Supporting Information

Aromatization-driven deconstructive functionalization of spiro dihydroquinazolinones via dual photoredox/nickel catalysis

Hong-Jie Miao, Jin-Hua Zhang, Wenke Li, Wenpeng Yang, Hong Xin, Pin Gao, Xin-Hua Duan and Li-Na Guo*

Department of Chemistry, School of Chemistry, Xi'an Key Laboratory of Sustainable Energy Material Chemistry and Engineering Research Center of Energy Storage Materials and Devices, Ministry of Education, Xi'an Jiaotong University, Xi'an 710049, China.

*E-mail: guoln81@xjtu.edu.cn

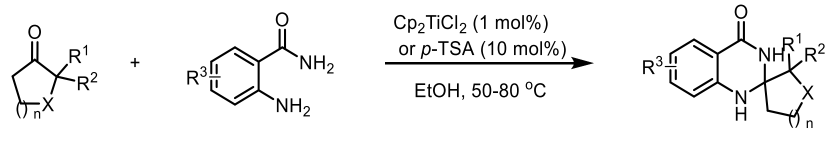
Table of Contents

1. General Information

The reactions were conducted in oven-dried Schlenk-tube. And the photoinduced reactions were carried out in oven-dried Schlenk-tube with Wattecs blue LEDs Irradiation Parallel Reactor. Unless otherwise stated, all reagents were purchased from commercial sources and used without further purification. ^{1}H and ^{13}C NMR spectra were recorded on a 400 MHz JEOL (100 MHz for ^{13}C NMR) spectrometer at ambient temperature. Chemical shift is reported in ppm from TMS with the solvent resonance as internal standard ($CDCl_3$: ^{1}H NMR: δ 7.26; ^{13}C NMR: δ 77.0). Coupling constants are reported in Hz with multiplicities denoted as s (singlet), d (doublet), t (triplet), q (quartet), dd (doublet of doublets), td (triplet of doublets) and m (multiplet). HRMS were obtained on a WATERS I-Class VION IMS Q-Tof. Melting points were measured using open glass capillaries in an SGW® X-4A apparatus. Analytical TLC: aluminum backed plates pre-coated (0.25 mm) with Merck Silica Gel 60F-254. Compounds were visualized by exposure to UV-light or by dipping the plates in 2,4-dinitrophenylhydrazine stain followed by heating.

2. General Procedures

2.1 General procedure 1: Synthesis of Dihydroquinazolinones 1[1]



Dihydroquinazolinones **1** were prepared according to the literature. 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%) were dissolved in 10 mL EtOH in one portion under air. The reaction mixture was stirred at 50-80 °C until the reaction was completed as indicated by TLC. For compounds **1b-1d**, **1h-1l**: Upon completion of the reaction, the reaction mixture was quenched with distilled water. The resulting mixture was extracted with EtOAc (3×10 mL), and the combined organic layers were dried over Na_2SO_4 and concentrated in vacuo. The residue was purified by column chromatography (PE/EtOAc = 2/1). For compounds **1a**, **1e**, **1f-1g, 1m-1p**: The reaction was cooled to 20 °C generating precipitate that was collected as crude product by suction filtration. The crude material was washed with water and purified by recrystallization (EtOH) to give desired product.

