Supplementary Information

Tempo Promoted Tandem Reaction of 2-Aminobenzophenones and Benzylamines under Electrochemical Conditions

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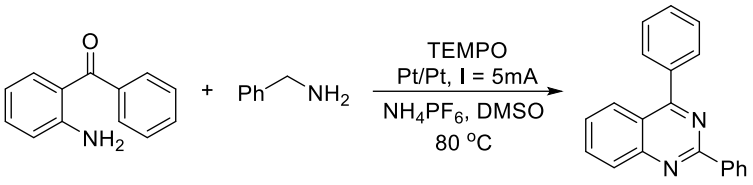
Part I Experiment Section

1.1 General Information

^{1}H NMR and ^{13}C NMR were recorded on a 500 MHz Nuclear Magnetic Resonance Spectrometer (^{1}H NMR: 500 MHz, ^{13}C NMR: 126 MHz) using TMS as the internal reference. Chemical shifts were expressed as δ with respect to TMS and coupling constants *J* are expressed in Hz. HRMS (ESI) were recorded on a Q-TOF Premier. Commercially available compounds were used without further purification. Solvents were purified according to the standard procedures unless otherwise noted.

1.2 General Procedures for the Synthesis of Quinazolines

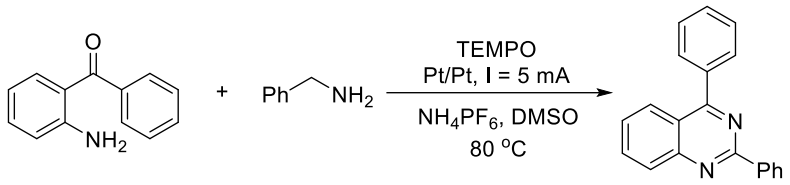


1a **2a** **3a**

1a (2-amino benzophenone,0.3 mmol, 59.2 mg), ammonium hexafluorophosphate (NH_4PF_6, 0.6 mmol, 97.8 mg), and TEMPO (2,2,6,6-tetramethylpiperidinooxy, 0.06 mmol, 4.7 mg) were added to a 10 mL reaction tube, followed by addition of 3 mL dimethylsulfoxide using a plastic pipette. Then add **2a** (benzylamine, 0.6mmol, 65.5 μL) with a microsyringe and use the Pt/Pt as electrodes. The reaction mixture was heated at 80 °C while stirring and monitoring the voltage. When the reaction was completed, the reaction solution was extracted three times with water and ethyl acetate, and the combined organic phases were dried over anhydrous sodium sulfate and evaporated in vacuo to obtain the crude product. The residue was purified by flash column chromatography (petroleum ether/ethyl acetate) to give **3a**.

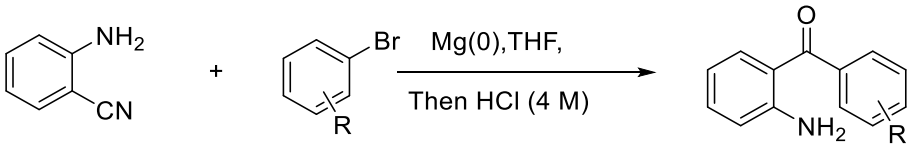
1.3 Gram-scale experiment

1a (2-aminobenzophenone, 6 mmol, 1.183 g), NH_4PF_6 (12 mmol, 1.956 g), and TEMPO (2,2,6,6-tetramethylpiperidinooxy, 1.2 mmol，94 mg) were added to a 100 mL reaction flask, followed by addition of 60 mL DMSO using a plastic pipette. Then add **2a** (benzylamine, 12 mmol, 1.31 mL) with a pipette and use the Pt/Pt as electrodes. The reaction mixture was heated at 80 °C while stirring and monitoring the voltage. When the reaction was completed, the reaction solution was extracted three times with water and ethyl acetate, and the combined organic phases were dried over anhydrous sodium sulfate and evaporated in vacuo to obtain the crude product. The residue was purified by flash column chromatography (petroleum ether/ethyl acetate) to give **3a** (1.1g, 65%).



1a, 6 mmol **2a,** 12 mmol **3a,** 1.1g, 65%

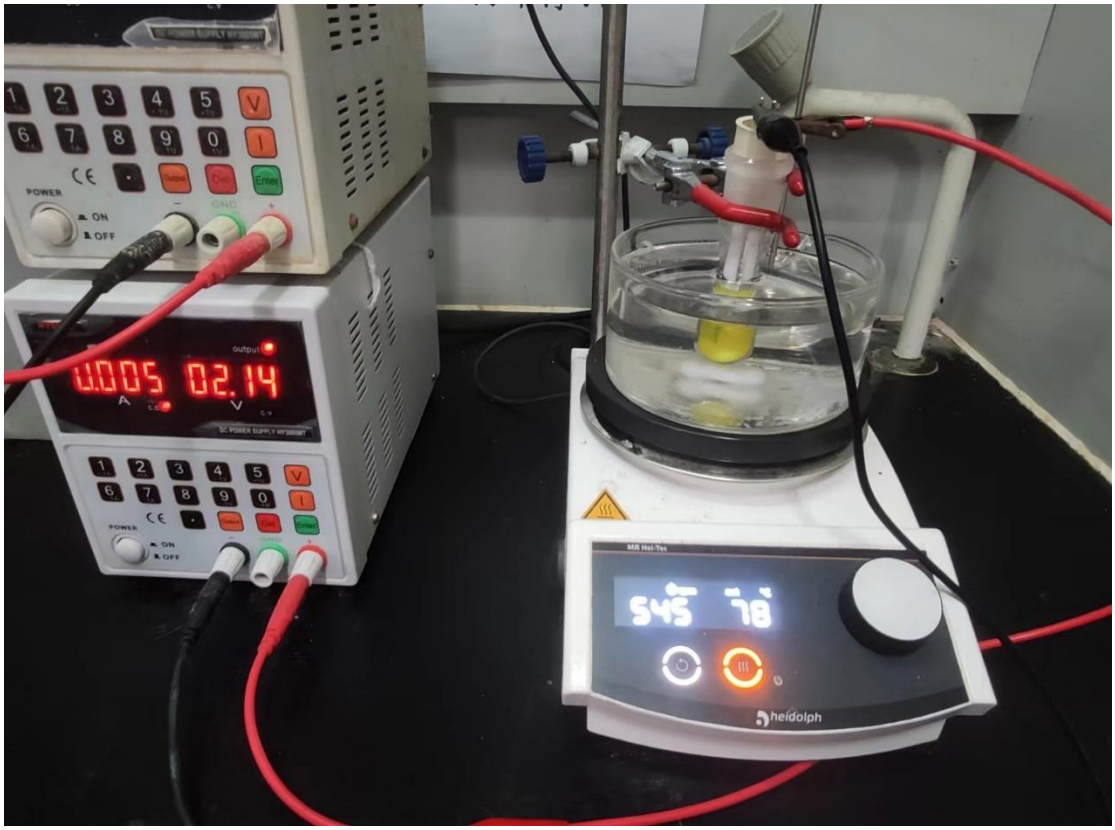
1.4 Steps in the synthesis of substrates



The magnesium strip (1.1 equiv.) and dry THF (1 M) were added to a flame-dried round-bottomed flask. Following the dropwise addition of aryl bromide (1.0 equiv.), the reaction mixture was kept under reflux conditions for 2 hours. Then 2-amino benzonitrile (0.2 to 0.25 eq.) was added. The reaction was heated to 60 °C and continued for about 12 hours. After consumption of the material, the reaction was quenched with a solution of 4 M hydrochloric acid in EtOH at 0 °C and then heated at reflux overnight. Concentrated in a vacuum and quenched with saturated sodium bicarbonate followed by extraction with EtOAc (×3). The organic layers were combined, dried, and concentrated in anhydrous sodium sulfate to give the crude product. The crude mixture was then purified by column chromatography using petroleum ether/ethyl acetate as eluent to give the target product.

1.5 The electrochemical reaction setting and the parameters of the electrochemical reactor

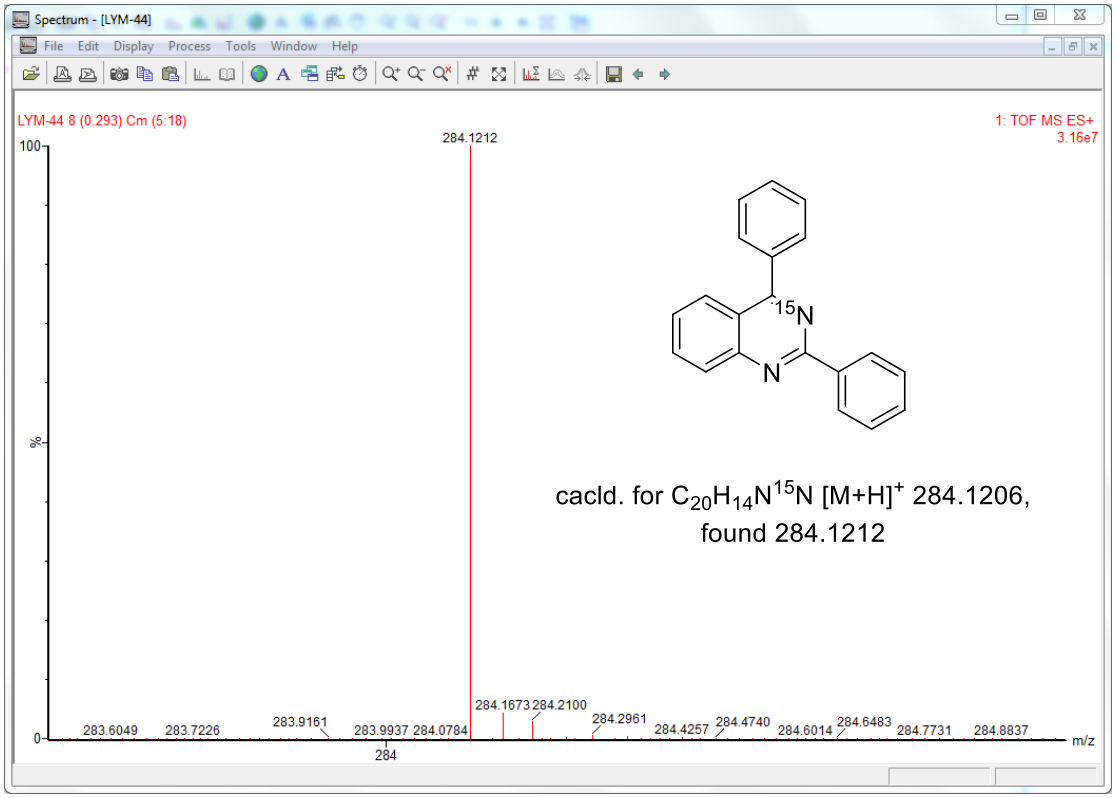
1.5.1 The picture of the electrochemical reaction setting



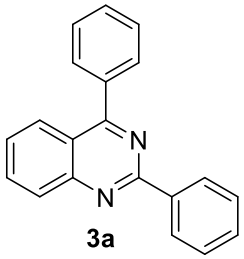
1.5.2 The parameters of the electrochemical reactor

Model number	HY3005MT
Output voltage	0-30VDC
Output current	0-5VDC
Ripple and noise	CV≤5 mV r ms CC≤20 mA
Input voltage	220VAC+10% 50HZ
Power supply effect	CV≤0.1%+3 mV CC≤0.5%+3mA
load effect	CV≤0.05%+3 mV CC≤0.5%+10mA
Monitor	Dual 4-digit LED display
Protection	Current limit, short circuit, overload and overheat protection
Operating environment	0～+40℃ Relative humidity:<90%
Locking function	Have
Anti-impact output control	Have
Voltage indication accuracy	LED ± 0.5% + 5 characters
Current indicating accuracy	LED±1％+5 characters
Volume	24 length x 13 width x 15 height CM
Weight	2KG

Part II HRMS data for ^{15}N-labelled quinazoline

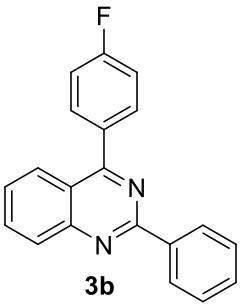


Part III The Analytical Data of Products



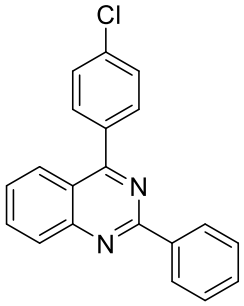
3a

2,4-diphenylquinazoline(3a[1]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.55 (d, *J* = 7.2 Hz ,2H), 7.93 (d, *J* = 8.4 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.70 – 7.64 (m, 2H), 7.62 – 7.55 (m, 1H), 7.41 – 7.28 (m, 6H), 7.27 – 7.21 (m, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.3, 160.2, 152.0, 138.3, 137.7, 133.6, 130.7, 130.3, 130.0, 129.2, 128.8, 128.6, 127.1, 121.7.



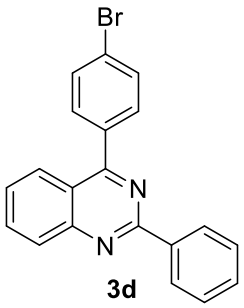
3b

4-(4-fluorophenyl)-2-phenylquinazoline(3b[7]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.71 – 8.66 (m, 2H), 8.19 (d, *J* = 6.8 Hz, 1H), 8.09 – 8.06 (m, 1H), 7.92 – 7.89 (m, 1H), 7.76 (q, *J* = 8.5 Hz, 3H), 7.58 – 7.51 (m, 4H), 7.25 (s, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.3, 164.0 ($J_{C\text{-}F}$= 135.4 Hz), 160.2, 151.9, 137.9, 136.5, 132.3 ($J_{C\text{-}F}$ = 8.3 Hz), 131.8, 130.7, 129.2, 128.6, 127.3, 126.6, 124.7, 121.4 ($J_{C\text{-}F}$ = 21.7 Hz). ^{19}F NMR (471 MHz, $CDCl_3$) δ 110.6.



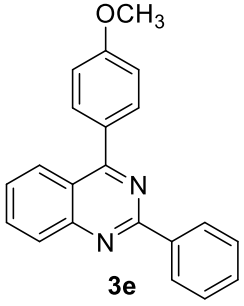
3c

4-(4-chlorophenyl)-2-phenylquinazoline(3c[6]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.7-8.6 (m, 2H), 8.14 (d, *J* = 8.5 Hz, 1H), 8.03 (d, *J* = 8.3 Hz, 1H), 7.88 – 7.78 (m, 2H), 7.60 – 7.47 (m, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.1, 160.2, 152.0, 138.0, 136.3, 136.1, 133.7, 131.6, 130.7, 129.3, 128.9, 128.7, 128.6, 127.3, 126.6, 121.5



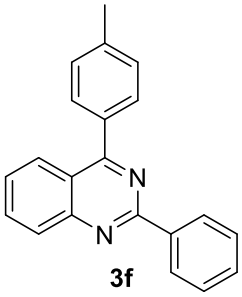
3d

4-(4-bromophenyl)-2-phenylquinazoline(3d[1]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.68 – 8.66 (m, 2H), 8.15 (d, *J* = 8.4 Hz, 1H), 8.06 (d, *J* = 8.4 Hz, 1H), 7.89 – 7.87 (m, 1H), 7.75 (q, *J* = 8.5 Hz, 4H), 7.56 – 7.49 (m, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.1, 160.3, 152.1, 138.0, 136.6, 133.8, 131.83, 131.77, 130.7, 129.3, 128.7, 128.6, 127.3, 126.6, 124.7, 121.5.



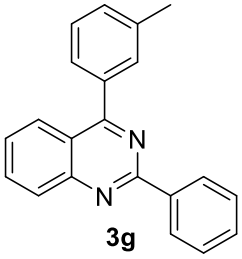
3e

4-(4-methoxyphenyl)-2-phenylquinazoline(3e[7]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.71 (d, *J* = 6.8 Hz, 2H), 8.18 (d, *J* = 7.9 Hz, 2H), 7.92 – 7.87 (m, 3H), 7.58 – 7.50 (m, 4H), 7.13 (d, *J* = 8.7 Hz, 2H), 3.94 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.0, 161.4, 160.0, 133.6, 132.0, 130.6, 130.1, 128.93, 128.91, 128.90, 128.8, 128.6, 127.1, 127.0, 121.6, 114.1, 55.5.



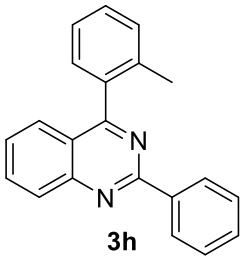
3f

2-Phenyl-4-(p-tolyl)quinazoline(3f[5]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.73 – 8.66 (m, 1H), 8.19 – 8.13 (m, 1H), 7.90 – 7.84 (m, 1H), 7.80 (d, *J* = 8.0 Hz, 1H), 7.57 – 7.46 (m, 2H), 7.40 (d, *J* = 7.9 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.4, 160.2, 152.0, 140.2, 138.3, 134.9, 133.5, 130.5, 130.2, 129.3, 129.1, 128.7, 128.5, 127.1, 126.9, 121.8, 21.5.



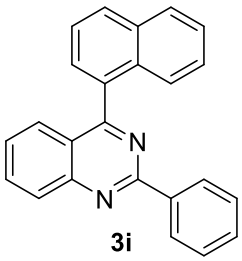
3g

2-phenyl-4-(m-tolyl)quinazoline(3g[5]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.73 – 8.68 (m, 2H), 8.19 (d, *J* = 8.3 Hz, 1H), 8.13 (d, *J* = 7.8 Hz, 1H), 7.91 – 7.87 (m, 1H), 7.69 (d, *J* = 9.5 Hz, 1H), 7.66 (d, *J* = 7.6 Hz, 1H), 7.58 – 7.47 (m, 5H), 7.40 (d, *J* = 7.6 Hz, 1H), 2.51 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.8, 160.2, 151.7, 138.4, 138.1, 137.6, 133.7, 130.8, 130.7, 130.6, 129.0, 128.8, 128.6, 128.4, 127.4, 127.2, 127.1, 121.8, 21.6.



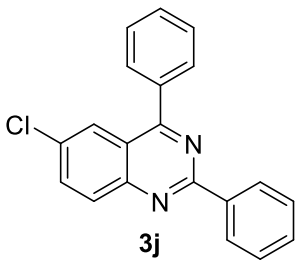
3h

2-(2-methylphenyl)-4-phenylquinazoline(3h[5]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.67 – 8.65 (m, 2H), 8.17 (d, *J* = 8.4 Hz, 1H), 7.90 – 7.88 (m, 1H), 7.68 (d, *J* = 8.3 Hz, 1H), 7.54 – 7.48 (m, 4H), 7.48 – 7.43 (m, 1H), 7.40 (t, *J* = 9.1 Hz, 2H), 7.37 (t, *J* = 7.2 Hz, 1H), 2.24 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 169.9, 160.3, 151.4, 138.2, 136.9, 136.5, 133.8, 130.8, 130.6, 129.7, 129.3, 129.0, 128.8 128.6, 127.12, 127.08, 125.7, 122.7, 20.1.



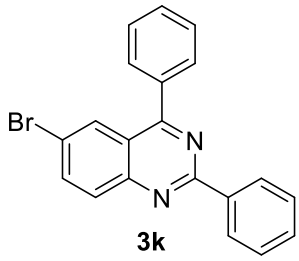
3i

4-**(naphthalen-1-yl)-2-phenylquinazoline(3i[11]):** ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.80 – 8.69 (m, 1H), 8.31 (s, 1H), 8.18-8.14 (m, 1H), 8.06 – 7.90 (m, 2H), 7.89 – 7.82 (m, 1H), 7.63 – 7.44 (m, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.3, 160.3, 152.06, 138.3, 135.1, 134.0, 133.6, 133.0, 130.6, 130.4, 129.2, 128.8, 128.6, 127.9, 127.32, 127.30, 127.2, 127.1, 126.7.



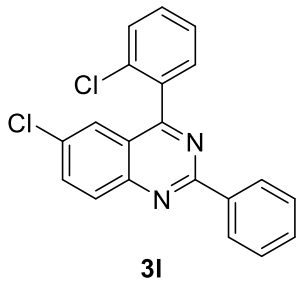
3j

6-chlorine-2,4-diphenylquinazoline(3j[4]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.64 – 8.58 (m, 2H), 8.05 – 8.02 (m, 2H), 7.83 – 7.79 (m, 2H), 7.76 – 7.74 (m, 1H), 7.59 – 7.52 (m, 3H), 7.45 (q, *J* = 5.0 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 166.6, 159.4, 149.4, 136.7, 136.5, 133.5, 131.6, 129.8, 129.2, 129.0, 127.73, 127.67, 127.6, 124.8, 121.2.



