Supporting Information

Dual Nickel/Photoredox-Catalyzed Acylation of Spiro-Dihyrdoquinazolinones with Carboxylic Acids via Aromatization-Driven Deconstructive Strategy

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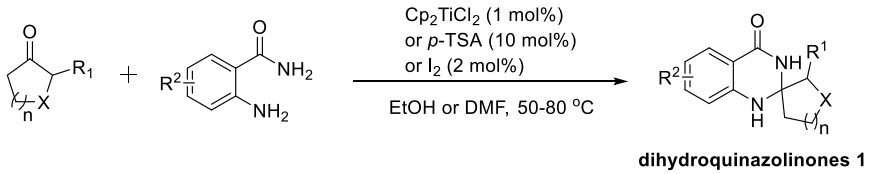
Table of Contents:

1. General Information

Unless otherwise noted, all reagents and solvents were purchased from commercial suppliers and used without further purification. Especially, NMP (Extra Dry, with molecular sieves, Water ≤ 50 ppm) were purchased from the company of Energy Chemical. A blue LEDs (λ =450 - 465 nm, 40 W) was used as the light source for all the photoredox catalyzed reactions. The photo-catalyzed reactions were conducted in oven-dried Schlenk-tube. Stern-Volmer quenching experiments were conducted on CARY Eclipse fluorescence spectrophotometer. NMR spectra were recorded on Bruker ADVANCE III (400 MHz) spectrometers for ^{1}H NMR, ^{13}C NMR and ^{19}F NMR. $CDCl_3$ as the solvent was used for the NMR analysis, with tetramethylsilane as the internal standard. Chemical shifts were reported up field to TMS (0.00 ppm) for ^{1}H NMR and relative to $CDCl_3$ (77.00 ppm) for ^{13}C NMR. Column Chromatography was performed with silica gel Merck 60 (200-300 mesh). All new products were further characterized by ESI-HRMS.

2. Experimental Procedure

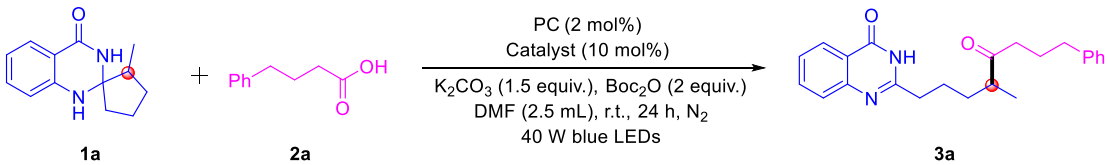
2.1. General procedure for synthesis of dihydroquinazolinones 1[1]



According to literature reports, A 50 mL oven-dried round-bottom flask equipped with a magnetic stirrer was charged with 2-aminobenzamide (10 mmol, 1.0 equiv.), corresponding cyclic ketone (11 mmol, 1.1 equiv.) and Cp_2TiCl_2 (1 mol%) or *p*-TSA (10 mol%) (or 5 mol% I_2) were dissolved in 10 mL EtOH (or 20 mL DMF) in one portion under nitrogen. The reaction mixture was stirred at 50-80 ℃for 24 h. After completion of the reaction, the reaction mixture was cooled to room temperature and quenched with distilled water. The resulting mixture was extracted with EtOAc (3×10 mL), and the combined organic layers were washed with saturated NaCl solution and dried over anhydrous Na2SO4, filtered and concentrated under reduced pressure. The crude products were purified by recrystallization from EtOH to give the desired product **1**. Or the residue was purified by silica gel flash column chromatography (PE/EtOAc = 2/1 to 1/1) to give the desired product **1**.

2.2. Optimization of reaction conditions

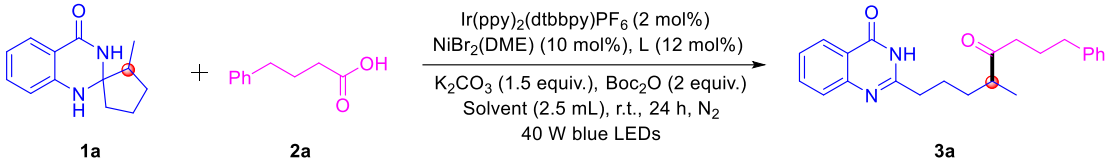
Table S1 *Screening of photocatalysts (PC) and catalysts* [a]

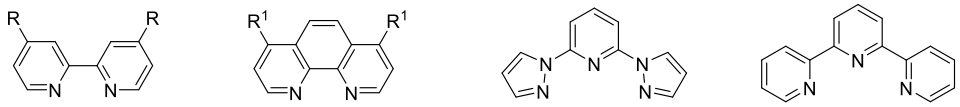


Entry	PC	Catalyst	Yield (%)[b]
1	$Ir(ppy)_2(dtbbpy)PF_6$	$Ni(dtbbpy)Br_2$	53
2	4CzIPN	$Ni(dtbbpy)Br_2$	-
3	$Ru(bpy)_3(PF_6)_2$	$Ni(dtbbpy)Br_2$	trace
4	N-Me MesACr$^+$BF$_4^-$	$Ni(dtbbpy)Br_2$	-
5	Eosin Y	$Ni(dtbbpy)Br_2$	-
6	*fac*-$Ir(ppy)_3$	$Ni(dtbbpy)Br_2$	-
7	$Ir[dF(Me)ppy]_2(dtbbpy)PF_6$	$Ni(dtbbpy)Br_2$	trace
8	$Ir(dFppy)_2(bpy)PF_6$	$Ni(dtbbpy)Br_2$	trace
9	$Ir[dF(CF_3)ppy]_2(dtbbpy)PF_6$	$Ni(dtbbpy)Br_2$	23
10[c]	$Ir(ppy)_2(dtbbpy)PF_6$	$NiBr_2$ + dtbbpy	54
11[c]	$Ir(ppy)_2(dtbbpy)PF_6$	$NiBr_2$(DME) + dtbbpy	55
12[c]	$Ir(ppy)_2(dtbbpy)PF_6$	$NiCl_2$(DME) + dtbbpy	42

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (0.4 mmol, 2.0 eq.), **PC** (2 mol%), catalyst (10 mol%), K_2CO_3 (0.3 mmol, 1.5 eq.), Boc_2O (0.4 mmol, 2.0 eq.), DMF (2.5 mL), 40 W blue LEDs irradiation at room temperature for 24 h under N_2 atmosphere. [b]Isolated yield. [c]10 mol% Ni catalyst and 12 mol% dtbbpy was added.

Table S2 *Screening of ligands (L) and solvent* [a]





L_1, R = H
L_2, R = OMe
L_3, R = Ph
L_4, R = ^{t}Bu

L_5, R = H
L_6, R = Ph

L_7

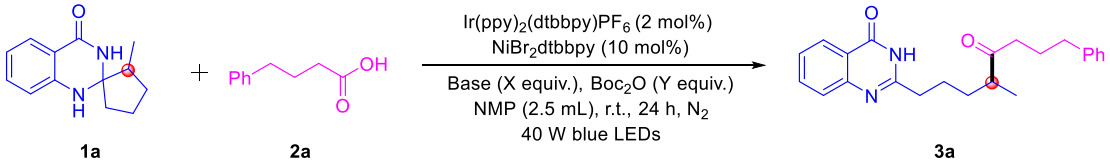
L_8

Entry	L	Solvent	Yield (%)[b]
1	**L_1**	DMF	trace
2	**L_2**	DMF	28
3	**L_3**	DMF	24
4	**L_4**	DMF	53
5	**L_5**	DMF	24
6	**L_6**	DMF	28
7	**L_7**	DMF	-
8	**L_8**	DMF	-
9	**L_4**	NMP	57
10	**L_4**	DMA	47
11	**L_4**	DMSO	21

12	**L4**	DCM	-
13	**L4**	Toluene	-
14	**L4**	MeCN	-

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (0.4 mmol, 2.0 eq.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $NiBr_2$(DME) (10 mol%), **L** (12 mol%), K_2CO_3 (0.3 mmol, 1.5 eq.), Boc_2O (0.4 mmol, 2.0 eq.), solvent (2.5 mL), 40 W blue LEDs irradiation at room temperature for 24 h under N_2 atmosphere. [b]Isolated yield.

Table S3 *Screening of base and* Boc_2O [a]

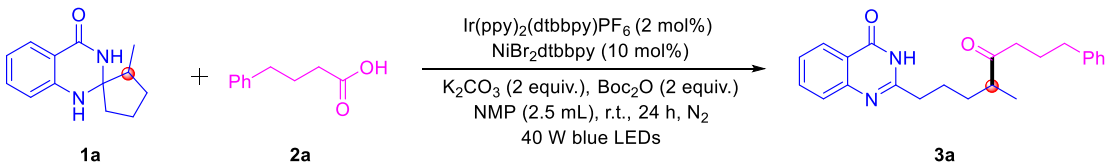


1a **2a** **3a**

Entry	Base	X	Y	Yield (%)[b]
1	K_2CO_3	1.5	2	57
2	Cs_2CO_3	1.5	2	trace
3	Na_2CO_3	1.5	2	58
4	$NaHCO_3$	1.5	2	57
5	K_3PO_4	1.5	2	trace
6	K_2HPO_4	1.5	2	32
7	TMG	1.5	2	29
8	DBU	1.5	2	43
9	Collidine	1.5	2	24
10	Et_3N	1.5	2	trace
11	K_2CO_3	2	2	71
12	Na_2CO_3	2	2	58
13	K_2CO_3	2.5	2	61
14	K_2CO_3	2	1.5	58
15	K_2CO_3	2	2.5	46

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (0.4 mmol, 2.0 eq.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), Ni(dtbbpy)Br_2 (10 mol%), base (X eq.), Boc_2O (Y eq.), NMP (2.5 mL), 40 W blue LEDs irradiation at room temperature for 24 h under N_2 atmosphere. [b]Isolated yield.

Table S4 *Control experiments* [a]



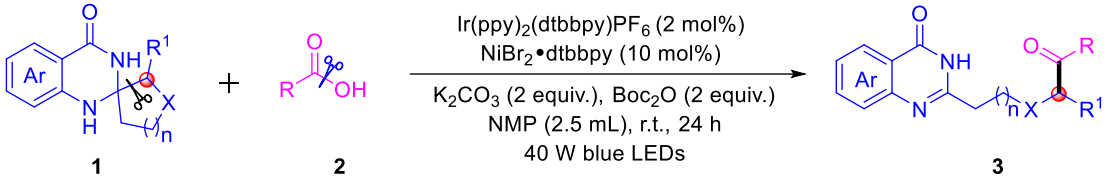
1a **2a** **3a**

Entry	Variation from standard conditions	Yield (%)[b]

1	None	71
2	No PC	-
3	No $Ni(dtbbpy)Br_2$	-
4	No K_2CO_3	-
5	No Boc_2O	-
6	No blue LEDs	-

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (0.4 mmol, 2.0 eq.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $Ni(dtbbpy)Br_2$ (10 mol%), K_2CO_3 (0.4 mmol, 2.0 eq.), Boc_2O (0.4 mmol, 2.0 eq.), NMP (2.5 mL), 40 W blue LEDs irradiation at room temperature for 24 h under N_2 atmosphere. [b]Isolated yield.

2.3. General procedure for the synthesis of product 3

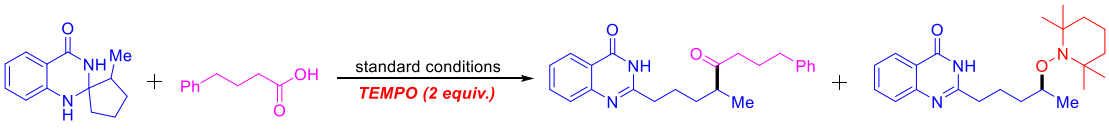


1 **2** **3**

To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added substrate **1** (0.2 mmol, 1 equiv.), **2** (0.4 mmol, 2 equiv.), K_2CO_3 (0.4 mmol, 2 equiv.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $Ni(dtbbpy)Br_2$ (10 mol%), and Boc_2O (0.4 mmol, 2 equiv.). The tube was sealed, evacuated and backfilled with argon three times, then dry NMP (2.5 mL) was added by syringe under nitrogen atmosphere. The resulting mixture was then allowed to stir at room temperature and irradiated with 40 W blue LEDs for 24 h. The reaction mixture was quenched with water (8 mL) and extracted with ethyl acetate (3×5 mL), the combined organic layers were washed with brine (10 mL), dried over anhydrous Na_2SO_4 and concentrated in vacuo. The residue was purified by column chromatography on silica gel (PE/EA =2/1 - 1/1) to afford the desired product **3**.

3. Mechanistic Studies

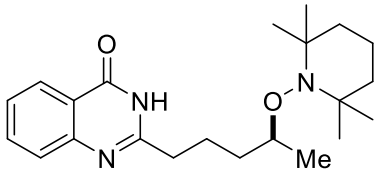
3.1. Radical trapping experiment



1a **2a** **3a**, 0% **4a**, 57%

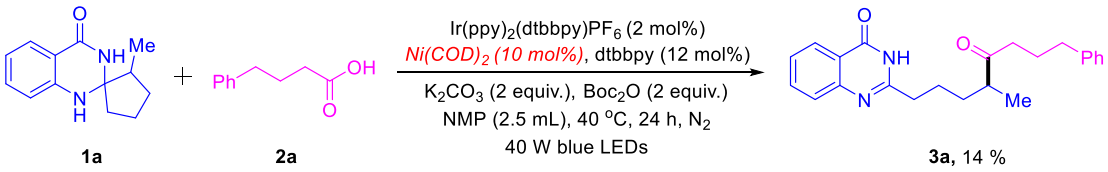
To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added substrate **1a** (0.2 mmol, 1 equiv.), **2a** (0.4 mmol, 2 equiv.), K_2CO_3 (0.4 mmol, 2 equiv.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $Ni(dtbbpy)Br_2$ (10 mol%), Boc_2O (0.4 mmol, 2 equiv.) and TEMPO (0.4 mmol, 2 equiv.). The tube was sealed, evacuated and backfilled with nitrogen three times, then dry NMP (2.5 mL) was added by syringe

under nitrogen atmosphere. The resulting mixture was then allowed to stir at room temperature and irradiated with 40 W blue LEDs for 24 h. After that, it was found that the formation of **3a** was inhibited. The crude product was purified by column chromatography on silica gel (PE/EA =5/1 - 2/1) to afford compound **4a** as a white solid (42 mg, 57% yield).



2-(4-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)pentyl)quinazolin-4(3H)-one 4a
^{1}H NMR (400 MHz, $CDCl_3$) δ 12.43 (brs, 1H), 8.30 (d, *J* = 7.9 Hz, 1H), 7.83 - 7.75 (m, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.47 (t, *J* = 7.4 Hz, 1H), 4.08 - 3.90 (m, 1H), 2.93 - 2.78 (m, 2H), 2.09 - 1.92 (m, 2H), 1.89 - 1.78 (m, 1H), 1.66 - 1.38 (m, 6H), 1.34 - 1.19 (m, 4H), 1.09 (s, 12H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.55, 156.91, 149.45, 134.67, 127.12, 126.18, 120.39, 77.88, 40.15, 36.15, 35.78, 34.33, 23.89, 20.33, 19.70, 17.22.

3.2. Demonstration of the presence of Ni(0) species



1a **2a** **3a**, 14 %

To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added substrate **1a** (0.2 mmol, 1 equiv.), **2a** (0.4 mmol, 2 equiv.), K_2CO_3 (0.4 mmol, 2 equiv.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $Ni(COD)_2$ (10 mol%), dtbbpy (12 mol%) and Boc_2O (0.4 mmol, 2 equiv.). The tube was sealed, evacuated and backfilled with nitrogen three times, then dry NMP (2.5 mL) was added by syringe under nitrogen atmosphere. The resulting mixture was then allowed to stir at 40 °C and irradiated with 40 W blue LEDs for 24 h. The reaction mixture was quenched with water (8 mL) and extracted with ethyl acetate (3×5 mL), the combined organic layers were washed with brine (10 mL), dried over anhydrous Na_2SO_4 and concentrated in vacuo. The residue was purified by column chromatography on silica gel (PE/EA =2/1 - 1/1) to afford the desired product **3a** as white solid (10 mg, 14% yield).

3.3. Light on-off experiments

We applied the light on-off experiments to monitor the process of this reaction. According to **2.2. General Procedure**, six parallel reactions with serial numbers

from1 to 6 were performed with **1a** (0.2 mmol, 1 equiv.), **2a** (0.4 mmol, 2 equiv.) and Boc_2O (0.4 mmol, 2 equiv.), each reaction at different times affords the desired product **3a** by silica gel column chromatography (**Figure S1**). The white area indicates the light irradiation, while the grey area indicates the reaction mixture is placed in the dark.

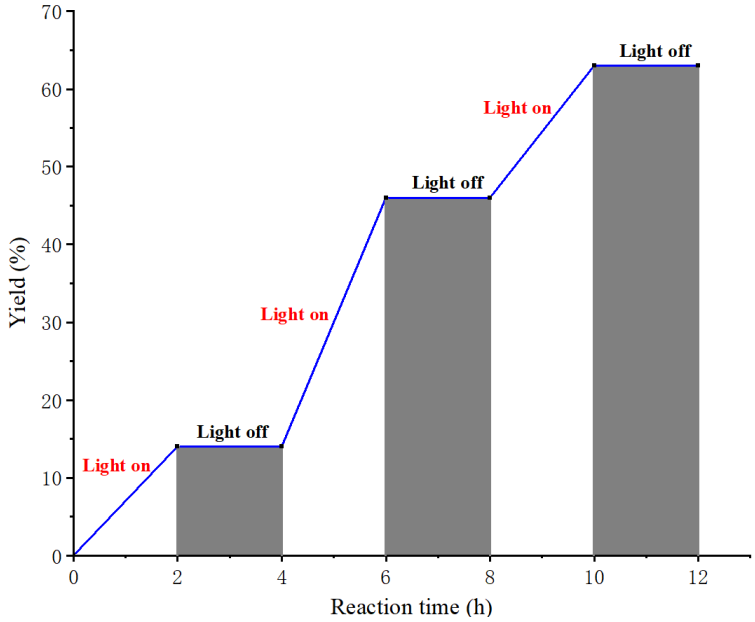


Figure S1. The light on-off experiments

3.4. Stern-Volmer studies

Stern-Volmer quenching experiments were conducted on a spectrophotometer. Fresh stock solutions of $Ir(ppy)_2(dtbbpy)PF_6$ (5×10^{-4} M) with variable concentrations (0.2, 0.4, 0.6, 0.8, 1.0 mM) of **1a** and **2a** in dry NMP were prepared in quartz cuvettes. The samples were irradiated at 490 nm, and emission intensity at 575 nm were recorded. Stern-Volmer plots for each component are listed below.

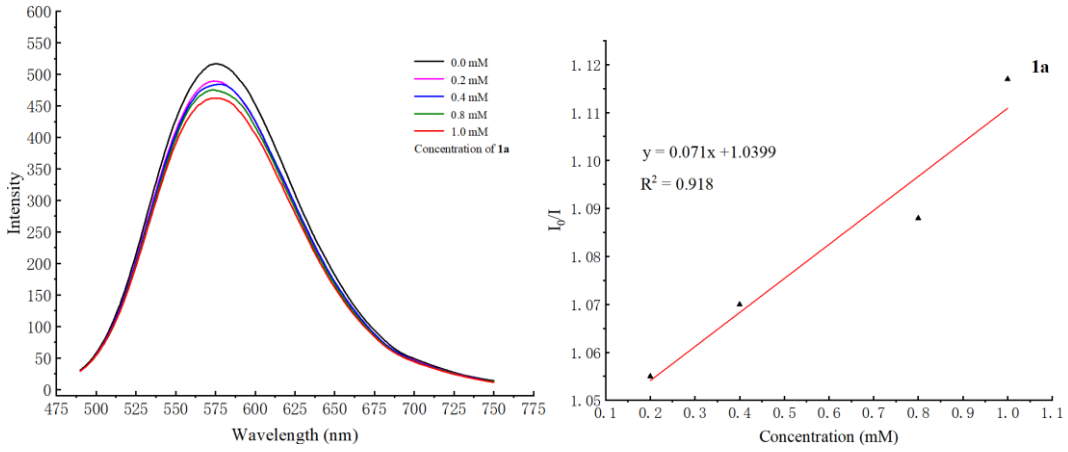


Figure S2. Stern-Volmer plot of $Ir(ppy)_2(dtbbpy)PF_6$ with varied **1a** in NMP

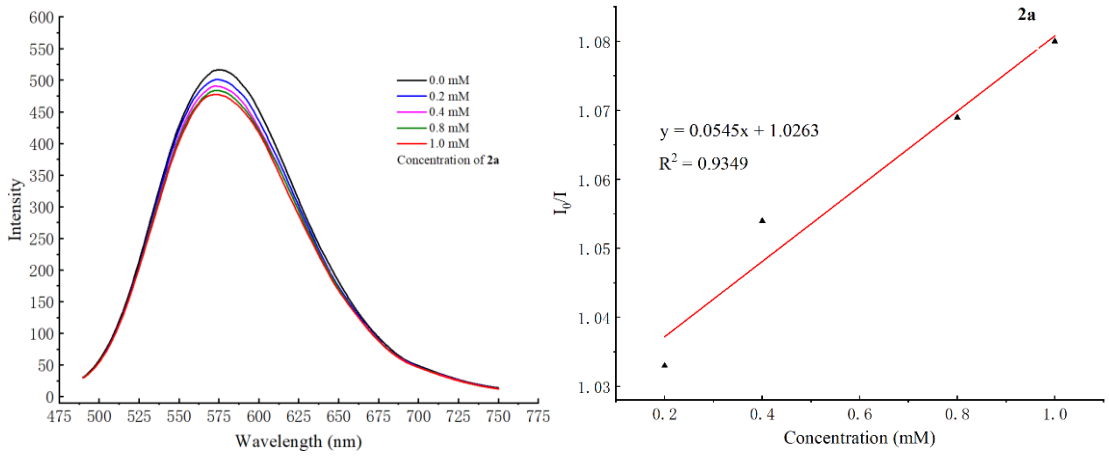


Figure S3. Stern-Volmer plot of $Ir(ppy)_2(dtbbpy)PF_6$ with varied **2a** in NMP

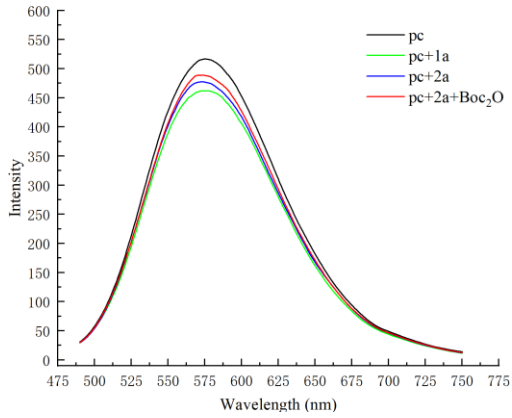


Figure S4. Stern-Volmer plot of $Ir(ppy)_2(dtbbpy)PF_6$ with each sample in NMP

3.5. Quantum Yield Experiment

Determination of the light intensity at 455 nm

Following a literature procedure of Yoon,[2] the photon flux of the LED (40 W, λ_{max} = 455 nm) was determined by standard ferrioxalate actinometry.[3] A 0.15 M ferrioxalate solution was prepared by dissolving 737 mg of potassium ferrioxalate hydrate in 10 mL of 0.05 M H_2SO_4 aqueous solution. A buffered solution of 1,10-phenanthroline was prepared by dissolving 25 mg of phenanthroline and 5.63 g of sodium acetate in 25 mL of 0.5 M H_2SO_4 aqueous solution. Both solutions were stored in the dark. To determine the photon flux of the LED, 4.0 mL of the ferrioxalate solution was placed in 8.0 mL vial and irradiated for 30 s at λ_{max} = 455 nm. After irradiation, the phenanthroline solution (700 μL) was added to the vial and the mixture was rested for 1 h in the dark to allow the ferrous ions to completely coordinate to the phenanthroline. The solution was transferred to a quartz cuvette and the absorption of the solution was measured at 510 nm. A non-irradiated sample was also prepared and the absorption at 510 nm was measured. Each sample preparation and measurement were repeated two more times. The average of the absorption of the irradiated and non-irradiated samples was determined and used to calculate the conversion applying eq. 1.

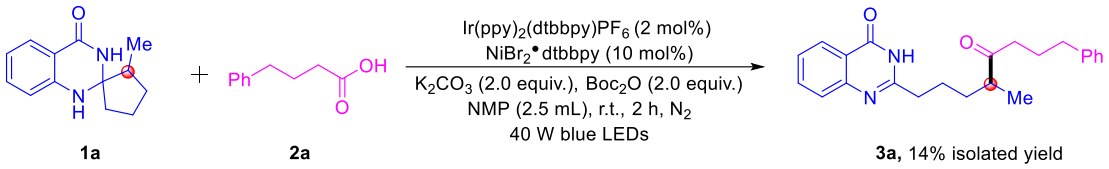
$$mol\ Fe^{2+} = \frac{V \cdot \Delta A\ (510\ nm)}{l \cdot \varepsilon} \qquad (1)$$

Where V is the total volume (0.0047 L) of the solution after addition of phenanthroline, ΔA is the difference in absorption at 510 nm between the irradiated and non-irradiated solutions, l is the path length (1.0 cm), and ε is the molar absorptivity at 510 nm (11,100 L $mol^{-1}cm^{-1}$). The photon flux can be calculated using eq. 2.

$$Photon\ flux = \frac{mol\ Fe^{2+}}{\Phi \cdot t \cdot f} \qquad (2)$$

Where Φ is the quantum yield for the ferrioxalate actinometer (0.93 for a 0.15M solution at λ_{max} = 455 nm),[3c] t is the irradiation time (30 s), and f is the fraction of light absorbed at λ = 455 nm (0.961). The photon flux was calculated (average of three experiments) to be $2.30 \cdot 10^{-8}$ ensteins s^{-1}.

Determination of the reaction quantum yield



1a **2a** **3a,** 14% isolated yield

To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added substrate **1a** (0.2 mmol, 1 equiv.), **2a** (0.4 mmol, 2 equiv.), K_2CO_3 (0.4 mmol, 2 equiv.), $Ir(ppy)_2(dtbbpy)PF_6$ (2 mol%), $Ni(dtbbpy)Br_2$ (10 mol%), and Boc_2O (0.4 mmol, 2 equiv.). The tube was sealed, evacuated and backfilled with argon three times, then dry NMP (2.5 mL) was added by syringe under nitrogen atmosphere. The resulting mixture was then allowed to stir at room temperature and irradiated with 40 W blue LEDs for 2 h. The reaction mixture was quenched with water (8 mL) and extracted with ethyl acetate (3×5 mL), the combined organic layers were washed with brine (10 mL), dried over anhydrous Na_2SO_4 and concentrated in vacuo. The residue was purified by column chromatography on silica gel to afford the desired product with 14% ($0.2 \times 0.14 = 2.8 \times 10^{-5}$ mol) isolated yield. The quantum yield was calculated using the equation eq.3.

$$\Phi = \frac{n\ (product)}{photon\ flux \cdot t \cdot f_R} \qquad (3)$$

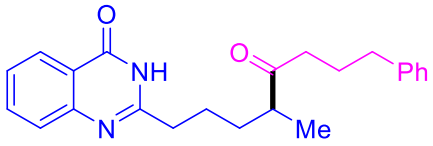
The reaction quantum yield (Φ) was calculated using eq. 3 where the photon flux is $1.73 \cdot 10^{-8}$ ensteins s^{-1} (determined by actinometry as described above), t is the reaction time (7200 s) and f_R is the fraction of incident light absorbed by the reaction mixture, determined using eq. 4 where A (455 nm) is the absorption of the reaction mixture at 455 nm.

$$f_R = 1 - 10^{-A\ (455\ nm)} \qquad (4)$$

An absorption spectrum of the reaction mixture gave an absorbance value of 1.442 at 455 nm, indicating that the fraction of absorbed light (f_R) is 0.964.

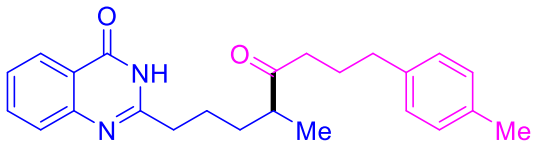
The reaction quantum yield (Φ) was thus determined to be Φ = 0.18. This result suggests that a radical chain mechanism is unlikely under this reaction conditions.

4. Characterization Data for the Products



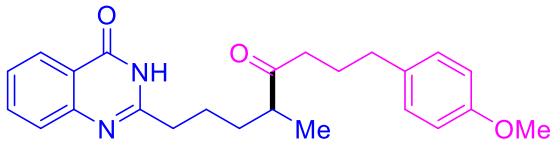
2-(4-methyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3a

White solid in 71% yield (52 mg); R_f = 0.38 (EA/PE = 1/1); m.p. = 103.6 - 104.6 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.39 (brs, 1H), 8.30 (d, *J* = 7.8 Hz, 1H), 7.77 (t, *J* = 7.5 Hz, 1H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.47 (t, *J* = 7.4 Hz, 1H), 7.29 - 7.21 (m, 2H), 7.20 - 7.09 (m, 3H), 2.88 - 2.73 (m, 2H), 2.66 - 2.52 (m, 3H), 2.52 - 2.39 (m, 2H), 1.97 - 1.76 (m, 5H), 1.57 - 1.41 (m, 1H), 1.09 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.11, 164.50, 156.34, 149.38, 141.54, 134.79, 128.35, 128.28, 127.16, 126.38, 126.16, 125.83, 120.39, 45.93, 40.27, 35.61, 35.02, 32.12, 24.99, 16.36; ESI-HRMS Calculated for $C_{23}H_{27}N_2O_2^+$ ($[M+H]^+$): 363.2067, found: 363.2074.



2-(4-methyl-5-oxo-8-(p-tolyl)octyl)quinazolin-4(3H)-one 3b

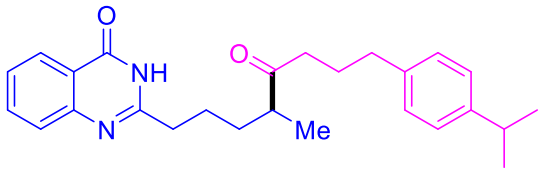
White solid in 57% yield (43 mg); R_f = 0.30 (EA/PE = 1/1); m.p. = 147.4 - 148.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.36 (brs, 1H), 8.29 (d, *J* = 7.9 Hz, 1H), 7.83 - 7.75 (m, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.47 (t, *J* = 7.4 Hz, 1H), 7.13 - 7.00 (m, 4H), 2.86 - 2.72 (m, 2H), 2.60 - 2.50 (m, 3H), 2.49 - 2.41 (m, 2H), 2.29 (s, 3H), 1.94 - 1.73 (m, 5H), 1.54 - 1.42 (m, 1H), 1.09 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.22, 164.51, 156.33, 149.30, 138.41, 135.23, 134.82, 128.99, 128.94, 128.29, 128.21, 127.08, 126.41, 126.16, 120.30, 45.90, 40.30, 35.55, 34.56, 32.08, 25.09, 24.99, 20.92, 16.35; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ($[M+H]^+$): 377.2224, found: 377.2218.



2-(8-(4-methoxyphenyl)-4-methyl-5-oxooctyl)quinazolin-4(3H)-one 3c

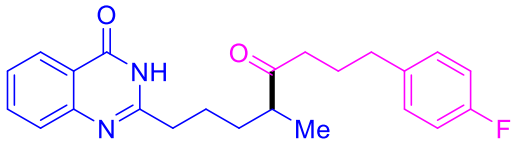
White solid in 54% yield (42 mg); R_f = 0.25 (EA/PE = 1/1); m.p. = 132.2 - 133.3 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.39 (brs, 1H), 8.29 (d, *J* = 7.9 Hz, 1H), 7.80 - 7.74 (m, 1H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.52 - 7.41 (m, 1H), 7.03 (d, *J* = 8.4 Hz, 2H), 6.78 (d, *J* = 8.5 Hz, 2H), 3.75 (s, 3H), 2.86 - 2.74 (m, 2H), 2.65 - 2.48 (m, 3H), 2.47 - 2.36 (m, 2H), 1.99 - 1.75 (m, 5H), 1.54 - 1.42 (m, 1H), 1.08 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.23, 164.48, 157.66, 156.35, 149.30, 134.77, 133.55, 129.30, 129.20, 127.07, 126.37, 126.13, 120.31, 113.62, 55.11, 45.89, 40.22, 35.54, 34.07, 32.08, 25.21, 24.98, 16.34; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_3^+$ ($[M+H]^+$):

393.2173, found:393.2175.



