Supporting Information

I_2 Catalyzed Aerobic Dehydrative Coupling and Tandem Cyclization/Aerobic Dehydrative Coupling in the Preparation of 4-Aminoquinoline Derivatives

Zikun Yao, Pan Li, Fei Chen, Jiuwei Nie, Hui Wang, Lei Tang,* Yuanyong Yang*

School of Pharmacy, Guizhou Provincial Engineering Technology Research Center for Chemical Drug R&D, Guizhou Medical University, 550014 Guiyang, P. R. China.

E-mail: yangyuanyong@gmc.edu.cn; 312854015@qq.com.

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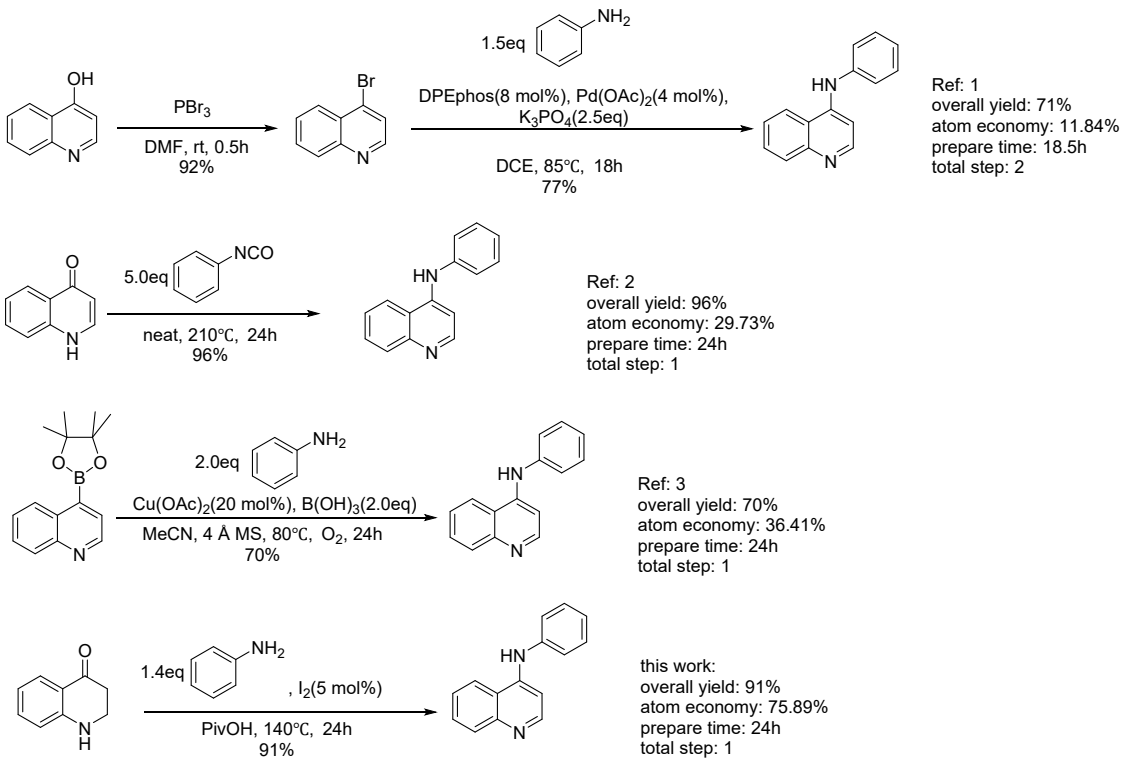
1. Comparasion of current methode with reported work:

Based on the reported synthesis of 3a,[1-3] we compared the current method with the reported work.

Atom Economy (AE)= *MW of product* / $\sum$*MW of reactants* ×100%.



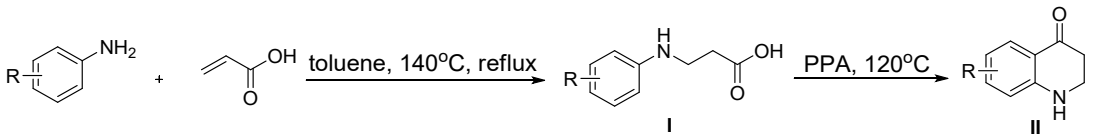
2. General Information:

Proton nuclear magnetic resonance (^{1}H NMR) spectra and carbon nuclear magnetic resonance (^{13}C NMR) spectra were recorded on Bruker 600 MHz spectrometer (600 MHz and 400 MHz). Chemical shifts (δ) for protons are reported in parts per million downfield from tetramethylsilane and are referenced to residual protium in the NMR solvent (DMSO: 2.50). Chemical shifts (δ) for carbon are reported in parts per million downfield from tetramethylsilane and are referenced to the carbon resonances of the solvent (DMSO: 39.51). Data are represented as follows: chemical shift, integration, multiplicity (br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants (*J*) were reported in Hertz (Hz). All high-resolution mass spectra were obtained on a Waters G2-XSQTof mass

spectrometer. Melting points were determined on a Tektronix X-4 melting point apparatus. The EPR spectra were obtained on a Bruker EMX PLUS, and simulated using Xenon software package in Bruker EMX PLUS. Analytical TLC was performed using EM separations percolated silica gel 0.2 mm layer UV 254 fluorescent sheets. Flash chromatography was performed using 200-300 mesh neutral alumina with the indicated solvent system.

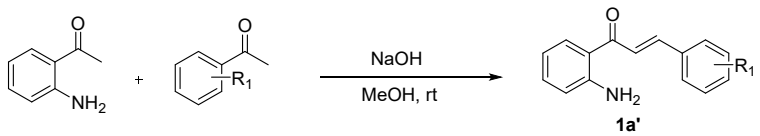
3. General procedures

3.1. The preparation of 2, 3-dihydroquinolin-4(1*H*)-one derivatives



The 2, 3-dihydroquinolin-4(1*H*)-one derivatives were prepared according to the reference.[4-6] A 100.0 ml round-bottomed flask was charged with substituted aniline (5 mmol, 1 eq.), acrylic acid (7.5 mmol, 1.5 eq.), and toluene (5.0 ml). Then, the reaction was stirred and refluxed at 140°C. Upon completion, cooled to room temperature, toluene was removed. Finally, compound **I** was obtained by silica gel column chromatography separation and purification. Subsequently, polyphosphoric acid is added to compound **I**, which is reacted at 120°C for 6~8 hours. After the reaction is completed and cooled to room temperature,ice water is added and stirred at room temperature overnight. Then, pH is adjusted to 8~10 with saturated potassium carbonate. The aqueous layer is extracted with ethyl acetate, the combine organic layers were dried over anhydrous Na_2SO_4, filtered. Finally, the target product **II** is obtained through silica gel column chromatography.

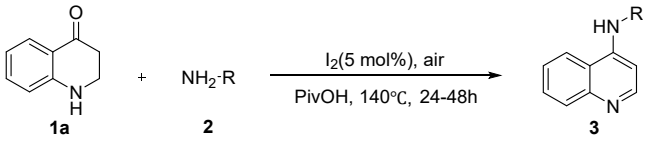
3.2. The preparation of 2'-Aminochalcone derivatives



The 2'-Aminochalcone derivatives were prepared according to the reference.[7] In a 50.0 mL round bottom flask, a mixture of 3 mmol of the aldehyde、3 mmol of 2-aminoacetophenone in 10.0 mL of methanol was stirred at room temperature. After a complete dissolution of reagents, 12 mmol of NaOH (powder) were added. The reaction progress was monitored by TLC and after 20 h, the solid was filtered off under

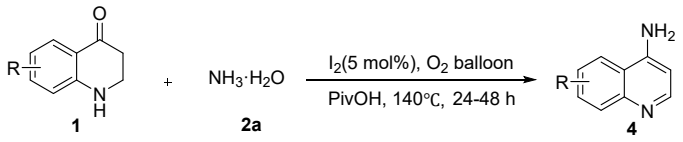
vaccum and successivelly washed with a cold mixture of methanol and water (1:1, 10 × 5.0 mL). The solid was dried at room temperature and recrystallizedwhen necessary, as specified for each compound, or purified by flash chromatography.

3.3. Experimental Procedure for Synthesis of 3



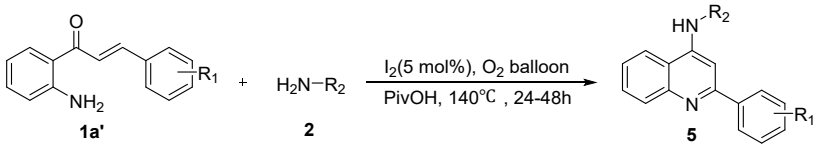
The 2, 3-dihydroquinolin-4(1*H*)-one **1a** (0.4mmol, 1.0 eq)、amine **2a** (0.56 mmol, 1.4 eq) and I_2 (0.02 mmol, 5 mol%) was added to 10.0 mL reaction tube containing 2.0 mL PivOH, the reaction mixture was stirred at 140°C under open air condition for 24-48h. Then, the reaction was quenched upon the addition of 15.0 mL saturated K_2CO_3. The aqueous layer was extracted with EtOAc(3×15.0mL), and the combined organic layers were dried over anhydrous Na_2SO_4, then the solvent was removed by rotary evaporator. The residue was purified by alumina column chromatography (petroleum ether/ethyl acetate = 1:1) to give the compound **3**.

3.4. Experimental Procedure for Synthesis of 4



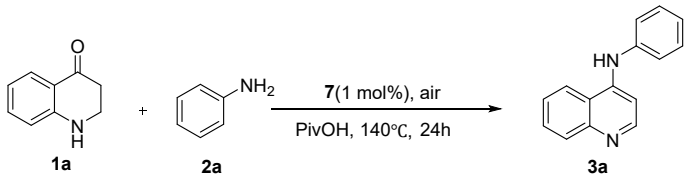
The 2, 3-dihydroquinolin-4(1*H*)-one derivative **1** (0.4mmol, 1.0 eq)、ammonia **2a**(1.2 mmol, 3.0 eq) and I_2 (0.02 mmol, 5 mol%) was added to 10.0 mL reaction tube containing 2.0 mL PivOH, the reaction mixture was stirred at 140°C under an oxygen balloon condition for 24-48h. Then, the reaction was quenched upon the addition of 15.0 mL saturated K_2CO_3. The aqueous layer was extracted with EtOAc(3×15.0mL), and the combined organic layers were dried over anhydrous Na_2SO_4, then the solvent was removed by rotary evaporator. The residue was purified by alumina column chromatography (petroleum ether/ethyl acetate = 1:1) to give the compound **4**.

3.5. Experimental Procedure for Synthesis of 5



The 2'-Aminochalcone derivative **1a'** (0.4mmol, 1.0 eq)、amine **2**(0.56 mmol, 1.4 eq) and I_2 (0.02 mmol, 5 mol%) was added to 10.0 mL reaction tube containing 2.0 mL PivOH, the reaction mixture was stirred at 140°C under an oxygen balloon condition for 24-48h. Then, the reaction was quenched upon the addition of 15.0 mL saturated K_2CO_3. The aqueous layer was extracted with EtOAc(3×15.0mL), and the combined organic layers were dried over anhydrous Na_2SO_4, then the solvent was removed by rotary evaporator. The residue was purified by alumina column chromatography (petroleum ether/ethyl acetate = 1:1) to give the compound **5**.

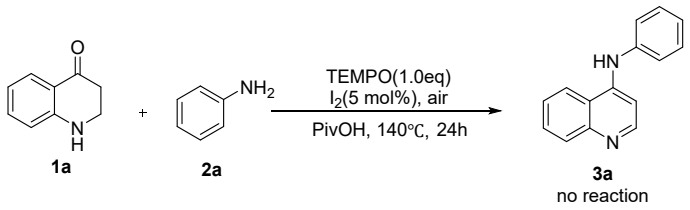
3.6. Large-Scale Synthesis of 3a



The 2, 3-dihydroquinolin-4(1*H*)-one **1a** (10.0mmol, 1.0 eq)、aniline **2a** (14.0 mmol, 1.4 eq) and 3-iodoquinolin-4-ol **7** (0.1 mmol, 1 mol%) was added to 250.0 mL reaction tube containing 50.0 mL PivOH, the reaction mixture was stirred at 140°C under open air condition for 24h. Then, the reaction was quenched upon the addition of 100.0 mL saturated K_2CO_3. The aqueous layer was extracted with EtOAc(3×100.0mL), and the combined organic layers were dried over anhydrous Na_2SO_4, then the solvent was removed by rotary evaporator. The residue was purified by alumina column chromatography (petroleum ether/ethyl acetate = 1:1) to give the compound **3a** in 78% isolated yield.

4. Mechanism studies

4.1. Control experiment



The 2, 3-dihydroquinolin-4(1*H*)-one **1a** (0.4mmol, 1.0 eq)、aniline **2a** (0.56 mmol, 1.4 eq)、I_2 (0.02 mmol, 5 mol%) and TEMPO (1.0 eq) was added to 10.0 mL reaction tube containing 2.0 mL PivOH, the reaction mixture was stirred at 140°C under open air condition for 24h. No production of product 3a was detected by TLC.

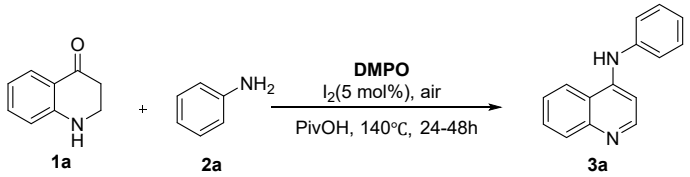
4.2. EPR Measurements and Simulations

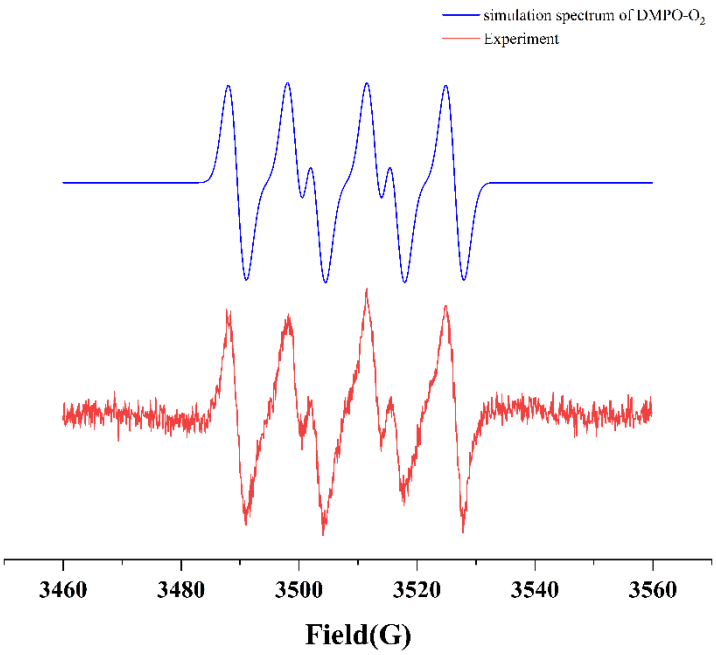
EPR Spectra and Simulation:

To gain more insight into the possible radical intermediates, we carried out paramagnetic resonance (EPR) studies by using using 5,5-dimethyl-pyrroline N-oxide (DMPO) as a free radical spin-trapping agent. Typical Acquisition parameters for the measurements: Center Field = 3510.00 G； Sweep Width =100.00 G；Power = 6.325 mW； Sweep Time = 30.00 s；Time constant = 0.01 ms ; Modulation Amplitude= 1.00 G；ModFreq = 100.00 kHz; FrequencyMon = 9.854844 GHz. The EPR spectra were simulated using Xenon software package in Bruker EMX PLUS.

superoxide radical ($O_2^{\bullet-}$) detection:

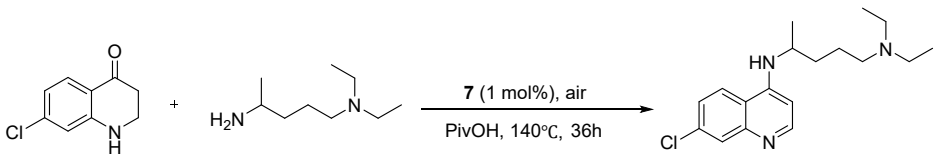
A mixture of **1a** (50 mM), **2a** (1 mol%), I_2 (5 mol%) and DMPO (50 mM) in PivOH (2.0 mL) was prepared. Then, the mixture was stirred at 140 °C for 4.0 h under an air atmosphere. Subsequently, 5,5-dimethyl-1-pyrroline N-oxide (DMPO) (0.05 mmol) was added. When the mixture was stirred for 5 min, the reaction mixture was used directly to proceed EPR analysis. A superoxide radical ($O_2^{\bullet-}$)–trapping adduct DMPO-$O_2^{\bullet-}$ ($g = 2.0067$, $A_N = 13.3834$ G, $A_H = 10.3475$ G) were observed, which were coincident with the simulated spectrums (**Supplementary Figure 2**).





Supplementary Figure 2: The EPR study of photocatalytic system

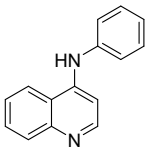
5. **Synthetic applications**:



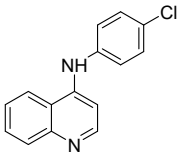
1k **6** **6a**, Chloroquine, 74% yield

The 7-chloro-2,3-dihydroquinolin-4(1H)-one **1k** (0.4mmol, 1.0 eq)、N^1,N^1-diethylpentane-1,4-diamine **6** (0.96 mmol, 2.4 eq) and 3-iodoquinolin-4-ol **7** (0.004 mmol, 1 mol%) was added to 10.0 mL reaction tube containing 2.0 mL PivOH, the reaction mixture was stirred at 140°C under open air condition for 24.0 h. Then, the reaction was quenched upon the addition of 15.0 mL saturated K_2CO_3. The aqueous layer was extracted with EtOAc(3×15.0mL), and the combined organic layers were dried over anhydrous Na_2SO_4, then the solvent was removed by rotary evaporator. The residue was purified by alumina column chromatography (petroleum ether/ethyl acetate = 1:1) to give the **Chloroquine 6a** in 74% isolated yield.

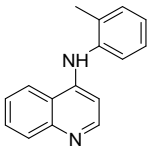
6. **Characterization Data** (Full characteristic data for compounds **3a-3y**, **4p**, **4q** was reported in our previous study, so only **^{1}H NMR** was presented here.[8])



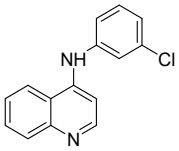
N-phenylquinolin-4-amine(**3a**). Yellow solid: 74.8mg (85%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.96 (s, 1H), 8.46 (d, J = 5.2 Hz, 1H), 8.41 – 8.37 (m, 1H), 7.90 – 7.86 (m, 1H), 7.69 (ddd, J = 8.2, 6.7, 1.3 Hz, 1H), 7.53 (ddd, J = 8.2, 6.8, 1.3 Hz, 1H), 7.42 (t, J = 7.8 Hz, 2H), 7.39 – 7.36 (m, 2H), 7.14 (t, J = 7.3 Hz, 1H), 6.93 (d, J = 5.2 Hz, 1H).



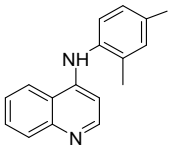
N-(4-chlorophenyl)quinolin-4-amine(**3b**). Yellow solid: 87.5mg (86%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.02 (s, 1H), 8.49 (d, J = 5.2 Hz, 1H), 8.35 (d, J = 8.5 Hz, 1H), 7.89 (d, J = 8.4 Hz, 1H), 7.73 – 7.68 (m, 1H), 7.57 – 7.52 (m, 1H), 7.47 – 7.43 (m, 2H), 7.41 – 7.36 (m, 2H), 6.97 (d, J = 5.2 Hz, 1H).



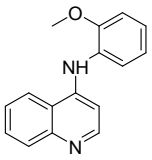
N-(o-tolyl)quinolin-4-amine(**3c**). Yellow solid: 76.8mg (82%); **^{1}H NMR** (600 MHz, DMSO-d6) δ 8.72 (s, 1H), 8.43 (d, J = 8.3 Hz, 1H), 8.34 (d, J = 5.2 Hz, 1H), 7.85 (d, J = 8.4 Hz, 1H), 7.68 (t, J = 7.7 Hz, 1H), 7.51 (t, J = 7.7 Hz, 1H), 7.39 (d, J = 7.5 Hz, 1H), 7.31 (d, J = 7.4 Hz, 1H), 7.29 – 7.24 (m, 2H), 6.08 (d, J = 4.4 Hz, 1H), 2.17 (s, 3H).



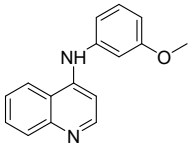
N-(3-chlorophenyl)quinolin-4-amine(**3d**). Yellow solid: 85.7mg (84%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.06 (s, 1H), 8.53 (d, J = 5.1 Hz, 1H), 8.34 (d, J = 8.4 Hz, 1H), 7.91 (d, J = 8.4 Hz, 1H), 7.72 (t, J = 7.6 Hz, 1H), 7.56 (t, J = 7.6 Hz, 1H), 7.43 – 7.38 (m, 2H), 7.35 (d, J = 8.1 Hz, 1H), 7.14 (d, J = 7.9 Hz, 1H), 7.07 (d, J = 5.2 Hz, 1H).



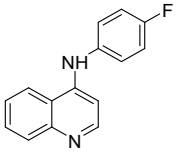
N-(2,4-dimethylphenyl)quinolin-4-amine(**3e**). Yellow solid: 77.7mg (79%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.66 (s, 1H), 8.42 (d, J = 8.4 Hz, 1H), 8.31 (d, J = 5.2 Hz, 1H), 7.84 (d, J = 8.4 Hz, 1H), 7.66 (t, J = 8.2 Hz, 1H), 7.49 (t, J = 6.9 Hz, 1H), 7.19 (s, 1H), 7.15 (d, J = 7.9 Hz, 1H), 7.11 (d, J = 9.8 Hz, 1H), 6.03 (d, J = 5.2 Hz, 1H), 2.33 (s, 3H), 2.12 (s, 3H).



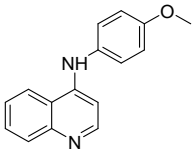
N-(2-methoxyphenyl)quinolin-4-amine(**3f**). Yellow solid: 71.2mg (71%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.53 (s, 1H), 8.41 (d, J = 8.4 Hz, 1H), 8.35 (d, J = 5.3 Hz, 1H), 7.85 (d, J = 8.4 Hz, 1H), 7.68 – 7.64 (m, 1H), 7.51 – 7.47 (m, 1H), 7.33 – 7.27 (m, 2H), 7.18 (d, J = 8.2 Hz, 1H), 7.04 (t, J = 7.5 Hz, 1H), 6.25 (d, J = 5.9 Hz, 1H), 3.76 (d, J = 1.4 Hz, 3H).



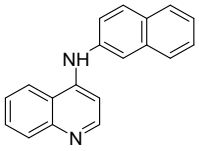
N-(3-methoxyphenyl)quinolin-4-amine(**3g**). Yellow solid: 75.9mg (76%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.93 (s, 1H), 8.48 (d, J = 6.6 Hz, 1H), 8.37 (d, J = 8.4 Hz, 1H), 7.88 (d, J = 8.4 Hz, 1H), 7.71 – 7.67 (m, 1H), 7.55 – 7.51 (m, 1H), 7.31 (t, J = 8.8 Hz, 1H), 7.01 (d, J = 6.6 Hz, 1H), 6.96 (d, J = 8.0 Hz, 1H), 6.92 (s, 1H), 6.71 (d, J = 8.2 Hz, 1H), 3.77 (s, 3H).



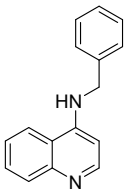
N-(4-fluorophenyl)quinolin-4-amine(**3h**). Yellow solid: 82.3mg (86%); **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.96 (s, 1H), 8.43 (d, J = 5.3 Hz, 1H), 8.37 (dd, J = 8.5, 1.4 Hz, 1H), 7.87 (dd, J = 8.5, 1.3 Hz, 1H), 7.69 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.53 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.42 – 7.36 (m, 2H), 7.31 – 7.22 (m, 2H), 6.78 (d, J = 5.3 Hz, 1H). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -118.6.



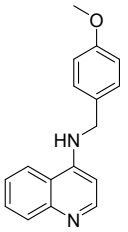
N-(4-methoxyphenyl)quinolin-4-amine(**3i**). Yellow solid: 81.4mg (81%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.82 (s, 1H), 8.38 (d, J = 6.6 Hz, 2H), 7.85 (d, J = 8.4 Hz, 1H), 7.67 (t, J = 7.6 Hz, 1H), 7.52 – 7.48 (m, 1H), 7.28 (d, J = 7.0 Hz, 2H), 7.02 (d, J = 7.0 Hz, 2H), 6.62 (d, J = 5.3 Hz, 1H), 3.78 (s, 3H).



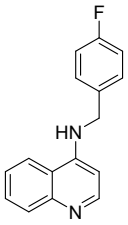
N-(naphthalen-2-yl)quinolin-4-amine(**3j**). Yellow solid: 69.3mg (64%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.19 (s, 1H), 8.51 (d, J = 5.3 Hz, 1H), 8.45 (d, J = 8.4 Hz, 1H), 7.96 (d, J = 8.7 Hz, 1H), 7.90 (t, J = 9.1 Hz, 2H), 7.86 (d, J = 8.2 Hz, 1H), 7.83 (s, 1H), 7.74 – 7.70 (m, 1H), 7.60 – 7.54 (m, 2H), 7.49 (t, J = 7.5 Hz, 1H), 7.45 – 7.41 (m, 1H), 7.09 (d, J = 5.2 Hz, 1H).



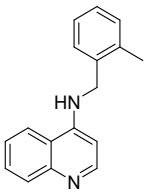
N-benzylquinolin-4-amine(**3k**). Yellow solid: 72.1mg (76%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.29 (d, J = 5.7 Hz, 2H), 7.91 (t, J = 6.1 Hz, 1H), 7.78 (d, J = 8.4 Hz, 1H), 7.62 (t, J = 7.6 Hz, 1H), 7.45 (t, J = 7.6 Hz, 1H), 7.39 (d, J = 8.1 Hz, 2H), 7.34 – 7.30 (m, 2H), 7.23 (t, J = 7.4 Hz, 1H), 6.32 (d, J = 5.1 Hz, 1H), 4.56 (d, J = 6.0 Hz, 2H).



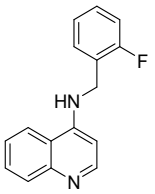
N-(4-methoxybenzyl)quinolin-4-amine(**3l**). Yellow oil: 87.9mg (83%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.29 (dd, J = 11.7, 6.2 Hz, 2H), 7.85 (t, J = 6.2 Hz, 1H), 7.77 (d, J = 9.7 Hz, 1H), 7.63 – 7.59 (m, 1H), 7.46 – 7.41 (m, 1H), 7.31 (d, J = 8.6 Hz, 2H), 6.88 (d, J = 8.7 Hz, 2H), 6.34 (d, J = 5.3 Hz, 1H), 4.48 (d, J = 5.9 Hz, 2H), 3.71 (s, 3H).



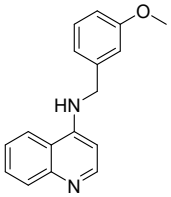
N-(4-fluorobenzyl)quinolin-4-amine(**3m**). Yellow solid: 75.8mg (75%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.31 (d, J = 5.3 Hz, 1H), 8.28 (d, J = 9.8 Hz, 1H), 7.90 (t, J = 6.1 Hz, 1H), 7.78 (d, J = 8.4 Hz, 1H), 7.62 (t, J = 7.6 Hz, 1H), 7.46 (d, J = 8.3 Hz, 1H), 7.42 (dd, J = 8.7, 5.8 Hz, 2H), 7.15 (t, J = 8.9 Hz, 2H), 6.33 (d, J = 5.3 Hz, 1H), 4.54 (d, J = 5.9 Hz, 2H). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -116.2 (d, J = 10.9 Hz).



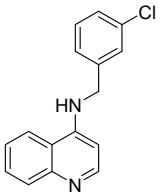
N-(2-methylbenzyl)quinolin-4-amine(**3n**). Yellow solid: 71.4mg (72%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.33 (d, J = 8.4 Hz, 1H), 8.31 (d, J = 5.2 Hz, 1H), 7.80 (d, J = 8.4 Hz, 1H), 7.74 (t, J = 5.8 Hz, 1H), 7.63 (t, J = 7.1 Hz, 1H), 7.47 – 7.43 (m, 1H), 7.20 (t, J = 8.8 Hz, 2H), 7.15 (t, J = 7.3 Hz, 1H), 7.09 (t, J = 7.4 Hz, 1H), 6.26 (d, J = 5.3 Hz, 1H), 4.51 (d, J = 5.6 Hz, 2H), 2.38 (s, 3H).



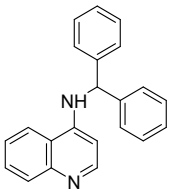
N-(2-fluorobenzyl)quinolin-4-amine(**3o**). Yellow solid: 70.9mg (70%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.34 (d, *J* = 5.2 Hz, 1H), 8.29 (d, *J* = 8.4 Hz, 1H), 7.85 – 7.77 (m, 2H), 7.65 – 7.60 (m, 1H), 7.48 – 7.44 (m, 1H), 7.35 (t, *J* = 7.7 Hz, 1H), 7.31 (q, *J* = 7.0, 5.9 Hz, 1H), 7.25 – 7.20 (m, 1H), 7.13 (t, *J* = 7.5 Hz, 1H), 6.34 (d, *J* = 5.3 Hz, 1H), 4.59 (d, *J* = 5.8 Hz, 2H). ^{19}F NMR (565 MHz, DMSO-d_6) δ -118.6 – -118.7 (m).



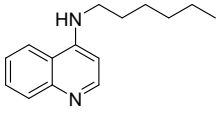
N-(3-methoxybenzyl)quinolin-4-amine(**3p**). Yellow solid: 77.5mg (73%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.30 (t, *J* = 6.7 Hz, 2H), 7.89 (t, *J* = 6.1 Hz, 1H), 7.79 (d, *J* = 8.5 Hz, 1H), 7.64 – 7.60 (m, 1H), 7.45 (t, *J* = 7.6 Hz, 1H), 7.23 (t, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 6.7 Hz, 2H), 6.81 – 6.78 (m, 1H), 6.33 (d, *J* = 5.3 Hz, 1H), 4.52 (d, *J* = 6.0 Hz, 2H), 3.71 (s, 3H).



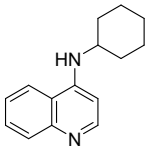
N-(3-chlorobenzyl)quinolin-4-amine(**3q**). Yellow solid: 79.9mg (74%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.32 (d, *J* = 5.2 Hz, 1H), 8.28 (d, *J* = 8.4 Hz, 1H), 7.91 (t, *J* = 6.2 Hz, 1H), 7.79 (d, *J* = 8.4 Hz, 1H), 7.65 – 7.61 (m, 1H), 7.49 – 7.43 (m, 2H), 7.36 (d, *J* = 4.7 Hz, 2H), 7.31 – 7.28 (m, 1H), 6.33 (d, *J* = 5.3 Hz, 1H), 4.57 (d, *J* = 6.0 Hz, 2H).



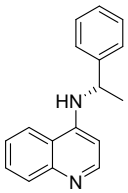
N-benzhydrylquinolin-4-amine(**3r**). Yellow solid: 84.5mg (68%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.51 (d, *J* = 8.4 Hz, 1H), 8.32 (d, *J* = 5.3 Hz, 1H), 7.79 (d, *J* = 8.4 Hz, 1H), 7.62 (t, *J* = 7.6 Hz, 1H), 7.58 (d, *J* = 7.3 Hz, 1H), 7.48 – 7.41 (m, 5H), 7.36 (t, *J* = 7.6 Hz, 4H), 7.27 (t, *J* = 7.4 Hz, 2H), 6.47 (d, *J* = 5.4 Hz, 1H), 6.03 (d, *J* = 7.3 Hz, 1H).



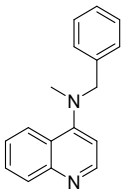
N-hexylquinolin-4-amine(**3s**). Yellow solid: 68.7mg (75%); mp=82.3-83.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.37 (d, J = 5.3 Hz, 1H), 8.22 (d, J = 7.1 Hz, 1H), 7.76 (d, J = 8.4 Hz, 1H), 7.60 – 7.56 (m, 1H), 7.41 – 7.37 (m, 1H), 7.12 (t, J = 5.6 Hz, 1H), 6.41 (d, J = 5.4 Hz, 1H), 3.25 (q, J = 7.2 Hz, 2H), 1.65 (p, J = 7.4 Hz, 2H), 1.38 (q, J = 6.9, 6.2 Hz, 2H), 1.32 – 1.27 (m, 4H), 0.88 – 0.84 (m, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 151.2, 150.4, 148.9, 129.5, 129.1, 124.1, 122.2, 119.4, 98.6, 42.9, 31.6, 28.3, 26.8, 22.6, 14.4. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{15}H_{21}N_2$ 229.1705; found 229.1714.



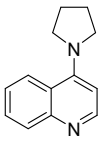
N-cyclohexylquinolin-4-amine(**3t**). Yellow solid: 70.9mg (78%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.36 (d, J = 5.4 Hz, 1H), 8.28 (d, J = 8.6 Hz, 1H), 7.75 (dd, J = 8.3, 1.3 Hz, 1H), 7.60 – 7.56 (m, 1H), 7.40 – 7.36 (m, 1H), 6.73 (d, J = 7.7 Hz, 1H), 6.47 (d, J = 5.4 Hz, 1H), 3.47 (qd, J = 10.5, 3.6 Hz, 1H), 2.00 (d, J = 9.1 Hz, 2H), 1.77 (d, J = 6.4 Hz, 2H), 1.66 (d, J = 13.5 Hz, 1H), 1.38 (q, J = 9.9, 9.4 Hz, 4H), 1.19 (td, J = 12.3, 3.7 Hz, 1H).



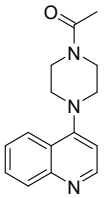
(S)-N-(1-phenylethyl)quinolin-4-amine(**3u**). Yellow solid: 82.7mg (83%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.49 (d, J = 8.6 Hz, 1H), 8.24 (d, J = 5.2 Hz, 1H), 7.76 (d, J = 9.8 Hz, 1H), 7.63 – 7.60 (m, 1H), 7.48 – 7.42 (m, 3H), 7.40 (d, J = 6.9 Hz, 1H), 7.30 (t, J = 7.7 Hz, 2H), 7.20 (t, J = 7.6 Hz, 1H), 6.23 (d, J = 5.4 Hz, 1H), 4.78 (p, J = 6.8 Hz, 1H), 1.61 (d, J = 6.8 Hz, 3H).



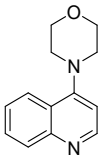
N-benzyl-N-methylquinolin-4-amine(**3v**). Yellow solid: 51.7mg (52%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.62 (d, J = 5.0 Hz, 1H), 8.07 (d, J = 8.5 Hz, 1H), 7.95 (d, J = 8.4 Hz, 1H), 7.69 – 7.65 (m, 1H), 7.49 – 7.46 (m, 1H), 7.39 – 7.35 (m, 4H), 7.31 – 7.28 (m, 1H), 6.94 (d, J = 5.0 Hz, 1H), 4.50 (s, 2H), 2.86 (s, 3H).



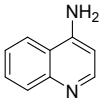
4-(pyrrolidin-1-yl)quinoline(**3w**). Yellow oil: 46.2mg (58%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.38 (d, J = 5.4 Hz, 1H), 8.27 (dd, J = 8.5, 1.3 Hz, 1H), 7.80 (dd, J = 8.4, 1.4 Hz, 1H), 7.61 – 7.57 (m, 1H), 7.38 – 7.34 (m, 1H), 6.52 (d, J = 5.4 Hz, 1H), 3.65 – 3.62 (m, 4H), 1.98 – 1.95 (m, 4H).



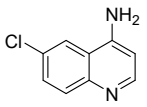
1-(4-(quinolin-4-yl)piperazin-1-yl)ethan-1-one(**3x**). Yellow oil: 52.4mg (51%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.70 (d, J = 4.9 Hz, 1H), 8.07 (dd, J = 8.5, 1.5 Hz, 1H), 7.97 (dd, J = 8.4, 1.3 Hz, 1H), 7.73 – 7.69 (m, 1H), 7.59 – 7.55 (m, 1H), 6.99 (d, J = 4.9 Hz, 1H), 3.75 – 3.69 (m, 4H), 3.17 (t, J = 5.0 Hz, 2H), 3.11 (t, J = 5.1 Hz, 2H), 2.07 (s, 3H).



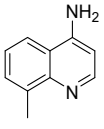
4-(quinolin-4-yl)morpholine(**3y**). Yellow oil: 44.8mg (52%); **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.70 (d, J = 4.9 Hz, 1H), 8.06 (dd, J = 8.5, 1.4 Hz, 1H), 7.96 (d, J = 8.3 Hz, 1H), 7.70 (ddd, J = 8.4, 6.7, 1.5 Hz, 1H), 7.55 (ddd, J = 8.2, 6.7, 1.3 Hz, 1H), 6.99 (d, J = 4.9 Hz, 1H), 3.90 – 3.85 (m, 4H), 3.16 (t, J = 4.6 Hz, 4H).



quinolin-4-amine(**4a**). Yellow solid: 47.9mg (83%); mp=153.1-155.6°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.29 (d, J = 5.2 Hz, 1H), 8.13 (d, J = 8.4 Hz, 1H), 7.74 (d, J = 8.4 Hz, 1H), 7.58 (dd, J = 8.4, 6.8 Hz, 1H), 7.37 (dd, J = 8.4, 6.7 Hz, 1H), 6.75 (s, 2H), 6.53 (d, J = 5.1 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 151.9, 150.8, 149.2, 129.3, 123.9, 122.8, 119.1, 102.7. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_9N_2$ 145.0765; found 145.0766.

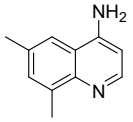


6-chloroquinolin-4-amine(**4b**). Yellow solid: 64.3mg (90%); mp=247.1-249.3°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.31 (d, J = 5.1 Hz, 1H), 8.29 (d, J = 2.4 Hz, 1H), 7.76 (d, J = 9.0 Hz, 1H), 7.58 (dd, J = 8.9, 2.3 Hz, 1H), 6.89 (s, 2H), 6.57 (d, J = 5.2 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 151.4, 151.3, 147.8, 131.5, 129.8, 128.4, 122.0, 119.8, 103.4. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_8N_2Cl$ 179.0386; found 179.0376.

