

## Supporting Information

### A Novel Construction of Acetamides from Rhodium-Catalyzed Aminocarbonylation of DMC with Nitro compounds

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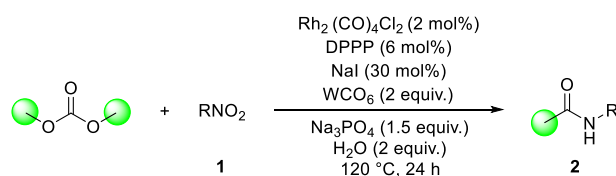
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## 1. General Information

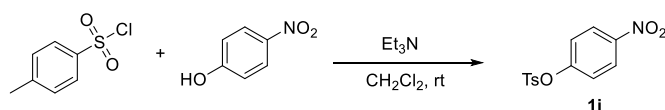
Unless otherwise noted, all reactions were carried out under a nitrogen atmosphere. All reagents were from commercial sources, all solvents are extra dry solvents and used as received without further purification. Column chromatography was performed on silica gel (200-300 meshes) using petroleum ether (b.p. 60-90 °C) and ethyl acetate as the eluents. <sup>1</sup>H and <sup>13</sup>C NMR spectra were taken on 400 MHz instruments and spectral data were reported in ppm relative to tetramethylsilane (TMS) as the internal standard and CDCl<sub>3</sub> or DMSO-D<sub>6</sub> as solvent. All coupling constants (*J*) are reported in Hz with the following abbreviations: s = singlet, d = doublet, dd = double doublet, ddd = double doublet of doublets, t = triplet, dt = double triplet, q = quartet, m = multiplet, br = broad. Gas (GC) analyses were performed on a Shimadzu GC-2014C chromatograph equipped with FID detector. Mass spectra (MS) were measured on spectrometer by direct inlet at 70 eV.

## 2. General Procedure

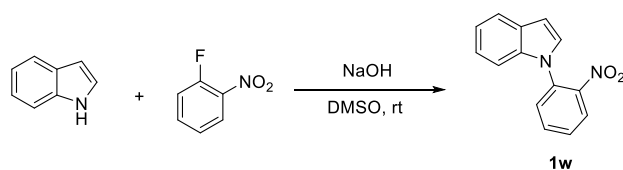


$\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. Nitrobenzenes (0.5 mmol),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via a syringe. The tube was sealed, and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the crude mixture was filtered and concentrated under vacuum. The crude product was purified by column chromatography (PE/EA=1/1) on silica gel to afford the desired acetamide products.

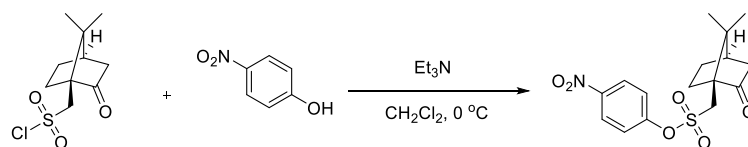
## 3. Synthesis of **1i**<sup>1</sup>, **1w**<sup>2</sup>, **4**<sup>1</sup> and **6**<sup>3</sup>



An oven-dried round-bottom flask was charged under air with 4-methylbenzenesulfonyl chloride (12 mmol, 2.28 g), DCM (40 mL), 4-nitrophenol (10 mmol, 1.39 g), and triethylamine (15 mmol, 1.52 g) was stirred at 0 °C until completion (monitored by TLC). The reaction mixture was then diluted with 40 mL of  $\text{H}_2\text{O}$  and extracted three times with 25 mL of DCM. The combined organic phases were dried over magnesium sulfate, filtered through short celite pad, and concentrated under reduced pressure. Purification by column chromatography (PE/EA=10/1) afforded **1i** as a white solid (2.34 g, 80%).



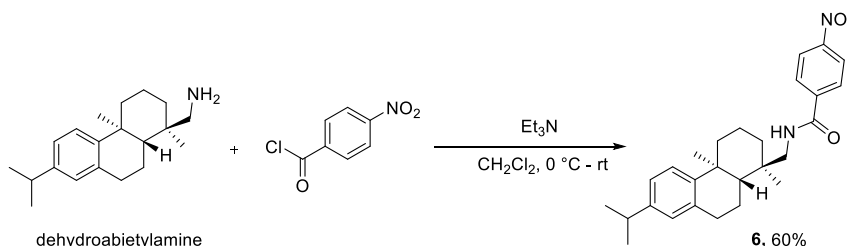
A mixture of indole (5 mmol, 0.59 g), 1-fluoro-2-nitrobenzene (5 mmol, 0.71 g) and NaOH (5 mmol, 0.20 g) in DMSO (5 mL) was stirred vigorously for 2 h at room temperature. After cooling, the reaction mixture was poured into water (30 mL) and extracted with EtOAc three times ( $3 \times 30$  mL). The combined organic layers were dried with  $\text{Na}_2\text{SO}_4$  and concentrated under reduced pressure. Purification by column chromatography (PE/DCM=5/1) afforded **1w** as a light yellow solid (1.07 g, 90%).



D-10-Camphorsulfonyl chloride

**4**, 70%

An oven-dried round-bottom flask was charged under air with D-10-Camphorsulfonyl chloride (12 mmol, 3.00 g), DCM (40 mL), 4-nitrophenol (10 mmol, 1.39 g), and triethylamine (15 mmol, 1.52 g) was stirred at 0 °C until completion (monitored by TLC). The reaction mixture was then diluted with 40 mL of H<sub>2</sub>O and extracted three times with 25 mL of DCM. The combined organic phases were dried over magnesium sulfate, filtered through short celite pad, and concentrated under reduced pressure. Purification by column chromatography (PE/EA= 10/1) afforded **4** as a white solid (2.47 g, 70%).

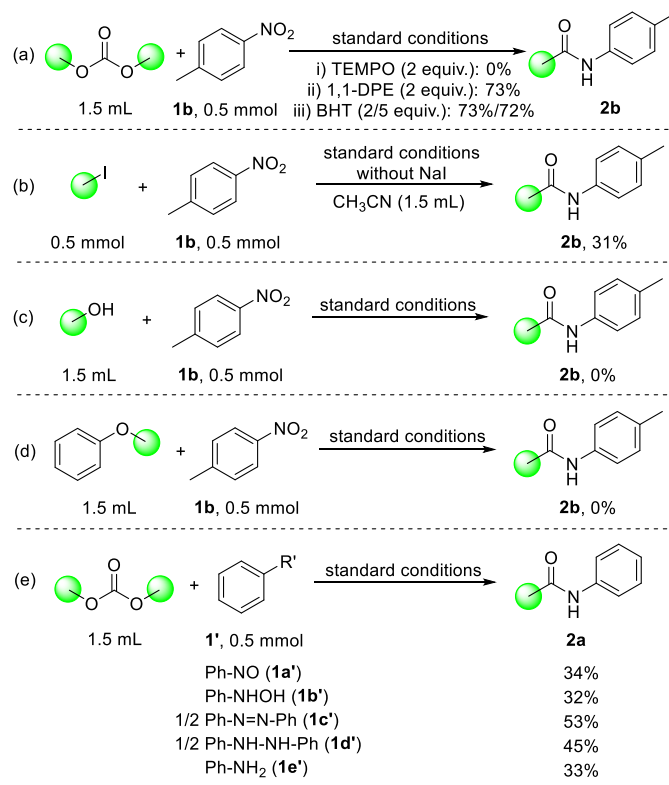


dehydroabietylamine

**6**, 60%

An oven-dried round-bottom flask was charged under air with dehydroabietylamine (10 mmol, 2.85 g), DCM (40 mL), and triethylamine (12 mmol, 1.21 g), 4-nitrobenzoyl chloride (11 mmol, 2.04 g) was add in slowly and stirred at 0 °C, then stir the reaction mixture at room temperature until completion (monitored by TLC). The reaction mixture was then diluted with 40 mL of H<sub>2</sub>O and extracted three times with 25 mL of DCM. The combined organic phases were dried over magnesium sulfate, filtered through short celite pad, and concentrated under reduced pressure. Purification by column chromatography (PE/EA= 10/1 to 5/1) afforded **6** as a light yellow solid (2.60 g, 60%).

## 4. Mechanistic Studies



(a)

**i)** TEMPO (1 mol, 156.1 mg),  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, **2b** was not observed. (Yields determined by GC analysis using hexadecane as an internal standard).

**ii)** 1,1-DPE (1 mol, 180.1 mg),  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was observed in 73% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

**iii)** (1) BHT (1 mol, 220.2 mg),  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was observed in 73% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

**iii)** (2) BHT (2.5 mol, 551.5 mg),  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30

mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $H_2O$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was observed in 72% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

(b)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg), MeI (0.5 mmol, 71.0 mg),  $H_2O$  (1 mmol, 18.0 mg), and  $CH_3CN$  (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was observed in 31% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

(c)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $H_2O$  (1 mmol, 18.0 mg), and  $CH_3OH$  (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was not observed. (Yields determined by GC analysis using hexadecane as an internal standard).

(d)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b** (0.5 mmol, 68.5 mg),  $H_2O$  (1 mmol, 18.0 mg), and anisole (1.5 mL) were added into the tube via syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the product **2b** was not observed. (Yields determined by GC analysis using hexadecane as an internal standard).

(e)

(1)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1a'** (0.5 mmol, 53.5 mg),  $H_2O$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. After the reaction was completed, the product **2a** was observed in 34% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

(2)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1b'** (0.5 mmol, 54.5 mg),  $H_2O$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. After the reaction was completed, the product **2a** was observed in 32% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

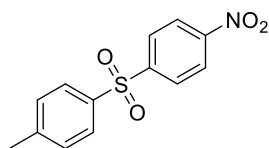
(3)  $Rh_2(CO)_4Cl_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $W(CO)_6$  (1 mmol, 351.9 mg),  $Na_3PO_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1c'** (0.5 mmol, 91.0 mg),  $H_2O$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. After the reaction was

completed, the product **2a** was observed in 53% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

(4) Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1d'** (0.5 mmol, 92.1 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. After the reaction was completed, the product **2a** was observed in 45% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

(5) Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1e'** (0.5 mmol, 46.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. After the reaction was completed, the product **2a** was observed in 33% yield. (Yields determined by GC analysis using hexadecane as an internal standard).

## 5.1 Characterization of **1i**, **1w**, **4** and **6**

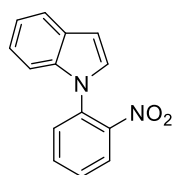


1-methyl-4-((4-nitrophenyl)sulfonyl)benzene (**1i**)<sup>1</sup>

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.13 (d, *J* = 9.1 Hz, 2H), 7.68 (d, *J* = 8.3 Hz, 2H), 7.32 (d, *J* = 8.2 Hz, 2H), 7.15 (d, *J* = 9.1 Hz, 2H), 2.41 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 153.6, 146.1, 145.9, 131.3, 129.9, 128.2, 125.2, 123.0, 21.5.

M.p. 93.4–95.2 °C

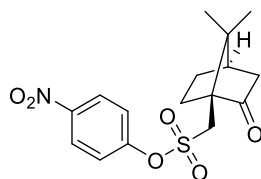


1-(2-nitrophenyl)-1*H*-indole (**1w**)<sup>2</sup>

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.82 (d, *J* = 8.1 Hz, 1H), 7.64–7.56 (m, 1H), 7.44 (t, *J* = 7.7 Hz, 1H), 7.35–7.23 (m, 2H), 7.15–7.01 (m, 4H), 6.63 (d, *J* = 3.1 Hz, 1H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 145.7, 136.3, 133.6, 132.2, 129.3, 128.7, 128.1, 127.8, 125.1, 122.6, 121.0, 120.6, 109.2, 104.6.

M.p. 59.6–61.5 °C



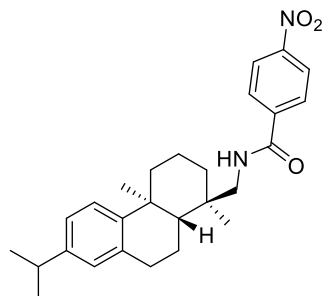
4-nitrophenyl((1*S*,4*R*)-7,7-dimethyl-2-oxobicyclo[2.2.1]heptan-1-yl)methanesulfonate (**4**)<sup>1</sup>

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.29 (d, *J* = 8.7 Hz, 2H), 7.50 (d, *J* = 8.7 Hz, 2H), 3.86 (d, *J* = 15.0 Hz, 1H), 3.29 (d, *J* = 15.0 Hz, 1H), 2.55 – 2.38 (m, 2H), 2.22 – 1.95 (m, 3H), 1.82 – 1.73 (m, 1H), 1.58 – 1.43 (m, 1H), 1.14 (s, 3H), 0.91 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 213.6, 153.3, 145.9, 125.4, 122.6, 57.9, 48.4, 47.9, 42.6, 42.2, 26.6, 25.0, 19.5, 19.4.

HRMS (ESI): [M+Na]<sup>+</sup> calcd. for C<sub>16</sub>H<sub>19</sub>NNaO<sub>6</sub>S<sup>+</sup>, 376.0825; found, 376.0836.

M.p. 103.6 – 105.4 °C



*N*-(((1*R*,4*aS*,10*aR*)-7-isopropyl-1,4*a*-dimethyl-1,2,3,4,4*a*,9,10,10*a*-octahydrophenanthren-1-yl)methyl)-4-nitrobenzamide (**6**)<sup>3</sup>

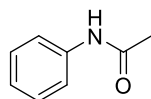
<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.23 (d, *J* = 8.8 Hz, 2H), 7.88 (d, *J* = 8.8 Hz, 2H), 7.17 (d, *J* = 8.2 Hz, 1H), 7.01 – 6.98 (m, 1H), 6.89 (s, 1H), 6.33 (t, *J* = 6.1 Hz, 1H), 3.47 (dd, *J* = 13.7, 6.5 Hz, 1H), 3.32 (dd, *J* = 13.7, 6.5 Hz, 1H), 3.01 – 2.89 (m, 1H), 2.87 – 2.76 (m, 2H), 2.31 (d, *J* = 12.8 Hz, 1H), 2.01 – 1.90 (m, 1H), 1.84 – 1.74 (m, 2H), 1.73 – 1.65 (m, 1H), 1.56 – 1.45 (m, 2H), 1.42 – 1.33 (m, 2H), 1.25 – 1.19 (m, 9H), 1.02 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 165.7, 149.4, 146.8, 145.7, 140.3, 134.5, 128.0, 126.9, 124.1, 123.9, 123.7, 50.5, 45.7, 38.2, 37.7, 37.5, 36.4, 33.3, 30.3, 25.4, 23.9, 23.9, 19.0, 18.8, 18.5.

HRMS (ESI): [M+H]<sup>+</sup> calcd. for C<sub>27</sub>H<sub>35</sub>N<sub>2</sub>O<sub>3</sub><sup>+</sup>, 435.2642; found, 435.2648.

M.p. 101.8 – 103.6 °C

## 5.2 Characterization of Products



*N*-phenylacetamide (**2a**)<sup>4</sup>

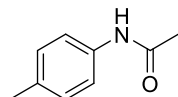
General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. nitrobenzene (0.5 mmol, 61.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2a** as a **light yellow solid** (64.8 mg, 96%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.23 (s, 1H), 7.51 (d, *J* = 7.7 Hz, 2H), 7.27 (t, *J* = 7.8 Hz, 2H), 7.08 (t, *J* = 7.4 Hz, 1H), 2.12 (s, 3H).



$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  169.0, 138.0, 128.8, 124.2, 120.1, 24.3.

M.p. 113.4–115.2 °C



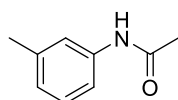
*N*-(*p*-tolyl)acetamide (**2b**)<sup>4</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-methyl-4-nitrobenzene (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2b** as a **light yellow solid** (70.8 mg, 95%).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.88 (s, 1H), 7.37 (d,  $J$  = 8.3 Hz, 2H), 7.08 (d,  $J$  = 8.2 Hz, 2H), 2.30 (s, 3H), 2.12 (s, 3H).

$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.7, 135.4, 133.8, 129.3, 120.2, 24.2, 20.8.

M.p. 146.2–148.0 °C

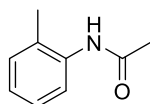


*N*-(*m*-tolyl)acetamide (**2c**)<sup>4</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-methyl-3-nitrobenzene (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2c** as a **light yellow liquid** (73.8 mg, 99%).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.18 (s, 1H), 7.36 (s, 1H), 7.30 (d,  $J$  = 8.1 Hz, 1H), 7.16 (t,  $J$  = 7.8 Hz, 1H), 6.90 (d,  $J$  = 7.5 Hz, 1H), 2.28 (s, 3H), 2.13 (s, 3H).

$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.9, 138.6, 137.9, 128.6, 124.9, 120.7, 117.2, 24.3, 21.3.



*N*-(*o*-tolyl)acetamide (**2d**)<sup>4</sup>

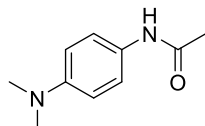
General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-methyl-2-nitrobenzene (0.5 mmol, 68.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via

flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2d** as a **light yellow solid** (67.1 mg, 90%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.60 (d, *J* = 8.1 Hz, 1H), 7.42 (s, 1H), 7.15 (d, *J* = 4.5 Hz, 2H), 7.06 (t, *J* = 7.3 Hz, 1H), 2.20 (s, 3H), 2.13 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.7, 135.5, 130.4, 130.1, 126.4, 125.4, 123.9, 23.9, 17.7.

M.p. 106.2 – 108.0 °C



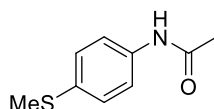
*N*-(4-(dimethylamino)phenyl)acetamide (**2e**)<sup>5</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. *N,N*-dimethyl-4-nitroaniline (0.5 mmol, 83.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2e** as a **light yellow solid** (71.3 mg, 80%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.63 (s, 1H), 7.32 (d, *J* = 9.0 Hz, 2H), 6.67 (d, *J* = 9.0 Hz, 2H), 2.89 (s, 6H), 2.10 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.5, 147.8, 127.9, 122.1, 113.0, 40.9, 24.1.

M.p. 102.0 – 104.0 °C



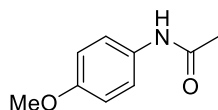
*N*-(4-(methylthio)phenyl)acetamide (**2f**)<sup>6</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. methyl(4-nitrophenyl)sulfane (0.5 mmol, 84.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2f** as a **light yellow solid** (88.7 mg, 98%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.23 (s, 1H), 7.41 (d, *J* = 8.6 Hz, 2H), 7.17 (d, *J* = 8.6 Hz, 2H), 2.43 (s, 3H), 2.11 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.9, 135.5, 133.4, 127.7, 120.8, 24.2, 16.5.

M.p. 124.8 – 126.5 °C



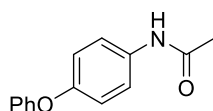
*N*-(4-methoxyphenyl)acetamide (**2g**)<sup>4</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-methoxy-4-nitrobenzene (0.5 mmol, 76.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2g** as a **light yellow solid** (80.9 mg, 98%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.20 (s, 1H), 7.38 (d, *J* = 9.0 Hz, 2H), 6.80 (d, *J* = 9.0 Hz, 2H), 3.75 (s, 3H), 2.09 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.9, 156.2, 131.1, 122.0, 113.9, 55.3, 23.9.

M.p. 133.3 – 135.1 °C



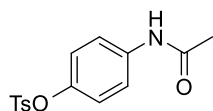
*N*-(4-phenoxyphenyl)acetamide (**2h**)<sup>7</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-nitro-4-phenoxybenzene (0.5 mmol, 107.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2h** as a **light yellow solid** (109.0 mg, 96%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.35 (s, 1H), 7.47 (d, *J* = 8.8 Hz, 2H), 7.30 (t, *J* = 7.9 Hz, 2H), 7.07 (t, *J* = 7.4 Hz, 1H), 6.95 (t, *J* = 9.0 Hz, 4H), 2.15 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 169.0, 157.3, 153.3, 133.5, 129.6, 123.0, 121.9, 119.3, 118.3, 24.1.

M.p. 128.2 – 129.8 °C



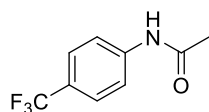
4-acetamidophenyl 4-methylbenzenesulfonate (**2i**)<sup>8</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 4-nitrophenyl 4-methylbenzenesulfonate (0.5 mmol, 146.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2i** as a **light yellow solid** (143.4 mg, 94%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.41 (s, 1H), 7.67 (d,  $J = 8.1$  Hz, 2H), 7.46 (d,  $J = 8.7$  Hz, 2H), 7.30 (d,  $J = 8.1$  Hz, 2H), 6.86 (d,  $J = 8.8$  Hz, 2H), 2.43 (s, 3H), 2.11 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  169.0, 145.6, 145.1, 137.1, 131.8, 129.7, 128.3, 122.5, 120.6, 24.2, 21.5.

M.p. 145.1 – 147.0 °C



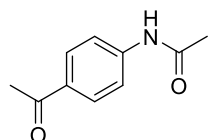
*N*-(4-(trifluoromethyl)phenyl)acetamide (**2j**)<sup>4</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-nitro-4-(trifluoromethyl)benzene (0.5 mmol, 95.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2j** as a **light yellow solid** (94.4 mg, 93%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.71 (s, 1H), 7.63 (d,  $J = 8.4$  Hz, 2H), 7.55 (d,  $J = 8.6$  Hz, 2H), 2.20 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.8, 140.9, 126.2 (d,  $J = 3.4$  Hz), 125.9, 124.1 (q,  $J = 271.5$  Hz), 119.4, 24.6.

M.p. 149.2 – 151.0 °C



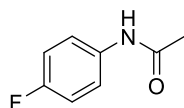
*N*-(4-acetylphenyl)acetamide (**2k**)<sup>9</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-(4-nitrophenyl)ethan-1-one (0.5 mmol, 82.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2k** as a **light yellow solid** (83.2 mg, 94%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.44 (s, 1H), 7.89 (d,  $J = 8.6$  Hz, 2H), 7.64 (d,  $J = 8.4$  Hz, 2H), 2.56 (s, 3H), 2.20 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  197.4, 169.1, 142.7, 132.6, 129.6, 118.9, 26.4, 24.6.

M.p. 167.1 – 169.0 °C



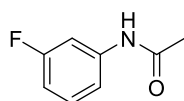
*N*-(4-fluorophenyl)acetamide (**2l**)<sup>4</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-fluoro-4-nitrobenzene (0.5 mmol, 70.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2l** as a **light yellow solid** (73.5 mg, 96%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.88 (s, 1H), 7.51 – 7.39 (m, 2H), 6.97 (t, *J* = 8.6 Hz, 2H), 2.13 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.6, 159.3 (d, *J* = 243.3 Hz), 133.9, 121.9 (d, *J* = 7.9 Hz), 115.5 (d, *J* = 22.5 Hz), 24.3.

M.p. 151.8 – 153.6 °C



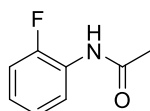
*N*-(3-fluorophenyl)acetamide (**2m**)<sup>10</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-fluoro-3-nitrobenzene (0.5 mmol, 70.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2m** as a **light yellow solid** (74.2 mg, 97%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.60 (s, 1H), 7.48 (d, *J* = 11.0 Hz, 1H), 7.24 – 7.15 (m, 2H), 6.88 – 6.66 (m, 1H), 2.15 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 169.3, 162.8 (d, *J* = 244.3 Hz), 139.6 (d, *J* = 10.8 Hz), 129.9 (d, *J* = 9.3 Hz), 115.3 (d, *J* = 2.4 Hz), 110.8 (d, *J* = 21.3 Hz), 107.4 (d, *J* = 26.1 Hz), 24.3.

M.p. 84.2 – 86.1 °C



*N*-(2-fluorophenyl)acetamide (**2n**)<sup>11</sup>

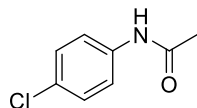
General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-fluoro-2-nitrobenzene (0.5 mmol, 70.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash

column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2n** as a **light yellow solid** (71.9 mg, 94%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.22 (t,  $J = 7.7$  Hz, 1H), 7.66 (s, 1H), 7.14 – 6.96 (m, 3H), 2.19 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.5, 152.4 (d,  $J = 243.1$  Hz), 126.2 (d,  $J = 10.3$  Hz), 124.4 (d,  $J = 3.7$  Hz), 124.3, 122.0, 114.7 (d,  $J = 19.3$  Hz), 24.4.

M.p. 75.0 – 76.9 °C



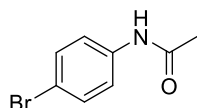
*N*-(4-chlorophenyl)acetamide (**2o**)<sup>4</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-chloro-4-nitrobenzene (0.5 mmol, 78.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2o** as a **light yellow solid** (83.6 mg, 99%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.45 (d,  $J = 8.7$  Hz, 2H), 7.34 (s, 1H), 7.27 (d,  $J = 7.8$  Hz, 2H), 2.17 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.3, 136.4, 129.3, 129.0, 121.1, 24.6.

M.p. 177.8 – 178.9 °C



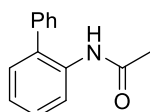
*N*-(4-bromophenyl)acetamide (**2p**)<sup>4</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-bromo-4-nitrobenzene (0.5 mmol, 100.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2p** as a **light yellow solid** (104.3 mg, 98%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.47 (s, 1H), 7.44 (d,  $J = 9.4$  Hz, 4H), 2.20 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.4, 136.9, 131.9, 121.4, 116.8, 24.6.

M.p. 168.5 – 170.4 °C



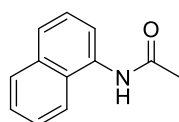
*N*-([1,1'-biphenyl]-2-yl)acetamide (**2q**)<sup>12</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 2-nitro-1,1'-biphenyl (0.5 mmol, 99.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2q** as a **light yellow solid** (96.0 mg, 91%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.22 (d,  $J = 8.1$  Hz, 1H), 7.55 – 7.32 (m, 6H), 7.14 – 7.25 (m, 3H), 2.00 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.2, 138.1, 134.6, 132.3, 130.0, 129.1, 129.0, 128.3, 127.8, 124.3, 121.8, 24.4.

