Supplementary Information

Synergistic Cesium Carbonate-Promoted Dehydration of Ketonitrones: Stereoselective Synthesis of Indenyl-2-azadienes

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List of Contents

(A) General information

^{1}H, ^{13}C, and ^{19}F NMR spectra were recorded at ambient temperatures on a Bruker 400 MHz advance spectrometer with tetramethylsilane as internal standard. High-resolution mass spectra (HRMS) were recorded on an Agilent 1290 or GCT primierr Mass spectrometer using ESI-TOF or EI (electrospray ionizationtime of flight). All reactions were monitored by thin-layer chromatography. Column chromatography (petroleum ether/ethyl acetate) was performed on silica gel (200-300 mesh). Unless otherwise noted, all reactions were carried out using standard Schlenk techniques, and all starting materials and solvents were commercially available and were used without further purification.

(B) General experimental procedures

(a) Preparation of substrates :

Substrates **1**, **2** were prepared according to literature procedure.[1]

Substrate **5** was prepared according to literature procedure.[2]

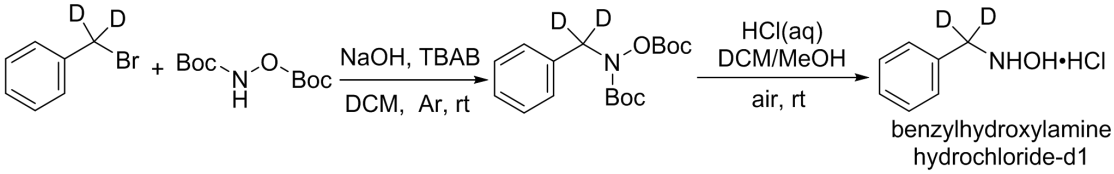
Substrate **6** was prepared according to literature procedure.[3]

Substrate **7** was prepared according to literature procedure.[4]

Substrate **8** was prepared according to literature procedure.[5]

Substrates **1a-**d1, **1a-**d2, **2a-**d3 were prepared according to literature procedure. [1,6,7]

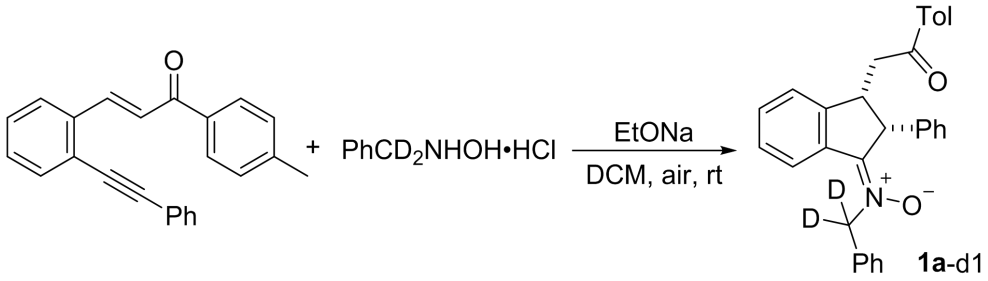
Preparation of substrate 1a-d1



To a solution of benzyl bromide-d1 (1.0000 g, 5.78 mmol), N,O-Bis(tert-butoxycarbonyl)hydroxylamine (1.3485 g, 1.0 equiv) in DCM (110.0 mL) at room temperature was added 1 M NaOH (6.0 mL) and tetrabutylammonium bromide (0.0932 g, 0.05 equiv) under argon. The reaction mixture was stirred for 15 h, then the resulting mixture was washed with water and dried with Na_2SO_4, concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 20:1, v/v) to give tert-butyl

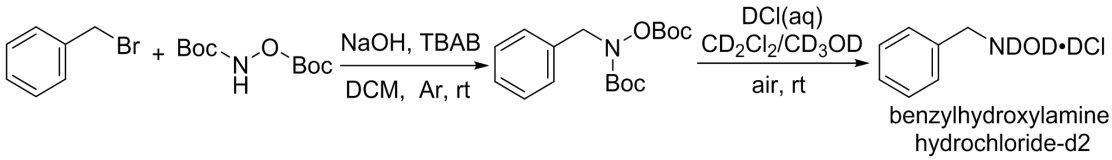
benzyl((tert-butoxycarbonyl)oxy)carbamate-d1 (1.6363 g, 87%).

To a solution of tert-butyl benzyl((tert-butoxycarbonyl)oxy)carbamate-d1 (0.3579 g, 1.1 mmol) in DCM (6 mL) and MeOH (6 mL) was added dropwise HCl(aq) (12 M, 2.2 mL, 26 equiv) at room temperature under air atmosphere. The bubbling solution was stirred vigorously for 4 hours and concentrated in vacuum to give benzylhydroxylamine hydrochloride-d1 as a white powder (0.1767 g, 99%).



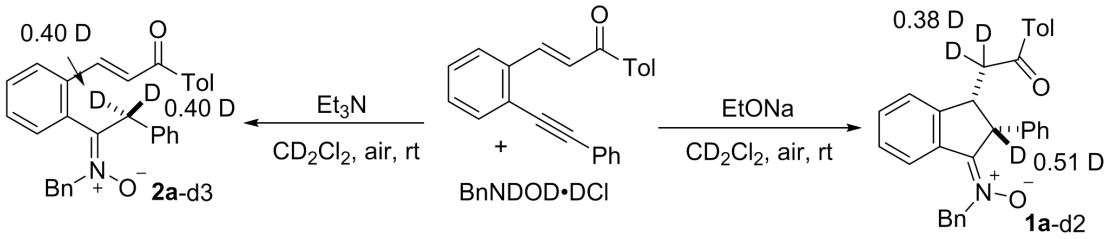
A 10 mL round-bottom flask was charged with α,β-unsaturated ketone (0.1612 g, 0.5 mmol), benzylhydroxylamine hydrochloride-d1 (0.0808 g, 0.5 mmol), EtONa (0.0511 g, 0.75 mmol) and DCM (5.0 mL) under air atmosphere. The reaction mixture was stirred at room temperature for 12 h, then filtered through a short pad of silica gel and washed with ethyl acetate. After removal of solvent, the crude residue was purified by flash chromatography on silica gel (petroleum ether/ ethyl acetate = 1:1, v/v) to afford the desired product **1a-**d1 as a pale white solid (0.1052 g, 43% yield).

Preparation of substrates 1a-d2 and 2a-d3



To a solution of benzyl bromide (1.0000 g, 5.78 mmol), N,O-Bis(tert-butoxycarbonyl)hydroxylamine (1.3485 g, 1.0 equiv) in DCM (110.0 mL) at room temperature was added 1 M NaOH (6.0 mL) and tetrabutylammonium bromide (0.0932 g, 0.05 equiv) under argon. The reaction mixture was stirred for 15 h, then the resulting mixture was washed with water and dried with Na_2SO_4, concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 20:1, v/v) to give tert-butyl benzyl((tert-butoxycarbonyl)oxy)carbamate (1.6363 g, 87%).

To a solution of tert-butyl benzyl((tert-butoxycarbonyl)oxy)carbamate (0.3579 g, 1.1 mmol) in CD_2Cl_2 (6 mL) and CD_3OD (6 mL) was added dropwise DCl(aq) (12 M, 2.2 mL, 26 equiv) at room temperature under air atmosphere. The bubbling solution was stirred vigorously for 4 hours and concentrated in vacuum to give benzylhydroxylamine hydrochloride-d2 as a white powder (0.1752 g, 98%).



A 10 mL round-bottom flask was charged with α,β-unsaturated ketone (0.1612 g, 0.5 mmol), benzylhydroxylamine hydrochloride-d2 (0.0813 g, 0.5 mmol), EtONa (0.0511 g, 0.75 mmol) and CD_2Cl_2 (5.0 mL) under air atmosphere. The reaction mixture was stirred at room temperature for 12 h, then filtered through a short pad of silica gel and washed with ethyl acetate. After removal of solvent, the crude residue was purified by flash chromatography on silica gel (petroleum ether/ ethyl acetate = 1:1, v/v) to afford the desired product **1a-**d2 as a pale white solid (0.1144 g, 51% yield).

A 10 mL round-bottom flask was charged with α,β-unsaturated ketone (0.1612 g, 0.5 mmol), benzylhydroxylamine hydrochloride-d2 (0.0813 g, 0.5 mmol), Et_3N (0.0759 g, 0.75 mmol) and CD_2Cl_2 (5.0 mL) under air atmosphere. The reaction mixture was stirred at room temperature for 12 h, and then was concentrated. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 3:1, v/v) to afford the desired product **2a-**d3 as a light yellow oil (0.1357 g, 61% yield).

(b) Typical experimental procedure for the synthesis of indenyl-2-azadienes 3a from indanone-derived nitrone 1a

To a dried Schlenk flask was charged with **1a** (0.0891 g, 0.20 mmol), Cs_2CO_3 (0.0652 g, 1.0 equiv), and toluene (2.0 mL) under argon. The reaction mixture was stirred at 60 ^oC for 16 h until complete consumption of the starting material, as monitored by TLC. Then the reaction mixture was filtered through a short pad of silica gel with ethyl acetate as the eluent and concentrated in vacuum. The crude residue was

purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 20:1, v/v) to afford the desired product **3a** as a red-yellow oil (0.0777 g, 91% yield).

(c) General procedure for the synthesis of indenyl-2-azadienes 3a from 2.85 mmol scale of indanone-derived nitrone 1a

To a dried Schlenk flask was charged with **1a** (1.2699 g, 2.85 mmol), Cs_2CO_3 (0.9285 g, 1.0 equiv), and toluene (28.0 mL) under argon. The reaction mixture was stirred at 60 ^oC for 16 h until complete consumption of the starting material, as monitored by TLC. Then the reaction mixture was filtered through a short pad of silica gel with ethyl acetate as the eluent and concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 20:1, v/v) to afford the desired product **3a** as a red-yellow oil (1.0844 g, 89% yield).

(d) Typical experimental procedure for the synthesis of indenyl-2-azadienes 3a from ketonitrone 2a

To a dried Schlenk flask was charged with **2a** (0.0891 g, 0.20 mmol), Cs_2CO_3 (0.0652 g, 1.0 equiv), and toluene (2.0 mL) under argon. The reaction mixture was stirred at 60 ^oC for 17 h until complete consumption of the starting material, as monitored by TLC. Then the reaction mixture was filtered through a short pad of silica gel with ethyl acetate as the eluent and concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 20:1, v/v) to afford the desired product **3a** as a red-yellow oil (0.0573 g, 67% yield).

(e) Procedure for the synthesis of azadienyl alcohol 9 from indenyl-2-azadiene 3a.

To a dried Schlenk flask was charged with **3a** (0.0973 g, 0.22 mmol), $NaBH_4$ (0.0416 g, 5.0 equiv), and MeOH (1.5 mL)/DCM (1.0 mL) under air atmosphere. The reaction mixture was stirred at room temperature for 16 h until complete consumption of the starting material, as monitored by TLC. Then the reaction mixture was filtered through a short pad of silica gel with ethyl acetate as the eluent and concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 10:1, v/v) to afford product **9** as a yellow solid (0.0499 g, 53% yield).

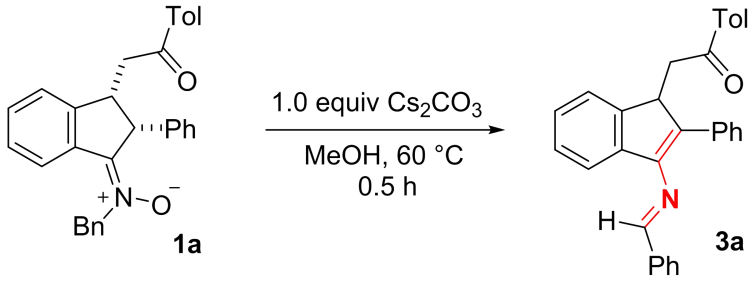
(f) Procedure for the synthesis of cis-1-aminoindan 10 from indenyl-2-azadiene

3a.

To a dried Schlenk flask was charged with **3a** (0.0427 g, 0.15 mmol), $NaBH_3CN$ (0.0377 g, 4.0 equiv), HOAc (0.0135 g, 1.5 equiv), and THF (1.5 mL) under argon. The reaction mixture was stirred at 50 °C for 16 h until complete consumption of the starting material, as monitored by TLC. Then the reaction mixture was filtered through a short pad of silica gel with ethyl acetate as the eluent and concentrated in vacuum. The crude residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 10:1, v/v) to afford product **10** as a light yellow solid (0.0319 g, 49% yield).

(g) Monitoring experiment for intermediates C and D

To a dried Schlenk flask was charged with indanone-derived nitrone **1a** (0.0446 g, 0.10 mmol), Cs_2CO_3 (0.0326 g, 1.0 equiv), and methanol (1.0 mL) under argon. The reaction mixture was stirred at 60 ℃ for 0.5 h (Scheme S1). Subsequent HRMS analysis of the resulting mixture was carried out. Intermediate **C** was successfully detected with a relatively high abundance at m/z 578.1102 (Fig. S1). Intermediate **D** was also observed, albeit in low amount, at m/z 577.0985 (Fig. S2). These results indicate that the nitrone coordinates strongly with cesium, facilitating the facile formation of intermediate **C**, whereas the five-membered ring intermediate **D** attains appreciable stability only under cesium mediation. In conjunction with the dehydration experiment using a catalytic amount of Cs_2CO_3 (Table 1, see the text), these findings suggest that cesium-directed deprotonation generates a carbanion, and that cesium-mediated stabilization of intermediate **D** play a crucial role in the dehydration process.



Scheme S1

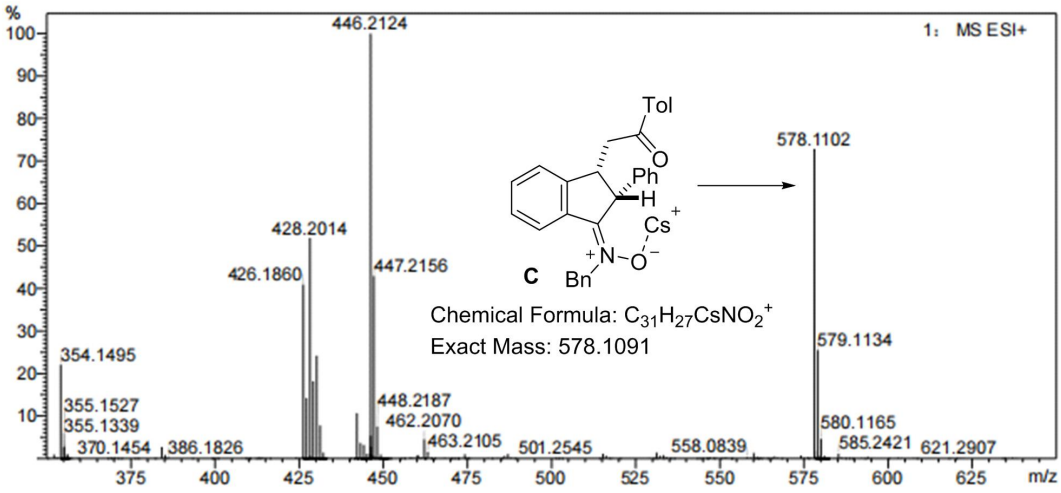


Fig. S1 Copy of HRMS Spectra of the Reaction Mixture

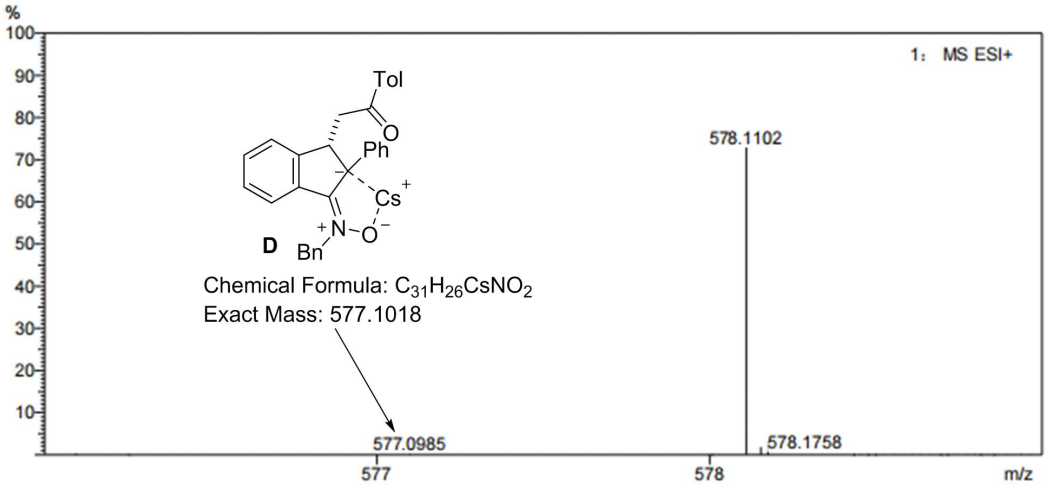
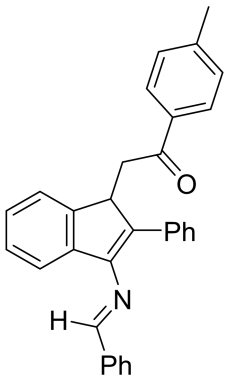


Fig. S2 Copy of HRMS Spectra of the Reaction Mixture

(C) Analytical data

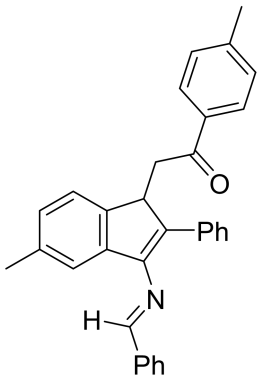
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 77.7 mg, 91% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.96

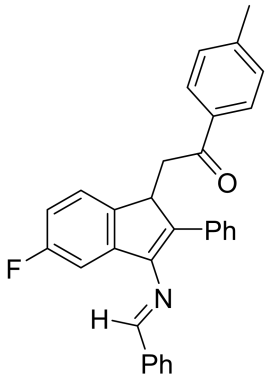
(d, *J* = 8.0 Hz, 2H), 7.82 (d, *J* = 8.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.53-7.46 (m, 4H), 7.34 (t, *J* = 8.0 Hz, 3H), 7.28 (t, *J* = 8.0 Hz, 1H), 7.24-7.15 (m, 4H), 4.93 (d, *J* = 8.0 Hz, 1H), 3.38 (d, *J* = 20.0 Hz, 1H), 3.05 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.3, 163.2, 147.2, 144.3, 141.2, 136.4, 134.7, 134.5, 131.9, 131.7, 129.4, 129.2, 129.1, 128.9, 128.7, 128.5, 127.1, 126.7, 126.1, 124.6, 119.2, 43.4, 41.6, 21.8; HRMS (ESI) Calcd for $C_{31}H_{26}NO$ $(M+H)^+$ 428.2014, Found 428.2019.

(*E*)-2-(3-(benzylideneamino)-5-methyl-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3b)



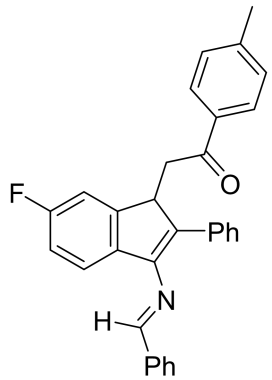
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 68.6 mg, 78% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.64 (s, 1H), 7.97 (t, *J* = 4.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.58 (d, *J* = 8.0 Hz, 2H), 7.53-7.49 (m, 3H), 7.35-7.31 (m, 3H), 7.21-7.16 (m, 3H), 7.12 (s, 1H), 6.98 (d, *J* = 8.0 Hz, 1H), 4.88 (d, *J* = 8.0 Hz, 1H), 3.36 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.02 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.37 (s, 3H), 2.35 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.5, 163.2, 147.3, 144.4, 144.2, 141.4, 136.8, 136.4, 134.8, 134.6, 131.9, 131.7, 129.4, 129.2, 129.1, 129.0, 128.7, 128.5, 126.9, 126.6, 124.3, 119.8, 43.2, 41.8, 21.8, 21.7; HRMS (ESI) Calcd for $C_{32}H_{28}NO$ $(M+H)^+$: 442.2165, Found 442.2171.

(*E*)-2-(3-(benzylideneamino)-5-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3c)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 77.5 mg, 87% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (s, 1H), 7.95 (d, *J* = 4.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.58-7.49 (m, 5H), 7.42-7.39 (m, 1H), 7.34 (t, *J* = 8.0 Hz, 2H), 7.24-7.19 (m, 3H), 7.02-6.99 (m, 1H), 6.86-6.81 (m, 1H), 4.87 (d, *J* = 12.0 Hz, 1H), 3.36 (dd, *J* = 4.0, 16.0 Hz, 1H), 3.00 (dd, *J* = 12.0, 16.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.1, 163.6, 162.8 (d, *J* = 241.9 Hz), 146.6, 144.4, 143.3 (d, *J* = 8.5 Hz), 142.4, 136.2, 134.7, 134.2, 133.6, 132.1, 129.5, 129.3, 129.1, 129.0, 128.8, 128.5, 127.0, 125.6 (d, *J* = 8.6 Hz), , 112.6 (d, *J* = 22.5 Hz), 106.4 (d, *J* = 23.8 Hz), 43.1, 41.7, 21.8; ^{19}F NMR (282 MHz, $CDCl_3$): δ -115.6 (s, 1F); HRMS (ESI) Calcd for $C_{31}H_{25}FNO$ $(M+H)^+$ 446.1920, Found 446.1924.

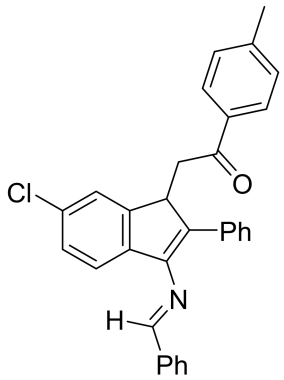
(*E*)-2-(3-(benzylideneamino)-6-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3d)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 82.7 mg, 93% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (s, 1H), 7.94 (t, *J* = 4.0 Hz, 2H), 7.82 (d, *J* = 8.0 Hz, 2H), 7.56-7.49 (m, 5H), 7.33 (t, *J* = 8.0 Hz,

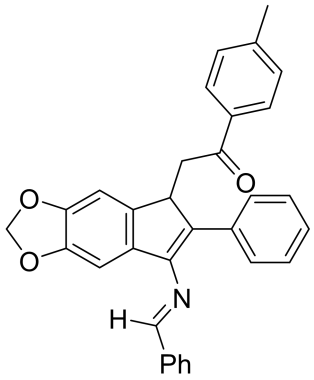
2H), 7.26-7.17 (m, 5H), 7.00-6.95 (m, 1H), 4.89 (d, *J* = 8.0 Hz, 1H), 3.38 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.01 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.0, 163.4, 162.1 (d, *J* = 243.1 Hz), 149.3 (d, *J* = 8.4 Hz), 146.6, 144.4, 137.3, 136.3, 134.5, 134.3, 132.0, 131.1, 131.1, 129.5, 129.1, 129.1, 129.0, 128.8, 128.5, 126.7, 120.0 (d, *J* = 8.5 Hz), 114.0 (d, *J* = 22.7 Hz), 112.7 (d, *J* = 23.7 Hz), 43.4, 41.6, 21.9; ^{19}F NMR (282 MHz, $CDCl_3$): δ -116.0 (s, 1F); HRMS (ESI) Calcd for $C_{31}H_{25}FNO$ $(M+H)^+$: 446.1915, Found 446.1920.

(*E*)-2-(3-(benzylideneamino)-6-chloro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3e)



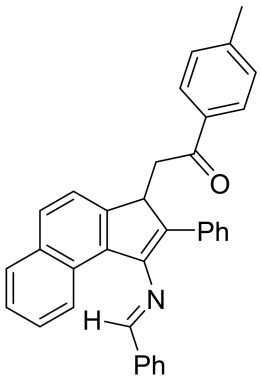
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 86.8 mg, 94% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (s, 1H), 7.94 (t, *J* = 4.0 Hz, 2H), 7.82 (d, *J* = 8.0 Hz, 2H), 7.56-7.49 (m, 6H), 7.33 (t, *J* = 8.0 Hz, 2H), 7.27-7.18 (m, 5H), 4.90 (d, *J* = 8.0 Hz, 1H), 3.41 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.02 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.8, 163.6, 148.7, 146.5, 144.4, 139.8, 136.1, 134.4, 134.1, 132.1, 132.0, 131.8, 129.5, 129.1, 129.1, 129.0, 128.8, 128.5, 127.4, 126.9, 125.1, 120.0, 43.2, 41.5, 21.9; HRMS (ESI) Calcd for $C_{31}H_{25}ClNO$ $(M+H)^+$: 462.1619, Found 462.1616.

(*E*)-2-(7-(benzylideneamino)-6-phenyl-5H-indeno[5,6-d][1,3]dioxol-5-yl)-1-(*p*-tolyl)ethan-1-one (3f)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 76.5 mg, 81% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.59 (s, 1H), 7.94 (d, *J* = 8.0 Hz, 2H), 7.82 (d, *J* = 8.0 Hz, 2H), 7.56-7.48 (m, 5H), 7.31 (t, *J* = 8.0 Hz, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.16 (t, *J* = 8.0 Hz, 1H), 7.01 (s, 1H), 6.79 (s, 1H), 5.92 (d, *J* = 8.0 Hz, 2H), 4.80 (d, *J* = 12.0 Hz, 1H), 3.37 (d, *J* = 20.0 Hz, 1H), 3.00 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.4, 163.3, 147.2, 147.1, 146.7, 144.3, 141.4, 136.3, 135.2, 134.7, 134.5, 131.9, 130.3, 129.5, 129.1, 128.9, 128.8, 128.7, 128.5, 126.3, 106.4, 101.3, 100.3, 43.1, 41.9, 21.8; HRMS (ESI) Calcd for $C_{32}H_{26}NO_3$ $(M+H)^+$ 472.1913, Found 472.1917.

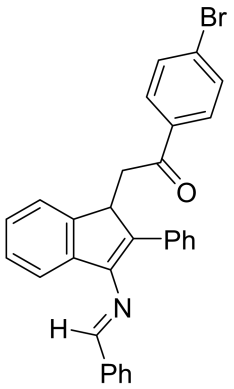
(*E*)-2-(1-(benzylideneamino)-2-phenyl-3H-cyclopenta[a]naphthalen-3-yl)-1-(*p*-tolyl)ethan-1-one (3g)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 82.2 mg, 86% yield; Brownish-yellow solid, m.p. 164-166 ^{o}C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67-8.65 (m, 1H), 8.40 (s, 1H), 7.95 (t, *J* = 4.0 Hz, 2H), 7.84-7.78 (m, 3H), 7.65 (d, *J* = 8.0 Hz, 1H), 7.59-7.47 (m, 7H), 7.40-7.37 (m, 2H), 7.29-7.24 (m, 1H), 7.19 (d, *J* = 8.0 Hz, 2H), 7.12 (t, *J* = 4.0 Hz, 1H), 4.99 (d, *J* = 8.0

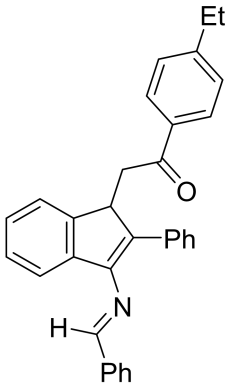
Hz, 1H), 3.26 (dd, *J* = 4.0, 16.0 Hz, 1H), 3.03 (dd, *J* = 12.0, 16.0 Hz, 1H), 2.36 (s, 3H), 2.35 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.6, 163.8, 151.6, 145.5, 144.3, 136.9, 136.2, 134.8, 134.4, 133.8, 131.9, 129.4, 129.2, 129.1, 129.0, 128.9, 128.6, 128.5, 126.7, 126.2, 126.0, 125.4, 125.3, 122.4, 44.6, 40.7, 21.8; HRMS (ESI) Calcd for $C_{35}H_{29}NO$ $(M+H)^+$: 478.2165, Found 478.2160.

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(4-bromophenyl)ethan-1-one (3h)



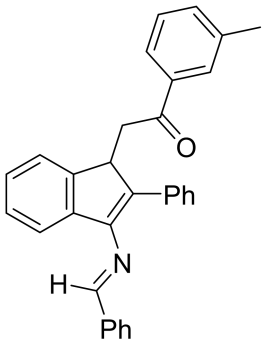
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 86.7 mg, 88% yield; Reddish-yellow solid, m.p. 116-118 ^{o}C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.65 (s, 1H), 7.95 (t, *J* = 4.0 Hz, 2H), 7.65 (d, *J* = 8.0 Hz, 2H), 7.58-7.49 (m, 7H), 7.44 (d, *J* = 8.0 Hz, 1H), 7.36-7.27 (m, 4H), 7.21-7.16 (m, 2H), 4.89 (dd, *J* = 4.0, 8.0 Hz, 1H), 3.36 (d, *J* = 4.0, 20.0 Hz, 1H), 3.02 (dd, *J* = 12.0, 20.0 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.9, 163.3, 147.4, 146.9, 141.2, 136.3, 135.9, 134.4, 132.1, 131.9, 131.3, 129.9, 129.2, 129.1, 129.0, 128.8, 128.6, 127.3, 126.8, 126.2, 124.5, 119.3, 43.5, 41.7; HRMS (ESI) Calcd for $C_{30}H_{23}BrNO$ $(M+H)^+$: 492.0958, Found 492.0960.

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(4-ethylphenyl)ethan-1-one (3i)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 77.1 mg, 87% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.85 (d, *J* = 8.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.53-7.46 (m, 4H), 7.35-7.32 (m, 3H), 7.29 (d, *J* = 8.0 Hz, 1H), 7.24 (d, *J* = 8.0 Hz, 2H), 7.21-7.15 (m, 2H), 4.93 (d, *J* = 8.0 Hz, 1H), 3.38 (d, *J* = 20.0 Hz, 1H), 3.05 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.3, 163.2, 150.4, 147.2, 141.2, 136.4, 135.0, 134.5, 131.9, 131.7, 129.2, 129.1, 128.9, 128.7, 128.6, 128.3, 127.1, 126.7, 126.1, 124.6, 119.2, 43.5, 41.7, 29.1, 15.4; HRMS (ESI) Calcd for $C_{32}H_{28}NO$ $(M+H)^+$ 442.2171, Found 442.2169.

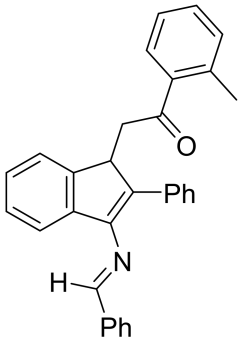
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(m-tolyl)ethan-1-one (3j)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 68.1 mg, 80% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.71 (t, *J* = 8.0 Hz, 2H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.52-7.47 (m, 4H), 7.36-7.27 (m, 6H), 7.21-7.15 (m, 2H), 4.93 (d, *J* = 8.0 Hz, 1H), 3.40 (d, *J* = 20.0 Hz, 1H), 3.07 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.9, 163.2, 147.2, 147.2, 141.2, 138.6, 137.2, 136.4, 134.5, 134.2, 131.9, 131.6, 129.2, 129.1, 128.9, 128.7, 128.7, 127.1, 126.7, 126.1, 125.6, 124.6, 119.2, 43.5, 41.9,

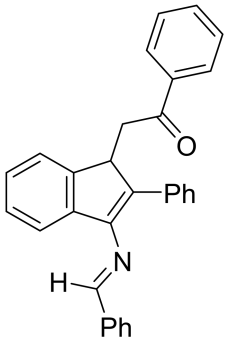
21.5; HRMS (ESI) Calcd for $C_{31}H_{26}NO$ $(M+H)^+$ 428.2014, Found 428.2018.

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*o*-tolyl)ethan-1-one (3k)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 80.0 mg, 94% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (s, 1H), 7.95 (dd, *J* = 4.0, 8.0 Hz, 2H), 7.57 (d, *J* = 8.0 Hz, 2H), 7.52-7.48 (m, 4H), 7.40 (d, *J* = 8.0 Hz, 1H), 7.37-7.28 (m, 5H), 7.24-7.18 (m, 3H), 7.12 (d, *J* = 8.0 Hz, 1H), 4.89 (dd, *J* = 4.0, 8.0 Hz, 1H), 3.36 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.00 (dd, *J* = 8.0, 20.0 Hz, 1H), 2.54 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 203.6, 163.3, 147.2, 147.0, 141.3, 138.2, 138.1, 136.4, 134.5, 132.1, 131.9, 131.7, 131.6, 129.2, 129.0, 128.9, 128.7, 127.2, 126.7, 126.1, 125.8, 124.4, 119.3, 44.6, 43.7, 21.6; HRMS (ESI) Calcd for $C_{31}H_{26}NO$ $(M+H)^+$ 428.2014, Found 428.2017.

