

Supporting Information

Synthesis of γ -amino acids *via* photocatalyzed intermolecular carboimination of alkenes

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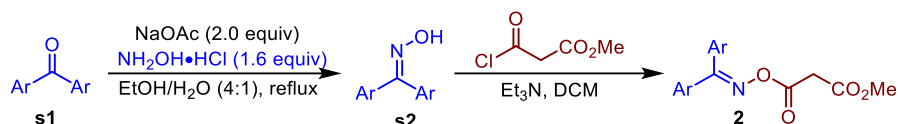
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1. General information

All glassware was thoroughly oven-dried. Chemicals and solvents were either purchased from commercial suppliers or purified by standard techniques. Thin-layer chromatography plates were visualized by exposure to ultraviolet light and/or staining with phosphomolybdic acid followed by heating on a hot plate. Flash chromatography was carried out using silica gel (200–300 mesh). ^1H NMR and ^{13}C NMR spectra were recorded on a Bruker AM-400 (400 MHz). The spectra were recorded in deuteriochloroform (CDCl_3) as solvent at room temperature, ^1H and ^{13}C NMR chemical shifts are reported in ppm relative to the residual solvent peak. The residual solvent signals were used as references and the chemical shifts were converted to the TMS scale (CDCl_3 : $\delta_{\text{H}} = 7.26$ ppm, $\delta_{\text{C}} = 77.0$ ppm). Data for ^1H NMR are reported as follows: chemical shift (δ ppm), multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet, dd = doublet, br = broad), integration, coupling constant (Hz) and assignment. Data for ^{13}C NMR are reported as chemical shift. Electrospray-ionisation HRMS data were acquired on a Q-TOF mass spectrometer (Waters SYNAPT G2-Si) LC-MS TOF.

2. General experimental procedure

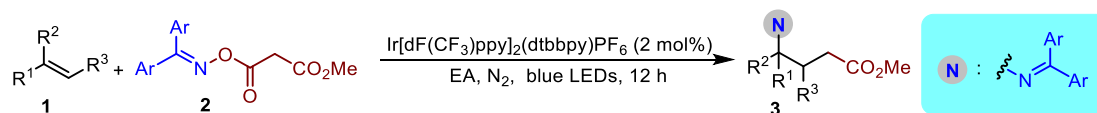
2.1 General procedure for the preparation of oxime esters¹



Step 1: In a 100 mL round bottom flask equipped with a condenser, aromatic ketones **s1** (20 mmol, 1.0 equiv) were dissolved in the mixture of EtOH/H₂O (v/v, 4:1, 50 mL). Then, hydroxylamine hydrochloride (2.2 g, 32 mmol, 1.6 equiv) and NaOAc (3.3 g, 40 mmol, 2.0 equiv) were added in one portion. The reaction mixture was refluxed overnight and the consumption of the starting material was observed by TLC. The reaction mixture was cooled down to room temperature, and then EtOH was removed under reduced pressure. The resulting mixture was extracted with EtOAc. The organic layer was then washed with brine and dried over Na₂SO₄. The solvent was removed under vacuum to give oxime **s2**, not further purified.

Step 2: To a mixture of oxime **s2** (10 mmol) and CH₂Cl₂ (50 mL) was slowly added methyl malonyl chloride (1.6 g, 12 mmol, 1.2 equiv), Et₃N (1.5 g, 15 mmol, 1.5 equiv) at 0 °C. The solution was stirred at rt for overnight. The product was washed with saturated NaHCO₃ and the aqueous layer was extracted with CH₂Cl₂. The organic layer was dried over Na₂SO₄. The solvent was removed under reduced pressure and the residue was washed with PE to afford the desired product **2**.

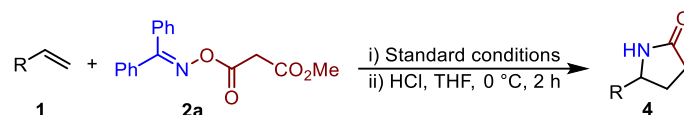
2.2 General procedure for the preparation of γ -amino acid ester



All optimization reactions were set up in a glove box under N₂ atmosphere. Substrate **1** (0.2 mmol, 1.0 equiv) and oxime ester **2** (0.3 mmol, 1.5 equiv) were added to a solution of photocatalyst Ir[dF(CF₃)ppy]₂(dtbbpy)PF₆ (2 mol %) in dry EA (4 mL) at room temperature. The heterogenous mixture was placed in the irradiation apparatus equipped with blue LEDs. The resulting mixture was stirred at rt for 12 h.

Upon completion of the reaction, the resulting crude residue was concentrated in vacuum and purified by column chromatography with gradient eluents to afford the desired product **3**.

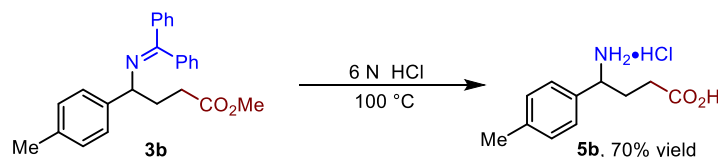
2.3 General procedure for the preparation of γ -lactams



Step 1: All optimization reactions were set up in a glove box under N_2 atmosphere. Substrate **1** (0.2 mmol, 1.0 equiv) and oxime ester **2a** (0.3 mmol, 1.5 equiv) were added to a solution of photocatalyst $Ir[dF(CF_3)ppy]_2(dtbbpy)PF_6$ (2 mol %) in dry EA (4 mL) at room temperature. The heterogenous mixture was placed in the irradiation apparatus equipped with blue LEDs. The resulting mixture was stirred at rt for 12 h. The solvent was then evaporated, and the crude product **3** was used in the following step without further purification.

Step 2: The crude product **3** was dissolved into THF (3.0 ml), and 1 M HCl (0.3 mL) was added at 0 °C. After the solution was stirred for 2 h, THF was removed in vacuo, and neutralized with $NaHCO_3$. The mixture was then extracted with CH_2Cl_2 three times. The organic layer was dried over Na_2SO_4 . The solvent was removed under reduced pressure and the residue was isolated by column chromatography with gradient eluents (EA/ Et_3N = 50/1) to provide **4**.

2.4 synthetic 3-carboxy-1-(p-tolyl)propan-1-aminium chloride



A 4 mL vial was charged with **3b** (0.10 mmol, 1.0 equiv.) and 6 M HCl (1.0 mL) and the solution was stirred overnight at 100 °C. After consumption of starting material was confirmed by TLC analysis, the solution was poured into 1 N HCl (5.0 mL) and extracted with diethyl ether (3 x 5.0 mL). The water layer was combined and water was removed in vacuo, and the product was obtained.

3. Devices for the photocatalytic reactions.

Irradiation of visible light was performed with a 36 W Blue LED strip. All photocatalyzed reactions were carried out at room temperature with fan-assisted cooling to maintain a temperature of 35-40 °C. The distance between tube and lamp was approximately 3 cm.

Manufacture of the light source: LED strip

Manufacturer: Greethink

Model: GT-5050-Blue

Wavelength of peak intensity: 460-470 nm

Material of the irradiation vessel: borosilicate glass

Distance of the irradiation vessel from the light source: approximately 3 cm.

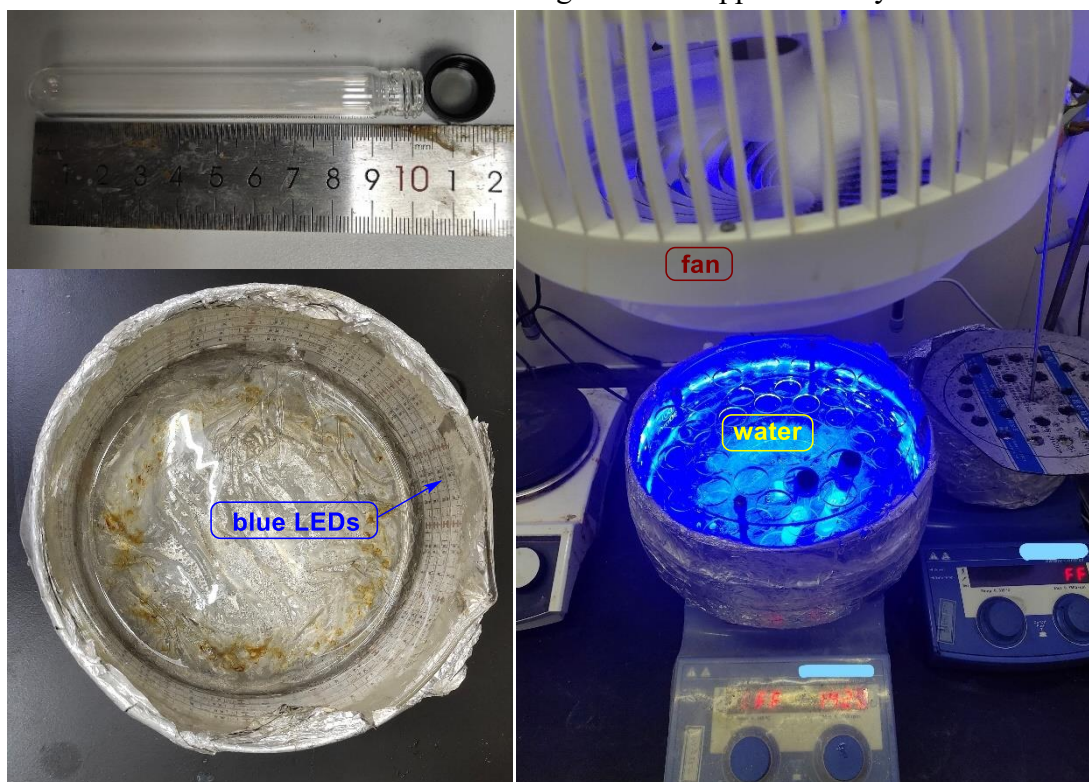
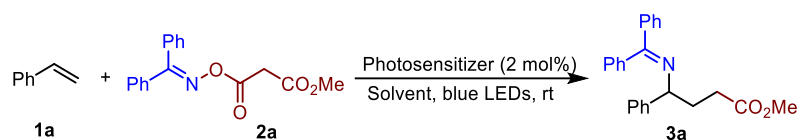


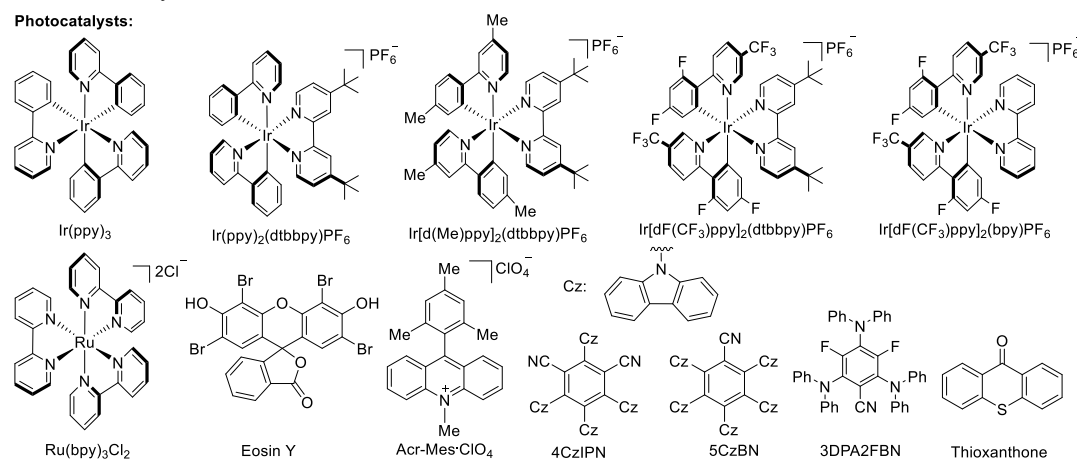
Figure S1. Devices for the photocatalytic reactions

4. Initial studies and the reaction optimization^{a,b}



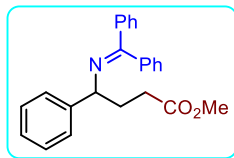
Entry	Photocatalyst	Solvent	Time	Yield (%)
1	Ir(ppy) ₃	MeCN	36 h	trace
2	Ir(ppy) ₂ (dtbbpy)PF ₆	MeCN	36 h	66
3	Ir[d(Me)ppy] ₂ (dtbbpy)PF ₆	MeCN	36 h	trace
4	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	MeCN	36 h	68
5	Ir[dF(CF ₃)ppy] ₂ (ppy)PF ₆	MeCN	36 h	64
6	Ru(bpy) ₃ Cl ₂	MeCN	36 h	trace
7	Eosin Y	MeCN	36 h	trace
8	Mes-Acr-ClO ₄	MeCN	36 h	trace
9	5CzBN	MeCN	36 h	33
10	4CzIPN	MeCN	36 h	trace
11	3DPA2FBN	MeCN	36 h	trace
12	Thioxanthone	MeCN	36 h	trace
13	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	DCE	36 h	20
14	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	EA	36 h	72
15	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	THF	36 h	24
16	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	1,4-dioxane	36 h	45
17	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	Acetone	36 h	69
18	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	CH ₃ OH	36 h	50
19	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	DMF	36 h	32
20	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	Toluene	36 h	33
21	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	Methyl acetate	36 h	71
22	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	Butyl acetate	36 h	68
23	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	EA	12 h	72
24	-	EA	12 h	NR
25 ^c	Ir[dF(CF ₃)ppy] ₂ (dtbbpy)PF ₆	EA	12 h	NR

^aReaction conditions: styrene **1a** (0.2 mmol), **2a** (0.3 mmol), photocatalyst (0.004 mmol), solvent (4 mL), blue LEDs, under a N₂ atmosphere. ^bDetermined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. [c] In the dark.



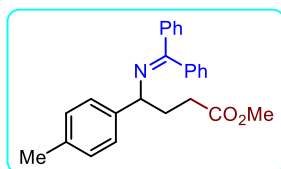
5. Characterization of all products

Methyl 4-((diphenylmethylene)amino)-4-phenylbutanoate (3a)



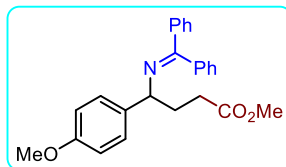
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 67% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.68 (dd, *J* = 8.0, 1.2 Hz, 2H), 7.42–7.28 (m, 10H), 7.23–7.20 (m, 1H), 7.04–7.02 (m, 2H), 4.39–4.36 (m, 1H), 3.56 (s, 3H), 2.30–2.13 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.9, 167.4, 144.3, 139.8, 136.8, 130.0, 128.6, 128.4, 128.0, 127.7, 127.1, 126.8, 65.4, 51.5, 45.6, 34.4, 31.0; HRMS (ESI) for C₂₄H₂₄NO₂ [M+H]⁺ calcd. 358.1802, found: 358.1808.

Methyl 4-((diphenylmethylene)amino)-4-(p-tolyl)butanoate (3b)



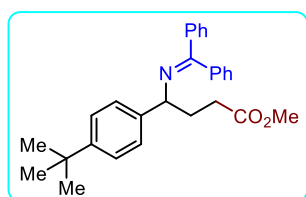
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 94% yield; ¹H NMR (400 MHz, CDCl₃) δ = (ppm) 7.68–7.65 (m, 2H), 7.41–7.39 (m, 3H), 7.36–7.29 (m, 3H), 7.18 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 8.0 Hz, 2H), 7.05–7.01 (m, 2H), 4.34 (t, *J* = 7.2 Hz, 1H), 3.55 (s, 3H), 2.31 (s, 3H), 2.29–2.10 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 167.1, 141.3, 139.8, 136.9, 136.4, 130.0, 129.1, 128.6, 128.4, 128.0, 127.8, 127.0, 65.2, 51.4, 34.4, 31.1, 21.1; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1969.

Methyl 4-((diphenylmethylene)amino)-4-(4-methoxyphenyl)butanoate (3c)



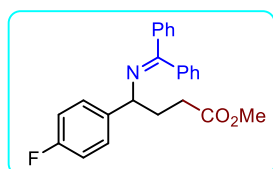
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 62% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.68–7.65 (m, 2H), 7.42–7.30 (m, 6H), 7.21–7.19 (m, 2H), 7.05–7.02 (m, 2H), 6.85–6.81 (m, 2H), 4.34–4.31 (m, 1H), 3.78 (s, 3H), 3.56 (s, 3H), 2.28–2.08 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 167.1, 158.4, 139.8, 136.9, 136.5, 130.0, 128.6, 128.3, 128.1, 128.0, 127.7, 113.8, 64.8, 55.3, 51.4, 34.4, 31.0; HRMS (ESI) for C₂₅H₂₆NO₃ [M+H]⁺ calcd. 388.1907, found: 388.1908.

Methyl 4-(4-(tert-butyl)phenyl)-4-((diphenylmethylene)amino)butanoate (3d)



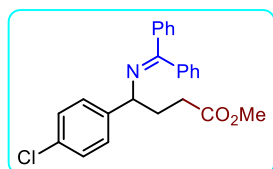
Purification by flash chromatography (petroleum ether/
Et₃N = 15/1). Colorless oil; 78% yield; ¹H NMR (400 MHz,
CDCl₃) δ (ppm) = 7.68–7.65 (m, 2H), 7.43–7.41 (m, 3H),
7.36–7.29 (m, 5H), 7.24–7.22 (m, 2H), 7.07–7.05 (m, 2H),
4.36 (t, *J* = 6.8 Hz, 1H), 3.55 (s, 3H), 2.28–2.11 (m, 4H), 1.30 (s, 9H); ¹³C NMR (100
MHz, CDCl₃) δ (ppm) = 174.0, 166.9, 149.6, 141.1, 139.8, 136.9, 129.9, 128.6, 128.3,
128.3, 128.0, 127.8, 126.7, 125.2, 65.2, 51.4, 34.4, 34.3, 31.4, 31.0, 29.7; HRMS (ESI)
for C₂₈H₃₂NO₂ [M+H]⁺ calcd. 414.2428, found: 414.2430.

Methyl 4-((diphenylmethylene)amino)-4-(4-fluorophenyl)butanoate (3e)



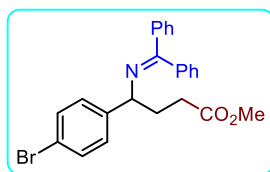
Purification by flash chromatography (petroleum ether/ Et₃N =
15/1). Colorless oil, 92% yield; ¹H NMR (400 MHz, CDCl₃)
δ (ppm) = 7.68–7.65 (m, 2H), 7.41 (dd, *J* = 6.4, 2.4 Hz, 3H),
7.38–7.30 (m, 3H), 7.27–7.23 (m, 2H), 7.03–6.95 (m, 4H), 4.36 (dd, *J* = 6.0, 1.6 Hz,
1H), 3.56 (s, 3H), 2.28–2.08 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.8,
167.6, 161.7 (d, *J* = 243.1 Hz), 140.0 (d, *J* = 3.2 Hz), 139.6, 136.8, 130.2, 128.6,
128.6, 128.5, 128.5, 128.4, 128.1, 127.6, 115.3, 115.0, 64.7, 51.5, 34.5, 30.9; HRMS
(ESI) for C₂₄H₂₃FO₂ [M+H]⁺ calcd. 376.1707, found: 376.1707.

Methyl 4-(4-chlorophenyl)-4-((diphenylmethylene)amino)butanoate (3f)



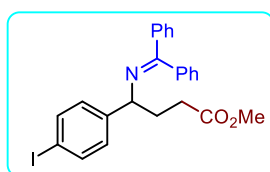
Purification by flash chromatography (petroleum ether/ Et₃N =
15/1). Colorless oil; 76% yield; ¹H NMR (400 MHz, CDCl₃)
δ (ppm) = 7.68–7.65 (m, 2H), 7.42–7.31 (m, 6H), 7.27–7.21 (m,
4H), 7.02–7.00 (m, 2H), 4.35 (dd, *J* = 7.6, 5.2 Hz, 1H), 3.56 (s, 3H), 2.28–2.09 (m,
4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.7, 167.8, 142.8, 139.5, 136.7,
132.5, 130.2, 128.6, 128.5, 128.5, 128.4, 128.4, 128.1, 127.6, 64.7, 51.5, 34.4, 30.9;
HRMS (ESI) for C₂₄H₂₃ClNO₂ [M+H]⁺ calcd. 392.1412, found: 392.1417.

Methyl 4-(4-bromophenyl)-4-((diphenylmethylene)amino)butanoate (3g)



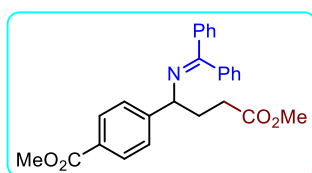
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 58% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.67–7.65 (m, 2H), 7.42–7.31(m, 8H), 7.17 (d, *J* = 8.4 Hz, 2H), 7.02–7.00 (m, 2H), 4.34 (dd, *J* = 7.6, 5.2 Hz, 1H), 3.56 (s, 3H), 2.28–2.09 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.7, 167.9, 143.4, 139.5, 136.7, 131.5, 130.2, 128.8, 128.5, 128.5, 128.1, 127.6, 120.6, 64.8, 51.5, 34.3, 30.8; HRMS (ESI) for C₂₄H₂₃BrNO₂ [M+H]⁺ calcd. 436.0907, found: 436.0915.

Methyl 4-((diphenylmethylene)amino)-4-(4-iodophenyl)butanoate (3h)



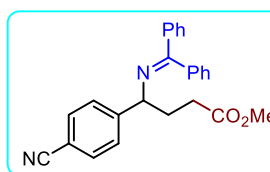
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 69% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.63 (dd, *J* = 19.6, 8.0 Hz, 4H), 7.42–7.31 (m, 6H), 7.06–7.00 (m, 4H), 4.33–4.31 (m, 1H), 3.56 (s, 3H), 2.28–2.08 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.7, 167.9, 144.1, 139.5, 137.5, 136.7, 130.2, 129.1, 128.6, 128.5, 128.5, 128.1, 127.6, 92.2, 64.8, 51.5, 34.3, 30.8; HRMS (ESI) for C₂₄H₂₃INO₂ [M+H]⁺ calcd. 484.0768, found: 484.0777.

Methyl 4-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobutyl)benzoate (3i)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 40% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.67–7.65 (m, 2H), 7.42–7.39 (m, 3H), 7.38–7.29 (m, 5H), 7.04–7.00 (m, 4H), 4.38 (dd, *J* = 7.2, 5.6 Hz, 1H), 3.55 (s, 3H), 2.29–2.10 (m, 7H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.8, 169.5, 167.5, 149.4, 141.8, 139.6, 136.7, 130.1, 128.6, 128.4, 128.0, 127.8, 121.4, 64.8, 51.5, 34.4, 30.9, 21.2; HRMS (ESI) for C₂₆H₂₆NO₄ [M+H]⁺ calcd. 416.1856, found: 416.1862.

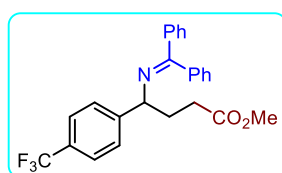
Methyl 4-(4-cyanophenyl)-4-((diphenylmethylene)amino)butanoate (3j)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 46% yield; ¹H NMR (400 MHz,

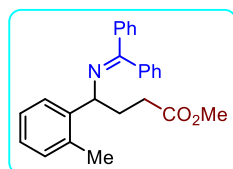
CDCl₃) δ (ppm) = 7.67 (d, J = 7.6 Hz, 2H), 7.59 (d, J = 8.0 Hz, 2H), 7.43–7.33 (m, 8H), 6.99–6.97 (m, 2H), 4.44 (dd, J = 7.6, 5.2 Hz, 1H), 3.56 (s, 3H), 2.30–2.11 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 173.5, 168.7, 149.9, 139.3, 136.5, 132.3, 130.5, 128.7, 128.6, 128.6, 128.1, 127.9, 127.5, 119.0, 110.7, 64.9, 51.6, 34.2, 30.7; HRMS (ESI) for C₂₅H₂₃N₂O₂ [M+H]⁺ calcd. 383.1754, found: 383.1768.

Methyl 4-((diphenylmethylene)amino)-4-(4-(trifluoromethyl)phenyl)butanoate (3k)



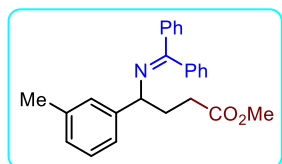
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 65% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.68 (d, J = 7.6 Hz, 2H), 7.55 (d, J = 8.0 Hz, 2H), 7.43–7.32 (m, 8H), 7.01 (d, J = 4.0 Hz, 2H), 4.46–4.43 (m, 1H), 3.56 (s, 3H), 2.30–2.14 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 173.6, 168.3, 148.4, 139.4, 136.6, 130.3, 129.1 (q, J = 32.2 Hz), 128.6, 128.6, 128.5, 128.1, 127.6, 127.4, 125.3 (q, J = 3.8 Hz), 124.3 (q, J = 270.2 Hz), 65.0, 51.5, 34.3, 30.8; HRMS (ESI) for C₂₅H₂₃F₃NO₂ [M+H]⁺ calcd. 426.1675, found: 426.1680.

Methyl 4-((diphenylmethylene)amino)-4-(o-tolyl)butanoate (3l)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 76% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.70–7.68 (m, 2H), 7.63 (d, J = 7.6 Hz, 1H), 7.39–7.31 (m, 6H), 7.16 (t, J = 7.2 Hz, 1H), 7.09 (td, J = 7.2, 1.2 Hz, 1H), 7.03 (d, J = 7.2 Hz, 1H), 6.94–6.92 (m, 2H), 4.57 (dd, J = 8.4, 4.0 Hz, 1H), 3.57 (s, 3H), 2.38–2.34 (m, 2H), 2.23–2.05 (m, 2H), 1.89 (s, 3H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 172.9, 166.6, 142.3, 138.7, 136.3, 133.2, 129.1, 129.0, 127.5, 127.3, 127.2, 127.0, 126.5, 125.3, 125.1, 60.2, 50.4, 32.5, 30.1, 17.7; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1964.

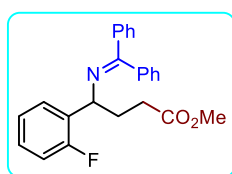
Methyl 4-((diphenylmethylene)amino)-4-(m-tolyl)butanoate (3m)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 72% yield; **¹H NMR (400 MHz,**

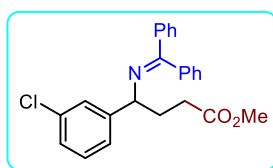
CDCl₃) δ (ppm) = 7.69–7.66 (m, 2H), 7.42–7.39 (m, 3H), 7.37–7.30 (m, 3H), 7.17 (t, $J = 7.6$ Hz, 1H), 7.11 (s, 1H), 7.08–7.01 (m, 4H), 4.34 (dd, $J = 7.2, 5.6$ Hz, 1H), 3.56 (s, 3H), 2.32 (s, 3H), 2.29–2.10 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 172.9, 166.2, 143.2, 138.8, 136.9, 135.8, 129.0, 127.6, 127.3, 127.2, 127.0, 126.7, 126.7, 126.6, 123.1, 64.4, 50.4, 33.4, 30.0, 20.5; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1970.

Methyl 4-((diphenylmethylene)amino)-4-(2-fluorophenyl)butanoate (3n)



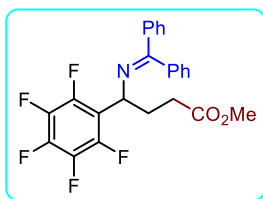
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 68% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.71–7.64 (m, 3H), 7.41–7.31 (m, 6H), 7.21–7.15 (m, 1H), 7.11 (td, $J = 7.6, 1.2$ Hz, 1H), 7.03–7.00 (m, 2H), 6.97–6.92 (m, 1H), 4.76 (dd, $J = 11.6, 6.2$ Hz, 1H), 3.56 (s, 3H), 2.32–2.14 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 172.8, 167.3, 158.5 (d, $J = 244.2$ Hz, 1H), 138.6, 135.7, 130.2 (d, $J = 13.2$ Hz, 1H), 129.1, 128.0 (d, $J = 4.7$ Hz, 1H), 127.6, 127.4, 127.4, 127.0 (d, $J = 8.1$ Hz, 1H), 127.0, 127.0, 126.5, 123.2 (d, $J = 3.5$ Hz, 1H), 114.1 (d, $J = 22.0$ Hz, 1H), 57.0, 50.4, 32.1, 29.8; HRMS (ESI) for C₂₄H₂₃FNO₂ [M+H]⁺ calcd. 376.1707, found: 376.1706.

Methyl 4-(3-chlorophenyl)-4-((diphenylmethylene)amino)butanoate (3o)



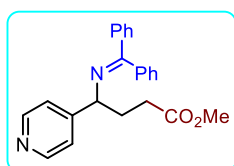
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 62% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.69–7.67(m, 2H), 7.43–7.32 (m, 7H), 7.21–7.14 (m, 3H), 7.03–7.01 (m, 2H), 4.36 (dd, $J = 5.6, 2.0$ Hz, 1H), 3.56 (s, 3H), 2.29–2.10 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 173.7, 168.0, 146.4, 139.5, 136.6, 134.2, 130.2, 129.6, 128.6, 128.5, 128.5, 128.1, 127.6, 127.2, 127.1, 125.2, 64.9, 51.5, 34.3, 30.8; HRMS (ESI) for C₂₄H₂₃ClNO₂ [M+H]⁺ calcd. 392.1412, found: 392.1418.

Methyl 4-((diphenylmethylene)amino)-4-(perfluorophenyl)butanoate (3p)



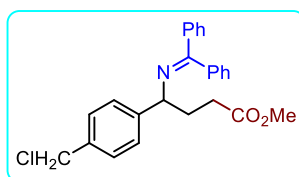
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 78% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.67–7.64 (m, 2H), 7.46–7.44 (m, 3H), 7.40–7.37 (m, 1H), 7.34–7.30 (m, 2H), 7.03–7.00 (m, 2H), 4.91–4.85 (m, 1H), 3.58 (s, 3H), 2.43–2.23 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.0, 170.5, 139.1, 136.2, 130.6, 128.7 (d, *J* = 3.6 Hz), 128.7, 128.1, 127.2, 56.4, 51.6, 31.1, 30.8; HRMS (ESI) for C₂₄H₁₉F₅NO₂ [M+H]⁺ calcd. 448.1330, found: 448.1340.

Methyl 4-((diphenylmethylene)amino)-4-(pyridin-4-yl)butanoate (3q)



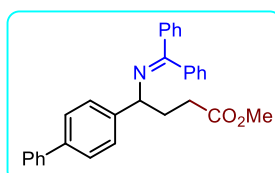
Purification by flash chromatography (petroleum ether/ Et₃N = 5/1). Colorless oil, 58% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 8.52 (d, *J* = 5.6 Hz, 2H), 7.69 (d, *J* = 7.6 Hz, 2H), 7.43–7.33 (m, 6H), 7.23 (d, *J* = 5.6 Hz, 2H), 7.01–7.00 (m, 2H), 4.39 (dd, *J* = 7.6, 4.8 Hz, 1H), 3.57 (s, 3H), 2.31–2.12 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.5, 168.9, 153.1, 149.9, 139.3, 136.4, 130.5, 128.7, 128.6, 128.1, 127.5, 122.2, 64.2, 51.5, 33.8, 30.6; HRMS (ESI) for C₂₃H₂₃N₂O₂ [M+H]⁺ calcd. 359.1754, found: 359.1753.

Methyl 4-(4-(chloromethyl)phenyl)-4-((diphenylmethylene)amino)butanoate (3r)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 61% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.67 (d, *J* = 7.2 Hz, 2H), 7.43–7.30 (m, 10H), 7.03 (d, *J* = 3.6 Hz, 2H), 4.57 (s, 2H), 4.38 (t, *J* = 7.2 Hz, 1H), 3.56 (s, 3H), 2.29–2.10 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.8, 167.6, 144.7, 139.6, 136.7, 136.0, 130.1, 128.7, 128.6, 128.4, 128.4, 128.1, 127.7, 127.5, 65.1, 51.5, 46.2, 34.3, 30.9; HRMS (ESI) for C₂₅H₂₅ClNO₂ [M+H]⁺ calcd. 406.1568, found: 406.1574.

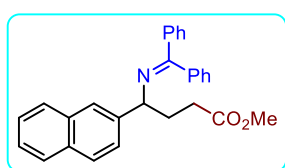
Methyl 4-([1,1'-biphenyl]-4-yl)-4-((diphenylmethylene)amino)butanoate (3s)



Purification by flash chromatography (petroleum ether/ Et₃N

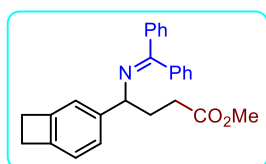
= 15/1). Colorless oil; 76% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.71–7.68 (m, 2H), 7.57 (dd, *J* = 8.4, 1.6 Hz, 2H), 7.52 (d, *J* = 8.0 Hz, 2H), 7.43–7.29 (m, 11H), 7.08–7.05 (m, 2H), 4.43 (t, *J* = 7.2 Hz, 1H), 3.56 (s, 3H), 2.33–2.16 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 173.9, 167.5, 143.4, 141.1, 139.8, 136.9, 130.1, 128.8, 128.6, 128.4, 128.1, 127.8, 127.5, 127.1, 127.1, 65.2, 51.5, 34.4, 31.0; HRMS (ESI) for C₃₀H₂₈NO₂ [M+H]⁺ calcd. 434.2115, found: 434.2120.

Methyl 4-((diphenylmethylene)amino)-4-(naphthalen-2-yl)butanoate (3t)



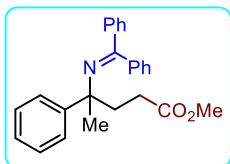
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 53% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.79–7.70 (m, 5H), 7.66 (s, 1H), 7.51 (dd, *J* = 8.8, 1.6 Hz, 1H), 7.43–7.31 (m, 8H), 7.05–7.02 (m, 2H), 4.55 (t, *J* = 5.2 Hz, 1H), 3.54 (s, 3H), 2.35–2.23 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 173.9, 167.8, 141.9, 139.8, 136.9, 133.5, 132.7, 130.2, 128.7, 128.5, 128.4, 128.1, 127.9, 127.8, 127.7, 125.9, 125.6, 65.6, 51.5, 34.4, 31.0; HRMS (ESI) for C₂₈H₂₆NO₂ [M+H]⁺ calcd. 408.1958, found: 408.1961.

Methyl 4-(bicyclo[4.2.0]octa-1(6),2,4-trien-3-yl)-4-((diphenylmethylene)amino)butanoate (3u)



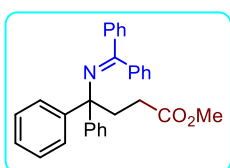
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 56% yield; **¹H NMR (400 MHz, CDCl₃)** δ (ppm) = 7.68–7.65 (m, 2H), 7.42–7.41 (m, 3H), 7.37–7.30 (m, 3H), 7.07–7.04 (m, 4H), 6.95 (d, *J* = 8.0 Hz, 1H), 4.34–4.31 (m, 1H), 3.56 (s, 3H), 3.13 (s, 4H), 2.27–2.10 (m, 4H); **¹³C NMR (100 MHz, CDCl₃)** δ (ppm) = 174.0, 166.9, 145.8, 144.3, 143.0, 139.8, 136.9, 129.9, 128.6, 128.3, 128.0, 127.8, 125.7, 122.3, 121.5, 66.1, 51.4, 34.7, 31.1, 29.4, 29.3; HRMS (ESI) for C₂₆H₂₆NO₂ [M+H]⁺ calcd. 384.1958, found: 384.1960.

Methyl 4-((diphenylmethylene)amino)-4-phenylpentanoate (3v)



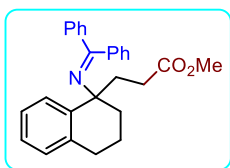
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 65% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.61–7.59 (m, 2H), 7.38–7.29 (m, 3H), 7.20–7.08 (m, 8H), 6.66 (d, *J* = 7.2 Hz, 2H), 3.62 (s, 3H), 2.51–2.35 (m, 3H), 2.24–2.17 (m, 1H), 1.27 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.8, 166.4, 149.0, 141.5, 139.0, 129.8, 128.3, 127.9, 127.9, 127.9, 127.5, 127.4, 126.3, 126.1, 62.9, 51.5, 42.8, 30.1, 25.5; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1968.

Methyl 4-((diphenylmethylene)amino)-4,4-diphenylbutanoate (3w)



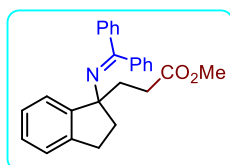
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 76% yield; ¹H NMR (400 MHz, CDCl₃): δ (ppm) 7.69 (d, *J* = 7.2 Hz, 2H), 7.38–7.28 (m, 7H), 7.17–7.08 (m, 7H), 7.03 (t, *J* = 7.6 Hz, 2H), 6.51 (d, *J* = 7.2 Hz, 2H), 3.52 (s, 3H), 2.59–2.55 (m, 2H), 2.27–2.23 (m, 2H); ¹³C NMR (100 MHz, CDCl₃): δ (ppm) 174.3, 167.2, 149.0, 141.7, 138.4, 130.0, 128.4, 128.0, 127.9, 127.8, 127.3, 127.1, 127.0, 126.0, 68.3, 51.5, 35.8, 29.2; HRMS (ESI) for C₃₀H₂₈NO₂ [M+H]⁺ calcd. 434.2115, found: 434.2123.

Methyl 3-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-1-yl)propanoate (3x)



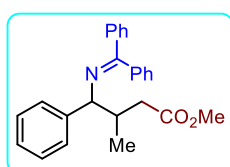
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 32% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.55 (d, *J* = 7.2 Hz, 2H), 7.36–7.28 (m, 4H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.06–6.98 (m, 4H), 6.77 (d, *J* = 7.2 Hz, 1H), 6.54 (d, *J* = 7.2 Hz, 2H), 3.69 (s, 3H), 2.98–2.90 (m, 1H), 2.66–2.44 (m, 3H), 2.26–2.19 (m, 1H), 2.04–1.96 (m, 1H), 1.86–1.84 (m, 2H), 1.72–1.64 (m, 2H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 175.1, 166.3, 144.8, 141.9, 138.7, 136.8, 129.7, 128.8, 128.3, 128.2, 128.0, 127.8, 127.2, 127.1, 126.0, 125.9, 62.3, 51.5, 40.4, 32.5, 30.2, 29.6, 20.2; HRMS (ESI) for C₂₇H₂₈NO₂ [M+H]⁺ calcd. 398.2115, found: 398.2125.

Methyl 3-(1-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-1-yl)propanoate (3y)



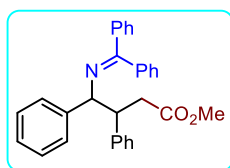
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 38% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.61–7.59 (m, 3H), 7.35–7.26 (m, 6H), 7.22 (t, *J* = 7.2 Hz, 1H), 7.16 (td, *J* = 7.6, 1.2 Hz, 1H), 7.10–7.06 (m, 3H), 3.51 (s, 3H), 2.74–2.68 (m, 1H), 2.62–2.44 (m, 3H), 2.23–2.02 (m, 3H), 1.65–1.62 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.5, 165.4, 149.3, 141.7, 141.3, 139.1, 129.8, 128.3, 128.2, 127.9, 127.8, 127.8, 127.2, 126.2, 125.2, 124.6, 72.7, 51.5, 40.2, 37.8, 30.2, 29.6; HRMS (ESI) for C₂₆H₂₅NO₂ [M+Na]⁺ calcd. 406.1778, found: 406.1781.

Methyl 4-((diphenylmethylene)amino)-3-methyl-4-phenylbutanoate (3z)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 65% yield, > 20:1 dr; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.69–7.67 (m, 2H), 7.41–7.32 (m, 6H), 7.27–7.19 (m, 5H), 6.98–6.96 (m, 2H), 4.16 (dd, *J* = 34.4, 6.4 Hz, 1H), 3.55 (d, *J* = 8.8 Hz, 3H), 2.60–2.52 (m, 1H), 2.34–2.15 (m, 1H), 1.98 (dd, *J* = 15.2, 9.2 Hz, 1H), 0.96 (d, *J* = 6.8 Hz, 2H), 0.77 (d, *J* = 6.8 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.6, 167.2, 143.2, 140.0, 139.9, 136.9, 130.0, 128.6, 128.3, 128.2, 128.2, 128.0, 127.8, 127.8, 126.8, 70.3, 51.3, 38.4, 38.0, 17.3, 16.2; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1959.

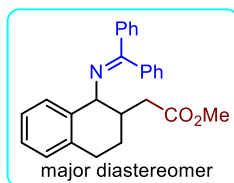
Methyl 4-((diphenylmethylene)amino)-3,4-diphenylbutanoate (3aa)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil; 52% yield, 5:1 dr; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.71–7.68 (m, 1.7H), 7.52–7.49 (m, 0.3H), 7.39–7.28 (m, 5H), 7.24–7.20 (m, 2H), 7.19–7.15 (m, 4H), 7.15–7.12 (m, 1H), 7.12–7.08 (m, 2H), 7.05–6.96 (m, 2H), 6.64–6.57 (m, 2H), 4.45 (dd, *J* = 15.6, 6.0 Hz, 1H), 3.78–3.72 (m, 1H), 3.40 (d, *J* = 11.2 Hz, 3H), 2.98–2.87 (m, 1.7H), 2.58–2.47 (m, 0.3H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.2, 172.6, 167.8, 166.8, 142.9, 142.3, 141.6, 141.3, 139.9, 139.5, 136.7, 136.5, 130.1, 129.8, 128.9, 128.6, 128.5, 128.4, 128.2, 128.1, 128.0, 128.0, 127.9, 127.6, 127.4, 127.1, 126.7, 126.5, 126.4,

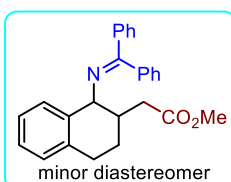
71.5, 71.1, 51.4, 50.2, 49.7, 36.9, 35.7; HRMS (ESI) for C₃₀H₂₈NO₂ [M+H]⁺ calcd. 434.2115, found: 434.2125.

Methyl 2-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-2-yl)acetate (3ab, major diastereomer)



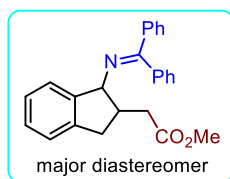
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Yellow solid; 54% yield, 2:1 dr, mp = 128.9–130.9 °C; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.70–7.67 (m, 2H), 7.46–7.38 (m, 4H), 7.35–7.30 (m, 4H), 7.18–7.10 (m, 3H), 7.04–7.02 (m, 1H), 4.28 (d, *J* = 9.2 Hz, 1H), 3.57 (s, 3H), 3.05–2.97 (m, 1H), 2.87–2.81 (m, 1H), 2.64–2.55 (m, 1H), 2.45 (dd, *J* = 15.2, 5.2 Hz, 1H), 2.13–2.06 (m, 1H), 1.99 (dd, *J* = 15.2, 8.8 Hz, 1H), 1.57–1.47 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.2, 169.1, 139.7, 137.1, 136.6, 136.2, 130.2, 129.0, 128.9, 128.6, 128.5, 128.1, 127.7, 127.6, 126.7, 125.8, 66.0, 51.5, 45.9, 38.6, 37.9, 28.5, 26.7; HRMS (ESI) for C₂₆H₂₆NO₂ [M+H]⁺ calcd. 384.1958, found: 384.1966.

Methyl 2-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-2-yl)acetate (3ab, minor diastereomer)



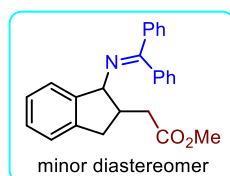
¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.65–7.63 (m, 2H), 7.50–7.43 (m, 3H), 7.36–7.27 (m, 5H), 7.14–7.07 (m, 3H), 6.95 (d, *J* = 7.6 Hz, 1H), 4.57 (d, *J* = 4.4 Hz, 1H), 3.57 (s, 3H), 3.03–2.95 (m, 1H), 2.84–2.76 (m, 1H), 2.71 (dd, *J* = 15.6, 6.4 Hz, 1H), 2.51–2.47 (m, 1H), 2.29 (dd, *J* = 15.6, 8.0 Hz, 1H), 2.20–2.12 (m, 1H), 1.84–1.76 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) = δ (ppm) 174.0, 167.5, 139.8, 137.5, 136.9, 136.0, 130.0, 128.9, 128.7, 128.6, 128.4, 128.4, 128.0, 127.9, 126.7, 125.8, 62.4, 51.4, 36.2, 34.8, 29.7, 26.6, 25.0; HRMS (ESI) for C₂₆H₂₆NO₂ [M+H]⁺ calcd. 384.1958, found: 384.1960.