M.p. 112.6 – 114.6 °C



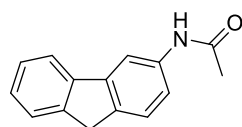
*N*-(naphthalen-1-yl)acetamide (**2r**)<sup>13</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-nitronaphthalene (0.5 mmol, 86.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2r** as a **light yellow solid** (81.4 mg, 88%).

$^1\text{H NMR}$  (400 MHz, DMSO)  $\delta$  9.94 (s, 1H), 8.11 (d,  $J = 7.7$  Hz, 1H), 7.96 – 7.90 (m, 1H), 7.73 (t,  $J = 6.8$  Hz, 2H), 7.60 – 7.43 (m, 3H), 2.21 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz, DMSO)  $\delta$  169.0, 133.7, 128.1, 127.7, 126.0, 125.7, 125.6, 125.0, 122.7, 121.5, 39.5, 23.5.

M.p. 125.1 – 127.0 °C



*N*-(9H-fluoren-3-yl)acetamide (**2s**)

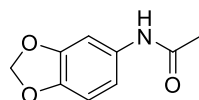
General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 3-nitro-9H-fluorene (0.5 mmol, 105.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2s** as a **light yellow solid** (107.1 mg, 96%).

**<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)** δ 7.81 (s, 1H), 7.78 (s, 1H), 7.70 – 7.61 (m, 2H), 7.46 (d, *J* = 7.4 Hz, 1H), 7.36 – 7.30 (m, 2H), 7.24 (t, *J* = 7.2 Hz, 1H), 3.80 (s, 2H), 2.17 (s, 3H).

**<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)** δ 168.6, 144.2, 143.1, 141.2, 138.0, 136.7, 126.7, 126.2, 124.9, 120.0, 119.4, 118.8, 117.0, 36.9, 24.5.

HRMS (ESI): [M+H]<sup>+</sup> calcd. for C<sub>15</sub>H<sub>14</sub>NO<sup>+</sup>, 224.1070; found, 224.1085.

M.p. 189.1 – 191.0 °C



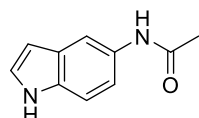
*N*-(benzo[*d*][1,3]dioxol-5-yl)acetamide (**2t**)<sup>14</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 5-nitrobenzo[*d*][1,3]dioxole (0.5 mmol, 83.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2t** as a **white solid** (86.0 mg, 96%).

**<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)** δ 8.07 (s, 1H), 7.15 (s, 1H), 6.77 (d, *J* = 7.5 Hz, 1H), 6.68 (d, *J* = 7.9 Hz, 1H), 5.90 (s, 2H), 2.09 (s, 3H).

**<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)** δ 168.6, 147.6, 144.2, 132.1, 113.4, 107.9, 103.1, 101.2, 24.2.

M.p. 134.0 – 135.8 °C



*N*-(1*H*-indol-5-yl)acetamide (**2u**)

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 5-nitro-1*H*-indole (0.5 mmol, 81.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 2/1, volume ratio) to give the titled product **2u** as a **light yellow solid** (80.1 mg, 92%).

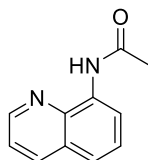
**<sup>1</sup>H NMR (400 MHz, DMSO)** δ 10.95 (s, 1H), 9.69 (s, 1H), 7.84 (d, *J* = 1.2 Hz, 1H), 7.34 – 7.25 (m, 2H), 7.19 – 7.14 (m, 1H), 6.35 (s, 1H), 2.02 (s, 3H).

**<sup>13</sup>C NMR (101 MHz, DMSO)** δ 168.1, 133.0, 131.8, 127.9, 126.2, 115.2, 111.5, 111.0, 101.5, 24.4.

HRMS (ESI): [M+H]<sup>+</sup> calcd. for C<sub>10</sub>H<sub>11</sub>N<sub>2</sub>O<sup>+</sup>, 175.0866; found, 175.0882.

M.p. 99.1 – 101.0 °C





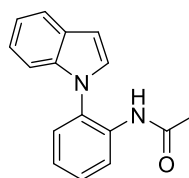
*N*-(quinolin-8-yl)acetamide (**2v**)<sup>15</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 8-nitroquinoline (0.5 mmol, 87.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2v** as a **light yellow solid** (60.5 mg, 65%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 9.76 (s, 1H), 8.91 – 8.63 (m, 2H), 8.13 – 8.07 (m, 1H), 7.52 – 7.43 (m, 2H), 7.43 – 7.37 (m, 1H), 2.32 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.8, 148.1, 138.2, 136.3, 134.5, 127.9, 127.4, 121.6, 121.4, 116.4, 25.1.

M.p. 99.7 – 101.7 °C



*N*-(2-(1*H*-indol-1-yl)phenyl)acetamide (**2w**)

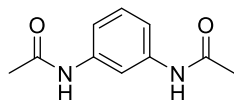
General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-(2-nitrophenyl)-1*H*-indole (0.5 mmol, 119.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2w** as a **light yellow solid** (113.8 mg, 91%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.38 (d, *J* = 8.1 Hz, 1H), 7.73 – 7.66 (m, 1H), 7.50 – 7.39 (m, 1H), 7.28 (d, *J* = 6.7 Hz, 1H), 7.24 – 7.14 (m, 4H), 7.09 – 7.03 (m, 1H), 6.90 (s, 1H), 6.73 (d, *J* = 3.2 Hz, 1H), 1.84 (s, 3H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 168.4, 136.5, 134.3, 128.9, 128.6, 128.5, 128.4, 127.9, 124.5, 122.8, 122.2, 121.2, 120.7, 110.3, 104.3, 24.5.

HRMS (ESI): [M+H]<sup>+</sup> calcd. for C<sub>16</sub>H<sub>15</sub>N<sub>2</sub>O<sup>+</sup>, 251.1179; found, 251.1194.

M.p. 139.6 – 141.5 °C



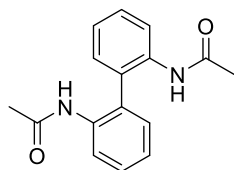
*N,N'*-(1,3-phenylene)diacetamide (**2x**)<sup>8</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1, 3-dinitrobenzene (0.5 mmol, 84.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/2, volume ratio) to give the titled product **2x** as a **light yellow solid** (78.8 mg, 82%).

<sup>1</sup>H NMR (400 MHz, DMSO) δ 9.88 (s, 2H), 7.85 (s, 1H), 7.26 – 7.21 (m, 2H), 7.18 – 7.10 (m, 1H), 1.99 (s, 6H).

<sup>13</sup>C NMR (101 MHz, DMSO) δ 168.3, 139.6, 128.8, 113.9, 109.9, 24.0.

M.p. 178.4 – 180.4 °C



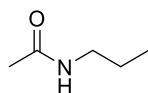
*N,N'*-([1,1'-biphenyl]-2,2'-diyl)diacetamide (**2y**)<sup>16</sup>

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 2, 2'-dinitro-1,1'-biphenyl (0.5 mmol, 122.0 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/2, volume ratio) to give the titled product **2y** as a **light yellow solid** (87.2 mg, 65%).

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.90 (d, *J* = 8.0 Hz, 2H), 7.44 – 7.33 (m, 2H), 7.30 (s, 2H), 7.20 (t, *J* = 7.4 Hz, 2H), 7.13 (d, *J* = 7.6 Hz, 2H), 1.87 (s, 6H).

<sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 169.4, 135.4, 130.5, 130.2, 129.1, 125.4, 124.0, 23.9.

M.p. 154.5 – 156.5 °C



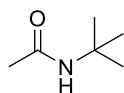
*N*-propylacetamide (**2aa**)

General Procedure was followed with Rh<sub>2</sub>(CO)<sub>4</sub>Cl<sub>2</sub> (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg), W(CO)<sub>6</sub> (1 mmol, 351.9 mg), Na<sub>3</sub>PO<sub>4</sub> (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-nitropropane (0.5 mmol, 44.5 mg), H<sub>2</sub>O (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column

chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2aa** as a **light yellow liquid** (25.3 mg, 50%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  6.63 (s, 1H), 3.09 – 3.03 (m, 2H), 1.86 (s, 3H), 1.47 – 1.35 (m, 2H), 0.80 (t,  $J = 7.4$  Hz, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  170.3, 41.1, 22.8, 22.5, 11.1.



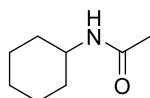
*N*-(*tert*-butyl)acetamide (**2ab**)<sup>17</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 2-methyl-2-nitropropane (0.5 mmol, 51.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2ab** as a **light yellow solid** (39.1 mg, 68%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  5.72 (s, 1H), 1.84 (s, 3H), 1.27 (s, 9H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  169.5, 50.9, 28.6, 24.3.

M.p. 92.8 – 94.6 °C



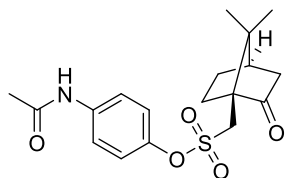
*N*-cyclohexylacetamide (**2ac**)<sup>13</sup>

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. Nitrocyclohexane (0.5 mmol, 64.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **2ac** as a **light yellow solid** (60.0 mg, 85%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  5.49 (s, 1H), 3.78– 3.66 (m, 1H), 1.93 (s, 3H), 1.89 (dd,  $J = 12.5, 3.3$  Hz, 2H), 1.73 – 1.65 (m, 2H), 1.63 – 1.56 (m, 1H), 1.40 – 1.27 (m, 2H), 1.20 – 1.03 (m, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  169.2, 48.2, 33.1, 25.5, 24.9, 23.5.

M.p. 104.2 – 106.1 °C



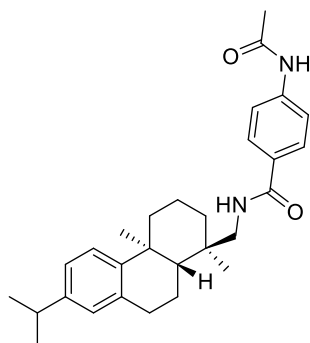
4-acetamidophenyl((1*S*,4*R*)-7,7-dimethyl-2-oxobicyclo[2.2.1]heptan-1-yl)methanesulfonate (**5**)

General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1ad** (0.5 mmol, 176.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product **5** as a **light yellow liquid** (127.8 mg, 70%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.25 (s, 1H), 7.51 (d,  $J = 9.0$  Hz, 2H), 7.17 (d,  $J = 9.0$  Hz, 2H), 3.75 (d,  $J = 15.0$  Hz, 1H), 3.17 (d,  $J = 15.0$  Hz, 1H), 2.54 – 2.34 (m, 2H), 2.15 – 2.08 (m, 4H), 2.08 – 2.00 (m, 1H), 1.94 (d,  $J = 18.6$  Hz, 1H), 1.77 – 1.65 (m, 1H), 1.48 – 1.39 (m, 1H), 1.11 (s, 3H), 0.87 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  214.1, 169.0, 144.6, 137.2, 122.4, 121.0, 58.0, 47.9, 47.3, 42.6, 42.3, 26.7, 25.0, 24.2, 19.7, 19.6.

HRMS (ESI):  $[\text{M}+\text{Na}]^+$  calcd. for  $\text{C}_{18}\text{H}_{23}\text{NNaO}_5\text{S}^+$ , 388.1189; found, 388.1203.



5-acetamido-*N*-(((1*R*,4*aS*,10*aR*)-7-isopropyl-1,4*a*-dimethyl-1,2,3,4,4*a*,9,10,10*a*-octahydrophenanthren-1-yl)methyl)benzamide (**7**)

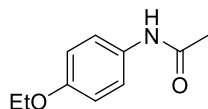
General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. **1ae** (0.5 mmol, 217.1 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/2, volume ratio) to give the titled product **7** as a **light yellow solid** (212.0 mg, 95%).

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.23 (s, 1H), 7.65 (d,  $J = 8.3$  Hz, 2H), 7.58 (d,  $J = 8.3$  Hz, 2H), 7.19 (d,  $J = 8.1$  Hz, 1H), 7.01 (d,  $J = 7.8$  Hz, 1H), 6.89 (s, 1H), 6.64 (s, 1H), 3.39 (d,  $J = 5.5$  Hz, 2H), 2.98 – 2.78 (m, 3H), 2.31 (d,  $J = 12.1$  Hz, 1H), 2.14 (s, 3H), 1.97 (s, 1H), 1.83 – 1.65 (m, 3H), 1.53 (t,  $J = 14.2$  Hz, 3H), 1.47 – 1.37 (m, 2H), 1.24 (s, 6H), 1.23 (s, 3H), 1.01 (s, 3H).

$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  169.4, 167.7, 146.9, 145.5, 141.3, 134.5, 129.6, 127.6, 126.8, 124.1, 123.7, 119.3, 50.4, 45.9, 38.2, 37.7, 37.4, 36.3, 33.3, 30.2, 26.8, 25.3, 24.3, 23.8, 19.0, 18.5.

HRMS (ESI):  $[\text{M}+\text{H}]^+$  calcd. for  $\text{C}_{29}\text{H}_{39}\text{N}_2\text{O}_2^+$ , 447.3006; found, 447.3013.

M.p. 112.6–114.4 °C



*N*-(4-ethoxyphenyl)acetamide (**3**)<sup>18</sup>

(a) General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (2 mol%, 3.9 mg), DPPP (6 mol%, 12.4 mg), NaI (30 mol%, 22.5 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 351.9 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 123.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-ethoxy-4-nitrobenzene (0.5 mmol, 83.5 mg),  $\text{H}_2\text{O}$  (1 mmol, 18.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product Phenacetin **3** as a **light yellow solid** (88.6 mg, 99%).

(b) General Procedure was followed with  $\text{Rh}_2(\text{CO})_4\text{Cl}_2$  (1 mol%, 3.9 mg), DPPP (3 mol%, 12.4 mg), NaI (30 mol%, 45 mg),  $\text{W}(\text{CO})_6$  (1 mmol, 703.8 mg),  $\text{Na}_3\text{PO}_4$  (0.75 mmol, 246.0 mg) were added to an oven-dried tube (15 mL), which was then placed under vacuum and refilled with nitrogen for three times. 1-ethoxy-4-nitrobenzene (1.0 mmol, 167.0 mg),  $\text{H}_2\text{O}$  (2 mmol, 36.0 mg), and DMC (1.5 mL) were added into the tube via syringe. Upon completion the mixture was concentrated and purified via flash column chromatography (PE/EA = 5/1 to 1/1, volume ratio) to give the titled product Phenacetin **3** as a **light yellow solid** (164.8 mg, 92%).

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.96 (s, 1H), 7.36 (d,  $J$  = 8.9 Hz, 2H), 6.79 (d,  $J$  = 8.9 Hz, 2H), 3.97 (q,  $J$  = 7.0 Hz, 2H), 2.09 (s, 3H), 1.37 (t,  $J$  = 7.0 Hz, 3H).

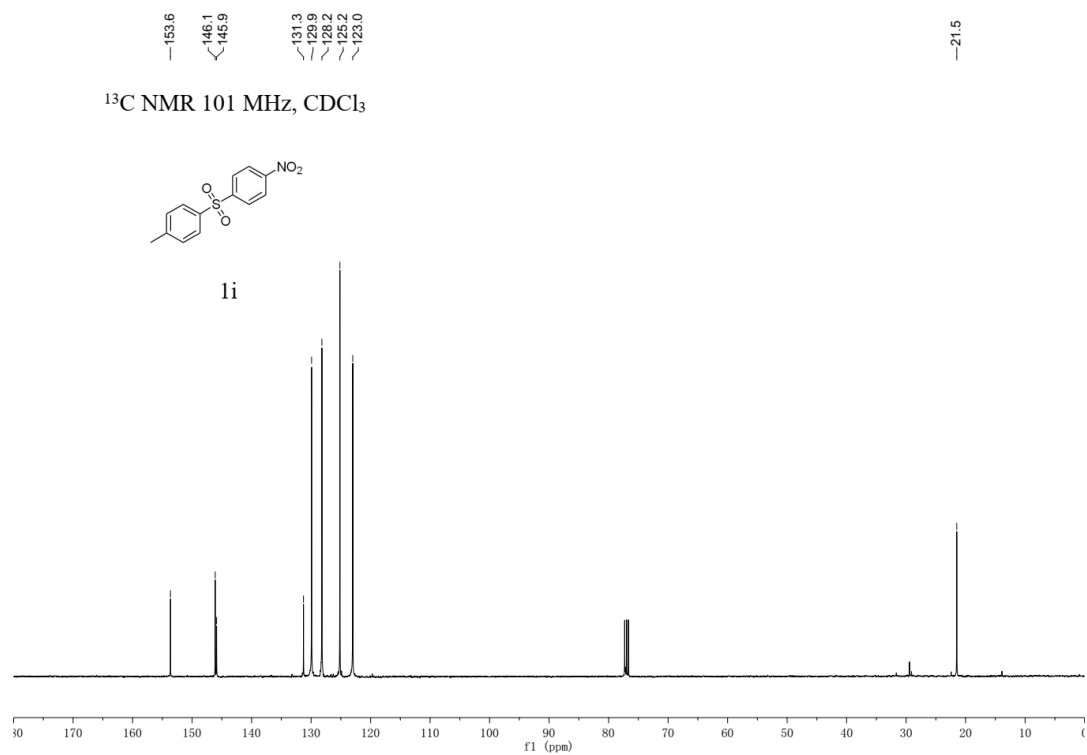
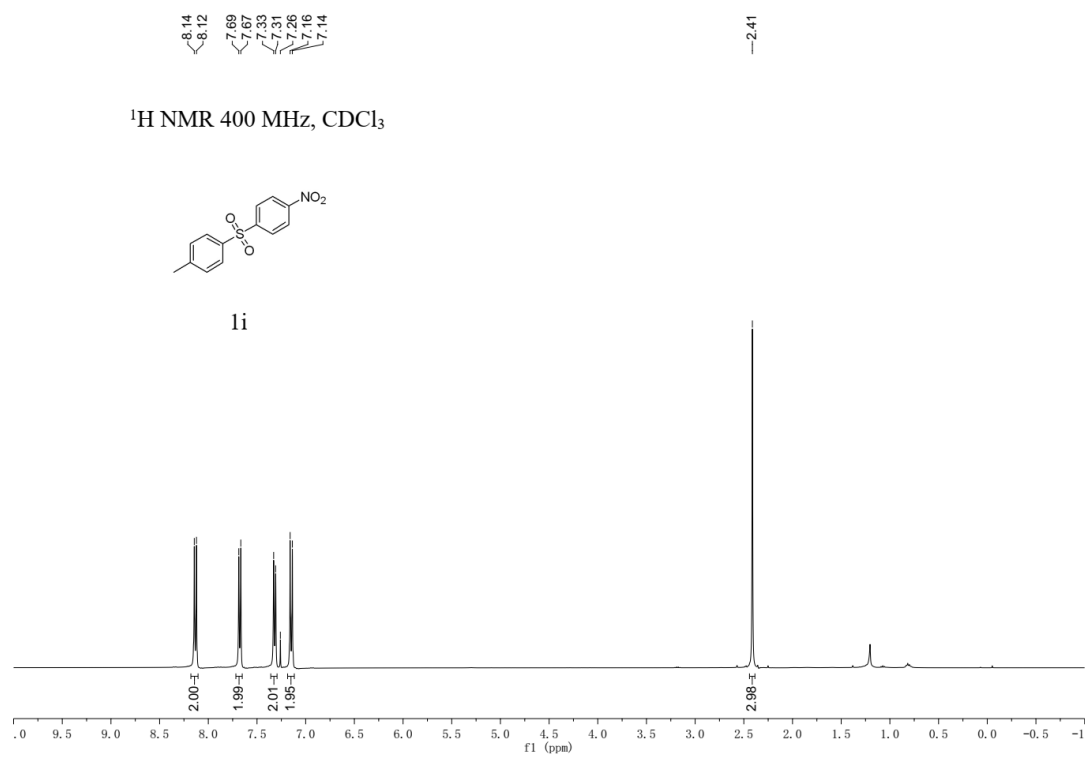
$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  168.9, 155.5, 131.0, 122.0, 114.5, 63.5, 23.9, 14.7.

M.p. 132.6–134.5 °C

## 6. References

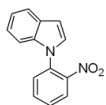
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## 7.1 Copy of $^1\text{H}$ and $^{13}\text{C}$ NMR Spectra of 1i, 1w, 4 and 6

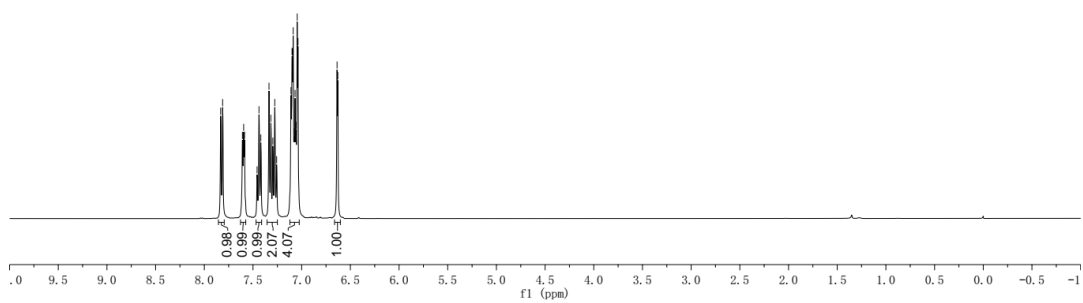


7.83  
7.81  
7.81  
7.60  
7.59  
7.44  
7.42  
7.34  
7.32  
7.30  
7.28  
7.11  
7.10  
7.10  
7.09  
7.08  
7.07  
7.06  
7.05  
6.84  
6.63

$^1\text{H}$  NMR 400 MHz,  $\text{CDCl}_3$

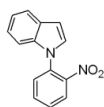


1w

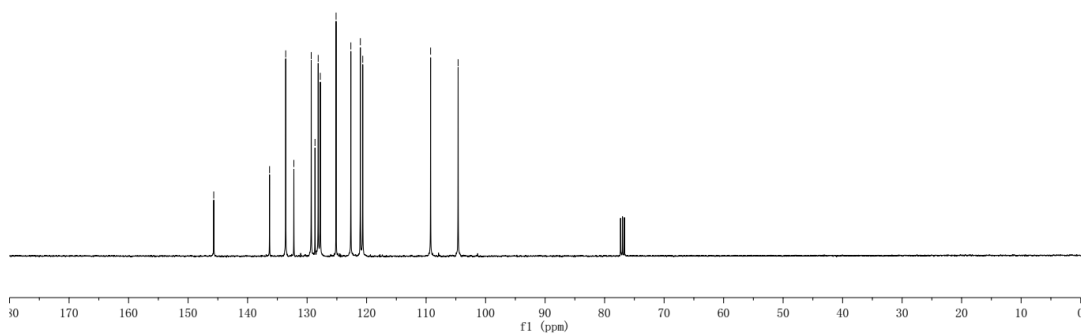


145.7  
136.3  
133.6  
132.2  
129.3  
128.7  
128.1  
127.8  
125.1  
122.6  
121.0  
120.6  
109.2  
104.6

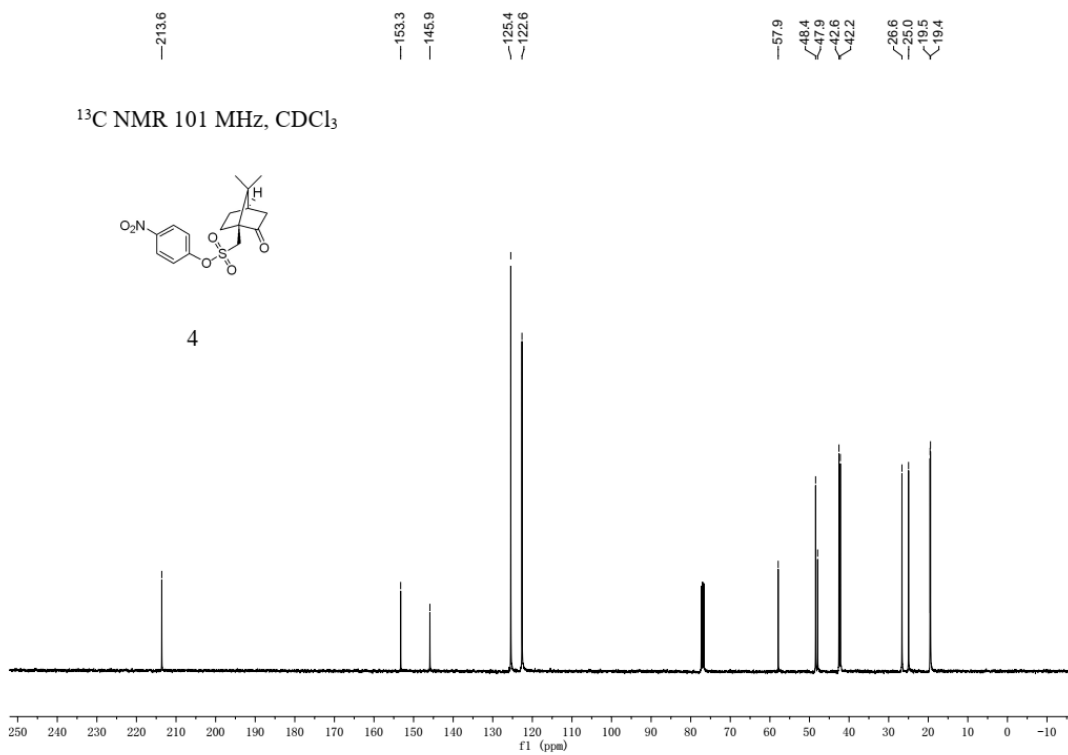
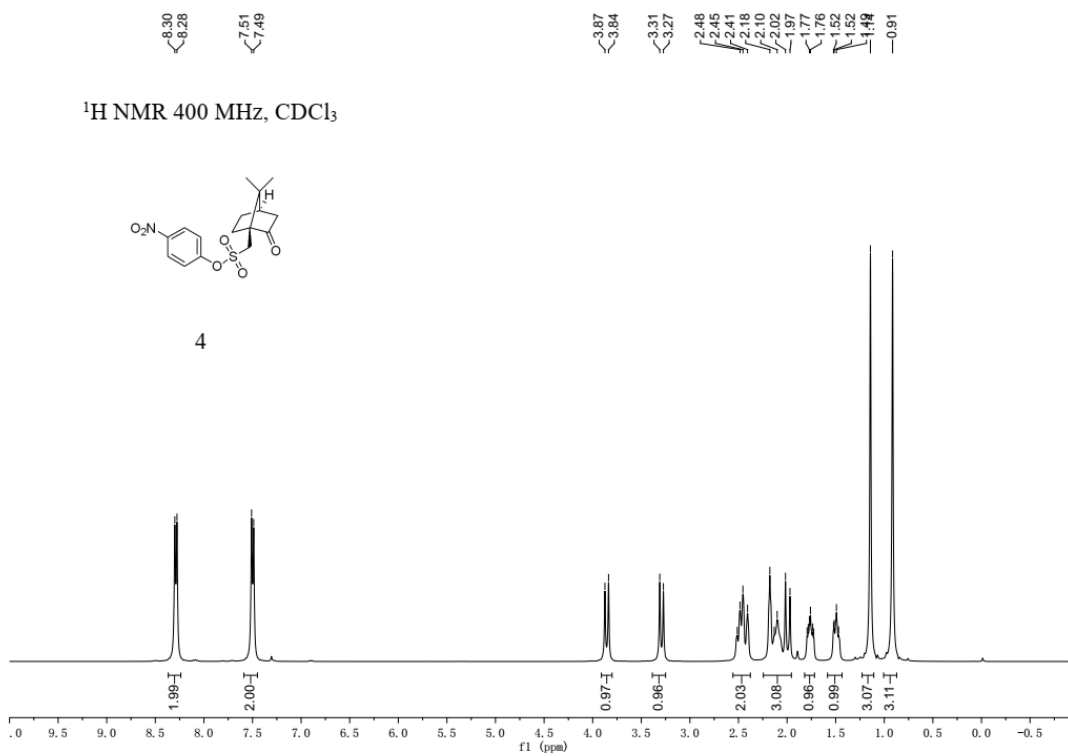
$^{13}\text{C}$  NMR 101 MHz,  $\text{CDCl}_3$



