

Supporting information

Synthesis of Carbonyl-Containing Oxindoles via Ni-Catalyzed Reductive Aryl-Acylation and Aryl-Esterification of Alkenes

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1. General information

^1H and ^{13}C NMR data were recorded with Bruker ADVANCE III (600 MHz) or JNM-ECZ400S/L1 (400 MHz) spectrometers. Chemical shifts are given in ppm. The spectra are calibrated to the residual ^1H and ^{13}C signals of the solvents. Multiplicities are abbreviated as follows: singlet (s), doublet (d), triplet (t), quartet (q), doublet-doublet (dd), quintet (quint), septet (sept), multiplet (m), and broad (b). ^{19}F NMR spectra were recorded using CFCl_3 as internal standard. Gas chromatography were determined with a SHIMADZU Nexis GC 2030 gas chromatography instrument with an FID detector. High-resolution mass spectra (HRMS) were recorded on Thermo Fisher Orbitrap Elite mass spectrometer. Column and elution details were specified in each entry.

Unless otherwise stated, starting materials were purchased from commercial suppliers (Energy Chemical, Alfa, Aldrich and so on). All reactions dealing with air- or moisture-sensitive compounds were performed in the argon-filled glove box or by standard Schlenk techniques in oven-dried reaction vessels under argon atmosphere. Solvents were purchased in HPLC quality, degassed by purging thoroughly with argon and dried over activated molecular sieves of appropriate size. More sensitive compounds were stored in a desiccator or in a glove-box if required. Reactions were monitored by thin layer chromatography (TLC) using glass 0.25 mm silica gel plates. Compounds were visualized by UV-light at 254 nm and by dipping the plates in an aqueous potassium permanganate solution followed by heating. Flash column chromatography was performed over silica gel (200-400 mesh).

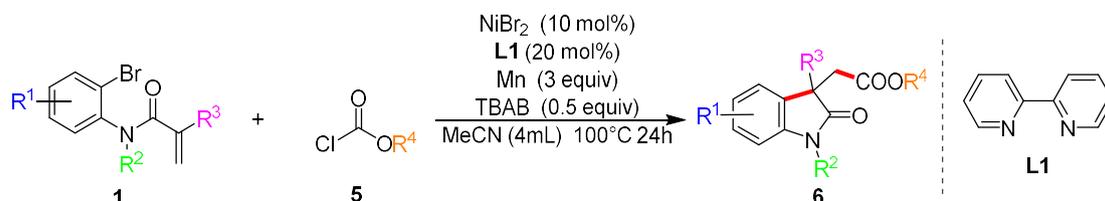
2. General procedure

2.1 General Procedure for the synthesis of ketones



An oven-dried sealed tube equipped with a PTFE-coated stir bar was charged with NiBr_2 (10 mol%), 1,10-phenanthroline-5,6-dione (**L8**) (20 mol%), **1** (0.1 mmol, 1.0 equiv), manganese powder (3.0 equiv), TBAB (0.5 equiv) and K_3PO_4 (2.0 equiv). The sealed tube was evacuated and backfilled with argon (this process was repeated for three times) and then MeCN (0.05 M) was added. This reaction mixture was stirred at room temperature for 15 minutes and then aryl anhydride **2** (2.0 equiv) was added. The reaction was heated at 60 °C until the reaction was complete (monitored by TLC). The resulting mixture was purified by chromatography on silica gel, eluting with ethyl acetate/petroleum ether 1:20~1:5 (v/v) to afford the corresponding products **3**.

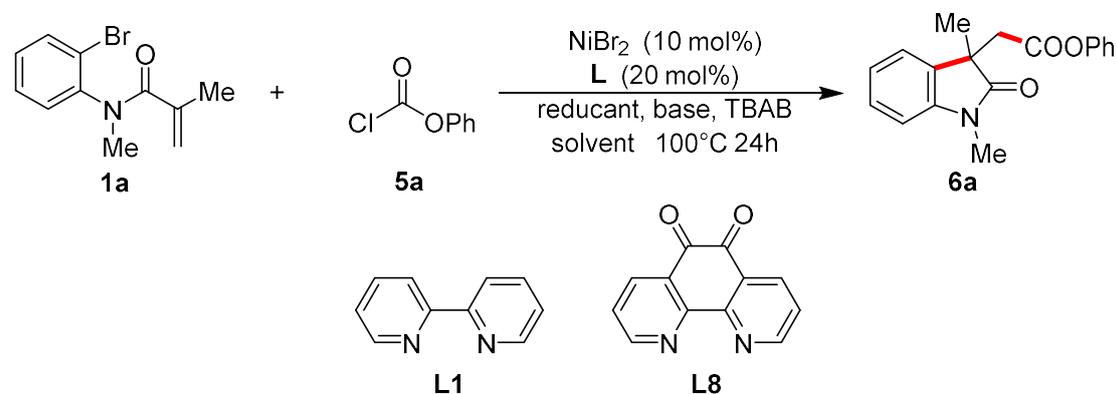
2.2 General Procedure for the synthesis of esters



An oven-dried sealed tube equipped with a PTFE-coated stir bar was charged with NiBr_2 (10 mol%), bpy (**L1**) (20 mol%), **1** (0.1 mmol, 1.0 equiv), manganese powder (3.0 equiv) and TBAB (0.5 equiv). The sealed tube was evacuated and backfilled with argon (this process was repeated for three times) and then MeCN (0.025 M) was added. This reaction mixture was stirred at room temperature for 15 minutes and then acid chloride **5** (2.0~4.0 equiv) was added. Then, the reaction heated at 100 °C until the reaction was complete (monitored by TLC). The resulting mixture was purified by chromatography on silica gel, eluting with ethyl acetate/petroleum ether 1:20~1:5 (v/v) to afford the corresponding products **6**.

3. Optimization of reaction conditions

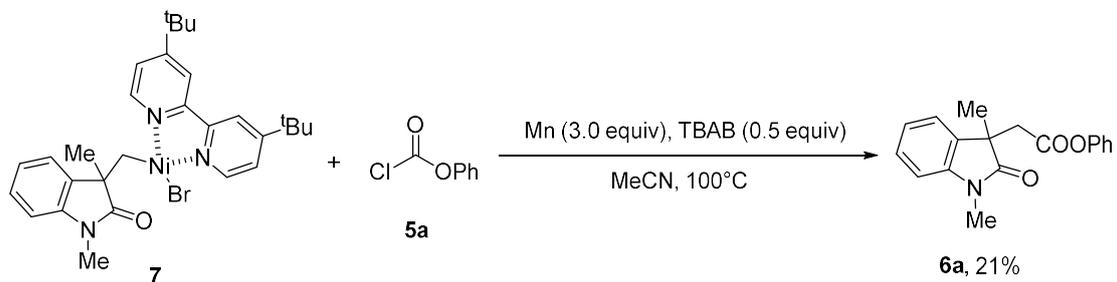
Table S1: Optimization reaction conditions for the synthesis of esters



entry	L	reductant	solvent	base	yield of 6a (%) ^b
1	L8	Mn	MeCN	K ₃ PO ₄	51
2	L8	Mn	DMF	K ₃ PO ₄	<1
3	L8	Mn	DMAc	K ₃ PO ₄	<1
4	L8	Zn	MeCN	K ₃ PO ₄	17
5	L8	Mn	MeCN	K ₃ CO ₄	42
6	L8	Mn	MeCN	Cs ₂ CO ₃	52
7	L8	Mn	MeCN	-	53
8 ^c	L8	Mn	MeCN	-	58
9 ^c	L1	Mn	MeCN	-	75
10 ^{c,d}	L1	Mn	MeCN	-	51
11 ^{d,e}	L1	Mn	MeCN	-	55

^a Unless indicated otherwise, reactions of **1a** (0.10 mmol), **5a** (0.40 mmol), NiBr₂ (0.01 mmol), ligand (0.02 mmol), reductant (0.30 mmol), TBAB (0.05 mmol), and K₃PO₄ (0.20 mmol) were carried out in solvent (2 mL) at 100 °C for 24h. ^bIsolated yields. ^c4mL MeCN was used. ^d80 °C. ^eWithout TBAB.

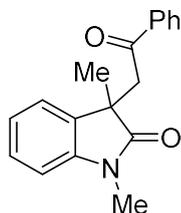
4. Control experiments



Experimental procedure^[1]: An oven-dried seal-tube equipped with a PTFE-coated stir bar was charged with TBAB (0.025 mmol, 8.1 mg), Mn⁰ (0.15 mmol, 9.8 mg), complex **7** (0.05 mmol, 29.1 mg) and phenyl carbonochloridate (0.1 mmol, 15.7 mg) in anhydrous MeCN (1 mL). The seal-tube was sealed and removed from the glovebox. Then the reaction was stirred at 100 °C for overnight. The resulting mixture was purified by chromatography on silica gel, eluting with ethyl acetate/petroleum ether 1:10 (v/v) to afford the corresponding products **6a** (3.1 mg, 21% yield).

5. Characterization data of products

1,3-dimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3a)



Chemical Formula: C₁₈H₁₇NO₂

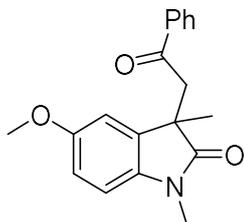
Exact Mass: 279.1259

3a was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 10/1~5/1) to obtain **3a** as yellow oil (23.7 mg, 85% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ¹H NMR data matched those reported in the literature.^[2]

¹H NMR (400 MHz, CDCl₃) δ 7.87-7.80 (m, 2H), 7.56-7.48 (m, 1H), 7.45-7.36 (m, 2H), 7.28-7.22 (m, 1H), 7.16-7.12 (m, 1H), 7.01-6.95 (m, 1H), 6.90 (d, *J* = 7.8 Hz, 1H), 3.72 (d, *J* = 17.9 Hz, 1H), 3.65 (d, *J* = 17.8 Hz, 1H), 3.31 (s, 3H), 1.44 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.1, 180.6, 143.8, 136.4, 133.7, 133.2, 128.5, 128.0, 127.8, 122.2, 121.8, 108.2, 46.0, 45.3, 26.5, 24.9.

5-methoxy-1,3-dimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3b)



Chemical Formula: C₁₉H₁₉NO₃

Exact Mass: 309.14

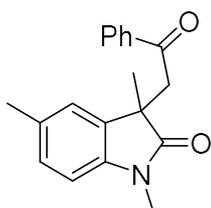
3b was prepared according to general procedure **2.1** using *N*-(2-bromo-4-methoxyphenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.4 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 5/1) to obtain **3b** as brown oil (22.9 mg, 74% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f

= 0.3. The ^1H NMR data matched those reported in the literature.^[2]

^1H NMR (400 MHz, CDCl_3) δ 7.91-7.79 (m, 2H), 7.57-7.46 (m, 1H), 7.46-7.32 (m, 2H), 6.86-6.79 (m, 1H), 6.79-6.71 (m, 2H), 3.73 (s, 3H), 3.67 (s, 2H), 3.29 (s, 3H), 1.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 196.0, 155.6, 137.4, 136.2, 135.1, 133.2, 128.4, 127.9, 111.3, 109.8, 108.3, 55.6, 45.9, 45.6, 26.5, 25.0.

1,3,5-trimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3c)



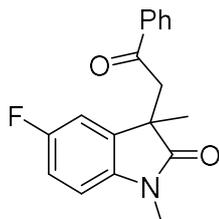
Chemical Formula: $\text{C}_{19}\text{H}_{19}\text{NO}_2$
Exact Mass: 293.1416

3c was prepared according to general procedure **2.1** using *N*-(2-bromo-4-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =5/1) to obtain **3c** as yellow oil (23.7 mg, 81% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ^1H NMR data matched those reported in the literature.^[3]

^1H NMR (400 MHz, CDCl_3) δ 7.90-7.81 (m, 2H), 7.56-7.48 (m, 1H), 7.44-7.36 (m, 2H), 7.09-7.02 (m, 1H), 6.97-6.92 (m, 1H), 6.79 (d, J = 7.9 Hz, 1H), 3.75-3.59 (m, 2H), 3.29 (s, 3H), 2.27 (s, 3H), 1.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 196.1, 180.5, 141.4, 136.4, 133.7, 133.1, 131.6, 128.5, 128.1, 128.0, 122.7, 107.8, 46.0, 45.3, 26.5, 25.0, 21.1.

5-fluoro-1,3-dimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3d)



Chemical Formula: $\text{C}_{18}\text{H}_{16}\text{FNO}_2$
Exact Mass: 297.12

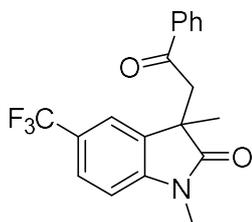
3d was prepared according to general procedure **2.1** using *N*-(2-bromo-4-fluorophenyl)-*N*-methylmethacrylamide (0.1 mmol, 27.2 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3d** as yellow oil (26.7 mg, 90% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ¹H NMR data matched those reported in the literature.^[4]

¹H NMR (400 MHz, CDCl₃) δ 7.89-7.79 (m, 2H), 7.58-7.49 (m, 1H), 7.46-7.37 (m, 2H), 7.02-6.92 (m, 1H), 6.90 (dd, *J* = 8.0, 2.5 Hz, 1H), 6.82 (dd, *J* = 8.5, 4.2 Hz, 1H), 3.67 (s, 2H), 3.30 (s, 3H), 1.44 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.9, 180.2, 157.9, 139.8, 136.1, 135.4 (d, *J* = 7.8 Hz), 133.3, 128.6, 127.9, 113.8 (d, *J* = 23.3 Hz), 110.1 (d, *J* = 24.9 Hz), 108.5 (d, *J* = 8.2 Hz), 46.0, 45.7, 26.6, 24.8.

¹⁹F NMR (377 MHz, CDCl₃) δ -121.1 (s).

1,3-dimethyl-3-(2-oxo-2-phenylethyl)-5-(trifluoromethyl)indolin-2-one (**3e**)



Chemical Formula: C₁₉H₁₆F₃NO₂
Exact Mass: 347.11

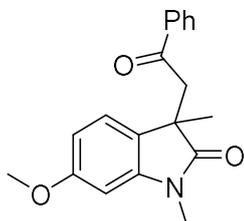
3e was prepared according to general procedure **2.1** using *N*-(2-bromo-4-(trifluoromethyl)phenyl)-*N*-methylmethacrylamide (0.1 mmol, 32.2 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3e** as yellow solid (18.0 mg, 52% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. m.p. 114.5-115.9 °C. The ¹H NMR data matched those reported in the literature.^[5]

¹H NMR (400 MHz, CDCl₃) δ 7.90-7.80 (m, 2H), 7.59-7.50 (m, 2H), 7.46-7.38 (m, 2H), 7.34 (d, *J* = 1.8 Hz, 1H), 6.98 (d, *J* = 8.2 Hz, 1H), 3.75 (s, 2H), 3.36 (s, 3H), 1.45 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.8, 180.5, 146.9, 135.8, 134.4, 133.5, 128.6, 127.9, 125.7 (d, *J* = 4.0 Hz), 118.5, 107.9, 46.1, 45.1, 26.7, 24.9.

^{19}F NMR (377 MHz, CDCl_3) δ -61.2 (s).

6-methoxy-1,3-dimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3f)



Chemical Formula: $\text{C}_{19}\text{H}_{19}\text{NO}_3$

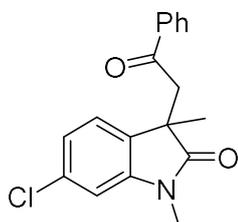
Exact Mass: 309.14

3f was prepared according to general procedure **2.1** using *N*-(2-bromo-5-methoxyphenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.4 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3f** as yellow oil (19.5 mg, 63% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.3. The ^1H NMR data matched those reported in the literature.^[5]

^1H NMR (400 MHz, CDCl_3) δ 7.88-7.80 (m, 2H), 7.54-7.48 (m, 1H), 7.43-7.36 (m, 2H), 7.03 (d, J = 8.0 Hz, 1H), 6.52-6.44 (m, 2H), 3.80 (s, 3H), 3.69 (d, J = 17.9 Hz, 1H), 3.60 (d, J = 17.9 Hz, 1H), 3.29 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 196.3, 181.1, 159.9, 145.0, 136.3, 133.1, 128.4, 127.9, 125.6, 122.3, 105.8, 96.2, 55.4, 46.0, 44.8, 26.4, 25.0.

6-chloro-1,3-dimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3g)



Chemical Formula: $\text{C}_{18}\text{H}_{16}\text{ClNO}_2$

Exact Mass: 313.09

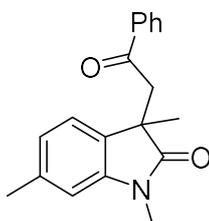
3g was prepared according to general procedure **2.1** using *N*-(2-bromo-5-chlorophenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.9 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3g** as white solid (24.4 mg, 78% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v):

R_f = 0.4. m.p. 142.1-143.4 °C. The ¹H NMR data matched those reported in the literature.^[8]

¹H NMR (400 MHz, CDCl₃) δ 7.88-7.79 (m, 2H), 7.57-7.48 (m, 1H), 7.46-7.35 (m, 2H), 7.03 (d, *J* = 7.8 Hz, 1H), 6.94 (dd, *J* = 7.8, 1.8 Hz, 1H), 6.90 (d, *J* = 1.8 Hz, 1H), 3.69 (dd, *J* = 21.7, 18.1 Hz, 2H), 3.30 (s, 3H), 1.42 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.9, 180.5, 145.0, 136.0, 133.5, 133.3, 132.1, 128.5, 127.9, 122.5, 121.9, 108.9, 46.0, 44.9, 26.5, 24.8.

1,3,6-trimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3h)



Chemical Formula: C₁₉H₁₉NO₂

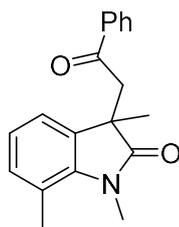
Exact Mass: 293.14

3h was prepared according to general procedure **2.1** using *N*-(2-bromo-5-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3h** as colorless oil (24.3 mg, 83% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ¹H NMR data matched those reported in the literature.^[4]

¹H NMR (400 MHz, CDCl₃) δ 7.91-7.78 (m, 2H), 7.58-7.46 (m, 1H), 7.45-7.34 (m, 2H), 7.02 (d, *J* = 7.5 Hz, 1H), 6.81-6.76 (m, 1H), 6.73 (s, 1H), 3.65 (dd, *J* = 29.9, 17.9 Hz, 2H), 3.29 (s, 3H), 2.37 (s, 3H), 1.42 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.2, 180.9, 143.9, 137.8, 136.4, 133.1, 130.8, 128.4, 128.0, 122.6, 121.5, 109.2, 46.0, 45.1, 26.4, 25.0, 21.8.

1,3,7-trimethyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3i)



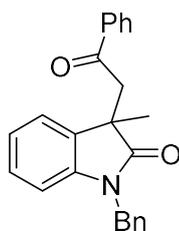
Chemical Formula: C₁₉H₁₉NO₂
Exact Mass: 293.14

3i was prepared according to general procedure **2.1** using *N*-(2-bromo-6-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3i** as brown oil (14.9 mg, 51% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ¹H NMR data matched those reported in the literature.^[4]

¹H NMR (400 MHz, CDCl₃) δ 7.92-7.78 (m, 2H), 7.58-7.47 (m, 1H), 7.47-7.33 (m, 2H), 7.02-6.90 (m, 2H), 6.89-6.81 (m, 1H), 3.67 (d, *J* = 0.8 Hz, 2H), 3.59 (s, 3H), 2.62 (s, 3H), 1.41 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.2, 181.4, 141.6, 136.4, 134.3, 133.1, 131.6, 128.4, 128.0, 122.1, 119.8, 119.5, 46.3, 44.7, 29.8, 25.5, 19.1.

1-benzyl-3-methyl-3-(2-oxo-2-phenylethyl)indolin-2-one (**3j**)



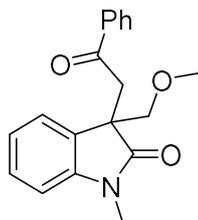
Chemical Formula: C₂₄H₂₁NO₂
Exact Mass: 355.16

3j was prepared according to general procedure **2.1** using *N*-benzyl-*N*-(2-bromophenyl)methacrylamide (0.1 mmol, 33.0 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 5/1) to obtain **3j** as yellow solid (30.2 mg, 85% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. m.p. 146.4-148.8 °C. The ¹H NMR data matched those reported in the literature.^[5]

¹H NMR (400 MHz, CDCl₃) δ 7.94-7.85 (m, 2H), 7.58-7.49 (m, 1H), 7.48-7.39 (m, 4H), 7.39-7.32 (m, 2H), 7.32-7.26 (m, 1H), 7.18-7.08 (m, 2H), 6.99-6.90 (m, 1H), 6.78-6.71 (m, 1H), 5.10

(d, $J = 15.8$ Hz, 1H), 4.98 (d, $J = 15.8$ Hz, 1H), 3.75 (dd, $J = 23.3, 18.0$ Hz, 2H), 1.51 (s, 3H).
 ^{13}C NMR (101 MHz, CDCl_3) δ 195.9, 180.7, 142.9, 136.31, 136.28, 133.8, 133.3, 128.8, 128.5, 128.1, 127.7, 127.4, 127.3, 122.2, 121.7, 109.3, 45.9, 45.4, 44.0, 25.6.

3-(methoxymethyl)-1-methyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3k)



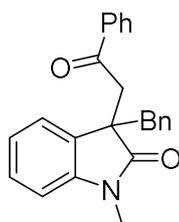
Chemical Formula: $\text{C}_{19}\text{H}_{19}\text{NO}_3$
Exact Mass: 309.14

3k was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-2-(methoxymethyl)-*N*-methylacrylamide (0.1 mmol, 28.4 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 5/1) to obtain **3k** as yellow solid (23.8 mg, 77% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.3$. m.p. 126.3-128.6 °C. The ^1H NMR data matched those reported in the literature.^[5]

^1H NMR (400 MHz, CDCl_3) δ 7.92-7.79 (m, 2H), 7.56-7.46 (m, 1H), 7.45-7.34 (m, 2H), 7.32-7.21 (m, 2H), 7.04-6.94 (m, 1H), 6.90 (d, $J = 7.7$ Hz, 1H), 3.96 (d, $J = 18.1$ Hz, 1H), 3.74 (d, $J = 8.8$ Hz, 1H), 3.64 (d, $J = 18.1$ Hz, 1H), 3.44 (d, $J = 8.7$ Hz, 1H), 3.31 (s, 3H), 3.30 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 196.0, 177.9, 144.4, 136.3, 133.1, 130.8, 128.4, 128.1, 128.0, 123.1, 122.0, 108.0, 59.6, 50.5, 42.2, 29.7, 26.5.

3-benzyl-1-methyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3l)



Chemical Formula: $\text{C}_{24}\text{H}_{21}\text{NO}_2$
Exact Mass: 355.16

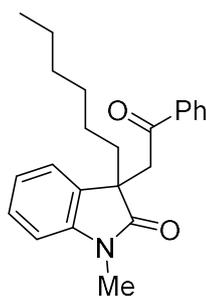
3l was prepared according to general procedure **2.1** using 2-benzyl-*N*-(2-bromophenyl)-*N*-

methylacrylamide (0.1 mmol, 33.0 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 5/1) to obtain **3l** as yellow solid (21.3 mg, 60% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.4. m.p. 142.6-144.7 °C. The ¹H NMR data matched those reported in the literature.^[5]

¹H NMR (400 MHz, CDCl₃) δ 7.88-7.82 (m, 2H), 7.57-7.49 (m, 1H), 7.44-7.37 (m, 2H), 7.18 (td, *J* = 7.7, 1.3 Hz, 1H), 7.14-7.01 (m, 4H), 6.95 (td, *J* = 7.5, 1.0 Hz, 1H), 6.88-6.80 (m, 2H), 6.66-6.60 (m, 1H), 3.81 (d, *J* = 2.7 Hz, 2H), 3.15 (d, *J* = 12.7 Hz, 1H), 3.09 (d, *J* = 12.7 Hz, 1H), 3.04 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.8, 179.1, 144.3, 136.4, 134.8, 133.2, 130.9, 130.0, 128.5, 128.0, 127.9, 127.4, 126.7, 122.7, 121.7, 107.8, 50.9, 44.9, 44.5, 26.0.

3-hexyl-1-methyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3m)



Chemical Formula: C₂₃H₂₇NO₂
Exact Mass: 349.2042

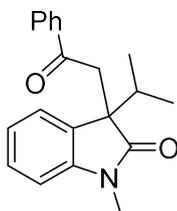
3m was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*-methyl-2-methyleneoctanamide (0.1 mmol, 32.4 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 10:1~5/1) to obtain **3m** as yellow oil (20.9 mg, 60% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.4.

¹H NMR (400 MHz, CDCl₃) δ 7.85-7.78 (m, 2H), 7.54-7.47 (m, 1H), 7.42-7.35 (m, 2H), 7.28-7.22 (m, 1H), 7.12-7.07 (m, 1H), 7.00-6.94 (m, 1H), 6.87 (d, *J* = 7.6 Hz, 1H), 3.72 (d, *J* = 17.8 Hz, 1H), 3.62 (d, *J* = 17.8 Hz, 1H), 3.29 (s, 3H), 1.95-1.79 (m, 2H), 1.24-0.98 (m, 8H), 0.85-0.77 (m, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.2, 180.1, 144.6, 136.5, 133.1, 132.1, 128.4, 127.9, 127.8, 122.03, 121.99, 107.9, 49.4, 45.8, 38.7, 31.5, 29.3, 26.3, 23.2, 22.5, 14.0.

HRMS: (ESI) calcd for $C_{23}H_{27}NO_2H^+[M+H]^+$ 350.2115; found 350.2106.

3-isopropyl-1-methyl-3-(2-oxo-2-phenylethyl)indolin-2-one (3n)



Chemical Formula: $C_{20}H_{21}NO_2$

Exact Mass: 307.1572

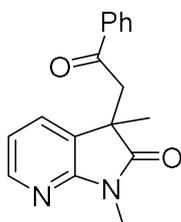
3n was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*,3-dimethyl-2-methylenebutanamide (0.1 mmol, 28.2 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3n** as colorless oil (19.0 mg, 62% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.4$.

1H NMR (400 MHz, $CDCl_3$) δ 7.85-7.78 (m, 2H), 7.55-7.47 (m, 1H), 7.42-7.35 (m, 2H), 7.28-7.22 (m, 1H), 7.11-7.05 (m, 1H), 6.95 (td, $J = 7.5, 1.0$ Hz, 1H), 6.87 (d, $J = 7.8$ Hz, 1H), 3.84 (d, $J = 17.7$ Hz, 1H), 3.64 (d, $J = 17.7$ Hz, 1H), 3.28 (s, 3H), 2.32-2.11 (m, 1H), 1.03 (d, $J = 6.9$ Hz, 3H), 0.74 (d, $J = 6.7$ Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 196.4, 180.1, 145.1, 136.6, 133.0, 130.5, 128.4, 127.9, 127.8, 122.8, 121.7, 107.7, 52.5, 44.1, 35.8, 26.2, 17.3, 16.8.

HRMS: (ESI) calcd for $C_{20}H_{21}NO_2H^+[M+H]^+$ 308.1645; found 308.1646.

1,3-dimethyl-3-(2-oxo-2-phenylethyl)-1,3-dihydro-2H-pyrrolo[2,3-b]pyridin-2-one (3o)



Chemical Formula: $C_{17}H_{16}N_2O_2$

Exact Mass: 280.12

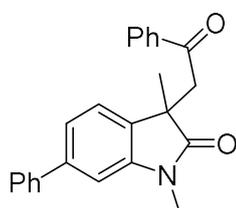
3o was prepared according to general procedure **2.1** using *N*-(3-bromopyridin-2-yl)-*N*-methylmethacrylamide (0.1 mmol, 25.5 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and

was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3o** as yellow oil (17.1 mg, 61% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.3. The ¹H NMR data matched those reported in the literature.^[5]

¹H NMR (400 MHz, CDCl₃) δ 8.17 (dd, *J* = 5.2, 1.5 Hz, 1H), 7.93-7.78 (m, 2H), 7.59-7.49 (m, 1H), 7.47-7.34 (m, 3H), 6.87 (dd, *J* = 7.2, 5.3 Hz, 1H), 3.69 (dd, *J* = 21.3, 18.2 Hz, 2H), 3.39 (s, 3H), 1.47 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.8, 180.2, 157.3, 146.6, 136.1, 133.4, 129.3, 128.6, 128.2, 128.0, 117.8, 45.6, 45.0, 25.6, 24.1.

1,3-dimethyl-3-(2-oxo-2-phenylethyl)-6-phenylindolin-2-one (**3p**)



Chemical Formula: C₂₄H₂₁NO₂

Exact Mass: 355.1572

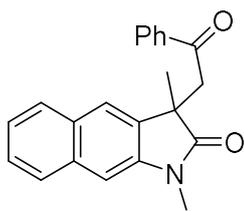
3p was prepared according to general procedure **2.1** using 3-(*N*-methylmethacrylamido)-[1,1'-biphenyl]-4-yl trifluoromethanesulfonate (0.1 mmol, 39.9 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3p** as yellow oil (18.1 mg, 51% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.3.

¹H NMR (400 MHz, CDCl₃) δ 7.88-7.83 (m, 2H), 7.61-7.56 (m, 2H), 7.56-7.49 (m, 1H), 7.47-7.38 (m, 4H), 7.38-7.32 (m, 1H), 7.21-7.18 (m, 2H), 7.11-7.07 (m, 1H), 3.76 (d, *J* = 18.0 Hz, 1H), 3.68 (d, *J* = 18.0 Hz, 1H), 3.37 (s, 3H), 1.48 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.2, 180.8, 144.4, 141.4, 141.3, 136.3, 133.2, 132.8, 128.7, 128.5, 128.0, 127.4, 127.2, 122.0, 121.2, 107.2, 46.0, 45.2, 26.5, 25.0.

HRMS: (ESI) calcd for C₂₄H₂₁NO₂H⁺ [M+H]⁺ 356.1645; found 356.1645.

1,3-dimethyl-3-(2-oxo-2-phenylethyl)-1,3-dihydro-2H-benzo[f]indol-2-one (**3q**)



Chemical Formula: C₂₂H₁₉NO₂

Exact Mass: 329.1416

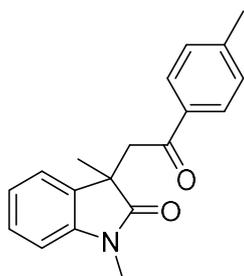
3q was prepared according to general procedure **2.1** using 3-(*N*-methylmethacrylamido)naphthalen-2-yl trifluoromethanesulfonate (0.1 mmol, 37.3 mg) and benzoic anhydride (0.2 mmol, 45.2 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 5/1) to obtain **3q** as white solid (19.7 mg, 60% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.3. m.p. 147.2-149.0 °C.

¹H NMR (400 MHz, CDCl₃) δ 7.86-7.82 (m, 2H), 7.78 (d, *J* = 7.7 Hz, 1H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.54-7.48 (m, 2H), 7.45-7.36 (m, 3H), 7.34-7.28 (m, 1H), 7.18 (s, 1H), 3.84 (d, *J* = 18.1 Hz, 1H), 3.78 (d, *J* = 18.1 Hz, 1H), 3.42 (s, 3H), 1.52 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.0, 180.2, 142.4, 136.2, 135.0, 133.8, 133.2, 130.2, 128.5, 128.0, 127.8, 127.1, 126.2, 123.9, 120.7, 103.8, 46.6, 44.7, 26.7, 25.5.

HRMS: (ESI) calcd for C₂₂H₁₉NO₂H⁺ [M+H]⁺ 330.1489; found 330.1488.

1,3-dimethyl-3-(2-oxo-2-(*p*-tolyl)ethyl)indolin-2-one (**3r**)



Chemical Formula: C₁₉H₁₉NO₂

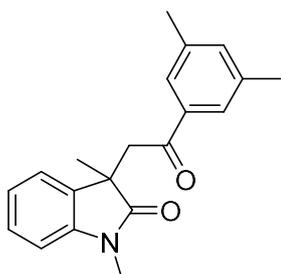
Exact Mass: 293.1416

3r was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and 4-methylbenzoic anhydride (0.2 mmol, 50.8 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate = 10:1~5/1) to obtain **3r** as colorless oil (26.7 mg, 91% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. The ¹H NMR data matched those reported in the literature.^[4]

¹H NMR (400 MHz, CDCl₃) δ 7.77-7.70 (m, 2H), 7.25 (td, *J* = 7.7, 1.3 Hz, 1H), 7.21-7.16 (m, 2H), 7.15-7.11 (m, 1H), 6.97 (td, *J* = 7.6, 1.0 Hz, 1H), 6.89 (d, *J* = 8.1 Hz, 1H), 3.70 (d, *J* = 17.2 Hz, 1H), 3.61 (d, *J* = 17.6 Hz, 1H), 3.31 (s, 3H), 2.37 (s, 3H), 1.43 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 195.7, 180.7, 144.0, 143.8, 133.9, 133.8, 129.1, 128.1, 127.8, 122.1, 121.7, 108.1, 45.9, 45.3, 26.4, 24.9, 21.6.

3-(2-(3,5-dimethylphenyl)-2-oxoethyl)-1,3-dimethylindolin-2-one (3s)



Chemical Formula: C₂₀H₂₁NO₂

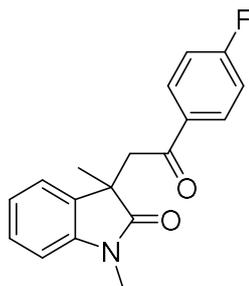
Exact Mass: 307.1572

3s was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and 3,5-dimethylbenzoic anhydride (0.2 mmol, 56.4 mg) at 80 °C and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3s** as white solid (23.8 mg, 62% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. m.p. 105.2-106.8 °C. The ¹H NMR data matched those reported in the literature.^[3]

¹H NMR (400 MHz, CDCl₃) δ 7.44 (s, 2H), 7.27-7.22 (m, 1H), 7.17-7.10 (m, 2H), 6.96 (td, *J* = 7.5, 1.0 Hz, 1H), 6.89 (d, *J* = 7.7 Hz, 1H), 3.70 (d, *J* = 17.8 Hz, 1H), 3.61 (d, *J* = 17.6 Hz, 1H), 3.31 (s, 3H), 2.31 (s, 6H), 1.44 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 196.5, 180.7, 143.9, 138.1, 136.4, 134.8, 133.8, 127.8, 125.8, 122.1, 121.7, 108.1, 46.1, 45.3, 26.4, 24.8, 21.1.

3-(2-(4-fluorophenyl)-2-oxoethyl)-1,3-dimethylindolin-2-one (3t)



Chemical Formula: C₁₈H₁₆FNO₂

Exact Mass: 297.1165

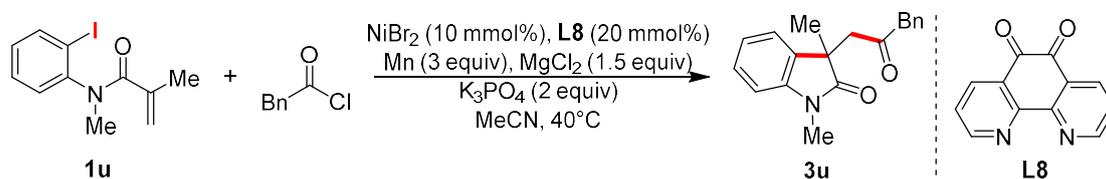
3t was prepared according to general procedure **2.1** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and 4-fluorobenzoic anhydride (0.2 mmol, 52.4 mg) and was purified by silica gel column chromatography (petroleum ether/ethyl acetate =10:1~5/1) to obtain **3t** as white solid (23.8 mg, 80% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. m.p. 107.8-109.5 °C. The ¹H NMR data matched those reported in the literature.^[4]

¹H NMR (400 MHz, CDCl₃) δ 7.92-7.80 (m, 2H), 7.29-7.23 (m, 1H), 7.16-7.11 (m, 1H), 7.11-7.02 (m, 2H), 6.98 (td, *J* = 7.5, 1.0 Hz, 1H), 6.90 (d, *J* = 7.8 Hz, 1H), 3.65 (d, *J* = 2.3 Hz, 2H), 3.31 (s, 3H), 1.44 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 194.5, 180.5, 165.7 (d, *J* = 254.8 Hz), 143.8, 133.6, 132.7 (m), 130.60 (d, *J* = 9.5 Hz), 127.9, 122.2, 121.7, 115.6 (d, *J* = 22.0 Hz), 108.2, 45.9, 45.3, 26.4, 24.9.