Methyl 2-(1-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-2-yl)acetate (3ac, major diastereomer)



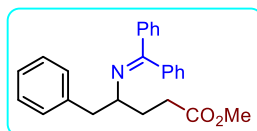
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Yellow solid, 54% yield, 2:1 dr, mp = 86.1–88.1 °C; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.70–7.68 (m, 2H), 7.47–7.37 (m, 4H), 7.35–7.28 (m, 4H), 7.23–7.16 (m, 3H), 7.06–7.04 (m, 1H), 4.64 (d, *J* = 8.4 Hz, 1H), 3.62 (s, 3H), 3.28 (dd, *J* = 15.2, 7.6 Hz, 1H), 3.13–3.07 (m, 1H), 2.64–2.52 (m, 2H), 2.28 (dd, *J* = 15.2, 9.6 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃): δ (ppm) 173.0, 169.7, 144.2, 142.2, 139.6, 136.8, 130.2, 128.8, 128.6, 128.5, 128.1, 127.9, 127.4, 126.5, 124.6, 123.7, 72.0, 51.6, 45.7, 37.2, 37.0; ESI-HRMS: calcd. for C₂₅H₂₃NO₂+H⁺: 370.1807, found: 370.1809.

Methyl 2-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-1-yl)acetate (3ac, minor diastereomer)



¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.65–7.63 (m, 2H), 7.51–7.43 (m, 3H), 7.36–7.29 (m, 5H), 7.23–7.13 (m, 3H), 7.04 (d, *J* = 7.2 Hz, 1H), 4.91 (d, *J* = 6.4 Hz, 1H), 3.53 (s, 3H), 3.09 (dd, *J* = 10.8, 6.8 Hz, 1H), 3.02–2.91 (m, 2H), 2.81 (dd, *J* = 16.0, 8.8 Hz, 1H), 2.41 (dd, *J* = 16.0, 8.8 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 168.1, 144.3, 142.5, 139.7, 136.9, 130.0, 128.7, 128.6, 128.4, 128.0, 127.4, 126.4, 124.8, 124.4, 67.9, 51.4, 42.7, 37.4, 35.0; ESI-HRMS: calcd. for C₂₅H₂₃NO₂+H⁺: 370.1807, found: 370.1811.

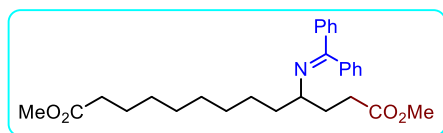
Methyl 4-((diphenylmethylene)amino)-5-phenylpentanoate (3ad)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 47% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.56 (d, *J* = 7.6 Hz, 2H), 7.36–7.27 (m, 5H), 7.24 (s, 1H), 7.19–7.14 (m, 3H), 6.99 (d, *J* = 7.6 Hz, 2H), 6.51 (d, *J* = 6.4 Hz, 2H), 3.57 (s, 3H), 3.50–3.43 (m, 1H), 2.93–2.80 (m, 2H), 2.38–2.19 (m, 2H), 2.08–1.90 (m, 2H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 167.8, 139.7, 139.2, 137.0, 129.9, 129.8, 128.4, 128.2, 128.1, 128.0, 127.9, 127.5, 126.0, 63.2, 51.5, 43.1, 31.4, 31.3; HRMS (ESI) for C₂₅H₂₆NO₂ [M+H]⁺ calcd. 372.1958, found: 372.1955.

388.1907, found: 388.1910.

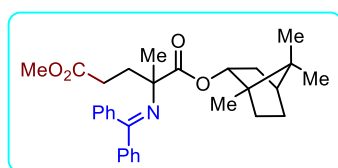
Dimethyl 4-((diphenylmethylene)amino)tridecanedioate (3ah)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 34% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.61–7.58

(m, 2H), 7.46–7.40 (m, 3H), 7.36–7.29 (m, 3H), 7.14–7.11 (m, 2H), 3.66 (s, 3H), 3.58 (s, 3H), 3.32–3.25 (m, 1H), 2.31–2.21 (m, 4H), 1.92–1.87 (m, 2H), 1.73 (d, *J* = 6.4 Hz, 1H), 1.62–1.53 (m, 4H), 1.26–1.21 (m, 9H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.3, 174.2, 167.0, 140.0, 137.3, 129.8, 128.4, 128.3, 128.1, 128.0, 127.9, 61.0, 51.4, 36.3, 34.1, 31.3, 31.1, 29.7, 29.4, 29.2, 29.1, 26.3, 24.9; HRMS (ESI) for C₂₈H₃₈NO₄ [M+H]⁺ calcd. 452.2795, found: 452.2800.

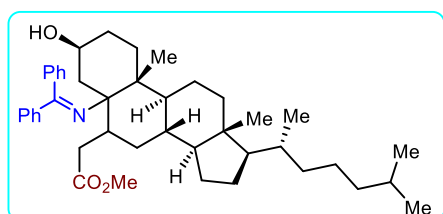
5-Methyl 1-((1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl) 2-((diphenylmethylene)amino)-2-methylpentanedioate (3ai)



Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 41% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.55–7.53 (m, 2H), 7.38–7.34

(m, 4H), 7.29 (d, *J* = 7.6 Hz, 2H), 7.18–7.15 (m, 2H), 4.33–4.20 (m, 1H), 3.65 (s, 3H), 2.68–2.64 (m, 2H), 2.29–2.13 (m, 2H), 1.76–1.71 (m, 1H), 1.64–1.46 (m, 4H), 1.26 (d, *J* = 3.2 Hz, 3H), 1.09–1.02 (m, 2H), 0.92–0.88 (m, 2H), 0.79 (d, *J* = 10.4 Hz, 6H), 0.64 (s, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.4, 174.4, 173.7, 173.6, 167.6, 167.6, 141.0, 137.8, 130.0, 128.7, 128.7, 128.5, 128.3, 127.9, 127.8, 127.8, 81.5, 81.3, 65.3, 65.2, 51.6, 48.7, 48.7, 46.9, 44.9, 38.9, 38.7, 38.3, 37.8, 33.7, 33.7, 29.5, 29.4, 27.0, 24.4, 20.0, 19.9, 19.8, 11.6, 11.5; HRMS (ESI) for C₃₀H₃₈NO₄ [M+H]⁺ calcd. 476.2795, found: 476.2804.

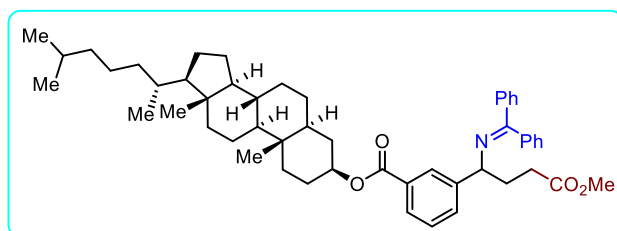
Methyl 2-(5-((diphenylmethylene)amino)-3-hydroxy-10,13-dimethyl-17-(6-methylheptan-2-yl)hexadecahydro-1H-cyclopenta[a]phenanthren-6-yl)acetate (3aj)



Purification by flash chromatography (petroleum

ether/ Et₃N = 3/1). Yellow oil, 21% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.54–7.52 (m, 2H), 7.47–7.41 (m, 3H), 7.35–7.31 (m, 3H), 7.22–7.02 (m, 2H), 3.82–3.75 (m, 1H), 3.67 (d, *J* = 10.4 Hz, 1H), 3.51 (s, 3H), 3.39 (q, *J* = 7.2 Hz, 1H), 2.59–2.56 (m, 1H), 2.38–2.26 (m, 3H), 2.08–2.00 (m, 3H), 1.82–1.77 (m, 2H), 1.70 (dd, *J* = 12.8, 3.6 Hz, 1H), 1.62 (s, 1H), 1.56–1.57 (m, 1H), 1.55 (d, *J* = 2.0 Hz, 1H), 1.53–1.49 (m, 3H), 1.47–1.46 (m, 2H), 1.43 (s, 1H), 1.34–1.31 (m, 6H), 1.26 (s, 1H), 1.21 (s, 1H), 1.16 (s, 1H), 1.13–1.10 (m, 5H), 1.06 (s, 2H), 0.93 (d, *J* = 6.4 Hz, 3H), 0.86 (dd, *J* = 6.8, 1.6 Hz, 6H), 0.70 (s, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.8, 161.3, 142.3, 139.3, 129.4, 128.1, 128.0, 128.0, 128.0, 68.0, 67.2, 58.5, 56.2, 56.0, 51.5, 46.4, 42.8, 41.1, 40.4, 39.5, 38.2, 38.0, 36.2, 35.8, 35.7, 33.9, 31.2, 30.5, 28.2, 28.0, 24.2, 23.8, 22.8, 22.6, 21.5, 18.7, 18.5, 12.4, 8.3; HRMS (ESI) for C₄₃H₆₂NO₃ [M+H]⁺ calcd. 640.4724, found: 640.4728.

(3R,10S,13R)-10,13-Dimethyl-17-((S)-6-methylheptan-2-yl)hexadecahydro-1H-cyclo-penta[a]phenanthren-3-yl 3-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobuty-1)benzoate (3ak)

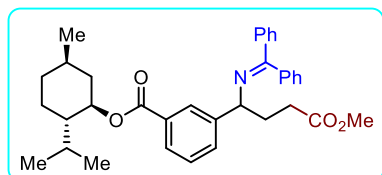


Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 56% yield; ¹H NMR (400 MHz, CDCl₃)

δ (ppm) = 7.89 (dd, *J* = 8, 5.2 Hz, 2H), 7.69–7.67 (m 2H), 7.54–7.52 (m, 1H), 7.42–7.30 (m, 7H), 7.02 (dd, *J* = 5.6, 2.0 Hz, 2H), 4.97–4.89 (m, 1H), 4.44 (t, *J* = 7.2 Hz, 1H), 3.56 (s, 3H), 2.53 (q, *J* = 7.2 Hz, 1H), 2.30–2.14 (m, 4H), 2.00–1.93 (m, 2H), 1.83–1.50 (m, 10H), 1.37–1.23 (m, 10H), 1.15–1.08 (m, 5H), 1.50–1.01 (m, 4H), 0.91 (d, *J* = 6.4 Hz, 3H), 0.88–0.87 (m, 5H), 0.86 (d, *J* = 1.6 Hz, 2H), 0.72–0.69 (m, 1H), 0.66 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.7, 167.9, 166.2, 144.6, 139.6, 136.7, 131.5, 131.0, 130.2, 128.6, 128.5, 128.4, 128.3, 128.1, 128.1, 127.6, 74.4, 65.1, 56.5, 56.3, 54.3, 51.5, 46.2, 44.8, 42.6, 40.0, 39.6, 36.9, 36.2, 35.8, 35.6, 35.5, 35.4, 34.3, 34.2, 34.2, 32.1, 30.9, 28.7, 28.3, 28.0, 27.6, 27.6, 24.3, 23.9, 22.9, 22.6, 21.3, 18.7, 12.4, 12.1, 11.4; HRMS (ESI) for C₅₂H₇₀NO₄ [M+H]⁺ calcd.

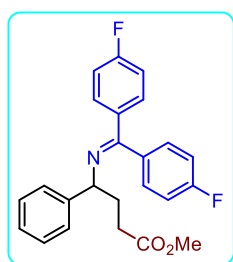
772.5299, found: 772.5300.

(1S,2S,5R)-2-Isopropyl-5-methylcyclohexyl 3-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobutyl)benzoate (3al)



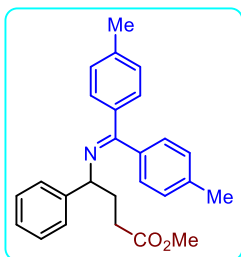
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 32% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.96–7.88 (m, 2H), 7.69–7.67 (m, 2H), 7.59–7.47 (m, 1H), 7.43–7.31 (m, 7H), 7.03–7.02 (m, 2H), 4.95–4.88 (m, 1H), 4.46–4.43 (m, 1H), 3.57 (s, 3H), 2.32–2.11 (m, 5H), 1.99–1.93 (m, 1H), 1.73 (d, *J* = 11.2 Hz, 2H), 1.54 (d, *J* = 12 Hz, 1H), 1.16–1.08 (m, 2H), 0.94–0.89 (m, 7H), 0.85–0.83 (m, 1H), 0.79 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.7, 167.8, 166.2, 166.1, 144.6, 144.6, 139.5, 136.7, 136.7, 131.6, 131.5, 131.0, 130.9, 130.2, 128.6, 128.6, 128.5, 128.4, 128.3, 128.2, 128.2, 128.1, 128.1, 127.6, 127.6, 74.9, 74.8, 65.2, 65.0, 51.5, 47.2, 41.0, 41.0, 34.4, 34.4, 34.3, 34.2, 31.5, 30.9, 30.9, 26.6, 26.5, 23.8, 23.7, 22.1, 20.8, 20.7, 16.6, 16.6; HRMS (ESI) for C₃₅H₄₂NO₄ [M+H]⁺ calcd. 540.3108, found: 540.3115.

Methyl 4-((bis(4-fluorophenyl)methylene)amino)-4-phenylbutanoate (3am)



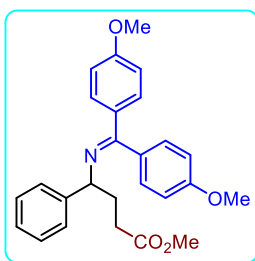
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 69% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.66–7.63 (m, 2H), 7.31–7.22 (m, 5H), 7.12 (t, *J* = 7.6 Hz, 2H), 7.01 (t, *J* = 8.0 Hz, 4H), 4.33 (d, *J* = 6.8 Hz, 1H), 3.56 (s, 3H), 2.26–2.12 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.8, 164.6 (d, *J* = 154.0 Hz), 165.3, 162.2 (d, *J* = 151.8 Hz), 144.0, 135.8 (d, *J* = 3.0 Hz), 132.4 (d, *J* = 3.6 Hz), 130.5 (d, *J* = 8.6 Hz), 129.6 (d, *J* = 8.1 Hz), 128.5, 127.0, 115.6 (d, *J* = 21.3 Hz), 115.0 (d, *J* = 21.6 Hz), 65.6, 51.5, 34.4, 30.9; HRMS (ESI) for C₂₄H₂₂F₂NO₂ [M+H]⁺ calcd. 394.1613, found: 394.1619.

Methyl 4-((di-p-tolylmethylene)amino)-4-phenylbutanoate (3an)



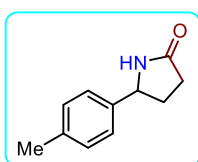
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 68% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.56 (d, *J* = 8.0 Hz, 2H), 7.30 (t, *J* = 6.8 Hz, 4H), 7.20 (d, *J* = 7.6 Hz, 3H), 7.12 (d, *J* = 8.0 Hz, 2H), 6.91 (d, *J* = 7.6 Hz, 2H), 4.40–4.37 (m, 1H), 3.56 (s, 3H), 2.41 (s, 3H), 2.35 (s, 3H), 2.29–2.13 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 167.4, 144.6, 140.1, 138.0, 137.4, 134.0, 128.9, 128.7, 128.6, 128.3, 127.7, 127.1, 126.7, 65.3, 51.4, 34.4, 31.0, 21.4, 21.3; HRMS (ESI) for C₂₆H₂₈NO₂ [M+H]⁺ calcd. 386.2115, found: 386.2118.

Methyl 4-((bis(4-methoxyphenyl)methylene)amino)-4-phenylbutanoate (3ao)



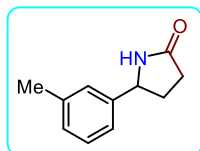
Purification by flash chromatography (petroleum ether/ Et₃N = 15/1). Colorless oil, 71% yield; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.64–7.61 (m, 2H), 7.32–7.26 (m, 4H), 7.22–7.17 (m, 1H), 6.93 (q, *J* = 7.2 Hz, 4H), 6.85–6.82 (m, 2H), 4.39 (dd, *J* = 7.6, 5.6 Hz, 1H), 3.85 (s, 3H), 3.80 (s, 3H), 3.56 (s, 3H), 2.31–2.10 (m, 4H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 174.0, 166.6, 161.2, 159.4, 144.7, 133.1, 130.2, 129.2, 129.2, 128.3, 127.1, 126.7, 113.7, 113.3, 65.2, 55.4, 55.3, 51.4, 34.5, 31.1; HRMS (ESI) for C₂₆H₂₈NO₄ [M+H]⁺ calcd. 418.2013, found: 418.2021.

5-(p-Tolyl)pyrrolidin-2-one (4a)



Purification by flash chromatography (ethyl acetate/Et₃N = 50/1). White solid, 34% yield, mp = 108.9–110.9 °C; ¹H NMR (400 MHz, CDCl₃) δ (ppm) = 7.19–7.15 (m, 4H), 6.72 (s, 1H), 4.70 (t, *J* = 7.2 Hz, 1H), 2.57–2.48 (m, 1H), 2.44–2.35 (m, 2H), 2.33 (s, 3H), 1.97–1.90 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 178.7, 139.6, 137.6, 129.5, 125.6, 58.0, 31.4, 30.4, 21.1; HRMS (ESI) for C₁₁H₁₄NO [M+H]⁺ calcd. 176.1070, found: 176.1076.

5-(m-Tolyl)pyrrolidin-2-one (4b)



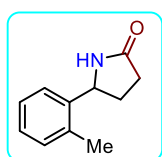
Purification by flash chromatography (ethyl acetate/Et₃N = 50/1).

White solid, 54% yield, mp = 121.0–123.0 °C; ¹H NMR (400 MHz,

CDCl₃) δ (ppm) = 7.32 (d, *J* = 7.2 Hz, 1H), 7.23–7.18 (m, 2H),

7.17–7.13 (m, 2H), 4.96 (dd, *J* = 7.6, 6.0 Hz, 1H), 2.60–2.53 (m, 1H), 2.45–2.34 (m, 2H), 2.32 (s, 3H), 1.86–1.78 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 179.2, 140.7, 134.4, 130.7, 127.3, 126.5, 124.0, 54.8, 30.0, 29.4, 19.0; HRMS (ESI) for C₁₁H₁₄NO [M+H]⁺ calcd. 176.1070, found: 176.1076.

5-(*o*-Tolyl)pyrrolidin-2-one (4c)



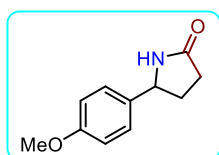
Purification by flash chromatography (ethyl acetate/Et₃N = 50/1).

White solid, 39% yield, mp = 101.9–103.9 °C; ¹H NMR (400 MHz,

CDCl₃) δ (ppm) = 7.34–7.32 (m, 1H), 7.24–7.14 (m, 3H), 6.97 (s, 1H),

4.97 (dd, *J* = 7.6, 6.0 Hz, 1H), 2.64–2.55 (m, 1H), 2.46–2.36 (m, 2H), 2.33 (s, 3H), 1.88–1.79 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 179.01, 140.6, 134.4, 130.7, 127.4, 126.6, 124.0, 54.7, 29.9, 29.5, 19.0; HRMS (ESI) for C₁₁H₁₄NO [M+H]⁺ calcd. 176.1070, found: 176.1075.

5-(4-Methoxyphenyl)pyrrolidin-2-one (4d)



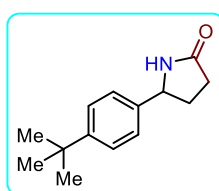
Purification by flash chromatography (ethyl acetate/Et₃N = 50/1).

White solid, 51% yield, mp = 122.3–124.3 °C; ¹H NMR (400

MHz, CDCl₃) δ (ppm) = 7.22–7.19 (m, 2H), 6.93 (s, 1H), 6.90–

6.86 (m, 2H), 4.69 (t, *J* = 6.8 Hz, 1H), 3.79 (s, 3H), 2.53–2.35 (m, 3H), 1.96–1.89 (m, 1H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 178.7, 159.2, 134.6, 126.9, 114.2, 57.7, 55.3, 31.4, 30.5; HRMS (ESI) for C₁₁H₁₄NO₂ [M+H]⁺ calcd. 192.1019, found: 192.1026.

5-(4-(*tert*-Butyl)phenyl)pyrrolidin-2-one (4e)



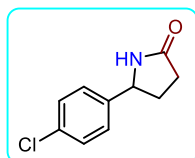
Purification by flash chromatography (ethyl acetate/Et₃N = 50/1).

White solid, 66% yield, mp = 155.9–157.9 °C; ¹H NMR (400

MHz, CDCl₃) δ (ppm) = 7.40–7.38 (m, 2H), 7.23 (d, *J* = 8.0 Hz,

2H), 7.02 (s, 1H), 4.73 (t, $J = 6.8$ Hz, 1H), 2.54–2.37 (m, 3H), 2.00–1.93 (m, 1H), 1.32 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3): δ (ppm) = 178.8, 150.8, 139.5, 125.8, 125.4, 57.9, 34.5, 31.3, 31.3, 30.5; HRMS (ESI) for $\text{C}_{14}\text{H}_{20}\text{NO}$ $[\text{M}+\text{H}]^+$ calcd. 218.1539, found: 218.1548.

5-(4-Chlorophenyl)pyrrolidin-2-one (4f)

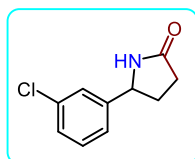


Purification by flash chromatography (ethyl acetate/ $\text{Et}_3\text{N} = 50/1$).

White solid, 36% yield, mp = 107.5–109.5 °C; ^1H NMR (400 MHz,

CDCl_3) δ (ppm) = 7.34–7.31 (m, 3H), 7.24–7.21 (m, 2H), 4.73 (t, $J = 7.2$ Hz, 1H), 2.59–2.51 (m, 1H), 2.44–2.33 (m, 2H), 1.94–1.85 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ (ppm) = 179.0, 141.1, 133.5, 129.0, 127.0, 57.6, 31.2, 30.3; HRMS (ESI) for $\text{C}_{10}\text{H}_{11}\text{ClNO}$ $[\text{M}+\text{H}]^+$ calcd. 196.0524, found: 196.0532.

5-(3-Chlorophenyl)pyrrolidin-2-one (4g)

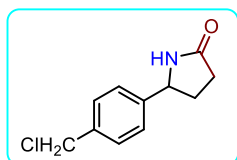


Purification by flash chromatography (ethyl acetate/ $\text{Et}_3\text{N} = 50/1$).

white solid, 52% yield, mp = 117.0–119.0 °C; ^1H NMR (400 MHz,

CDCl_3) δ (ppm) = 7.54 (s, 1H), 7.31–7.23 (m, 3H), 7.19–7.16 (m, 1H), 4.72 (t, $J = 6.8$ Hz, 1H), 2.59–2.50 (m, 1H), 2.46–2.31 (m, 2H), 1.95–1.86 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ (ppm) = 179.1, 144.9, 134.7, 130.2, 127.9, 125.8, 123.8, 57.6, 31.0, 30.2; HRMS (ESI) for $\text{C}_{10}\text{H}_{11}\text{ClNO}$ $[\text{M}+\text{H}]^+$ calcd. 196.0524, found: 196.0532.

5-(4-(Chloromethyl)phenyl)pyrrolidin-2-one (4h)

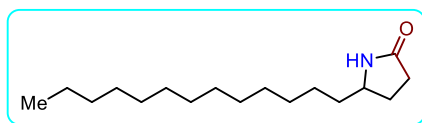


Purification by flash chromatography (ethyl acetate/ $\text{Et}_3\text{N} = 50/1$).

white solid, 50% yield, mp = 148.7–150.7 °C; ^1H NMR (400

MHz, CDCl_3) δ (ppm) = 7.39 (d, $J = 8.0$ Hz, 2H), 7.30–7.28 (m, 2H), 7.18 (s, 1H), 4.75 (t, $J = 7.2$ Hz, 1H), 4.57 (s, 2H), 2.59–2.50 (m, 1H), 2.47–2.33 (m, 2H), 1.96–1.87 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ (ppm) = 179.0, 143.0, 137.1, 129.1, 126.0, 57.8, 45.8, 31.2, 30.3; HRMS (ESI) for $\text{C}_{11}\text{H}_{13}\text{ClNO}$ $[\text{M}+\text{H}]^+$ calcd. 210.0680, found: 210.0692.

5-Tridecylpyrrolidin-2-one (4i)

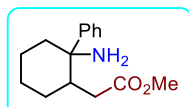


Purification by flash chromatography (ethyl acetate/Et₃N = 50/1). White solid, 24% yield, mp

= 72.9–74.9 °C; ¹H NMR (400 MHz, CDCl₃): δ

(ppm) = 6.41 (d, *J* = 26.4 Hz, 1H), 3.66–3.59 (m, 1H), 2.39–2.20 (m, 3H), 2.05–1.99 (m, 1H), 1.75–1.65 (m, 1H), 1.56–1.37 (m, 3H), 1.30–1.26 (m, 20H), 0.88 (t, *J* = 6.8 Hz, 3H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 178.3, 54.6, 36.8, 31.9, 30.2, 29.7, 29.7, 29.6, 29.6, 29.5, 29.4, 27.3, 25.9, 22.7, 14.1; HRMS (ESI) for C₁₇H₃₄NO [M+H]⁺ calcd. 268.2635, found: 268.2644.

Methyl 2-(2-amino-2-phenylcyclohexyl)acetate (5a)

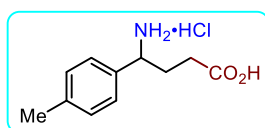


Purification by flash chromatography (ethyl acetate/Et₃N = 50/1).

Colorless oil, 38% yield, 7:1 dr; ¹H NMR (400 MHz, CDCl₃) δ

(ppm) 7.46 (d, *J* = 8.0 Hz, 2H), 7.33 (t, *J* = 7.6 Hz, 2H), 7.22 (t, *J* = 7.2 Hz, 1H), 3.52 (s, 3H), 2.48–2.45 (m, 1H), 2.27–2.20 (m, 1H), 2.18–1.97 (m, 5H), 1.86 (dd, *J* = 15.2, 3.2 Hz, 1H), 1.78–1.70 (m, 3H), 1.57–1.50 (m, 2H); ¹³C NMR (100 MHz, CDCl₃) δ (ppm) = 173.6, 148.4, 128.4, 126.7, 125.6, 55.7, 51.4, 42.0, 34.6, 32.5, 25.3, 21.5, 20.0; HRMS (ESI) for C₁₅H₂₁NO₂Na [M+Na]⁺ calcd. 270.1465, found: 270.1470.

3-Carboxy-1-(p-tolyl)propan-1-aminium chloride (6b)



Yellow solid, 70% yield, mp = 262.9–264.9 °C; ¹H NMR (400

MHz, D₂O) δ (ppm) = 7.20–7.15 (m, 4H), 4.24–4.21 (m, 1H),

2.21–2.06 (m, 7H); ¹³C NMR (100 MHz, D₂O) δ (ppm) =

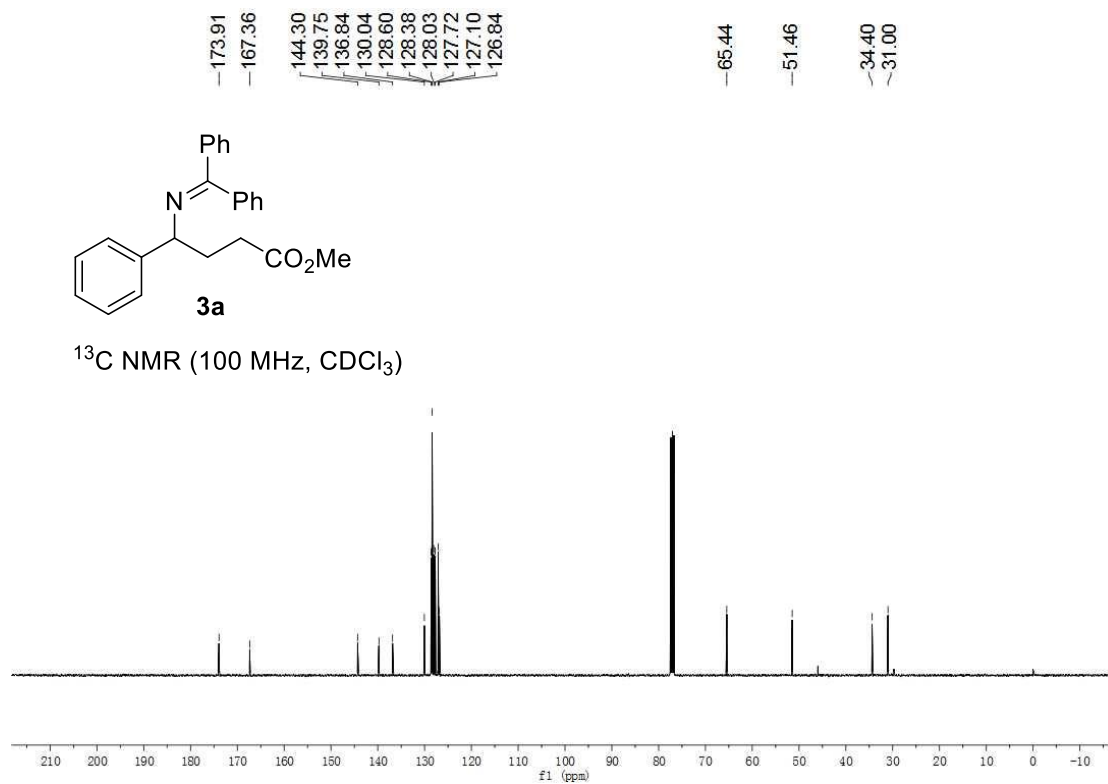
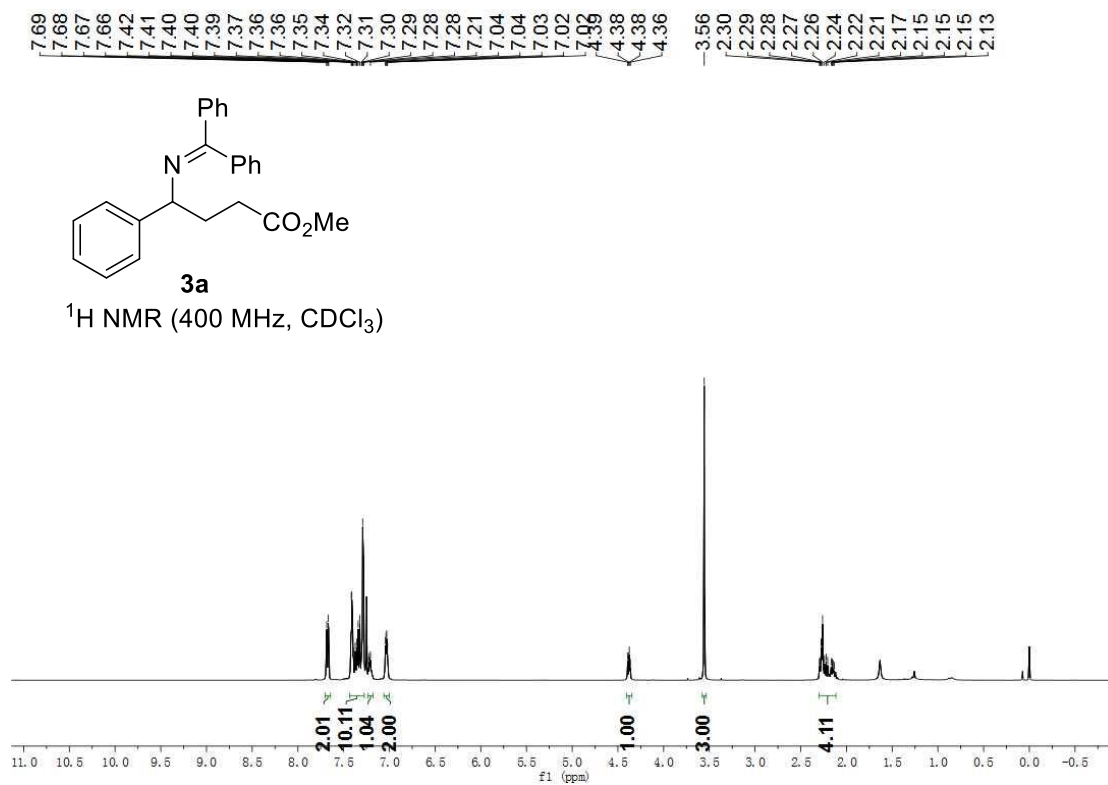
176.5, 139.9, 132.0, 129.9, 127.3, 54.4, 29.9, 28.4, 20.3; ESI-HRMS: calcd. for C₁₁H₁₄NO₂⁻: 192.1025, found: 192.1026.

6. References

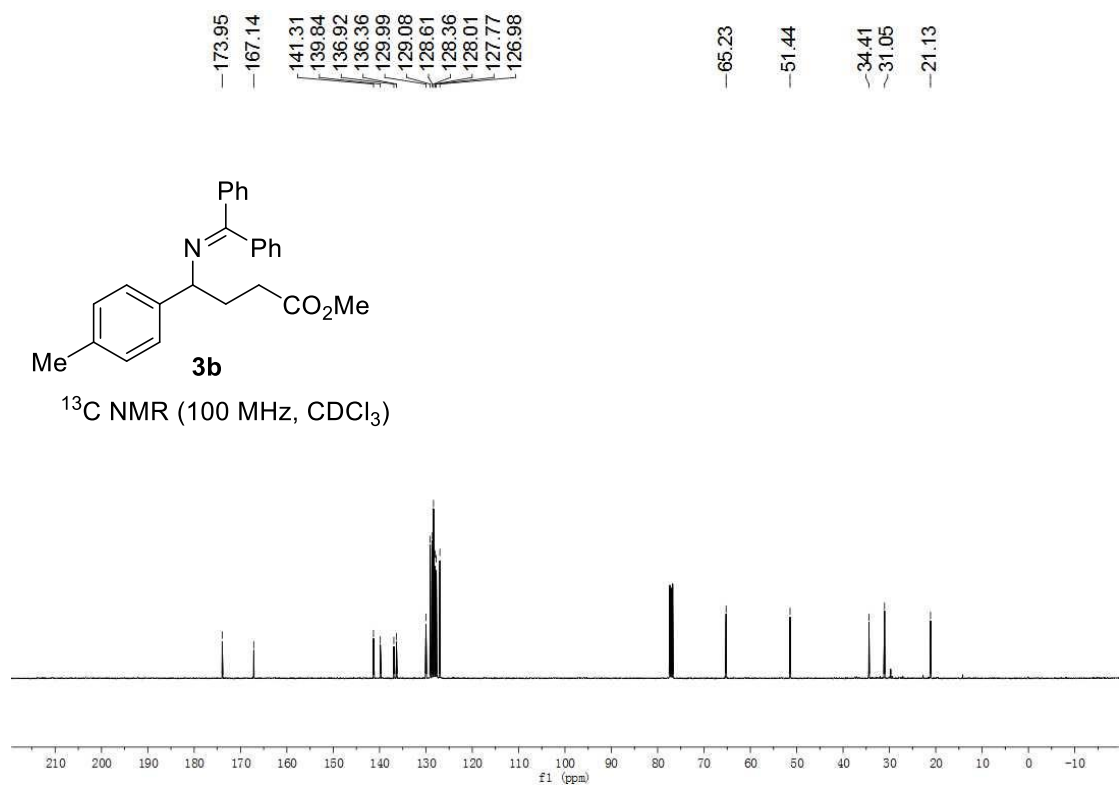
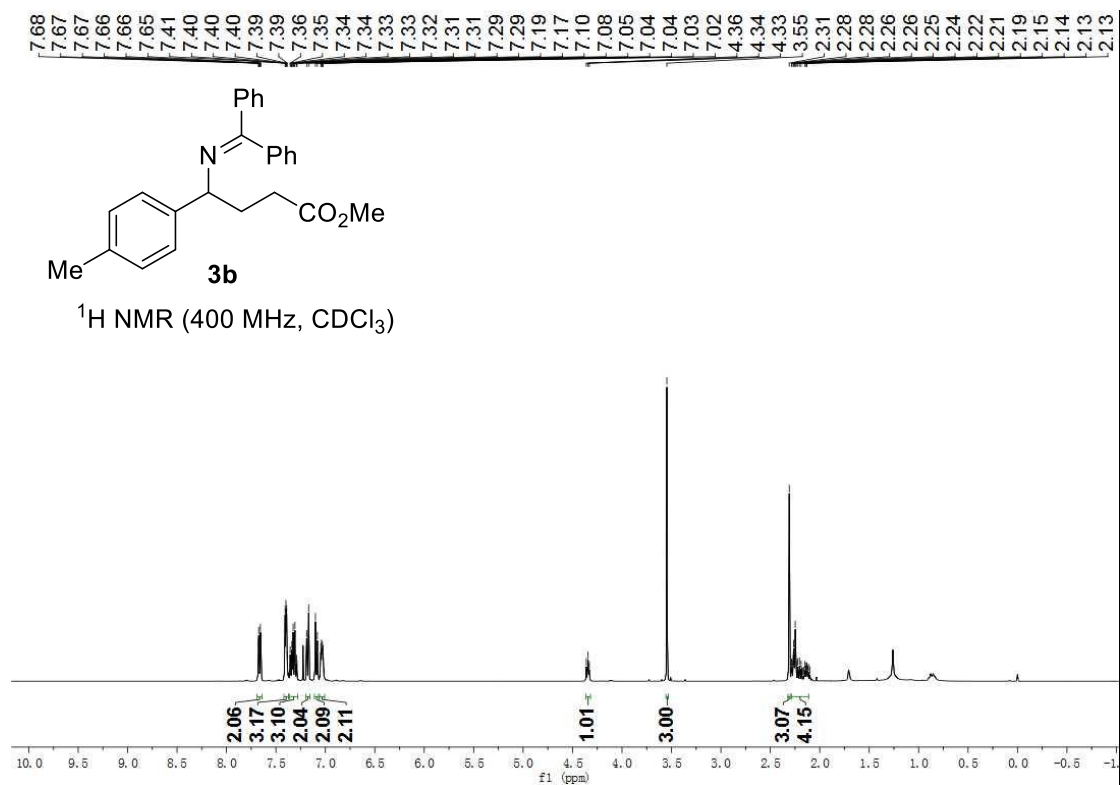
1 T. Patra, M. Das, C. G. Daniliuc, F. Glorius, *Nat. Catal.* **2021**, *4*, 54–61.

7. NMR spectra of compounds

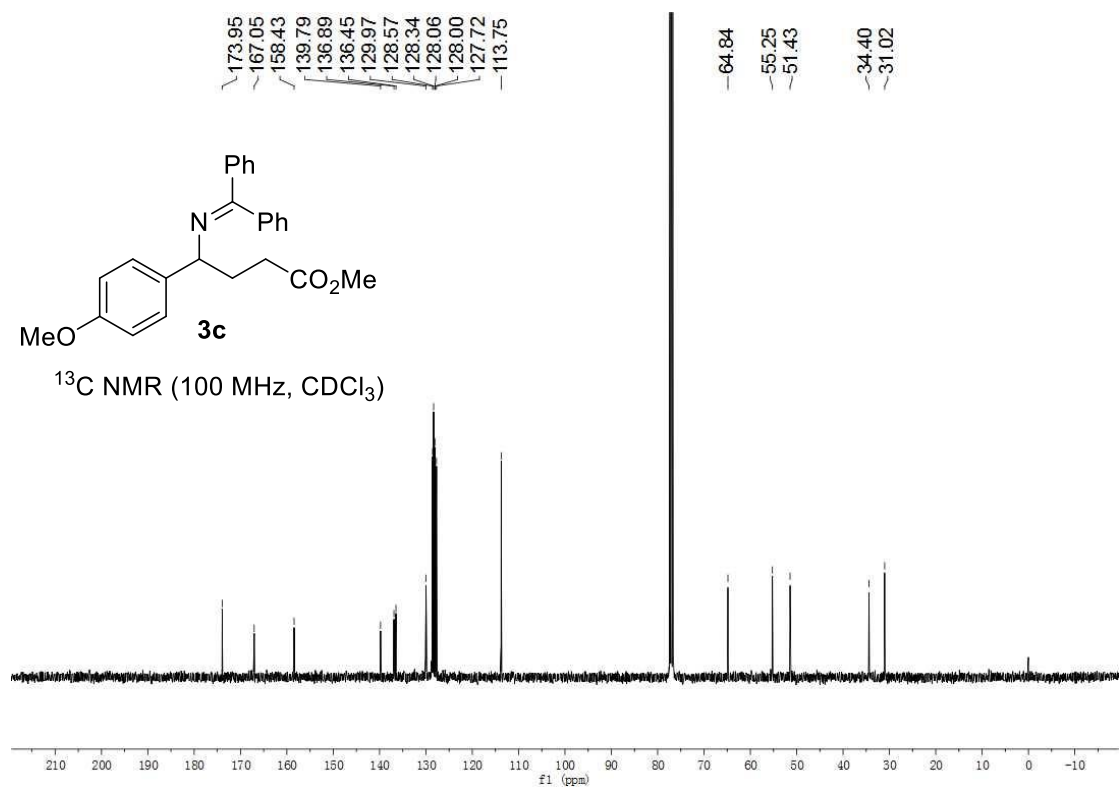
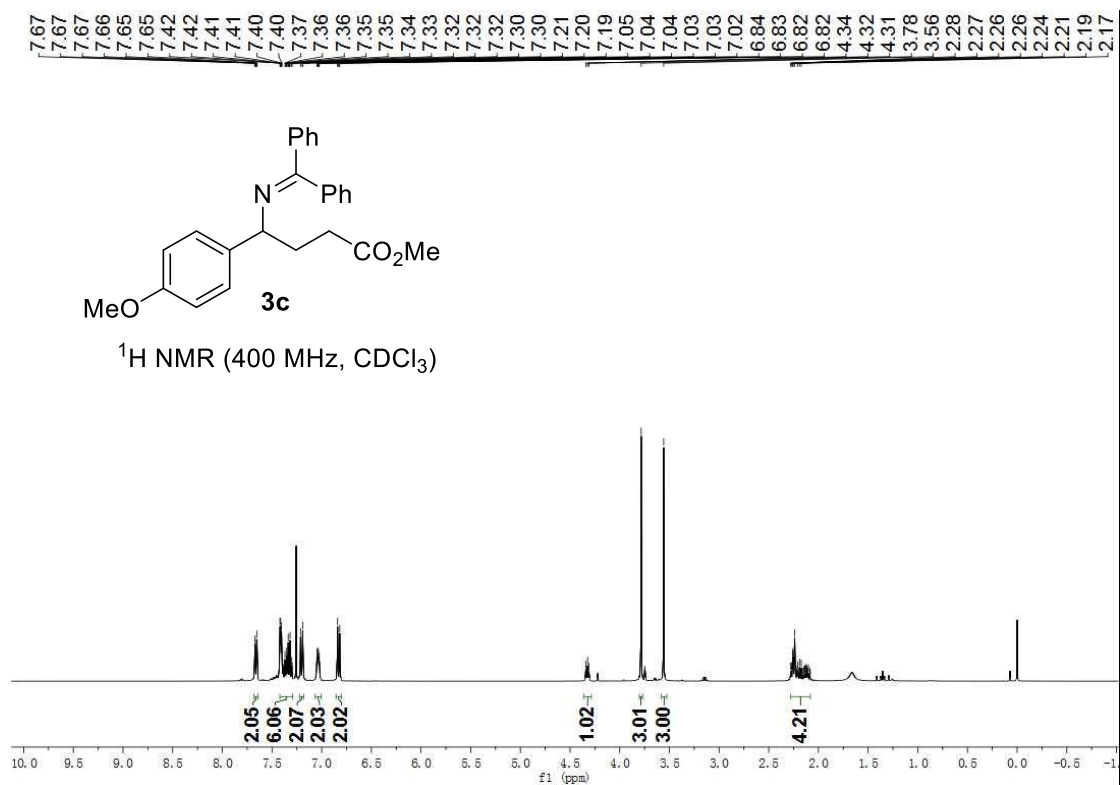
Methyl 4-((diphenylmethylene)amino)-4-phenylbutanoate (3a)