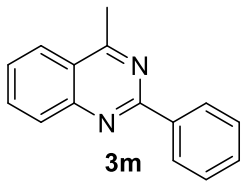
3k

6-bromo-2,4-diphenylquinazoline(3k[8]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.67 (s, 2H), 8.25 (s, 1H), 8.11 – 7.79 (m, 4H), 7.56 (d, *J* = 49.0 Hz, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.5, 160.5, 150.7, 137.7, 137.1, 130.9, 130.9, 130.3, 130.1, 129.1, 128.8, 128.8, 128.6, 122.7, 120.7.



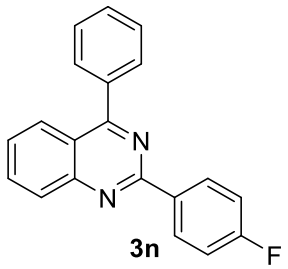
3l

6-chloro-4-(2-chlorophenyl)-2-phenylquinazoline(3l[2]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.67 – 8.62 (m, 2H), 8.12 (d, *J* = 9.0 Hz, 1H), 7.81 (q, *J* = 9.0 Hz, 1H), 7.63 – 7.58 (m, 2H), 7.55 – 7.46 (m, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 166.5, 160.7, 149.8, 137.6, 135.9, 135.0, 132.9, 132.9, 131.1, 130.92, 130.90, 130.75, 130.2, 128.8, 128.7, 127.1, 125.6, 122.9.



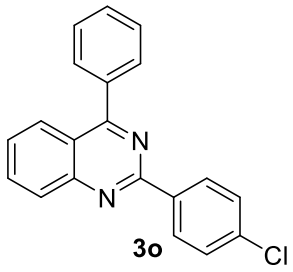
3m

4-methyl-2-phenylquinazoline(3m[3]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.50 – 8.46 (m, 2H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.75 (d, *J* = 8.3 Hz, 1H), 7.60-7.57 (m, 1H) , 7.41 – 7.23 (m, 4H), 2.74 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.2, 160.1, 150.4, 138.4, 133.5, 130.4, 129.2, 128.64, 128.59, 126.8, 124.9, 123.0, 22.00.



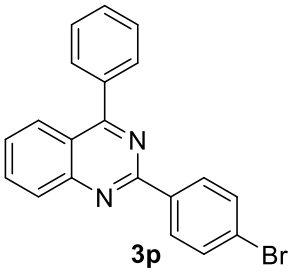
3n

2-(4-Fluorophenyl)-4-phenylquinazoline(3n[6]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.70 (dd, *J* = 8.6, 5.7 Hz, 2H), 8.14 – 8.10 (m, 2H), 7.93 – 7.82 (m, 3H), 7.60 – 7.58 (m, 3H), 7.55 – 7.52 (m, 1H), 7.25 (s, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.5, 164.7 ($J_{C\text{-}F}$ = 250.6 Hz), 159.3, 151.8, 137.6, 134.3, 133.7, 130.8 ($J_{C\text{-}F}$ = 8.6 Hz), 130.2, 130.1, 129.0, 128.6, 127.1, 121.6, 115.5 ($J_{C\text{-}F}$ = 21.6 Hz). ^{19}F NMR (471 MH_Z, $CDCl_3$) δ 110.6.

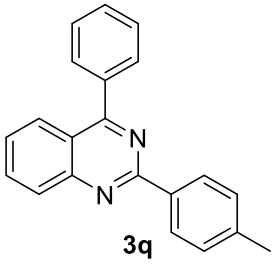


3o

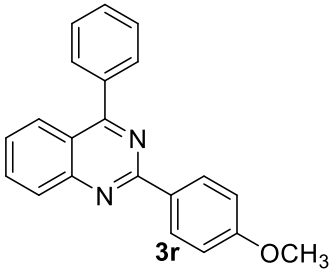
2-(4-Chlorine)-4-phenylquinazoline(3o[9]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.66 (d, *J* = 8.5 Hz, 2H), 8.18 (d, *J* = 8.3 Hz, 1H), 8.14 (d, *J* = 8.4 Hz, 1H), 7.93 – 7.87 (m, 3H), 7.59 – 7.53 (m, 4H), 7.50 (d, *J* = 8.5 Hz, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.5, 159.2, 151.8, 137.5, 136.8, 136.7, 133.7, 130.2, 130.1, 129.1, 128.7, 128.6, 127.3, 127.1, 121.7.



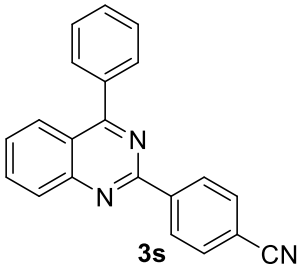
2-(4-bromophenyl)-4-phenylquinazoline(3p[4]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.60 – 8.57 (m, 2H), 8.20 – 8.11 (m, 2H), 7.92 – 7.85 (m, 3H), 7.67 – 7.54 (m, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.6, 159.2, 151.7, 137.5, 137.0, 133.8, 131.7, 130.3, 130.2, 130.1, 129.0, 128.6, 127.3, 127.1, 125.4, 121.8.



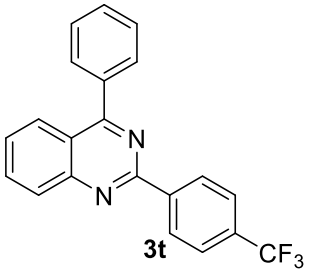
2-(4-Methylphenyl)-4-phenylquinazoline(3q[2]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.59 (d, J = 8.1 Hz, 2H), 8.13 (d, J = 6.0 Hz, 1H), 8.09 (d, J = 8.3 Hz, 1H), 7.88 – 7.83 (m, 3H), 7.59 – 7.57 (m, 3H), 7.51 – 7.48 (m, 1H), 7.32 (d, J = 8.0 Hz, 2H), 2.43 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.3, 160.3, 152.0, 140.8, 137.8, 135.5, 133.5, 130.2, 129.9, 129.3, 129.1, 128.7, 128.5, 127.0, 126.8, 121.6, 21.6.



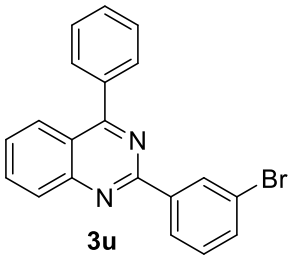
2-(4-methoxyphenyl)-4-phenylquinazoline(3r[9]): ^{1}H NMR (500 MHz, $CDCl_3$ δ 8.68 – 8.63 (m, 2H), 8.13 – 8.04 (m, 2H), 7.90 – 7.80 (m, 3H), 7.61 – 7.54 (m, 3H), 7.47 (m, 1H), 7.05 – 7.01 (m, 2H), 3.88 (d, J = 8.3 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.2, 161.8, 160.1, 152.1 137.8, 133.5, 130.9, 130.4, 130.2, 129.9, 129.0, 128.5, 127.0, 126.6 121.4, 113.9, 55.4.



4-(4-phenylquinazolin-2-yl)benzonitrile(3s[8]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.81 (d, J = 8.4 Hz, 2H), 8.19-8.15 (m, 2H), 7.96 – 7.90 (m, 1H), 7.90 – 7.85 (m, 2H), 7.79 (d, J = 6.3Hz, 1H), 7.65 – 7.58 (m, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.8, 158.2, 151.7, 142.2, 137.3, 134.1, 132.3, 130.3, 130.2, 129.3, 129.1, 128.7, 128.0, 127.2, 127.0, 119.0, 113.7.

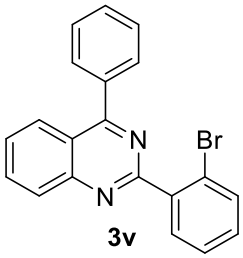


4-Phenyl-2-(4-(trifluoromethyl)phenyl)quinazoline(3t[10]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.79 (d, J = 8.1 Hz, 2H), 8.18 – 8.08 (m, 2H), 7.85 (d, J = 3.5 Hz, 3H), 7.74 (d, J = 8.2 Hz, 2H), 7.59 – 7.54 (m, 4H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.6, 158.6, 151.9, 141.5, 137.4, 133.8, 132.0 ($J_{C\text{-}F}$ = 32.9 Hz), 130.2, 130.1, 129.3, 128.9, 128.6, 127.6, 127.1, 125.5, 125.4 ($J_{C\text{-}F}$ = 10.7 Hz), 124.8 ($J_{C\text{-}F}$ = 280.0 Hz). ^{19}F (471 MHz, $CDCl_3$) δ 62.5.



3u

2-(3-bromophenyl)-4-phenylquinazoline(3u[2]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.85 (s, 1H), 8.64 (d, *J* = 7.8 Hz, 2H), 8.16 – 8.12 (m, 2H), 7.91 – 7.86 (m, 3H), 7.62 – 7.59 (m, 4H), 7.58 – 7.55 (m, 1H), 7.40 – 7.37 (m, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.6, 158.7, 151.8, 140.3, 137.4, 133.8, 133.4, 131.6, 130.2, 130.12, 130.09, 129.2, 128.6, 127.5, 127.3, 127.1, 122.9, 121.9.

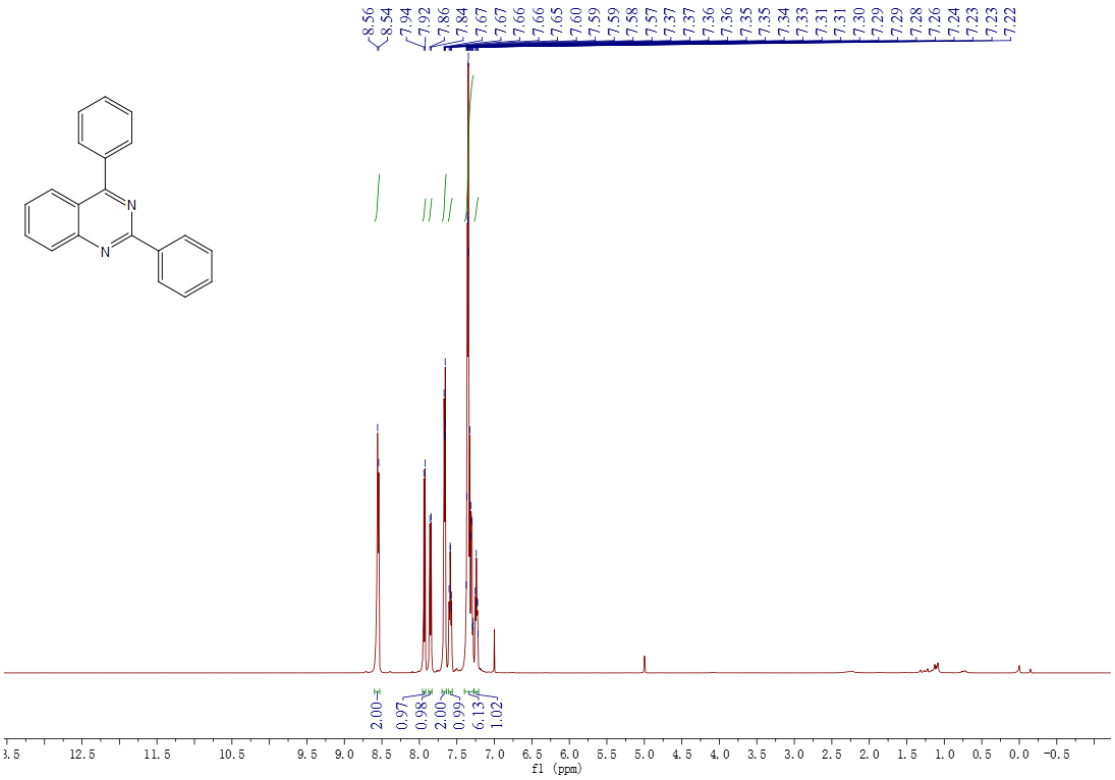


3v

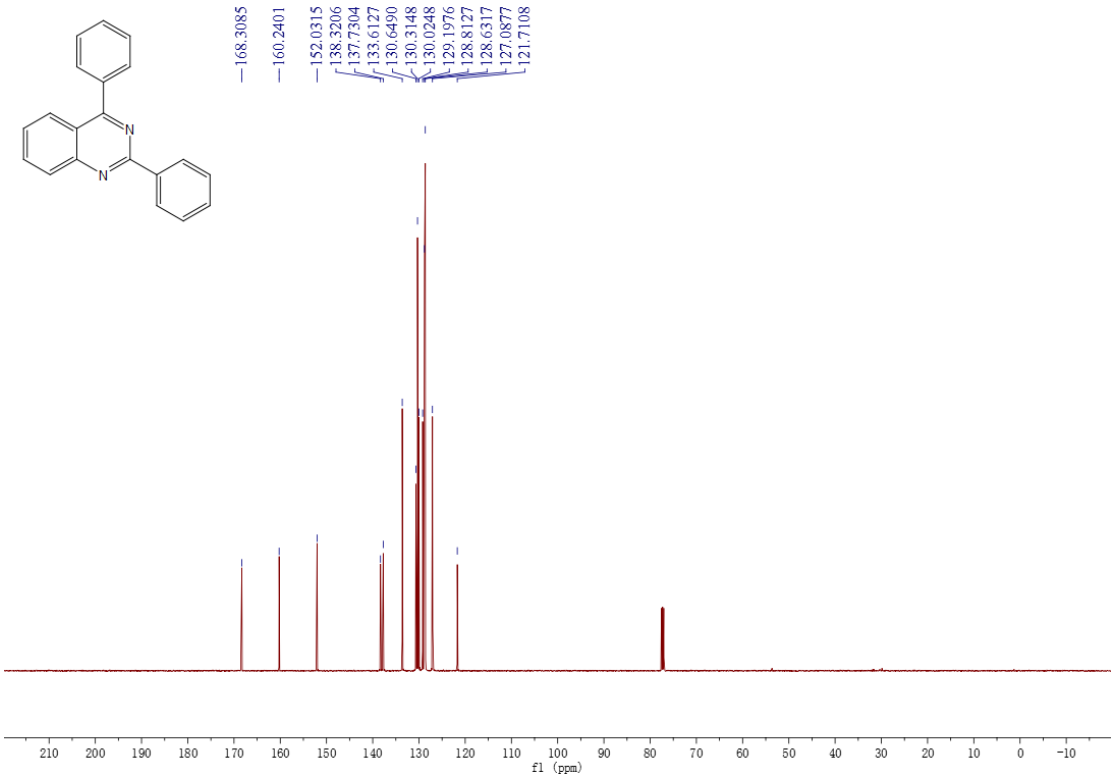
2-(2-bromophenyl)-4-phenylquinazoline(3v[12]): ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.50 (d, *J* = 8.6 Hz, 2H), 8.10 – 8.03 (m, 2H), 7.83 – 7.79 (m, 3H), 7.57 (d, *J* = 8.5 Hz, 2H), 7.54 – 7.52 (m, 3H), 7.50 – 7.47 (m, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 167.5, 158.2, 150.7, 136.4, 136.0, 132.7, 130.8, 129.9, 129.2, 129.1, 129.0, 128.0, 127.8, 127.6, 126.3, 126.1, 124.3, 120.7.

