

## Supporting Information

### Visible light-induced synthesis of polysubstituted oxazoles from diazo compounds

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### Table of Contents

<b>1. Experimental Section</b>	<b>S2</b>
A) General information	S2
B) Methods for the synthesis of substrates	S5
C) General procedure for the photoreaction	S6
D) Procedure for the gram-scale reaction	S7
E) Determination of the light intensity	S9
F) Other failed cases	S11
<b>2. Characterization Data</b>	<b>S12</b>
A) Characterization data of selected diazo substrates	S12
B) Characterization data of the products	S13
<b>3. <sup>1</sup>H NMR, <sup>13</sup>C NMR and <sup>19</sup>F NMR Spectra for Products</b>	<b>S23</b>

# 1. Experimental Section

## A) General information

Unless otherwise noted, all commercially available compounds were used as provided without further purification. Solvents were dried and purified according to the procedure from “Purification of Laboratory Chemicals book”. Column chromatography was performed using silica gel. Reactions were monitored by TLC and visualized by UV lamp (254 nm) and stained with ethanolic solution of concentrated potassium permanganate. Yields generally referred to chromatographically isolated yields, unless otherwise noted.  $^1\text{H}$  NMR (400 MHz),  $^{13}\text{C}$  NMR (101 MHz) and  $^{19}\text{F}$  NMR (376 MHz) spectra are recorded on a Bruker AV-400 spectrometer in  $\text{CDCl}_3$  with TMS as internal standard. For  $^1\text{H}$  NMR (400 MHz),  $\text{CDCl}_3$  ( $\delta = 7.26$  ppm) served as internal standard and data are reported as follows: chemical shift (in ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, qd = quartet of doublets, tq = triplet of quartets, brs = broad singlet), coupling constant (in Hz), and integration. GC-MS analysis was performed on 7890A-5975C/Agilent. HR-MS spectra were recorded on a Waters Xevo G2QTOF/UPLC mass spectrometer using TOF as the mass analyzer type. Starting material **1** were synthesized according to the literature methods. Starting material  $\text{NaSO}_2\text{CF}_3$  and  $\text{Mn}(\text{acac})_3$  were directly purchased from chemical suppliers (e.g. Bide Chemical, Energy Chemical, Sigma Aldrich). The photoreaction instrument (WPP-TEC-1020SL) was purchased from WATTCAS, China. The light source used in the experiment is LED-460 nm, and the manufacturer is also from WATTCAS, China. The reaction vessel is a quartz reaction tube, as shown in the Figure S1.

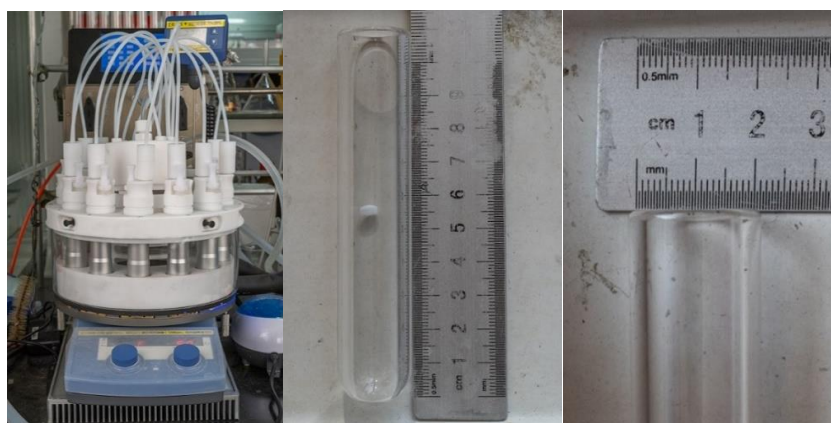


Figure S1. WPP-TEC-1020SL

### SPECTROPHOTOCOLORMETER ANALYSIS REPORT FOR LED-460nm (WATTCAS, China.)

#### Color Parameters:

CIE(1931:) x =0.1461

y =0.0375

CIE(1960:) u =0.1850

v =0.0713

CIE (1976:) u' =0.1850

v' =0.1070

Color Temperature: Tc=25000K Dominant Wave: WL.D=461.00nm Purity: PUR=97.99

Peak Wave: WL.P=456.0nm Delta Wave: WL.H=24.0nm

Color Tolerance: SDCM=195.3 Ra:Ra=0.0

CRI1=0.0 CRI2=0.0 CRI3=0.0 CRI4=0.0 CRI5=0.0

CRI6=0.0 CRI7=0.0 CRI8=0.0 CRI9=0.0 CRI10=0.0

CRI11=0.0 CRI12=0.0 CRI13=0.0 CRI14=0.0 CRI15=0.0

**Photology Parameters:**

Lum Flux:  $\Phi(lm)$ = 221.54 lm Optical Power:  $\Phi_e(mW)$ = 4440.3 mW  $\eta(lm/W)$ = 22.3 lm/W

**Electric Parameters:**

Forward Voltage:  $V_F$  = 23.64 V Forward Current:  $I_F$  = 419.9 mA Power = 9.93 W

**Status:**

Wavelength Range: 380nm---780nm Intergration Time : 476 ms

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**Test Project: LED COB TESTING**

**Test Equipment: ZP OPTO SYSTEM**

**Product Model:HIGH POWER COB**

**Manufacturer:LEARNEW OPTO**

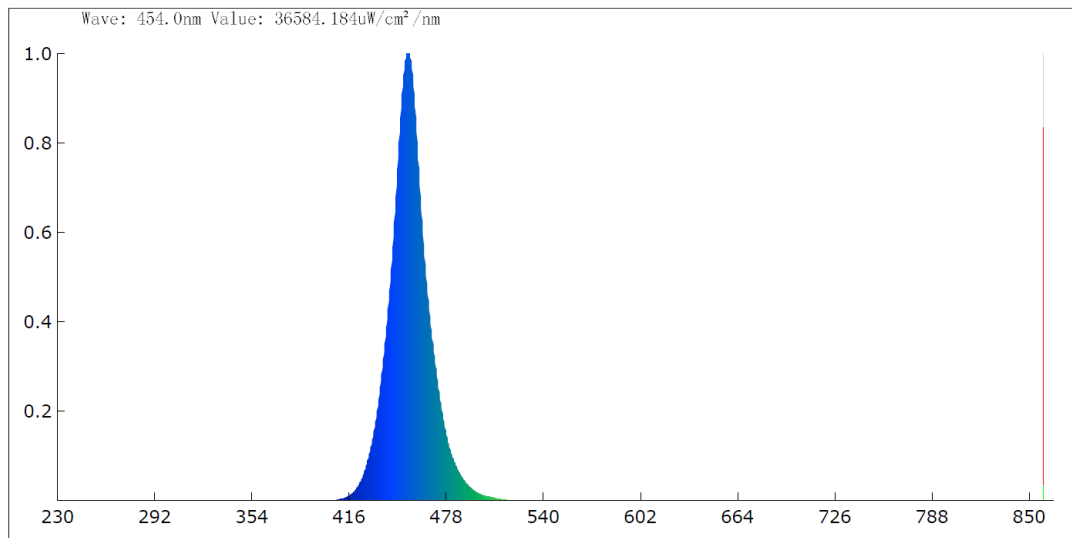
**Temperature:25**

**Humidity:40%**

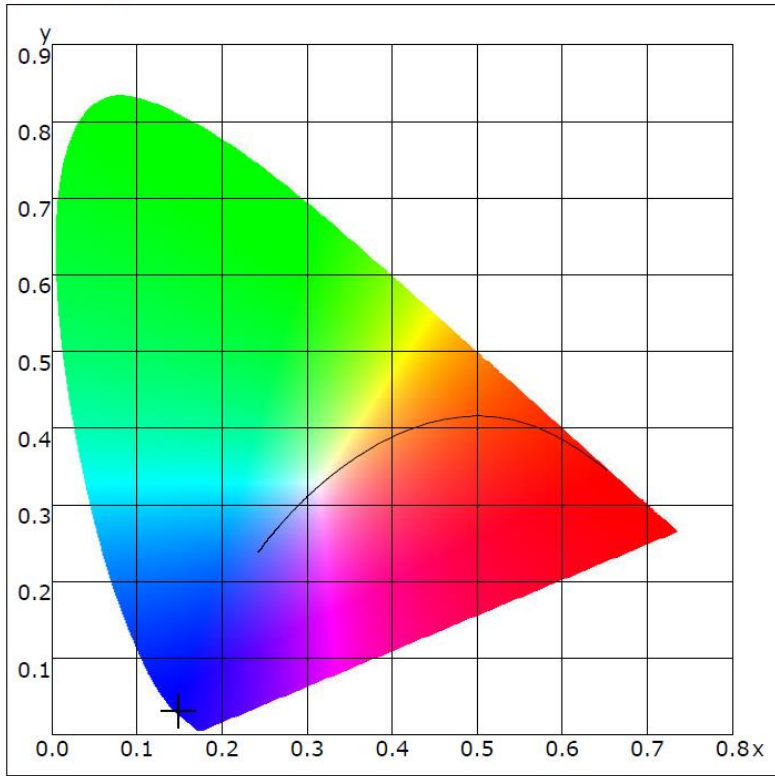
**Tester:MESSI LAN Time: 2019-03-12 12:27**

**Test Mechanism: ZP OPTO LAB**

The distance between Reflective surface and Liquid level is 5mm.



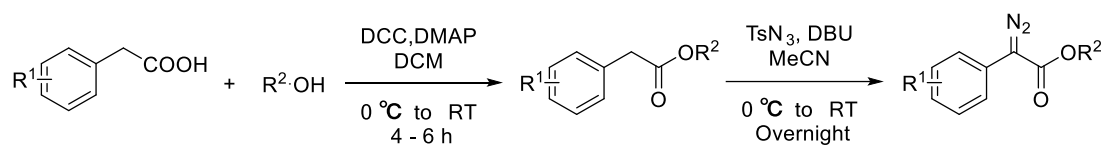
CIE1931



**Figure S2.** Wavelength of peak and spectral distribution and intensity of light source

## B) Methods for the synthesis of substrates

General Procedure for the synthesis of diazoacetates (Substrate characterization data were identical to Literature alignments)<sup>1</sup>.

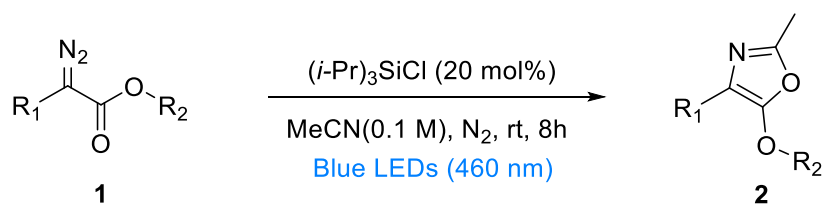


**Step-I:** To a stirred, ice cooled solution of the phenylacetic acid (1.3 g, 10 mmol, 1 equiv.), and alcohol (12 mmol, 1.2 equiv.) in 20 mL DCM was added a solution of DCC (13 mmol, 1.3 equiv.) and DMAP (1 mmol, 0.1 equiv.) in 10 mL DCM at once. The solution was stirred 6 h while slowly warming up to room temperature. After finishing the reaction, the solid was filtered off and washed with Et<sub>2</sub>O. The solvent was evaporated, and the residue was purified by silica gel column chromatography (pentane : EtOAc 40:1 - 20:1) provided the desired ester.

**Step-II:** To a stirred, ice cooled solution of the ester (5 mmol, 1 equiv.) and *p*-tosyl azide (5.5 mmol, 1.1 equiv.) in 10 mL MeCN were added DBU (7 mmol, 1.4 equiv.) dropwise. The solution was stirred over night while slowly warming up to room temperature. DCM was added, and the organic layer was washed two times with sat. aq. NH<sub>4</sub>Cl solution. The organic layer was dried over MgSO<sub>4</sub> and the solvent was removed in vacuum. The crude product was purified by silica gel column chromatography using (pentane : EtOAc - 80:1 to 40:1) provided the desired diazo compound.

(1) a) Jana, S.; Yang, Z.; Li, F.; Empel, C.; Ho, J.; Koenigs, R. M. *Angew. Chem. Int. Ed.* **2020**, *59*, 5562-5566; b) Jana, S.; Yang, Z.; Pei, C.; Xu, X.; Koenigs, R. M. *Chem. Sci.* **2019**, *10*, 10129-10134; c) Keipour, H.; Ollevier, T. *Org. Lett.* **2017**, *19*, 5736-5739.

### C) General procedure for the photoreaction

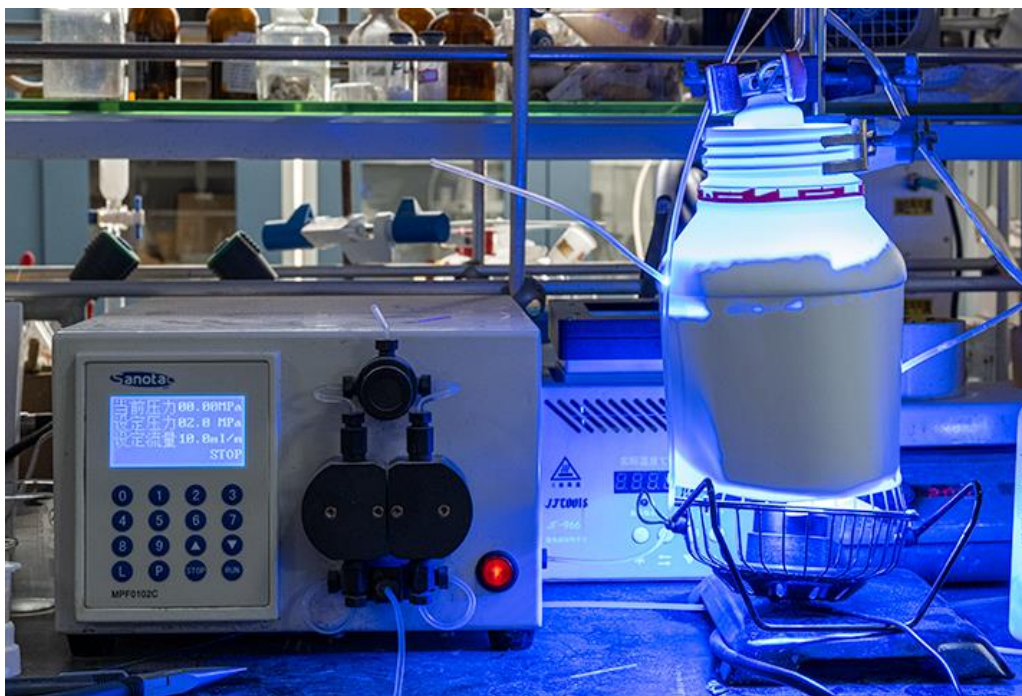


#### General Procedure for the Synthesis of Oxazole Ring (GP-1)

Add diazo substrate **1a** (0.1 mmol, 1.0 eq.), (i-Pr)<sub>3</sub>SiCl (0.02 mmol, 0.2 equiv.) to a 25 ml dry quartz reaction tube at room temperature with a small magnet. 1 ml of MeCN was added as a solvent, nitrogen was passed through the reaction system (Using the ventilation function of the WPP-TEC-1020SL photoreactor, as acetonitrile is prone to boiling under low pressure, a diaphragm pump is used to vacuum for 5 seconds before filling with nitrogen and cycling for 30 times.), and irradiate the reaction mixture with a 7W blue LED light (WATTCAS: WPTEC-1020SL) and stir for 8 hours until the reaction was completed. Preparing (petroleum ether:ethyl acetate = 30:1) and purifying to obtain colorless oily liquid **2a**.

#### D) Procedure for the gram-scale reaction

Methyl  $\alpha$ -diazoacetate **1a** (1.8 g, 10.0 mmol), (*i*-Pr)<sub>3</sub>SiCl (0.38 g, 2.0 mmol) were added to a 100 ml flask equipped with a rubber septum containing 22.5 mL of anhydrous MeCN and sparged with nitrogen 20 minutes. Mix with a magnetic stirrer and connect the system to a flow reactor with a peristaltic pump (Figure S2). The combined reaction system flow rate was set to 1 ml/min and the reaction mixture would flow into a microtube reactor (PFA, OD = 1/8", ID = 1/16", 10 m, volume = 18.8 mL) and be illuminated with 40 W blue LED (As shown in Figure S2, the flow reaction tube is wound along the LED light rod, fixed with the light rod with Double-sided tape on the inner side, and reinforced with a proper amount of transparent adhesive on the outer side. In addition, the inner side of the reactor lamp cover is covered with aluminum foil. The reactor and the flask containing the reaction raw materials form a closed system, and a balloon filled with nitrogen gas is used to maintain the relative high pressure of the system.). Use fan ventilation to keep the device at room temperature. The cycle time in the reactor was controlled at 1 hours, after which the reaction was quenched and processed according to the GP-1 method to finally obtain 1.7 g of oxazole product **2a** (yield 90%).





**Figure S2. Flow Reactor**



## E) Determination of the light intensity

The photon flux of the spectrophotometer was measured by a standard ferrite photometer.<sup>22</sup> Prepare a 0.15 M ferric oxalate solution by dissolving 2.21 g of potassium ferric oxalate hydrate in 30 mL of 0.05 M H<sub>2</sub>SO<sub>4</sub>. Prepare a phenanthroline buffer solution by dissolving 50 mg phenanthroline and 11.25 g sodium acetate in 50 mL 0.5 M H<sub>2</sub>SO<sub>4</sub>. Both solutions were stored in the dark. To determine the photon flux of the spectrophotometer, place 2.0 mL of ferric oxalate solution in a cuvette and illuminate for 90.0 s at  $\lambda = 460$  nm with an emission slit width of 10.0 nm. After irradiation, add 0.35 mL of phenanthroline solution into the cuvette. The solution was then allowed to stand for 1 hour to fully coordinate the ferrous ion to the phenanthroline. Measure the absorbance of the solution at 510 nm. Non-irradiated samples were also prepared and the absorbance at 510 nm was measured. Calculate the conversion rate using eq (1).

$$\text{mol Fe}^{2+} = \frac{V \cdot \Delta A}{l \cdot \epsilon} \quad (1)$$

V is the volume of solvent (0.003 L);  $\Delta A$  is the difference of absorptions of irradiated sample and un-irradiated sample (1.989) at 510 nm. l is the path length (1 cm), and  $\epsilon$  is the molar absorptivity at 510nm (11100 L mol<sup>-1</sup> cm<sup>-1</sup>). The photon flux can be calculated via eq (2).

$$\text{photon flux} = \frac{\text{mol Fe}^{2+}}{\Phi \cdot t \cdot f} \quad (2)$$

$\Phi$  is the quantum yield of Fe<sup>2+</sup> at 460 nm (approximately 0.94 at 460 nm for a 0.15M solution). t is time (90 s), and f is fraction of light absorbed at 460nm ( $f = 1 - 10^{-A}$ ,  $A = 2.44$  at 460nm,  $f = 0.996$ ). Photon flux was calculated to be  $6.403 \cdot 10^{-9}$  einstein s<sup>-1</sup>.

$$\text{mol Fe}^{2+} = \frac{0.003 \text{ L} \cdot 1.989}{1 \text{ cm} \cdot 11100 \text{ L mol}^{-1} \text{ cm}^{-1}} = 5.375 \cdot 10^{-7} \text{ mol} \quad (3)$$

$$\text{photon flux} = \frac{5.375 \cdot 10^{-7}}{0.94 \cdot 90 \text{ s} \cdot 0.996} = 6.403 \cdot 10^{-9} \text{ einstein s}^{-1} \quad (4)$$

A cuvette was charged with diazo substrate **1a** (0.2 mmol, 1.0 eq.), (i-Pr)<sub>3</sub>SiCl (0.04 mmol, 0.4 equiv.) and 2.0 mL MeCN (0.1 M). Then cover the cuvette with PTFE plugs under nitrogen protection. The sample was stirred and irradiated ( $\lambda = 460$  nm, slit width = 10.0 nm) for 600 s (10 min). After irradiation, the solution was passed through a silica plug. Product yield is determined based on column chromatography separation and structure verification with HNMR. The quantum yield was determined using eq (5). Essentially all incident light ( $f = 0.999$ ) is absorbed by the Reaction system at the reaction conditions described above.

$$\Phi = \frac{\text{mol product}}{\text{flux} \cdot t \cdot f} \quad (5)$$

Experiment 1: 35.2 mg (0.2 mmol) diazo substrate **1a**, 7.7 mg (0.04 mmol) (i-Pr)<sub>3</sub>SiCl, 2.0 mL (0.1 M) MeCN, after 600 s yielded 1.7%.  $\Phi(1.7\%) = 0.91$ .

$$\Phi = \frac{3.47 \cdot 10^{-6} \text{ mol}}{6.403 \cdot 10^{-9} \text{ einstein s}^{-1} \cdot 600 \text{ s} \cdot 0.99} = 0.91 \quad (6)$$

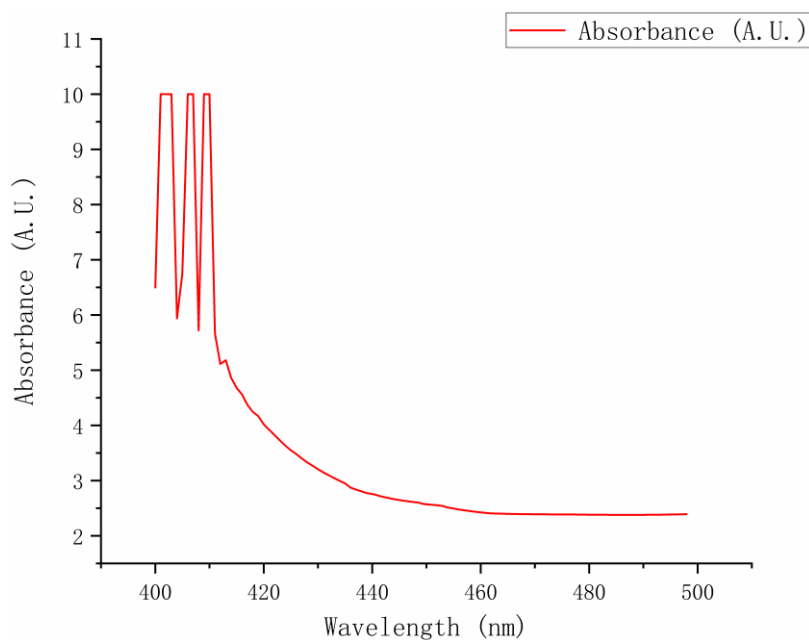
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(2) a) Hatchard, C. G.; Parker, C. A. *Proc. Roy. Soc. (London)*. **1956**, A235, 518–536; b) Kuhn, H. J.; Braslavsky, S. E.; Schmidt, R. *Pure Appl. Chem.* **2004**, 76, 2105–2146.

### Determination of fraction of light

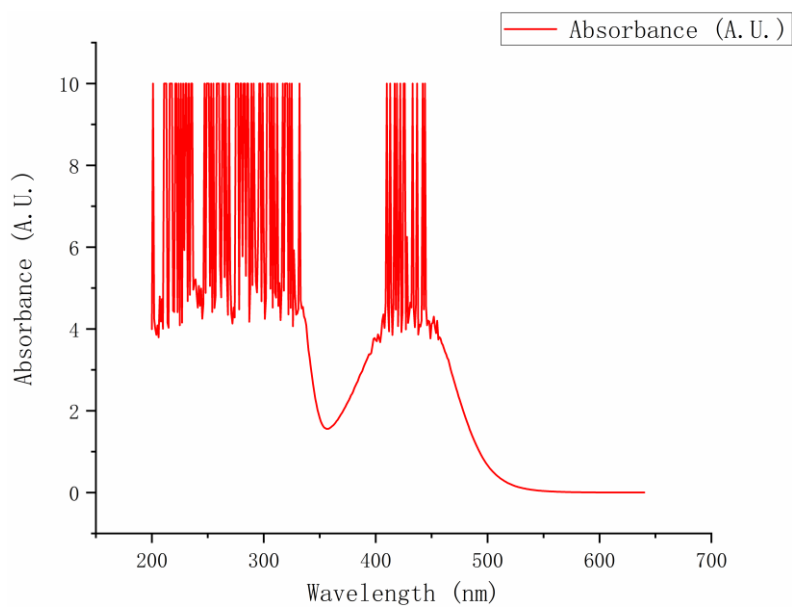
The absorbance of the above ferrioxalate solution at 460 nm was measured to be 2.448. The fraction of light absorbed ( $f$ ) by this solution was calculated using eq (7), where  $A$  is the measured absorbance at 460 nm.

$$f = 1 - 10^{-A} \quad (7)$$



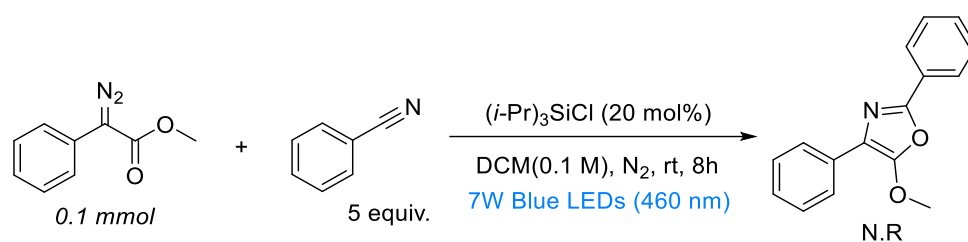
**Figure 3. Absorbance of the ferrioxalate actinometer solution.**

The measured absorbance of the reaction system at 460nm is 3.07.



**Figure 4. The absorbance of the reaction system.**

## F) Other failed cases

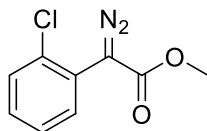


Add diazo substrate **1a** (0.1 mmol, 1.0 eq.),  $(i\text{-Pr})_3\text{SiCl}$  (0.02 mmol, 0.2 equiv.) benzonitrile (0.5 mmol, 5.0 equivalent) to a 25 ml dry quartz reaction tube at room temperature with a small magneton. 1 ml of DCM was added as a solvent, nitrogen was passed through the reaction system (Using the ventilation function of the WPP-TEC-1020SL photoreactor, as DCM is prone to boiling under low pressure, a diaphragm pump is used to vacuum for 5 seconds before filling with nitrogen and cycling for 30 times.), and irradiate the reaction mixture with a 7W blue LED light (WATTCAS: WPTEC-1020SL) and stir for 8 hours until **1a** is completely consumed. The corresponding oxazole product was not isolated.

## 2. Characterization Data

### A) Characterization data of selected diazo substrates

#### Methyl 2-(2-chlorophenyl)-2-diazoacetate (1c)

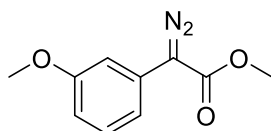


**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 8.05 – 8.00 (m, 1H), 7.56 – 7.53 (m, 1H), 7.50 – 7.41 (m, 2H), 6.24 (s, 1H), 3.92 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 166.0, 133.8, 132.4, 130.1, 129.7, 127.2, 124.0, 52.3.

**HRMS (m/z):**C<sub>9</sub>H<sub>8</sub>ClN<sub>2</sub>O<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 211.0269, found 211.0273.

