 1H), 4.71 (dd, *J* = 13.5, 3.8 Hz, 1H), 2.94 – 2.80 (m, 1H), 2.73 (dd, *J* = 16.0, 3.7 Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.31, 165.35, 152.70, 150.95, 148.66, 140.65, 137.87, 134.66, 129.42, 129.07, 128.59, 126.64, 125.73, 121.82, 119.27, 118.76, 118.06, 116.31, 57.80, 47.15. HRMS (ESI): calc. for [(C<sub>24</sub>H<sub>19</sub>NO<sub>3</sub>)] (M+H) 370.1443, measured 370.1422.

**7,7-Dimethyl bicyclo[2.2.1]heptan-2-yl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3h):**



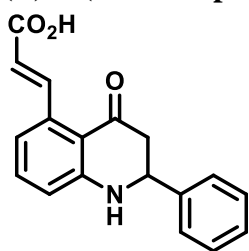
Yellow solid, Yield: (95%), M.P: (137-138 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.55 (d, *J* = 15.8 Hz, 1H), 7.45-7.29 (m, 6H), 6.84 (d, *J* = 7.4 Hz, 1H), 6.74 (d, *J* = 8.2 Hz, 1H), 6.15 (d, *J* = 15.8 Hz, 1H), 4.78 (dd, *J* = 11.9, 4.9 Hz, 1H), 4.63 (brs, 1H), 3.69 – 2.77 (m, 2H), 1.88 – 1.58 (m, 7H), 1.26 (d, *J* = 4.8 Hz, 3H), 1.10 (s, 3H), 0.94 (s, 3H), 0.86(s, 3H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.16, 194.13, 166.46, 152.57, 146.01, 140.83, 138.49, 138.47, 134.49, 129.14, 128.64, 126.66, 121.11, 118.79, 117.54, 116.44, 81.11, 57.95, 49.00, 47.41, 47.13, 45.23, 39.05, 33.87, 27.22, 20.28, 20.18, 11.70; HRMS (ESI): calc. for [(C<sub>27</sub>H<sub>29</sub>NO<sub>3</sub>)] (M+H) 430.2464, measured 430.2382

**2-Ethylhexyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3i):**



Yellow color liquid, Yield: (94%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ 8.56 (d, *J* = 15.8 Hz, 1H), 7.45–7.29 (m, 6H), 6.79 (dd, *J* = 29.5, 7.8 Hz, 2H), 6.17 (d, *J* = 15.8 Hz, 1H), 4.74 (dd, *J* = 13.7, 3.9 Hz, 1H), 4.71 (s, 1H), 4.11 (t, *J* = 4Hz, 2H), 2.91 (dd, *J* = 15.7, 13.8 Hz, 1H), 2.78 (dd, *J* = 15.9, 2.4 Hz, 1H), 1.76 - 0.90 (m, 15H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.15, 167.20, 152.56, 146.40, 140.82, 138.46, 134.53, 129.15, 128.66, 126.68, 120.54, 118.83, 117.57, 116.51, 67.07, 58.00, 47.37, 38.95, 30.60, 29.10, 24.00, 23.12, 14.20, 11.17; HRMS (ESI): calc. for [(C<sub>26</sub>H<sub>31</sub>NO<sub>3</sub>)] (M+H) 406.2394, measured 406.2382

**(*E*)-3-(4-Oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylic acid (3j):**

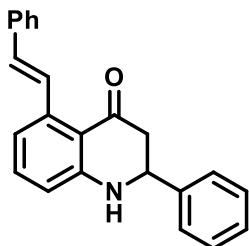


Yellow solid, Yield: (88%), M.P: (129-131 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ 8.55 (d, *J* = 15.7 Hz, 1H), 7.44-7.27 (m, 6H), 6.82 (dd, *J* = 20.3, 7.7 Hz, 2H), 6.14 (d, *J* = 15.7 Hz, 1H), 5.47 (brs, 1H), 4.74 (d, *J* = 13.3 Hz, 1H), 2.92-2.66 (m, *J* = 8.1, 6.0 Hz, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.03, 168.98, 152.78, 146.71, 140.85, 137.91, 134.29, 128.79, 128.24, 126.55, 120.34, 118.14,



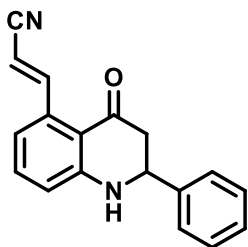
117.62, 115.92, 57.48, 47.07, 39.92, 39.71, 39.50; HRMS (ESI): calc. for [(C<sub>18</sub>H<sub>15</sub>NO<sub>3</sub>)] (M+H) 294.1147, measured 294.1130

**2-Phenyl-5-styryl-2,3-dihydroquinolin-4(1H)-one [E/Z = 52:48] (3k):**



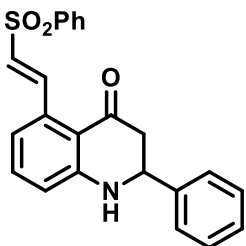
Yellow gammy liquid, Yield: (90%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ 8.23 (d, *J* = 16.1 Hz, 1H), 7.87 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.57 (d, *J* = 7.3 Hz, 2H), 7.46 (dd, *J* = 8.1, 1.3 Hz, 4H), 7.42-7.33 (m, , 8H), 7.00 (d, *J* = 7.5 Hz, 1H), 6.93 (d, *J* = 16.1 Hz, 1H), 6.82 – 6.75 (m, 1H), 6.72 (d, *J* = 8.2 Hz, 1H), 6.65 (d, *J* = 8.1 Hz, 1H), 4.76 – 4.72 (m, 2H), 4.60 (d, *J* = 23.9 Hz, 2H), 2.97-2.74 (m, 4H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>): δ 194.94, 193.50, 152.74, 151.72, 141.35, 141.11, 141.09, 137.85, 135.56, 134.48, 130.94, 129.92, 129.10, 128.71, 128.58, 127.71, 127.68, 127.04, 126.75, 126.72, 119.09, 118.54, 117.85, 116.21, 116.07, 115.49, 58.59, 58.01, 47.93, 46.54; HRMS (ESI): calc. for [(C<sub>23</sub>H<sub>19</sub>NO)] (M+H) 326.1540, measured 326.1545

**3-(4-Oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylonitrile [E/Z = 58:42] (3l):**



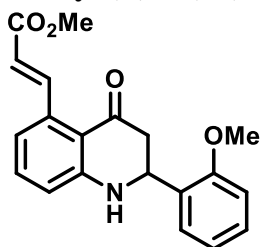
Yellow gummy liquid, Yield: (56%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ 8.39 (d, *J* = 16.4 Hz, 1H), 7.98 (d, *J* = 11.6 Hz, 1H), 7.45-7.38(m, 9H), 7.02 (d, *J* = 7.4 Hz, 1H), 6.81 – 6.74 (m, 3H), 5.65 (d, *J* = 16.4 Hz, 1H), 5.50 (d, *J* = 11.6 Hz, 1H), 4.80-4.74 (m, 2H), 4.69 (s, 2H), 2.97-2.75 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>): δ 194.10, 152.67, 152.60, 152.47, 140.48, 137.14, 136.42, 134.98, 134.71, 129.25, 128.84, 126.71, 126.68, 120.00, 118.52, 118.32, 118.27, 115.85, 98.21, 96.70, 96.26, 58.02, 57.93, 47.19, 29.84; HRMS (ESI): calc. for [(C<sub>18</sub>H<sub>14</sub>N<sub>2</sub>O)] (M+H) 275.1179, measured 275.1184

**(E)-2-Phenyl-5-(2-(phenylsulfonyl) vinyl)-2,3-dihydroquinolin-4(1H)-one (3m):**



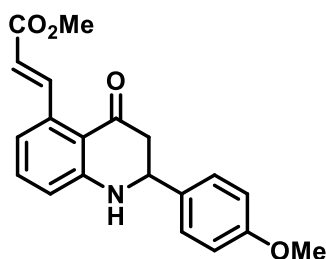
Yellow solid, Yield : (88%), M.P: (140-142 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.52 (d, *J* = 15.2 Hz, 1H), 8.06 (d, *J* = 7.2 Hz, 2H), 7.60 – 7.53 (m, 3H), 7.44– 7.35 (m, 6H), 6.78 (d, *J* = 8.3 Hz, 1H), 6.71 (d, *J* = 7.3 Hz, 1H), 6.56 (d, *J* = 15.2 Hz, 1H), 4.75 (dd, *J* = 8.3, 4.5 Hz, 1H), 4.72 (brs, 1H), 2.94 – 2.76 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 193.90, 152.58, 145.86, 140.96, 140.54, 136.10, 134.69, 133.31, 129.34, 129.20, 128.76, 128.62, 127.98, 126.68, 118.91, 118.39, 116.44, 57.93, 47.06; HRMS (ESI): calc. for [(C<sub>23</sub>H<sub>19</sub>NO<sub>3</sub>S)] (M+H) 390.1173, measured 390.1164

**Methyl (*E*)-3-(2-(2-methoxyphenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3n):**



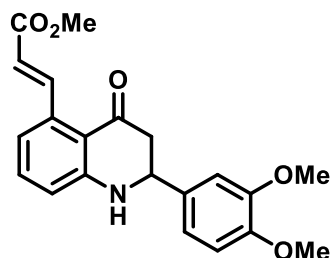
Yellow solid, Yield : (89%), M.P: (138-141 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.57 (d, *J* = 15.8 Hz, 1H), 7.44 (d, *J* = 7.5 Hz, 1H), 7.31– 7.24 (m, 3H CDCl<sub>3</sub> merged), 6.97 (t, *J* = 7.5 Hz, 1H), 6.90 (d, *J* = 8.3 Hz, 1H), 6.76 (t, *J* = 7.7 Hz, 2H), 6.15 (d, *J* = 15.8 Hz, 1H), 5.15 (dd, *J* = 11.0, 4.9 Hz, 1H), 4.84 (d, *J* = 5.7 Hz, 1H), 3.82 (s, 3H), 3.79 (s, 3H), 2.95 – 2.82 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.76, 167.45, 156.75, 152.93, 146.98, 138.24, 134.39, 129.28, 128.59, 126.50, 121.00, 119.77, 118.42, 117.81, 116.41, 110.72, 55.49, 51.76, 50.85, 44.54; HRMS (ESI): calc. for [(C<sub>20</sub>H<sub>19</sub>NO<sub>4</sub>)] (M+H) 338.1412, measured 338.1392

**Methyl (*E*)-3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3o):**



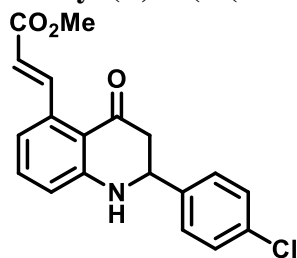
Yellow color solid, Yield: (91%), M.P: (120-123 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.55 (d, *J* = 15.8 Hz, 1H), 7.35 (d, *J* = 8.7 Hz, 2H), 7.29 – 7.25 (m, 1H), 6.90 (d, *J* = 8.7 Hz, 2H), 6.79 (d, *J* = 7.4 Hz, 1H), 6.74 (d, *J* = 8.3 Hz, 1H), 6.15 (d, *J* = 15.8 Hz, 1H), 4.70 (brs, 1H), 4.69 – 4.66 (m, 1H), 3.80 (s, 3H), 3.78 (s, 3H), 2.88 (dd, *J* = 15.8, 13.9 Hz, 1H), 2.72 (ddd, *J* = 15.9, 3.6, 1.6 Hz, 1H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.47, 167.39, 159.77, 152.61, 146.78, 138.25, 134.53, 132.75, 127.89, 119.91, 118.65, 117.62, 116.40, 114.40, 57.37, 55.46, 51.78, 47.40; HRMS (ESI): calc. for [(C<sub>20</sub>H<sub>19</sub>NO<sub>4</sub>)] (M+H) 338.1410, measured 338.1392

**Methyl (*E*)-3-(2-(3, 4-dimethoxyphenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3p):**



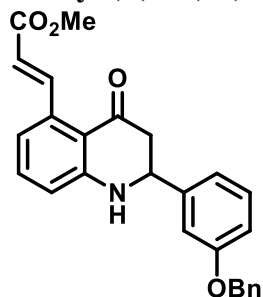
Yellow solid, Yield: (90%), M.P: (181-183 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.54 (d, *J* = 15.8 Hz, 1H), 7.30 – 7.26 (m, 1H), 6.97 – 6.95 (m, 2H), 6.85 (d, *J* = 8.7 Hz, 1H), 6.81 (d, *J* = 7.4 Hz, 1H), 6.75 (dd, *J* = 8.2, 0.5 Hz, 1H), 6.16 (d, *J* = 15.8 Hz, 1H), 4.71 - 4.67 (m, 1H), 4.66 (brs, 1H), 3.81 (s, 3H), 3.80 (s, 3H), 3.79 (s, 3H), 2.91 (dd, *J* = 15.9, 14.0 Hz, 1H), 2.75 (ddd, *J* = 15.9, 3.6, 1.7 Hz, 1H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.62, 167.48, 153.92, 152.90, 150.90, 146.96, 138.33, 134.44, 129.76, 119.88, 118.63, 117.82, 116.54, 113.17, 113.08, 111.69, 56.00, 55.90, 51.82, 51.03, 44.74. HRMS (ESI): calc. for [(C<sub>21</sub>H<sub>21</sub>NO<sub>5</sub>)] (M+H) 368.1523, measured 368.1498

**Methyl (*E*)-3-(2-(4-chlorophenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3q):**



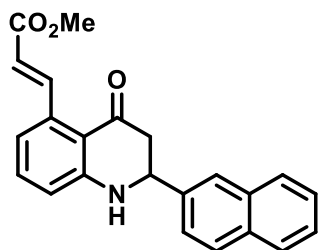
Yellow solid, Yield: (85%), M.P: ( 162-165 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.54 (d, *J* = 15.8 Hz, 1H), 7.41-7.29 (m, 5H), 6.84 (d, *J* = 7.4 Hz, 1H), 6.75 (d, *J* = 8.3 Hz, 1H), 6.18 (d, *J* = 15.8 Hz, 1H), 4.75 (dd, *J* = 13.2, 4.0 Hz, 1H), 4.60 (brs, 1H), 3.80 (s, 3H), 2.92-2.75 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 193.80, 167.38, 152.34, 146.57, 139.31, 138.38, 134.71, 134.43, 129.36, 128.08, 120.18, 119.08, 117.64, 116.58, 57.43, 51.85, 47.30; HRMS (ESI): calc. for [(C<sub>19</sub>H<sub>16</sub>ClO<sub>3</sub>)] (M+H) 342.0889, measured 342.0897

**Methyl (*E*)-3-(2-(3-(benzyloxy) phenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3r):**



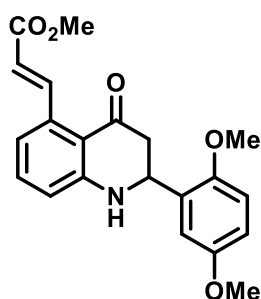
Yellow solid, Yield: (91%), M.P: (145-148 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.55 (d, *J* = 15.8 Hz, 1H), 7.44-7.27 (m,7H), 7.07(m,1H),7.01 (d, *J* = 7.7 Hz, 1H), 6.96 – 6.92 (m, 1H), 6.80 (d, *J* = 7.4 Hz, 1H), 6.75 (d, *J* = 8.2 Hz, 1H), 6.17 (d, *J* = 15.8 Hz, 1H), 5.07 (s, 2H), 4.73 (brs, 1H), 4.72 - 4.67 (m, 1H), 3.79 (s, 3H), 2.92 - 2.73 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.18, 167.40, 159.30, 152.52, 146.73, 142.44, 138.26, 136.76, 134.59, 130.24, 128.75, 128.21, 127.62, 119.97, 119.16, 118.76, 117.65, 116.41, 114.69, 113.31, 70.16, 57.86, 51.80, 47.28; HRMS (ESI): calc. for [(C<sub>26</sub>H<sub>23</sub>NO<sub>4</sub>)] (M+H) 414.1710,measured 414.1705

**Methyl (*E*)-3-(2-(naphthalen-2-yl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3s):**



Brown color liquid, Yield: (88%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.60 (d, *J* = 15.8 Hz, 1H), 8.11 (d, *J* = 7.5 Hz, 1H), 7.93 – 7.76 (m, 3H), 7.57 – 7.51 (m, 3H), 7.32 (t, *J* = 7.9 Hz, 1H), 6.85 (d, *J* = 7.4 Hz, 1H), 6.81 (d, *J* = 8.3 Hz, 1H), 6.20 (d, *J* = 15.8 Hz, 1H), 5.59 (dd, *J* = 12.7, 4.6 Hz, 1H), 4.77 (brs, 1H), 3.81 (s, 3H), 3.12 – 3.0 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.36, 167.43, 152.88, 146.78, 138.54, 136.12, 134.63, 134.15, 130.43, 129.43, 129.09, 126.90, 126.20, 125.70, 123.73, 122.38, 120.10, 118.93, 117.77, 116.60, 51.84, 46.22; HRMS (ESI): calc. for [(C<sub>23</sub>H<sub>19</sub>NO<sub>3</sub>)] (M+H) 358.1434,measured 358.1443.

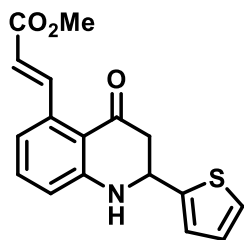
**Methyl (*E*)-3-(2-(2,5-dimethoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3t):**



Yellow liquid, Yield: (86%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.57 (d, *J* = 15.8 Hz, 1H), 7.05 (m, 1H), 6.82 – 6.73 (m, 4H), 6.16 (d, *J* = 15.8 Hz, 1H), 5.14 (dd, *J* = 11.7, 4.5 Hz, 1H), 4.74 (s, 1H), 3.80(s, 3H), 3.76(s, 3H), 2.94 – 2.80 (m, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 194.62, 167.48, 153.92, 152.90, 150.90, 146.96, 138.33, 134.44, 129.76, 119.88, 118.63, 117.82, 116.54, 113.17,

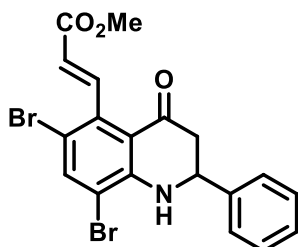
113.08, 111.69, 56.00, 55.90, 51.82, 51.03, 44.74. HRMS (ESI): calc. for [(C<sub>21</sub>H<sub>21</sub>NO<sub>5</sub>)] (M+H) 368.1523, measured 368.1497

**Methyl (*E*)-3-(4-oxo-2-(thiophen-2-yl)-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3u):**



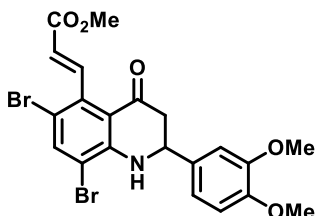
Yellow solid, Yield: (82%) M.P: (146-147<sup>0</sup>C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.51 (d, *J* = 15.8 Hz, 1H), 7.28-7.22 (m, 2H), 7.08 – 6.92 (m, 2H), 6.77 (t, *J* = 7.7 Hz, 2H), 6.12 (d, *J* = 15.8 Hz, 1H), 5.02 – 4.99 (m, 1H), 4.98 (brs, 1H), 3.75 (s, 3H), 2.95-2.82 (m, Hz, 2H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 193.61, 167.33, 151.88, 146.65, 144.22, 138.14, 134.62, 126.98, 125.24, 125.21, 119.95, 118.96, 117.77, 116.56, 53.16, 51.74, 47.76. HRMS (ESI): calc. for [(C<sub>17</sub>H<sub>15</sub>NO<sub>3</sub>S)] (M+H) 314.0846, measured 314.0851.

**Methyl (*E*)-3-(6, 8-dibromo-4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (5a):**



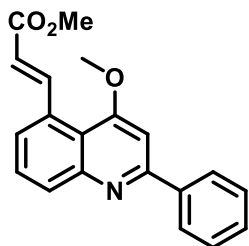
Brown colour solid, Yield: (81%), M.P: (146-148<sup>0</sup>C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ 7.87 (t, *J* = 8.1 Hz, 2H), 7.44 - 7.38 (m, 5H), 5.98 (d, *J* = 16.3 Hz, 1H), 5.25 (brs, 1H), 4.80 (dd, *J* = 13.1, 4.2 Hz, 1H), 3.82 (s, 3H), 2.92 (dd, *J* = 15.9, 13.1 Hz, 1H), 2.82 (ddd, *J* = 15.9, 4.2, 1.6 Hz, 1H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 191.98, 166.69, 148.16, 144.62, 140.98, 139.84, 137.46, 129.38, 128.99, 126.55, 123.50, 118.70, 110.95, 57.30, 51.93, 46.22; HRMS (ESI): calc. for [(C<sub>19</sub>H<sub>15</sub>Br<sub>2</sub>NO<sub>3</sub>)] (M+H) 465.9500, measured 465.9476.

**Methyl (*E*)-3-(6,8-dibromo-2-(3,4-dimethoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (5b):**



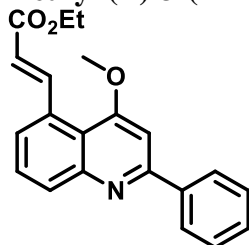
Brown colour solid, Yield: (84%), M.P: (152-156 °C), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.86 (t, *J* = 8.1 Hz, 2H), 6.99 – 6.88 (m, 4H), 5.97 (d, *J* = 16.3 Hz, 1H), 5.20 (brs, 1H), 4.72 (dd, *J* = 13.4, 3.9 Hz, 1H), 3.90 (s, 1H), 3.89 (s, 1H), 3.81 (s, 1H), 2.96 – 2.74 (m, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 192.18, 166.70, 149.57, 149.49, 148.13, 144.63, 140.91, 137.42, 132.21, 123.45, 118.97, 118.70, 111.54, 110.95, 110.85, 109.43, 57.14, 56.13, 51.94, 46.36. HRMS (ESI): calc. for [(C<sub>21</sub>H<sub>19</sub>Br<sub>2</sub>NO<sub>5</sub>)] (M+H) 523.9708, measured 523.9808

**Methyl (*E*)-3-(4-methoxy-2-phenylquinolin-5-yl) acrylate (12a):**



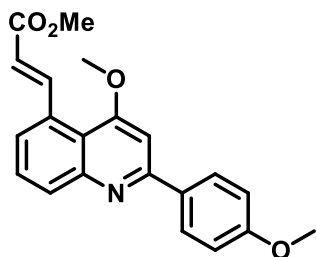
White solid, Yield: (67%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.84 (d, *J* = 15.7 Hz, 1H), 8.17 – 8.06 (m, 3H), 7.70 – 7.62 (m, 1H), 7.56 – 7.47 (m, 4H), 7.23 (s, 1H), 6.22 (d, *J* = 15.7 Hz, 1H), 4.12 (s, 3H), 3.85 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 167.68, 164.46, 158.91, 150.42, 148.15, 139.78, 133.08, 131.54, 129.67, 129.51, 128.96, 127.64, 126.36, 119.25, 118.63, 99.60, 55.96, 51.83, 29.83. HRMS (ESI): calc. for [(C<sub>19</sub>H<sub>15</sub>NO<sub>3</sub>)] (M+H) 321.1365, measured 321.1376.

**Methyl (*E*)-3-(4-methoxy-2-phenylquinolin-5-yl) acrylate (12b):**



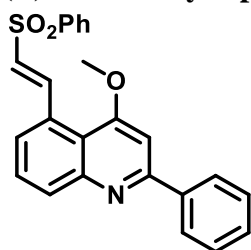
White solid, Yield: (71%), <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.84 (d, *J* = 15.7 Hz, 1H), 8.13 (t, *J* = 7.9 Hz, 3H), 7.72 – 7.61 (m, 1H), 7.59 – 7.47 (m, 4H), 7.23 (s, 1H), 6.22 (d, *J* = 15.7 Hz, 1H), 4.31 (q, *J* = 7.1 Hz, 2H), 4.11 (s, 3H), 1.37 (t, *J* = 7.1 Hz, 3H), <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 167.24, 164.48, 158.88, 150.44, 147.84, 139.79, 133.15, 131.48, 129.66, 129.51, 128.96, 127.64, 126.32, 119.72, 118.63, 99.58, 60.56, 55.93, 14.51. HRMS (ESI): calc. for [(C<sub>21</sub>H<sub>19</sub>NO<sub>3</sub>)] (M+H) 352.1548, measured 352.1544.

**Methyl (*E*)-3-(4-methoxy-2-(4-methoxyphenyl)quinolin-5-yl) acrylate (12c):**



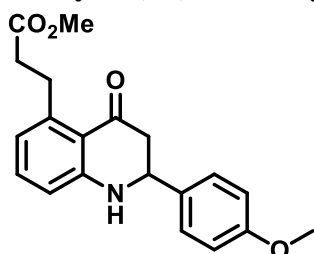
White solid, Yield: (78%),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.84 (d,  $J = 15.7$  Hz, 1H), 8.10 (ddd,  $J = 4.9, 4.2, 1.7$  Hz, 3H), 7.75 – 7.56 (m, 1H), 7.51 (dd,  $J = 4.6, 3.6$  Hz, 1H), 7.18 (s, 1H), 7.12 – 6.94 (m, 2H), 6.22 (d,  $J = 15.7$  Hz, 1H), 4.11 (s, 3H), 3.89 (s, 3H), 3.84 (s, 3H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.72, 164.35, 161.07, 158.40, 150.43, 148.25, 133.04, 132.27, 131.34, 129.44, 128.97, 126.04, 119.15, 118.43, 114.31, 99.04, 55.90, 55.56, 51.83, 29.84. HRMS (ESI): calc. for  $[(\text{C}_{21}\text{H}_{19}\text{NO}_4)]$  (M+H) 351.1470, measured 351.1445.