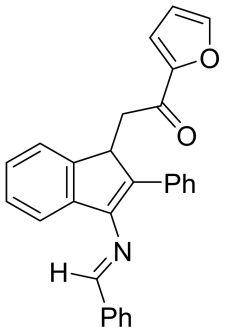
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-phenylethan-1-one (3l)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 74.6 mg, 90% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.92 (d, *J* = 8.0 Hz, 2H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.53-7.48 (m, 5H), 7.43-7.40 (m, 2H), 7.36-7.27 (m 4H), 7.25-7.16 (m, 2H), 4.94 (d, *J* = 12.0 Hz, 1H), 3.42 (d, *J* = 20.0 Hz, 1H), 3.06 (dd, *J* = 12.0, 20.0 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.7, 163.3, 147.3, 147.1, 141.2, 137.2, 136.4, 134.5, 133.4, 131.9, 131.6,

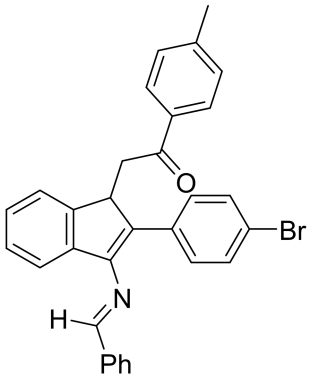
129.2, 129.1, 128.9, 128.8, 128.4, 127.2, 126.7, 126.1, 124.6, 119.2, 43.5, 41.8; HRMS (ESI) Calcd for $C_{30}H_{24}NO$ $(M+H)^+$: 414.1852, Found 414.1856.

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(furan-2-yl)ethan-1-one (3m)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 58.0 mg, 72% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.95 (t, *J* = 4.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.53-7.49 (m, 4H), 7.46 (d, *J* = 8.0 Hz, 1H), 7.36-7.27 (m, 4H), 7.21-7.16 (m, 2H), 7.11 (d, *J* = 4.0 Hz, 1H), 6.48(d, *J* = 4.0 Hz, 1H), 4.85 (dd, *J* = 4.0, 12.0 Hz, 1H), 3.29 (dd, *J* = 4.0, 20.0 Hz, 1H), 2.89 (dd, *J* = 8.0, 20.0 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 188.7, 163.3, 152.8, 147.2, 146.8, 146.6, 141.2, 136.3, 134.3, 131.9, 131.4, 129.2, 129.0, 128.9, 128.7, 127.2, 126.7, 126.1, 124.5, 119.2, 117.8, 112.4, 43.2, 41.5; HRMS (ESI) Calcd for $C_{28}H_{22}NO_2$ $(M+H)^+$ 404.1651, Found 404.1649.

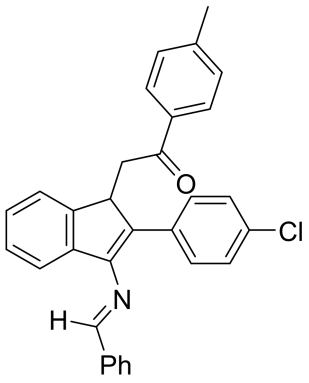
(*E*)-2-(3-(benzylideneamino)-2-(4-bromophenyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3n)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 80.0 mg, 79% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.95 (d, *J* = 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.56-7.50 (m, 3H), 7.45 (t, *J* = 8.0 Hz,

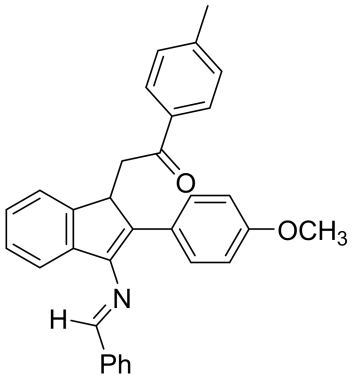
5H), 7.33 (d, *J* = 8.0 Hz, 1H), 7.28 (t, *J* = 8.0 Hz, 1H), 7.24-7.16 (m, 3H), 4.87 (d, *J* = 8.0 Hz, 1H), 3.32 (d, *J* = 4.0, 20.0 Hz, 1H), 3.05 (dd, *J* = 8.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.1, 163.3, 147.7, 147.2, 144.4, 140.8, 136.3, 134.7, 133.5, 132.1, 131.8, 130.7, 129.5, 129.1, 129.0, 128.5, 127.2, 126.4, 124.6, 120.7, 119.4, 43.4, 41.5, 21.8; HRMS (ESI) Calcd for $C_{31}H_{25}BrNO$ $(M+H)^+$ 506.1120, Found 506.1120.

(*E*)-2-(3-(benzylideneamino)-2-(4-chlorophenyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3o)



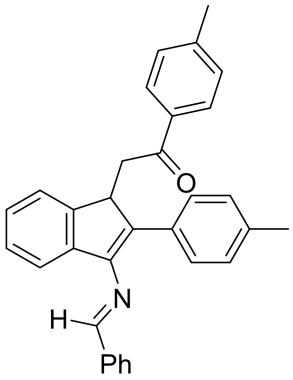
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 67.1 mg, 72% yield; Yellow solid, m.p. 80-82 ^{o}C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.95 (d, *J* = 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.57-7.52 (m, 5H), 7.46 (d, *J* = 8.0 Hz, 1H), 7.34-7.29 (m, 4H), 7.25-7.16 (m, 3H), 4.86 (d, *J* = 8.0 Hz, 1H), 3.33 (d, *J* = 20.0 Hz, 1H), 3.05 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.1, 163.3, 147.6, 147.2, 144.4, 140.8, 136.3, 134.7, 133.0, 132.5, 132.1, 130.8, 130.4, 129.5, 129.1, 129.0, 128.9, 128.5, 127.2, 126.4, 124.6, 119.3, 43.4, 41.5, 21.8; HRMS (ESI) Calcd for $C_{31}H_{25}ClNO$ $(M+H)^+$ 462.1625, Found 462.1627.

(*E*)-2-(3-(benzylideneamino)-2-(4-methoxyphenyl)-1H-inden-1-yl)-1-(*p*-tolyl)etha n-1-one (3p)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 82.4 mg, 90% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.71 (s, 1H), 7.96 (t, *J* = 4.0 Hz, 2H), 7.82 (d, *J* = 8.0 Hz, 2H), 7.56-7.51 (m, 5H), 7.45 (d, *J* = 8.0 Hz, 1H), 7.33 (d, *J* = 8.0 Hz, 1H), 7.27 (d, *J* = 8.0 Hz, 1H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.14 (t, *J* = 8.0 Hz, 1H), 6.89 (d, *J* = 8.0 Hz, 2H), 4.87 (dd, *J* = 4.0, 8.0 Hz, 1H), 3.79 (s, 3H), 3.36 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.04 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.4, 162.9, 158.6, 147.1, 145.6, 144.2, 141.3, 136.6, 134.8, 132.3, 131.8, 130.6, 129.5, 129.1, 128.9, 128.5, 127.2, 127.1, 125.7, 124.5, 118.9, 114.3, 55.5, 43.5, 42.0, 21.8; HRMS (ESI) Calcd for $C_{32}H_{28}NO_2$ $(M+H)^+$ 458.2120, Found 458.2121.

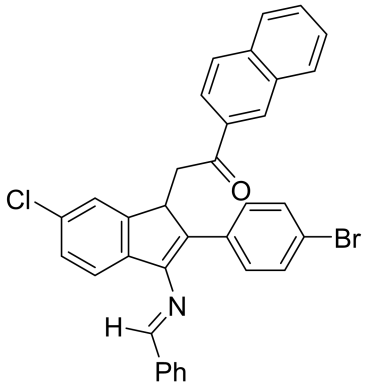
(*E*)-2-(3-(benzylideneamino)-2-(p-tolyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3q)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 70.7 mg, 80% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.96 (dd, *J* = 4.0, 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.52-7.45 (m, 6H), 7.32 (d, *J* = 8.0 Hz, 1H), 7.28-7.24 (m, 1H), 7.20 (d, *J* = 8.0 Hz, 2H), 7.16-7.13 (m, 3H), 4.90 (dd, *J* =

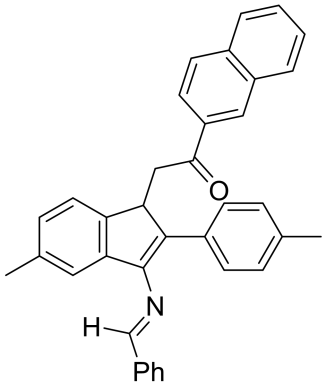
4.0, 8.0 Hz, 1H), 3.37 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.03 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.37 (s, 3H), 2.31 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.4, 163.0, 147.2, 146.5, 144.2, 141.3, 136.5, 134.8, 132.0, 131.8, 131.6, 129.5, 129.4, 129.2, 129.0, 128.9, 128.5, 127.1, 125.9, 124.6, 119.1, 43.5, 41.8, 21.8, 21.4; HRMS (ESI) Calcd for $C_{32}H_{28}NO$ $(M+H)^+$ 442.2171, Found 442.2173.

(*E*)-2-(3-(benzylideneamino)-2-(4-bromophenyl)-6-chloro-1H-inden-1-yl)-1-(naphthalen-2-yl)ethan-1-one (3r)



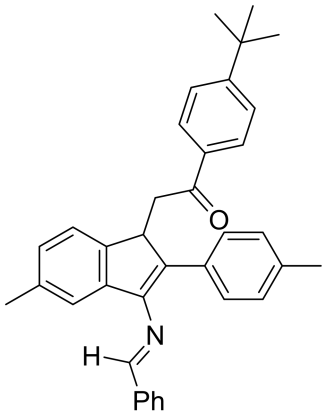
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 78.5 mg, 68% yield; Yellow solid, m.p. 168-170 ^{o}C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (s, 1H), 8.36 (s, 1H), 8.04 (dd, *J* = 4.0, 8.0 Hz, 1H), 7.95 (d, *J* = 4.0 Hz, 2H), 7.90-7.85 (m, 3H), 7.61-7.50 (m, 6H), 7.48-7.43 (m, 4H), 7.28-7.23 (m, 2H), 4.91 (dd, *J* = 4.0, 8.0 Hz, 1H), 3.52 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.22 (dd, *J* = 12.0, 20.0 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.9, 163.7, 148.7, 147.2, 139.5, 136.0, 135.9, 134.2, 133.1, 132.6, 132.4, 132.3, 132.0, 130.7, 130.6, 130.3, 129.8, 129.2, 129.0, 128.9, 128.8, 128.0, 127.6, 127.1, 125.2, 123.9, 121.0, 120.2, 43.3, 41.5; HRMS (ESI) Calcd for $C_{34}H_{24}BrClNO$ $(M+H)^+$ 576.0730, Found 576.0728.

(*E*)-2-(3-(benzylideneamino)-5-methyl-2-(*p*-tolyl)-1H-inden-1-yl)-1-(naphthalen-2-yl)ethan-1-one (3s)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 57.4 mg, 58% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.65 (s, 1H), 8.34 (s, 1H), 8.04 (dd, *J* = 4.0, 8.0 Hz, 1H), 7.98-7.96 (m, 2H), 7.84 (t, *J* = 8.0 Hz, 3H), 7.57-7.47 (m, 7H), 7.38 (d, *J* = 8.0 Hz, 1H), 7.14 (d, *J* = 8.0 Hz, 3H), 6.97 (d, *J* = 8.0 Hz, 1H), 4.91 (d, *J* = 4.0, 8.0 Hz, 1H), 3.41 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.20 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.34 (s, 3H), 2.31 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.8, 163.0, 146.7, 144.2, 141.5, 136.8, 136.5, 136.5, 135.8, 134.6, 132.6, 131.9, 131.8, 131.7, 130.2, 129.7, 129.5, 129.1, 129.0, 128.9, 128.7, 128.6, 127.9, 126.9, 126.8, 124.3, 124.1, 119.7, 43.3, 42.1, 21.7, 21.4; HRMS (ESI) Calcd for $C_{36}H_{30}NO$ $(M+H)^+$ 492.2327, Found 492.2330.

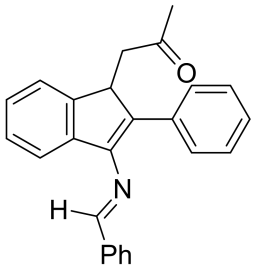
(*E*)-2-(3-(benzylideneamino)-5-methyl-2-(*p*-tolyl)-1H-inden-1-yl)-1-(4-(tert-butyl) phenyl)ethan-1-one (3t)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 64.6 mg, 65% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.97 (t, *J* = 4.0 Hz, 2H), 7.86 (d, *J* = 8.0 Hz, 2H), 7.52 (t, *J* = 4.0 Hz, 2H), 7.48 (d, *J* = 8.0 Hz, 2H), 7.42 (d, *J* = 8.0 Hz, 2H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.24 (s, 1H), 7.13 (t, *J* =

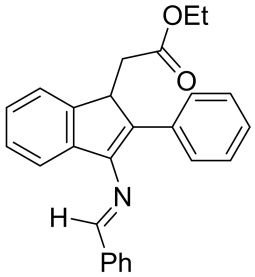
8.0 Hz, 3H), 6.96 (d, *J* = 8.0 Hz, 1H), 4.85 (d, *J* = 8.0 Hz, 1H), 3.37 (dd, *J* = 4.0, 20.0 Hz, 1H), 3.02 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.35 (s, 3H), 2.31(s, 3H), 1.31 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.5, 163.0, 157.1, 146.6, 144.4, 141.5, 136.8, 136.5, 136.4, 134.7, 132.0, 131.8, 131.7, 129.5, 129.1, 129.0, 128.9, 128.3, 126.7, 125.7, 124.3, 119.7, 43.1, 42.0, 35.3, 31.3, 21.8, 21.4; HRMS (ESI) Calcd for $C_{36}H_{36}NO$ $(M+H)^+$ 498.2797, Found 498.2799.

(*E*)-1-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)propan-2-one (3u)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). 45.0 mg, 64% yield; Red-yellow oil;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (s, 1H), 7.93 (t, *J* = 4.0 Hz, 2H), 7.54-7.45 (m, 6H), 7.36-7.28 (m, 4H), 7.25-7.19 (m, 2H), 4.66 (dd, *J* = 8.0, 12.0 Hz, 1H), 2.96 (dd, *J* = 4.0, 20.0 Hz, 1H), 2.46 (dd, *J* = 12.0, 20.0 Hz, 1H), 2.13 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 208.3, 163.3, 147.2, 146.9, 141.2, 136.4, 134.4, 131.9, 131.4, 129.2, 129.0, 128.9, 128.7, 127.2, 126.7, 126.2, 124.2, 119.3, 46.4, 43.4, 30.9; HRMS (ESI) Calcd for $C_{25}H_{22}NO$ $(M+H)^+$ 352.1701, Found 352.1706.

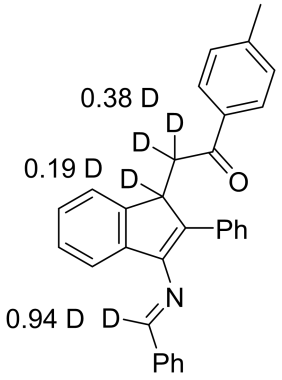
ethyl (*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)acetate (3v)



Purified by silica gel column chromatography (10:1 petroleum ether/ethyl acetate). 28.3 mg, 37% yield; Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (s, 1H), 7.93 (t, *J* = 8.0 Hz, 2H), 7.57-7.47 (m, 6H), 7.37-7.30 (m, 4H), 7.27-7.19 (m, 2H), 4.53 (dd, *J* = 4.0, 12.0 Hz, 1H), 4.21-4.15 (m, 2H), 2.92 (dd, *J* = 4.0, 16.0 Hz, 1H), 2.24 (dd, *J*

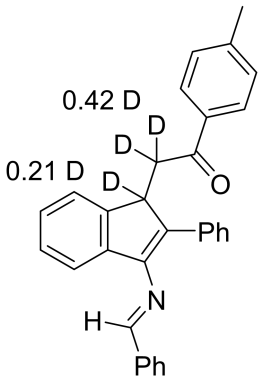
= 12.0, 16.0 Hz, 1H), 1.26 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 173.1, 163.3, 147.3, 146.2, 141.3, 136.4, 134.4, 131.9, 131.2, 129.3, 129.0, 128.9, 128.7, 127.4, 126.7, 126.1, 124.0, 119.4, 60.9, 44.8, 37.5, 14.4; HRMS (ESI) Calcd for $C_{26}H_{24}NO_2$ $(M+H)^+$ 382.1807, Found 382.1810.

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d1)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 0.06H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.60 (d, *J* = 4.0 Hz, 2H), 7.52-7.46 (m, 4H), 7.34 (t, *J* = 8.0 Hz, 3H), 7.28 (t, *J* = 8.0 Hz, 1H), 7.23-7.14 (m, 4H), 4.93 (d, *J* = 8.0 Hz, 0.81H), 3.37 (dd, *J* = 4.0, 20.0 Hz, 0.81H), 3.04 (dd, *J* = 8.0, 16.0 Hz, 0.81H), 2.37 (s, 3H).

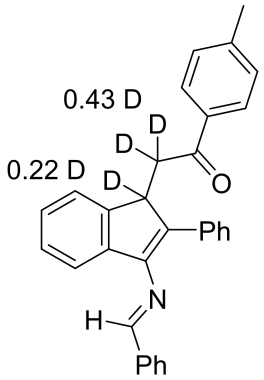
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d2)



Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.95 (d, *J* = 4.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.52-7.46 (m, 4H), 7.33 (t, *J* = 8.0 Hz, 3H), 7.27 (t, *J* =

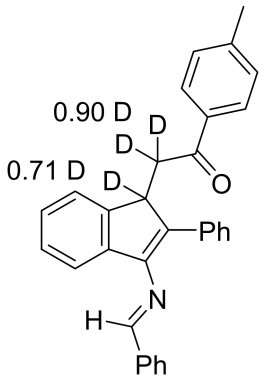
8.0 Hz, 1H), 7.23-7.14 (m, 4H), 4.93 (d, *J* = 8.0 Hz, 0.79H), 3.38 (dd, *J* = 4.0, 20.0 Hz, 0.79H), 3.04 (dd, *J* = 12.0, 20.0 Hz, 0.79H), 2.37 (s, 3H).

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d3)



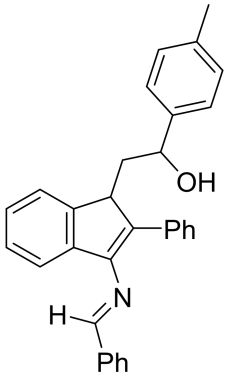
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.95 (d, *J* = 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.52-7.46 (m, 4H), 7.34 (t, *J* = 8.0 Hz, 3H), 7.28 (t, *J* = 8.0 Hz, 1H), 7.24-7.15 (m, 4H), 4.93 (d, *J* = 8.0 Hz, 0.78H), 3.38 (d, *J* = 20.0 Hz, 0.79H), 3.04 (dd, *J* = 12.0, 20.0 Hz, 0.78H), 2.37 (s, 3H).

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d4)



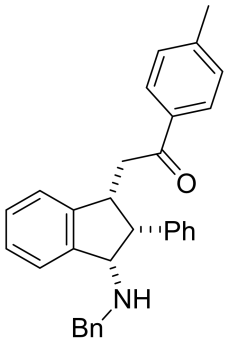
Purified by silica gel column chromatography (20:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (s, 1H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.52-7.45 (m, 4H), 7.34 (t, *J* = 8.0 Hz, 3H), 7.28 (t, *J* = 8.0 Hz, 1H), 7.24-7.14 (m, 4H), 4.93 (t, *J* = 8.0 Hz, 0.24H), 3.37 (d, *J* = 20.0 Hz, 0.50H), 3.05 (dd, *J* = 8.0, 20.0 Hz, 0.50H), 2.37 (s, 3H).

(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-ol (9)



Purified by silica gel column chromatography (10:1 petroleum ether/ethyl acetate). Yellow solid, m.p. 49-51 °C (uncorrected); ^{1}H NMR (400 MHz, CD_3OD) δ 8.57 (s, 0.8H), 7.88 (m, 3.2H), 7.73 (d, *J* = 8.0 Hz, 0.5H), 7.60 (d, *J* = 8.0 Hz, 0.5H), 7.51-7.48 (m, 2.8H), 7.39 (d, *J* = 8.0 Hz, 1H), 7.31-7.11 (m, 9H), 6.96-6.89 (m, 1.5H), 4.80-4.74 (m, 1.4H), 4.39-4.36 (m, 0.2H), 3.91-3.89 (m, 0.4H), 2.47-2.40 (m, 0.4H), 2.32 (s, 1.5H), 2.25-2.16 (m, 1.8H), 2.03-1.96 (m, 0.5H), 1.78-1.71 (m, 0.3H); ^{13}C NMR (100 MHz, CD_3OD) δ 165.5, 165.3, 148.2, 147.6, 147.6, 143.2, 142.5, 142.4, 142.3, 138.3, 137.8, 137.4, 137.4, 136.2, 135.9, 134.6, 134.4, 132.9, 130.4, 130.0, 129.9, 129.7, 129.2, 129.1, 127.9, 127.8, 127.7, 127.6, 127.4, 127.0, 126.7, 126.6, 125.4, 125.0, 120.0, 119.9, 79.4, 73.4, 72.6, 46.7, 46.5, 42.6, 41.9, 21.2, 21.1; HRMS (ESI) Calcd for $C_{31}H_{28}NO$ $(M+H)^+$ 430.2171, Found 430.2170.

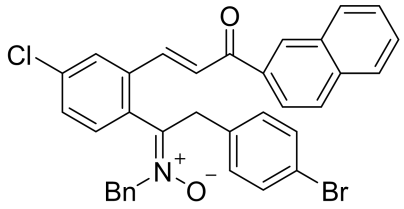
2-(-3-(benzylamino)-2-phenyl-2,3-dihydro-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (10)



Purified by silica gel column chromatography (10:1 petroleum ether/ethyl acetate). Light yellow solid, m.p. 86-88 °C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 (d, *J* = 4.0 Hz, 1H), 7.55 (d, *J* = 8.0 Hz, 2H), 7.32-7.26 (m, 2H), 7.23-7.16 (m, 3H),

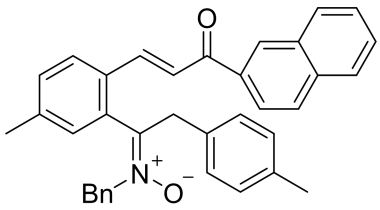
7.13 (d, *J* = 8.0 Hz, 4H), 7.08 (t, *J* = 8.0 Hz, 3H), 7.04 (d, *J* = 8.0 Hz, 1H), 6.73 (d, *J* = 8.0 Hz, 2H), 4.71 (d, *J* = 8.0 Hz, 1H), 4.32 (d, *J* = 8.0 Hz, 1H), 4.18-4.13 (m, 1H), 3.72 (s, 2H), 3.24 (dd, *J* = 4.0, 16.0 Hz, 1H), 2.90 (dd, *J* = 8.0, 20.0 Hz, 1H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.5, 144.3, 143.8, 137.5, 134.9, 129.7, 129.2, 128.6, 128.5, 128.0, 127.7, 127.4, 127.3, 127.2, 124.2, 122.8, 64.9, 54.8, 51.4, 42.5, 38.9, 21.8. HRMS (ESI) Calcd for $C_{31}H_{30}NO$ $(M+H)^+$ 432.2327, Found 432.2330.

(*E*)-N-benzyl-2-(4-bromophenyl)-1-(4-chloro-2-((*E*)-3-(naphthalen-2-yl)-3-oxopro *p*-1-en-1-yl)phenyl)ethan-1-imine oxide (2r)



Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). Red-yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41 (s, 1H), 8.04-7.99 (m, 2H), 7.96-7.90 (m, 2H), 7.78 (d, *J* = 4.0 Hz, 1H), 7.66-7.58 (m, 2H), 7.43-7.34 (m, 3H), 7.32-7.29 (m, 1H), 7.23-7.16 (m, 6H), 7.01 (d, *J* = 8.0 Hz, 2H), 6.87 (d, *J* = 8.0 Hz, 1H), 4.90-4.81 (m, 2H), 4.39 (d, *J* = 12.0 Hz, 1H), 3.87 (d, *J* = 12.0 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 188.7, 145.0, 138.6, 136.4, 135.8, 135.7, 134.7, 134.1, 133.2, 133.0, 132.5, 131.6, 131.4, 130.3, 130.2, 129.8, 128.8, 128.8, 128.7, 128.7, 128.5, 127.9, 127.7, 127.0, 125.8, 124.3, 121.0, 65.8, 38.6; HRMS (ESI) Calcd for $C_{34}H_{26}NO_2ClBr$ $(M+H)^+$ 594.0835, Found 594.0837.

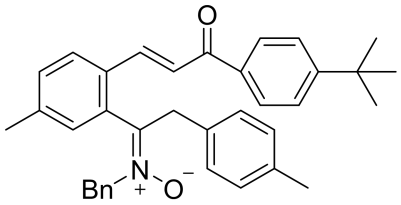
(*E*)-N-benzyl-1-(5-methyl-2-((*E*)-3-(naphthalen-2-yl)-3-oxoprop-1-en-1-yl)phenyl) -2-(*p*-tolyl)ethan-1-imine oxide (2s)



Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (s, 1H), 8.01-7.88 (m, 4H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.63-7.55 (m, 2H), 7.42-7.25 (m, 3H), 7.21-7.16 (m, 5H), 7.01 (d, *J* = 8.0 Hz, 2H), 6.86 (d, *J* = 8.0 Hz, 2H), 6.75 (s, 1H), 4.90-4.80 (m, 2H), 4.21 (d, *J* =

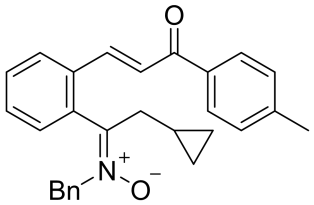
16.0 Hz, 1H), 4.00 (d, *J* = 16.0 Hz, 1H), 2.32 (s, 3H), 2.12 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 189.7, 147.4, 140.9, 140.9, 136.4, `135.7, 135.4, 135.3, 133.6, 132.7, 132.3, 131.3, 130.9, 130.8, 130.3, 129.9, 129.8, 129.2, 129.1, 128.8, 128.7, 128.6, 128.6, 128.2, 128.0, 127.0, 124.6, 124.1, 65.6, 39.0, 21.5, 21.1; HRMS (ESI) Calcd for $C_{36}H_{32}NO_2$ $(M+H)^+$ 510.2433, Found 510.2436.

(*E*)-N-benzyl-1-(2-((*E*)-3-(4-(tert-butyl)phenyl)-3-oxoprop-1-en-1-yl)-5-methylphenyl)-2-(*p*-tolyl)ethan-1-imine oxide (2t)



Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). Yellow solid, m.p. 123-124 °C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, *J* = 8.0 Hz, 2H), 7.61 (d, *J* = 8.0 Hz, 1H), 7.49 (d, *J* = 8.0 Hz, 2H), 7.37 (d, *J* = 16.0 Hz, 1H), 7.26- 7.15 (m, 7H), 7.01 (d, *J* = 8.0 Hz, 2H), 6.91 (d, *J* = 8.0 Hz, 2H), 6.71 (s, 1H), 4.88-4.77 (m, 2H), 4.33 (d, *J* = 16.0 Hz, 1H), 3.94 (d, *J* = 12.0 Hz, 1H), 2.30 (s, 3H), 2.17 (s, 3H), 1.37 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 189.4, 156.8, 147.5, 140.8, 140.4, 136.4, 135.3, 135.2, 133.6, 132.3, 131.2, 130.8, 130.8, 129.8, 129.2, 129.1, 128.7, 128.6, 128.5, 128.3, 125.8, 124.2, 65.5, 38.9, 35.3, 31.3, 21.5, 21.1; HRMS (ESI) Calcd for $C_{36}H_{38}NO_2$ $(M+H)^+$ 516.2903, Found 516.2905.

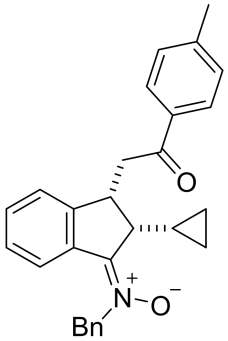
(*E*)-N-benzyl-2-cyclopropyl-1-(2-((*E*)-3-oxo-3-(*p*-tolyl)prop-1-en-1-yl)phenyl)ethan-1-imine oxide (2x)



Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.0 Hz, 3H), 7.59-7.45 (m, 3H), 7.36-7.27 (m, 3H), 7.23-7.15 (m, 6H), 4.87-4.68 (m, 2H), 2.93 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.72 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.43 (s, 3H), 0.79-0.67 (m, 1H), 0.36-0.27 (m, 1H), 0.10-0.02 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 189.4, 149.3, 144.1, 140.5,

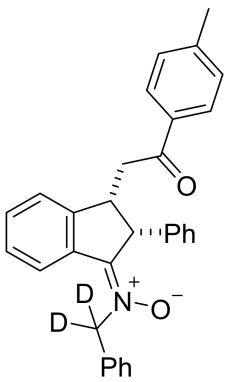
135.9, 135.3, 134.1, 133.5, 130.4, 130.0, 129.9, 129.6, 128.9, 128.6, 128.5, 127.8, 124.8, 65.3, 37.7, 21.9, 7.3, 5.1, 4.7; HRMS (ESI) Calcd for $C_{28}H_{28}NO_2$ $(M+H)^+$ 410.2120, Found 410.2125.

(*E*)-N-benzyl-2-cyclopropyl-3-(2-oxo-2-(*p*-tolyl)ethyl)-2,3-dihydro-1H-inden-1-imine oxide (1x)



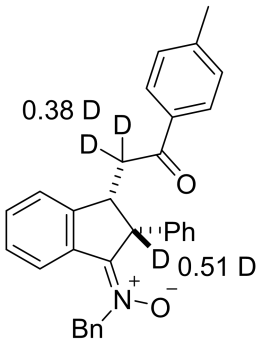
Purified by silica gel column chromatography (2:1 petroleum ether/ethyl acetate). 71.3 mg, 87% yield; Pale white solid, m.p. 58-60 °C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97(d, *J* = 8.0 Hz, 2H), 7.49-7.38 (m, 4H), 7.35-7.29 (m, 5H), 7.25 (d, *J* = 4.0 Hz, 1H), 7.23-718 (m, 1H), 5.60 (d, *J* = 16.0 Hz, 1H), 5.27 (d, *J* = 16.0 Hz, 1H), 4.15 (dd, *J* = 16.0, 8.0 Hz, 1H), 3.80 (dd, *J* = 16.0, 8.0 Hz, 1H), 3.72 (dd, *J* = 12.0, 8.0 Hz, 1H), 3.47 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.44 (s, 3H), 1.13-1.07 (m, 1H), 0.59-0.50 (m, 1H), 0.44-0.37 (m, 1H), 0.35-0.27 (m, 1H), 0.22-0.16 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.4, 154.8, 149.8, 144.2, 134.7, 134.2, 132.3, 129.9, 129.6, 129.3, 128.3, 128.1, 127.8, 126.8, 124.7, 123.9, 65.0, 51.2, 40.3, 38.2, 21.9, 11.4, 4.0, 2.3; HRMS (ESI) Calcd for $C_{28}H_{28}NO_2$ $(M+H)^+$ 410.2120, Found 410.2123.

(*E*)-*N*-(3-(2-oxo-2-*p*-tolylethyl)-2-phenyl-2,3-dihydro-1H-inden-1-ylidene)-1-phenylmethanamine oxide (1a-d1)



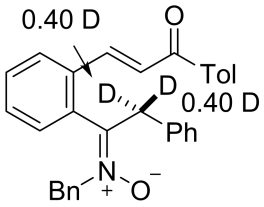
Purified by silica gel column chromatography (2:1 petroleum ether/ethyl acetate). Pale white solid, m.p. 118-120 °C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 8.0 Hz, 2H), 7.40 (d, *J* = 8.0 Hz, 1H), 7.36-7.22 (m, 8H), 7.14-7.08 (m, 5H), 6.92 (d, *J* = 4.0 Hz, 2H), 5.13 (d, *J* = 8.0 Hz, 1H), 4.45-4.40 (m, 1H), 3.06 (dd, *J* = 8.0, 16.0 Hz, 1H), 2.91 (dd, *J* = 8.0, 16.0 Hz, 1H), 2.36 (s, 3H).