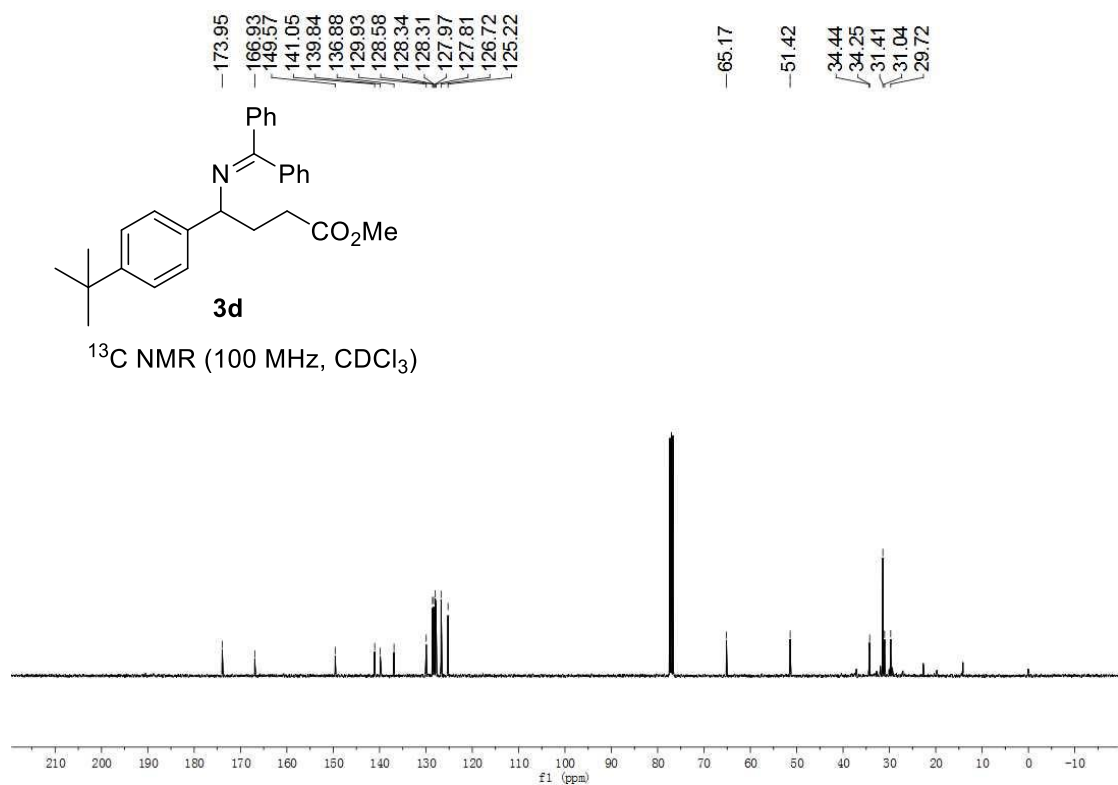
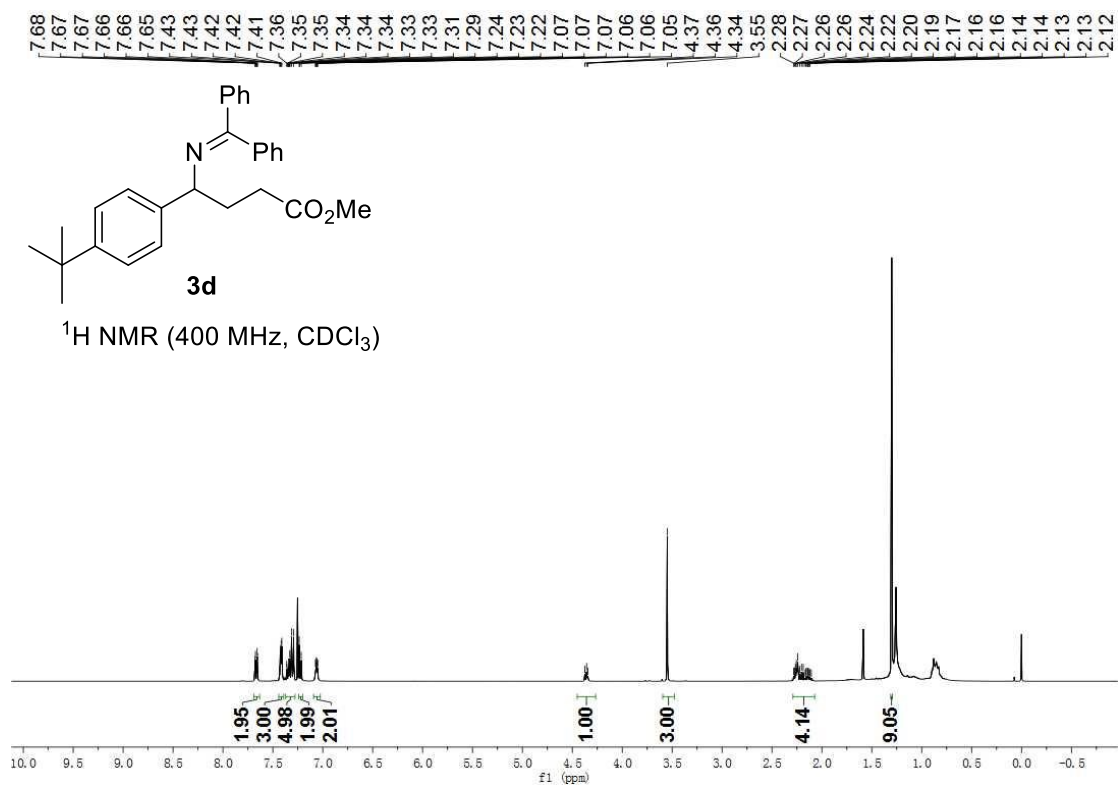
Methyl 4-((diphenylmethylene)amino)-4-(p-tolyl)butanoate (3b)



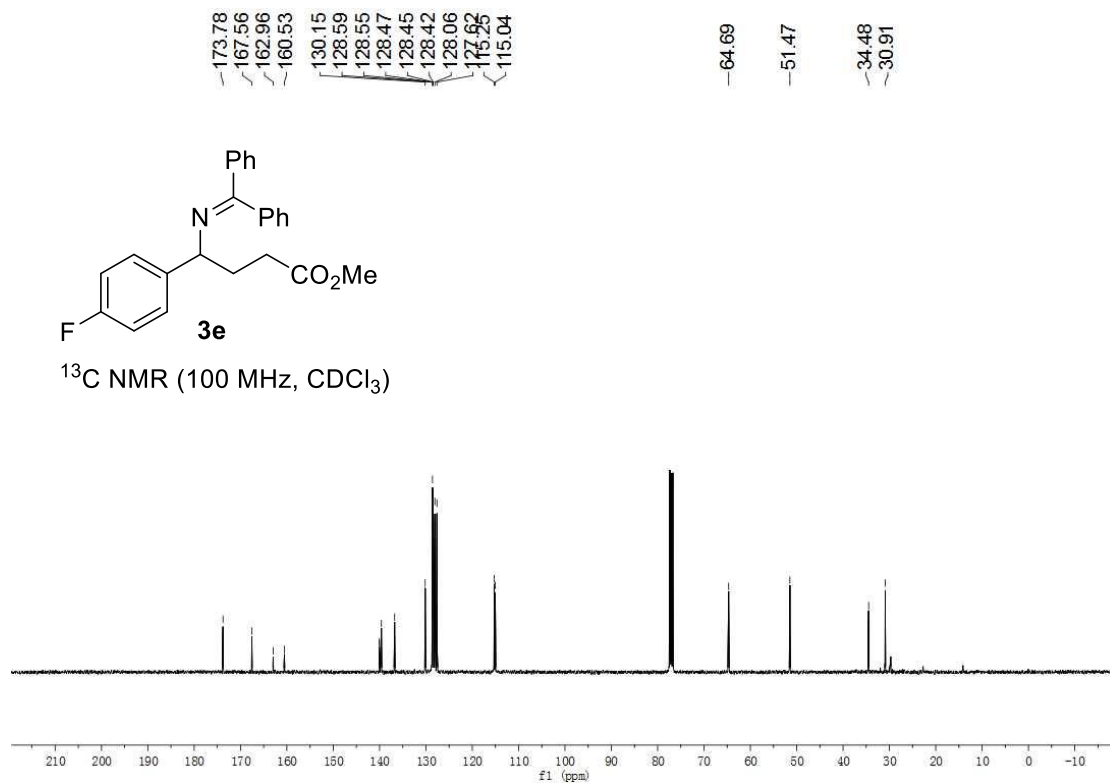
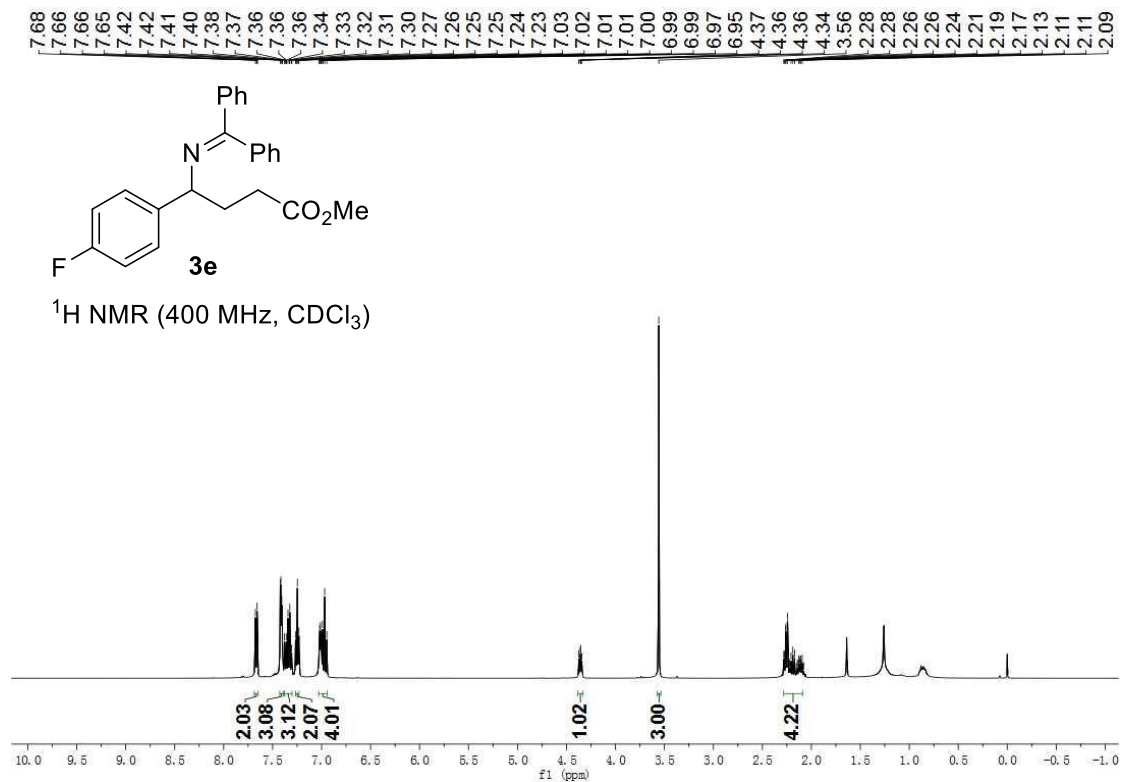
Methyl 4-((diphenylmethylene)amino)-4-(4-methoxyphenyl)butanoate (3c)



Methyl 4-(4-(tert-butyl)phenyl)-4-((diphenylmethylene)amino)butanoate (3d)

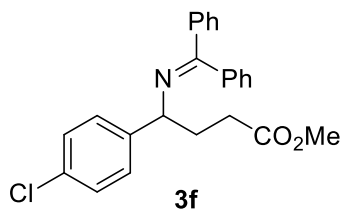


Methyl 4-((diphenylmethylene)amino)-4-(4-fluorophenyl)butanoate (3e)

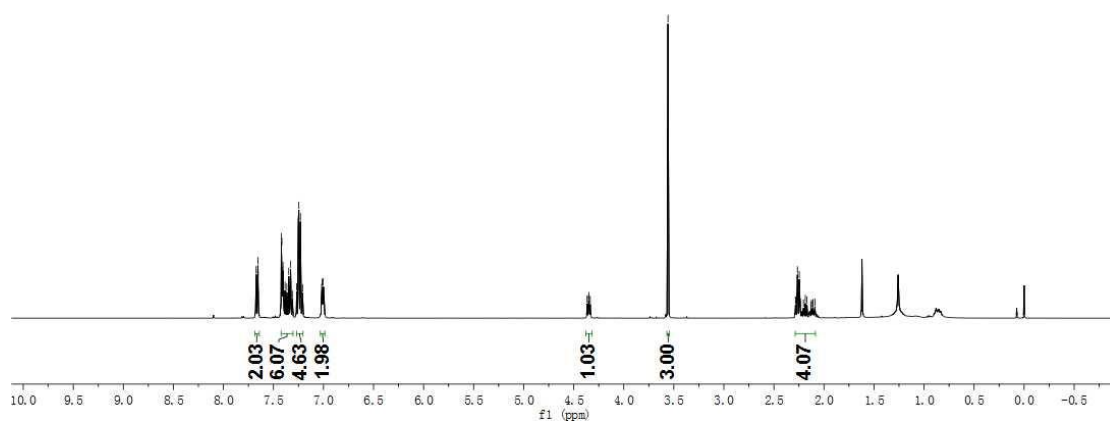


Methyl 4-(4-chlorophenyl)-4-((diphenylmethylene)amino)butanoate (3f)

7.68
7.67
7.67
7.66
7.66
7.65
7.42
7.42
7.41
7.40
7.40
7.40
7.38
7.37
7.37
7.36
7.35
7.34
7.34
7.33
7.33
7.31
7.31
7.27
7.26
7.25
7.25
7.24
7.23
7.22
7.21
7.21
7.02
7.01
7.00
7.00
6.99
4.37
4.35
4.35
4.33
3.56
2.28
2.28
2.26
2.25
2.24
2.19
2.17
2.11
2.09



¹H NMR (400 MHz, CDCl₃)



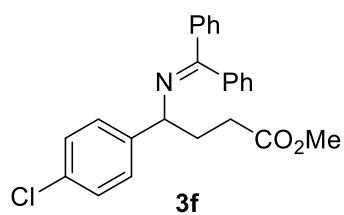
173.72
167.84
142.83
139.54
136.68
132.46
130.20
128.60
128.52
128.49
128.44
128.42
128.07
127.59

64.71

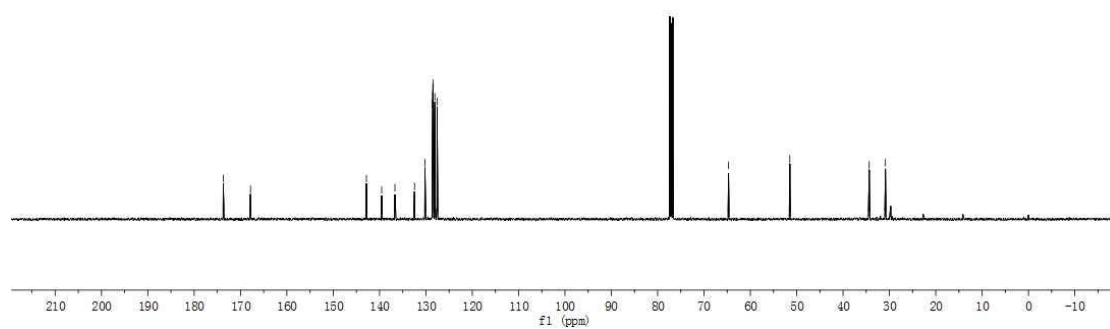
51.49

34.35

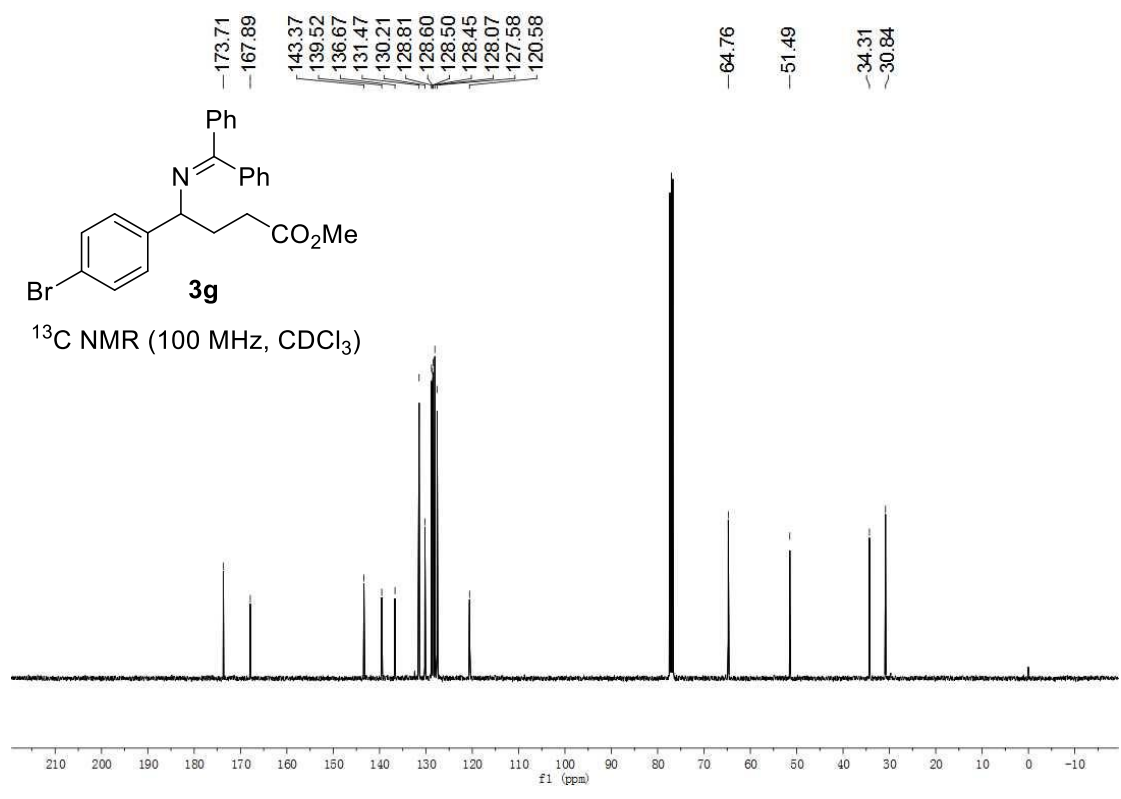
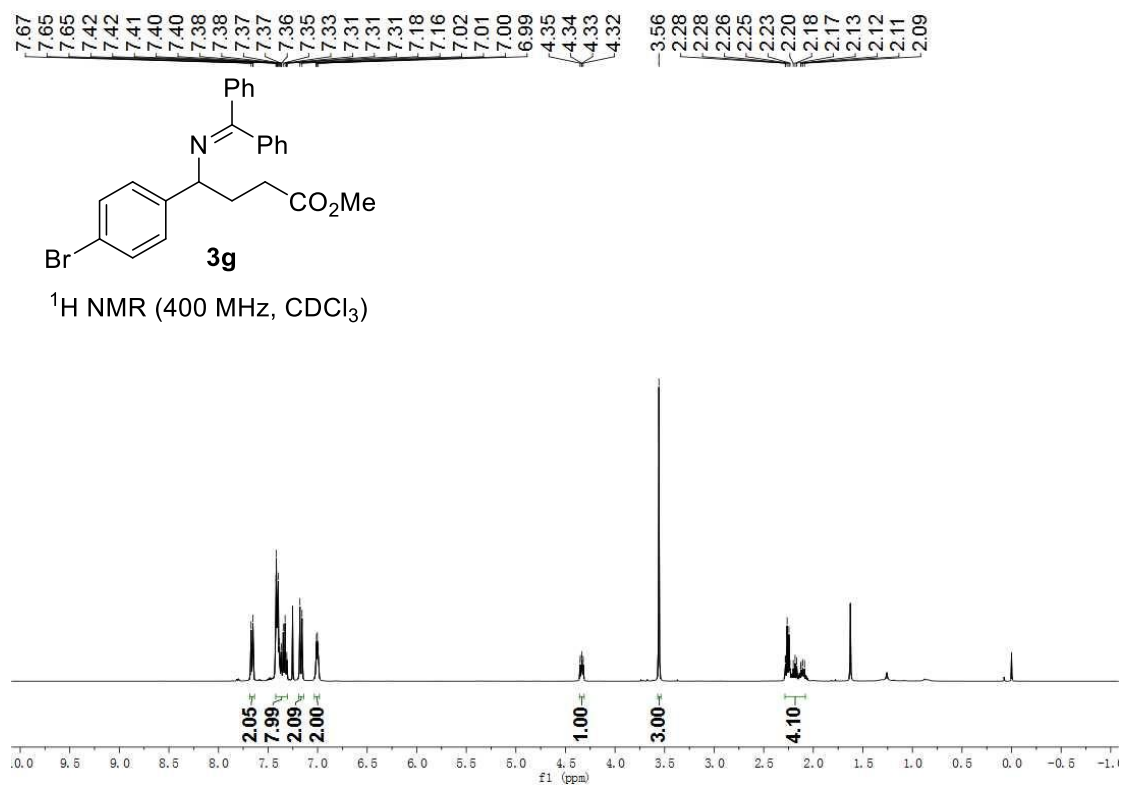
30.85



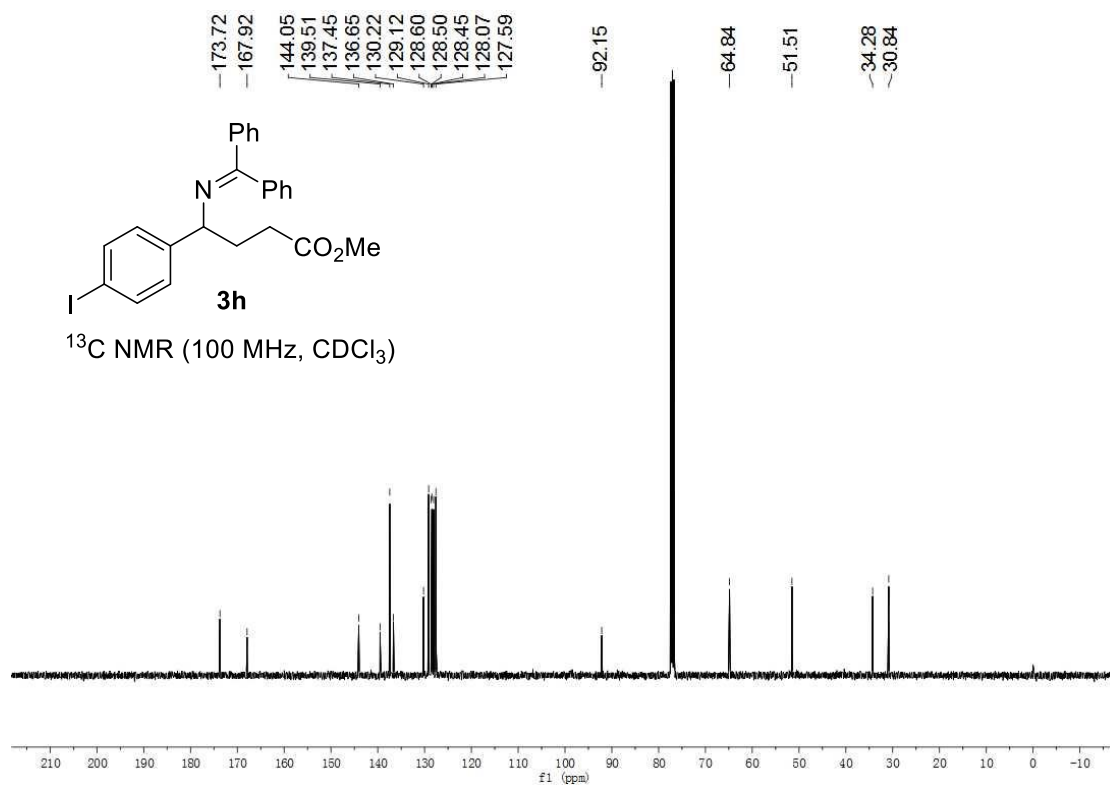
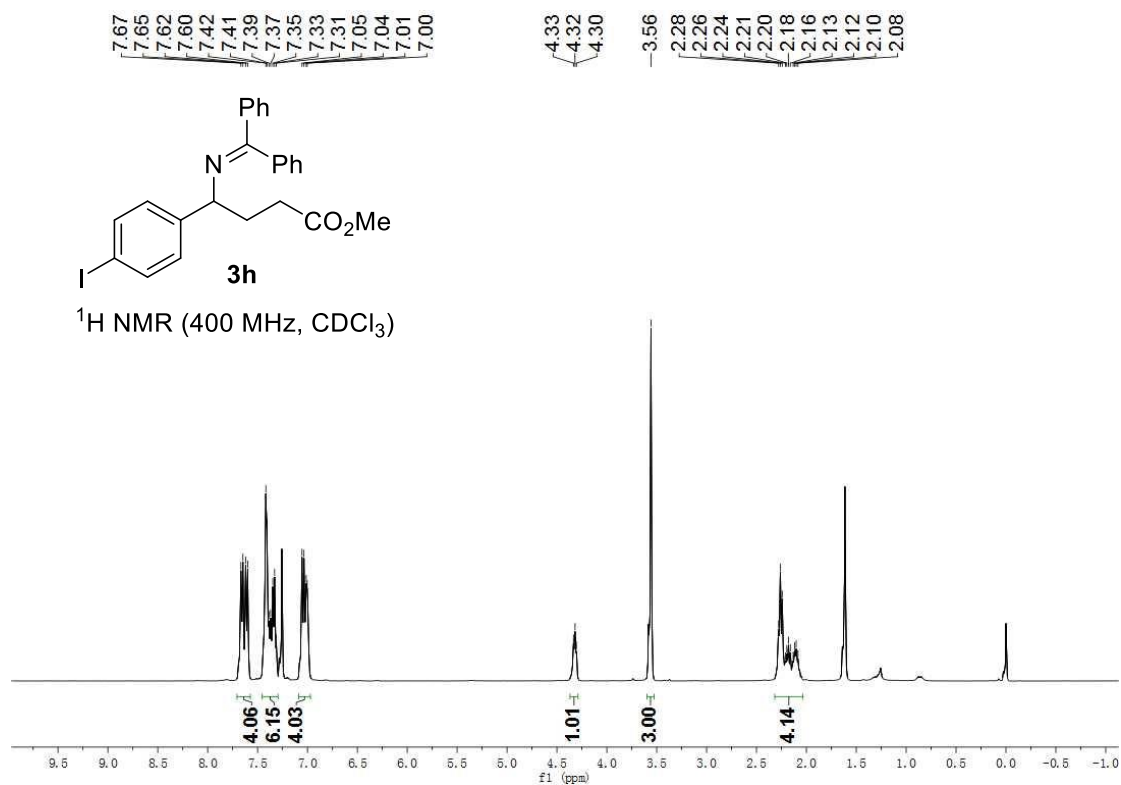
¹³C NMR (100 MHz, CDCl₃)



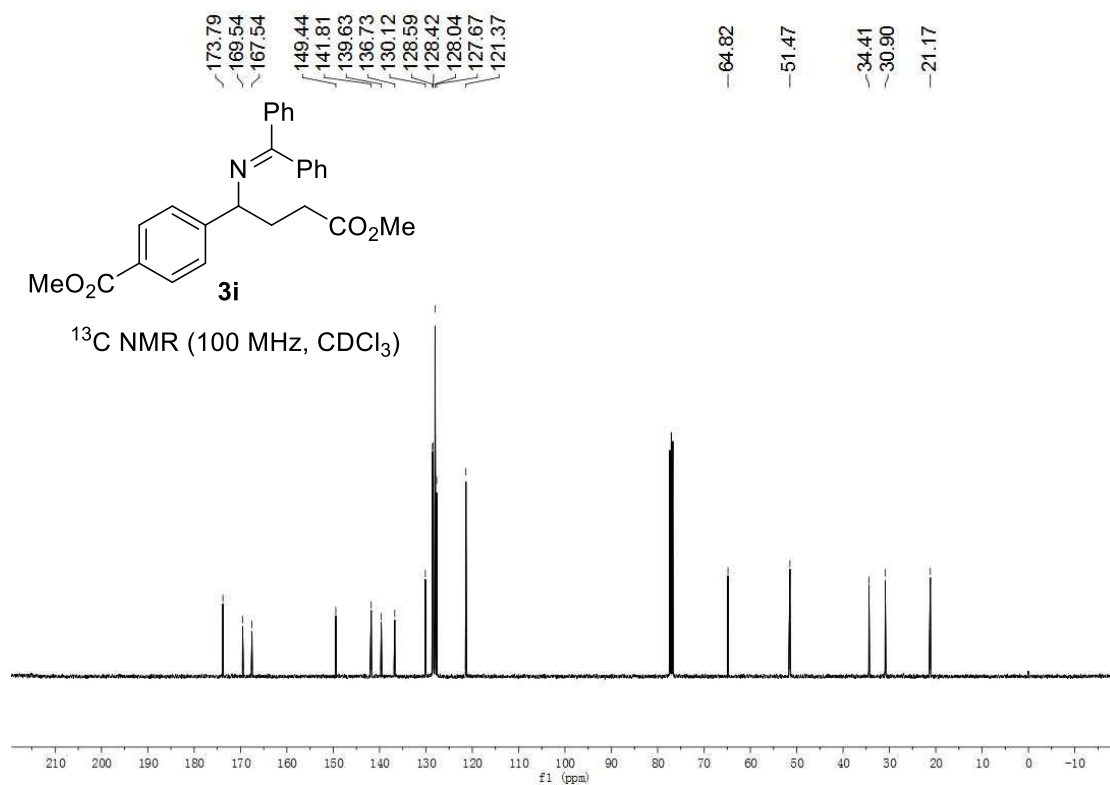
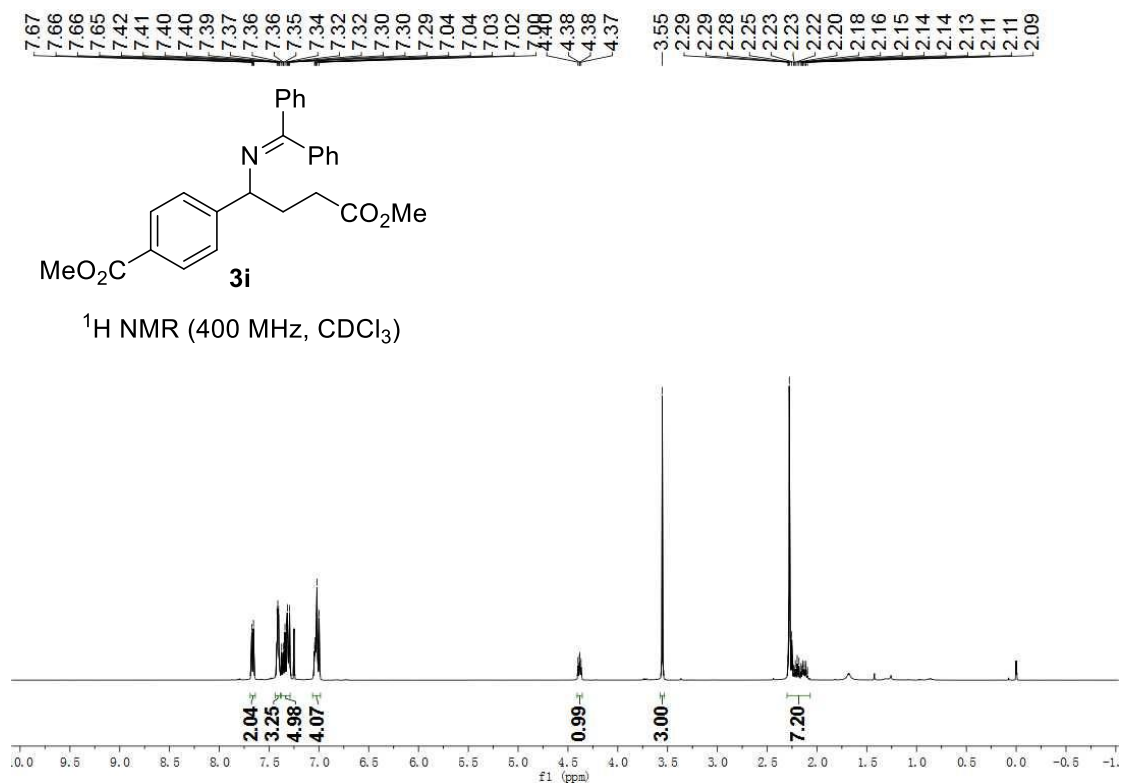
Methyl 4-(4-bromophenyl)-4-((diphenylmethylene)amino)butanoate (3g)



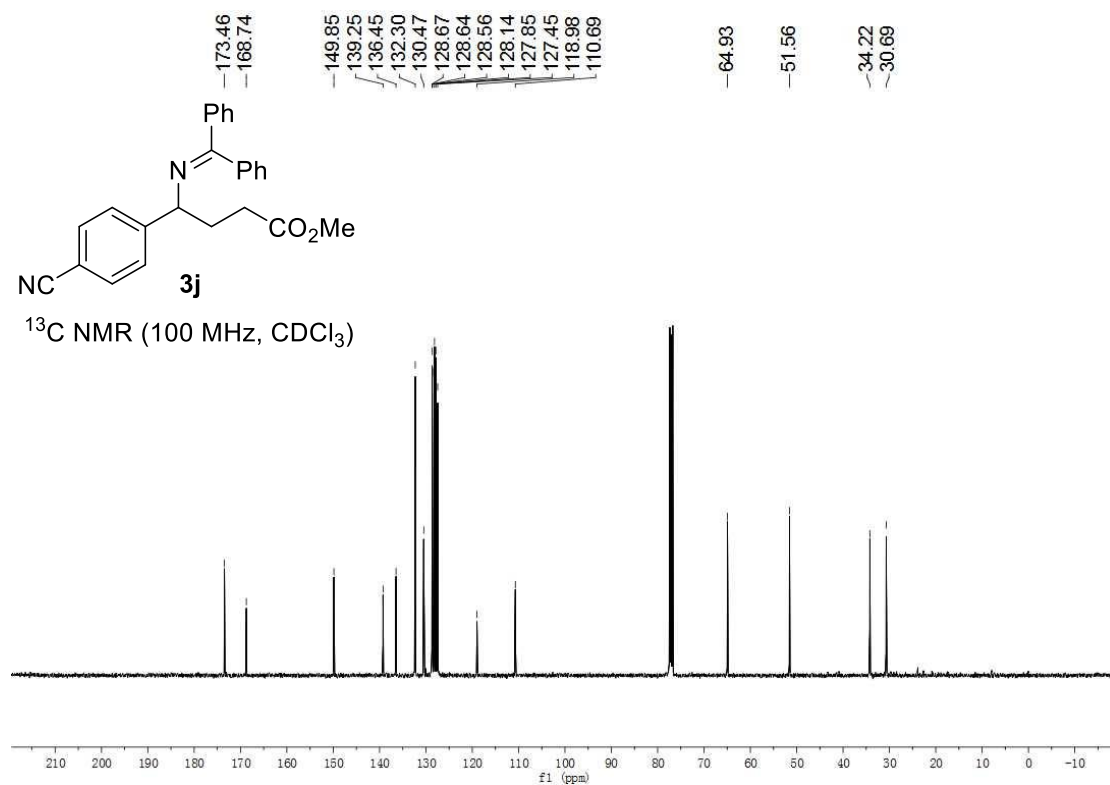
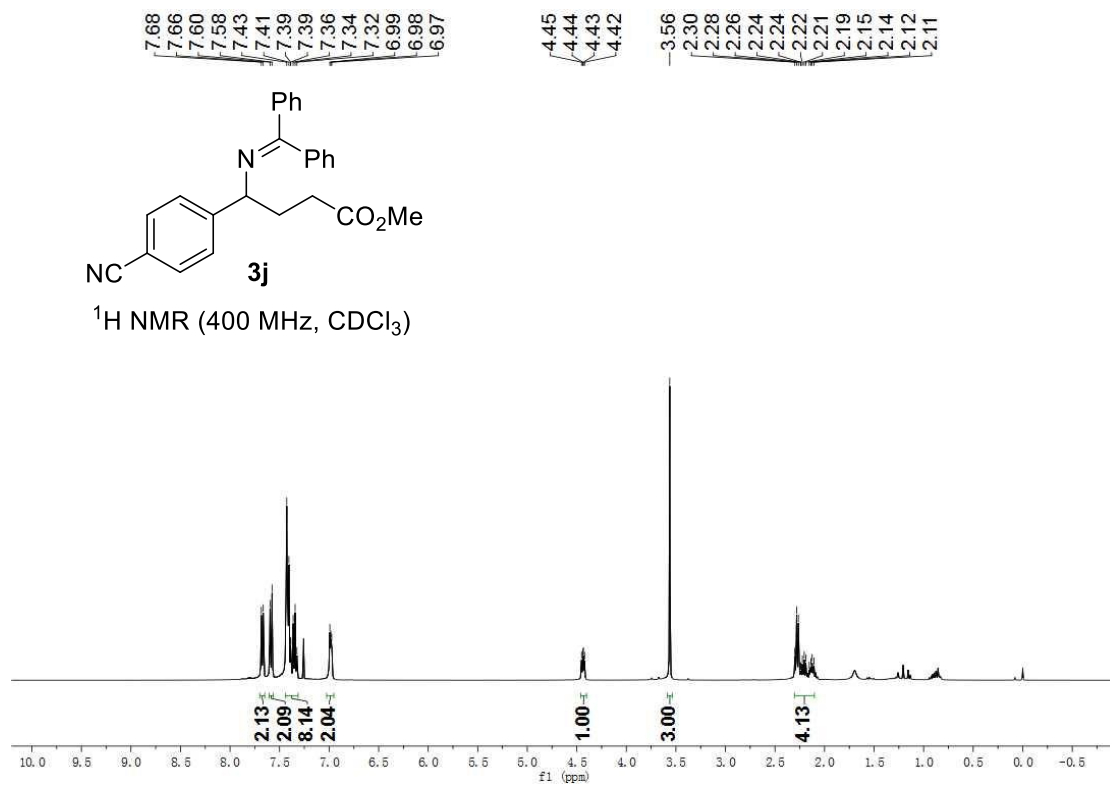
Methyl 4-((diphenylmethylene)amino)-4-(4-iodophenyl)butanoate (3h)



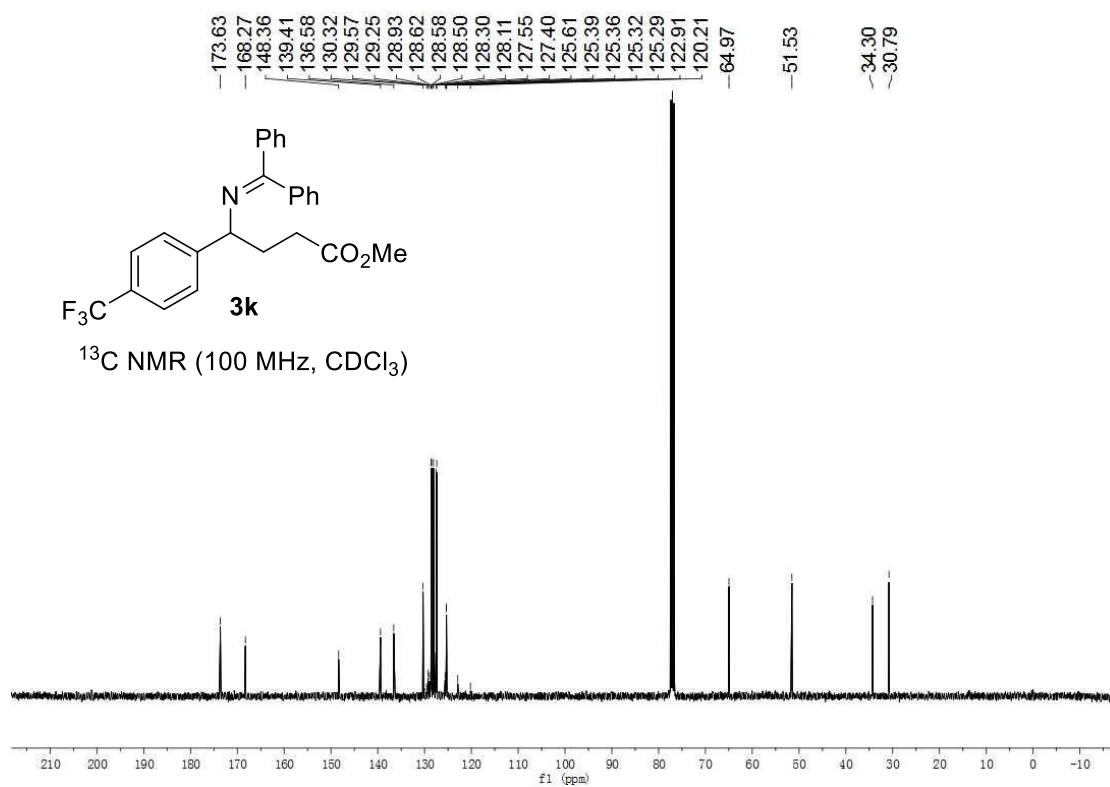
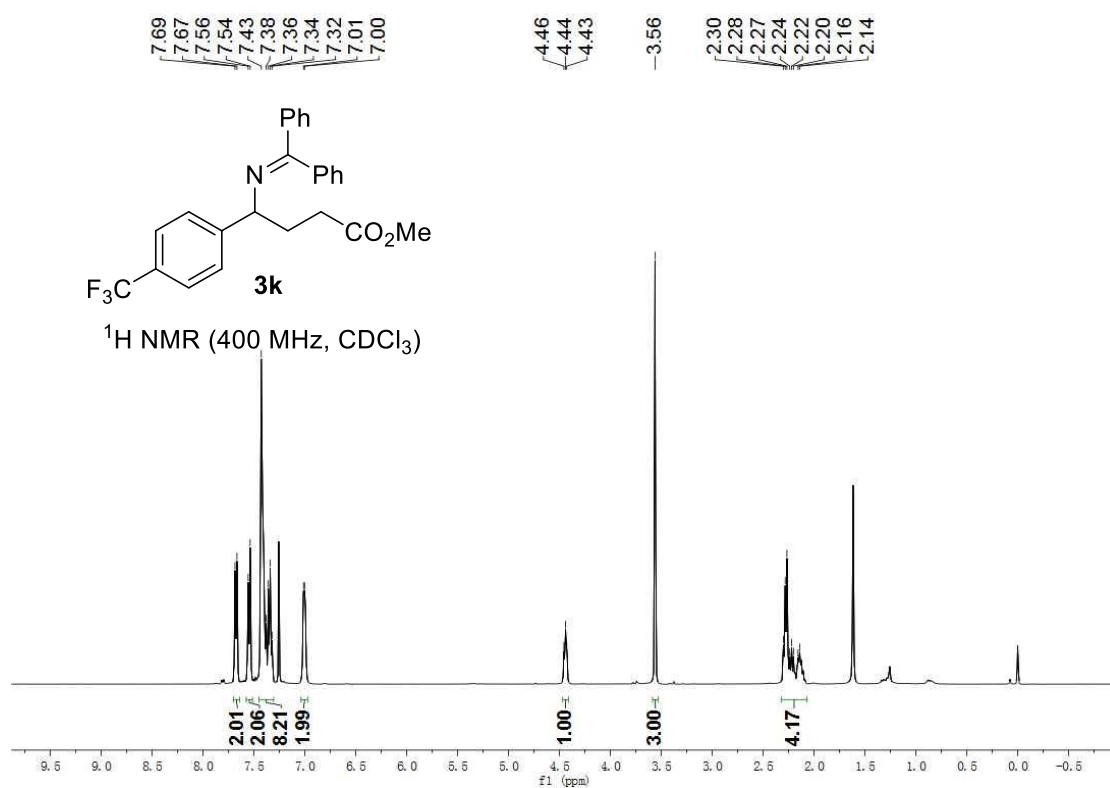
Methyl 4-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobutyl)benzoate (3i)



