Supplementary Information (SI) for Green Chemistry.
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Supporting Information

Light-fuelled nitro-reduction via cascaded electron donor-acceptor complexes in aqueous media

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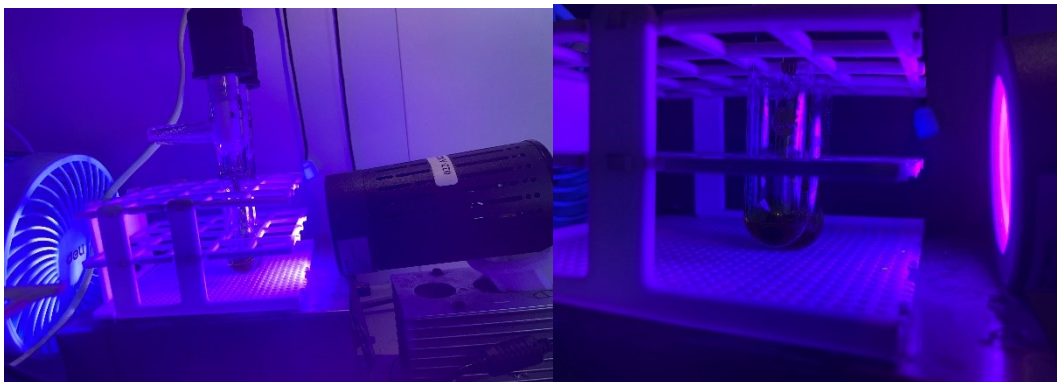
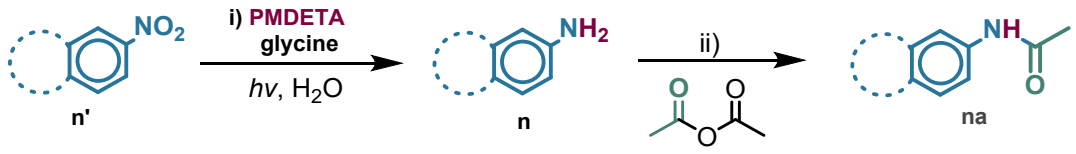
I. General Information

All reactions were run in a tube under air atmosphere. All commercially available reagent grade chemicals and solvents were used as received without further purification. ^{1}H NMR (400 MHz), ^{13}C NMR (100 MHz) and ^{19}F NMR (376 MHz) spectra are reported relative to chemical shift of tetramethylsilane (TMS). Chemical shifts (δ) are reported in ppm and coupling constants (*J*) in hertz (Hz). The following abbreviations are used to explain the multiplicities: s = singlet, d = doublet, dd = doublet of doublet, t = triplet, q = quartet, m = multiplet. For HRMS (ESI) measurements, the mass analyzer is micrOTOF-Q.



II. General procedure for the reduction of nitroarenes

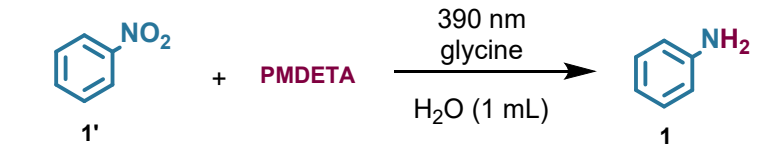
(1) With the scale of 0.2 mmol



(i) A 10 mL tube was charged with nitroarenes **n'** (0.2 mmol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent), glycine (1.0 equivalent) in H_2O (0.5 mL) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere for 24 h. (Notice: for the insoluble nitroarenes, EA may be added as appropriate to promote dissolution.) The reaction was monitored by TLC. After completion, the reaction mixture was quenched with water (10 mL) and extracted with dichloromethane for three times. The combined organic phase was dried over anhydrous Na_2SO_4, filtered, and evaporated to leave a reside, which was purified by silica gel column chromatography with petroleum ether/ ethyl acetate (from 10 :1) to give the pure desired product **38A-38B, 39-61.**

(ii) A 25 mL round bottom flask was charged with acetic anhydride (2.0 equivalent), DMAP (20% mmol) and concentrated solution, which is extracted from the previous step, in DCM (5 mL) at rt to 80 °C temperature for 30 min to 10 h. The reaction was monitored by TLC. After completion, the reaction mixture was quenched with water (10 mL) and extracted with dichloromethane for three times. The combined organic phase was dried over anhydrous Na_2SO_4, filtered, and evaporated to leave a reside, which was purified by silica gel column chromatography with petroleum ether/ ethyl acetate (from 5 :1) to give the pure desired product **1a-37a.**

(2) With the scale of 10 mmol (gram scale)



1'

10 mmol, 1.23 g

1

67%, 623 mg, 48 h

A 10 mL tube was charged with **1'** (10.0 mol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent), glycine (1.0 equivalent) in H_2O (1 mL) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere for 48 h. The reaction was monitored by TLC. After completion, the reaction mixture was quenched with water (15 mL) and extracted with dichloromethane for three times. The combined organic phase was dried over anhydrous Na_2SO_4, filtered, and evaporated to leave a reside, which was purified by silica gel column chromatography with petroleum ether/ ethyl acetate (from 10 :1) to give the pure desired product **1** in a yield of 67%.

III. Calculation of Ecoscale score

(1) Table S1. Calculation of Ecoscale score for this work

Eco Scale = 100 -Sum of individual penalties

Score on Eco Scale: >75, Excellent; >50, Accepable; <50, Inadequate

A. Calculation of Penalty Points:

Parameters		Penalty Points
1. Yield:	(100- % of yield)/2 = (100-85)/2	**7.5**
2. Price of reaction components (To obtain 10 mmol of end product, **60**)		
a. ethyl *p*-nitrobenzoate (**60'**) = 11.76 mmol = 2.295 g = USD 0.6		
b. pentamethyldiethylenetriamine (PMDETA) = 35.28 mmol = 6.114 g = USD 1.22		
c. glycine = 11.76 mmol = 0.882 g = USD 0.066		
Total cost of synthesis of **60** = (0.6 + 1.22 + 0.066) = USD 1.886		
Thus inexpensive, since (total cost of synthesis of 10 mmol of **60**) < $ 10:		**0**
3. Safety		
PMDETA (T)		**5**
4. Technical Setup		
photochemical activation		**2**
5. Temperature/time		
Room temperature, 24 h		**1**
6. Workup and purification		
Liquid-liquid extraction		**3**
Classical chromatography		**10**
Total penalty points:		**28.5**

B. Ecoscale calculation:

EcoScale score: (100-28.5) = **71.5 (> 50; it is an acceptable synthesis)**

(2) Table S2. Calculation of Ecoscale score for the site-selective nitro reduction method involved metal-loaded catalysts[1]

Eco Scale = 100 -Sum of individual penalties

Score on Eco Scale: ＞75, Excellent; ＞50, Accepable; ＜50, Inadequate

A. Calculation of Penalty Points:

Parameters		Penalty Points
1. Yield:	(100- % of yield)/2 = (100-99.9)/2	**0.05**
2. Price of reaction components (To obtain 10 mmol of end product, **60**)		
a. ethyl *p*-nitrobenzoate (**60'**) = 11.76 mmol = 2.295 g = USD 0.6		
b. catalyst (**10Cu-5Ni/AlSBA-R**) = not considered		
c. H_2 = not considered		
Due to the difficulty of estimating the amount of hydrogen gas, the parameters for the price of components are not being considered for the time being		**0**
3. Safety		
$Ni(NO_3)_2{\cdot}6H_2O$ (N)		**5**
Na_2SiO_3 (N)		**5**
Pluronic P123 (T)		**5**
H_2 (F^+)		**10**
THF (F)		**5**
4. Technical Setup		
Pressure equipment, 2.5 MPa		**3**
5. Temperature/time		
Heating (95 ^oC), 3 h		**3**
6. Workup and purification		
Liquid-liquid extraction		**3**
Classical chromatography		**10**
Total penalty points:		**49.05**

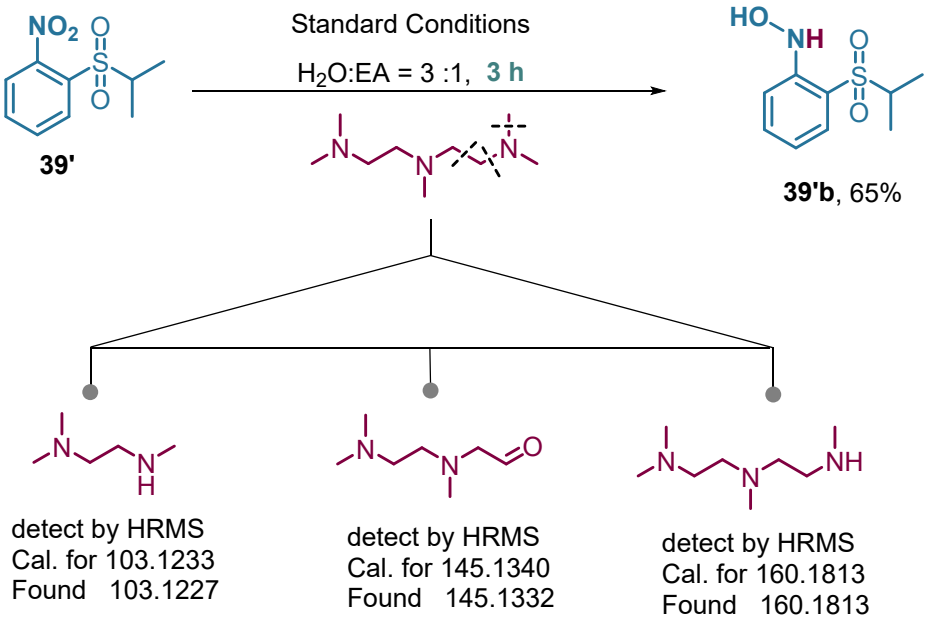
B. Ecoscale calculation:

EcoScale score: (100-49.05) = **50.95 (＞ 50; it is an acceptable synthesis)**

The result unveiled that this EDA complex-based strategy demonstrated higher economic and ecology benefits (71.5) compare to the reported metal-catalyzed hydrogenation (50.95).

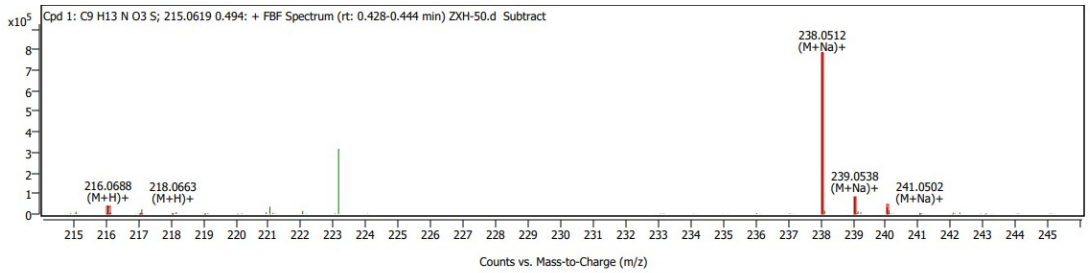
IV. Mechanism study

(1) Intermediates investigation



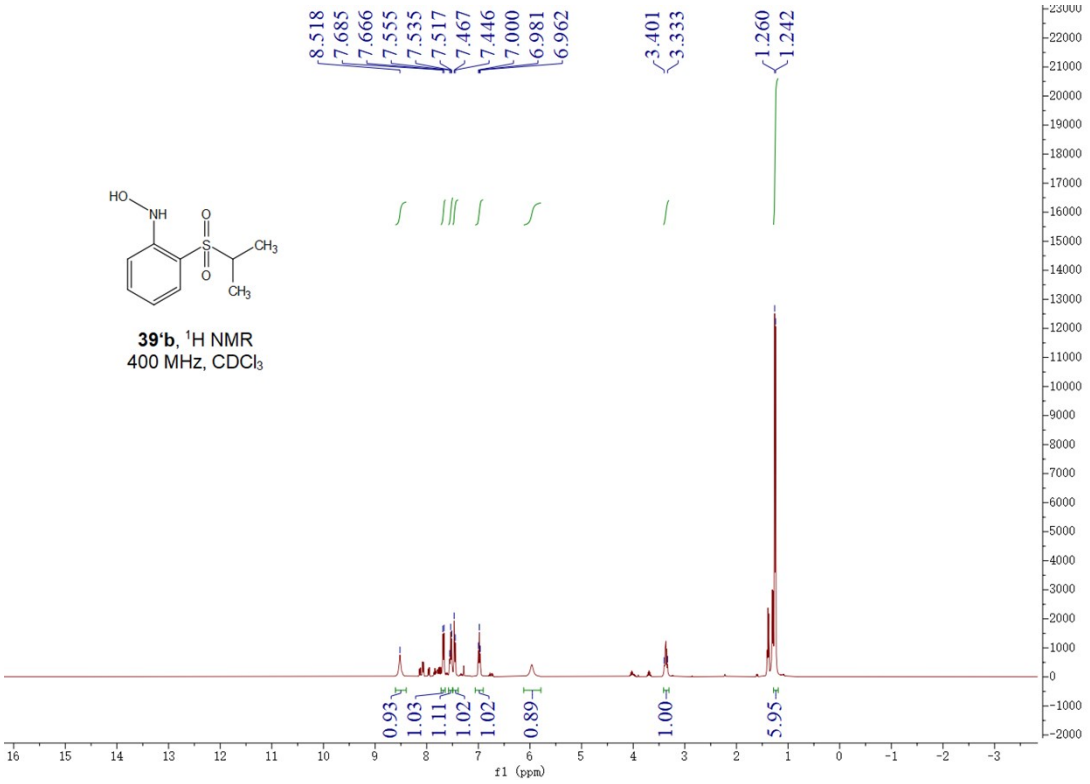
A 10 mL tube was charged with **39'** (0.2 mol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent), glycine (1.0 equialent) in mix solvent (H_2O: EA=3:1) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere for 3 h. The reaction was monitored by TLC. After completion, the reaction mixture was quenched with water (10 mL) and extracted with dichloromethane for three times. The combined organic phase was dried over anhydrous Na_2SO_4, filtered, and evaporated to leave a reside, which was purified by silica gel column chromatography with petroleum ether/ ethyl acetate (from 10 :1) to give the pure desired product **39'b.**

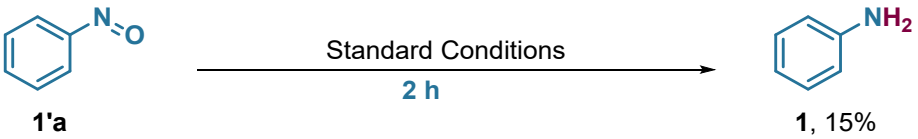
Yellow solid, **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.52 (s, 1H), 7.68 (d, J = 7.6 Hz, 1H), 7.54 (t, J = 8.0 Hz, 1H), 7.46 (d, J = 8.4 Hz, 1H), 6.98 (t, J = 7.6 Hz, 1H), 5.96 (s, 1H), 3.40-3.33 (m, 1H), 2.16 (d, J = 7.2 Hz, 6H).
HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_9H_{13}NO_3SNa$ 238.0514; Found: 238.0512.



Compound ID Table

Name	Formula	Species	RT	RT Diff	Mass	CAS	ID Source	Score	Score (Lib)	Score (Tgt)
	C9 H13 N O3 S	(M+H)+ (M+Na)+	0.494		215.0619		FBF	99.14		99.14



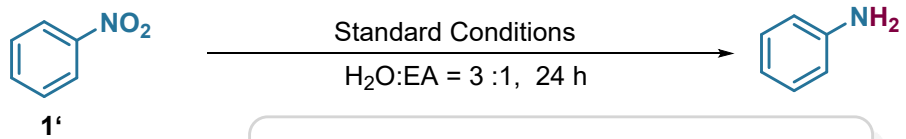


1'a **1**, 15%

A 10 mL tube was charged with **1'a** (0.2 mol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent), glycine (1.0 equialent) in (H_2O: EA=3:1) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere for 2 h. The reaction was monitored by TLC. After completion, the reaction mixture was quenched with water (10 mL) and extracted with dichloromethane for three times. The combined organic phase was dried over anhydrous Na_2SO_4, filtered, and evaporated to leave a reside, which was purified by silica gel column chromatography with petroleum ether/ ethyl acetate (from 10 :1) to give the pure desired product **1.**

The results indicate that hydroxylamine and nitrosoarene are potential intermediates.

(2) Triplet state quench experiment[2-3]



1'

Triplet quencher (2 eq.)	1
Benzil	75%
octafluoronaphthalene	77%

The triplet state quench experiments were conducted with nitrobenzene **1'**, PMDETA and glycine under the standard conditions using two different triplet quenchers (benzill, octafluoronaphthalene), respectly. However, these quenching studies did not reduce the reaction yield, indicating that the T_1 excited state of nitrobenzene is not the active species for triggering reaction.

The results rule out the possibility of nitroarene itself absorbing light to initiate the reaction.

(3) UV-vis experiment

UV-vis experiments were performed to analyse the potential association of PMDETA, gylcine with electron acceptors (nitroarene, nitrosoarene, or hydroxylamine compounds).

(i) Various combinations of **8'**, PMDETA and glycine in DMF

a) **8'** (1 mmol) was dissolved in DMF (5 mL).
b) **8'** (1 mmol) and PMDETA (250 μL) were dissolved in DMF (4.75 mL).
c) **8'** (1 mmol) and gylcine (250 μL) were dissolved in DMF (4.75 mL).
d) **8'** (1 mmol), PMDETA (250 μL) and gylcine (250 μL) were dissolved in DMF (4.5 mL).

(ii) Various combinations of **1'a**, PMDETA and glycine in DMF

e) **1'a** (1 mmol) was dissolved in DMF (5 mL)
f) **1'a** (1 mmol) and PMDETA (250 μL) were dissolved in DMF (4.75 mL)
g) **1'a** (1 mmol) and gylcine (250 μL) were dissolved in DMF (4.75 mL)
h) **1'a** (1 mmol), PMDETA (250 μL) and gylcine (250 μL) were dissolved in DMF (4.5 mL)

(iii) Various combinations of **39'b**, PMDETA and glycine in DMF

i) **39'b** (1 mmol) was dissolved in DMF (5 mL)
j) **39'b** (1 mmol) and PMDETA (250 μL) were dissolved in DMF (4.75 mL)
k) **39'b** (1 mmol) and gylcine (250 μL) were dissolved in DMF (4.75 mL).
l) **39'b** (1 mmol), PMDETA (250 μL) and glycine (250 μL) were dissolved in DMF (4.5 mL)
m) PMDETA (250 μL) and glycine (250 μL) was dissolved in DMF (4.5 mL).
n) PMDETA (250 μL) was dissolved in DMF (4.75 mL)
o) glycine (250 μL) was dissolved in DMF (4.75 mL)

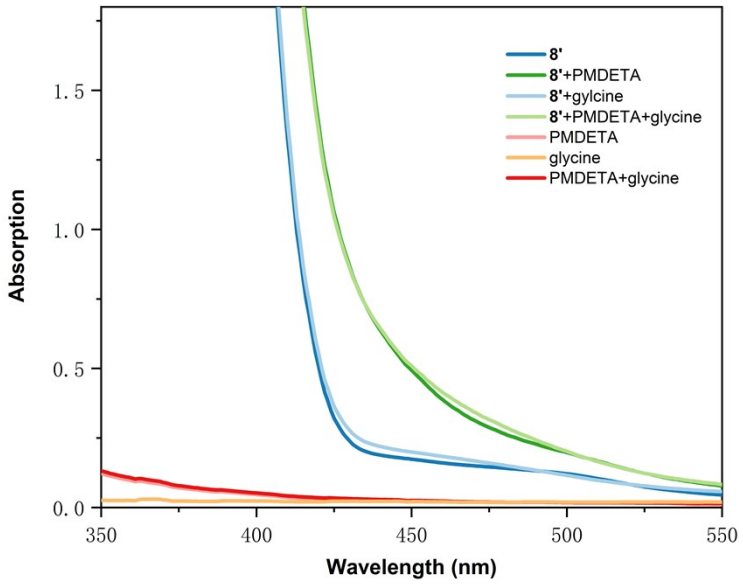


Figure S1: UV-vis spectra of various combinations of **8'**, PMDETA and glycine in DMF

The results revealed that PMDETA can associate with ***8'*** *to form the EDA complex I, resulting a bathochromic shifted compared to the spectra of the individual components.*

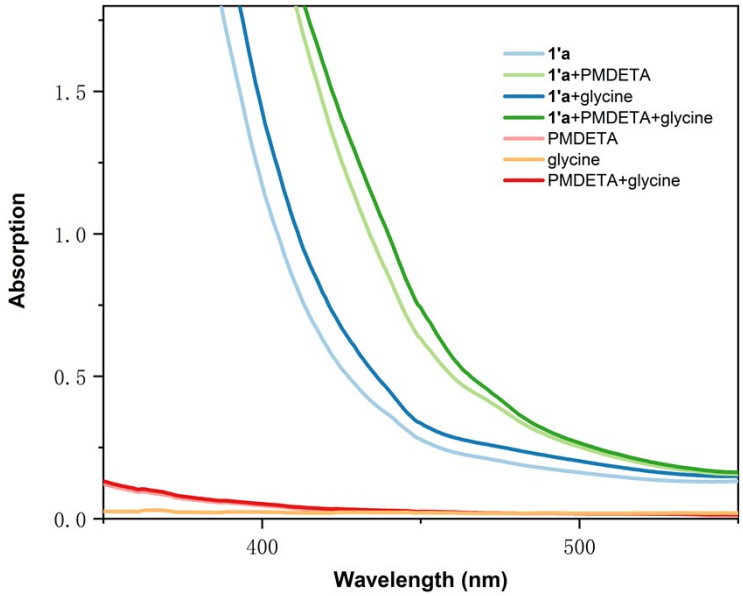


Figure S2: UV-vis spectra of various combinations of **1'a**, PMDETA and glycine in DMF

The results revealed that the addition of PMDETA resulted in a bathochromic shift in the absorbance of the nitroso compounds, with a slight modulation observed upon the addition of glycine. Based on these findings, it can be inferred that the formation of EDA complex II occurs between PMDETA and nitroso compounds.

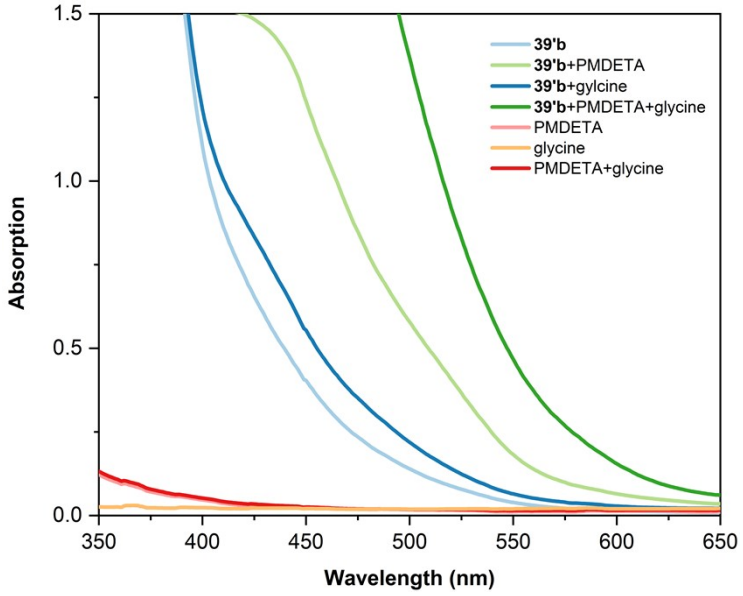


Figure S3: UV-vis spectra of various combinations of **39'b**, PMDETA and glycine in DMF

The results indicated that the absorbance of the hydroxylamine compounds underwent a bathochromic shift upon the introduction of PMDETA, while the addition of glycine further accentuated this red-shift. Based on these findings, it can be inferred that the

formation of EDA complex III occurs between PMDETA, glycine and hydroxylamine compounds.

(4) NMR titration[4-5]

The NMR sample of electron acceptors (**8'**, **1'a**, and **39'b**·glycine adduct) with different excesses of PMDETA in $CDCl_3$ or DMSO-*d6* was prepared.

(i) EDA complex I: 8' (0.25 M) with PMDETA (0.025 M to 0.075 M) in $CDCl_3$ (Figure S4).

(ii) EDA complex II: 1'a (0.25 M) with PMDETA (0.025 M to 0.075 M) in $CDCl_3$ (Figure S5).

(iii) EDA complex III': 39'b (0.25 M) with PMDETA (0.025 M to 0.075 M) in $CDCl_3$ (Figure S6).

(iv) EDA complex III: 39'b·glycine adduct (0.025 M) with PMDETA (0.025 M to 0.075 M) in DMSO-*d6* (Figure S7).

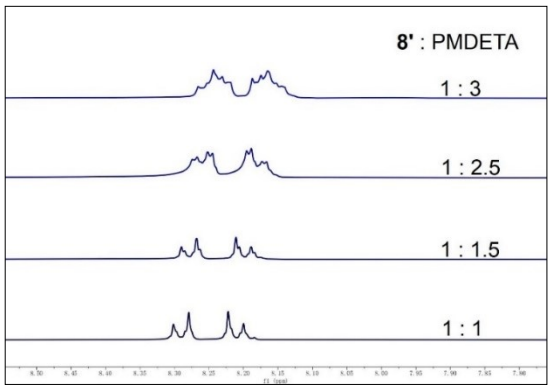


Figure S4: NMR titrationof **8'** and PMDETA

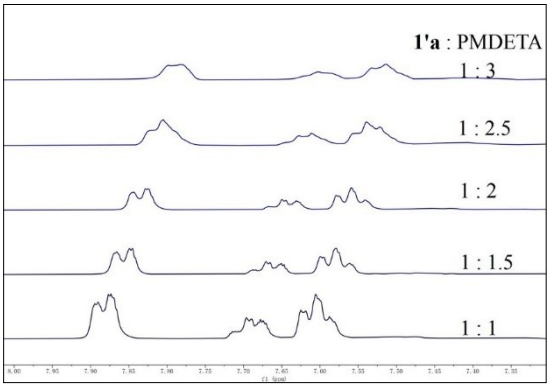
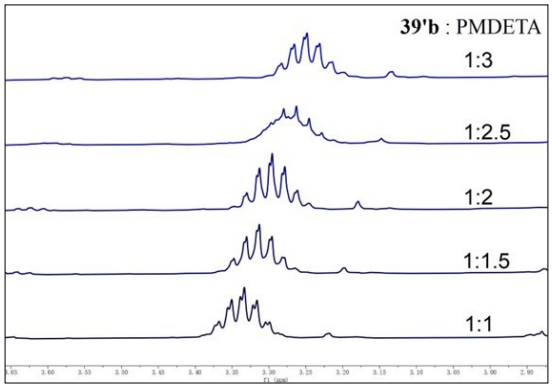


Figure S5: NMR titrationof **1'a** and PMDETA



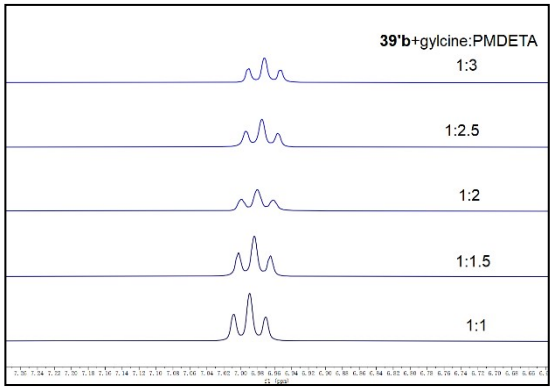


Figure S6: NMR titrationof 3**9'b** and PMDETA

Figure S7: NMR titrationof 3**9'b**·glycine adduct and PMDETA

The change in chemical shift (in ppm) of each peak of electron acceptor was calculated by comparing the 0.25 M electron acceptor' solution. The association constants K_{EDA} were measured from the slope and intercept of the plots.

Table S3: Data obtained by ^{1}H NMR spectra for EDA complex I in $CDCl_3$, with **8'** = 0.025 mol/L.

[PMDETA](M)	1/[PMDETA](M^{-1})	δ_0	δ_{EDA-I}	$\Delta\delta$	$1/\Delta\delta$
0.025	40	8.326	8.302	0.024	41.7
0.0375	26.7	8.326	8.290	0.036	27.8
0.0625	16	8.326	8.274	0.052	19.2
0.075	13.3	8.326	8.266	0.082	12.2

Table S4: Data obtained by ^{1}H NMR spectra for EDA complex II in $CDCl_3$, with **1'a** = 0.025 mol/L.

[PMDETA](M)	1/[PMDETA](M^{-1})	δ_0	δ_{EDA-II}	$\Delta\delta$	$1/\Delta\delta$
0.025	40.0	7.918	7.877	0.041	24.4
0.0375	26.7	7.918	7.850	0.068	14.7
0.05	20.0	7.918	7.829	0.089	11.2
0.0625	16.0	7.918	7.805	0.113	8.4
0.075	13.3	7.918	7.778	0.140	7.1

Table S5: Data obtained by ^{1}H NMR spectra for EDA complex III' in $CDCl_3$, with **39'b** = 0.025 mol/L.

[PMDETA](M)	1/[PMDETA](M^{-1})	δ_0	$\delta_{EDA-III'}$	$\Delta\delta$	$1/\Delta\delta$
0.025	40.0	7.918	7.877	0.041	24.4
0.0375	26.7	7.918	7.850	0.068	14.7
0.05	20.0	7.918	7.829	0.089	11.2
0.0625	16.0	7.918	7.805	0.113	8.4
0.075	13.3	7.918	7.778	0.140	7.1

Table S6: Data obtained by ^{1}H NMR spectra for EDA complex III in DMSO, with **39'b**·glycine adduct = 0.025 mol/L.

[PMDETA](M)	1/[PMDETA](M^{-1})	δ_0	$\delta_{EDA\text{-}III'}$	$\Delta\delta$	$1/\Delta\delta$
0.025	40.0	7.001	9.9894	0.0107	93.5
0.0375	26.7	7.001	6.9840	0.0161	62.1
0.05	20.0	7.001	6.9804	0.0197	50.8
0.0625	16.0	7.001	6.9751	0.250	40
0.075	13.3	7.001	6.9721	0.0280	35.7

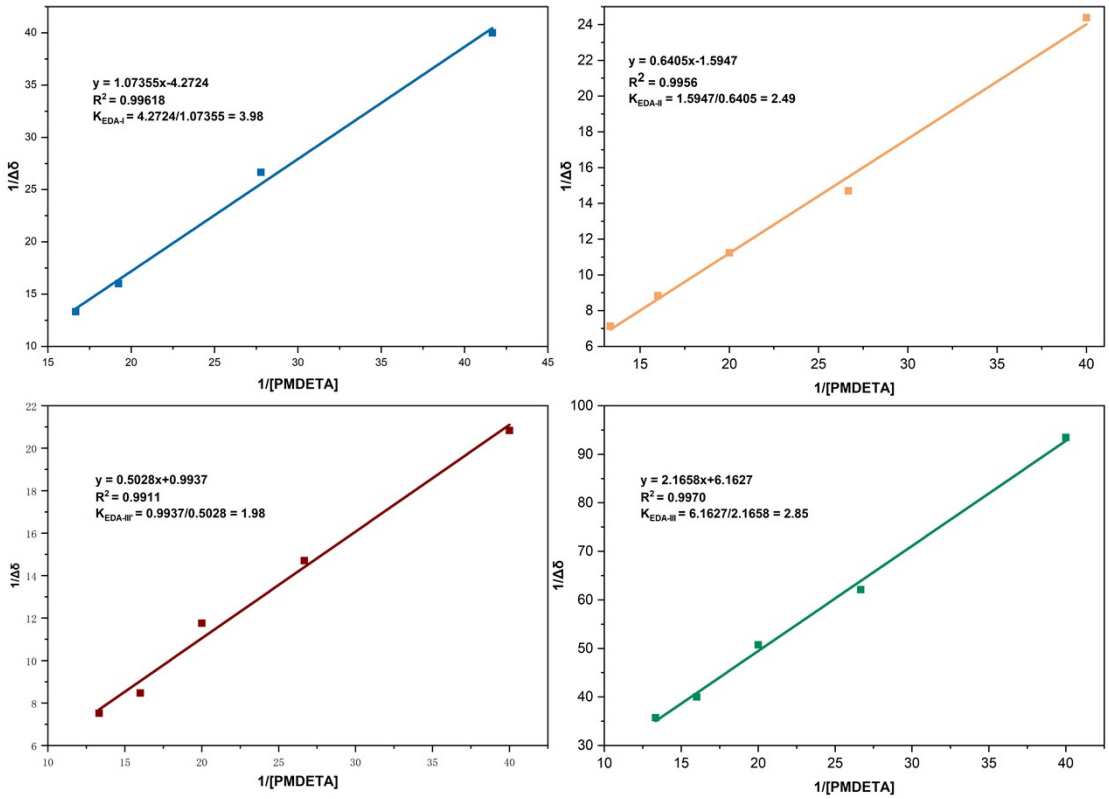


Figure S8: The association constants K_{EDA}

*The results indicated that the value of K were decrease progressively in the absence of glycine ($K_{EDA\ I}$=3.98 > $K_{EDA\ II}$=2.49 > $K_{EDA\ III'}$=1.98). Furthermore, the $K_{EDA\text{-}III}$ was mesured at 2.85, suggesting that glycine could enhance the ability of **39'b** to associate with PMDETA.*

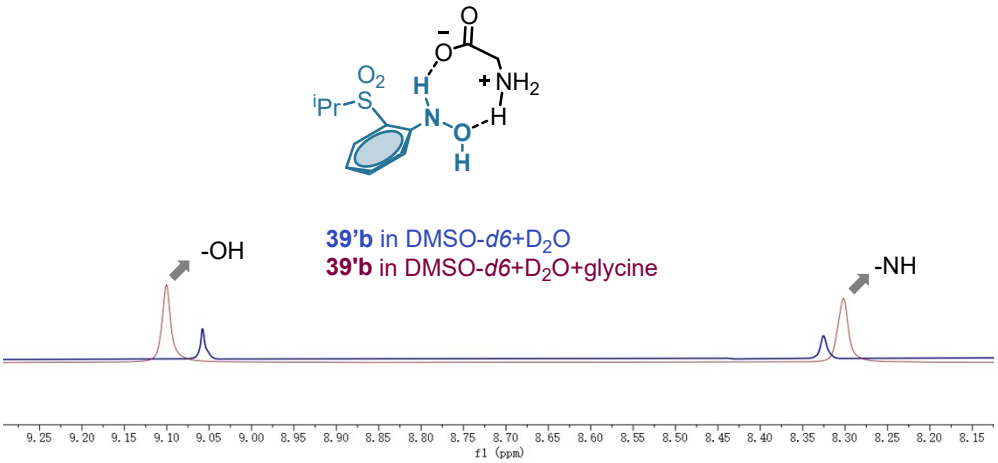


Figure S9: ^{1}H NMR shift of 39'b and glycine

Based on the effect of electron-cloud density in chemical shift of protons, the following conclusions can be draw:
*(a) the downfiled shift of -OH proton indicates a reduced electron-cloud density of hydrogen atom, which is caused by the lone pair of electrons of O (oxygen in the **39'b**) to be biased toward H of -NH_3^+ to form the intermolecular hydrogen bonding between -NH_3^+ of glycine and **39'b** (-OH).*

*(b) the upfiled of -NH proton suggests an increased electron-cloud density of hydrogen atom, which is caused by the presence of intermolecular hydrogen bonding between -COO^- of glycine and **39'b** (-NH).*

(5) Preliminary kinetic investigation

(i) A 10 mL tube was charged with 1-(isopropylsulfonyl)-2-nitrobenzene **39'** (0.2 mol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent) in H_2O: EA (150 μL: 50 μL) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere. Five parallel reactions were respectively illumined under 390 nm for different time 1 h, 3 h, 5 h, 10 h, 24 h. The yield of **39** was obtained by ^{1}H NMR using 1,3,5-trimethoxybenzene (0.05 mmol) as an internal standard.

*The results (blue lines) showed that in the absence of glycine, the **39'** was almost completely converted within 5 h, with 64.5% of **39'b** and 21.5% of **39** being formed, and thereafter the rate of conversion of **39'b** to **39** decreased dramatically, with only 36.5% of **39** being formed, accompanied by 55.5% of **39'b** remaining even after 24 h of reaction.*

(ii) A 10 mL tube was charged with **39'** (0.2 mol), pentamethyldiethylenetriamine PMDETA (3.0 equivalent), glycine (1.0 equivalent) in H_2O: EA (150 μL: 50 μL) upon irradiation of 100 W 390 nm LEDs at room temperature under N_2 atmosphere. Five parallel reactions were respectively illumined under 390 nm for different time 1 h, 3 h, 5 h, 10 h, 24 h. The yield of **39** was obtained by ^{1}H NMR using 1,3,5-trimethoxybenzene (0.05 mmol) as an internal standard.

*The results (orange lines) showed that upon addition of glycine, the **39'** was almost completely converted within 3 h, with 82% of **39'b** and 8% of **39** being formed, and the*

*yield of **39** after 24 hours of reaction was 78%, accompanied by 12% **39'b** remaining.*

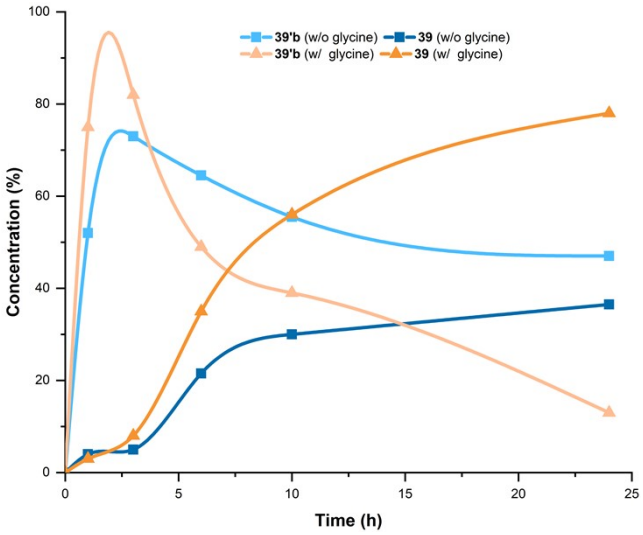
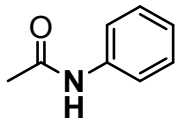


Figure S10: ^{1}H NMR of reaction solution

V. Characterization data for the products (reactions was conducted at 0.2 mmol scale).

***N*-phenylacetamide (1a)**



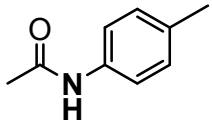
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 21.9 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (s, 1H), 7.53 (d, *J* = 8.2 Hz, 2H), 7.31 (t, *J* = 7.6 Hz, 2H), 7.11 (t, *J* = 7.4 Hz, 1H), 2.16 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.1, 138.1, 128.9, 124.3, 120.2, 24.4.

(Known compound: *ACS Sustainable Chem. Eng.,* 2023, **11**, 9047-9056.).

***N*-(*p*-tolyl)acetamide (2a)**



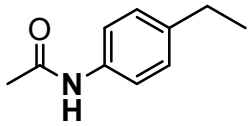
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (88% yield, 26.2 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63 (s, 1H), 7.39 (d, *J* = 8.2 Hz, 2H), 7.11 (t, *J* = 8.1 Hz, 2H), 2.32 (s, 3H), 2.16 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.6, 135.4, 133.9, 129.4, 120.2, 24.4, 20.9.

(Known compound: *ACS Sustainable Chem. Eng.,* 2023, **11**, 9047-9056.).

***N*-(4-ethylphenyl)acetamide (3a)**



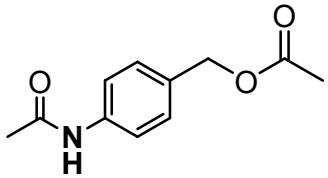
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (86% yield, 28.1 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46-7.41 (m, 3H), 7.15 (d, *J* = 8.2 Hz, 2H), 2.62 (q, *J* = 7.6 Hz, 2H), 2.17 (s, 3H), 1.23 (t, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 140.4, 135.5, 128.3, 120.2, 28.3, 24.6, 15.6.

(Known compound: *ChemSusChem* 2022, **15**, e202200227.)

***4*-acetamidobenzyl acetate (4a)**



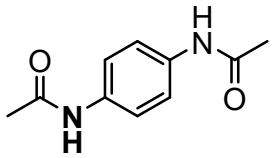
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (85% yield, 35.2 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55-7.51 (m, 3H), 7.32 (d, *J* = 8.3 Hz, 2H), 5.07 (s, 2H), 2.19 (s, 3H), 2.11 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 168.5, 138.0, 131.7, 129.2, 119.9, 65.9, 24.6, 21.0.

(Known compound: *Eur. J. Org. Chem.*, 2012, **2012**, 6127-6131.)

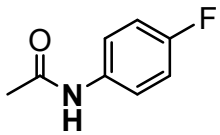
***N,N′*-(1,4-phenylene)diacetamide (5a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (36% yield, 13.8 mg).

^{1}H NMR (400 MHz, DMSO-*d6)* δ 9.86 (d, *J* = 16.4 Hz, 2H), 7.50 (d, *J* = 16.8 Hz, 4H), 2.05-2.01 (m, 6H).
^{13}C NMR (100 MHz, DMSO-*d6*) δ 168.4, 135.1, 119.8, 24.3.
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{10}H_{13}N_2O_2$ 193.0977, Found: 193.0974**.**

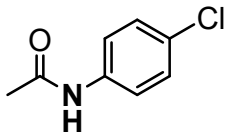
***N*-(4-fluorophenyl)acetamide (6a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (80% yield, 24.5 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (s, 1H), 7.48 (dd, *J* = 9.0 Hz, *J* = 4.8 Hz, 2H), 7.01 (t, *J* = 8.6 Hz, 2H), 2.18 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.6, 159.4 (d, J_{F-C} = 242.1 Hz), 133.87, 121.9 (d, J_{F-C} = 7.4 Hz), 115.6 (d, J_{F-C} = 22.3 Hz), 24.4.
^{19}F NMR (376 MHz, $CDCl_3$) δ -118.0
(Known compound: *Angew. Chem. Int. Ed*., 2021, **60**, 7936-7940.)

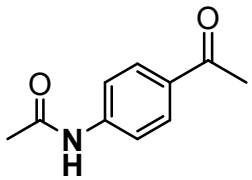
***N*-(4-chlorophenyl)acetamide (7a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 27.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47 (d, *J* = 8.7 Hz, 2H), 7.46-7.31 (m, 3H), 2.19 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.3, 136.4, 129.3, 129.0, 121.1, 24.6.
(Known compound: *J. Am. Chem. Soc.*, 2022, **144**, 15437-15442.)

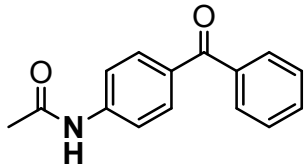
***N*-(4-acetylphenyl)acetamide (8a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 28.9 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.0 Hz, 2H), 7.86 (s, 1H), 7.65 (d, *J* = 8.4 Hz, 2H), 2.59 (s, 3H), 2.24 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 197.2, 168.8, 142.4, 132.8, 129.8, 118.9, 26.5, 24.8.
(Known compound: *J. Am. Chem. Soc.*, 2022, **144**, 15437-15442.)

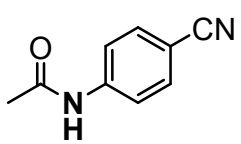
***N*-(4-benzoylphenyl)acetamide (9a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (79% yield, 37.8 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (s, 1H), 7.83-7.77 (m, 4H), 7.67 (d, *J* = 8.0 Hz, 2H), 7.60 (t, *J* = 7.2 Hz, 1H), 7.49 (t, *J* = 7.2 Hz, 2H), 2.23 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 195.8, 168.8, 142.1, 137.8, 132.9, 132.3, 131.6, 129.8, 128.3, 118.8, 24.7.
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{15}H_{14}NO_2$ 240.1028, Found: 240.1025**.**

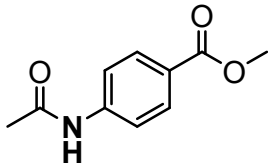
***N*-(4-cyanophenyl)acetamide (10a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 25.9 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 10.37 (s, 1H), 7.77-7.72 (m, 4H), 2.09 (s, 3H).
^{13}C NMR (100 MHz, DMSO-*d6*) δ 169.6, 143.9, 133.7, 119.5, 119.4, 105.1, 24.7.
(Known compound: *ACS Sustainable Chem. Eng.,* 2023, **11**, 9047-9056.).

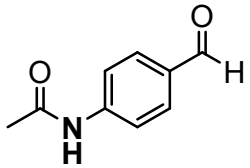
methyl 4-acetamidobenzoate (11a)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (83% yield, 32.1 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02-8.00 (m, 2H), 7.67 (s, 1H), 7.61 (d, *J* = 8.4 Hz, 2H), 3.92 (s, 3H), 2.22 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 166.7, 142.2, 130.8, 125.5, 118.8, 52.1, 24.8.
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{10}H_{12}NO_3$ 194.0819, Found: 194.0814**.**

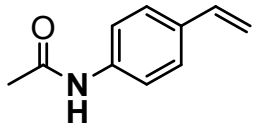
***N*-(4-formylphenyl)acetamide (12a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (79% yield, 25.8 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 9.93 (s, 1H), 8.01 (s, 1H), 7.86 (d, *J* = 8.8 Hz, 2H), 7.74 (d, *J* = 8.4 Hz, 2H), 2.25 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 191.2, 169.0, 143.7, 132.2, 131.2, 119.3, 24.8.
(Known compound: *Angew. Chem. Int. Ed*., 2021, **60**, 7935-7940.)

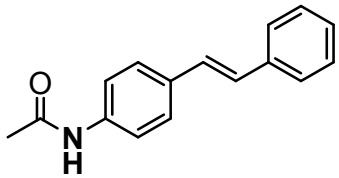
***N*-(4-vinylphenyl)acetamide (13a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (80% yield, 25.8 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63 (s, 1H), 7.49 (d, *J* = 8.4 Hz, 2H), 7.37 (d, *J* = 8.4 Hz, 2H), 6.68 (dd, *J* = 17.6 Hz, *J* = 7.8 Hz, 1H), 6.70 (d, *J* = 17.6 Hz, 1H), 5.21 (d, *J* = 10.8 Hz, 1H), 2.19 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 137.5, 136.1, 133.7, 126.8, 119.8, 113.1, 24.6.
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{10}H_{12}NO$ 160.0921, Found: 160.0915**.**

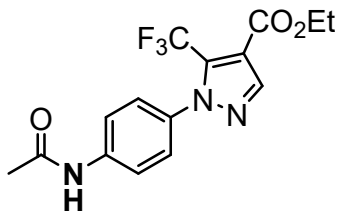
***(E)*-*N*-(4-styrylphenyl)acetamide (14a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (82% yield, 38.9 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (s, 1H), 7.39 (d, *J* = 8.0 Hz, 2H), 7.27-7.21 (m, 7H), 6.61-6.53 (m, 2H), 2.18 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 137.3, 136.8, 133.2, 129.9, 129.6, 129.6, 128.8, 128.3, 127.1, 119.5, 24.6
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{16}H_{16}NO$ 238.1232, Found: 238.1230**.**

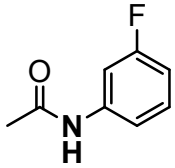
ethyl 1-(4-acetamidophenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylate (15a)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (71% yield, 48.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (s, 1H), 7.68 (d, *J* = 8.7 Hz, 2H), 7.53 (s, 1H), 7.38 (d, *J* = 8.7 Hz, 2H), 4.39 (q, *J* = 7.2 Hz, 2H), 2.24 (s, 3H), 1.40 (d, *J* = 7.2 Hz, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.8 (d, $J_{F\text{-}C}$ = 8.5 Hz), 161.8, 142.4, 139.5 (d, $J_{F\text{-}C}$ = 4.4 Hz), 134.8, 132.6 (q, $J_{F\text{-}C}$ = 39.8 Hz), 126.5, 119.8 (d, $J_{F\text{-}C}$ = 2.5 Hz), 119.1 (q, $J_{F\text{-}C}$ = 269.9 Hz), 116.6, 61.4, 24.6, 14.10.
^{19}F NMR (376 MHz, $CDCl_3$) δ -55.42
HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}F_3N_3O_3$ 342.1065, Found: 342.1069.

***N*-(3-fluorophenyl)acetamide (16a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (83% yield, 25.4 mg).

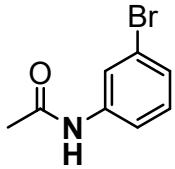
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.69 (s, 1H), 7.50 (d, *J* = 7.2 Hz, 1H), 7.29-7.23 (s, 1H), 7.15 (d, *J* = 8.4 Hz, 1H), 6.81 (t, *J* = 8.4 Hz, 1H), 2.20 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.8, 162.9 (d, J_{F-C} = 243.2 Hz), 139.4 (d, J_{F-C} = 10.8 Hz), 130.0 (d, J_{F-C} = 9.3 Hz), 115.0 (d, J_{F-C} = 2.8 Hz), 110.9 (d, J_{F-C} = 21.2 Hz), 107.4 (d, J_{F-C} = 26.1 Hz), 24.6.

^{19}F NMR (376 MHz, $CDCl_3$) δ -111.52.

(Known compound: *Angew. Chem. Int. Ed*., 2021, **60**, 7935-7940.)

***N*-(3-bromophenyl)acetamide (17a)**



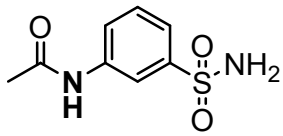
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (85% yield, 36.2 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (s, 1H), 7.79 (s, 1H), 7.41 (d, *J* = 7.9 Hz, 1H), 7.22 (d, *J* = 8.0 Hz, 1H), 7.16 (t, *J* = 8.0 Hz, 1H), 2.18 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.1, 139.3, 130.2, 127.3, 123.0, 122.5, 118.5, 24.5.

HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for C_8H_9BrNO 213.9868, Found: 213.9862.

***N*-(3-sulfamoylphenyl)acetamide (18a)**



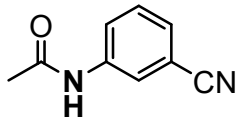
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (51% yield, 21.8 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 10.24 (s, 1H), 8.15 (s, 1H), 7.75-7.70 (m, 1H), 7.49-7.48 (m, 2H), 7.35 (s, 2H), 2.07 (s, 3H).

^{13}C NMR (100 MHz, DMSO- *d6*) δ 169.2, 145.0, 140.1, 129.9, 122.2, 120.5, 116.4, 24.5.

HRMS (ESI) m/z: $[M + H]^+$ Calcd for $C_8H_{11}N_2O_3S$ 215.049; Found: 215.0501.

***N*-(3-cyanophenyl)acetamide (19a)**



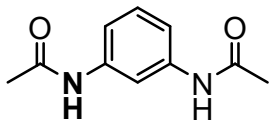
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (67% yield, 21.4 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.11 (s, 1H), 7.97 (s, 1H), 7.74 (d, *J* = 8.0 Hz, 1H), 7.45-7.38 (m, 2H), 2.22 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.2, 139.0, 130.0, 127.6, 124.0, 123.0, 118.7, 112.7, 24.5.

HRMS (ESI-TOF) m/z: $[M+H]^+$ Calcd for $C_9H_9N_2O$ 161.0715, Found: 161.0708.

***N,N′*-(1,3-phenylene)diacetamide (20a)**



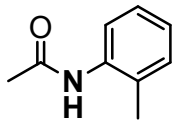
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (74% yield, 28.4 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 9.89 (s, 2H), 7.87 (s, 1H), 7.27-7.25 (m, 2H), 7.19-7.15 (m, 1H), 2.03 (s, 6H).

^{13}C NMR (100 MHz, DMSO-*d6*) δ 168.7, 140.0, 129.2, 114.3, 110.2, 24.5.

(Known compound: *Org. Chem. Front.*, 2022, **9**, 311-319.)

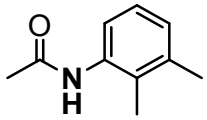
***N*-(*o*-tolyl)acetamide (21a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (82% yield, 24.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72 (s, 1H), 7.23-7.19 (m, 3H), 7.10 (t, *J* = 7.2 Hz, 1H), 2.26 (s, 3H), 2.20 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.6, 135.6, 130.5, 126.7, 125.4, 123.7, 123.7, 24.2, 17.8.
(Known compound: *ACS Sustainable Chem. Eng.,* 2023, **11**, 9047-9056.).

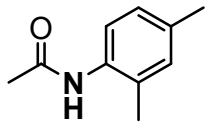
***N*-(2,3-dimethylphenyl)acetamide (22a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (79% yield, 25.8mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 (d, *J* = 7.8 Hz, 1H), 7.15-7.09 (m, 2H), 7.03 (d, *J* = 7.4 Hz, 1H), 2.31 (s, 3H), 2.21 (s, 3H), 2.15 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 137.5, 135.2, 129.9, 127.7, 125.9, 122.7, 24.0, 20.6, 13.9.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{14}NO$ 164.1075; Found: 164.1069.

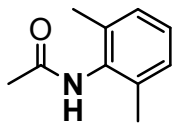
***N*-(2,4-dimethylphenyl)acetamide (23a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (80% yield, 26.1 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.53-7.51 (m, 1H), 7.10-7.02 (m, 3H), 2.30 (s, 3H), 2.22 (s, 3H), 2.19 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 135.3, 132.9, 131.2, 130.3, 127.2, 124.1, 24.0, 20.9, 17.8.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{14}NO$ 164.1075; Found: 164.1070.

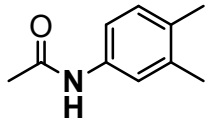
***N*-(2,6-dimethylphenyl)acetamide (24a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (82% yield, 26.7 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 9.23 (s, 1H), 7.06 (s, 3H), 2.14 (s, 6H), 2.05 (s, 3H).
^{13}C NMR (100 MHz, DMSO *d6*) δ 168.2, 135.9, 135.6, 128.0, 126.7, 23.0, 18.6.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{14}NO$ 164.1075; Found: 164.1071.

***N*-(3,4-dimethylphenyl)acetamide (25a)**

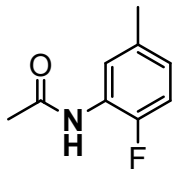


Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (90% yield, 29.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (s, 1H), 7.30 (s, 1H), 7.23 (d, *J* = 8.0 Hz, 1H), 7.07 (d, *J* = 8.0 Hz, 1H), 2.24 (s, 3H), 2.23 (s, 3H), 2.16 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 137.2, 135.6, 132.7, 129.9, 121.5, 117.6, 24.5, 19.9, 19.2.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{14}NO$ 164.1075; Found: 164.1068.

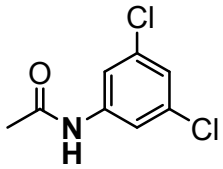
***N*-(2-fluoro-5-methylphenyl)acetamide (26a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (68% yield, 22.7 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (d, J = 7.4 Hz, 1H), 7.41 (s, 1H), 6.96 (dd, J = 10.6 Hz, J = 8.4 Hz, 1H), 6.86-6.83 (m, 1H), 2.33 (s, 3H), 2.23 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.4, 150.6 (d, J_{F-C} = 238.7 Hz), , 134.2 (d, J_{F-C} = 3.6 Hz), 125.8 (d, J_{F-C} = 10.5 Hz), 124.6 (d, J_{F-C} = 7.3 Hz), 122.2, 114.2 (d, J_{F-C} = 19.1 Hz), 24.7, 21.1.
^{19}F NMR (376 MHz, $CDCl_3$) δ -136.19.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_9H_{11}FNO$ 168.0824; Found: 168.0817.

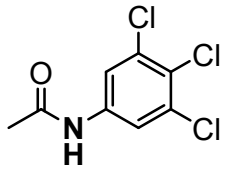
***N*-(3,5-dichlorophenyl)acetamide (27a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (79% yield, 32.1 mg).

^{1}H NMR (400 MHz, MeOH-*d4*) δ 7.60 (s, 2H), 7.14-7.13 (m, 1H), 2.14 (s, 3H).
^{13}C NMR (100 MHz, MeOH *d4*) δ 174.4, 144.8, 138.7, 126.9, 121.4, 26.5.
HRMS (ESI) m/z: $[M + H]^+$ Calcd for $C_8H_8Cl_2NO$ 203.9983; Found: 203.9977.

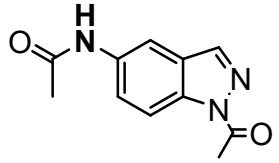
***N*-(3,4,5-trichlorophenyl)acetamide (28a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (80% yield, 38.0 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 10.31 (s, 1H), 7.84-7.82 (m, 2H), 2.07. (s, 3H)
^{13}C NMR (100 MHz, DMSO-*d6*) δ 169.6, 139.7, 133.2, 123.4, 119.3, 24.6.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_8H_7Cl_3NO$ 237.9593; Found: 237.9585.