1w

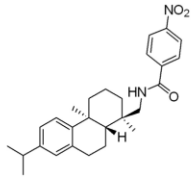




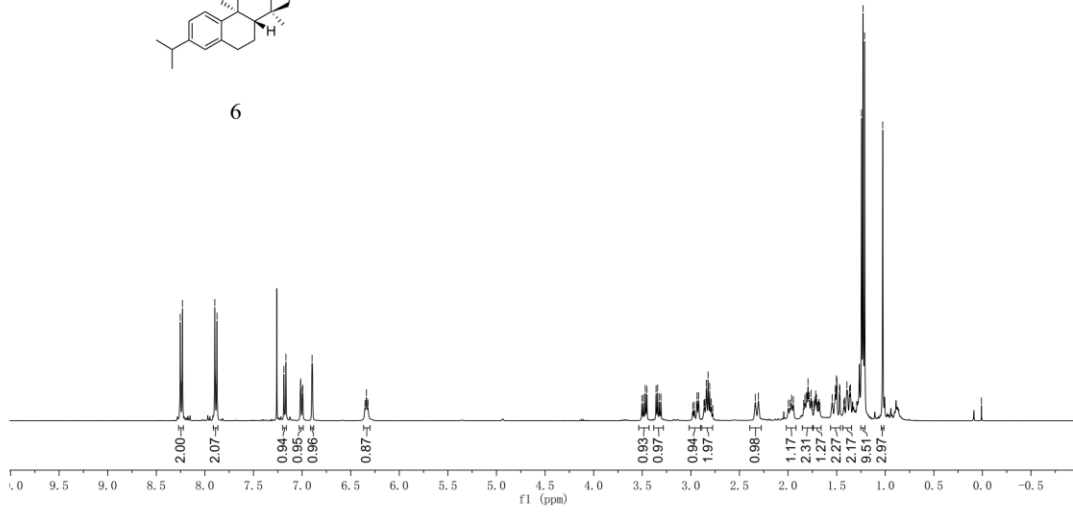


8.25  
8.23  
7.90  
7.88  
7.19  
7.17  
7.02  
7.01  
6.99  
6.96  
6.95  
6.93  
6.92  
6.50  
6.49  
3.47  
3.45  
3.36  
3.34  
3.32  
3.31  
2.98  
2.96  
2.94  
2.92  
2.87  
2.86  
2.84  
2.82  
2.81  
2.79  
2.74  
2.71  
2.31  
2.00  
1.98  
1.96  
1.95  
1.84  
1.83  
1.81  
1.80  
1.80  
1.78  
1.76  
1.75  
1.73  
1.72  
1.71  
1.70  
1.69  
1.67  
1.55  
1.51  
1.50  
1.47  
1.47  
1.43  
1.42  
1.39  
1.37  
1.36  
1.24  
1.23  
1.21  
1.03  
0.01

<sup>1</sup>H NMR 400 MHz, CDCl<sub>3</sub>



6



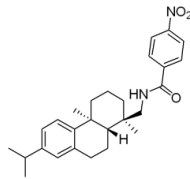
165.7

149.4  
146.8  
145.7  
140.3

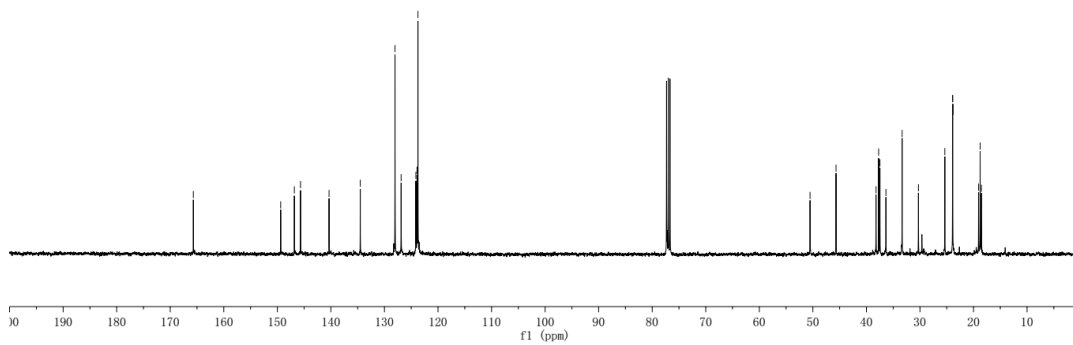
134.5  
128.0  
126.9  
124.1  
123.9  
123.7

50.5  
48.7  
37.7  
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23.9  
19.0  
18.8  
18.5

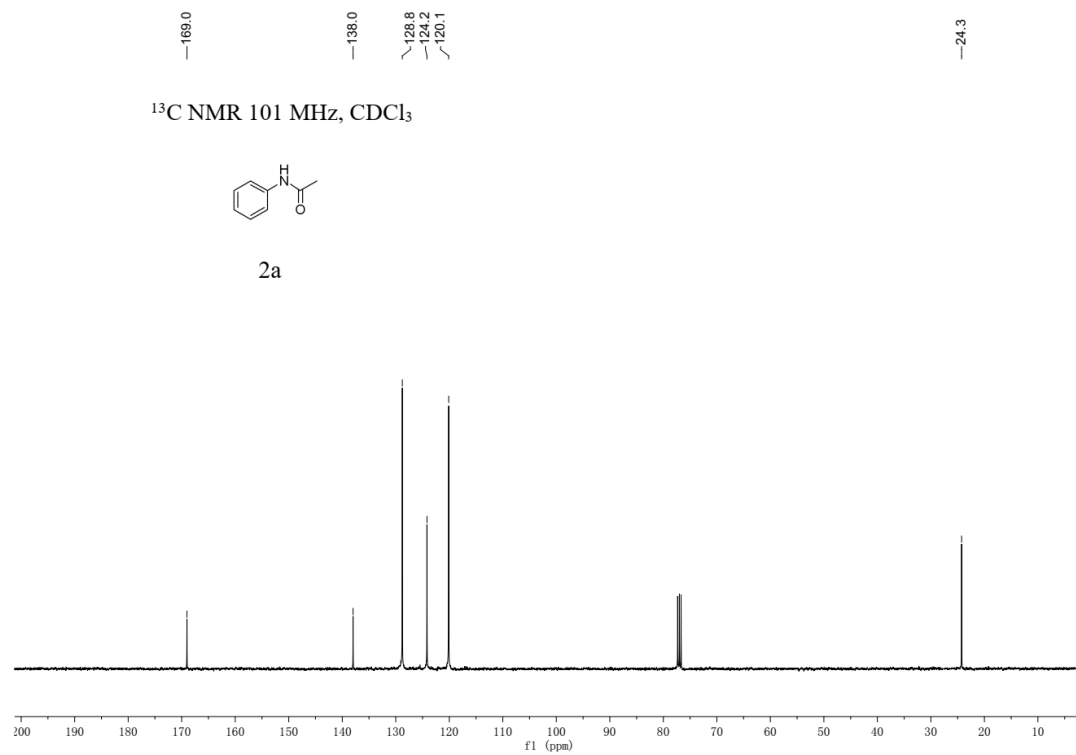
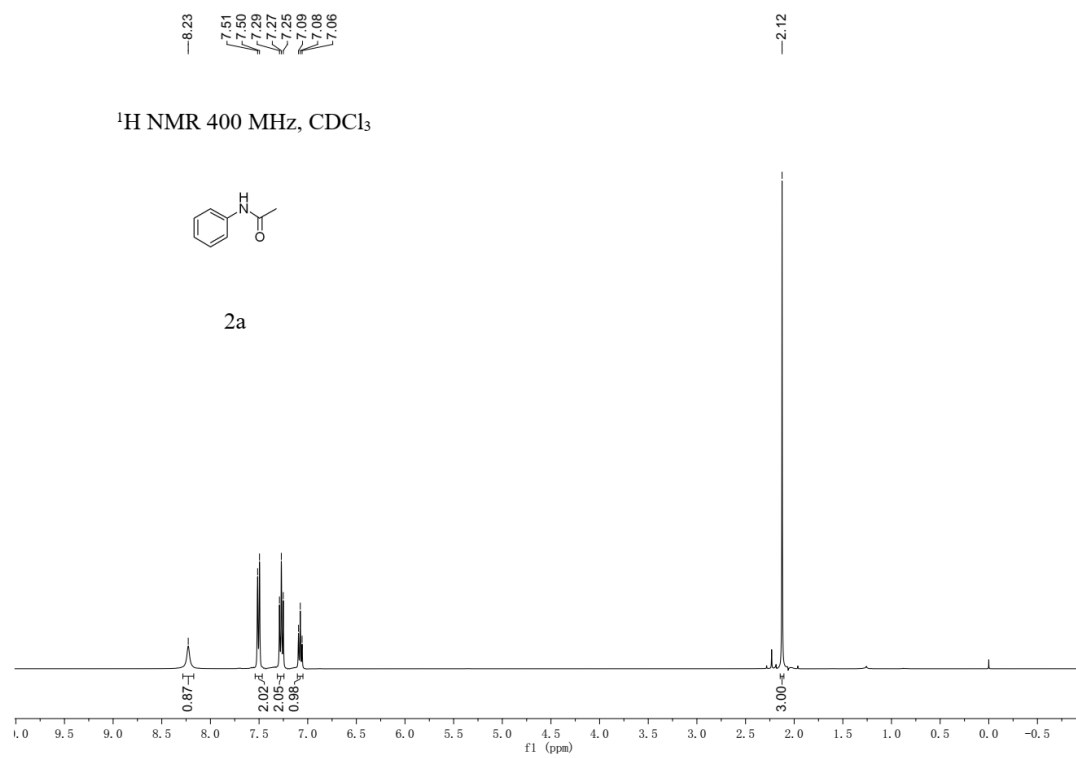
<sup>13</sup>C NMR 101 MHz, CDCl<sub>3</sub>

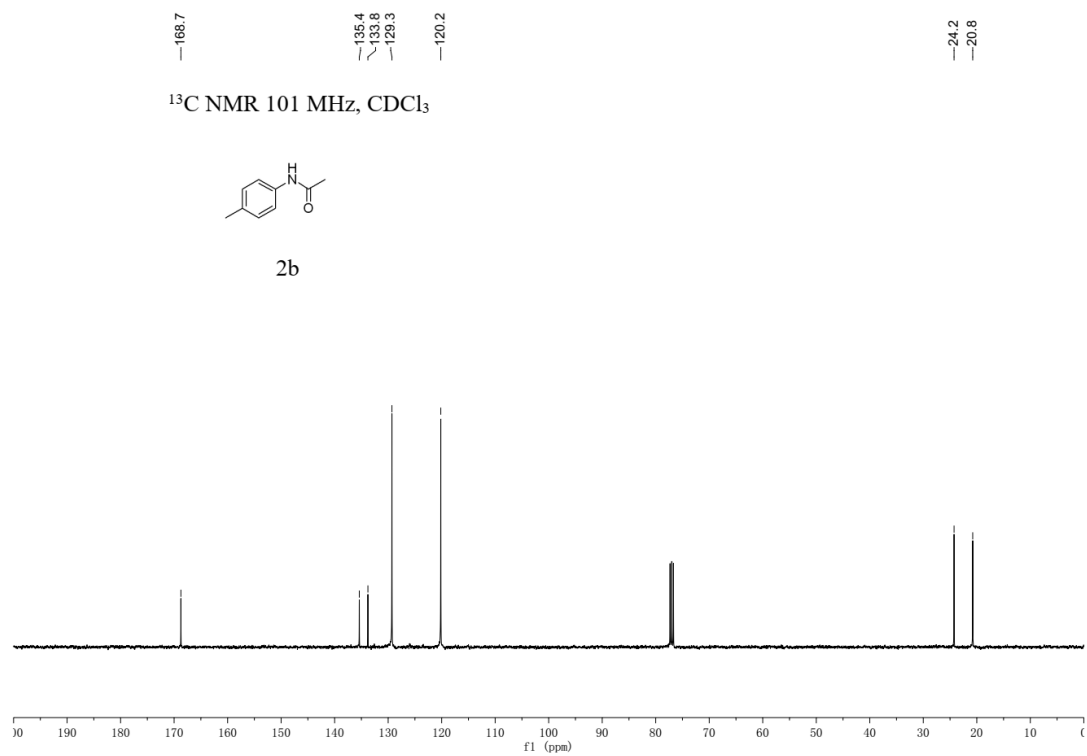
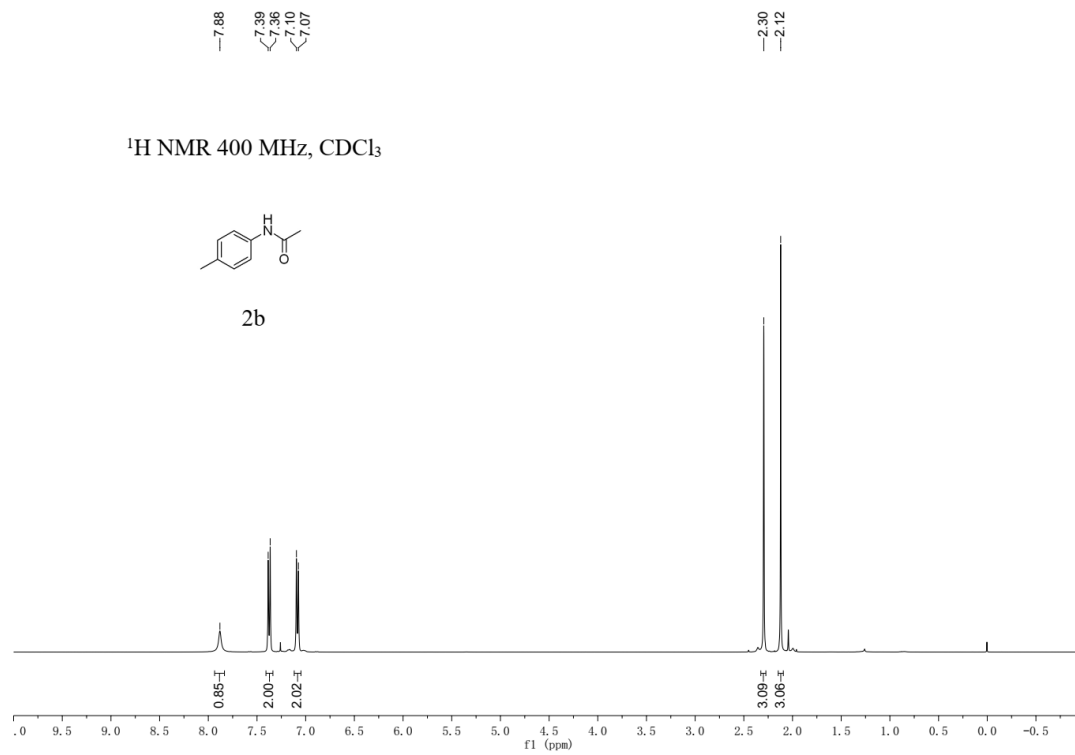


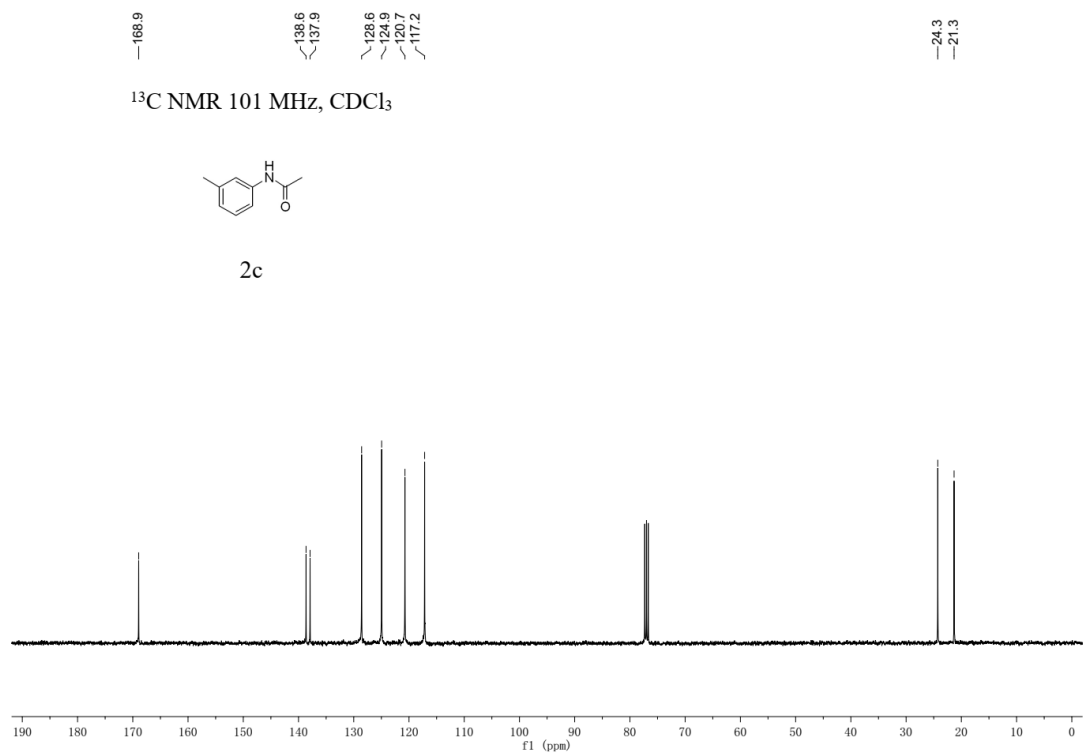
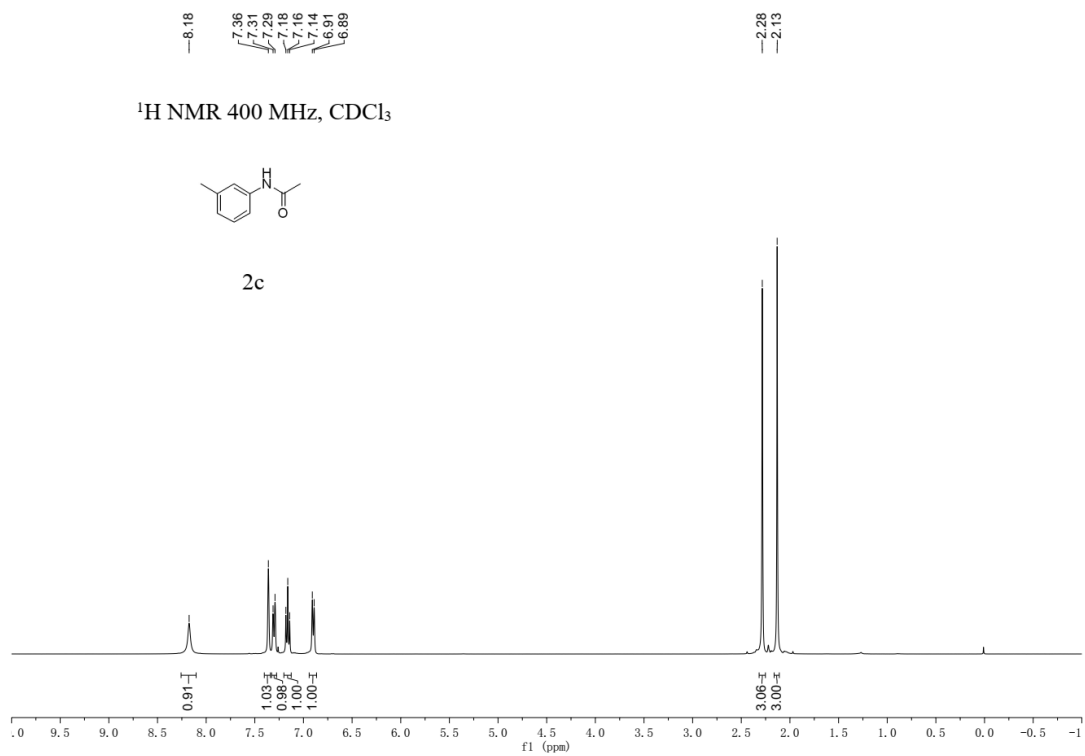
6



## 7.2 Copy of $^1\text{H}$ and $^{13}\text{C}$ NMR Spectra of Products







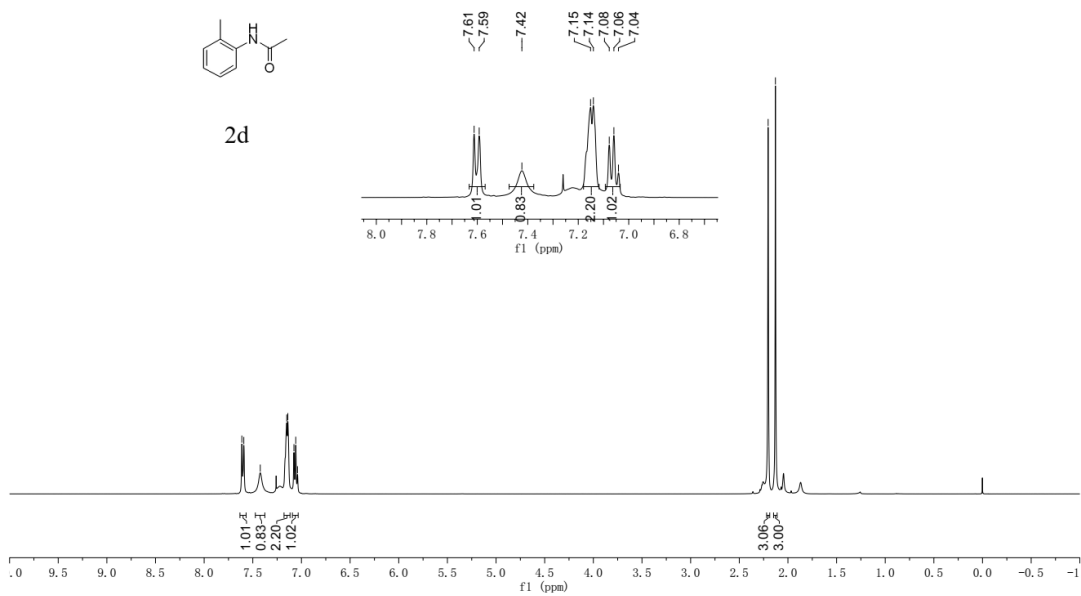
7.61  
7.59  
7.42  
7.15  
7.14  
7.08  
7.06  
7.04

2.20  
2.13

<sup>1</sup>H NMR 400 MHz, CDCl<sub>3</sub>



2d



168.7

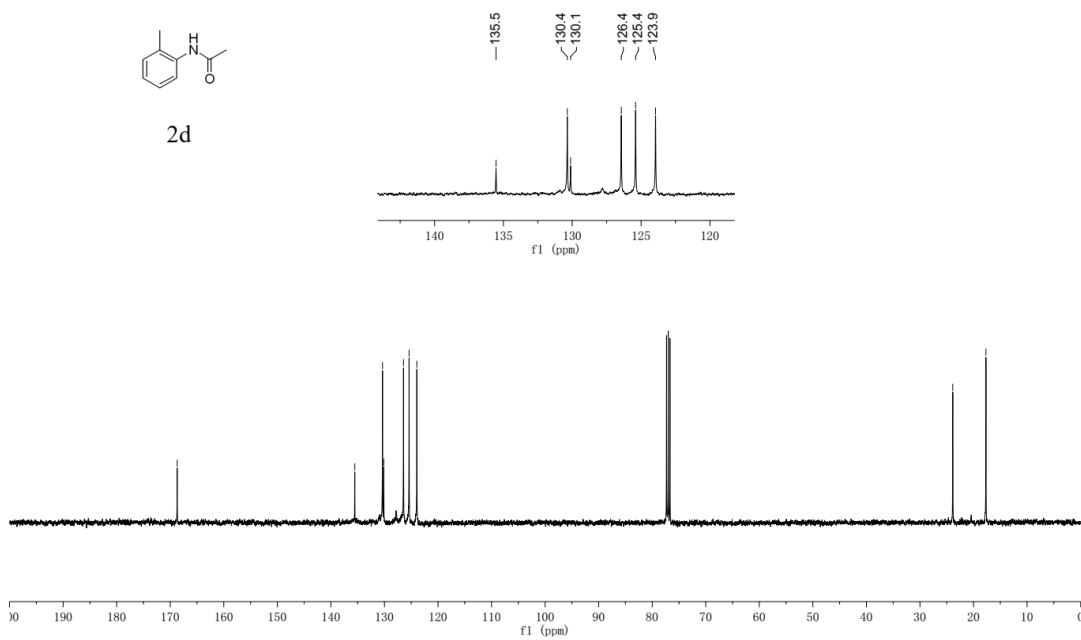
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130.4  
130.1  
126.4  
125.4  
123.9