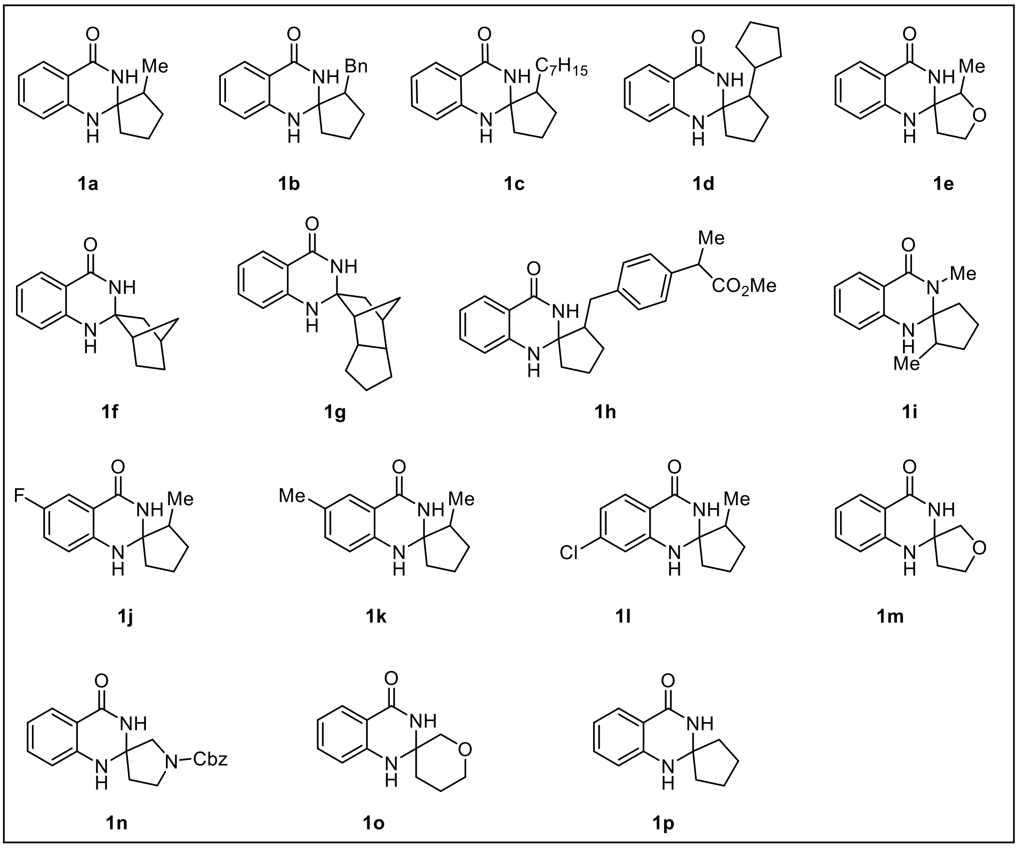
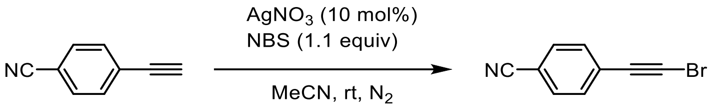


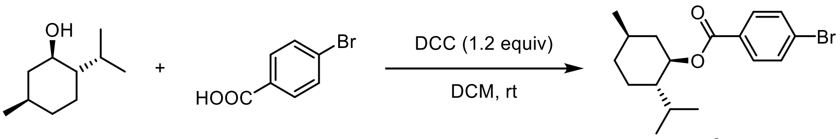
Figure S1. Dihydroquinazolinones **1**

2.2 General Procedure 2: Synthesis of Alkynyl Bromide 2t[2]



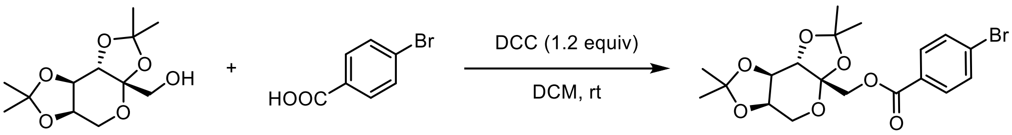
Charge a dried Schlenk flask equipped with a stir bar with ethynylbenzene (5.0 mmol, 1.0 equiv) in dry acetone. Evacuate the Schlenk flask. Fill the Schlenk flask with nitrogen (three cycles). Add $AgNO_3$ (0.5 mmol, 0.1 equiv), NBS (5.5 mmol, 1.1 equiv) in portions under the N_2 atmosphere to the above mixture. Stir the mixture for 7 h at room temperature. Monitor the completion of the reaction by TLC. Concentrate the solvent in vacuum. Dilute the reaction mixture with water. Extract the mixture with EtOAc. Dry the combined organic layer over Na_2SO_4. Filter the mixture. Concentrate the mixture to obtain the crude material. Purify the crude material by column chromatography (PE/ EtOAc = 50/1) to obtain alkynyl bromide **2t** as a white solid (0.8 g, 78%).