¹⁹F NMR (377 MHz, CDCl₃) δ -104.8(s).

1,3-dimethyl-3-(2-oxo-3-phenylpropyl)indolin-2-one (**3u**)



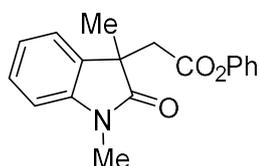
An oven-dried sealed tube equipped with a PTFE-coated stir bar was charged with NiBr₂ (10 mol%), **L8** (20 mol%), *N*-(2-iodophenyl)-*N*-methylmethacrylamide (0.1 mmol, 1.0 equiv), manganese powder (3.0 equiv), MgCl₂ (1.5 equiv) and K₃PO₄ (2.0 equiv). The sealed tube was evacuated and backfilled with argon (this process was repeated for three times) and then MeCN (2 mL) was added. This reaction mixture was stirred at room temperature for 15 minutes and then 2-phenylacetyl chloride (3.0 equiv) was added. Then, the reaction heated at 40 °C for 36

hours. The resulting mixture was purified by chromatography on silica gel, eluting with ethyl acetate/petroleum ether 1:20~1:5 (v/v) to afford the corresponding product **3u** as yellow oil (17.9 mg, 61% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.5$. The ^1H NMR data matched those reported in the literature.^[6]

^1H NMR (400 MHz, CDCl_3) δ 7.3-7.2 (m, 4H), 7.1-7.0 (m, 2H), 7.0-6.9 (m, 2H), 6.9-6.8 (m, 1H), 3.5 (d, $J = 1.2$ Hz, 2H), 3.2 (s, 3H), 3.1 (d, $J = 3.4$ Hz, 2H), 1.3 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 204.3, 180.4, 143.8, 133.7, 133.4, 129.5, 128.8, 128.0, 127.2, 122.3, 121.9, 108.3, 50.2, 48.8, 45.3, 26.5, 24.5.

Phenyl 2-(1,3-dimethyl-2-oxoindolin-3-yl)acetate (**6a**)



Chemical Formula: $\text{C}_{18}\text{H}_{17}\text{NO}_3$

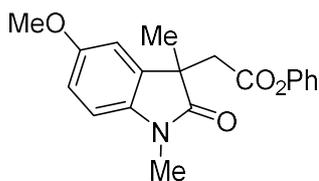
Exact Mass: 295.1208

6a was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6a** as colorless oil (22.1 mg, 75% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.5$. The ^1H NMR data matched those reported in the literature.^[7]

^1H NMR (400 MHz, CDCl_3): δ 7.29 (m, 2H), 7.25-7.18 (m, 2H), 7.14-7.04 (m, 2H), 6.90-6.82 (m, 1H), 6.70-6.63 (m, 2H), 3.29 (d, $J = 16.0$ Hz, 1H), 3.20 (s, 3H), 3.06 (d, $J = 16.0$ Hz, 1H), 1.45 (s, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 179.6, 168.5, 150.2, 143.7, 132.5, 129.4, 128.5, 125.9, 122.6, 122.6, 121.4, 108.4, 45.8, 41.9, 26.5, 24.4.

Phenyl 2-(5-methoxy-1,3-dimethyl-2-oxoindolin-3-yl)acetate (**6b**)



Chemical Formula: C₁₉H₁₉NO₄

Exact Mass: 325.1314

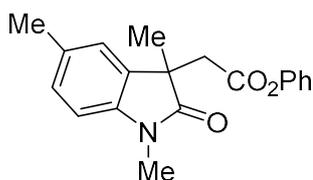
6b was prepared according to general procedure **2.2** using *N*-(2-bromo-4-methoxyphenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.4 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 5/1) to obtain **6b** as brown solid (21.1 mg, 65% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4. m.p. 86.0-88.4 °C.

¹H NMR (400 MHz, CDCl₃): δ 7.28-7.22 (m, 2H), 7.16-7.11 (m, 1H), 6.93 (d, *J* = 2.5 Hz, 1H), 6.84-6.80 (m, 1H), 6.78-6.70 (m, 3H), 3.80 (s, 3H), 3.29 (d, *J* = 16.2 Hz, 1H), 3.19 (s, 3H), 3.04 (d, *J* = 16.2 Hz, 1H), 1.45 (s, 3H);

¹³C NMR (400 MHz, CDCl₃): δ 179.3, 168.4, 156.0, 150.2, 137.2, 133.9, 129.3, 125.9, 121.4, 112.3, 110.3, 108.6, 55.9, 46.1, 41.8, 26.5, 24.4;

HRMS: (ESI) calcd for C₁₉H₁₉NNaO₄⁺[M+Na]⁺ 348.1212; found 348.1194.

Phenyl 2-(1,3,5-trimethyl-2-oxindolin-3-yl)acetate (**6c**)



Chemical Formula: C₁₉H₁₉NO₃

Exact Mass: 309.1365

6c was prepared according to general procedure **2.2** using *N*-(2-bromo-4-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6c** as yellow solid (19.1 mg, 62% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. m.p. 100.1-103.0 °C.

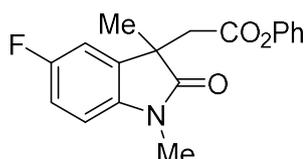
¹H NMR (400 MHz, CDCl₃): δ 7.28-7.21 (m, 2H), 7.16-7.07 (m, 3H), 6.75 (d, *J* = 7.8 Hz, 1H), 6.71-6.65 (m, 2H), 3.28 (d, *J* = 16.0 Hz, 1H), 3.19 (s, 3H), 3.04 (d, *J* = 16.0 Hz, 1H), 2.35 (s,

3H), 1.45 (s, 3H);

¹³C NMR (101 MHz, CDCl₃): δ 179.6, 168.5, 150.2, 141.3, 132.6, 132.1, 129.4, 128.6, 125.9, 123.5, 121.4, 108.1, 45.8, 41.9, 26.5, 24.4, 21.2;

HRMS: (ESI) calcd for C₁₉H₁₉NNaO₃⁺[M+Na]⁺ 332.1263; found 332.1261.

Phenyl 2-(5-fluoro-1,3-dimethyl-2-oxoindolin-3-yl)acetate (**6d**)



Chemical Formula: C₁₈H₁₆FNO₃

Exact Mass: 313.1114

6d was prepared according to general procedure **2.2** using *N*-(2-bromo-4-fluorophenyl)-*N*-methylmethacrylamide (0.1 mmol, 27.2 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6d** as yellow solid (20.0 mg, 64% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. m.p. 81.4-84.3 °C.

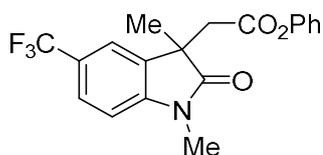
¹H NMR (400 MHz, CDCl₃): δ 7.31-7.23 (m, 2H), 7.18-7.12 (m, 1H), 7.09–7.05 (m, 1H), 7.04–6.97 (m, 1H), 6.80-6.74 (m, 3H), 3.30 (d, *J* = 16.5 Hz, 1H), 3.21 (s, 3H), 3.06 (d, *J* = 16.5 Hz, 1H), 1.45 (s, 3H);

¹³C NMR (101 MHz, CDCl₃): δ 179.3, 168.3, 159.3 (d, *J* = 240.8 Hz), 150.1, 139.7, 134.2, 129.4, 126.0, 121.3, 114.5 (d, *J* = 23.4 Hz), 110.8 (d, *J* = 24.9 Hz), 108.8 (d, *J* = 8.1 Hz), 46.1, 41.6, 26.6, 24.3;

¹⁹F NMR (377 MHz, CDCl₃) δ -120.5(s).

HRMS: (ESI) calcd for C₁₈H₁₆FNNaO₃⁺[M+Na]⁺ 336.1012; found 336.1007.

Phenyl 2-(1,3-dimethyl-2-oxo-5-(trifluoromethyl)indolin-3-yl)acetate (**6e**)



Chemical Formula: C₁₉H₁₆F₃NO₃

Exact Mass: 363.1082

6e was prepared according to general procedure **2.2** using *N*-(2-bromo-4-(trifluoromethyl)phenyl)-*N*-methylmethacrylamide (0.1 mmol, 32.2 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6e** as brown solid (23.9 mg, 66% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. m.p. 86.8-88.6 °C.

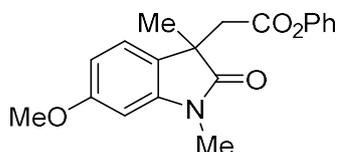
¹H NMR (400 MHz, CDCl₃): δ 7.62-7.56 (m, 1H), 7.53 (d, *J* = 1.8 Hz, 1H), 7.31-7.23 (m, 2H), 7.18-7.12 (m, 1H), 6.92 (d, *J* = 8.2 Hz, 1H), 6.79-6.77 (m, 1H), 6.76-6.74 (m, 1H), 3.34 (d, *J* = 16.7 Hz, 1H), 3.25 (s, 3H), 3.14 (d, *J* = 16.7 Hz, 1H), 1.47 (s, 3H);

¹³C NMR (101 MHz, CDCl₃): δ 179.6, 168.3, 150.0, 146.8, 133.3, 129.5, 126.2 (q, *J* = 4.0 Hz), 126.1, 125.3 (d, *J* = 91.3 Hz), 123.8 (d, *J* = 147.5 Hz), 121.2, 119.4 (q, *J* = 3.6 Hz), 108.1, 45.6, 41.6, 26.7, 24.3;

¹⁹F NMR (377 MHz, CDCl₃) δ -61.2(s).

HRMS: (ESI) calcd for C₁₉H₁₆F₃NNaO₃⁺[M+Na]⁺ 386.0980; found 386.0976.

Phenyl 2-(6-methoxy-1,3-dimethyl-2-oxindolin-3-yl)acetate (**6f**)



Chemical Formula: C₁₉H₁₉NO₄

Exact Mass: 325.1314

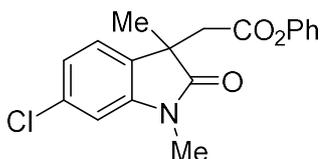
6f was prepared according to general procedure **2.2** using *N*-(2-bromo-5-methoxyphenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.4 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc =15/1~5/1) to obtain **6f** as colorless oil (19.5 mg, 60% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.4.

¹H NMR (400 MHz, CDCl₃): δ 7.31-7.22 (m, 2H), 7.20 (d, *J* = 8.1 Hz, 1H), 7.17-7.11 (m, 1H), 6.76-6.68 (m, 2H), 6.62-6.55 (m, 1H), 6.45 (d, *J* = 2.3 Hz, 1H), 3.83 (s, 3H), 3.25 (d, *J* = 15.9 Hz, 1H), 3.20 (s, 3H), 3.03 (d, *J* = 15.9 Hz, 1H), 1.44 (s, 3H);

¹³C NMR (101 MHz, CDCl₃): δ 180.2, 168.6, 160.4, 150.2, 145.0, 129.4, 125.9, 124.4, 123.2, 121.4, 106.2, 96.4, 55.6, 45.3, 42.1, 26.5, 24.5;

HRMS: (ESI) calcd for C₁₉H₁₉NNaO₄⁺[M+Na]⁺ 348.1212; found 348.1208.

Phenyl 2-(6-chloro-1,3-dimethyl-2-oxindolin-3-yl)acetate (**6g**)



Chemical Formula: C₁₈H₁₆ClNO₃

Exact Mass: 329.0819

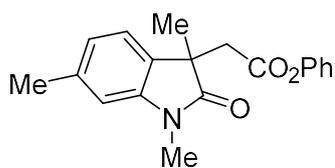
6g was prepared according to general procedure **2.2** using *N*-(2-bromo-5-chlorophenyl)-*N*-methylmethacrylamide (0.1 mmol, 28.8 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6g** as white solid (18.7 mg, 57% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. m.p. 113.0-114.6 °C.

¹H NMR (400 MHz, CDCl₃): δ 7.31-7.24 (m, 2H), 7.21 (d, *J* = 7.9 Hz, 1H), 7.18-7.12 (m, 1H), 7.09-7.03 (m, 1H), 6.86 (d, *J* = 1.8 Hz, 1H), 6.77-6.75 (m, 1H), 6.75-6.73 (m, 1H), 3.29 (d, *J* = 16.4 Hz, 1H), 3.20 (s, 3H), 3.06 (d, *J* = 16.4 Hz, 1H), 1.44 (s, 3H);

¹³C NMR (101 MHz, CDCl₃): δ 179.6, 168.3, 150.1, 145.0, 134.2, 131.0, 129.5, 126.0, 123.4, 122.3, 121.3, 109.1, 45.4, 41.7, 26.6, 24.3;

HRMS: (ESI) calcd for C₁₈H₁₆ClNNaO₃⁺[M+Na]⁺ 352.0717; found 352.0709.

Phenyl 2-(1,3,6-trimethyl-2-oxindolin-3-yl)acetate (**6h**)



Chemical Formula: C₁₉H₁₉NO₃

Exact Mass: 309.1365

6h was prepared according to general procedure **2.2** using *N*-(2-bromo-5-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6h** as white solid (18.8 mg, 61% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. m.p. 77.9-79.3 °C.

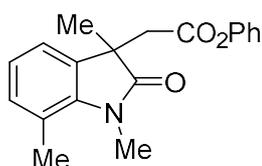
¹H NMR (400 MHz, CDCl₃): δ 7.28-7.21 (m, 2H), 7.18 (m, 1H), 7.16-7.10 (m, 1H), 6.93-6.86

(m, 1H), 6.74-6.66 (m, 3H), 3.26 (d, $J = 16.1$ Hz, 1H), 3.20 (s, 3H), 3.04 (d, $J = 16.0$ Hz, 1H), 2.39 (s, 3H), 1.44 (s, 3H);

^{13}C NMR (101 MHz, CDCl_3): δ 180.0, 168.5, 150.2, 143.8, 138.5, 129.6, 129.3, 125.9, 123.0, 122.3, 121.4, 109.3, 45.6, 41.9, 26.4, 24.4, 21.9;

HRMS: (ESI) calcd for $\text{C}_{19}\text{H}_{19}\text{NNaO}_3^+[\text{M}+\text{Na}]^+$ 332.1263; found 332.1258.

Phenyl 2-(1,3,7-trimethyl-2-oxindolin-3-yl)acetate (**6i**)



Chemical Formula: $\text{C}_{19}\text{H}_{19}\text{NO}_3$

Exact Mass: 309.1365

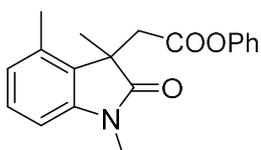
6i was prepared according to general procedure **2.2** using *N*-(2-bromo-6-methylphenyl)-*N*-methylmethacrylamide (0.1 mmol, 26.8 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6i** as yellow solid (13.3 mg, 43% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.5$. m.p. 103.4-104.8 °C.

^1H NMR (400 MHz, CDCl_3): δ 7.29–7.22 (m, 2H), 7.17-7.09 (m, 2H), 7.04-7.00 (m, 1H), 7.00–6.94 (m, 1H), 6.71–6.69 (m, 1H), 6.69-6.66 (m, 1H), 3.49 (s, 3H), 3.30 (d, $J = 16.0$ Hz, 1H), 3.03 (d, $J = 16.0$ Hz, 1H), 2.56 (s, 3H), 1.43 (s, 3H);

^{13}C NMR (101 MHz, CDCl_3): δ 180.4, 168.5, 150.2, 141.5, 133.2, 132.1, 129.4, 125.9, 122.5, 121.4, 120.3, 112.0, 45.1, 42.2, 29.8, 24.8, 19.1;

HRMS: (ESI) calcd for $\text{C}_{19}\text{H}_{19}\text{NNaO}_3^+[\text{M}+\text{Na}]^+$ 332.1263; found 332.1260.

phenyl 2-(1,3,4-trimethyl-2-oxindolin-3-yl)acetate (**6j**)



Chemical Formula: $\text{C}_{19}\text{H}_{19}\text{NO}_3$

Exact Mass: 309.1365

6j was prepared according to general procedure **2.2** using *N*-(2-bromo-3-methylphenyl)-*N*-

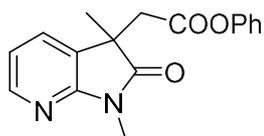
methylmethacrylamide (0.1 mmol, 26.8 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6j** as white solid (13.6 mg, 44% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.4. m.p. 82.5-84.7 °C.

¹H NMR (400 MHz, CDCl₃) δ 7.24-7.16 (m, 3H), 7.13-7.07 (m, 1H), 6.86 (d, *J* = 7.8 Hz, 1H), 6.71 (d, *J* = 7.7 Hz, 1H), 6.53-6.46 (m, 2H), 3.41 (d, *J* = 15.3 Hz, 1H), 3.24-3.18 (m, 4H), 2.46 (s, 3H), 1.52 (s, 3H).

¹³C NMR (101 MHz, CDCl₃) δ 179.6, 168.4, 150.1, 144.1, 134.2, 129.2, 128.3, 125.8, 125.1, 121.2, 106.1, 46.8, 41.3, 26.5, 22.4, 18.2.

HRMS: (ESI) calcd for C₁₉H₁₉NO₃H⁺[M+H]⁺ 310.1438; found 310.1440.

phenyl 2-(1,3-dimethyl-2-oxo-2,3-dihydro-1H-pyrrolo[2,3-b]pyridin-3-yl)acetate (**6k**)



Chemical Formula: C₁₇H₁₆N₂O₃

Exact Mass: 296.1161

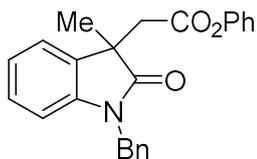
6k was prepared according to general procedure **2.2** using *N*-(3-bromopyridin-2-yl)-*N*-methylmethacrylamide (0.1 mmol, 25.5 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6k** as colorless oil (18.0 mg, 61% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.4.

¹H NMR (600 MHz, CDCl₃) δ 8.21 (dd, *J* = 5.3, 1.6 Hz, 1H), 7.56 (dd, *J* = 7.2, 1.6 Hz, 1H), 7.30-7.26 (m, 2H), 7.19-7.14 (m, 1H), 6.97 (dd, *J* = 7.3, 5.3 Hz, 1H), 6.81-6.73 (m, 2H), 3.33-3.26 (m, 4H), 3.09 (d, *J* = 16.5 Hz, 1H), 1.49 (s, 3H).

¹³C NMR (151 MHz, CDCl₃) δ 179.2, 168.2, 157.1, 150.0, 147.1, 130.1, 129.4, 127.1, 126.0, 121.2, 118.1, 45.3, 41.3, 25.6, 23.6.

HRMS: (ESI) calcd for C₁₇H₁₆N₂O₃H⁺[M+H]⁺ 297.1234; found 297.1236.

Phenyl 2-(1-benzyl-3-methyl-2-oxoindolin-3-yl)acetate (**6l**)



Chemical Formula: $C_{24}H_{21}NO_3$

Exact Mass: 371.1521

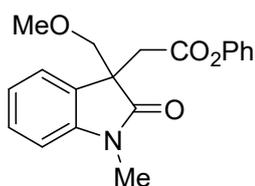
6l was prepared according to general procedure **2.2** using *N*-benzyl-*N*-(2-bromophenyl)methacrylamide (0.1 mmol, 33.0 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 10/1~5/1) to obtain **6l** as yellow oil (16.0 mg, 43% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.5.

1H NMR (400 MHz, $CDCl_3$): δ 7.34-7.29 (m, 1H), 7.28-7.24 (m, 2H), 7.24-7.09 (m, 7H), 7.08-7.02 (m, 1H), 6.75-6.70 (m, 1H), 6.61-6.58 (m, 1H), 6.57-6.55 (m, 1H), 4.92 (q, $J = 15.7$ Hz, 2H), 3.39 (d, $J = 15.9$ Hz, 1H), 3.10 (d, $J = 15.9$ Hz, 1H), 1.52 (s, 3H);

^{13}C NMR (101 MHz, $CDCl_3$): δ 179.7, 168.5, 150.2, 142.8, 135.8, 132.5, 129.3, 128.7, 128.3, 127.5, 127.3, 125.9, 122.7, 122.6, 121.4, 109.5, 45.9, 44.0, 41.8, 25.2;

HRMS: (ESI) calcd for $C_{24}H_{21}NNaO_3^+[M+Na]^+$ 394.1419; found 394.1417.

Phenyl 2-(3-(methoxymethyl)-1-methyl-2-oxoindolin-3-yl)acetate (**6m**)



Chemical Formula: $C_{19}H_{19}NO_4$

Exact Mass: 325.1314

6m was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-2-(methoxymethyl)-*N*-methylacrylamide (0.1 mmol, 28.4 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 5/1) to obtain **6m** as yellow oil (16.5 mg, 51% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.4.

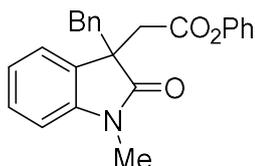
1H NMR (400 MHz, $CDCl_3$) δ 7.43-7.38 (m, 1H), 7.36-7.30 (m, 1H), 7.27-7.20 (m, 2H), 7.15-7.05 (m, 2H), 6.86 (d, $J = 7.8$ Hz, 1H), 6.68-6.65 (m, 1H), 6.65-6.62 (m, 1H), 3.71 (d, $J = 8.8$

Hz, 1H), 3.52 (d, $J = 8.8$ Hz, 1H), 3.30 (s, 3H), 3.26 (s, 2H), 3.21 (s, 3H);

^{13}C NMR (101 MHz, CDCl_3): δ 177.1, 168.4, 150.2, 144.4, 129.7, 129.3, 128.7, 125.9, 123.8, 122.5, 121.3, 108.2, 76.2, 59.7, 50.9, 37.9, 26.5.

HRMS: (ESI) calcd for $\text{C}_{19}\text{H}_{19}\text{NNaO}_4^+[\text{M}+\text{Na}]^+$ 348.1212; found 348.1212.

Phenyl 2-(3-benzyl-1-methyl-2-oxoindolin-3-yl)acetate (**6n**)



Chemical Formula: $\text{C}_{24}\text{H}_{21}\text{NO}_3$

Exact Mass: 371.1521

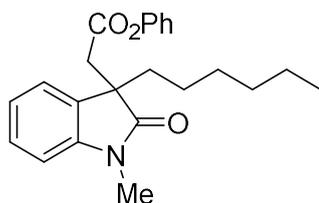
6n was prepared according to general procedure **2.2** using 2-benzyl-*N*-(2-bromophenyl)-*N*-methylacrylamide (0.1 mmol, 33.0 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6n** as yellow oil (26.1 mg, 70% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): $R_f = 0.5$.

^1H NMR (400 MHz, CDCl_3): δ 7.27-7.18 (m, 4H), 7.14-7.03 (m, 5H), 6.89-6.84 (m, 2H), 6.66-6.63 (m, 1H), 6.63-6.59 (m, 2H), 3.44 (d, $J = 15.9$ Hz, 1H), 3.17 (d, $J = 16.0$ Hz, 1H), 3.12 (s, 2H), 2.97 (s, 3H);

^{13}C NMR (101 MHz, CDCl_3): δ 178.2, 168.4, 150.2, 144.26, 134.7, 130.1, 129.8, 129.3, 128.5, 127.6, 126.9, 125.9, 123.5, 122.1, 121.3, 108.0, 51.4, 44.0, 40.6, 26.1.

HRMS: (ESI) calcd for $\text{C}_{24}\text{H}_{21}\text{NNaO}_3^+[\text{M}+\text{Na}]^+$ 394.1419; found 394.1416.

Phenyl 2-(3-hexyl-1-methyl-2-oxoindolin-3-yl)acetate (**6o**)



Chemical Formula: $\text{C}_{23}\text{H}_{27}\text{NO}_3$

Exact Mass: 365.1991

6o was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*-methyl-2-methyloctanamide (0.1 mmol, 32.4 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg)

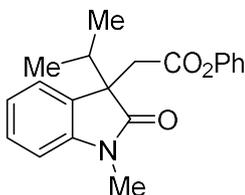
and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6o** as brown oil (22.2 mg, 63% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.5.

¹H NMR (400 MHz, CDCl₃): δ 7.35-7.18 (m, 4H), 7.15-7.05 (m, 2H), 6.85 (d, *J* = 7.8 Hz, 1H), 6.65-6.58 (m, 2H), 3.28 (d, *J* = 15.8 Hz, 1H), 3.20 (s, 3H), 3.06 (d, *J* = 15.8 Hz, 1H), 1.86 (dtd, *J* = 45.9, 12.9, 4.4 Hz, 2H), 1.36-0.70 (m, 13H);

¹³C NMR (101 MHz, CDCl₃): δ 179.1, 168.5, 150.2, 144.5, 130.9, 129.3, 128.37, 125.8, 122.8, 122.5, 121.3, 108.1, 50.0, 41.7, 38.3, 31.5, 29.3, 26.4, 23.6, 22.6, 14.0;

HRMS: (ESI) calcd for C₂₃H₂₇NNaO₃⁺[M+Na]⁺ 388.1889; found 388.1881.

Phenyl 2-(3-isopropyl-1-methyl-2-oxoindolin-3-yl)acetate (**6p**)



Chemical Formula: C₂₀H₂₁NO₃

Exact Mass: 323.1521

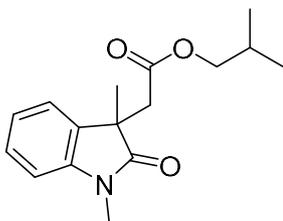
6p was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*,3-dimethyl-2-methylenebutanamide (0.1 mmol, 29.6 mg) and phenyl carbonochloridate (0.4 mmol, 62.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6p** as yellow solid (21.4 mg, 66% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): Rf = 0.5. m.p. 75.8-78.2 °C.

¹H NMR (400 MHz, CDCl₃): δ 7.35-7.29 (m, 1H), 7.28-7.25 (m, 1H), 7.24-7.18 (m, 2H), 7.14-7.04 (m, 2H), 6.87-6.81 (m, 1H), 6.61-6.58 (m, 1H), 6.58-6.55 (m, 1H), 3.32 (d, *J* = 15.8 Hz, 1H), 3.20 (d, *J* = 9.1 Hz, 4H), 2.20 (p, *J* = 6.8 Hz, 1H), 0.99 (d, *J* = 6.9 Hz, 3H), 0.81 (d, *J* = 6.7 Hz, 3H);

¹³C NMR (101 MHz, CDCl₃) δ 179.1, 168.8, 150.2, 144.9, 129.7, 129.3, 128.4, 125.8, 123.5, 122.1, 121.3, 108.0, 53.2, 39.9, 35.6, 26.2, 17.3, 16.9.

HRMS: (ESI) calcd for C₂₀H₂₁NNaO₃⁺[M+Na]⁺ 346.1419; found 346.1410.

isobutyl 2-(1,3-dimethyl-2-oxoindolin-3-yl)acetate (**6q**)

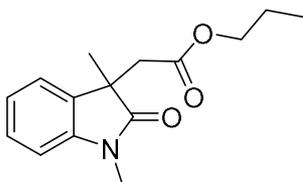


Chemical Formula: C₁₆H₂₁NO₃
Exact Mass: 275.1521

6q was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and isobutyl carbonochloridate (0.4 mmol, 54.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6q** as yellow oil (16.5 mg, 60% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.23 (m, 1H), 7.20 (d, *J* = 7.0 Hz, 1H), 7.03 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 7.8 Hz, 1H), 3.61 (d, *J* = 6.6 Hz, 2H), 3.25 (s, 3H), 3.04 (d, *J* = 16.2 Hz, 1H), 2.86 (d, *J* = 16.2 Hz, 1H), 1.74-1.65 (m, 1H), 1.37 (s, 3H), 0.75 (t, *J* = 7.1 Hz, 6H). ¹³C NMR (101 MHz, CDCl₃) δ 179.9, 169.9, 143.5, 133.0, 128.1, 122.4, 122.2, 108.1, 70.7, 45.5, 41.6, 27.5, 26.3, 24.5, 18.9.

HRMS: (ESI) calcd for C₁₆H₂₁NO₃H⁺ [M+H]⁺ 276.1594; found 276.1593.

propyl 2-(1,3-dimethyl-2-oxoindolin-3-yl)acetate (**6r**)

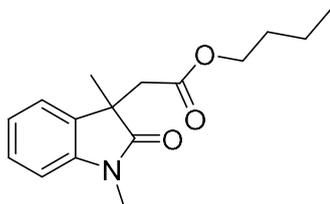


Chemical Formula: C₁₅H₁₉NO₃
Exact Mass: 261.1365

6r was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and propyl carbonochloridate (0.4 mmol, 49.0 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6r** as yellow oil (17.7 mg, 68% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5. The ¹H NMR data matched those reported in the literature.^[7] ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.23 (m, 1H), 7.22-7.17 (m, 1H), 7.03 (td, *J* = 7.5, 1.0 Hz, 1H), 6.85 (d, *J* = 7.8 Hz, 1H), 3.86-3.72 (m, 2H), 3.25 (s, 3H), 3.03 (d, *J* = 16.2 Hz, 1H), 2.84 (d, *J* = 16.2 Hz, 1H), 1.45-1.36 (m, 5H), 0.76 (t, *J* = 7.4 Hz, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 179.9, 169.9, 143.6, 133.0, 128.1, 122.4, 122.3, 108.1, 66.1, 45.5, 41.7, 26.3, 24.5, 21.7, 10.2.

butyl 2-(1,3-dimethyl-2-oxoindolin-3-yl)acetate (6s)



Chemical Formula: $\text{C}_{16}\text{H}_{21}\text{NO}_3$

Exact Mass: 275.1521

6s was prepared according to general procedure **2.2** using *N*-(2-bromophenyl)-*N*-methylmethacrylamide (0.1 mmol, 25.4 mg) and butyl carbonochloridate (0.4 mmol, 54.6 mg) and was purified by silica gel column chromatography (PE/EtOAc = 15/1~5/1) to obtain **6s** as yellow oil (15.7mg, 57% yield). TLC (petroleum ether: ethyl acetate, 5:1 v/v): R_f = 0.5.

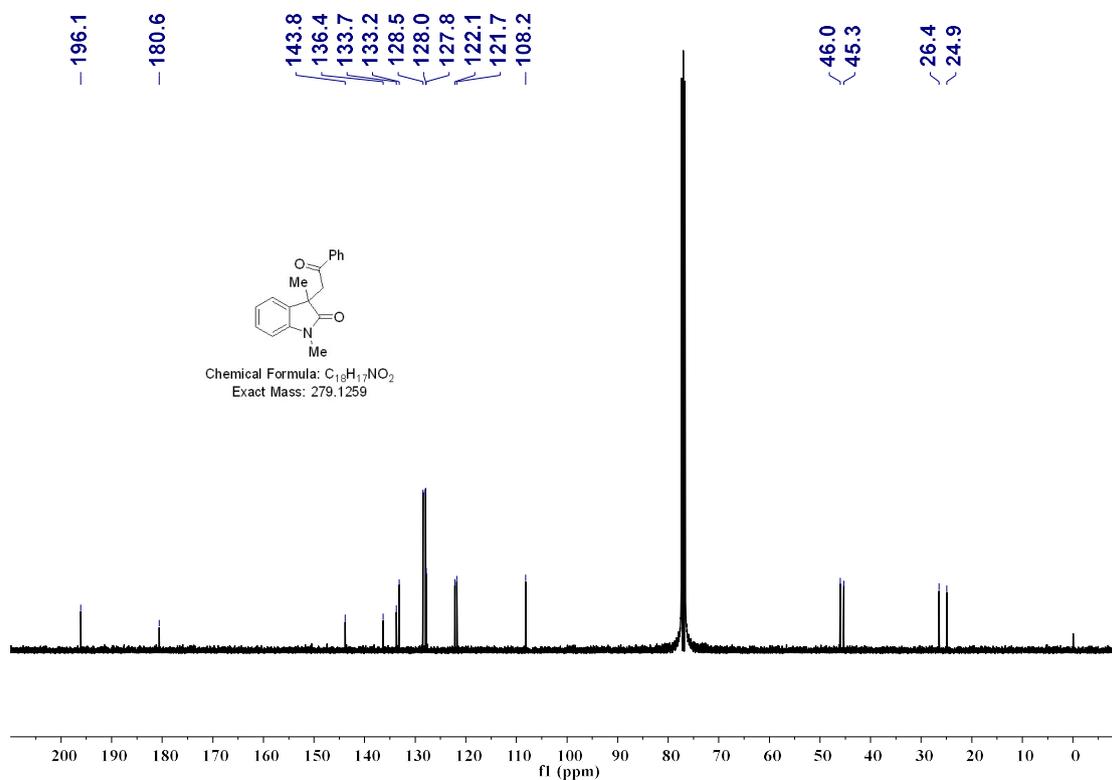
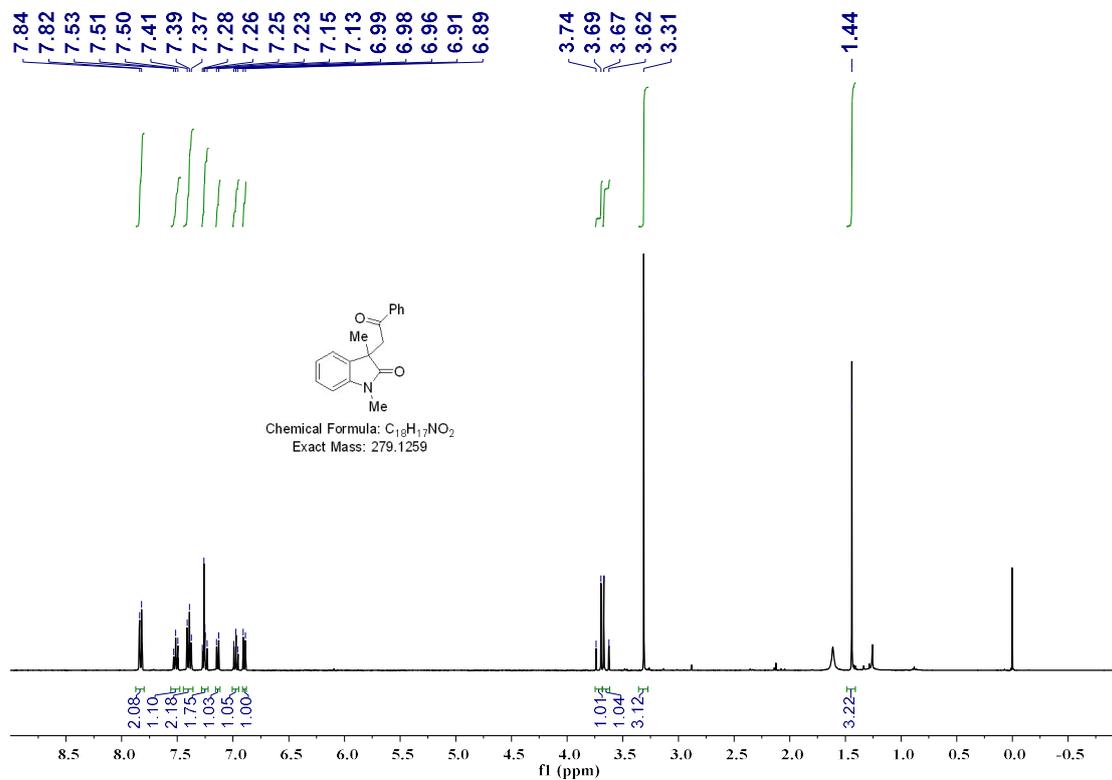
^1H NMR (400 MHz, CDCl_3) δ 7.32-7.23 (m, 1H), 7.23-7.16 (m, 1H), 7.03 (td, J = 7.5, 1.0 Hz, 1H), 6.85 (d, J = 7.8 Hz, 1H), 3.91-3.75 (m, 2H), 3.25 (s, 3H), 3.03 (d, J = 16.2 Hz, 1H), 2.83 (d, J = 16.2 Hz, 1H), 1.40-1.30 (m, 5H), 1.22-1.11 (m, 2H), 0.82 (t, J = 7.3 Hz, 3H).

^{13}C NMR (101 MHz, CDCl_3) δ 179.9, 169.9, 143.6, 133.0, 128.1, 122.3, 122.3, 108.1, 64.4, 45.5, 41.7, 30.4, 26.3, 24.5, 18.9, 13.6.