#### Methyl 2-diazo-2-(3-methoxyphenyl)acetate (1f)

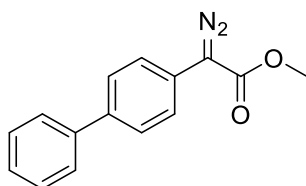


**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.33 (t, *J* = 8.1 Hz, 1H), 7.19 (s, 1H), 7.02 (ddt, *J* = 7.9, 1.5, 0.7 Hz, 1H), 6.81 – 6.73 (m, 1H), 3.90 (s, 3H), 3.86 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 165.6, 160.1, 129.9, 127.0, 116.1, 111.6, 109.8, 55.3, 52.0.

**HRMS (m/z):**C<sub>10</sub>H<sub>11</sub>N<sub>2</sub>O<sub>3</sub><sup>+</sup> ([M+H]<sup>+</sup>): 207.0764, found 207.0759.

#### Methyl 2-([1,1'-biphenyl]-4-yl)-2-diazoacetate (1q)

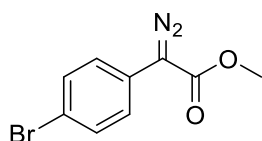


**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.70 – 7.57 (m, 6H), 7.49 (dd, *J* = 8.4, 6.9 Hz, 2H), 7.41 – 7.37 (m, 1H), 3.93 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 165.7, 140.4, 138.7, 128.9, 127.7, 127.4, 126.9, 124.4, 124.4, 52.1.

**HRMS (m/z):**C<sub>15</sub>H<sub>13</sub>N<sub>2</sub>O<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 253.0972, found 253.0974.

### Methyl 2-(4-bromophenyl)-2-diazoacetate (1o)



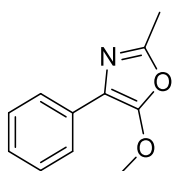
$^1\text{H NMR}$  (400 MHz, Chloroform-*d*)  $\delta$  7.54 – 7.50 (m, 2H), 7.41 – 7.37 (m, 2H), 3.90 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz, Chloroform-*d*)  $\delta$  165.3, 132.1, 125.4, 124.8, 119.4, 52.2.

**HRMS (m/z):**  $\text{C}_9\text{H}_8\text{BrN}_2\text{O}_2^+$  ( $[\text{M}+\text{H}]^+$ ): 254.9764, found 254.9766.

## B) Characterization data of the products

### 5-methoxy-2-methyl-4-phenyloxazole (2a)



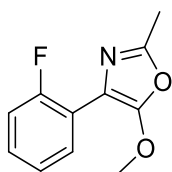
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (93%, 18 mg).

$^1\text{H NMR}$  (400 MHz, Chloroform-*d*)  $\delta$  7.84 – 7.78 (m, 2H), 7.41 (t,  $J = 7.8$  Hz, 2H), 7.27 – 7.21 (m, 1H), 4.06 (s, 3H), 2.45 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  154.3, 151.9, 131.5, 128.5, 126.3, 124.9, 114.5, 60.1, 14.3.

**HRMS (m/z):**  $\text{C}_{11}\text{H}_{12}\text{NO}_2^+$  ( $[\text{M}+\text{H}]^+$ ): 190.0863, found 190.0866.

### 4-(2-fluorophenyl)-5-methoxy-2-methyloxazole (2b)



The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (91%, 19 mg).

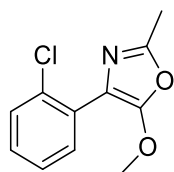
$^1\text{H NMR}$  (400 MHz, Chloroform-*d*)  $\delta$  7.67 (td,  $J = 7.6, 1.9$  Hz, 1H), 7.29 – 7.10 (m, 3H), 4.02 (s, 3H), 2.46 (s, 3H).

$^{13}\text{C NMR}$  (101 MHz, Chloroform-*d*)  $\delta$  160.5, 156.5 (d,  $J = 305.3$  Hz), 152.6, 129.5 (d,  $J = 3.7$  Hz), 128.7 (d,  $J = 8.0$  Hz), 124.1 (d,  $J = 3.4$  Hz), 119.3 (d,  $J = 14.2$  Hz), 115.9 (d,  $J = 21.9$  Hz), 110.3, 60.7, 14.3.

$^{19}\text{F NMR}$  (376 MHz, Chloroform-*d*)  $\delta$  -113.93.

**HRMS (m/z):**  $\text{C}_{11}\text{H}_{11}\text{FNO}_2^+$  ( $[\text{M}+\text{H}]^+$ ): 208.0768, found 208.0764.

#### 4-(2-chlorophenyl)-5-methoxy-2-methyloxazole (2c)



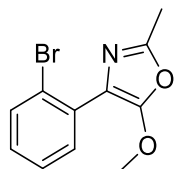
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (95%, 21 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.52 (dd, *J* = 7.4, 2.0 Hz, 1H), 7.45 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.35 – 7.22 (m, 2H), 3.97 (s, 3H), 2.45 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.7, 152.0, 133.1, 131.4, 130.4, 129.9, 128.9, 126.6, 112.4, 60.0, 14.3.

**HRMS (m/z):** C<sub>11</sub>H<sub>11</sub>ClNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 224.0473, found 224.0469.

#### 4-(2-bromophenyl)-5-methoxy-2-methyloxazole (2d)



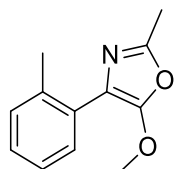
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (90%, 24 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.61 (dt, *J* = 8.1, 1.4 Hz, 1H), 7.45 (dt, *J* = 7.7, 1.7 Hz, 1H), 7.31 (tt, *J* = 6.2, 1.4 Hz, 1H), 7.15 (tt, *J* = 7.6, 1.6 Hz, 1H), 3.91 (d, *J* = 1.5 Hz, 3H), 2.41 (d, *J* = 1.5 Hz, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.4, 151.7, 133.1, 132.4, 131.8, 129.2, 127.2, 123.2, 113.7, 59.9, 14.2.

**HRMS (m/z):** C<sub>11</sub>H<sub>11</sub>BrNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 267.9968, found 267.9970.

#### 5-methoxy-2-methyl-4-(o-tolyl)oxazole (2e)



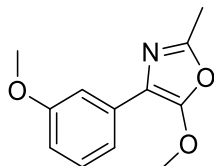
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (61%, 12 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.48 – 7.41 (m, 1H), 7.28 – 7.20 (m, 3H), 3.92 (s, 3H), 2.45 (s, 3H), 2.41 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.3, 151.8, 136.7, 130.5, 130.4, 129.6, 127.6, 125.6, 114.7, 60.3, 20.4, 14.3.

**HRMS (m/z):**C<sub>12</sub>H<sub>14</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 204.1019, found 204.1022.

#### 5-methoxy-4-(3-methoxyphenyl)-2-methyloxazole (2f)



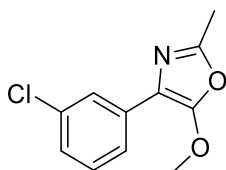
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (70%, 15 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.40 – 7.26 (m, 5H), 6.81 – 6.75 (m, 1H), 4.04 (s, 3H), 3.85 (s, 3H), 2.44 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 159.9, 154.4, 151.9, 132.6, 129.6, 117.5, 114.3, 112.5, 110.0, 60.1, 55.4, 14.3.

**HRMS (m/z):**C<sub>12</sub>H<sub>14</sub>NO<sub>3</sub><sup>+</sup> ([M+H]<sup>+</sup>): 220.0968, found 220.0967.

#### 4-(3-chlorophenyl)-5-methoxy-2-methyloxazole (2g)



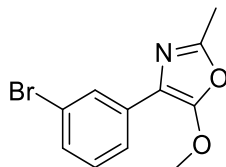
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (72%, 16 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.80 (t, *J* = 1.9 Hz, 1H), 7.68 (ddd, *J* = 7.8, 1.7, 1.0 Hz, 1H), 7.34 – 7.30 (m, 1H), 7.19 (ddd, *J* = 8.0, 2.1, 1.1 Hz, 1H), 4.09 (s, 3H), 2.45 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 154.7, 151.8, 134.6, 133.4, 129.8, 126.1, 124.8, 122.8, 113.0, 59.9, 14.2.

**HRMS (m/z):**C<sub>11</sub>H<sub>11</sub>ClNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 224.0473, found 224.0469.

#### 4-(3-bromophenyl)-5-methoxy-2-methyloxazole (2h)



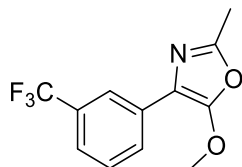
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (77%, 21 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.95 (t, *J* = 1.8 Hz, 1H), 7.72 (dt, *J* = 7.8, 1.3 Hz, 1H), 7.35 (ddd, *J* = 7.9, 2.0, 1.1 Hz, 1H), 7.25 (t, *J* = 7.9 Hz, 1H), 4.08 (s, 3H), 2.44 (s, 3H).

<sup>13</sup>C NMR (101 MHz, Chloroform-*d*) δ 154.6 , 151.9 , 133.6 , 130.0 , 129.1 , 127.6 , 123.2 , 122.8 , 112.8 , 59.9 , 14.2 .

HRMS (m/z):C<sub>11</sub>H<sub>11</sub>BrNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 267.9968, found 267.9970.

#### 5-methoxy-2-methyl-4-(3-(trifluoromethyl)phenyl)oxazole (2i)



The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (70%, 18 mg).

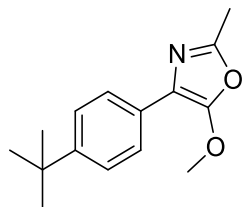
<sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 8.06 (dt, *J* = 1.6, 0.9 Hz, 1H), 7.97 (dt, *J* = 7.4, 1.8 Hz, 1H), 7.55 – 7.44 (m, 2H), 4.11 (s, 3H), 2.46 (s, 3H).

<sup>13</sup>C NMR (101 MHz, Chloroform-*d*) δ 154.8 , 151.9 , 132.4 , 130.9 (q, *J* = 32.1 Hz), 128.9 , 127.8 , 124.3 (d, *J* = 272.4 Hz), 122.6 (d, *J* = 4.1 Hz), 121.5 (d, *J* = 4.0 Hz), 112.9 , 59.9 , 14.2 .

<sup>19</sup>F NMR (376 MHz, Chloroform-*d*) δ -62.67 .

HRMS (m/z):C<sub>12</sub>H<sub>11</sub>F<sub>3</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 258.0736, found 258.0741.

#### 4-(4-(tert-butyl)phenyl)-5-methoxy-2-methyloxazole (2j)



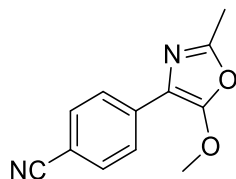
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (57%, 14 mg).

<sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 7.74 (d, *J* = 8.4 Hz, 2H), 7.44 (d, *J* = 8.5 Hz, 2H), 4.05 (s, 3H), 2.45 (s, 3H), 1.37 (s, 9H).

<sup>13</sup>C NMR (101 MHz, Chloroform-*d*) δ 154.1 , 152.2, 149.4 , 128.2 , 125.5 , 124.7 , 114.6 , 60.4 , 34.6 , 31.4 , 14.3 .

HRMS (m/z):C<sub>15</sub>H<sub>20</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 246.1489, found 246.1490.

#### 4-(5-methoxy-2-methyloxazol-4-yl)benzotrile (2k)





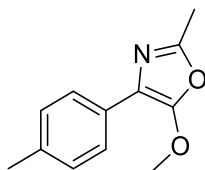
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (74%, 16 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.85 (dd, *J* = 8.4, 1.6 Hz, 2H), 7.63 (dd, *J* = 8.5, 1.6 Hz, 2H), 4.11 (s, 3H), 2.43 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 155.6, 151.9, 136.2, 132.3, 124.8, 119.4, 112.2, 108.8, 59.7, 14.2.

**HRMS (m/z):** C<sub>12</sub>H<sub>11</sub>N<sub>2</sub>O<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 215.0815, found 215.0811.

#### 5-methoxy-2-methyl-4-(p-tolyl)oxazole (2l)



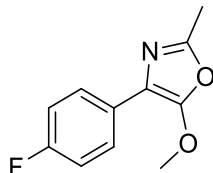
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (63%, 13 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.74 – 7.64 (m, 2H), 7.22 – 7.19 (m, 2H), 4.03 (s, 3H), 2.43 (s, 3H), 2.37 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 154.0, 152.0, 136.1, 129.9, 129.3, 124.9, 114.7, 60.3, 21.3, 14.3.

**HRMS (m/z):** C<sub>12</sub>H<sub>14</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 204.1019, found 204.1022.

#### 4-(4-fluorophenyl)-5-methoxy-2-methyloxazole (2m)



The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (76%, 16 mg).

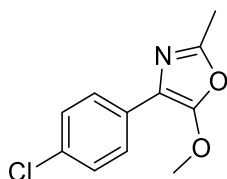
**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*) δ 7.78 (ddd, *J* = 8.7, 5.4, 2.9 Hz, 2H), 7.10 (td, *J* = 8.8, 2.9 Hz, 2H), 4.07 (s, 3H), 2.46 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*) δ 162.6, 154.0, 152.0, 127.4, 126.5 (d, *J* = 7.9 Hz), 115.5 (d, *J* = 21.5 Hz), 113.7, 60.2, 14.3.

**<sup>19</sup>F NMR** (376 MHz, Chloroform-*d*) δ -115.88.

**HRMS (m/z):** C<sub>11</sub>H<sub>11</sub>FNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 208.0768, found 208.0764.

#### 4-(4-chlorophenyl)-5-methoxy-2-methyloxazole (2n)



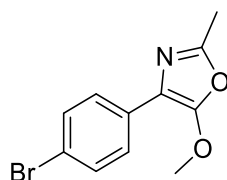
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (83%, 19 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.75 – 7.71 (m, 2H), 7.38 – 7.34 (m, 2H), 4.07 (s, 3H), 2.44 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.3, 152.0, 131.7, 130.0, 128.7, 126.1, 113.4, 60.0, 14.2.

**HRMS (m/z):** C<sub>11</sub>H<sub>11</sub>ClNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 224.0473, found 224.0469.

#### 4-(4-bromophenyl)-5-methoxy-2-methyloxazole (2o)



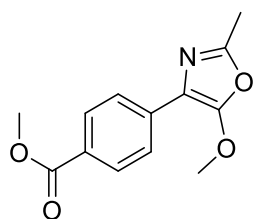
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (86%, 23 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.65 (d, *J* = 8.4 Hz, 2H), 7.49 (d, *J* = 8.1 Hz, 2H), 4.07 (s, 3H), 2.44 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.4, 151.9, 131.6, 130.5, 126.4, 119.8, 113.4, 60.0, 14.3.

**HRMS (m/z):** C<sub>11</sub>H<sub>11</sub>BrNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 267.9968, found 267.9970.

#### methyl 4-(5-methoxy-2-methyloxazol-4-yl)benzoate (2p)



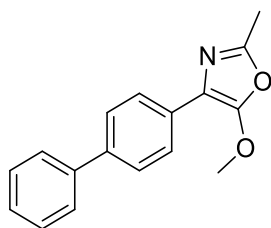
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (84%, 21 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  8.07 (d, *J* = 8.3 Hz, 2H), 7.86 (d, *J* = 8.3 Hz, 2H), 4.12 (s, 3H), 3.95 (s, 3H), 2.47 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  167.2, 155.3, 152.0, 136.0, 130.0, 127.4, 124.4, 113.2, 59.9, 52.1, 14.3.

**HRMS (m/z):** C<sub>13</sub>H<sub>14</sub>NO<sub>4</sub><sup>+</sup> ([M+H]<sup>+</sup>): 248.0917, found 248.0918.

#### 4-([1,1'-biphenyl]-4-yl)-5-methoxy-2-methyloxazole (2q)



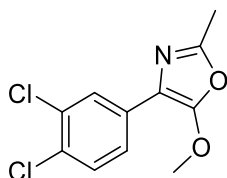
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (72%, 19 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.92 – 7.86 (m, 2H), 7.68 – 7.64 (m, 4H), 7.47 (dd, *J* = 8.4, 6.9 Hz, 2H), 7.40 – 7.34 (m, 1H), 4.09 (s, 3H), 2.47 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.4, 152.0, 141.0, 138.9, 130.5, 128.8, 127.2, 127.2, 127.0, 125.2, 114.2, 60.2, 14.3.

**HRMS (m/z):** C<sub>17</sub>H<sub>16</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 266.1176, found 266.1173.

#### 4-(3,4-dichlorophenyl)-5-methoxy-2-methyloxazole (2r)



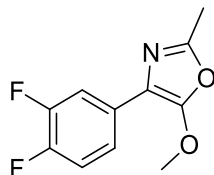
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (88%, 23 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.88 (d, *J* = 1.9 Hz, 1H), 7.62 (dd, *J* = 8.5, 2.1 Hz, 1H), 7.44 (d, *J* = 8.4 Hz, 1H), 4.09 (s, 3H), 2.44 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.7, 151.9, 132.7, 131.7, 130.4, 129.6, 126.4, 123.9, 112.1, 59.9, 14.2.

**HRMS (m/z):** C<sub>11</sub>H<sub>10</sub>Cl<sub>2</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 258.0083, found 258.0080.

#### 4-(3,4-difluorophenyl)-5-methoxy-2-methyloxazole (2s)



The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (85%, 19 mg).

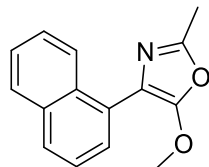
**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.64 – 7.56 (m, 1H), 7.54 – 7.46 (m, 1H), 7.22 – 7.11 (m, 1H), 4.07 (s, 3H), 2.43 (s, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  154.3, 151.9, 151.8 – 149.8 (m), 149.5 – 147.5 (m), 128.7, 120.7, 117.4 (d, *J* = 17.6 Hz), 113.4 (d, *J* = 19.3 Hz), 112.6, 60.0, 14.3.

<sup>19</sup>F NMR (376 MHz, Chloroform-*d*) δ -138.13 (dp, *J* = 20.5, 10.5 Hz), -141.06 (dd, *J* = 22.5, 10.8 Hz).

HRMS (m/z): C<sub>11</sub>H<sub>10</sub>F<sub>2</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 226.0674, found 226.0671.

#### 5-methoxy-2-methyl-4-(naphthalen-1-yl)oxazole (2t)



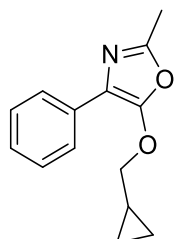
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (67%, 16 mg).

<sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 8.37 – 8.28 (m, 1H), 7.96 – 7.81 (m, 2H), 7.66 (d, *J* = 7.1 Hz, 1H), 7.54 (tt, *J* = 7.9, 3.6 Hz, 3H), 3.91 (s, 3H), 2.52 (s, 3H).

<sup>13</sup>C NMR (101 MHz, Chloroform-*d*) δ 155.3, 152.0, 133.9, 131.5, 128.4, 128.3, 128.2, 127.3, 126.1, 126.1, 125.8, 125.3, 114.1, 60.5, 14.2.

HRMS (m/z): C<sub>15</sub>H<sub>14</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 240.1019, found 240.1021.

#### 5-(cyclopropylmethoxy)-2-methyl-4-phenyloxazole (2u)



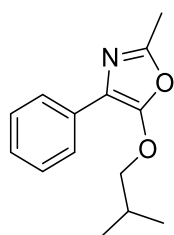
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (87%, 20 mg).

<sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 7.90 – 7.82 (m, 2H), 7.41 (t, *J* = 7.8 Hz, 2H), 7.24 (ddt, *J* = 7.8, 6.9, 1.3 Hz, 1H), 4.09 (d, *J* = 7.3 Hz, 2H), 2.44 (s, 1H), 1.39 – 1.31 (m, 1H), 0.74 – 0.62 (m, 2H), 0.41 – 0.35 (m, 2H).

<sup>13</sup>C NMR (101 MHz, Chloroform-*d*) δ 153.7, 152.2, 131.6, 128.5, 126.3, 124.9, 115.7, 78.9, 14.3, 10.5, 3.5.

HRMS (m/z): C<sub>14</sub>H<sub>16</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 230.1176, found 230.1180.

#### 5-isobutoxy-2-methyl-4-phenyloxazole (2v)



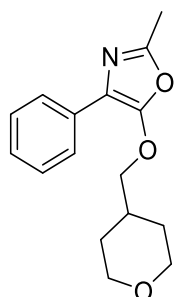
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (88%, 20 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.8 (d, *J* = 8.1 Hz, 2H), 7.41 (t, *J* = 7.7 Hz, 2H), 7.25 (t, *J* = 7.5 Hz, 1H), 4.05 (d, *J* = 6.5 Hz, 2H), 2.49 (s, 3H), 2.19 – 2.13 (m, 1H), 1.09 (d, *J* = 6.7 Hz, 6H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  153.9, 152.2, 131.1, 128.6, 126.4, 124.9, 114.4, 80.0, 28.6, 19.0, 14.2.

**HRMS (m/z):** C<sub>14</sub>H<sub>18</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 232.1332, found 232.1329.

### 2-methyl-4-phenyl-5-((tetrahydro-2H-pyran-4-yl)methoxy)oxazole (2w)



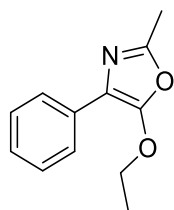
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (60%, 16 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.86 (dt, *J* = 8.3, 1.2 Hz, 2H), 7.41 (t, *J* = 7.5 Hz, 2H), 7.27 – 7.22 (m, 1H), 4.42 – 4.36 (m, 1H), 2.47 (s, 3H), 2.04 (d, *J* = 12.6 Hz, 2H), 1.84 (dd, *J* = 10.4, 5.2 Hz, 4H), 1.75 – 1.53 (m, 4H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  152.9, 152.6, 128.8, 128.5, 126.3, 125.0, 116.2, 83.0, 32.2, 25.3, 23.6, 14.3.

**HRMS (m/z):** C<sub>16</sub>H<sub>20</sub>NO<sub>3</sub><sup>+</sup> ([M+H]<sup>+</sup>): 274.1438, found 274.1435.

### 5-ethoxy-2-methyl-4-phenyloxazole (2x)



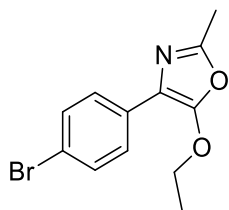
The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (85%, 17 mg).

**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.88 – 7.81 (m, 2H), 7.41 (t, *J* = 7.8 Hz, 2H), 7.28 – 7.22 (m, 1H), 4.34 (q, *J* = 7.1 Hz, 2H), 2.47 (s, 3H), 1.48 (t, *J* = 7.1 Hz, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  153.6, 152.4, 128.6, 127.2, 126.4, 124.9, 115.2, 69.9, 15.2, 14.3.

**HRMS (m/z):** C<sub>12</sub>H<sub>14</sub>NO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 204.1019, found 204.1022.

**4-(4-bromophenyl)-5-ethoxy-2-methyloxazole (2y)**



The titled compound was synthesized according to the general procedure GP-1. And was obtained after silica gel column chromatography (n-pentane : EtOAc 30:1) as a colorless oil (82%, 23 mg).

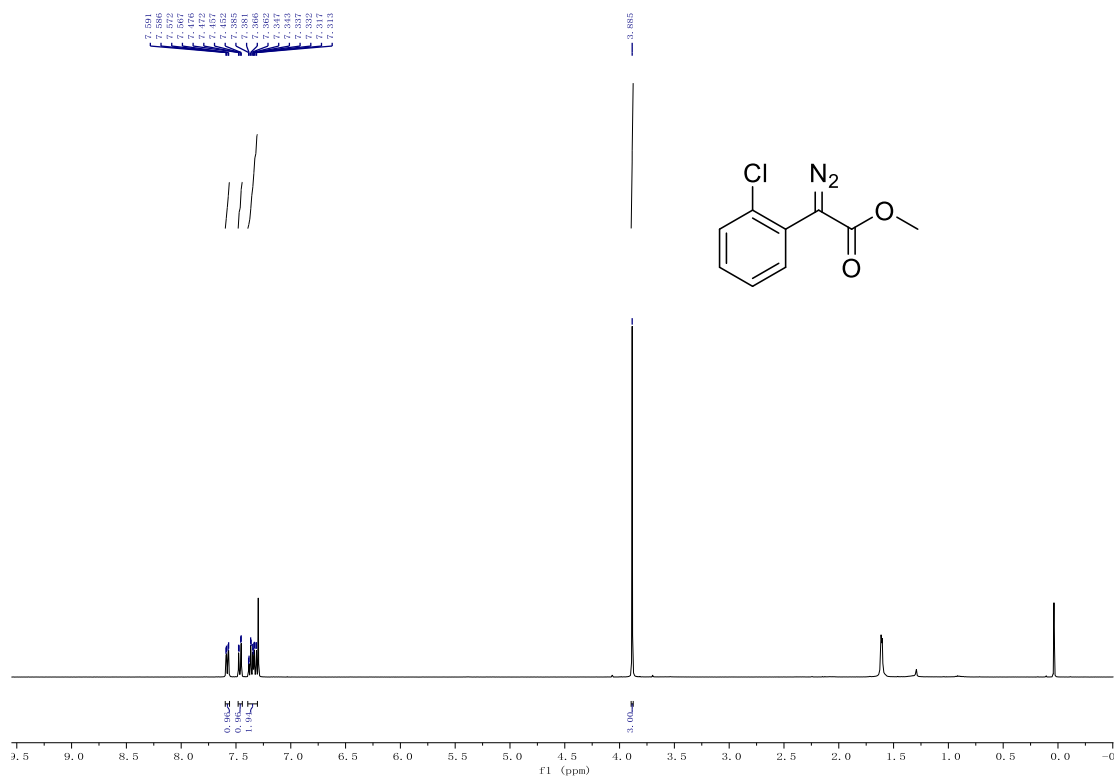
**<sup>1</sup>H NMR** (400 MHz, Chloroform-*d*)  $\delta$  7.71 – 7.67 (m, 2H), 7.54 – 7.49 (m, 2H), 4.34 (q, *J* = 7.1 Hz, 2H), 2.43 (s, 3H), 1.47 (t, *J* = 7.1 Hz, 3H).

**<sup>13</sup>C NMR** (101 MHz, Chloroform-*d*)  $\delta$  153.7 , 152.2 , 131.6 , 130.6 , 126.4 , 119.8 , 114.3 , 69.7 , 15.2 , 14.3 .