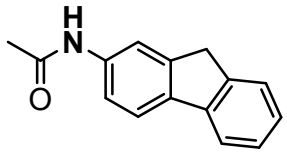
***N*-(1-acetyl-*1H*-indazol-5-yl)acetamide (29a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (82% yield, 35.6 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (d, J = 8.8 Hz, 1H), 8.26 (s, 1H), 8.10 (s, 1H), 7.55 (s, 1H), 7.36 (dd, J = 8.8 Hz, J = 1.9 Hz, 1H), 2.80 (s, 3H), 2.25 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 168.6, 139.9, 135.9, 134.5, 126.8, 122.4, 115.8, 111.6, 24.6, 22.9.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{11}H_{12}N_3O_2$ 218.0929; Found: 218.0922.

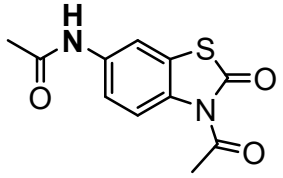
***N*-(9H-fluoren-2-yl)acetamide (30a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (89% yield, 39.7 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (s, 1H), 7.72 (t, *J* = 8.7 Hz, 2H), 7.60-7.49 (m, 2H), 7.36 (d, *J* = 7.8 Hz, 2H), 7.29 (d, *J* = 7.8 Hz, 2H), 3.88 (s, 2H), 2.23 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.5, 144.3, 143.2, 141.3, 138.1, 136.7, 126.8, 126.3, 125.0, 120.1, 119.5, 118.7, 117.0, 37.0, 24.7.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{15}H_{14}NO$ 224.1075; Found: 224.1069.

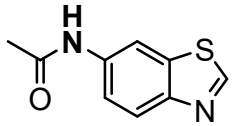
***N*-(3-acetyl-2-oxo-2,3-dihydrobenzo[d]thiazol-6-yl)acetamide (31a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (77% yield, 38.5 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (d, *J* = 9.2 Hz, 1H), 8.00 (d, *J* = 2.4 Hz, 1H), 7.60 (s, 1H), 7.11 (dd, *J* = 8.8 Hz, *J* = 2.4 Hz, 1H), 2.75 (s, 3H), 2.14 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 171.2, 170.8, 168.6, 135.5, 130.8, 122.6, 118.2, 118.1, 113.3, 27.3, 24.6.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{11}H_{11}N_2O_3S$ 251.049; Found: 251.0489.

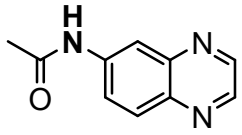
***N*-(benzo[d]thiazol-6-yl)acetamide (32a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (79% yield, 30.3 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (s, 1H), 8.54 (d, *J* = 1.6 Hz, 1H), 8.03-7.99 (m, 2H), 7.35 (dd, *J* = 8.8 Hz, *J* = 2.0 Hz, 1H), 2.23 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.9, 153.5, 149.8, 135.9, 134.8, 123.4, 119.1, 112.7, 24.6.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_9H_9N_2OS$ 193.0435; Found: 193.0430.

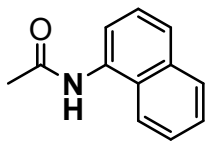
***N*-(quinoxalin-6-yl)acetamide (33a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (64% yield, 23.9 mg).

^{1}H NMR (400 MHz, MeOH-*d4*) δ 8.78 (d, *J* = 2.0 Hz, 1H), 8.73 (d, *J* = 1.6 Hz, 1H), 8.47 (d, *J* = 2.0 Hz, 1H), 7.96 (d, *J* = 8.8 Hz, 1H), 7.87 (dd, *J* = 9.2 Hz, *J* = 2.4 Hz, 1H), 2.22 (s, 3H).
^{13}C NMR (100 MHz, MeOH-*d4*) δ 170.7, 145.3, 143.5, 143.1, 140.4, 139.5, 128.9, 123.9, 115.8, 22.7.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{10}N_3O$ 188.0824; Found: 188.0818.

***N*-(naphthalen-1-yl)acetamide (34a)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 30.0 mg)

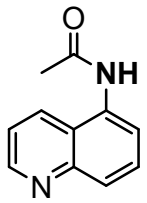
^{1}H NMR (400 MHz, DMSO-*d6*) δ 9.94 (s, 1H), 8.10 (d, *J* = 8.8 Hz, 1H), 7.95-7.93 (m, 1H), 7.75 (d, *J*

= 8.0 Hz, 1H), 7.71 (d, *J* = 7.6 Hz, 1H), 7.58-7.47 (m, 3H), 2.21 (s, 3H).

^{13}C NMR (100 MHz, DMSO-*d6*) δ 169.4, 134.2, 128.6, 128.1, 126.4, 126.2, 126.0, 125.5, 123.2, 122.0, 24.0.

(Known compound: *ACS Sustainable Chem. Eng.,* 2023, **11**, 9047-9056.).

_N_-(quinolin-5-yl)acetamide (35a)



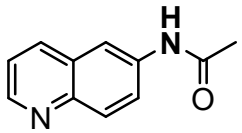
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (73% yield, 27.2 mg)

^{1}H NMR (400 MHz, DMSO-*d6*) δ 10.07 (s, 1H), 8.92 (dd, *J* = 4.0 Hz, *J* = 1.2 Hz, 1H), 8.51 (d, *J* = 8.4 Hz, 1H), 7.86 (d, *J* = 8.0 Hz, 1H), 7.80 (d, *J* = 7.6 Hz, 1H), 7.73 (t, *J* = 8.0 Hz, 1H), 7.56 (dd, *J* = 8.8 Hz, *J* = 4.0 Hz,1H), 2.21(s, 3H).

^{13}C NMR (100 MHz, DMSO-*d6*) δ 169.6, 150.9, 148.6, 134.5, 132.0, 129.5, 126.4, 123.2, 121.8, 121.3, 24.0.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{11}H_{11}N_2O$ 187.0871; Found: 187.0876.

_N_-(quinolin-6-yl)acetamide (36a)



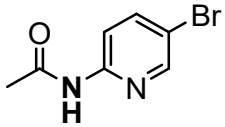
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (69% yield, 25.7 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 10.26 (s, 1H), 8.77 (dd, *J* = 4.0 Hz, *J* = 1.2 Hz, 1H), 8.36, 8.36 (d, *J* = 2.0 Hz, 1H), 8.26 (d, *J* = 8.4 Hz, 1H), 7.96 (d, *J* = 9.2 Hz, 1H), 7.78 (dd, *J* = 8.8 Hz, *J* = 2.0 Hz, 1H), 7.46 (dd, *J* = 8.0 Hz, *J* = 4.0 Hz, 1H), 2.13 (s, 3H).

^{13}C NMR (100 MHz, DMSO-*d6*) δ 169.6, 150.9, 148.6, 134.6, 131.9, 129.5, 126.4, 123.2, 121.8, 121.3, 24.0.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{11}H_{11}N_2O$ 187.0871; Found: 187.0869.

_N_-(5-bromopyridin-2-yl)acetamide (37a)



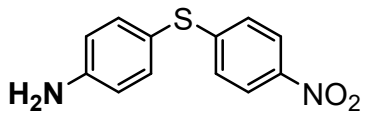
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (57% yield, 24.4 mg).

^{1}H NMR (400 MHz, DMSO-*d6*) δ 8.33-8.27 (m, 2H), 8.18 (d, *J* = 8.8 Hz, 1H), 7.82 (d, *J* = 8.8 Hz, 1H), 2.23 (s, 3H).

^{13}C NMR (100 MHz, DMSO-*d6*) δ 168.7, 150.0, 148.4, 141.0, 115.3, 114.5, 24.8.

(Known compound: *Org. Biomol. Chem.*, 2020, **18**, 9292-9299)

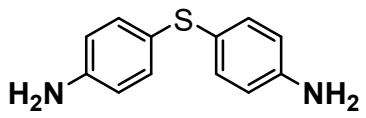
4-((4-nitrophenyl)thio)aniline (38A)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, yellow solid (41% yield, 20.2 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (d, *J* = 9.2 Hz, 2H), 7.36 (d, *J* = 8.4 Hz, 2H), 7.11 (t, *J* = 9.2 Hz, 2H), 6.77 (d, *J* = 8.4 Hz, 2H), 3.56 (br, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 151.0, 148.3, 144.8, 137.3, 125.2, 123.9, 116.5, 116.2.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{12}H_{11}N_2O_2S$ 247.0541; Found: 247.0543

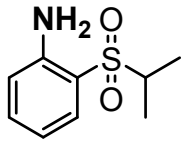
4,4'-thiodianiline (38B)[11]



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, yellow solid (53% yield, 15.1 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.18 (d, *J* = 8.4 Hz, 4H), 6.62 (d, *J* = 8.4 Hz, 4H), 3.65 (br, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 145.7, 132.8, 125.0, 115.8.
(Known compound: *Org. Lett.,* 2010, **12**, 2430-2433.)

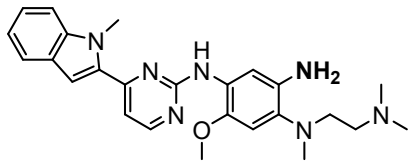
2-(isopropylsulfonyl)aniline (39)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (78% yield, 31 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 8.0 Hz, 1H), 7.36 (t, *J* = 7.2 Hz, 1H), 6.81 (t, *J* = 7.6 Hz, 1H), 6.75 (d, *J* = 8.0 Hz, 1H), 4.67 (br, 2H), 3.40-3.30 (m, 1H), 1.32 (d, *J* = 6.8 Hz, 6H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 147.2, 135.0, 131.2, 118.1, 117.6, 117.5, 54.1, 15.3.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_9H_{14}NO_2S$ 200.0745; Found: 200.0736.

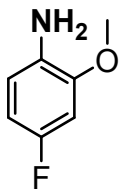
***N*^{1}-(2-(dimethylamino)ethyl)-5-methoxy-*N*^{1}-methyl-N4-(4-(1-methyl-1H-indol-2-yl)pyrimidin-2-yl)benzene-1,2,4-triamine (40)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (DCM/MeOH = 3:1) as eluant, white solid (45% yield, 40.1 mg)

^{1}H NMR (400 MHz, DMSO-*d6*) δ 8.44 (d, *J* = 7.6 Hz, 1H), 8.30 (s, 1H), 8.28 (d, *J* = 5.6 Hz, 1H), 7.80 (s, 1H), 7.52-7.50 (m, 2H), 7.25 (t, *J* = 8.4 Hz, 1H), 7.19 (d, *J* = 8.0 Hz, 1H), 7.15 (d, *J* = 5.2 Hz, 1H), 6.77 (s, 1H), 4.58 (s, 2H), 3.87 (s, 3H), 3.75 (s, 3H), 2.89 (t, *J* = 6.8 Hz, 2H), 2.64 (s, 3H), 2.36 (t, *J* = 6.4 Hz, 2H), 2.17 (s, 6H).
^{13}C NMR (100 MHz, DMSO-*d6*) δ 162.5, 160.9, 157.4, 142.2, 138.1, 137.2, 133.8, 133.3, 126.0, 125.7, 122.7, 122.6, 121.4, 112.9, 110.8, 109.5, 107.2, 105.7, 57.9, 56.9, 54.5, 46.2, 42.1, 40.6, 33.5.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{25}H_{32}N_7O$ 446.2668; Found: 446.2660.

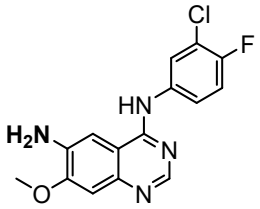
4-fluoro-2-methoxyaniline (41)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (85% yield, 24.0 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.64 (t, J = 7.6 Hz, 1H), 6.58 (dd, J = 10.4 Hz, J = 2.4 Hz, 1H), 6.53 (t, J = 8.4 Hz, 1H), 3.85 (s, 3H), 3.58 (br, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 156.4 (d, J_{F-C} = 234.1 Hz), 147.8 (d, J_{F-C} = 9.4 Hz), 132.0 (d, J_{F-C} = 2.6 Hz), 114.7 (d, J_{F-C} = 9.1 Hz), 106.4 (d, J_{F-C} = 21.7 Hz), 99.1 (d, J_{F-C} = 16.7 Hz), 55.7.
^{19}F NMR (376 MHz, $CDCl_3$) δ -124.19.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for C_7H_9FNO 142.0668; Found: 142.0662.

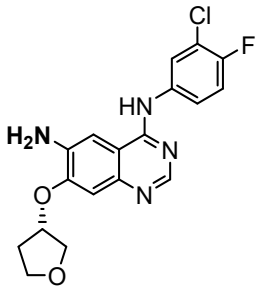
***N*^{4}-(3-chloro-4-fluorophenyl)-7-methoxyquinazoline-4,6-diamine (42)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (67% yield, 42.6 mg).

^{1}H NMR (400 MHz, DMSO) δ 9.40 (s, 1H), 8.39 (s, 1H), 8.21-8.19 (m, 1H), 7.83-7.80 (m, 1H), 7.42-7.38 (m, 2H), 7.11 (s, 1H), 5.40 (br, 2H), 3.97 (s, 3H).
^{13}C NMR (100 MHz, DMSO) δ 155.5, 153.1 (d, J_{F-C} = 240.3 Hz), 153.2, 150.7, 145.3, 139.0, 138.0, 122.9, 121.9 (d, J_{F-C} = 6.7 Hz), 119.0 (d, J_{F-C} = 18.1 Hz), 116.8 (d, J_{F-C} = 21.4 Hz), 110.9, 106.4, 101.3, 56.3.
^{19}F NMR (376 MHz, DMSO) δ -124.36.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{15}H_{13}ClFN_4O$ 319.0762; Found: 319.0757.

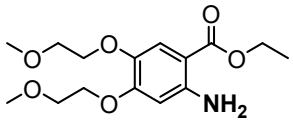
***(S)*-*N*^{4}-(3-chloro-4-fluorophenyl)-7-((tetrahydrofuran-3-yl)oxy)quinazoline-4,6-diamine (43)**



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (78% yield, 58.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 (s, 1H), 7.92-7.90 (m, 2H), 7.52-7.48 (m, 2H), 7.36 (s, 1H), 7.14 (t, J = 8.4 Hz, 1H), 7.11, 7.09 (s, 1H), 7.00 (s, 1H), 5.09-5.07 (m, 1H), 4.28 (br, 2H), 4.11-4.08 (m, 1H), 4.05-4.01 (m, 2H), 3.96-3.90 (m, 1H), 2.37-2.28 (m, 1H), 2.25-2.19 (m, 1H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 154.5 (d, J_{F-C} = 244.3 Hz), 155.23, 151.9, 150.9, 145.5, 137.9, 135.5, 123.7, 121.1 (d, J_{F-C} = 6.7 Hz), 121.1 (d, J_{F-C} = 18.5 Hz), 116.5 (d, J_{F-C} = 21.9 Hz), 110.1, 108.1, 100.8, 78.6, 73.0, 67.3, 32.8.
^{19}F NMR (376 MHz, $CDCl_3$) δ -121.30.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{18}H_{17}ClFN_4O_2$ 375.1024; Found: 375.1021.

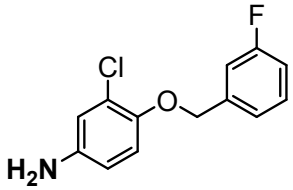
ethyl 2-amino-4,5-bis(2-methoxyethoxy)benzoate (44)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (81% yield, 50.7 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (s, 1H), 6.17 (s, 1H), 4.30 (q, *J* = 7.2 Hz, 2H), 4.13 (t, *J* = 4.4 Hz, 2H), 4.09 (t, *J* = 4.4 Hz, 2H), 3.78 (t, *J* = 4.8 Hz, 2H), 3.74 (t, *J* = 4.8 Hz, 2H), 3.45 (d, *J* = 3.2 Hz, 6H), 1.37 (t, *J* = 7.2 Hz, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.7, 155.2, 147.4, 139.7, 118.2, 103.2, 100.9, 71.2, 70.7, 70.1, 68.0, 60.1, 59.2, 59.1, 14.5.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{15}H_{24}NO_6$ 314.1603; Found: 314.1602.

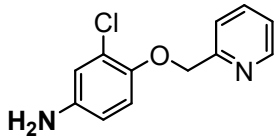
3-chloro-4-((3-fluorobenzyl)oxy)aniline (45)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (83% yield, 41.7 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.33 (m, 1H), 7.24-7.20 (m, 2H), 7.04-7.00 (m, 1H), 6.81-6.78 (m, 2H), 6.52 (dd, *J* = 8.8 Hz, *J* = 2.8 Hz, 1H), 5.05 (br, 2H), 3.53 (s, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 163.0 (d, J_{F-C} = 244.4 Hz), 146.9, 141.6, 139.7 (d, J_{F-C} = 7.3 Hz), 130.0 (d, J_{F-C} = 8.1 Hz), 124.5, 122.7, 122.6, 117.1 (d, J_{F-C} = 29.7 Hz), 114.7 (d, J_{F-C} = 21.1 Hz), 114.2 (d, J_{F-C} = 21.9 Hz), 114.2, 71.4 (d, J_{F-C} = 1.8 Hz).
^{19}F NMR (376 MHz, $CDCl_3$) δ -112.93.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{13}H_{12}ClFNO$ 252.0591; Found: 252.0587.

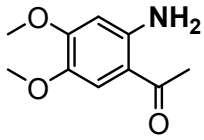
3-chloro-4-(pyridin-2-ylmethoxy)aniline (46)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (81% yield, 37.9 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 (d, *J* = 8.8 Hz, 1H), 7.74 (td, *J* = 7.6 Hz, *J* = 1.6 Hz, 1H), 7.76 (d, *J* = 7.6 Hz, 1H), 7.25-7.22 (m, 1H), 6.82 (d, *J* = 8.8 Hz, 1H), 6.78 (d, *J* = 2.8 Hz, 1H), 6.53 (dd, *J* = 8.8 Hz, *J* = 2.8 Hz, 1H), 5.20 (br, 2H), 3.27 (s, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 157.3, 149.0, 146.8, 141.3, 136.9, 123.9, 122.6, 121.3, 117.2, 115.9, 114.3, 72.3.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{12}H_{12}ClN_2O$ 235.0638; Found: 235.0633.

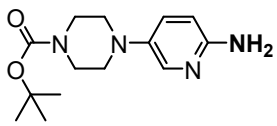
1-(2-amino-4,5-dimethoxyphenyl)ethan-1-one (47)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (79% yield, 30.8 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12 (s, 1H), 6.47-6.14 (m, 3H), 3.89 (s, 3H), 3.86 (s, 3H), 2.54 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 198.4, 155.4, 147.5, 140.1, 114.1, 110.6, 99.3, 56.8, 55.8, 27.8.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{10}H_{14}NO_3$ 196.0973; Found: 196.0969.

tert-butyl 4-(6-aminopyridin-3-yl)piperazine-1-carboxylate (48)



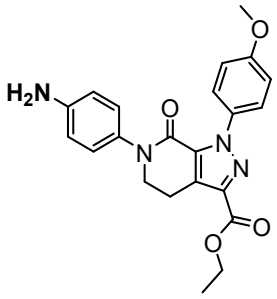
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (73% yield, 40.6 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 2.8 Hz, 1H), 7.19 (dd, *J* = 8.8 Hz, *J* = 2.4 Hz, 1H), 6.51 (d, *J* = 8.8 Hz, 1H), 4.29 (s, 2H), 3.58 (t, *J* = 4.8 Hz, 4H), 2.97 (t, *J* = 4.4 Hz, 4H), 1.49 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 154.7, 153.3, 140.6, 137.2, 129.8, 109.3, 80.0, 51.0, 28.4.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{14}H_{23}N_4O_2$ 279.1821; Found: 279.1817.

Ethyl6-(4-aminophenyl)-1-(4-methoxyphenyl)-7-oxo-4,5,6,7-tetrahydro-1H-pyrazolo[3,4-c]pyridine-3-carboxylate (49)



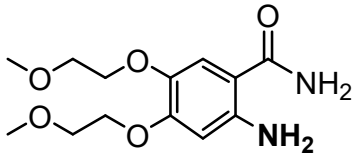
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (61% yield, 49.6 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.50 (d, *J* = 4.8 Hz, 2H), 7.09 (d, *J* = 8.8 Hz, 2H), 6.91 (d, *J* = 9.2 Hz, 2H), 6.68 (d, *J* = 8.8 Hz, 2H), 4.50 (q, *J* = 7.2 Hz, 2H), 4.05 (t, *J* = 6.4 Hz, 2H), 3.82 (s, 3H), 3.32-3.19 (m, 4H), 1.45 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.2, 159.8, 157.4, 144.7, 138.9, 133.3, 132.9, 132.6, 127.0, 126.7, 126.6, 115.5, 113.6, 61.2, 55.5, 51.4, 21.5, 14.4.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{22}H_{23}N_4O_4$ 407.1719; Found: 407.1716.

2-amino-4,5-bis(2-methoxyethoxy)benzamide (50)



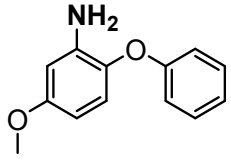
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (75% yield, 42.6 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.05 (s, 1H), 6.40-6.02 (m, 3H), 5.28 (br, 2H), 4.05-4.01 (m, 4H), 3.72 (t, *J* = 5.2 Hz, 2H), 3.64 (t, *J* = 4.8 Hz, 2H), 3.38 (d, *J* = 7.2 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 171.5, 154.2, 146.8, 139.1, 117.3, 105.8, 101.6, 71.29, 70.7, 70.6, 67.8, 59.1, 58.9.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{13}H_{21}N_2O_5$ 285.1450; Found: 285.1461.

5-methoxy-2-phenoxyaniline (51)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 15:1) as eluant, white solid (75% yield, 32.3 mg).

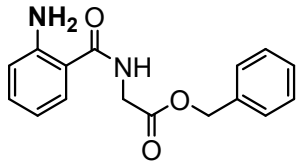
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 (t, *J* = 8.0 Hz, 2H), 7.05 (t, *J* = 7.2 Hz, 1H), 6.96 (d, *J* = 8.0 Hz, 2H), 6.87 (d, *J* = 8.8 Hz, 1H), 6.42 (d, *J* = 2.8 Hz, 1H), 6.31 (dd, *J* = 8.8 Hz, *J* = 2.8 Hz, 1H), 3.80 (s, 3H),

3.62 (br, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 158.3, 157.2, 139.8, 136.5, 129.7, 122.2, 121.9, 116.1, 103.7, 102.2, 55.5.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{13}H_{14}NO_2$ 216.1024; Found: 216.1020.

benzyl (2-aminobenzoyl)glycinate (52)



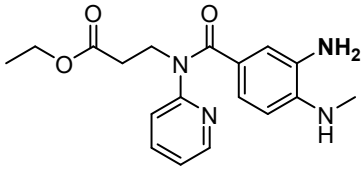
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (80% yield, 45.5 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44-7.37 (m, 6H), 7.26-7.22 (m, 1H), 6.71-6.65 (m, 3H), 5.25-5.03 (m, 4H), 4.25 (d, *J* = 4.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 170.1, 169.2, 148.6, 135.2, 132.7, 128.7, 128.6, 128.4, 127.5, 117.4, 116.8, 115.2, 67.3, 41.6.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{16}H_{17}N_2O_3$ 285.1239; Found: 285.1237.

ethyl 3-(3-amino-4-(methylamino)-*N*-(pyridin-2-yl)benzamido)propanoate (53)



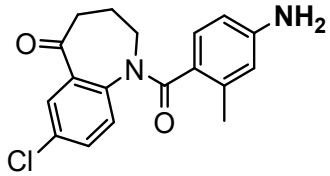
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (62% yield, 42.4 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.43 (s, 1H), 7.42-7.36 (m, 1H), 7.03-6.98 (m, 1H), 6.86-6.82 (m, 1H), 6.76-6.70 (m, 2H), 6.35-6.28 (m, 1H), 4.41-4.35 (m, 2H), 4.10-4.03 (m, 2H), 3.46 (s, 3H), 2.81-2.73 (m, 5H), 1.23-1.17 (m, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 171.9, 171.0, 156.8, 148.6, 141.6, 137.0, 132.5, 124.2, 123.4, 122.5, 120.5, 117.5, 108.3, 60.4, 44.5, 33.5, 30.5, 14.1.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{18}H_{23}N_4O_3$ 343.1770; Found: 343.1773

1-(4-amino-2-methylbenzoyl)-7-chloro-1,2,3,4-tetrahydro-5H-benzo[b]azepin-5-one (54)



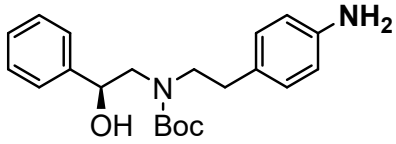
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (77% yield, 50.5 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 2.4 Hz, 1H), 7.21 (d, *J* = 7.2 Hz, 1H), 6.77 (s, 1H), 6.64 (d, *J* = 6.0 Hz, 1H), 6.45 (d, *J* = 1.6 Hz, 1H), 6.24 (d, *J* = 7.6, 1H), 3.99-3.63 (m, 4H), 2.89 (t, *J* = 6.8 Hz, 2H), 2.34 (s, 3H), 2.14 (s, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 200.5, 171.2, 147.4, 141.8, 138.0, 135.1, 132.6, 129.9, 129.2, 129.0, 125.1, 116.8, 111.7, 47.4, 40.1, 23.1, 20.0.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{18}H_{18}ClN_2O_2$ 329.1057; Found: 329.1054.

***tert*-butyl *(S)*-(4-aminophenethyl)(2-hydroxy-2-phenylethyl)carbamate (55)**



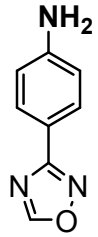
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 3:1) as eluant, white solid (85% yield, 60.6 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.36 (m, 5H), 6.92 (d, *J* = 6.8 Hz, 2H), 6.63 (d, *J* = 8.0 Hz, 2H), 4.89 (d, *J* = 6.4 Hz, 1H), 3.54-3.21 (m, 7H), 2.70-2.56 (m, 2H), 1.49 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 158.1, 144.7, 142.5, 129.6, 128.9, 128.4, 127.5, 125.9, 115.4, 80.5, 74.4, 56.7, 51.7, 34.1, 28.4.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{21}H_{29}N_2O_3$ 357.2178; Found: 357.2165.

4-(1,2,4-oxadiazol-3-yl)aniline (56)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (67% yield, 21.6 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.69 (s, 1H), 7.93 (d, *J* = 8.8 Hz, 2H), 6.76 (d, *J* = 8.4 Hz, 2H), 4.02 (br, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 167.6, 164.2, 149.4, 129.1, 116.0, 114.8.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_8H_8N_3O$ 162.0667; Found: 162.0662.

3-bromo-2-methoxyaniline (57)

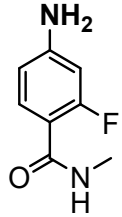
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 15:1) as eluant, white solid (79% yield, 31.8 mg)

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.93 (d, *J* = 8.0 Hz, 1H), 6.80 (t, *J* = 8.0 Hz, 1H), 6.70 (d, *J* = 7.6 Hz, 1H), 3.85 (s, 3H), 3.73 (br, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 144.2, 141.3, 125.8, 122.5, 117.1, 115.1, 59.6.

HRMS (ESI-TOF) m/z: $[M - H]^+$ Calcd for C_7H_7BrNO 199.9703; Found: 199.9708.

4-amino-2-fluoro-*N*-methylbenzamide (58)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 5:1) as eluant, white solid (66% yield, 22.2 mg).

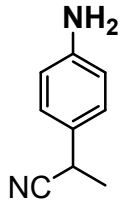
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.91 (t, *J* = 8.8 Hz, 1H), 6.63 (s, 1H), 6.49 (dd, *J* = 8.4 Hz, *J* = 2.0 Hz, 1H), 6.33 (dd, *J* = 14.4 Hz, *J* = 2.0 Hz, 1H), 4.18 (br, 2H), 3.00 (dd, *J* = 4.8 Hz, *J* = 0.8 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.4 (d, $J_{F\text{-}C}$ = 3.7 Hz), 162.2 (d, $J_{F\text{-}C}$ = 243.1 Hz), 151.4 (d, $J_{F\text{-}C}$ = 12.7 Hz), 133.3 (d, $J_{F\text{-}C}$ = 4.3 Hz), 110.8 (d, $J_{F\text{-}C}$ = 1.8 Hz), 110.2 (d, $J_{F\text{-}C}$ = 1.7 Hz), 100.8 (d, $J_{F\text{-}C}$ = 28.5 Hz), 26.6

^{19}F NMR (376 MHz, $CDCl_3$) δ -112.86.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_8H_{10}FN_2O$ 169.0778; Found: 169.0771.

2-(4-aminophenyl)propanenitrile (59)



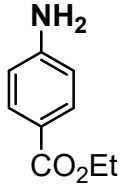
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (76% yield, 22.2 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.14 (d, *J* = 8.4 Hz, 2H), 6.71-6.68 (m, 2H), 3.84-3.78 (m, 2H), 1.61 (d, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 146.2, 127.7, 126.8, 122.2, 115.4, 30.5, 21.5.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_9H_{11}N_2$ 147.0922; Found: 147.0917.

ethyl 4-aminobenzoate (60)



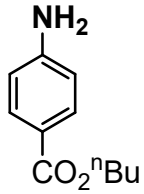
Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (85% yield, 28.1 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (d, *J* = 8.8 Hz, 2H), 6.66 (d, *J* = 8.4 Hz, 2H), 4.36 (br, 2H), 4.32 (q, *J* = 7.2 Hz, 2H), 1.38 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 150.8, 131.6, 120.0, 113.8, 60.3, 14.4.

HRMS (ESI) m/z: $[M + H]^+$ Calcd for $C_9H_{12}NO_2$ 166.0868; Found: 166.0863.

butyl 4-aminobenzoate (61)



Purified by column chromatography using the mixture of petroleum ether and ethyl acetate (PE/EA = 10:1) as eluant, white solid (81% yield, 31.3 mg).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (d, *J* = 8.4 Hz, 2H), 6.67 (d, *J* = 8.8 Hz, 2H), 4.28 (t, *J* = 6.8 Hz, 2H), 4.00 (br, 2H), 1.78-1.71 (m, 2H), 1.53-1.44 (m, 2H), 0.99 (t, *J* = 7.6 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.8, 150.5, 131.6, 120.3, 113.9, 64.3, 30.9, 19.3, 13.8.

HRMS (ESI) m/z: $[M + H]^+$ Calcd for $C_{11}H_{16}NO_2$ 194.1182; Found: 194.1177.

Reference

[1] X. Li, Y. Tan, Z. Liu, J. Su, Y. Xiao, B. Qiao, Y. Ding, *J. Catal.,* 2022, **416**, 332-343.

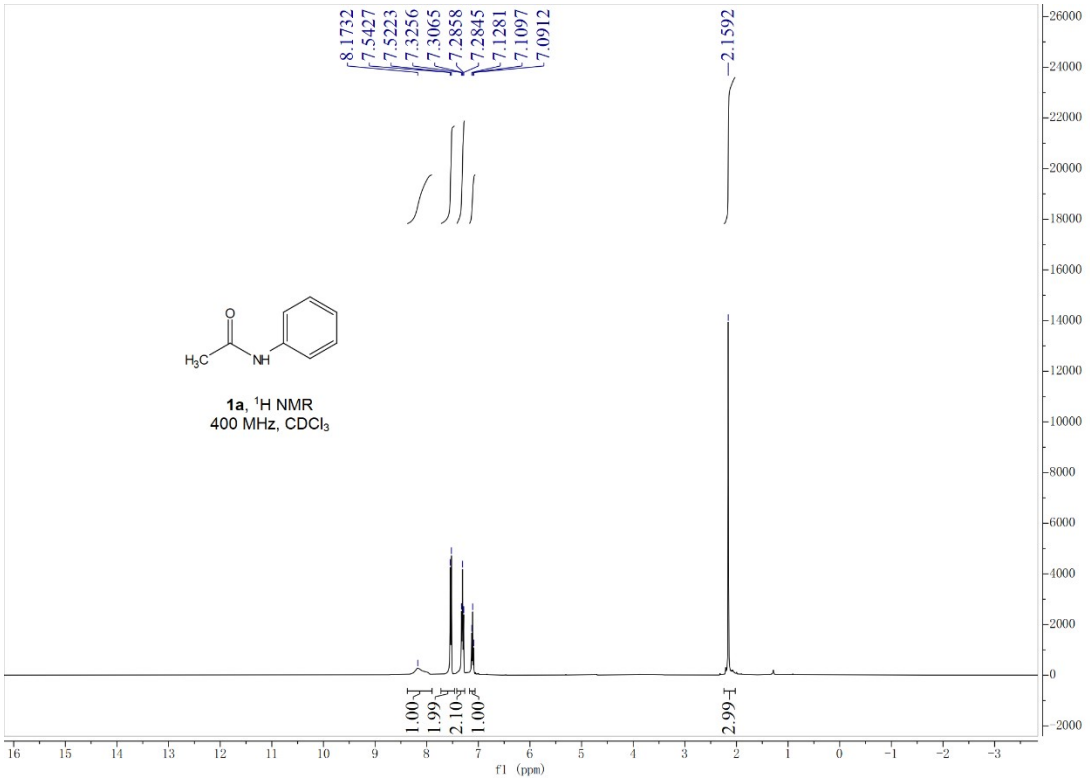
[2] D. E. Wise, E. S. Gogarnoiu, A. D. Duke, J. M. Paolillo, T. L. Vacala, W. A. Hussain and M. Parasram, *J. Am. Chem. Soc.*, 2022, **144**, 15437-15442.

[3] R. Hurley and A. C. Testa, *J. Am. Chem. Soc.*, 1966, **88**, 4330-4332.

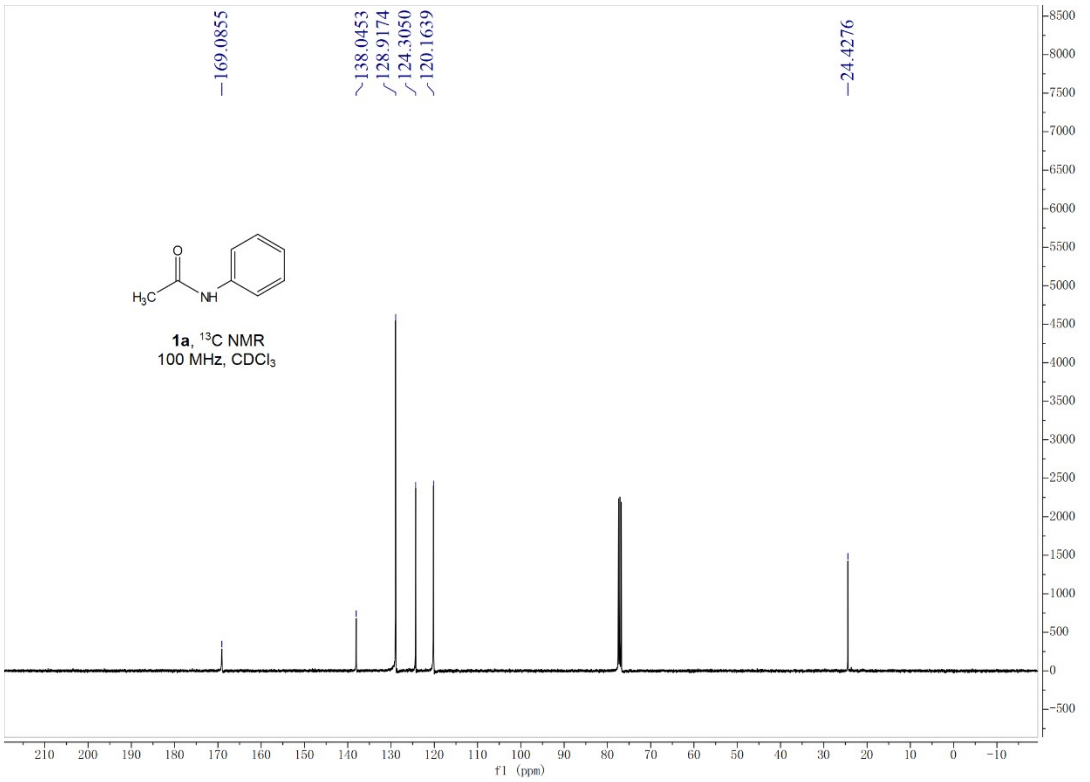
[4] R. S. Macomber, *J. Chem. Educ.*, 1992, **69**, 375-378.

[5] R. Foeter and C. A. Fyfe, *Trans. Faraday Soc.*, 1965, **61**, 1626-1631.

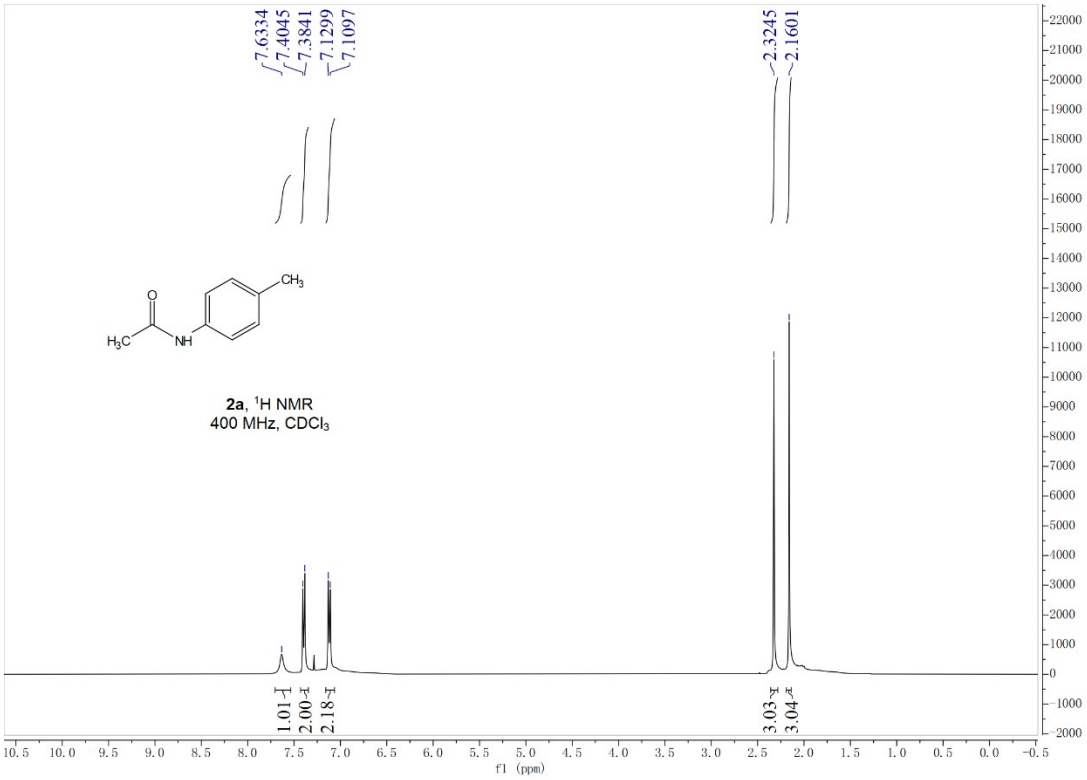
VI. Copies of NMR Spectra

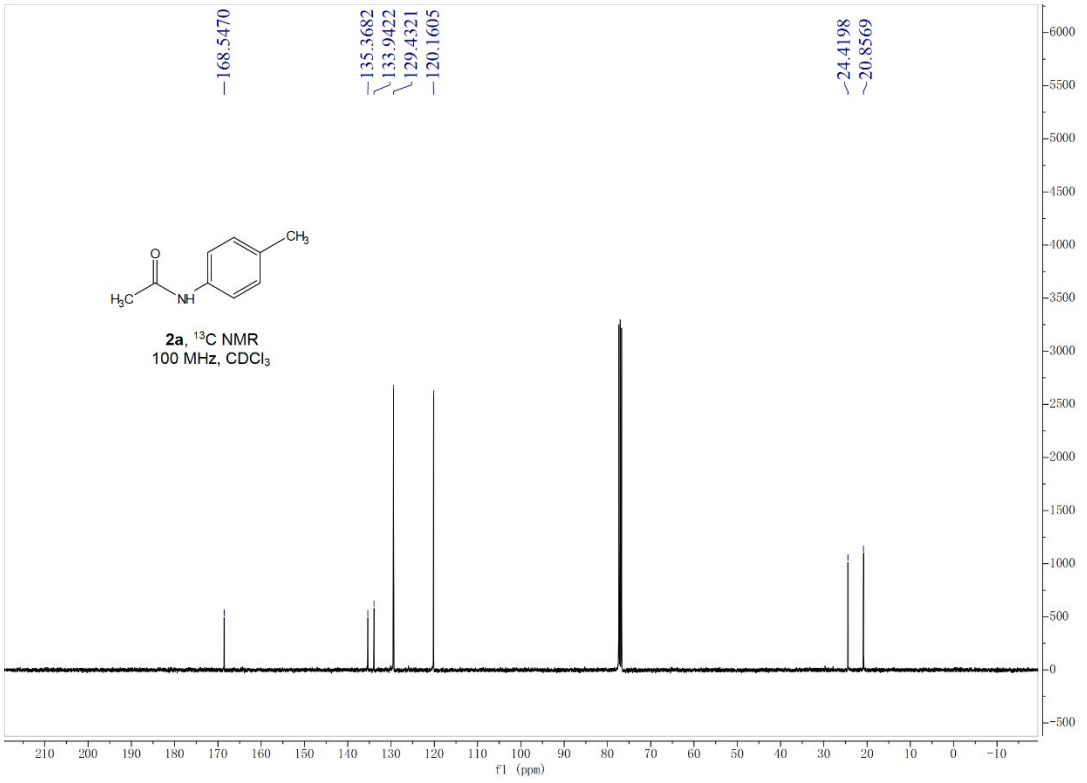


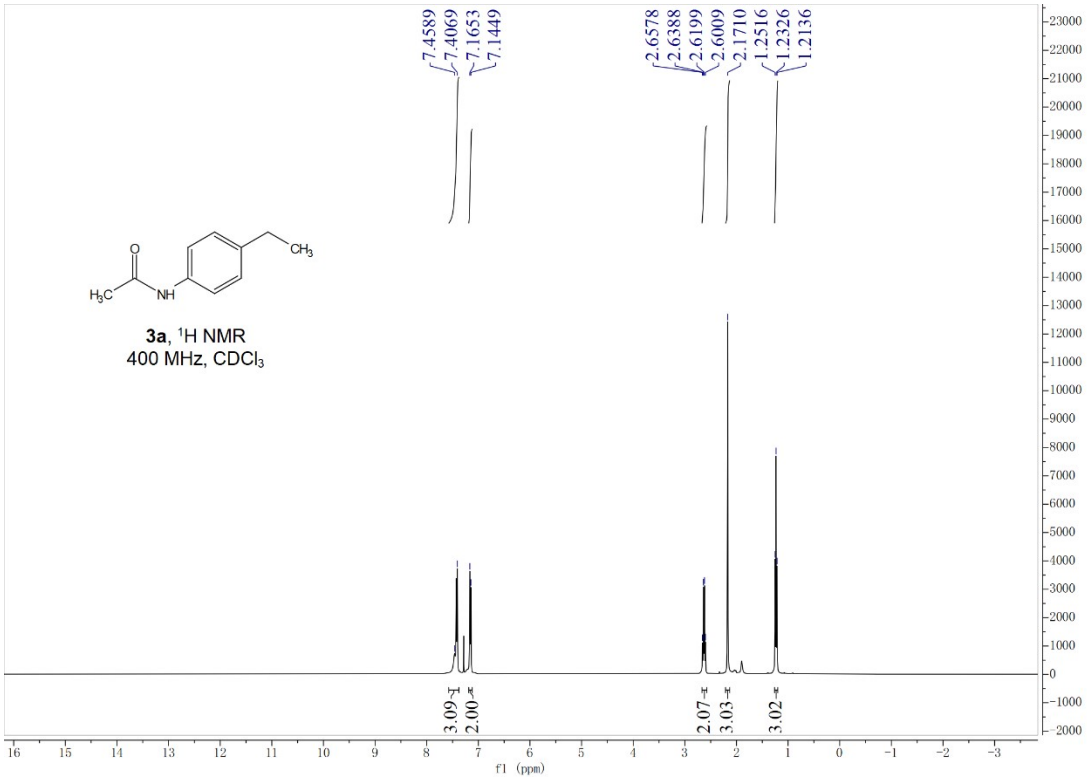
1a, ^{1}H NMR
400 MHz, $CDCl_3$



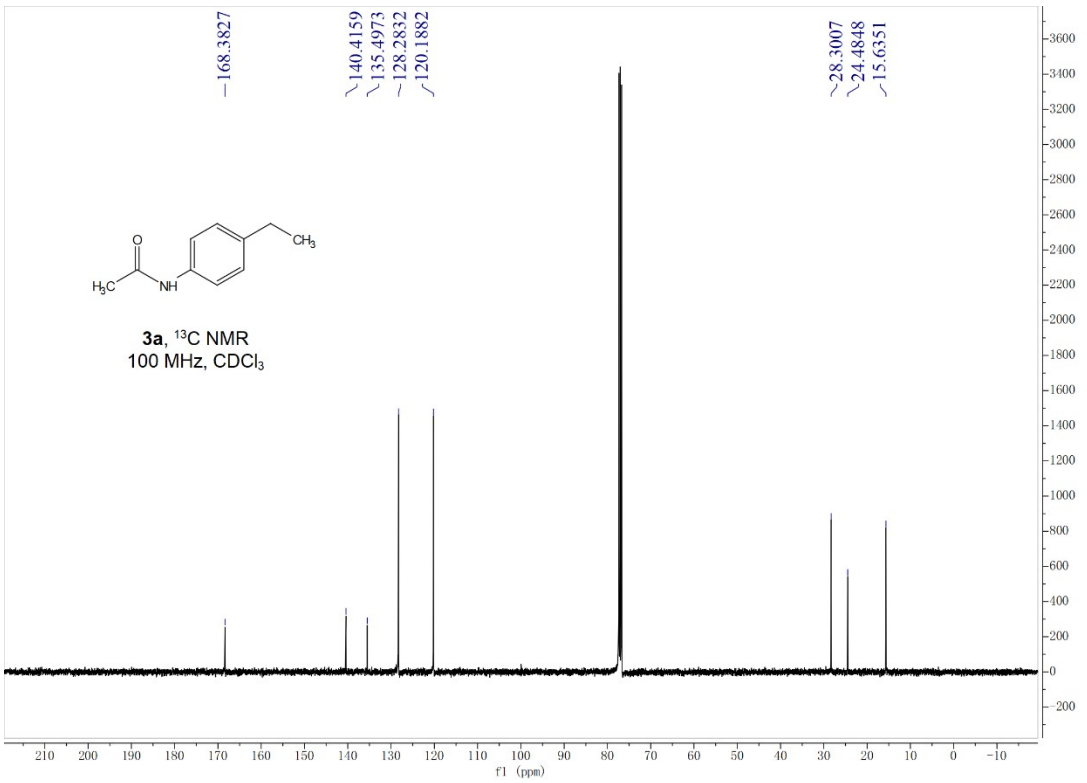
1a, ^{13}C NMR
100 MHz, $CDCl_3$


7.6334
7.4045
7.3841
7.1299
7.1097
2.3245
2.1601
CH3
O
H3C
NH
2a, 1H NMR
400 MHz, CDCl3
1.01
2.00
2.18
3.03
3.04
f1 (ppm)

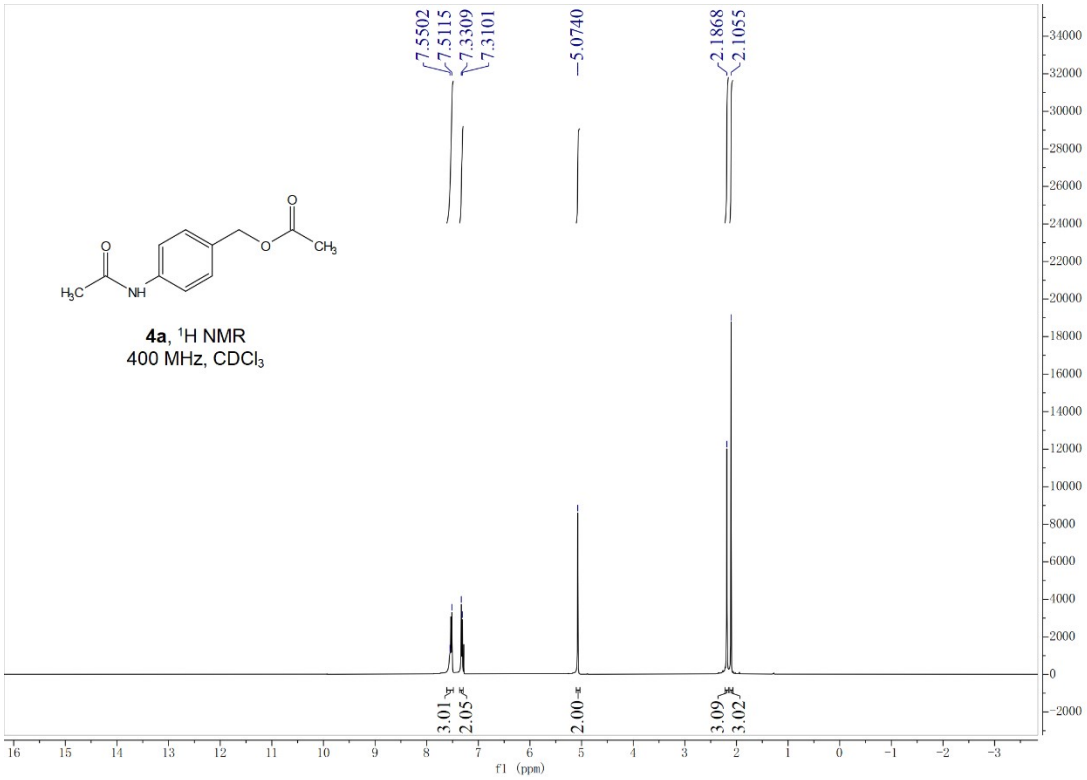

168.5470
135.3682
133.9422
129.4321
120.1605
24.4198
20.8569
CH3
O
H3C
NH
2a, 13C NMR
100 MHz, CDCl3
f1 (ppm)