**(*E*)-4-Methoxy-2-phenyl-5-(2-(phenylsulfonyl) vinyl) quinolone (12d):**



White solid, Yield: (74%),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.82 (d,  $J = 15.2$  Hz, 1H), 8.17 (d,  $J = 7.8$  Hz, 1H), 8.12 – 8.05 (m, 1H), 8.03 – 7.93 (m, 1H), 7.67 – 7.40 (m, 3H), 7.24 (s, 1H), 6.65 (d,  $J = 15.1$  Hz, 1H), 4.12 (s, 1H),  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  164.24, 159.13, 150.03, 146.02, 140.99, 139.26, 133.52, 131.99, 130.73, 129.93, 129.57, 129.49, 129.37, 129.01, 128.41, 127.87, 127.77, 127.69, 126.66, 118.50, 99.88, 56.09. HRMS (ESI): calc. for  $[(\text{C}_{24}\text{H}_{19}\text{NO}_3\text{S})]$  (M+H) 403.1242, measured 403.1267.

**Methyl 3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl)propanoate (13):**



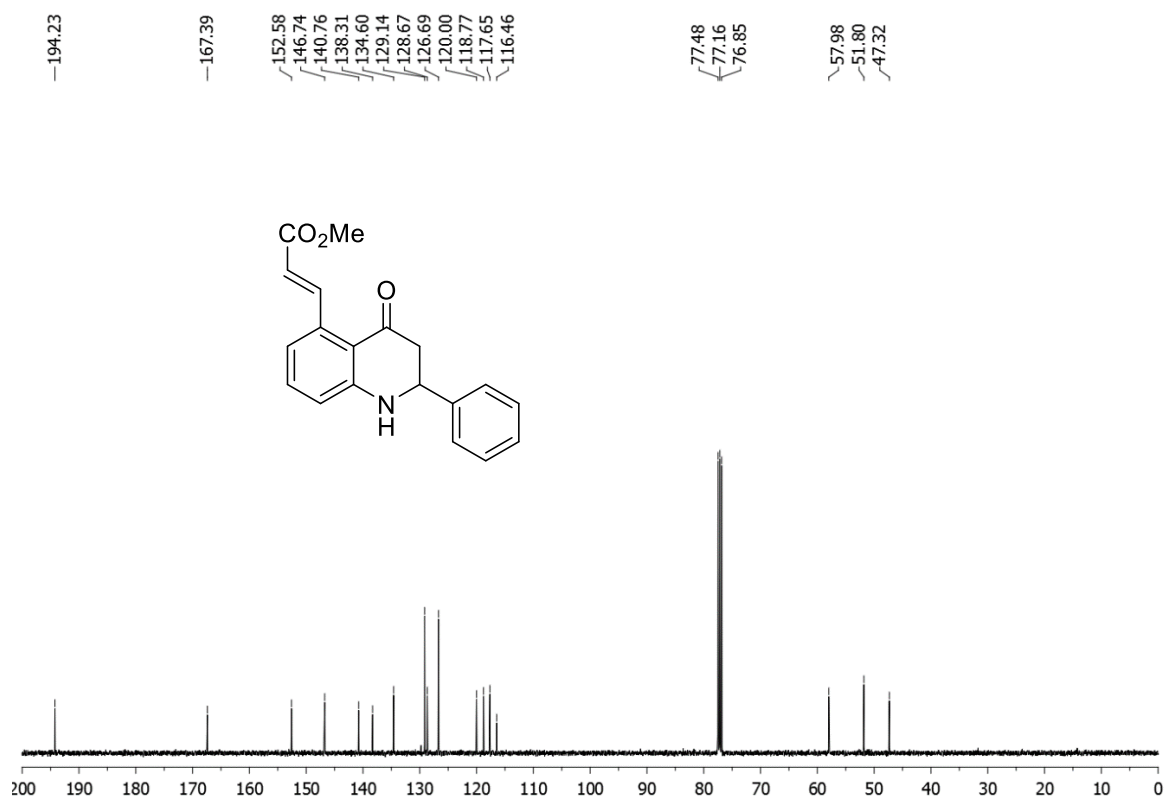
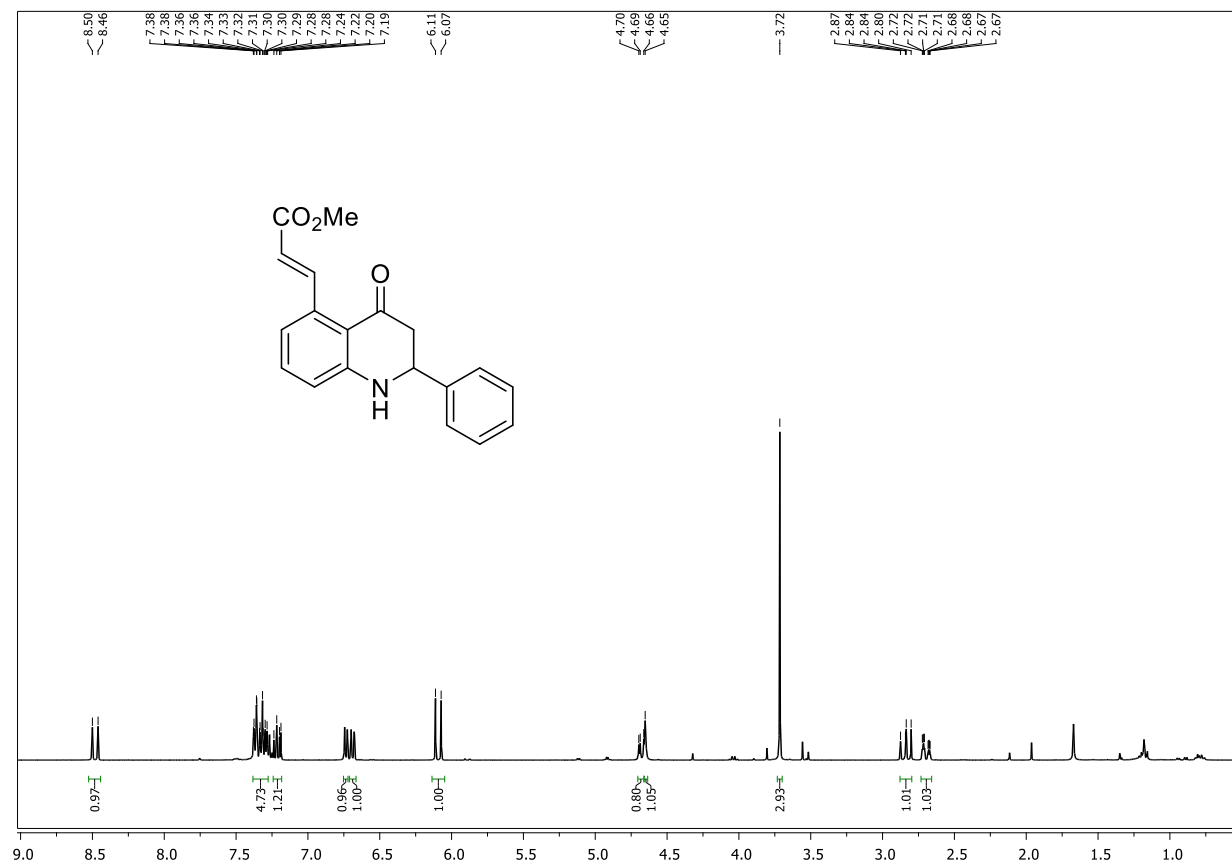
Yellow liquid, Yield: (79%),  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.36 (d,  $J = 8.6$  Hz, 1H), 7.18 (t,  $J = 7.8$  Hz, 1H), 6.92 (d,  $J = 8.7$  Hz, 1H), 6.58 (dd,  $J = 7.7, 4.1$  Hz, 1H), 4.68 (dd,  $J = 14.0, 3.5$  Hz, 1H), 4.50 (brs, 1H), 3.82 (s, 3H), 3.67 (s, 3H), 3.31 (tdd,  $J = 19.7, 9.6, 5.3$  Hz, 2H), 2.89 (dd,  $J = 15.6, 14.1$  Hz, 1H), 2.76 – 2.59 (m, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  194.73, 174.12, 159.77,

153.30, 144.54, 134.52, 133.17, 127.92, 121.36, 116.84, 115.06, 114.41, 57.46, 55.50, 51.64, 48.13, 35.17, 31.05. HRMS (ESI): calc. for  $[(C_{20}H_{21}NO_4)]$  (M+H) 341.1627, measured 341.1645.

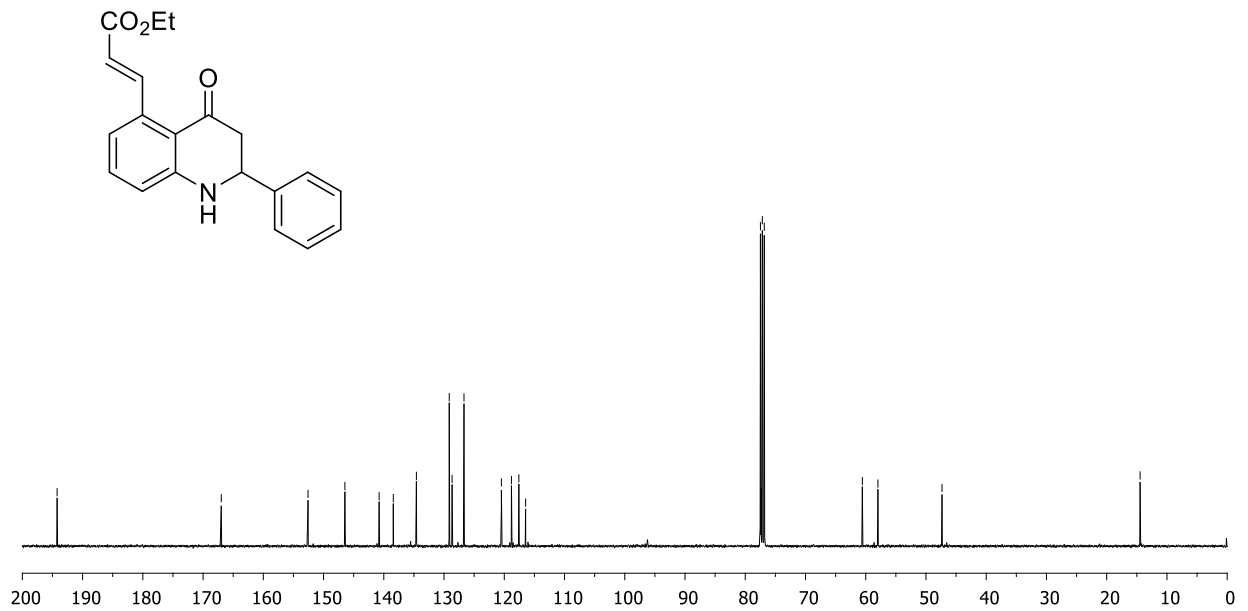
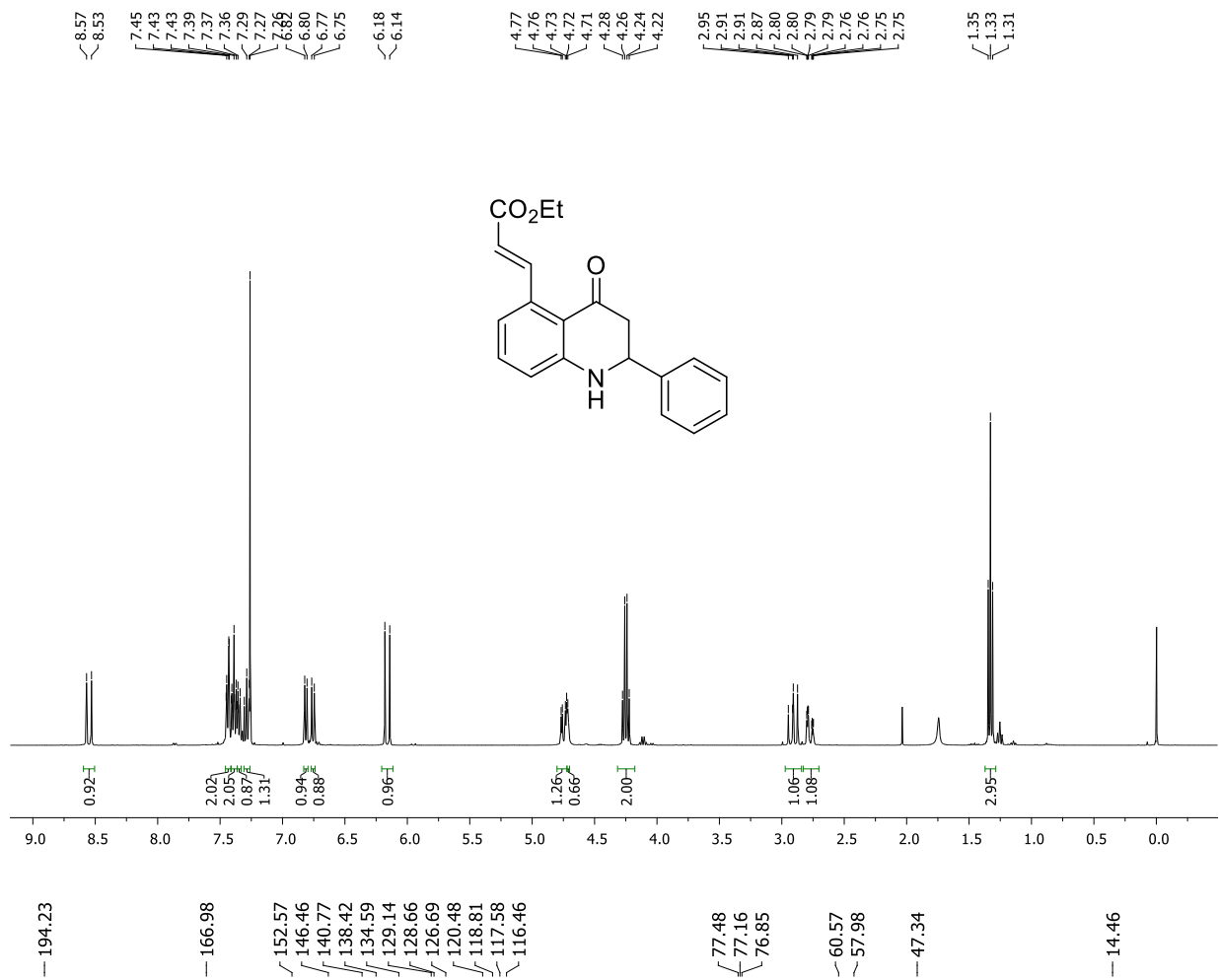


5. <sup>1</sup>H and <sup>13</sup>C NMR spectra for the compounds (3a-u and 5a-b, 12a-d, 13)

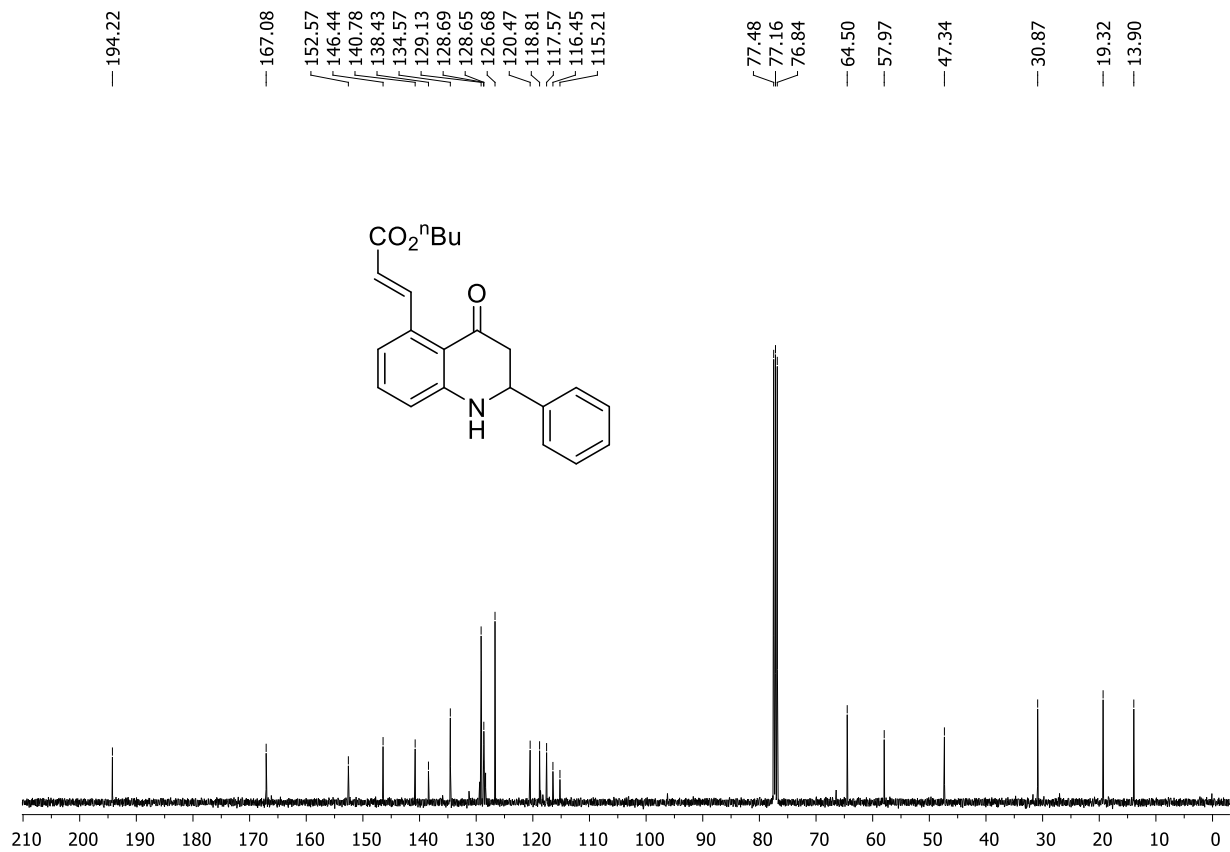
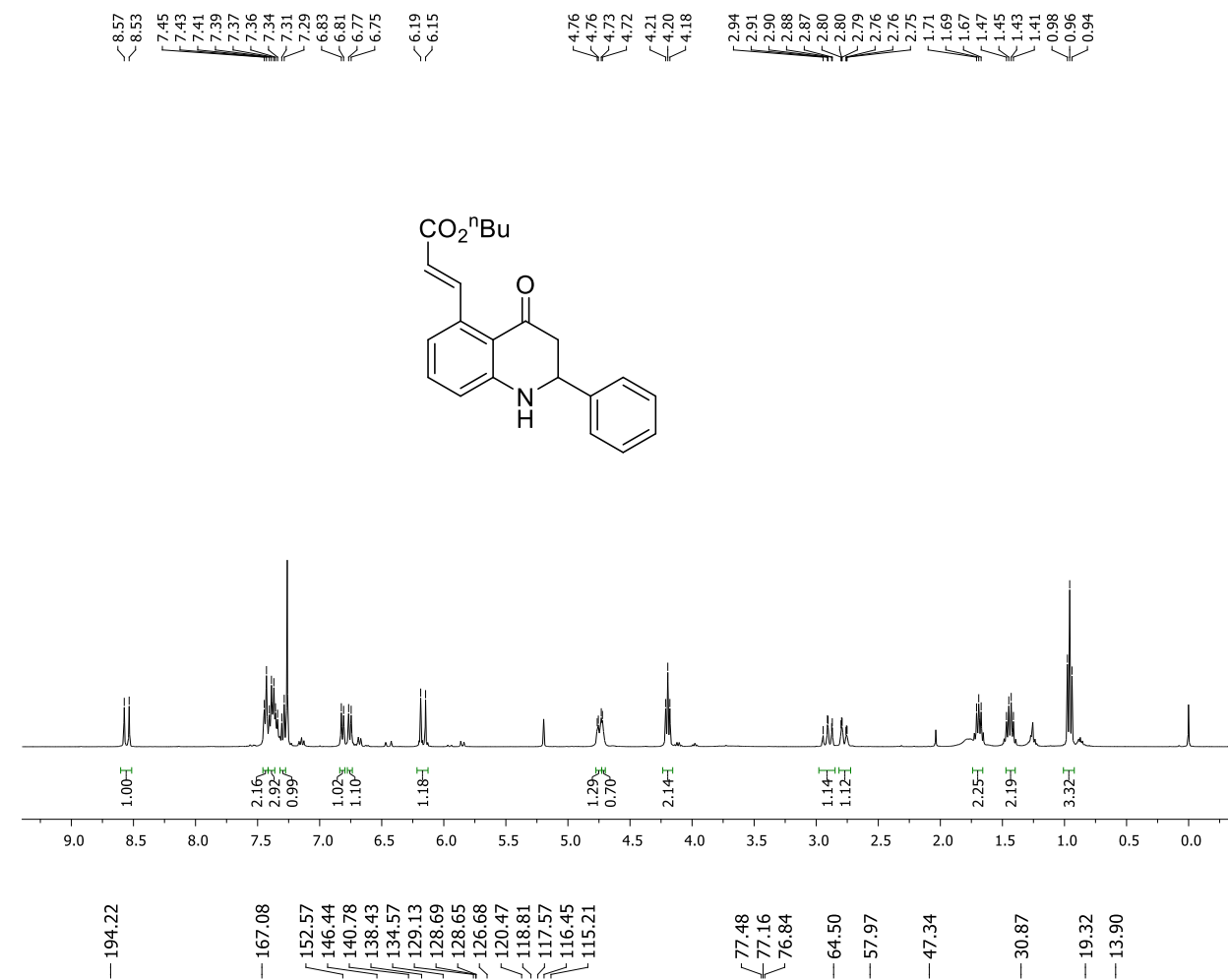
Methyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3a):



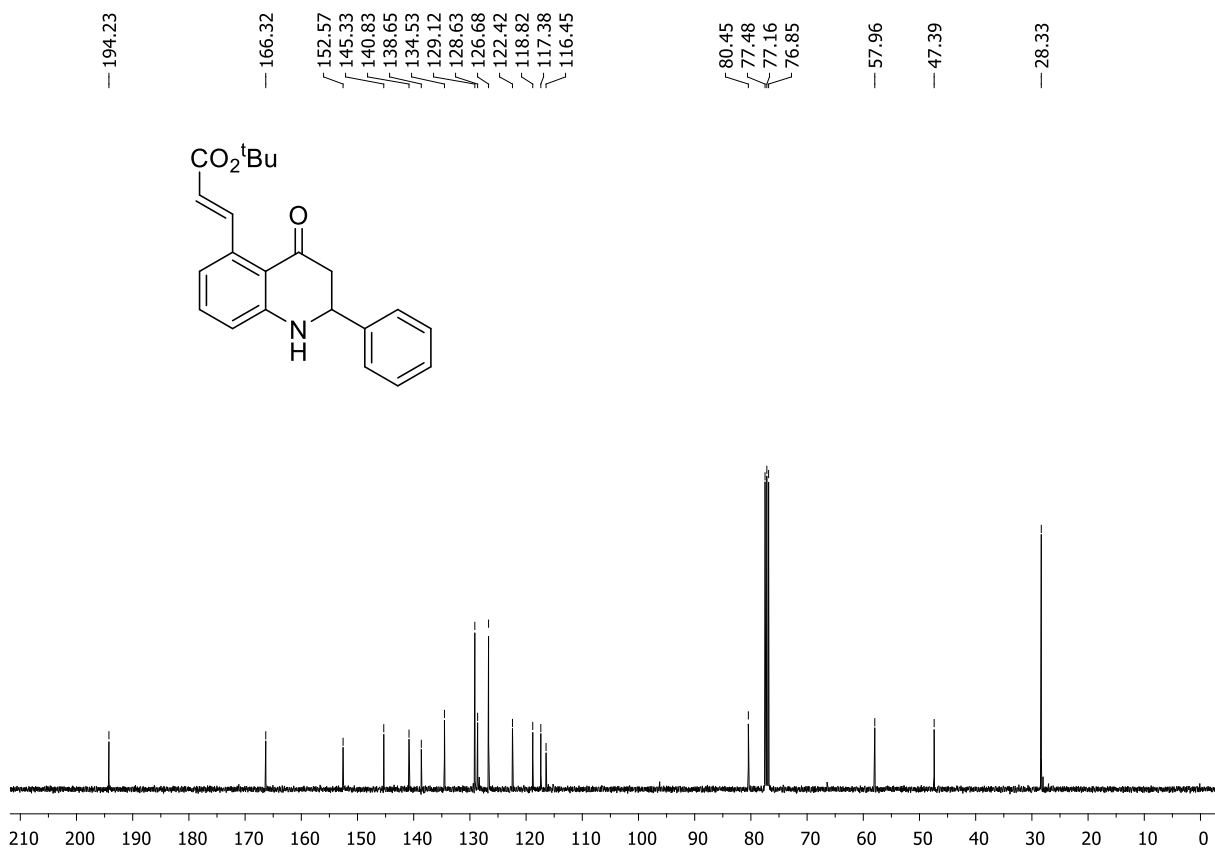
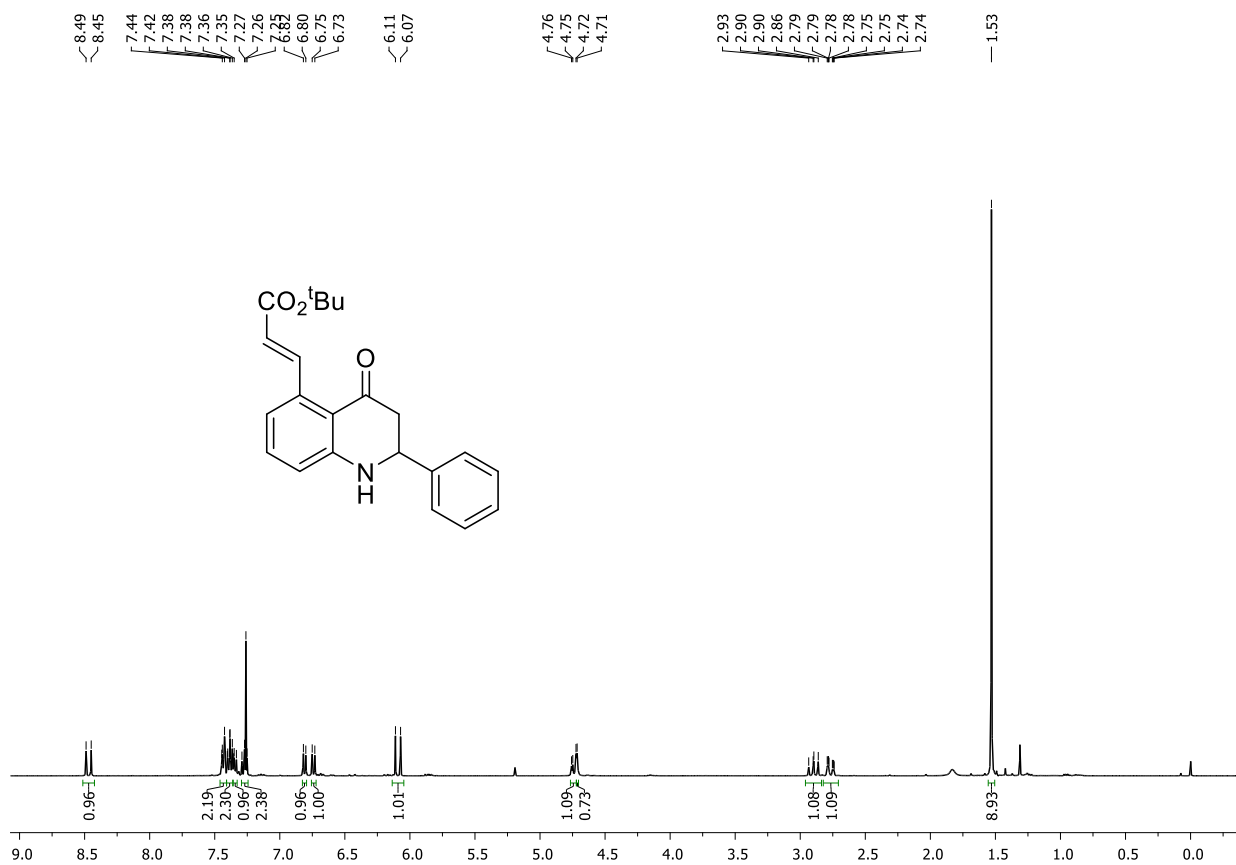
**Ethyl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3b):**