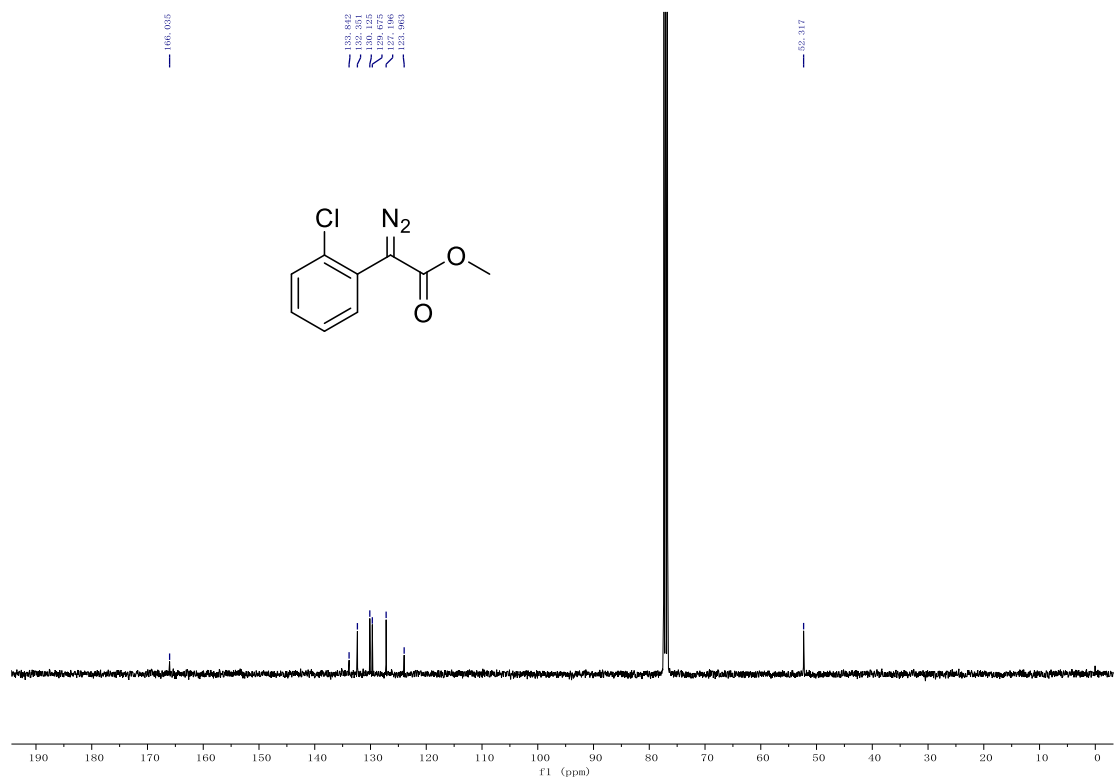
**HRMS (m/z):** C<sub>12</sub>H<sub>13</sub>BrNO<sub>2</sub><sup>+</sup> ([M+H]<sup>+</sup>): 282.0124, found 282.0121.

### 3. $^1\text{H}$ NMR, $^{13}\text{C}$ NMR and $^{19}\text{F}$ NMR Spectra for Products

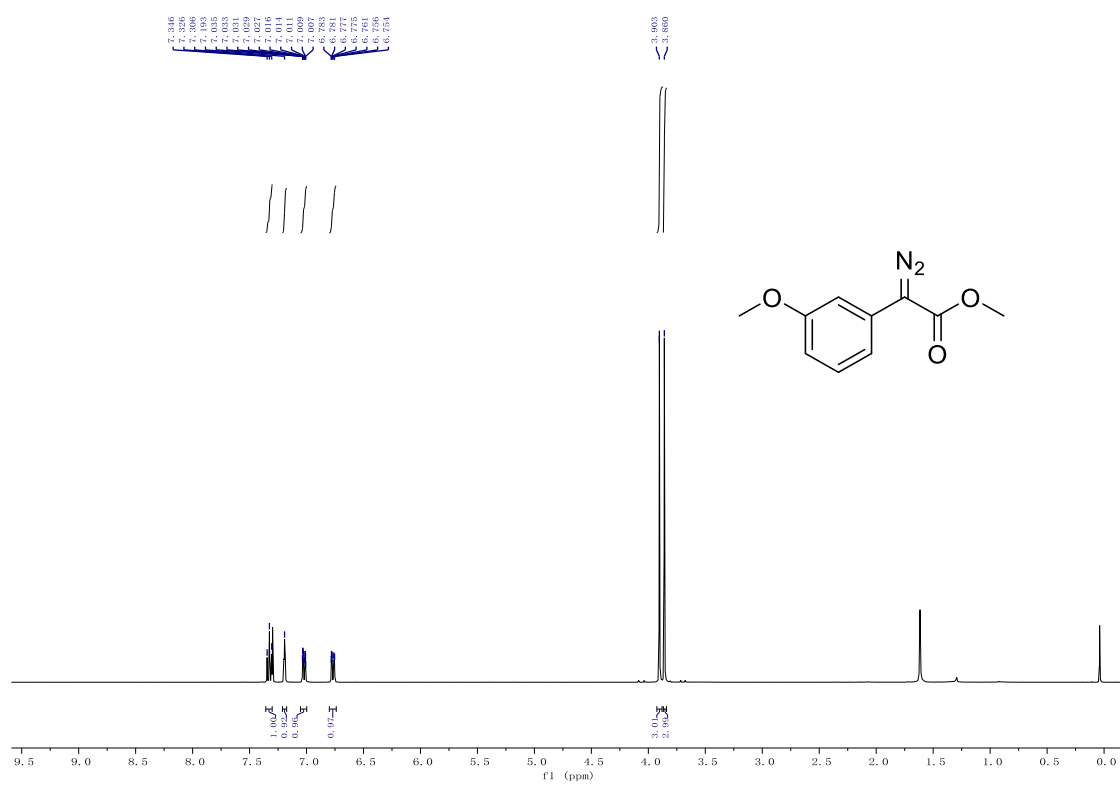
1c:  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



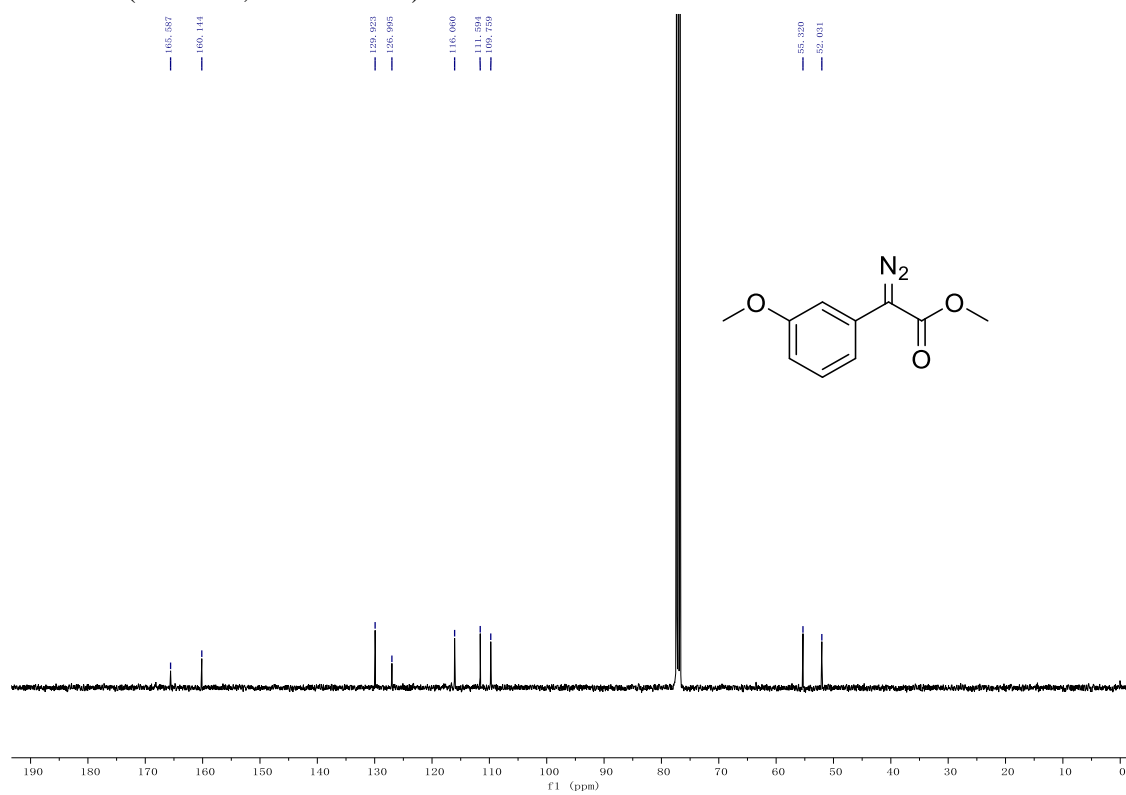
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



**1f:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)

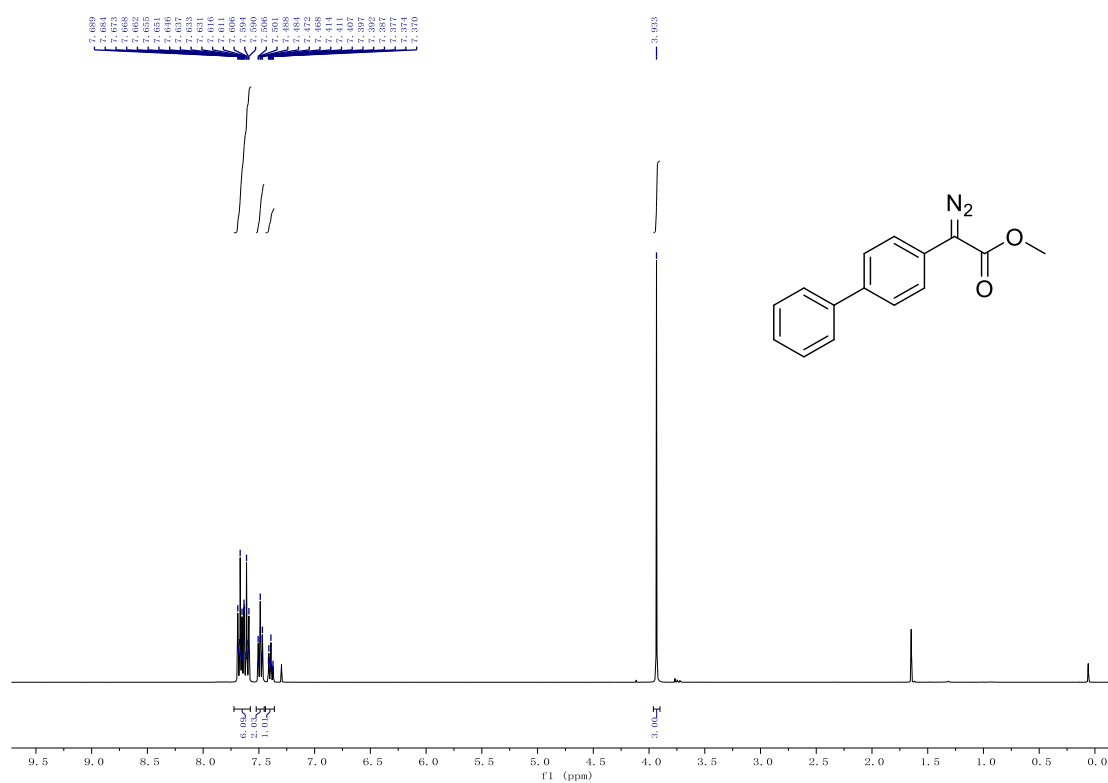


$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)

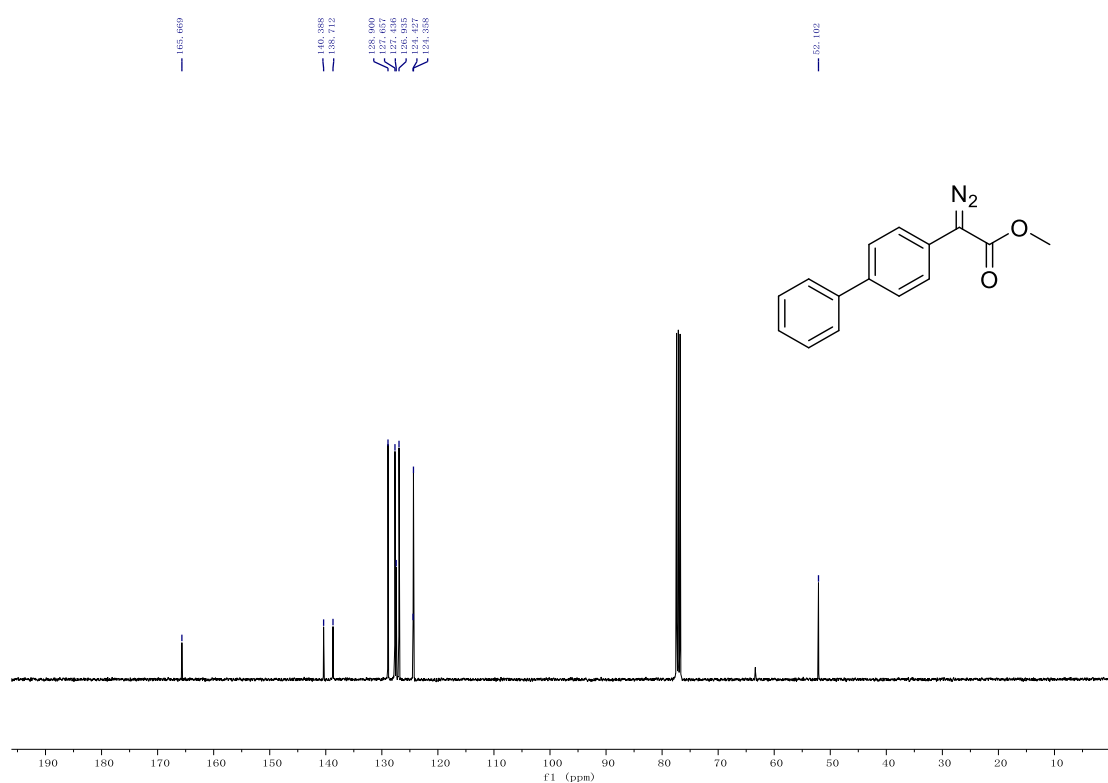




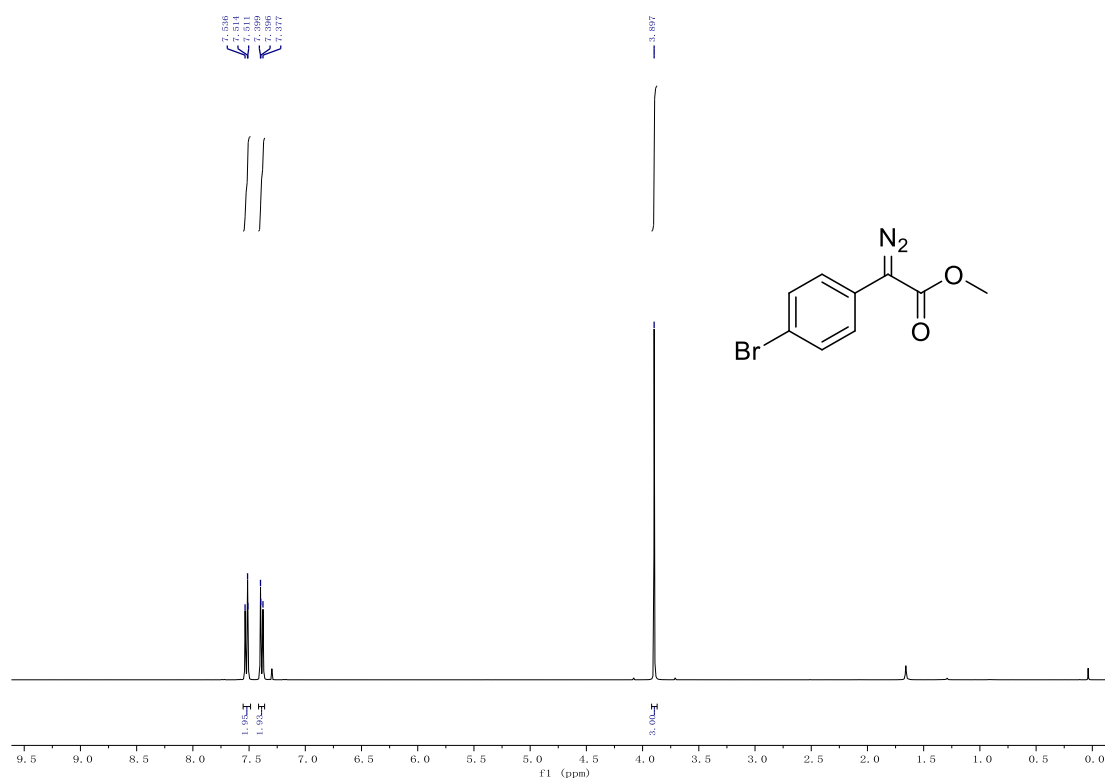
1q:  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



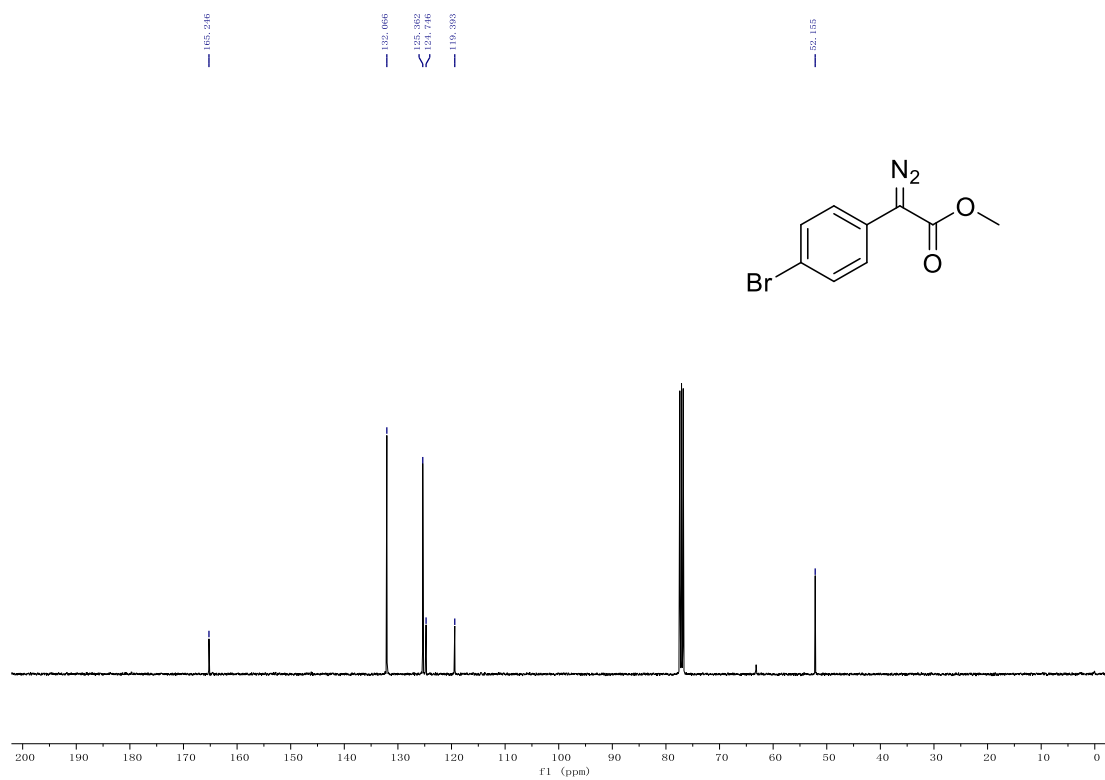
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



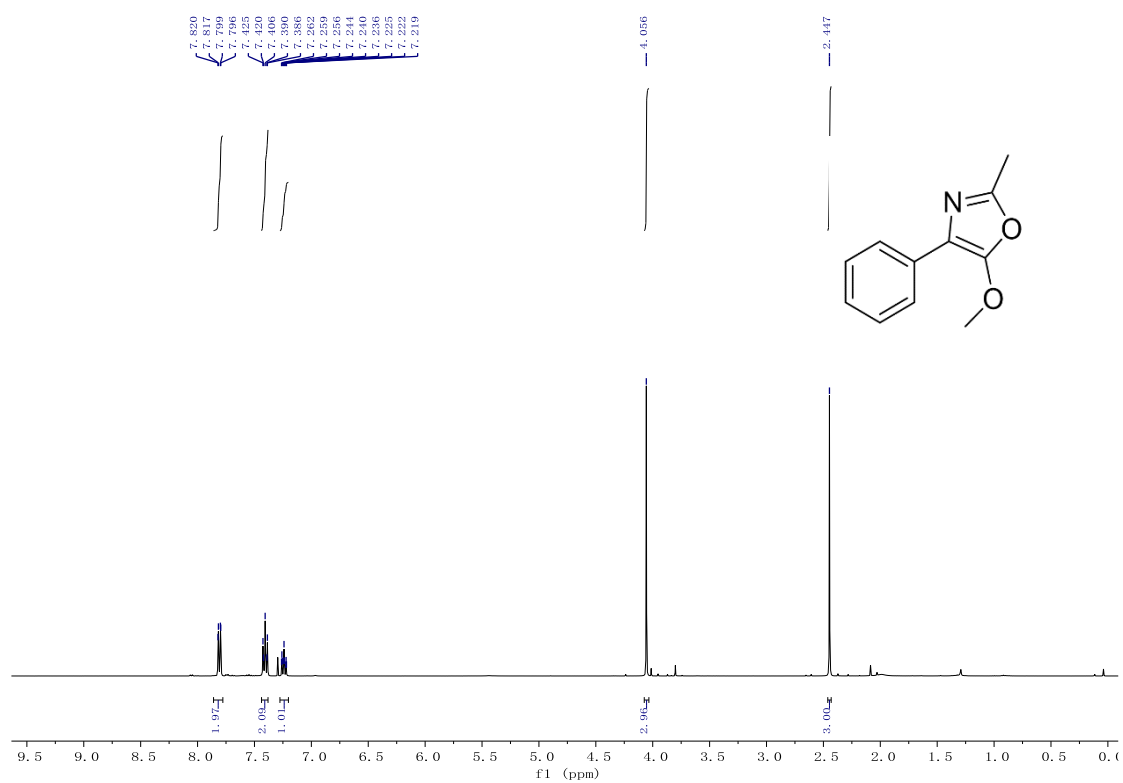
**1o:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



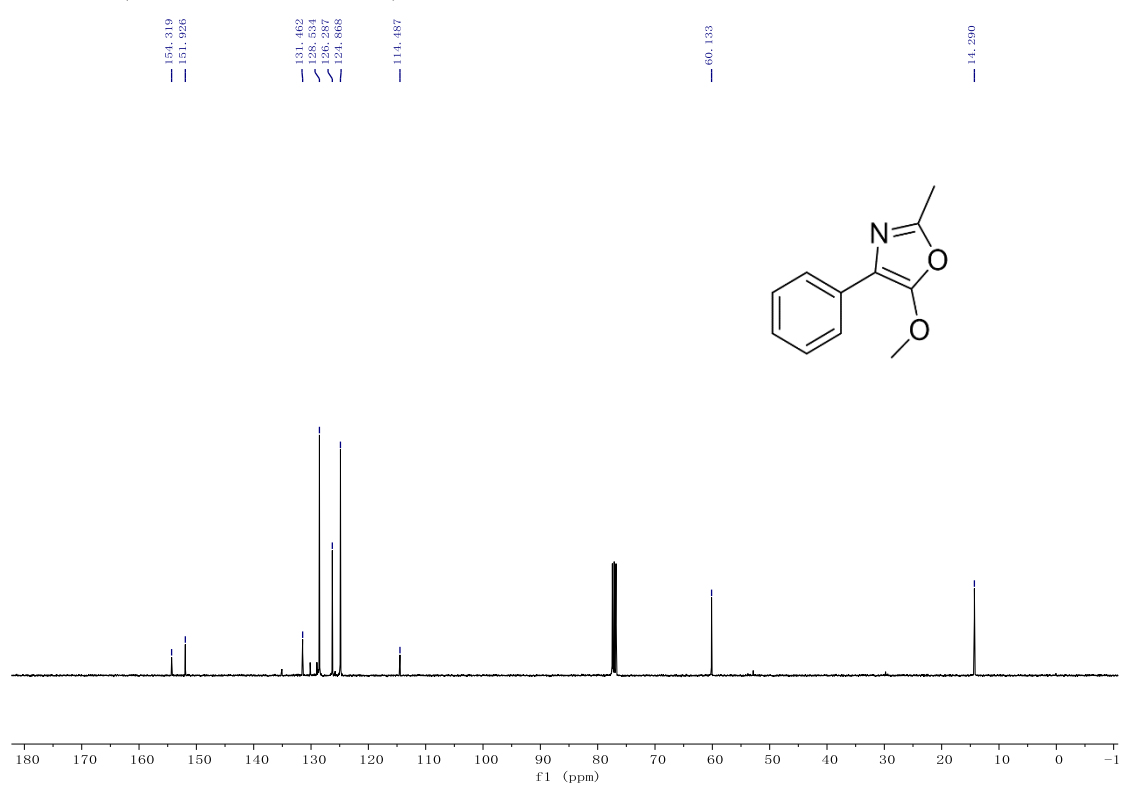
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



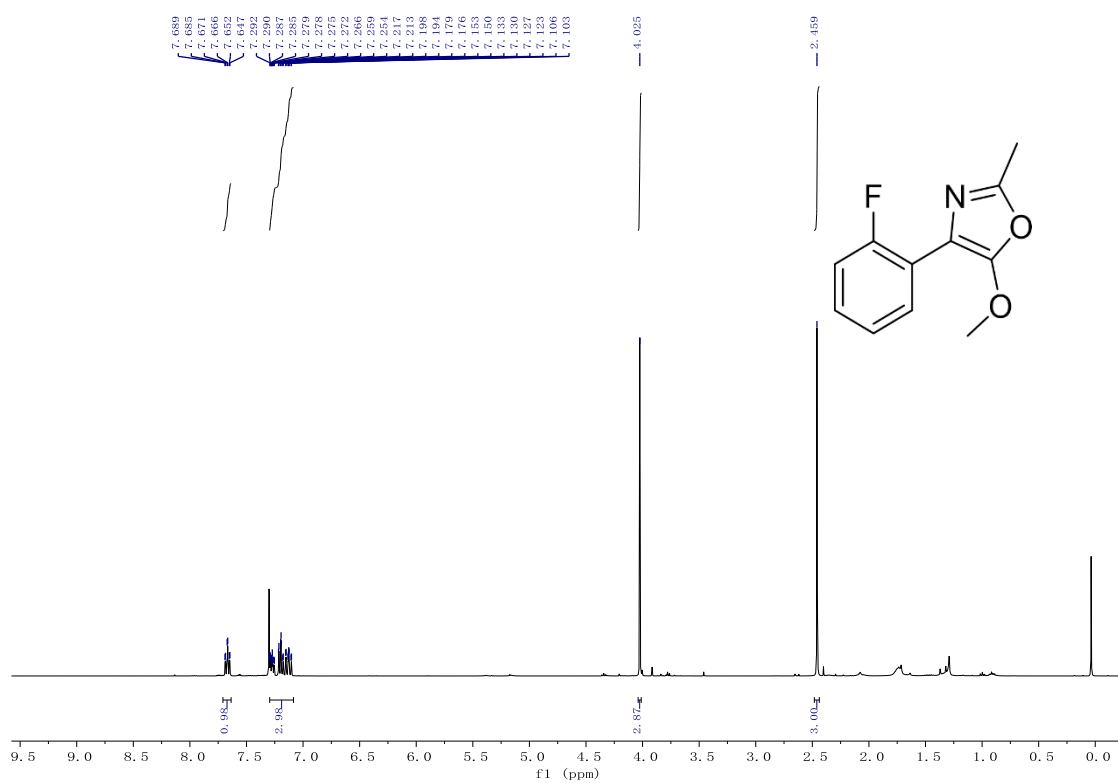
**2a:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