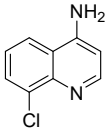


8-methylquinolin-4-amine(**4c**). Yellow solid: 38.8mg (62%); mp=185.4-188.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.32 (d, J = 5.0 Hz, 1H), 7.97 (d, J = 8.4 Hz, 1H), 7.44 (d, J = 6.9 Hz, 1H), 7.25 (dd, J = 8.4, 6.9 Hz, 1H), 6.69 (s, 2H), 6.55 (d, J = 5.0 Hz, 1H), 2.60 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ

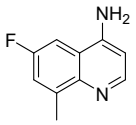
152.2, 149.7, 148.2, 136.5, 129.4, 123.5, 120.6, 118.7, 102.9, 18.9. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{11}N_2$ 159.0933; found 159.0922.



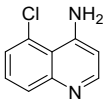
6,8-dimethylquinolin-4-amine(**4d**). Yellow solid: 44.2mg (64%); mp=217.7-219.5°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.26 (d, J = 5.1 Hz, 1H), 7.75 (s, 1H), 7.29 (s, 1H), 6.56 (s, 2H), 6.51 (d, J = 5.0 Hz, 1H), 2.57 (s, 3H), 2.40 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 151.6, 148.8, 146.6, 136.2, 132.4, 131.4, 119.5, 118.7, 102.9, 21.7, 18.8. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{11}H_{13}N_2$ 173.1094; found 173.1079.



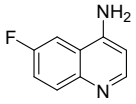
8-chloroquinolin-4-amine(**4e**). Brown solid: 40.3mg (56%); mp=205.6-207.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.38 (d, J = 5.2 Hz, 1H), 8.13 (dd, J = 8.4, 1.5 Hz, 1H), 7.77 (dd, J = 7.4, 1.4 Hz, 1H), 7.33 (t, J = 7.9 Hz, 1H), 6.98 (s, 2H), 6.62 (d, J = 5.2 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 152.5, 151.3, 145.3, 132.9, 129.6, 123.7, 122.3, 120.3, 103.7. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_8N_2Cl$ 179.0389; found 179.0376.



6-fluoro-8-methylquinolin-4-amine(**4f**). Yellow solid: 43.3mg (61%); mp=164.7-168.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.31 (d, J = 5.1 Hz, 1H), 7.77 (dd, J = 10.8, 2.9 Hz, 1H), 7.38 (dd, J = 9.3, 2.8 Hz, 1H), 6.67 (s, 2H), 6.57 (d, J = 5.1 Hz, 1H), 2.62 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 159.0, 157.4, 151.9, 149.2, 145.4, 140.3, 118.9, 103.9, 103.2, 18.8. **^{19}F NMR** (565 MHz, DMSO-d_6) δ -117.05. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{10}N_2F$ 177.0844; found 177.0828.

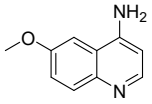


5-chloroquinolin-4-amine(**4g**). Yellow solid: 55.3mg (77%); mp=146.9-148.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.29 (d, J = 5.3 Hz, 1H), 7.71 (dd, J = 8.5, 1.4 Hz, 1H), 7.49 (dd, J = 8.6, 7.4 Hz, 1H), 7.39 (dd, J = 7.5, 1.4 Hz, 1H), 7.00 (s, 2H), 6.66 (d, J = 5.3 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 152.3, 151.6, 150.8, 129.7, 129.1, 128.8, 126.7, 116.0, 105.6. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_8N_2Cl$ 179.0388; found 179.0376.

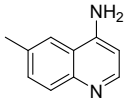


6-fluoroquinolin-4-amine(**4h**). Yellow solid: 46.2mg (71%); mp=182.1-183.5°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.29 (d, J = 5.1 Hz, 1H), 7.96 (dd, J = 10.8, 2.9 Hz, 1H), 7.81 (dd, J = 9.2, 5.7 Hz, 1H),

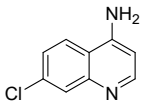
7.49 (td, *J* = 8.7, 2.8 Hz, 1H), 6.76 (s, 2H), 6.55 (d, *J* = 5.1 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 159.6, 158.0, 151.6, 150.3, 146.4, 133.6, 119.1, 106.6, 102.9. **^{19}F NMR** (565 MHz, DMSO-d_6) δ -116.65 – -116.91 (m). **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_8N_2F$ 163.0684; found 163.0672.



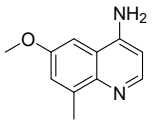
6-methoxyquinolin-4-amine(**4i**). Yellow solid: 47.6mg (68%); mp=123.2-124.7°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.19 (d, *J* = 5.1 Hz, 1H), 7.67 (d, *J* = 9.1 Hz, 1H), 7.50 (d, *J* = 2.7 Hz, 1H), 7.24 (dd, *J* = 9.1, 2.7 Hz, 1H), 6.61 (s, 2H), 6.51 (d, *J* = 5.1 Hz, 1H), 3.86 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 156.1, 151.0, 148.5, 144.9, 130.8, 121.2, 119.5, 102.8, 101.7, 56.0. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{11}N_2O$ 175.0885; found 175.0871.



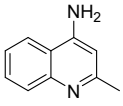
6-methylquinolin-4-amine(**4j**). Yellow solid: 44.3mg (70%); mp=181.8-183.5°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.23 (d, *J* = 5.1 Hz, 1H), 7.92 (s, 1H), 7.65 (d, *J* = 8.5 Hz, 1H), 7.41 (dd, *J* = 8.6, 1.9 Hz, 1H), 6.64 (s, 2H), 6.50 (d, *J* = 5.1 Hz, 1H), 2.45 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 151.3, 145.0, 147.7, 133.1, 131.2, 129.2, 121.7, 118.9, 102.8, 21.7. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{11}N_2$ 159.0934; found 159.0922.



7-chloroquinolin-4-amine(**4k**). Yellow solid: 45.7mg (64%); mp=159.3-164.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.31 (d, *J* = 5.2 Hz, 1H), 8.19 (d, *J* = 8.9 Hz, 1H), 7.76 (d, *J* = 2.2 Hz, 1H), 7.40 (dd, *J* = 8.9, 2.2 Hz, 1H), 6.94 (s, 2H), 6.55 (d, *J* = 5.2 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 152.2, 152.0, 149.9, 133.9, 127.8, 125.1, 124.3, 117.6, 103.2. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_9H_8N_2Cl$ 179.0388; found 179.0376.

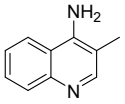


6-methoxy-8-methylquinolin-4-amine(**4l**). Yellow solid: 43.6mg (59%); mp=214.2-216.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.20 (d, *J* = 5.0 Hz, 1H), 7.33 (d, *J* = 2.8 Hz, 1H), 7.13 (dd, *J* = 2.7, 1.3 Hz, 1H), 6.52 (d, *J* = 4.8 Hz, 3H), 3.84 (s, 3H), 2.57 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 155.4, 151.2, 147.4, 144.1, 138.4, 121.1, 119.3, 103.1, 99.4, 55.8, 18.9. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{11}H_{13}N_2O$ 189.1039; found 189.1028.

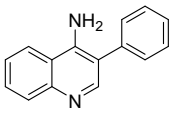


2-methylquinolin-4-amine(**4m**). Yellow solid: 52.2mg (82%); mp=192.4-196.1°C; **^{1}H NMR** (600 MHz,

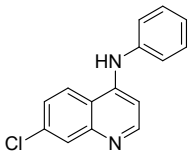
DMSO-d_6) δ 8.08 (d, J = 8.4 Hz, 1H), 7.66 (d, J = 8.4 Hz, 1H), 7.55 – 7.51 (m, 1H), 7.33 – 7.28 (m, 1H), 6.64 (s, 2H), 6.43 (s, 1H), 2.40 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 158.7, 152.0, 148.9, 129.3, 128.6, 123.2, 122.6, 117.7, 102.5, 25.3. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{11}N_2$ 159.0936; found 159.0922.



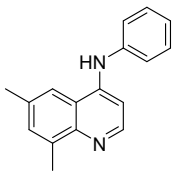
3-methylquinolin-4-amine(**4n**). Yellow solid: 47.6mg (75%); mp=155.4-157.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.27 (s, 1H), 8.20 (d, J = 8.3 Hz, 1H), 7.73 (d, J = 8.8 Hz, 1H), 7.52 (t, J = 6.9 Hz, 1H), 7.36 (t, J = 7.0 Hz, 1H), 6.44 (s, 2H), 2.20 (s, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 152.2, 148.8, 148.1, 129.3, 128.2, 123.9, 122.5, 118.4, 109.6, 15.2. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{10}H_{11}N_2$ 159.0936; found 159.0922.



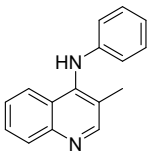
3-phenylquinolin-4-amine(**4o**). Yellow solid: 64.5mg (74%); mp=198.3-200.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.33 (d, J = 8.3 Hz, 1H), 8.30 (s, 1H), 7.81 (dd, J = 8.3, 1.3 Hz, 1H), 7.63 (ddd, J = 8.3, 6.8, 1.4 Hz, 1H), 7.52 (d, J = 6.9 Hz, 4H), 7.45 (ddd, J = 8.3, 6.8, 1.4 Hz, 1H), 7.41 (ddd, J = 8.7, 6.5, 2.1 Hz, 1H), 6.41 (s, 2H). **^{13}C NMR** (151 MHz, DMSO) δ 151.6, 148.3, 147.7, 137.4, 129.8, 129.6, 129.4, 127.7, 124.7, 123.3, 118.7, 115.3. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{15}H_{13}N_2$ 221.1091; found 221.1079.



7-chloro-*N*-phenylquinolin-4-amine(**4p**). Yellow solid: 73.4mg (73%). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 9.11 (s, 1H), 8.49 – 8.40 (m, 2H), 7.90 (d, J = 2.2 Hz, 1H), 7.57 (dd, J = 9.0, 2.3 Hz, 1H), 7.47 – 7.33 (m, 4H), 7.17 (tt, J = 7.2, 1.4 Hz, 1H), 6.92 (d, J = 5.3 Hz, 1H).

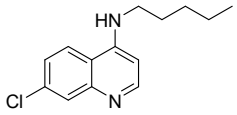


6,8-dimethyl-*N*-phenylquinolin-4-amine(**4q**). Yellow solid: 83.9mg (84%). **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.79 (s, 1H), 8.42 (d, J = 5.3 Hz, 1H), 8.00 (s, 1H), 7.42 – 7.37 (m, 3H), 7.34 (d, J = 7.8 Hz, 2H), 7.11 (t, J = 7.3 Hz, 1H), 6.95 (d, J = 5.2 Hz, 1H), 2.63 (s, 3H), 2.47 (s, 3H).

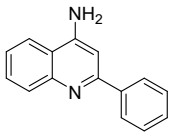


3-methyl-*N*-phenylquinolin-4-amine(**4r**). White solid: 64.4mg (69%); mp=202.1-202.8°C **^{1}H NMR** (400

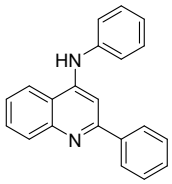
MHz, DMSO-d_6) δ 8.72 (s, 1H), 8.43 (s, 1H), 7.99 (dd, *J* = 12.7, 8.5 Hz, 2H), 7.65 (ddd, *J* = 8.3, 6.8, 1.4 Hz, 1H), 7.48 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 7.21 – 7.11 (m, 2H), 6.78 (t, *J* = 7.4 Hz, 1H), 6.68 – 6.62 (m, 2H), 2.21 (s, 3H). **^{13}C NMR** (101 MHz, DMSO) δ 154.2, 148.4, 145.3, 143.7, 129.7, 129.4, 128.9, 126.1, 124.7, 123.9, 123.4, 119.7, 116.1, 16.6. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{16}H_{15}N_2$ 235.1235; found 235.1242.



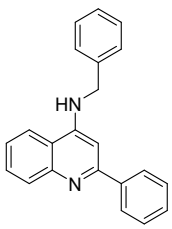
7-chloro-*N*-pentylquinolin-4-amine(**4s**). Yellow solid: 82.3mg (83%); mp=98.3-99.7℃; **^{1}H NMR** (400 MHz,) δ 8.38 (d, *J* = 5.4 Hz, 1H), 8.28 (d, *J* = 9.0 Hz, 1H), 7.77 (d, *J* = 2.2 Hz, 1H), 7.43 (dd, *J* = 9.0, 2.3 Hz, 1H), 7.29 (t, *J* = 5.4 Hz, 1H), 6.43 (d, *J* = 5.4 Hz, 1H), 3.28 – 3.18 (m, 2H), 1.65 (p, *J* = 7.3 Hz, 2H), 1.35 (dq, *J* = 7.3, 3.3 Hz, 4H), 0.91 – 0.81 (m, 3H). **^{13}C NMR** (101 MHz,) δ 152.4, 150.6, 149.6, 133.81, 128.0, 124.6, 124.4, 117.9, 99.0, 42.8, 29.3, 28.0, 22.4, 14.4. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{14}H_{18}N_2Cl$ 2249.1159; found 249.1165.



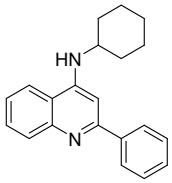
2-phenylquinolin-4-amine(**5a**).Yellow solid: 38.2mg (42%); mp=254.8-256.1°C; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.16 (dd, *J* = 8.5, 1.4 Hz, 1H), 8.10 – 8.03 (m, 2H), 7.84 (dd, *J* = 8.5, 1.2 Hz, 1H), 7.61 (ddd, *J* = 8.3, 6.8, 1.4 Hz, 1H), 7.53 – 7.47 (m, 2H), 7.46 – 7.41 (m, 1H), 7.38 (ddd, *J* = 8.2, 6.8, 1.3 Hz, 1H), 7.12 (s, 1H), 6.84 (s, 2H). **^{13}C NMR** (151 MHz, DMSO) δ 156.7, 152.9, 149.7, 140.5, 129.8, 129.8, 129.3, 129.0, 127.3, 124.0, 122.7, 118.3, 99.6. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{15}H_{13}N_2$ 221.1094; found 221.1079.



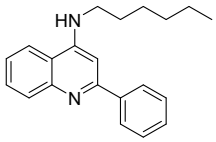
N,2-diphenylquinolin-4-amine(**5b**). Yellow solid: 64.5mg (54%); mp=198.1-200.3 °C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.05 (s, 1H), 8.41 (dd, *J* = 8.4, 1.4 Hz, 1H), 8.02 – 7.99 (m, 2H), 7.97 (dd, *J* = 8.4, 1.3 Hz, 1H), 7.72 (ddd, *J* = 8.3, 6.8, 1.4 Hz, 1H), 7.53 (ddd, *J* = 8.3, 6.8, 1.4 Hz, 1H), 7.49 – 7.41 (m, 8H), 7.17 (ddd, *J* = 8.5, 5.4, 3.3 Hz, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 157.1, 149.5, 149.2, 141.2, 140.2, 130.2, 130.0, 129.9, 129.5, 129.1, 127.4, 125.1, 124.2, 122.9, 122.5, 119.5, 99.1. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{21}H_{17}N_2$ 297.1396; found 297.1392.



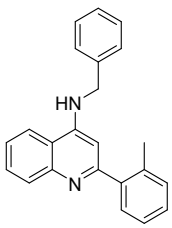
N-benzyl-2-phenylquinolin-4-amine(**5c**). Yellow solid: 79.5mg (64%); mp=172.7-175.9 °C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.31 (d, J = 8.4 Hz, 1H), 8.05 – 8.01 (m, 2H), 7.98 (t, J = 6.1 Hz, 1H), 7.87 (d, J = 7.2 Hz, 1H), 7.65 (ddd, J = 8.2, 6.7, 1.3 Hz, 1H), 7.48 – 7.43 (m, 5H), 7.42 – 7.39 (m, 1H), 7.34 (t, J = 7.6 Hz, 2H), 7.23 (t, J = 7.4 Hz, 1H), 6.89 (s, 1H), 4.70 (d, J = 6.0 Hz, 2H). **^{13}C NMR** (151 MHz, DMSO) δ 156.9, 151.1, 148.8, 140.5, 139.6, 129.9, 129.7, 129.4, 128.9, 127.5, 127.4, 127.4, 124.5, 122.0, 118.7, 96.5, 46.0. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{22}H_{19}N_2$ 311.1560; found 311.1548.



N-cyclohexyl-2-phenylquinolin-4-amine(**5d**). Yellow solid: 53.4mg (44%); mp=147.8-150.1℃; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.30 (dd, J = 8.5, 1.3 Hz, 1H), 8.19 – 8.15 (m, 2H), 7.84 (dd, J = 8.4, 1.3 Hz, 1H), 7.64 – 7.59 (m, 1H), 7.50 (t, J = 7.7 Hz, 2H), 7.44 (t, J = 7.3 Hz, 1H), 7.38 (ddd, J = 8.3, 6.7, 1.4 Hz, 1H), 6.98 (s, 1H), 6.76 (d, J = 7.9 Hz, 1H), 3.73 (ddp, J = 10.6, 7.3, 3.7 Hz, 1H), 2.05 (d, J = 11.4 Hz, 2H), 1.82 – 1.75 (m, 2H), 1.71 – 1.65 (m, 1H), 1.51 – 1.38 (m, 4H), 1.25 – 1.16 (m, 1H). **^{13}C NMR** (151 MHz, DMSO) δ 157.2, 150.3, 149.0, 140.8, 129.8, 129.5, 129.3, 128.9, 127.6, 124.0, 122.3, 118.6, 95.7, 51.1, 32.5, 26.0, 25.3. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{21}H_{23}N_2$ 303.1871; found 303.1861.

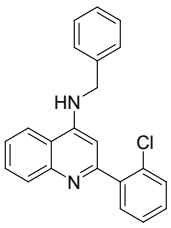


N-hexyl-2-phenylquinolin-4-amine(**5e**). Yellow oil: 59.9mg (49%); mp=169.3-170.1°C ; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.24 (dd, J = 8.5, 1.3 Hz, 1H), 8.18 (dd, J = 7.2, 1.8 Hz, 2H), 7.85 (dd, J = 8.4, 1.3 Hz, 1H), 7.62 (ddd, J = 8.2, 6.7, 1.4 Hz, 1H), 7.50 (t, J = 7.6 Hz, 2H), 7.46 – 7.42 (m, 1H), 7.40 (ddd, J = 8.2, 6.7, 1.3 Hz, 1H), 7.15 (t, J = 5.5 Hz, 1H), 6.94 (s, 1H), 3.41 – 3.37 (m, 2H), 1.72 (p, J = 7.3 Hz, 2H), 1.42 (q, J = 7.1 Hz, 2H), 1.36 – 1.27 (m, 4H), 0.87 (t, J = 6.9 Hz, 3H). **^{13}C NMR** (151 MHz, DMSO) δ 157.1, 151.3, 148.8, 140.7, 129.8, 129.5, 129.3, 128.9, 127.6, 124.1, 122.1, 118.6, 95.5, 42.9, 31.6, 28.4, 26.9, 22.6, 14.4. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{21}H_{25}N_2$ 305.2024; found 305.2018.

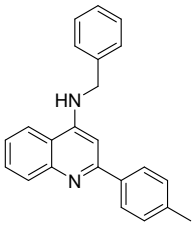


N-benzyl-2-(o-tolyl)quinolin-4-amine(**5f**). Yellow solid: 68.6mg (53%); mp=166.3-167.1°C; **^{1}H NMR** (400 MHz, DMSO-d6) δ 8.33 (dd, J = 8.4, 1.4 Hz, 1H), 7.98 (t, J = 6.0 Hz, 1H), 7.80 (dd, J = 8.5, 1.3 Hz, 1H), 7.64 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.48 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.39 (d, J = 8.4 Hz, 2H), 7.34 – 7.27 (m, 3H), 7.26 – 7.18 (m, 4H), 6.36 (s, 1H), 4.60 (d, J = 5.8 Hz, 2H), 2.07 (s, 3H). **^{13}C NMR** (101 MHz, DMSO) δ 160.1, 150.2, 148.5, 142.2, 139.5, 135.6, 130.8, 129.7, 129.5, 128.9, 128.2,

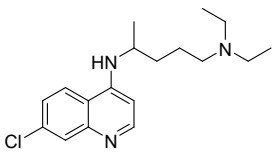
127.3, 127.2, 126.0, 124.5, 122.0, 118.2, 100.6, 46.0, 20.3. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{23}H_{21}N_2$ 325.1744; found 325.1705.



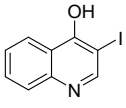
N-benzyl-2-(2-chlorophenyl)quinolin-4-amine(**5g**). Yellow solid: 73.6mg (52%); mp=209.3-210.1°C; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.34 (dd, J = 8.5, 1.4 Hz, 1H), 8.04 (t, J = 6.0 Hz, 1H), 7.83 (dd, J = 8.4, 1.3 Hz, 1H), 7.66 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.56 – 7.45 (m, 3H), 7.42 – 7.35 (m, 4H), 7.31 (t, J = 7.6 Hz, 2H), 7.25 – 7.18 (m, 1H), 6.53 (s, 1H), 4.59 (d, J = 5.9 Hz, 2H). **^{13}C NMR** (101 MHz, DMSO) δ 157.4, 150.2, 148.6, 140.8, 139.4, 131.9, 131.6, 130.2, 130.1, 129.8, 129.7, 128.9, 127.5, 127.3, 124.9, 122.0, 118.4, 100.8, 46.1. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{22}H_{18}N_2Cl$ 345.1174; found 345.1159.



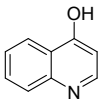
N-benzyl-2-(p-tolyl)quinolin-4-amine(**5h**). Yellow solid: 65.0mg (51%); mp=175.5-176.2°C; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.29 (dd, J = 8.5, 1.5 Hz, 1H), 7.97 – 7.89 (m, 3H), 7.84 (dd, J = 8.4, 1.3 Hz, 1H), 7.63 (ddd, J = 8.3, 6.8, 1.3 Hz, 1H), 7.48 – 7.41 (m, 3H), 7.33 (dd, J = 8.4, 6.9 Hz, 2H), 7.28 – 7.20 (m, 3H), 6.86 (s, 1H), 4.69 (d, J = 5.9 Hz, 2H), 2.34 (s, 3H). **^{13}C NMR** (101 MHz, DMSO) δ 156.8, 151.0, 148.8, 139.6, 138.9, 137.7, 129.8, 129.6, 129.5, 128.9, 127.5, 127.3, 127.3, 124.3, 122.0, 118.6, 96.2, 46.0, 21.3. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{23}H_{21}N_2$ 325.1703; found 325.1705.



Chloroquine(**6a**). white solid: 94.1mg(74%). mp=76.7-77.1°C; **^{1}H NMR** (600 MHz, DMSO-d_6) δ 8.36 (dd, J = 7.3, 1.8 Hz, 2H), 7.76 (d, J = 2.2 Hz, 1H), 7.42 (dd, J = 9.0, 2.2 Hz, 1H), 6.91 (d, J = 8.1 Hz, 1H), 6.50 (d, J = 5.6 Hz, 1H), 3.71 (hept, J = 6.5 Hz, 1H), 2.40 (q, J = 7.1 Hz, 4H), 2.35 (t, J = 7.0 Hz, 2H), 1.72 – 1.64 (m, 1H), 1.55 – 1.41 (m, 3H), 1.22 (d, J = 6.4 Hz, 3H), 0.89 (t, J = 7.1 Hz, 6H). **^{13}C NMR** (151 MHz, DMSO) δ 152.4, 150.0, 149.8, 133.8, 127.9, 124.8, 124.2, 118.0, 99.3, 52.6, 48.1, 46.6, 33.8, 23.9, 20.3, 12.1. **HRMS** (m/z): $[M+H]^+$ Calcd. for $C_{18}H_{26}N_3Cl$ 320.1894; found 320.1897.



3-iodoquinolin-4-ol(**7**). white solid: 24.1mg(22%); mp=291.5-292.3°C; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.20 (s, 1H), 8.51 (s, 1H), 8.11 (dd, *J* = 8.2, 1.5 Hz, 1H), 7.68 (ddd, *J* = 8.4, 6.9, 1.5 Hz, 1H), 7.59 (dd, *J* = 8.3, 0.7 Hz, 1H), 7.38 (ddd, *J* = 8.2, 7.0, 1.2 Hz, 1H). **^{13}C NMR** (101 MHz, DMSO) δ 173.5, 145.1, 140.0, 132.4, 125.9, 124.6, 122.9, 118.9, 81.1. **HRMS** (m/z): $[M+H]^+$ Calcd. for C_9H_7INO 271.9581; found 271.9552.



quinolin-4-ol(**8**). white solid: 52.3mg(90%); mp=187.6-188.5°C; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.87 (s, 1H), 8.11 (dd, *J* = 8.1, 1.5 Hz, 1H), 7.92 (dd, *J* = 7.5, 4.7 Hz, 1H), 7.62 (ddd, *J* = 8.4, 6.8, 1.6 Hz, 1H), 7.55 (d, *J* = 7.2 Hz, 1H), 7.34 – 7.26 (m, 1H), 6.07 (d, *J* = 7.3 Hz, 1H). **^{13}C NMR** (101 MHz, DMSO) δ 177.5, 140.5, 140.0, 132.1, 126.3, 125.4, 123.6, 118.8, 109.2. **HRMS** (m/z): [M+H]+ Calcd. for C9H8NO 146.0615; found 146.0601.

7. ^{1}H NMR and ^{13}C NMR spectra for spectroscopic data.

