Supporting Information

A new tetrazine catalytic system for the synthesis of N-aryl-α-arylated glycine ester derivatives

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Contents

Experimental Section

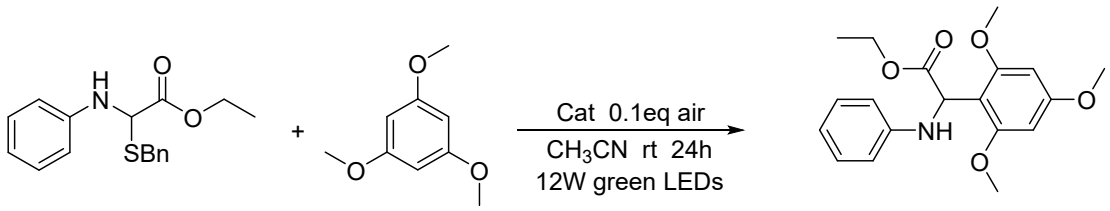
Most materials and reagents were purchased from commercial suppliers and used without further purification. Compound **4a** and **4b** was prepared according to the literature. [1,2] ^{1}H and ^{13}C NMR spectra were mainly recorded on 600 MHz Varian VNMRS Spectrometer using D_2O, DMSO-d_6, or $CDCl_3$ as solvent at 25°C. ^{19}F NMR spectra were recorded on 500 MHz Brucker spectrometer. High-resolution mass spectroscopy (HRMS) was performed on a Bruker APEXIIFT-ICR mass spectrometer. Melting points were measured on a WRS-1B micro-melting point apparatus (YiCe, Shanghai).

1. Optimization of reaction conditions

1.1 Screening of catalyst

After reviewing the literature on S-tetrazine as a catalyst, we found that S-tetrazine is commonly employed in catalytic applications. [3] S-tetrazine exhibits a prominent absorption peak at approximately 530 nm in the visible spectrum. Consequently, we utilized 0.1 equivalents of S-tetrazine as the catalyst under initial reaction conditions and incorporated a green light source into our reaction system. Additionally, since ambient air contains a sufficient amount of oxygen, most reactions do not require the addition of extra oxidants. Therefore, our initial reaction was conducted under atmospheric conditions using raw materials **1a** and **2a** in a 1:1 ratio, acetonitrile as the solvent, and allowed to proceed at room temperature for 24 hours. The results of the catalyst screening under these conditions are summarized in Table S1.

Table S1. Screening of catalyst [a]

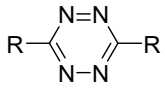
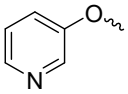
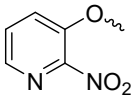
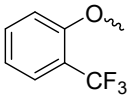


1a 2a 3a

[1] Helm, M. D.; Plant, A.; Harrity, J. P. A novel approach to functionalised pyridazinone arrays，*Org Biomol Chem*, **2006**, 4, 4278-4280.

[2] Abdo, M.; Brown, S. P.; Courter, J. R.; Tucker, M. J.; Hochstrasser, R. M.; Smith, A. B. III; Design, Synthesis, and Photochemical Validation of Peptide Linchpins Containing the S,S-Tetrazine Phototrigger, *Org. Lett.*, **2012**, 14, 3518-3521.

[3] Clavier, G.; Audebert, P., s-Tetrazines as Building Blocks for New Functional Molecules and Molecular Materials. *Chem. Rev.* **2010,** *110* (6), 3299-3314.

Catalyst:  4a: R=Cl 4b: R=Br 4c: R=  4d: R=  4e: R= 

Entry	Catalyst	Yield[b]
1	None	/
2	3,6-Dichloro-1,2,4,5-tetrazine(**4a**)	37.68%
3	3,6-Dibromo-1,2,4,5-tetrazine(**4b**)	38.40%
4	3,6-bis(3-pyridyloxy)-1,2,4,5-tetrazine(**4c**)	/
5	3,6-bis(2-nitro-3-pyridyloxy)-1,2,4,5-tetrazine(**4d**)	/
6	3,6-bis(2-trifluoromethylphenoxy)-1,2,4,5-tetrazine (**4e**)	/

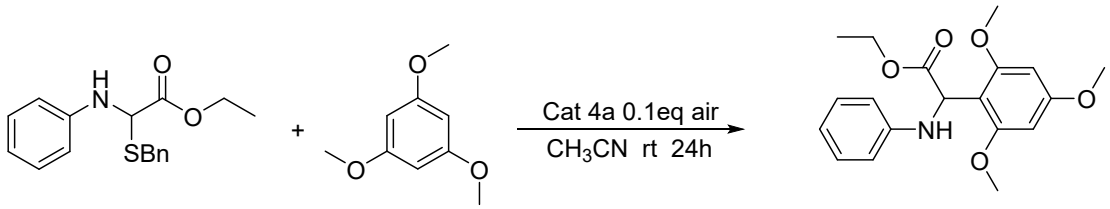
[a] Reaction conditions: **1a** (0.2 mmol), **2a**(0.2 mmol), Catalyst (0.1 equiv), solvent (1ml), air, 12W green LED light irradiation for 24h at room temperature. [b] isolated yield.

According to Table S1, the most critical observation is that the reaction necessitates the involvement of S-tetrazine. In the absence of S-tetrazine, TLC monitoring revealed no product formation. Due to the poor solubility of compound **4e**, the reaction mixture was heterogeneous, preventing TLC from detecting any products. Although compounds **4c** and **4d** exhibited satisfactory solubility, no new signal points were observed *via* TLC analysis. Surprisingly, the inclusion of compound **4a** resulted in the isolation of the target product with a yield of 37.68%. At this juncture, we hypothesized that the difference between **4a** and compounds **4c** and **4d** lies in the halogen atoms attached to both ends of **4a**, which possess superior leaving group properties. Consequently, we speculated that this phenomenon might be related to the facile departure of groups connected to S-tetrazine. Subsequently, we employed compound **4b** as the catalyst for the reaction, achieving a target product yield of 38.40%. Given that **4a** is more cost-effective and readily available compared to **4b**, and considering the negligible difference in yields between them, we selected 3,6-dichloro-1,2,4,5-tetrazine (**4a**) as the catalyst for this reaction system.

1.2 Evaluation and Selection of Optimal Light Sources

Upon identification of the catalyst, we will systematically investigate the influence of light on the reaction, specifically examining whether the reaction is dependent on light and how varying intensities of light affect the yield. Using 3,6-dichloro-1,2,4,5-tetrazine (**4a**) as the catalyst, raw materials **1a** and **2a** were introduced in a 1:1 ratio, with acetonitrile serving as the solvent. The reaction was conducted under an air atmosphere at room temperature for 24 hours, and the results are summarized in Table S2.

Table S2. Screening of catalyst [a]



1a 2a 3a

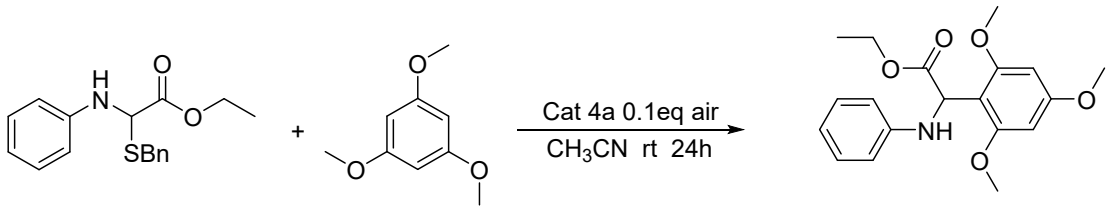
Entry	light	Yield[b]
1	12W green LEDs	37.68%
2	None	37.39%

[a] Reaction conditions:**1a** (0.2 mmol), **2a** (0.2 mmol), Catalyst(**4a**,0.1 equiv), solvent (1ml), air, at room temperature for 24h. [b] isolated yield.

1.3 Optimization of feed ratio

Upon evaluating the catalyst and light conditions discussed earlier, we observed through TLC analysis that the reactants were not fully consumed. To address this issue, I proposed adjusting the feed ratio of the reactants to shift the chemical equilibrium. Specifically, increasing the quantity of one reactant could potentially promote the forward reaction. Given that compound **2a** is more readily available than **1a**, we opted to increase the amount of **2a**. The experiment was conducted using 3,6-dichloro-1,2,4,5-tetrazine (**4a**) as the catalyst, acetonitrile as the solvent, and varying the proportions of reactants **1a** and **2a**. The reaction proceeded for 24 hours under an air atmosphere at room temperature. The results are summarized in Table S3.

Table S3、Screening of feed ratio



1a 2a 3a

Entry	Feed ratio(1a:2a)	Yield[b]
1	1:1	37.68%
2	1:1.2	38.40%
3	1:1.5	40.48%
4	1:2	46.37%
5	1:3	43.38%

[a] Reaction conditions:**1a**, **2a**, Catalyst(**4a**,0.1 equiv), solvent (1ml), air, at room temperature for 24h. [b] isolated yield.

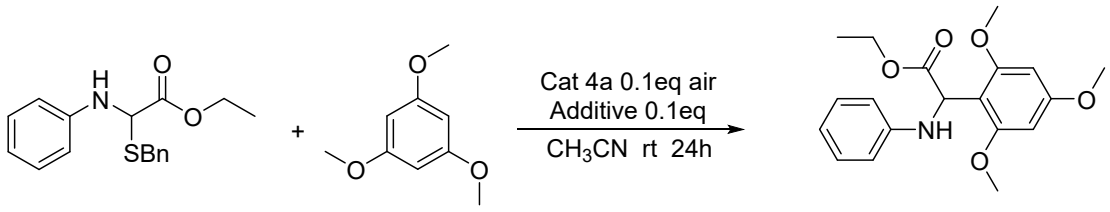
From Table S3, it is observed that as the proportion of **2a** in the reactant mixture increases gradually, the yield of the reaction product also increases. When the molar ratio of **1a**:**2a** reaches 1:2, the yield peaks at 46.37%. However, further increasing the feed ratio to 1:3 does not result in

a significant increase in yield and instead leads to a slight decrease. Based on these findings, we determined that the optimal feed ratio for the reaction is **1a**:**2a** = 1:2.

1.4 Selection of additives (Lewis acid)

During the literature review, we observed that incorporating an appropriate amount of Lewis acid into the reaction system facilitates reaction progression. Consequently, we investigated the effects of adding various acidic additives to the reaction mixture. The experimental conditions were as follows: a raw material feeding ratio of **1a**:**2a** = 1:2, 3,6-dichloro-1,2,4,5-tetrazine (**4a**) as the catalyst, acetonitrile as the solvent, and a 24-hour reaction under ambient air and room temperature conditions. By introducing different additives, we compared the product yields. Specifically, we tested organic acids as well as common, inexpensive copper and zinc salts. The results are summarized in Table S4.

Table S4、Selection of acid [a]



1a 2a 3a

Entry	Acid(0.1eq)	Yield[b]
1	None	46.37%
2	Benzoic acid	48.99%
3	Citric Acid	33.33%
4	$Cu(OAC)_2$	49.27%
5	CuI	55.07%
6	ZnI_2	45.50%
7	$Zn(OAC)_2$	59.42%
8	$ZnCl_2$	42.90%
9[c]	$Zn(OAC)_2$	/
10[d]	$Zn(OAC)_2$	8.99%
11[e]	$Zn(OAC)_2$	45.69%

[a] Reaction conditions:**1a** (0.2 mmol), **2a** (0.2 mmol), Catalyst (**4a,** 0.1 equiv), Acid (0.1 equiv) solvent (1ml) air, at room temperature for 24h. [b] isolated yield .[c] without catalyst **4a**. [d] $Zn(OAc)_2$ (0.2 equiv), the solvent was DCM. [e] $Zn(OAc)_2$ (0.3 equiv), the solvent was DCM.

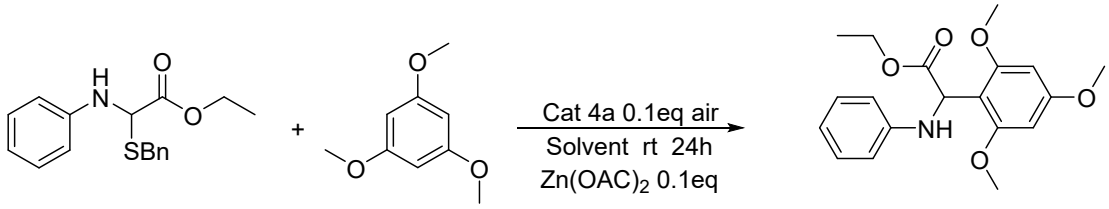
As is well established, various additives exert distinct influences on the reaction outcomes, as initially anticipated. The yield of the reaction was observed to increase without the use of metal salts; however, Table S4 indicates that the introduction of organic acids also had an impact. Subsequent literature review highlighted the necessity of exploring simple, cost-effective, and low-toxicity metal salts. Consequently, copper and zinc salts were selected for experimentation. As shown in Table S4, zinc acetate yielded the highest reaction efficiency. In light of this finding,

a controlled experiment was conducted by omitting compound 4a and using only zinc acetate to determine if the mere presence of an acidic additive would initiate the reaction. Post-reaction analysis via TLC revealed no target product formation, confirming that zinc acetate alone does not induce the reaction. Therefore, zinc acetate was chosen as the optimal acidic additive for the reaction system.

1.5 Selection of solvent

The reaction conditions we selected involved a feedstock ratio of **1a**:**2a** = 1:2, with 3,6-dichloro-1,2,4,5-tetrazine (**4a**) serving as the catalyst and zinc acetate as an additive. Various solvents were employed to investigate the product yield under an air atmosphere at room temperature for 24 hours. The results are summarized in Table S5.

Table S5、Screening of solvent [a]



1a 2a 3a

Entry	Solvent	Yeld[b]
1	CH_3CN	59.42%
2	Toluene	44.06%
3	THF	21.74%
4	DCM	66.96%
5	CH_3OH	49.09%
6	DCE	55.07%
7	N-hexane	51.17%

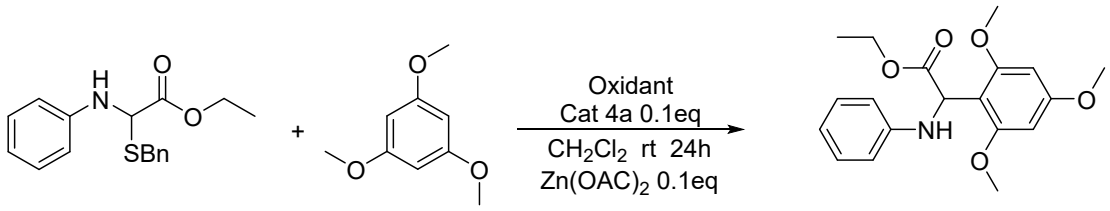
[a] Reaction conditions: **1a** (0.2 mmol), **2a** (0.2 mmol), Catalyst (**4a,** 0.1 equiv), $Zn(OAc)_2$ (0.1 equiv) solvent (1ml) air, at room temperature for 24h. [b] isolated yield.

As shown in Table S5, utilizing dichloromethane as the reaction solvent yields the highest product output, reaching 66.96%. Consequently, dichloromethane was selected as the optimal reaction solvent.

1.6 Selection of oxidant

We discovered that oxidizing agents were essential in most cases, whether as catalysts in the reaction of S-tetrazine or during the arylation of glycine derivatives. Consequently, the impact of various oxidants on reaction yield was also examined. The feedstock ratio was set at **1a:2a** = 1:2, with 3,6-dichloro-1,2,4,5-tetrazine (**4a**) serving as the catalyst, zinc acetate as an additive, and dichloromethane as the solvent. The reaction proceeded under room temperature conditions for 24 hours. To compare the effects of different oxidants, the results are summarized in Table S6.

Table S6. Screening of oxidant [a]



1a 2a 3a

Entry	oxidant	Yield[b]
1	N_2	/
2	O_2	65.94%
3	$K_2S_2O_8$	62.09%
4	TBHP(70%in water)	33.62%
5	air	66.96%

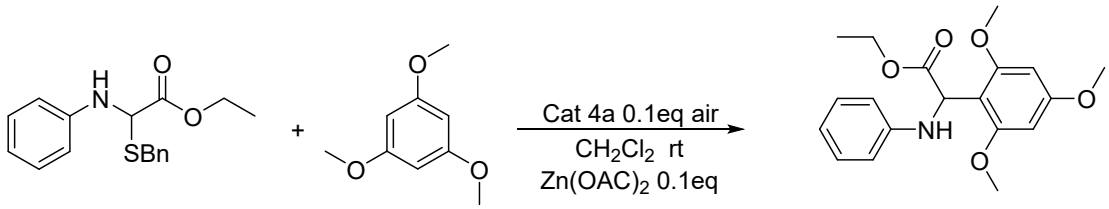
[a] Reaction conditions: **1a** (0.2 mmol), **2a** (0.2 mmol), Catalyst (**4a,** 0.1 equiv), $Zn(OAc)_2$ (0.1 equiv) solvent (1ml) air, at room temperature for 24h. [b] isolated yield.

In Entry 1 of Table S6, it is evident that no product formation was observed *via* TLC detection when the reaction system was conducted under a nitrogen atmosphere. This suggests that the reaction necessitates an oxidant for successful completion. Initially, we investigated oxygen, the most environmentally benign oxidant. The reaction tube was purged with oxygen for 3 minutes to ensure a fully oxygenated environment. As shown in Entry 2 of Table S6, the reaction yield in an oxygen atmosphere did not significantly differ from that in air, indicating that oxygen alone did not enhance or diminish the reaction efficiency. Subsequently, we explored common peroxide-based oxidants without evacuating air from the reaction tube to determine if these oxidants could improve the reaction yield. Entries 3 and 4 of Table S6 reveal that potassium persulfate had no significant effect on the product yield, whereas tert-butanol peroxide led to a notable decrease in yield, possibly due to the presence of water. In conclusion, air appears to be the optimal oxidizing agent for this reaction.

1.7 Selection of reaction time

To determine the optimal reaction time, we conducted experiments under the following conditions: a raw material feeding ratio of **1a:2a** = 1:2, with 6-dichloro-1,2,4,5-tetrazine (**4a**) serving as the catalyst, zinc acetate as the additive, and dichloromethane as the solvent. The reactions were carried out in an air atmosphere at room temperature. By varying the reaction time, we compared the product yields, as detailed in Table S7.

Table S7. Screening of time [a]



1a 2a 3a

Entry	Time	Yield[b]
1	5h	44.93%
2	16h	74.49%
3	24h	66.96%
4	48h	64.49%

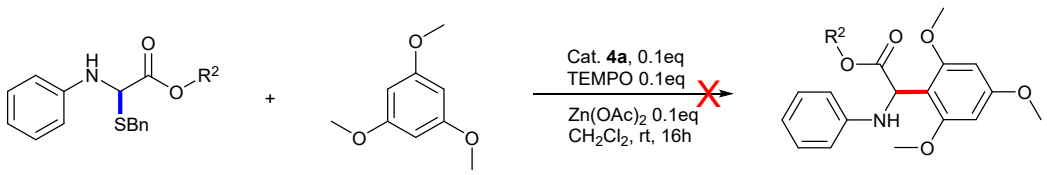
[a] Reaction conditions: **1a** (0.2 mmol), **2a** (0.2 mmol), Catalyst (**4a,** 0.1 equiv), $Zn(OAc)_2$ (0.1 equiv) solvent (1ml) air, at room temperature. [b] isolated yield.

The effects of catalyst type, light source, feed ratio, additive, solvent, oxidant, and reaction time were systematically investigated. After comprehensive screening, the optimal reaction conditions were determined as follows: 0.1 equivalents of 3,6-dichloro-1,2,4,5-tetrazine (**4a**) as the catalyst, no requirement for a light source, a feedstock ratio of **1a:2a** = 1:2, 0.1 equivalents of zinc acetate as the additive, dichloromethane as the solvent, air as the oxidant, and a reaction duration of approximately 16 hours at room temperature.

2. Control experiments.

The standardized procedures are outlined as follows:
The *N*-aryl-α-benzylthio glycine ester (0.2 mmol), 1,3,5-trimethoxybenzene (or phenol derivative) (0.4 mmol), 3,6-dichloro-1,2,4,5-tetrazine (3 mg, 0.1 eq.), $Zn(OAc)_2$ (3.7 mg, 0.1 eq.), and 1 mL of dichloromethane were individually added to a 10 mL test tube. The reaction mixture was allowed to incubate at room temperature for a duration of 16 hours. Upon completion, the crude product was purified using thin-layer chromatography to obtain the final products.

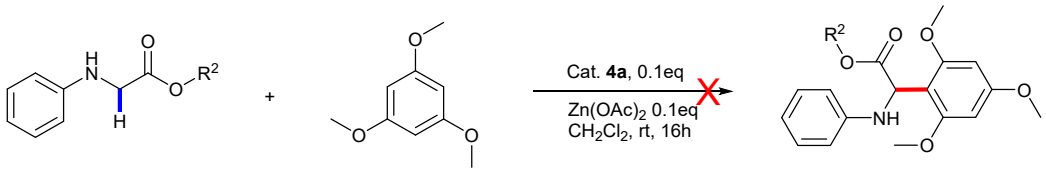
2.1 Classification of chemical reaction types



Scheme 1

We introduced 0.1 equivalents of the free radical trapping agent TEMPO under optimal reaction conditions. Post-reaction analysis via TLC did not detect the target product, indicating that no reaction occurred. This suggests that the reaction proceeds via a free radical mechanism.

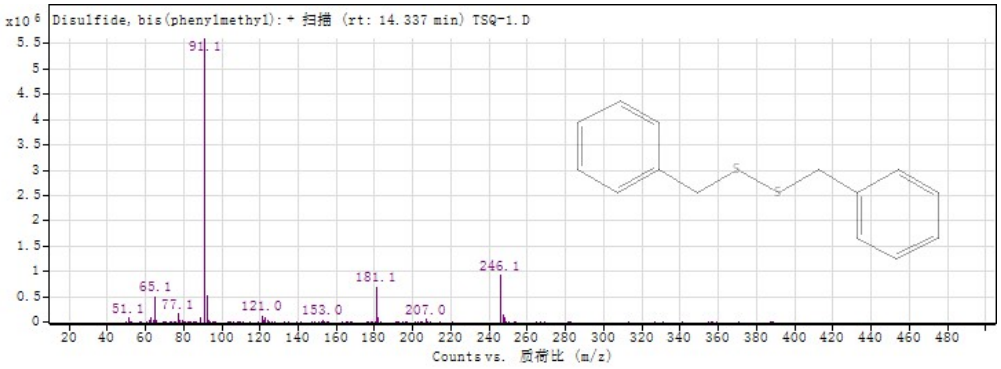
2.2 Is the inclusion of the benzylthio group is essential?



We substituted N-phenylglycine ethyl ester for the substrate N-phenyl-α-benzylthioglycine ethyl ester, while keeping all other conditions unchanged. Upon completion of the reaction, TLC analysis revealed no detectable reaction, leading to the conclusion that the presence of a benzyl sulfide moiety is essential.

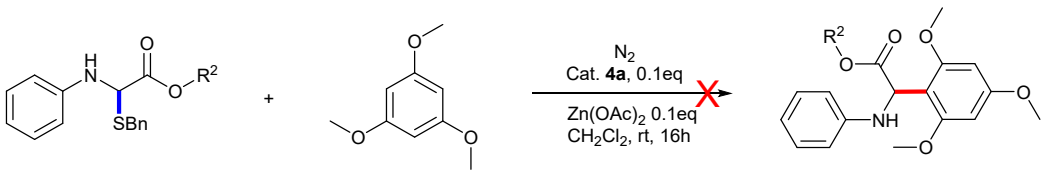
2.3 GC-MS determination

c



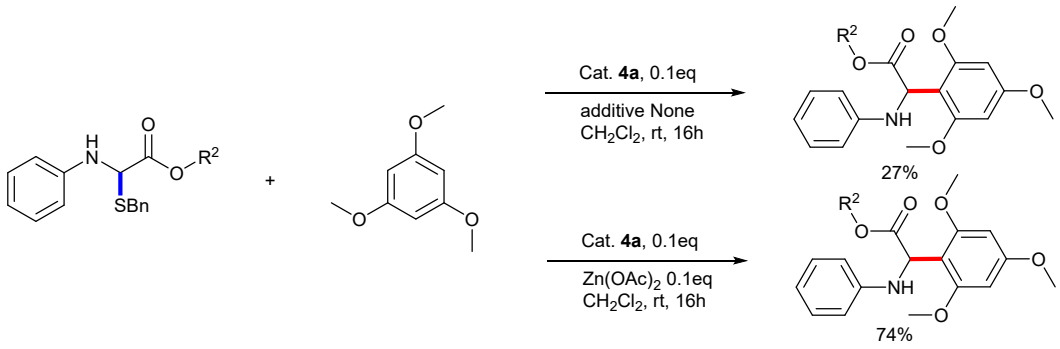
The molecular ion peak at m/z 246.1 in the GC-MS spectrum corresponds precisely to dibenzyl sulfide, with the theoretical isotopic mass calculated as 246.0537.

2.4 The necessity of O_2



Under standard reaction conditions, pure nitrogen was introduced into the reaction unit. Following the reaction, no product formation was detected by thin-layer chromatography (TLC).

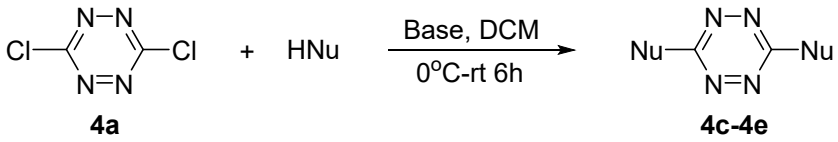
2.5 The necessity of $Zn(OAc)_2$



Under standard reaction conditions, the initial reaction was conducted in the absence of zinc acetate, resulting in a yield of 27% following separation and purification. Upon the addition of 0.1 equivalents of zinc acetate, the yield significantly increased to 74%. These results demonstrate that zinc acetate plays a crucial role in enhancing the yield of the reaction.

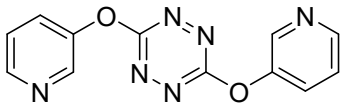
3.Synthesis of catalysts (4c-4e)

General steps for synthesis of s-tetrazine [4]



4a **4c-4e**

Under nitrogen protection, 100mg (0.67mmol) of 3,6-dichloro-1,2,4,5-tetrazine (**4a**) and 1.34 mmol of the nucleophile were added to a 100ml three-neck boiling flask under nitrogen protection. The mixture was dissolved in 25ml of methylene chloride and cooled to 0°C before adding dropwise 0.23ml (1.34mmol) of DIPEA. The reaction mixture was then gradually heated to room temperature for a duration of 6 hours. Upon completion, compounds **4c-4e** were obtained through purification methods with compounds **4c** and **4d** being solids that could be isolated by filtration followed by washing with a small amount of dichloromethane. Compound **4e** was separated using column chromatography.

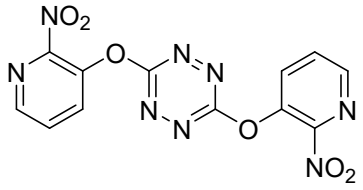


3,6-bis(3-pyridyloxy)-1,2,4,5-tetrazine (**4c**)

Pink solid, yield: 56%, mp: 220-221 °C.

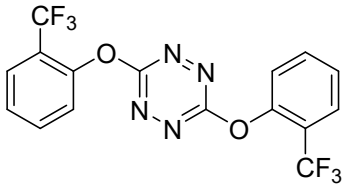
^{1}H NMR (600 MHz, DMSO-d_6) δ 8.69 (d, J = 2.7 Hz, 2H), 8.57 (dd, J = 4.7, 1.3 Hz, 2H), 7.89 (ddd, J = 8.4, 2.8, 1.4 Hz, 2H), 7.59 (ddd, J = 8.4, 4.7, 0.7 Hz, 2H). ^{13}C NMR (151 MHz, DMSO-d_6) δ 167.27, 149.82, 147.80, 142.97, 129.14, 125.32. HRMS(ESI) $C_{12}H_8N_6O_2$ $[M+H]^+$m/z : Calc 269.0781, Found 269.0784.

[4] Jullien-Macchi, E.; Alain-Rizzo, V.; Allain, C.; Dumas-Verdes, C.; Audebert, P., s-Tetrazines functionalized with phenols: synthesis and physico-chemical properties. *RSC Adv.* **2014,** *4* (64), 34127-34133.



3,6-bis (2-nitro-3-pyridyloxy) - 1,2,4,5-tetrazine (**4d**)

Orange solid, yield: 83%, melting point: 254-255 °C. ^{1}H NMR (600 MHz, DMSO-d_6) δ 8.66 (s, 2H), 8.41 (d, J = 8.3 Hz, 2H), 8.08 (s, 2H). ^{13}C NMR (151 MHz, DMSO-d_6) δ 166.97, 149.67, 147.18, 141.09, 135.98, 131.81. HRMS(ESI) $C_{12}H_6N_8O_6$ $[M+H]^+$m/z : Calc 359.0483, Found 359.0474.

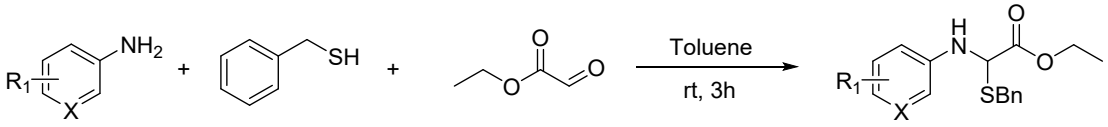


3,6-bis(2-trifluoromethylphenoxy)-1,2,4,5-tetrazine (**4e**)

Pink solid, yield: 52%, mp:184-185 °C. R_f = 0.6 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.76 (d, J = 7.9 Hz, 2H), 7.65 (t, J = 7.9 Hz, 2H), 7.44 (t, J = 7.7 Hz, 2H), 7.34 (d, J = 8.2 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 167.67, 149.72, 149.70, 134.01, 127.88, 127.85, 127.12, 123.57. HRMS(ESI) $C_{16}H_8F_6N_4O_2$ $[M+H]^+$m/z : Calc 403.0624, Found 403.0628.

4.Synthesis of *N*-aryl-α-benzylthio glycine ethyl ester

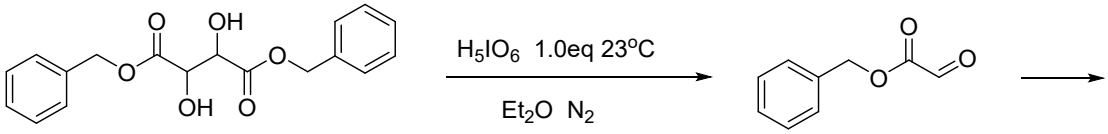
Method 1[5]:



X=C, N **1a-1m**

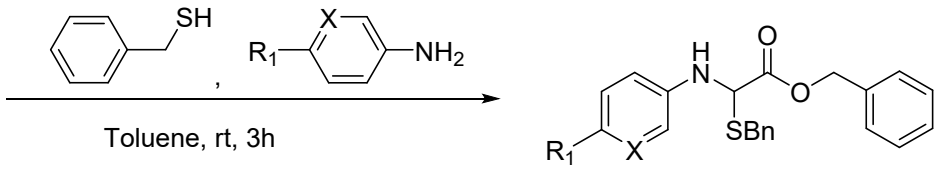
20ml of toluene was introduced into a 50ml dry three-neck boiling flask. Subsequently, 2mmol of aniline or its derivatives and 2mmol of ethyl glyoxylate were separately introduced. After stirring for 3 minutes, 2mmol of benzylmercaptan was added. The reaction proceeded at room temperature for 3 hours (the reaction condition for **1k** achieving the same result as at 110 ℃ is a duration of 16 hours). Upon completion, the crude product underwent purification through chromatography on silica gel to yield the final products.

Method 2 [6]:



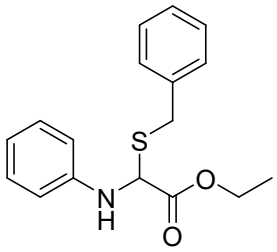
[5] Motherwell, W.; Hilton, S.; Selwood, D., An Expedient Entry into the α-Mercaptodiketopiperazine Nucleus. *Synlett* **2004,** *2004* (14), 2609-2611.

[6] Lisnyak, V. G.; Snyder, S. A., A Concise, Enantiospecific Total Synthesis of Chilocorine C Fueled by a Reductive Cyclization/Mannich Reaction Cascade. *J. Am. Chem. Soc.* **2020,** *142* (28), 12027-12033.



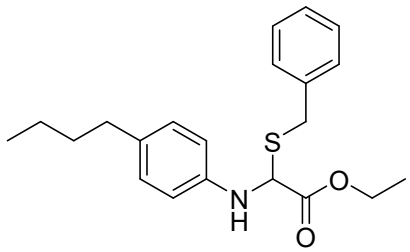
First, 2mmol of dibenzyl L-tartrate was added to a 50ml dry three-neck boiling flask. Under nitrogen protection, 20ml of ether was slowly added using a constant pressure funnel, and the mixture was stirred for 15 minutes until the solution became clear. Then, added 1 equivalent of H_5IO_6 quickly and stirred the turbid solution at 23 °C for 2 hours. Upon completion, retained the filtrate and removed the ether. The product could proceed to the next step without purification. Dissolved benzyl glyoxylate in 20ml of toluene, added 2mmol of aniline or its derivatives to it, stirred for 3 minutes, and then added 2mmol of benzyl mercaptan. The reaction was carried out at room temperature for 3 hours. Upon completion, purified the crude product by chromatography on silica gel to obtain the products.

N-phenyl-α-benzyl thioglycine ethyl ester (1a)



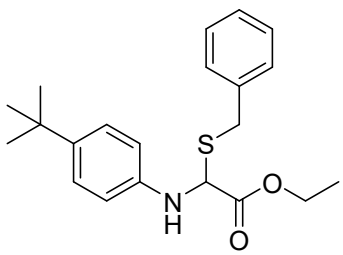
Yellow solid, yield:72%, mp: 49-50 °C, R_f = 0.8 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 20:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 (d, *J* = 4.4 Hz, 4H), 7.27 (d, *J* = 4.0 Hz, 1H), 7.13 (dd, *J* = 8.5, 7.4 Hz, 2H), 6.80 – 6.77 (m, 1H), 6.47 (dd, *J* = 8.6, 1.0 Hz, 2H), 4.95 (s, 1H), 4.28 (qd, *J* = 7.1, 4.1 Hz, 2H), 3.85 (d, *J* = 13.5 Hz, 1H), 3.78 (d, *J* = 13.4 Hz, 1H), 1.35 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.83, 143.23, 137.42, 129.16, 129.12, 128.47, 127.20, 119.06, 114.15, 62.05, 57.70, 34.11, 14.13. HRMS(ESI) $C_{17}H_{19}NO_2S[M+H]^+$m/z: Calc 302.1209, found 302.1209.

N-(4-n-butylphenyl)-α-benzyl thioglycine ethyl ester (1b)



Yellow viscous liquid, yield:72%, R_f = 0.8($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 15:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.29 (d, *J* = 4.3 Hz, 4H), 7.24 (d, *J* = 4.9 Hz, 1H), 6.94 (d, *J* = 8.3 Hz, 2H), 6.40 (d, *J* = 8.3 Hz, 2H), 4.93 (s, 1H), 4.25 (qq, *J* = 7.6, 3.7 Hz, 2H), 3.85 – 3.74 (m, 2H), 2.51 – 2.46 (m, 2H), 1.53 (t, *J* = 6.8 Hz, 2H), 1.33 (t, *J* = 7.2 Hz, 5H), 0.91 (t, *J* = 7.4 Hz, 3H).^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.86, 141.83, 140.79, 137.49, 129.14, 128.44, 127.14, 125.93, 113.82, 61.98, 58.10, 33.96, 33.93, 31.49, 14.12. HRMS(ESI) $C_{21}H_{27}NO_2S$ $[M+H]^+$m/z: Calc358.1835, Found 358.1834.

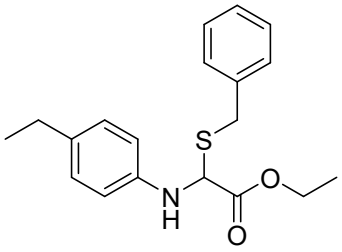
N-(4-tert-butylphenyl)-α-benzyl thioglycine ethyl ester (1c)



Yellow viscous liquid, yield: 79%, R_f= 0.8($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 15:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.30 (d, *J* = 4.4 Hz, 4H), 7.25 (d, *J* = 4.6 Hz, 1H), 7.16 (d, *J* = 8.5 Hz, 2H), 6.45 (d, *J* = 8.6 Hz, 2H), 4.95 (s, 1H), 4.30 – 4.21 (m, 2H), 3.86 – 3.76 (m, 2H), 1.34 (t, *J* = 7.1 Hz, 3H), 1.27 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.86, 141.83, 140.79, 137.49,

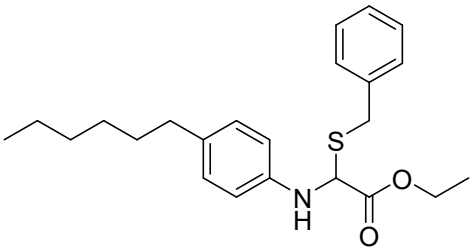
129.14, 128.44, 127.14, 125.93, 113.82, 61.98, 58.10, 33.96, 33.93, 31.49, 14.12. HRMS(ESI) $C_{21}H_{27}NO_2S$ $[M+H]^+$m/z: Calc358.1835, Found 358.1833.

N-(4-ethylphenyl)-α-benzyl thioglycine ethyl ester (1d)



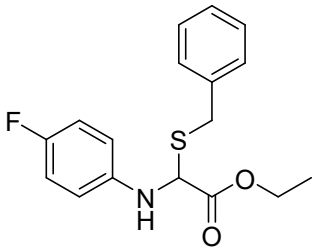
Yellow solid, yield: 79%. mp: 46-47°C， R_f= 0.8($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 15:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 (d, *J* = 4.4 Hz, 4H), 7.27 (d, *J* = 4.7 Hz, 1H), 6.98 (d, *J* = 8.5 Hz, 2H), 6.42 (d, *J* = 8.5 Hz, 2H), 4.94 (d, *J* = 8.6 Hz, 1H), 4.27 (qq, *J* = 7.4, 3.6 Hz, 2H), 3.85 (d, *J* = 13.4 Hz, 1H), 3.78 (d, *J* = 13.4 Hz, 1H), 2.55 (q, *J* = 7.6 Hz, 2H), 1.35 (t, *J* = 7.1 Hz, 3H), 1.19 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.87, 141.06, 137.49, 134.93, 129.17, 128.47, 128.45, 127.16, 114.24, 61.98, 58.09, 34.06, 27.96, 15.82, 14.13. HRMS(ESI) $C_{19}H_{23}NO_2S$ $[M+H]^+$m/z: Calc 330.1522, Found 330.1526.

N-(4-hexylphenyl)-α-benzyl thioglycine ethyl ester (1e)



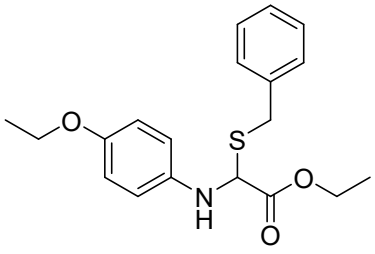
Yellow viscous liquid, yield: 83%, R_f= 0.8 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 15:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 (d, *J* = 4.4 Hz, 4H), 7.27 (d, *J* = 4.8 Hz, 1H), 6.96 (d, *J* = 8.4 Hz, 2H), 6.42 (d, *J* = 8.5 Hz, 2H), 4.95 (d, *J* = 7.7 Hz, 1H), 4.27 (qd, *J* = 7.1, 3.9 Hz, 2H), 3.87 – 3.76 (m, 2H), 2.52 – 2.47 (m, 2H), 1.56 (p, *J* = 7.8 Hz, 2H), 1.35 (t, *J* = 7.1 Hz, 3H), 1.31 (s, 6H), 0.92 – 0.86 (m, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.86, 141.02, 137.50, 133.61, 129.15, 129.00, 128.44, 127.14, 114.15, 61.96, 58.12, 35.07, 34.02, 31.75, 31.67, 28.97, 22.63, 14.11, 14.10. HRMS(ESI) $C_{23}H_{31}NO_2S$ $[M+H]^+$m/z: Calc 386.2148, Found 386.2152.

N-(4-fluorophenyl)-α-benzyl thioglycine ethyl ester (1f)



White solid, yield: 55%，mp:60-61 °C, R_f= 0.7 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =12:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 (d, *J* = 6.5 Hz, 4H), 7.27 (d, *J* = 3.7 Hz, 1H), 6.82 (t, *J* = 8.7 Hz, 2H), 6.36 – 6.32 (m, 2H), 4.85 (d, *J* = 9.3 Hz, 1H), 4.56 (d, *J* = 9.2 Hz, 1H), 4.29 (qd, *J* = 7.1, 2.2 Hz, 2H), 3.84 (d, *J* = 13.6 Hz, 1H), 3.77 (d, *J* = 13.6 Hz, 1H), 1.36 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.74, 157.44, 155.86, 139.43, 137.41, 129.14, 128.50, 127.25, 115.69, 62.10, 58.13, 34.19, 14.12. HRMS(ESI) $C_{17}H_{18}FNO_2S$ $[M+H]^+$m/z: Calc 320.1115, Found 320.1120.

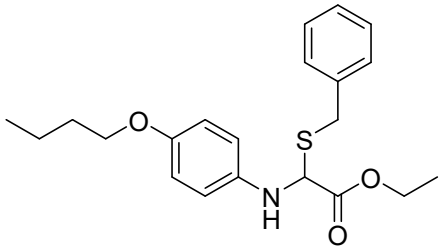
N-(4-ethoxyphenyl)-α-benzyl thioglycine ethyl ester (1g)



Brown viscous liquid, yield: 73%, R_f = 0.8 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =10:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.29 (d, *J* = 3.4 Hz, 4H), 7.25 (d, *J* = 5.4 Hz, 1H), 6.72 (d, *J* = 8.9 Hz, 2H), 6.40 (d, *J* = 8.9 Hz, 2H), 4.90 (d, *J* = 9.4 Hz, 1H),

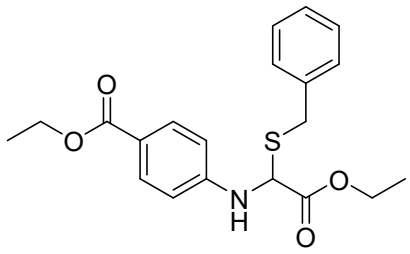
4.43 (d, *J* = 9.6 Hz, 1H), 4.27 (qq, *J* = 7.1, 3.6 Hz, 2H), 3.96 (q, *J* = 7.0 Hz, 2H), 3.83 (d, *J* = 13.0 Hz, 1H), 3.76 (d, *J* = 13.5 Hz, 1H), 1.36 (dt, *J* = 18.8, 7.1 Hz, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.84, 152.42, 137.53, 137.09, 129.14, 128.45, 127.15, 115.48, 115.47, 63.91, 61.94, 58.74, 34.03, 14.97, 14.12. HRMS(ESI) $C_{19}H_{23}NO_3S$ $[M+H]^+$m/z: Calc 346.1471, Found 346.1474.

N-(4-n-butoxyphenyl)-α-benzyl thioglycine ethyl ester (1h)



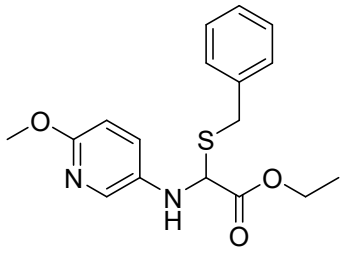
Brown viscous liquid, yield: 69%，R_f= 0.7 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ = 10:1). ^{1}H NMR (600 MHz, Chloroform-d) δ 7.33 – 7.29 (m, 4H), 7.25 (d, J = 3.4 Hz, 1H), 6.72 (d, J = 8.9 Hz, 2H), 6.40 (d, J = 8.9 Hz, 2H), 4.89 (s, 1H), 4.42 (s, 1H), 4.27 (qq, J = 7.1, 3.6 Hz, 2H), 3.88 (t, J = 7.1 Hz, 2H), 3.83 (d, J = 13.5 Hz, 1H), 3.76 (d, J = 13.5 Hz, 1H), 1.77 – 1.70 (m, 2H), 1.48 (dq, J = 14.8, 7.4 Hz, 2H), 1.34 (t, J = 7.1 Hz, 3H), 0.97 (t, J = 7.4 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.85, 152.68, 137.54, 137.02, 129.15, 127.15, 127.15, 115.47, 68.22, 61.93, 58.76, 34.03, 31.48, 19.26, 14.13, 13.88. HRMS(ESI) $C_{21}H_{27}NO_3S$ $[M+H]^+$m/z: Calc 374.1784, Found 374.1789.

N-(4-ethyl benzoate)-α-benzyl thioglycine ethyl ester (1i)



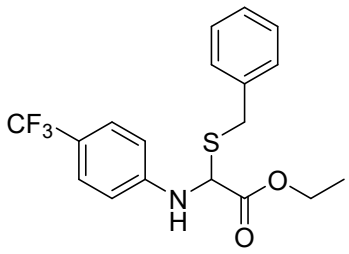
White solid, yield: 47%, mp: 71-72°C, R_f= 0.7 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.80 (d, *J* = 8.8 Hz, 2H), 7.34 – 7.26 (m, 5H), 6.39 – 6.36 (m, 2H), 5.05 (d, *J* = 8.4 Hz, 1H), 4.91 (d, *J* = 8.5 Hz, 1H), 4.34 – 4.27 (m, 4H), 3.87 (d, *J* = 13.6 Hz, 1H), 3.79 (d, *J* = 13.6 Hz, 1H), 1.37 (td, *J* = 7.1, 4.5 Hz, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.56, 166.63, 147.08, 137.08, 131.15, 129.15, 128.58, 127.42, 120.70, 113.08, 62.33, 60.36, 56.61, 34.46, 14.41, 14.13. HRMS(ESI) $C_{20}H_{23}NO_4S$ $[M+H]^+$m/z: Calc 374.1421, Found 374.1421.

N-(4-methoxy-3-pyridyl)-α-benzyl thioglycine ethyl ester (1j)



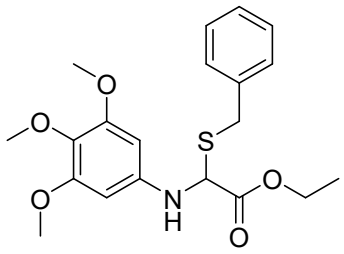
Yellow viscous liquid, yield: 70%, R_f= 0.7 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =10:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.51 (d, *J* = 2.8 Hz, 1H), 7.30 – 7.26 (m, 4H), 7.24 (t, *J* = 3.1 Hz, 1H), 6.68 (dd, *J* = 8.8, 3.0 Hz, 1H), 6.54 (d, *J* = 8.7 Hz, 1H), 4.87 (d, *J* = 7.0 Hz, 1H), 4.28 (qd, *J* = 7.1, 5.0 Hz, 2H), 3.87 (s, 3H), 3.81 (d, *J* = 13.6 Hz, 1H), 3.76 (d, *J* = 13.6 Hz, 1H), 1.35 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.56, 158.21, 137.37, 134.21, 132.39, 129.02, 128.51, 127.26, 126.48, 110.60, 62.13, 58.60, 53.40, 34.04, 14.10. HRMS(ESI) $C_{17}H_{20}N_2O_3S$ $[M+H]^+$m/z: Calc 333.1267, Found 333.1270.

N-(4-trifluoromethylphenyl)-α-benzyl thioglycine ethyl ester (1k)



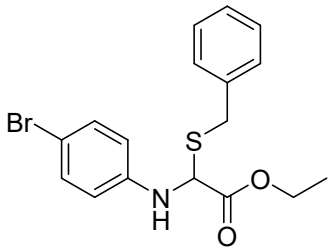
White solid, yield: 41%, mp: 63-64℃， R_f= 0.6 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =10:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 – 7.29 (m, 7H), 6.39 (d, *J* = 8.5 Hz, 2H), 4.88 (d, *J* = 8.5 Hz, 1H), 4.34 – 4.28 (m, 2H), 3.87 (d, *J* = 13.7 Hz, 1H), 3.79 (d, *J* = 13.7 Hz, 1H), 1.38 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.60, 145.85, 137.13, 129.16, 128.57, 127.42, 126.36, 120.76, 120.54, 113.41, 62.35, 56.65, 34.48, 14.12. HRMS(ESI) $C_{18}H_{18}F_3NO_2S$ $[M+H]^+$m/z: Calc 370.1083, Found 370.1087.

N-(3,4,5-trimethoxyphenyl)-α-benzyl thioglycine ethyl ester (1l)



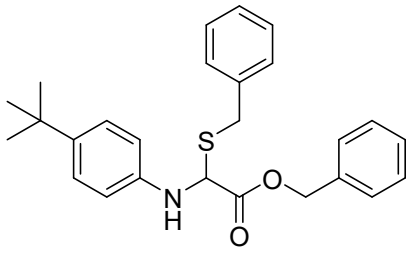
Yellow solid, yield: 36%, mp: 69-70ºC, R_f= 0.7 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =9:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.33 – 7.26 (m, 4H), 7.24 – 7.20 (m, 1H), 5.79 (s, 2H), 4.96 (s, 1H), 4.57 (s, 1H), 4.33 – 4.23 (m, 2H), 3.88 (d, *J* = 13.7 Hz, 1H), 3.78 (d, *J* = 13.7 Hz, 1H), 3.75 (s, 3H), 3.72 (s, 6H), 1.36 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.53, 153.85, 140.02, 137.72, 131.23, 128.99, 128.54, 127.12, 91.75, 62.14, 61.03, 58.14, 55.95, 33.99, 14.15. HRMS(ESI) $C_{20}H_{25}NO_5S$ [M+H]+m/z: Calc 392.1526, Found 392.1532.

N-(4-bromophenyl)-α-benzyl thioglycine ethyl ester (1m)



White solid, yield: 83%, mp:81-82 ºC, R_f= 0.8 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =18:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.36 – 7.26 (m, 5H), 7.22 – 7.16 (m, 2H), 6.28 – 6.24 (m, 2H), 4.84 (s, 1H), 4.71 (s, 1H), 4.30 (qd, *J* = 7.1, 0.9 Hz, 2H), 3.86 (d, *J* = 13.6 Hz, 1H), 3.78 (d, *J* = 13.6 Hz, 1H), 1.37 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.68, 142.23, 137.30, 131.84, 129.18, 128.56, 127.35, 115.71, 110.99, 62.21, 57.30, 34.37, 14.15. HRMS(ESI) $C_{17}H_{18}BrNO_2S$ $[M+H]^+$m/z: Calc 380.0314, Found 380.0311.

N-(4-tert-butylphenyl)-α-benzyl thioglycine benzyl ester (1n)

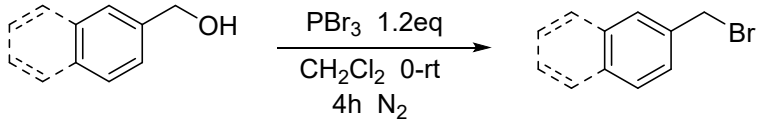


Yellow solid, yield: 73%, mp: 66-67ºC, R_f= 0.6 ($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$=12:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.44 – 7.36 (m, 5H), 7.29 – 7.26 (m, 2H), 7.26 – 7.24 (m, 1H), 7.24 – 7.22 (m, 2H), 7.19 – 7.16 (m, 2H), 6.48 – 6.45 (m, 2H), 5.27 – 5.20 (m, 2H), 5.03 (s, 1H), 3.75 (q, *J* = 13.3 Hz, 2H), 1.29 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 169.67, 141.91, 140.74, 137.30, 135.13, 129.41, 129.16, 128.68, 128.59, 128.38, 127.14, 125.95, 113.85, 67.57, 58.18, 43.27, 33.87, 31.48. HRMS(ESI) $C_{26}H_{29}NO_2S$ $[M+H]^+$m/z: Calc 420.1992, Found 420.1995.

5. Synthesis of phenol derivatives

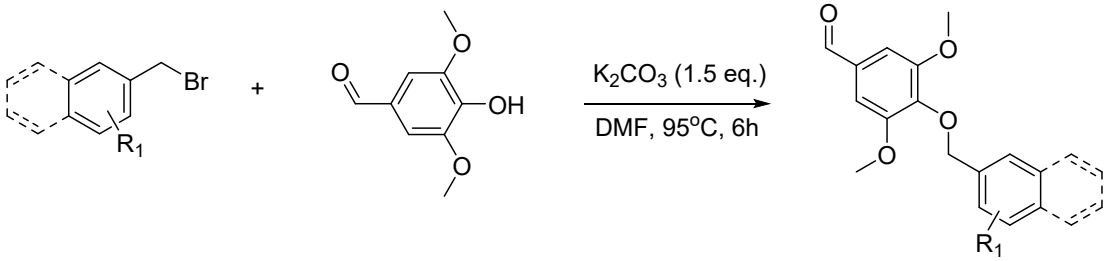
Method A **(5b-5d)**

Step 1：



Alcohols were brominated according to the method provided in the references. [7] Firstly, 5mmol of benzyl carbinol (or (2-naphthalene) methanol) was added in a 50ml dry three-neck flask. Then, 20ml of methylene chloride solution was added and the mixture was placed in an ice-water bath, cooled to 0℃. Under nitrogen protection, a constant pressure funnel was used to slowly add 1.5eq of phosphorus tribromide solution dropwise. The reaction mixture was then heated gradually to room temperature for 4 hours. After stopping the reaction, saturated sodium bicarbonate solution was added to quench it in the three-neck flask. The resulting bromine product could be extracted three times with dichloromethane (20ml×3), dried with anhydrous magnesium sulfate, and further dried by spinning off the dichloromethane solvent. The purified product could be directly used for subsequent reactions.

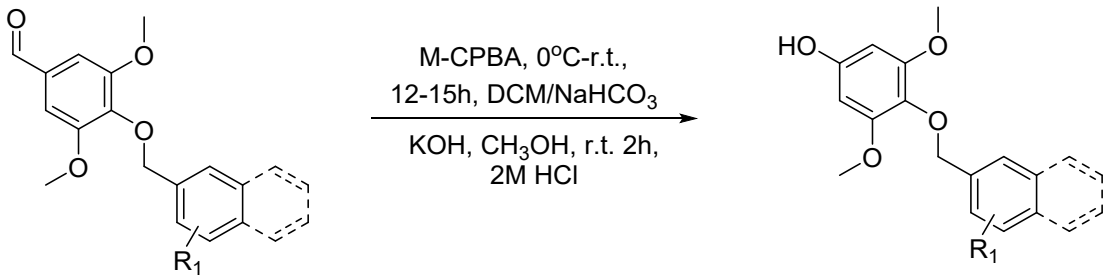
Step 2:



The method described in the literature [8] was followed. Bromomethyl compound (4 mmol), 4-hydroxy-3,5-dimethoxybenzaldehyde (4.5 mmol), and anhydrous potassium carbonate (6 mmol) were weighed on weighing paper and added to a dry three-mouth bottle with a capacity of 25 ml. A solvent, DMF (5 ml), was then added, and the reaction mixture was heated in an oil bath at 95°C for approximately 6 hours. TLC analysis was performed during the reaction to monitor the completion of the raw material conversion. After completion, the inorganic salts were removed by filtration under vacuum, followed by pouring the reaction mixture into water and extracting it with dichloromethane (25 ml × 3). The organic phase was collected and dried using anhydrous $MgSO_4$. Silica gel adsorption was employed to separate impurities from the dried organic phase, which was further purified through column chromatography using petroleum ether:ethyl acetate as eluent in a ratio of 3:1. Finally, solid aldehyde product could be obtained.

Step 3:

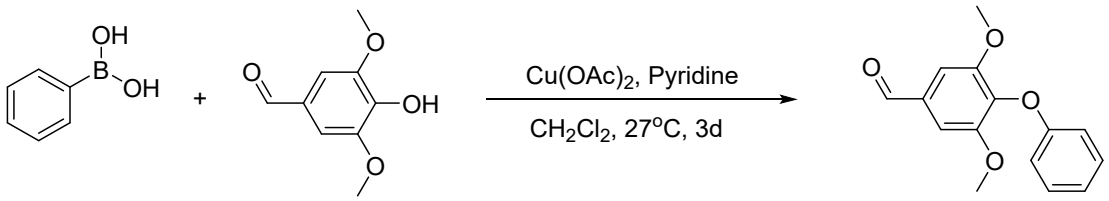
[7] Dowari, P.; Das, S.; Pramanik, B.; Das, D., pH clock instructed transient supramolecular peptide amphiphile and its vesicular assembly. *Chem. Commun. (Camb)* **2019**, 55 (94), 14119-14122.
[8] Fang, X.; Shen, L.; Hu, X., Asymmetric total synthesis of (+)-ovafolinins A and B. *Chem. Commun. (Camb)* **2018**, 54 (54), 7539-7541.



5b-5d

Please consult the methodology outlined in the literature [8]. The aldehyde product obtained from Step 2 was 1.5 mmol, which was placed in a dry three-neck flask with a capacity of 50 ml. Subsequently, 15 ml of dichloromethane was added to the solution and it was cooled in an ice water bath at 0°C. Then, at this temperature, 75% M-CPBA (1.5 equivalents) was introduced and stirred for one hour before gradually raising the temperature to room temperature for an overnight reaction period. The progress of the raw material's transformation was assessed using thin-layer chromatography (TLC). Upon completion of the reaction, it should be quenched by adding saturated sodium bicarbonate solution and extracted thrice with methylene chloride (20 ml ×3). The organic phase should be collected, dried with anhydrous $MgSO_4$, solvent removed through evaporation, followed by dissolution of the viscous residue in 10 ml of methanol and subsequent addition of KOH (3 equivalents) for a two-hour reaction time. After most of the methanol had been eliminated *via* evaporation, acidification was achieved using HCl solution (2M), extraction performed thrice with DCM (20 ml ×3), collection of organic phase and drying utilizing anhydrous $MgSO_4$. Finally, adsorption onto silica gel is conducted on the organic phase prior to separation and purification through column chromatography employing a mobile phase composed of petroleum ether:ethyl acetate =2:1 ratio to obtain phenol as desired.

Method B (**5e**)

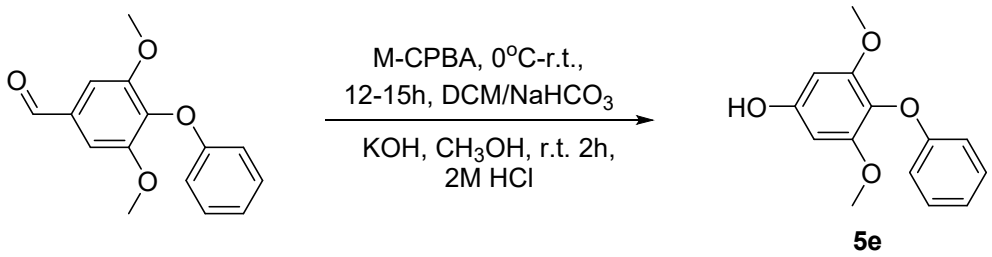


Please consult the methodology outlined in the literature. [9] Added 730mg (4mmol) of 4-hydroxy-3,5-dimethoxybenzaldehyde and 730mg of phenyl-boronic acid (1.5 equivalents) to a 100ml flask, along with copper acetate (1.25 equivalents), anhydrous pyridine (8mmol), and activated molecular sieves (4Å, 320mg). Subsequently, added 25ml of anhydrous dichloromethane to the mixture. Stirred the reaction at a temperature range of 25-27 °C for three days while monitoring its progress *via* TLC analysis. Upon completion, removed insoluble materials and washed the filtrate with dilute hydrochloric acid. Collected the organic phase and dried it using anhydrous $MgSO_4$. The crude product was then purified through chromatography on silica gel to

[9] Verma, R.; Boshoff, H. I. M.; Arora, K.; Bairy, I.; Tiwari, M.; Bhat, V. G.; Shenoy, G. G., Synthesis, antitubercular evaluation, molecular docking and molecular dynamics studies of 4,6-disubstituted-2-oxo-dihydropyridine-3-carbonitriles. *J. MOL. STRUCT.* **2019**, 1197, 117-133.

yield the desired products.

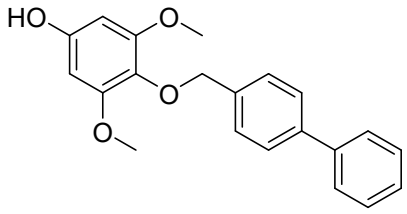
Step 2:



5e

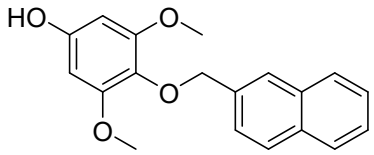
The step is the same as the step 3 in method A.

3,5-dimethoxy-4-(4-phenylbenzyloxy) phenol (5c)



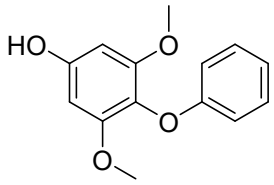
Pink solid, yield: 56%, mp:117-118℃, R_f=0.5($V_{Petroleum\ ether}$:$V_{Ethyl\ acetate}$=2:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.61 – 7.53 (m, 6H), 7.44 (t, *J* = 7.7 Hz, 2H), 7.35 (t, *J* = 7.4 Hz, 1H), 6.06 (s, 2H), 4.97 (s, 2H), 3.73 (s, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.97, 152.54, 141.01, 140.68, 136.84, 129.08, 128.74, 127.22, 127.09, 126.85, 93.07, 75.07, 55.94. HRMS(ESI) $C_{21}H_{20}O_4$ $[M+H]^+$m/z：Calc 337.1434, Found 337.1439.

3,5-dimethoxy-4-benzylnaphthoxyphenol (5d)



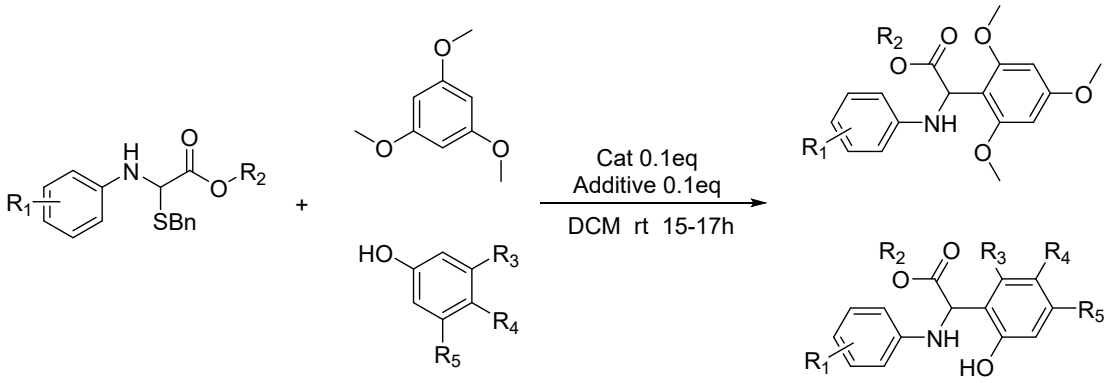
Brown solid, yield:37%, mp:102-103℃, R_f=0.5($V_{Petroleum\ ether}$:$V_{Ethyl\ acetate}$=3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.89 (s, 1H), 7.82 (dd, *J* = 6.8, 3.8 Hz, 3H), 7.63 (dd, *J* = 8.4, 1.7 Hz, 1H), 7.47 – 7.44 (m, 2H), 6.07 (s, 2H), 5.09 (s, 2H), 3.76 (s, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.94, 152.55, 135.31, 133.19, 133.08, 130.48, 128.02, 127.72, 127.61, 127.30, 126.63, 125.85, 125.81, 93.06, 75.44, 55.91. HRMS(ESI) $C_{19}H_{18}O_4$ $[M+H]^+$m/z: Calc 311.1278, Found 311.1283.

3,5-dimethoxy-4-phenoxyphenol (5e)



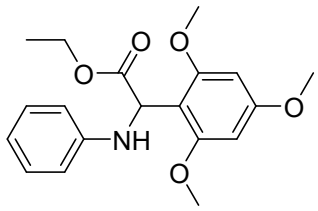
White solid, yield:43%, mp:154-155℃，R_f=0.5($V_{Petroleum\ ether}$:$V_{Ethyl\ acetate}$=2:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.24 (dd, *J* = 8.7, 7.3 Hz, 2H), 6.96 (t, *J* = 7.3 Hz, 1H), 6.87 (dd, *J* = 8.7, 1.0 Hz, 2H), 6.15 (s, 2H), 3.70 (s, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 158.66, 153.86, 153.60, 129.25, 121.45, 114.63, 93.18, 56.13. HRMS(ESI) $C_{14}H_{14}O_4$ $[M+H]^+$m/z: Calc 247.0965, Found 247.0967.

6.Synthesis of *N*-aryl-α-Aryl glycine ester



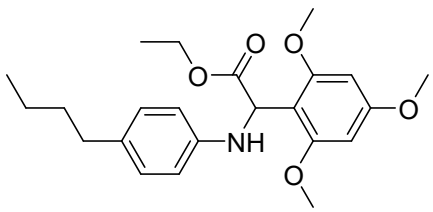
The *N*-aryl-α-benzylthio glycine ester (0.2 mmol), 1,3,5-trimethoxybenzene (or phenol derivative) (0.4 mmol), 3,6-dichloro-1,2,4,5-tetrazine (3 mg, 0.1 eq.), $Zn(OAc)_2$ (3.7 mg, 0.1 eq.), and 1 mL of dichloromethane were individually added to a 10 mL test tube. The reaction mixture was allowed to incubate at room temperature for a duration of 15-17 hours. Upon completion, the crude product was purified using thin-layer chromatography to obtain the final products.

N-phenyl-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3a) [10]



Yellow solid, yield: 75% (51.4mg), mp:107-108°C , R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$=5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.12 (dd, *J* = 8.6, 7.3 Hz, 2H), 6.73 (d, *J* = 8.6 Hz, 2H), 6.68 – 6.64 (m, 1H), 6.12 (s, 2H), 5.67 (s, 1H), 4.22 – 4.10 (m, 2H), 3.84 (s, 6H), 3.79 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.95, 160.92, 158.73, 147.35, 128.98, 117.59, 113.74, 108.65, 90.97, 61.04, 55.85, 55.30, 50.93, 14.20. HRMS(ESI) $C_{19}H_{23}O_5N[M+H]^+$m/z: Calc 346.1649, Found 346.1643.

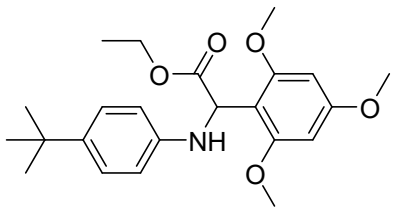
N-(4-n-butyl phenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3b)



Yellow viscous liquid, yield: 79% (63.2mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$=4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.95 – 6.92 (m, 2H), 6.68 – 6.65 (m, 2H), 6.11 (s, 2H), 5.64 (s, 1H), 4.22 – 4.16 (m, 1H), 4.15 – 4.09 (m, 1H), 3.83 (s, 6H), 3.79 (s, 3H), 2.48 – 2.43 (m, 2H), 1.51 (q, *J* = 7.7 Hz, 2H), 1.31 (dq, *J* = 14.6, 7.3 Hz, 2H), 1.17 (t, *J* = 7.1 Hz, 3H), 0.89 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.11, 160.86, 158.73, 145.23, 132.00, 128.86, 113.81, 108.90, 90.97, 60.97, 55.83, 55.29, 51.28, 34.71, 33.90, 22.32, 14.20, 13.97. HRMS(ESI) $C_{23}H_{31}O_5N$ $[M+H]^+$m/z: Calc 402.2275, Found 402.2273.

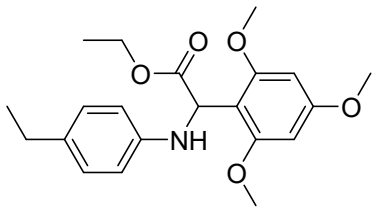
[10] M. Salman, Z.-Q. Zhu and Z.-Z. Huang, Dehydrogenative Cross-Coupling Reaction between N-Aryl α-Amino Acid Esters and Phenols or Phenol Derivative for Synthesis of α-Aryl α-Amino Acid Esters, *Org. Lett.*, 2016, **18**, 1526-1529.

N-(4-tert-butylphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3c)



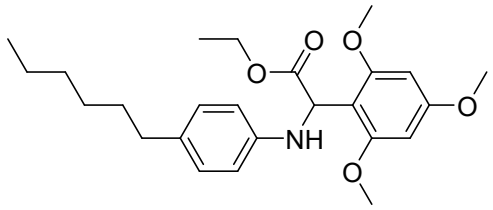
White solid yield: 69% (55.1mg), mp:100-101 °C, R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.15 (d, *J* = 8.7 Hz, 2H), 6.68 (d, *J* = 8.7 Hz, 2H), 6.12 (s, 2H), 5.64 (s, 1H), 4.22 – 4.16 (m, 1H), 4.15 – 4.09 (m, 1H), 3.84 (s, 6H), 3.79 (s, 3H), 1.25 (s, 9H), 1.17 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.11, 160.86, 158.73, 144.94, 140.10, 125.78, 113.23, 109.02, 90.98, 60.97, 55.84, 55.30, 51.02, 33.78, 31.54, 14.21. HRMS(ESI) $C_{23}H_{31}O_5N$ $[M+H]^+$m/z: Calc 402.2275, found 402.2272.

N-(4-ethylphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3d)



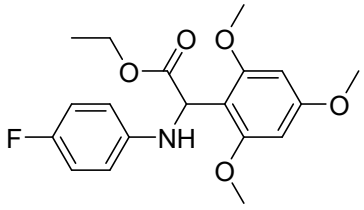
Yellow viscous liquid, yield: 70% (52.2mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.96 (d, *J* = 8.6 Hz, 2H), 6.68 (d, *J* = 8.5 Hz, 2H), 6.11 (s, 2H), 5.64 (s, 1H), 4.21 – 4.16 (m, 1H), 4.12 (dq, *J* = 10.8, 7.1 Hz, 1H), 3.83 (s, 6H), 3.79 (s, 3H), 2.50 (q, *J* = 7.6 Hz, 2H), 1.16 (td, *J* = 7.3, 5.7 Hz, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.10, 160.87, 158.74, 145.28, 133.35, 128.30, 113.89, 108.88, 90.98, 60.97, 55.83, 55.29, 51.27, 27.90, 15.81, 14.20. HRMS(ESI) $C_{21}H_{27}NO_5$ $[M+H]^+$m/z: Calc 374.1962, Found 374.1961.