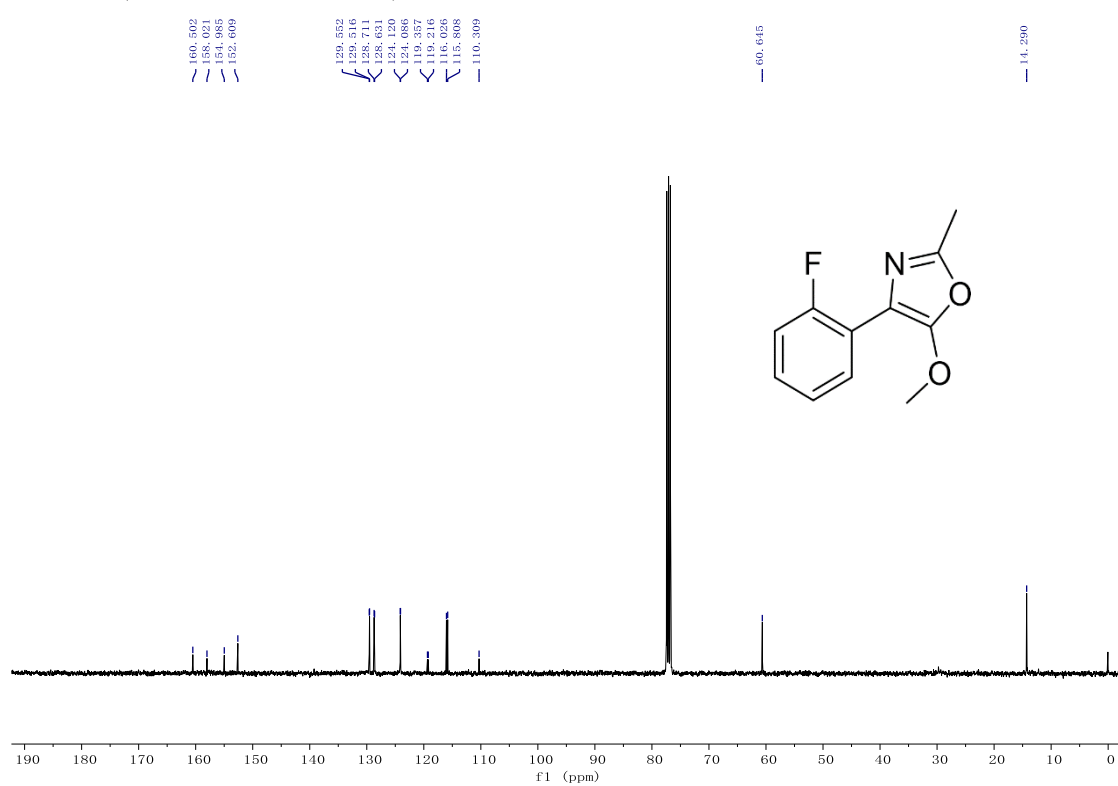
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



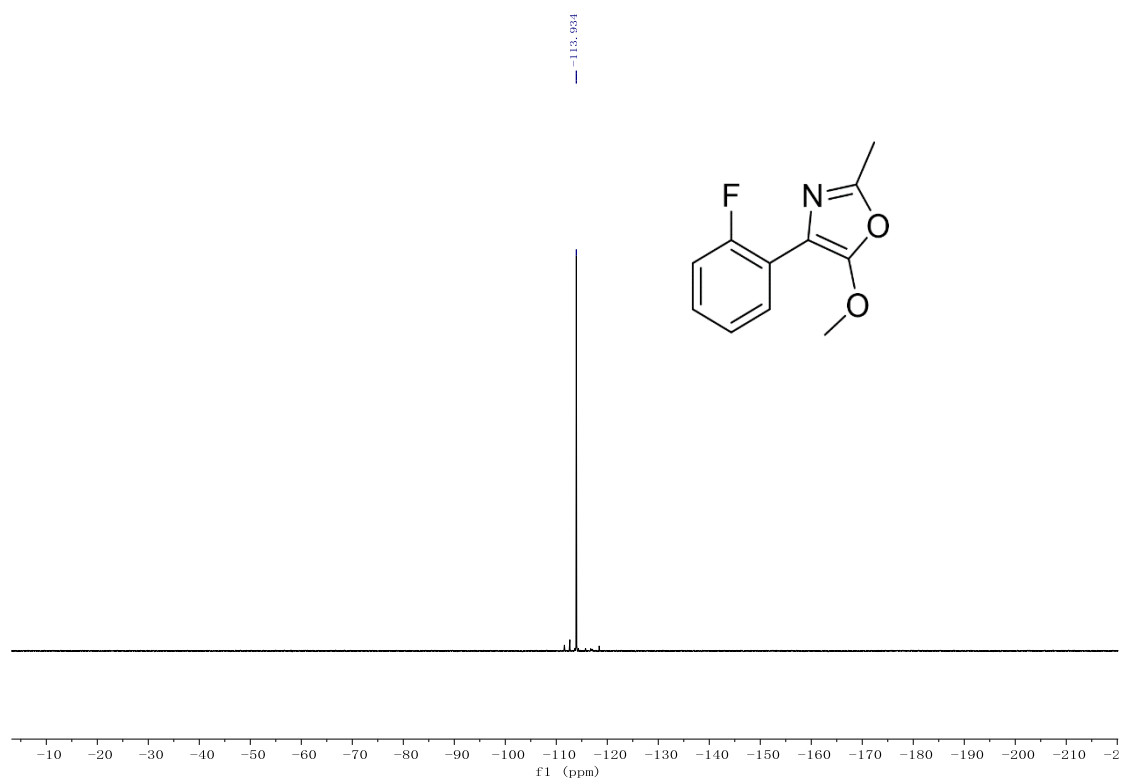
**2b:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



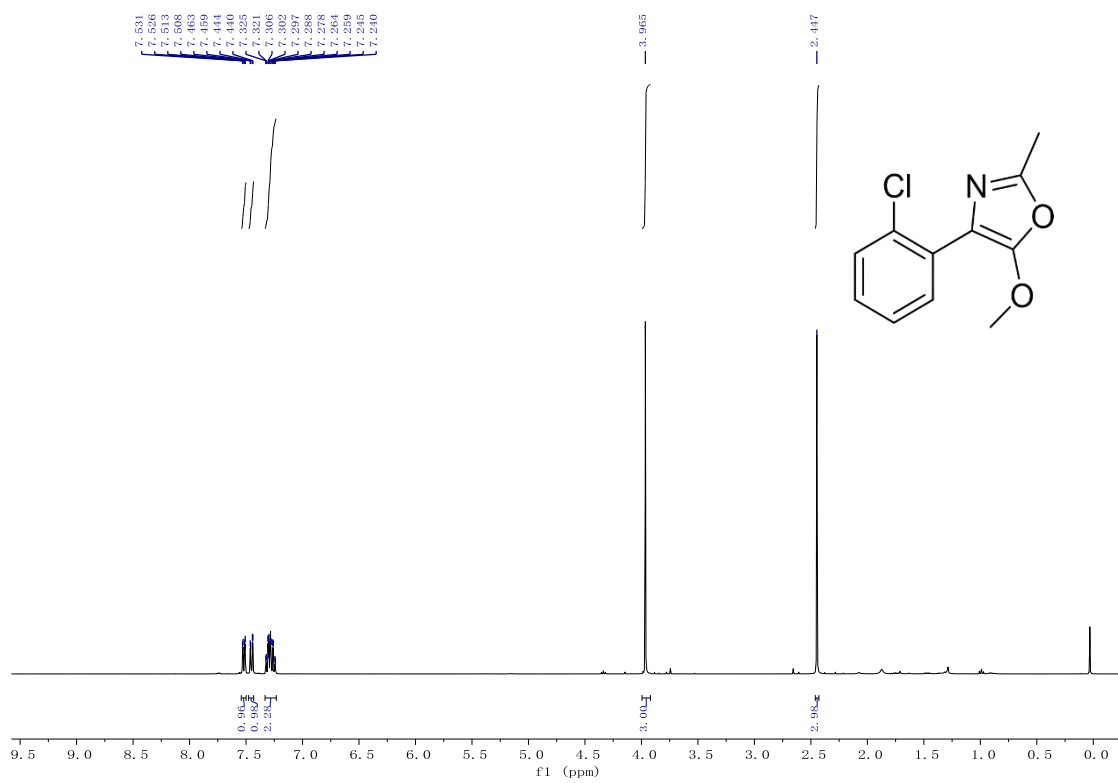
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



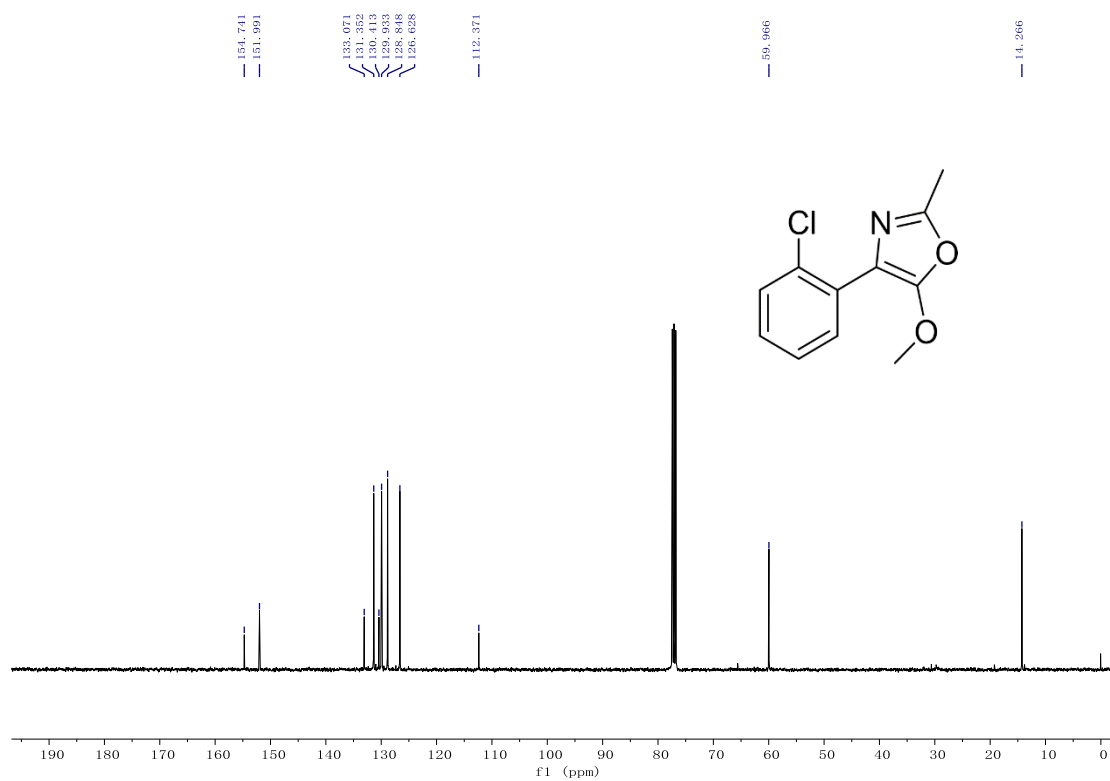
$^{19}\text{F}$  NMR (376 MHz, Chloroform-*d*)



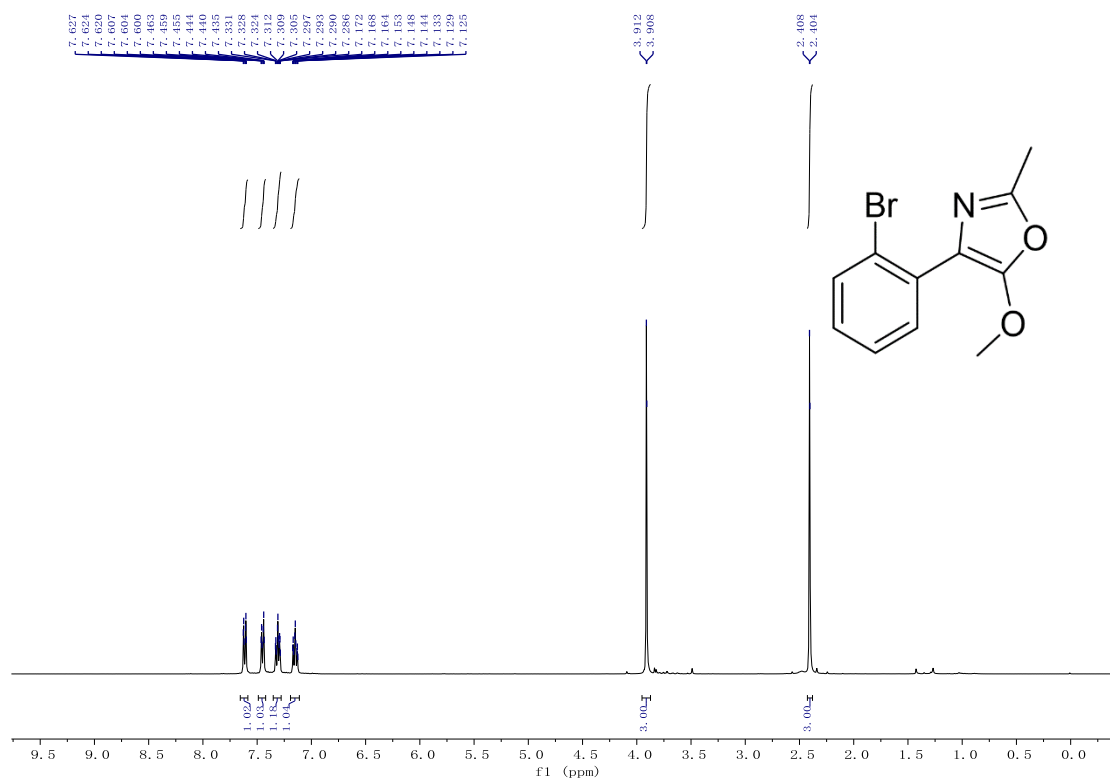
**2c:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



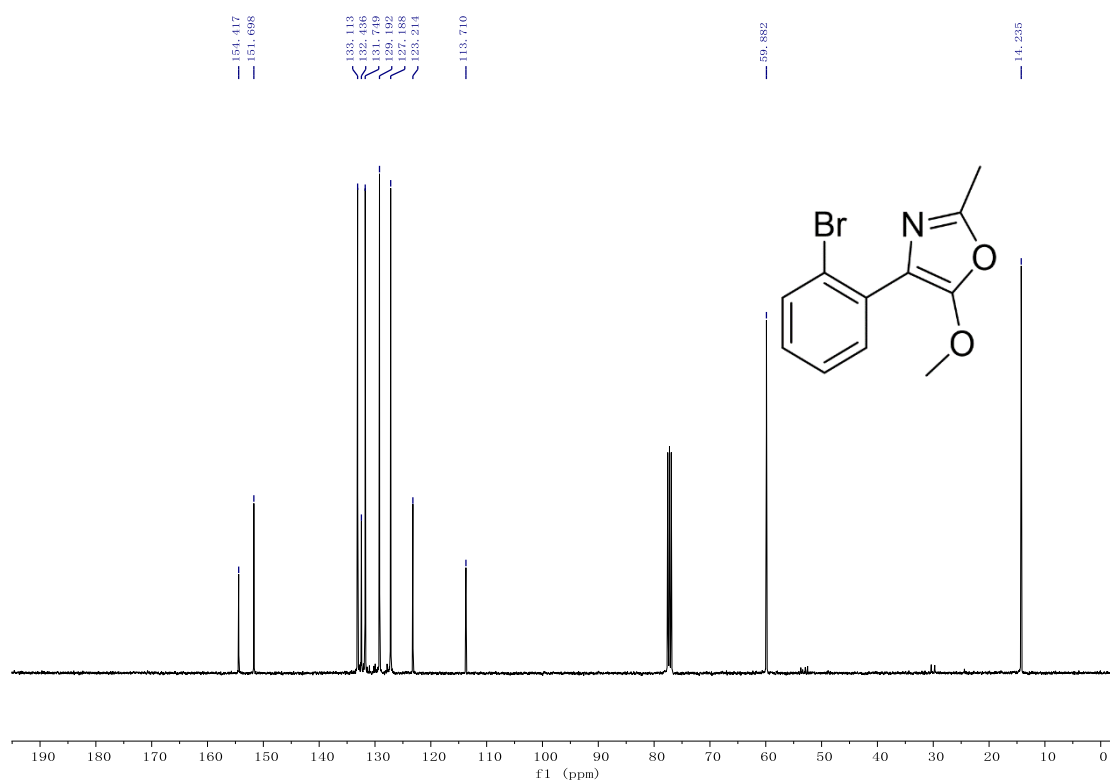
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



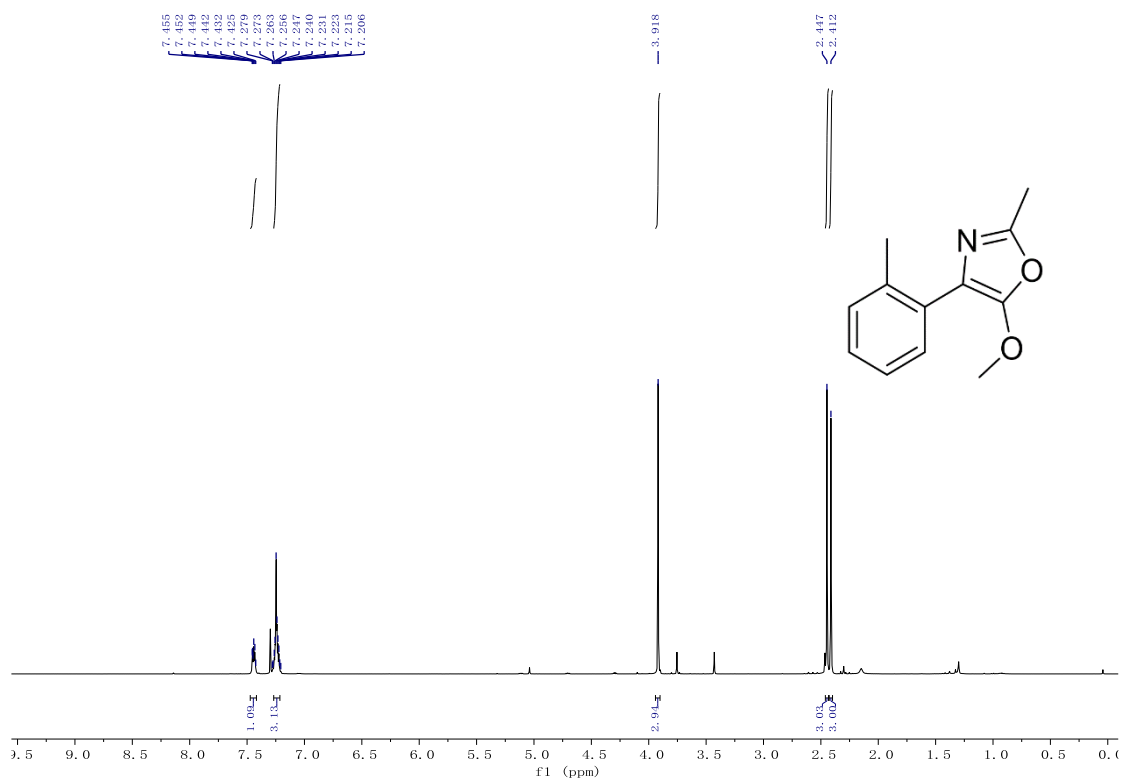
**2d:** <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)



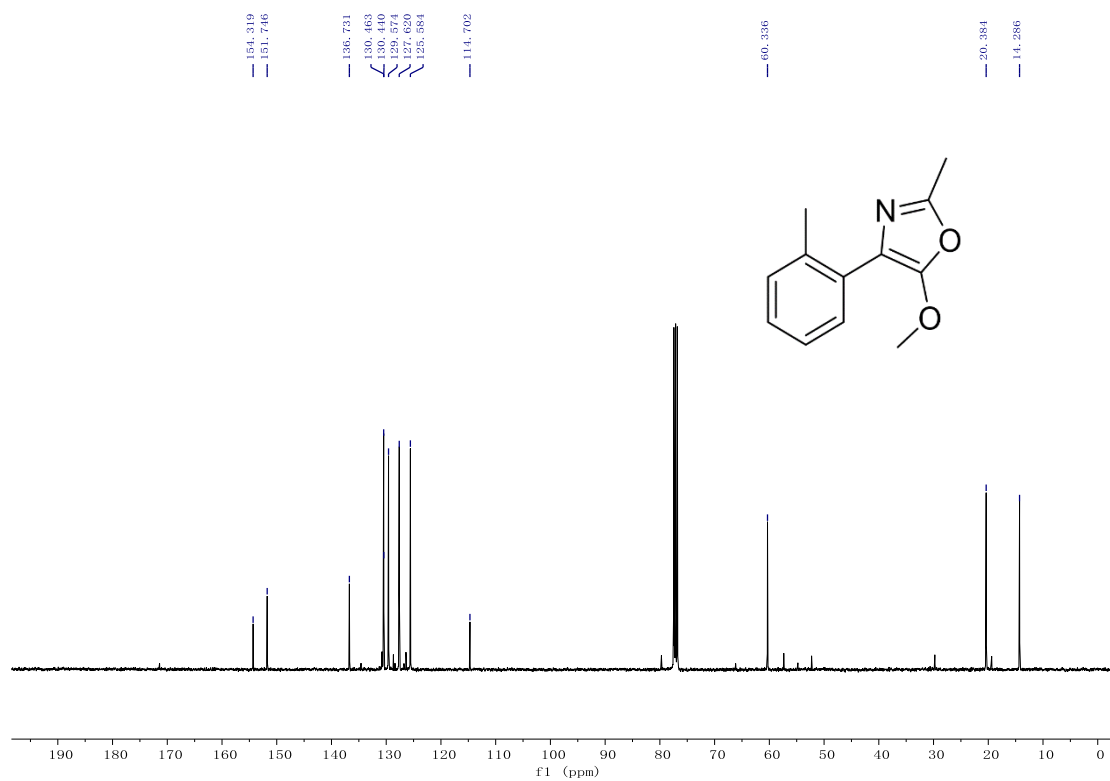
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



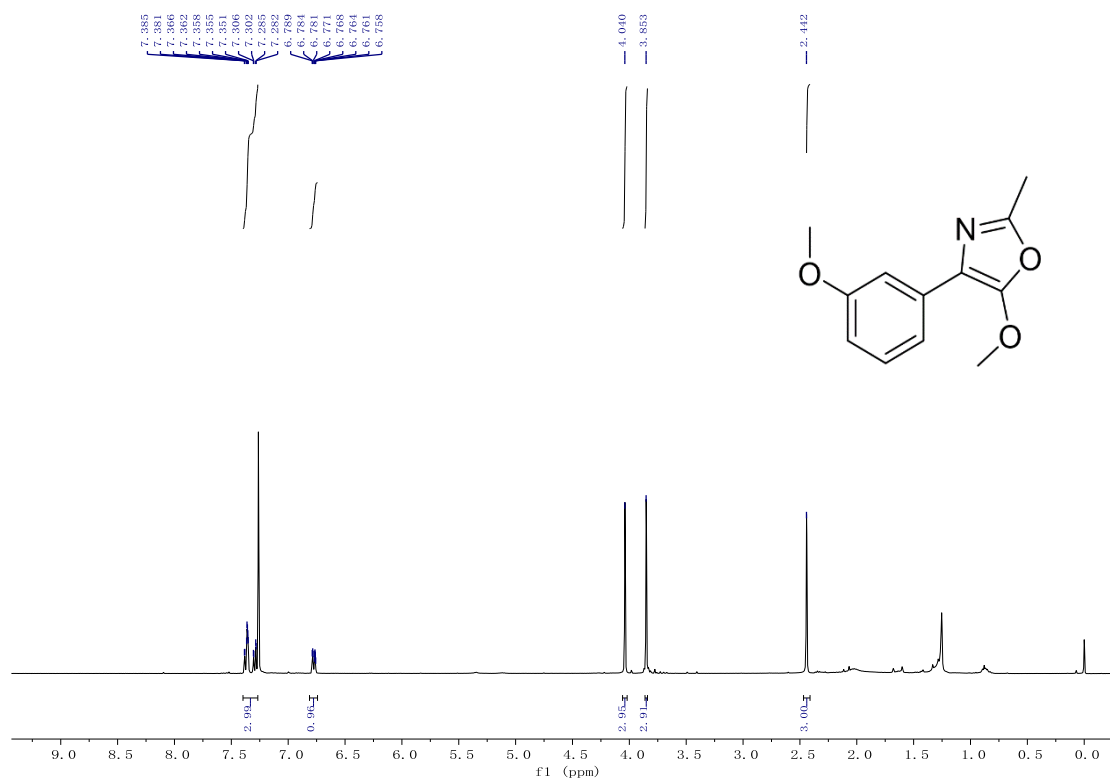
2e: <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)



<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)

