

Supporting Information

Palladium-Catalyzed Decarboxylative C2-Acylation of Indoles with α -Oxocarboxylic Acids

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Experimental

1. General experimental details

¹H NMR and ¹³C NMR spectra were measured on 300 MHz, 400 MHz or 600 MHz spectrometer, using CDCl₃ as the solvent with tetramethylsilane (TMS) as the internal standard at room temperature. Chemical shifts (δ) are given in ppm relative to TMS, the coupling constants *J* are given in Hz. HRMS were recorded on an Agilent 6210 TOF LC/MS equipped with electrospray ionization (ESI) probe operating in positive or negative ion mode.

Starting Materials:

All the 2-pyrimidylindoles were prepared according to the literature.¹ All α -oxocarboxylic acids except phenylglyoxylic acid **2a** were prepared from oxidation of corresponding methyl ketones with SeO₂ according to the reported procedure.²

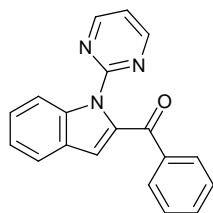
General procedure for palladium-catalyzed decarboxylative C2-acylation of indoles with α -oxocarboxylic acids to provide 2-aryloindole: Under N₂, a sealed tube was charged with indole **1** (0.2 mmol), α -oxocarboxylic acid **2** (0.3 mmol), Pd(OAc)₂ (4.48 mg, 10 mol %), Ag₂O (92 mg, 0.4 mmol), K₂S₂O₈ (54 mg, 0.2 mmol), 1,4-dioxant/HOAc/DMSO (7.5/2/0.5) 2 mL. The reaction tube was kept stirring at 130 °C for 24 h or 36 h. After the completion of the reaction, as monitored by TLC, the solvent was evaporated under reduced pressure and the residue was purified by flash column chromatography on silica gel to give the product.

The procedure of removal of 2-pyrimidyl director¹: Under N₂, a mixture of **3** (0.18 mmol), EtONa (36.7, 0.54 mmol) and DMSO (3 mL) was stirred in a reaction tube at 100 °C for 24 h. The resulting mixture was then quenched with water. The mixture was extracted with ethyl acetate, and the combined organic layer was dried over sodium sulfate. The solvent was evaporated under reduced pressure and the residue was purified by flash column chromatography (petroleum ether/ethyl acetate) on silica gel to give the product.

¹ L. Ackermann and A. V. Lygin, *Org. Lett.*, 2011, **13**, 3332.

² K. Wadhwa, C.-X. Yang, P. R. West, K. C. Deming, S. R. Chemburkar and R. E. Reddy, *Synth. Commun.*, 2008, **38**, 4434.

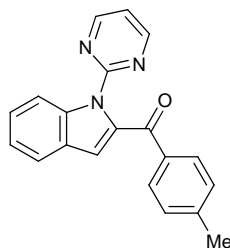
2. Experimental characterization data for compounds **phenyl(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3aa)**



White solid, mp. 122-124 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.63 (d, *J* = 4.8 Hz, 2H), 8.43 (d, *J* = 8.4 Hz, 1H), 7.99 (d, *J* = 7.1 Hz, 2H), 7.72 (d, *J* = 7.8 Hz, 2H), 7.58-7.53 (m, 1H), 7.49-7.43 (m, 3H), 7.34-7.27 (m, 1H), 7.15 (s, 1H), 7.07-7.03 (m, 1H). ¹³C NMR (CDCl₃, 150 MHz): δ 187.6, 158.0, 157.3, 138.3, 137.9, 137.2, 132.8, 129.6, 128.4, 128.0, 126.6, 122.9, 122.5, 117.3, 115.5, 114.2.

HRMS (ESI) *m/z* calcd for C₂₁H₁₆N₃NaO₃ (M+Na)⁺ 322.0956, found 322.0949.

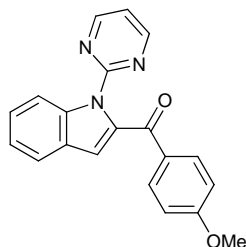
(1-(pyrimidin-2-yl)-1H-indol-2-yl)(*p*-tolyl)methanone (3ab)



White solid, mp. 121-123 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.64 (d, *J* = 4.8 Hz, 2H), 8.42 (d, *J* = 8.4 Hz, 1H), 7.91 (d, *J* = 8.1 Hz, 2H), 7.71 (d, *J* = 7.8 Hz, 1H), 7.48-7.45 (m, 1H), 7.43-7.25 (m, 3H), 7.12 (s, 1H), 7.08-7.05 (m, 1H), 2.43 (s, 3H). ¹³C NMR (CDCl₃, 150 MHz): δ 187.4, 158.0, 157.3, 143.7, 138.3, 137.3, 135.3, 129.8, 129.1, 128.0, 126.4, 122.8, 122.5, 117.5, 115.2, 114.2, 21.8.

HRMS (ESI) *m/z* calcd for C₂₀H₁₅N₃NaO (M+Na)⁺ 336.1113, found 336.1110.

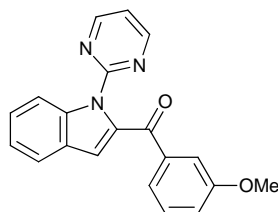
(4-methoxyphenyl)(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ac)



White solid, mp. 38-40 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.64 (d, *J* = 4.8 Hz, 2H), 8.42 (d, *J* = 8.4 Hz, 1H), 8.0 (d, *J* = 8.8 Hz, 2H), 7.71 (d, *J* = 7.8 Hz, 1H), 7.47-7.42 (m, 1H), 7.32-7.27 (m, 1H), 7.09-7.05 (m, 2H), 6.97-6.93 (m, 2H), 3.87 (s, 3H). ¹³C NMR (CDCl₃, 150 MHz): δ 186.5, 163.4, 158.0, 157.4, 138.1, 137.3, 131.9, 130.8, 128.1, 126.3, 122.8, 122.4, 117.4, 114.7, 114.2, 113.6, 55.5.

HRMS (ESI) *m/z* calcd for C₂₀H₁₅N₃NaO₂ (M+Na)⁺ 352.1062, found 352.1058.

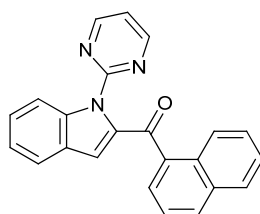
(3-methoxyphenyl)(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ad)



Semi-solid. ^1H NMR (CDCl_3 , 300 MHz): δ 8.65 (d, $J = 4.6$ Hz, 2H), 8.41 (d, $J = 8.4$ Hz, 1H), 7.72 (d, $J = 7.8$ Hz, 1H), 7.57-7.54 (m, 2H), 7.48-7.43 (m, 1H), 7.37-7.27 (m, 2H), 7.16-7.06 (m, 3H), 3.85 (s, 3H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 187.3, 159.6, 158.0, 157.3, 139.2, 138.3, 137.1, 129.4, 127.9, 126.6, 122.8, 122.6, 119.6, 117.5, 115.6, 114.2, 113.4, 55.5.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{15}\text{N}_3\text{NaO}_2$ ($\text{M}+\text{Na}$) $^+$ 352.1062, found 352.1057.

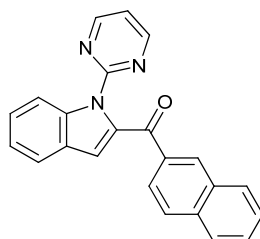
naphthalen-1-yl(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ae)



White solid, mp. 136-138 $^\circ\text{C}$. ^1H NMR (CDCl_3 , 300 MHz): δ 8.74 (d, $J = 8.4$ Hz, 1H), 8.53 (d, $J = 4.8$ Hz, 2H), 8.40 (d, $J = 8.4$ Hz, 1H), 7.95-7.87 (m, 2H), 7.79-7.72 (m, 2H), 7.64-7.50 (m, 2H), 7.48-7.27 (m, 3H), 7.17 (s, 1H), 6.95-6.92 (m, 1H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 188.9, 157.9, 157.4, 138.9, 138.5, 136.0, 133.7, 132.3, 131.1, 129.1, 128.2, 127.9, 127.6, 126.8, 126.4, 126.1, 124.2, 122.9, 122.7, 117.3, 116.3, 114.2.

HRMS (ESI) m/z calcd for $\text{C}_{23}\text{H}_{15}\text{N}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 372.1113, found 372.1114.

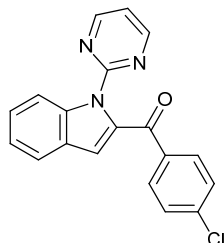
naphthalen-2-yl(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3af)



White solid, mp. 131-133 $^\circ\text{C}$. ^1H NMR (CDCl_3 , 300 MHz): δ 8.62 (d, $J = 4.8$ Hz, 2H), 8.49-8.45 (m, 2H), 8.11-8.07 (m, 1H), 7.93-7.88 (m, 3H), 7.75 (d, $J = 8.4$ Hz, 1H), 7.63-7.46 (m, 3H), 7.36-7.30 (m, 1H), 7.19 (s, 1H), 7.05-7.01 (m, 1H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 187.7, 158.0, 157.3, 138.3, 137.3, 135.5, 135.4, 132.4, 131.5,

129.6, 128.4, 128.1, 127.8, 126.7, 126.5, 125.1, 122.9, 122.5, 117.4, 115.4, 114.4.
HRMS (ESI) m/z calcd for $C_{23}H_{15}N_3NaO$ ($M+Na$)⁺ 372.1113, found 372.1114.

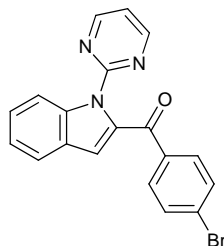
(4-chlorophenyl)(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ag)



White solid, mp. 85-87 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.63 (d, J = 4.8 Hz, 2H), 8.44 (d, J = 8.4 Hz, 1H), 7.92 (d, J = 8.4 Hz, 2H), 7.72 (d, J = 7.8 Hz, 1H), 7.49-7.41 (m, 3H), 7.34-7.28 (m, 1H), 7.13 (s, 1H), 7.08-7.05 (m, 1H). ¹³C NMR (CDCl₃, 150 MHz): δ 186.4, 158.0, 157.2, 139.1, 138.3, 136.7, 136.4, 130.9, 128.7, 127.9, 126.7, 123.0, 122.6, 117.5, 115.4, 114.4.

HRMS (ESI) m/z calcd for $C_{19}H_{12}ClN_3NaO$ ($M+Na$)⁺ 356.0567, found 356.0564.

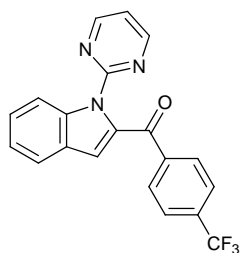
(4-bromophenyl)(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ah)



White solid, mp. 37-39 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.63 (d, J = 4.8 Hz, 2H), 8.44 (d, J = 8.4 Hz, 1H), 7.84 (d, J = 8.4 Hz, 2H), 7.72 (d, J = 7.8 Hz, 1H), 7.59 (d, J = 7.8 Hz, 2H), 7.50-7.44 (m, 1H), 7.35-7.28 (m, 1H), 7.12 (s, 1H), 7.09-7.05 (m, 1H). ¹³C NMR (CDCl₃, 150 MHz): δ 186.6, 158.0, 157.2, 138.3, 136.8, 136.7, 131.7, 131.0, 127.9, 127.8, 126.8, 123.0, 122.6, 117.5, 115.5, 114.4.

HRMS (ESI) m/z calcd for $C_{19}H_{12}BrN_3NaO$ ($M+Na$)⁺ 400.0061, found 400.0055.

(1-(pyrimidin-2-yl)-1H-indol-2-yl)(4-(trifluoromethyl)phenyl)methanone (3ai)

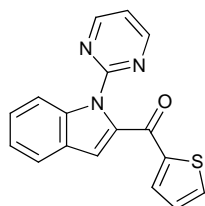


White solid, mp. 110-112 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.64 (d, J = 4.8 Hz, 2H),

8.44 (d, $J = 8.1$ Hz, 1H), 8.07 (d, $J = 8.1$ Hz, 2H), 7.74-7.69 (m, 3H), 7.51-7.46 (m, 1H), 7.35-7.30 (m, 1H), 7.16 (s, 1H), 7.10 (t, $J = 4.8$ Hz, 1H). ^{13}C NMR (CDCl_3 , 100 MHz): δ 186.3, 158.0, 157.2, 141.0, 138.4, 136.6, 133.9 (q, $J_{\text{C-F}} = 32.5$ Hz), 129.6, 128.0, 126.9, 125.4 (q, $J_{\text{C-F}} = 3.7$ Hz), 123.4 (q, $J_{\text{C-F}} = 271.1$ Hz), 123.1, 122.6, 117.5, 115.8, 114.5.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{13}\text{F}_3\text{N}_3\text{O}$ ($\text{M}+\text{H}$) $^+$ 368.1011, found 368.1015.

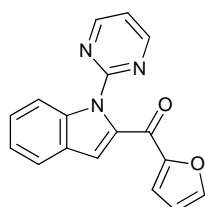
(1-(pyrimidin-2-yl)-1H-indol-2-yl)(thiophen-2-yl)methanone (3aj)



White solid, mp. 136-138 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.70 (d, $J = 4.8$ Hz, 2H), 8.38 (d, $J = 8.4$ Hz, 1H), 7.84-7.82 (m, 2H), 7.74-7.69 (m, 1H), 7.48-7.42 (m, 1H), 7.33-7.27 (m, 2H), 7.17-7.10 (m, 2H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 179.4, 158.1, 157.3, 144.3, 138.5, 136.6, 134.0, 133.9, 128.0, 127.9, 126.6, 122.9, 122.6, 117.6, 115.2, 114.1.

HRMS (ESI) m/z calcd for $\text{C}_{17}\text{H}_{11}\text{N}_3\text{NaOS}$ ($\text{M}+\text{Na}$) $^+$ 328.0521, found 328.0518.

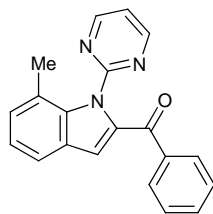
furan-2-yl(1-(pyrimidin-2-yl)-1H-indol-2-yl)methanone (3ak)



White solid, mp. 122-124 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.69 (d, $J = 4.8$ Hz, 2H), 8.36 (d, $J = 8.4$ Hz, 1H), 7.3 (d, $J = 7.8$ Hz, 1H), 7.63 (s, 1H), 7.45 (t, $J = 7.8$ Hz, 1H), 7.37 (s, 1H), 7.30-7.28 (m, 2H), 7.11 (t, $J = 4.8$ Hz, 1H), 6.55 (dd, $J = 3.3, 1.5$ Hz, 1H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 174.3, 158.1, 157.4, 152.6, 147.0, 135.6, 136.1, 127.9, 126.7, 122.8, 122.6, 119.4, 117.6, 115.3, 114.1, 112.3.

HRMS (ESI) m/z calcd for $\text{C}_{17}\text{H}_{11}\text{N}_3\text{NaO}_2$ ($\text{M}+\text{Na}$) $^+$ 312.0749, found 312.0722.

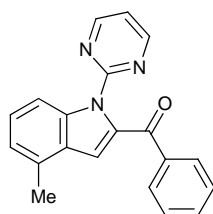
(7-methyl-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3ba)



Yellowish solid, 35-37 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.88 (d, $J = 4.8$ Hz, 2H), 7.95 (d, $J = 7.0$ Hz, 2H), 7.63-7.51 (m, 2H), 7.49-7.46 (m, 2H), 7.43-7.40 (m, 1H), 7.22 (s, 1H), 7.16-7.14 (m, 2H), 1.99 (s, 3H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 187.1, 159.8, 158.2, 138.4, 138.2, 136.0, 132.5, 129.7, 129.3, 128.3, 127.3, 122.5, 121.9, 121.2, 120.3, 116.6, 19.4.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{15}\text{N}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 336.1113, found 336.1109.