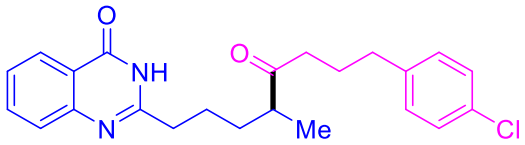
2-(8-(4-isopropylphenyl)-4-methyl-5-oxooctyl)quinazolin-4(3H)-one 3d

White solid in 31% yield (25 mg); R_f = 0.42 (EA/PE = 1/1); m.p. = 93.6 - 94.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.90 (brs, 1H), 8.22 (d, *J* = 7.8 Hz, 1H), 7.70 (t, *J* = 7.4 Hz, 1H), 7.62 (d, *J* = 8.1 Hz, 1H), 7.40 (t, *J* = 7.4 Hz, 1H), 7.04 - 6.94 (m, 4H), 2.83 - 2.65 (m, 2H), 2.58 - 2.43 (m, 3H), 2.37 - 2.32 (m, 2H), 1.88 - 1.70 (m, 6H), 1.47 - 1.35 (m, 1H), 1.02 (d, *J* = 6.9 Hz, 3H), 0.80 (d, *J* = 6.6 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.24, 164.23, 156.23, 149.33, 139.18, 138.72, 134.82, 129.04, 128.08, 127.18, 126.45, 126.24, 120.47, 45.95, 44.97, 40.41, 35.67, 34.68, 32.12, 30.21, 25.12, 25.02, 22.35, 16.44; ESI-HRMS Calculated for $C_{26}H_{32}N_2O_2Na^+$ ($[M+Na]^+$): 427.2356, found: 427.2351.



2-(8-(4-fluorophenyl)-4-methyl-5-oxooctyl)quinazolin-4(3H)-one 3e

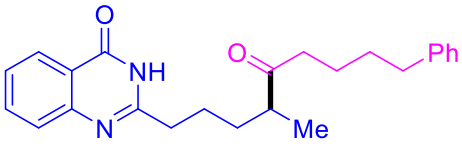
White solid in 49% yield (37 mg); R_f = 0.30 (EA/PE = 1/1); m.p. = 120.0 - 120.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.38 (brs, 1H), 8.35 - 8.22 (m, 1H), 7.82 - 7.72 (m, 1H), 7.67 (d, *J* = 8.1 Hz, 1H), 7.50 - 7.41 (m, 1H), 7.102 - 7.00 (m, 2H), 6.95 - 6.86 (m, 2H), 2.86 - 2.71 (m, 2H), 2.61 - 2.49 (m, 3H), 2.47 - 2.37 (m, 2H), 1.93 - 1.74 (m, 5H), 1.53 - 1.42 (m, 1H), 1.08 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.00, 163.45 (d, *J* = 216.1 Hz), 156.32, 149.35, 137.15 (d, *J* = 3.0 Hz), 134.82, 129.64 (d, *J* = 8.1 Hz), 127.13, 126.40, 126.15, 120.35, 115.00 (d, *J* = 21.2 Hz), 45.96, 40.12, 35.57, 34.18, 32.11, 25.10, 24.98, 16.37; ^{19}F NMR (376 MHz, $CDCl_3$) δ -112.98; ESI-HRMS Calculated for $C_{23}H_{26}FN_2O_2^+$ ($[M+H]^+$): 381.1973, found: 381.1979.



2-(8-(4-chlorophenyl)-4-methyl-5-oxooctyl)quinazolin-4(3H)-one 3f

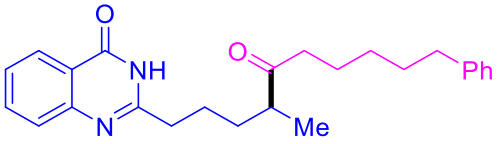
White solid in 45% yield (36 mg); R_f = 0.28 (EA/PE = 1/1); m.p. = 119.6 - 120.6 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.38 (brs, 1H), 8.29 (d, *J* = 7.8 Hz, 1H), 7.85 - 7.78 (m, 1H), 7.70 (d, *J* = 8.1 Hz, 1H), 7.55 - 7.44 (m, 1H), 7.21 (d, *J* = 8.3 Hz, 2H), 7.05 (d, *J* = 8.2 Hz, 2H), 2.88 - 2.73 (m, 2H), 2.63 - 2.50 (m, 3H), 2.49 - 2.36 (m, 2H), 1.94 - 1.75 (m, 5H), 1.56 - 1.41 (m, 1H), 1.09 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 213.90, 164.54, 156.29, 149.32, 139.99, 134.86, 131.51, 129.78, 129.67, 128.42, 128.36, 127.12, 126.43, 126.15, 120.30, 45.96, 40.07, 35.55, 34.32, 32.08, 24.96, 24.86, 16.38; ESI-HRMS Calculated for $C_{23}H_{26}ClN_2O_2^+$ ($[M+H]^+$): 397.1677,

found: 397.1681



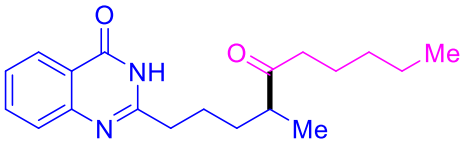
2-(4-methyl-5-oxo-9-phenylnonyl)quinazolin-4(3H)-one 3g

White solid in 65% yield (49 mg); R_f = 0.34 (EA/PE = 1/1); m.p. = 117.2 - 117.8 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.03 (brs, 1H), 8.22 (d, *J* = 7.9 Hz, 1H), 7.73 - 7.67 (m, 1H), 7.62 (d, *J* = 8.1 Hz, 1H), 7.39 (t, *J* = 7.5 Hz, 1H), 7.21 - 7.14 (m, 2H), 7.12 - 7.03 (m, 3H), 2.79 - 2.66 (m, 2H), 2.57 - 2.47 (m, 3H), 2.43 - 2.31 (m, 2H), 1.86 - 1.68 (m, 3H), 1.55 - 1.45 (m, 4H), 1.45 - 1.35 (m, 1H), 1.03 (d, *J* = 7.0 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.26, 164.34, 156.25, 149.35, 142.18, 134.84, 128.32, 128.25, 127.17, 126.44, 126.21, 125.69, 120.42, 45.93, 40.97, 35.75, 35.64, 32.12, 31.03, 25.00, 23.28, 16.40; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ([M+H]$^+$): 377.2224, found: 377.2218.



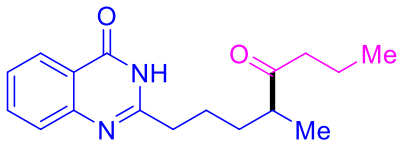
2-(4-methyl-5-oxo-10-phenyldecyl)quinazolin-4(3H)-one 3h

White solid in 42% yield (33 mg); R_f = 0.42 (EA/PE = 1/1); m.p. = 110.3 - 110.8 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.02 (brs, 1H), 8.22 (d, *J* = 7.6 Hz, 1H), 7.69 (t, *J* = 7.1 Hz, 1H), 7.62 (d, *J* = 8.0 Hz, 1H), 7.40 (t, *J* = 7.4 Hz, 1H), 7.24 - 7.15 (m, 2H), 7.14 - 7.03 (m, 3H), 2.80 - 2.67 (m, 2H), 2.58 - 2.46 (m, 3H), 2.45 - 2.28 (m, 2H), 1.85 - 1.70 (m, 3H), 1.57 - 1.45 (m, 4H), 1.28 - 1.16 (m, 3H), 1.03 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.46, 164.32, 156.27, 149.34, 142.50, 134.83, 128.33, 128.21, 127.17, 126.43, 126.22, 125.60, 120.43, 45.95, 41.07, 35.70, 35.65, 32.12, 31.25, 28.86, 25.02, 23.47, 16.41; ESI-HRMS Calculated for $C_{25}H_{31}N_2O_2^+$ ([M+H]$^+$): 391.2380, found: 391.2385.



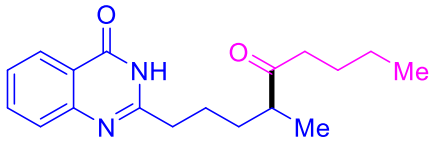
2-(4-methyl-5-oxodecyl)quinazolin-4(3H)-one 3i

White solid in 52% yield (32 mg); R_f = 0.43 (EA/PE = 1/1); m.p. = 107.5 - 108.8 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.38 (brs, 1H), 8.37 - 8.28 (m, 1H), 7.83 - 7.75 (m, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.55 - 7.44 (m, 1H), 2.89 - 2.77 (m, 2H), 2.67 - 2.57 (m, 1H), 2.51 - 2.40 (m, 2H), 1.97 - 1.78 (m, 3H), 1.60 - 1.48 (m, 3H), 1.33 - 1.18 (m, 4H), 1.11 (d, *J* = 7.0 Hz, 3H), 0.86 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.65, 164.49, 156.40, 149.35, 134.78, 127.12, 126.37, 126.16, 120.37, 45.88, 41.13, 35.60, 32.12, 31.37, 25.04, 23.29, 22.41, 16.34, 13.87; ESI-HRMS Calculated for $C_{19}H_{27}N_2O_2^+$ ([M+H]$^+$):315.2067, found:315.2063.



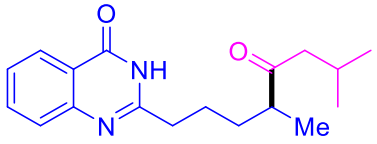
2-(4-methyl-5-oxooctyl)quinazolin-4(3H)-one 3j

White solid in 35% yield (20 mg); R_f = 0.33 (EA/PE = 1/1); m.p. = 96.4 - 97.5 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.30 (brs, 1H), 8.29 (d, *J* = 7.9 Hz, 1H), 7.85 - 7.74 (m, 1H), 7.68 (d, *J* = 8.1 Hz, 1H), 7.55 - 7.43 (m, 1H), 2.98 - 2.76 (m, 2H), 2.68 - 2.55 (m, 1H), 2.52 - 2.34 (m, 2H), 2.04 - 1.77 (m, 3H), 1.73 - 1.44 (m, 3H), 1.10 (d, *J* = 7.0 Hz, 3H), 0.86 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.52, 164.45, 156.39, 149.36, 134.79, 127.14, 126.38, 126.18, 120.41, 45.90, 43.04, 35.65, 32.11, 25.05, 17.03, 16.33, 13.74; ESI-HRMS Calculated for $C_{17}H_{23}N_2O_{22}^+$ ($[M+H]^+$): 287.1754, found: 287.1755.



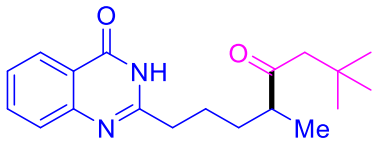
2-(4-methyl-5-oxononyl)quinazolin-4(3H)-one 3k

White solid in 32% yield (19 mg); R_f = 0.37 (EA/PE = 1/1); m.p. = 103.6 - 104.5 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.24 (brs, 1H), 8.30 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.82 - 7.75 (m, 1H), 7.70 (d, *J* = 7.9 Hz, 1H), 7.55 - 7.44 (m, 1H), 2.89 - 2.76 (m, 2H), 2.68 - 2.57 (m, 1H), 2.51 - 2.38 (m, 2H), 1.97 - 1.80 (m, 3H), 1.59 - 1.46 (m, 3H), 1.30 - 1.23 (m, 2H), 1.11 (d, *J* = 7.0 Hz, 3H), 0.87 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.71, 164.49, 156.45, 149.46, 134.89, 127.25, 126.49, 126.29, 120.52, 46.01, 41.00, 35.75, 32.23, 25.83, 25.14, 22.43, 16.47, 13.94; ESI-HRMS Calculated for $C_{18}H_{25}N_2O_2^+$ ($[M+H]^+$): 301.1911, found: 301.1905.



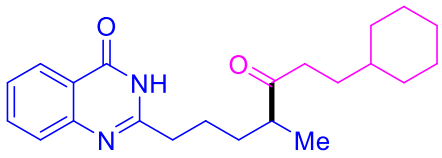
2-(4,7-dimethyl-5-oxooctyl)quinazolin-4(3H)-one 3l

White solid in 33% yield (20 mg); R_f = 0.31 (EA/PE = 1/1); m.p. = 108.4 - 108.8 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.34 (brs, 1H), 8.30 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.83 - 7.76 (m, 1H), 7.70 (d, *J* = 7.8 Hz, 1H), 7.56 - 7.44 (m, 1H), 2.93 - 2.78 (m, 2H), 2.64 - 2.53 (m, 1H), 2.45 - 2.27 (m, 2H), 2.22 - 2.07 (m, 1H), 1.98 - 1.76 (m, 3H), 1.57 - 1.44 (m, 1H), 1.10 (d, *J* = 7.0 Hz, 3H), 0.88 (d, *J* = 1.0 Hz, 3H), 0.87 (d, *J* = 1.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.12, 164.46, 156.39, 149.38, 134.79, 127.15, 126.38, 126.19, 120.42, 50.19, 46.19, 35.64, 31.95, 25.04, 24.16, 22.59, 22.53, 16.16; ESI-HRMS Calculated for $C_{18}H_{23}N_2O_2^+$ ($[M+H]^+$): 301.1911, found: 301.1904.



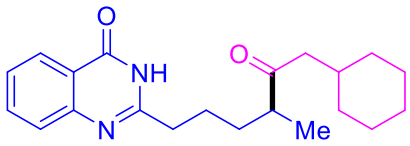
2-(4,7,7-trimethyl-5-oxooctyl)quinazolin-4(3H)-one 3m

White solid in 44% yield (28 mg); R_f = 0.43 (EA/PE = 1/1); m.p. = 110.5 - 111.5 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.35 (brs, 1H), 8.30 (d, *J* = 7.8 Hz, 1H), 7.95 - 7.66 (m, 2H), 7.58 - 7.44 (m, 1H), 2.97 - 2.72 (m, 2H), 2.68 - 2.52 (m, 1H), 2.44 - 2.28 (m, 2H), 2.01 - 1.73 (m, 3H), .53 - 1.42 (m, 1H), 1.08 (d, *J* = 6.9 Hz, 3H), 0.99 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.17, 164.48, 156.40, 149.38, 134.79, 127.16, 126.38, 126.20, 120.41, 53.44, 47.19, 35.70, 31.96, 30.96, 29.67, 25.06, 15.97; ESI-HRMS Calculated for $C_{19}H_{27}N_2O_2^+$ ([M+H]$^+$): 315.2067, found: 315.2068.



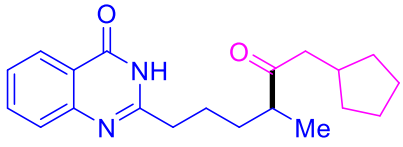
2-(7-cyclohexyl-4-methyl-5-oxoheptyl)quinazolin-4(3H)-one 3n

White solid in 54% yield (38 mg); R_f = 0.44 (EA/PE = 1/1); m.p. = 120.5 - 121.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.43 (brs, 1H), 8.30 (d, *J* = 7.8 Hz, 1H), 7.78 (t, *J* = 7.1 Hz, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.49 (t, *J* = 7.4 Hz, 1H), 2.89 - 2.77 (m, 2H), 2.68 - 2.59 (m, 1H), 2.53 - 2.36 (m, 2H), 2.02 - 1.78 (m, 4H), 1.73 - 1.58 (m, 5H), 1.56 - 1.48 (m, 1H), 1.47 - 1.38 (m, 2H), 1.23 - 1.09 (m, 6H), 0.92 - 0.77 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.88, 164.52, 156.40, 149.35, 134.77, 127.12, 126.36, 126.16, 120.35, 45.88, 38.70, 37.20, 35.57, 33.04, 33.02, 32.14, 30.99, 26.43, 26.16, 25.02, 16.38; ESI-HRMS Calculated for $C_{22}H_{31}N_2O_2^+$ ([M+H]$^+$): 355.2380, found: 355.2374.



2-(6-cyclohexyl-4-methyl-5-oxohexyl)quinazolin-4(3H)-one 3o

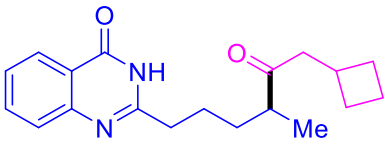
White solid in 59% yield (40 mg); R_f = 0.33 (EA/PE = 1/1); m.p. = 134.2 - 135.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.39 (brs, 1H), 8.40 - 8.24 (m, 1H), 7.84 - 7.75 (m, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.55 - 7.45 (m, 1H), 2.89 - 2.71 (m, 2H), 2.64 - 2.53 (m, 1H), 2.35 - 2.26 (m, 2H), 1.94 - 1.77 (m, 4H), 1.69 - 1.56 (m, 5H), 1.54 - 1.42 (m, 1H), 1.34 - 1.16 (m, 3H), 1.09 (d, *J* = 6.9 Hz, 3H), 0.93 - 0.80 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.14, 164.50, 156.40, 149.34, 134.79, 127.11, 126.38, 126.17, 120.35, 48.89, 46.28, 35.60, 33.43, 33.18, 33.14, 31.93, 26.13, 26.00, 25.03, 16.11; ESI-HRMS Calculated for $C_{21}H_{29}N_2O_2^+$ ([M+H]$^+$): 341.2224, found: 341.2223.



2-(6-cyclopentyl-4-methyl-5-oxohexyl)quinazolin-4(3H)-one 3p

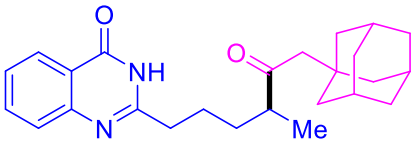
White solid in 34% yield (22 mg); R_f = 0.39 (EA/PE = 1/1); m.p. = 133.8 - 134.6 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.25 (brs, 1H), 8.23 (d, *J* = 7.9 Hz, 1H), 7.71 (t, *J* = 7.6 Hz, 1H), 7.63 (d, *J* = 8.1 Hz, 1H), 7.41 (t, *J* = 7.5 Hz, 1H), 2.88 - 2.69 (m, 2H), 2.61 - 2.48 (m, 1H), 2.46 - 2.33 (m, 2H), 2.21 - 2.08 (m, 1H), 1.90 - 1.66 (m, 6H), 1.57 - 1.37 (m, 6H), 1.03 (d, *J* = 6.9 Hz, 4H), 1.00 - 0.86 (m, 2H); ^{13}C NMR (101

MHz, $CDCl_3$) δ 214.43, 164.44, 156.40, 149.37, 134.79, 127.15, 126.38, 126.19, 120.41, 47.49, 45.94, 35.64, 35.25, 32.59, 32.57, 32.05, 25.05, 24.90, 16.30; ESI-HRMS Calculated for $C_{20}H_{27}N_2O_2^+$ ([M+H]$^+$): 327.2067, found: 327.2076.



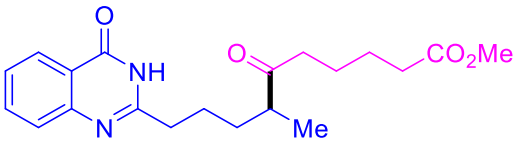
2-(6-cyclobutyl-4-methyl-5-oxohexyl)quinazolin-4(3H)-one 3q

White solid in 32% yield (20 mg); R_f = 0.39 (EA/PE = 1/1); m.p. = 113.6 - 114.3 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.21 (brs, 1H), 8.23 (d, *J* = 7.9 Hz, 1H), 7.71 (t, *J* = 7.5 Hz, 1H), 7.63 (d, *J* = 8.1 Hz, 1H), 7.41 (t, *J* = 7.4 Hz, 1H), 2.84 - 2.69 (m, 2H), 2.66 - 2.41 (m, 4H), 2.07 - 1.95 (m, 2H), 1.89 - 1.66 (m, 5H), 1.62 - 1.48 (m, 2H), 1.47 - 1.36 (m, 1H), 1.02 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 213.93, 164.42, 156.37, 149.36, 134.80, 127.15, 126.39, 126.19, 120.42, 48.33, 45.83, 35.63, 32.03, 31.36, 28.55, 28.53, 25.03, 18.76, 16.22; ESI-HRMS Calculated for $C_{19}H_{25}N_2O_2^+$ ([M+H]$^+$): 313.1911, found: 313.1903.



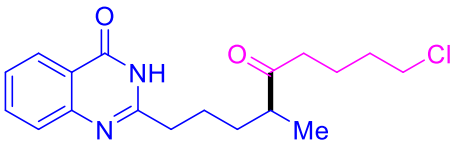
2-(6-((3r,5r,7r)-adamantan-1-yl)-4-methyl-5-oxohexyl)quinazolin-4(3H)-one 3r

White solid in 46% yield (36 mg); R_f = 0.43 (EA/PE = 1/1); m.p. = 106.5 - 107.2 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.37 (brs, 1H), 8.30 (d, *J* = 7.2 Hz, 1H), 7.85 - 7.76 (m, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.48 (t, *J* = 7.4 Hz, 1H), 2.90 - 2.75 (m, 2H), 2.65 - 2.50 (m, 1H), 2.26 - 2.16 (m, 2H), 1.96 - 1.81 (m, 5H), 1.72 - 1.56 (m, 13H), 1.51 - 1.41(m, 1H), 1.07 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.11, 164.52, 156.41, 149.36, 134.80, 127.14, 126.39, 126.19, 120.36, 54.56, 47.57, 42.42, 36.69, 35.67, 33.53, 31.82, 28.55, 28.50, 25.02, 15.72; ESI-HRMS Calculated for $C_{25}H_{33}N_2O_2^+$ ([M+H]$^+$): 393.2537, found: 393.2547.



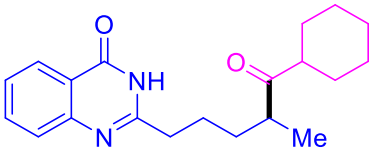
methyl 7-methyl-6-oxo-10-(4-oxo-3,4-dihydroquinazolin-2-yl)decanoate 3s

White solid in 37% yield (26 mg); R_f = 0.33 (EA/PE = 2/1); m.p. = 79.6 - 80.6 ºC; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.94 (brs, 1H), 8.29 (d, *J* = 7.0 Hz, 1H), 7.82 - 7.75 (m, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.49 (t, *J* = 7.1 Hz, 1H), 3.66 (s, 3H), 2.87 - 2.74 (m, 2H), 2.66 - 2.58 (m, 1H), 2.54 - 2.42 (m, 2H), 2.35 - 2.25 (m, 2H), 1.95 - 1.77 (m, 3H), 1.65 - 1.45 (m, 5H), 1.12 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 213.88, 173.89, 164.20, 156.27, 149.28, 134.82, 127.14, 126.44, 126.21, 120.46, 51.55, 45.96, 40.62, 35.64, 33.78, 32.11, 24.98, 24.40, 23.00, 16.40; ESI-HRMS Calculated for $C_{20}H_{27}N_2O_4^+$ ([M+H]$^+$): 359.1965, found: 359.1958.



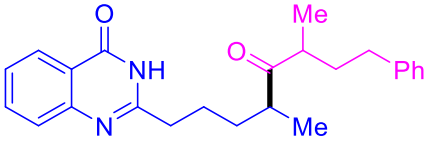
2-(9-chloro-4-methyl-5-oxononyl)quinazolin-4(3H)-one 3t

White solid in 15% yield (10 mg); R_f = 0.25 (EA/PE = 1/1); m.p. = 104.6 - 105.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.10 (brs, 1H), 8.30 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.87 - 7.76 (m, 1H), 7.70 (d, *J* = 8.1 Hz, 1H), 7.56 - 7.43 (m, 1H), 3.49 (t, *J* = 6.2 Hz, 2H), 2.88 - 2.74 (m, 2H), 2.67 - 2.59 (m, 1H), 2.56 - 2.43 (m, 2H), 2.00 - 1.79 (m, 4H), 1.77 - 1.67 (m, 3H), 1.57 - 1.46 (m, 1H), 1.12 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 213.68, 164.33, 156.23, 149.34, 134.86, 127.18, 126.46, 126.20, 120.44, 45.96, 44.65, 40.10, 35.62, 32.11, 31.93, 24.97, 20.89, 16.41; ESI-HRMS Calculated for $C_{18}H_{24}ClN_2O_{22}^+$ ([M+H]$^+$):335.1521, found: 335.1529



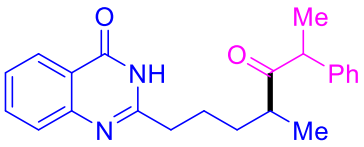
2-(5-cyclohexyl-4-methyl-5-oxopentyl)quinazolin-4(3H)-one 3u

White solid in 40% yield (26 mg); R_f = 0.5 (EA/PE = 1/1); m.p. = 132.8 - 133.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.93 (brs, 1H), 8.23 (d, *J* = 7.9 Hz, 1H), 7.74 - 7.68 (m, 1H), 7.63 (d, *J* = 8.1 Hz, 1H), 7.41 (t, *J* = 7.5 Hz, 1H), 2.79 - 2.64 (m, 3H), 2.43 - 2.33 (m, 1H), 1.84 - 1.63 (m, 7H), 1.61 - 1.53 (m, 1H), 1.44 - 1.35 (m, 1H), 1.32 - 1.05 (m, 6H), 1.01 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 217.43, 164.23, 156.33, 149.36, 134.80, 127.17, 126.42, 126.25, 120.48, 49.81, 44.11, 35.76, 32.23, 28.49, 28.42, 25.76, 25.68, 25.60, 25.25, 16.74; ESI-HRMS Calculated for $C_{20}H_{27}N_2O_2^+$ ([M+H]$^+$): 327.2067, found: 327.2061.



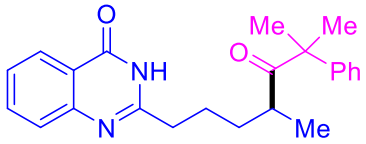
2-(4,6-dimethyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3v

White solid in 37% yield (28 mg, dr = 1.5:1); R_f = 0.38 (EA/PE = 1/1); m.p. = 80.1 - 80.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.20 (brs, 1H), 8.35 - 8.18 (m, 1H), 7.73 - 7.66 (m, 1H), 7.65 - 7.57 (m, 1H), 7.43 - 7.35 (m, 1H), 7.22 - 7.01 (m, 5H), 2.78 - 2.68 (m, 2H), 2.68 - 2.57 (m, 2H), 2.52 - 2.40 (m, 2H), 2.05 - 1.68 (m, 5H), 1.58 - 1.46 (m, 1H), 1.44 - 1.31 (m, 1H), 1.13 - 0.90 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 217.51, 217.34, 164.43, 156.34, 149.37, 141.71, 141.62, 134.79, 128.34, 128.32, 128.25, 128.23, 127.16, 126.39, 126.21, 125.86, 120.42, 44.72, 44.66, 44.50, 44.45, 35.70, 35.67, 34.35, 34.18, 33.49, 33.40, 32.10, 32.05, 25.18, 25.15, 16.59, 16.55, 16.52; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ([M+H]$^+$): 377.2224, found: 377.2228.



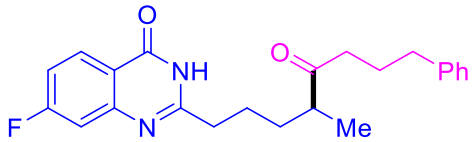
2-(4-methyl-5-oxo-6-phenylheptyl)quinazolin-4(3H)-one 3w

White solid in 36% yield (25 mg, dr = 1:1); R_f = 0.50 (EA/PE = 1/1); m.p. = 52.7 - 53.6 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.36 (brs, 1H), 8.29 (d, *J* = 7.9 Hz, 1H), 7.83 - 7.75 (m, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.47 (t, *J* = 7.4 Hz, 1H), 7.13 - 7.00 (m, 4H), 2.86 - 2.72 (m, 2H), 2.60 - 2.50 (m, 3H), 2.49 - 2.41 (m, 2H), 2.29 (s, 3H), 1.94 - 1.73 (m, 5H), 1.54 - 1.42 (m, 1H), 1.09 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.22, 164.51, 156.33, 149.30, 138.41, 135.23, 134.82, 128.99, 128.94, 128.29, 128.21, 127.08, 126.41, 126.16, 120.30, 45.90, 40.30, 35.55, 34.56, 32.08, 25.09, 24.99, 20.92, 16.35; ESI-HRMS Calculated for $C_{22}H_{25}N_2O_2^+$ ([M+H]$^+$): 349.1911, found:349.1907.



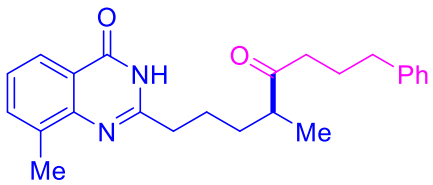
2-(4,6-dimethyl-5-oxo-6-phenylheptyl)quinazolin-4(3H)-one 3x

Colorless oil in 26% yield (28 mg); R_f = 0.55 (EA/PE = 1/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.87 (brs, 1H), 8.20 (d, *J* = 7.8 Hz, 1H), 7.71 (t, *J* = 7.5 Hz, 1H), 7.61 (d, *J* = 8.1 Hz, 1H), 7.42 (t, *J* = 7.5 Hz, 1H), 7.28 - 7.17 (m, 4H), 7.15 - 7.05 (m, 1H), 2.69 - 2.40 (m, 3H), 1.63 - 1.38 (m, 9H), 1.37 - 1.28 (m, 1H), 0.83 (d, *J* = 6.6 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 216.31, 164.21, 156.29, 149.30, 142.54, 134.80, 128.46, 127.13, 126.94, 126.63, 126.39, 126.19, 120.40, 52.59, 40.22, 35.48, 33.86, 24.73, 24.69, 24.59, 18.54; ESI-HRMS Calculated for $C_{23}H_{27}N_2O_2^+$ ([M+H]$^+$): 363.2067, found: 363.2077.



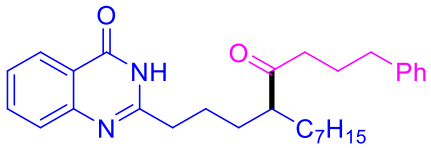
7-fluoro-2-(4-methyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3y

White solid in 57% yield (43 mg); R_f = 0.42 (EA/PE = 1/1); m.p. = 113.9 - 114.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.15 (brs, 1H), 7.84 (dd, *J* = 8.2, 2.8 Hz, 1H), 7.62 (dd, *J* = 8.9, 4.8 Hz, 1H), 7.51 - 7.37 (m, 1H), 7.35 - 7.12 (m, 3H), 7.11 - 7.03 (m, 2H), 2.84 - 2.68 (m, 2H), 2.64 - 2.49 (m, 3H), 2.46 - 2.28 (m, 2H), 1.96 - 1.68 (m, 5H), 1.50 - 1.35 (m, 1H), 1.03 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.08, 162.79 (d, *J* = 207.1 Hz), 159.29, 155.54, 146.06, 141.55, 129.59 (d, *J* = 8.1 Hz), 128.34 (d, *J* = 7.1 Hz), 125.87, 123.43 (d, *J* = 24.2 Hz), 121.54 (d, *J* = 9.1 Hz), 111.00 (d, *J* = 23.2 Hz), 45.98, 40.31, 35.49, 35.04, 32.08, 25.00, 24.89, 16.47. ^{19}F NMR (376 MHz, $CDCl_3$) δ -112.98; ESI-HRMS Calculated for $C_{23}H_{26}FN_2O_2^+$ ([M+H]$^+$): 381.1973, found: 381.1979.



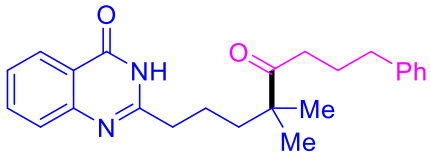
8-methyl-2-(4-methyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3z

White solid in 40% yield (30 mg); R_f = 0.29 (EA/PE = 1/2); m.p. = 149.5 – 150.4 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.79 (brs, 1H), 8.06 (d, *J* = 7.7 Hz, 1H), 7.54 (d, *J* = 7.2 Hz, 1H), 7.31 - 7.24 (m, 1H), 7.21 - 7.14 (m, 2H), 7.13 - 7.02 (m, 3H), 2.78 - 2.65 (m, 2H), 2.60 - 2.47 (m, 6H), 2.45 - 2.33 (m, 2H), 1.87 -1.69 (m, 5H), 1.48 - 1.37 (m, 1H), 1.03 (d, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 213.20, 163.63, 153.52, 146.99, 140.60, 134.82, 134.29, 127.40, 127.31, 124.87, 124.80, 122.79, 119.39, 45.04, 39.32, 34.39, 34.07, 31.11, 24.04, 23.57, 16.55, 15.38; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ([M+H]$^+$): 377.2224, found: 377.2225.



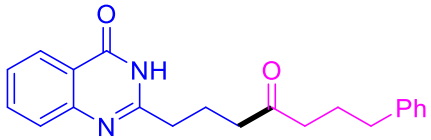
2-(4-(4-phenylbutanoyl)undecyl)quinazolin-4(3H)-one 3aa

White solid in 37% yield (33 mg); R_f = 0.58 (EA/PE = 1/1); m.p. = 60.1 - 61.0 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.23 (brs, 1H), 8.37 - 8.27 (m, 1H), 7.85 - 7.74 (m, 1H), 7.73 - 7.66 (m, 1H), 7.51 - 7.43 (m, 1H), 7.40 - 7.18 (m, 3H), 7.18 - 7.10 (m, 2H), 2.79 (t, *J* = 7.4 Hz, 2H), 2.69 - 2.50 (m, 3H), 2.49 - 2.34 (m, 2H), 2.00 - 1.71 (m, 5H), 1.64 - 1.50 (m, 2H), 1.45 - 1.35 (m, 2H), 1.33 - 1.12 (m, 9H), 0.85 (t, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.18, 164.39, 156.27, 149.37, 141.59, 134.79, 128.35, 128.28, 127.16, 126.39, 126.22, 125.83, 120.42, 51.94, 41.39, 35.69, 35.04, 31.73, 31.61, 30.82, 29.66, 29.07, 27.37, 25.20, 24.86, 22.57, 14.05; ESI-HRMS Calculated for $C_{29}H_{39}N_2O_2^+$ ([M+H]$^+$):447.3006, found: 447.2998.