(*E*)-*N*-(3-(2-oxo-2-*p*-tolylethyl)-2-phenyl-2,3-dihydro-1H-inden-1-ylidene)-1-phenylmethanamine oxide (1a-d2)



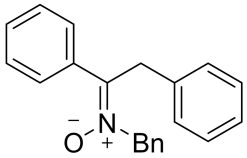
Purified by silica gel column chromatography (2:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, *J* = 4.0 Hz, 2H), 7.40 (d, *J* = 8.0 Hz, 1H), 7.36-7.22 (m, 8H), 7.14-7.08 (m, 5H), 6.91 (d, *J* = 4.0 Hz, 2H), 5.59 (d, *J* = 16.0 Hz, 1H), 5.35 (d, *J* = 16.0 Hz, 1H), 5.14 (d, *J* = 8.0 Hz, 0.49H), 4.43 (d, *J* = 4.0 Hz, 1H), 3.05 (dd, *J* = 4.0, 16.0 Hz, 0.81H), 2.91 (dd, *J* = 8.0, 16.0 Hz, 0.81H), 2.35 (s, 3H).

(*E*)-*N*-(1-(2-((*E*)-3-oxo-3-*p*-tolylprop-1-enyl)phenyl)-2-phenylethylidene)-1-phenylmethanamine oxide (2a-d3)



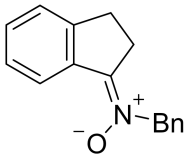
Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 8.0 Hz, 2H), 7.72 (d, *J* = 8.0 Hz, 1H), 7.46-7.41 (m, 1H), 7.38-7.32 (m, 2H), 7.27 (t, *J* = 8.0 Hz, 3H), 7.24-7.16 (m, 5H), 7.12-7.08 (m, 5H), 6.93 (d, *J* = 8.0 Hz, 1H), 4.86 (d, *J* = 16.0 Hz, 1H), 4.81 (d, *J* = 12.0 Hz, 1H), 4.46 (d, *J* = 12.0 Hz, 1H), 3.93 (d, *J* = 12.0 Hz, 1H), 2.44 (s, 3H).

(*Z*)-N-benzyl-1,2-diphenylethan-1-imine oxide (7)



Purified by silica gel column chromatography (3:1 petroleum ether/ethyl acetate). Light yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.33 (m, 3H), 7.32-7.29 (m, 3H), 7.25 (t, *J* = 4.0 Hz, 2H), 7.20-7.16 (m, 5H), 7.05-7.03 (m, 2H), 4.95 (s, *2*H), 4.22 (s, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.6, 136.1, 135.2, 134.4, 129.6, 129.4, 129.0, 128.7, 128.6, 128.5, 128.4, 126.8, 64.7, 39.3; HRMS (ESI) Calcd for $C_{21}H_{20}NO$ $(M+H)^+$ 302.1545, Found 302.1548.

(*Z*)-N-benzyl-2,3-dihydro-1H-inden-1-imine oxide (8)



Purified by silica gel column chromatography (1:1 petroleum ether/ethyl acetate). Yellow white solid, m.p. 95-96 °C (uncorrected); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 8.0 Hz, 1H), 7.48 (d, *J* = 8.0 Hz, 2H), 7.38-7.27 (m, 6H), 5.09 (s, 2H), 3.14 (d, *J* = 4.0 Hz, 2H), 3.04 (d, *J* = 4.0 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.7, 148.0, 134.8, 133.5, 131.4, 129.0, 128.5, 128.3, 127.4, 127.3, 127.1, 124.7, 66.7, 29.4, 29.1; HRMS (ESI) Calcd for $C_{16}H_{16}NO$ $[M+H]^+$ 238.1226, Found 238.1225.

(D) References

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(2) S. Franco, F. L. Merchán, P. Merino and T. Tejero, *Synth. Commun*.; 1995, **25**, 2275-2284.

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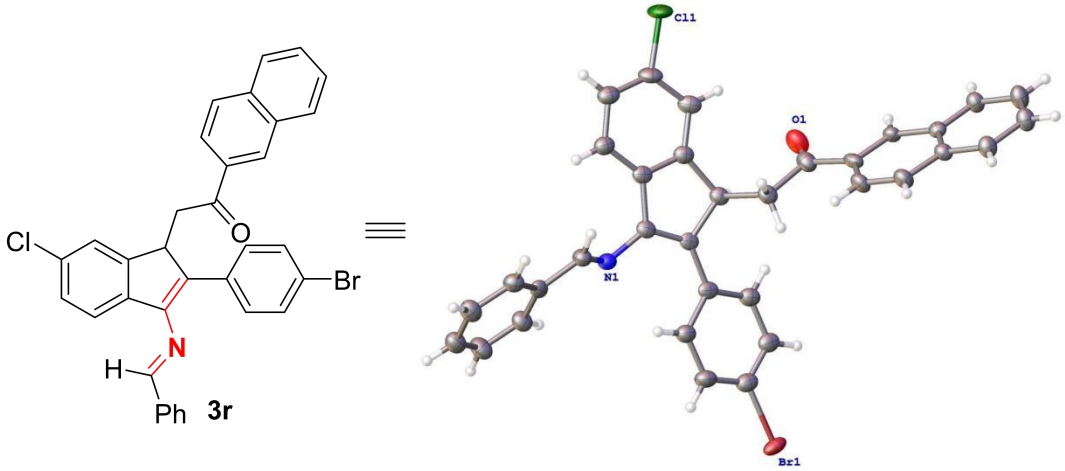
Ruan, X. Lei, X. Wang and Z. Zhang, *J. Med. Chem*.; 2017, **60**, 972-98.

(7) Y.-C. Dzeng and J. W. Bode, *ChemRxiv*, **2021**.DOI:10.26434/chemrxiv-2021-zm8

(E) X-ray crystal structures of compounds 3r, 9, 10



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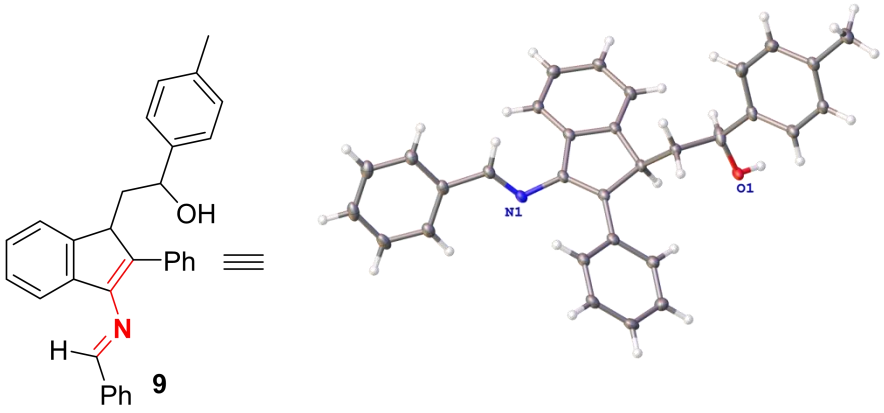

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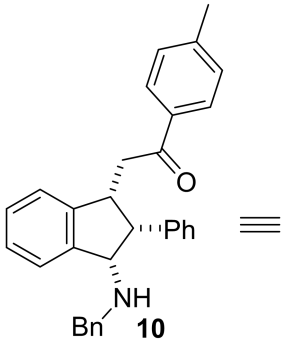

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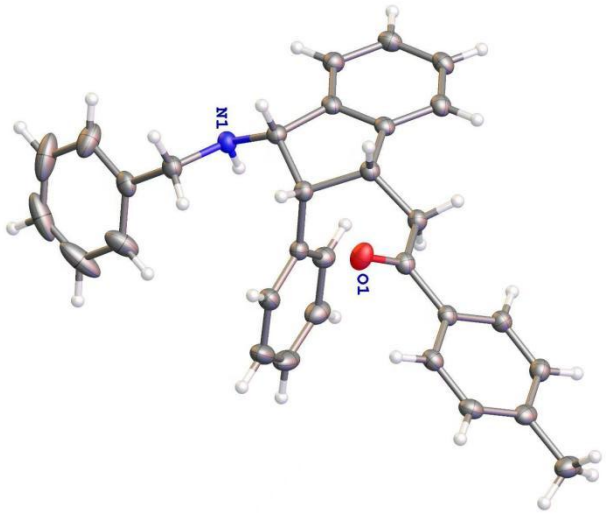

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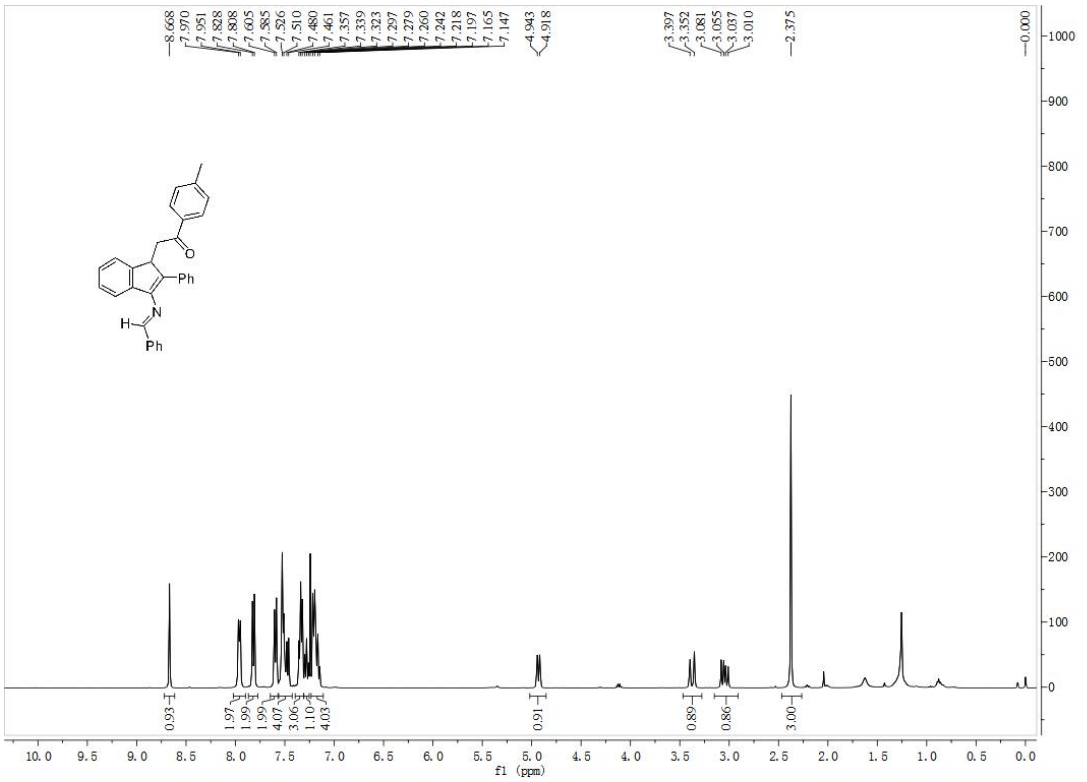
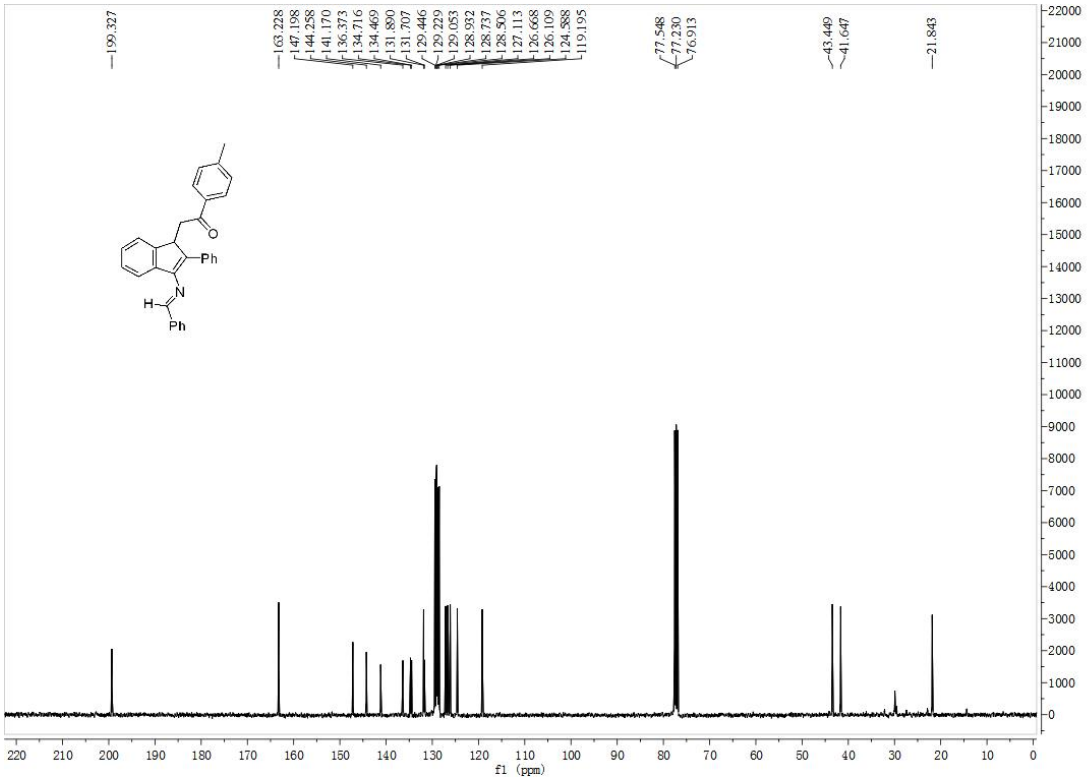
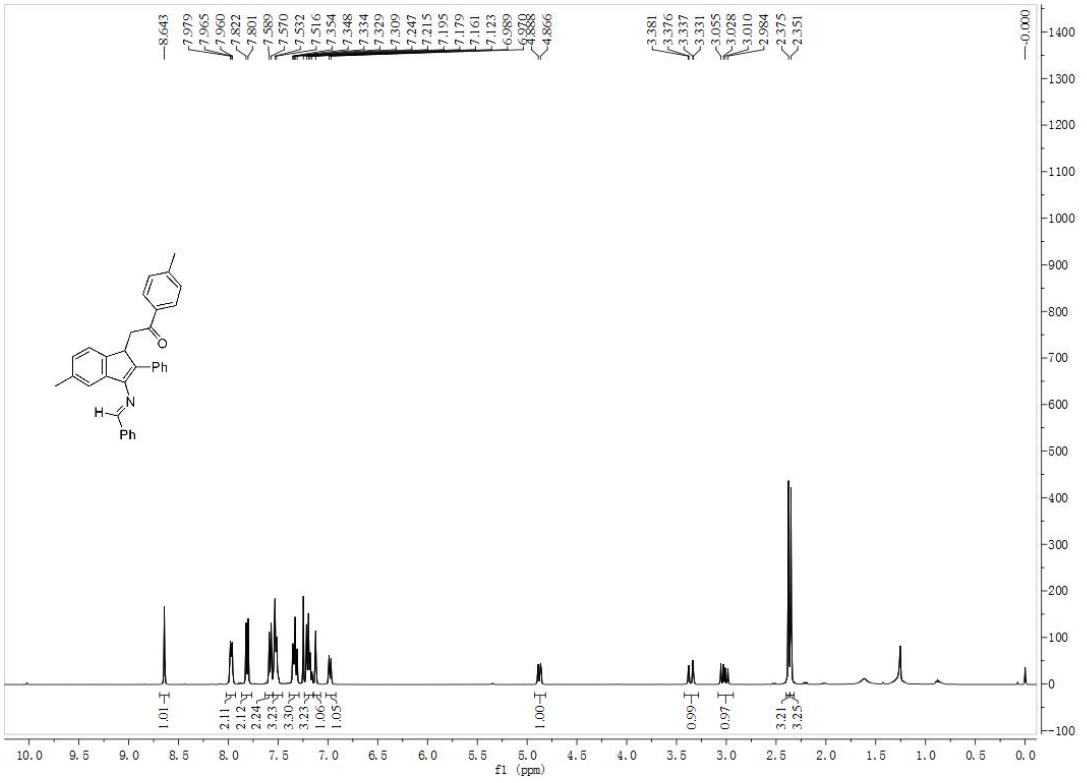
(F) Spectra

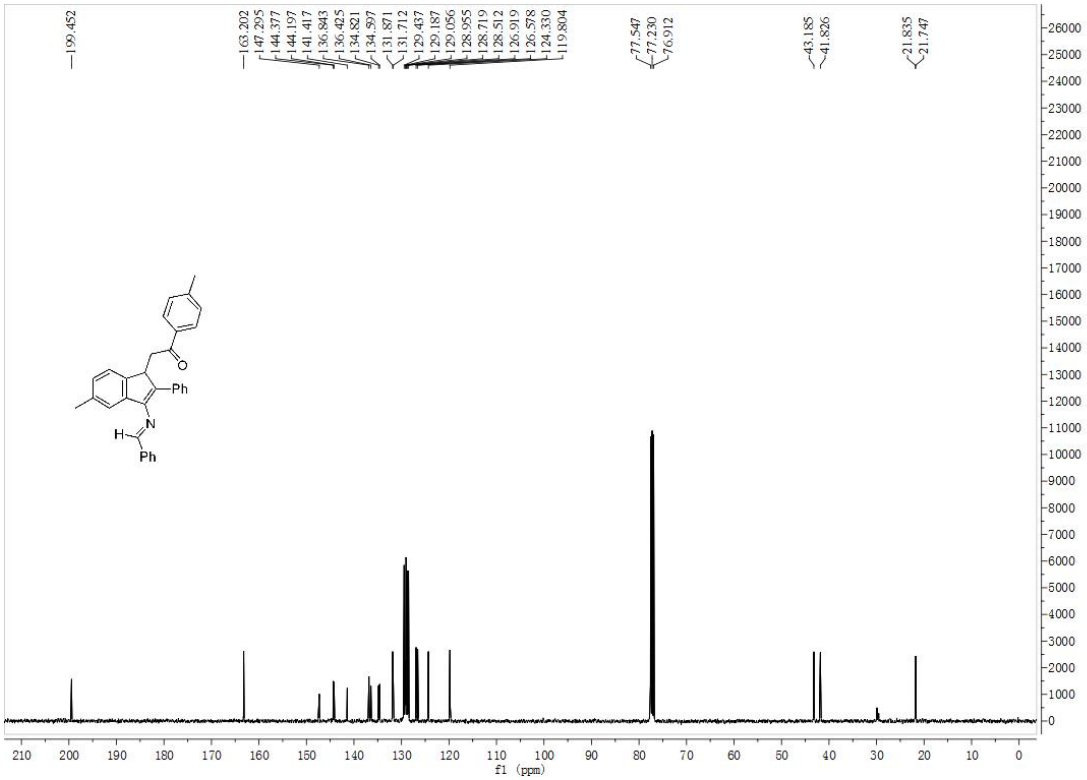
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a)



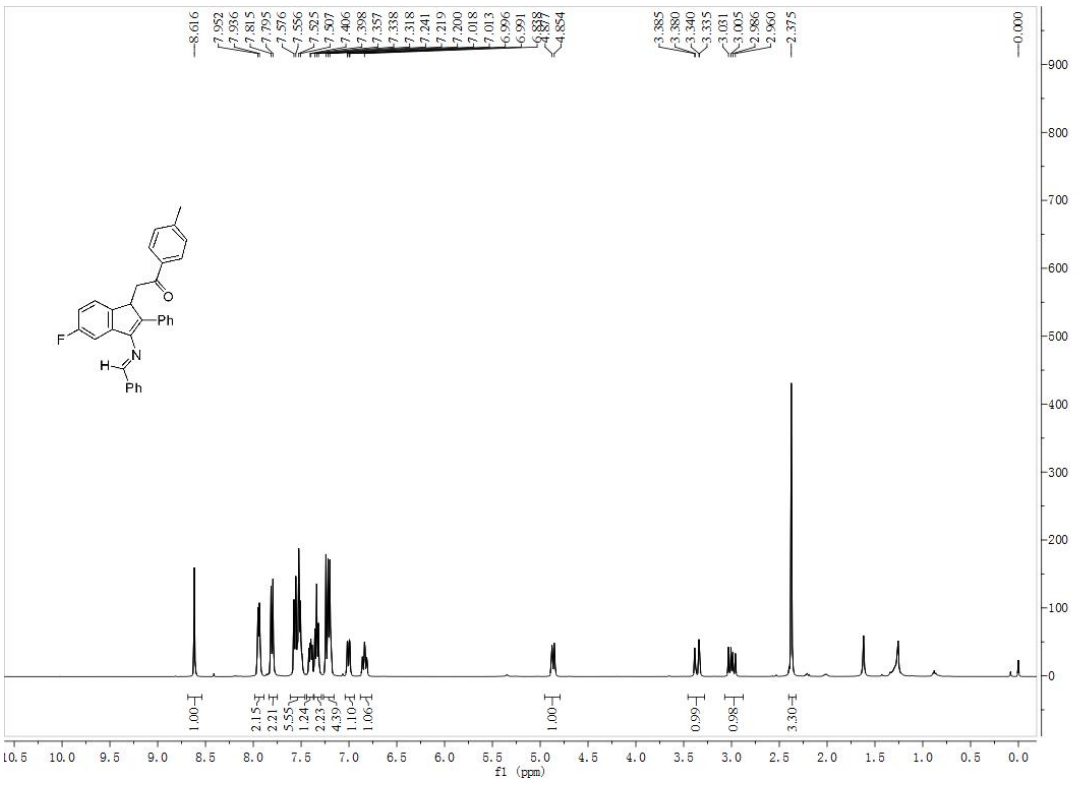


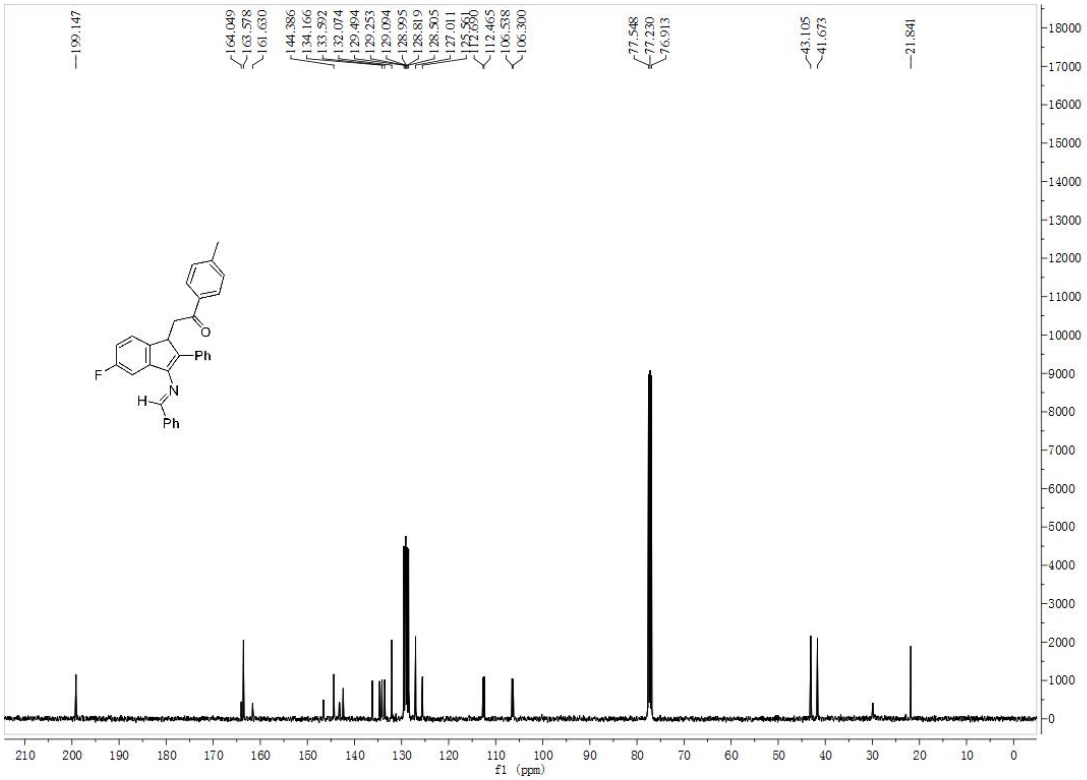
(*E*)-2-(3-(benzylideneamino)-5-methyl-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3b)



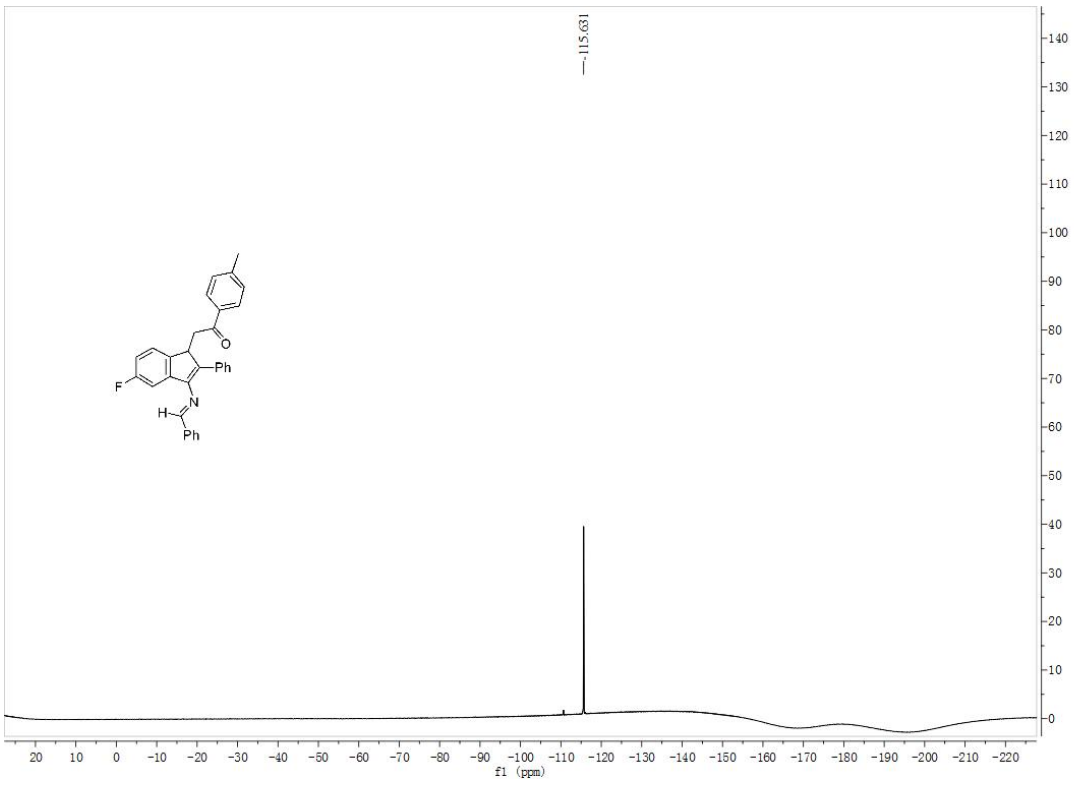


(*E*)-2-(3-(benzylideneamino)-5-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3c)

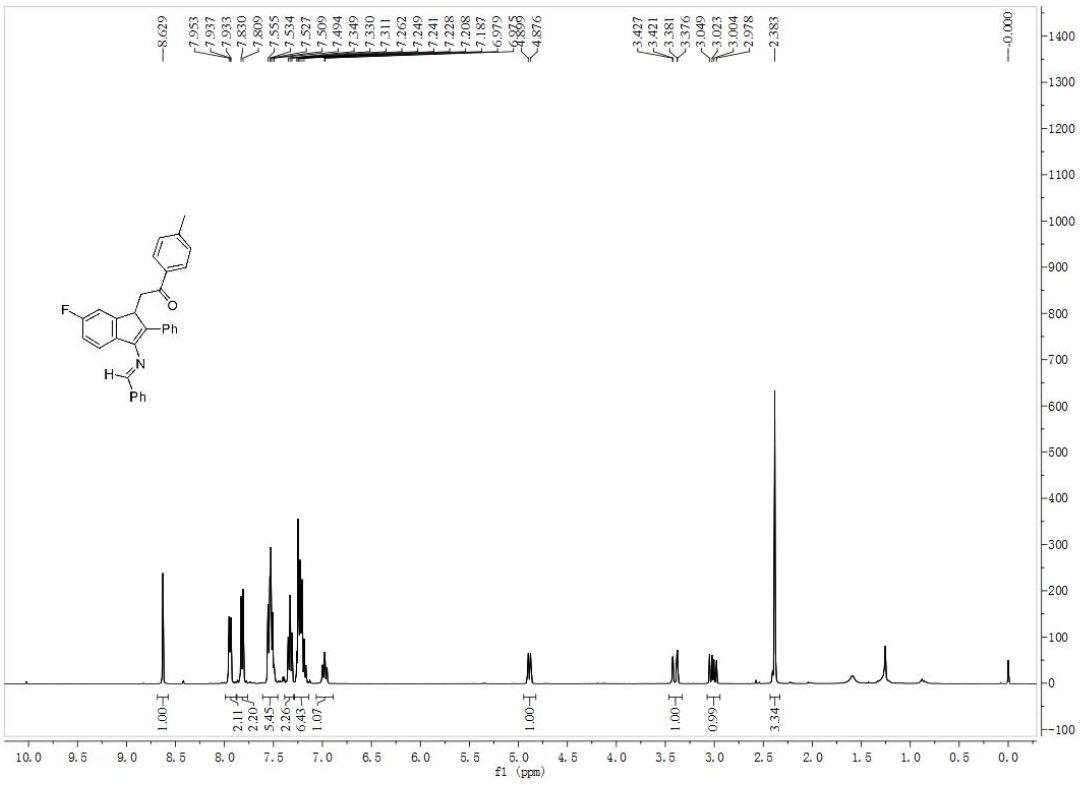


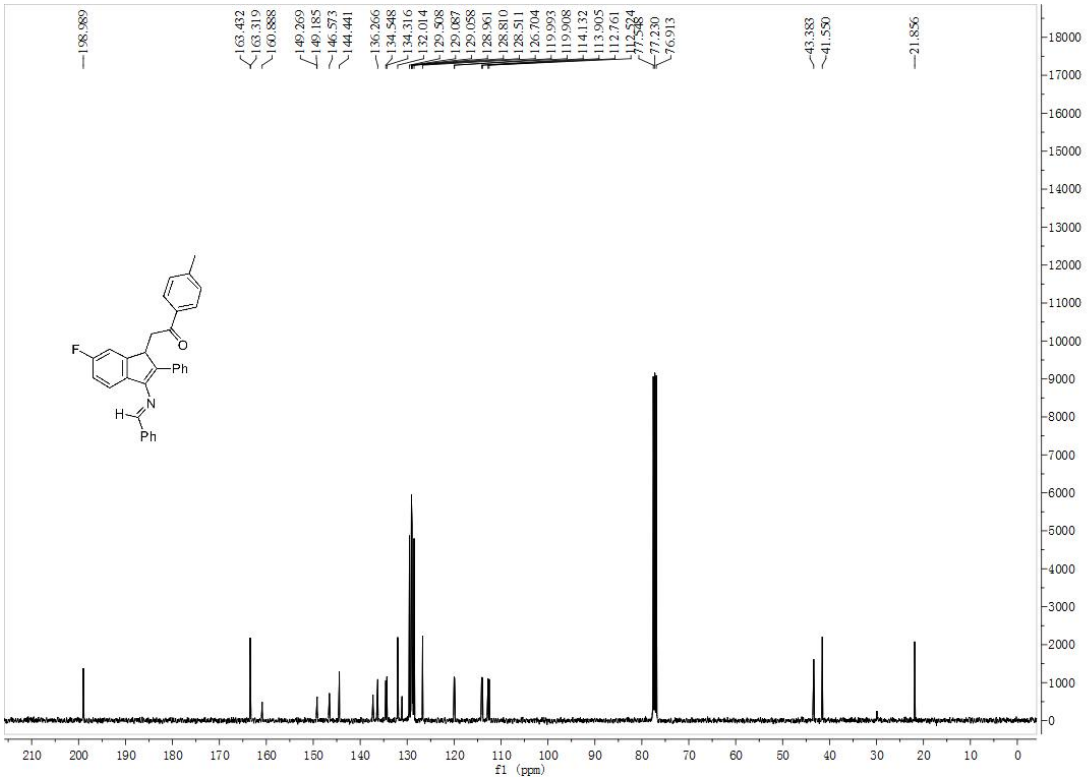


(*E*)-2-(3-(benzylideneamino)-5-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3c)