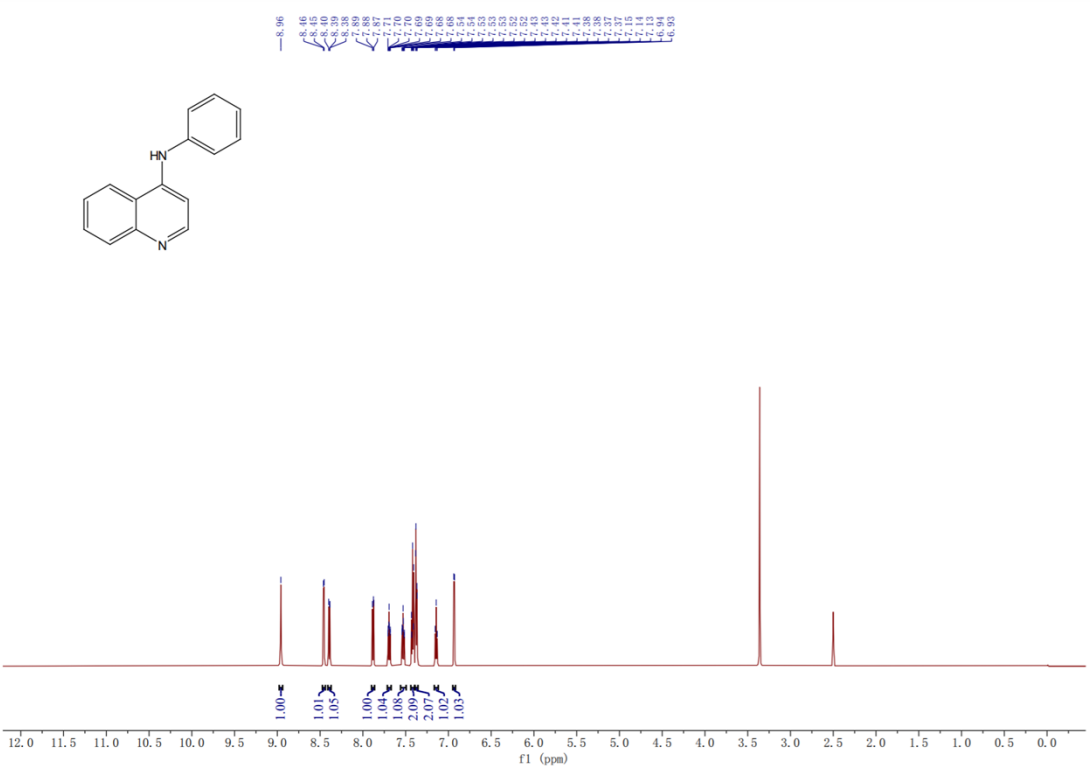


Figure S1. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3a**

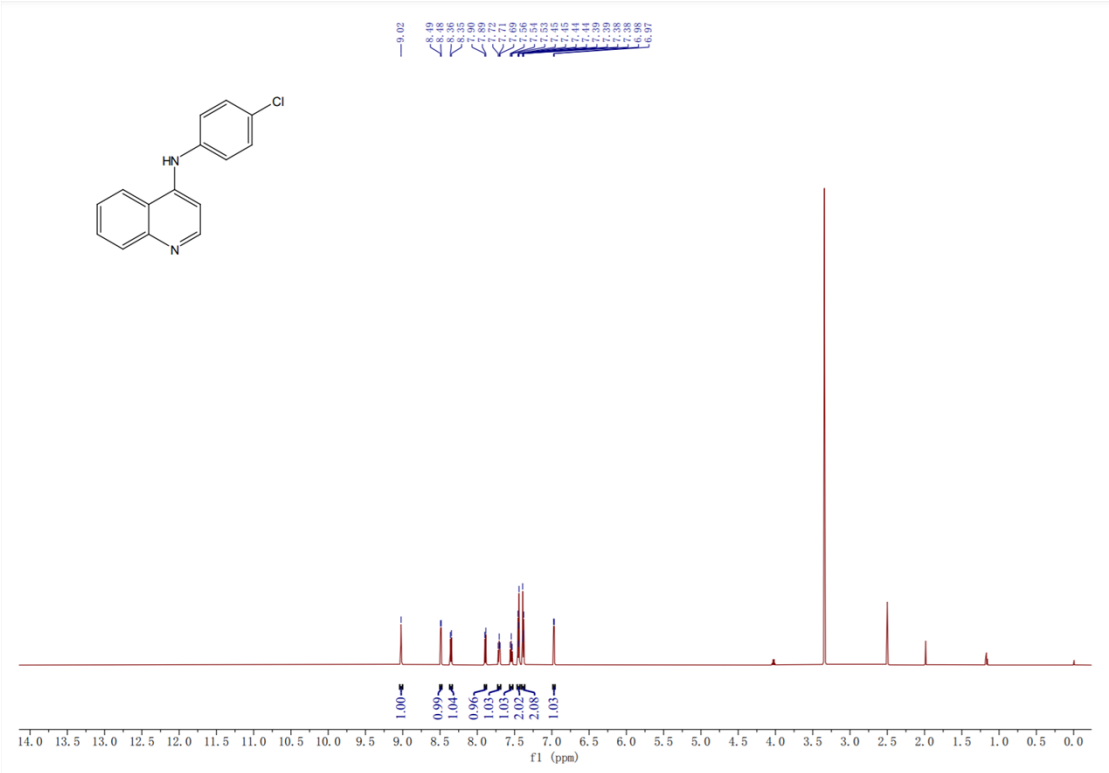


Figure S2. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3b**

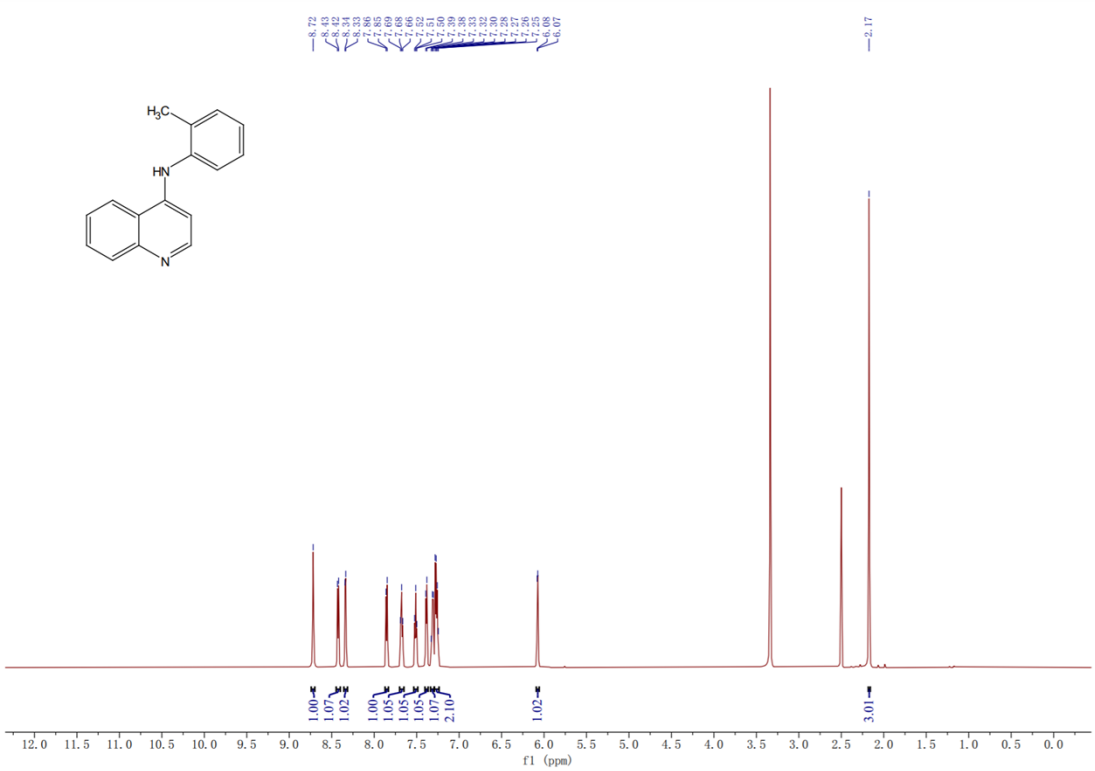


Figure S3. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3c**

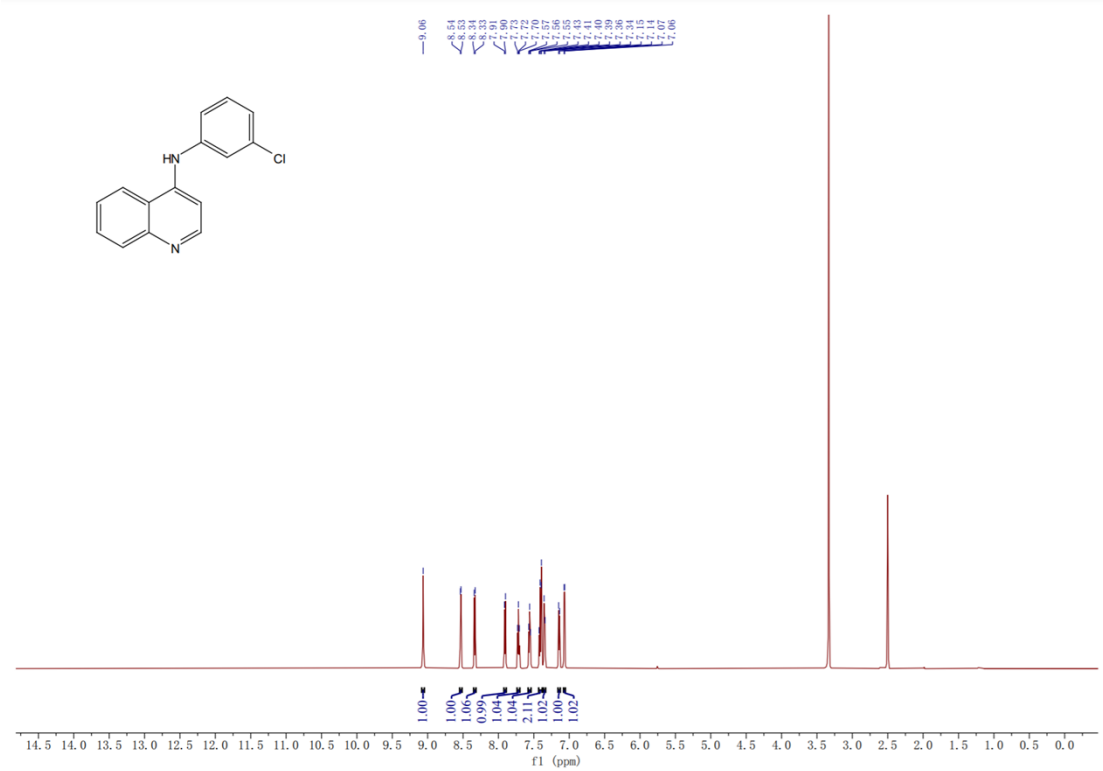


Figure S4. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3d**

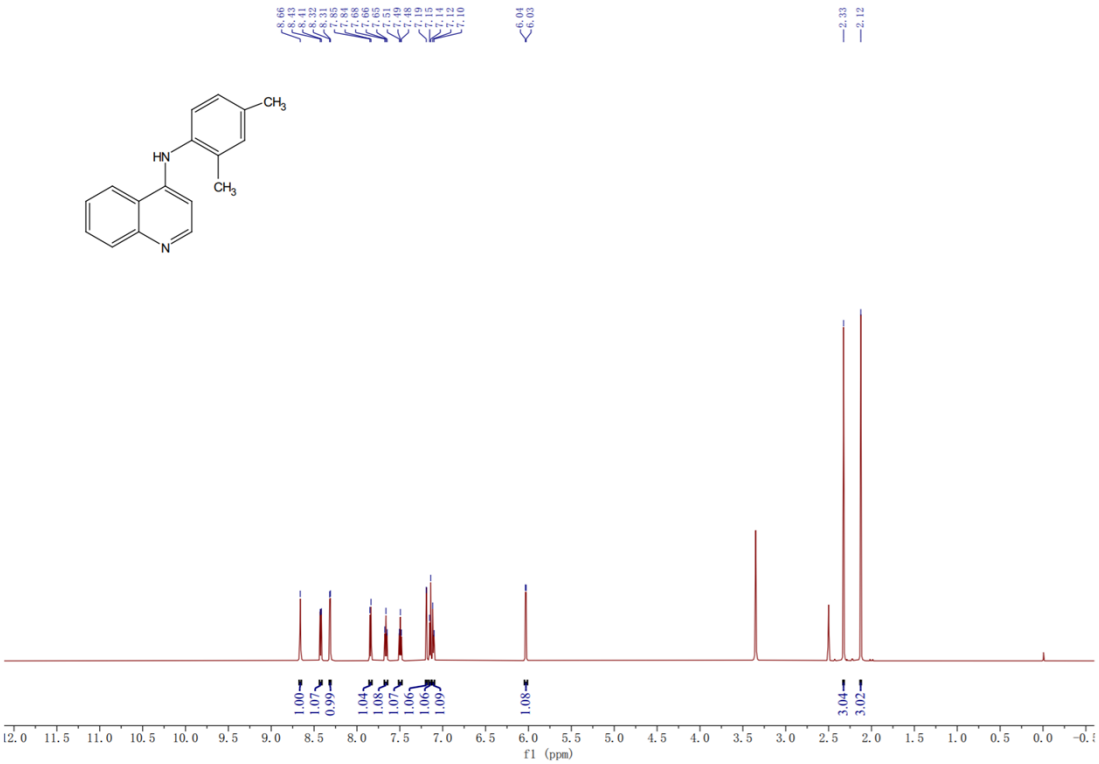


Figure S5. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3e**

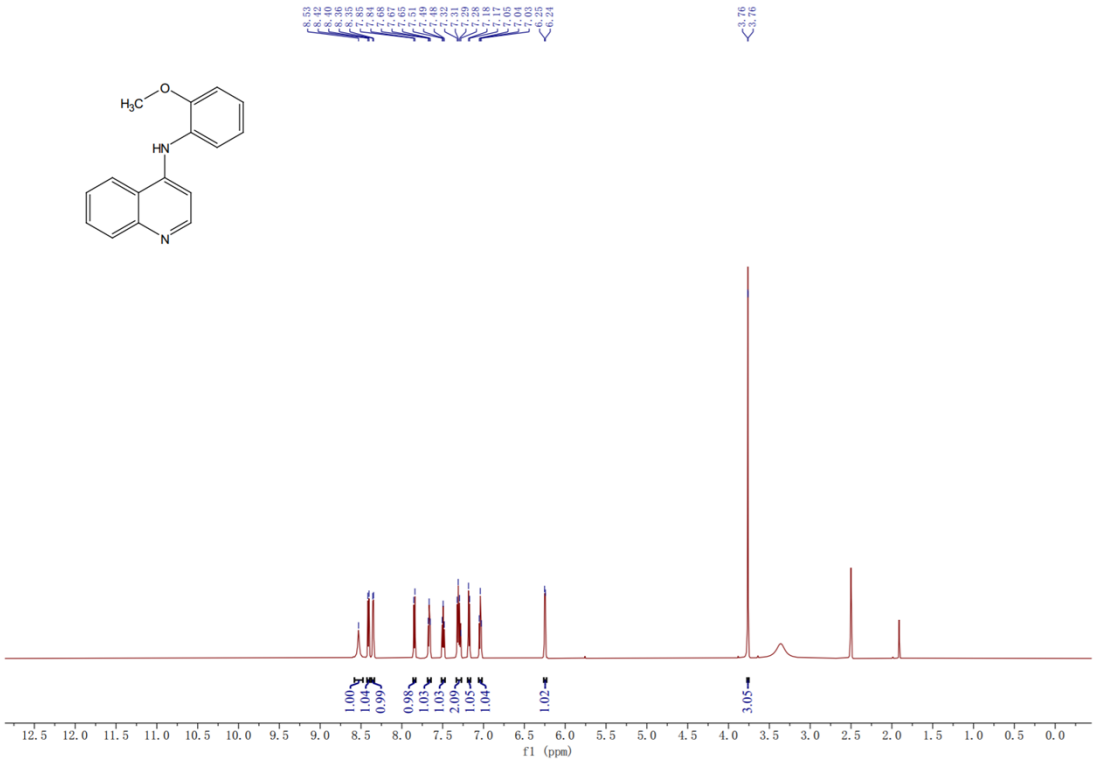


Figure S6. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3f**

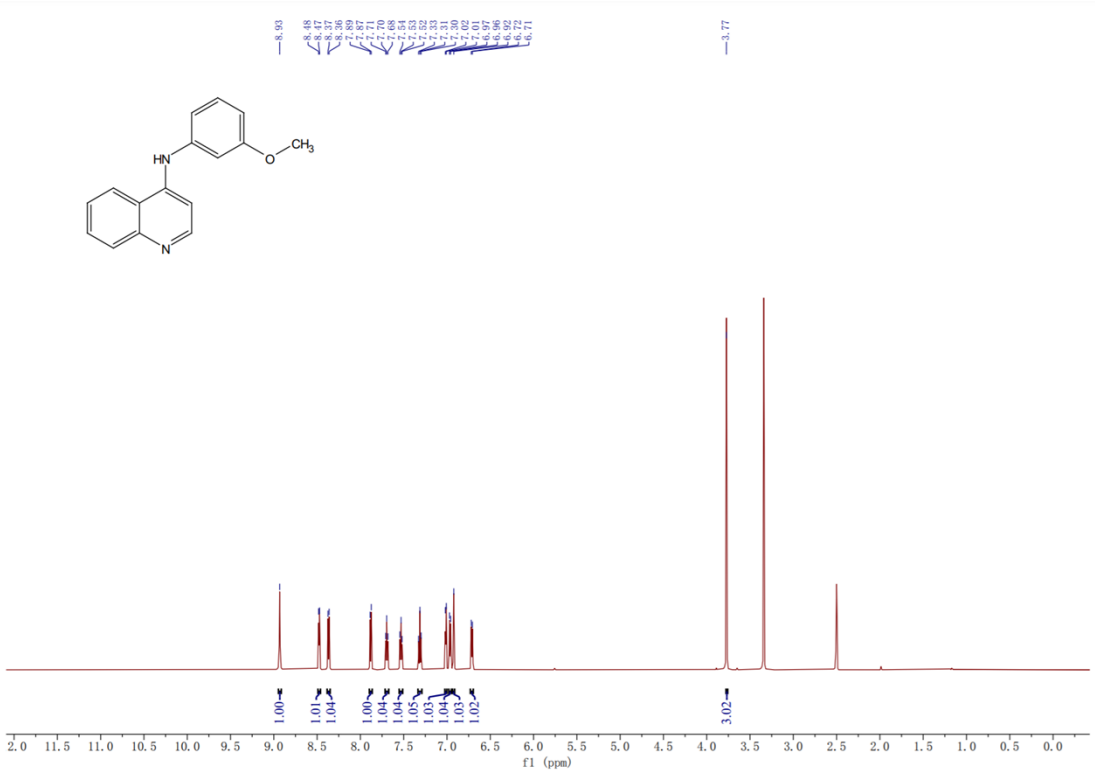


Figure S7. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3g**

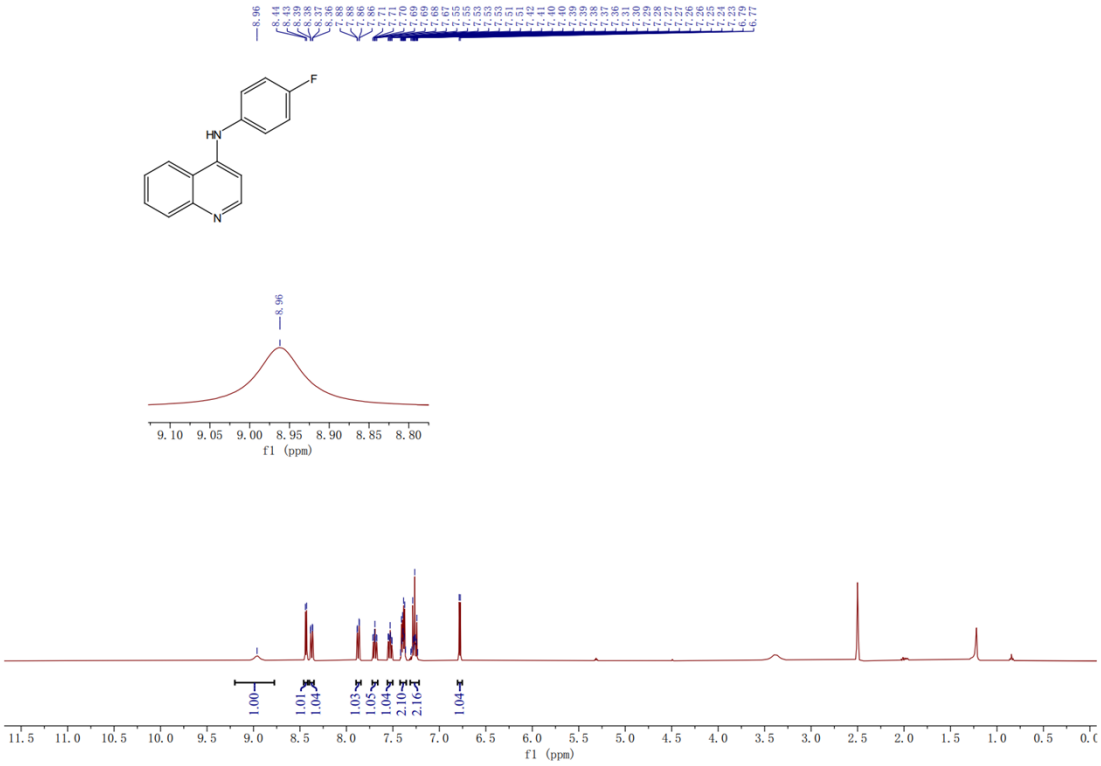


Figure S8. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3h**

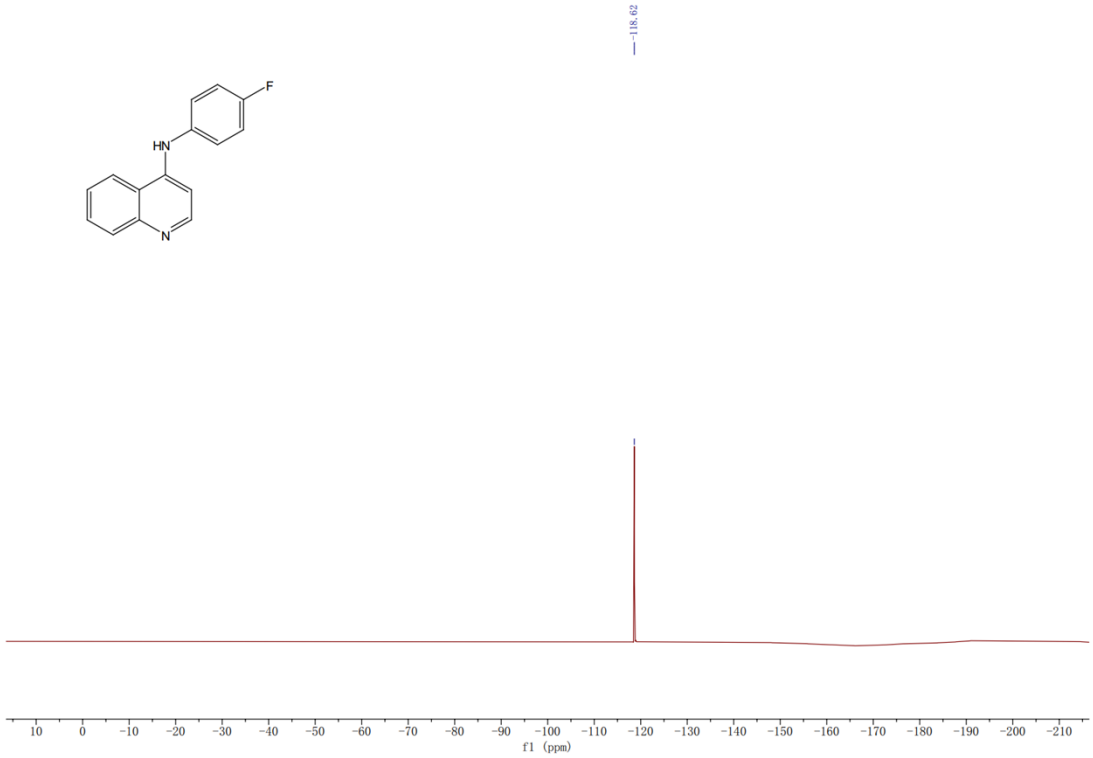


Figure S9. **^{19}F NMR** (565 MHz, DMSO-d_6) spectra of compound **3h**

Figure S10. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3i**

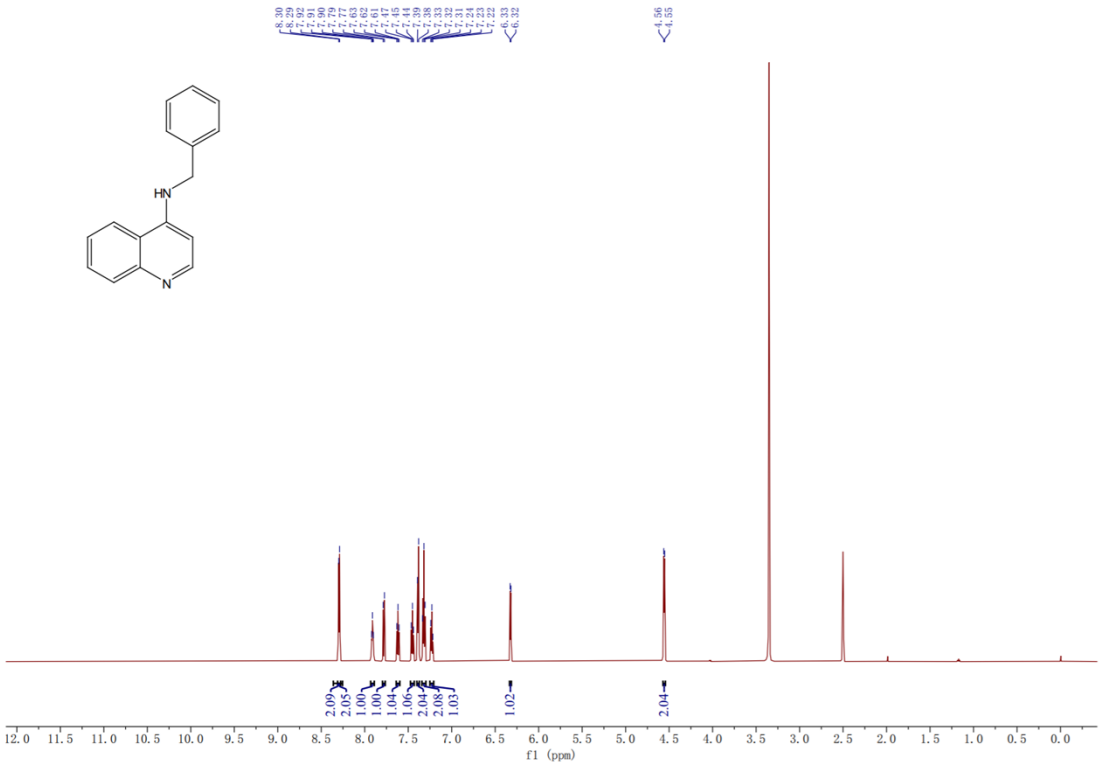


Figure S11. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3j**

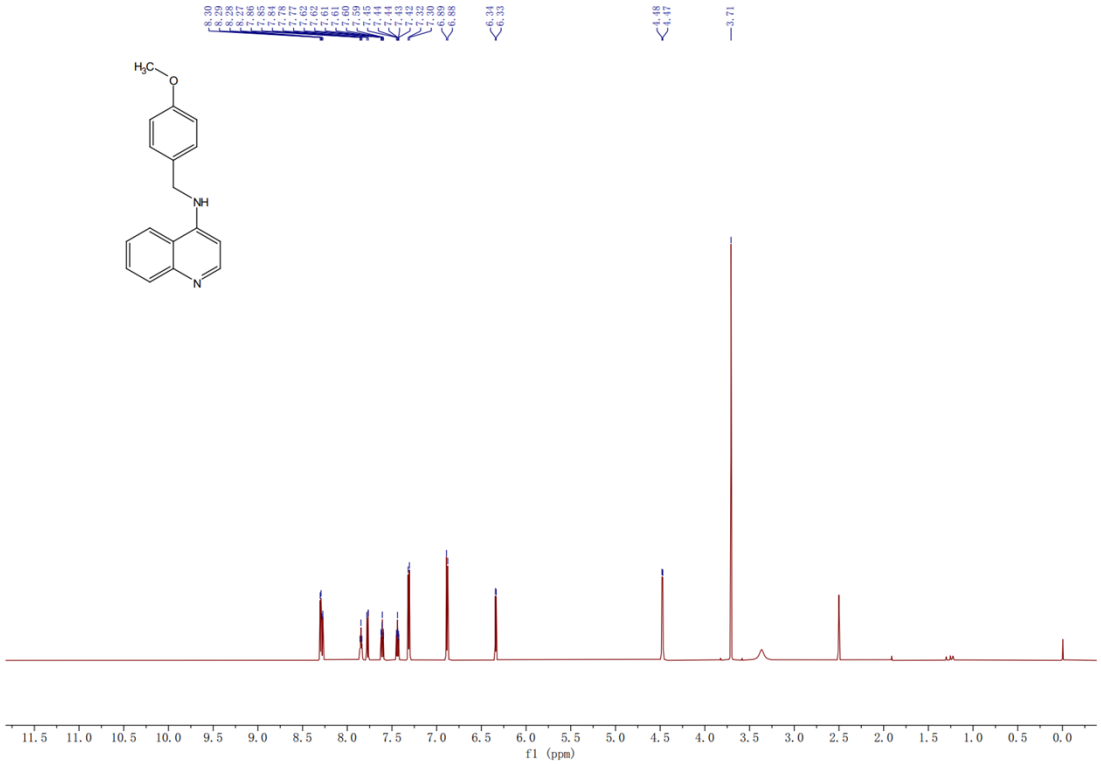


Figure S12. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3k**

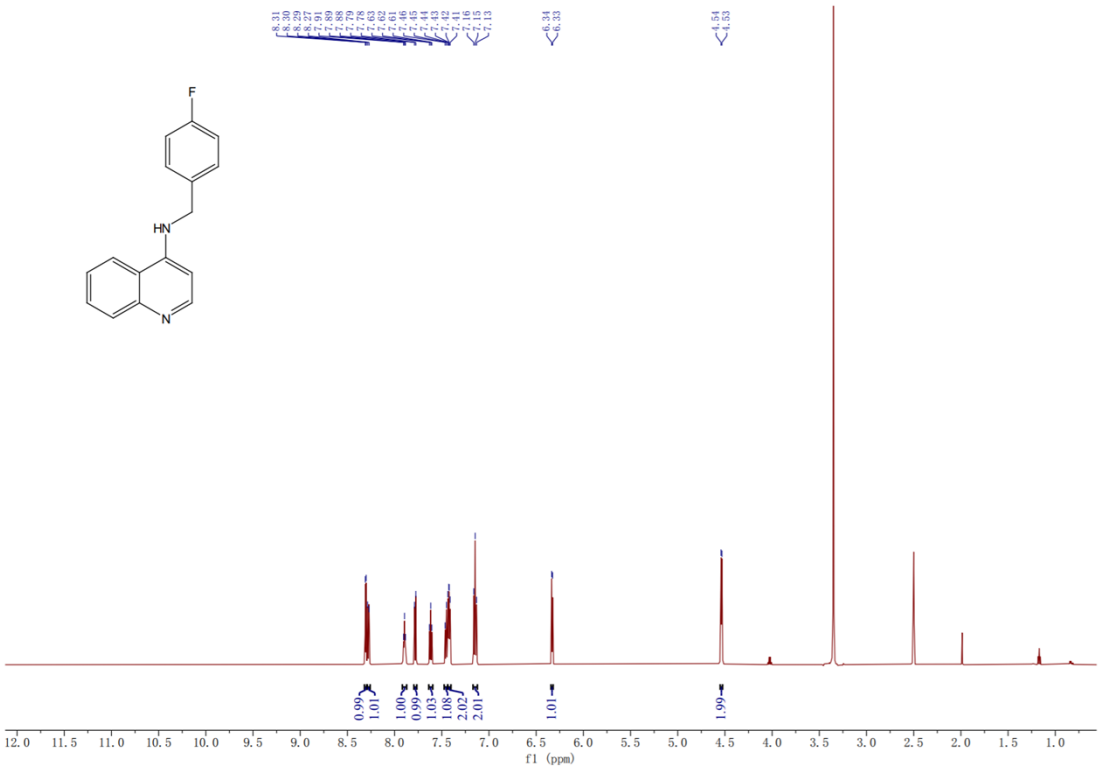


Figure S13. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3l**

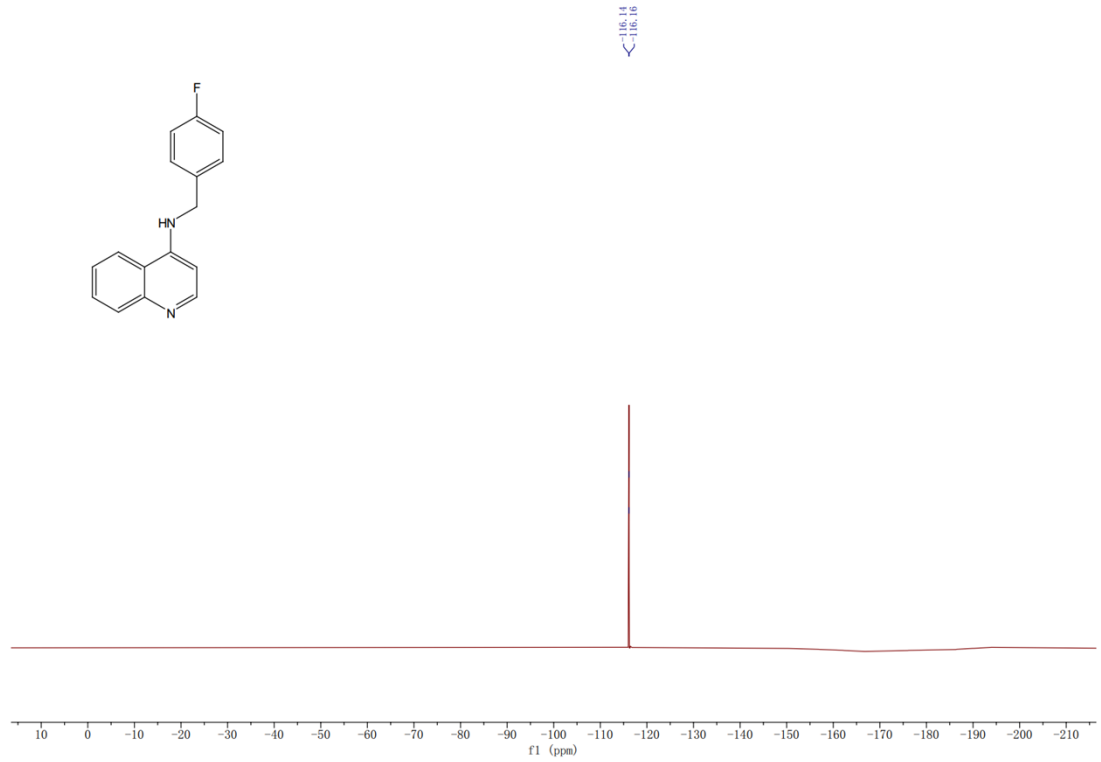


Figure S14. **^{19}F NMR** (565 MHz, DMSO-d_6) spectra of compound **3l**

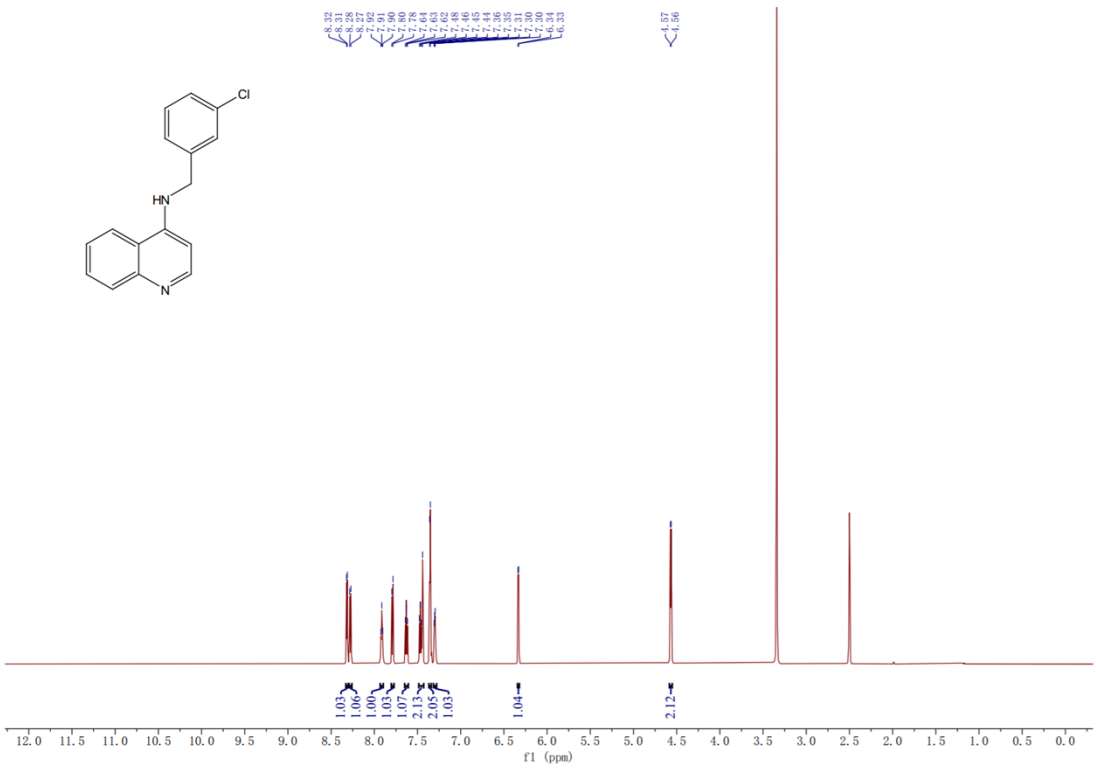


Figure S15. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3m**

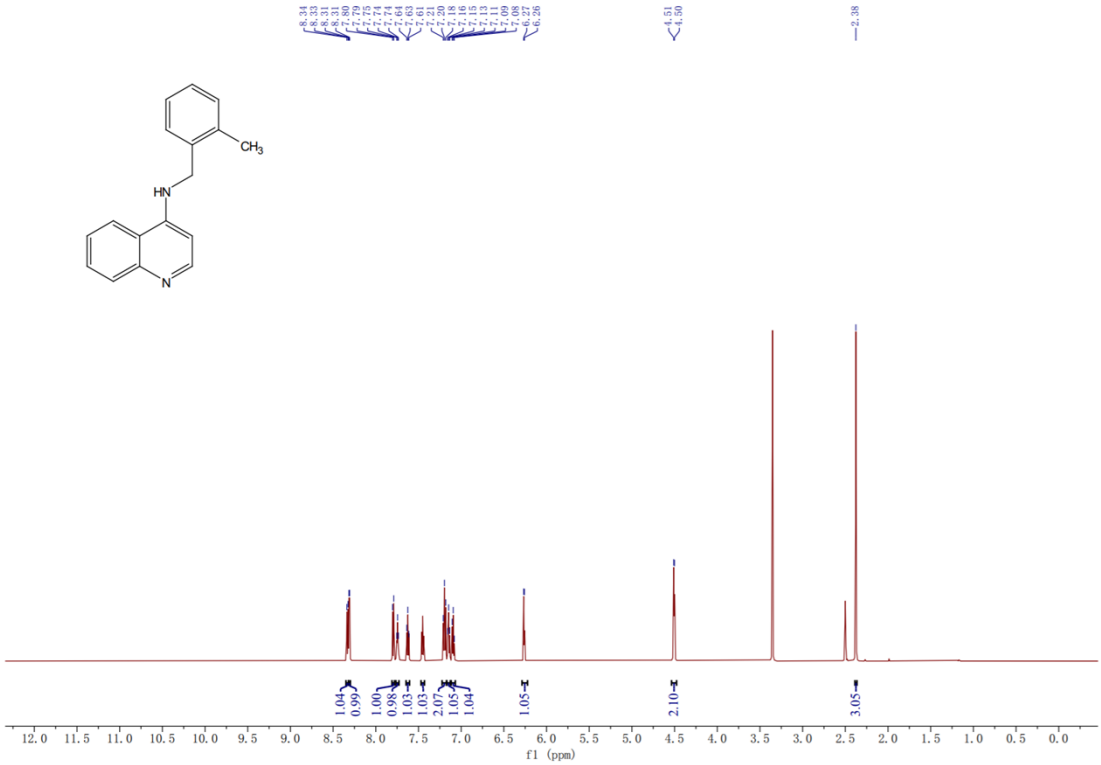


Figure S16. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3n**

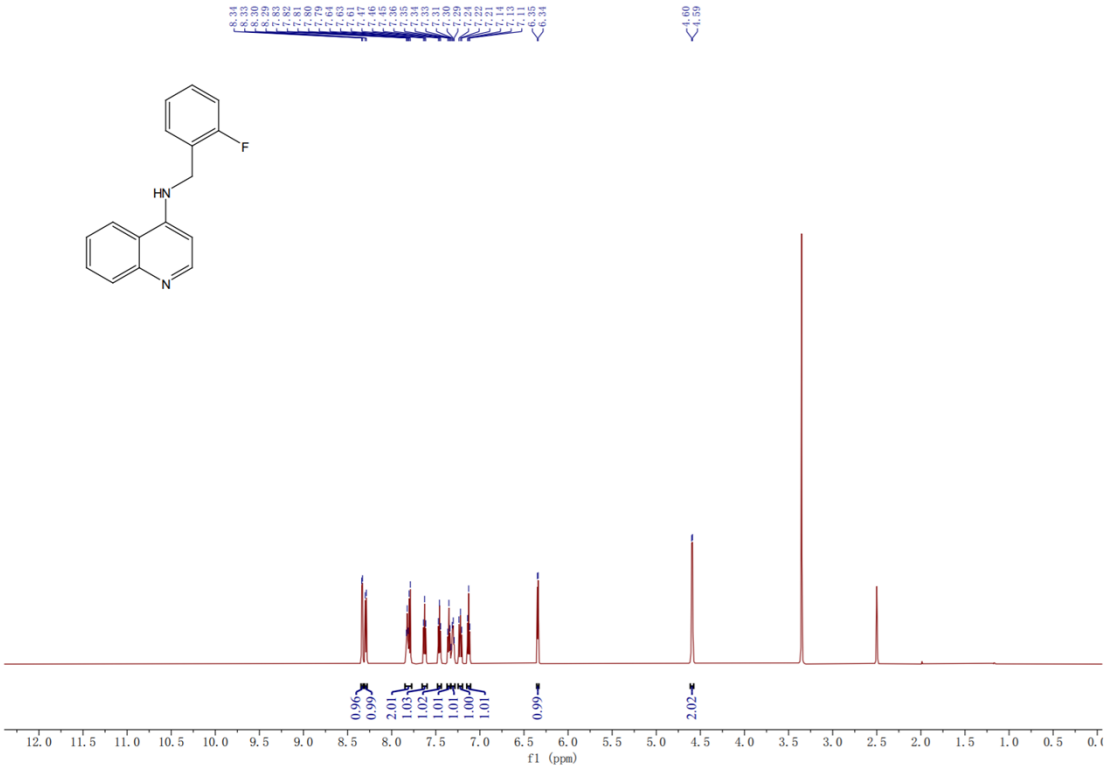