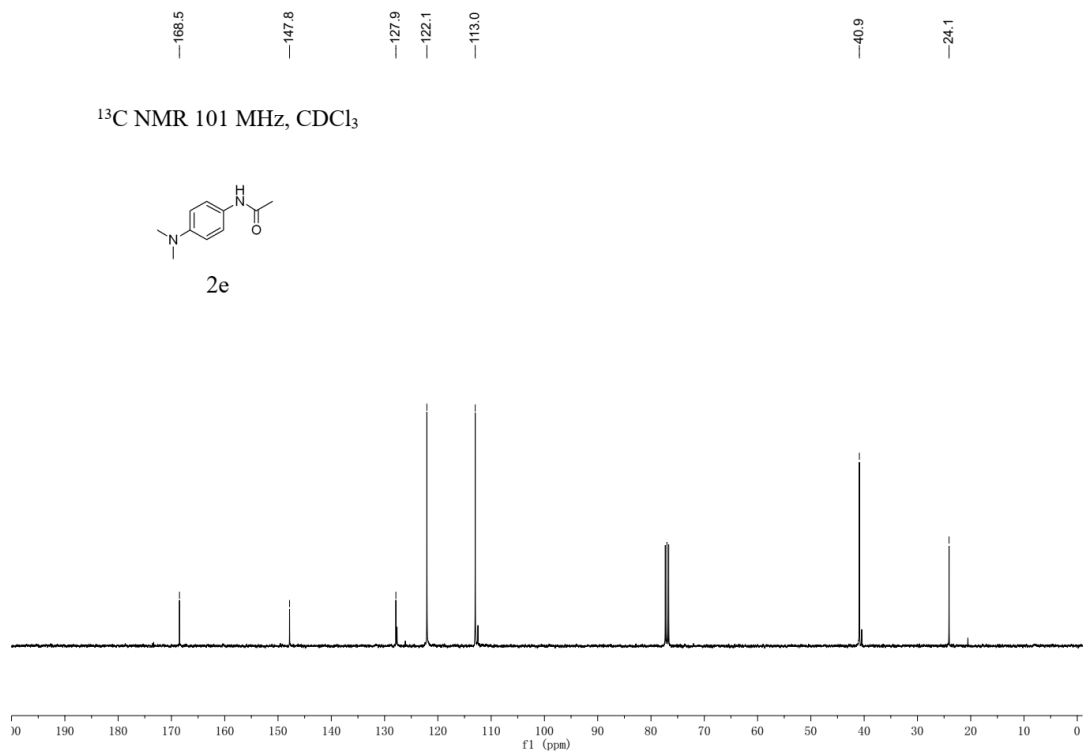
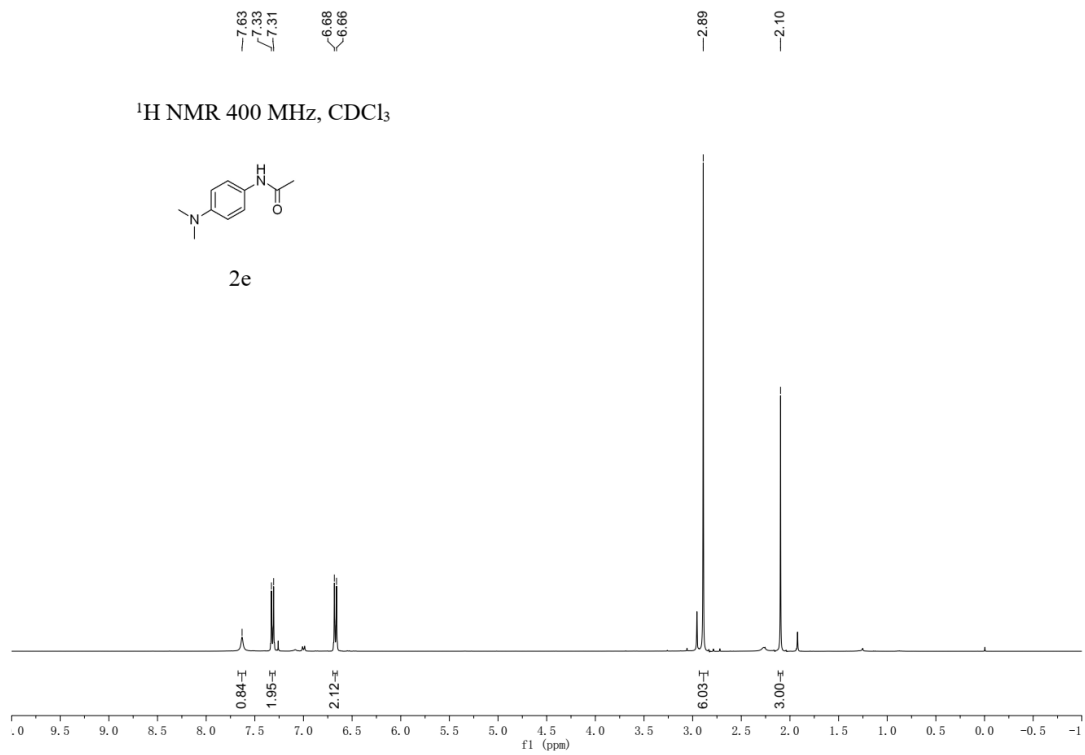
23.9  
17.7

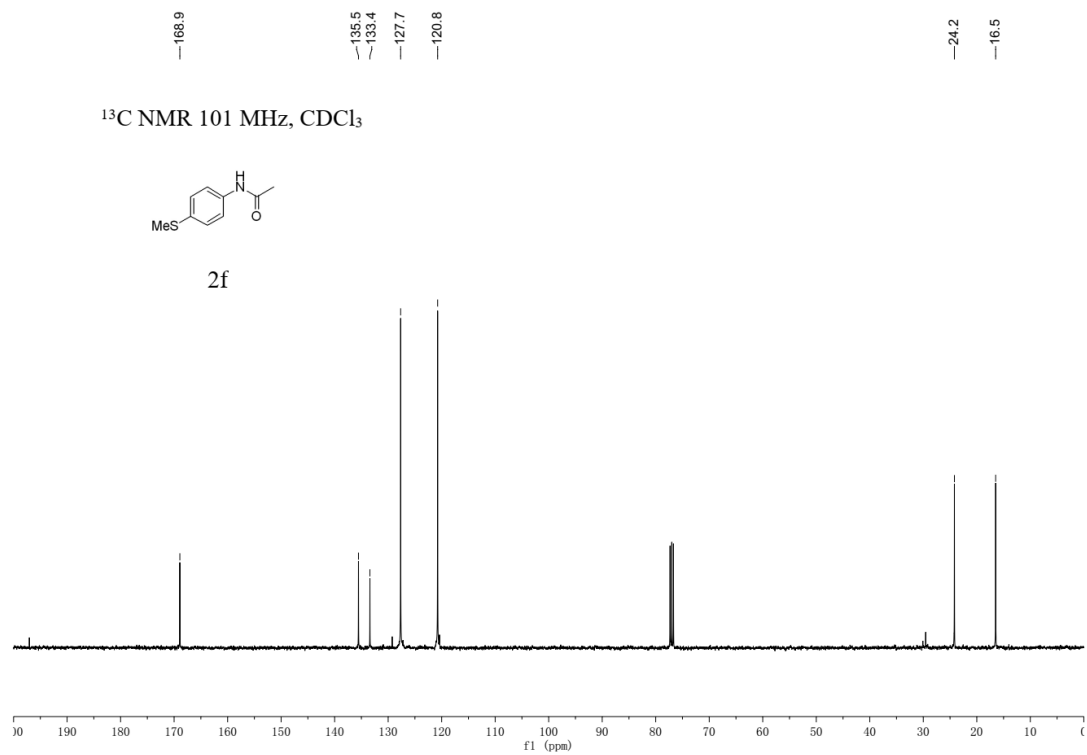
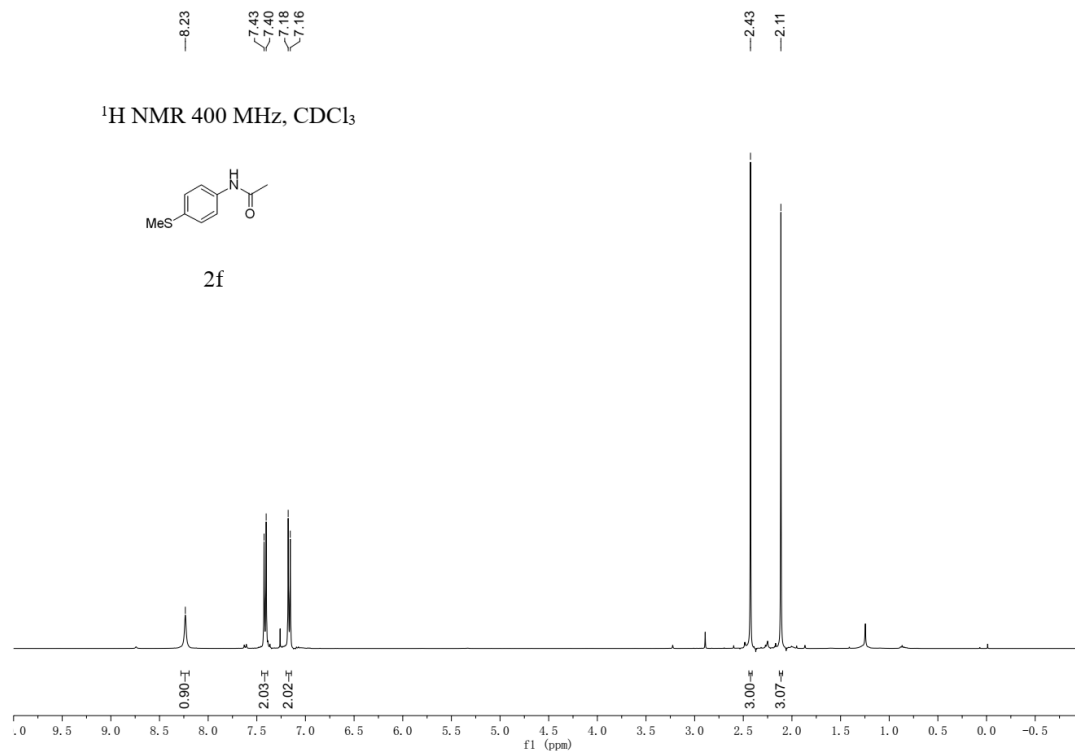
<sup>13</sup>C NMR 101 MHz, CDCl<sub>3</sub>



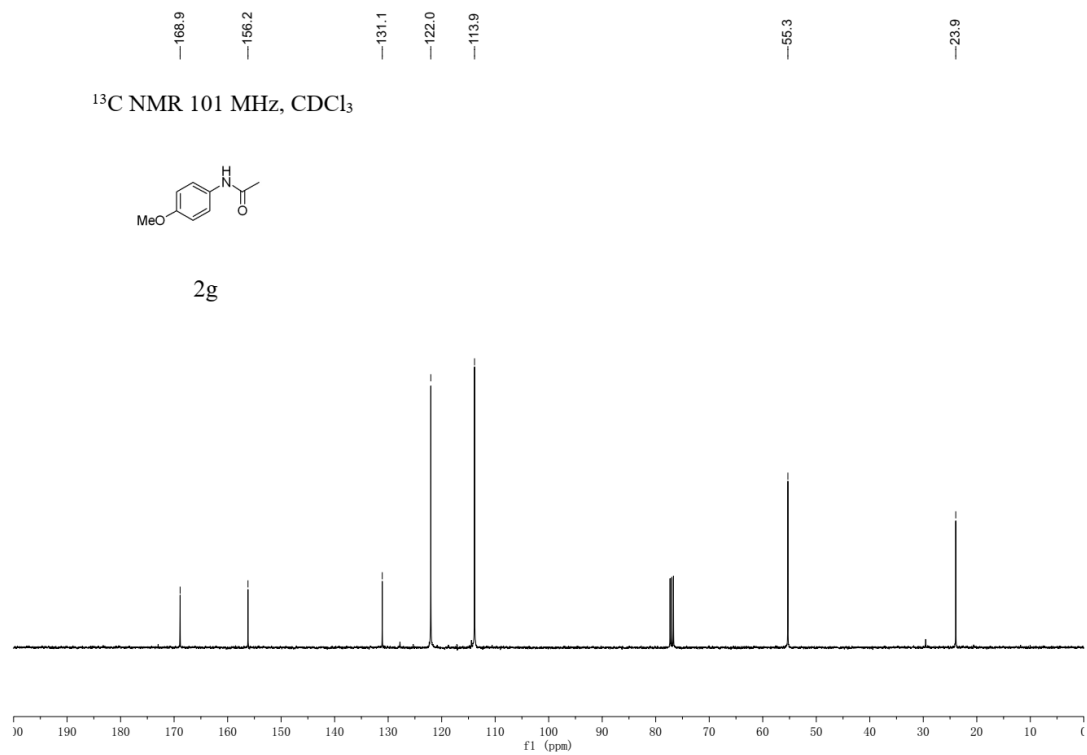
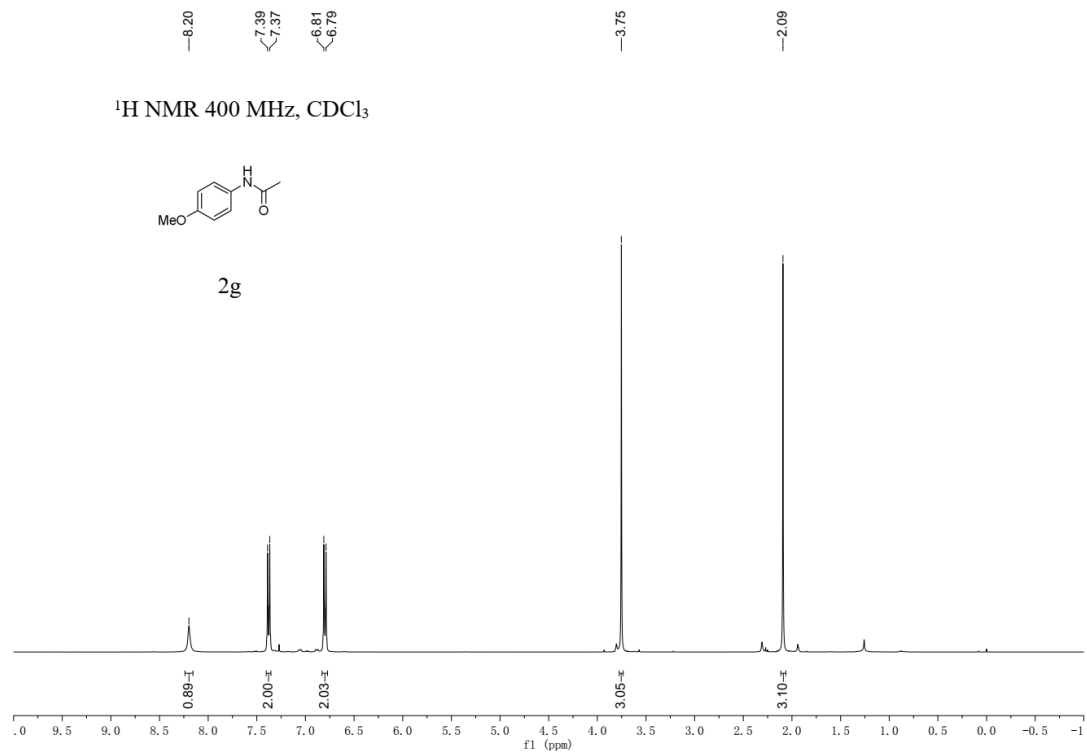
2d

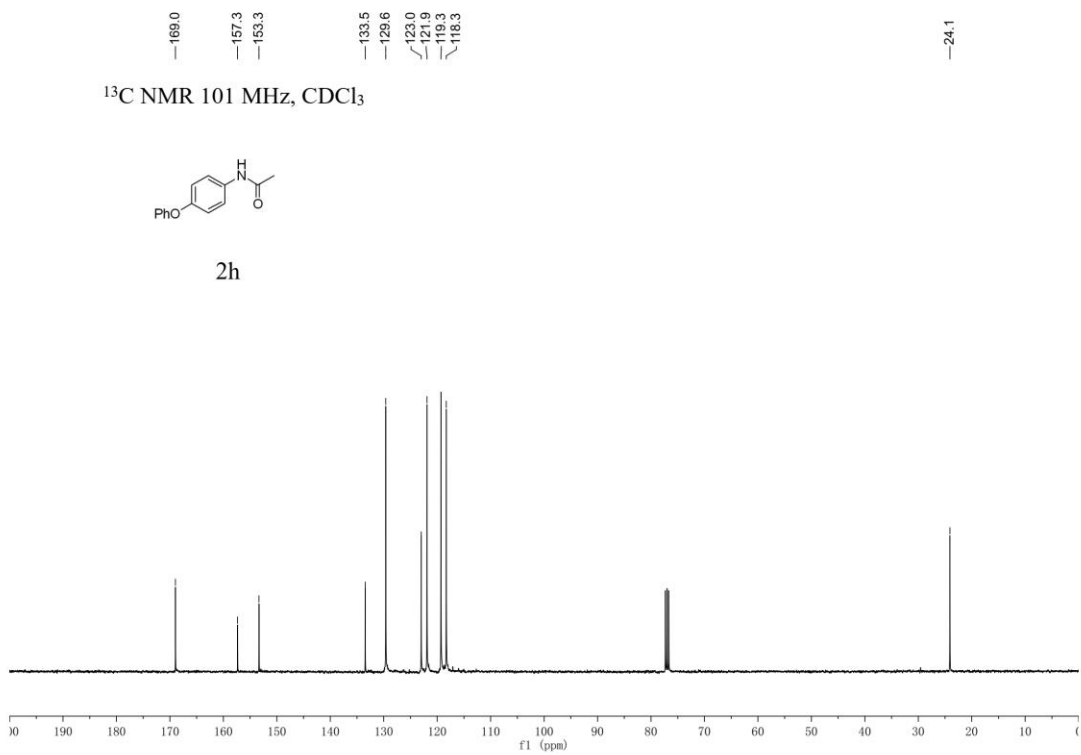
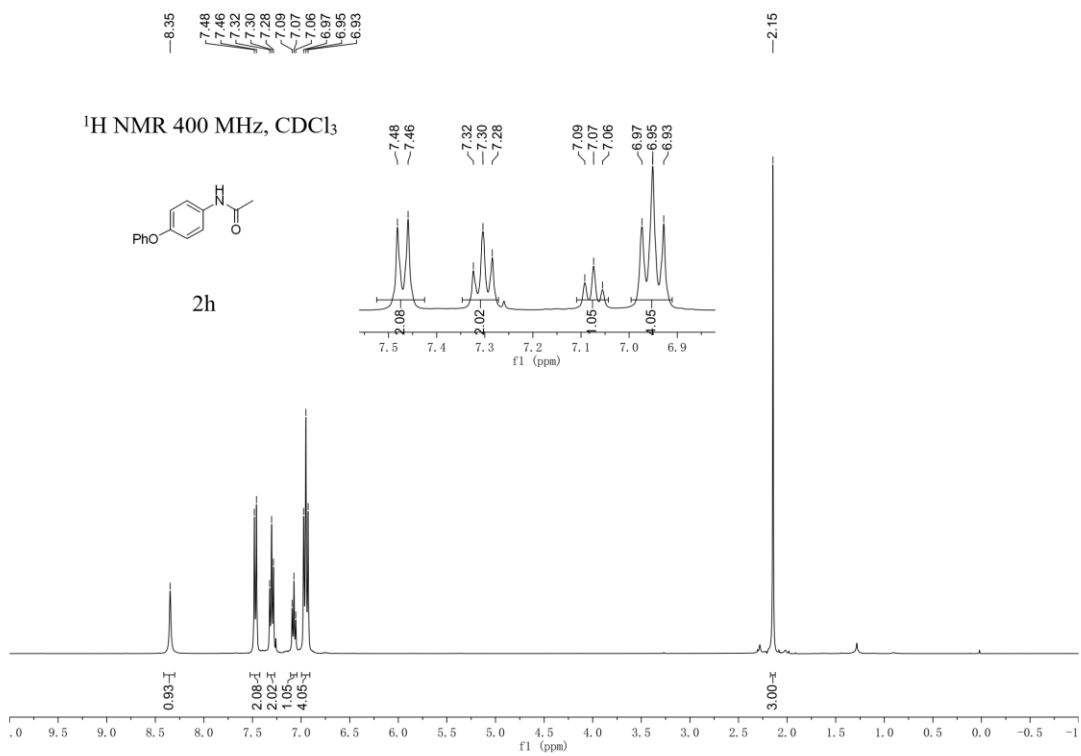


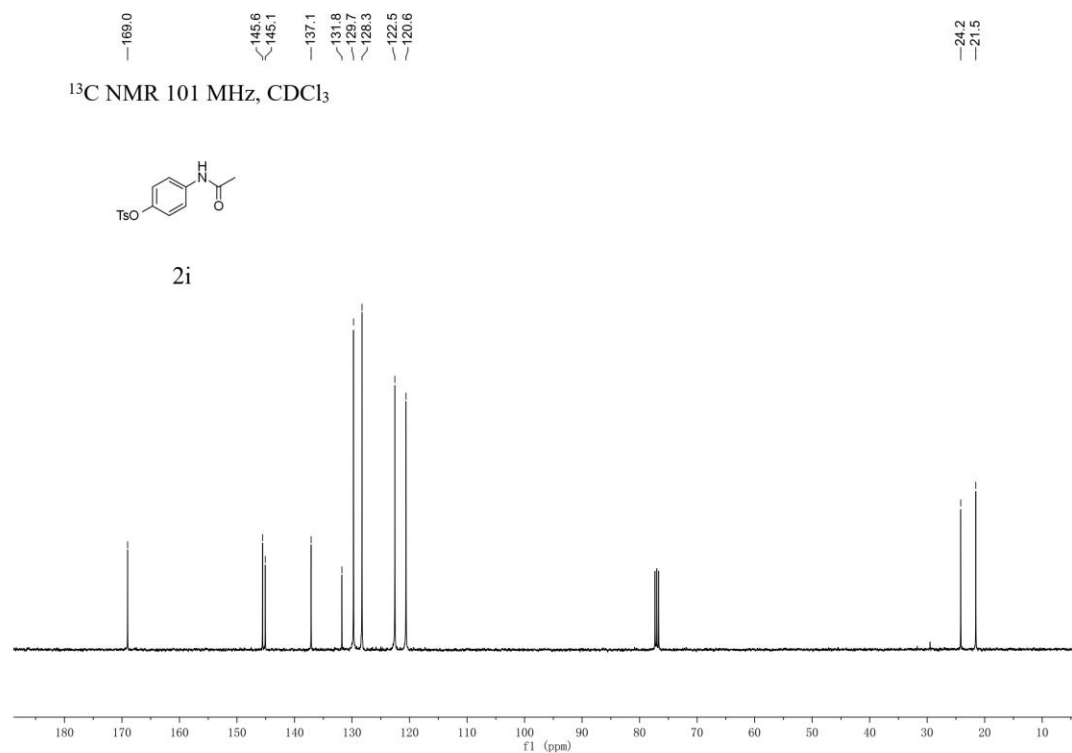
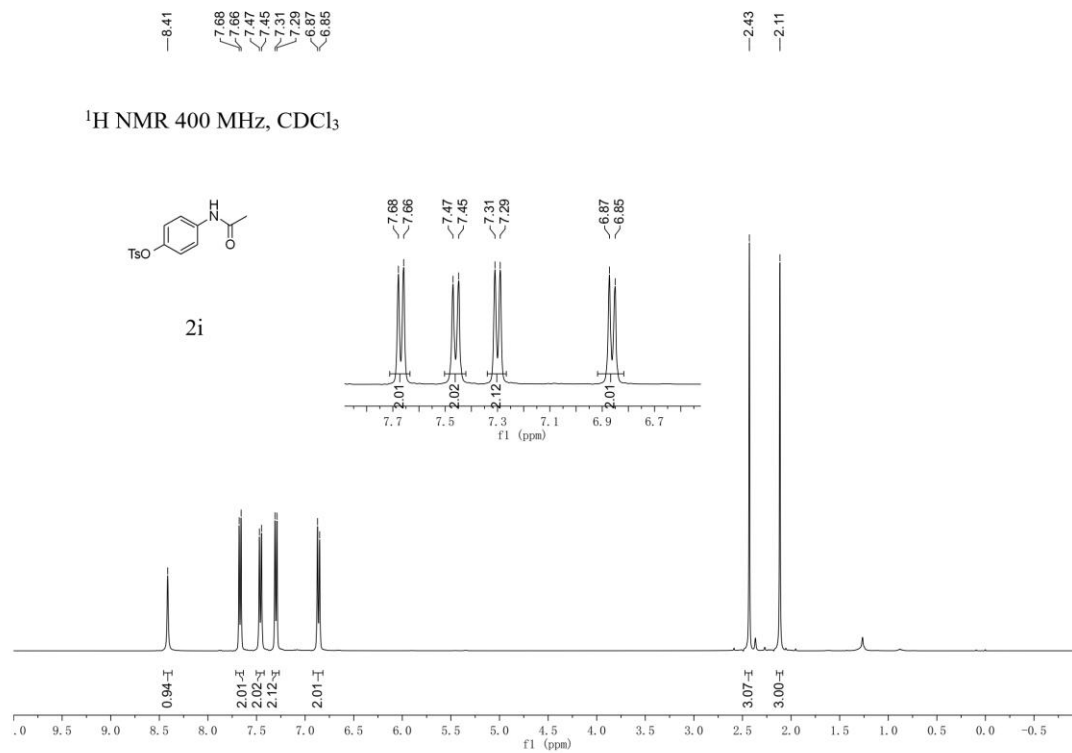