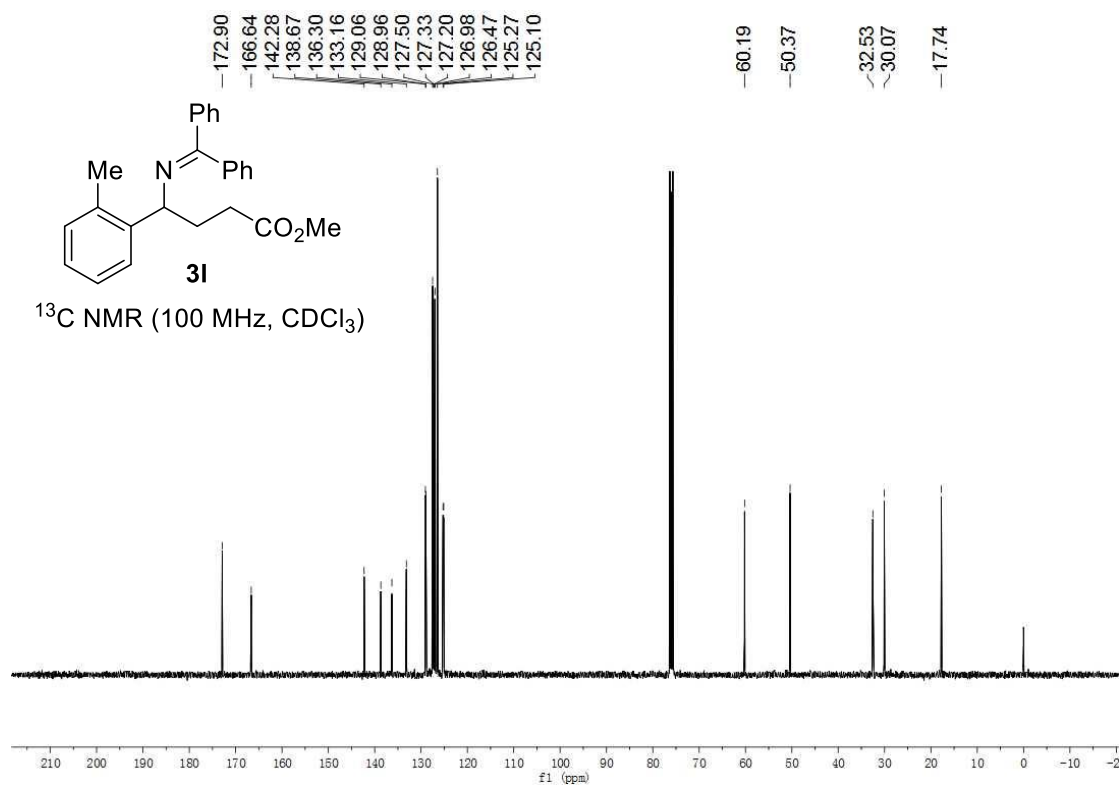
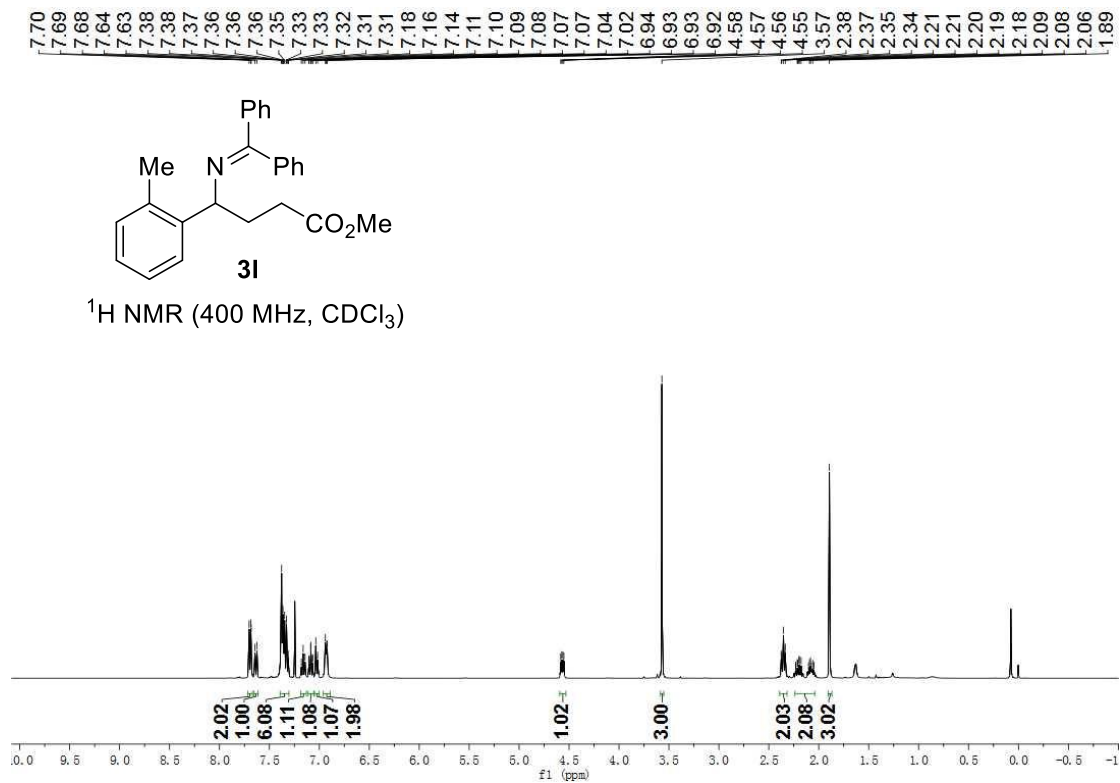
Methyl 4-(4-cyanophenyl)-4-((diphenylmethylene)amino)butanoate (3j)



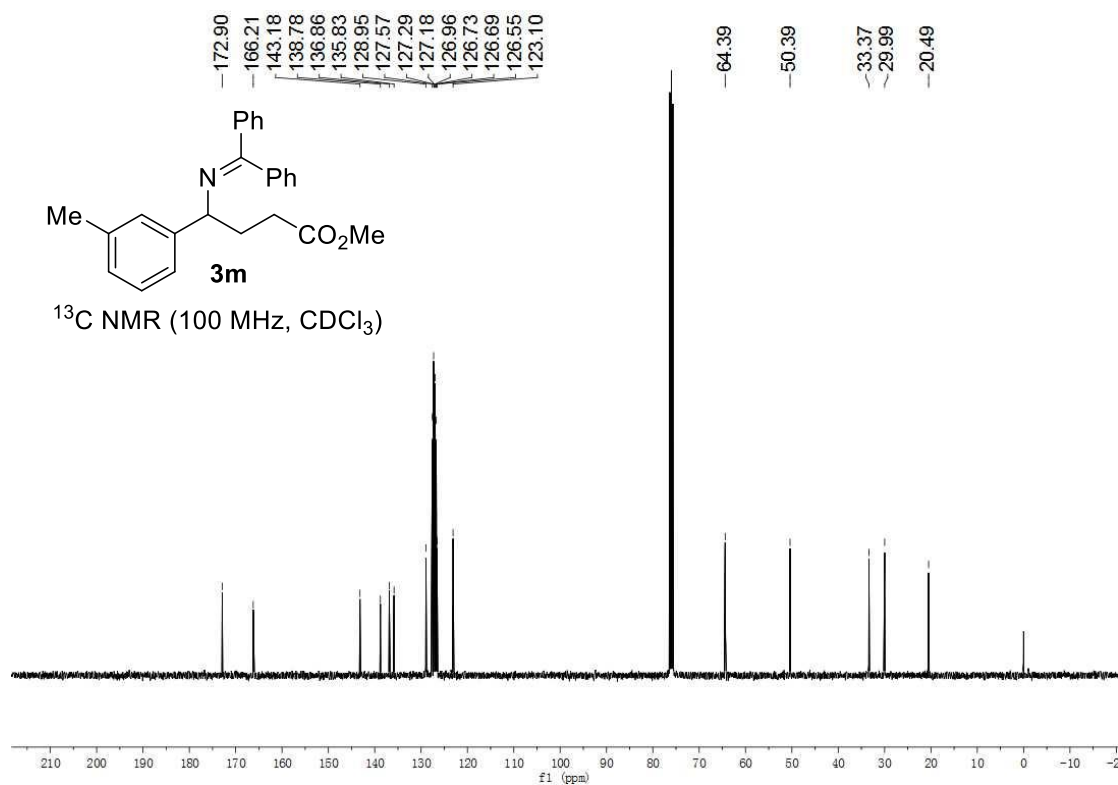
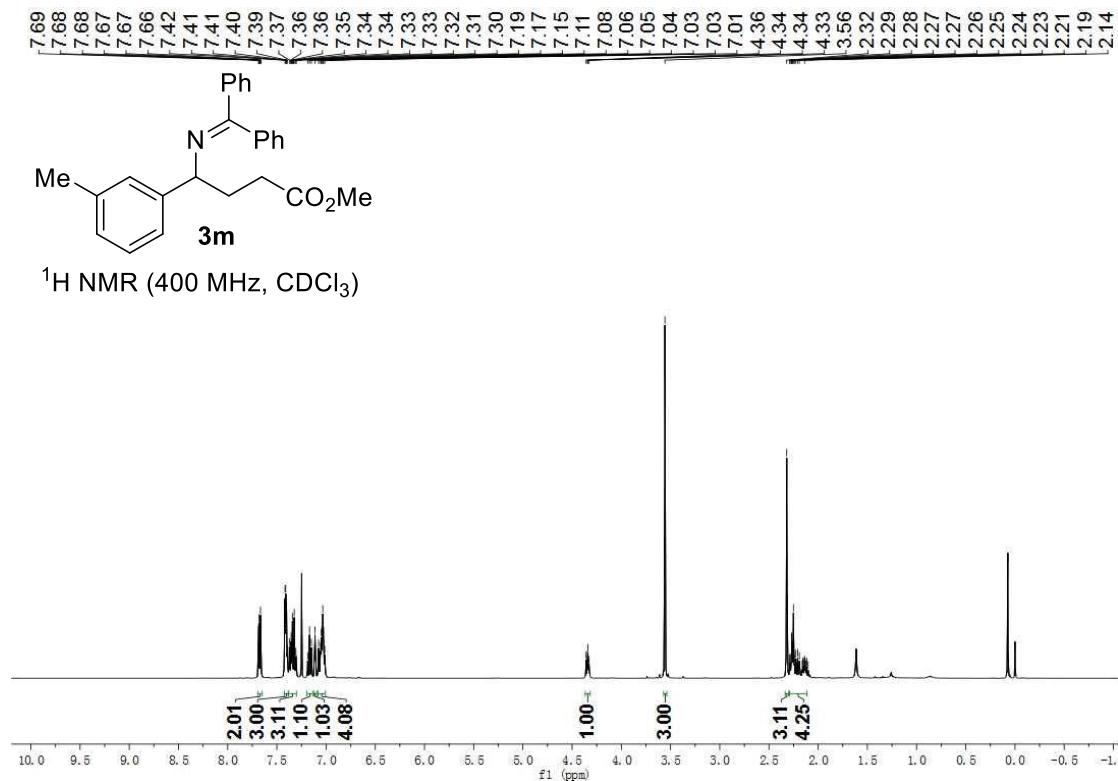
Methyl 4-((diphenylmethylene)amino)-4-(4-(trifluoromethyl)phenyl)butanoate (3k)



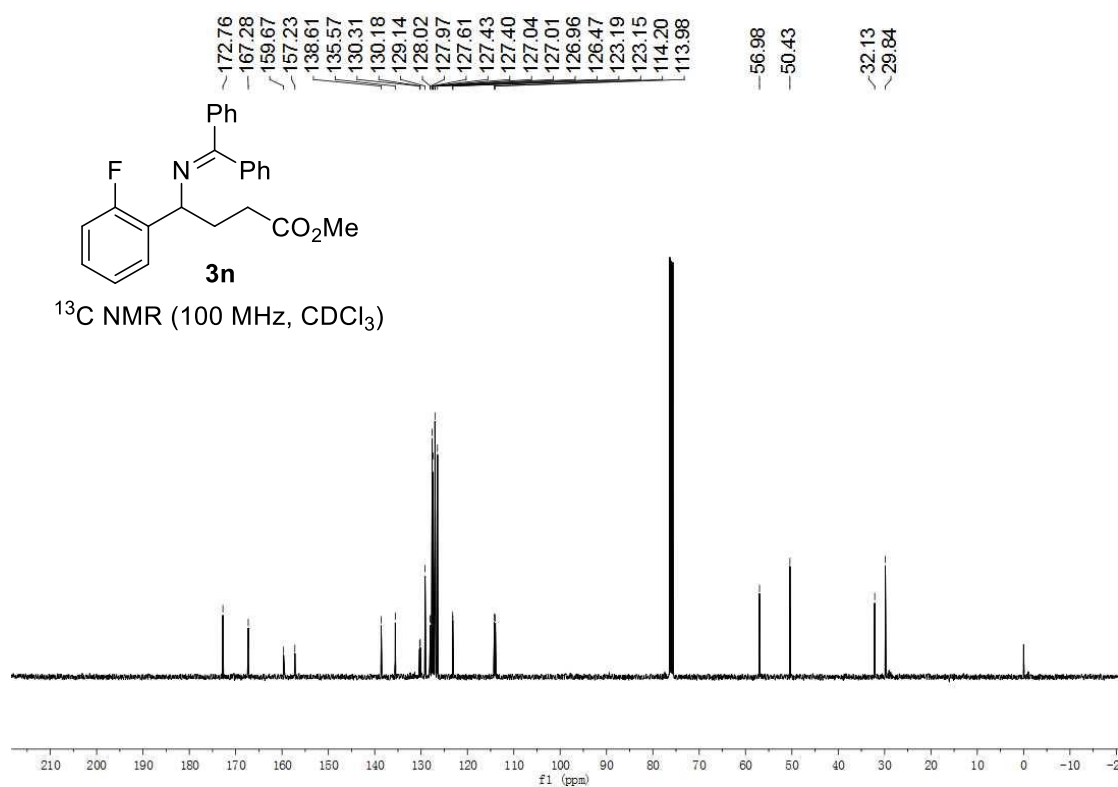
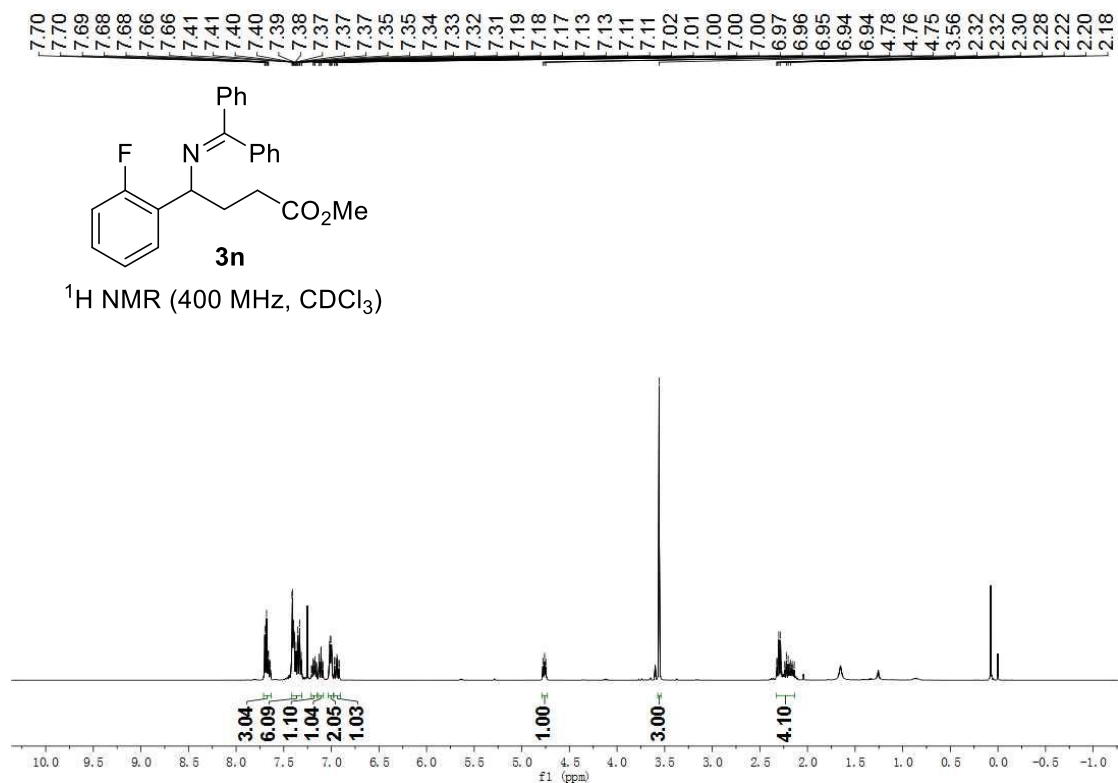
Methyl 4-((diphenylmethylene)amino)-4-(o-tolyl)butanoate (3I)



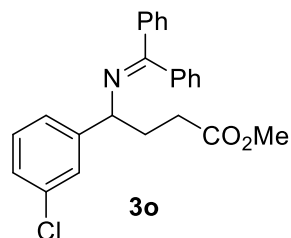
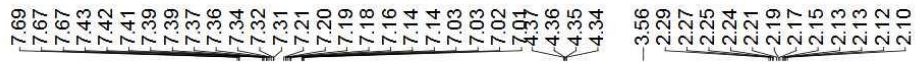
Methyl 4-((diphenylmethylene)amino)-4-(m-tolyl)butanoate (3m)



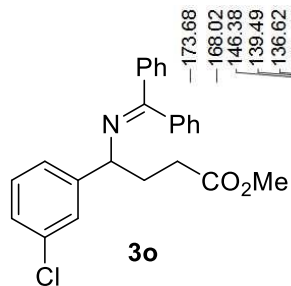
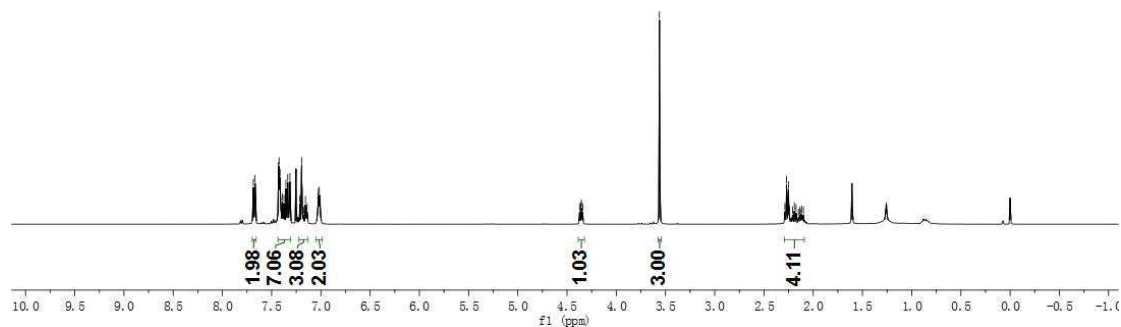
Methyl 4-((diphenylmethylene)amino)-4-(2-fluorophenyl)butanoate (3n)



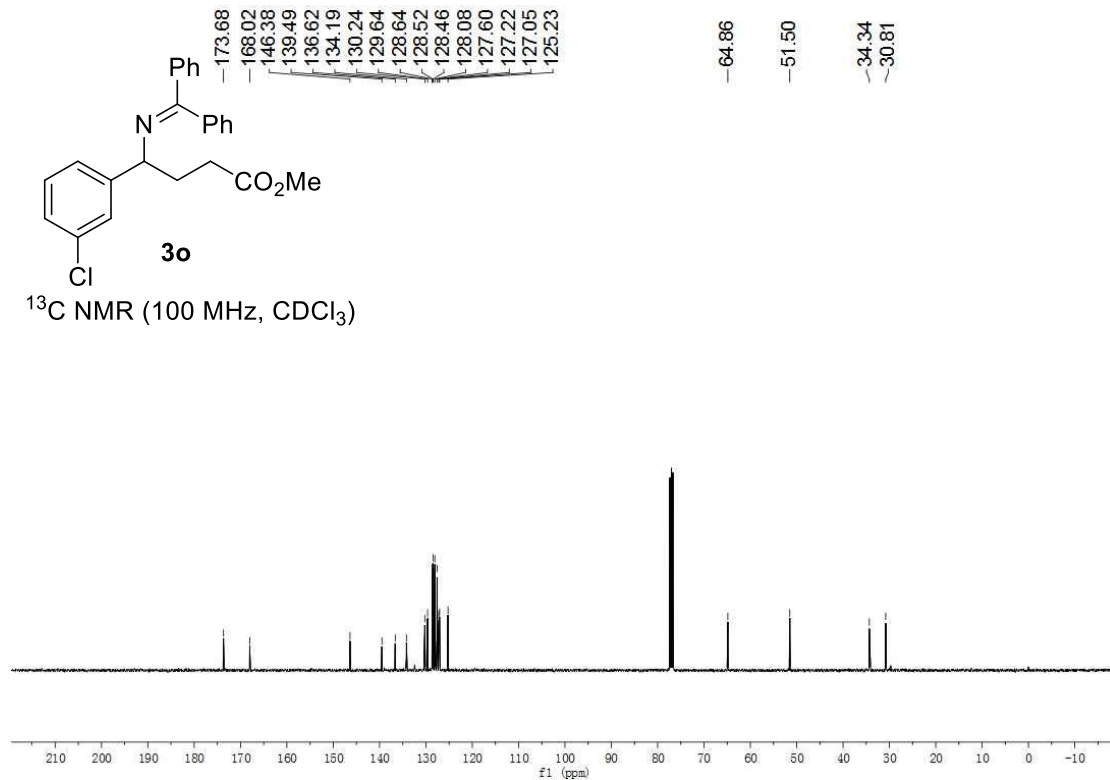
Methyl 4-(3-chlorophenyl)-4-((diphenylmethylene)amino)butanoate (3o)



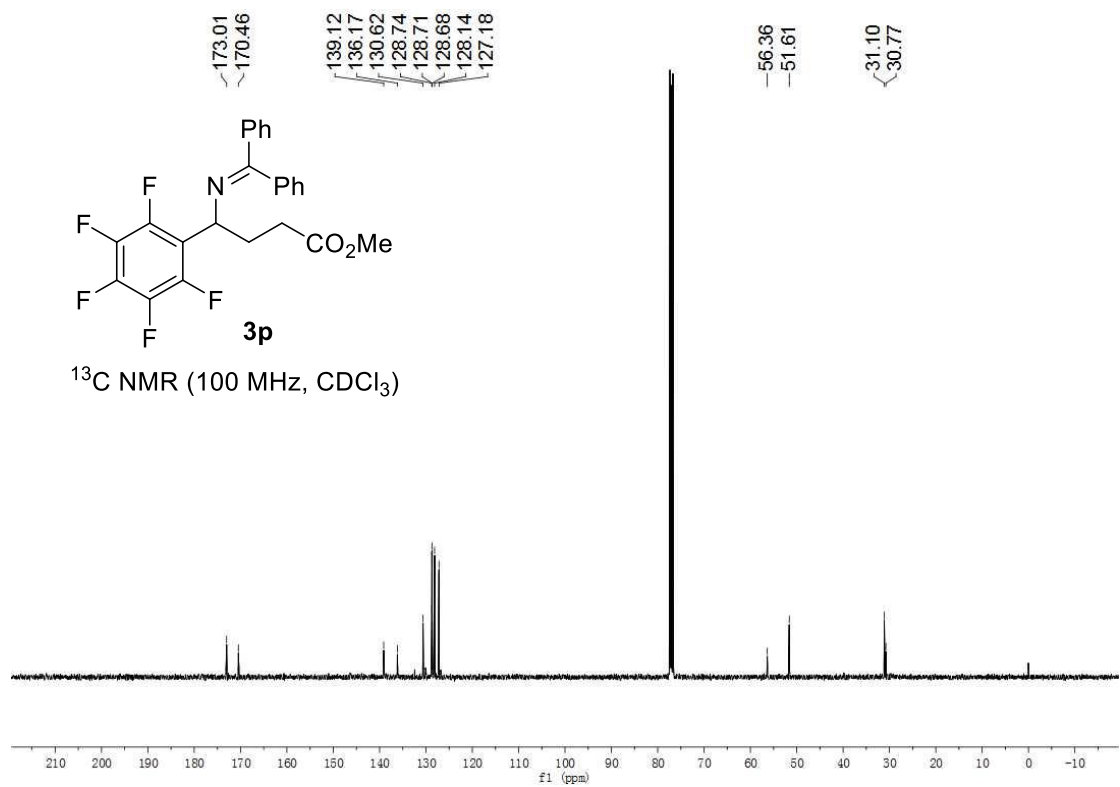
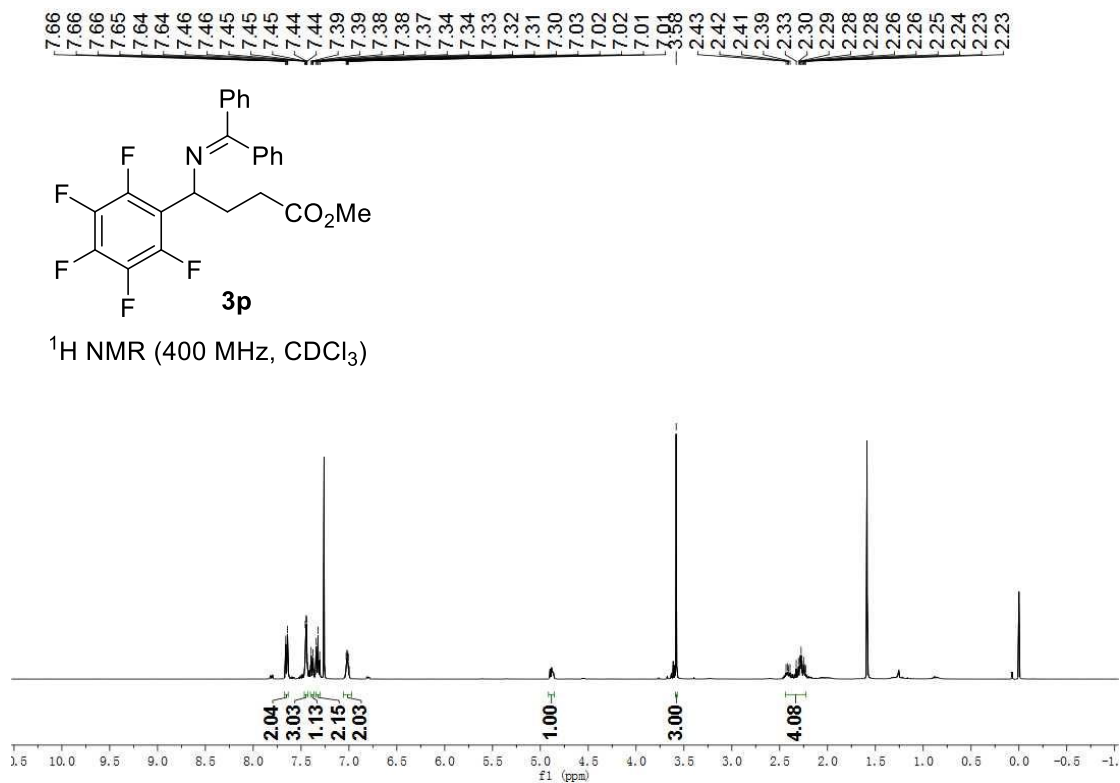
¹H NMR (400 MHz, CDCl₃)



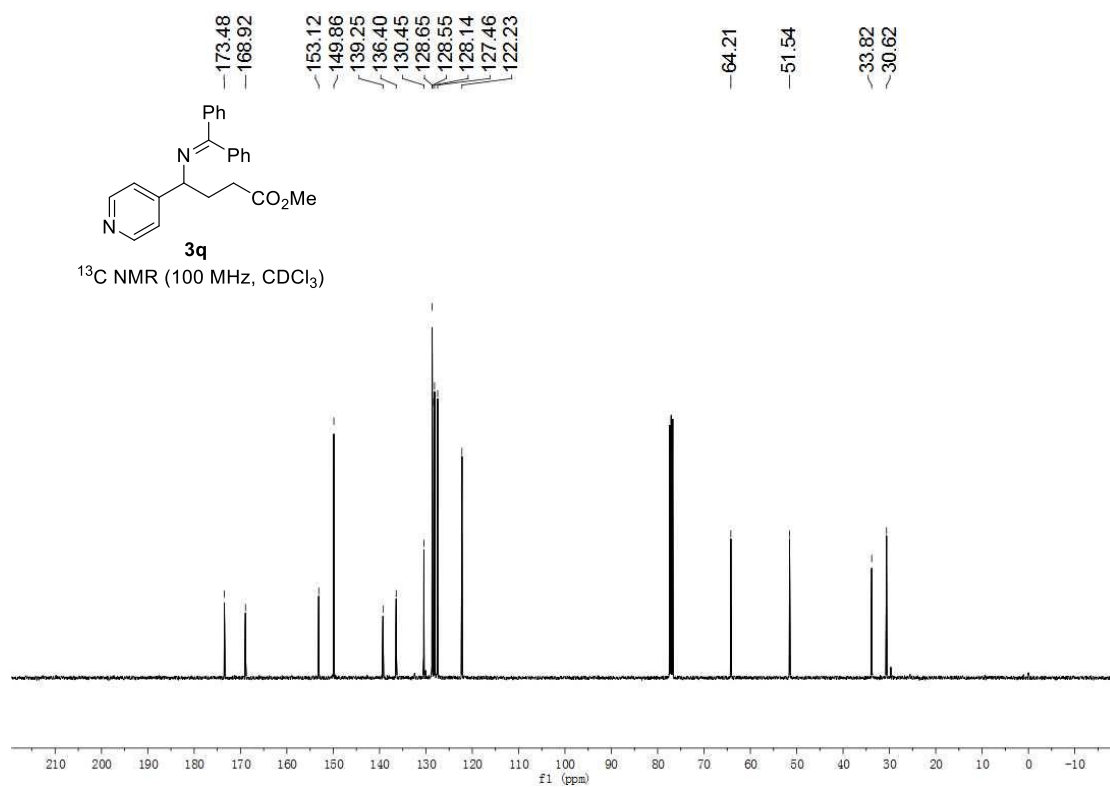
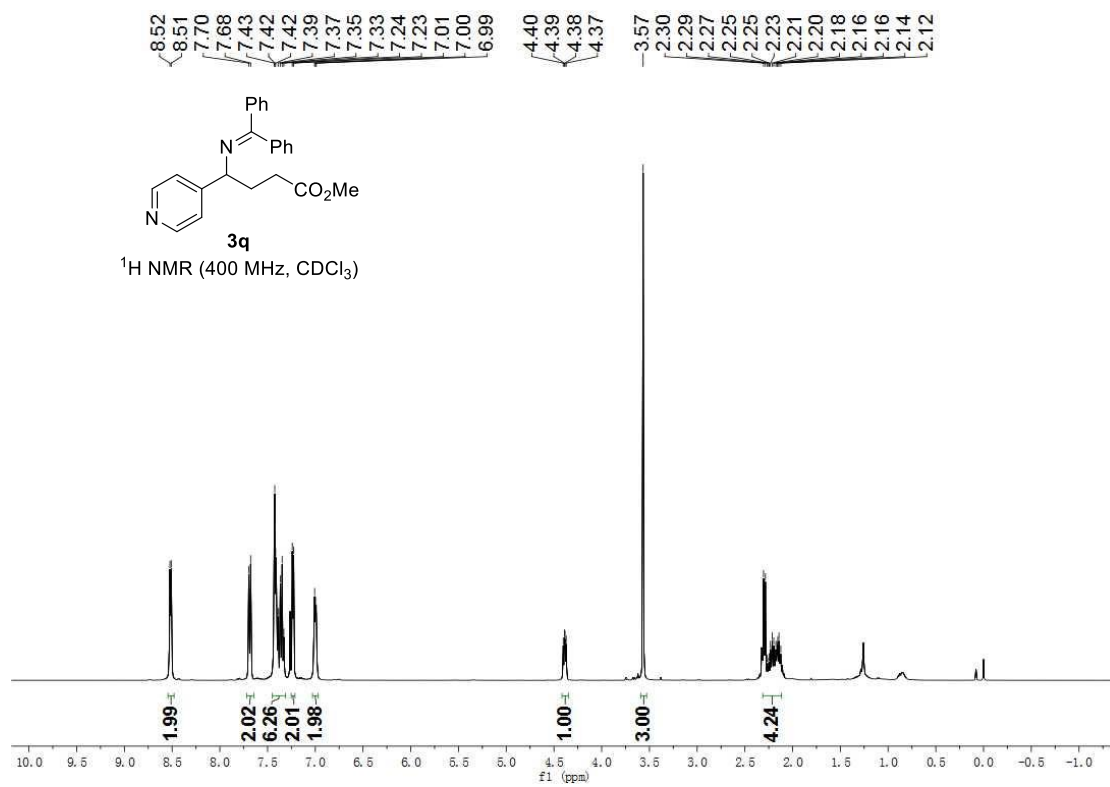
¹³C NMR (100 MHz, CDCl₃)



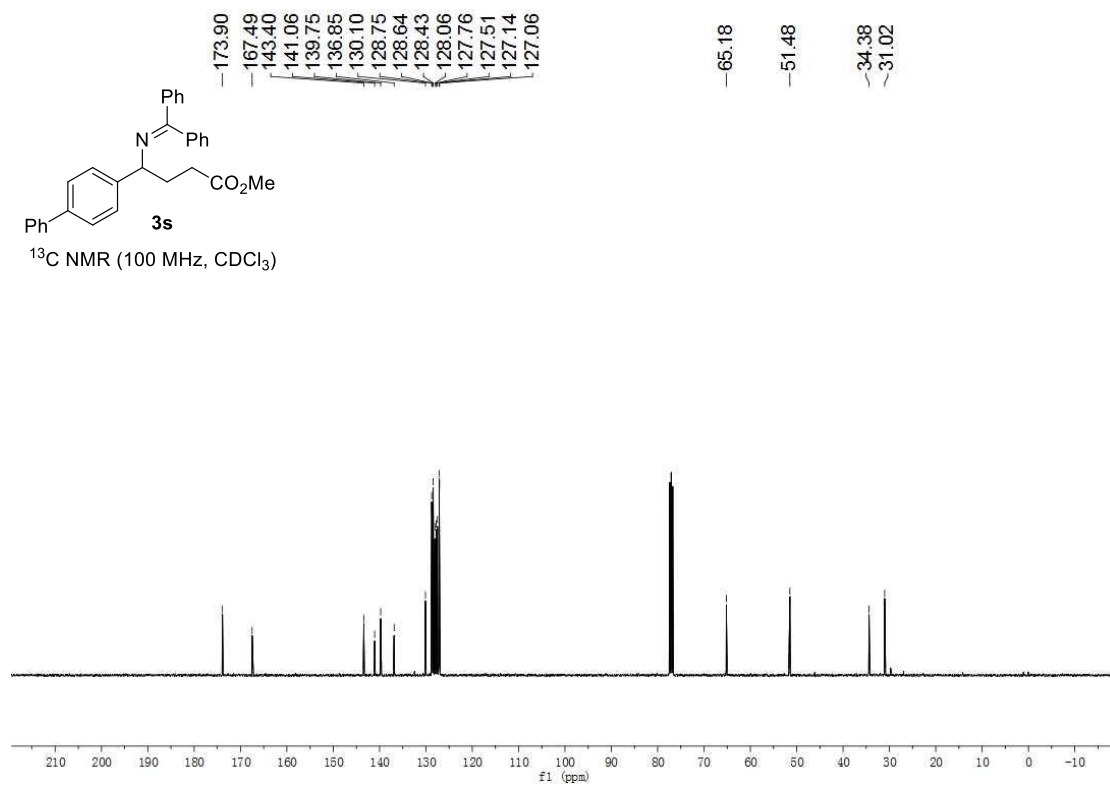
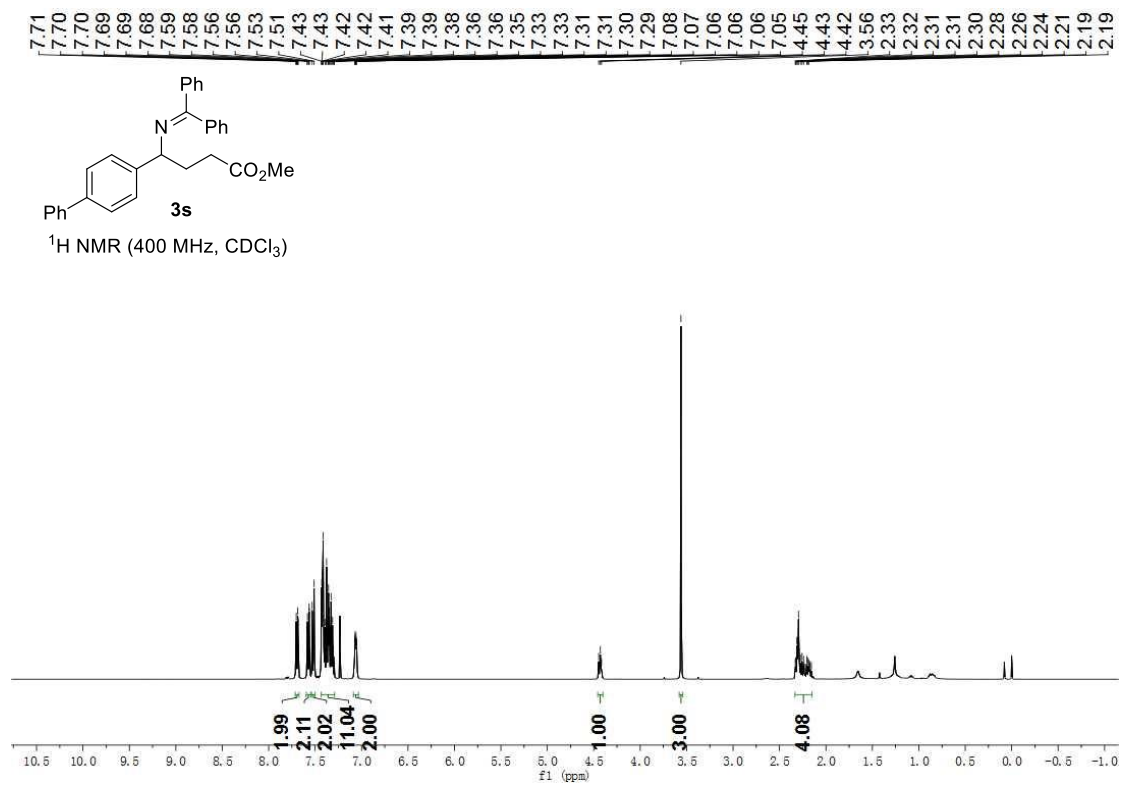
Methyl 4-((diphenylmethylene)amino)-4-(perfluorophenyl)butanoate (3p)



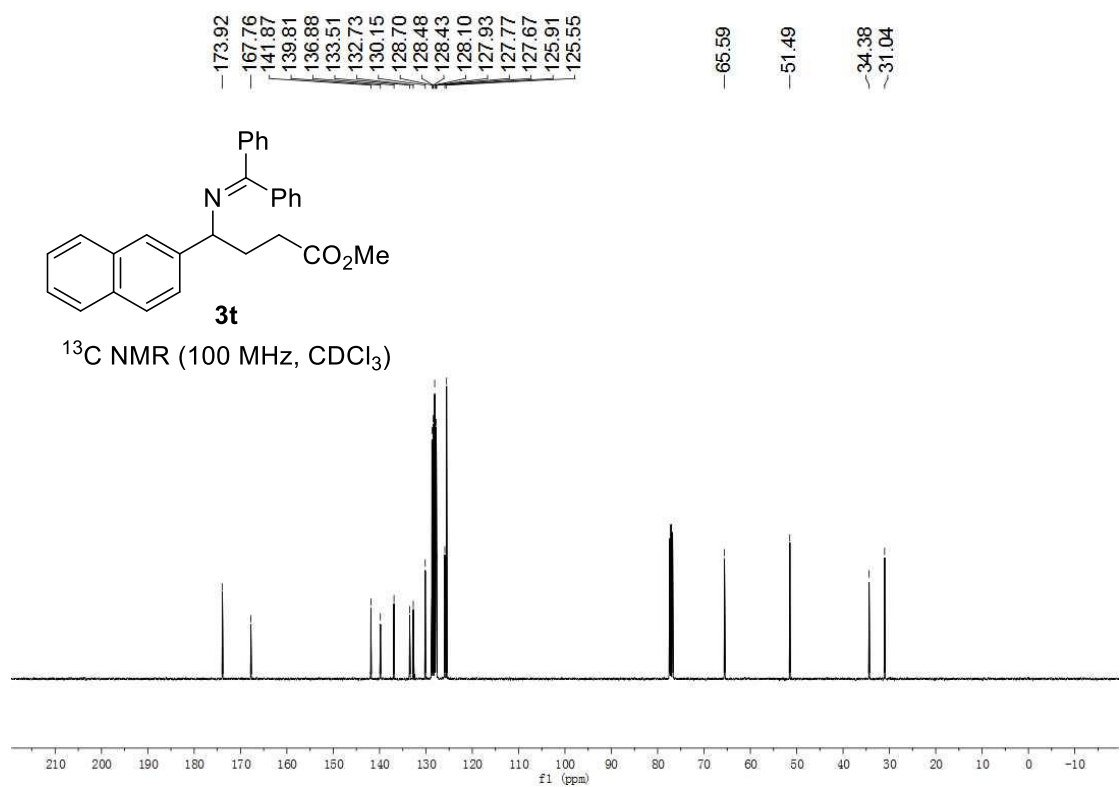
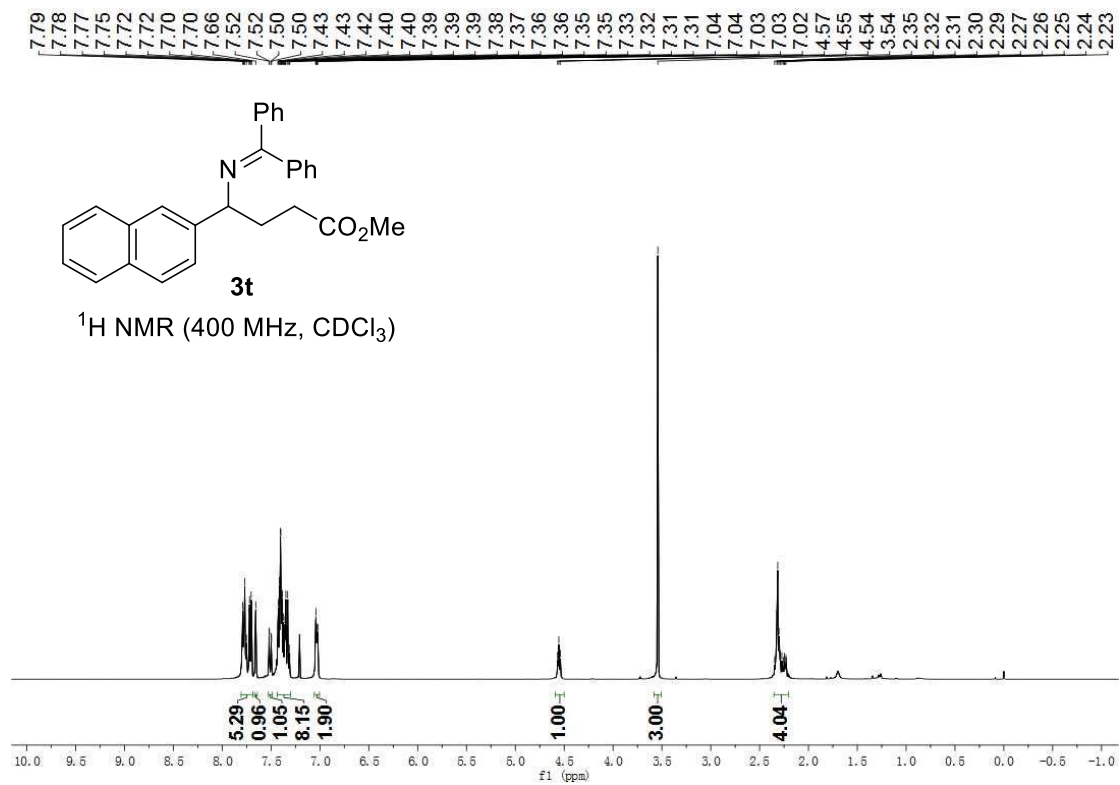
Methyl 4-((diphenylmethylene)amino)-4-(pyridin-4-yl)butanoate (3q)