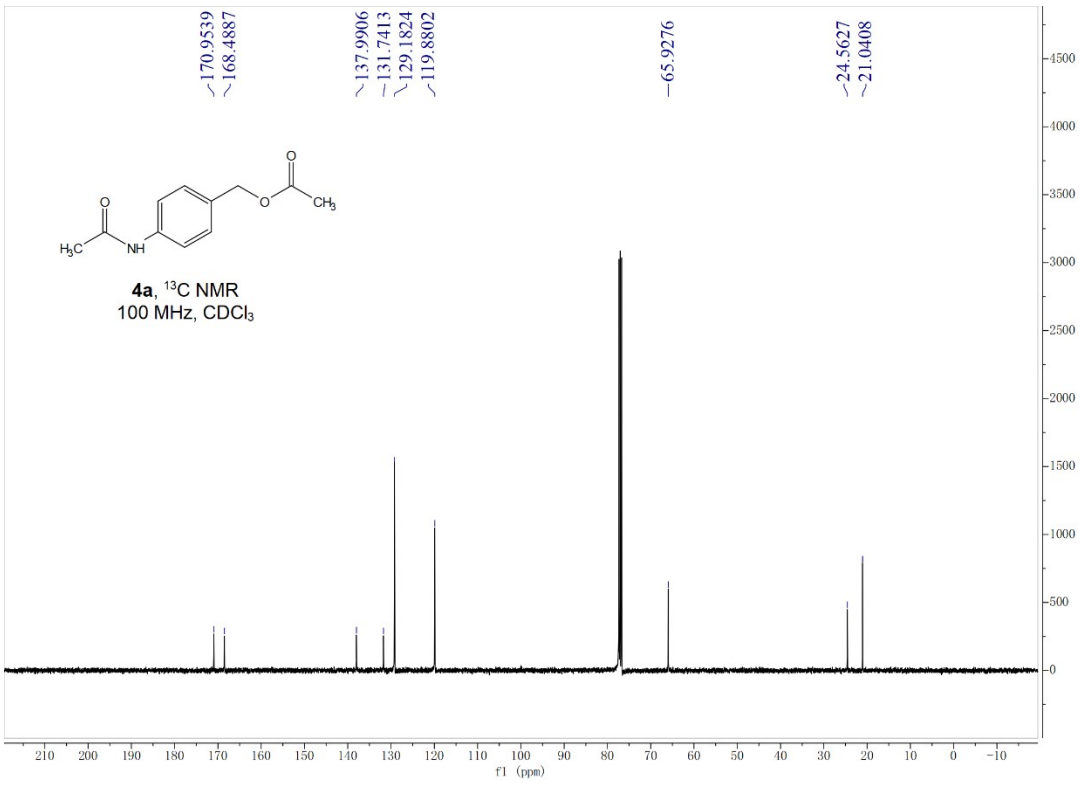
3a, ^{1}H NMR
400 MHz, $CDCl_3$



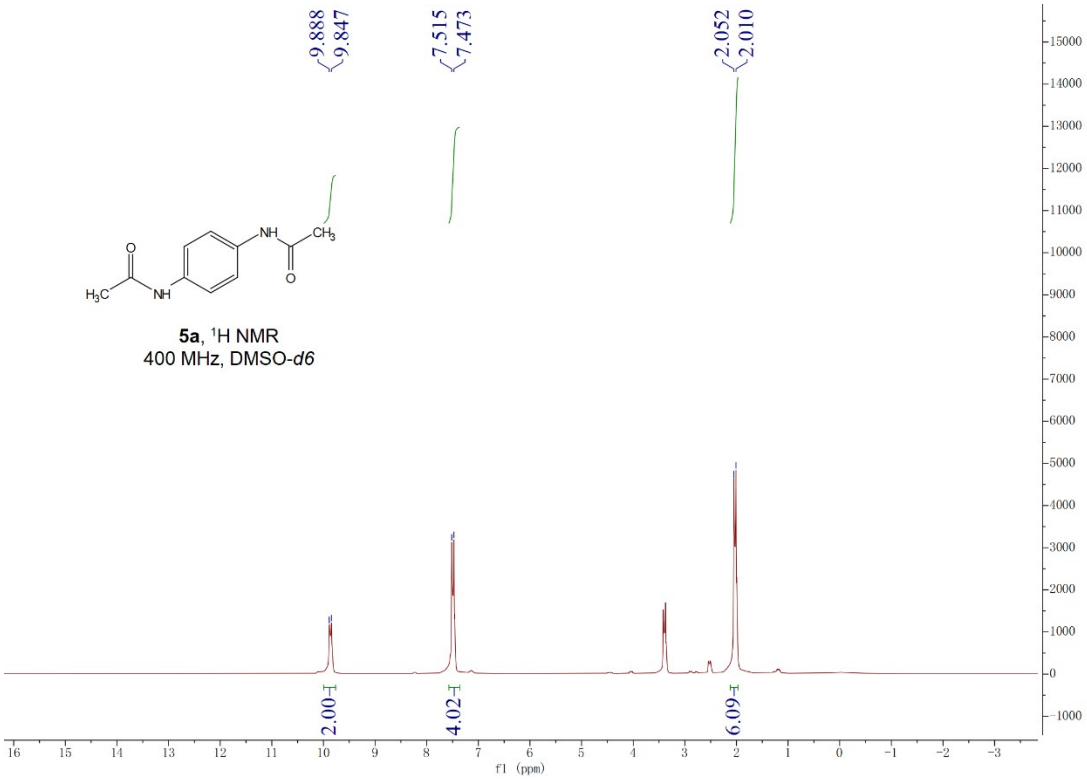
3a, ^{13}C NMR
100 MHz, $CDCl_3$



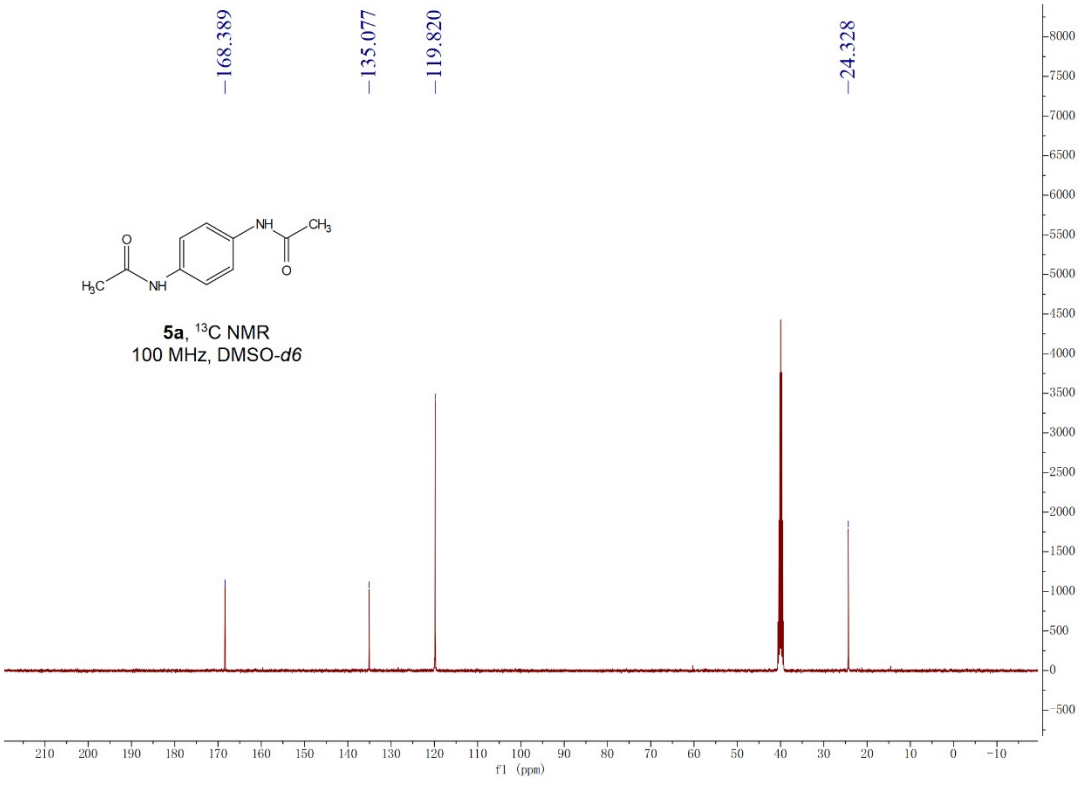
4a, ^{1}H NMR
400 MHz, $CDCl_3$



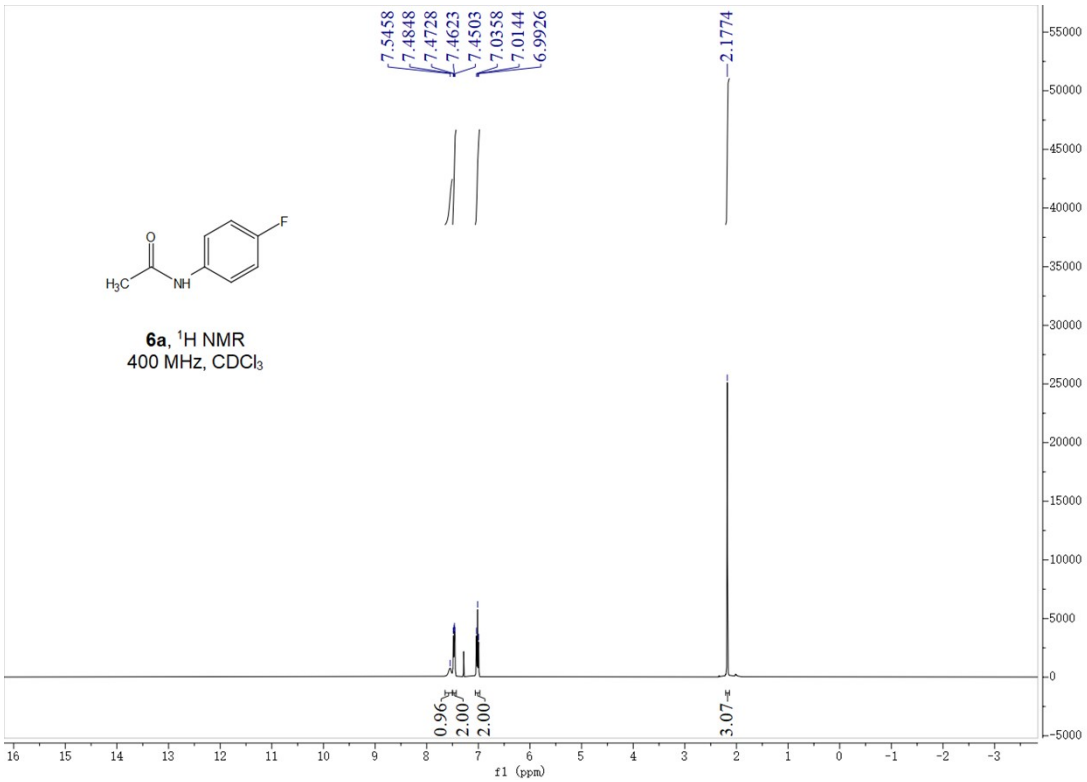
4a, ^{13}C NMR
100 MHz, $CDCl_3$



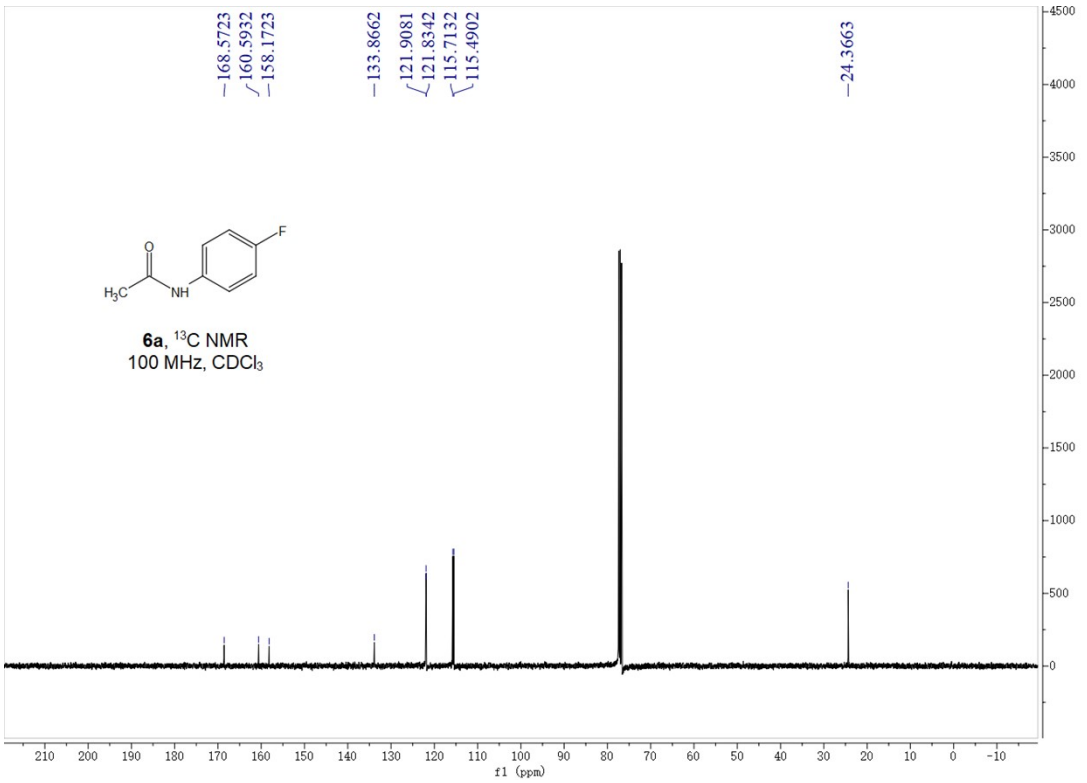
5a, ^{1}H NMR
400 MHz, DMSO-*d6*



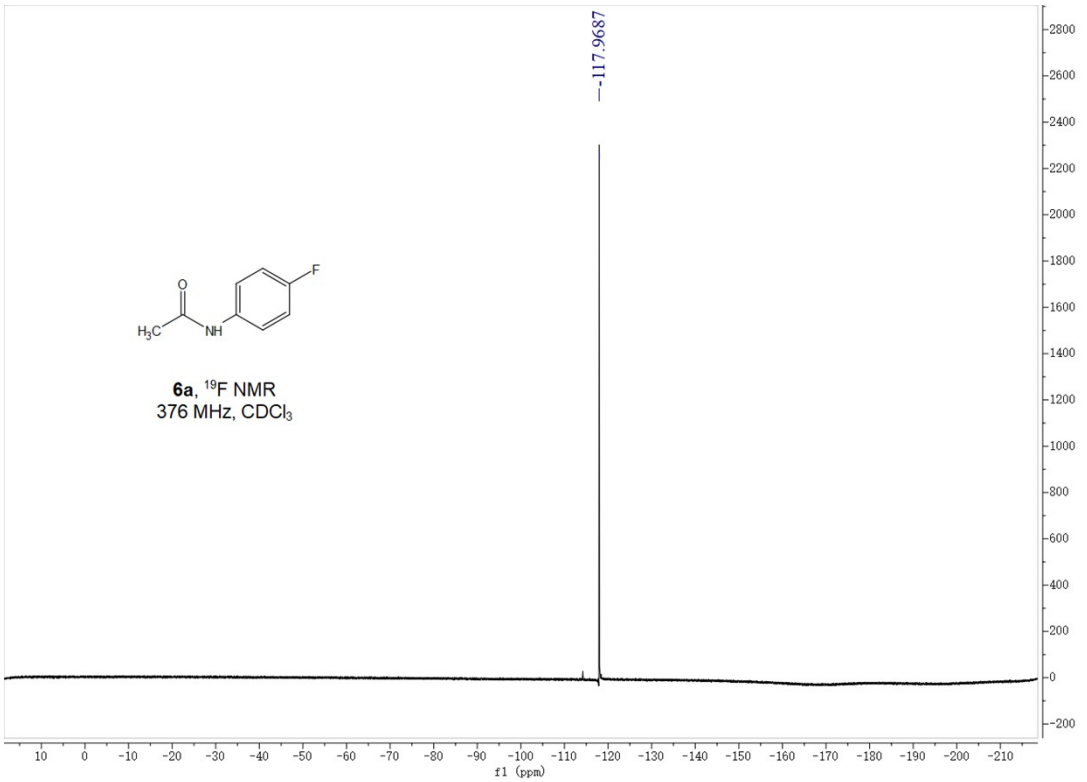
5a, ^{13}C NMR
100 MHz, DMSO-*d6*



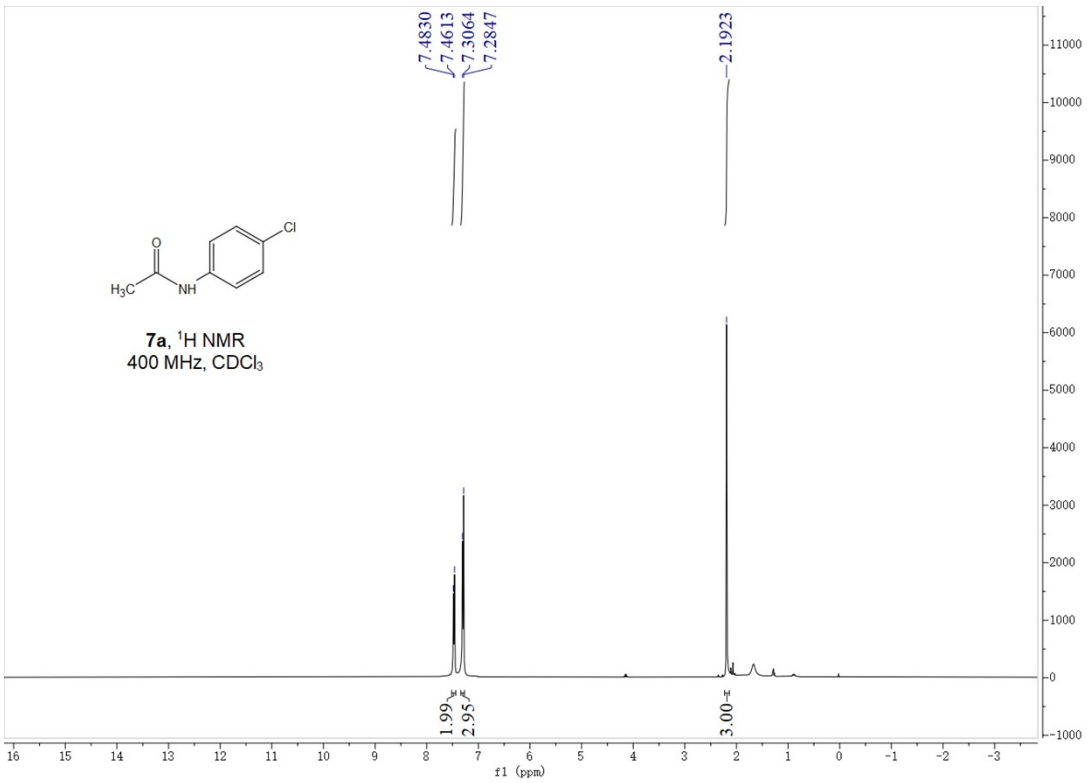
6a, ^{1}H NMR
400 MHz, $CDCl_3$



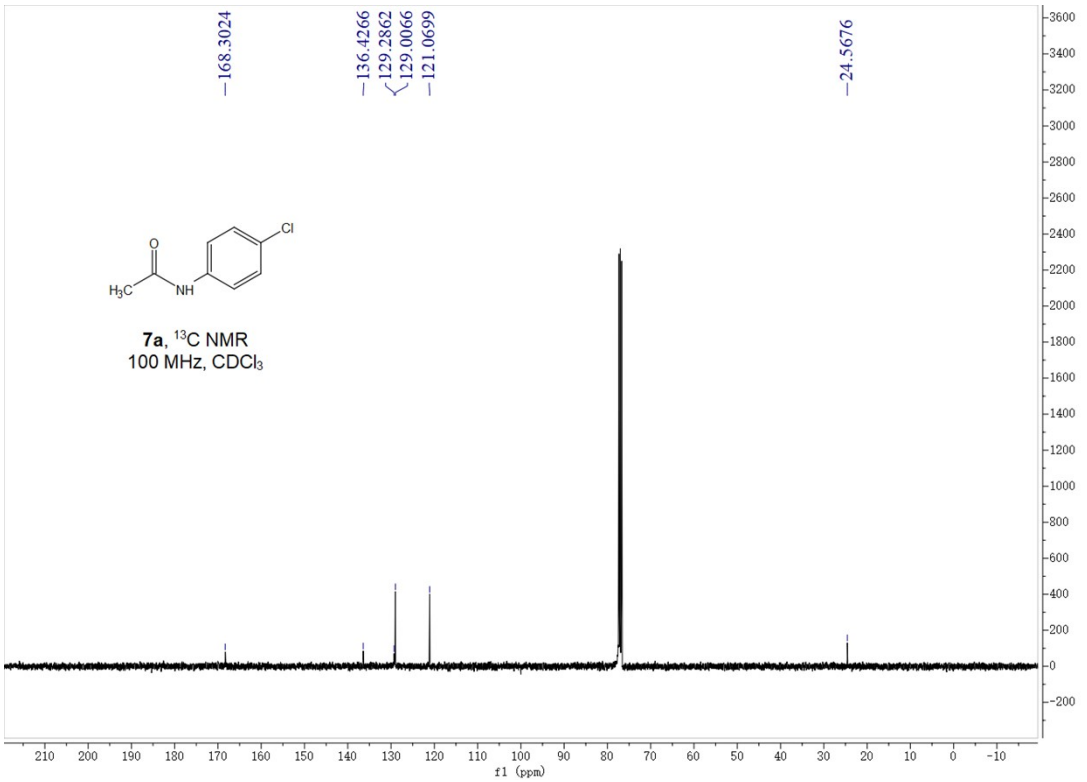
6a, ^{13}C NMR
100 MHz, $CDCl_3$



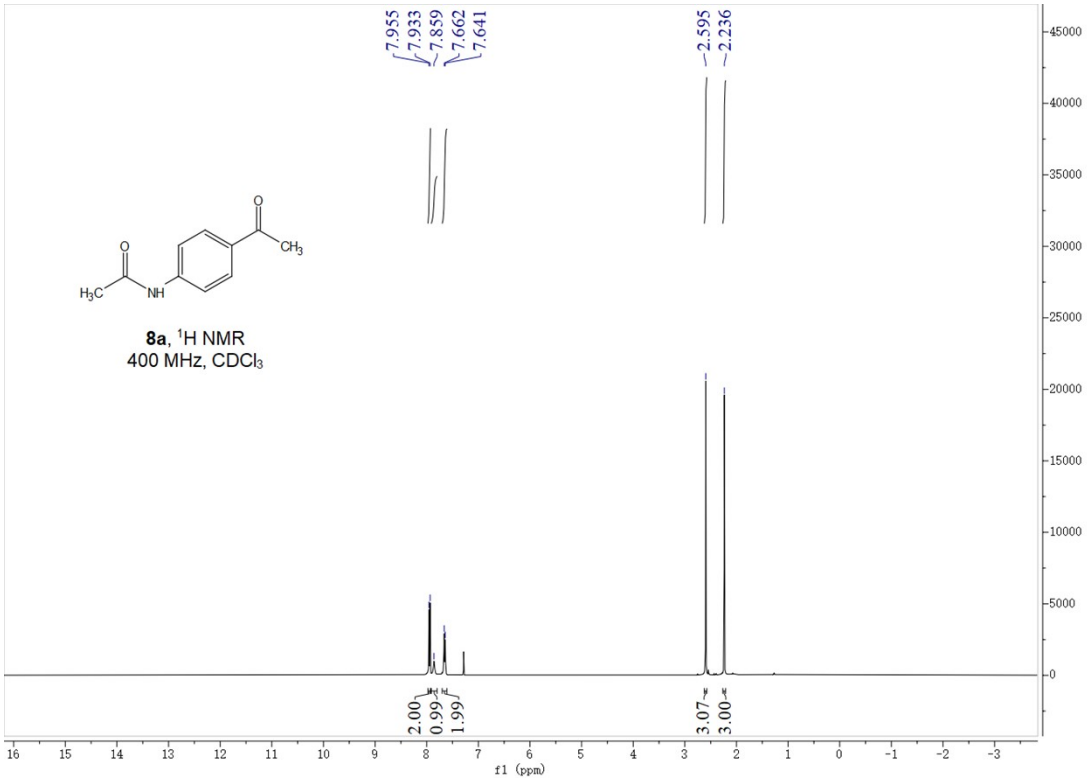
6a, ^{19}F NMR
376 MHz, $CDCl_3$



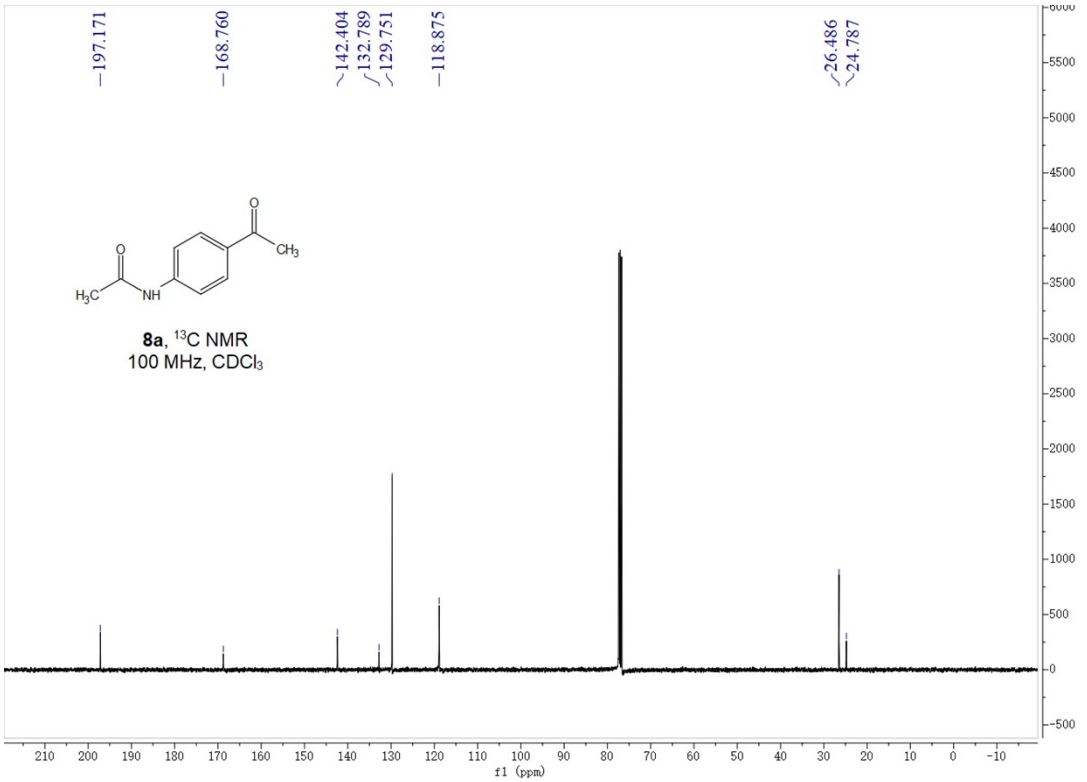
7a, ^{1}H NMR
400 MHz, $CDCl_3$

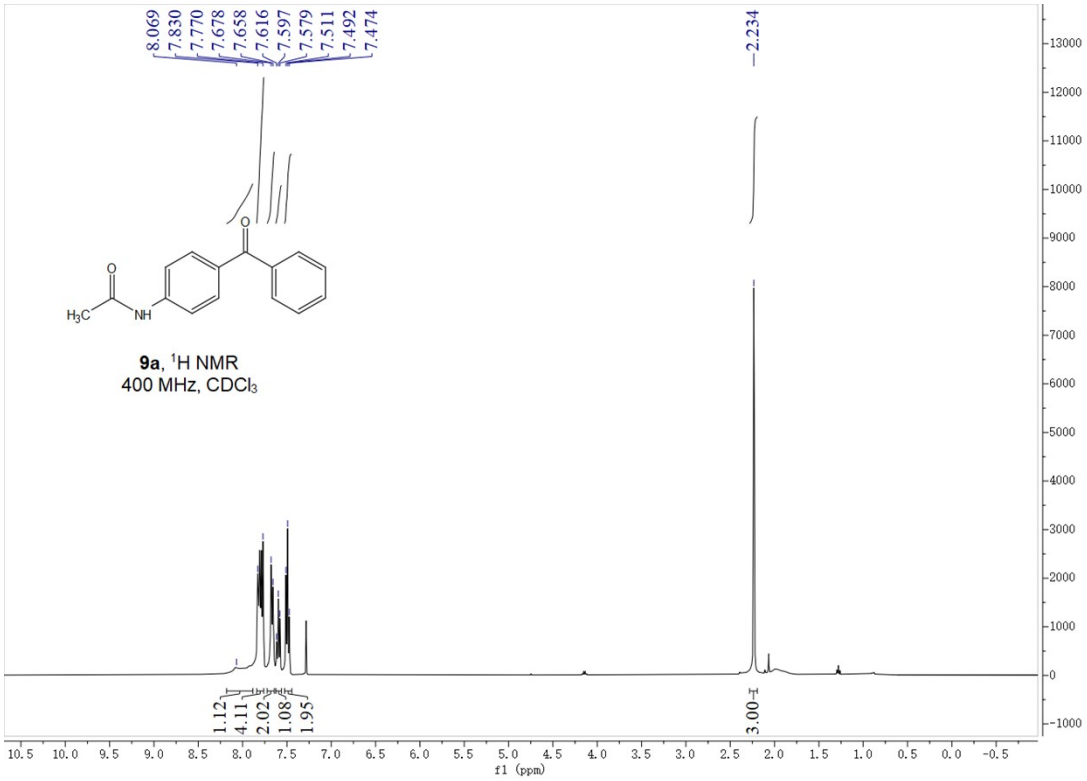


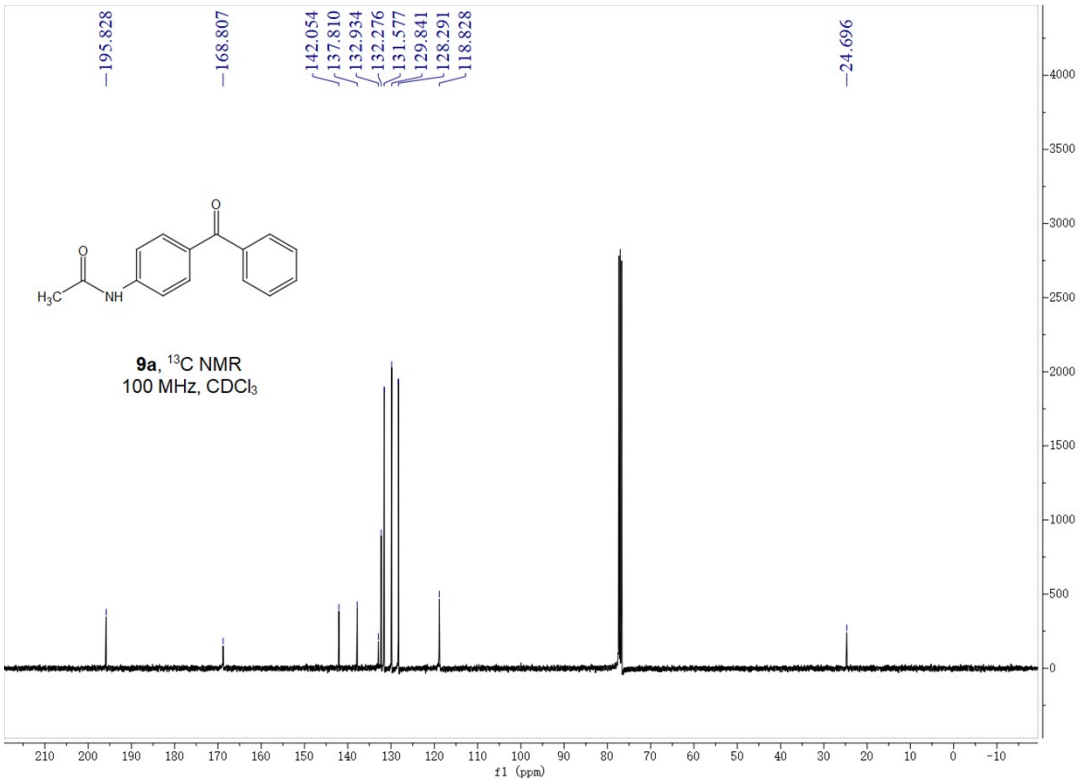
7a, ^{13}C NMR
100 MHz, $CDCl_3$

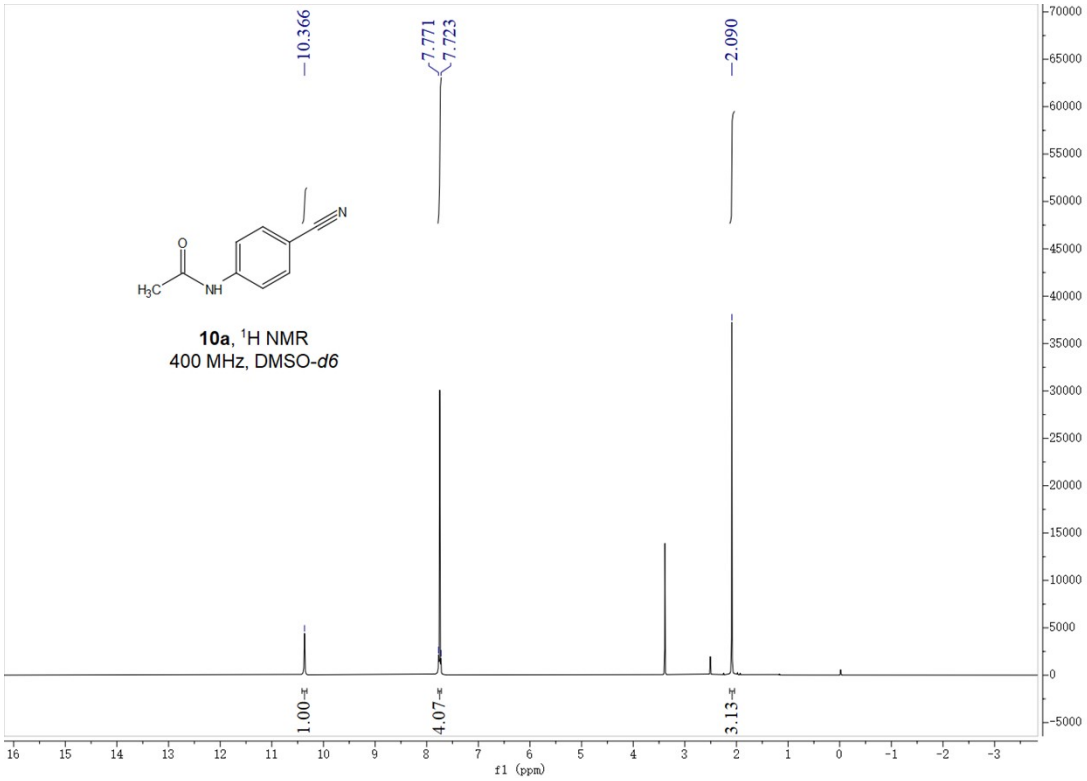


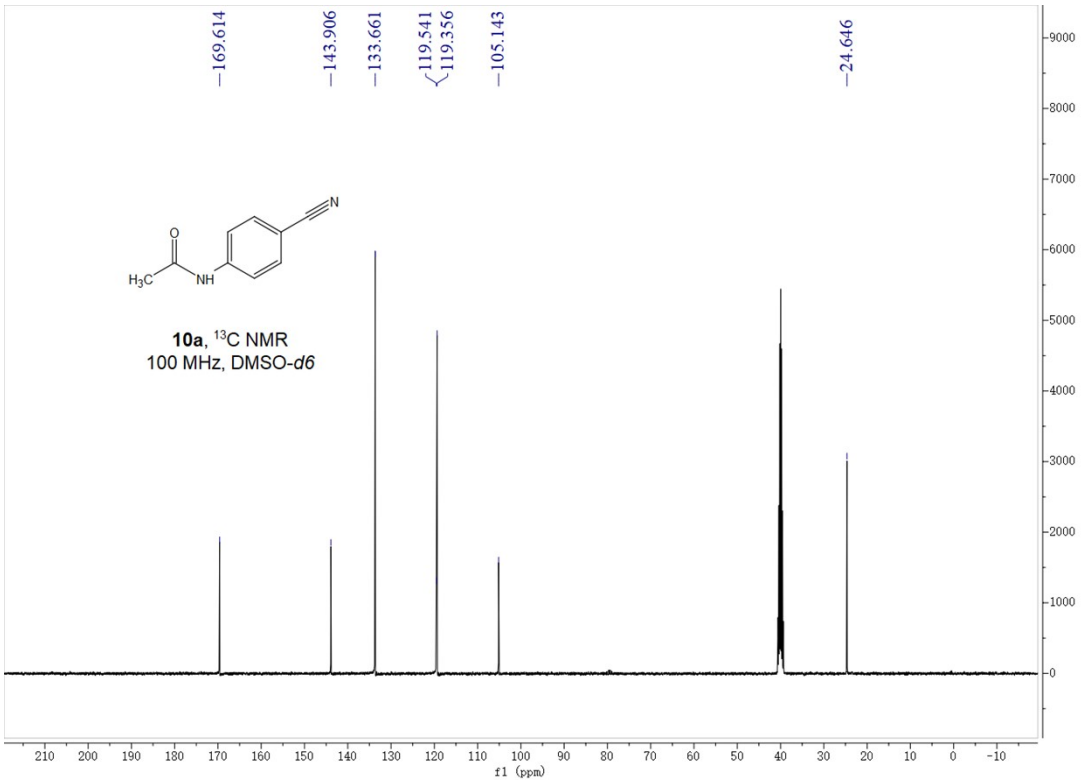
8a, ^{1}H NMR
400 MHz, $CDCl_3$


197.171
168.760
142.404
132.789
129.751
118.875
26.486
24.787
O
CH3
O
H3C
NH
8a, 13C NMR
100 MHz, CDCl3
f1 (ppm)

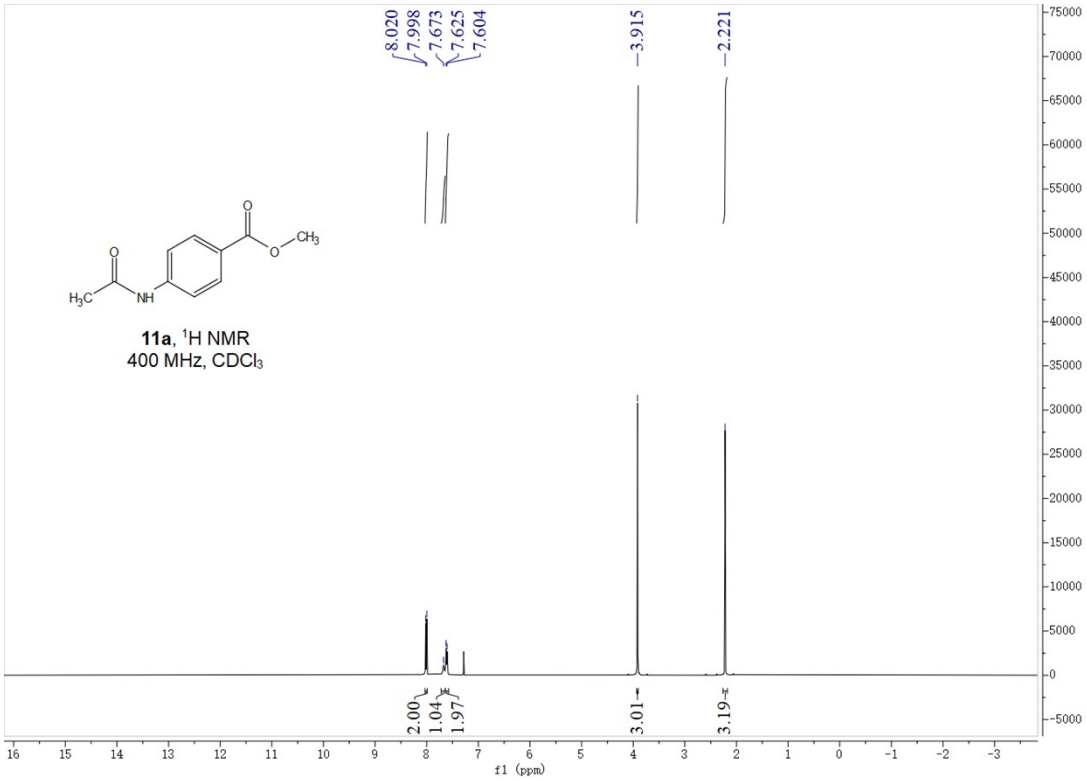

8.069
7.830
7.770
7.678
7.658
7.616
7.597
7.579
7.511
7.492
7.474
2.234
O
O
H3C
NH
9a, 1H NMR
400 MHz, CDCl3
1.12
4.11
2.02
1.08
1.95
3.00
f1 (ppm)


195.828
168.807
142.054
137.810
132.934
132.276
131.577
129.841
128.291
118.828
24.696
O
O
H3C
NH
9a, 13C NMR
100 MHz, CDCl3
f1 (ppm)

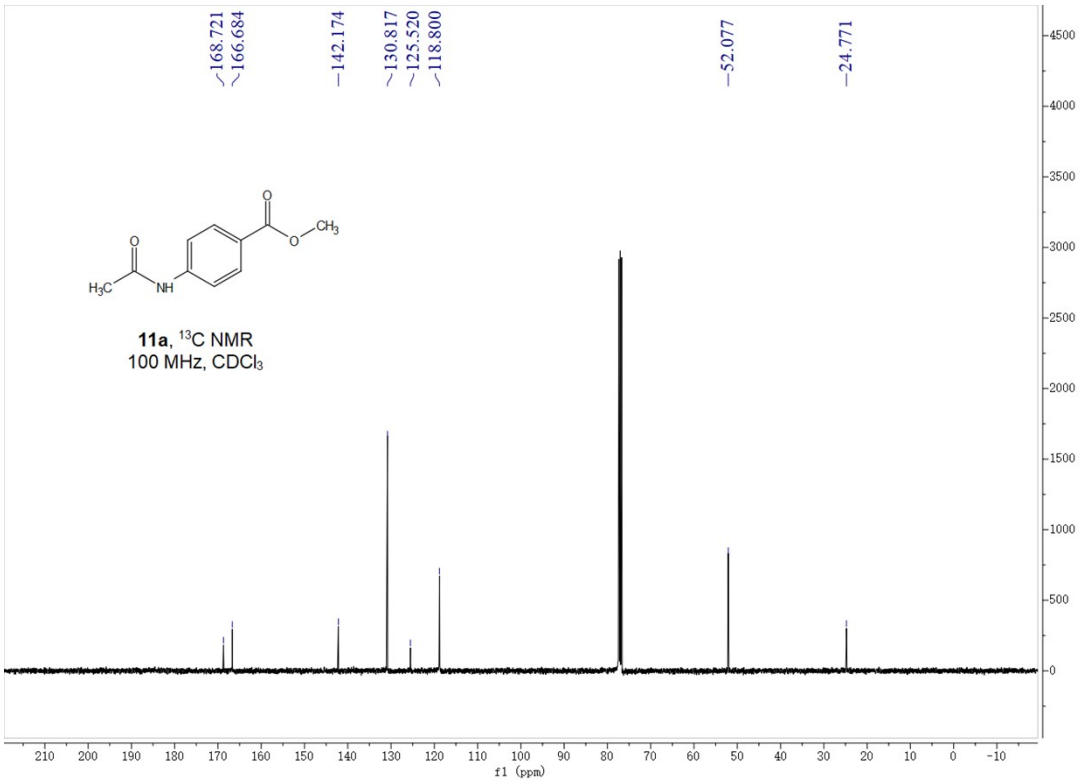

10.366
7.771
7.723
2.090
O
H3C
NH
N
10a, 1H NMR
400 MHz, DMSO-d6
1.00
4.07
3.13
f1 (ppm)

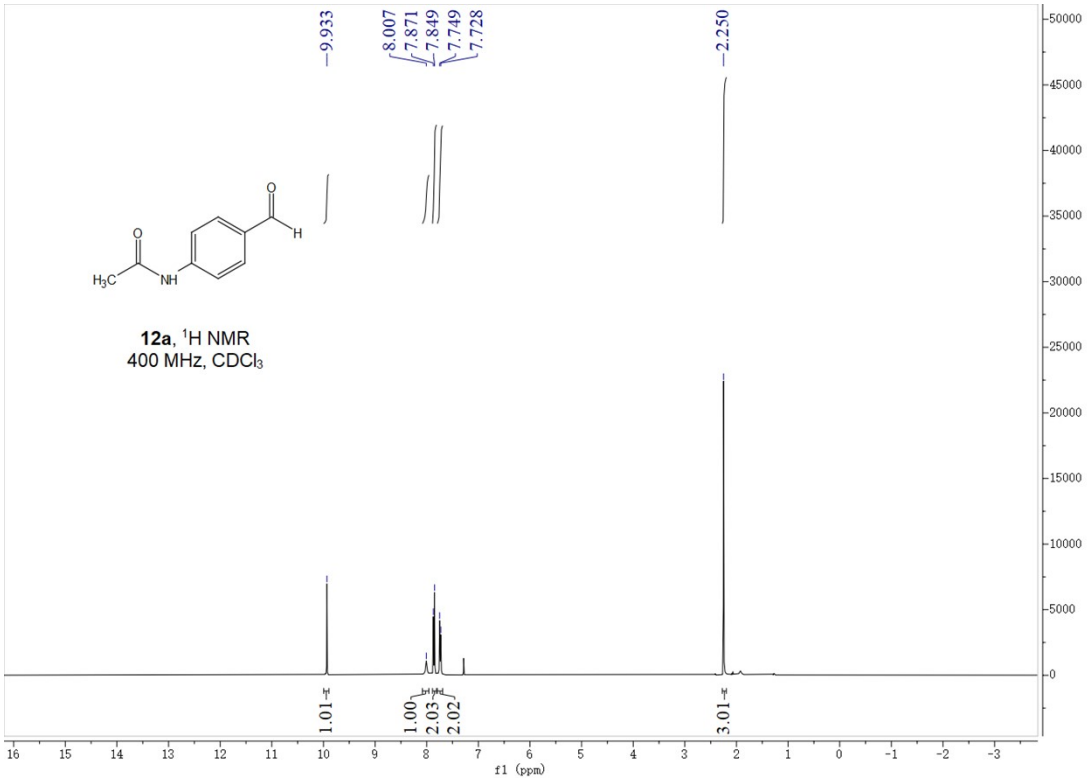


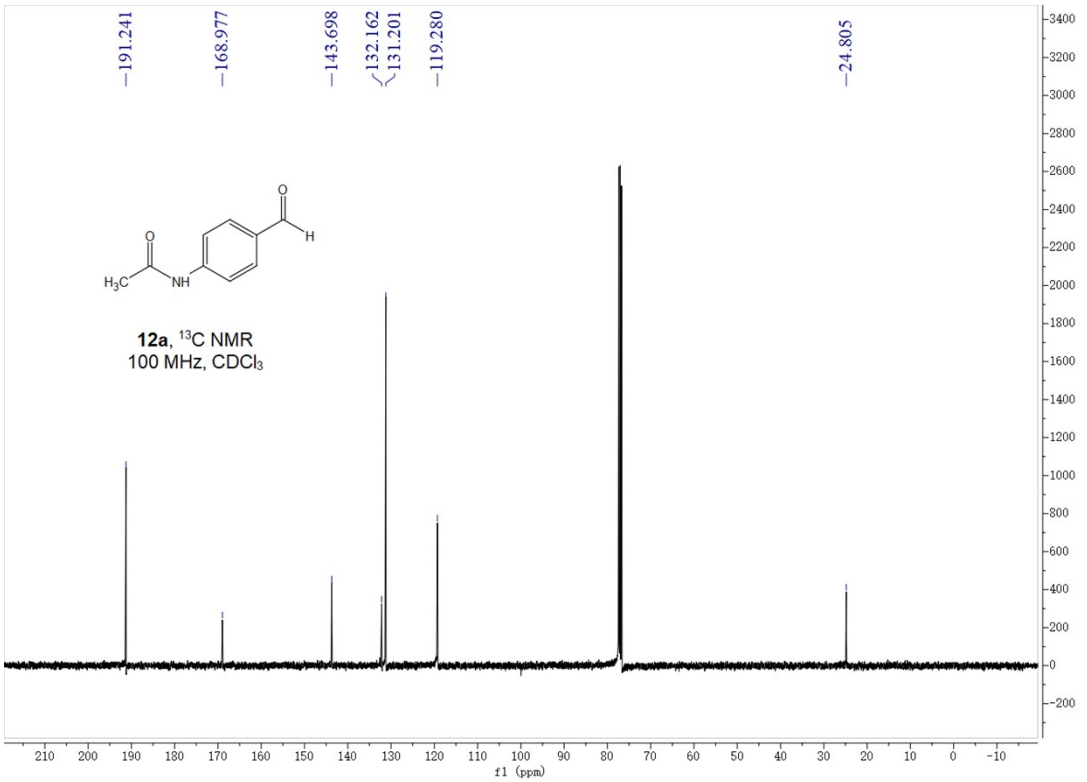
10a, ^{13}C NMR
100 MHz, DMSO-*d6*



11a, ^{1}H NMR
400 MHz, $CDCl_3$


168.721
166.684
142.174
130.817
125.520
118.800
52.077
24.771
O
O
CH3
O
H3C
NH
11a, 13C NMR
100 MHz, CDCl3
f1 (ppm)


9.933
8.007
7.871
7.849
7.749
7.728
2.250
O
H
O
H3C
NH
12a, 1H NMR
400 MHz, CDCl3
1.01
1.00
2.03
2.02
3.01
f1 (ppm)


191.241
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143.698
132.162
131.201
119.280
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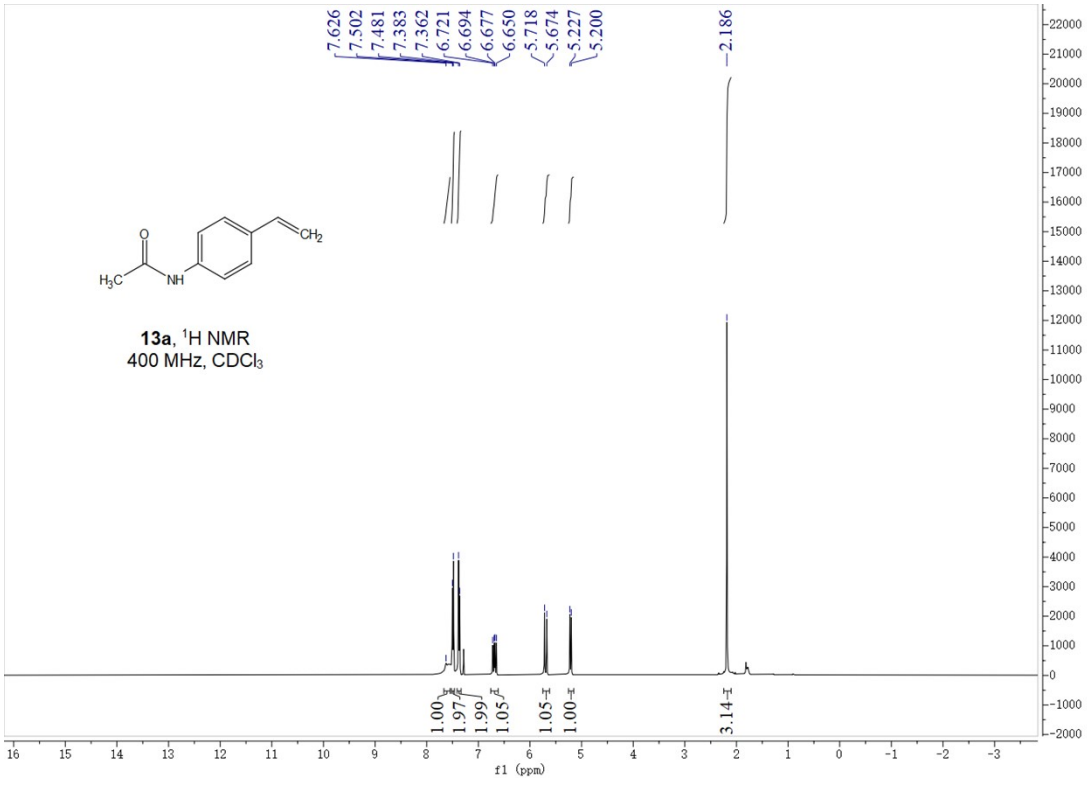
O
H
O
H3C
NH
12a, 13C NMR
100 MHz, CDCl3
f1 (ppm)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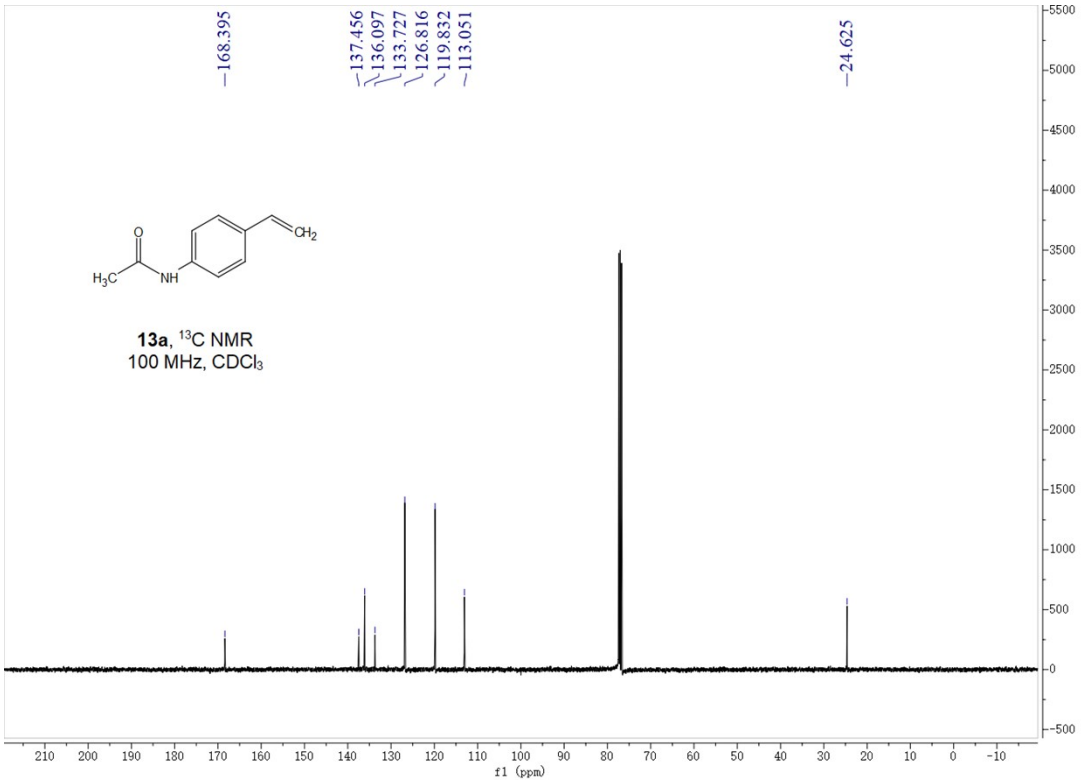
7.502
7.481
7.383
7.362
6.721
6.694
6.677
6.650
5.718
5.674
5.227
5.200
2.186
O
H3C
NH
CH2
13a, 1H NMR
400 MHz, CDCl3
1.00
1.97
1.99
1.05
1.05
1.00
3.14
f1 (ppm)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133.727
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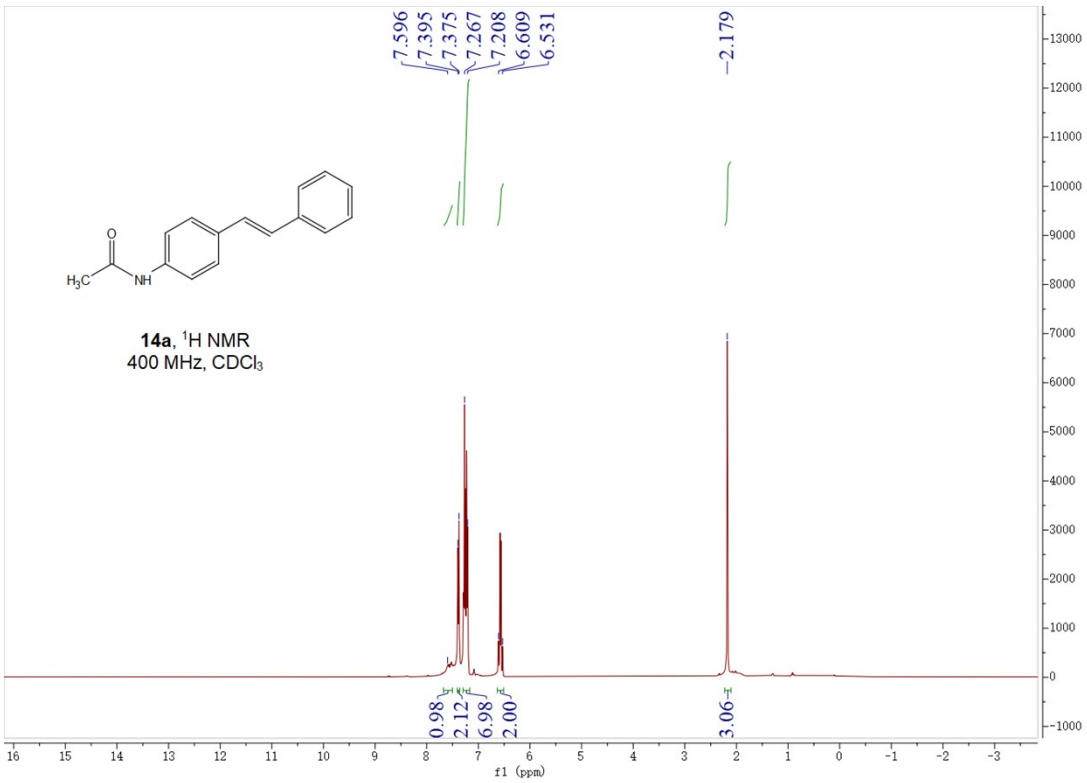
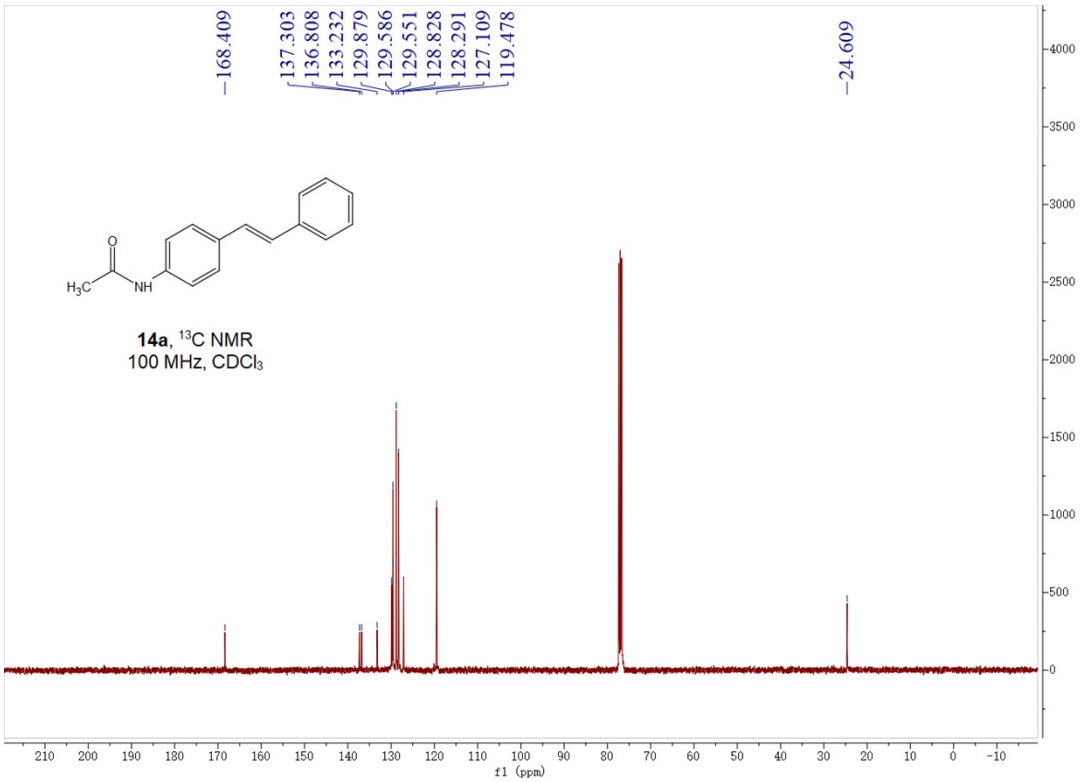
24.625
O
NH
CH2
H3C
13a, 13C NMR
100 MHz, CDCl3
f1 (ppm)