Part IV NMR Spectra

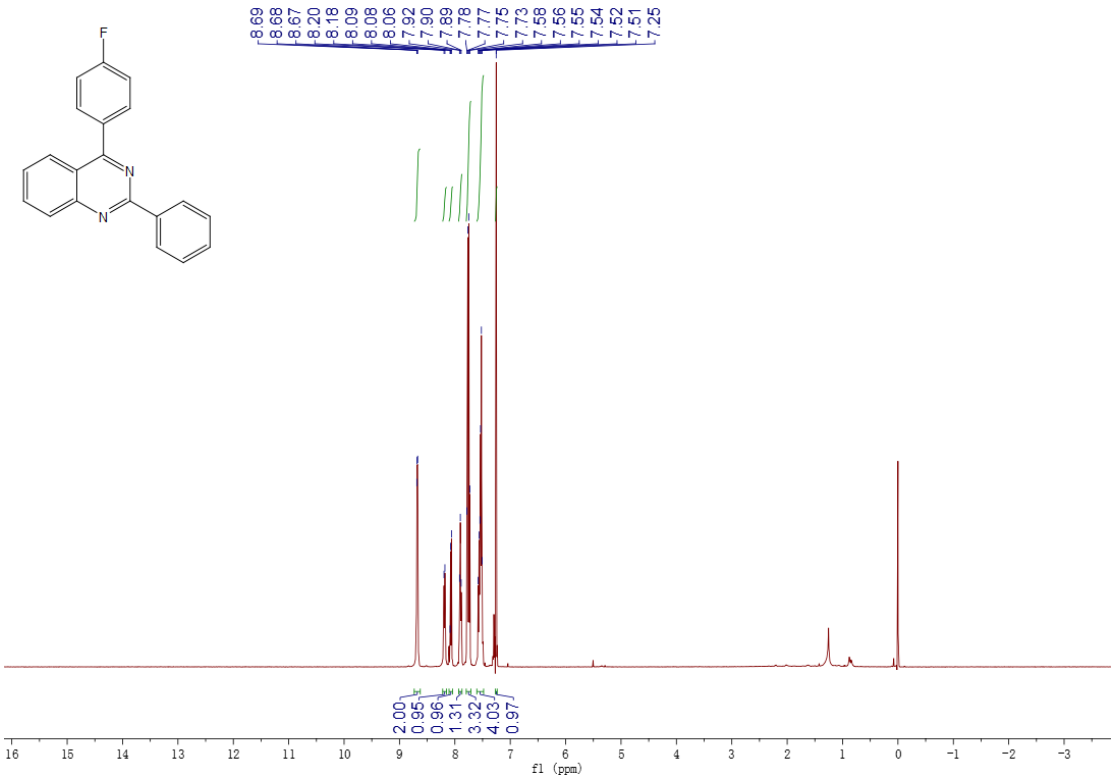
3a ^{1}H NMR



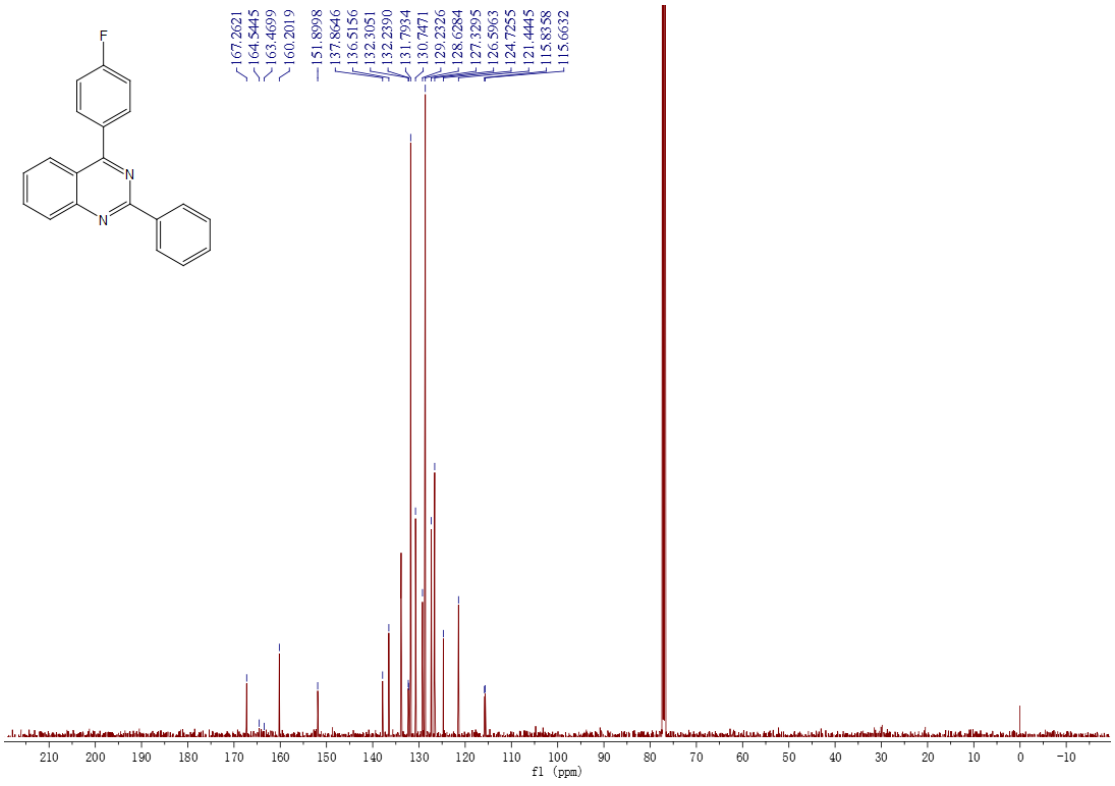
3a ^{13}C NMR



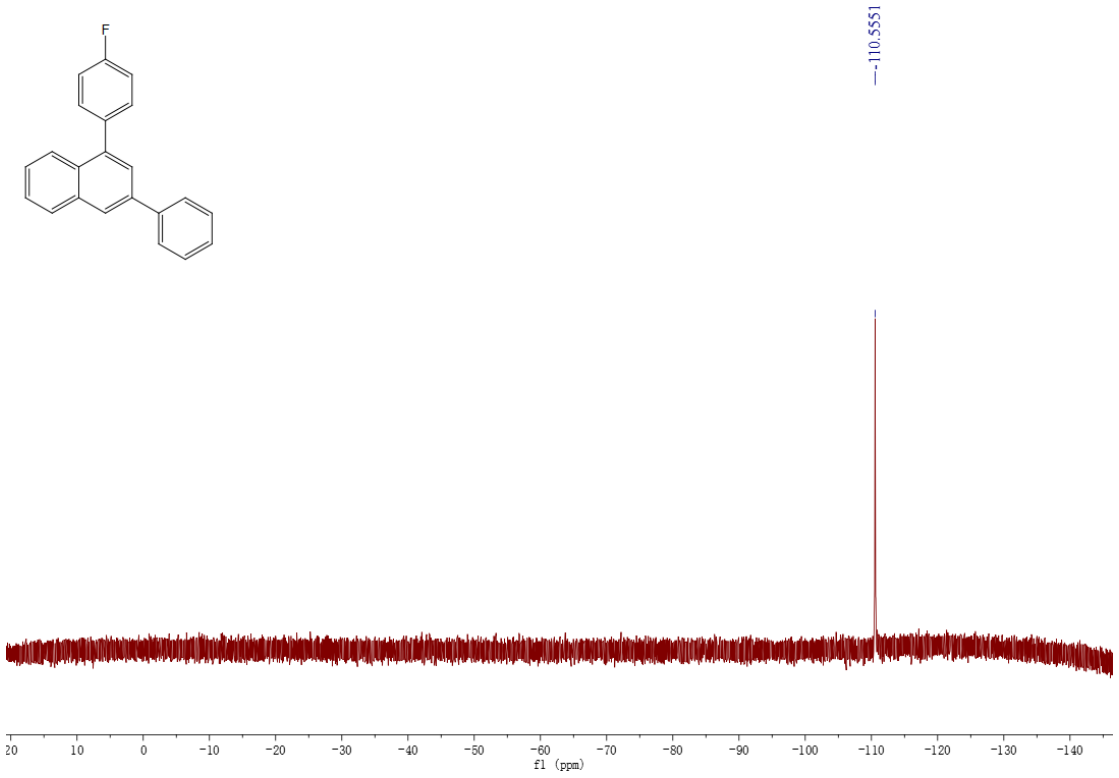
3b ^{1}H NMR



3b ^{13}C NMR



3b ^{19}F NMR


F
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20
10
0
-10
-20
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-40
-50
-60
-70
-80
-90
-100
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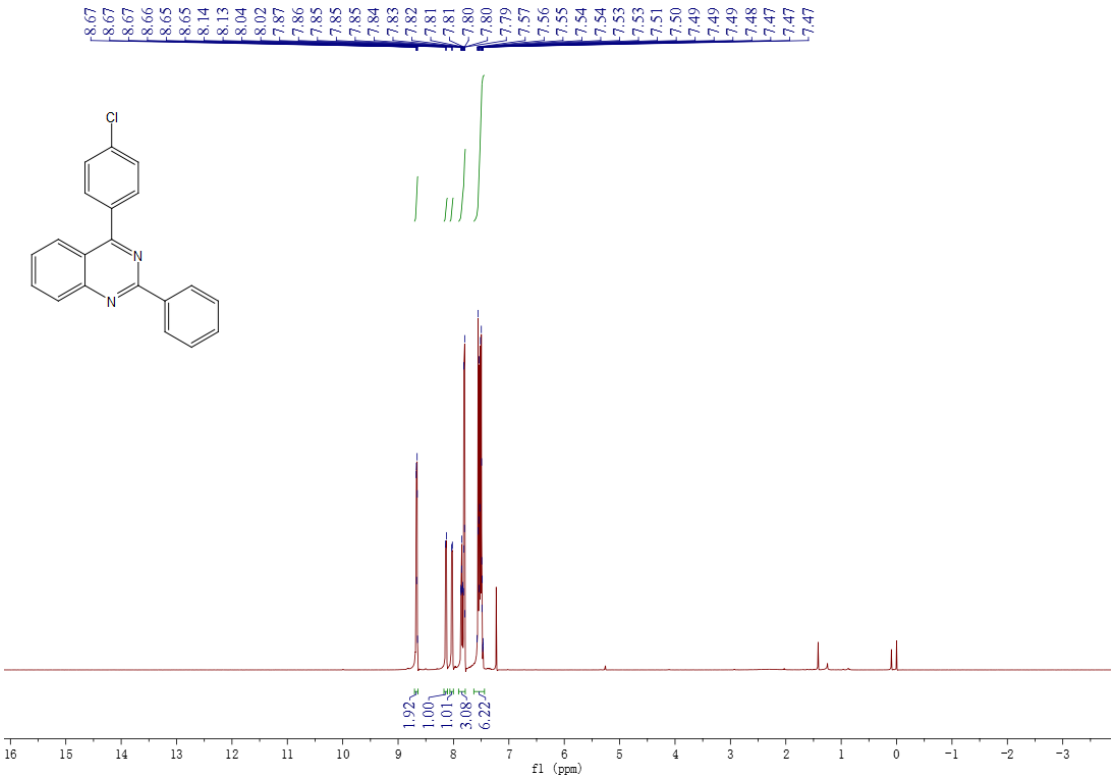
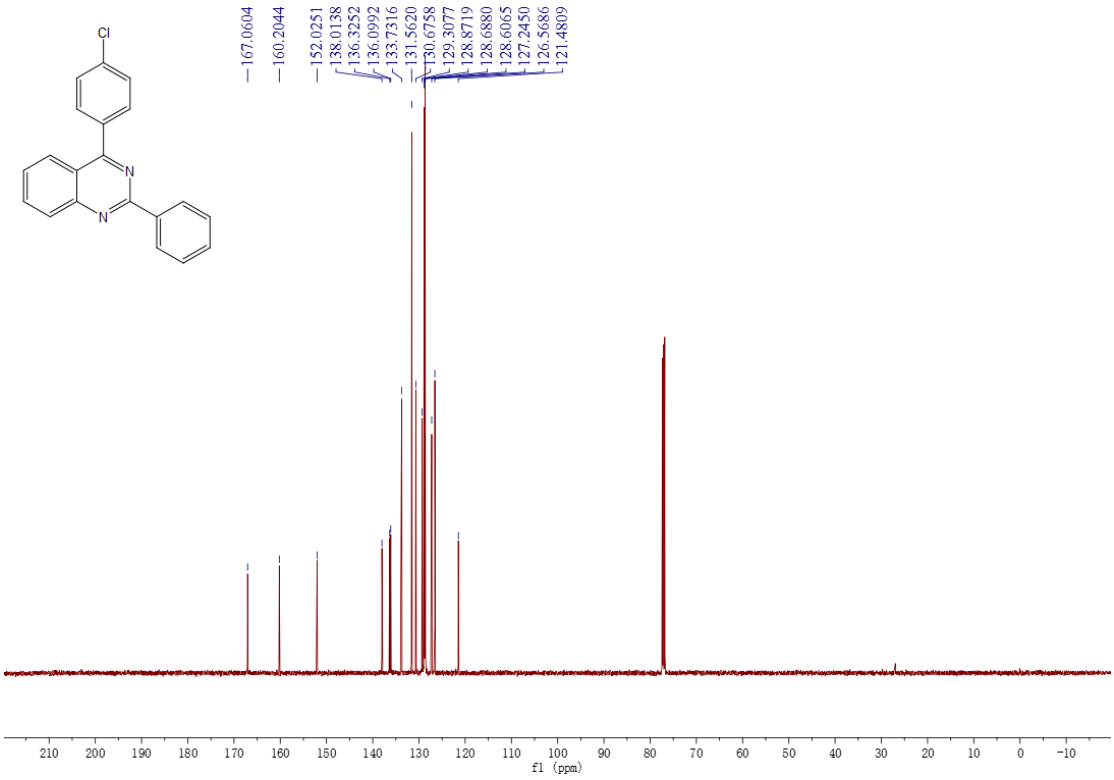
-120
-130
-140
f1 (ppm)