N-(4-hexylphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3e)



Yellow viscous liquid, yield: 71% (60.4mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.93 (d, *J* = 8.5 Hz, 2H), 6.68 – 6.65 (m, 2H), 6.11 (s, 2H), 5.64 (s, 1H), 4.15 (ddq, *J* = 37.7, 10.8, 7.1 Hz, 2H), 3.83 (s, 6H), 3.79 (s, 3H), 2.46 – 2.43 (m, 2H), 1.52 (dt, *J* = 15.3, 7.9 Hz, 2H), 1.27 (td, *J* = 7.5, 3.4 Hz, 6H), 1.16 (t, *J* = 7.1 Hz, 3H), 0.88 – 0.84 (m, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.12, 160.86, 158.73, 145.25, 132.04, 128.84, 113.81, 108.91, 90.97, 60.96, 55.83, 55.29, 51.28, 35.05, 31.77, 31.69, 28.98, 22.62, 14.20, 14.09. HRMS(ESI) $C_{25}H_{35}NO_5$ $[M+H]^+$m/z: Calc 430.2588, Found 430.2594.

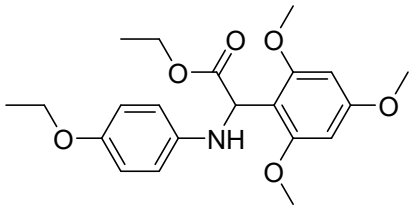
N-(4-fluorophenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3f)



Yellow solid, yield: 78% (56.5mg), mp: 91-92 °C, R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.84 – 6.80 (m, 2H), 6.68 – 6.65 (m, 2H), 6.11 (s, 2H), 5.58 (s, 1H), 4.16 (ddq, *J* = 37.4, 10.8, 7.1 Hz, 2H), 3.83 (s, 6H), 3.79 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.90, 160.98, 158.69, 156.81, 155.25, 143.71, 115.42, 113.40 (d, J_{C-F} = 7.6 Hz) 108.36, 90.94, 61.07, 55.84, 55.28, 51.80, 14.18.

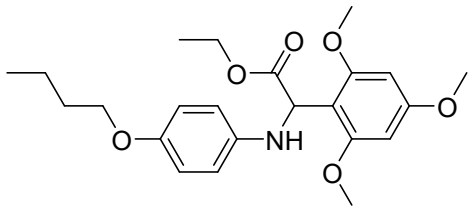
^{19}F NMR (500 MHz, DMSO-d^6) -129.33. HRMS(ESI) $C_{19}H_{22}FNO_5$ $[M+Na]^+$m/z: Calc 386.1374, Found 386.1378.

N-(4-ethoxyphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3g)



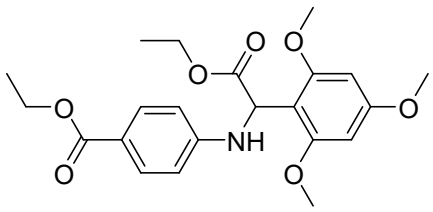
Brown viscous liquid, yield: 36% (27.8mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.72 – 6.67 (m, 4H), 6.11 (s, 2H), 5.58 (s, 1H), 4.21 – 4.09 (m, 2H), 3.92 (q, *J* = 7.0 Hz, 2H), 3.82 (s, 6H), 3.78 (s, 3H), 1.34 (t, *J* = 7.0 Hz, 3H), 1.16 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.18, 160.85, 158.70, 151.63, 141.58, 115.55, 115.39, 108.82, 90.95, 63.92, 60.94, 55.82, 55.27, 52.25, 15.00, 14.19. HRMS(ESI) $C_{21}H_{27}NO_6$ $[M+H]^+$m/z: Calc 390.1911, Found 390.1912.

N-(4-n-butoxyphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3h)



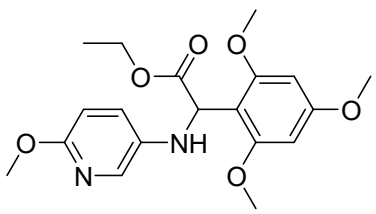
Brown viscous liquid, yield: 55% (45.5mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.73 – 6.67 (m, 4H), 6.10 (s, 2H), 5.58 (s, 1H), 4.21 – 4.09 (m, 2H), 3.85 (t, *J* = 6.6 Hz, 2H), 3.82 (s, 6H), 3.79 (s, 3H), 1.72 – 1.68 (m, 2H), 1.45 (p, *J* = 7.4, 6.8 Hz, 2H), 1.16 (t, *J* = 7.1 Hz, 3H), 0.94 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.22, 160.92, 158.71, 152.13, 141.04, 115.91, 115.36, 108.51, 90.93, 68.25, 61.07, 55.83, 55.29, 52.53, 31.50, 19.24, 14.18, 13.85. HRMS(ESI) $C_{23}H_{31}NO_6$ $[M+H]^+$m/z: Calc 418.2224, Found 418.2228.

N-(4-ethyl benzoate)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3i)



White solid, yield: 63% (52.5mg), mp:125-126°C, R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.81 (d, *J* = 8.8 Hz, 2H), 6.67 (d, *J* = 8.7 Hz, 2H), 6.11 (s, 2H), 5.71 (s, 1H), 4.28 (q, *J* = 7.1 Hz, 2H), 4.20 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.14 (dq, *J* = 10.8, 7.1 Hz, 1H), 3.84 (s, 6H), 3.79 (s, 3H), 1.33 (t, *J* = 7.1 Hz, 3H), 1.17 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.26, 166.88, 161.16, 158.67, 150.89, 131.30, 118.73, 112.11, 107.71, 90.94, 61.31, 60.05, 55.86, 55.29, 50.09, 14.43, 14.16. HRMS(ESI) $C_{22}H_{27}NO_7$ $[M+Na]^+$m/z: Calc 440.1680, Found 440.1682.

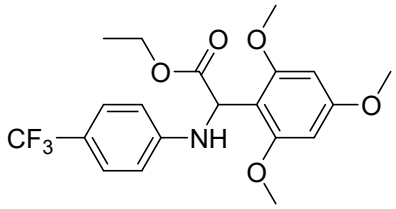
N-(4-methoxy-3-pyridyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3j)



Brown viscous liquid, yield: 38% (28.4mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.66 (d, *J* = 2.9 Hz, 1H), 7.10 (dd, *J* = 8.8, 3.0 Hz, 1H), 6.56 (d, *J* = 8.8 Hz, 1H), 6.10 (s, 2H), 5.54 (s, 1H), 4.21 – 4.11 (m, 2H), 3.83 (d, *J* = 5.3 Hz, 9H), 3.79 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.78, 161.04, 158.68,

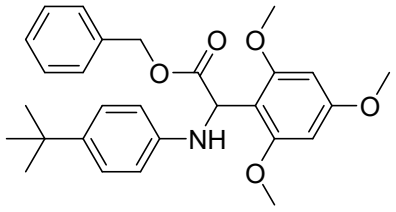
157.63, 138.35, 132.40, 127.26, 110.36, 108.03, 90.88, 61.13, 55.85, 55.28, 52.30, 29.67, 14.18. HRMS(ESI) $C_{19}H_{24}N_2O_6$ $[M+H]^+$m/z: Calc 377.1707, Found 377.1711.

N-(4-trifluoromethylphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine ethyl ester (3k) [11]



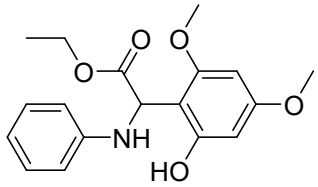
Yellow solid, yield: 72% (59.5mg), mp:107-108°C, R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 (d, *J* = 8.4 Hz, 2H), 6.71 (d, *J* = 8.5 Hz, 2H), 6.12 (s, 2H), 5.67 (s, 1H), 4.21 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.14 (dq, *J* = 10.8, 7.1 Hz, 1H), 3.85 (s, 6H), 3.80 (s, 3H), 1.18 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, DMSO-d^6) δ 171.39, 160.86, 158.34, 150.78, 126.00 (q, J_{C-F} = 3.0 Hz), 115.61, 115.39, 111.71, 107.14, 91.04, 60.39, 55.88, 55.29, 49.18, 39.52, 14.08. ^{19}F NMR (500 MHz, DMSO-d^6) -58.94. HRMS(ESI) $C_{20}H_{22}F_3NO_5$ $[M+Na]^+$m/z：Calc 436.1342, Found 436.1346.

N-(4-tert-butylphenyl)-α-(2,4,6-Trimethoxyphenyl) glycine benzyl ester (3l)



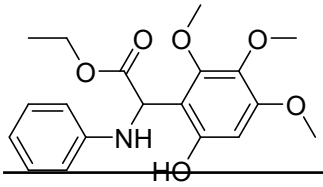
Yellow solid, yield: 51% (46.9mg), mp: 143-144°C, R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.29 – 7.26 (m, 3H), 7.19 – 7.15 (m, 4H), 6.70 (d, *J* = 8.7 Hz, 2H), 6.09 (s, 2H), 5.74 (s, 1H), 5.26 (d, *J* = 12.5 Hz, 1H), 5.05 (d, *J* = 12.5 Hz, 1H), 3.80 (s, 3H), 3.71 (s, 6H), 1.26 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 173.12, 160.98, 158.69, 144.67, 140.46, 136.28, 128.25, 127.91, 127.81, 125.81, 113.46, 108.51, 90.85, 66.41, 55.68, 55.33, 51.23, 33.80, 31.53. HRMS(ESI) $C_{28}H_{33}NO_5$ $[M+H]^+$m/z: Calc 464.2431, Found 464.2436.

N-phenyl-α-(2-(3,5-dimethoxy) phenol)-glycine ethyl ester (6a)



Yellow viscous liquid, yield: 45% (29.2mg), R_f=0.7($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.17 (dd, *J* = 8.6, 7.4 Hz, 2H), 6.86 (t, *J* = 7.4 Hz, 1H), 6.77 (dd, *J* = 8.6, 1.0 Hz, 2H), 6.12 (d, *J* = 2.4 Hz, 1H), 6.04 (d, *J* = 2.4 Hz, 1H), 5.55 (s, 1H), 4.25 (dq, *J* = 10.7, 7.1 Hz, 1H), 4.17 (dq, *J* = 10.8, 7.1 Hz, 1H), 3.88 (s, 3H), 3.75 (s, 3H), 1.21 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.43, 161.27, 158.59, 158.41, 145.75, 129.24, 120.67, 115.73, 102.78, 94.60, 91.58, 62.18, 55.99, 55.23, 53.94, 13.97. HRMS(ESI) $C_{18}H_{21}NO_5$ $[M+Na]^+$m/z: Calc 354.1312, Found 354.1318.

N-phenyl-α-(2-(3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6b)

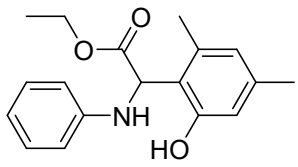


Yellow viscous liquid, yield: 70% (50.5mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.20 – 7.16 (m, 2H), 6.88 – 6.85 (m, 1H), 6.79 (d, *J* = 7.6 Hz, 2H), 6.20 (s, 1H), 5.53 (s, 1H), 4.30 – 4.26 (m, 1H), 4.21 – 4.17 (m, 1H), 4.02 (s, 3H),

[11] M.-H. Luo, Y.-Y. Jiang, K. Xu, Y.-G. Liu, B.-G. Sun and C.-C. Zeng, Functionalization of N-arylglycine esters: electrocatalytic access to C–C bonds mediated by n-Bu_4NI, *Beilstein J. Org. Chem.*, 2018, **14**, 499-505.

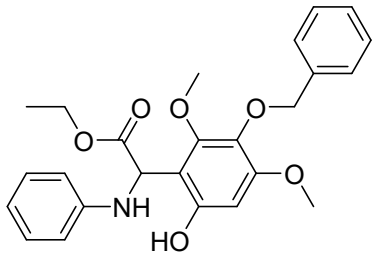
3.83 (s, 3H), 3.80 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.16, 154.25, 152.84, 151.70, 145.58, 135.61, 129.27, 120.78, 115.84, 107.36, 97.02, 62.41, 61.31, 60.98, 55.74, 54.64, 13.98. HRMS(ESI) $C_{19}H_{23}NO_6$ $[M+Na]^+$m/z: Calc 384.1418, Found 384.1421.

N-phenyl-α-(2-(3,5-dimethyl) phenol)-glycine ethyl ester (6c)



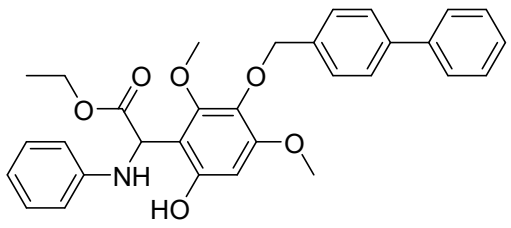
Yellow viscous liquid, yield: 45% (26.8mg), R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.17 (tt, *J* = 7.5, 2.1 Hz, 2H), 6.87 (t, *J* = 7.4 Hz, 1H), 6.73 – 6.69 (m, 2H), 6.62 (s, 1H), 6.54 (s, 1H), 5.24 (s, 1H), 4.31 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.18 – 4.13 (m, 1H), 2.48 (s, 3H), 2.25 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.75, 156.86, 145.84, 139.47, 136.96, 129.37, 123.63, 116.92, 116.34, 115.75, 62.43, 57.96, 21.08, 20.24, 13.97. HRMS(ESI) $C_{18}H_{21}NO_3$ $[M+H]^+$m/z: Calc 300.1594, Found 300.1595.

N-phenyl-α-(2-(3,5-dimethoxy-4-benzyloxy) phenol)-glycine ethyl ester (6d)



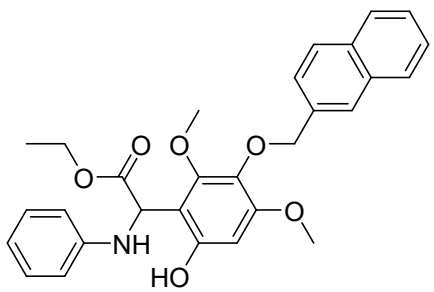
Yellow viscous liquid, yield: 66% (57.6mg), R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.48 (d, *J* = 7.0 Hz, 2H), 7.39 – 7.35 (m, 2H), 7.32 (t, *J* = 7.3 Hz, 1H), 7.21 – 7.17 (m, 2H), 6.88 (t, *J* = 7.4 Hz, 1H), 6.78 (dd, *J* = 8.6, 0.9 Hz, 2H), 6.19 (s, 1H), 5.52 (s, 1H), 5.00 (d, *J* = 10.9 Hz, 1H), 4.98 (d, *J* = 10.9 Hz, 1H), 4.28 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.20 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.02 (s, 3H), 3.76 (s, 3H), 1.22 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.07, 154.52, 153.07, 152.06, 145.60, 137.64, 134.19, 129.28, 128.49, 128.23, 127.91, 120.82, 115.88, 107.36, 97.09, 75.17, 62.42, 61.54, 55.73, 54.70, 14.00. HRMS(ESI) $C_{25}H_{27}NO_6$ $[M+Na]^+$m/z: Calc 460.1731, Found 460.1737.

N-phenyl-α-(2-(3,5-dimethoxy-4-(4-phenylbenzyloxy) phenol)-glycine ethyl ester (6e)



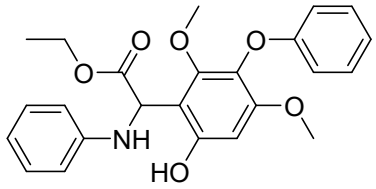
Grey solid, yield: 42% (43.3mg), mp: 46-47°C, R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.65 – 7.55 (m, 6H), 7.46 (t, *J* = 7.7 Hz, 2H), 7.36 (t, *J* = 7.4 Hz, 1H), 7.19 (t, *J* = 7.9 Hz, 2H), 6.87 (t, *J* = 7.4 Hz, 1H), 6.81 (d, *J* = 8.4 Hz, 2H), 6.22 (s, 1H), 5.56 (s, 1H), 5.08 – 5.02 (m, 2H), 4.30 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.21 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.07 (s, 3H), 3.77 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.09, 154.53, 153.10, 152.08, 145.60, 140.91, 140.80, 136.74, 134.29, 129.29, 128.88, 128.77, 127.31, 127.11, 127.00, 120.82, 115.88, 107.44, 97.15, 74.91, 62.43, 61.61, 55.76, 54.70, 14.02. HRMS(ESI) $C_{31}H_{31}NO_6$ $[M+Na]^+$m/z: Calc 536.2044, Found 536.2048.

N-phenyl-α-(2-(3,5-dimethoxy-4-benzylnaphthoxy) phenol)-glycine ethyl ester (6f)



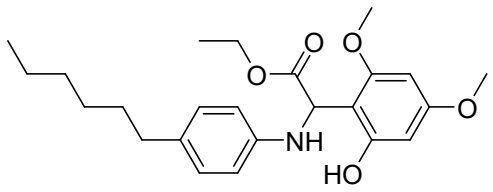
Yellow solid, yield: 63% (61.0mg), mp: 54-55°C, R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.93 (s, 1H), 7.88 – 7.83 (m, 3H), 7.66 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.50 (dt, *J* = 6.2, 3.4 Hz, 2H), 7.15 (dd, *J* = 8.5, 7.5 Hz, 2H), 6.87 (t, *J* = 7.4 Hz, 1H), 6.79 (d, *J* = 7.7 Hz, 2H), 6.22 (s, 1H), 5.55 (s, 1H), 5.18 (d, *J* = 2.3 Hz, 2H), 4.28 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.20 (dq, *J* = 11.5, 7.5 Hz, 1H), 4.07 (s, 3H), 3.77 (s, 3H), 1.22 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.08, 154.52, 153.11, 152.07, 145.58, 135.24, 134.30, 133.24, 133.09, 129.27, 128.03, 127.90, 127.68, 127.11, 126.40, 126.01, 125.94, 120.81, 115.87, 107.45, 97.14, 75.30, 62.42, 61.61, 55.76, 54.70, 14.00. HRMS(ESI) $C_{29}H_{29}NO_6$ $[M+Na]^+$m/z：Calc 510.1887, Found 510.1891.

N-phenyl-α-(2-(3,5-dimethoxy-4-phenoxyphenol)-glycine ethyl ester (6g)



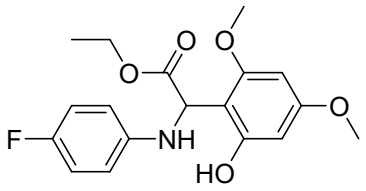
Yellow viscous liquid, yield: 71% (60.0mg), R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:2:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 – 7.27 (m, 2H), 7.20 (t, *J* = 7.9 Hz, 2H), 7.02 (t, *J* = 7.3 Hz, 1H), 6.90 (dd, *J* = 12.8, 7.6 Hz, 3H), 6.82 (d, *J* = 7.8 Hz, 2H), 6.29 (s, 1H), 5.55 (s, 1H), 4.30 – 4.22 (m, 2H), 3.96 (s, 3H), 3.71 (s, 3H), 1.25 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.77, 158.37, 154.39, 154.21, 151.87, 145.35, 129.38, 129.29, 129.27, 121.75, 121.07, 116.09, 114.61, 107.57, 97.22, 62.48, 61.39, 55.95, 54.57, 13.99. HRMS(ESI) $C_{24}H_{25}NO_6$ $[M+Na]^+$m/z: Calc 446.1574, Found 446.1581.

N-(4-hexylphenyl)-α-(2-(3,5-dimethoxy) phenol)-glycine ethyl ester (6h)



Yellow viscous liquid, yield: 91% (75.3mg), R_f=0.7($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.98 (dd, *J* = 8.8, 2.2 Hz, 2H), 6.71 – 6.68 (m, 2H), 6.10 (d, *J* = 2.4 Hz, 1H), 6.03 – 6.02 (m, 1H), 5.51 (s, 1H), 4.24 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.18 – 4.12 (m, 1H), 3.87 (s, 3H), 3.75 (s, 3H), 2.49 – 2.45 (m, 2H), 1.54 – 1.49 (m, 2H), 1.27 (t, *J* = 4.4 Hz, 6H), 1.20 (t, *J* = 7.1 Hz, 3H), 0.88 – 0.84 (m, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.39, 161.56, 158.63, 157.70, 143.37, 128.59, 120.55, 116.08, 102.88, 94.25, 92.95, 62.19, 55.27, 54.37, 35.07, 31.71, 31.58, 28.52, 27.98, 22.59, 15.74, 13.96. HRMS(ESI) $C_{24}H_{33}NO_5$ $[M+H]^+$m/z: Calc 416.2431, Found 416.2435.

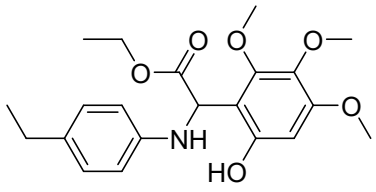
N-(4-fluorophenyl)-α-(2-(3,5-dimethoxy) phenol)-glycine ethyl ester (6i)



Brown viscous liquid, yield: 51% (35.2mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.90 – 6.85 (m, 2H), 6.74 – 6.70 (m, 2H), 6.11 (d, *J* = 2.4 Hz, 1H), 6.03 (d, *J* = 2.4 Hz, 1H), 5.48 (s, 1H), 4.25 (dq, *J* = 10.7, 7.1 Hz, 1H), 4.19 – 4.15 (m, 1H), 3.87 (s, 3H), 3.75 (s, 3H), 1.20 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, DMSO-*d*^{6}) δ172.00, 160.02, 158.78, 156.39, 144.36,

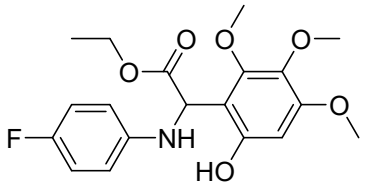
115.07, 114.93, 113.41(d, J_{C-F} =6.0 Hz), 106.53, 93.58, 90.02, 60.19, 55.68, 54.93, 50.41, 14.10. ^{19}F NMR (500 MHz, DMSO-d^6) -129.37. HRMS(ESI) $C_{18}H_{20}FNO_5$ $[M+Na]^+$m/z: Calc 372.1218, Found 372.1223.

N-(4-ethylphenyl)-α-(2-(3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6j)



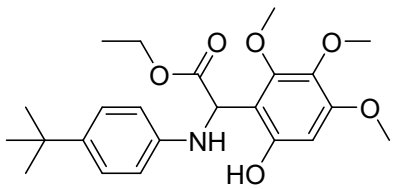
Brown viscous liquid, yield: 55% (42.5mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.33 – 7.30 (m, 1H), 7.02 (d, *J* = 8.5 Hz, 2H), 6.74 – 6.71 (m, 2H), 6.19 (s, 1H), 5.49 (s, 1H), 4.26 (dtd, *J* = 14.7, 7.3, 3.7 Hz, 1H), 4.21 – 4.16 (m, 1H), 4.01 (s, 3H), 3.83 (s, 3H), 3.79 (s, 3H), 2.53 (q, *J* = 7.6 Hz, 2H), 1.22 (t, *J* = 7.1 Hz, 3H), 1.16 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.01, 154.21, 153.04, 151.70, 143.22, 135.52, 129.08, 128.60, 116.18, 107.29, 96.96, 62.35, 61.27, 60.91, 55.71, 55.10, 27.97, 15.73, 13.98. HRMS(ESI) $C_{21}H_{27}NO_6$ $[M+Na]^+$m/z: Calc 412.1731, Found 412.1737.

N-(4-fluorophenyl)-α-(2-(3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6k)



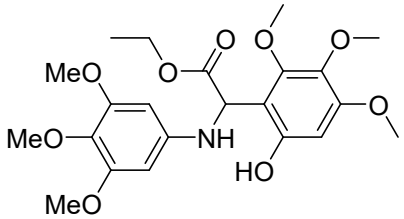
Yellow viscous liquid, yield: 48% (36.5mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =5:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.88 (t, *J* = 8.7 Hz, 2H), 6.75 (dd, *J* = 8.8, 4.4 Hz, 2H), 6.20 (s, 1H), 5.46 (s, 1H), 4.28 (dq, *J* = 10.8, 7.1 Hz, 1H), 4.19 (dq, *J* = 10.9, 7.1 Hz, 1H), 4.00 (s, 3H), 3.82 (s, 3H), 3.79 (s, 3H), 1.22 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.91, 158.53, 154.33, 152.83, 151.71, 141.60, 135.59, 117.26(d, J_{C-F} = 7.6 Hz), 115.73, 107.03, 97.00, 62.43, 61.31, 60.98, 55.73, 55.10, 13.97. ^{19}F NMR (500 MHz, DMSO-d^6) -129.15. HRMS(ESI) $C_{19}H_{22}FNO_6$ $[M+Na]^+$m/z: Calc 402.1323, Found 402.1325.

N-(4-tert-butylphenyl)-α-(2-(3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6l)



Yellow viscous liquid, yield: 51% (42.5mg), R_f=0.7($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.22 – 7.20 (m, 2H), 6.76 – 6.73 (m, 2H), 6.19 (s, 1H), 5.49 (s, 1H), 4.29 – 4.25 (m, 1H), 4.19 (qd, *J* = 7.2, 3.4 Hz, 1H), 4.02 (s, 3H), 3.84 (s, 3H), 3.79 (s, 3H), 1.25 (s, 9H), 1.22 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.96, 154.21, 153.08, 151.68, 143.78, 143.08, 135.54, 126.09, 115.69, 107.32, 96.95, 62.35, 61.27, 60.96, 55.73, 55.04, 34.01, 31.39, 13.98. HRMS(ESI) $C_{23}H_{31}NO_6$ $[M+H]^+$m/z: Calc 418.2224, Found 418.2225.

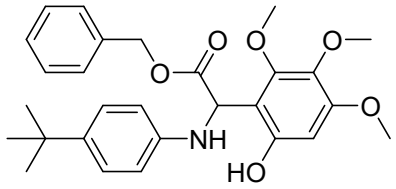
N-(3,4,5-trimethoxyphenyl)-α-(2-(3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6m)



Yellow viscous liquid, yield: 61% (55.1mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =6:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.20 (s, 1H), 6.07 (s, 2H), 5.51 (s, 1H), 4.31 – 4.26 (m, 1H), 4.21 – 4.16 (m, 1H), 4.02 (s, 3H), 3.78 (s, 3H), 3.77 (s, 3H), 3.74 (s, 6H), 3.72 (s, 3H), 1.22 (t, *J* =

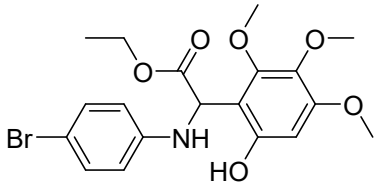
7.1 Hz, 3H).^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.77, 154.23, 153.68, 152.85, 151.64, 141.91, 135.66, 132.10, 107.70, 97.16, 93.37, 62.42, 61.43, 60.93, 60.81, 55.75, 55.74, 54.59, 14.00. HRMS(ESI) $C_{22}H_{29}NO_9$ [M+H]+m/z: Calc 452.1915, Found 452.1916.

N-(4-tert-butylphenyl)-α-(2-(3,4,5-Trimethoxy) phenol)-glycine benzyl ester (6n)



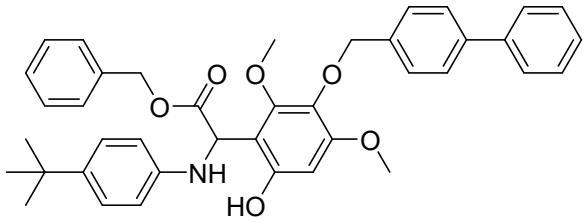
Yellow viscous liquid, yield: 48% (33.6mg), R_f=0.6($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =4:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.29 (dd, *J* = 5.0, 1.9 Hz, 3H), 7.22 – 7.20 (m, 2H), 7.19 (dt, *J* = 6.4, 2.2 Hz, 2H), 6.77 – 6.74 (m, 2H), 6.20 (s, 1H), 5.57 (s, 1H), 5.25 (d, *J* = 12.4 Hz, 1H), 5.18 (d, *J* = 12.5 Hz, 1H), 3.92 (s, 3H), 3.81 (d, *J* = 2.6 Hz, 6H), 1.26 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.76, 154.32, 153.19, 151.68, 143.91, 143.03, 135.53, 135.09, 128.49, 128.31, 127.70, 126.12, 115.77, 96.90, 67.72, 61.21, 60.94, 55.78, 55.24, 34.04, 31.41. HRMS(ESI) $C_{28}H_{33}NO_6$ [M+H]+m/z: Calc 480.2381, Found 480.2379.

N-(4-bromophenyl)-α-(2- (3,4,5-Trimethoxy) phenol)-glycine ethyl ester (6o)



Yellow viscous liquid, yield: 55% (48.3mg), R_f=0.5($V_{Petroleum\ ether}$:$V_{Ethyl\ acetate}$:$V_{Dichloromethane}$=6:1:2). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.26 (s, 1H), 7.25 (d, *J* = 2.2 Hz, 1H), 6.67 – 6.63 (m, 2H), 6.20 (s, 1H), 5.49 (s, 1H), 4.31 – 4.25 (m, 1H), 4.21 – 4.16 (m, 1H), 4.01 (s, 3H), 3.82 (s, 3H), 3.78 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 172.09, 154.37, 152.50, 151.71, 144.67, 135.74, 132.07, 117.18, 112.63, 107.22, 97.12, 62.49, 61.39, 60.99, 55.76, 54.15, 14.00. HRMS(ESI) $C_{19}H_{22}BrNO_6$ [M+Na]+m/z: Calc 462.0523, Found 462.0525.

N-(4-tert-butylphenyl)-α-(2-(3,5-dimethoxy-4-(4-phenylbenzyloxy)phenol)-glycine benzyl ester (6p)



Yellow viscous liquid, yield: 65% (82.4mg), R_f=0.5($V_{Petroleum\ ether}$: $V_{Ethyl\ acetate}$ =3:1). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.63 – 7.60 (m, 4H), 7.56 (d, *J* = 8.2 Hz, 2H), 7.47 – 7.44 (m, 2H), 7.39 – 7.35 (m, 1H), 7.32 – 7.27 (m, 3H), 7.24 – 7.19 (m, 4H), 6.79 – 6.76 (m, 2H), 6.22 (s, 1H), 5.60 (s, 1H), 5.26 (d, *J* = 12.4 Hz, 1H), 5.20 (d, *J* = 12.4 Hz, 1H), 5.01 (q, *J* = 10.9 Hz, 2H), 3.95 (s, 3H), 3.79 (s, 3H), 1.26 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 171.74, 153.40, 152.07, 143.96, 143.00, 140.92, 140.81, 136.73, 135.04, 134.22, 128.89, 128.78, 128.52, 128.36, 127.78, 127.30, 127.12, 127.00, 126.12, 115.83, 107.13, 97.01, 74.95, 67.80, 61.50, 55.79, 55.27, 34.03, 31.40. HRMS(ESI) $C_{40}H_{41}NO_6$ $[M+H]^+$m/z：Calc 632.3007, Found 632.3012.

7. ^{1}H NMR, ^{13}C NMR, HR-MS Spectra of New Compounds

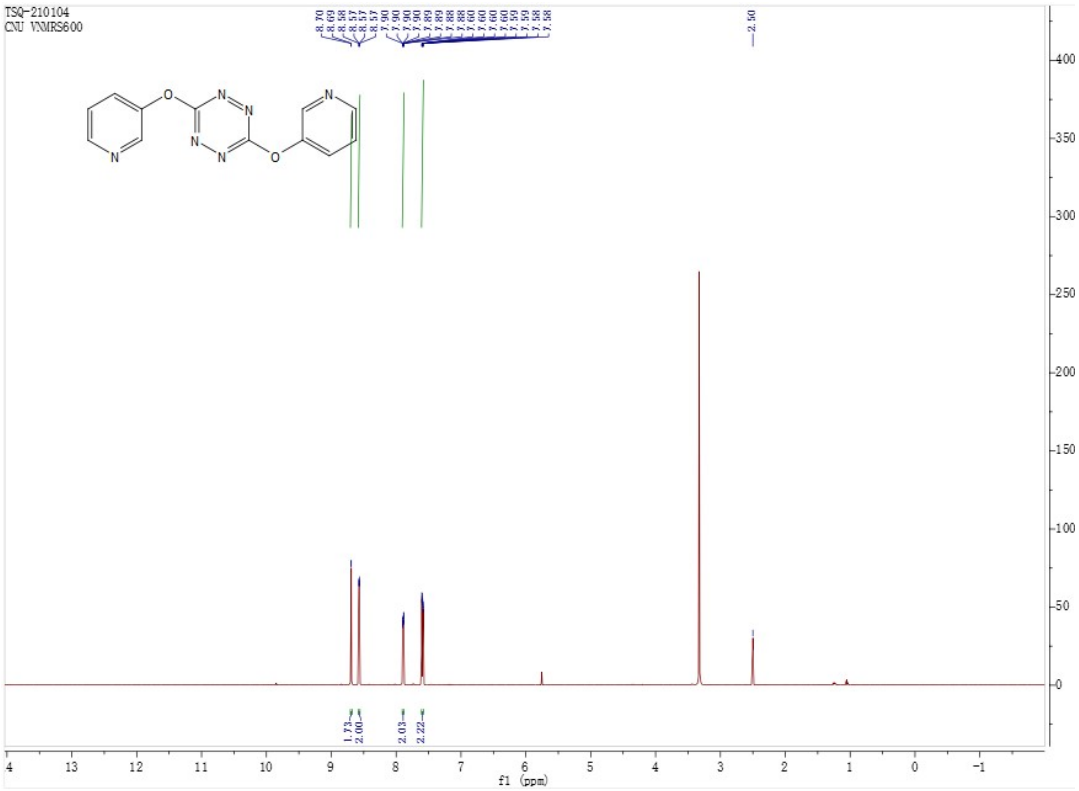


Figure S1 ^{1}H-NMR spectrum of **4c** in d^{6}-DMSO

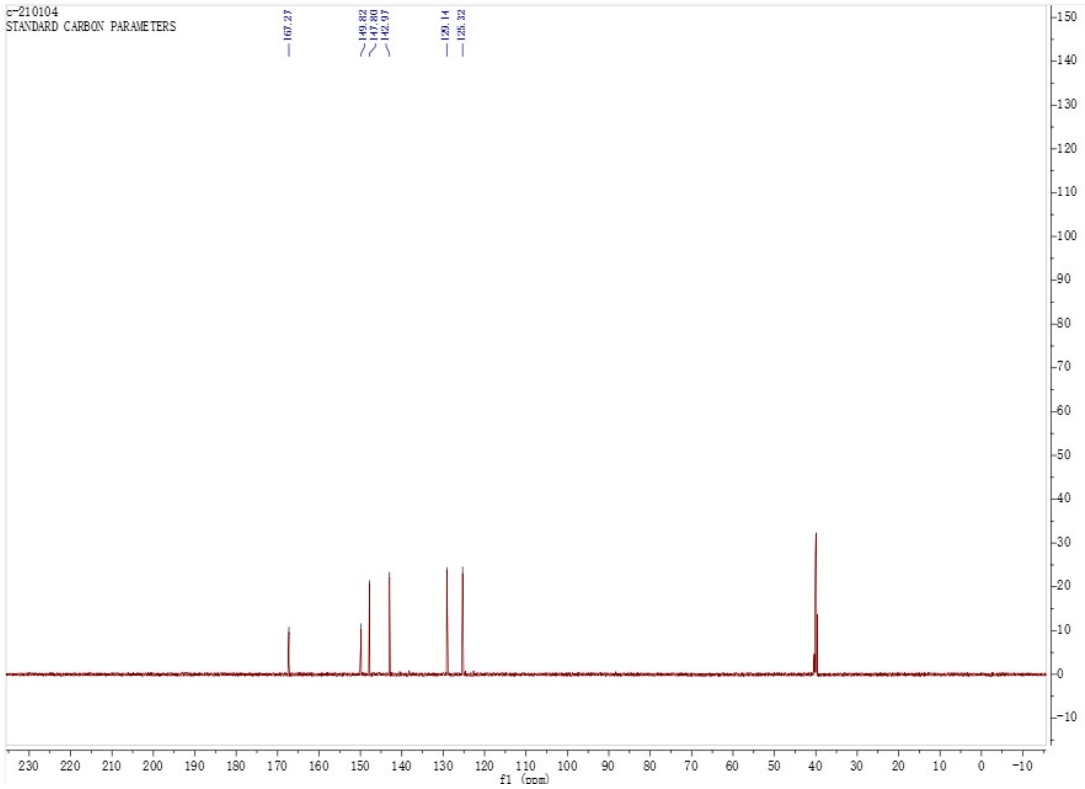


Figure S2 ^{13}C-NMR spectrum of **4c** in d^{6}-DMSO

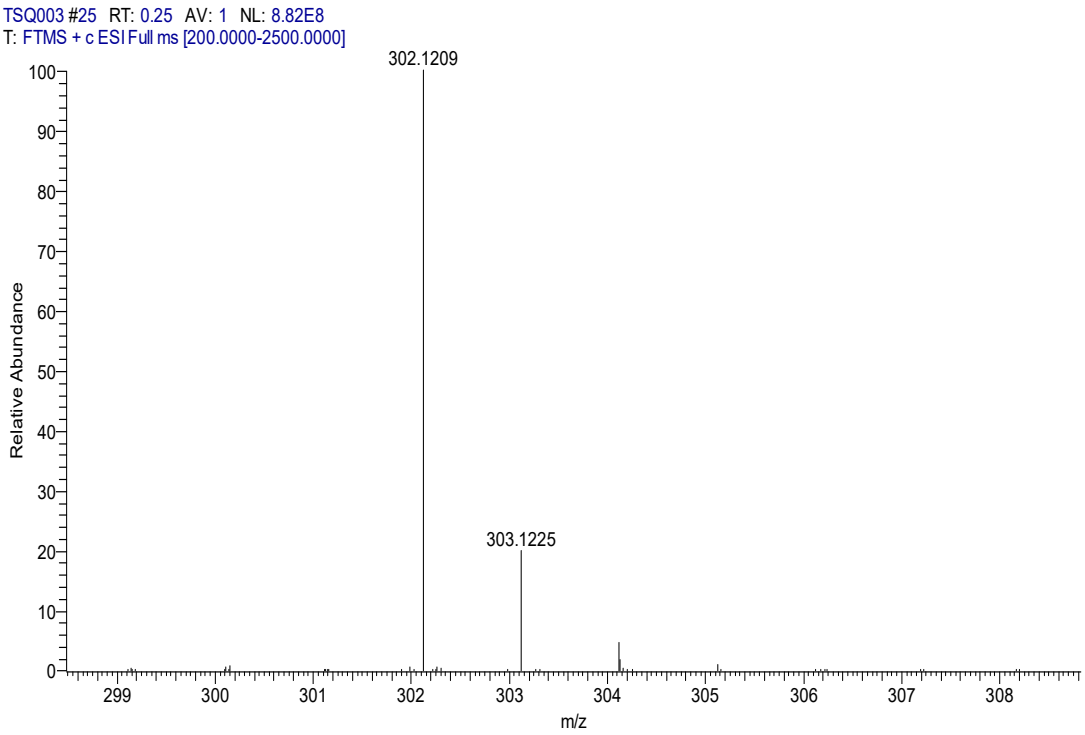


Figure S3 HRMS spectrum of **4c**.

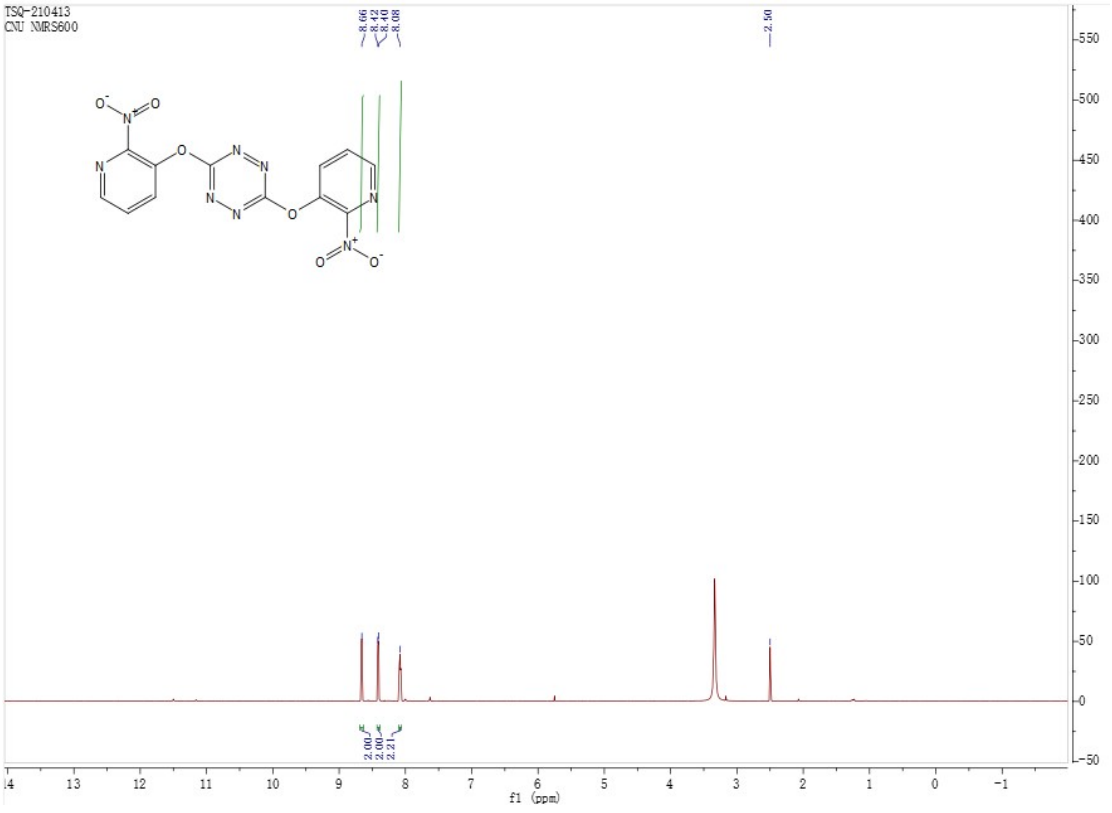


Figure S4 ^{1}H-NMR spectrum of **4d** in d^{6}-DMSO

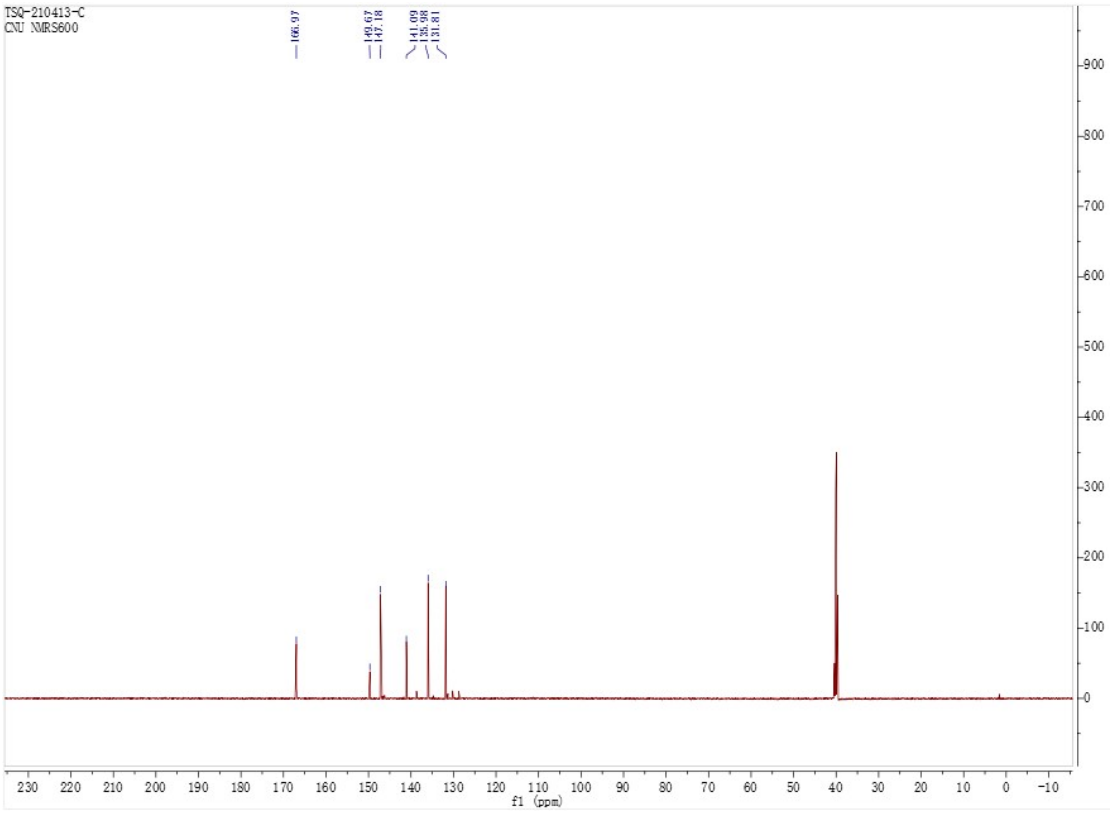


Figure S5 ^{13}C-NMR spectrum of **4d** in d^{6}-DMSO

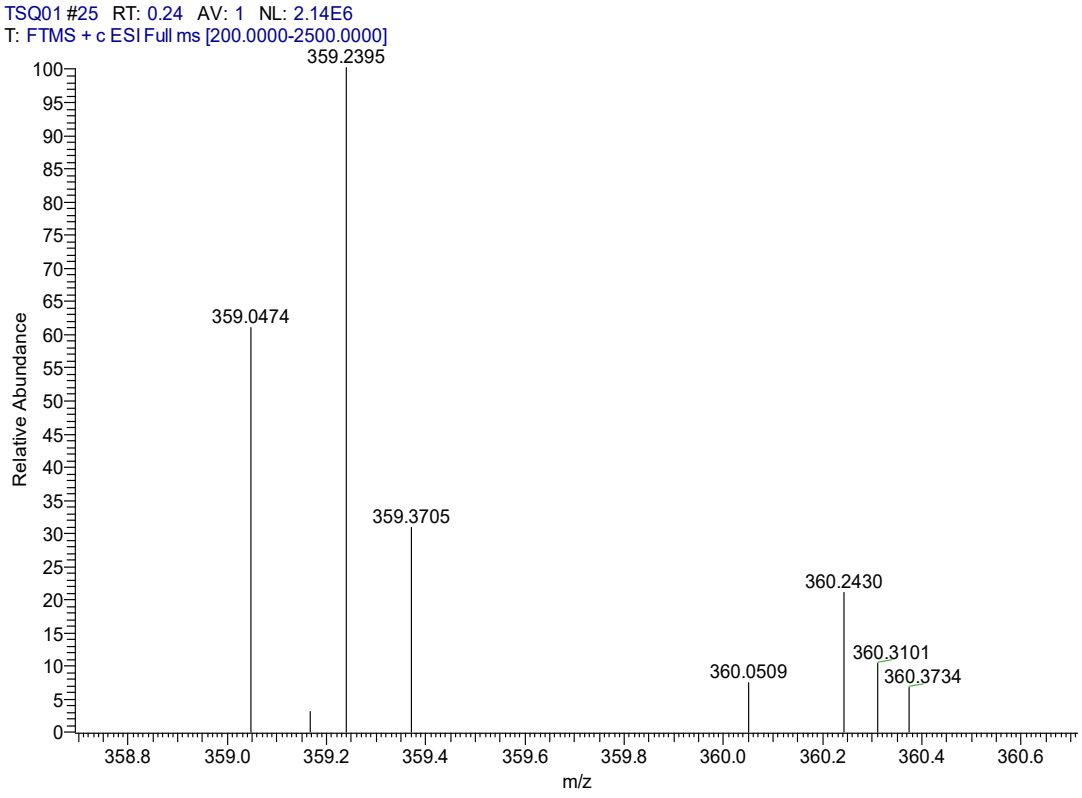


Figure S6 HRMS spectrum of **4d**.