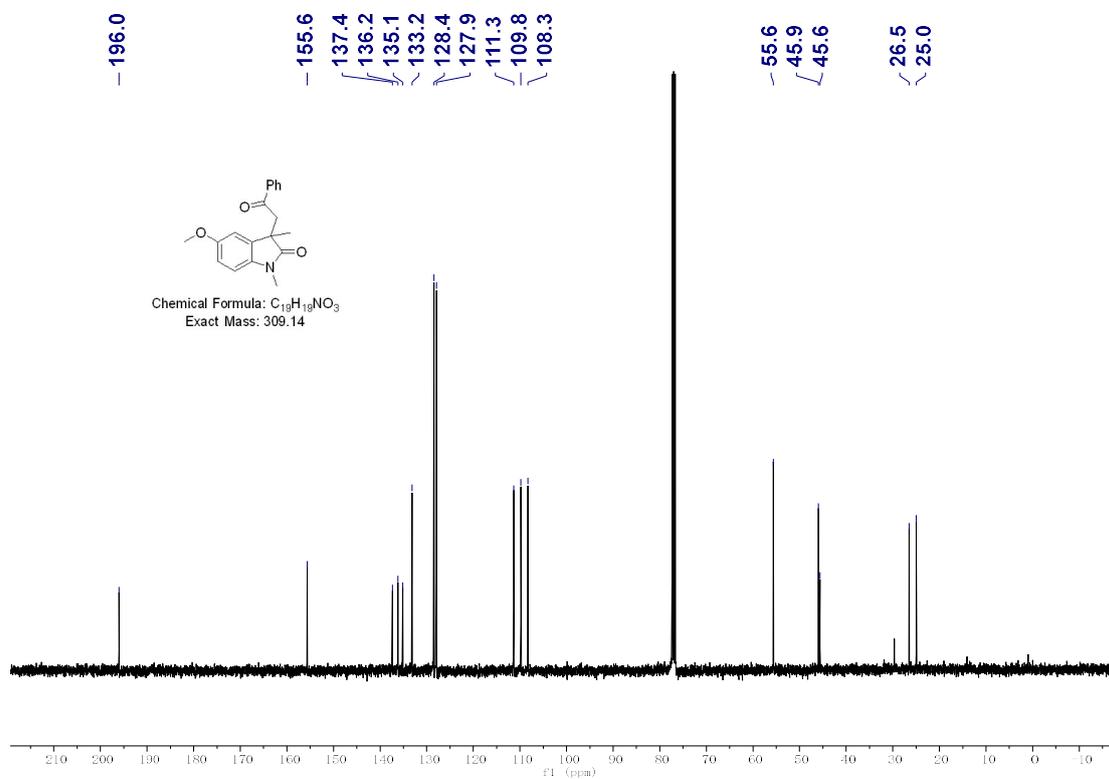
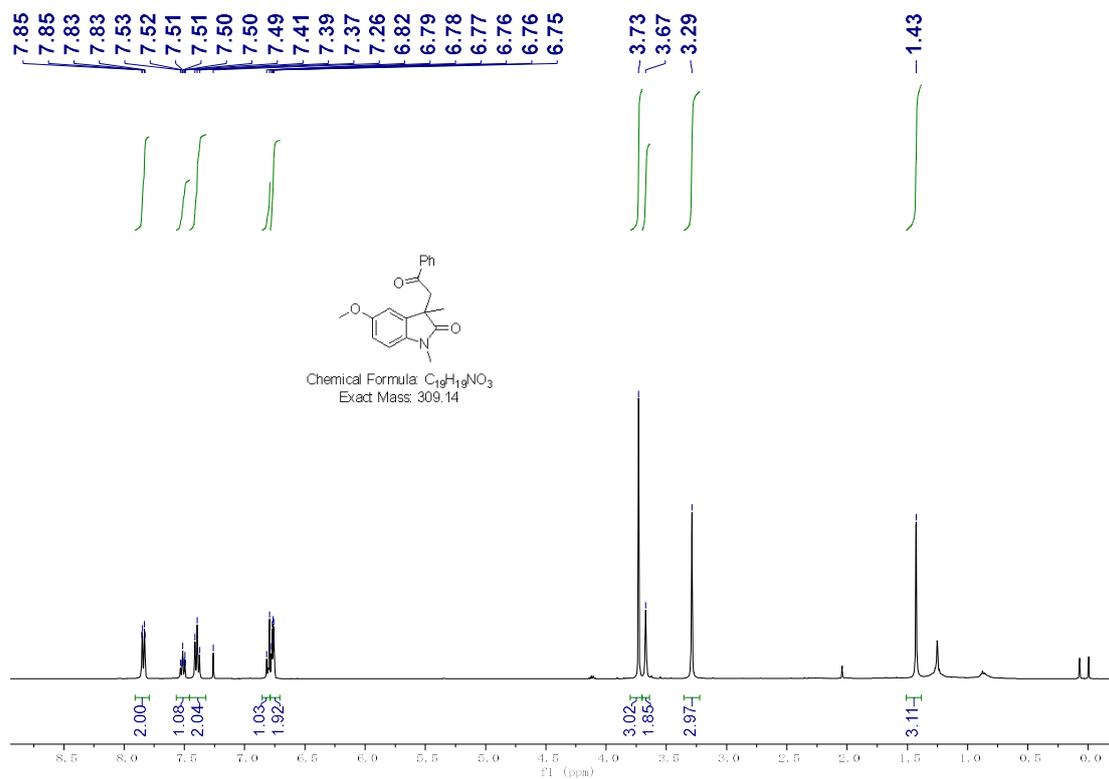
HRMS: (ESI) calcd for $\text{C}_{16}\text{H}_{21}\text{NO}_3\text{H}^+[\text{M}+\text{H}]^+$ 276.1594; found 276.1595.

6. Copies of the ^1H , ^{19}F and ^{13}C NMR spectra

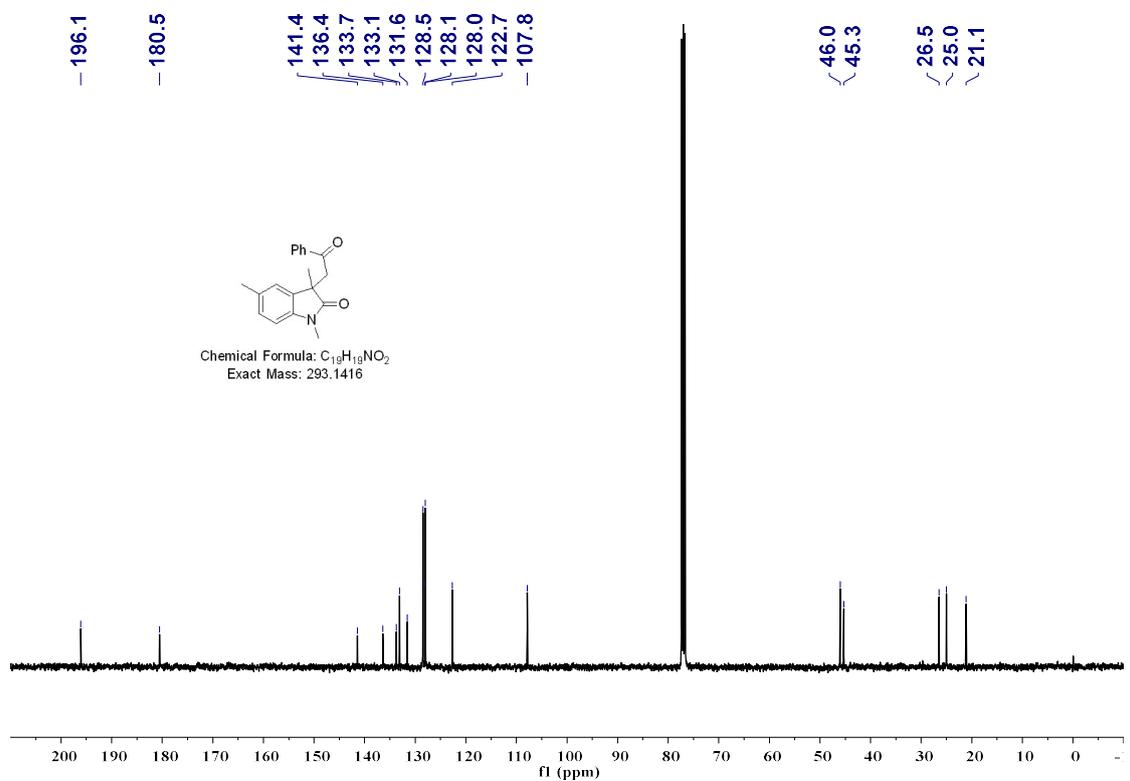
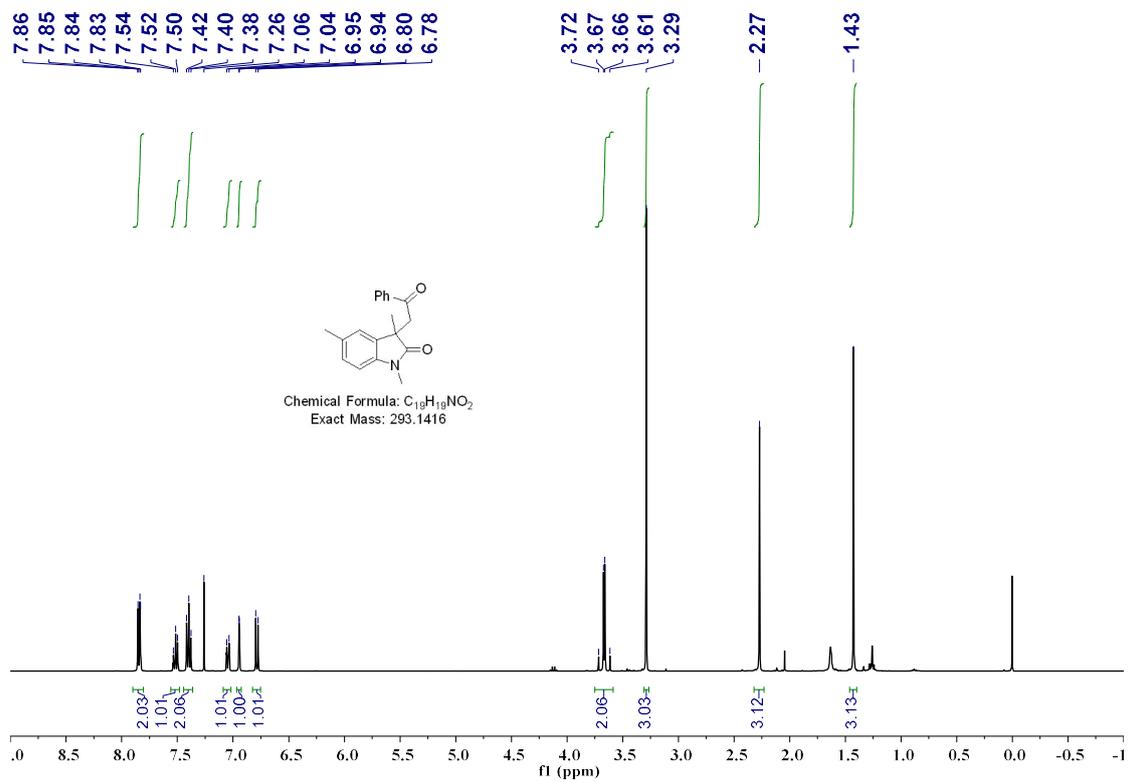
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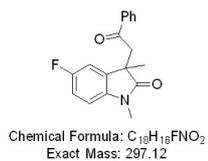
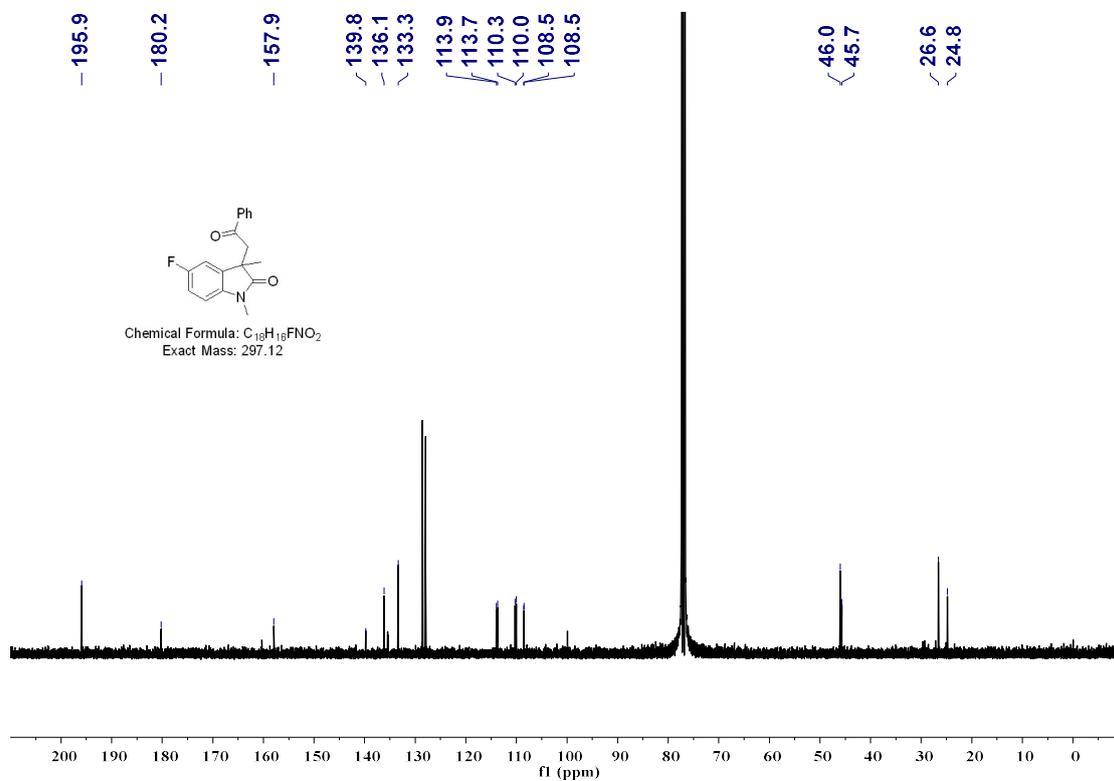
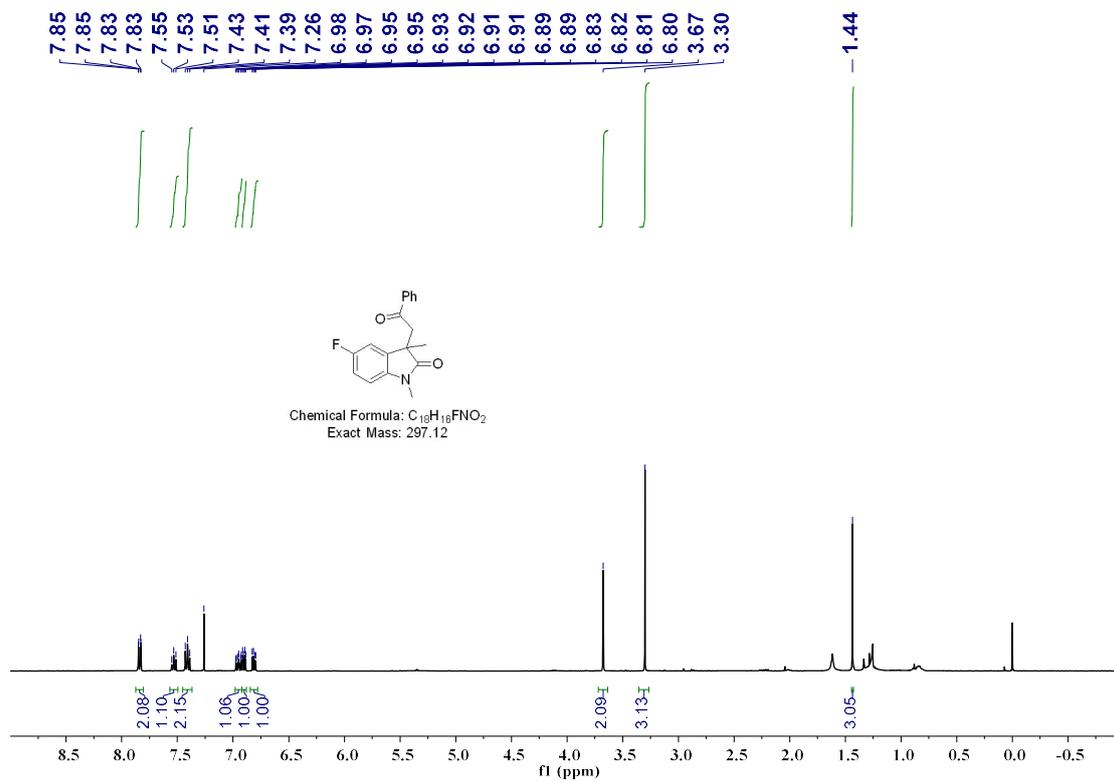
3b



3c

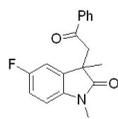


3d



dzt-2-60
single_pulse

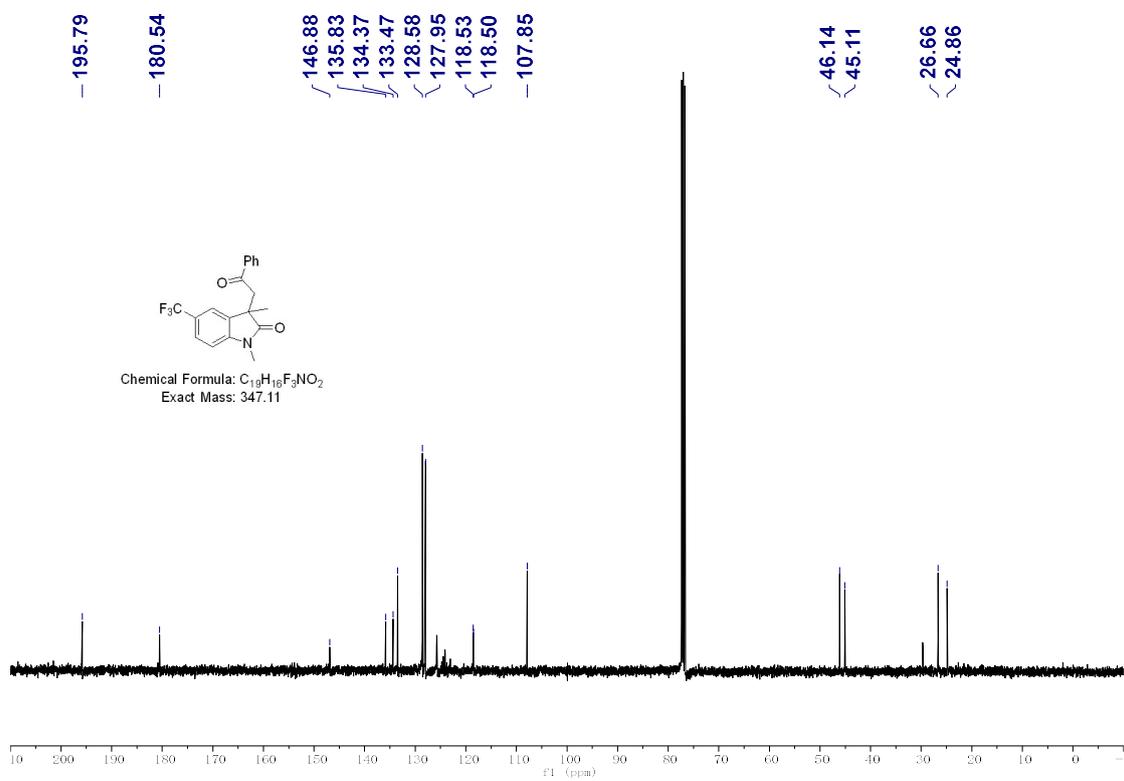
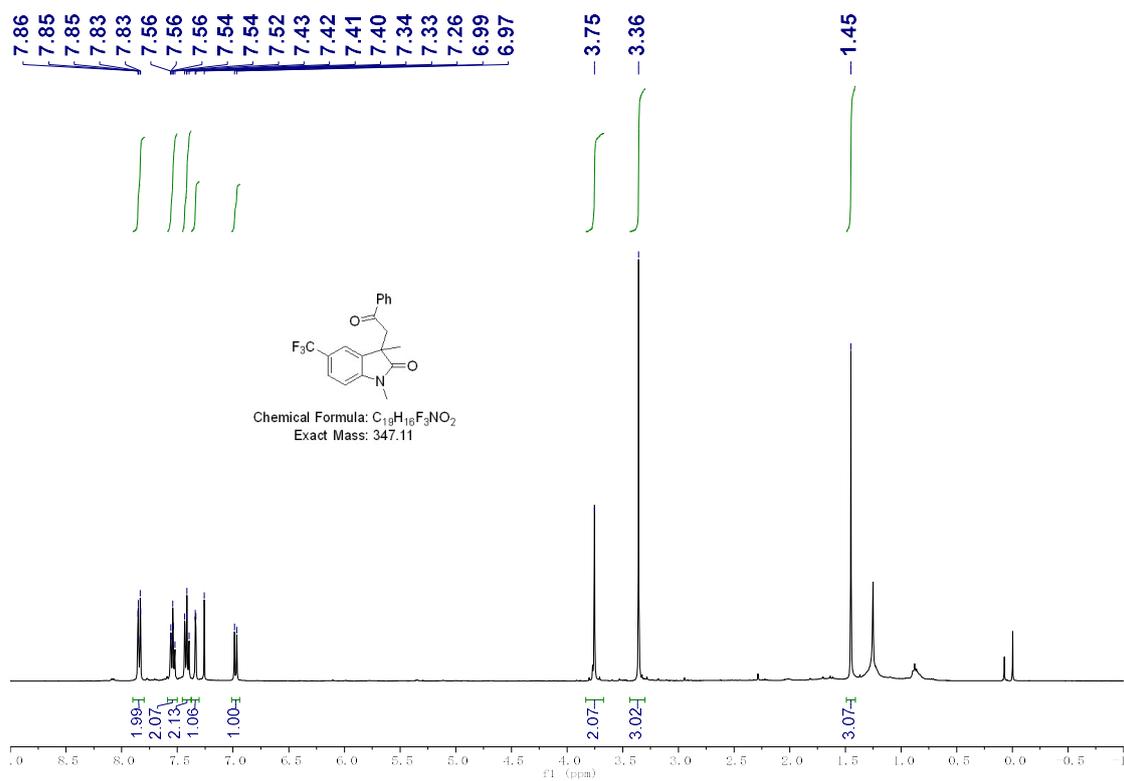
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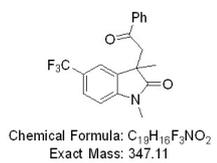


Chemical Formula: C₁₈H₁₅FN₂O₂
Exact Mass: 297.12



3e

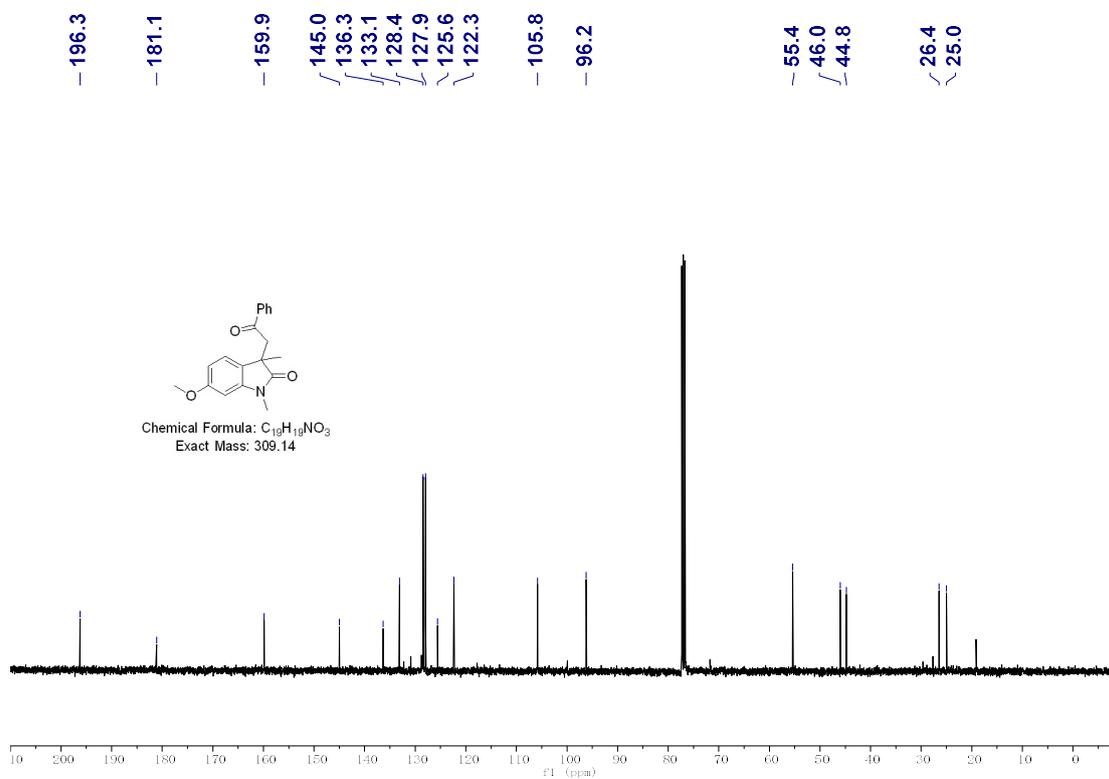
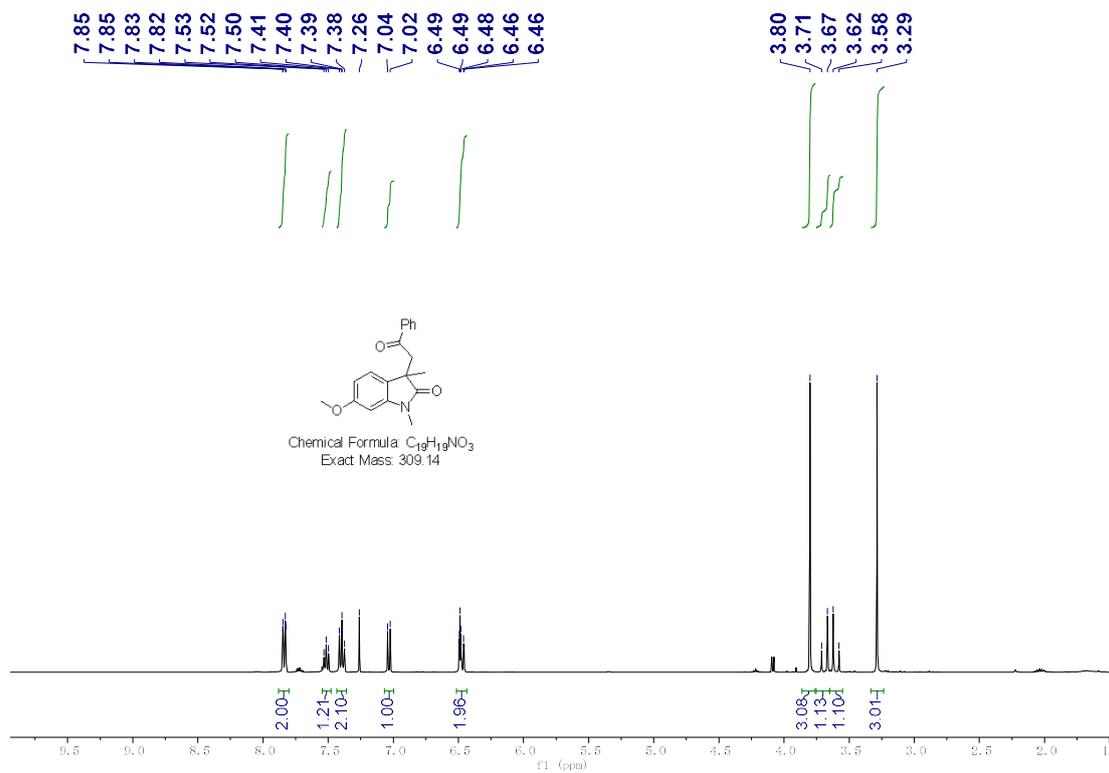