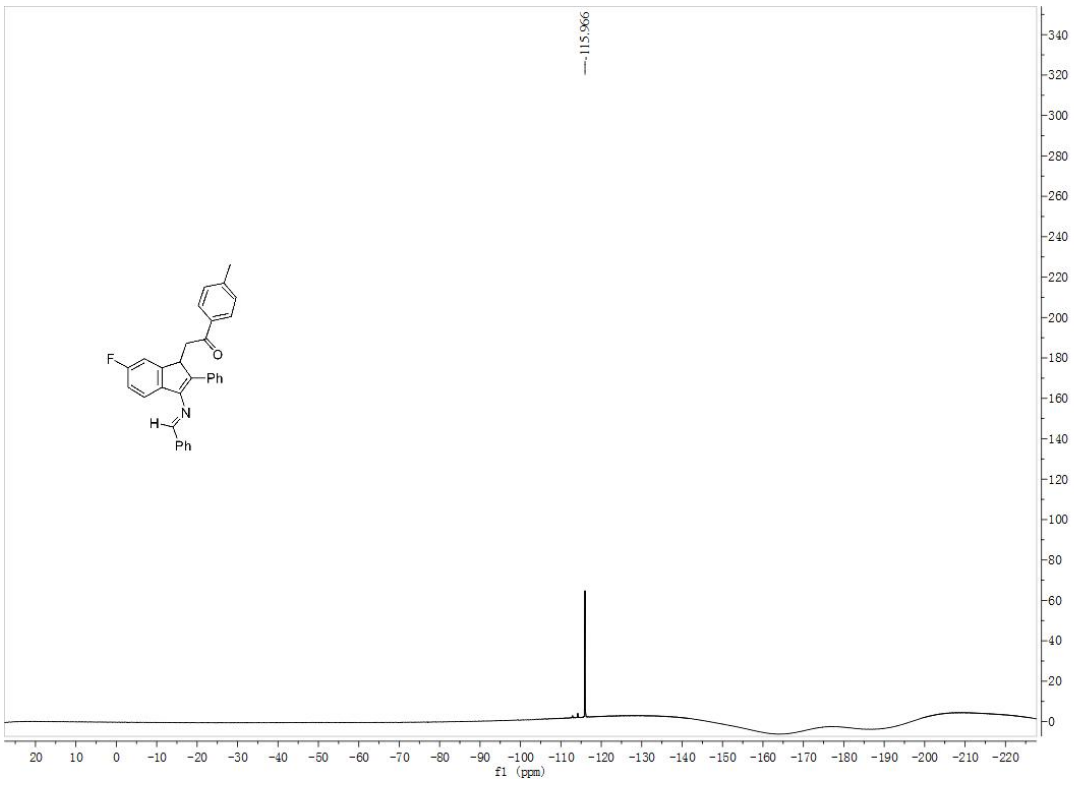


(*E*)-2-(3-(benzylideneamino)-6-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3d)

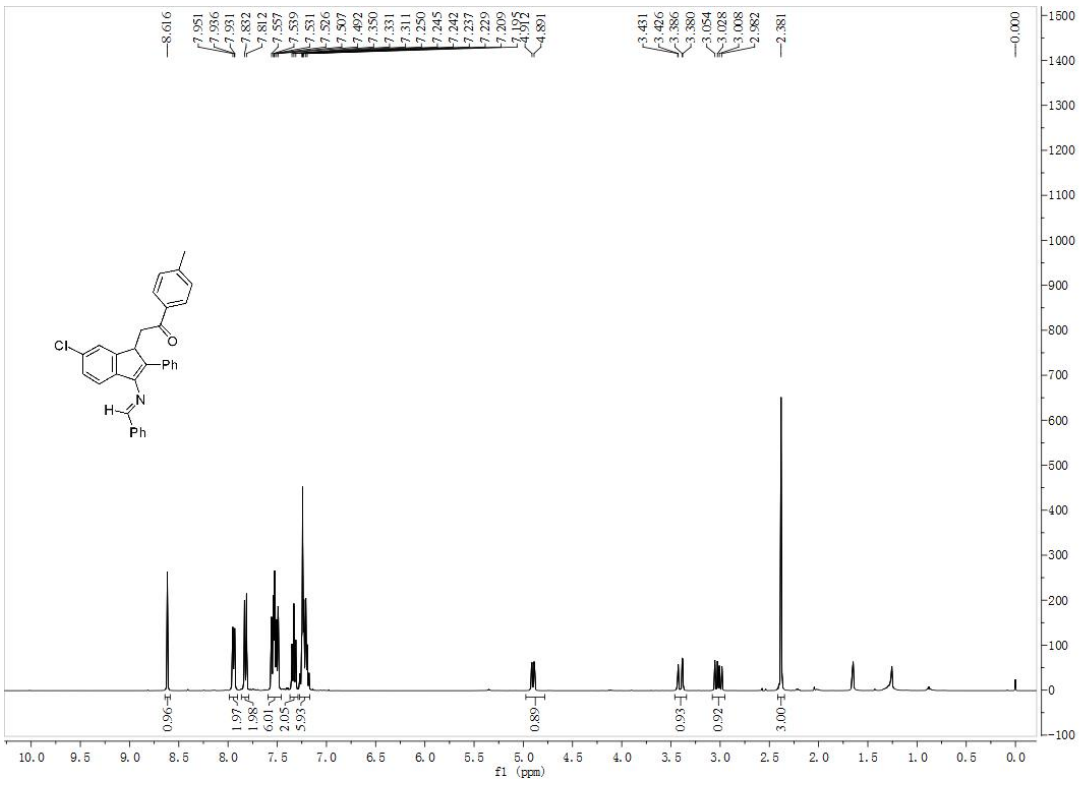


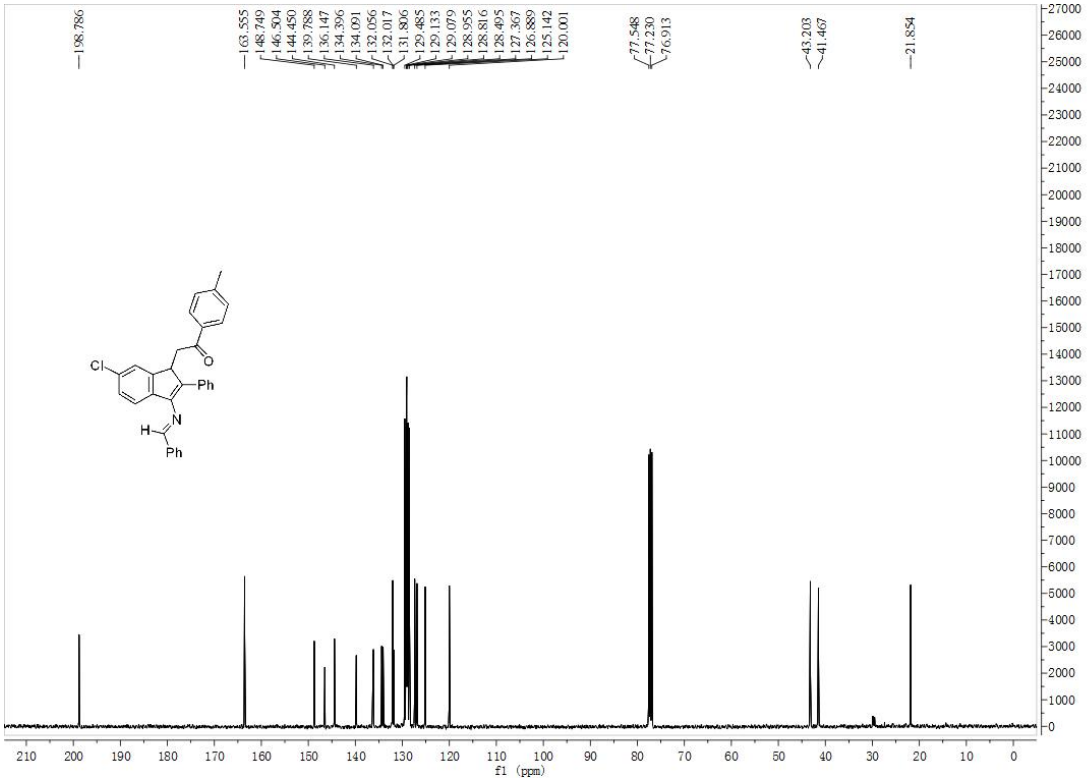


(*E*)-2-(3-(benzylideneamino)-6-fluoro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3d)

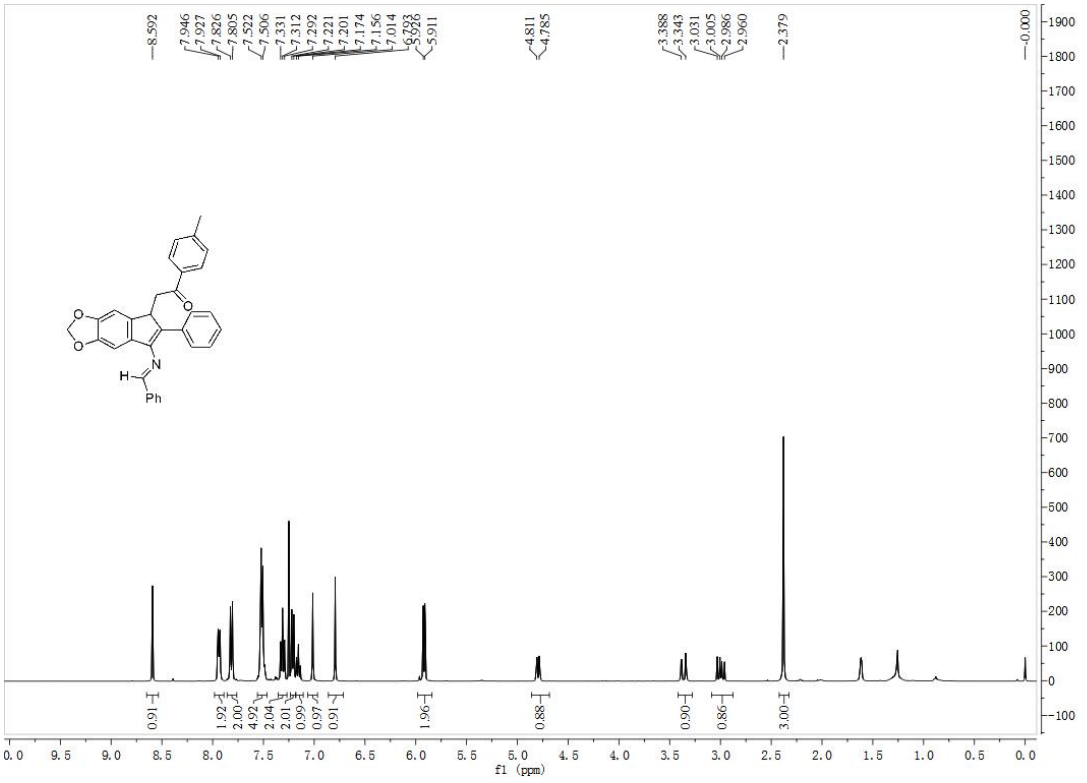


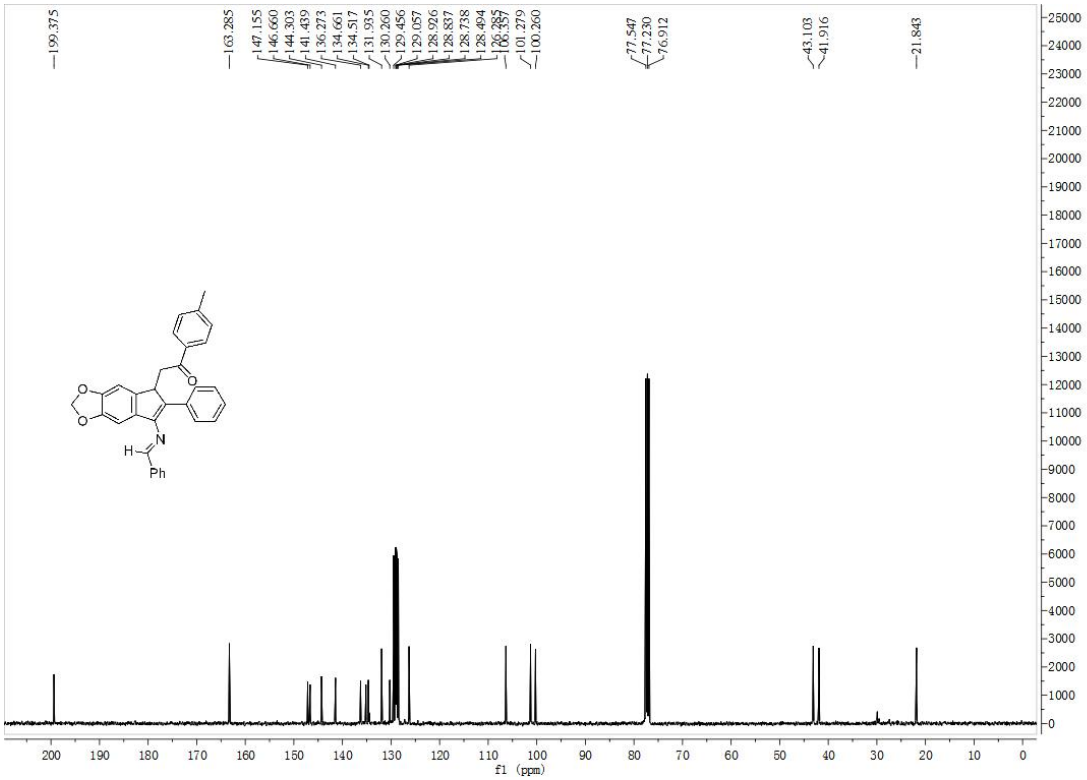
(*E*)-2-(3-(benzylideneamino)-6-chloro-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3e)



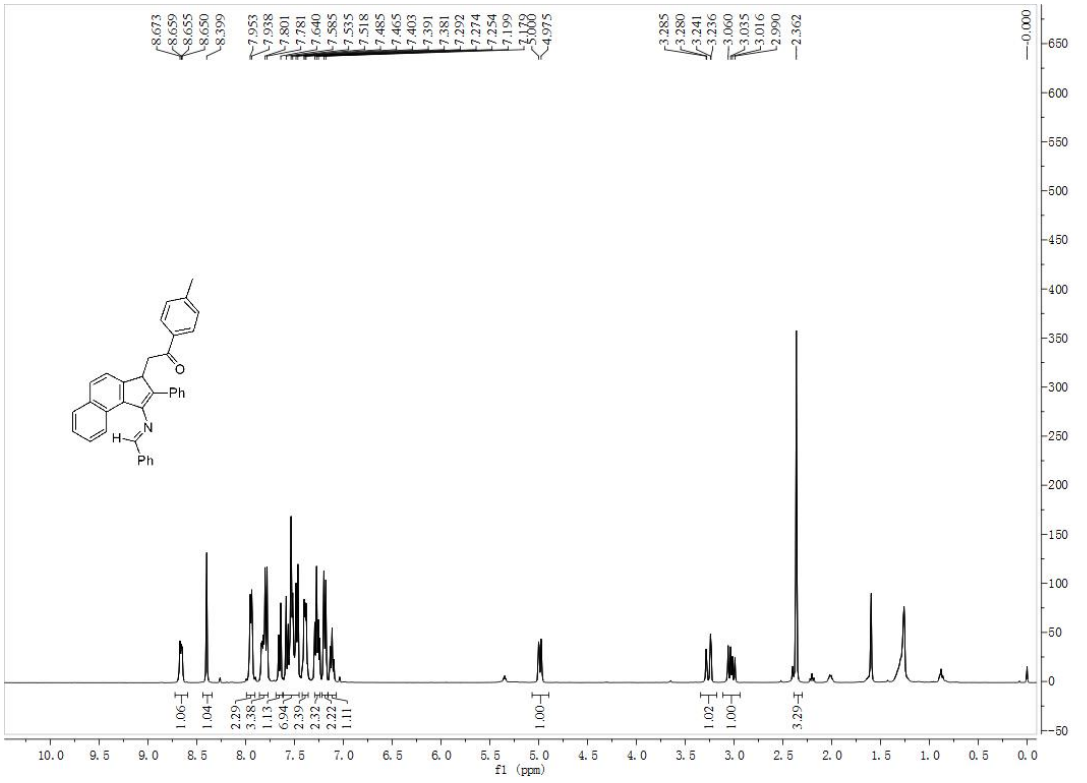


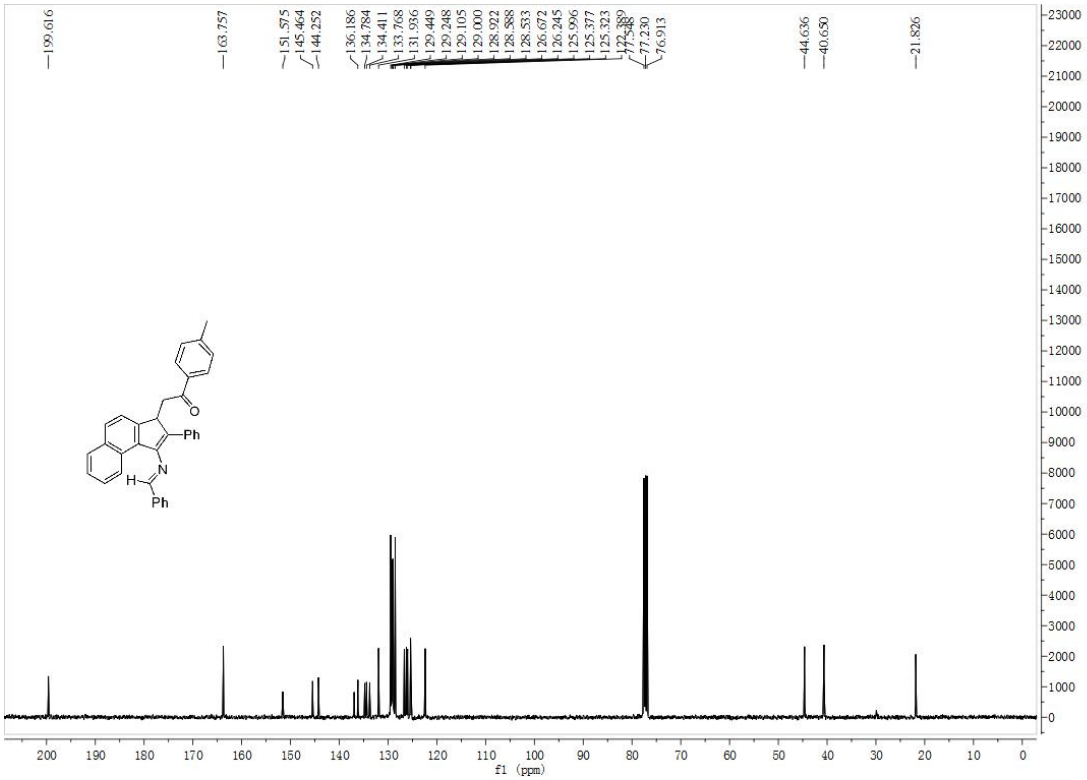
(*E*)-2-(7-(benzylideneamino)-6-phenyl-5H-indeno[5,6-d][1,3]dioxol-5-yl)-1-(*p*-toly l)ethan-1-one (3f)



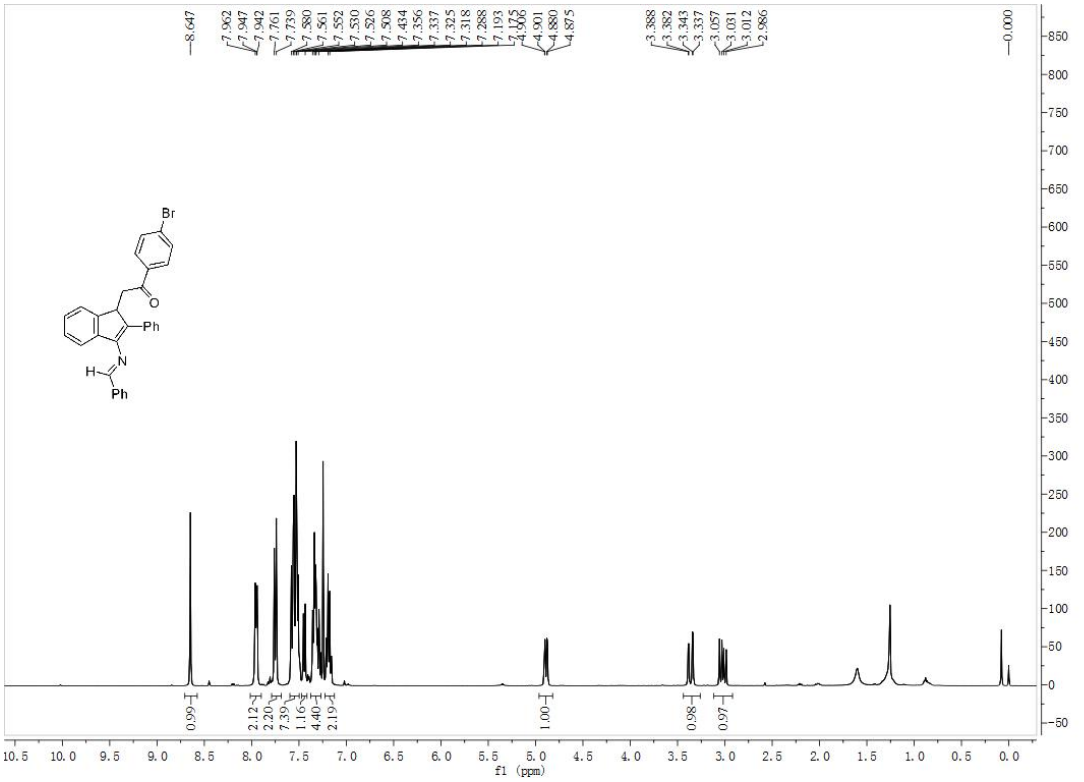


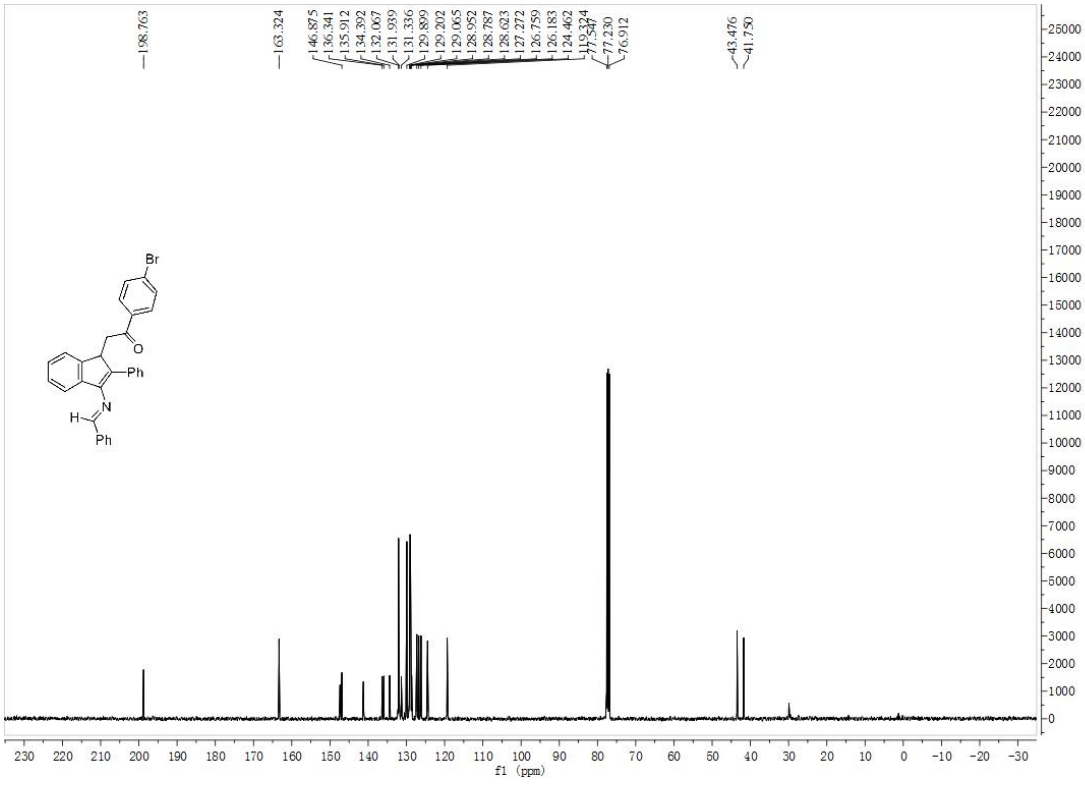
(*E*)-2-(1-(benzylideneamino)-2-phenyl-3H-cyclopenta[a]naphthalen-3-yl)-1-(*p*-tol yl)ethan-1-one (3g)



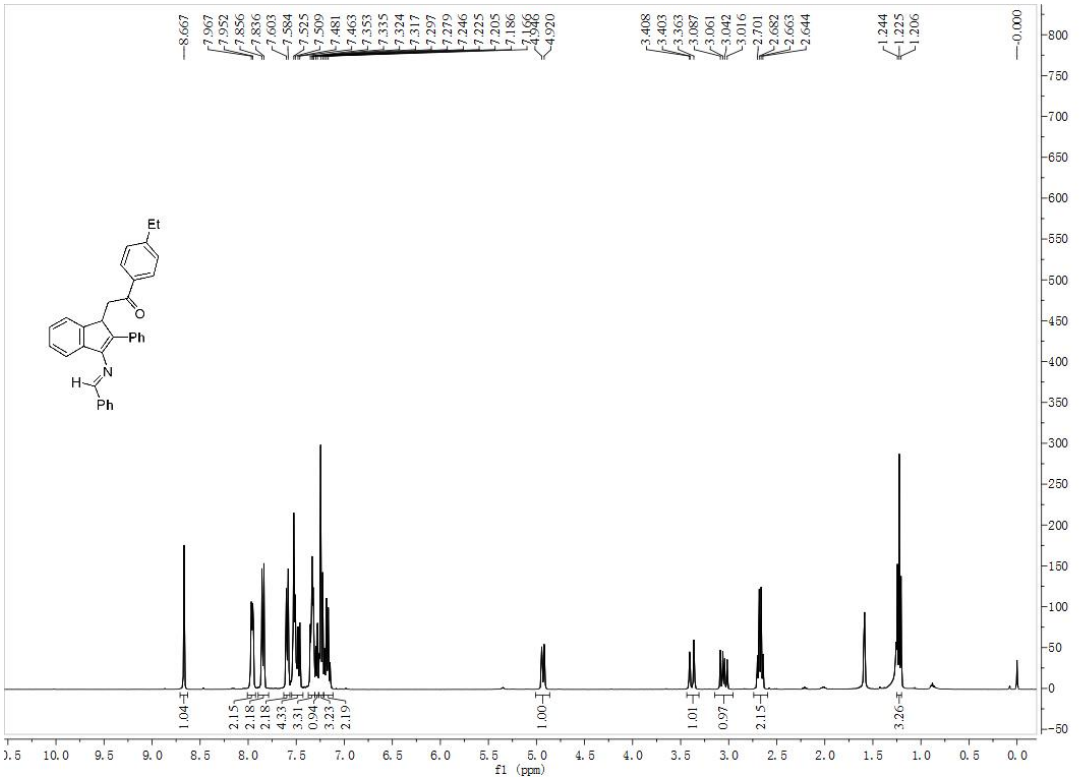


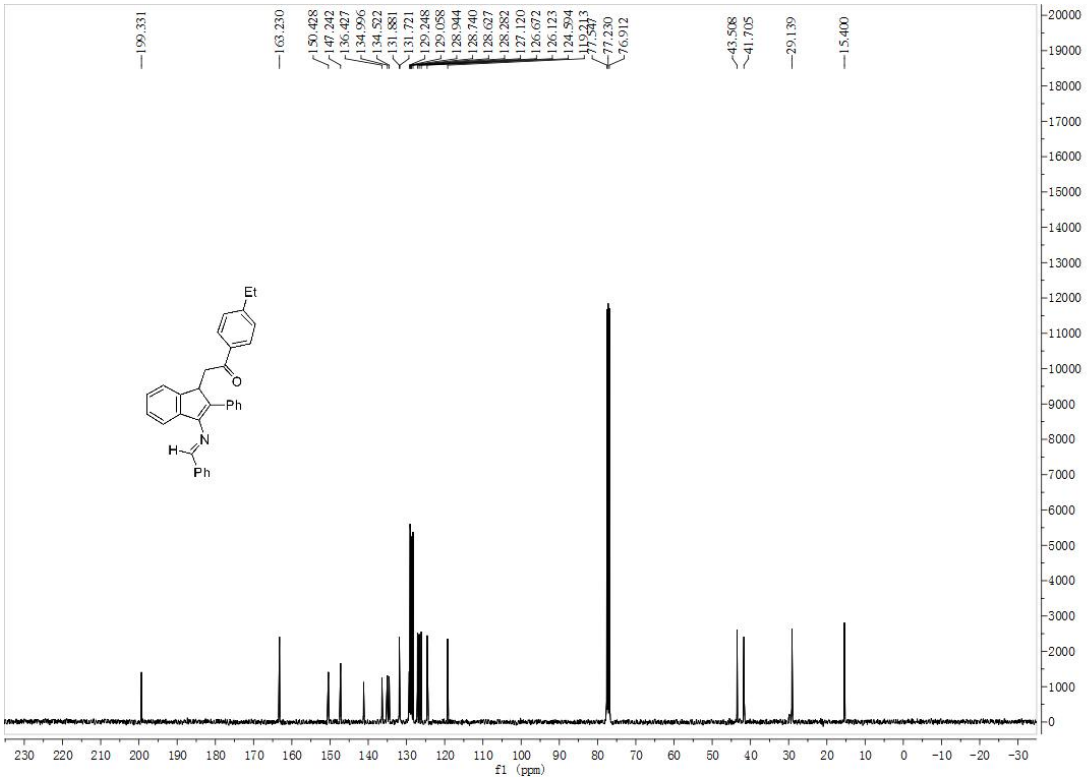
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(4-bromophenyl)ethan-1-one (3h)



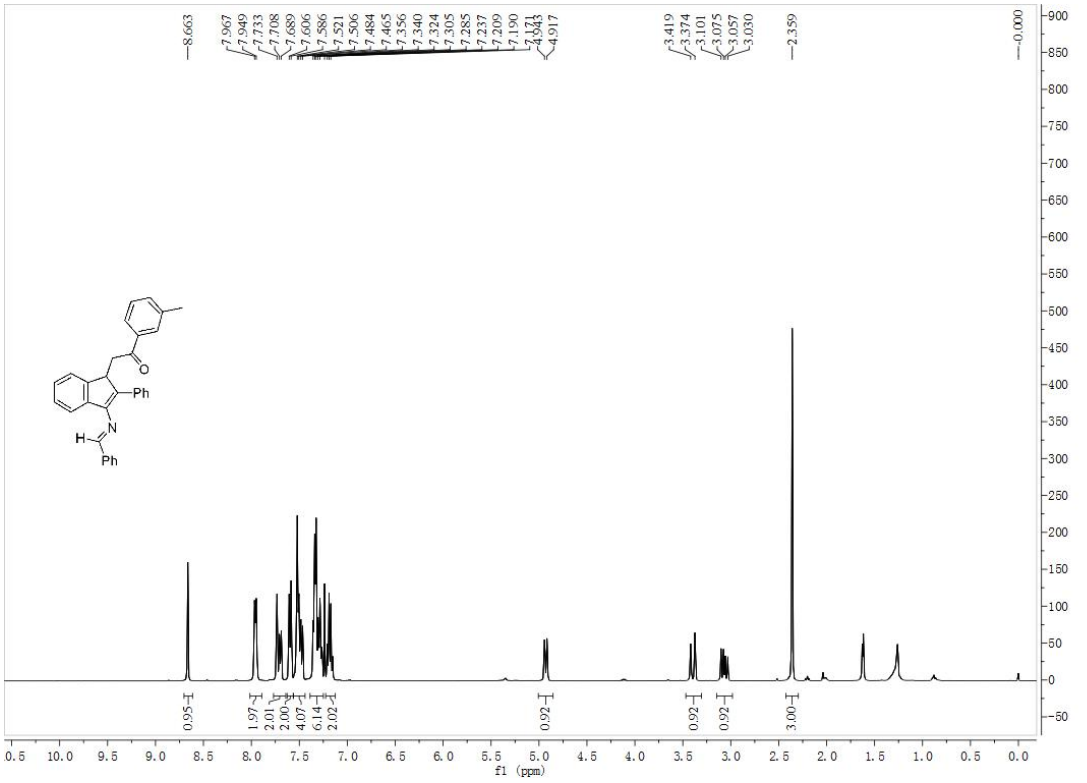


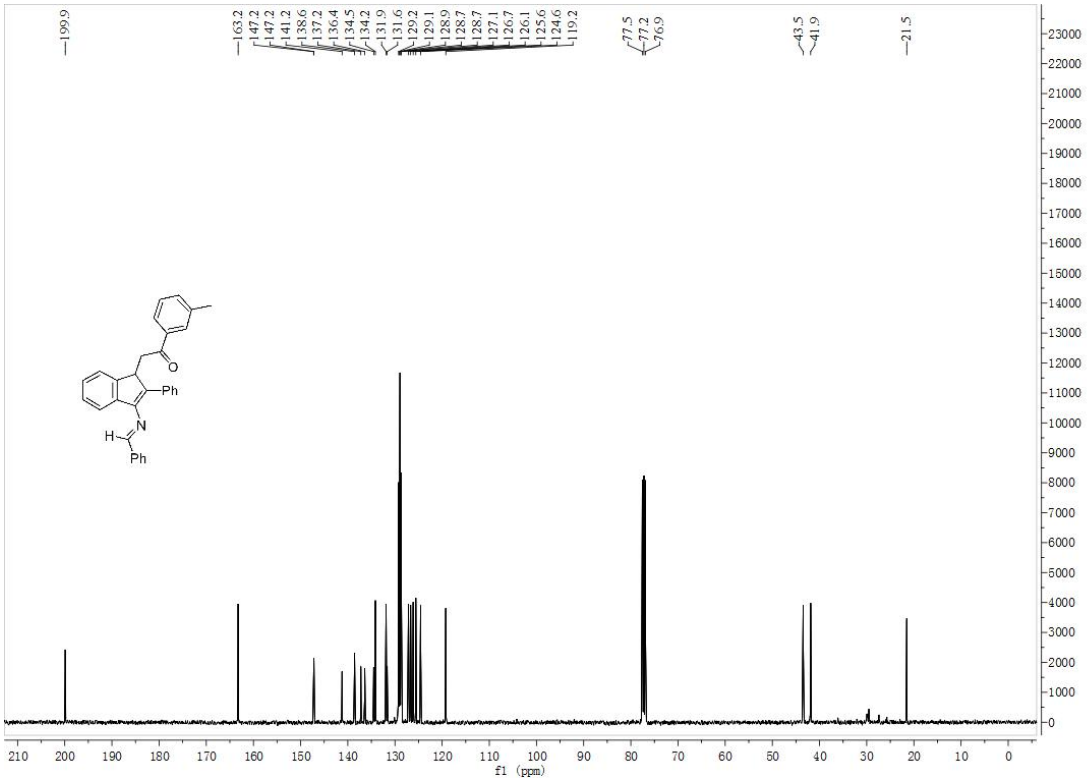
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(4-ethylphenyl)ethan-1-one (3i)