Figure S17. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3o**

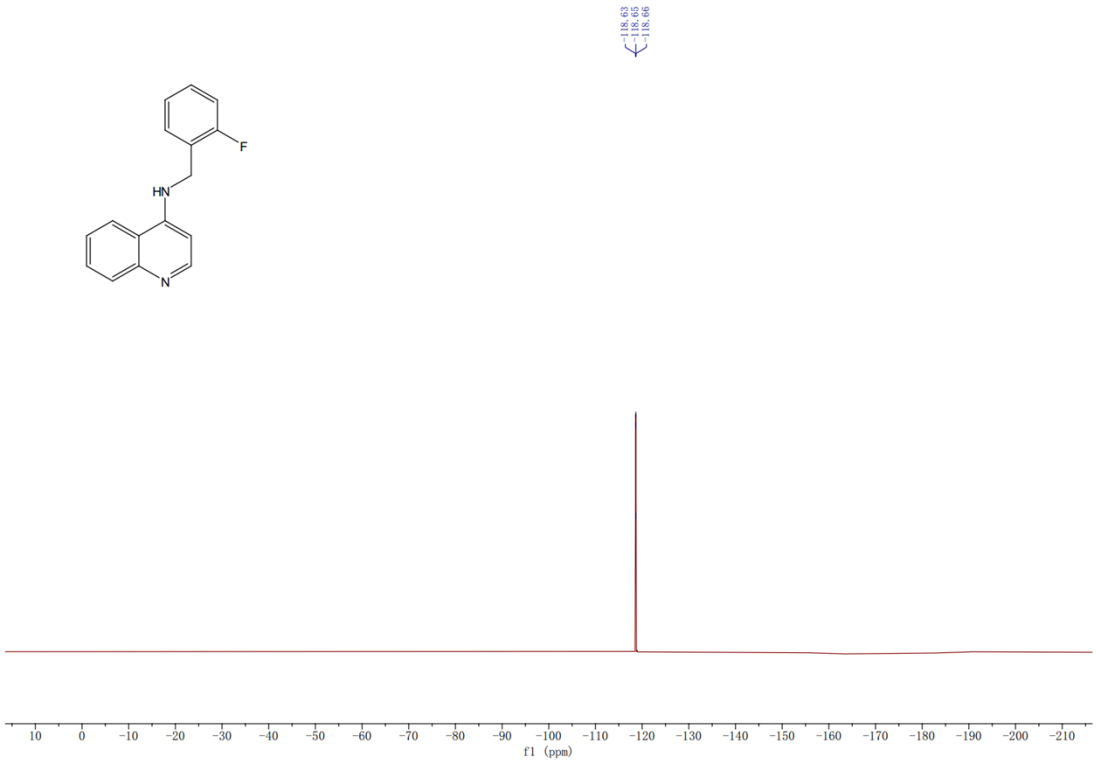


Figure S18. **^{19}F NMR** (565 MHz, DMSO-d_6) spectra of compound **3o**

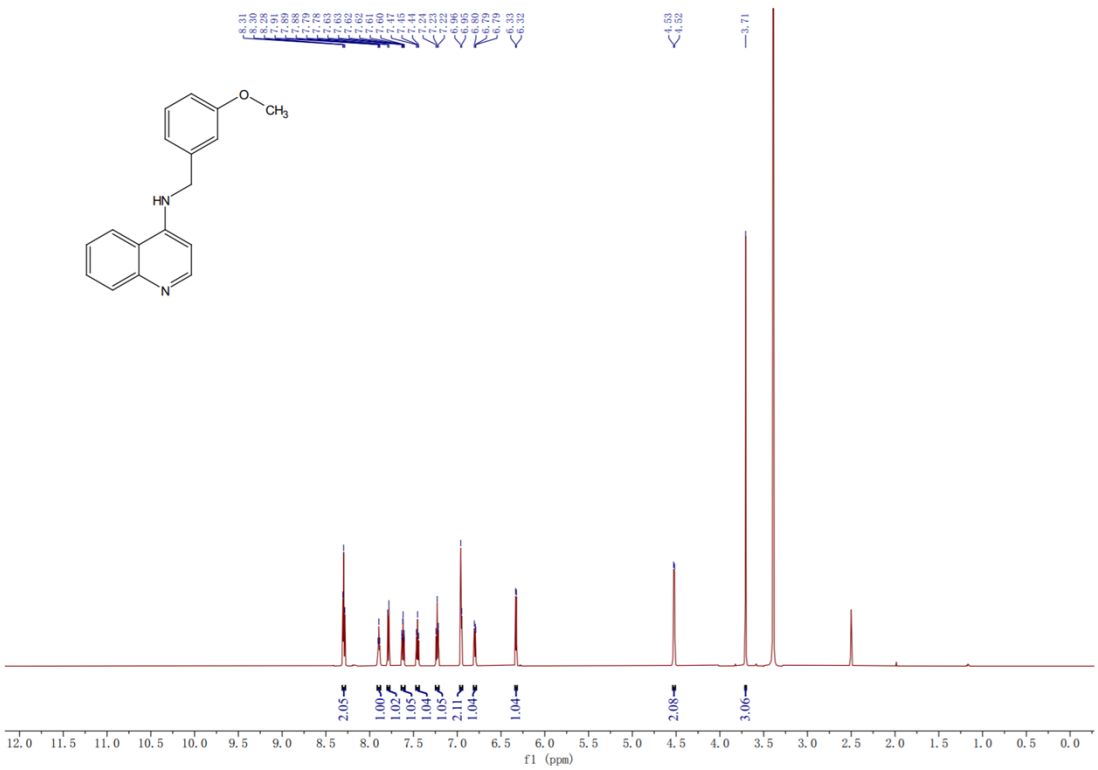


Figure S19. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3p**

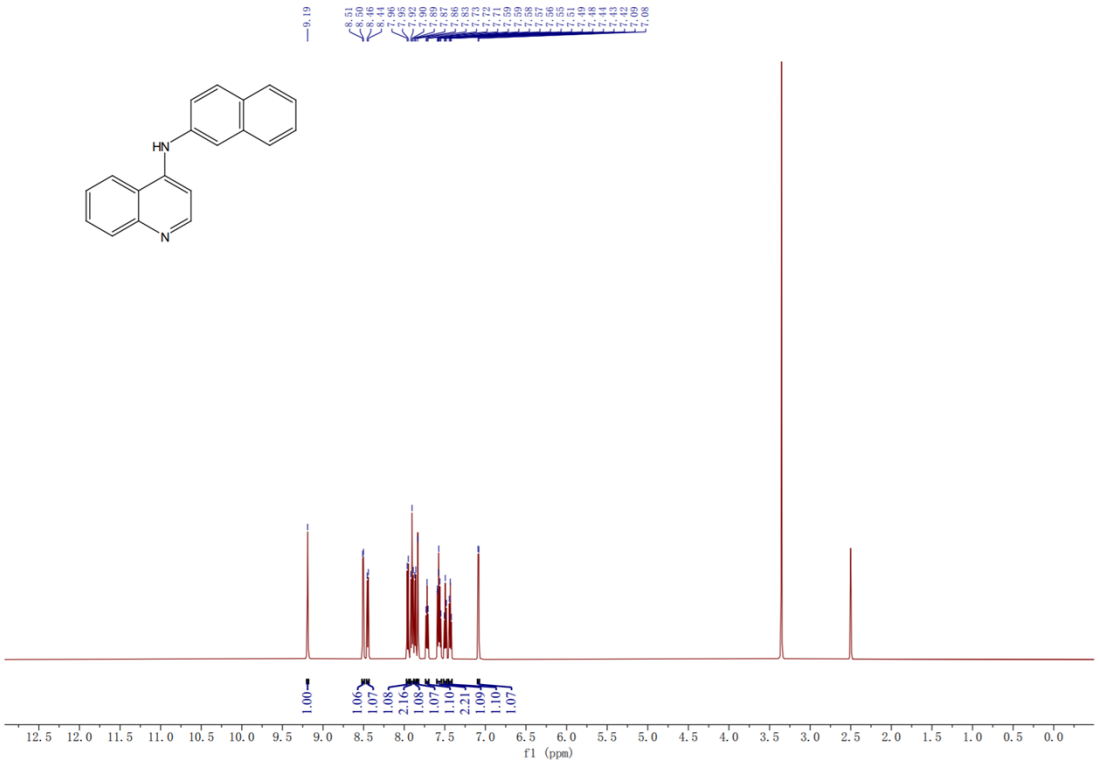


Figure S20. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3q**

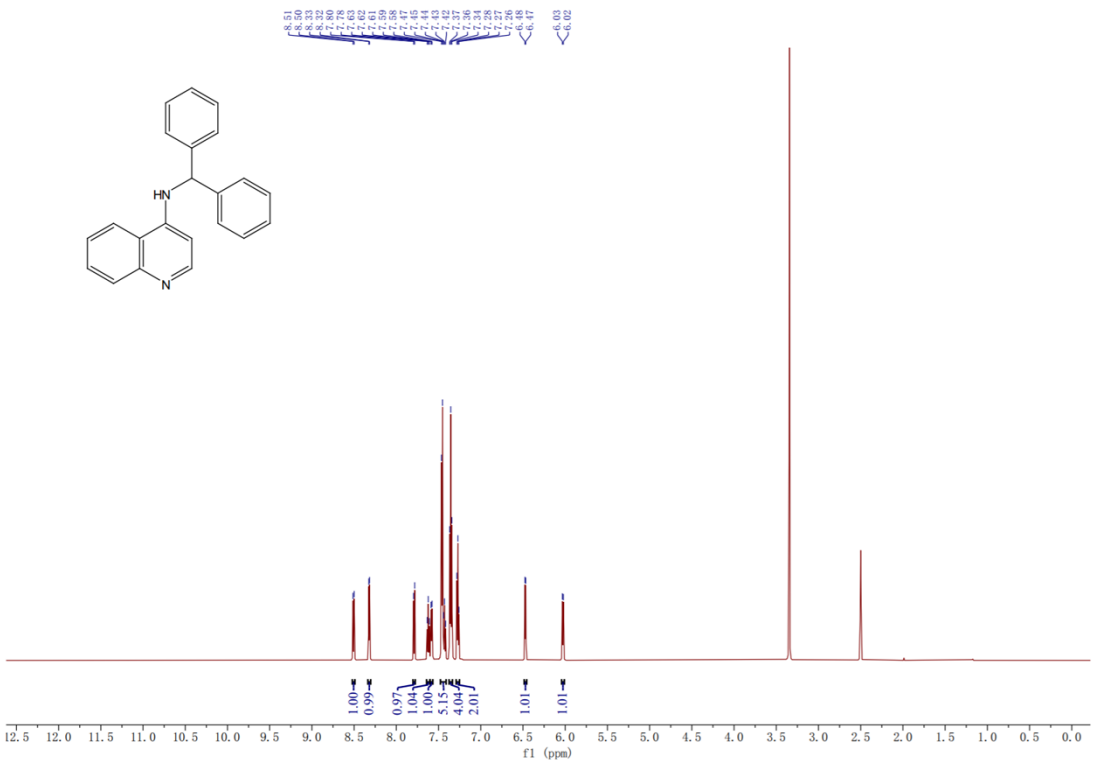


Figure 21. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3r**

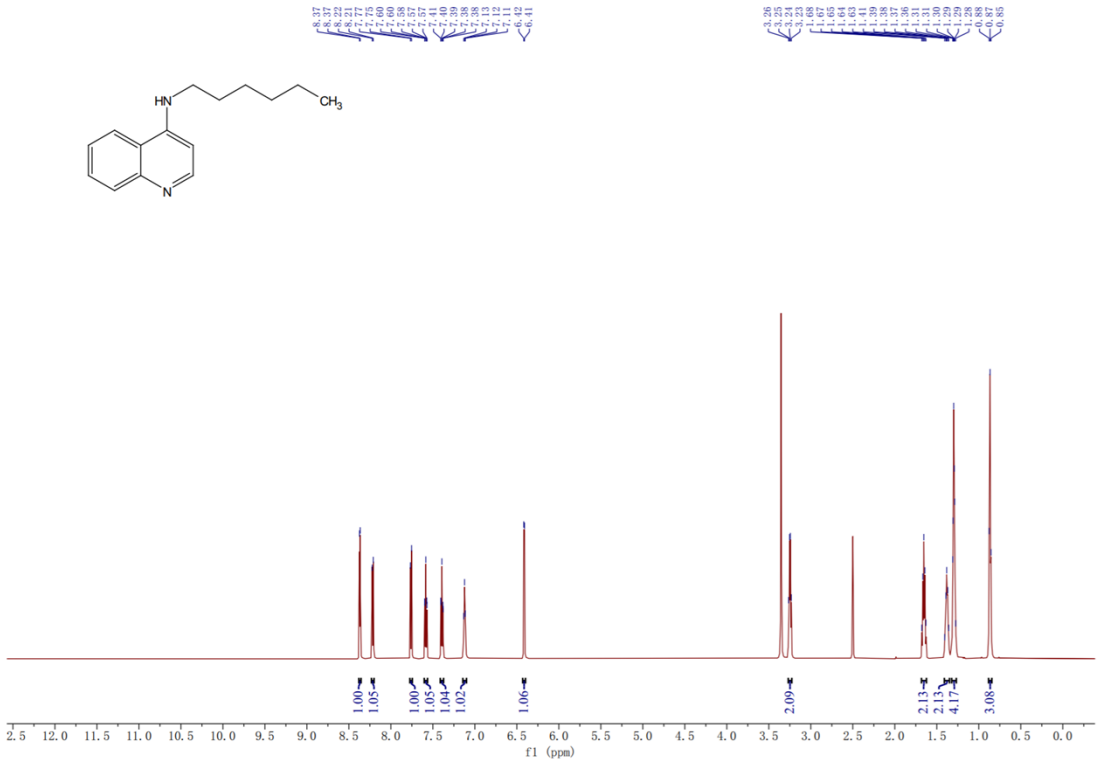


Figure S22. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3s**

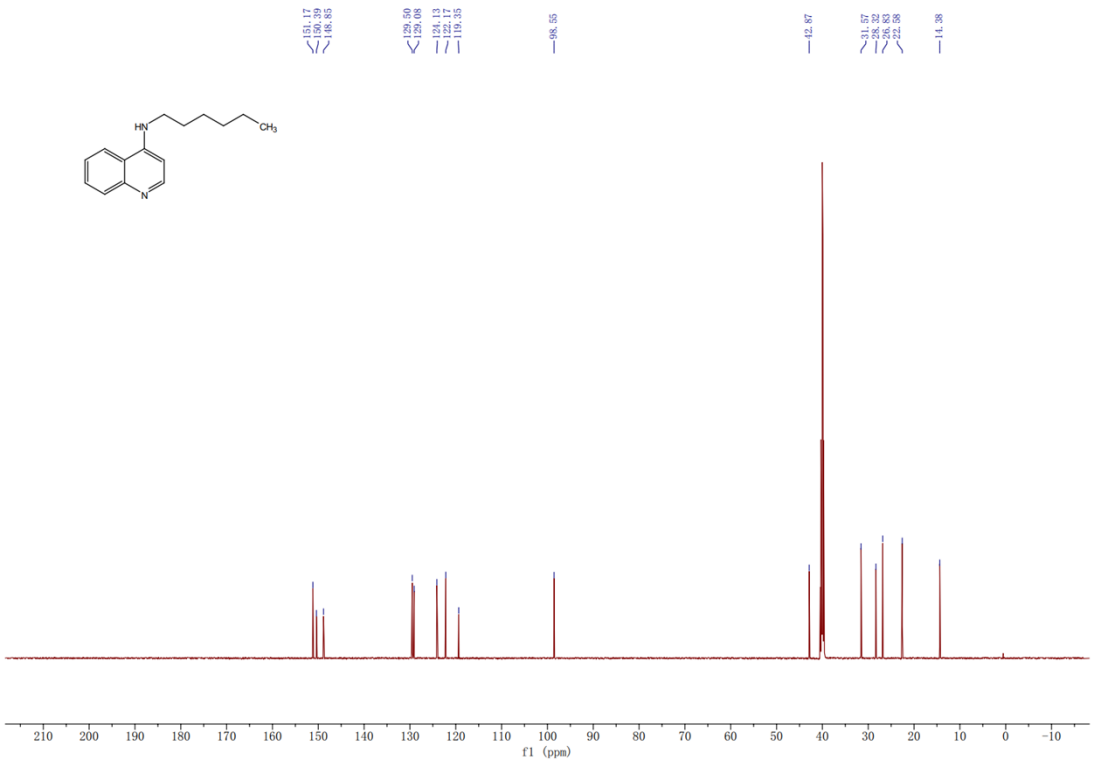


Figure S23. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **3s**

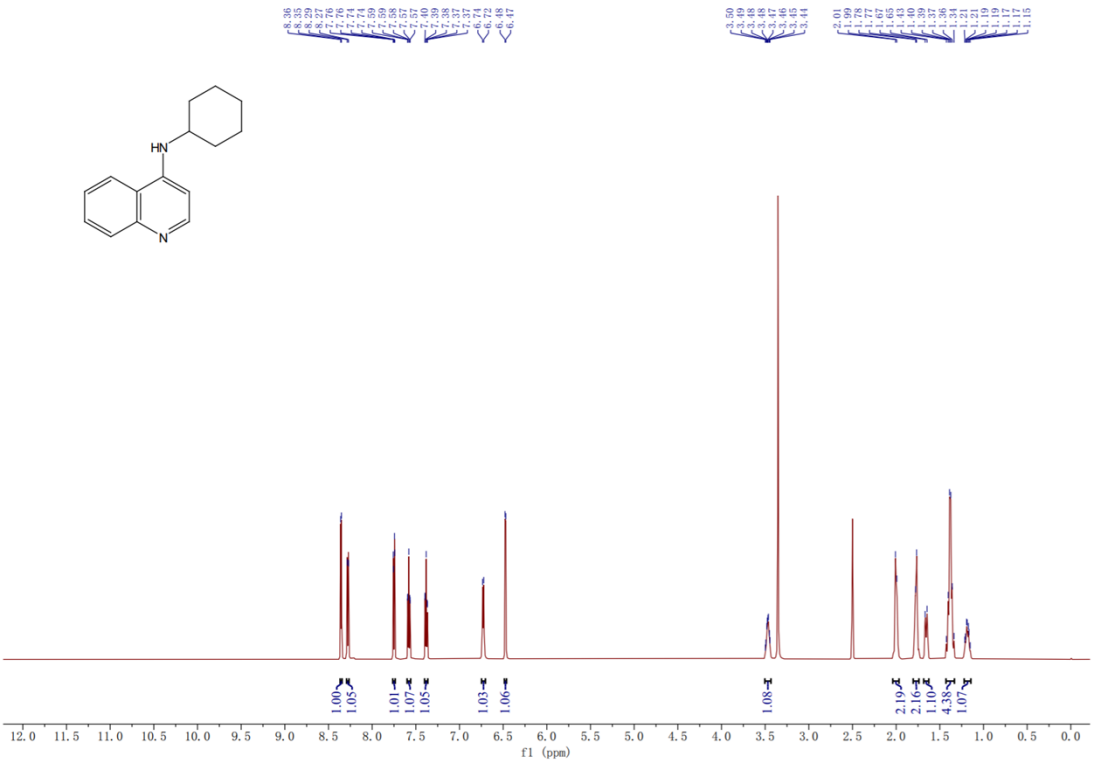


Figure S24. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3t**

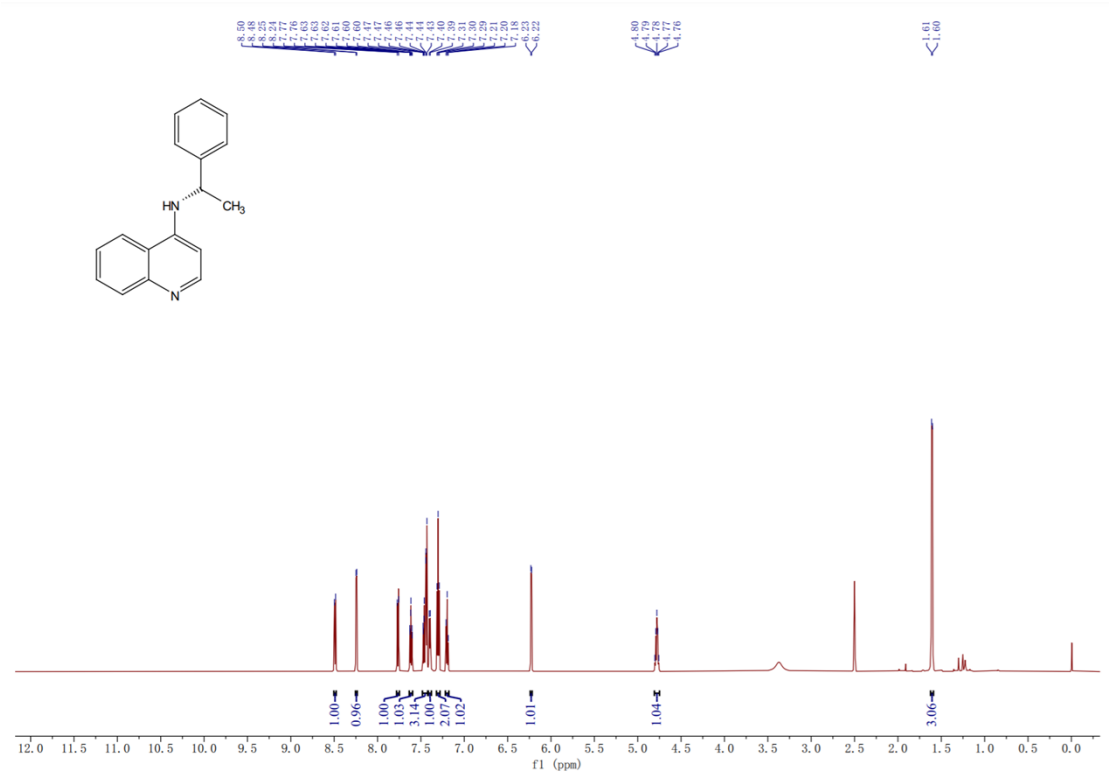


Figure S25. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3u**

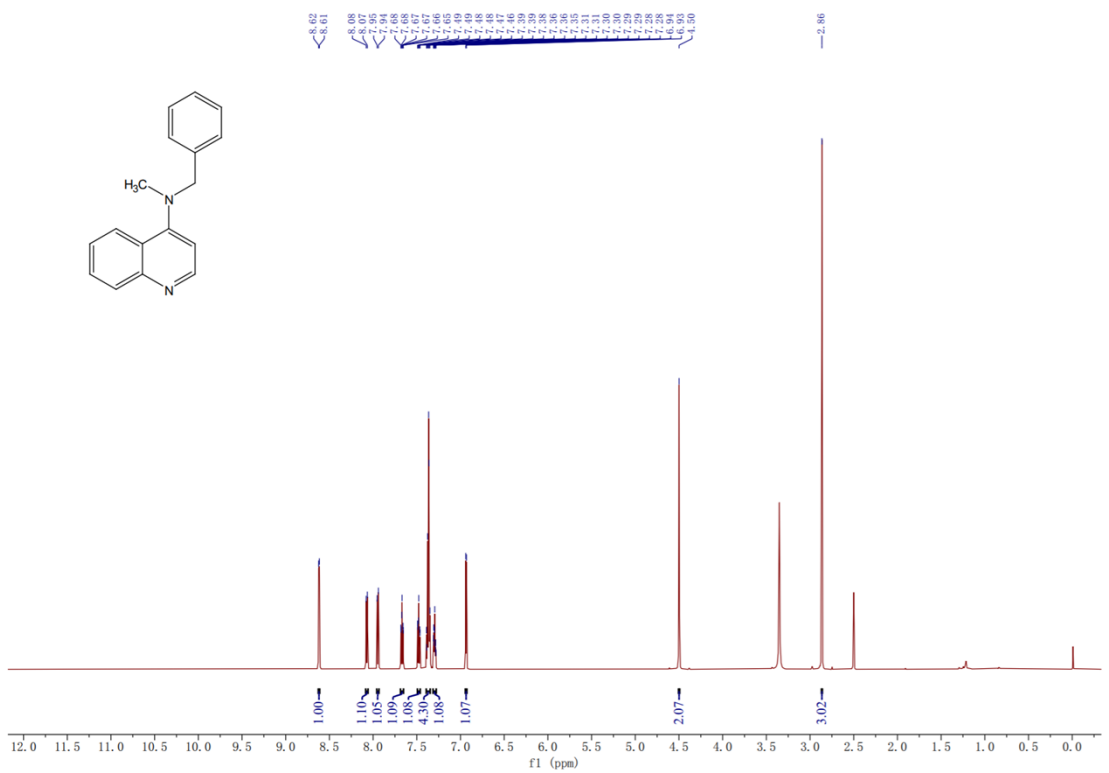


Figure S26. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3v**

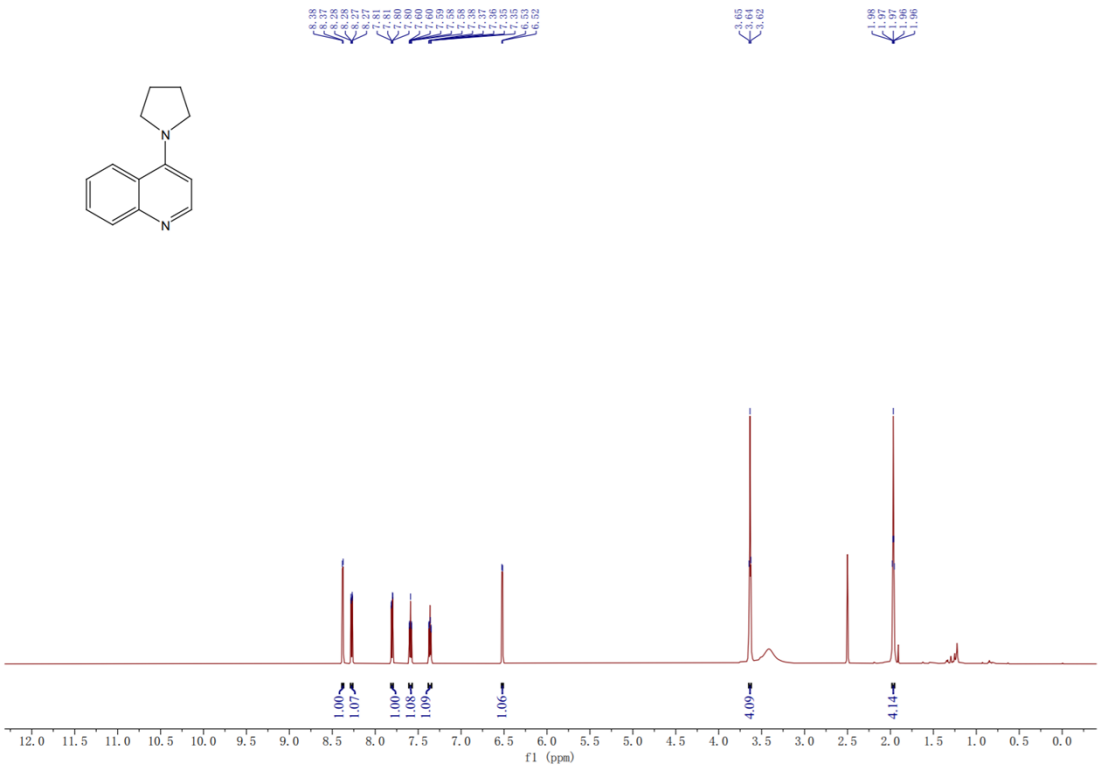


Figure S27. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3w**

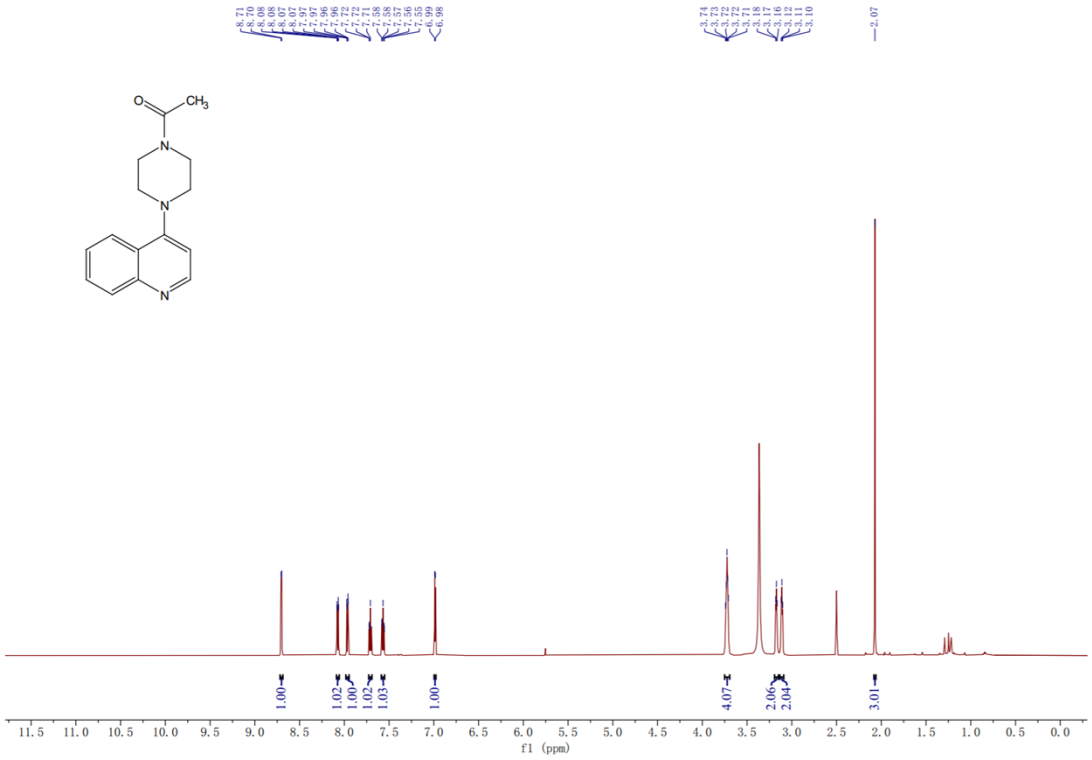


Figure S28. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3x**

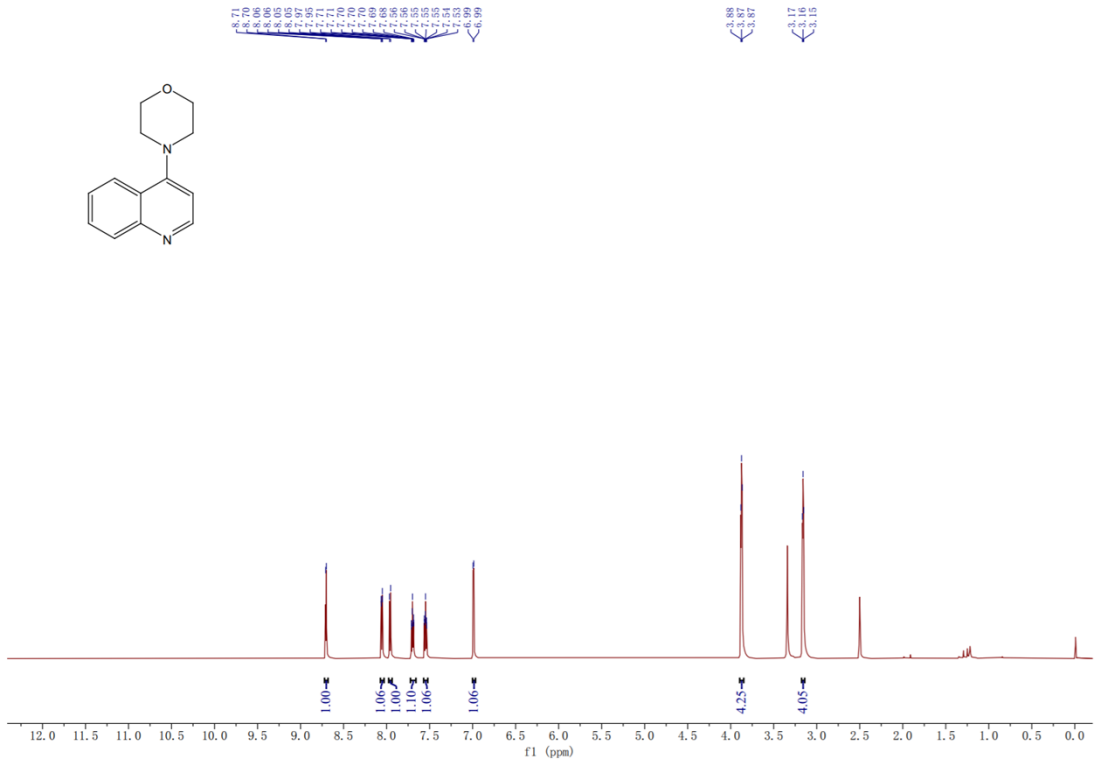


Figure S29. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **3y**

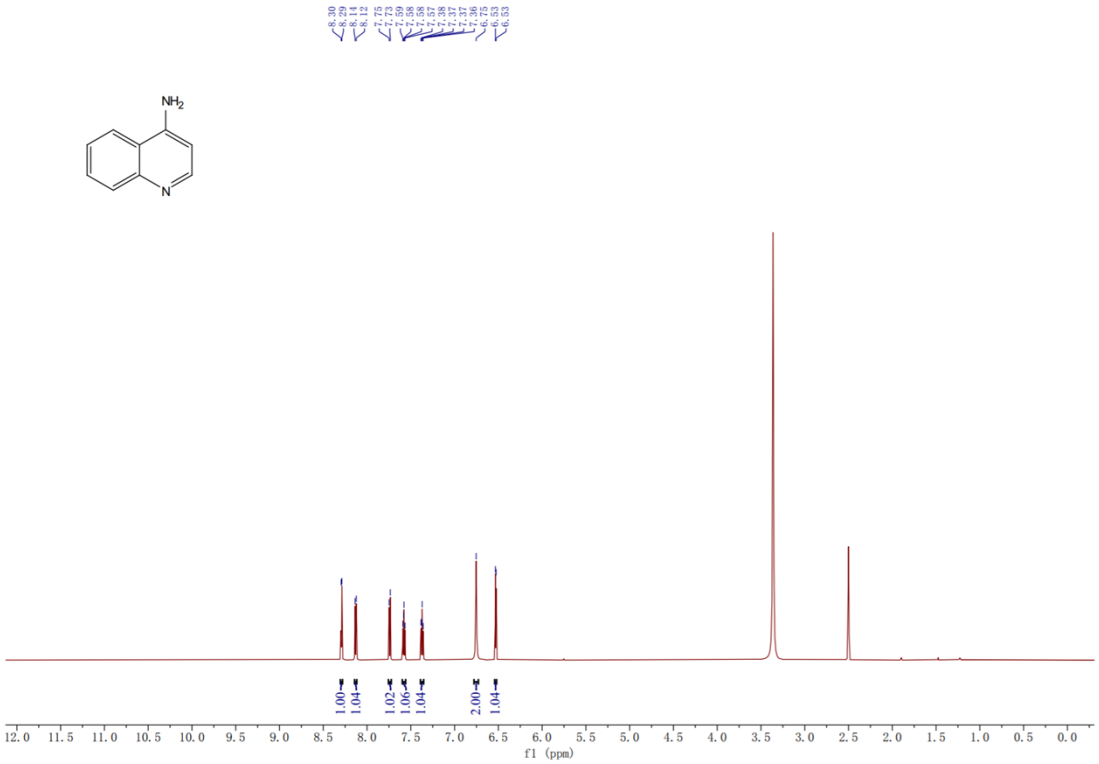


Figure S30. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4a**

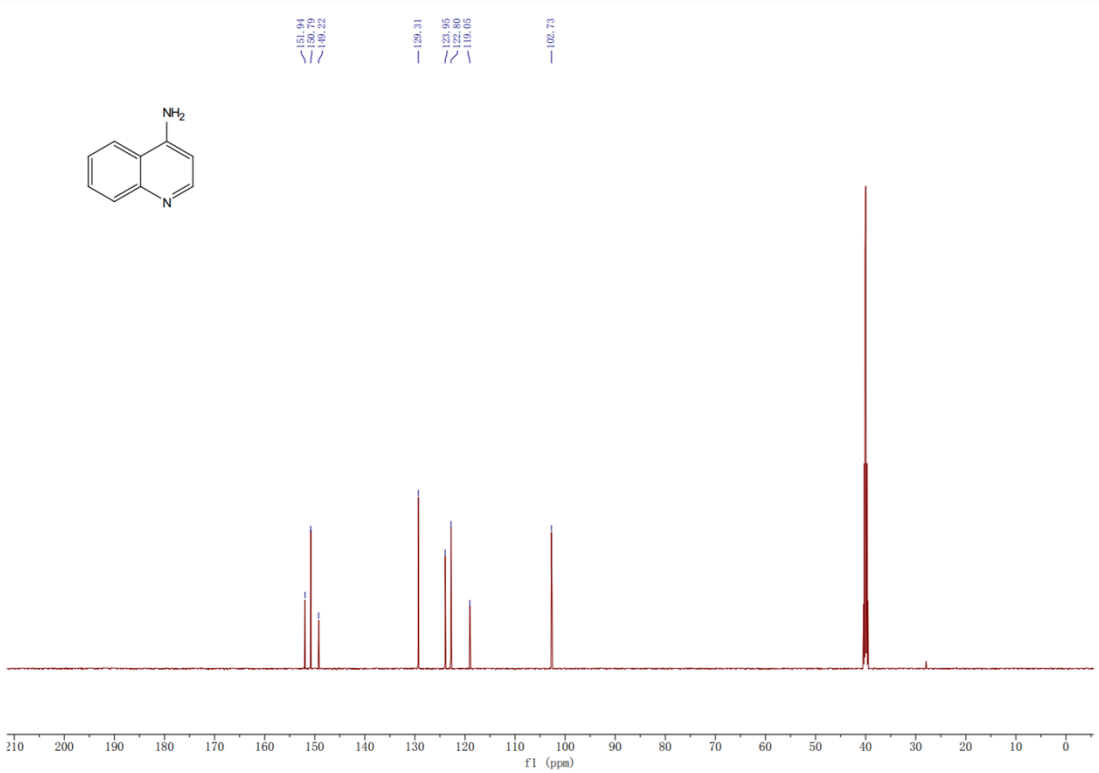


Figure S31. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4a**

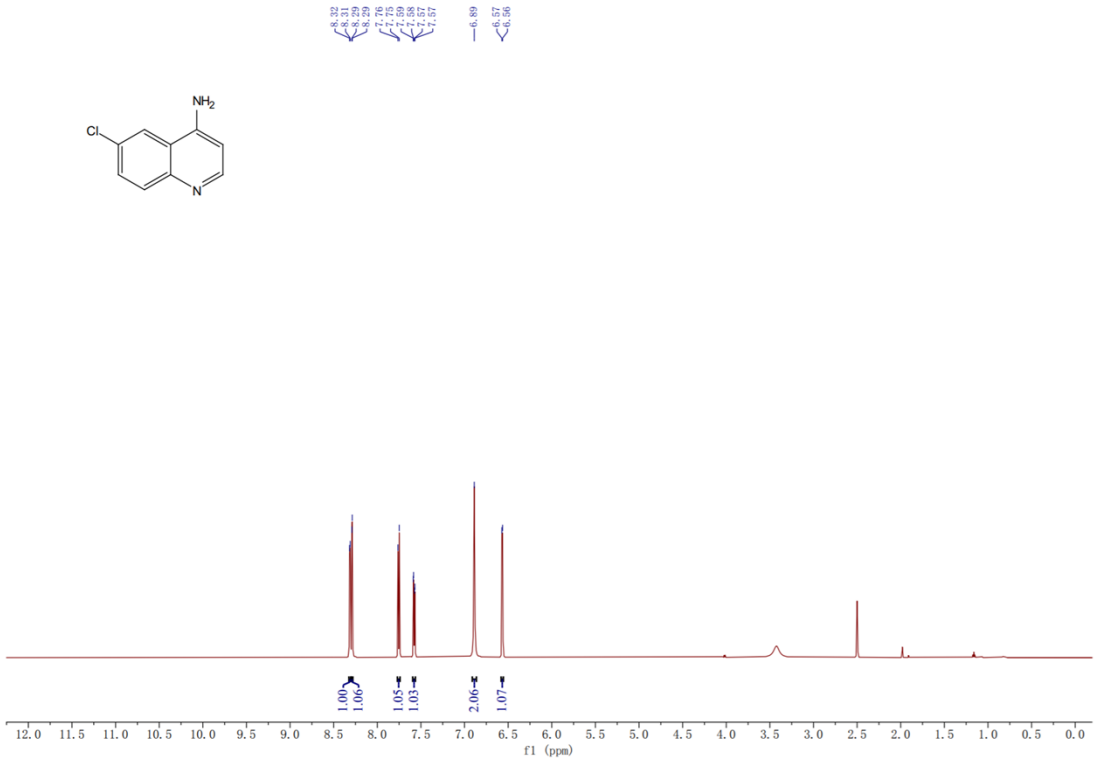


Figure S32. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4b**

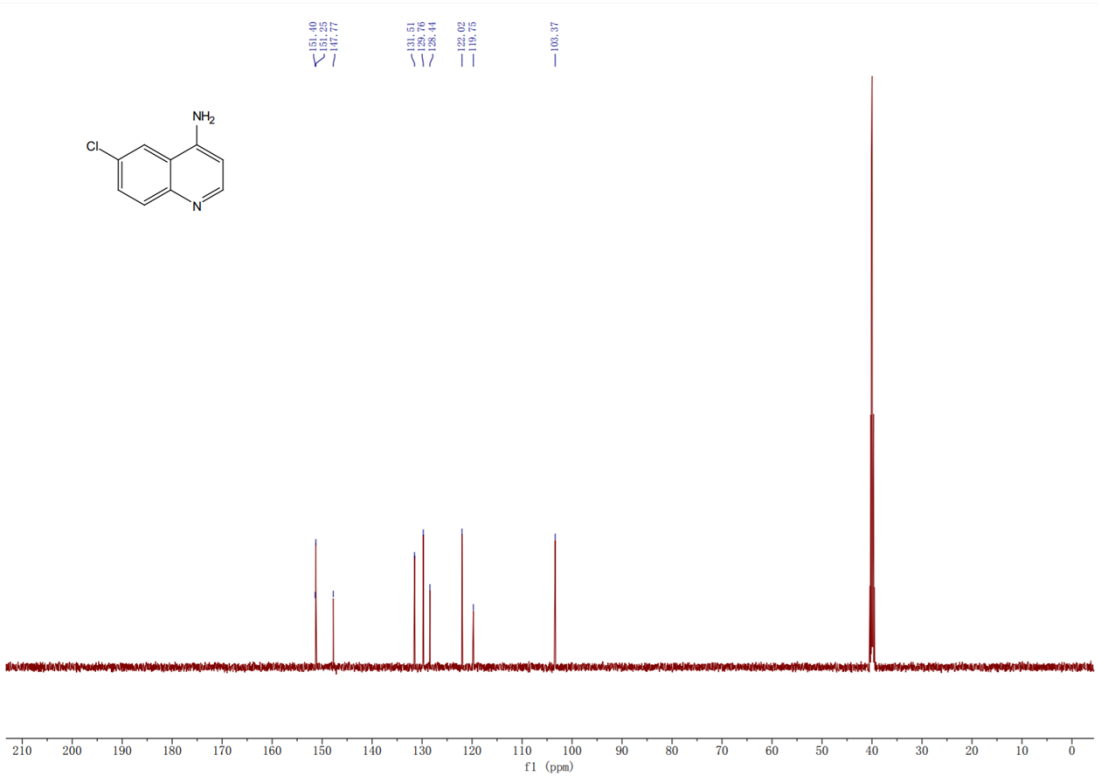