7.596
7.395
7.375
7.267
7.208
6.609
6.531
2.179
O
NH
H3C
14a, 1H NMR
400 MHz, CDCl3
0.98
2.12
6.98
2.00
3.06
f1 (ppm)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136.808
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128.828
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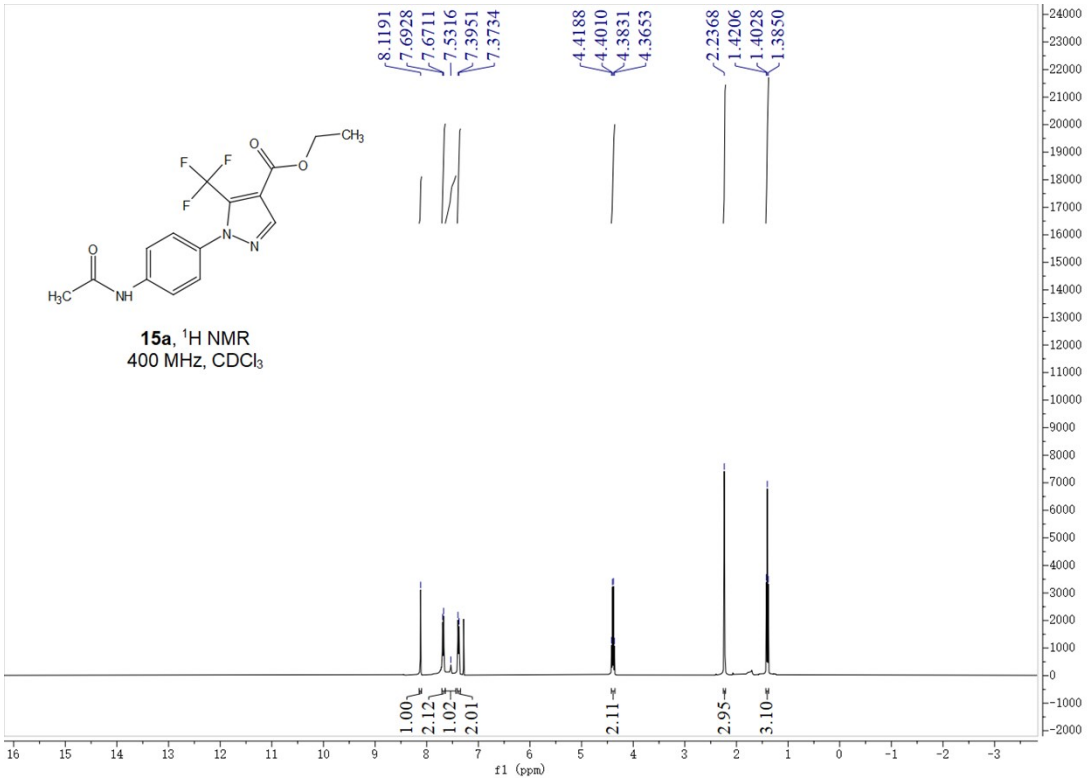
127.109
119.478
24.609
14a, 13C NMR
100 MHz, CDCl3
f1 (ppm)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7.3951
7.3734
4.4188
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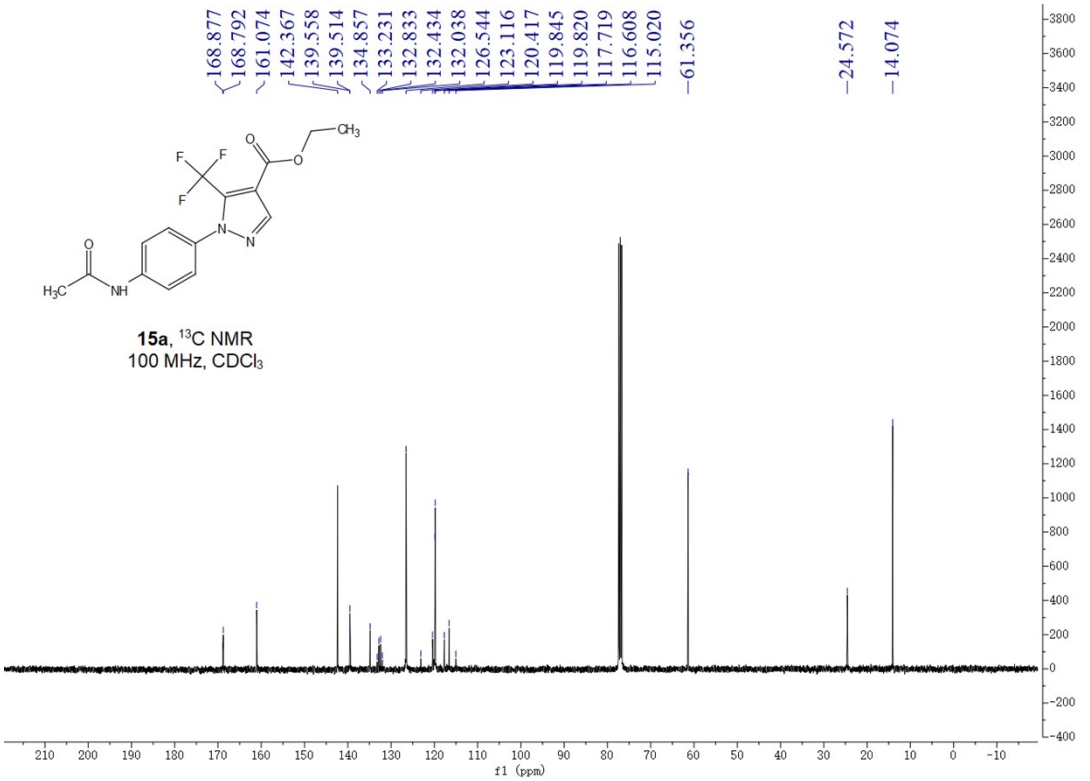
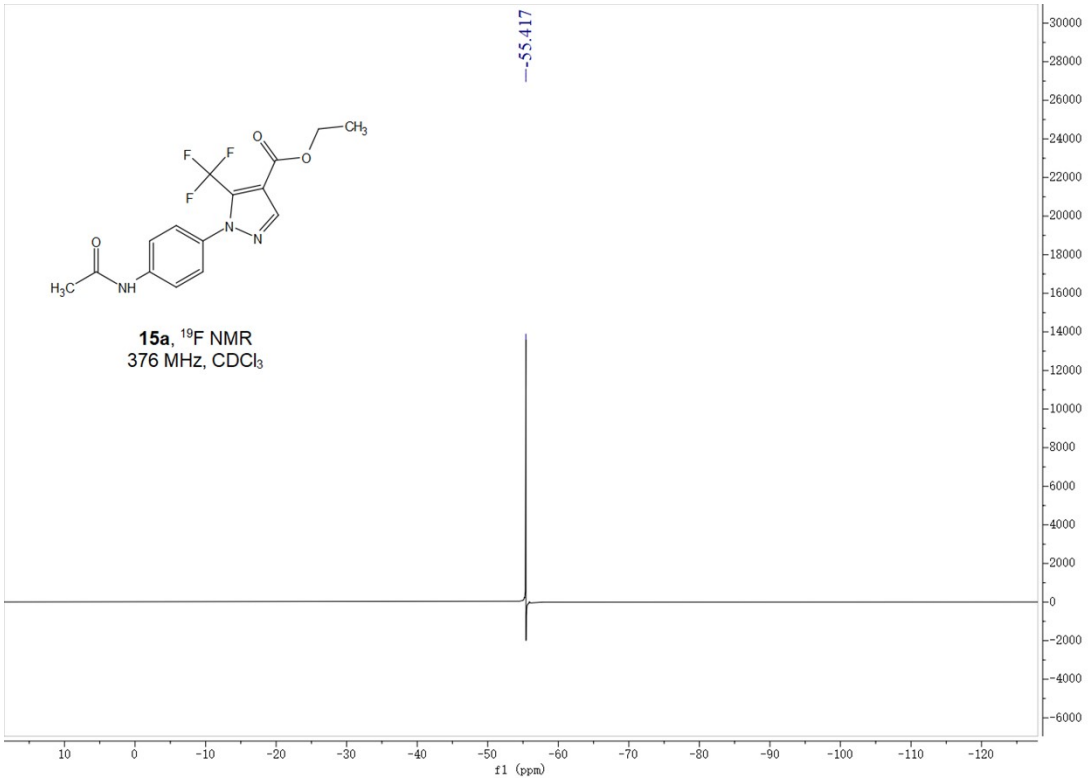
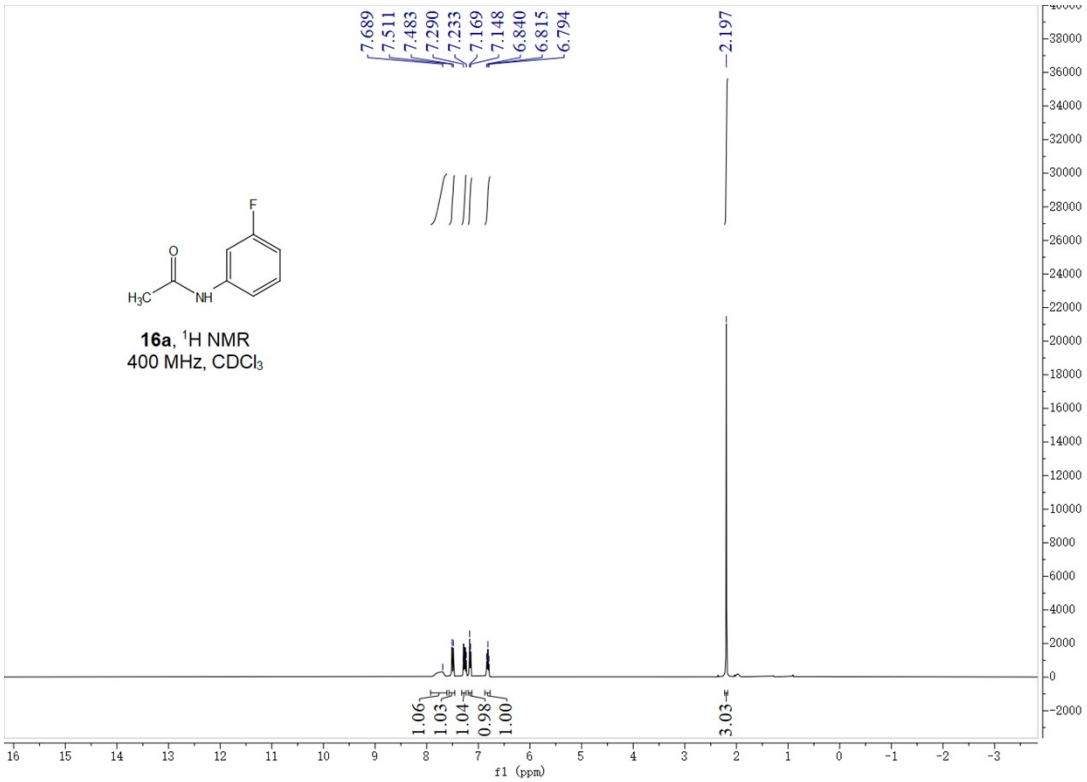
4.3831
4.3653
2.2368
1.4206
1.4028
1.3850
15a, 1H NMR
400 MHz, CDCl3
1.00
2.12
1.02
2.01
2.11
2.95
3.10
f1 (ppm)

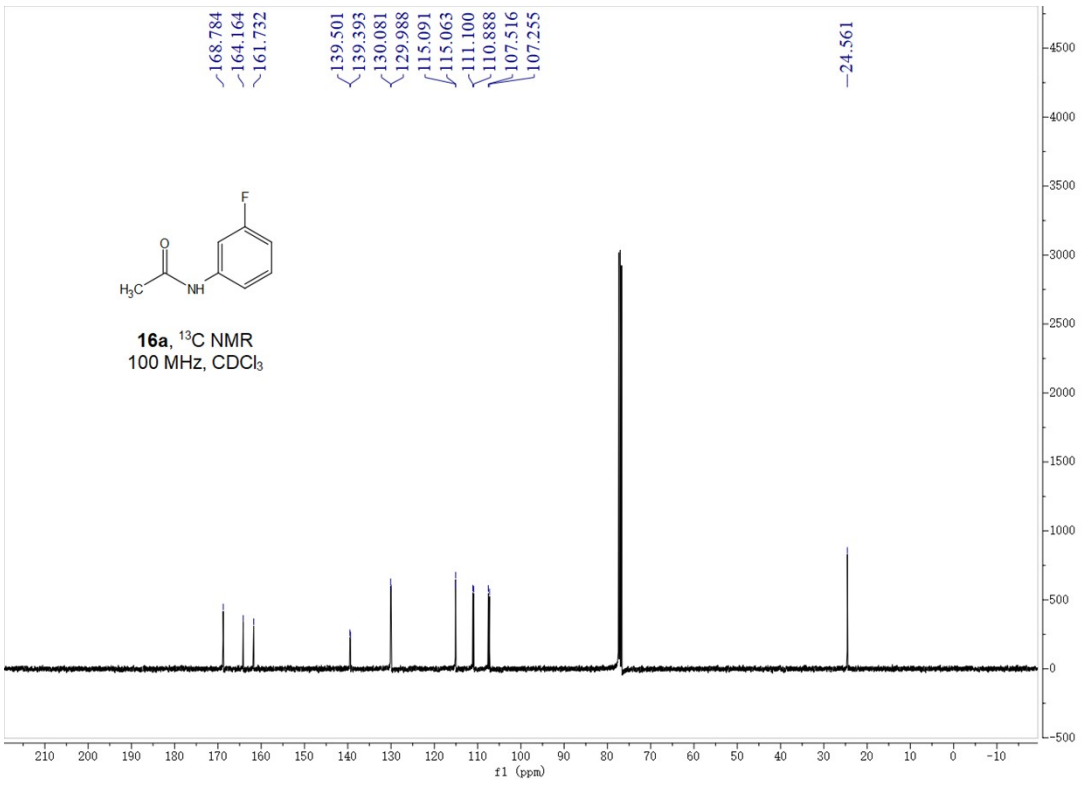


15a, ^{13}C NMR
100 MHz, $CDCl_3$



15a, ^{19}F NMR
376 MHz, $CDCl_3$


7.689
7.511
7.483
7.290
7.233
7.169
7.148
6.840
6.815
6.794
2.197
F
O
H3C
NH
16a, 1H NMR
400 MHz, CDCl3
1.06
1.03
1.04
0.98
1.00
3.03
f1 (ppm)


168.784
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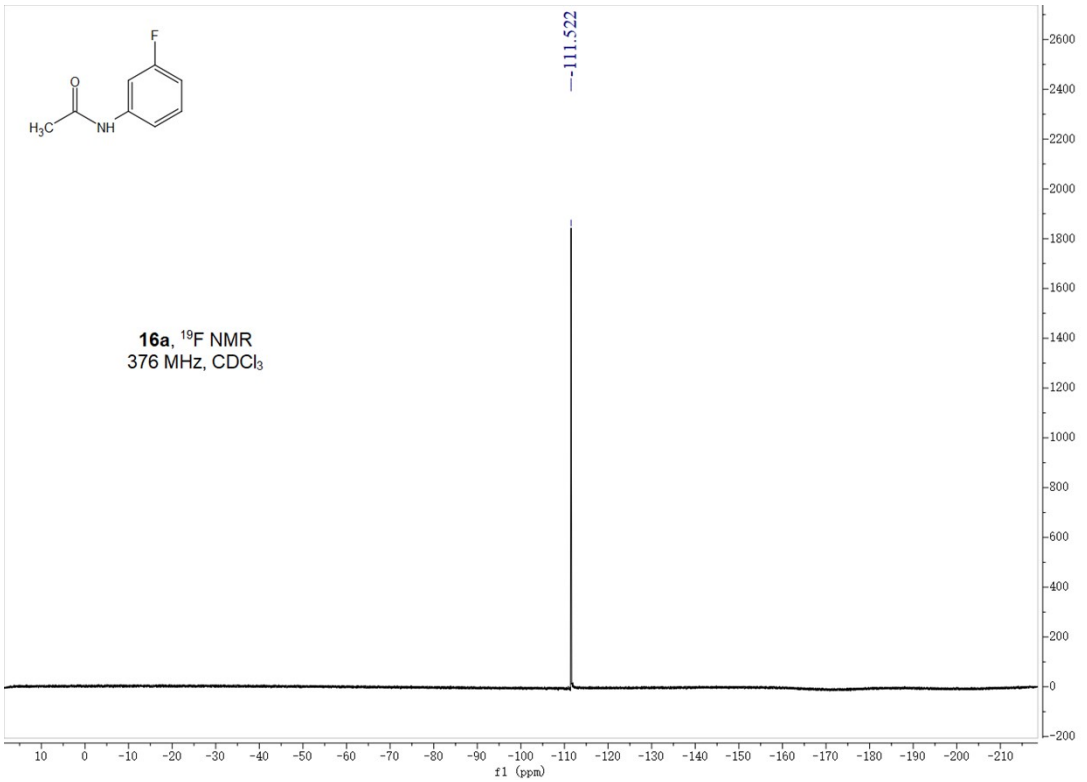
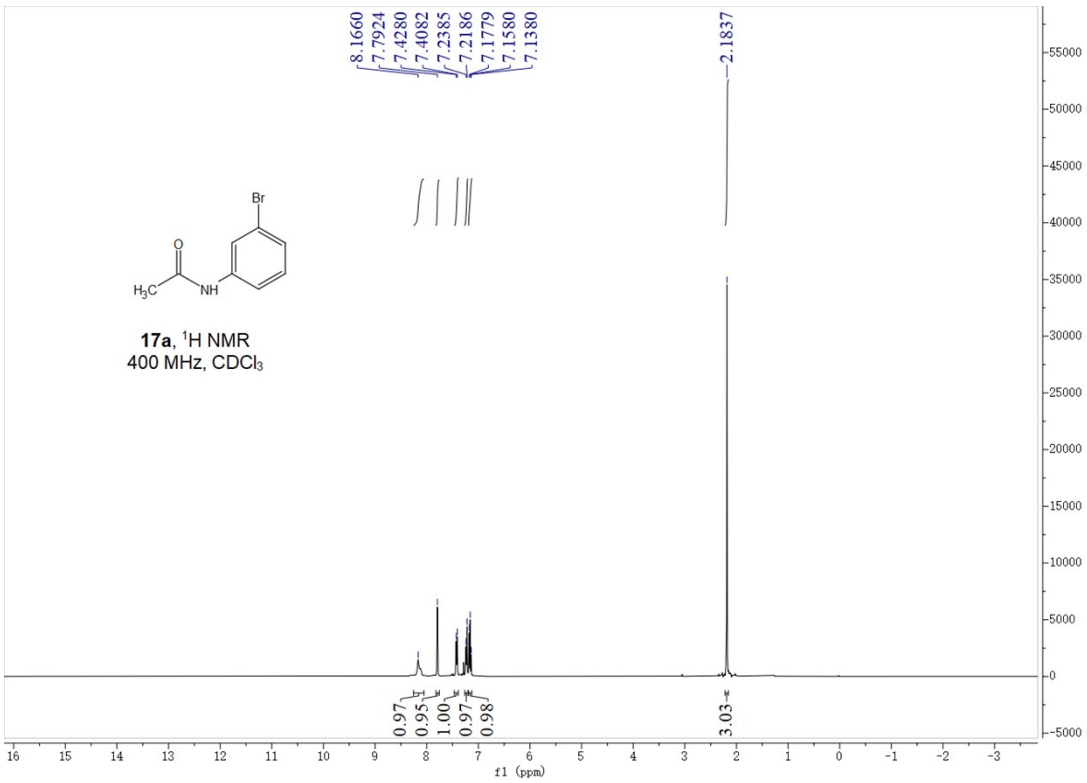
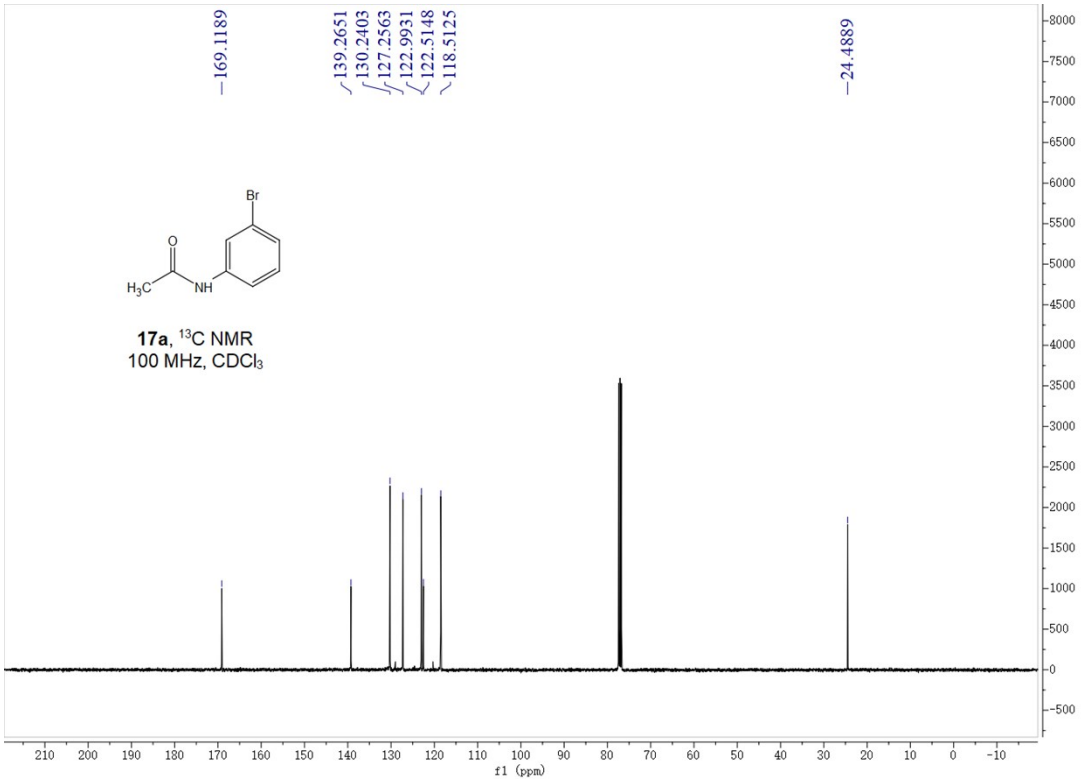
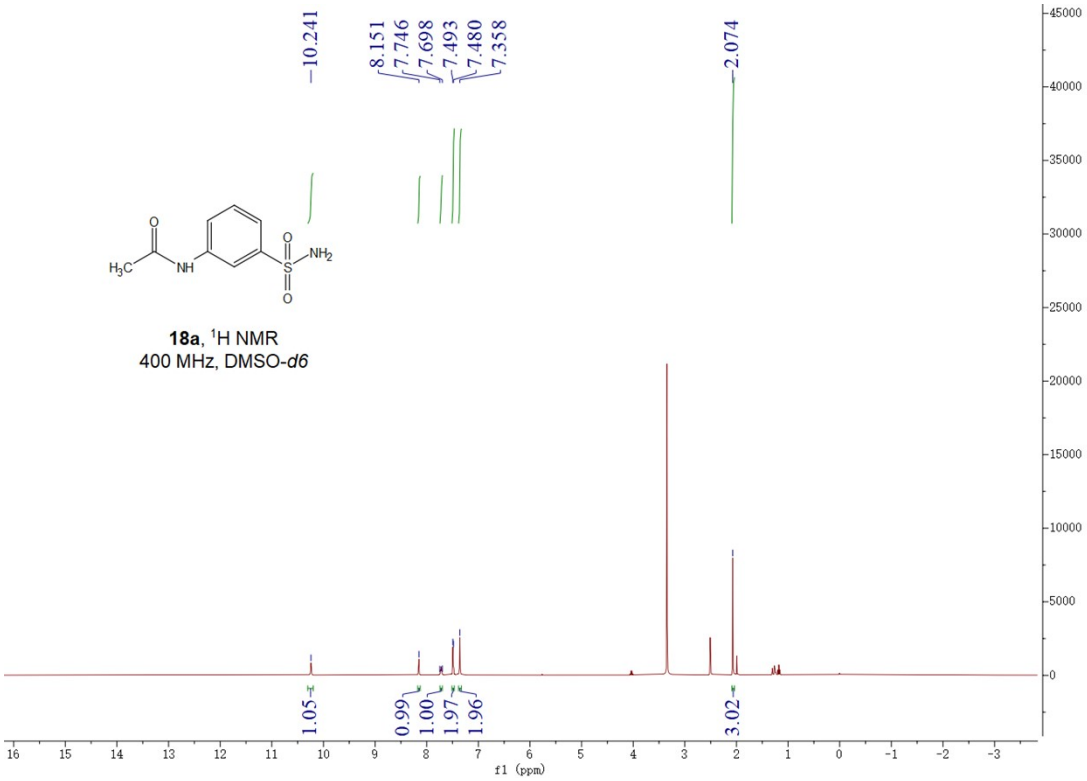
161.732
139.501
139.393
130.081
129.988
115.091
115.063
111.100
110.888
107.516
107.255
24.561
F
O
H3C
NH
16a, 13C NMR
100 MHz, CDCl3
f1 (ppm)


F
O
H3C
NH
-111.522
16a, 19F NMR
376 MHz, CDCl3
f1 (ppm)

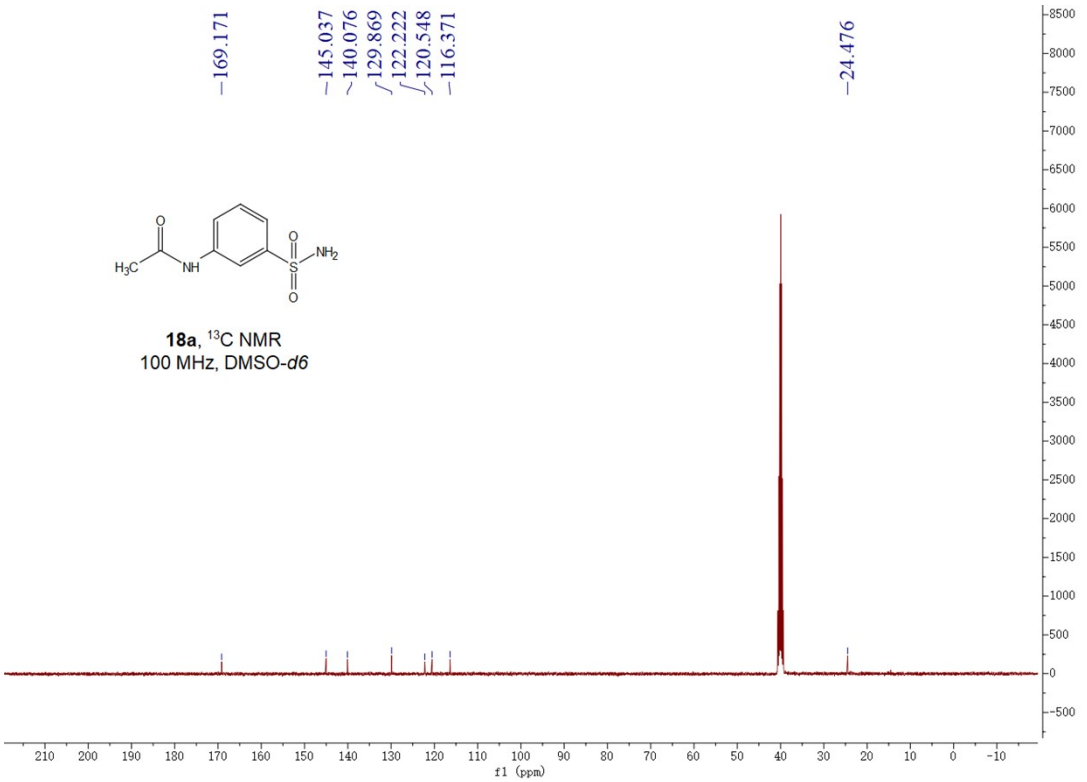

8.1660
7.7924
7.4280
7.4082
7.2385
7.2186
7.1779
7.1580
7.1380
2.1837
Br
O
H3C
NH
17a, 1H NMR
400 MHz, CDCl3
0.97
0.95
1.00
0.97
0.98
3.03
f1 (ppm)