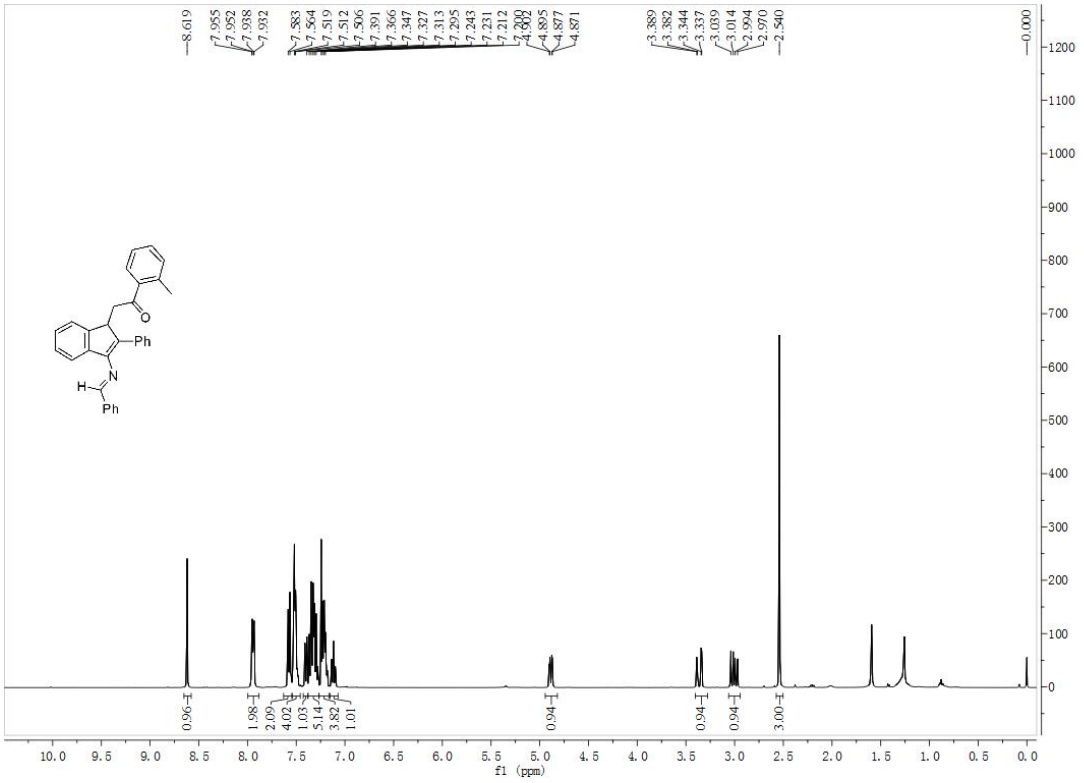


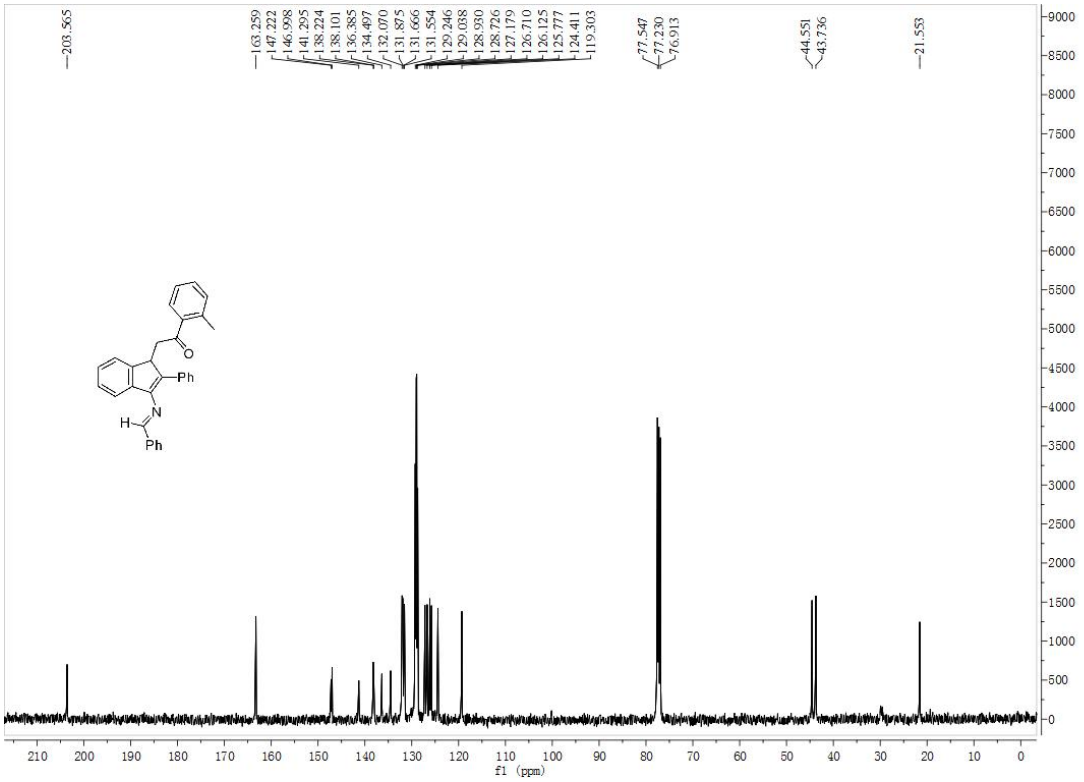
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(m-tolyl)ethan-1-one (3j)



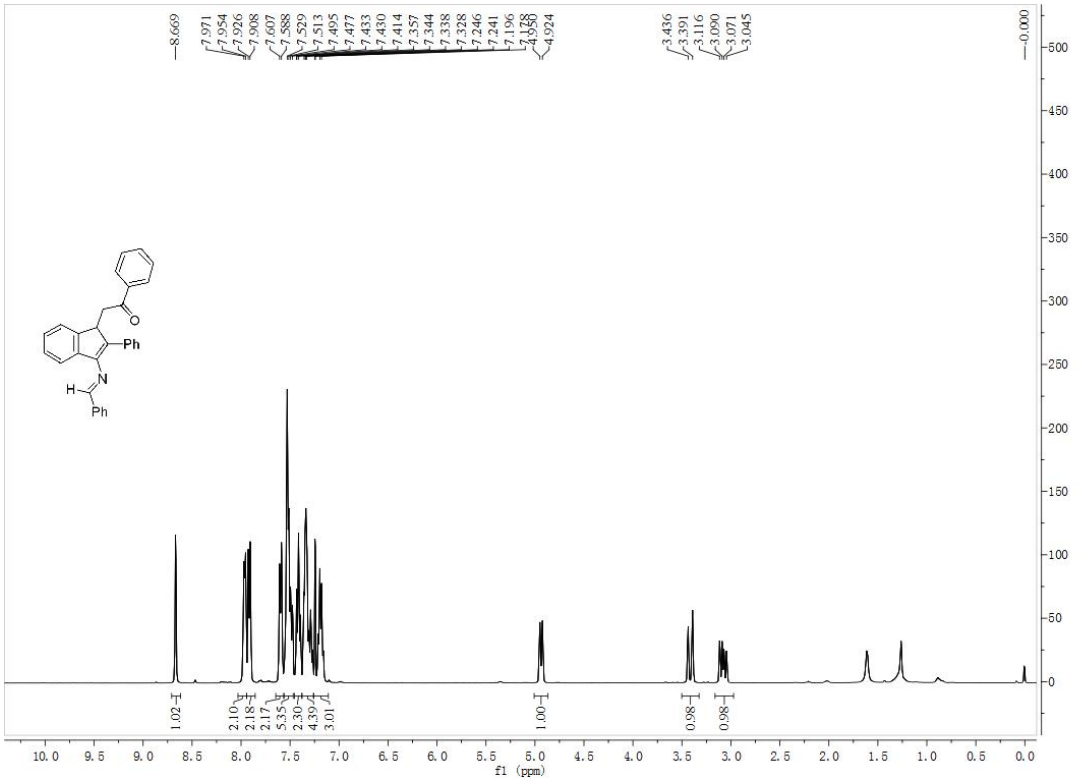


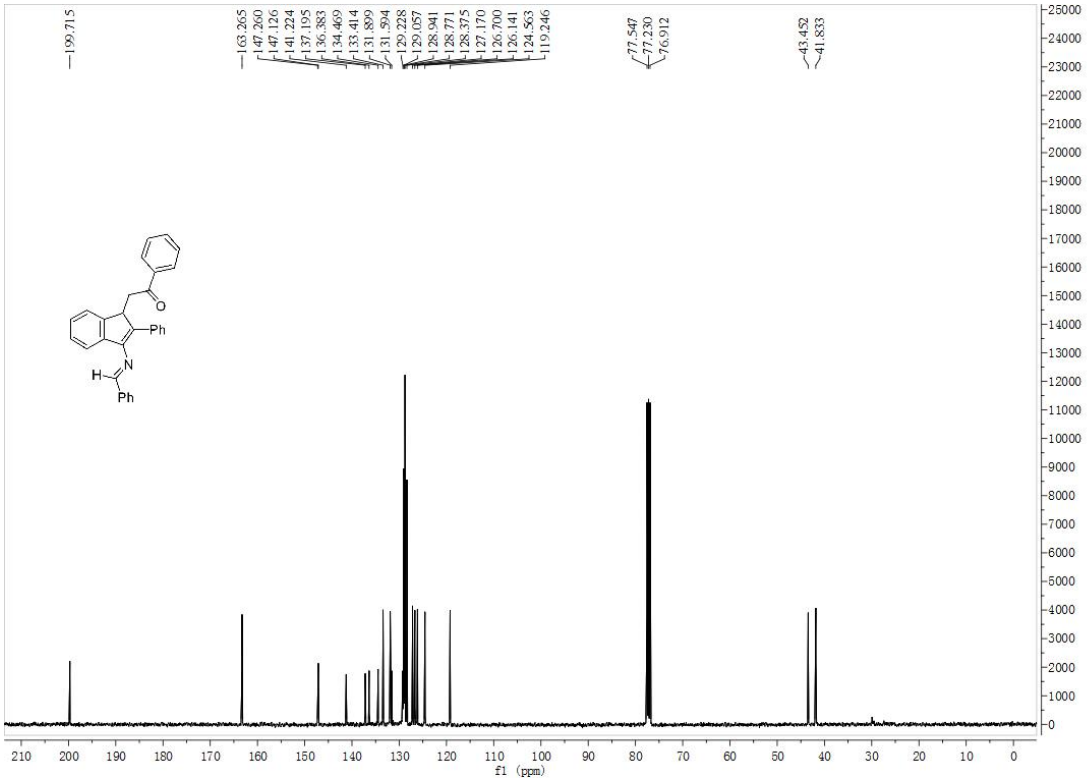
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*o*-tolyl)ethan-1-one (3k)



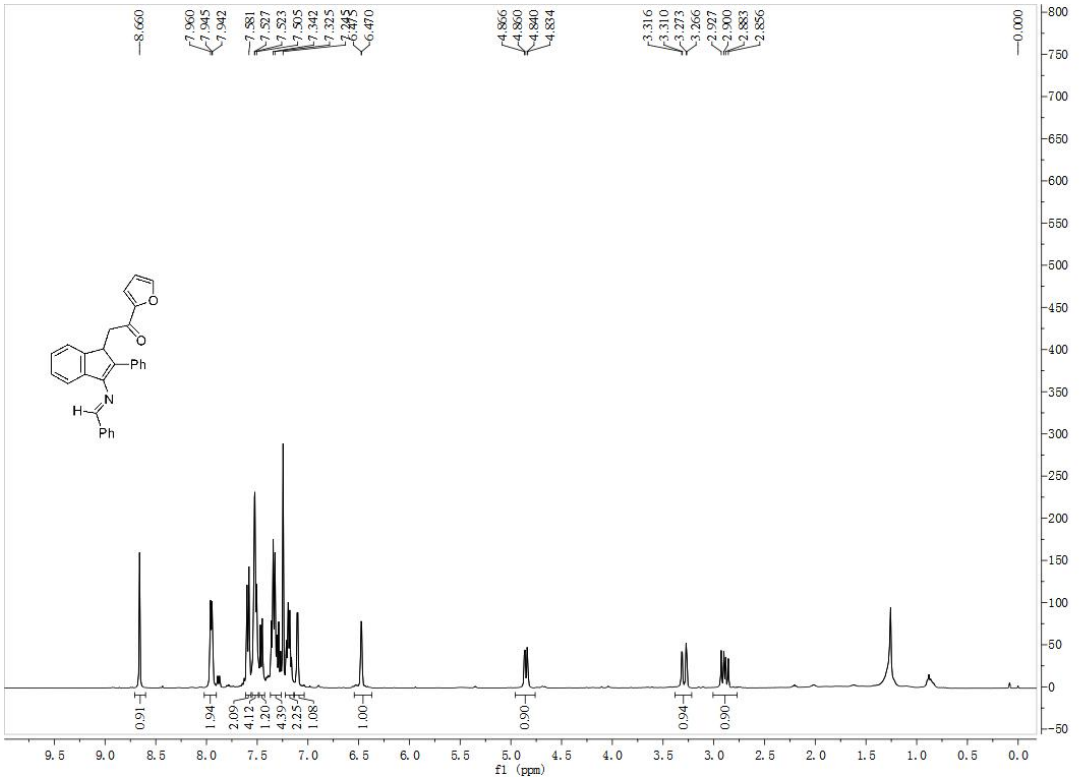


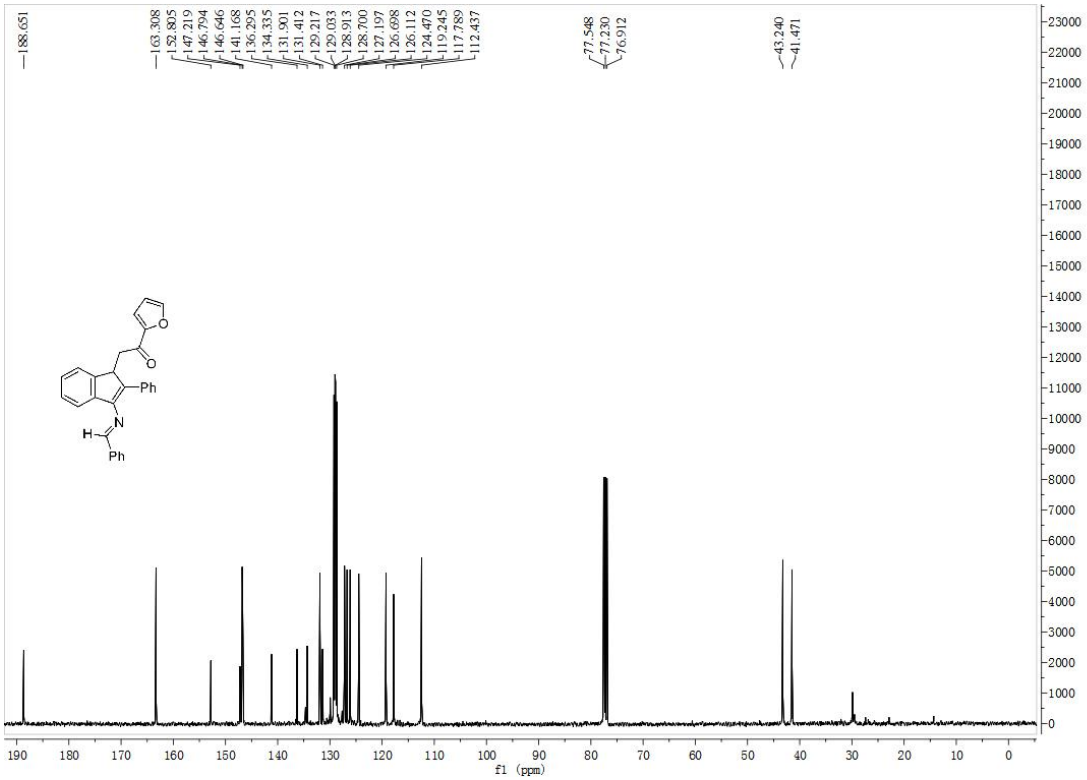
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-phenylethan-1-one (3l)



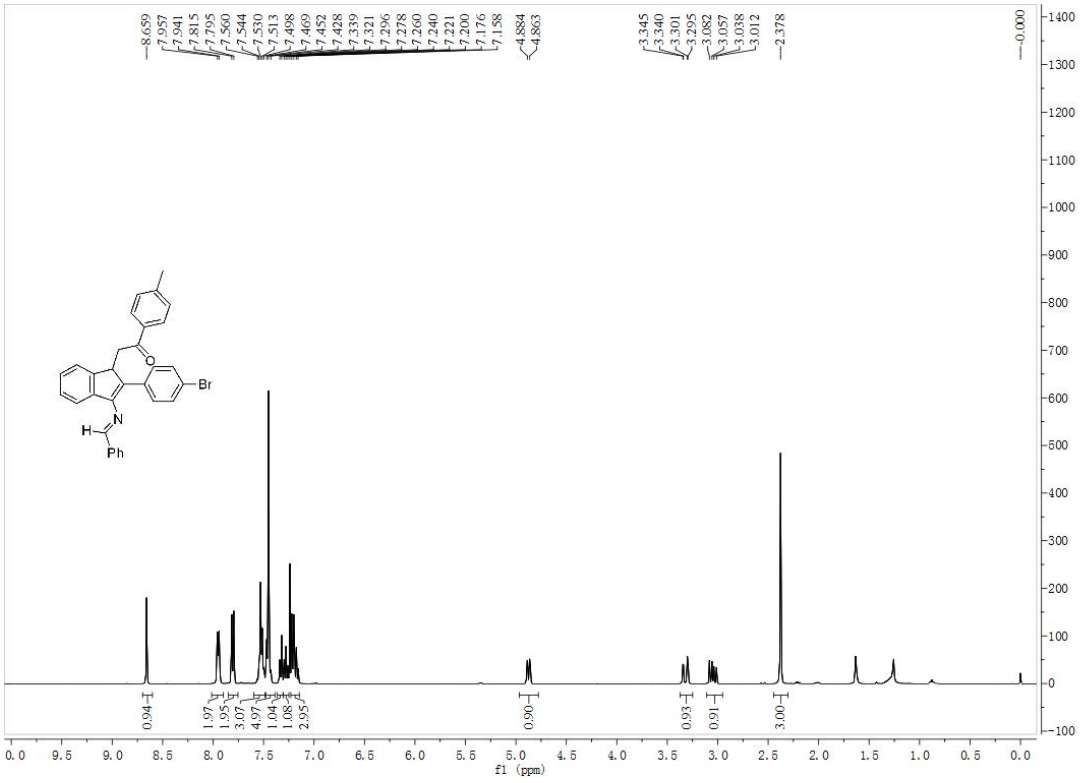


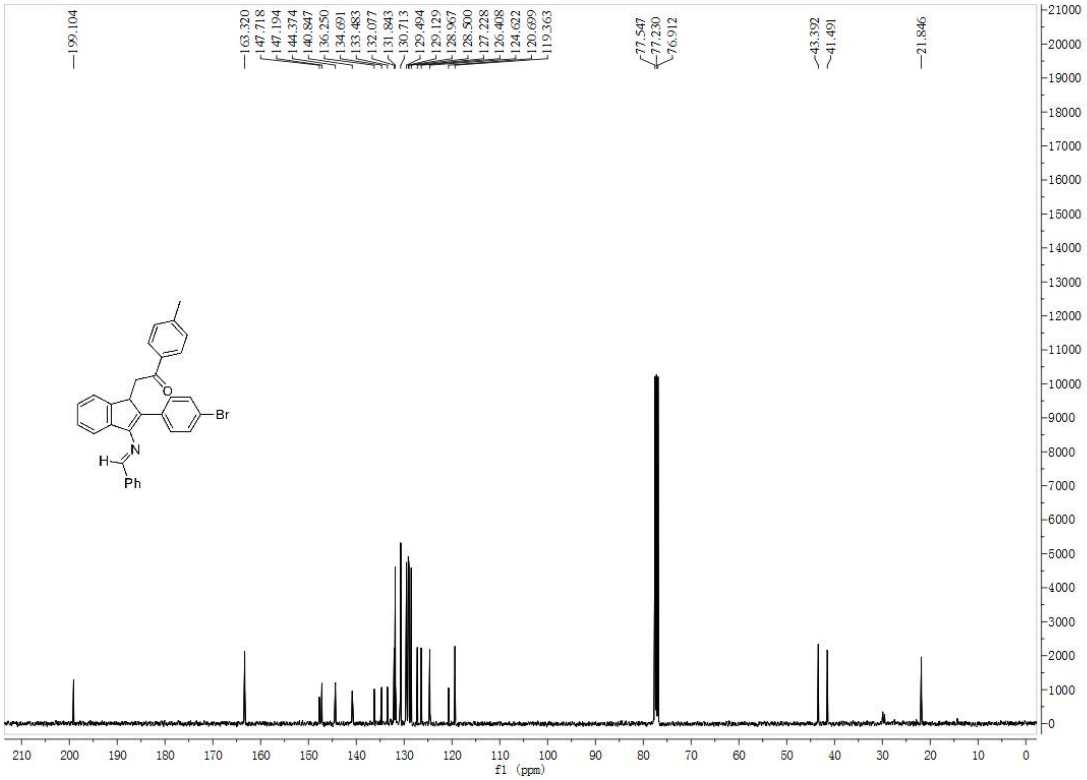
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(furan-2-yl)ethan-1-one (3m)



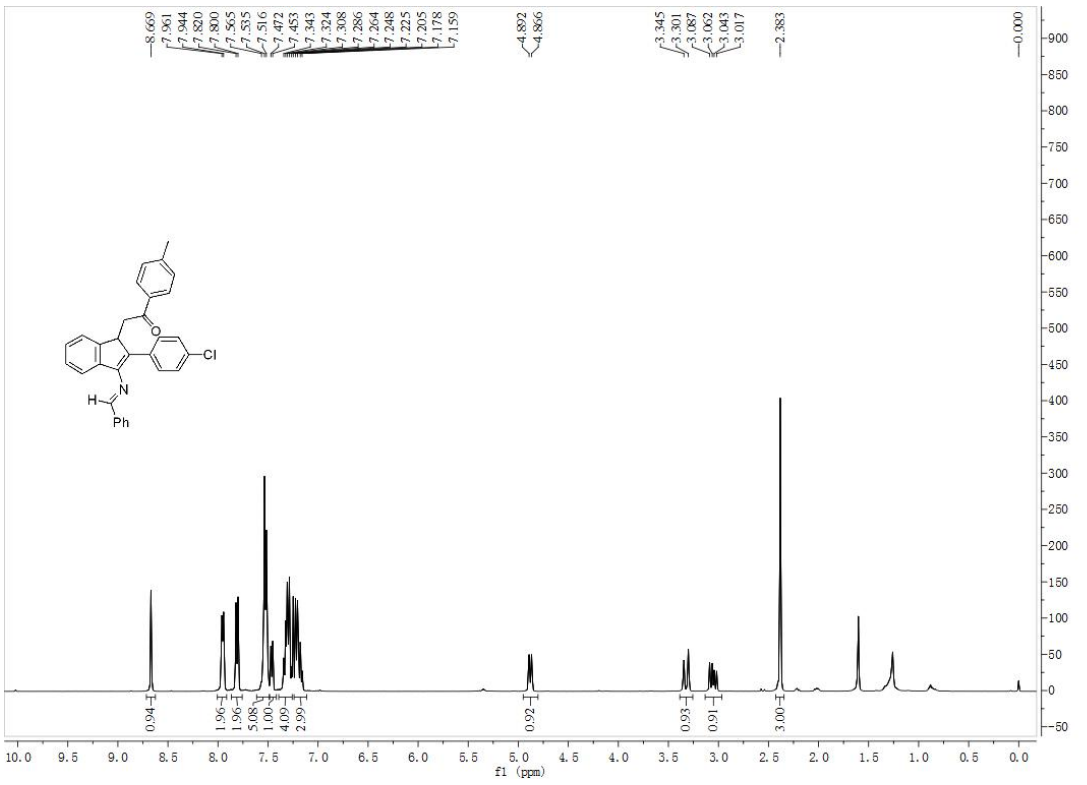


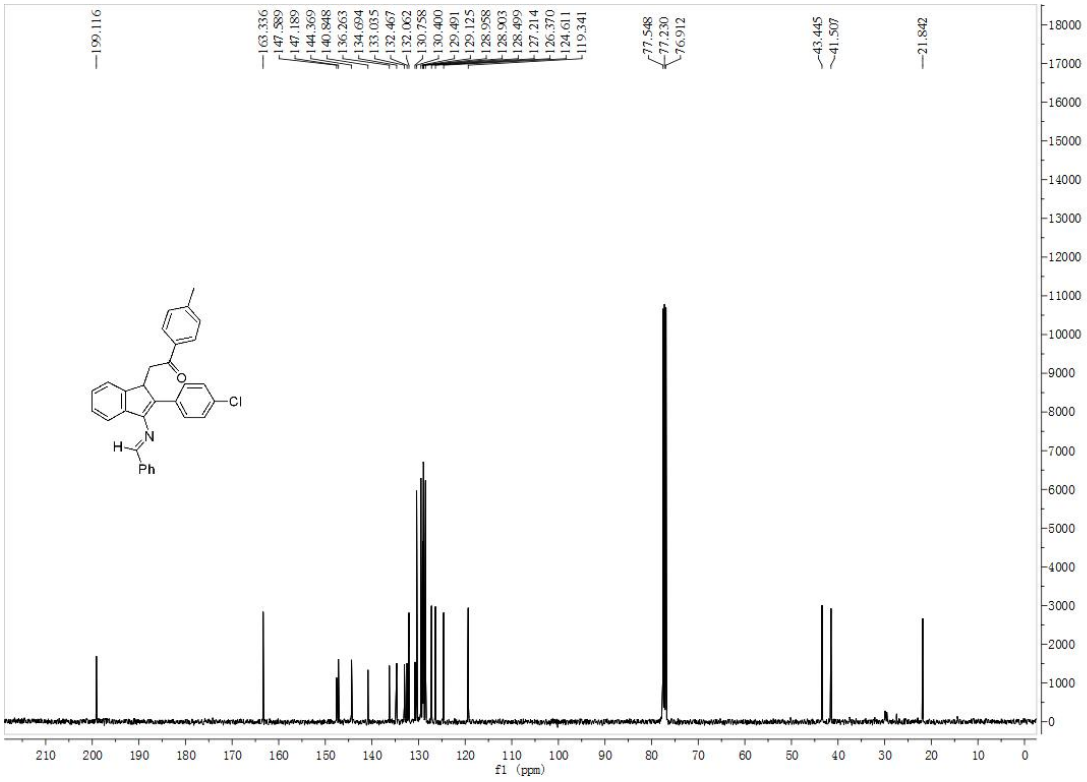
(*E*)-2-(3-(benzylideneamino)-2-(4-bromophenyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3n)



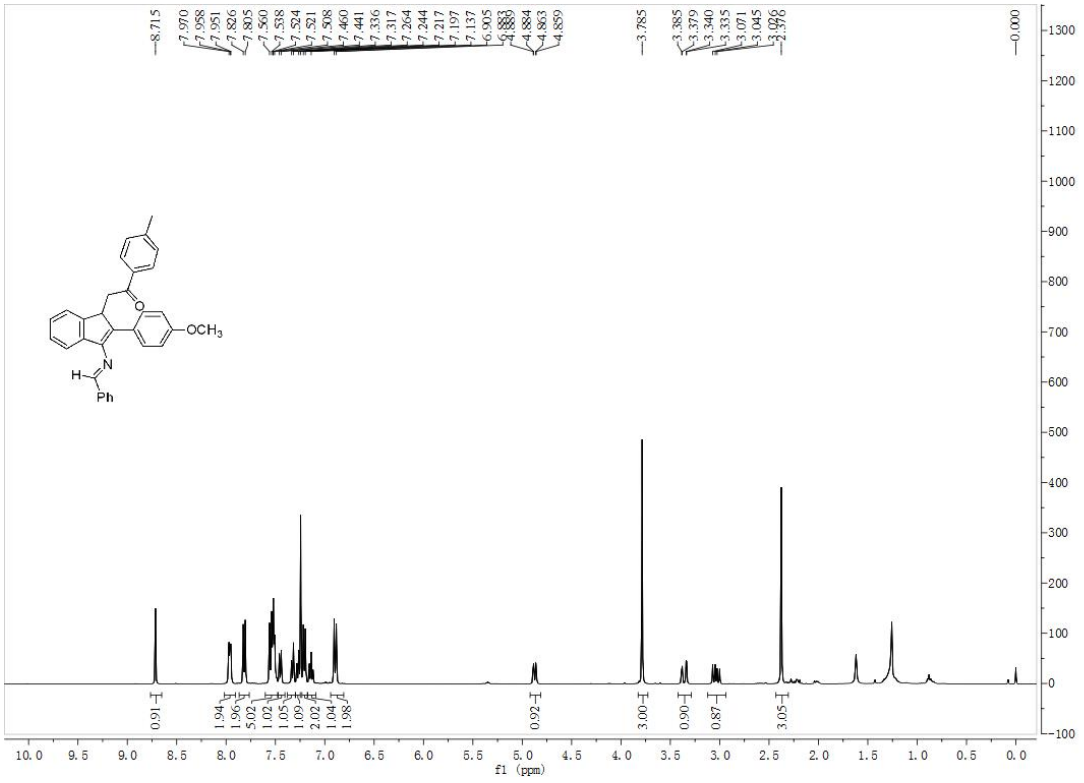


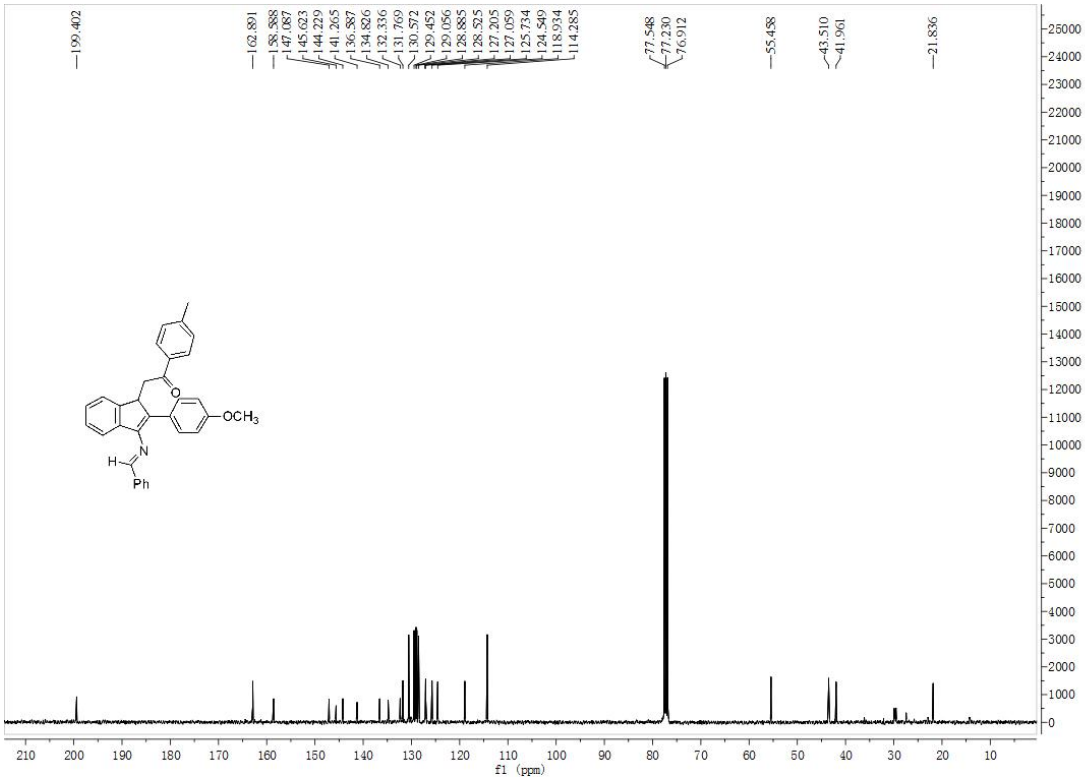
(*E*)-2-(3-(benzylideneamino)-2-(4-chlorophenyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3o)