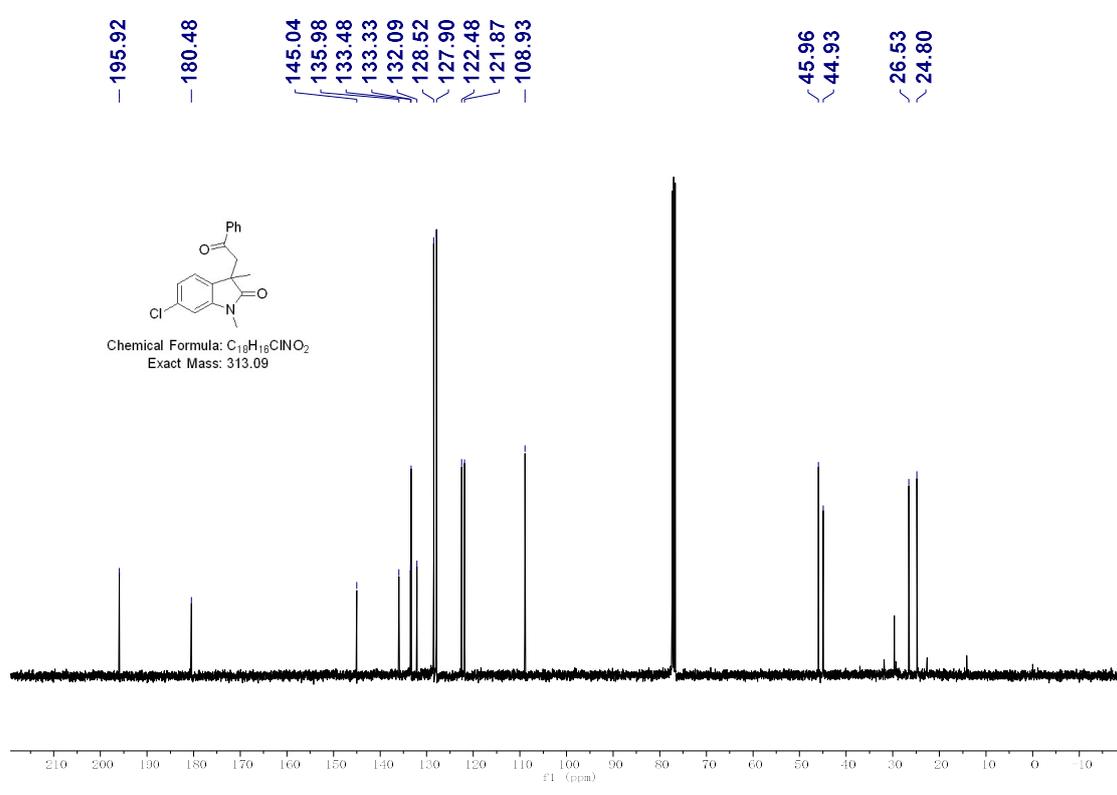
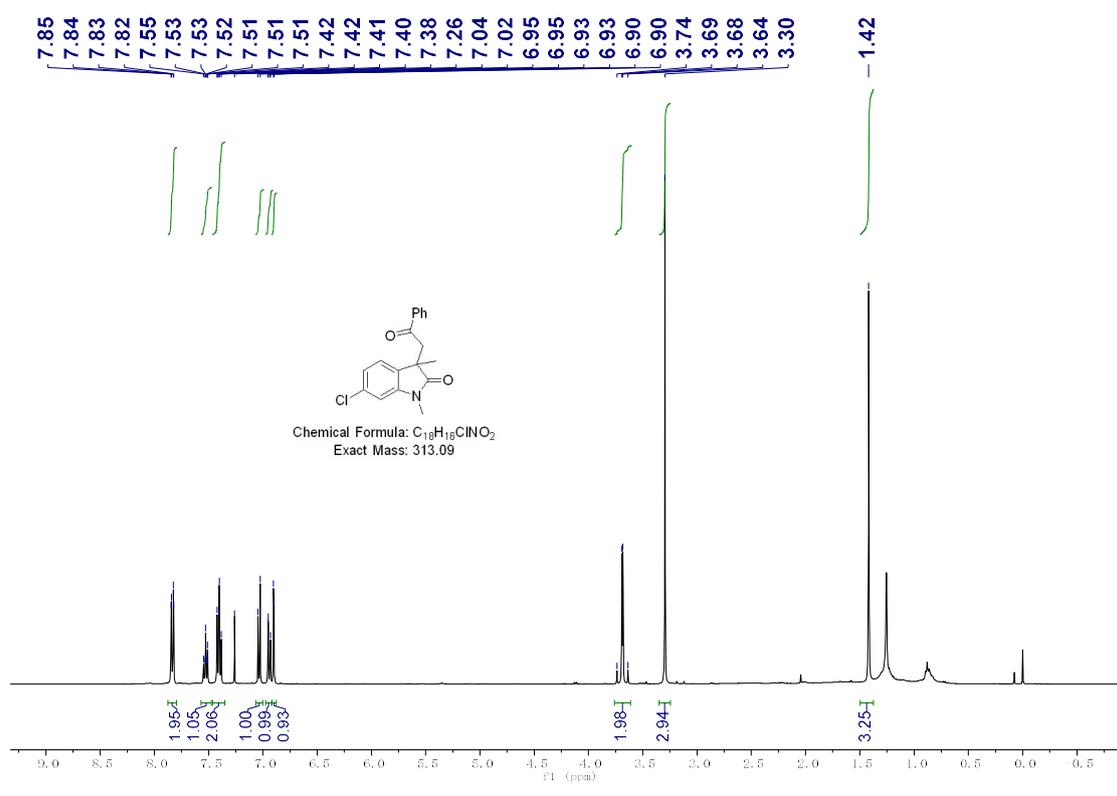
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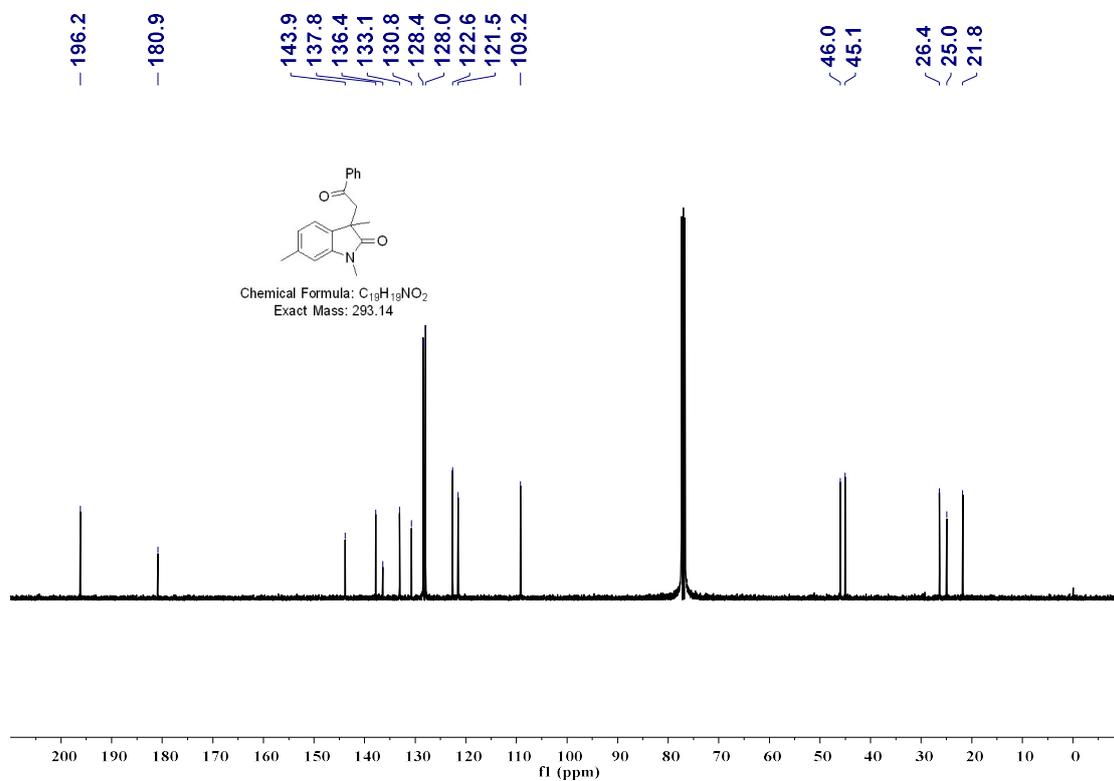
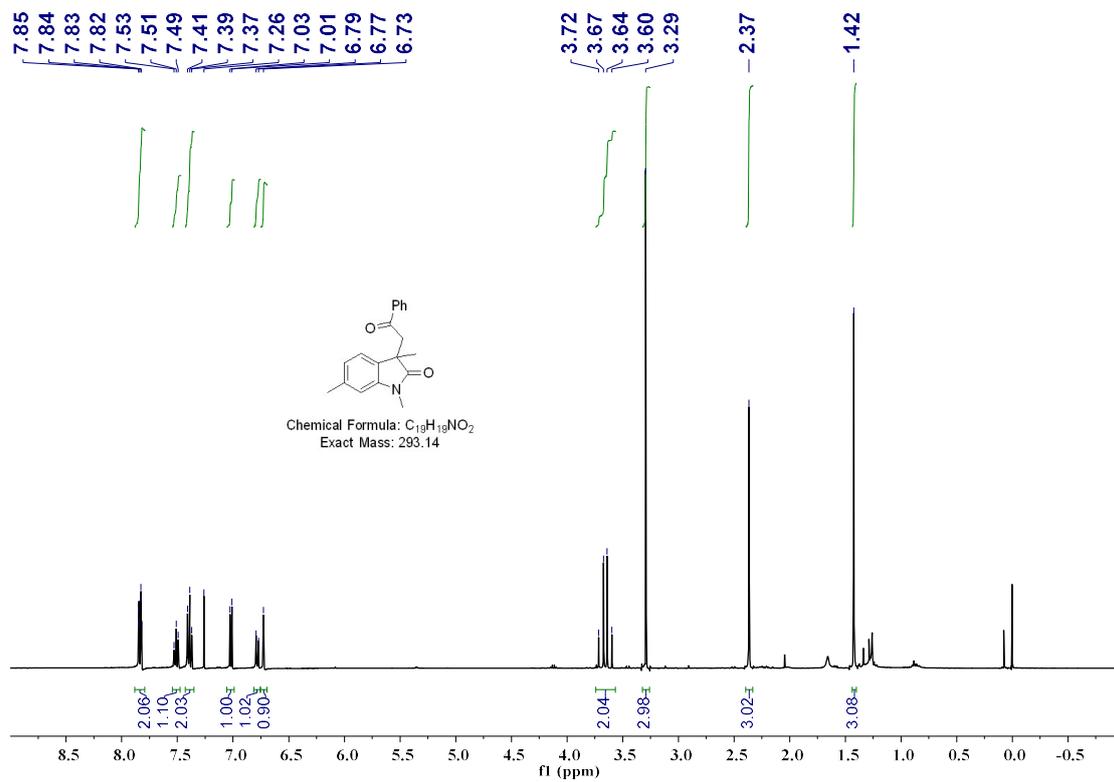
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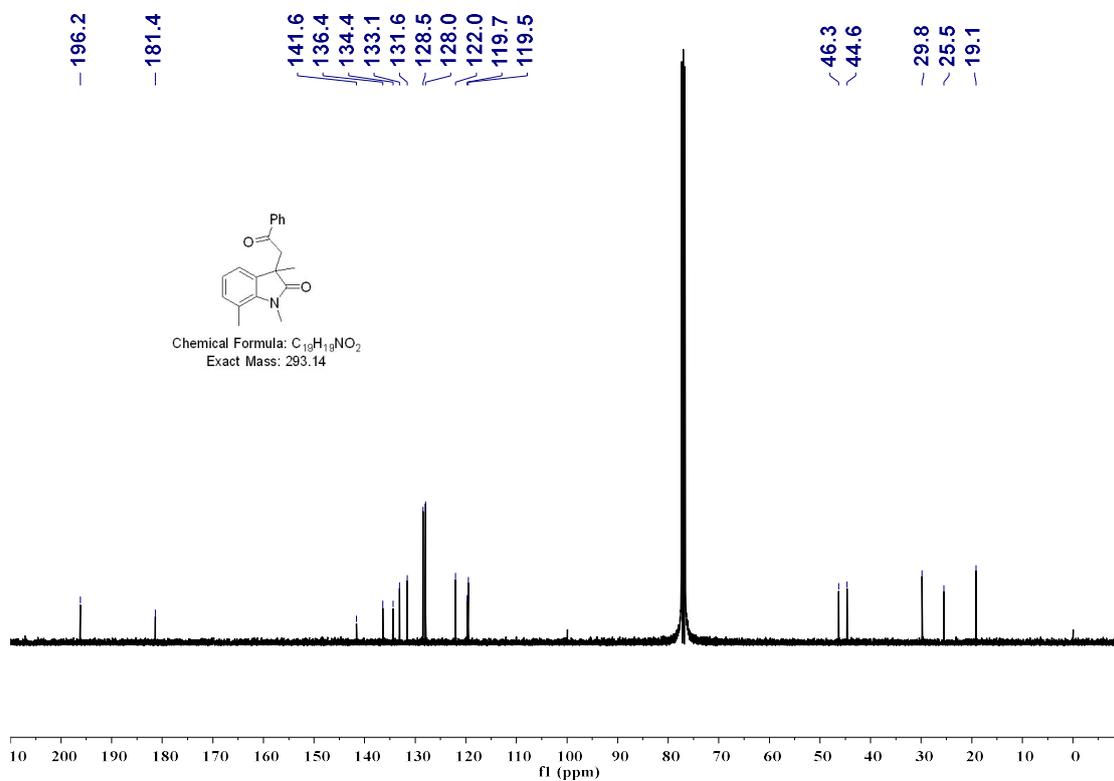
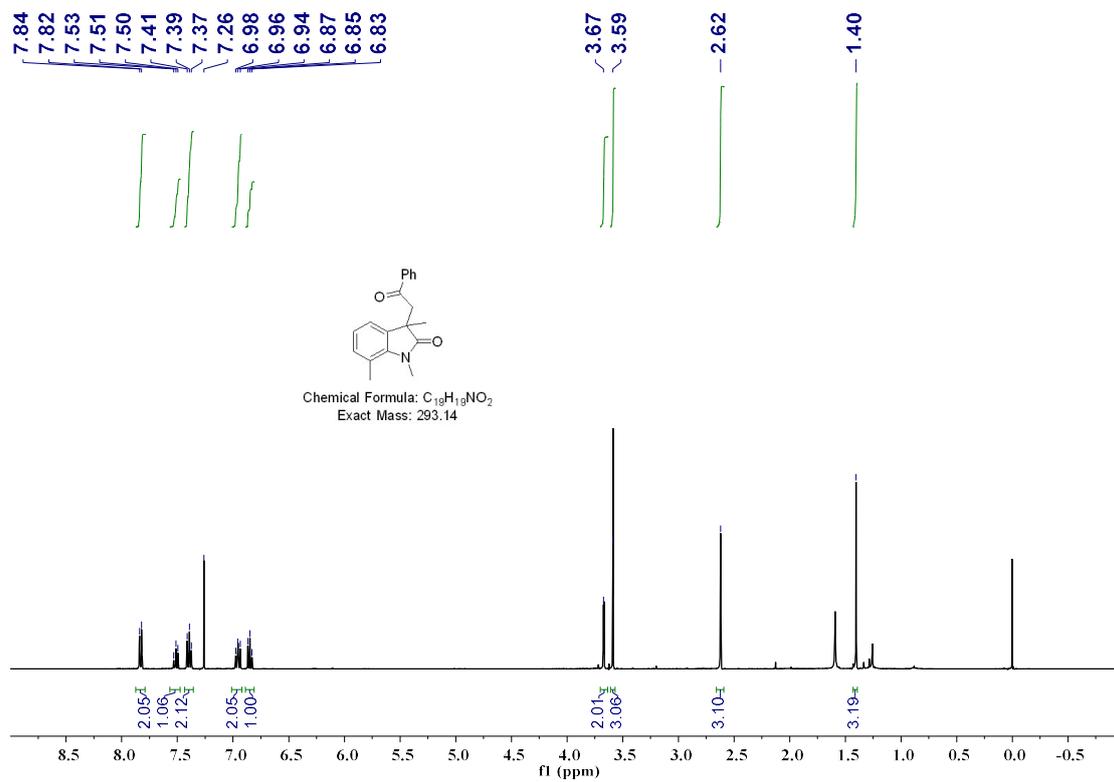
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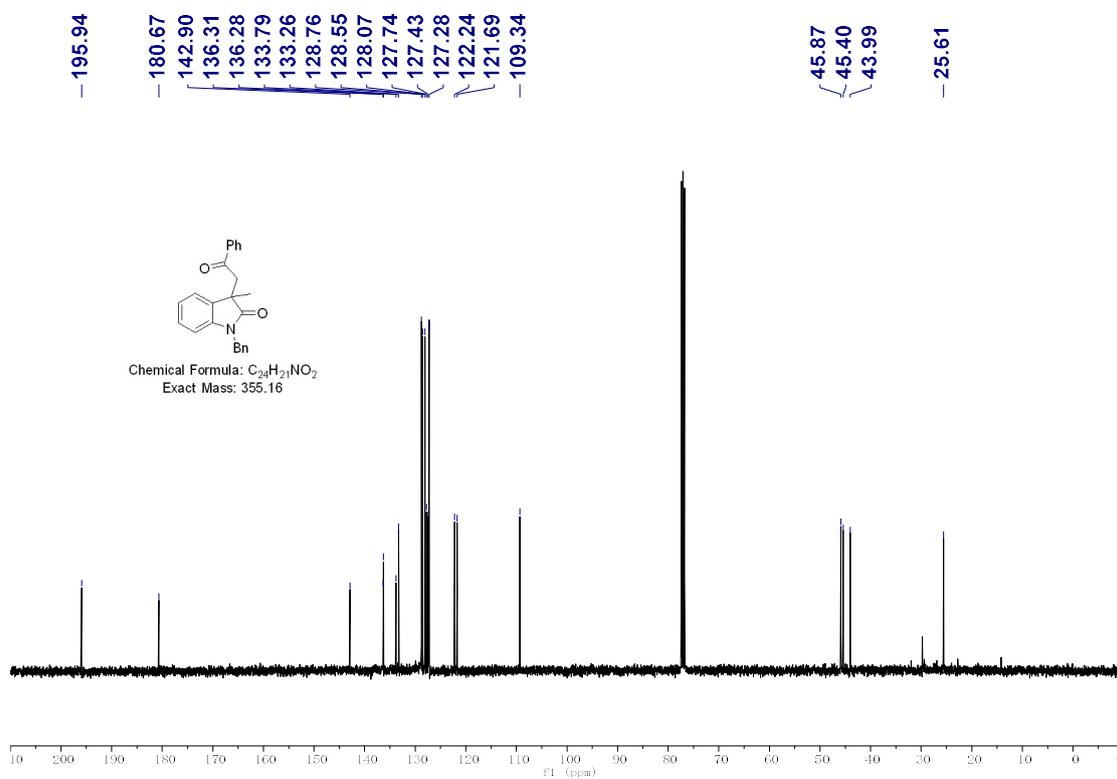
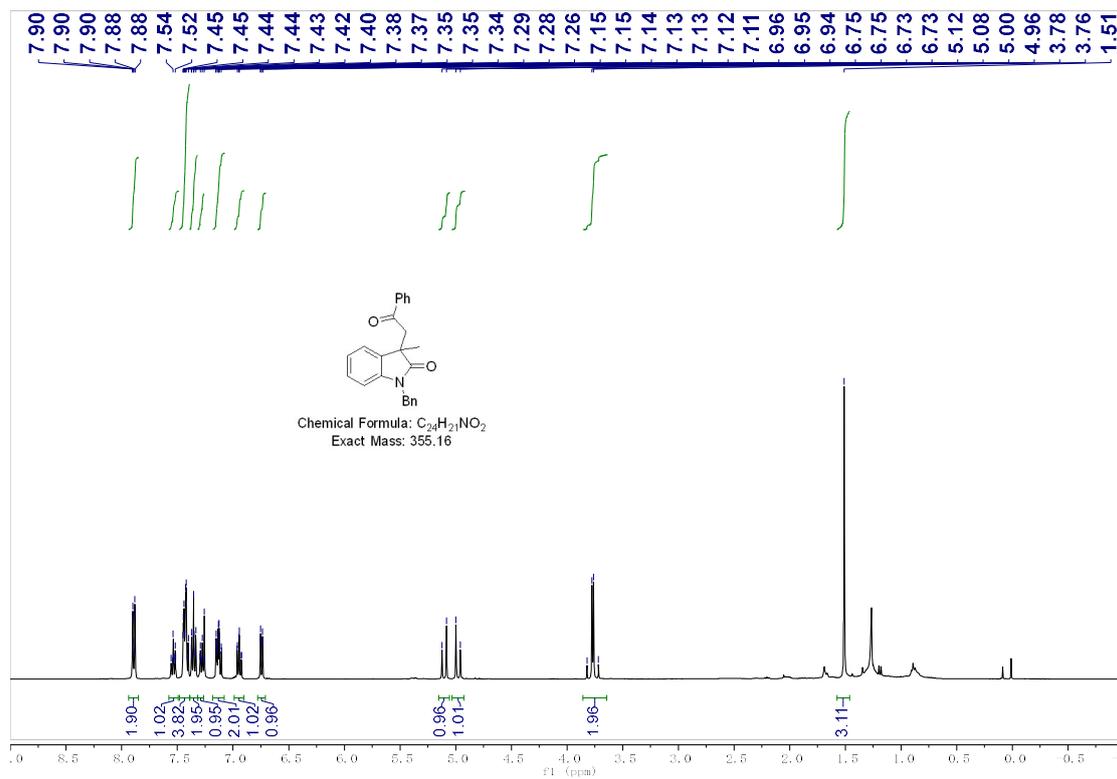
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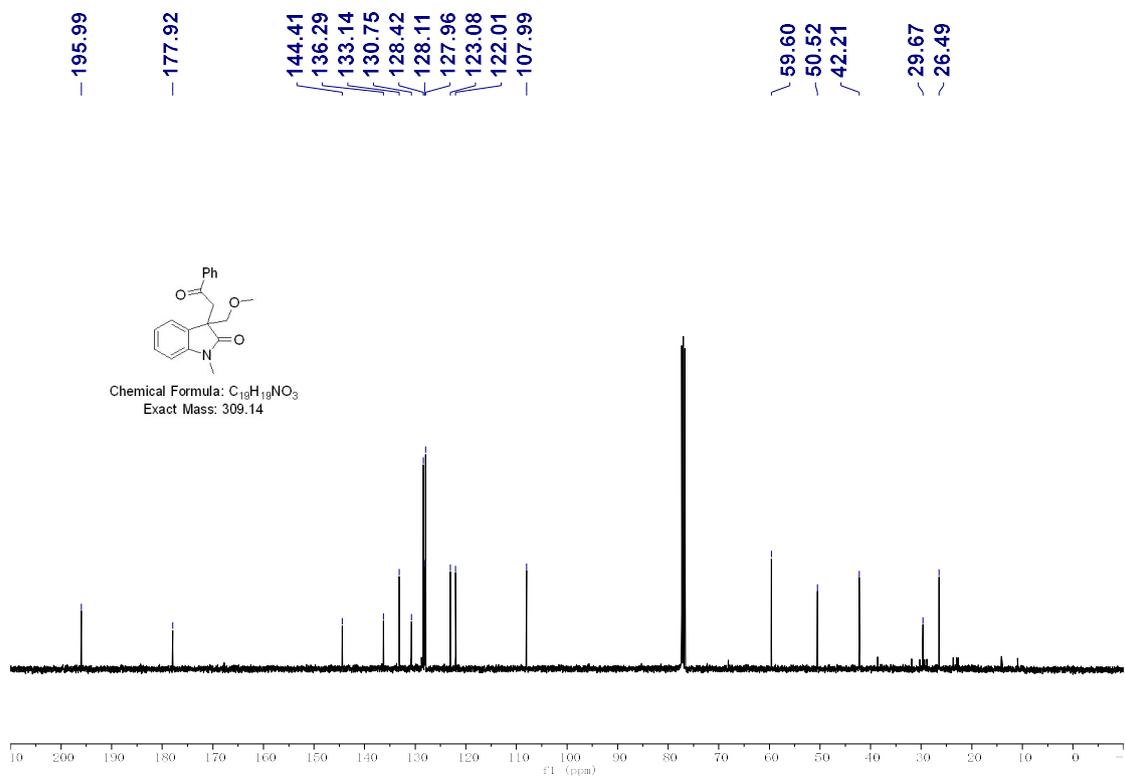
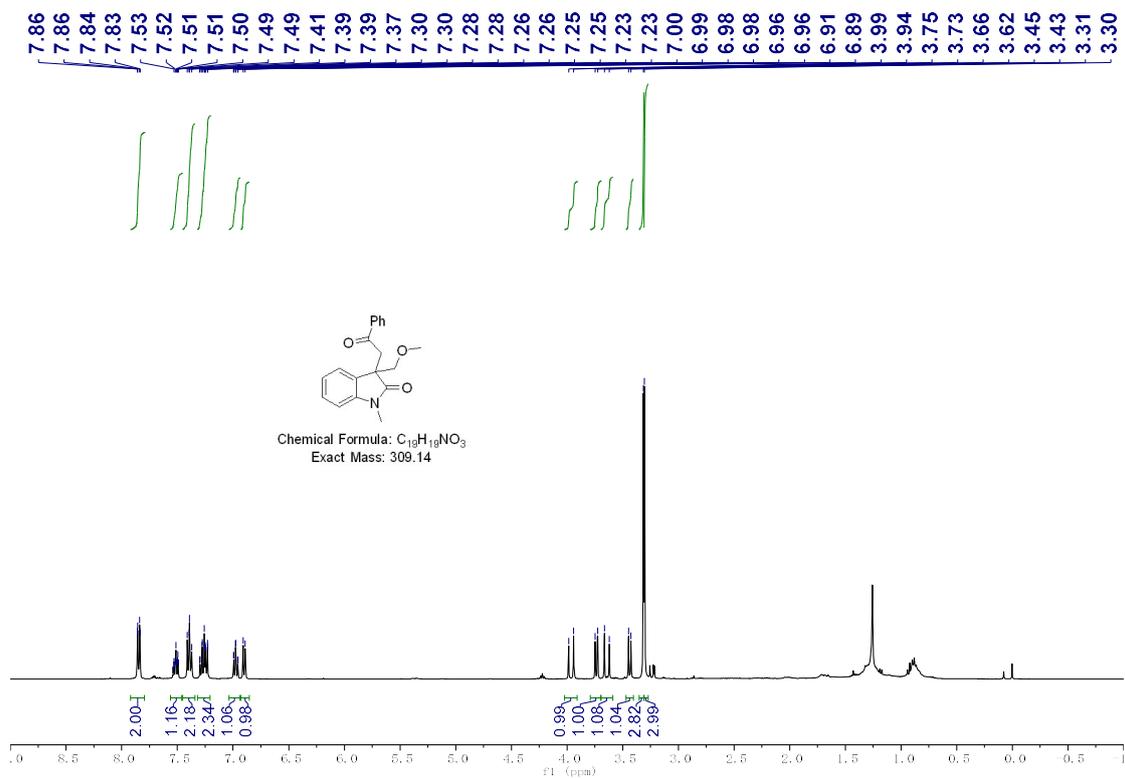
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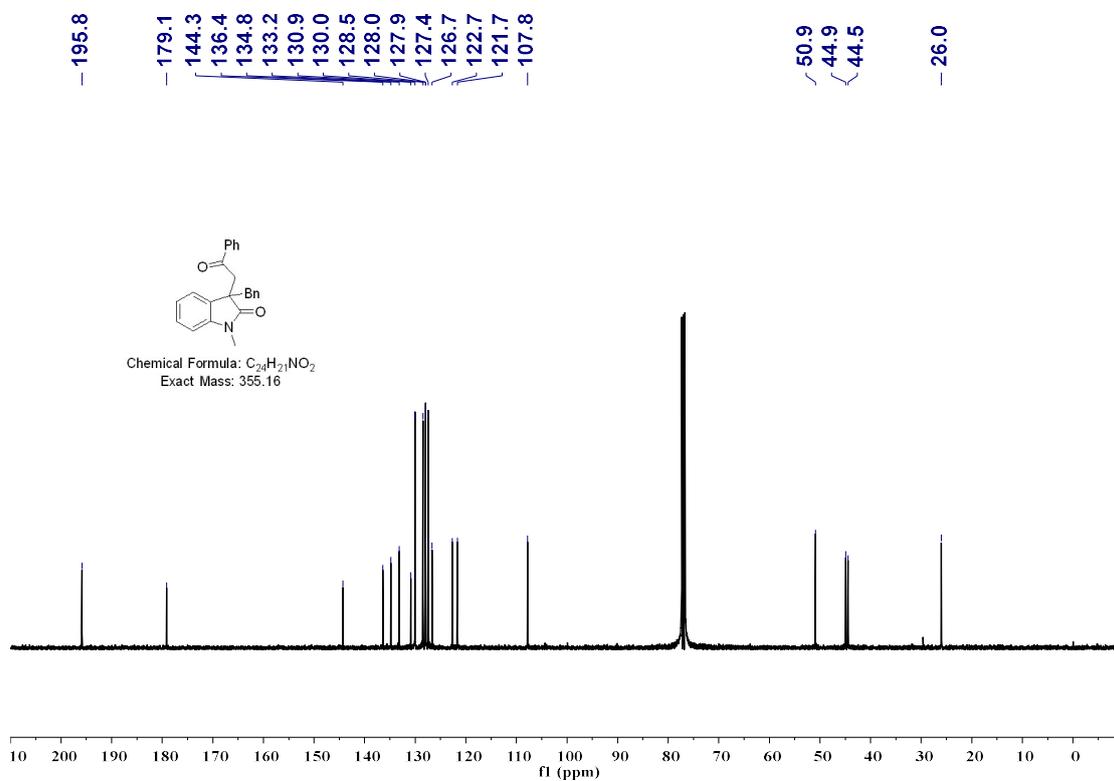
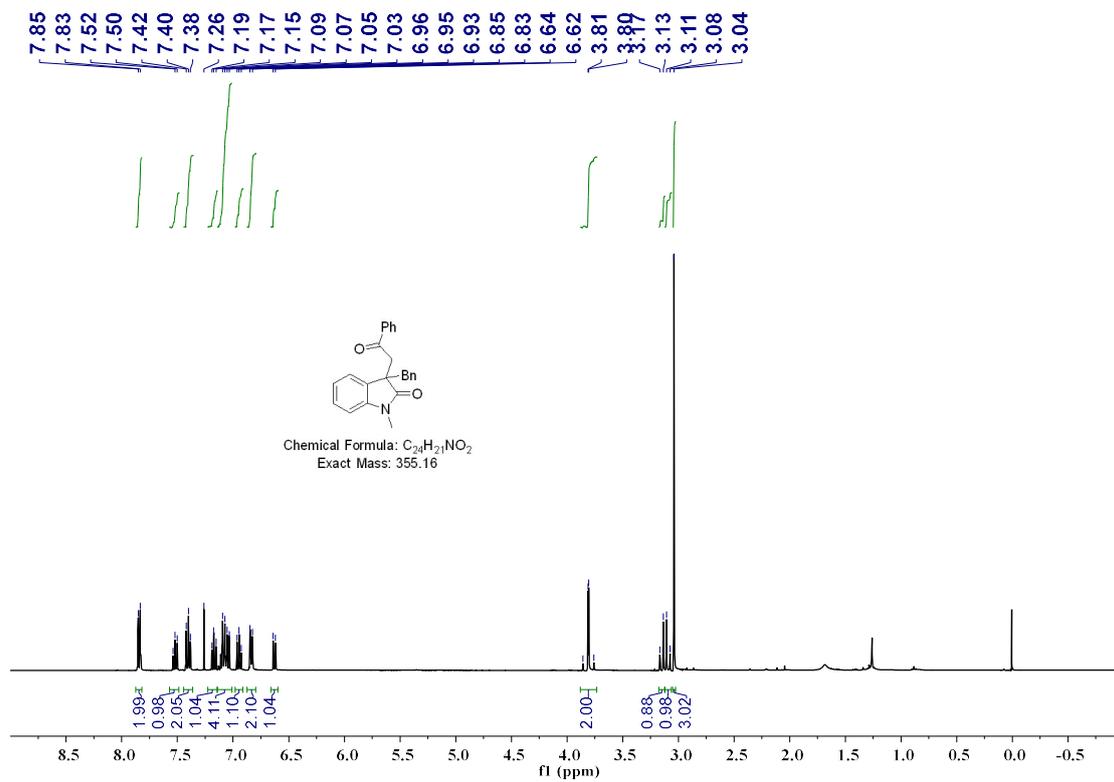
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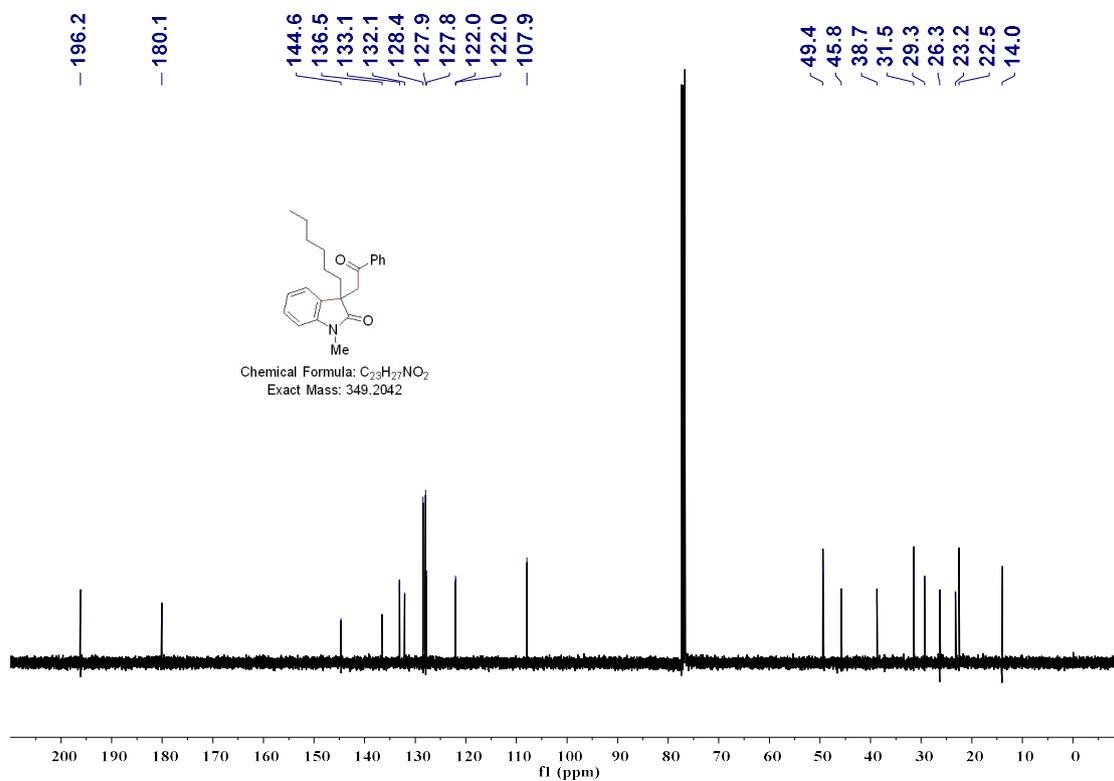
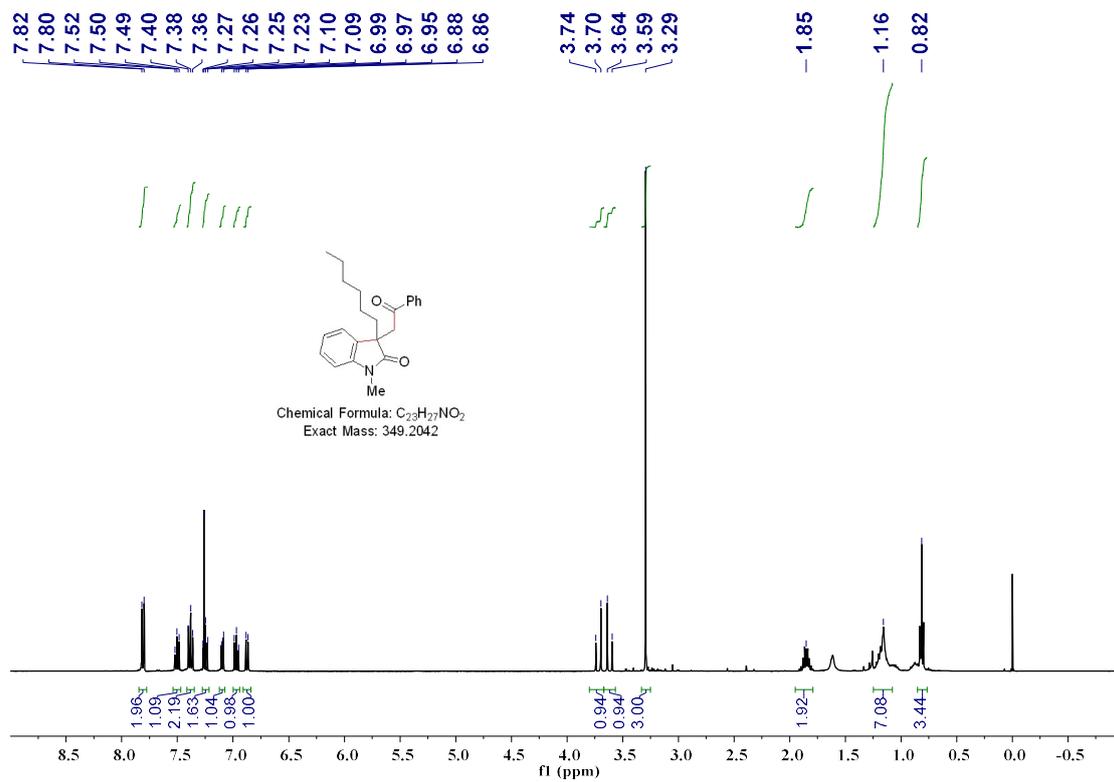
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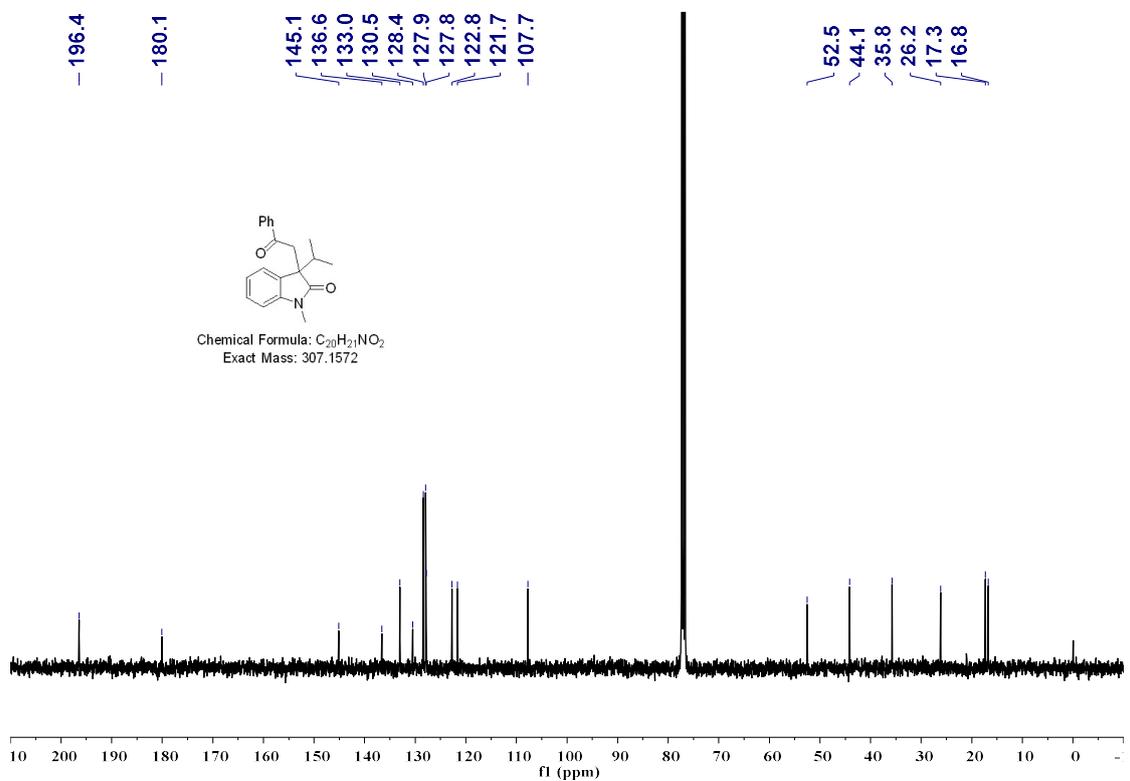
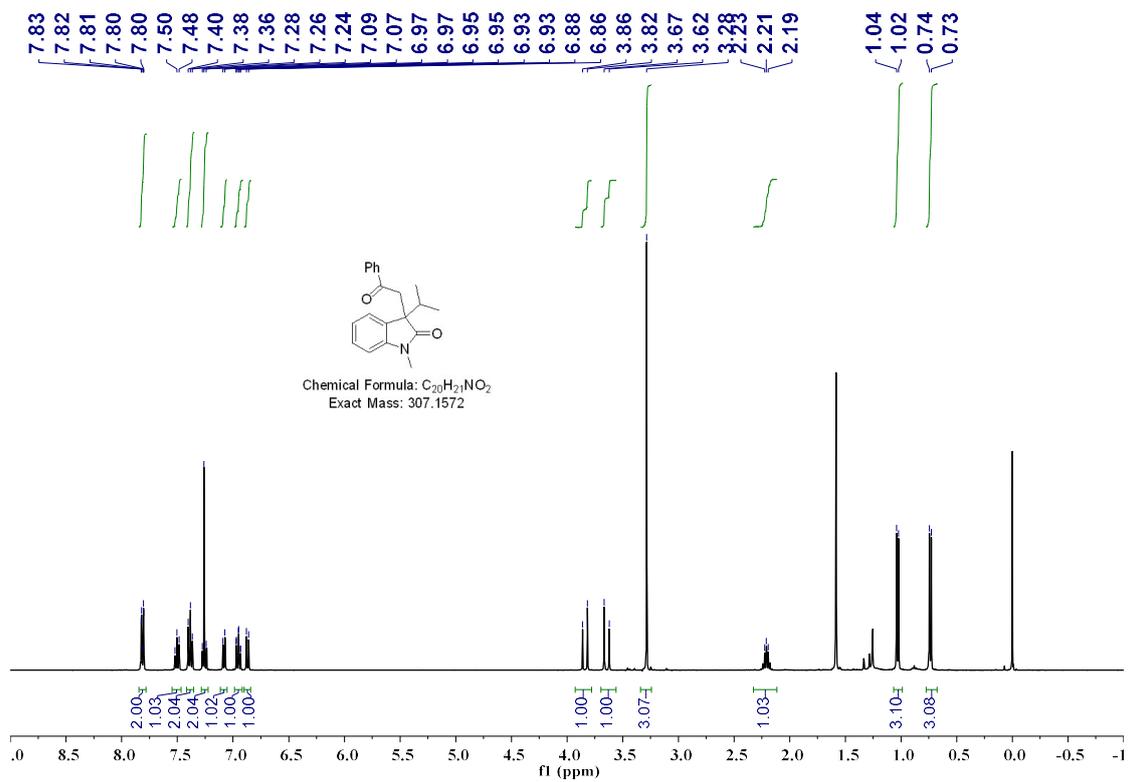
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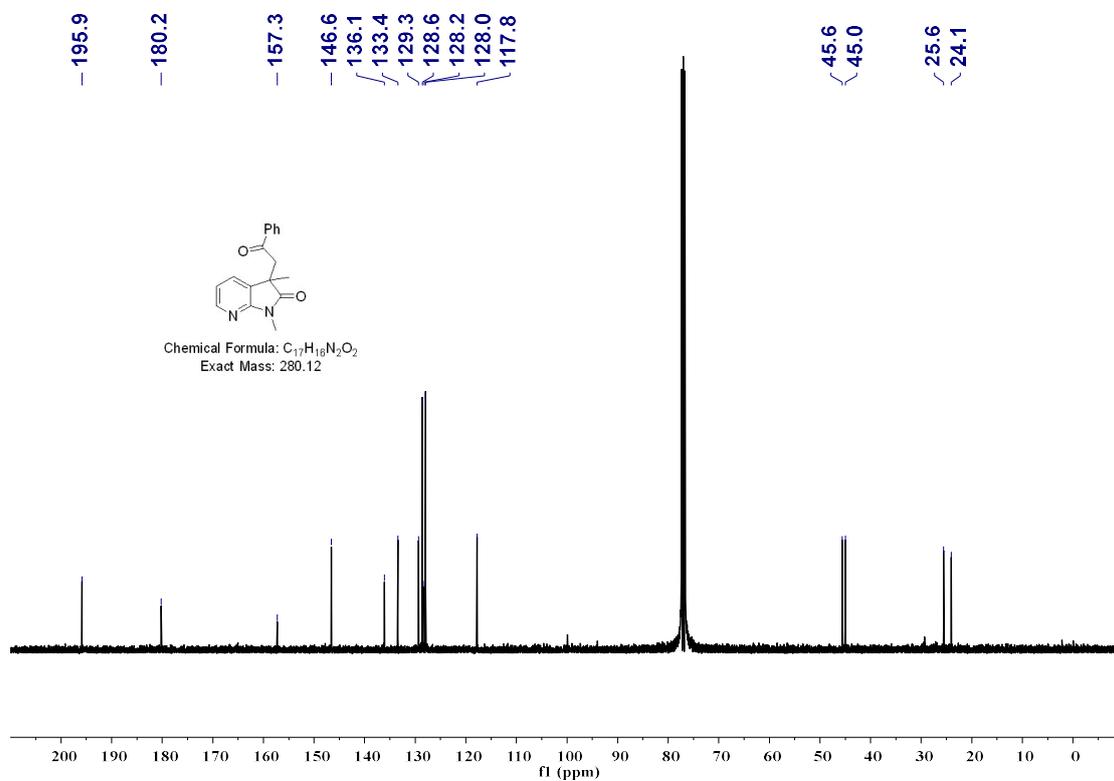
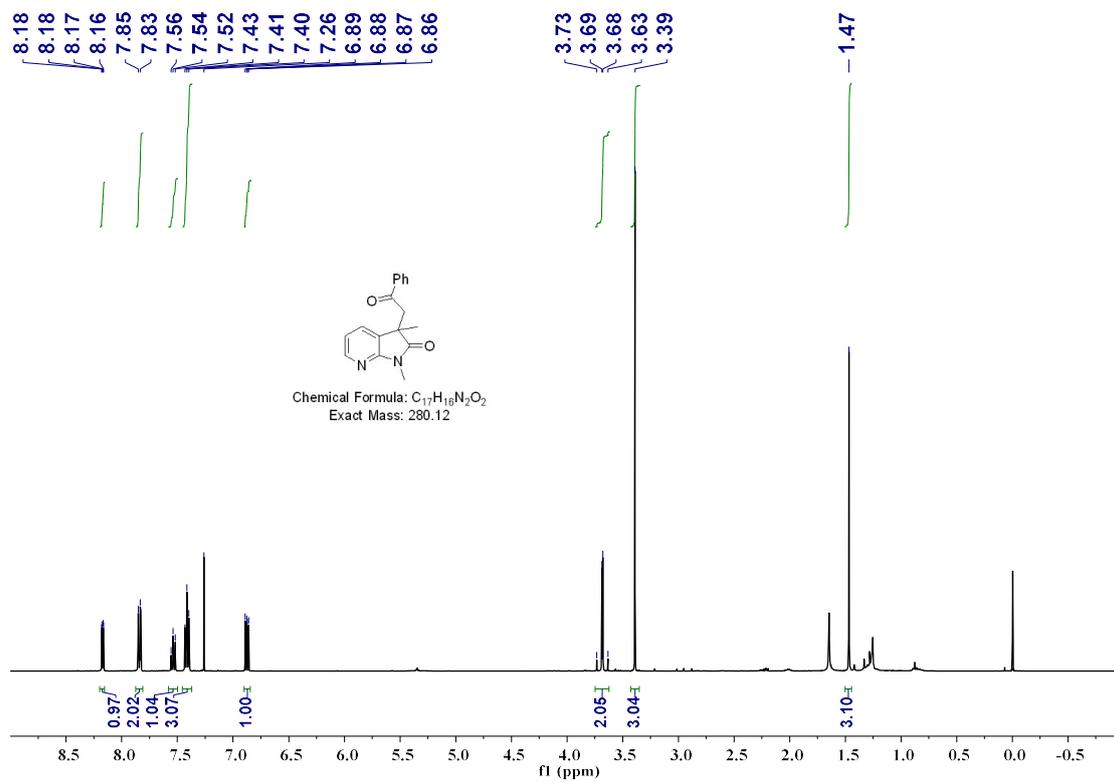
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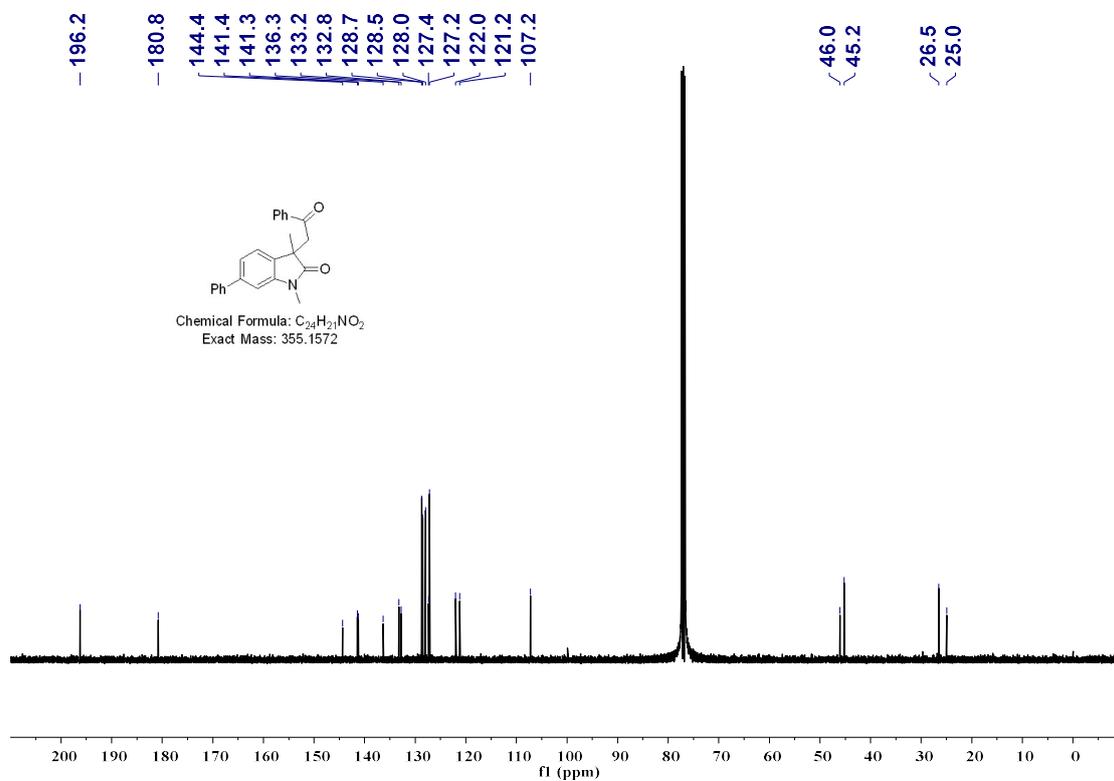
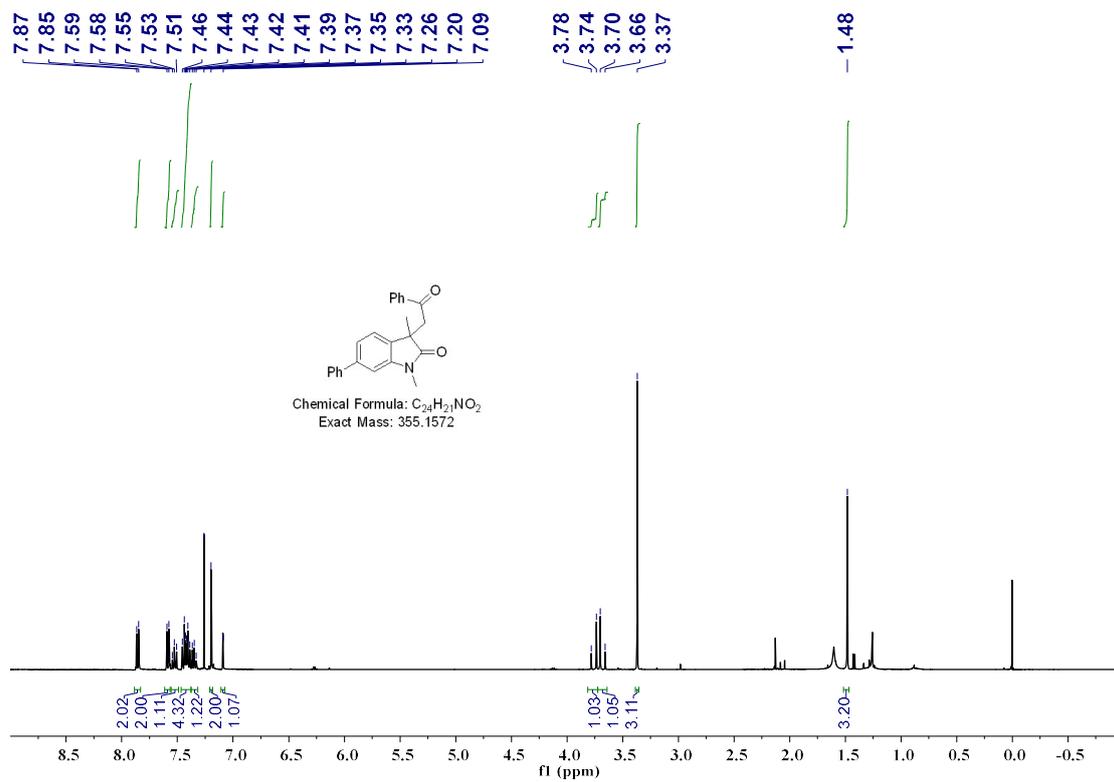
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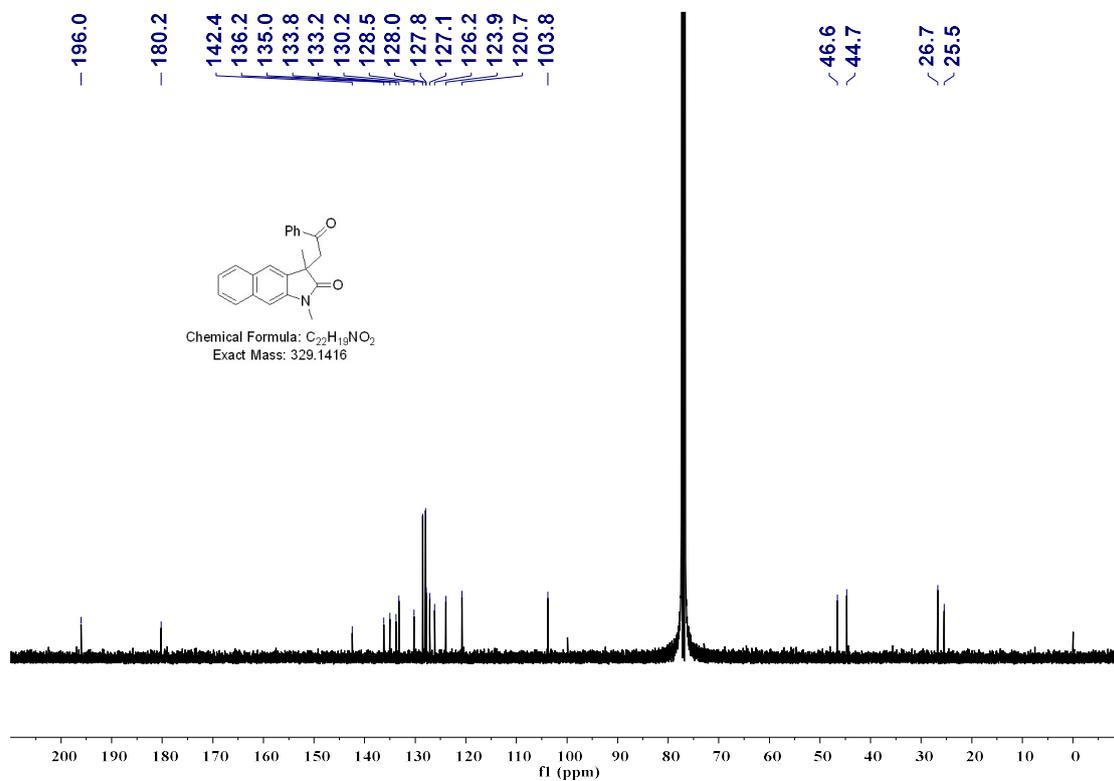
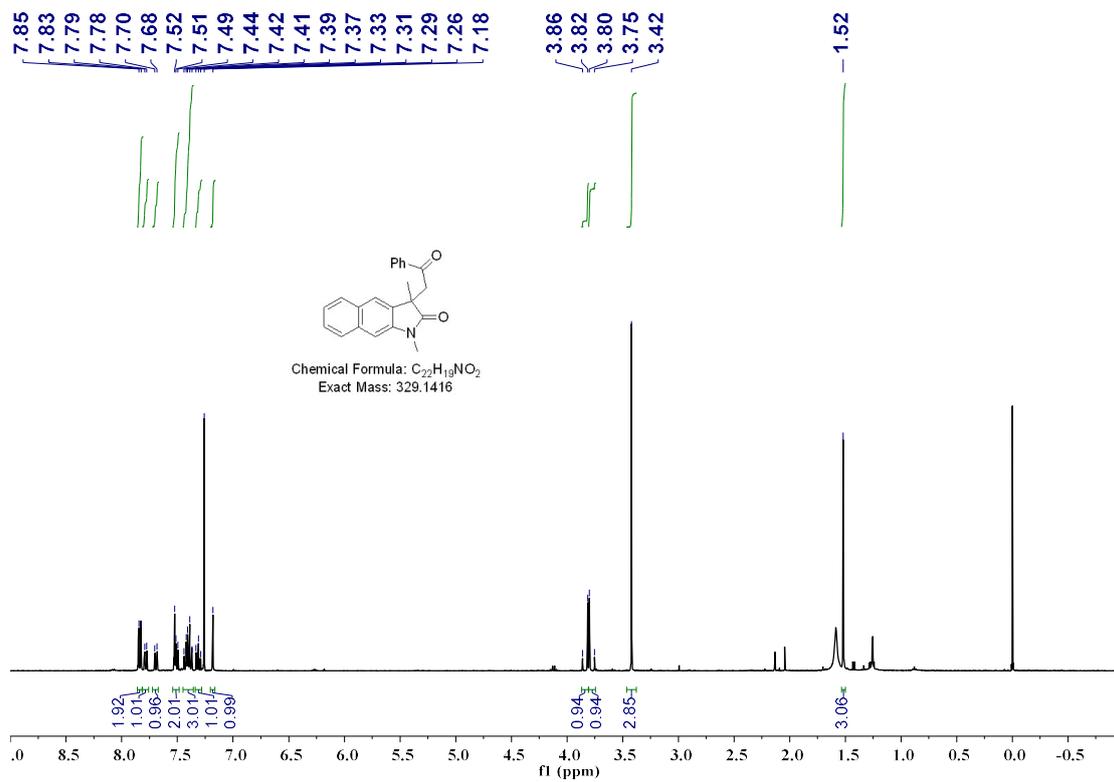
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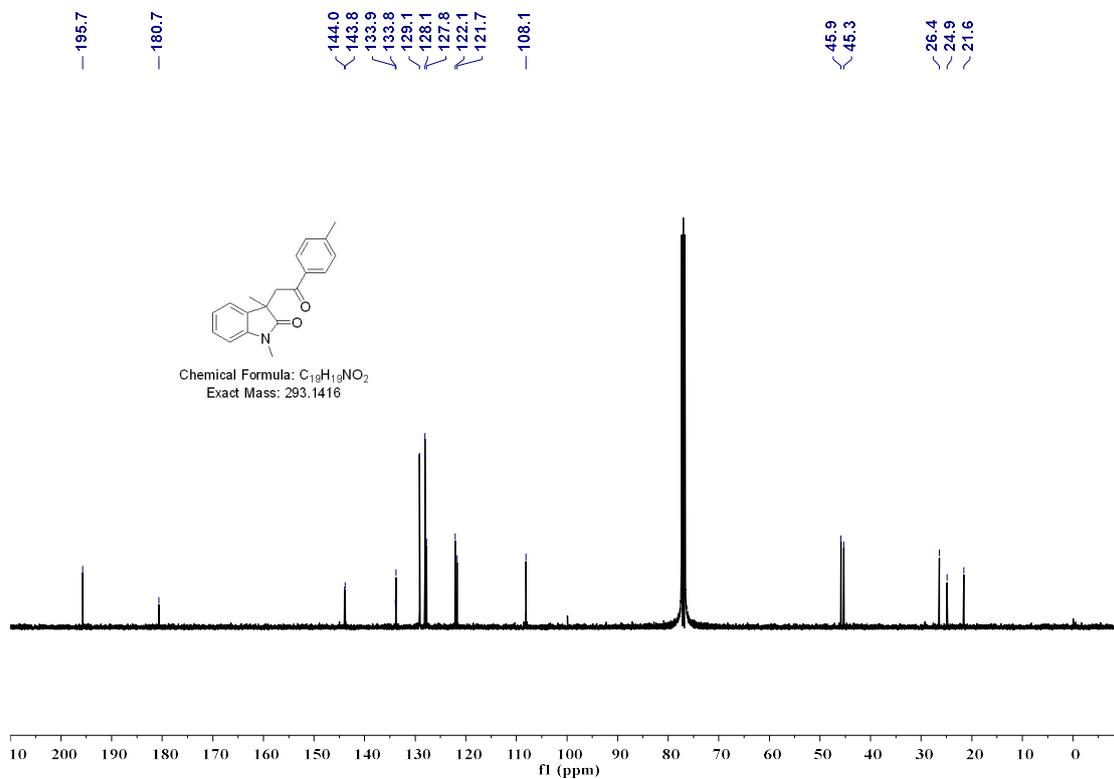
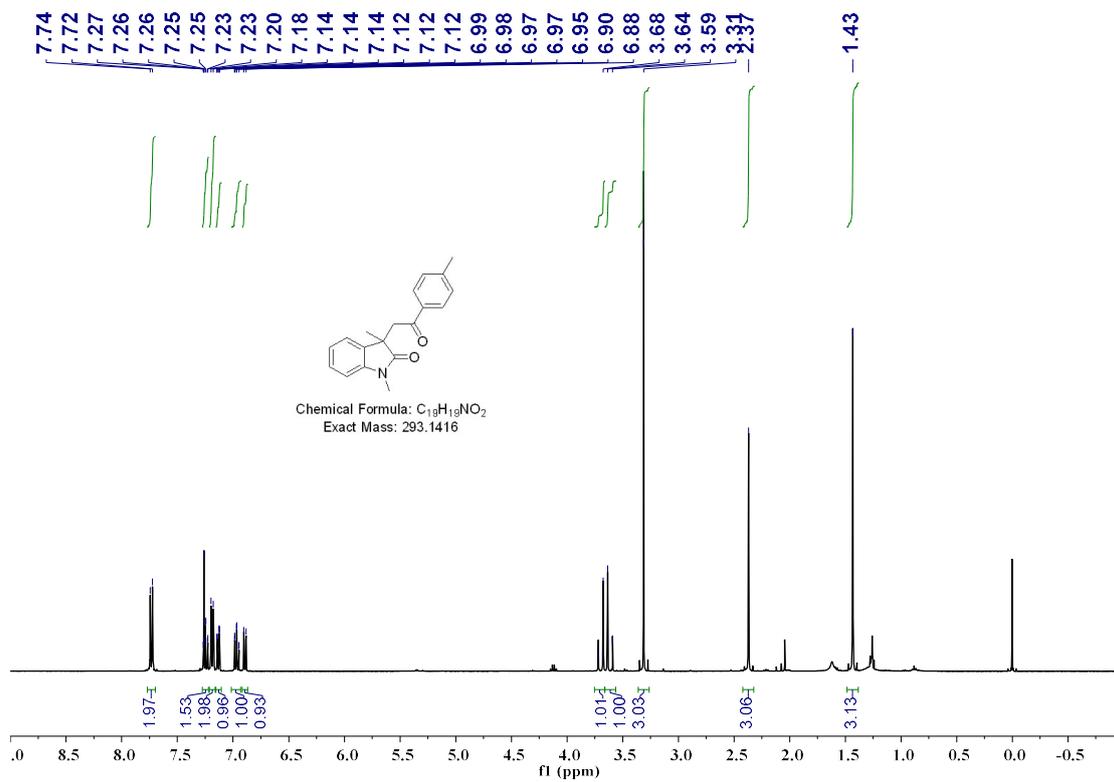
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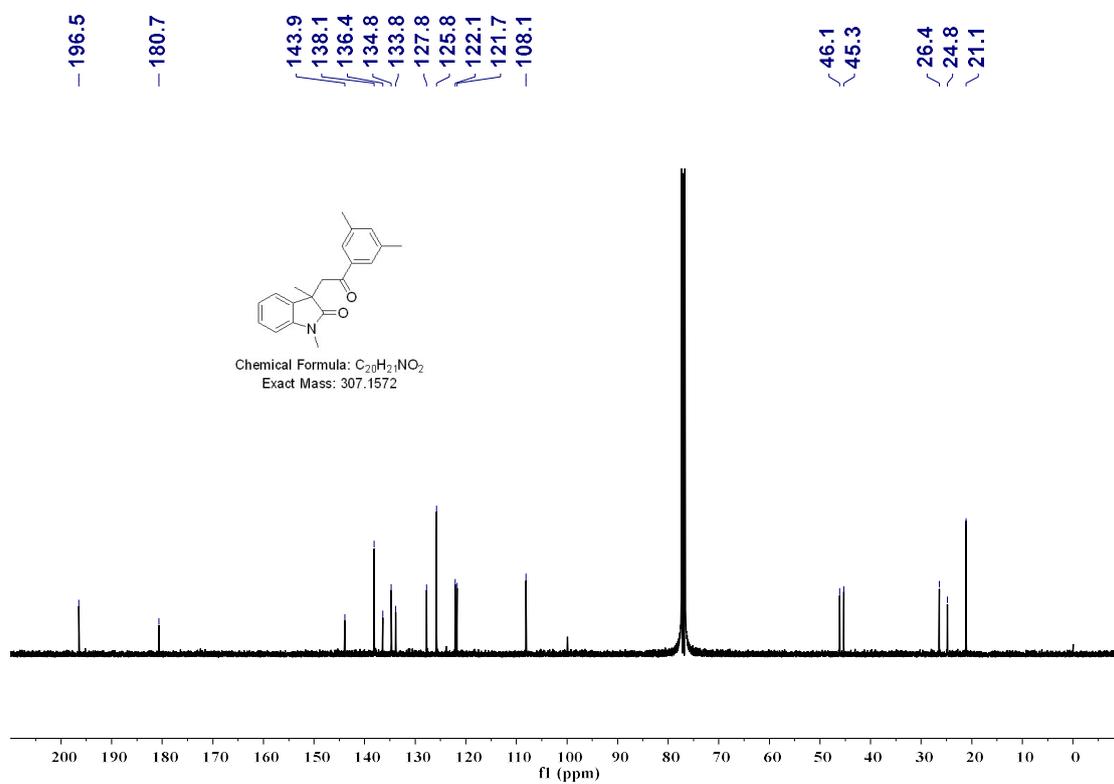
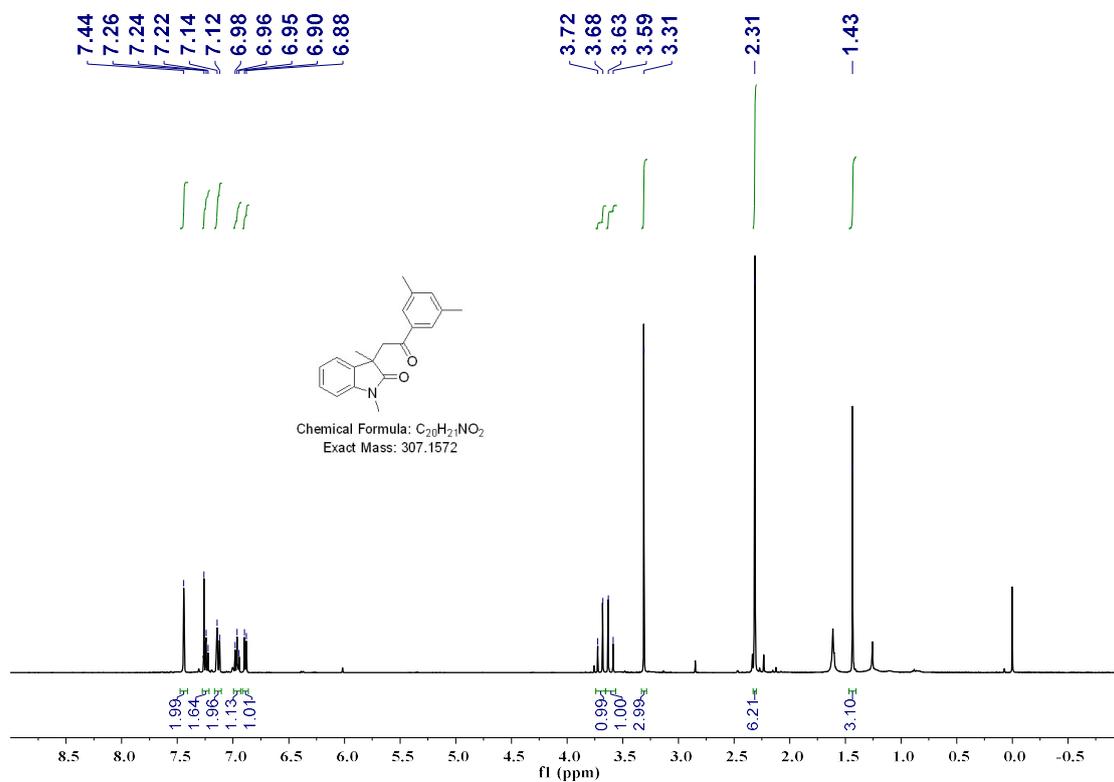
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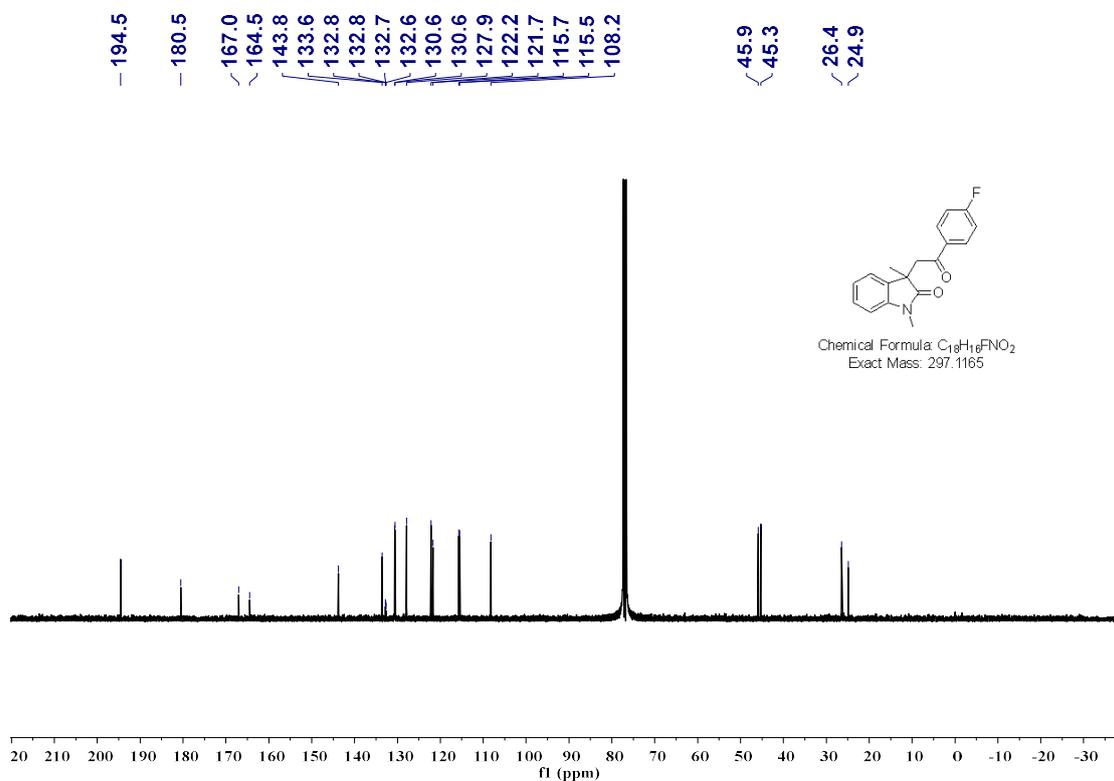
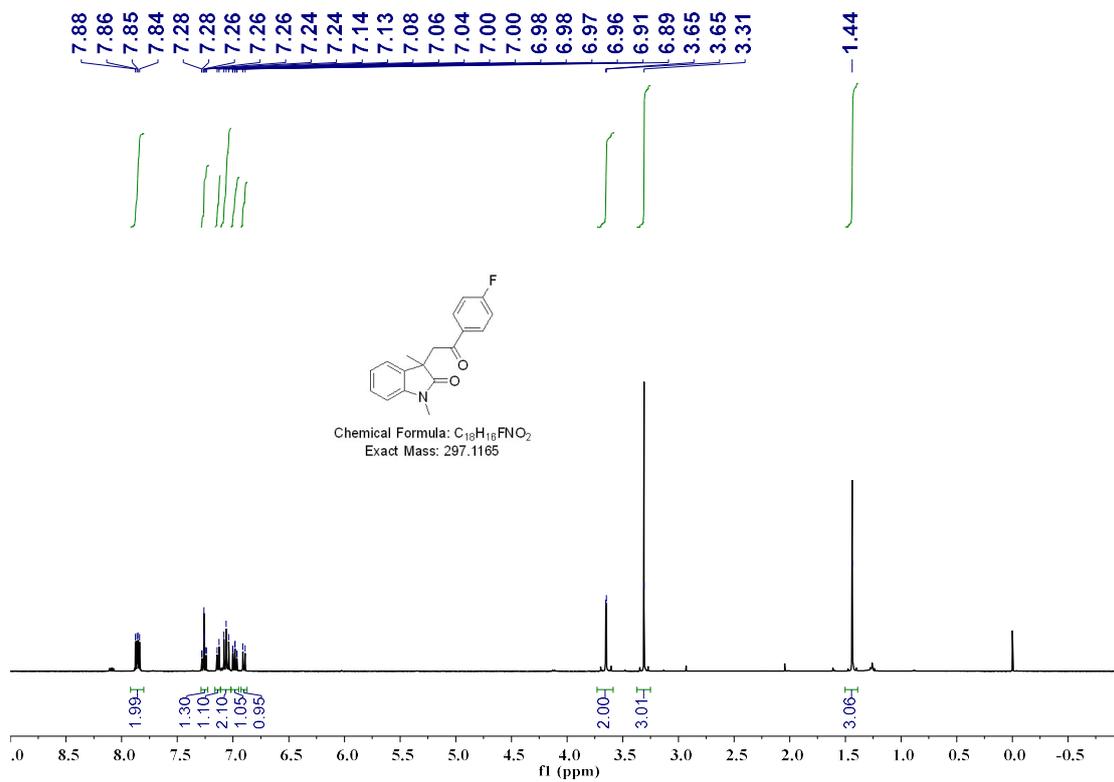
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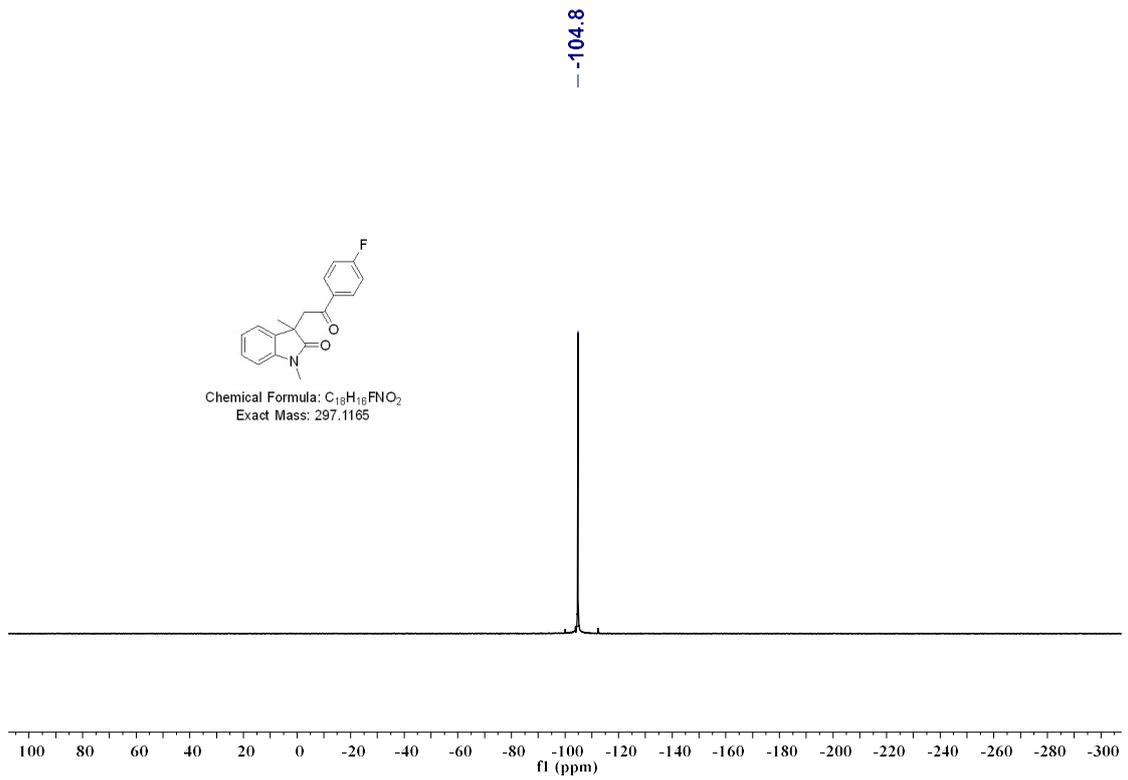
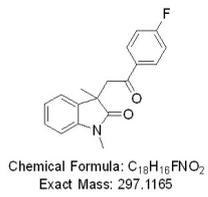