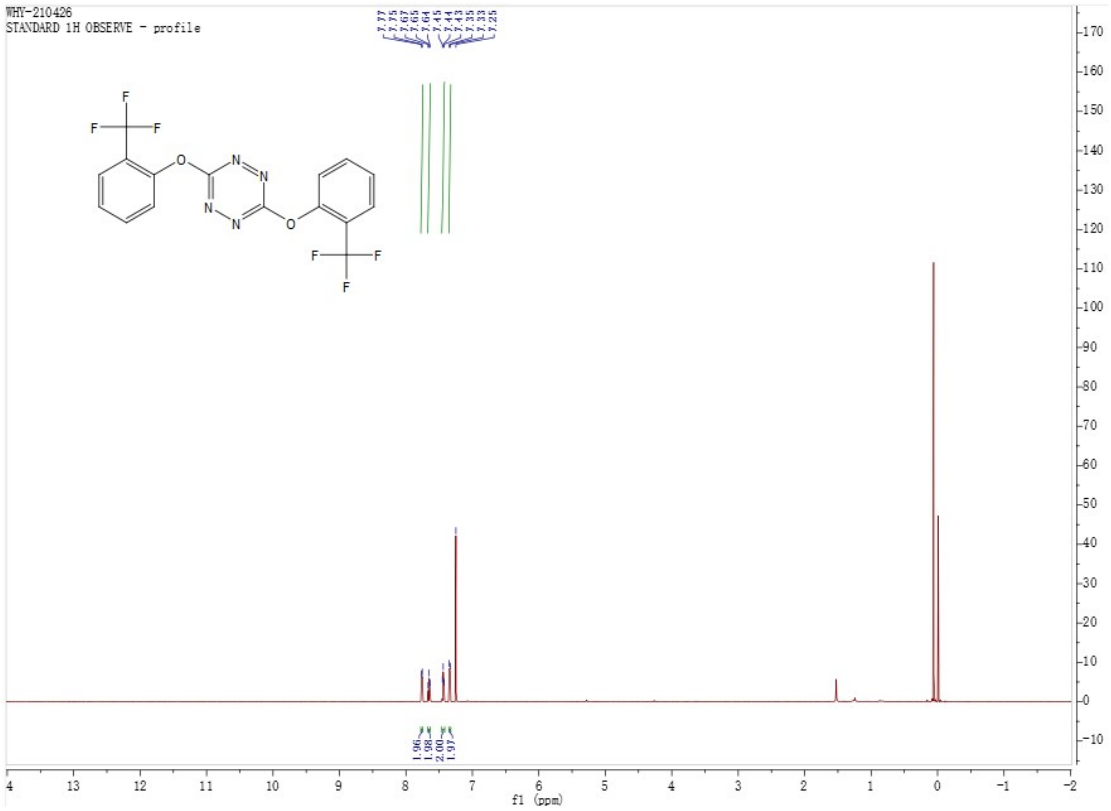


Figure S7 ^{1}H-NMR spectrum of **4e** in $CDCl_3$

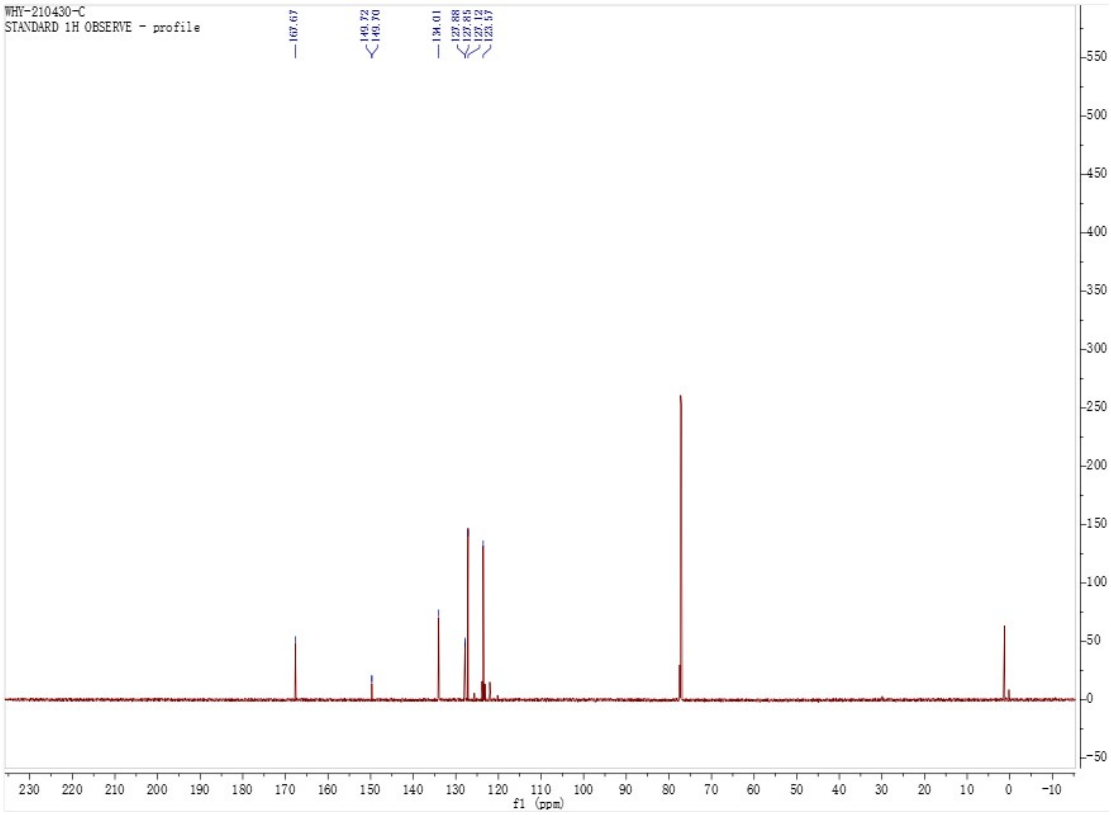


Figure S8 ^{13}C-NMR spectrum of **4e** in $CDCl_3$

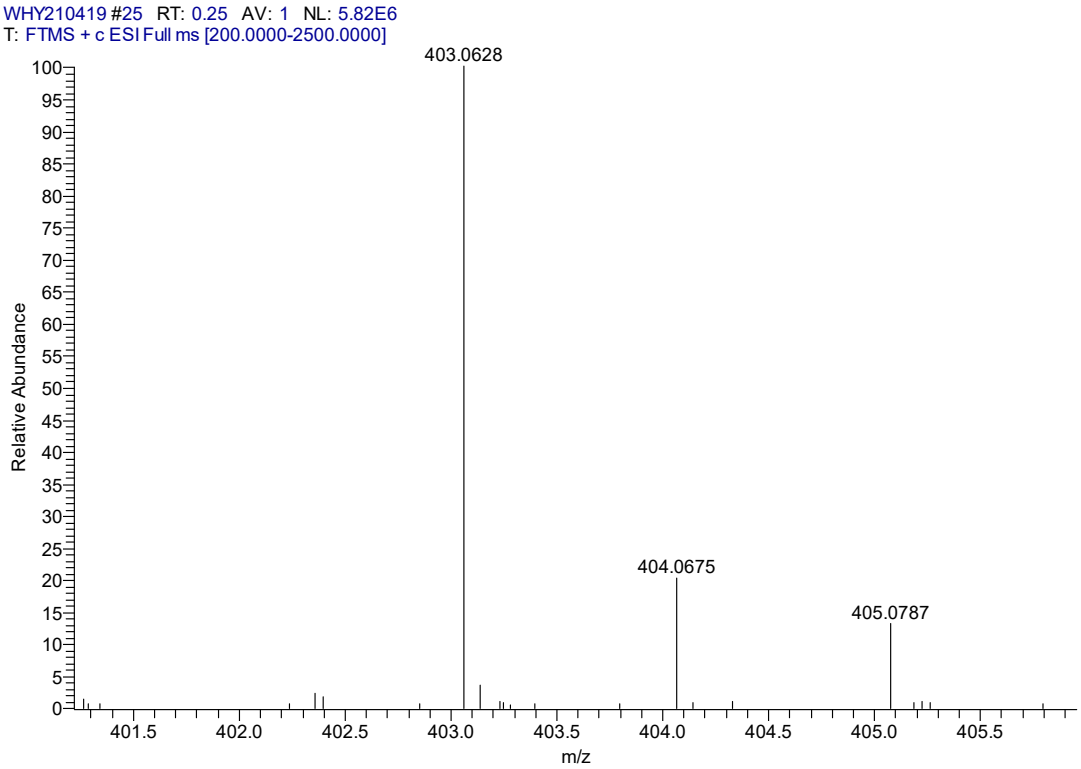


Figure S9 HRMS spectrum of **4e**

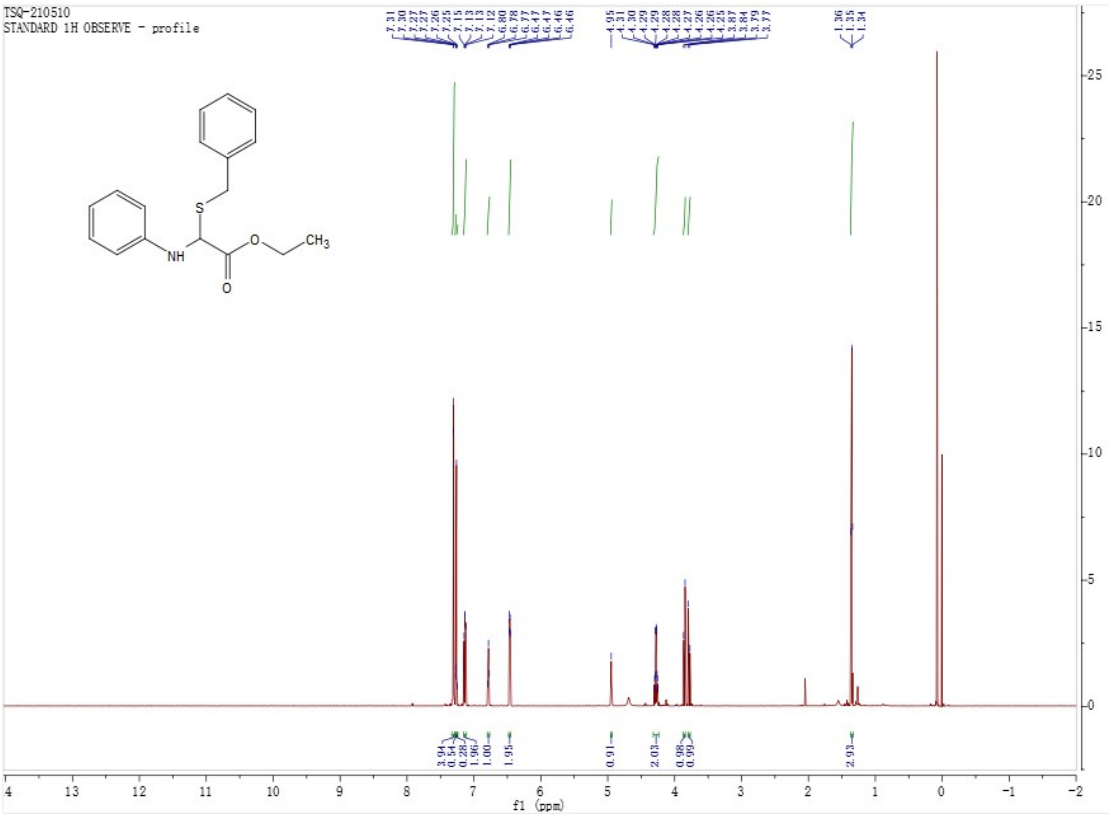


Figure S10 ^{1}H-NMR spectrum of **1a** in $CDCl_3$

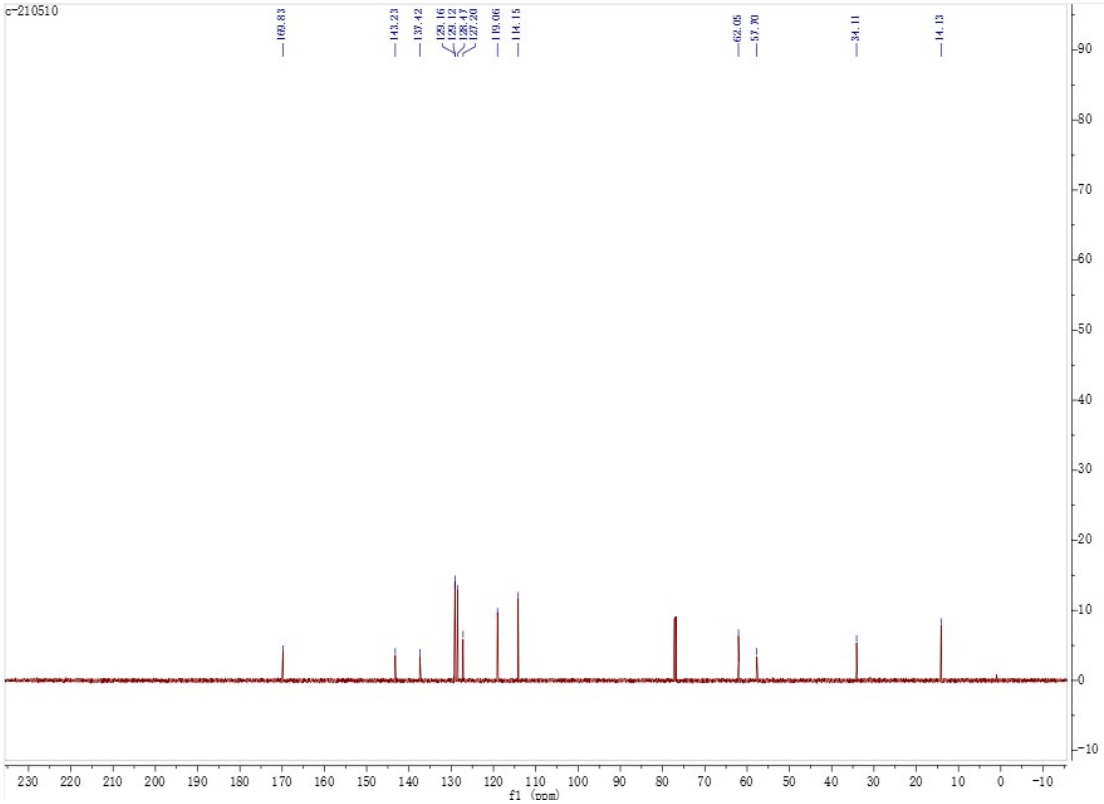


Figure S11 ^{13}C-NMR spectrum of **1a** in $CDCl_3$

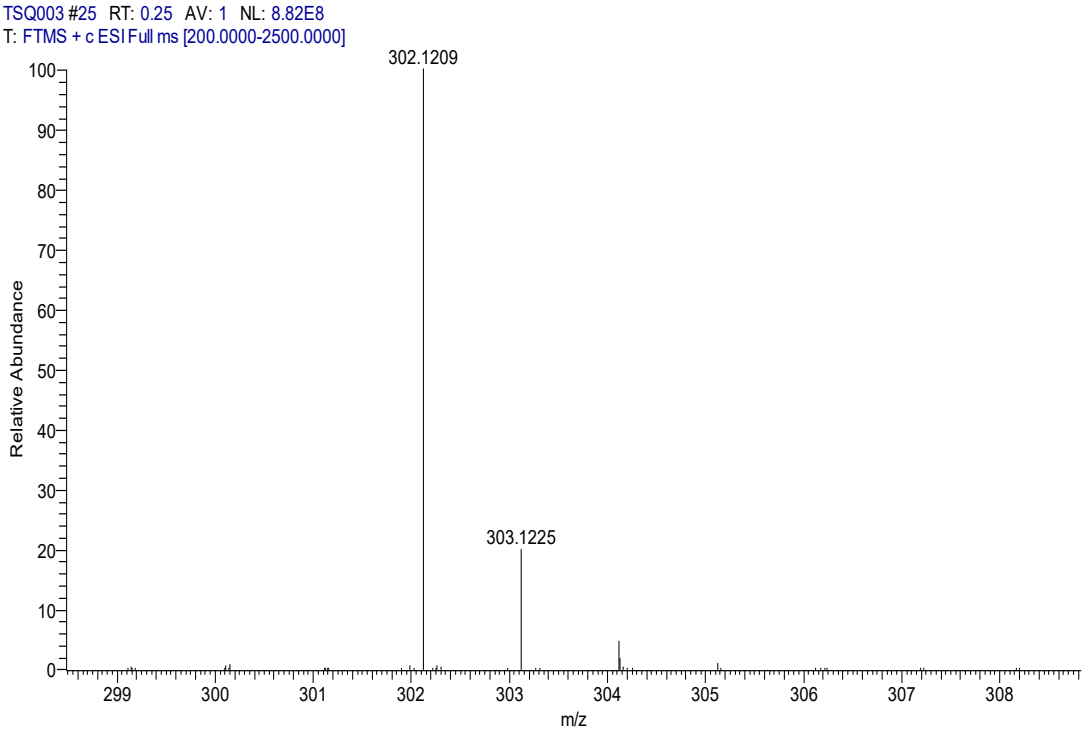


Figure S12 HRMS spectrum of **1a**

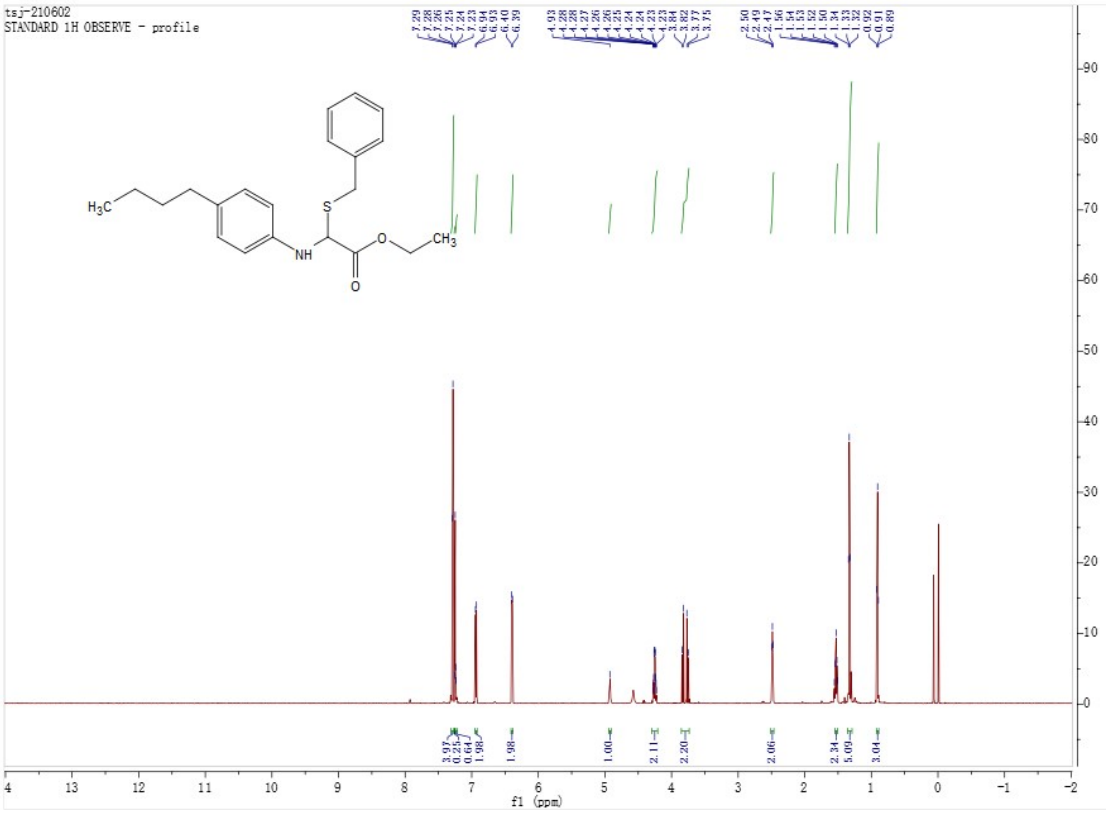


Figure S13 ^{1}H-NMR spectrum of **1b** in $CDCl_3$

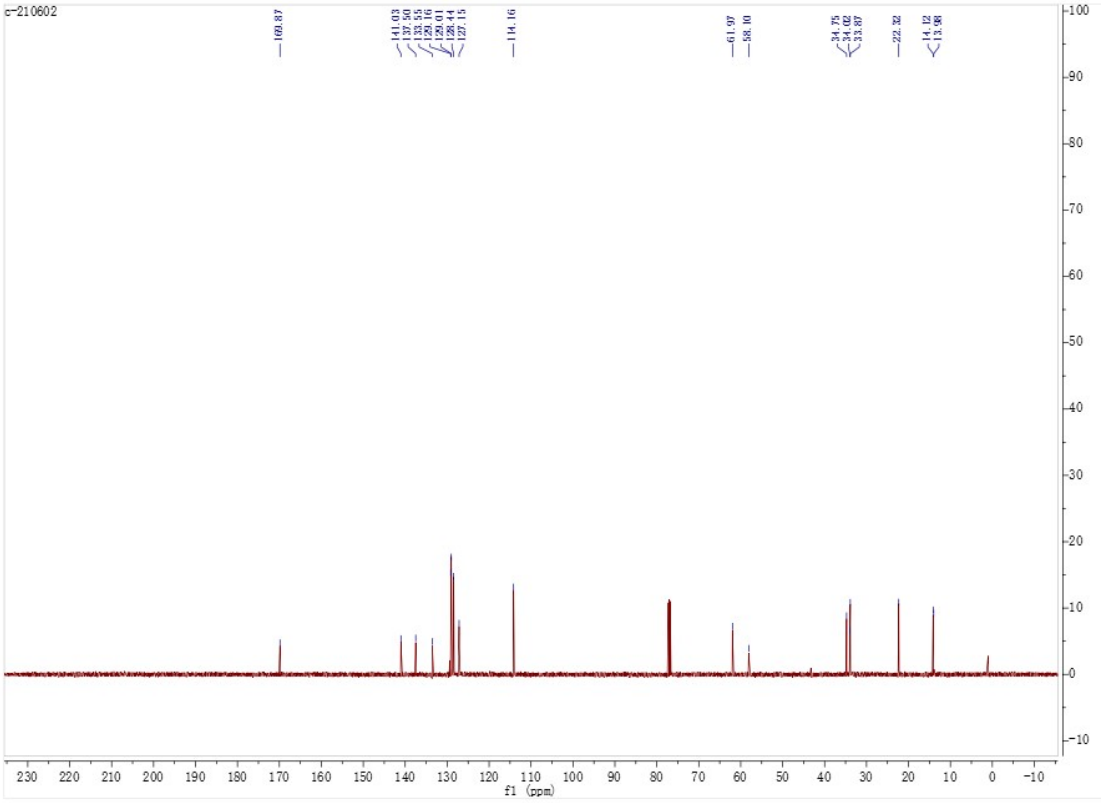


Figure S14 ^{13}C-NMR spectrum of **1b** in $CDCl_3$

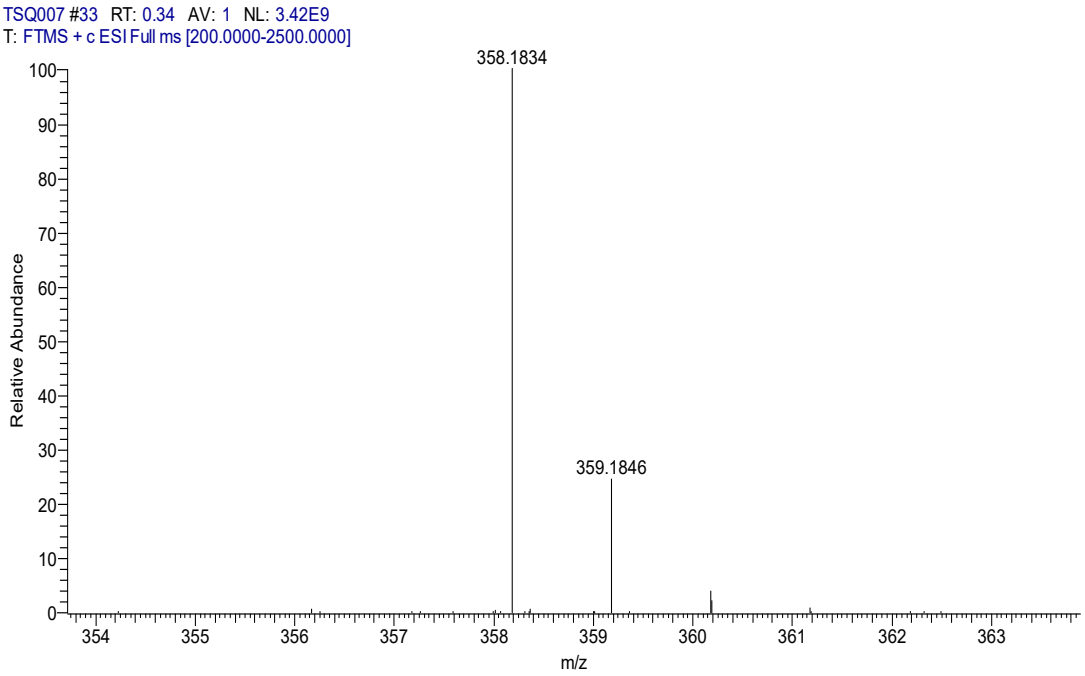


Figure S15 HRMS spectrum of **1b**

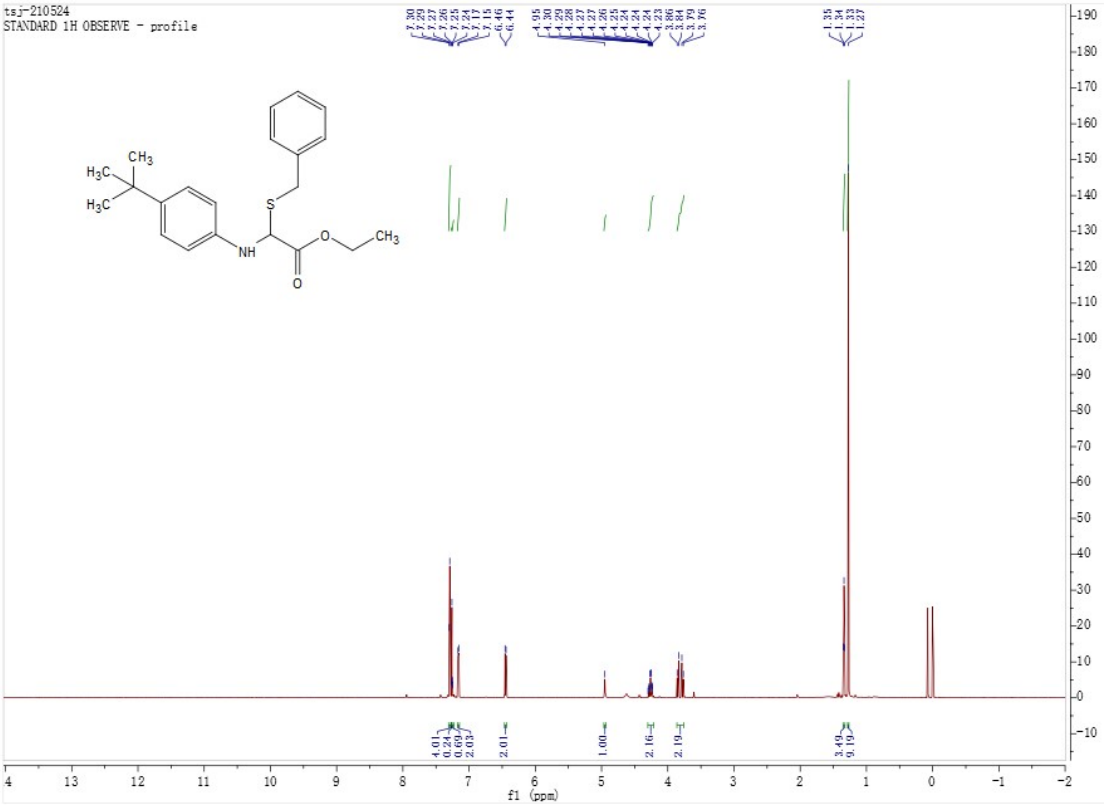


Figure S16 ^{1}H-NMR spectrum of **1c** in $CDCl_3$

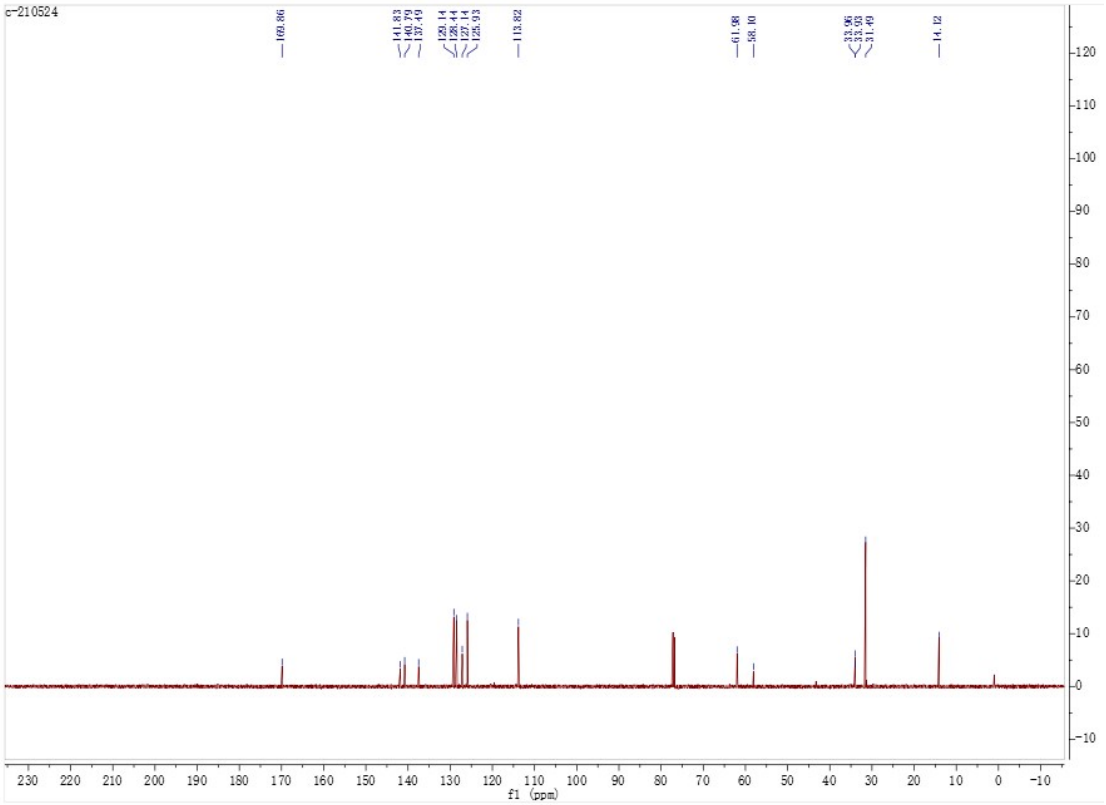


Figure S17 ^{13}C-NMR spectrum of **1c** in $CDCl_3$

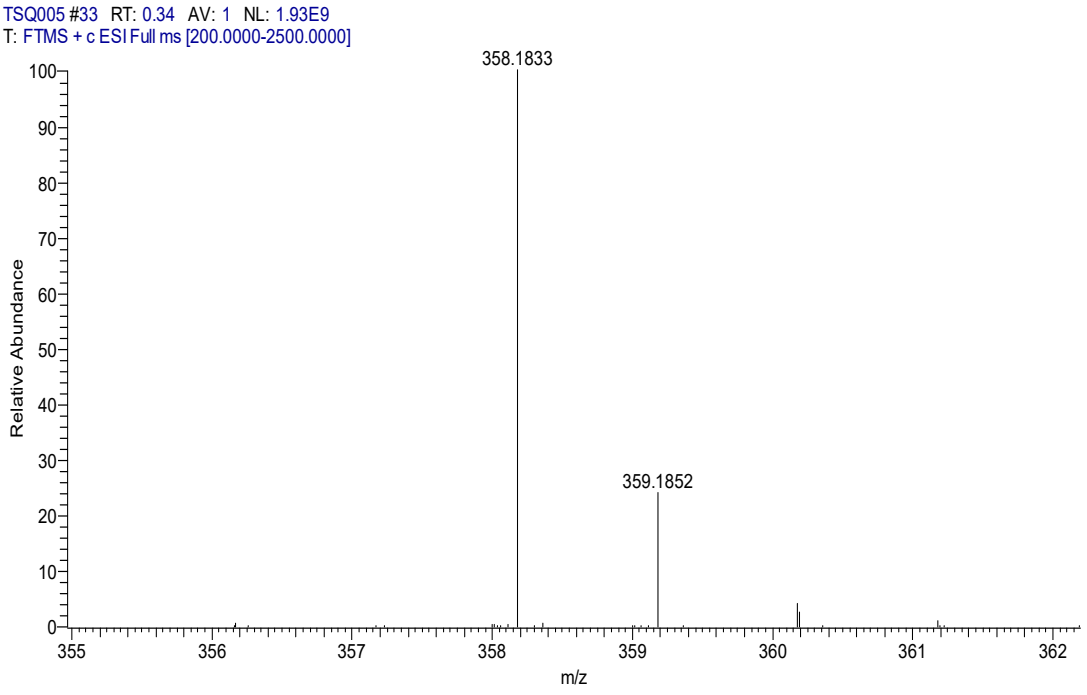


Figure S18 HRMS spectrum of **1c**

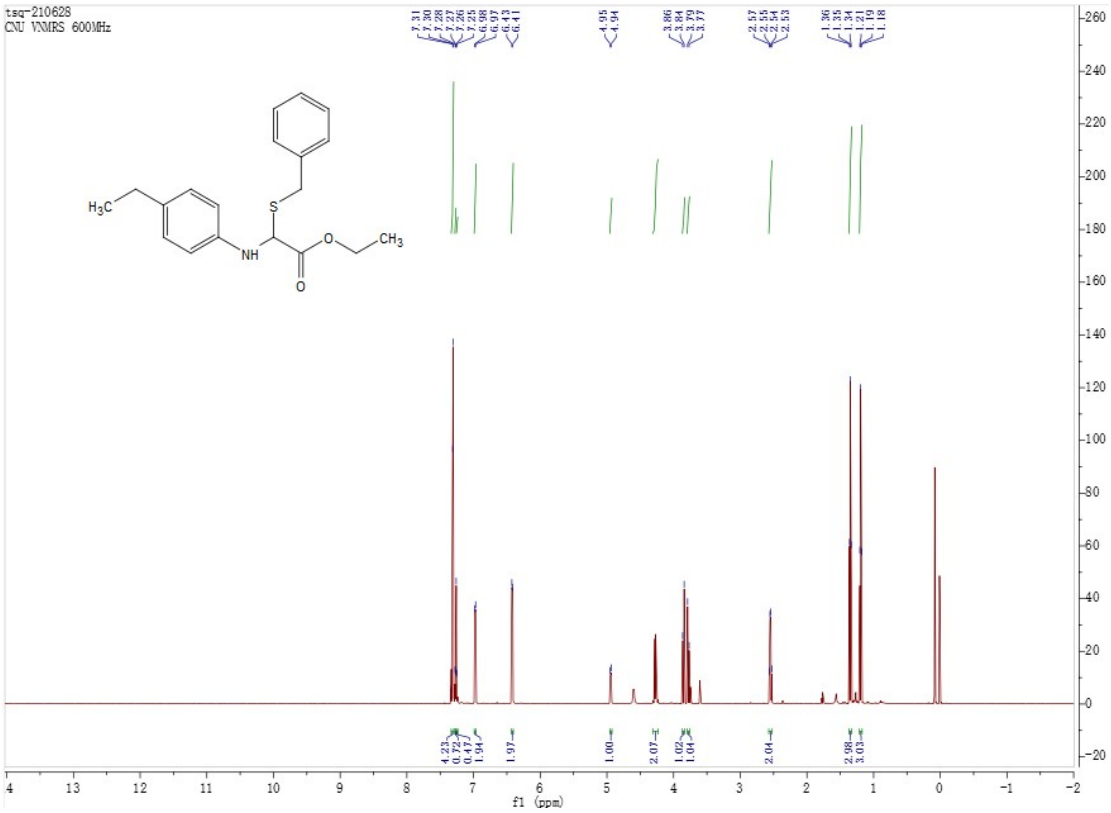


Figure S19 ^{1}H-NMR spectrum of **1d** in $CDCl_3$

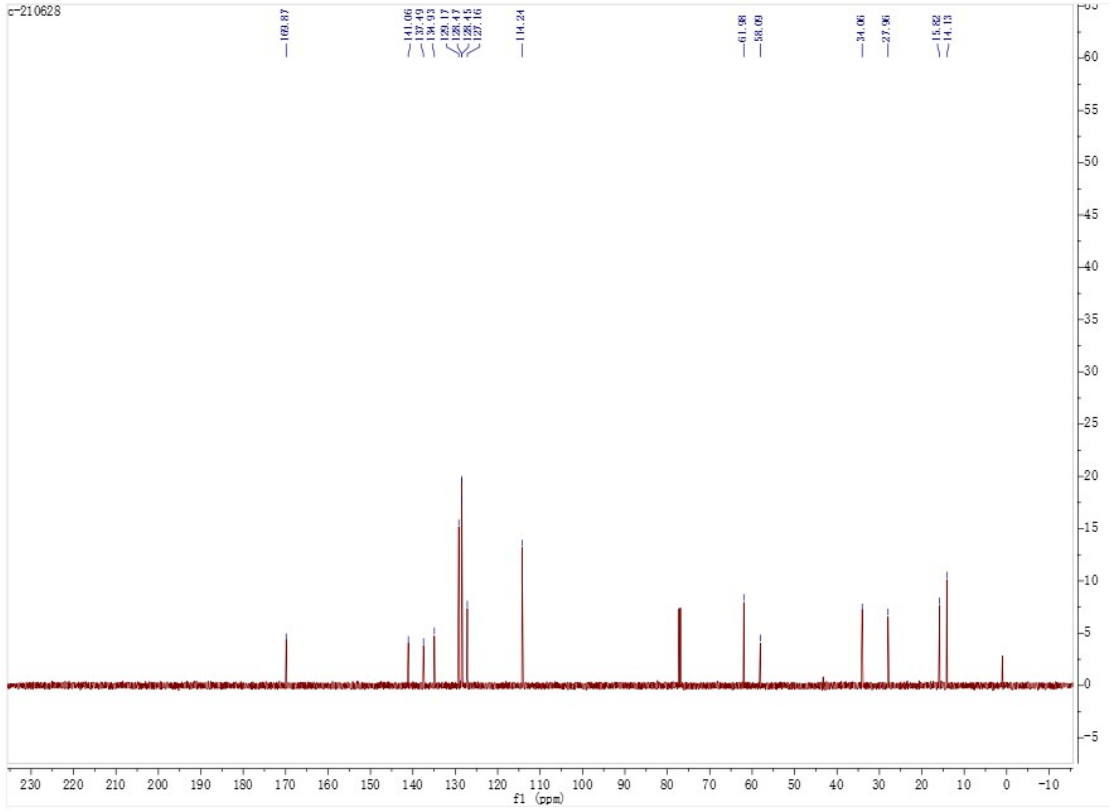


Figure S20 ^{13}C-NMR spectrum of **1d** in $CDCl_3$

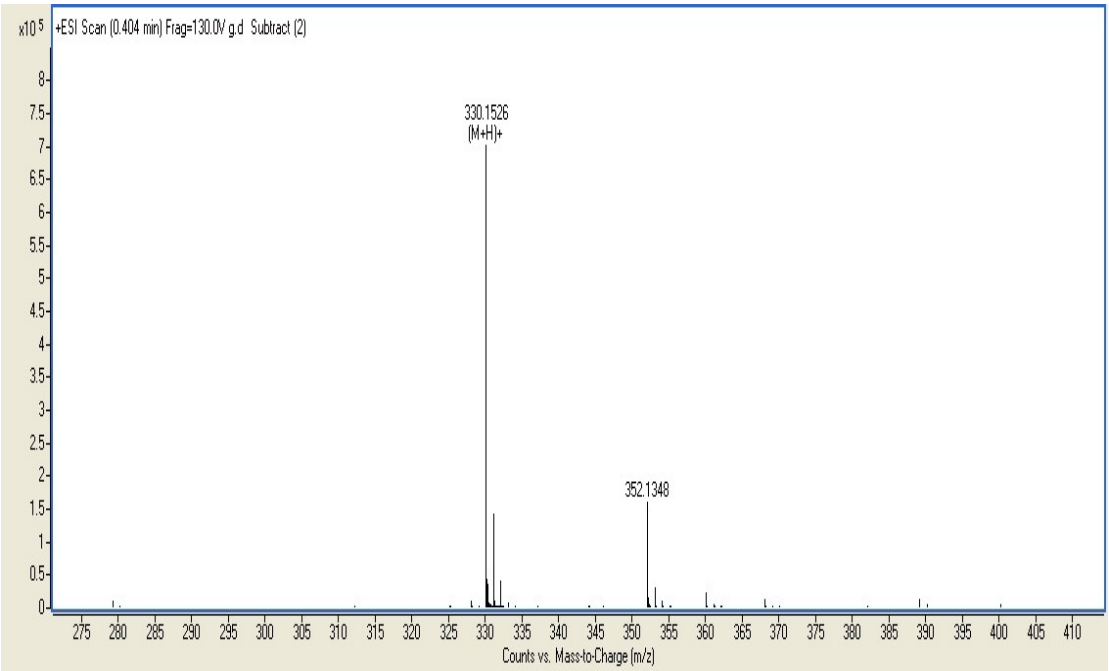


Figure S21 HRMS spectrum of **1d**

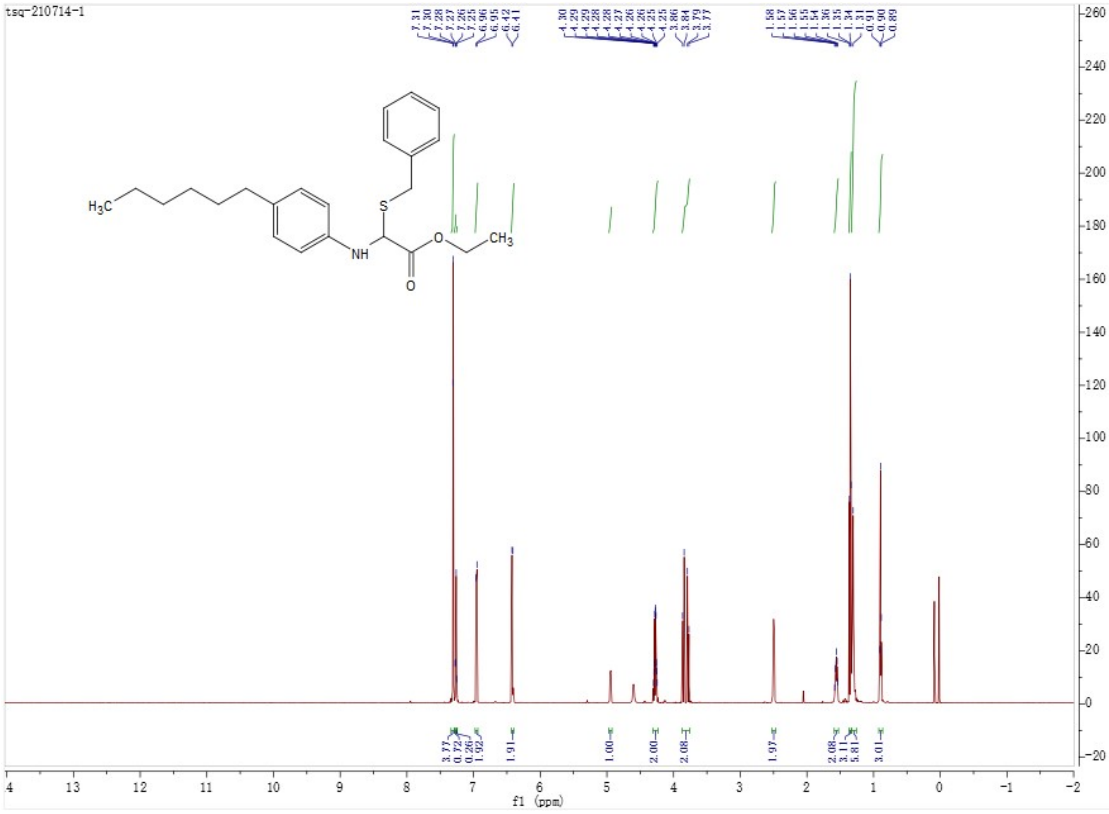


Figure S22 ^{1}H-NMR spectrum of **1e** in $CDCl_3$

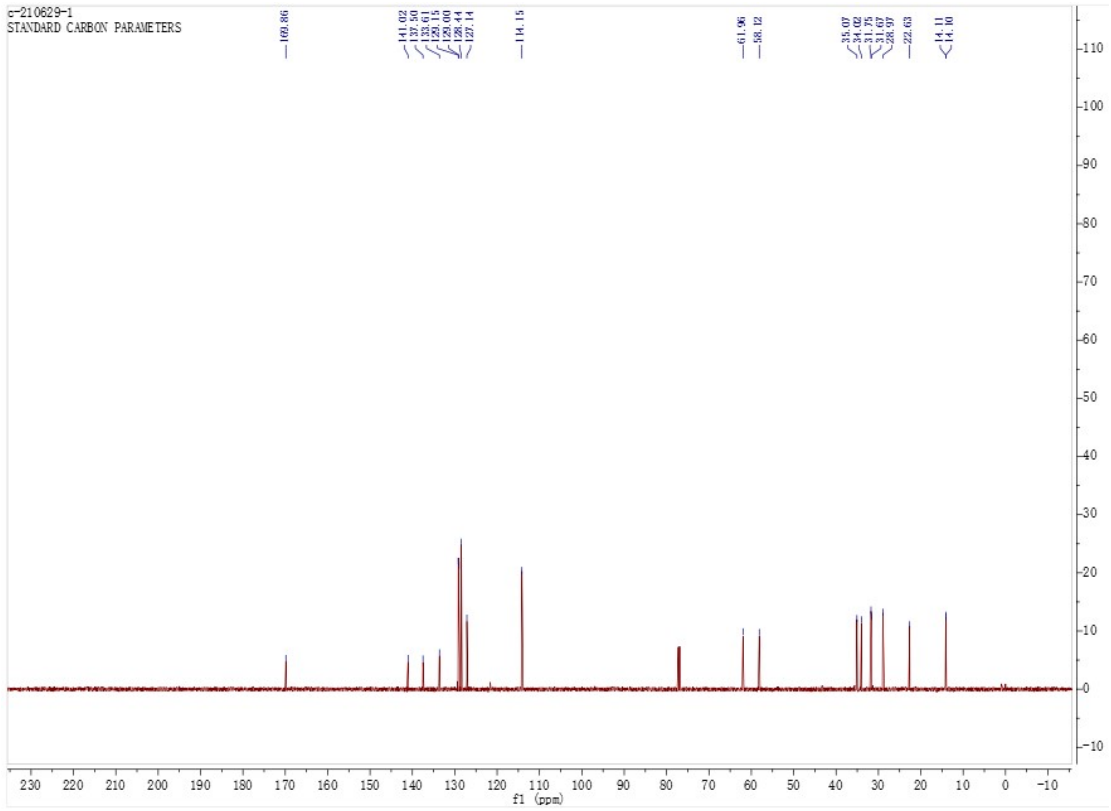


Figure S23 ^{13}C-NMR spectrum of **1e** in $CDCl_3$

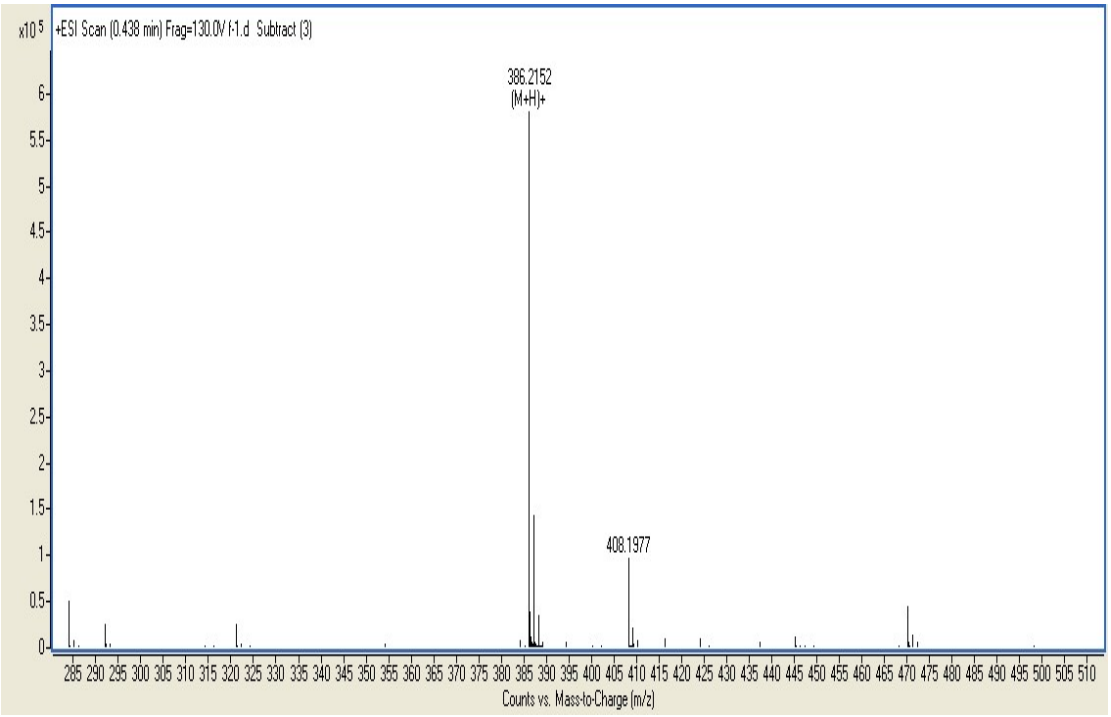


Figure S24 HRMS spectrum of **1e**

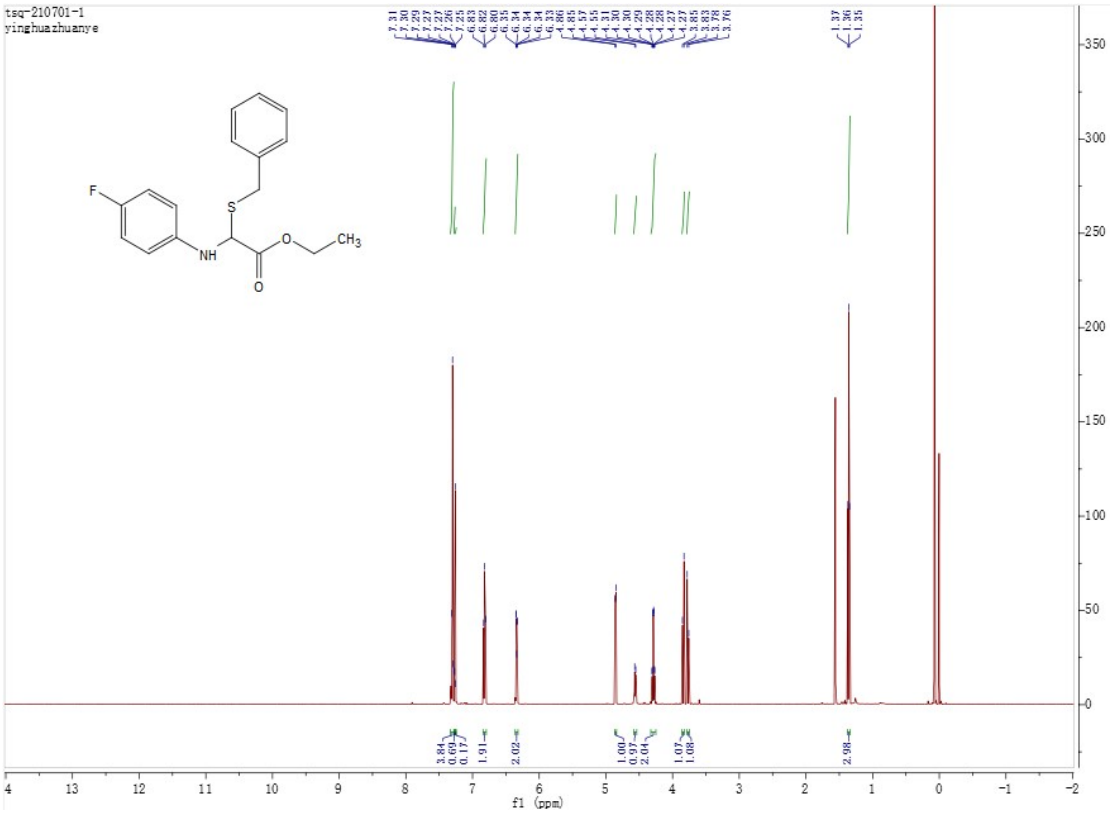


Figure S25 ^{1}H-NMR spectrum of **1f** in $CDCl_3$

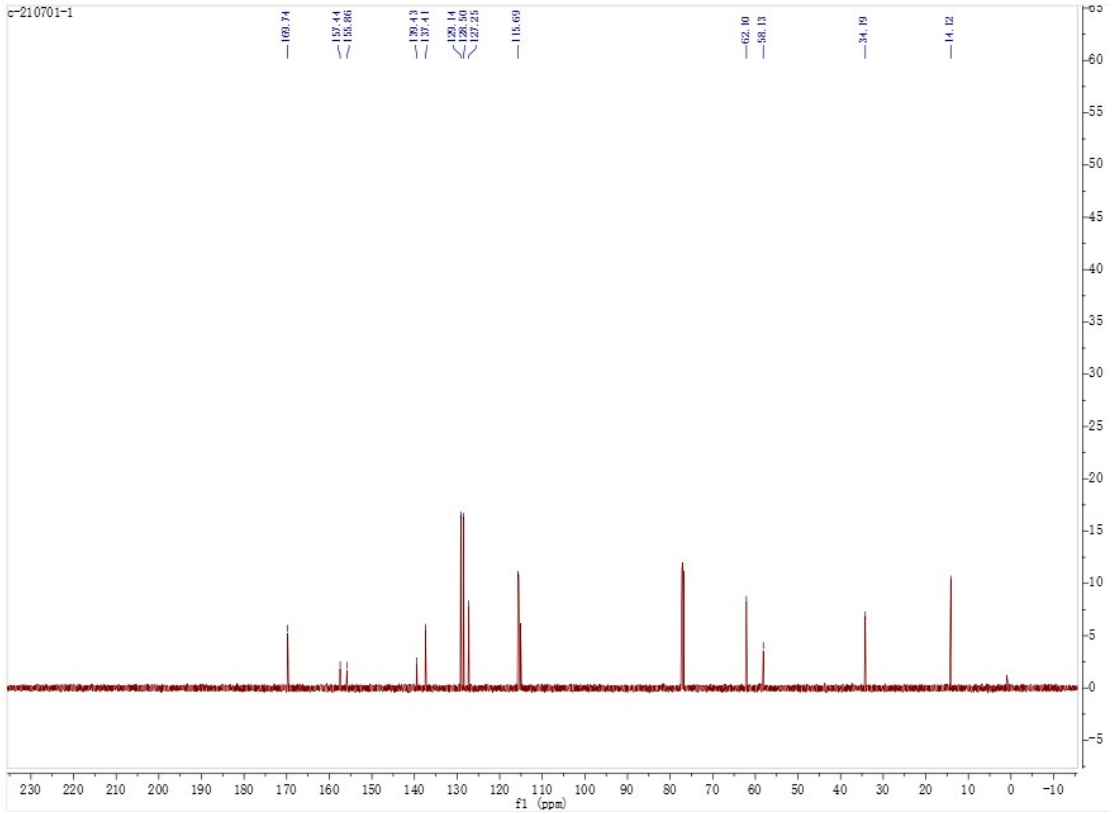


Figure S26 ^{13}C-NMR spectrum of **1f** in $CDCl_3$

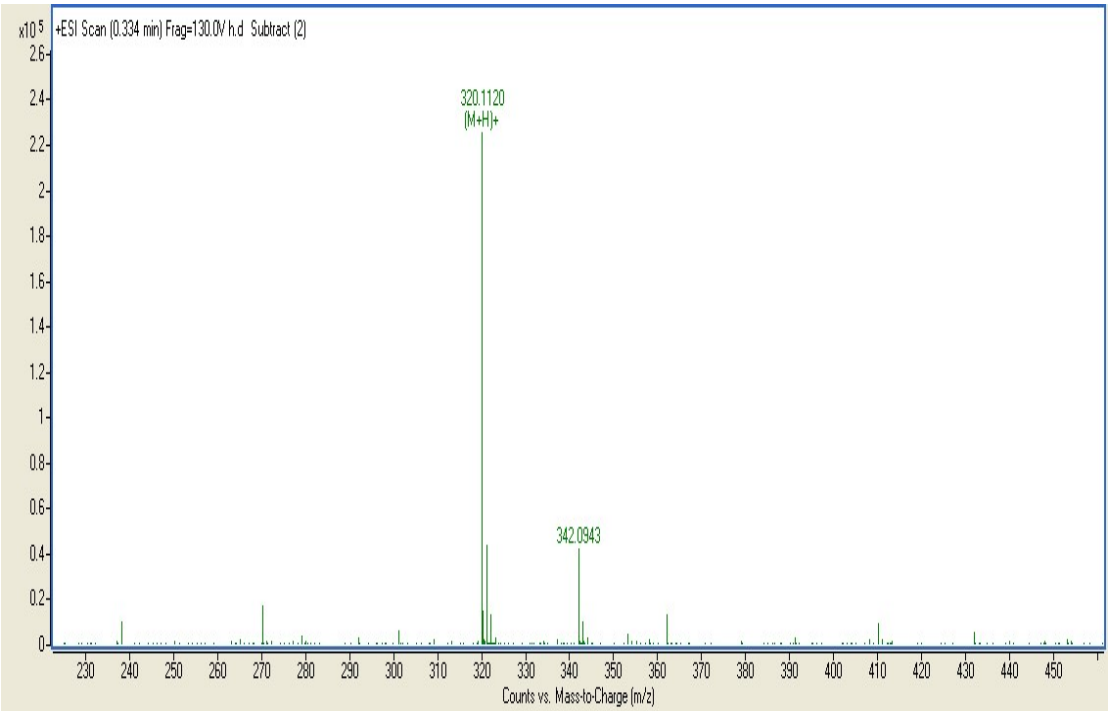


Figure S27 HRMS spectrum of **1f**

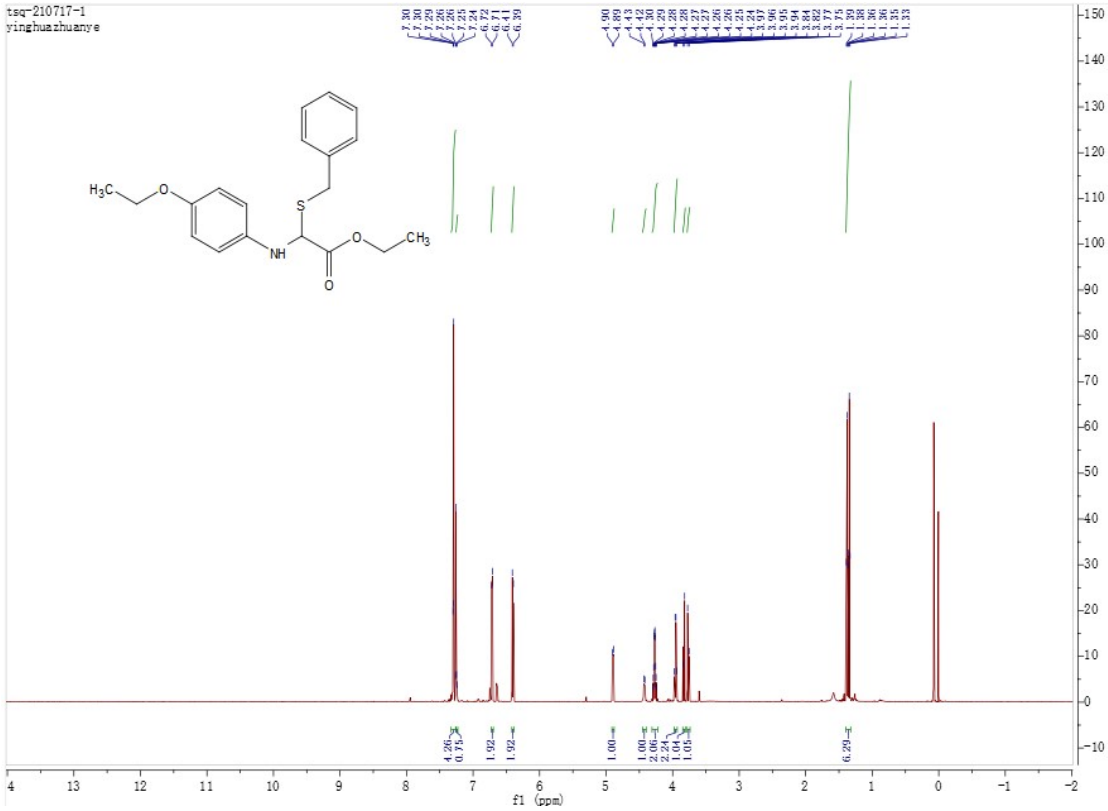


Figure S28 ^{1}H-NMR spectrum of **1g** in $CDCl_3$

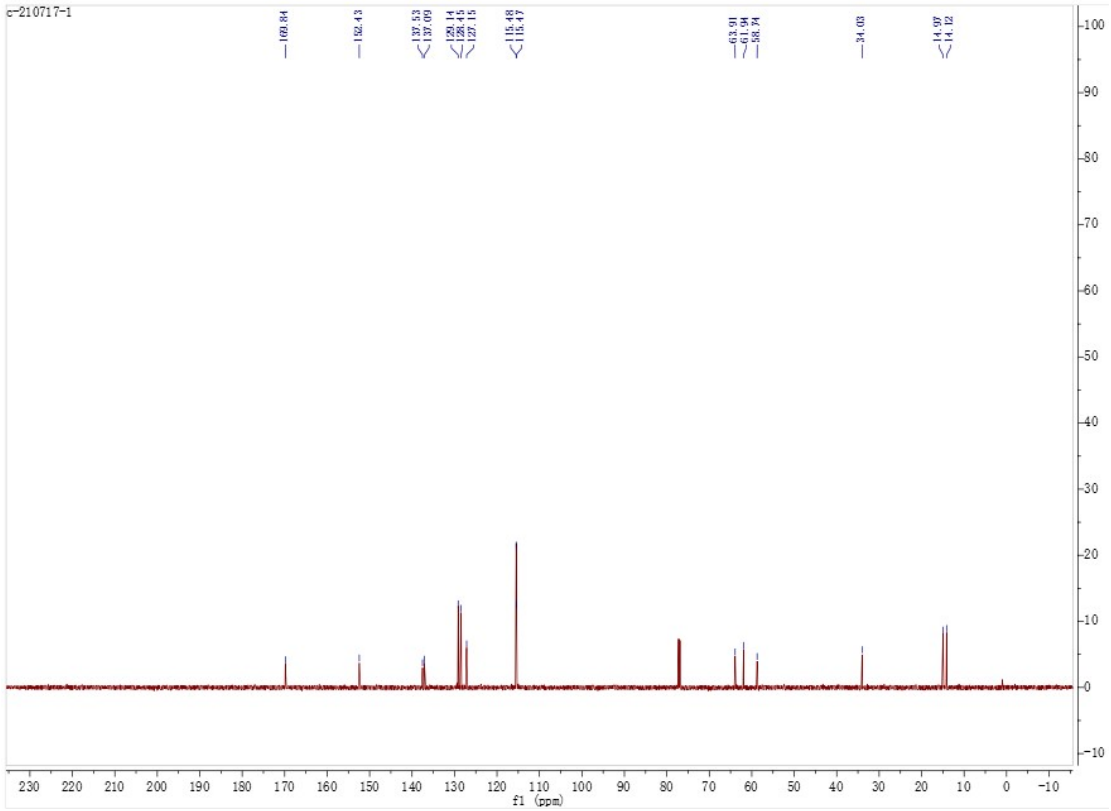


Figure S29 ^{13}C-NMR spectrum of **1g** in $CDCl_3$

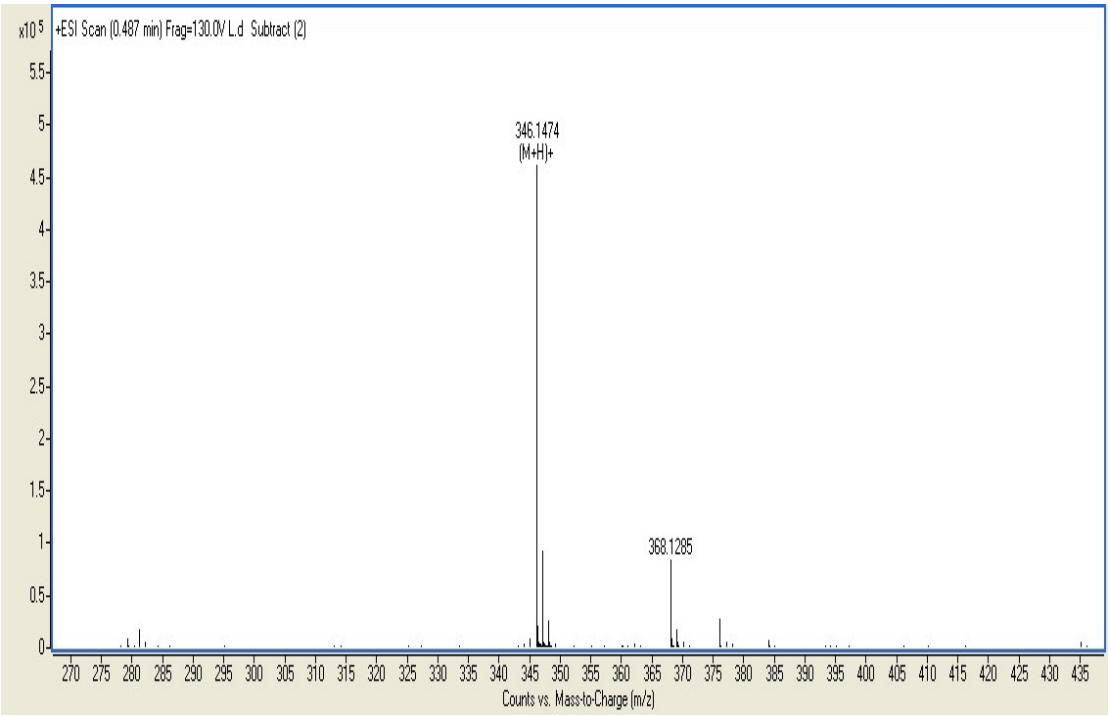


Figure S30 HRMS spectrum of **1g**

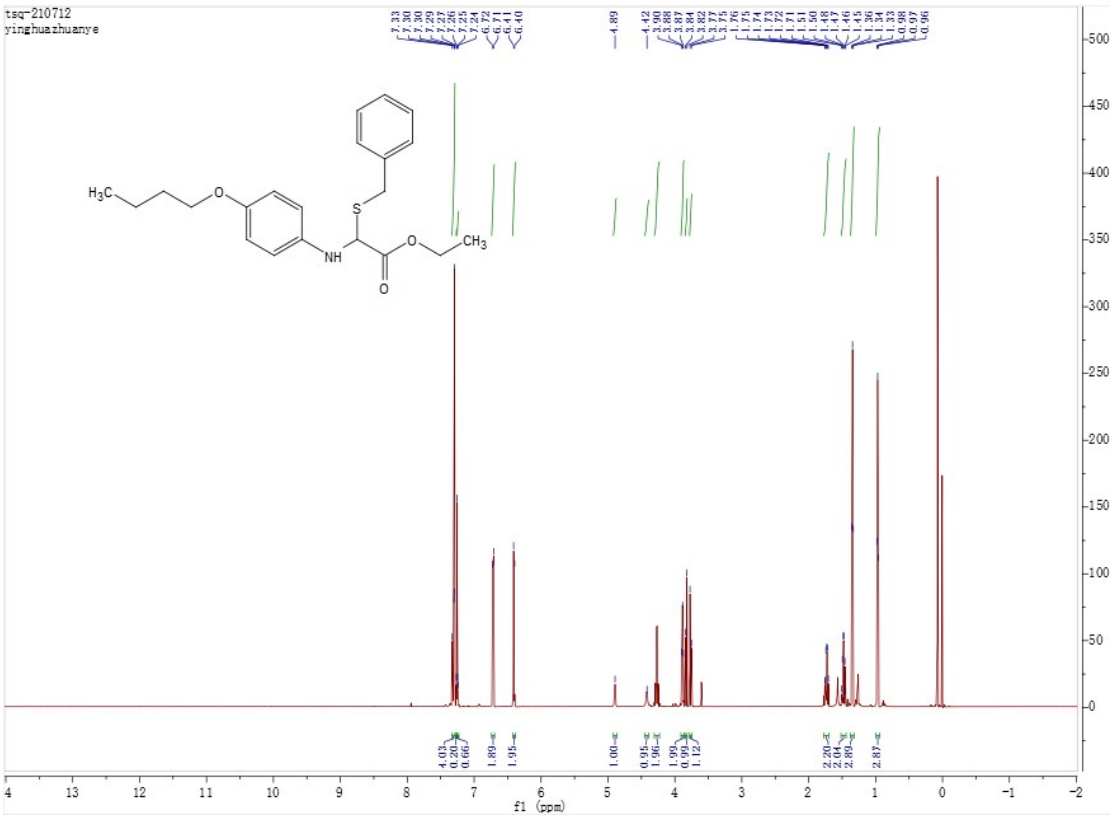


Figure S31 ^{1}H-NMR spectrum of **1h** in $CDCl_3$

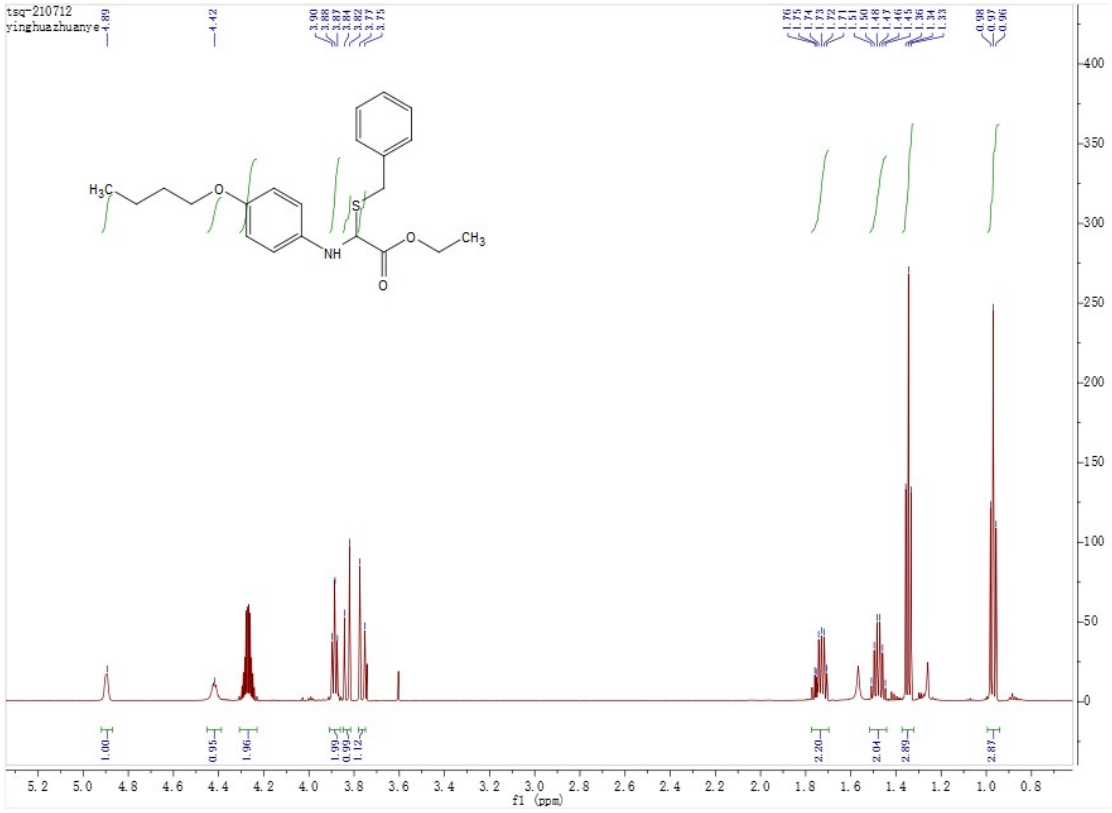


Figure S32 Partial enlarged ^{1}H-NMR spectrum of **1h** in $CDCl_3$

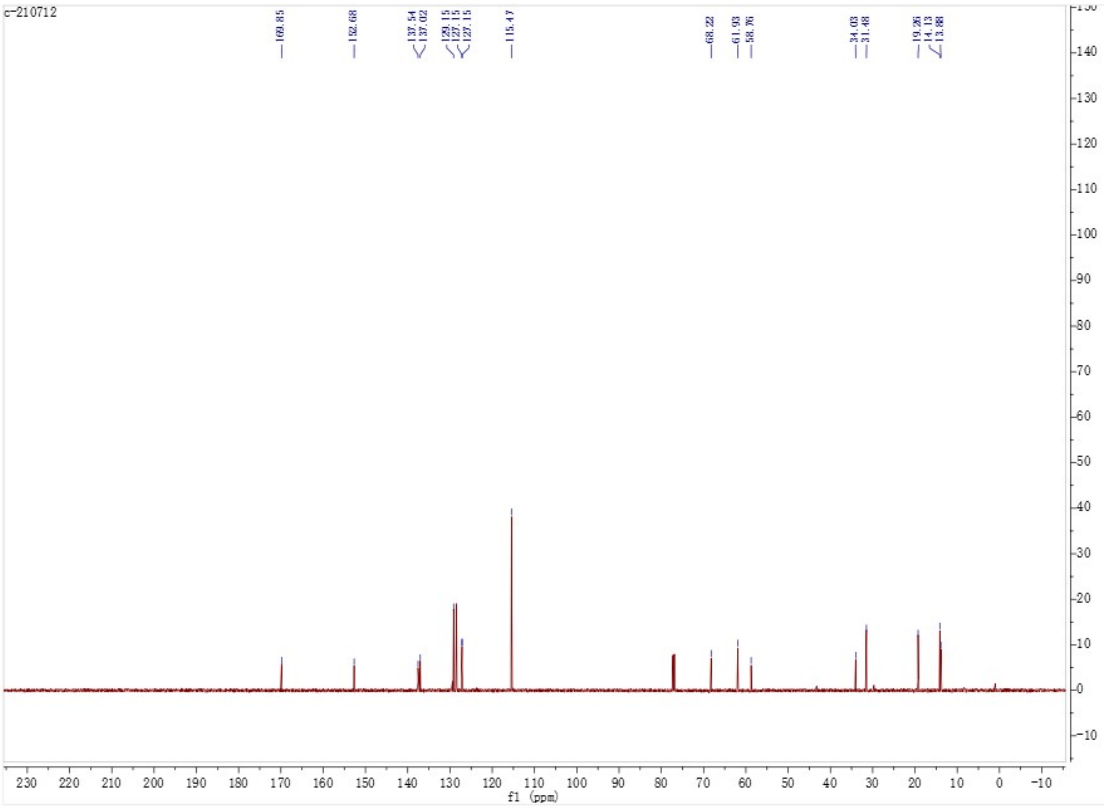


Figure S33 ^{13}C-NMR spectrum of **1h** in $CDCl_3$

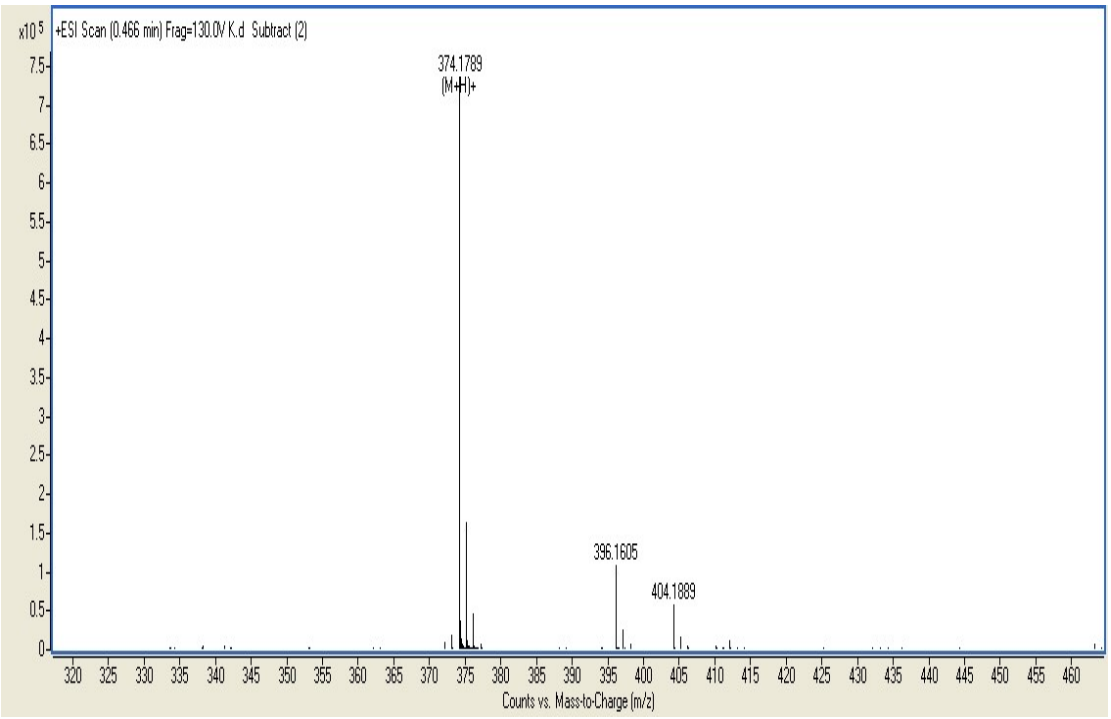


Figure S34 HRMS spectrum of **1h**

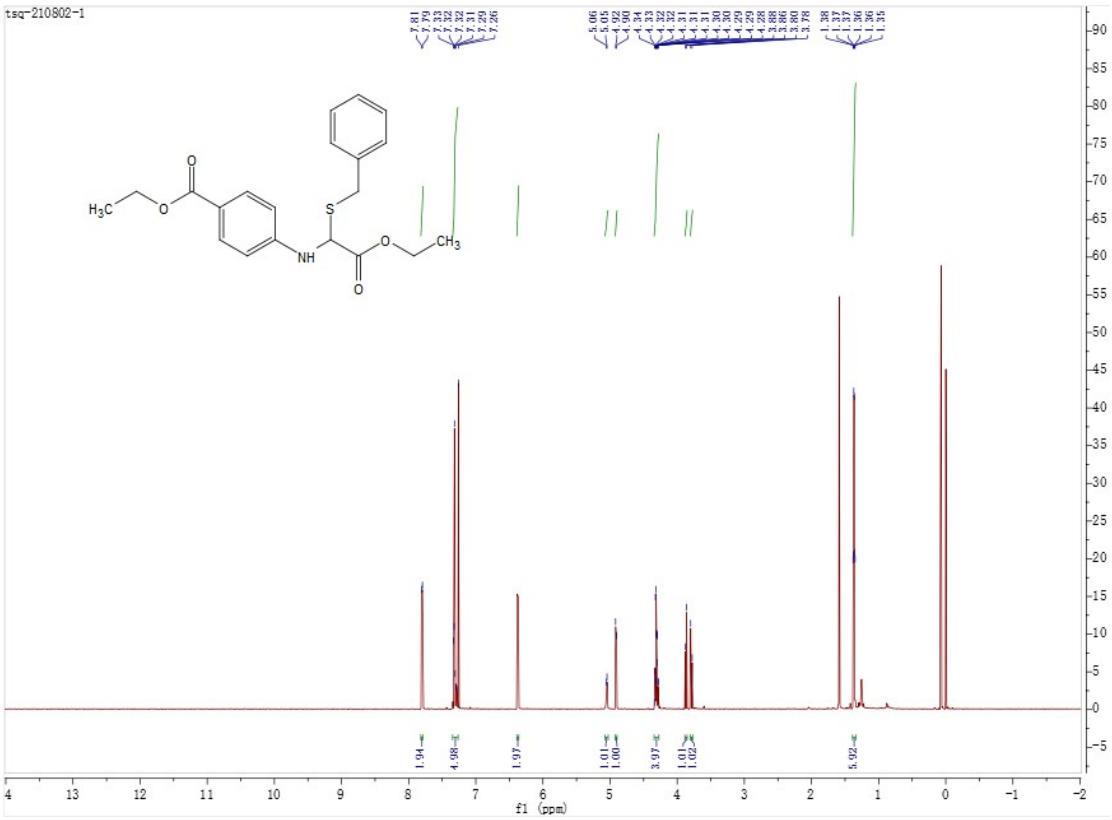


Figure S35 ^{1}H-NMR spectrum of **1i** in $CDCl_3$

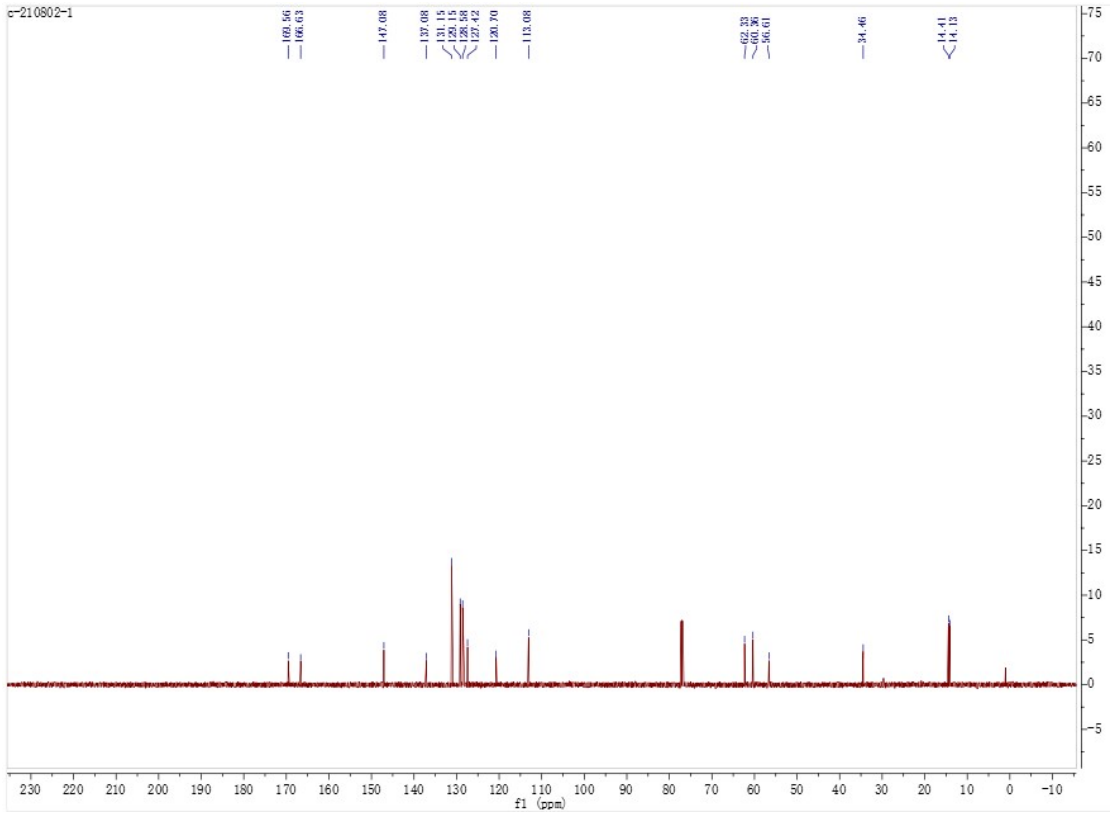