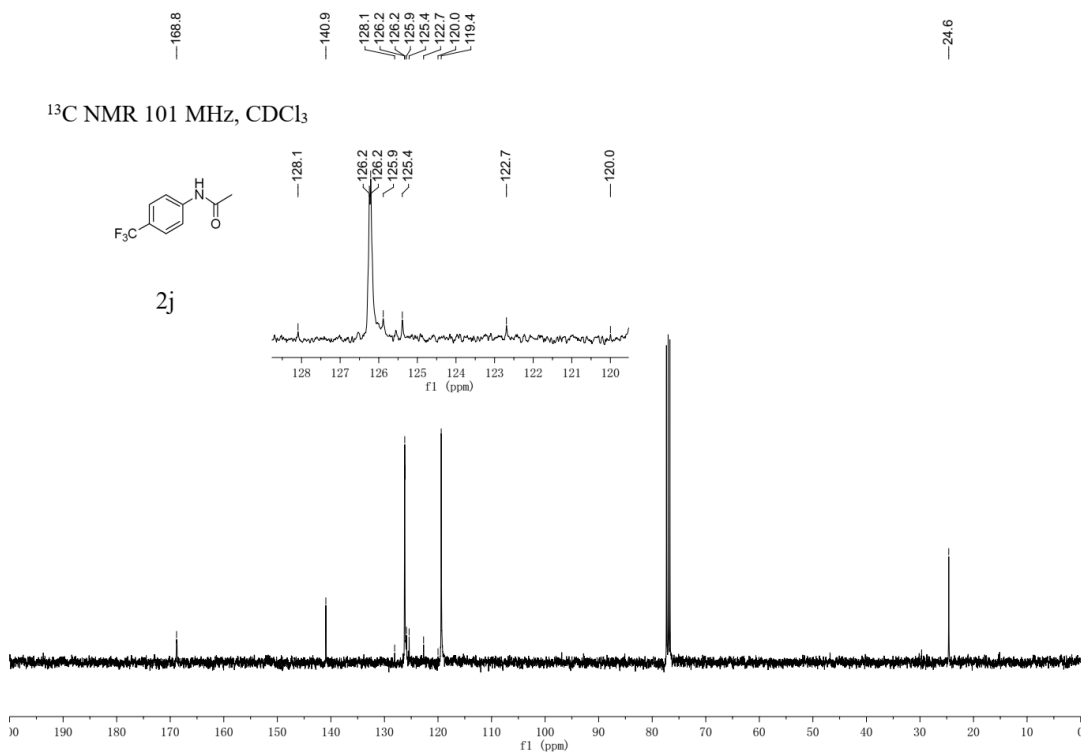
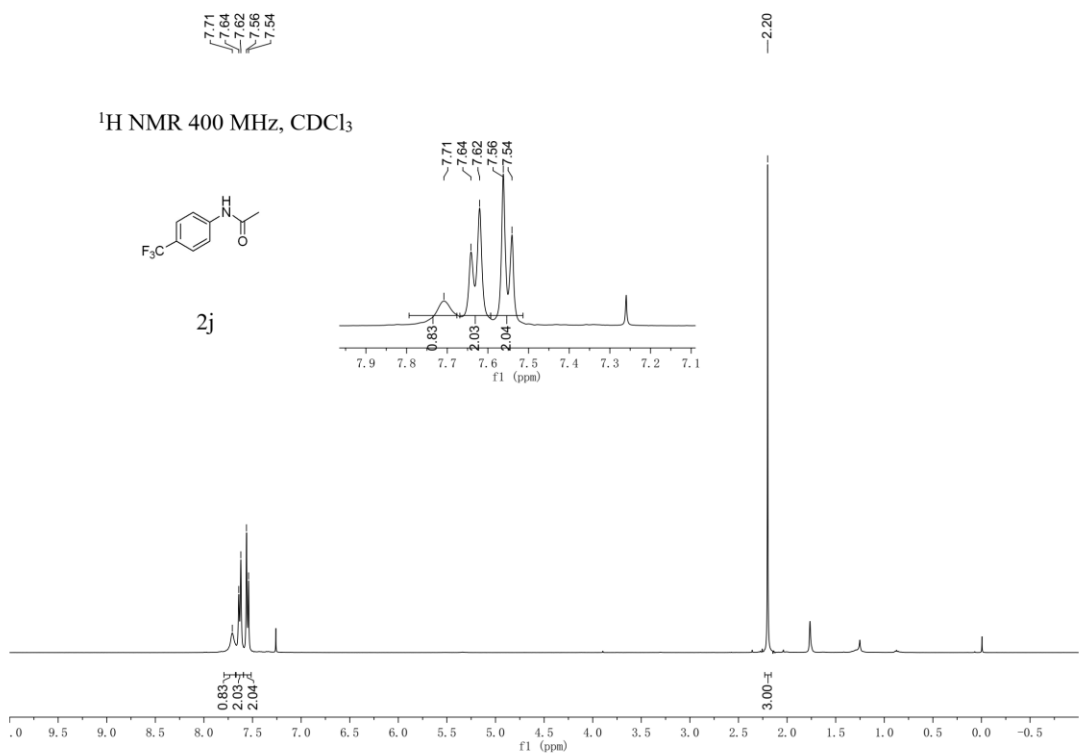


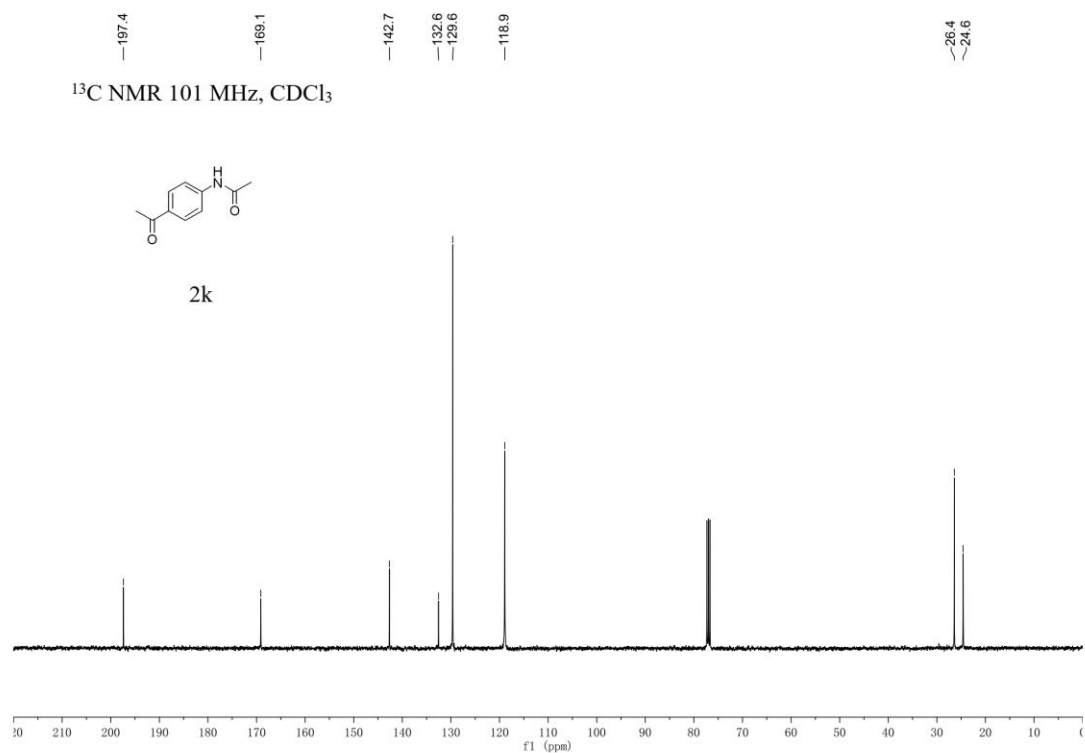
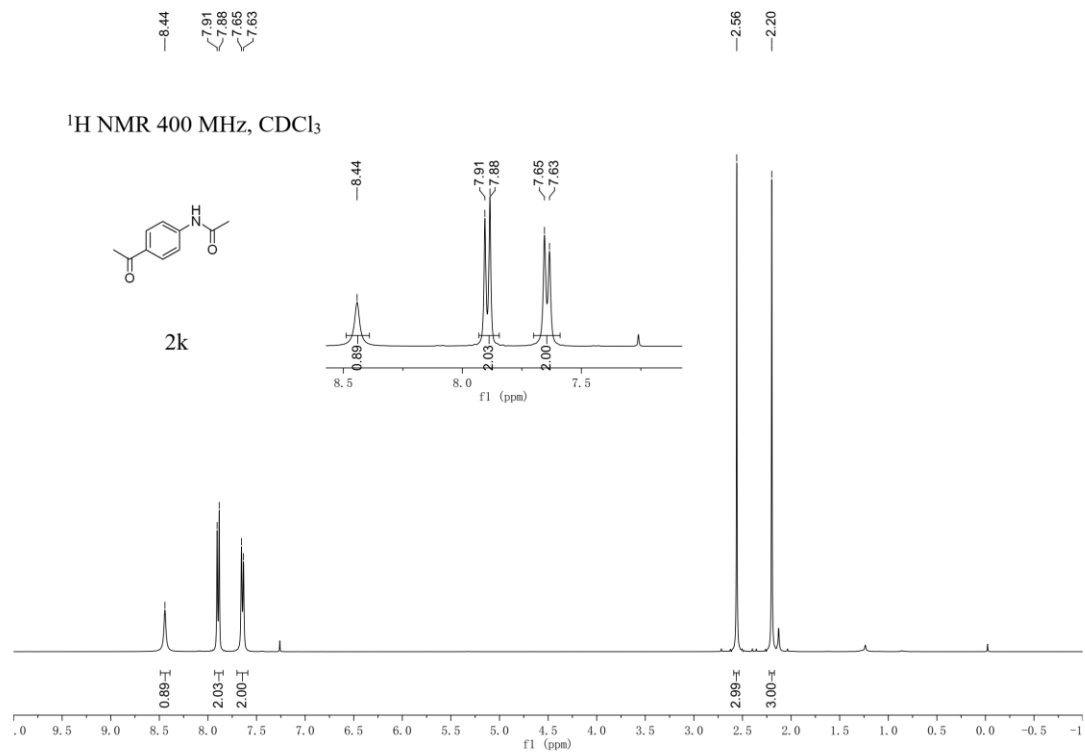


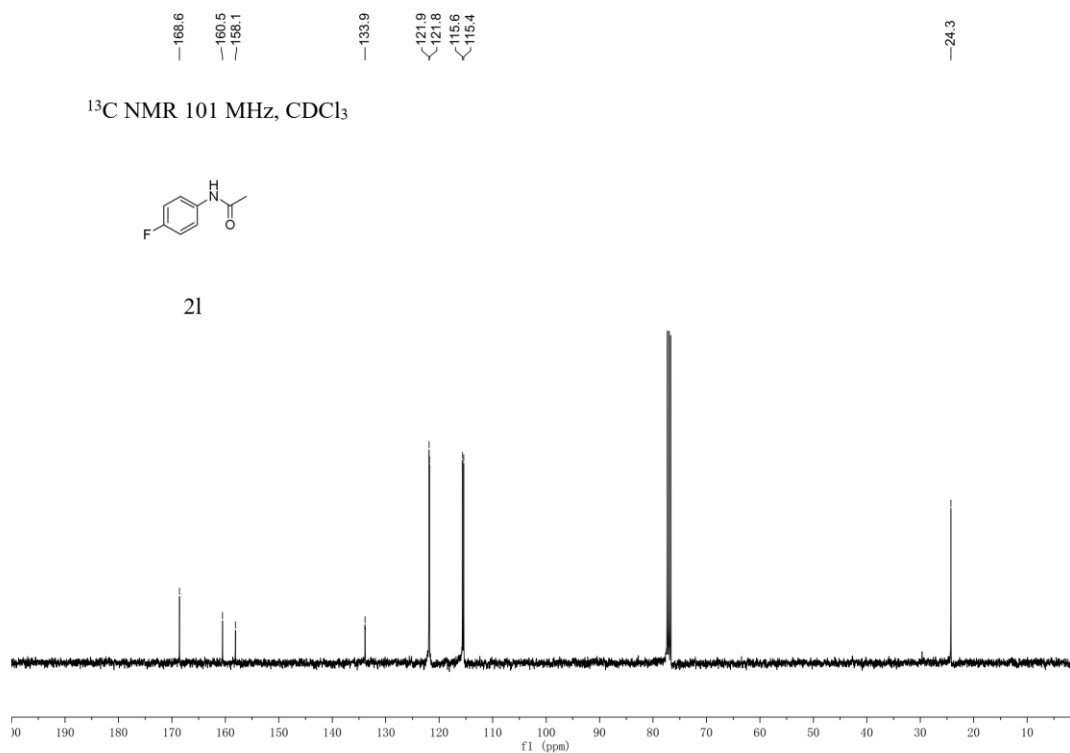
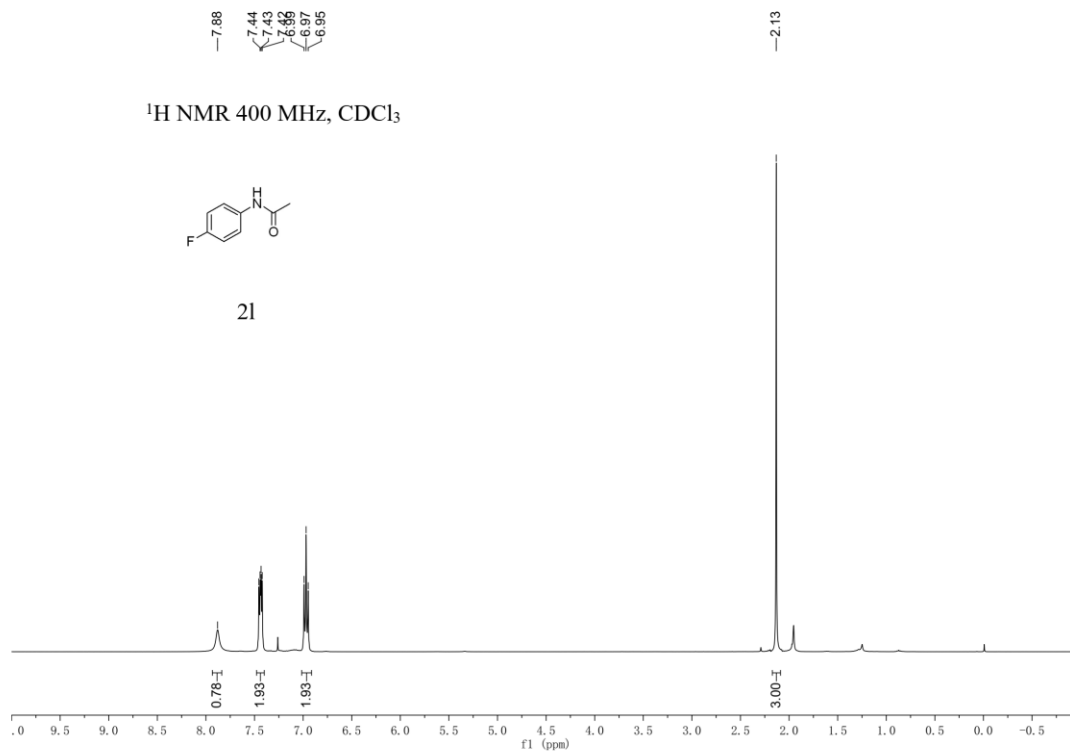


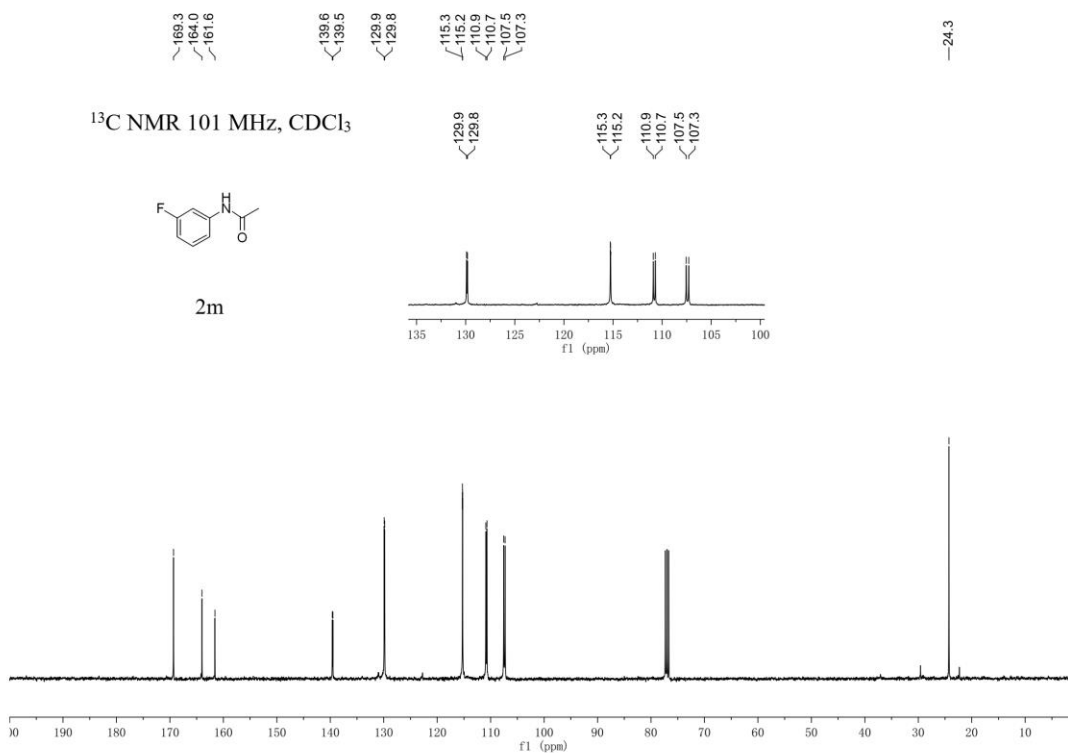
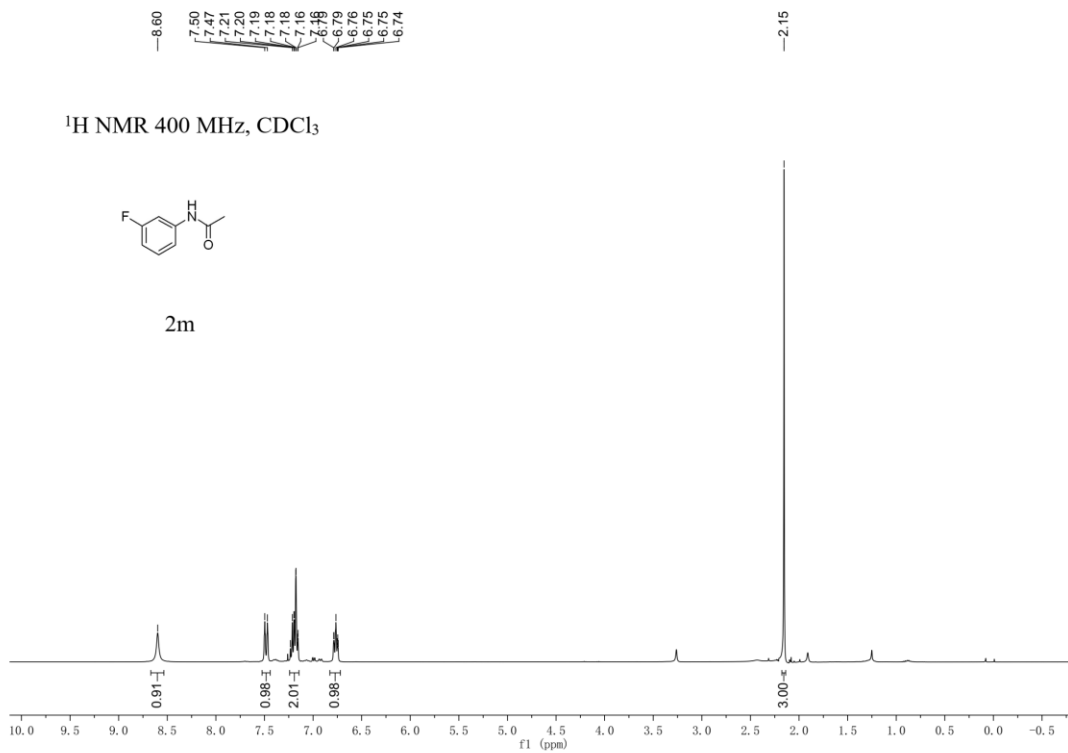


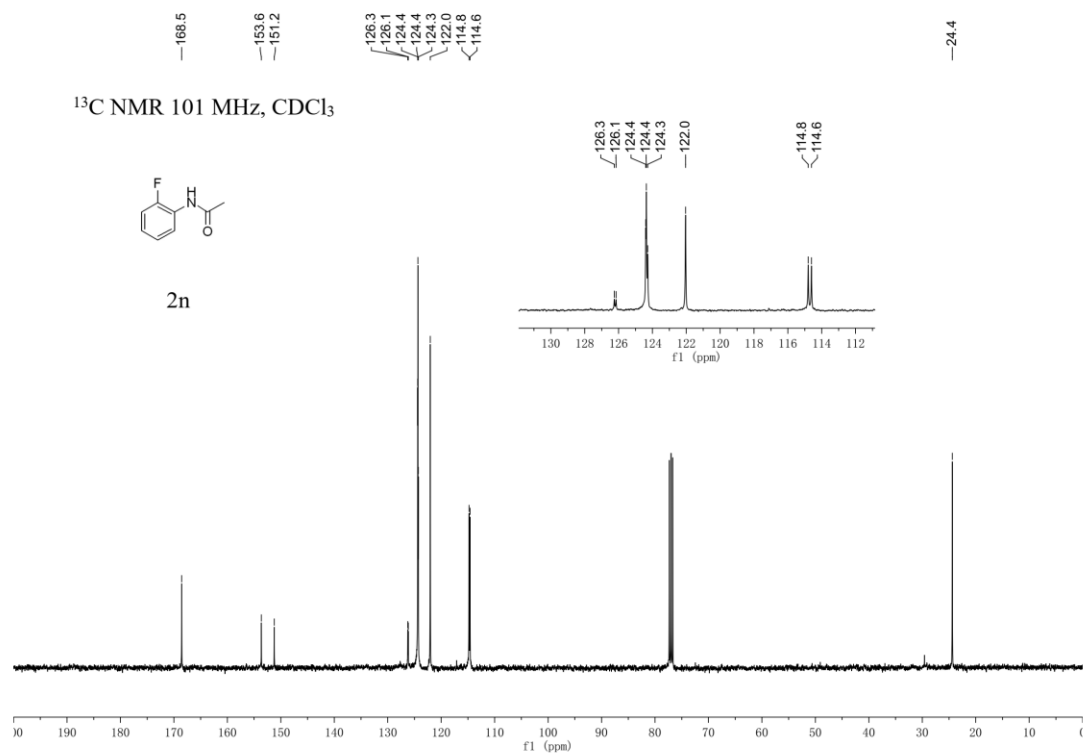
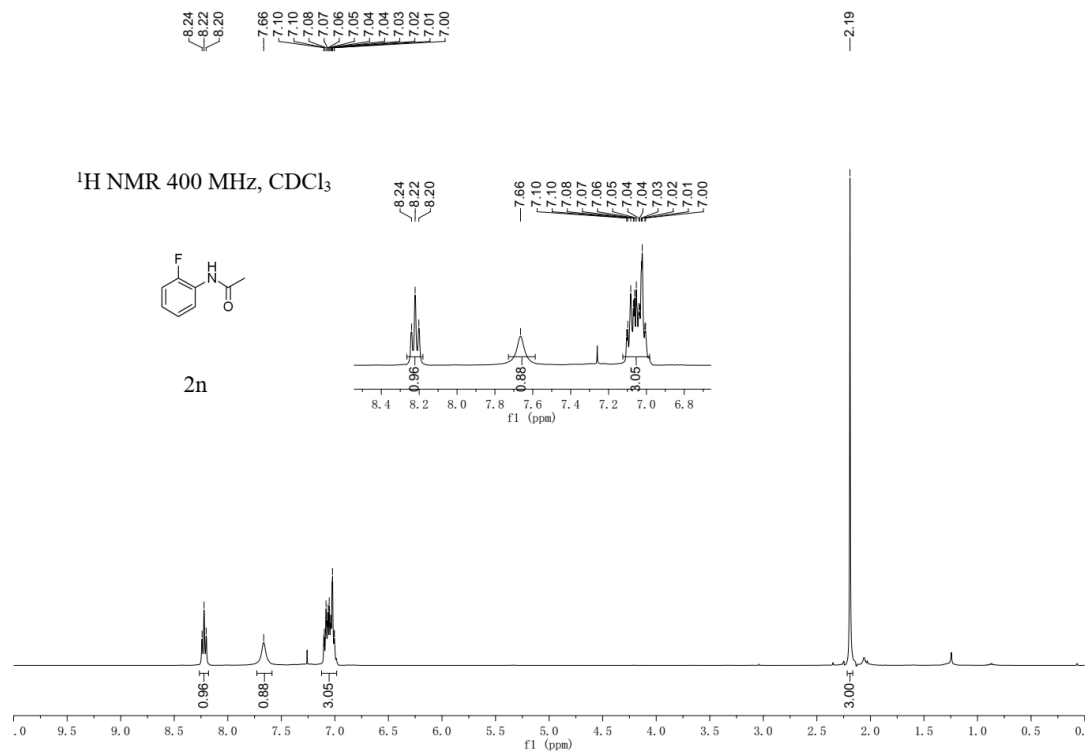