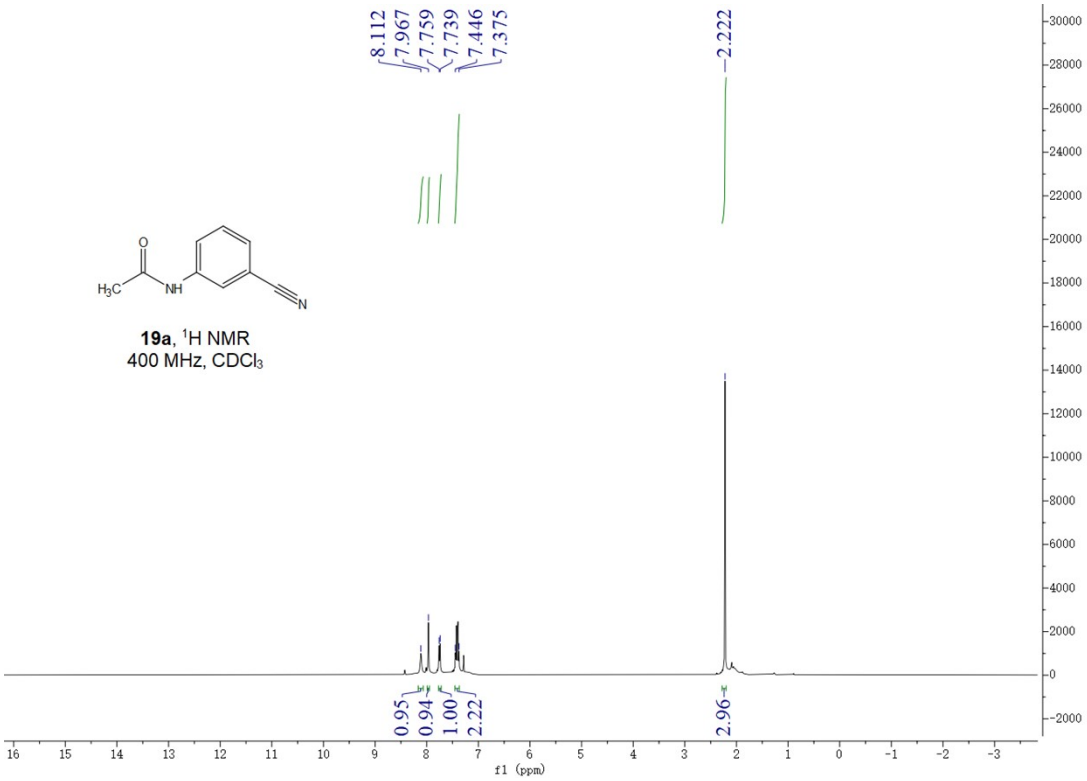
17a, ^{13}C NMR
100 MHz, $CDCl_3$



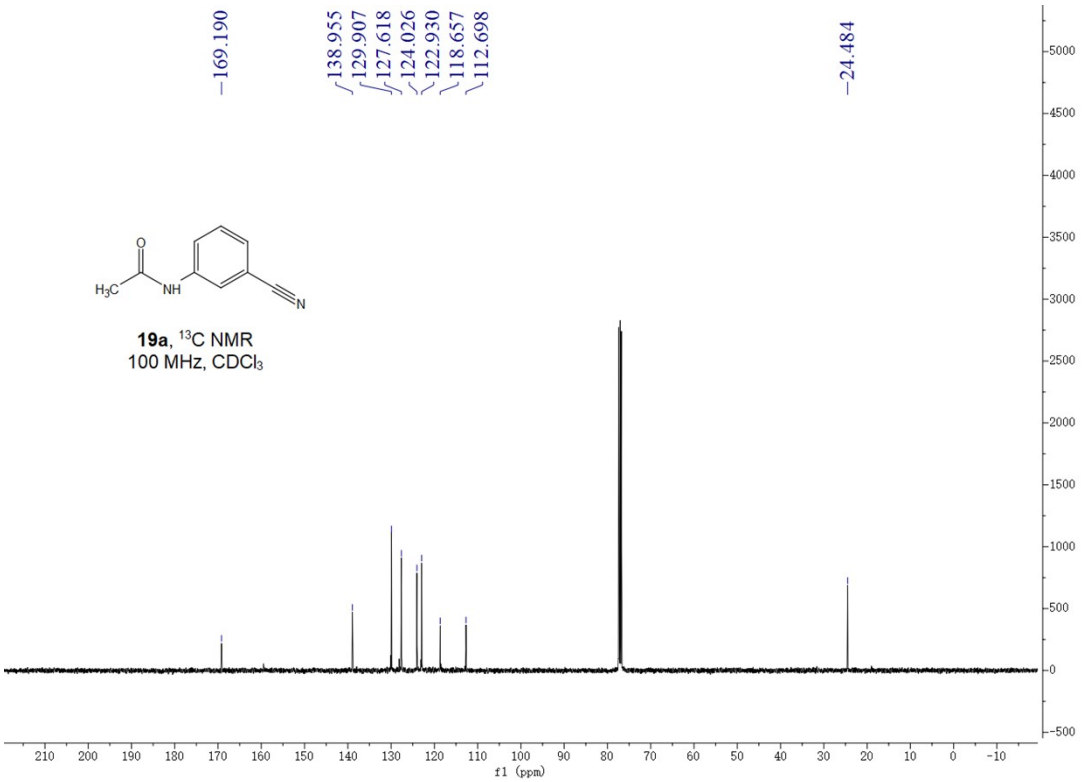
18a, ^{1}H NMR
400 MHz, DMSO-*d6*



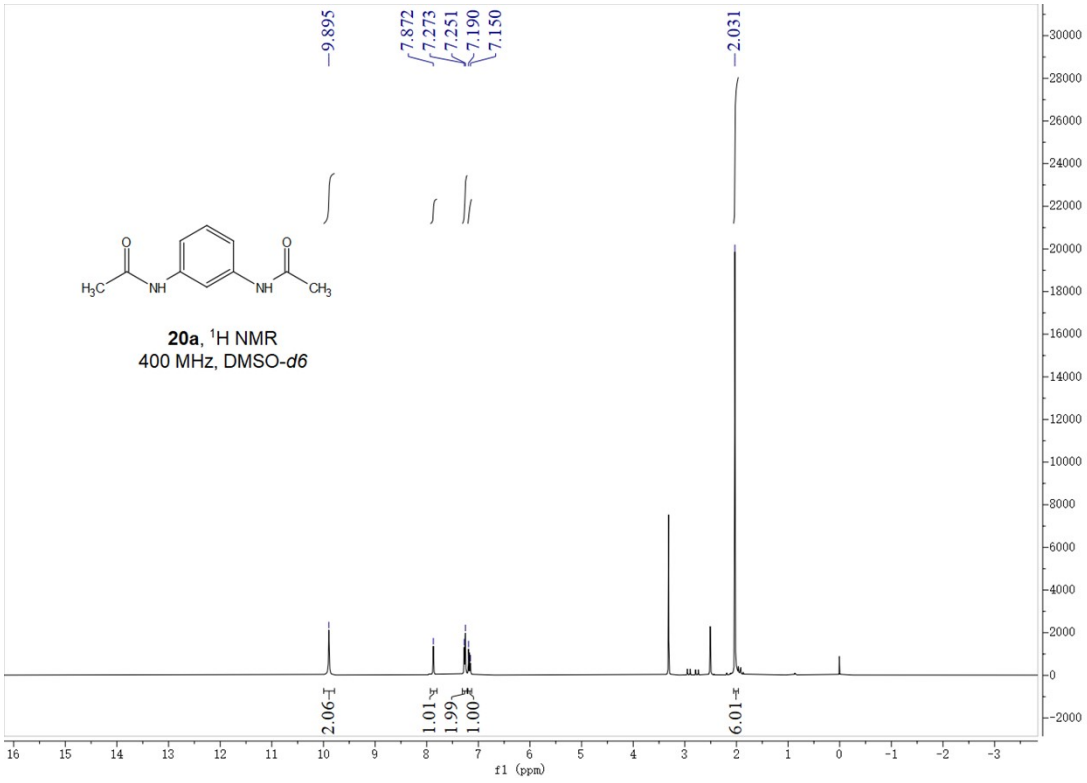
18a, ^{13}C NMR
100 MHz, DMSO-*d6*



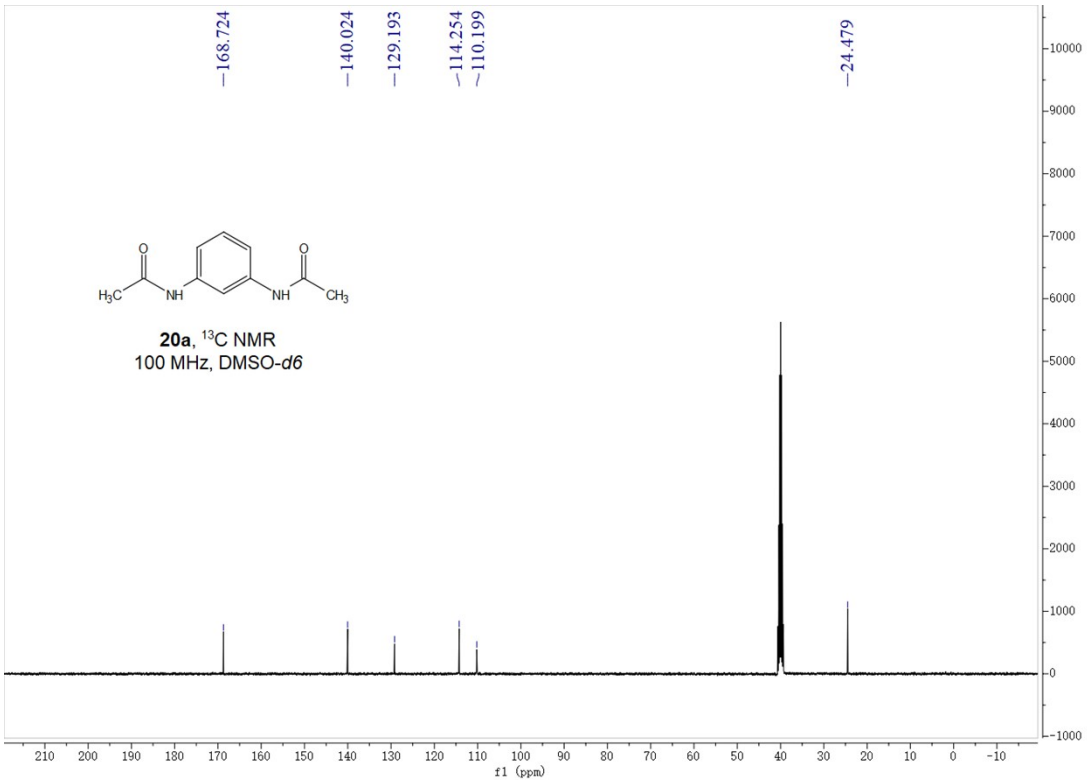
19a, ^{1}H NMR
400 MHz, $CDCl_3$



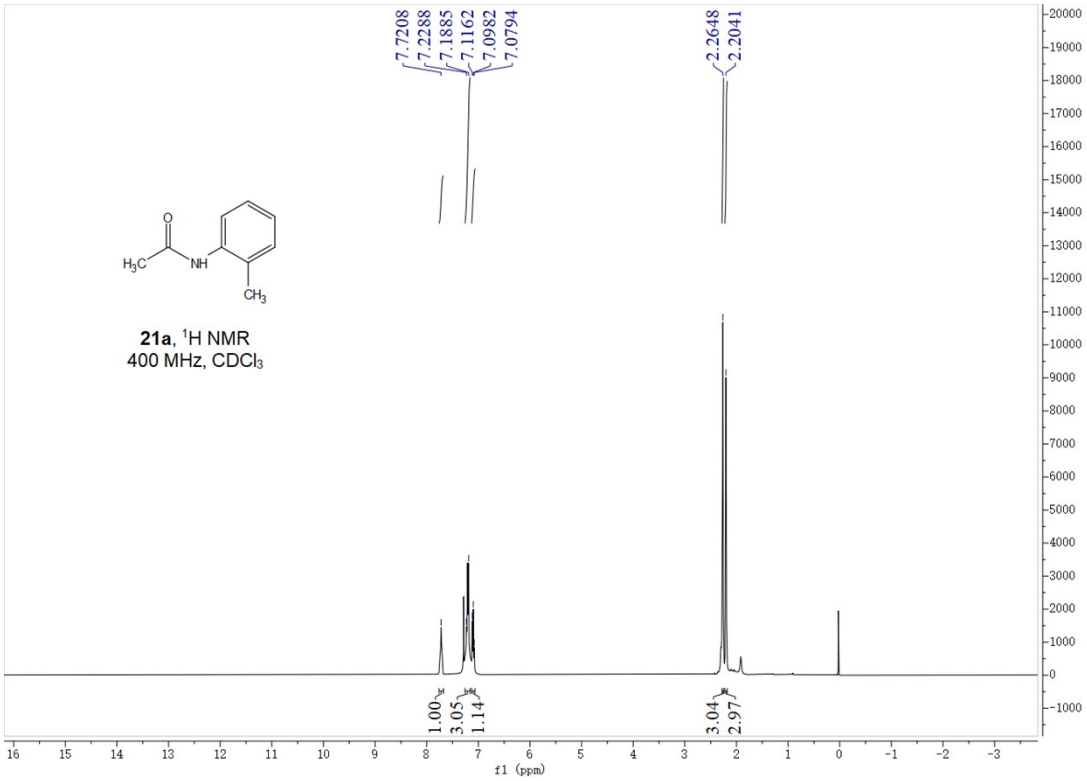
19a, ^{13}C NMR
100 MHz, $CDCl_3$



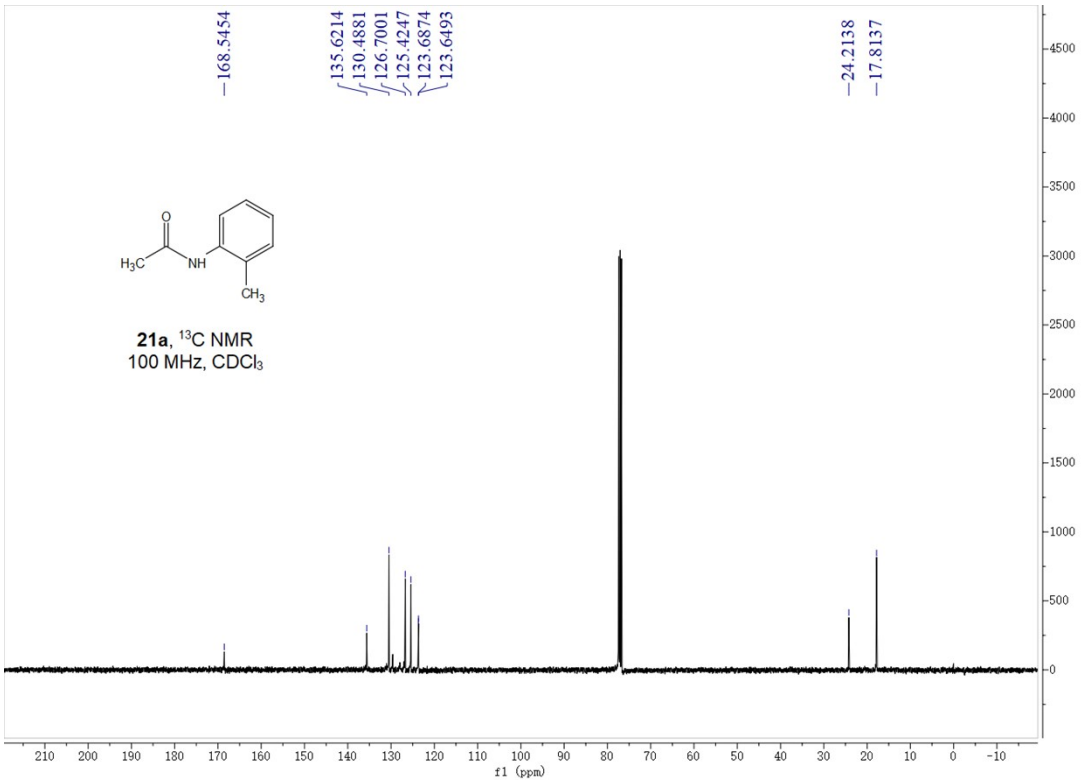
20a, ^{1}H NMR
400 MHz, DMSO-*d6*



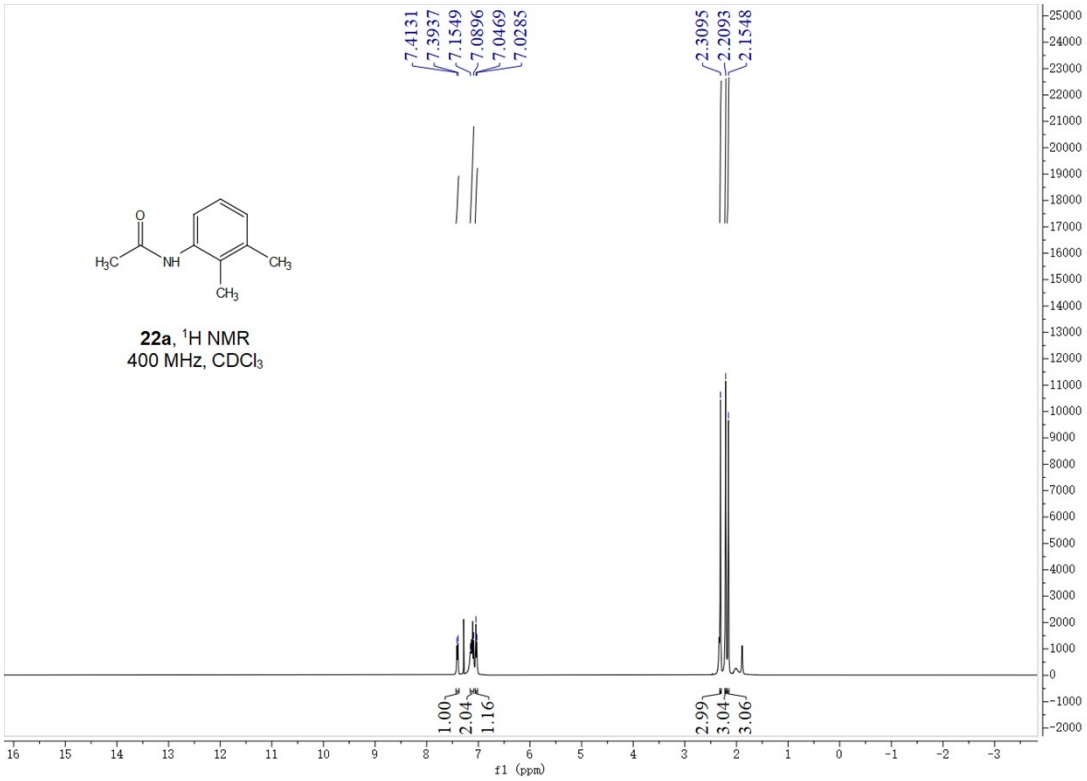
20a, ^{13}C NMR
100 MHz, DMSO-*d6*



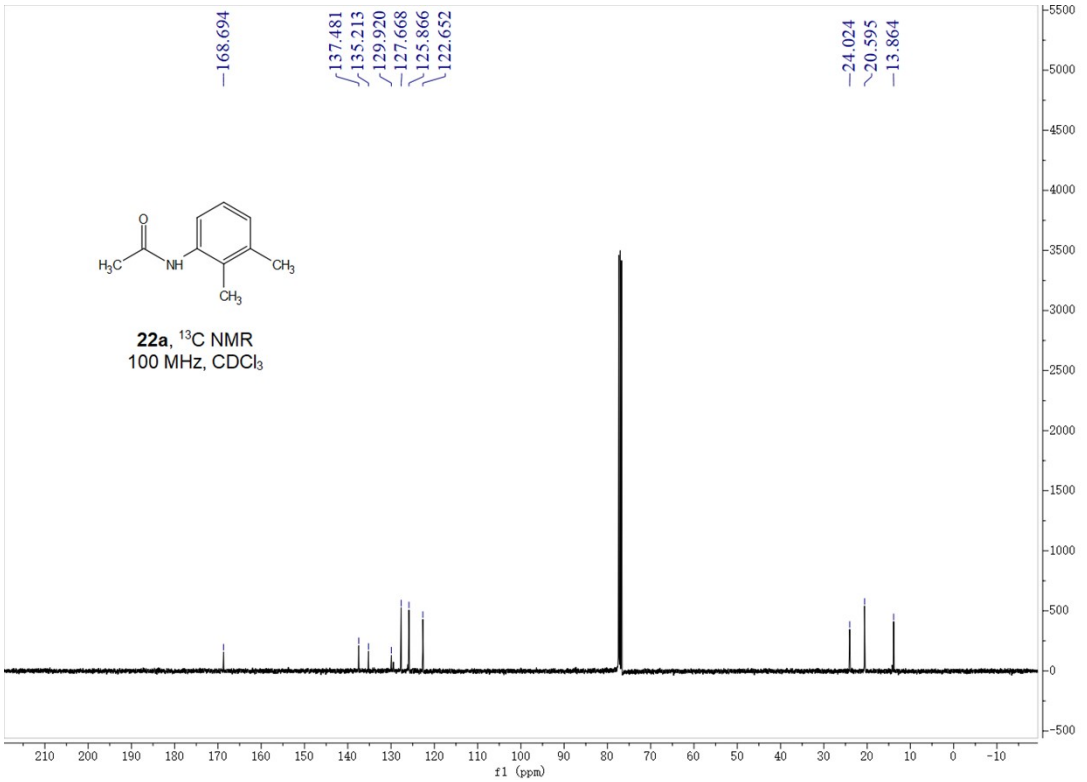
21a, ^{1}H NMR
400 MHz, $CDCl_3$



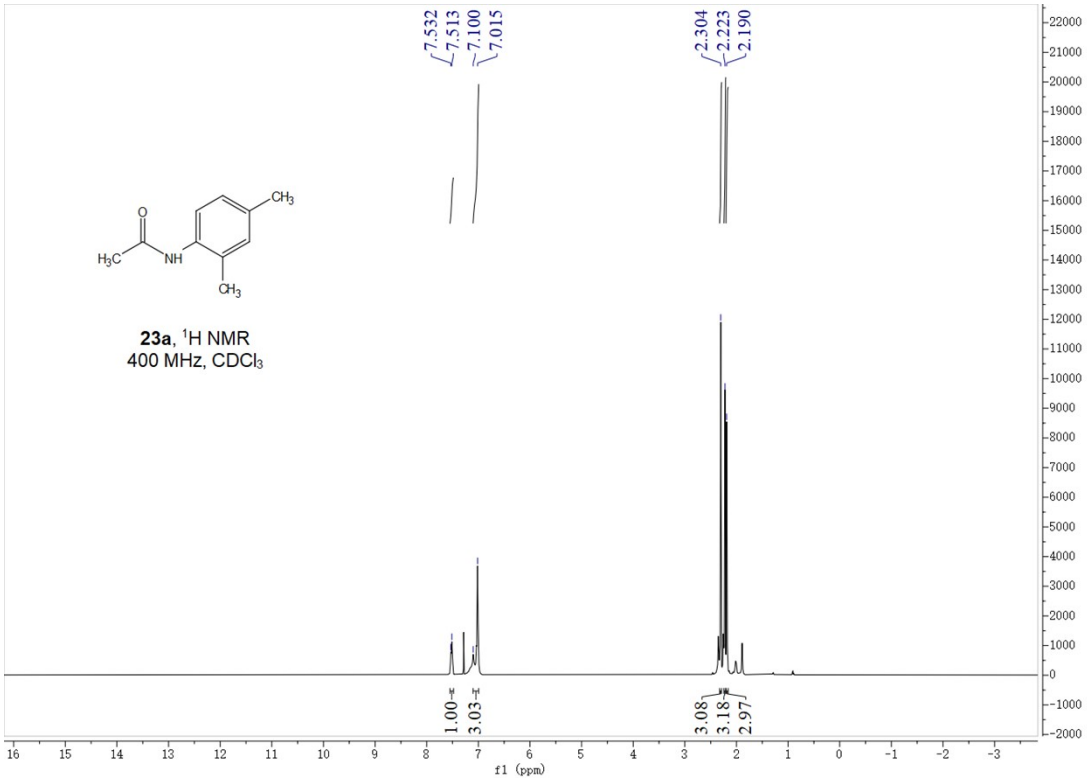
21a, ^{13}C NMR
100 MHz, $CDCl_3$



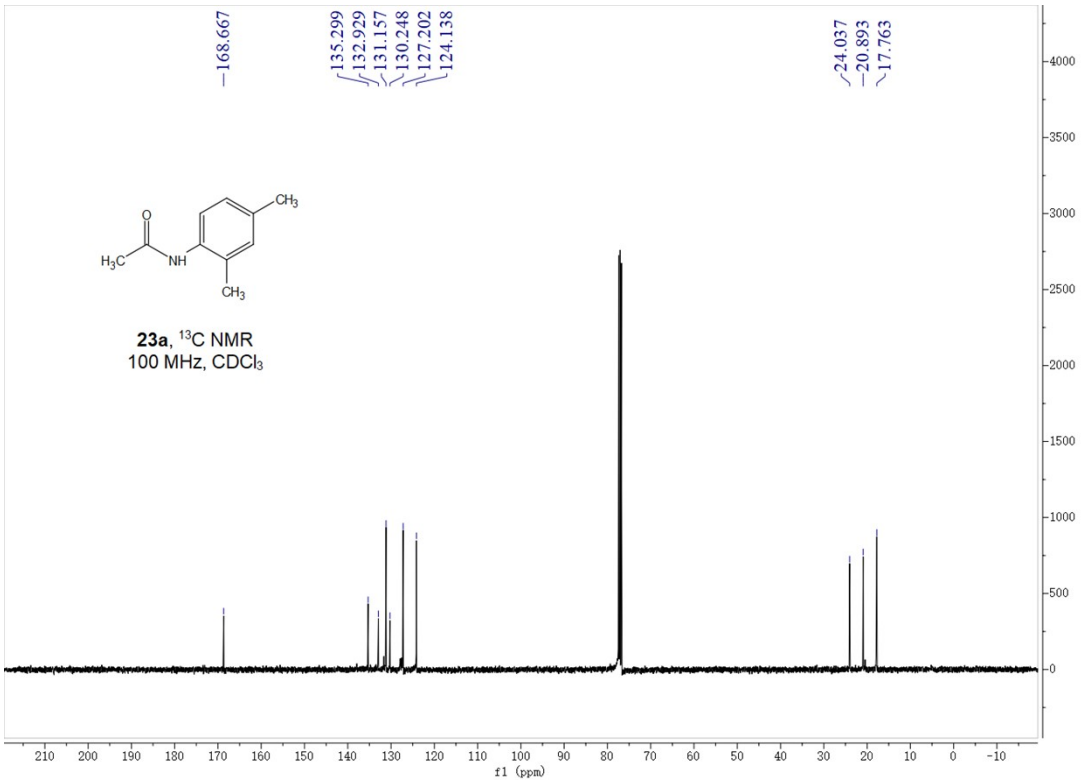
22a, ^{1}H NMR
400 MHz, $CDCl_3$



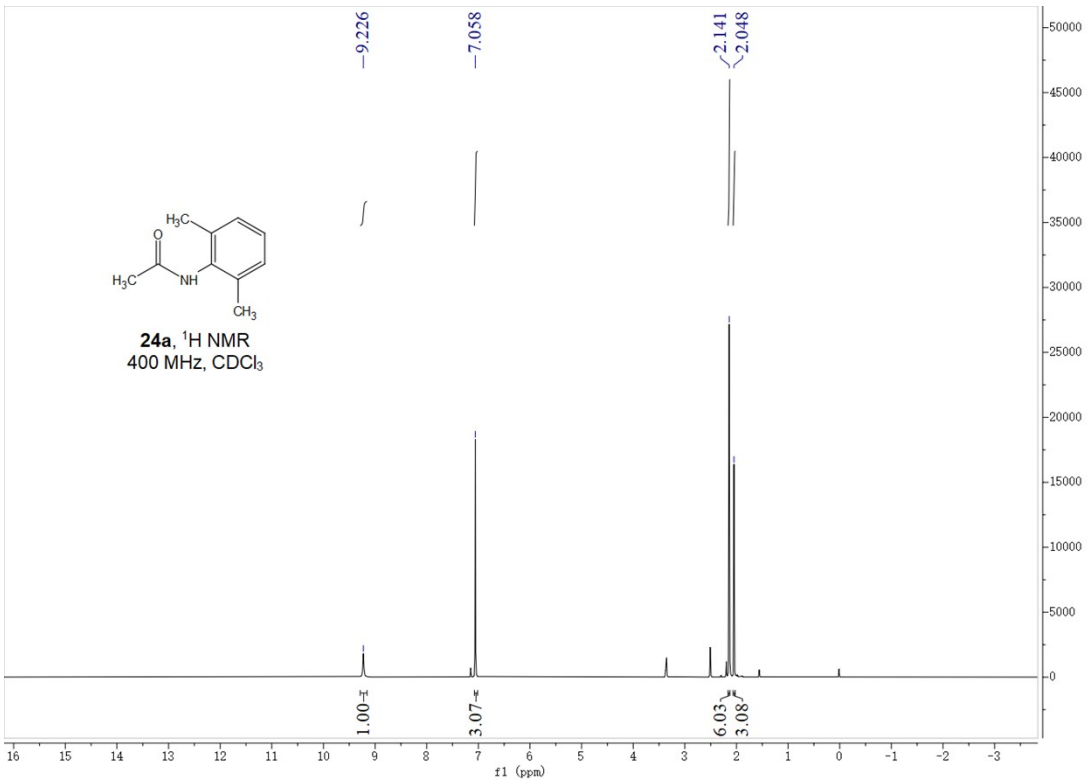
22a, ^{13}C NMR
100 MHz, $CDCl_3$



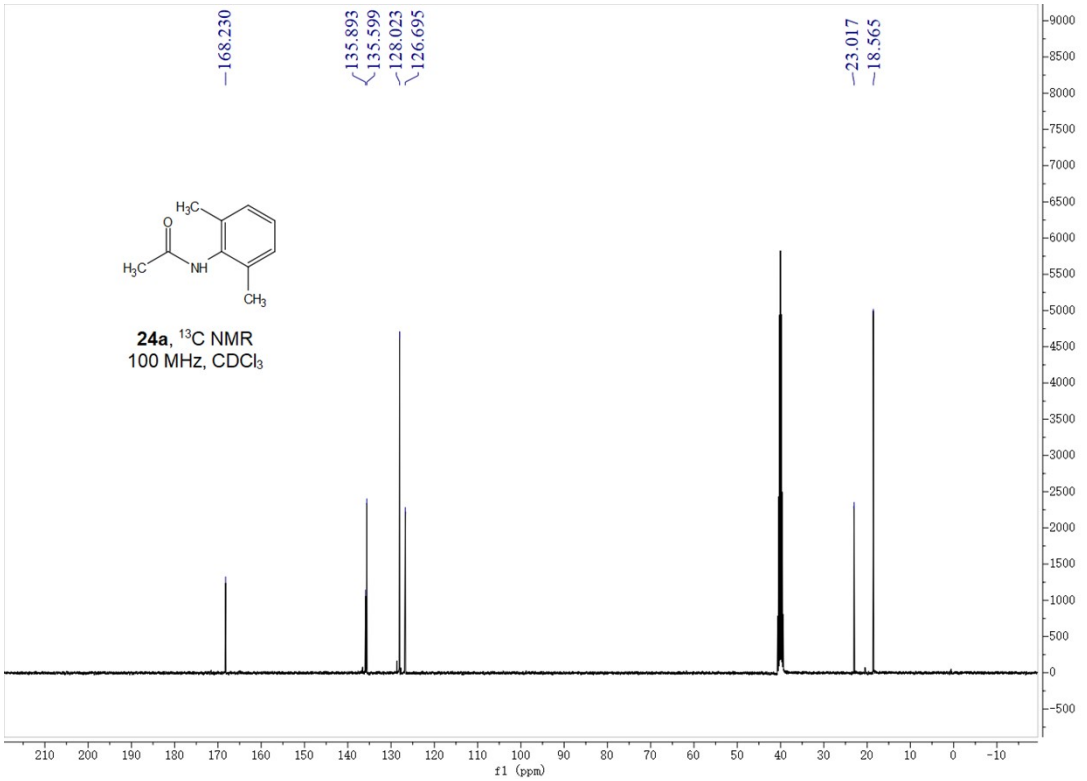
23a, ^{1}H NMR
400 MHz, $CDCl_3$



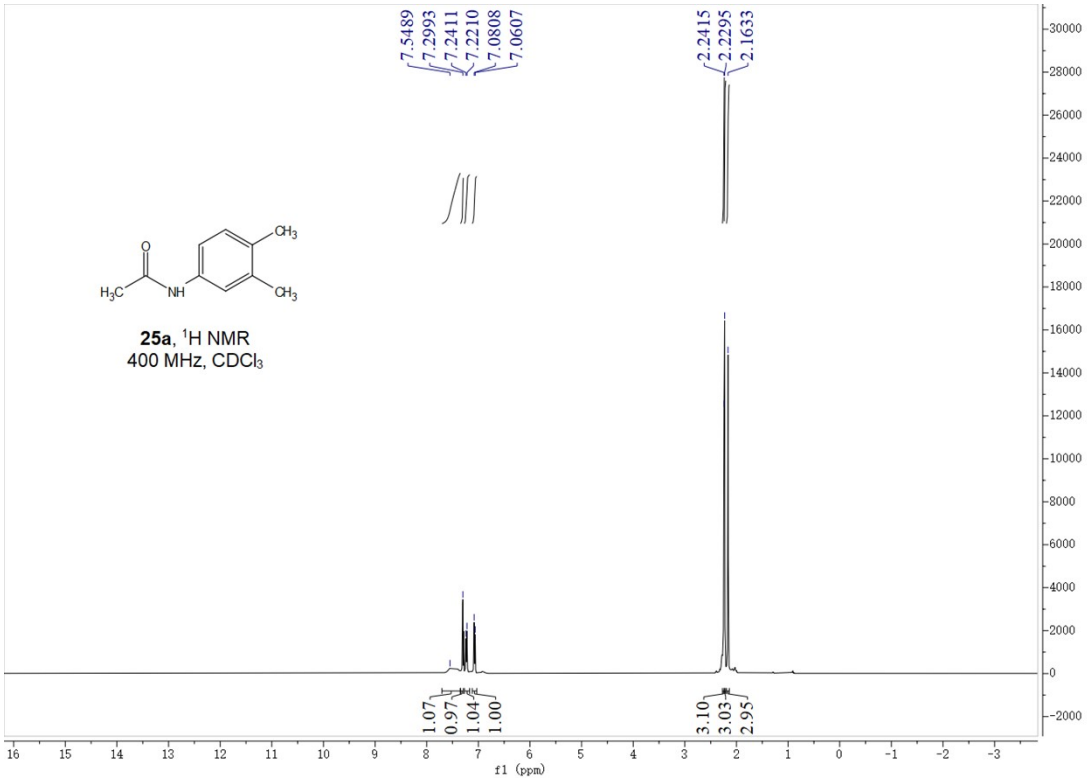
23a, ^{13}C NMR
100 MHz, $CDCl_3$



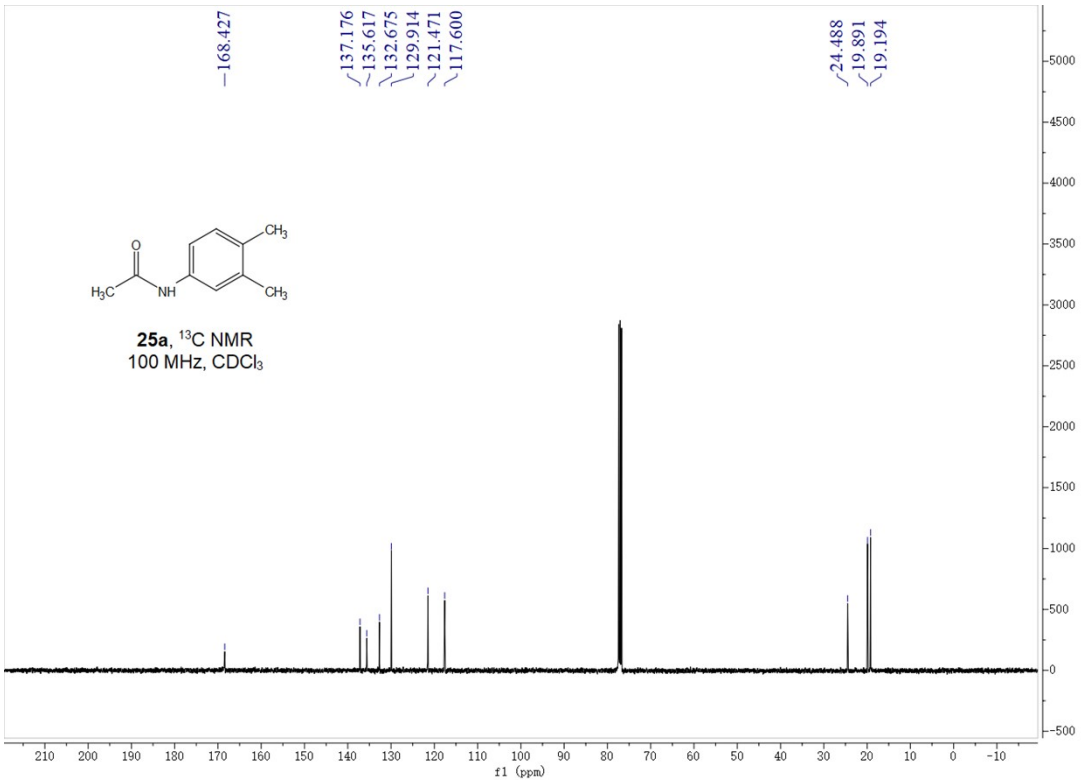
24a, ^{1}H NMR
400 MHz, $CDCl_3$



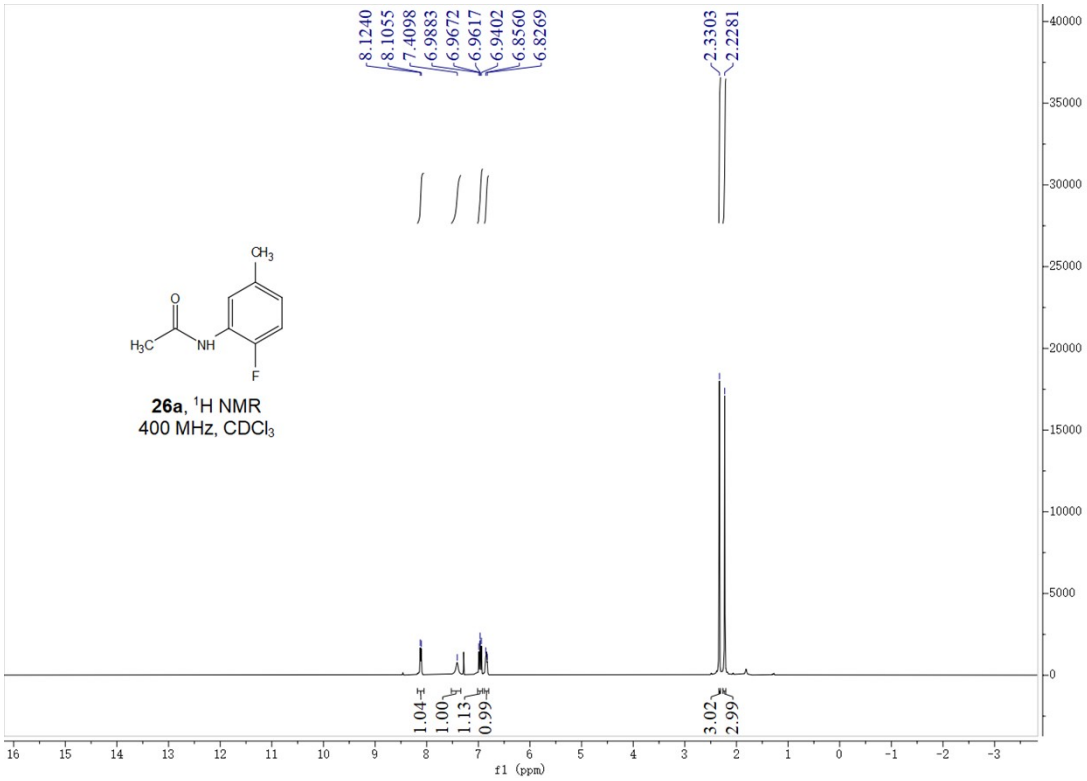
24a, ^{13}C NMR
100 MHz, $CDCl_3$



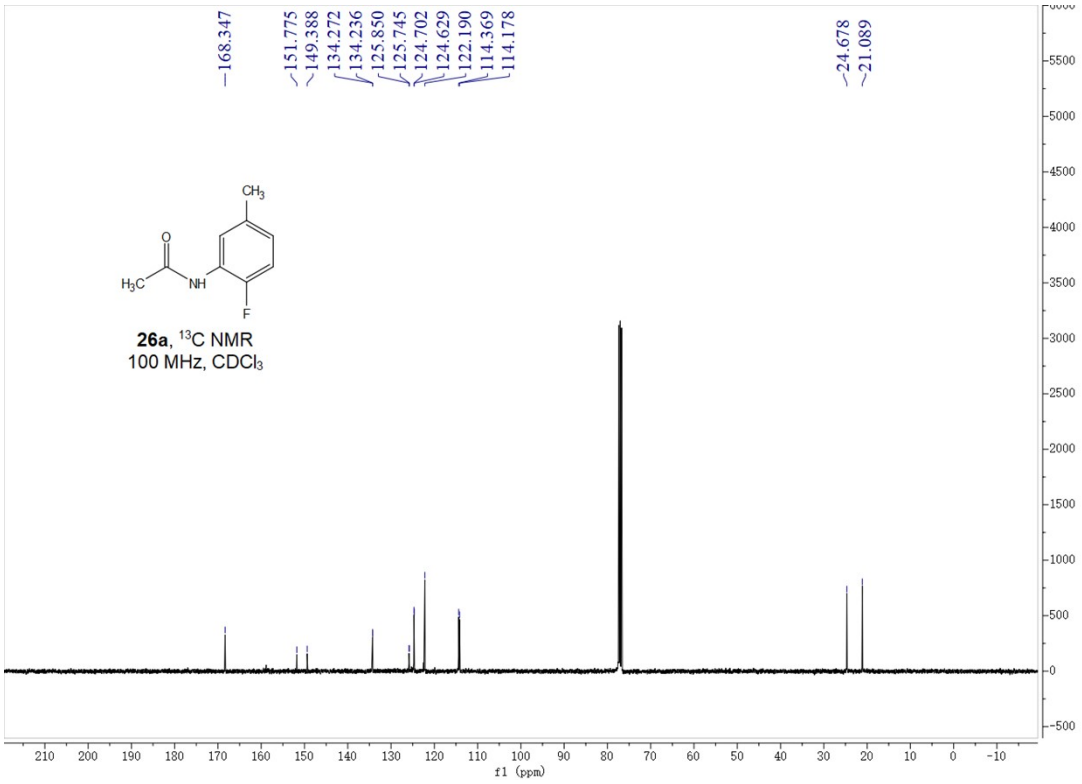
25a, ^{1}H NMR
400 MHz, $CDCl_3$



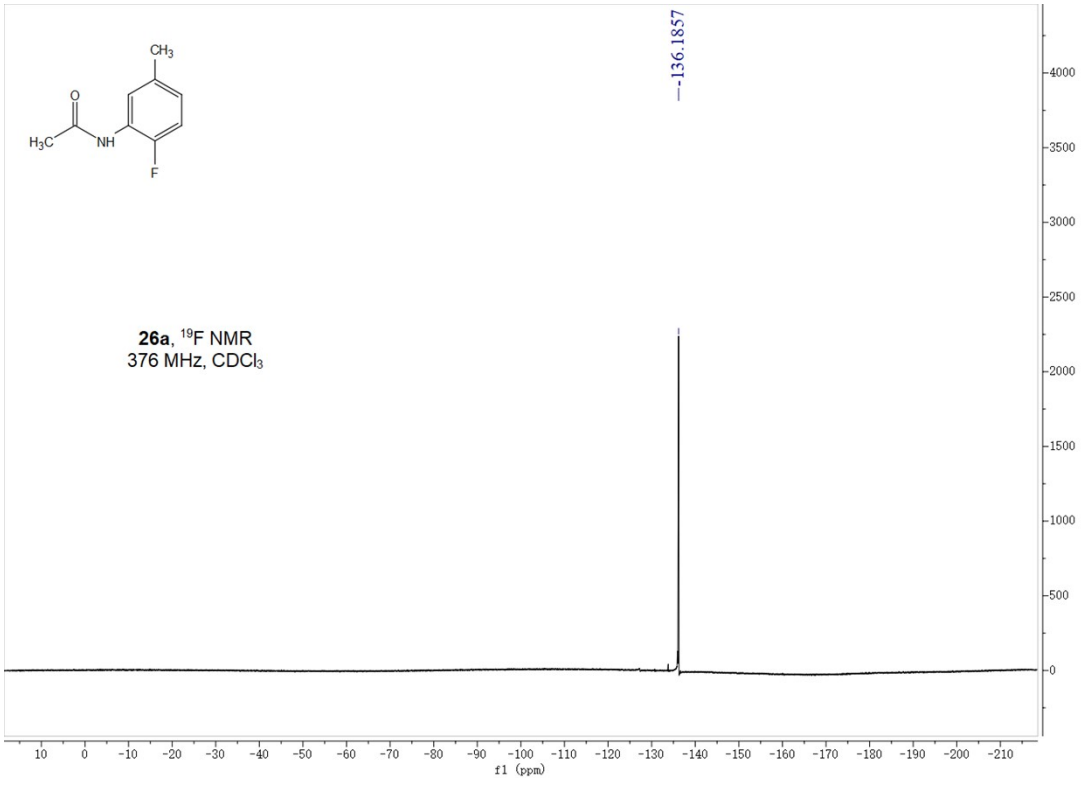
25a, ^{13}C NMR
100 MHz, $CDCl_3$



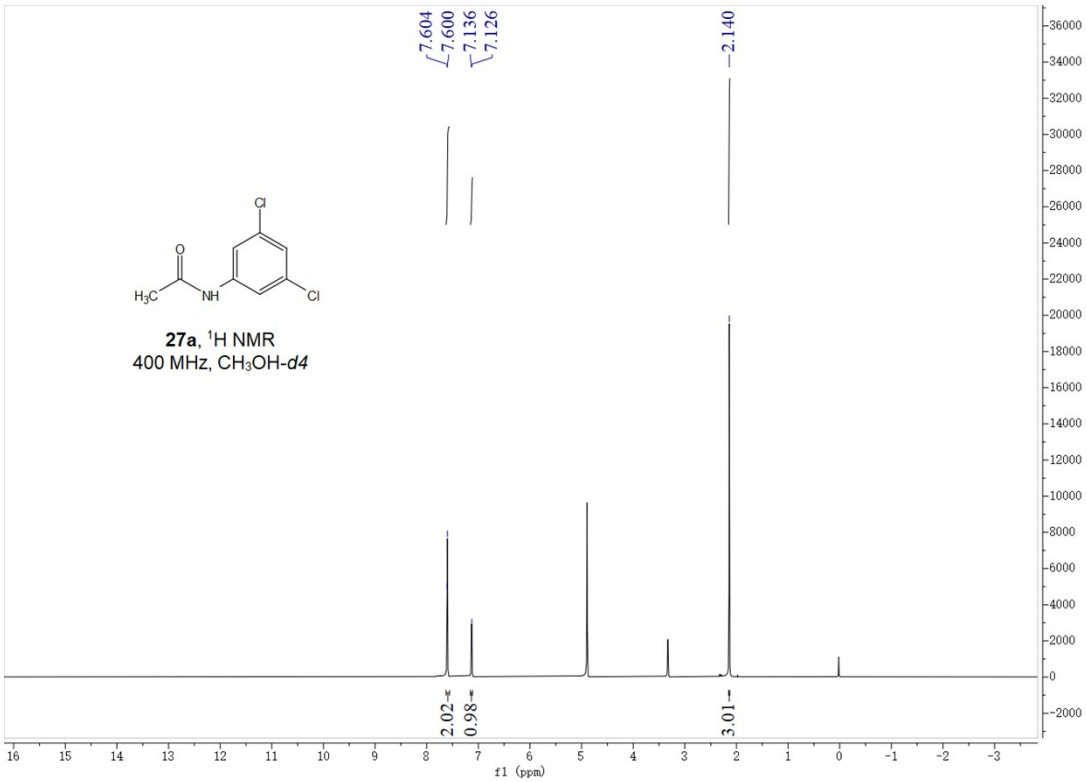
26a, ^{1}H NMR
400 MHz, $CDCl_3$



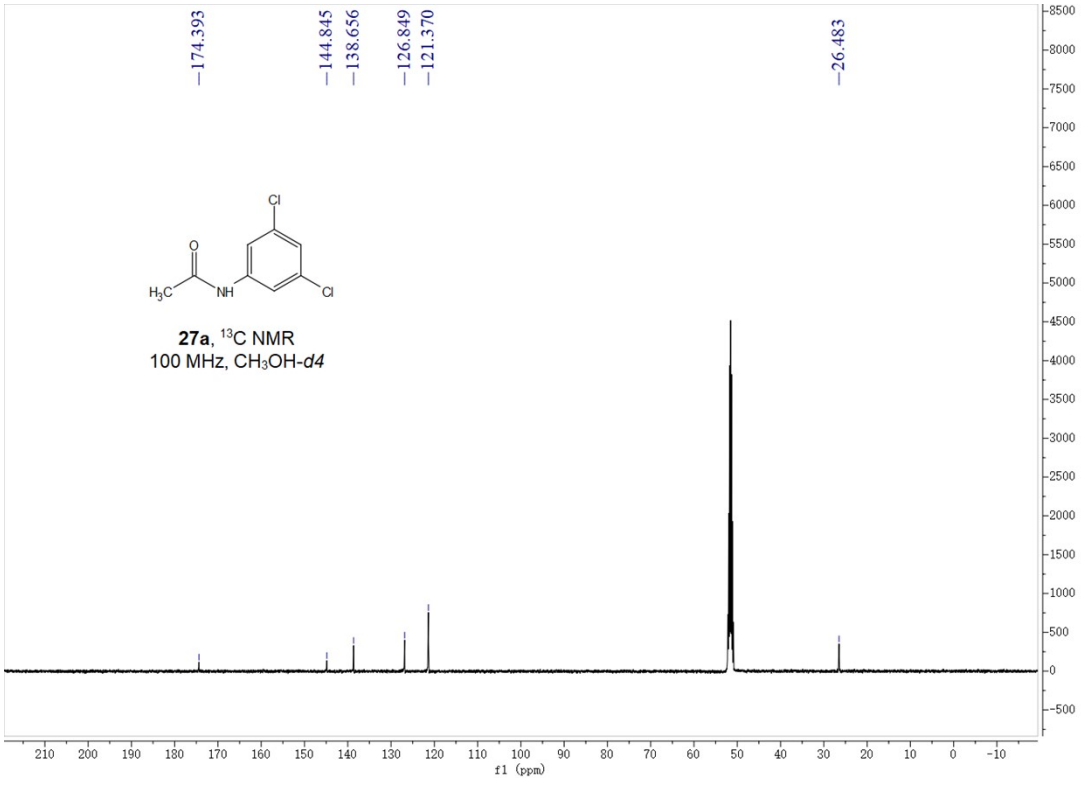
26a, ^{13}C NMR
100 MHz, $CDCl_3$



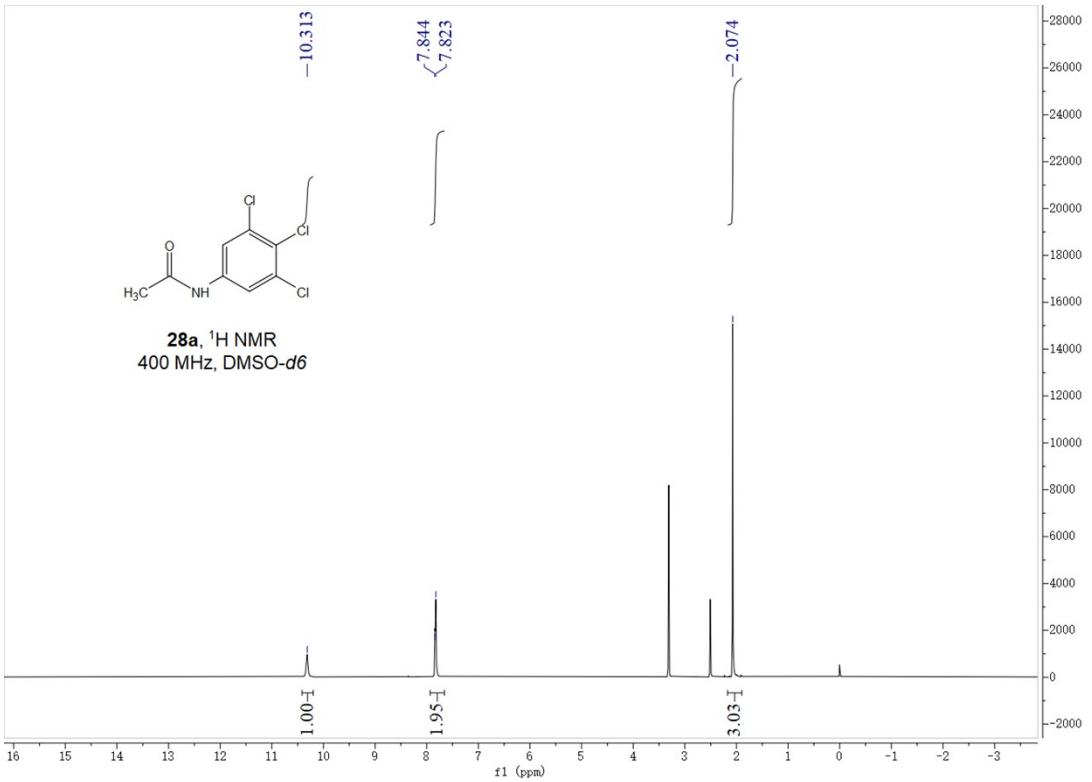
26a, ^{19}F NMR
376 MHz, $CDCl_3$



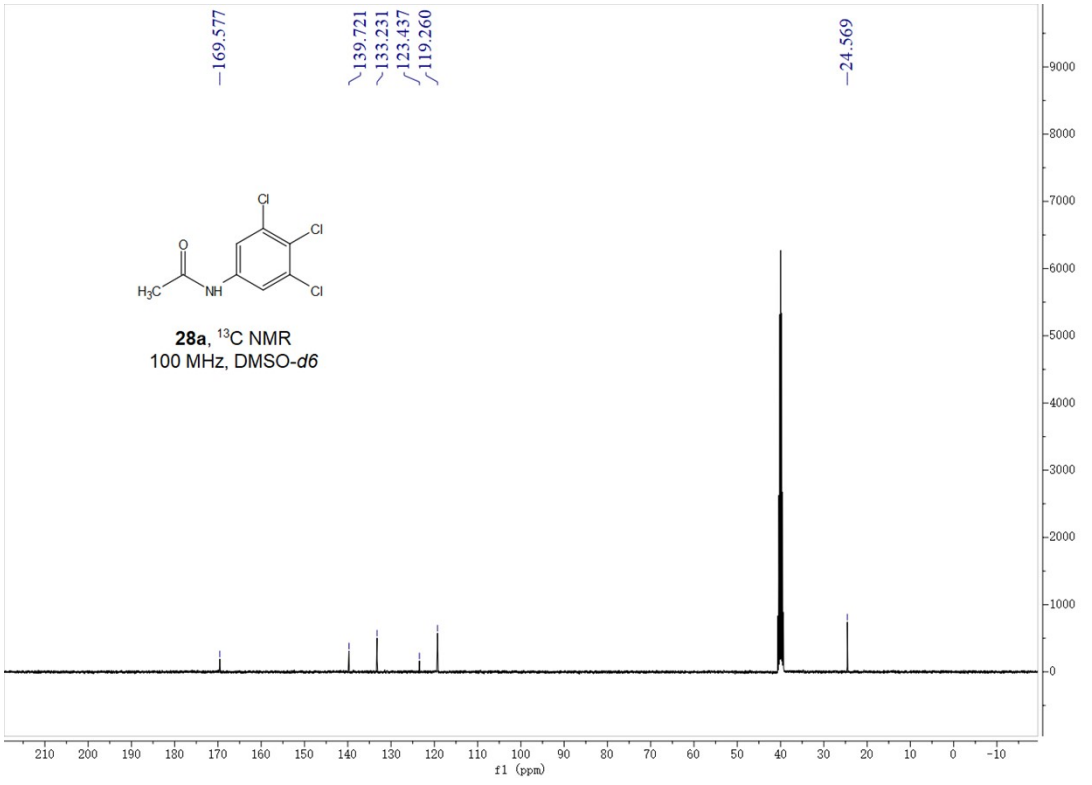
27a, ^{1}H NMR
400 MHz, CH_3OH-*d4*



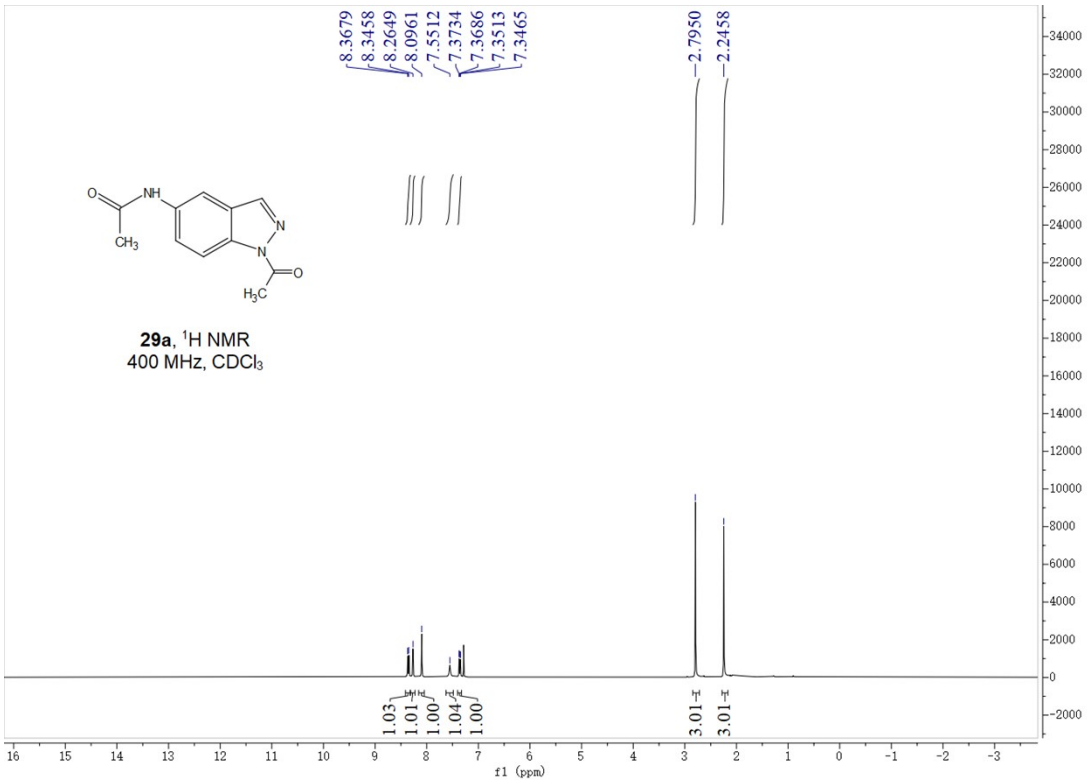
27a, ^{13}C NMR
100 MHz, CH_3OH-*d4*



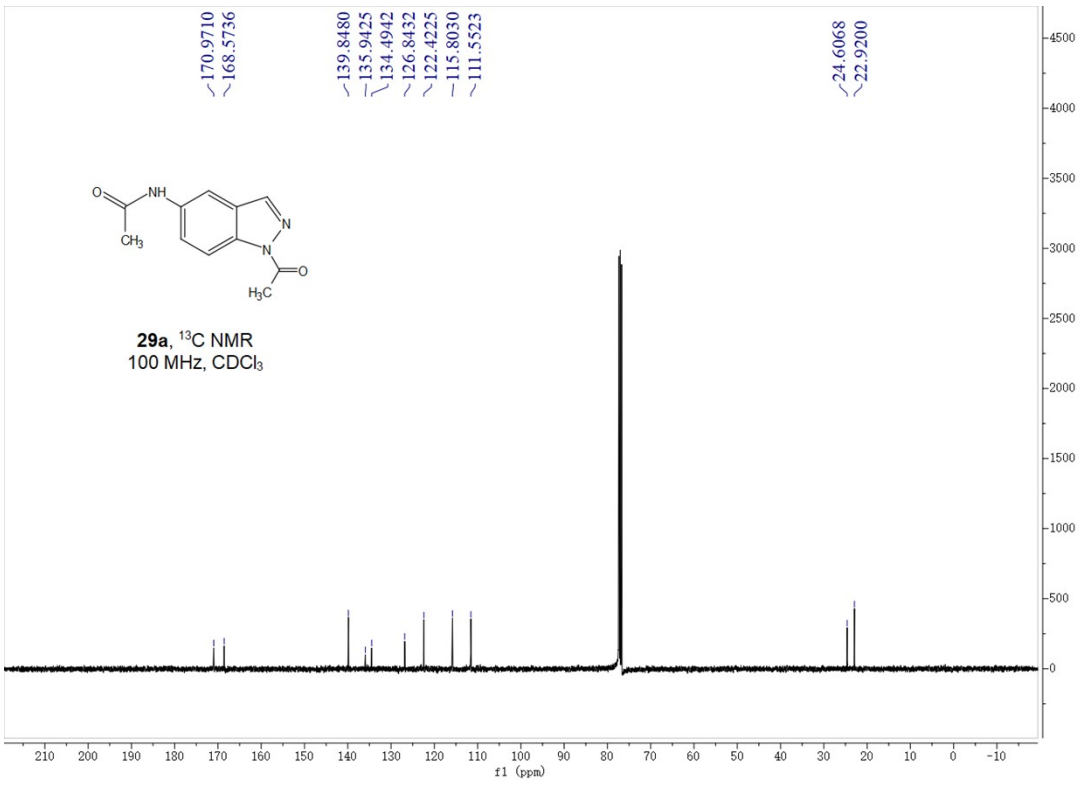
28a, ^{1}H NMR
400 MHz, DMSO-*d6*



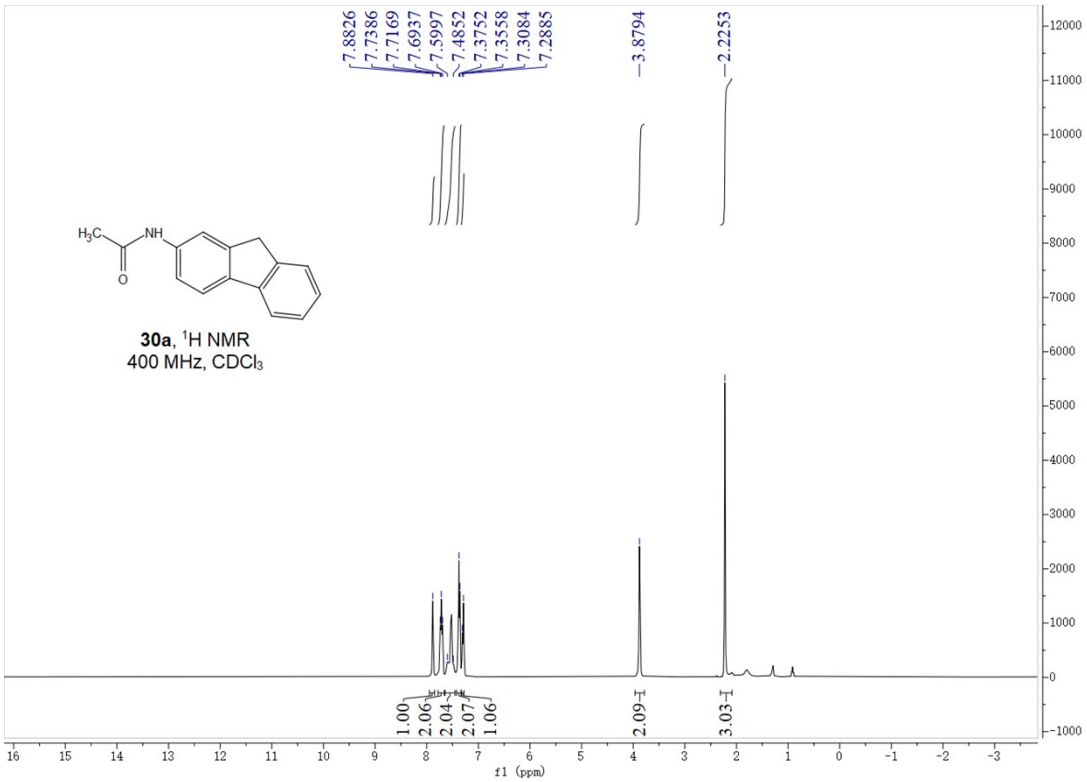
28a, ^{13}C NMR
100 MHz, DMSO-*d6*



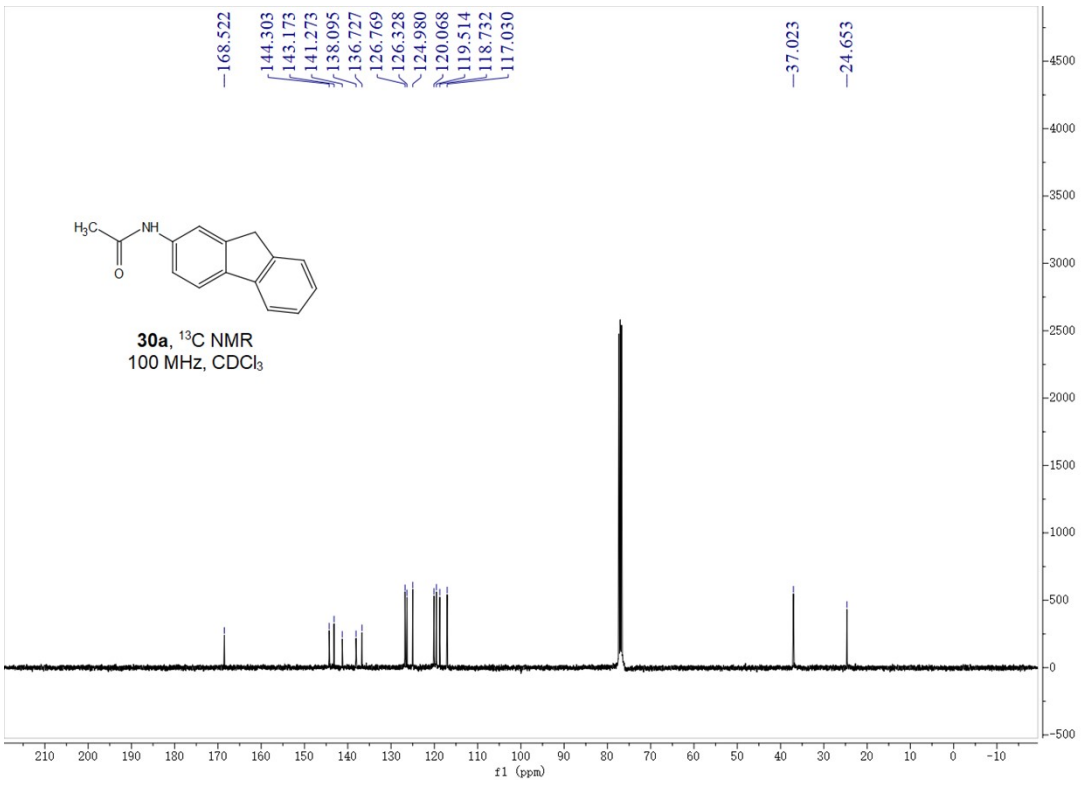
29a, ^{1}H NMR
400 MHz, $CDCl_3$



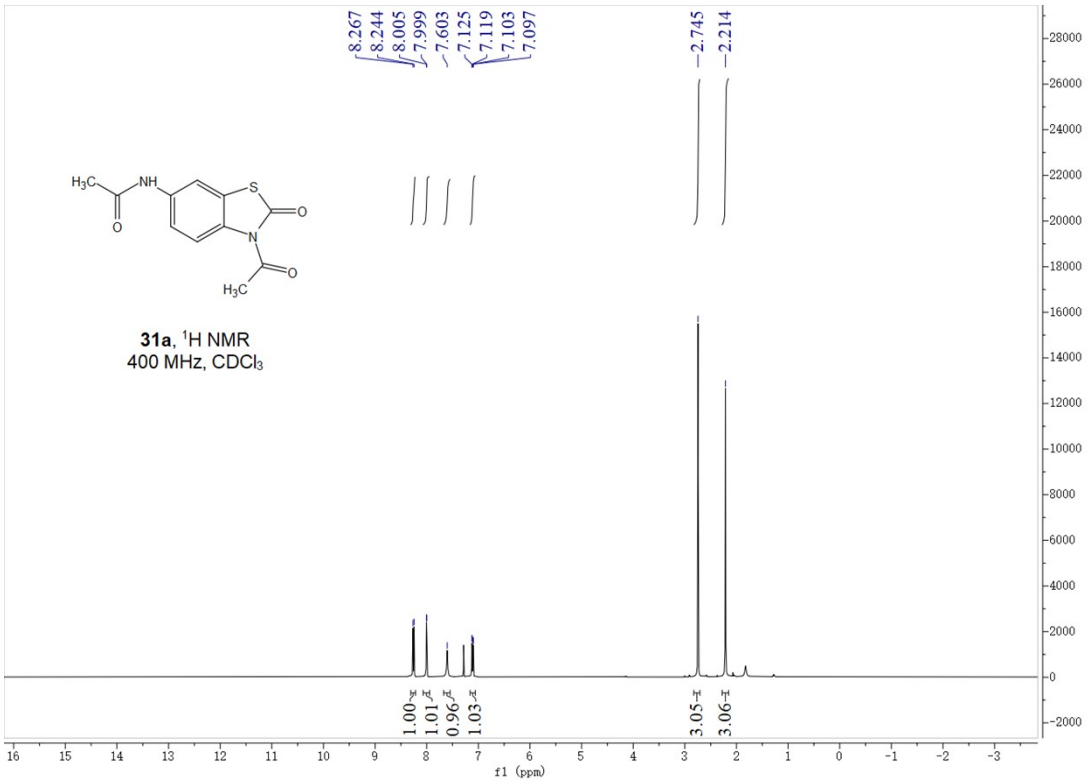
29a, ^{13}C NMR
100 MHz, $CDCl_3$



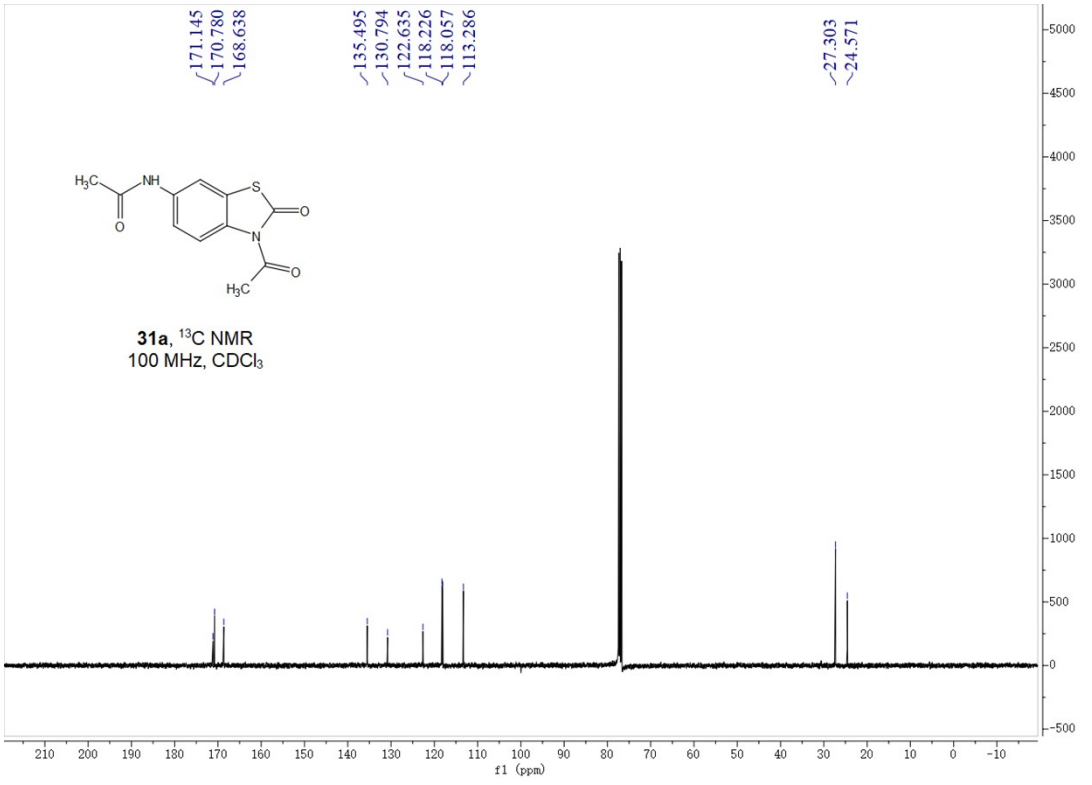
30a, ^{1}H NMR
400 MHz, $CDCl_3$



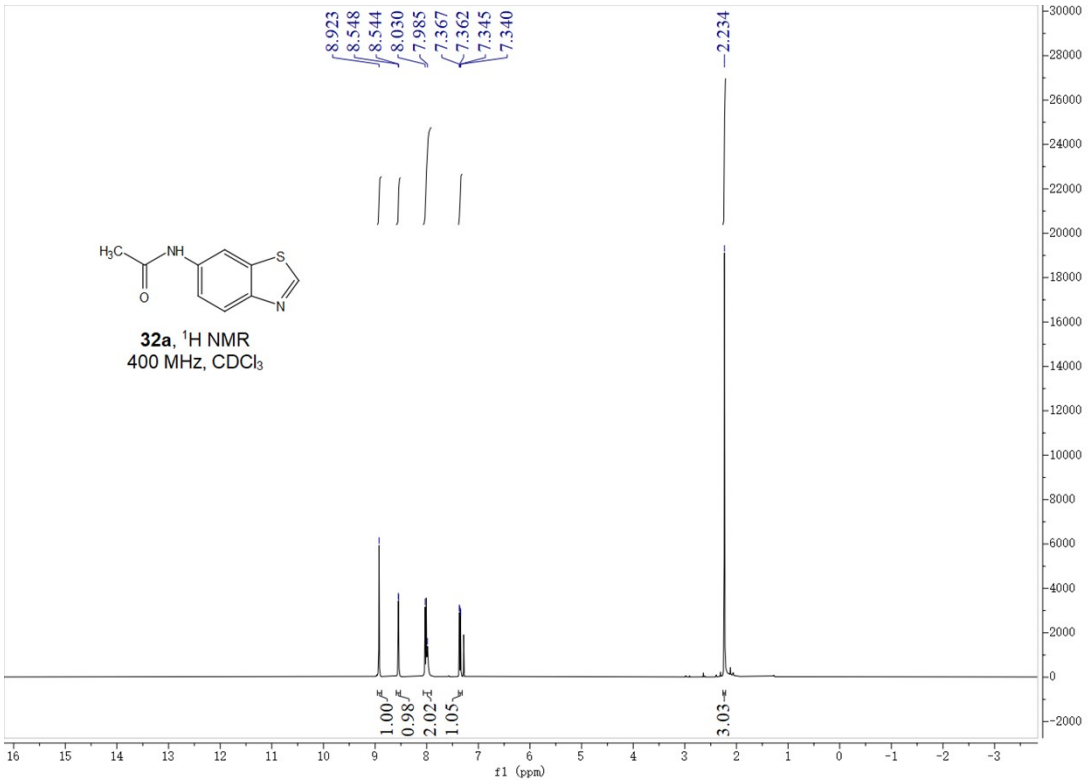