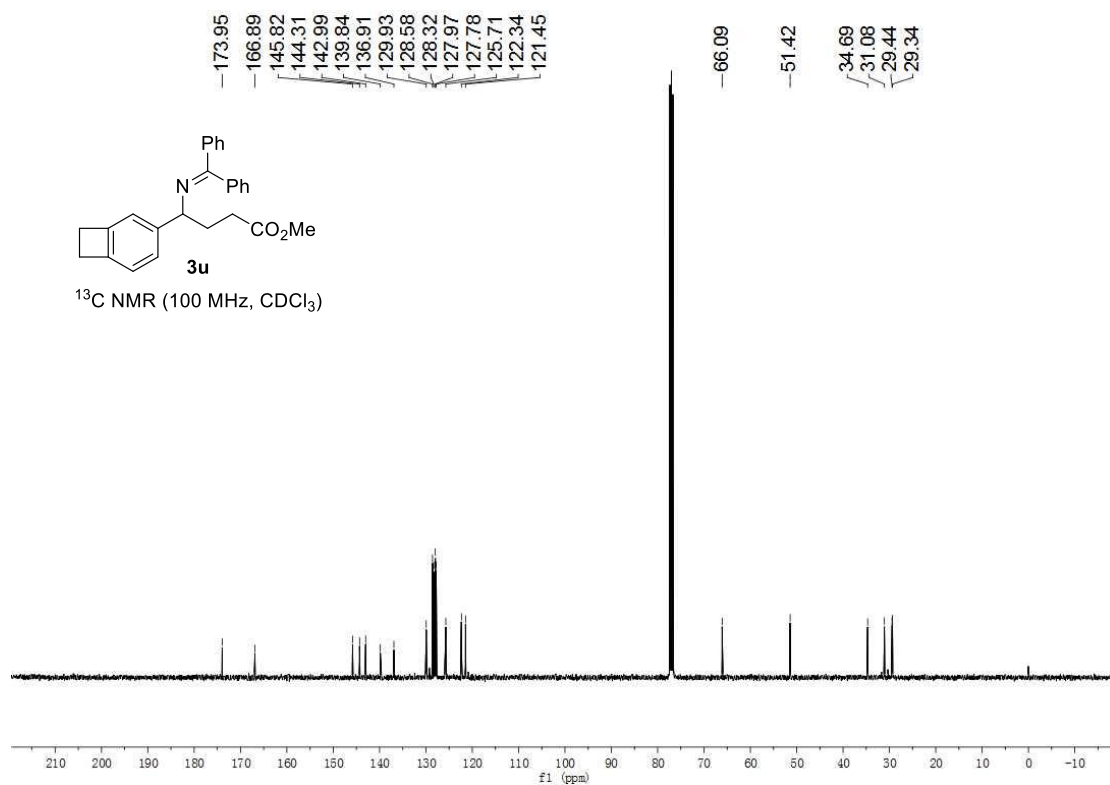
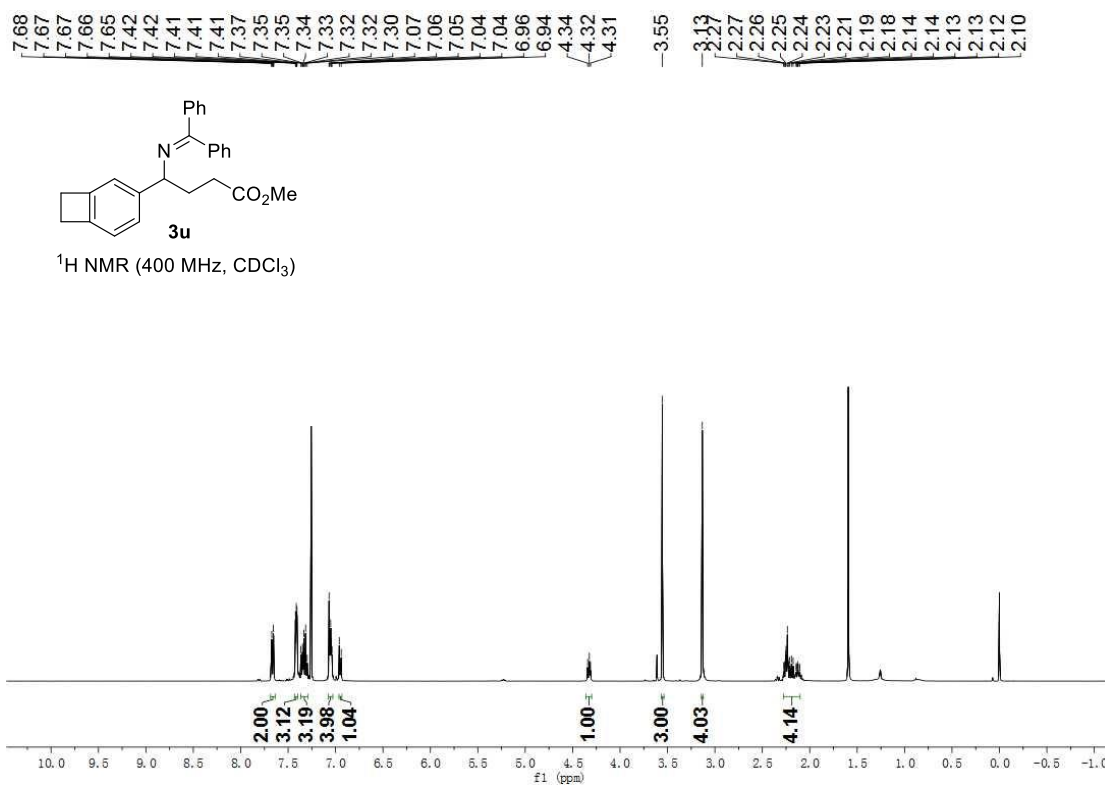
Methyl 4-([1,1'-biphenyl]-4-yl)-4-((diphenylmethylene)amino)butanoate (3s)



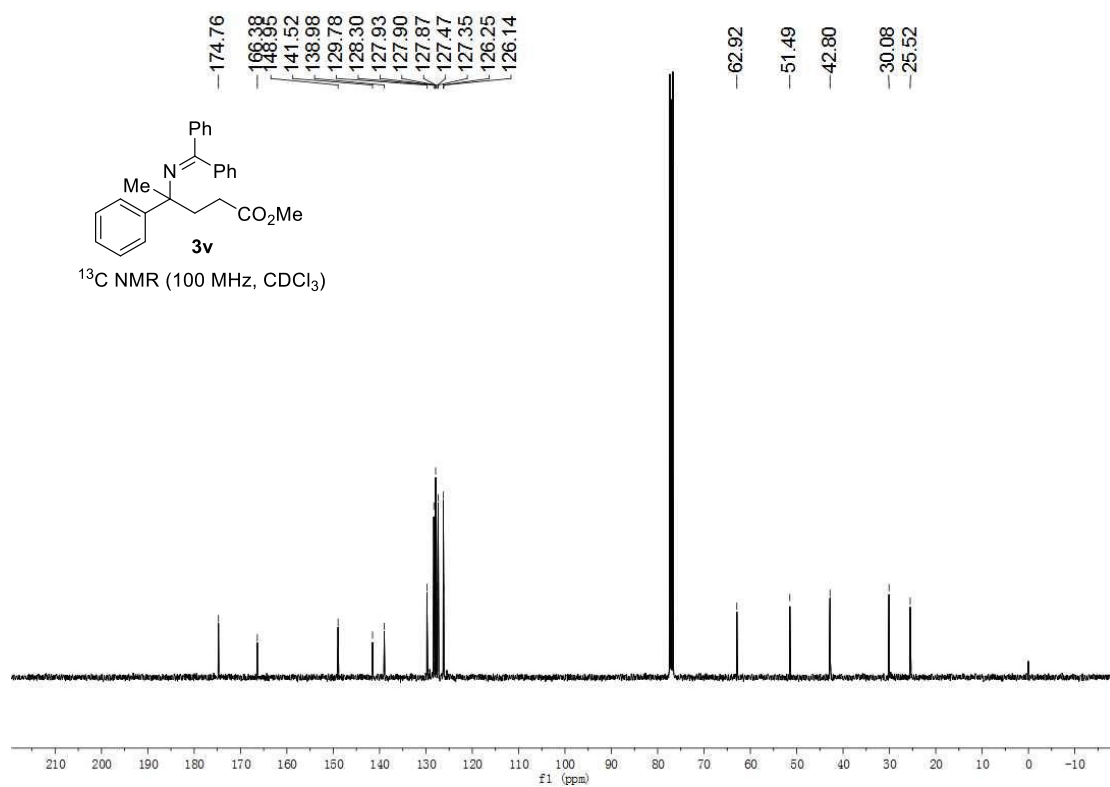
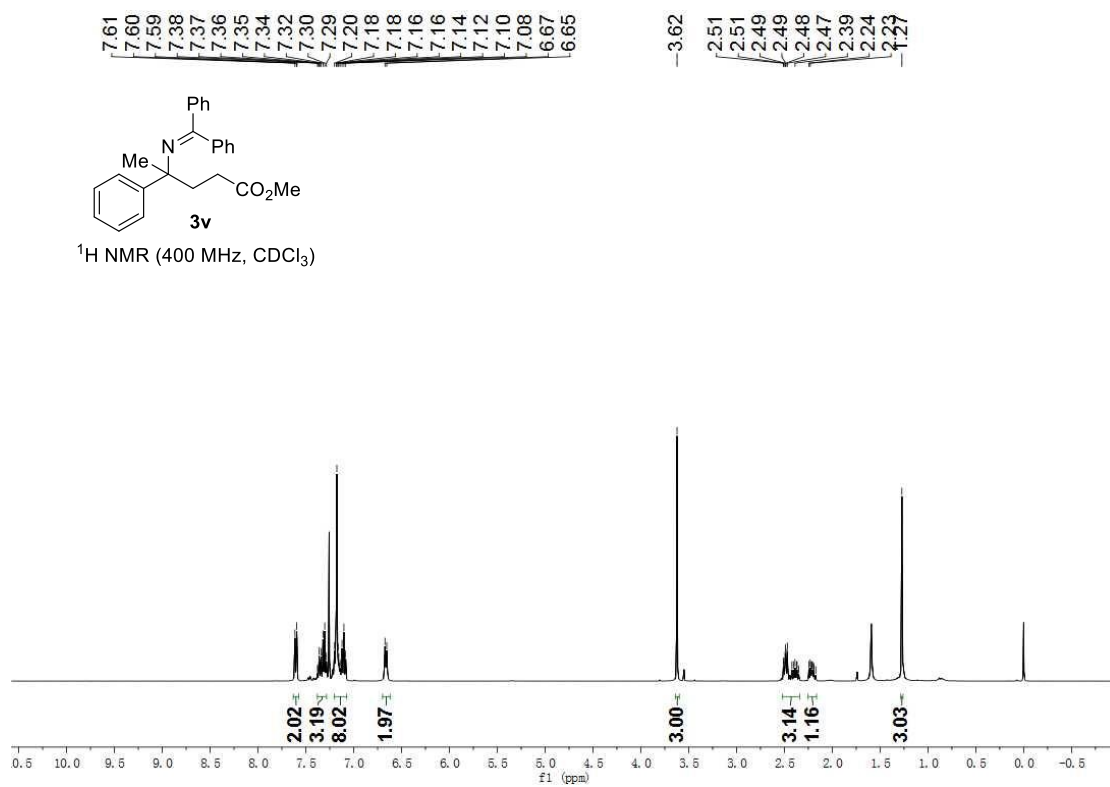
Methyl 4-((diphenylmethylene)amino)-4-(naphthalen-2-yl)butanoate (3t)



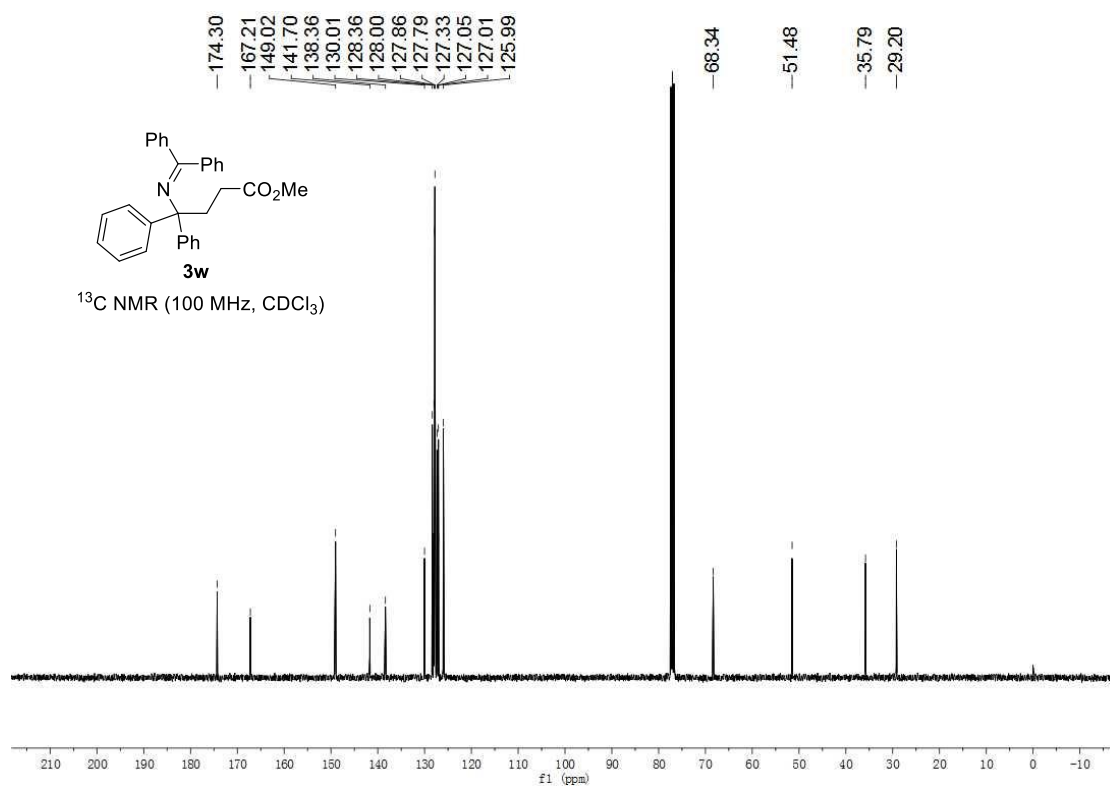
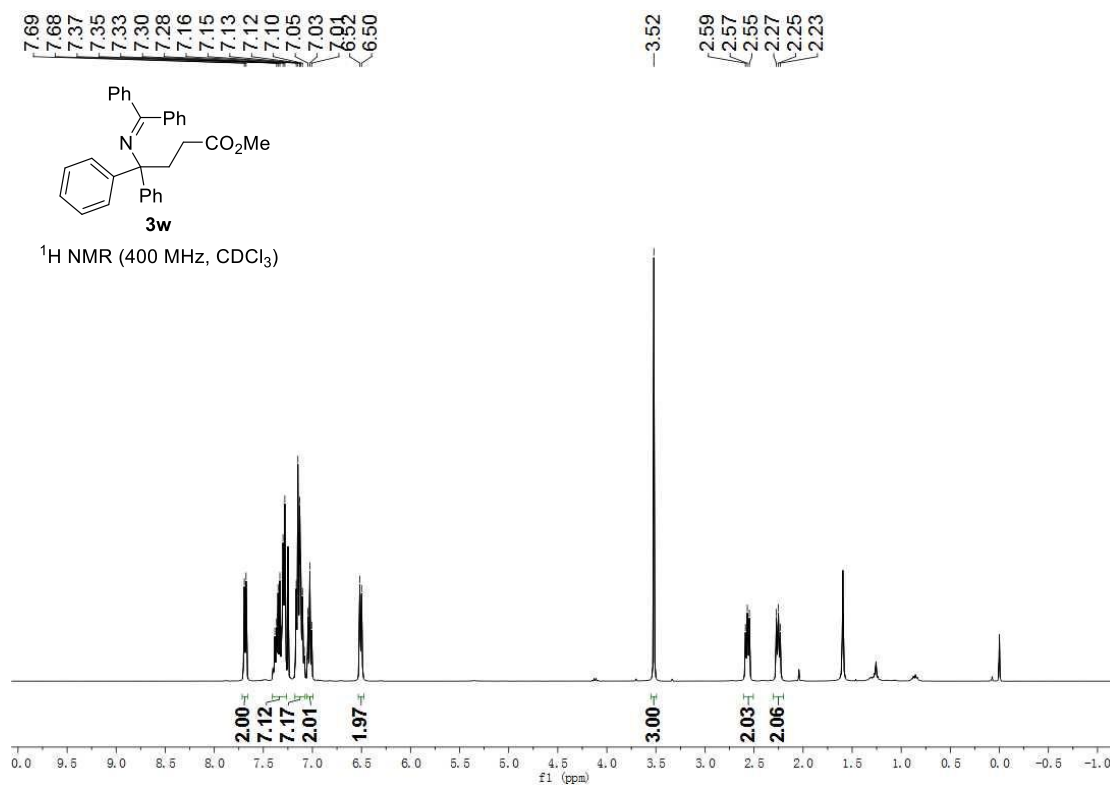
Methyl 4-(bicyclo[4.2.0]octa-1(6),2,4-trien-3-yl)-4-((diphenylmethylene)amino)butanoate (3u)



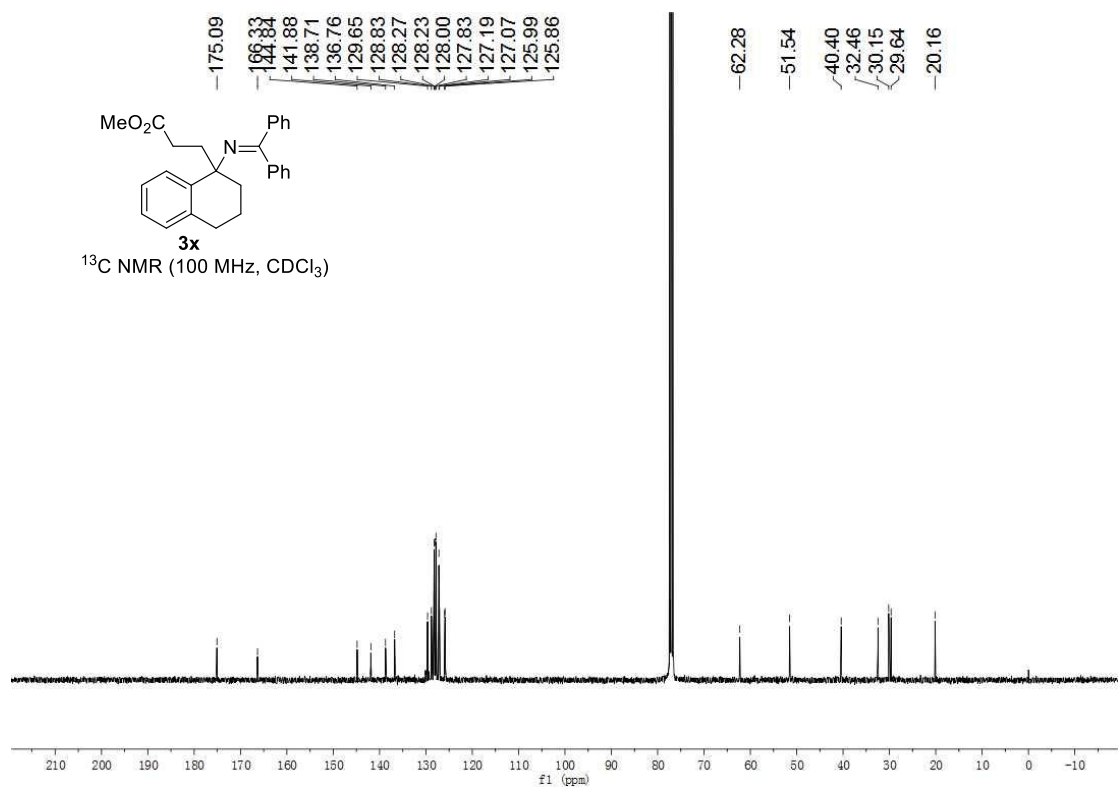
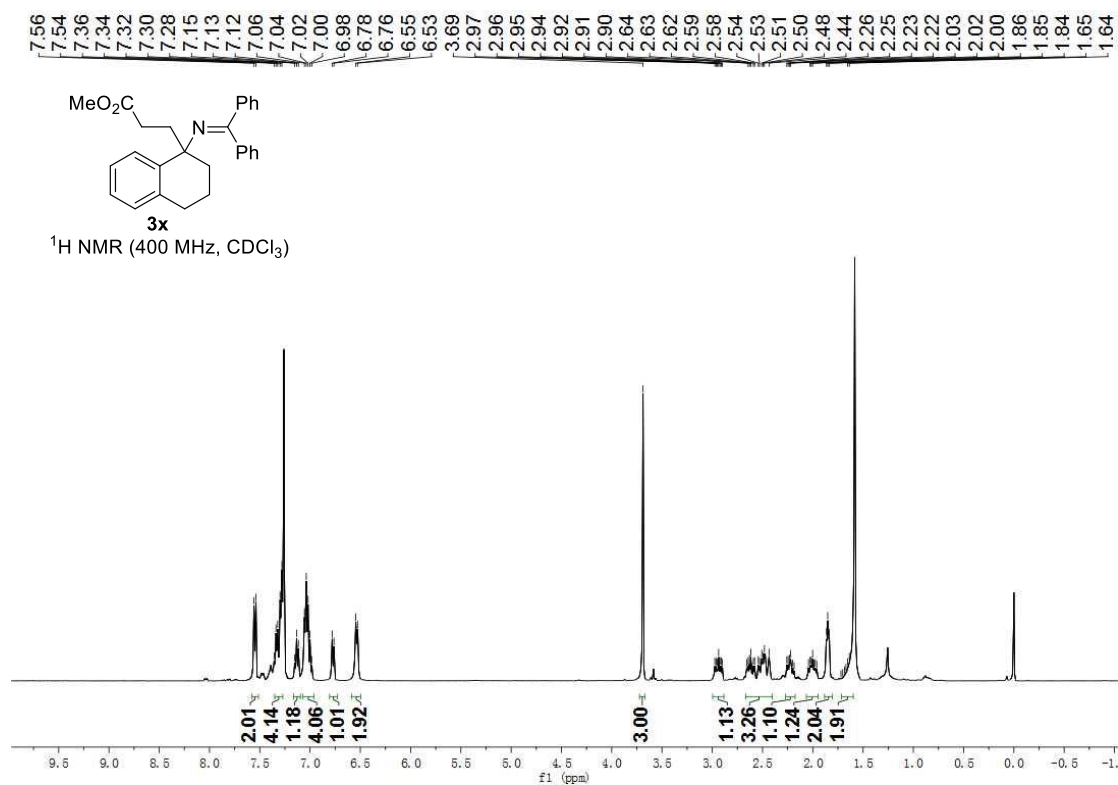
Methyl 4-((diphenylmethylene)amino)-4-phenylpentanoate (3v)



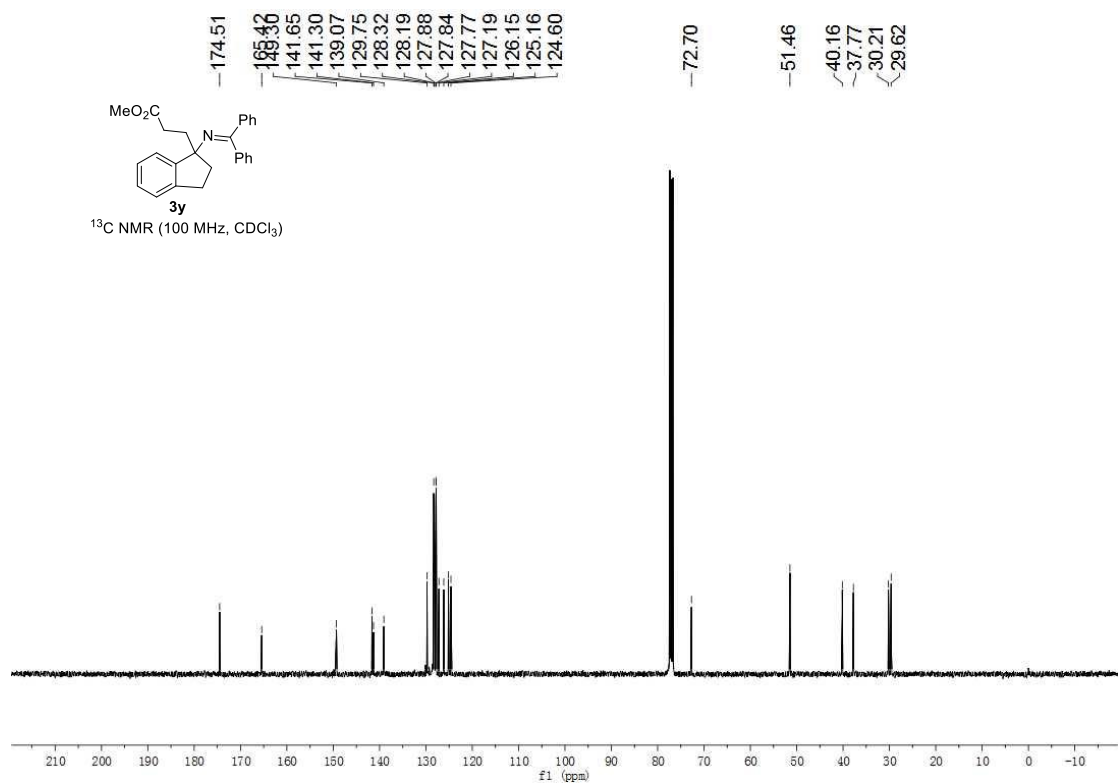
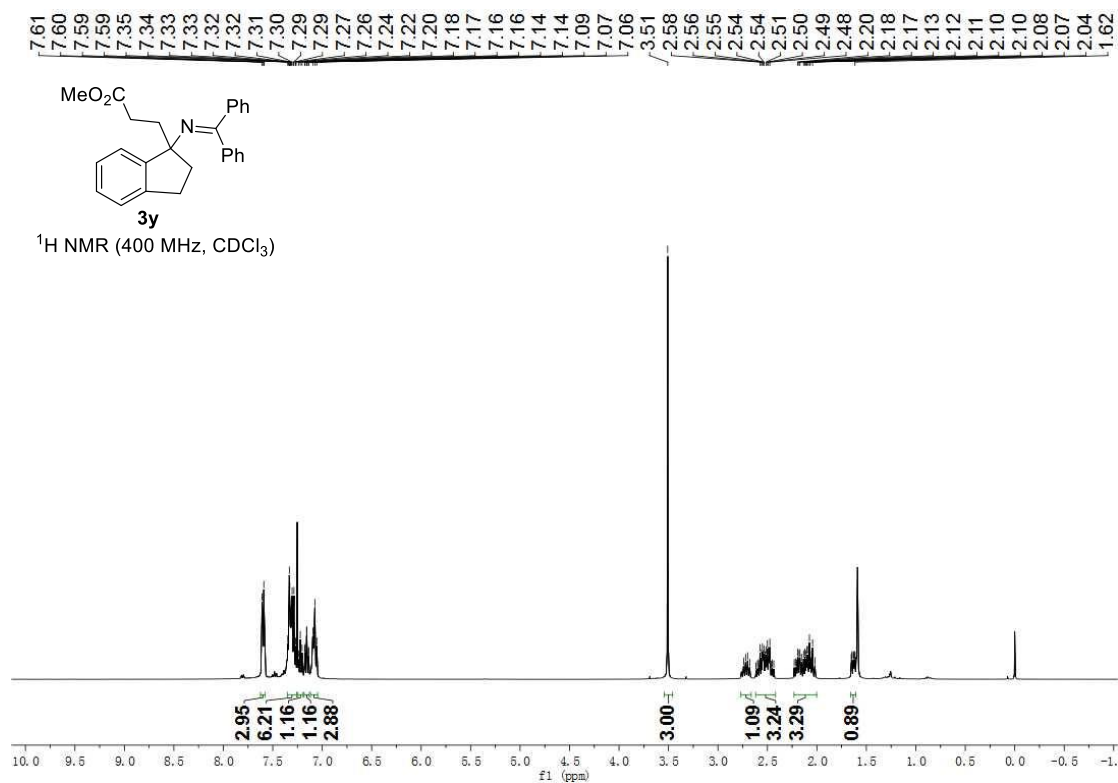
Methyl 4-((diphenylmethylene)amino)-4,4-diphenylbutanoate (3w)



Methyl 3-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-1-yl)propanoate (3x)

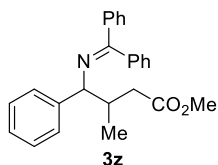


Methyl 3-(1-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-1-yl)propanoate
(3y)

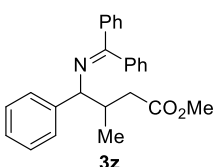
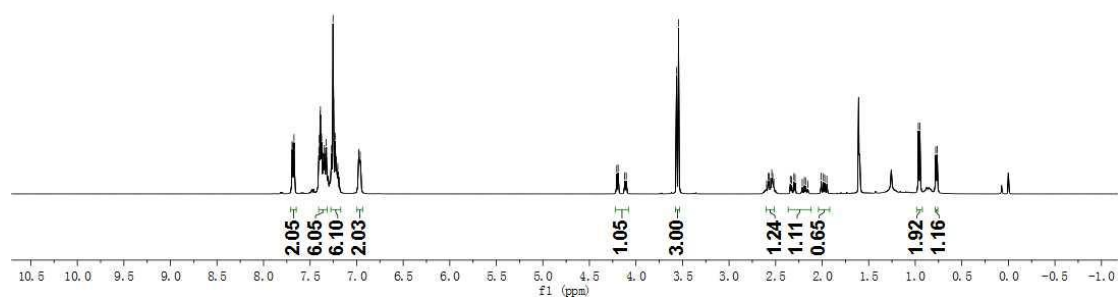


Methyl 4-((diphenylmethylene)amino)-3-methyl-4-phenylbutanoate (3z)

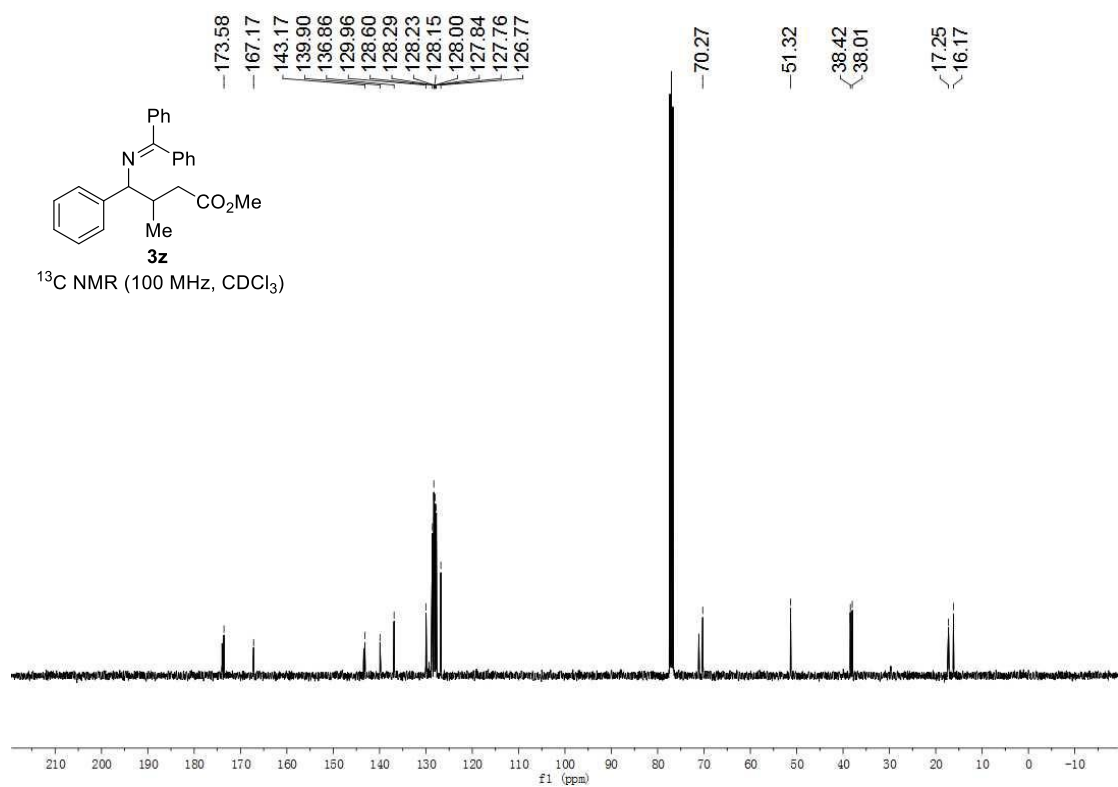
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0.78
0.76



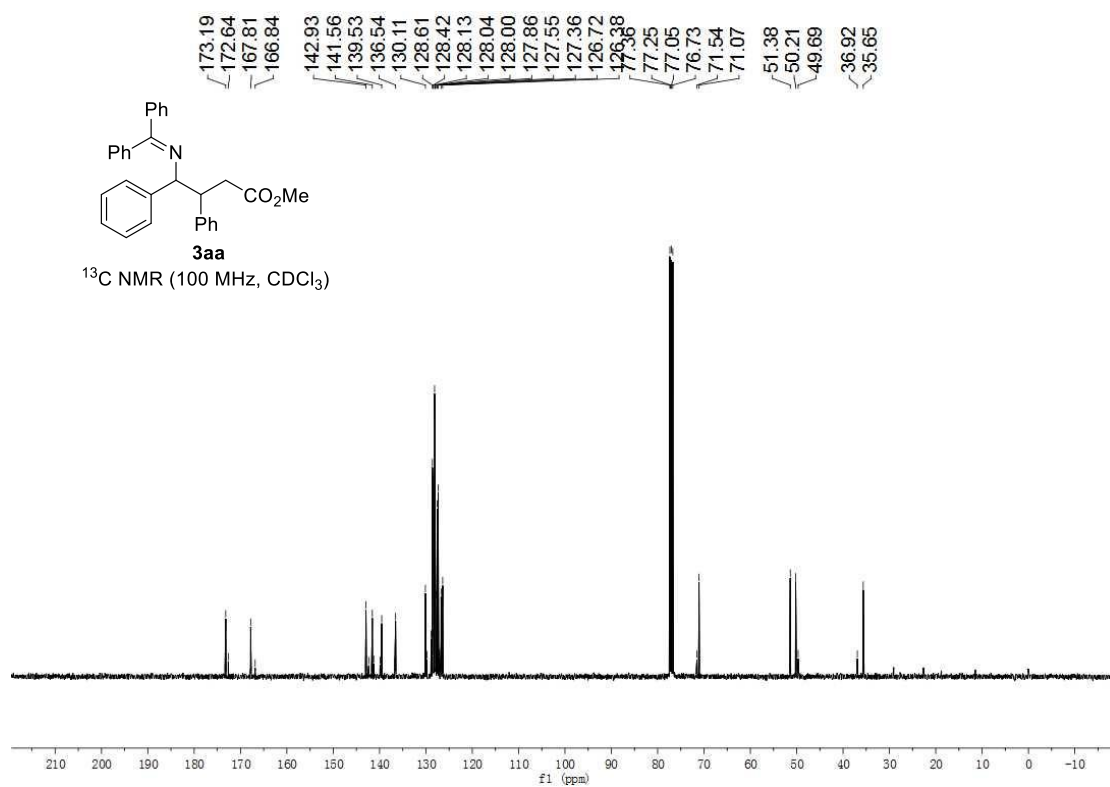
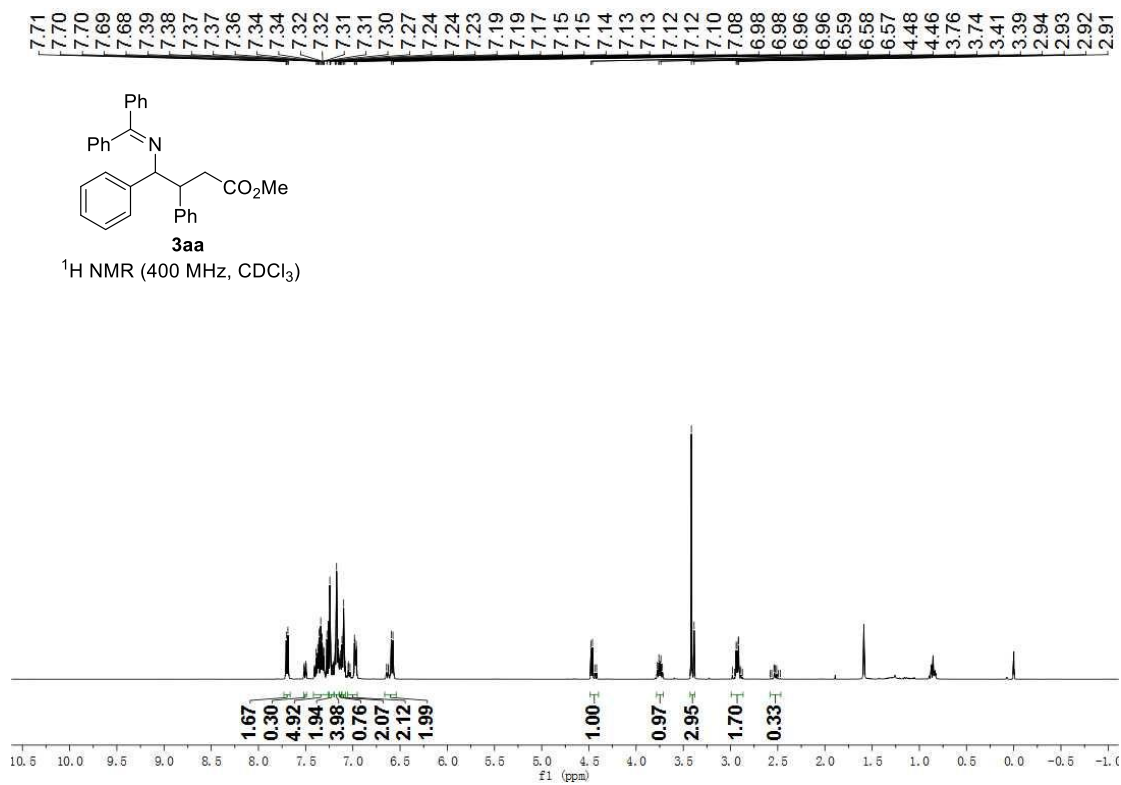
¹H NMR (400 MHz, CDCl₃)



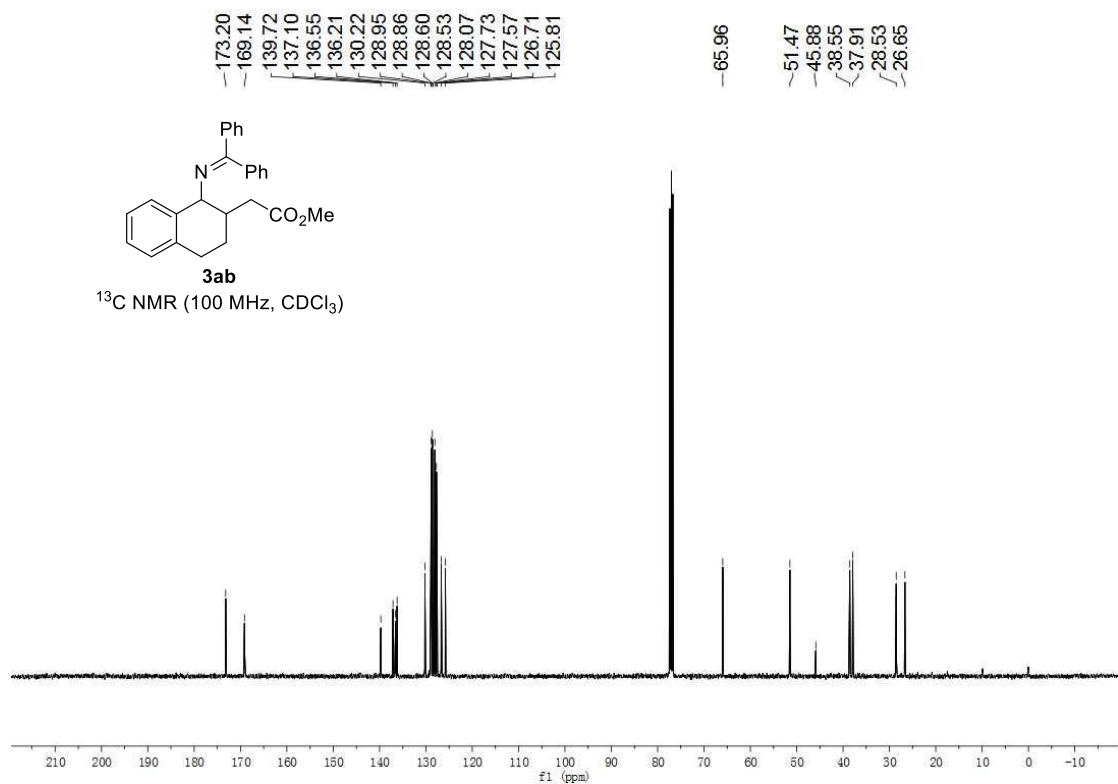
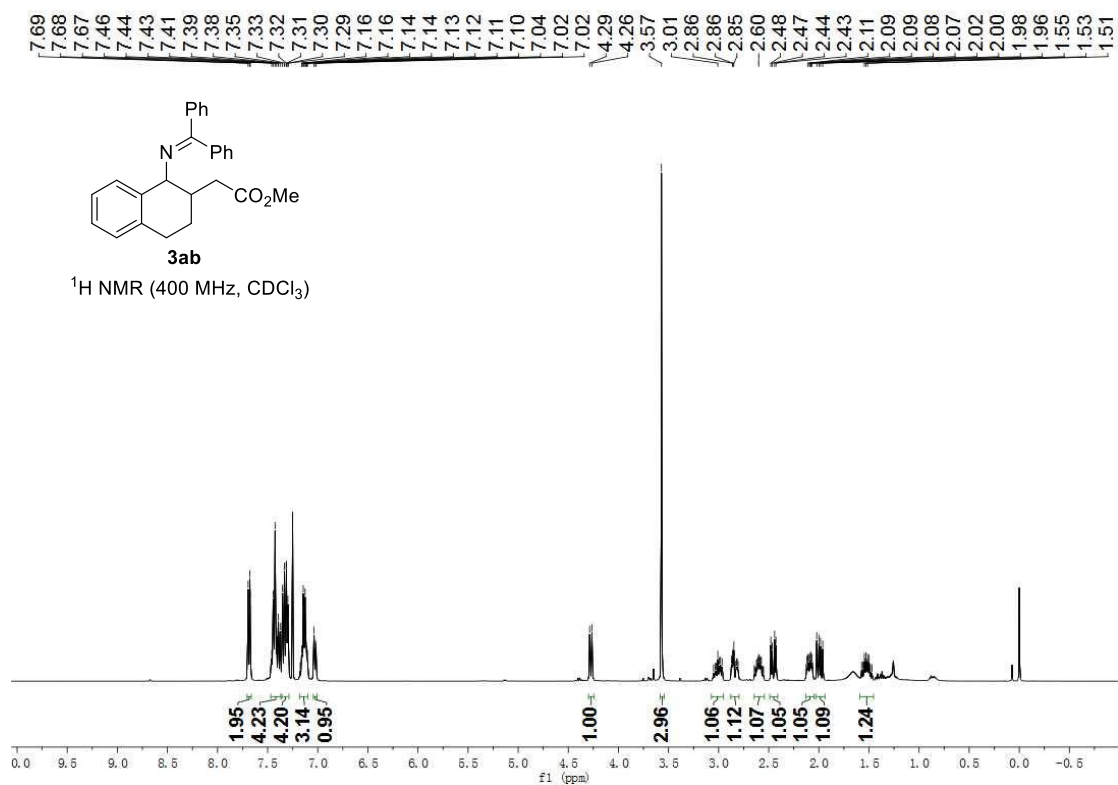
¹³C NMR (100 MHz, CDCl₃)



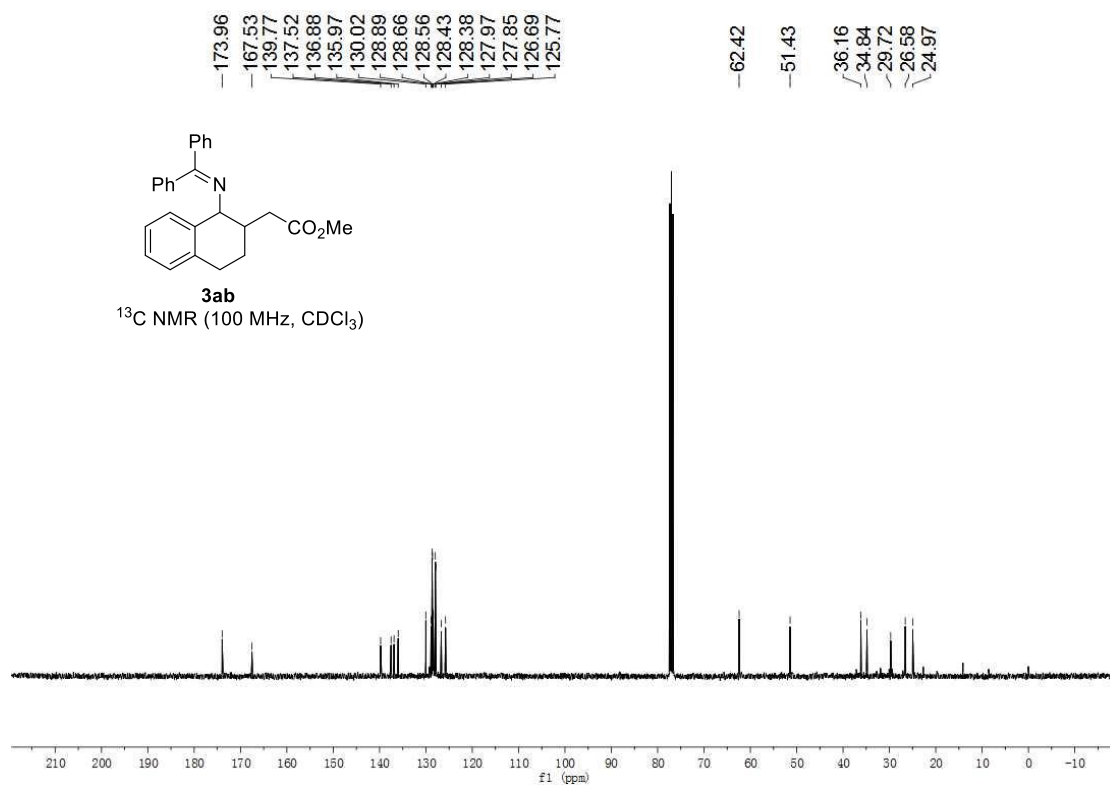
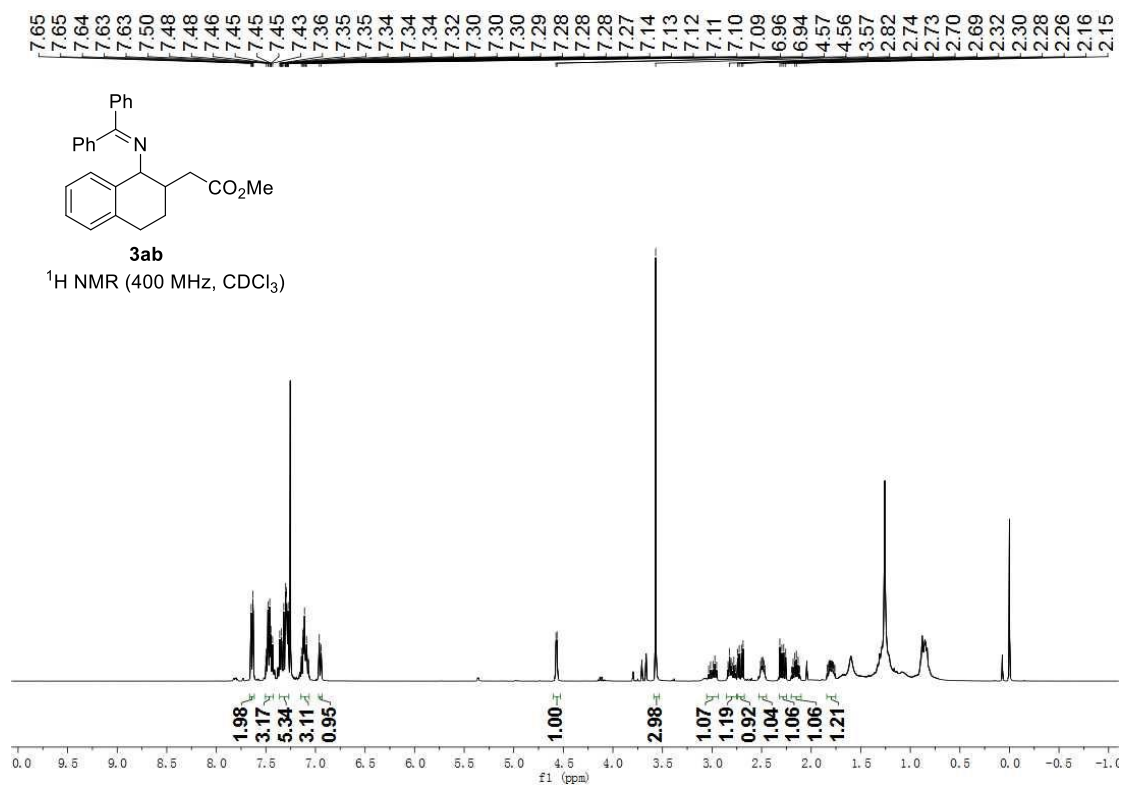
Methyl 4-((diphenylmethylene)amino)-3,4-diphenylbutanoate (3aa)