2-(4,4-dimethyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3ab

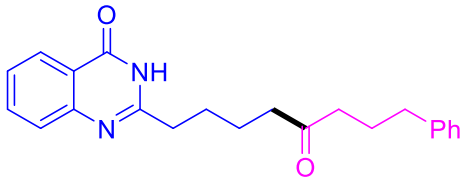
White solid in 32% yield (24 mg); R_f = 0.41 (EA/PE = 1/1); m.p. = 50.0 - 50.6 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.22 (brs, 1H), 8.32 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.84 - 7.77 (m, 1H), 7.71 (d, *J* = 8.1 Hz, 1H), 7.52 - 7.46 (m, 1H), 7.29 - 7.24 (m, 2H), 7.22 - 7.13 (m, 3H), 2.79 (t, *J* = 7.4 Hz, 2H), 2.58 (t, *J* = 7.4 Hz, 2H), 2.51 (t, *J* = 7.2 Hz, 2H), 1.93 - 1.85 (m, 2H), 1.84 - 1.76 (m, 2H), 1.74 - 1.65 (m, 2H), 1.14 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 215.23, 164.40, 156.24, 149.31, 141.72, 134.83, 128.34, 128.27, 127.14, 126.43, 126.20, 125.79, 120.39, 47.40, 39.14, 35.98, 35.08, 25.20, 24.33, 22.56; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ([M+H]$^+$): 377.2224, found: 377.2229.



2-(4-oxo-7-phenylheptyl)quinazolin-4(3H)-one 3ac

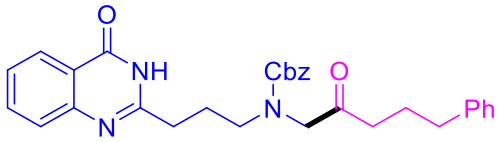
White solid in 25% yield (17 mg); R_f = 0.25 (EA/PE = 1/1); m.p. = 111.1 - 112.0 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.96 (brs, 1H), 8.28 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.76 (ddd, *J* = 8.5, 7.1, 1.5 Hz, 1H), 7.67 (d, *J* = 8.2 Hz, 1H), 7.54 - 7.41 (m, 1H), 7.31 -

7.23 (m, 2H), 7.22 - 7.04 (m, 3H), 2.80 (t, J = 7.4 Hz, 2H), 2.72 - 2.51(m, 4H), 2.43 (t, J = 7.4 Hz, 2H), 2.27 - 2.09 (m, 2H), 2.01 - 1.81(m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 210.05, 164.12, 155.93, 149.21, 141.46, 134.78, 128.40, 128.35, 128.32, 127.14, 126.47, 126.26, 125.90, 120.50, 99.93, 41.96, 41.43, 35.02, 34.69, 25.11, 21.07; ESI-HRMS Calculated for $C_{21}H_{23}N_2O_2^+$ ($[M+H]^+$): 335.1754, found: 335.1759.



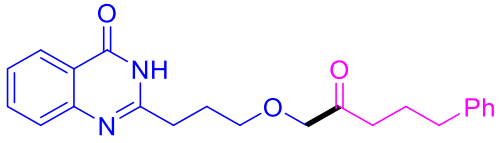
2-(5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3ad

White solid in 25% yield (18 mg); R_f = 0.28 (EA/PE = 1/1); m.p. = 99.2 - 99.9 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 12.15 (brs, 1H), 8.34 - 8.26 (m, 1H), 7.82 - 7.73 (m, 1H), 7.69 (d, J = 8.0 Hz, 1H), 7.50 - 7.43 (m, 1H), 7.31 - 7.23 (m, 2H), 7.22 - 7.11 (m, 3H), 2.81 (t, J = 7.6 Hz, 2H), 2.59 (t, J = 7.6 Hz, 2H), 2.49 (t, J = 7.3 Hz, 2H), 2.41 (t, J = 7.4 Hz, 2H), 1.99 - 1.84 (m, 4H), 1.80 - 1.68 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 210.51, 164.36, 156.40, 149.34, 141.49, 134.79, 128.39, 128.32, 127.13, 126.39, 126.18, 125.89, 120.41, 42.25, 41.91, 35.42, 35.02, 26.84, 25.13, 23.05; ESI-HRMS Calculated for $C_{22}H_{25}N_2O_2^+$ ($[M+H]^+$): 349.1911, found: 349.1914.



benzyl (3-(4-oxo-3,4-dihydroquinazolin-2-yl)propyl)(2-oxo-5-phenylpentyl)carbamate 3ae

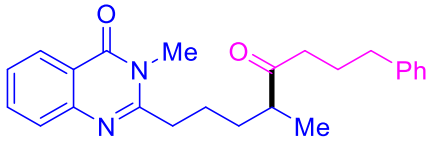
White solid in 31% yield (31 mg); R_f = 0.20 (EA/PE = 1/1); m.p. = 48.6 - 49.3 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.89 (brs, 2H), 8.41 - 8.27 (m, 1H), 7.81 - 7.73 (m, 1H), 7.71 - 7.62 (m, 1H), 7.49 - 7.42 (m, 1H), 7.40 - 7.23 (m, 7H), 7.23 - 7.14 (m, 2H), 7.13 - 7.05 (m, 1H), 5.13 (s, 2H), 4.08 (s, 2H), 3.50 (t, J = 6.4 Hz, 2H), 2.92 - 2.73 (m, 2H), 2.62 (t, J = 7.5 Hz, 1H), 2.54 (t, J = 7.5 Hz, 1H), 2.44 (t, J = 7.3 Hz, 1H), 2.31 (t, J = 7.3 Hz, 1H), 2.17 - 2.00 (m, 2H), 2.00 - 1.90 (m, 1H), 1.90 - 1.81 (m, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 206.17, 205.71, 163.93, 163.40, 156.47, 156.38, 156.33, 155.73, 149.13, 141.25, 141.07, 136.25, 135.96, 134.74, 134.56, 128.42, 128.35, 128.13, 127.95, 127.68, 127.04, 126.86, 126.46, 126.33, 125.98, 125.92, 120.71, 120.48, 67.77, 67.49, 56.73, 56.56, 47.94, 47.57, 38.95, 38.69, 34.91, 34.81, 32.42, 26.16, 25.95, 24.75; ESI-HRMS Calculated for $C_{30}H_{32}N_3O_4^+$ ($[M+H]^+$): 498.2387, found: 498.2383.



2-(3-((2-oxo-5-phenylpentyl)oxy)propyl)quinazolin-4(3H)-one 3af

White solid in 27% yield (20 mg); R_f = 0.25 (EA/PE = 2/1); m.p. = 101.1 - 102.0 °C;

^{1}H NMR (400 MHz, $CDCl_3$) δ 11.57 (brs, 1H), 8.39 - 8.26 (m, 1H), 7.83 - 7.73 (m, 1H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.45 (t, *J* = 7.5 Hz, 1H), 7.30 - 7.23 (m, 2H), 7.22 - 7.05 (m, 3H), 4.08 (s, 2H), 3.62 (t, *J* = 5.9 Hz, 2H), 2.93 (t, *J* = 7.1 Hz, 2H), 2.60 (t, *J* = 7.6 Hz, 2H), 2.42 (t, *J* = 7.4 Hz, 2H), 2.24 - 2.14 (m, 2H), 1.99 - 1.86 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 208.62, 163.64, 156.36, 149.19, 141.32, 134.66, 128.42, 128.34, 127.03, 126.37, 126.27, 125.94, 120.63, 75.75, 70.57, 37.94, 34.96, 32.62, 27.04, 24.61; ESI-HRMS Calculated for $C_{22}H_{25}N_2O_2^+$ ($[M+H]^+$): 365.1860, found: 365.1864.

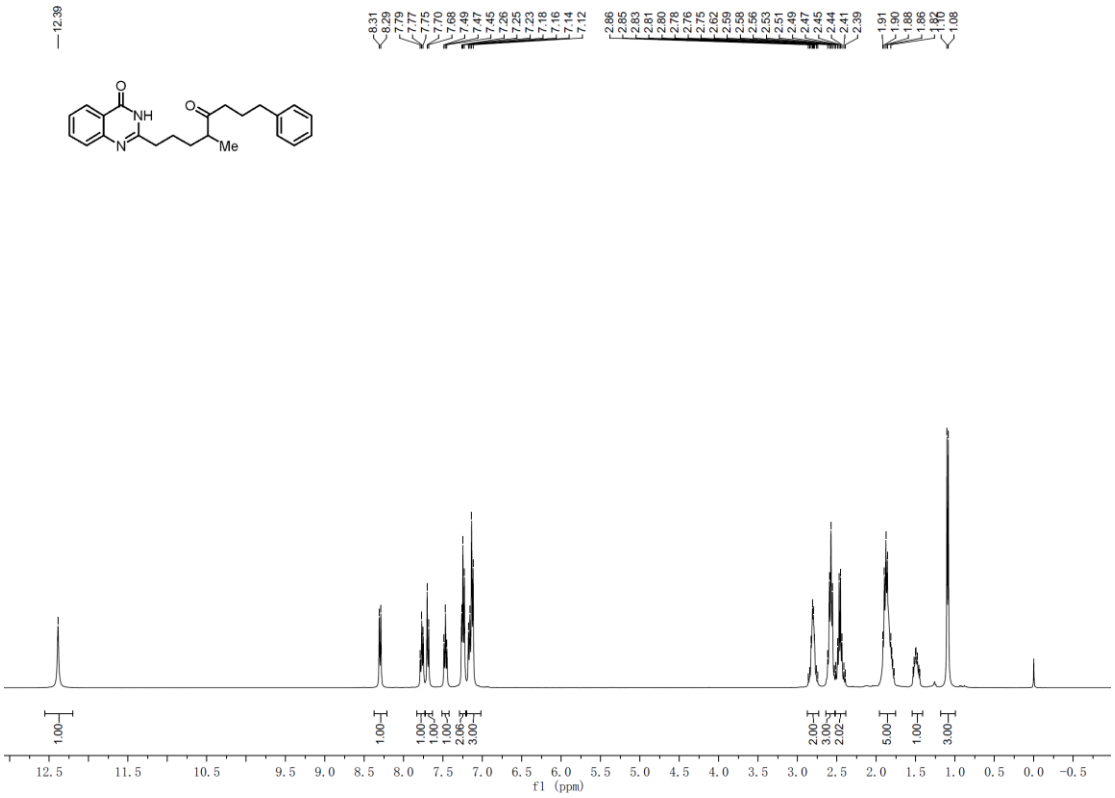


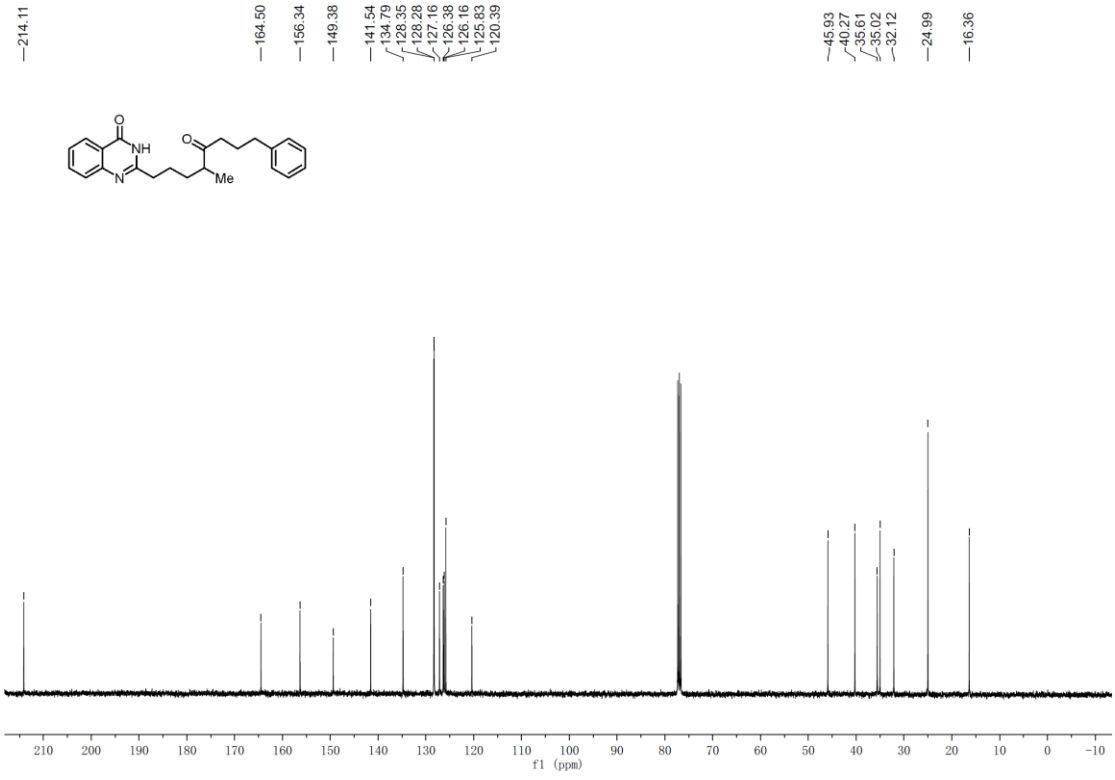
3-methyl-2-(4-methyl-5-oxo-8-phenyloctyl)quinazolin-4(3H)-one 3ag

Colorless oil in 40% yield (30 mg); R_f = 0.52 (EA/PE = 2/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 (d, *J* = 7.9 Hz, 1H), 7.63 (t, *J* = 7.5 Hz, 1H), 7.53 (d, *J* = 8.1 Hz, 1H), 7.36 (t, *J* = 7.5 Hz, 1H), 7.23 - 7.16 (m, 2H), 7.15 - 7.06 (m, 3H), 3.53 (s, 3H), 2.72 (t, *J* = 6.5 Hz, 2H), 2.59 - 2.50 (m, 3H), 2.45 - 2.28 (m, 2H), 1.89 - 1.79 (m, 2H), 1.78 - 1.65 (m, 3H), 1.48 - 1.35 (m, 1H), 1.03 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 214.06, 162.45, 156.42, 147.05, 141.53, 134.05, 128.39, 128.31, 126.74, 126.68, 126.35, 125.87, 120.11, 46.10, 40.23, 35.37, 35.03, 32.24, 30.38, 25.00, 24.28, 16.56; ESI-HRMS Calculated for $C_{24}H_{29}N_2O_2^+$ ($[M+H]^+$): 377.2224, found: 377.2232.

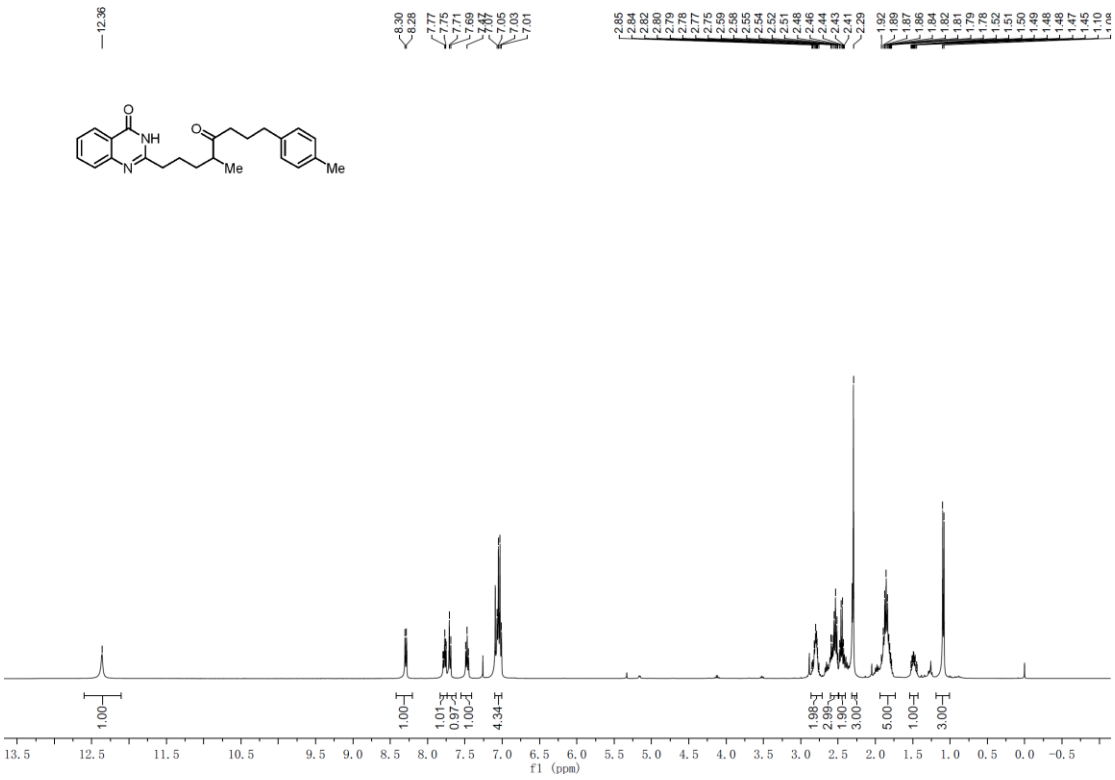
5. NMR Spectra

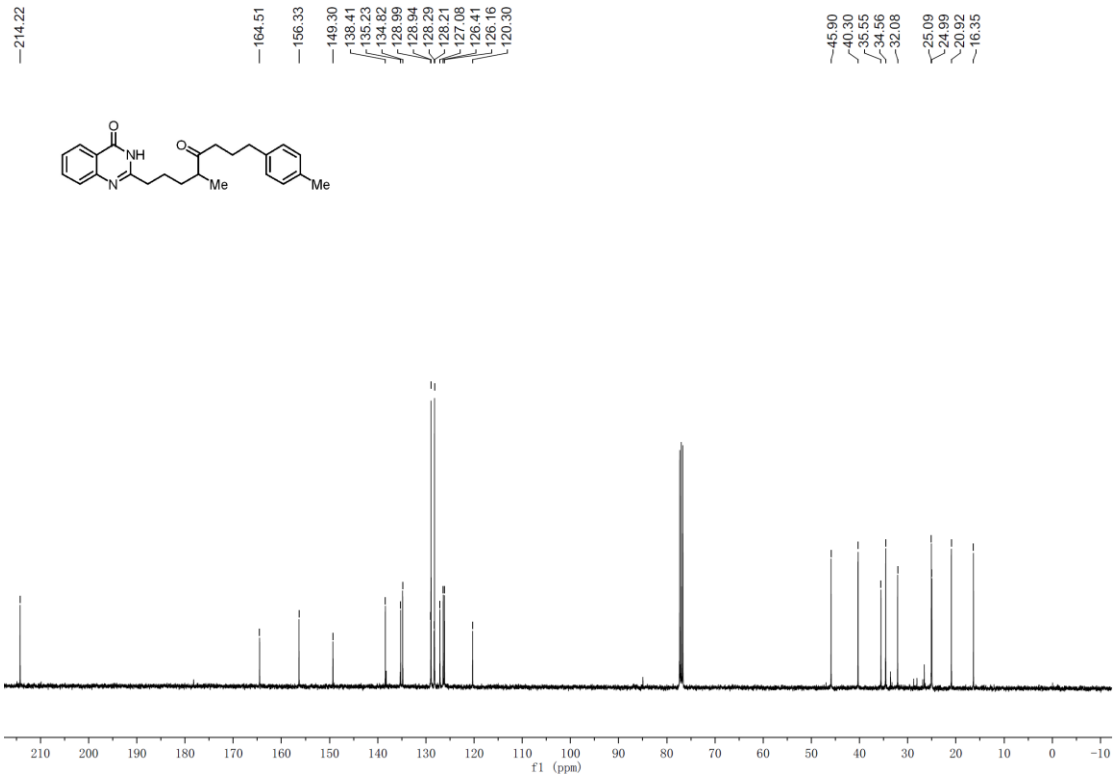
^{1}H NMR and ^{13}C NMR of **3a**



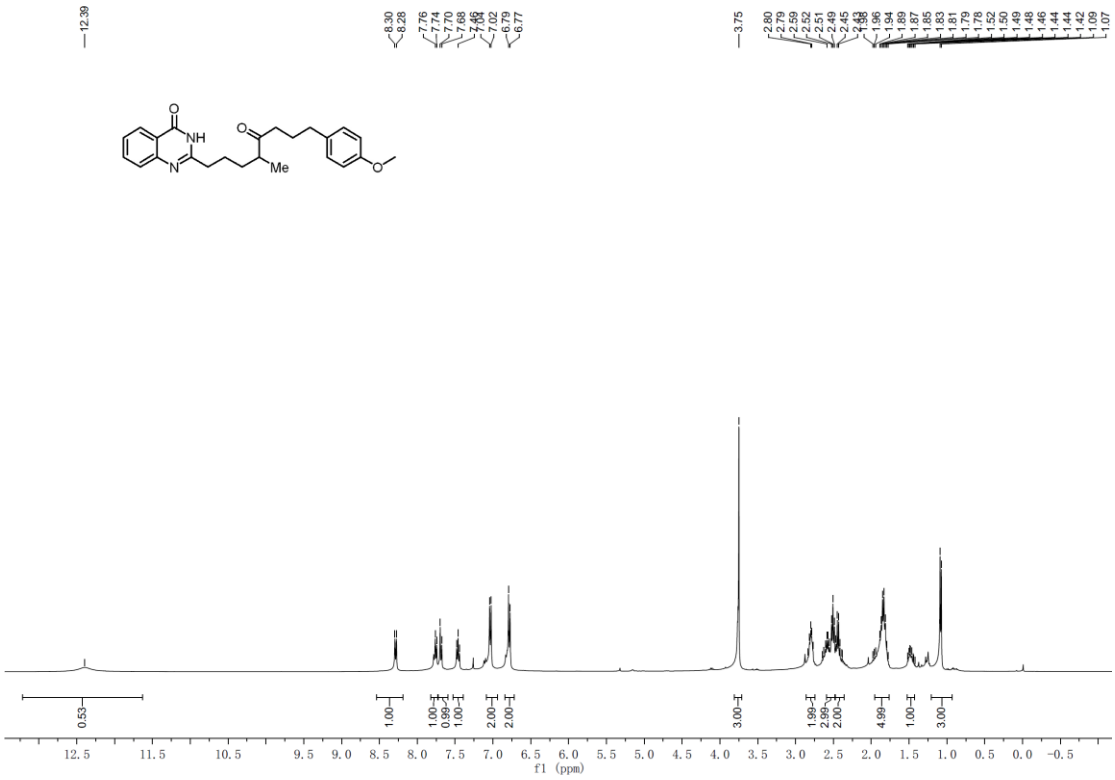


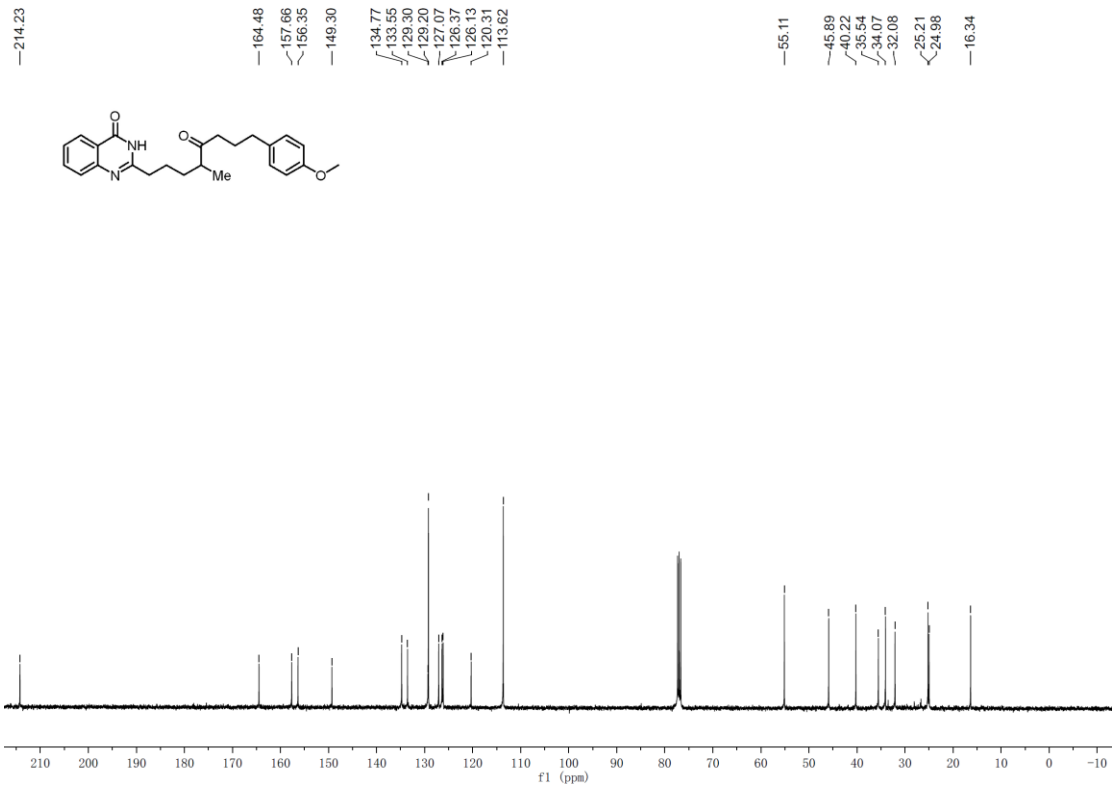
^{1}H NMR and ^{13}C NMR of **3b**



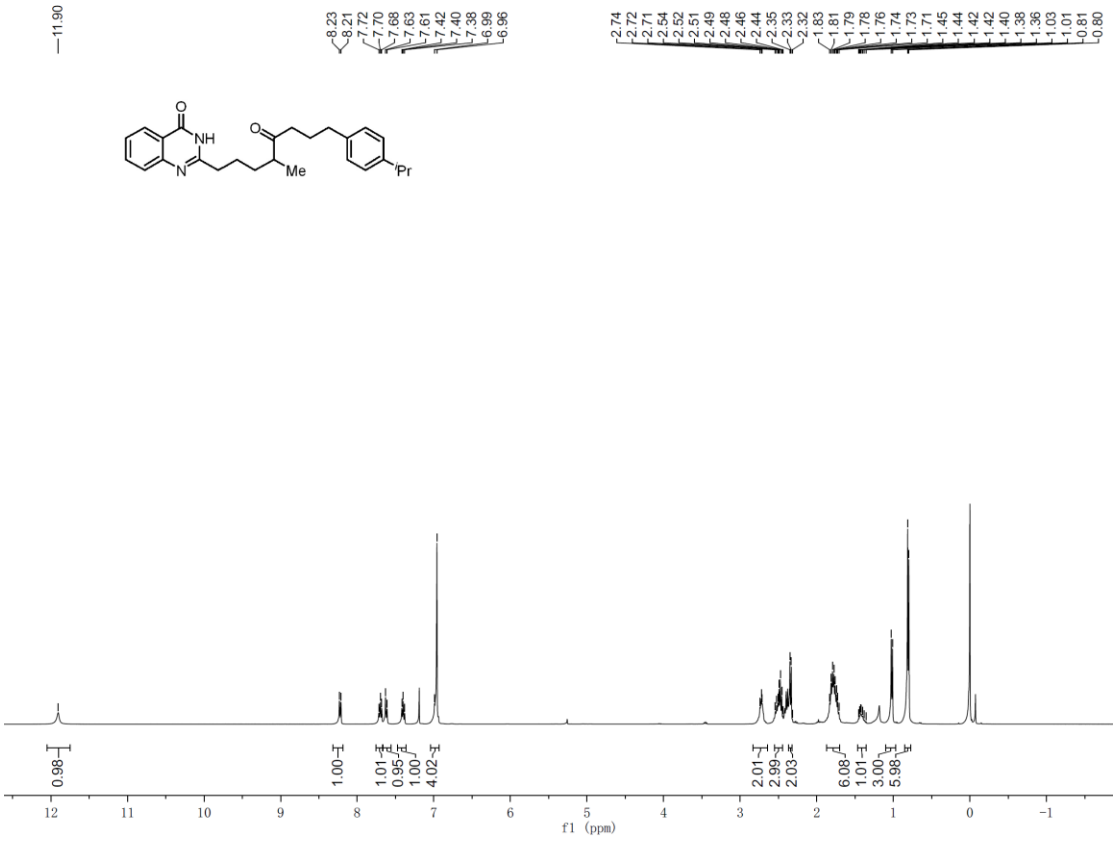


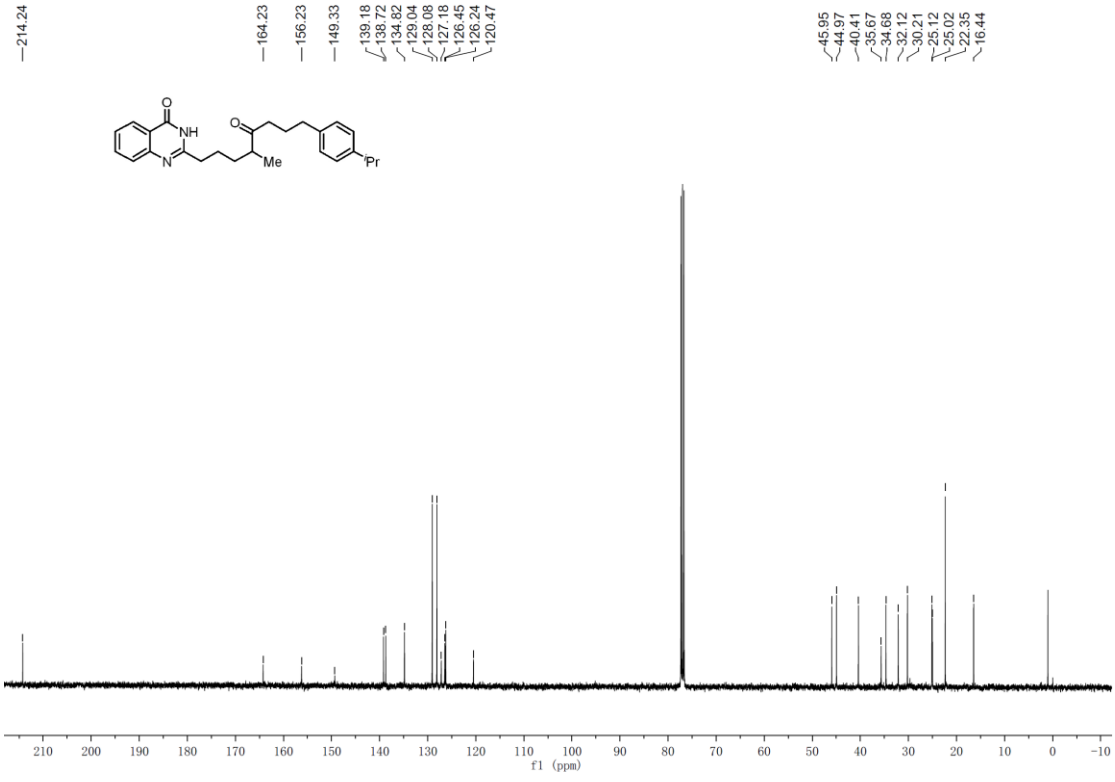
^{1}H NMR and ^{13}C NMR of **3c**



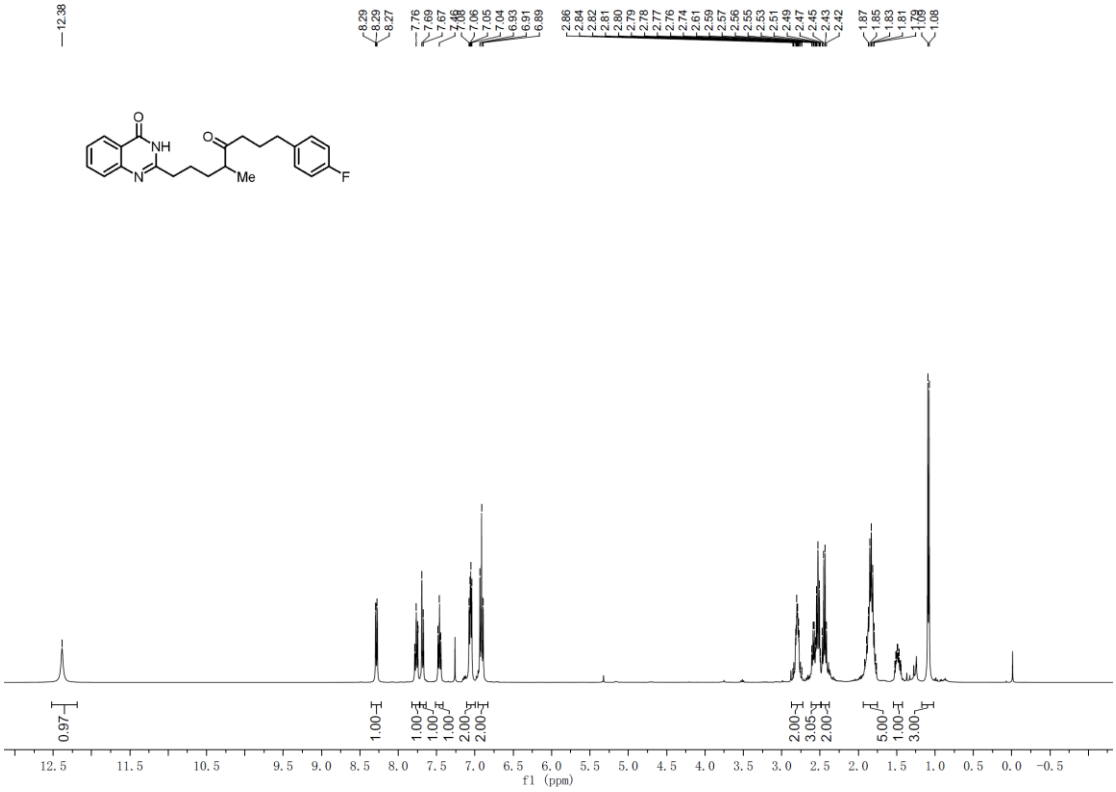


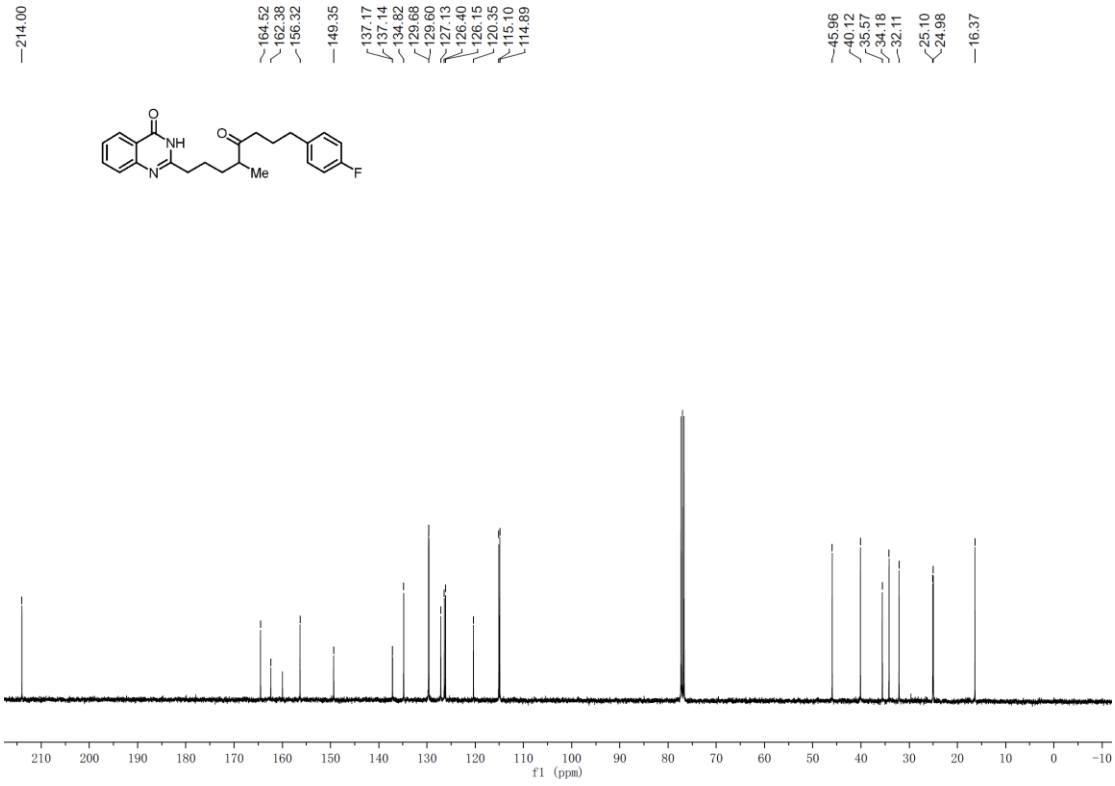
^{1}H NMR and ^{13}C NMR of **3d**

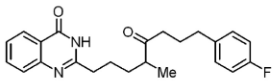




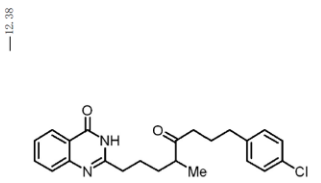
^{1}H NMR, ^{13}C NMR and ^{19}F NMR of **3e**