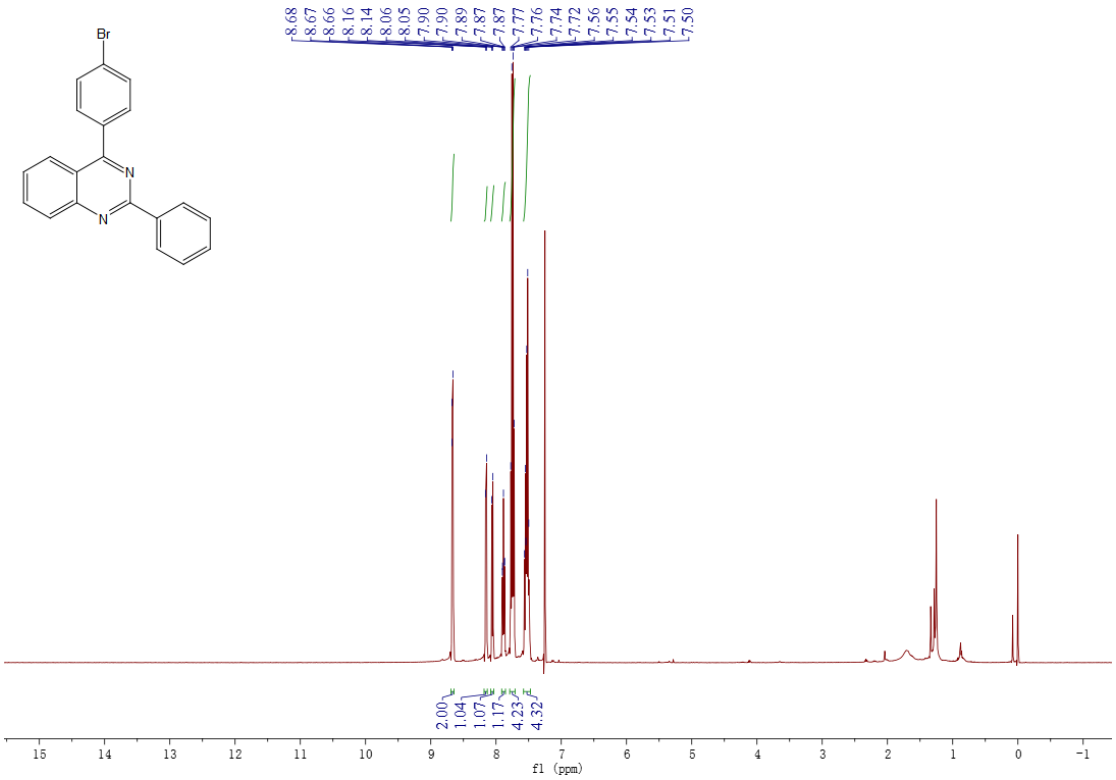
3c ^{1}H NMR



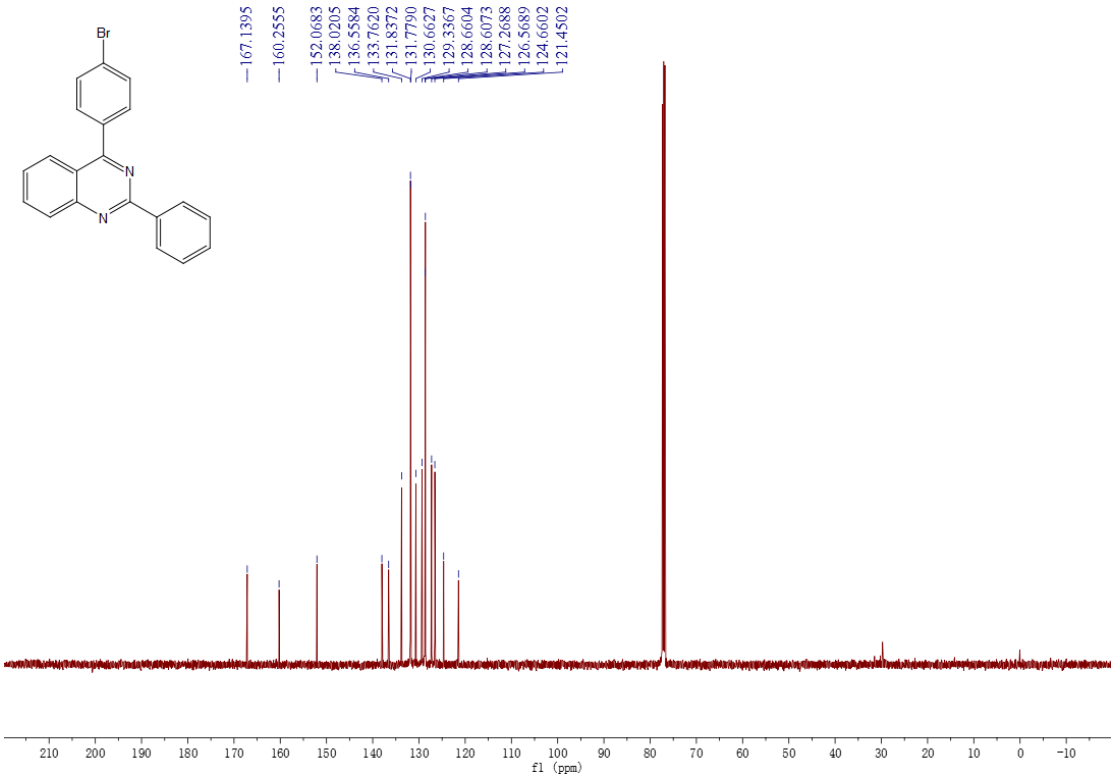
3c ^{13}C NMR



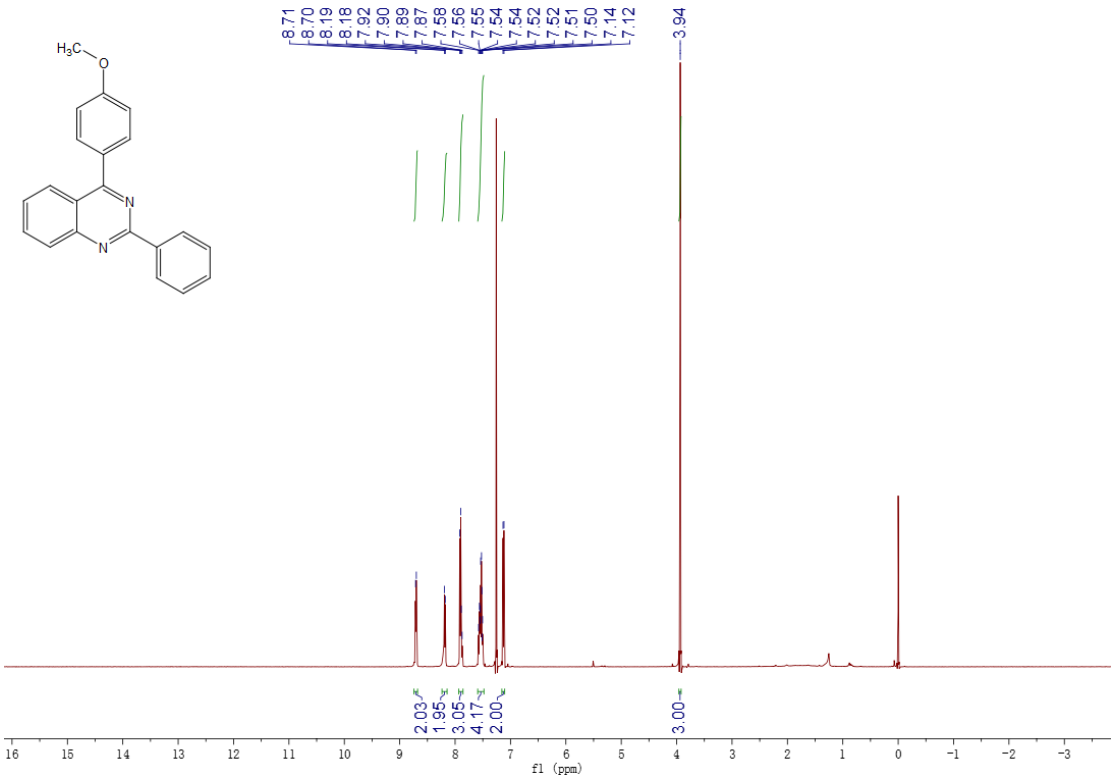
3d ^{1}H NMR



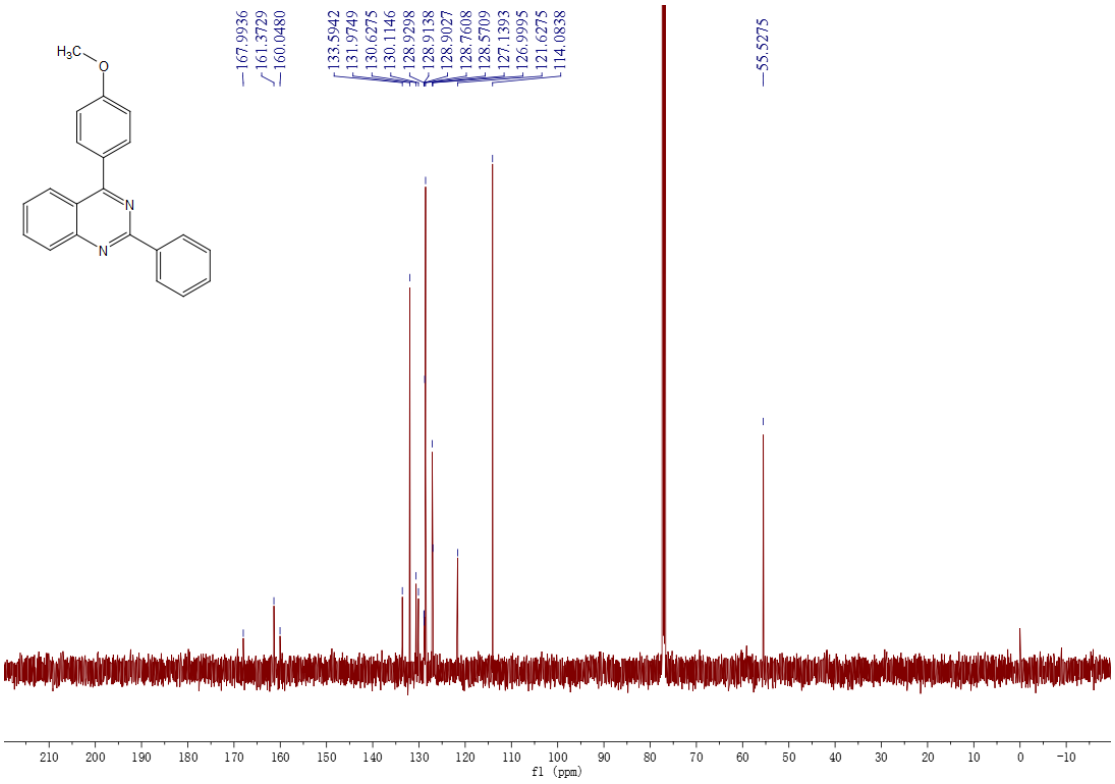
3d ^{13}C NMR



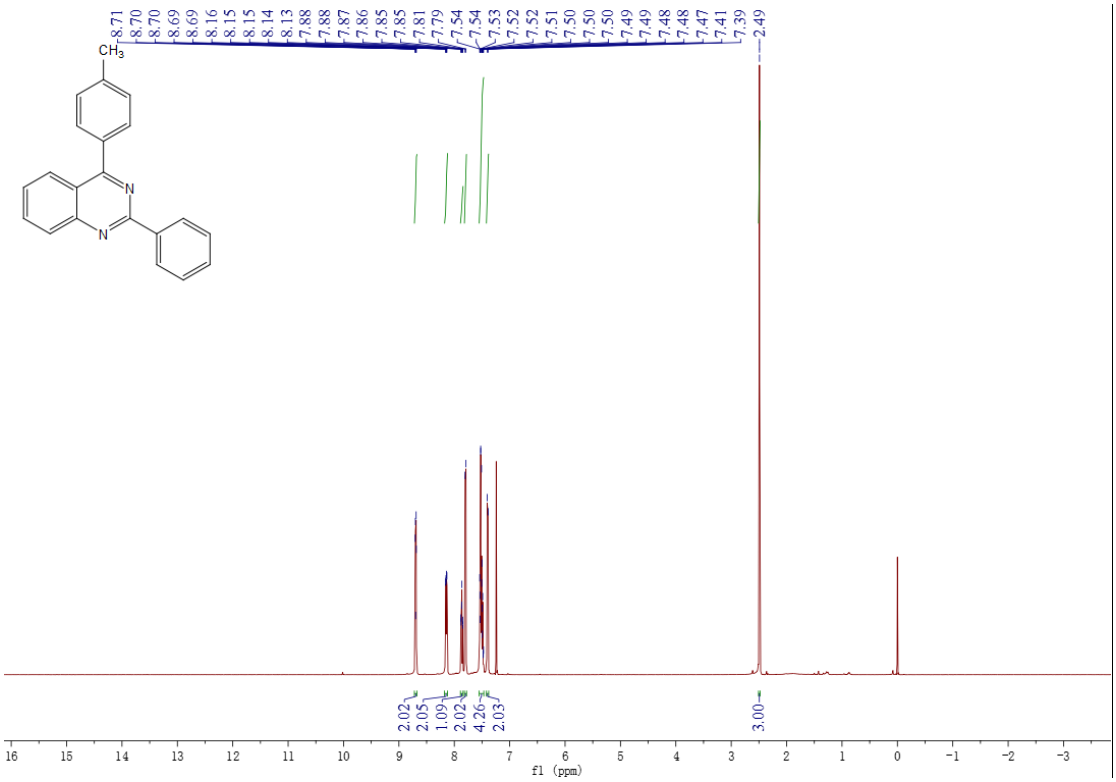
3e ^{1}H NMR



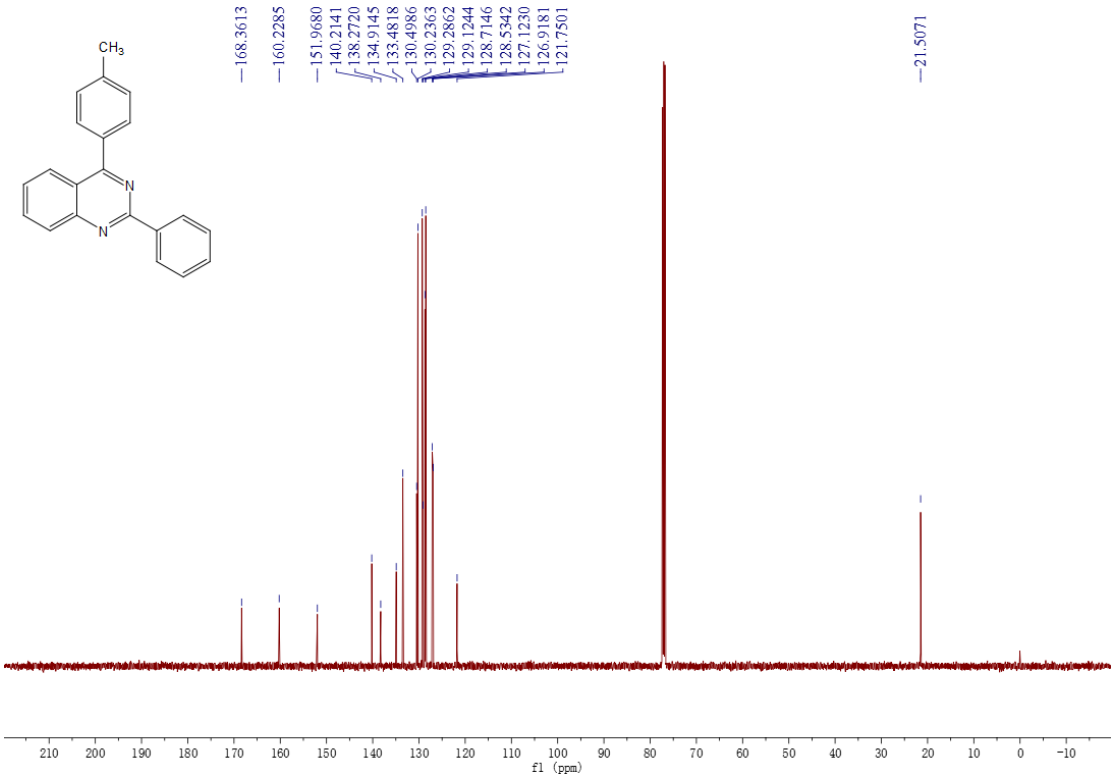
3e ^{13}C NMR



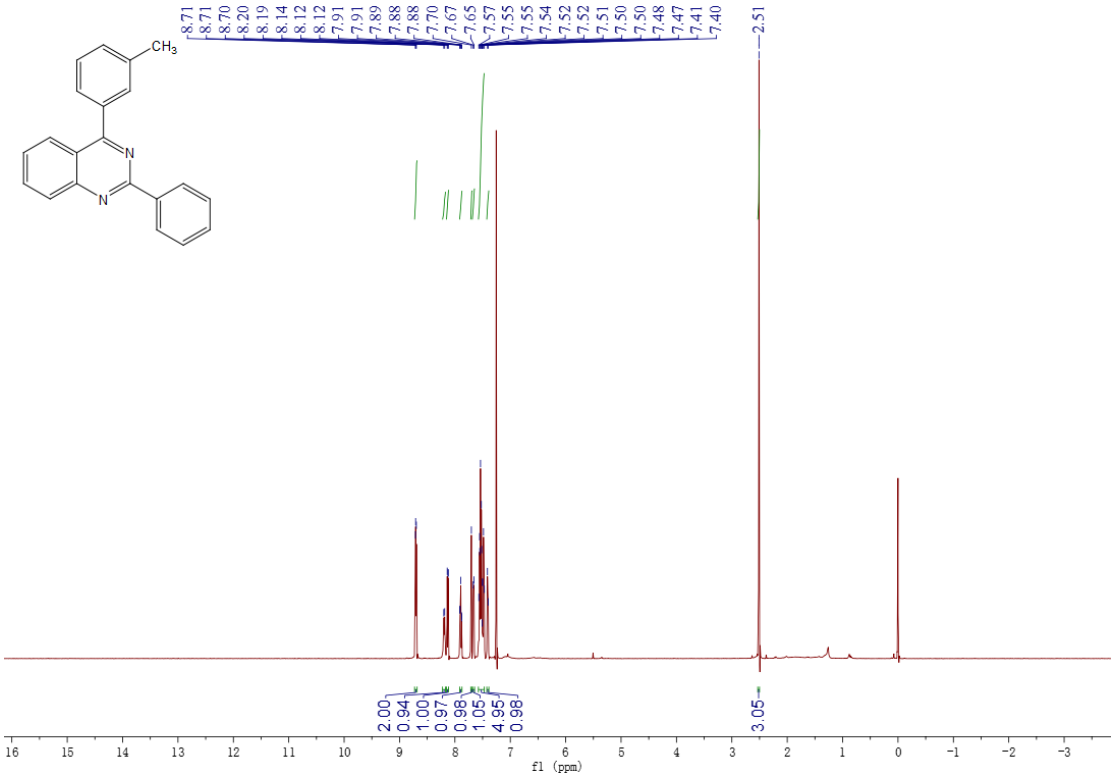
3f ^{1}H NMR



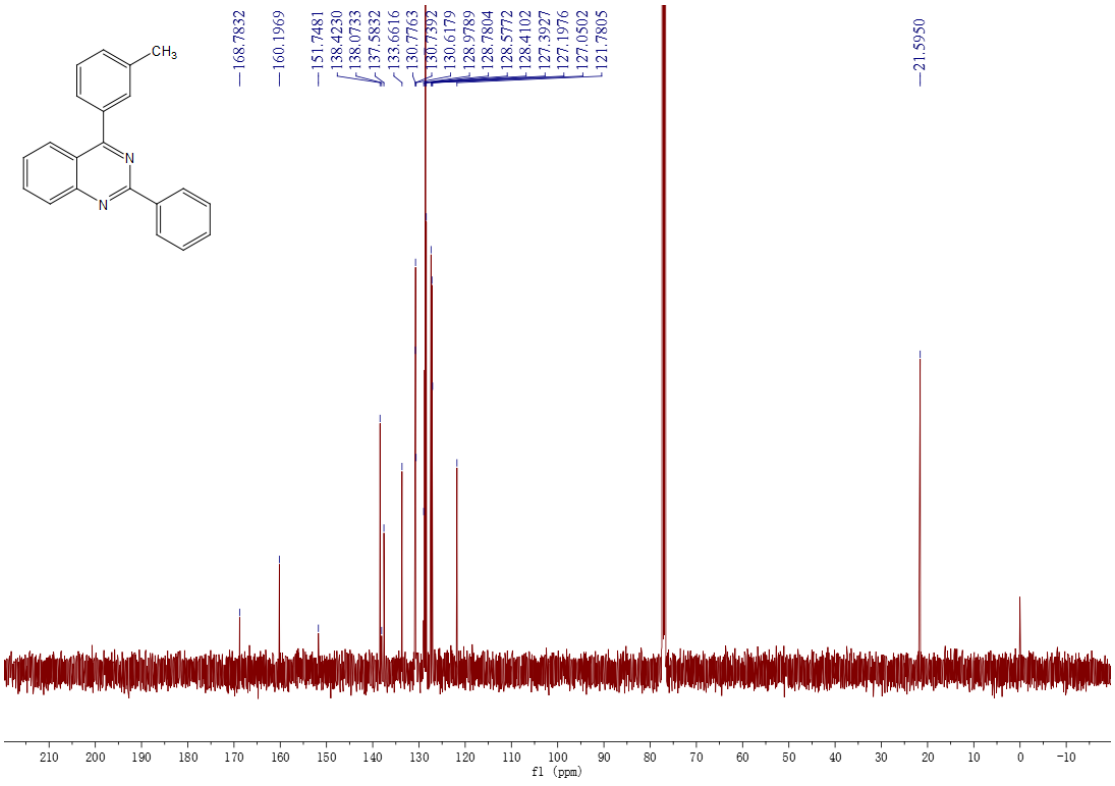
3f ^{13}C NMR



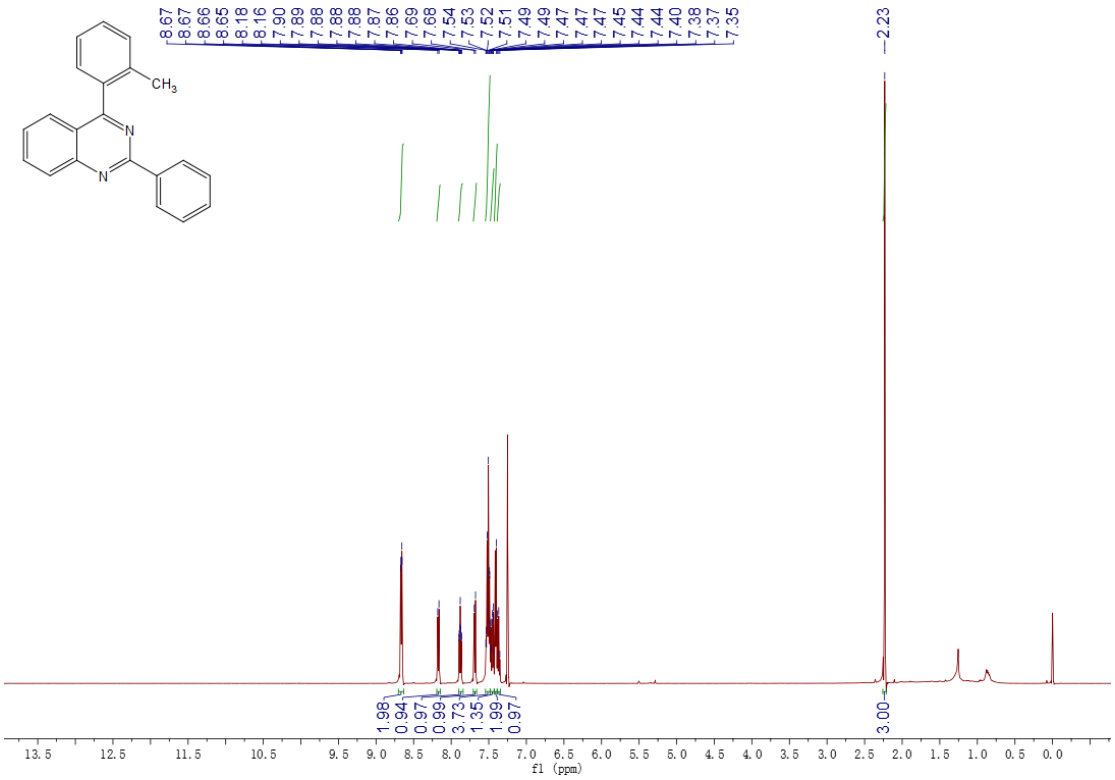