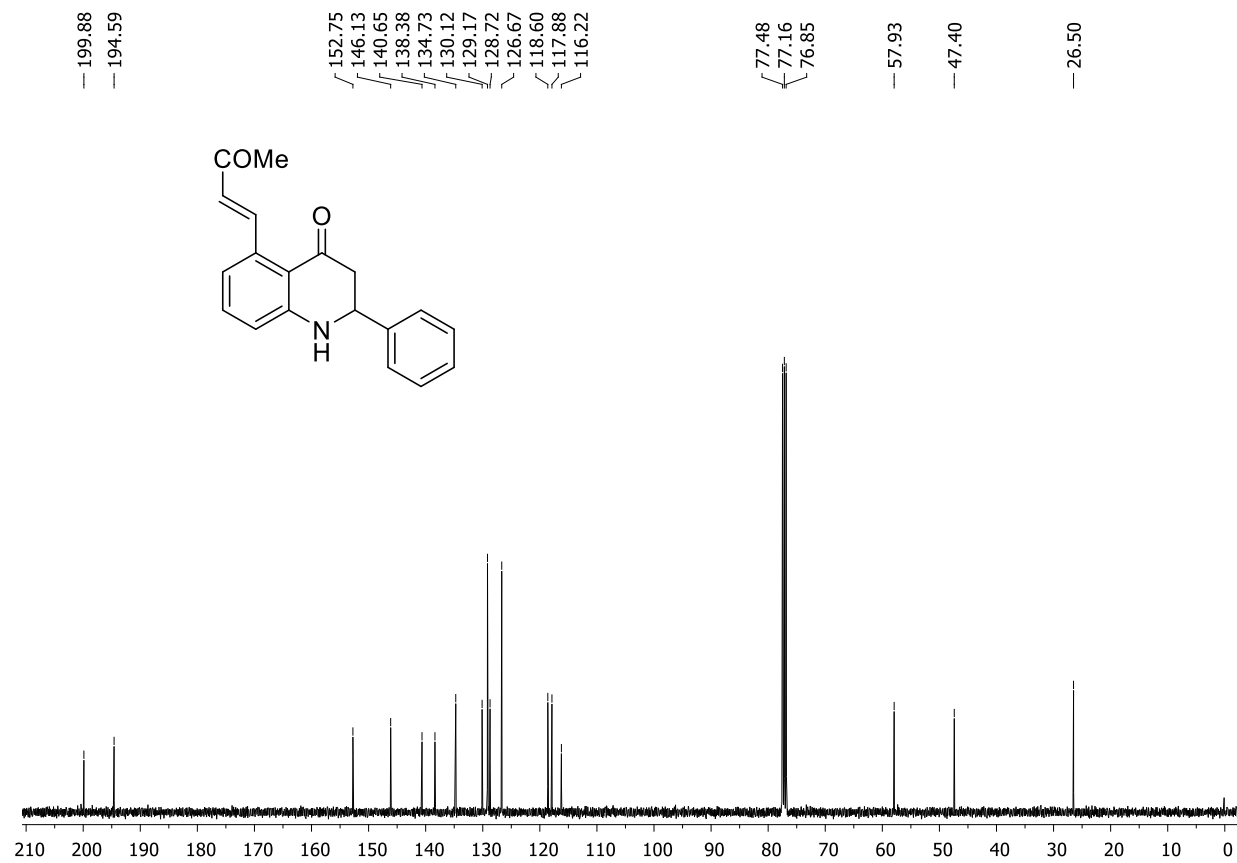
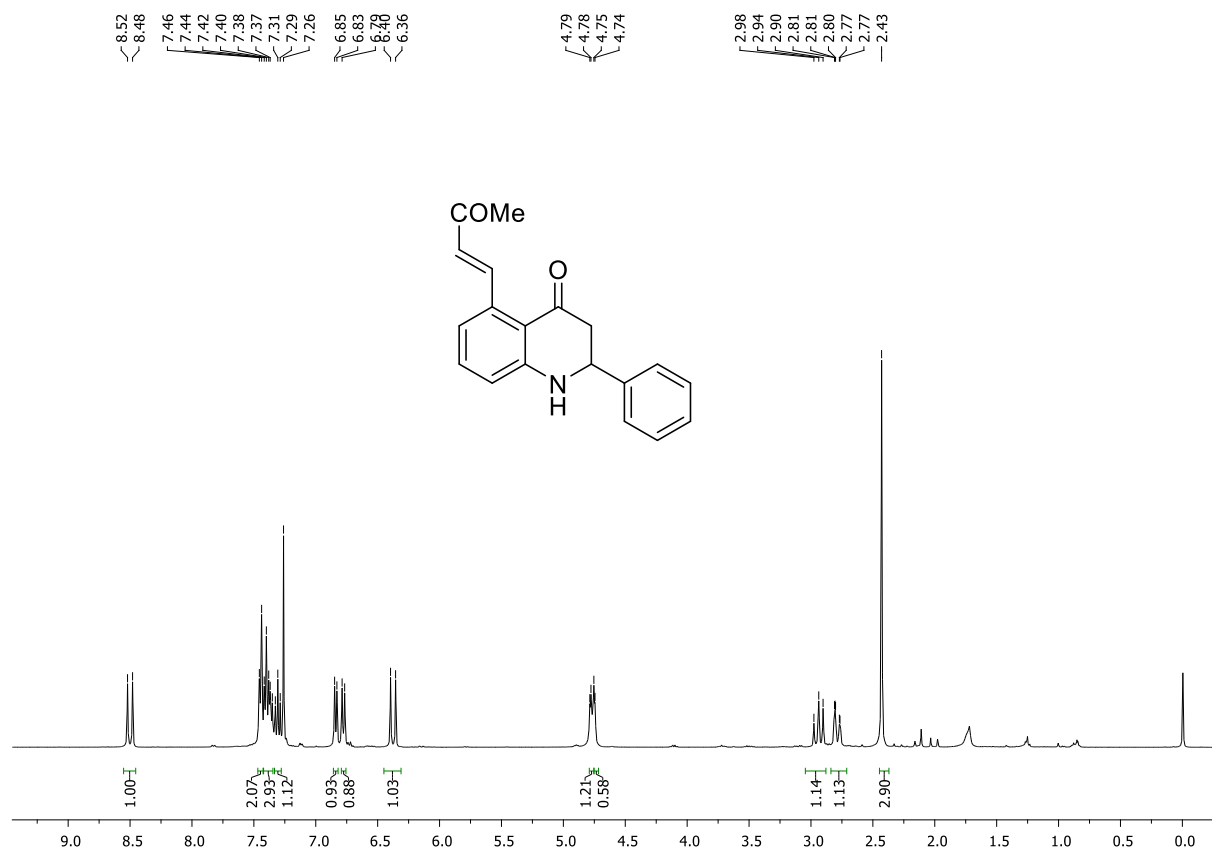
Butyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3c):



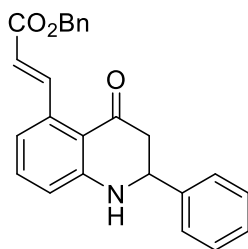
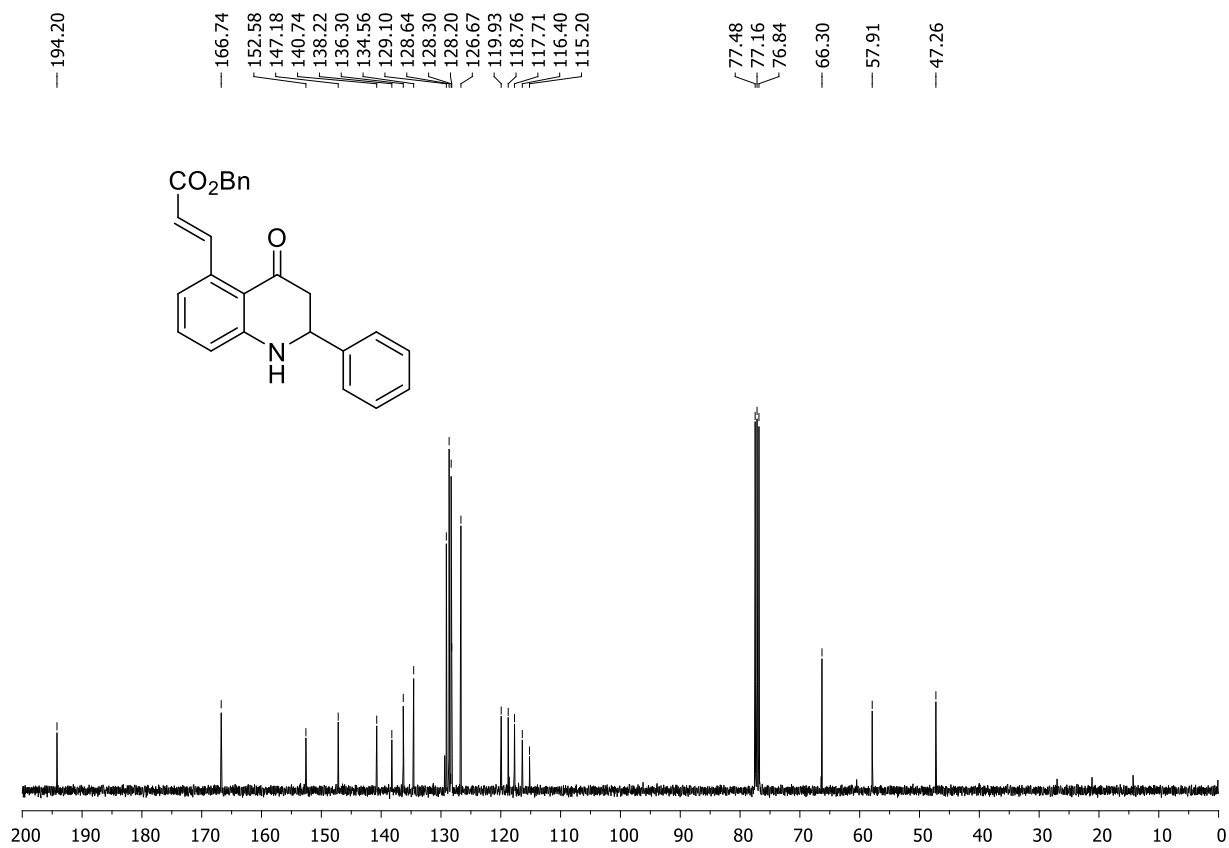
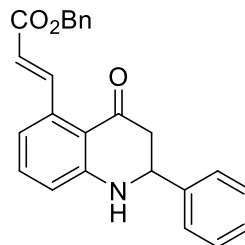
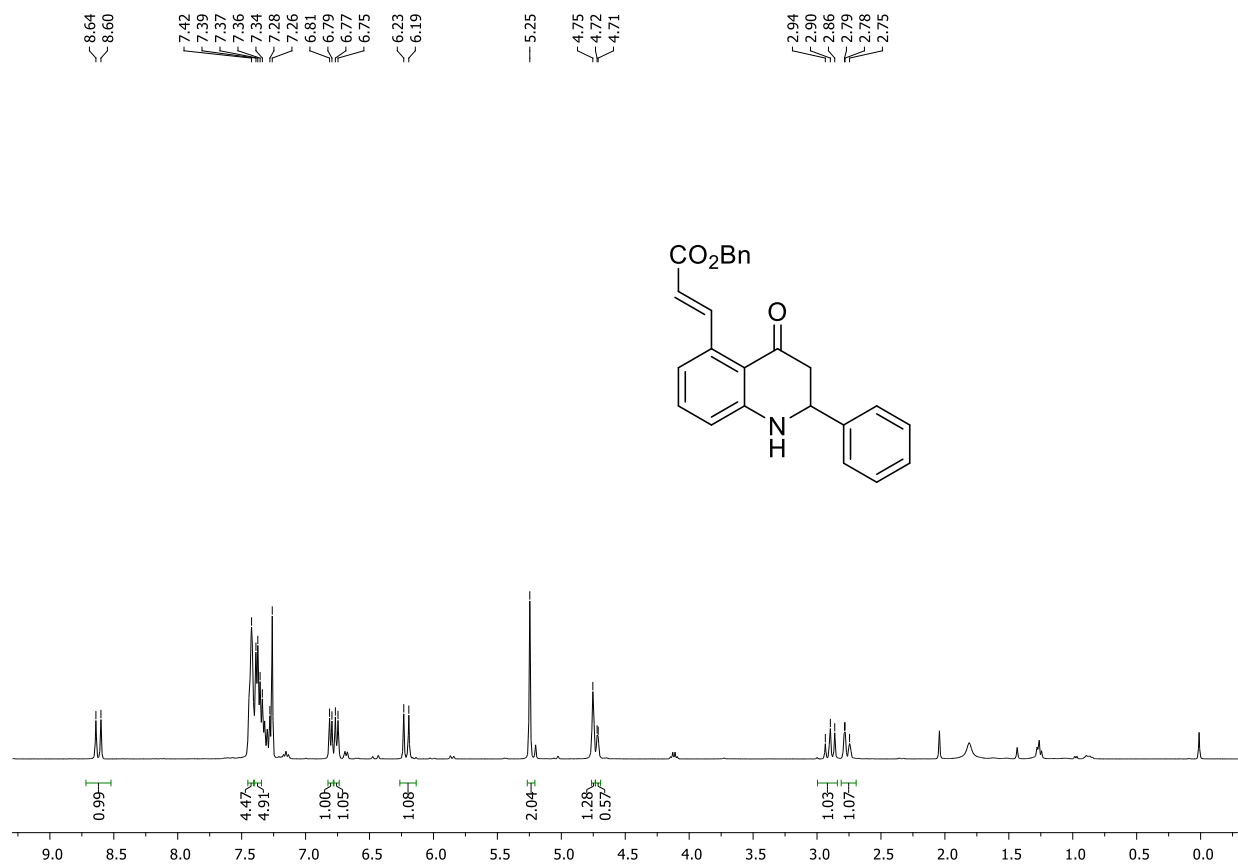
**tert-Butyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3d):**



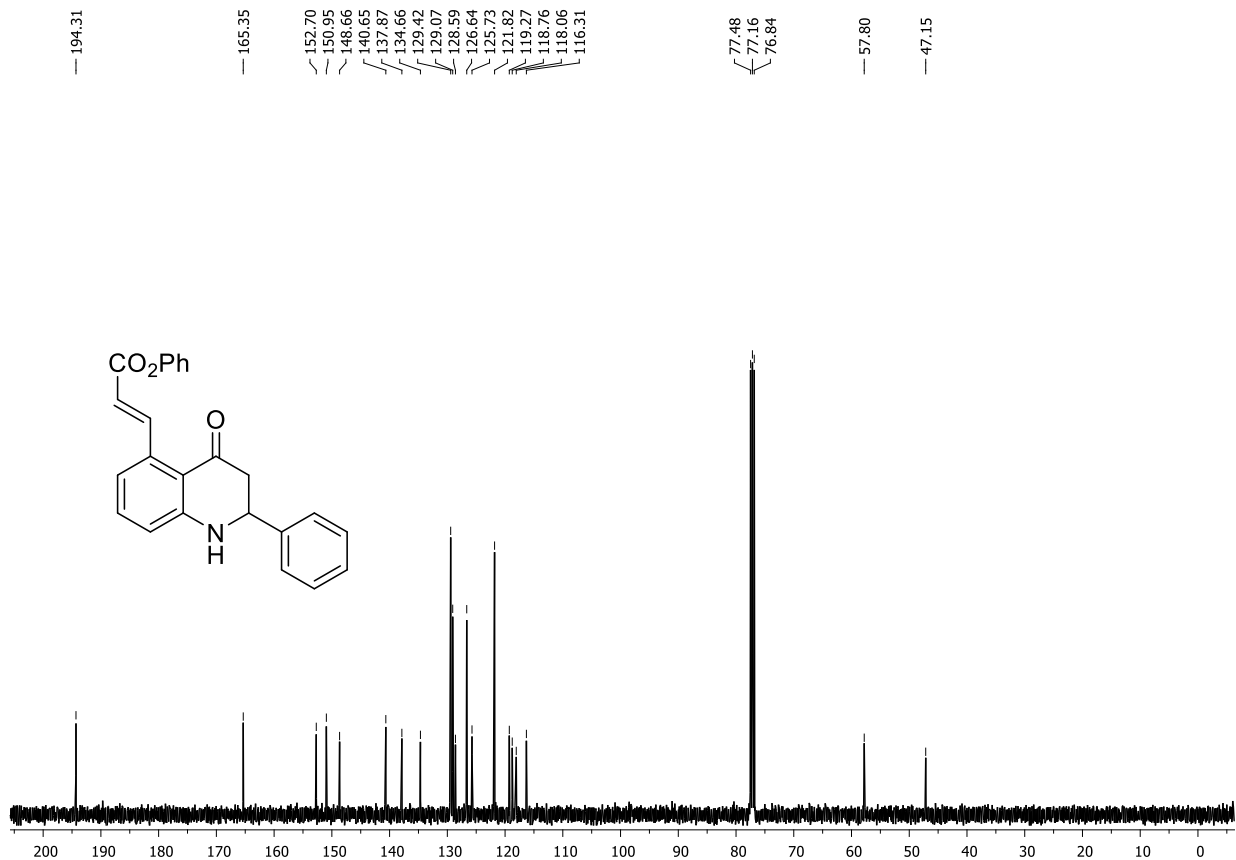
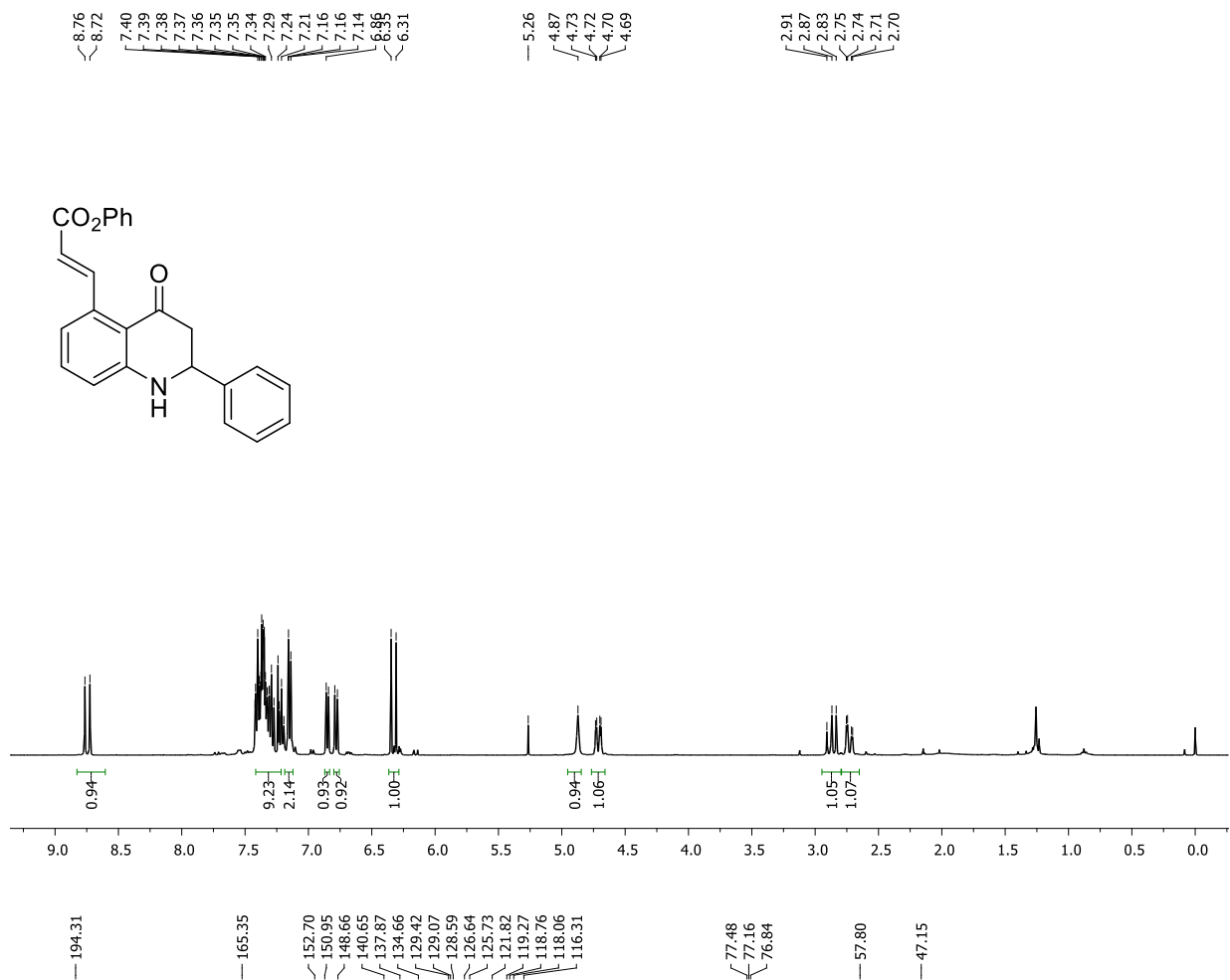
**(E)-5-(3-Oxobut-1-en-1-yl)-2-phenyl-2, 3-dihydroquinolin-4(1H)-one (3e):**