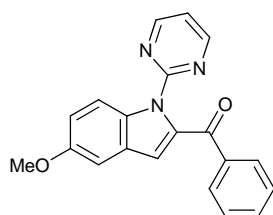
(4-methyl-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3ca)



White solid, mp. 135-137 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.64 (d, $J = 4.8$ Hz, 2H), 8.22 (d, $J = 8.4$ Hz, 1H), 7.99 (d, $J = 7.1$ Hz, 2H), 7.55 (d, $J = 7.2$ Hz, 1H), 7.48-7.43 (m, 2H), 7.39-7.34 (m, 1H), 7.19 (s, 1H), 7.09-7.04 (m, 2H), 2.59 (s, 3H). ^{13}C NMR (CDCl_3 , 100 MHz): δ 187.6, 158.0, 157.4, 138.3, 138.2, 136.8, 132.6, 132.2, 129.5, 128.3, 127.9, 126.7, 123.7, 117.4, 114.0, 111.7, 18.6.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{15}\text{N}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 336.1113, found 336.1110.

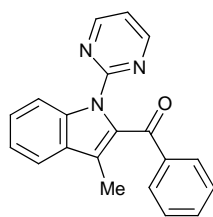
(5-methoxy-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3da)



White solid, mp. 134-135 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.59 (d, $J = 4.8$ Hz, 2H), 8.35 (d, $J = 9.0$ Hz, 1H), 7.96 (d, $J = 7.1$ Hz, 2H), 7.56-7.51 (m, 1H), 7.46-7.40 (m, 2H), 7.14-7.06 (m, 3H), 7.03-7.00 (m, 1H), 3.89 (s, 3H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 187.7, 157.9, 157.2, 155.9, 138.1, 137.6, 133.2, 132.7, 129.5, 128.7, 128.3, 117.2, 116.5, 115.4, 115.0, 103.4, 55.7.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{15}\text{N}_3\text{NaO}_2$ ($\text{M}+\text{Na}$) $^+$ 352.1062, found 352.1060.

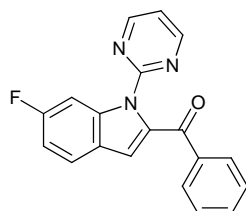
(3-methyl-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3ea)



White solid, mp. 153-155 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.65 (d, $J = 8.4$ Hz, 1H), 8.46 (d, $J = 4.8$ Hz, 2H), 7.80 (d, $J = 7.2$ Hz, 2H), 7.70 (d, $J = 7.8$ Hz, 1H), 7.51-7.41 (m, 2H), 7.38-7.31 (m, 3H), 6.87-6.84 (m, 1H), 2.39 (s, 3H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 189.5, 157.6, 157.1, 139.2, 136.4, 133.2, 132.3, 130.3, 128.6, 128.5, 128.4, 126.2, 122.6, 120.2, 116.2, 115.2, 9.4.

HRMS (ESI) m/z calcd for $\text{C}_{20}\text{H}_{15}\text{N}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 336.1113, found 336.1111.

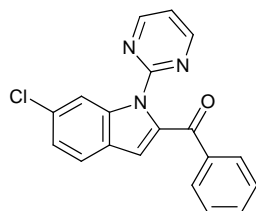
(6-fluoro-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3fa)



White solid, mp. 125-127 °C. ^1H NMR (CDCl_3 , 300 MHz): δ 8.64 (d, $J = 4.8$ Hz, 2H), 8.15 (d, $J = 7.5$ Hz, 1H), 7.98 (d, $J = 7.1$ Hz, 2H), 7.66-7.54 (m, 2H), 7.48-7.43 (m, 2H), 7.11-7.03 (m, 3H). ^{13}C NMR (CDCl_3 , 150 MHz): δ 187.1, 162.3 (d, $J_{\text{C-F}} = 241.6$ Hz), 158.1, 157.1, 138.7 (d, $J_{\text{C-F}} = 13.2$ Hz), 137.8, 137.7 (d, $J_{\text{C-F}} = 3.3$ Hz), 132.8, 129.6, 128.4, 124.4, 123.5 (d, $J_{\text{C-F}} = 10.2$ Hz), 117.6, 115.4, 111.8 (d, $J_{\text{C-F}} = 25.0$ Hz), 101.3 (d, $J_{\text{C-F}} = 28.4$ Hz).

HRMS (ESI) m/z calcd for $\text{C}_{19}\text{H}_{12}\text{FN}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 340.0862, found 340.0861.

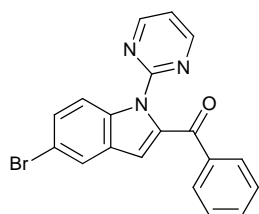
(6-chloro-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3ga)



Semi-solid. ^1H NMR (CDCl_3 , 300 MHz): δ 8.65 (d, $J = 4.8$ Hz, 2H), 8.48 (d, $J = 1.8$ Hz, 1H), 7.97-7.95 (m, 2H), 7.63-7.54 (m, 2H), 7.48-7.43 (m, 2H), 7.29-7.26 (m, 1H), 7.11-7.07 (m, 2H). ^{13}C NMR (CDCl_3 , 100 MHz): δ 187.2, 158.1, 157.0, 138.5, 137.8, 132.9, 132.4, 130.2, 129.5, 128.3, 126.5, 123.7, 123.2, 117.7, 114.8, 114.6.

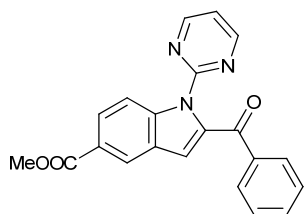
HRMS (ESI) m/z calcd for $\text{C}_{19}\text{H}_{12}\text{ClN}_3\text{NaO}$ ($\text{M}+\text{Na}$) $^+$ 356.0567, found 356.0565.

(5-bromo-1-(pyrimidin-2-yl)-1H-indol-2-yl)(phenyl)methanone (3ha)



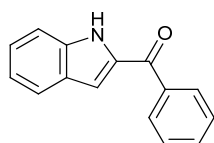
White solid, mp. 120-122 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.62 (d, *J* = 4.8 Hz, 2H), 8.33 (d, *J* = 9.0 Hz, 1H), 7.96-7.94 (m, 2H), 7.83 (d, *J* = 1.8 Hz, 1H), 7.59-7.42 (m, 4H), 7.09-7.03 (m, 2H). ¹³C NMR (CDCl₃, 100 MHz): δ 187.5, 158.0, 157.0, 138.1, 137.7, 136.7, 132.9, 129.8, 129.5, 129.2, 128.4, 124.8, 117.6, 116.1, 115.9, 113.6. HRMS (ESI) *m/z* calcd for C₁₉H₁₂BrN₃NaO (M+Na)⁺ 400.0061, found 400.0055.

methyl 2-benzoyl-1-(pyrimidin-2-yl)-1H-indole-5-carboxylate (3ia)



White solid, mp. 111-113 °C. ¹H NMR (CDCl₃, 300 MHz): δ 8.66 (d, *J* = 4.8 Hz, 2H), 8.46-8.41 (m, 2H), 8.13 (d, *J* = 8.9 Hz, 1H), 7.98 (d, *J* = 7.1 Hz, 2H), 7.61-7.55 (m, 1H), 7.49-7.44 (m, 2H), 7.18 (s, 1H), 7.12 (t, *J* = 4.8 Hz, 1H), 3.97 (s, 3H). ¹³C NMR (CDCl₃, 150 MHz): δ 187.3, 167.4, 158.2, 156.9, 140.5, 138.3, 137.6, 133.0, 129.6, 128.5, 127.7, 127.4, 125.2, 124.8, 118.0, 115.4, 114.0, 52.2. HRMS (ESI) *m/z* calcd for C₂₁H₁₅N₃NaO₃ (M+Na)⁺ 380.1011, found 380.1018.

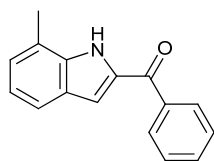
(1H-indol-2-yl)(phenyl)methanone (3aa')³



¹H NMR (CDCl₃, 300 MHz): δ 9.61 (s, 1H), 8.03 (d, *J* = 8.1 Hz, 2H), 7.74 (d, *J* = 8.1 Hz, 1H), 7.67-7.50 (m, 4H), 7.42-7.37 (m, 1H), 7.21-7.16 (m, 2H). ¹³C NMR (CDCl₃, 150 MHz): δ 187.3, 138.0, 137.6, 134.3, 132.4, 129.3, 128.5, 127.7, 126.6, 123.3, 121.1, 112.9, 112.3.

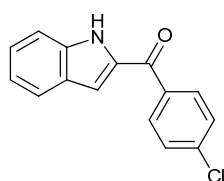
³ M. Arthuis, R. Pontikis and J.-C. Florent, *Org. Lett.*, 2009, **11**, 4608.

(7-methyl-1H-indol-2-yl)(phenyl)methanone (3ba')⁴



¹H NMR (CDCl₃, 300 MHz): δ 9.49 (s, 1H), 8.03 (d, *J* = 6.9 Hz, 2H), 7.64-7.52 (m, 4H), 7.20-7.18 (m, 2H), 7.13-7.08 (m, 1H), 2.58 (s, 3H). ¹³C NMR (CDCl₃, 150 MHz): δ 187.4, 138.1, 137.5, 134.2, 132.4, 129.3, 128.5, 127.3, 126.7, 121.7, 121.3, 120.8, 113.6, 16.8.

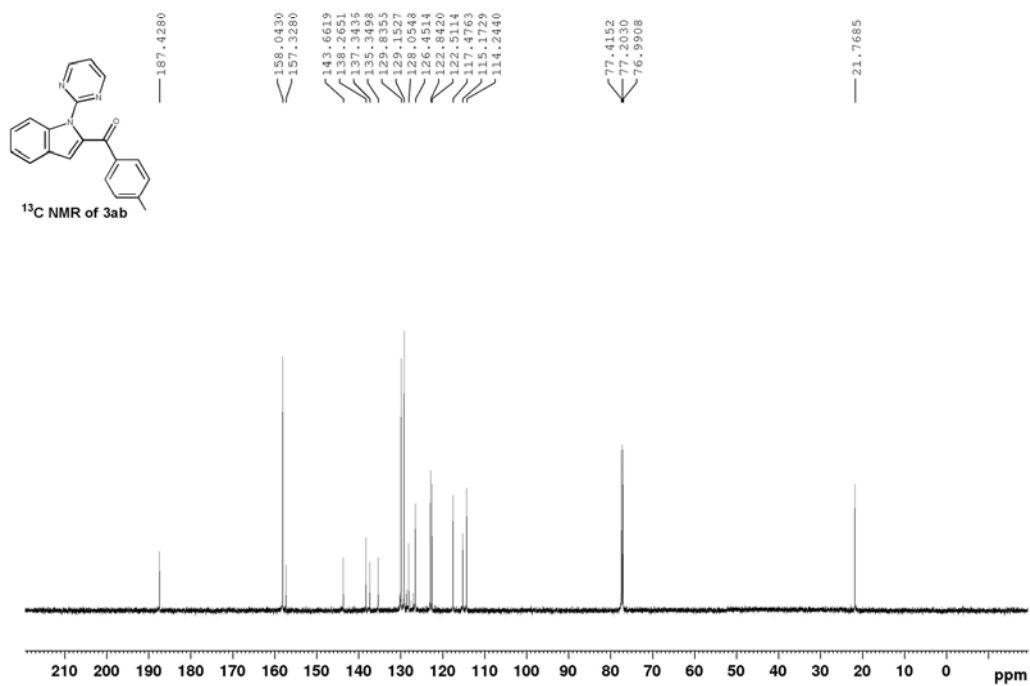
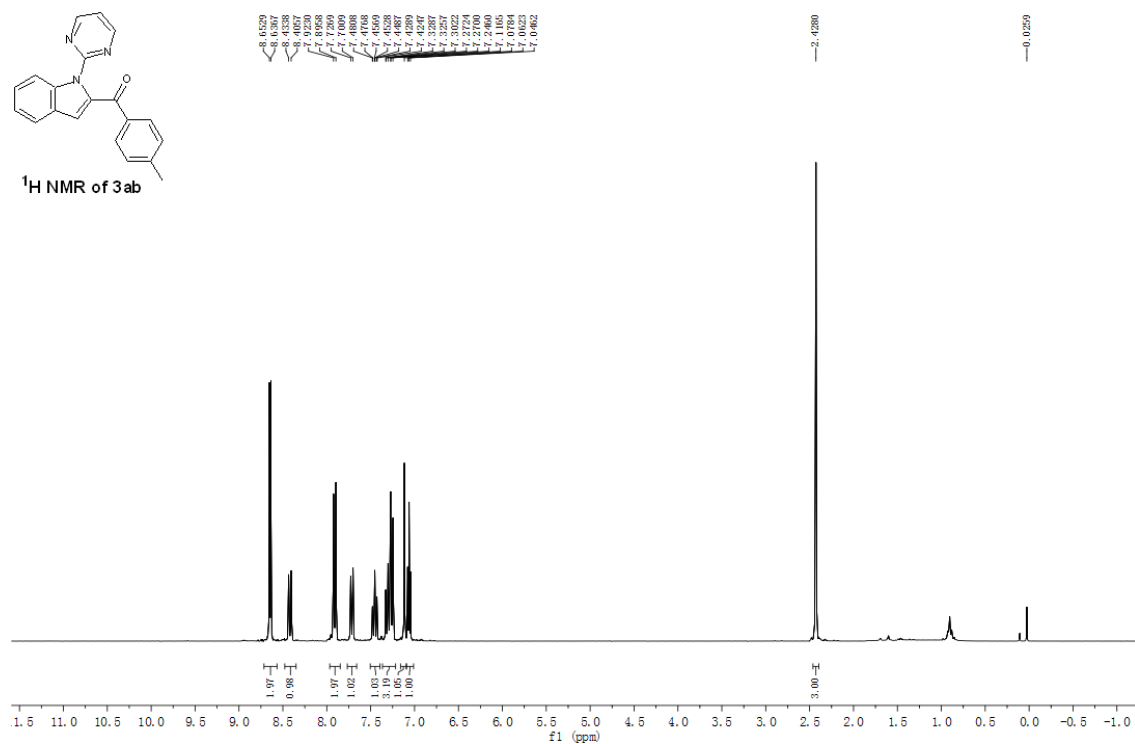
(4-chlorophenyl)(1H-indol-2-yl)methanone (3ag')³