3g ^{1}H NMR



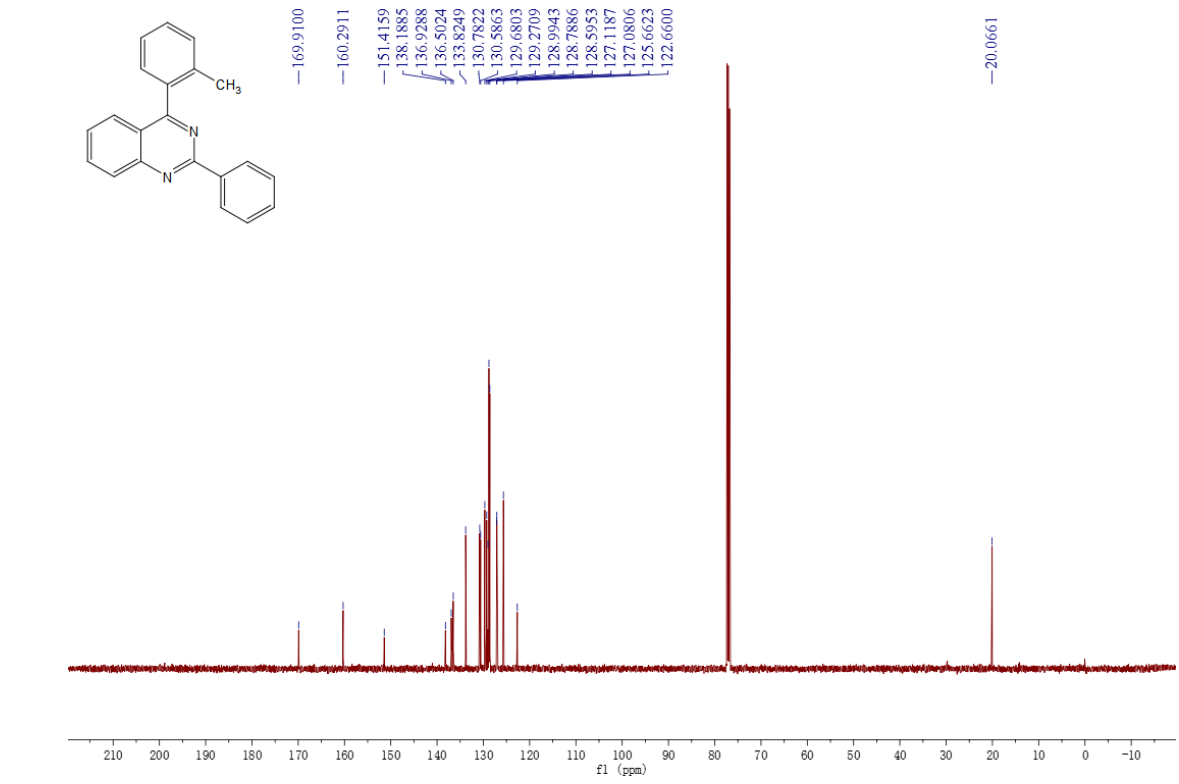
3g ^{13}C NMR



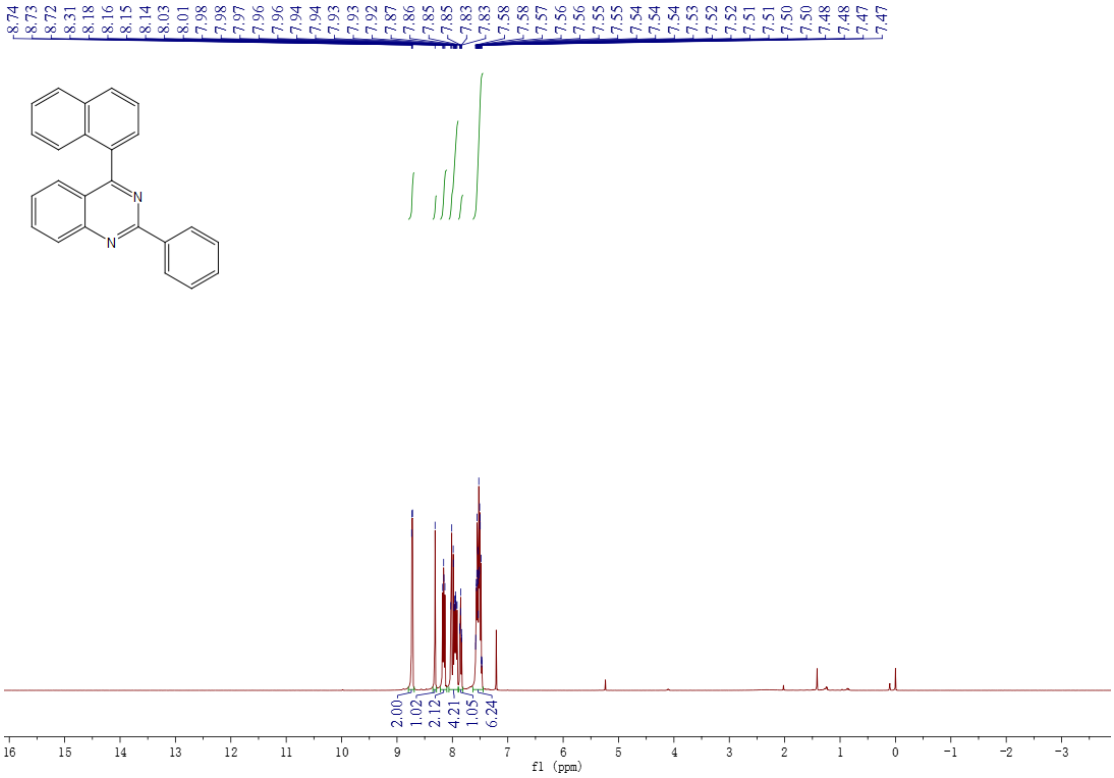
3h ^{1}H NMR



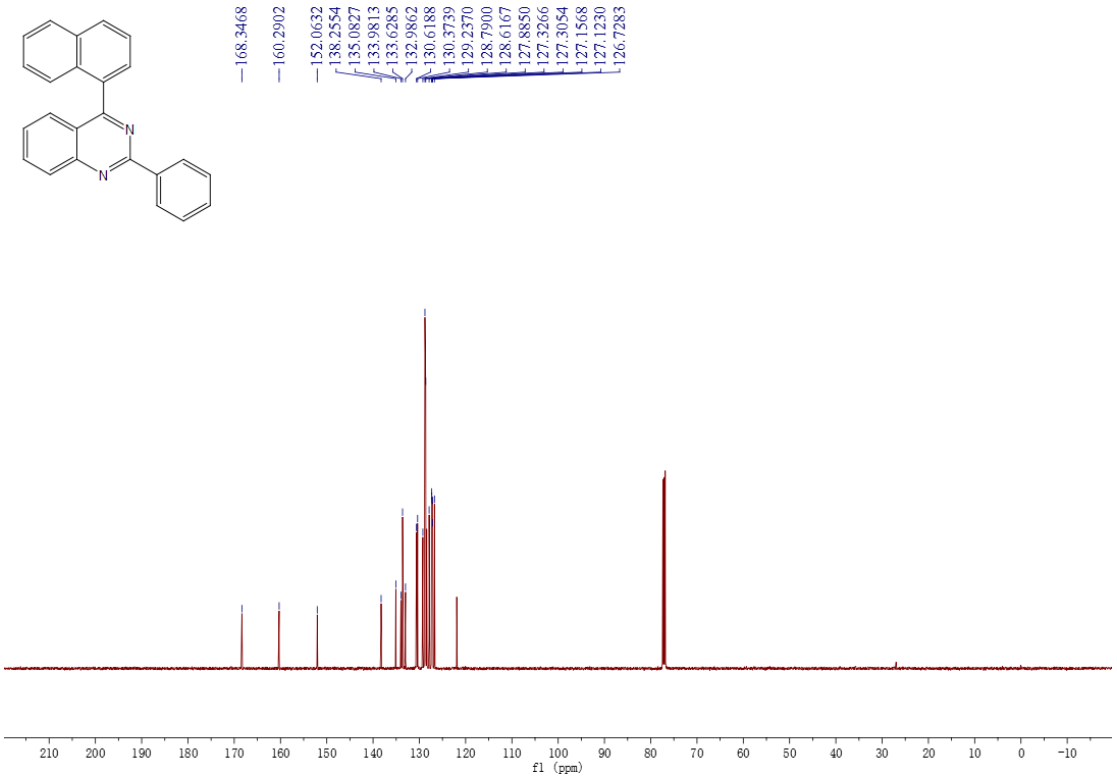
3h ^{13}C NMR



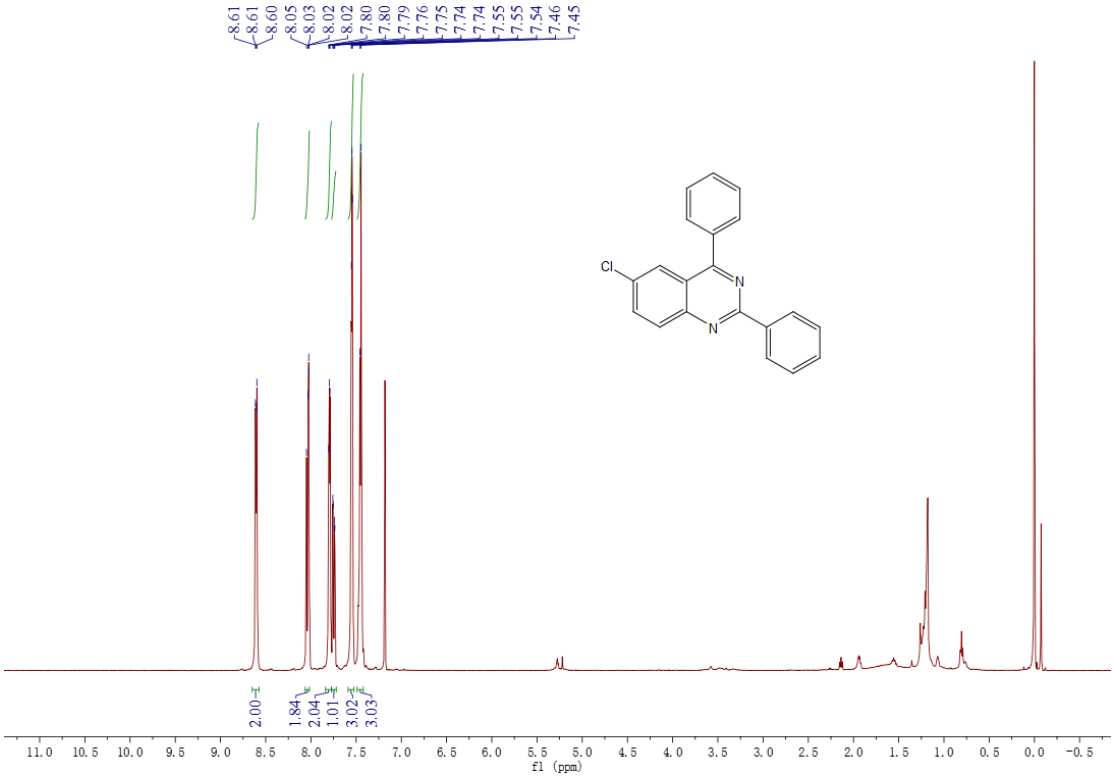
3i ^{1}H NMR



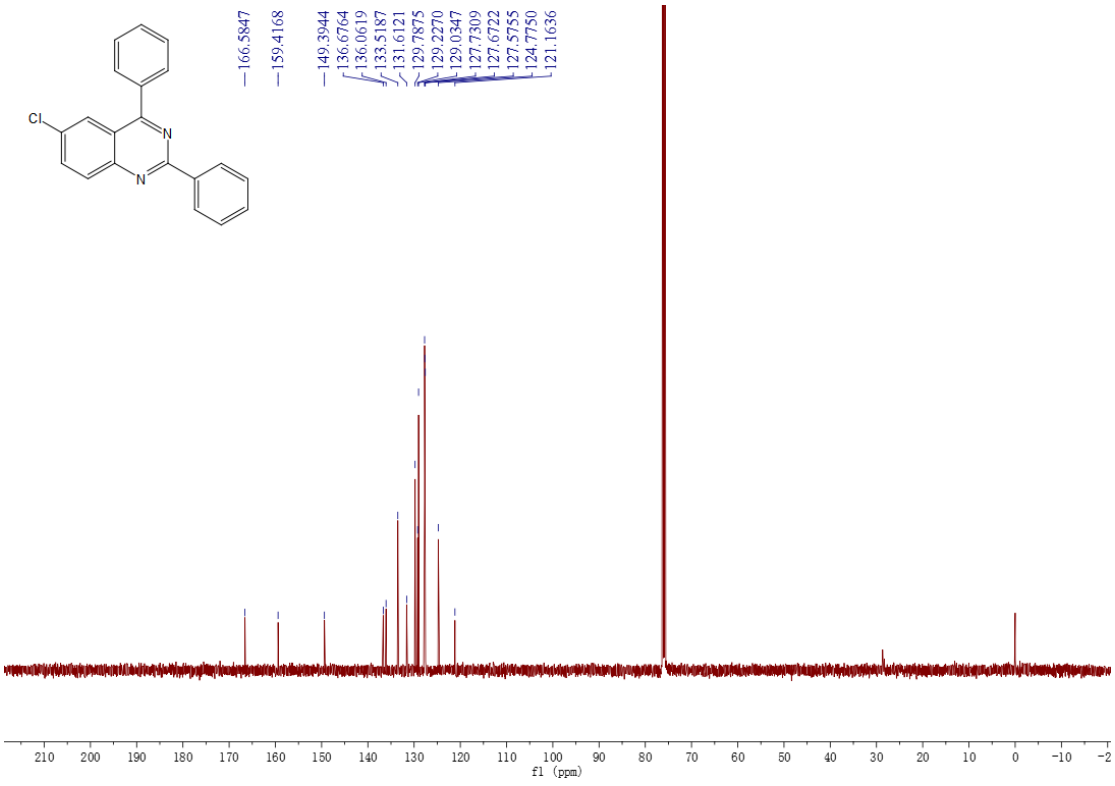
3i ^{13}C NMR



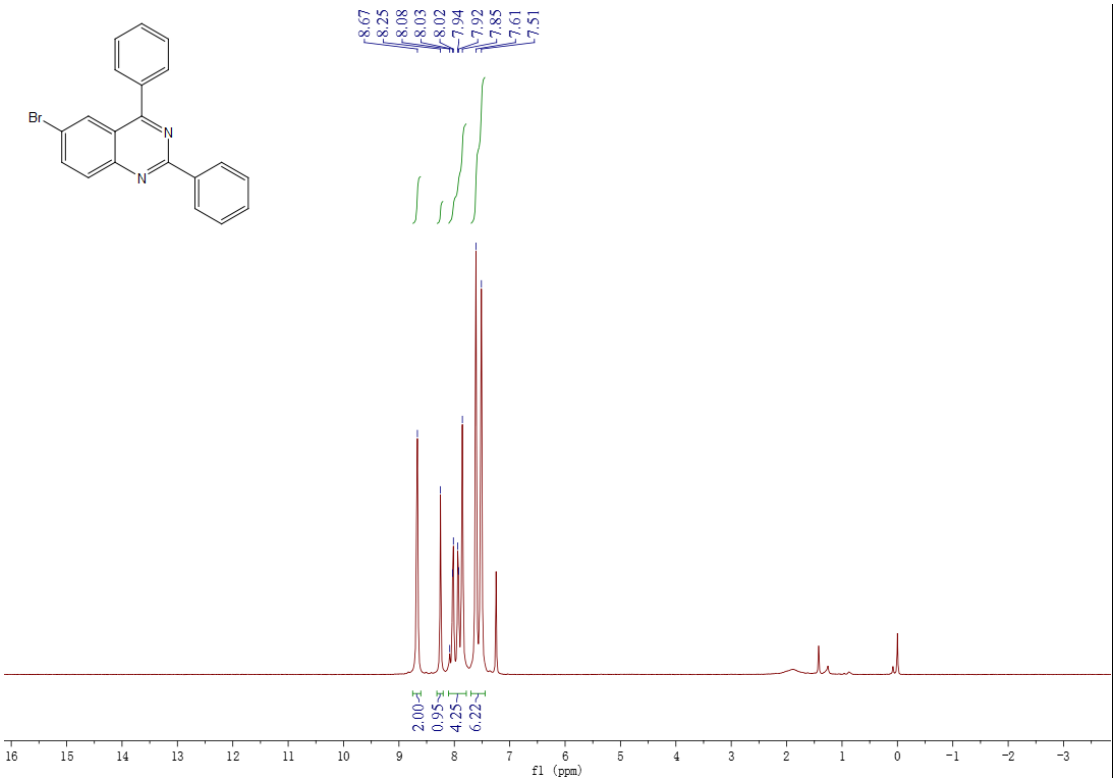
3j ^{1}H NMR



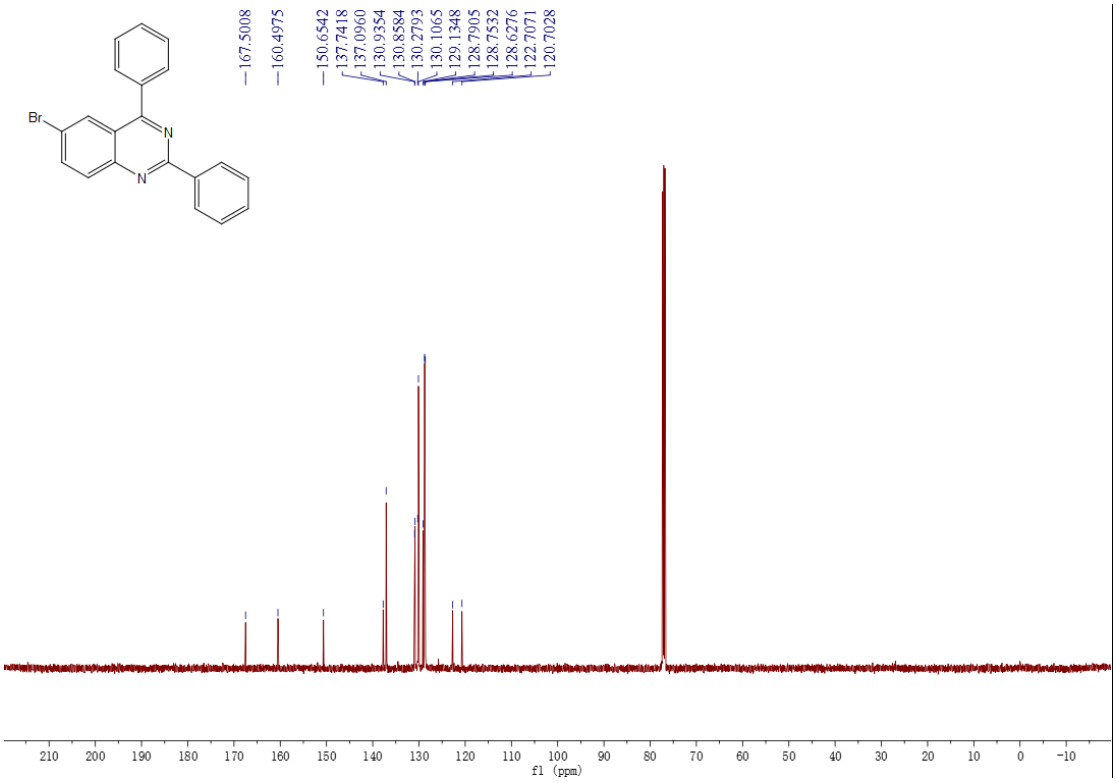
3j ^{13}C NMR



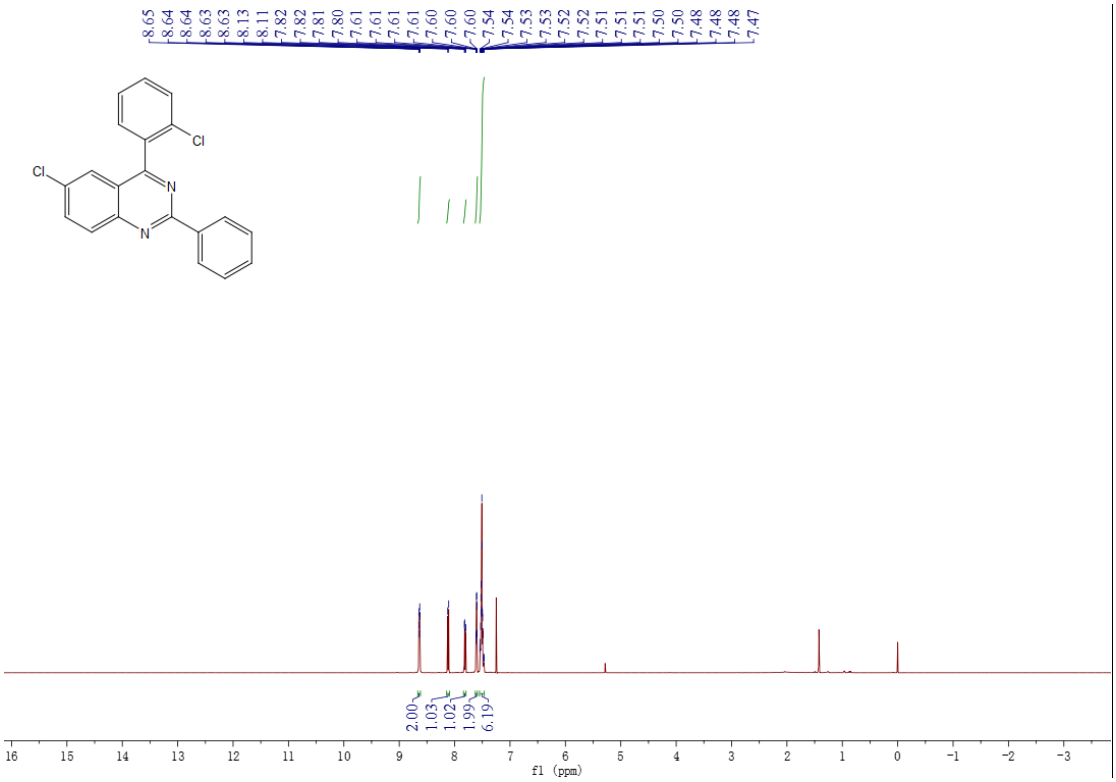
3k ^{1}H NMR



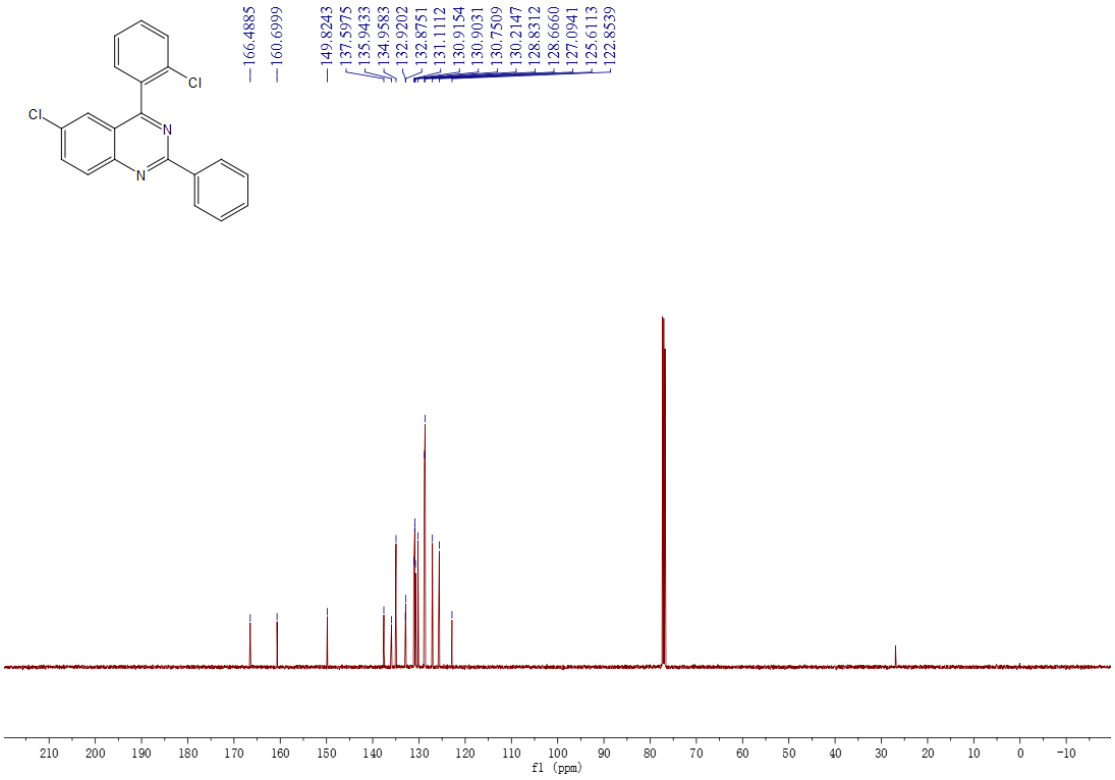