Methyl 2-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-2-yl)acetate
(3ab, major diastereomer)

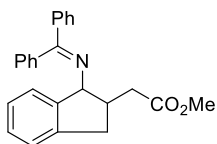


Methyl 2-(1-((diphenylmethylene)amino)-1,2,3,4-tetrahydronaphthalen-2-yl)acetate
(3ab, minor diastereomer)

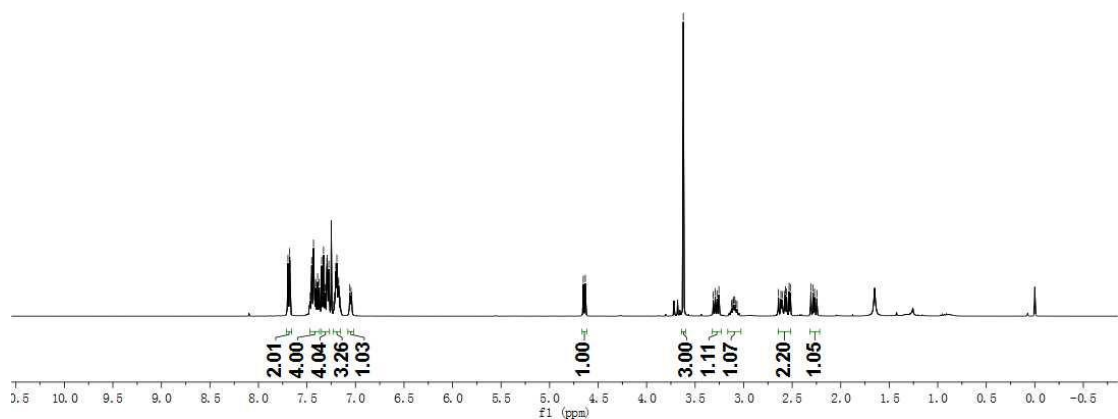


Methyl 2-(1-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-2-yl)acetate (3ac, major diastereomer)

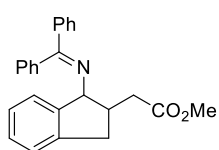
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7.06
7.05
7.04
4.65
4.63
3.62
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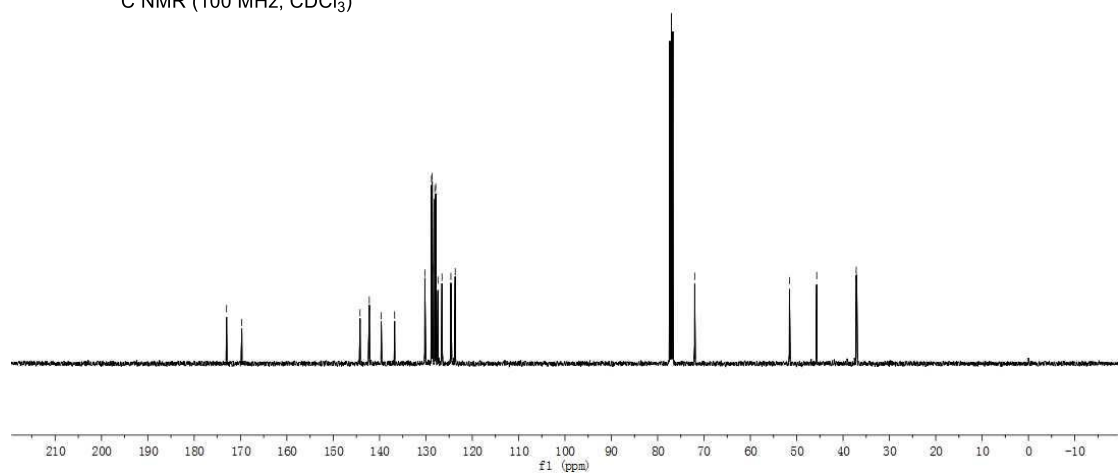
¹H NMR (400 MHz, CDCl₃)



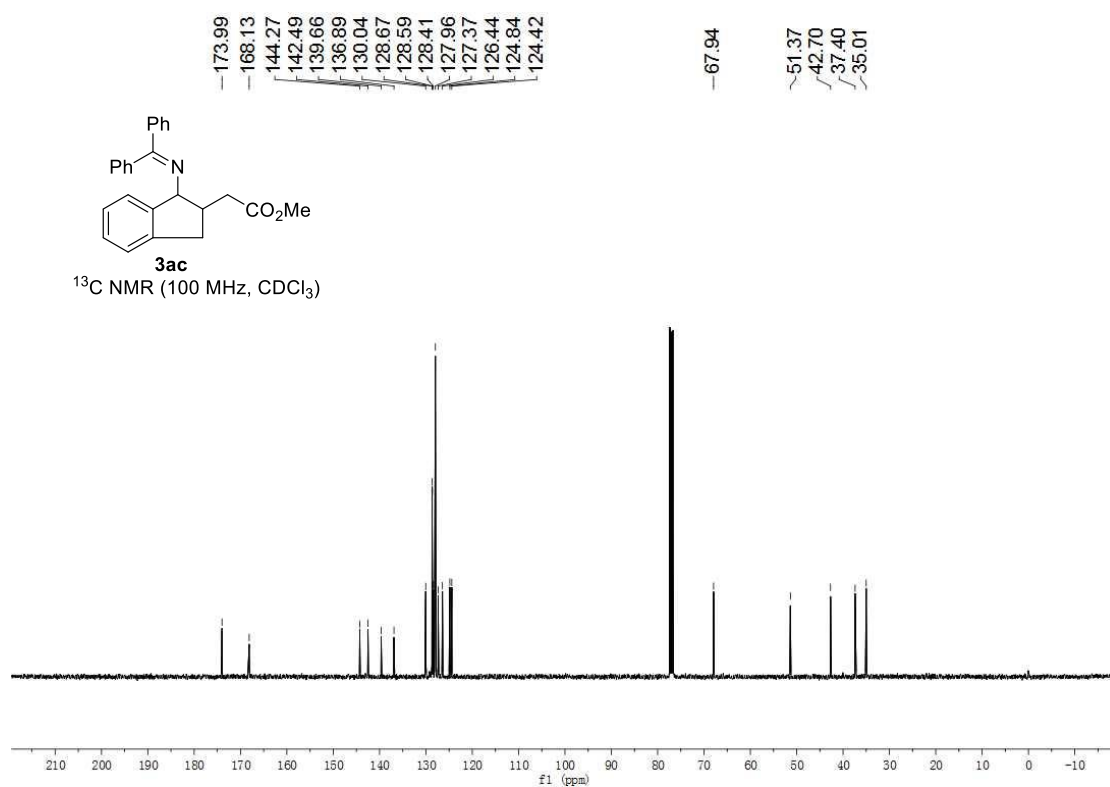
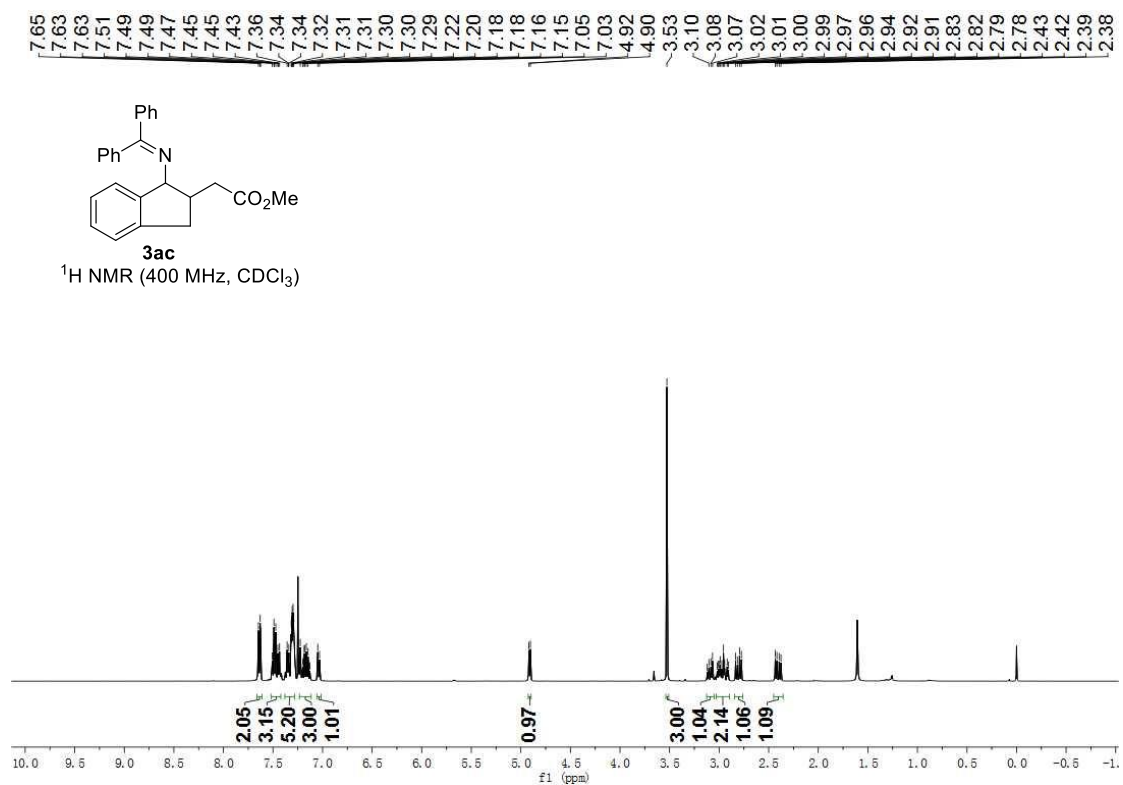
173.01
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128.80
128.64
128.52
128.08
127.40
126.53
124.61
123.67
72.00
51.56
45.67
37.16
37.04



¹³C NMR (100 MHz, CDCl₃)

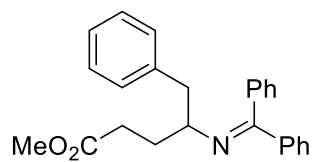


Methyl 2-(2-((diphenylmethylene)amino)-2,3-dihydro-1H-inden-1-yl)acetate (3ac, minor diastereomer)

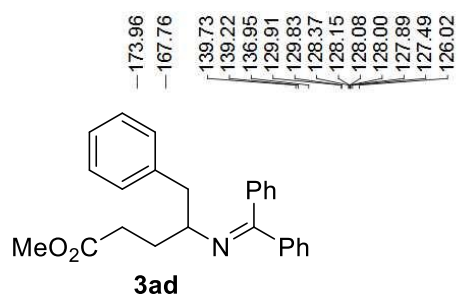
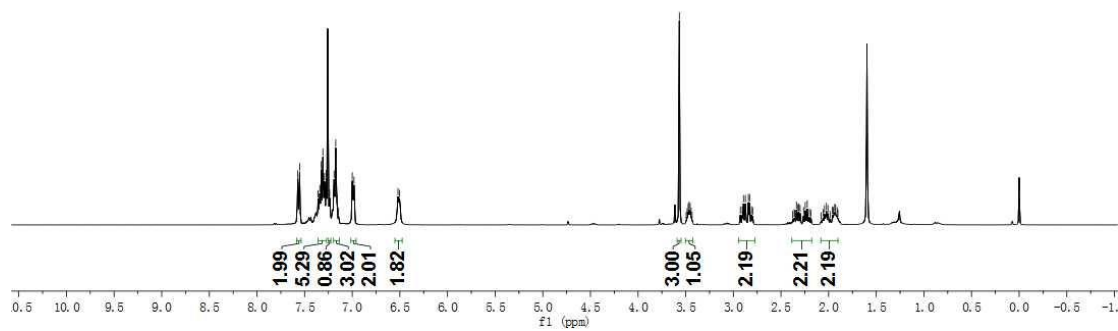


Methyl 4-((diphenylmethylene)amino)-5-phenylpentanoate (3ad)

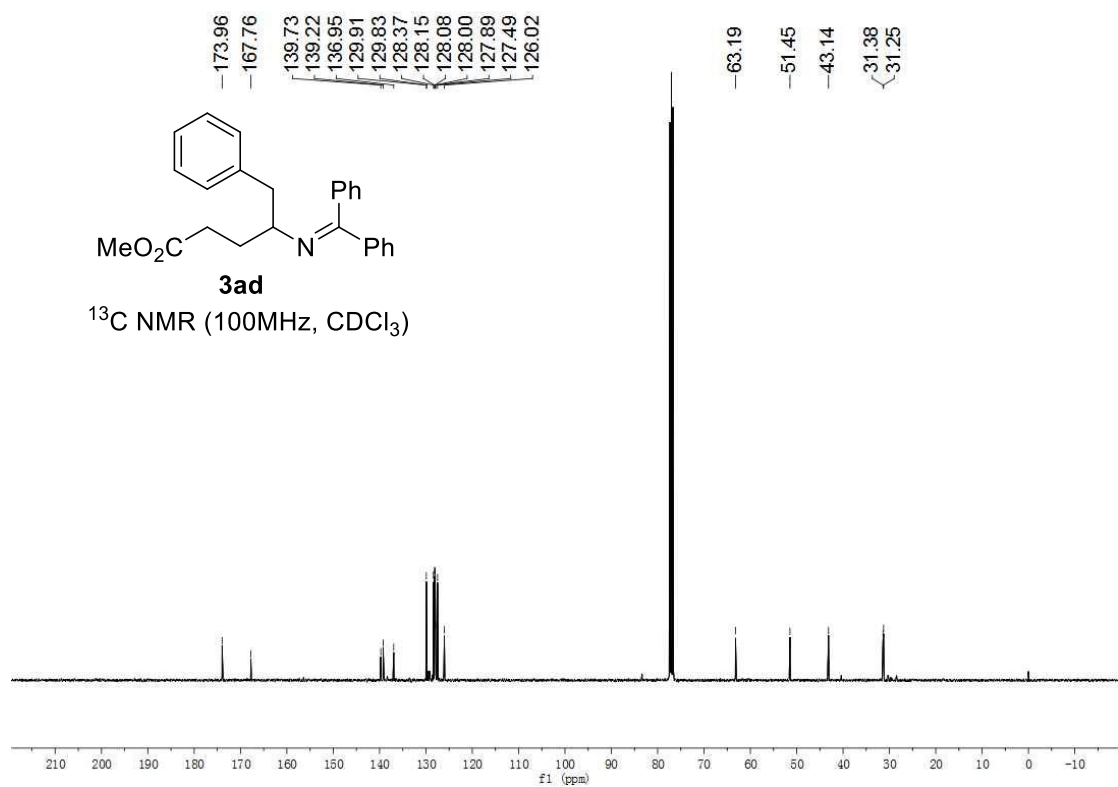
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1.91
1.90



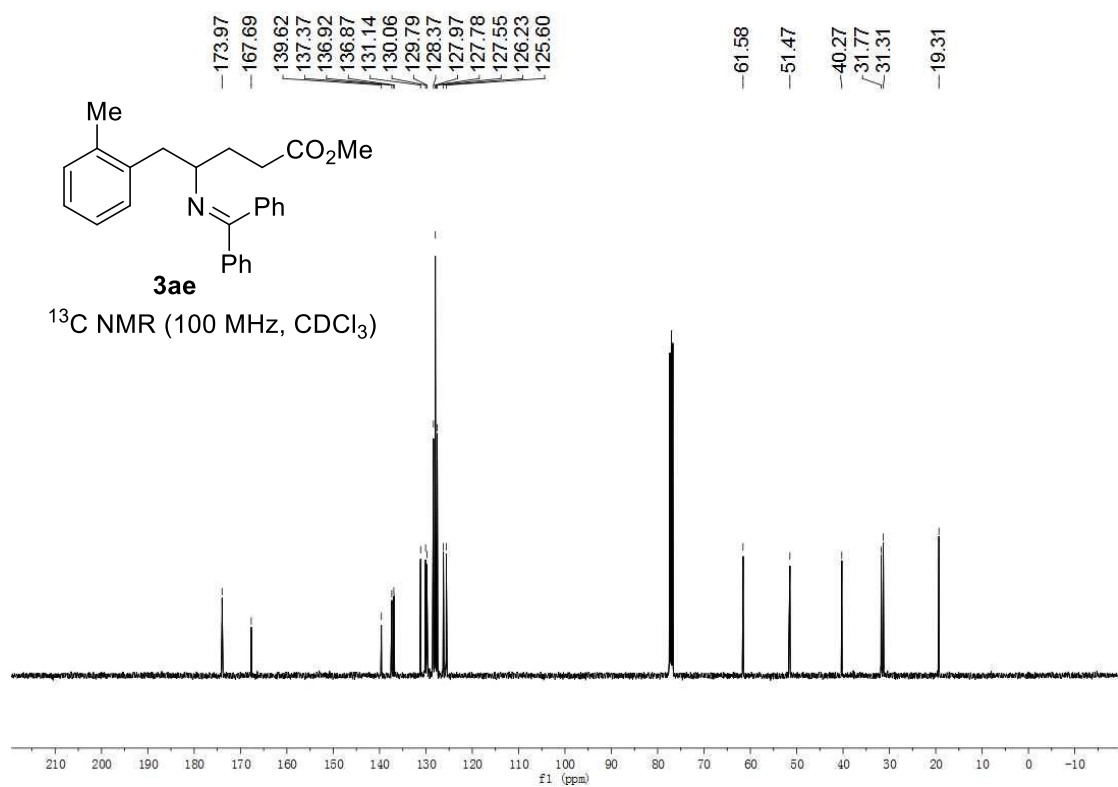
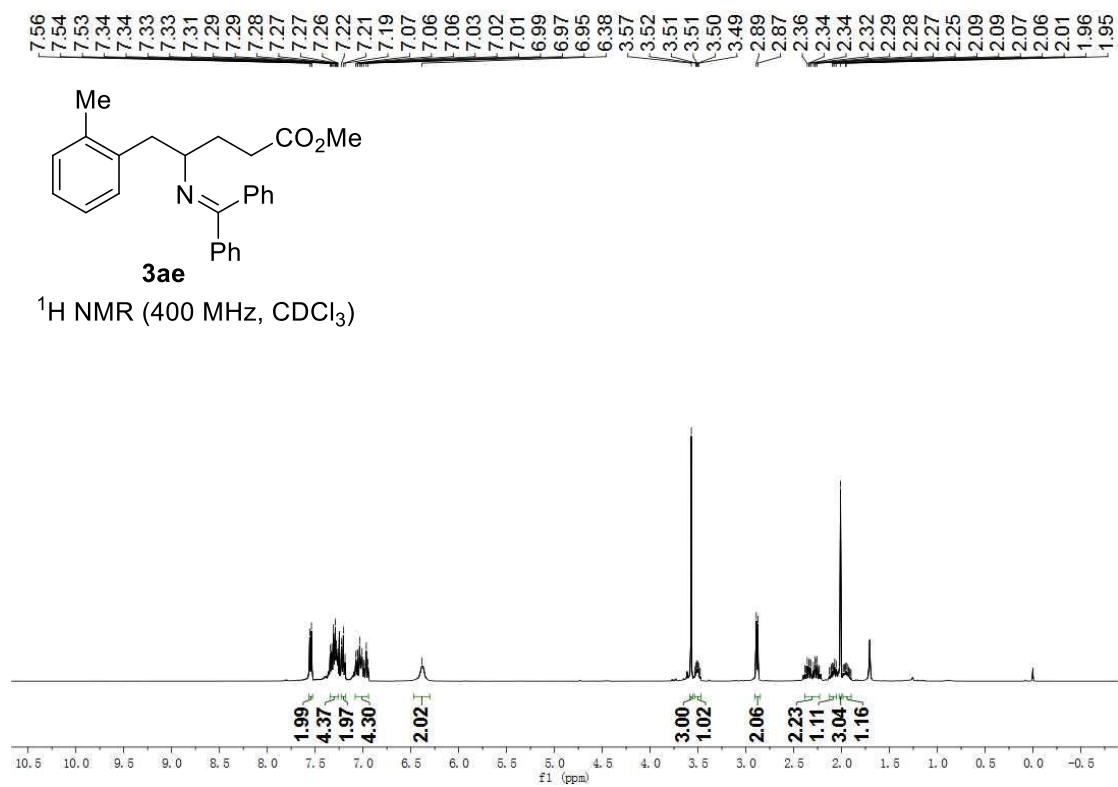
¹H NMR (400MHz, CDCl₃)



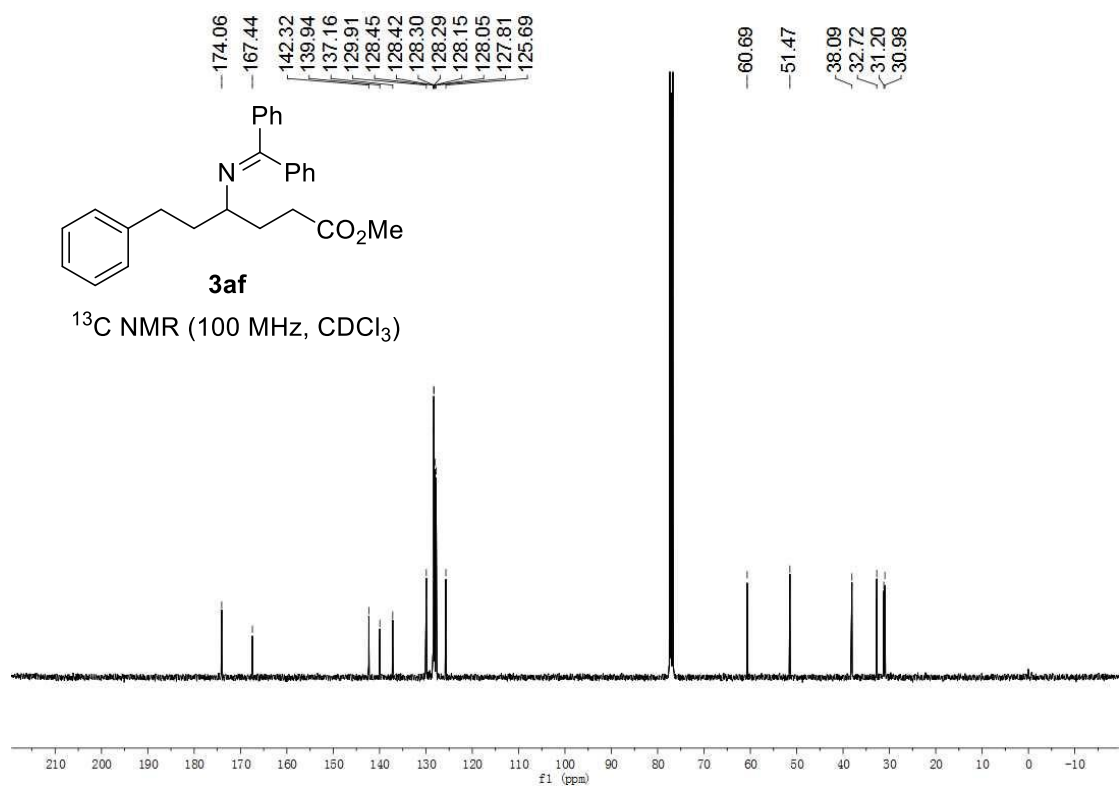
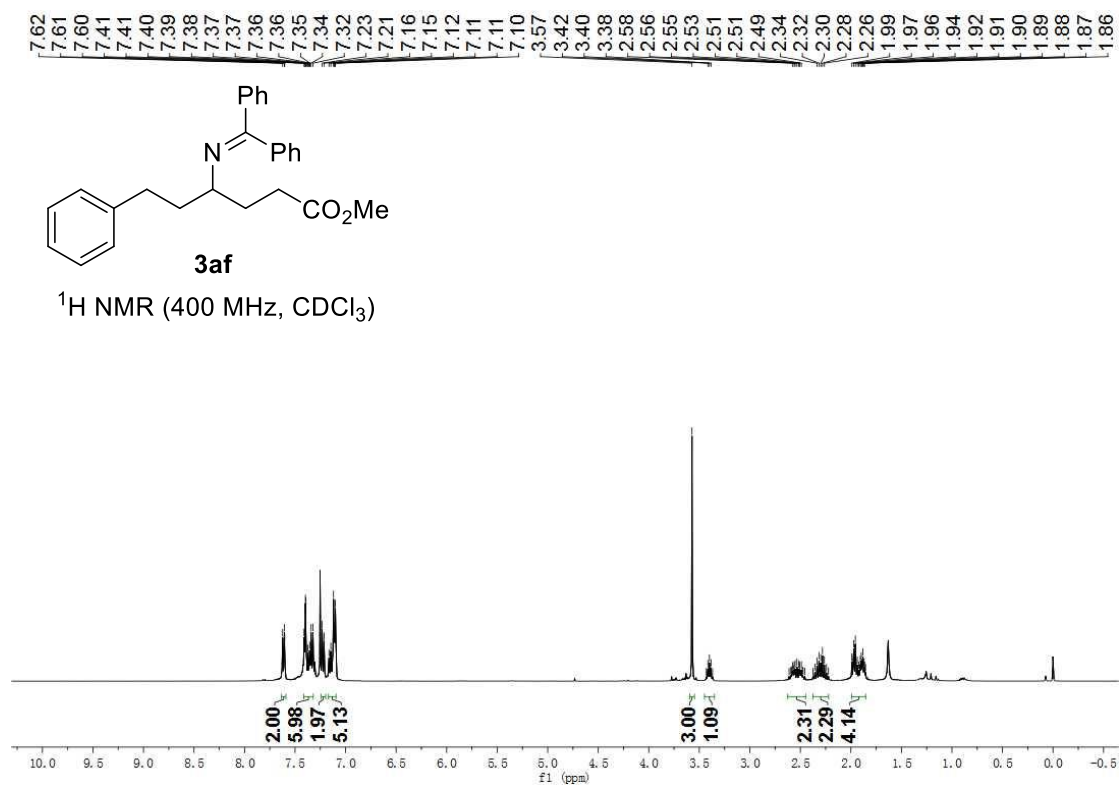
¹³C NMR (100MHz, CDCl₃)



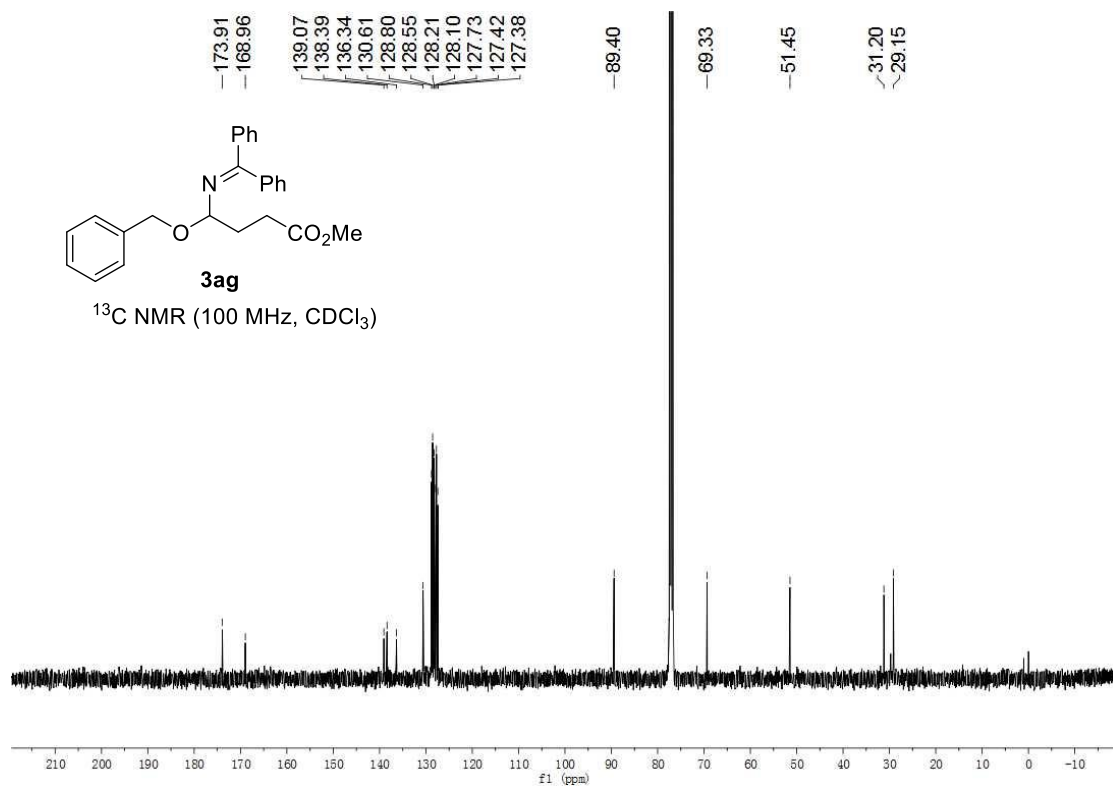
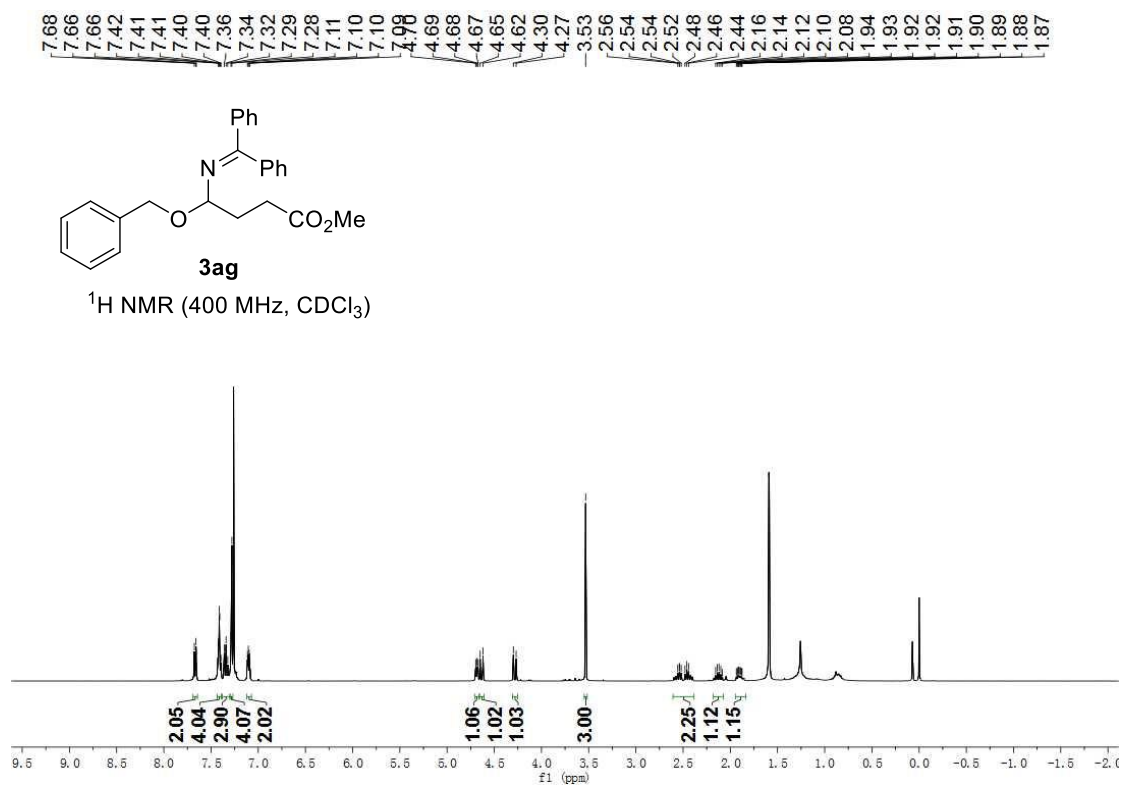
Methyl 4-((diphenylmethylene)amino)-5-(o-tolyl)pentanoate (3ae)



Methyl 4-((diphenylmethylene)amino)-6-phenylhexanoate (3af)

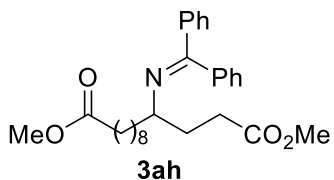


Methyl 4-(benzyloxy)-4-((diphenylmethylene)amino)butanoate (3ag)

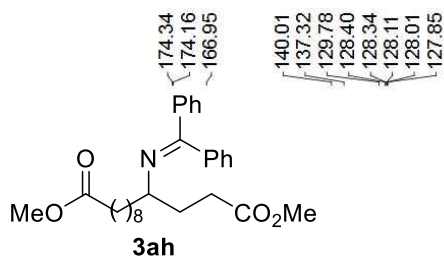
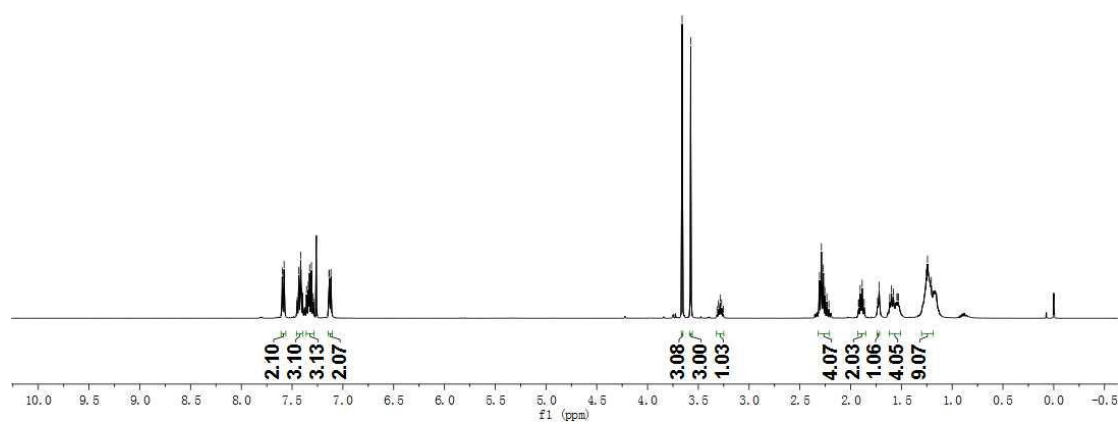


Dimethyl 4-((diphenylmethylene)amino)tridecanedioate (3ah)

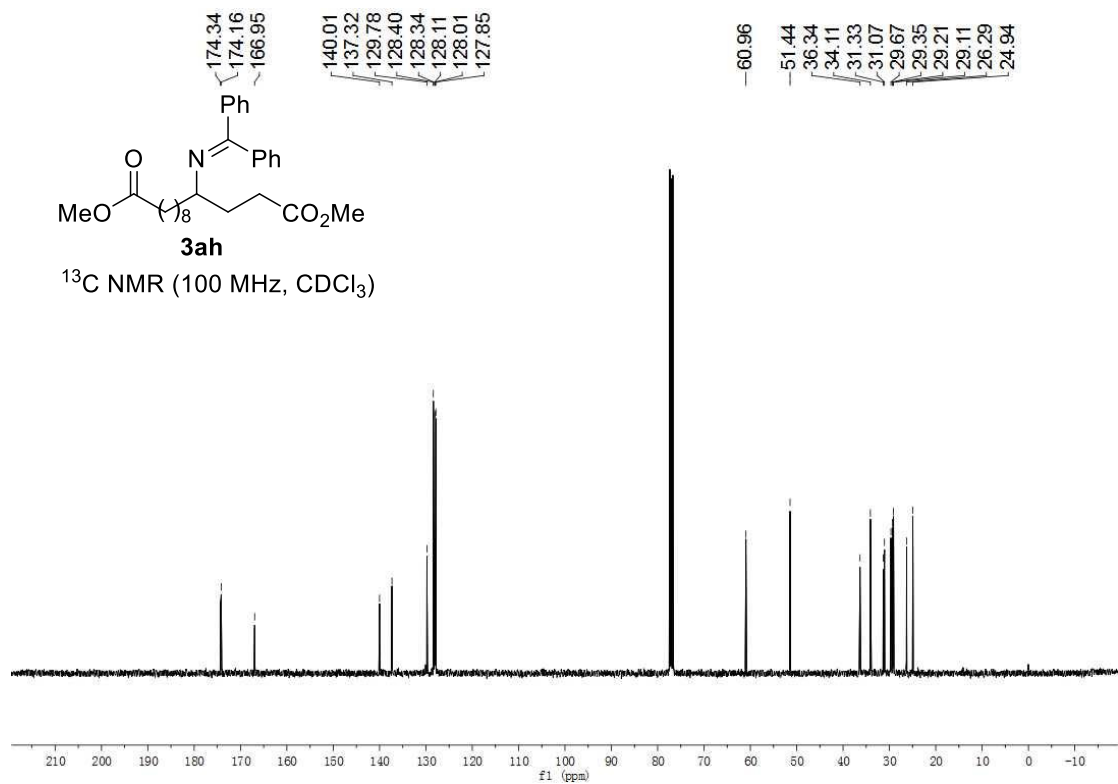
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1.21



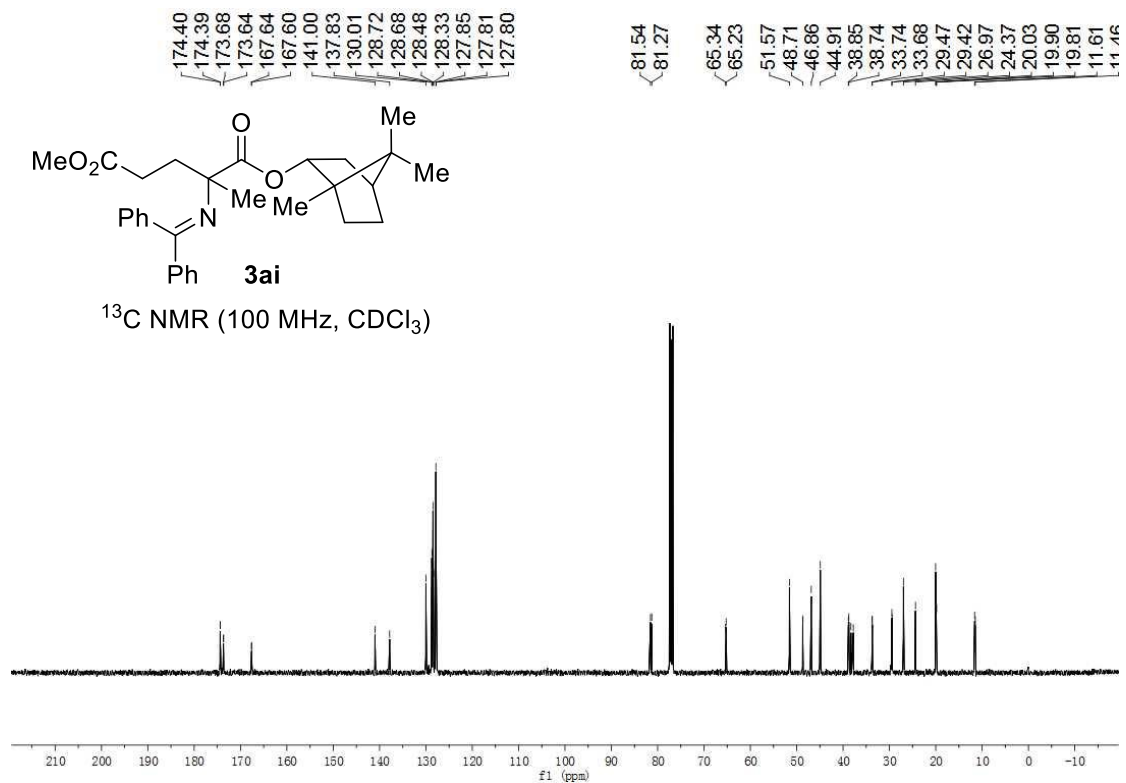
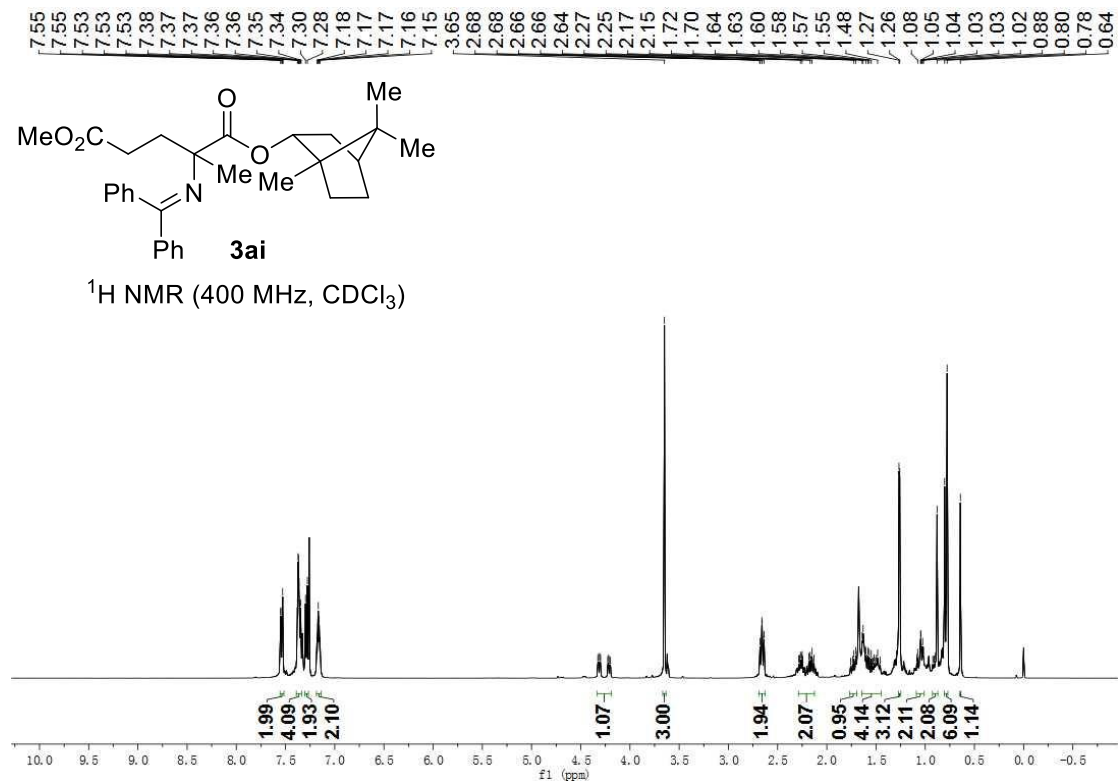
¹H NMR (400 MHz, CDCl₃)