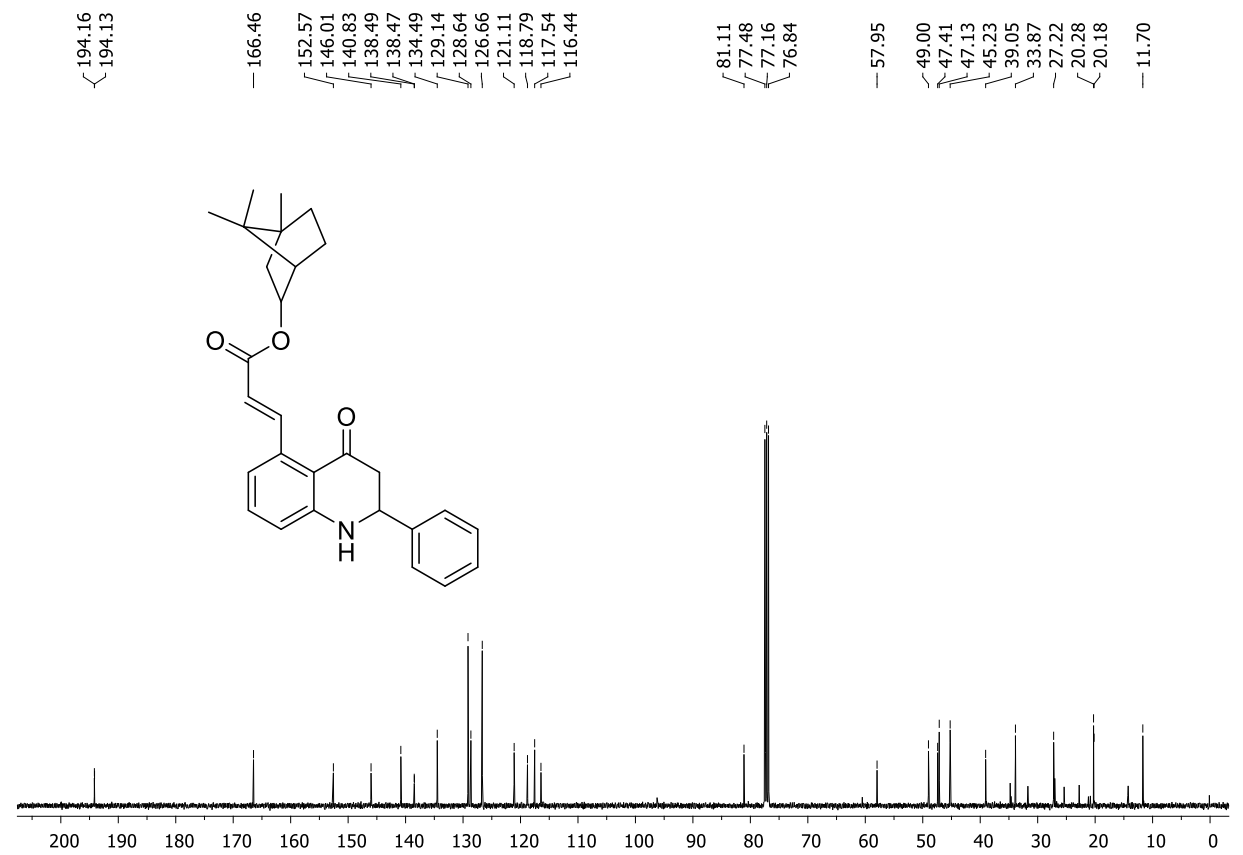
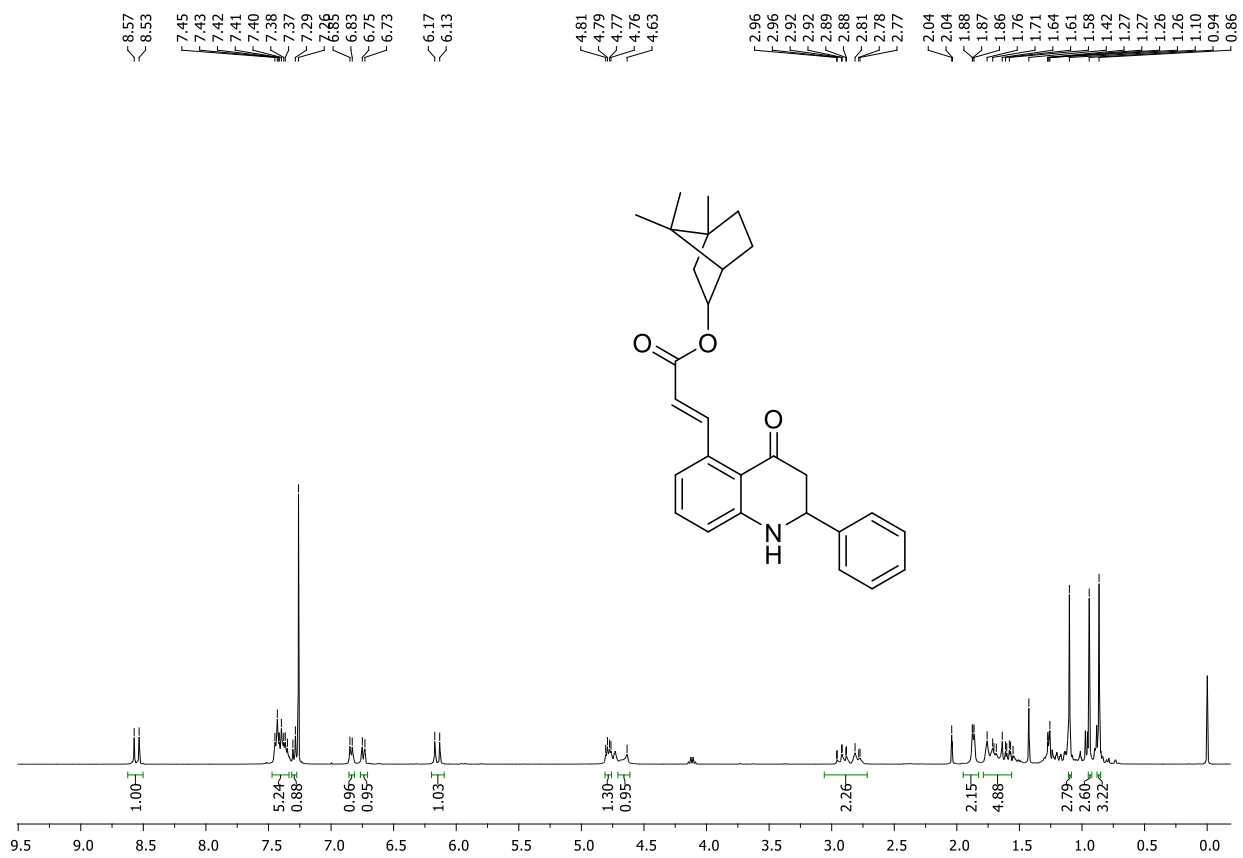
**Benzyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3f):**



Phenyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3g):

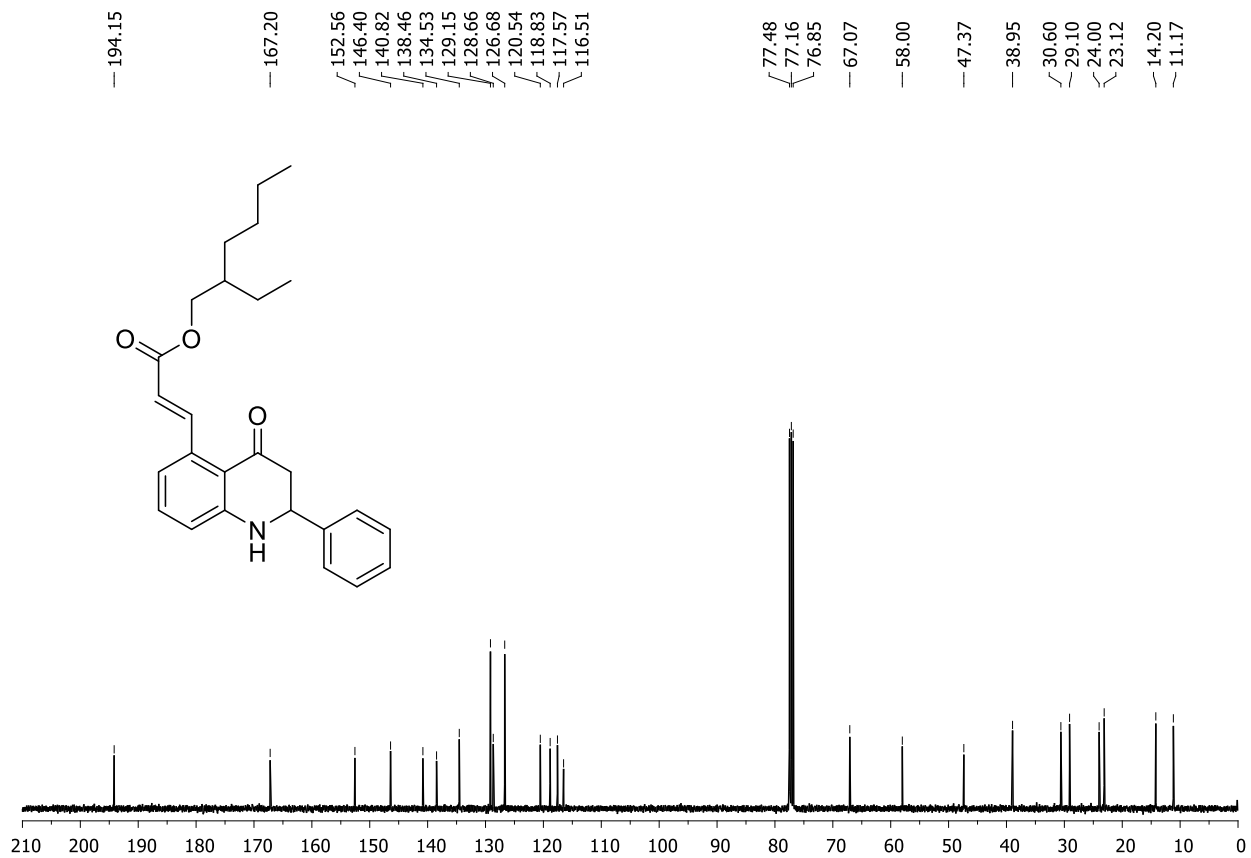
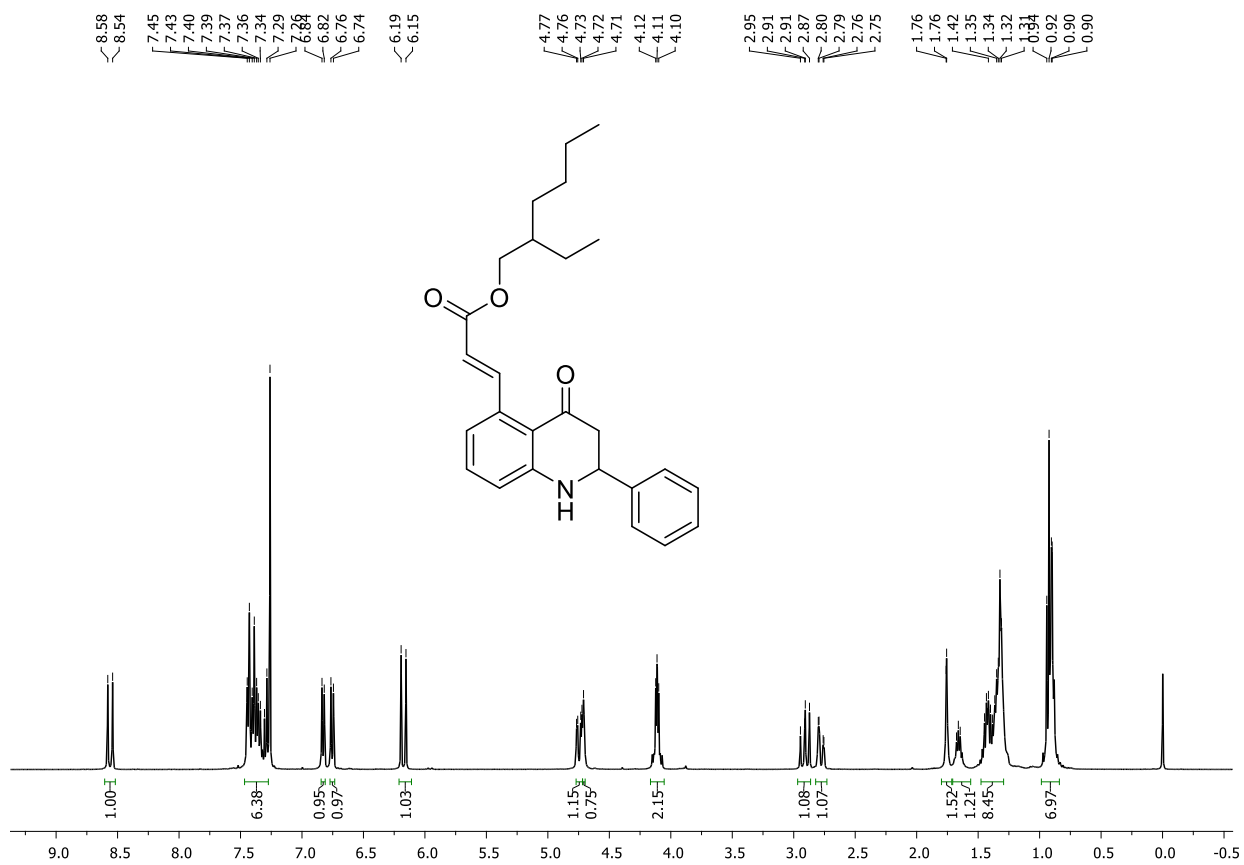


7, 7-Dimethyl bicyclo[2.2.1]heptan-2-yl (*E*)-3-(4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3h):

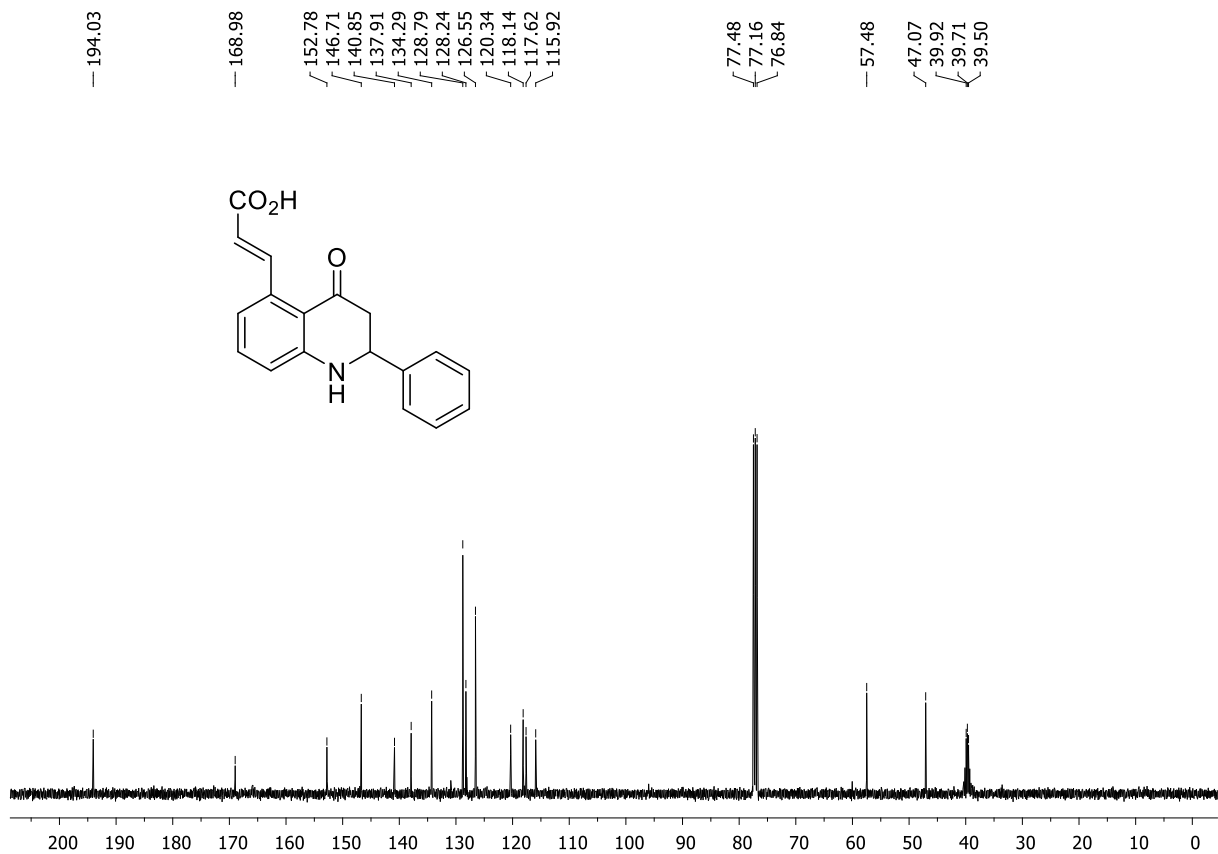
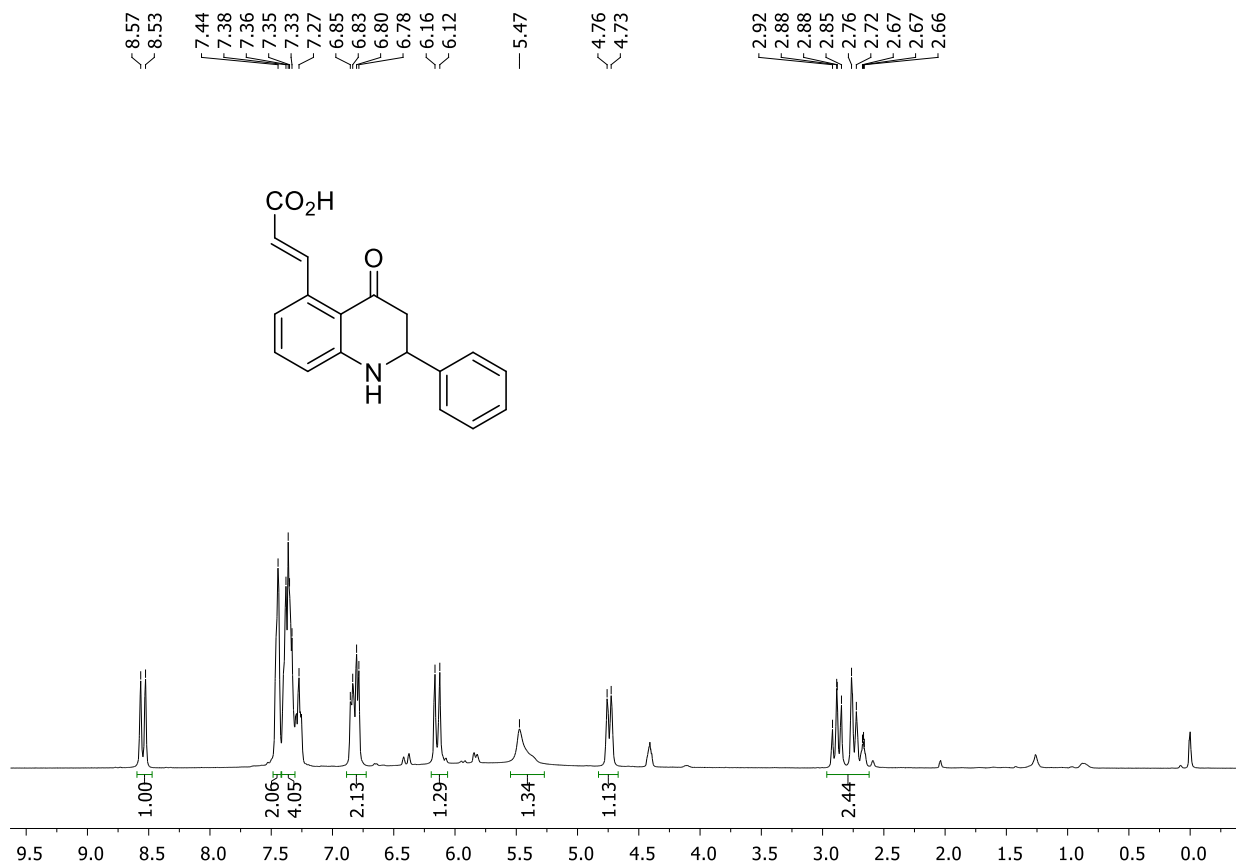




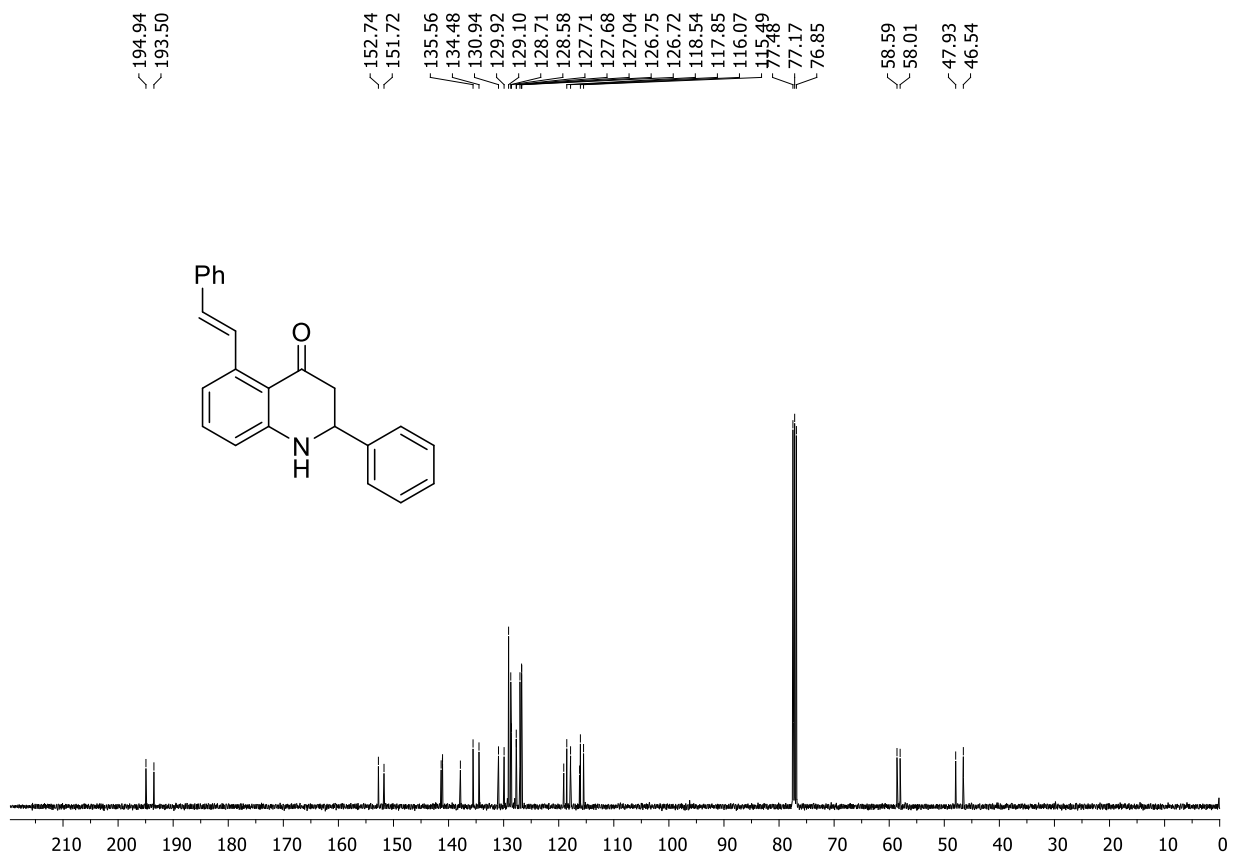
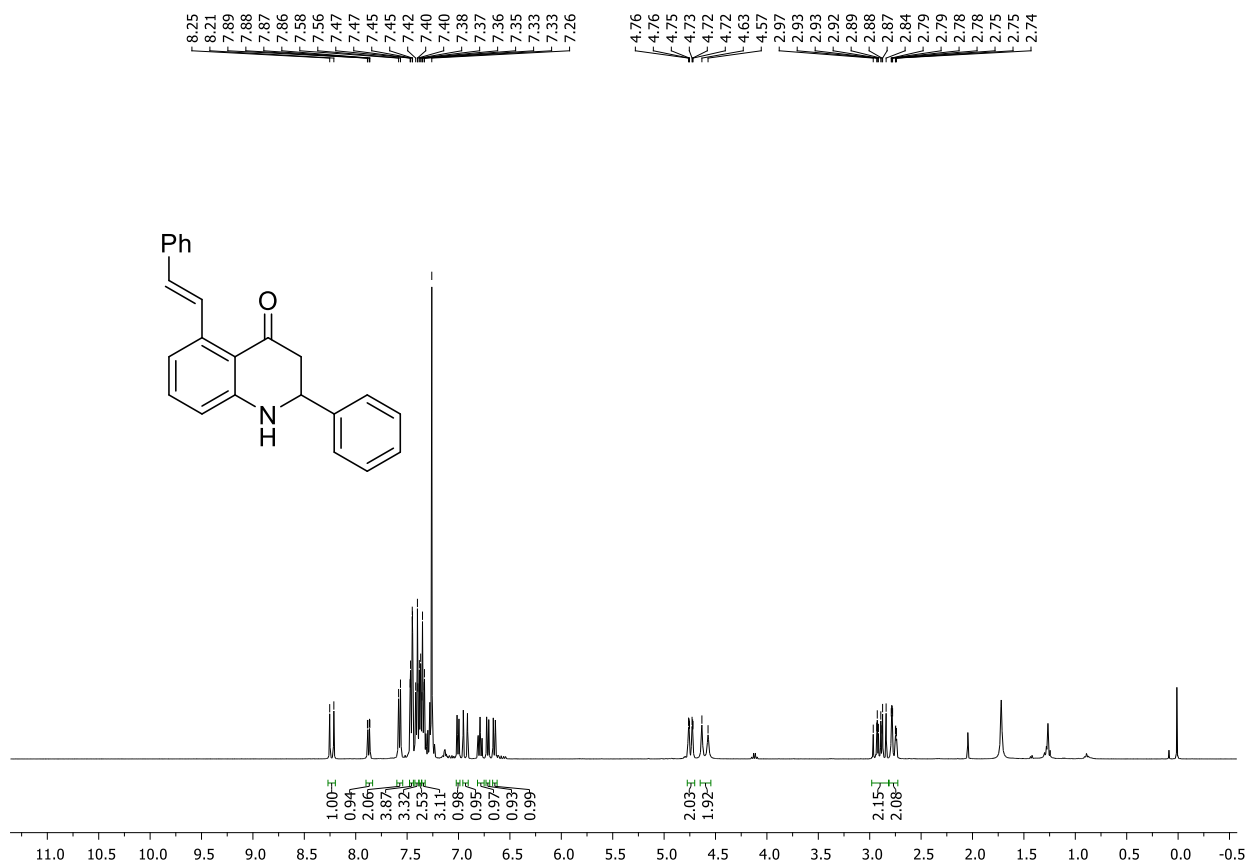
2-Ethylhexyl (*E*)-3-(4-oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3i):



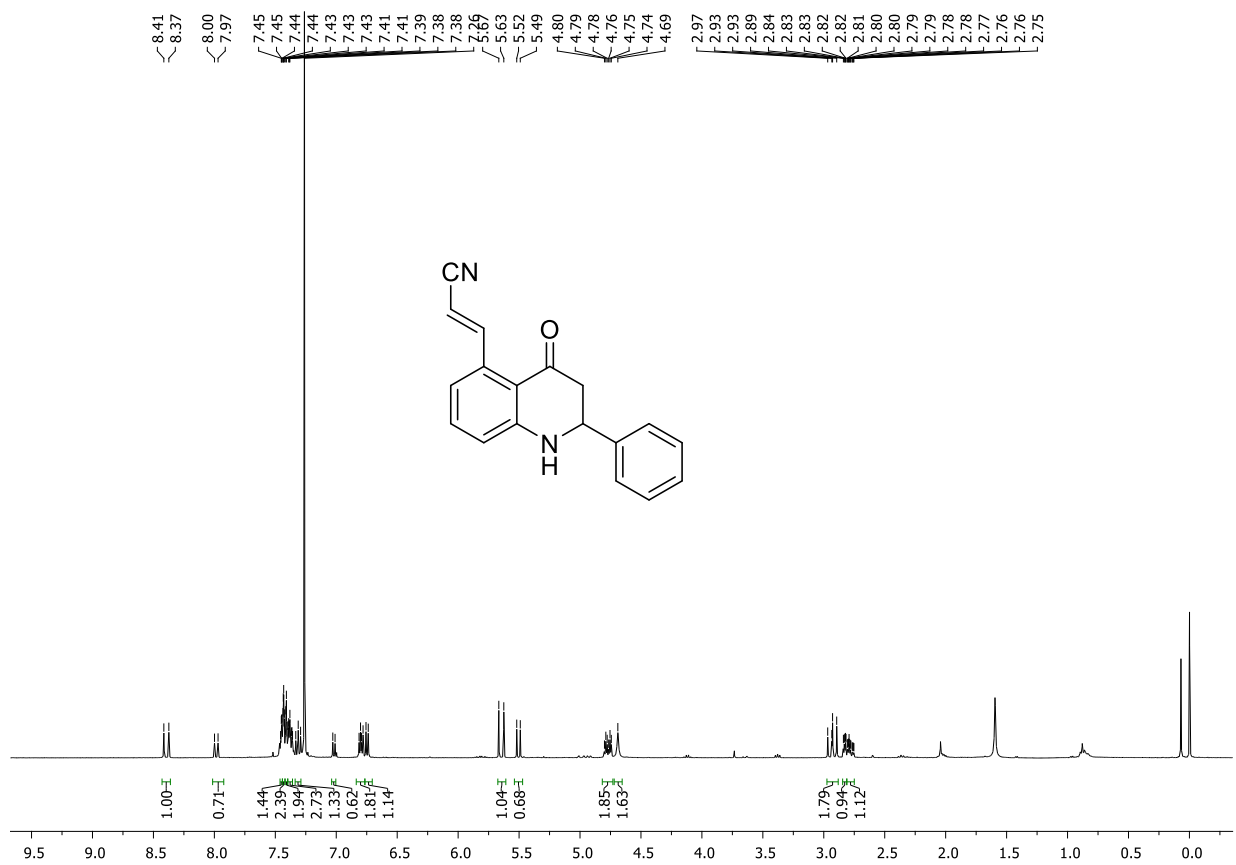
**(E)-3-(4-Oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylic acid (3j):**