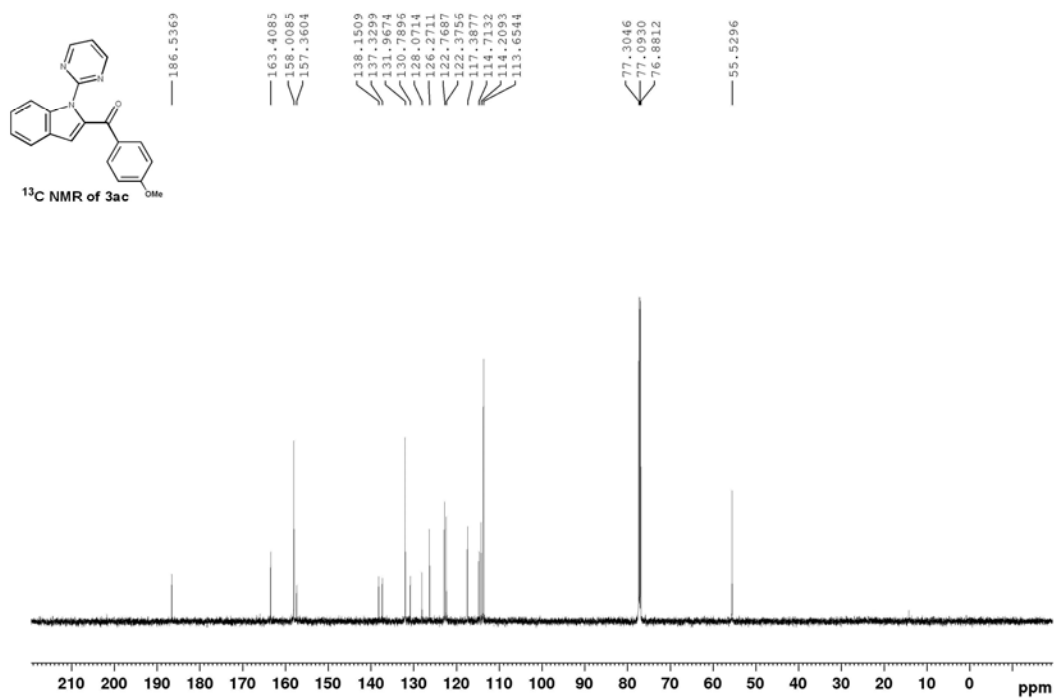
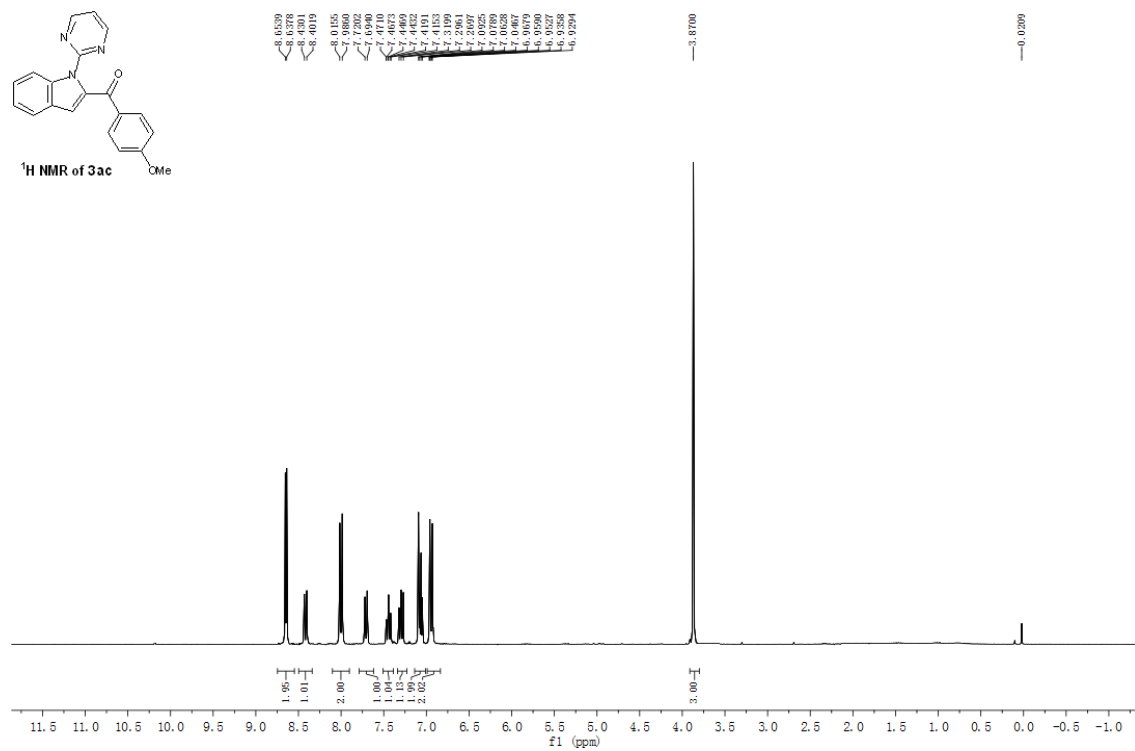
¹H NMR (CDCl₃, 300 MHz): δ 9.63 (s, 1H), 7.97 (d, *J* = 8.4 Hz, 2H), 7.74 (d, *J* = 8.1 Hz, 1H), 7.55-7.49 (m, 3H), 7.43-7.38 (m, 1H), 7.22-7.16 (m, 2H). ¹³C NMR (CDCl₃, 150 MHz): δ 185.9, 138.8, 137.7, 136.3, 134.0, 130.6, 128.8, 127.7, 126.8, 123.3, 121.2, 112.8, 112.2.

⁴ Q.-Q. Yang, C. Xiao, L.-Q. Lu, J. An, F. Tan, B.-J. Li and W.-J. Xiao, *Angew. Chem. Int. Ed.*, 2012, **51**, 9137.