3k ^{13}C NMR



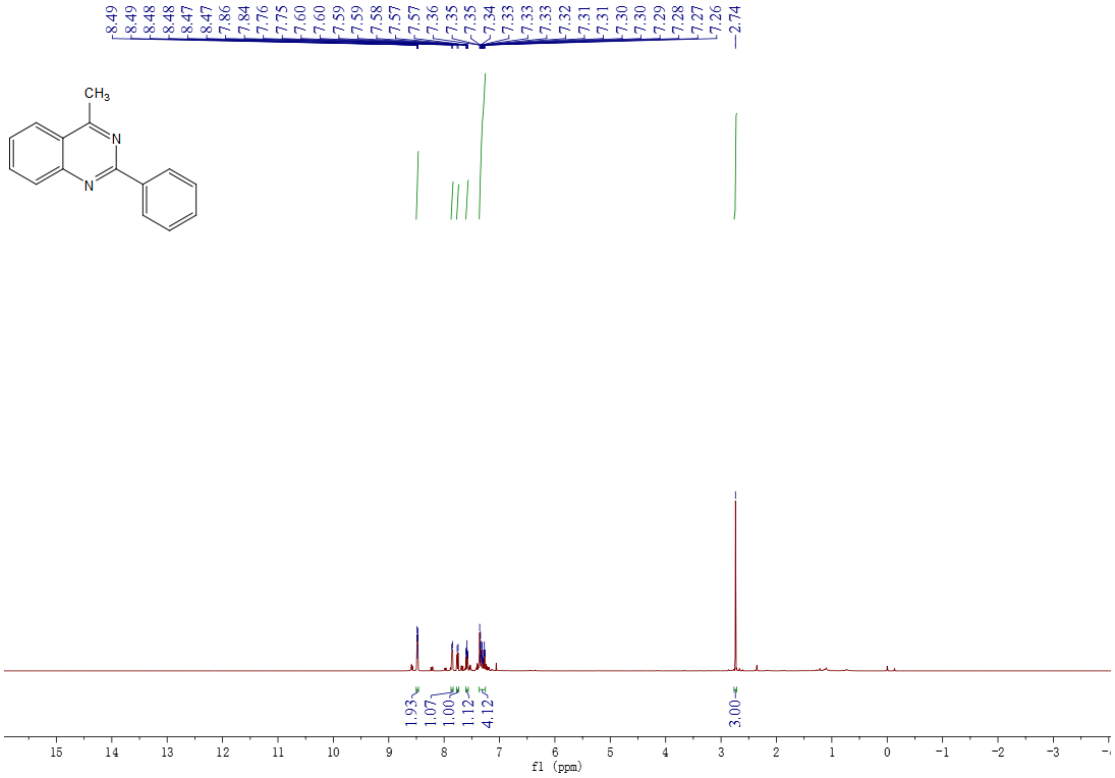
3l[1] H NMR



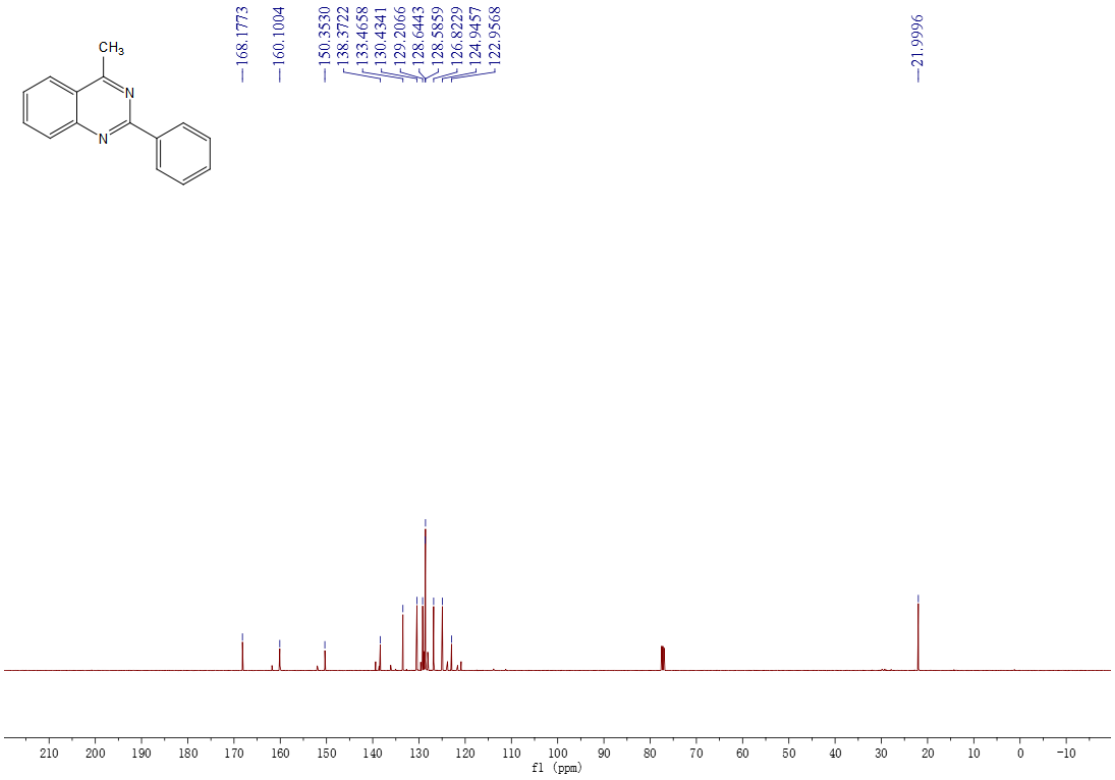
3l [13]C NMR



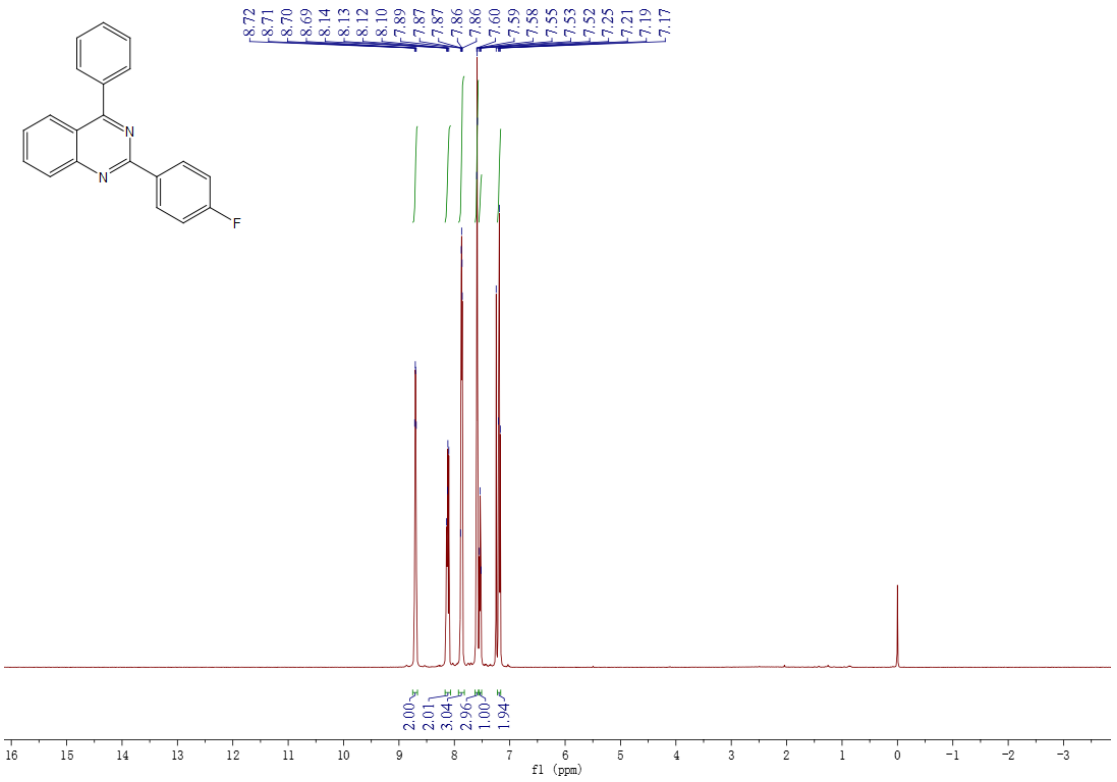
3m ^{1}H NMR



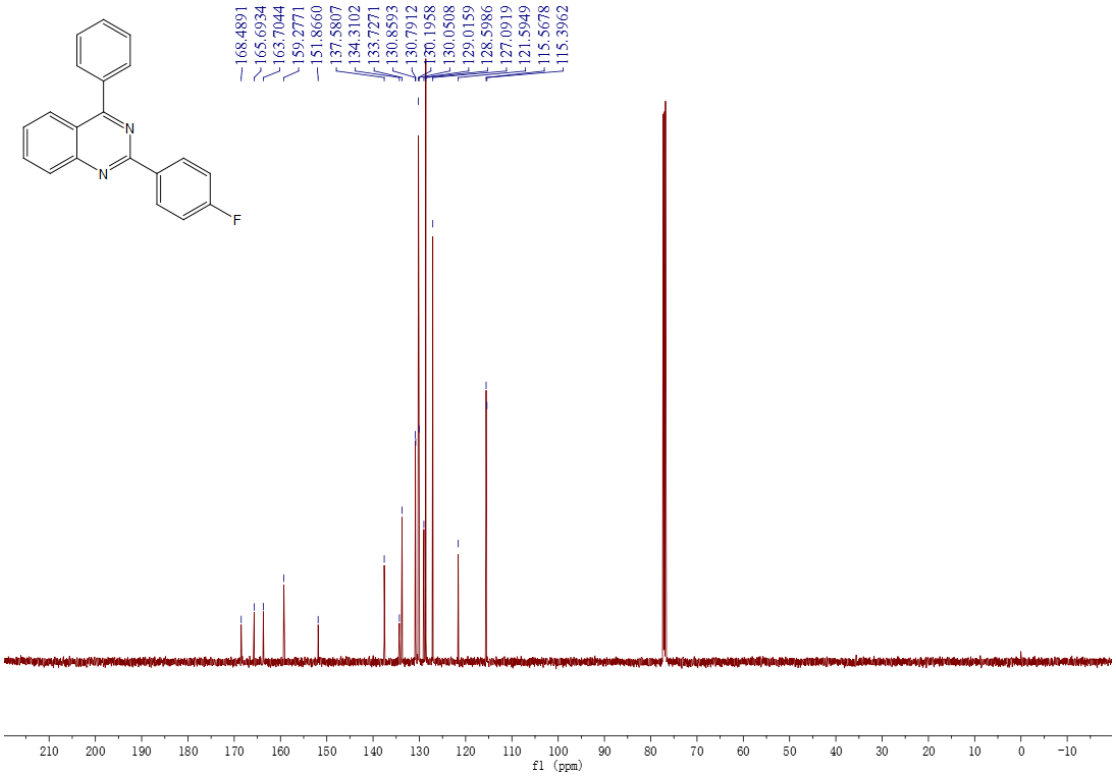
3m ^{13}C NMR



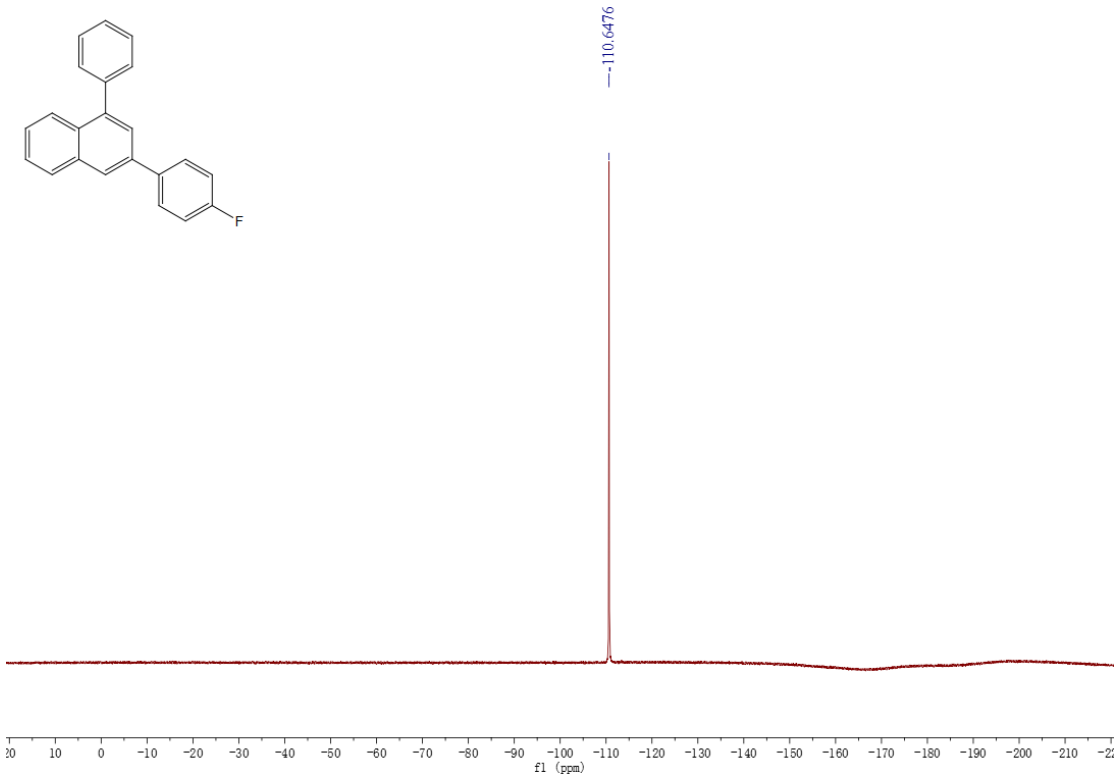
3n ^{1}H NMR



3n ^{13}C NMR



3n ^{19}F NMR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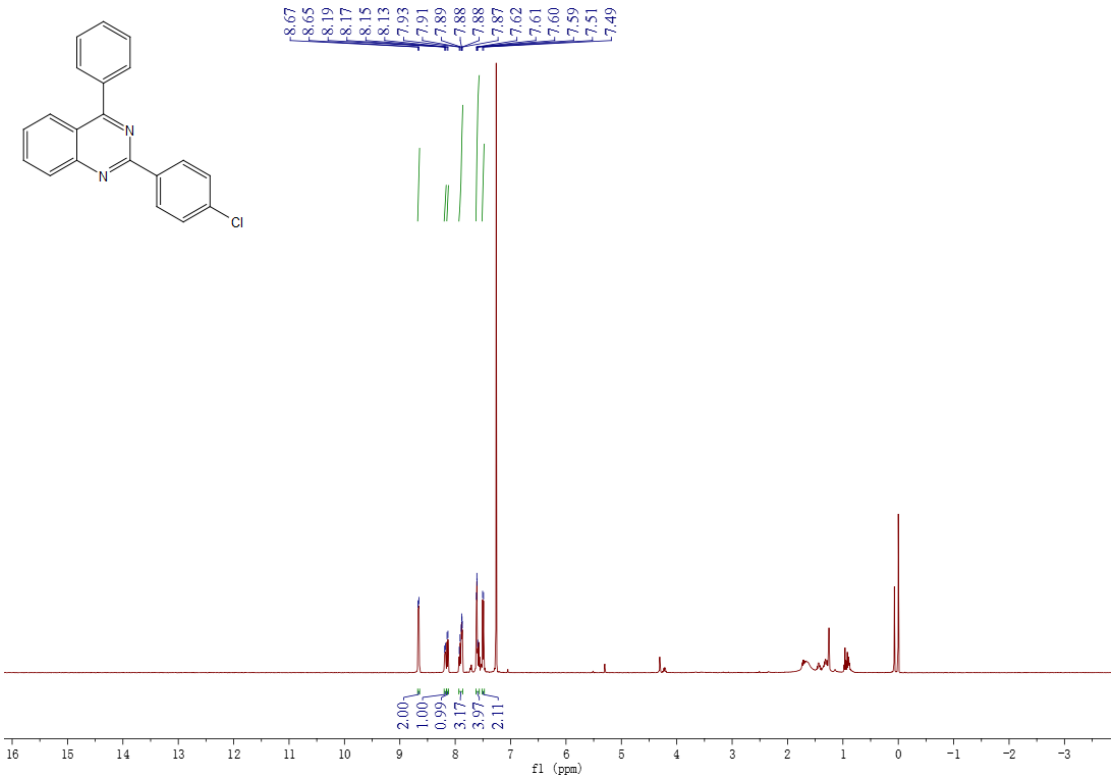
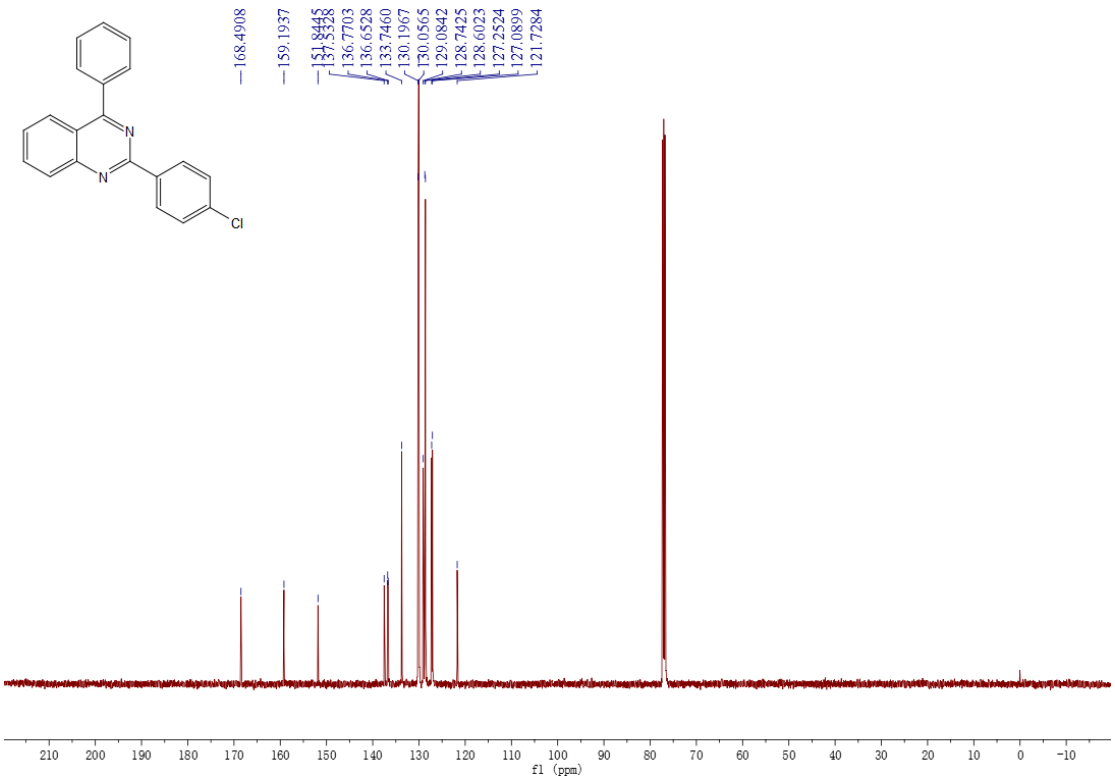
-210
f1 (ppm)