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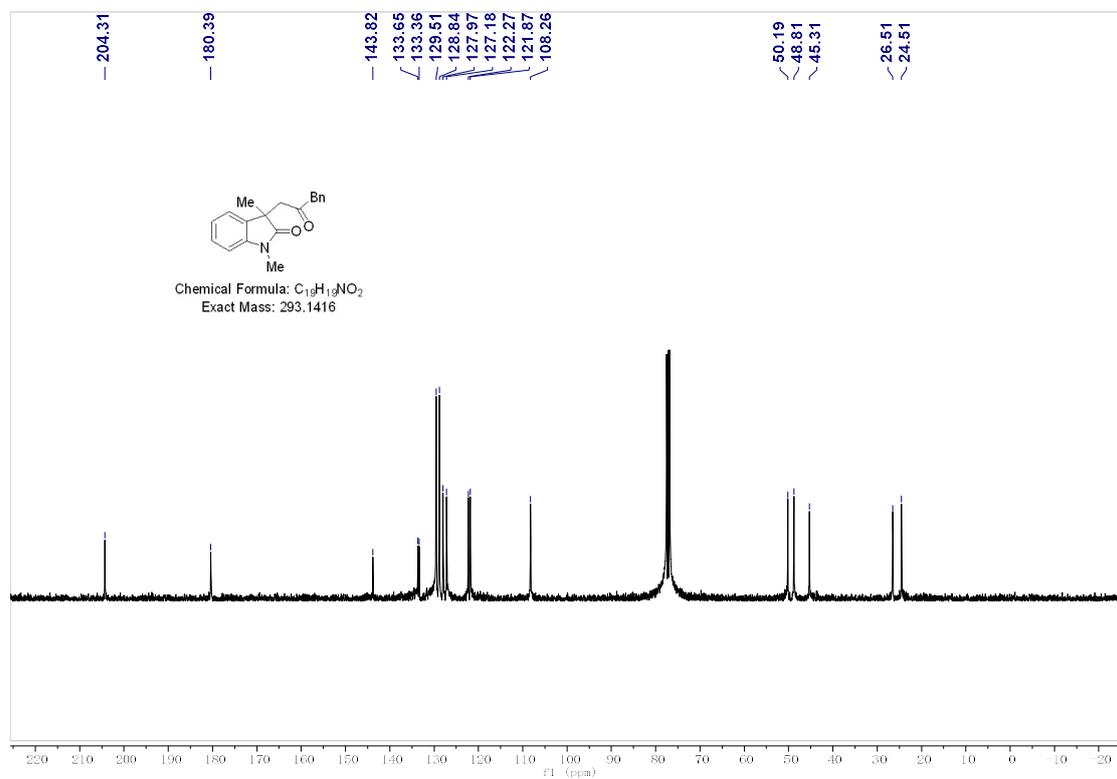
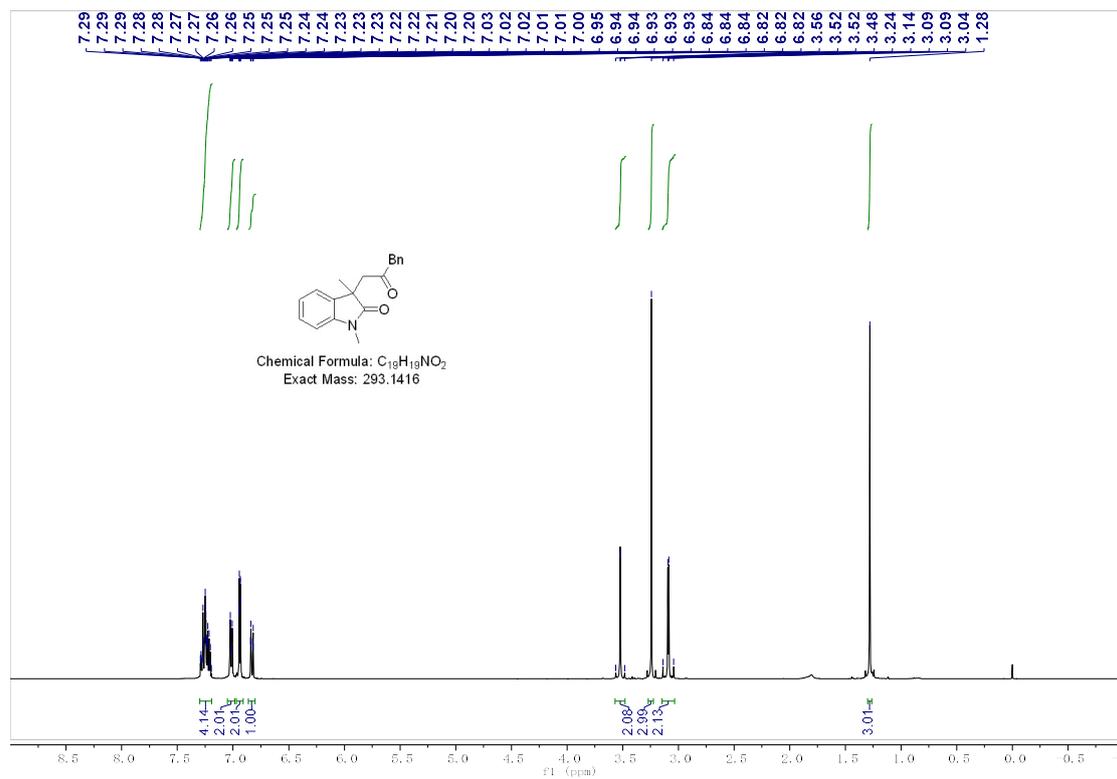