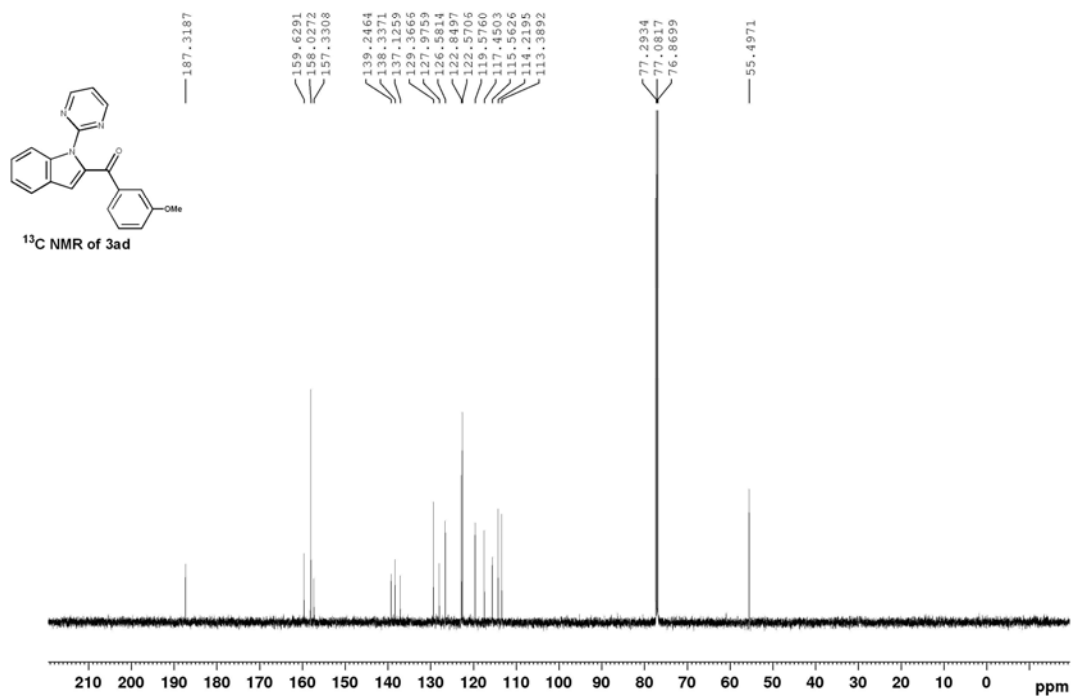
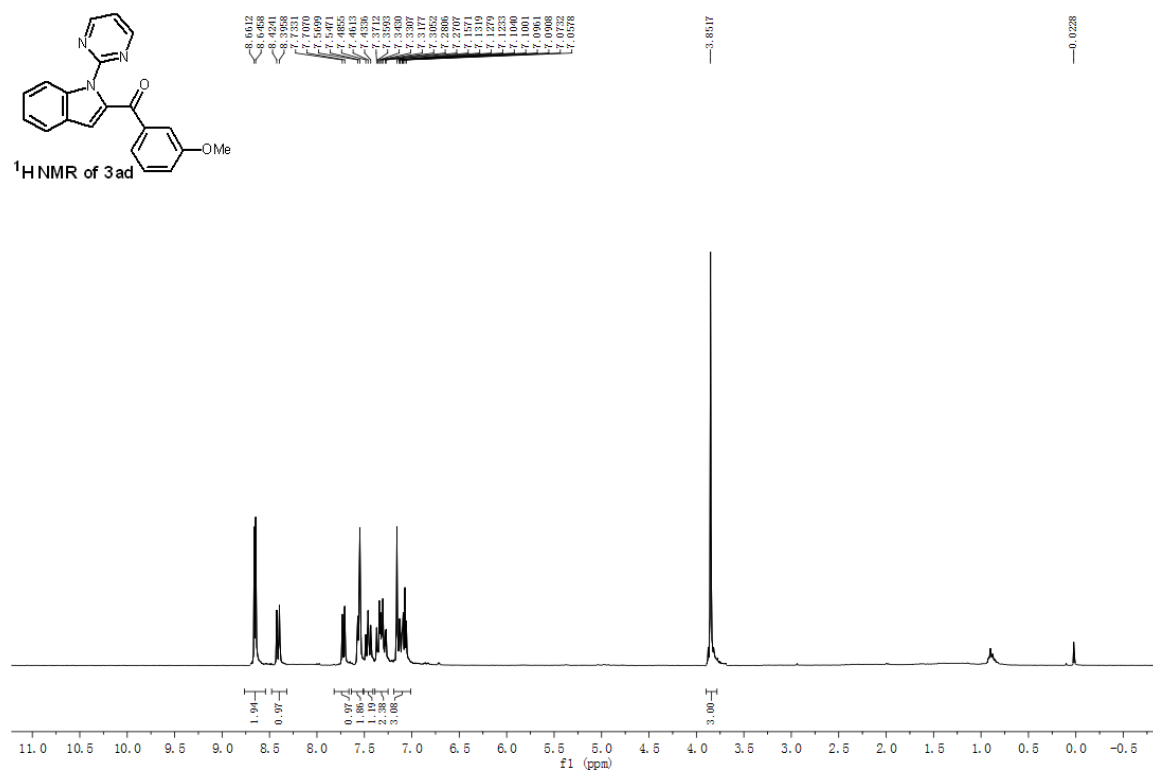
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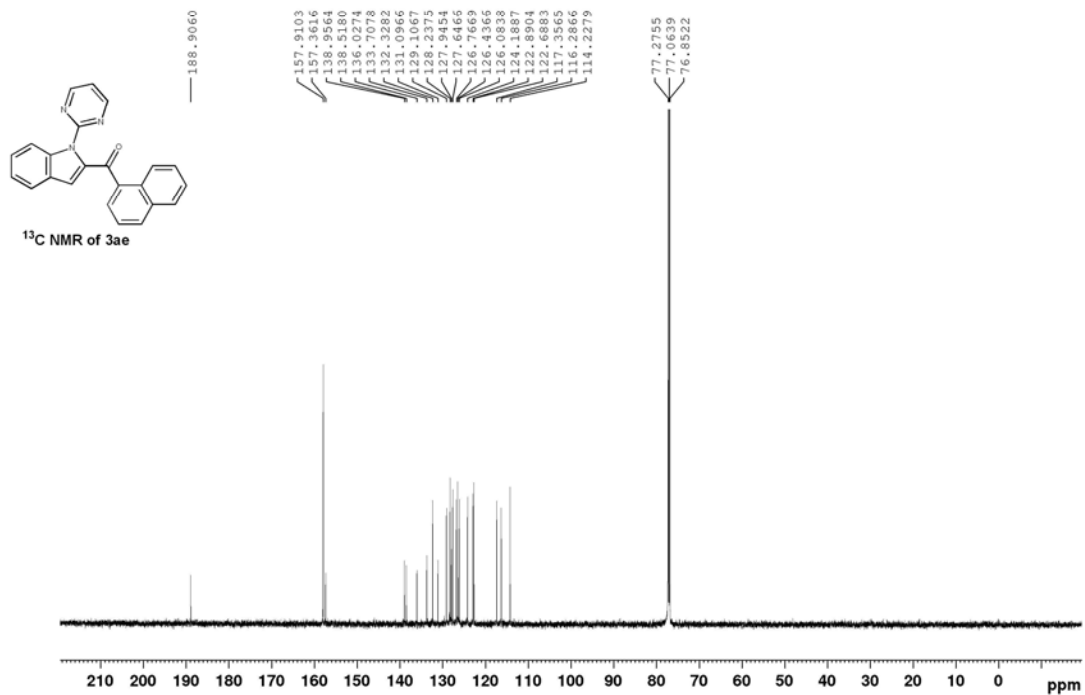
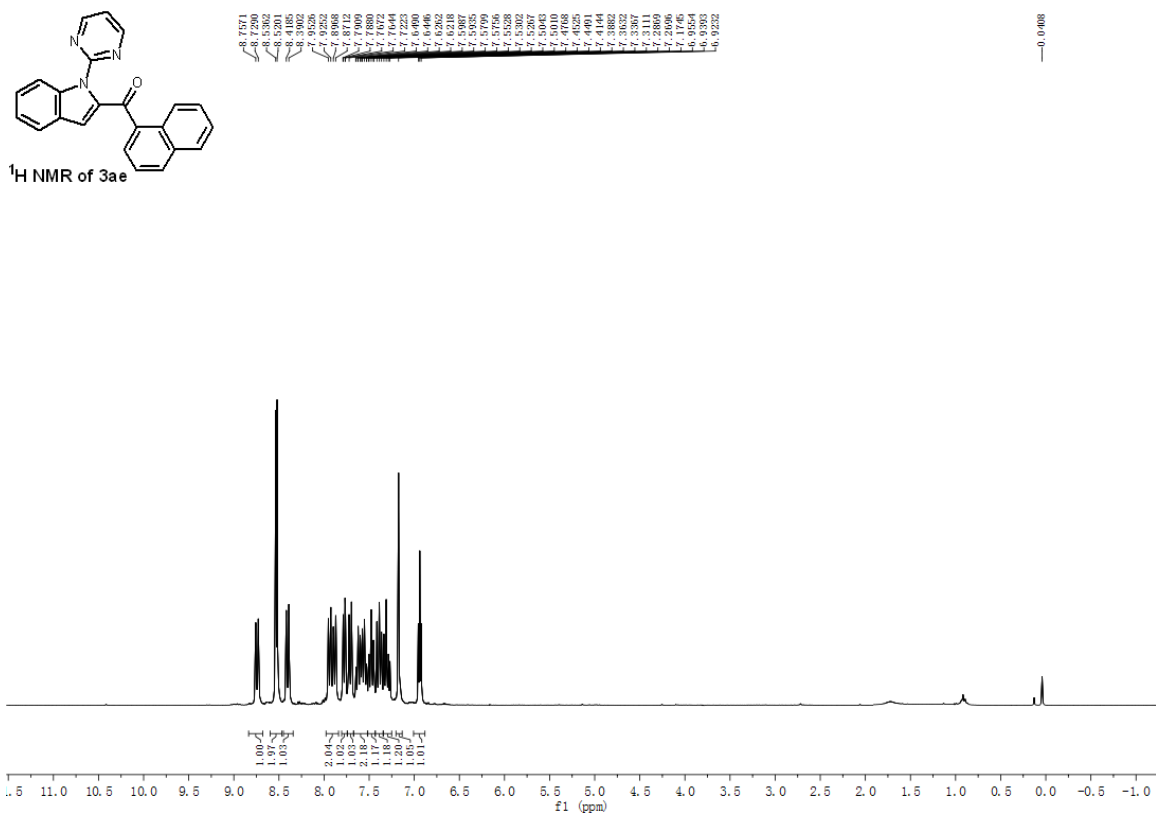
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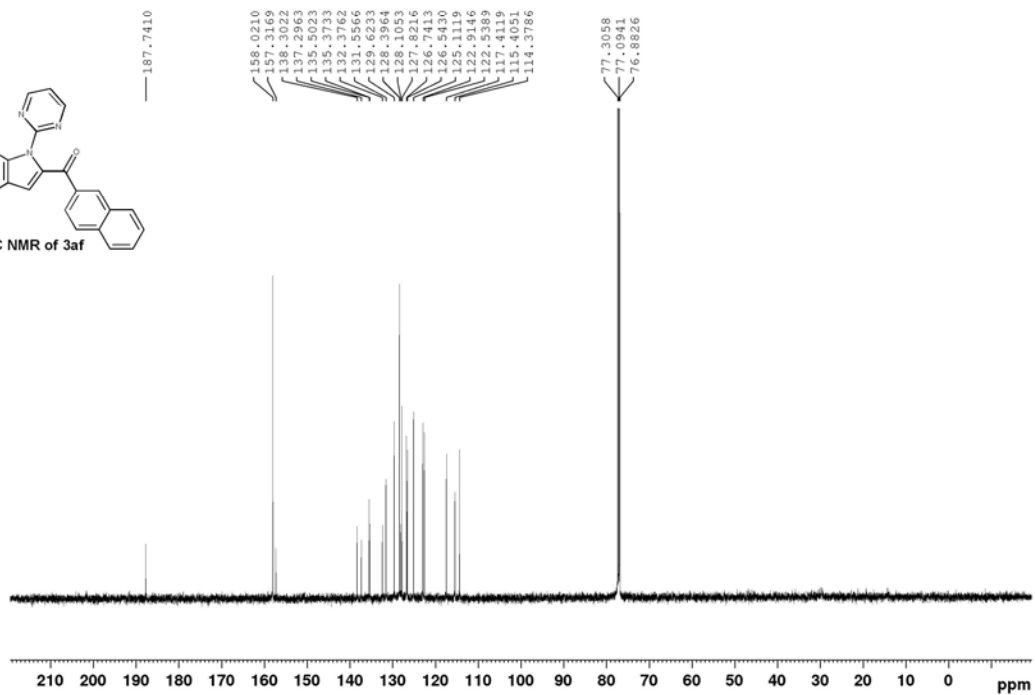
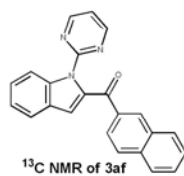
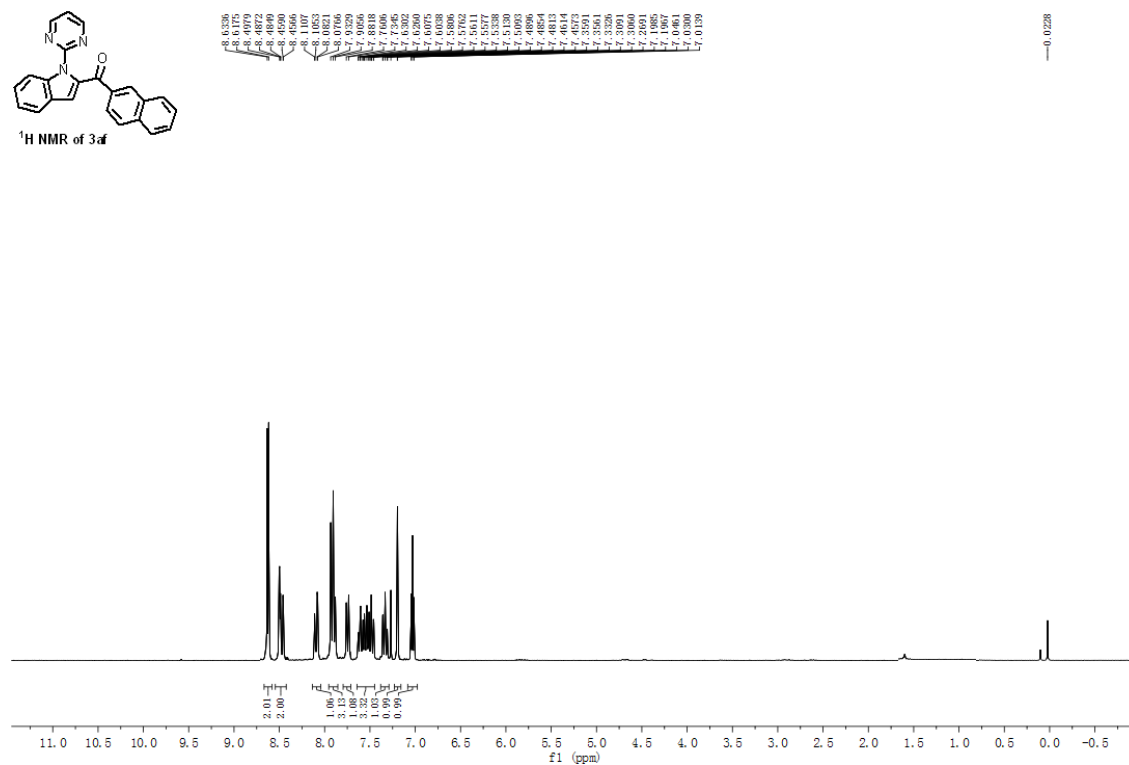
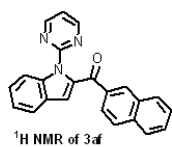
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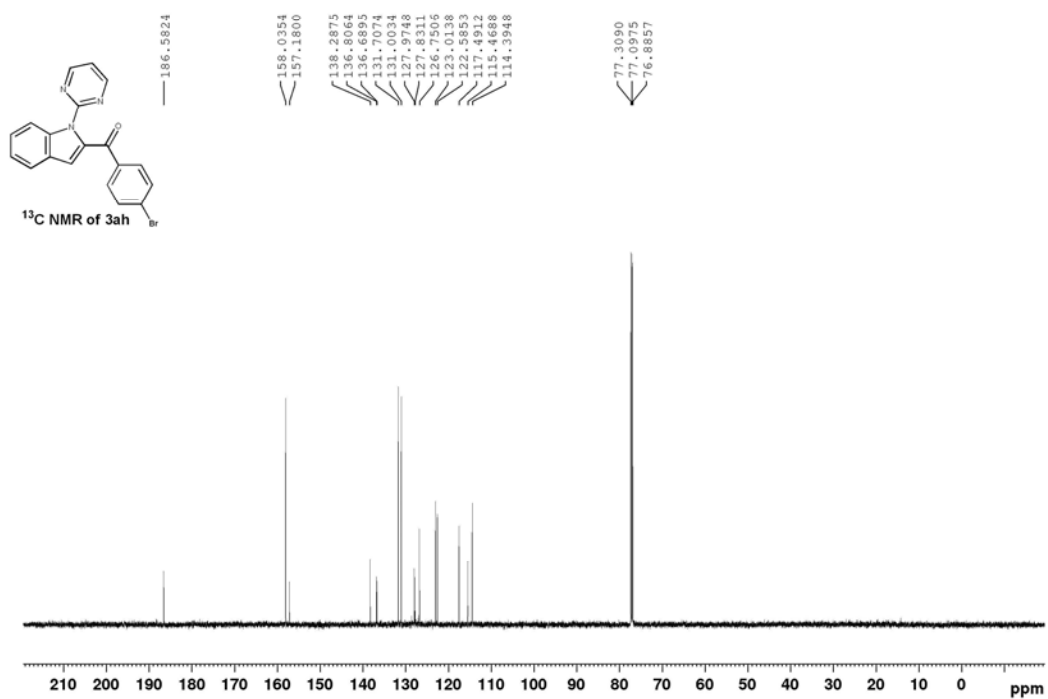