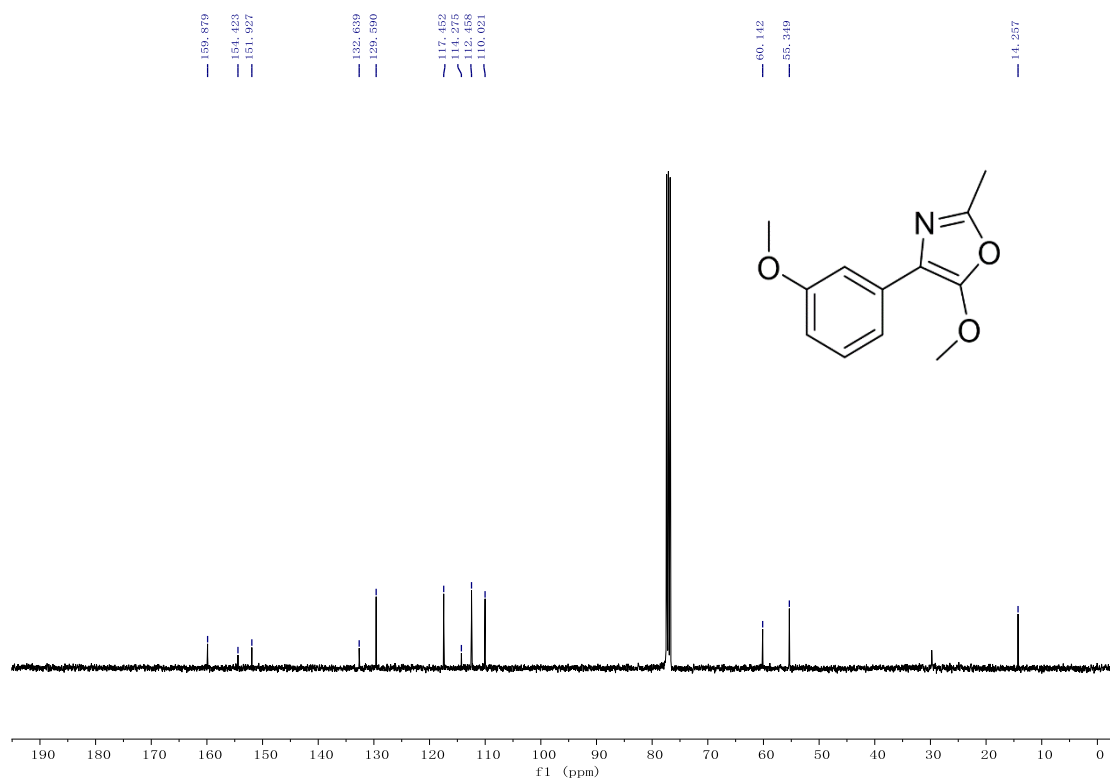


**2f:** <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)

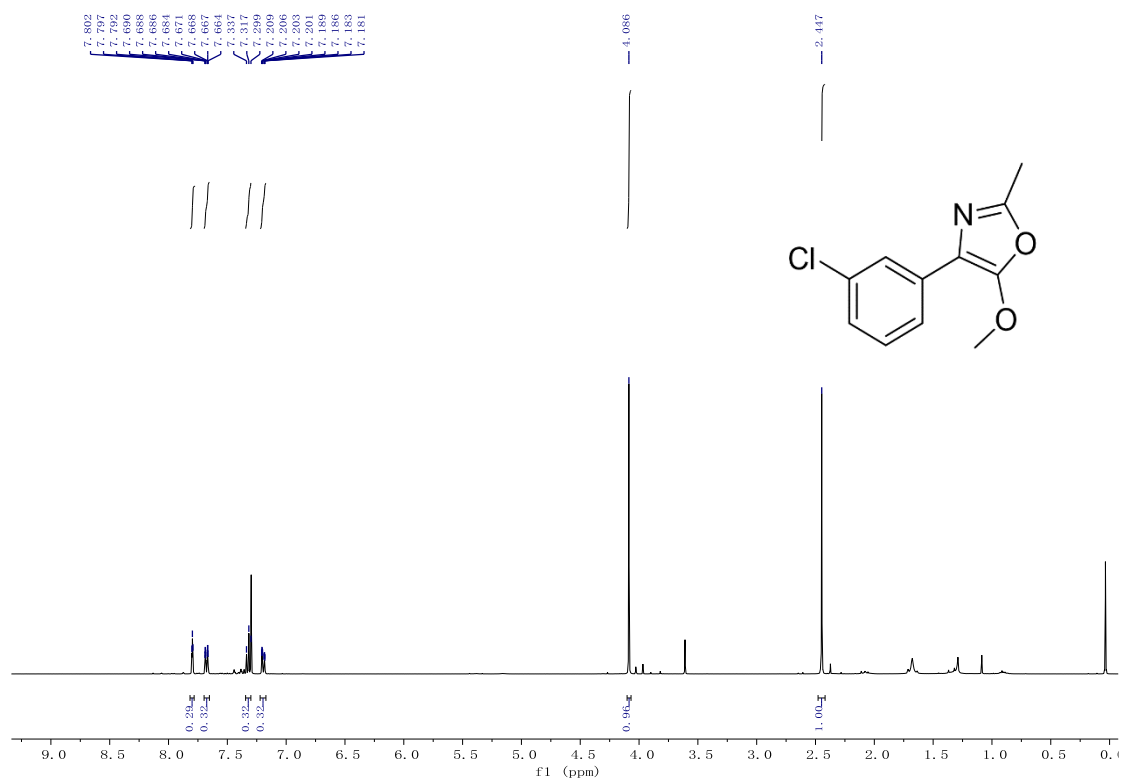




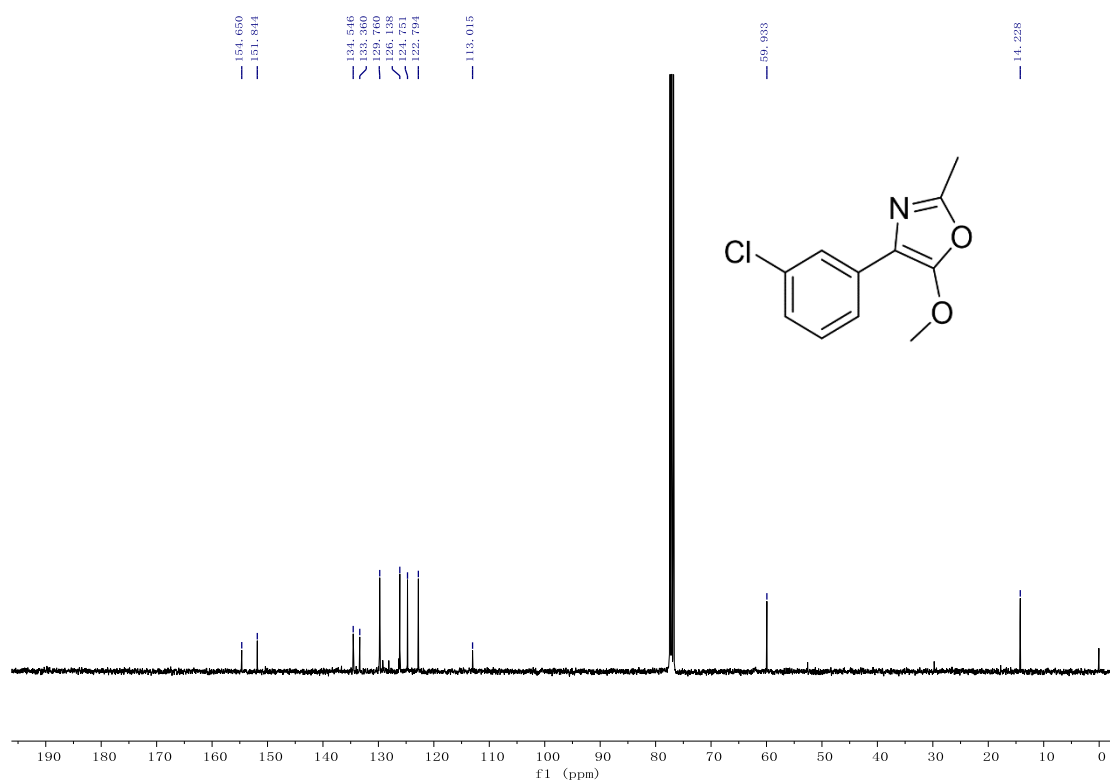
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



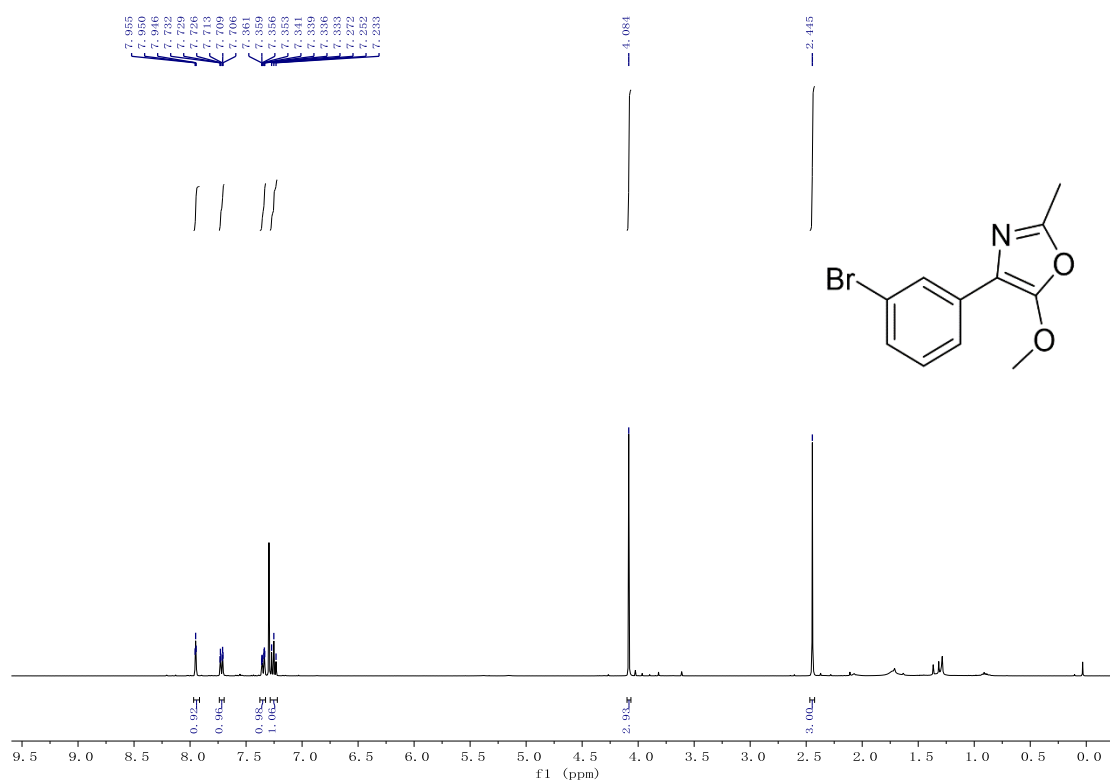
**2g:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



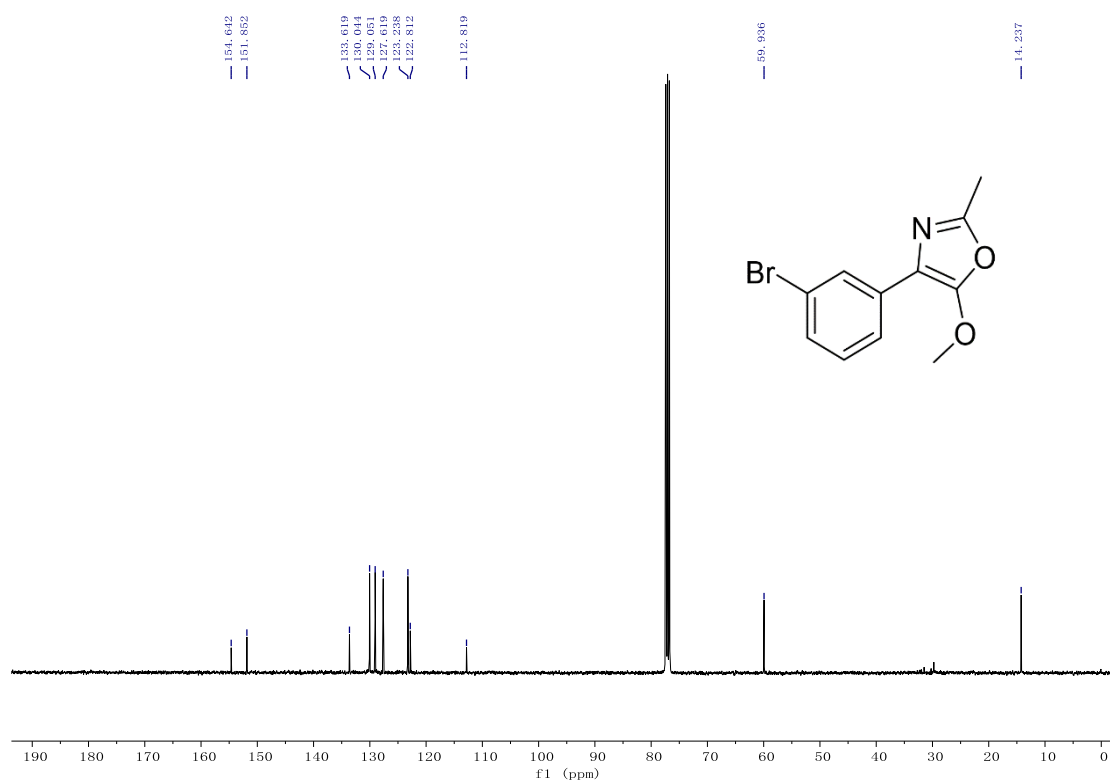
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



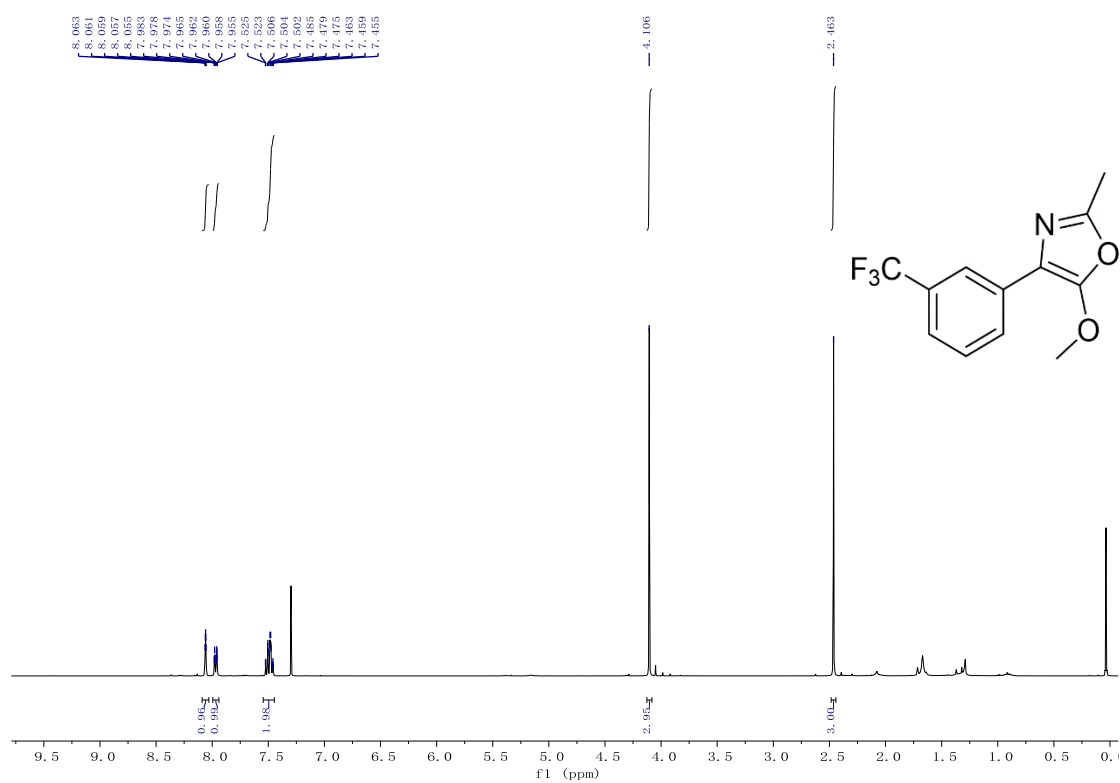
**2h:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



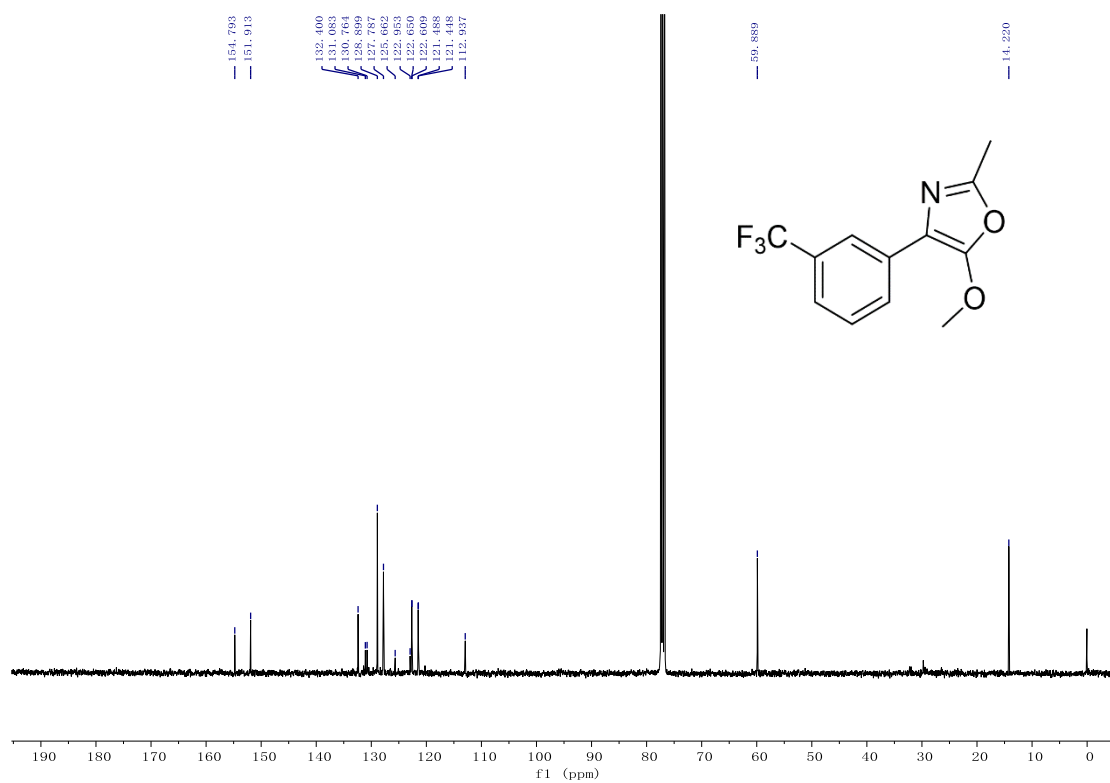
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



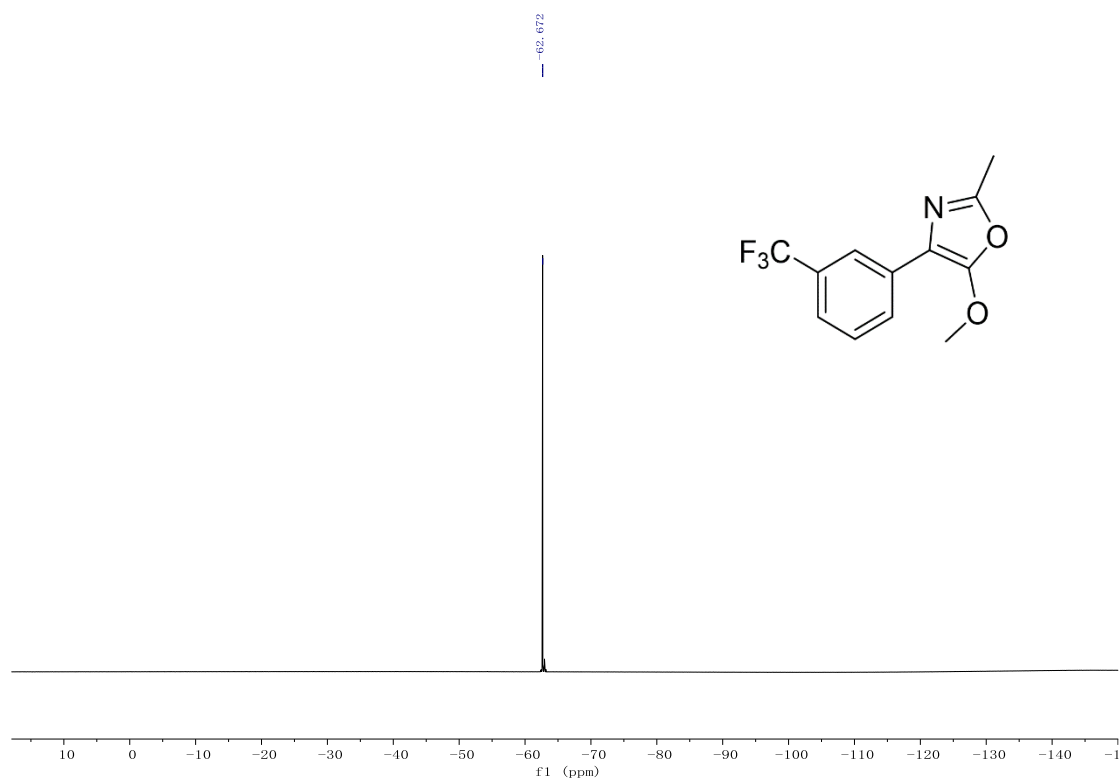
**2i:** <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)



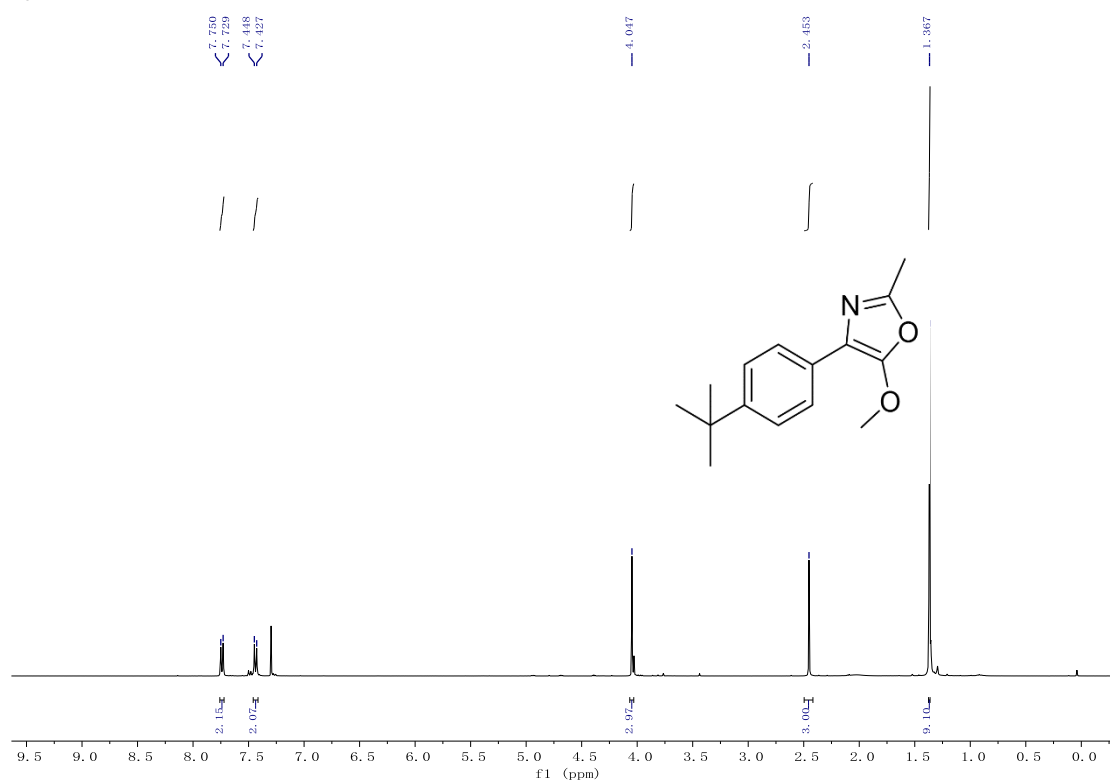
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



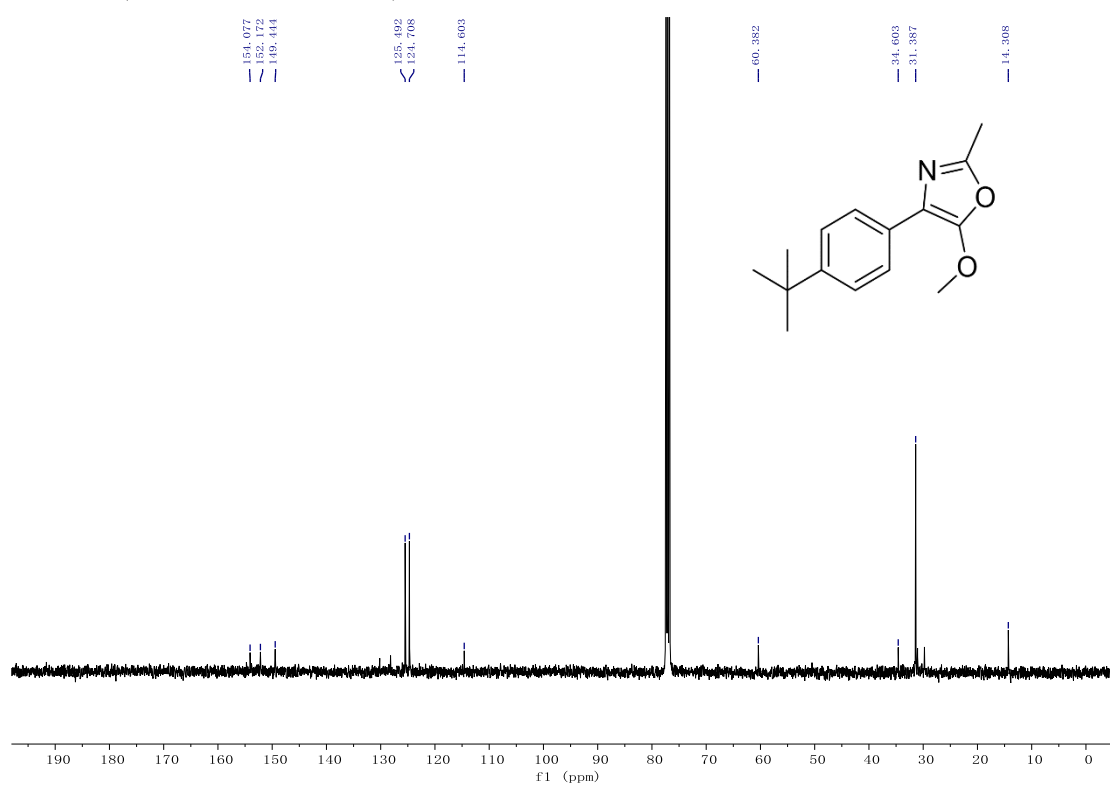
<sup>19</sup>F NMR (376 MHz, Chloroform-*d*)



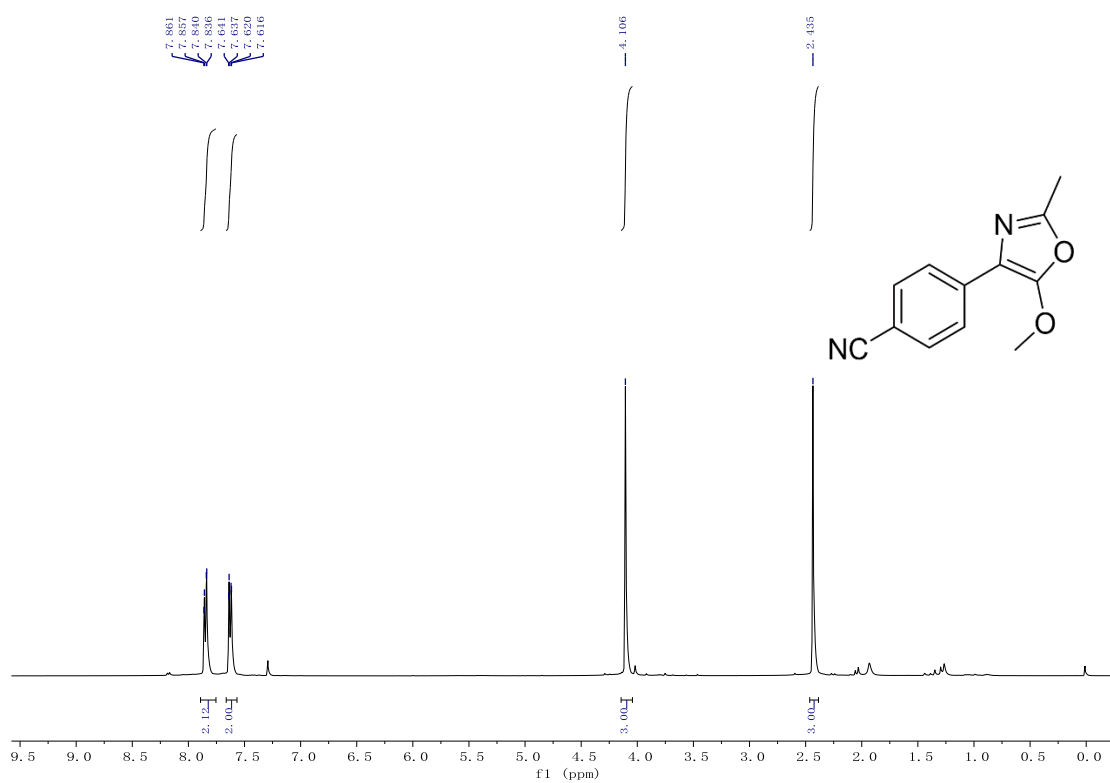
2j: <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)