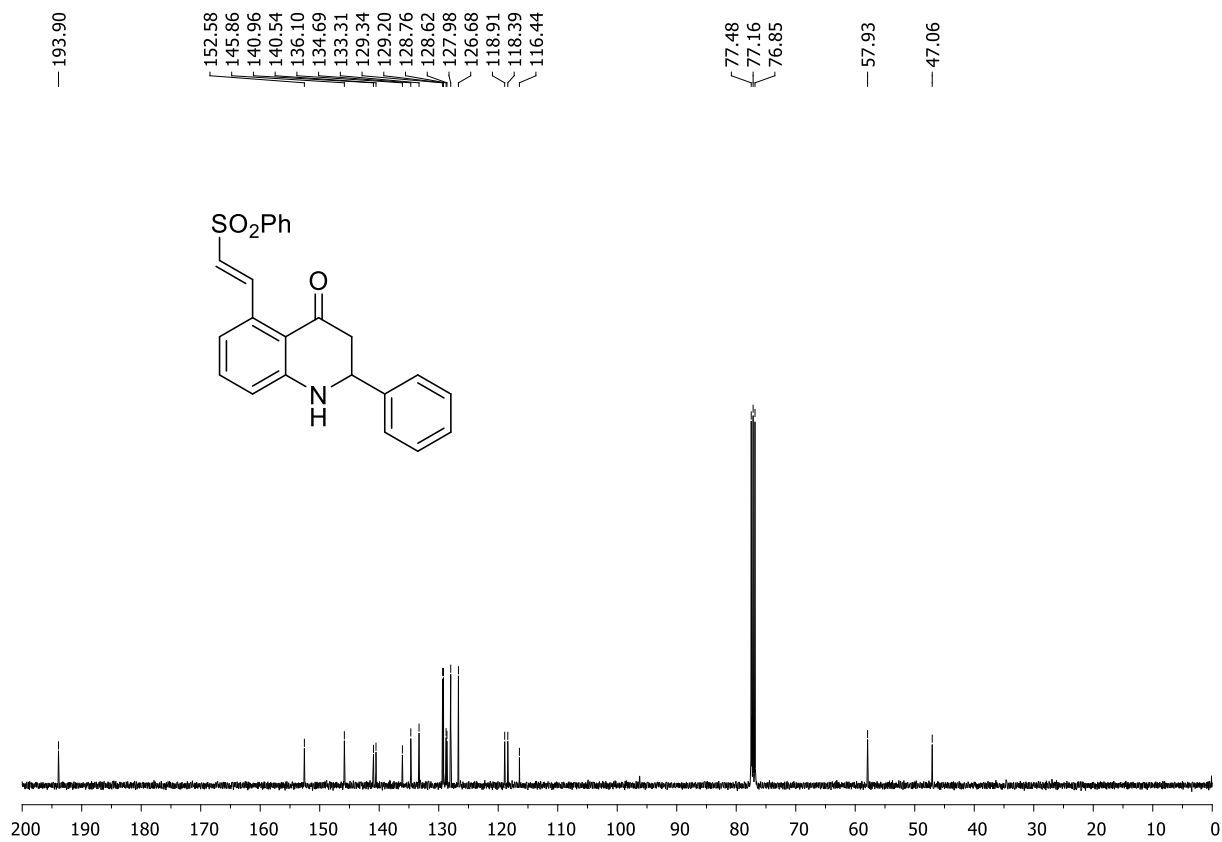
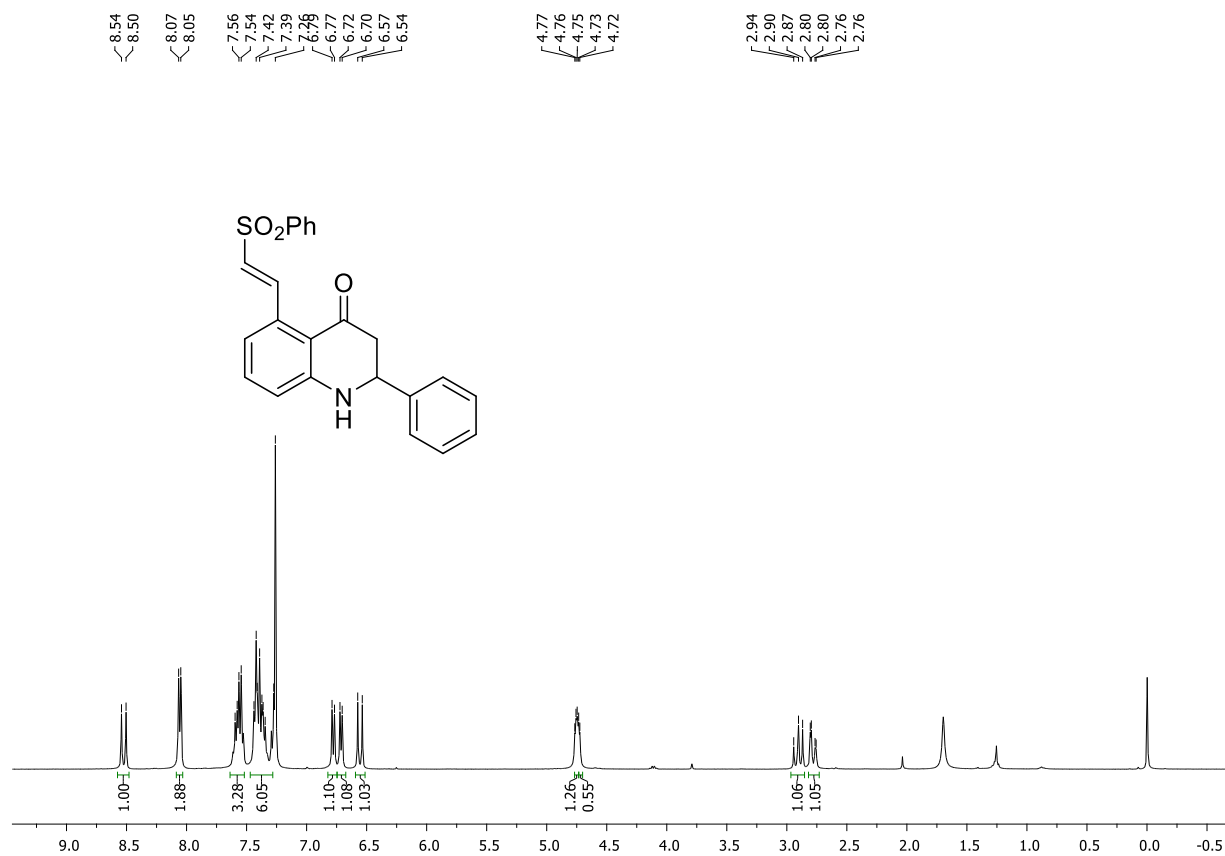
2-Phenyl-5-styryl-2, 3-dihydroquinolin-4(1H)-one [E/Z = 52:48] (3k):



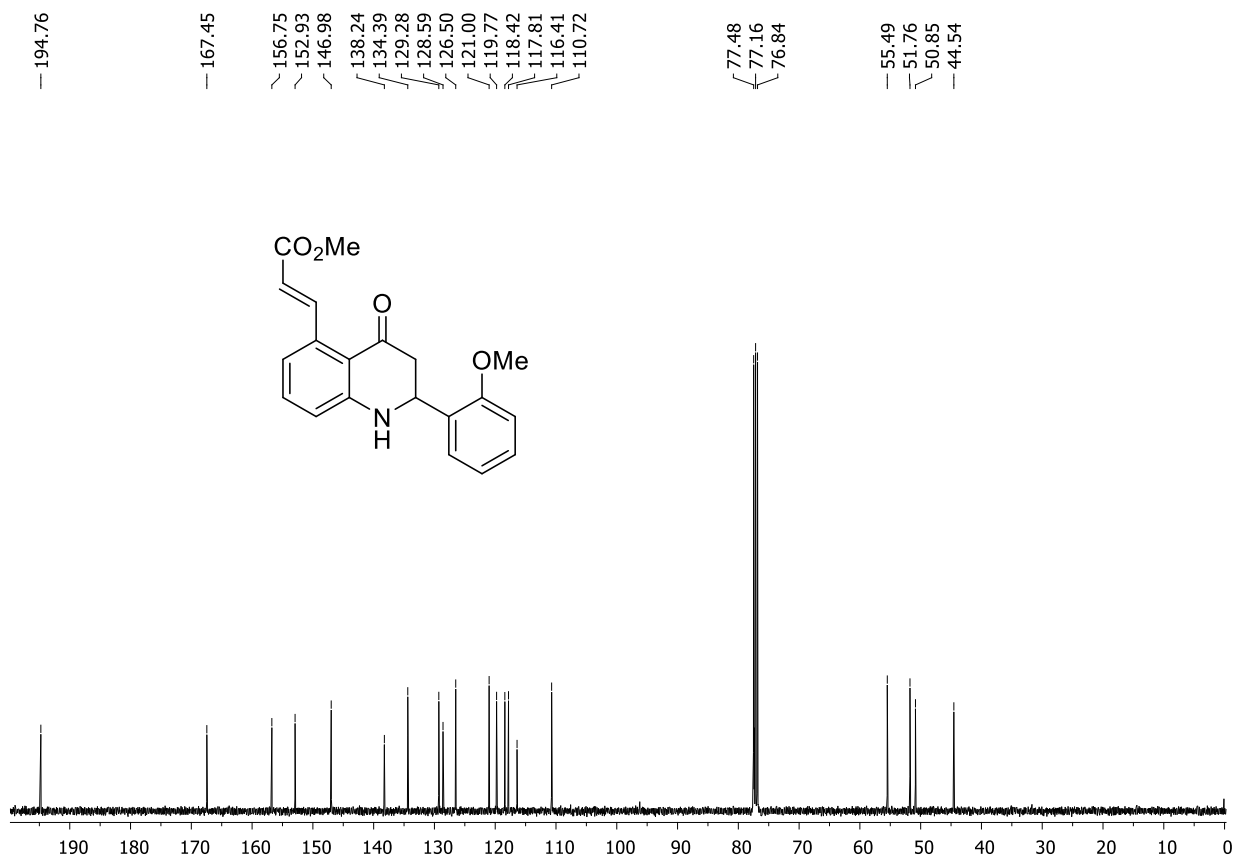
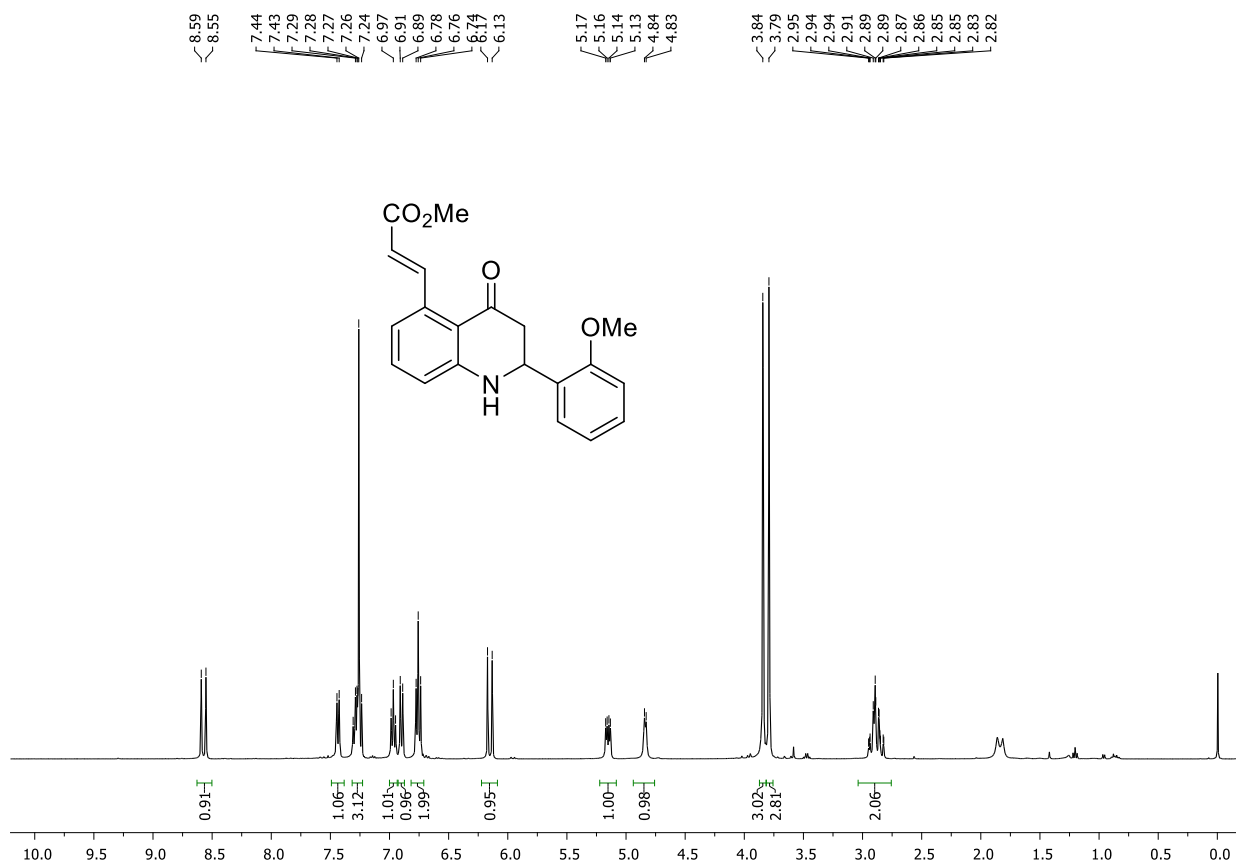
3-(4-Oxo-2-phenyl-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylonitrile [E/Z = 58:42] (3I):



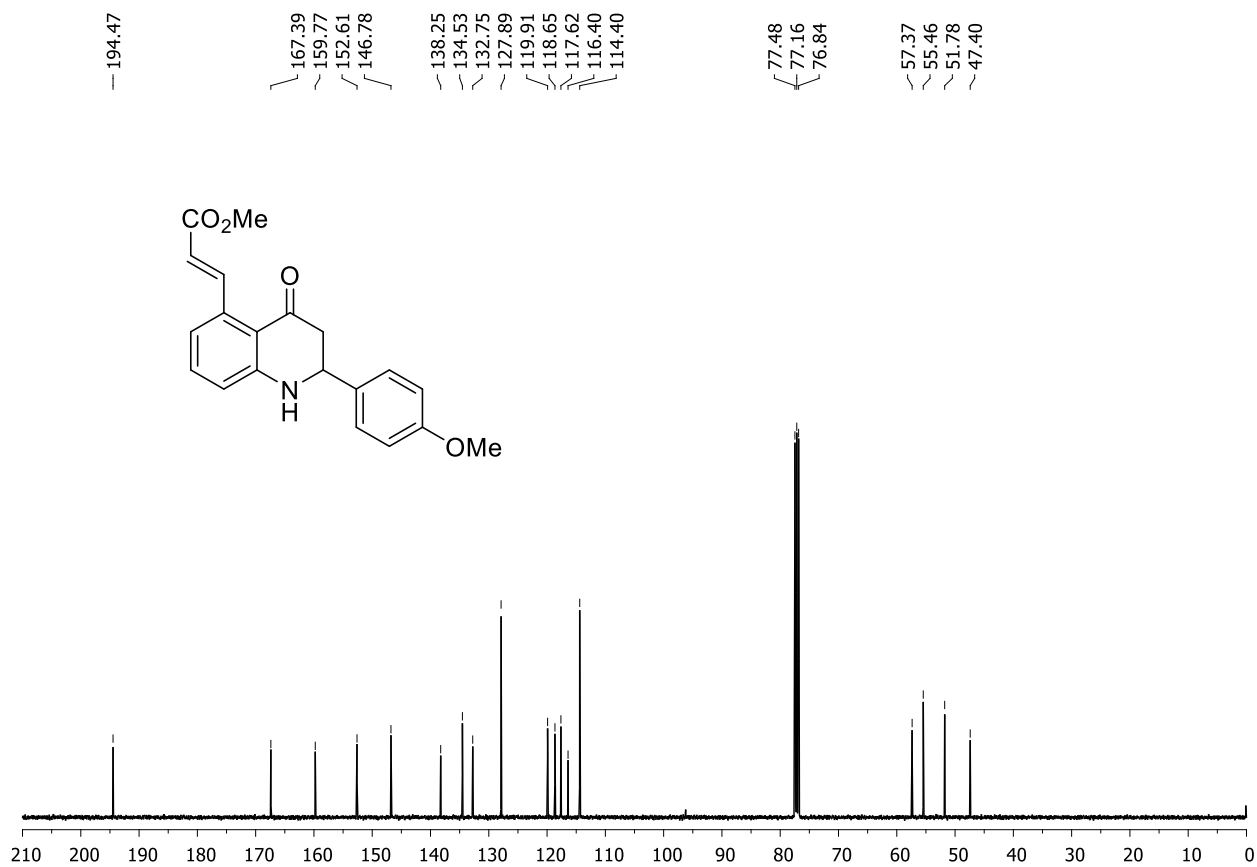
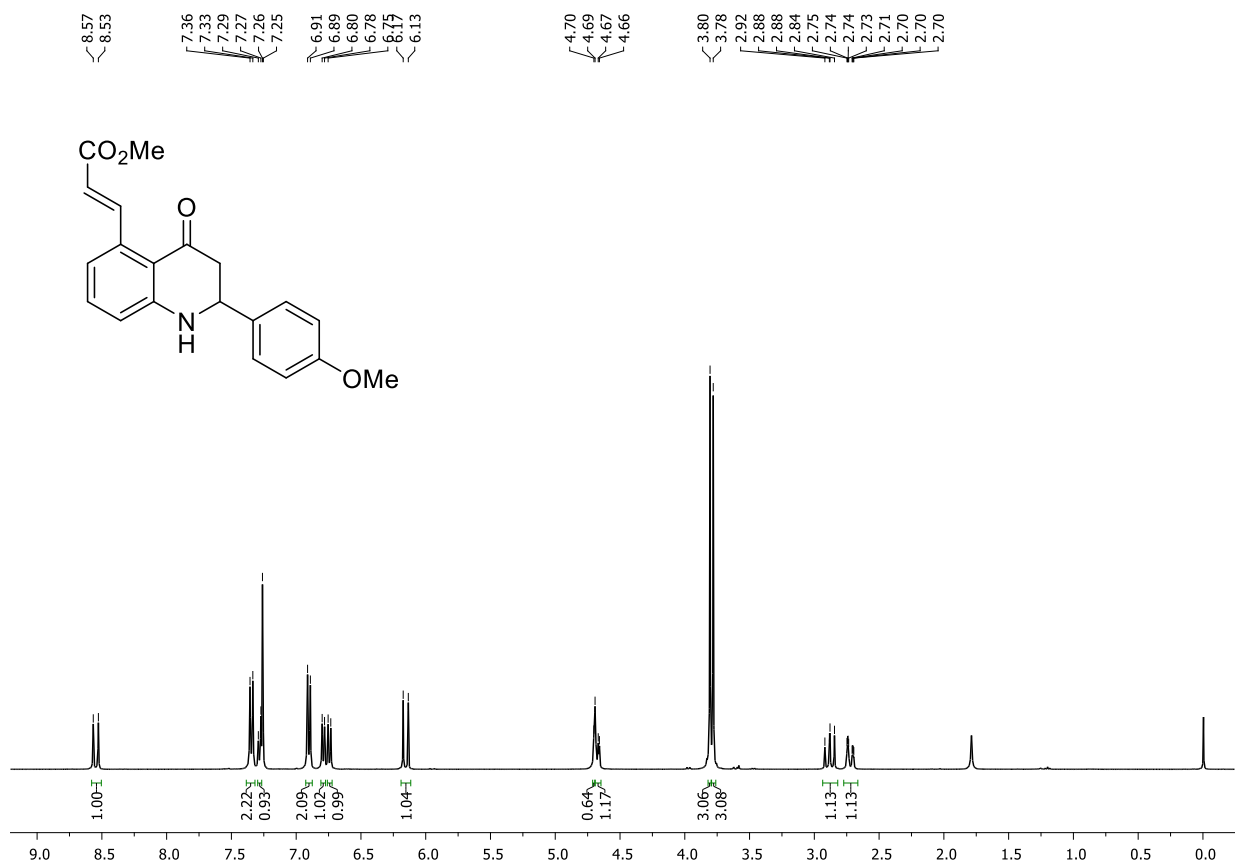
**(E)-2-Phenyl-5-(2-(phenylsulfonyl) vinyl)-2,3-dihydroquinolin-4(1H)-one(3m):**



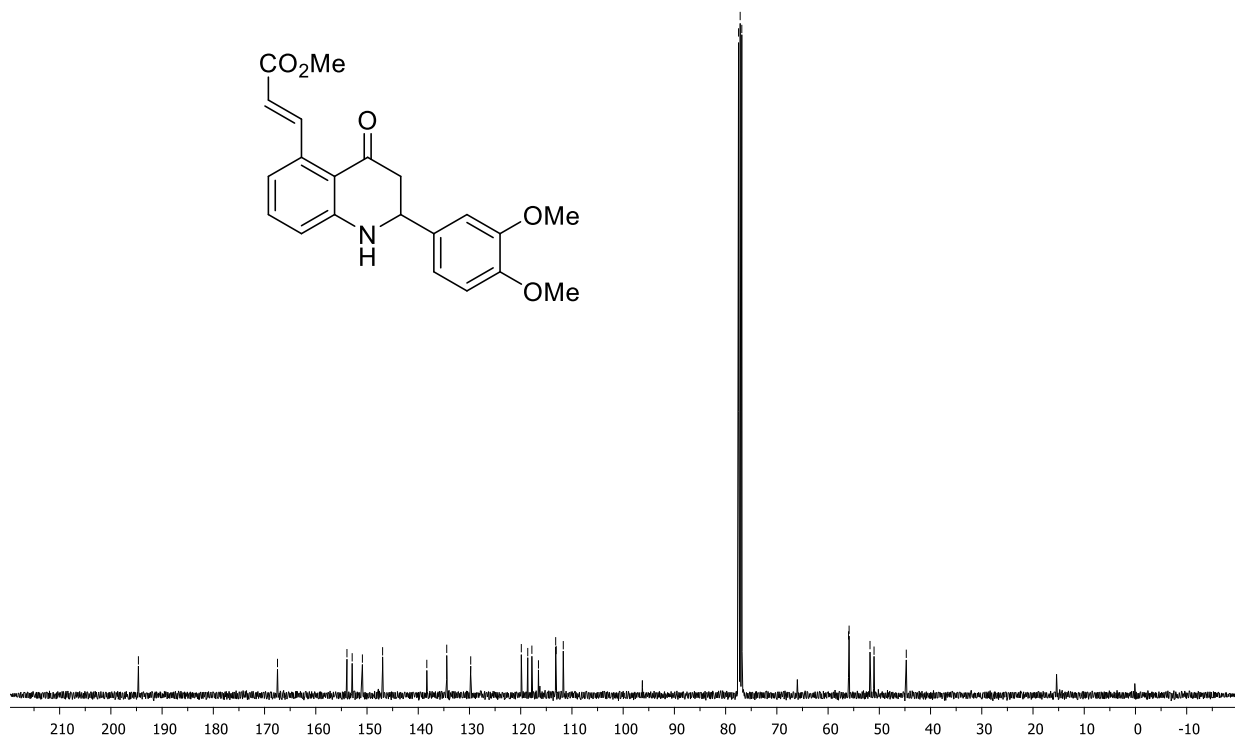
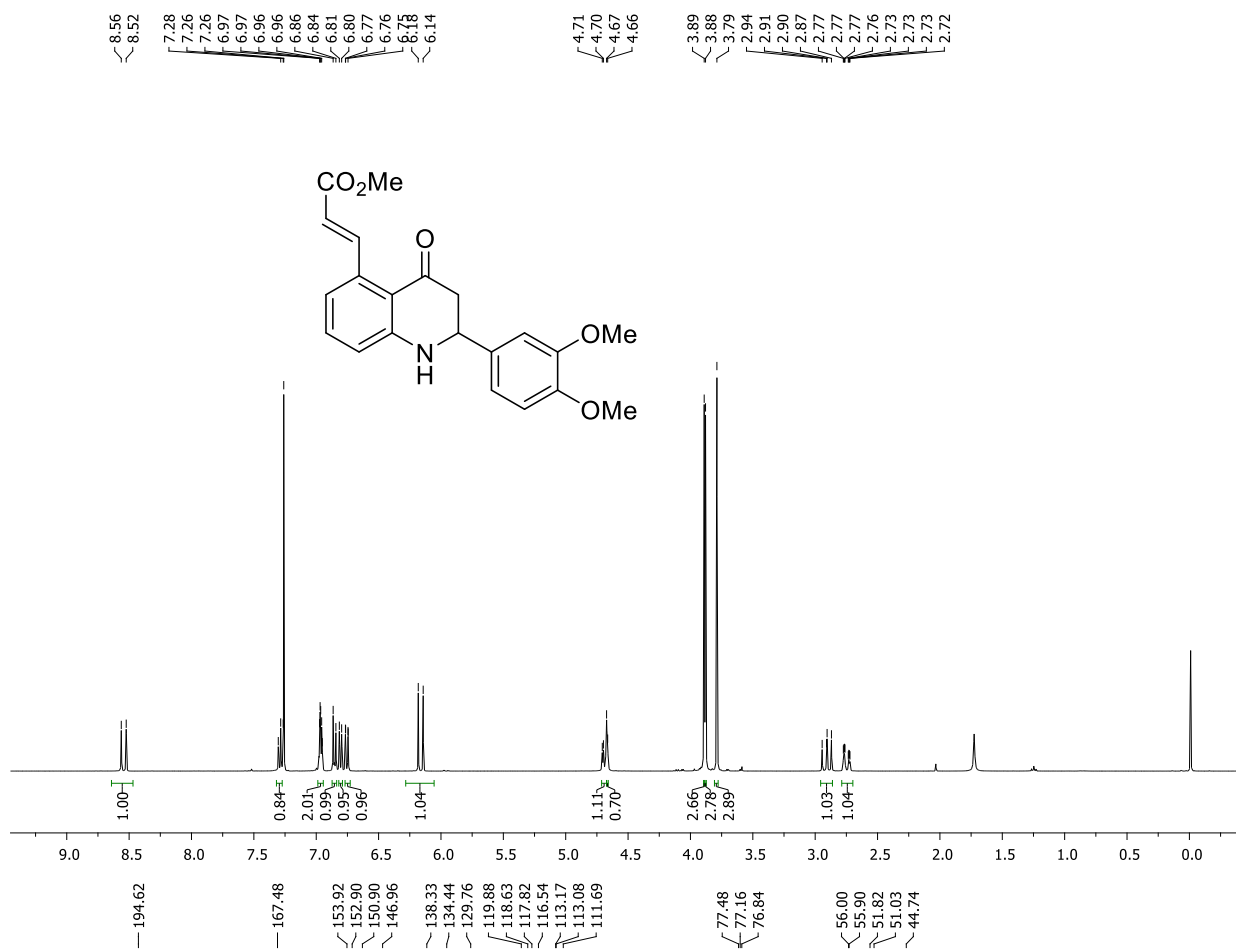
**Methyl (*E*)-3-(2-(2-methoxyphenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3n):**