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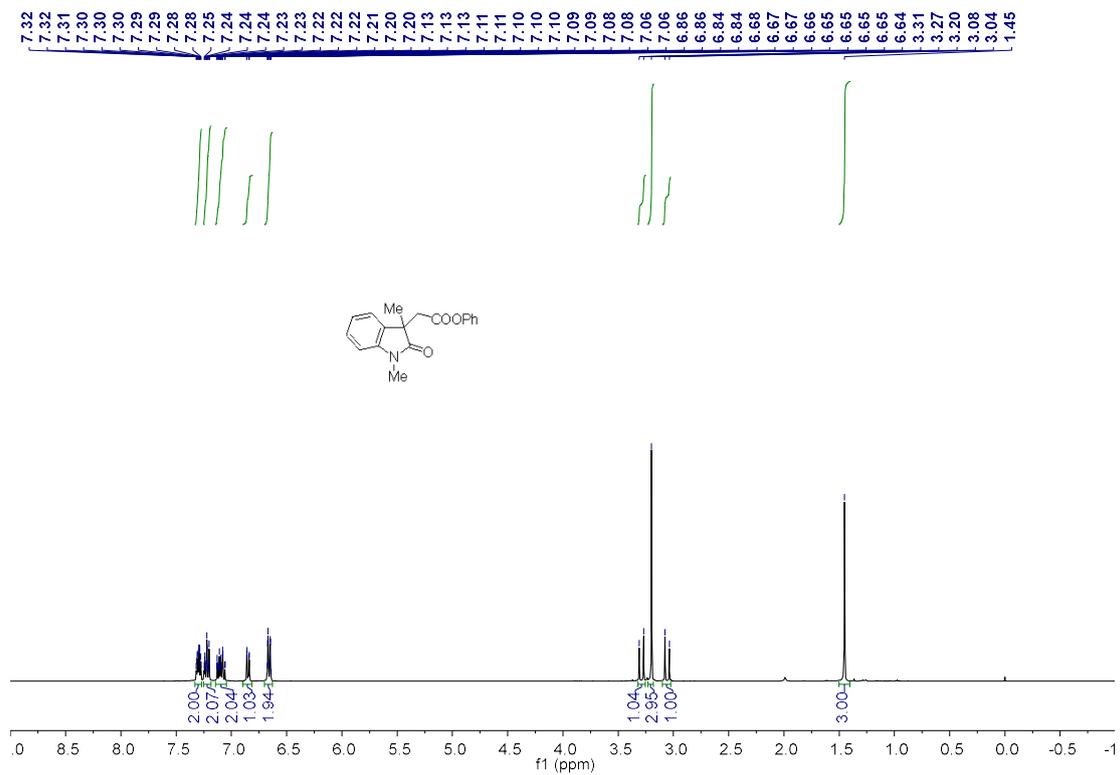




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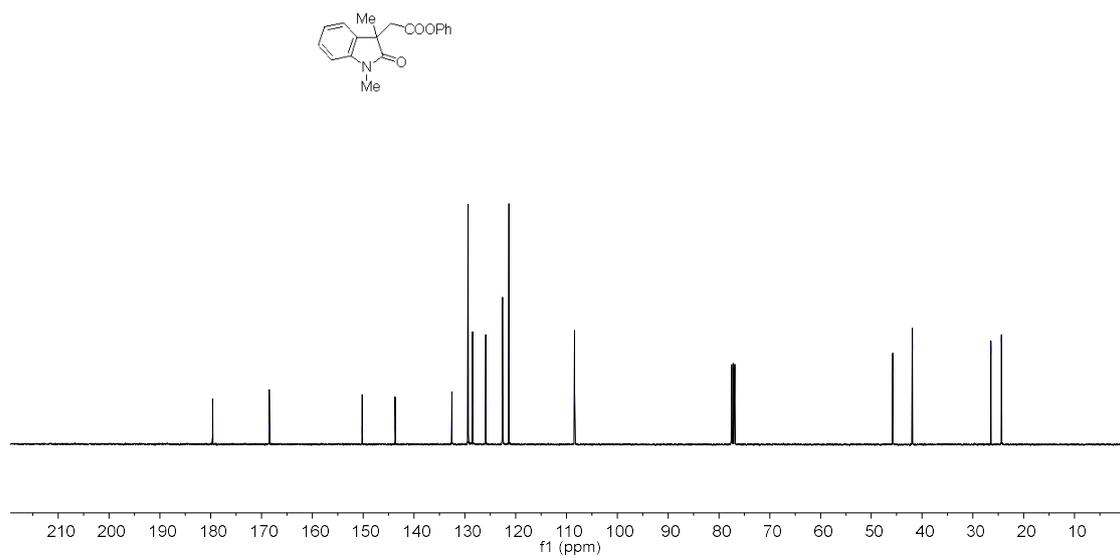


6a

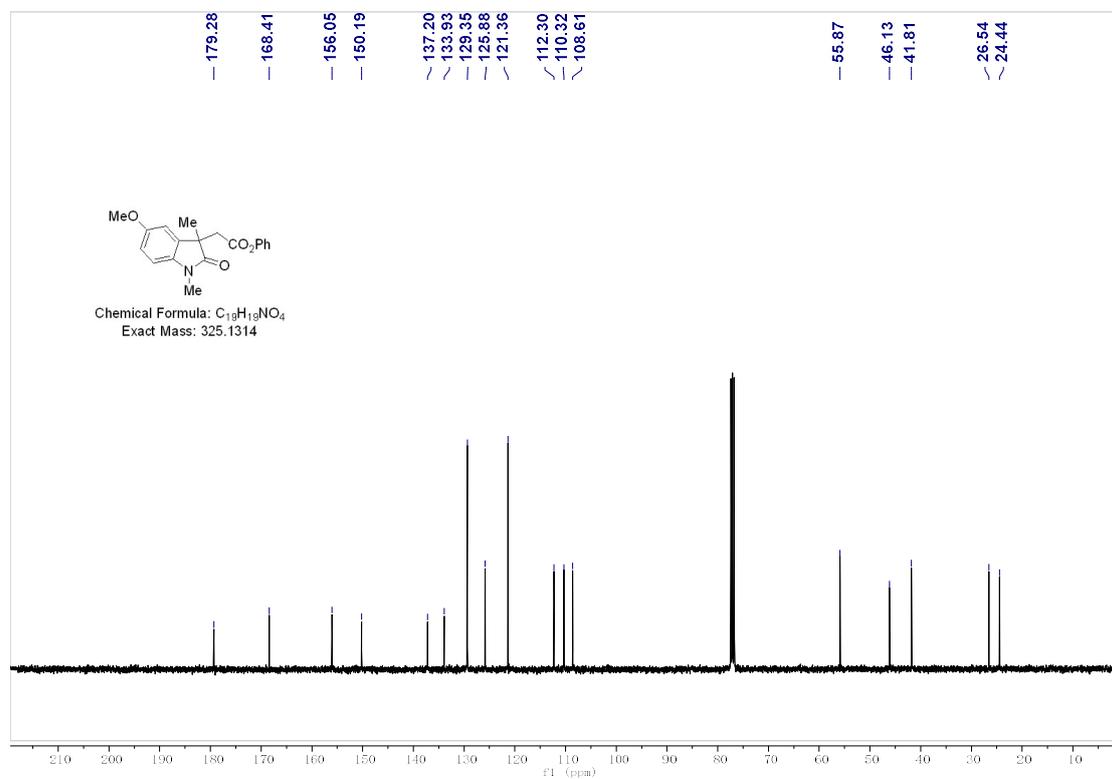
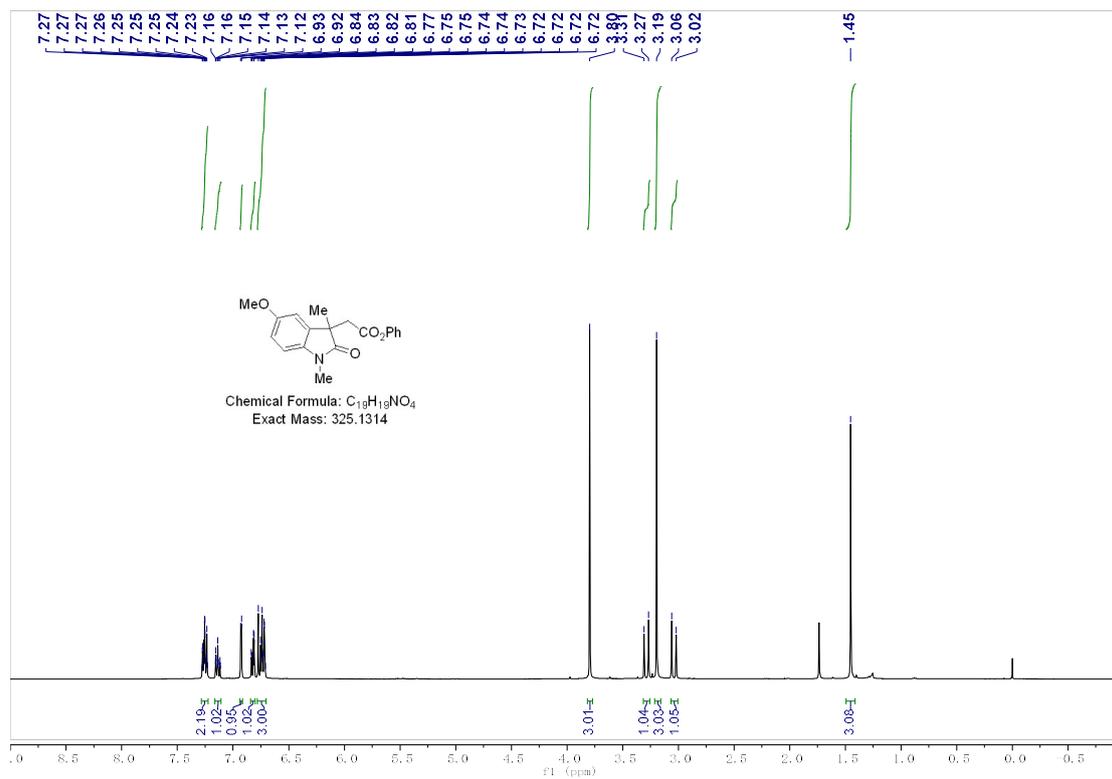


— 179.64
— 168.46
— 150.20
— 143.73
132.53
129.36
128.45
125.90
122.60
122.58
121.35
— 108.40

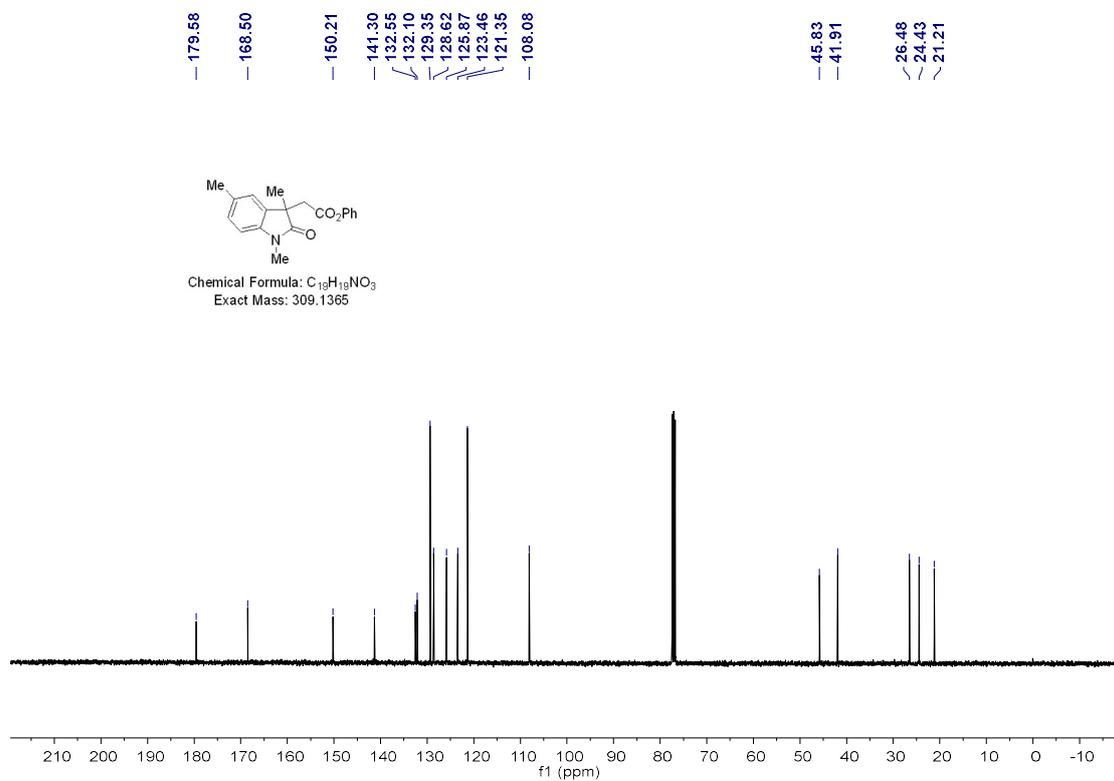
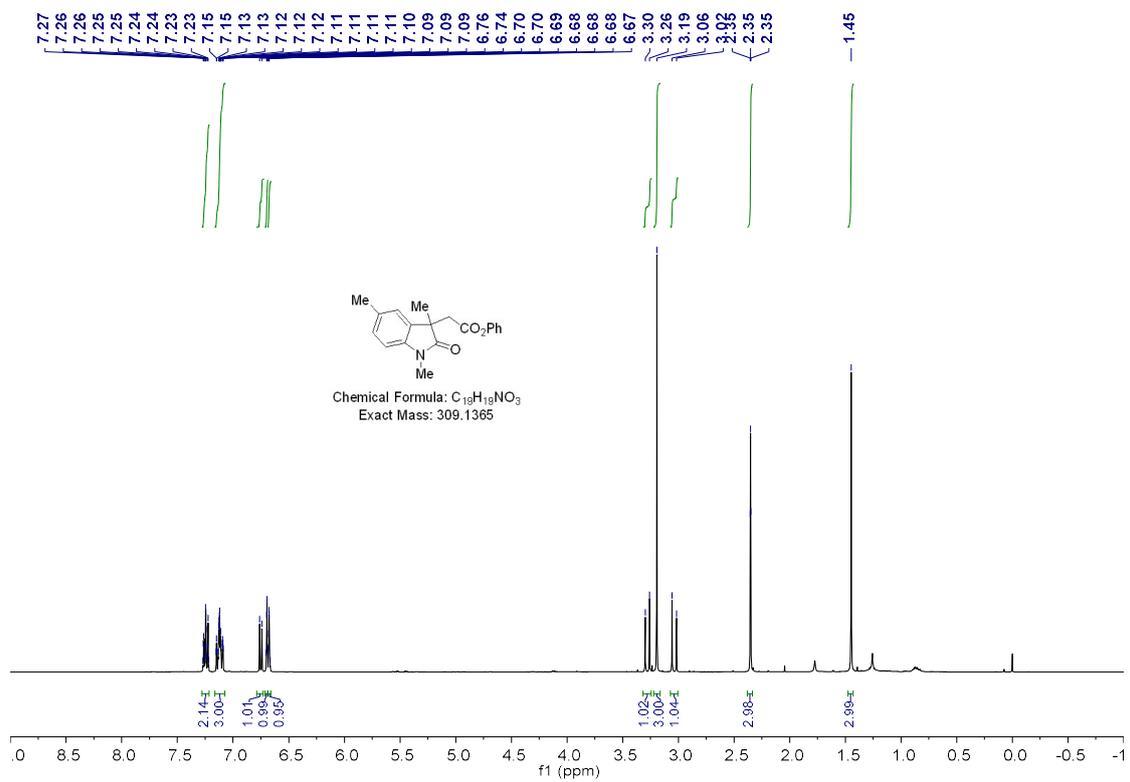
— 45.79
— 41.92
— 26.47
— 24.40



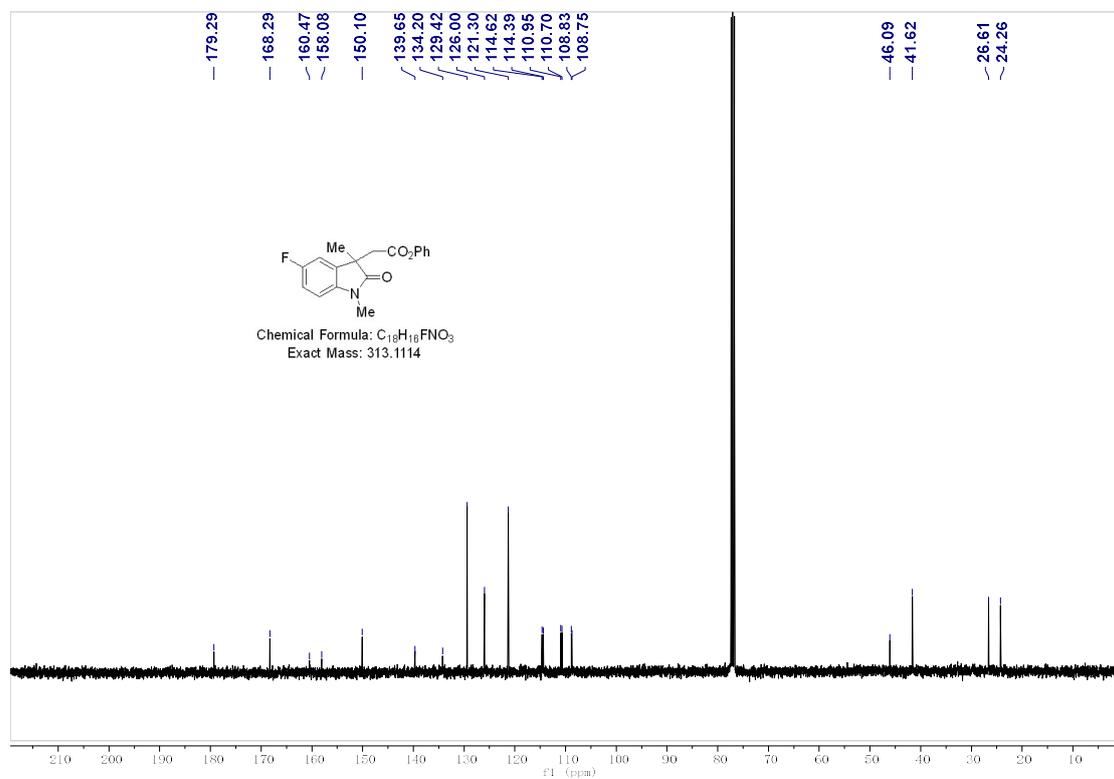
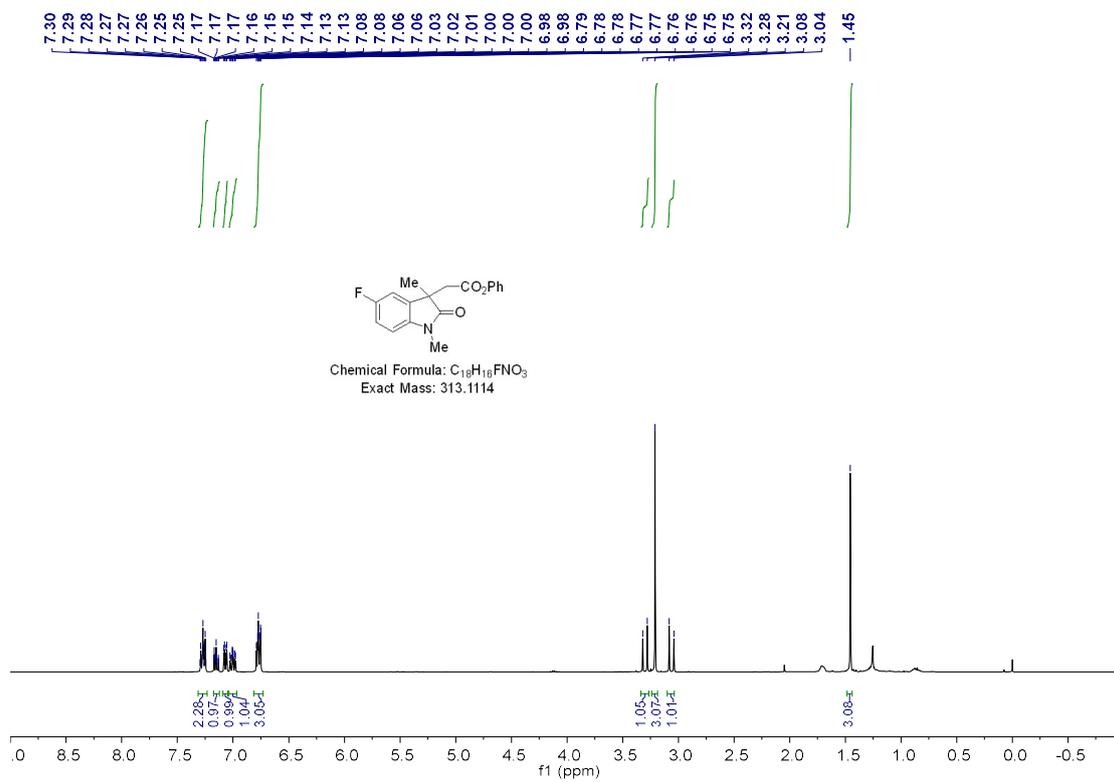
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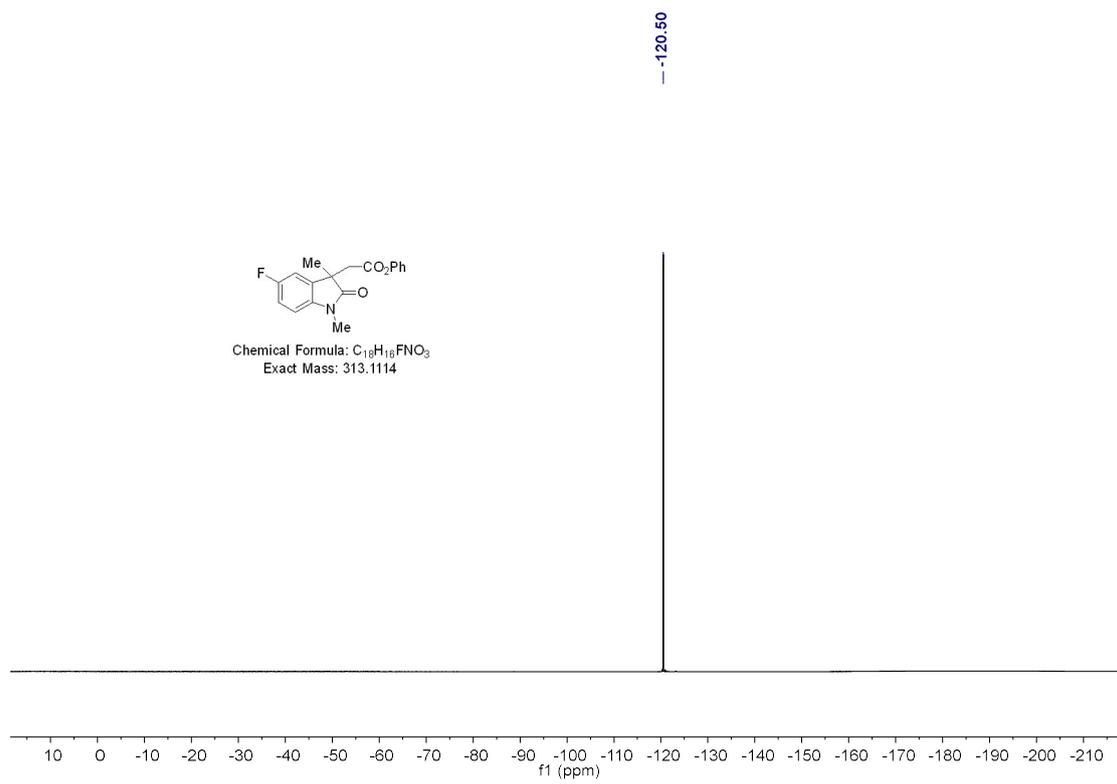


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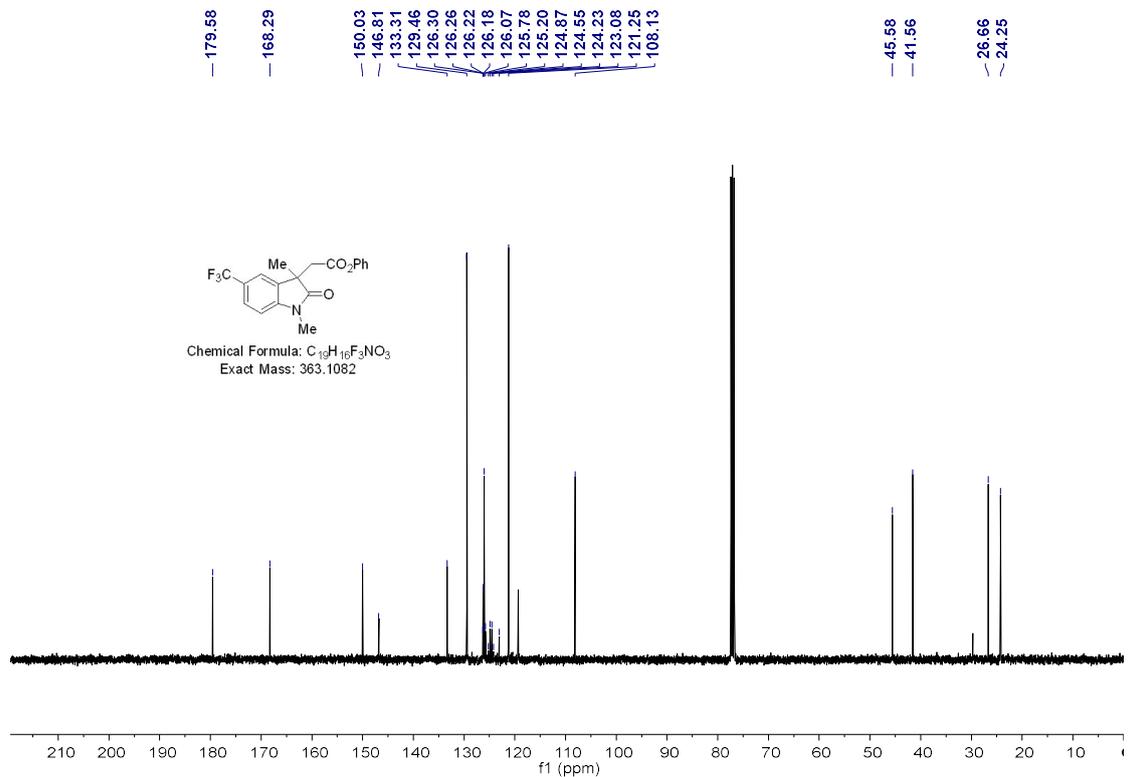
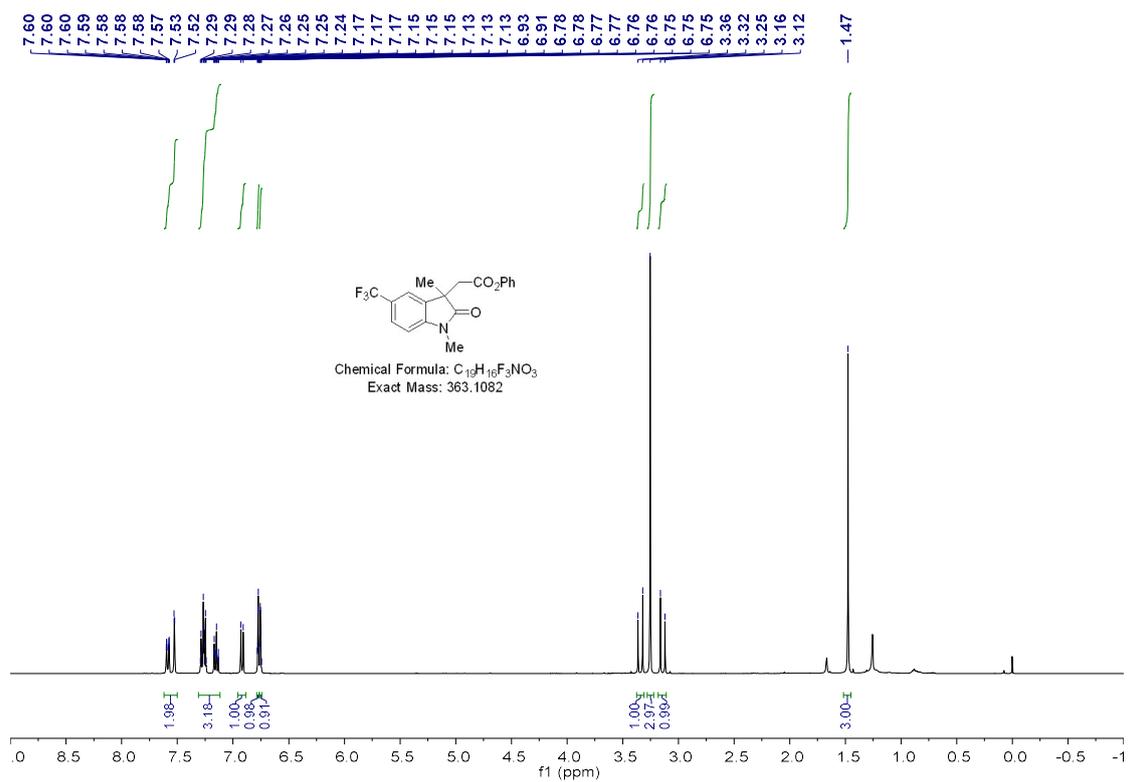


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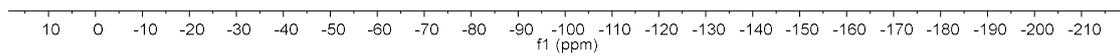