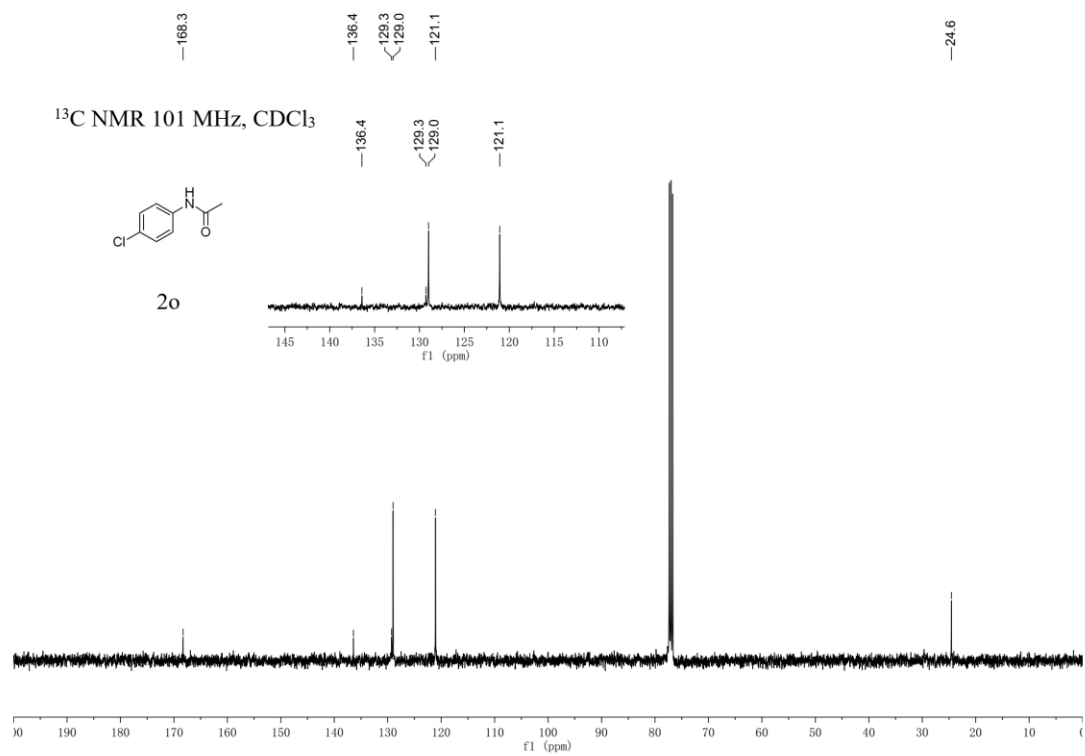
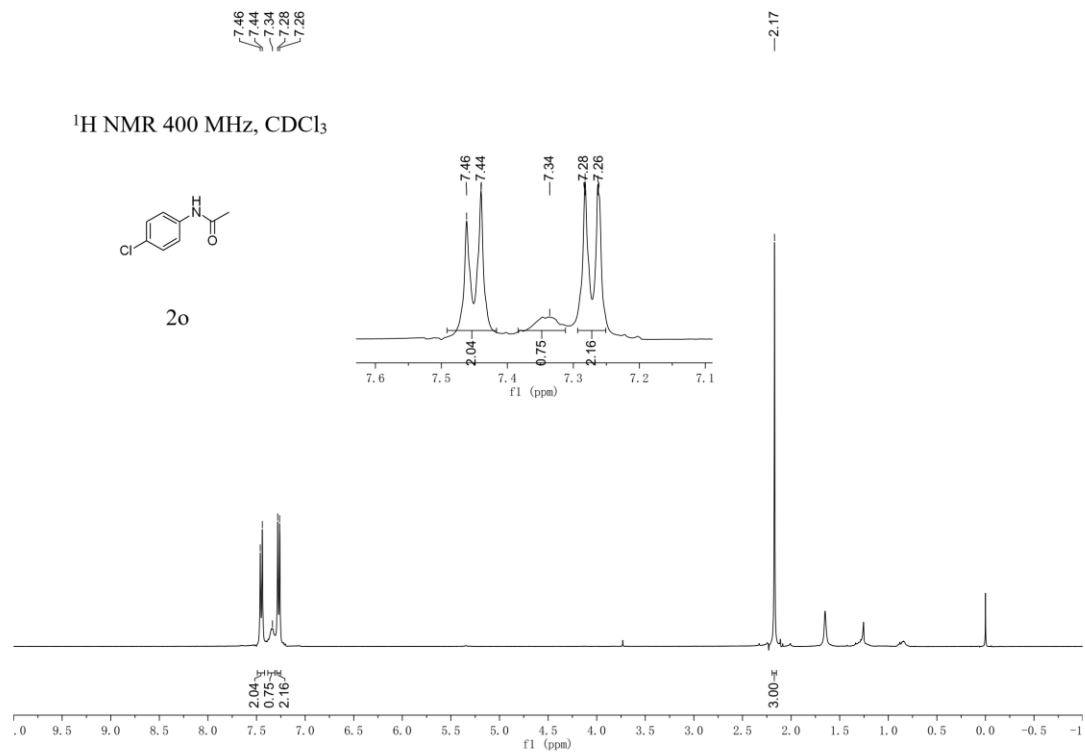


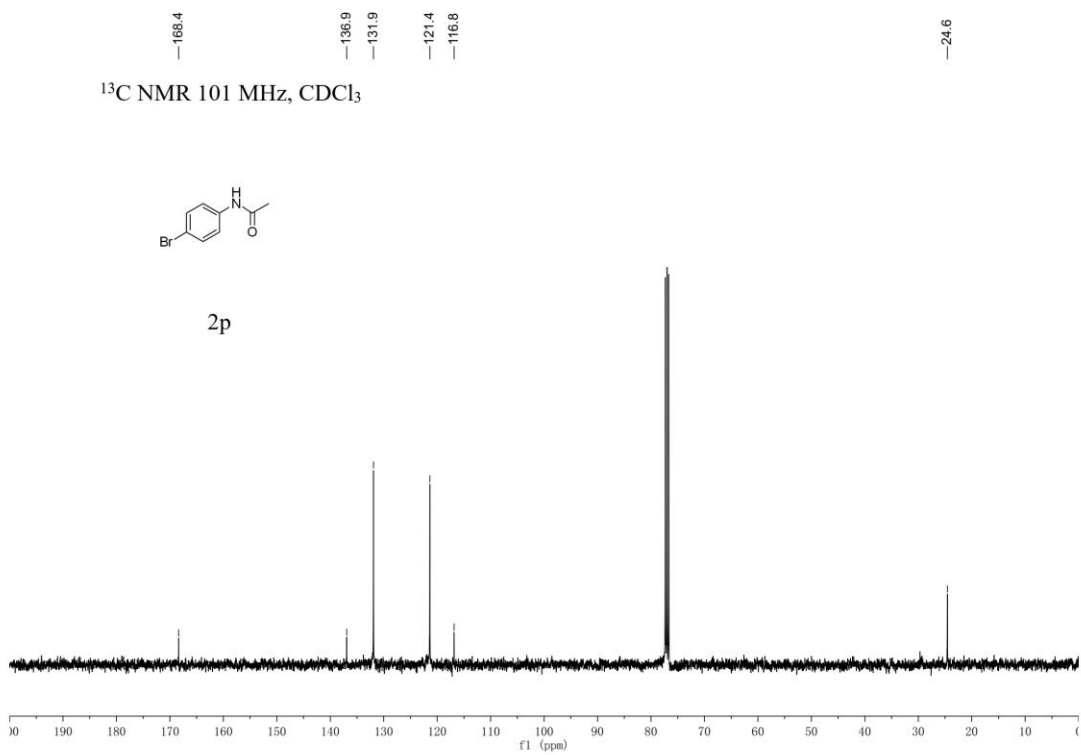
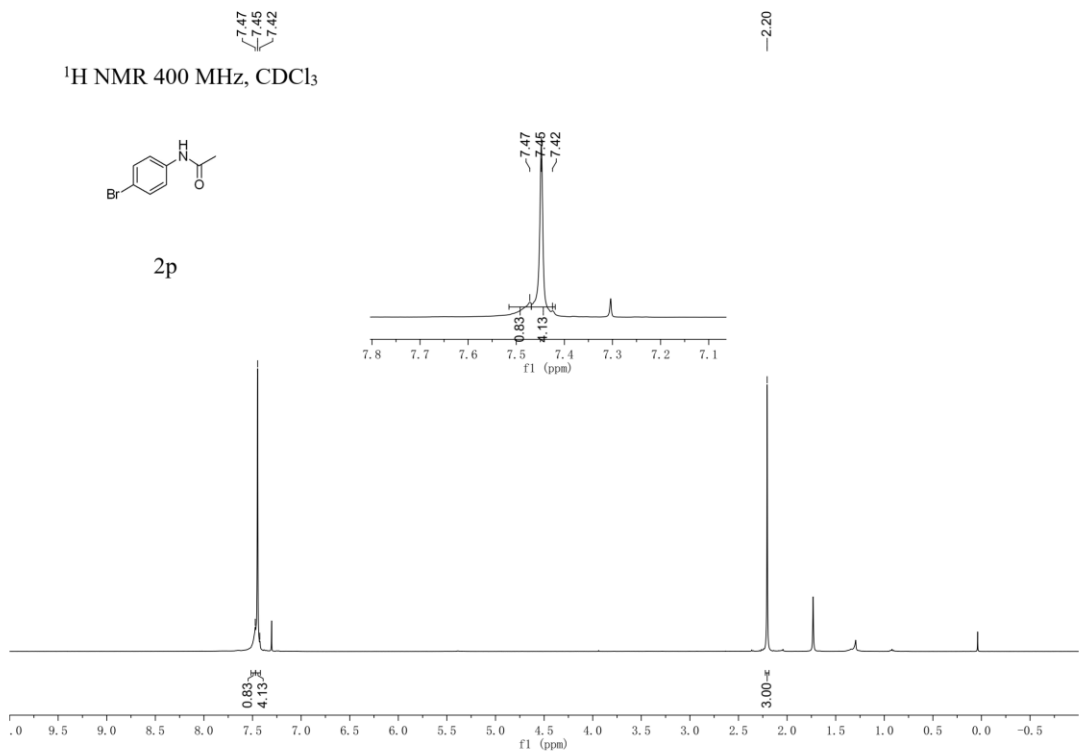


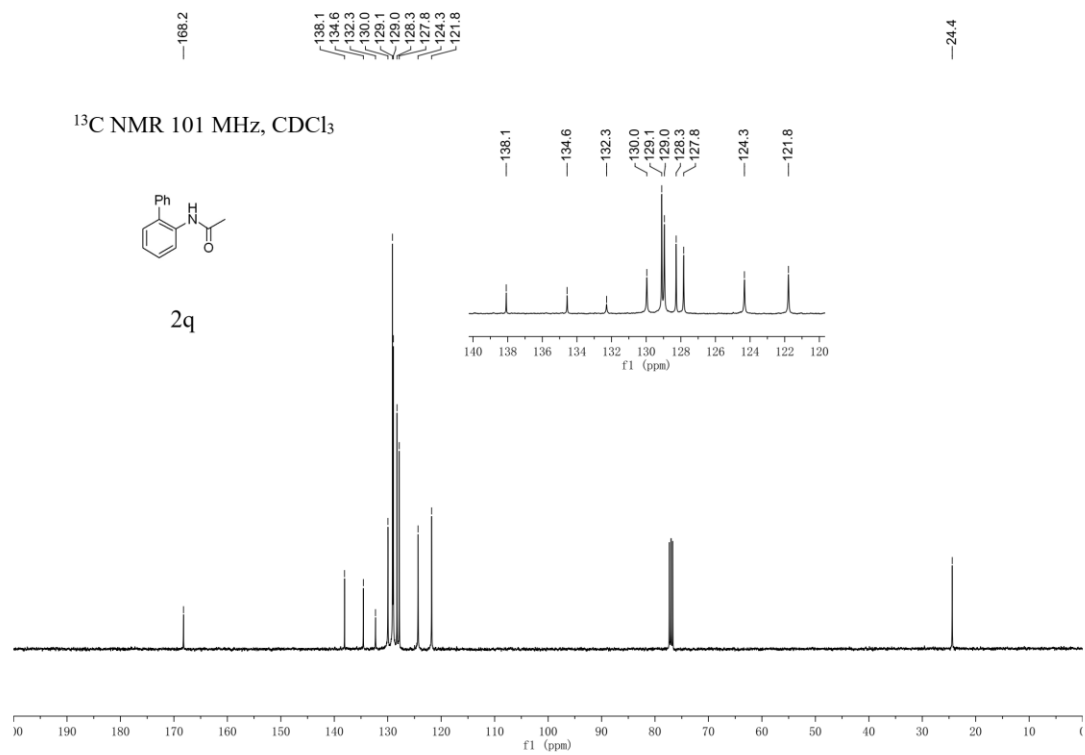
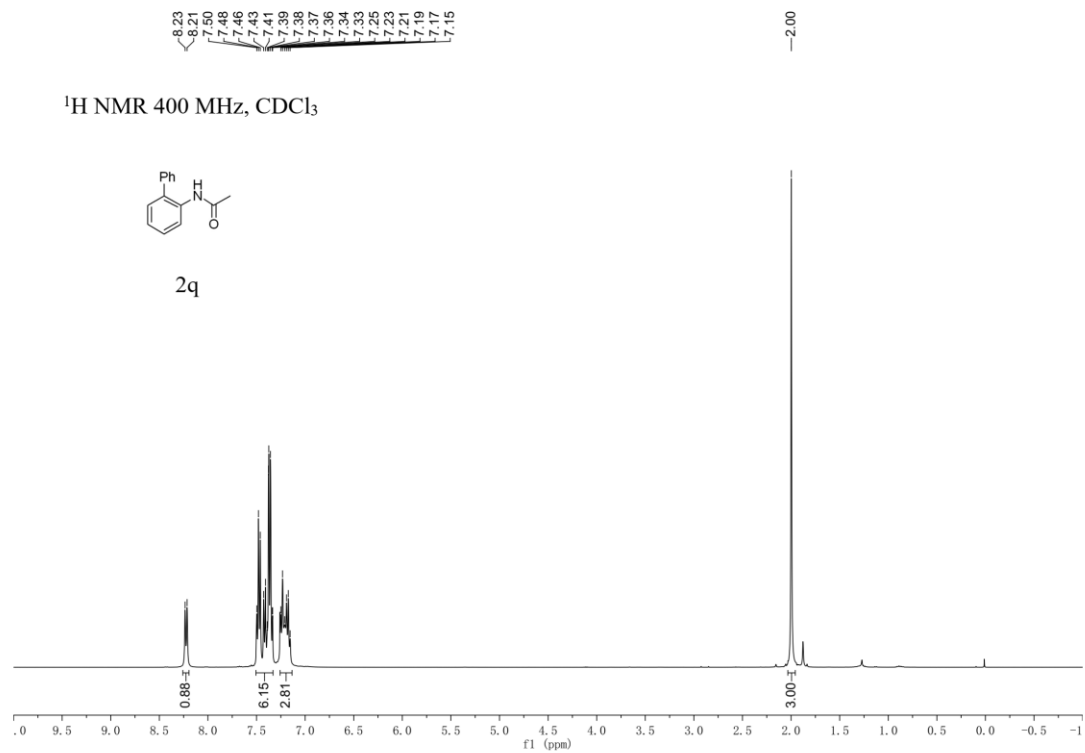


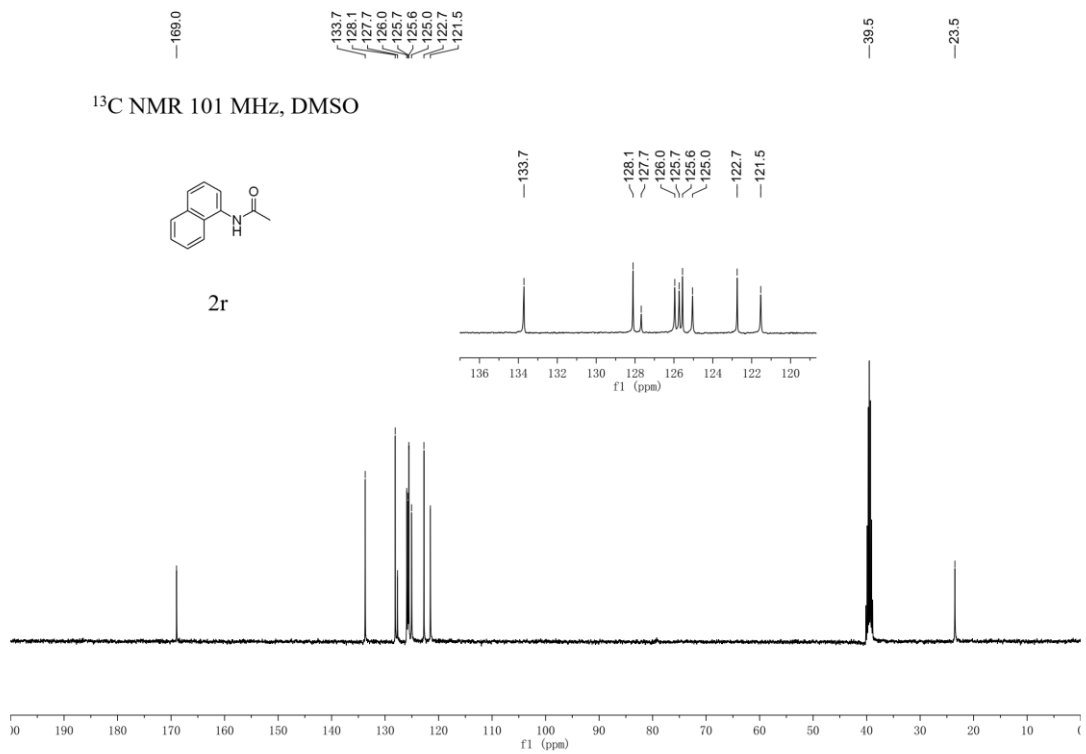
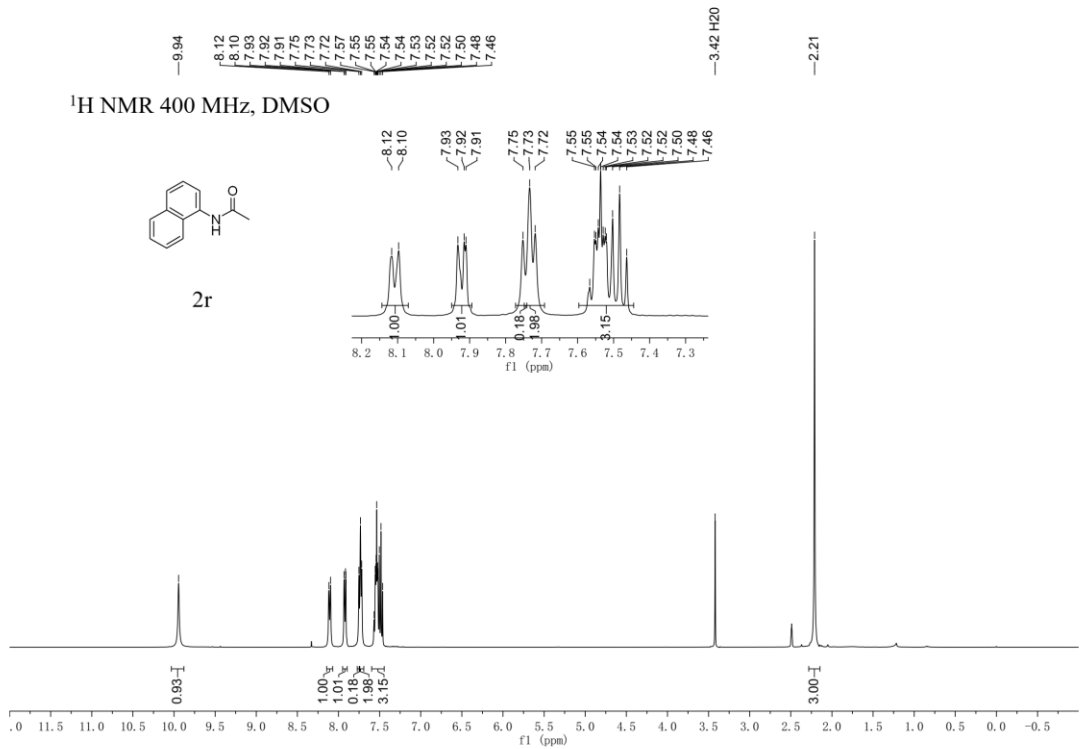


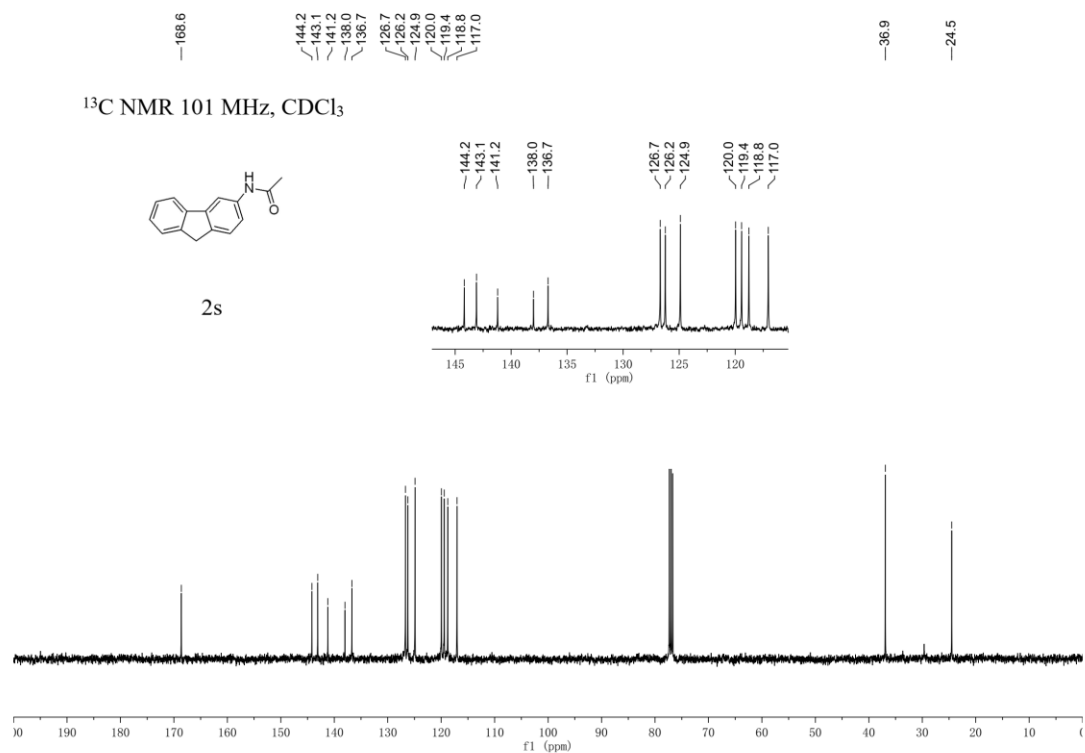
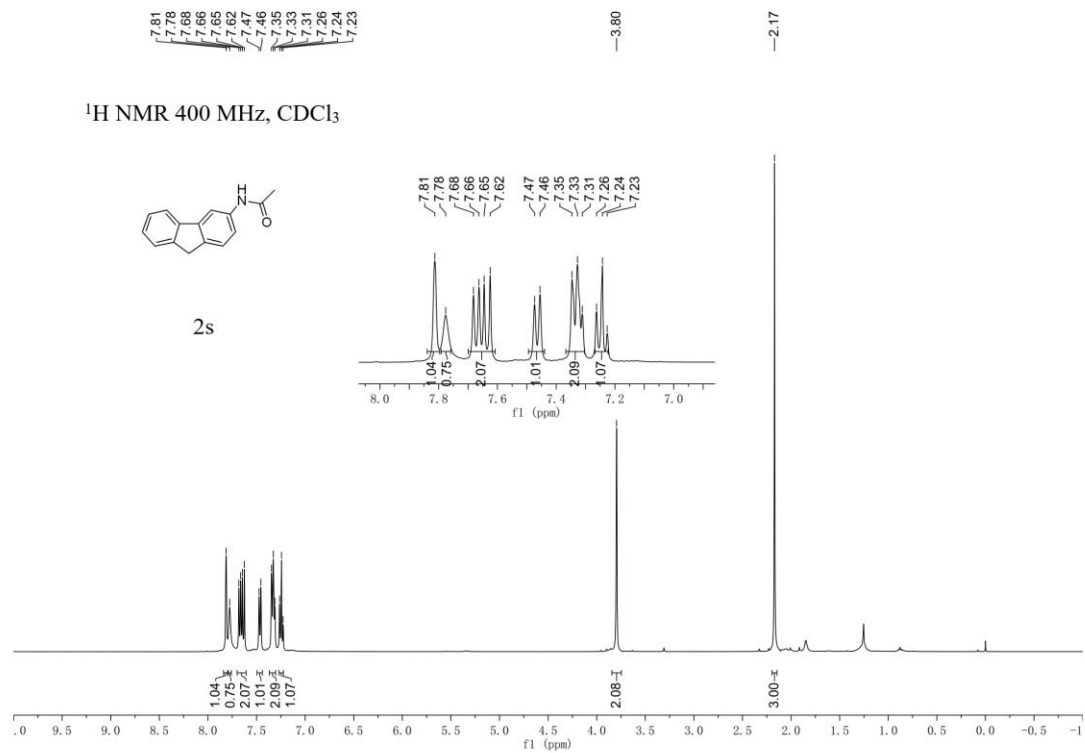