Figure S33. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4b**

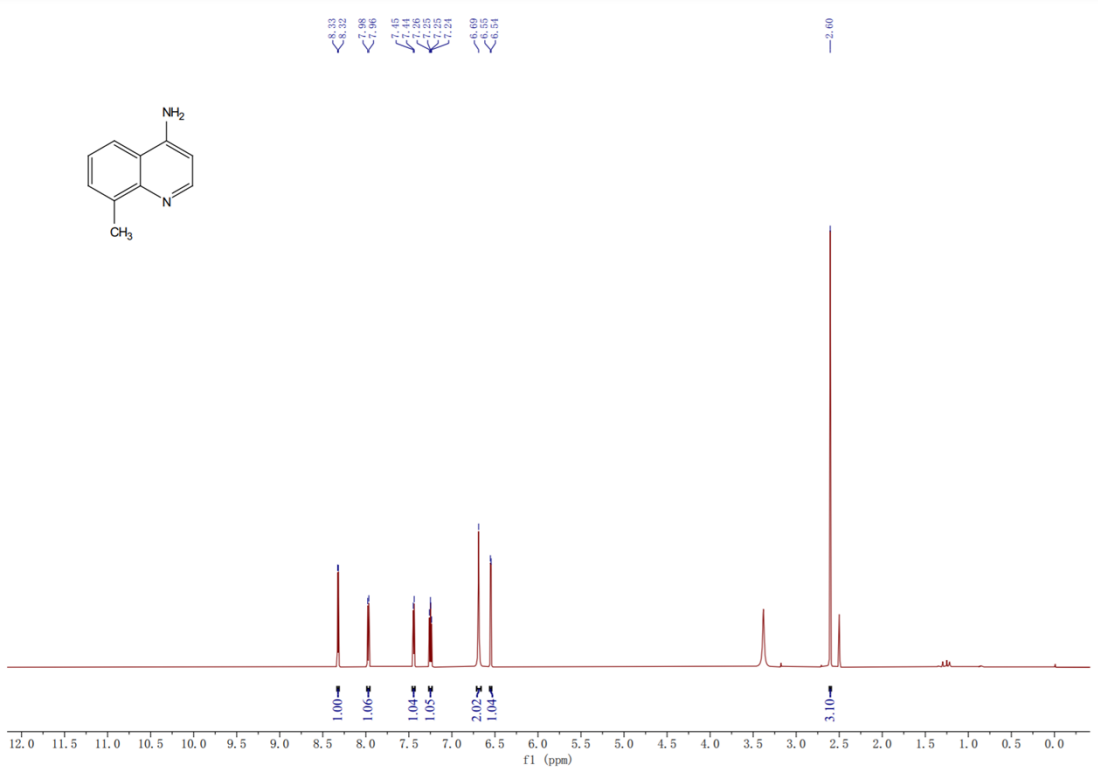


Figure S34. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4c**

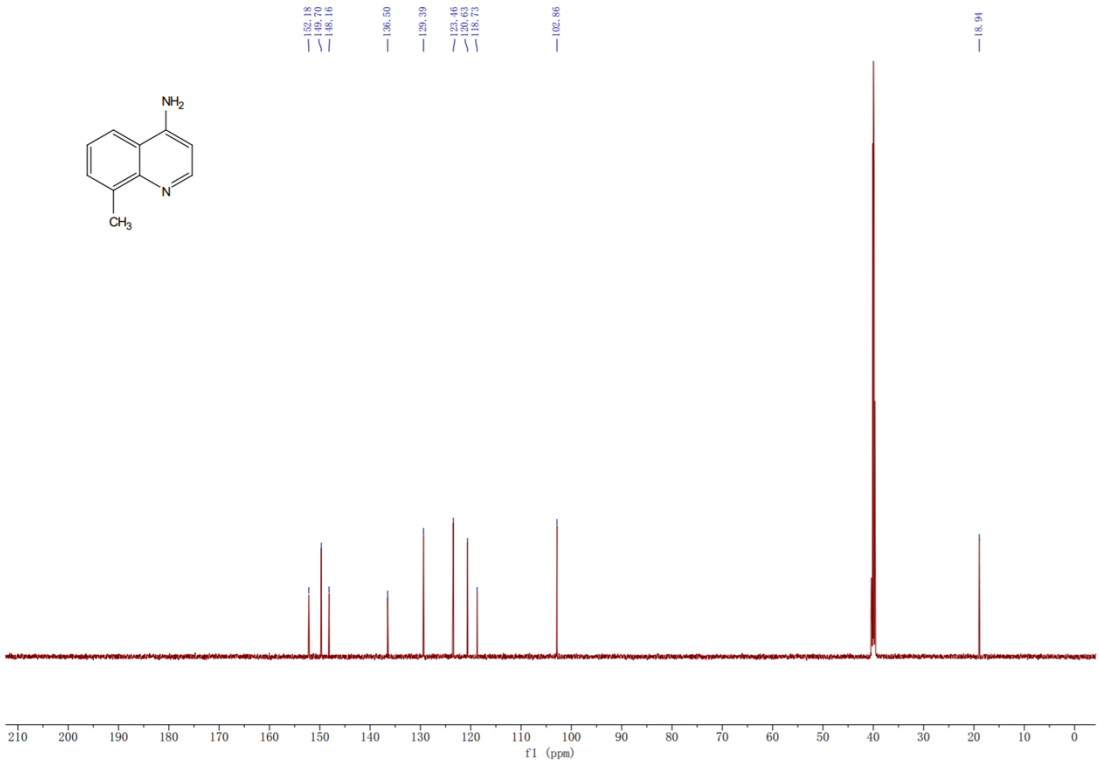


Figure S35. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4c**

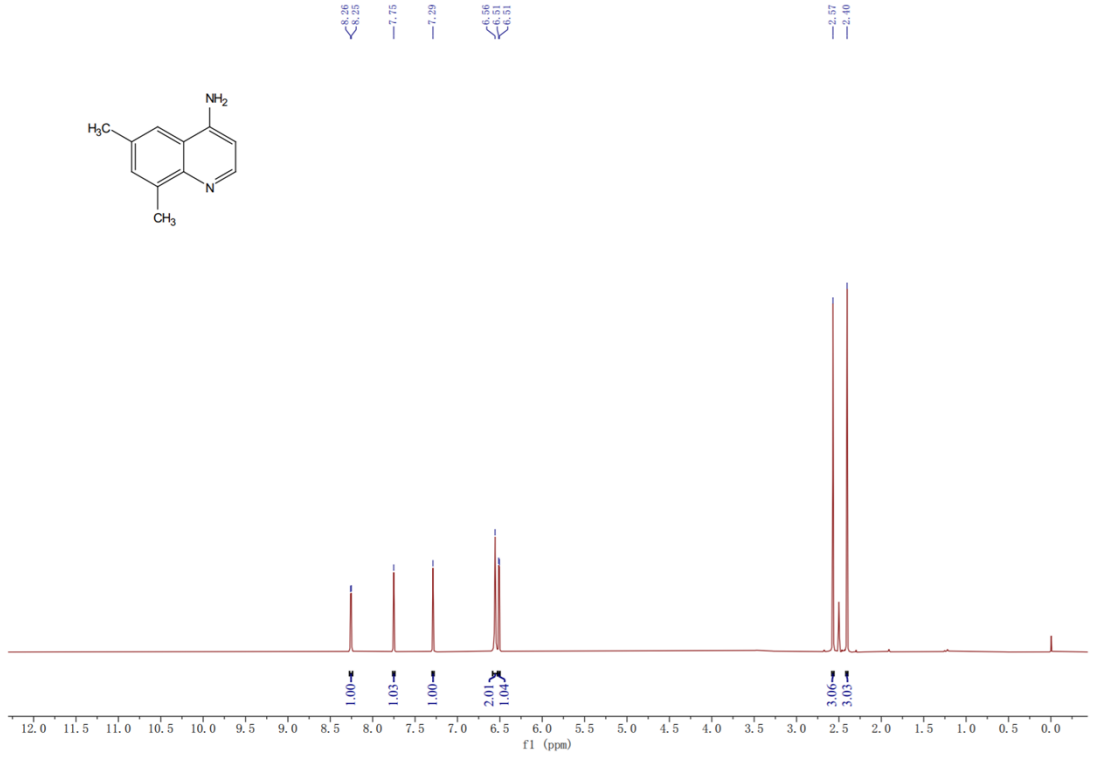


Figure S36. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4d**

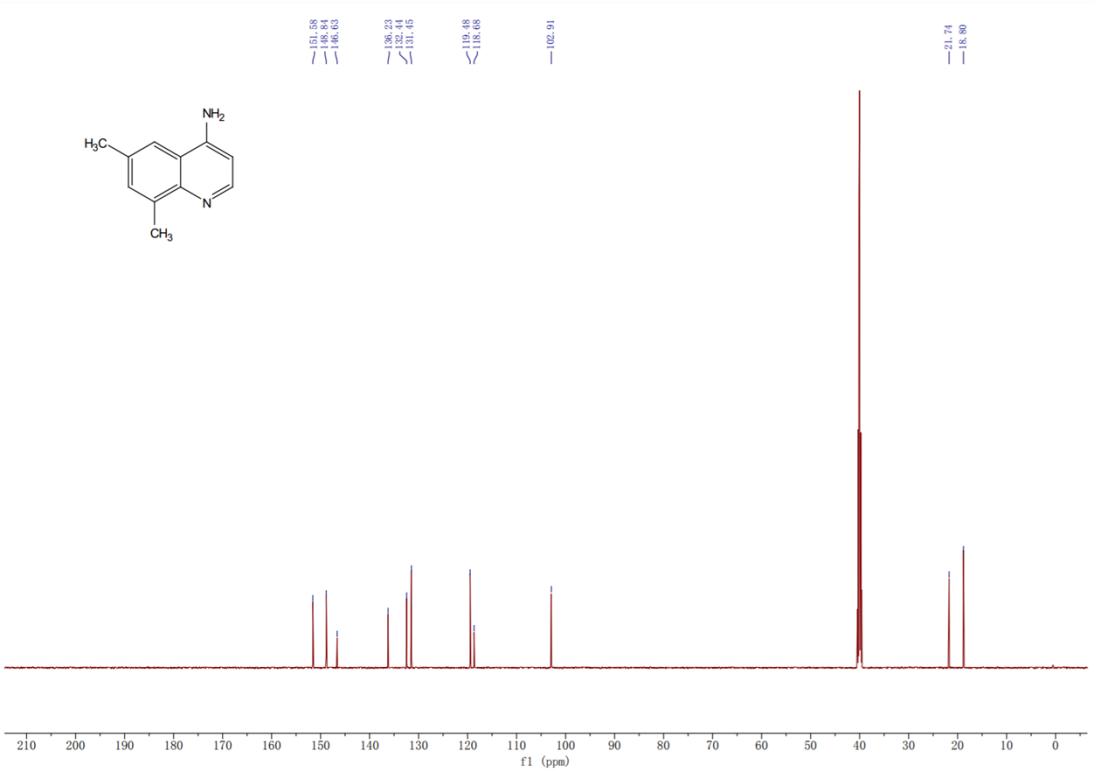


Figure S37. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4d**

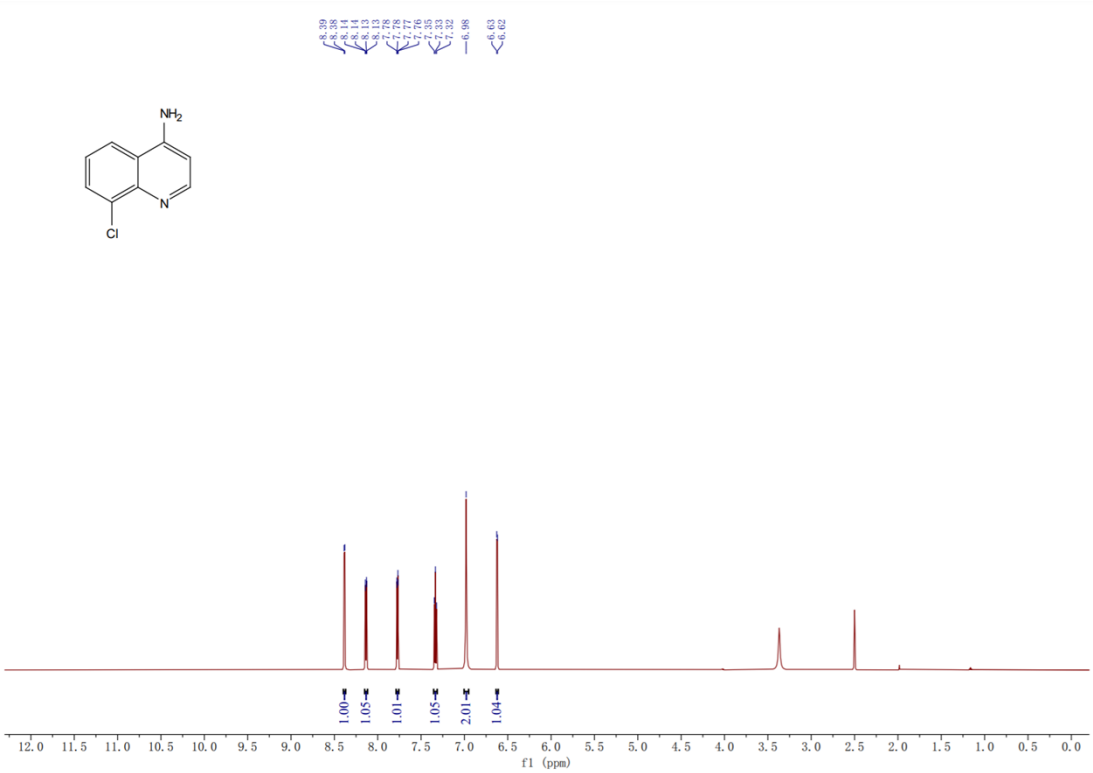


Figure S38. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4e**

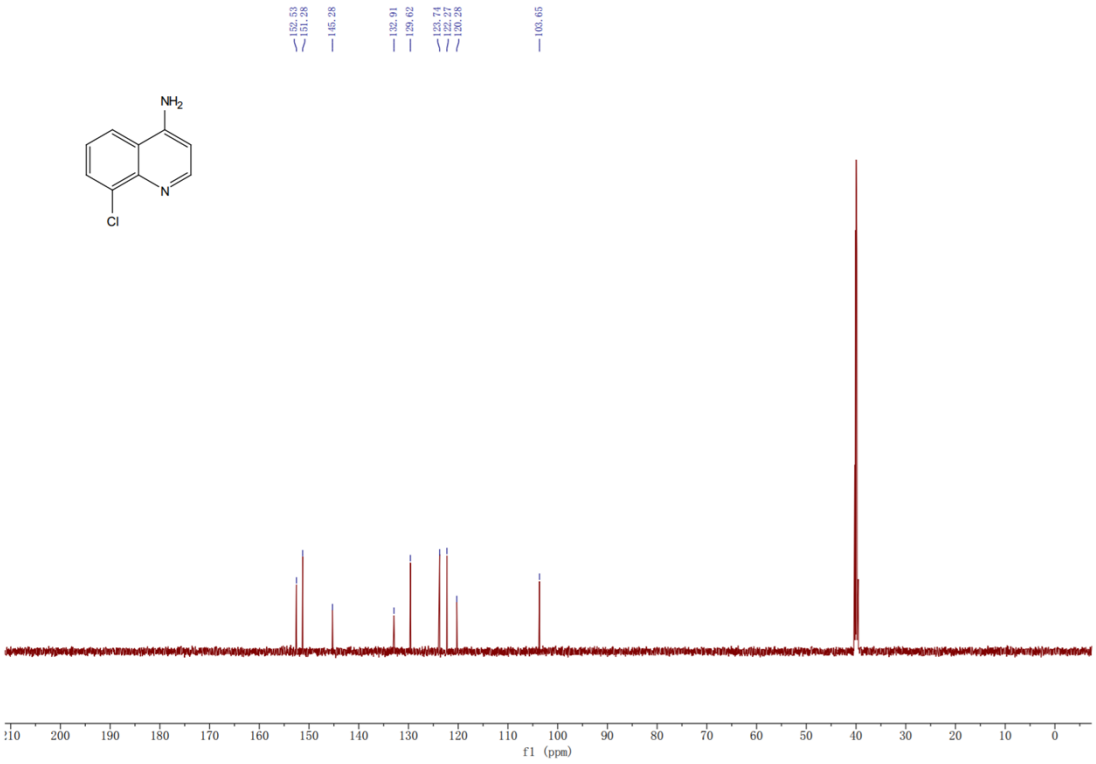


Figure S39. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4e**

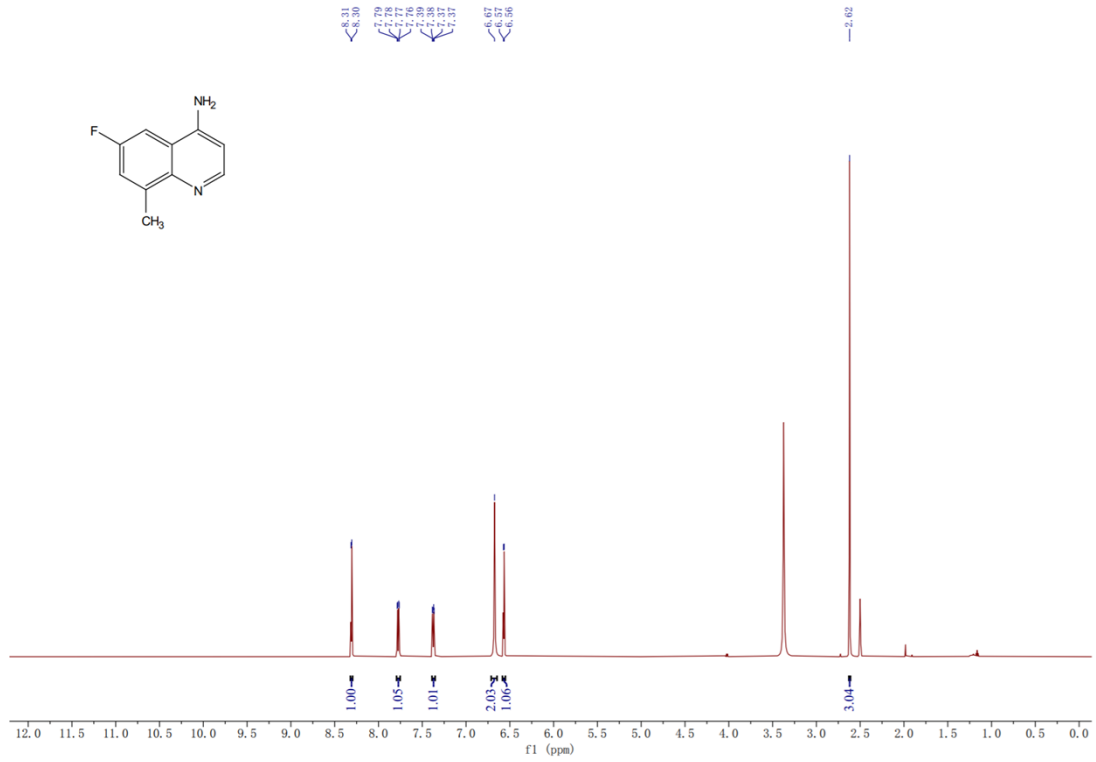


Figure S40. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4f**

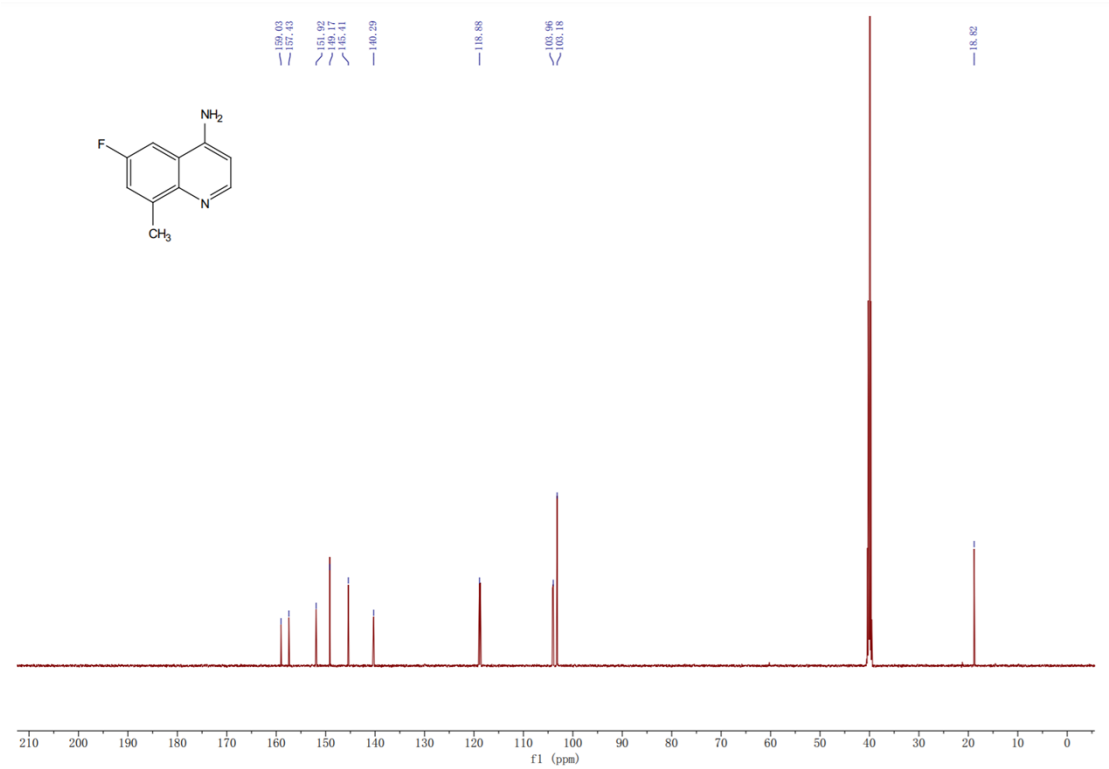


Figure S41. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4f**

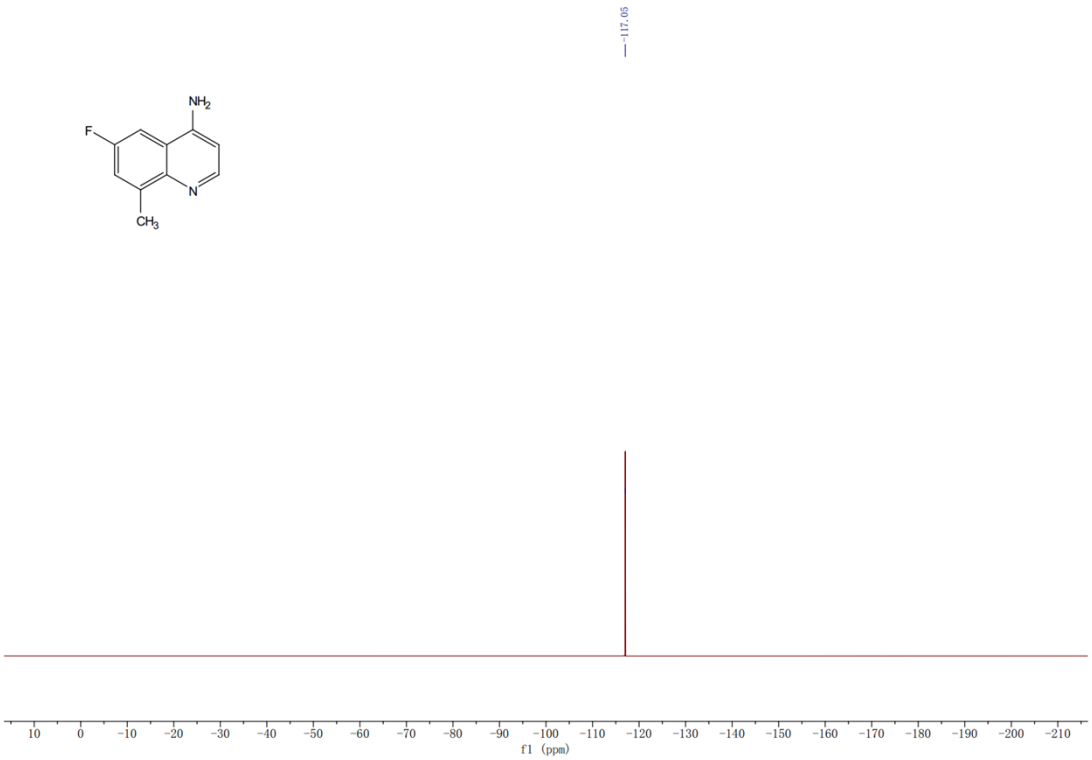


Figure S42. **^{19}F NMR** (565 MHz, DMSO-d_6) spectra of compound **4f**

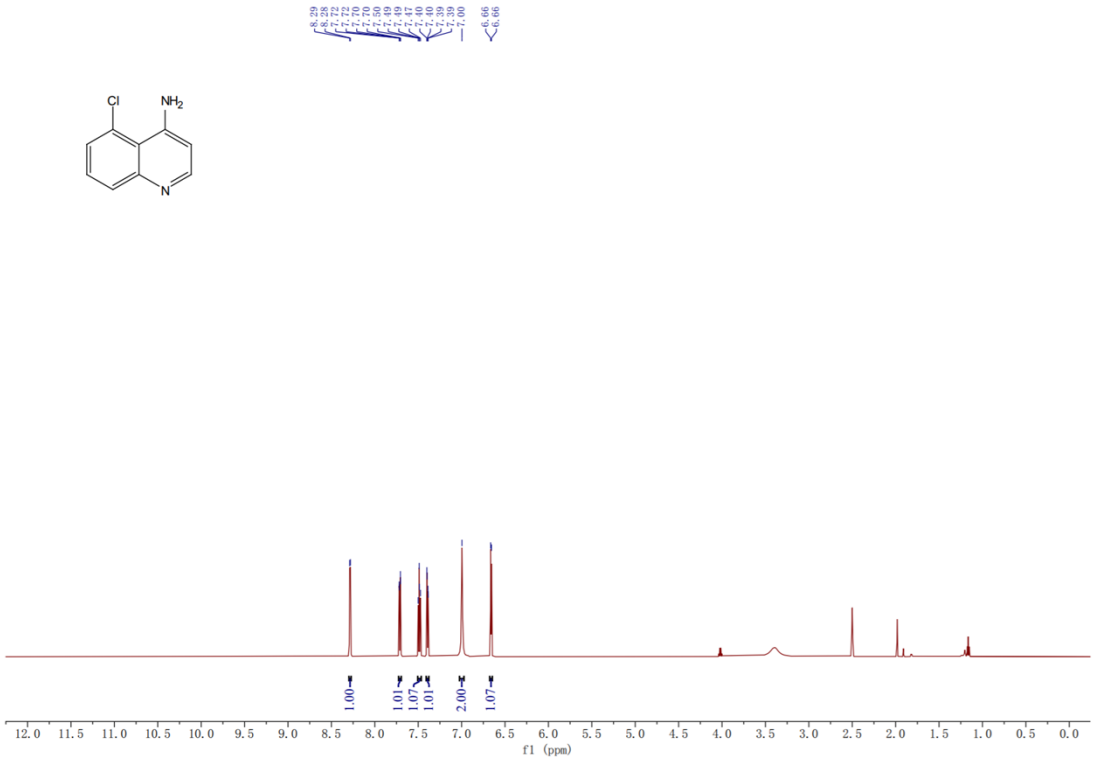


Figure S43. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4g**

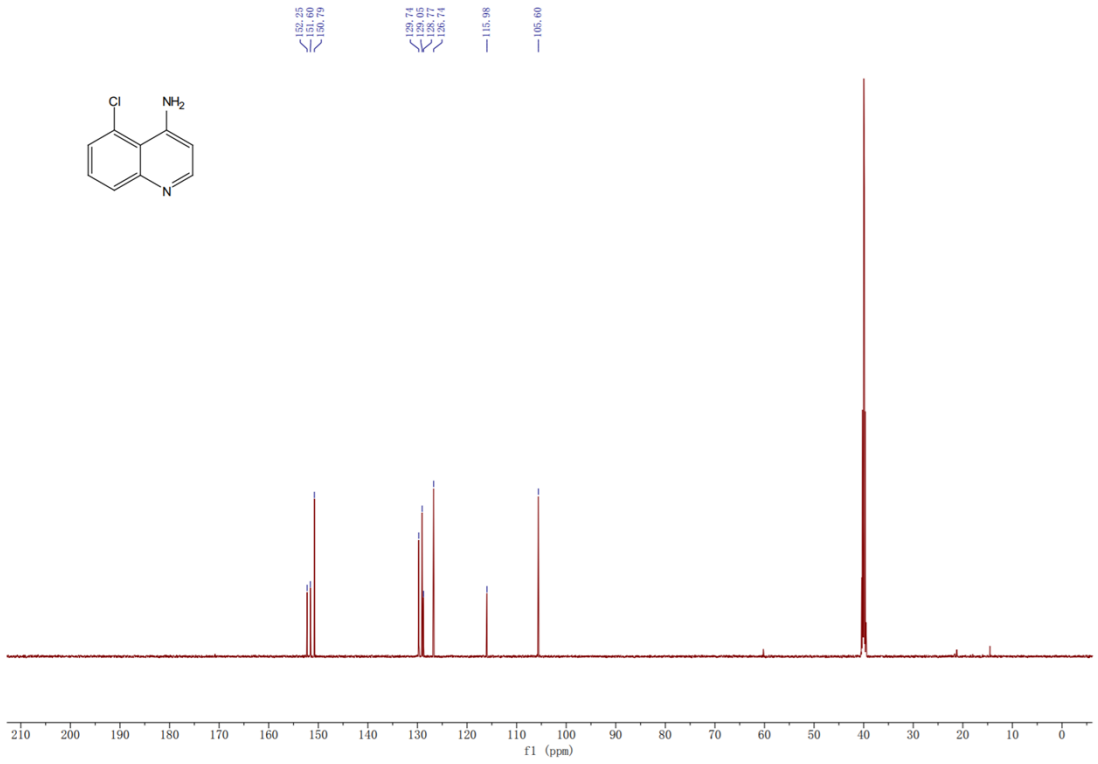


Figure S44. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4g**

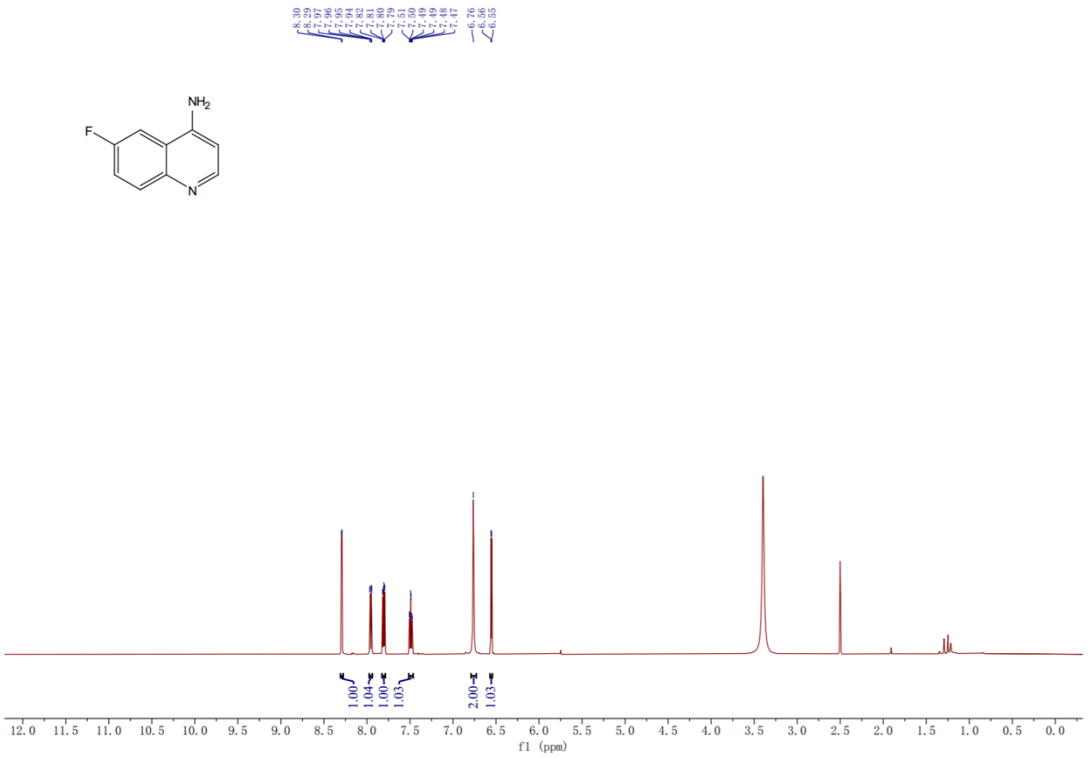


Figure S45. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4h**

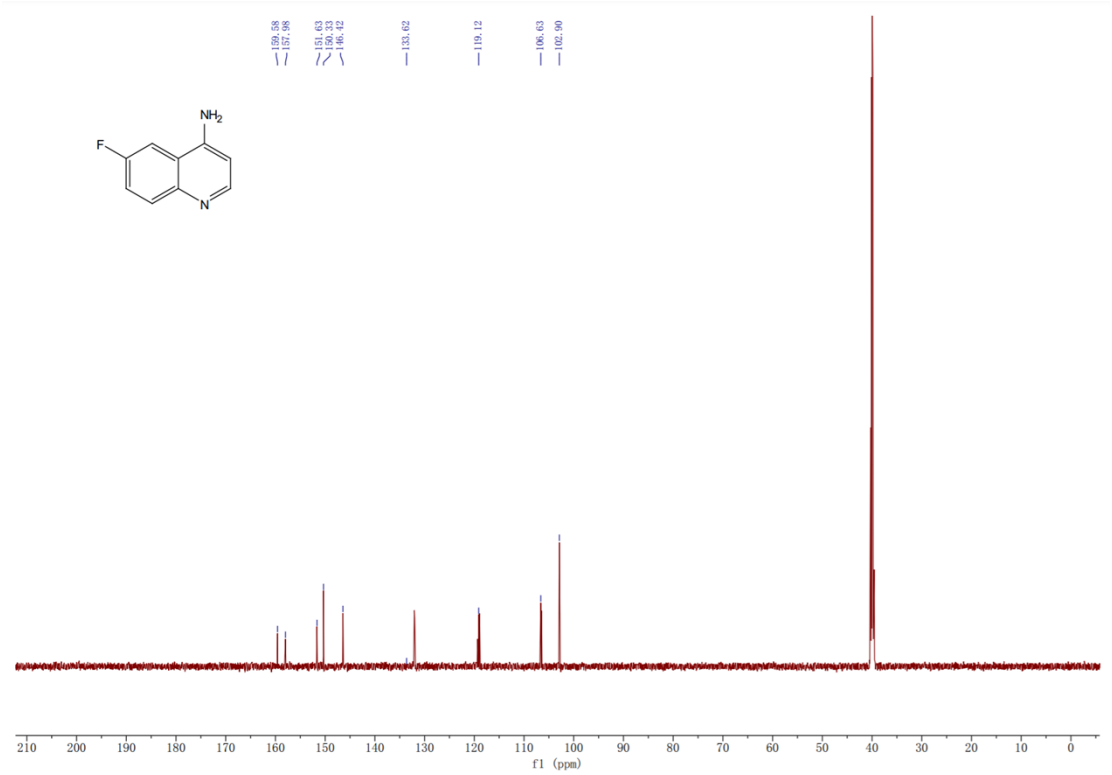


Figure S46. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4h**

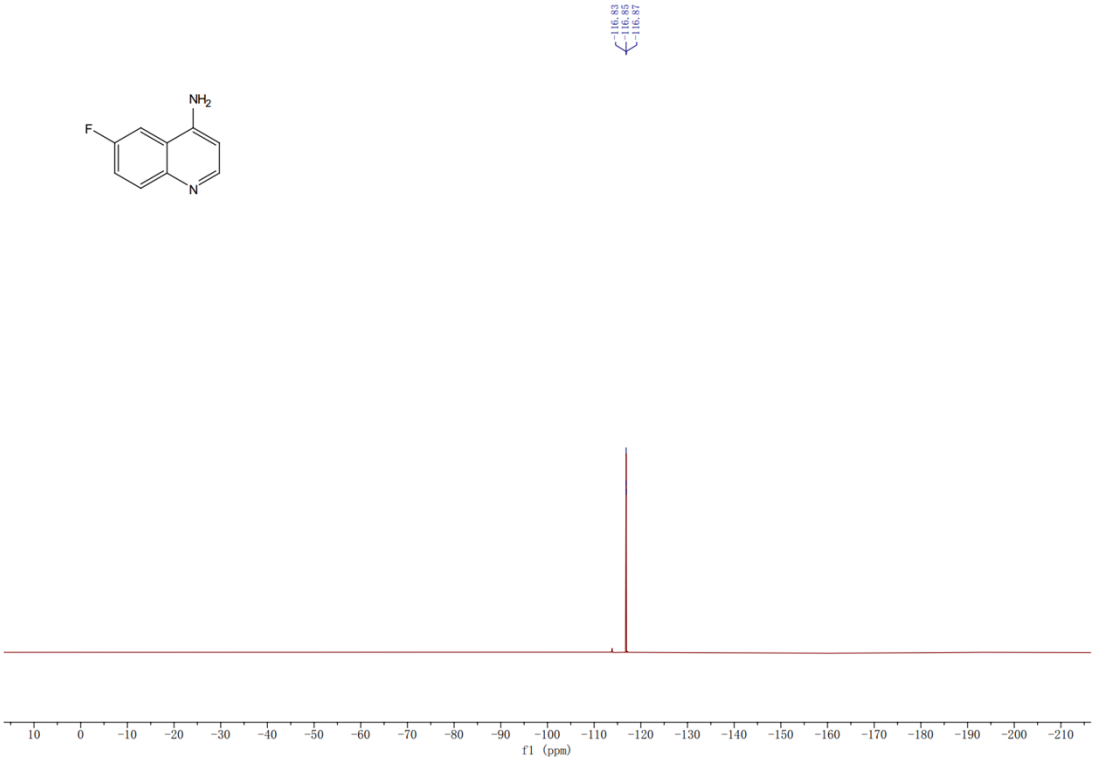


Figure S47. **^{19}F NMR** (565 MHz, DMSO-d_6) spectra of compound **4h**

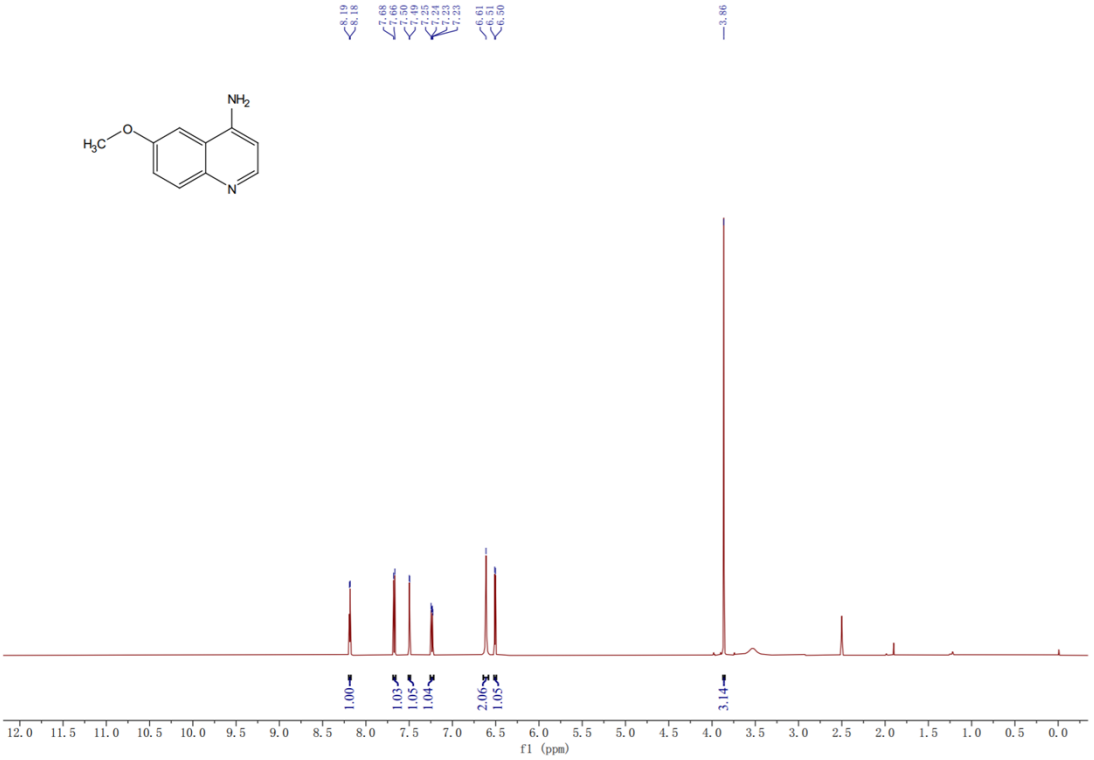


Figure S48. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4i**

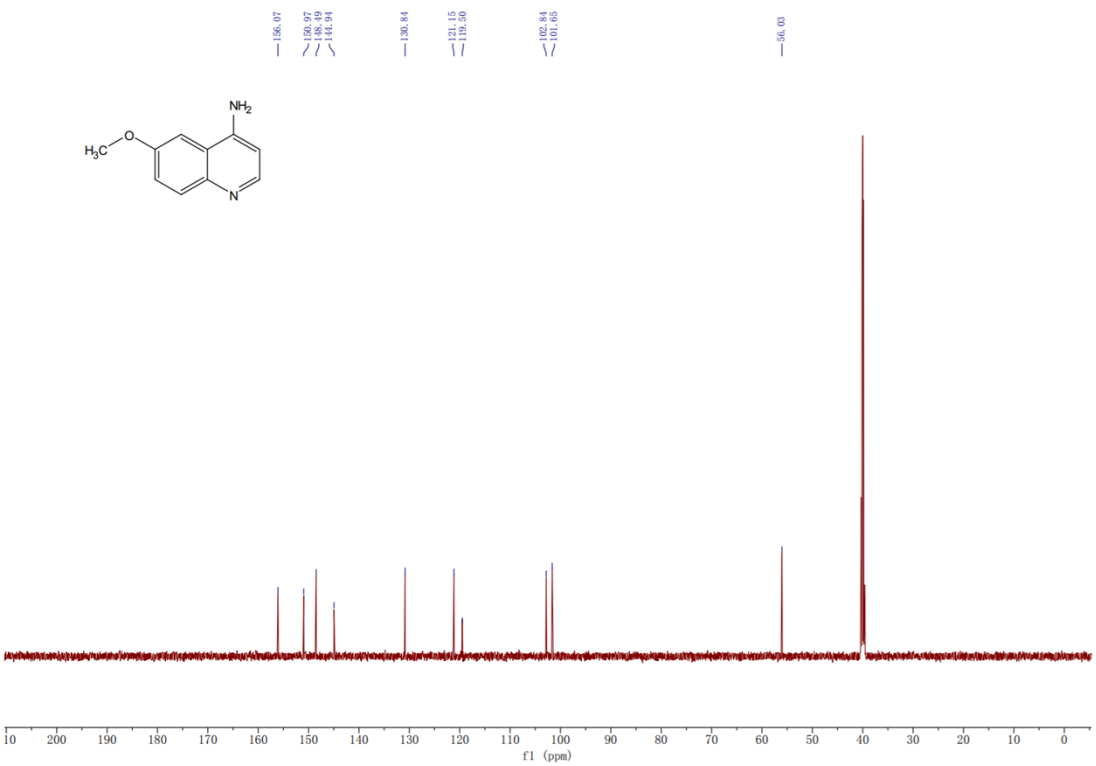