**Methyl (*E*)-3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3o):**

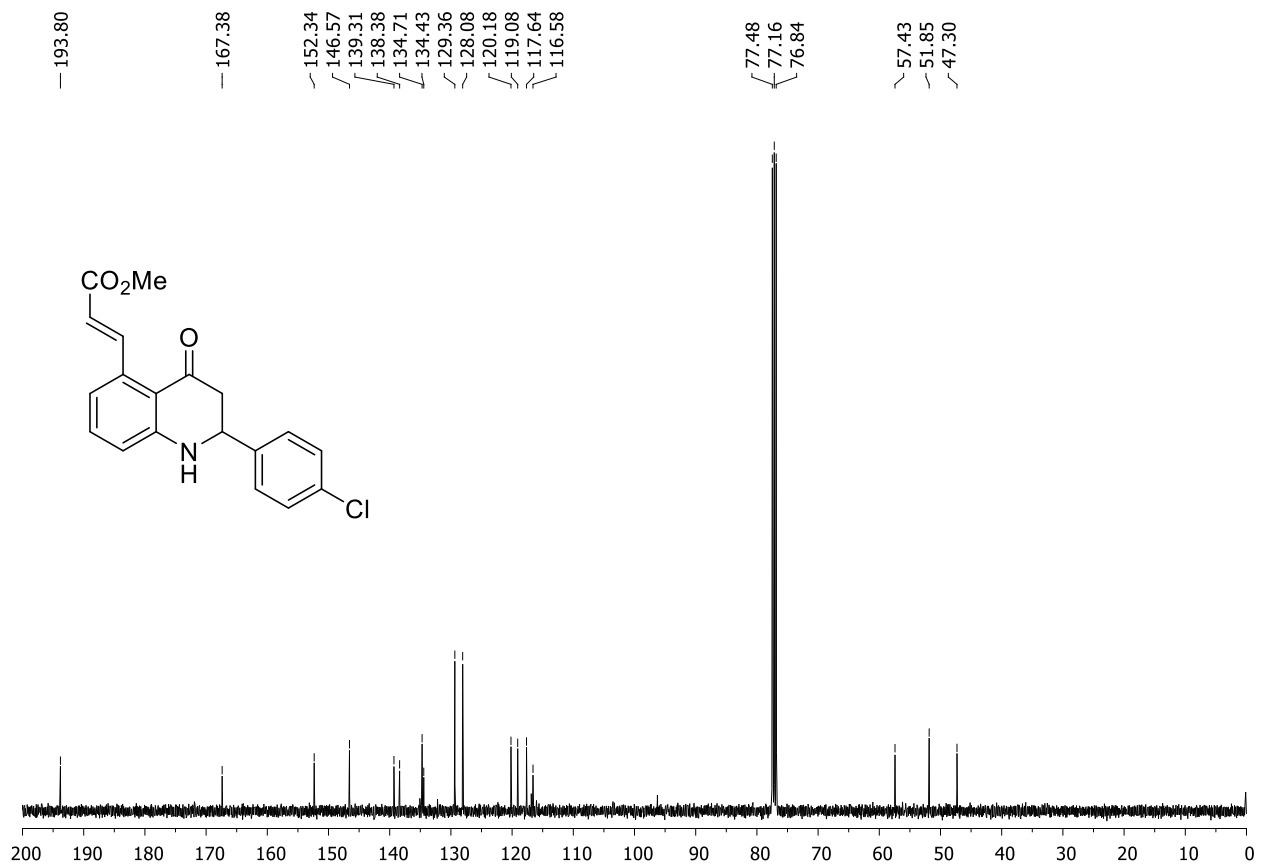
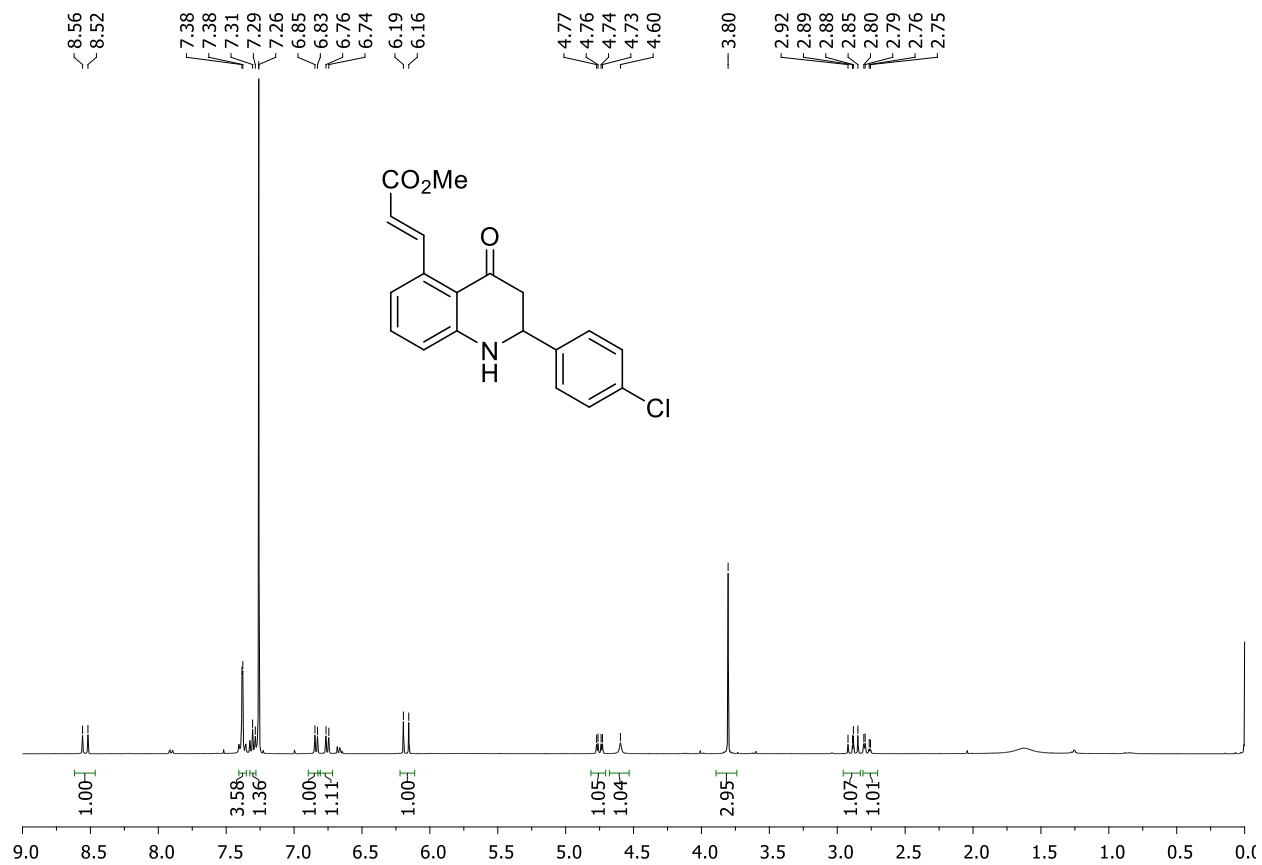


Methyl (*E*)-3-(2-(3, 4-dimethoxyphenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3p):

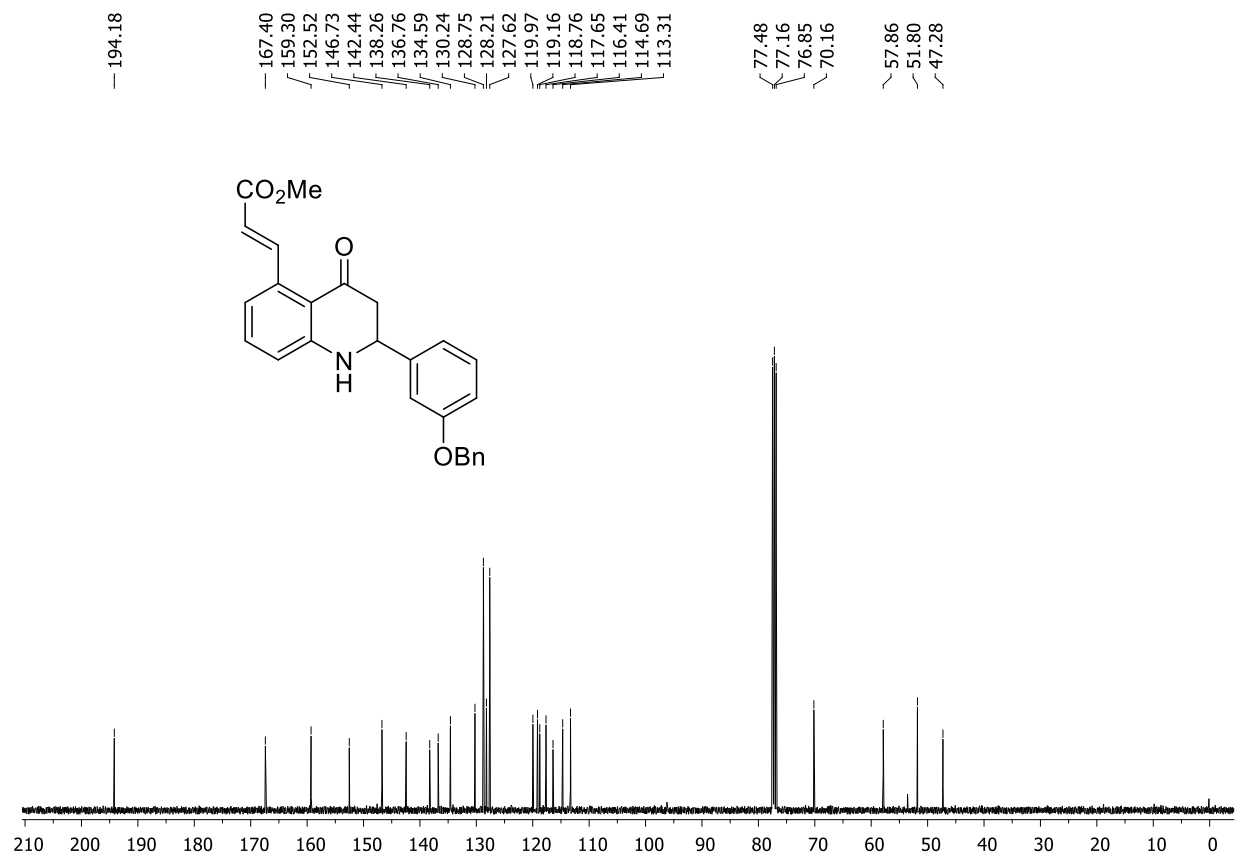
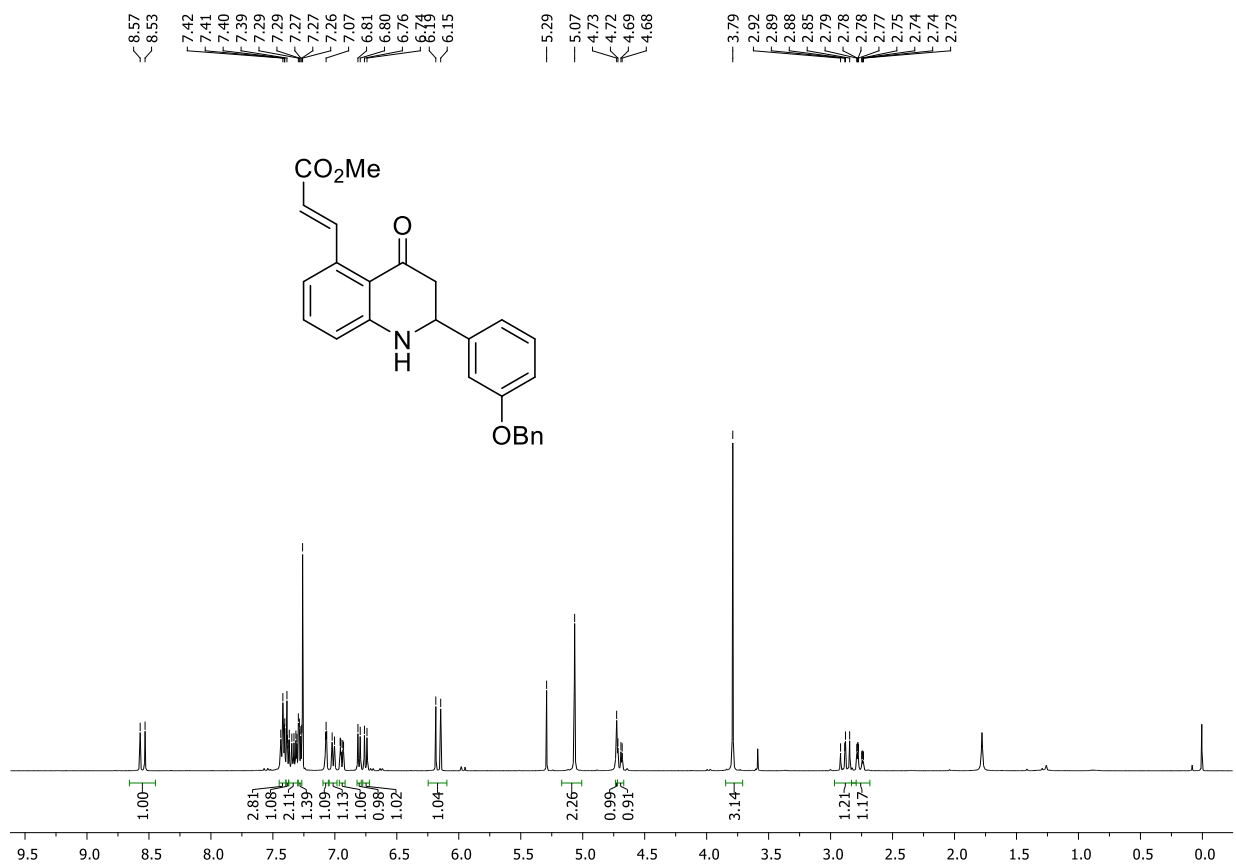




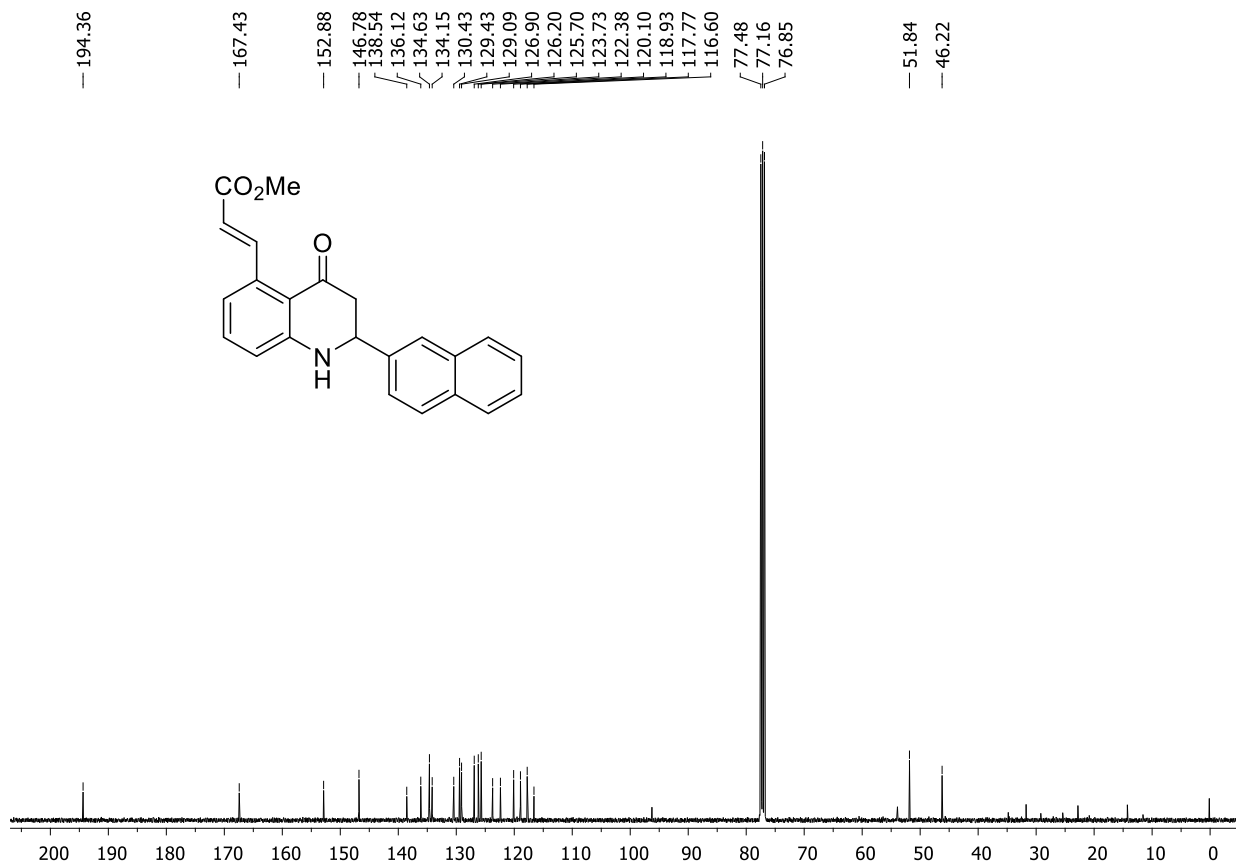
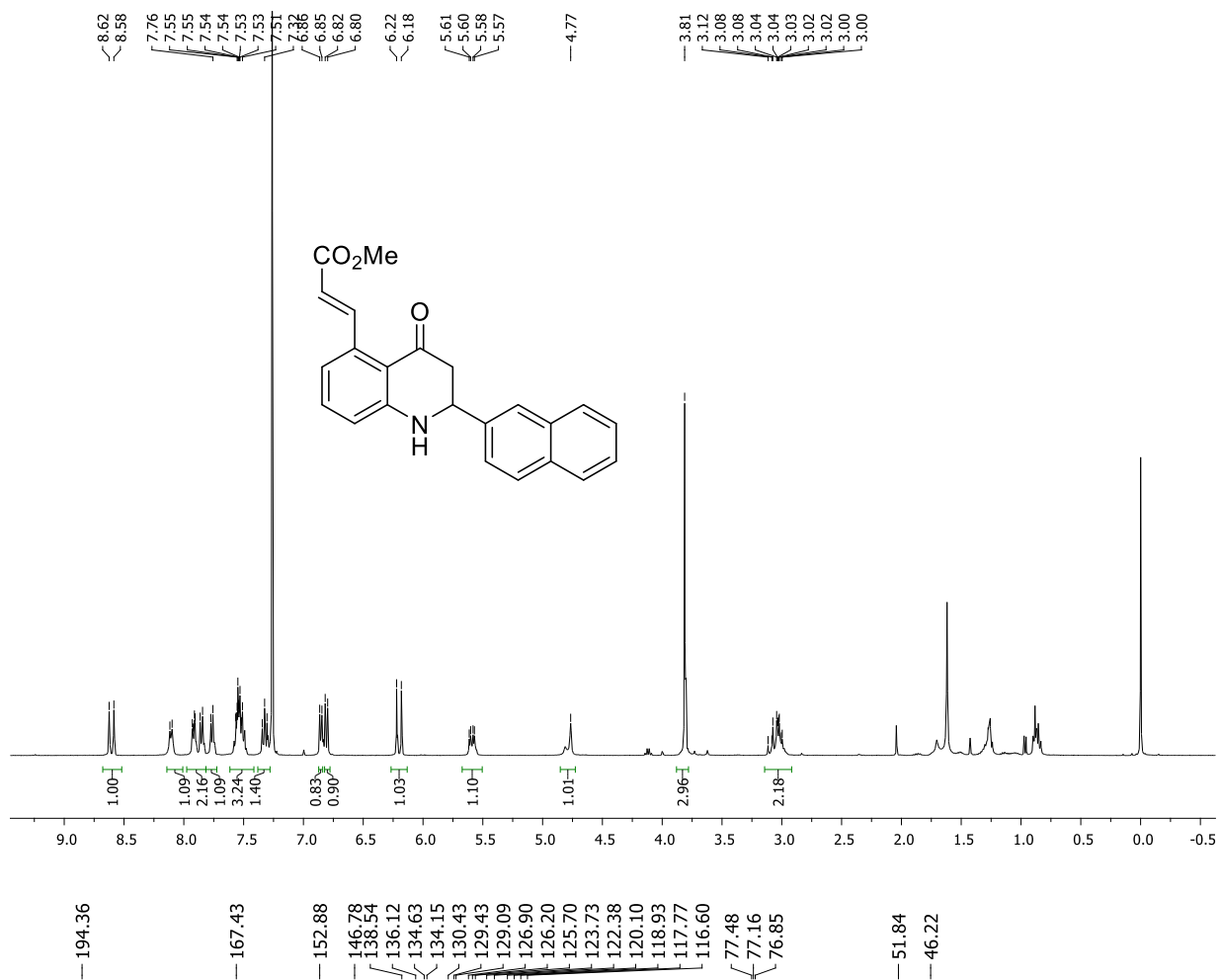
Methyl (*E*)-3-(2-(4-chlorophenyl)-4-oxo-1, 2, 3, 4-tetrahydroquinolin-5-yl) acrylate (3q):