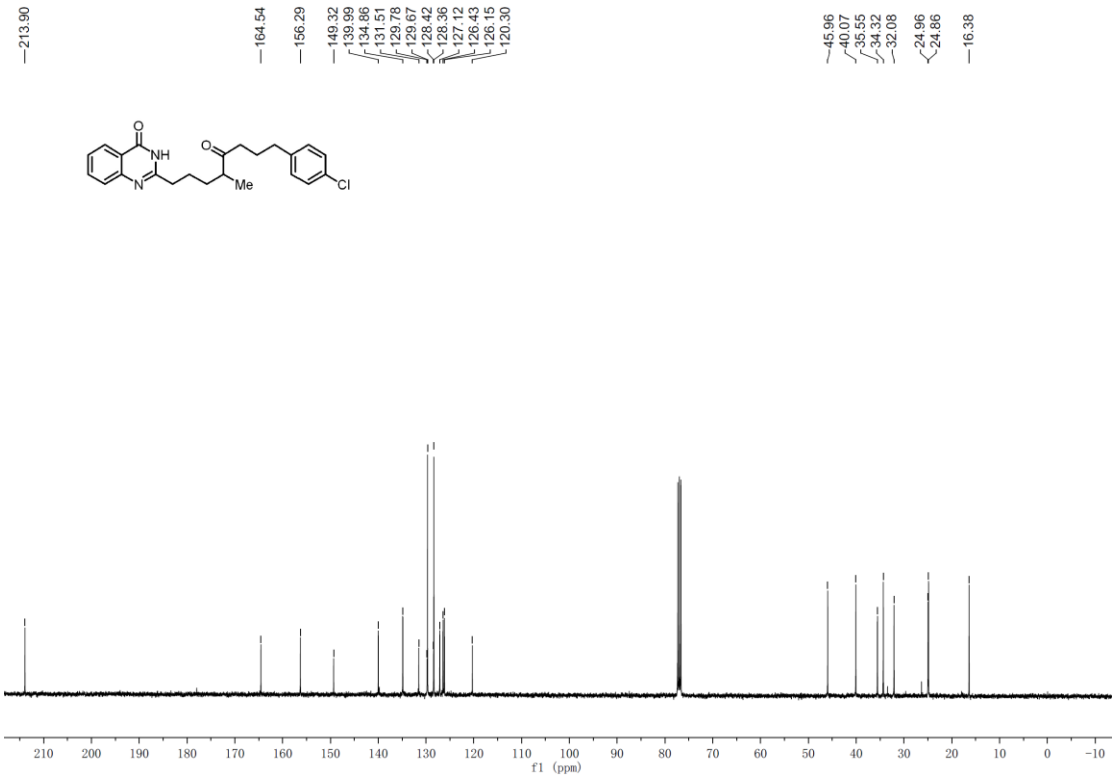




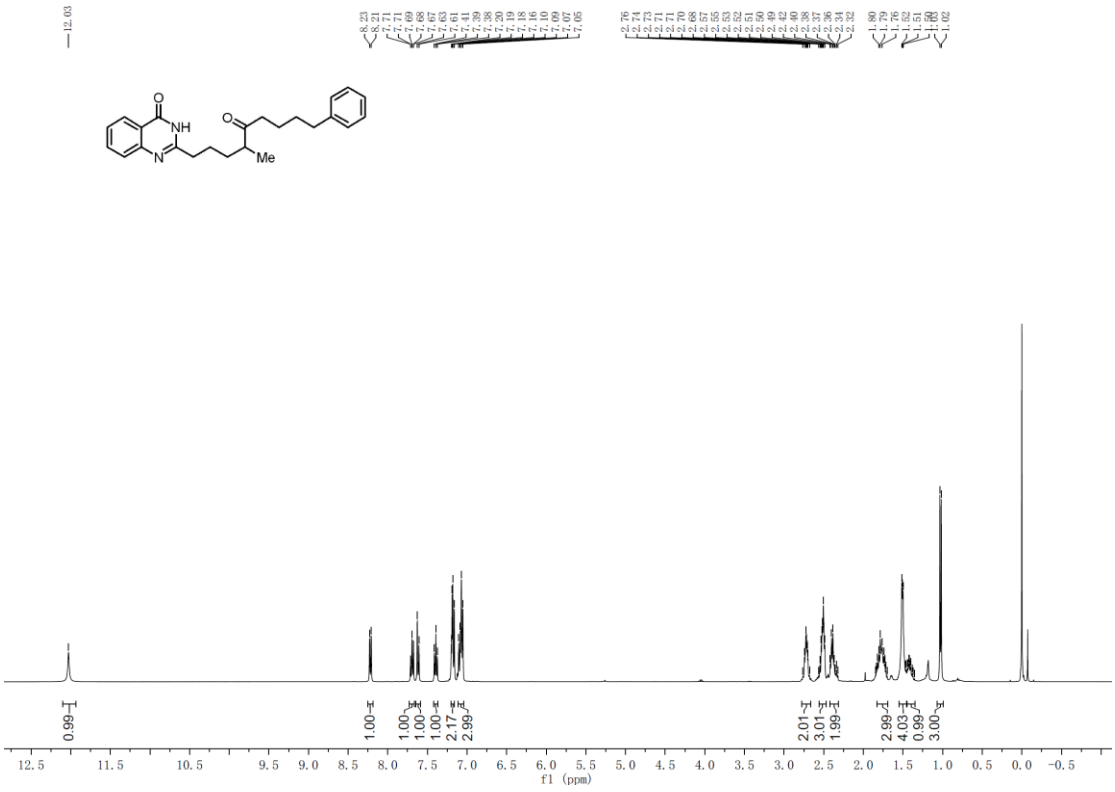


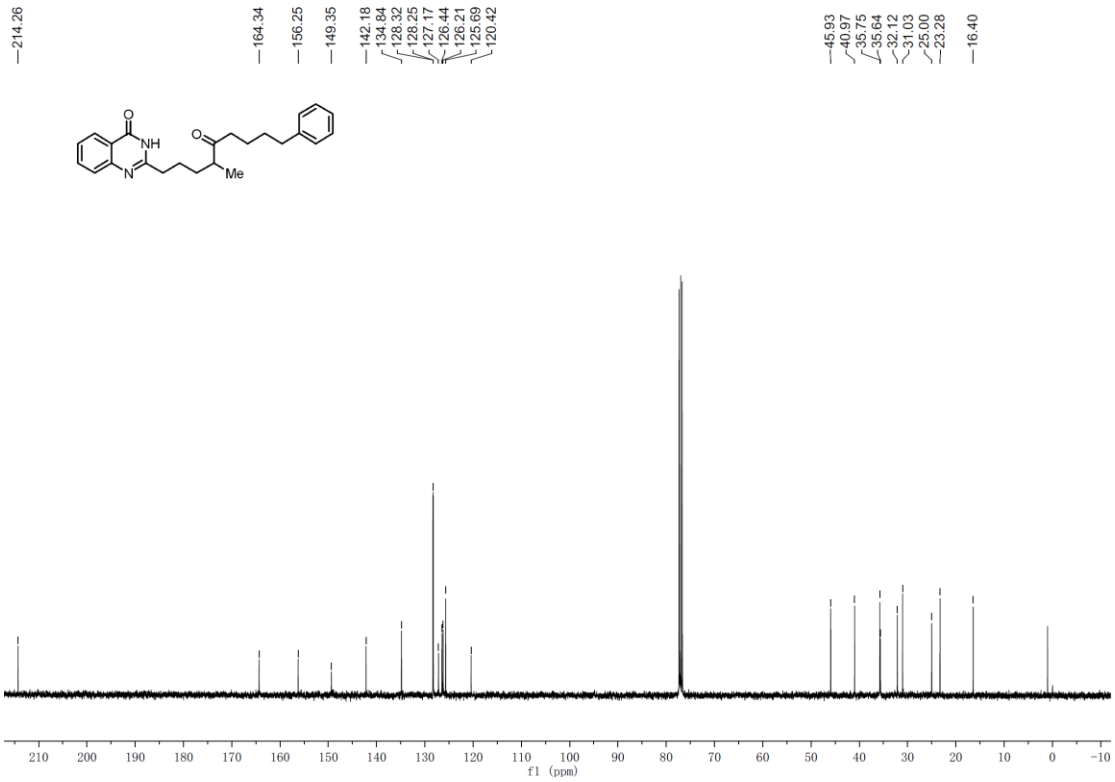
^{1}H NMR and ^{13}C NMR of **3f**



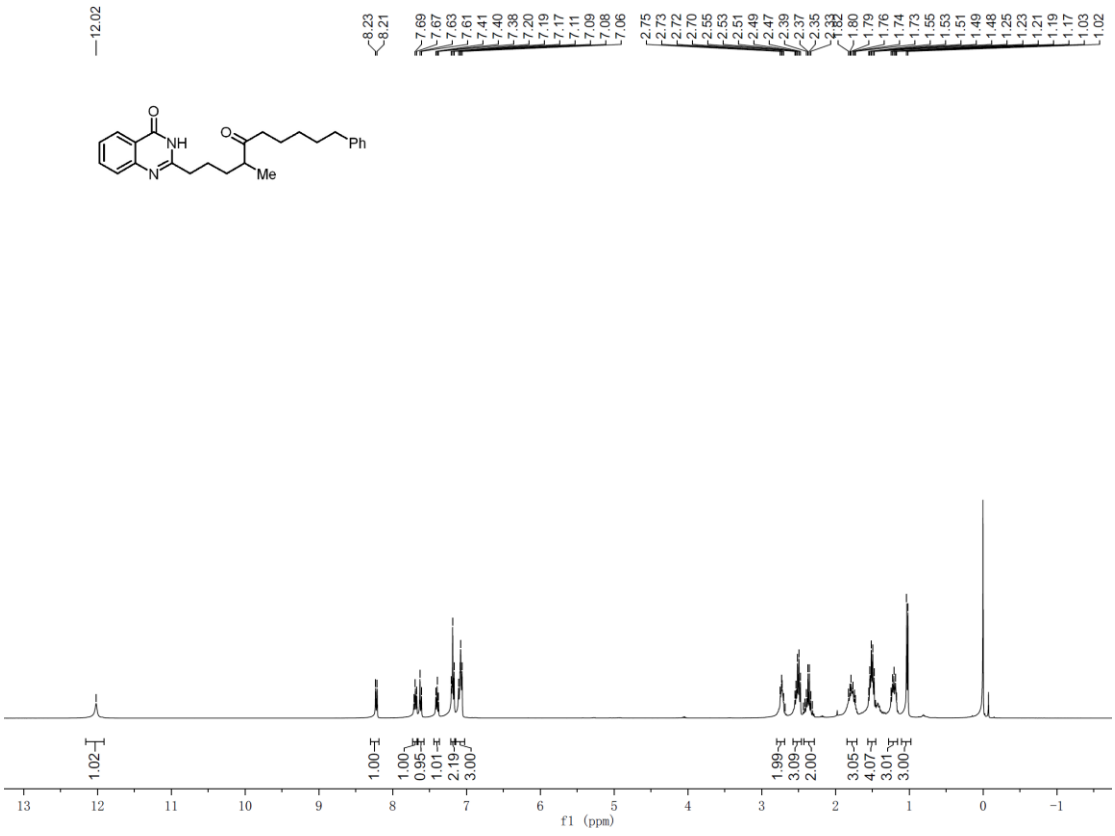


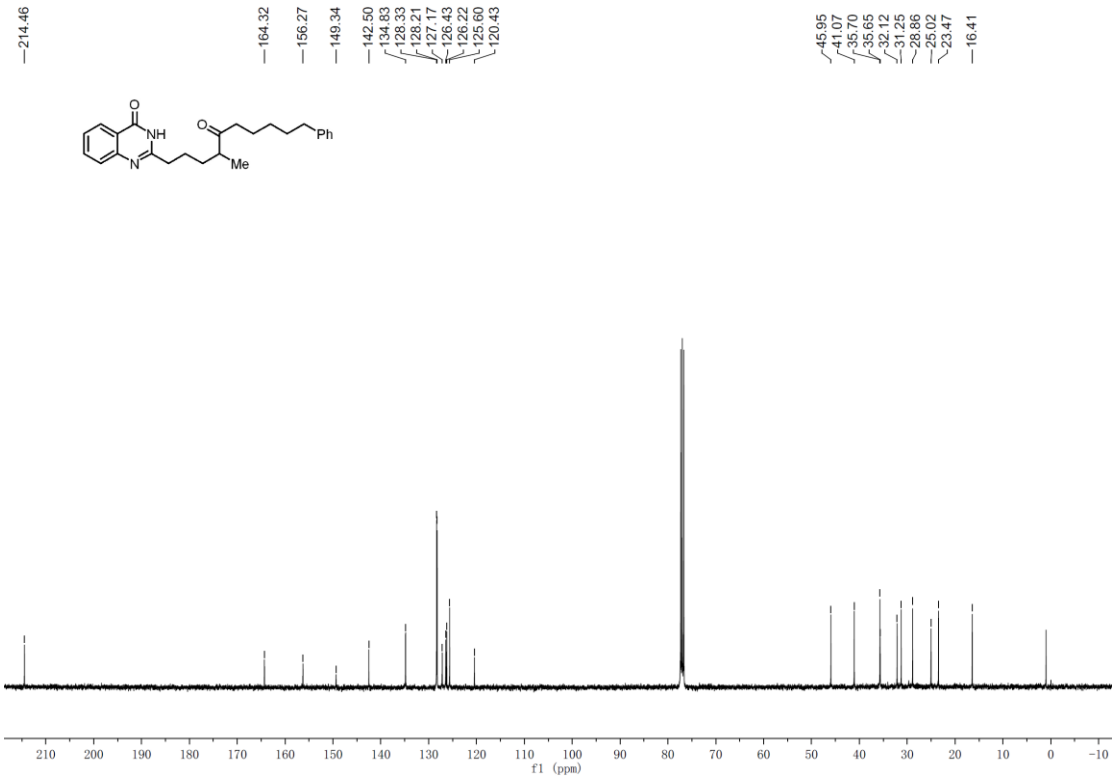
^{1}H NMR and ^{13}C NMR of **3g**



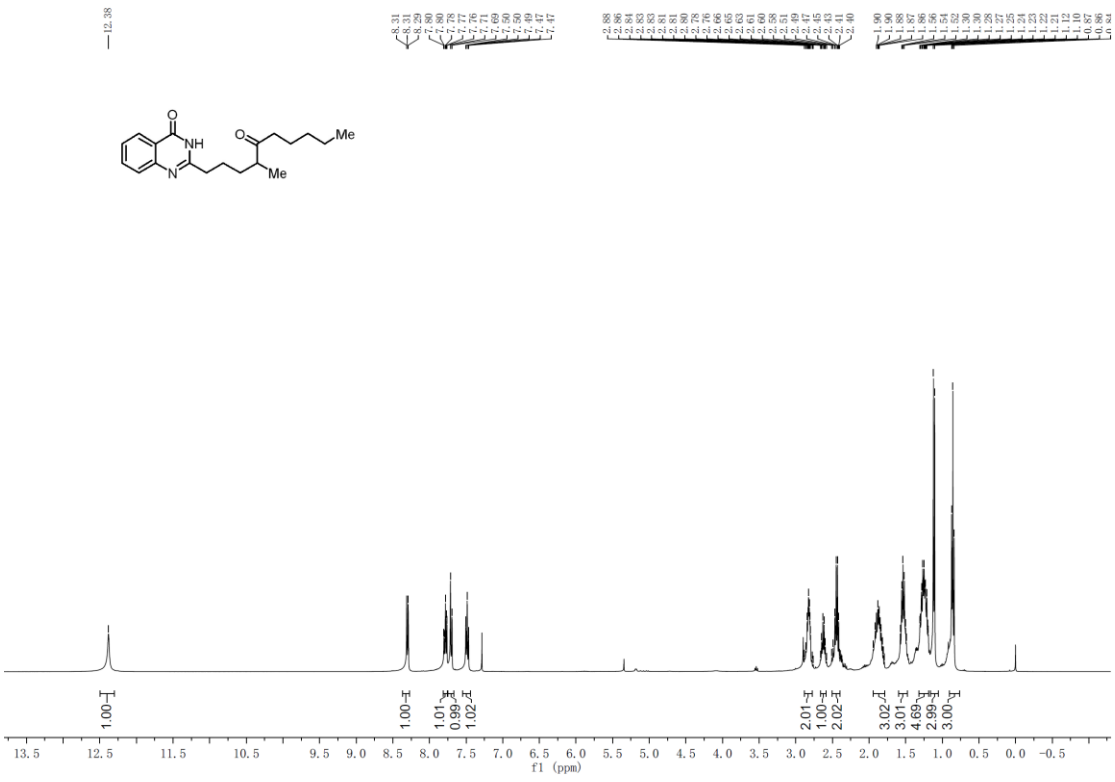


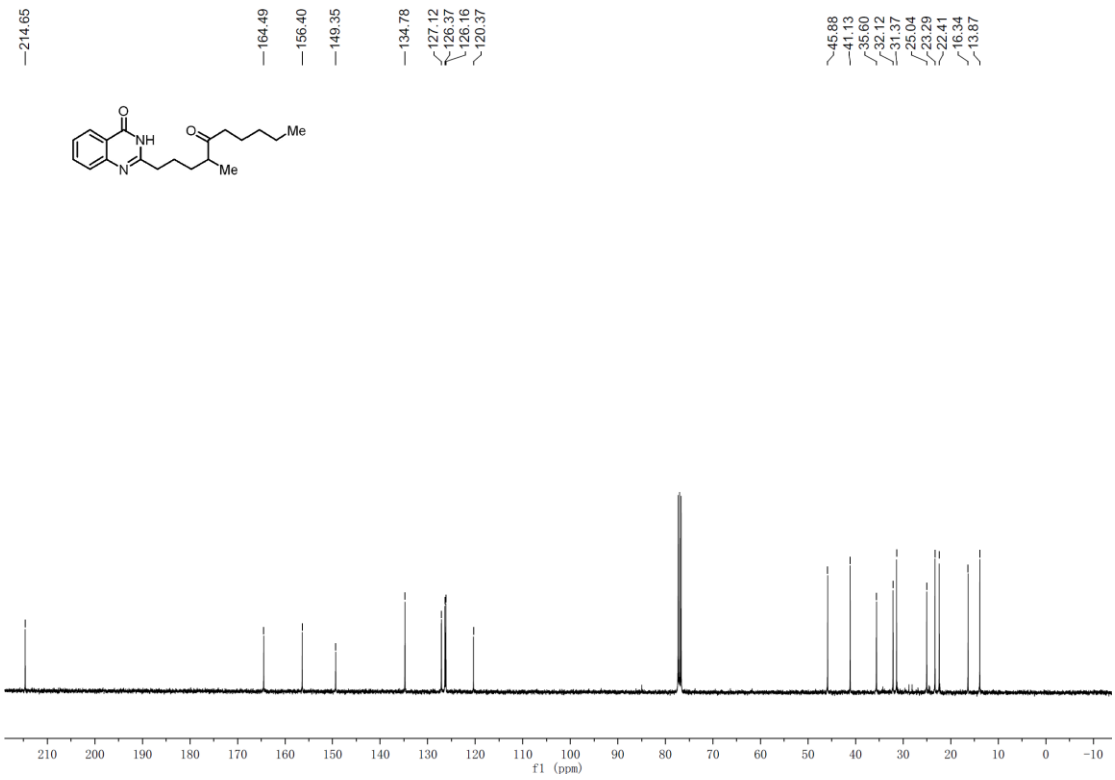
^{1}H NMR and ^{13}C NMR of **3h**



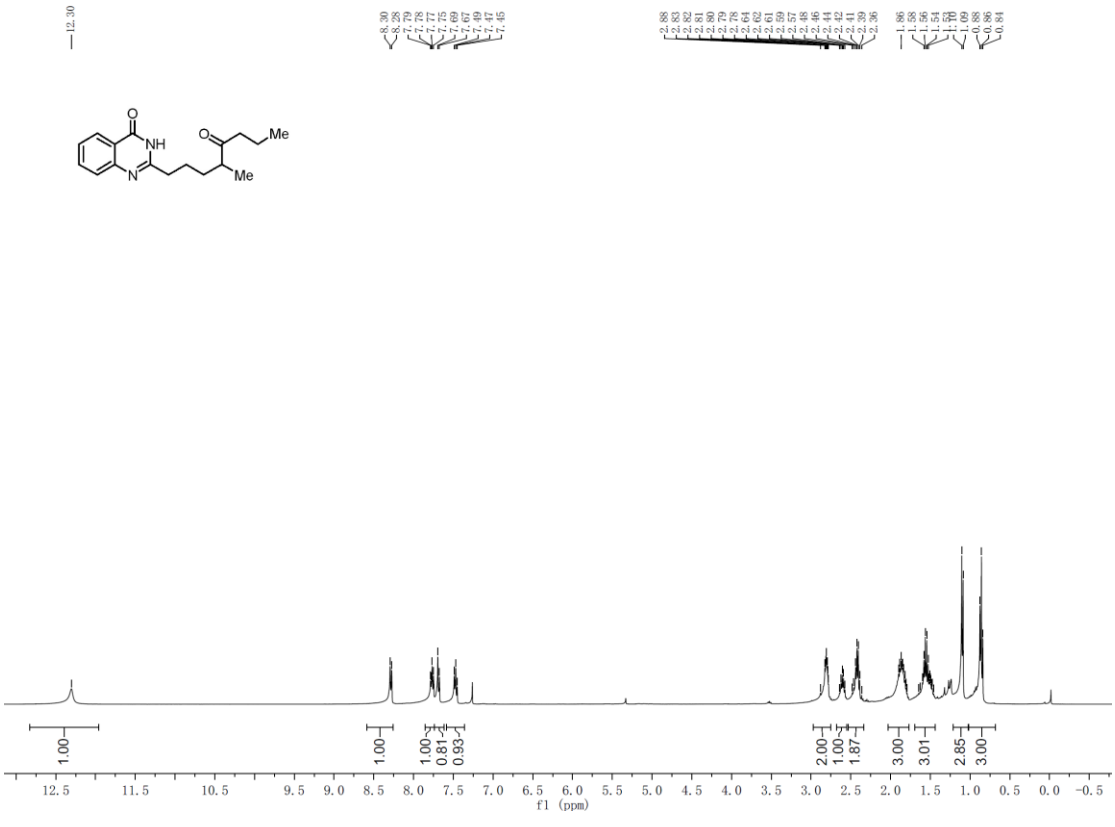


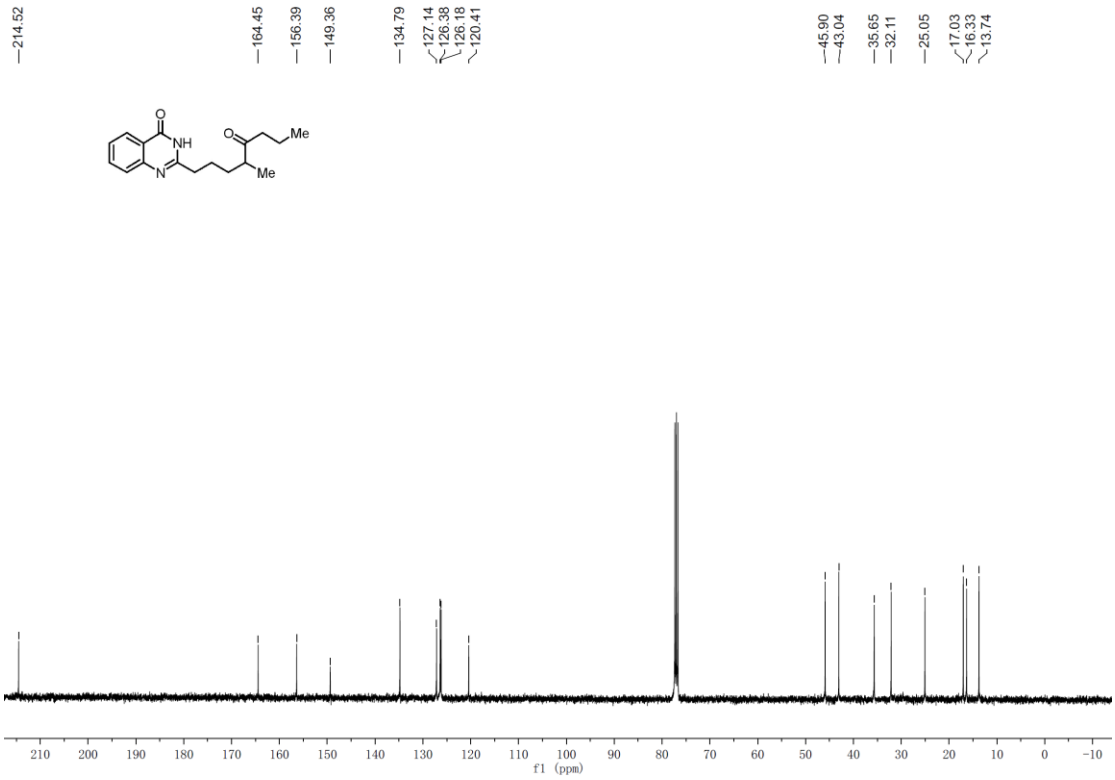
^{1}H NMR and ^{13}C NMR of **3i**



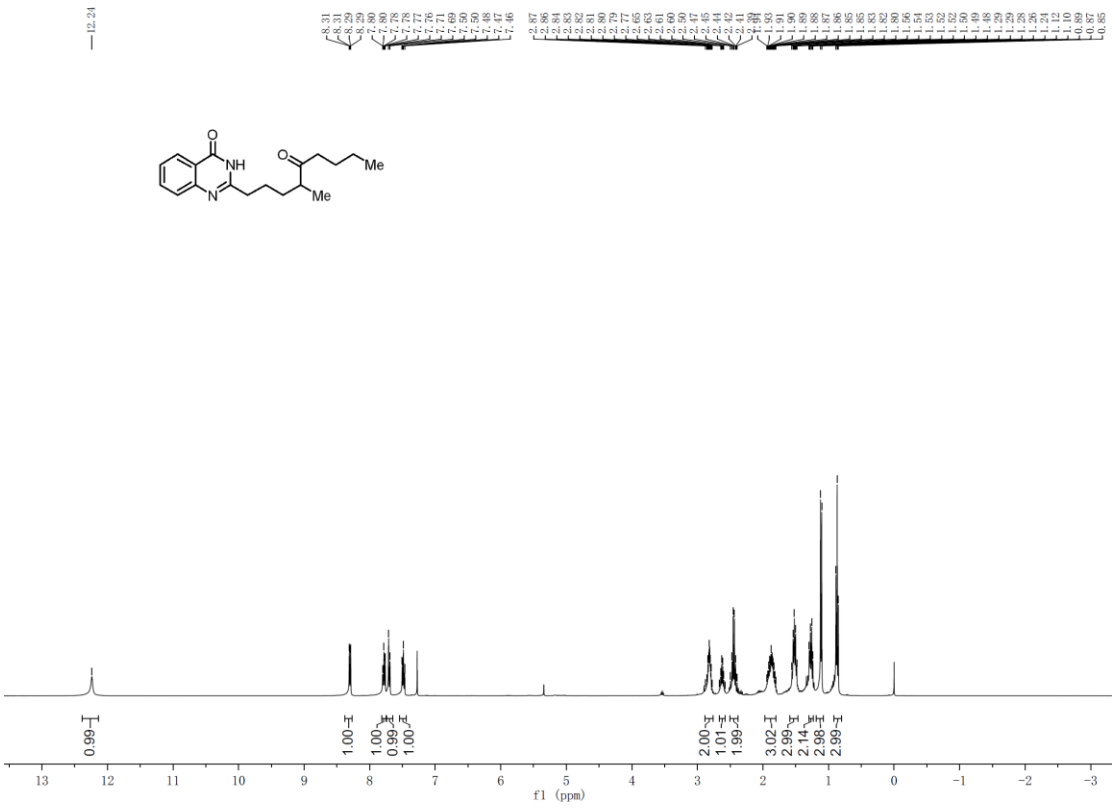


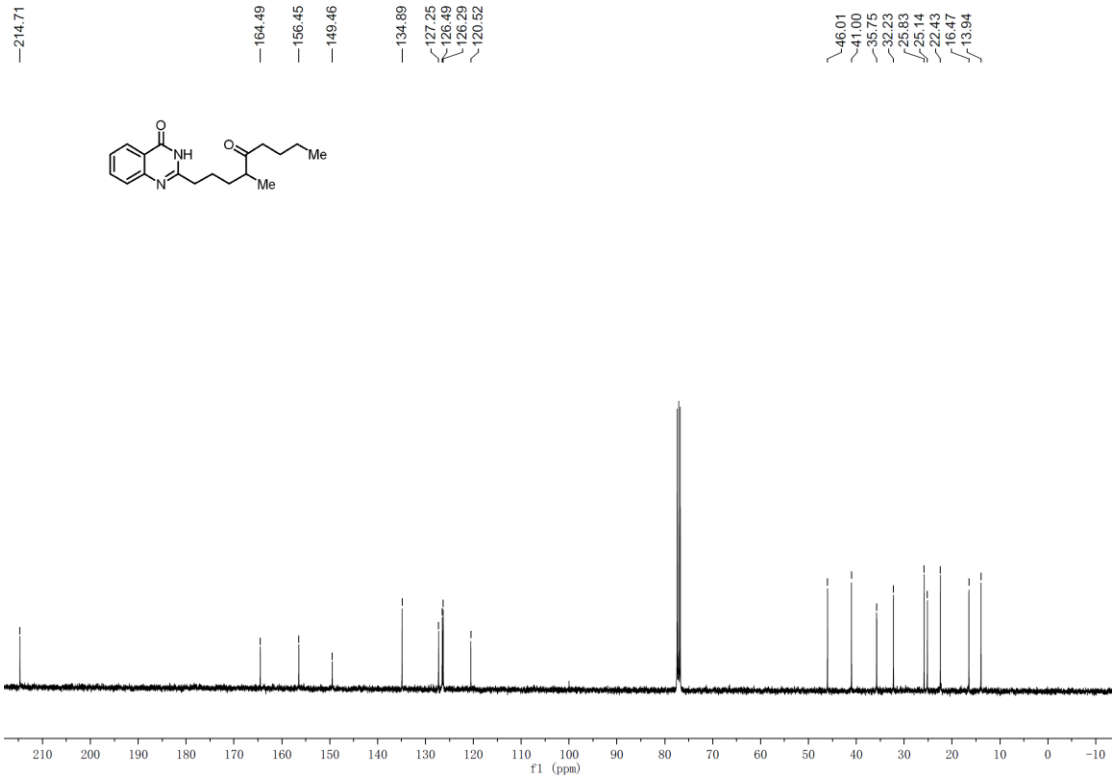
^{1}H NMR and ^{13}C NMR of **3j**



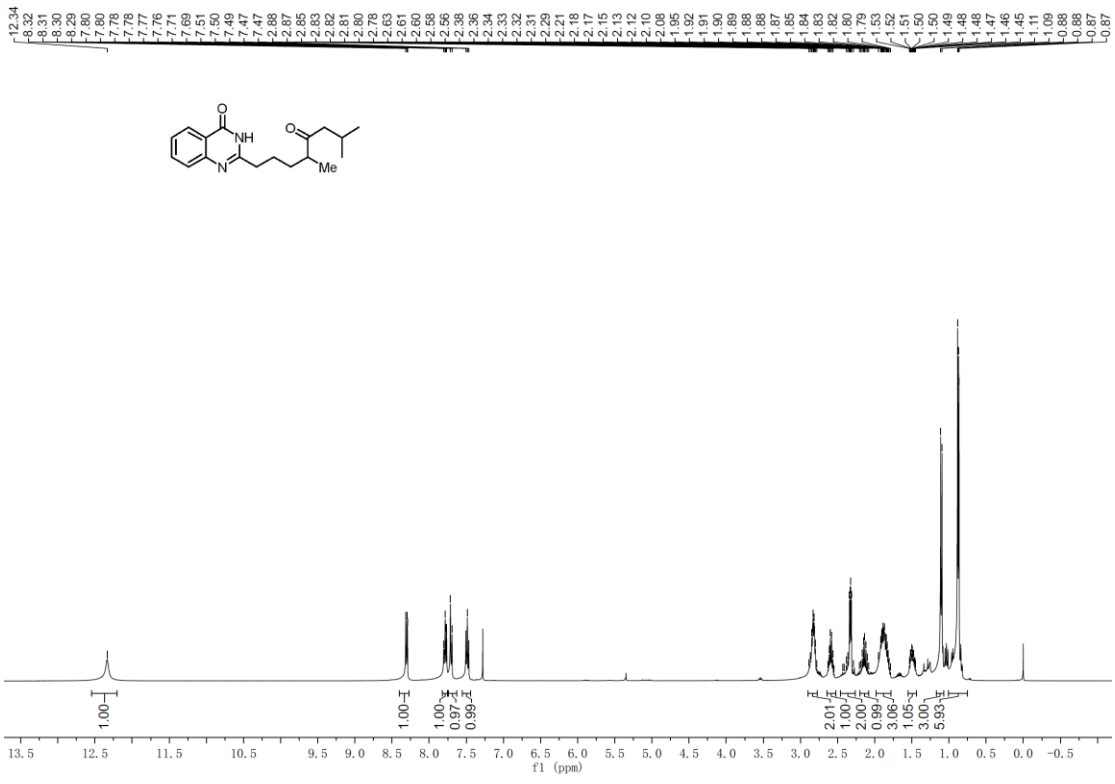


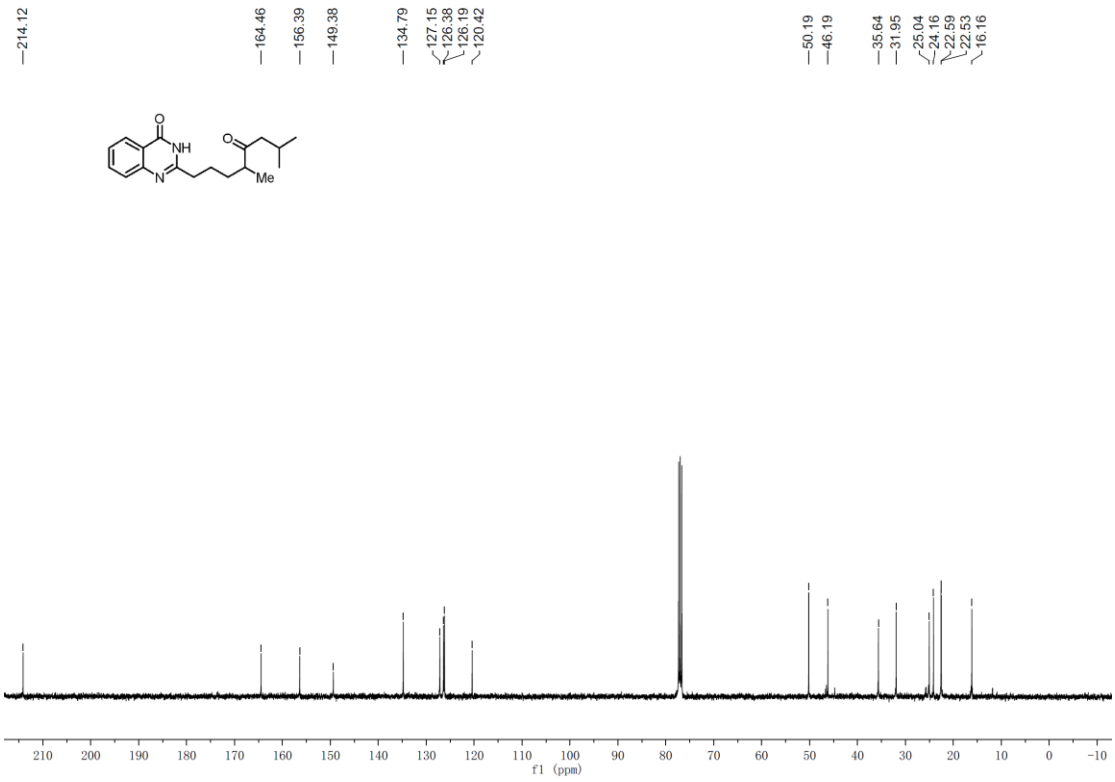