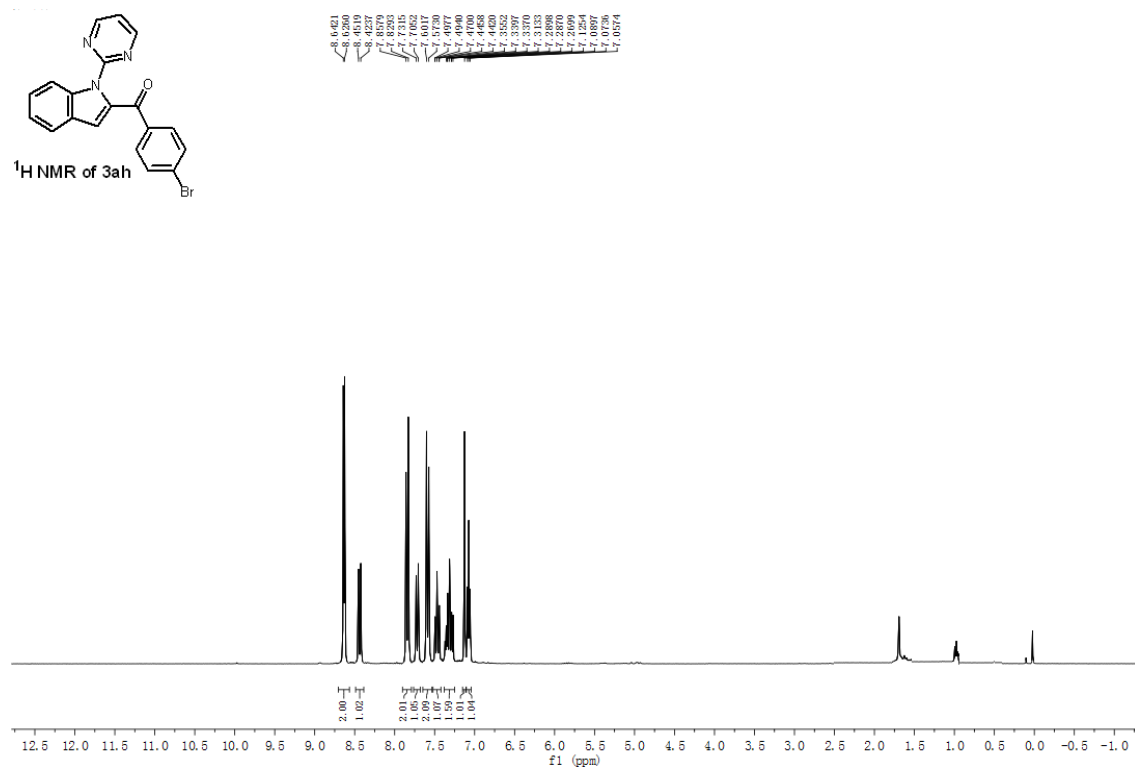
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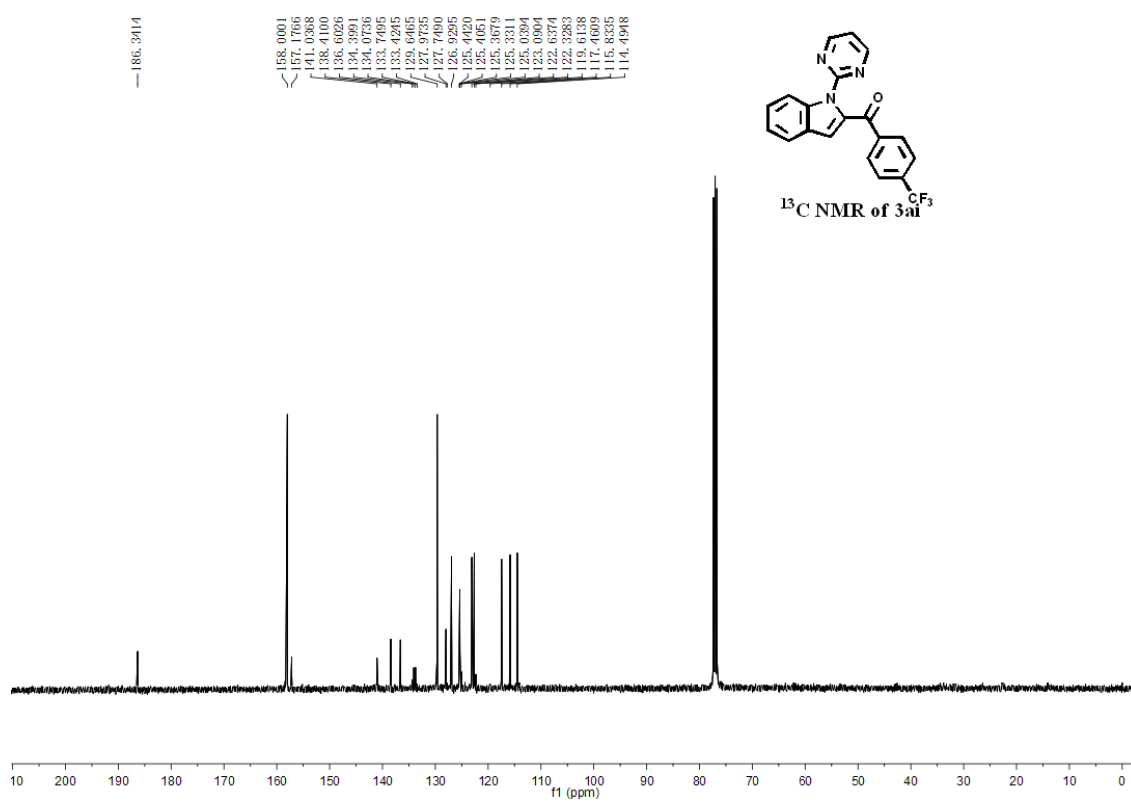
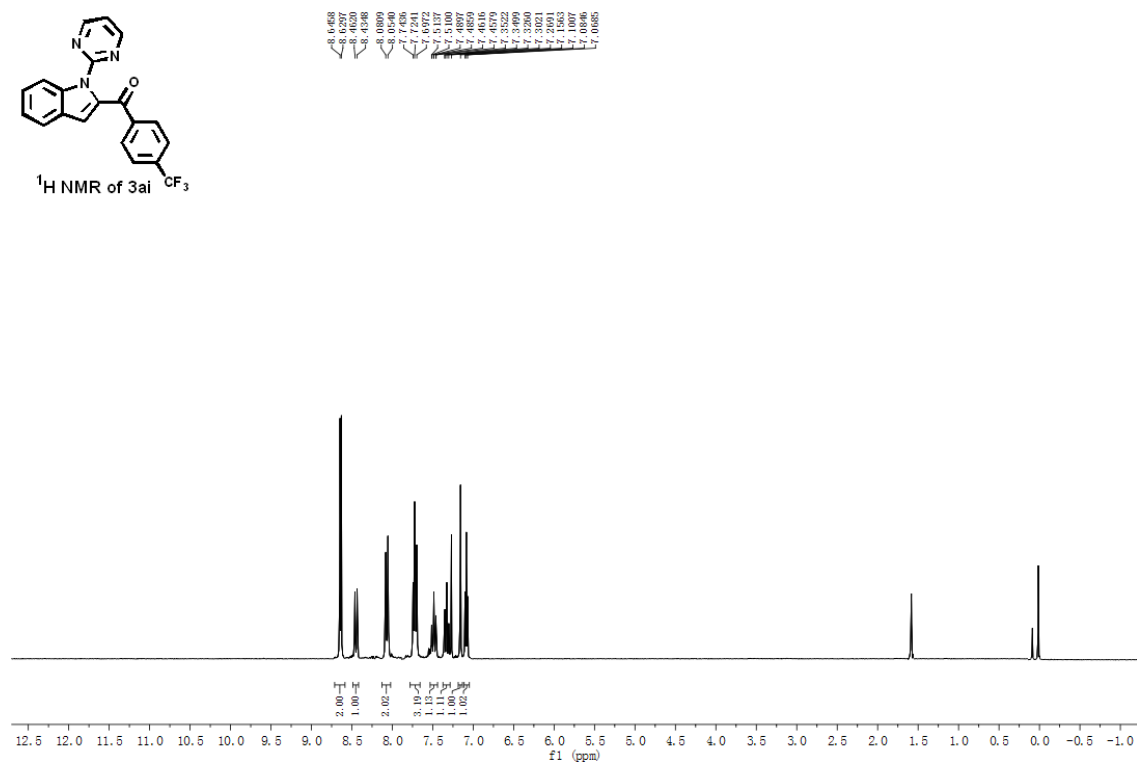
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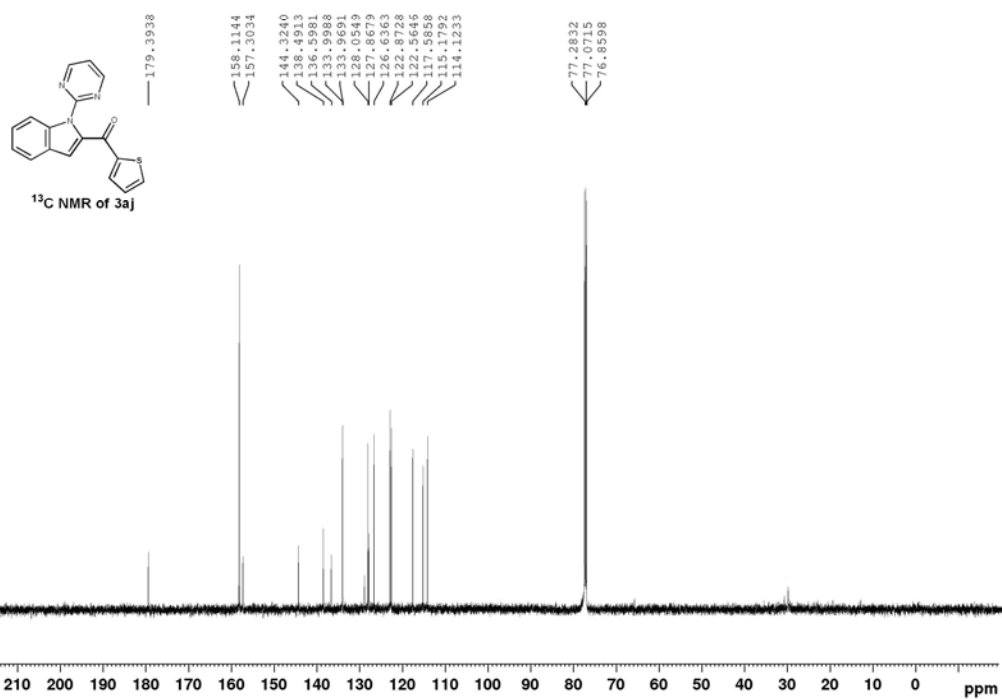
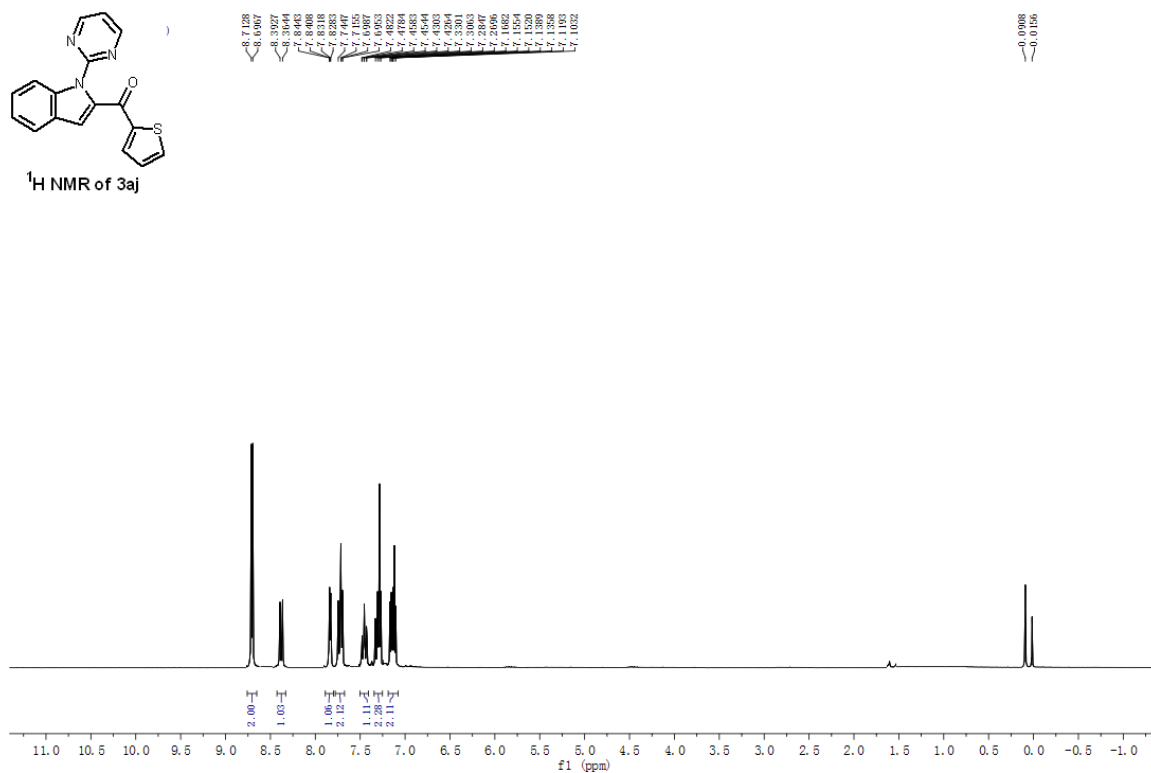
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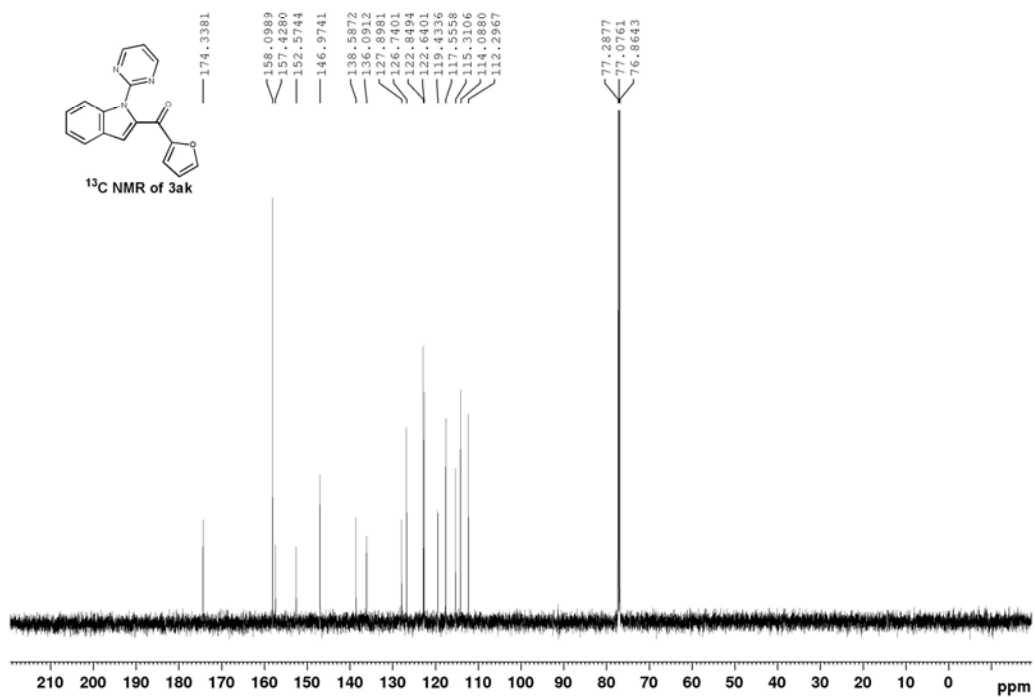
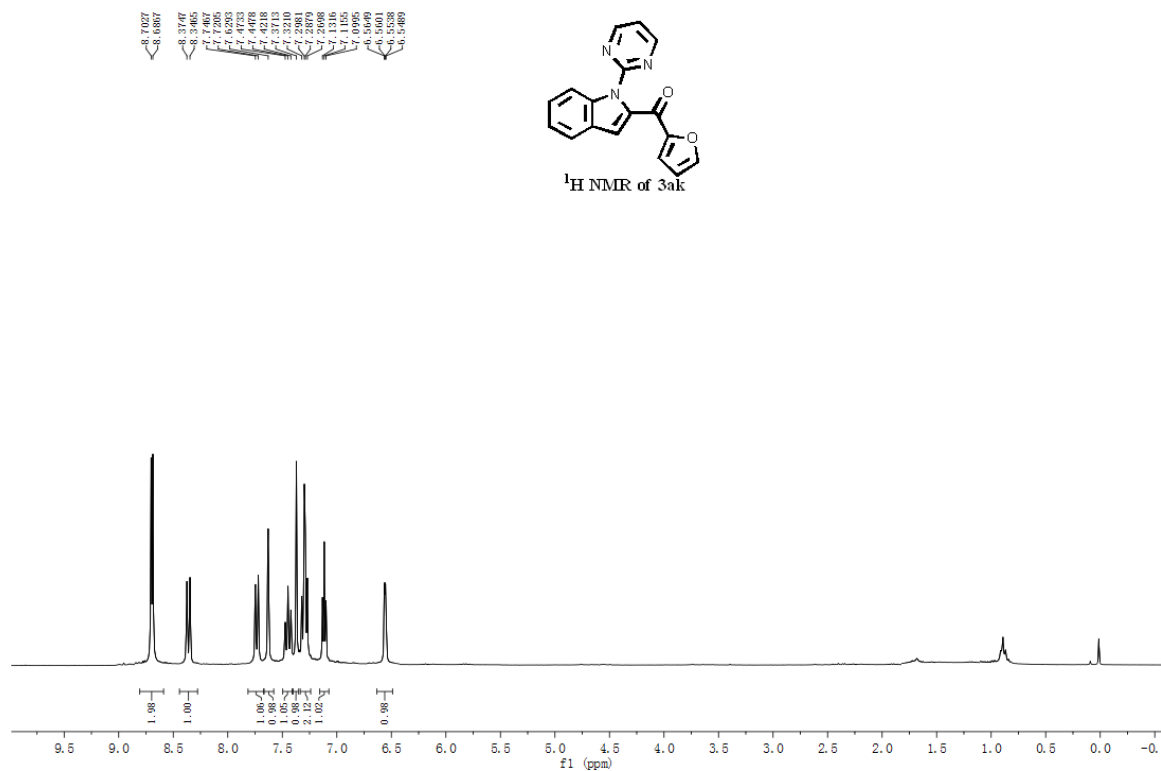