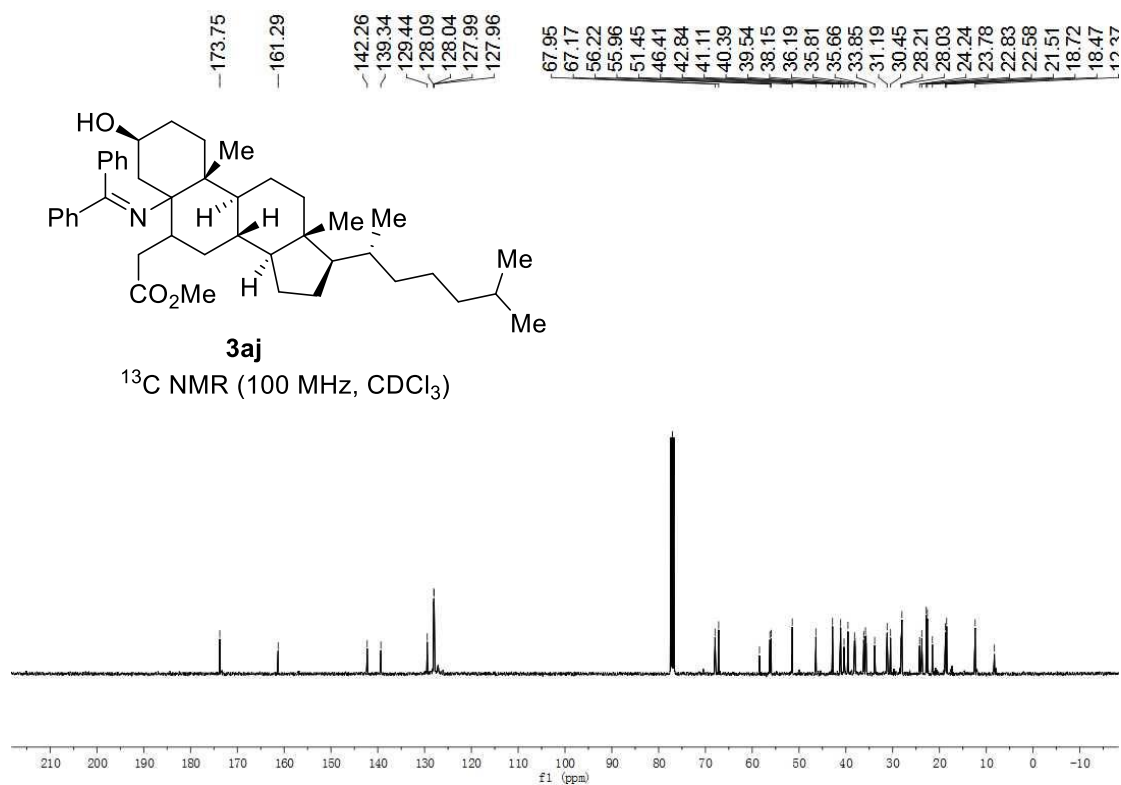
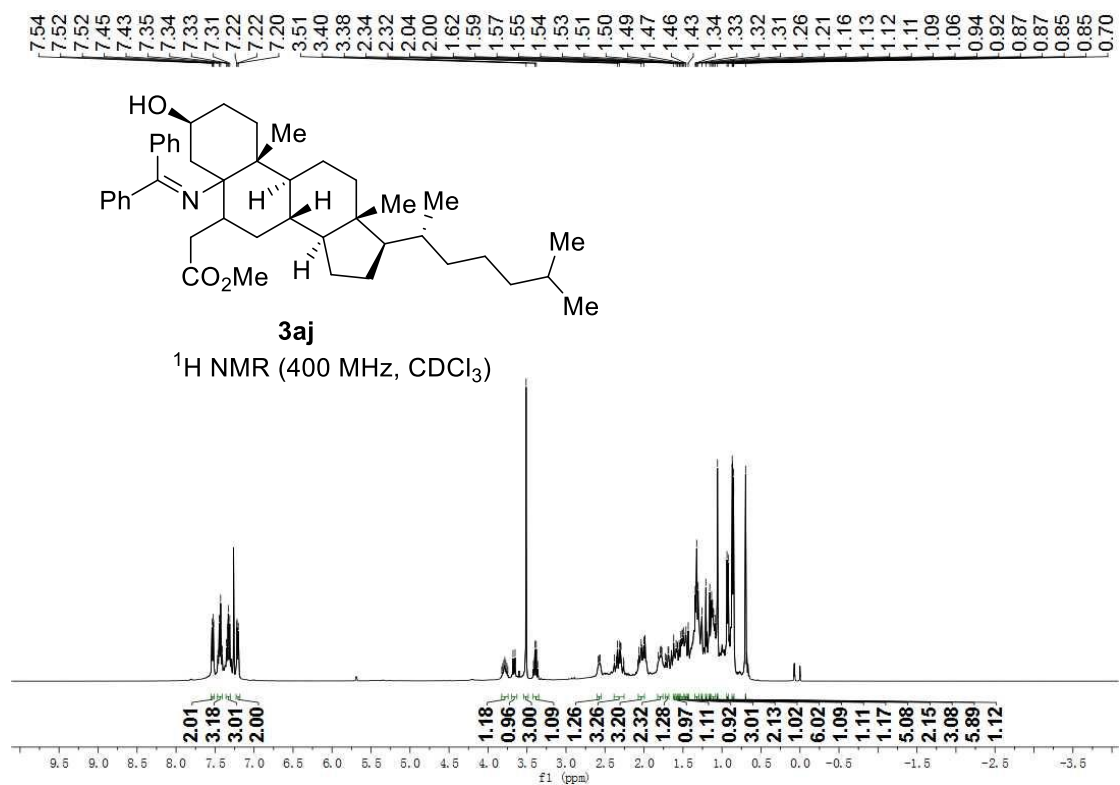
¹³C NMR (100 MHz, CDCl₃)



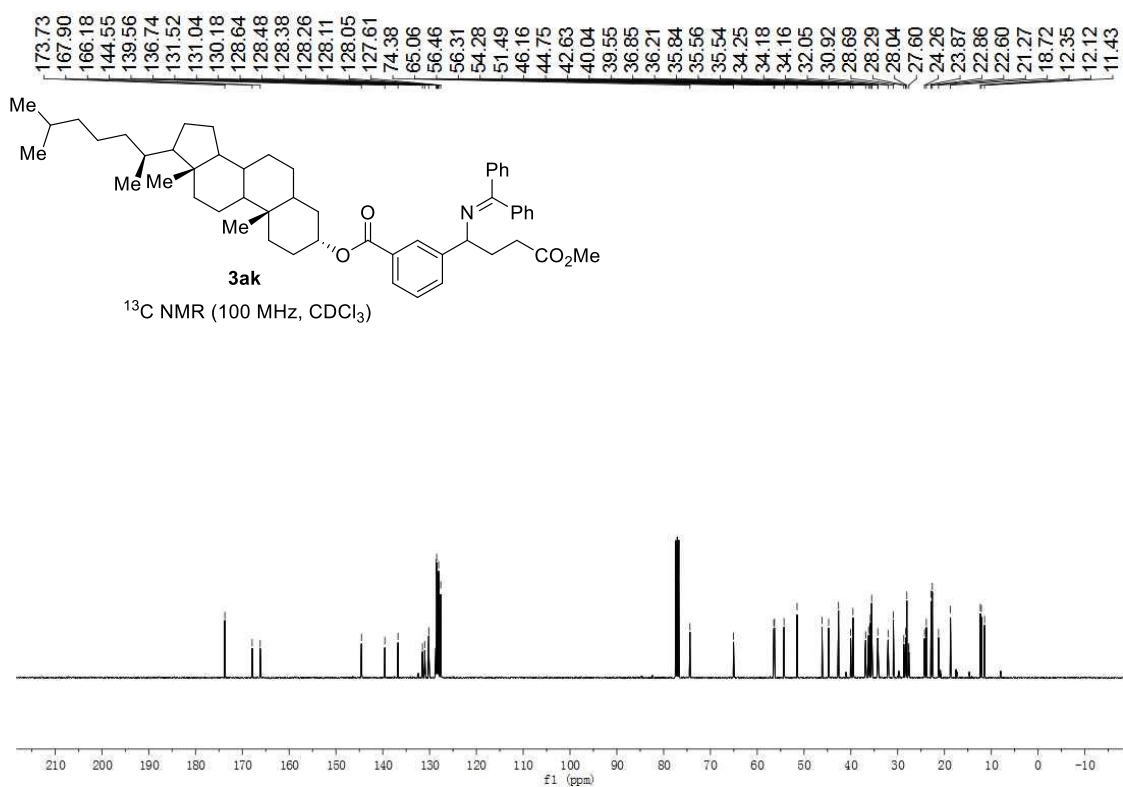
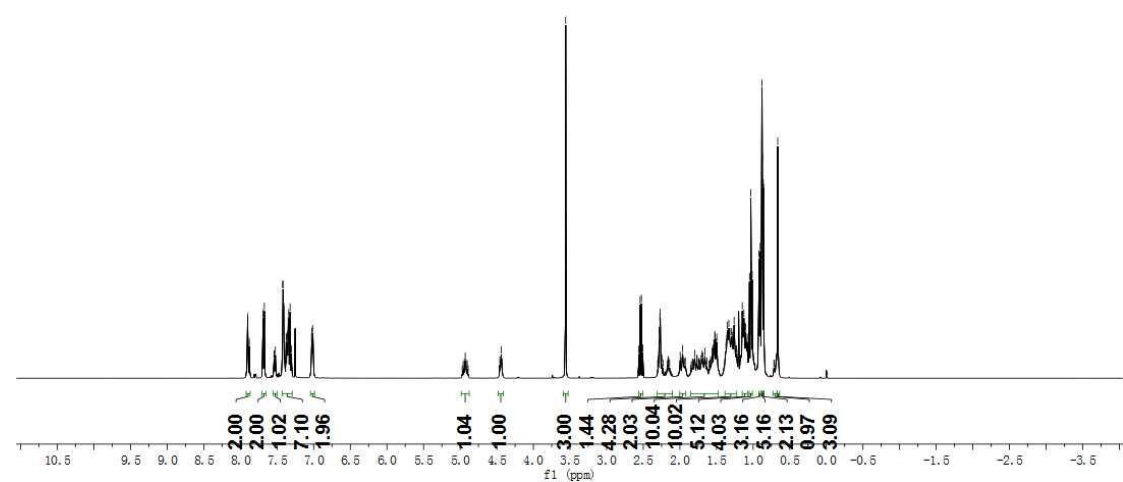
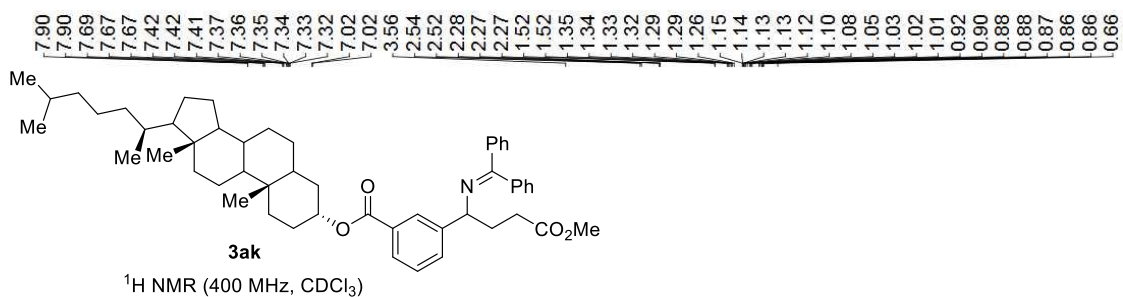
5-Methyl 1-((1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl) 2-((diphenylmethylene)amino)-2-methylpentanedioate (3ai)



Methyl 2-(5-((diphenylmethylene)amino)-3-hydroxy-10,13-dimethyl-17-(6-methylheptan-2-yl)hexadecahydro-1H-cyclopenta[a]phenanthren-6-yl)acetate (3aj)

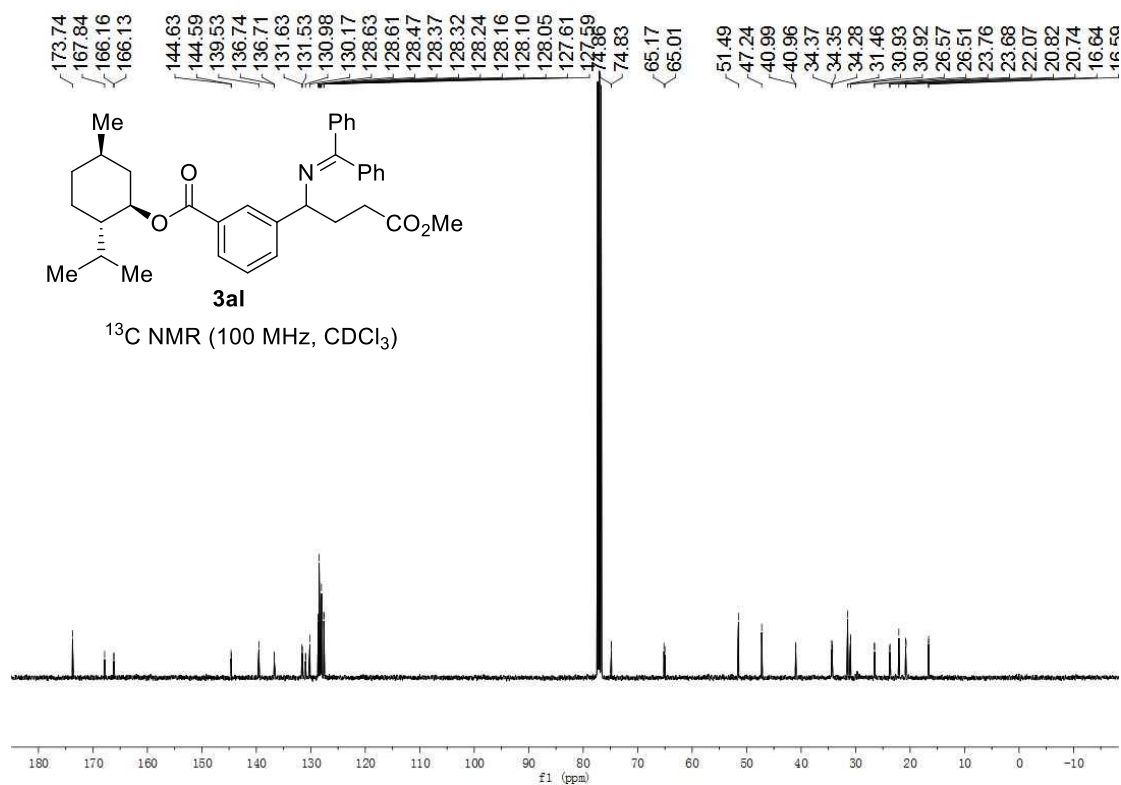
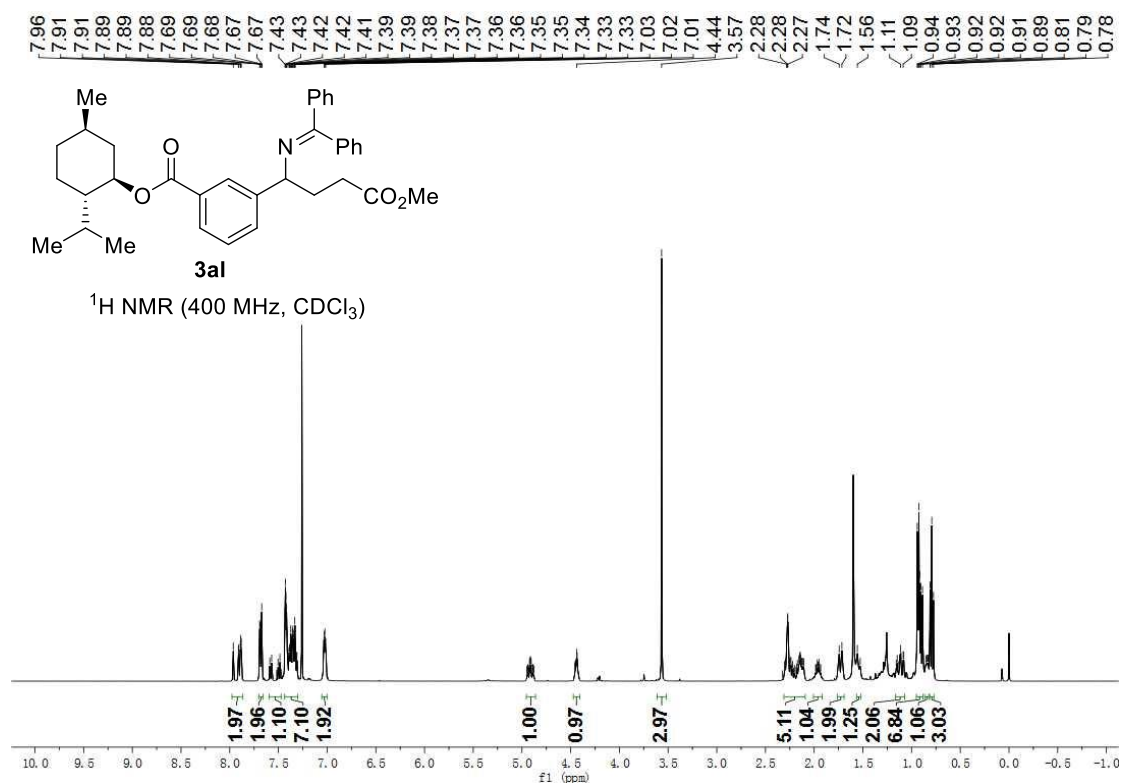


(3R,10S,13R)-10,13-Dimethyl-17-((*S*)-6-methylheptan-2-yl)hexadecahydro-1*H*-cyclo-penta[*a*]phenanthren-3-yl 3-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobuty-l)benzoate (**3ak**)

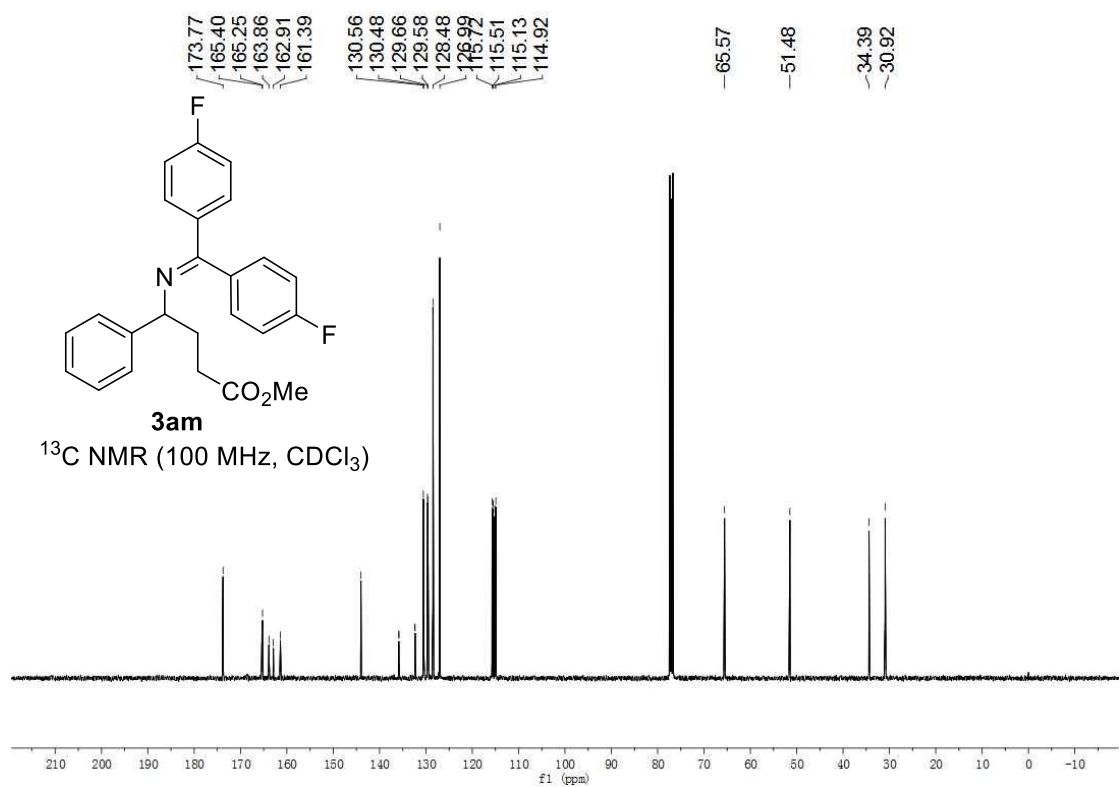
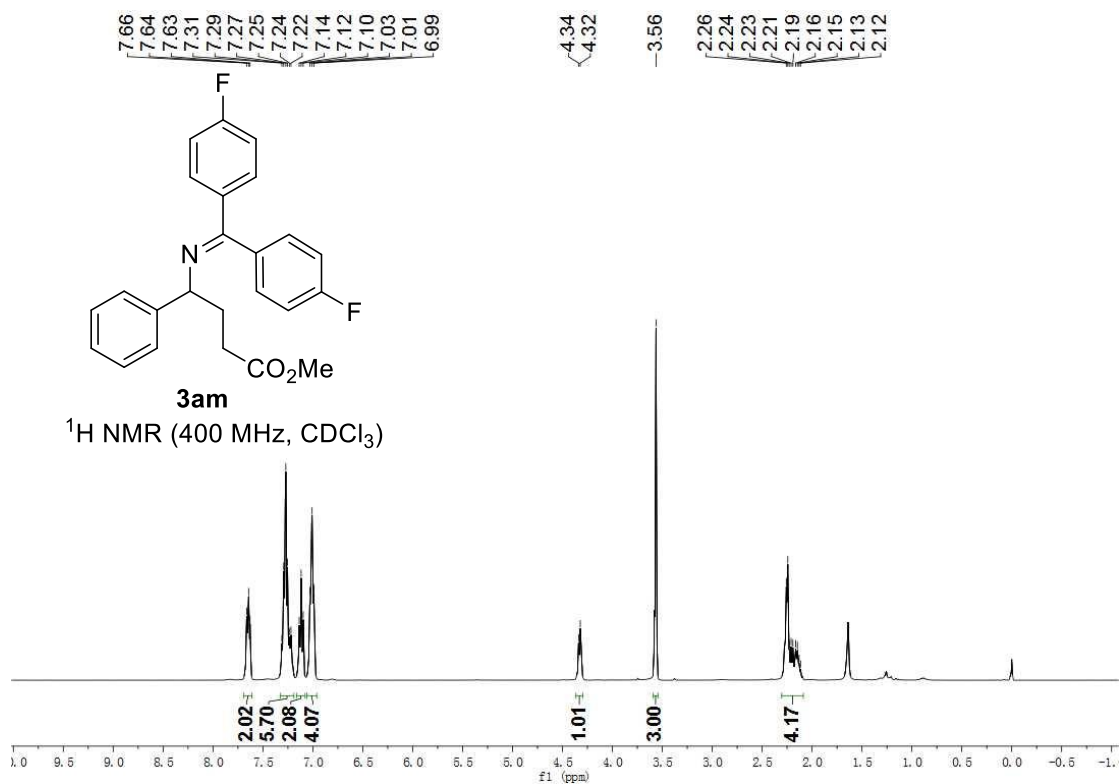


(1S,2S,5R)-2-Isopropyl-5-methylcyclohexyl

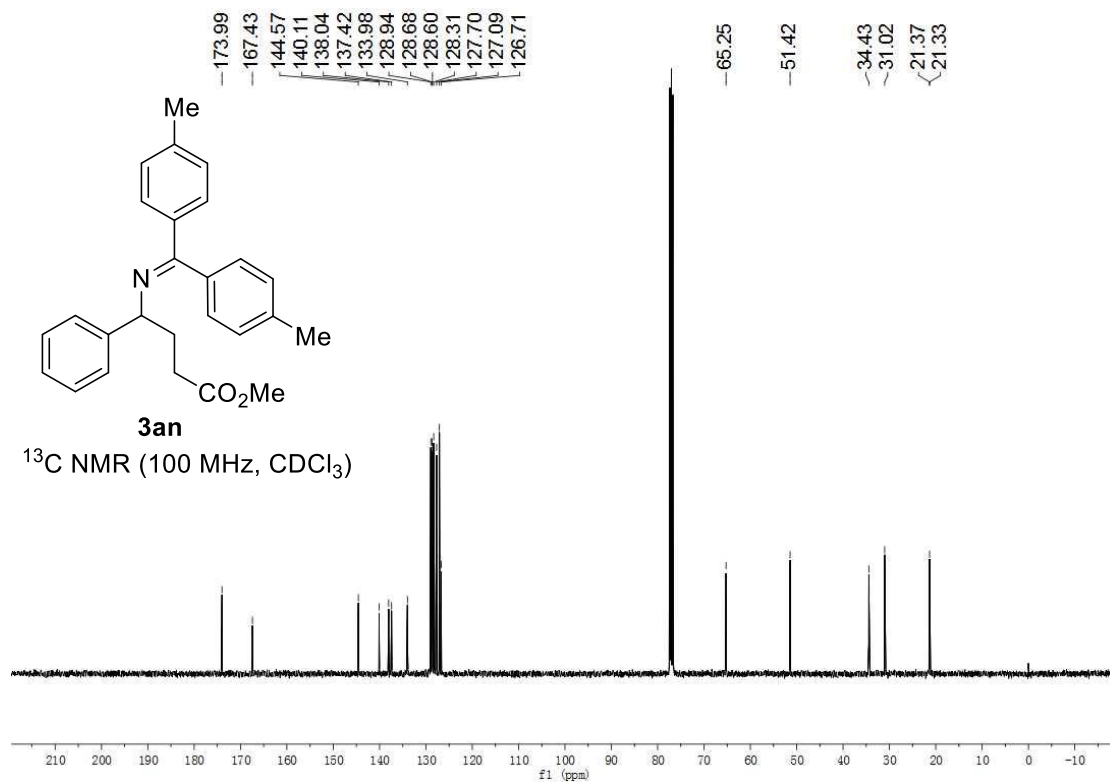
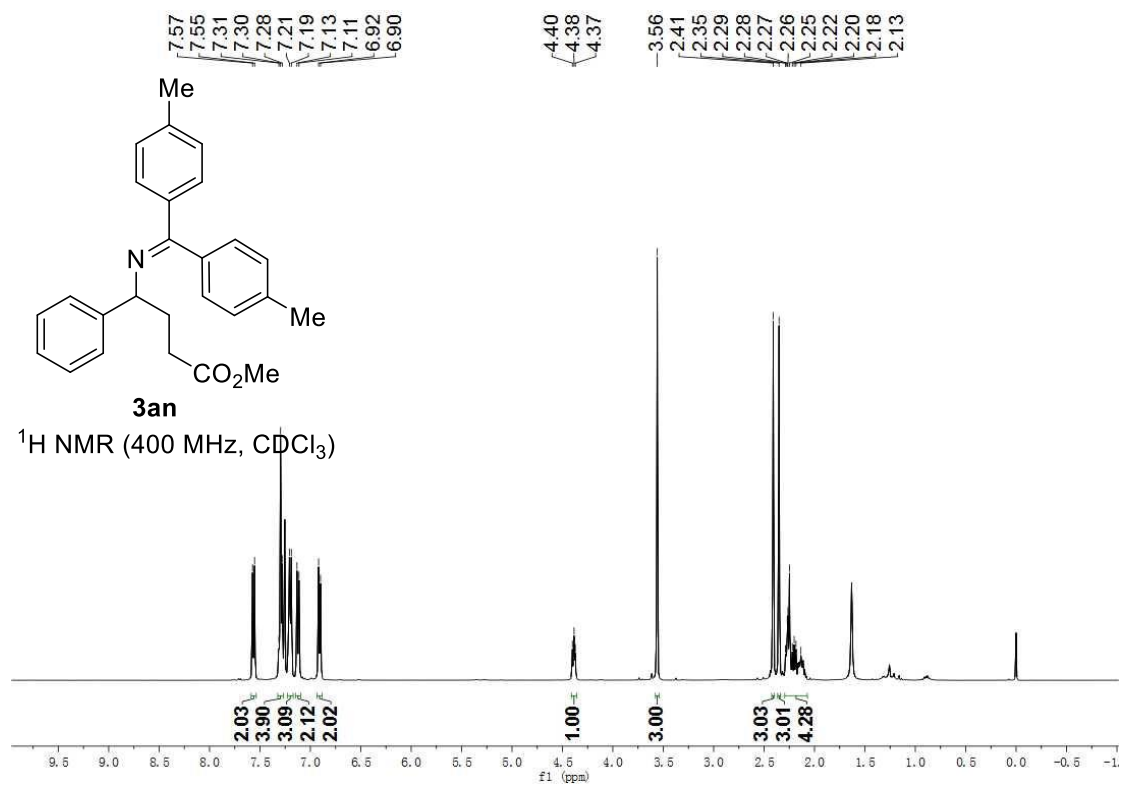
3-(1-((diphenylmethylene)amino)-4-methoxy-4-oxobutyl)benzoate (3al)



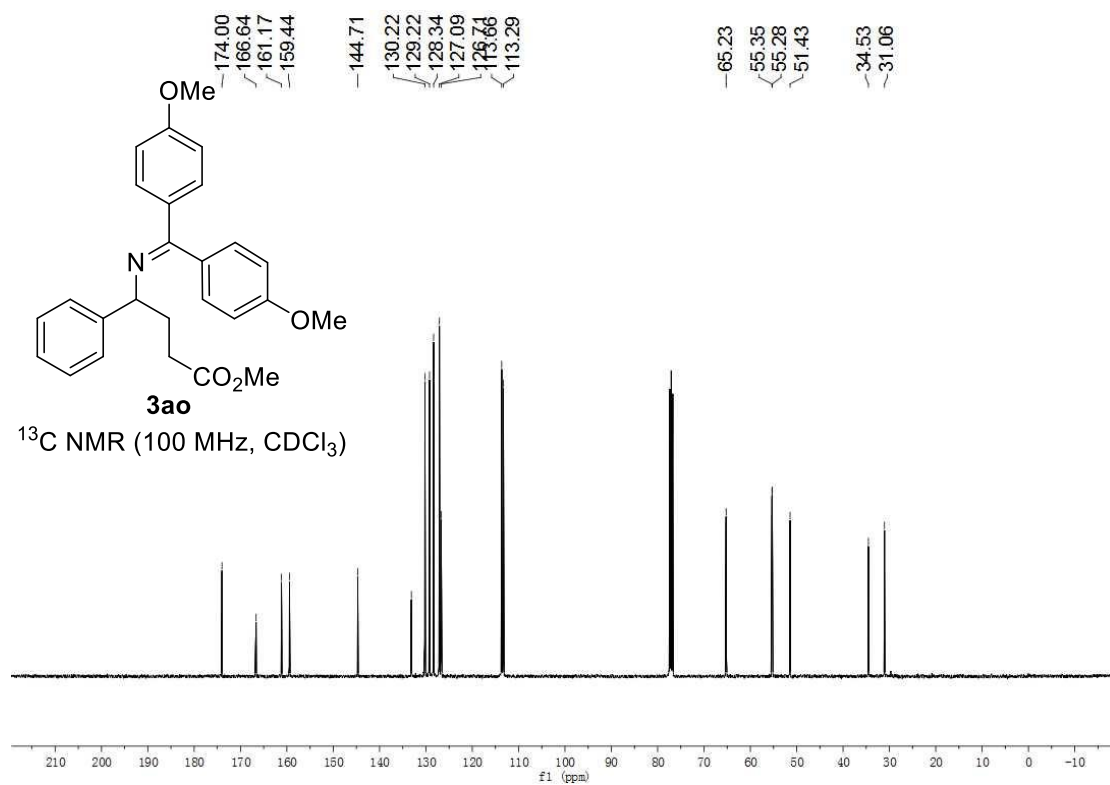
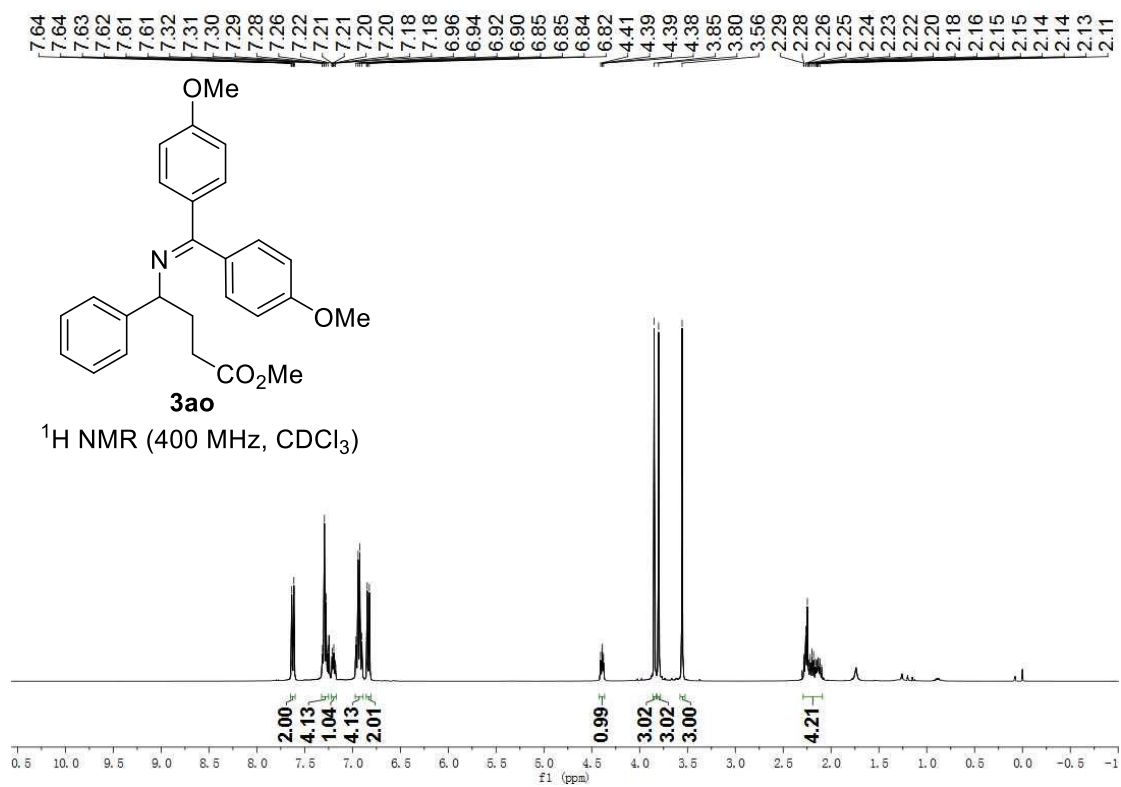
Methyl 4-((bis(4-fluorophenyl)methylene)amino)-4-phenylbutanoate (3am)



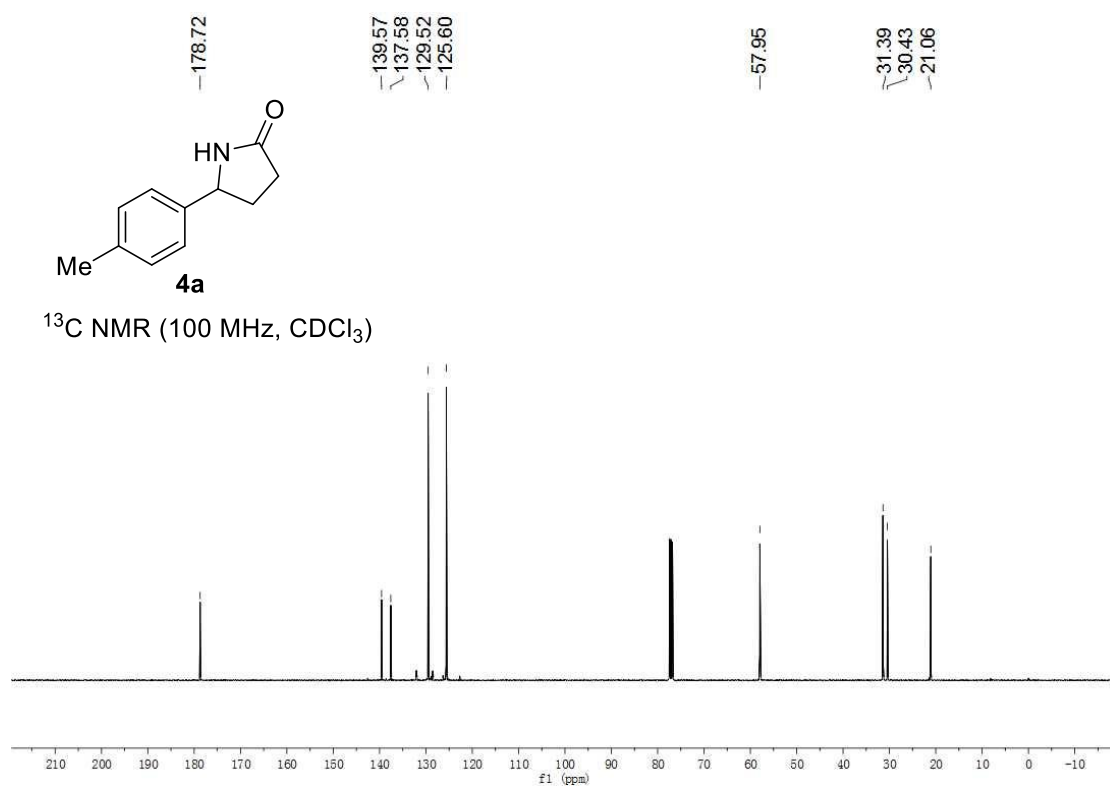
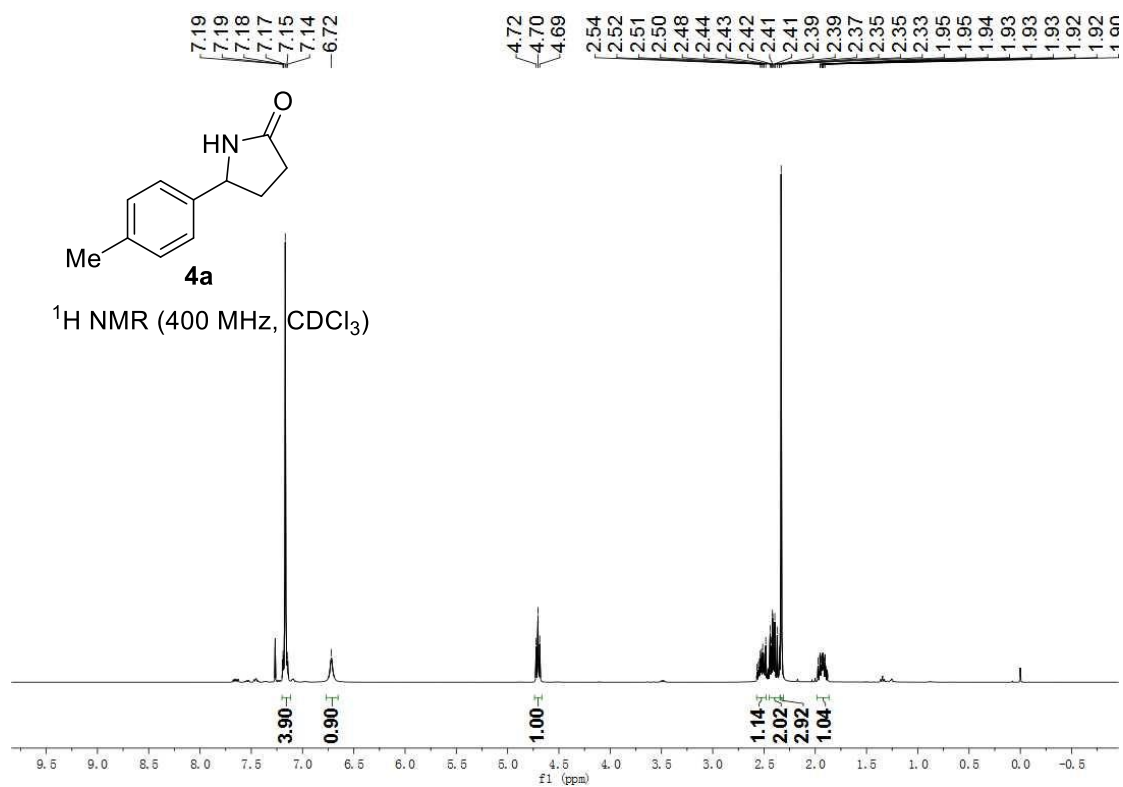
Methyl 4-((di-p-tolylmethylene)amino)-4-phenylbutanoate (3an)



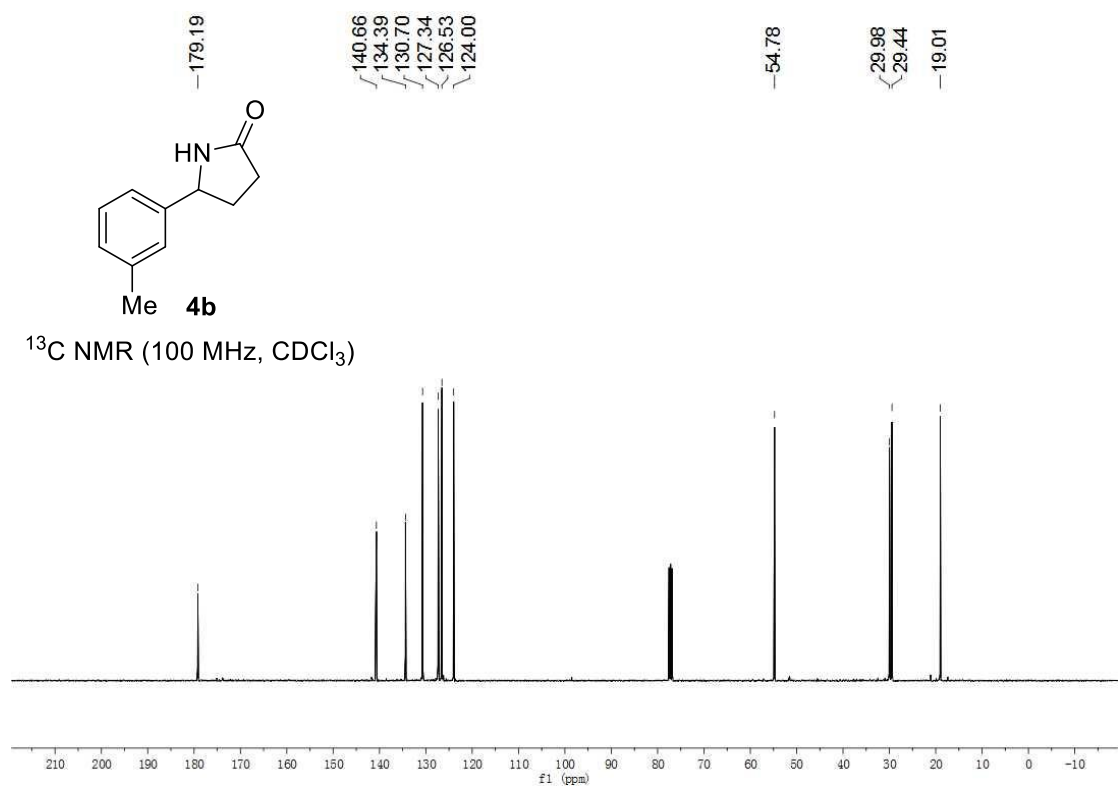
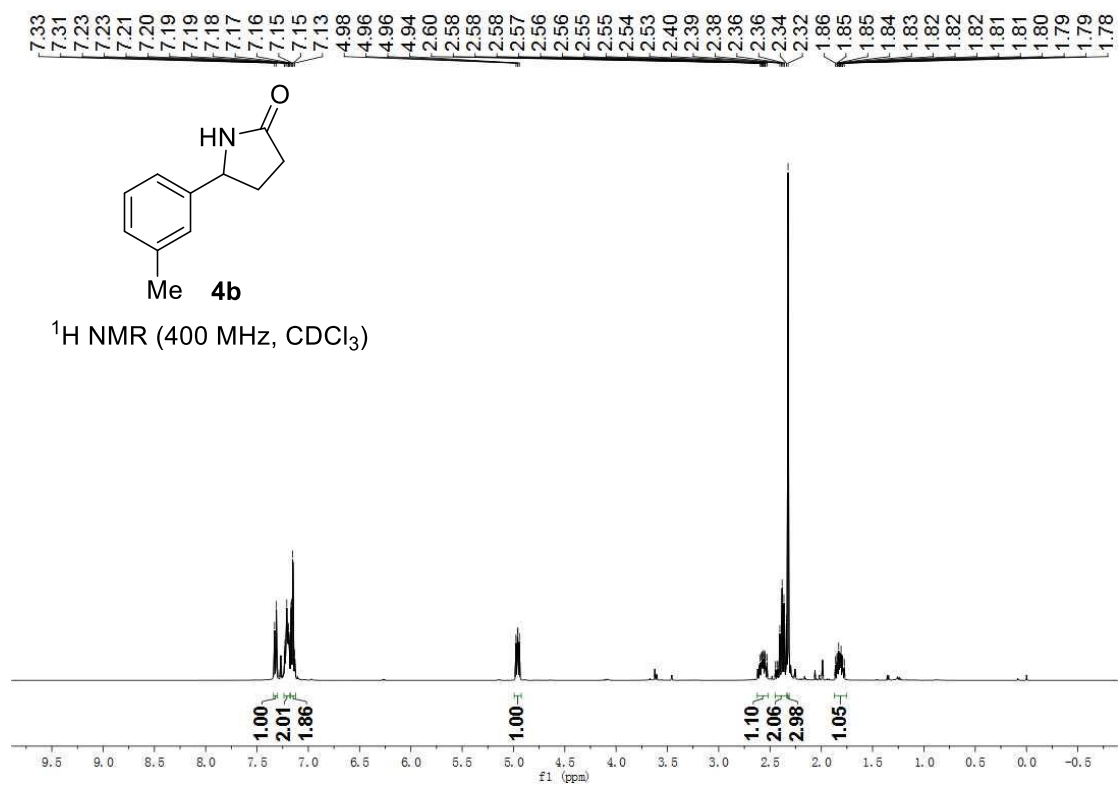
Methyl 4-((bis(4-methoxyphenyl)methylene)amino)-4-phenylbutanoate (3ao)