^{1}H NMR and ^{13}C NMR of **3k**



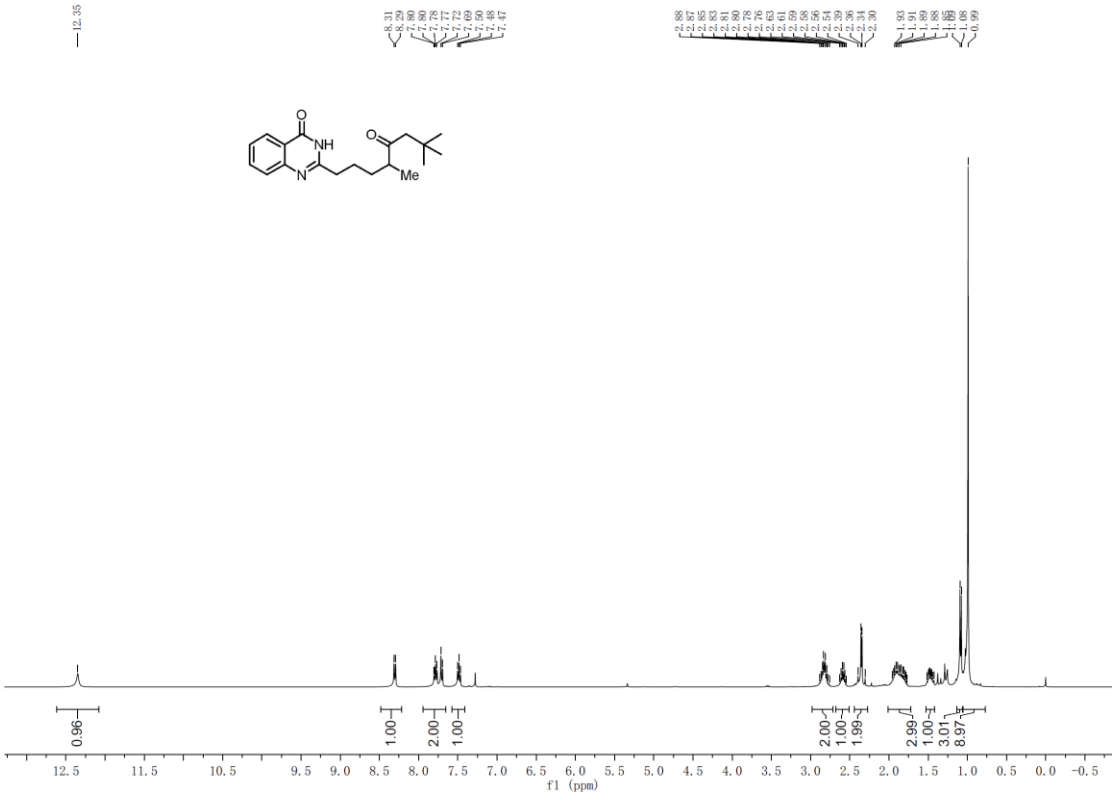


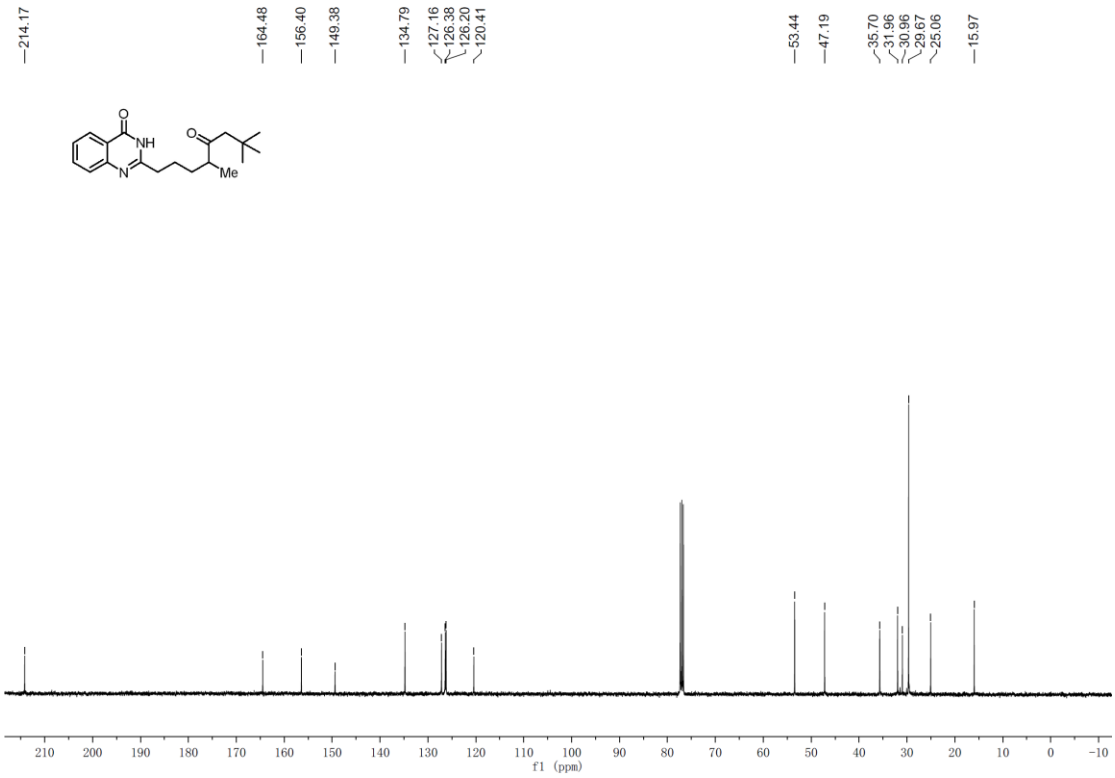
^{1}H NMR and ^{13}C NMR of **3l**



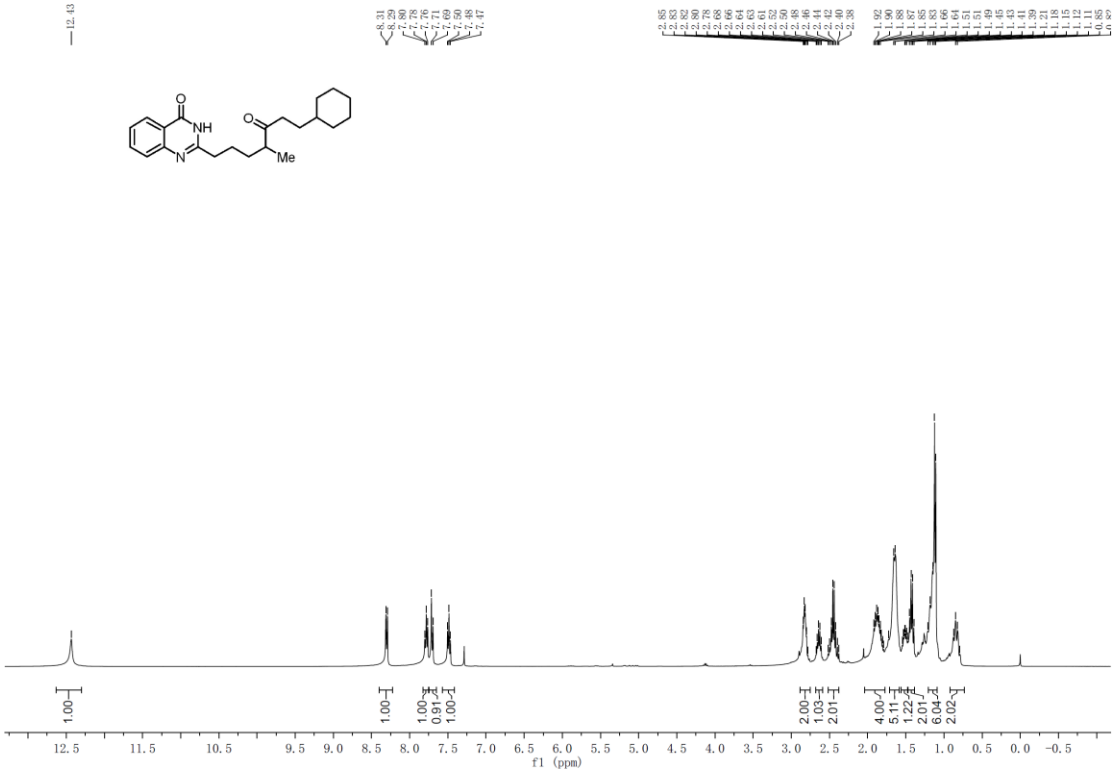


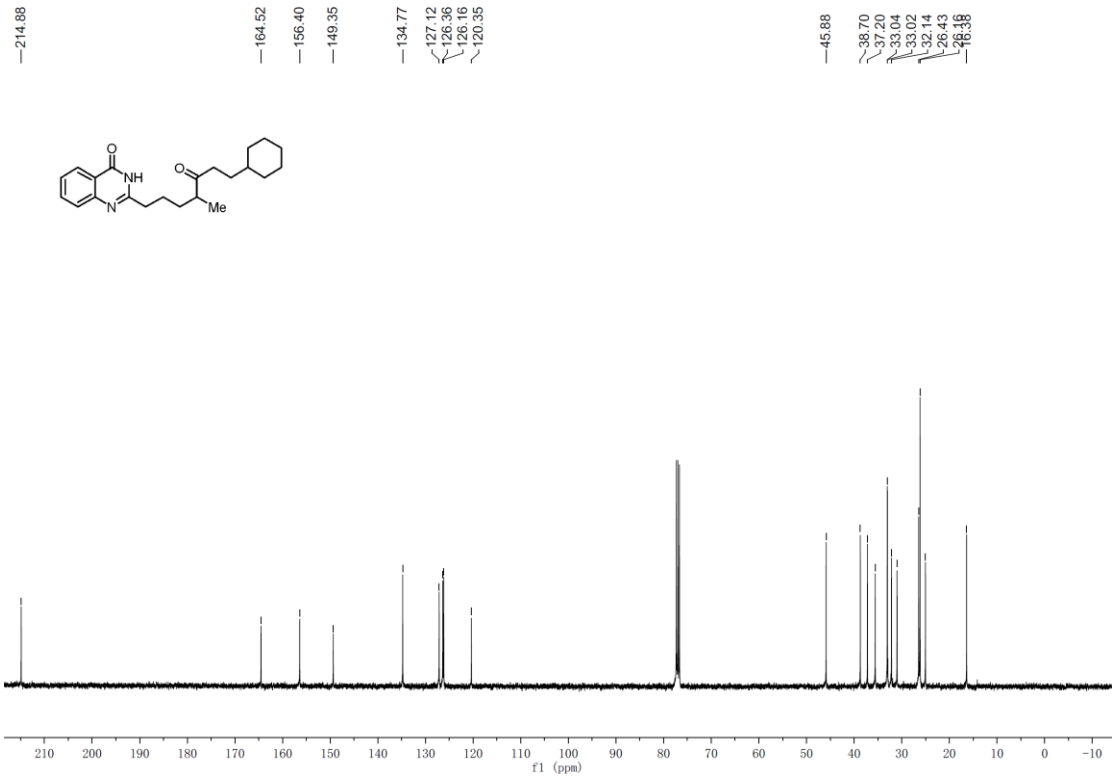
^{1}H NMR and ^{13}C NMR of **3m**



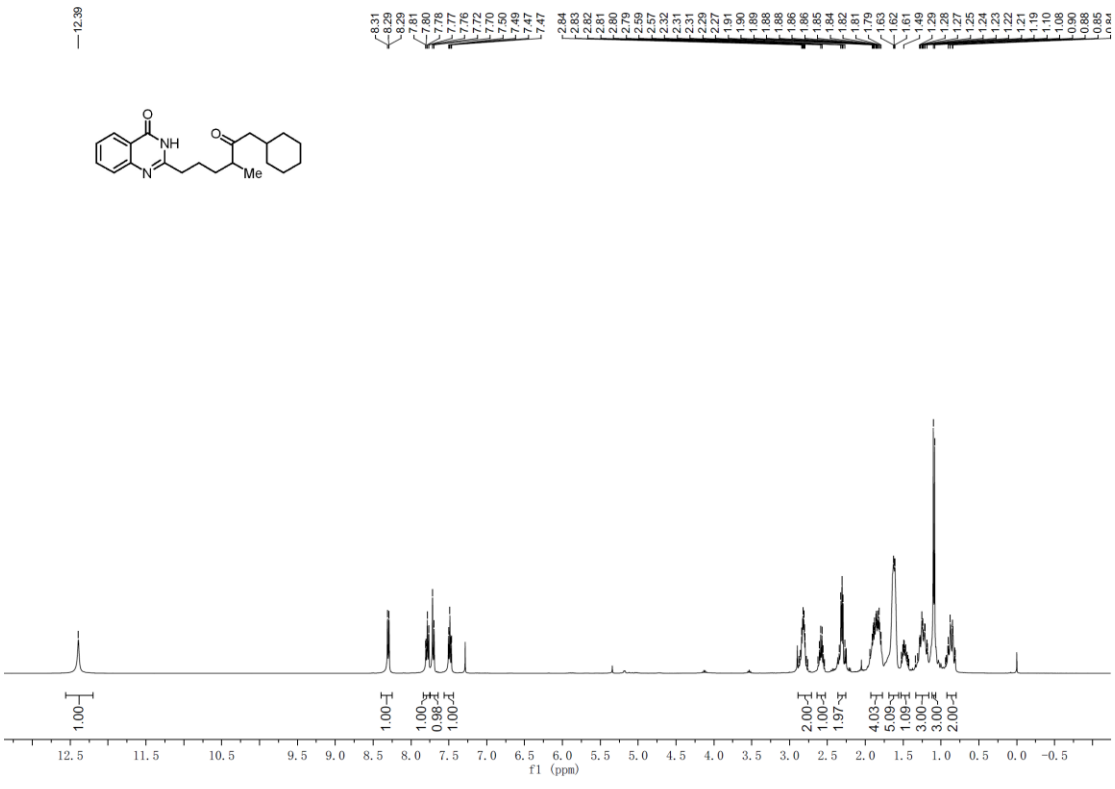


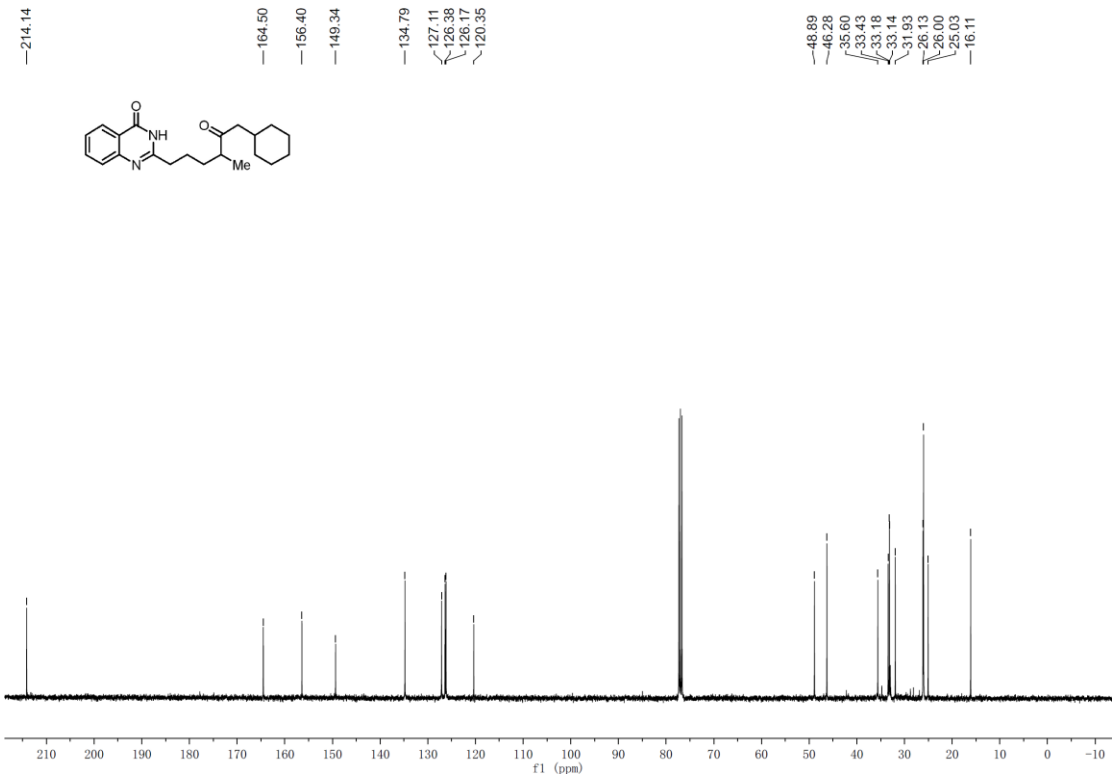
^{1}H NMR and ^{13}C NMR of **3n**



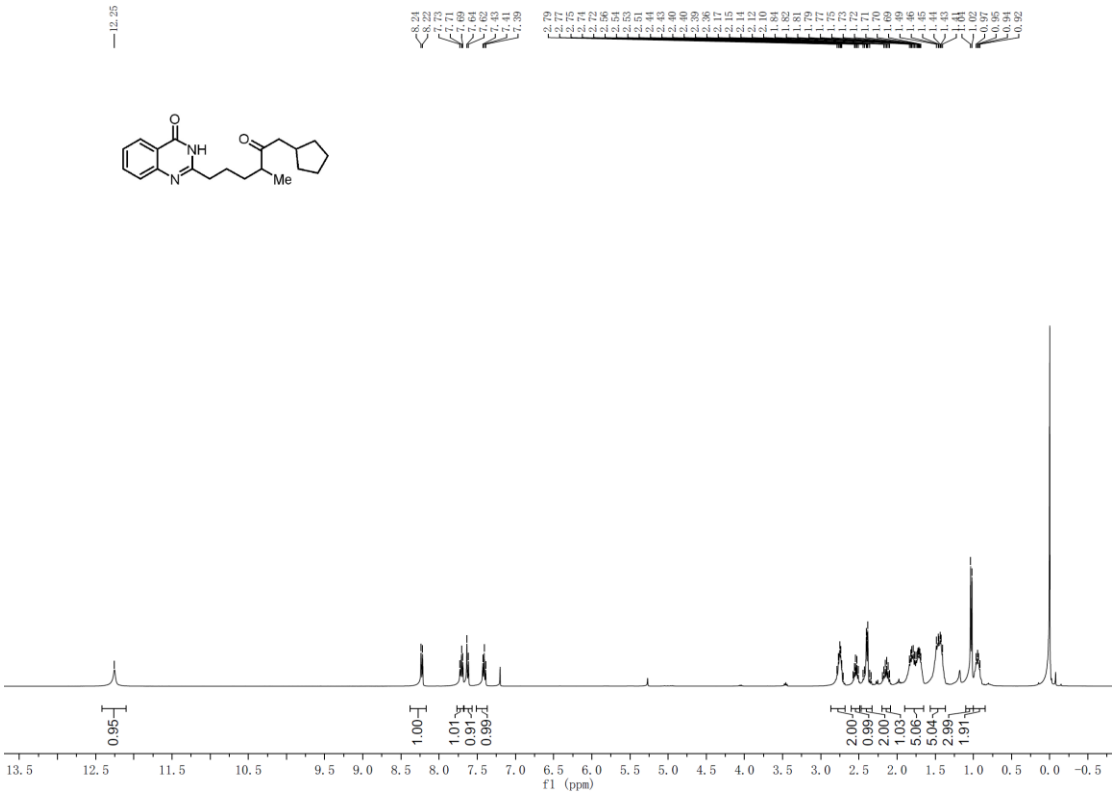


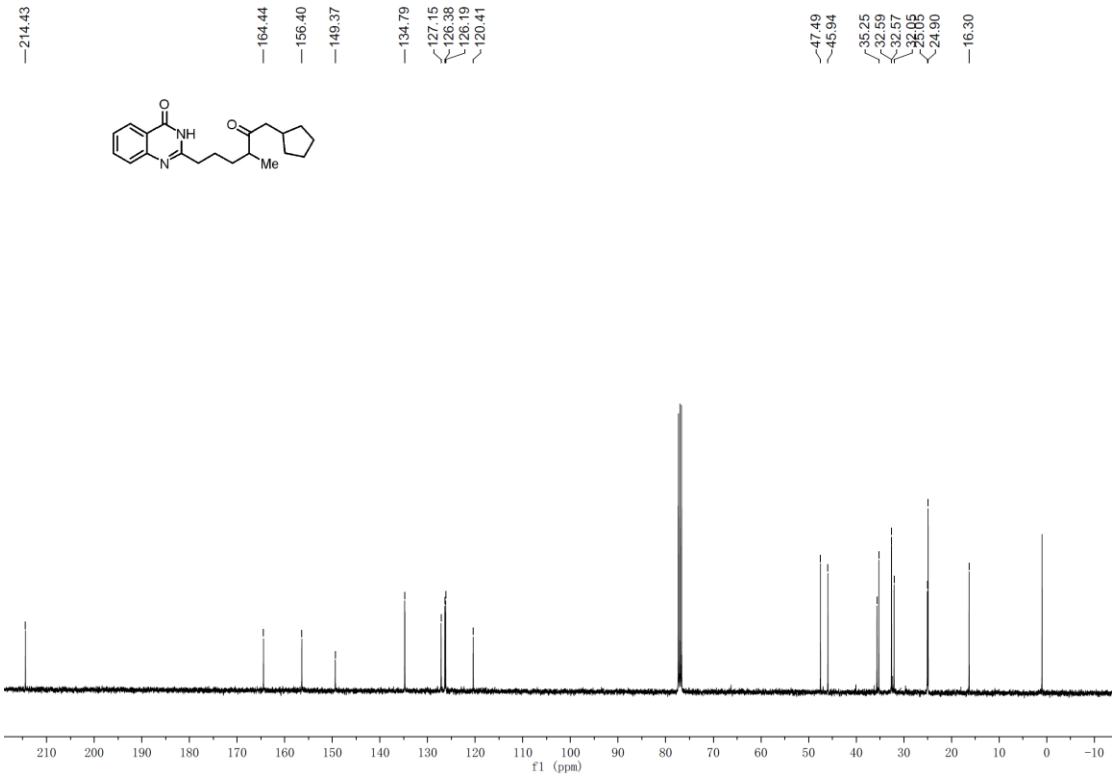
^{1}H NMR and ^{13}C NMR of **3o**



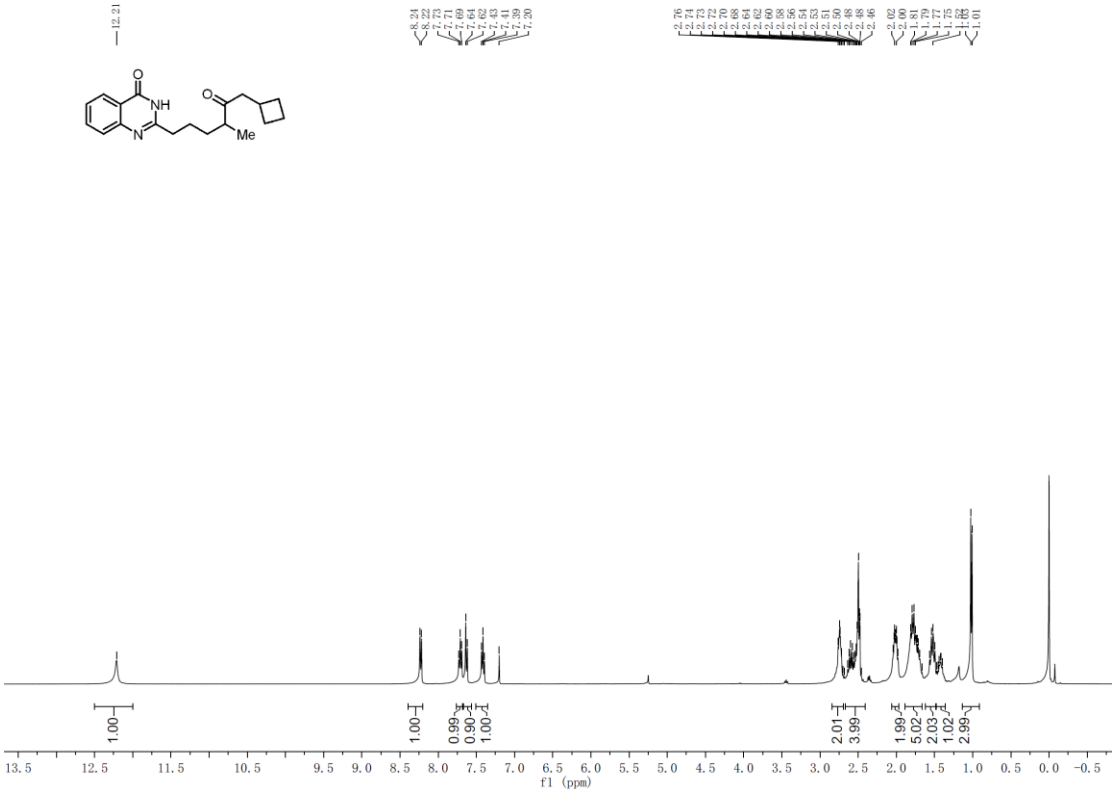


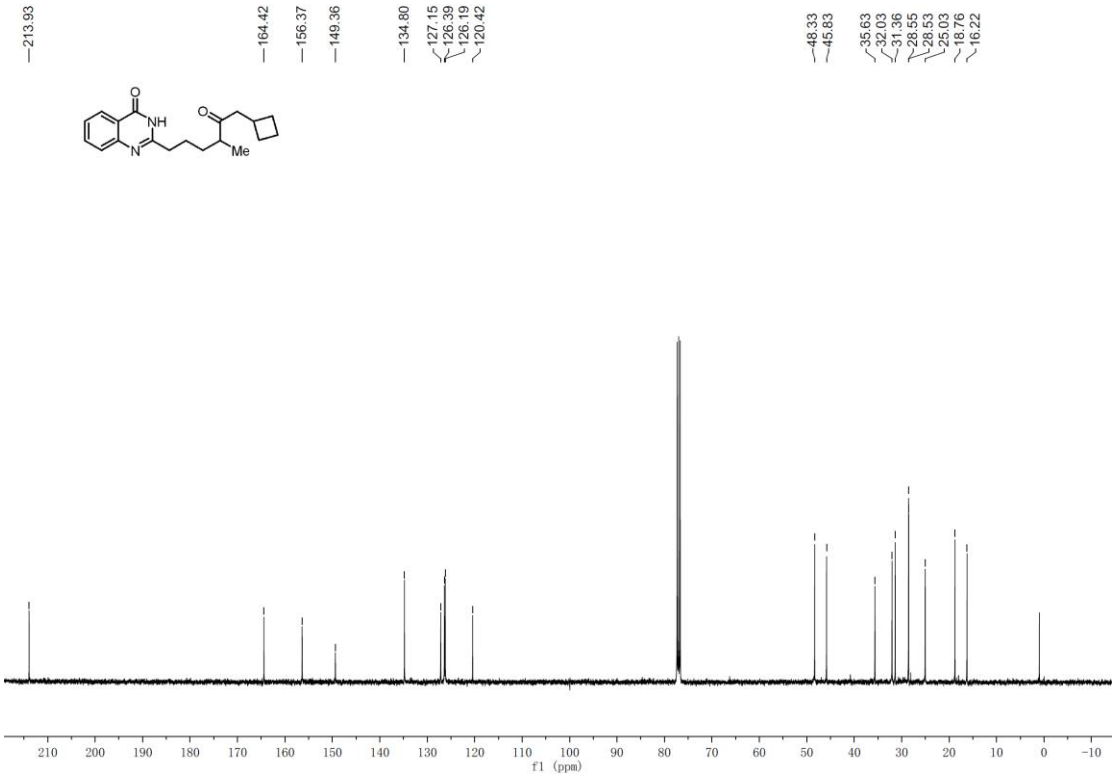
^{1}H NMR and ^{13}C NMR of **3p**



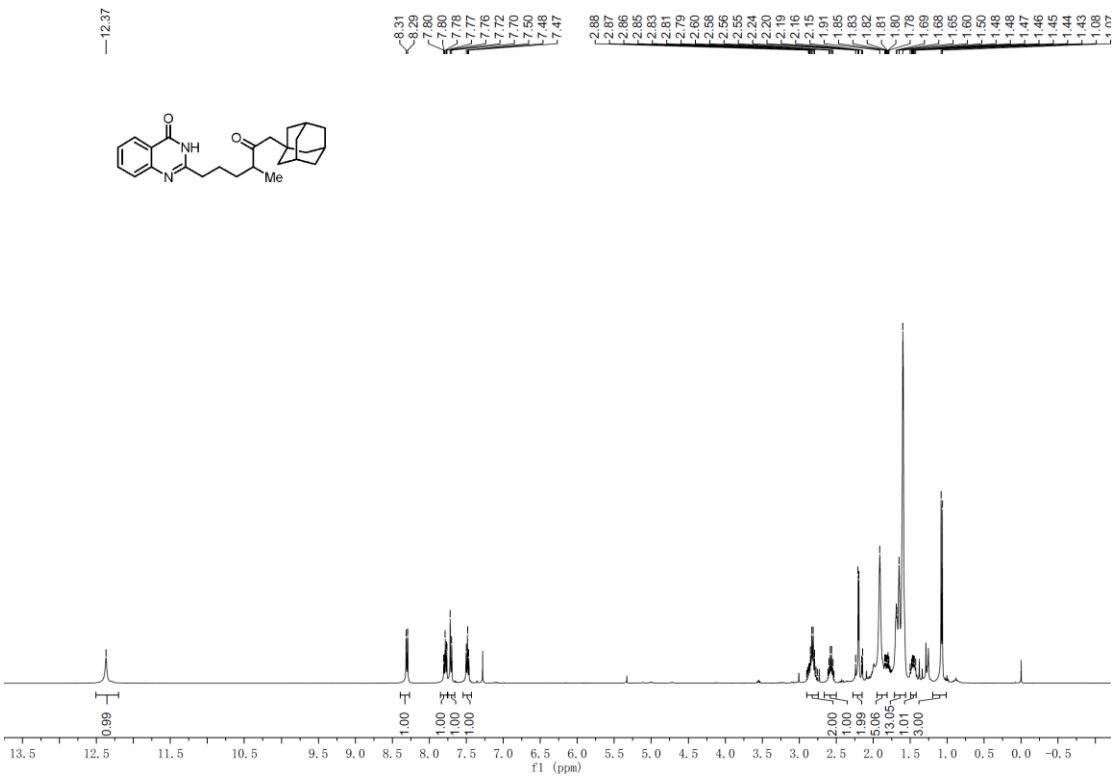


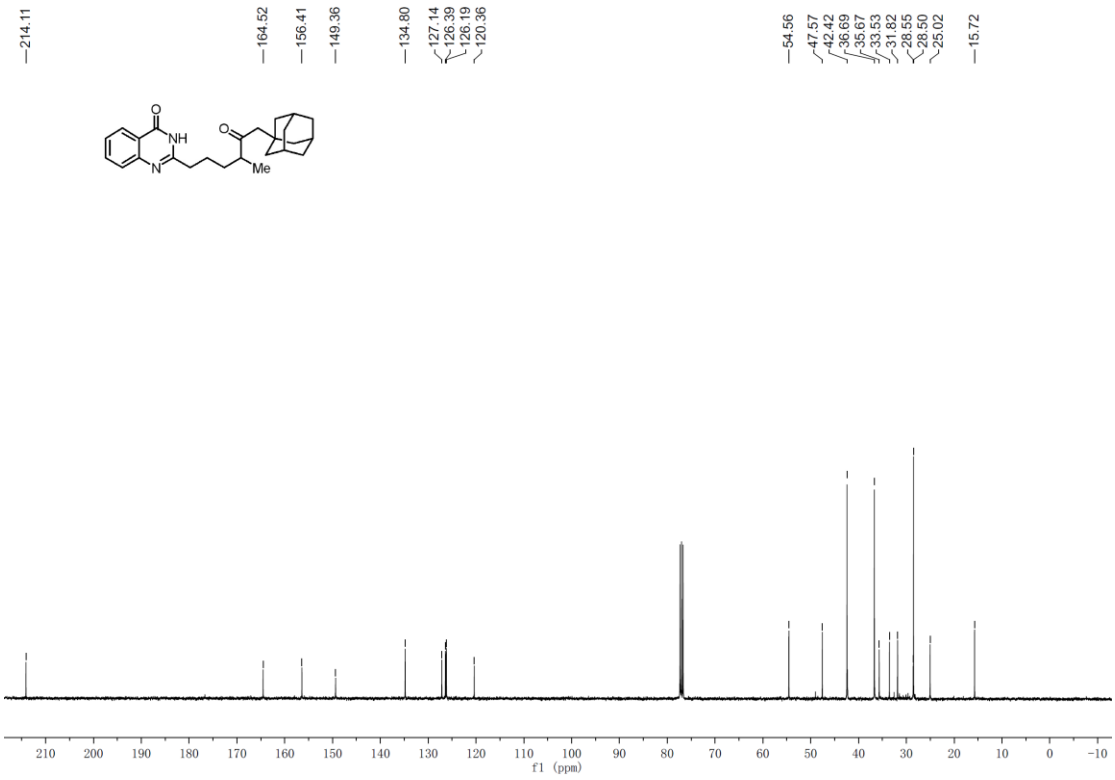