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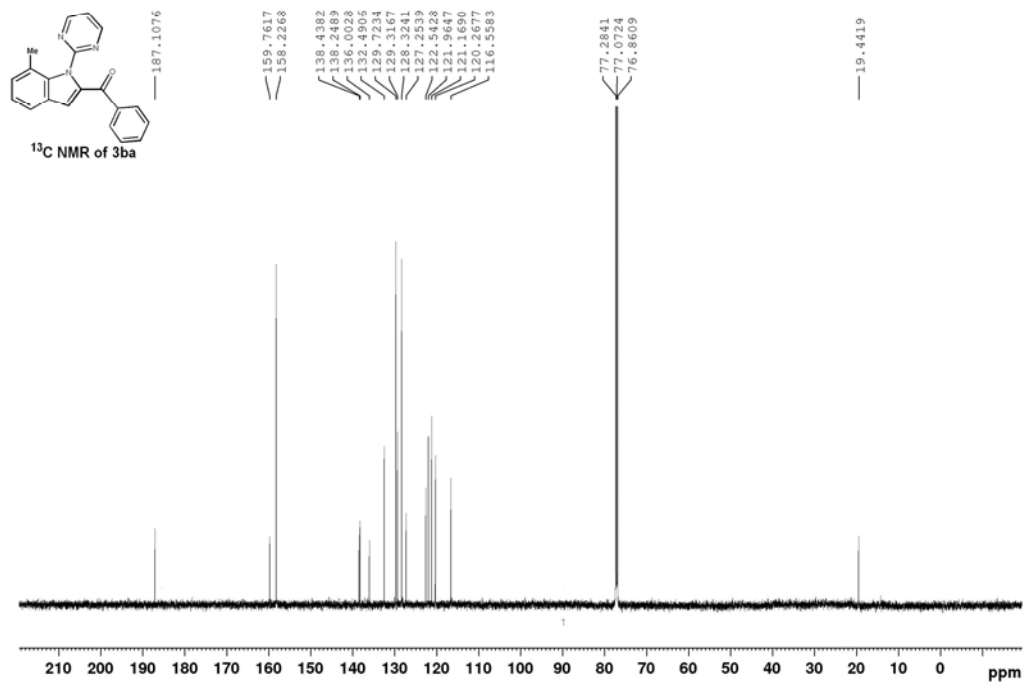
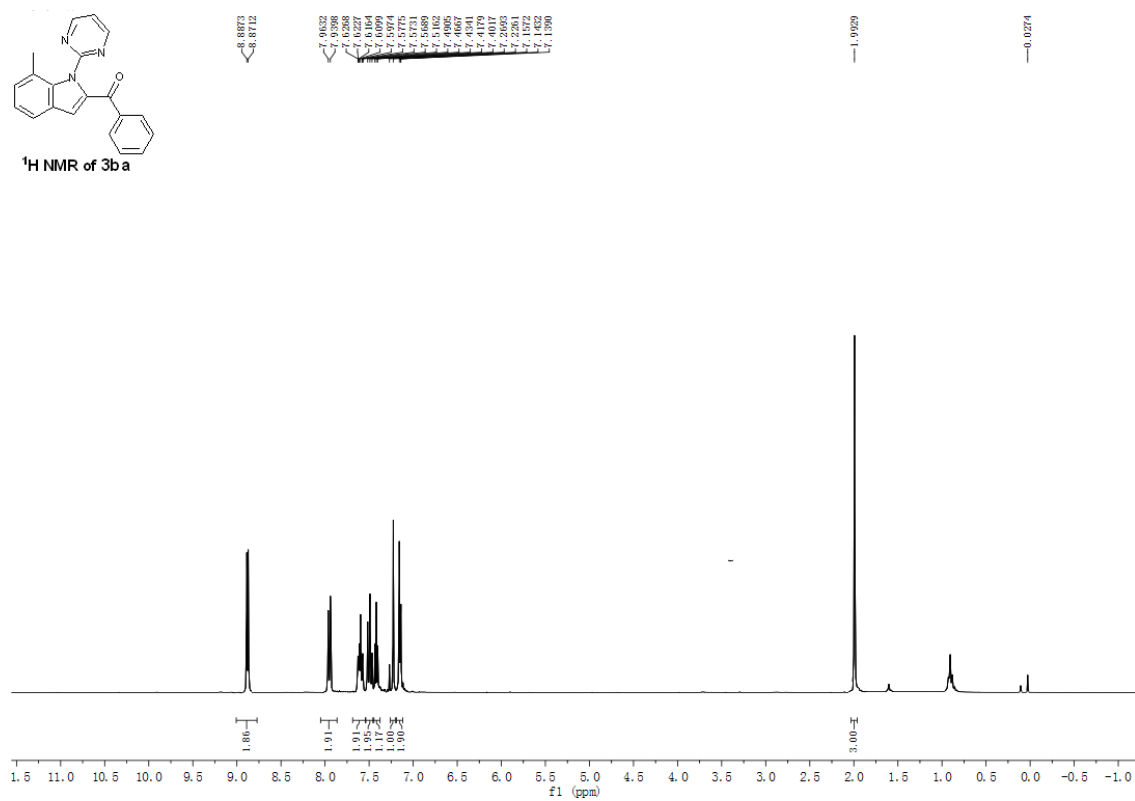
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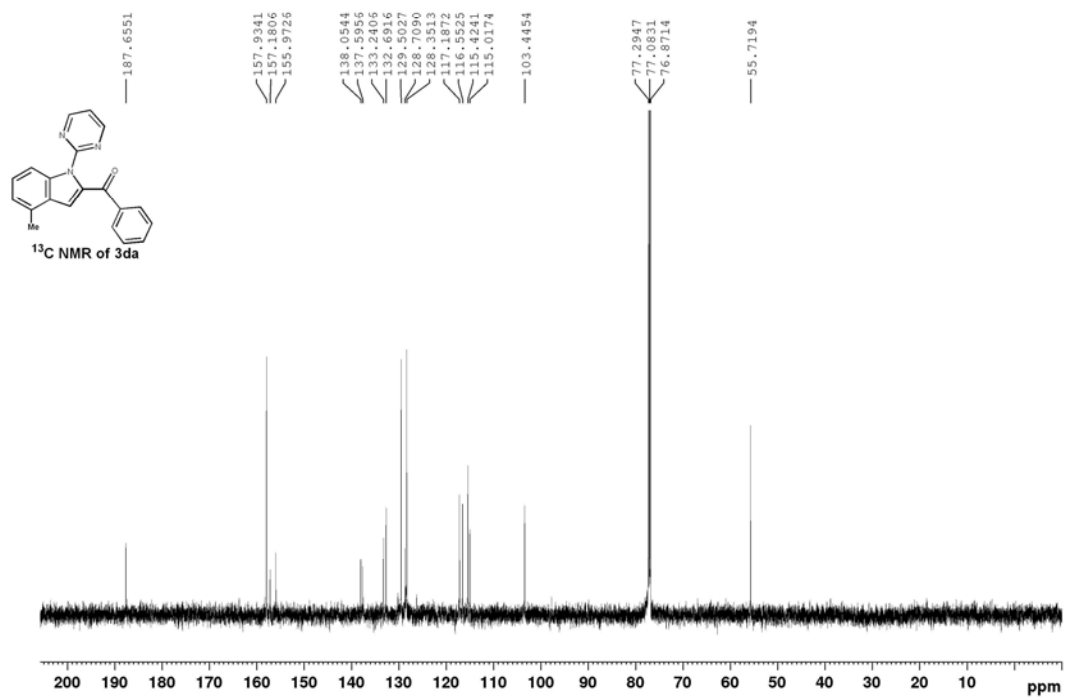
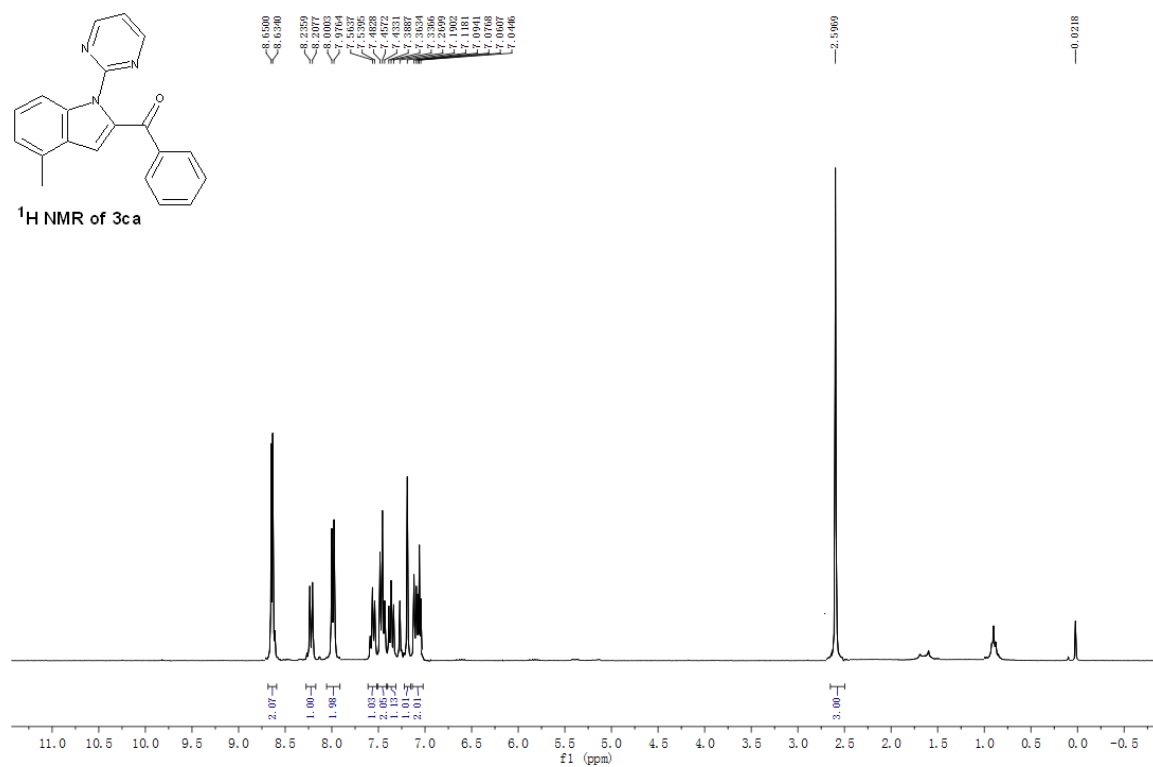
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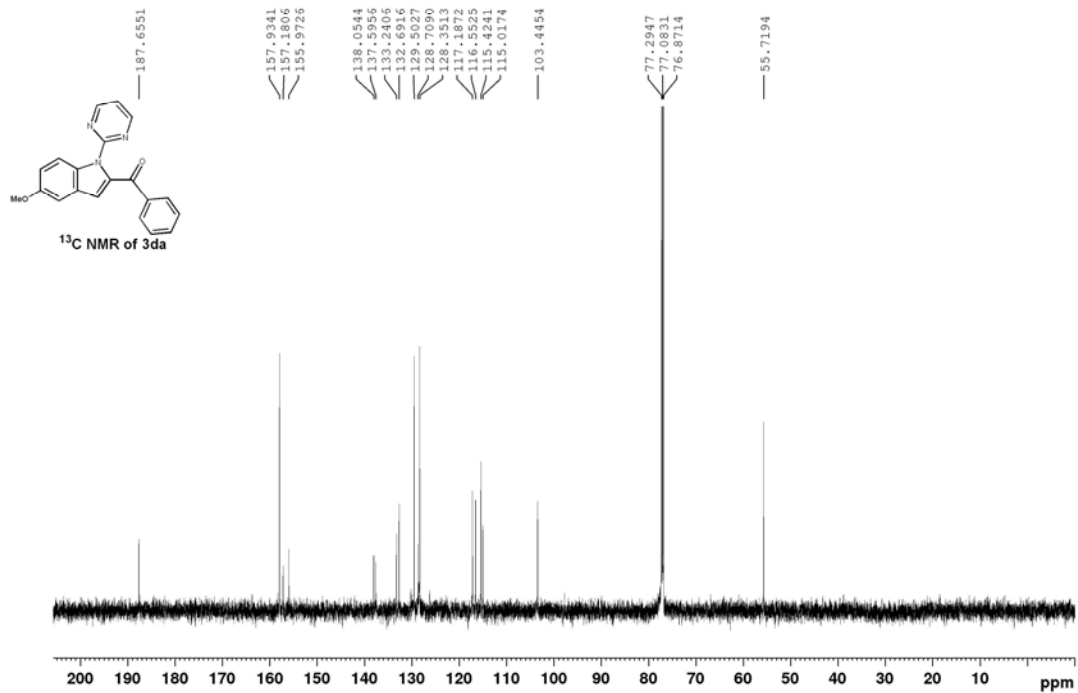
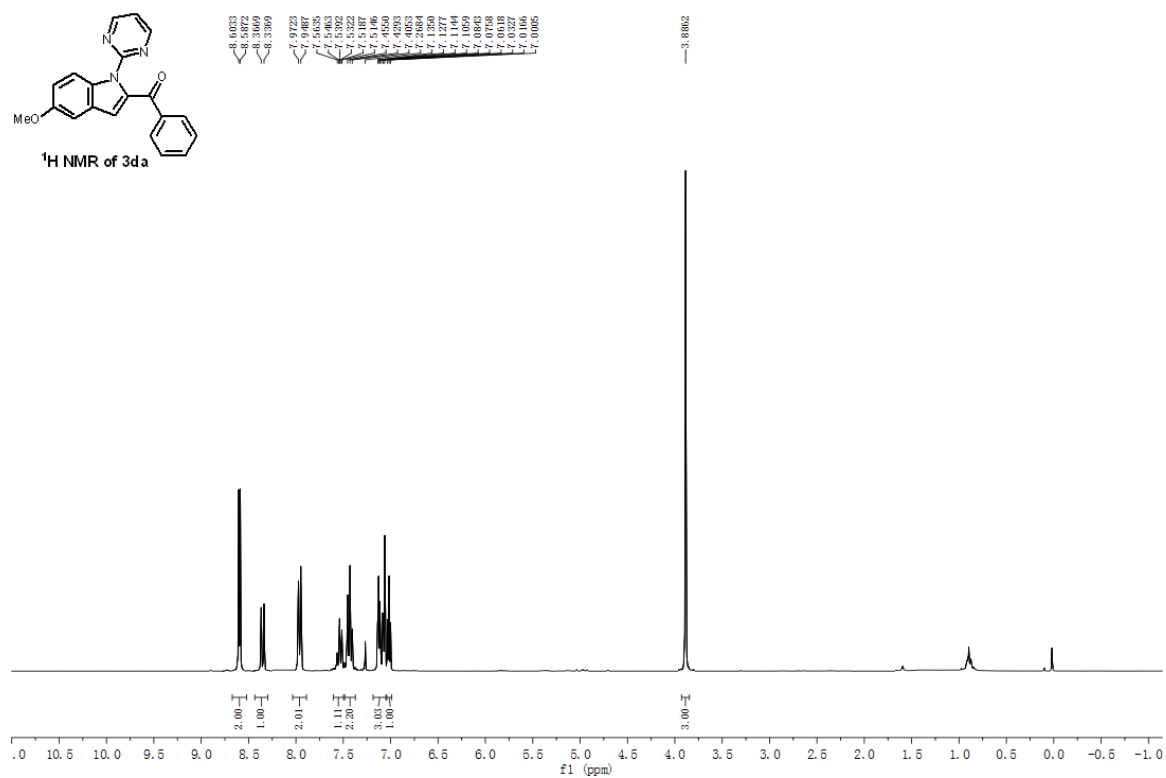
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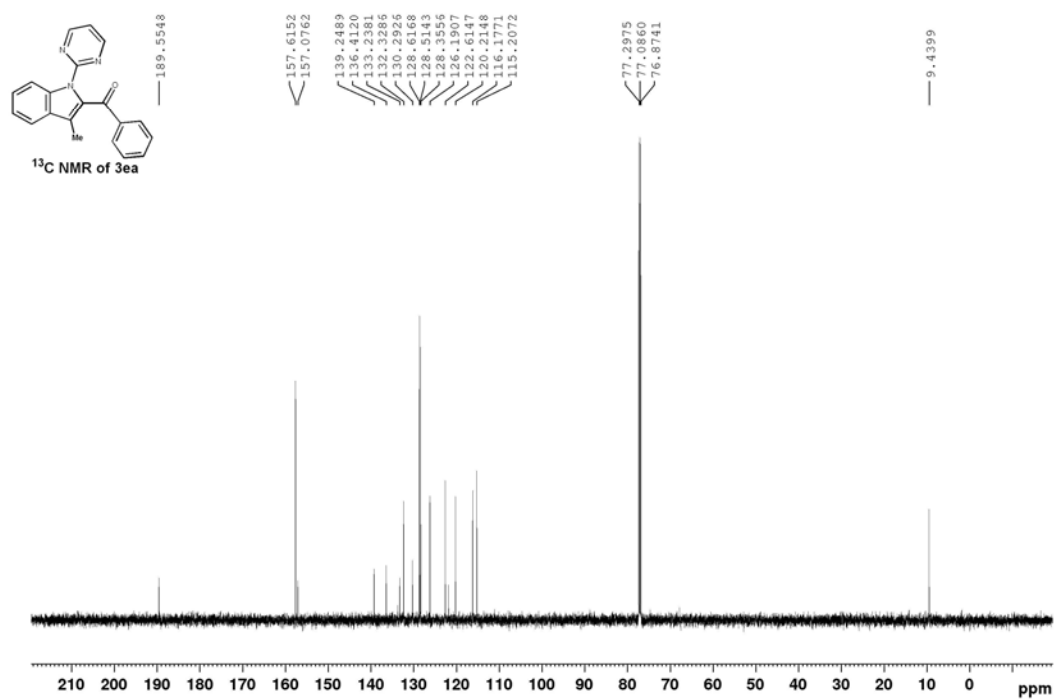
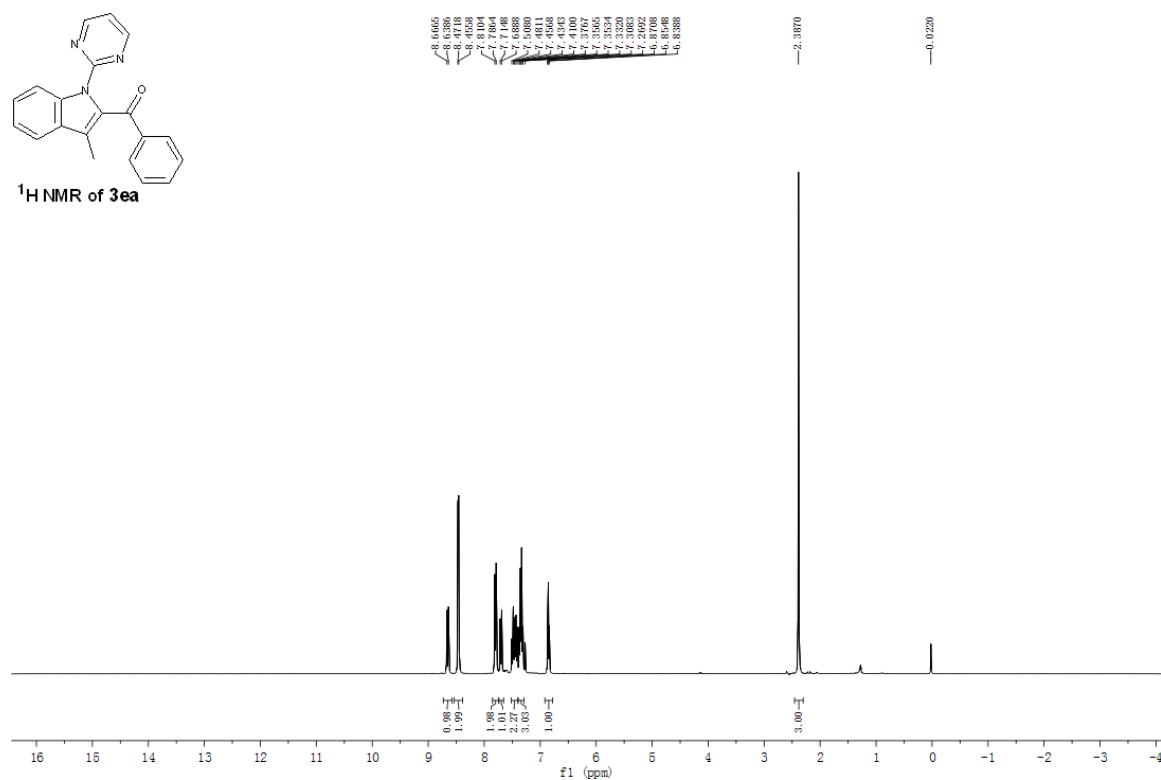