30a, ^{13}C NMR
100 MHz, $CDCl_3$



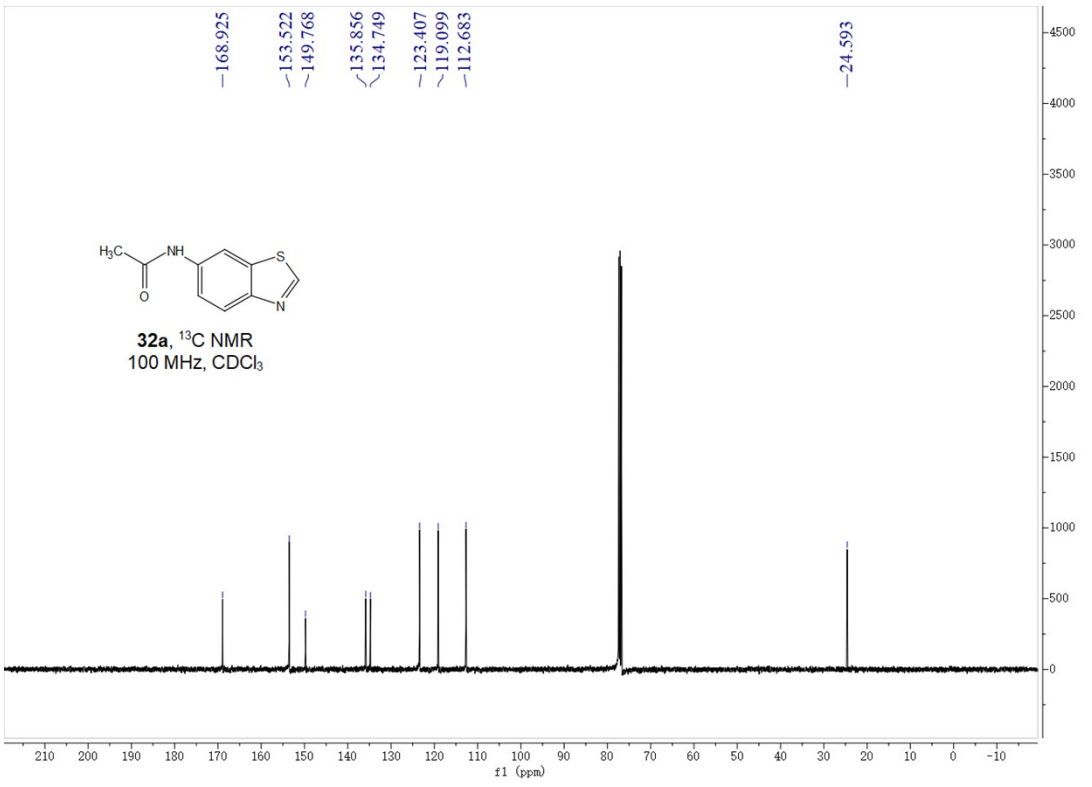
31a, ^{1}H NMR
400 MHz, $CDCl_3$



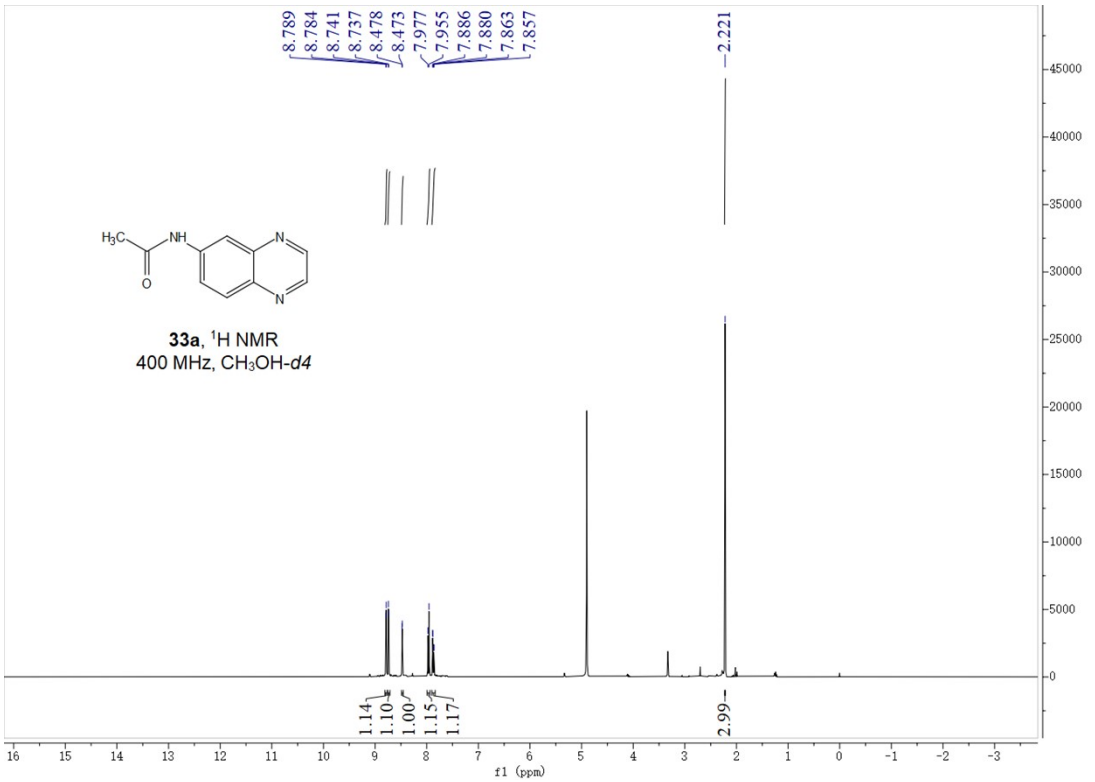
31a, ^{13}C NMR
100 MHz, $CDCl_3$



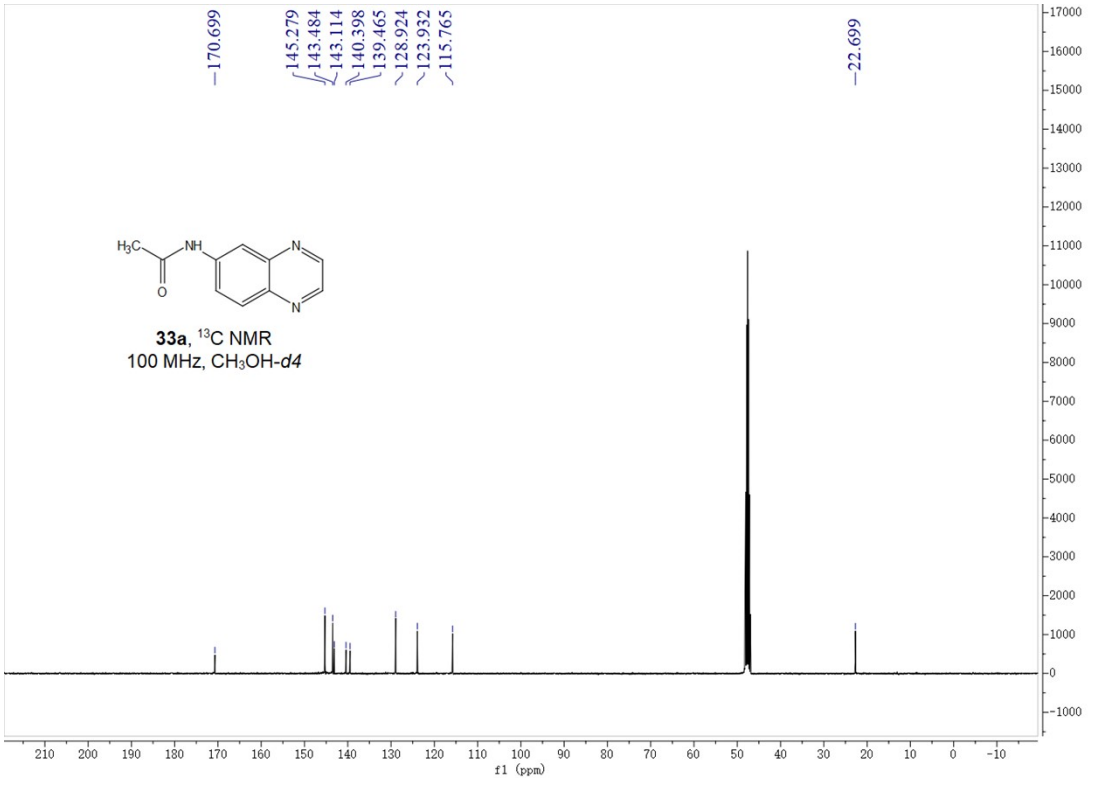
32a, ^{1}H NMR
400 MHz, $CDCl_3$



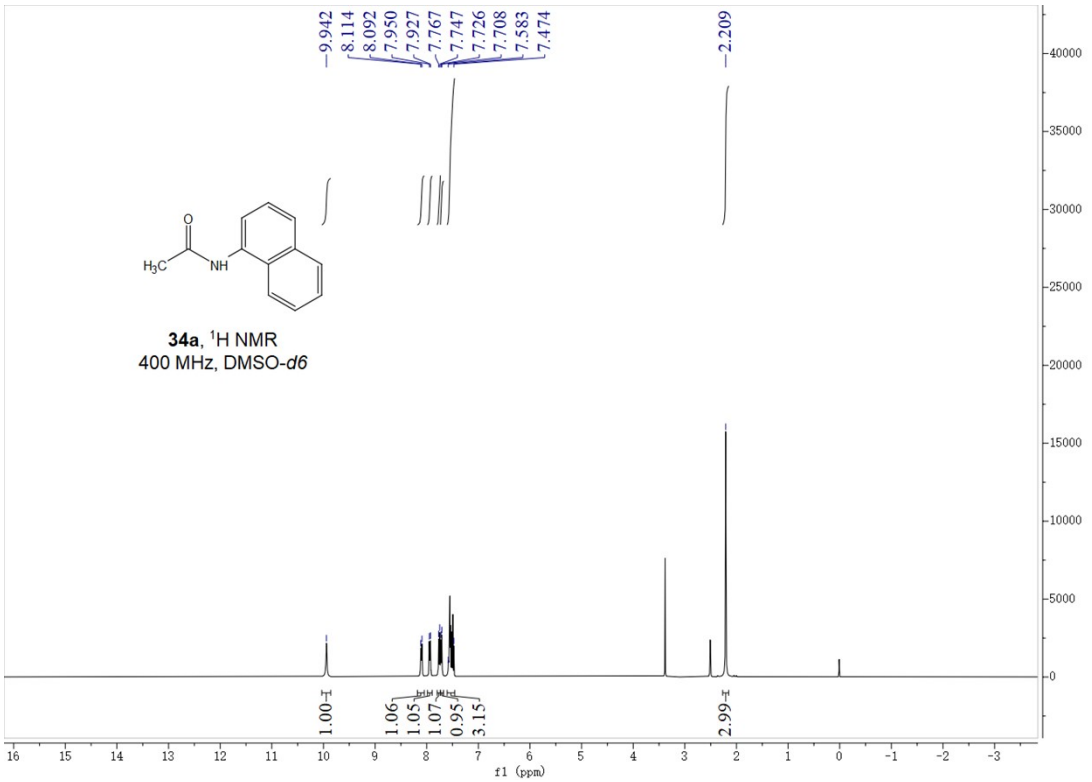
32a, ^{13}C NMR
100 MHz, $CDCl_3$



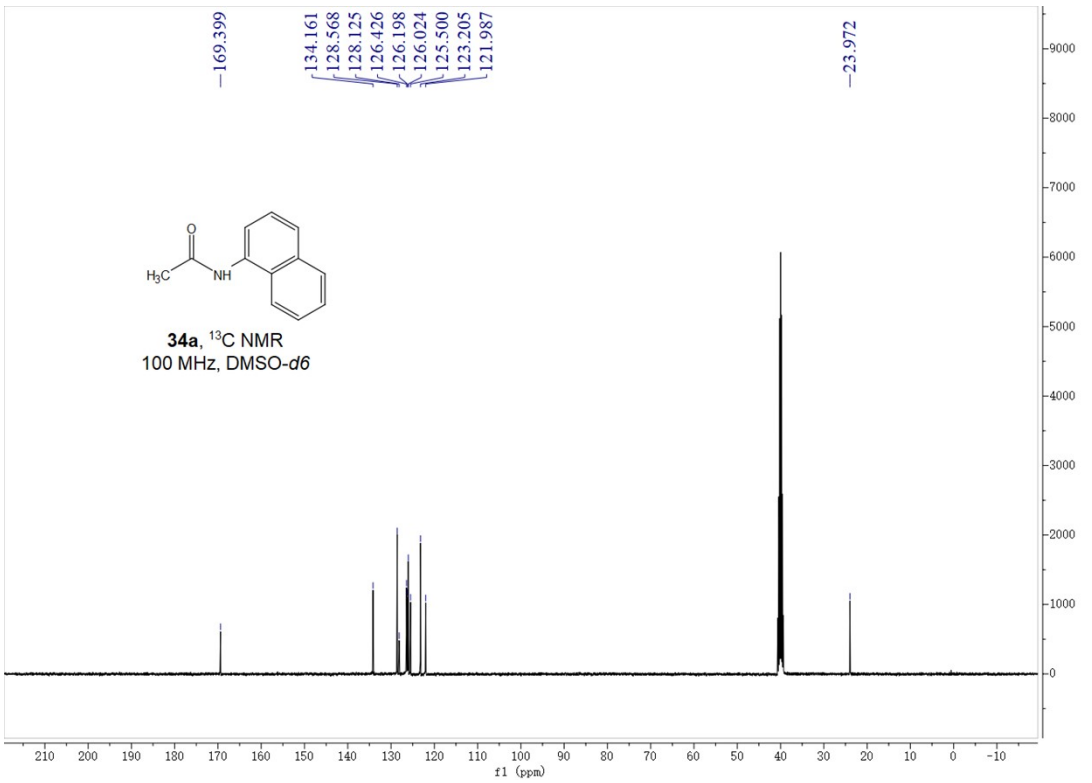
33a, ^{1}H NMR
400 MHz, CH_3OH-*d4*



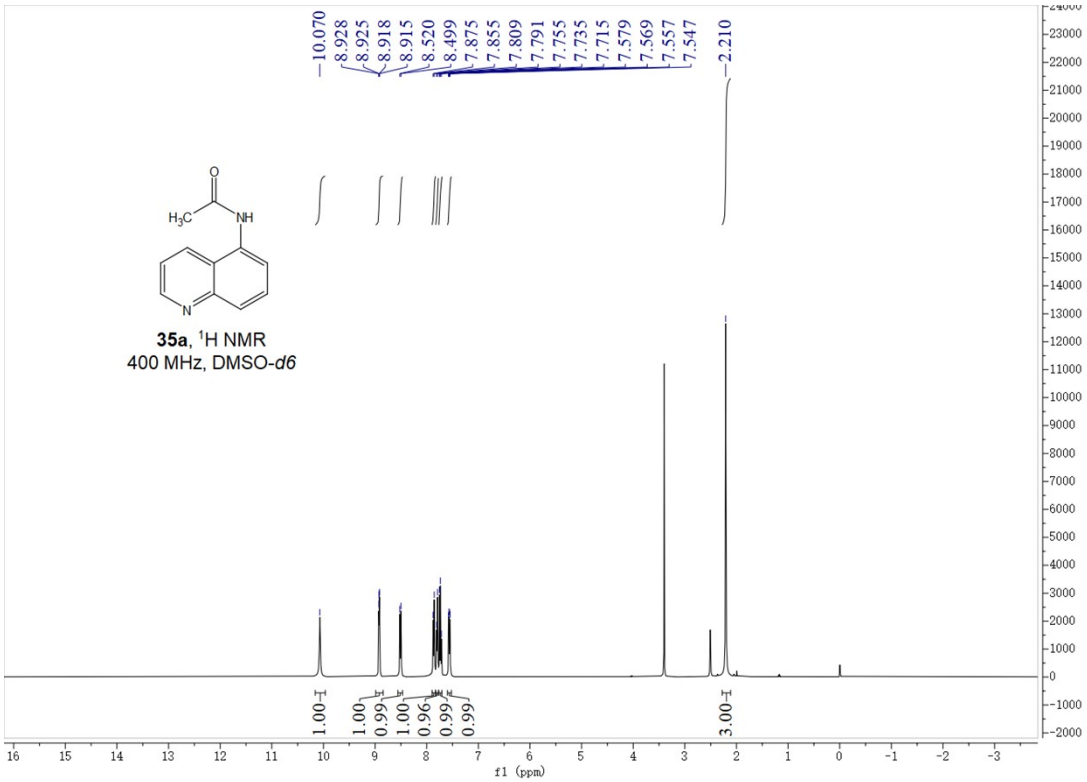
33a, ^{13}C NMR
100 MHz, CH_3OH-*d4*



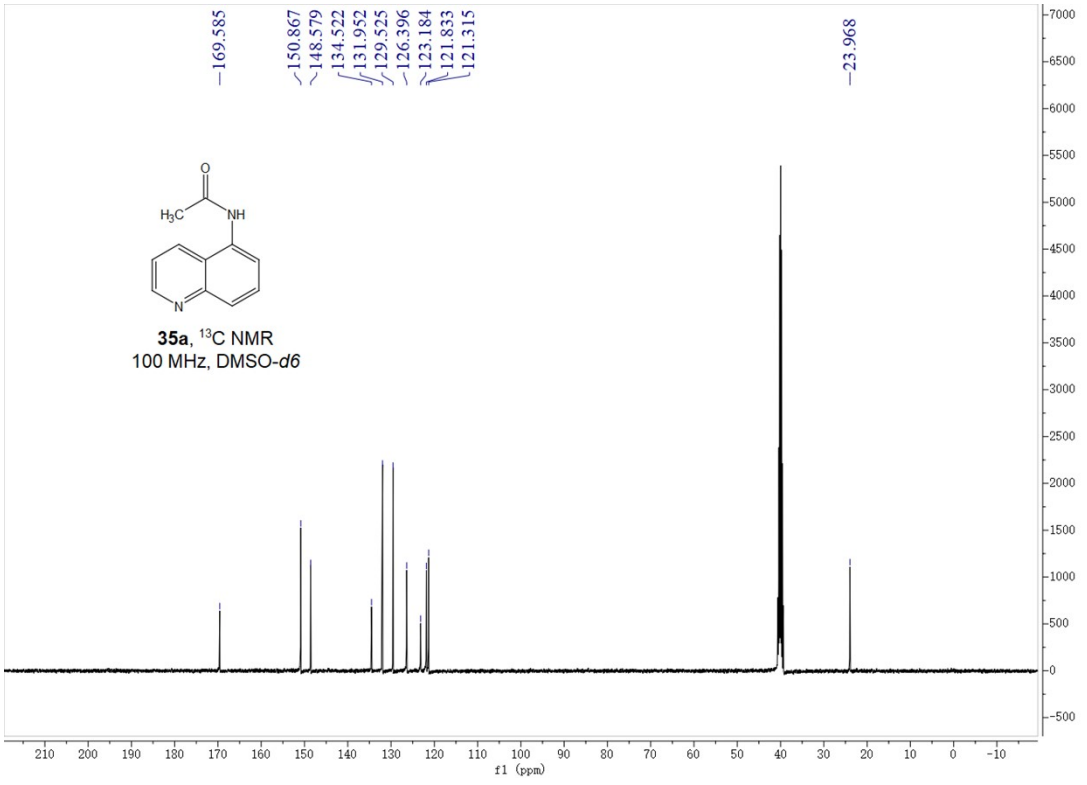
34a, ^{1}H NMR
400 MHz, DMSO-*d6*



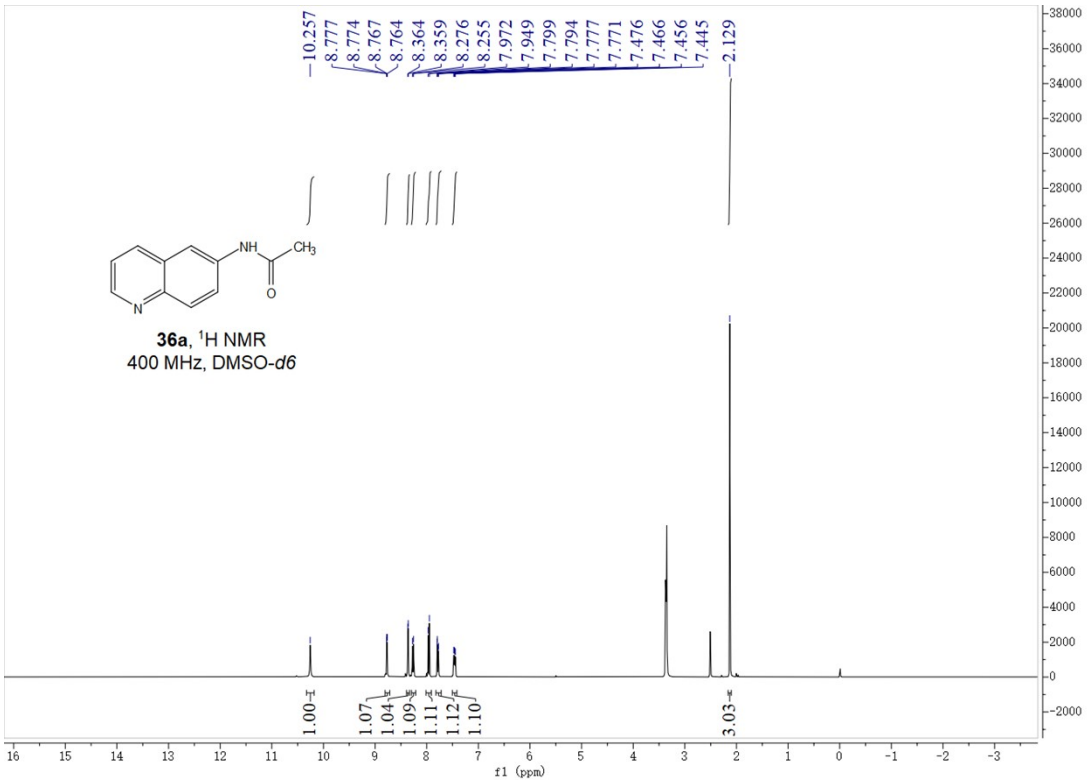
34a, ^{13}C NMR
100 MHz, DMSO-*d6*



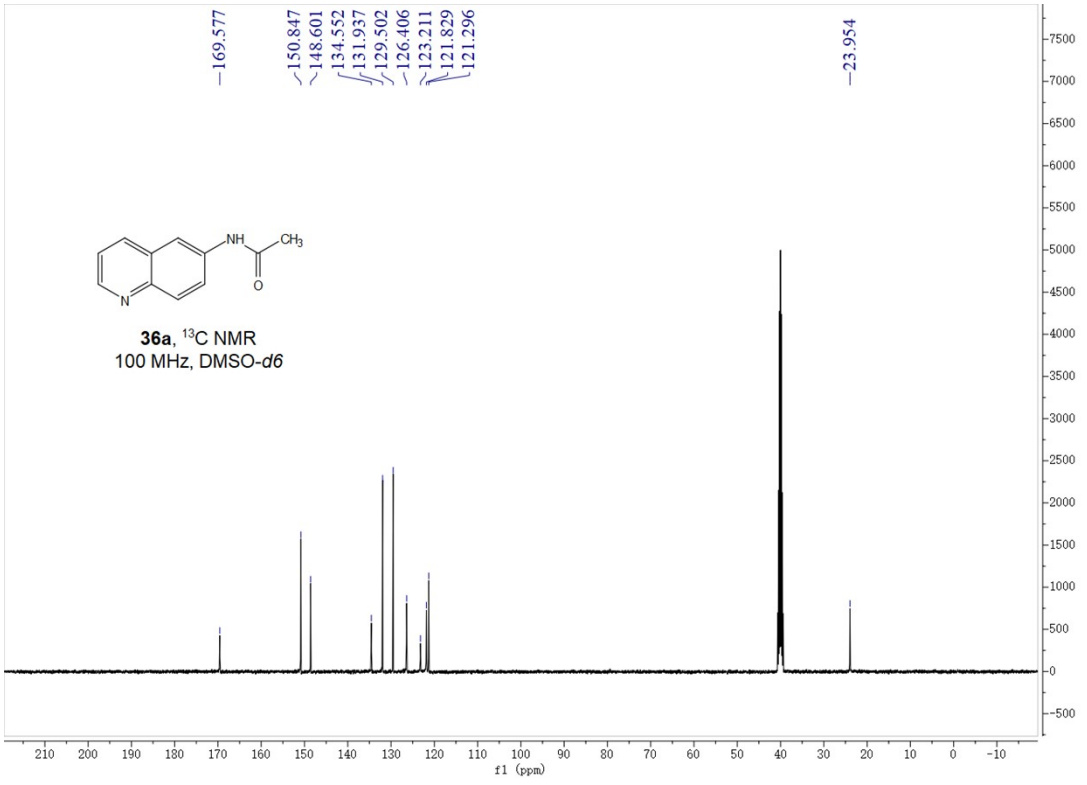
35a, ^{1}H NMR
400 MHz, DMSO-*d6*



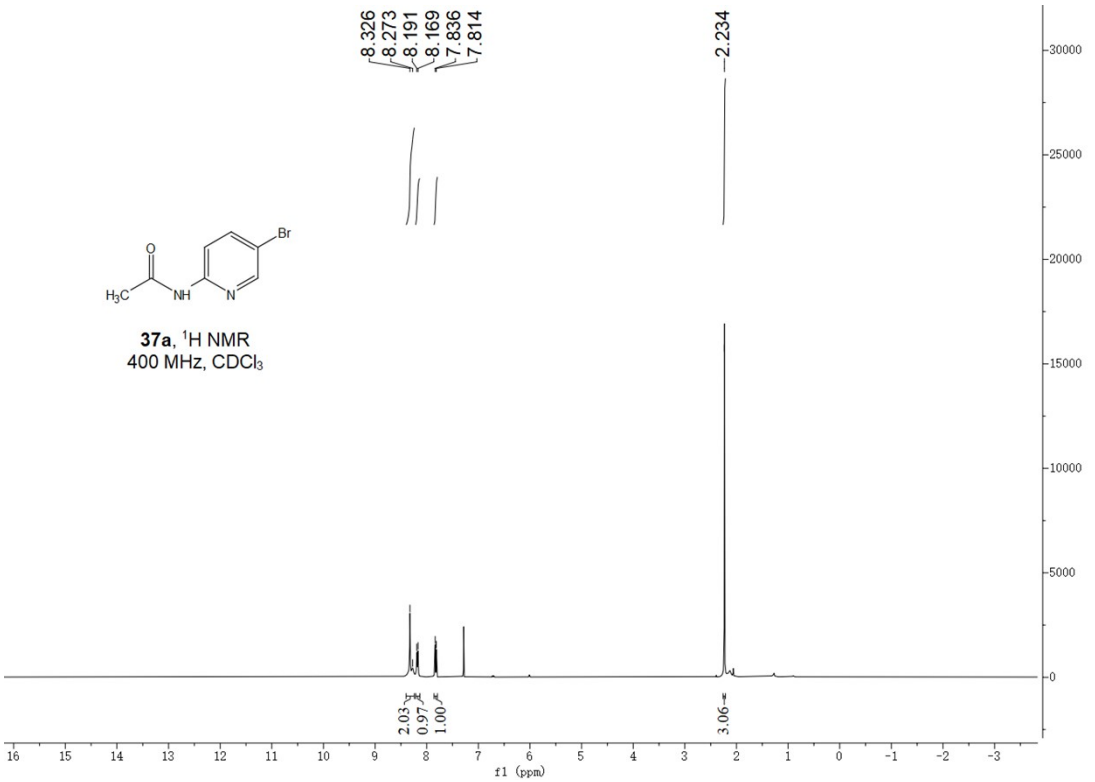
35a, ^{13}C NMR
100 MHz, DMSO-*d6*



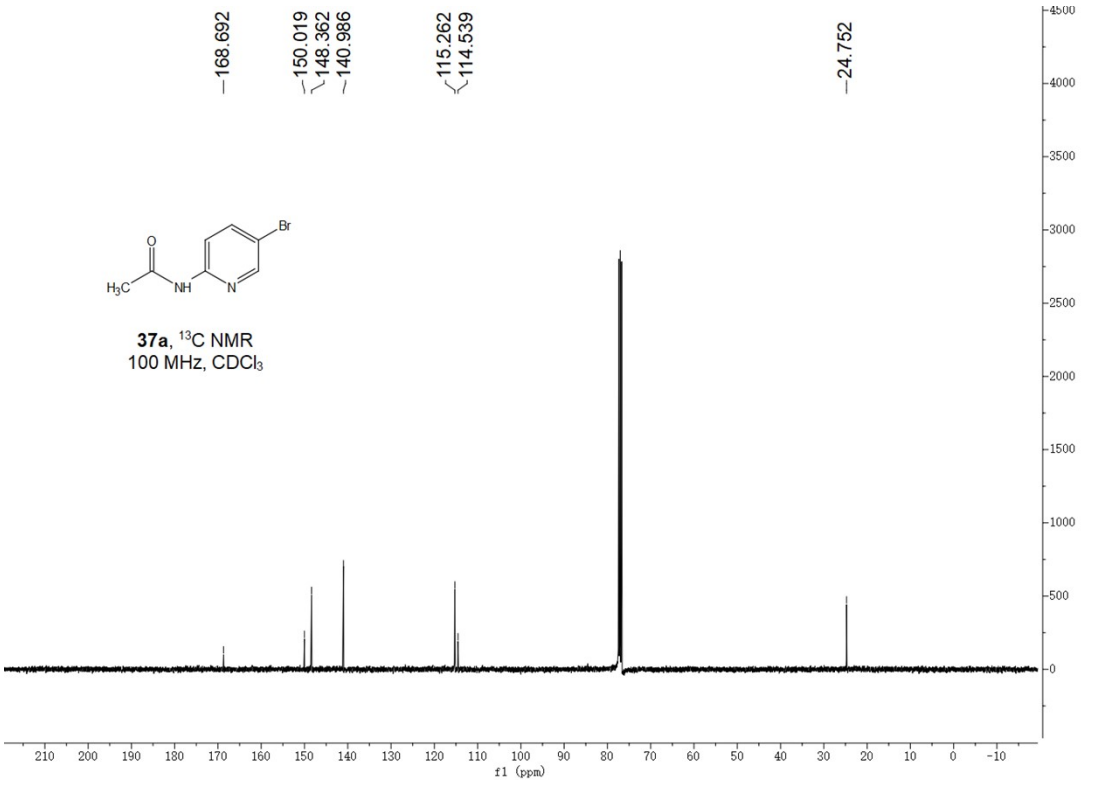
36a, ^{1}H NMR
400 MHz, DMSO-*d6*



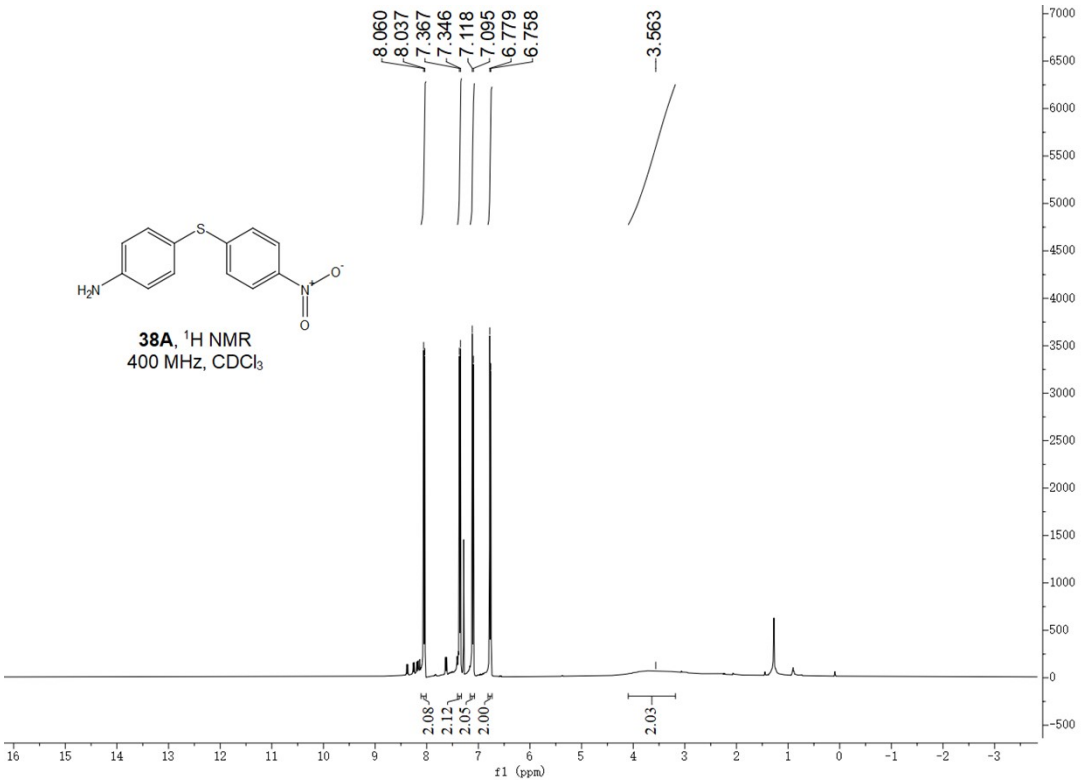
36a, ^{13}C NMR
100 MHz, DMSO-*d6*



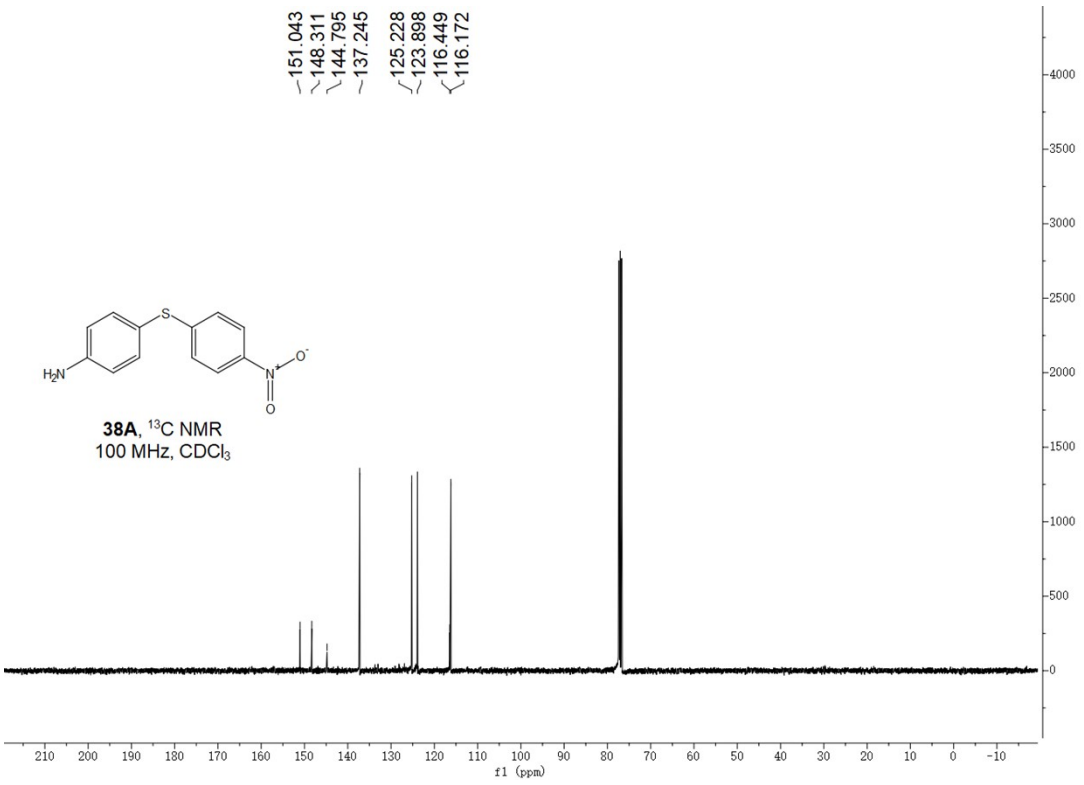
37a, ^{1}H NMR
400 MHz, $CDCl_3$



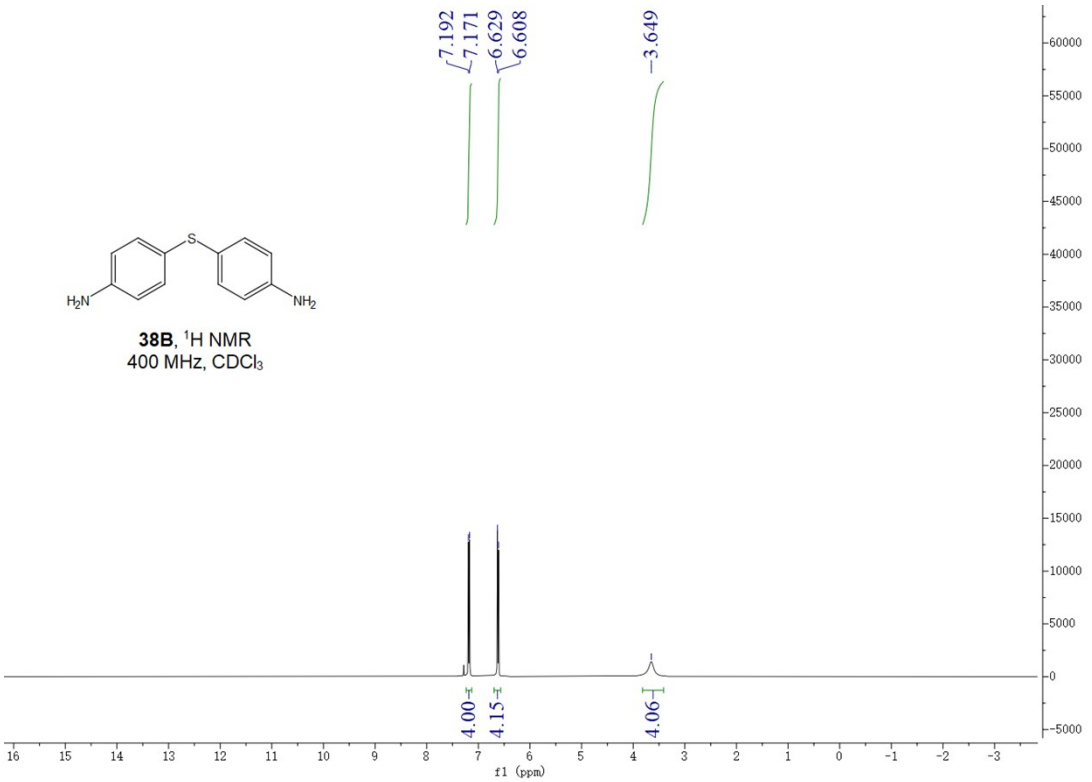
37a, ^{13}C NMR
100 MHz, $CDCl_3$



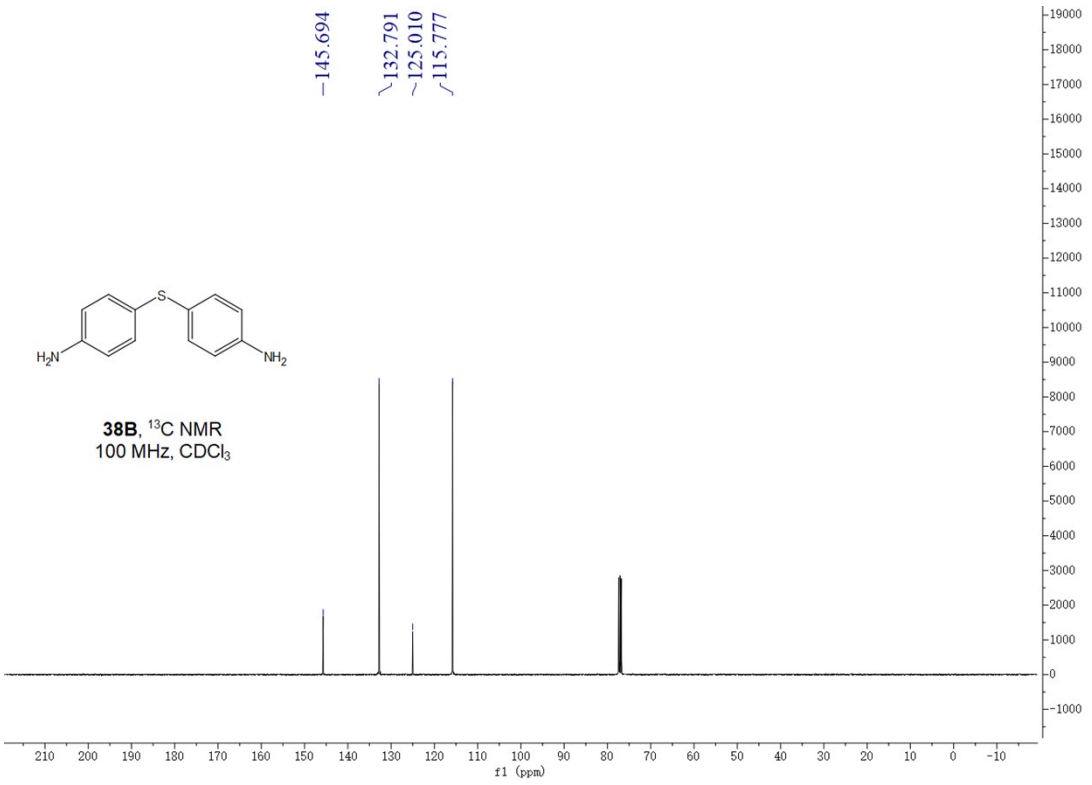
38A, ^{1}H NMR
400 MHz, $CDCl_3$



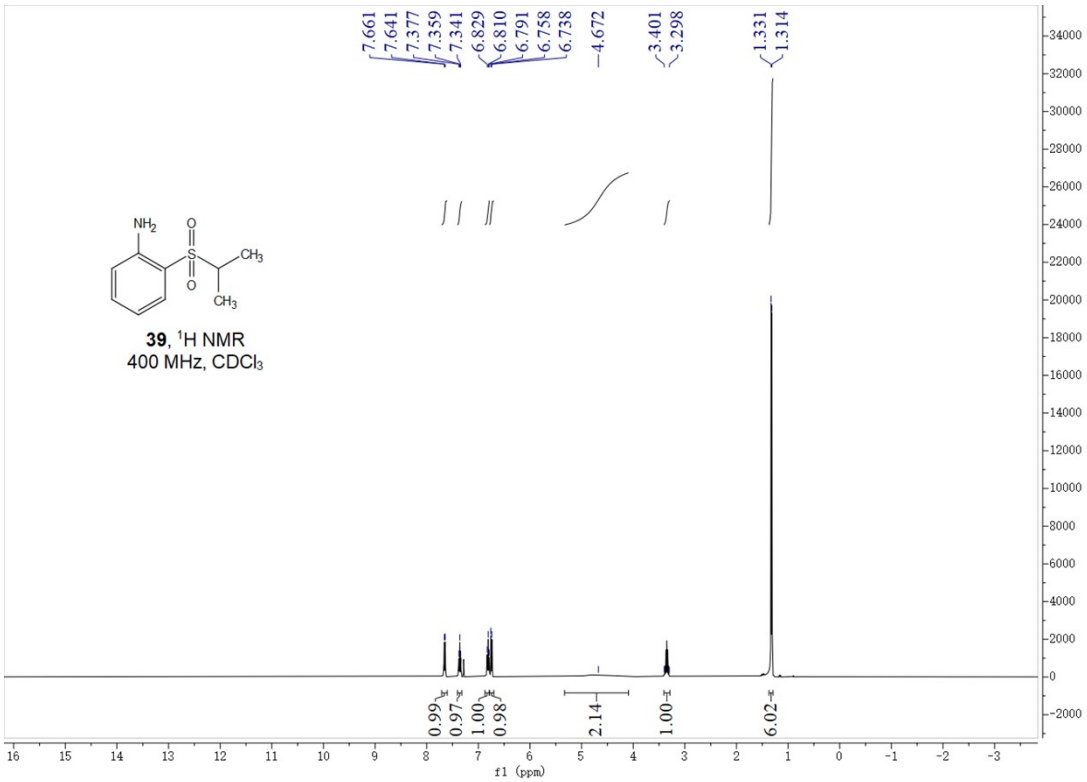
38A, ^{13}C NMR
100 MHz, $CDCl_3$



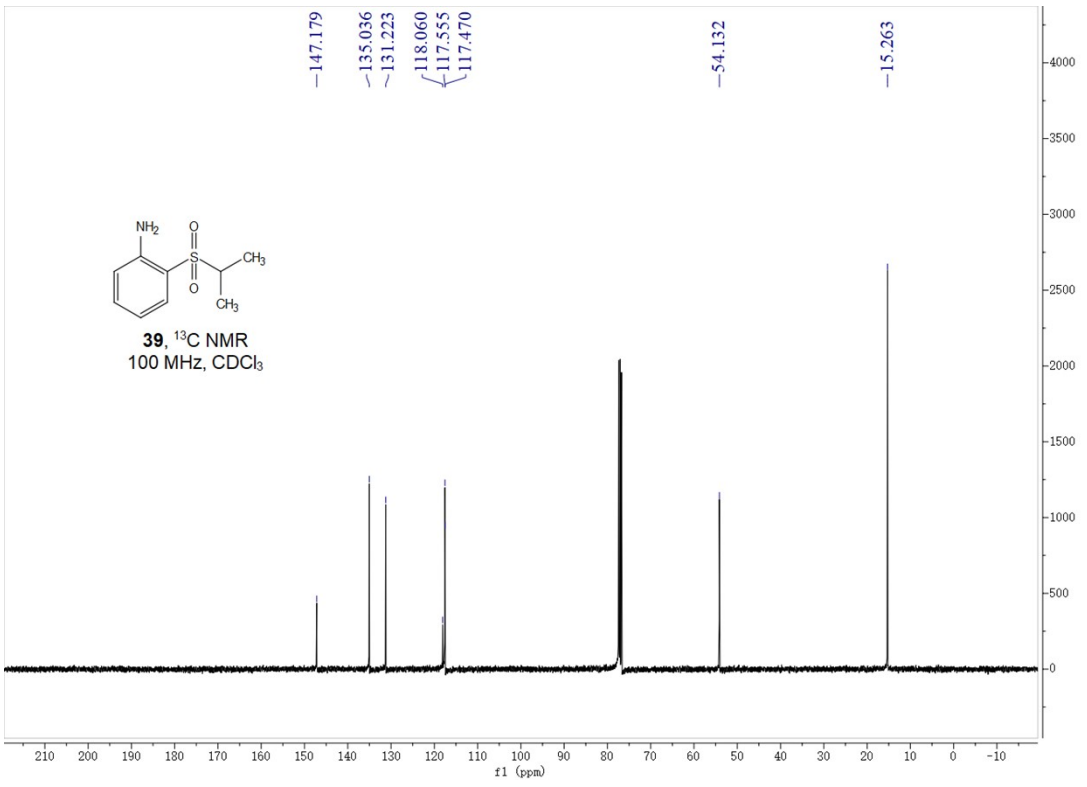
38B, ^{1}H NMR
400 MHz, $CDCl_3$



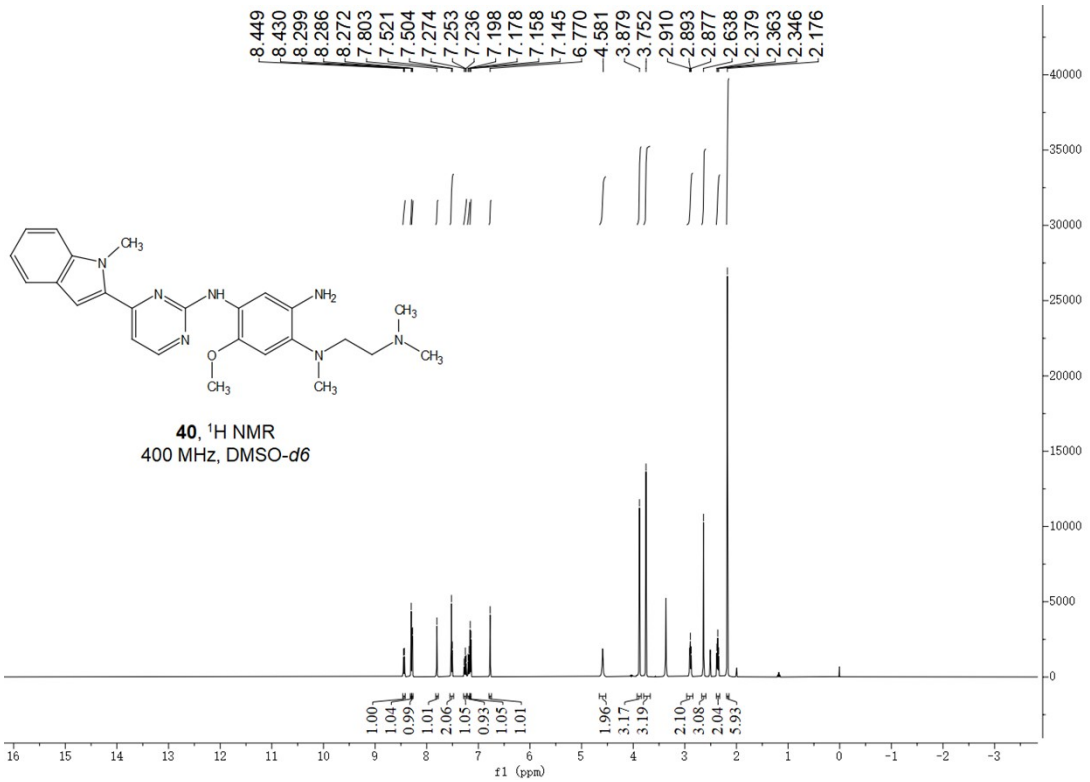
38B, ^{13}C NMR
100 MHz, $CDCl_3$



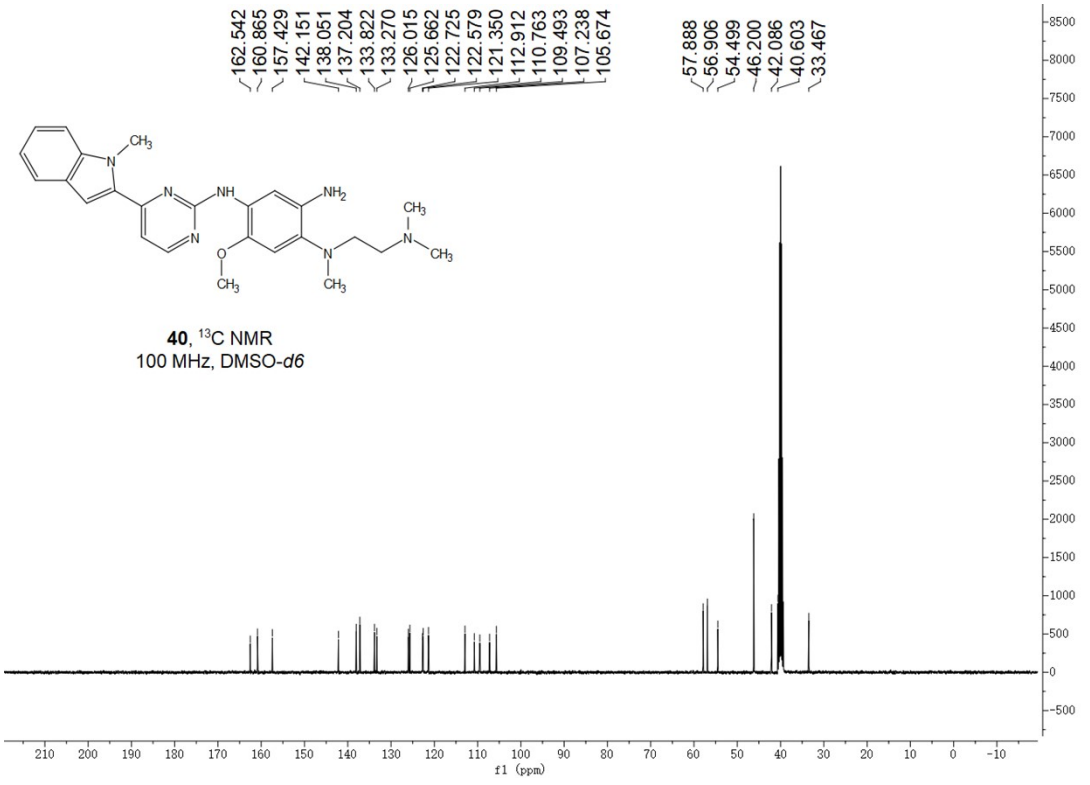
39, ^{1}H NMR
400 MHz, $CDCl_3$



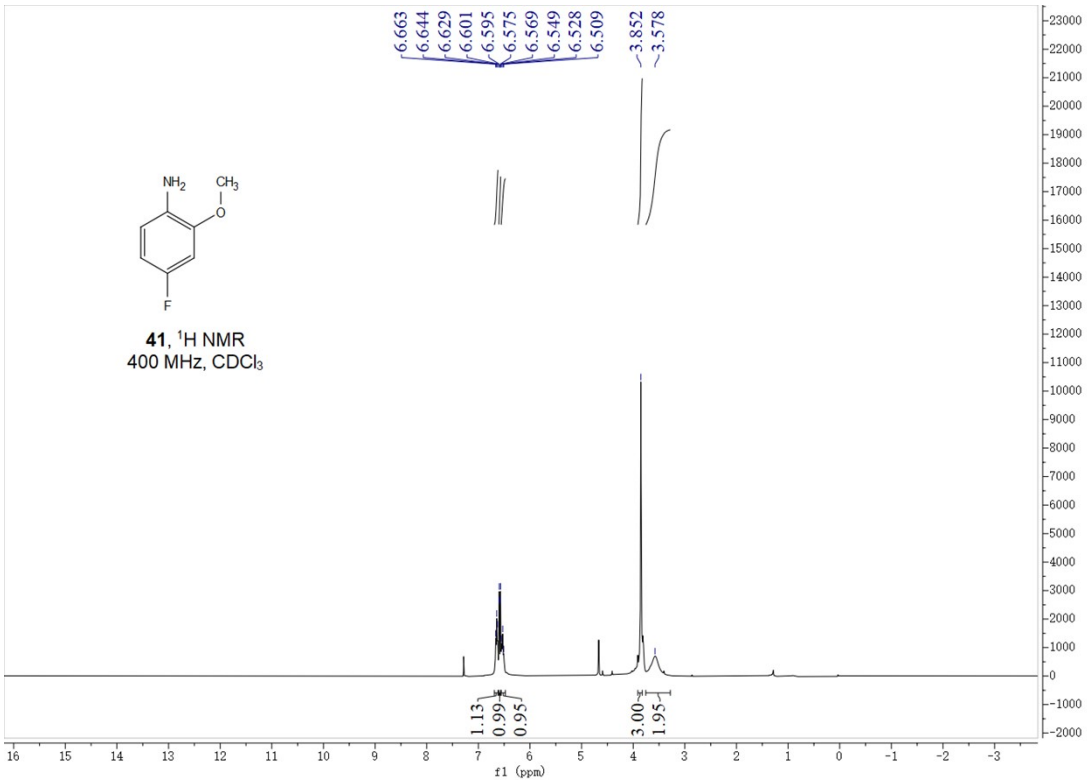
39, ^{13}C NMR
100 MHz, $CDCl_3$

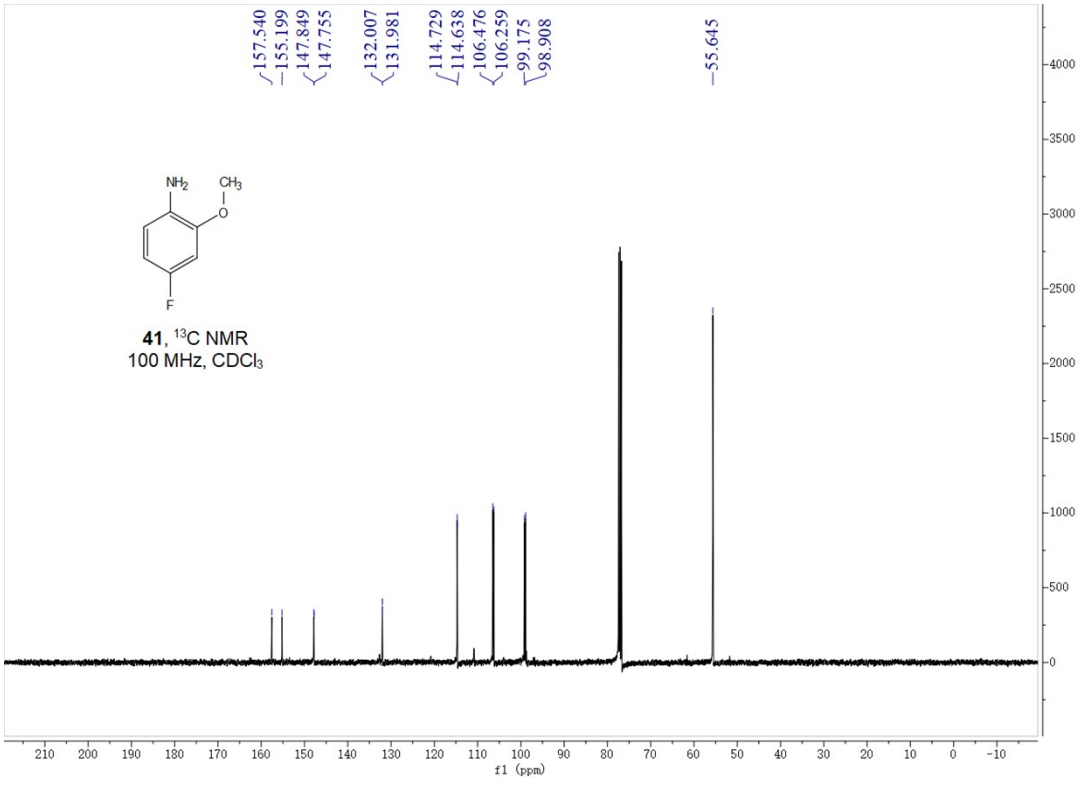


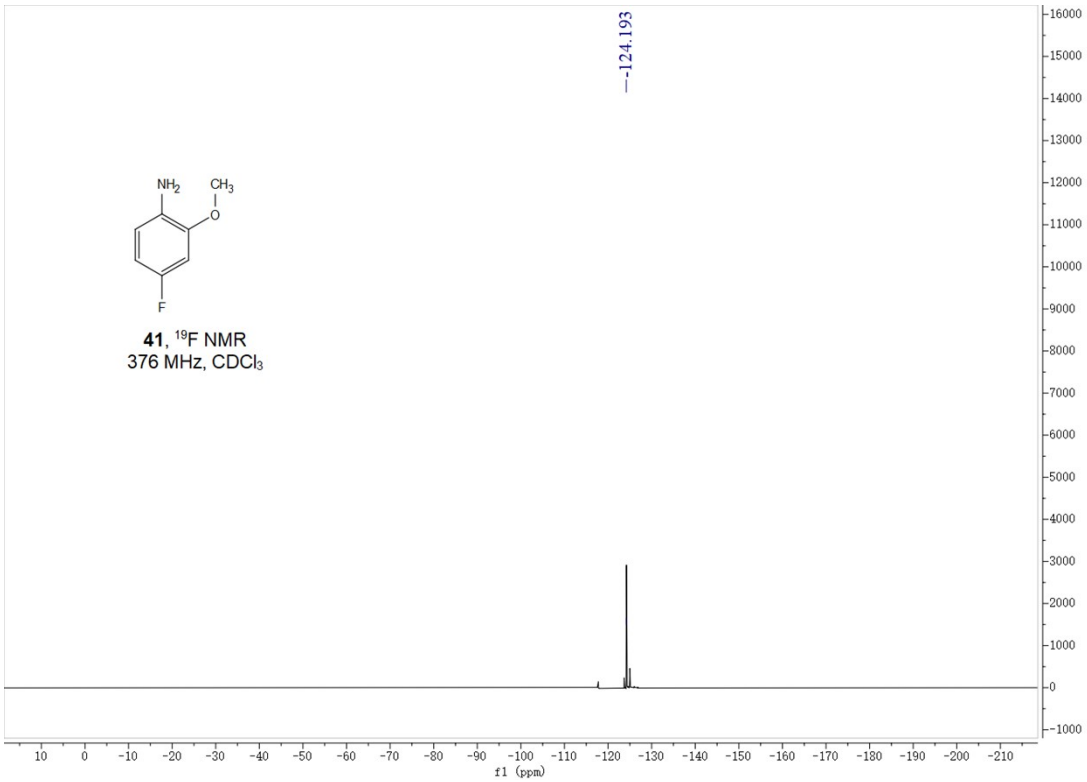
40, ^{1}H NMR
400 MHz, DMSO-*d6*



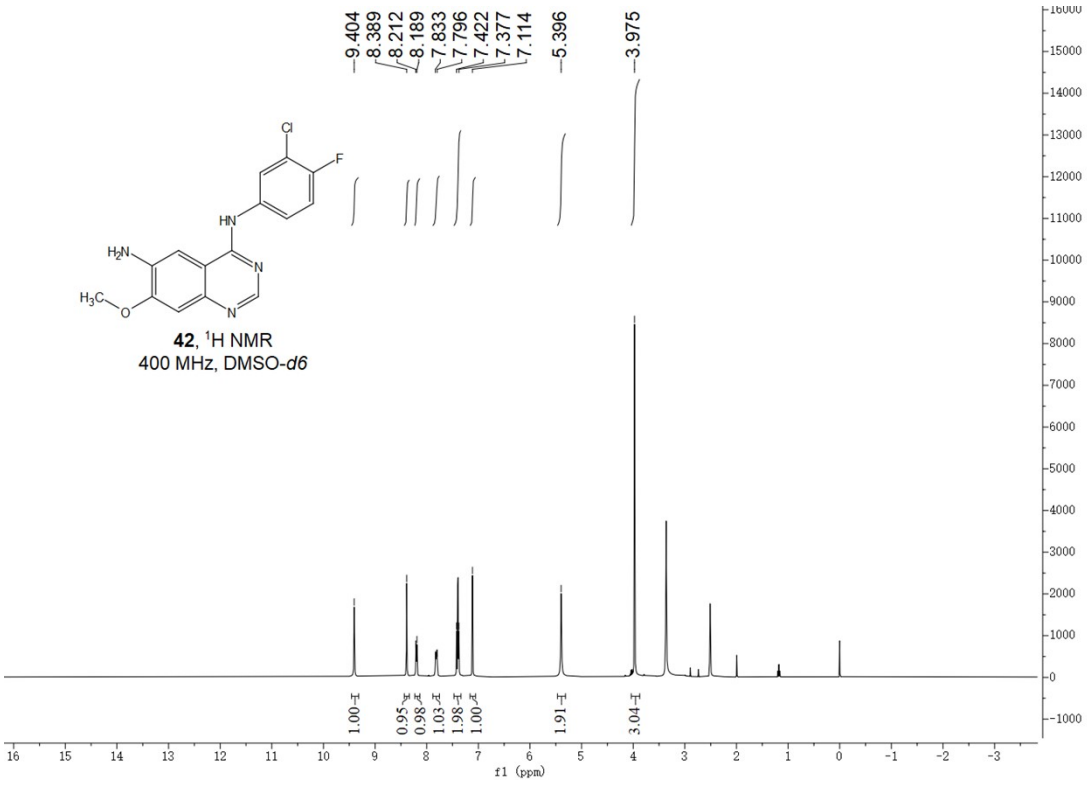
40, ^{13}C NMR
100 MHz, DMSO-*d6*


6.663
6.644
6.629
6.601
6.595
6.575
6.569
6.549
6.528
6.509
3.852
3.578
NH2
CH3
O
F
41, 1H NMR
400 MHz, CDCl3
1.13
0.99
0.95
3.00
1.95
f1 (ppm)

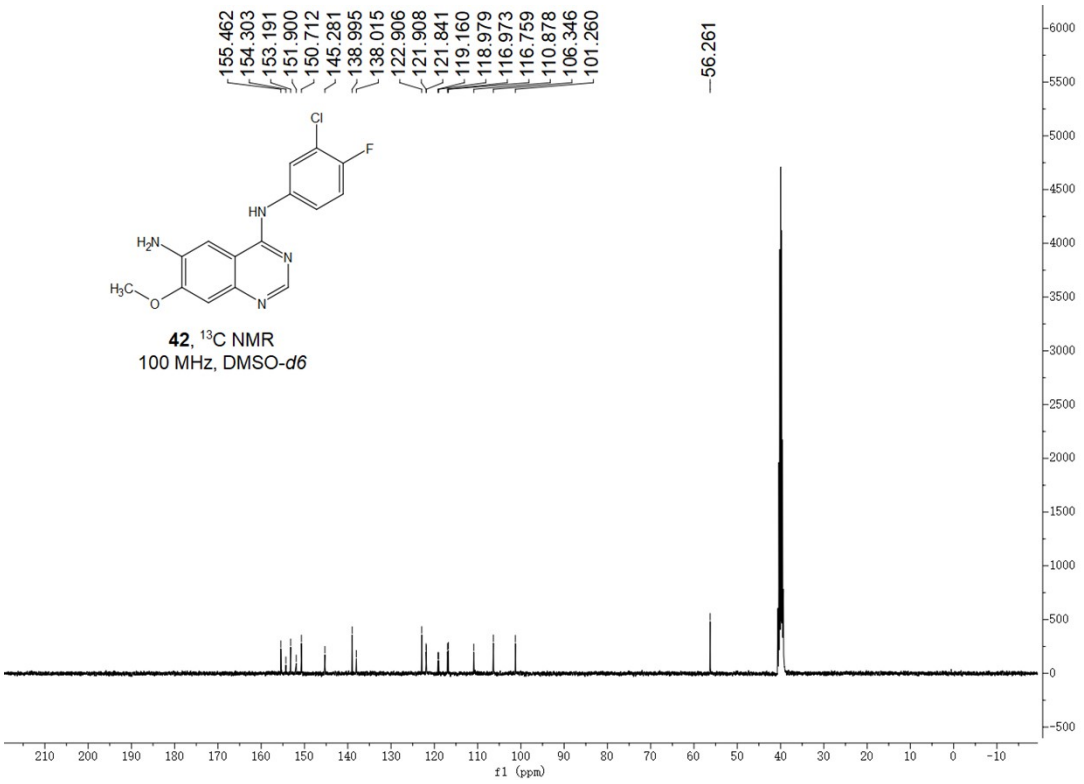

157.540
155.199
147.849
147.755
132.007
131.981
114.729
114.638
106.476
106.259
99.175
98.908
55.645
NH2
CH3
O
F
41, 13C NMR
100 MHz, CDCl3
f1 (ppm)