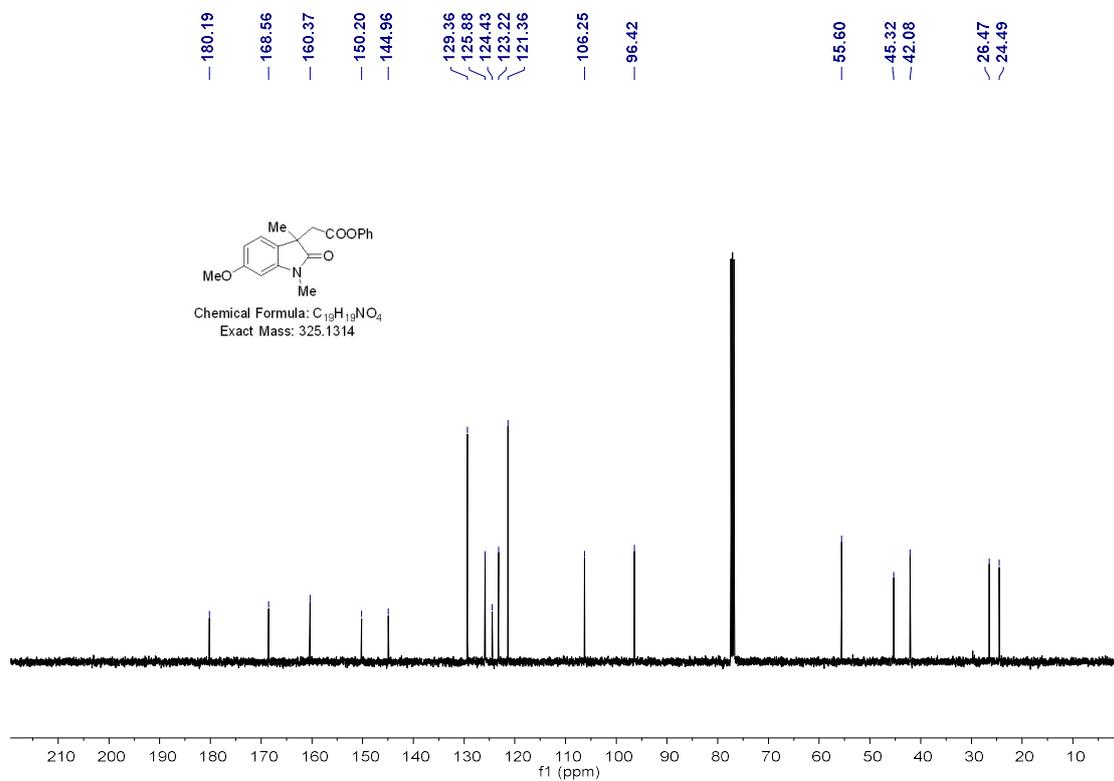
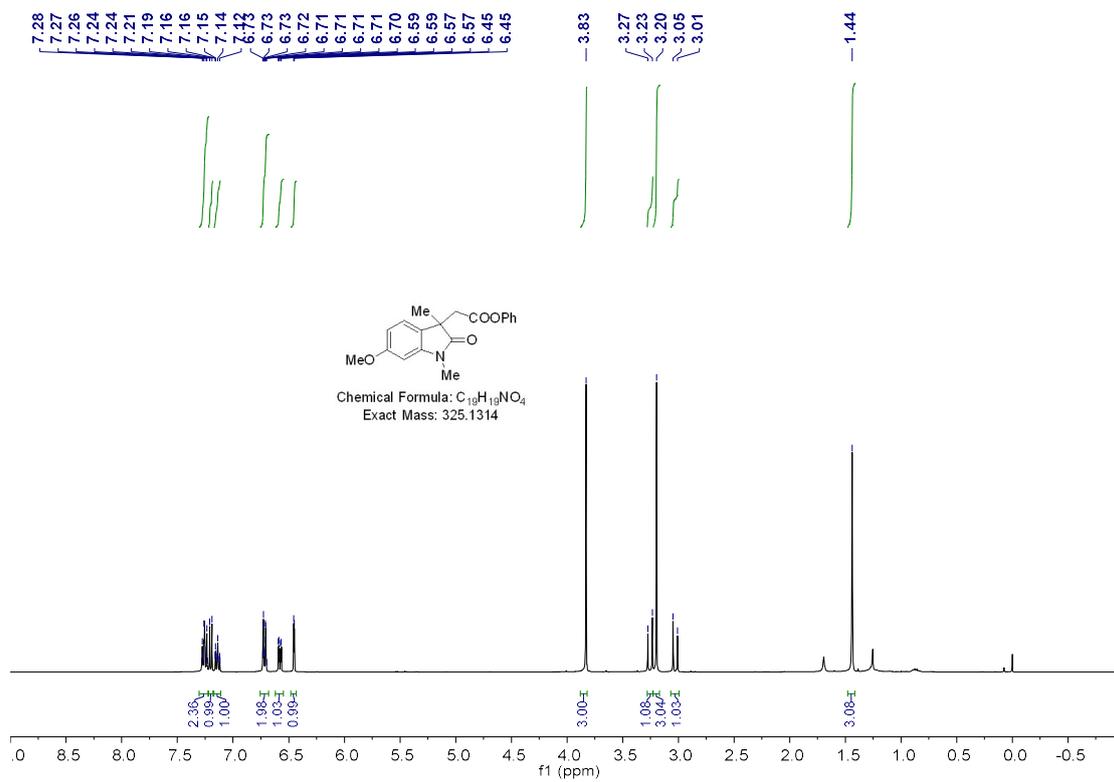
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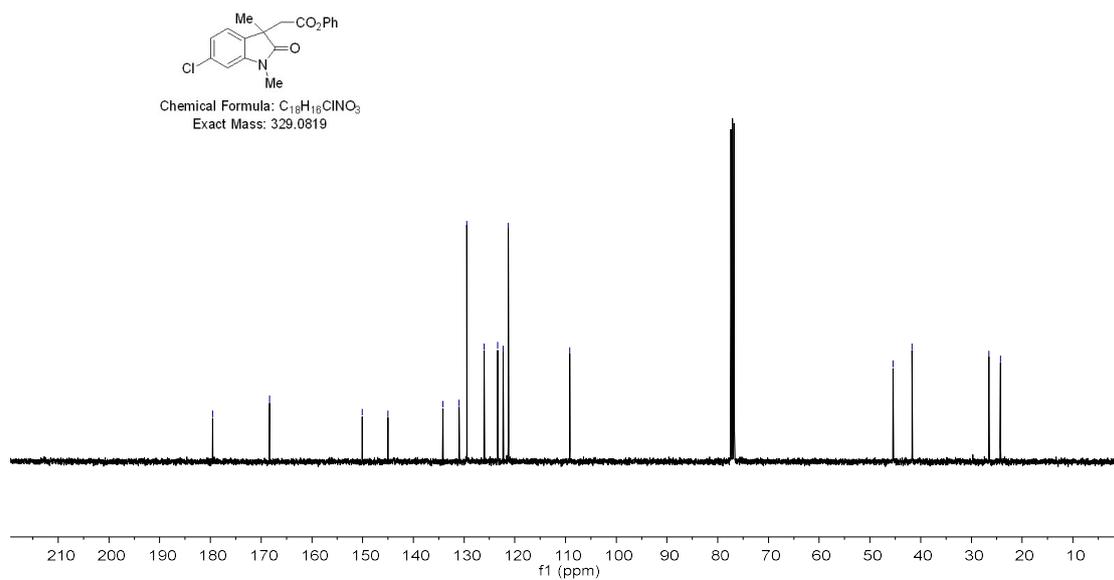
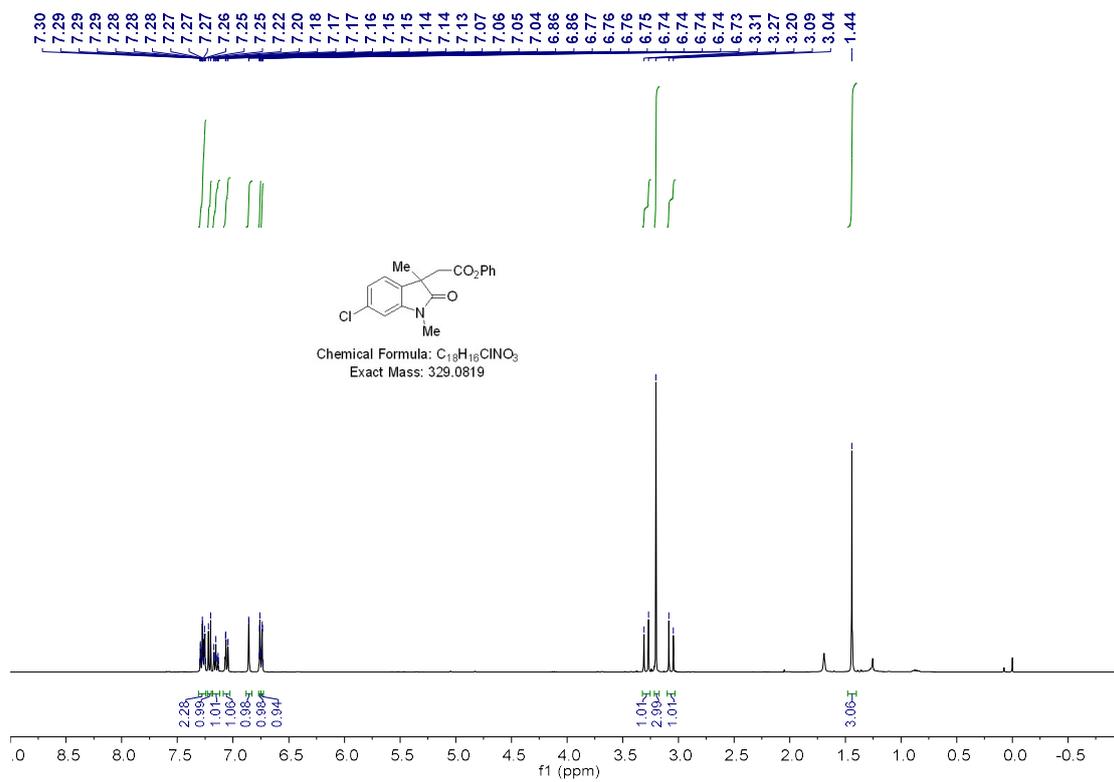
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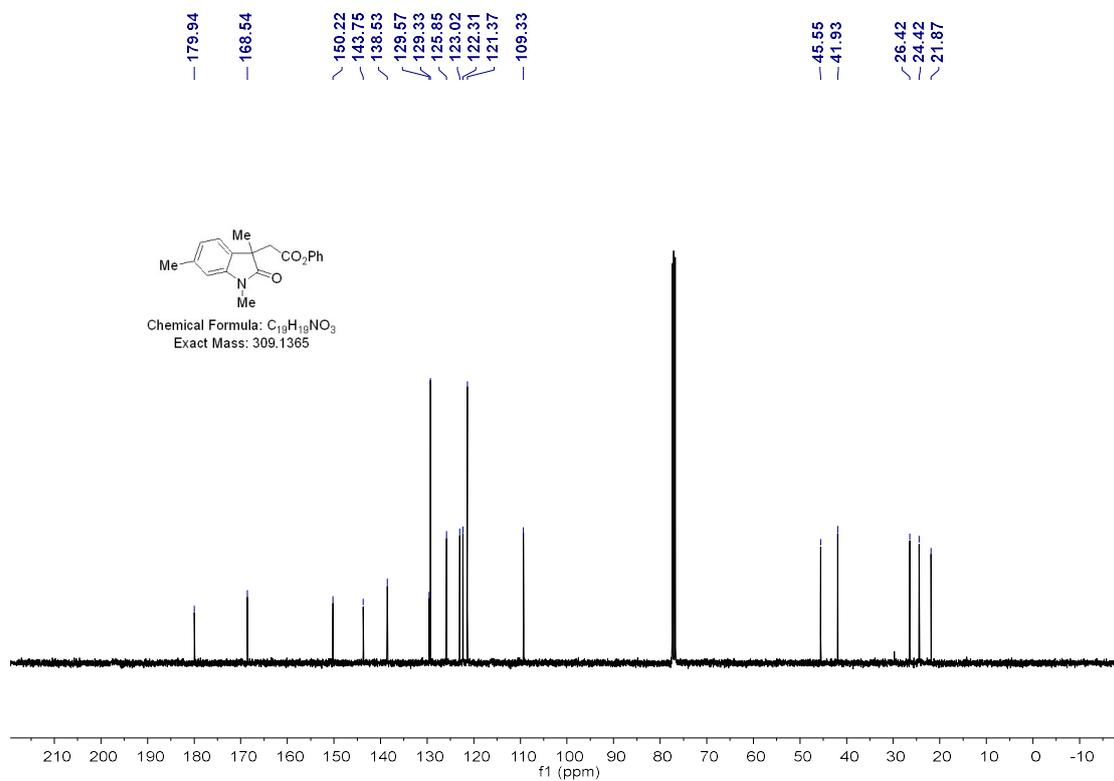
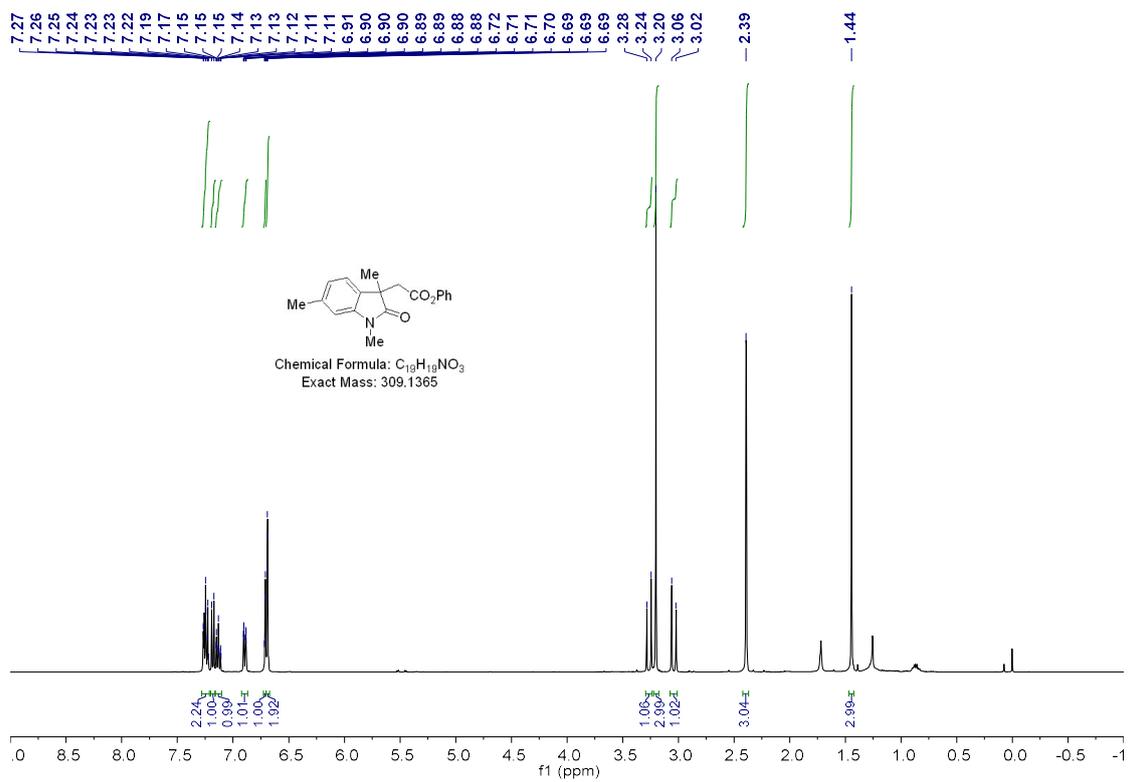
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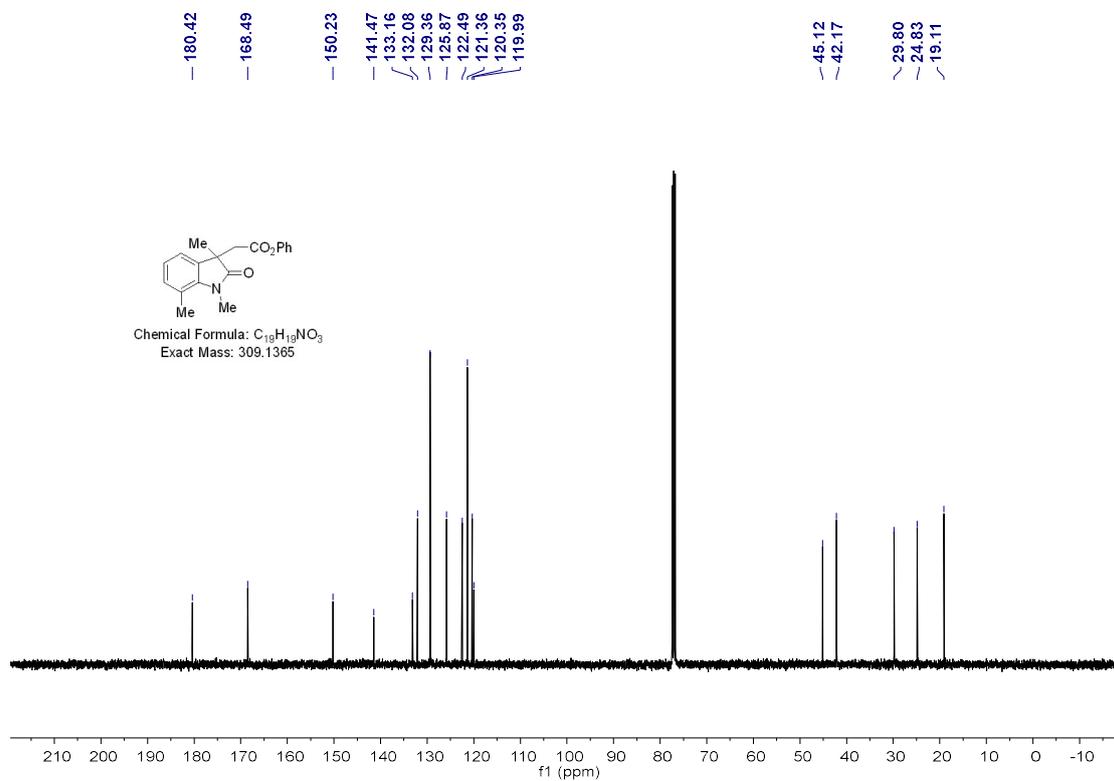
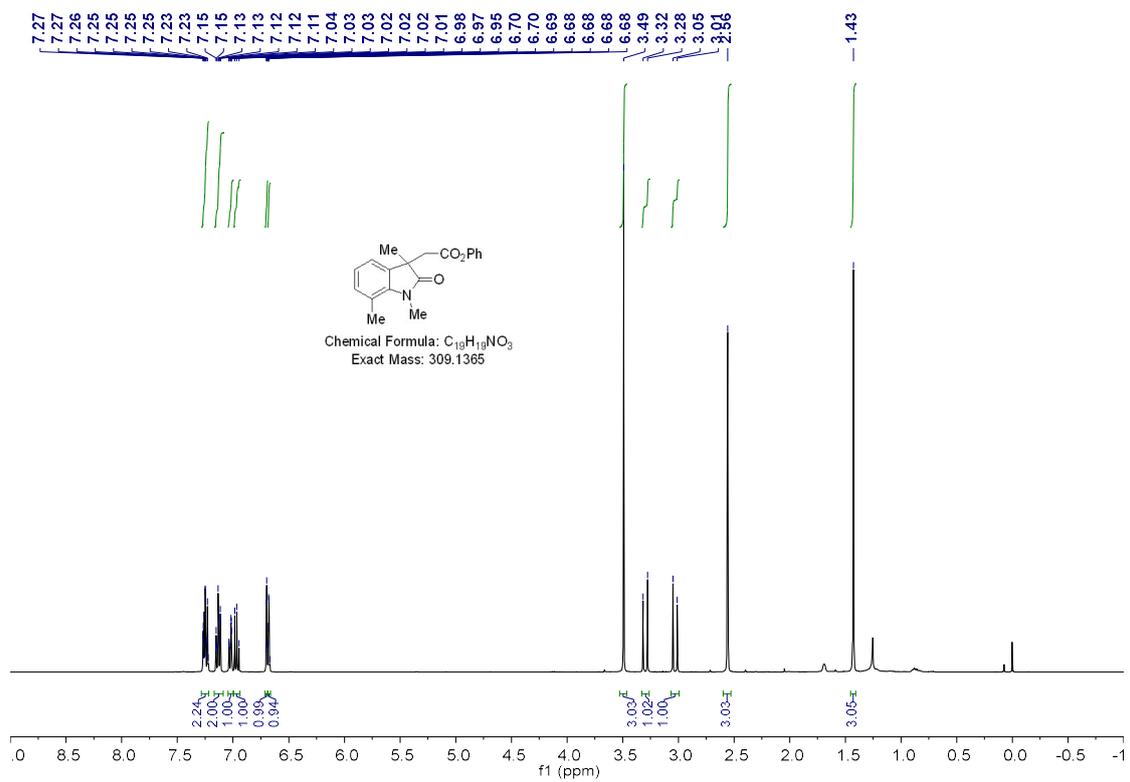
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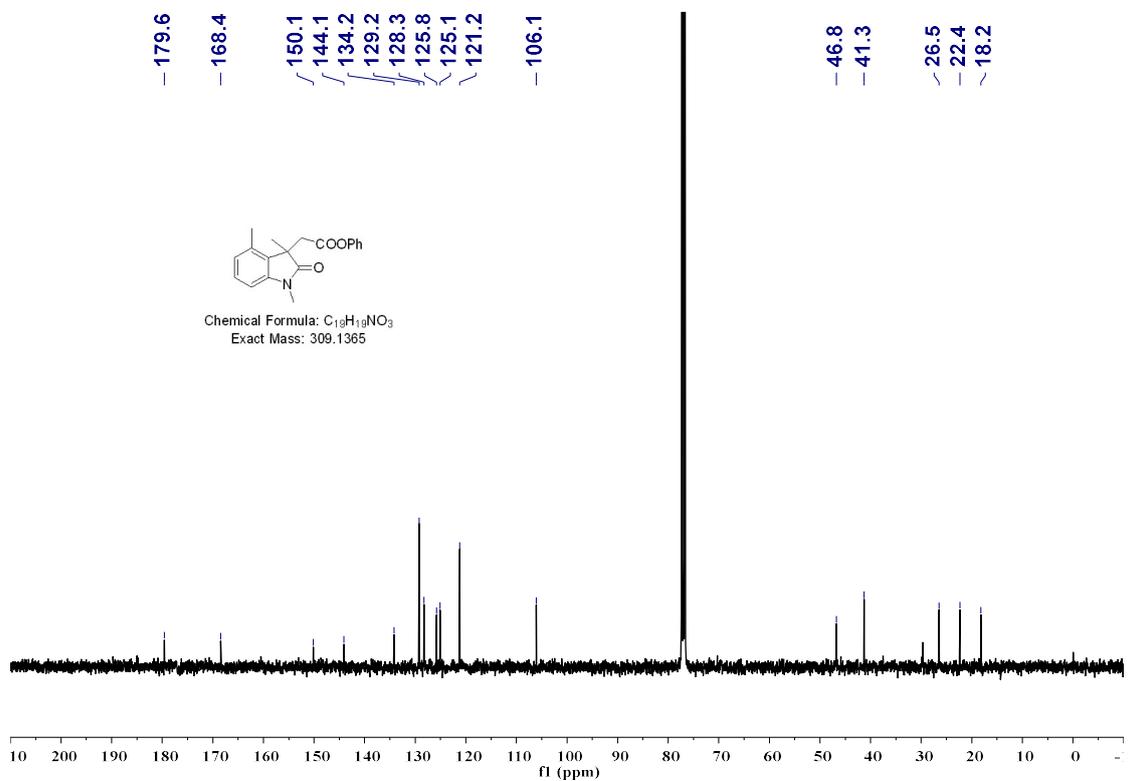
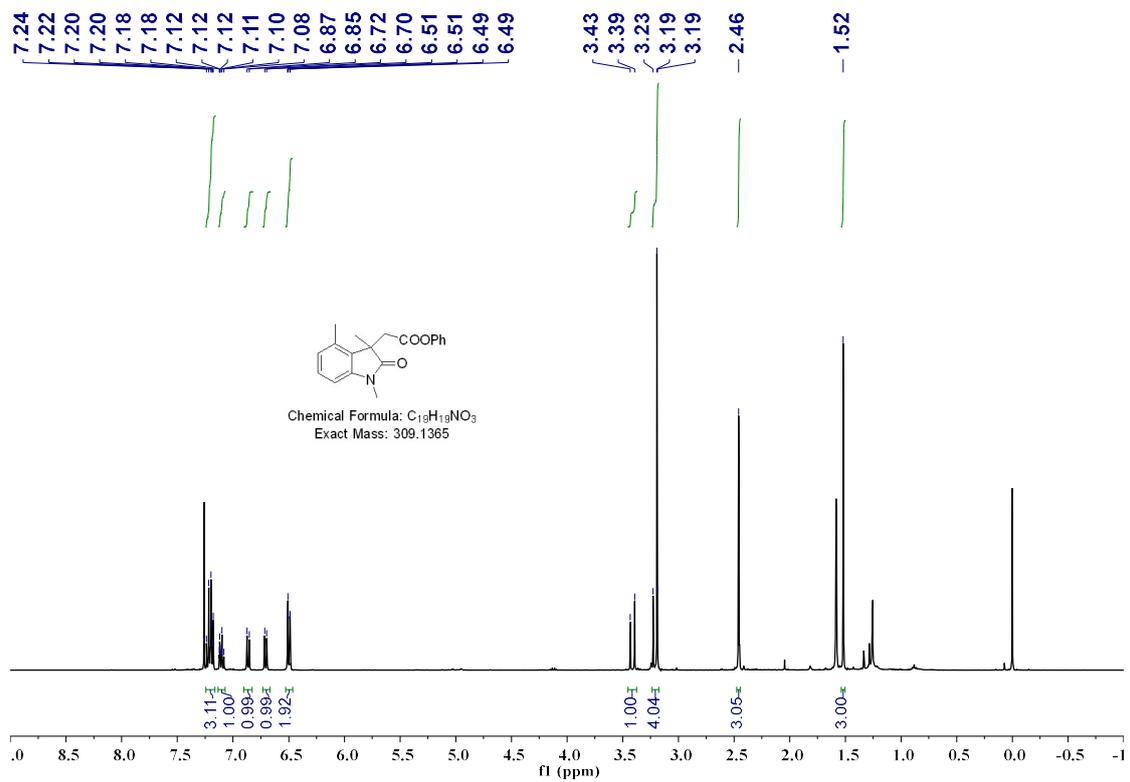
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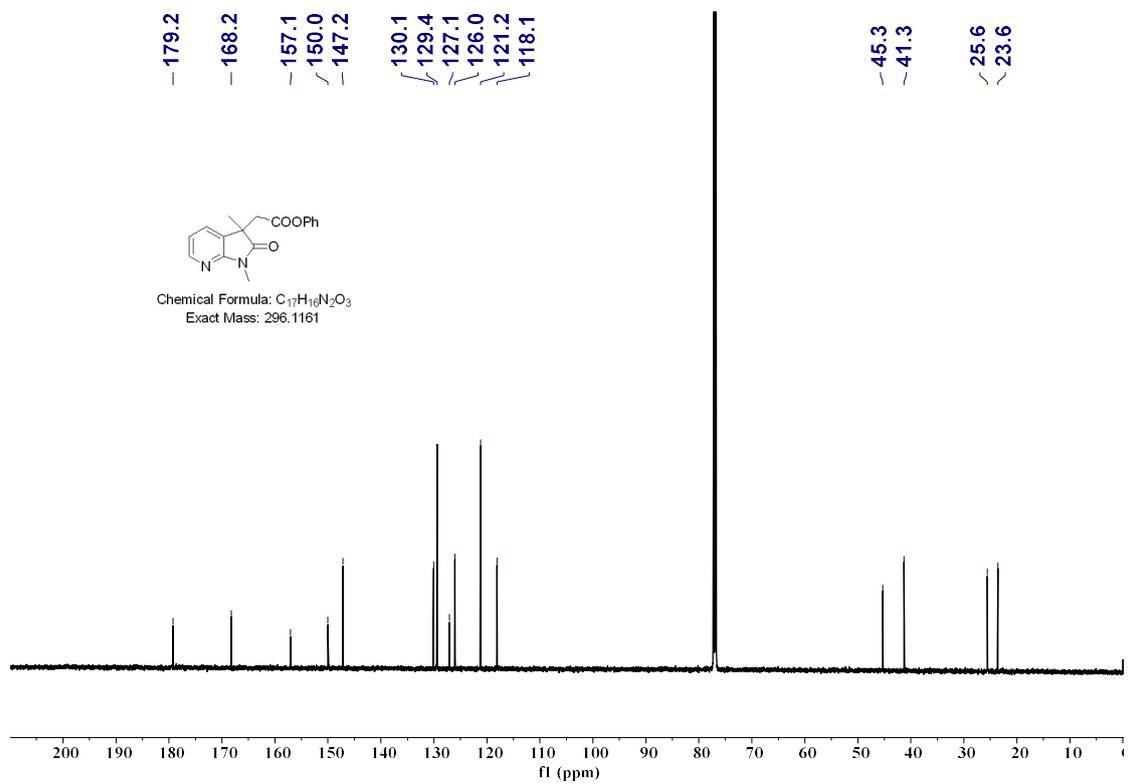
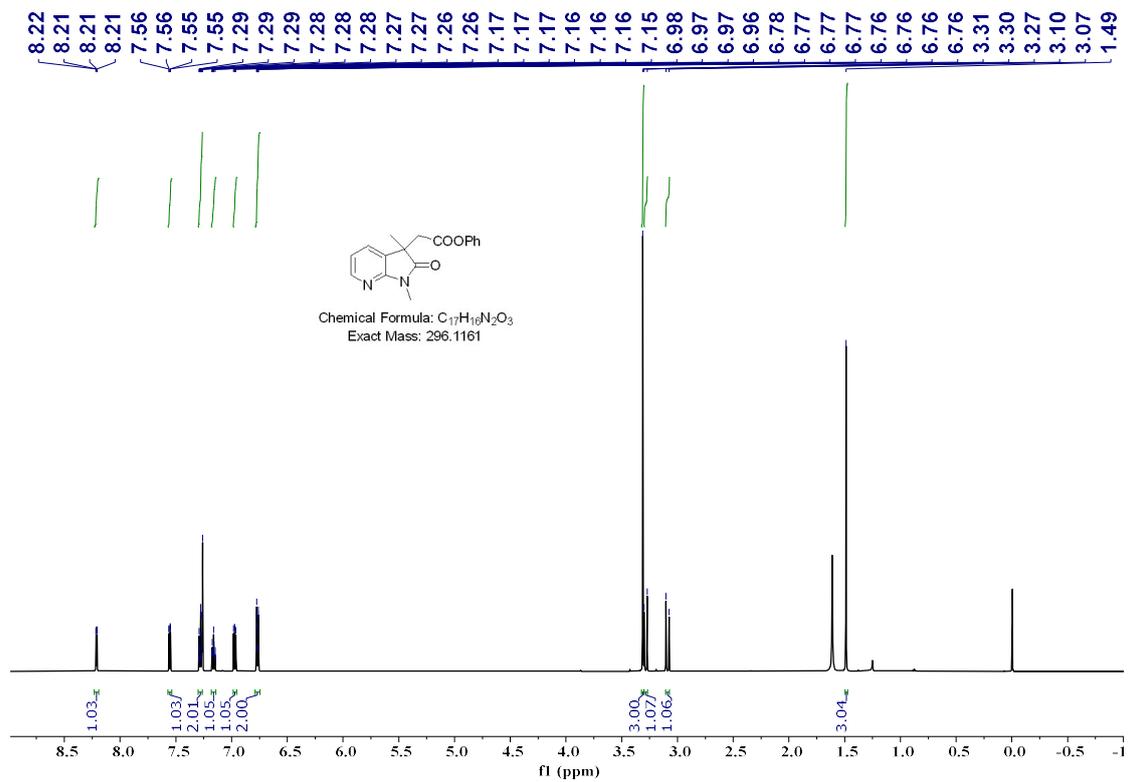
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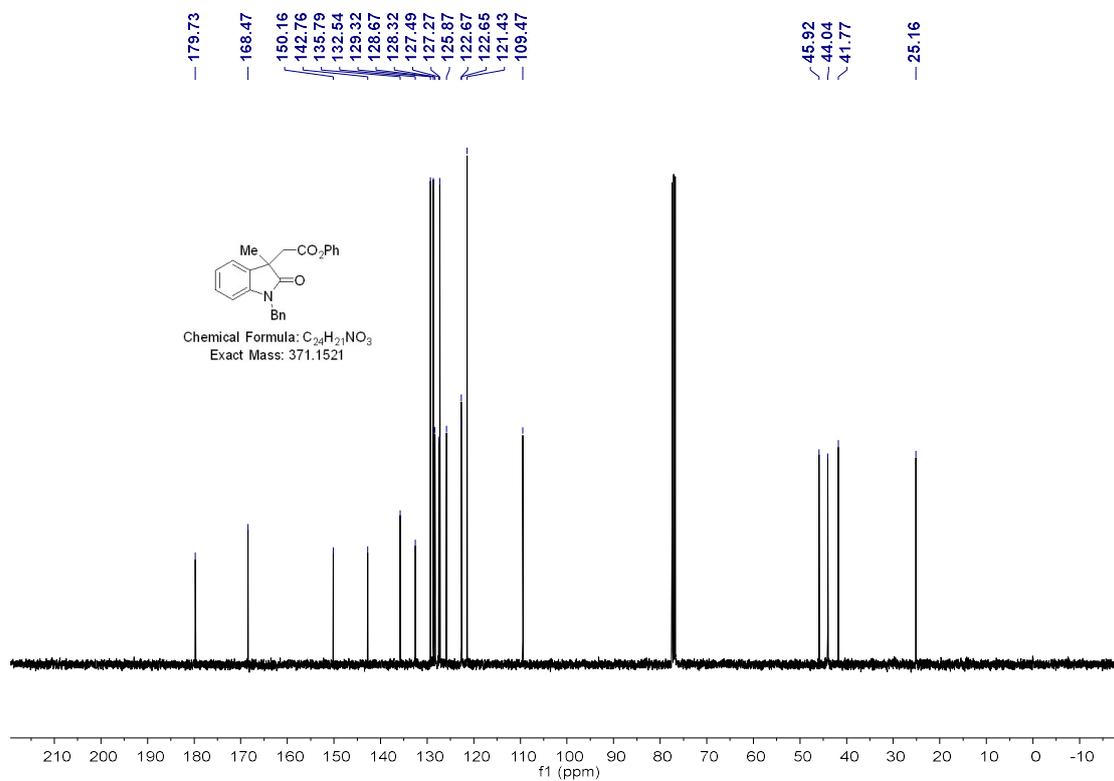
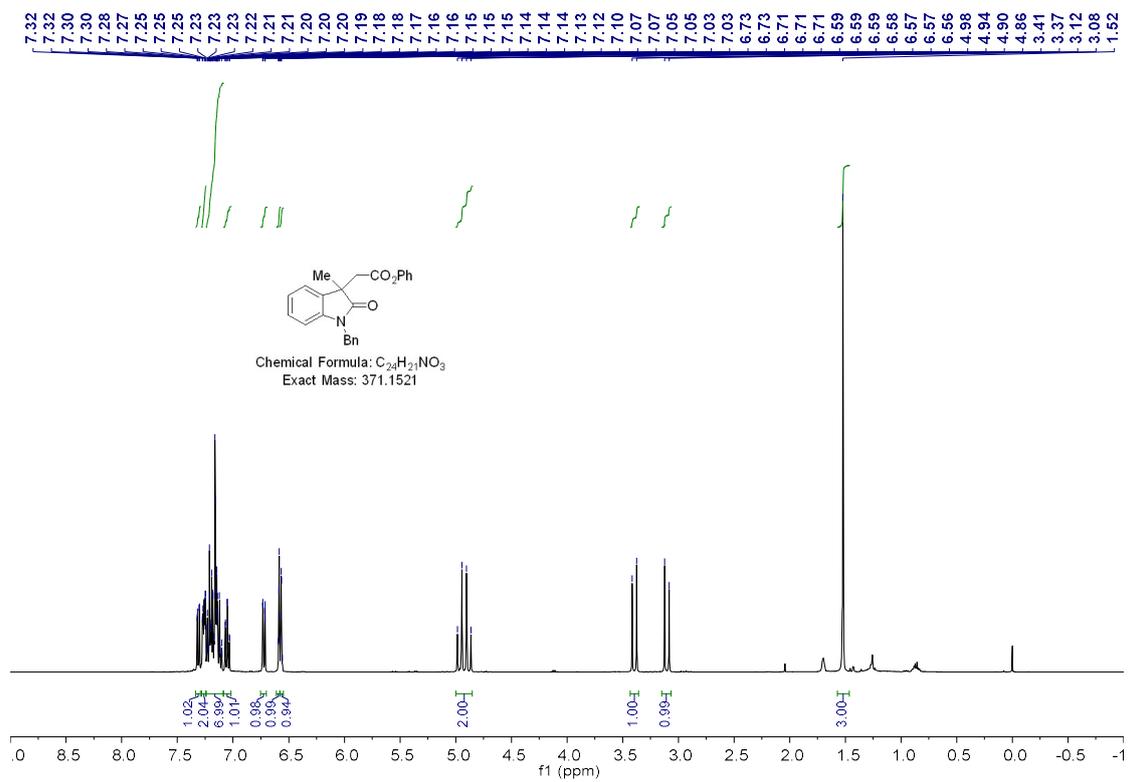
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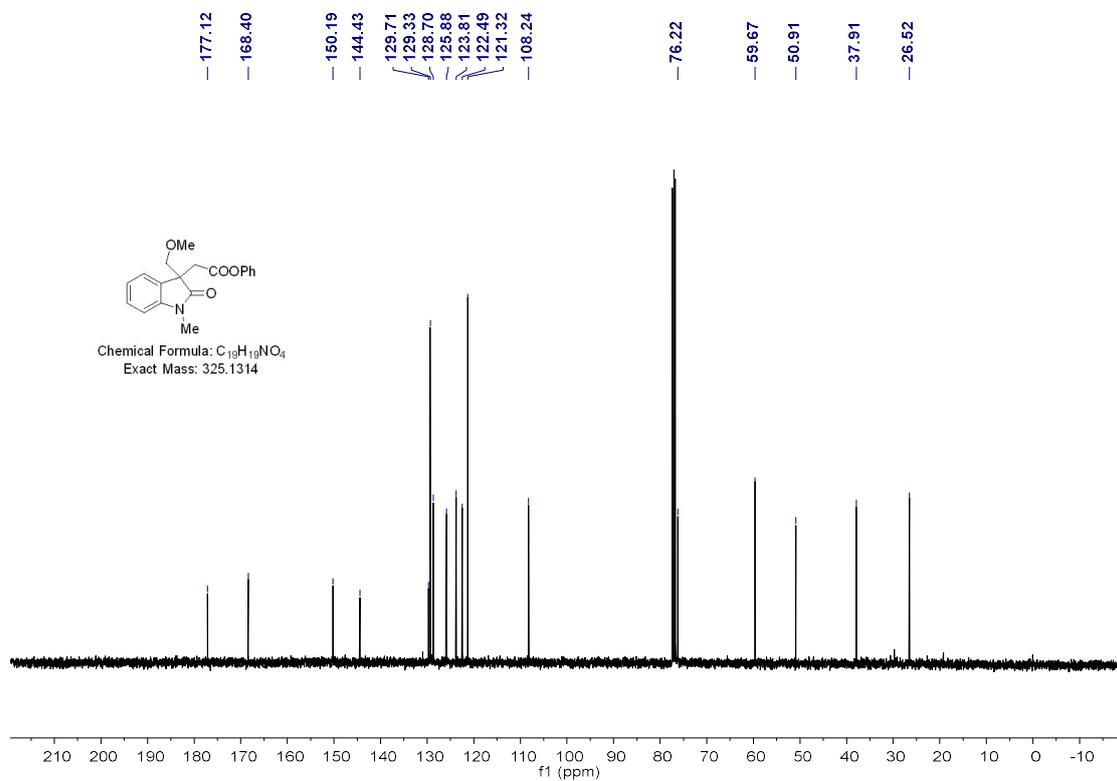
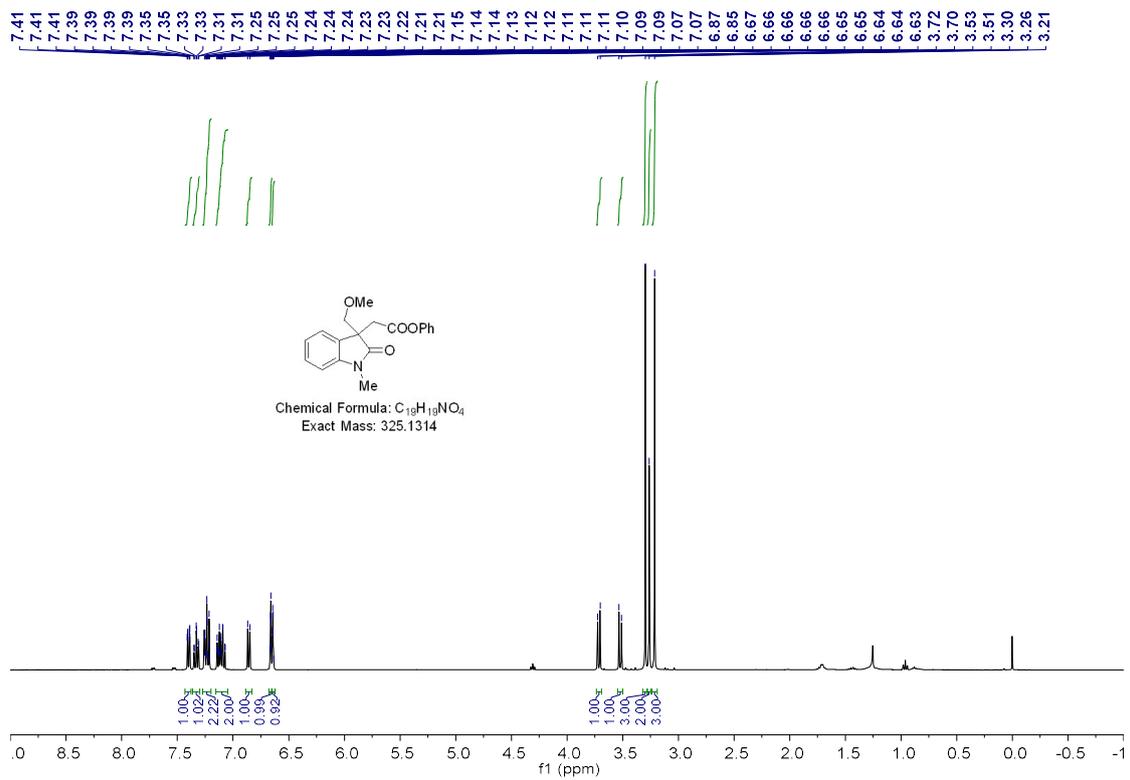
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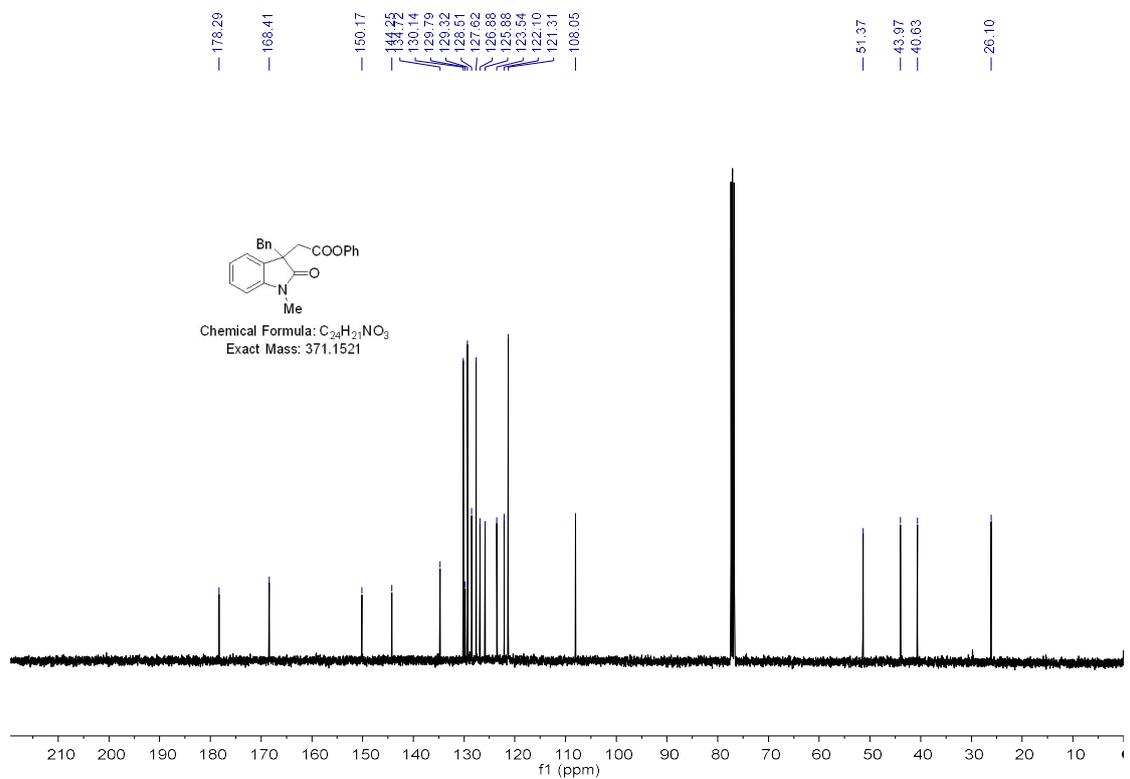
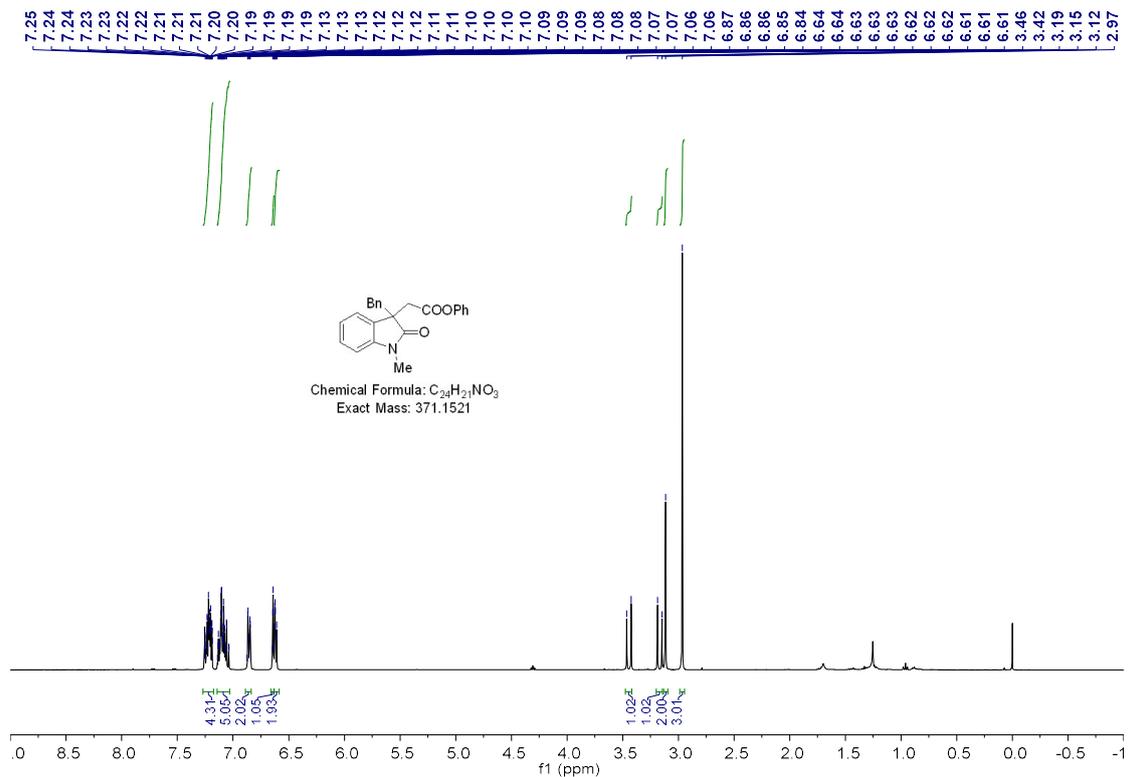
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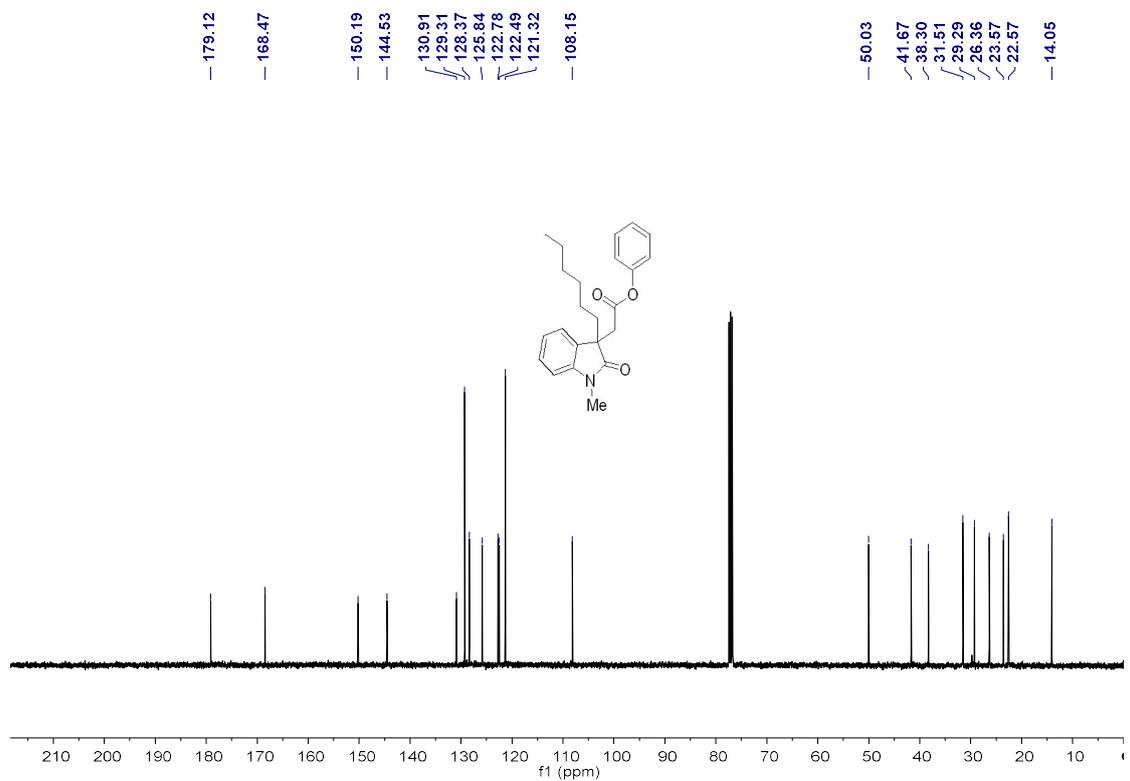
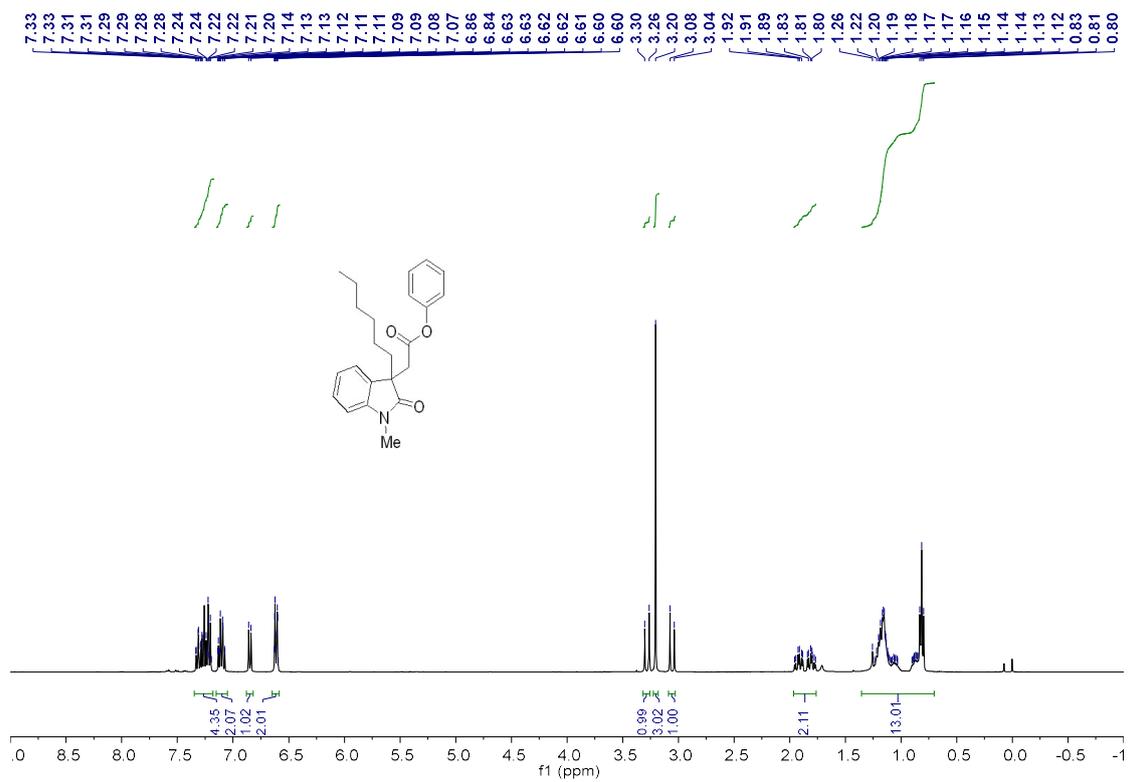