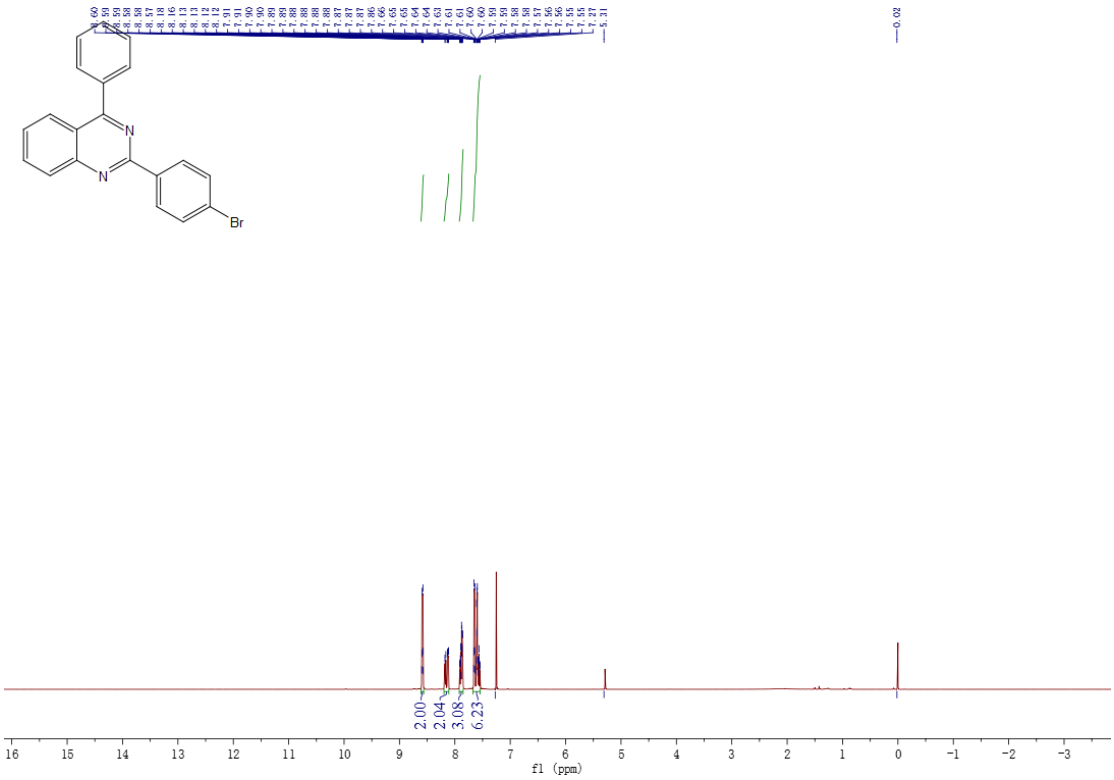
3o ^{1}H NMR



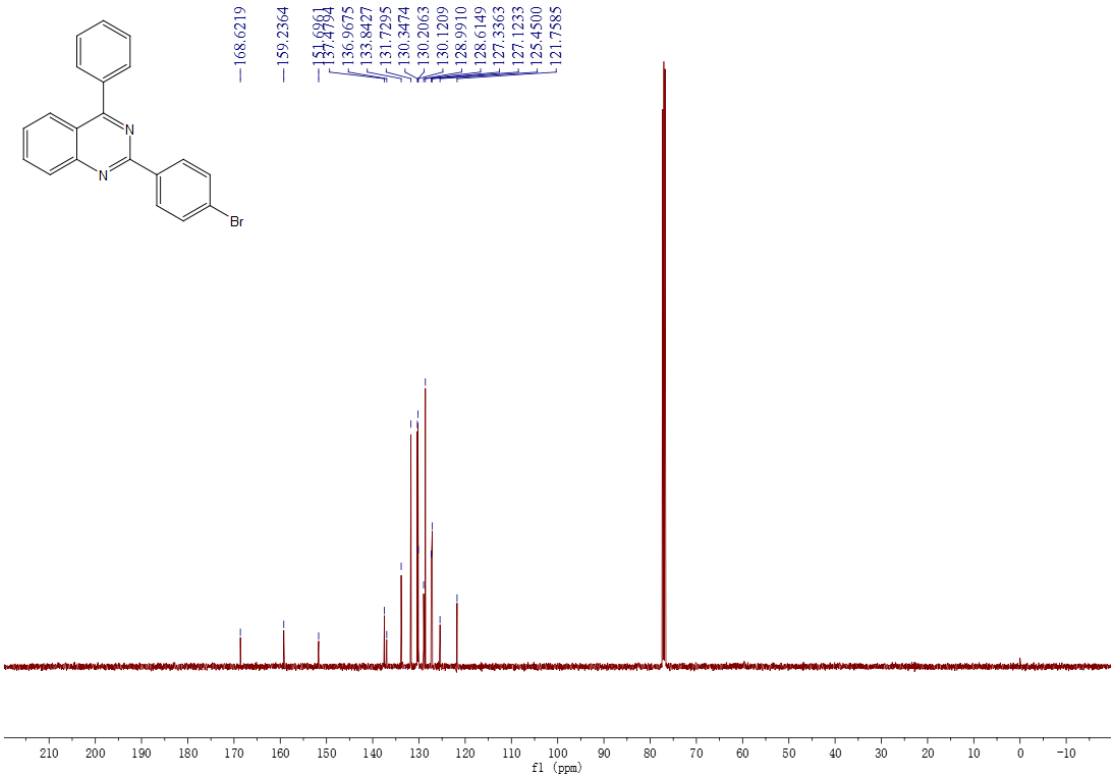
3o ^{13}C NMR



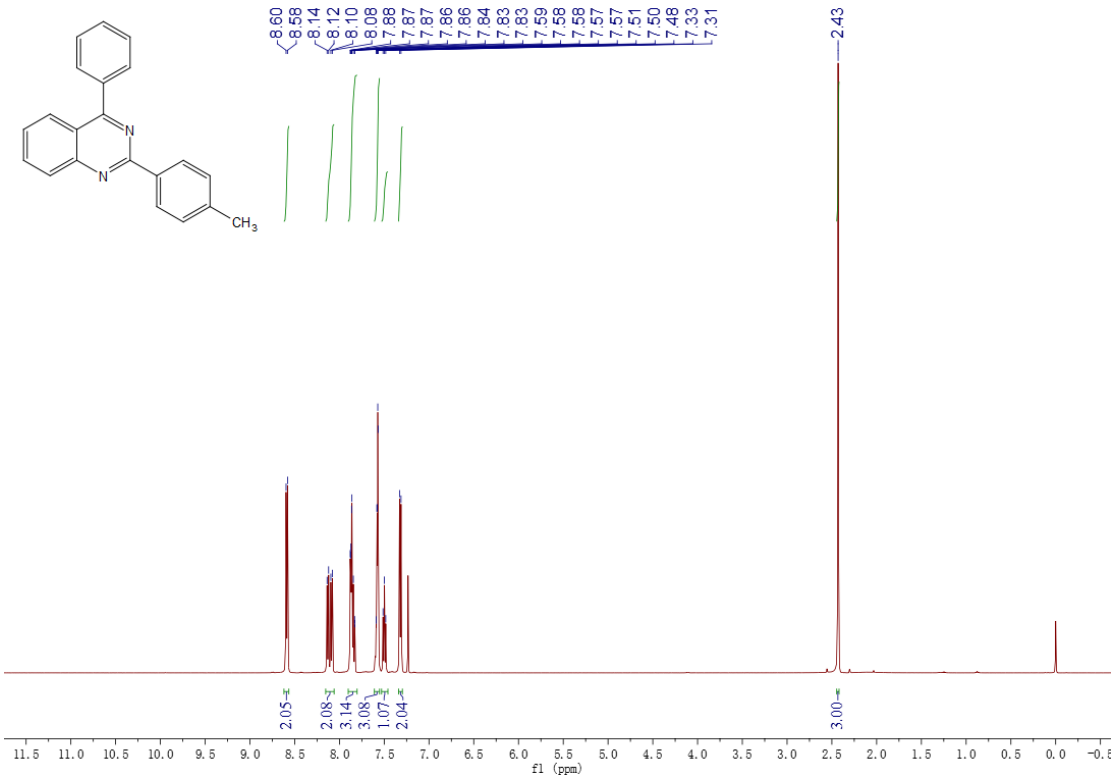
3p ^{1}H NMR



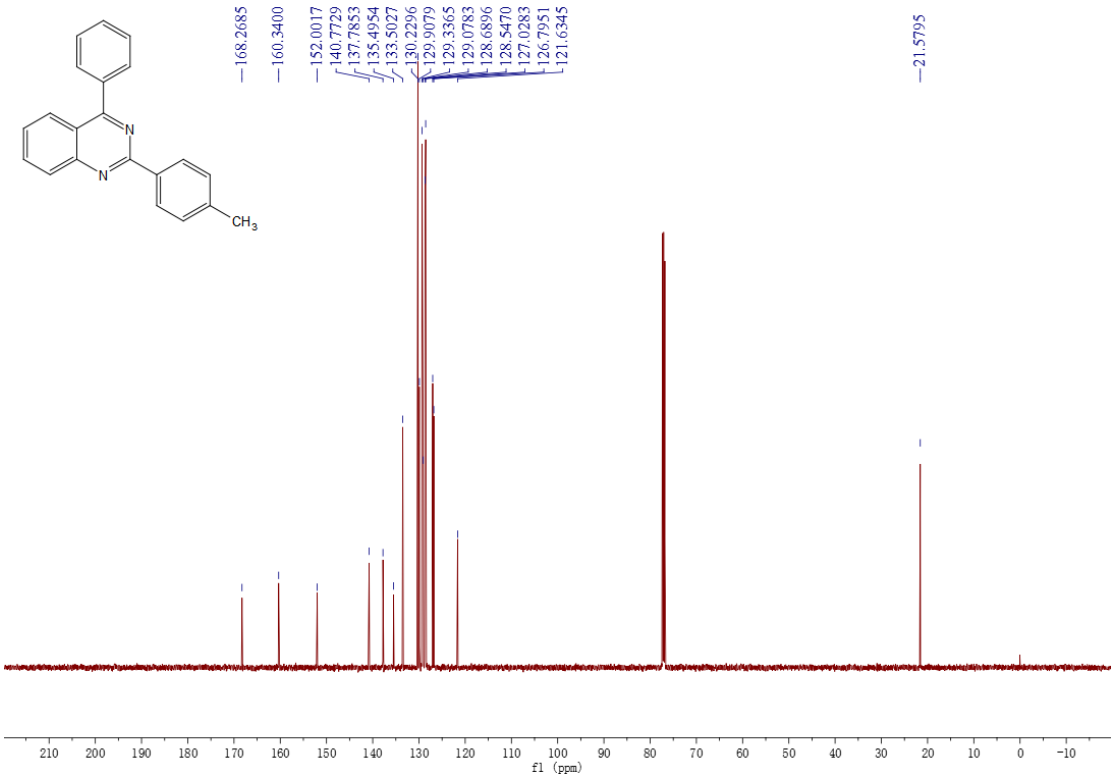
3p ^{13}C NMR



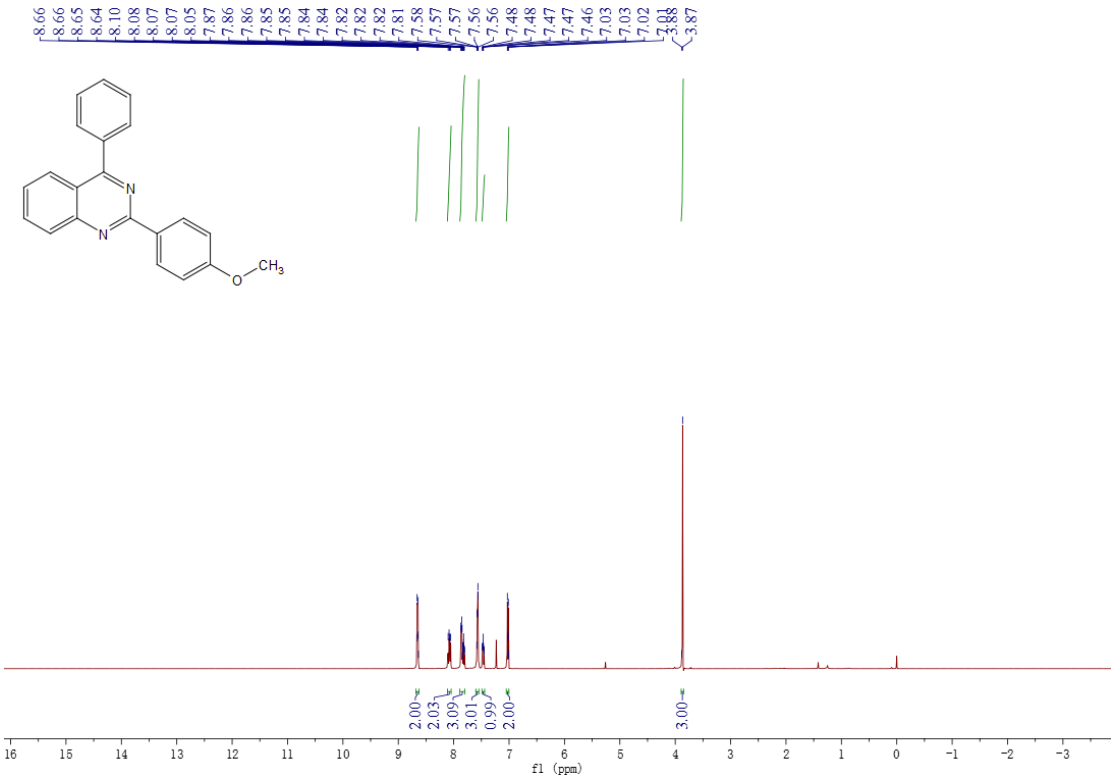
3q ^{1}H NMR



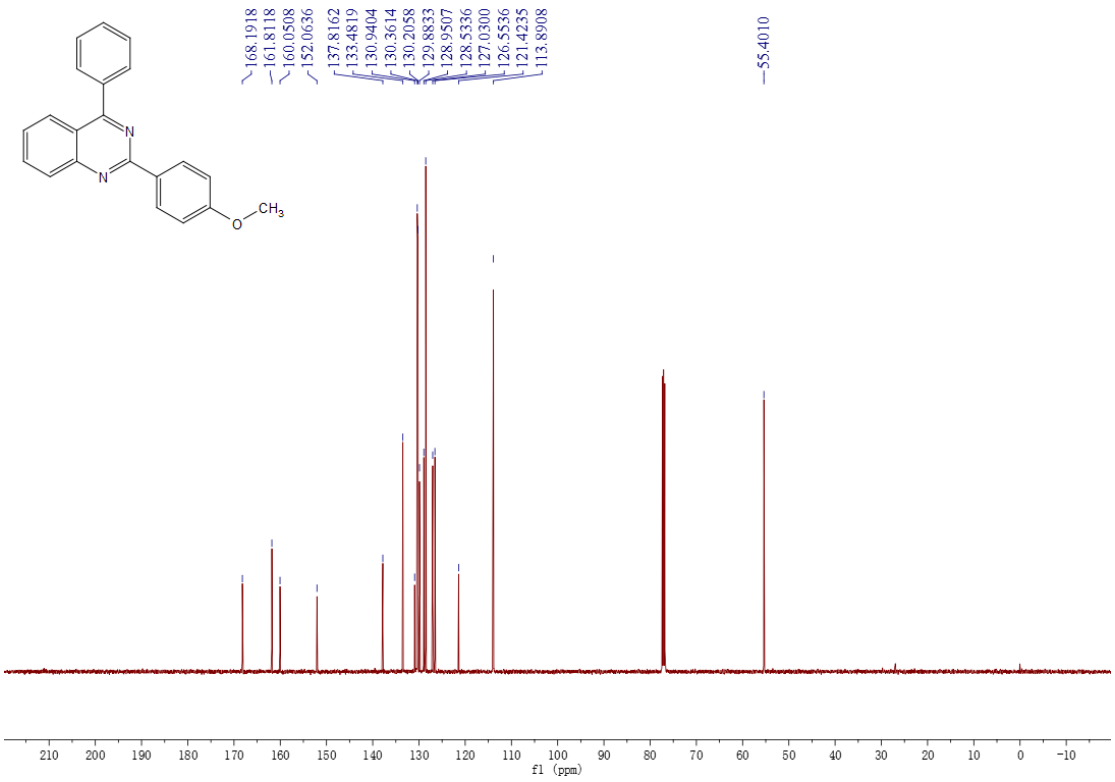
3q ^{13}C NMR



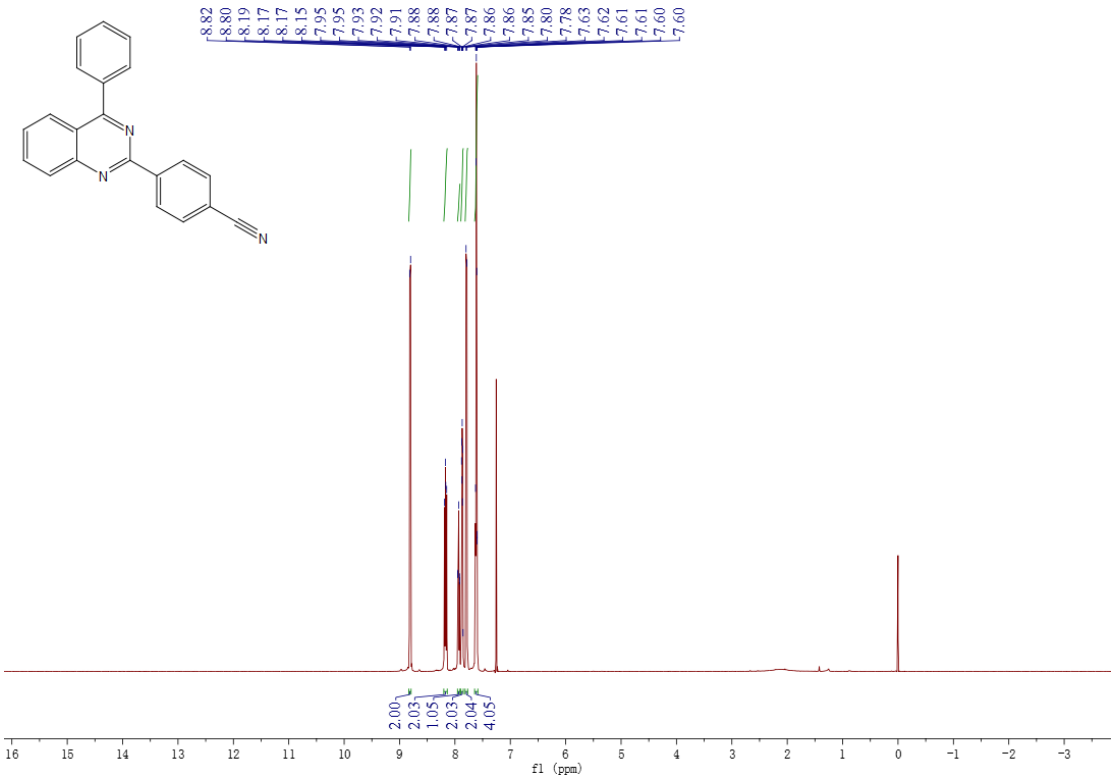
3r ^{1}H NMR



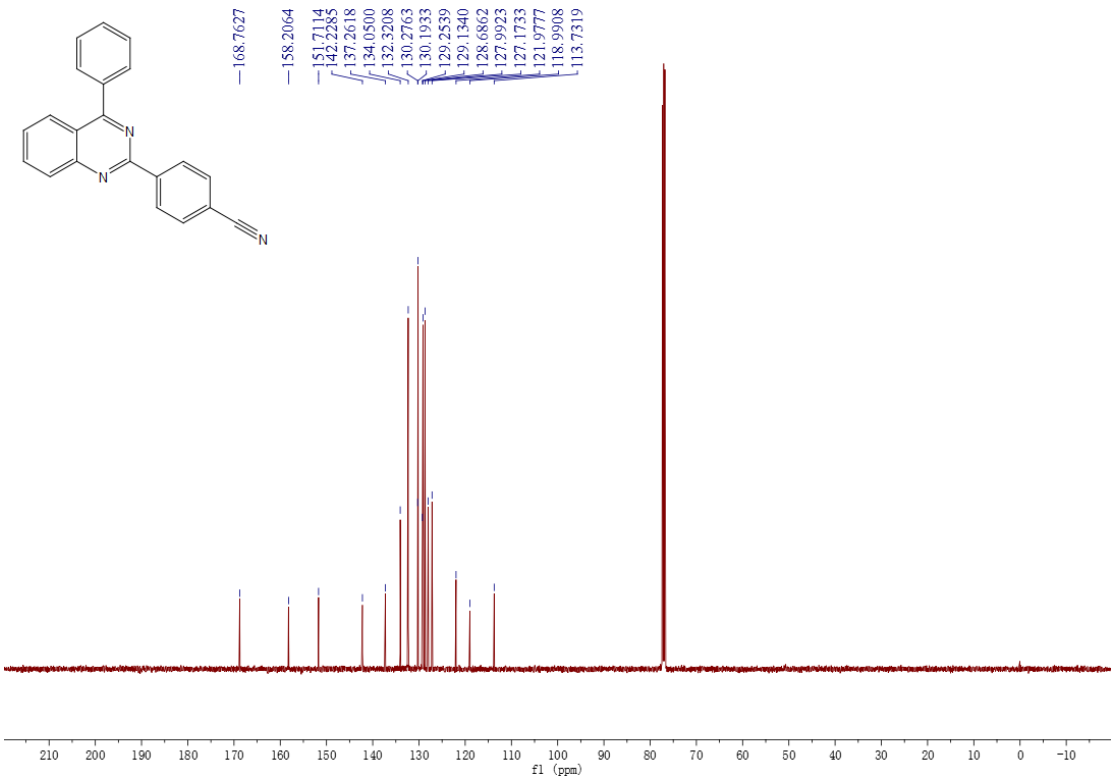
3r ^{13}C NMR



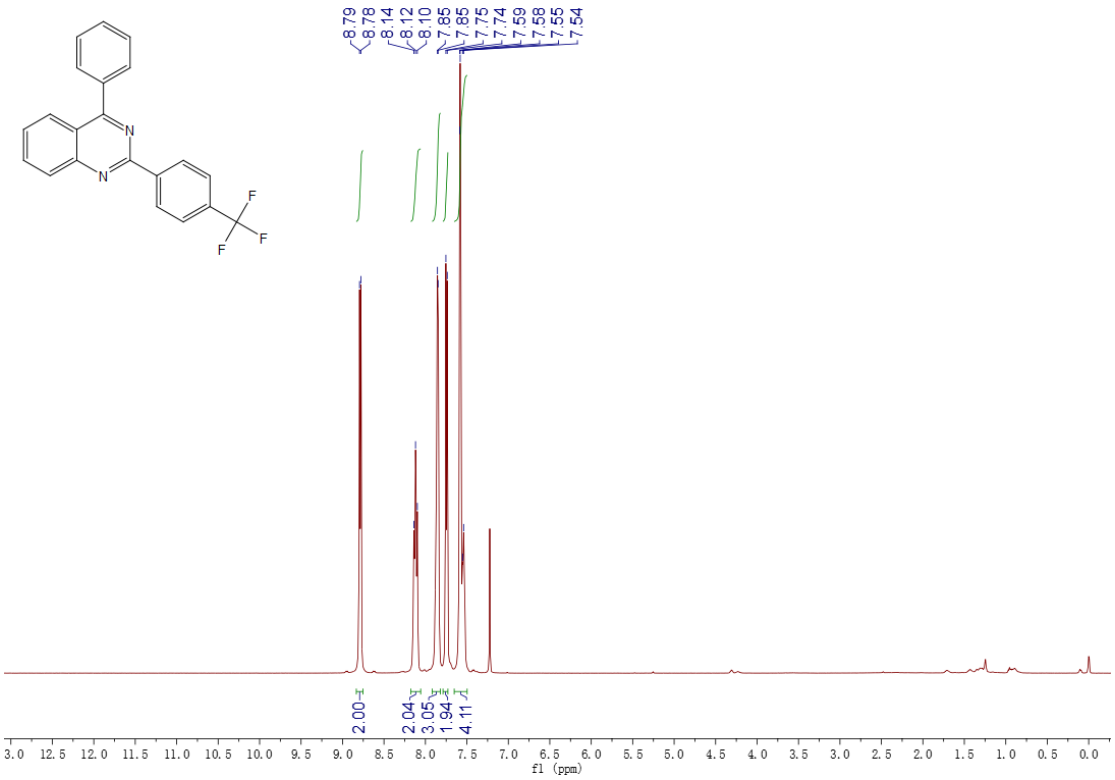
3s ^{1}H NMR



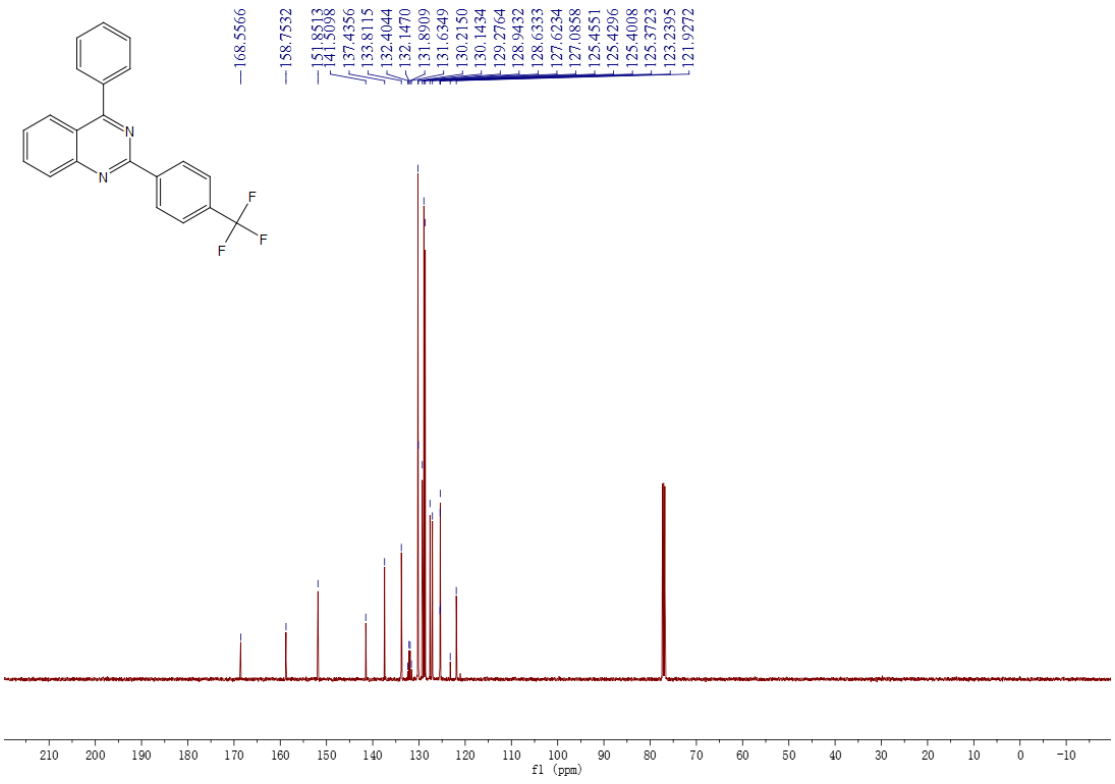
3s ^{13}C NMR



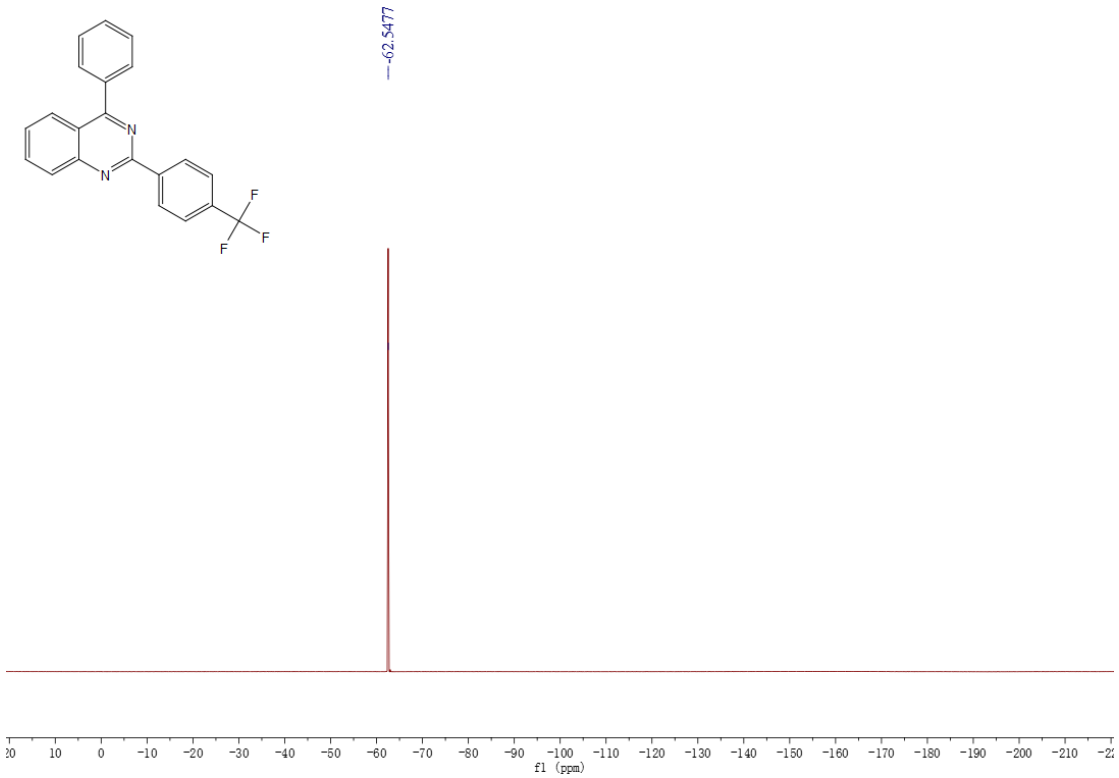
3t ^{1}H NMR



3t ^{13}C NMR



3t ^{19}F NMR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N
N
F
F
F
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0
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-100
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-160
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-180
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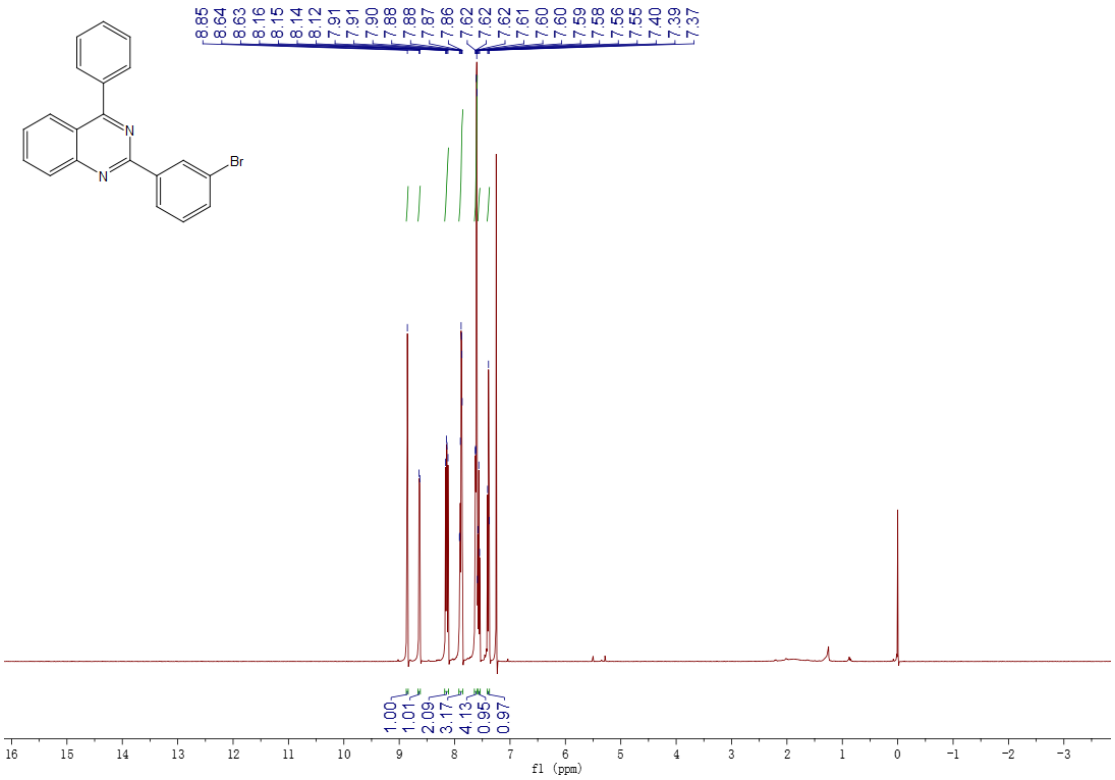
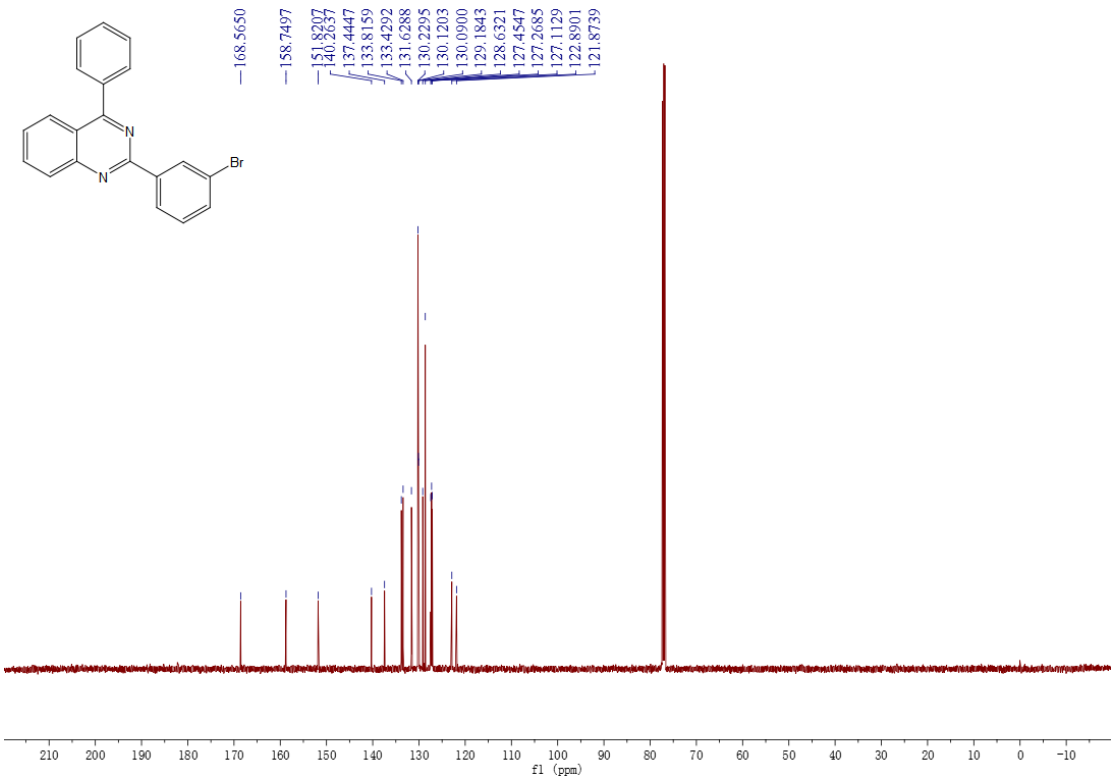
-200
-210
f1 (ppm)

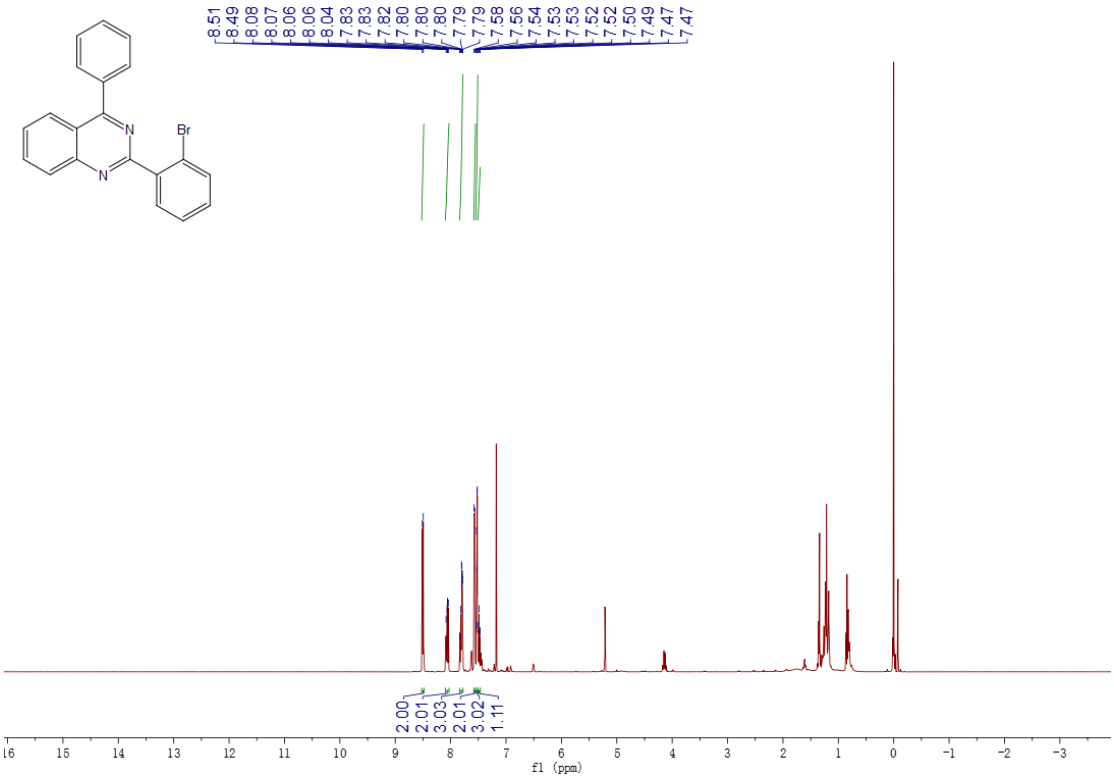
3u ^{1}H NMR



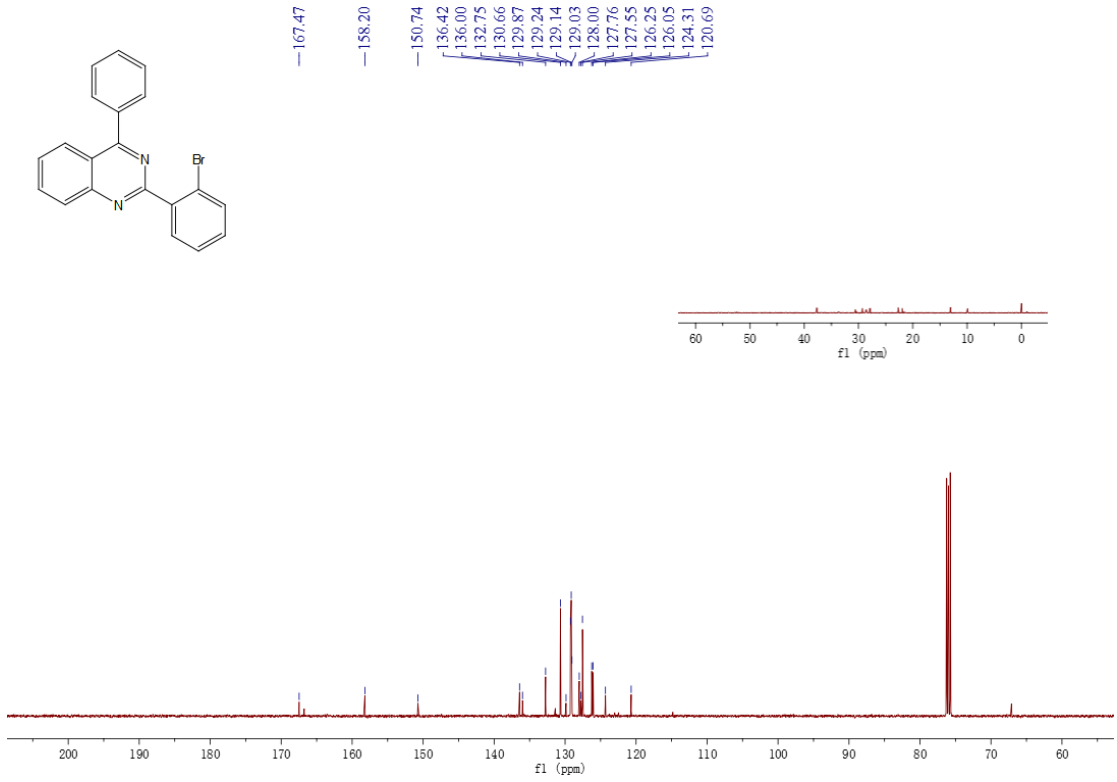
3u ^{13}C NMR



3v ^{1}H NMR

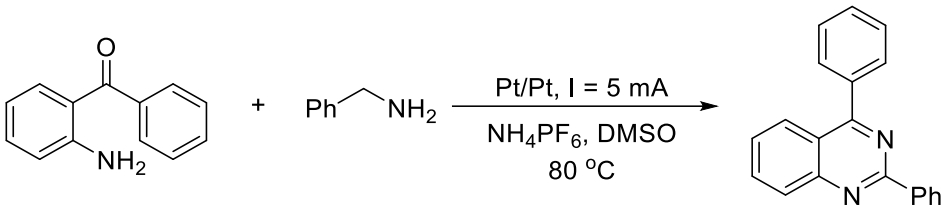


3v ^{13}C NMR



5. Control Experiments

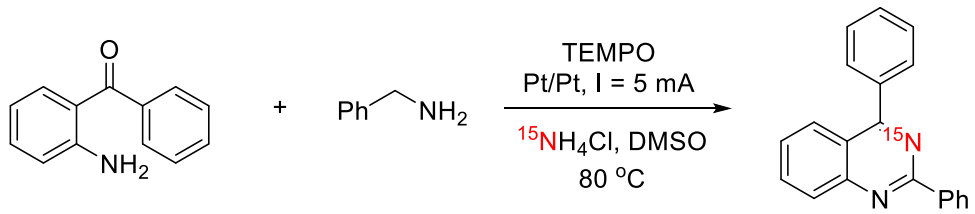
5.1 No TEMPO reaction



1a **2a** **3a**, 17%

1a (2-aminobenzophenone, 0.3 mmol, 59.2 mg), and NH_4PF_6 (0.6 mmol, 97.8 mg), were added to a 100 mL reaction vial, followed by the addition of 3 mL DMSO using a plastic pipette. Then add **2a** (benzylamine, 0.6 mmol, 65.5 μL) with a pipette and use the Pt/Pt as electrodes. The reaction mixture was heated at 80°C while stirring and monitoring the voltage. When the reaction was completed, the reaction solution was extracted three times with water and ethyl acetate, and the combined organic phases were dried over anhydrous sodium sulfate and evaporated in vacuo to obtain the crude product. The residue was purified by flash column chromatography (petroleum ether/ethyl acetate) to give **3a**.