Figure S36 ^{13}C-NMR spectrum of **1i** in $CDCl_3$

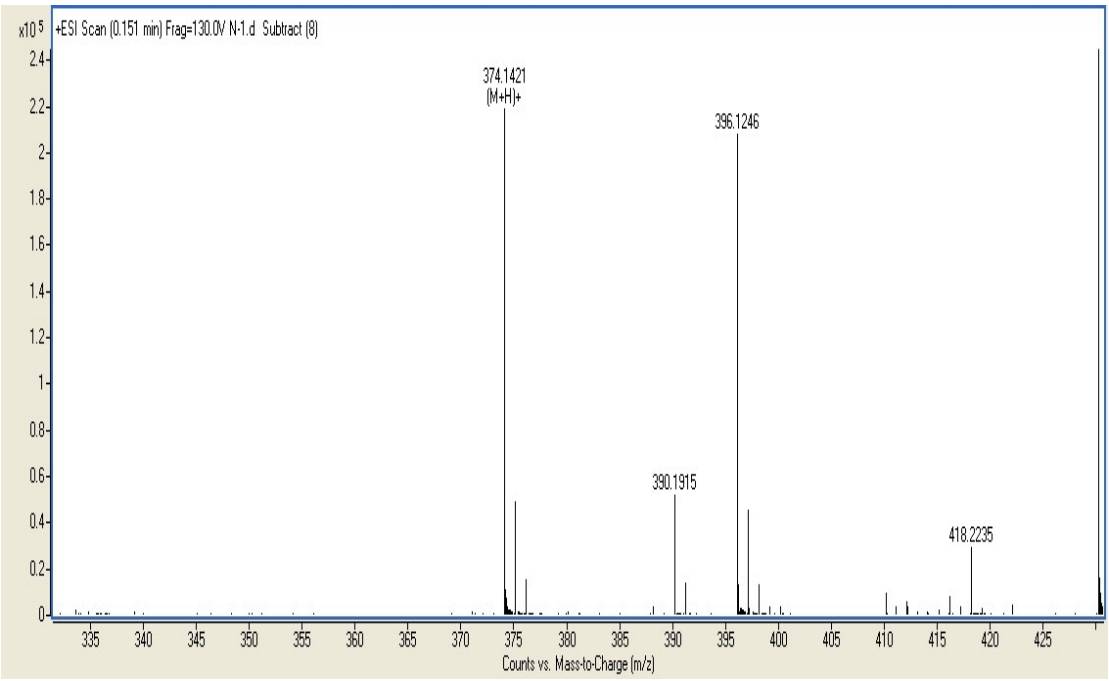


Figure S37 HRMS spectrum of **1i**

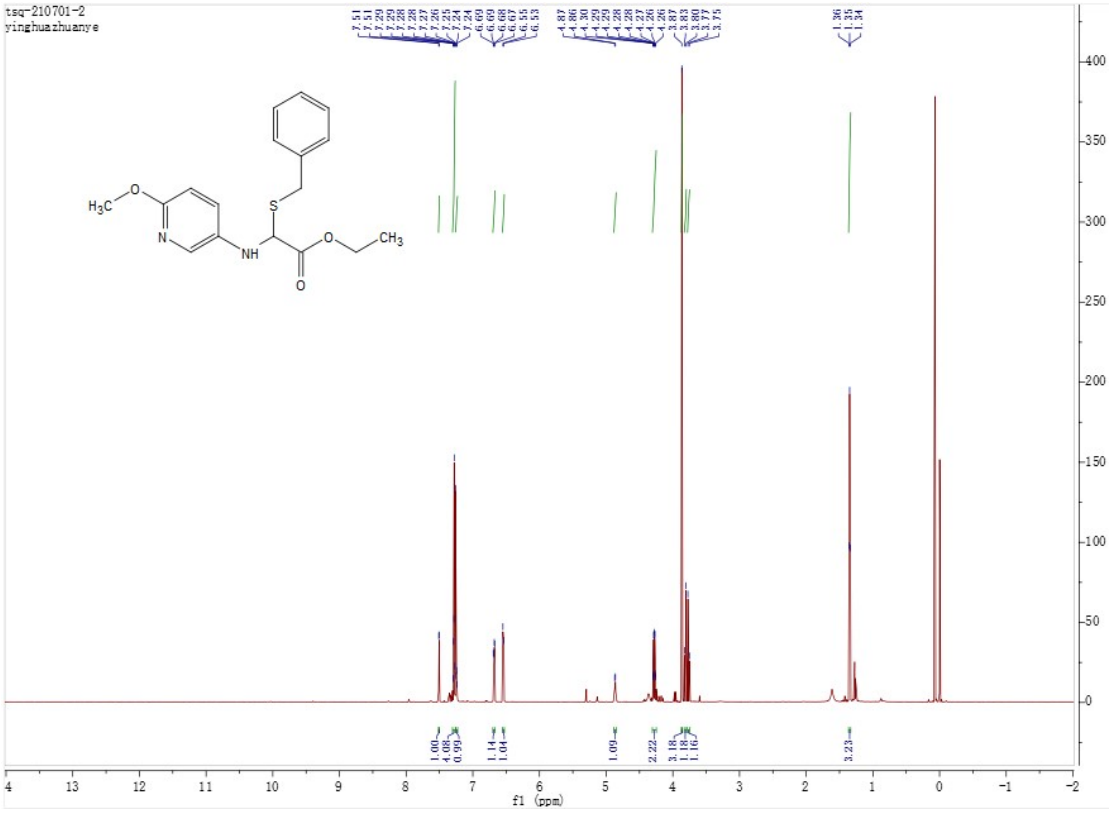


Figure S38 ^{1}H-NMR spectrum of **1j** in $CDCl_3$

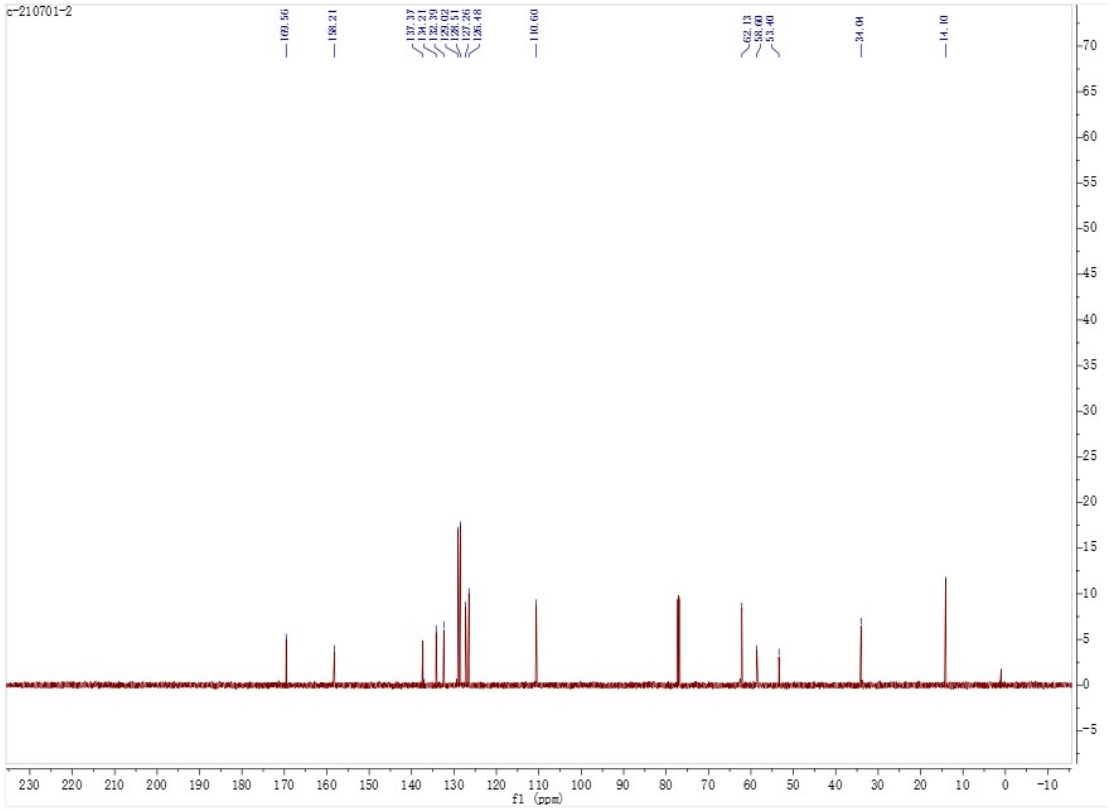


Figure S39 ^{13}C-NMR spectrum of **1j** in $CDCl_3$

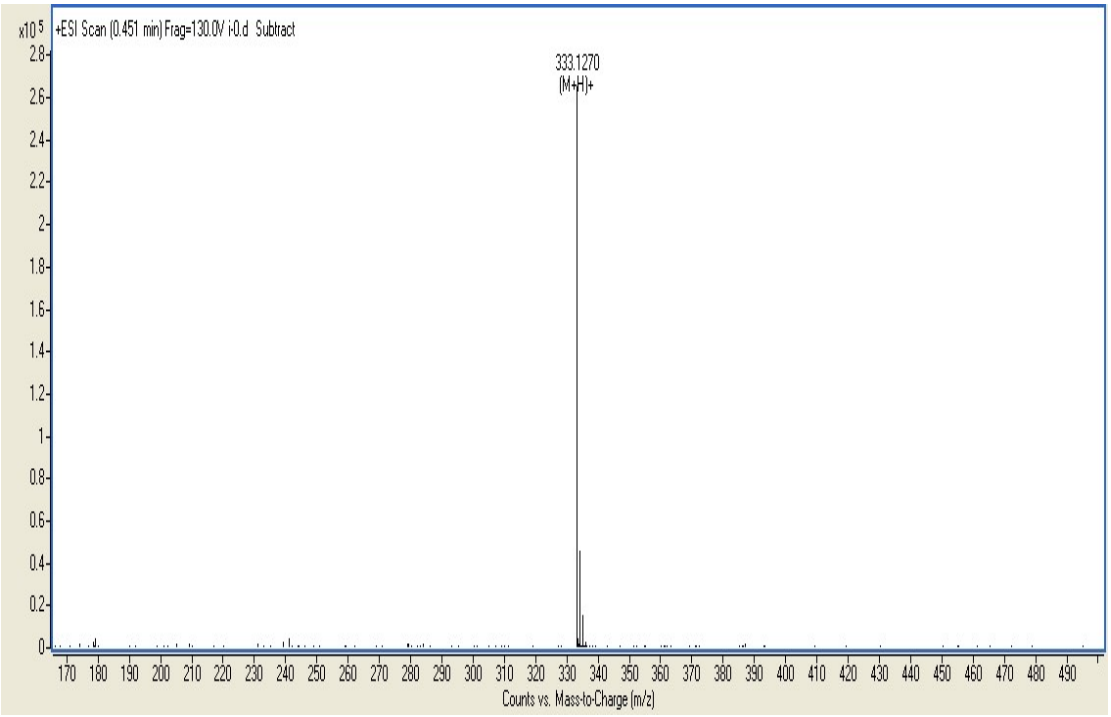


Figure S40 HRMS spectrum of **1j**

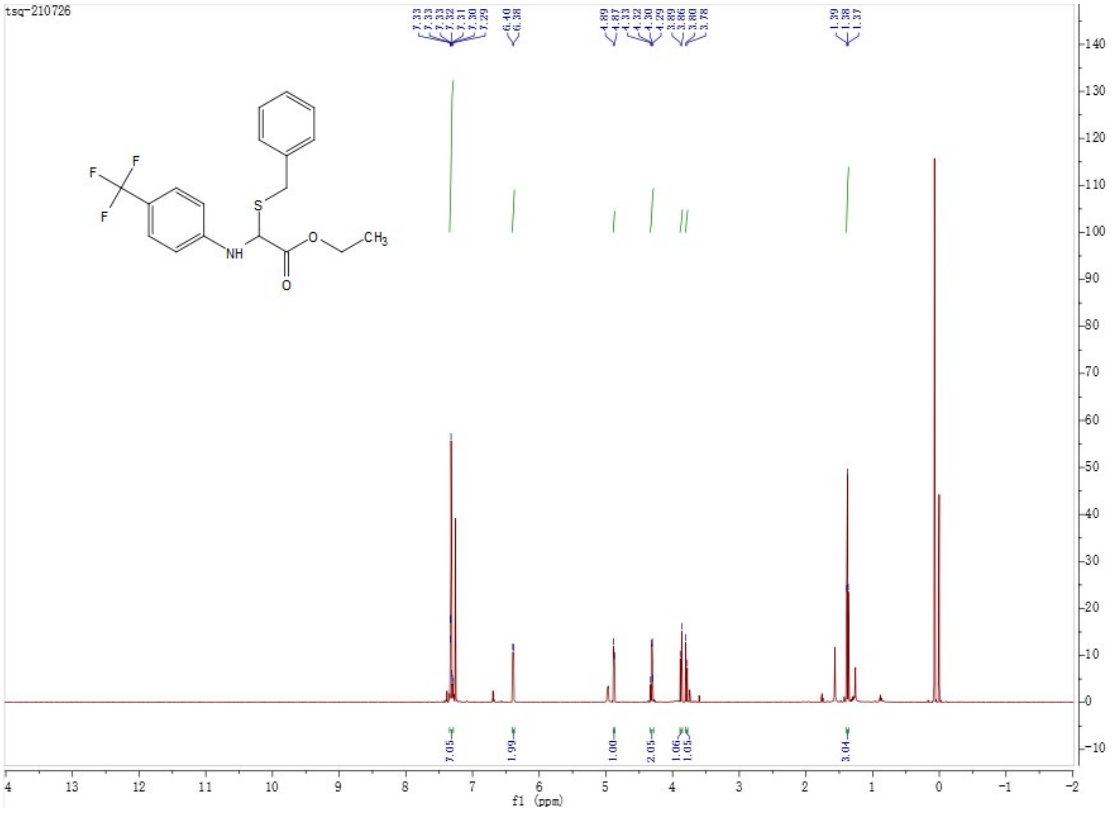


Figure S41 ^{1}H-NMR spectrum of **1k** in $CDCl_3$

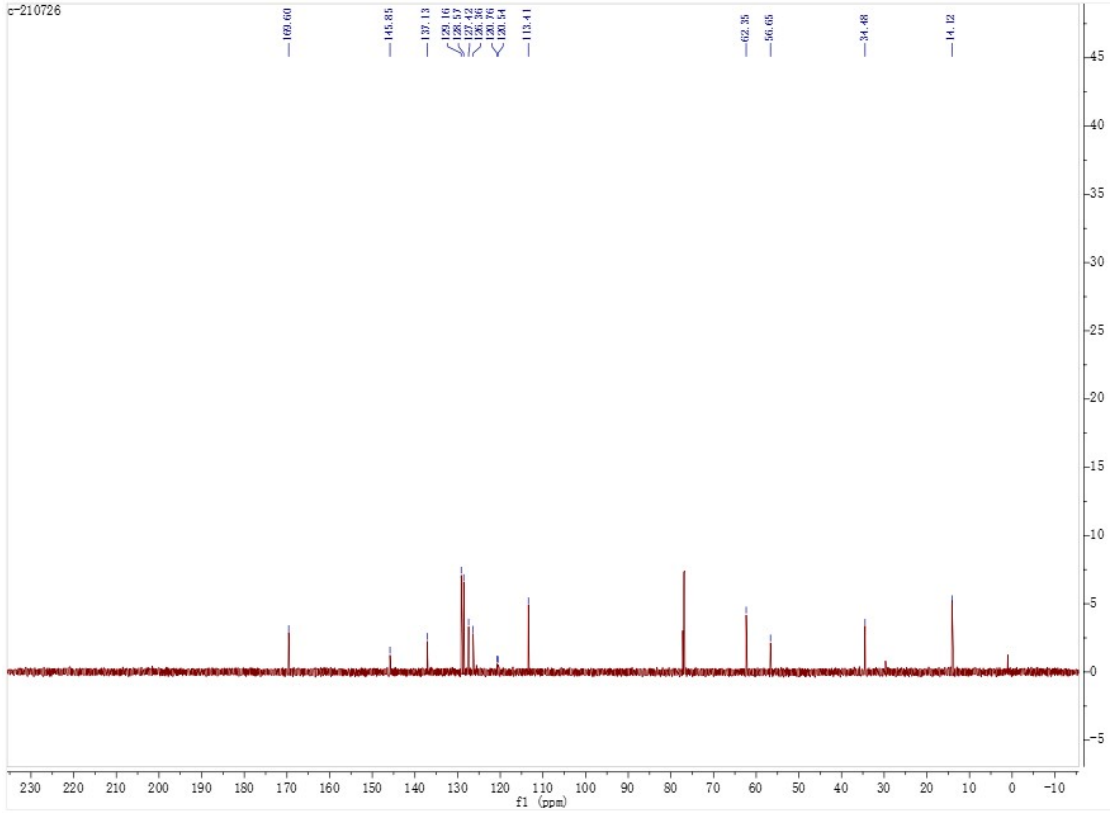


Figure S42 ^{13}C-NMR spectrum of **1k** in $CDCl_3$

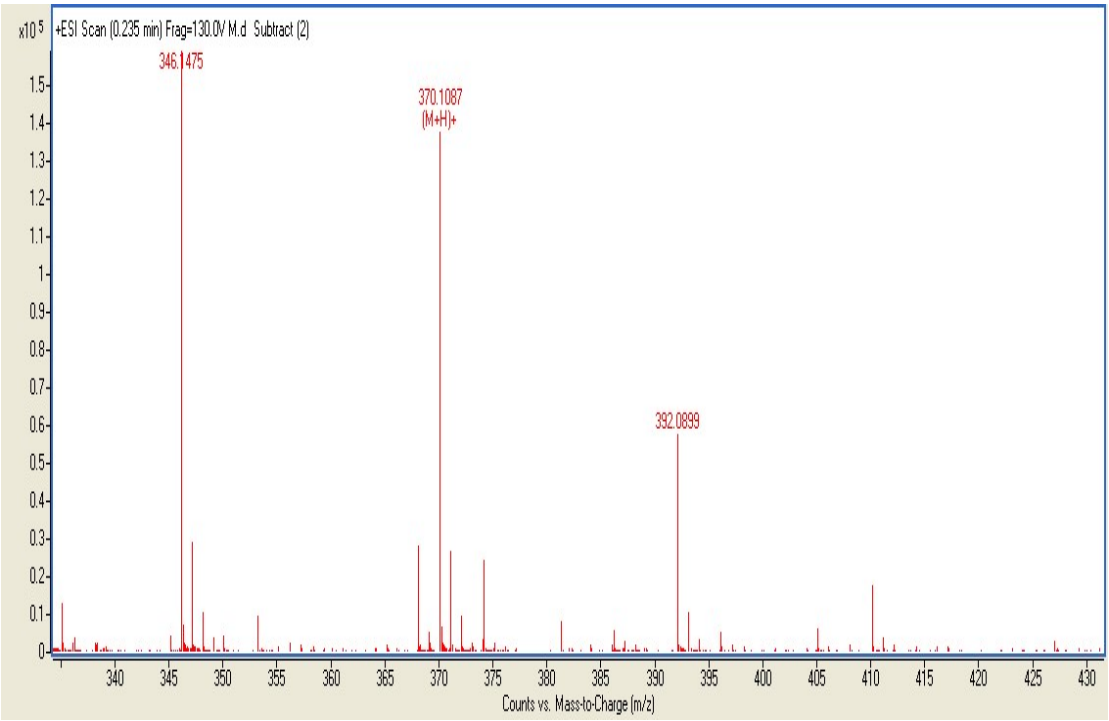


Figure S43 HRMS spectrum of **1k**

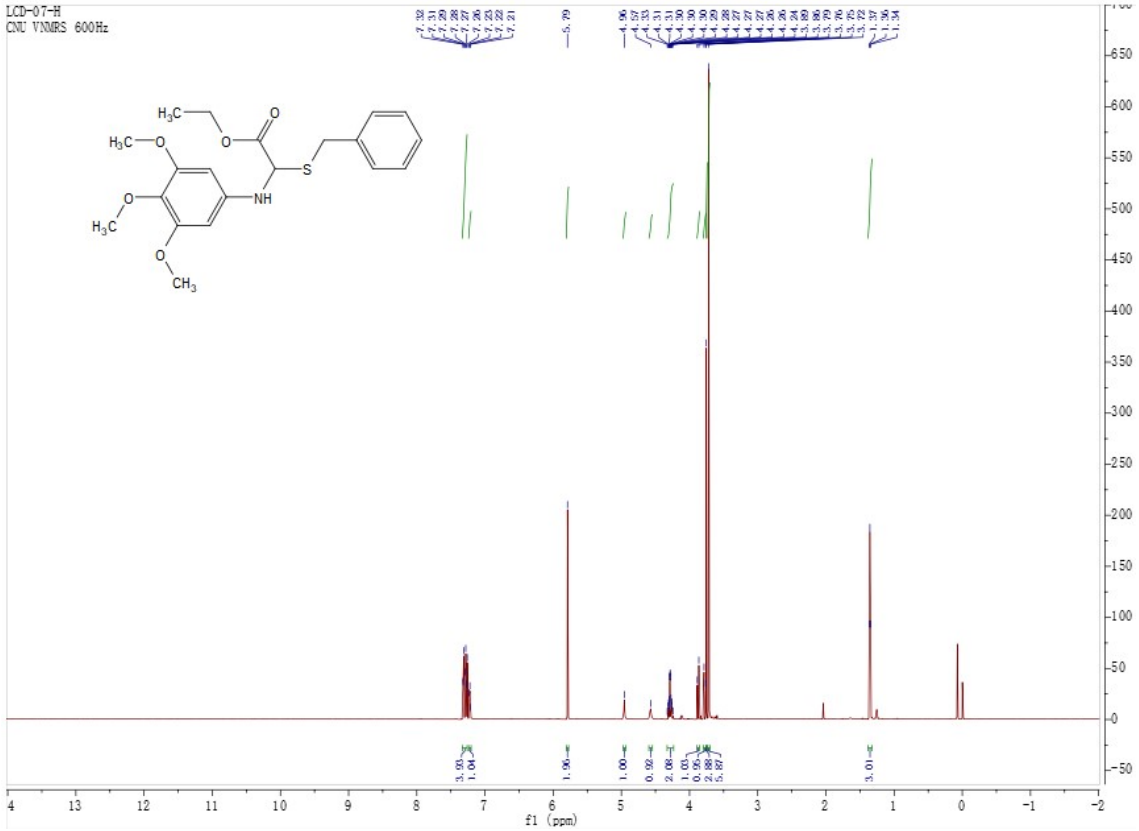


Figure S44 ^{1}H-NMR spectrum of **1l** in $CDCl_3$

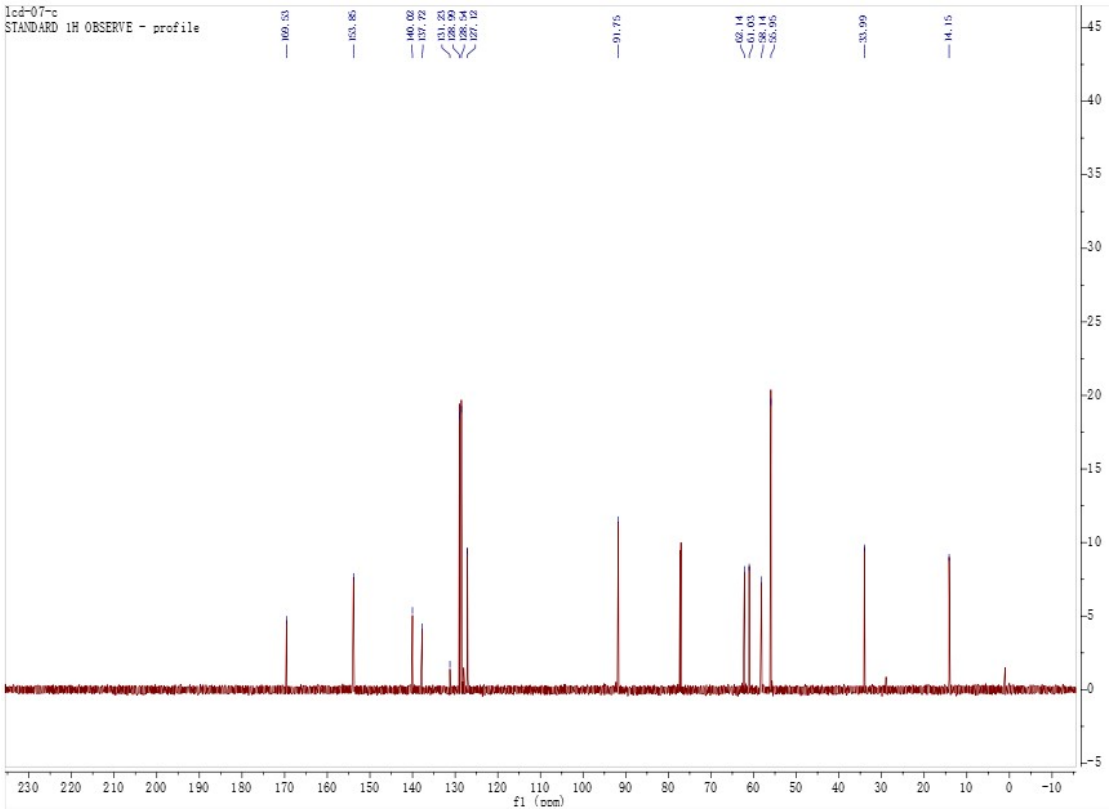


Figure S45 ^{13}C-NMR spectrum of **1l** in $CDCl_3$

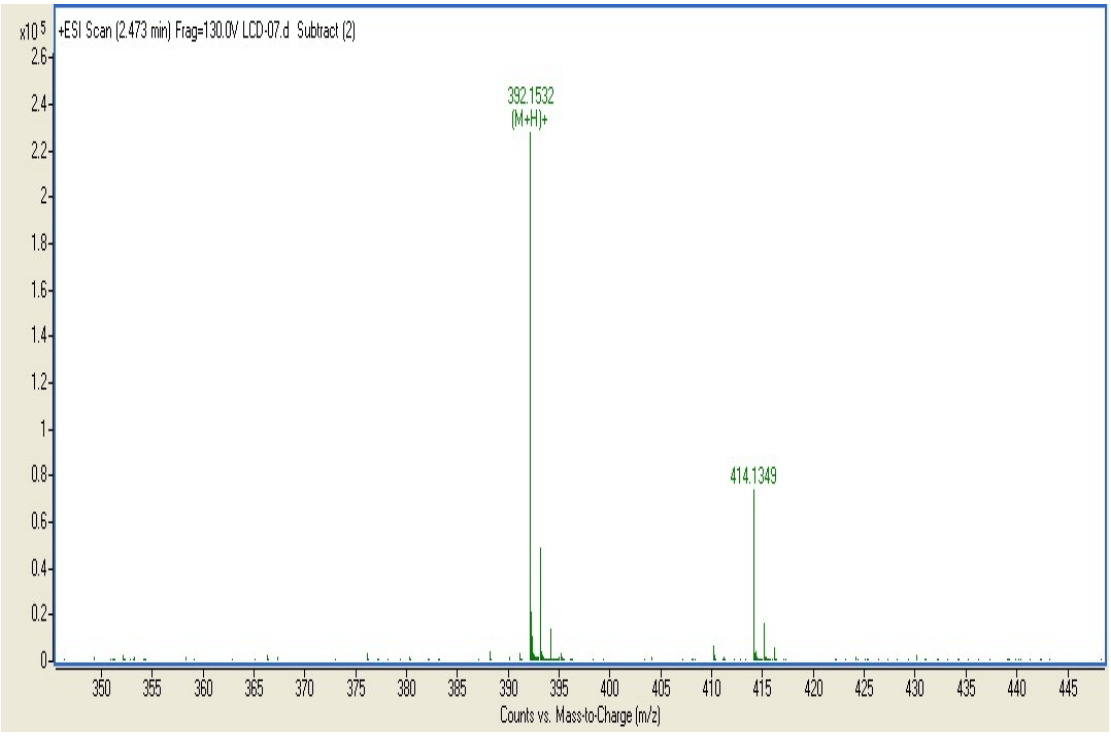


Figure S46 HRMS spectrum of **1l**

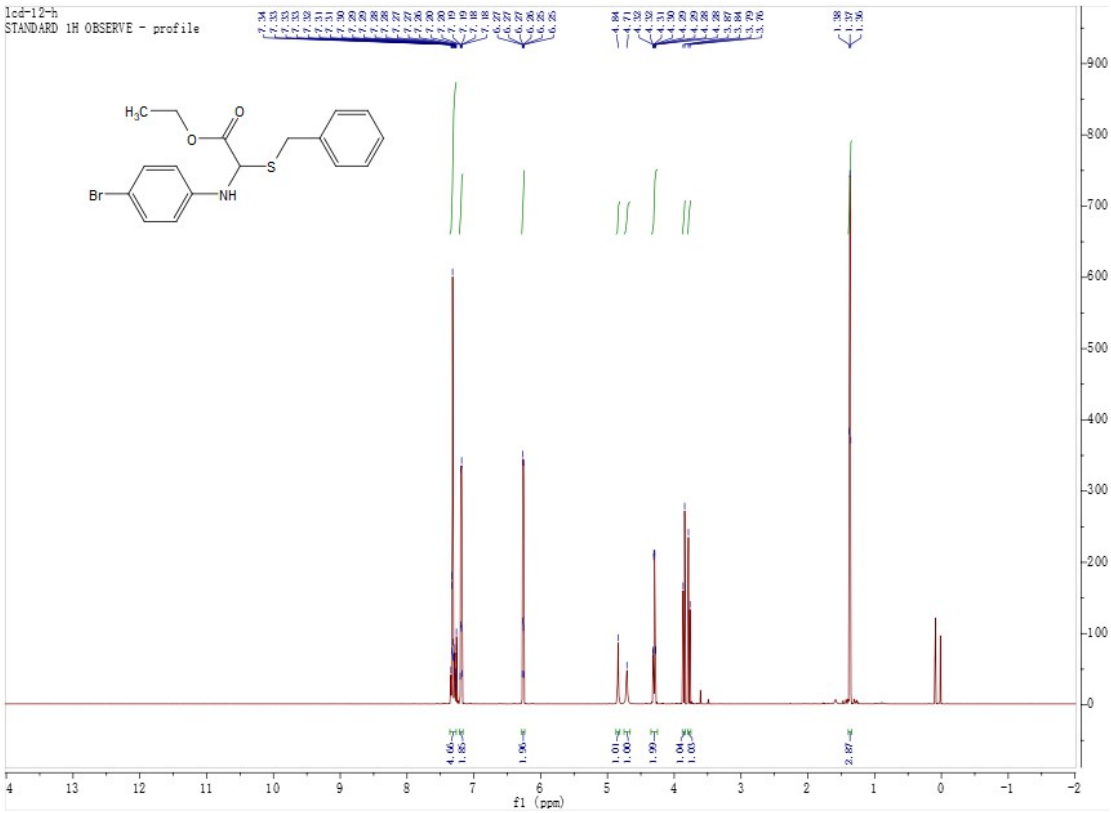


Figure S47 ^{1}H-NMR spectrum of **1m** in $CDCl_3$

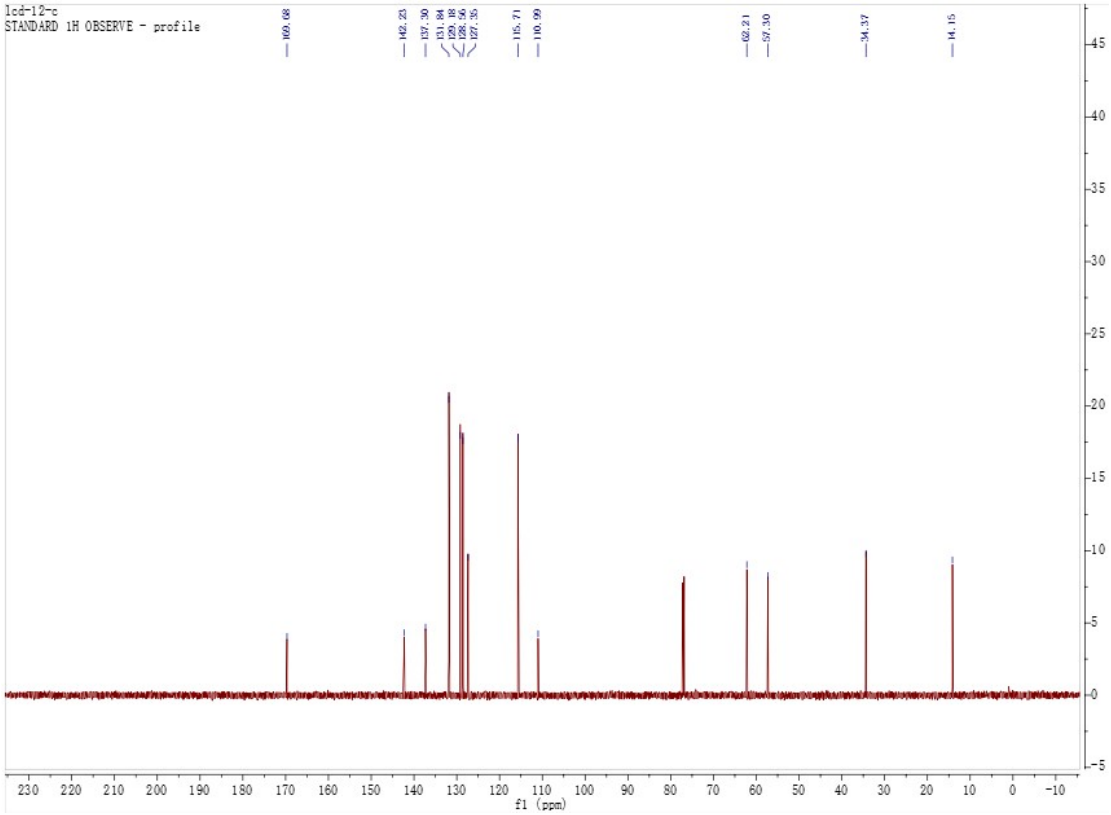


Figure S48 ^{13}C-NMR spectrum of **1m** in $CDCl_3$

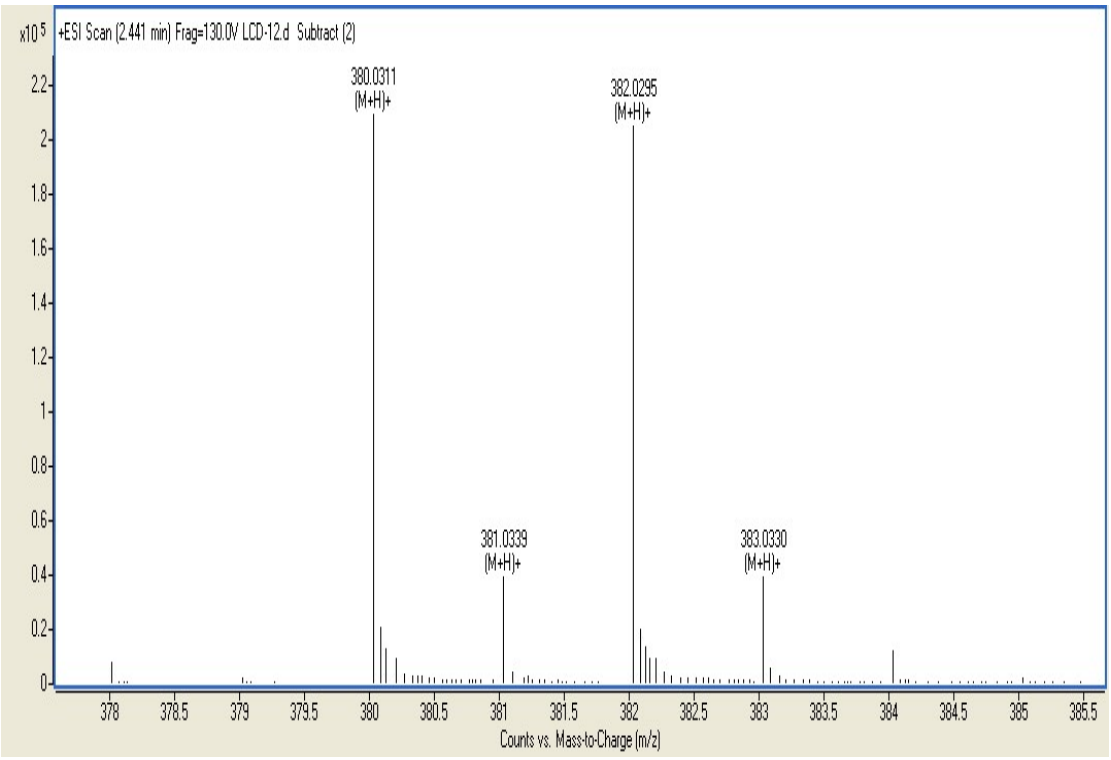


Figure S49 HRMS spectrum of **1m**

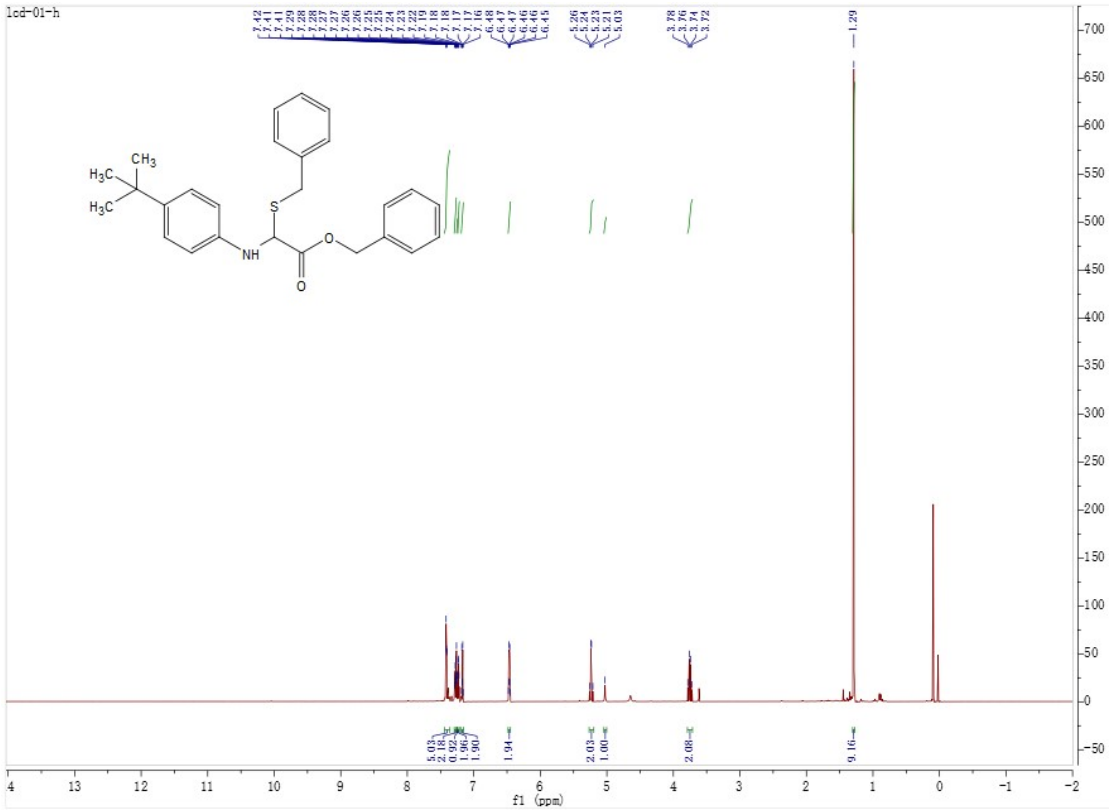


Figure S50 ^{1}H-NMR spectrum of **1n** in $CDCl_3$

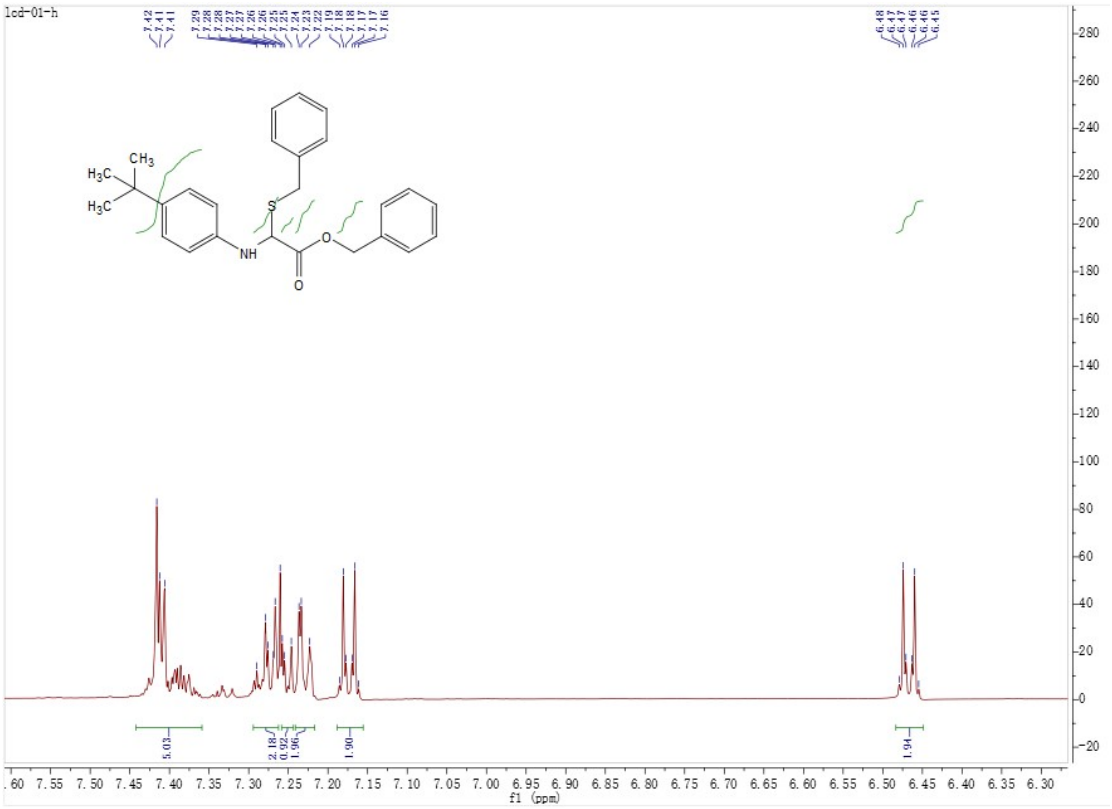


Figure S51 Partial enlarged ^{1}H-NMR spectrum of **1n** in $CDCl_3$

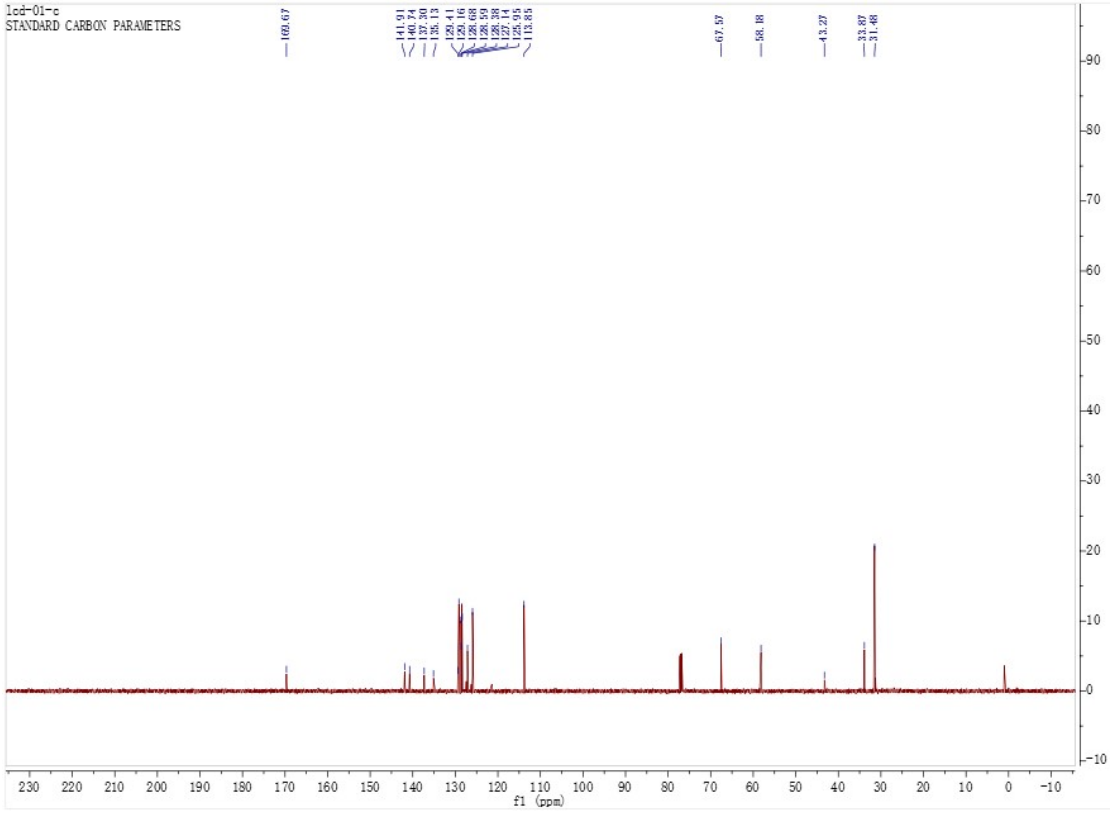


Figure S52 ^{13}C-NMR spectrum of **1n** in $CDCl_3$

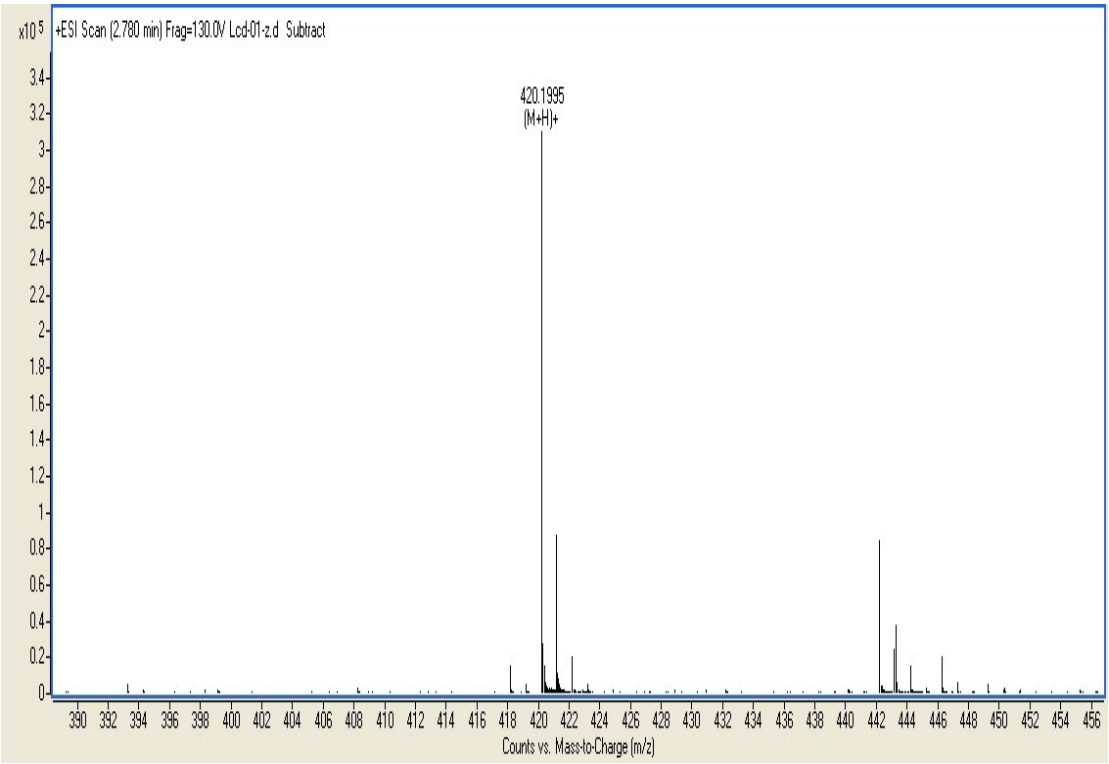


Figure S53 HRMS spectrum of **1n**

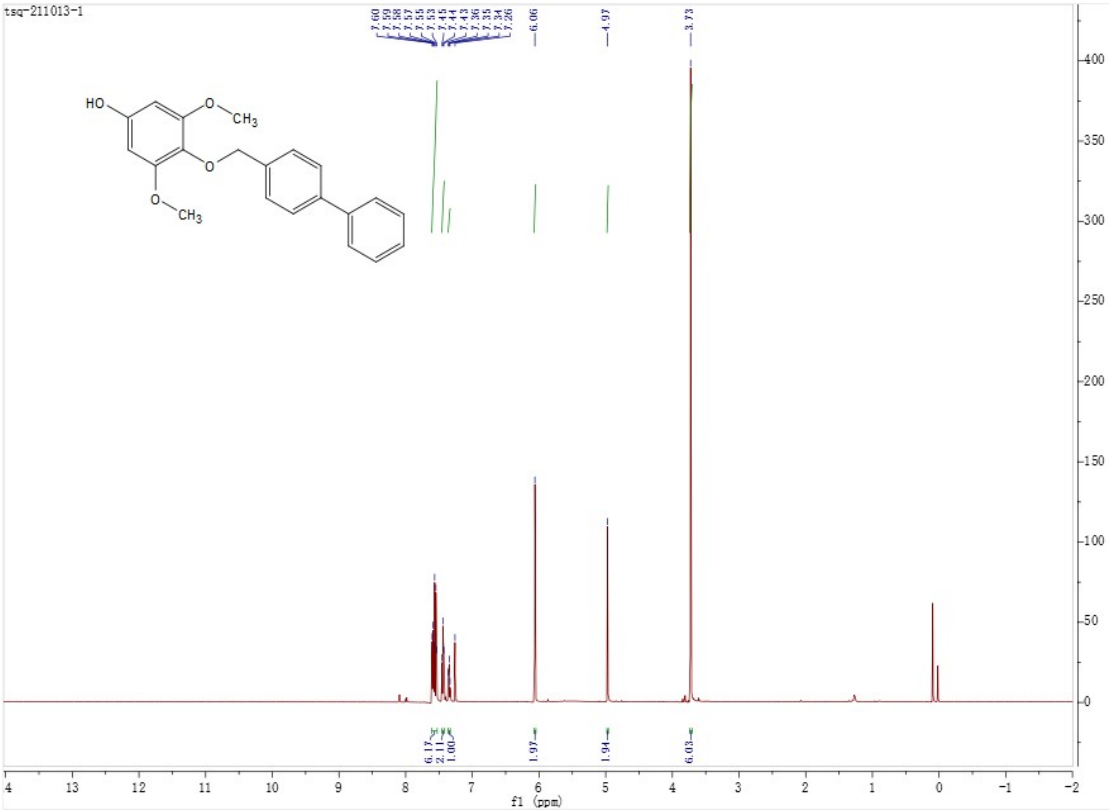


Figure S54 ^{1}H-NMR spectrum of **5c** in $CDCl_3$

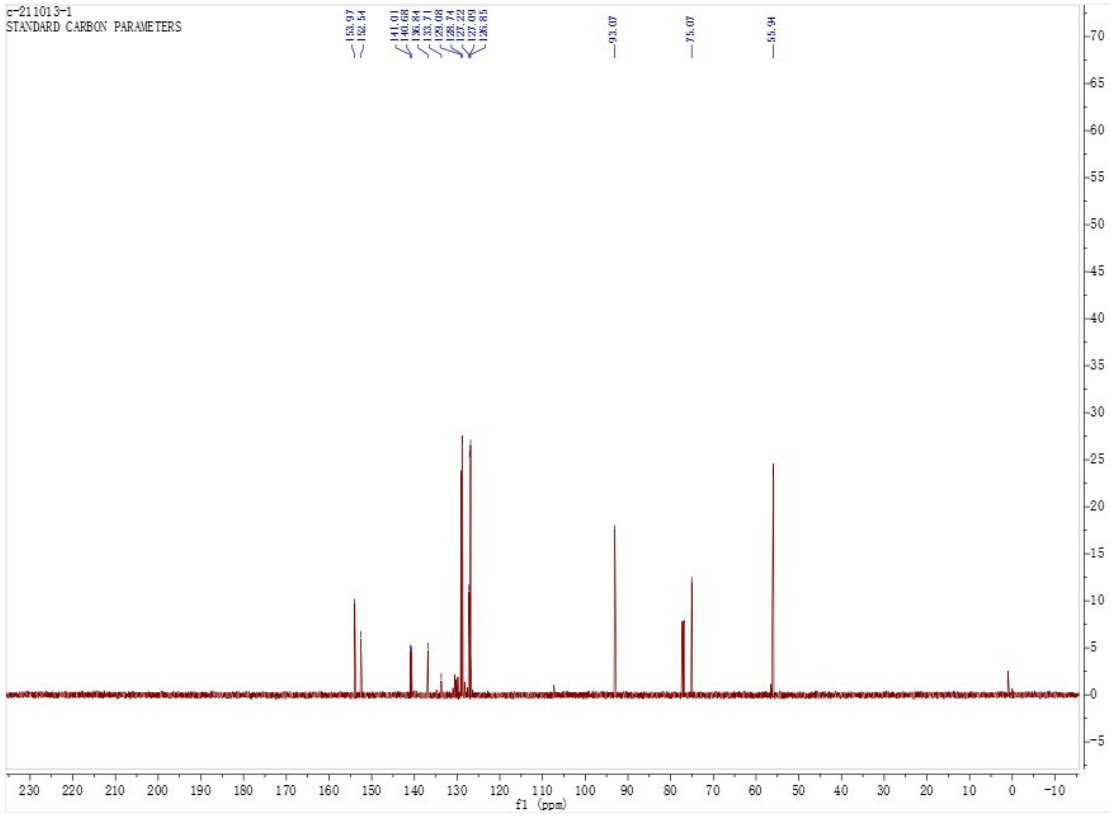


Figure S55 ^{13}C-NMR spectrum of **5c** in $CDCl_3$

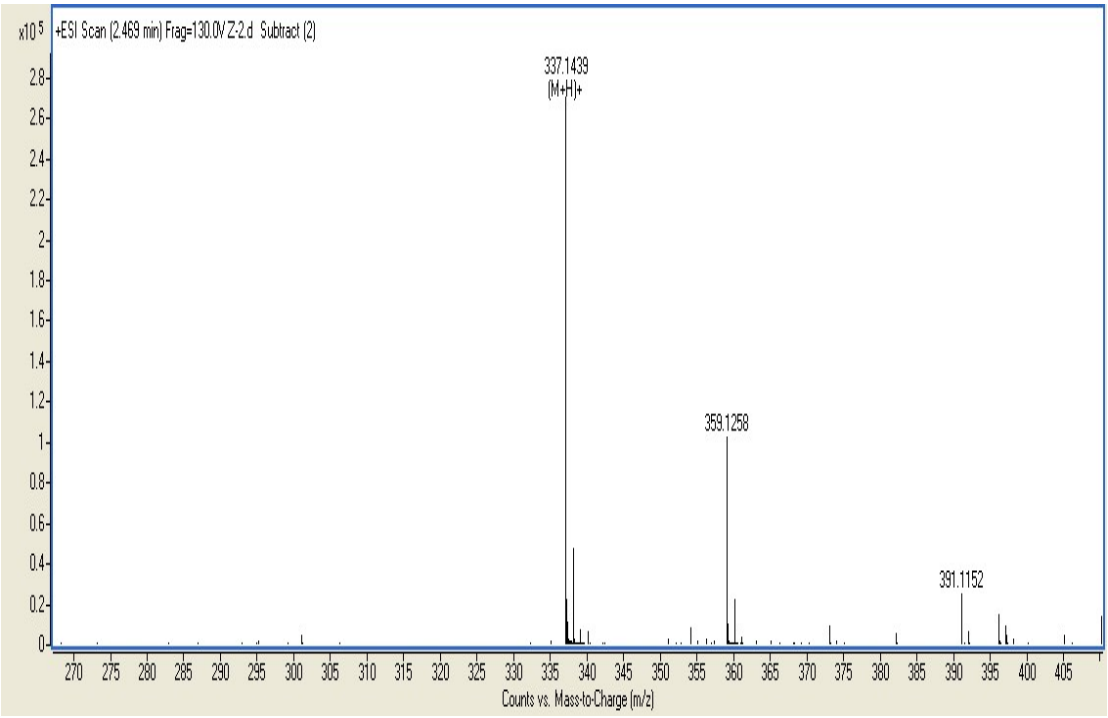


Figure S56 HRMS spectrum of **5c**

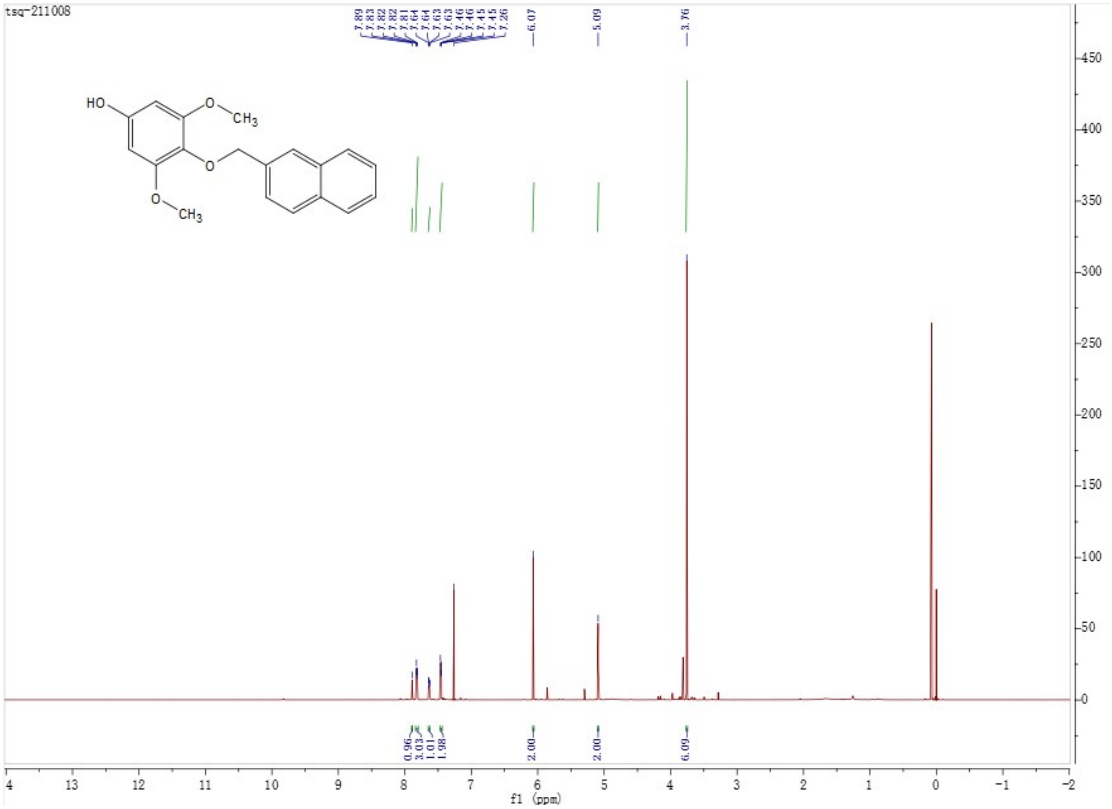


Figure S57 ^{1}H-NMR spectrum of **5d** in $CDCl_3$

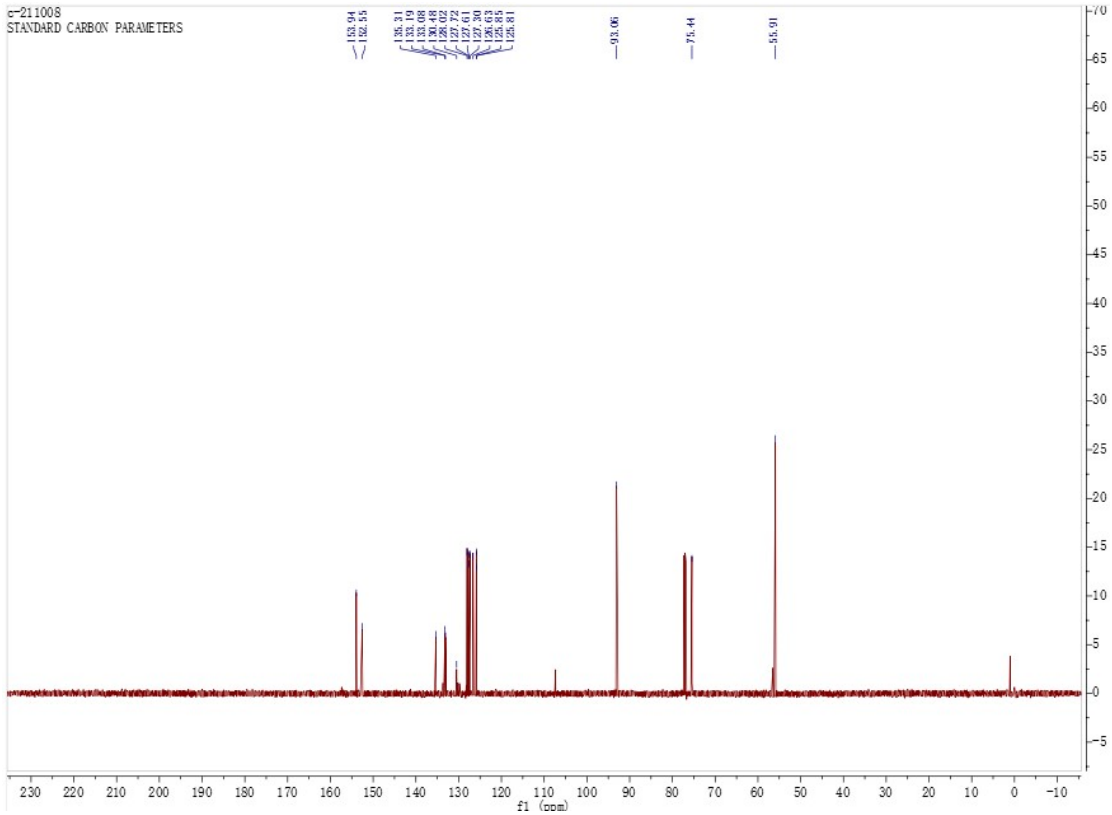


Figure S58 ^{13}C-NMR spectrum of **5d** in $CDCl_3$

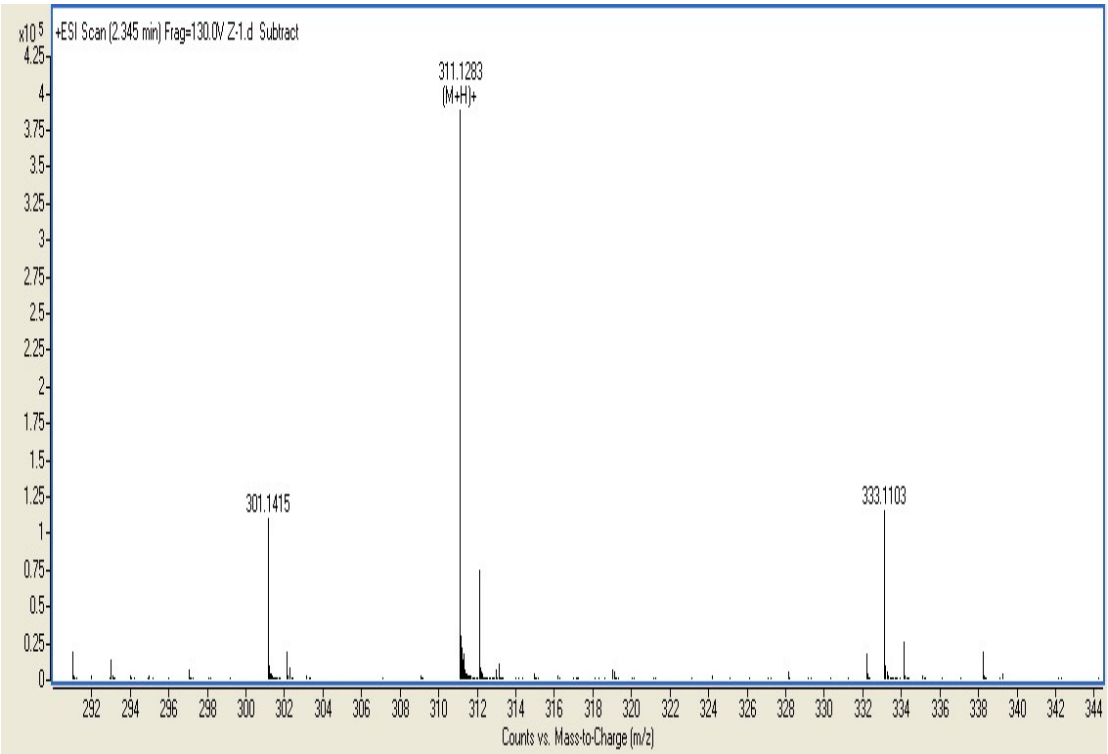


Figure S59 HRMS spectrum of **5d**

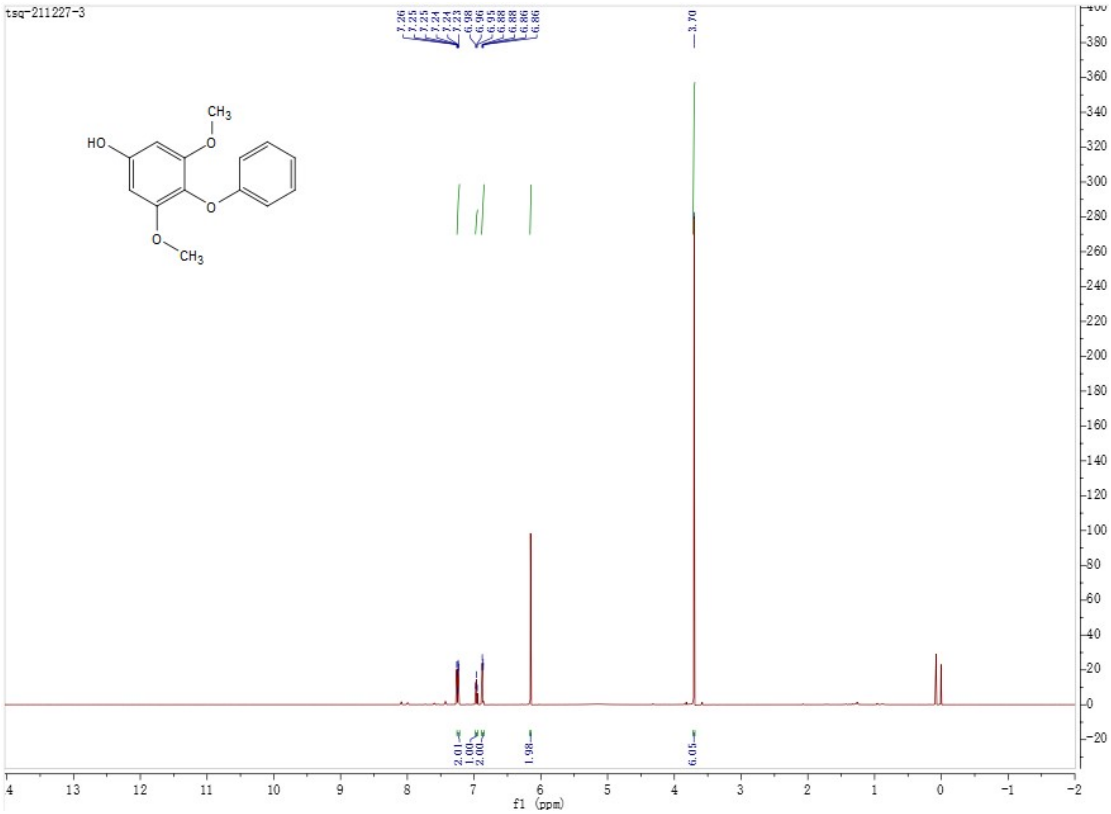


Figure S60 ^{1}H-NMR spectrum of **5e** in $CDCl_3$

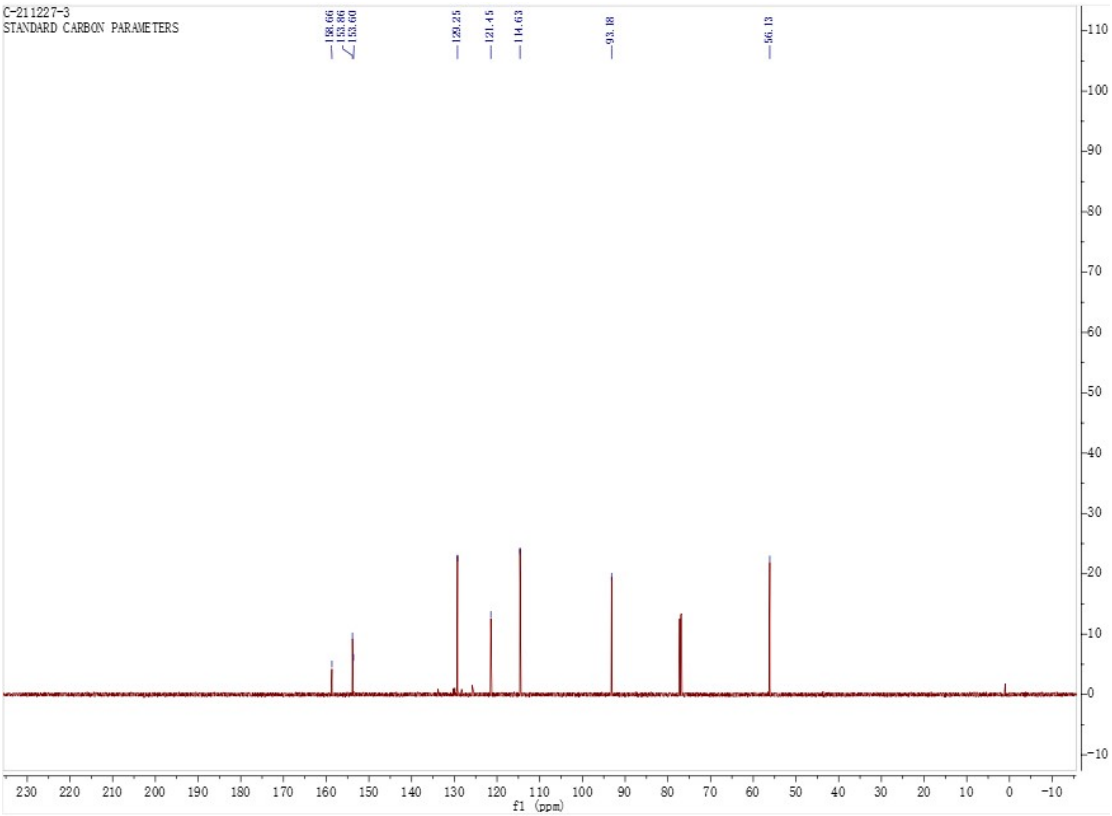


Figure S61 ^{13}C-NMR spectrum of **5e** in $CDCl_3$

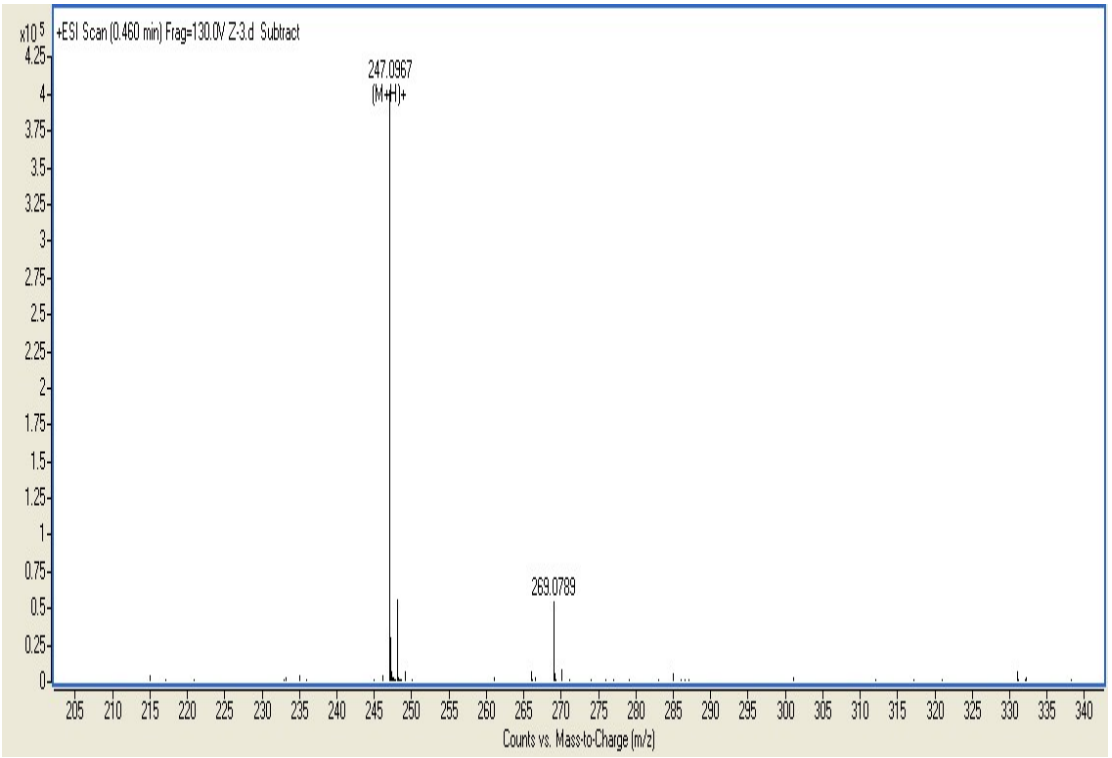


Figure S62 HRMS spectrum of **5e**

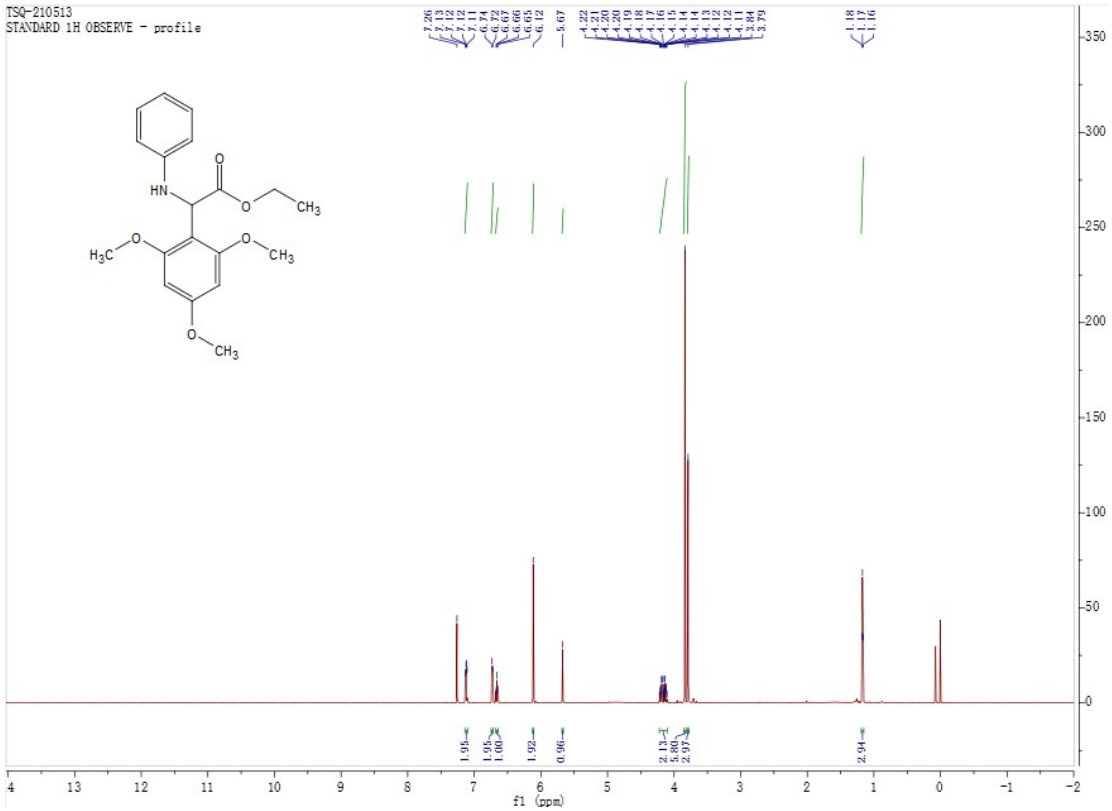


Figure S63 ^{1}H-NMR spectrum of **3a** in $CDCl_3$

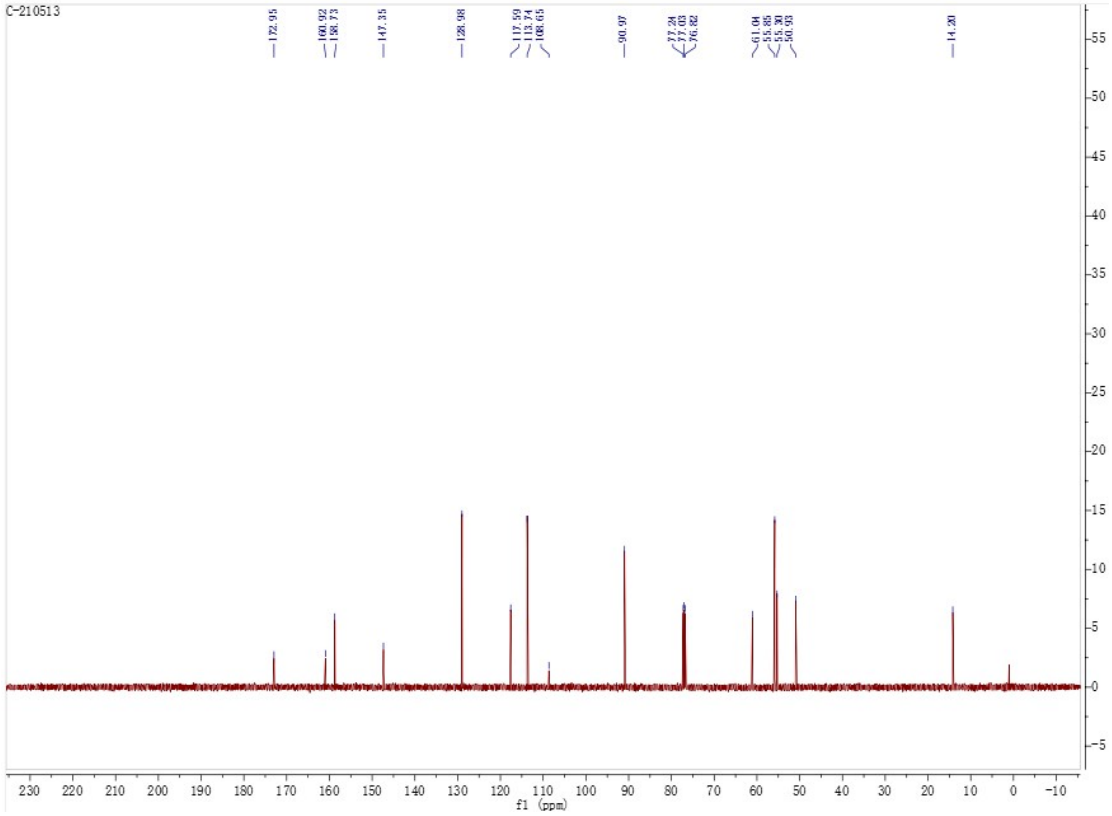


Figure S64 ^{13}C-NMR spectrum of **3a** in $CDCl_3$

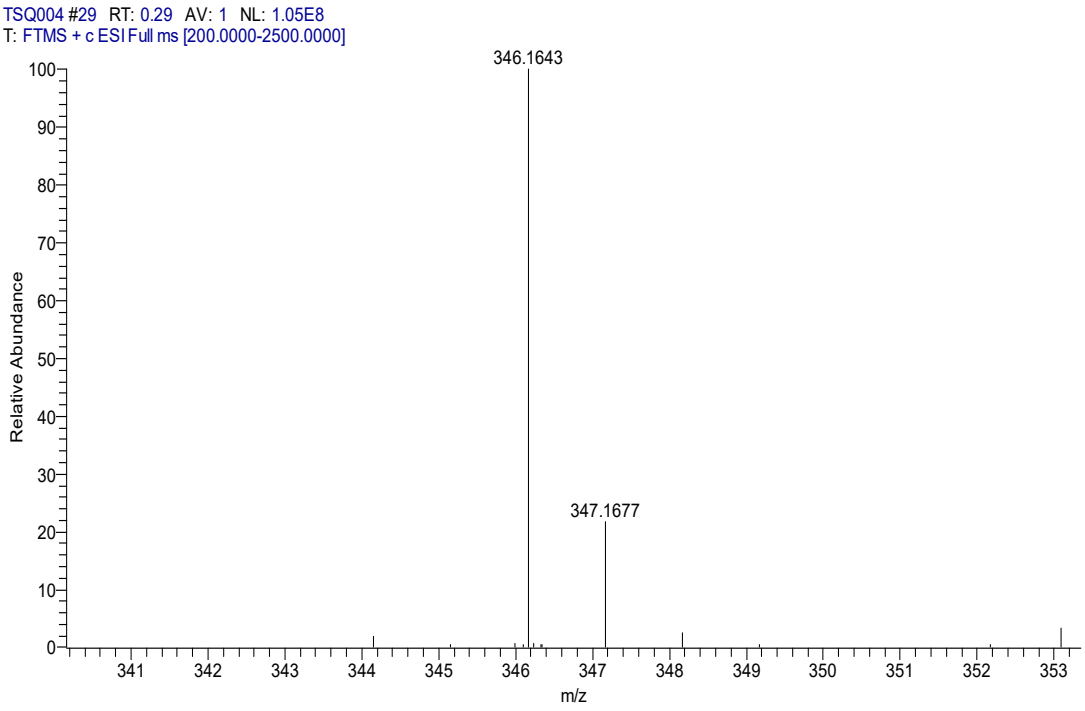


Figure S65 HRMS spectrum of **3a**

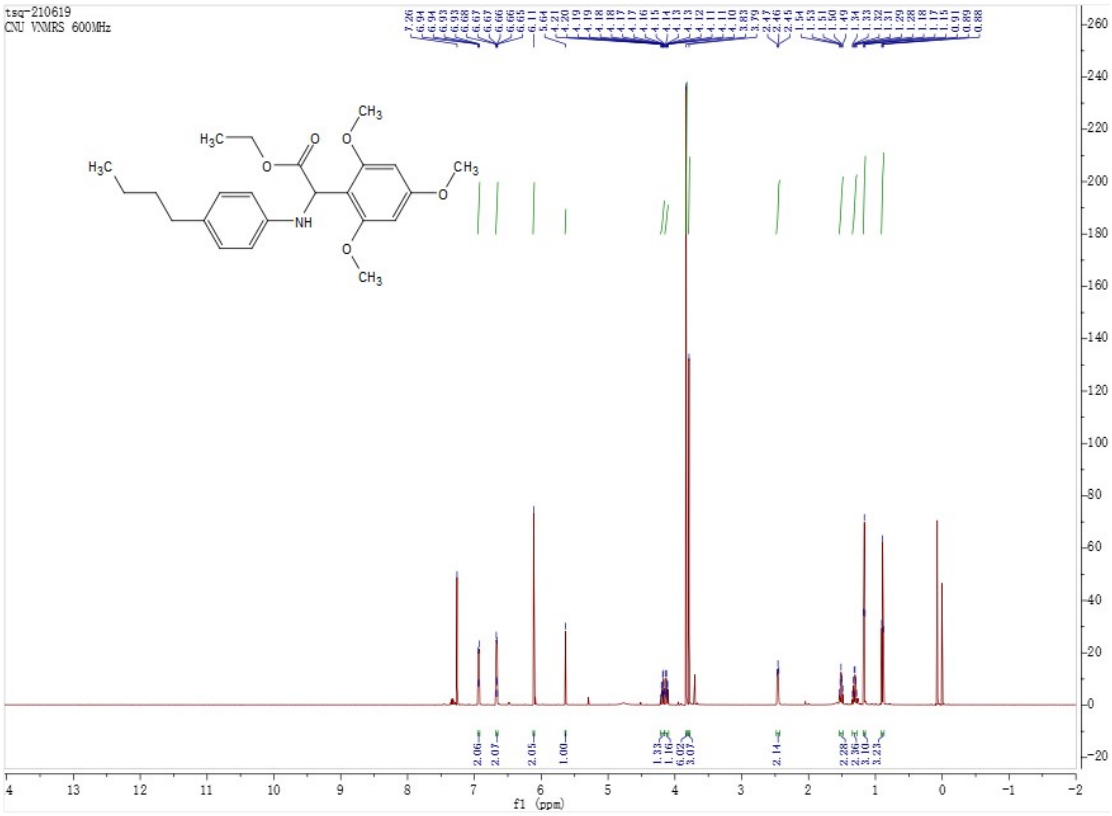