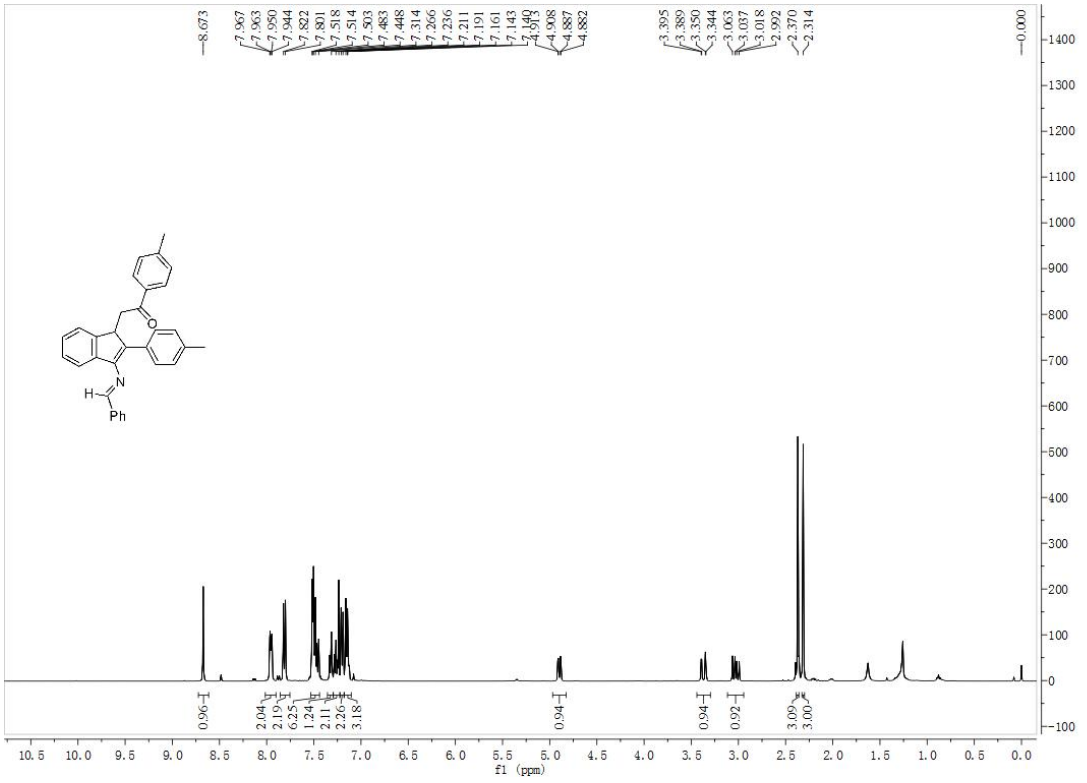


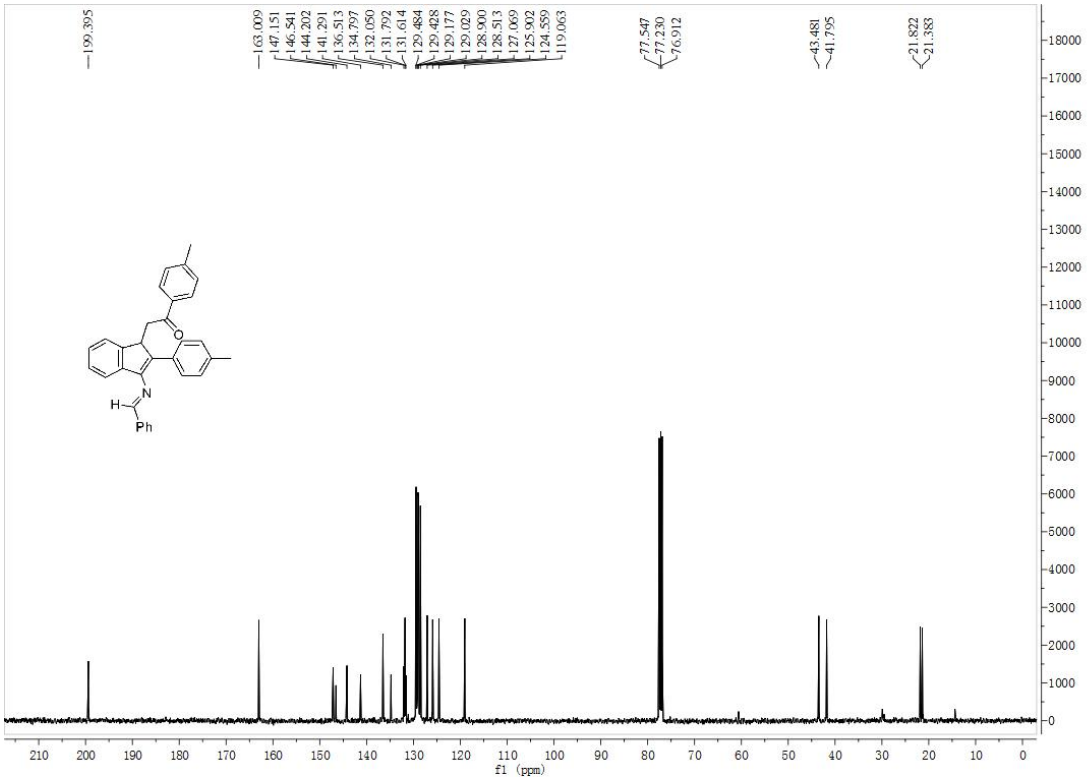
(*E*)-2-(3-(benzylideneamino)-2-(4-methoxyphenyl)-1H-inden-1-yl)-1-(*p*-tolyl)etha n-1-one (3p)



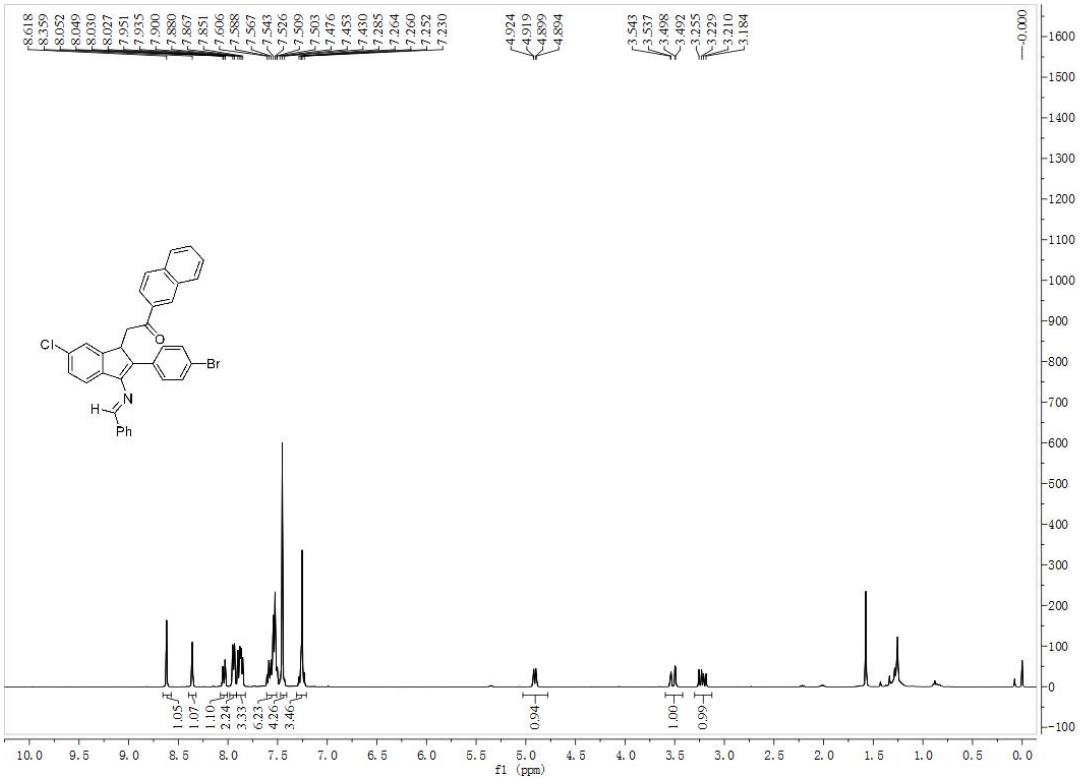


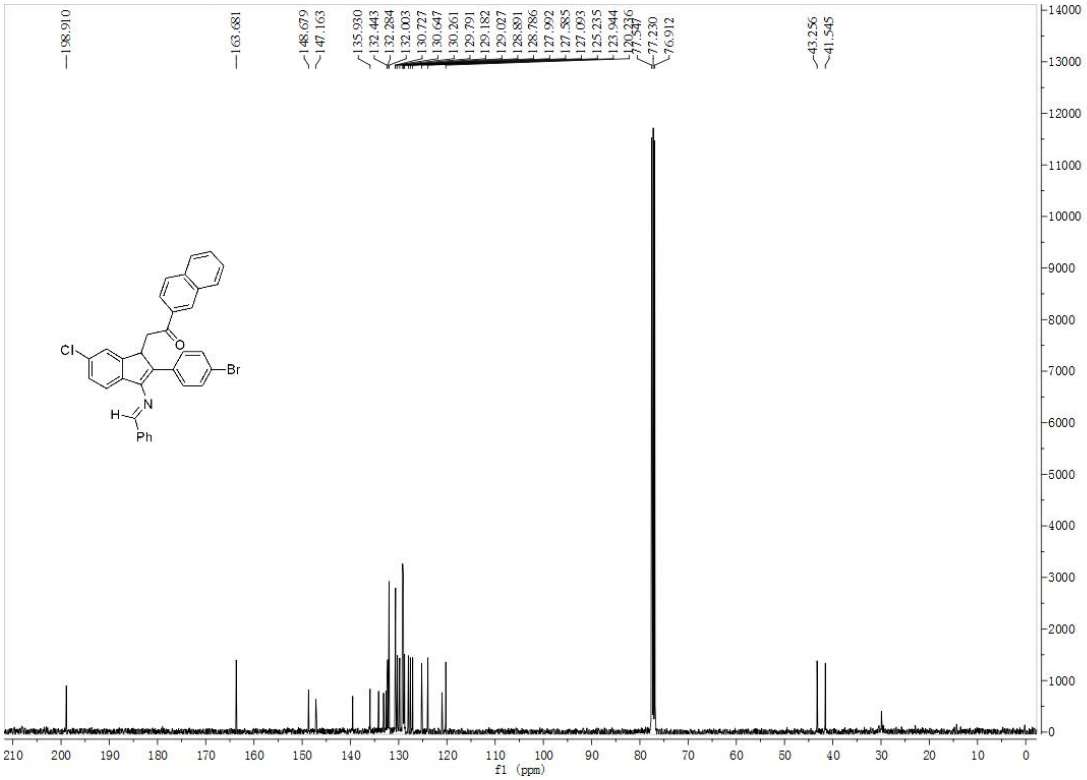
(*E*)-2-(3-(benzylideneamino)-2-(p-tolyl)-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3q)



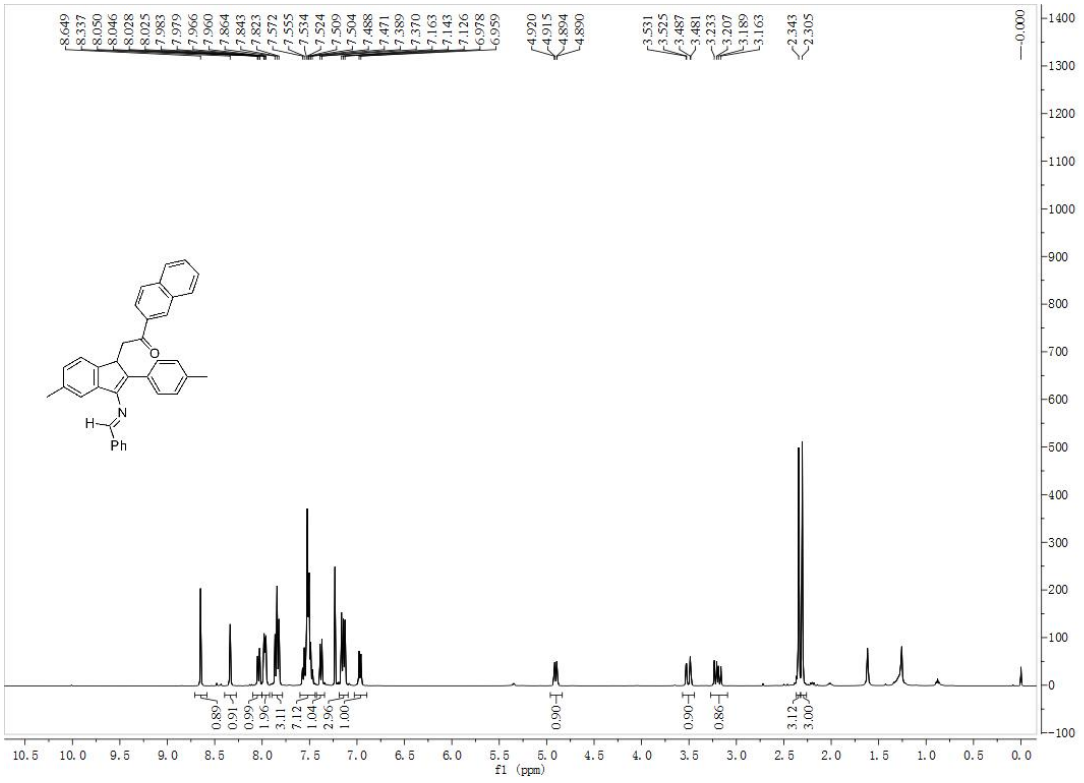


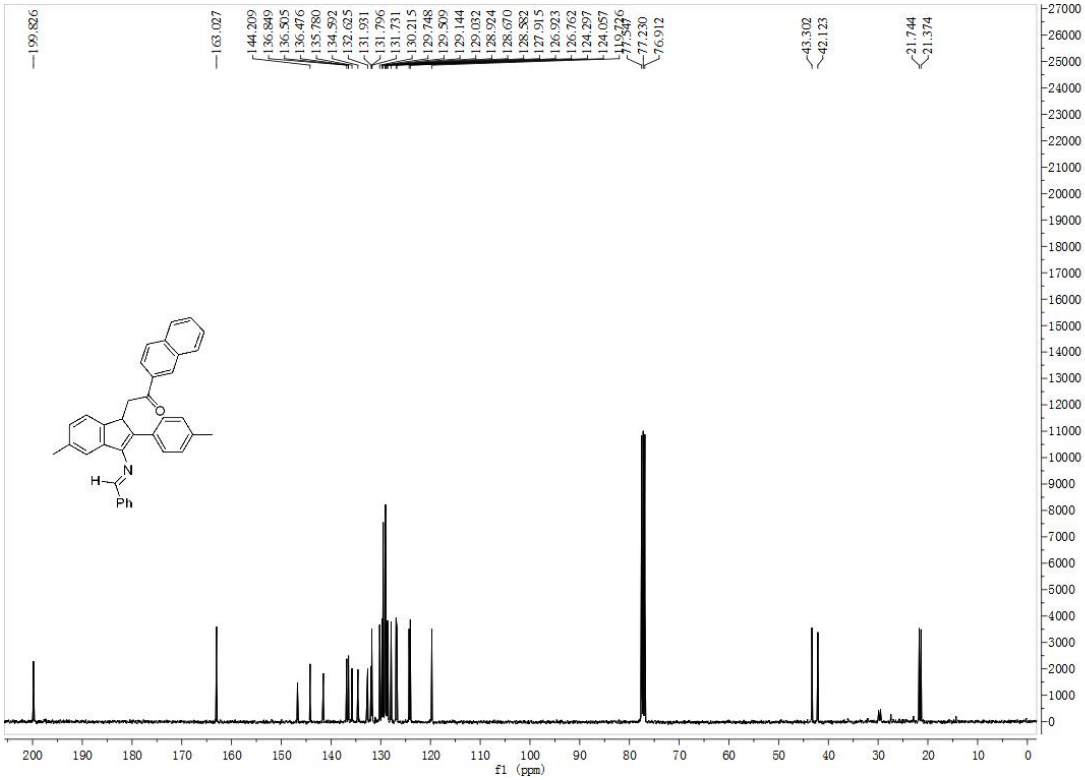
(*E*)-2-(3-(benzylideneamino)-2-(4-bromophenyl)-6-chloro-1H-inden-1-yl)-1-(naphthalen-2-yl)ethan-1-one (3r)



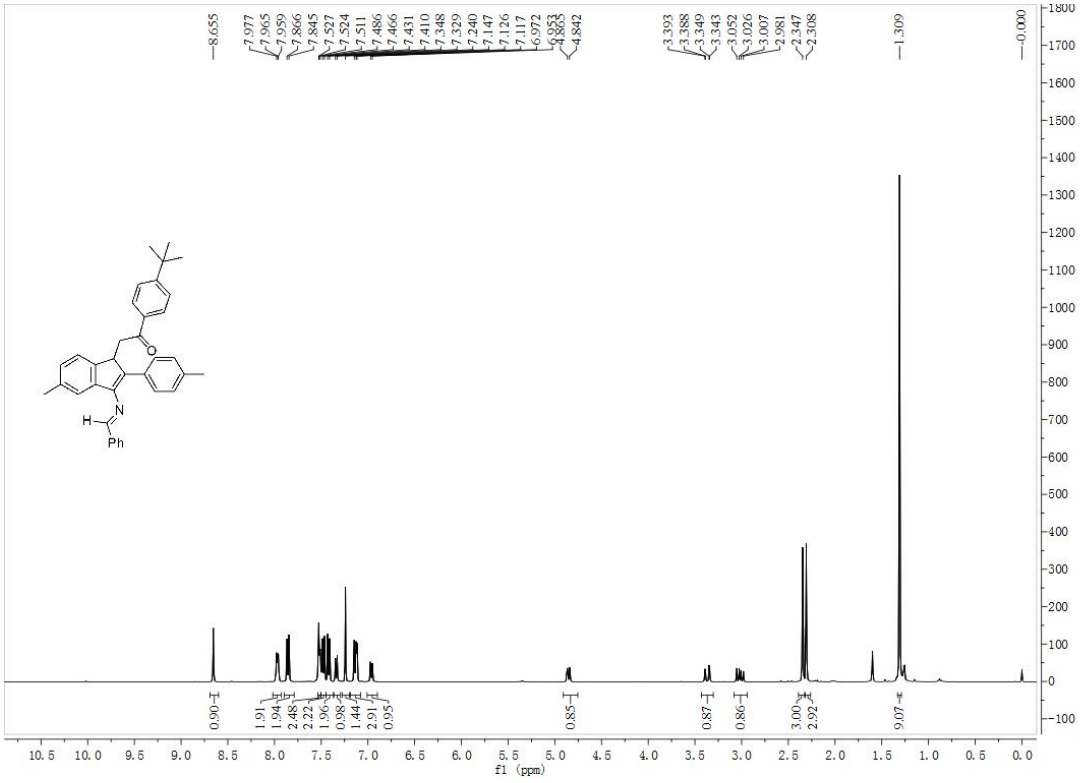


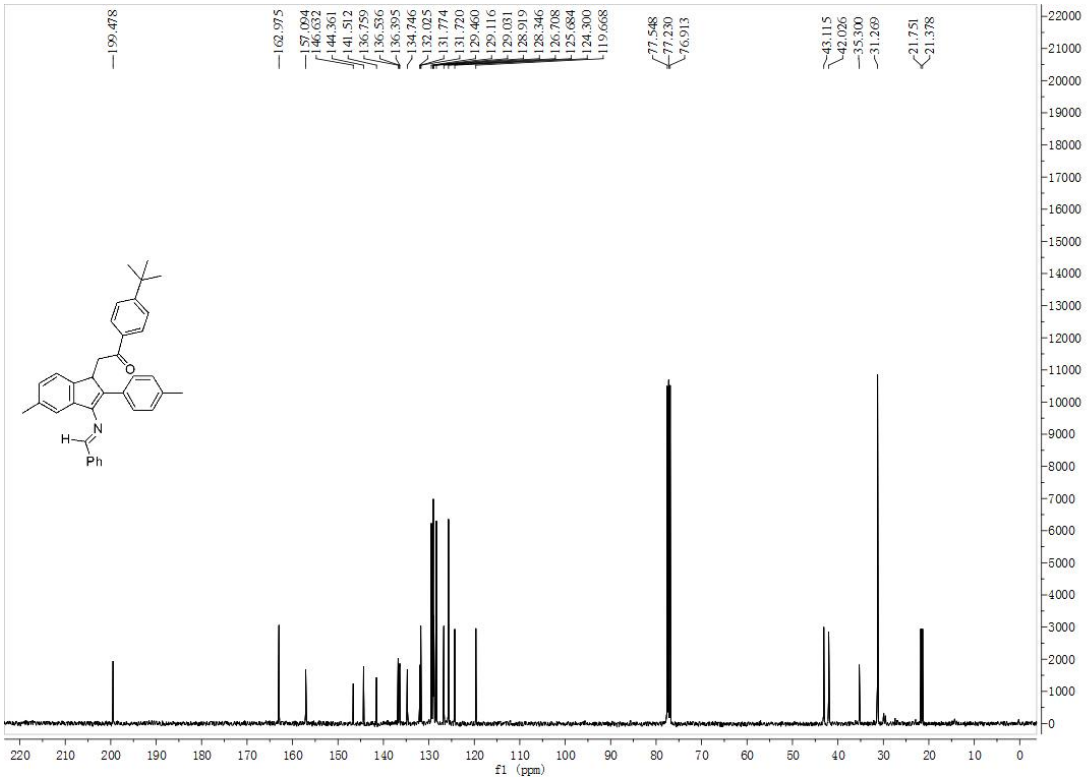
(*E*)-2-(3-(benzylideneamino)-5-methyl-2-(*p*-tolyl)-1H-inden-1-yl)-1-(naphthalen-2-yl)ethan-1-one (3s)



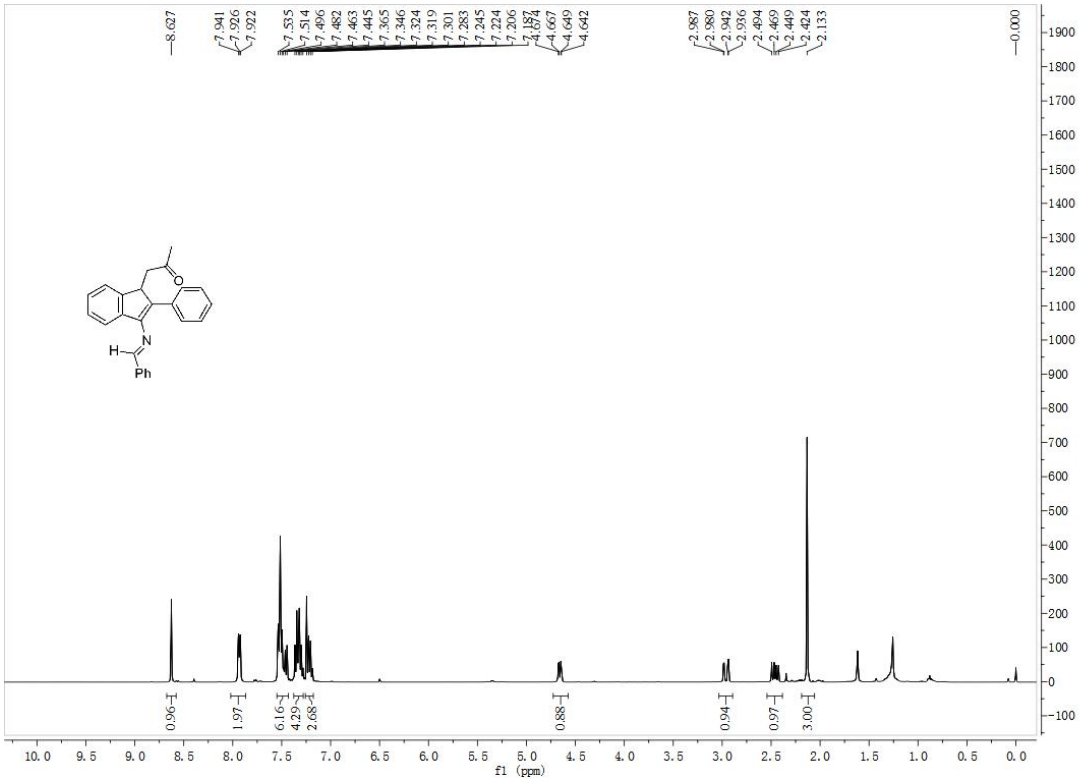


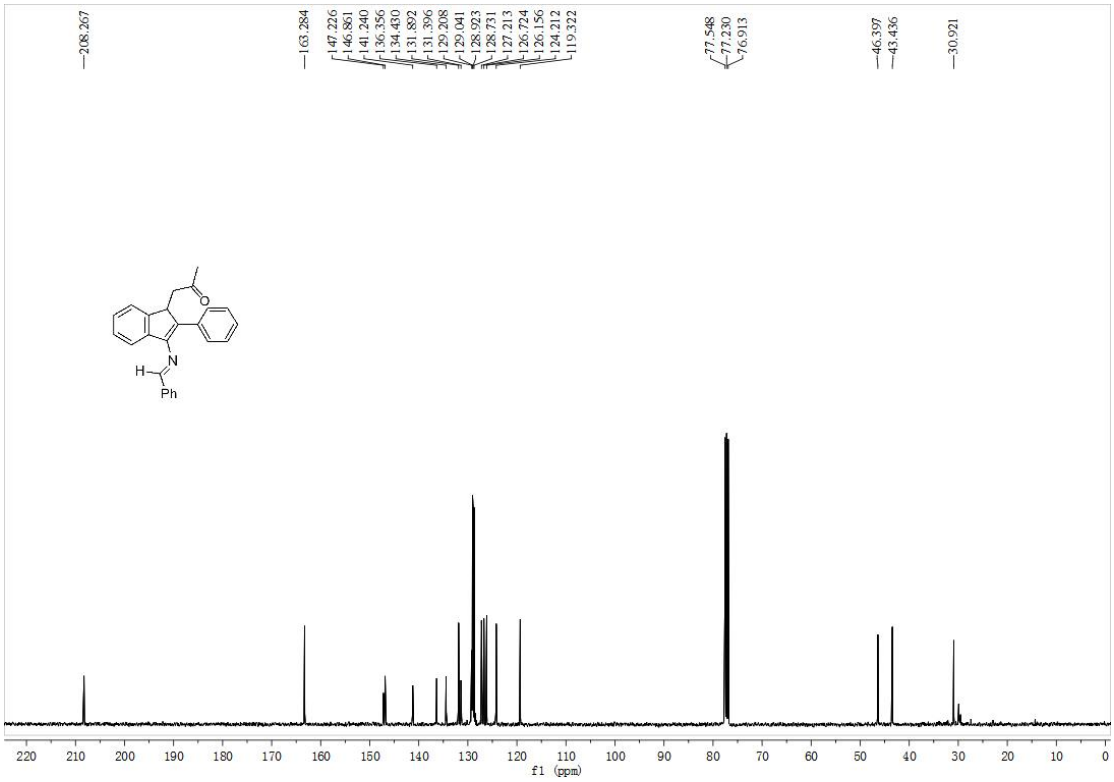
(*E*)-2-(3-(benzylideneamino)-5-methyl-2-(*p*-tolyl)-1H-inden-1-yl)-1-(4-(tert-butyl) phenyl)ethan-1-one (3t)



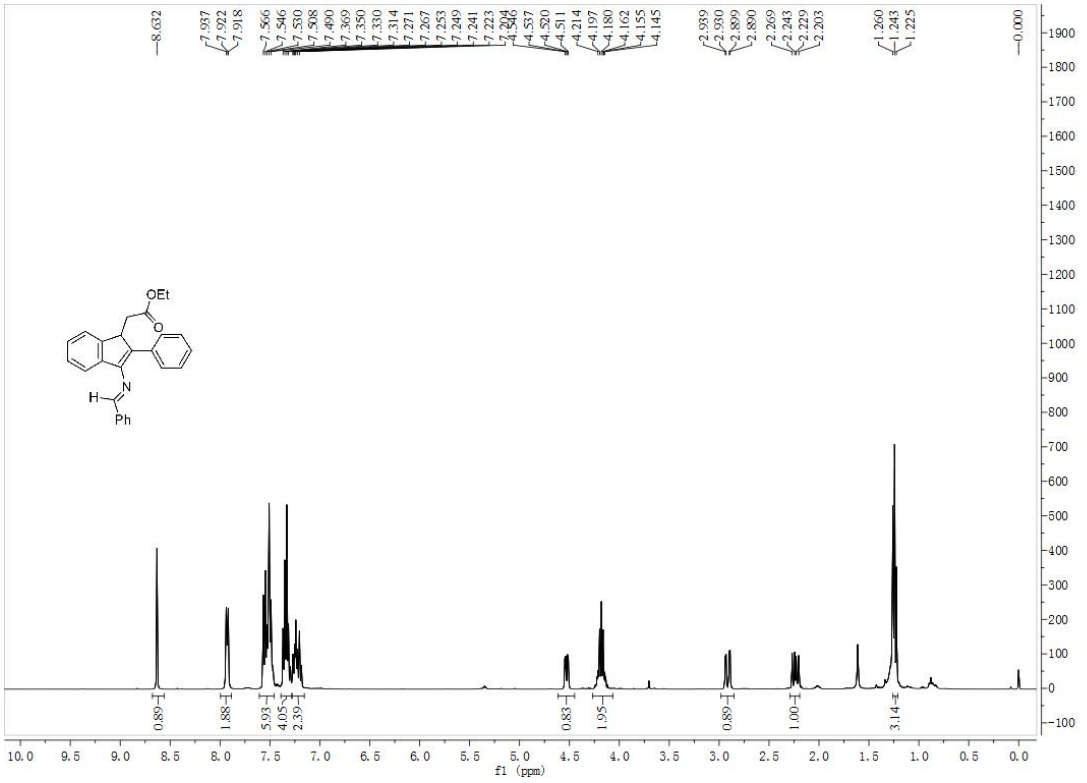


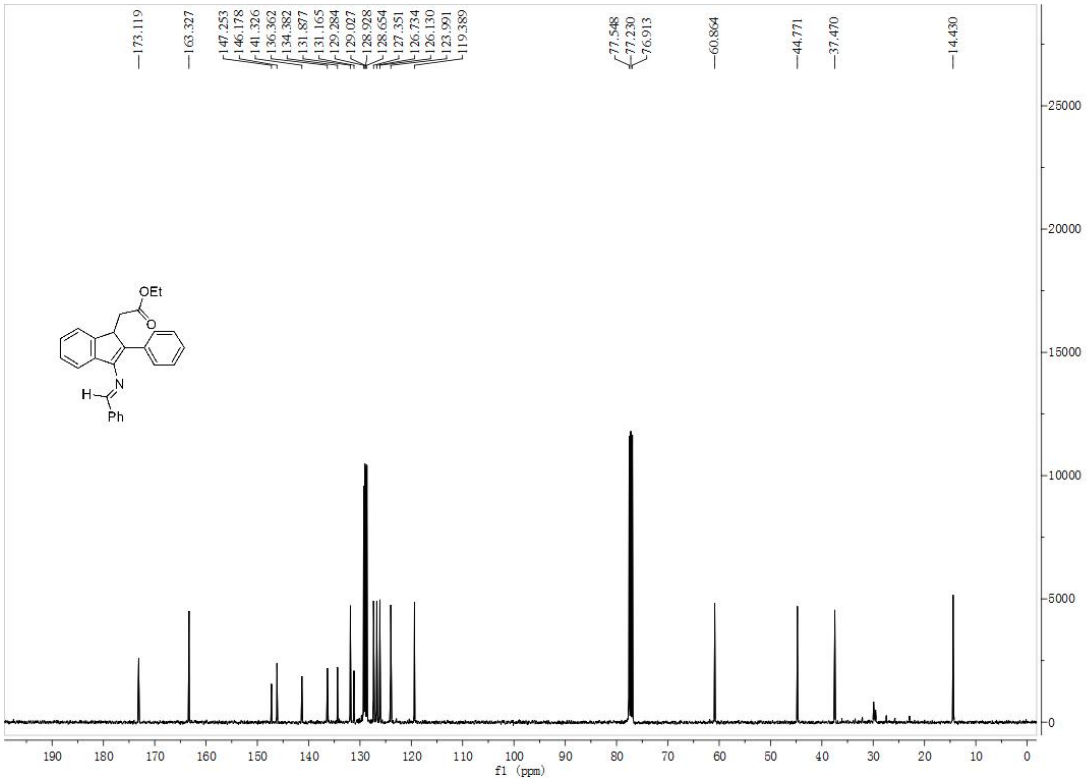
(*E*)-1-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)propan-2-one (3u)