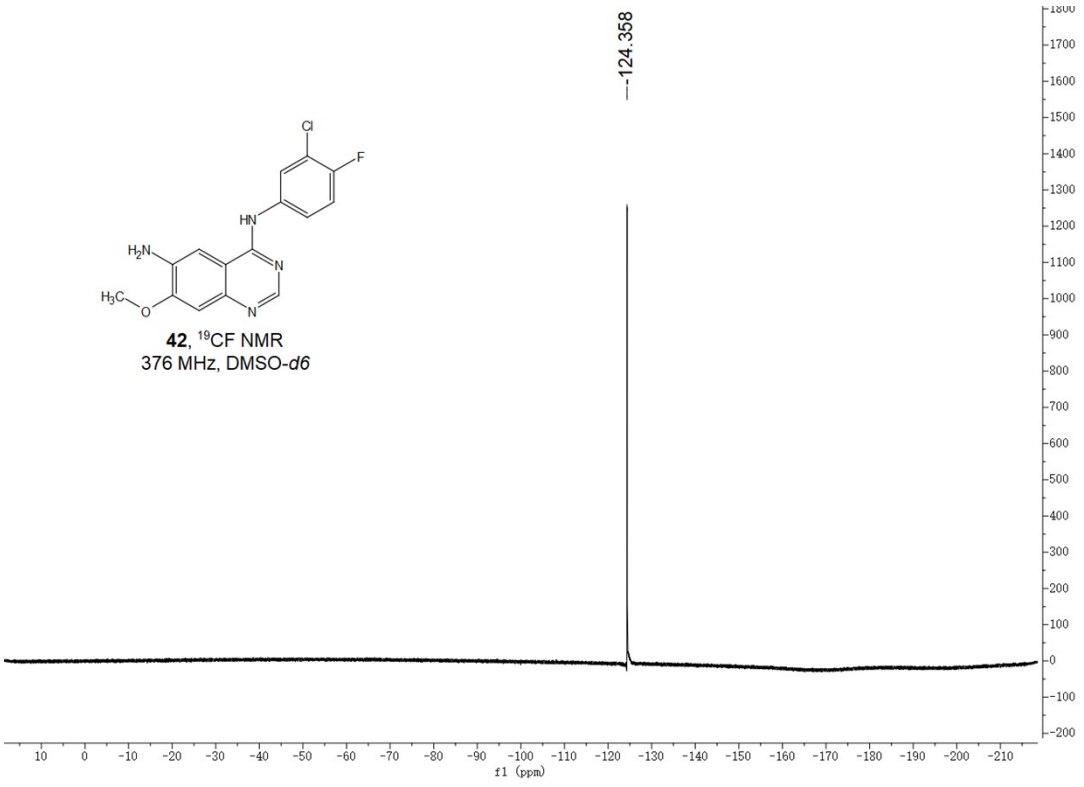
41, ^{19}F NMR
376 MHz, $CDCl_3$



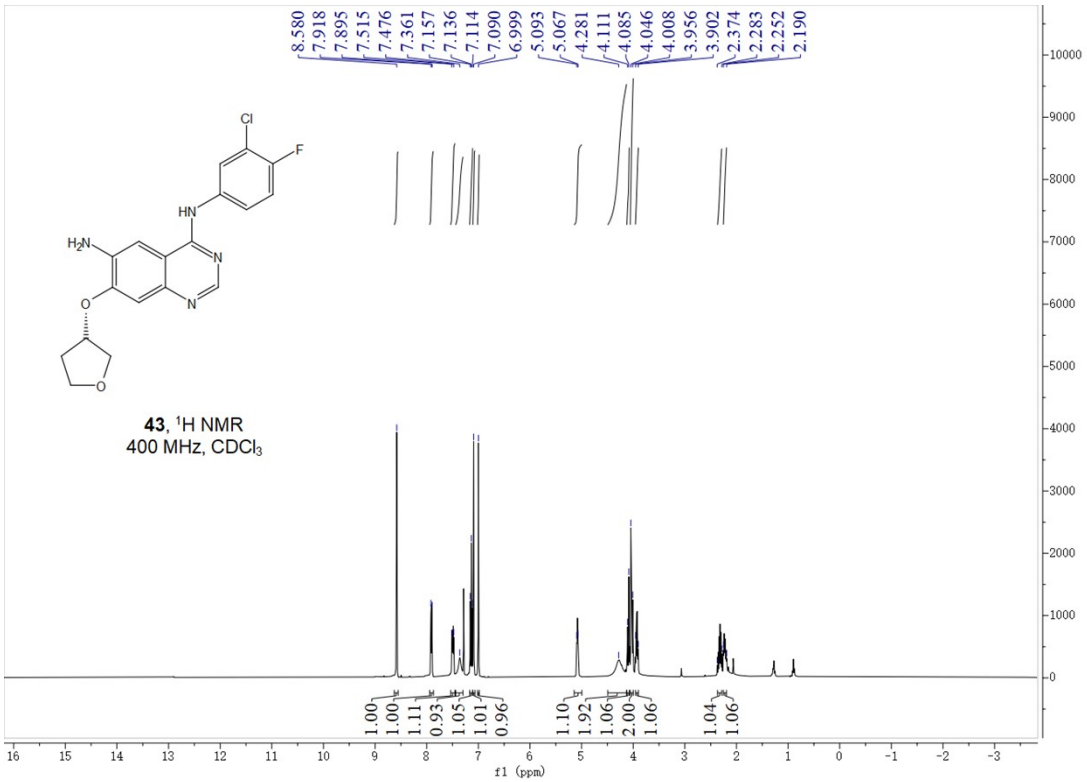
42, ^{1}H NMR
400 MHz, DMSO-*d6*

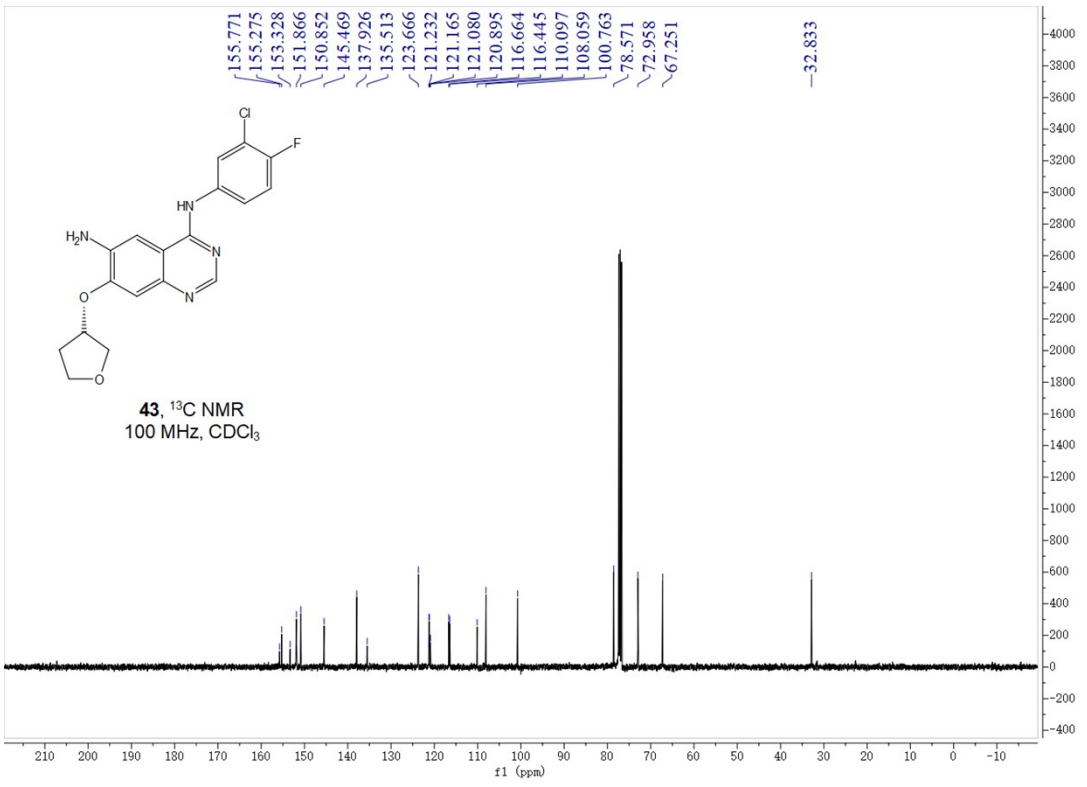


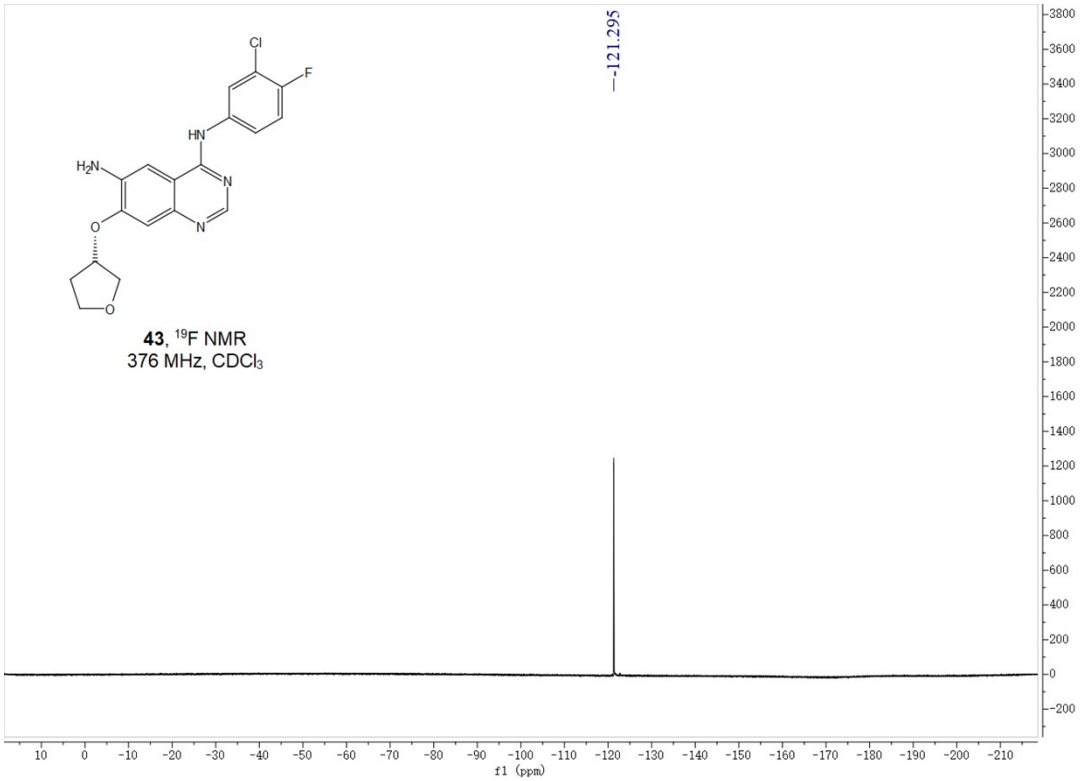
42, ^{13}C NMR
100 MHz, DMSO-*d6*



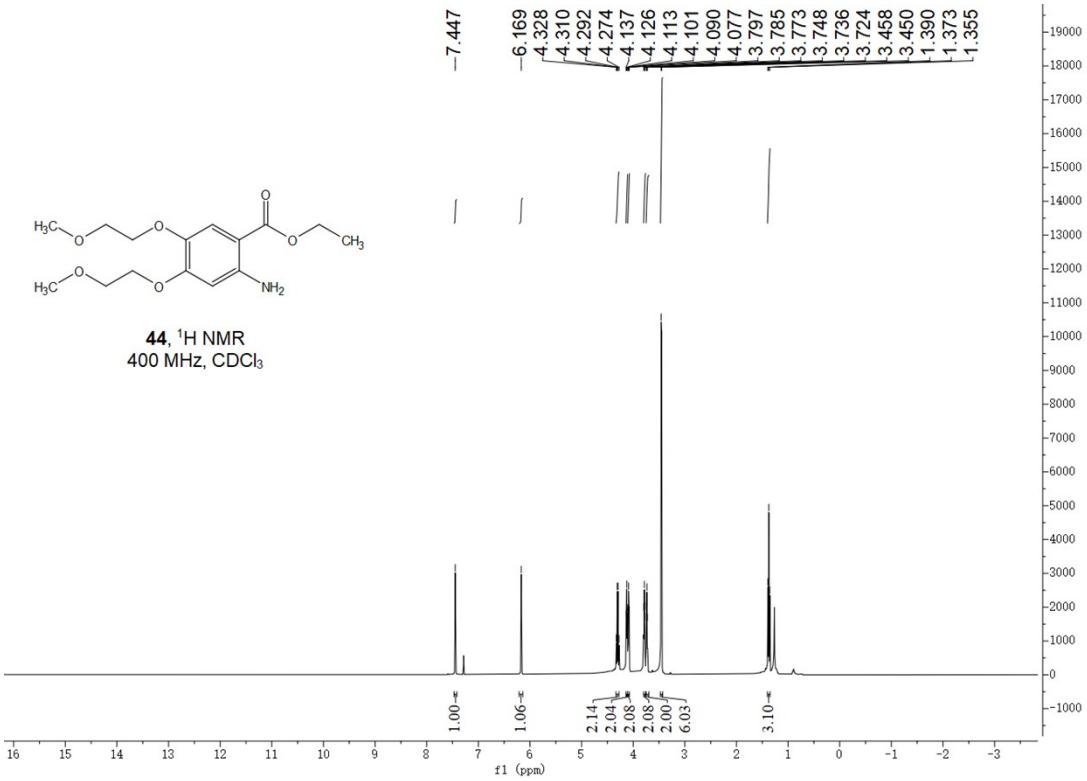
42, ^{19}CF NMR
376 MHz, DMSO-*d6*


8.580
7.918
7.895
7.515
7.476
7.361
7.157
7.136
7.114
7.090
6.999
5.093
5.067
4.281
4.111
4.085
4.046
4.008
3.956
3.902
2.374
2.283
2.252
2.190
Cl
F
HN
H2N
N
N
O
O
43, 1H NMR
400 MHz, CDCl3
1.00
1.00
1.11
0.93
1.05
1.01
0.96
1.10
1.92
1.06
2.00
1.06
1.04
1.06
f1 (ppm)

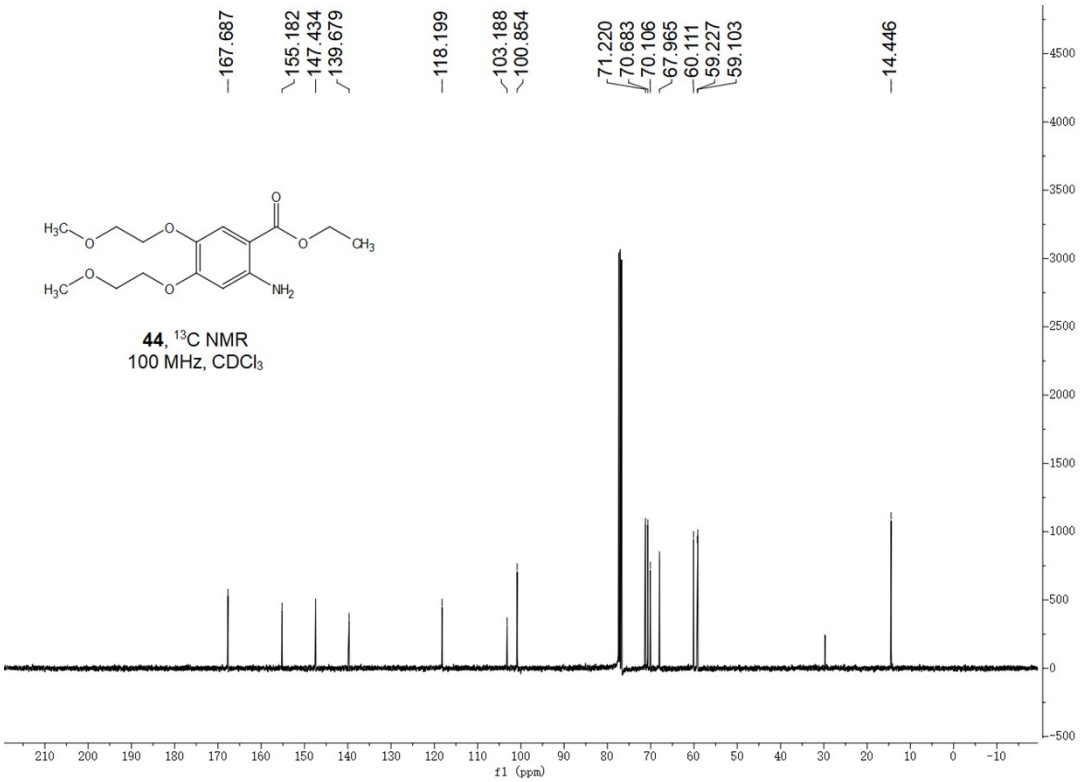

155.771
155.275
153.328
151.866
150.852
145.469
137.926
135.513
123.666
121.232
121.165
121.080
120.895
116.664
116.445
110.097
108.059
100.763
78.571
72.958
67.251
32.833
Cl
F
HN
H2N
N
N
O
O
43, 13C NMR
100 MHz, CDCl3
f1 (ppm)



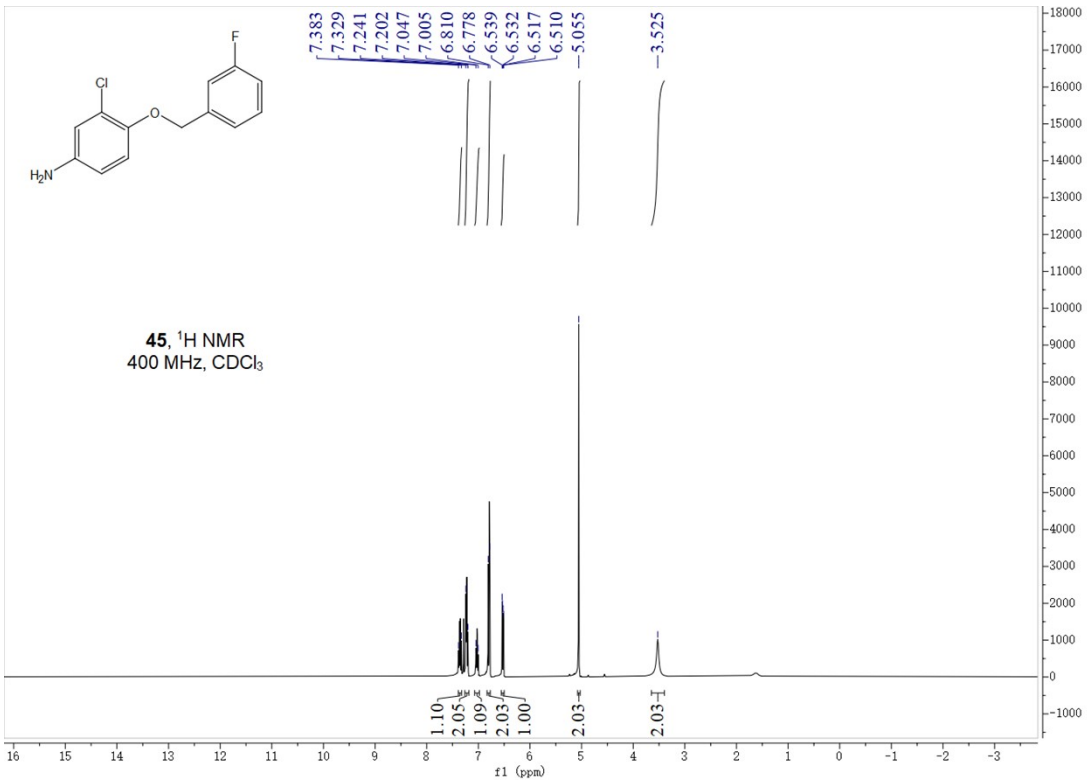
43, ^{19}F NMR
376 MHz, $CDCl_3$



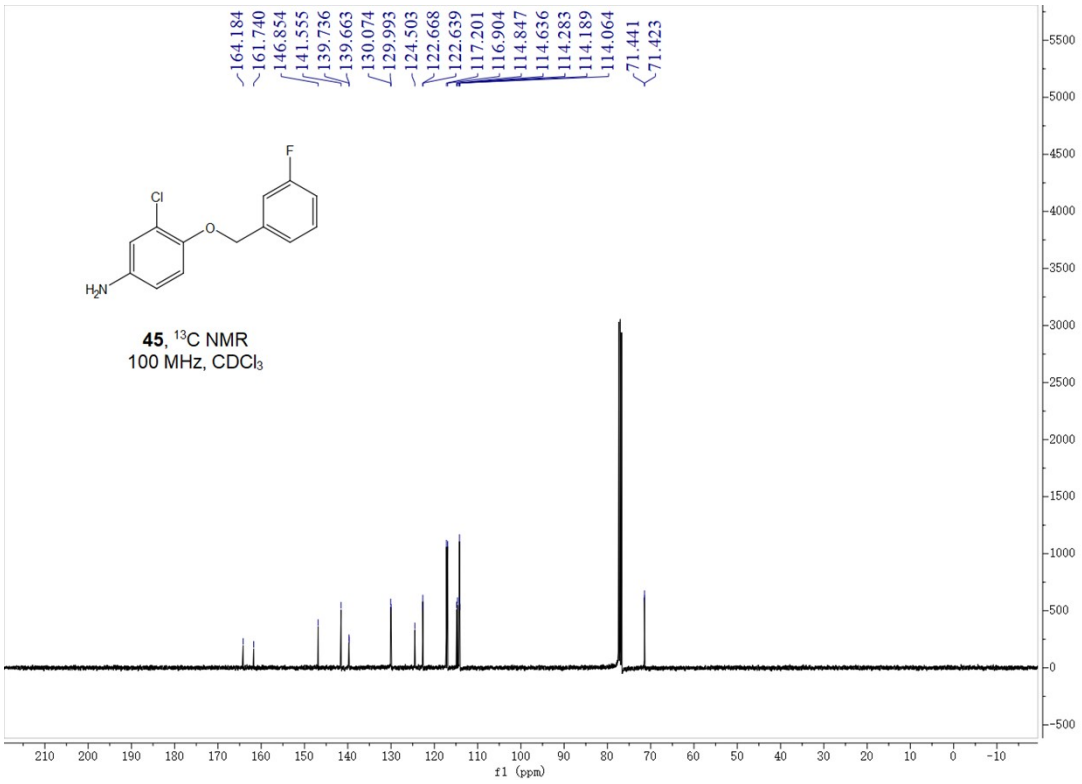
44, ^{1}H NMR
400 MHz, $CDCl_3$

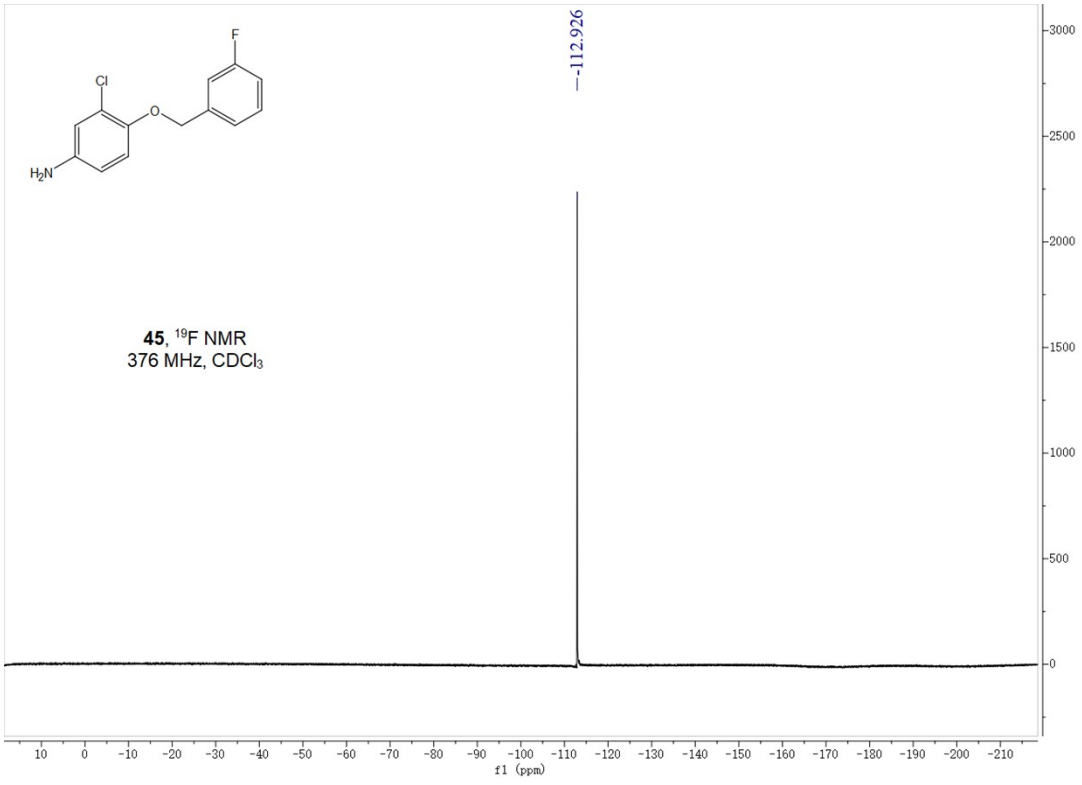


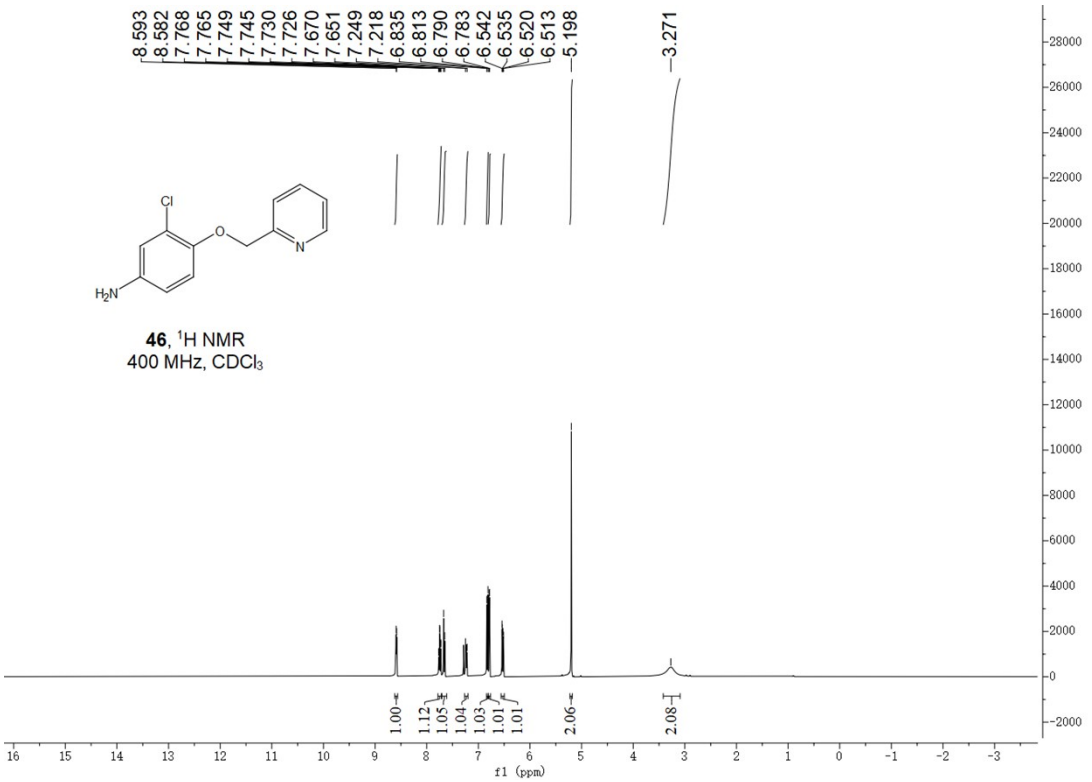
44, ^{13}C NMR
100 MHz, $CDCl_3$



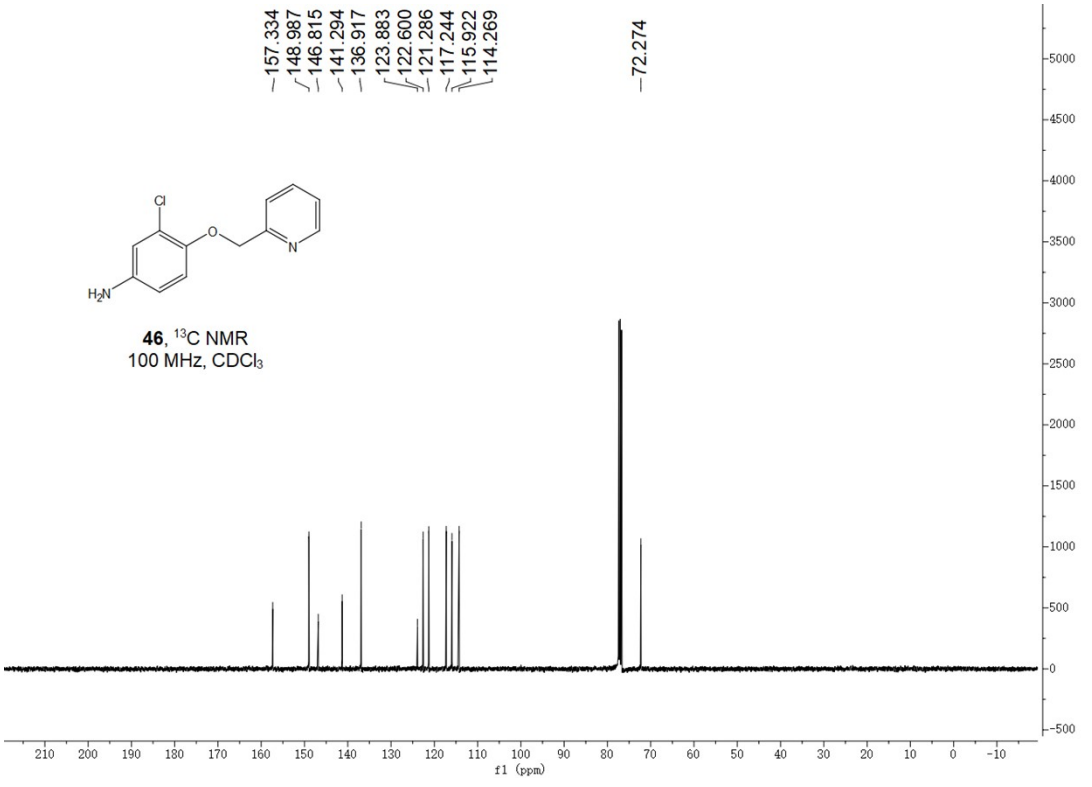
45, ^{1}H NMR
400 MHz, $CDCl_3$


164.184
161.740
146.854
141.555
139.736
139.663
130.074
129.993
124.503
122.668
122.639
117.201
116.904
114.847
114.636
114.283
114.189
114.064
71.441
71.423
F
Cl
O
H2N
45, 13C NMR
100 MHz, CDCl3
f1 (ppm)

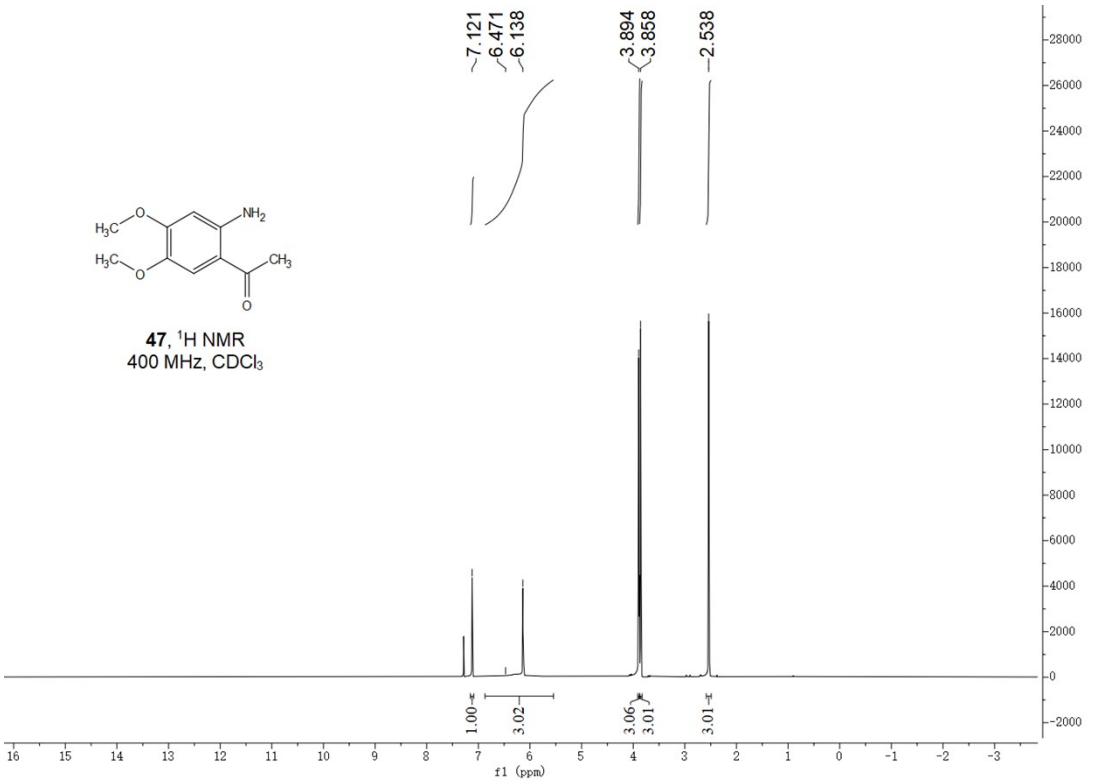

-112.926
F
Cl
O
H2N
45, 19F NMR
376 MHz, CDCl3
f1 (ppm)