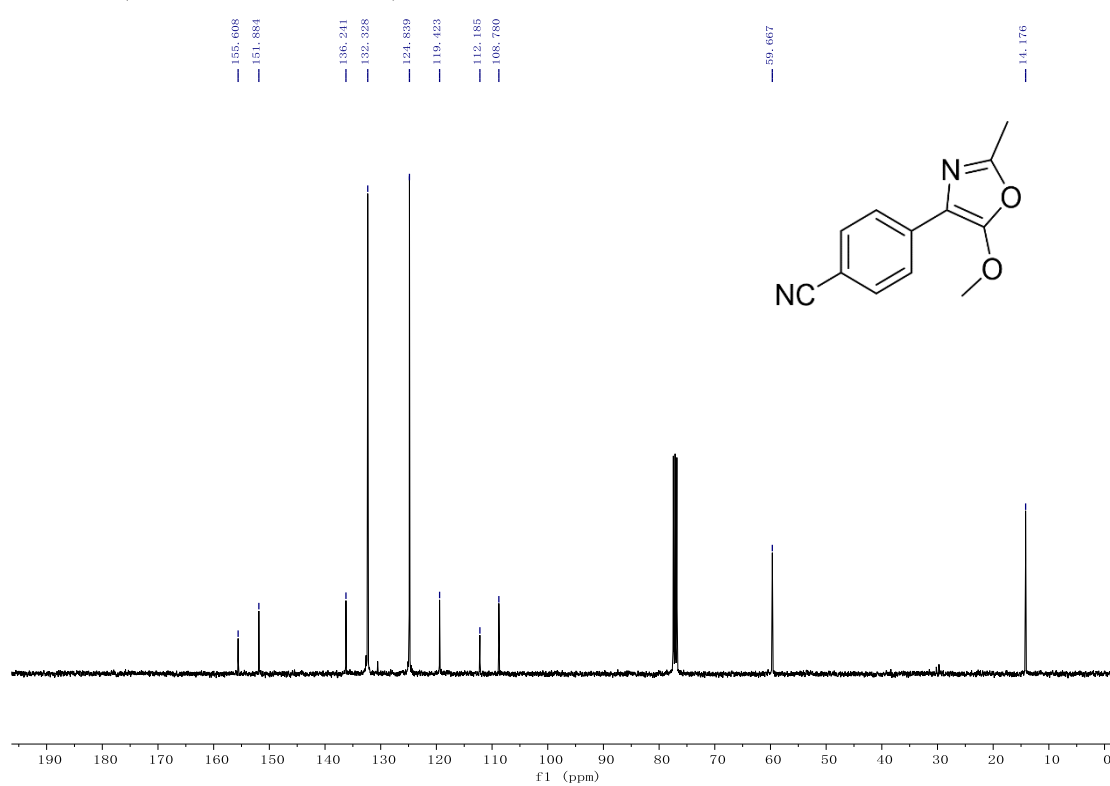
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



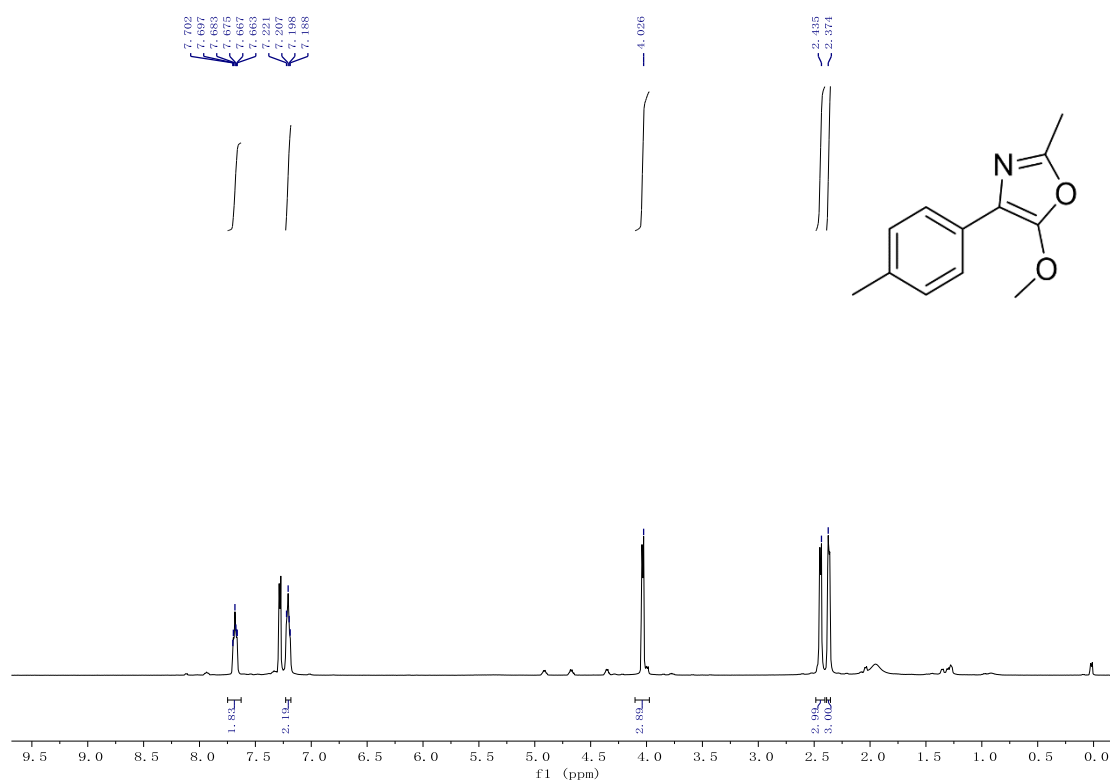
**2k:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



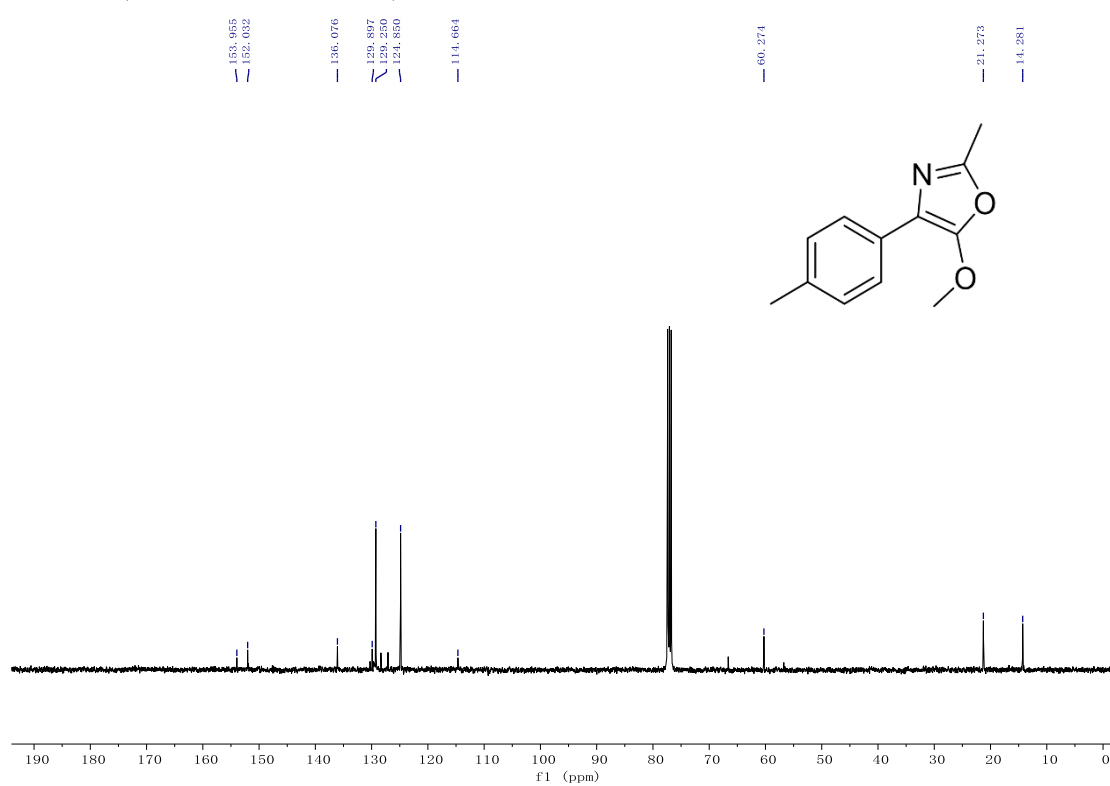
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



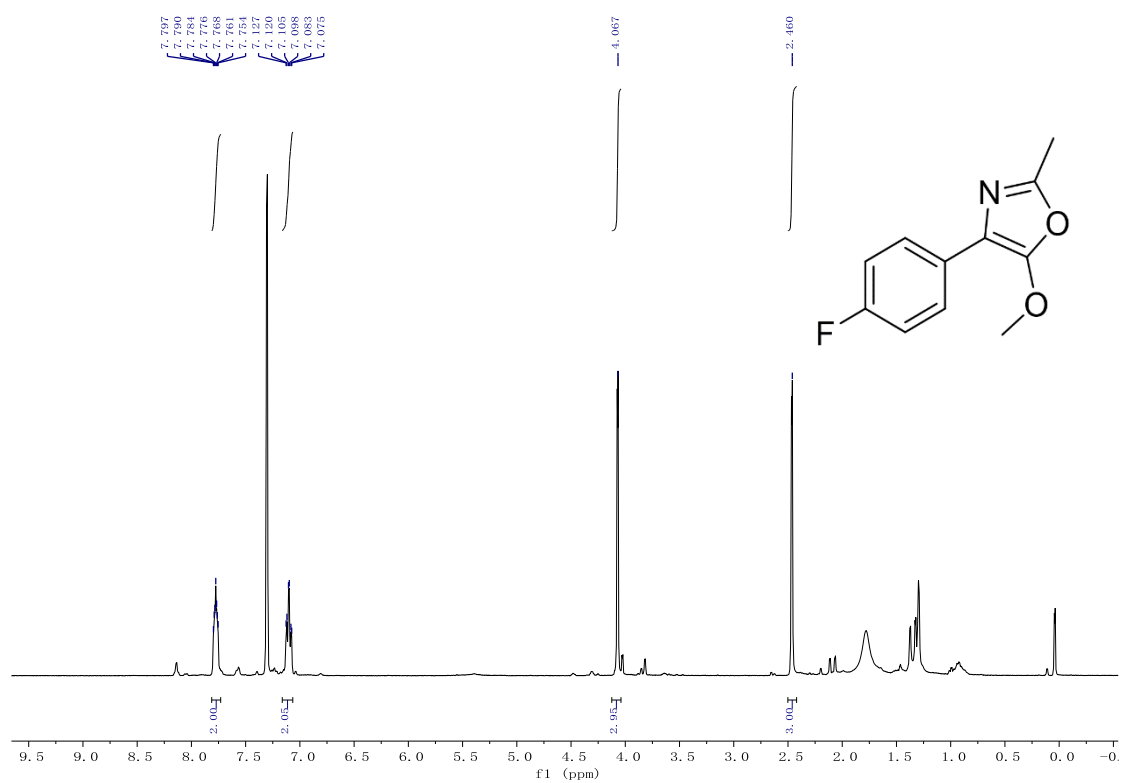
**2l:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



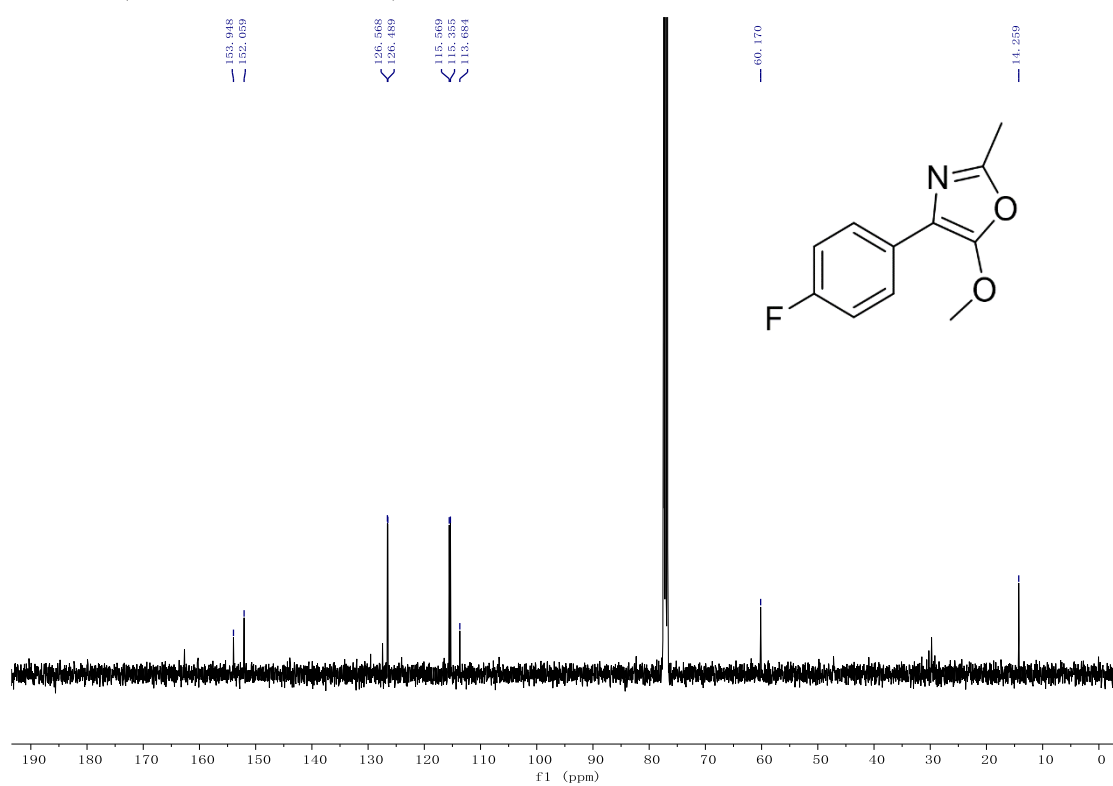
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



**2m:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)

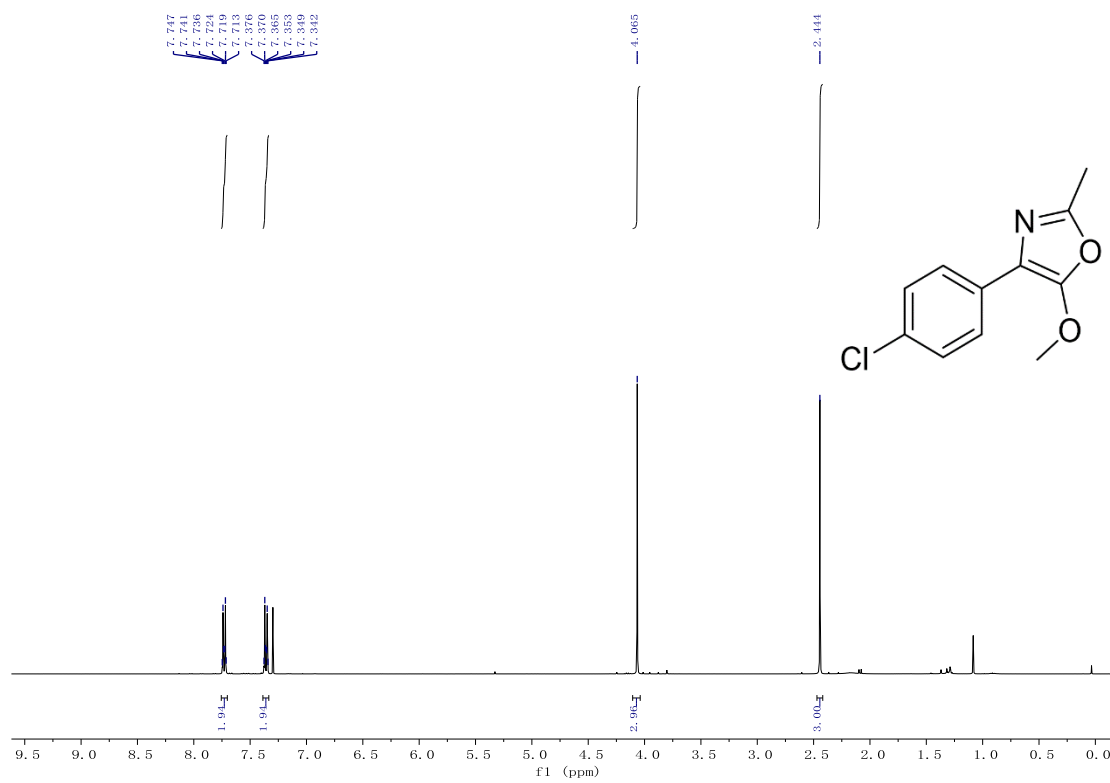




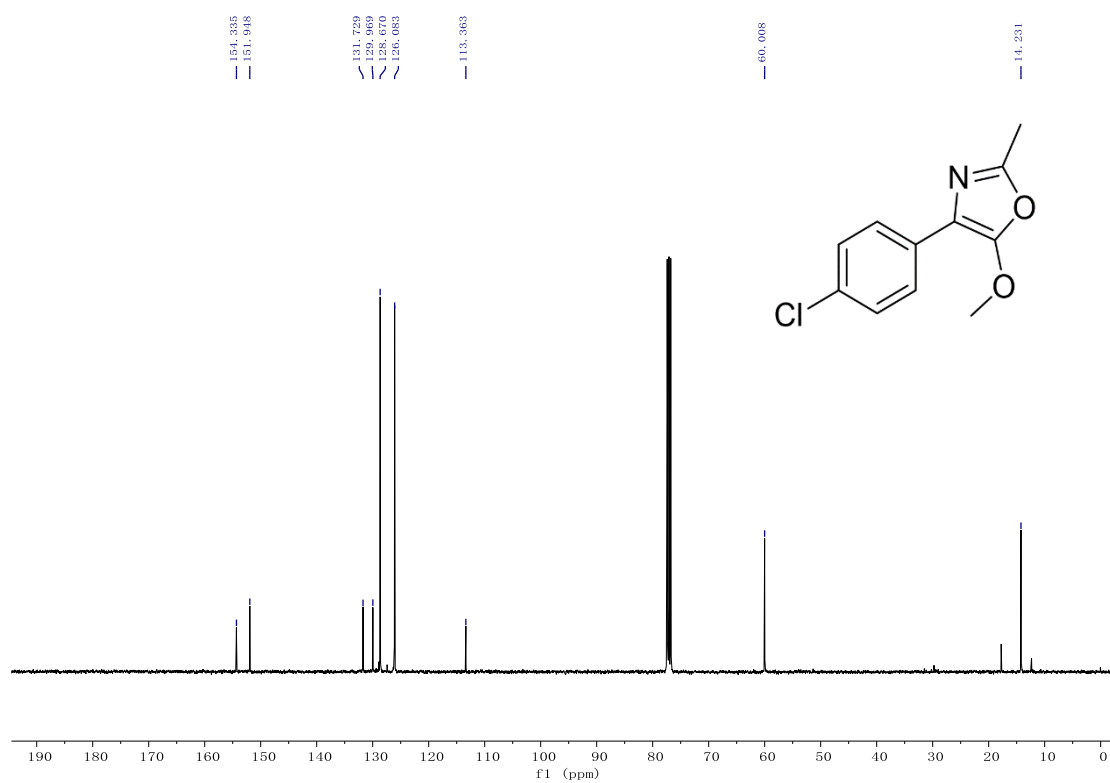
$^{19}\text{F}$  NMR (376 MHz, Chloroform-*d*)



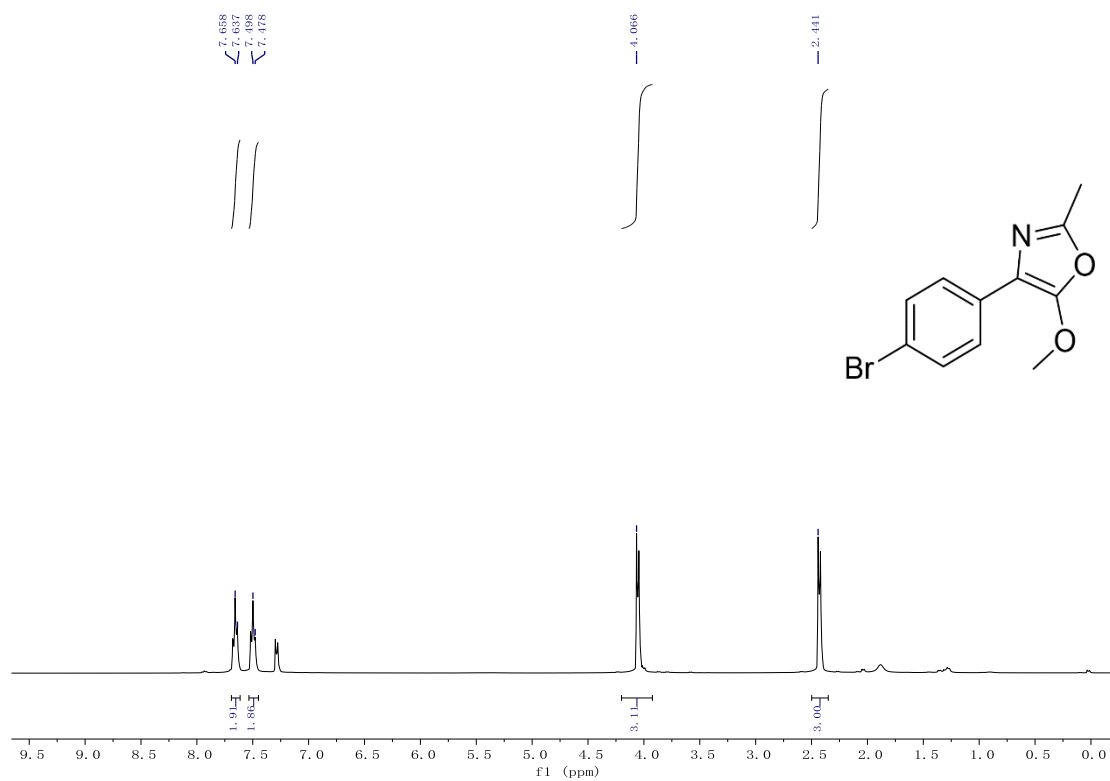
**2n:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



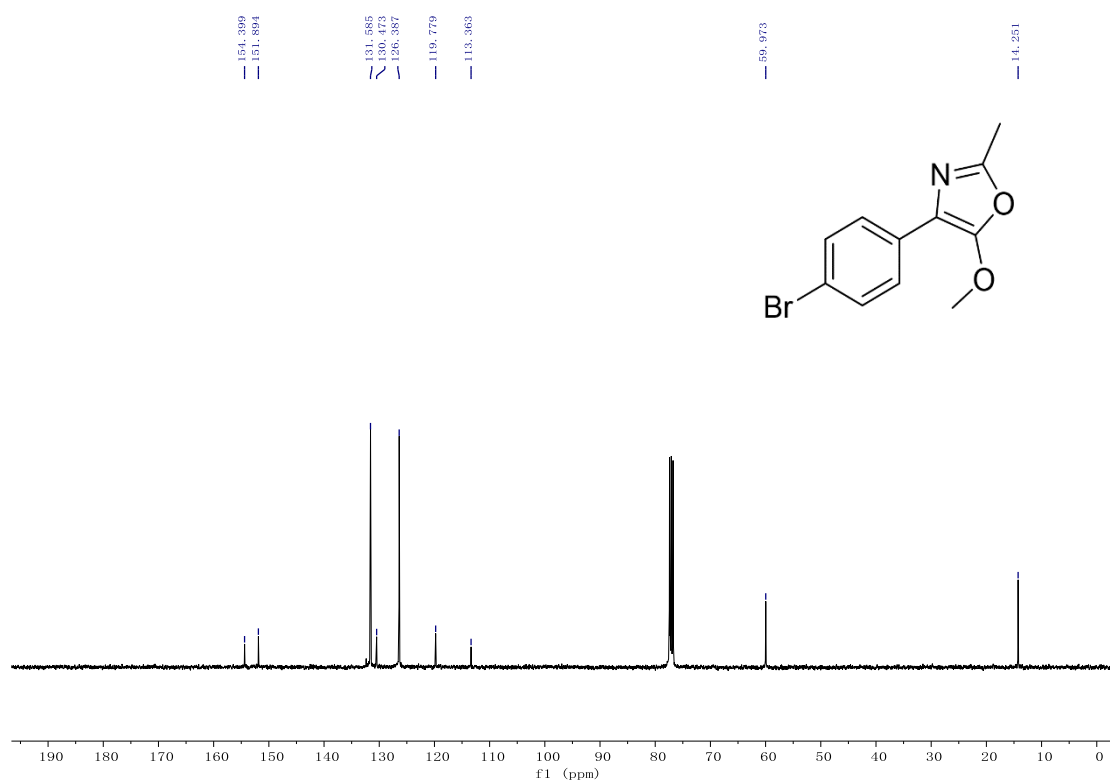
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