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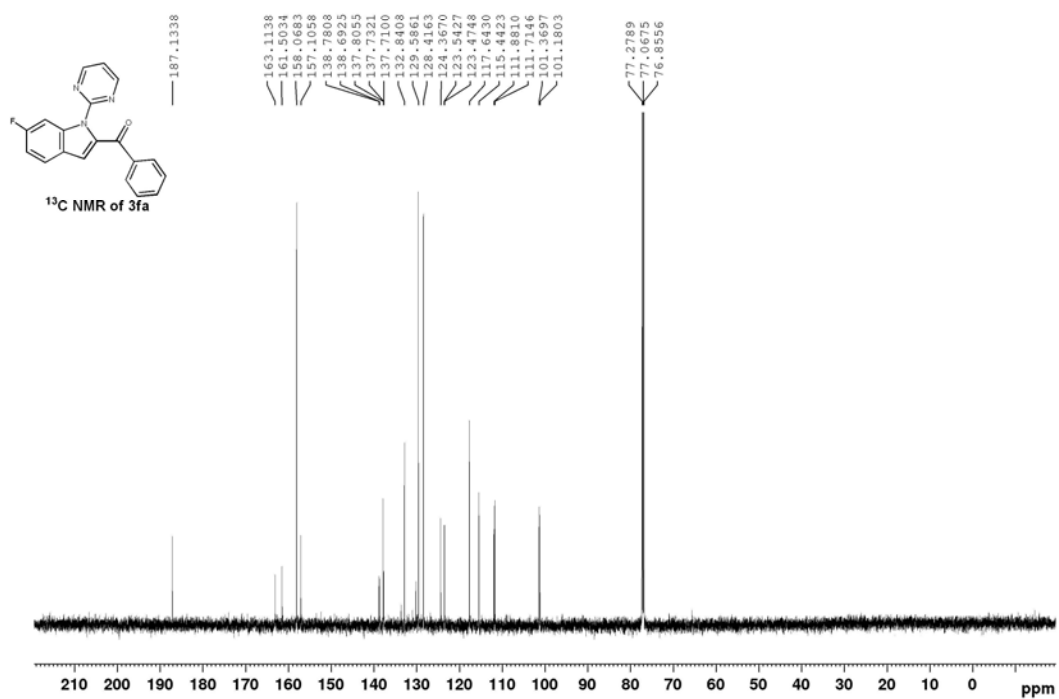
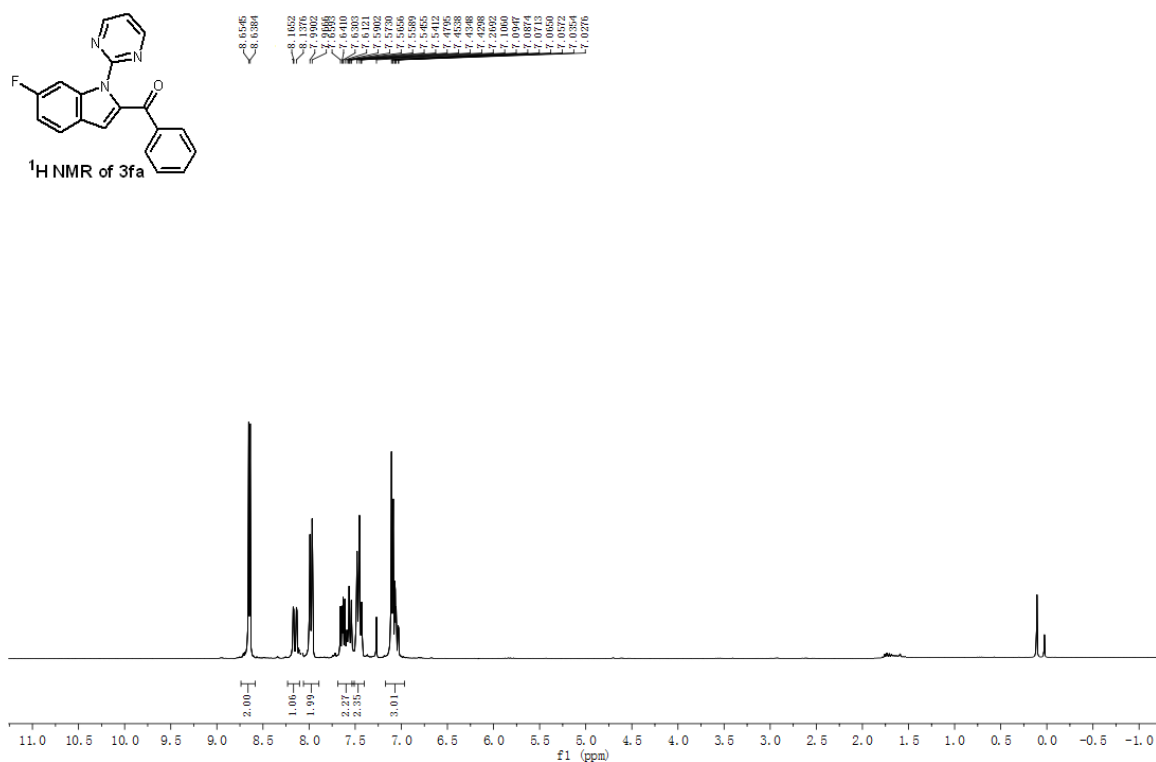
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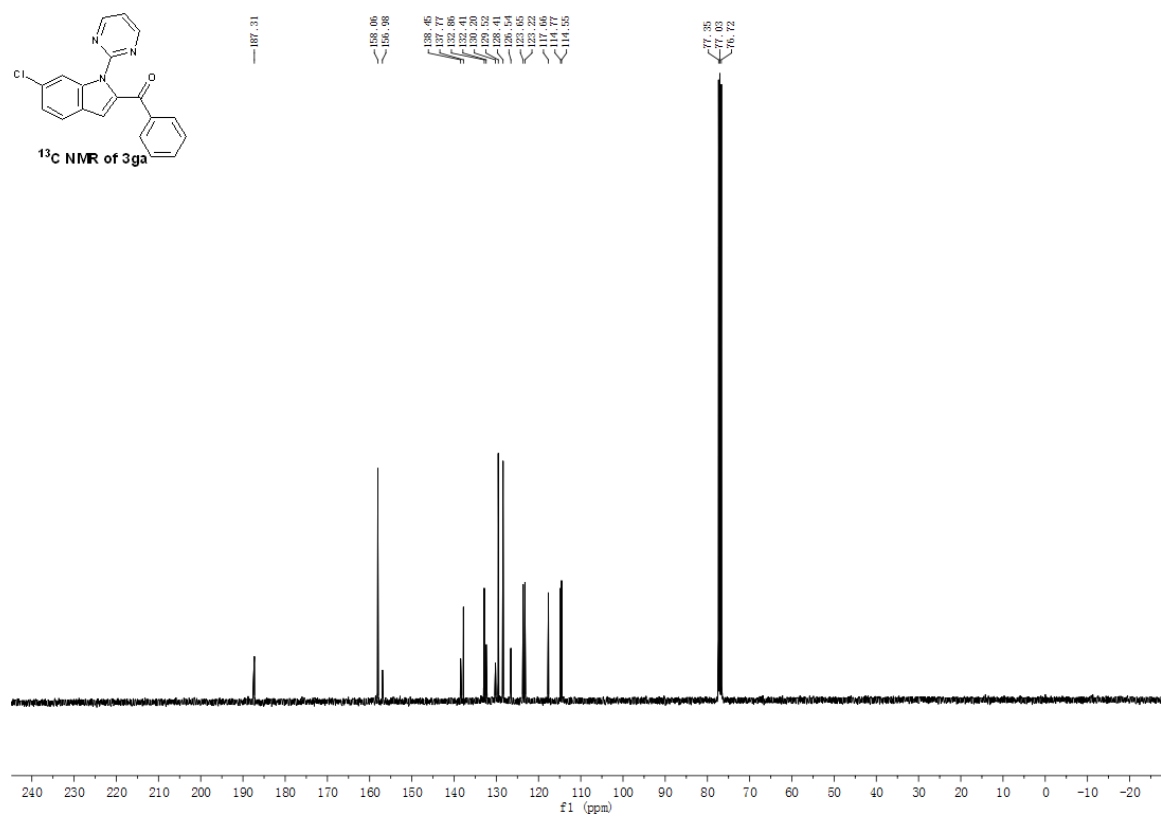
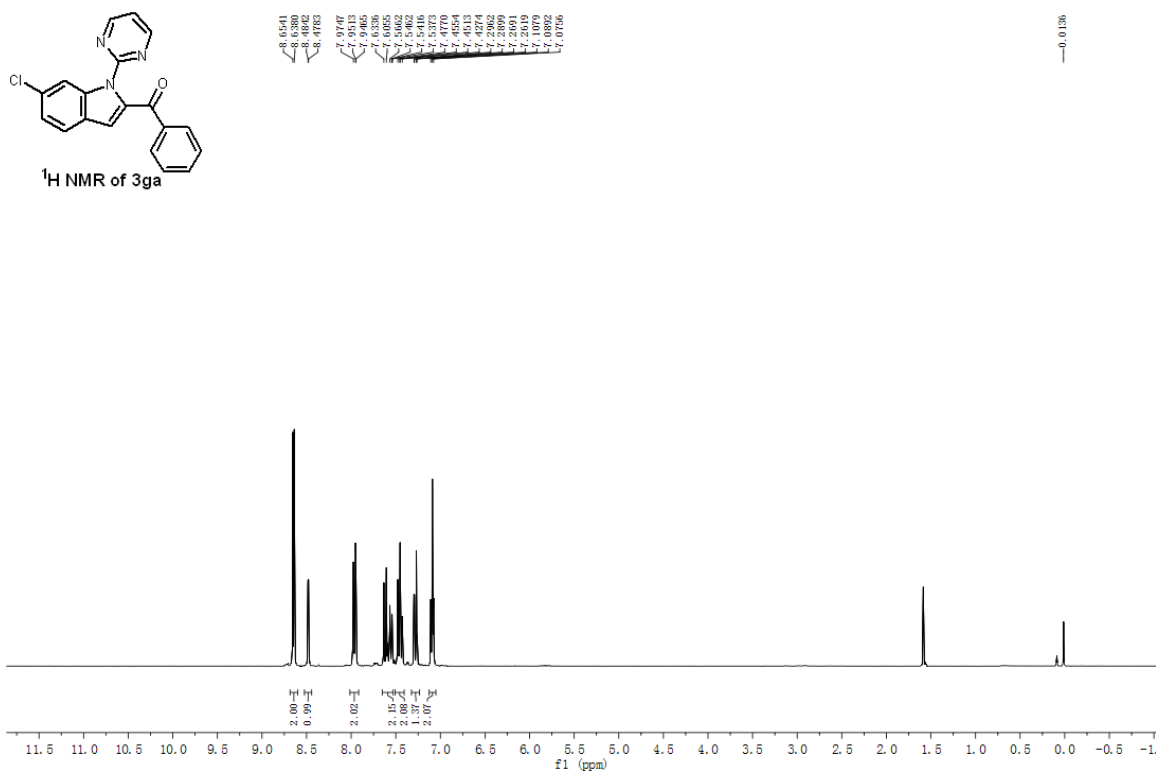
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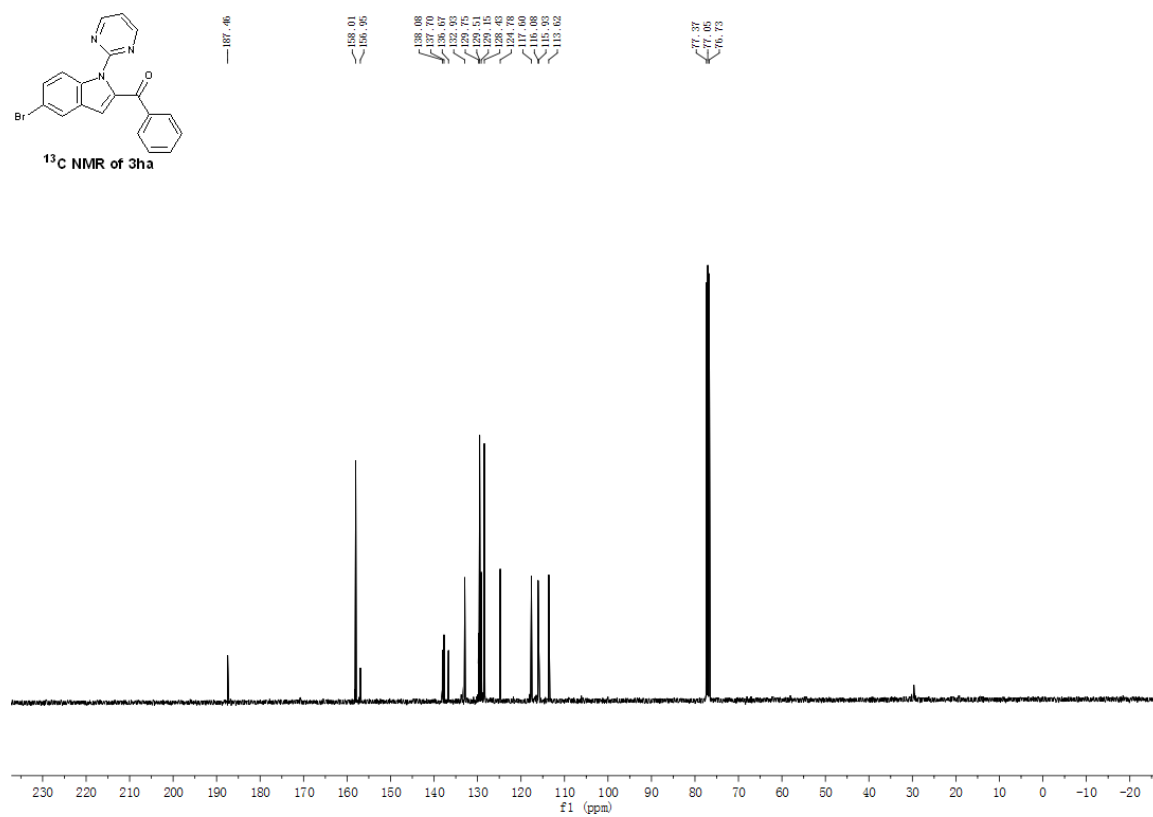
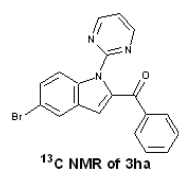
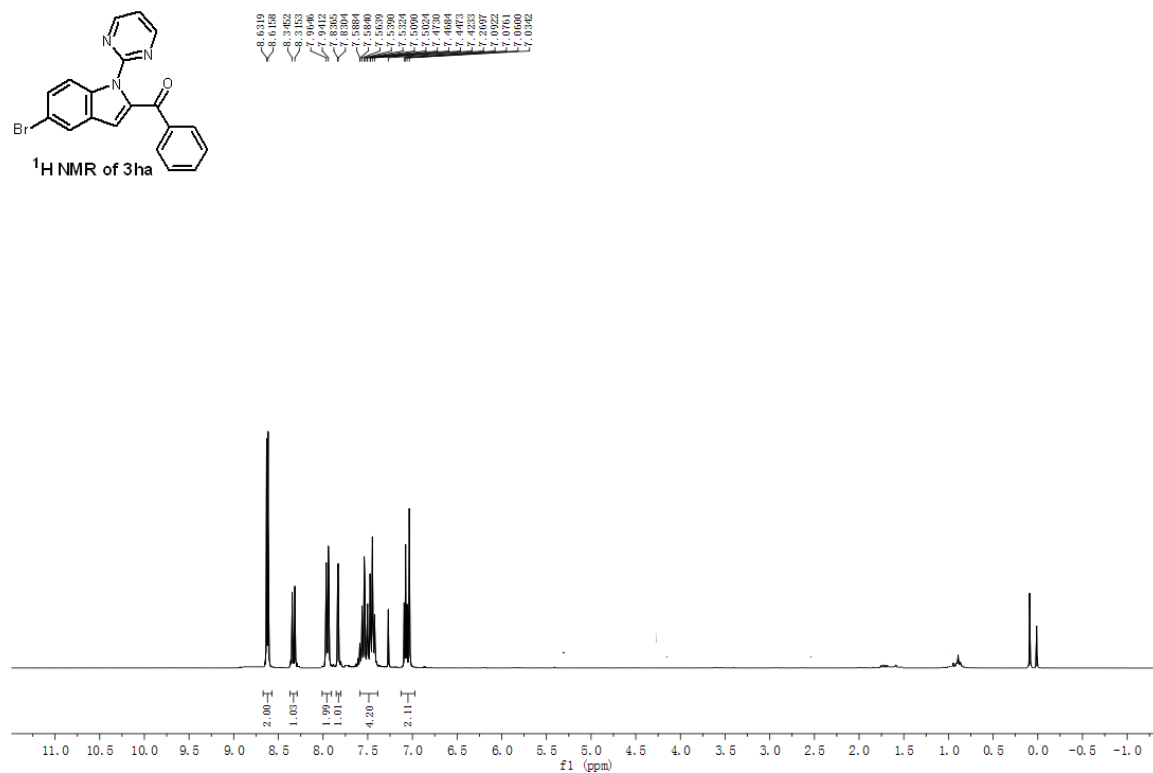
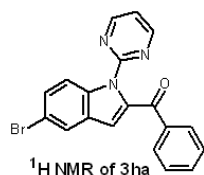