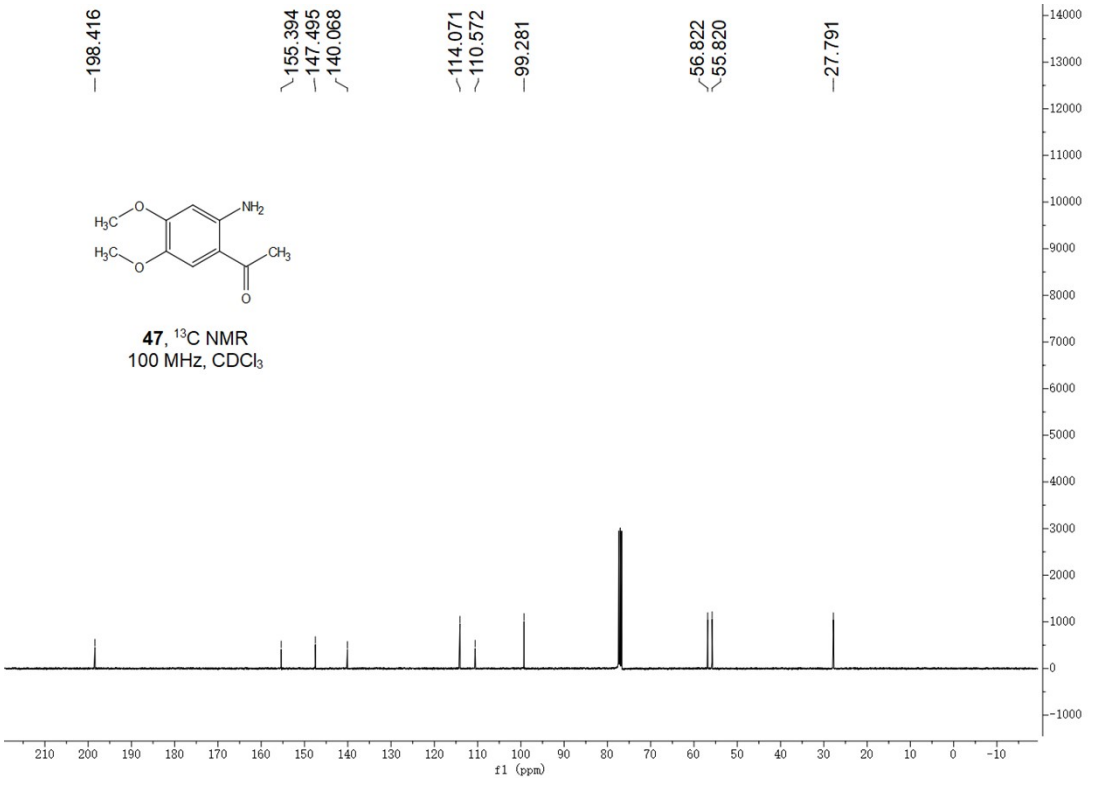
46, ^{1}H NMR
400 MHz, $CDCl_3$



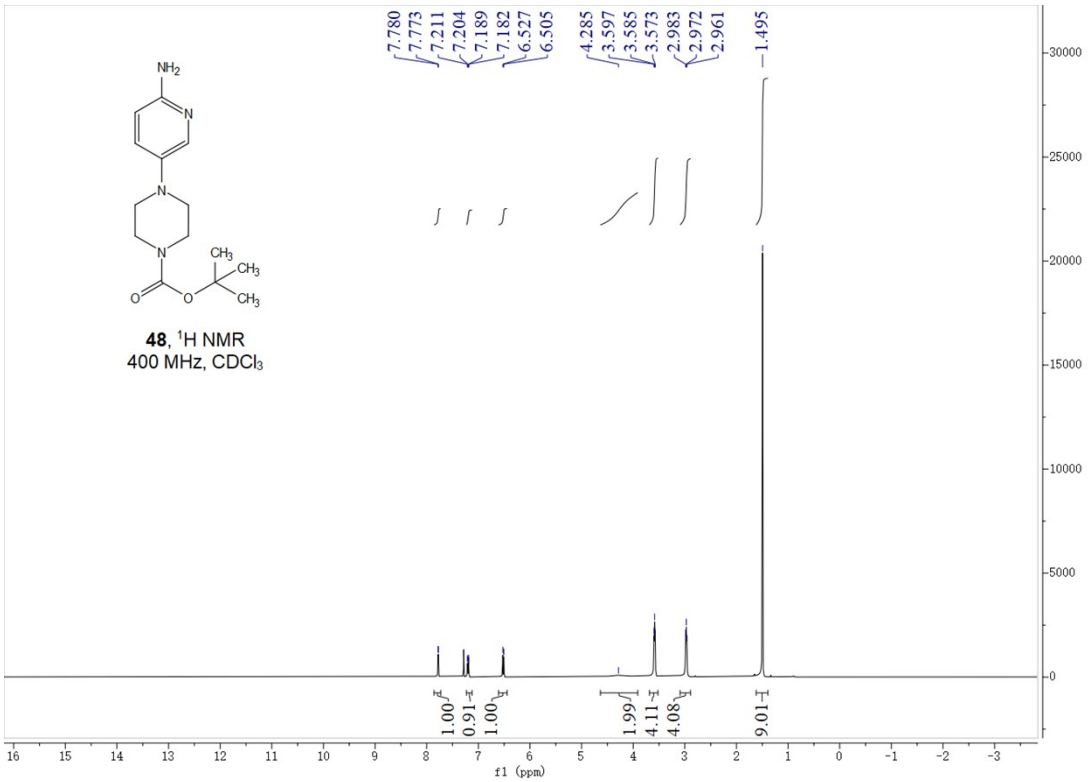
46, ^{13}C NMR
100 MHz, $CDCl_3$



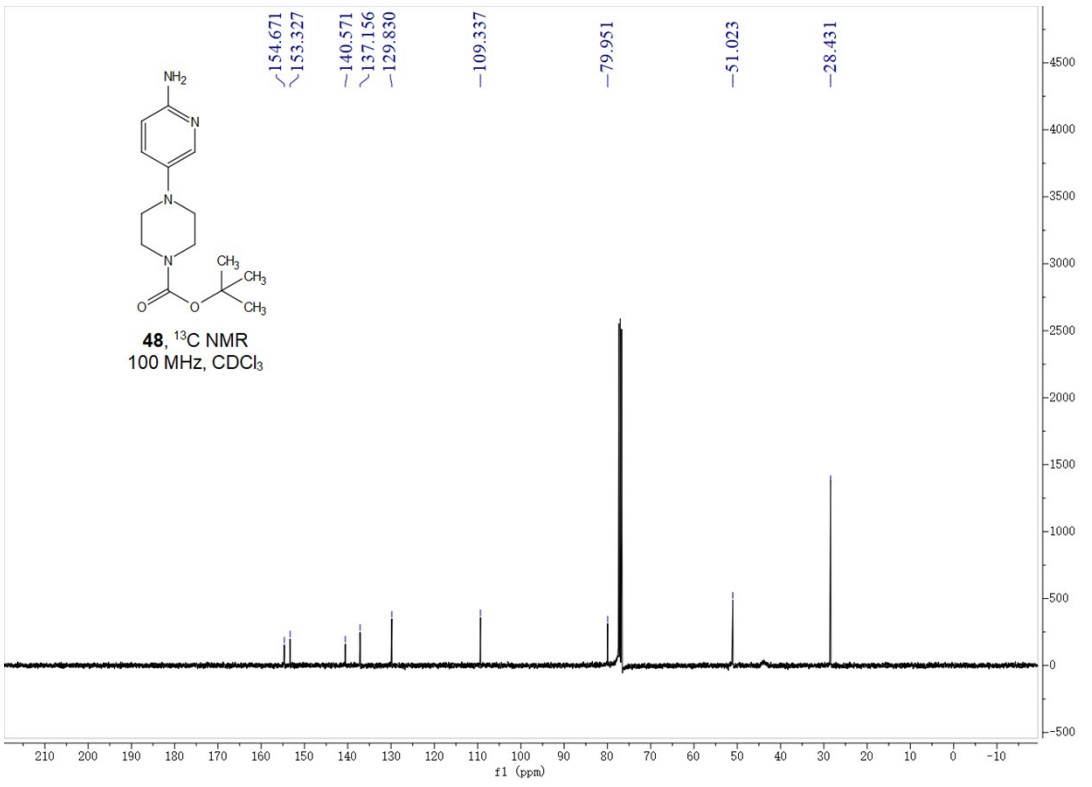
47, ^{1}H NMR
400 MHz, $CDCl_3$



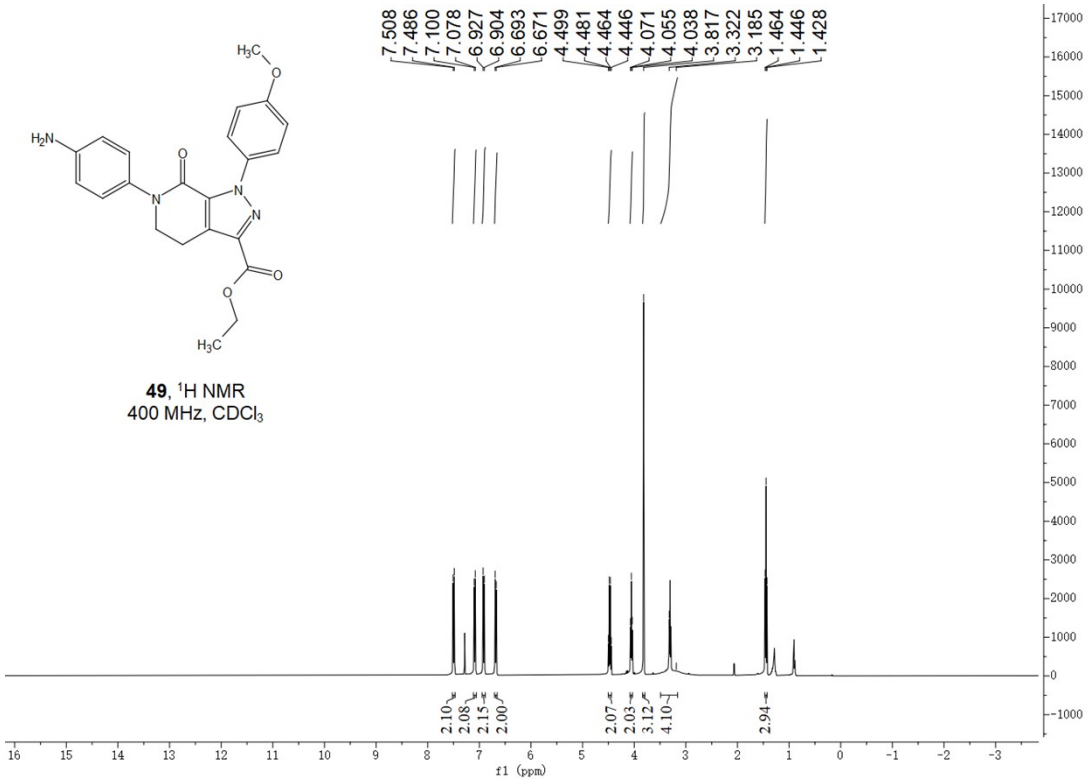
47, ^{13}C NMR
100 MHz, $CDCl_3$



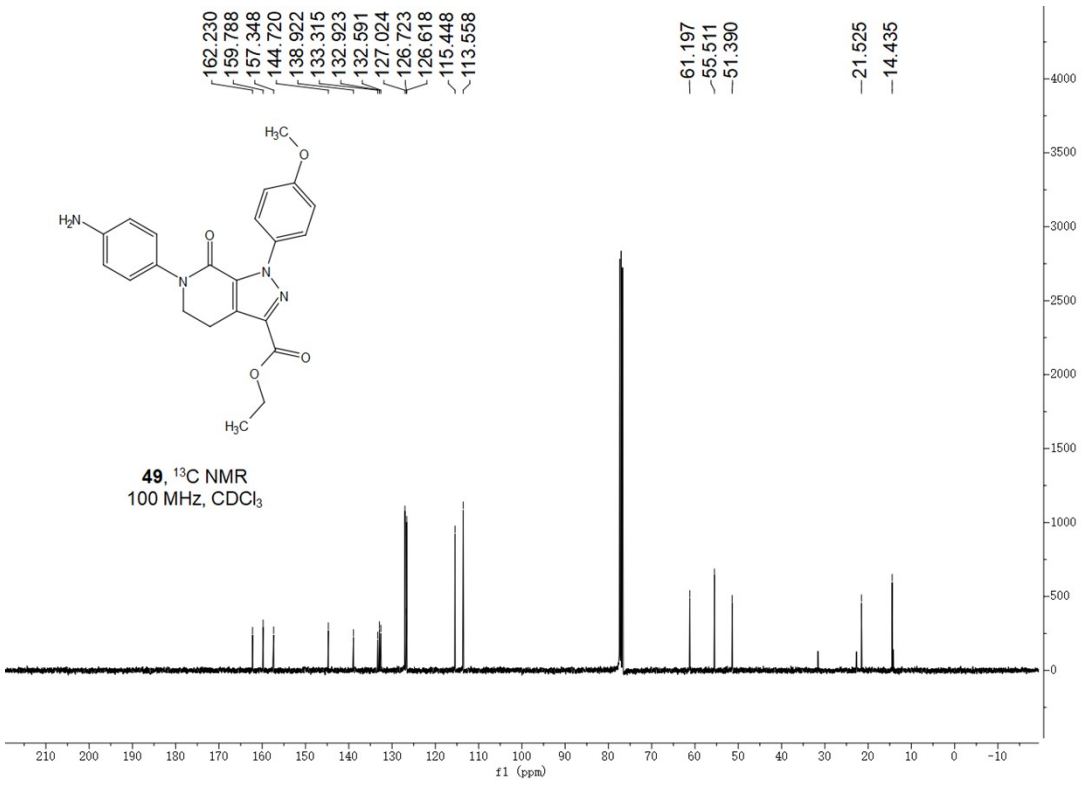
48, ^{1}H NMR
400 MHz, $CDCl_3$



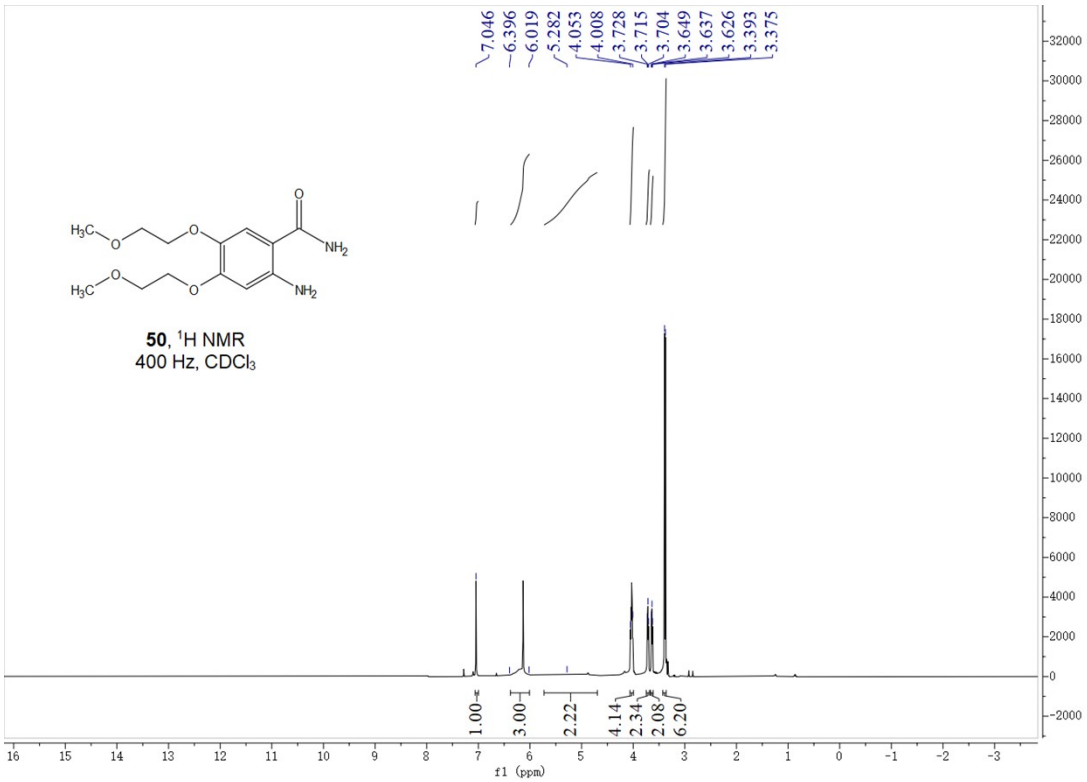
48, ^{13}C NMR
100 MHz, $CDCl_3$



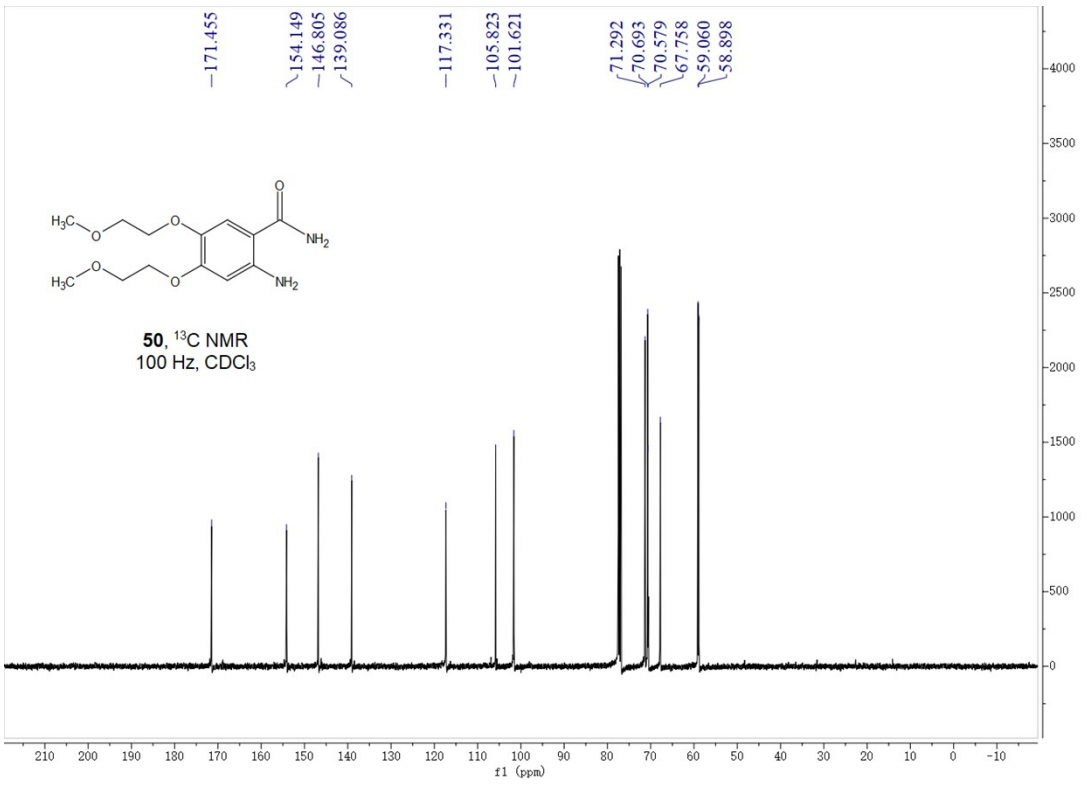
49, ^{1}H NMR
400 MHz, $CDCl_3$



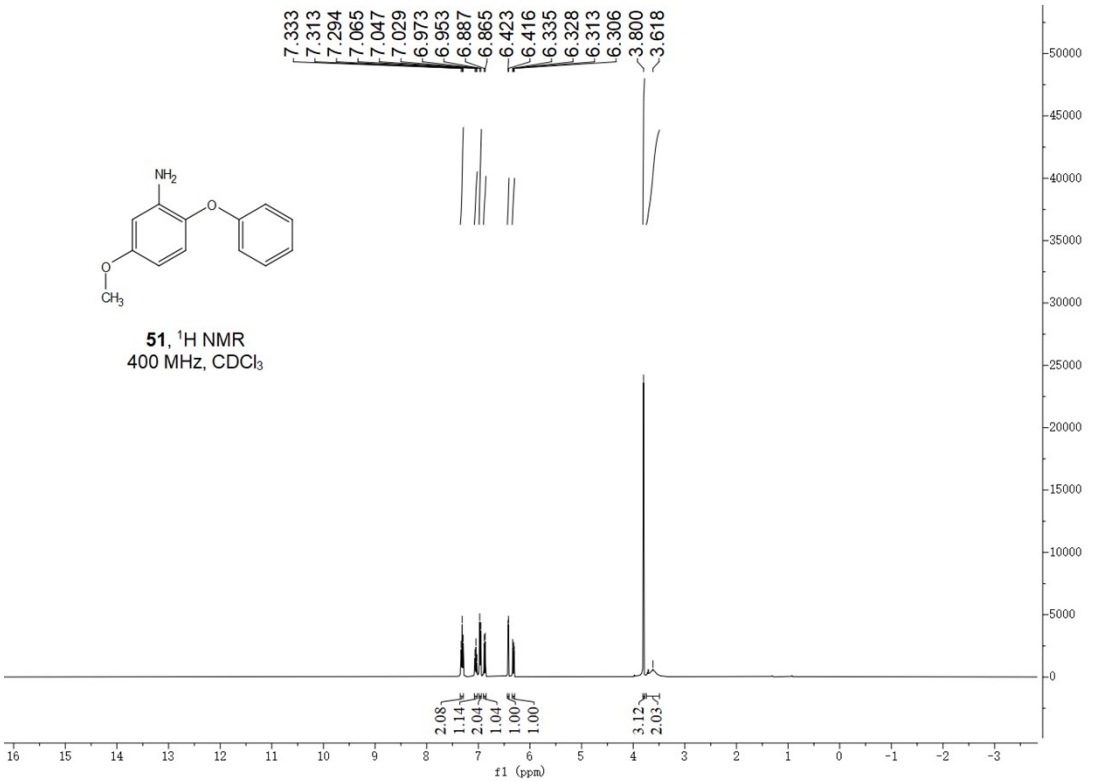
49, ^{13}C NMR
100 MHz, $CDCl_3$



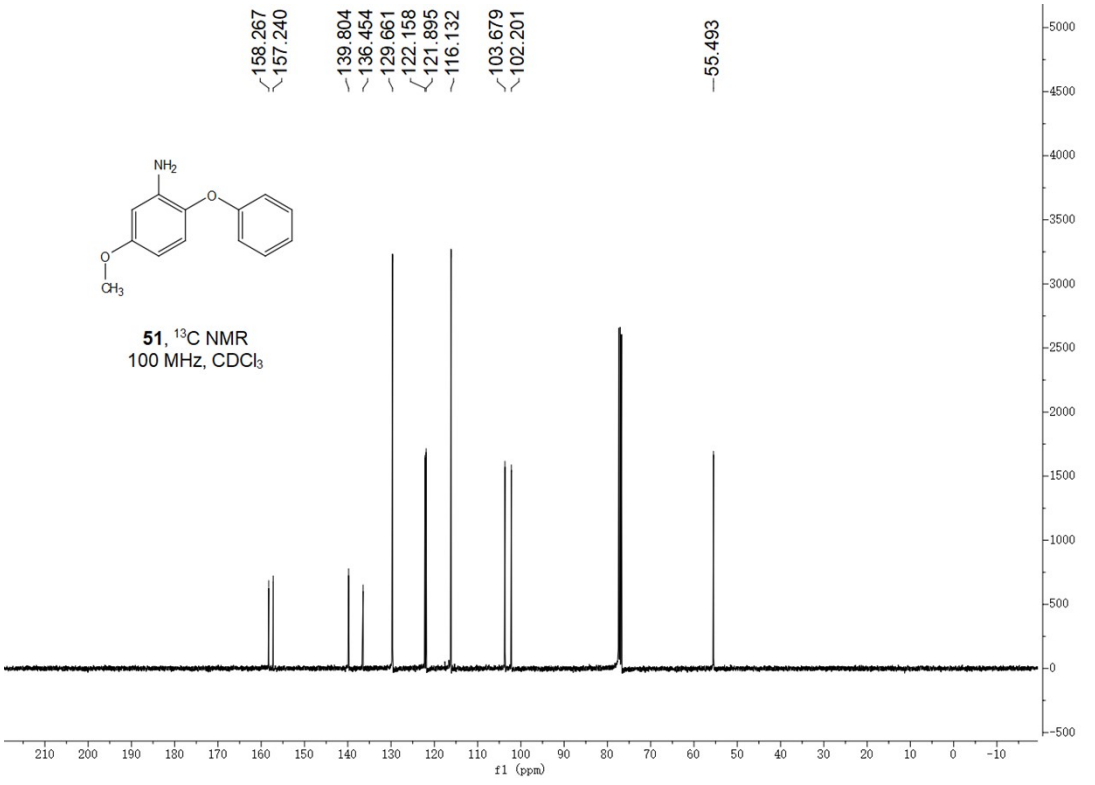
50, ^{1}H NMR
400 Hz, $CDCl_3$



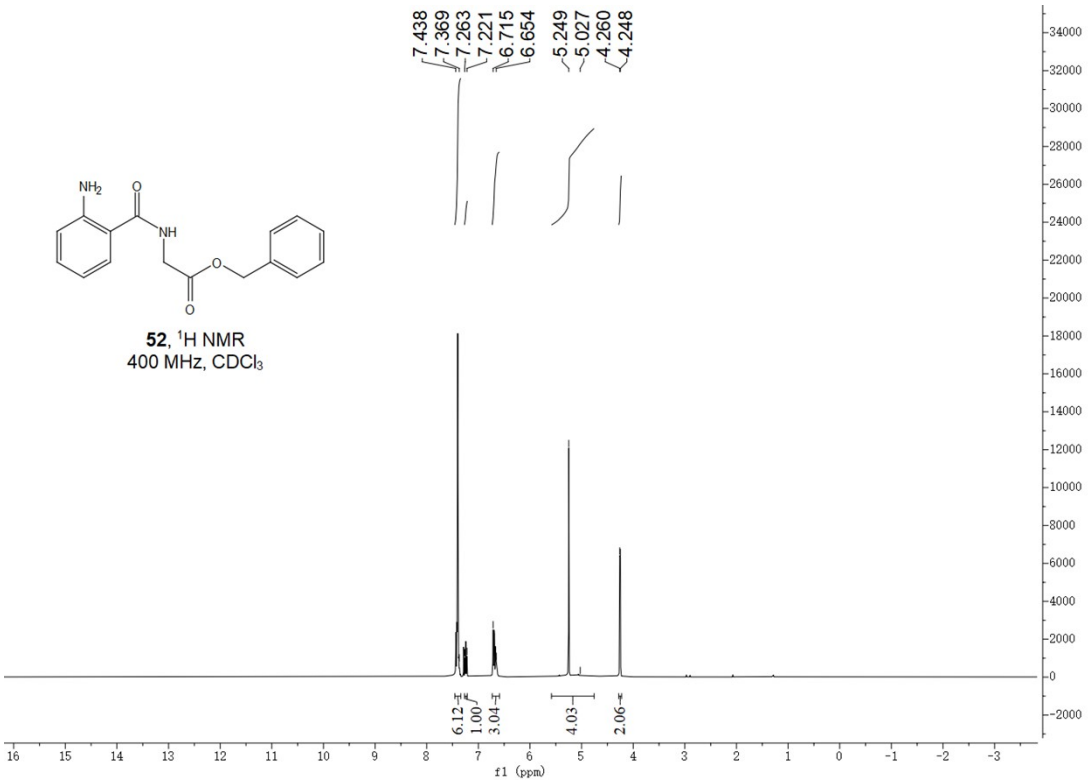
50, ^{13}C NMR
100 Hz, $CDCl_3$



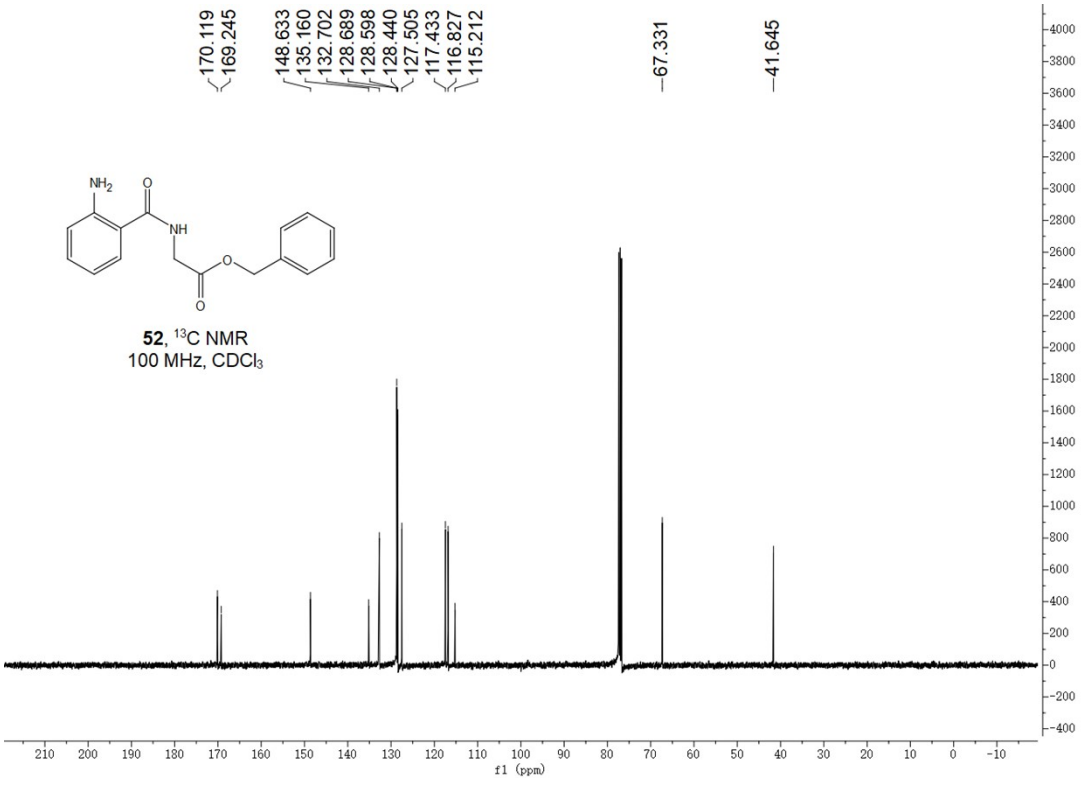
51, ^{1}H NMR
400 MHz, $CDCl_3$



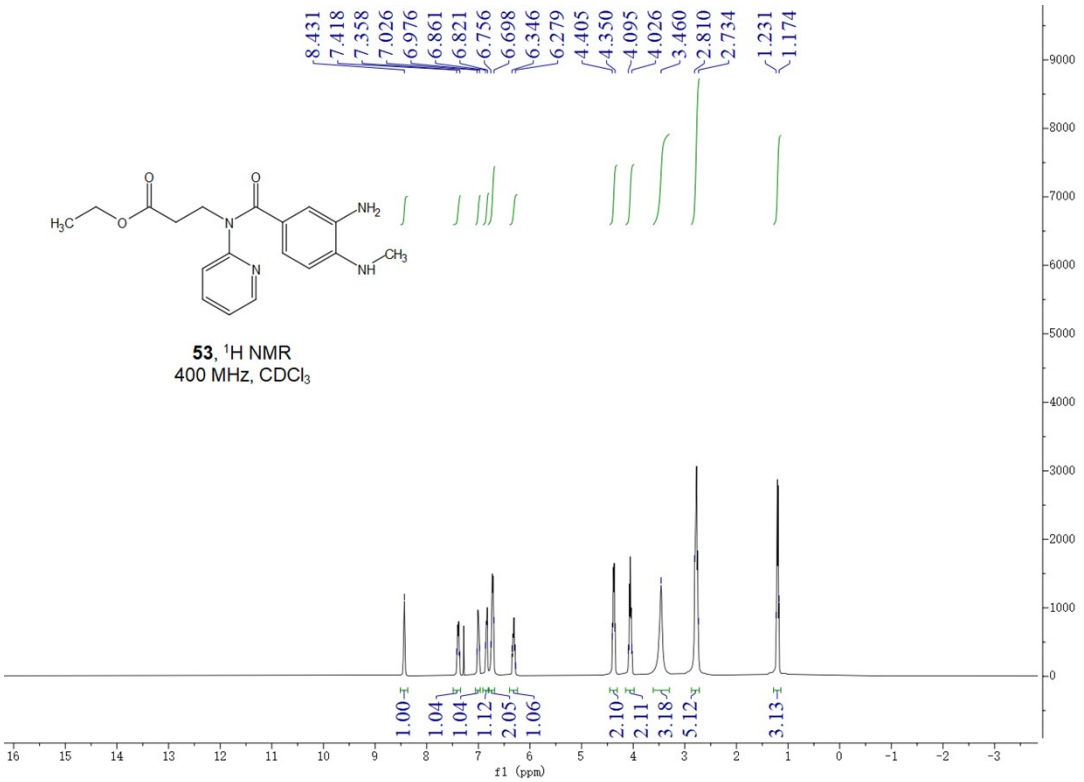
51, ^{13}C NMR
100 MHz, $CDCl_3$



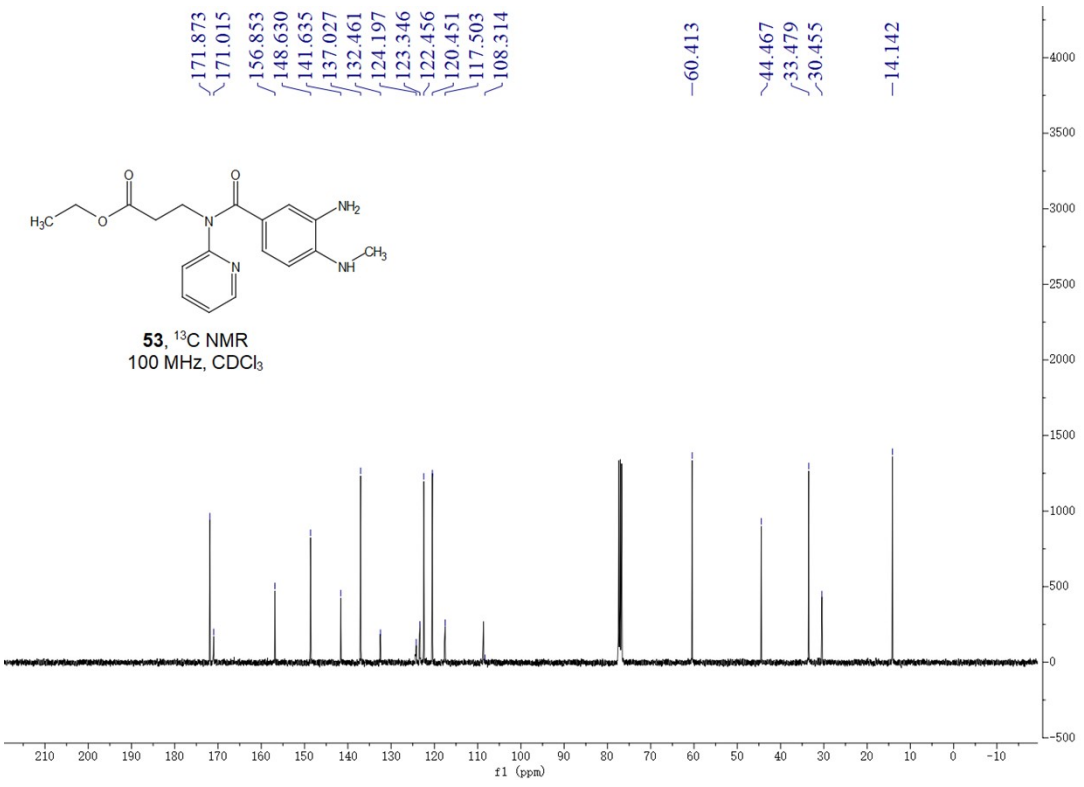
52, ^{1}H NMR
400 MHz, $CDCl_3$



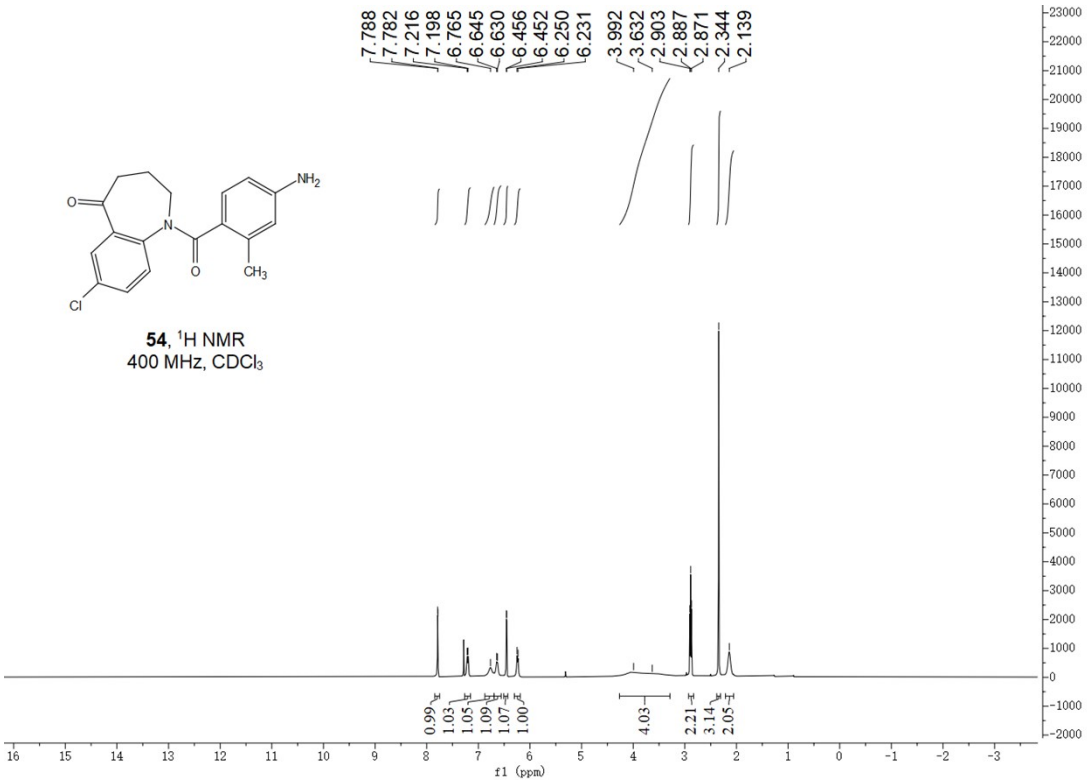
52, ^{13}C NMR
100 MHz, $CDCl_3$



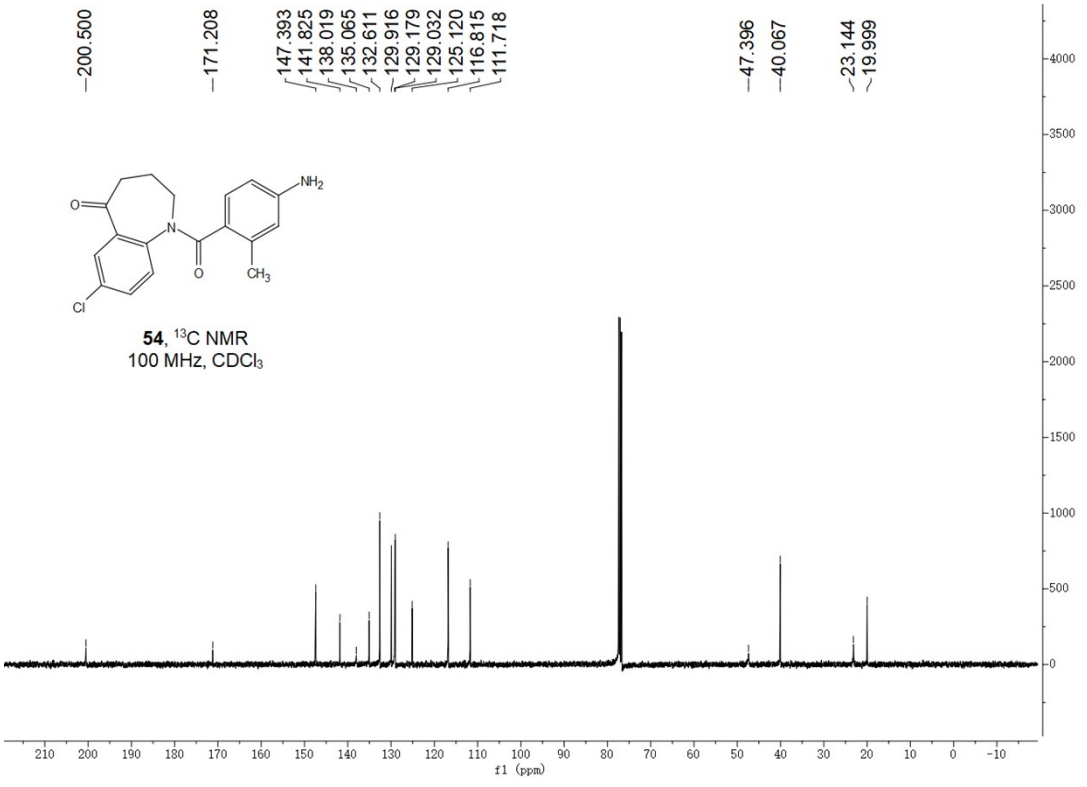
53, ^{1}H NMR
400 MHz, $CDCl_3$



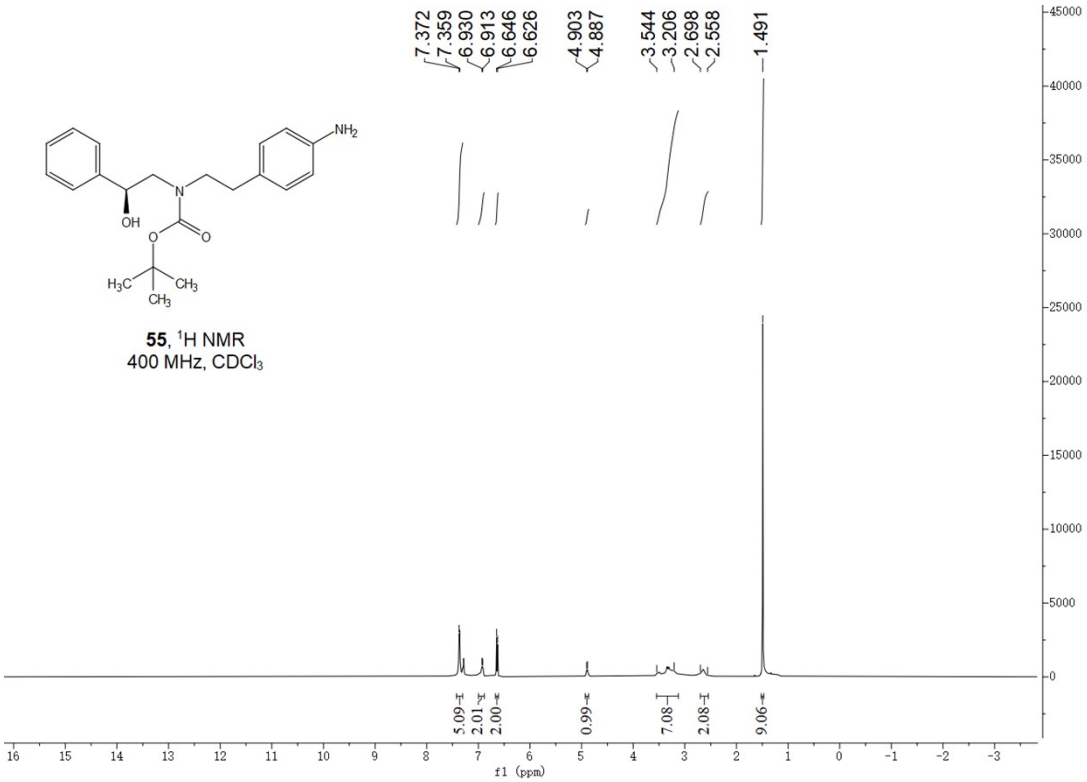
53, ^{13}C NMR
100 MHz, $CDCl_3$



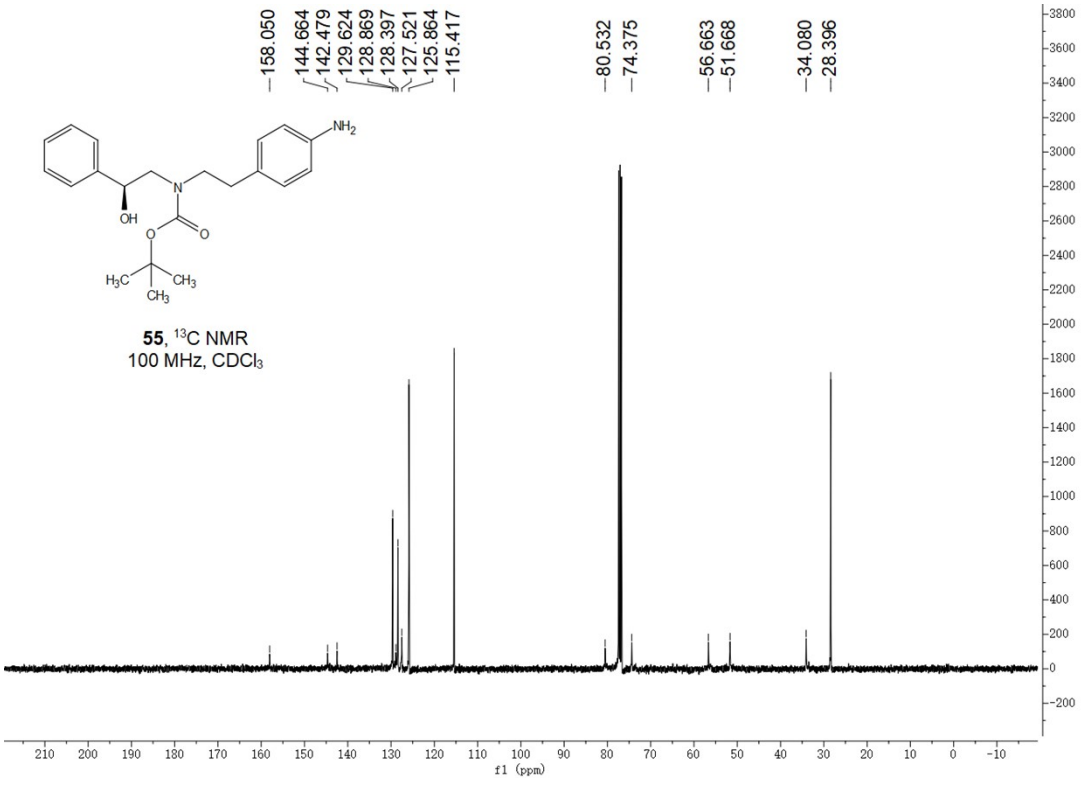
54, ^{1}H NMR
400 MHz, $CDCl_3$



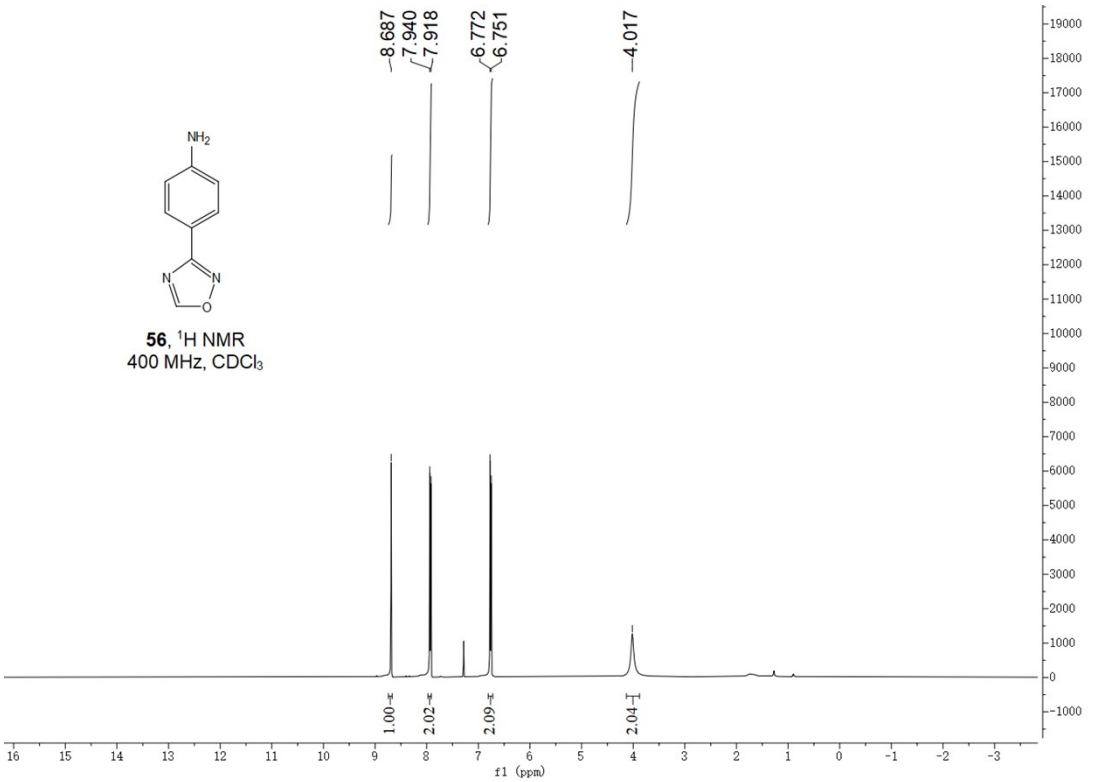
54, ^{13}C NMR
100 MHz, $CDCl_3$



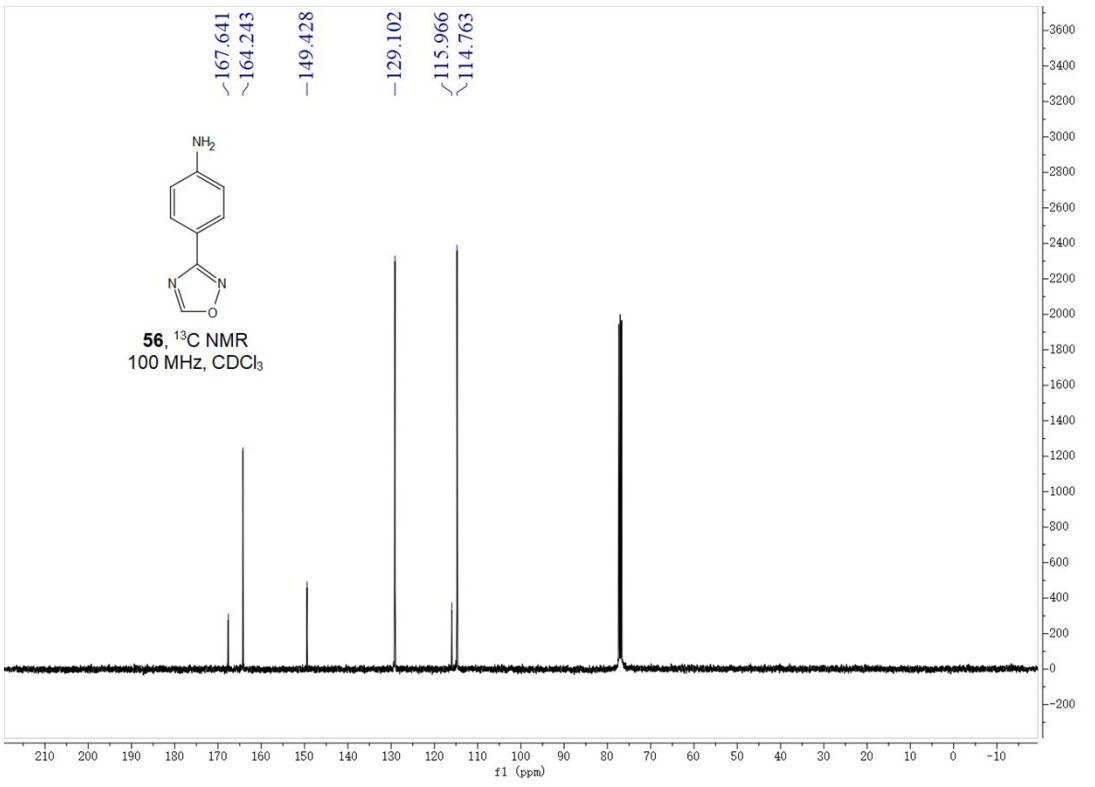
55, ^{1}H NMR
400 MHz, $CDCl_3$



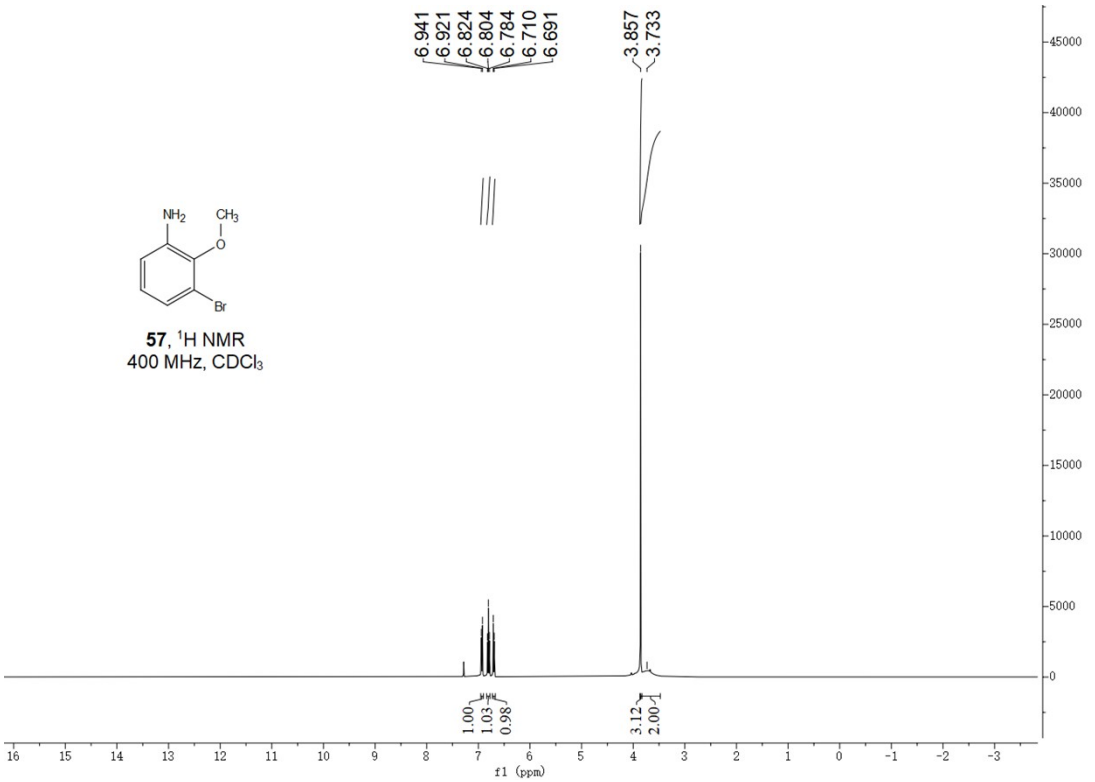
55, ^{13}C NMR
100 MHz, $CDCl_3$



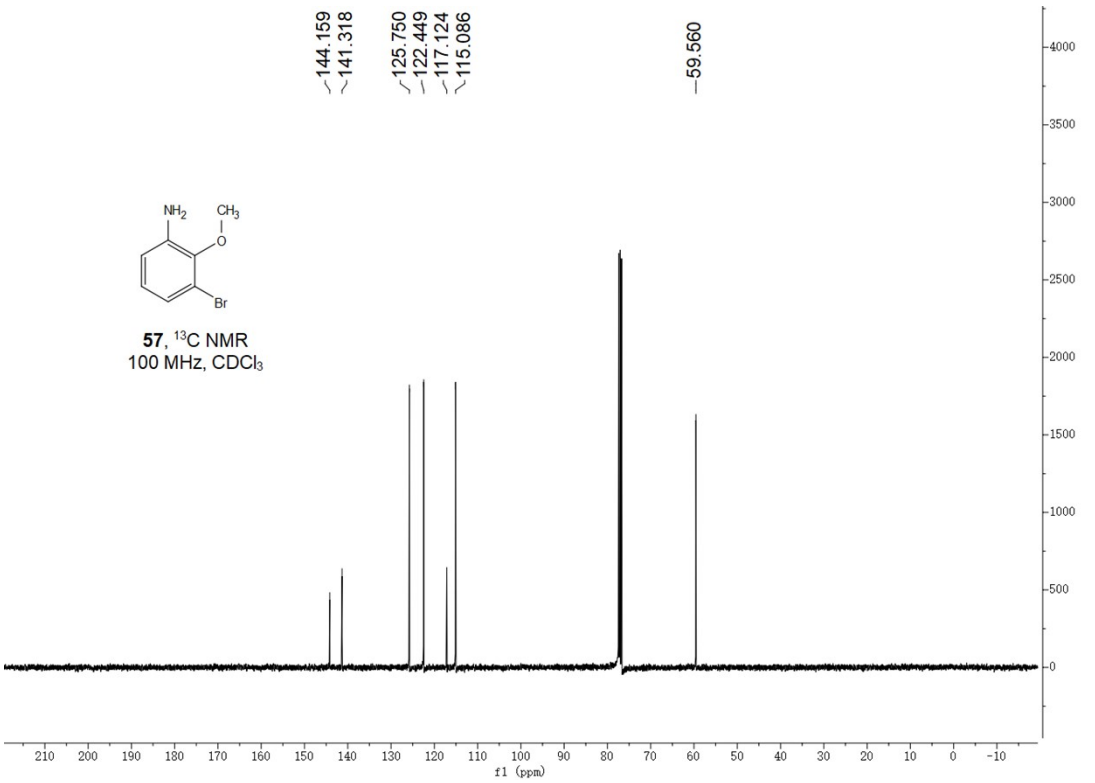
56, ^{1}H NMR
400 MHz, $CDCl_3$



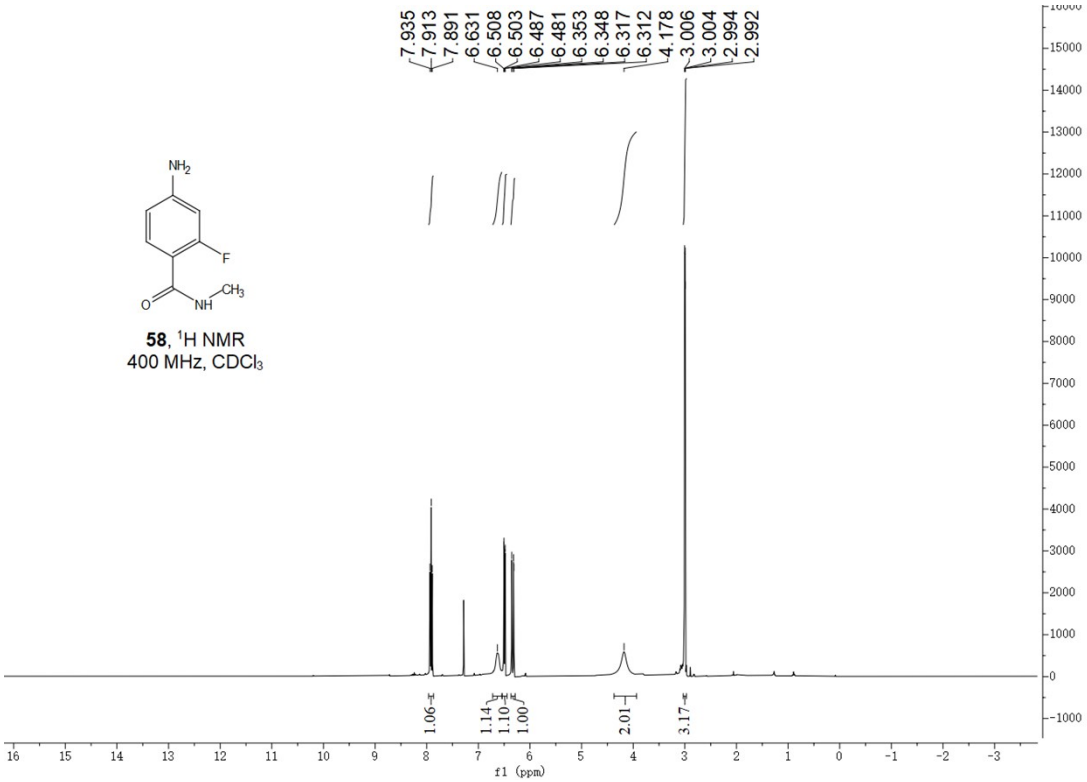
56, ^{13}C NMR
100 MHz, $CDCl_3$



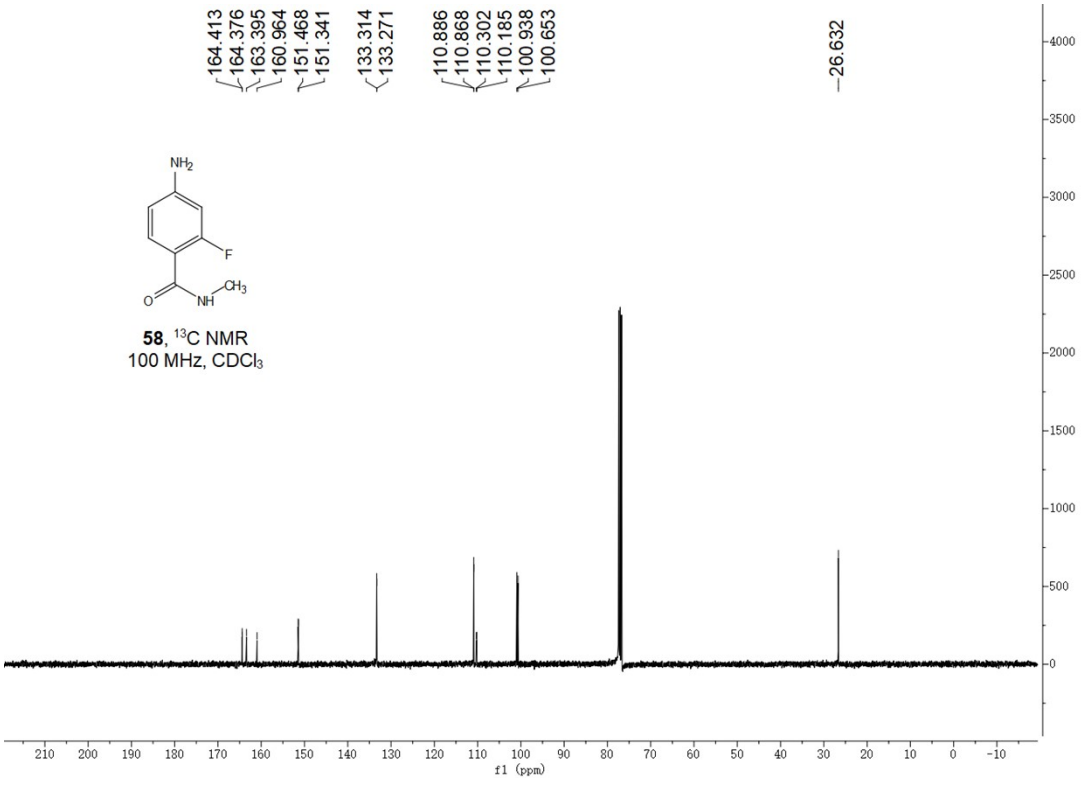
57, ^{1}H NMR
400 MHz, $CDCl_3$



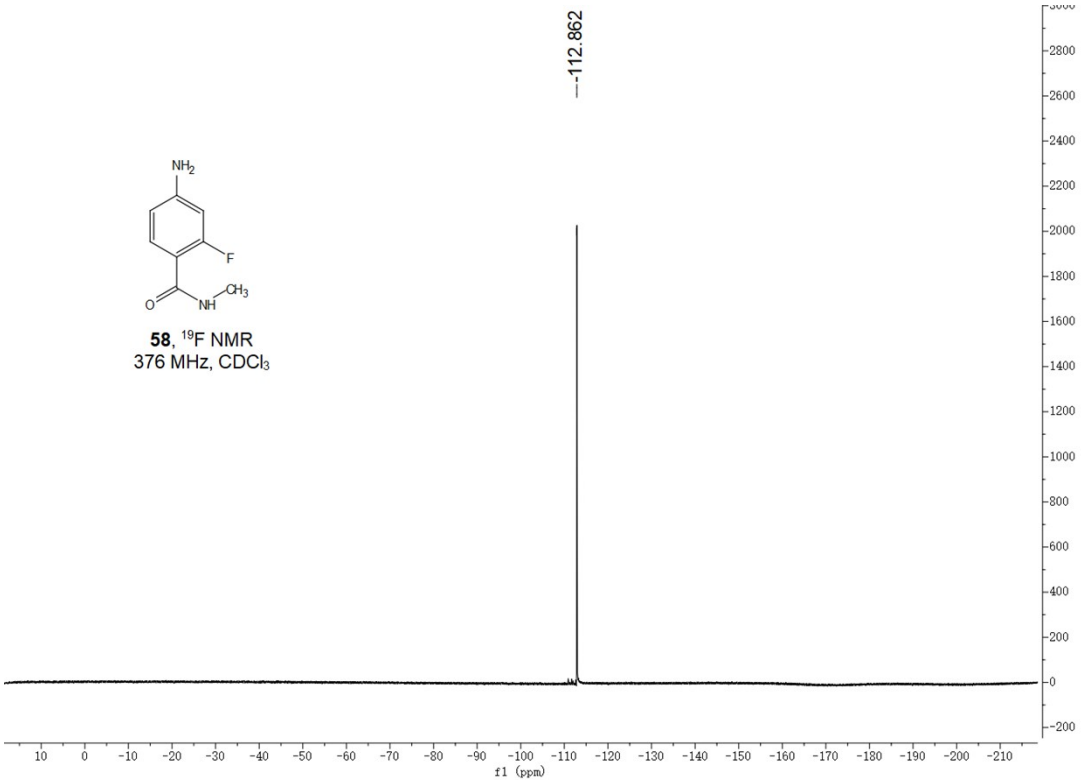
57, ^{13}C NMR
100 MHz, $CDCl_3$

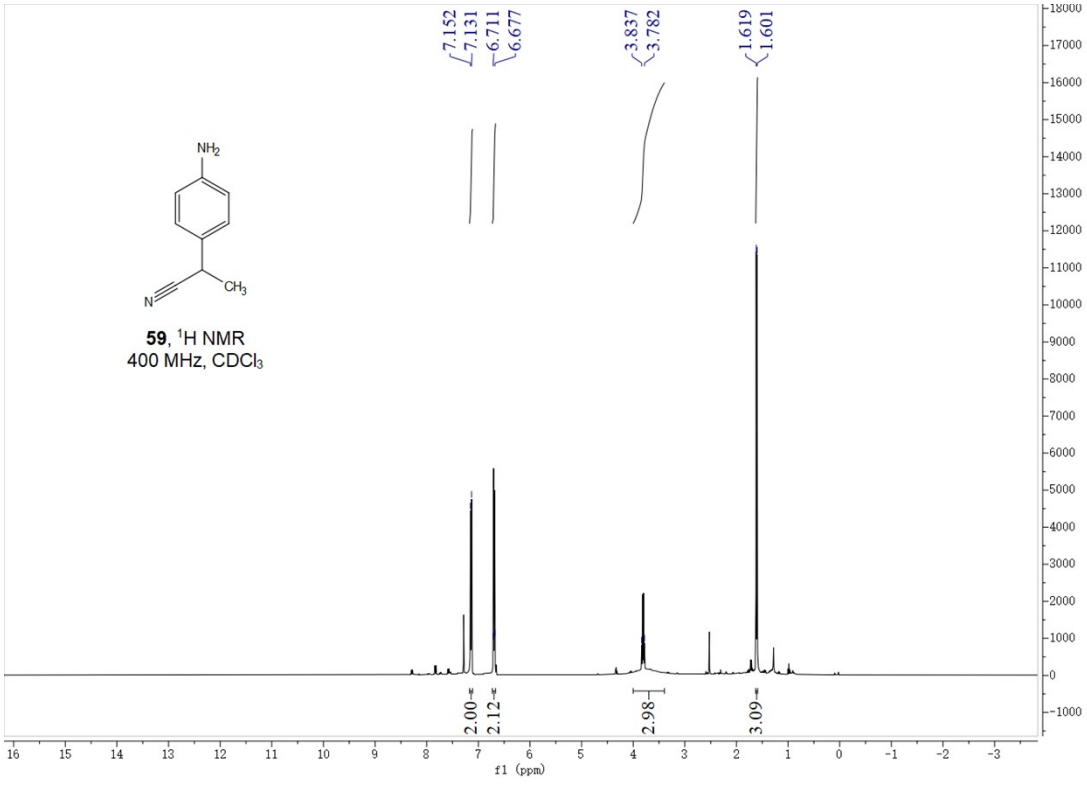


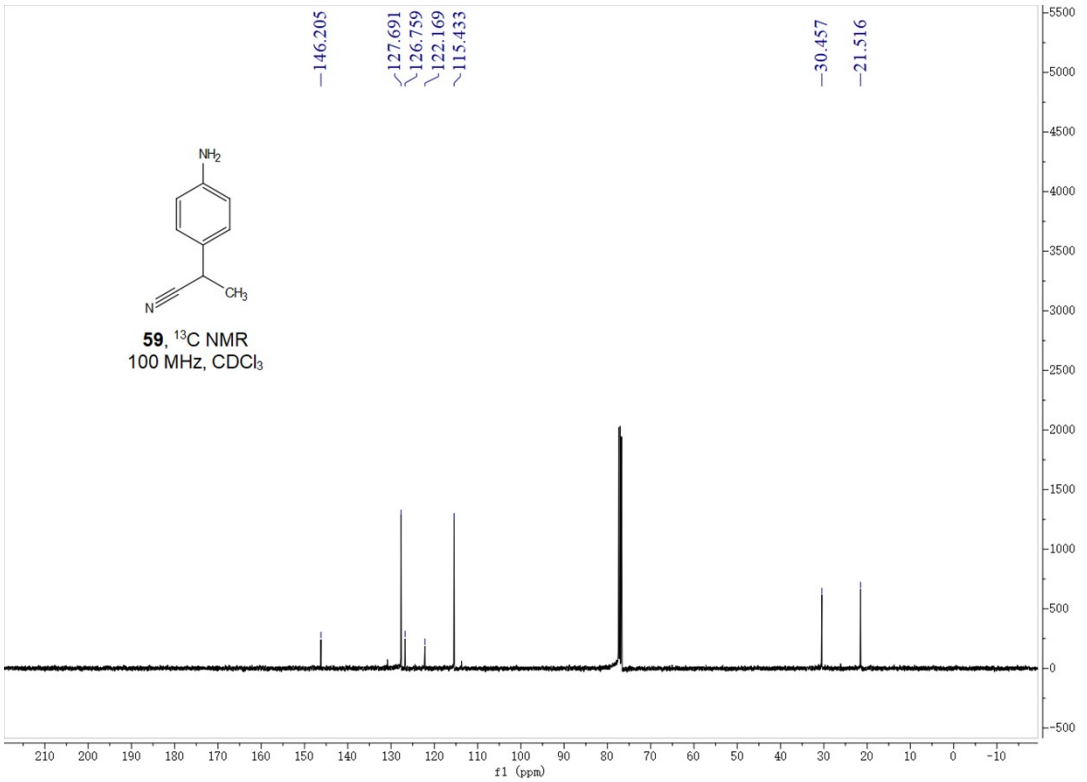
58, ^{1}H NMR
400 MHz, $CDCl_3$

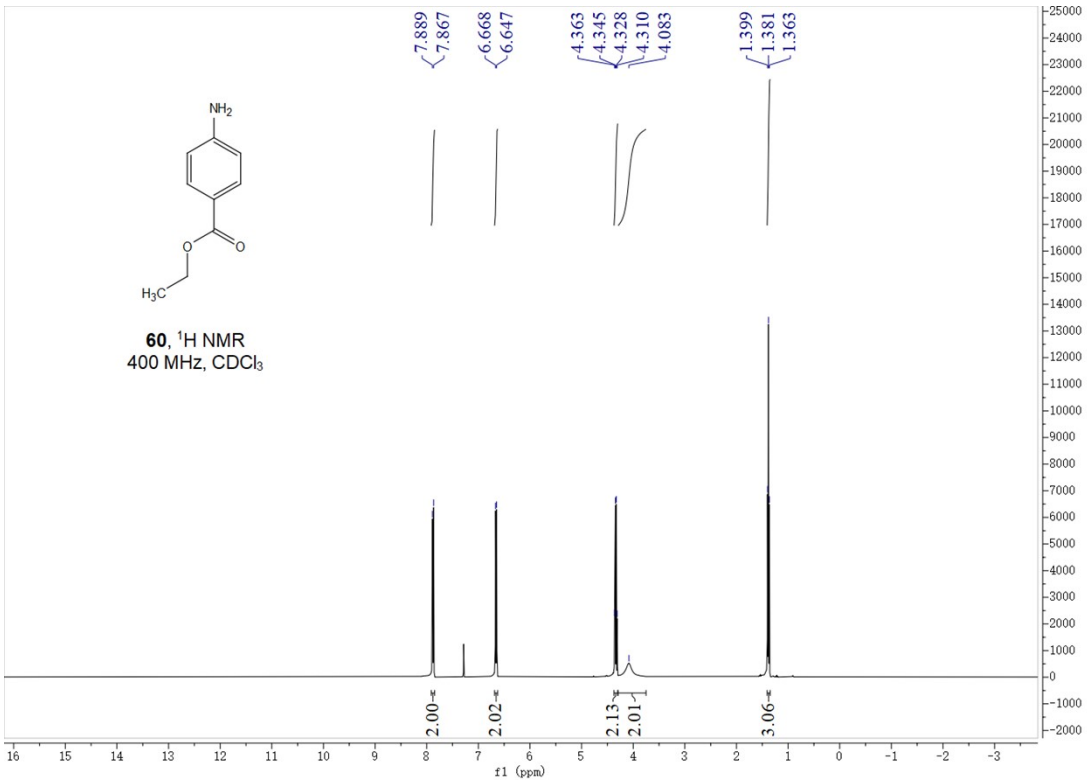


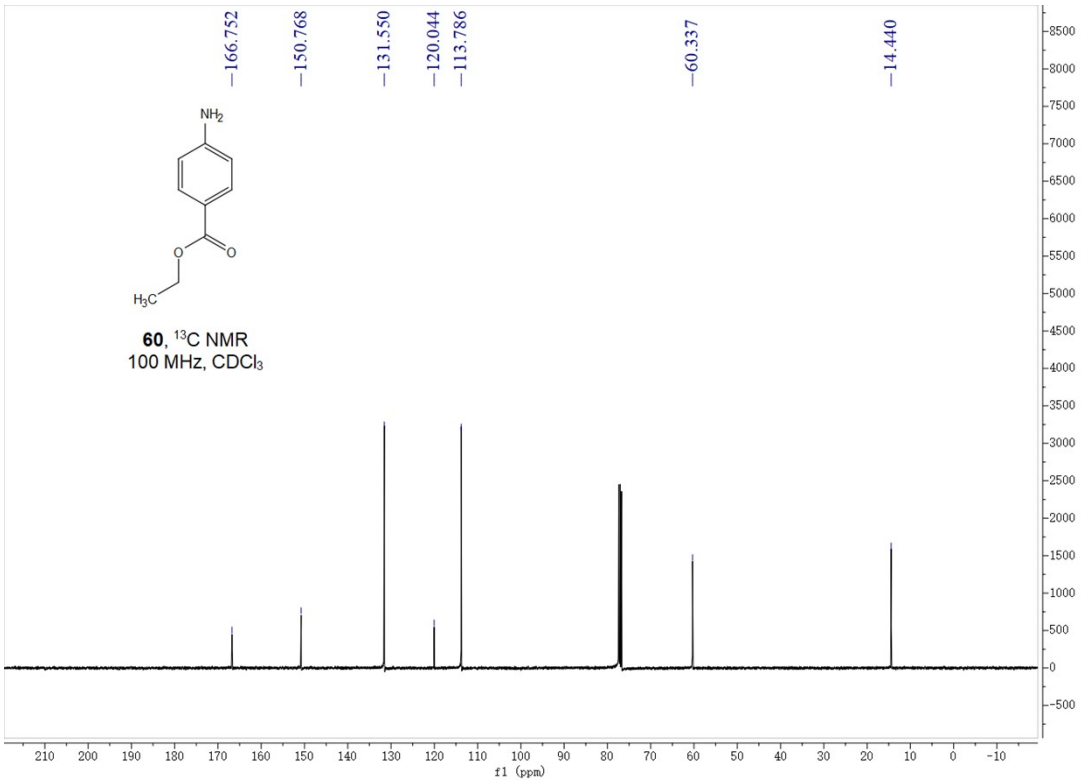
58, ^{13}C NMR
100 MHz, $CDCl_3$


-112.862
NH2
F
O
NH
CH3
58, 19F NMR
376 MHz, CDCl3
f1 (ppm)

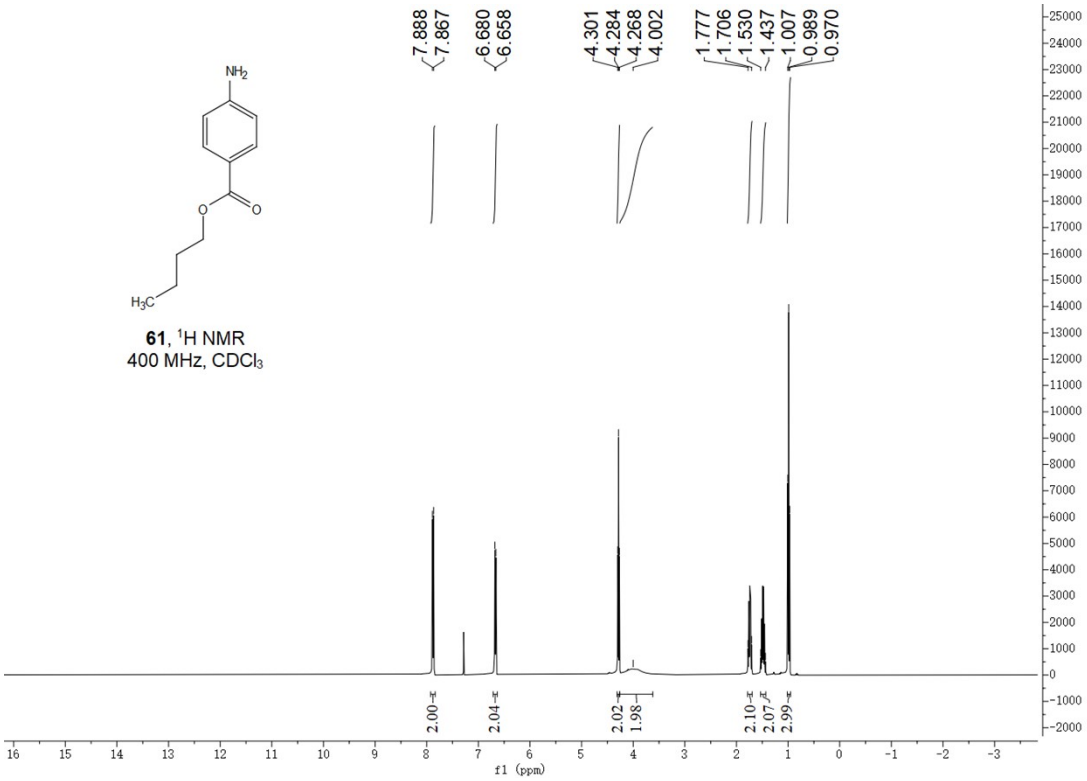

7.152
7.131
6.711
6.677
3.837
3.782
1.619
1.601
NH2
CH3
N
59, 1H NMR
400 MHz, CDCl3
2.00
2.12
2.98
3.09
f1 (ppm)


146.205
127.691
126.759
122.169
115.433
30.457
21.516
NH2
CH3
N
59, 13C NMR
100 MHz, CDCl3
f1 (ppm)

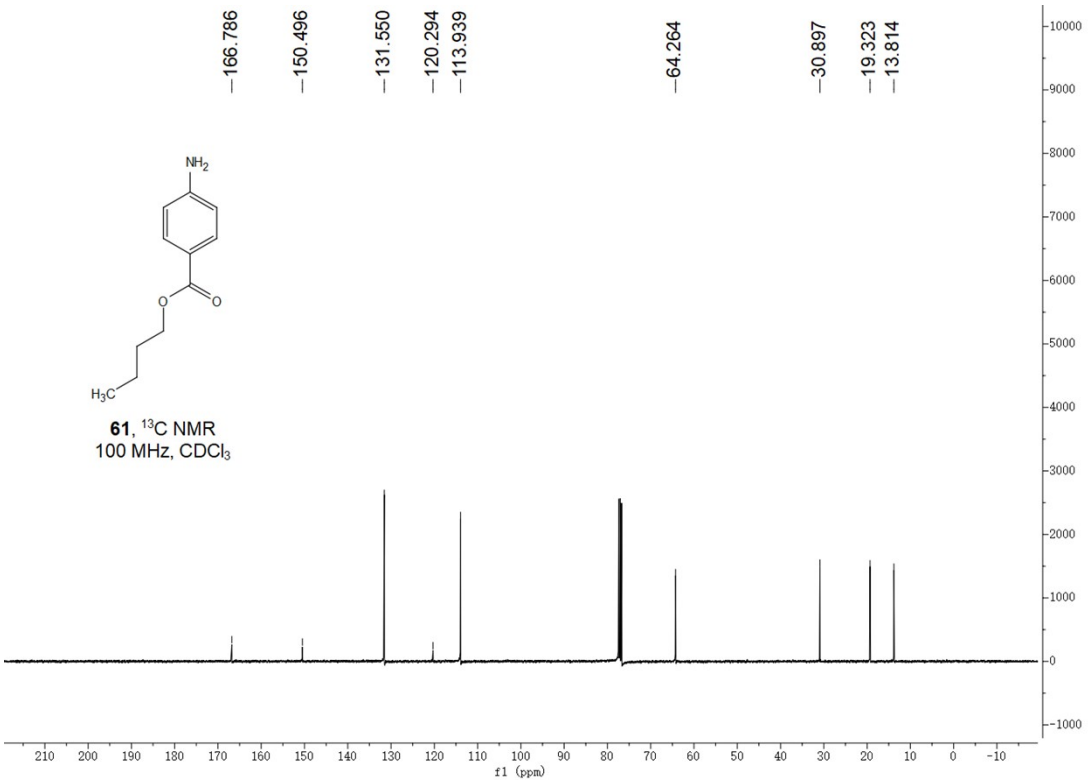

7.889
7.867
6.668
6.647
4.363
4.345
4.328
4.310
4.083
1.399
1.381
1.363
NH2
O
O
H3C
60, 1H NMR
400 MHz, CDCl3
2.00
2.02
2.13
2.01
3.06
f1 (ppm)



60, ^{13}C NMR
100 MHz, $CDCl_3$



61, ^{1}H NMR
400 MHz, $CDCl_3$


166.786
150.496
131.550
120.294
113.939
64.264
30.897
19.323
13.814
NH2
O
O
H3C
61, 13C NMR
100 MHz, CDCl3
f1 (ppm)