2.3 General Procedure 3: Synthesis of Aryl Bromides 2w-z[3]



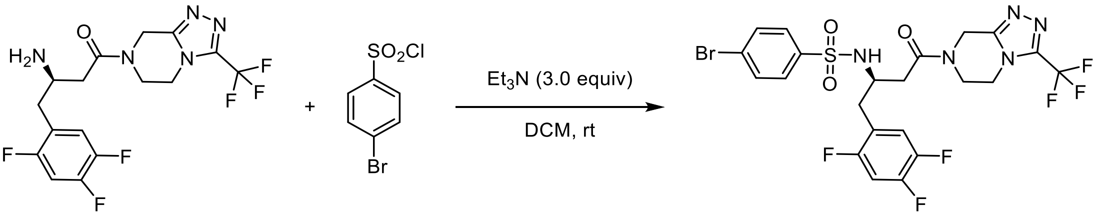
2v

To an oven-dried 50 mL round bottom flask equipped with a stir bar was added *L*-Menthol (5.0 mmol, 1.0 equiv), 4-bromobenzoic acid (6.0 mmol, 1.2 equiv), DCC (6.0 mmol, 1.2 equiv) and DCM (10 mL). And the reaction mixture was stirred at room temperature for 3 h. Monitor the completion of the reaction by TLC. Then, the reaction mixture was diluted with EtOAc and washed with brine solution. The organic layer was separated, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuo. The residue was purified by column chromatography (PE/ EtOAc = 20/1) to afford desired product **2v** as a colorless oil (1.4 g, 82%).



2w

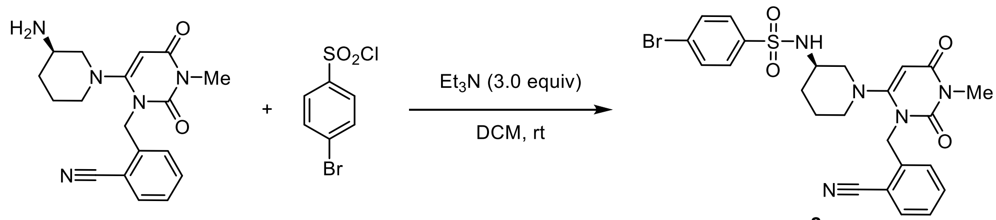
To an oven-dried 50 mL round bottom flask equipped with a stir bar was added diacetonefructose (5.0 mmol, 1.0 equiv), 4-bromobenzoic acid (6.0 mmol, 1.2 equiv), DCC (6.0 mmol, 1.2 equiv) and DCM (10 mL). And the reaction mixture was stirred at room temperature for 3 h. Monitor the completion of the reaction by TLC. Then, the reaction mixture was diluted with EtOAc and washed with brine solution. The organic layer was separated, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuo. The residue was purified by column chromatography (PE/ EtOAc = 20/1) to afford desired product **2w** as a white solid (1.6 g, 72% yield).



2x

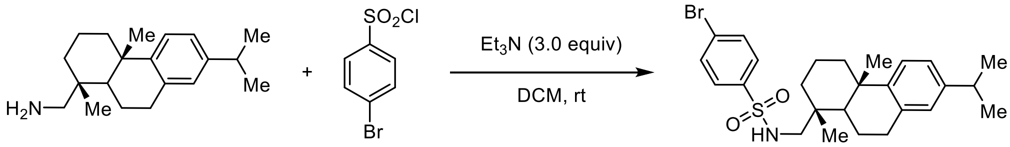
To an oven-dried 50 mL round bottom flask equipped with a stir bar was added Sitagliptin (2.0 mmol, 1.0 equiv), 4-bromobenzenesulfonyl chloride (2.2 mmol, 1.1 equiv), Et_3N (6.0 mmol, 3.0

equiv) and DCM (10 mL). And the reaction mixture was stirred at room temperature for 1 h. Monitor the completion of the reaction by TLC. Then, the reaction mixture was diluted with EtOAc and washed with brine solution. The organic layer was separated, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuo. The residue was purified by column chromatography (PE/ EtOAc = 1/1) to afford desired product **2x** as a white soild (0.8 g, 64%).



2y

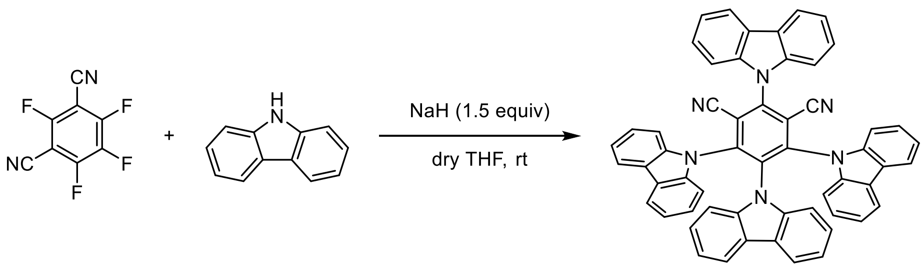
To an oven-dried 50 mL round bottom flask equipped with a stir bar was added Alogliptin (2.0 mmol, 1.0 equiv), 4-bromobenzenesulfonyl chloride (2.2 mmol, 1.1 equiv), Et_3N (6.0 mmol, 3.0 equiv) and DCM (10 mL). And the reaction mixture was stirred at room temperature for 1 h. Monitor the completion of the reaction by TLC. Then, the reaction mixture was diluted with EtOAc and washed with brine solution. The organic layer was separated, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuo. The residue was purified by column chromatography (PE/EA = 1:1) to afford desired product **2y** as a white soild (0.9 g, 81%).