Figure S49. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4i**

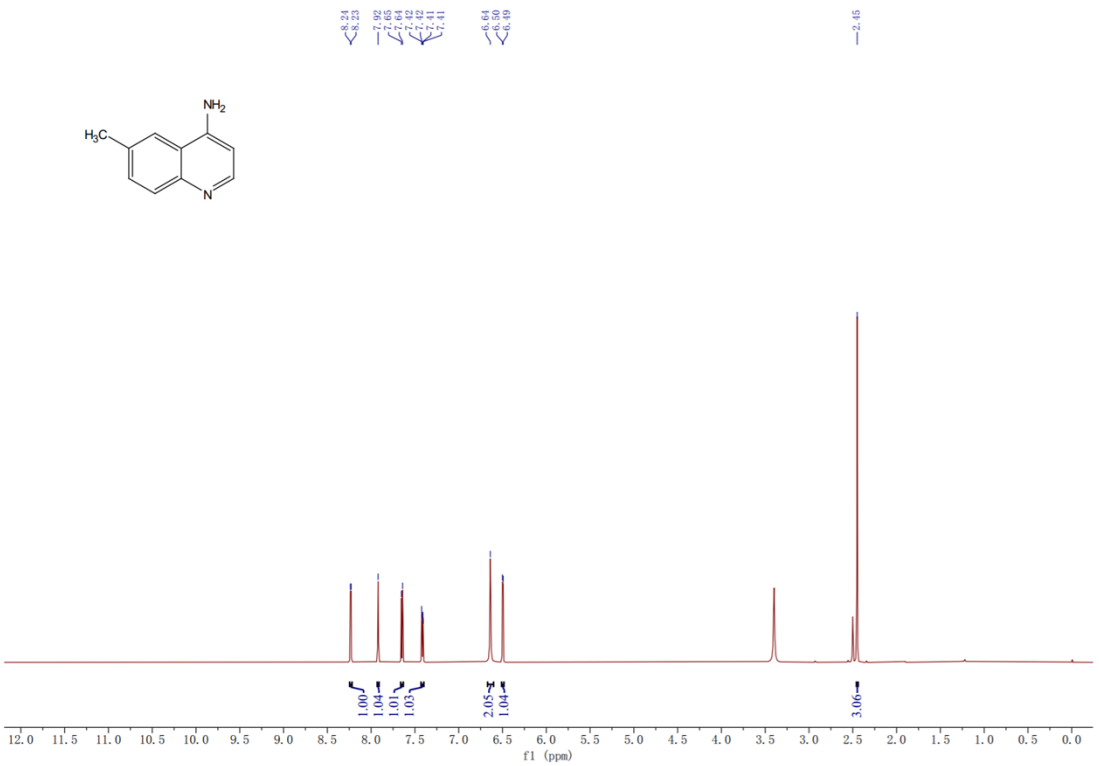


Figure S50. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4j**

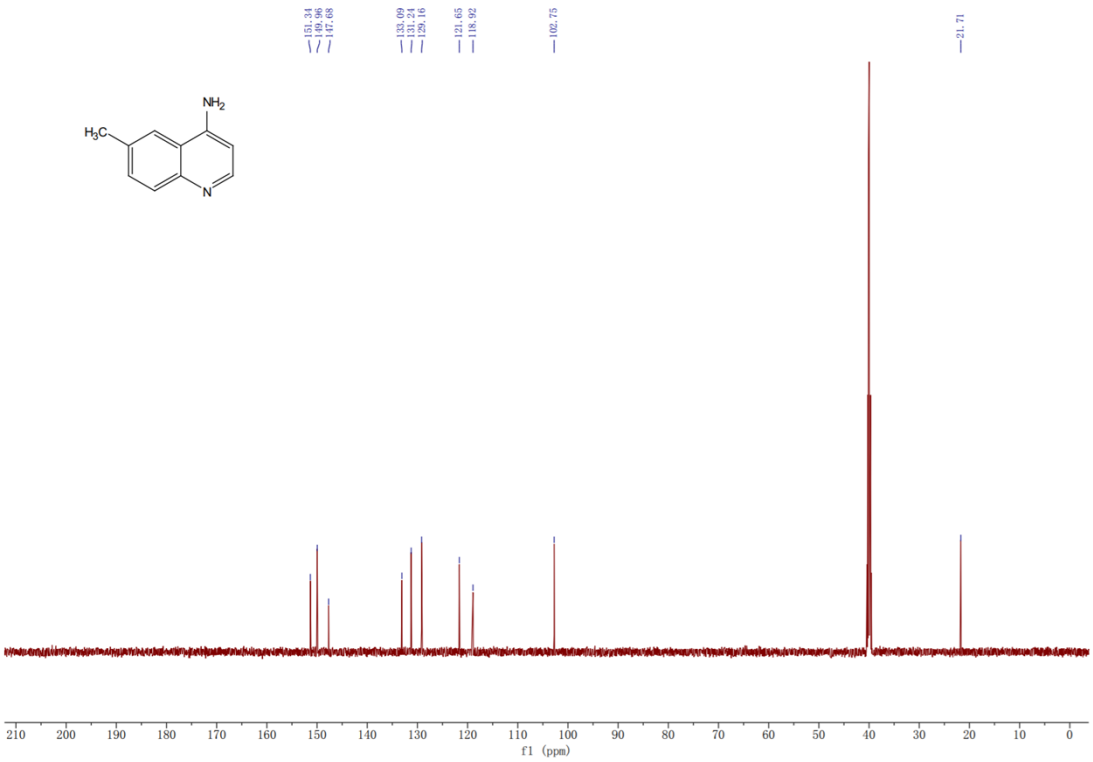


Figure S51. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4j**

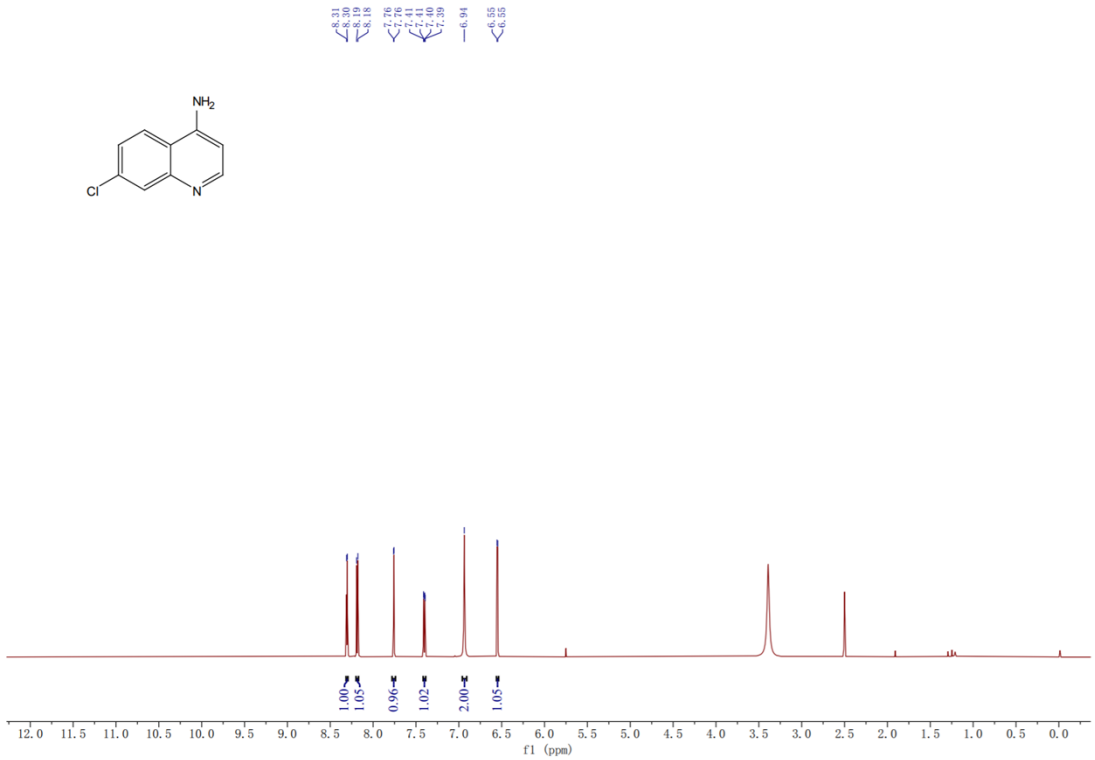


Figure S52. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4k**

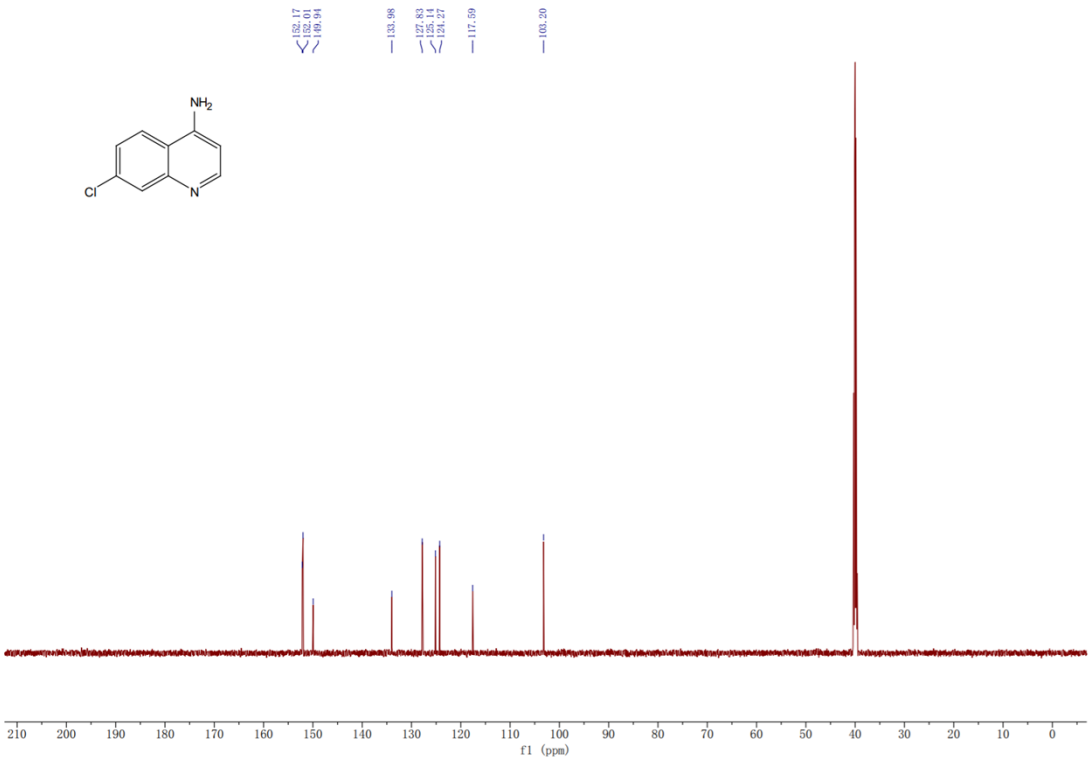


Figure S53. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4k**

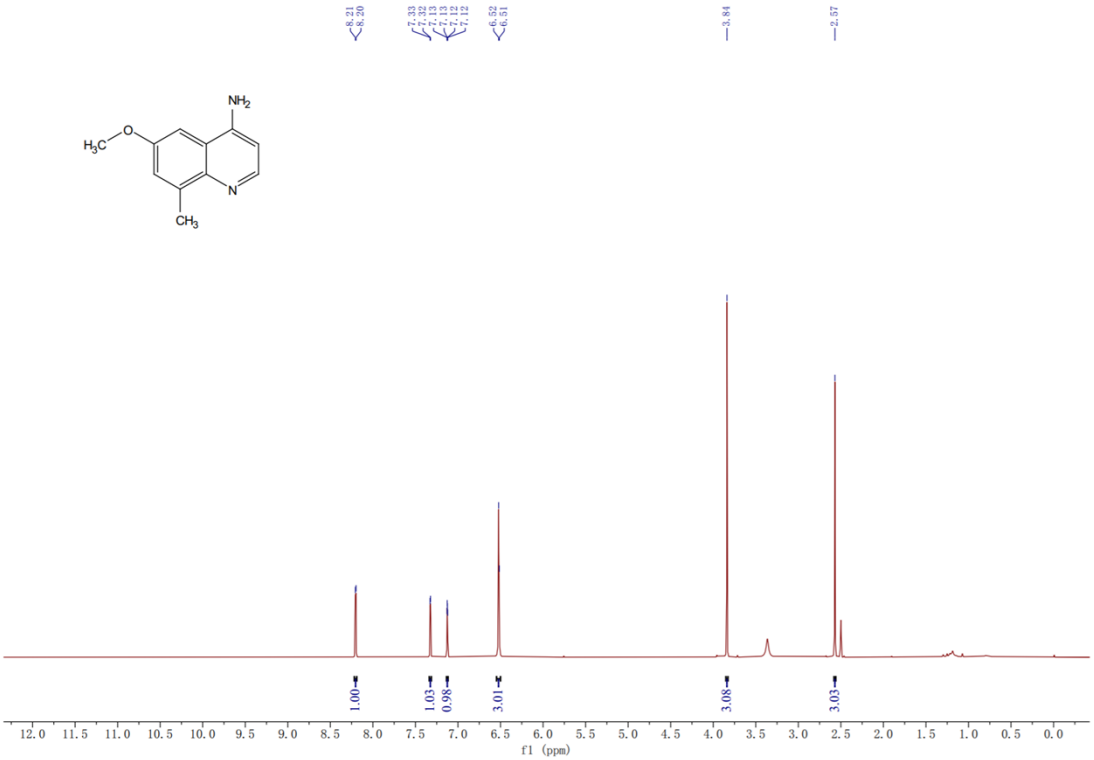


Figure S54. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4l**

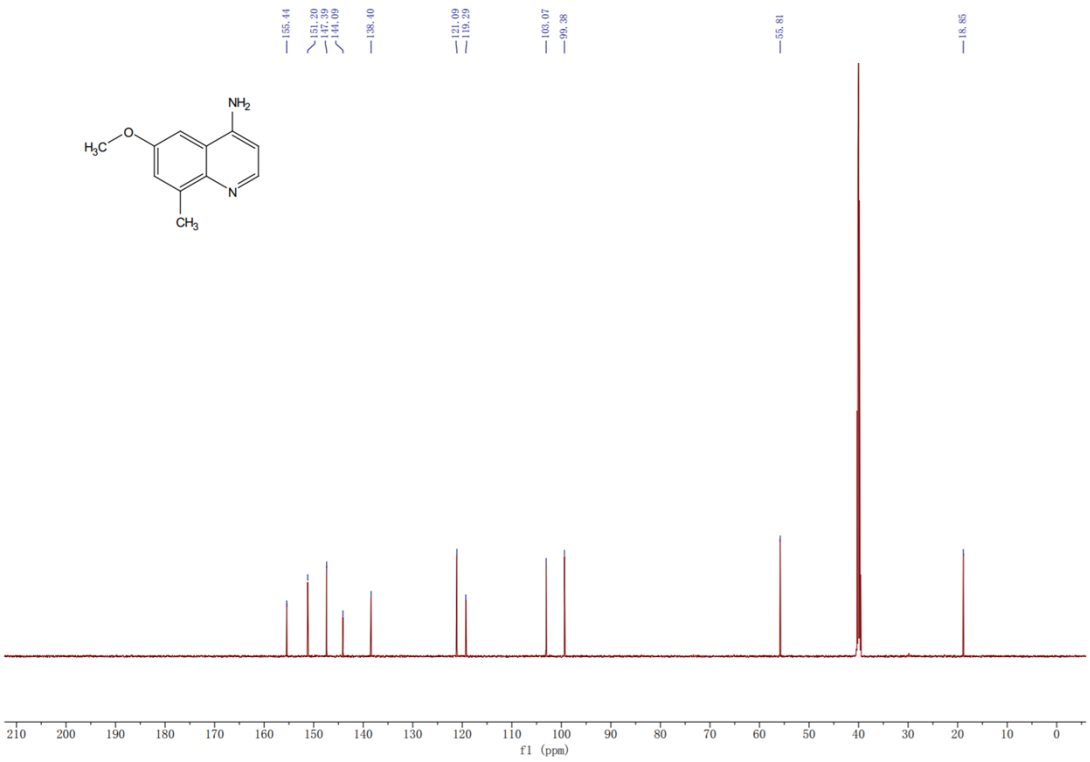


Figure S55. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4l**

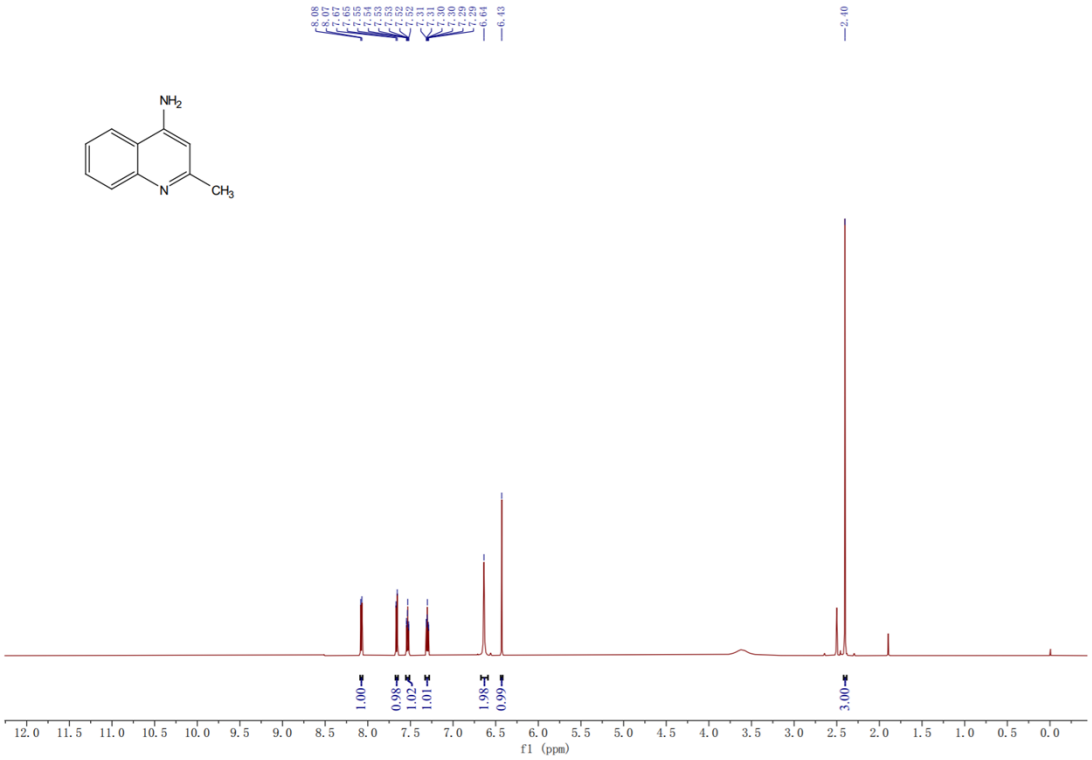


Figure S56. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4m**

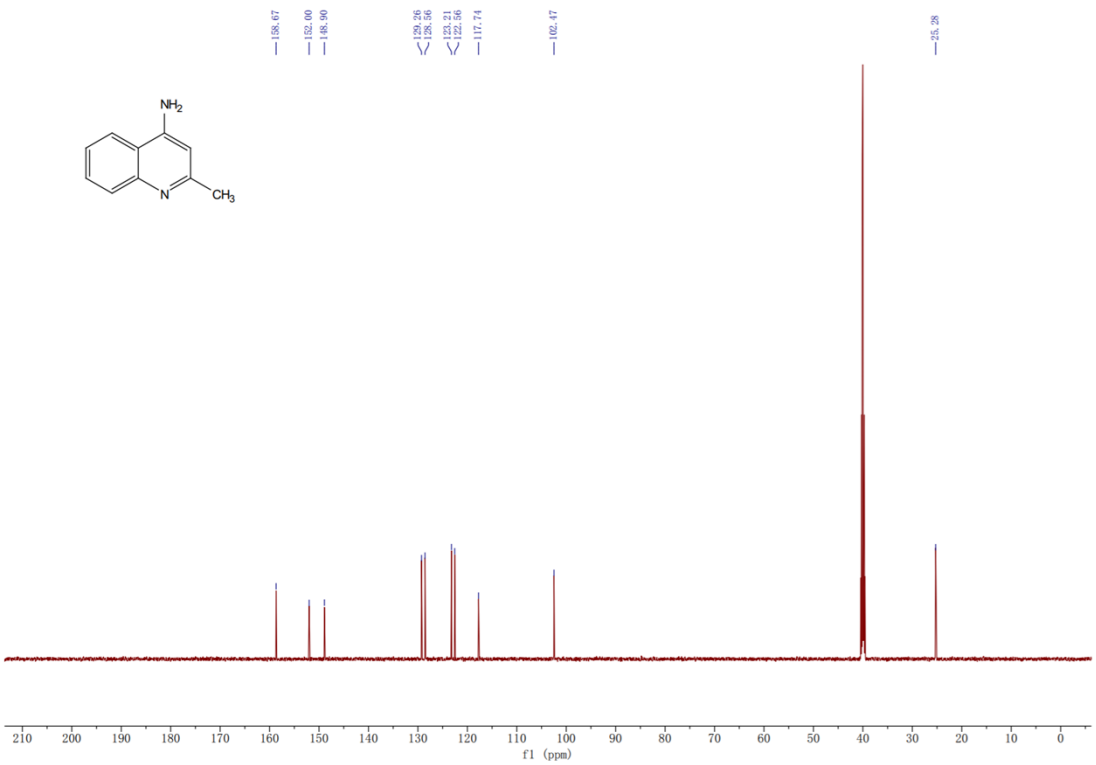


Figure S57. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4m**

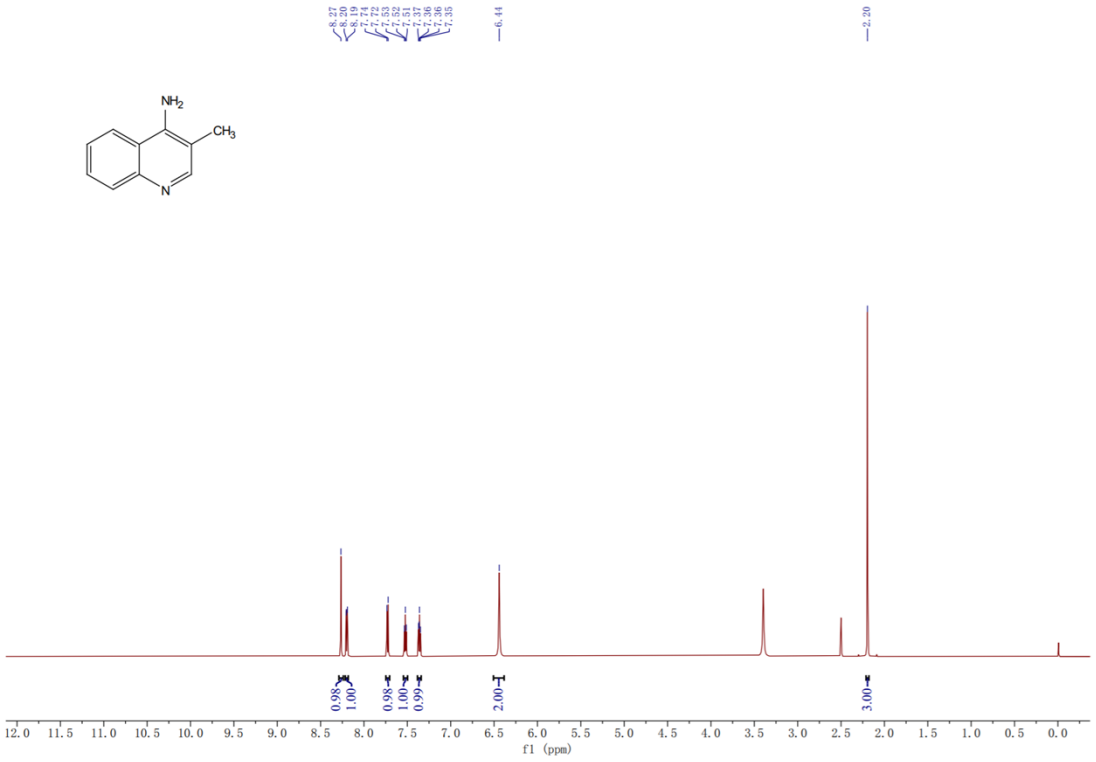


Figure S58. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4n**

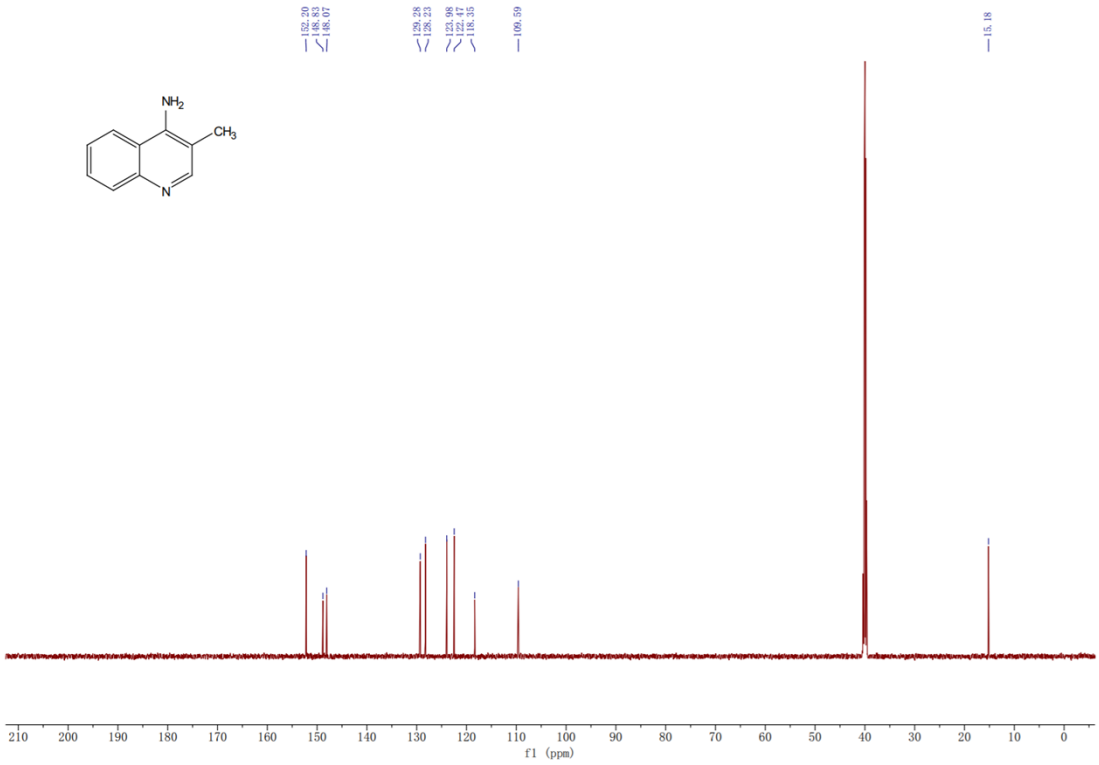


Figure S59. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4n**

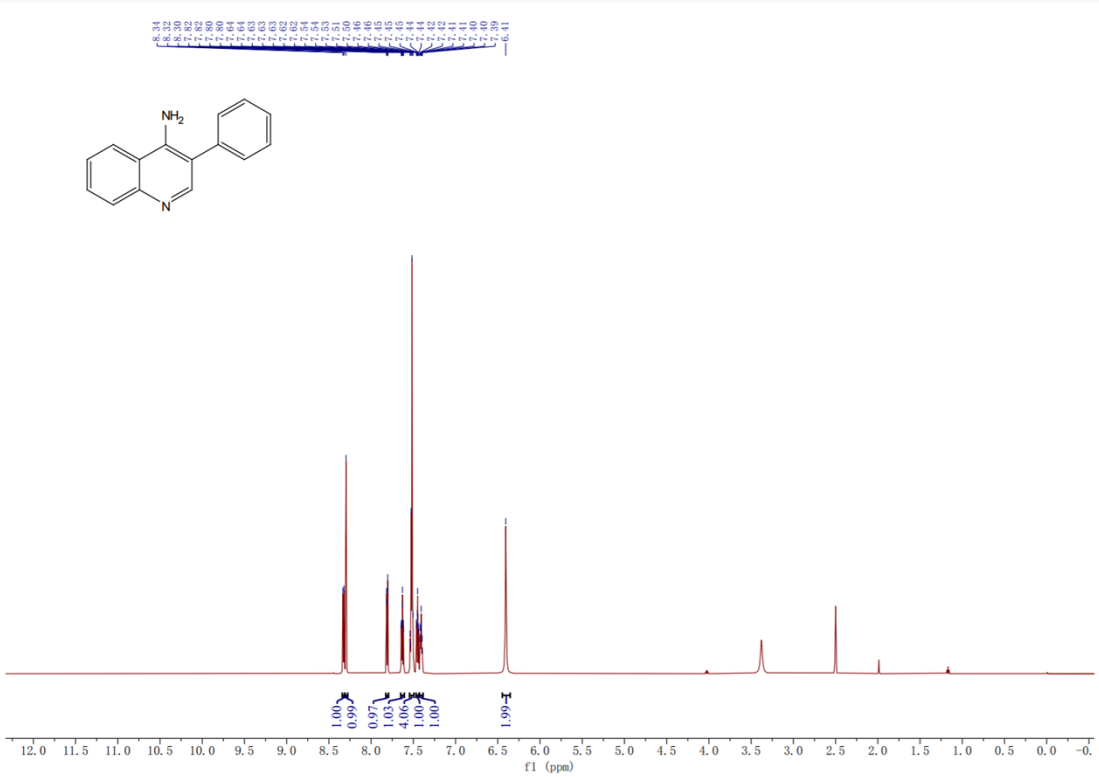


Figure S60. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **4o**

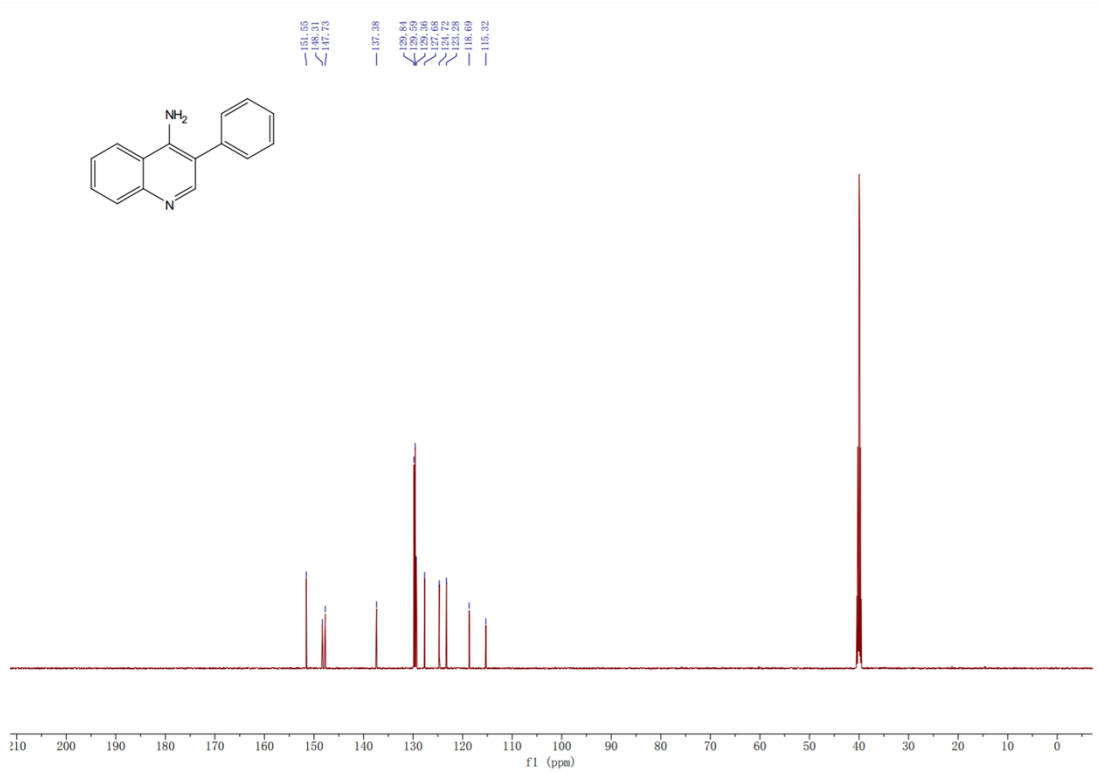


Figure S61. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **4o**

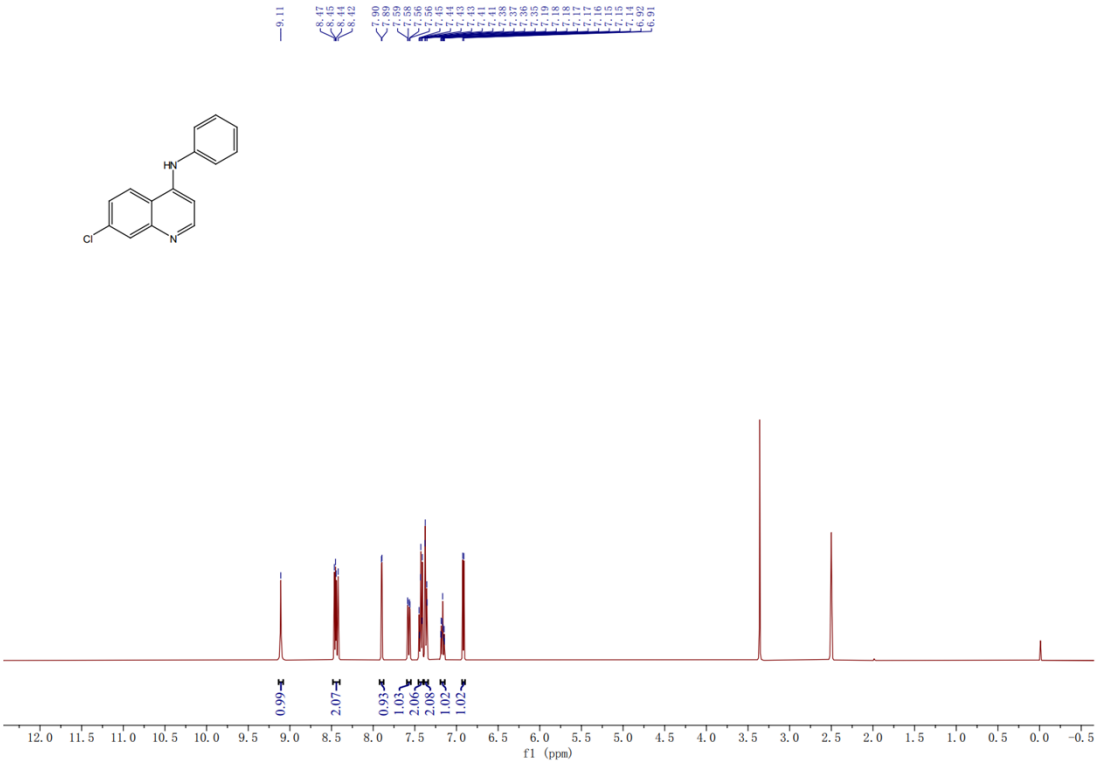


Figure S62. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **4p**

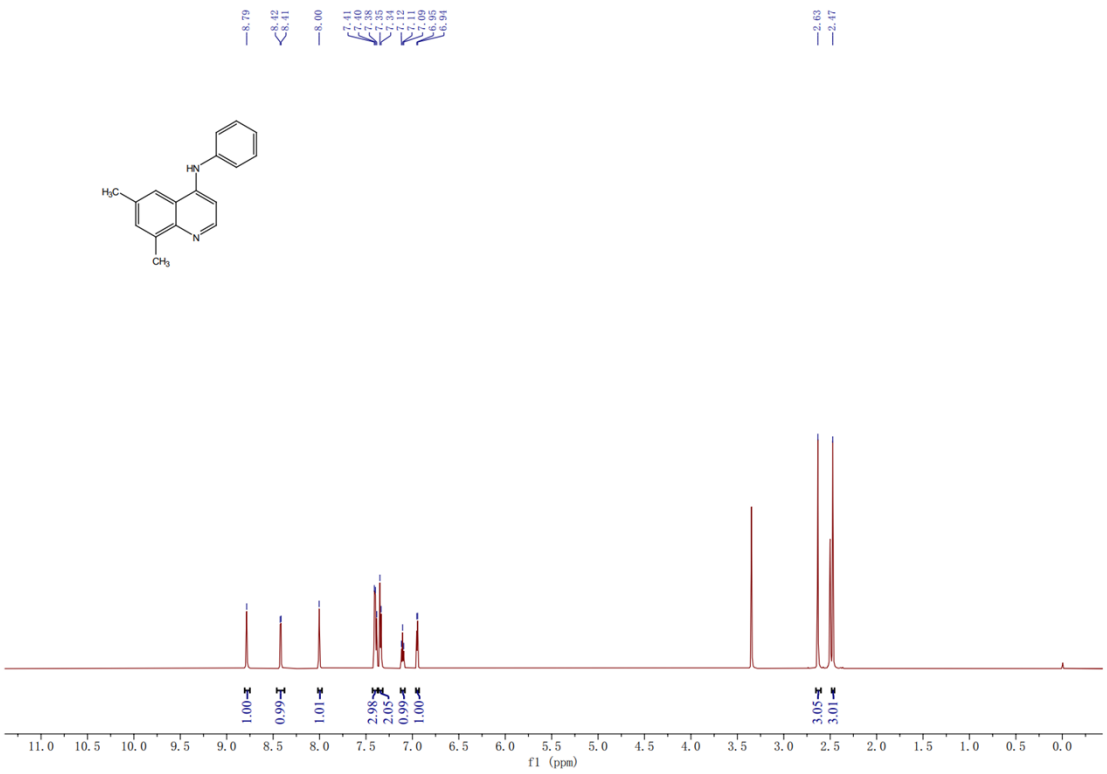


Figure S63. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **4q**

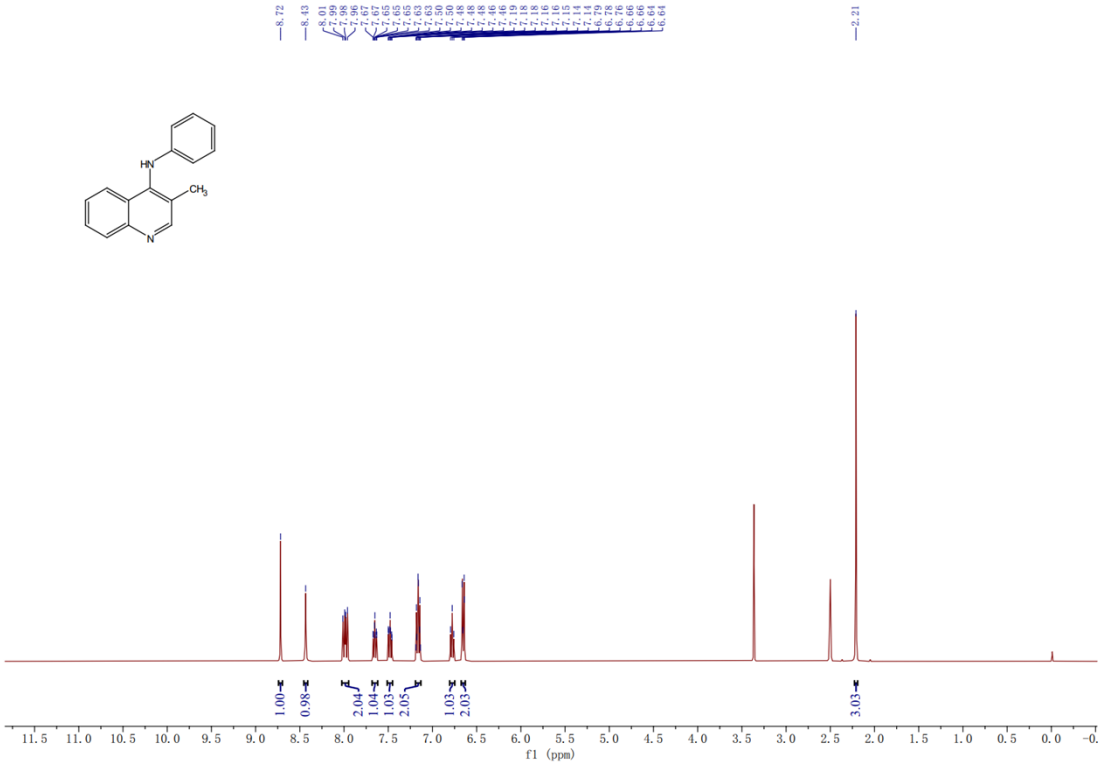


Figure S64. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **4r**

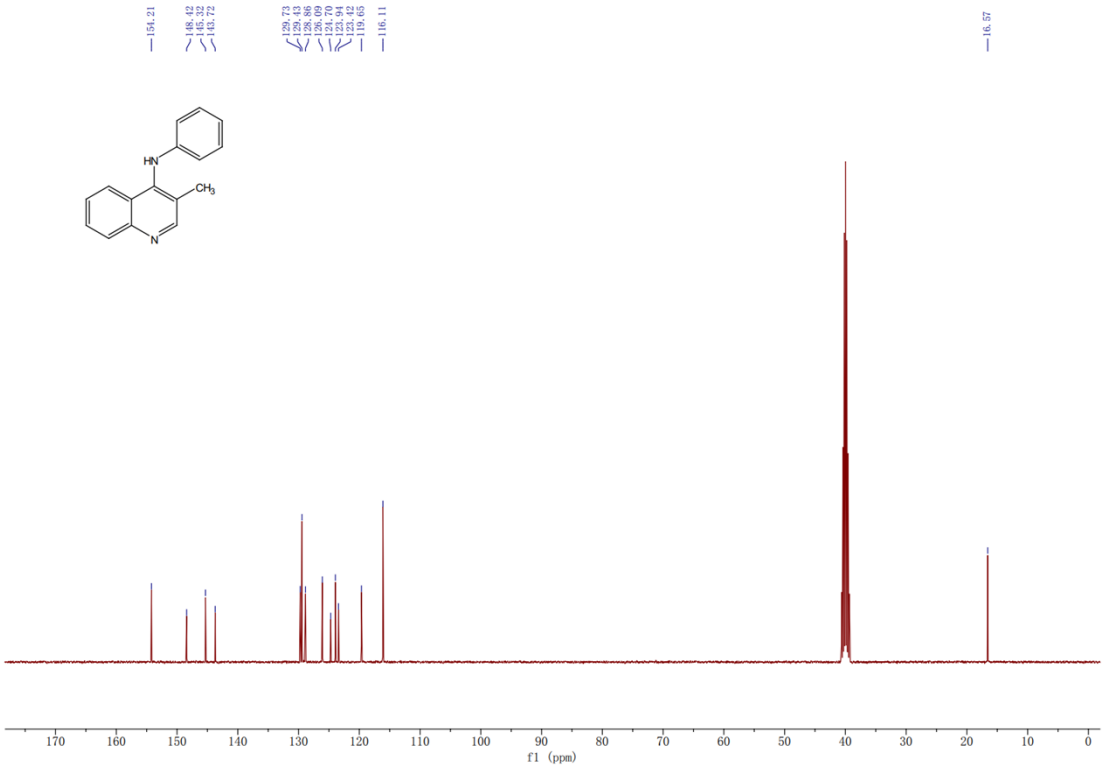