^{1}H NMR and ^{13}C NMR of **3q**



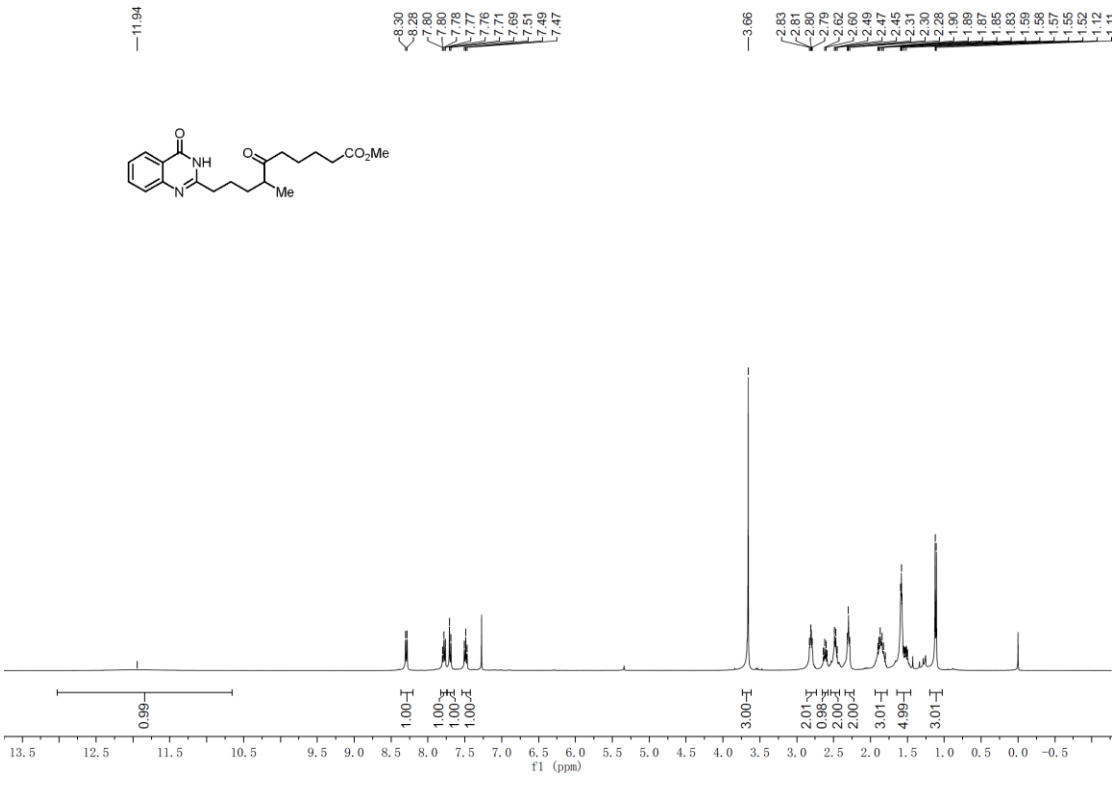


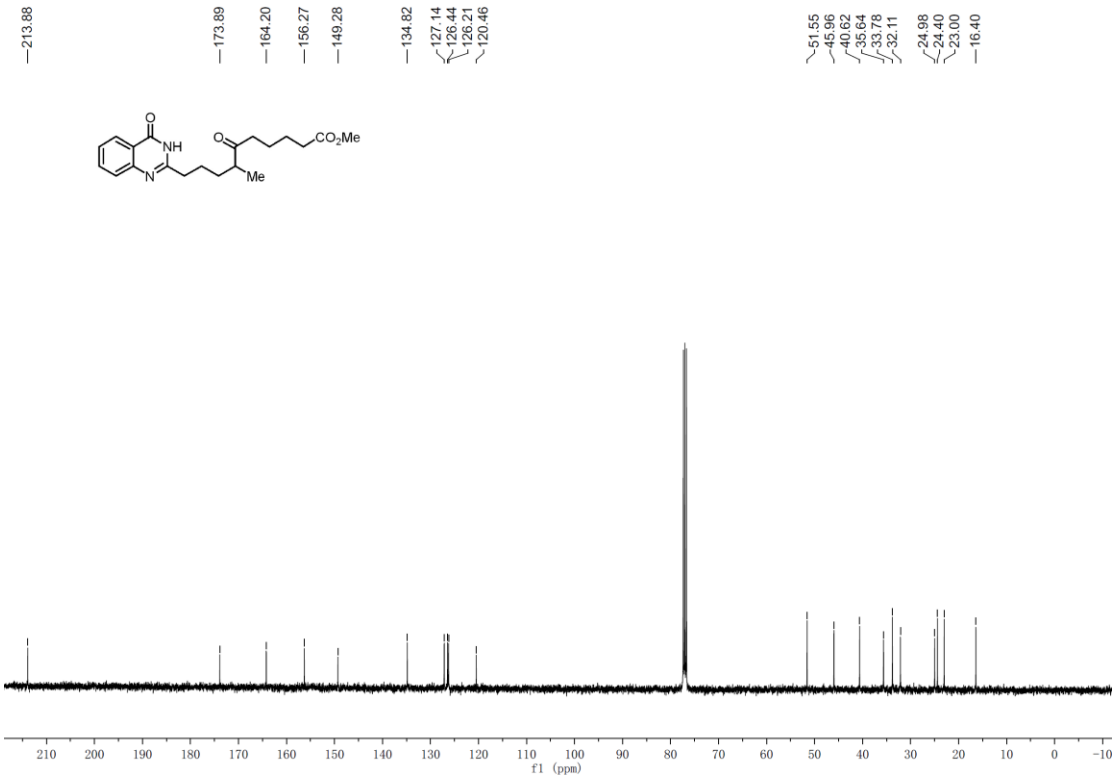
^{1}H NMR and ^{13}C NMR of **3r**



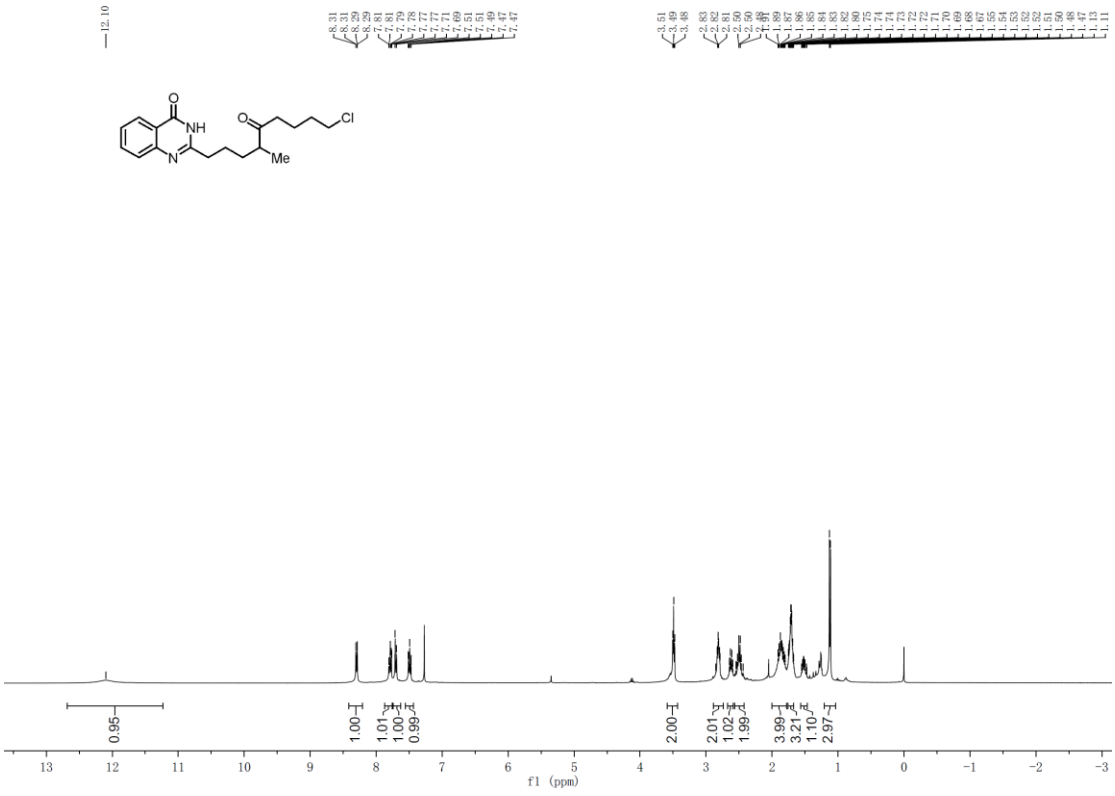


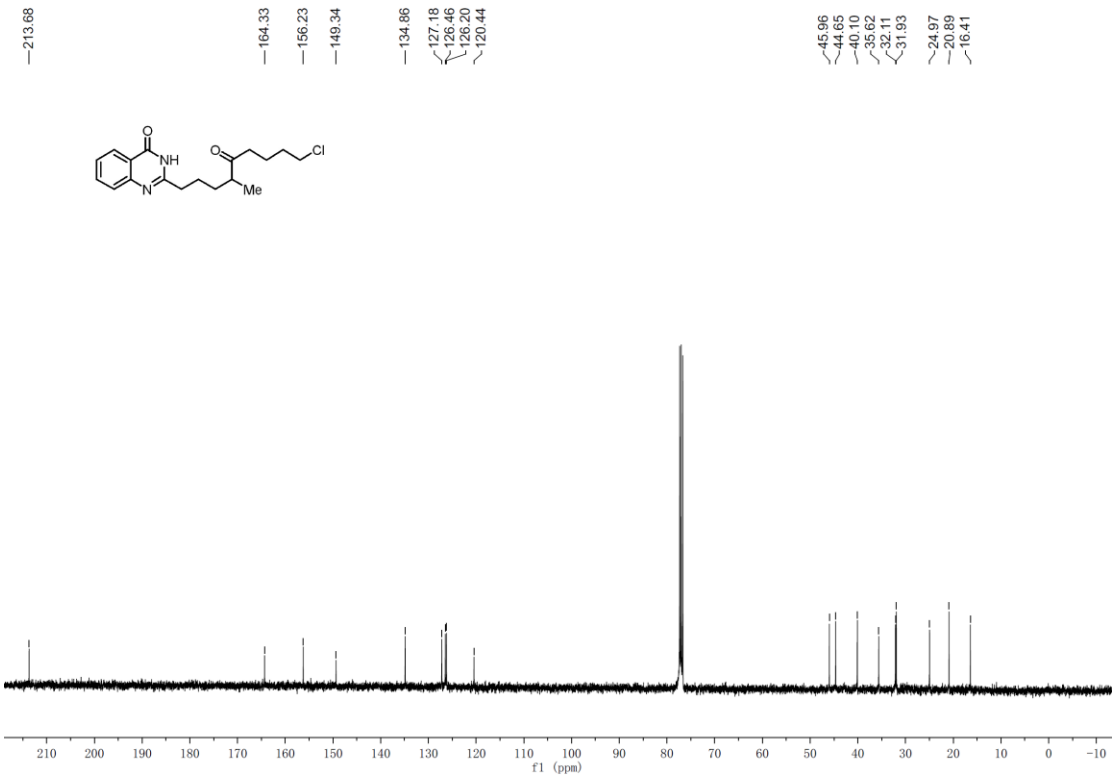
^{1}H NMR and ^{13}C NMR of **3s**



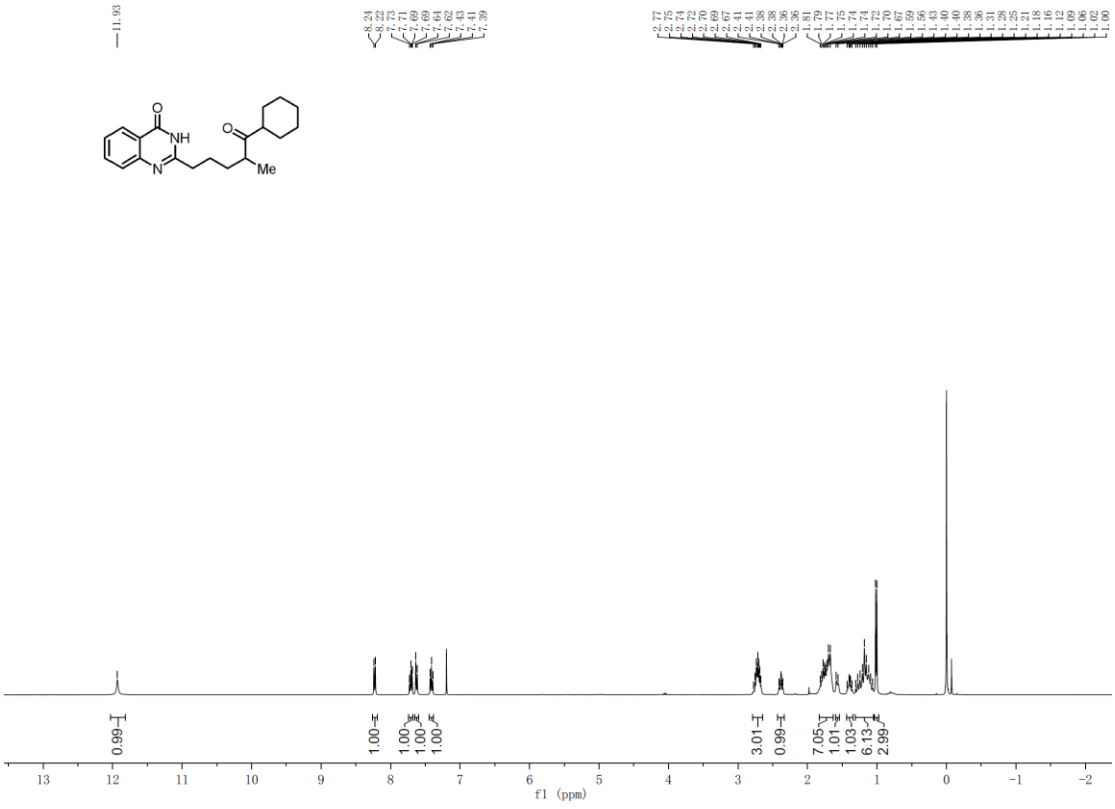


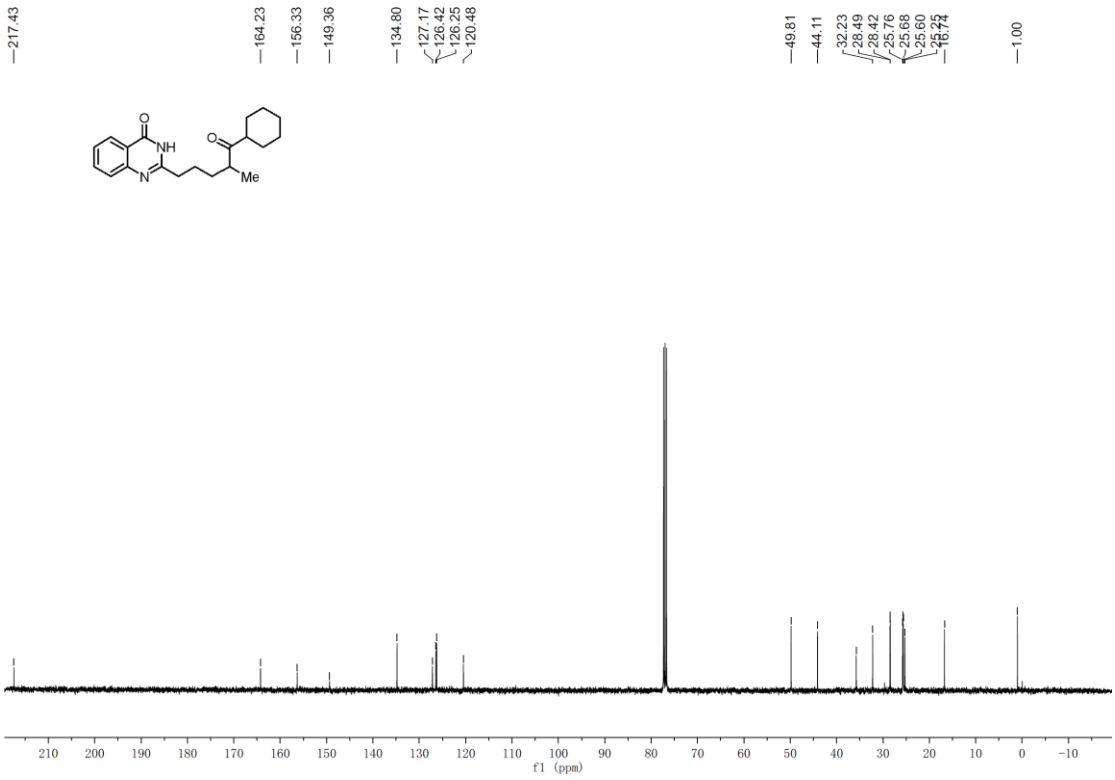
^{1}H NMR and ^{13}C NMR of **3t**



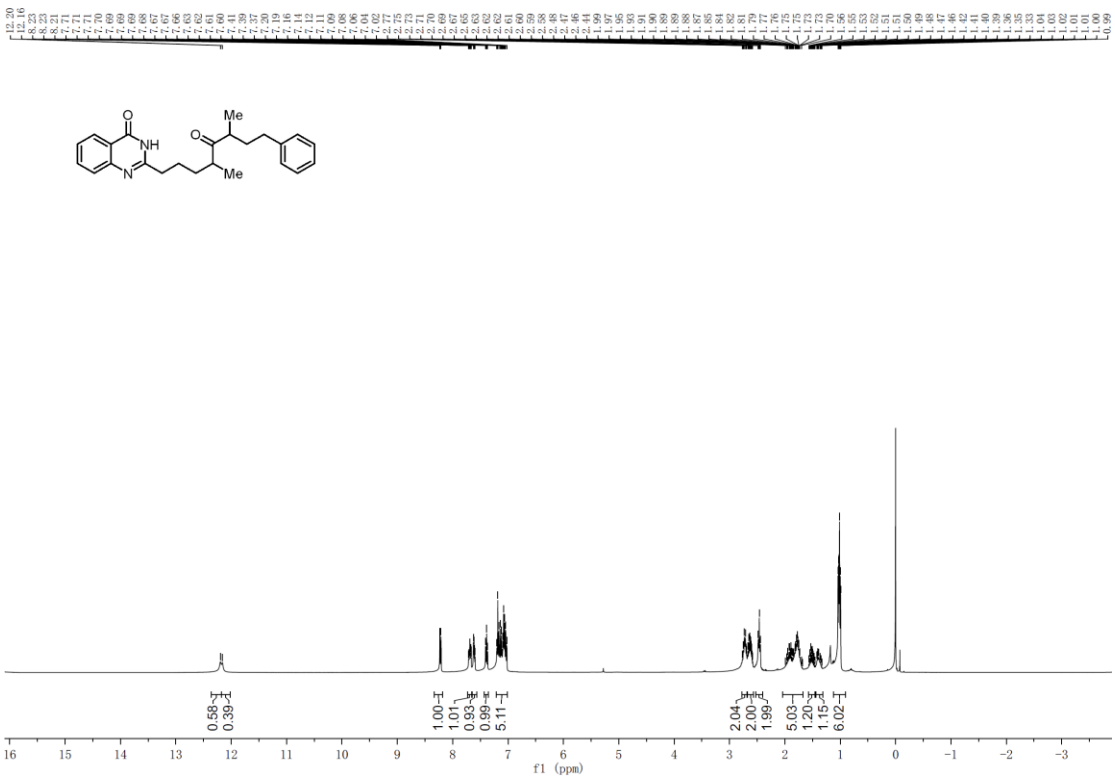


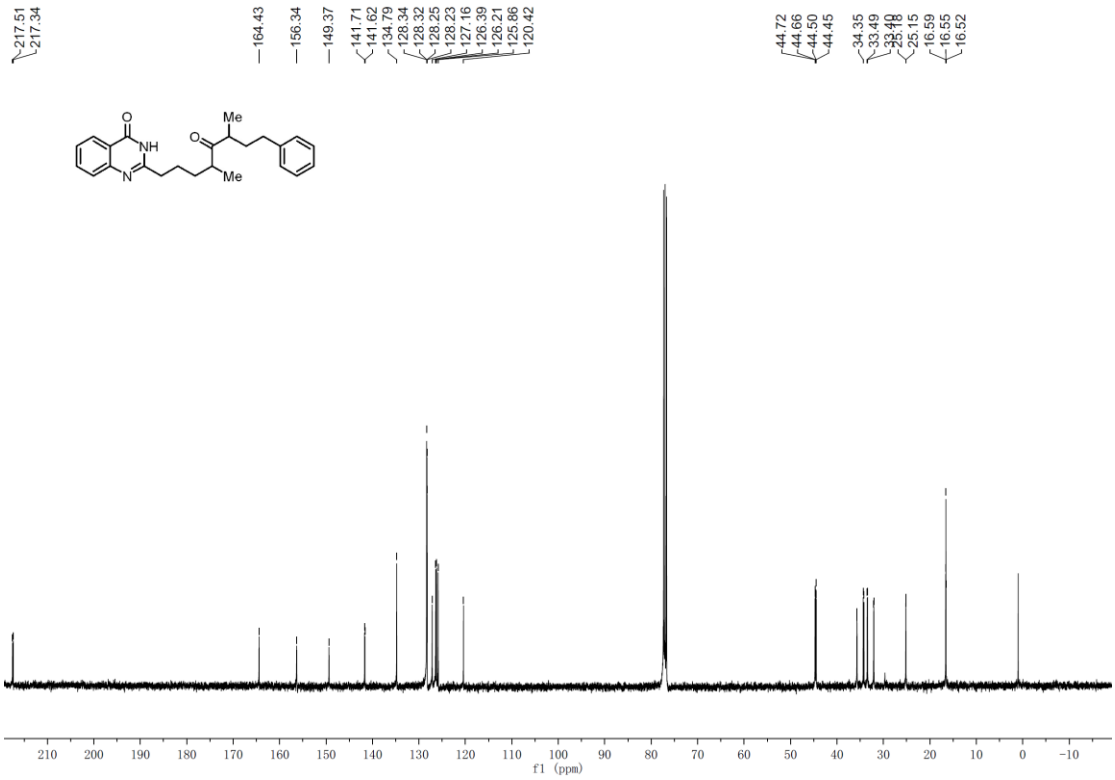
^{1}H NMR and ^{13}C NMR of **3u**



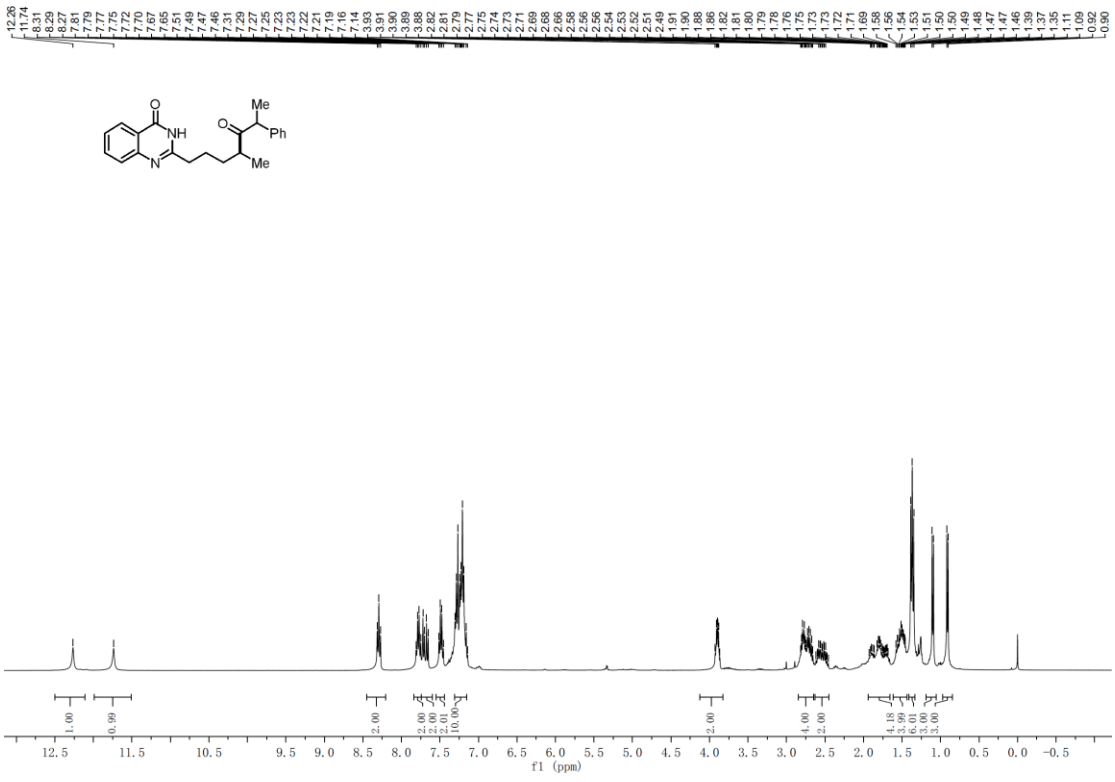


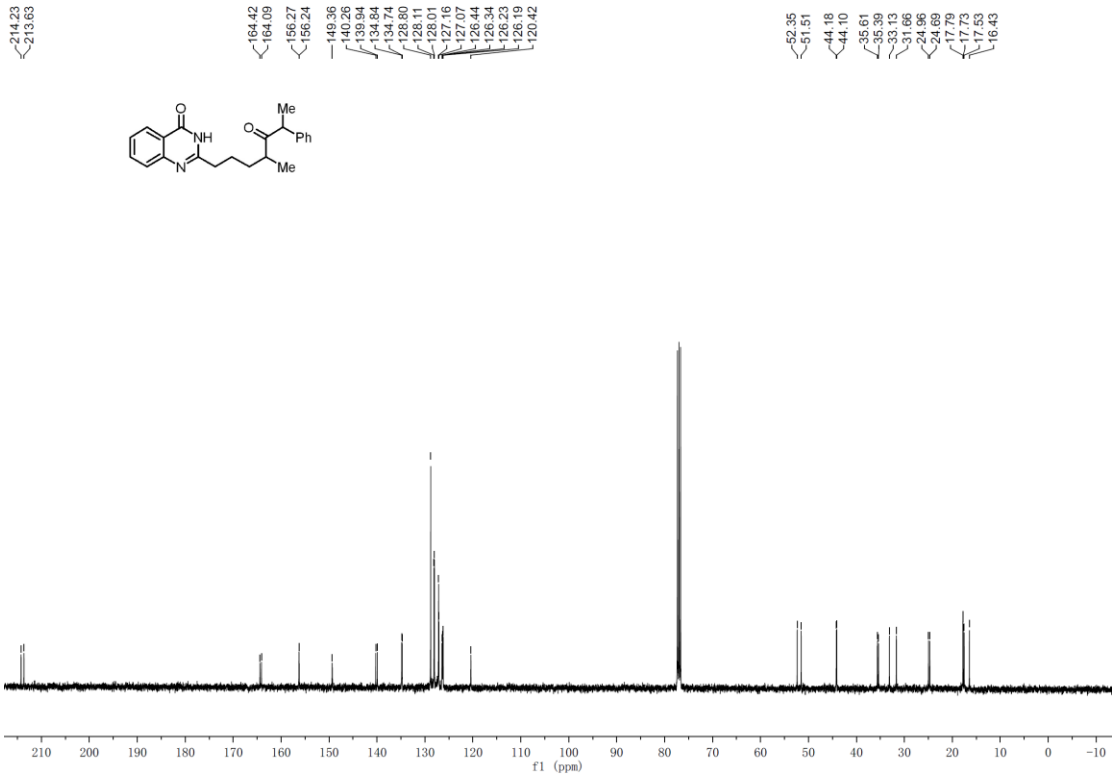
^{1}H NMR and ^{13}C NMR of **3v**



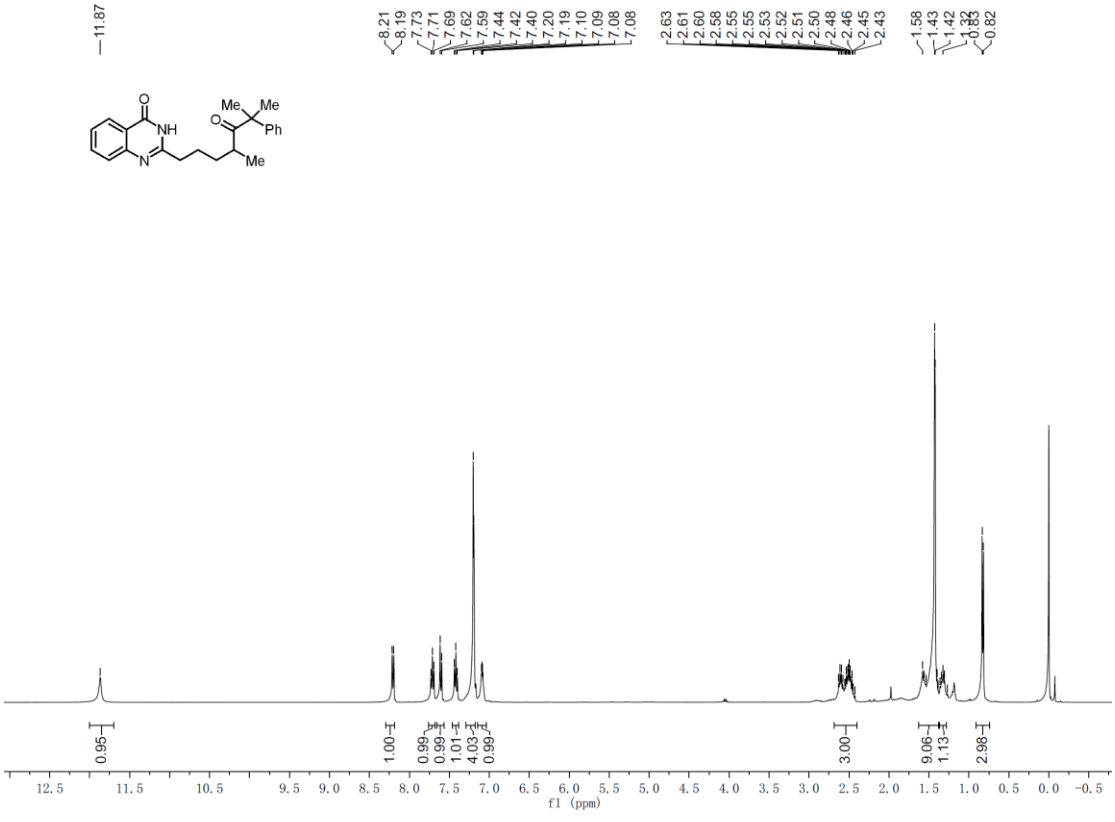


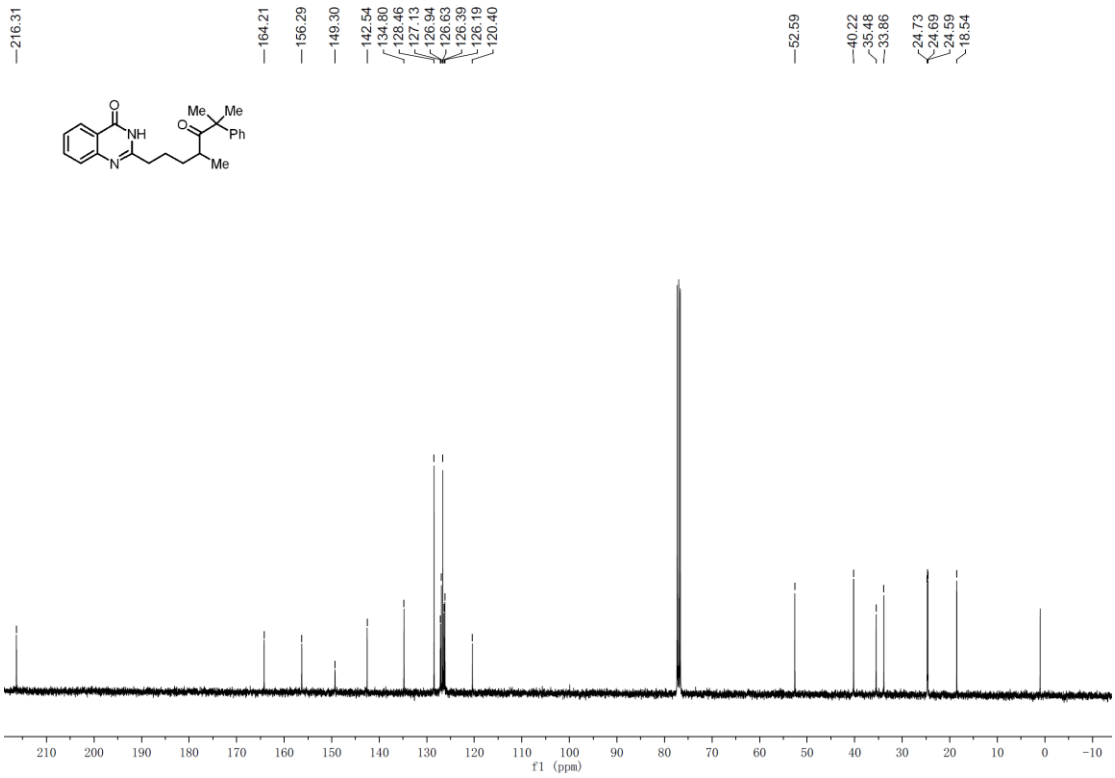