2z

To an oven-dried 50 mL round bottom flask equipped with a stir bar was added (+)-Dehydroabietylamine (2.0 mmol, 1.0 equiv), 4-bromobenzenesulfonyl chloride (2.2 mmol, 1.1 equiv), Et_3N (6.0 mmol, 3.0 equiv) and DCM (10 mL). And the reaction mixture was stirred at room temperature for 1 h. Monitor the completion of the reaction by TLC. Then, the reaction mixture was diluted with EtOAc and washed with brine solution. The organic layer was separated, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuo. The residue was purified by column chromatography (PE/EtOAc = 1/1) to afford desired product as a white soild (0.5 g, 50%).

2.4 General Procedure 4: Synthesis of 4CzIPN[4]



NaH (60% in oil, 15.0 mmol, 1.5 equiv) was added slowly to a stirred solution of carbazole (10.0 mmol, 1.0 equiv) in dry THF (40 mL) under argon at room temperature. After 30 min, tetrafluoroisophthalonitrile (2.0 mmol, 0.2 equiv) was added. After stirring at room temperature for 12 h, 2 mL H_2O was added to the reaction mixture to quench the excess NaH. The resulting mixture was then concentrated under reduced pressure and washed by H_2O and EtOH to yield the crude product, which was purified by recrystallization from acetone/$CHCl_3$ to give the product 4CzIPN (1.51 g, 96%).

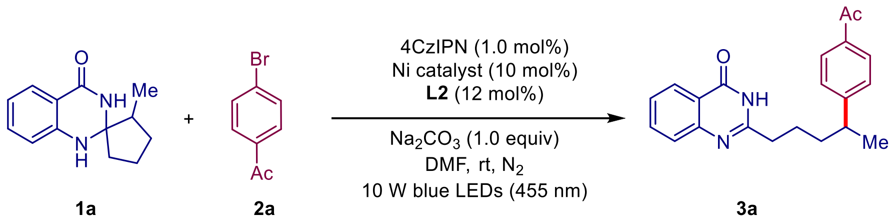
3. Optimization of Reaction Conditions

3.1 General Procedure for Photoredox Nickel-Catalyzed Coupling of Dihydroquinazolinone 1a with Aryl Bromide 2a

To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added PC (1 mol%), nickle catalyst (10 mol%), **L** (12 mol%) and Base (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv) and **2a** (0.2 mmol, 1.0 equiv) in solvent (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic extracts were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EtOAc = 3/1) on silica gel to afford compound **3a**.

3.2 Optimization of Reaction Conditions

Screening of Catalysts[a]