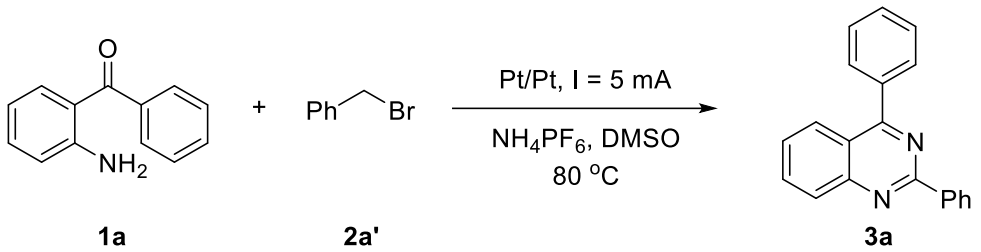
5.2 Isotope labeling experiment



1a **2a** **3a'**

1a (2-aminobenzophenone, 0.3 mmol, 59.2 mg), ammonium chloride ($^{15}NH_4Cl$, 0.6 mmol, 32.4 mg) and TEMPO (2,2,6,6-tetramethylpiperidinooxy, 0.06 mmol, 4.7 mg) were added to a 10 mL reaction vial, followed by addition of 3 mL DMSO using a plastic pipette. Then add **2a** (benzylamine, 0.6 mmol, 65.5 μL) with a pipette and use the Pt/Pt as electrodes. The reaction mixture was heated at 80°C while stirring and monitoring the voltage. When the reaction was completed, the reaction solution was extracted three times with water and ethyl acetate, and the combined organic phases were dried over anhydrous sodium sulfate and evaporated in vacuo to obtain the crude product. The residue was purified by flash column chromatography (petroleum ether/ethyl acetate) to give the ^{15}N-labelled quinazoline **3a'** (60%).

5.3 Benzylamine replaced by benzylbromide



1a **2a'** **3a**

1a (2-aminobenzophenone, 0.3 mmol, 59.2 mg), NH_4PF_6 (0.6 mmol, 97.8 mg) and TEMPO (2,2,6,6-tetramethylpiperidinooxy, 0.06 mmol, 4.7 mg) were added to a 10 mL reaction vial, followed by addition of 3 mL DMSO using a plastic pipette. Then add **2a'** (benzylbromide, 0.6 mmol, 71.3 μL) with a pipette and use the Pt/Pt as electrodes. The reaction mixture was heated at 80°C while stirring and monitoring the voltage. When the reaction was completed, the reaction solution was extracted three times with water and ethyl acetate, and the combined organic phases were dried over anhydrous sodium sulfate and evaporated in vacuo to obtain the crude product. The residue was purified by flash column chromatography (petroleum ether/ethyl acetate) to give **3a** (43%)

6. References

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