Figure S66 ^{1}H-NMR spectrum of **3b** in $CDCl_3$

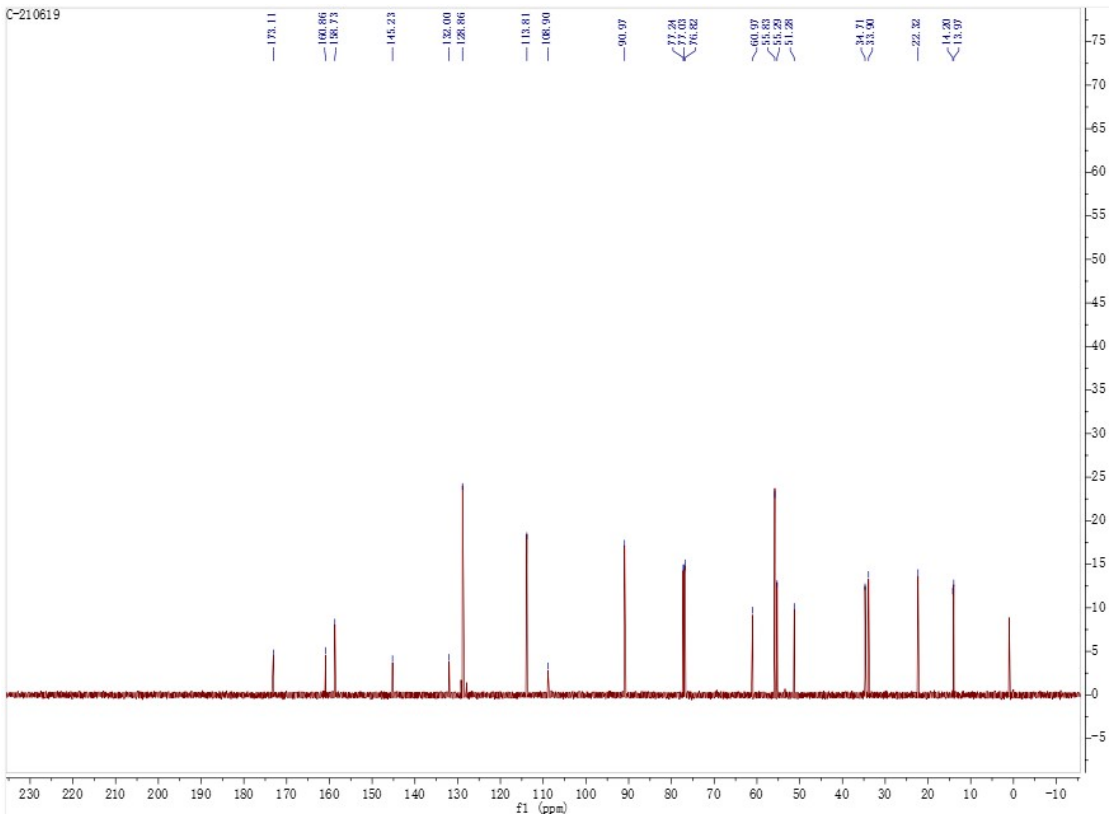


Figure S67 ^{13}C-NMR spectrum of **3b** in $CDCl_3$

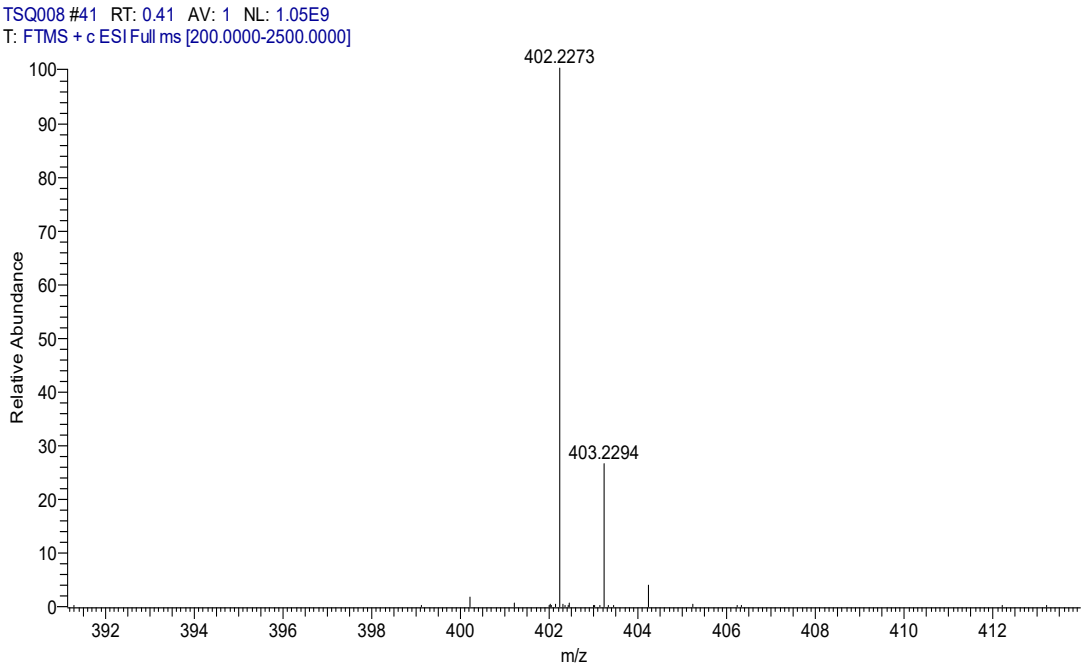


Figure S68 HRMS spectrum of **3b**

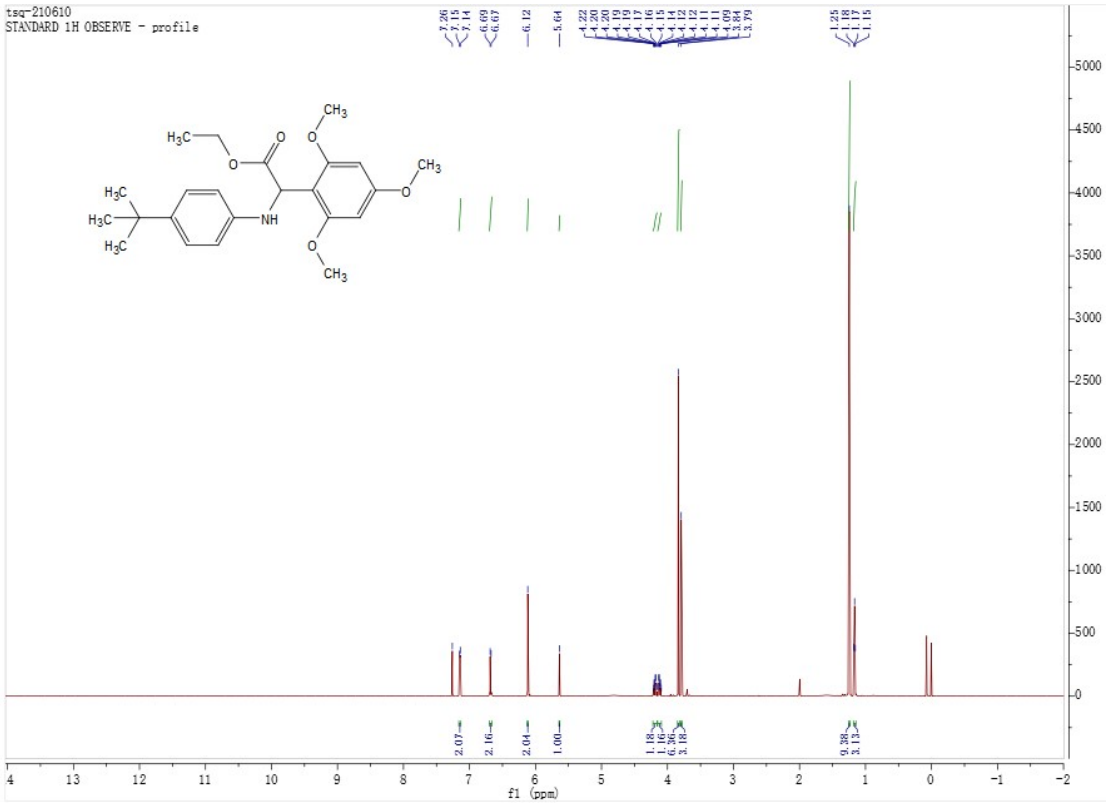


Figure S69 ^{1}H-NMR spectrum of **3c** in $CDCl_3$

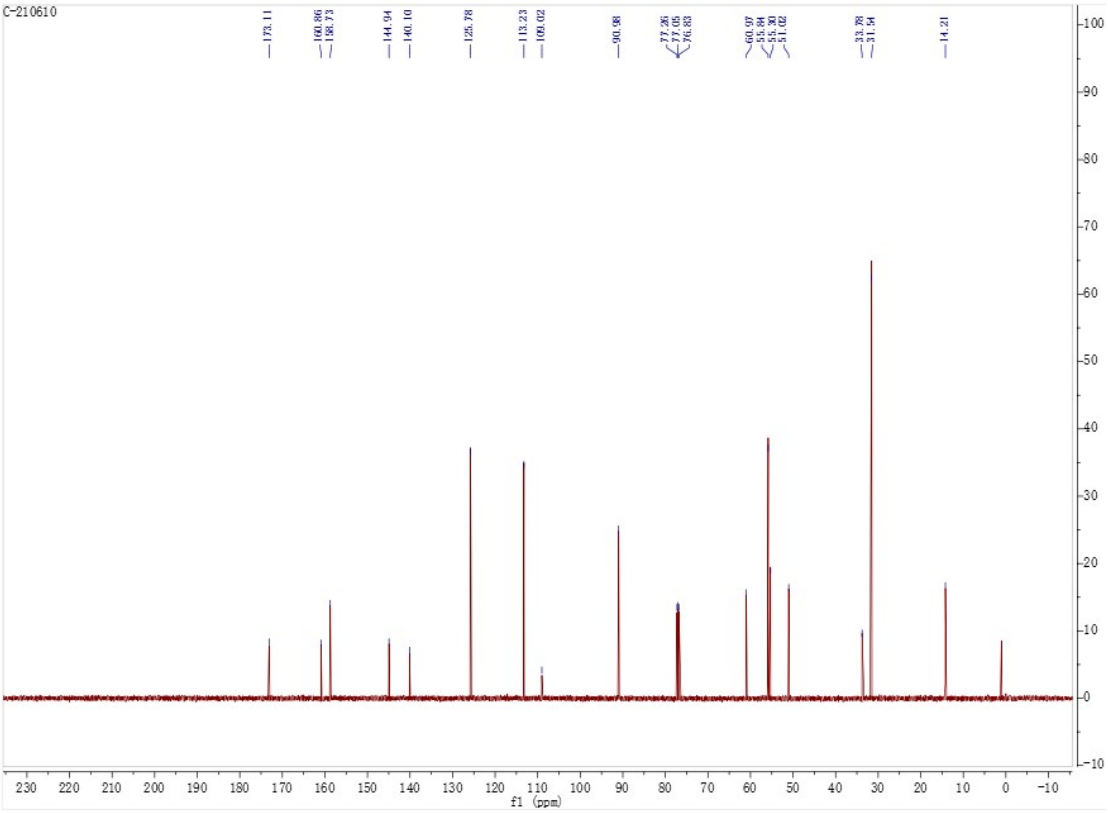


Figure S70 ^{13}C-NMR spectrum of **3c** in $CDCl_3$

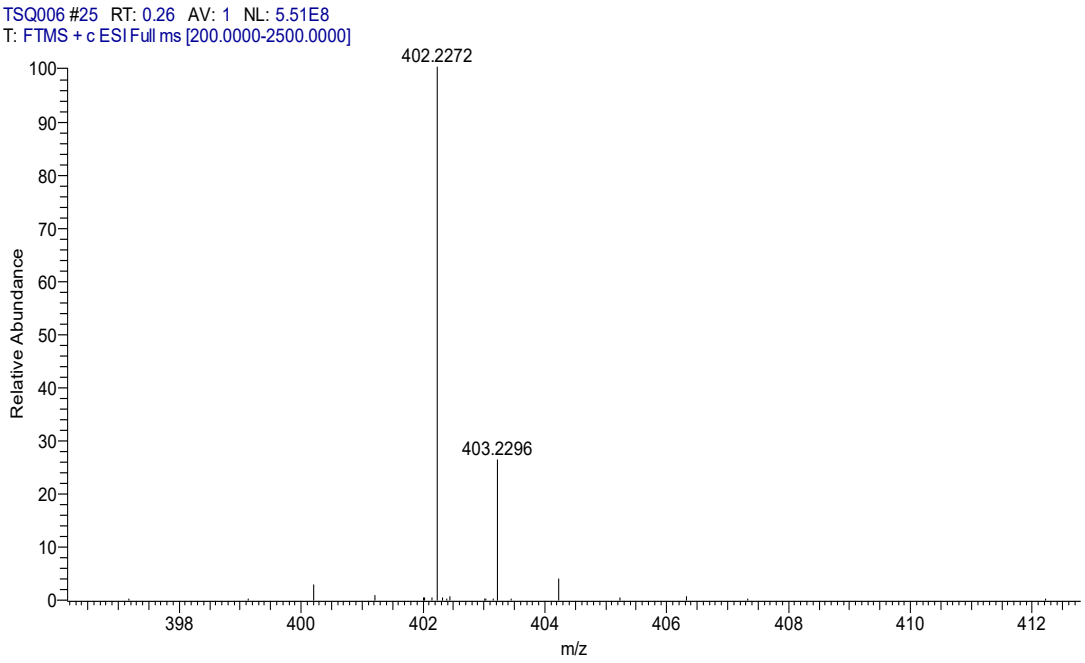


Figure S71 HRMS spectrum of **3c**

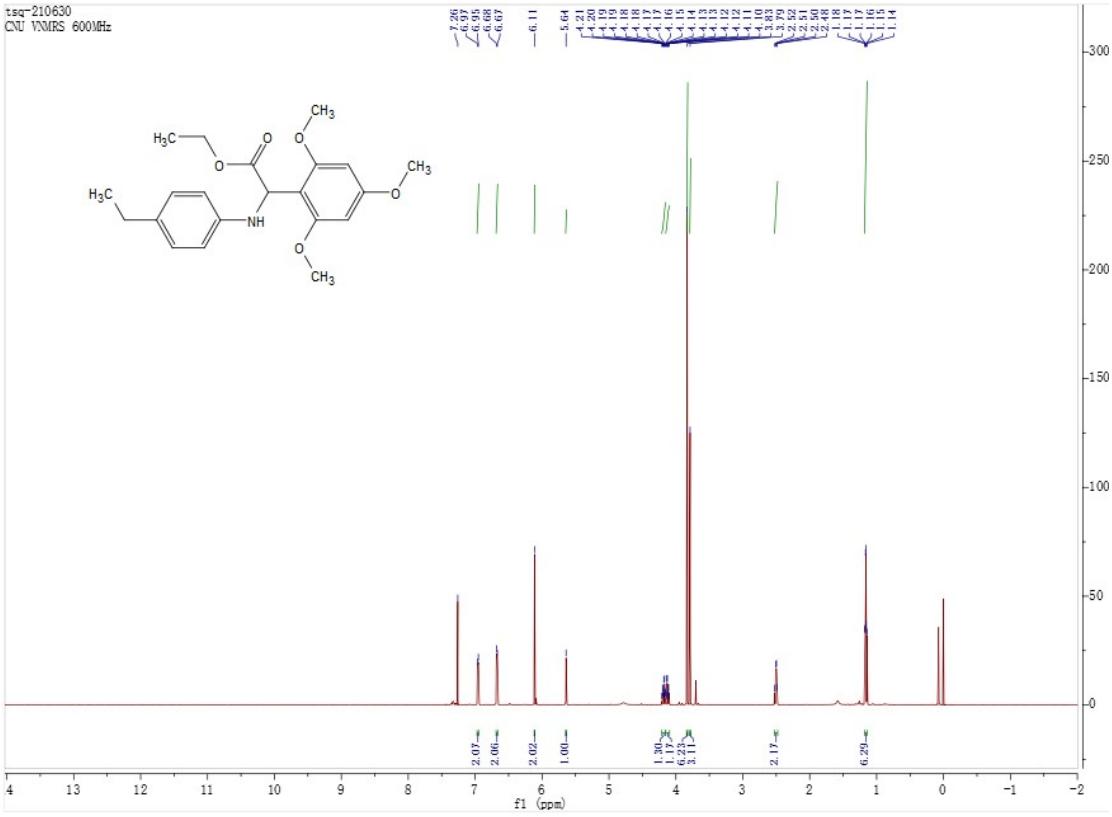


Figure S72 ^{1}H-NMR spectrum of **3d** in $CDCl_3$

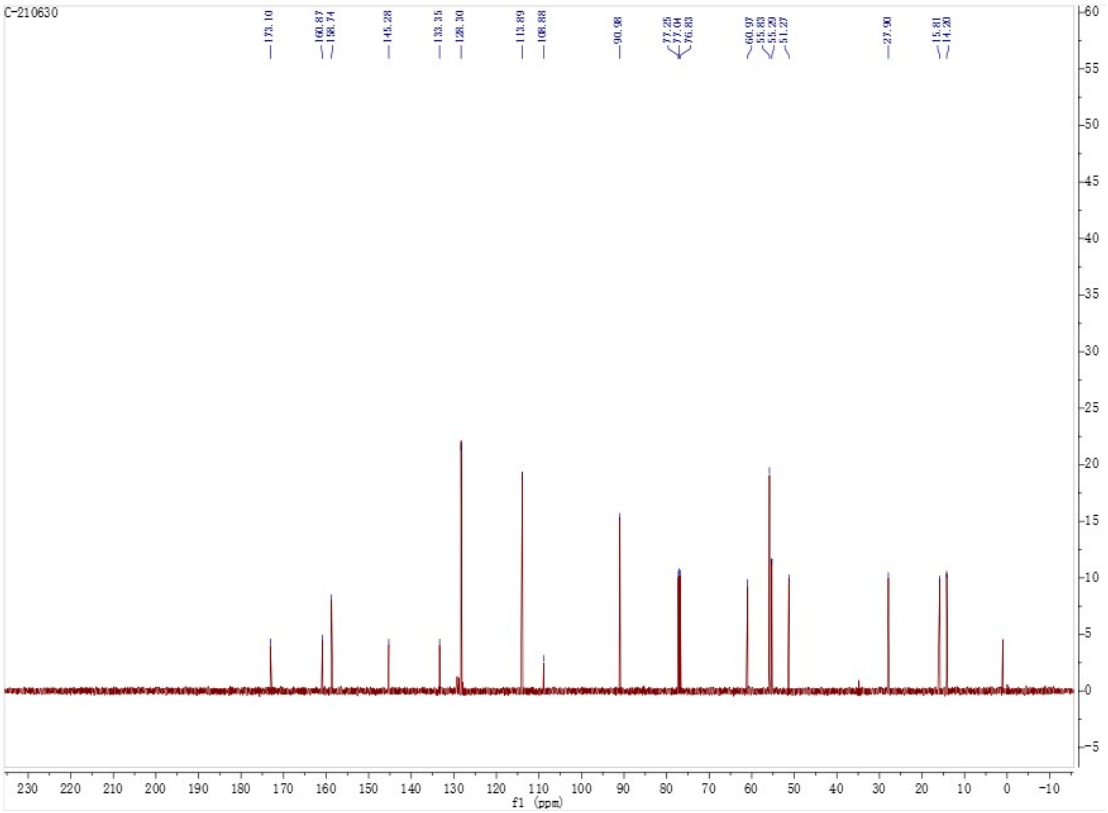


Figure S73 ^{13}C-NMR spectrum of **3d** in $CDCl_3$

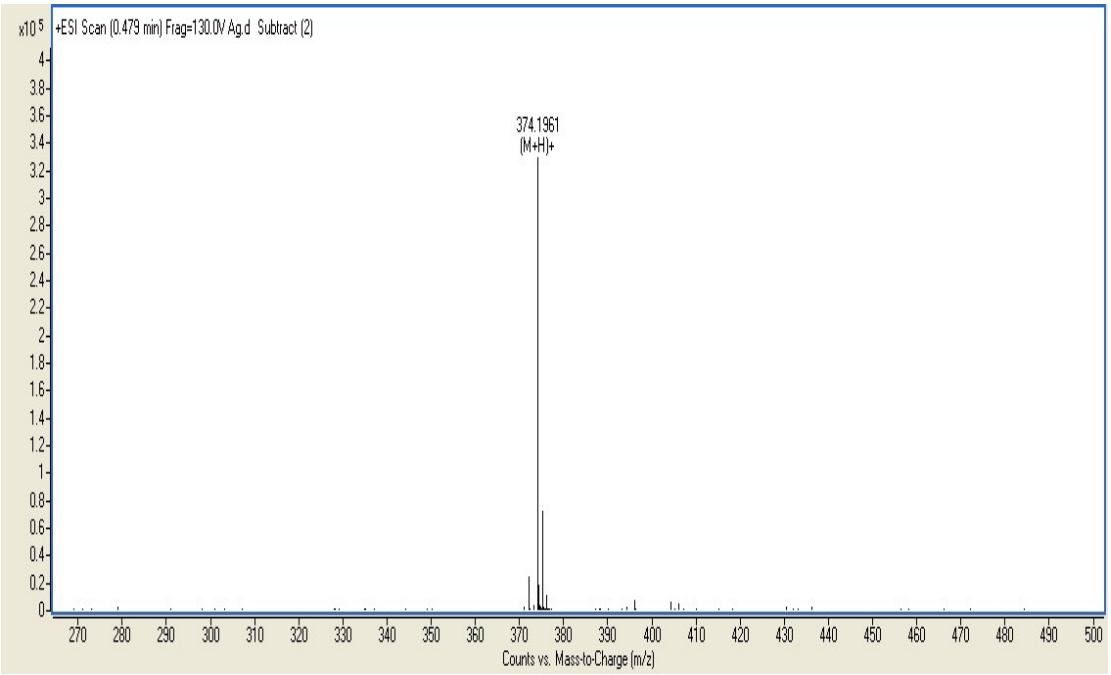


Figure S74 HRMS spectrum of **3d**

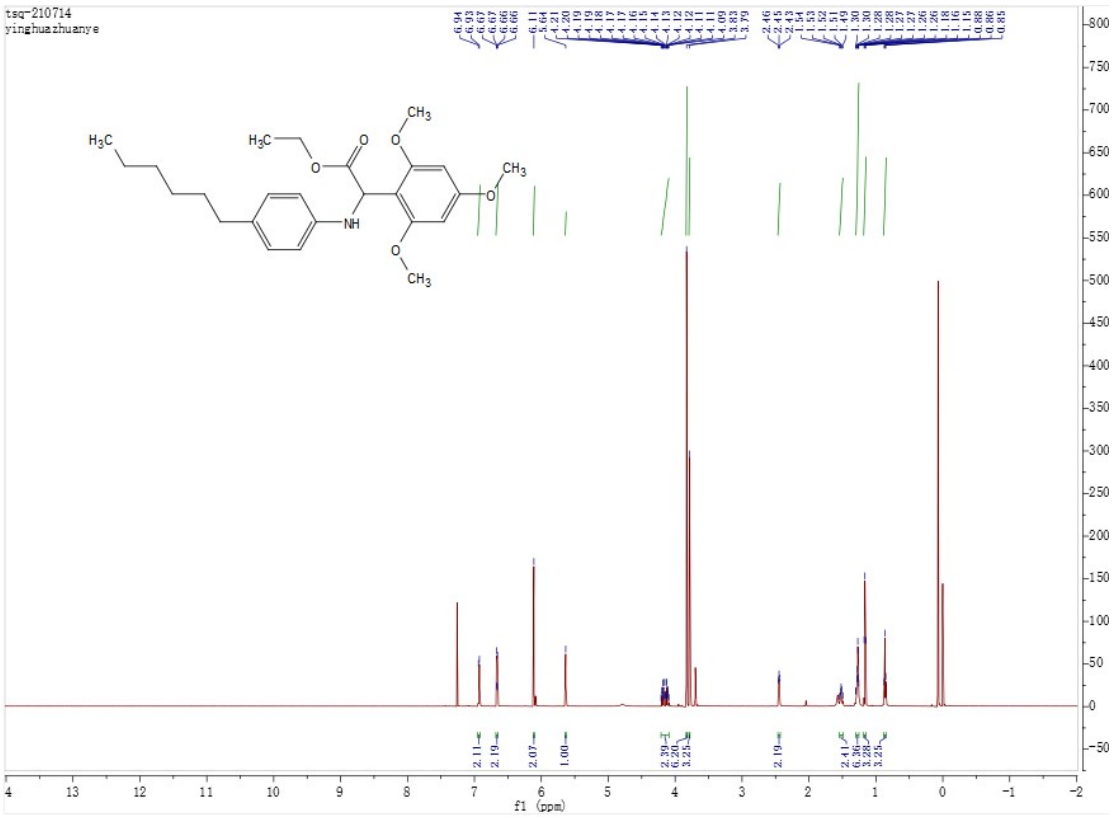


Figure S75 ^{1}H-NMR spectrum of **3e** in $CDCl_3$

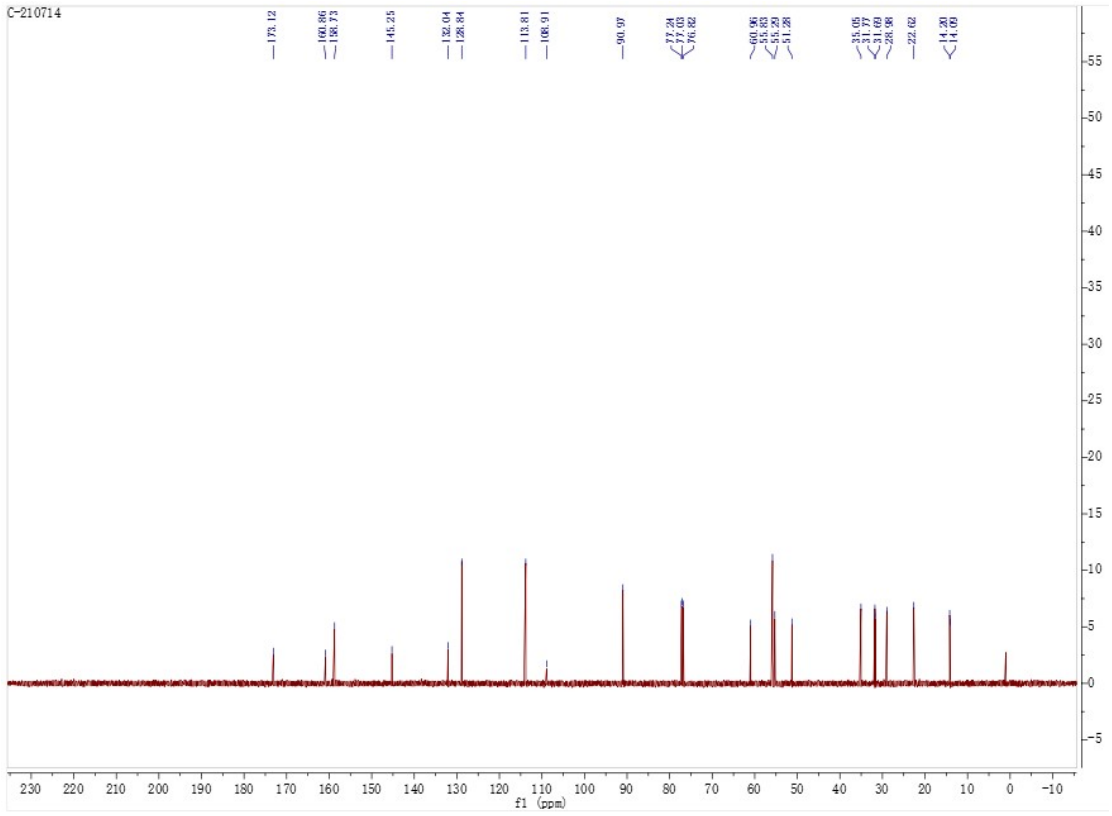


Figure S76 ^{13}C-NMR spectrum of **3e** in $CDCl_3$

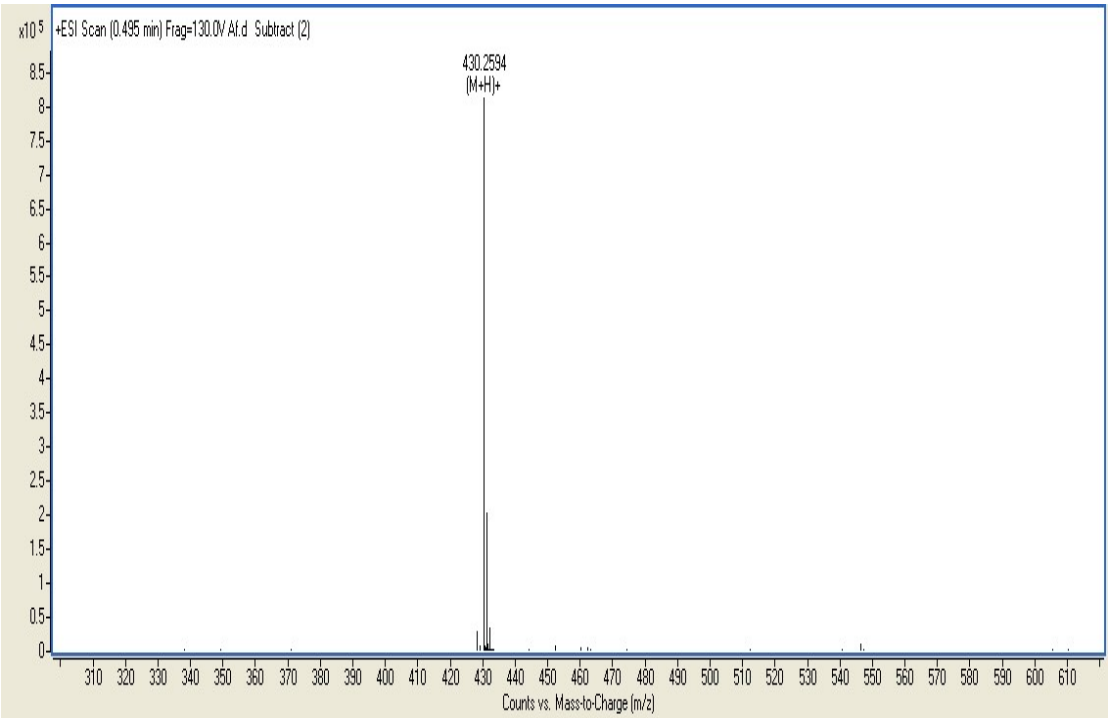


Figure S77 HRMS spectrum of **3e**

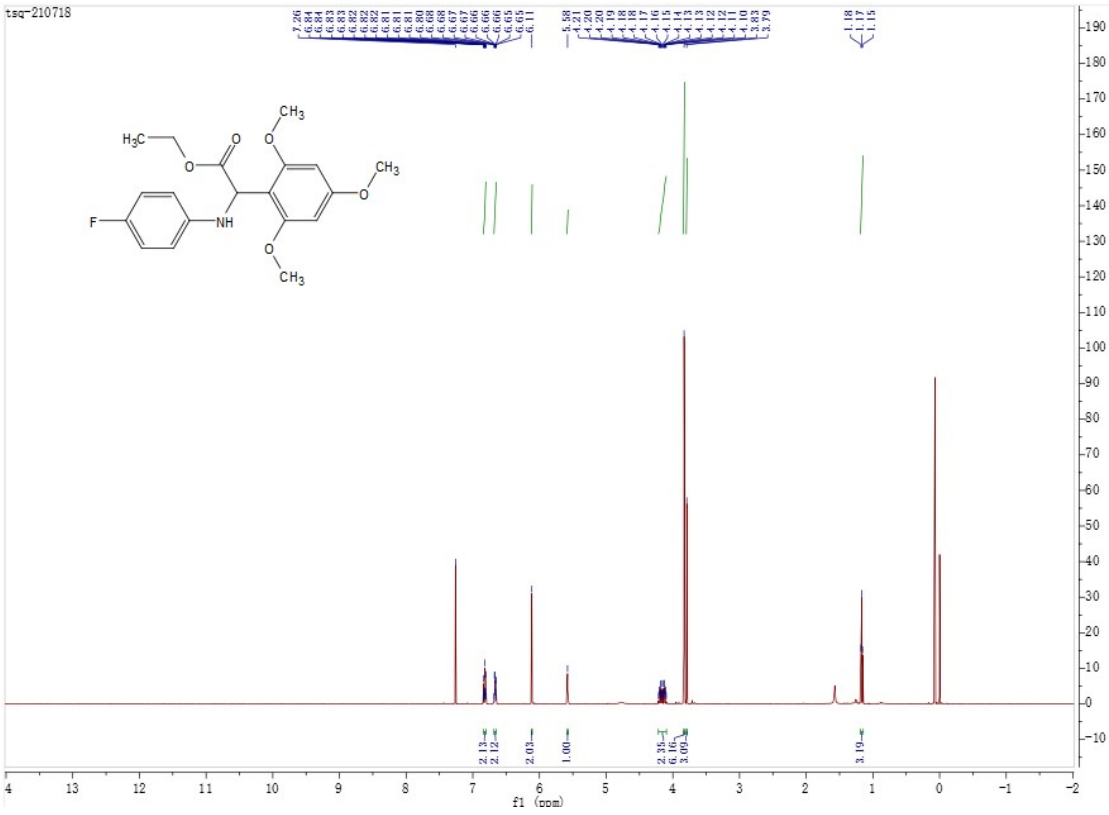


Figure S78 ^{1}H-NMR spectrum of **3f** in $CDCl_3$

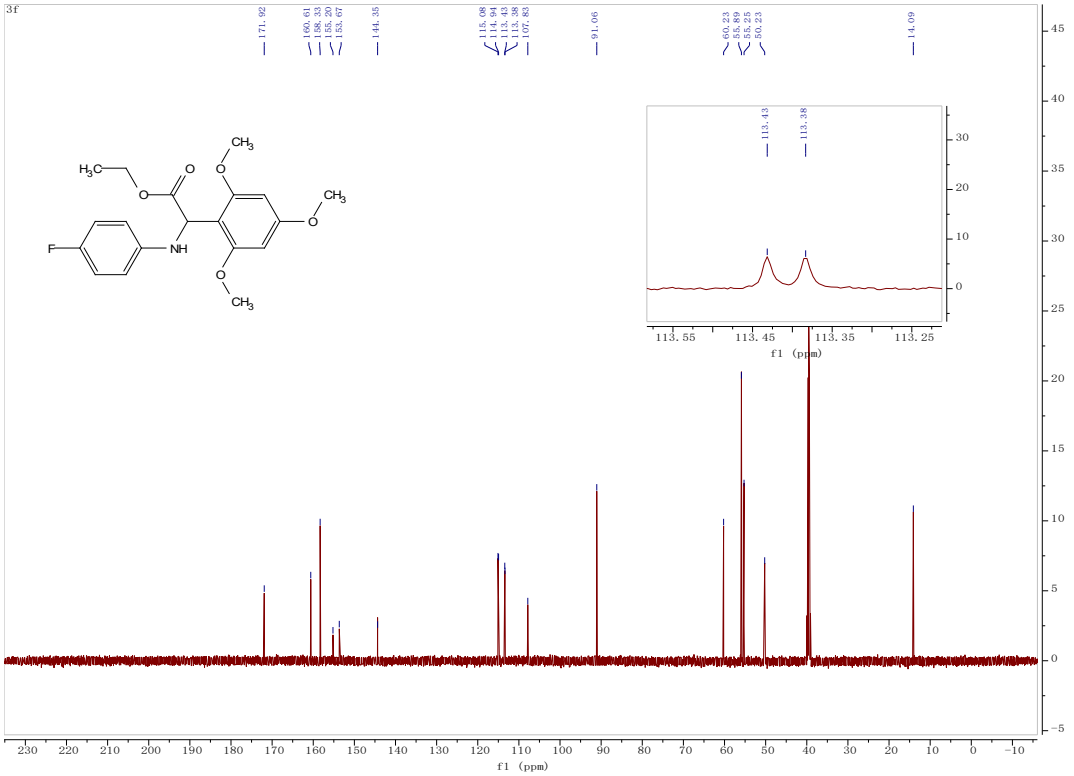


Figure S79 ^{13}C-NMR spectrum of **3f** in $CDCl_3$

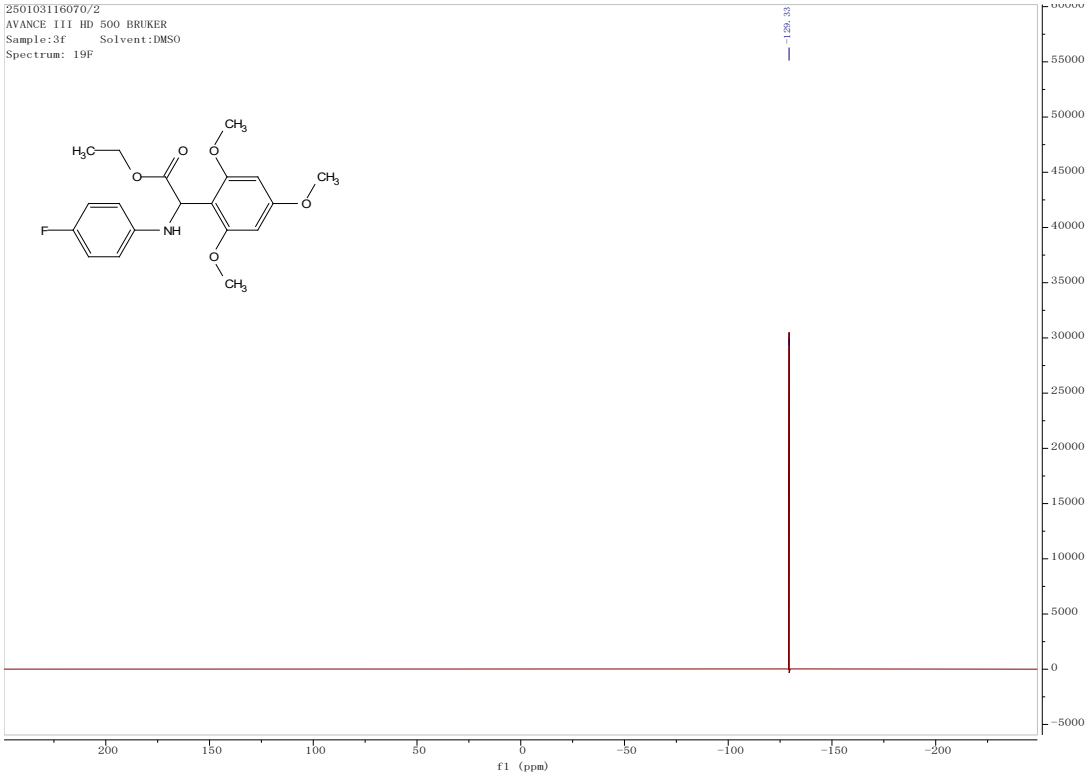


Figure S80 ^{19}F-NMR spectrum of **3f** in DMSO-d^6

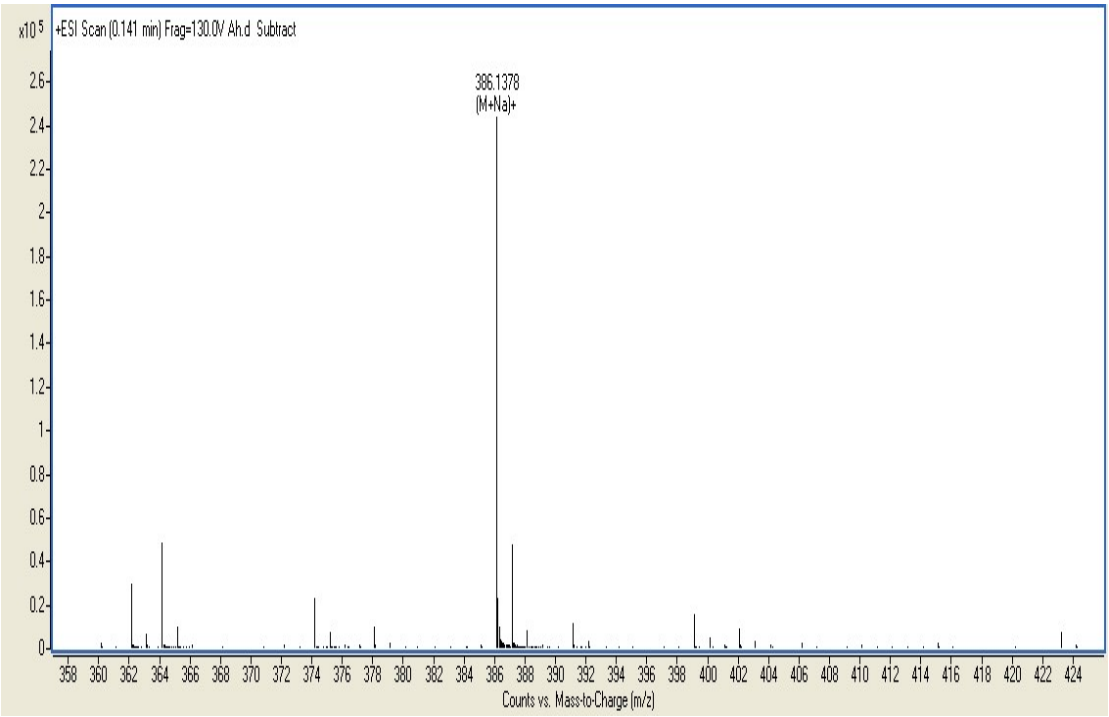


Figure S81 HRMS spectrum of **3f**

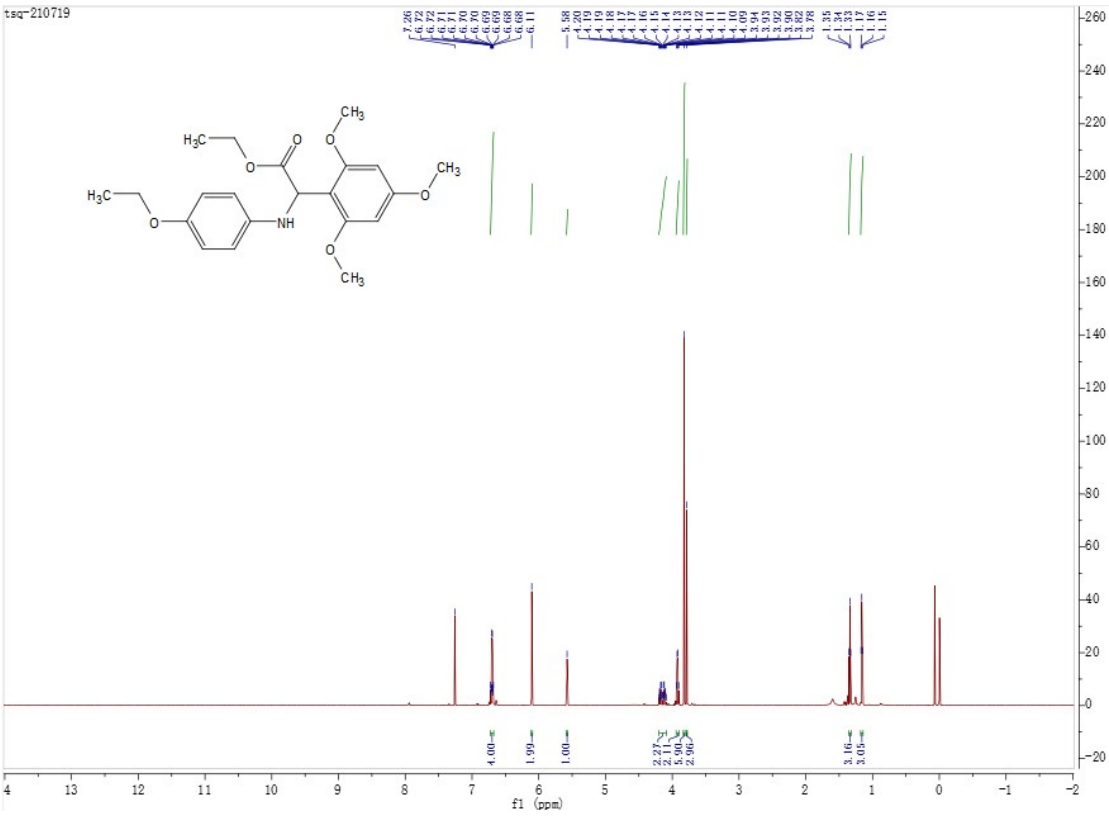


Figure S82 ^{1}H-NMR spectrum of **3g** in $CDCl_3$

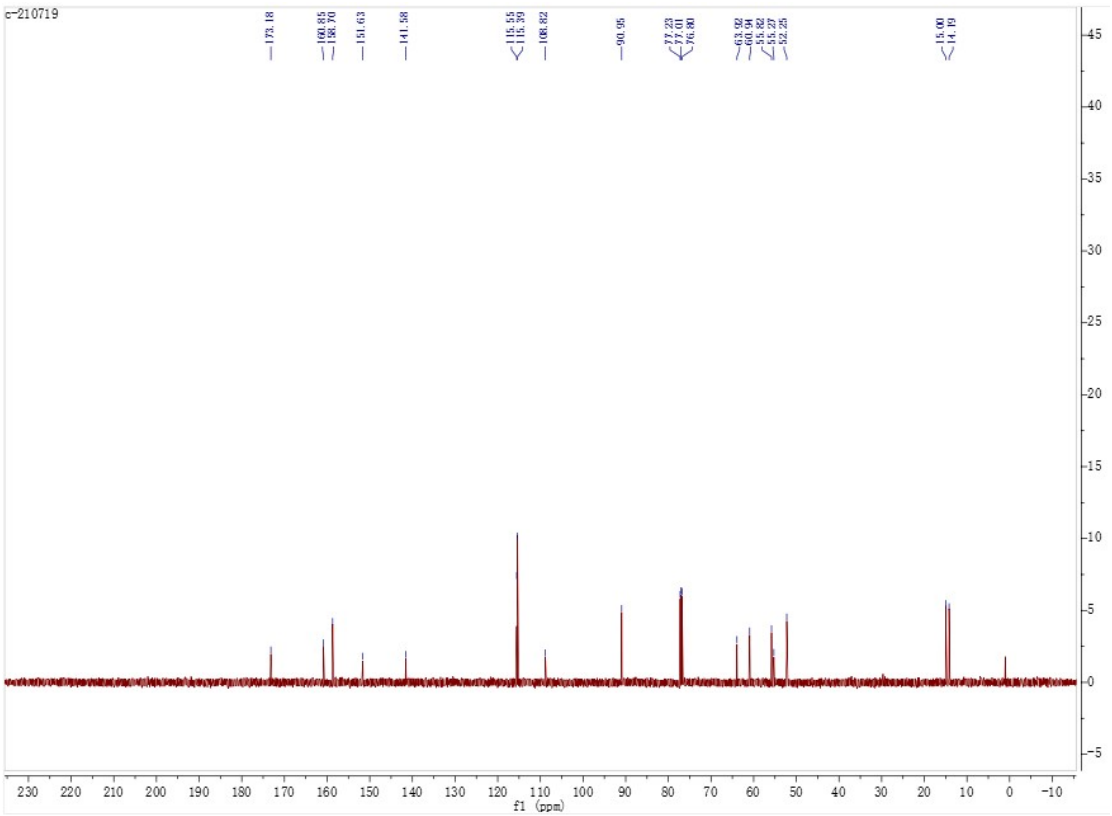


Figure S83 ^{13}C-NMR spectrum of **3g** in $CDCl_3$

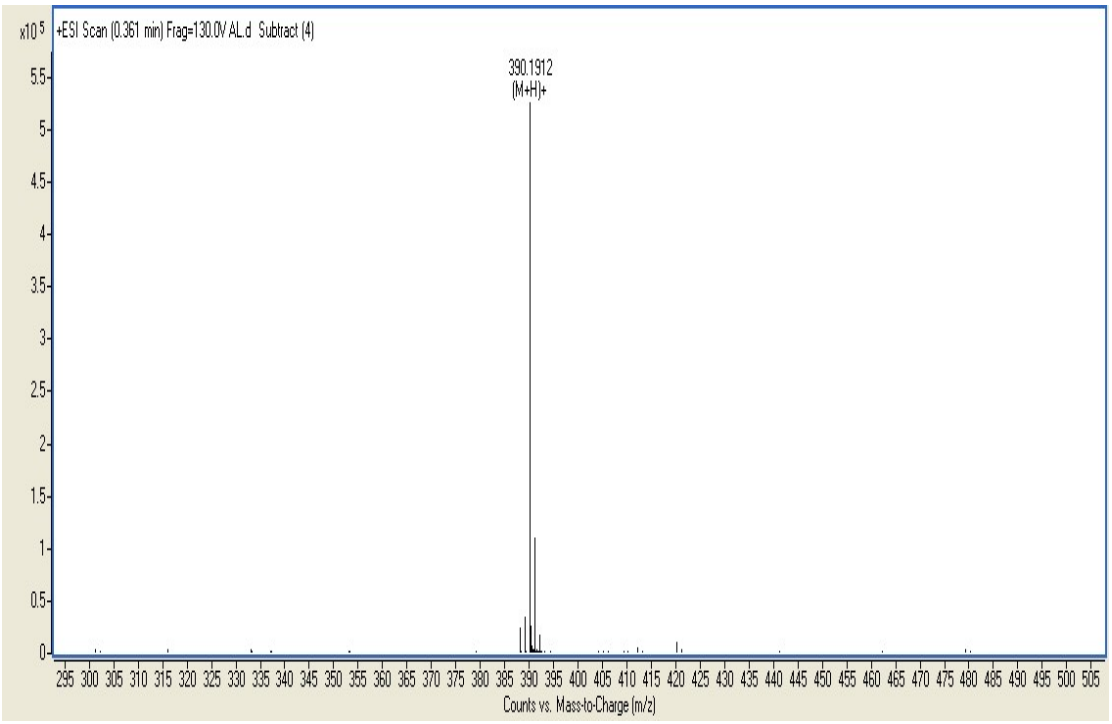


Figure S84 HRMS spectrum of **3g**

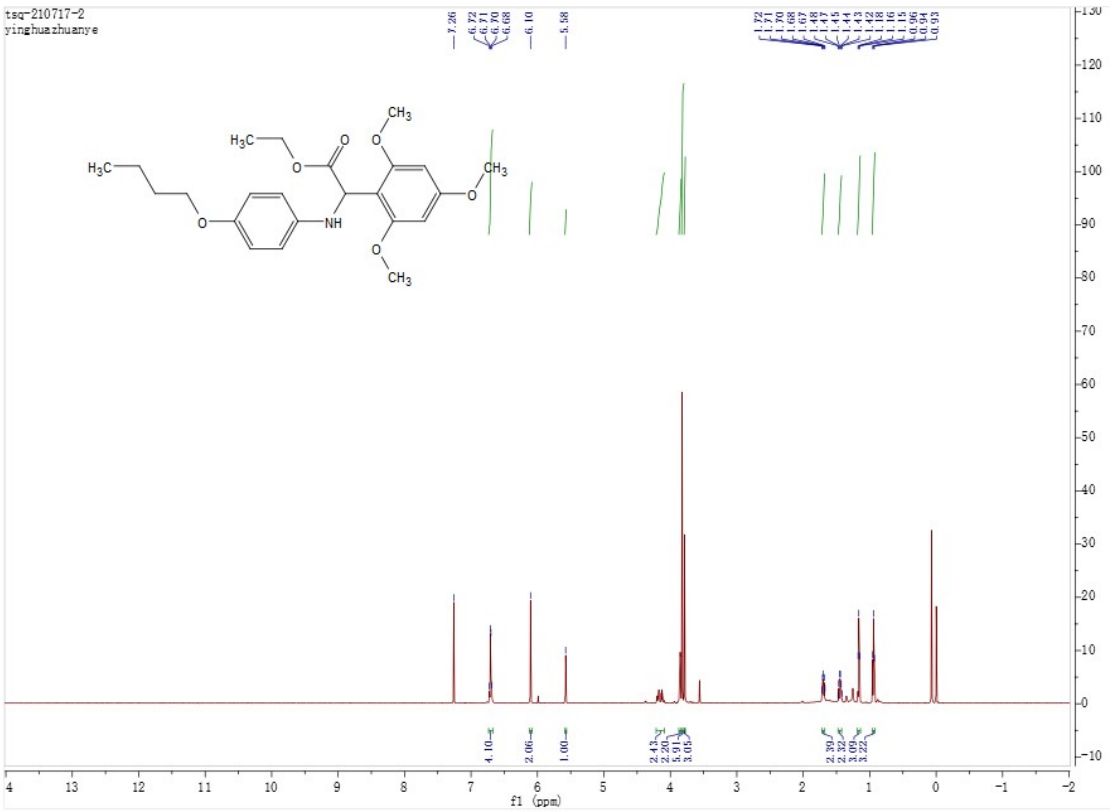


Figure S85 ^{1}H-NMR spectrum of **3h** in $CDCl_3$

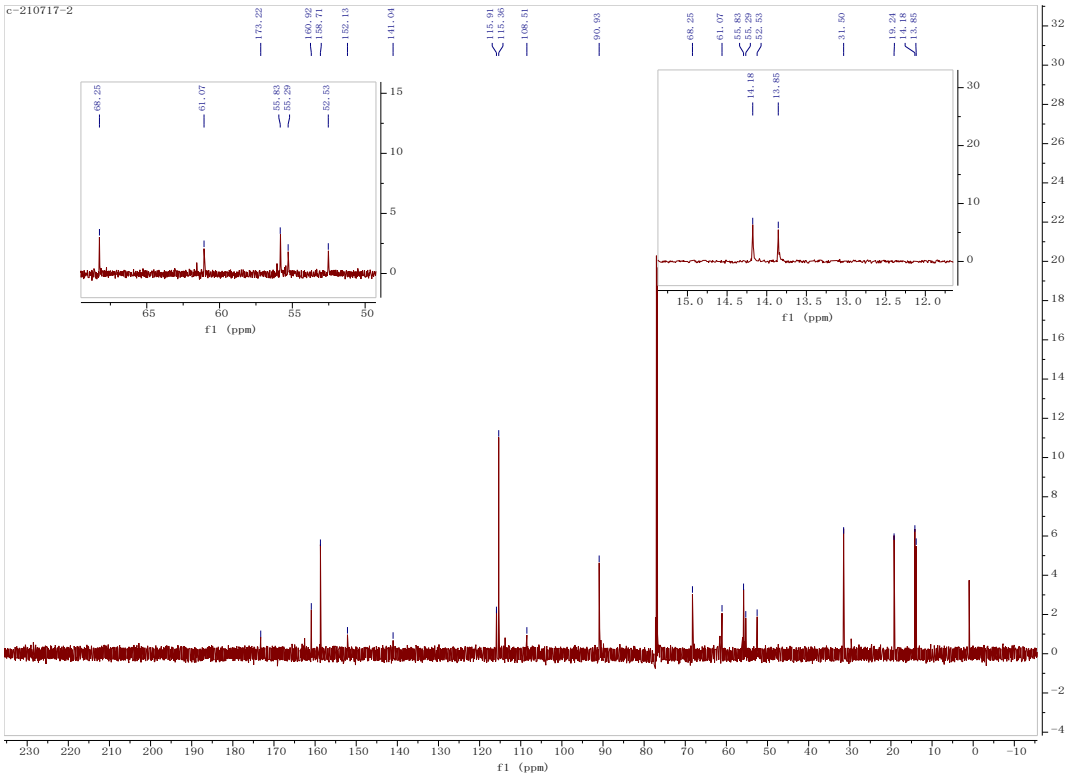


Figure S86 ^{13}C-NMR spectrum of **3h** in $CDCl_3$

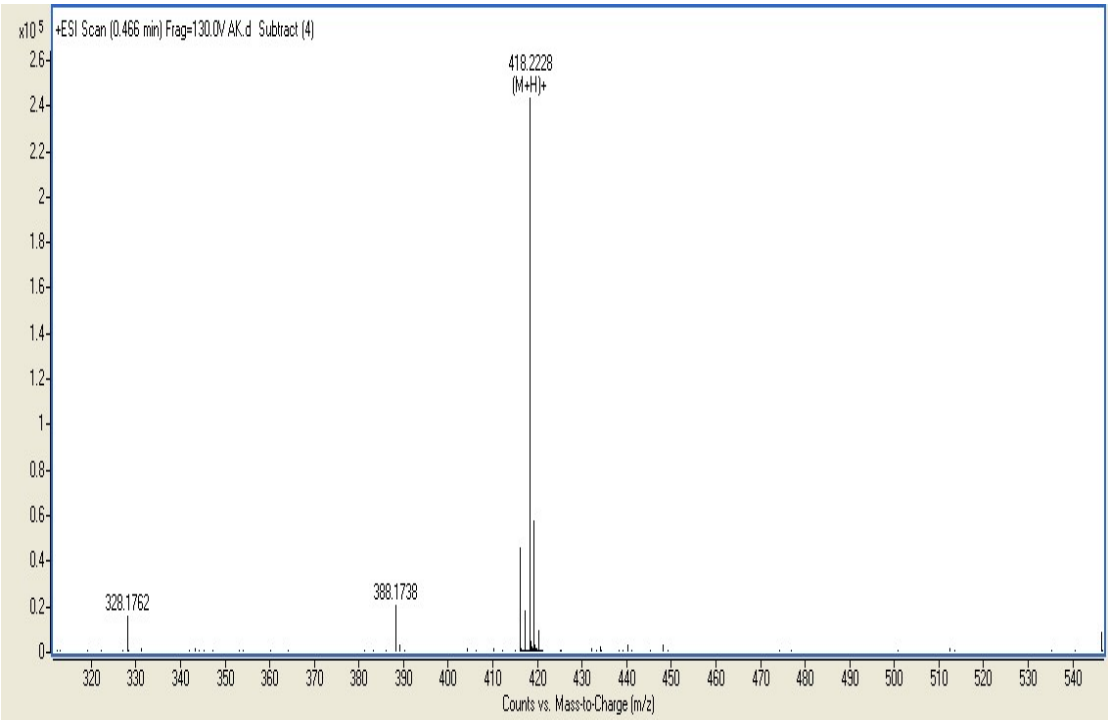


Figure S87 HRMS spectrum of **3h**

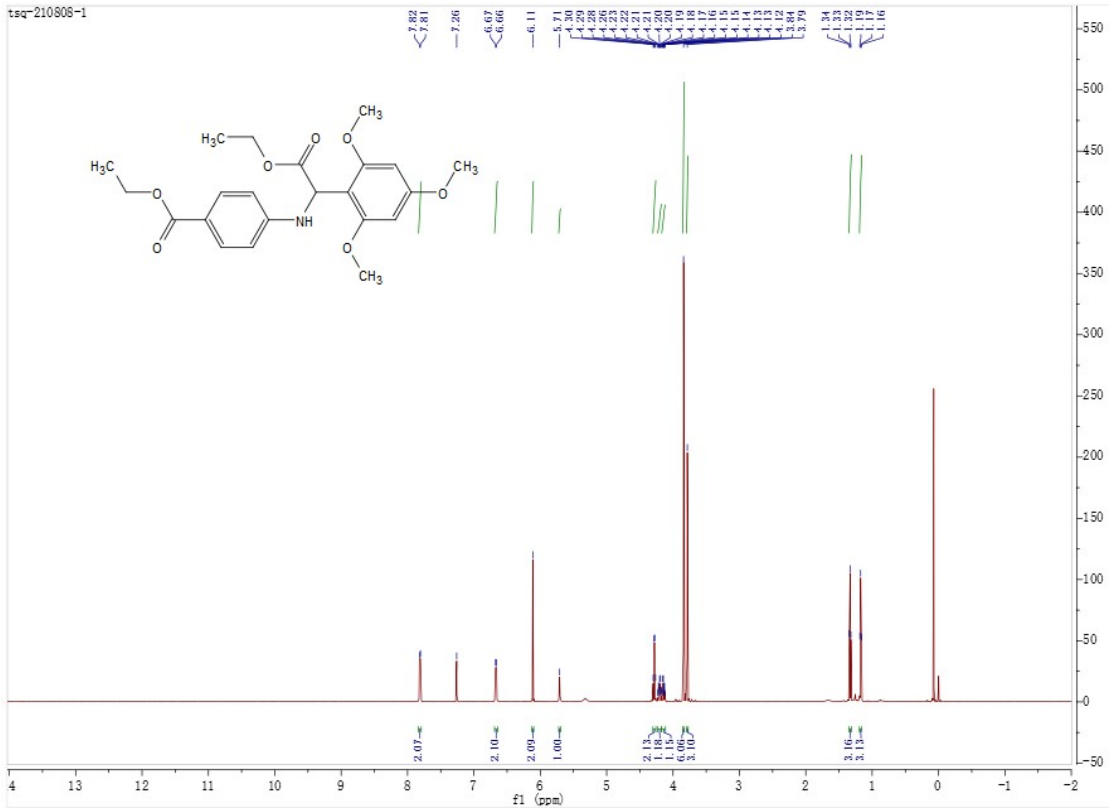


Figure S88 ^{1}H-NMR spectrum of **3i** in $CDCl_3$

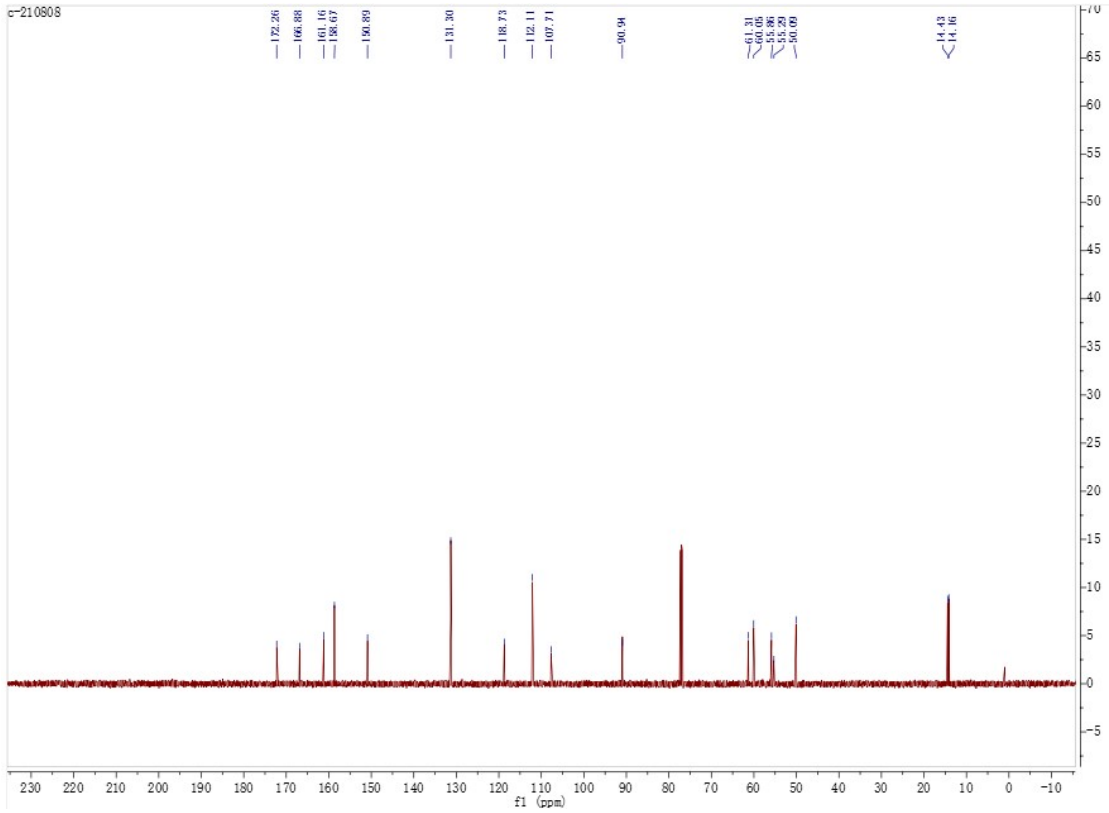


Figure S89 ^{13}C-NMR spectrum of **3i** in $CDCl_3$

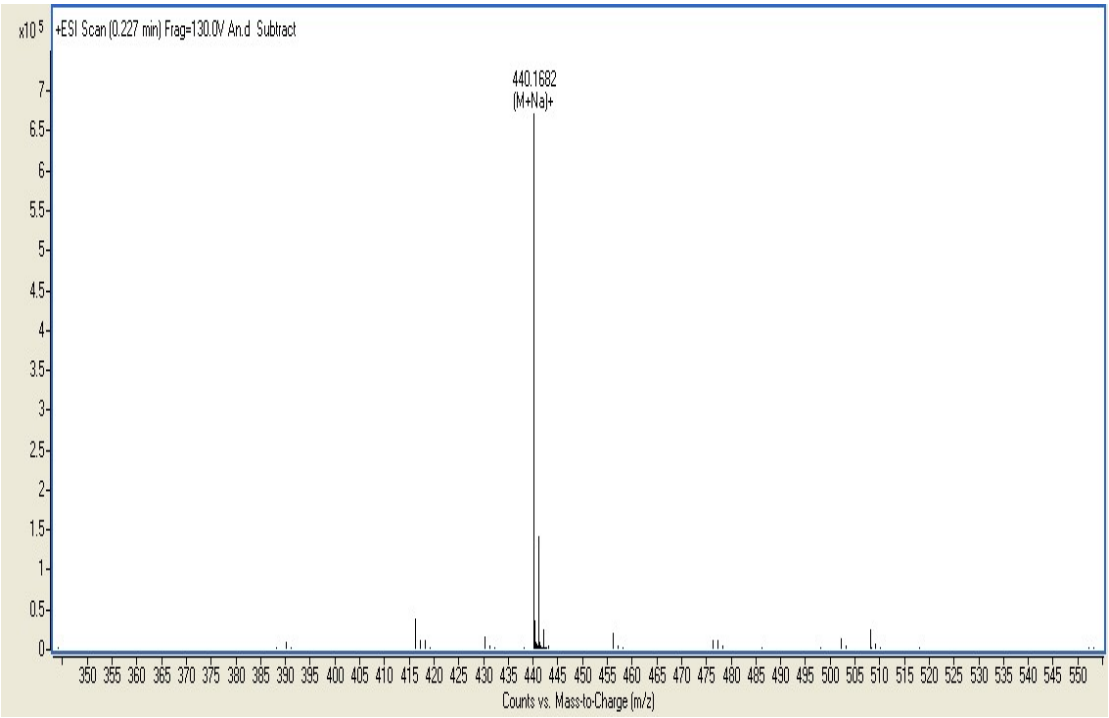


Figure S90 HRMS spectrum of **3i**

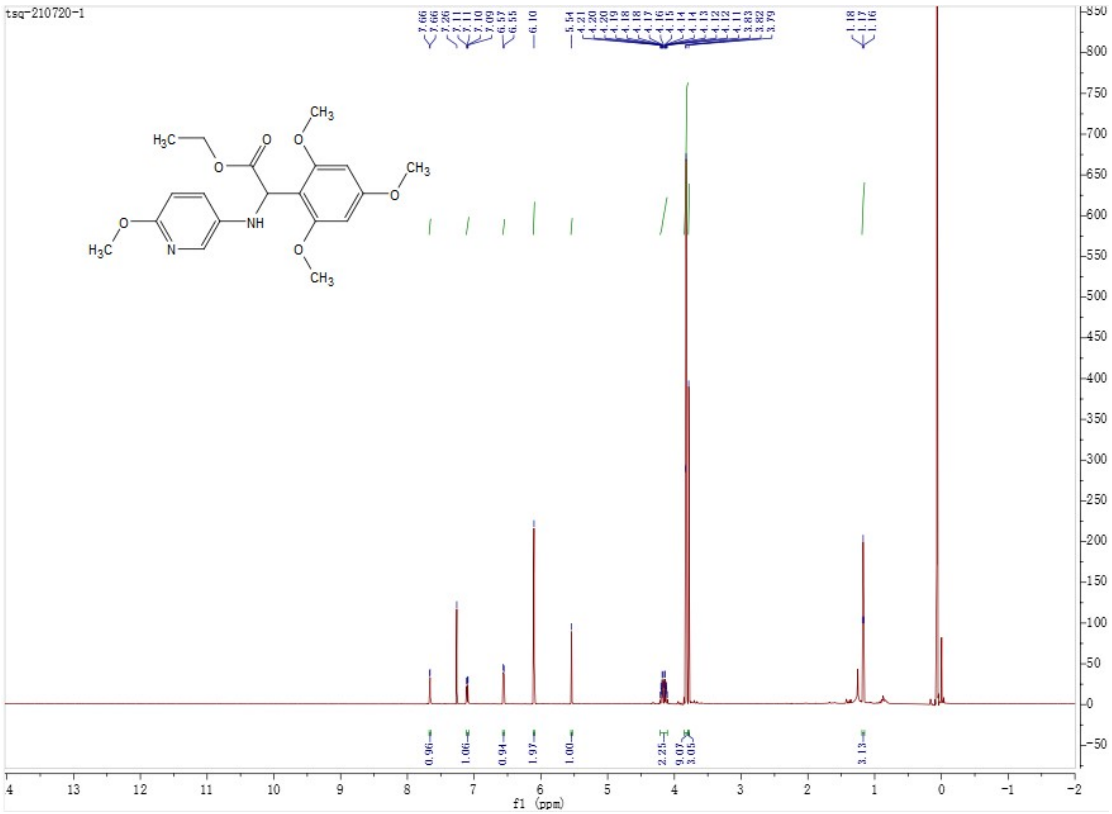


Figure S91 ^{1}H-NMR spectrum of **3j** in $CDCl_3$

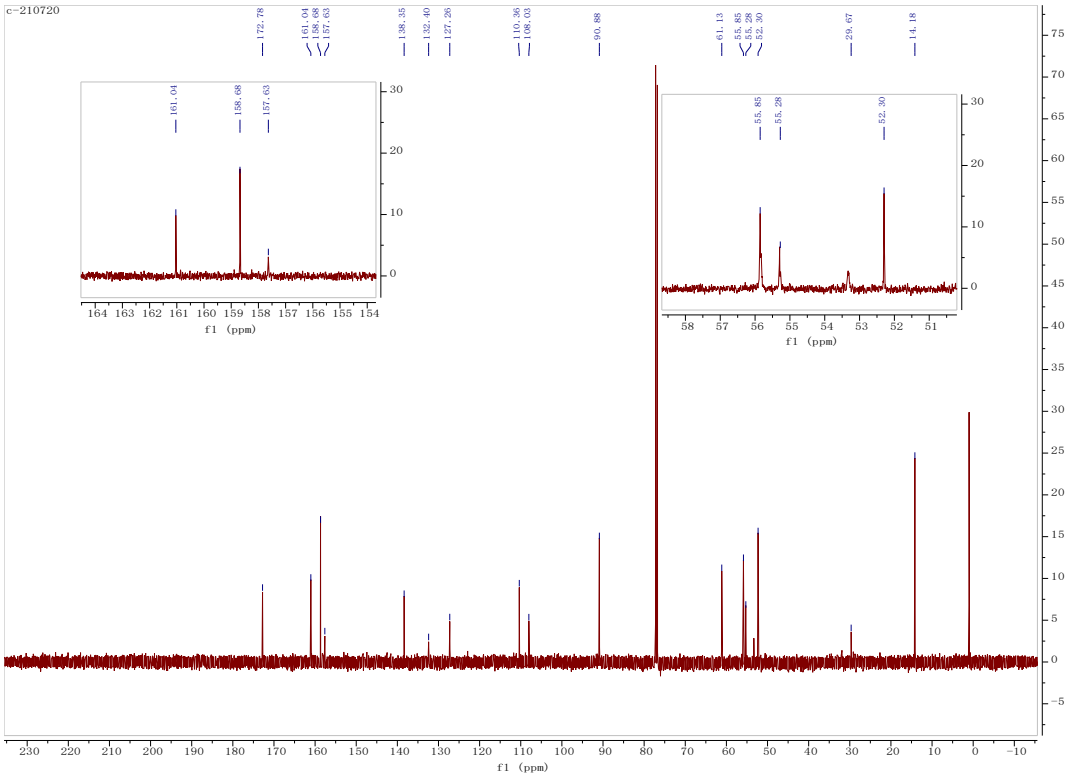


Figure S92 ^{13}C-NMR spectrum of **3j** in $CDCl_3$

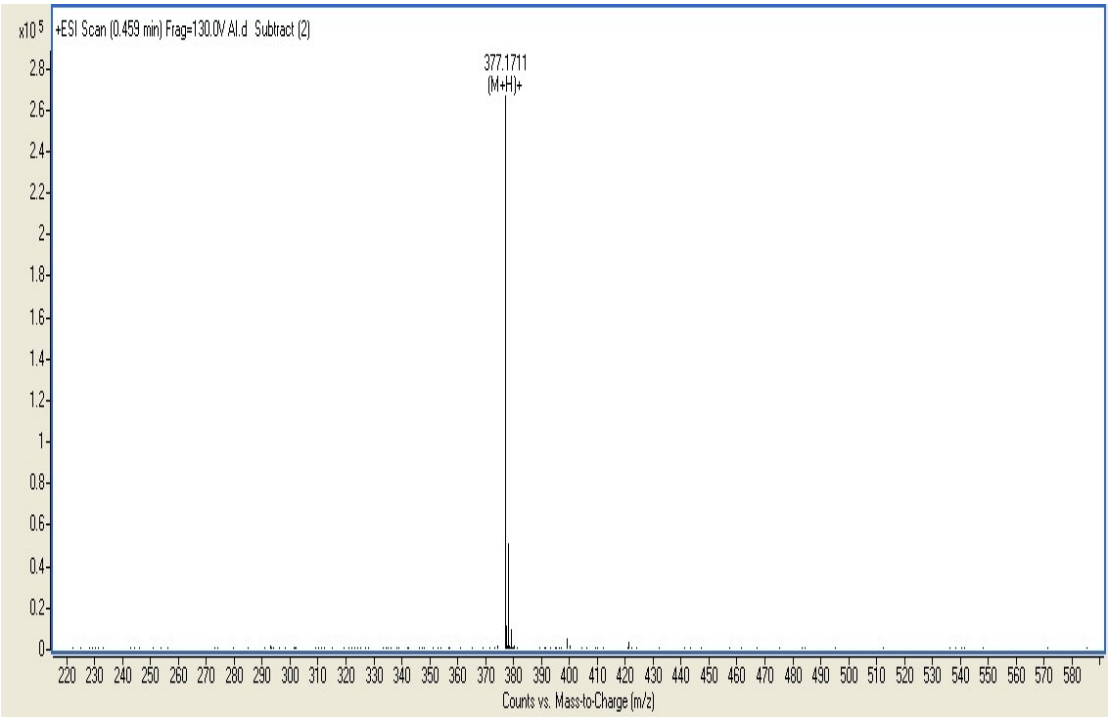


Figure S93 HRMS spectrum of **3j**

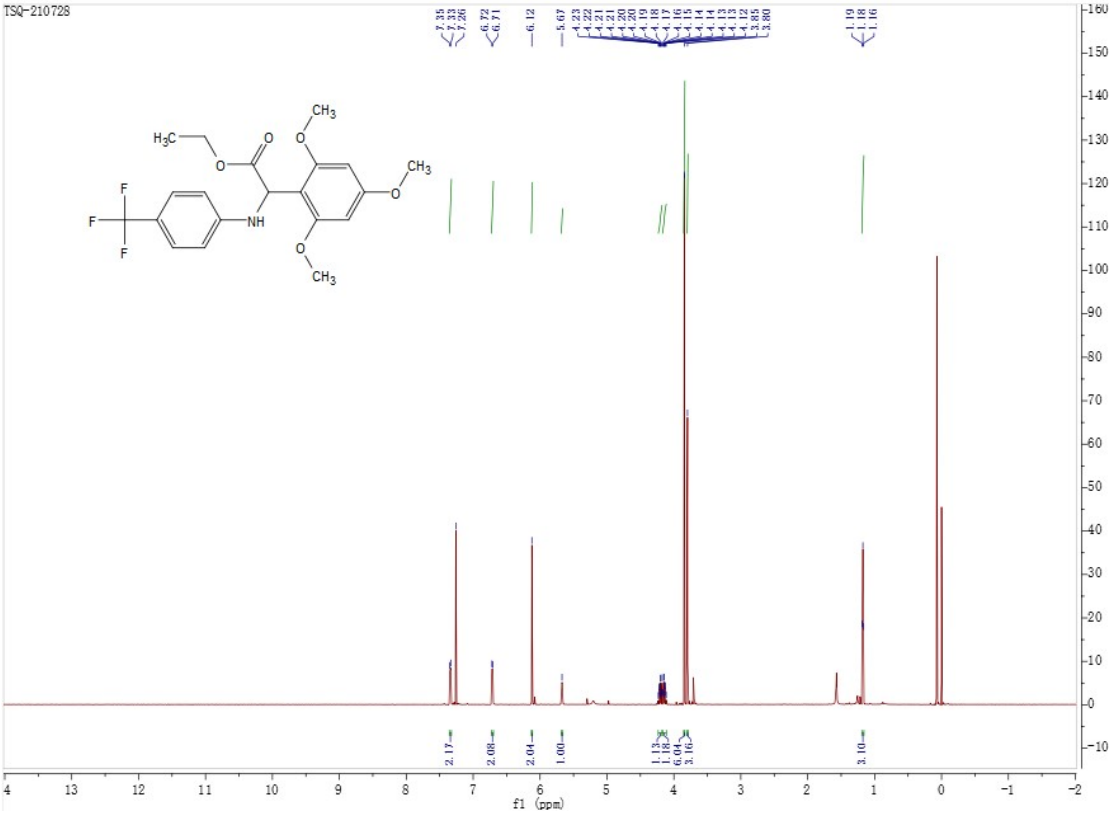


Figure S94 ^{1}H-NMR spectrum of **3k** in $CDCl_3$

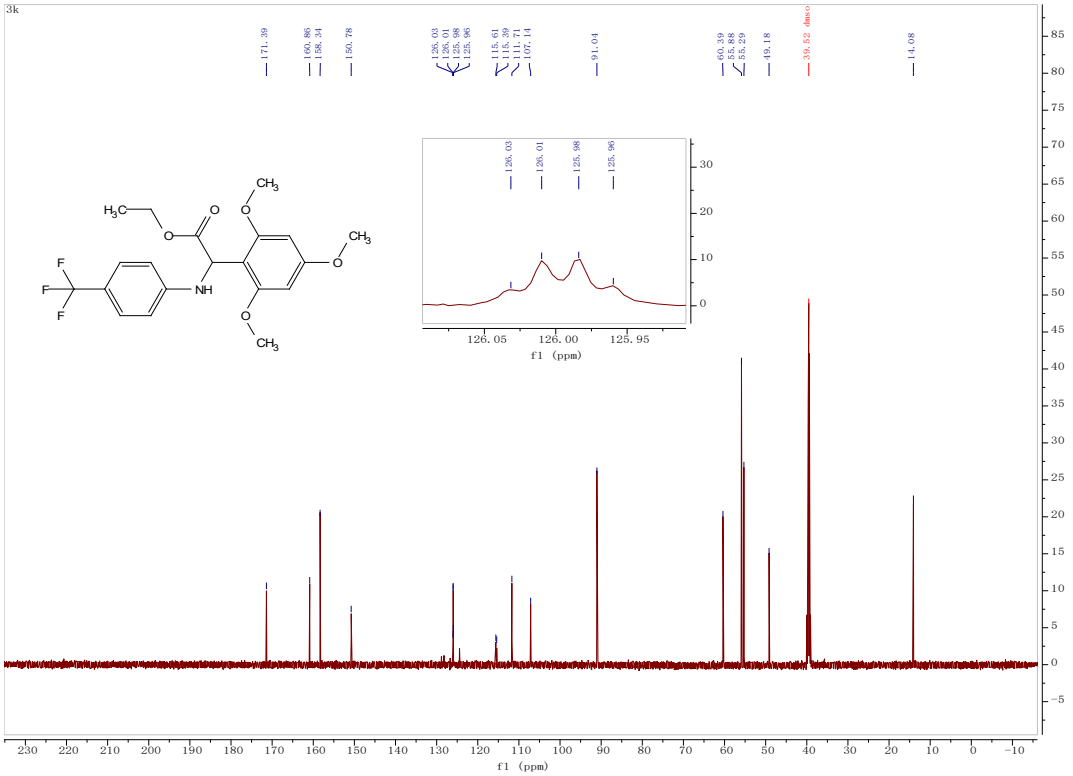


Figure S95 ^{13}C-NMR spectrum of **3k** in $CDCl_3$