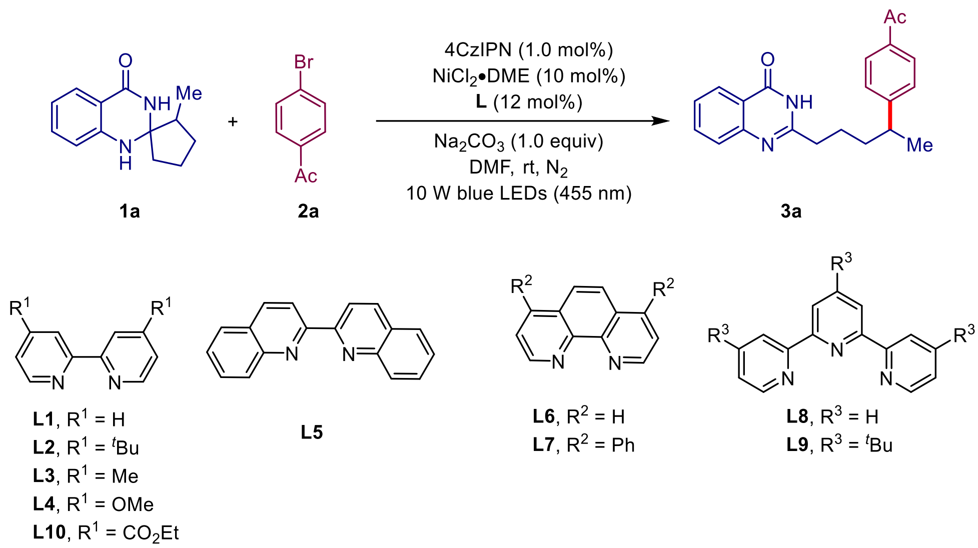


1a **2a** **3a**

Entry	Catalyst	Yield/%[b]
1	$NiCl_2$·DME	**73**
2	$NiCl_2$·$6H_2O$	45
3	Ni(dppe)Cl_2	52
4	Ni(dppp)Cl_2	40
5	$Ni(PPh_3)Cl_2$	69
6	$Ni(NO_3)$·$6H_2O$	24
7	$Ni(OTf)_2$	10
8	$NiBr_2$	37
9	$Ni(COD)_2$	18
10	Ni(dtbpy)Br_2	70[c]

[a]Reaction conditions: **1a** (0.24 mmol, 1.2 equiv), **2a** (0.2 mmol, 1.0 equiv), 4CzIPN (1 mol%), Ni catalyst (10 mol%), **L2** (12 mol%), Na_2CO_3 (1.0 equiv), DMF (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields. [c]No addition ligand.

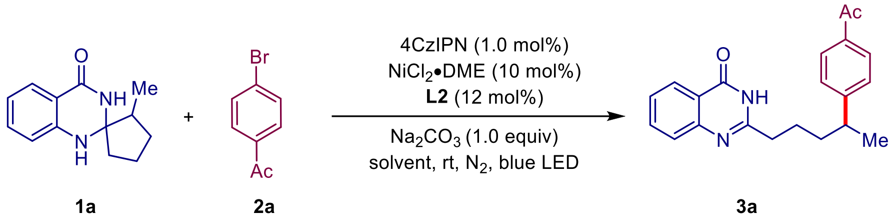
Screening of Ligands[a]



Entry	Ligand	Yield/%[b]
1	**L1**	55
2	**L2**	**73**
3	**L3**	48
4	**L4**	72
5	**L5**	N.D.
6	**L6**	61
7	**L7**	24
8	**L8**	37
9	**L9**	45

[a]Reaction conditions: **1a** (0.24 mmol, 1.2 equiv), **2a** (0.2 mmol, 1.0 equiv), 4CzIPN (1 mol%), $NiCl_2$·DME (10 mol%), **L** (12 mol%), Na_2CO_3 (1.0 equiv), DMF (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

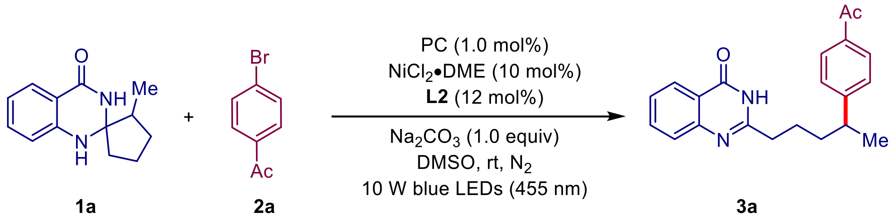
Screening of Solvent[a]



Entry	Solvent	Yield/%[b]
1	DMF	73
2	DMAc	71
3	DMSO	81
4	NMP	68
5	MeCN	46
6	Acetone	59
7	MeOH	N.D.

[a]Reaction conditions: **1a** (0.24 mmol, 1.2 equiv), **2a** (0.2 mmol, 1.0 equiv), PC (1 mol%), $NiCl_2$·DME (10 mol%), **L2** (12 mol%), Na_2CO_3 (1.0 equiv), and solvent (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

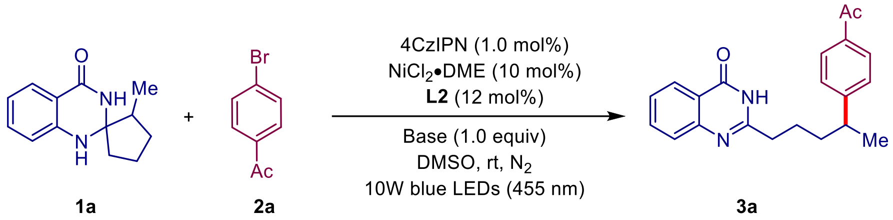
Screening of PC[a]