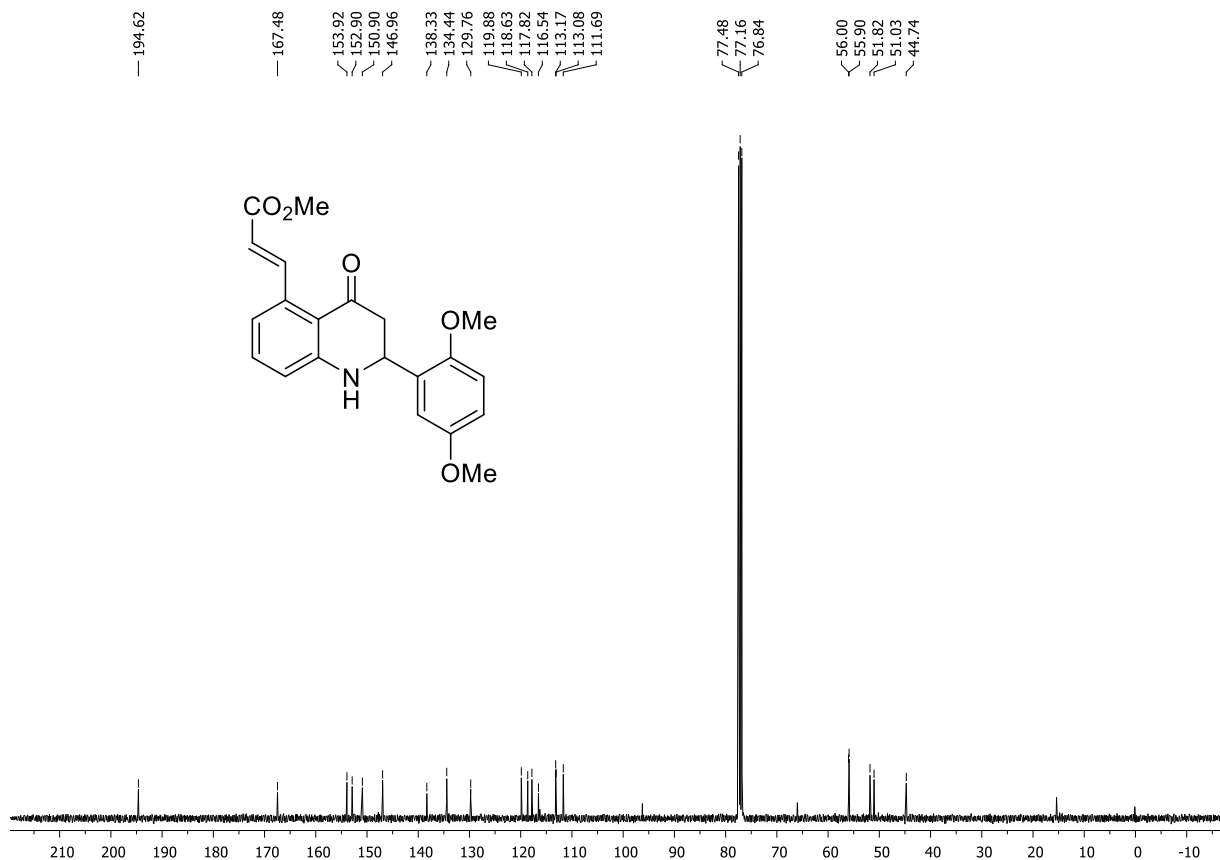
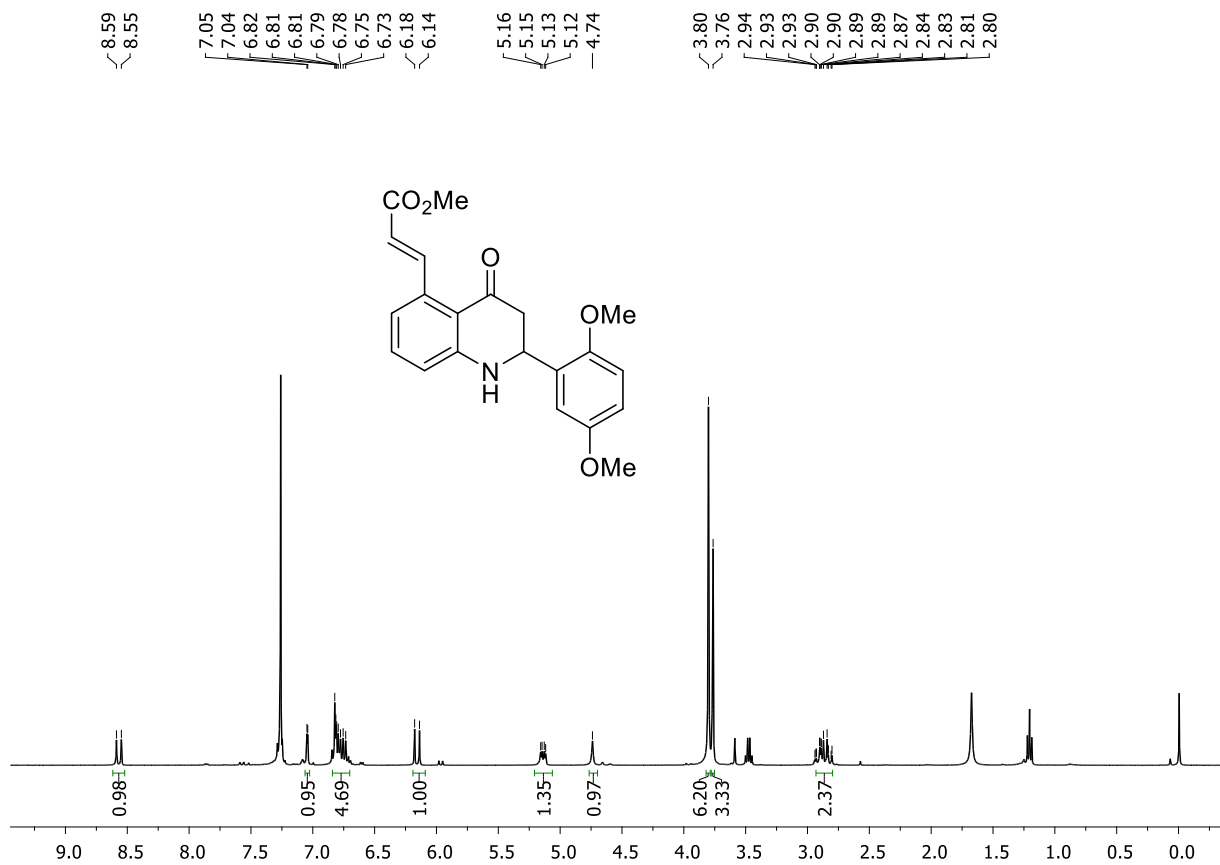
Methyl (*E*)-3-(2-(3-(benzyloxy) phenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3r):



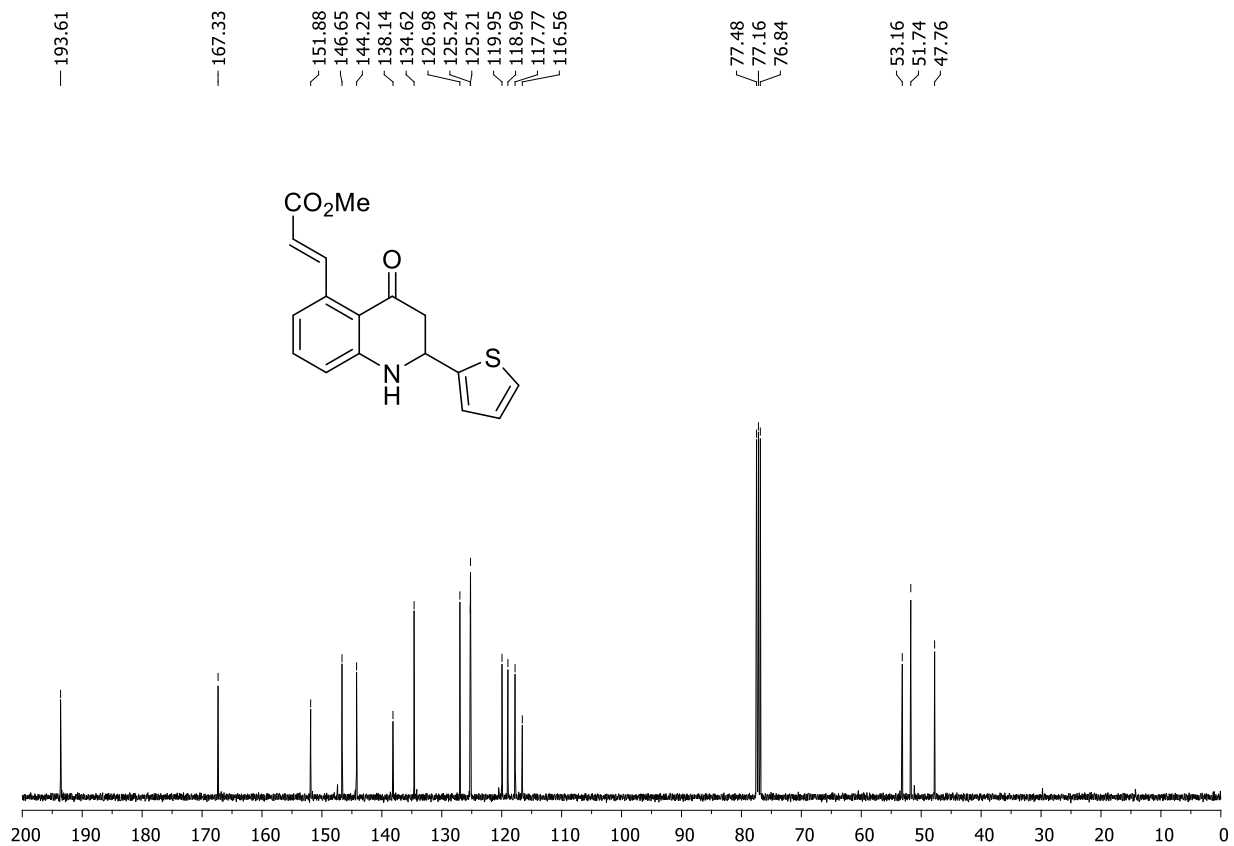
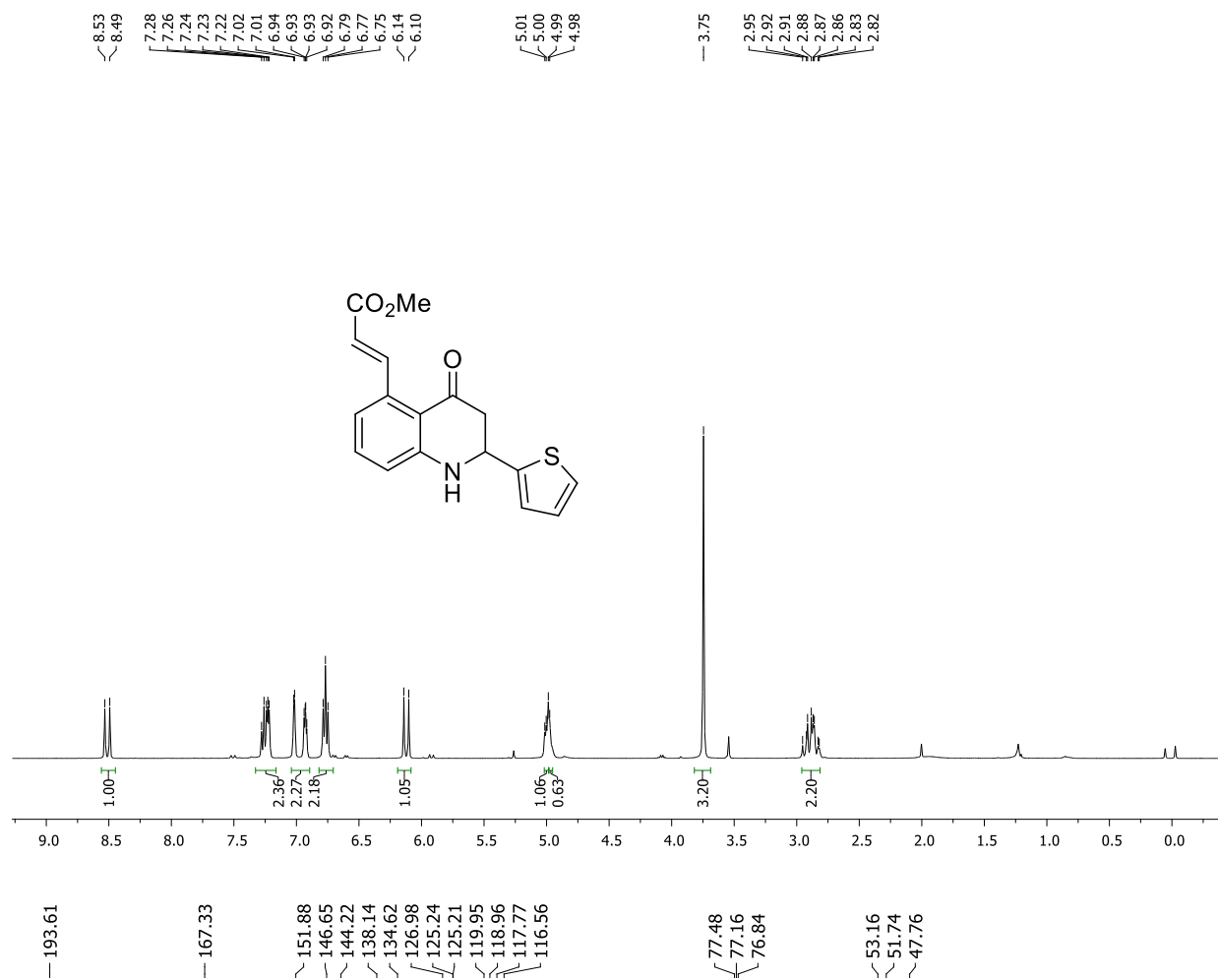
Methyl (*E*)-3-(2-(naphthalen-2-yl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3s):



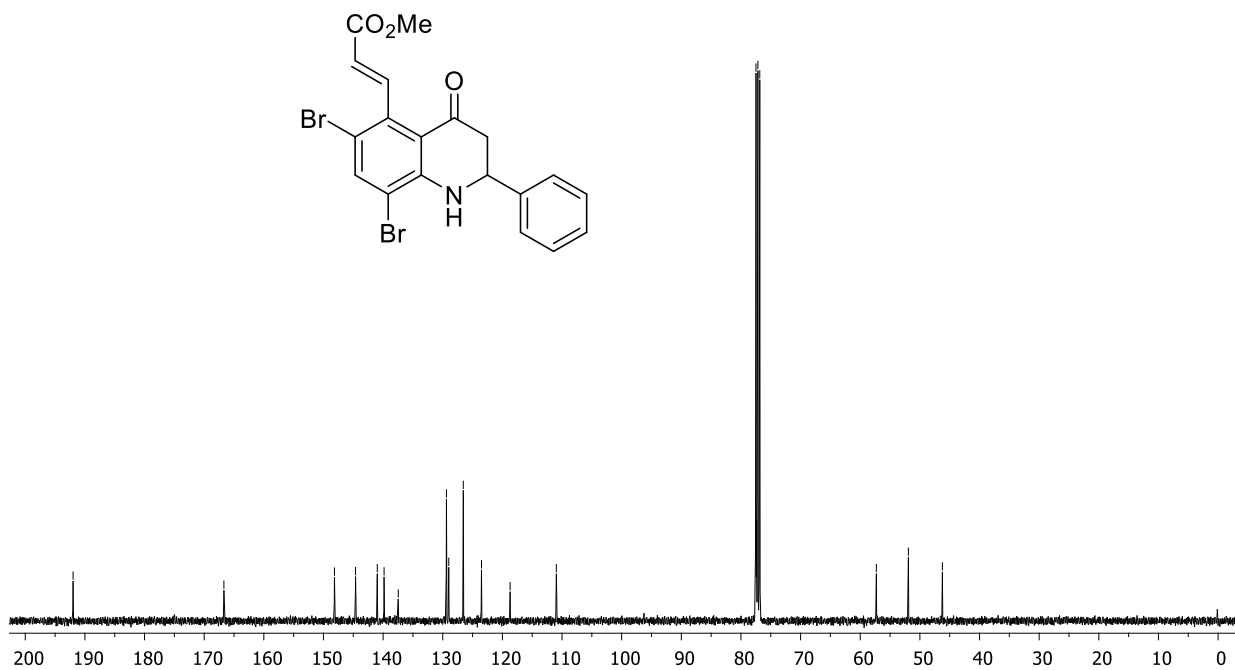
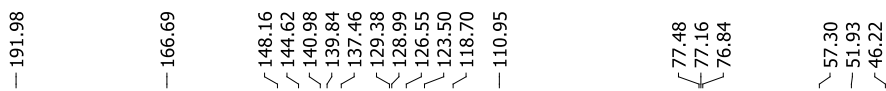
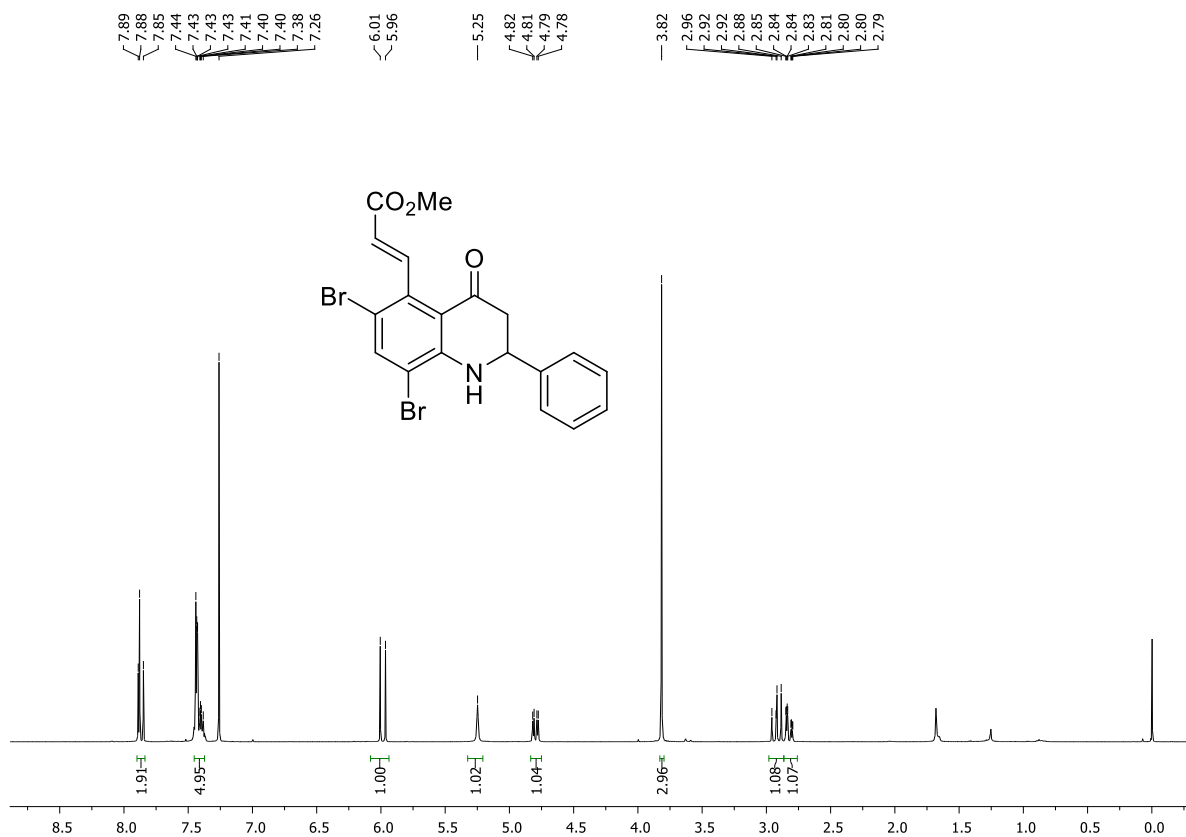
Methyl (*E*)-3-(2-(2,5-dimethoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (3t):



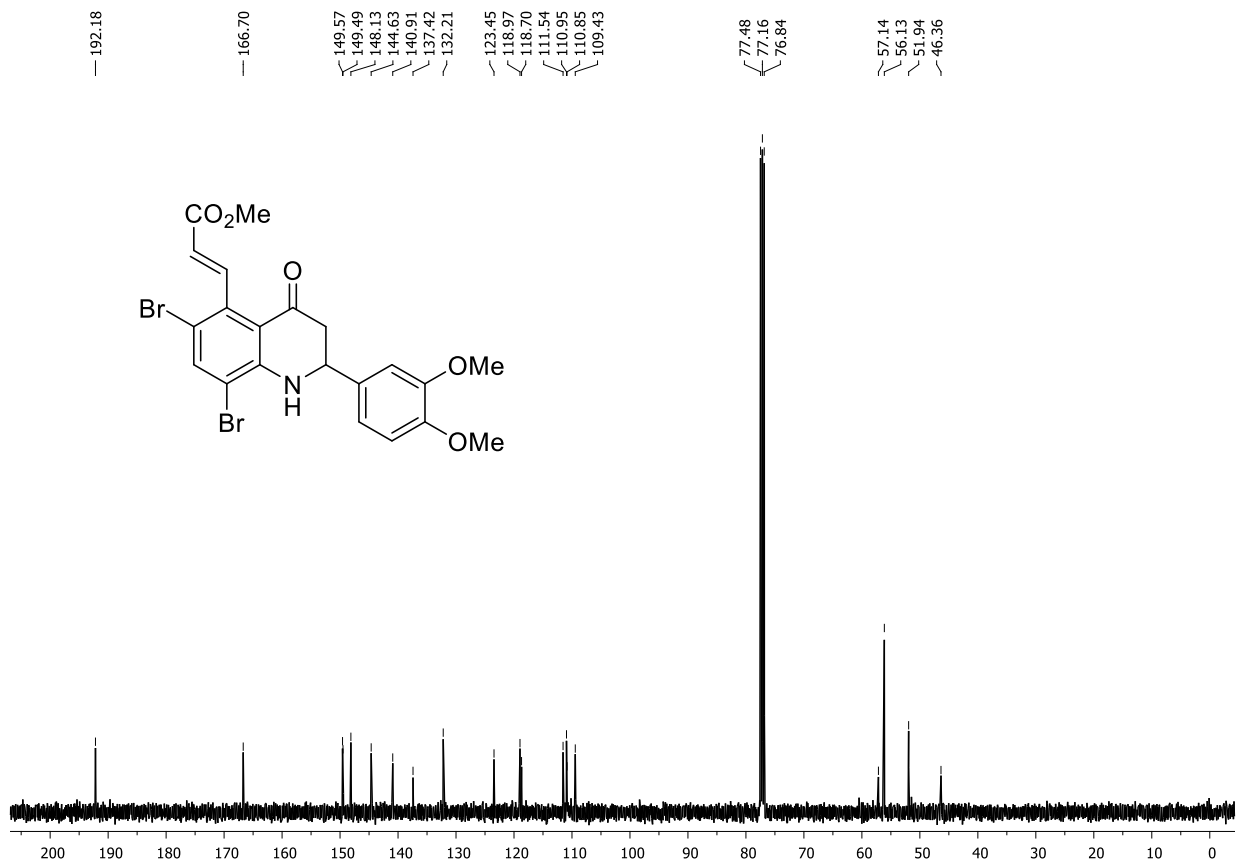
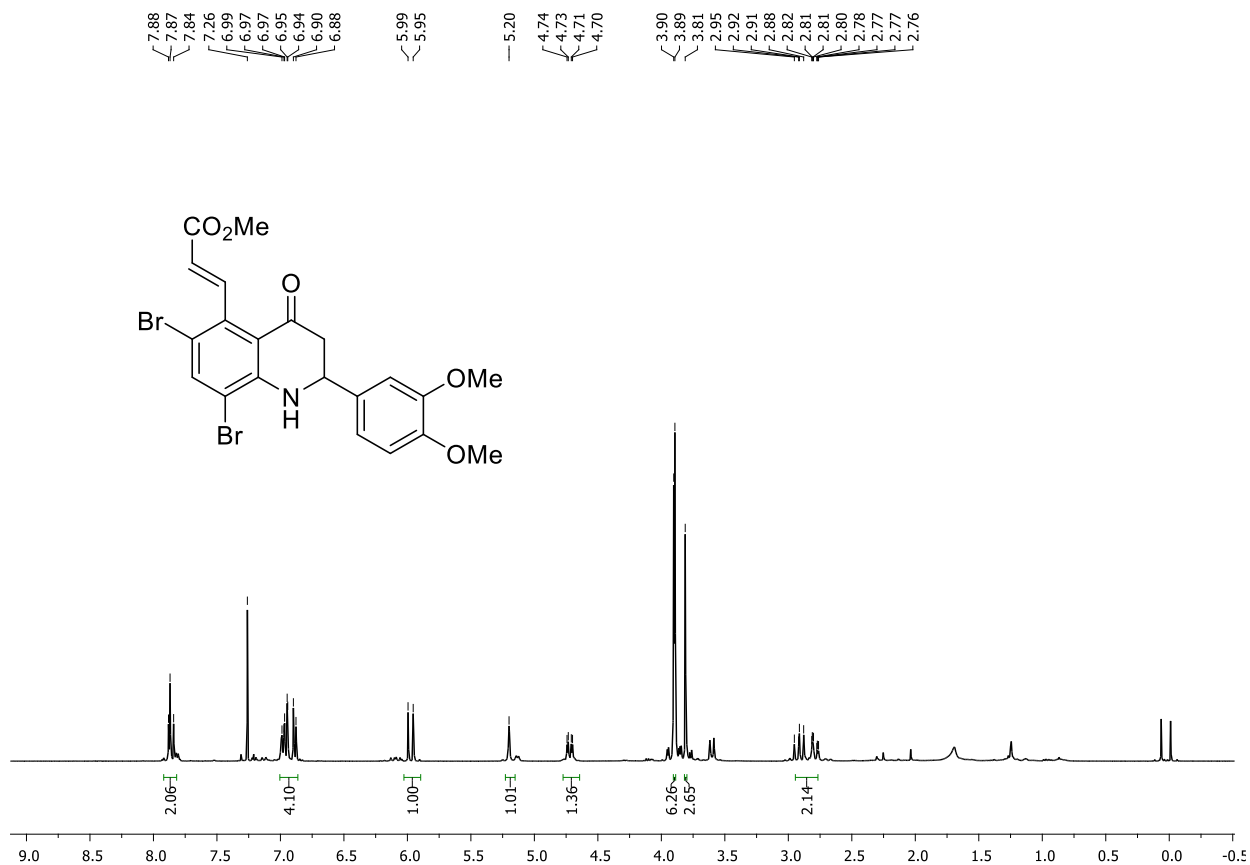
Methyl (*E*)-3-(4-oxo-2-(thiophen-2-yl)-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (**3u**):