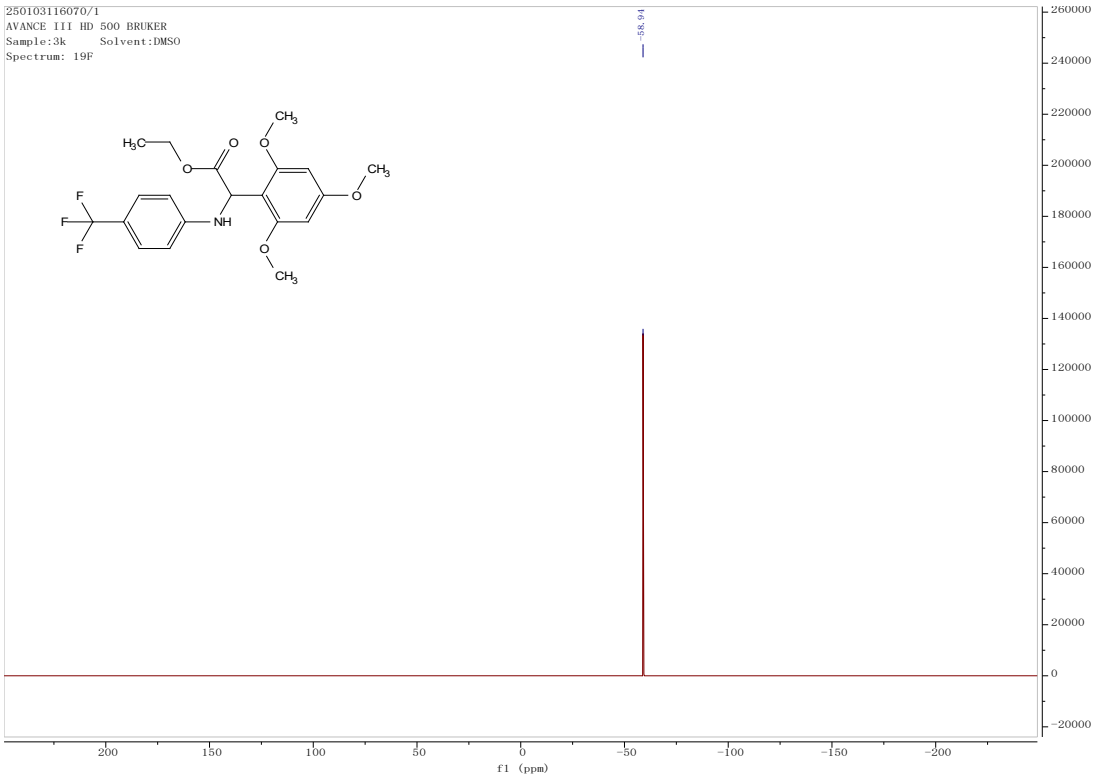


Figure S96 ^{19}F-NMR spectrum of **3k** in DMSO-d^6

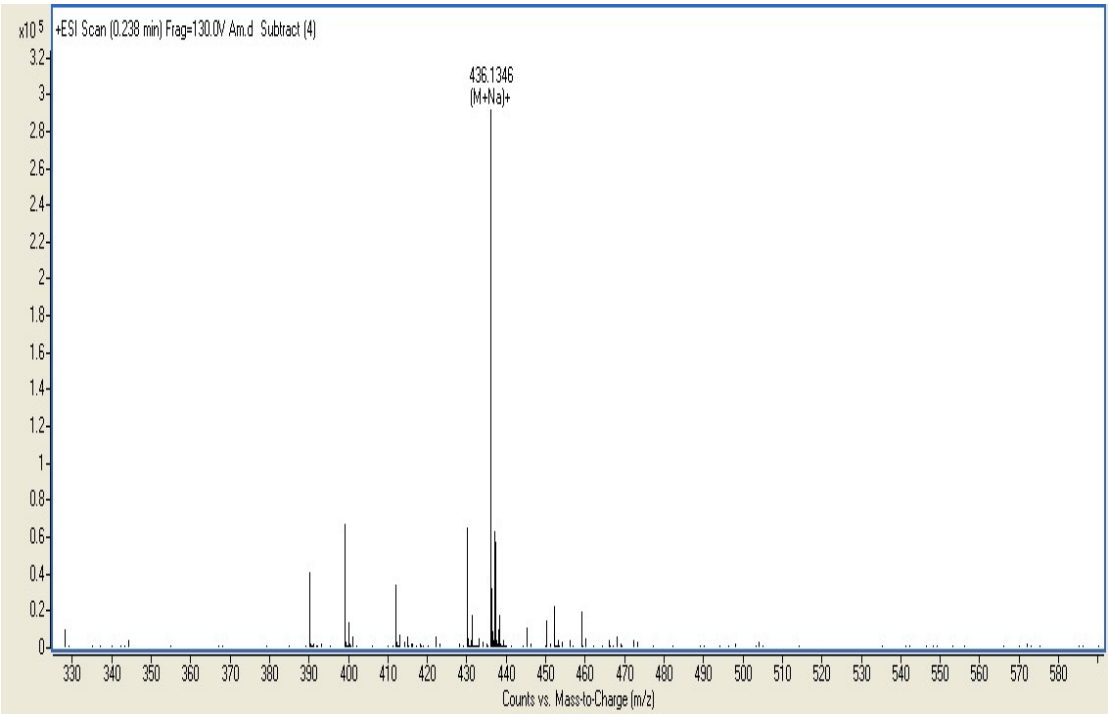


Figure S97 HRMS spectrum of **3k**

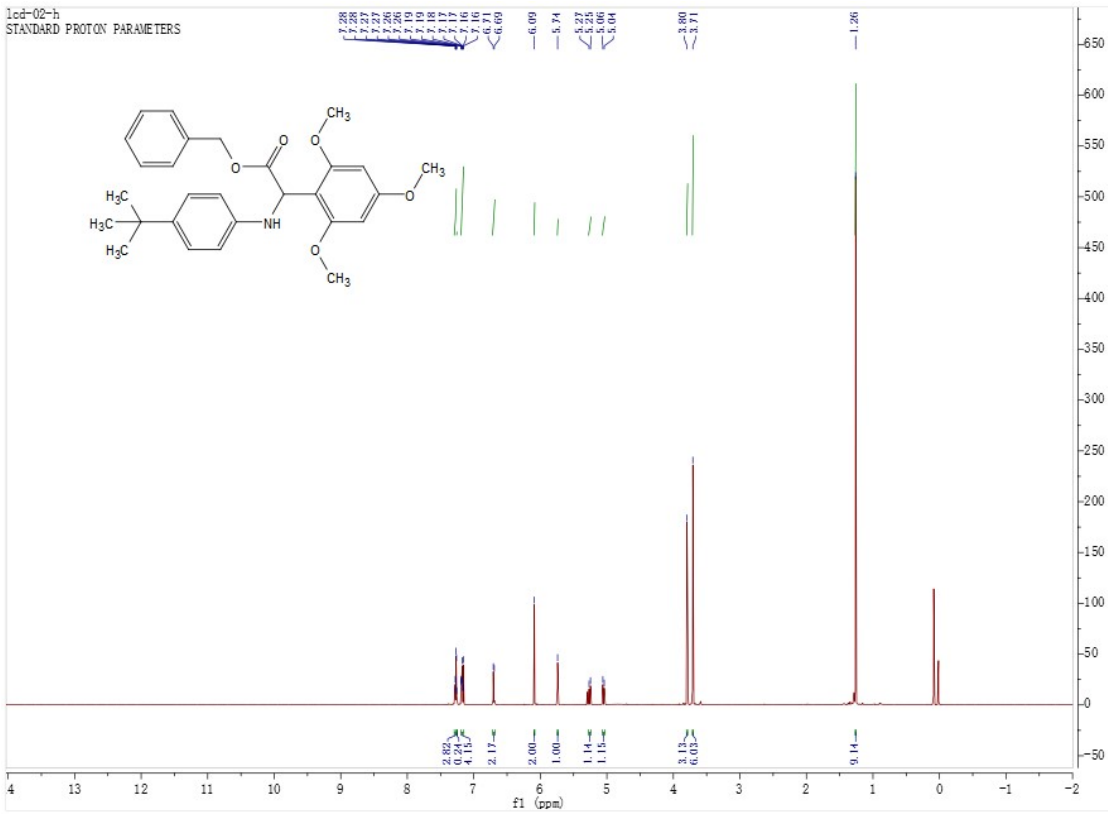


Figure S98 ^{1}H-NMR spectrum of **3l** in $CDCl_3$

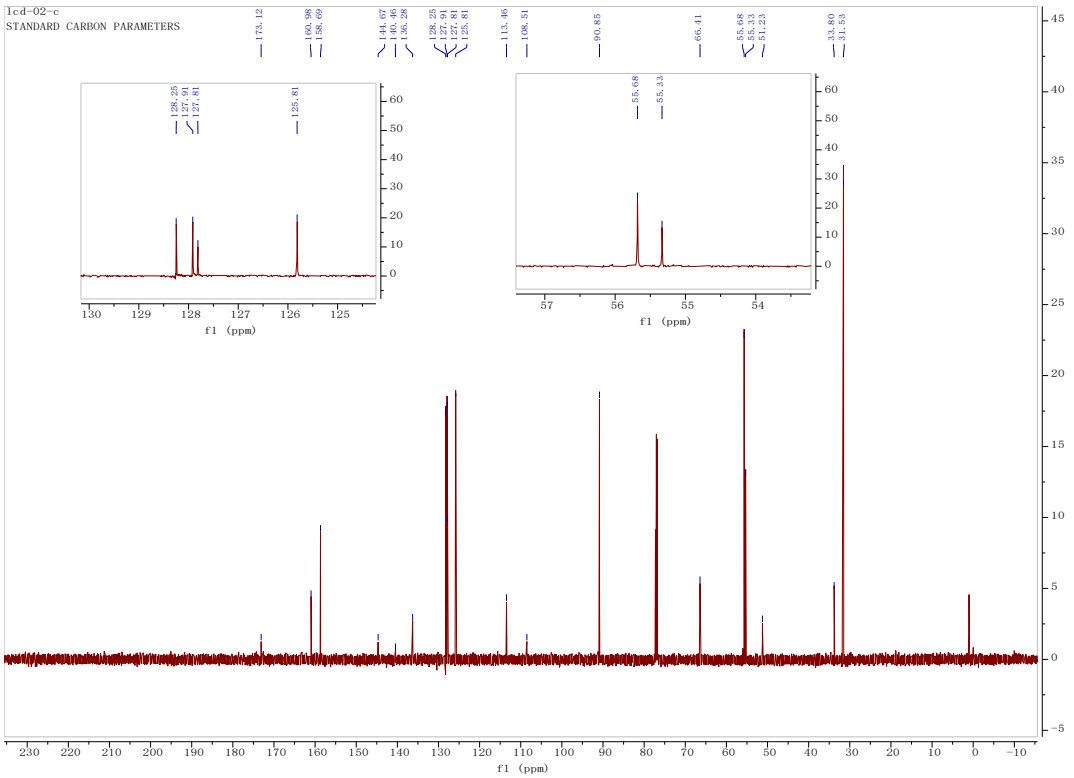


Figure S99 ^{13}C-NMR spectrum of **3l** in $CDCl_3$

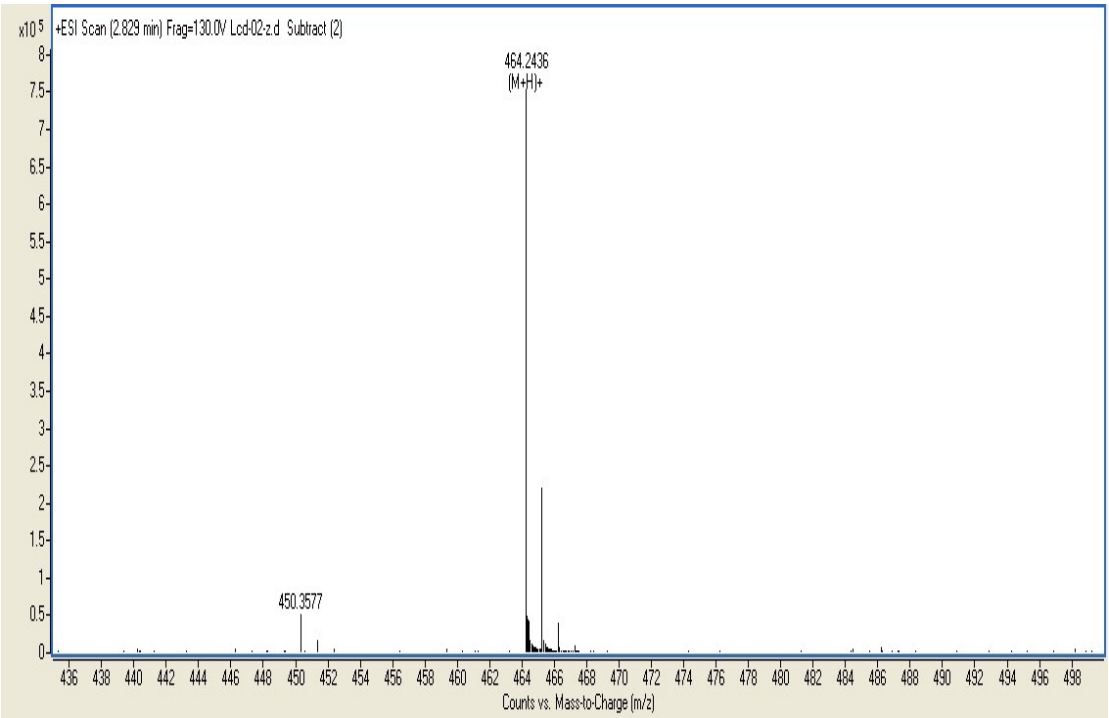


Figure S100 HRMS spectrum of **3l**

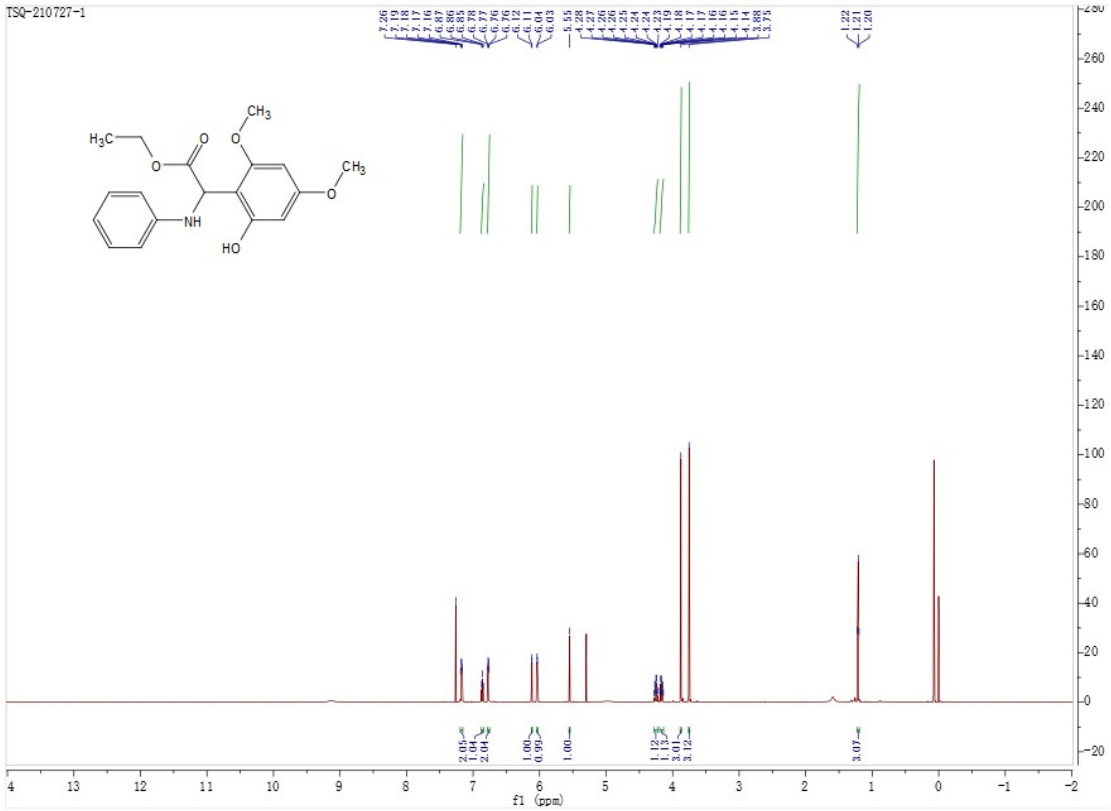


Figure S101 ^{1}H-NMR spectrum of **6a** in $CDCl_3$

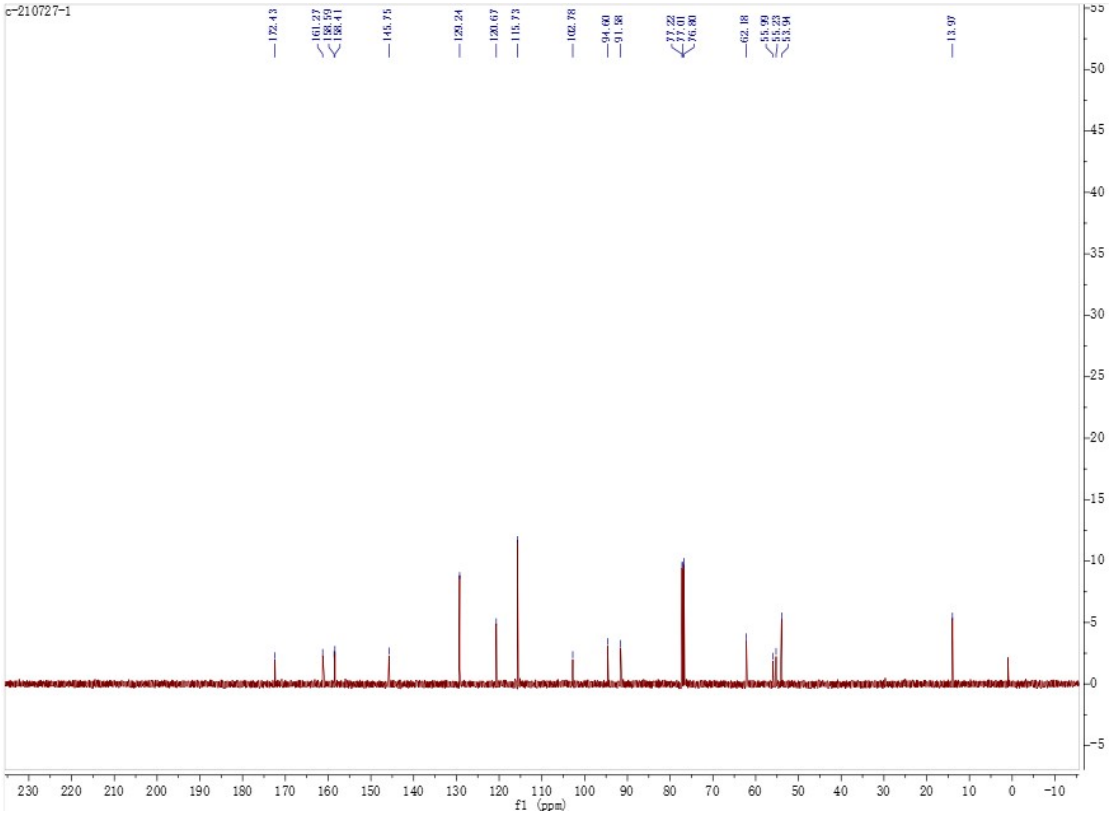


Figure S102 ^{13}C-NMR spectrum of **6a** in $CDCl_3$

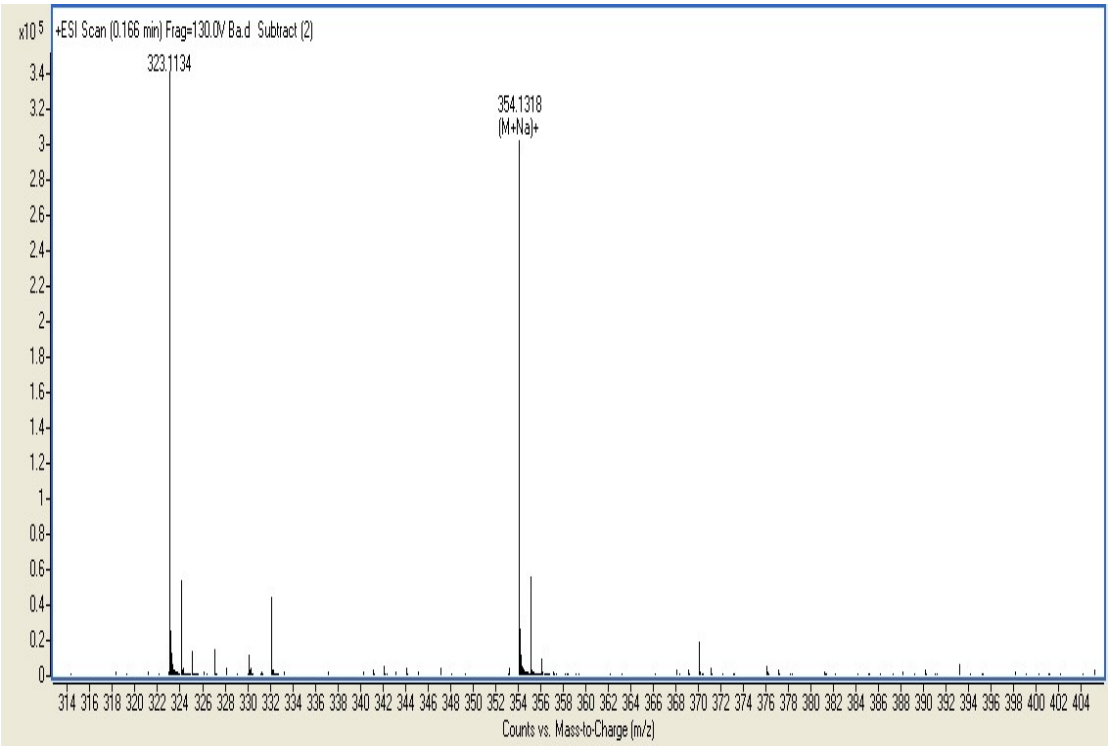


Figure S103 HRMS spectrum of **6a**

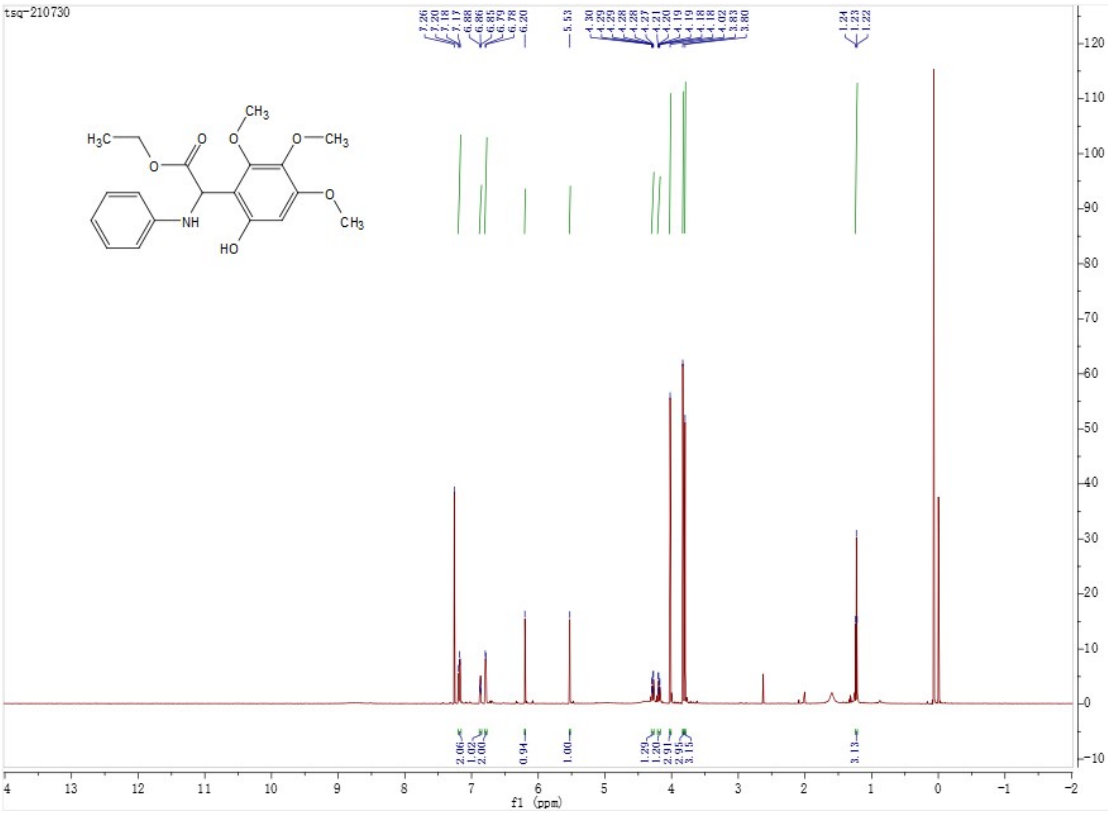


Figure S104 ^{1}H-NMR spectrum of **6b** in $CDCl_3$

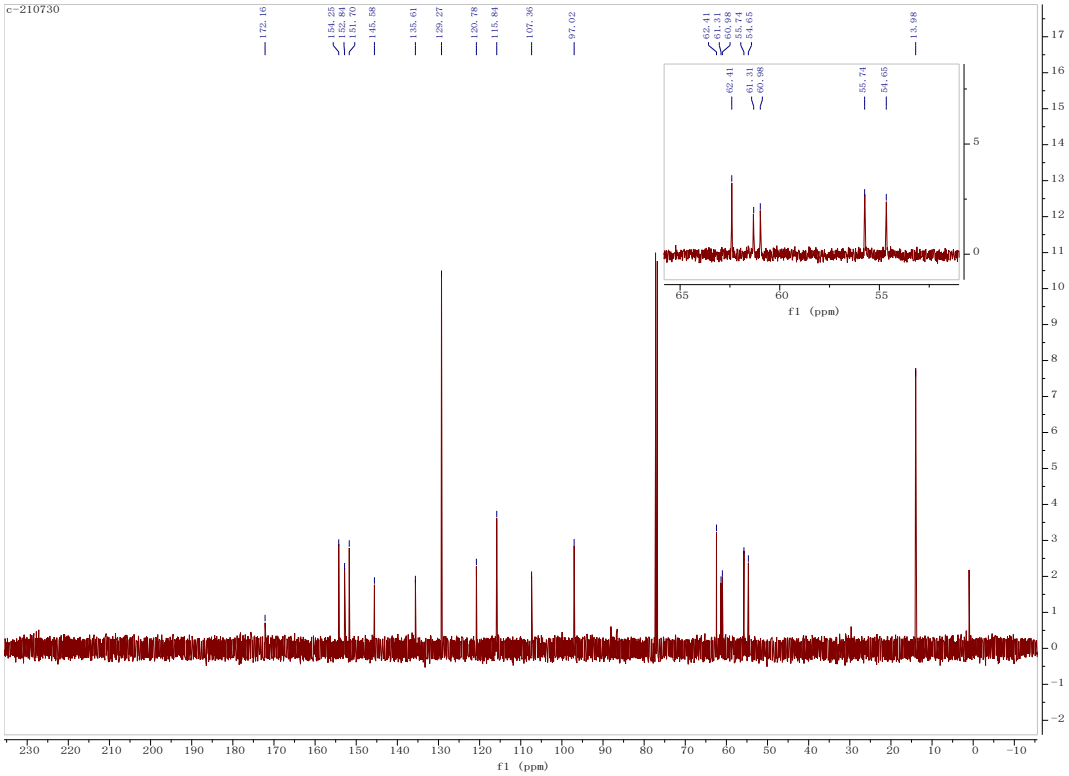


Figure S105 ^{13}C-NMR spectrum of **6b** in $CDCl_3$

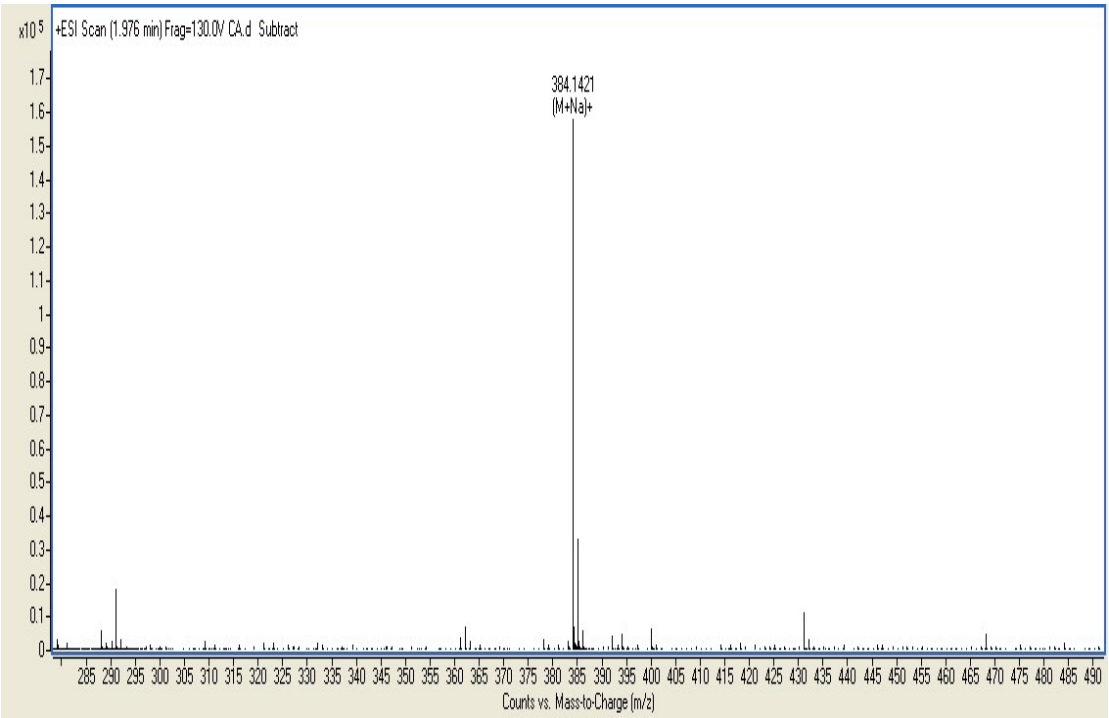


Figure S106 HRMS spectrum of **6b**

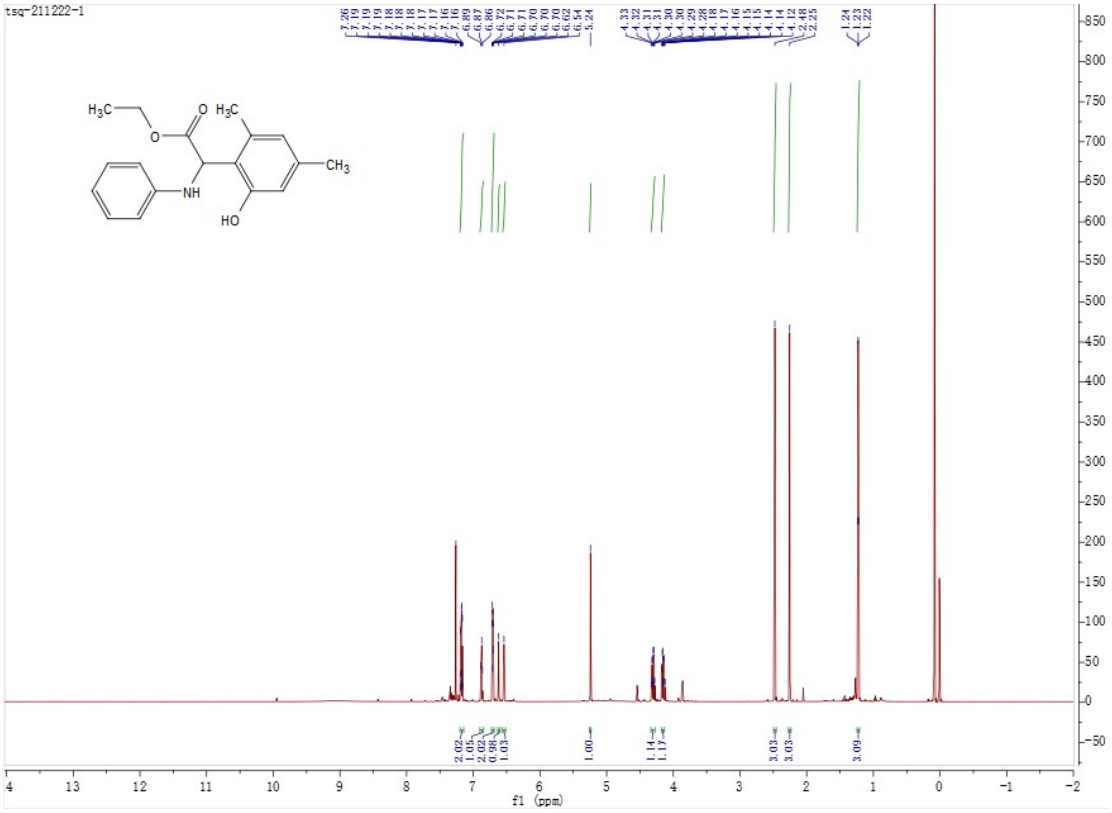


Figure S107 ^{1}H-NMR spectrum of **6c** in $CDCl_3$

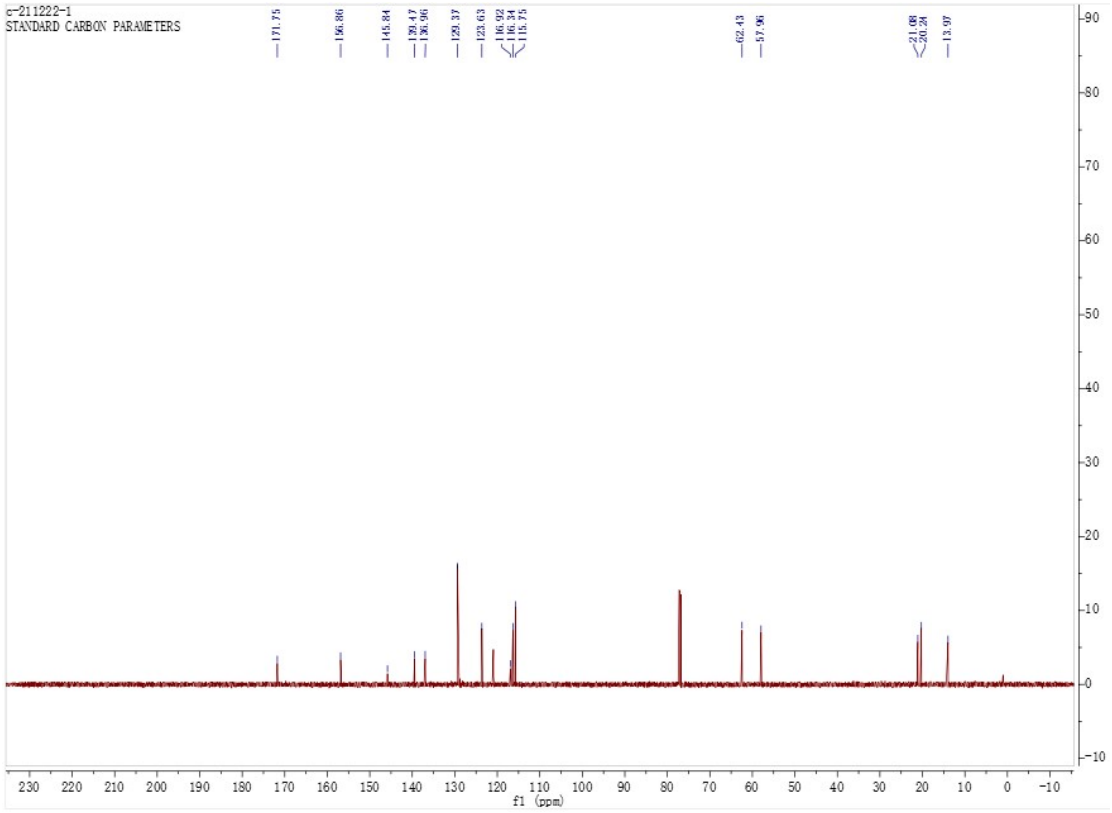


Figure S108 ^{13}C-NMR spectrum of **6c** in $CDCl_3$

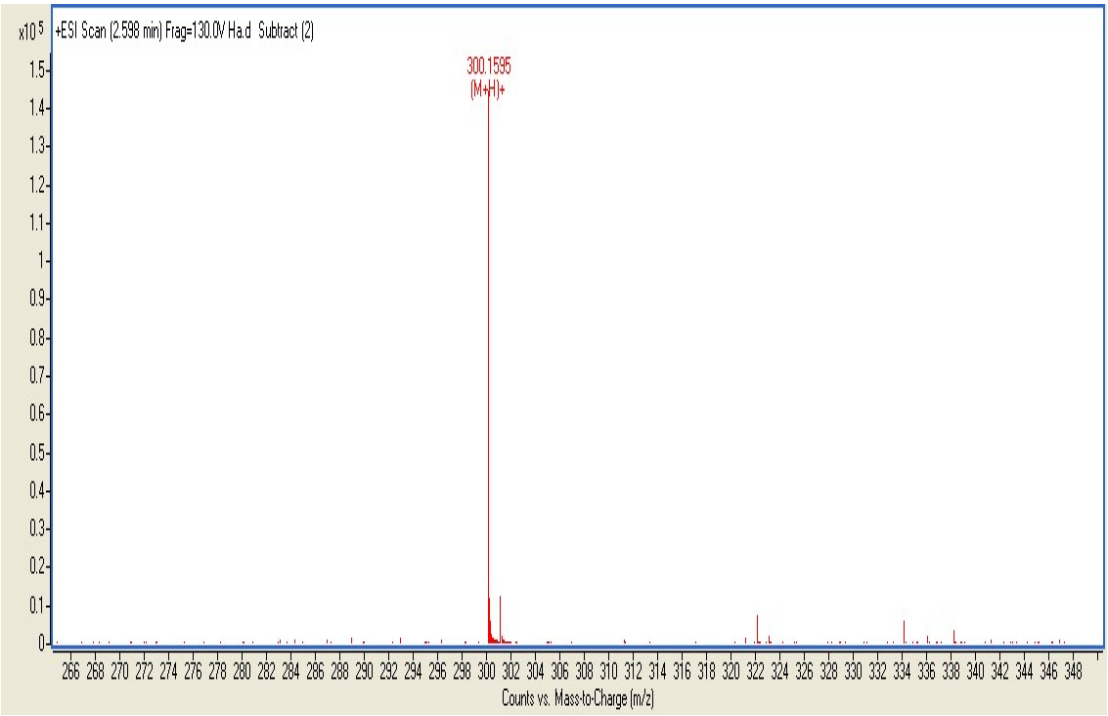


Figure S109 HRMS spectrum of **6c**

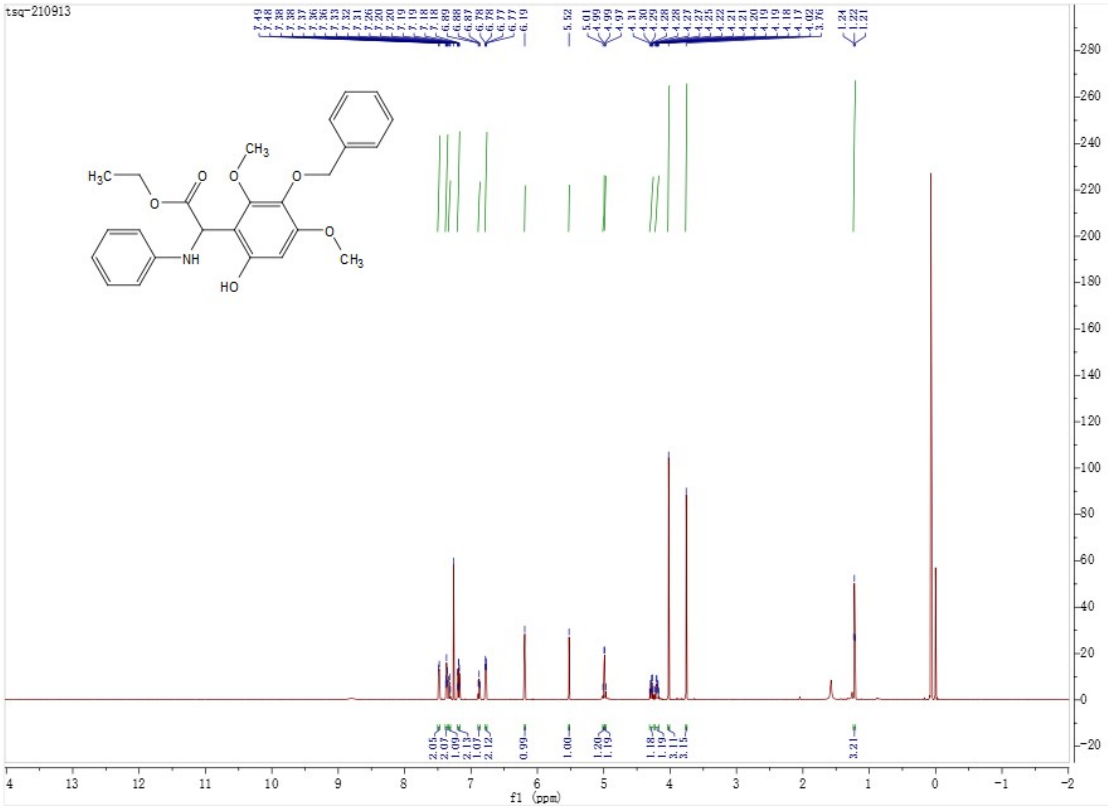


Figure S110 ^{1}H-NMR spectrum of **6d** in $CDCl_3$

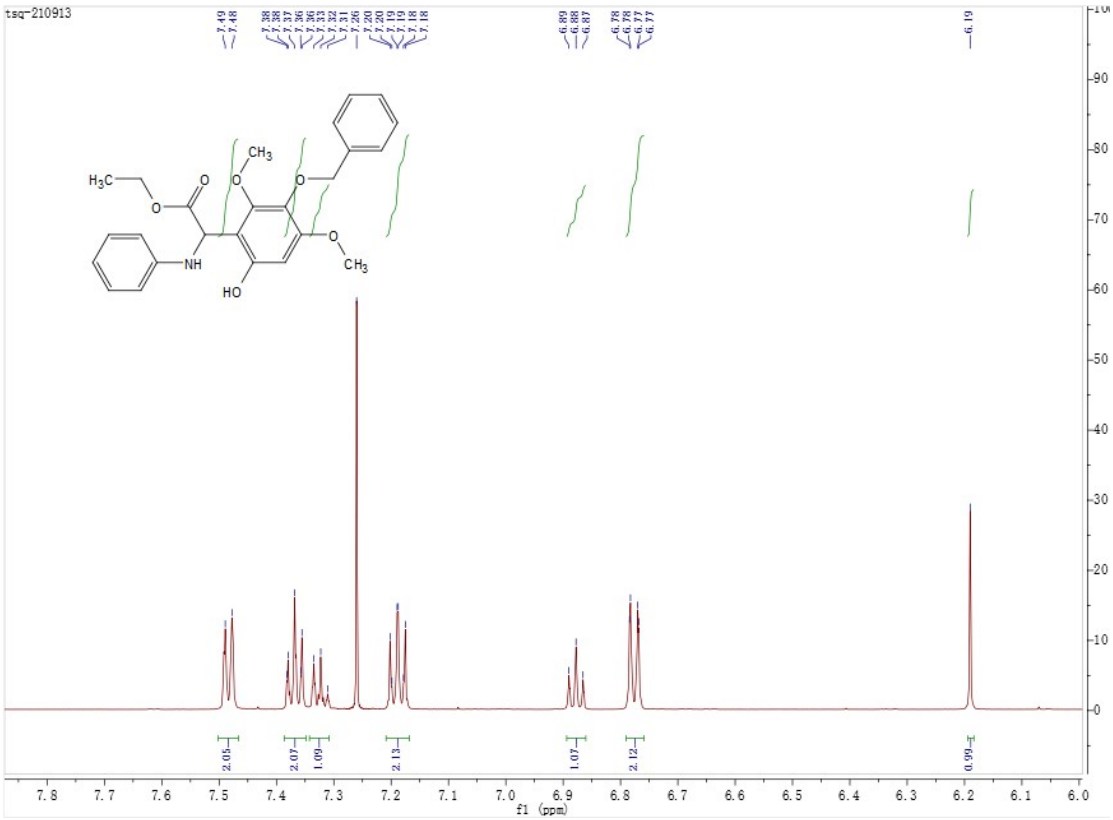


Figure S111 Partial enlarged ^{1}H-NMR spectrum of **6d** in $CDCl_3$

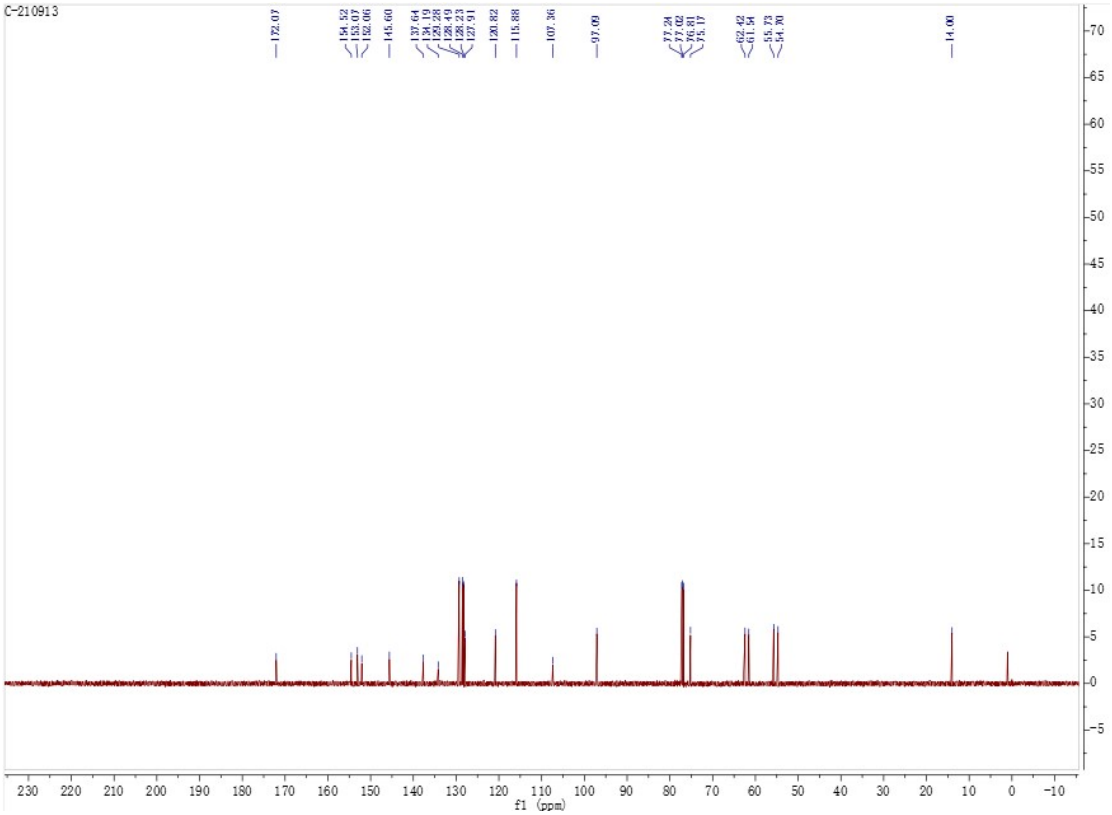


Figure S112 ^{13}C-NMR spectrum of **6d** in $CDCl_3$

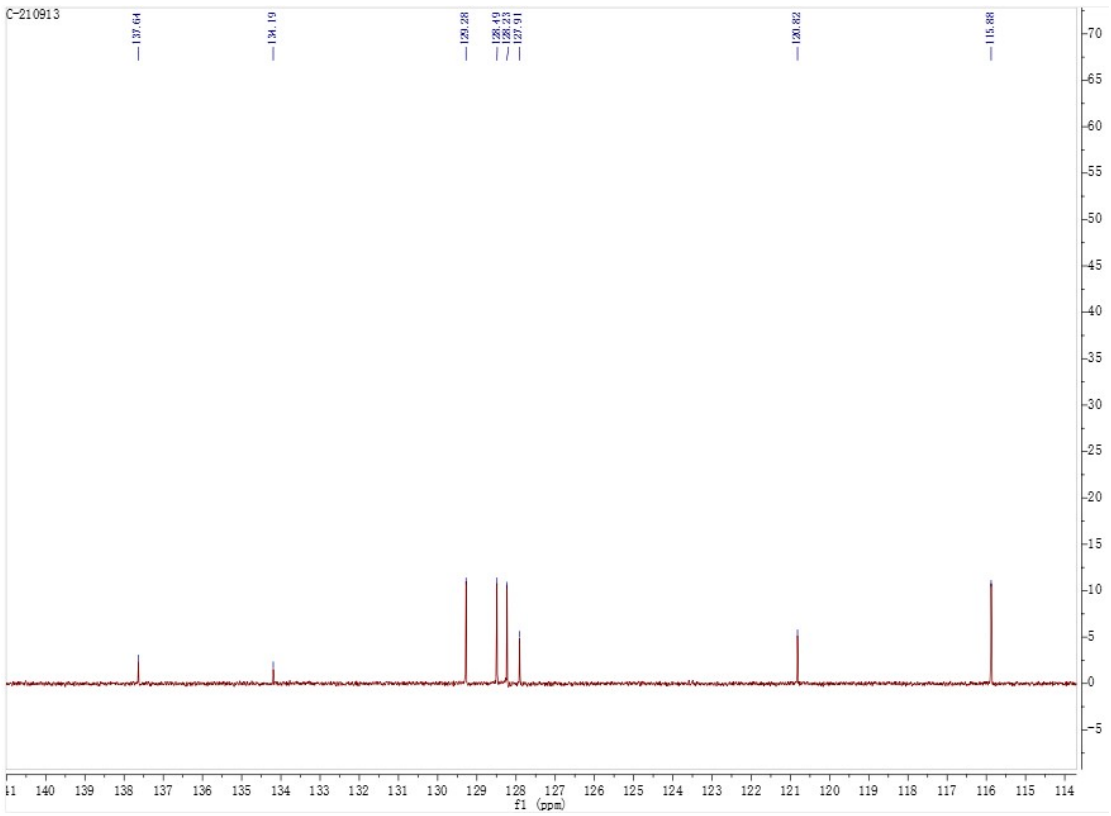


Figure S113 Partial enlarged ^{13}C-NMR spectrum of **6d** in $CDCl_3$

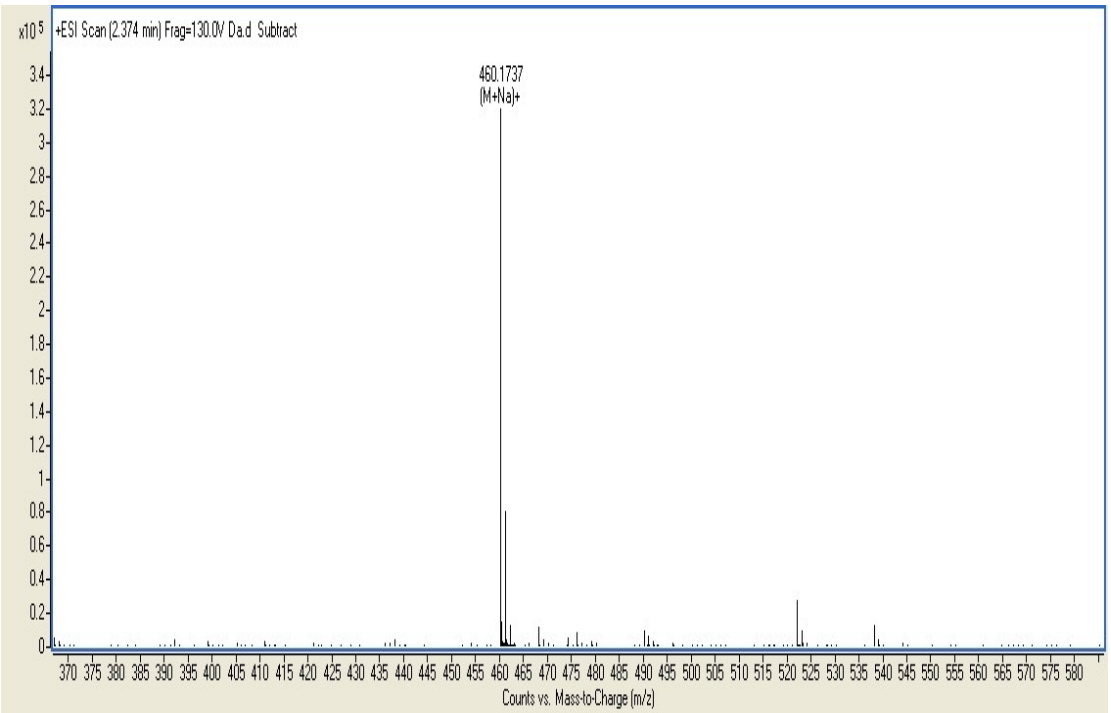


Figure S114 HRMS spectrum of **6d**

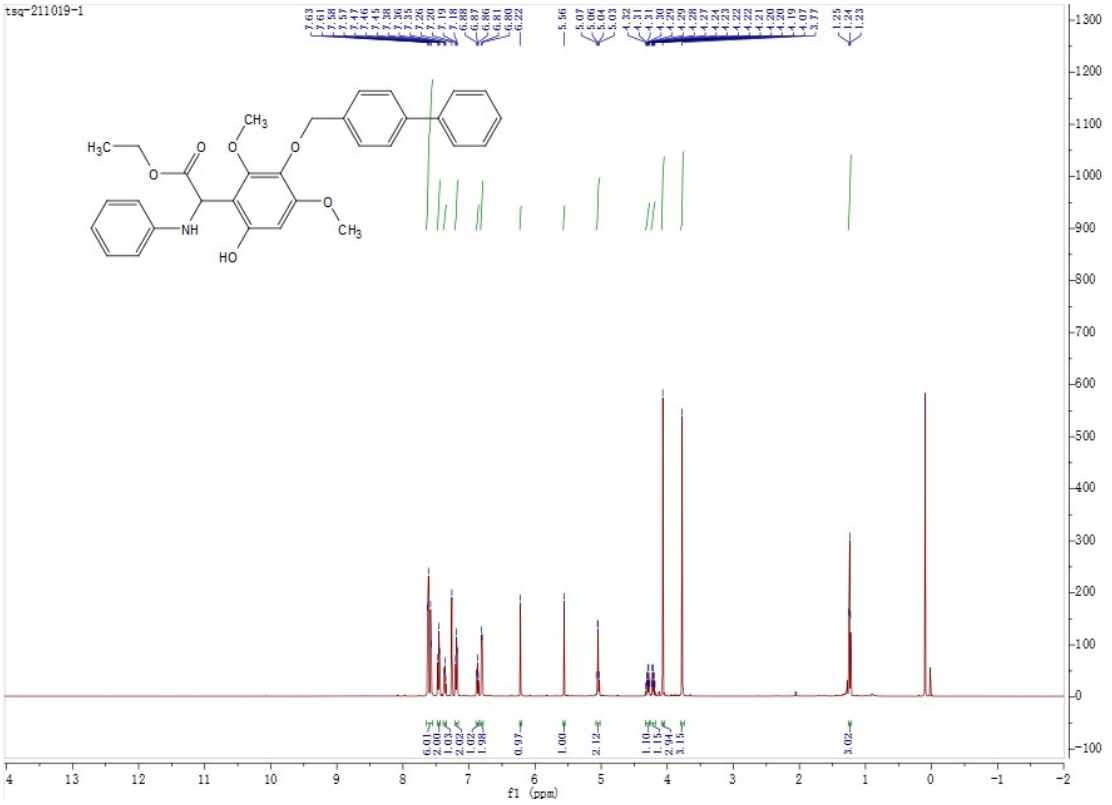


Figure S115 ^{1}H-NMR spectrum of **6e** in $CDCl_3$

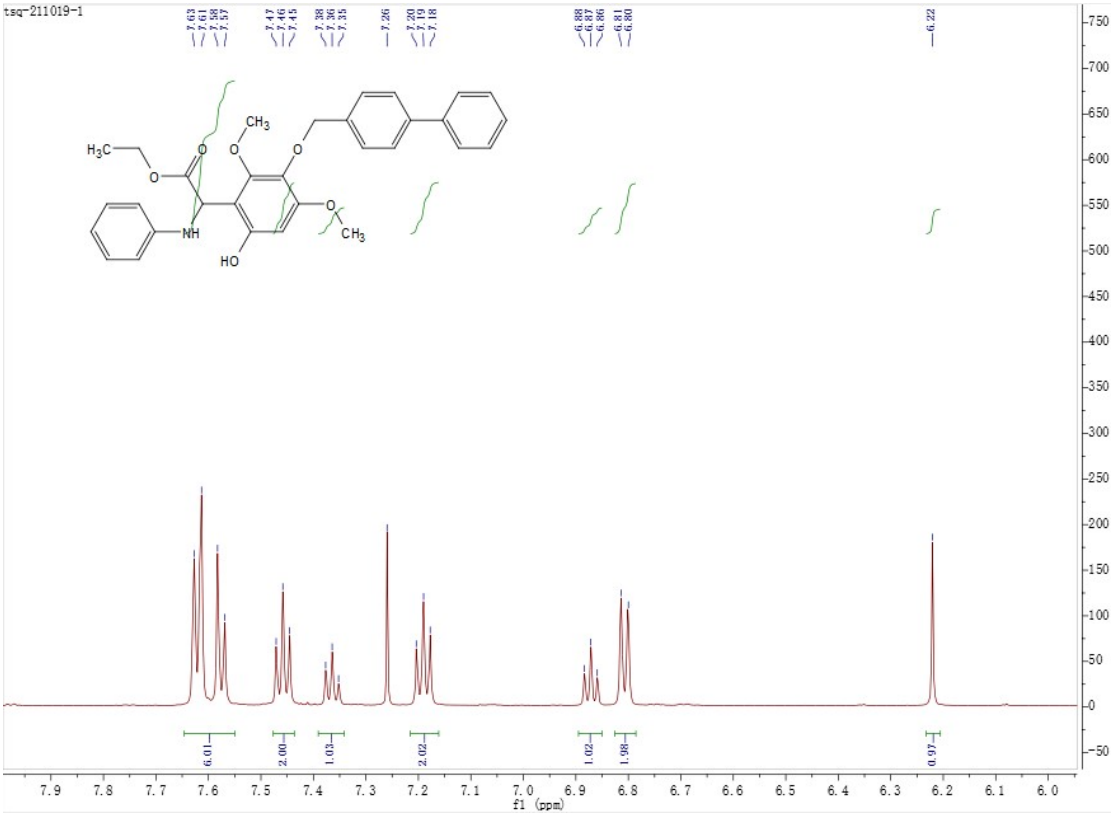


Figure S116 Partial enlarged ^{1}H-NMR spectrum of **6e** in $CDCl_3$

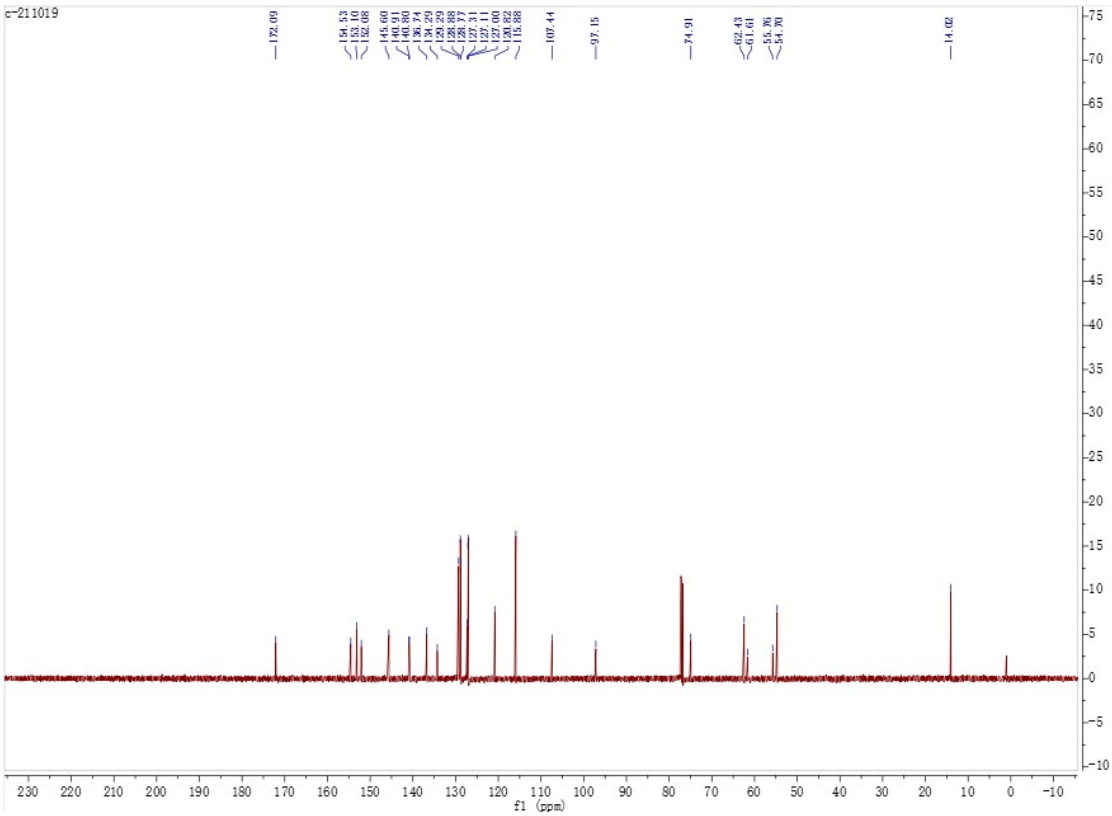


Figure S117 ^{13}C-NMR spectrum of**6e** in $CDCl_3$

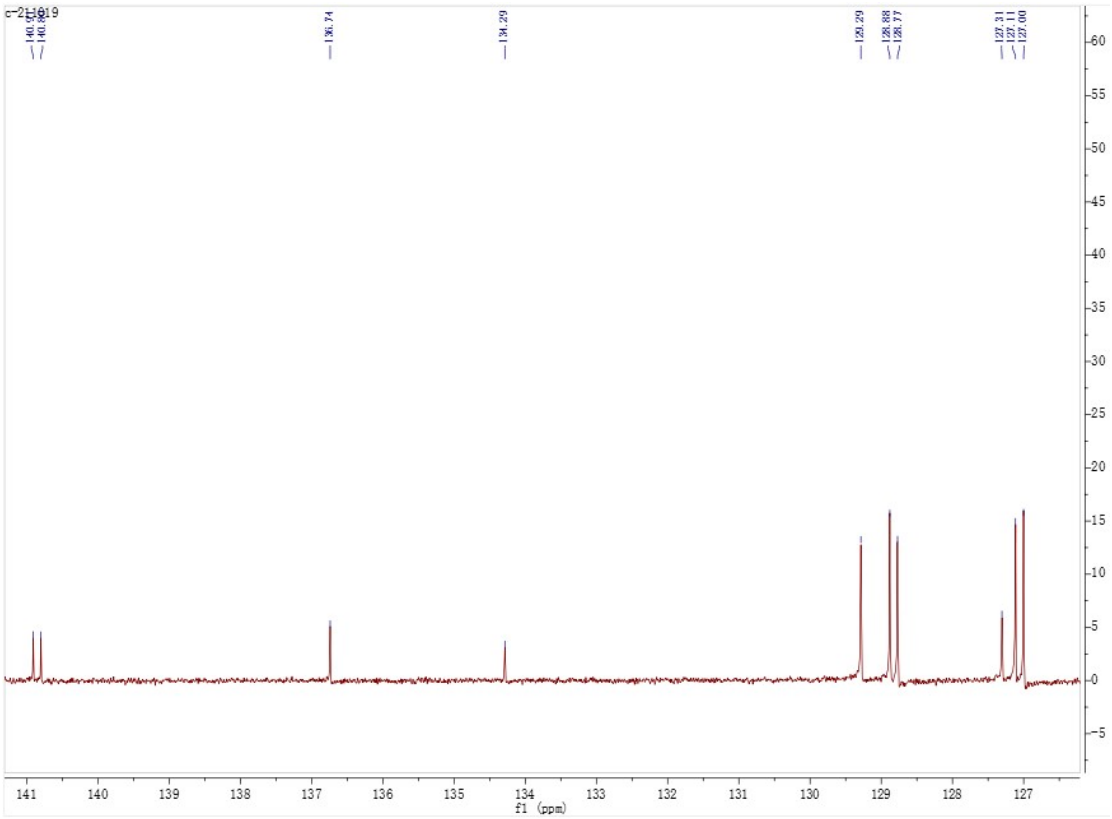


Figure S118 Partial enlarged ^{13}C-NMR spectrum of **6e** in $CDCl_3$

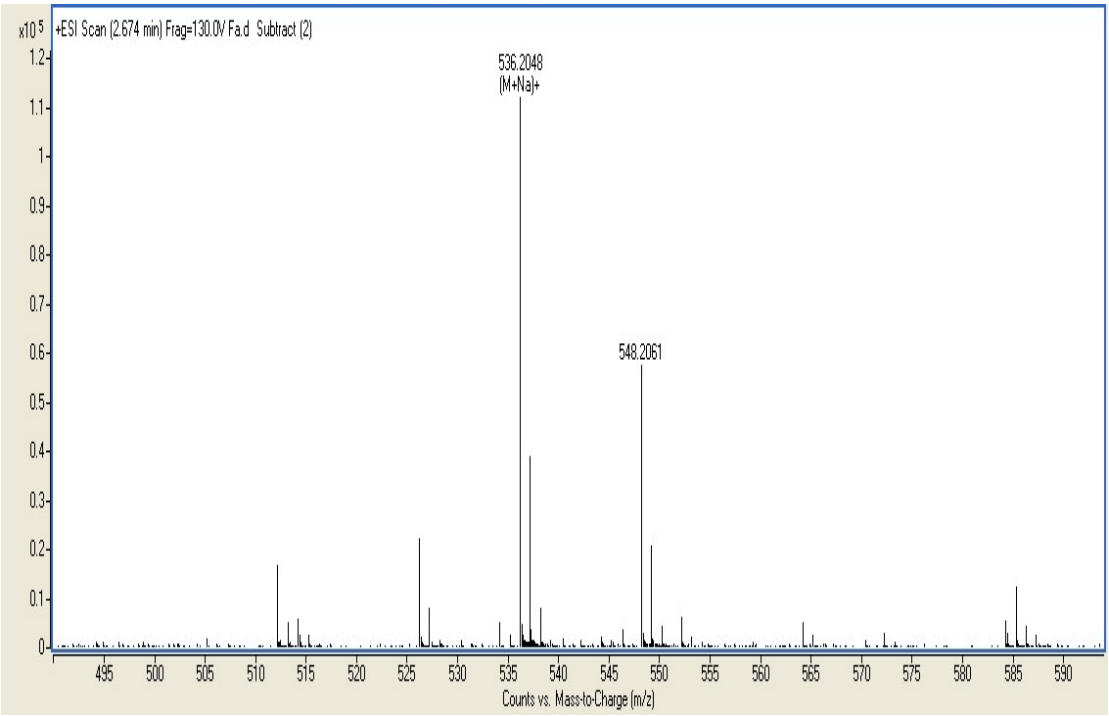


Figure S119 HRMS spectrum of **6e**

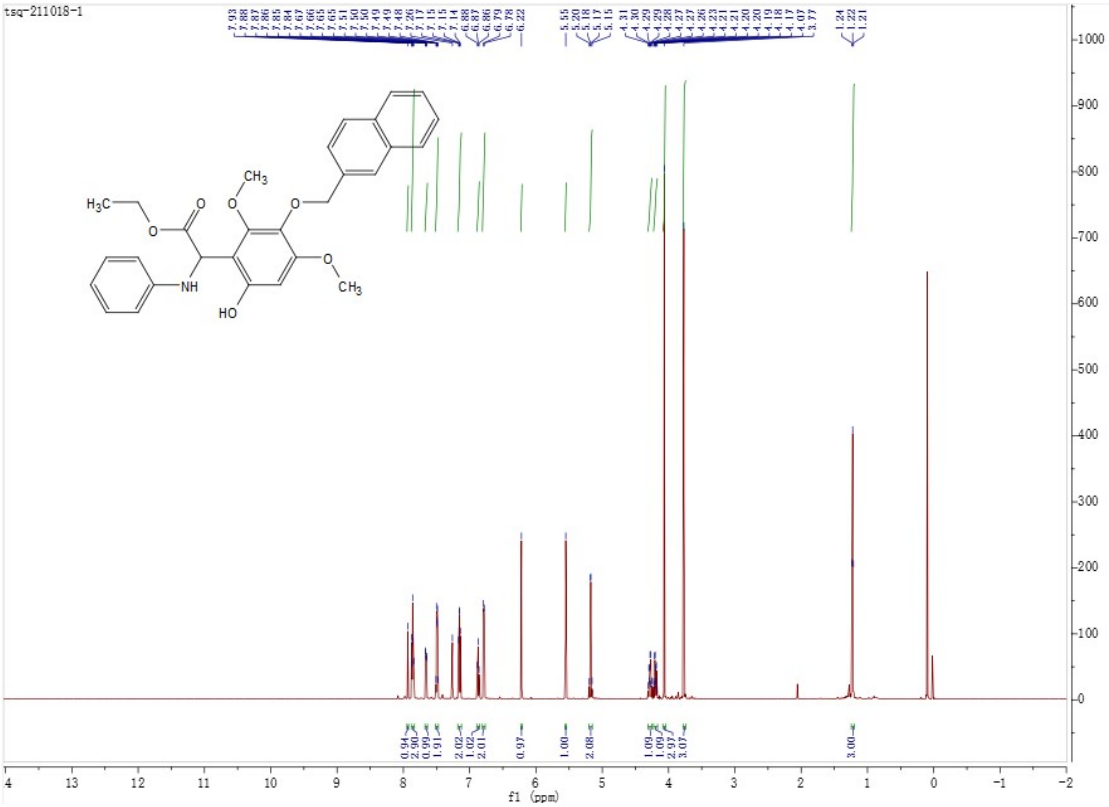


Figure S120 ^{1}H-NMR spectrum of **6f** in $CDCl_3$

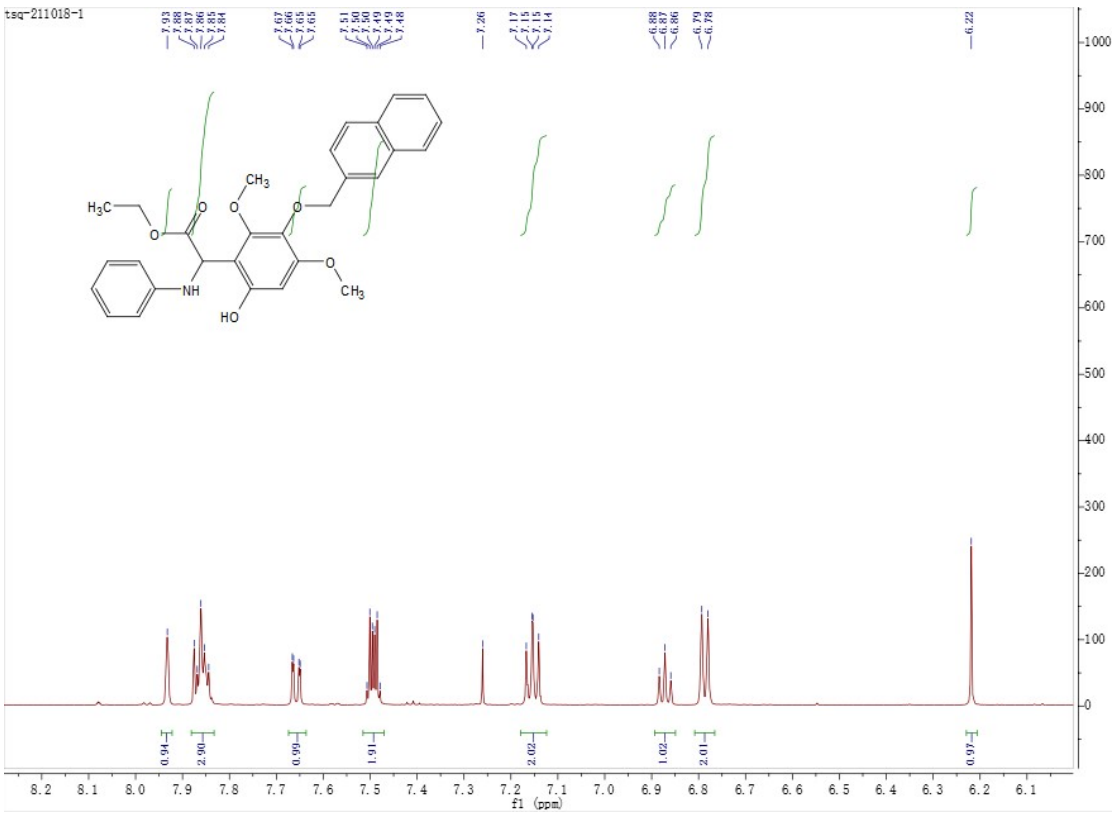


Figure S121 Partial enlarged ^{1}H-NMR spectrum of **6f** in $CDCl_3$

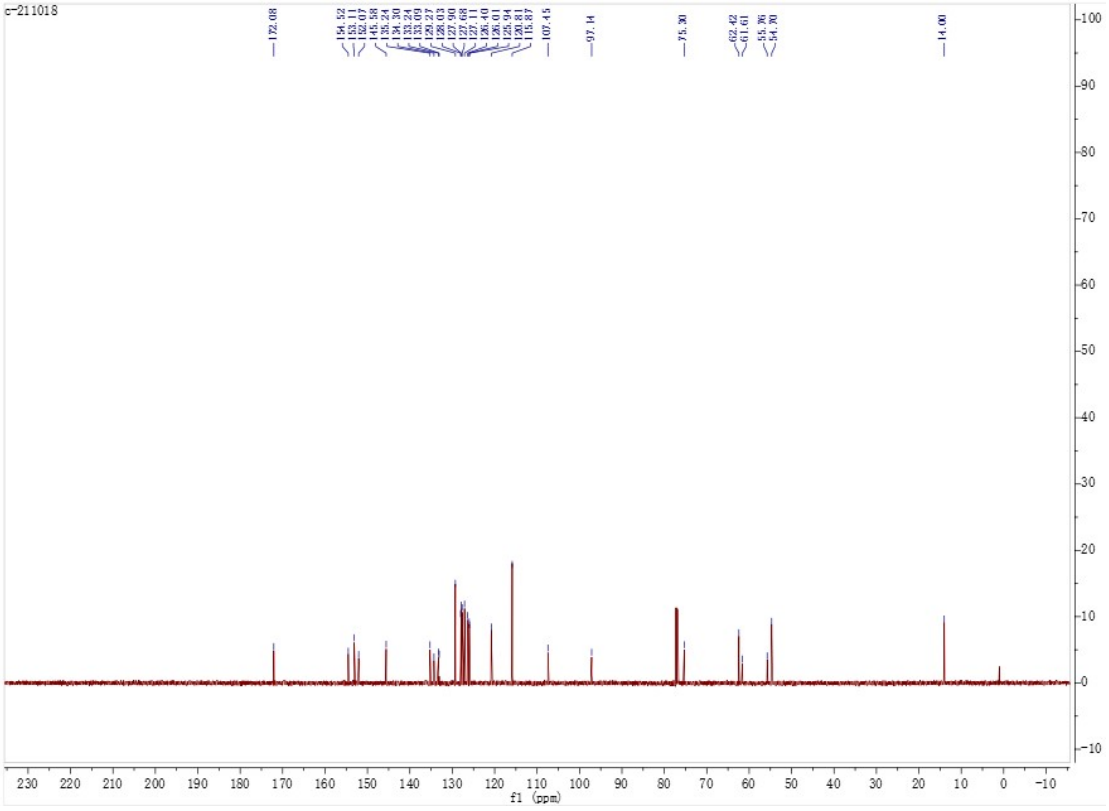


Figure S122 ^{13}C-NMR spectrum of **6f** in $CDCl_3$

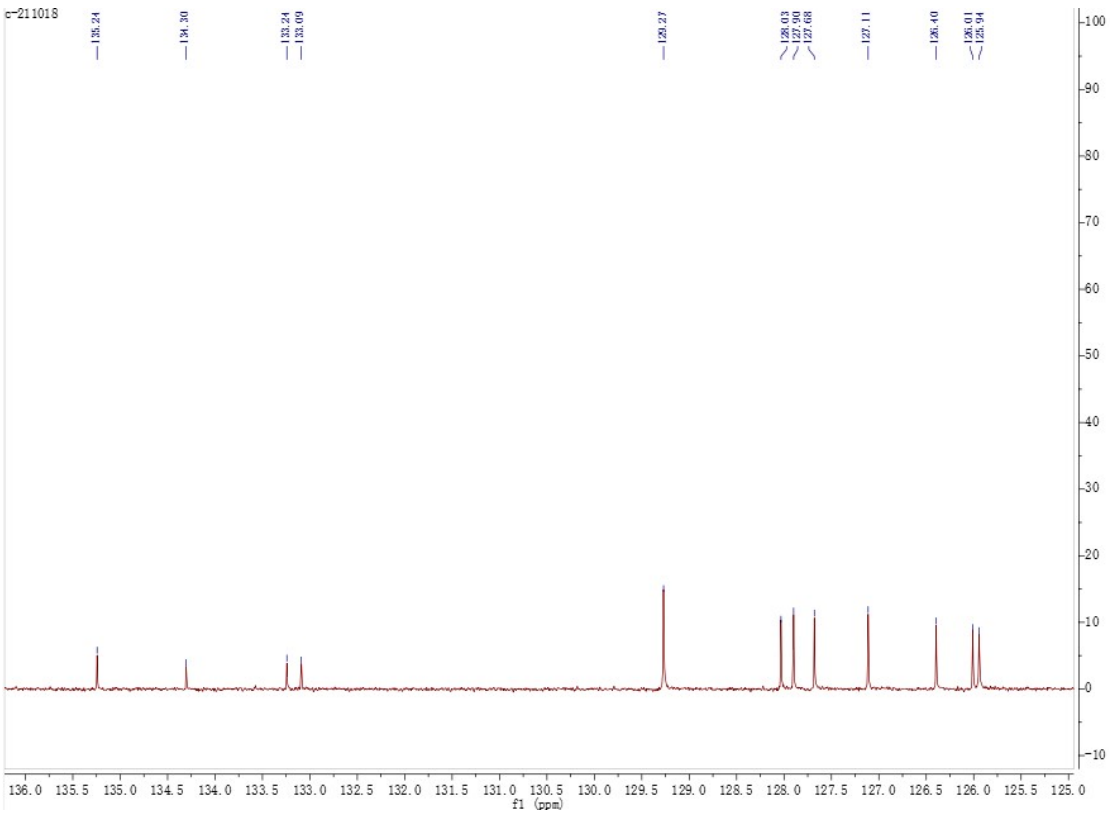


Figure S123 Partial enlarged ^{13}C-NMR spectrum of **6f** in $CDCl_3$