^{1}H NMR and ^{13}C NMR of **3w**



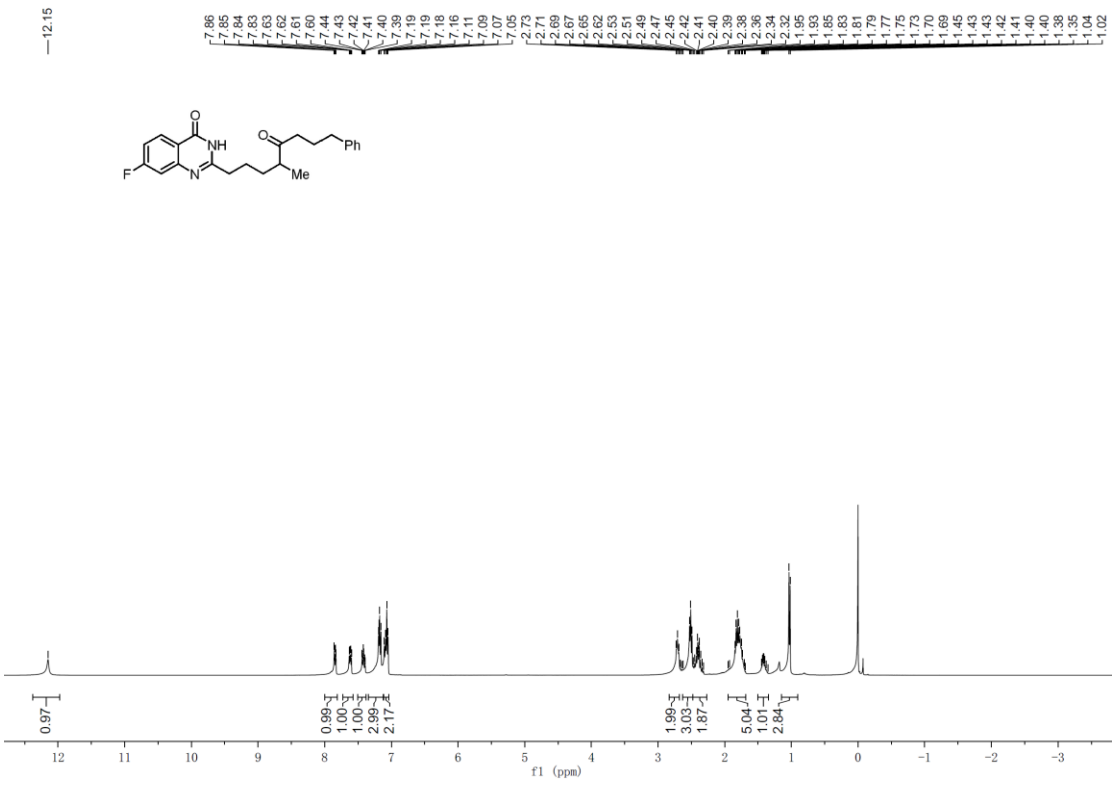


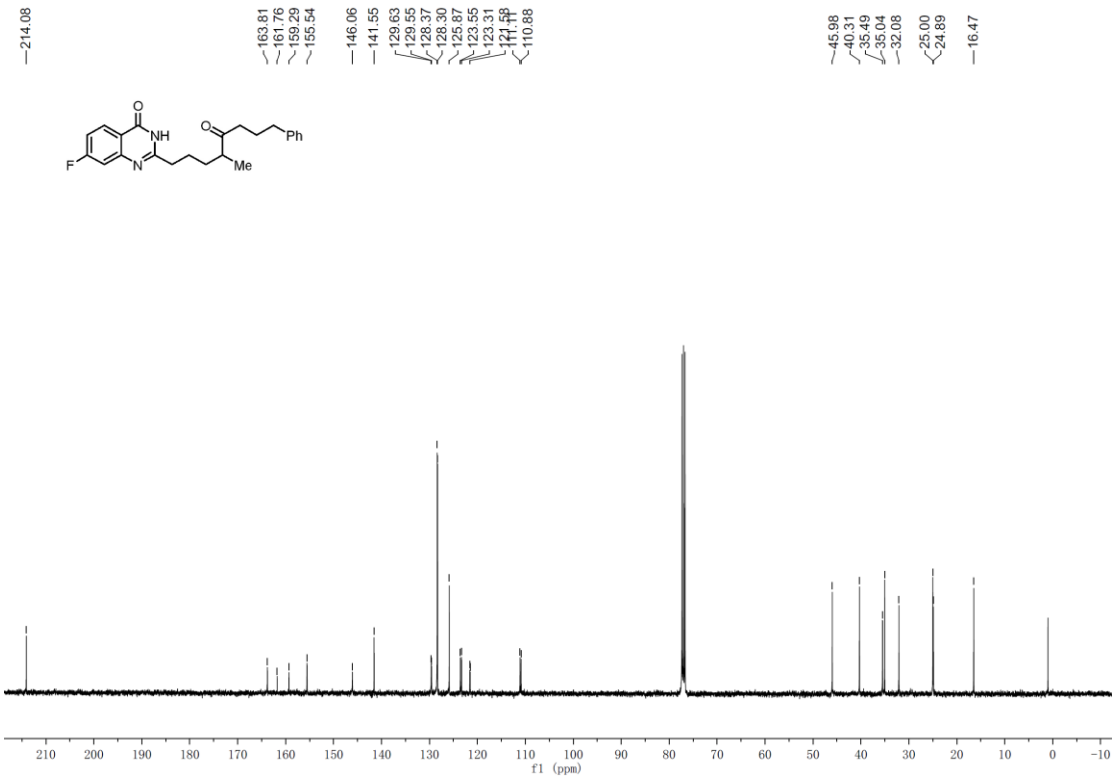
^{1}H NMR and ^{13}C NMR of **3x**

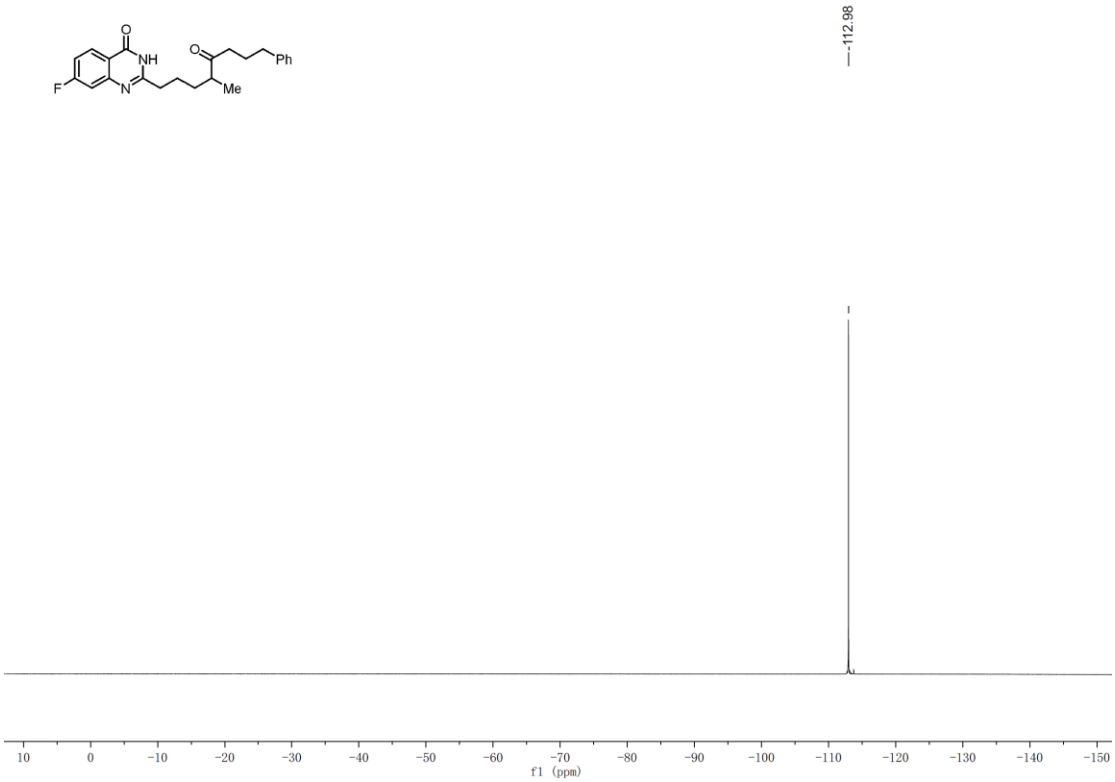




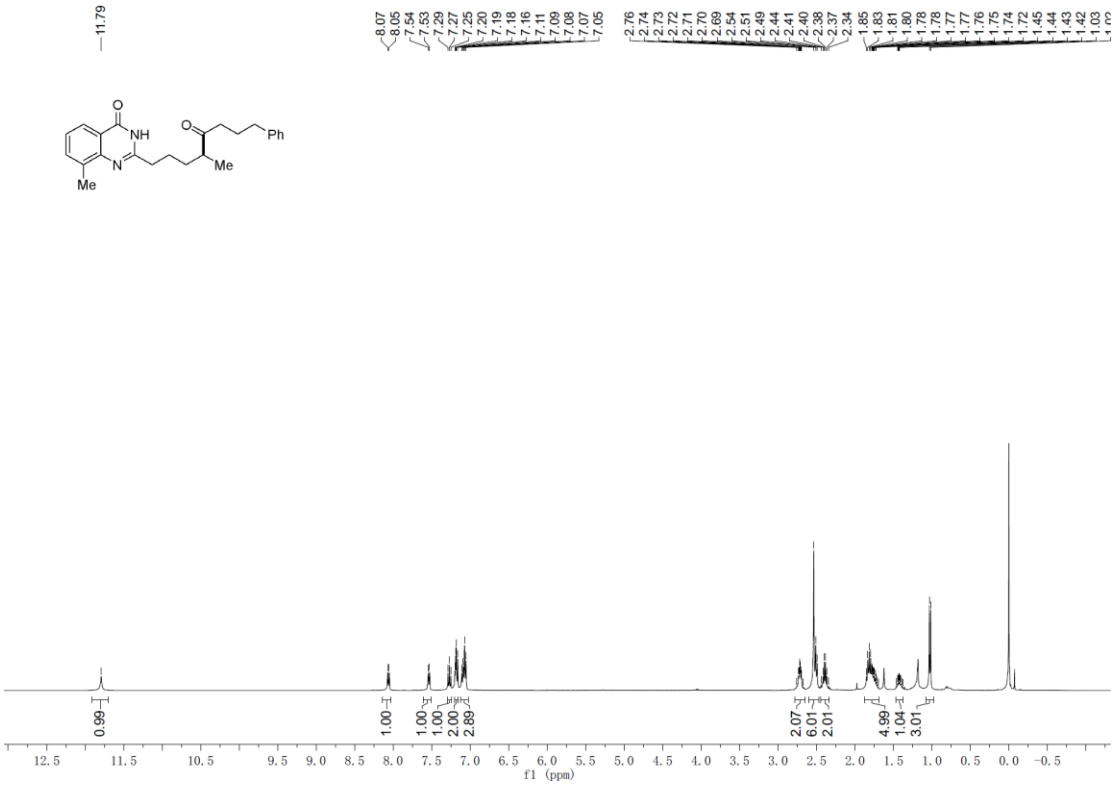
^{1}H NMR, ^{13}C NMR and ^{19}F NMR of **3y**

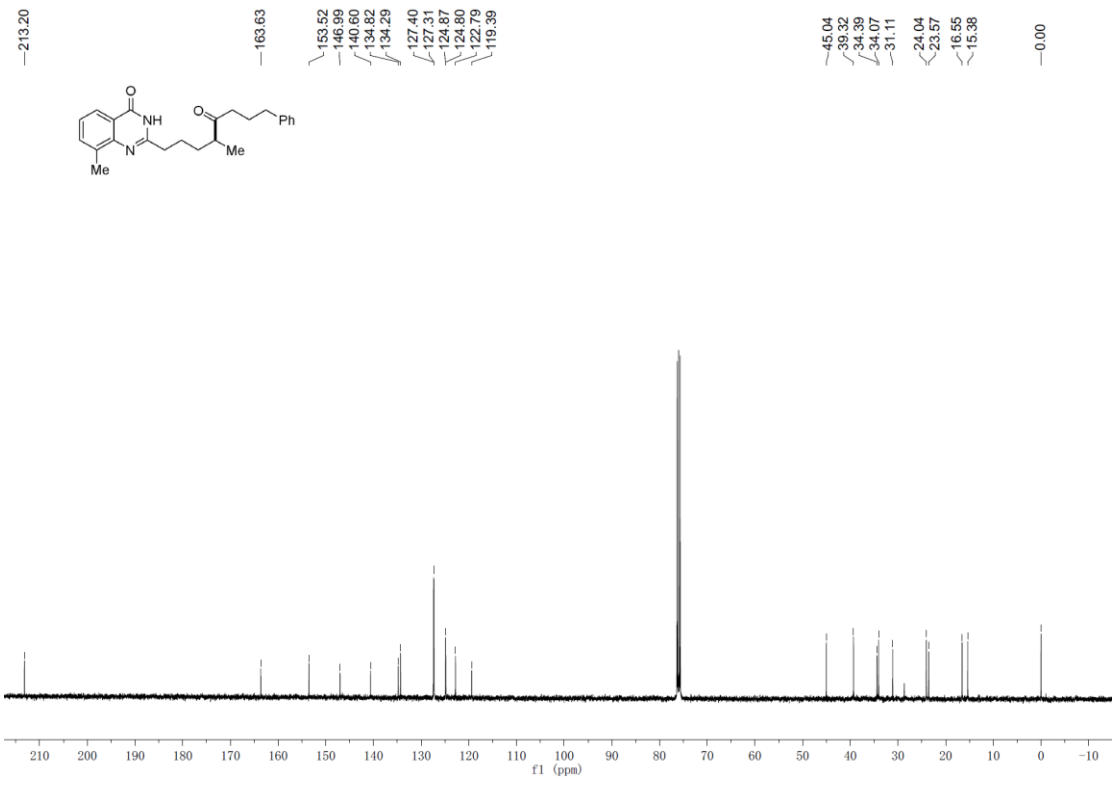



214.08
163.81
161.76
159.29
155.54
146.06
141.55
129.63
129.55
128.37
128.30
125.87
123.55
123.31
121.58
111.11
110.88
45.98
40.31
35.49
35.04
32.08
25.00
24.89
16.47
O
NH
N
F
O
Ph
Me
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

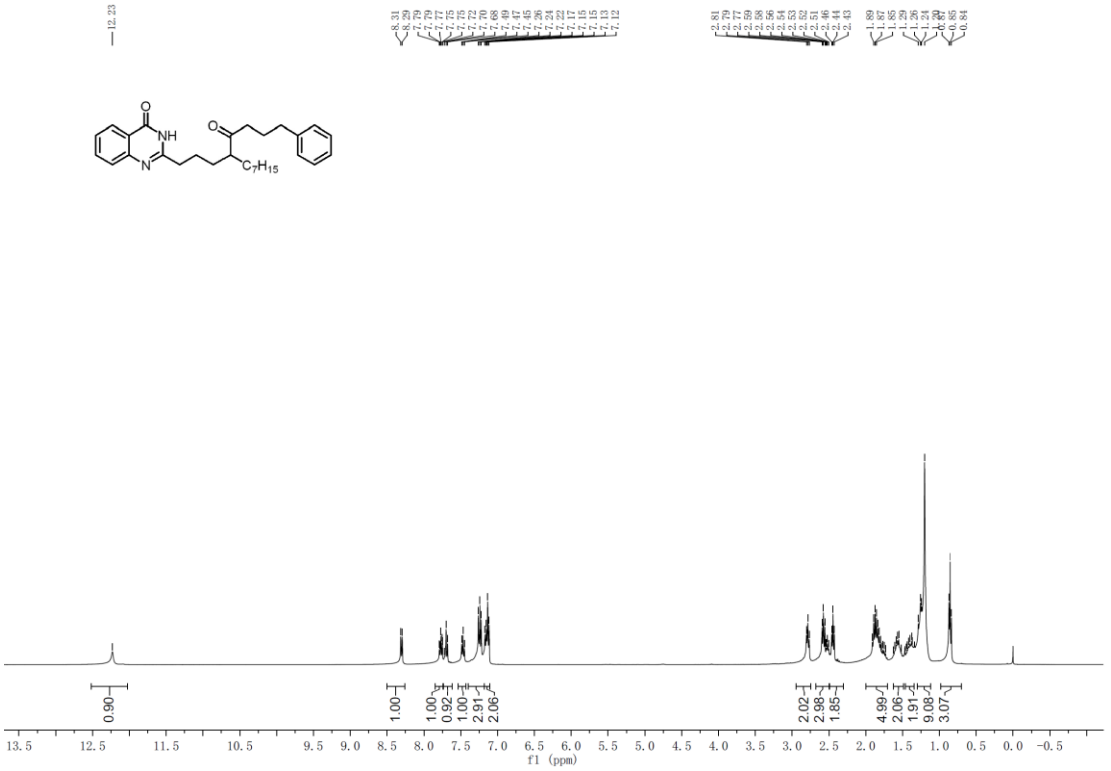

-112.98
O
NH
N
F
O
Ph
Me
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150
f1 (ppm)