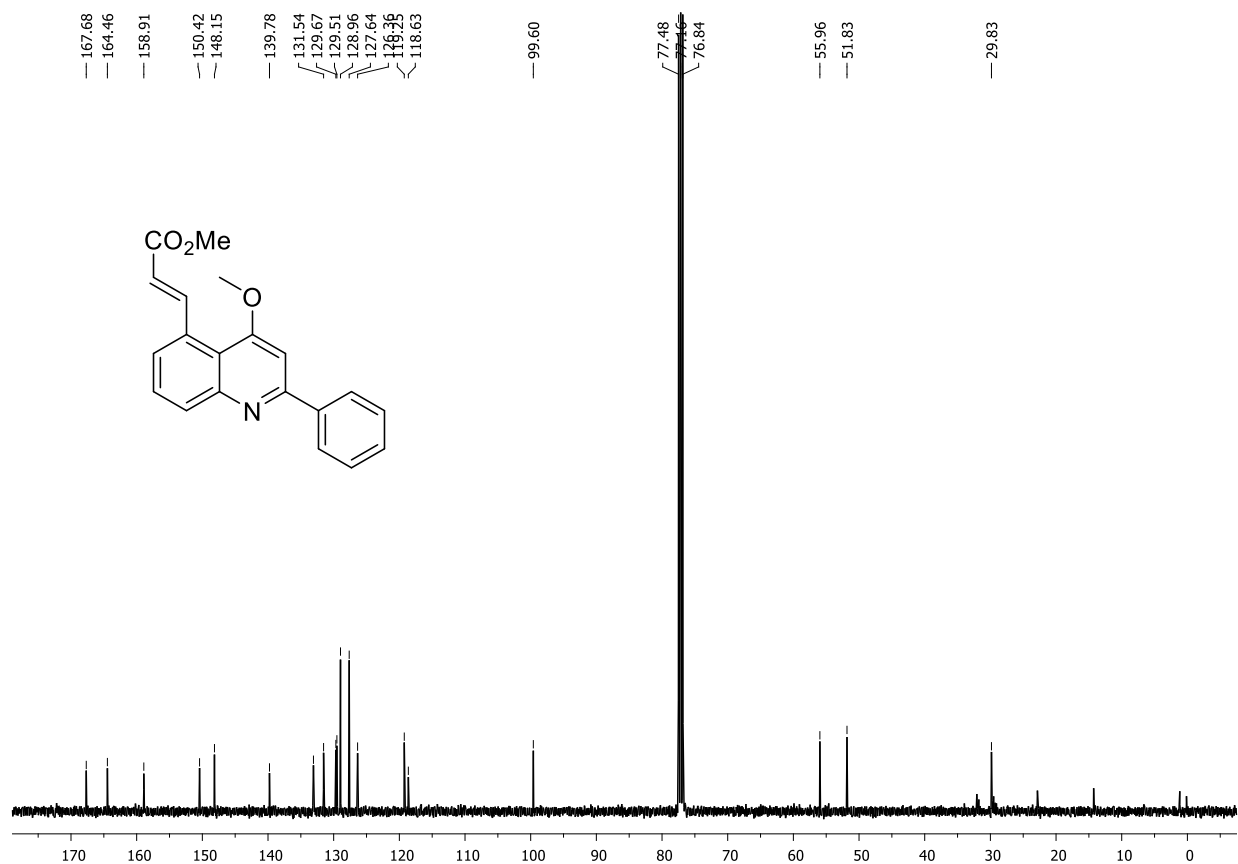
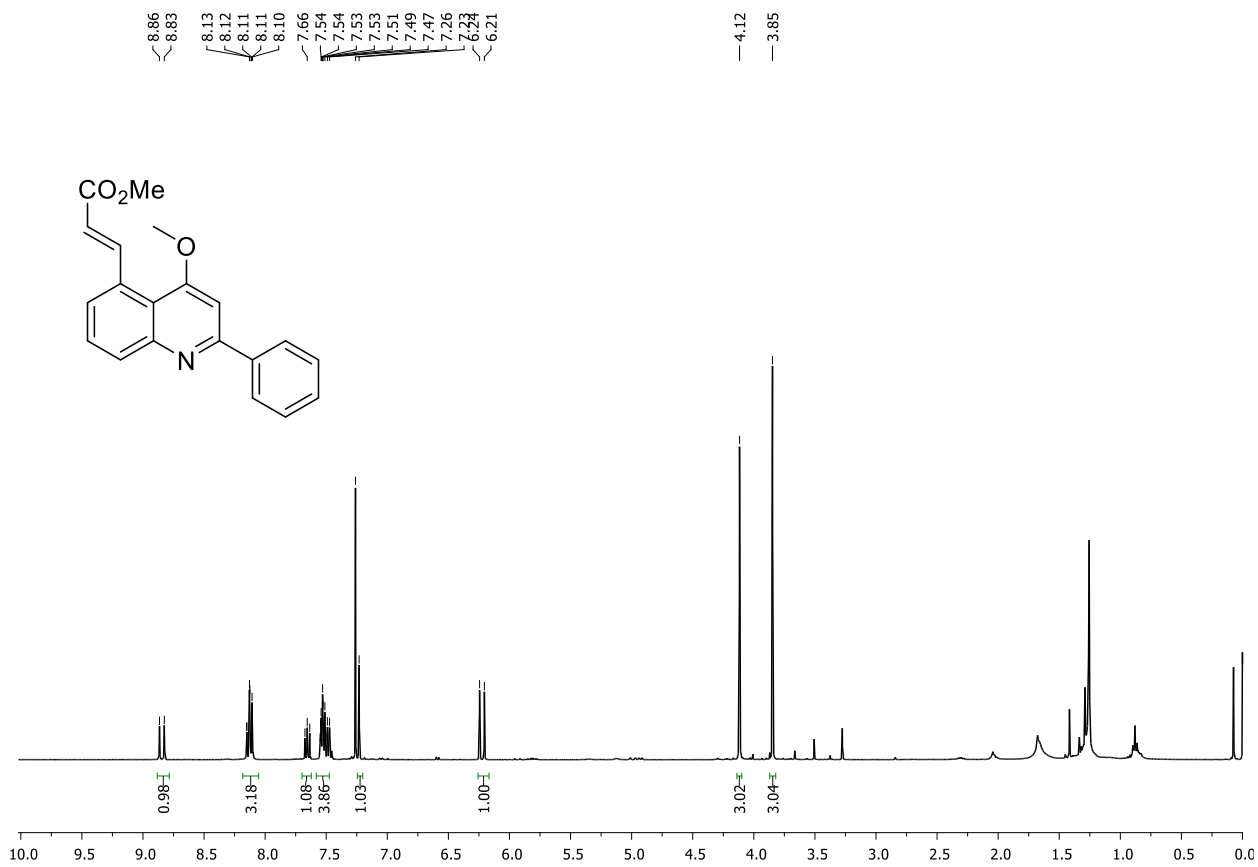
Methyl (*E*)-3-(6, 8-dibromo-4-oxo-2-phenyl-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (5a):



**Methyl (*E*)-3-(6,8-dibromo-2-(3,4-dimethoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) acrylate (5b):**

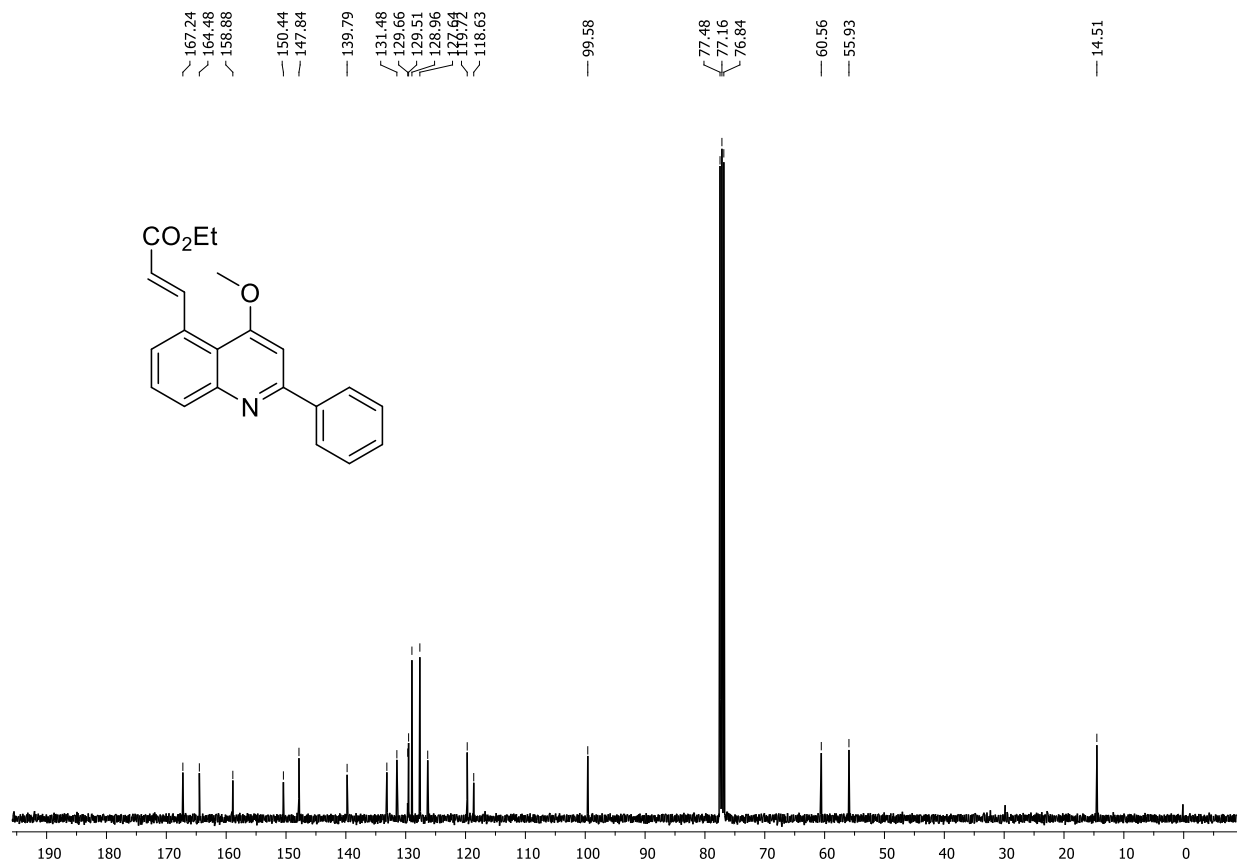
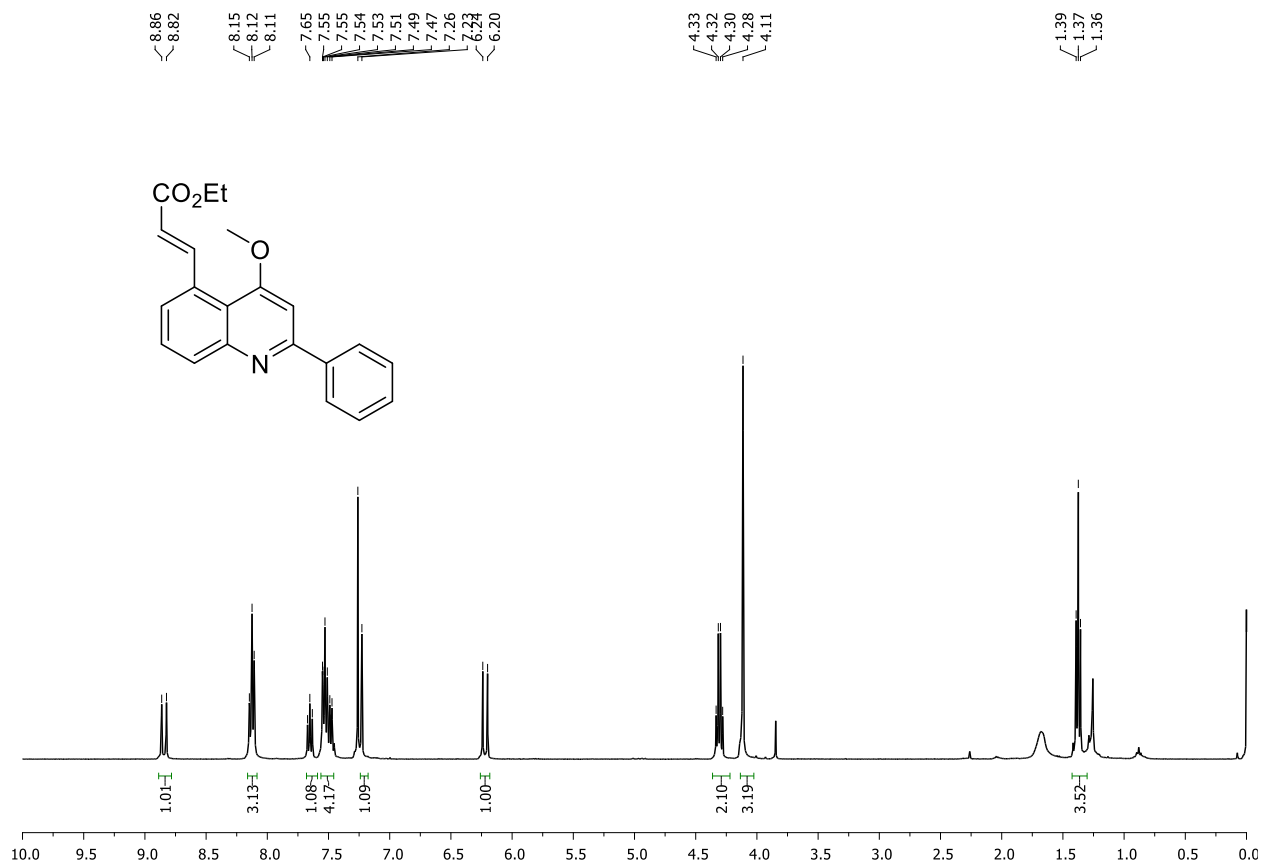


**Methyl (*E*)-3-(4-methoxy-2-phenylquinolin-5-yl) acrylate (12a):**

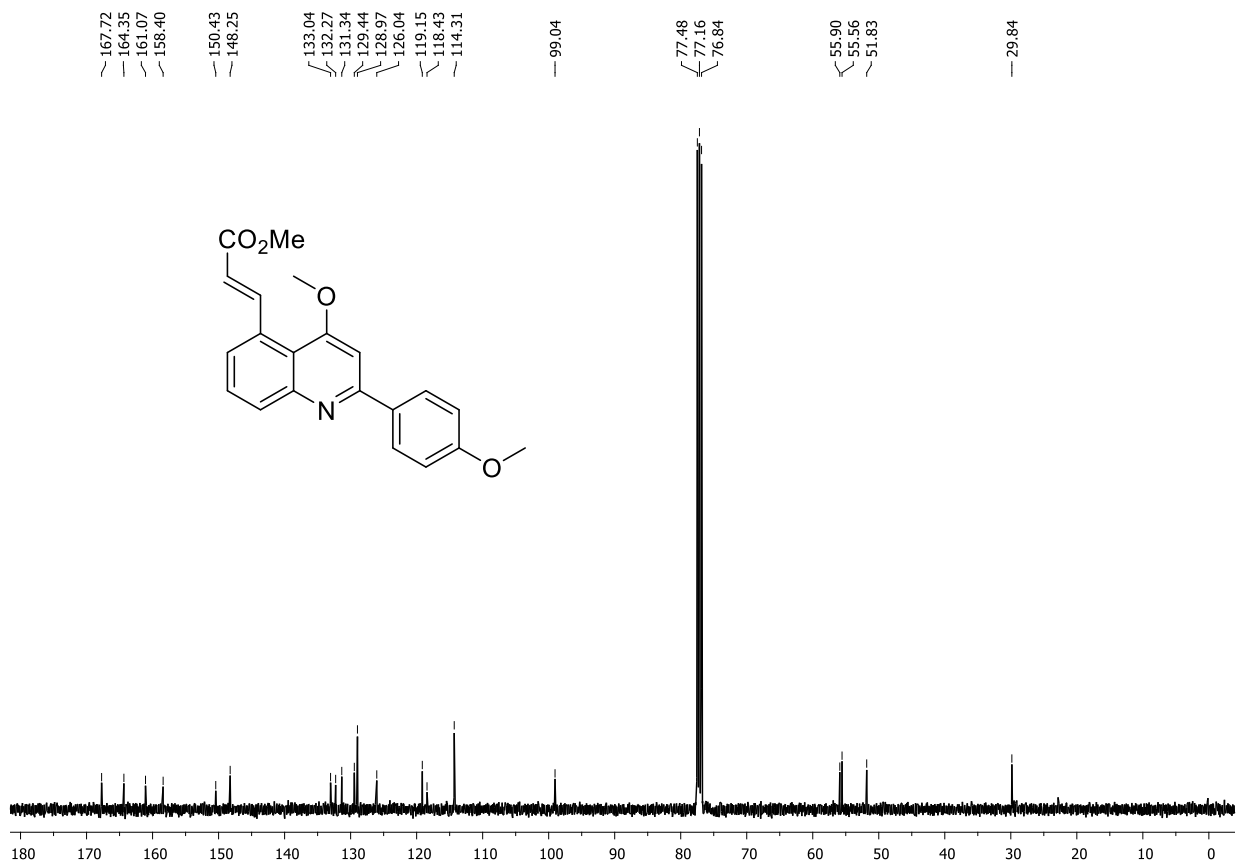
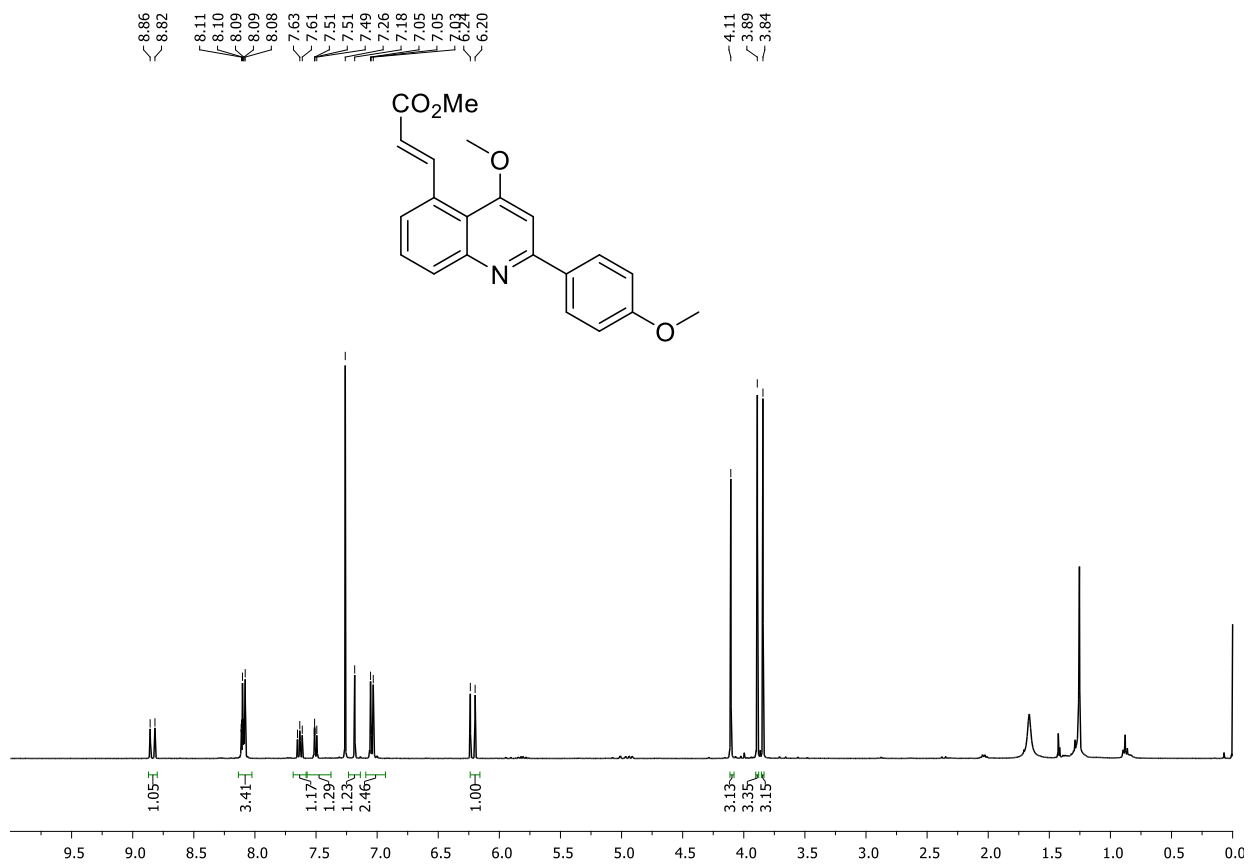




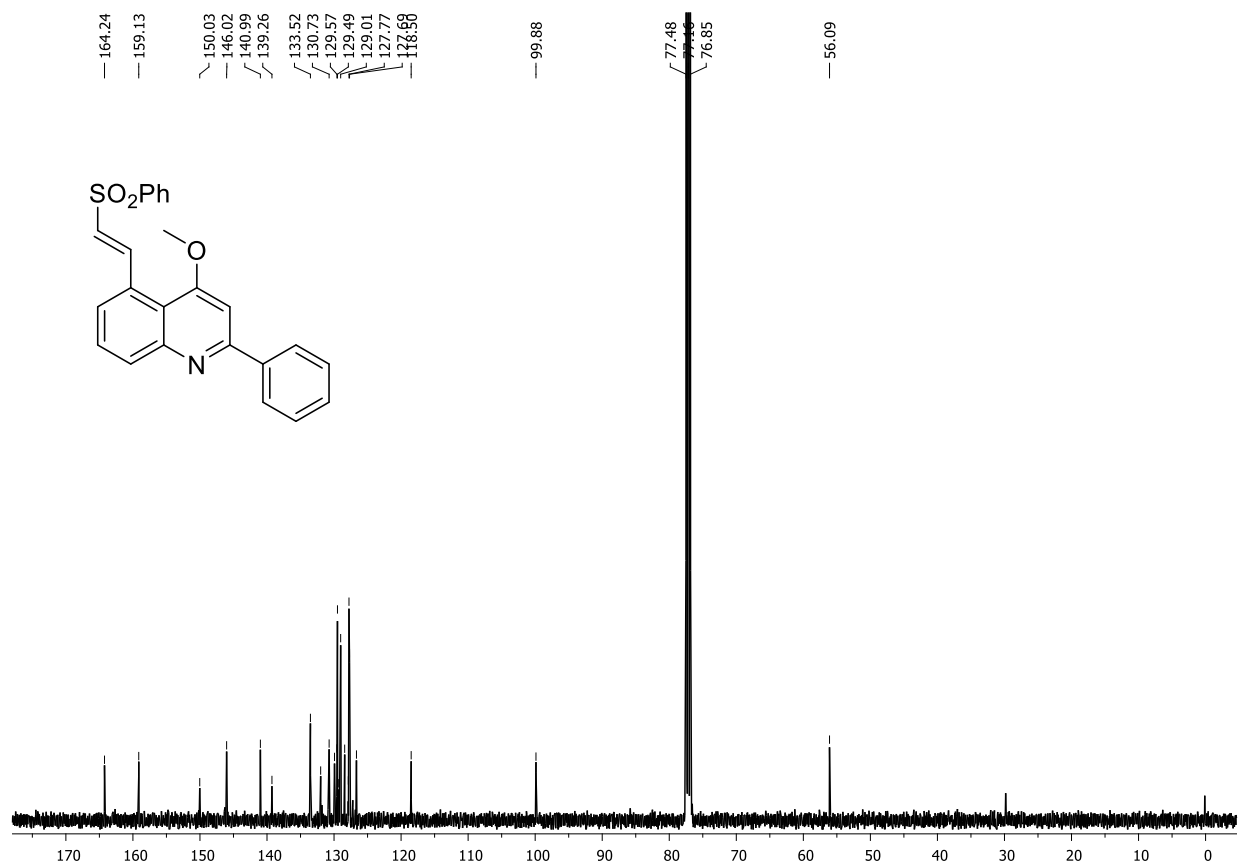
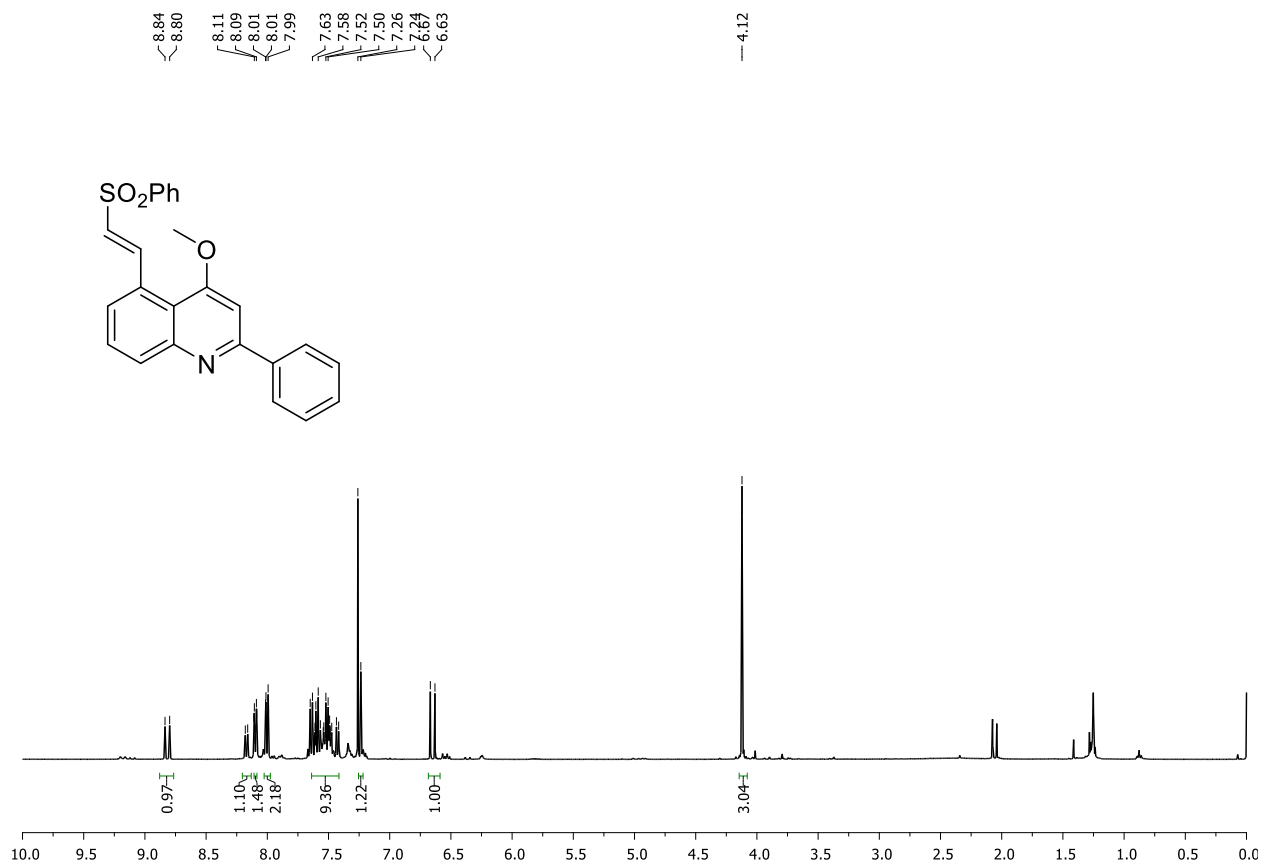
**Methyl (*E*)-3-(4-methoxy-2-phenylquinolin-5-yl) acrylate (12b):**



**Methyl (*E*)-3-(4-methoxy-2-(4-methoxyphenyl)quinolin-5-yl) acrylate (12c):**



**(E)-4-Methoxy-2-phenyl-5-(2-(phenylsulfonyl) vinyl) quinoline (12d):**



**Methyl 3-(2-(4-methoxyphenyl)-4-oxo-1,2,3,4-tetrahydroquinolin-5-yl) propanoate (13):**