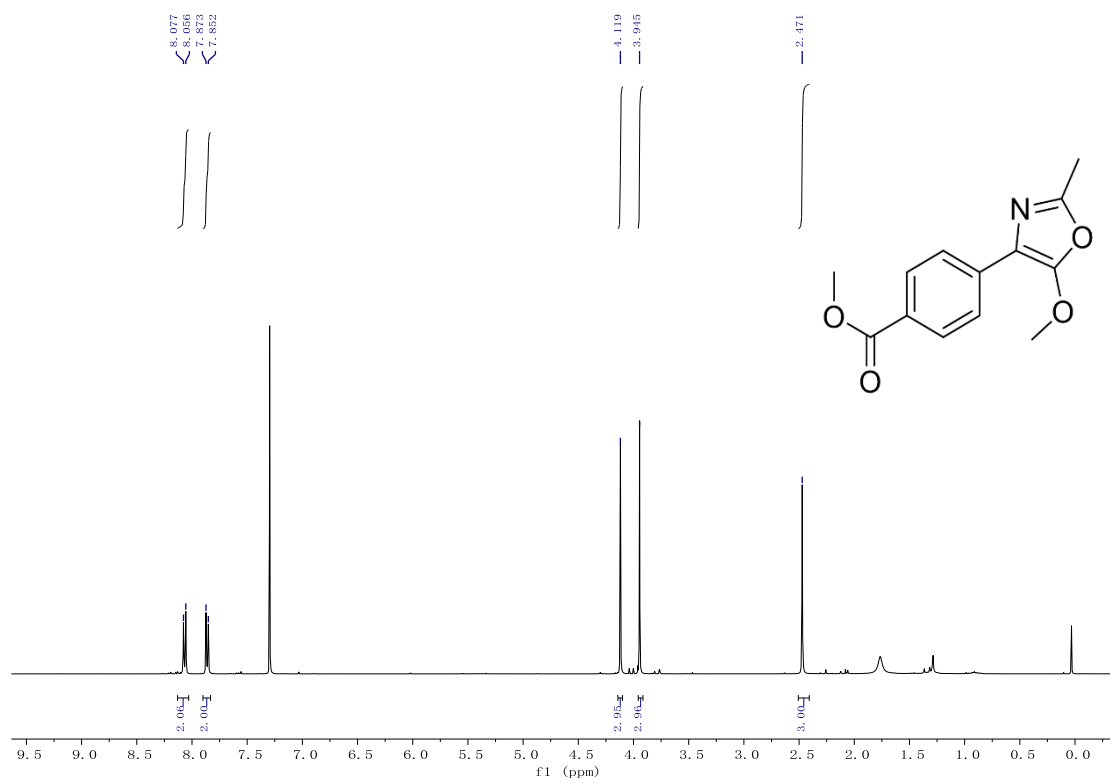
**2o:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



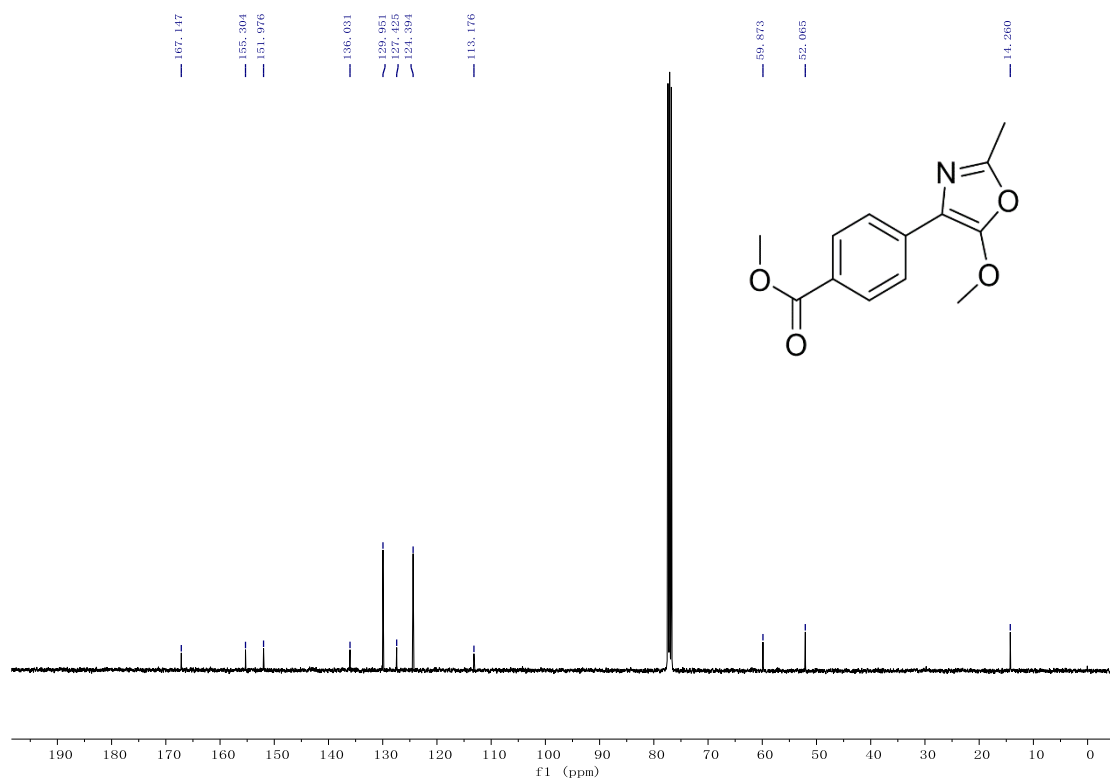
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



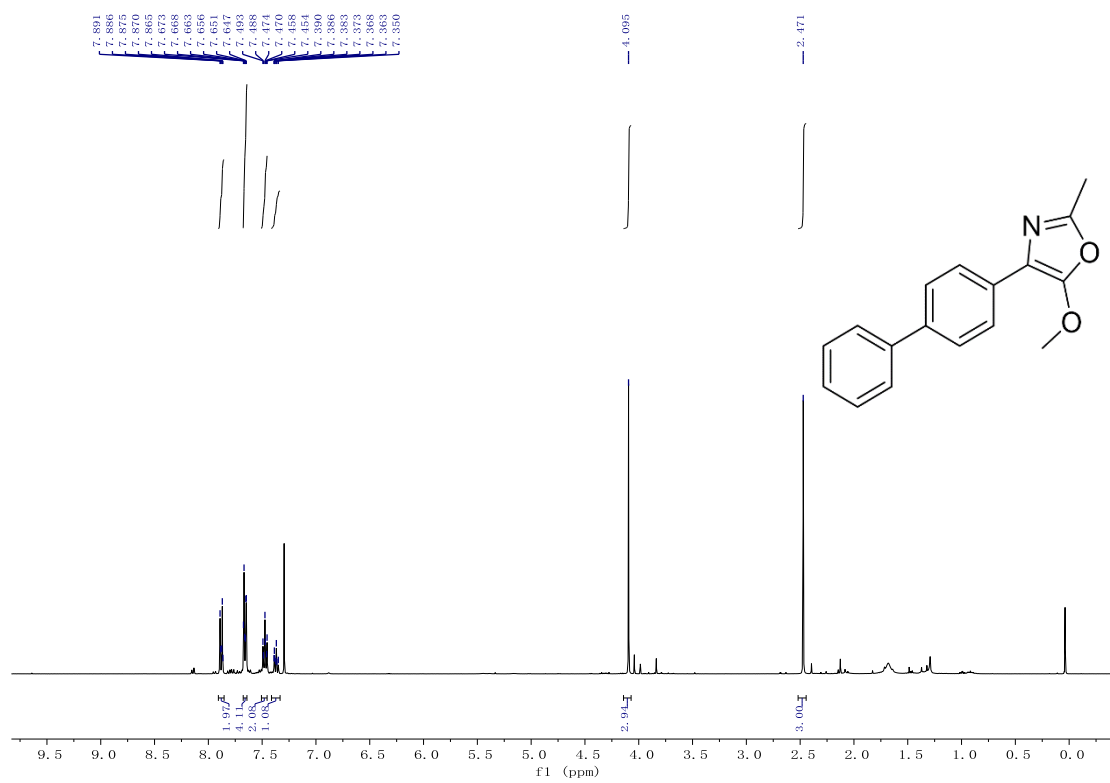
**2p:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



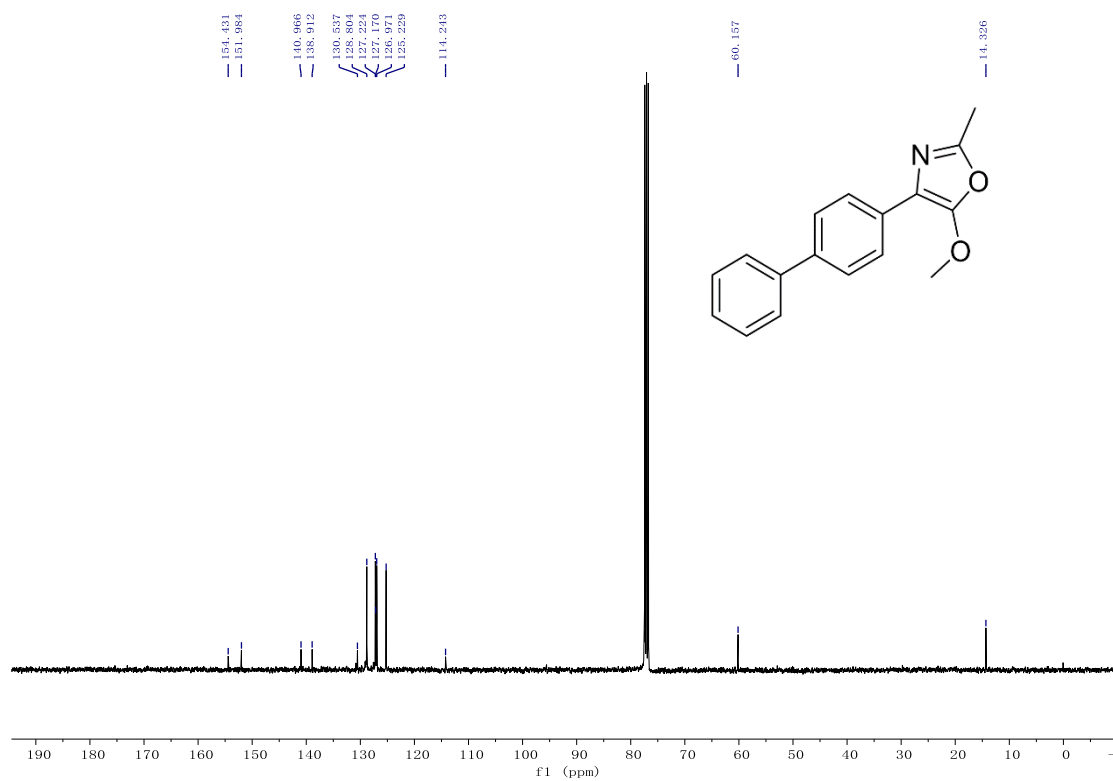
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



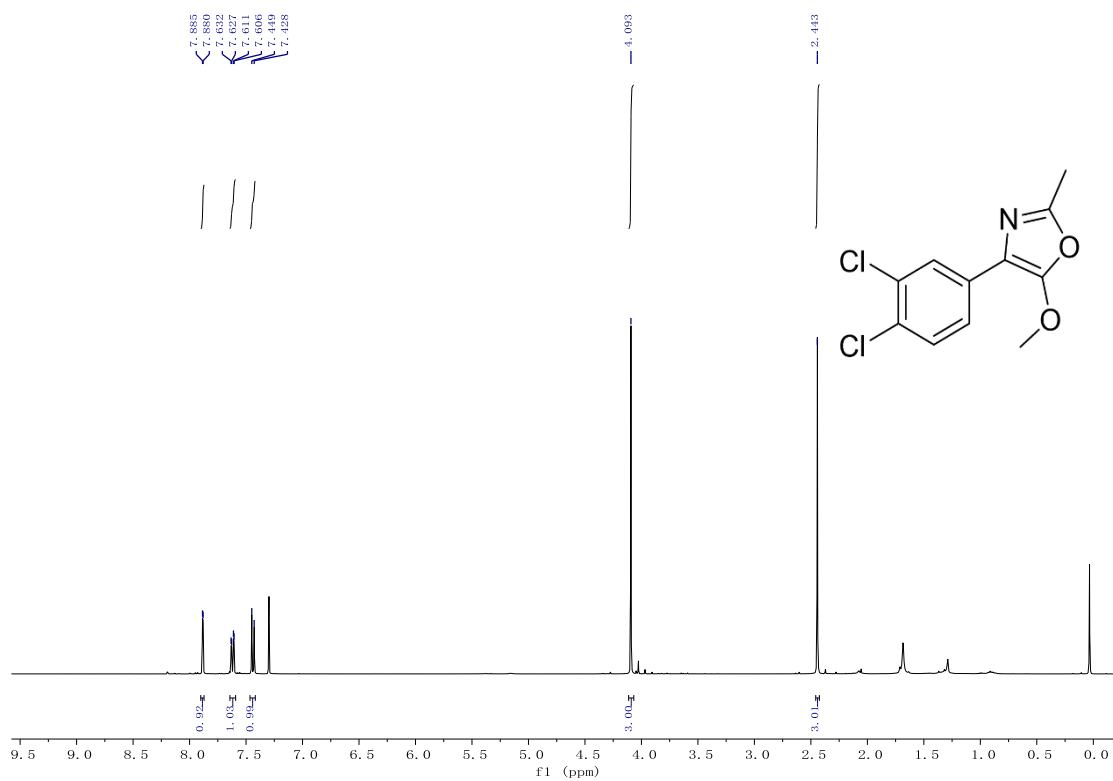
**2q:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



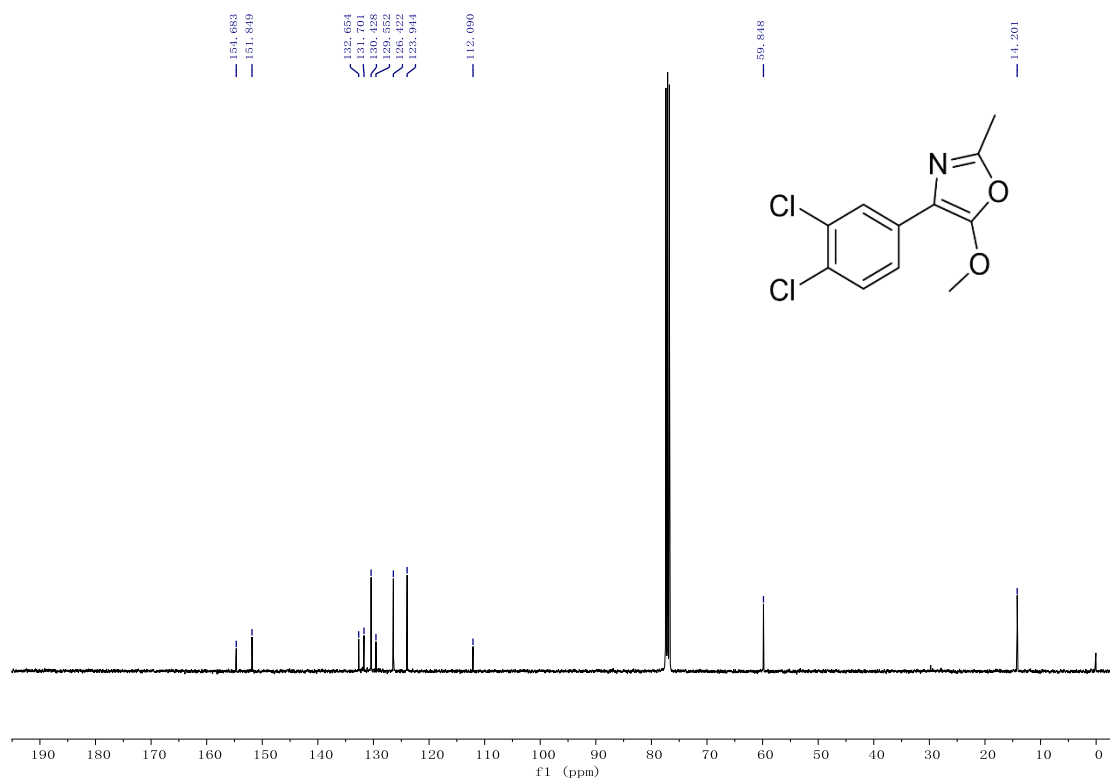
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



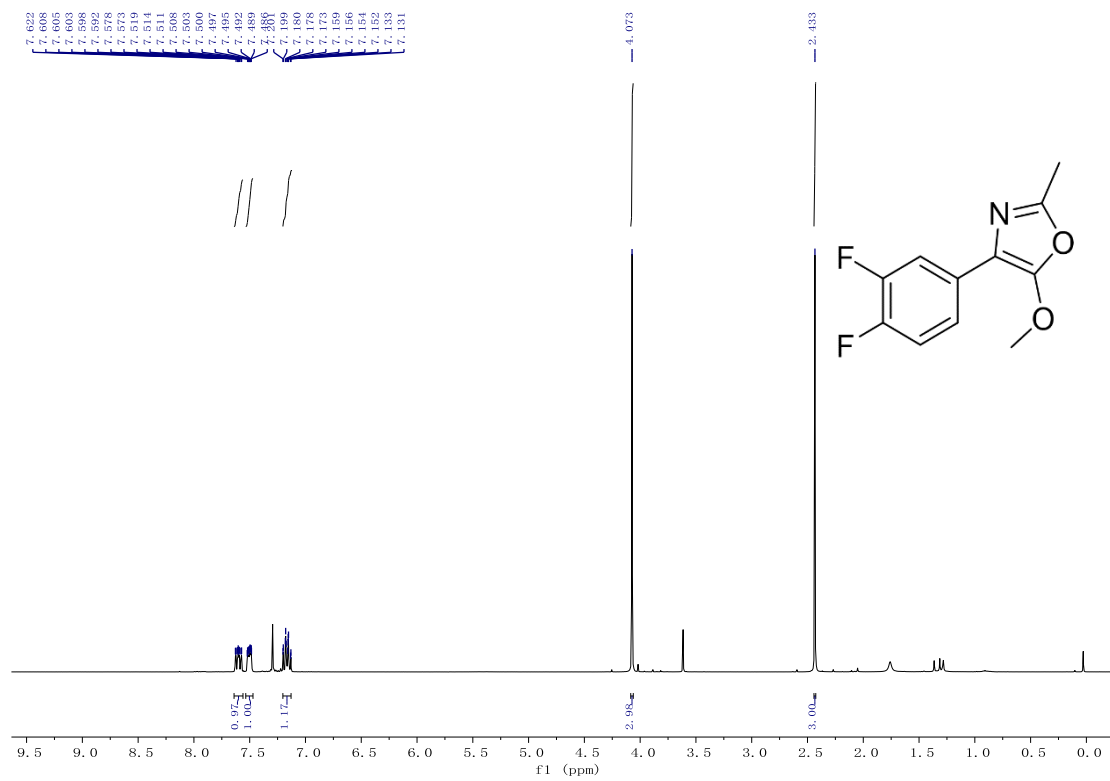
**2r**:  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



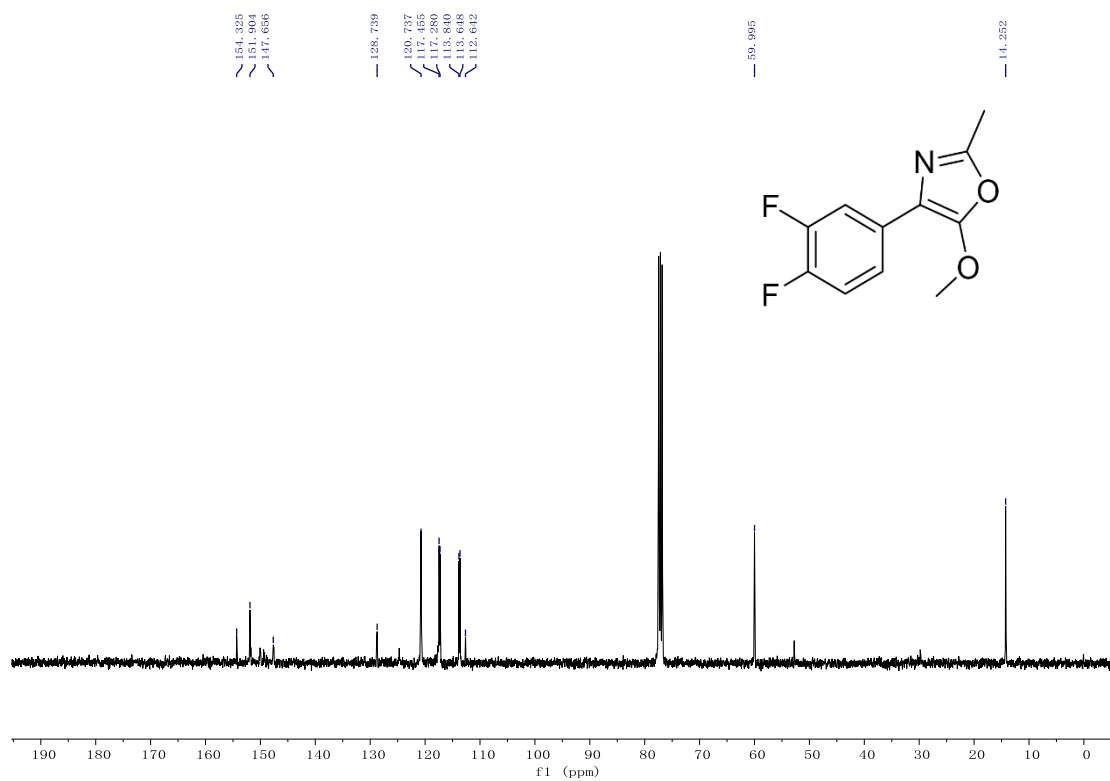
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



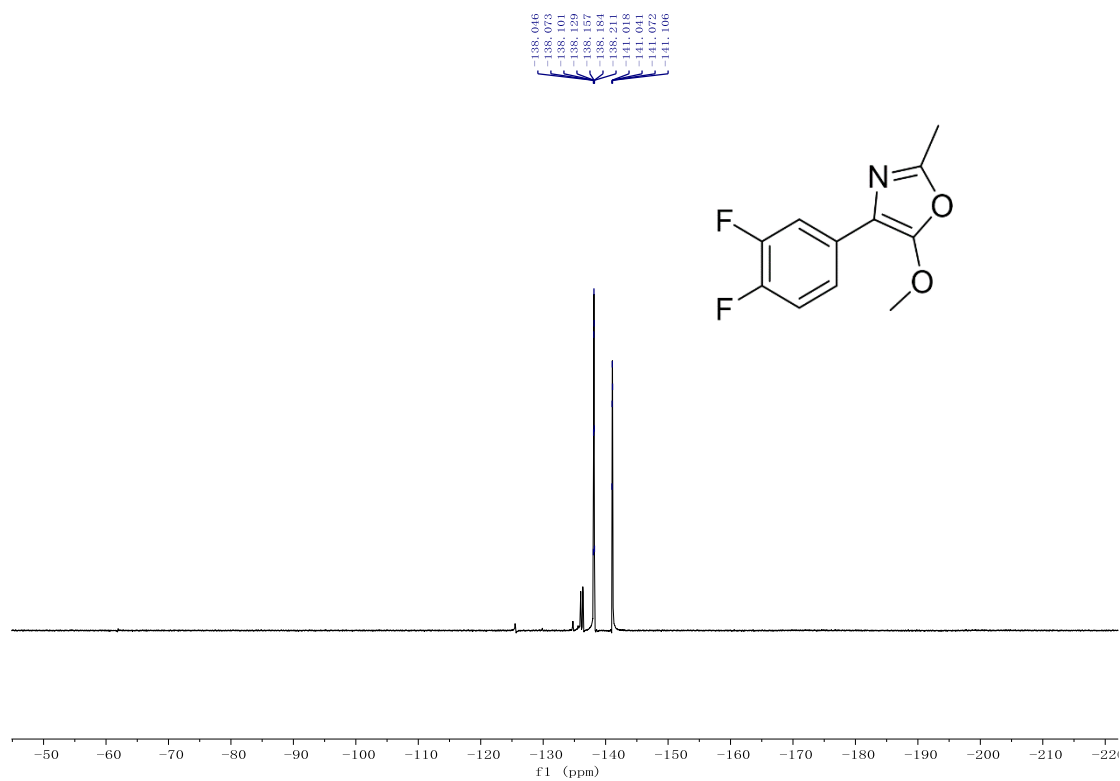
**2s:** <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)



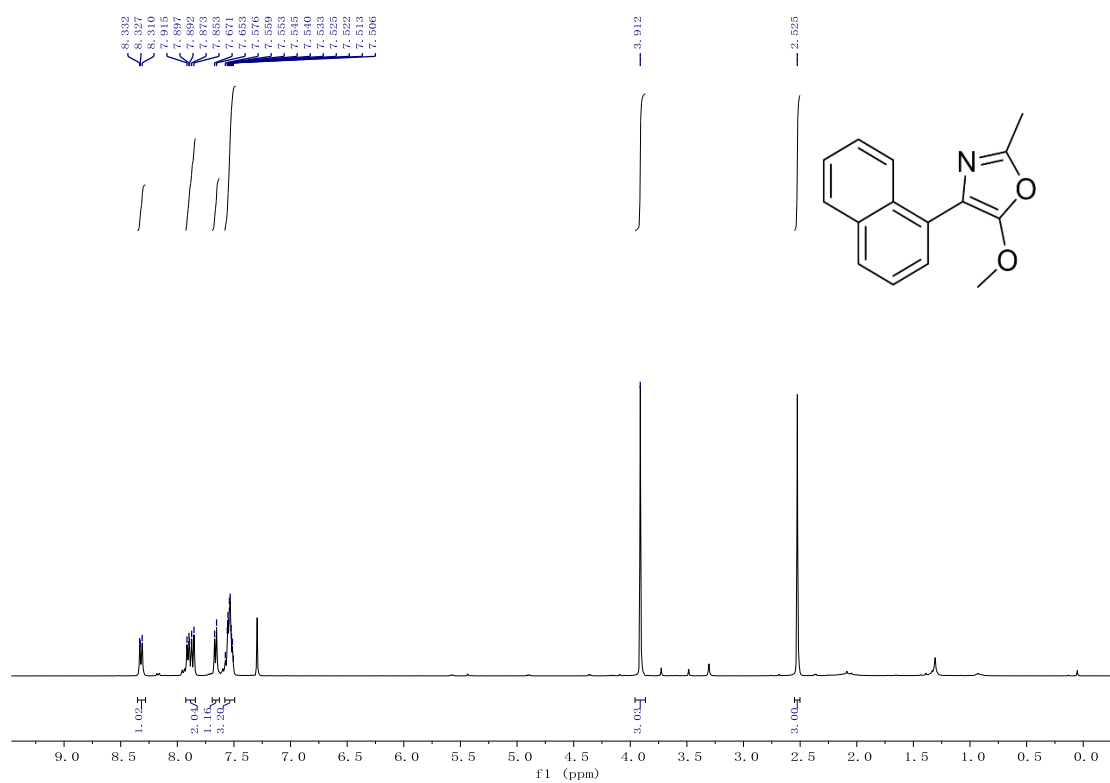
<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)