6m

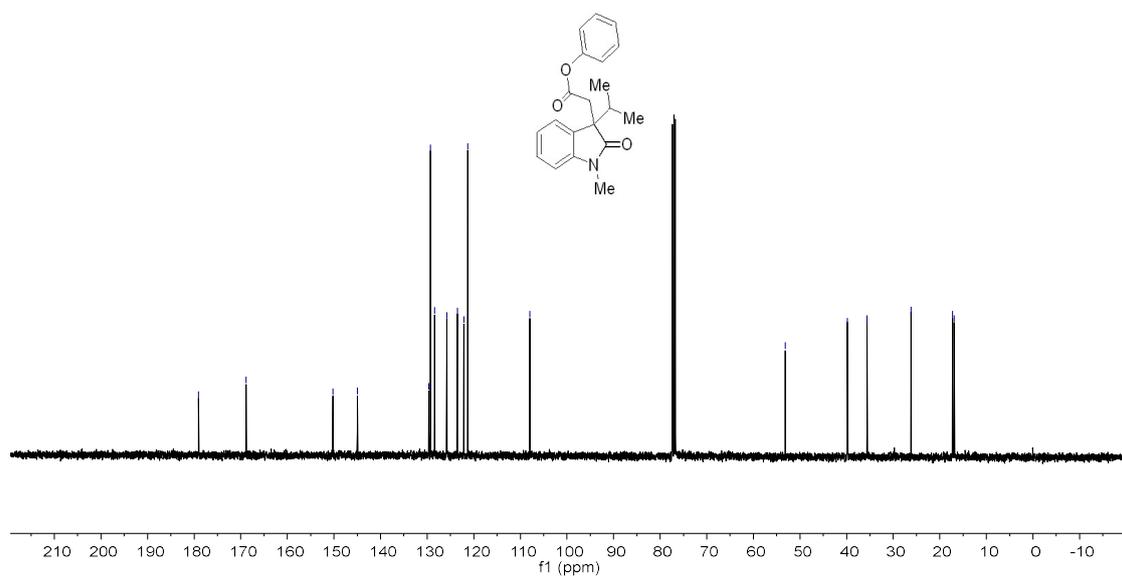
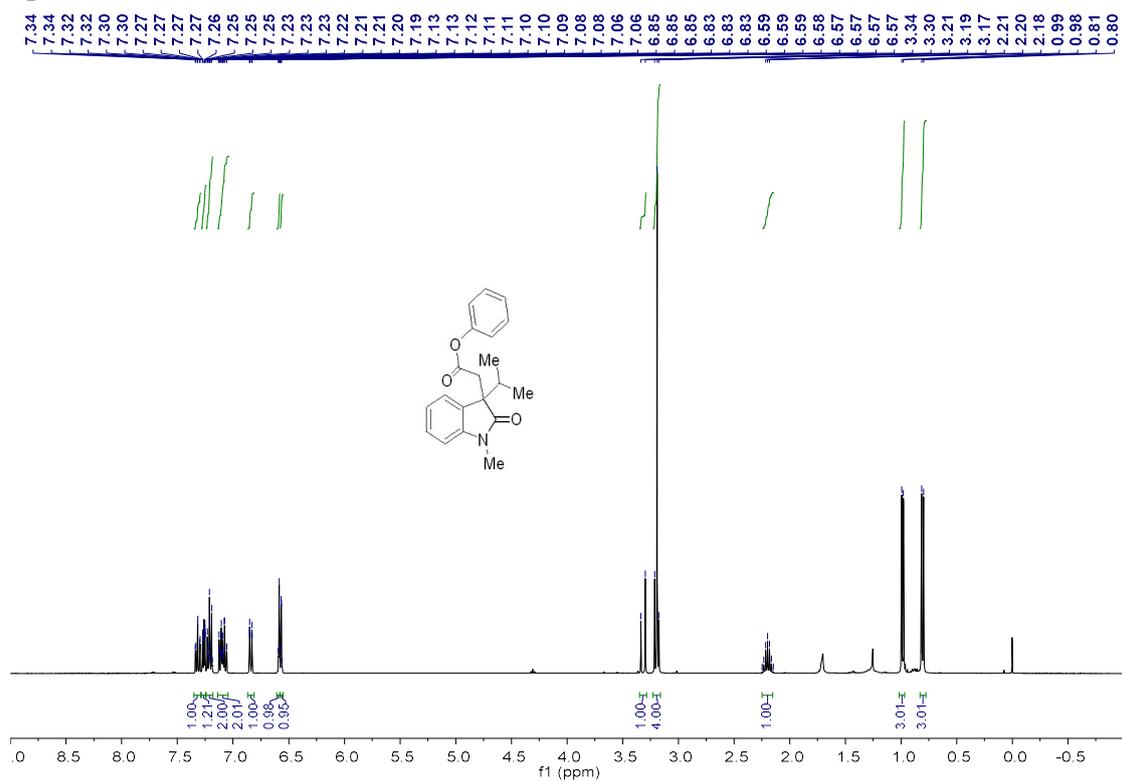


6n

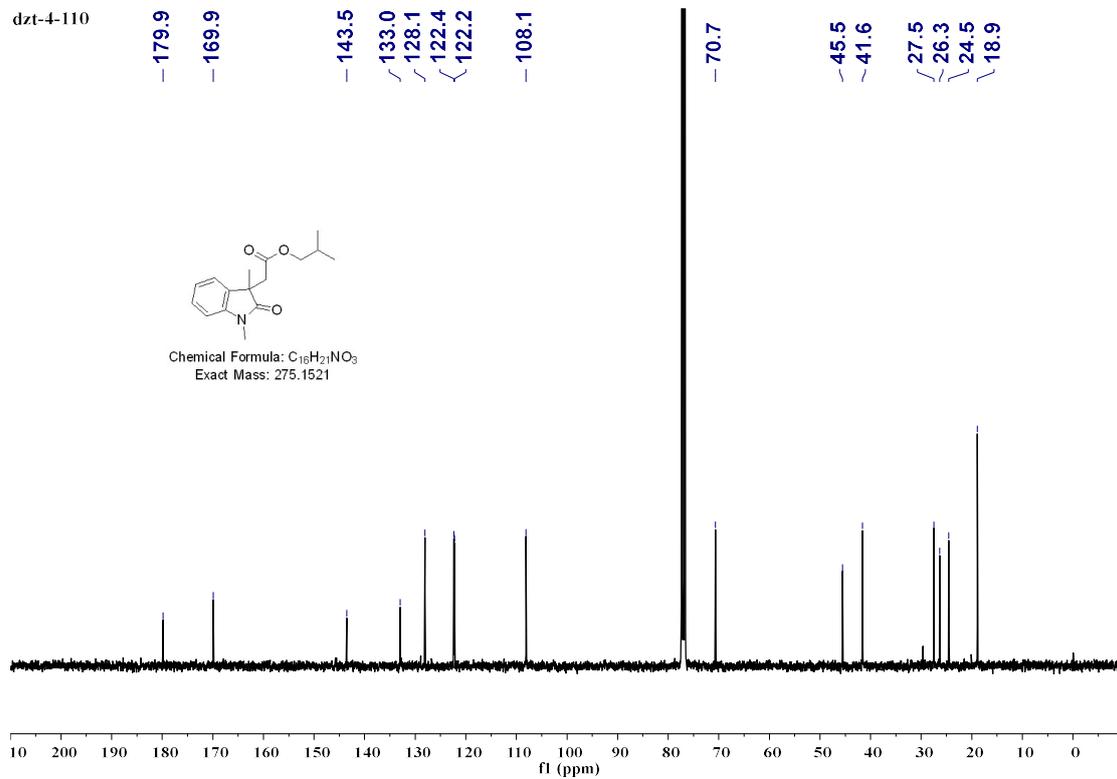
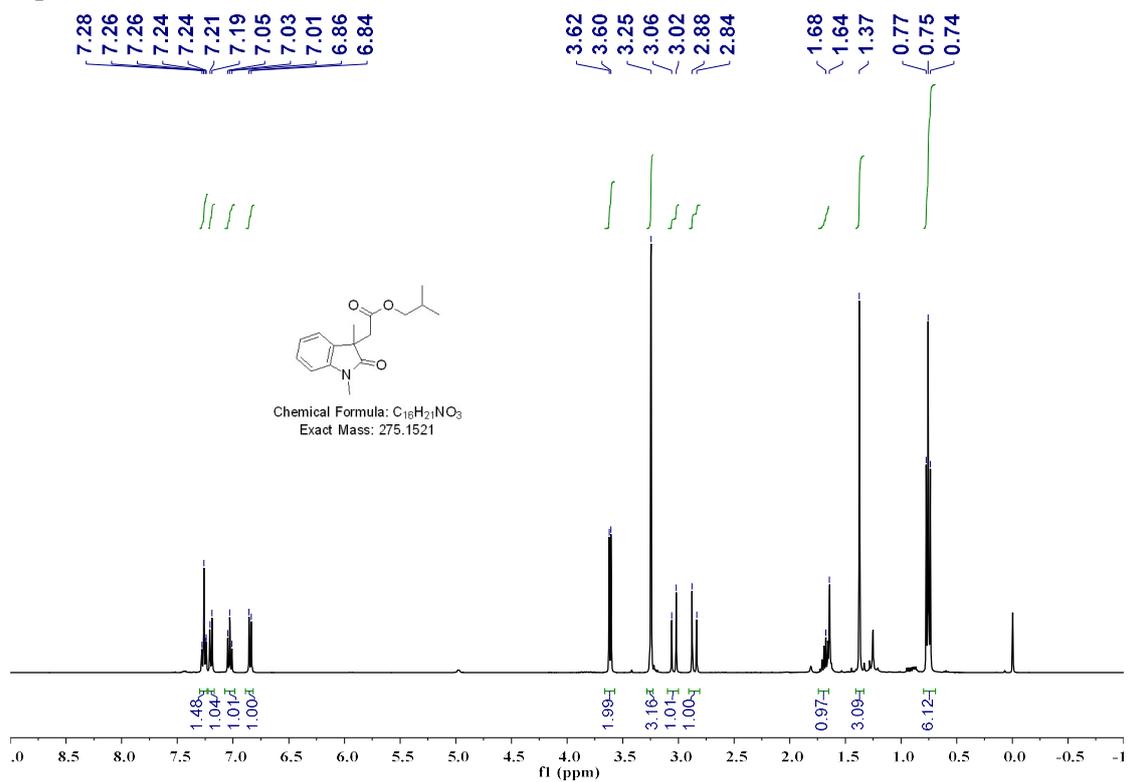




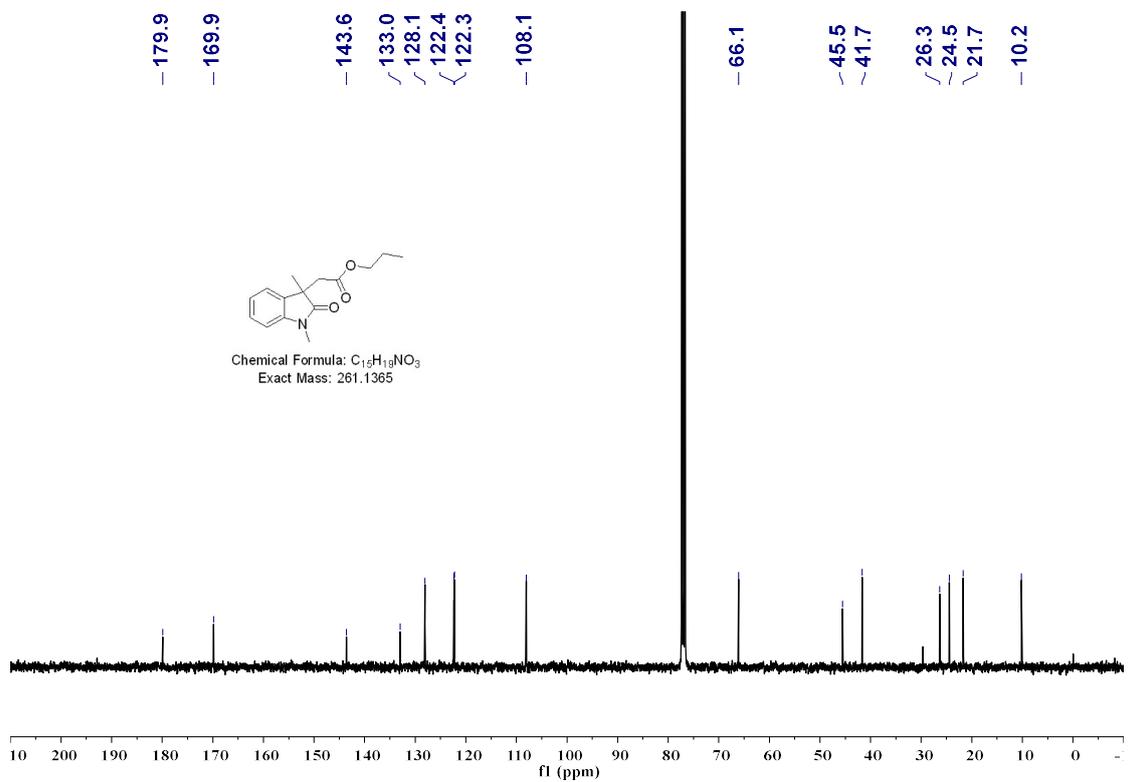
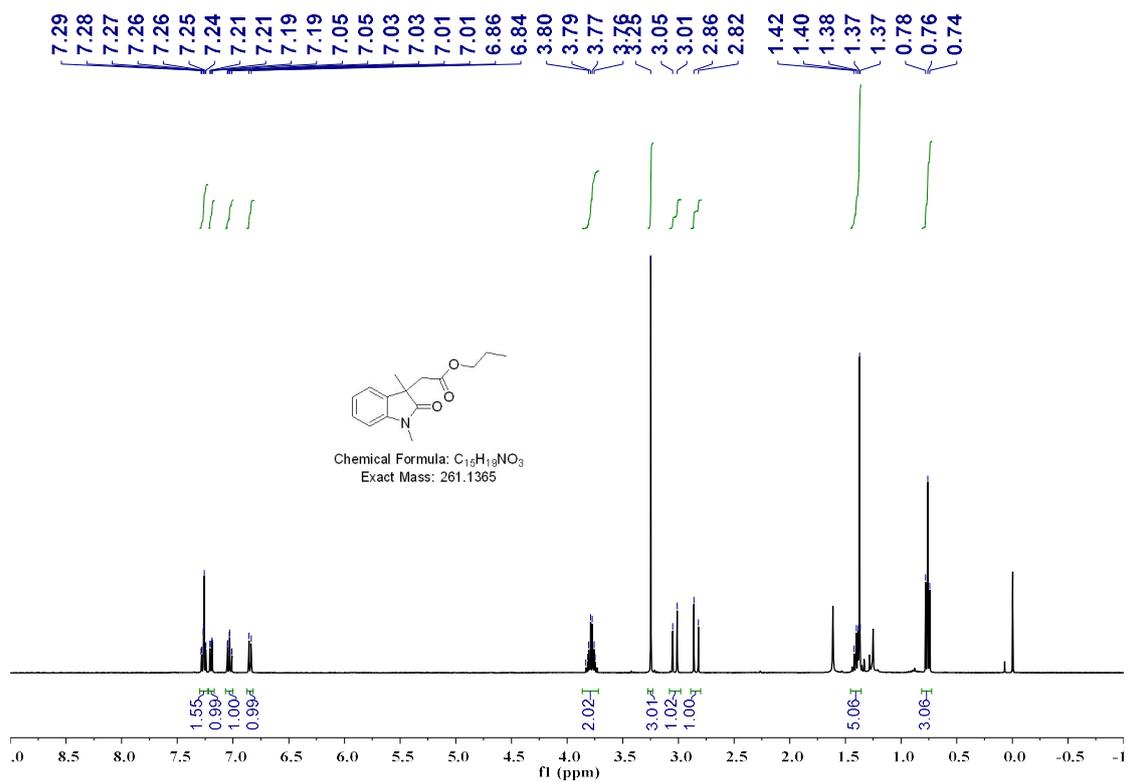
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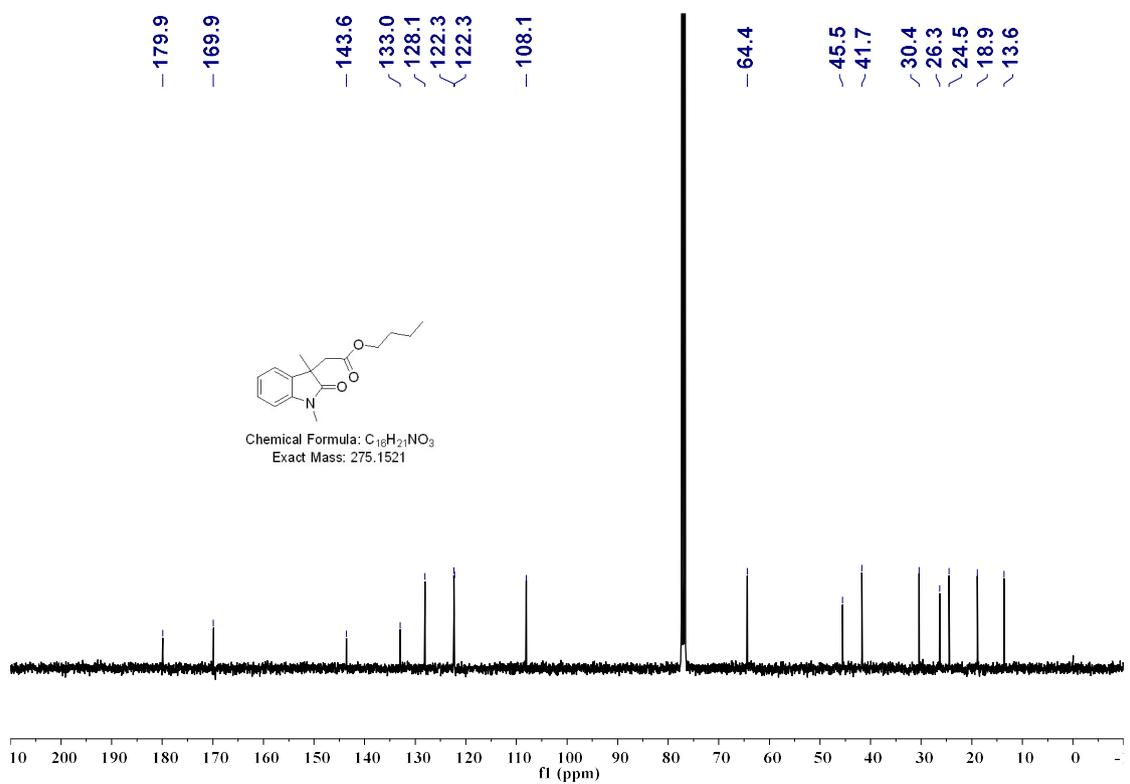
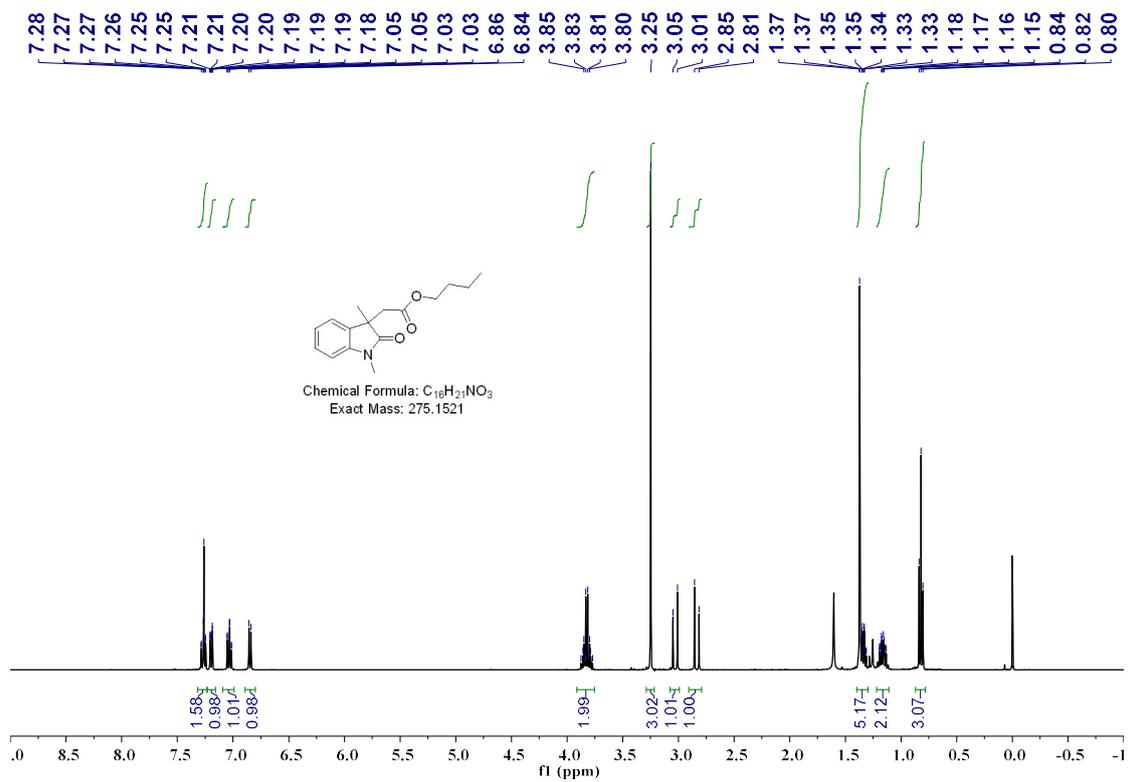
6q



6r



6s



7. References

- [1] Wang, K.; Ding, Z.; Zhou, Z.; Kong, W. Ni-Catalyzed Enantioselective Reductive Diarylation of Activated Alkenes by Domino Cyclization/Cross-Coupling. *J. Am. Chem. Soc.* **2018**, *140*, 12364-12368.
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