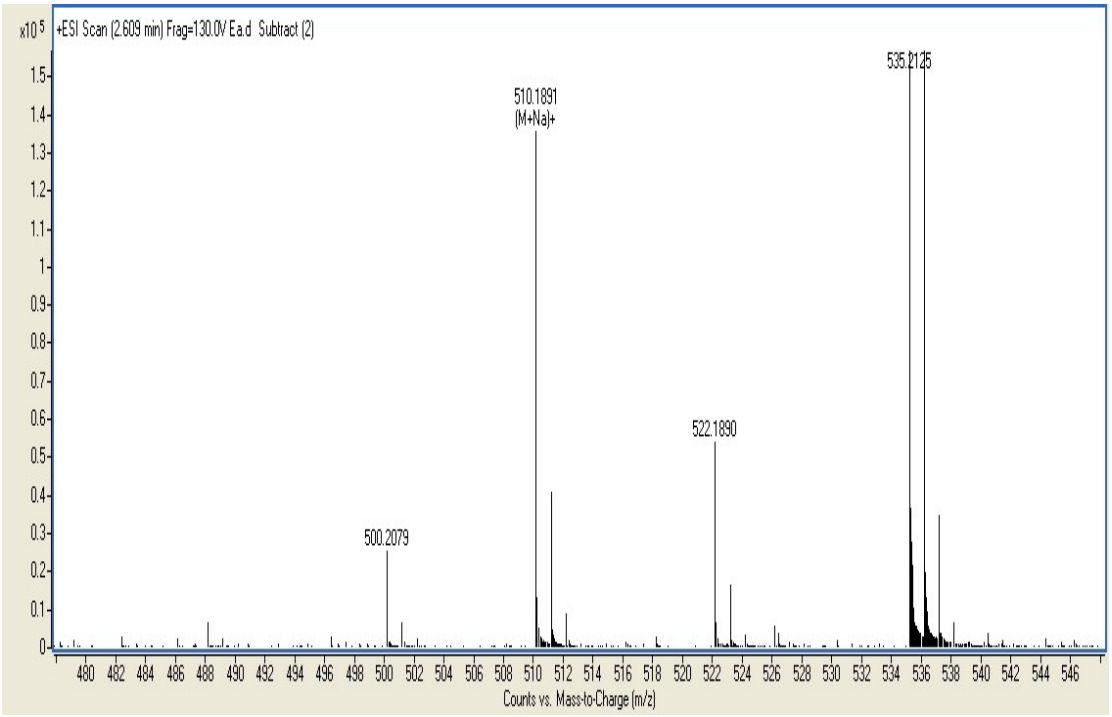


Figure S124 HRMS spectrum of **6f**

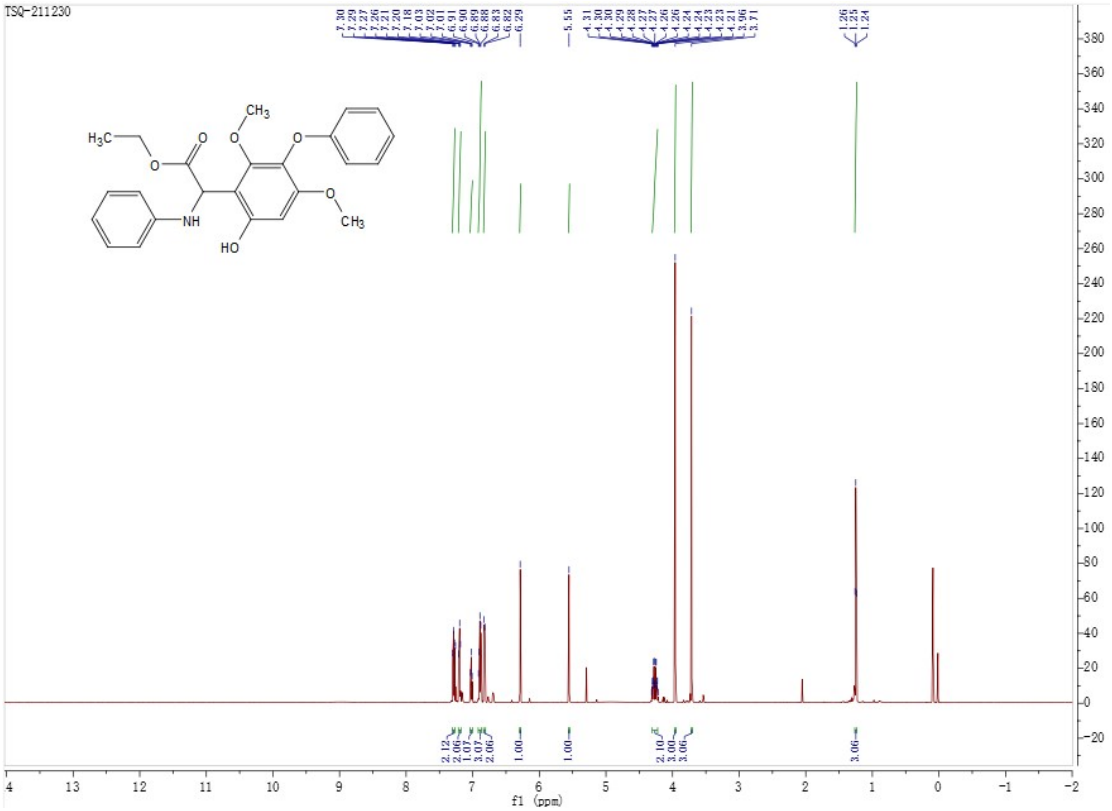


Figure S125 ^{1}H-NMR spectrum of **6g** in $CDCl_3$

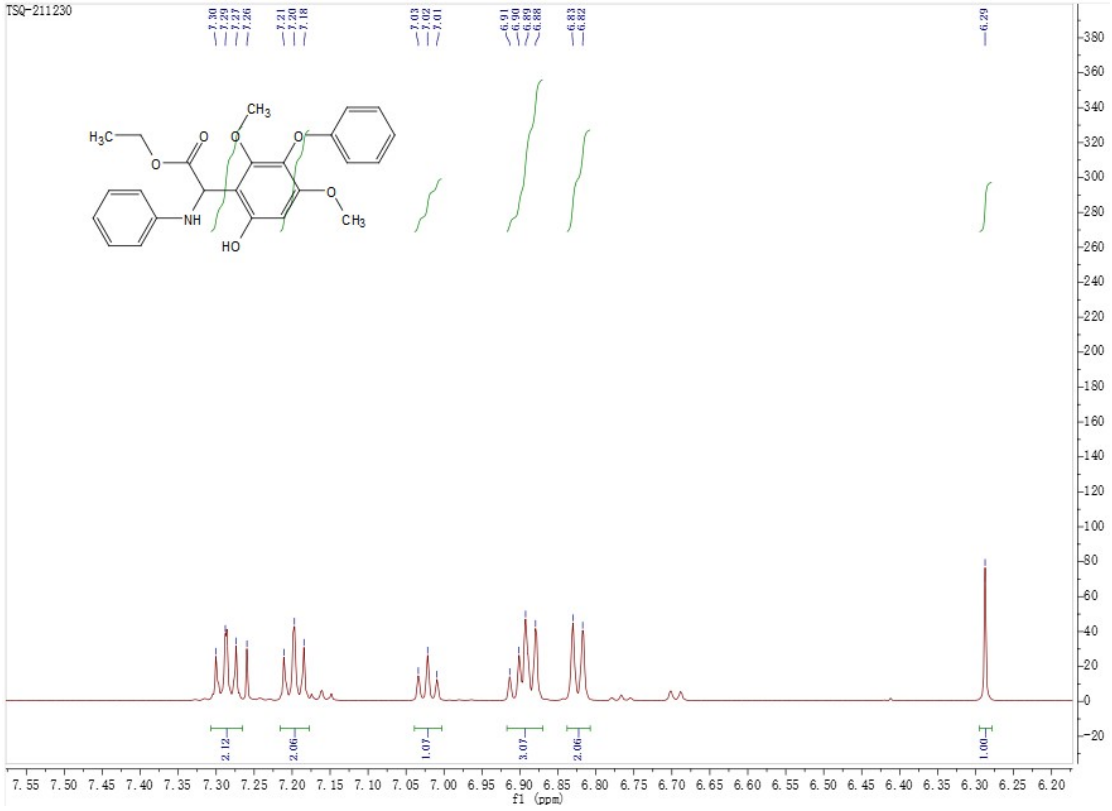


Figure S126 Partial enlarged ^{1}H-NMR spectrum of **6g** in $CDCl_3$

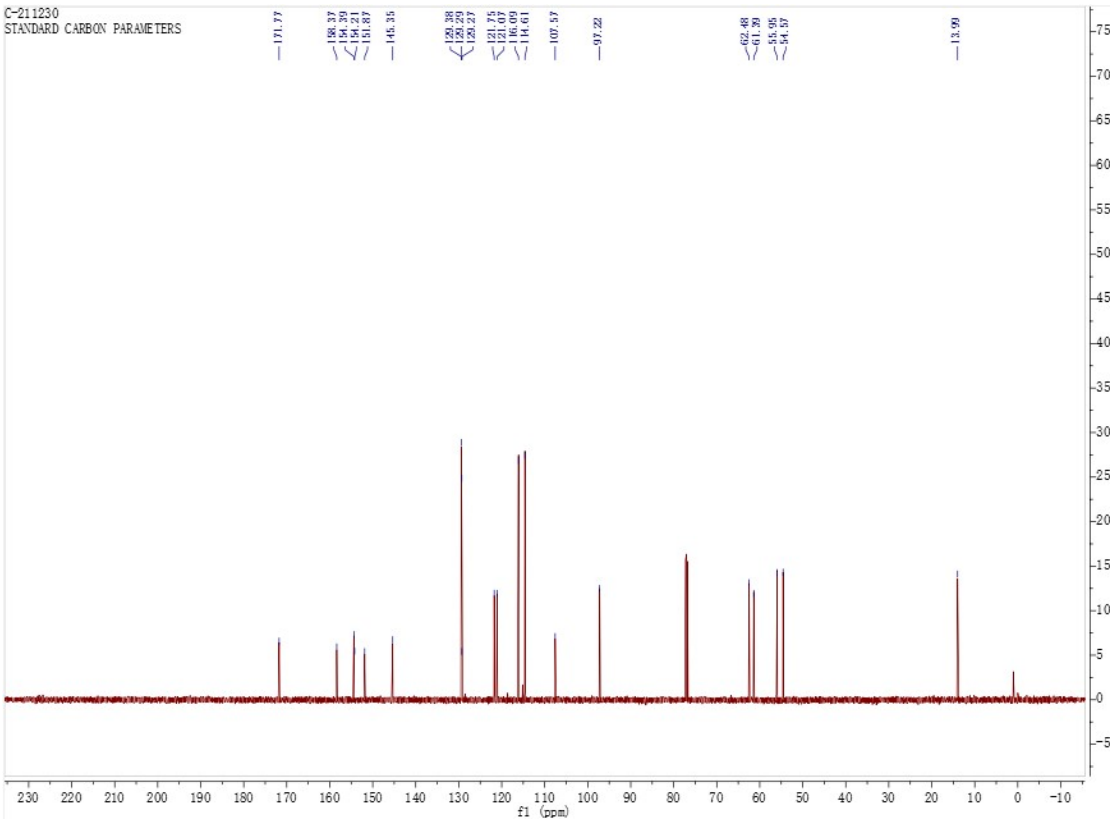


Figure S127 ^{13}C-NMR spectrum of **6g** in $CDCl_3$

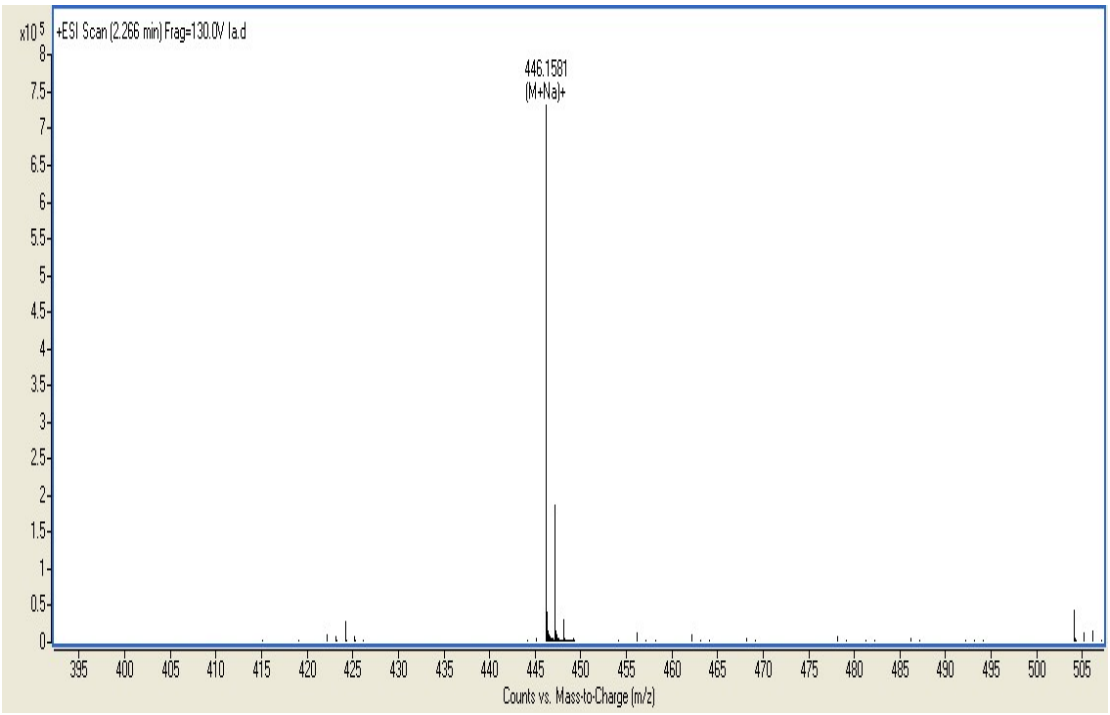


Figure S128 HRMS spectrum of **6g**

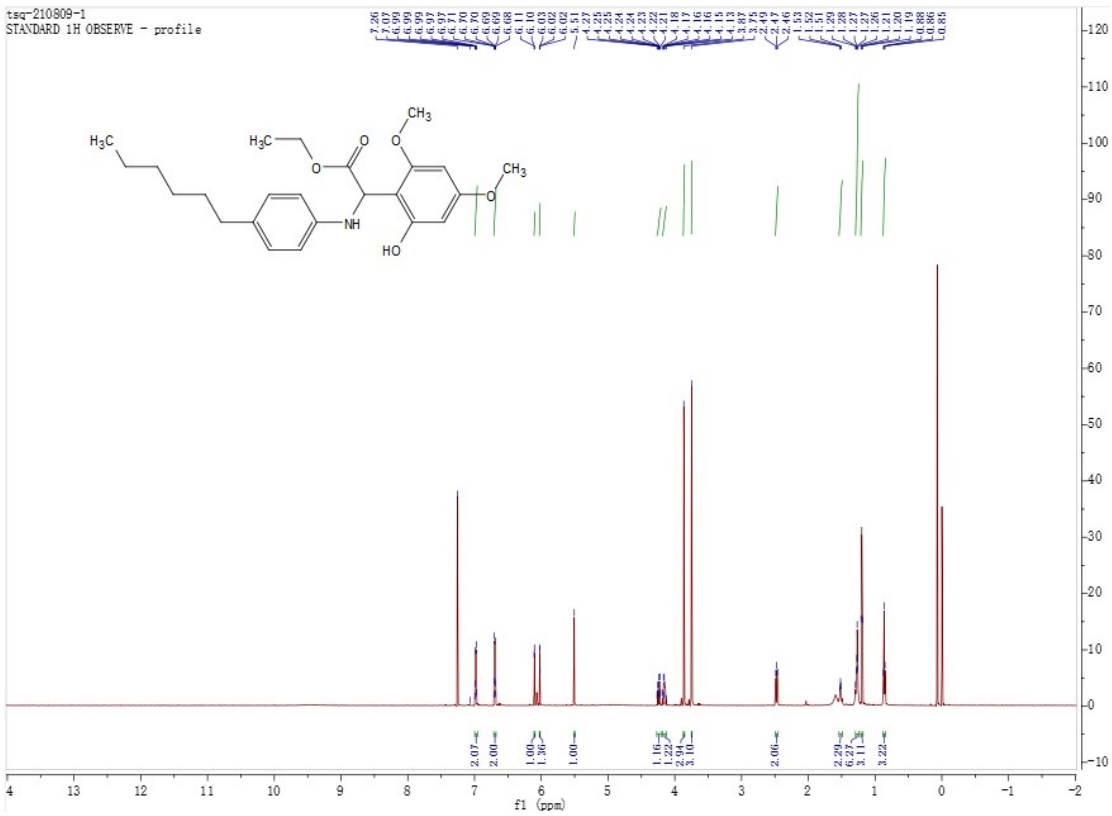


Figure S129 ^{1}H-NMR spectrum of **6h** in $CDCl_3$

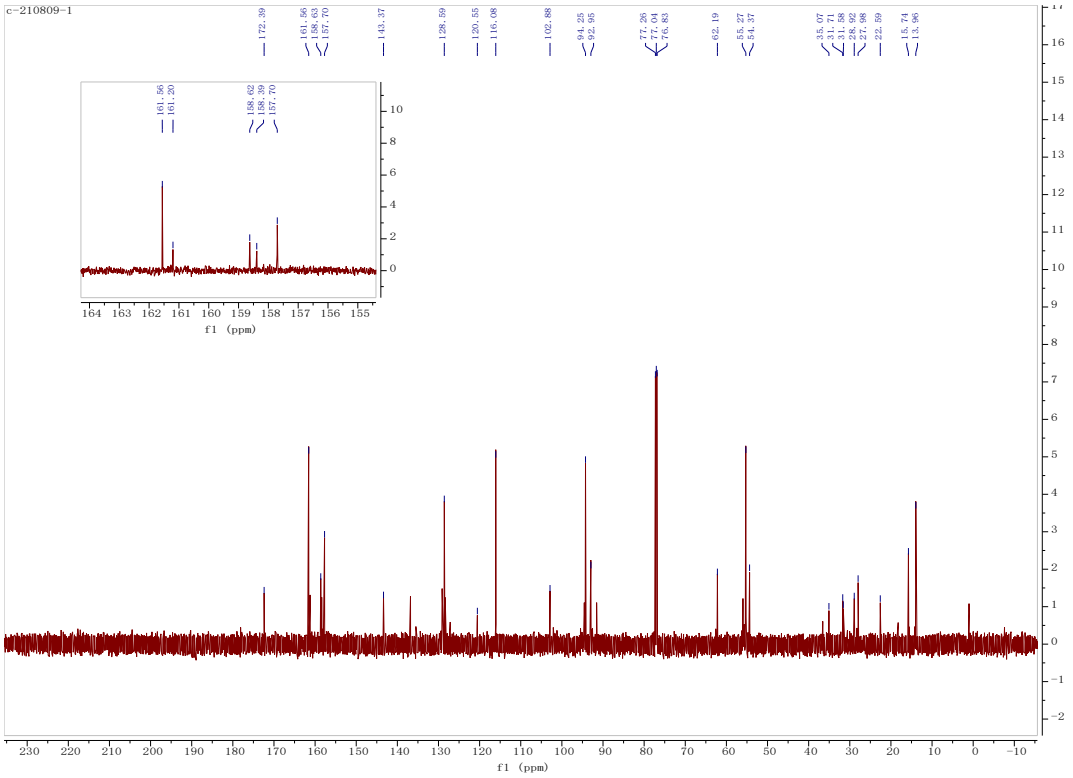


Figure S130 ^{13}C-NMR spectrum of **6h** in $CDCl_3$

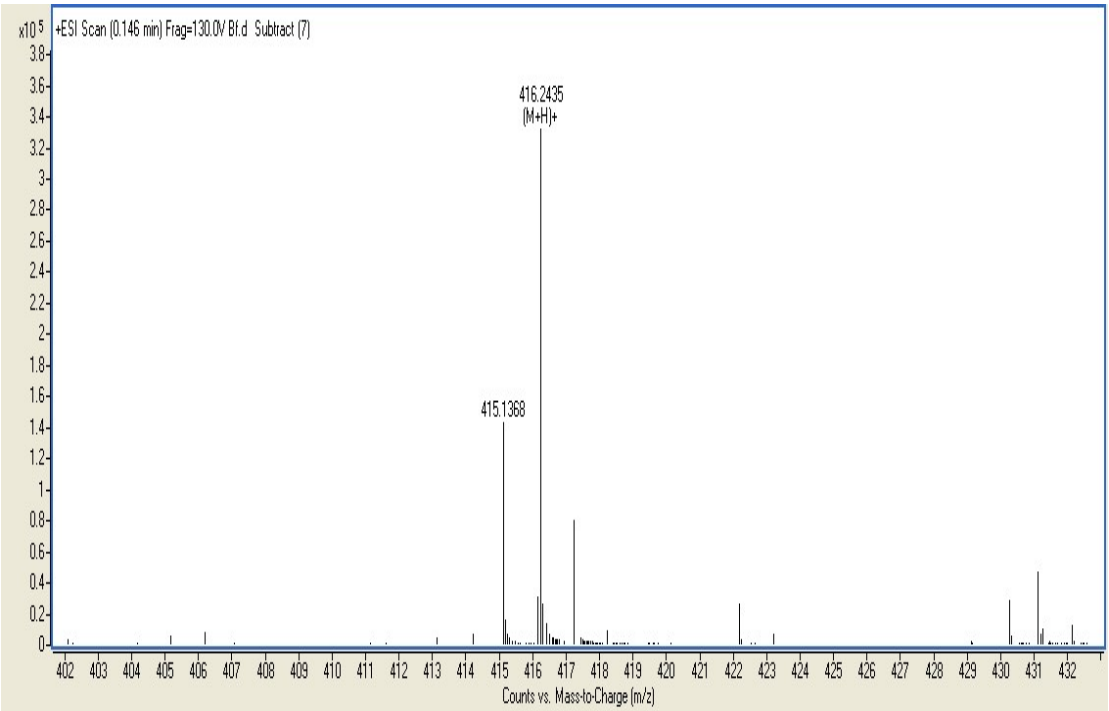


Figure S131 HRMS spectrum of **6h**

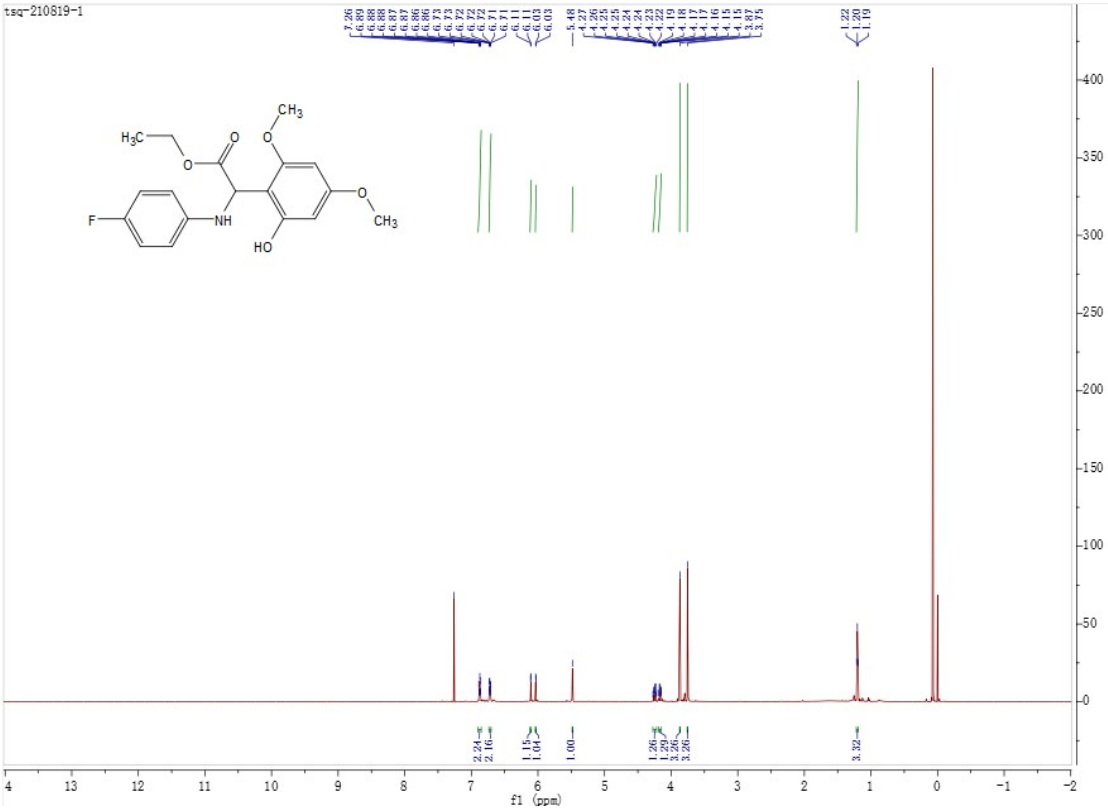


Figure S132 ^{1}H-NMR spectrum of **6i** in $CDCl_3$

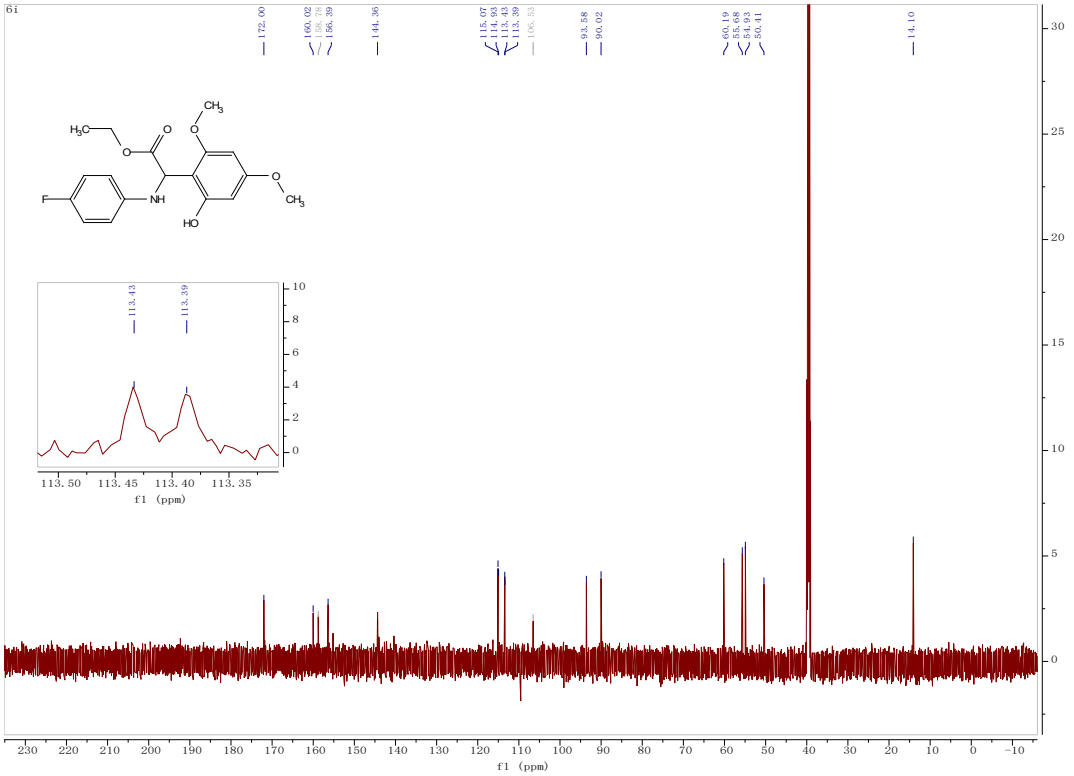


Figure S133 ^{13}C-NMR spectrum of **6i** in DMSO-*d*^{6}

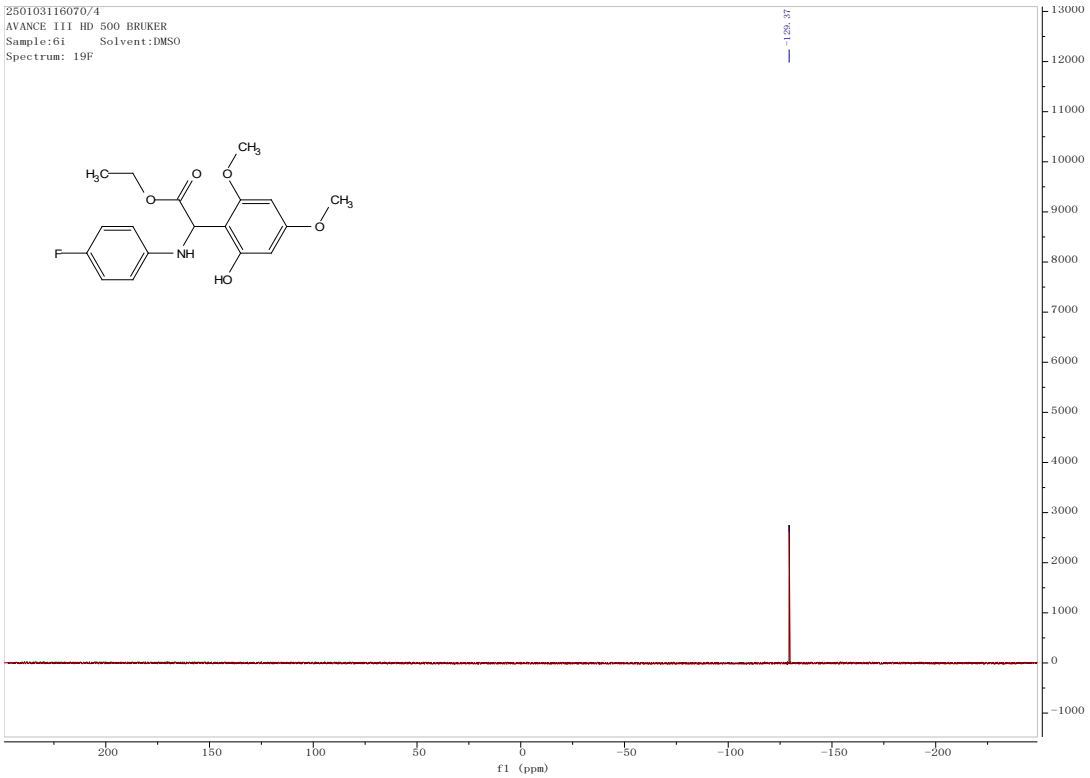


Figure S134 ^{19}F-NMR spectrum of **6i** in DMSO-*d*^{6}

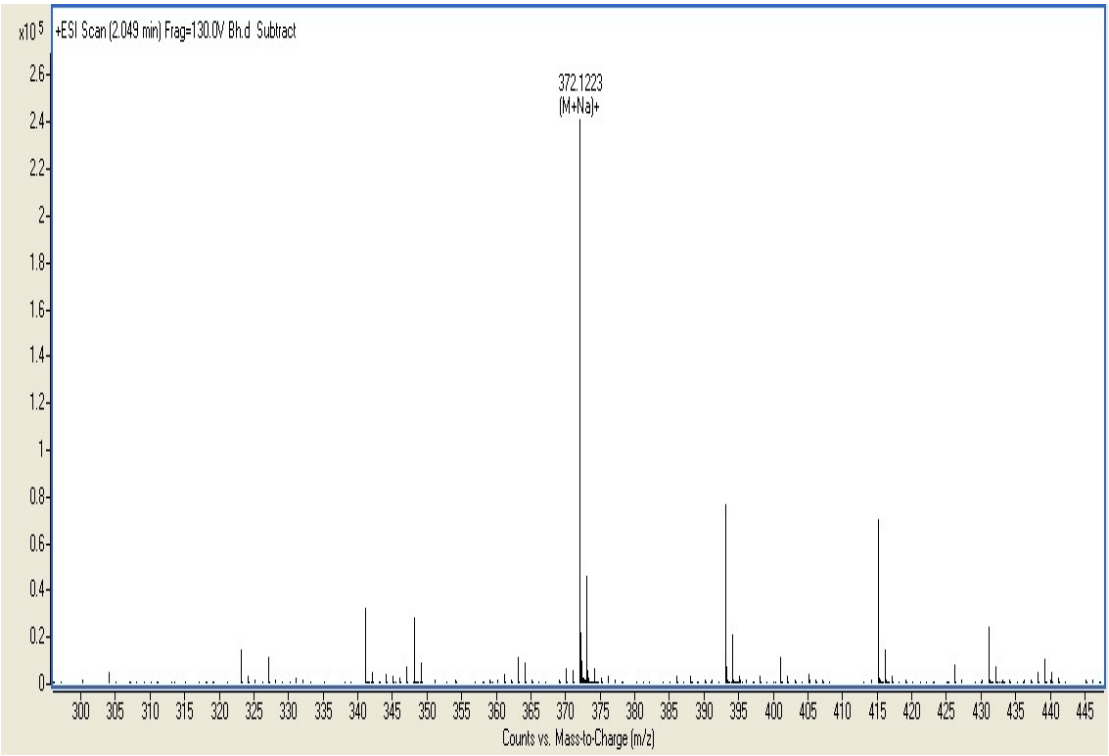


Figure S135 HRMS spectrum of **6i**

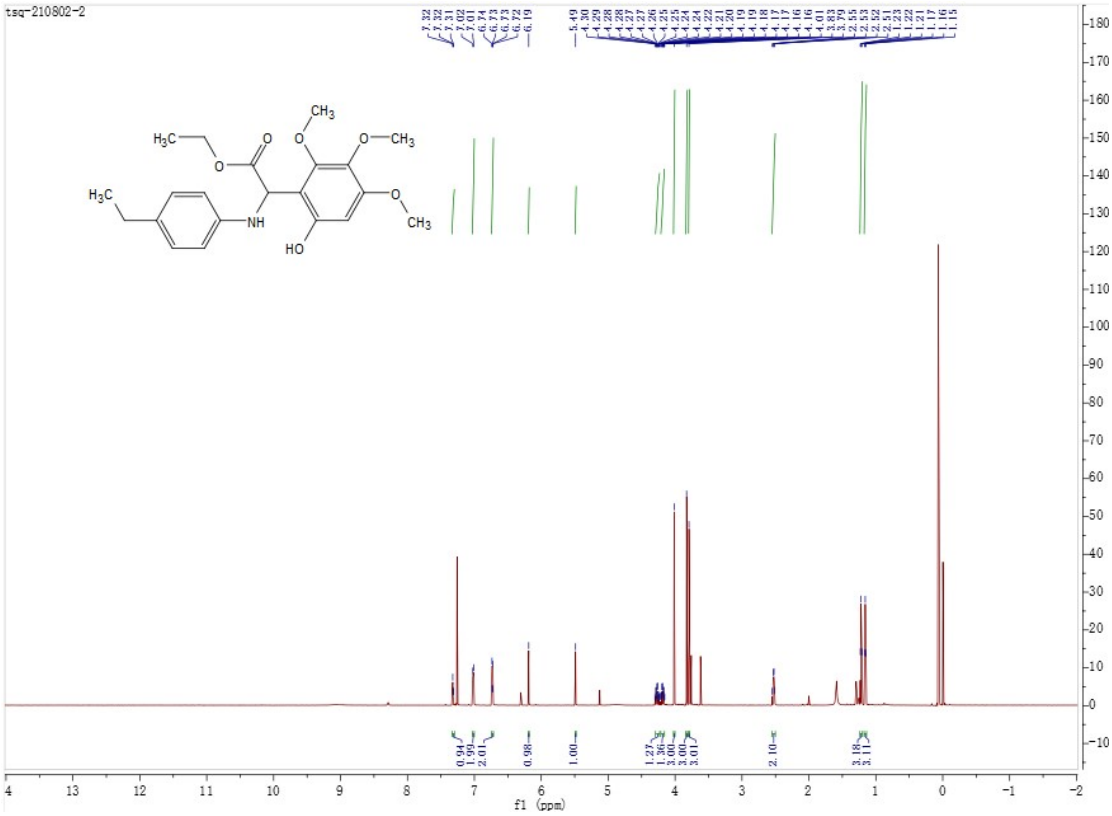


Figure S136 ^{1}H-NMR spectrum of **6j** in $CDCl_3$

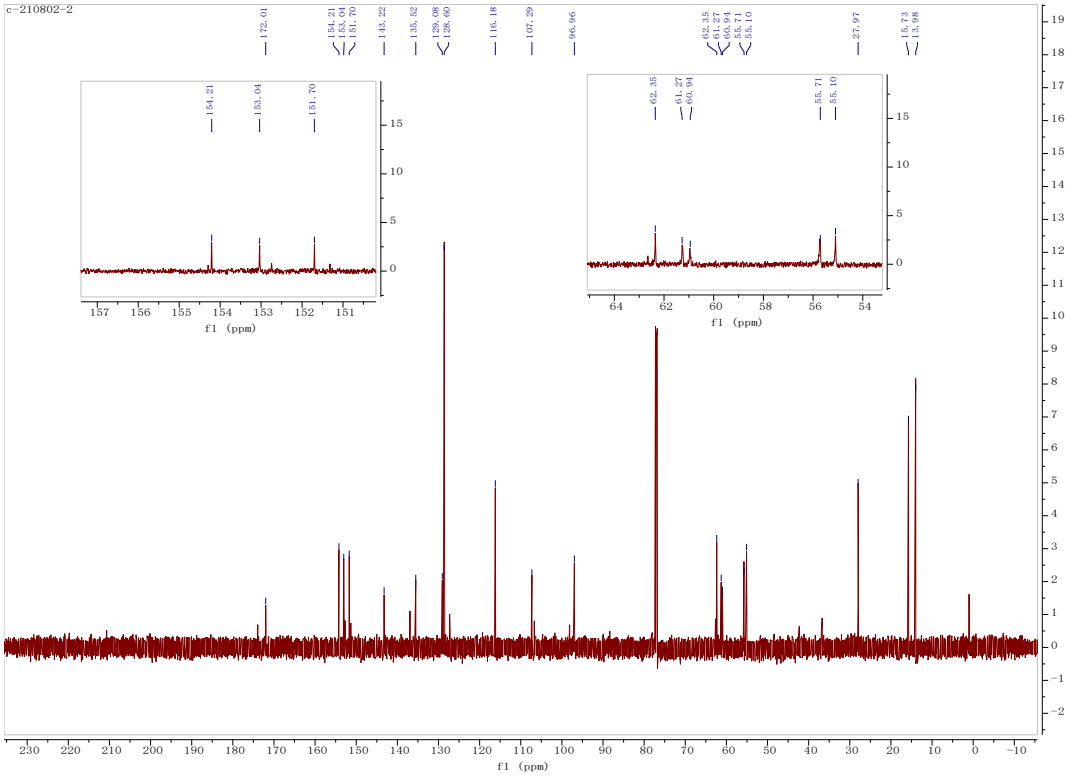


Figure S137 ^{13}C-NMR spectrum of **6j** in $CDCl_3$

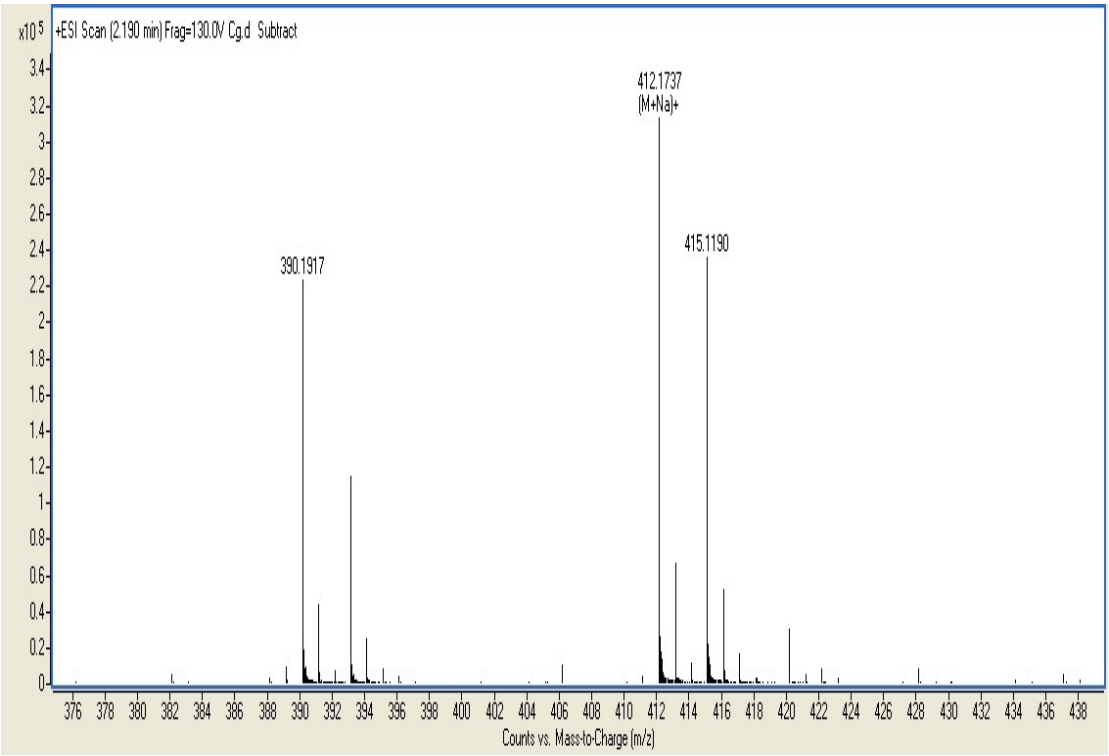


Figure S138 HRMS spectrum of **6j**

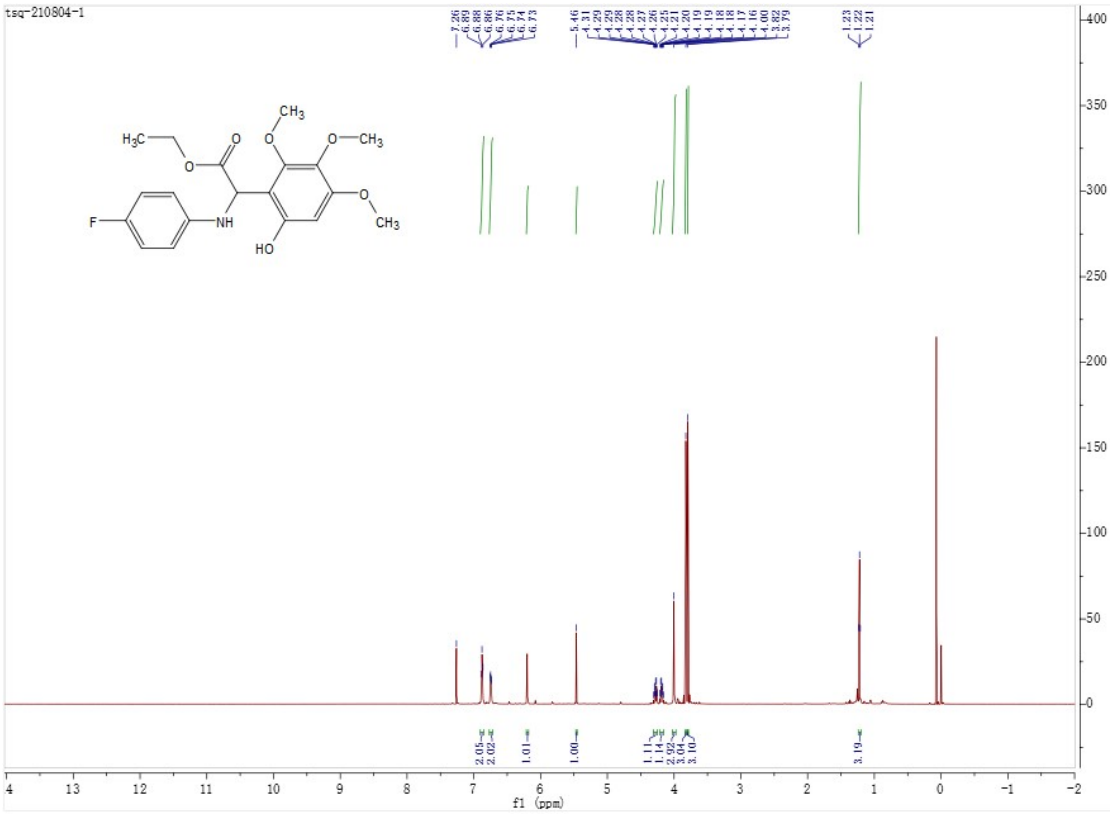


Figure S139 ^{1}H-NMR spectrum of **6k** in $CDCl_3$

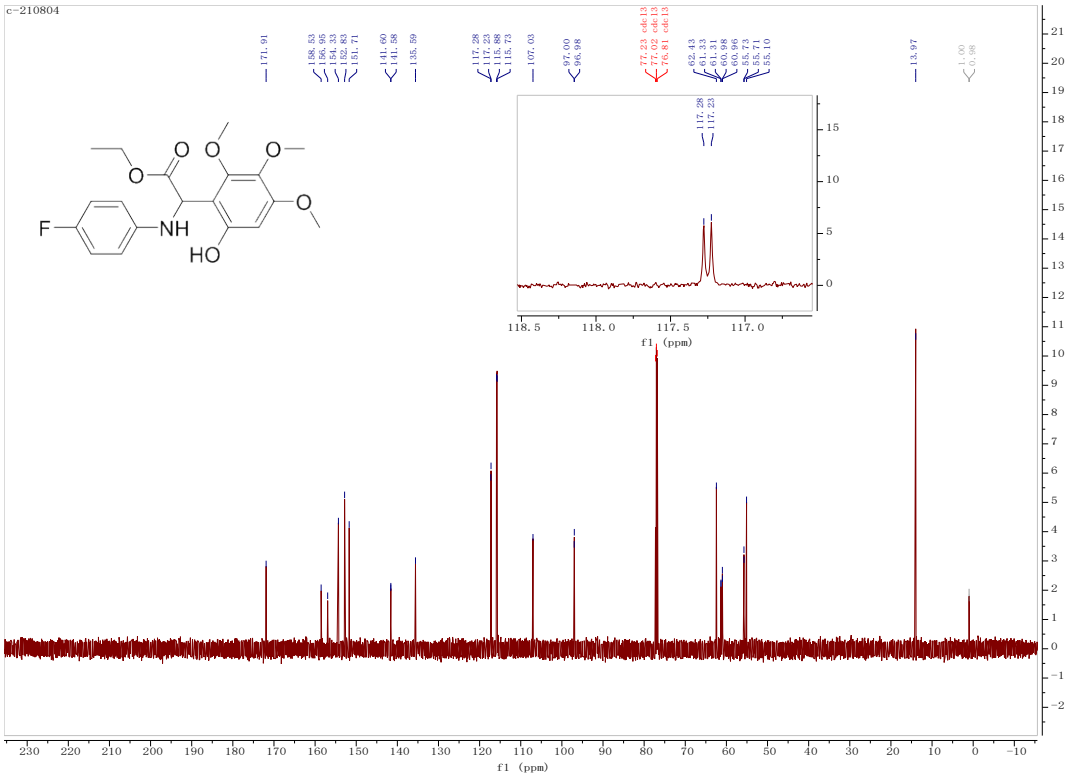


Figure S140 ^{13}C-NMR spectrum of **6k** in $CDCl_3$

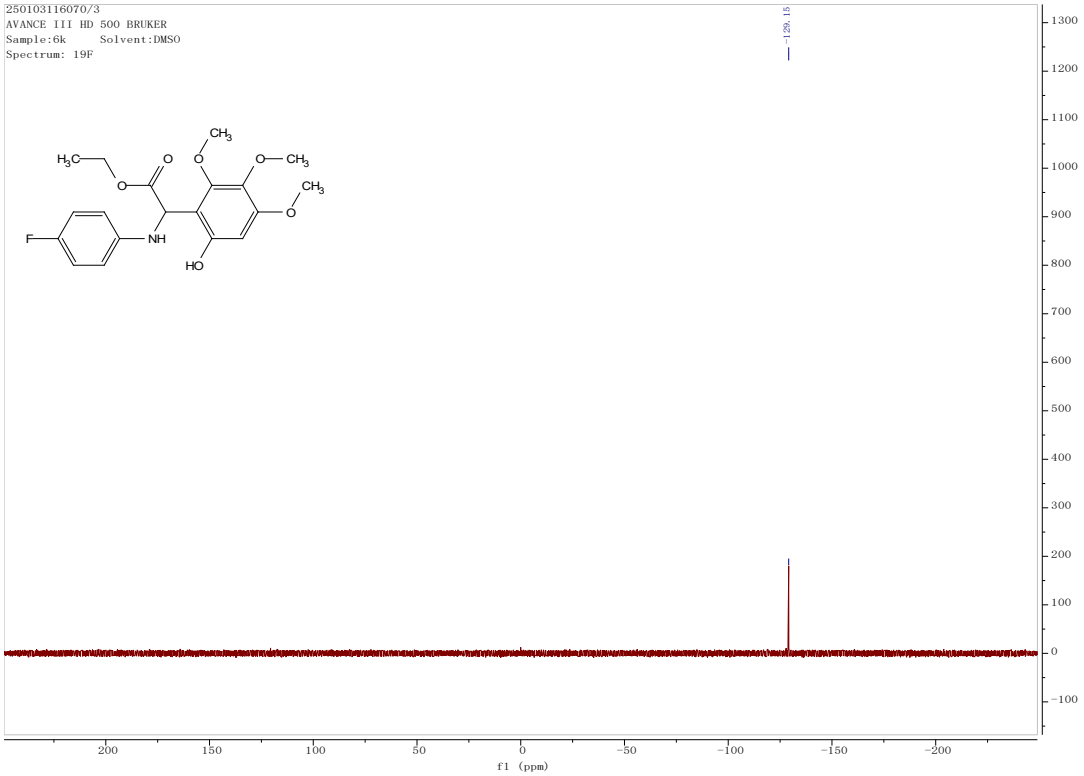


Figure S141 ^{19}F-NMR spectrum of **6k** in DMSO-*d*^{6}

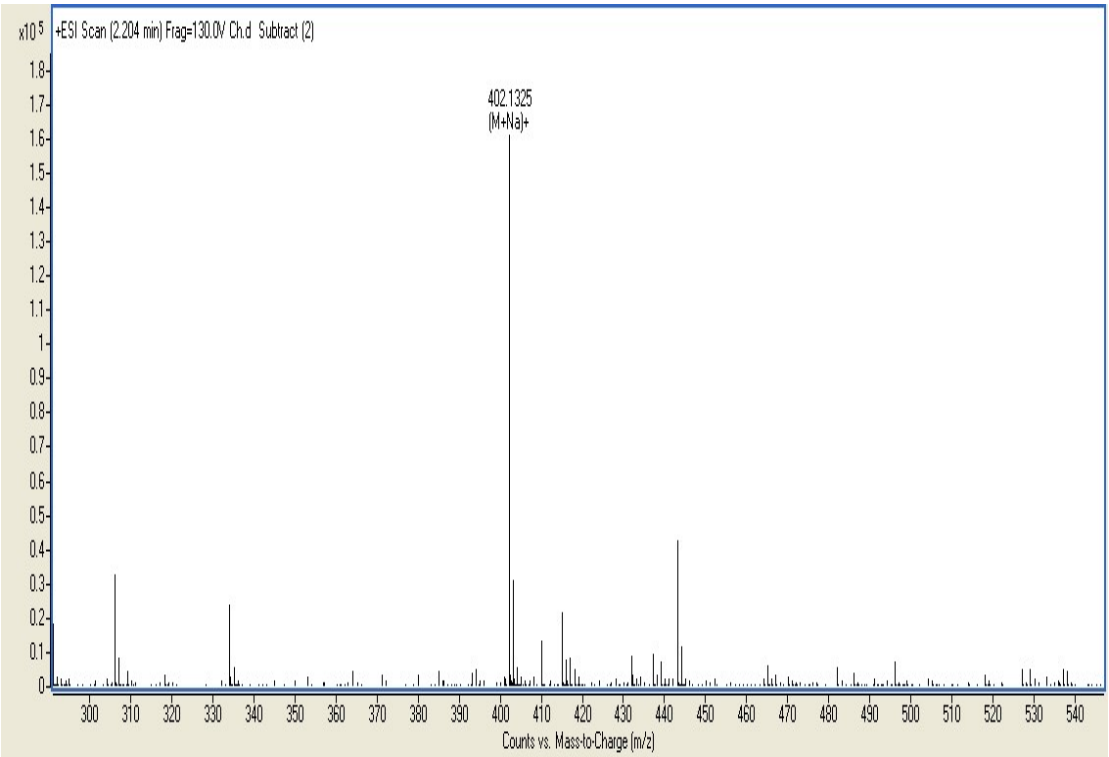


Figure S142 HRMS spectrum of **6k**

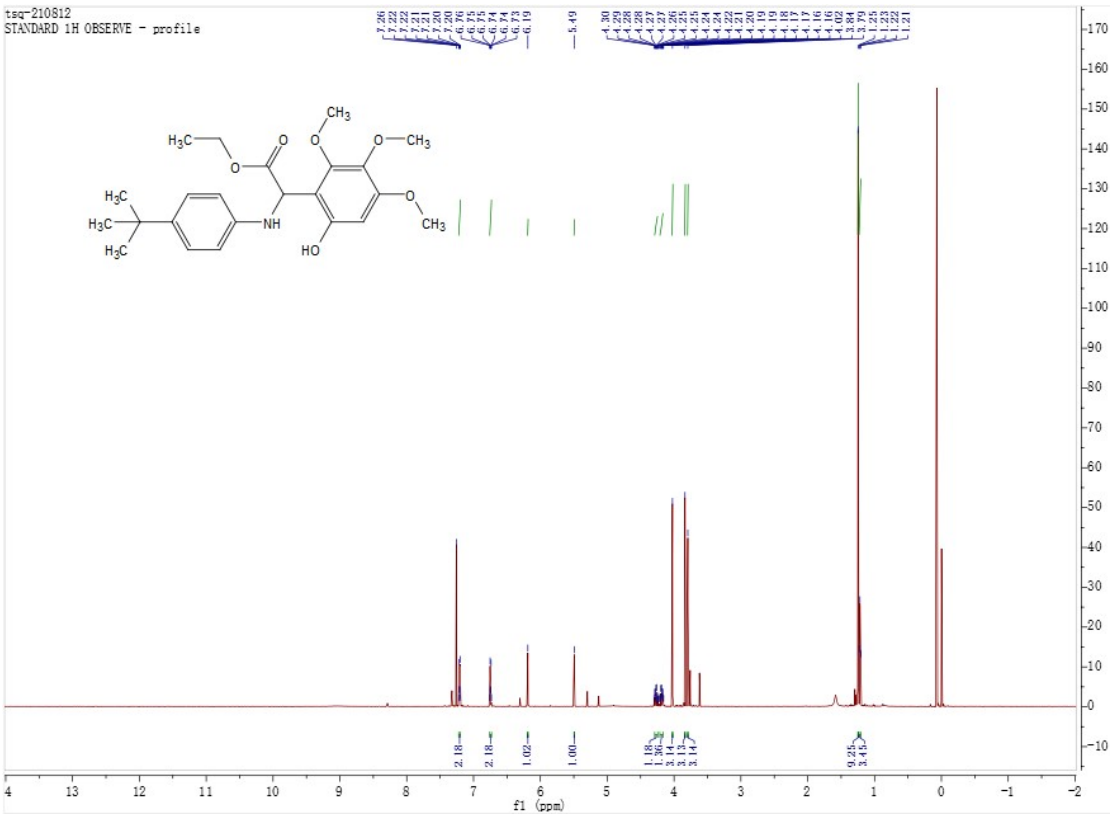


Figure S143 ^{1}H-NMR spectrum of **6l** in $CDCl_3$

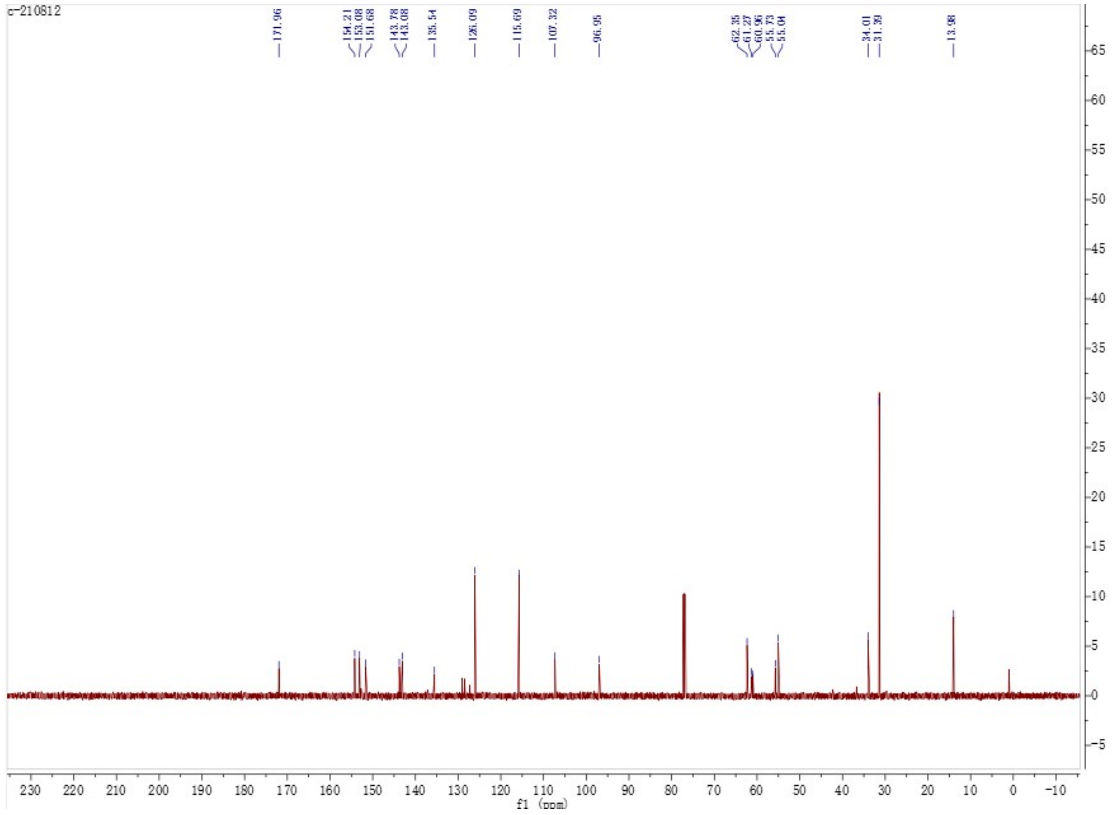


Figure S144 ^{13}C-NMR spectrum of **6l** in $CDCl_3$

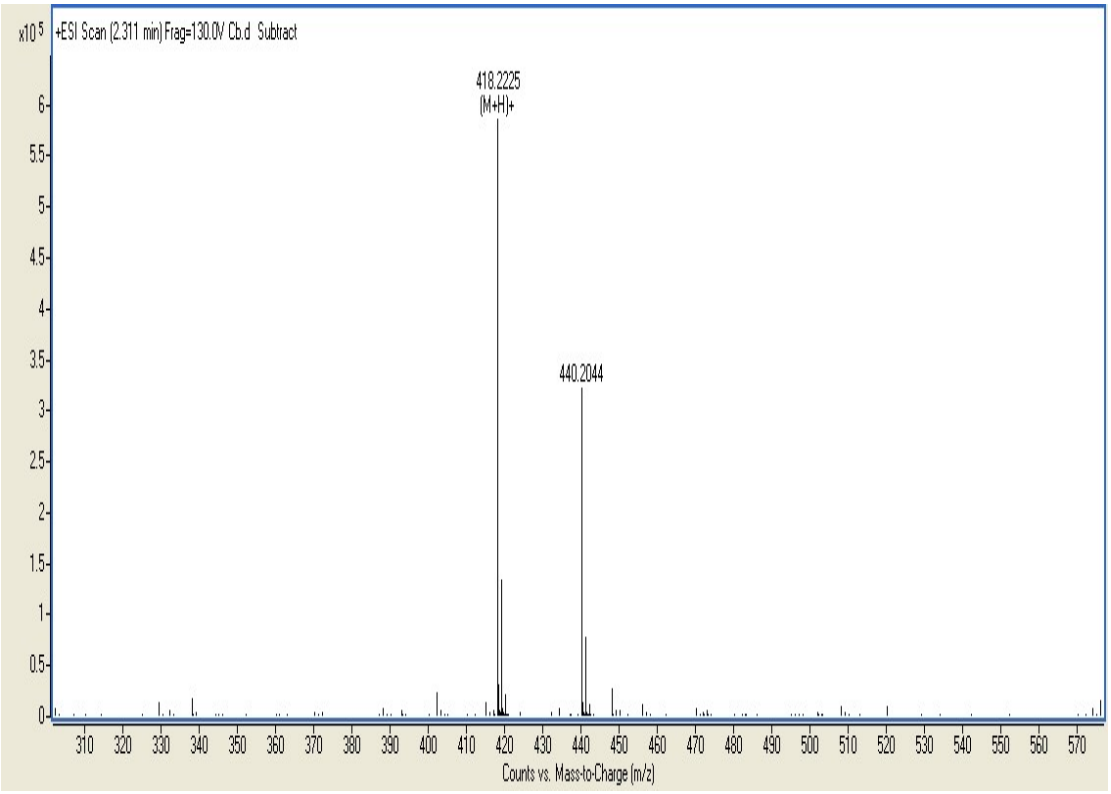


Figure S145 HRMS spectrum of **6l**

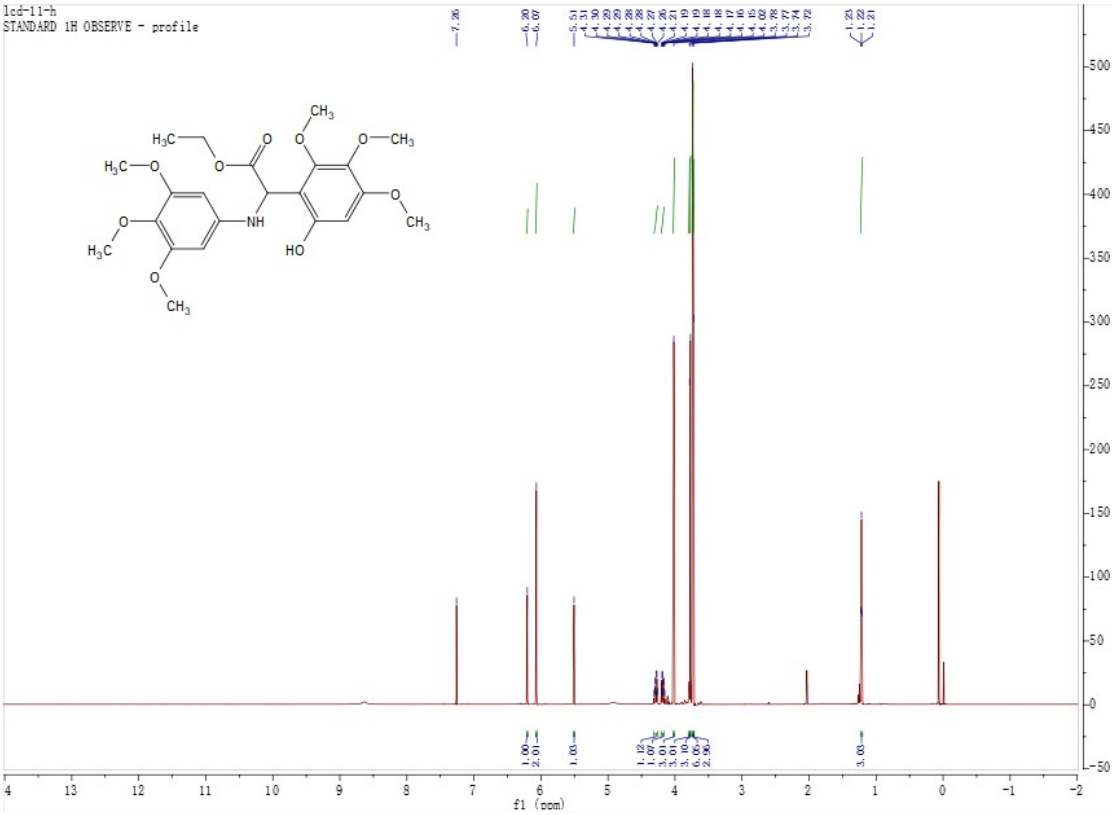


Figure S146 ^{1}H-NMR spectrum of **6m** in $CDCl_3$

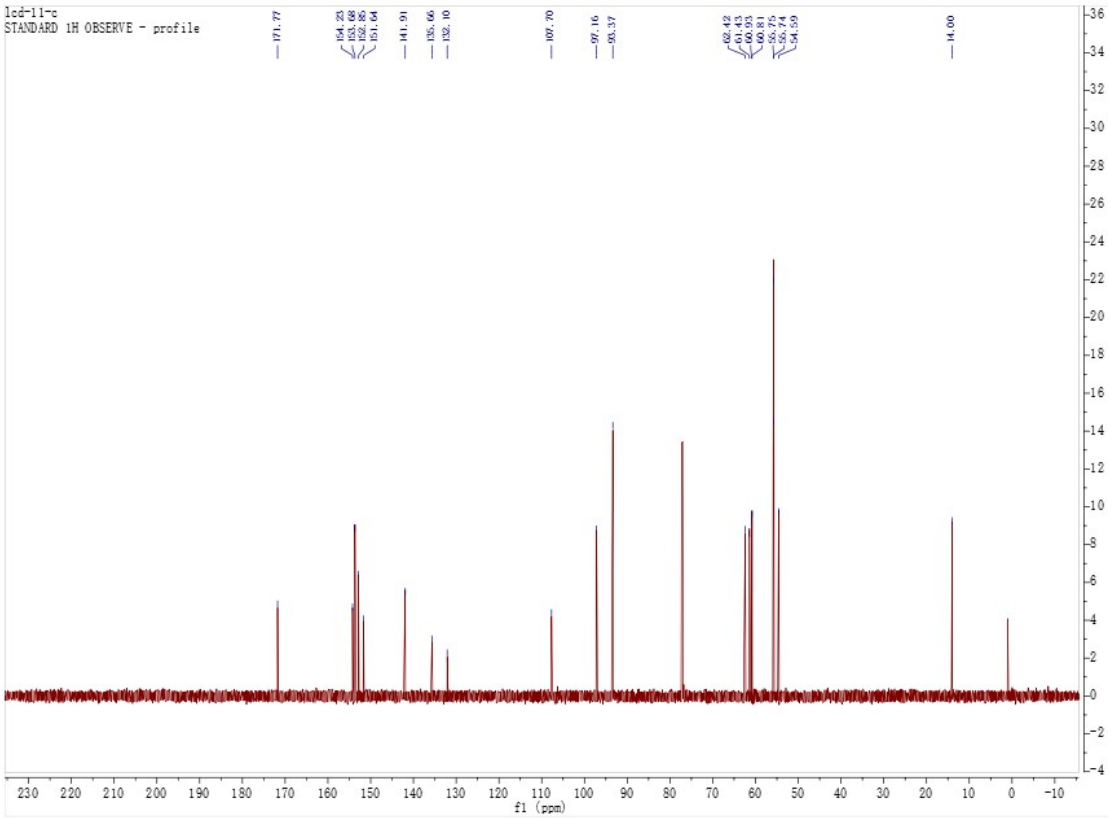


Figure S147 ^{13}C-NMR spectrum of **6m** in $CDCl_3$

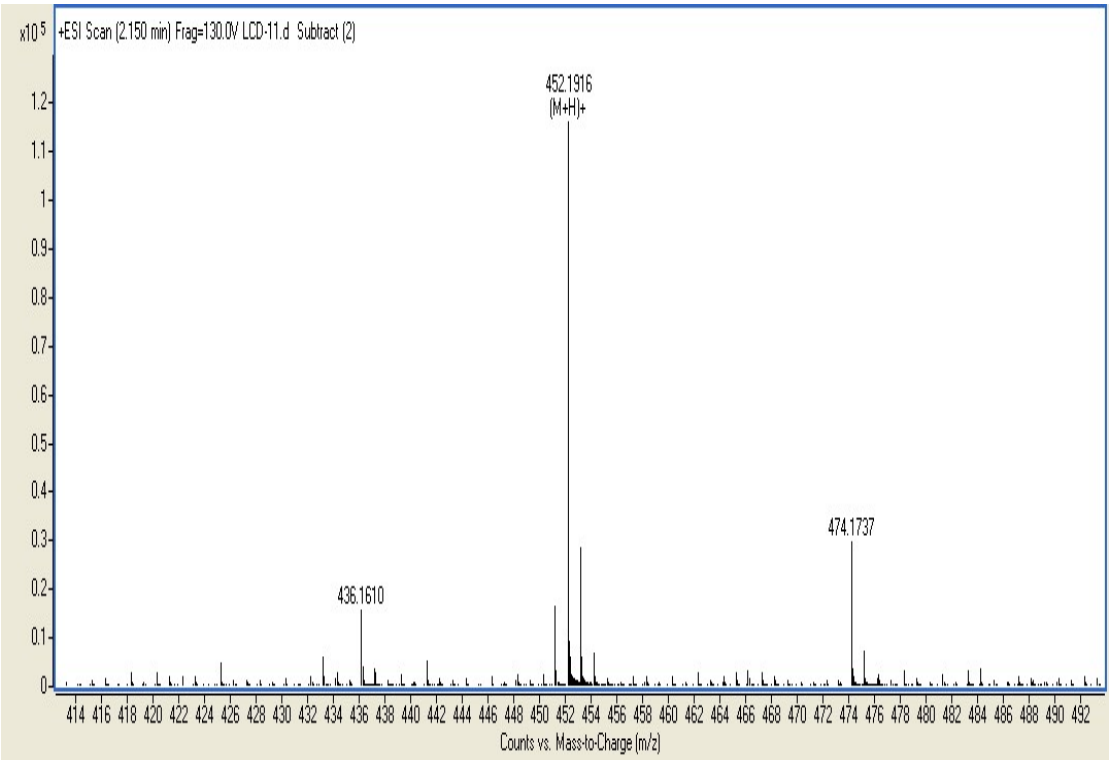


Figure S148 HRMS spectrum of **6m**

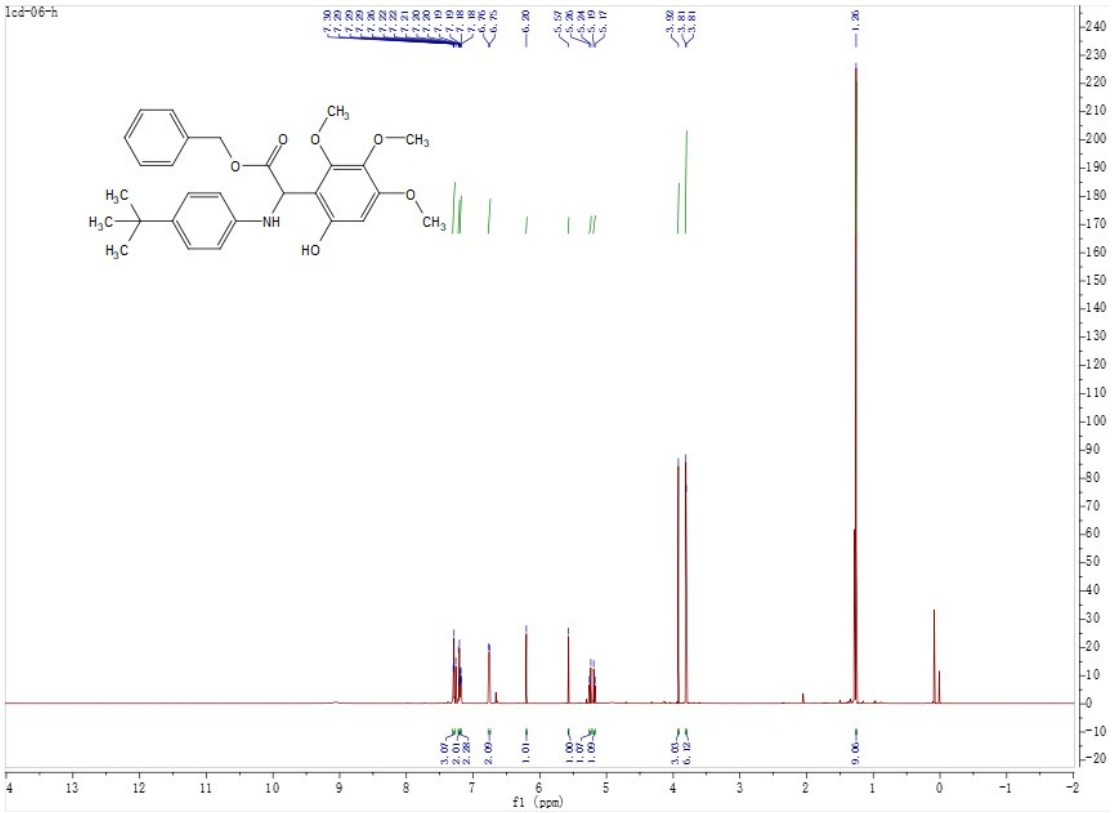


Figure S149 ^{1}H-NMR spectrum of **6n** in $CDCl_3$

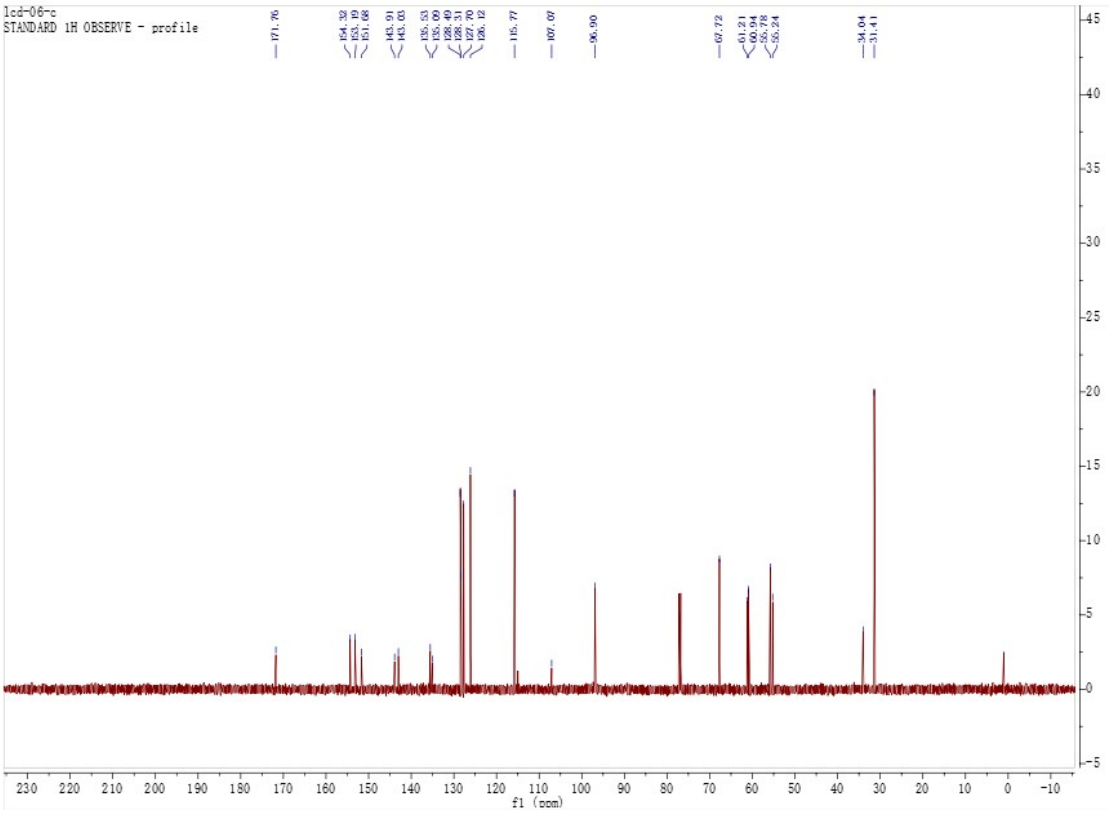


Figure S150 ^{13}C-NMR spectrum of **6n** in $CDCl_3$

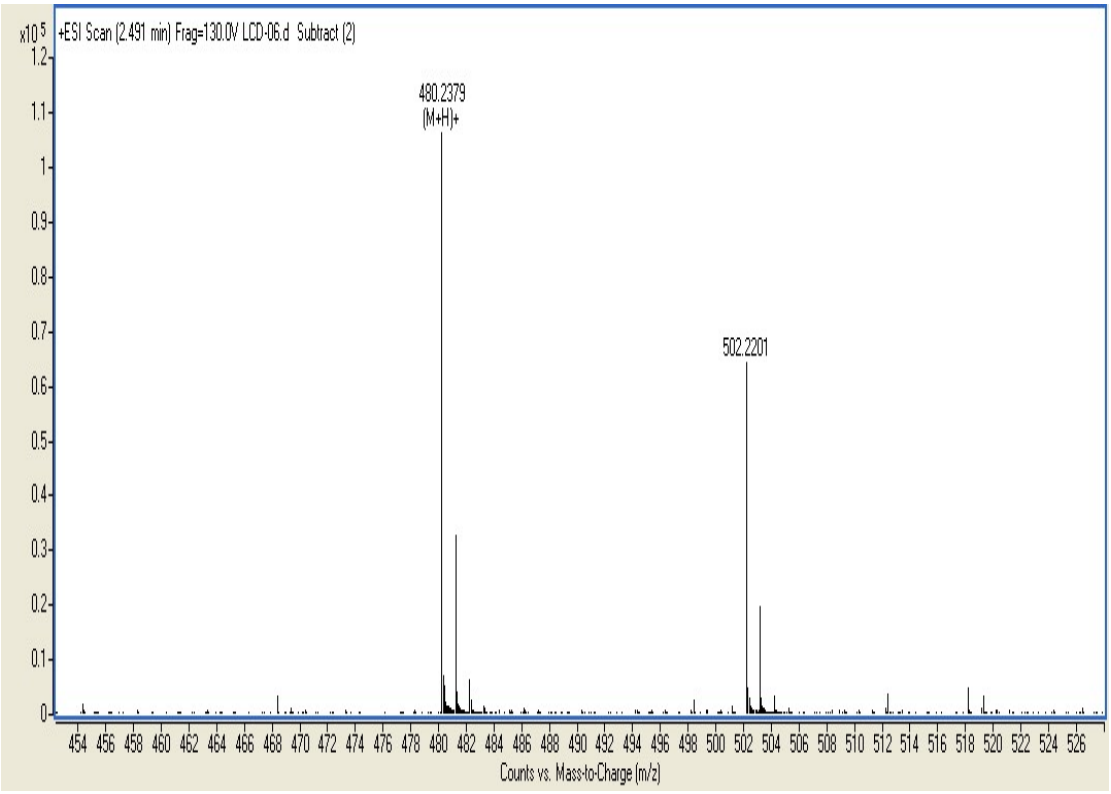


Figure S151 HRMS spectrum of **6n**

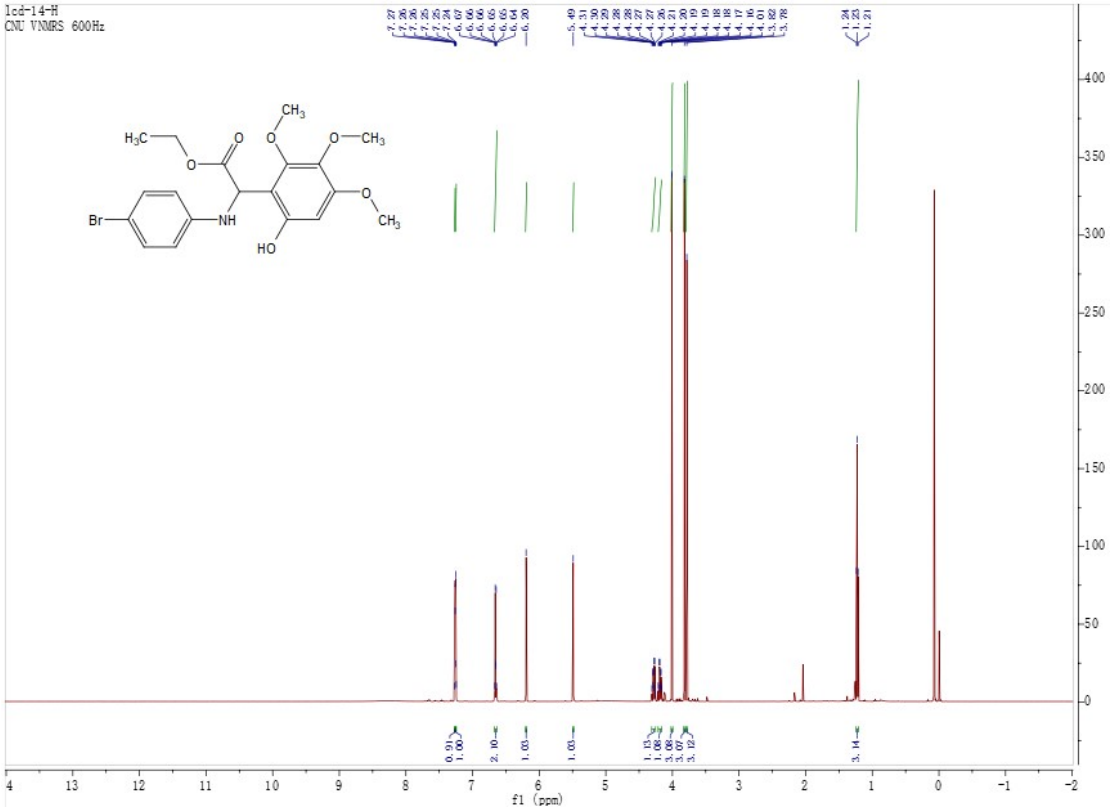


Figure S152 ^{1}H-NMR spectrum of **6o** in $CDCl_3$