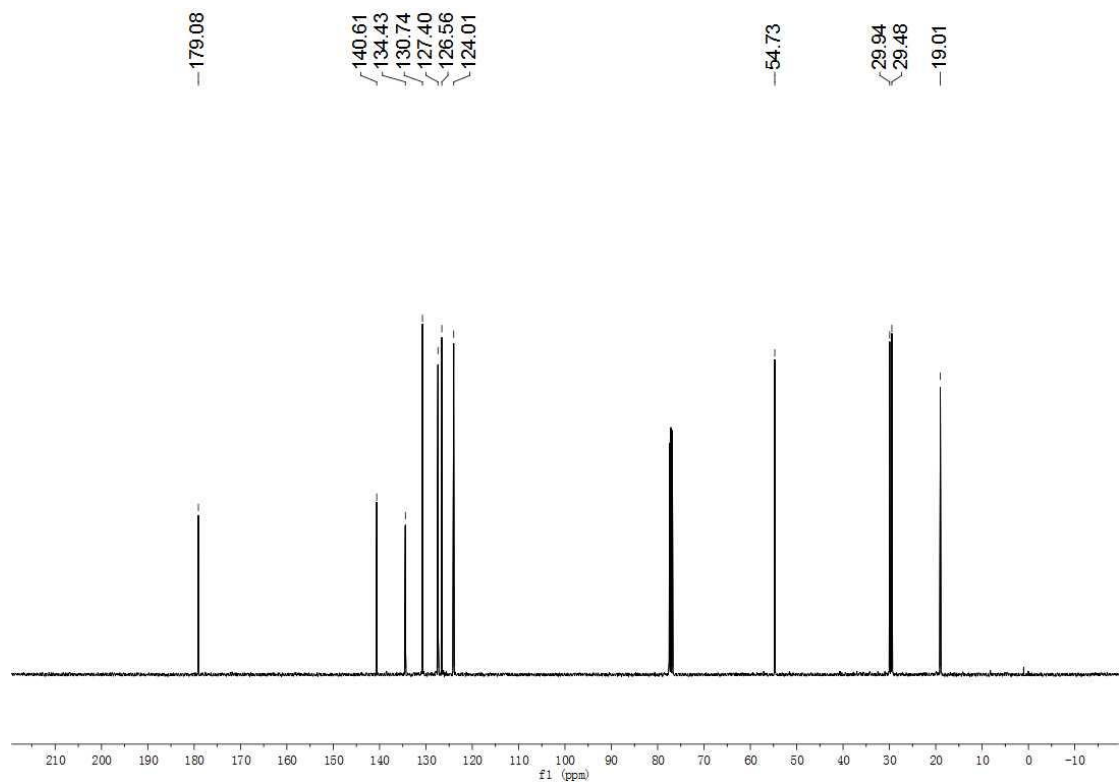
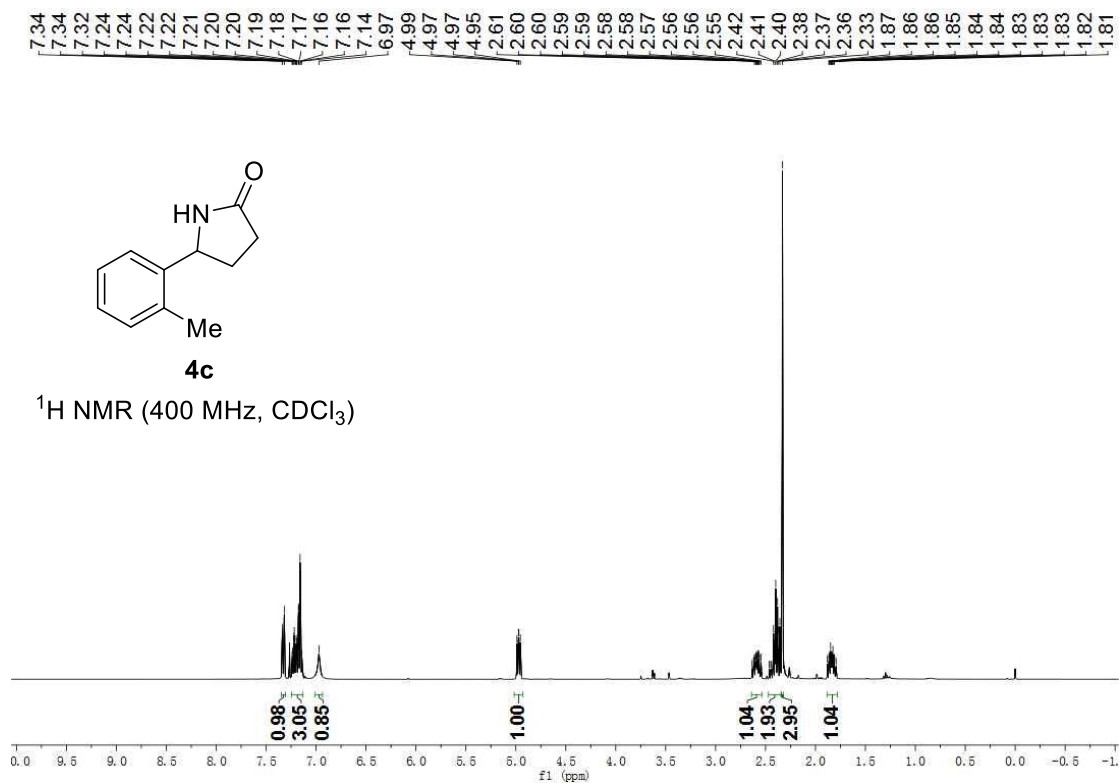
5-(p-Tolyl)pyrrolidin-2-one (4a)



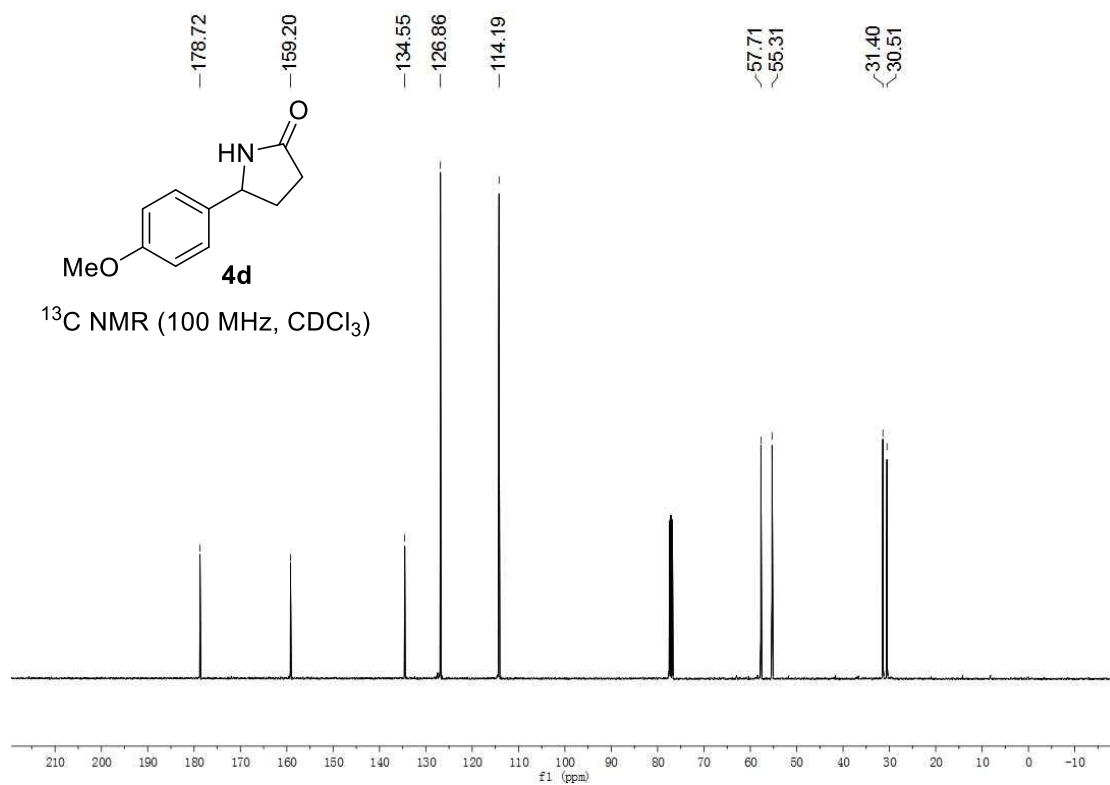
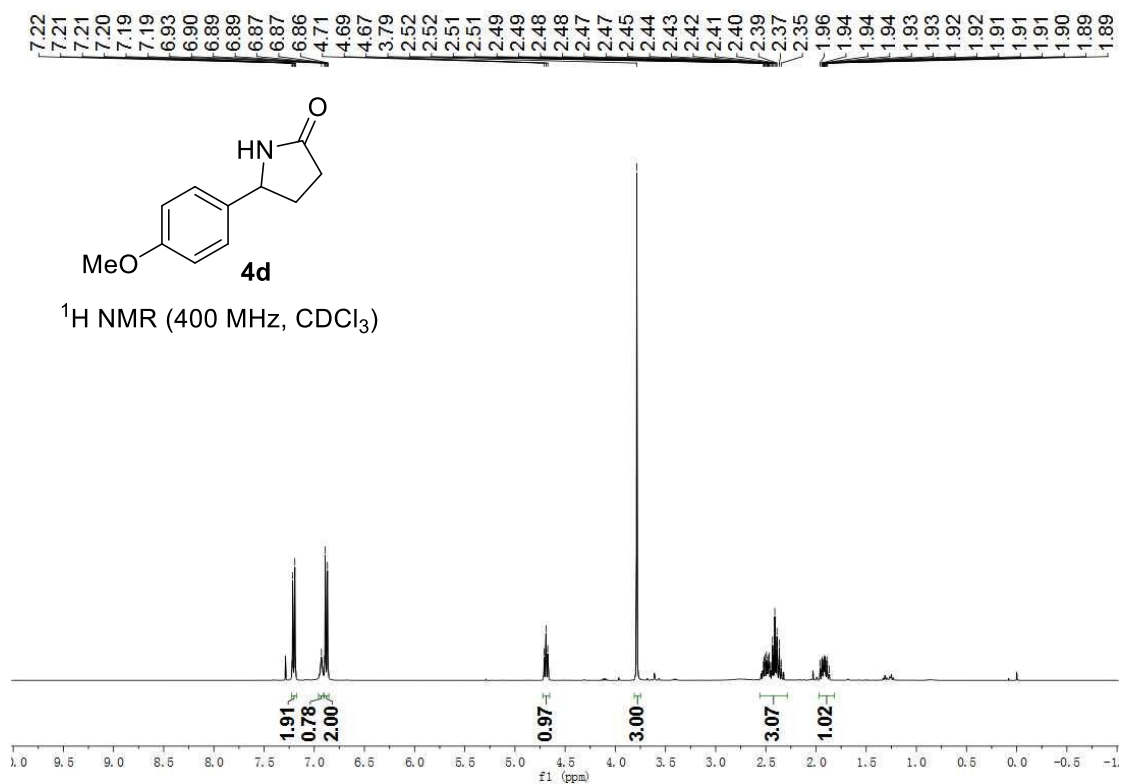
5-(*m*-Tolyl)pyrrolidin-2-one (**4b**)



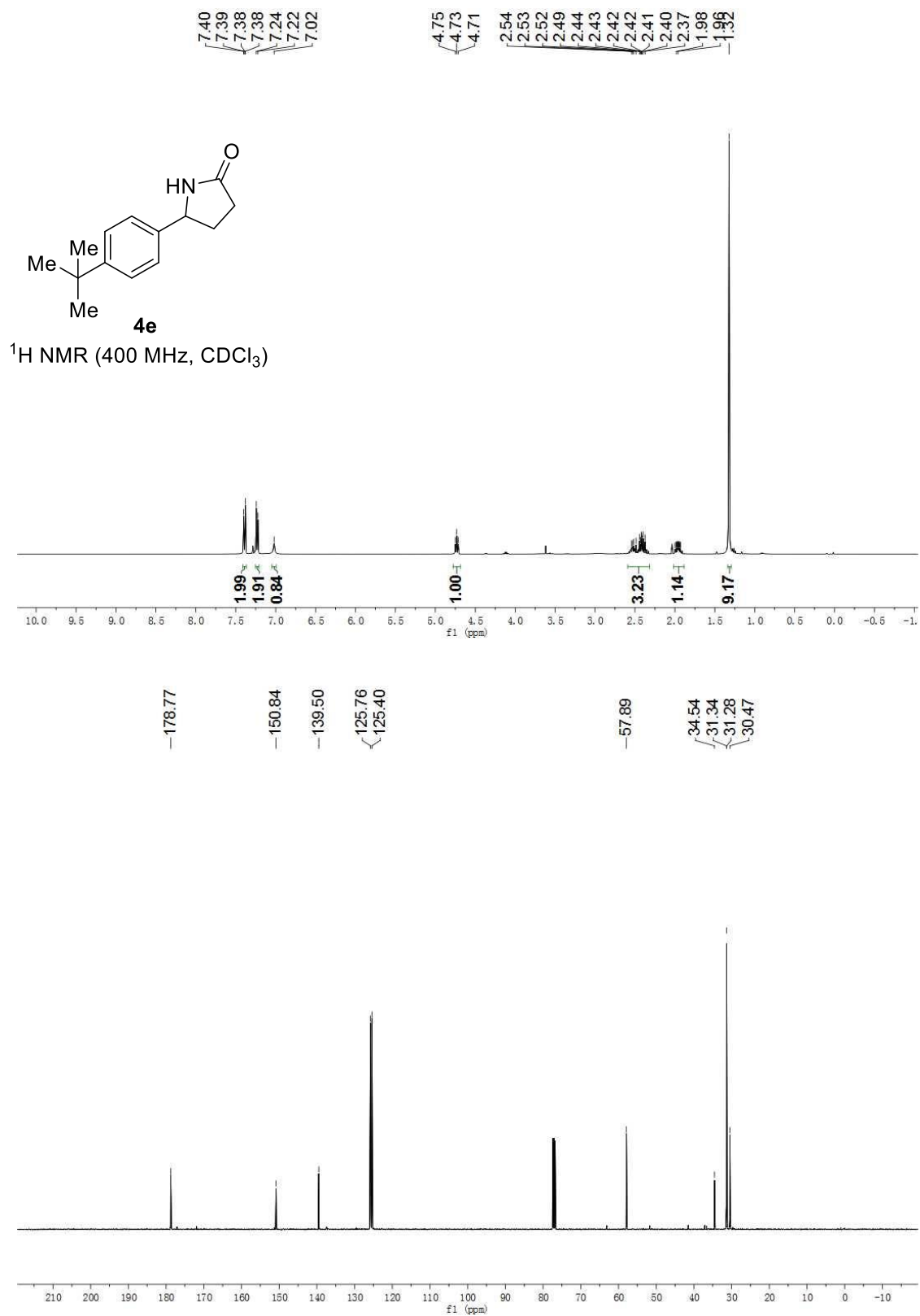
5-(*o*-Tolyl)pyrrolidin-2-one (4c)



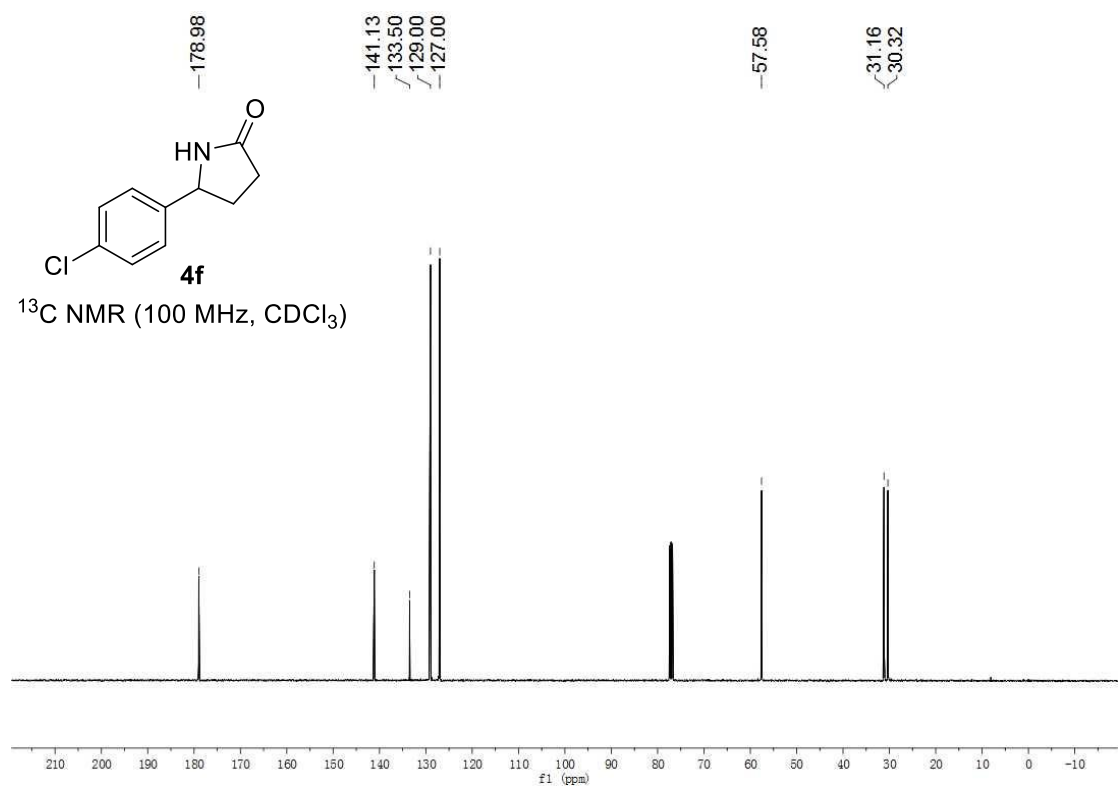
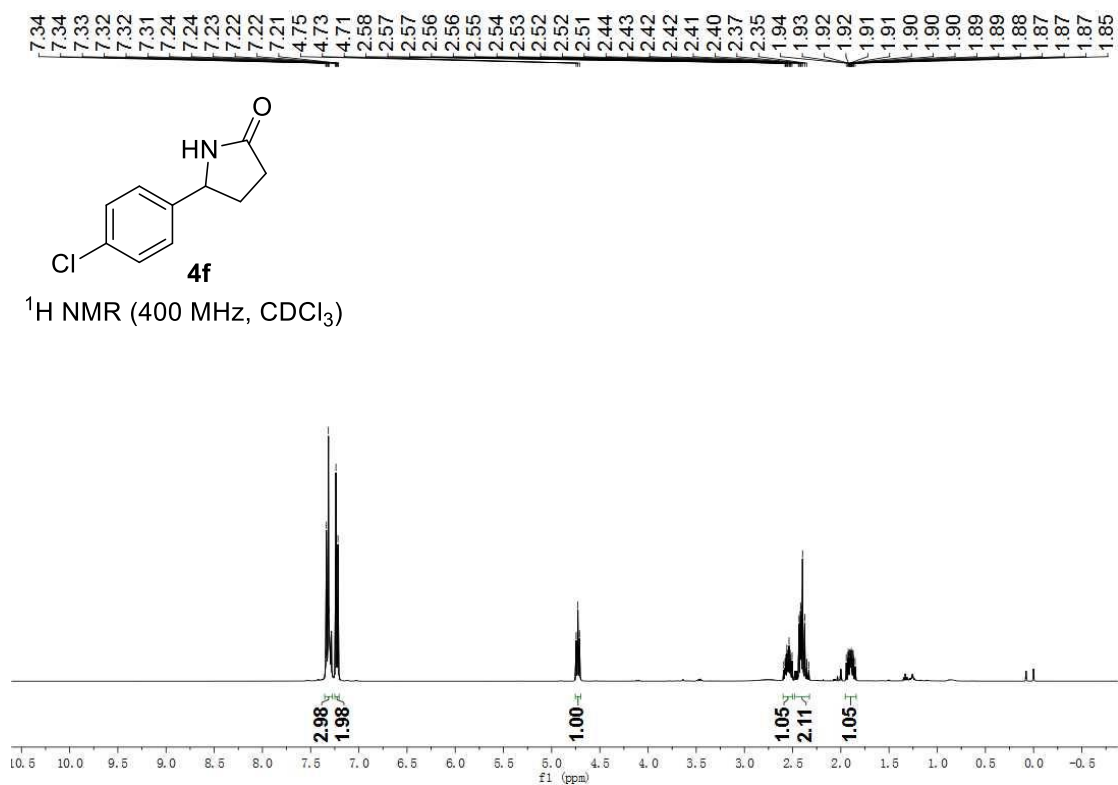
5-(4-Methoxyphenyl)pyrrolidin-2-one (4d)



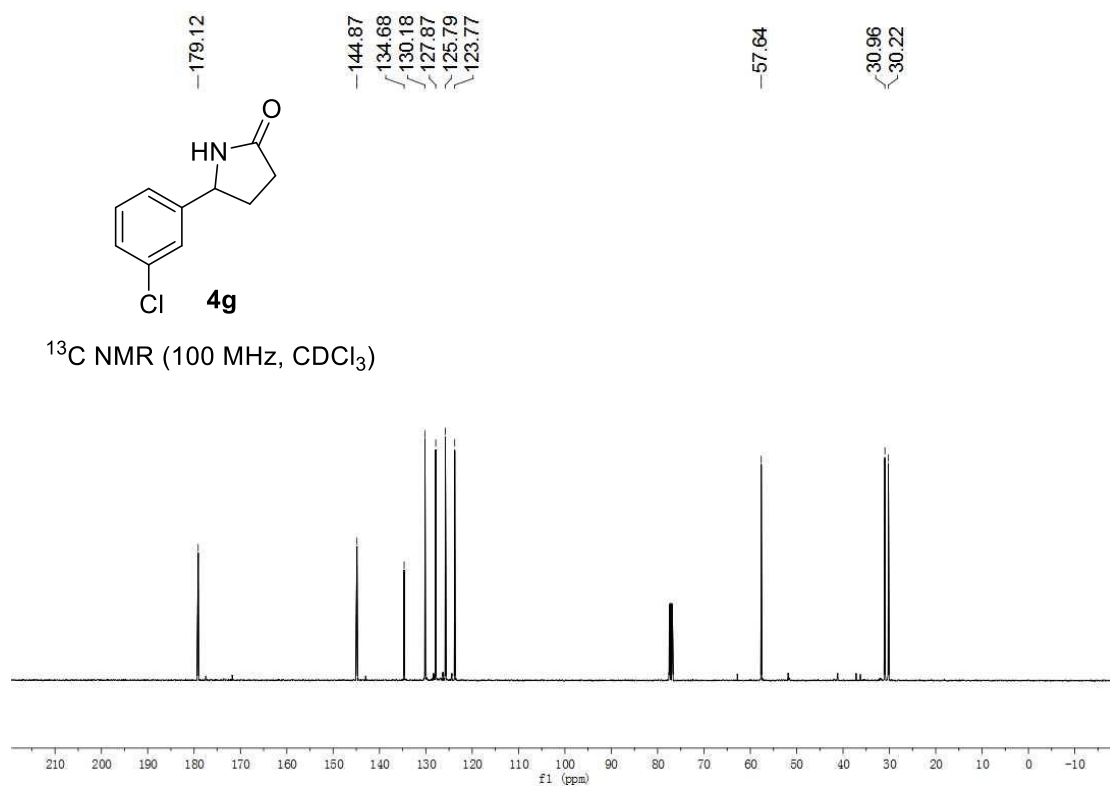
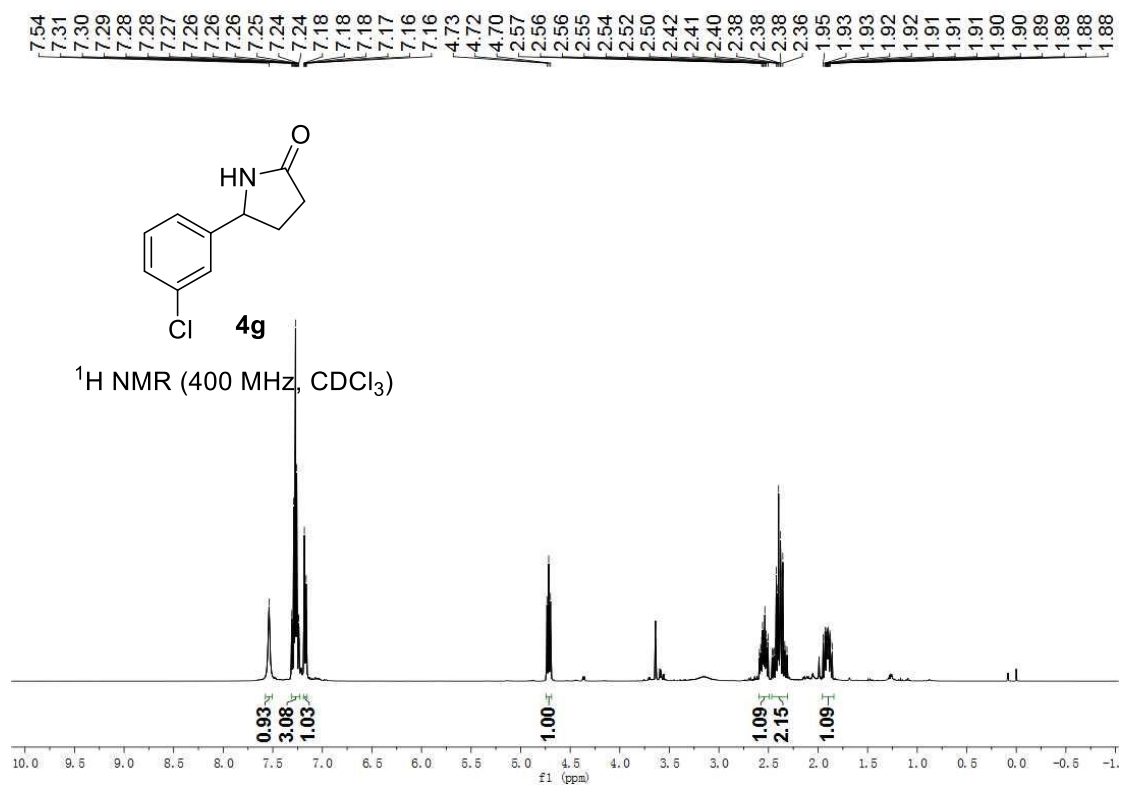
5-(4-(tert-Butyl)phenyl)pyrrolidin-2-one (4e)



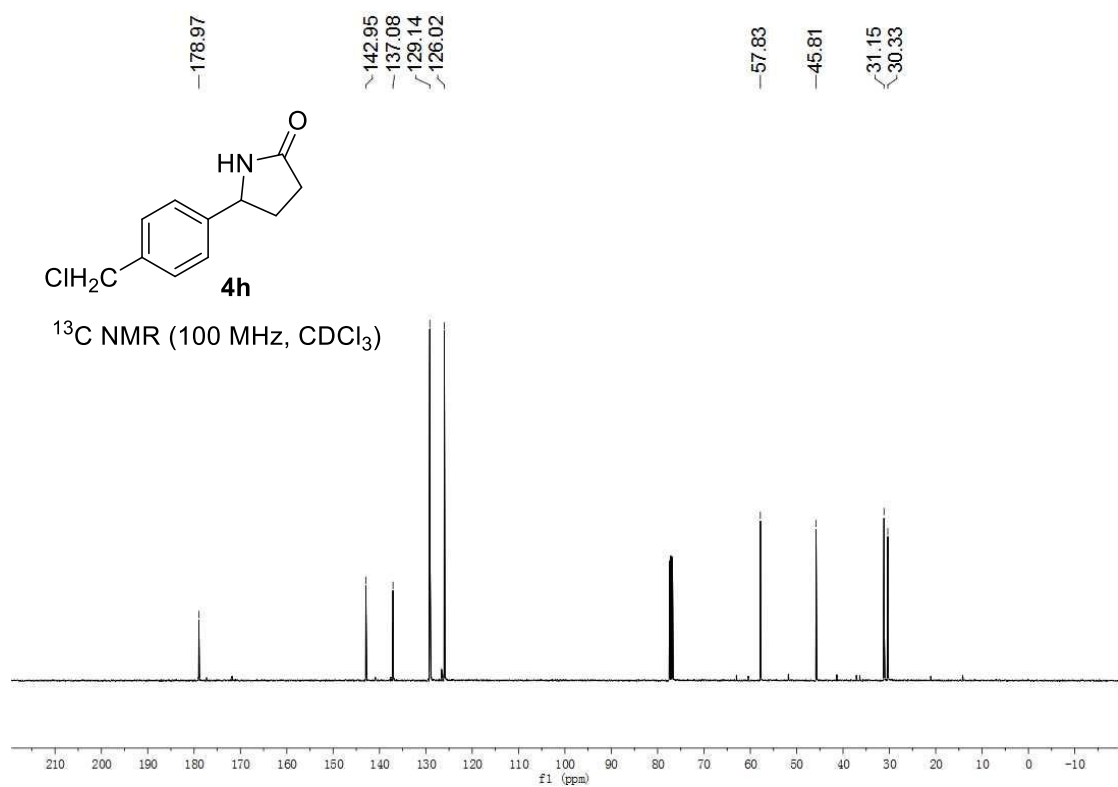
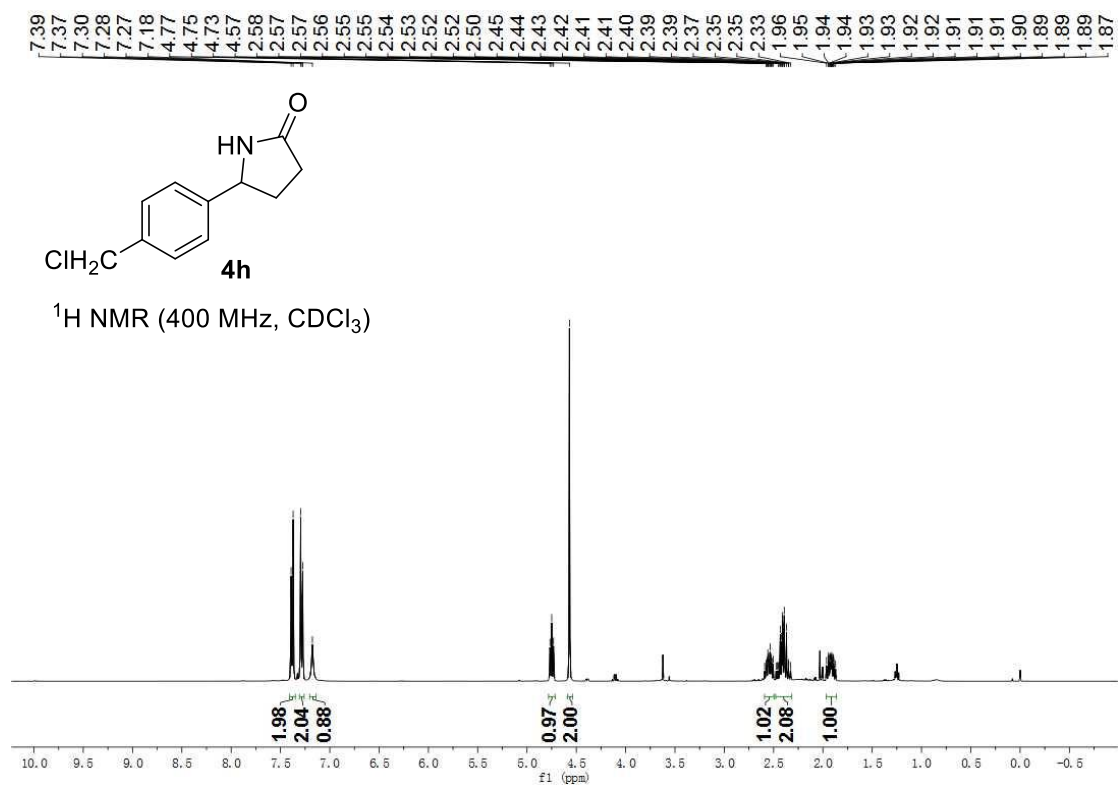
5-(4-Chlorophenyl)pyrrolidin-2-one (4f)



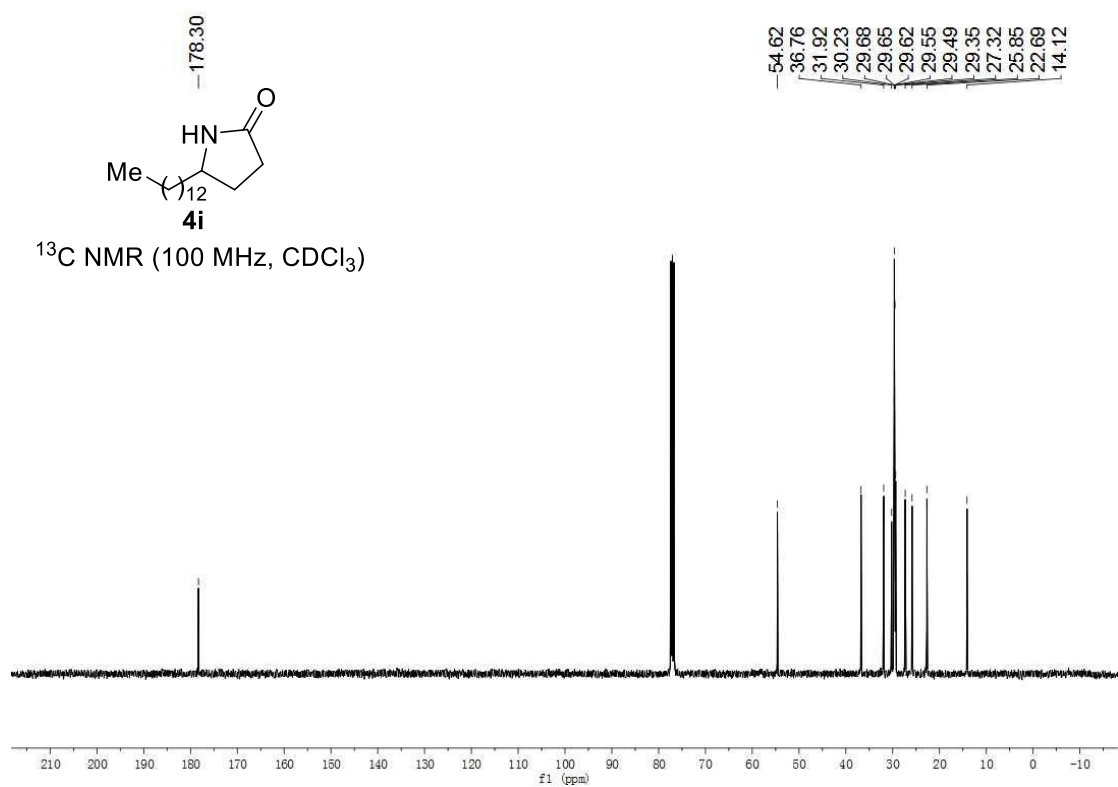
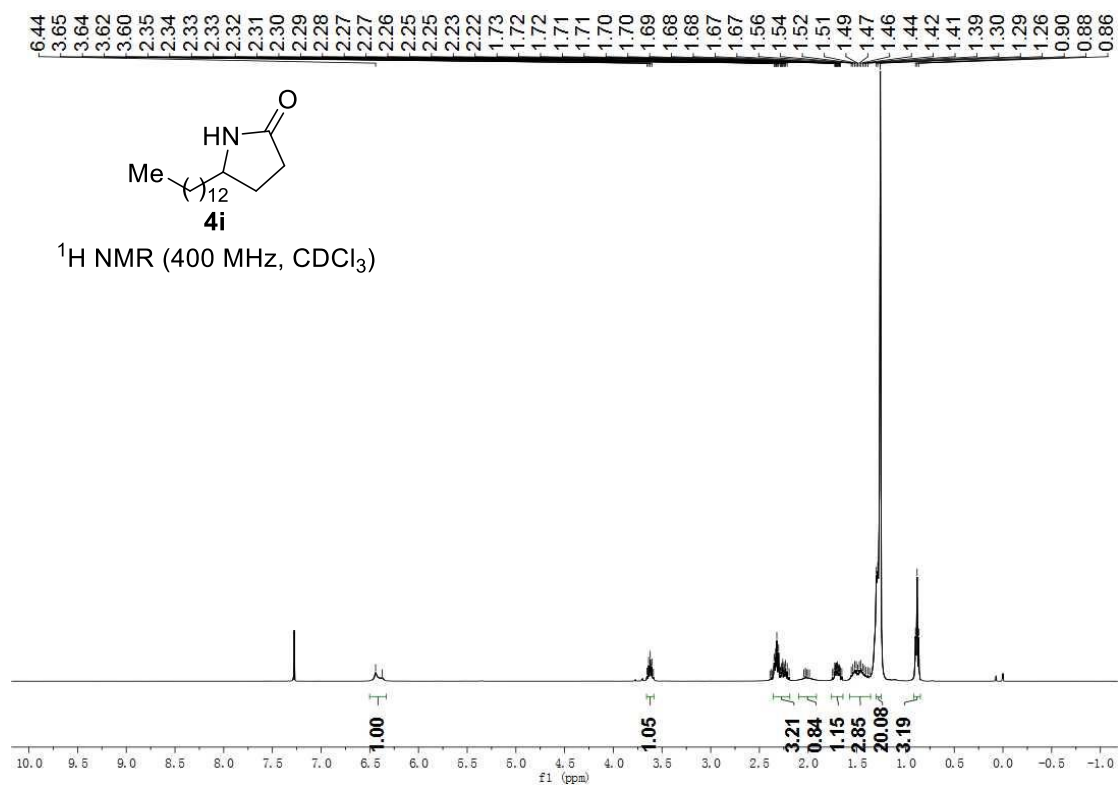
5-(3-Chlorophenyl)pyrrolidin-2-one (4g)



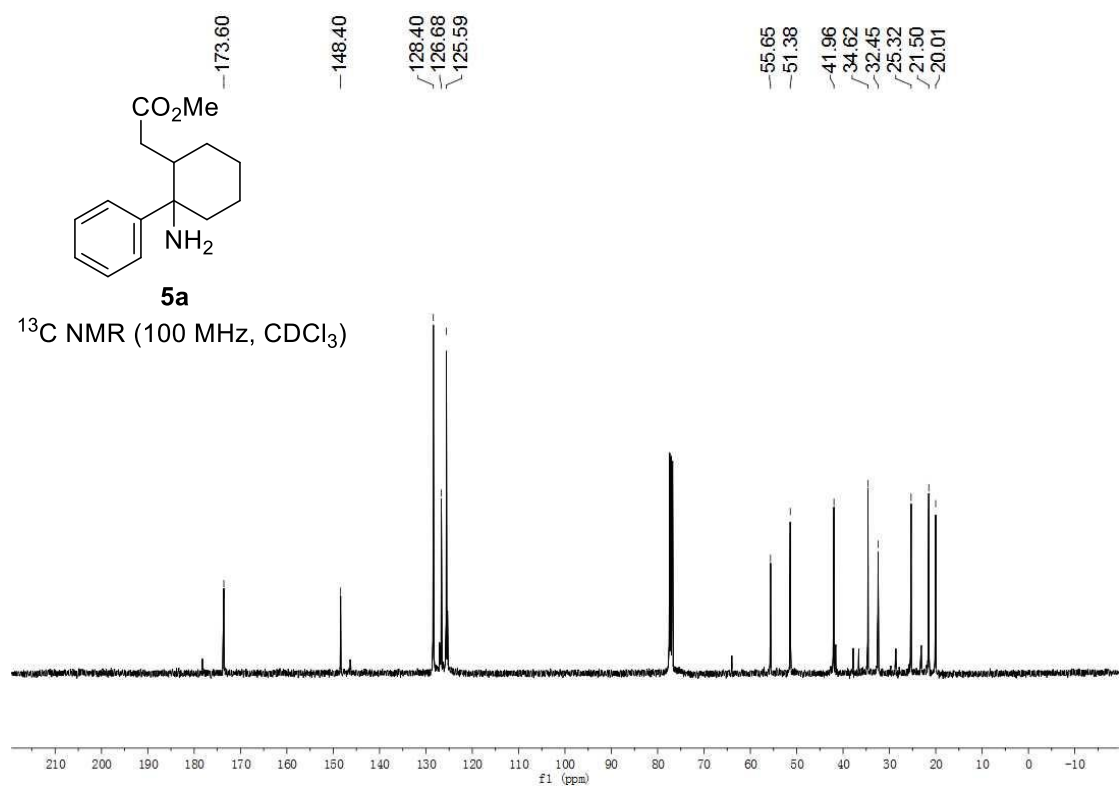
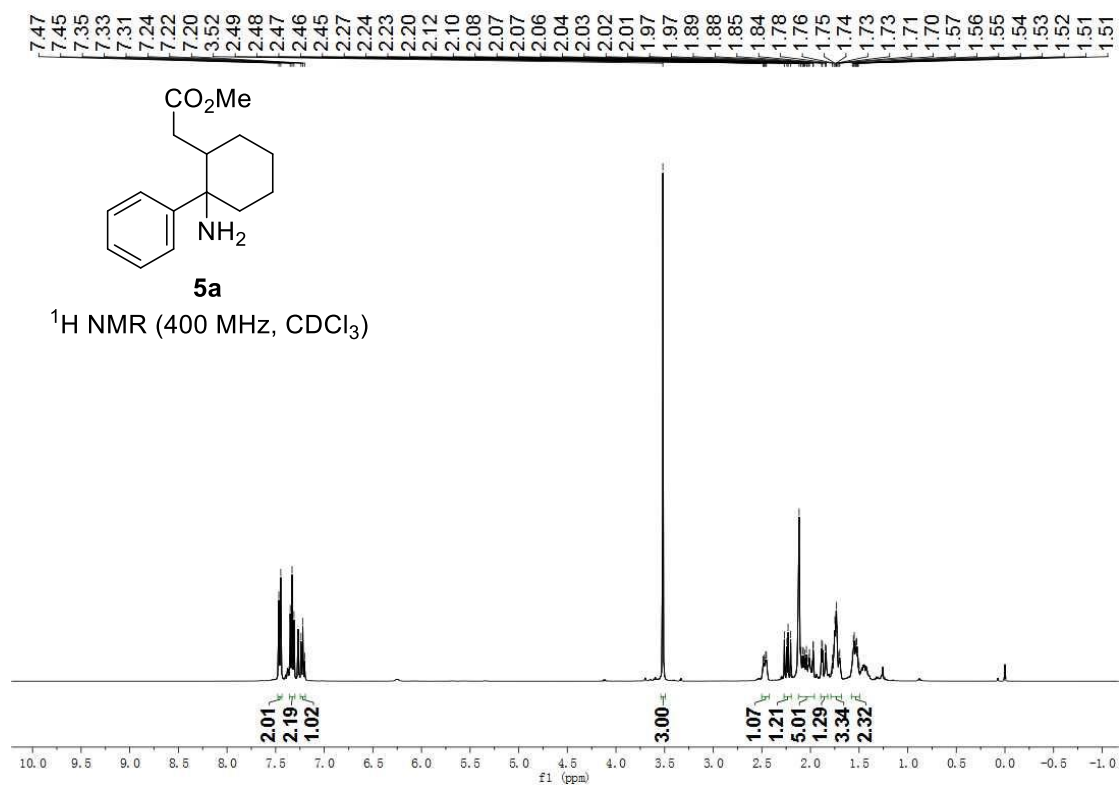
5-(4-(Chloromethyl)phenyl)pyrrolidin-2-one (4h)



5-Tridecylpyrrolidin-2-one (4i)



Methyl 2-(2-amino-2-phenylcyclohexyl)acetate (5a)



3-Carboxy-1-(p-tolyl)propan-1-aminium chloride (6b)