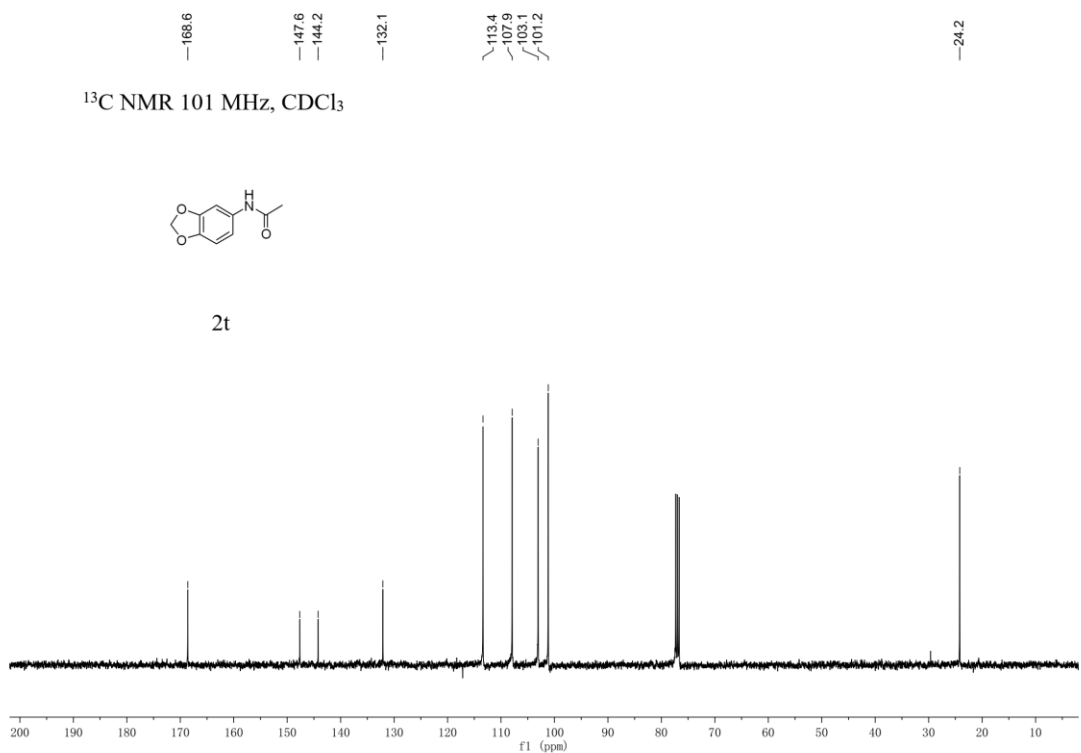
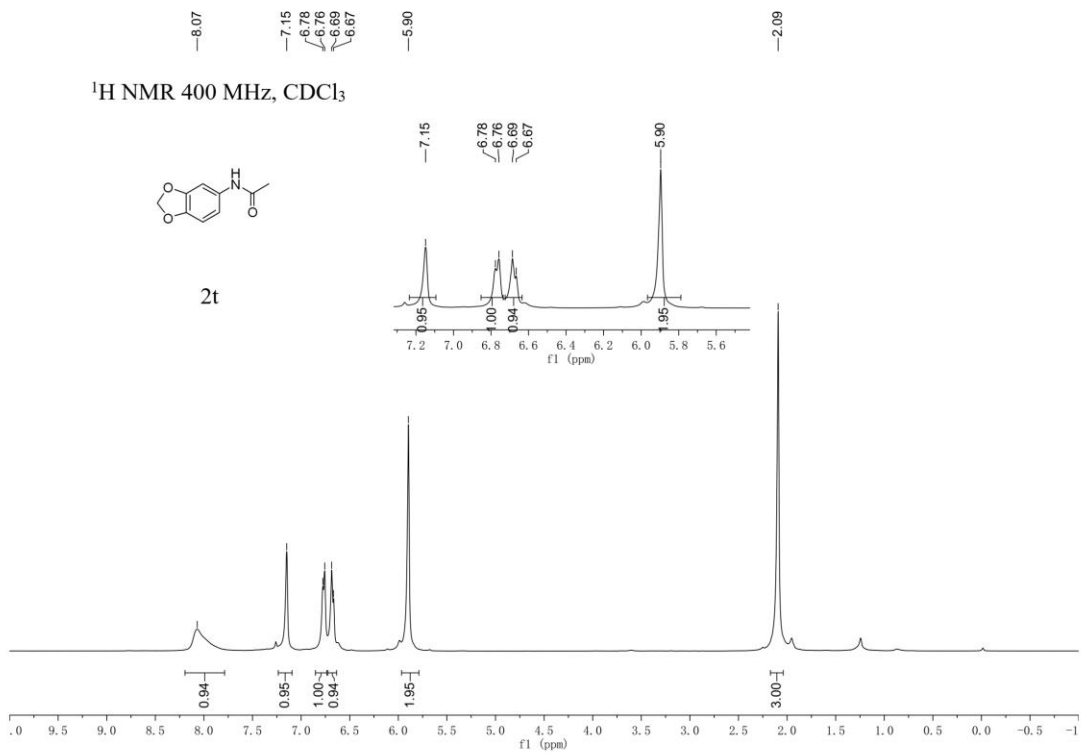


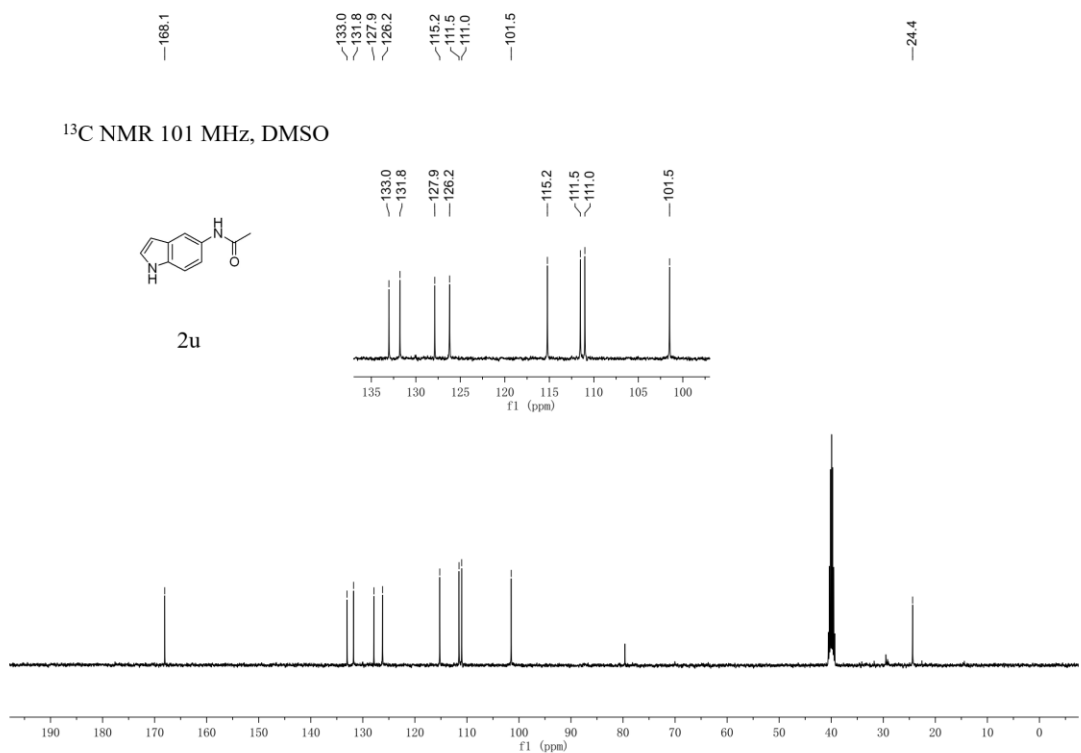
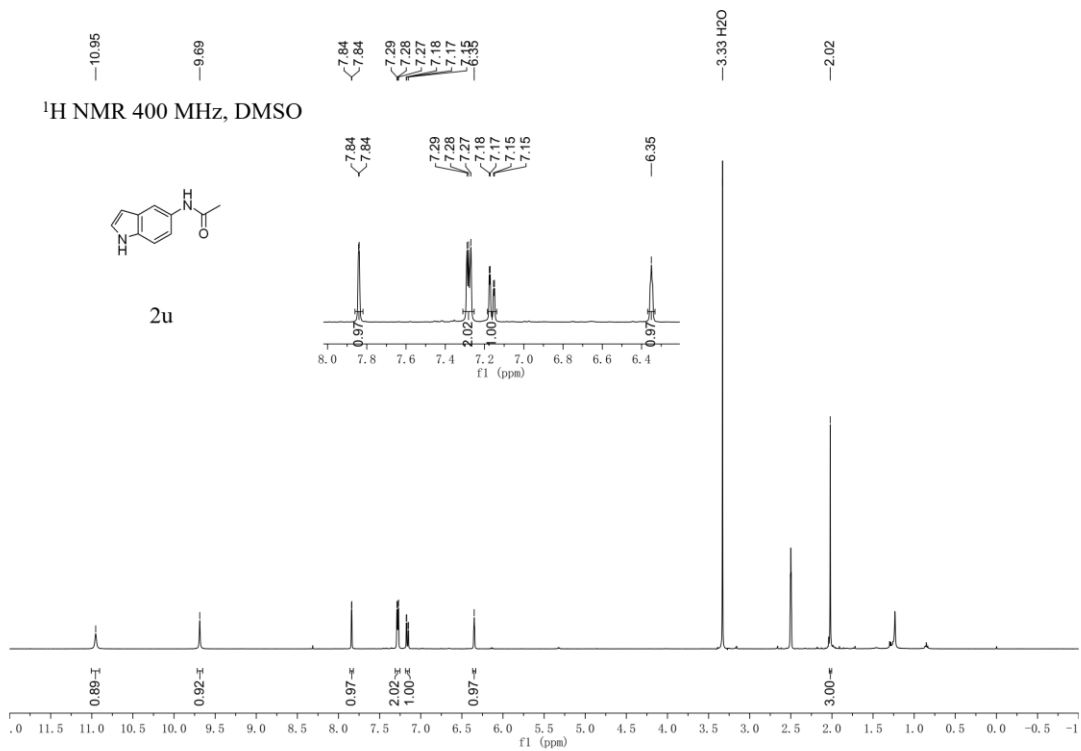


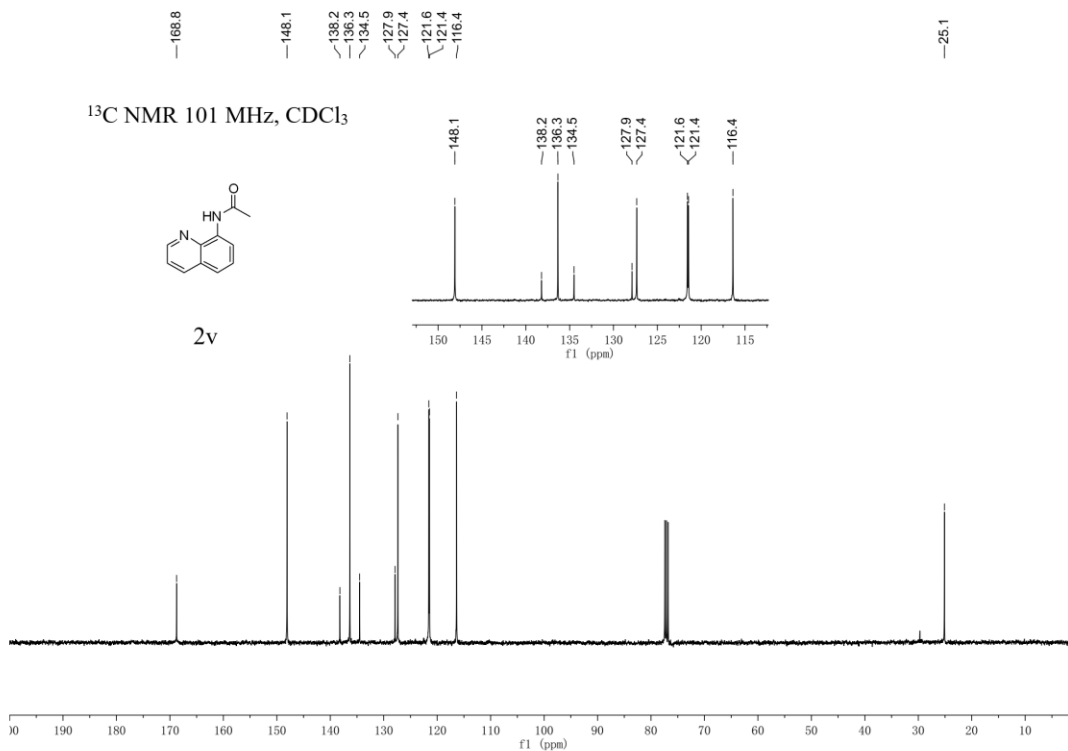
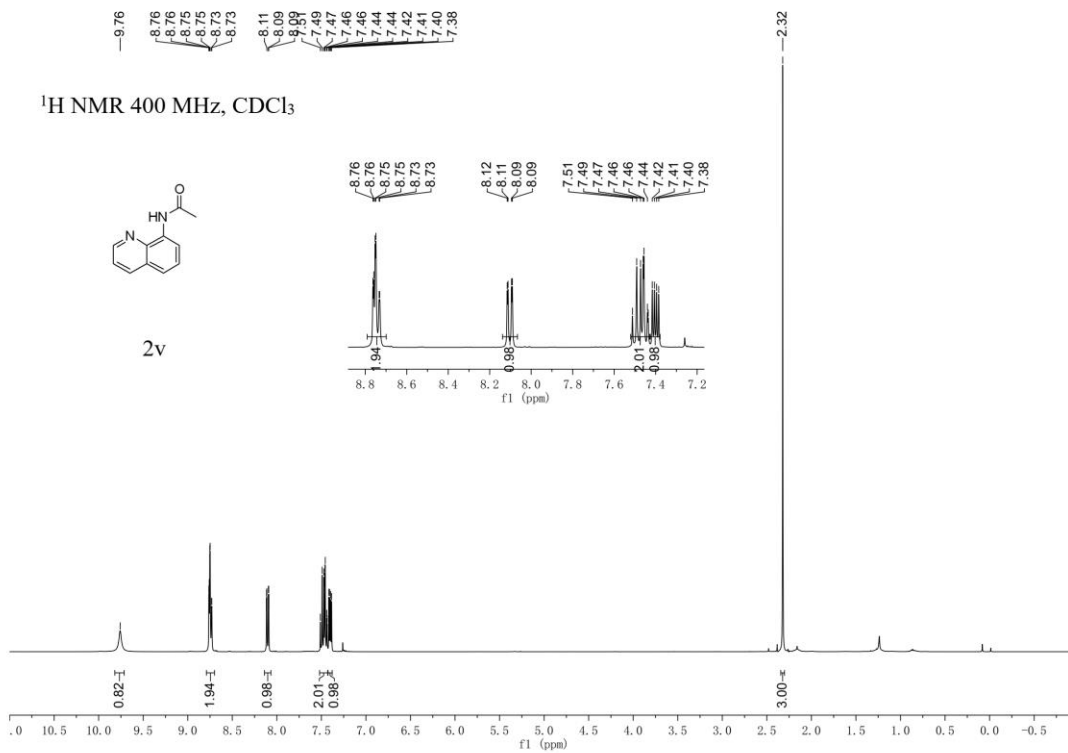




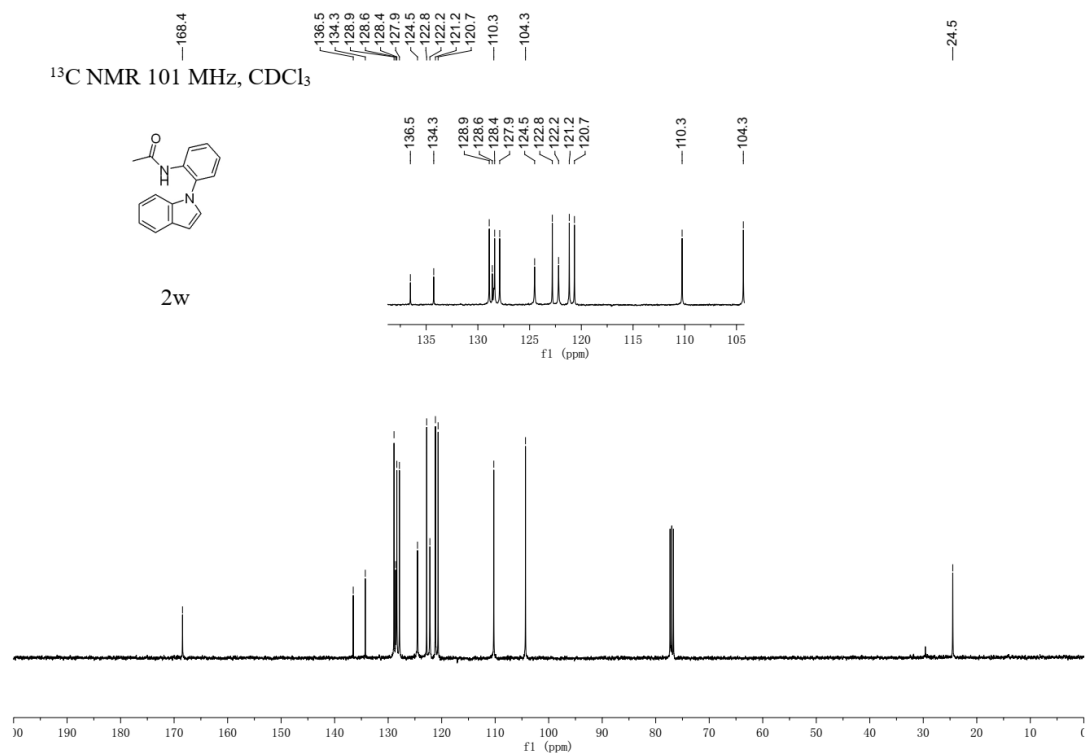
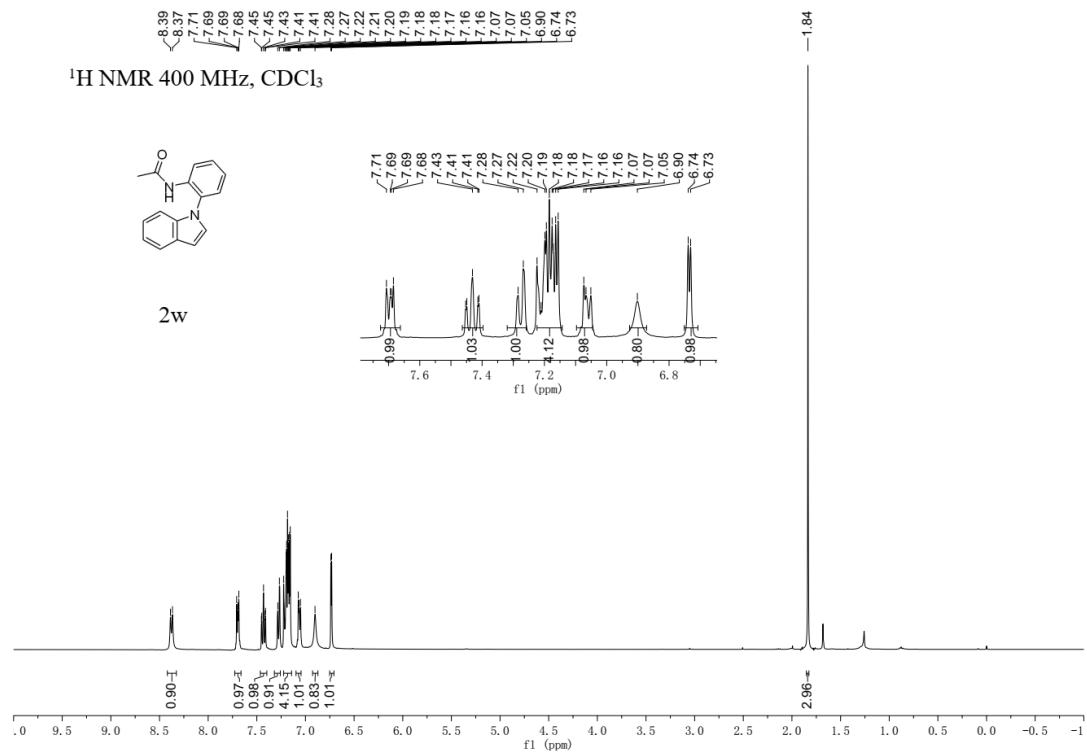


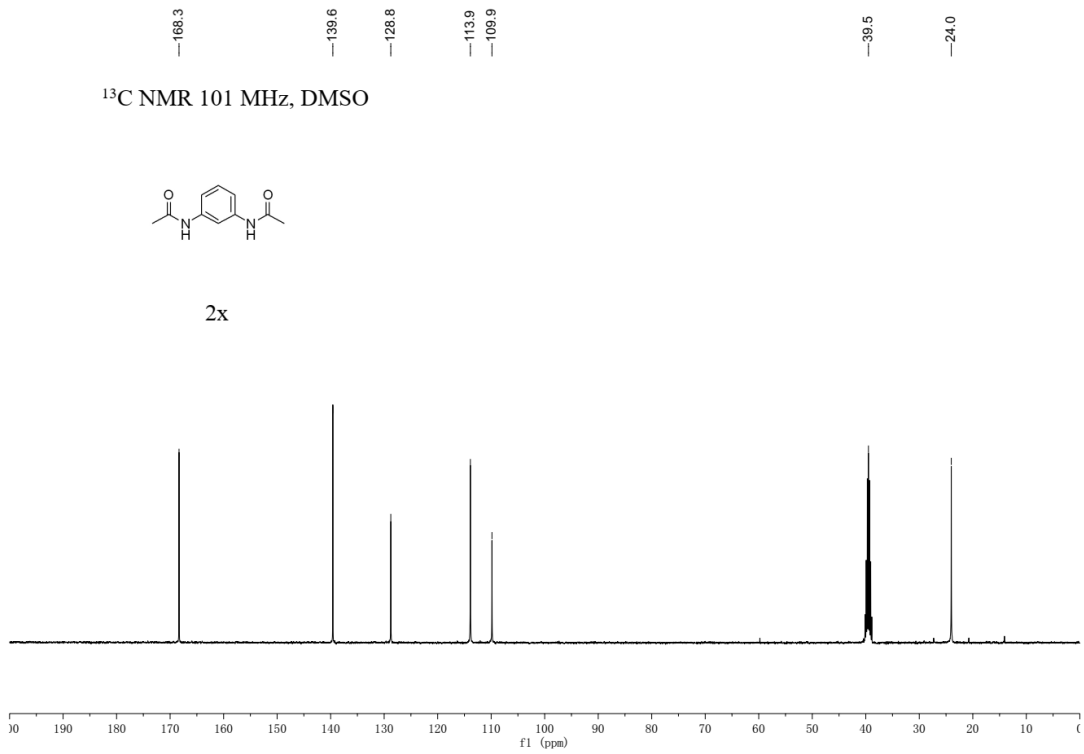
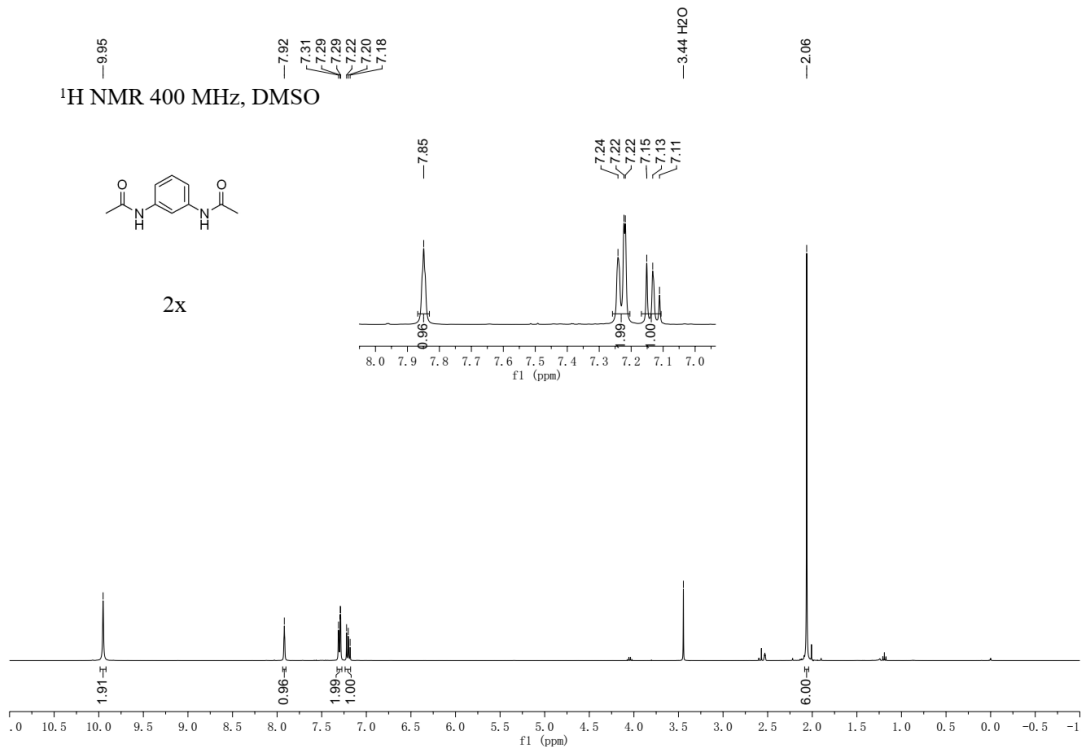