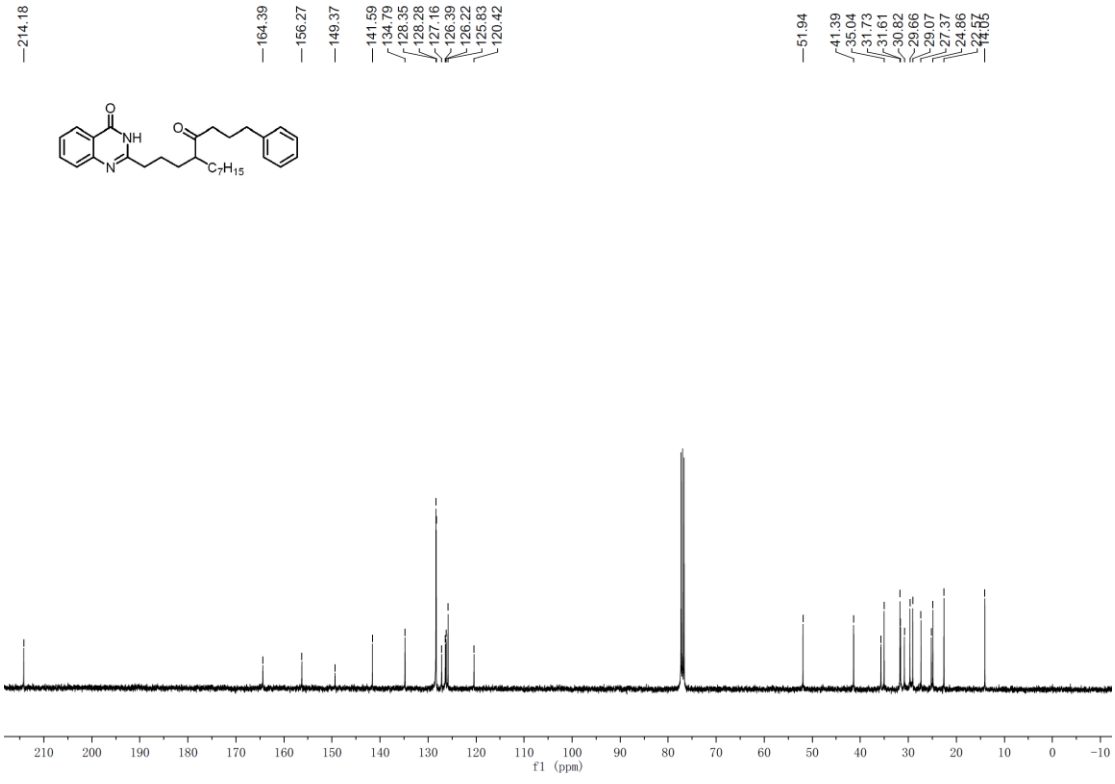
^{1}H NMR and ^{13}C NMR of **3z**



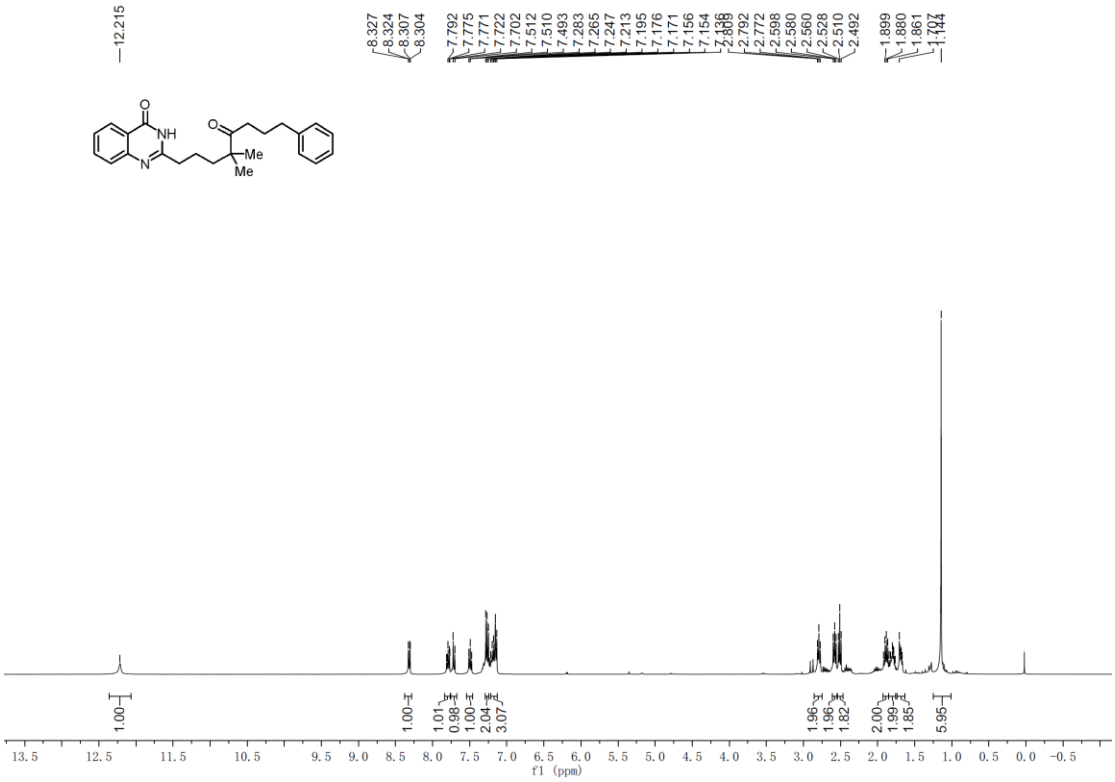


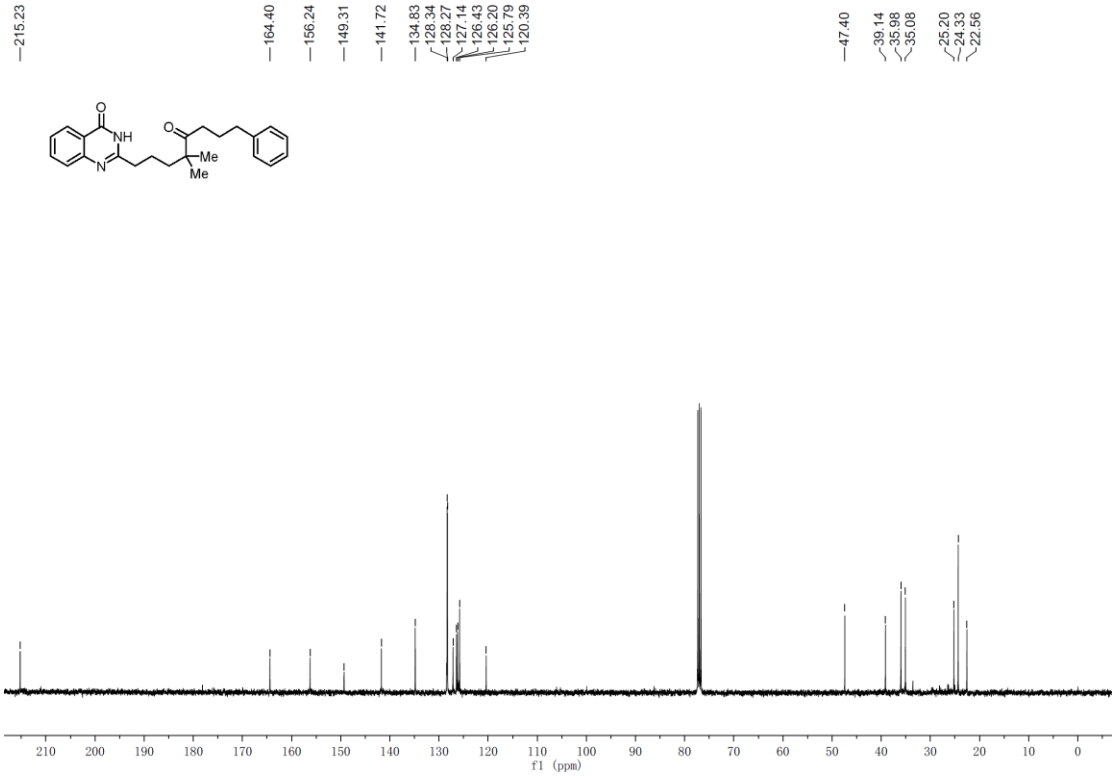
^{1}H NMR and ^{13}C NMR of **3aa**



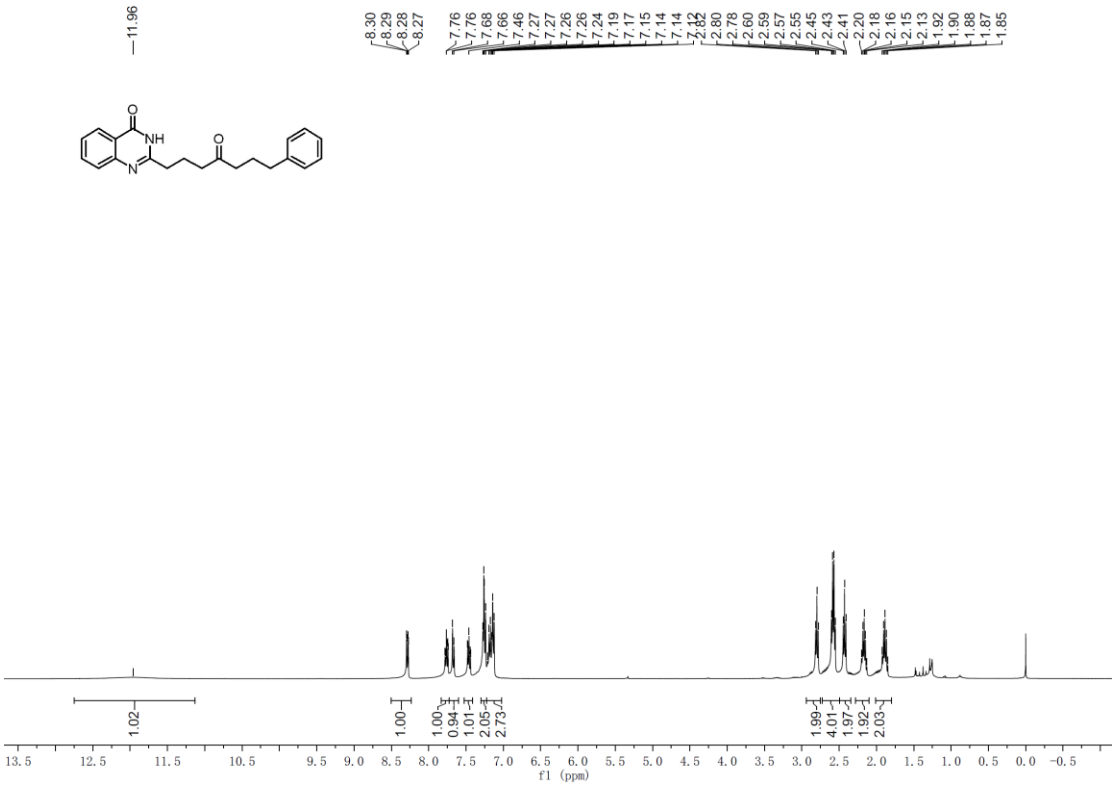


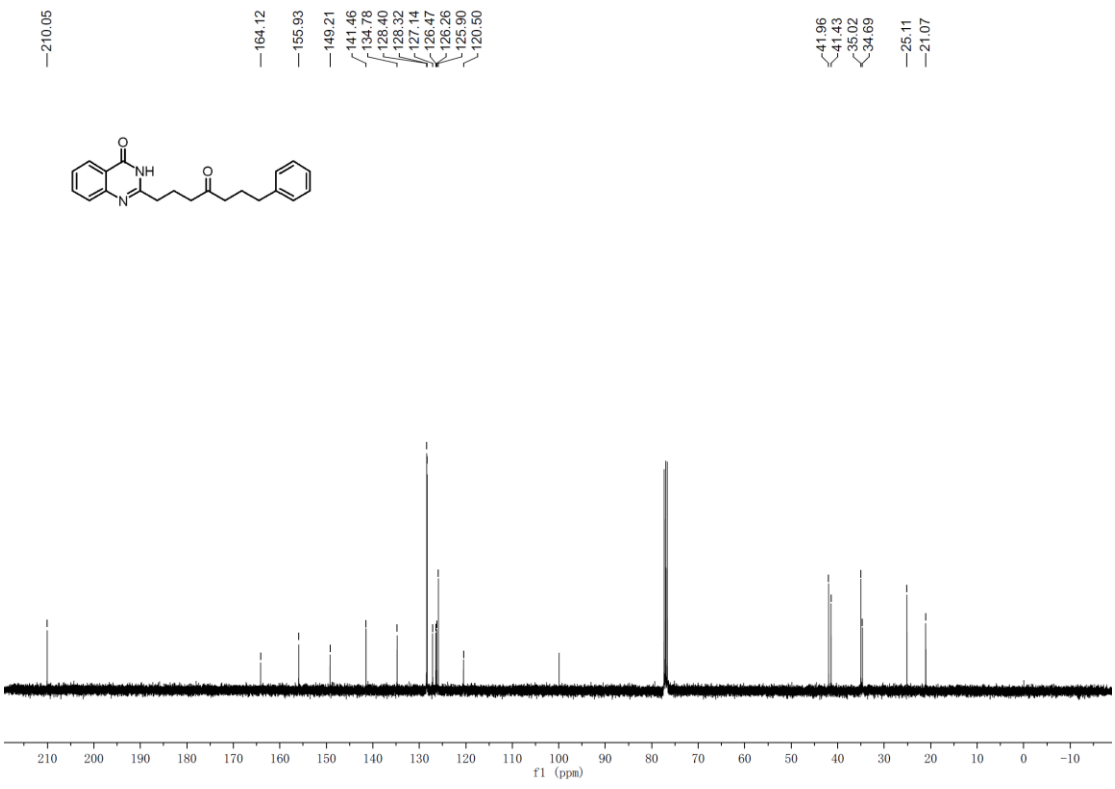
^{1}H NMR and ^{13}C NMR of **3ab**



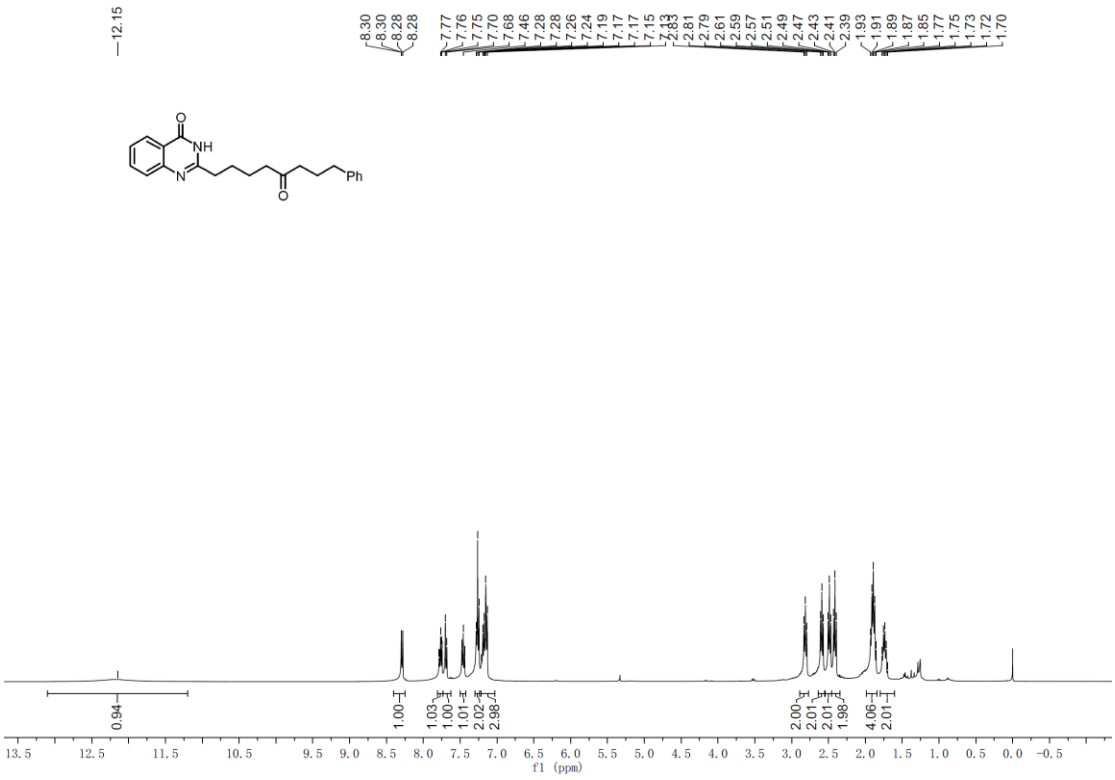


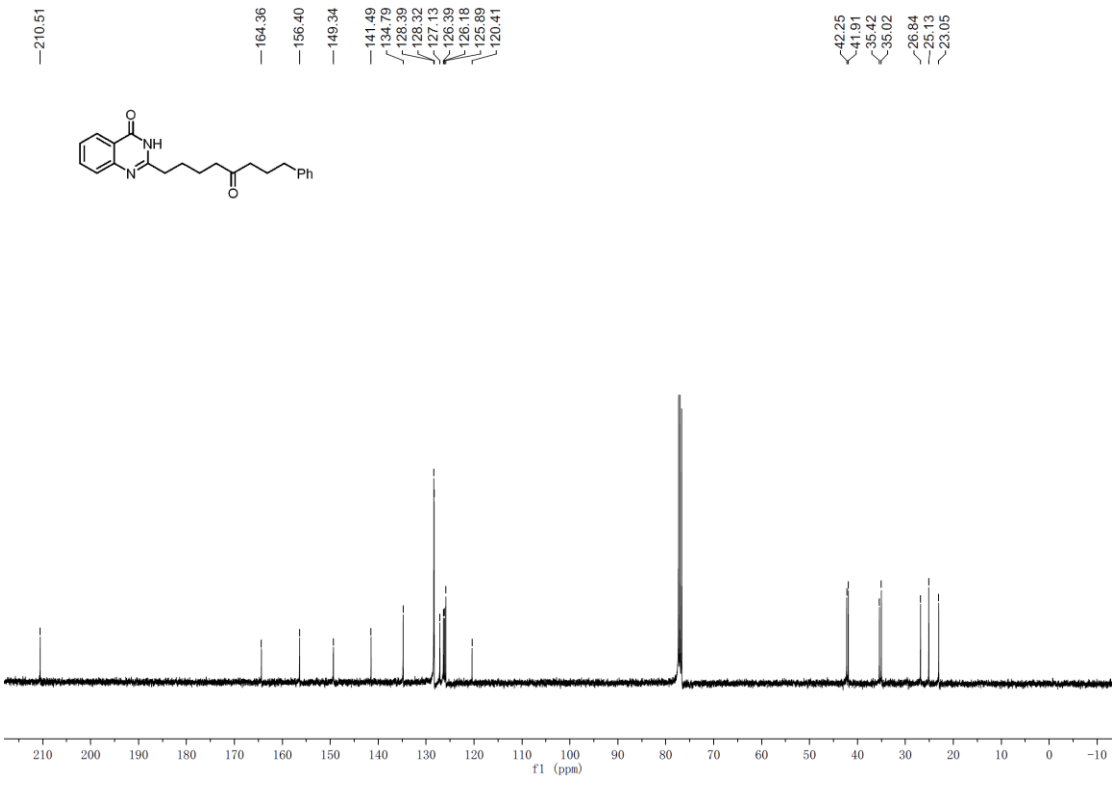
^{1}H NMR and ^{13}C NMR of **3ac**



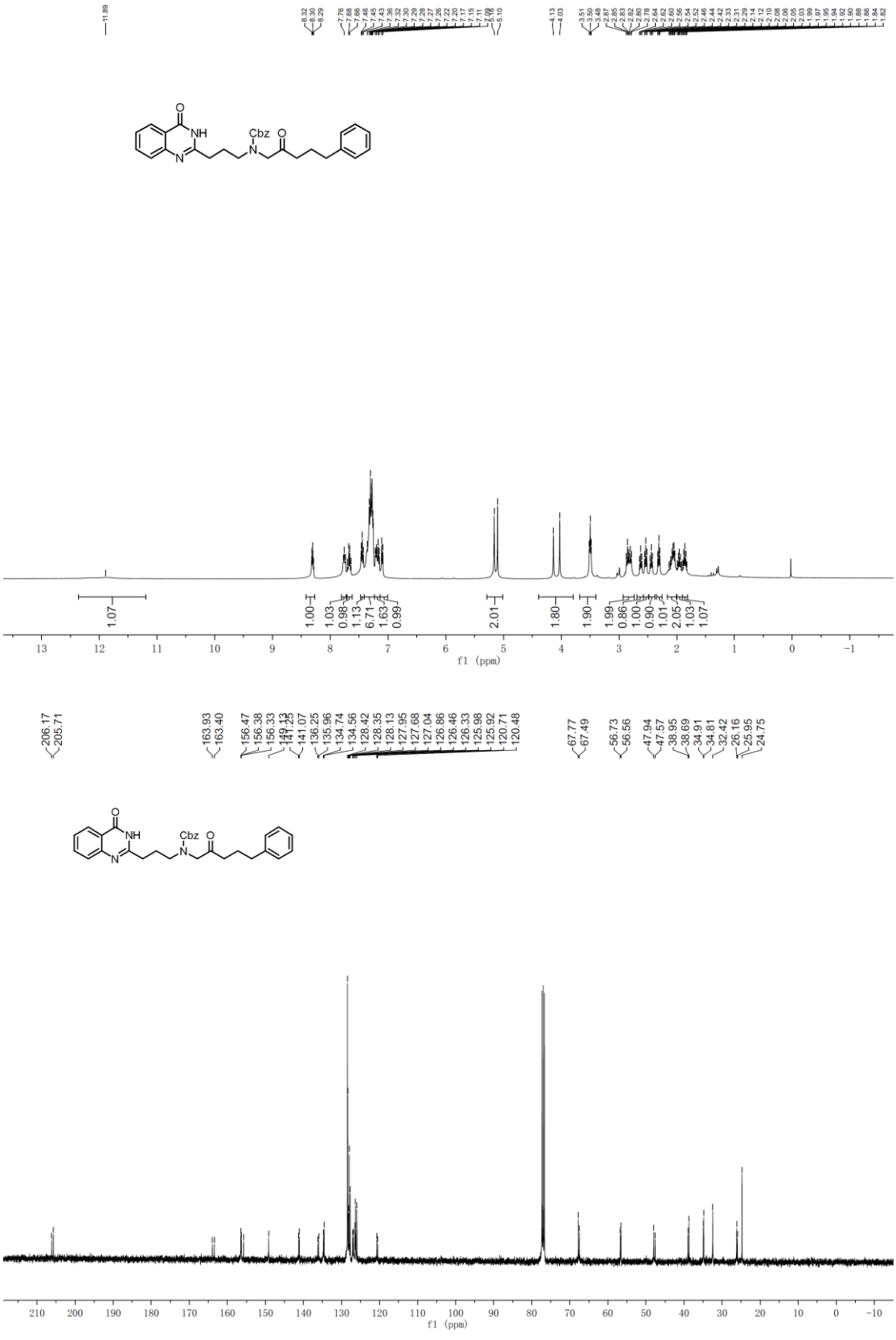


^{1}H NMR and ^{13}C NMR of **3ad**

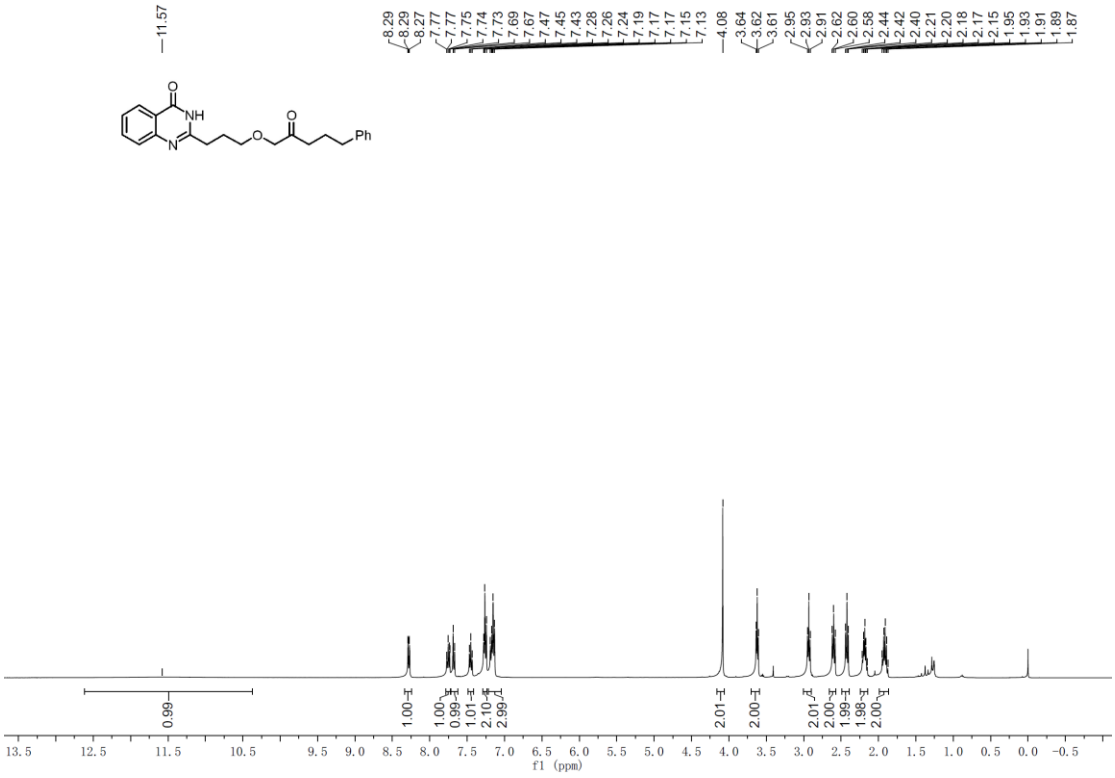


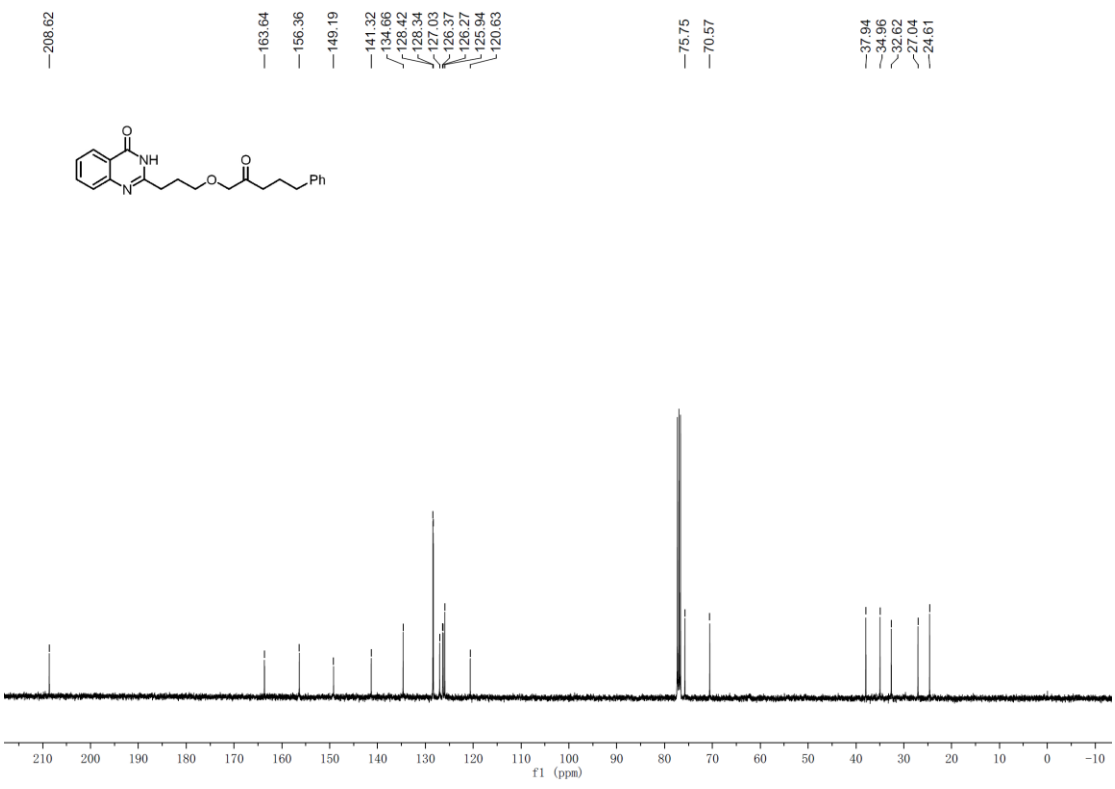


^{1}H NMR and ^{13}C NMR of **3ae**

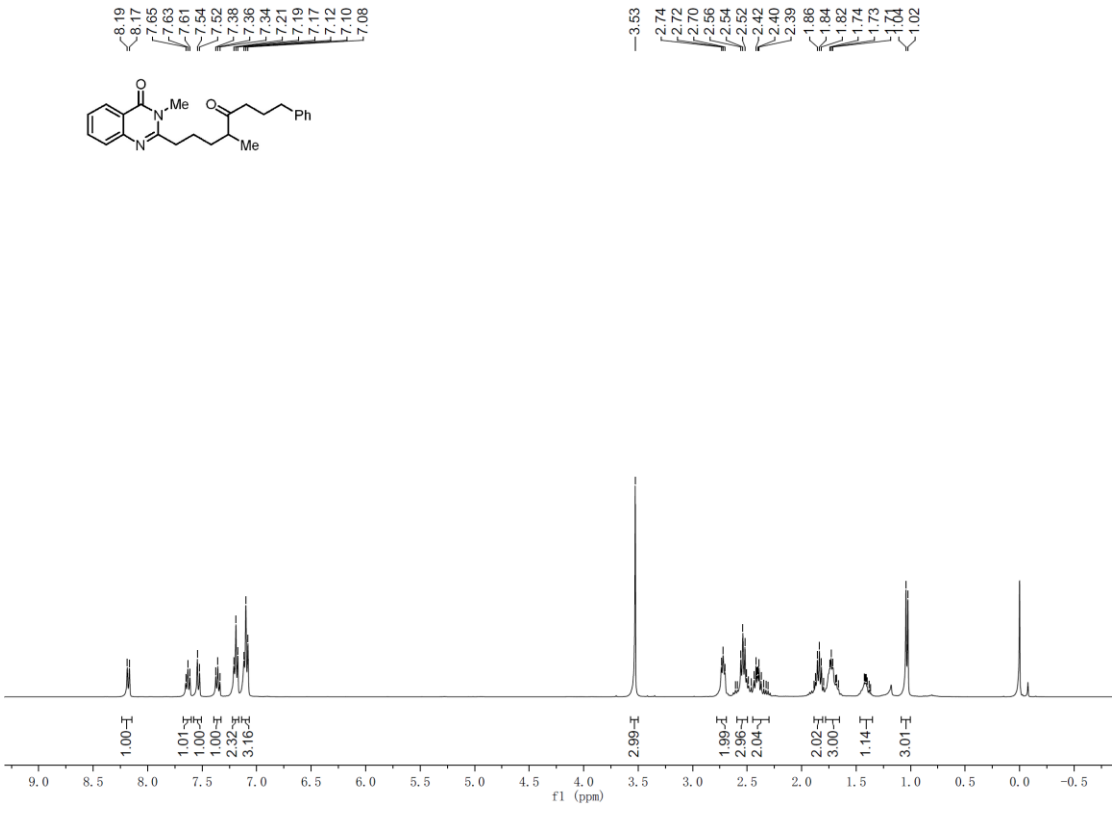


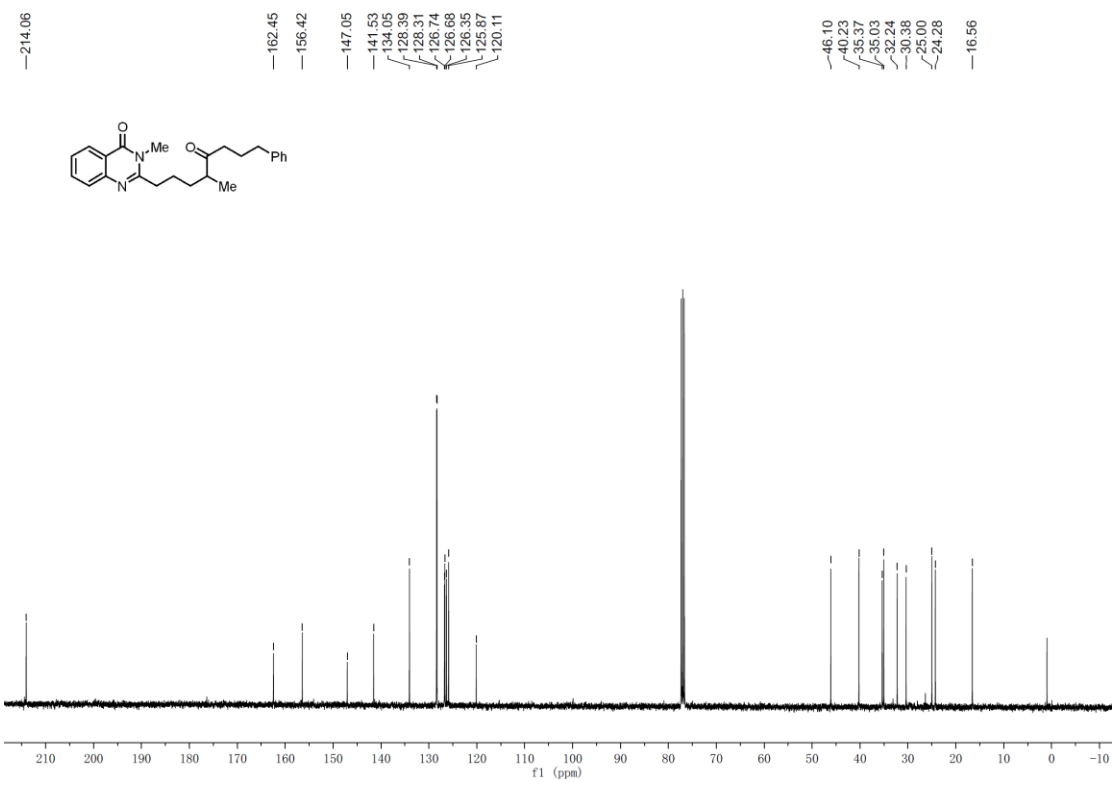
^{1}H NMR and ^{13}C NMR of **3af**



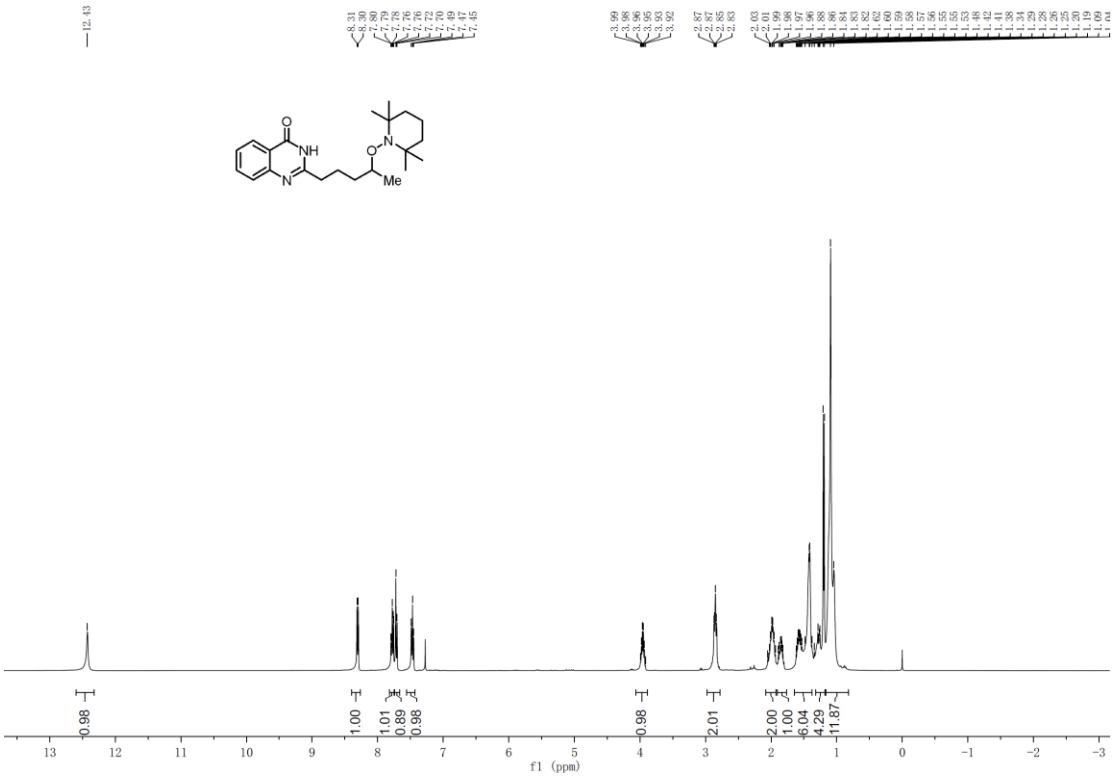


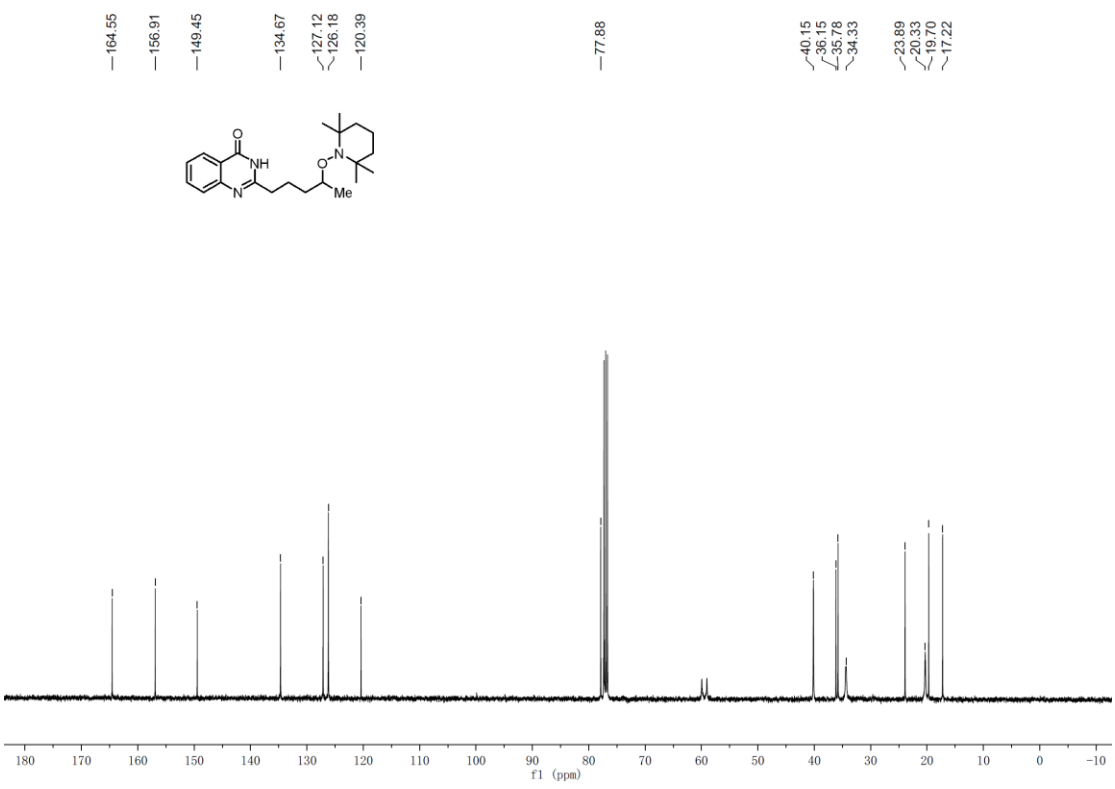
^{1}H NMR and ^{13}C NMR of **3ag**





^{1}H NMR and ^{13}C NMR of **4a**





6. References

1. (a) Luo, Y.-L.; Wu, Y.; Wang, Y.-Y.; Sun, H.-M.; Xie, Z.-Y.; Zhang, W.-Q.; Gao, Z.-W. *RSC Adv*. 2016, **6,** 66074; (b) Lv, X.-Y.; Abrams, R.; Martin, R. *Nat. Commun.* 2022, **13**, 2394; (c) Miao, H.-J.; Zhang, J.-H.; Li, W.-K.; Yang, W.-P.; X, H.; G, P.; Duan, X.-H.; Guo, L.-N. *Chem. Sci.,* 2024, **15**, 8993-8999; (d) He, K.-H.; Jin, N.; Chen, J.-C.; Zheng, Y.-F.; Pan, F. *Org. Lett.* 2024, **26**, 9503-9507.
2. Cismesia, M. A.; Yoon, T. P. *Chem. Sci.* 2015, **6**, 5426-5434.
3. (a) Kuhn, H. J.; Braslavsky, S. E.; Schmidt, R. *Pure Appl. Chem.* 2004, **76**, 2105-2146. (b) Monalti, M.; Credi, A.; Prodi, L.; Gandolfi, M. T. *Handbook of Photochemistry*, 3rd Ed; Taylor & Francis Group, LLC. Boca Raton, FL, 2006, 601. (c) Đỗ, P. M.N.; Akhmedov, N. G.; Petersen, J. L.; Dolinar, B. S.; Milsmann, C. *Chem. Commun.* 2020, **56**, 5397-5400.