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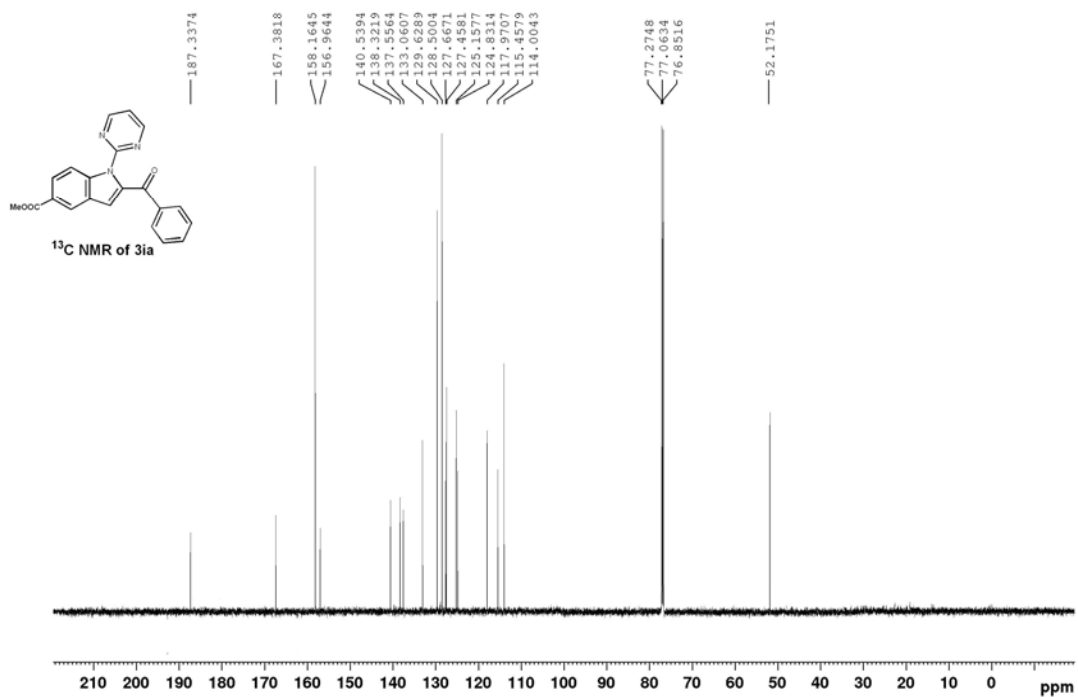
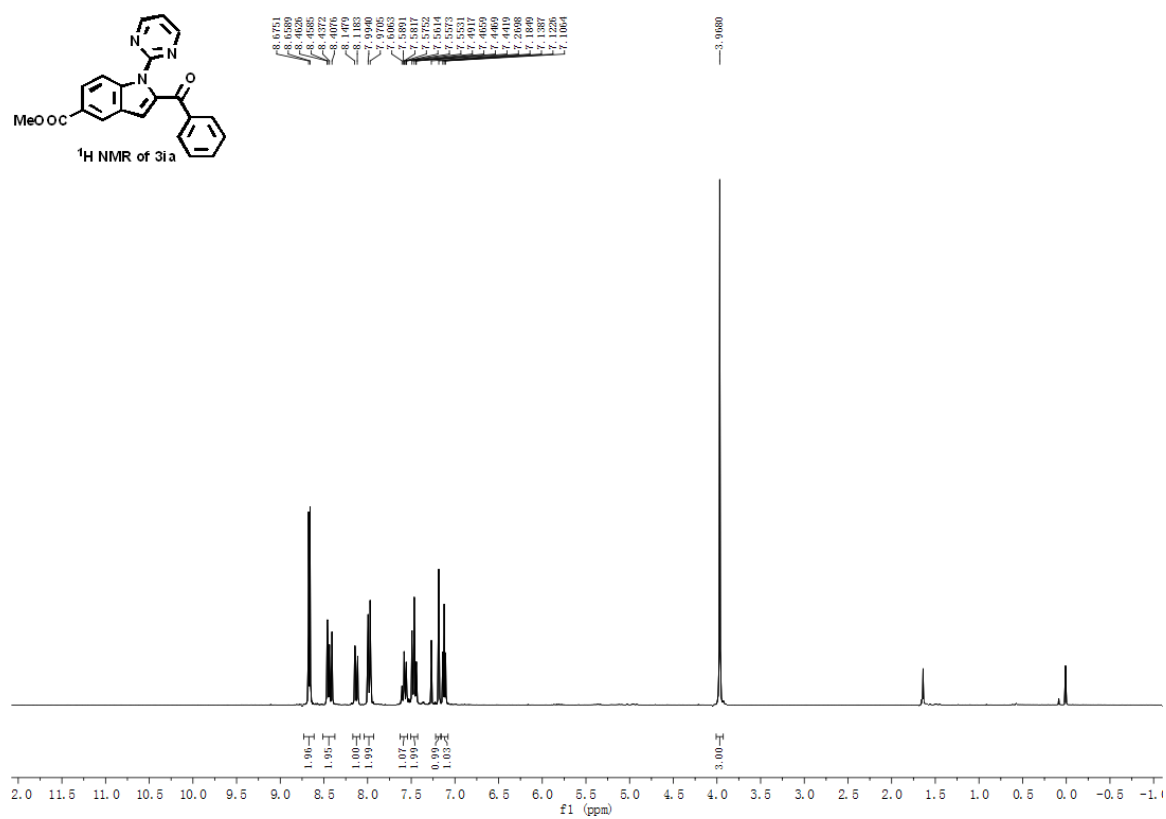
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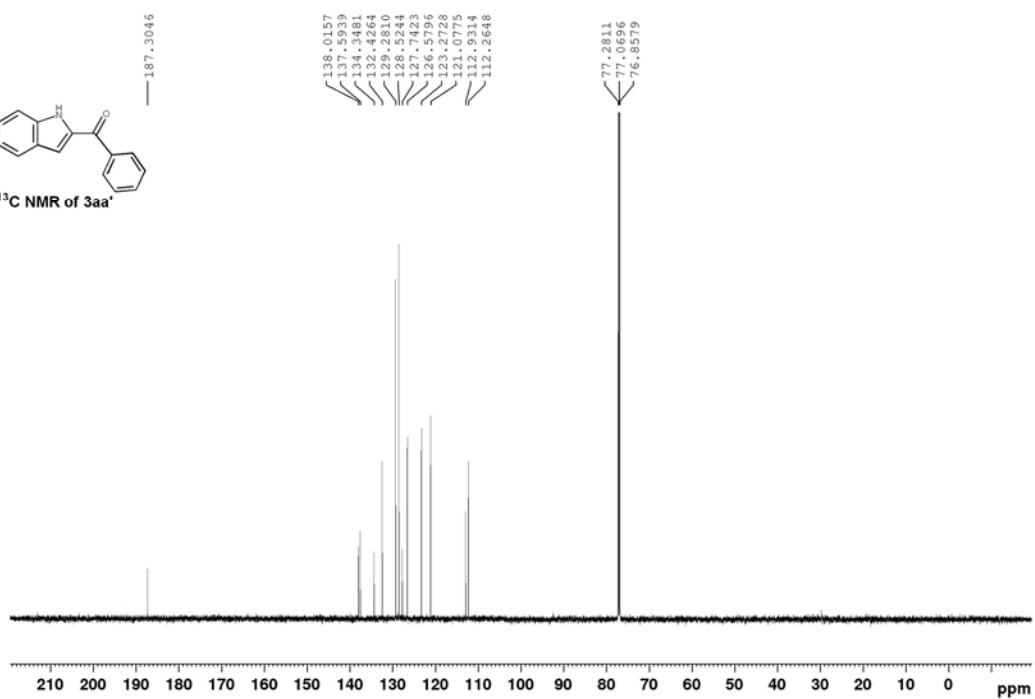
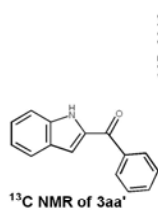
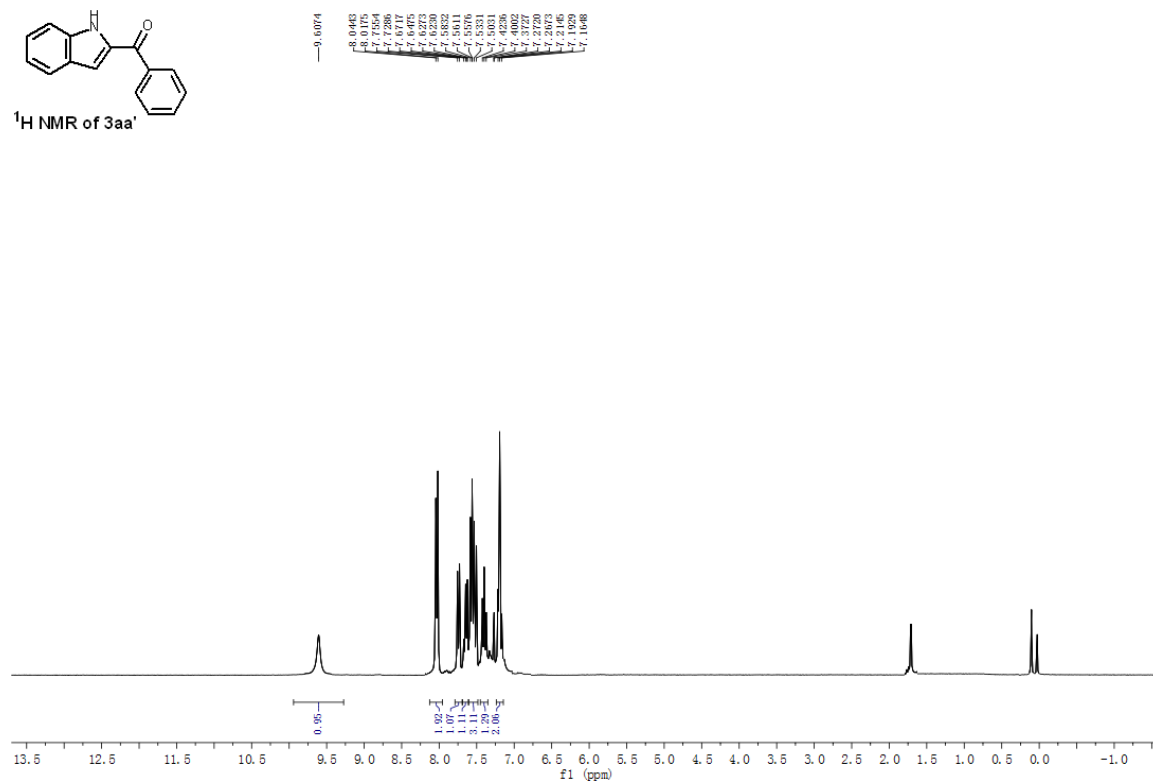
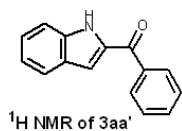
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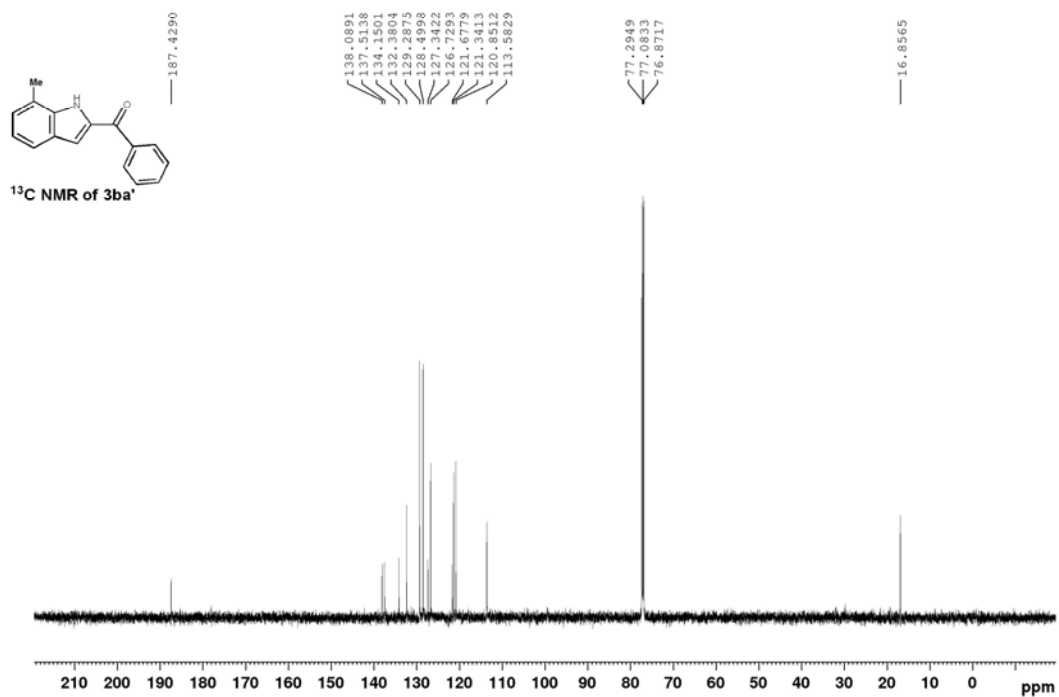
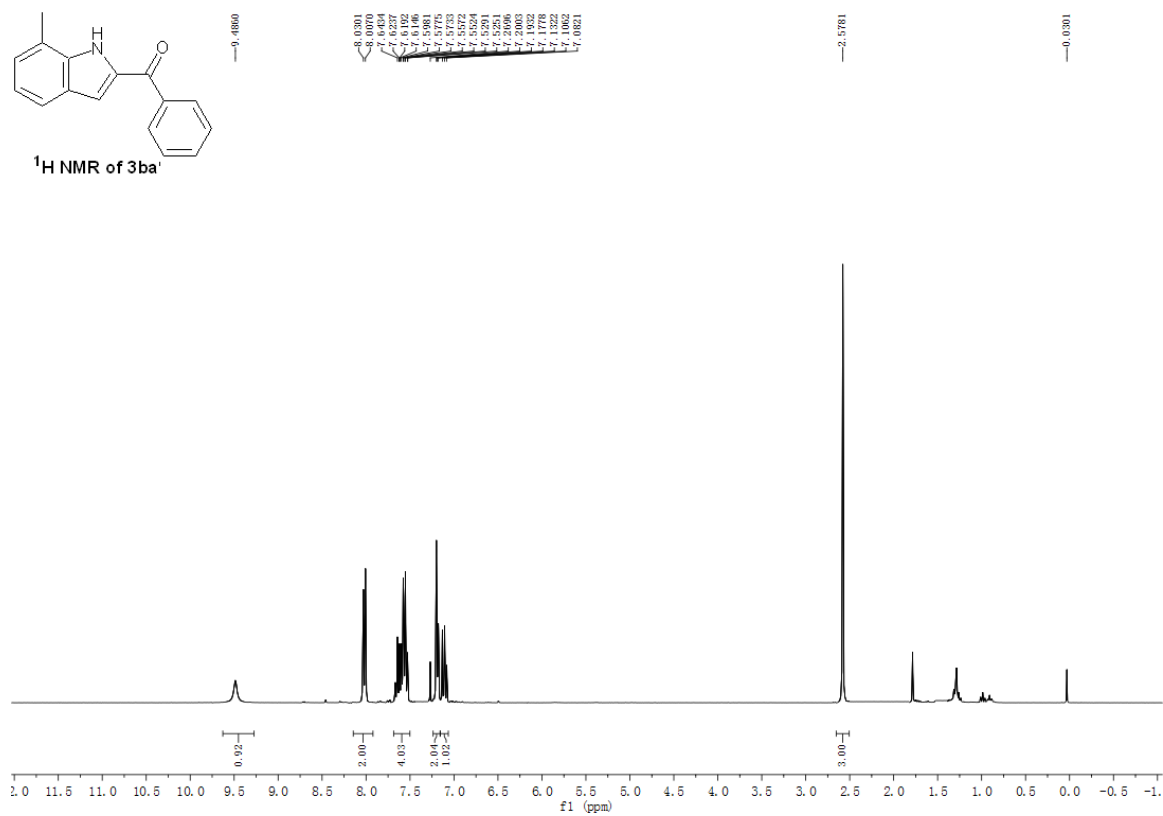
S29



S30



S31



S32