Figure S65. **^{13}C NMR** (101 MHz, DMSO) spectra of compound **4r**

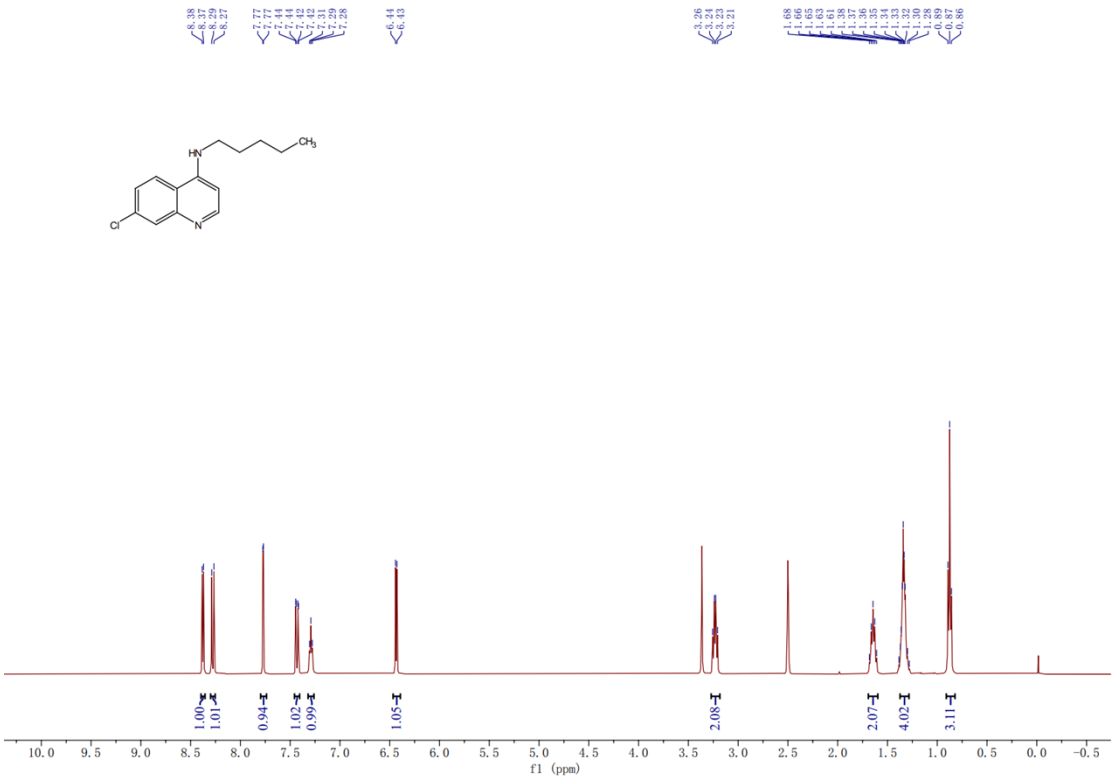


Figure S66. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **4s**

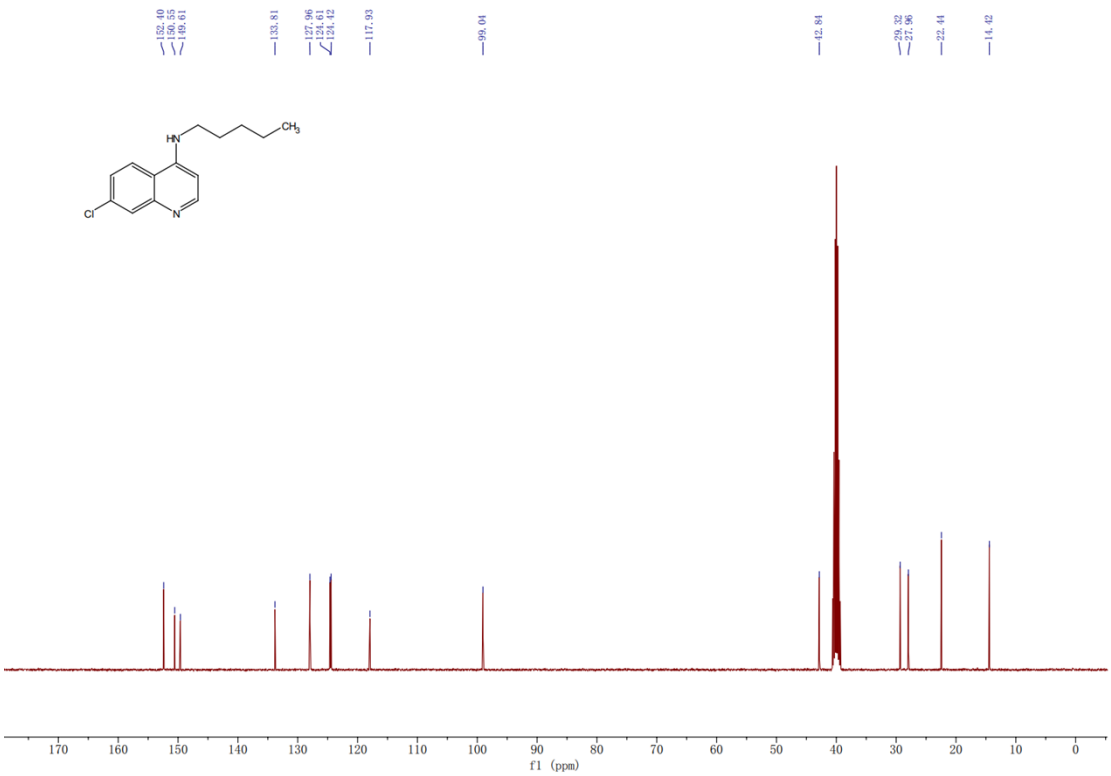


Figure S67. **^{13}C NMR** (101 MHz, DMSO) spectra of compound **4s**

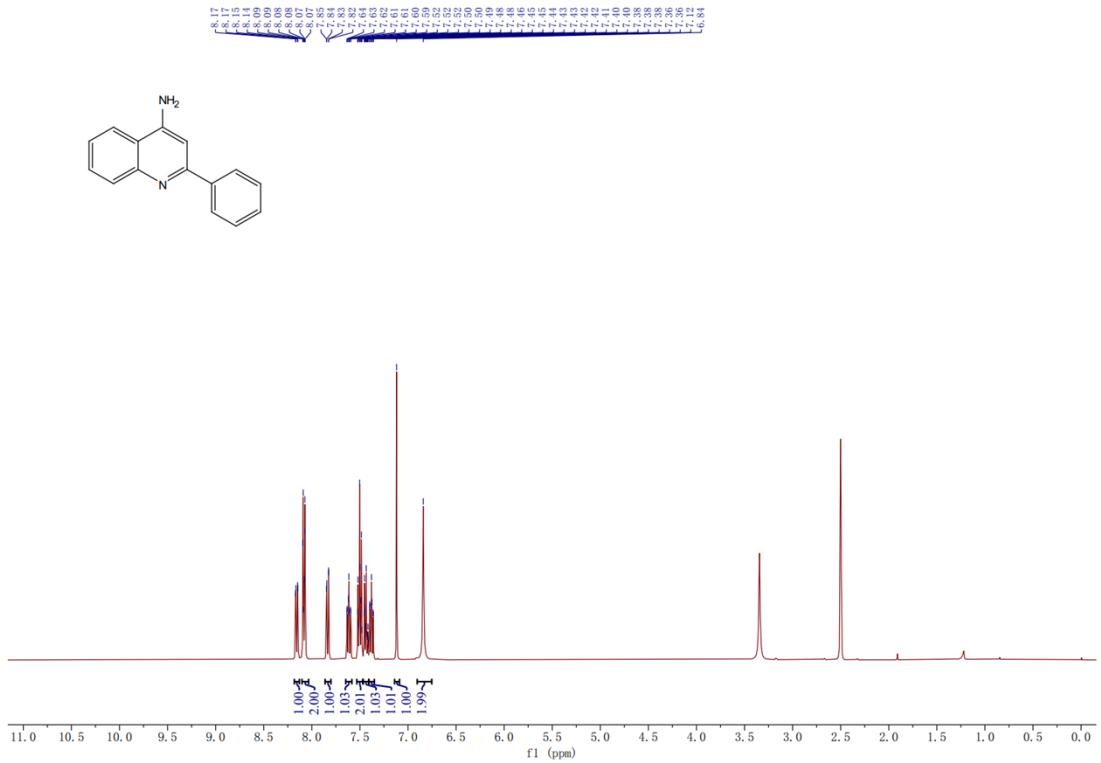


Figure S68. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5a**

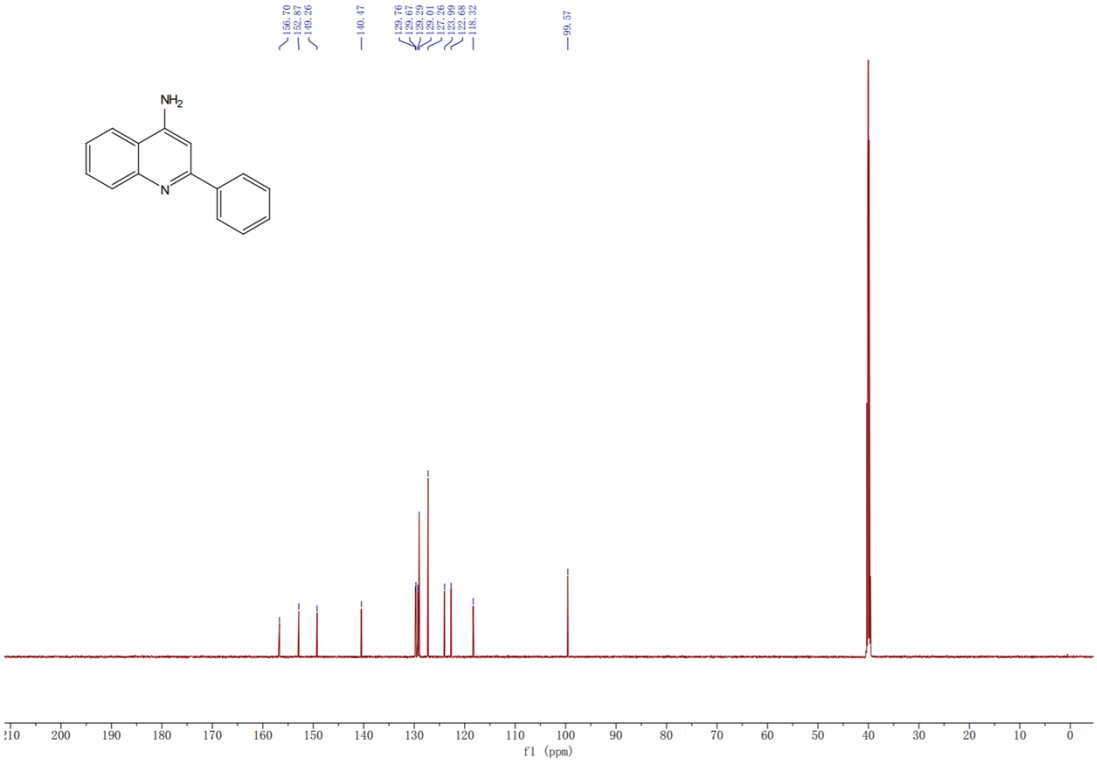


Figure S69. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5a**

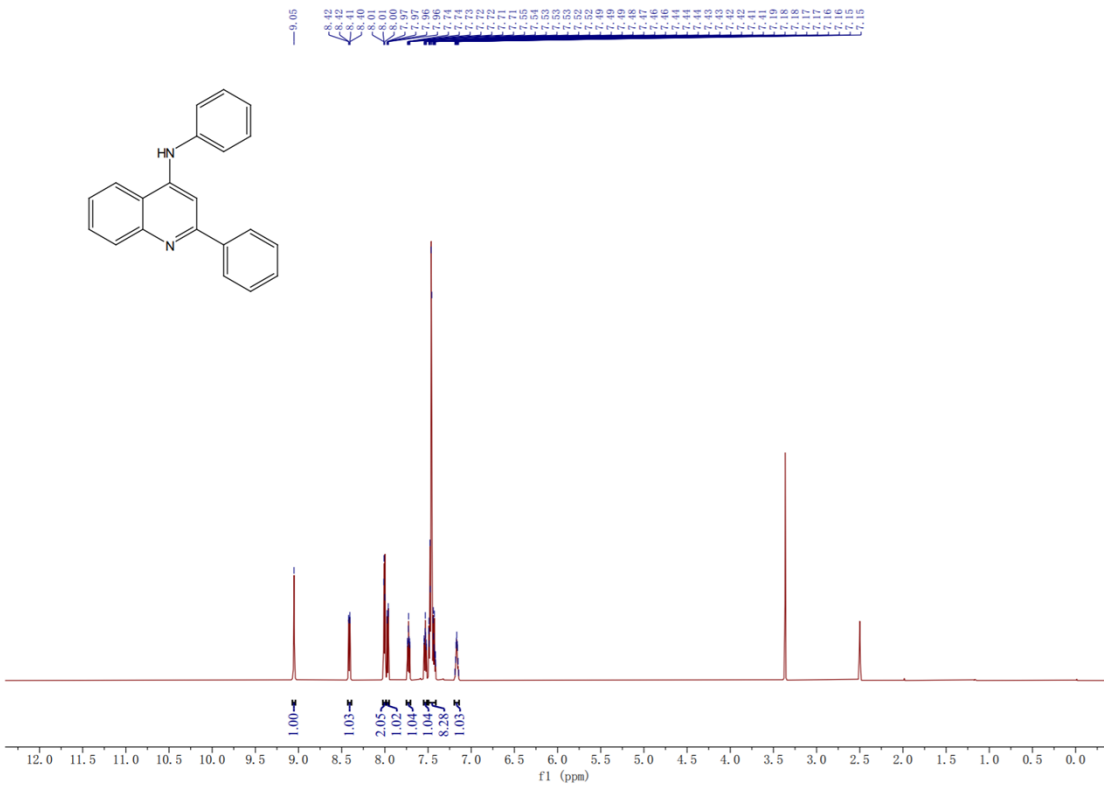


Figure S70. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5b**

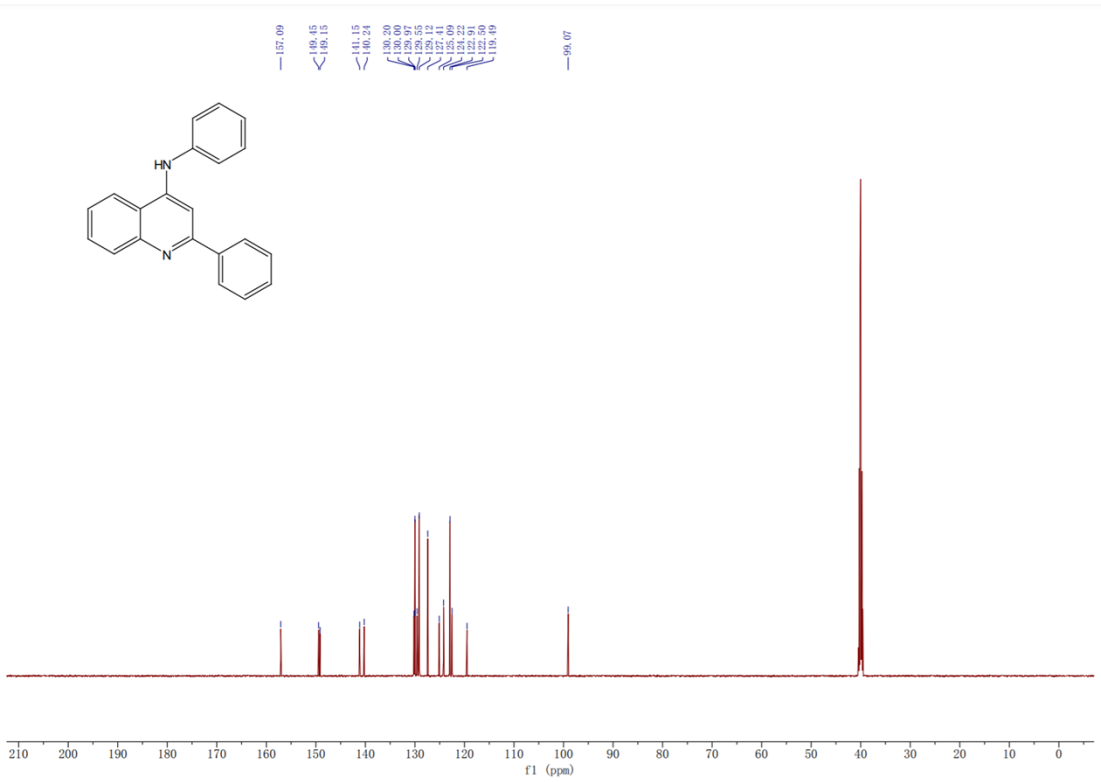


Figure S71. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5b**

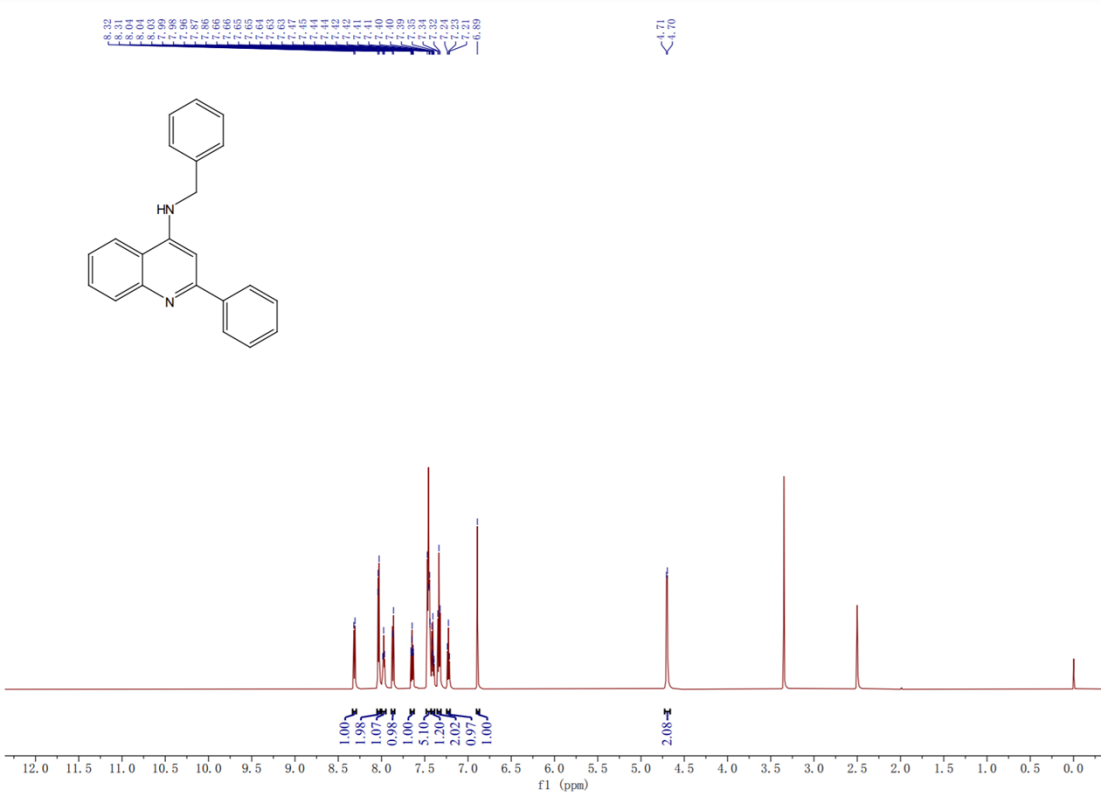


Figure S72. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5c**

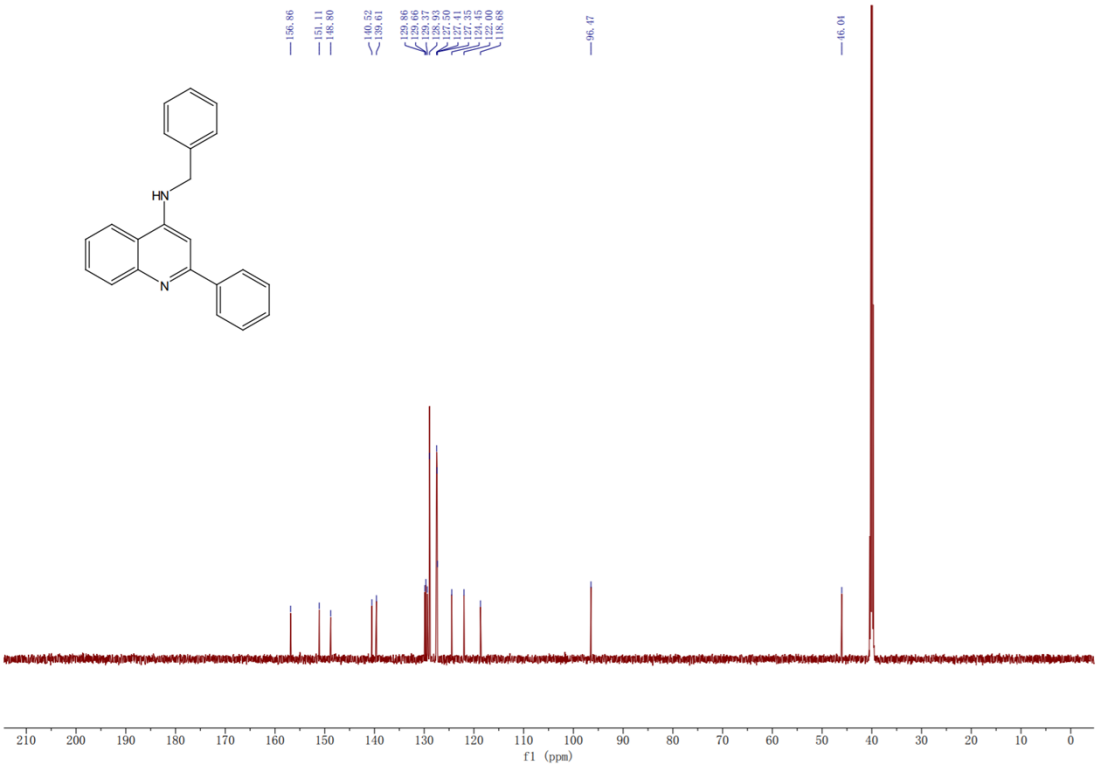


Figure S73. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5c**

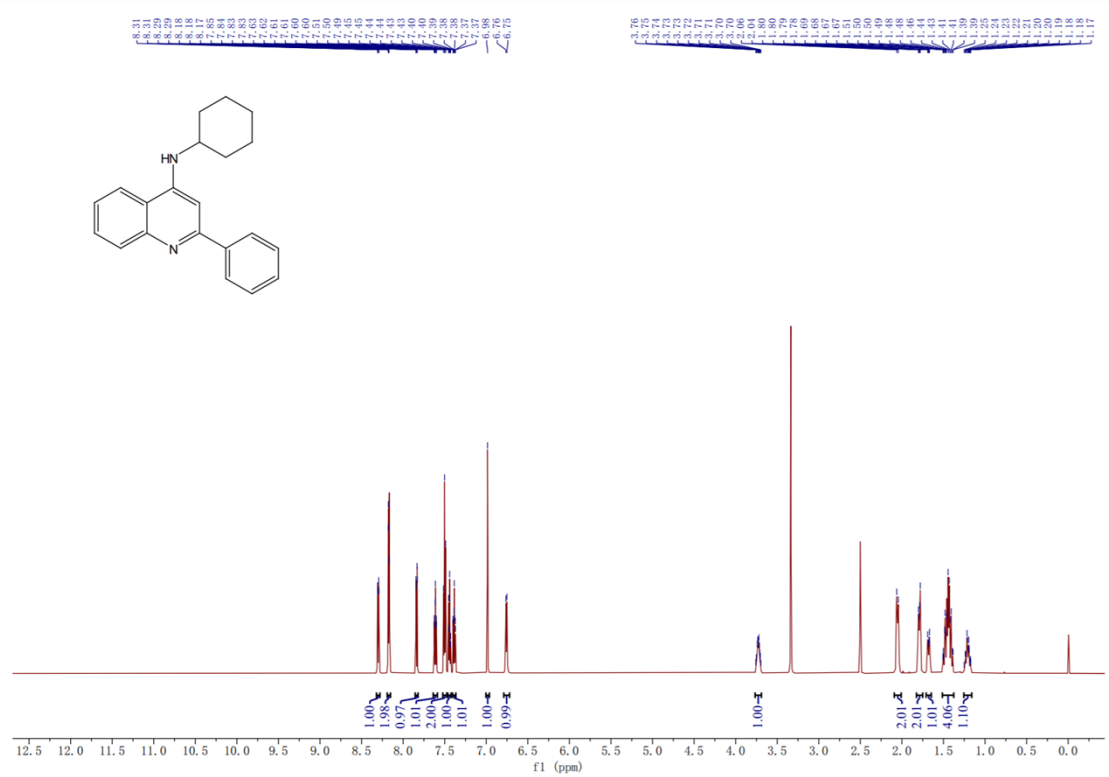


Figure S74. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5d**

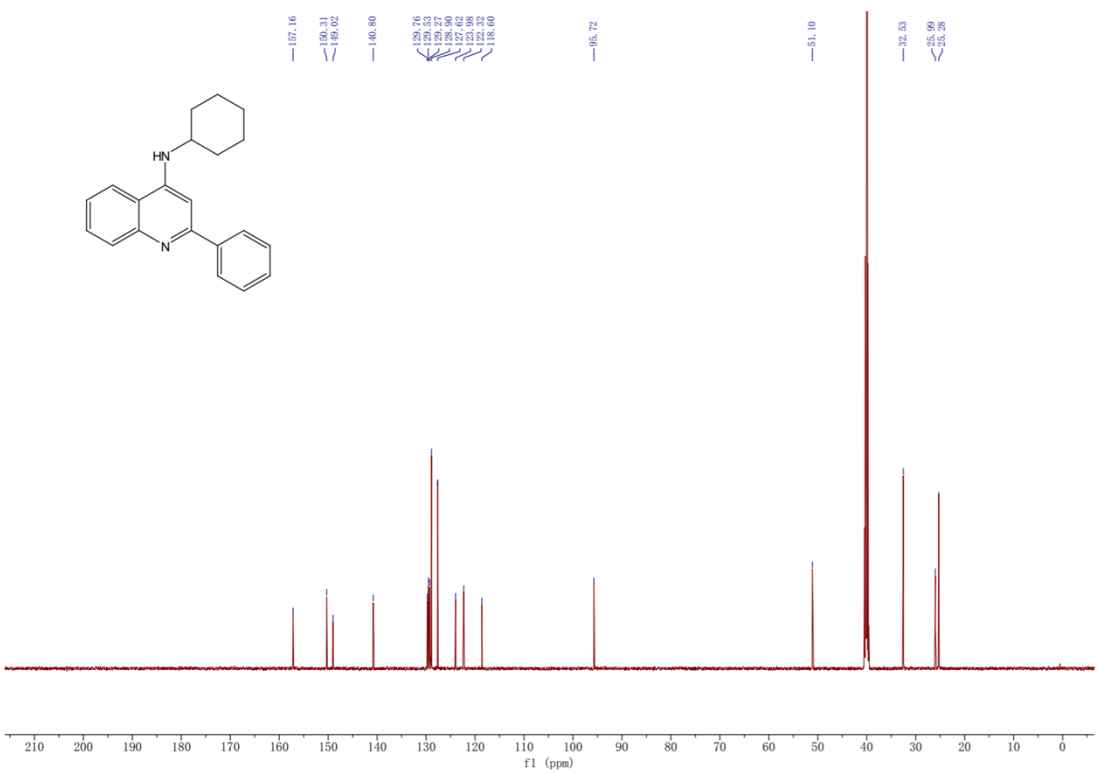


Figure S75. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5d**

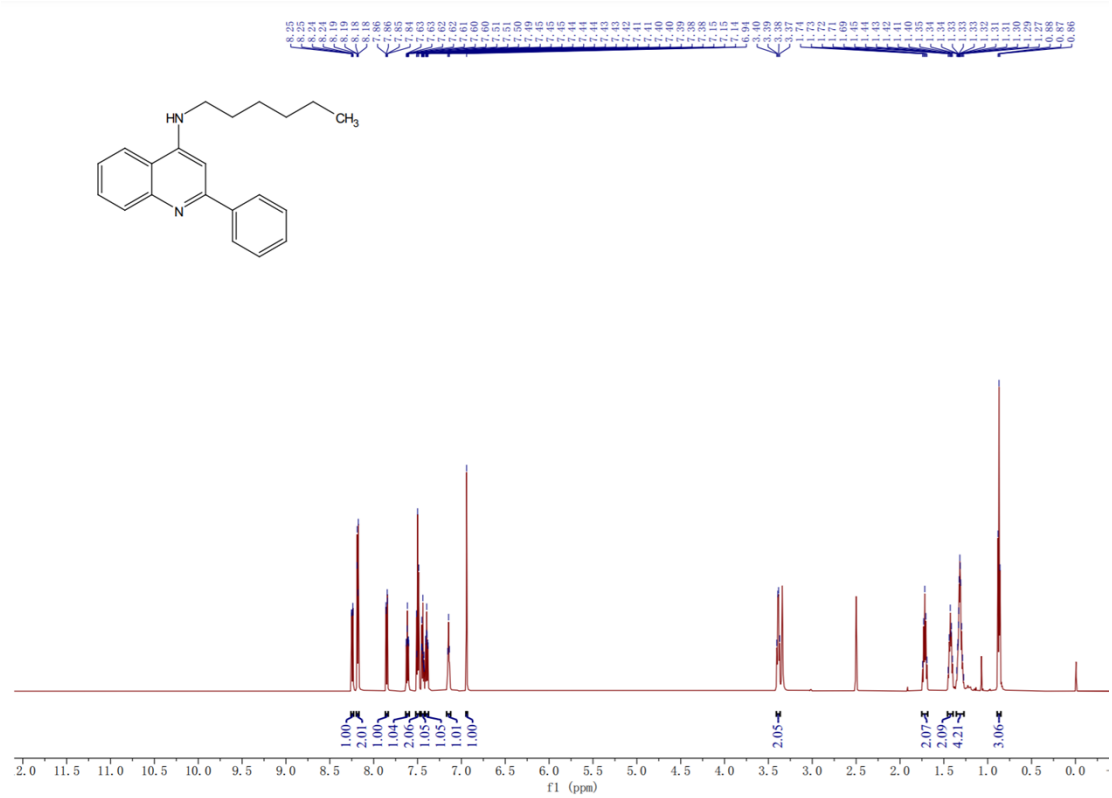


Figure S76. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5e**

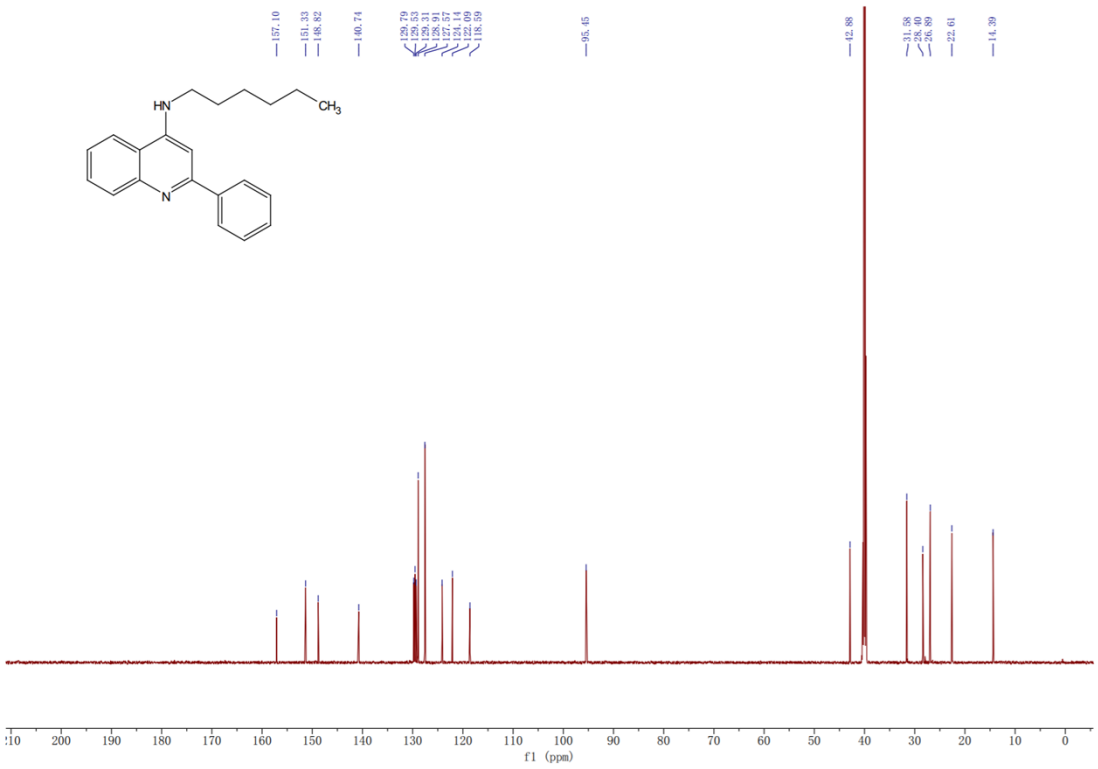


Figure S77. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5e**

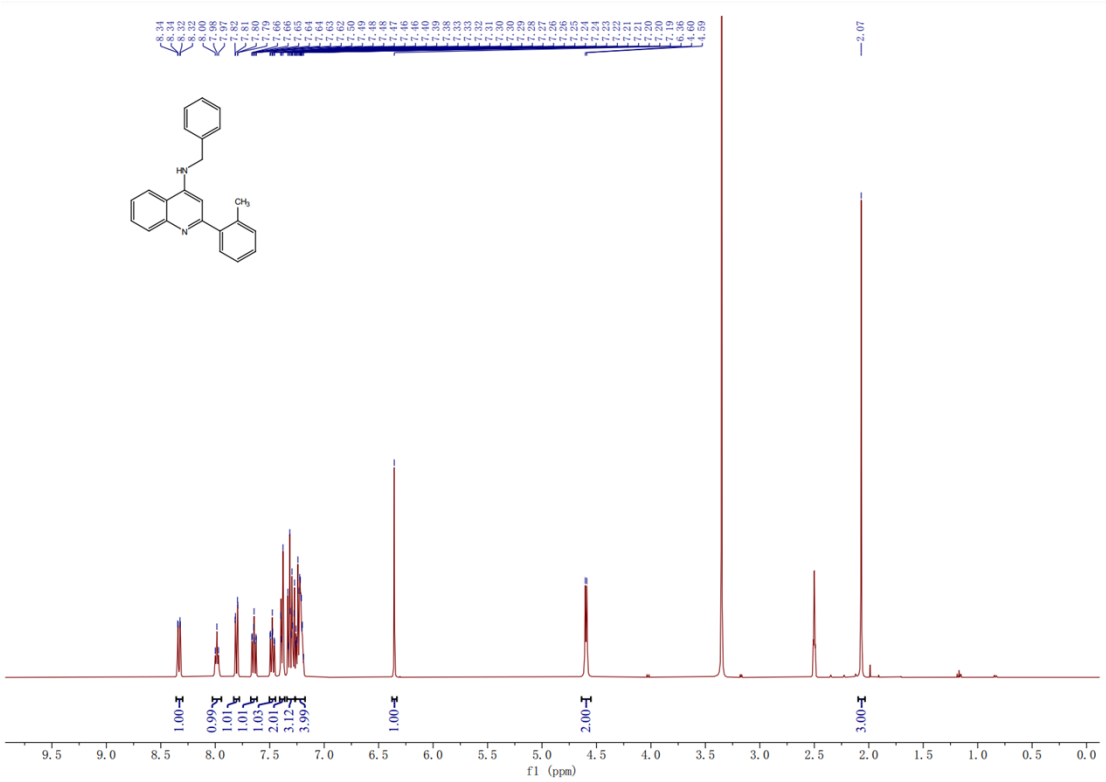


Figure S78. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5f**

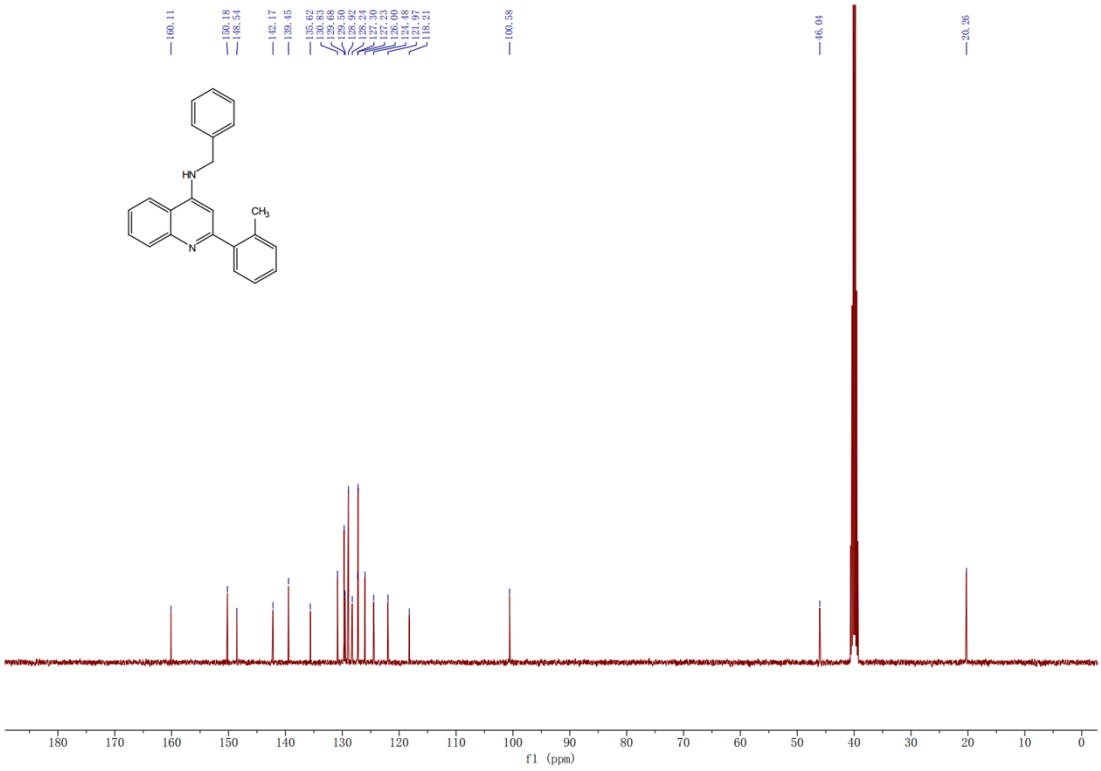


Figure S79. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5f**

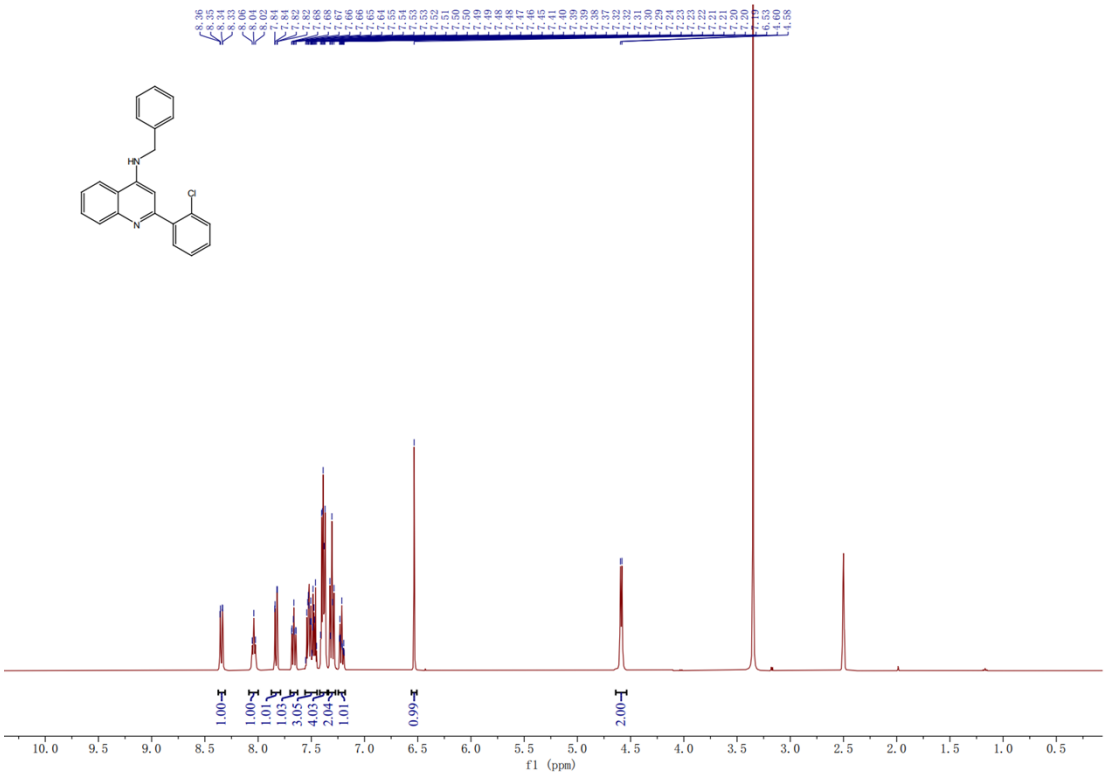


Figure S80. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5g**

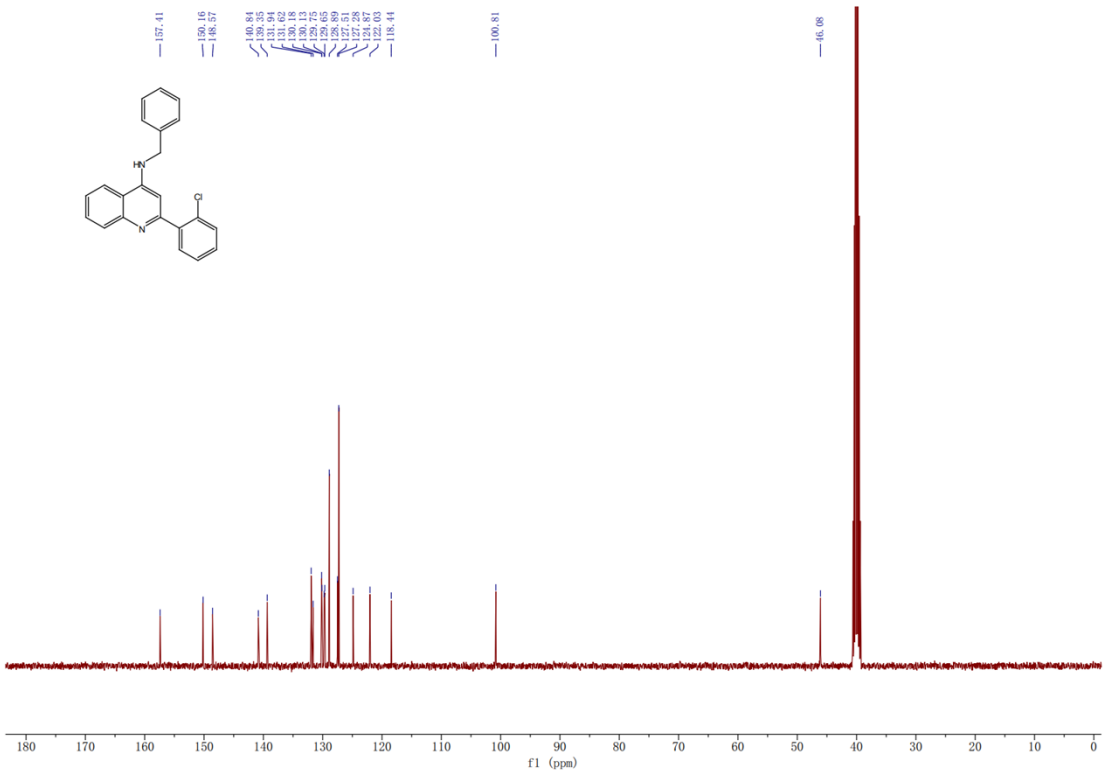