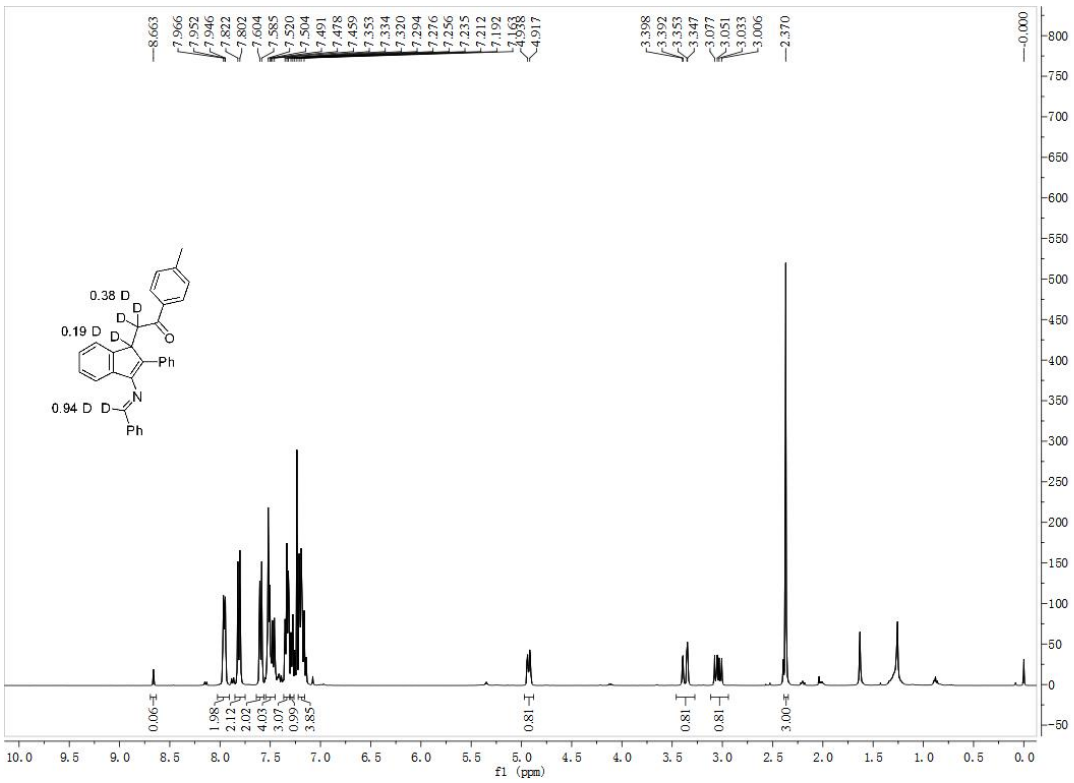


ethyl (*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)acetate (3v)

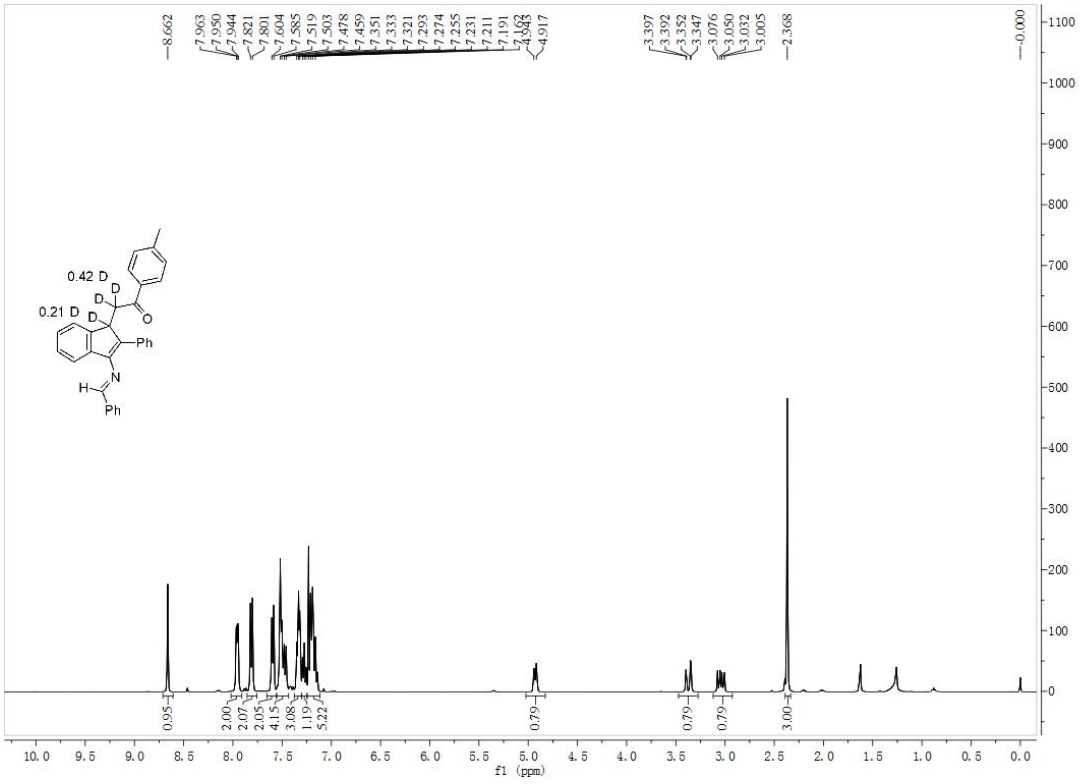




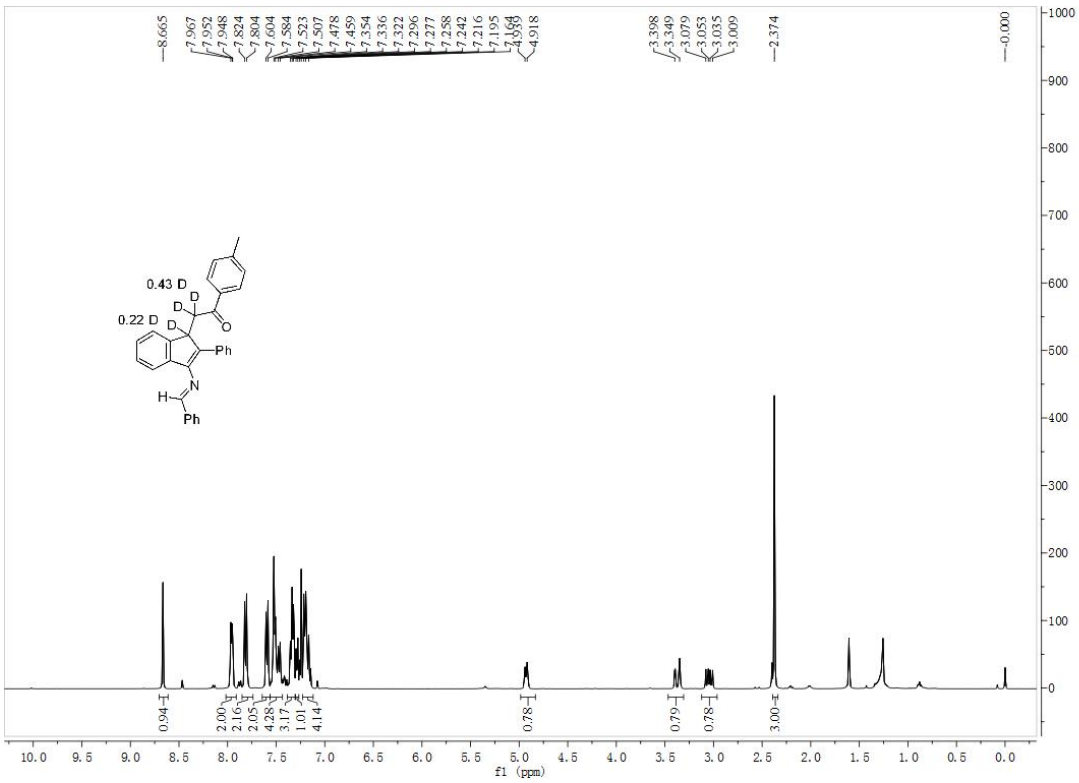
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d1)



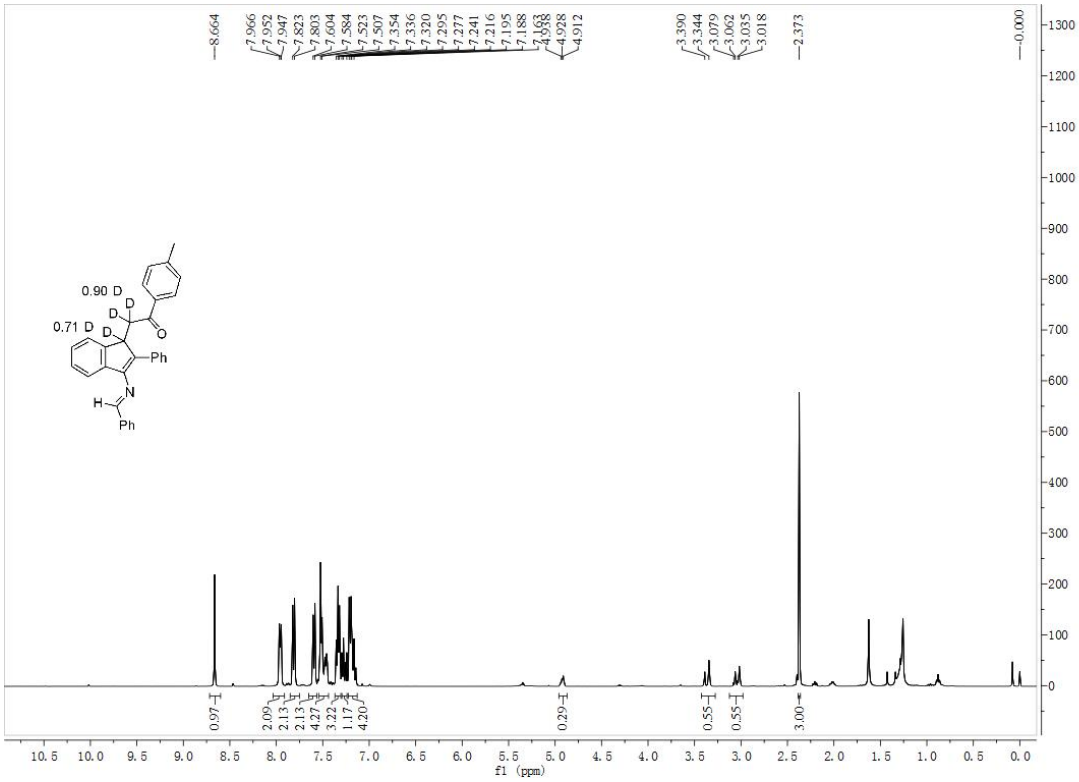
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d2)



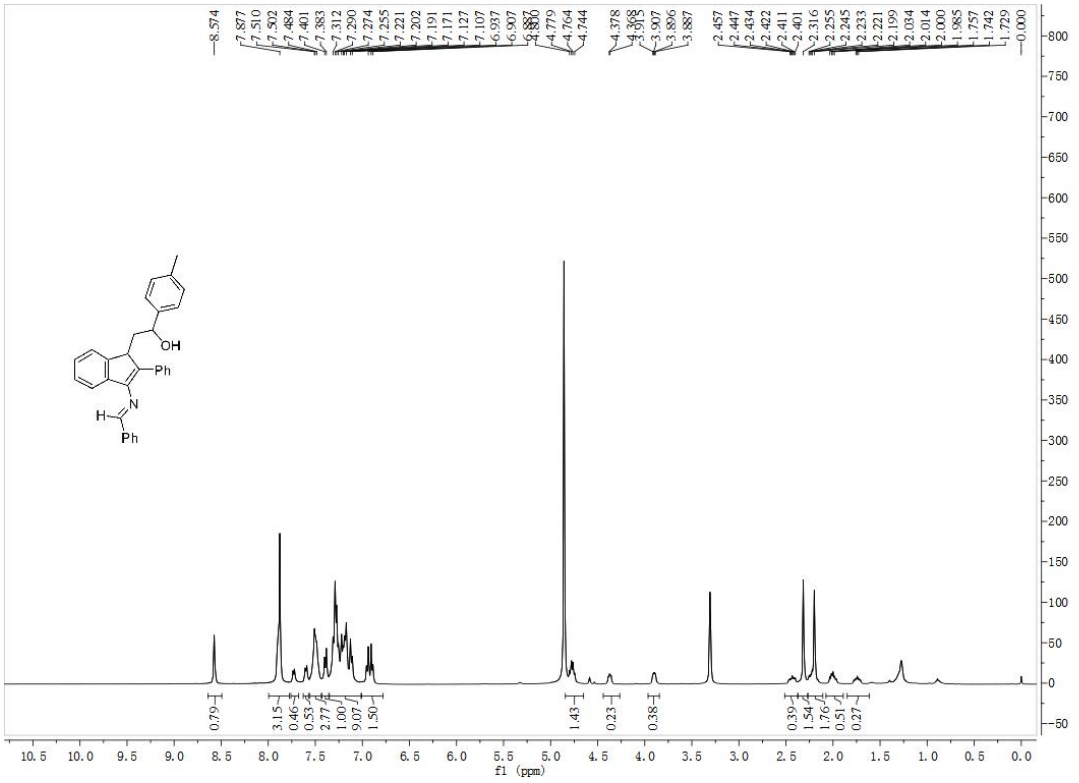
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d3)

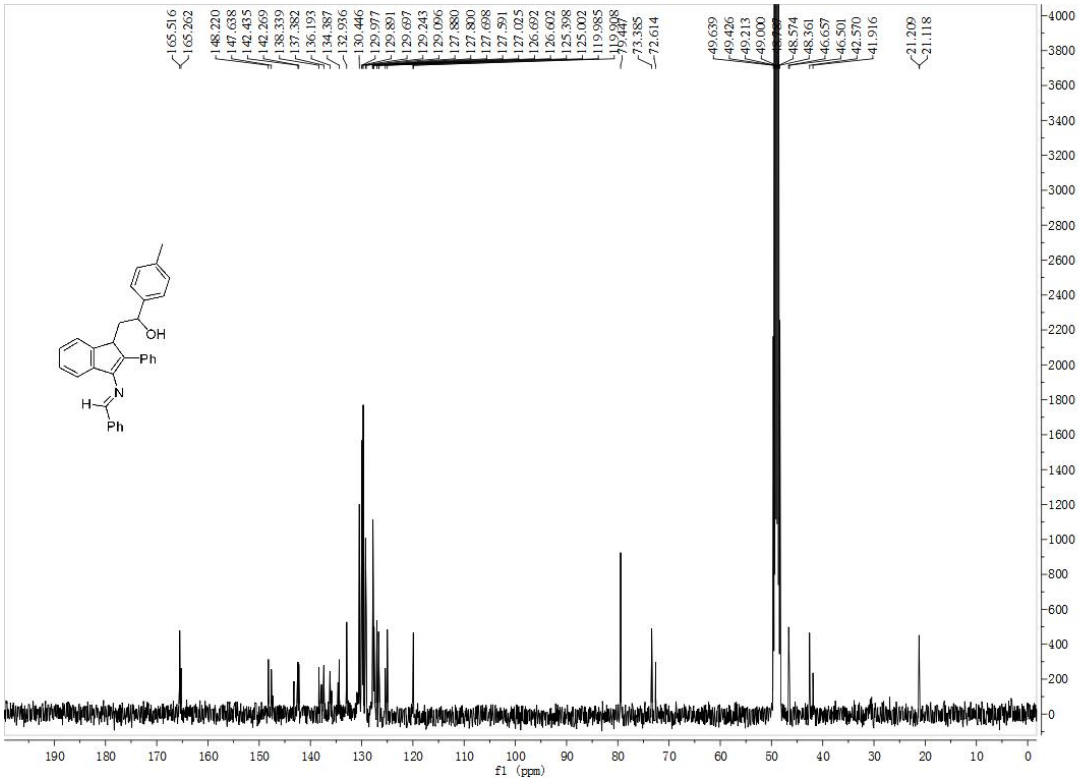


(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (3a-d4)

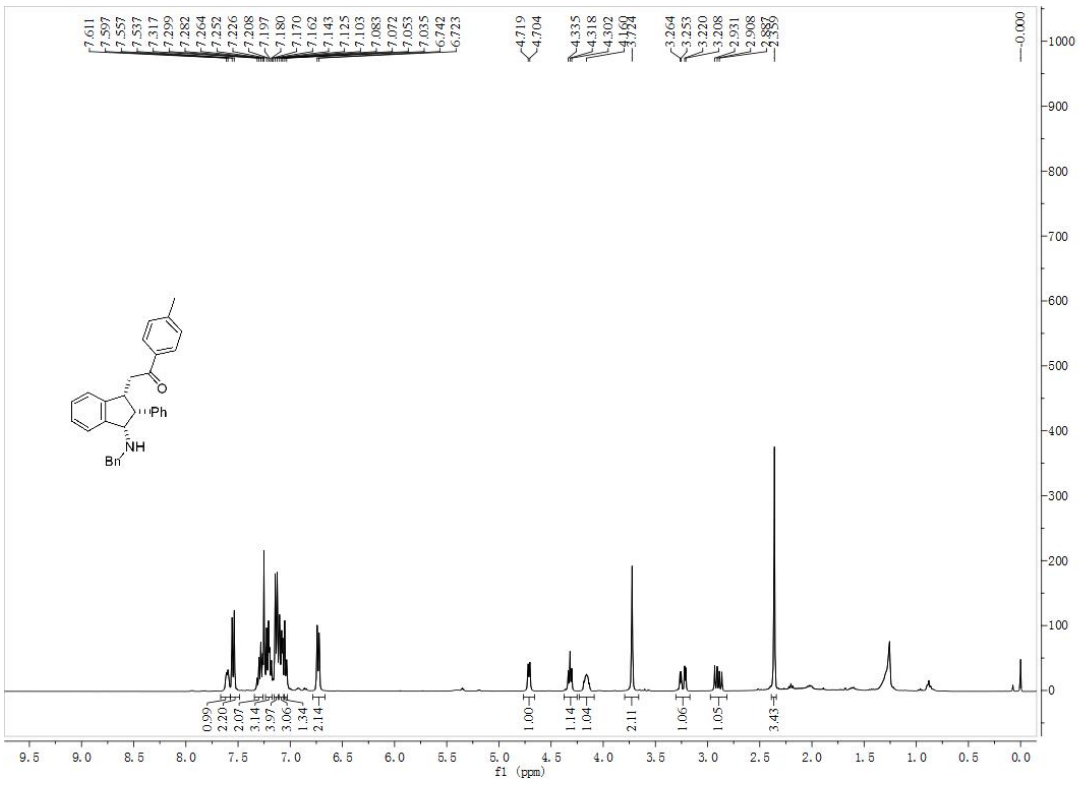


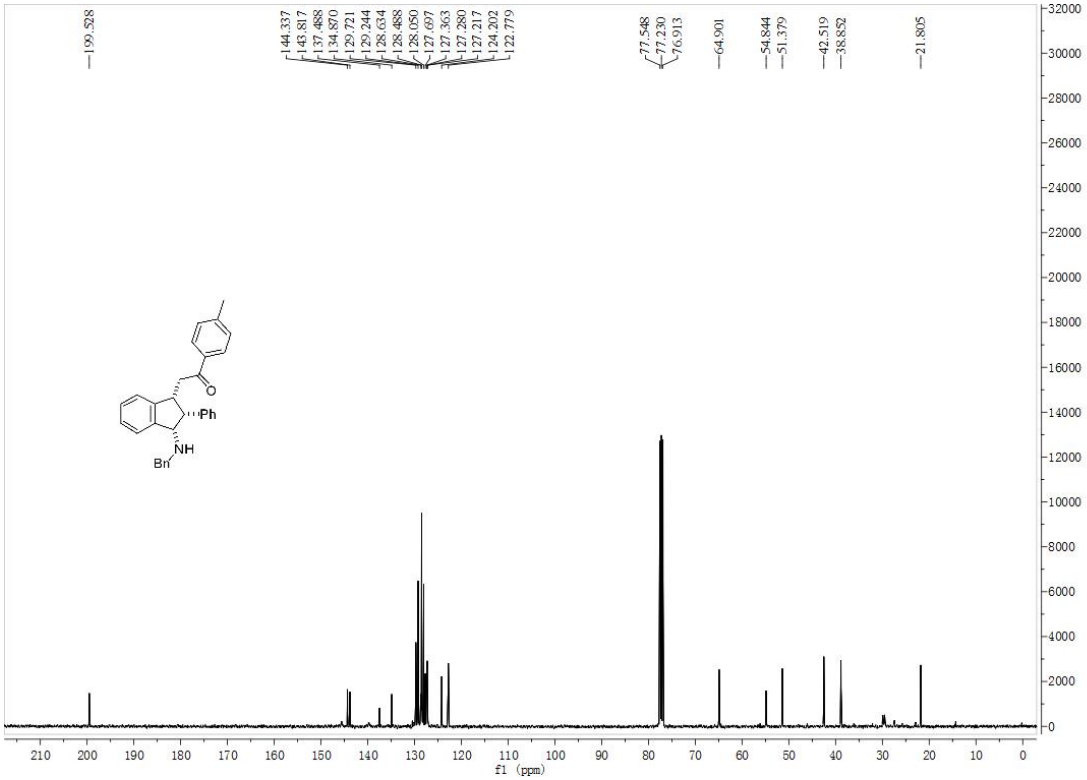
(*E*)-2-(3-(benzylideneamino)-2-phenyl-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-ol (9)



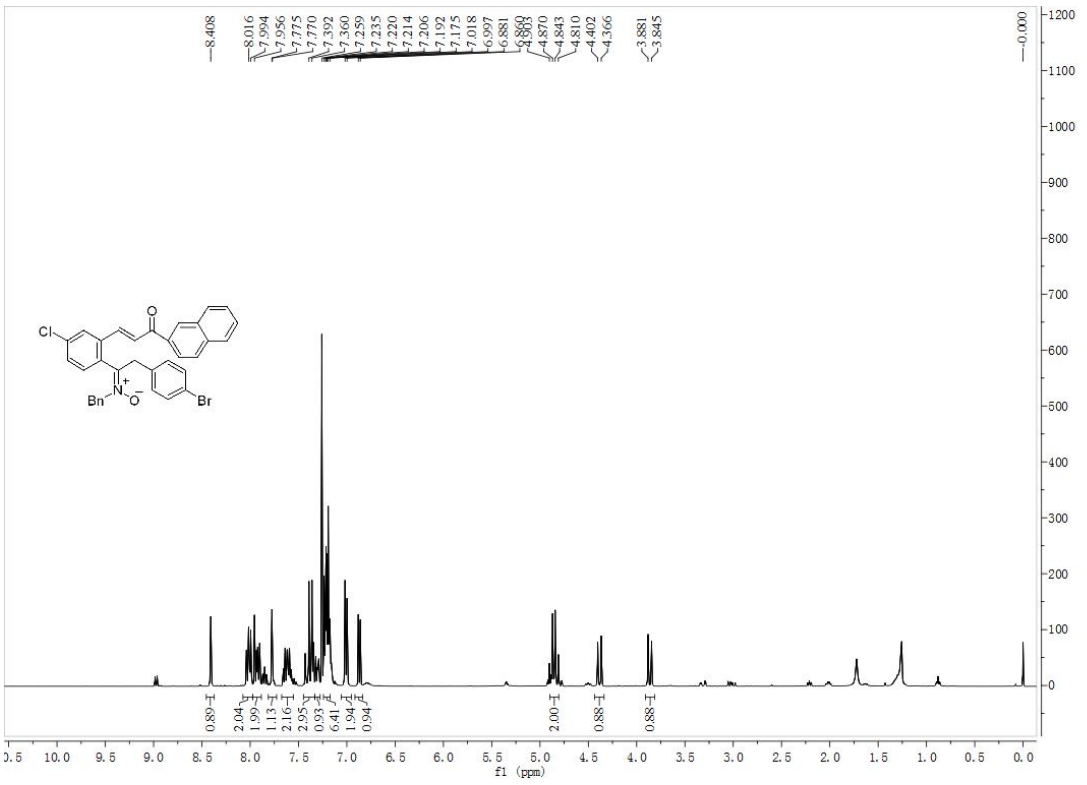


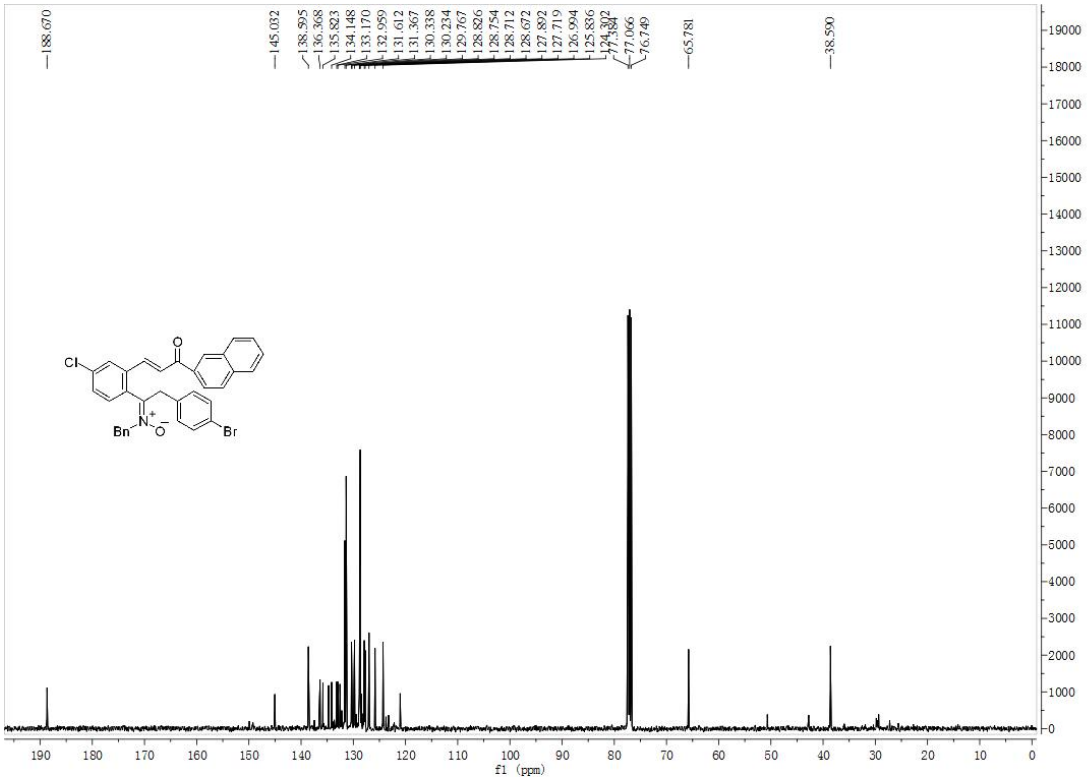
2-(-3-(benzylamino)-2-phenyl-2,3-dihydro-1H-inden-1-yl)-1-(*p*-tolyl)ethan-1-one (10)



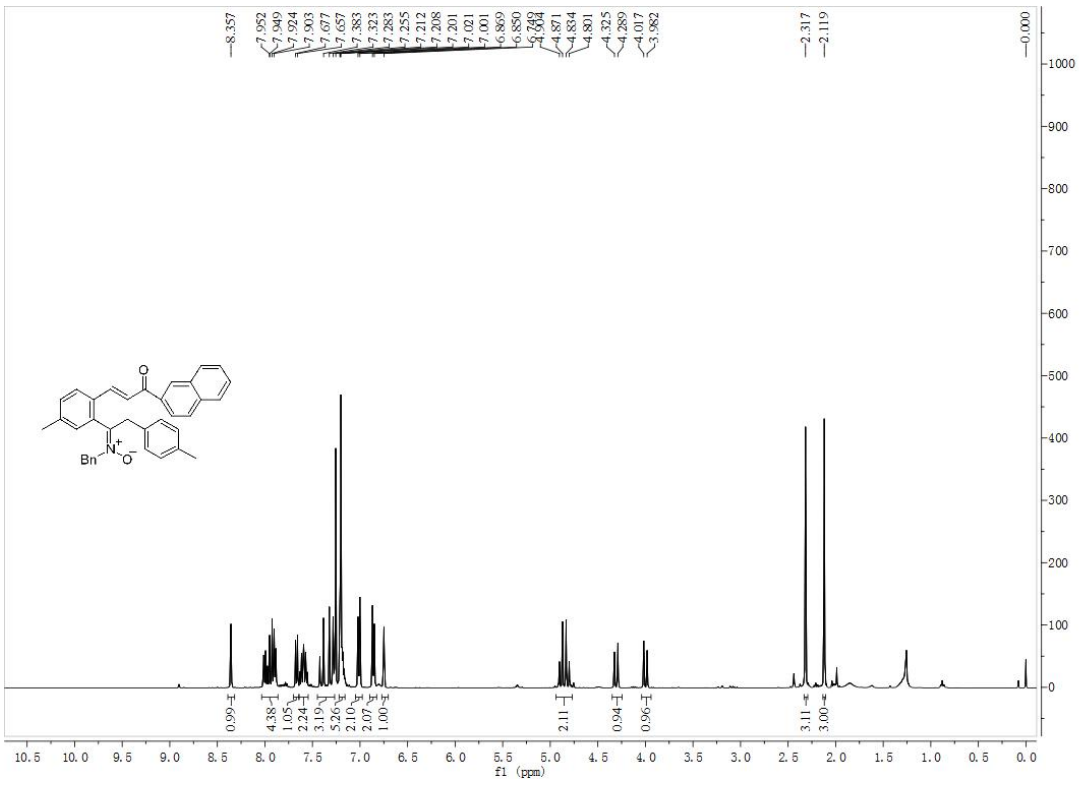


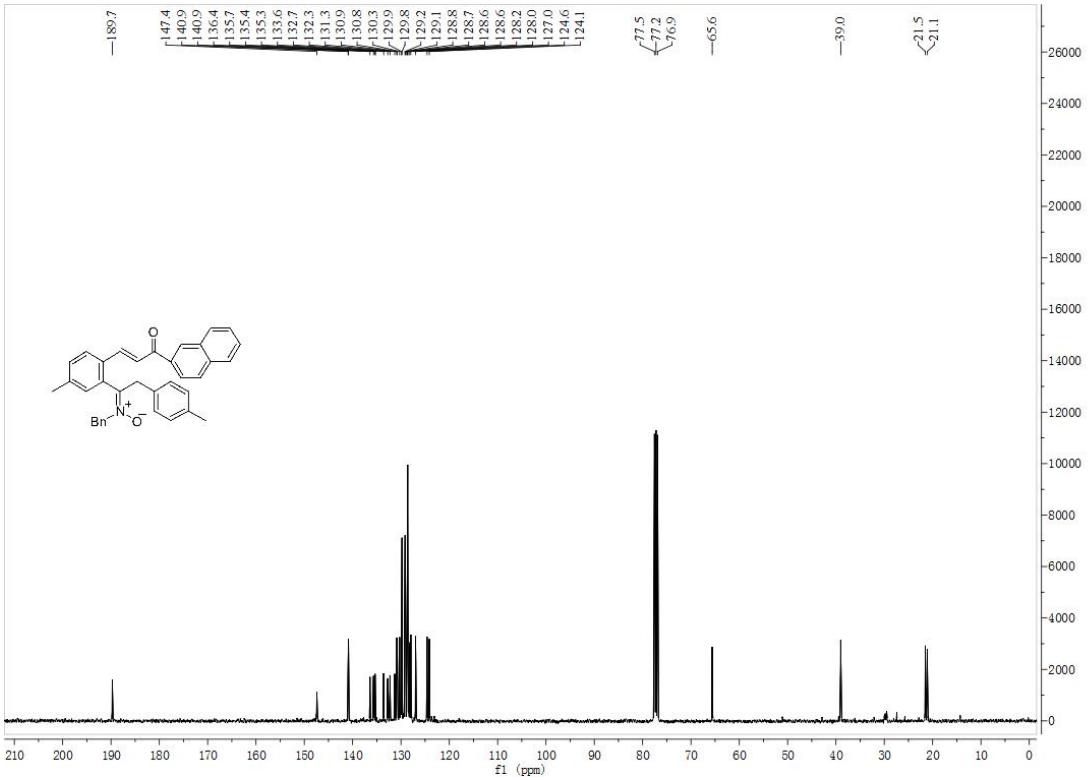
(*E*)-N-benzyl-2-(4-bromophenyl)-1-(4-chloro-2-((*E*)-3-(naphthalen-2-yl)-3-oxopro *p*-1-en-1-yl)phenyl)ethan-1-imine oxide (2r)