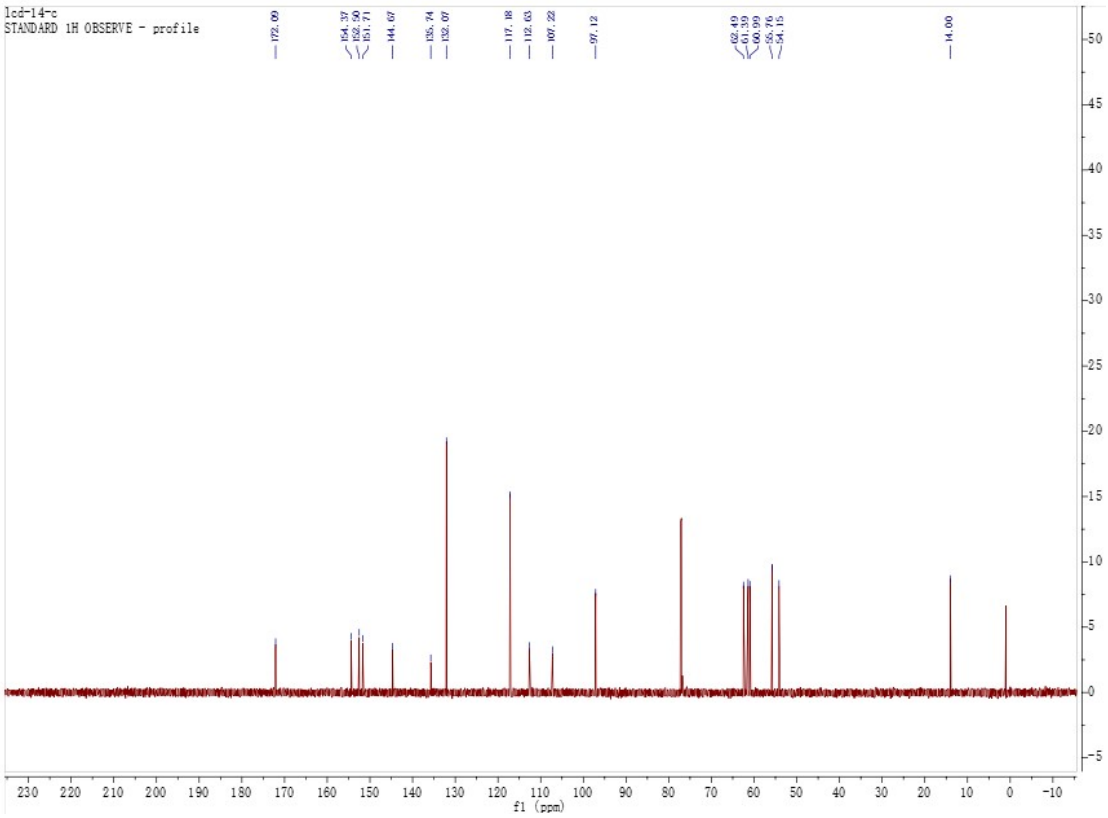


Figure S153 ^{13}C-NMR spectrum of **6o** in $CDCl_3$

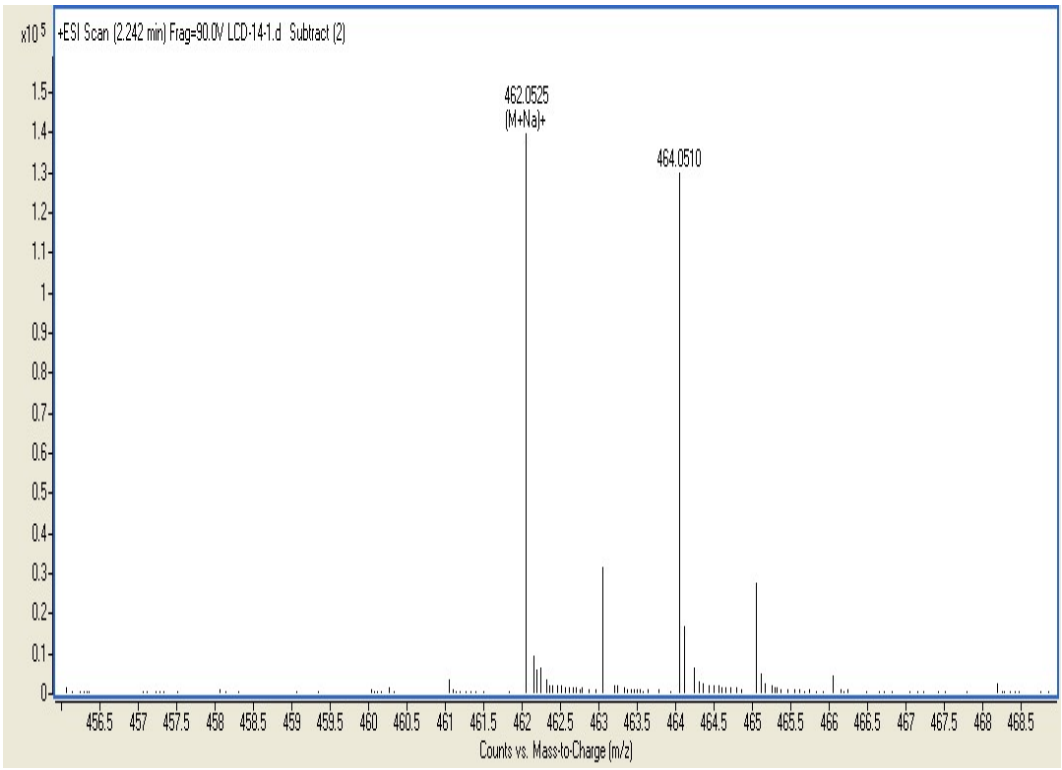


Figure S154 HRMS spectrum of **6o**

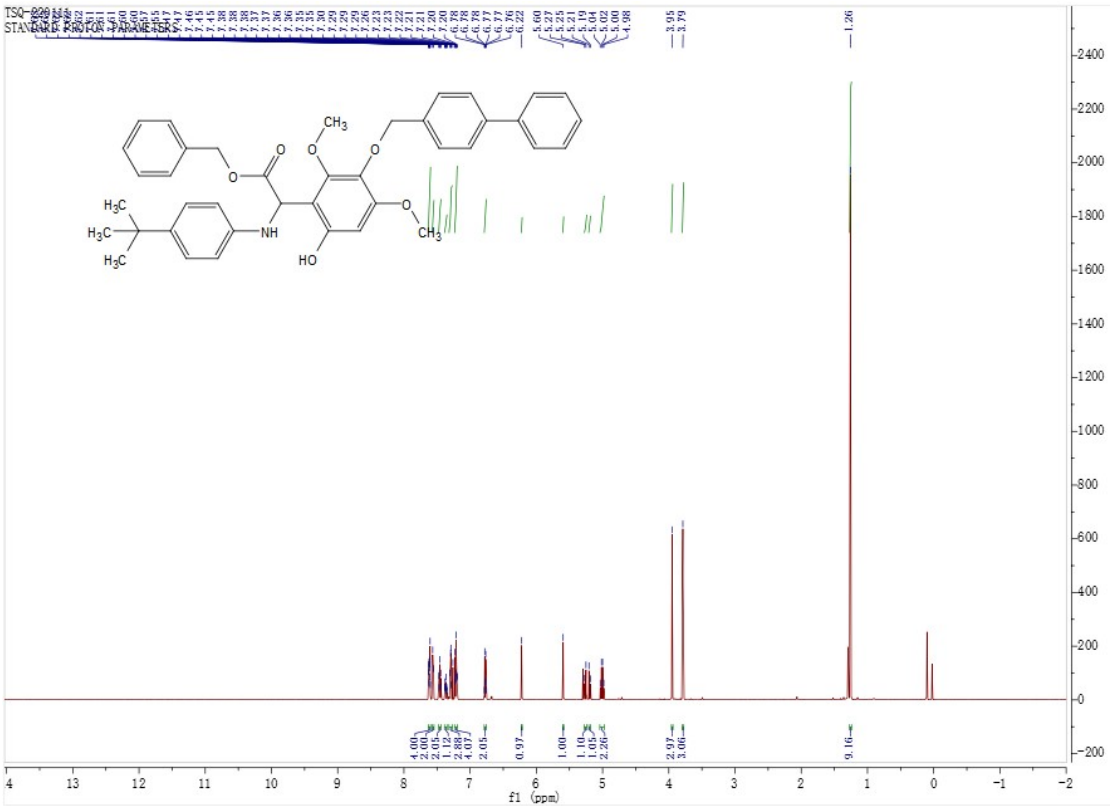


Figure S155 ^{1}H-NMR spectrum of **6p** in $CDCl_3$

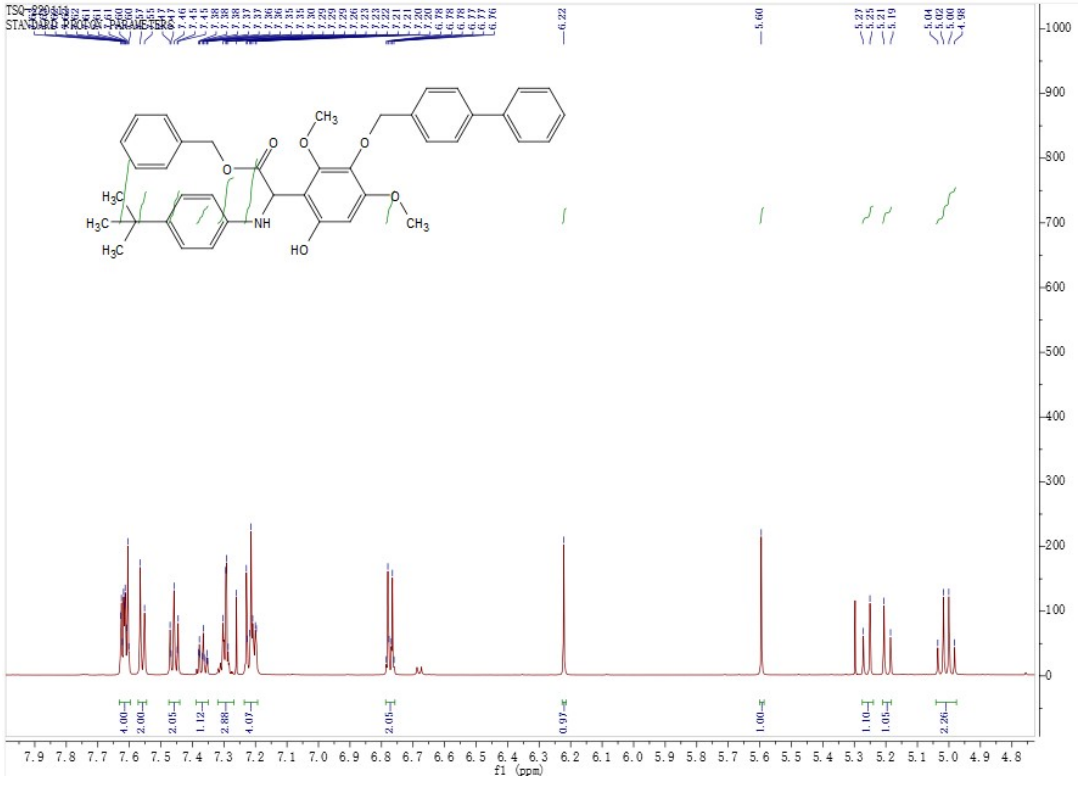


Figure S156 Partial enlarged ^{1}H-NMR spectrum of **6p** in $CDCl_3$

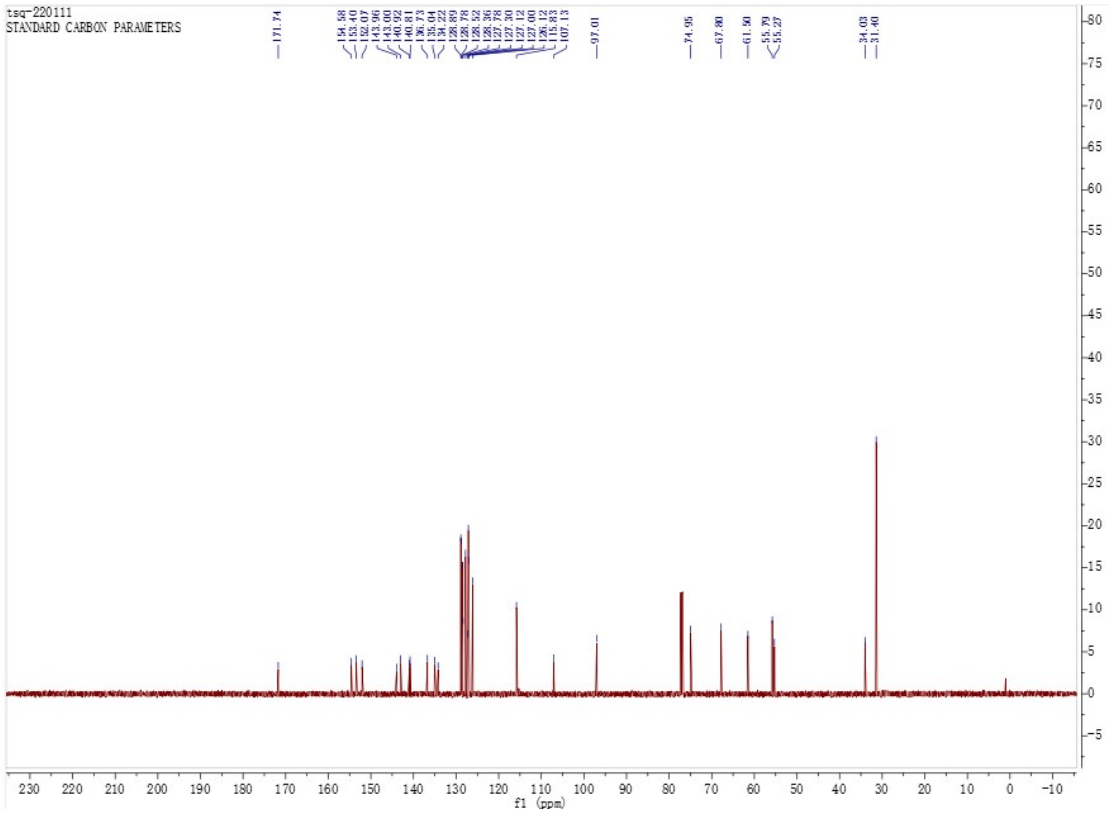


Figure S157 ^{13}C-NMR spectrum of **6p** in $CDCl_3$

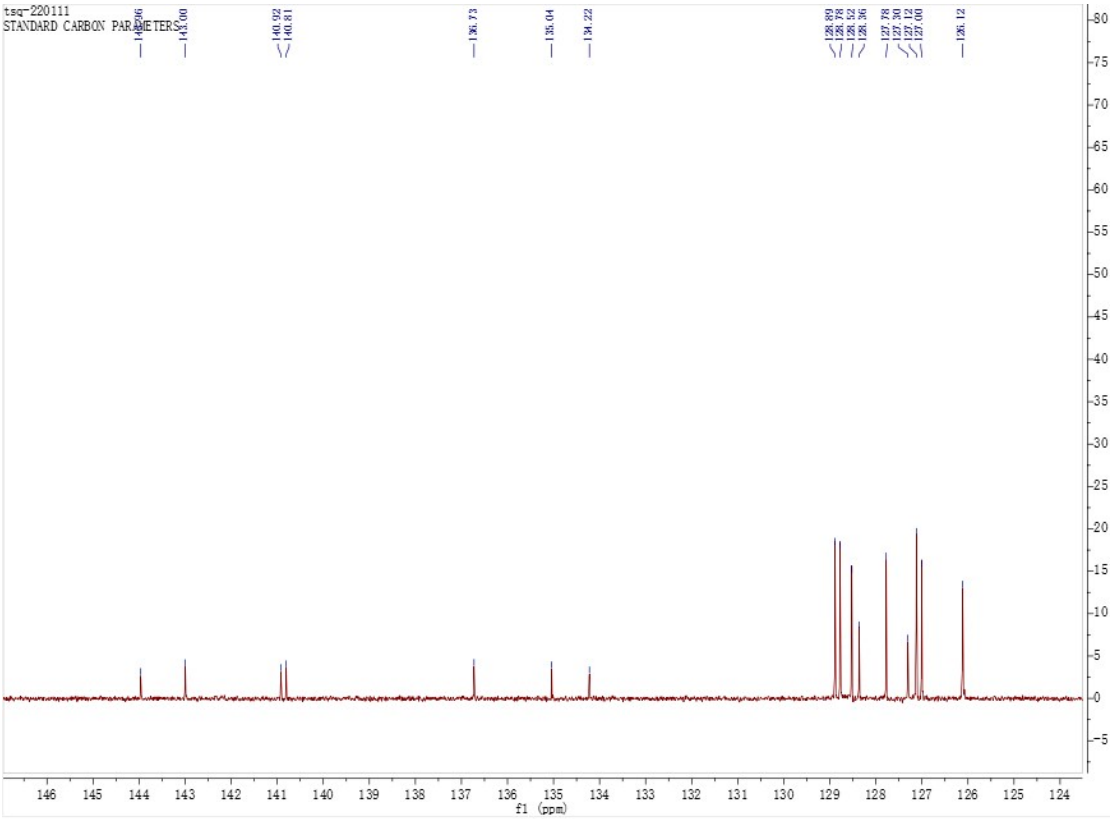


Figure S158 Partial enlarged ^{13}C-NMR spectrum of **6p** in $CDCl_3$

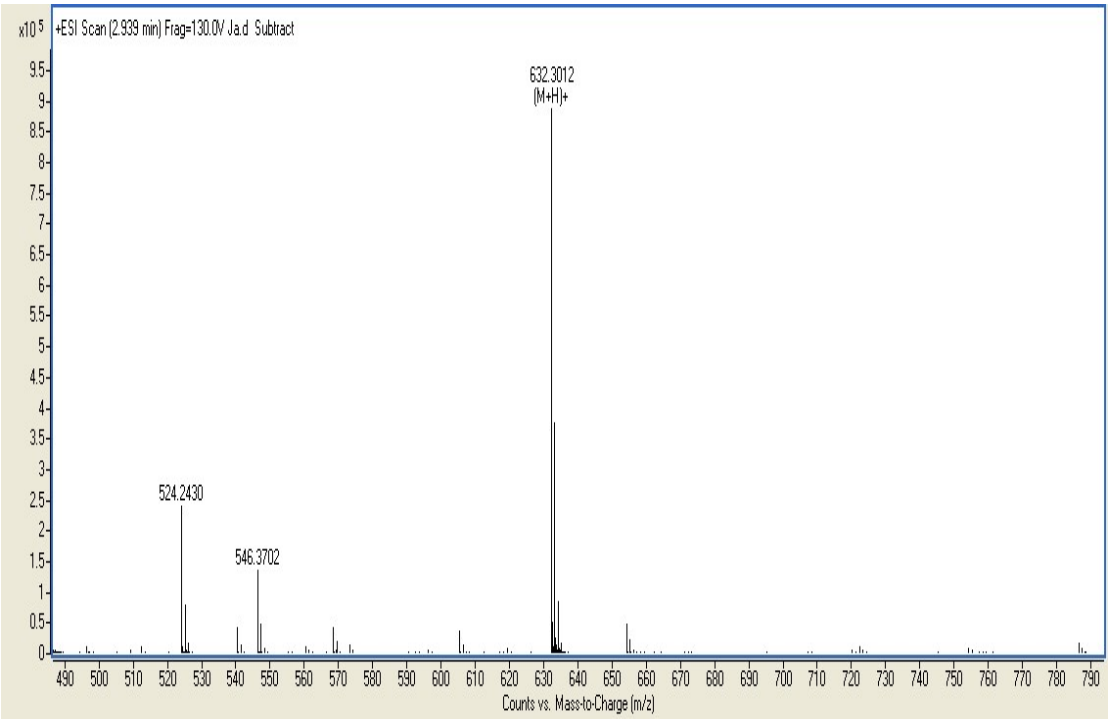


Figure S159 HRMS spectrum of **6p**

8 · Electrochemical data for compounds 1a, 4a and the mixture of 1a and 4a (molar ratio = 1:1)

Electrochemistry: Solvents (SDS, HPLC grade) and electrolyte (tetrabutylammonium hexafluorophosphate from Fluka, puriss.) were used without further purification. Cyclic voltammetry was performed in a three-electrode cell with a potentiostat (Shanghai Chenhua CHI660e-Electrochemical Instrument Co., LTD) driven by a PC. Carbon electrode (1 mm diameter) was used as working electrode, whereas platinium wire and Ag^{+} (0.01 M in acetonitrile)/Ag were used, respectively, as the counter and reference electrodes. Ferrocene was used as an internal standard. All the investigated solutions were de-aereted by argon bubbling for at least 2 min before performing the electrochemical measurements.

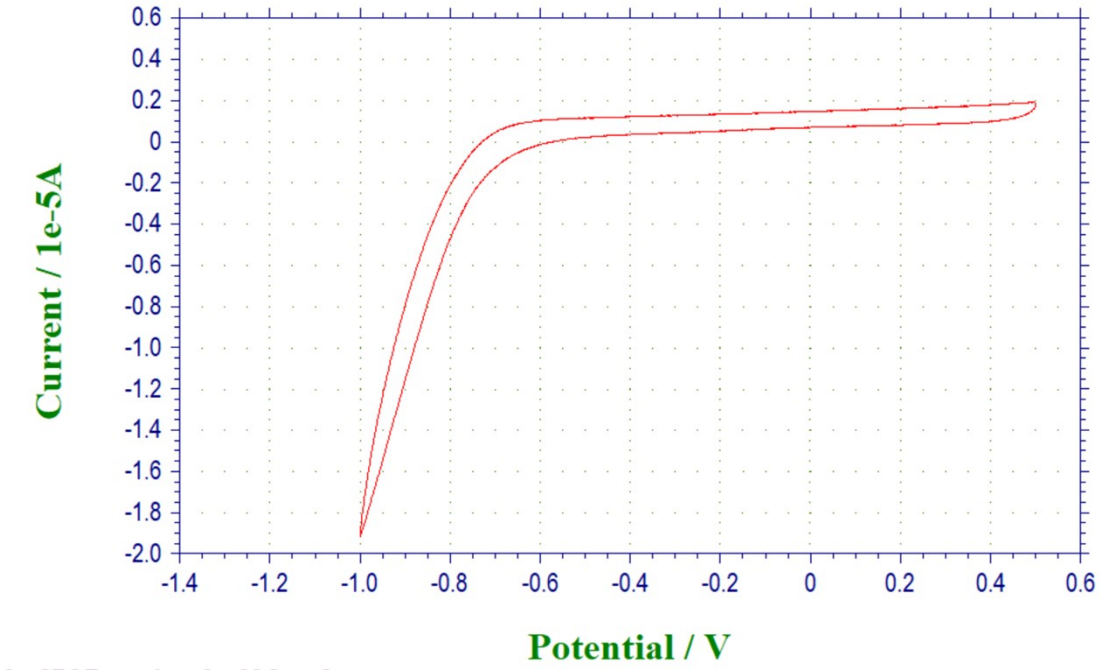


Figure S160 Cyclic voltammetry of *N*-phenyl-α-benzyl thioglycine ethyl ester (**1a)** (V vs. Ag^{+}/Ag), in dichloromethane (with 0.1 M Bu_4NPF_6 as electrolyte) on glassy carbon electrode at 0.1 V s^{-1}. Concentrations are about 10 mM. Scan rate: 50 mV s^{-1}.

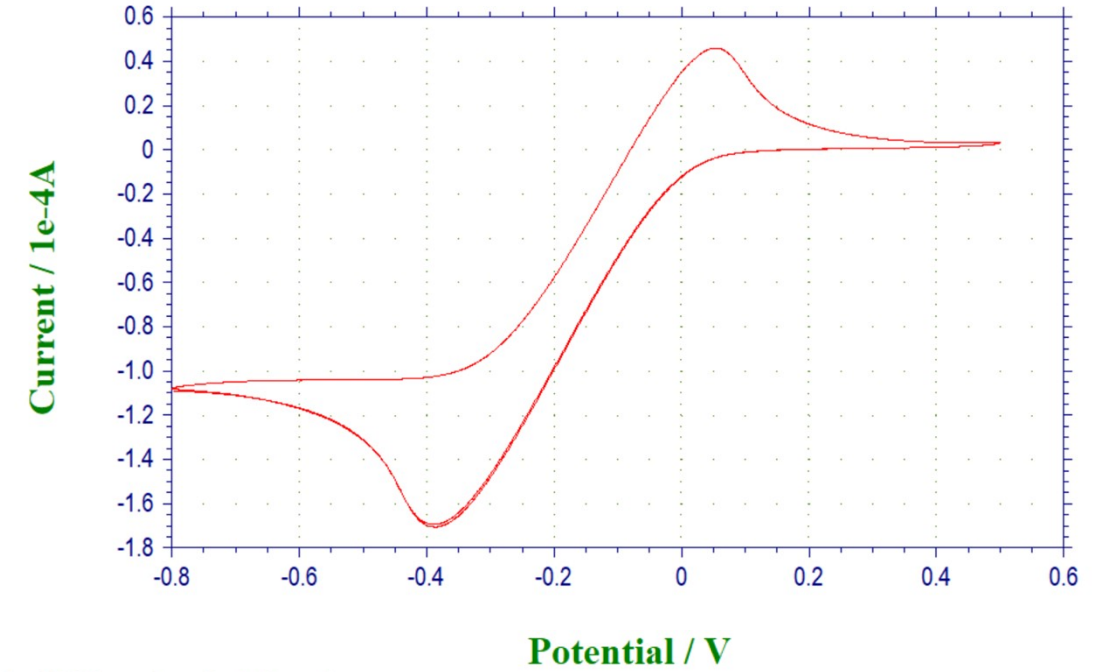


Figure S161 Cyclic voltammetry of 3,6-dichlor-1,2,4,5-tetrazine (**4a)** (V vs. Ag^{+}/Ag), in dichloromethane (with 0.1 M Bu_4NPF_6 as electrolyte) on glassy carbon electrode at 0.1 V s^{-1}. Concentrations are about 10 mM. Scan rate: 50 mV s^{-1}.

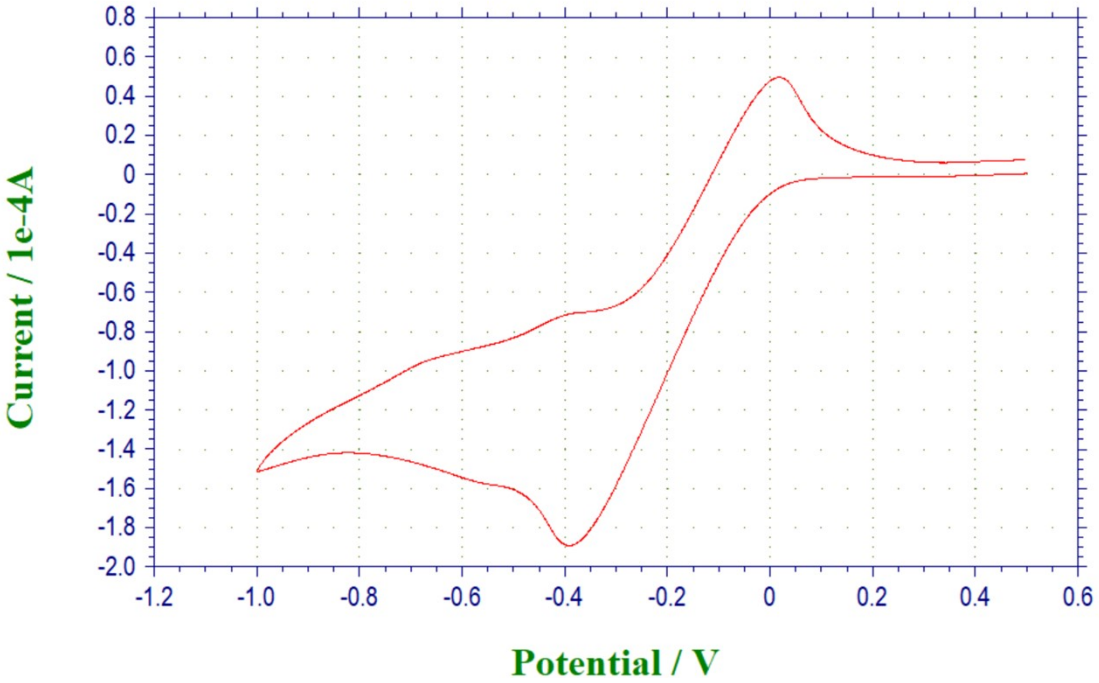


Figure S162 Cyclic voltammetry of mixture of **1a** and **4a** (molar ratio = 1:1**)** (V vs. Ag^{+}/Ag), in dichloromethane (with 0.1 M Bu_4NPF_6 as electrolyte) on glassy carbon electrode at 0.1 V s^{-1}. Concentrations are about 10 mM. Scan rate: 50 mV s^{-1}.

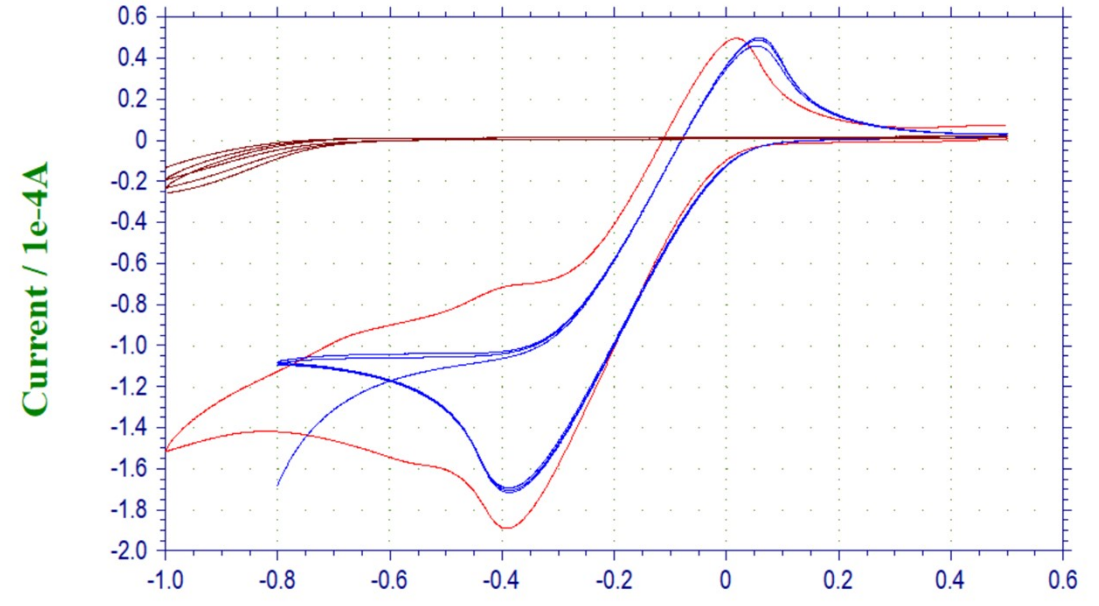


Figure S163 Cyclic voltammetry of **1a** (brown), **4a** (blue) and mixture of **1a** and **4a** (red) (molar ratio = 1:1**)** (V vs. Ag^{+}/Ag), in dichloromethane (with 0.1 M Bu_4NPF_6 as electrolyte) on glassy carbon electrode at 0.1 V s^{-1}. Concentrations are about 10 mM. Scan rate: 50 mV s^{-1}.