Figure S81. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5g**

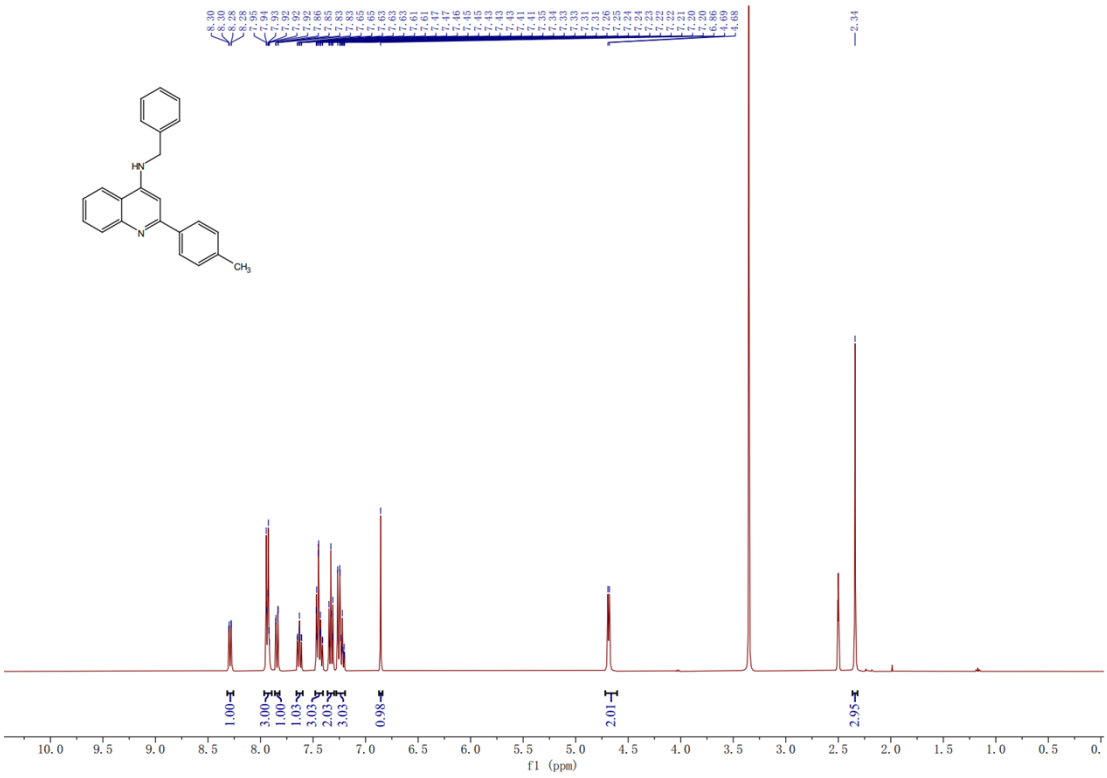


Figure S82. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **5h**

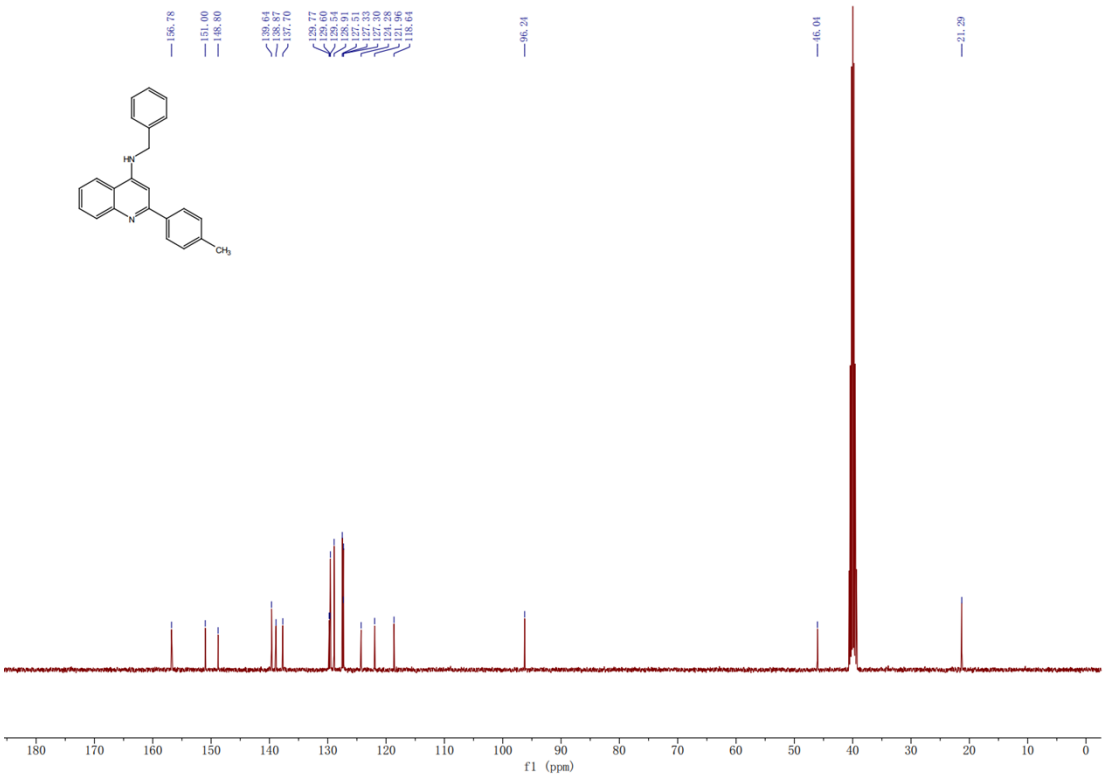


Figure S83. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **5h**

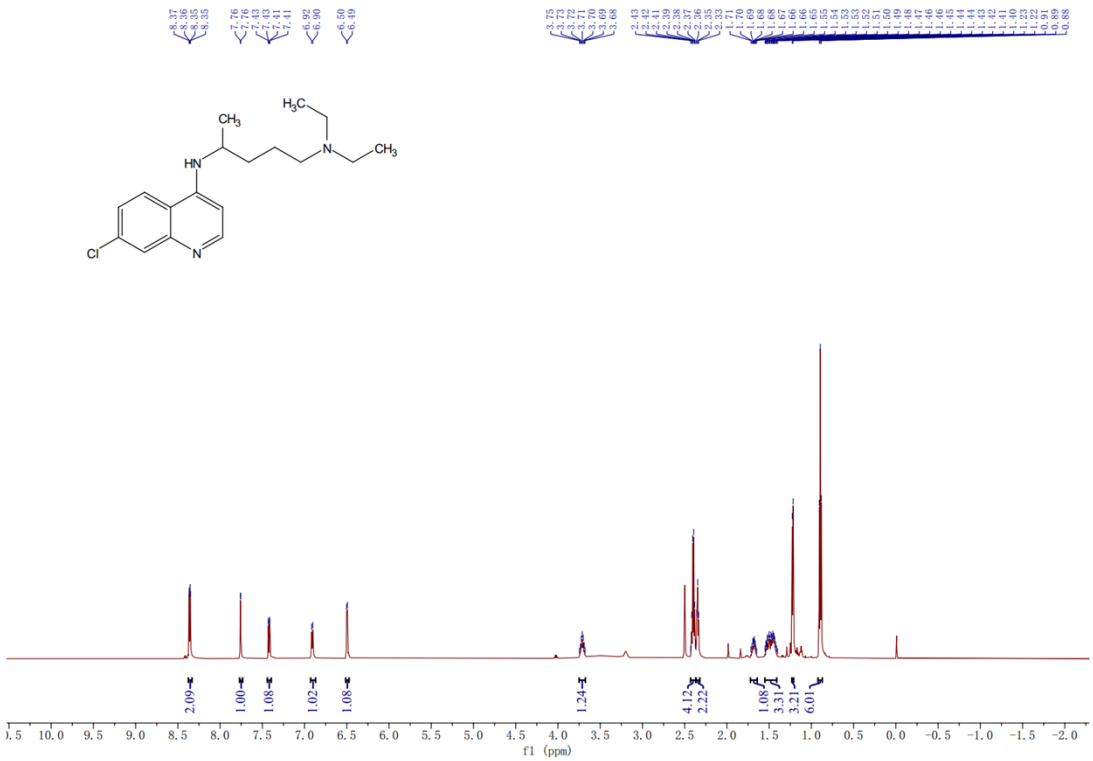


Figure S84. **^{1}H NMR** (600 MHz, DMSO-d_6) spectra of compound **6a**

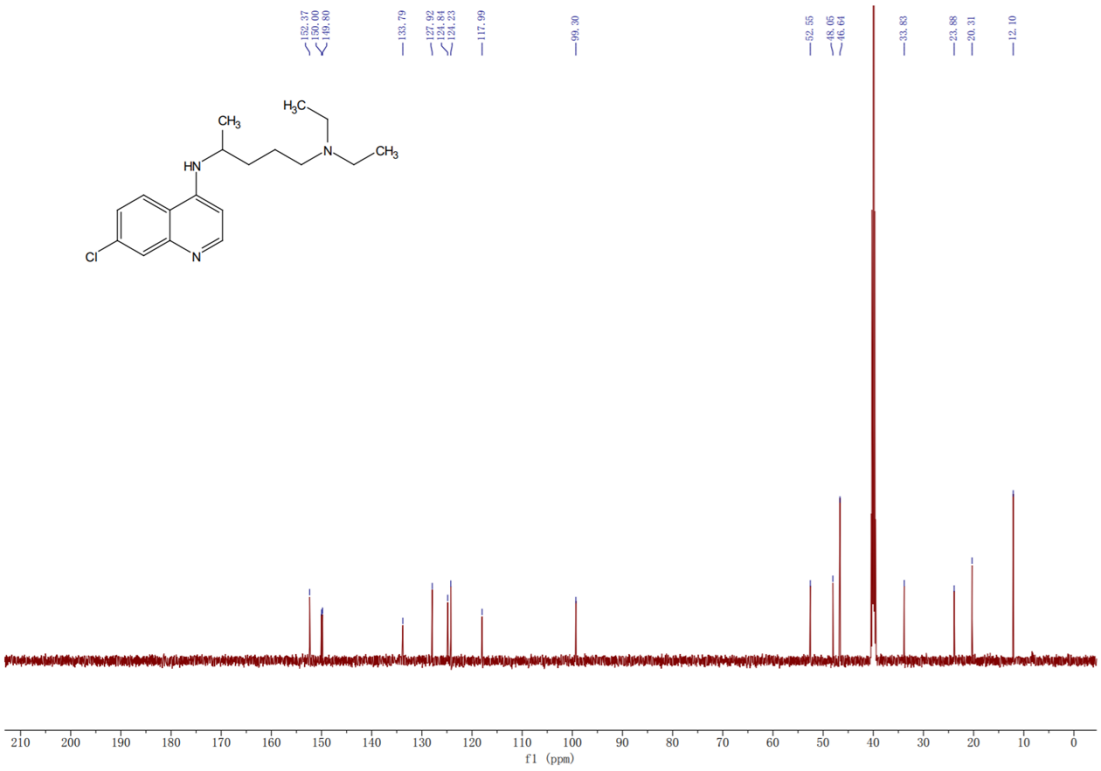


Figure S85. **^{13}C NMR** (151 MHz, DMSO) spectra of compound **6a**

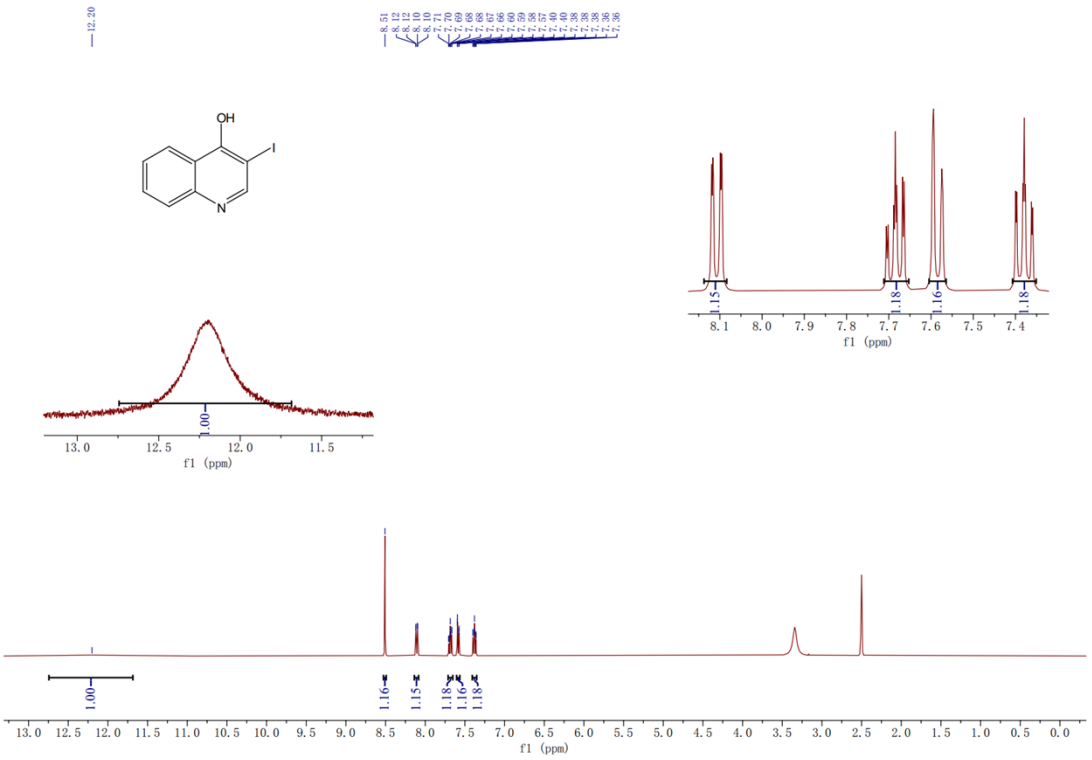


Figure S86. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **7**

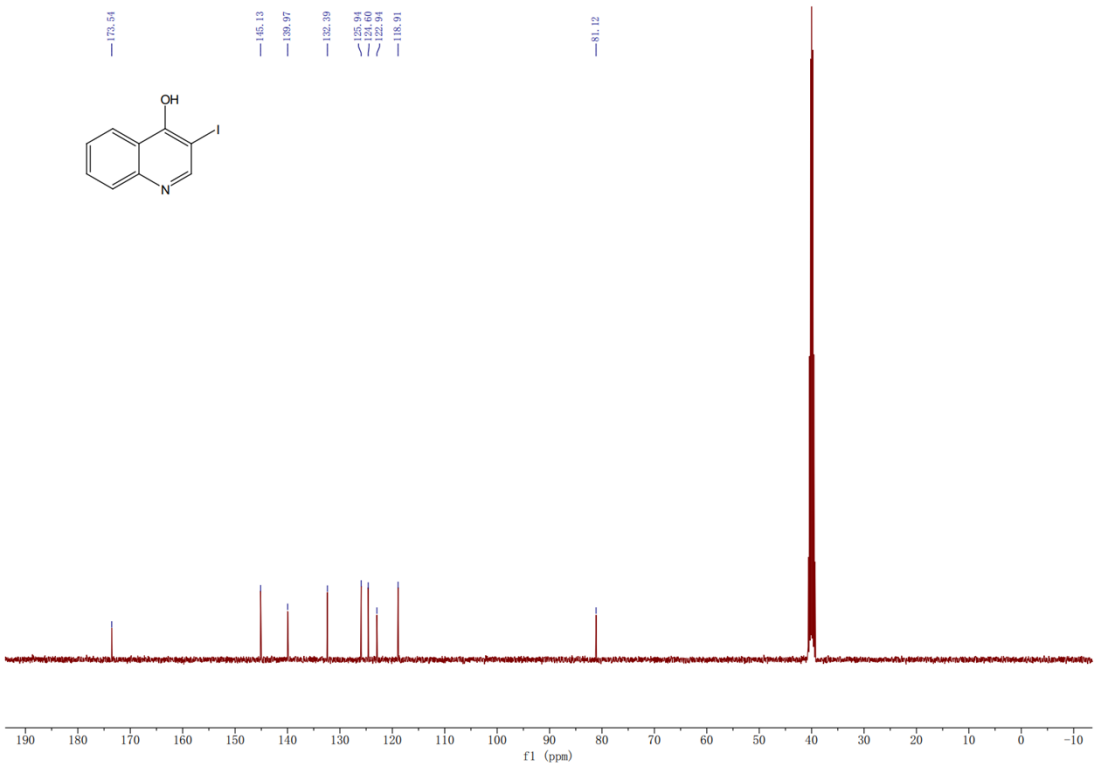


Figure S87. **^{13}C NMR** (101 MHz, DMSO) spectra of compound **7**

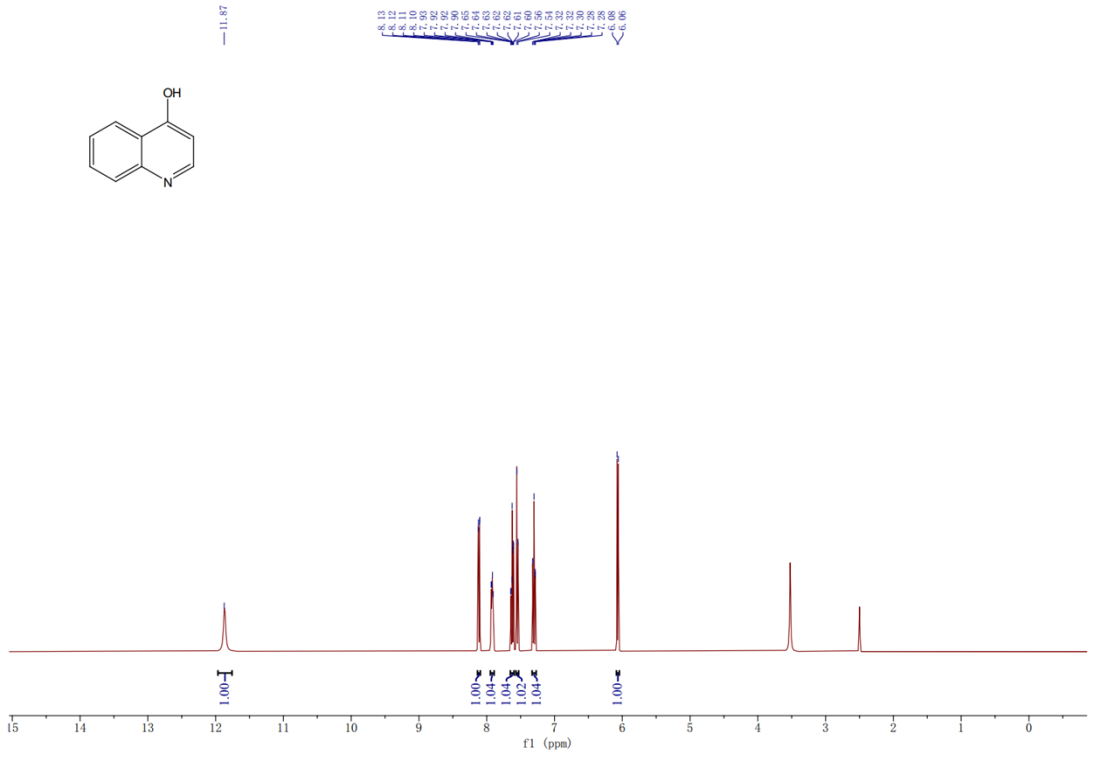


Figure S88. **^{1}H NMR** (400 MHz, DMSO-d_6) spectra of compound **8**

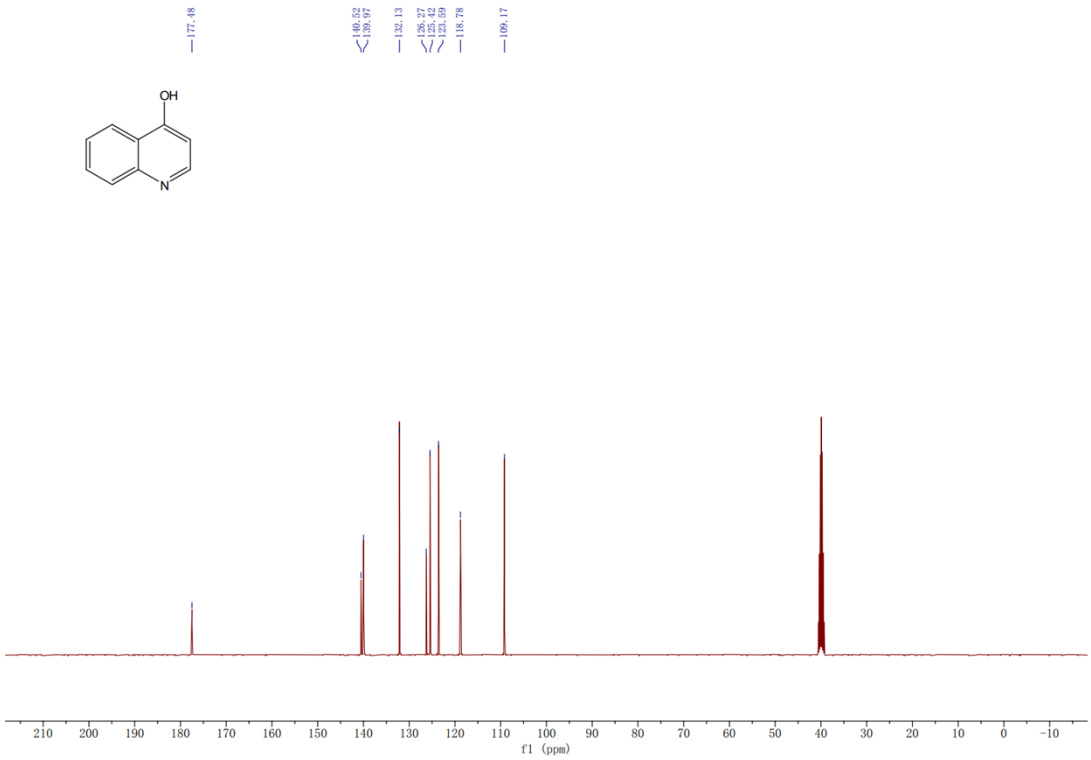
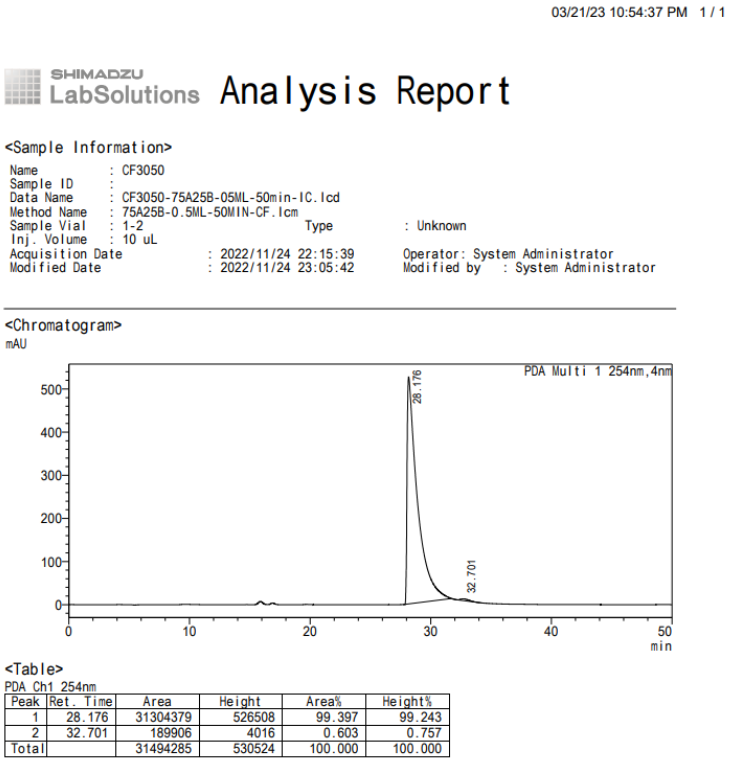


Figure S89. **^{13}C NMR** (101 MHz, DMSO) spectra of compound **8**

8. HPLC spectrum of product 3u.



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SHIMADZU LabSolutions Analysis Report

<Sample Information>

Name : CF3050
Sample ID :
Data Name : CF3050-75A25B-05ML-50min-IC.lcd
Method Name : 75A25B-0.5ML-50MIN-CF.lcm
Sample Vial : 1-2 Type : Unknown
Inj. Volume : 10 uL
Acquisition Date : 2022/11/24 22:15:39 Operator: System Administrator
Modified Date : 2022/11/24 23:05:42 Modified by : System Administrator

<Chromatogram>

mAU

PDA Multi 1 254nm,4nm

28.176
32.701

500 400 300 200 100 0
0 10 20 30 40 50
min

<Table>

PDA Ch1 254nm

Peak	Ret. Time	Area	Height	Area%	Height%
1	28.176	31304379	526508	99.397	99.243
2	32.701	189906	4016	0.603	0.757
Total		31494285	530524	100.000	100.000

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