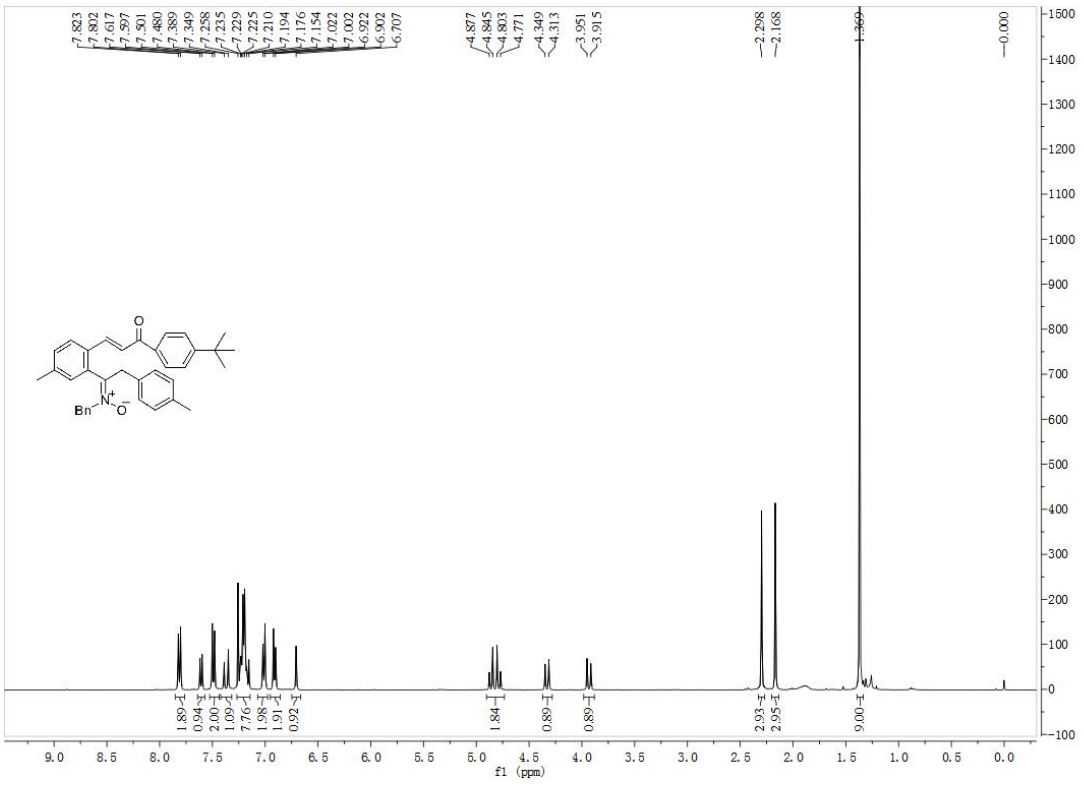


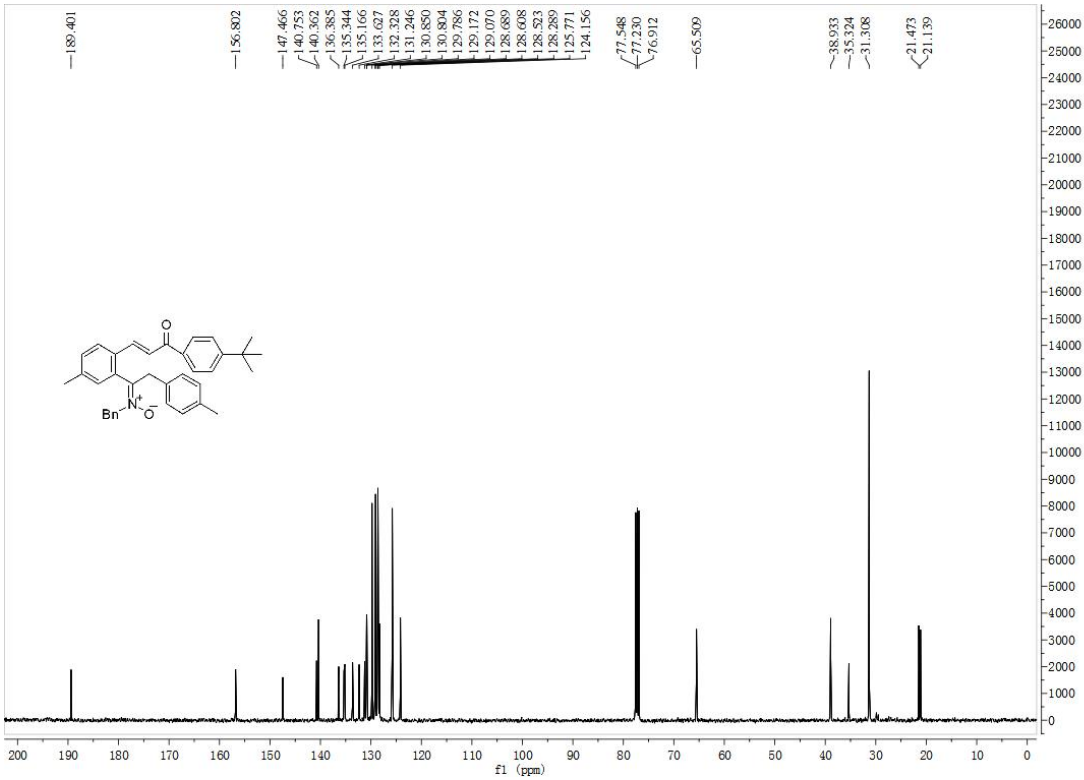
(*E*)-N-benzyl-1-(5-methyl-2-((*E*)-3-(naphthalen-2-yl)-3-oxoprop-1-en-1-yl)phenyl)-2-(*p*-tolyl)ethan-1-imine oxide (2s)



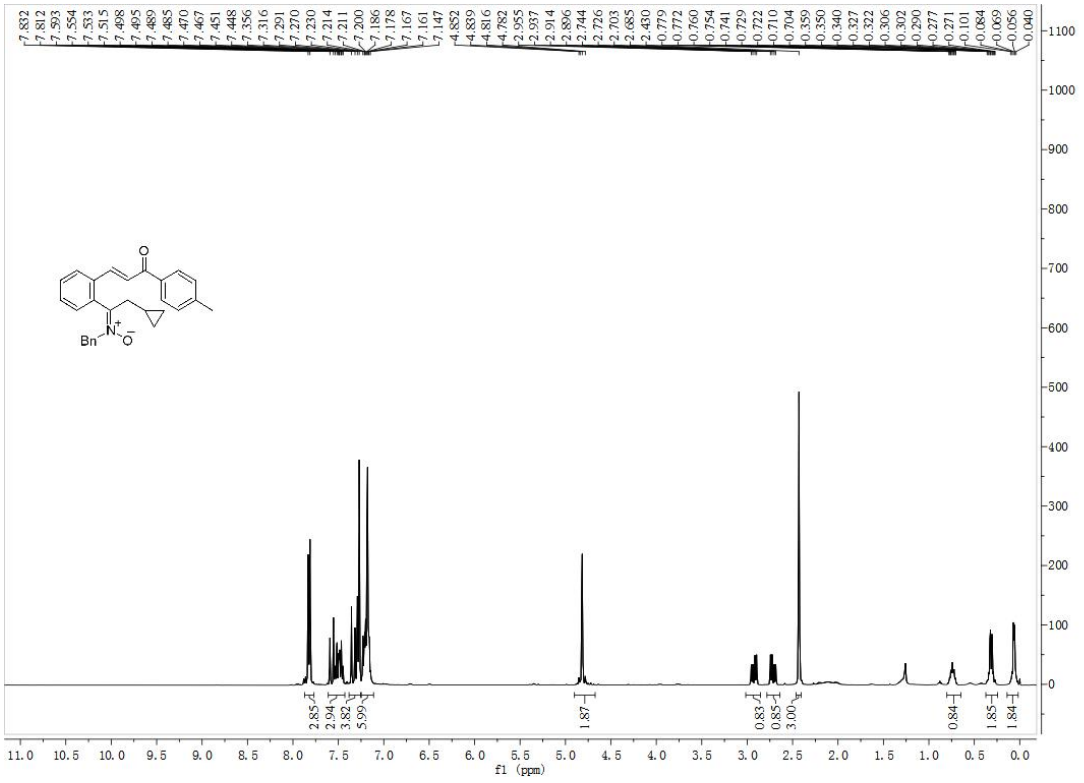


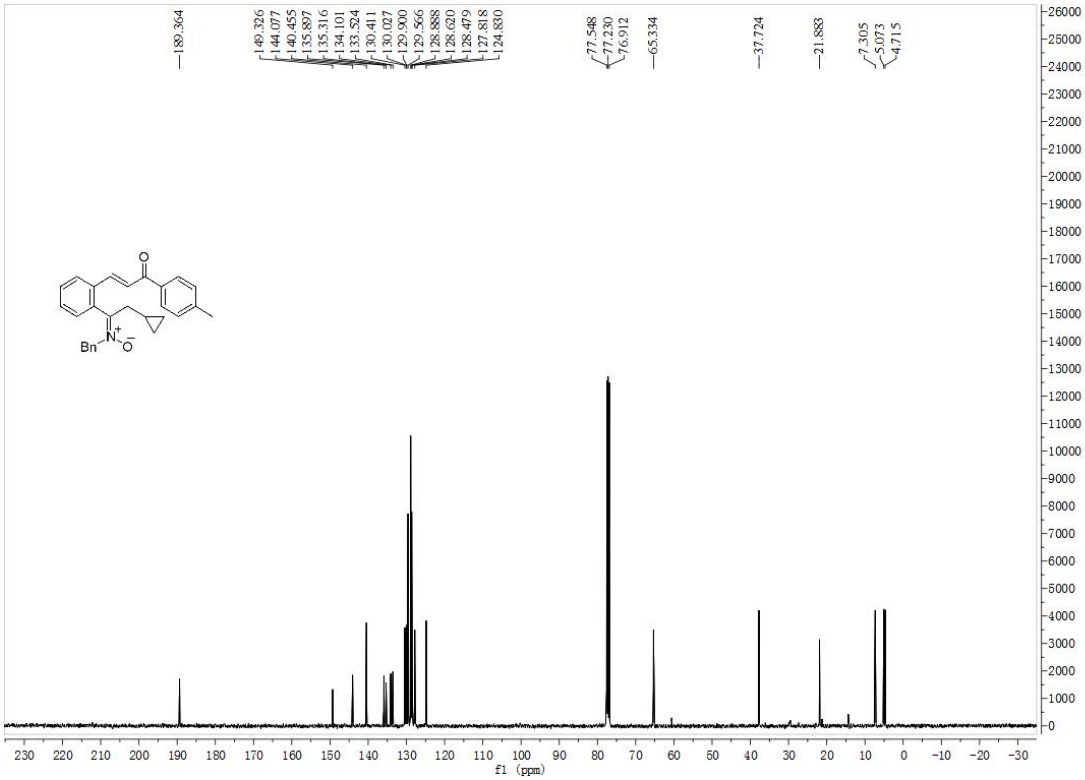
(*E*)-N-benzyl-1-(2-((*E*)-3-(4-(tert-butyl)phenyl)-3-oxoprop-1-en-1-yl)-5-methylph enyl)-2-(*p*-tolyl)ethan-1-imine oxide (2t)



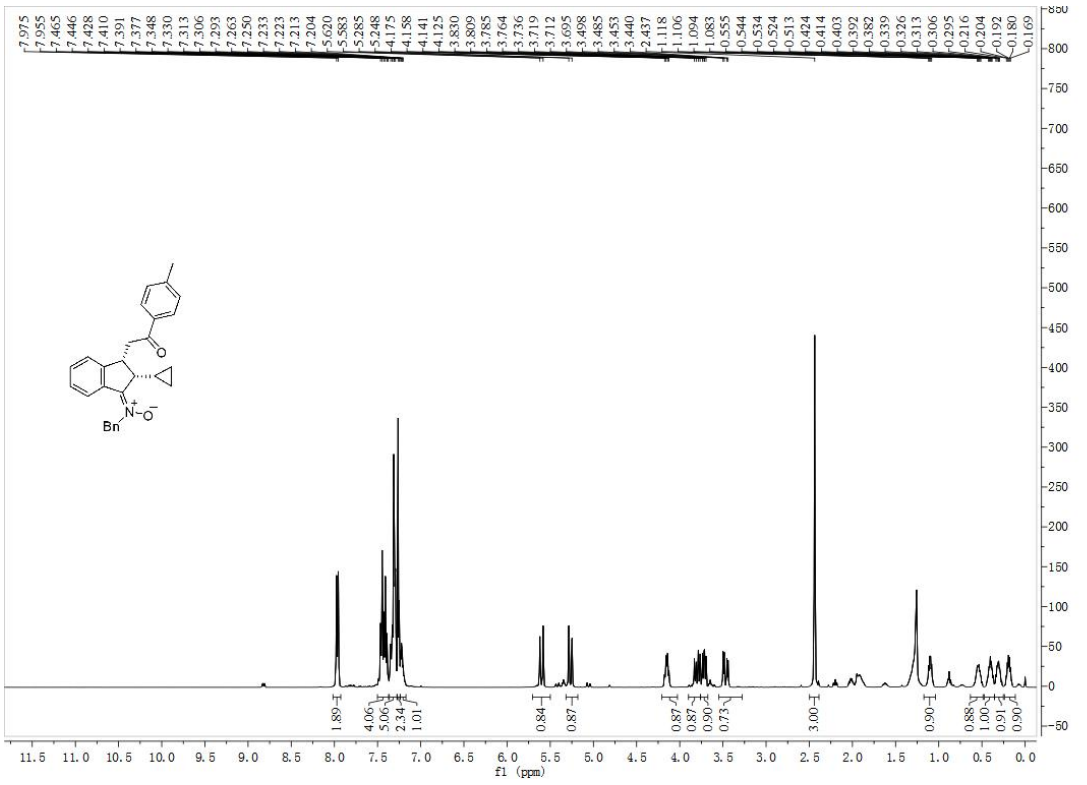


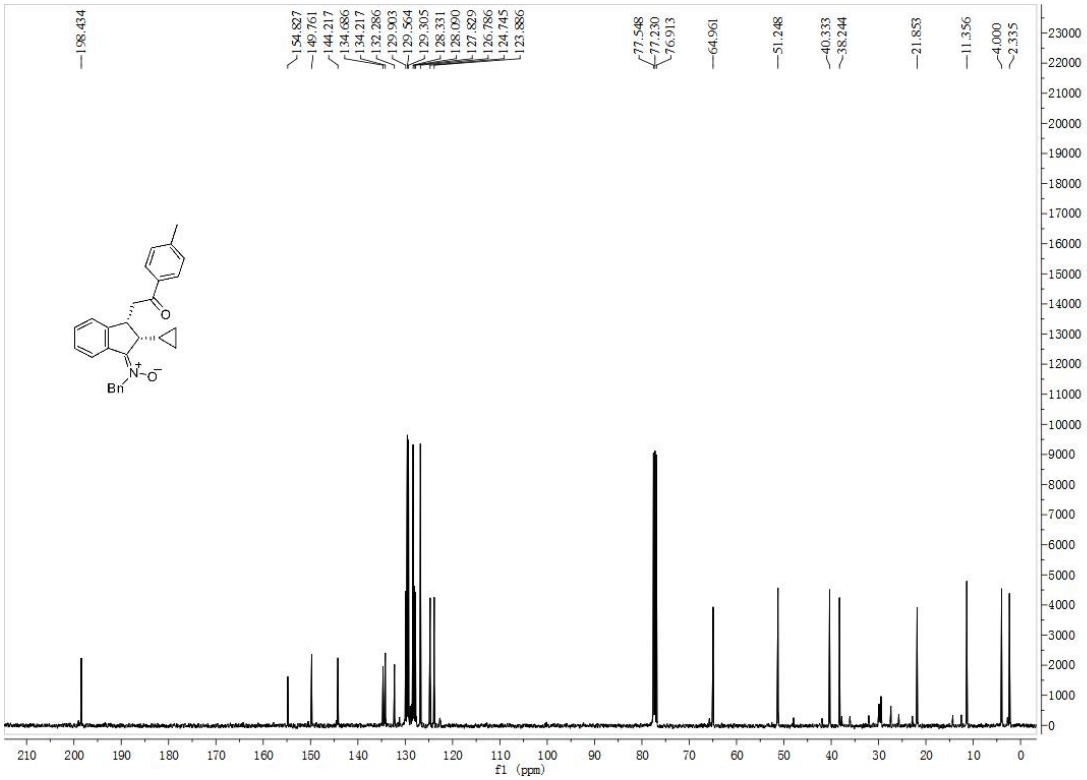
(*E*)-N-benzyl-2-cyclopropyl-1-(2-((*E*)-3-oxo-3-(*p*-tolyl)prop-1-en-1-yl)phenyl)etha n-1-imine oxide (2x)



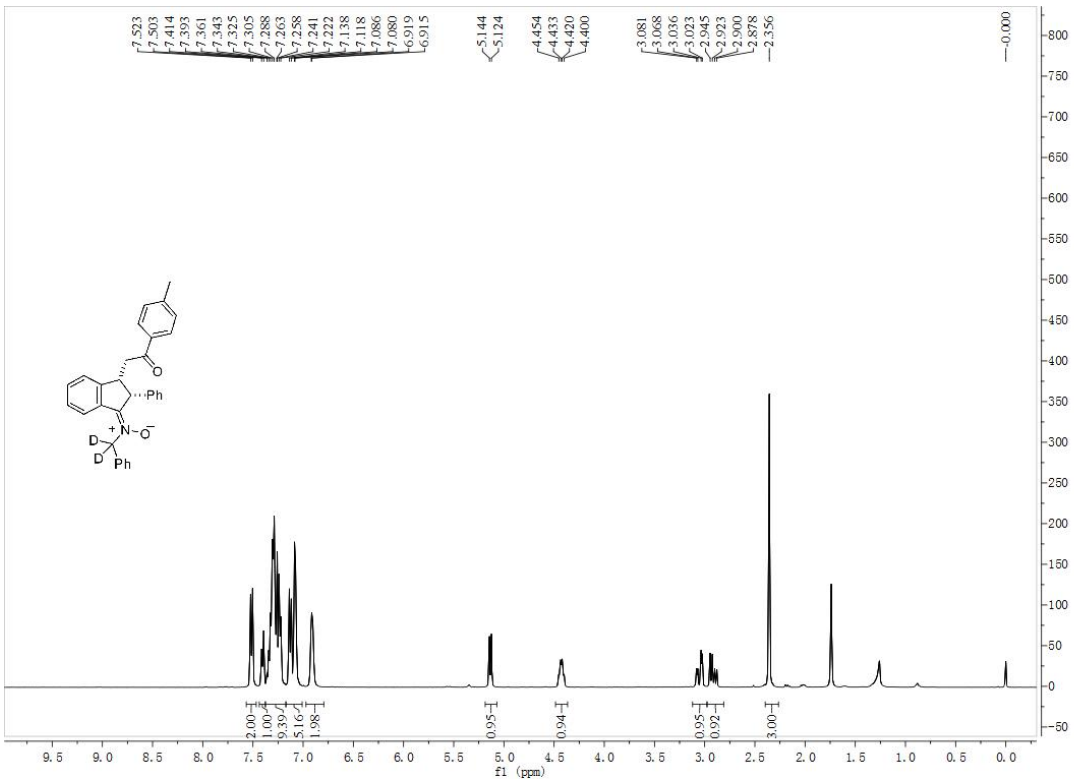


(*E*)-N-benzyl-2-cyclopropyl-3-(2-oxo-2-(*p*-tolyl)ethyl)-2,3-dihydro-1H-inden-1-imine oxide (1x)

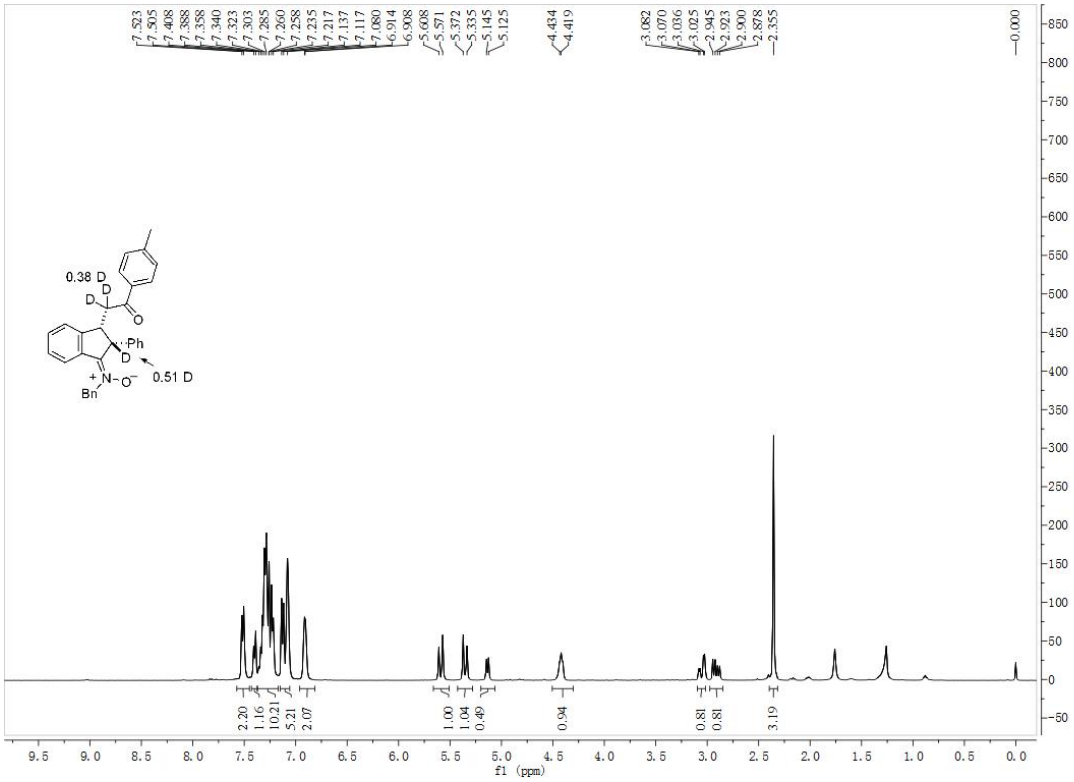




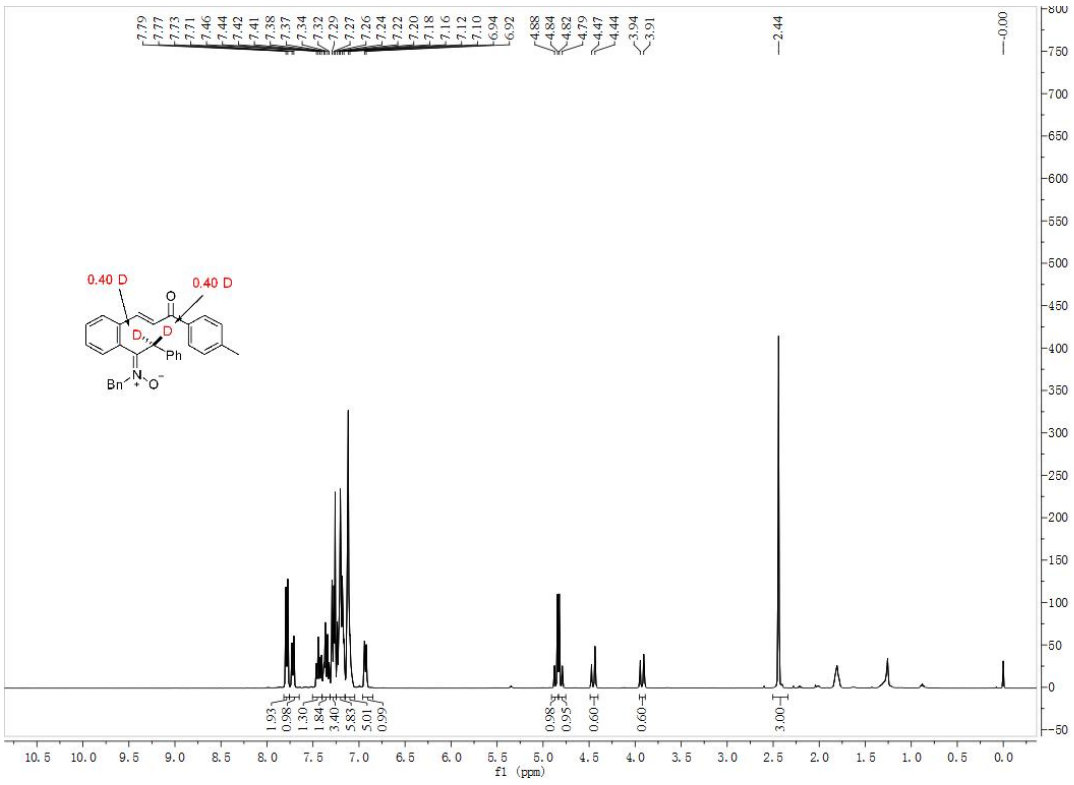
(*E*)-*N*-(3-(2-oxo-2-*p*-tolylethyl)-2-phenyl-2,3-dihydro-1H-inden-1-ylidene)-1-phenylmethanamine oxide (1a-d1)



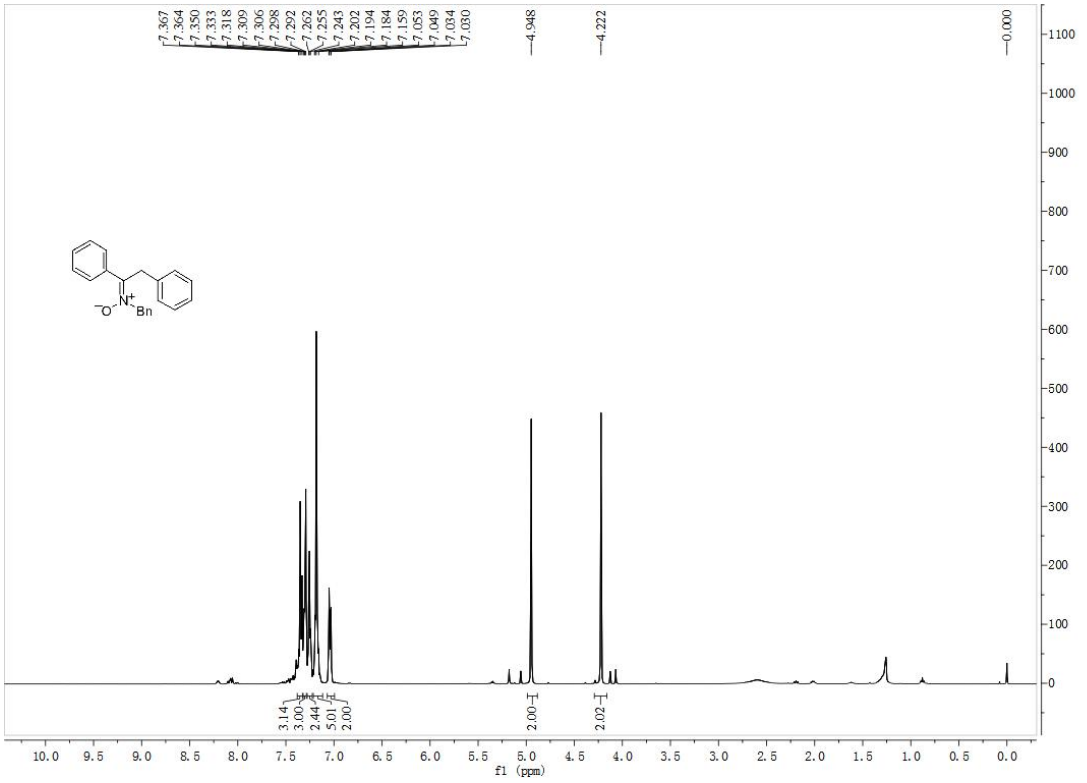
(*E*)-*N*-(3-(2-oxo-2-*p*-tolylethyl)-2-phenyl-2,3-dihydro-1H-inden-1-ylidene)-1-phenylmethanamine oxide (1a-d2)

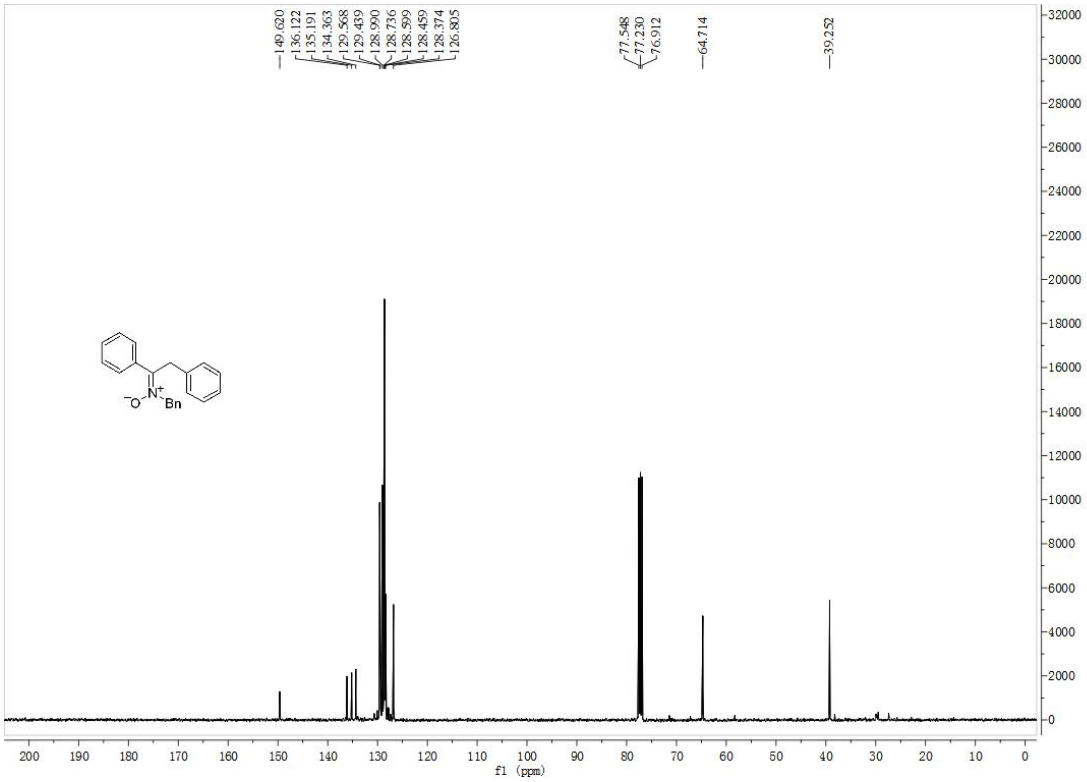


(*E*)-*N*-(1-(2-((*E*)-3-oxo-3-*p*-tolylprop-1-enyl)phenyl)-2-phenylethylidene)-1-phenylmethanamine oxide (2a-d3)



(*Z*)-N-benzyl-1,2-diphenylethan-1-imine oxide (7)





(*Z*)-N-benzyl-2,3-dihydro-1H-inden-1-imine oxide (8)