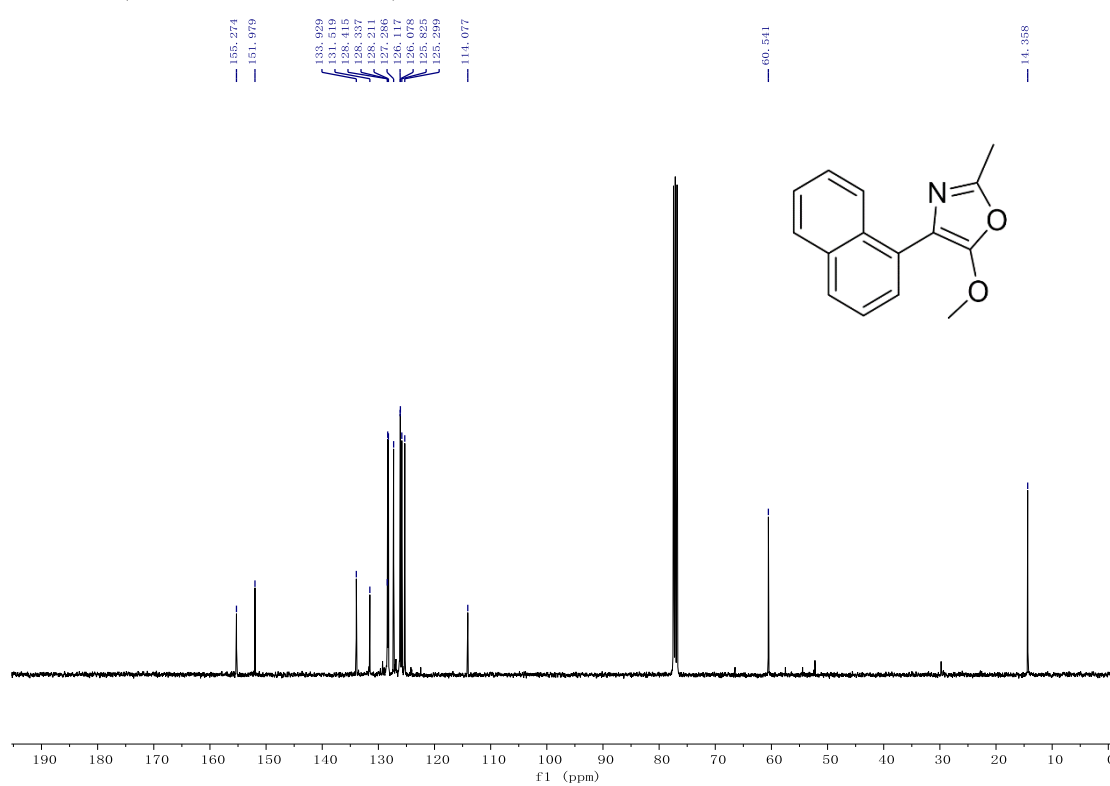
<sup>19</sup>F NMR (376 MHz, Chloroform-*d*)



**2t: <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)**

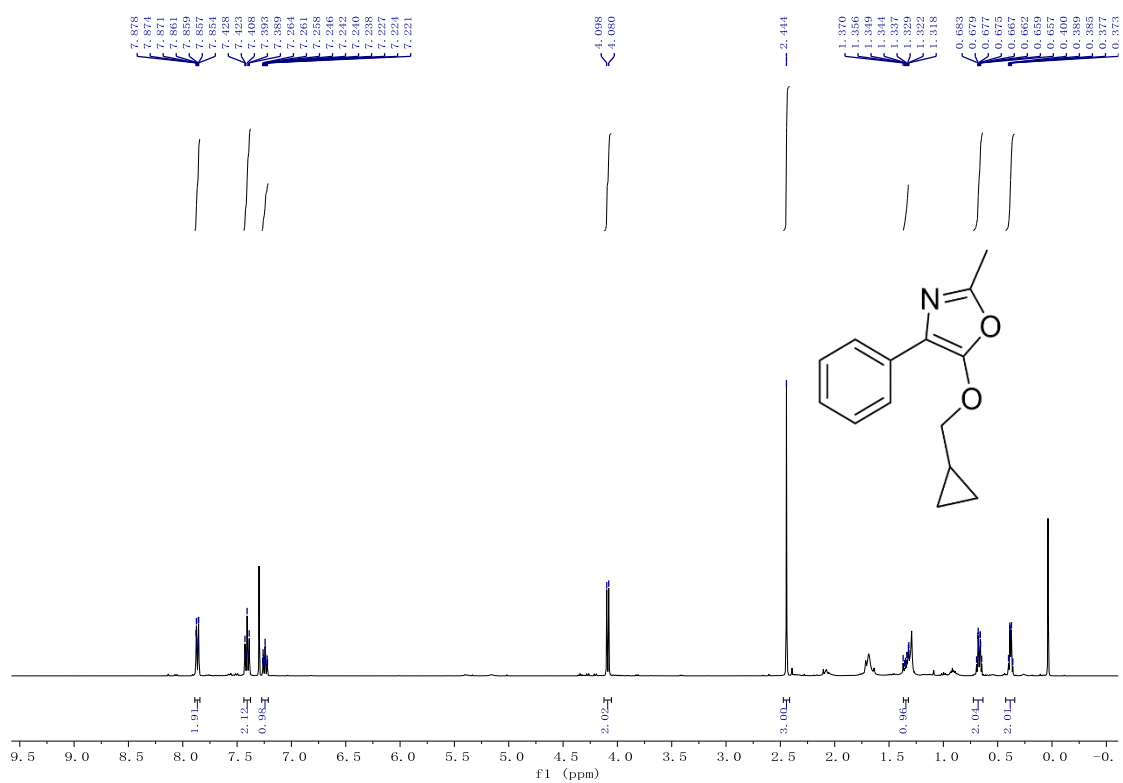


**<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)**

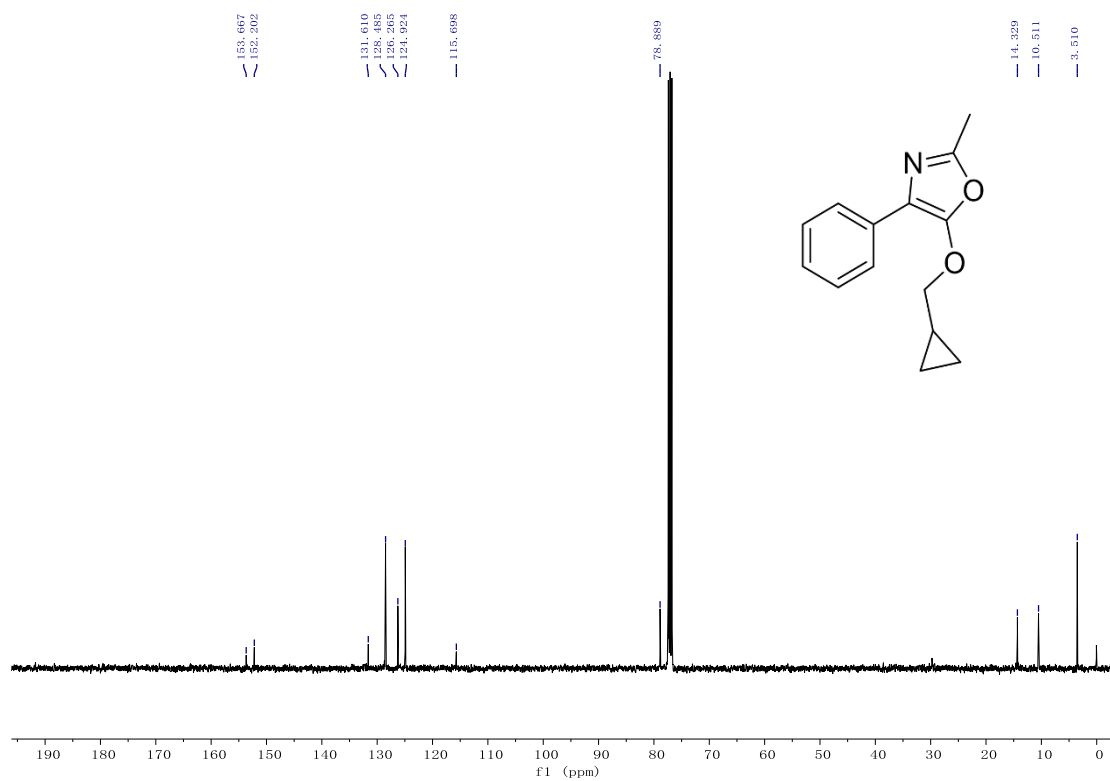




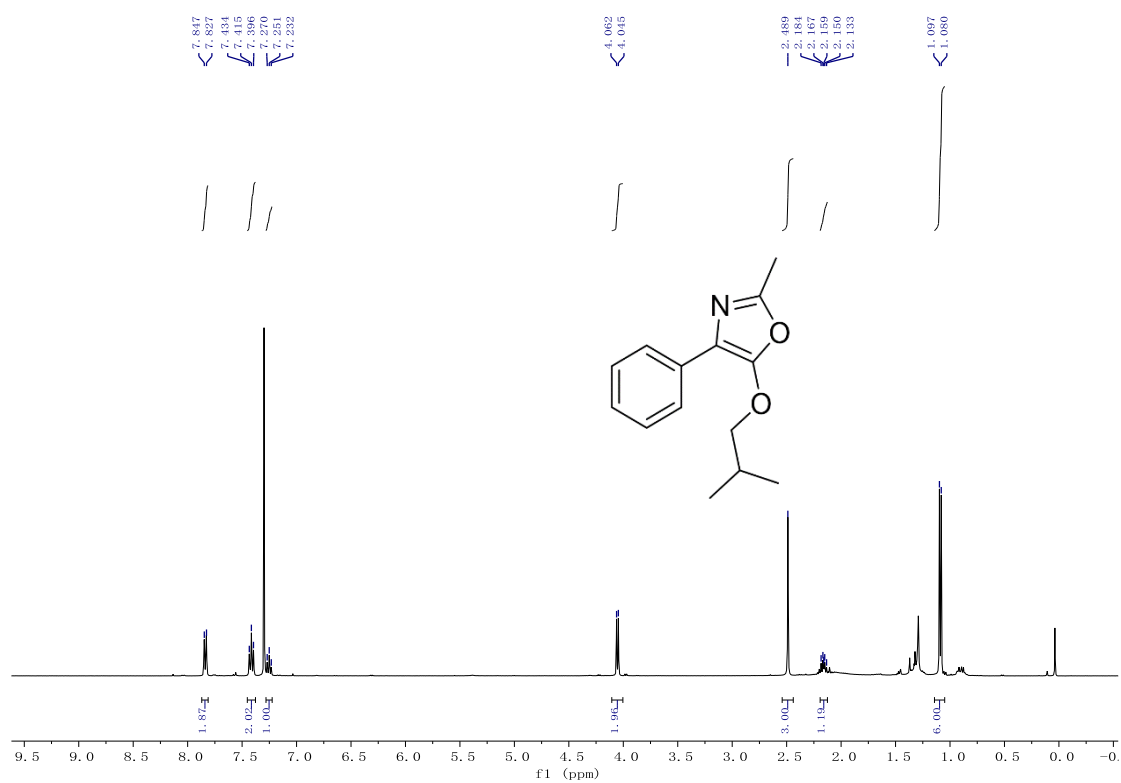
**2u:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



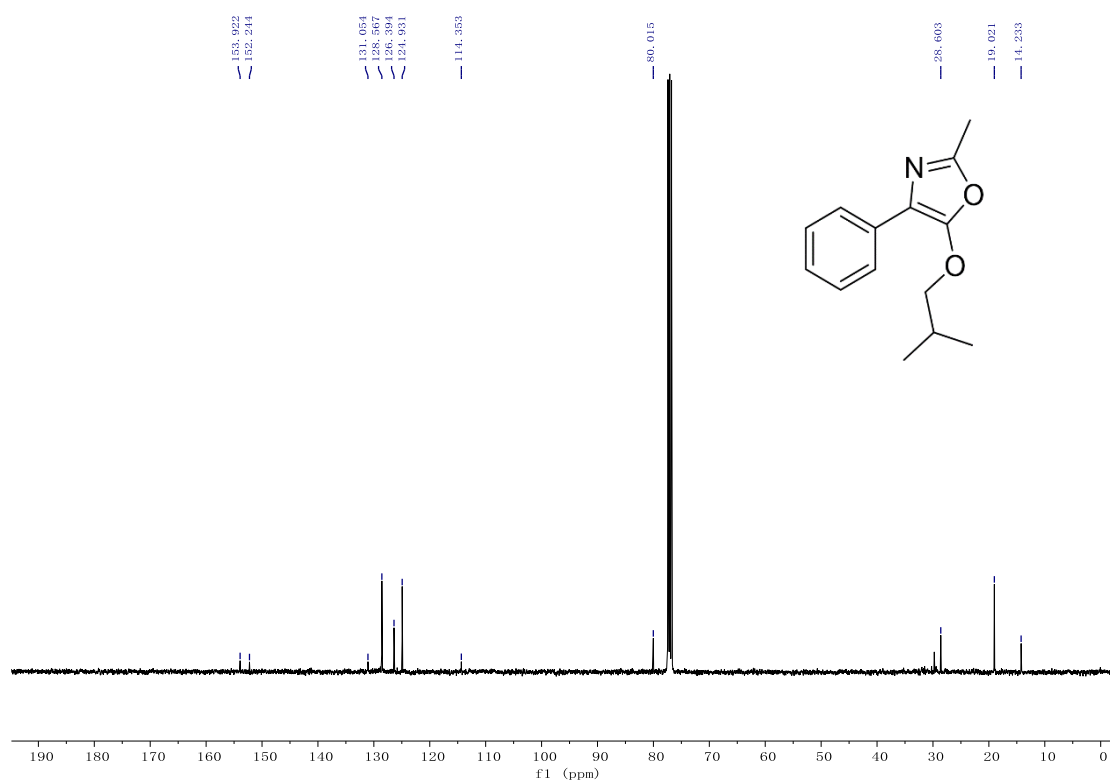
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



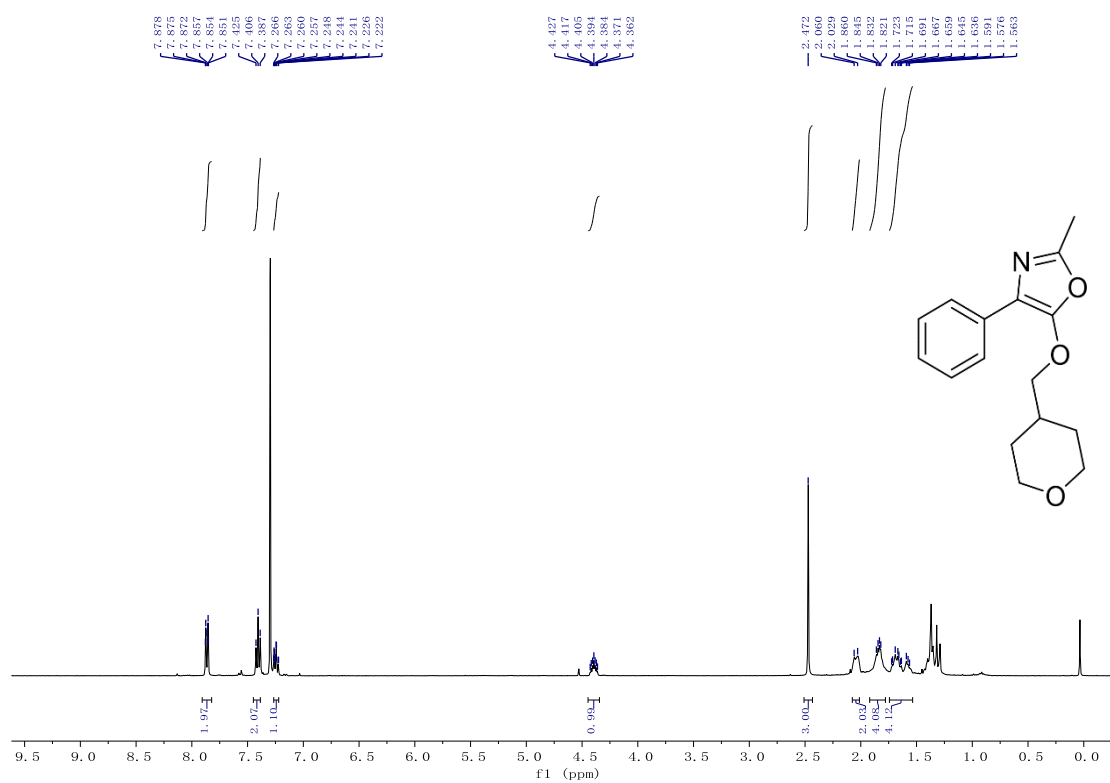
**2v:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



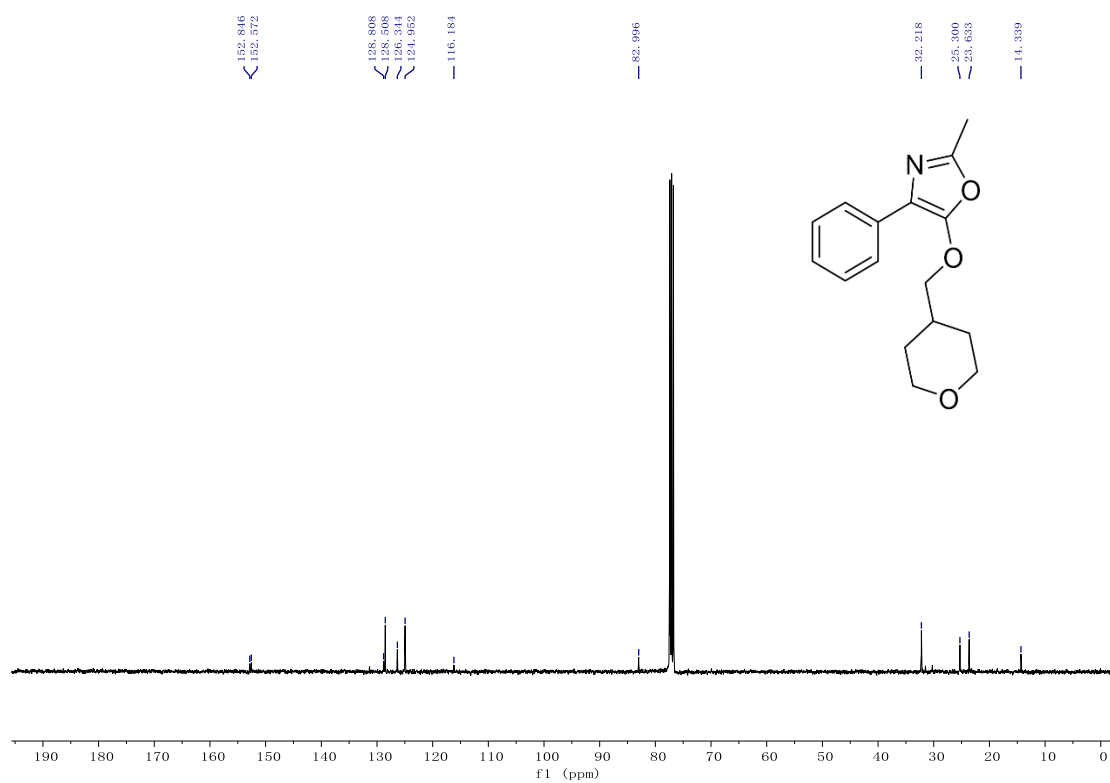
$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



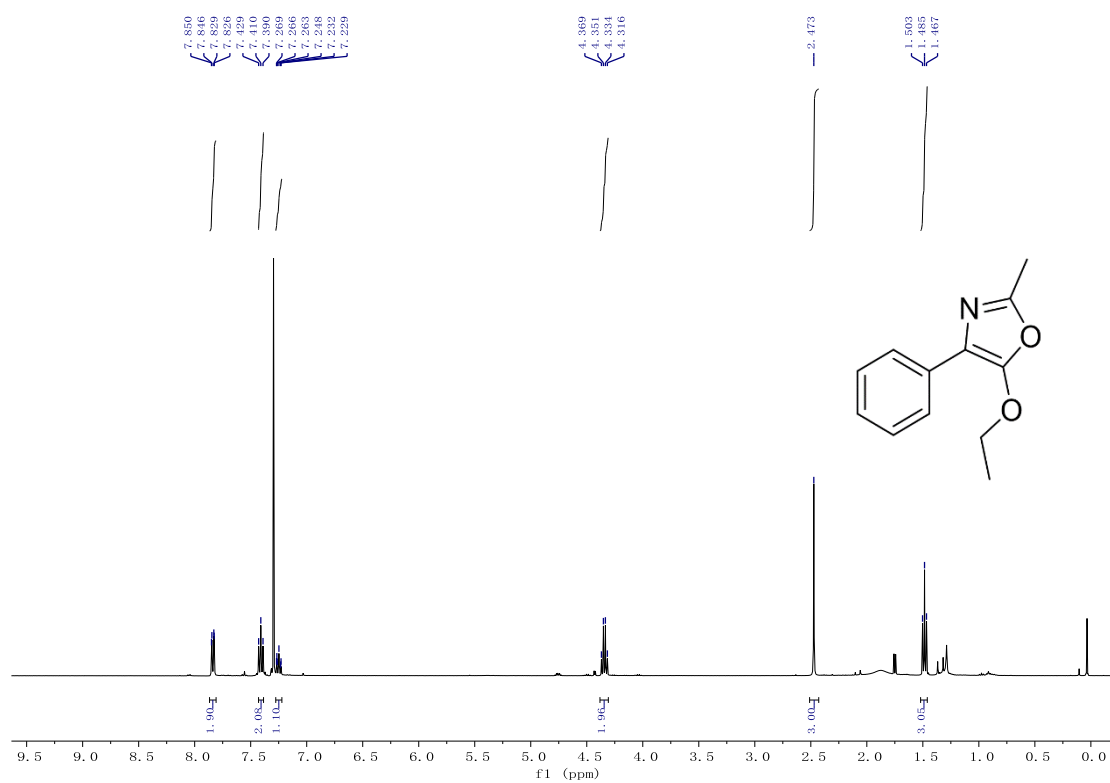
**2w: <sup>1</sup>H NMR (400 MHz, Chloroform-*d*)**



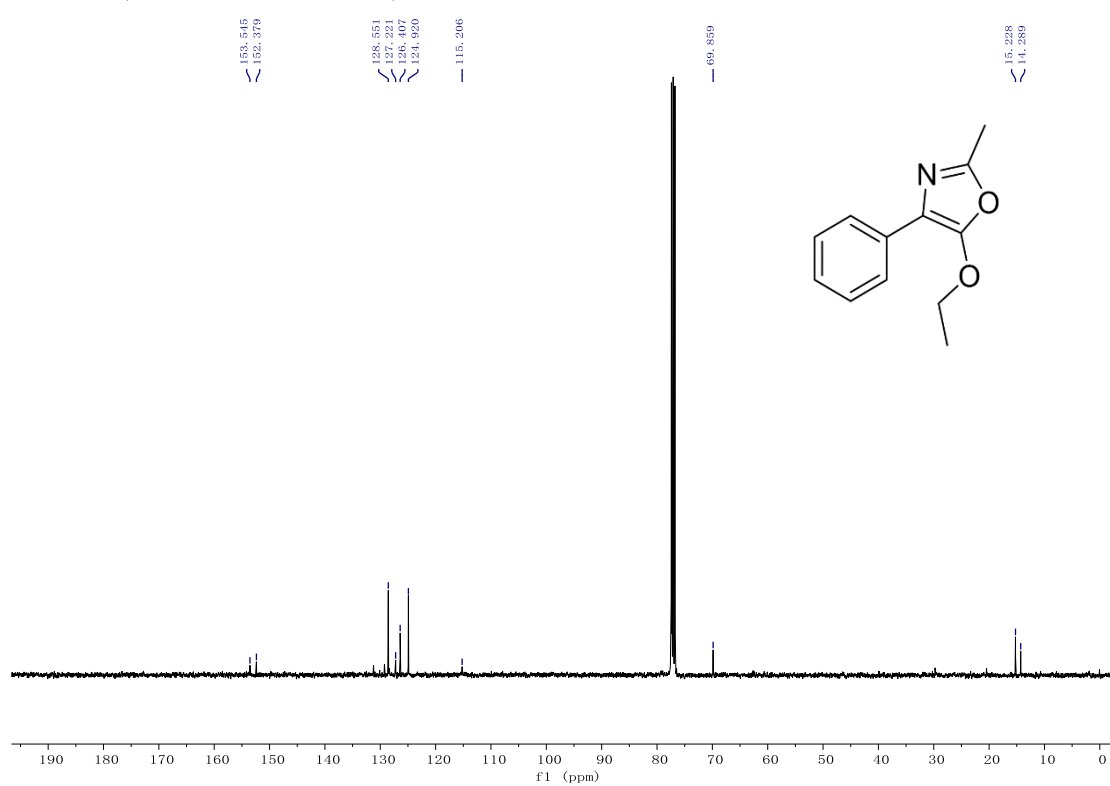
**<sup>13</sup>C NMR (101 MHz, Chloroform-*d*)**



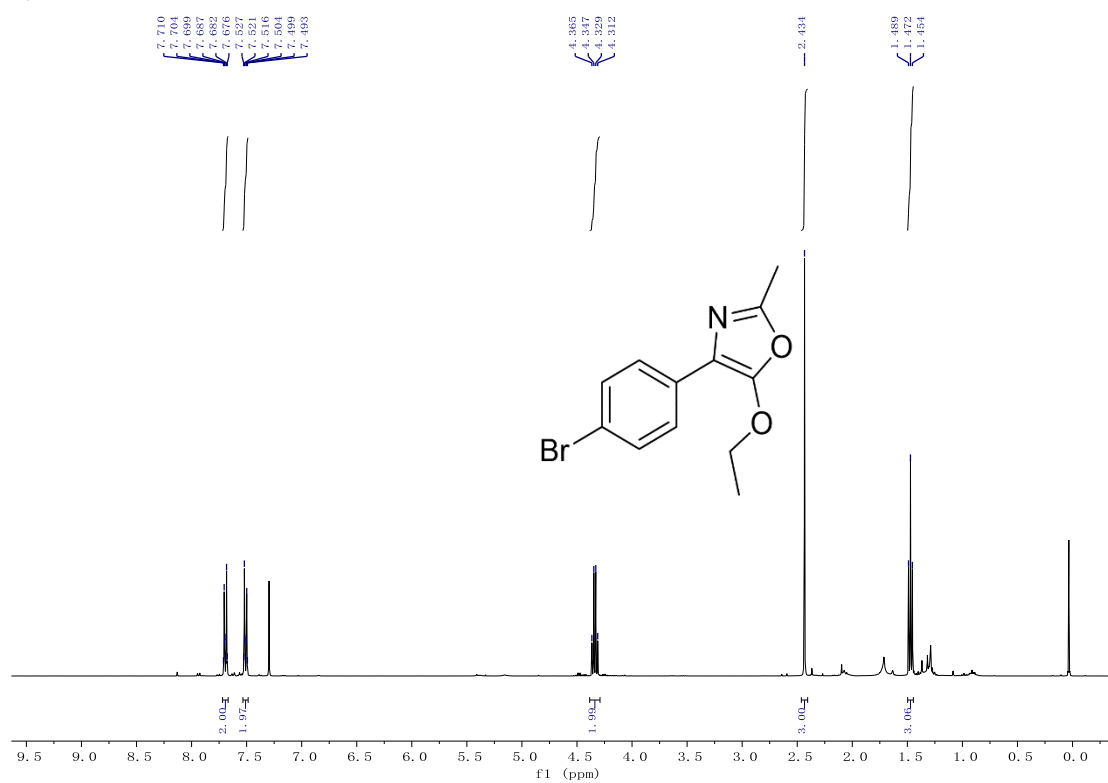
**2x:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)



**2y:**  $^1\text{H}$  NMR (400 MHz, Chloroform-*d*)



$^{13}\text{C}$  NMR (101 MHz, Chloroform-*d*)