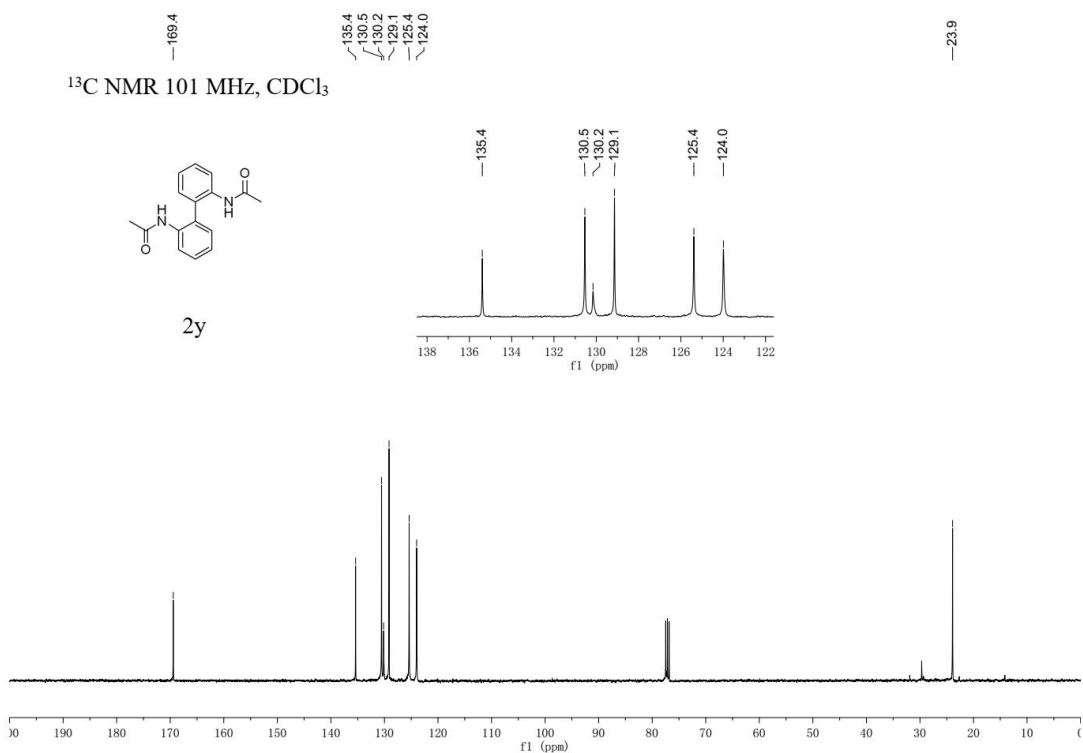
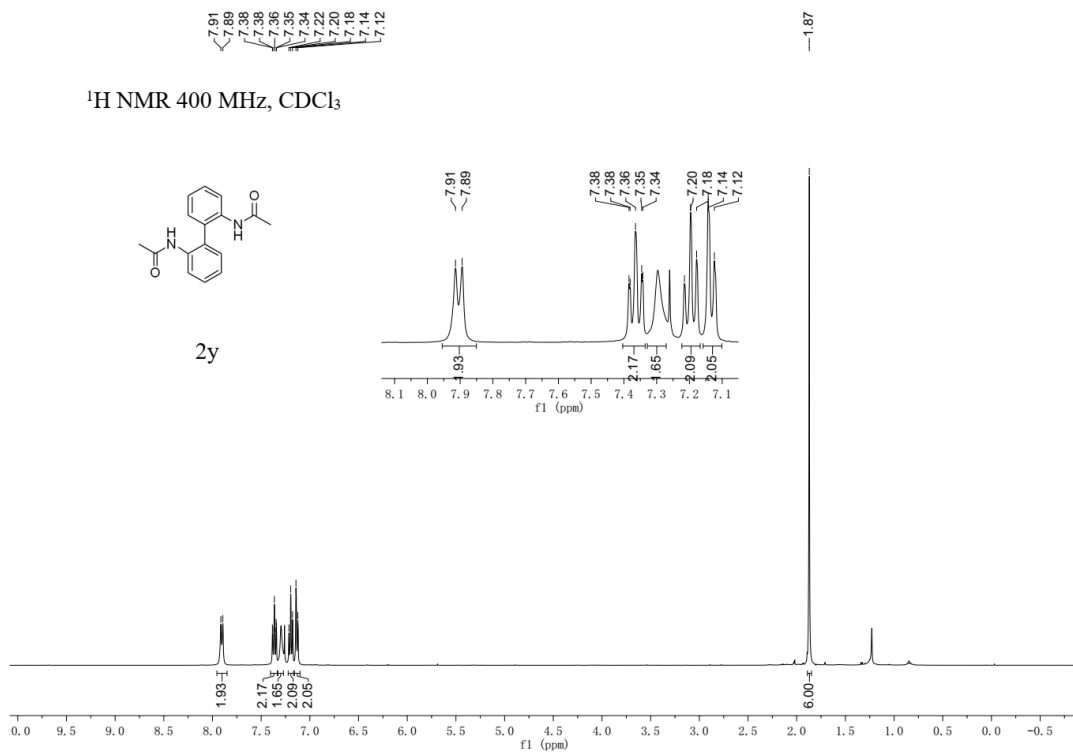


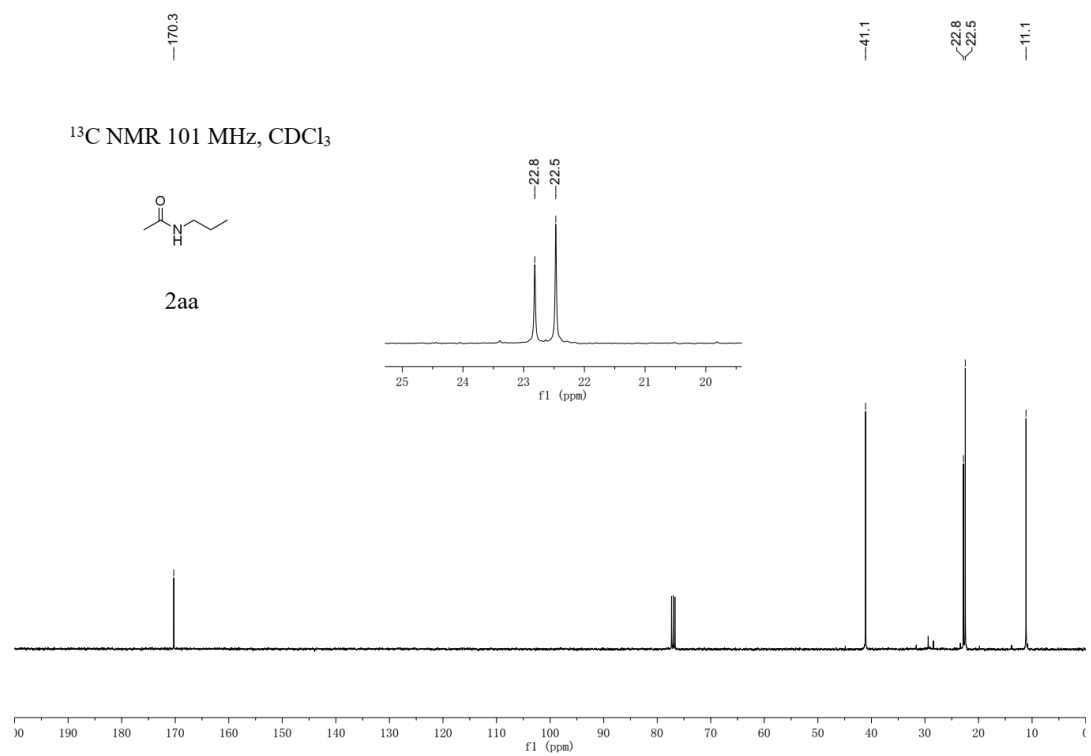
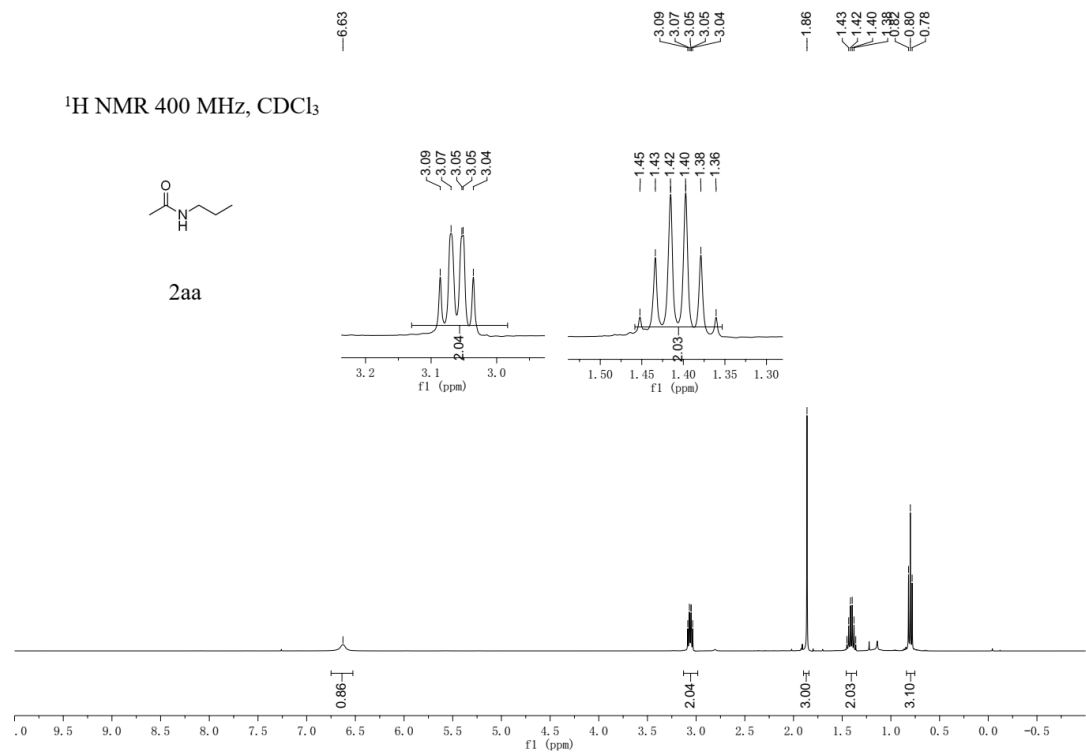


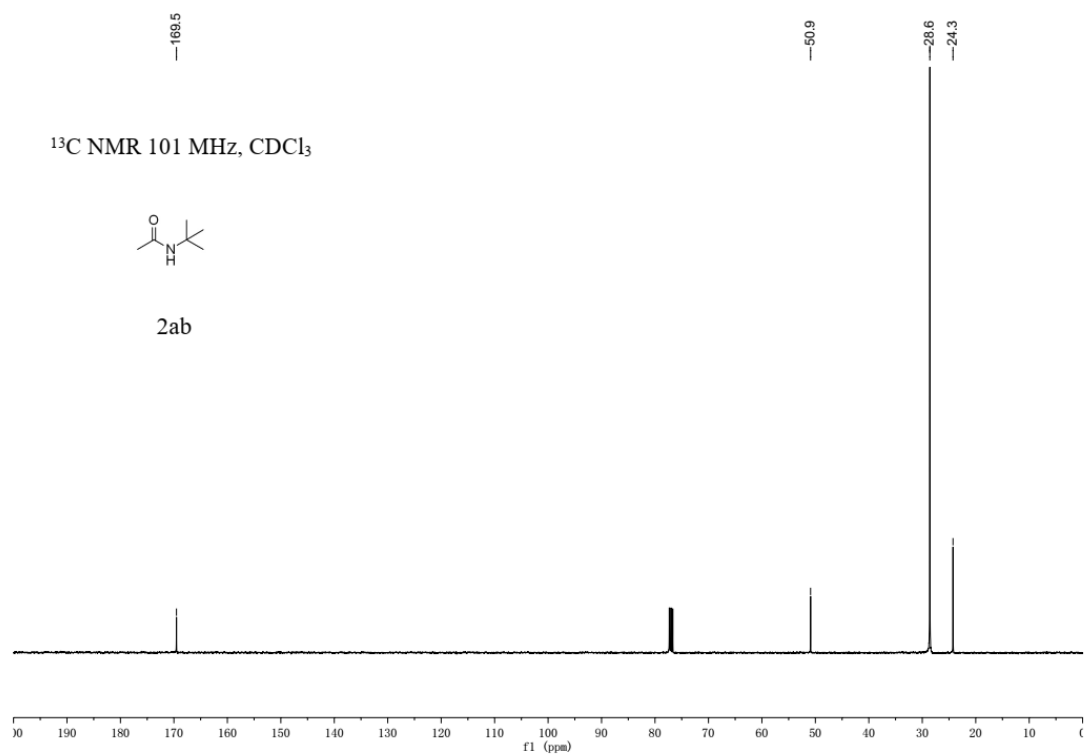
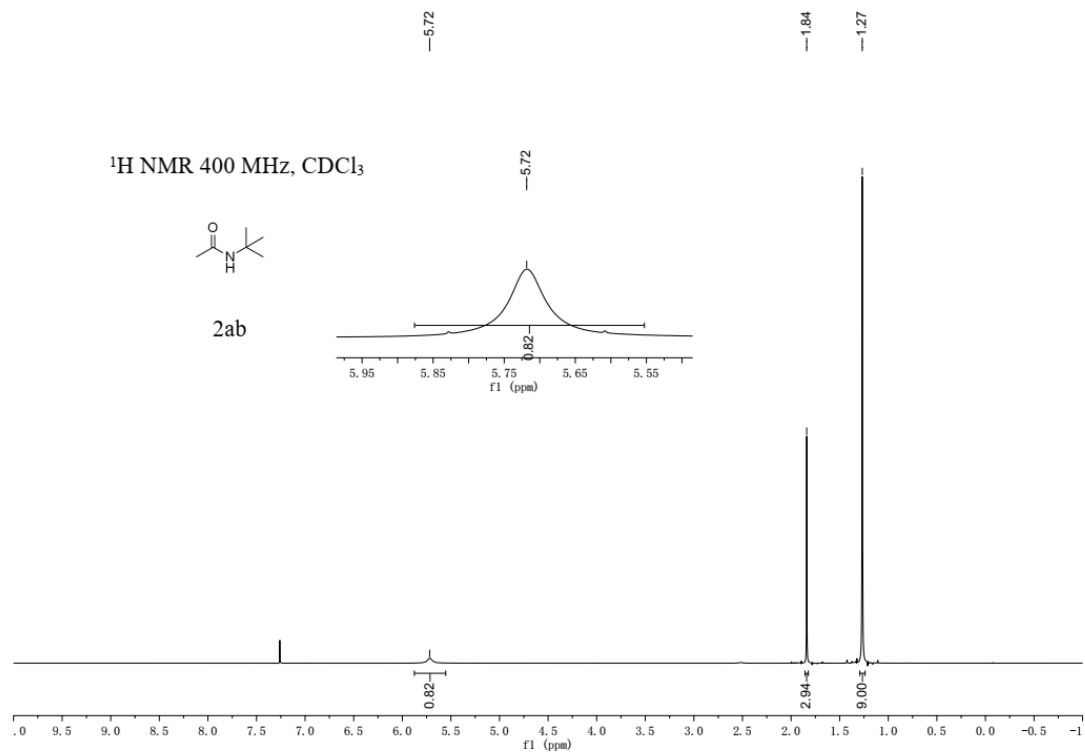


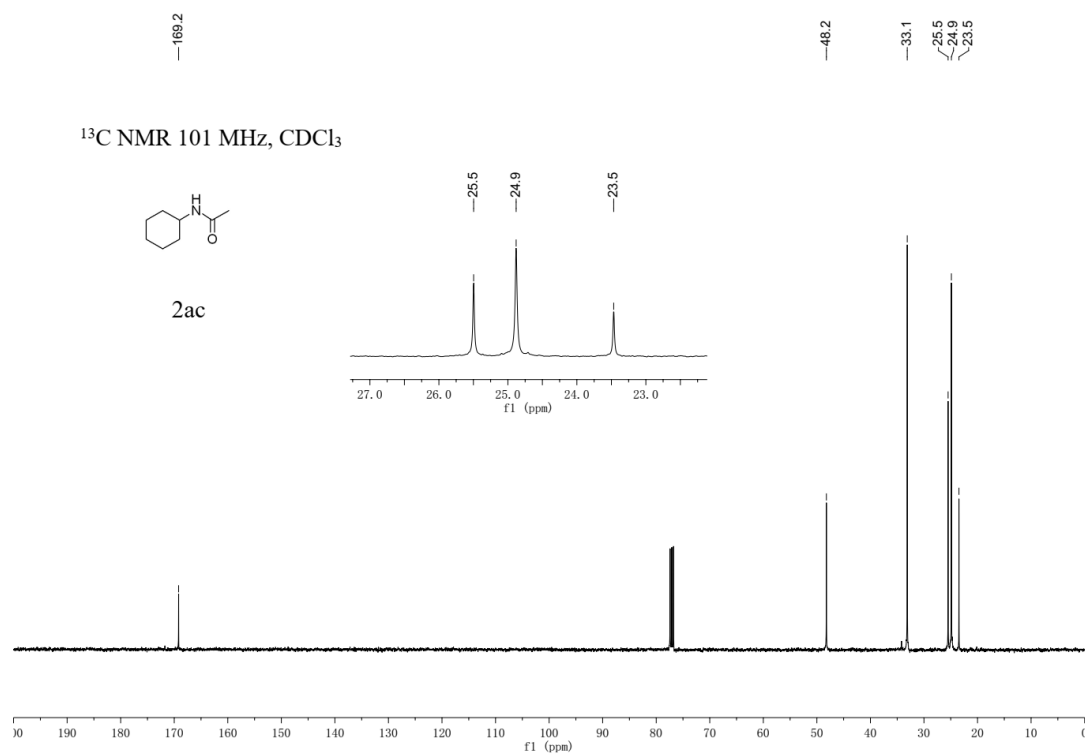
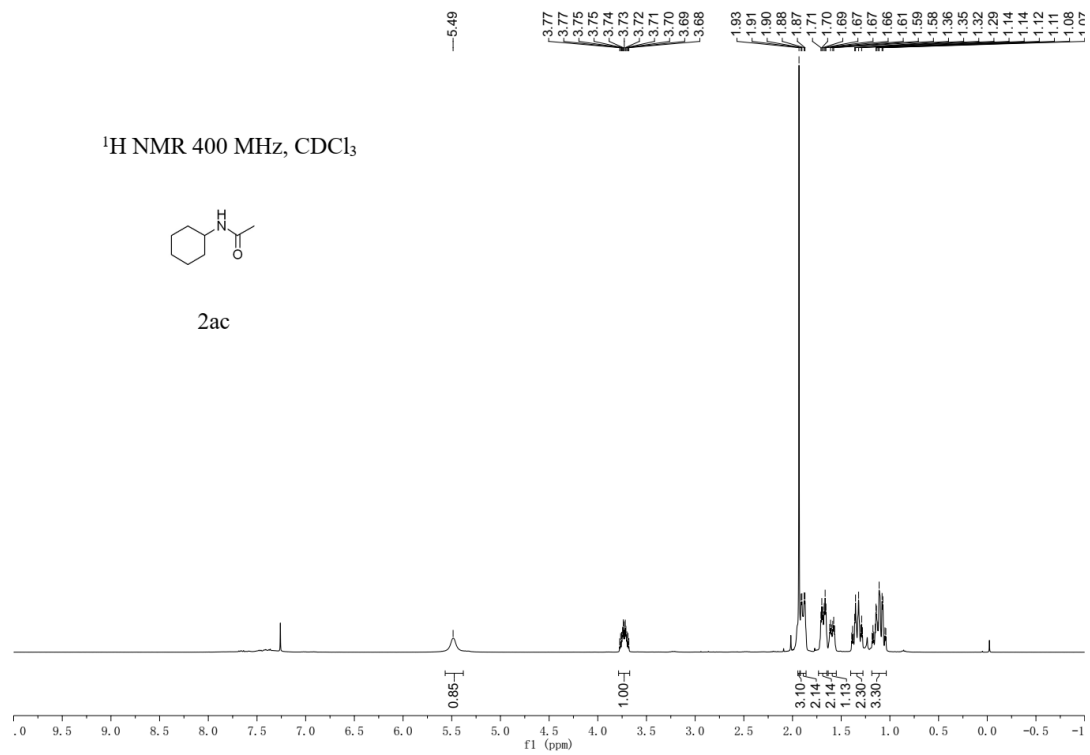


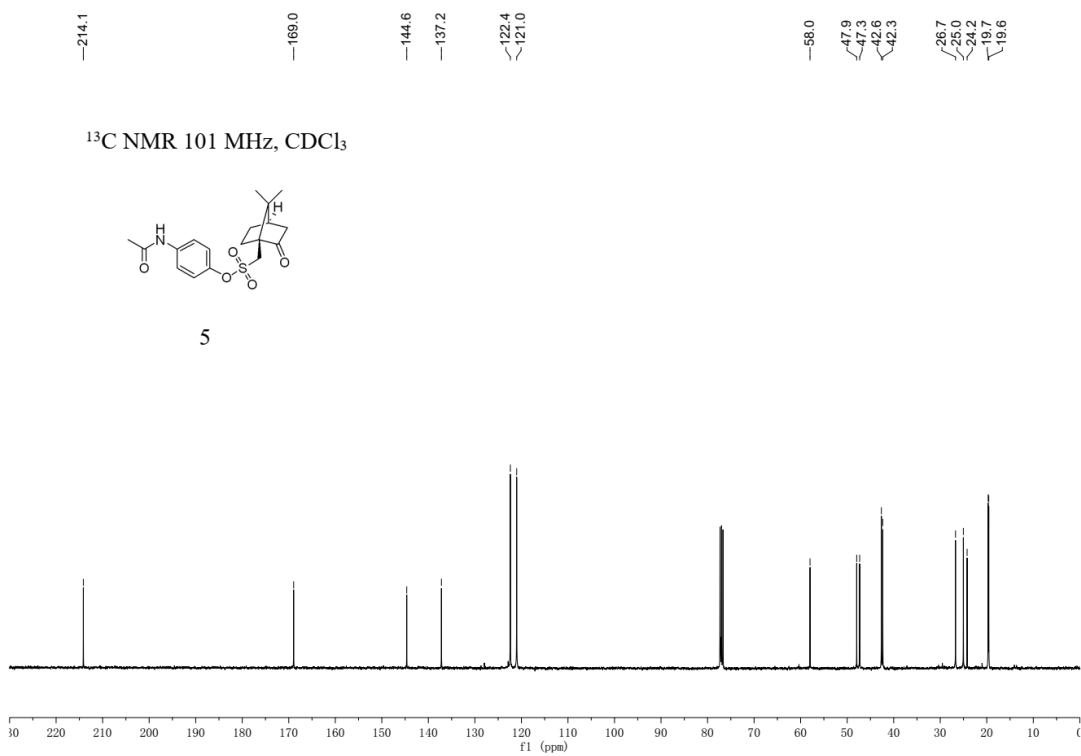
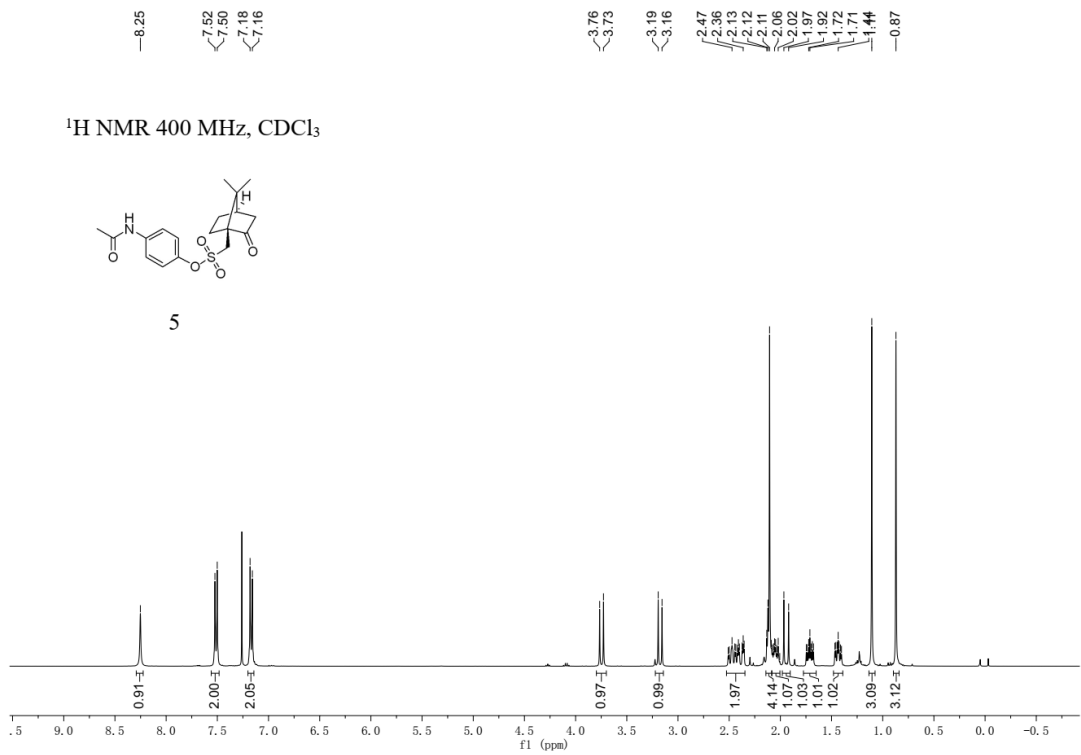




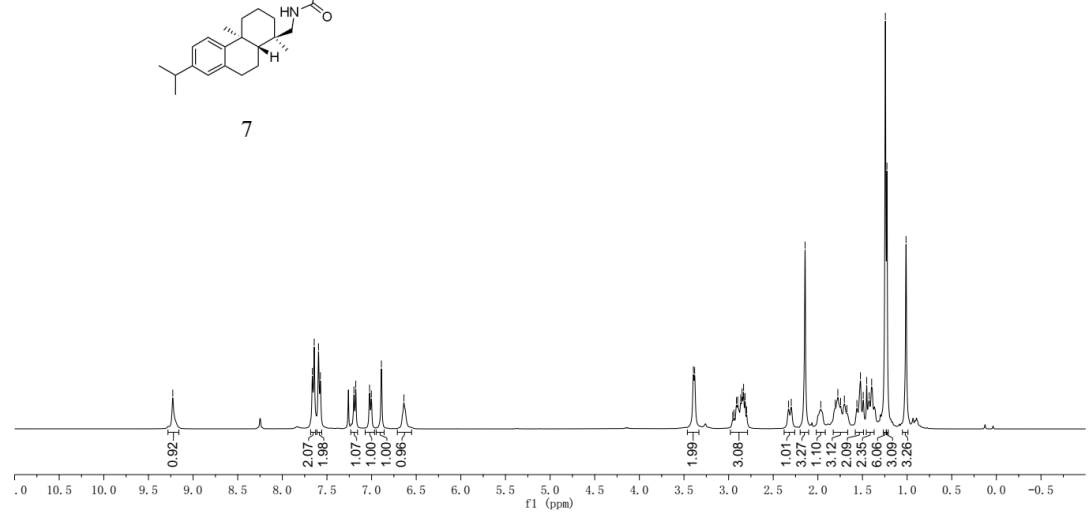
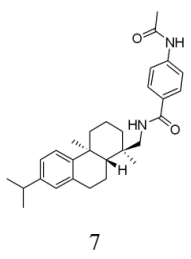








<sup>1</sup>H NMR 400 MHz, CDCl<sub>3</sub>



<sup>13</sup>C NMR 101 MHz, CDCl<sub>3</sub>