Entry	PC	Yield/%[b]
1	4CzIPN	81
2	4CzPN	75
3	4CzTPN	67
4	Rhodamine B	trace
5	TPP	36
6	Ir[dF(CF_3)ppy]$_2$(dtbpy)PF_6	66

[a]Reaction conditions: **1a** (0.24 mmol, 1.2 equiv), **2a** (0.2 mmol, 1.0 equiv), PC (1 mol%), $NiCl_2$·DME (10 mol%), **L2** (12 mol%), Na_2CO_3 (1.0 equiv), DMSO (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

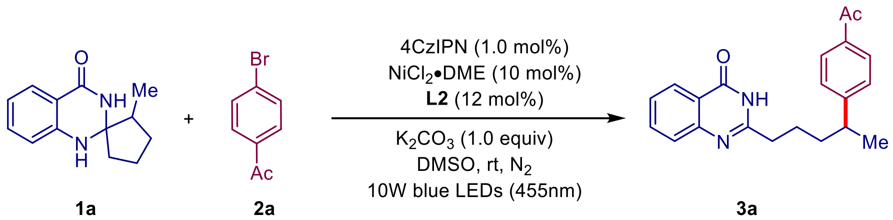
Screening of Base[a]



Entry	Base	Yield/%[b]
1	Na_2CO_3	81
2	$NaHCO_3$	63
3	K_3PO_4	26
4	K_2CO_3	83
5	Cs_2CO_3	77
6	^{t}BuOK	64
7	DIPEA	42
8	Et_3N	49
9	DABCO	trace
10	2,4,6-colidine	80

[a]Reaction conditions: **1a** (0.24 mmol, 1.2 equiv), **2a** (0.2 mmol, 1.0 equiv), 4CzIPN (1 mol%), $NiCl_2$·DME (10 mol%), **L2** (12 mol%), base (1.0 equiv), DMSO (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

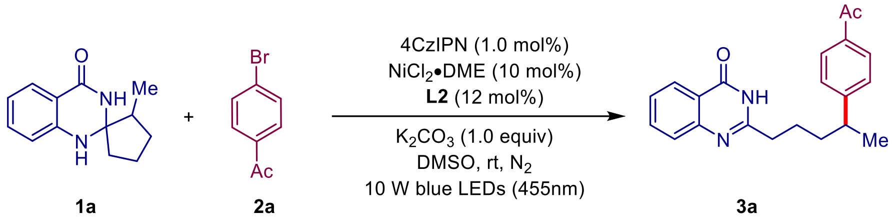
*Ratio of **1a** and **2a***[a]



entry	**1a** (x equiv)	Yield/%[b]
1	1.0	65
2	1.2	83
3	1.5	90
4	1.8	88

[a]Reaction conditions: **1a** (x equiv), **2a** (0.2 mmol, 1.0 equiv), 4CzIPN (1 mol%), $NiCl_2$·DME (10 mol%), **L2** (12 mol%), K_2CO_3 (1.0 equiv), DMSO (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

Control Experimenst[a]



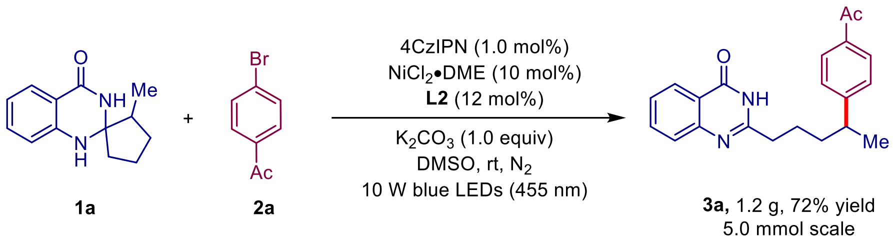
entry	Variation	Yield/%[b]
1	none	90
2	w/o 4CzIPN	0
3	w/o $NiCl_2$•DME	0
4	w/o L2	0
5	w/o light	0
6	w/o base	0
7	Under air	0

[a]Reaction conditions: **1a** (0.3 mmol, 1.5 equiv), **2a** (0.2 mmol, 1.0 equiv), 4CzIPN (1 mol%), $NiCl_2$·DME (10 mol%), **L2** (12 mol%), K_2CO_3 (1.0 equiv), DMSO (2 mL), 10 W blue LEDs irradiation at room temperature for 12 h under N_2. [b]Isolated yields.

3.3 Respective Procedure for Photoredox Nickel-Catalyzed Coupling of Dihydroquinazolinone 1 with Bromides 2 or 4

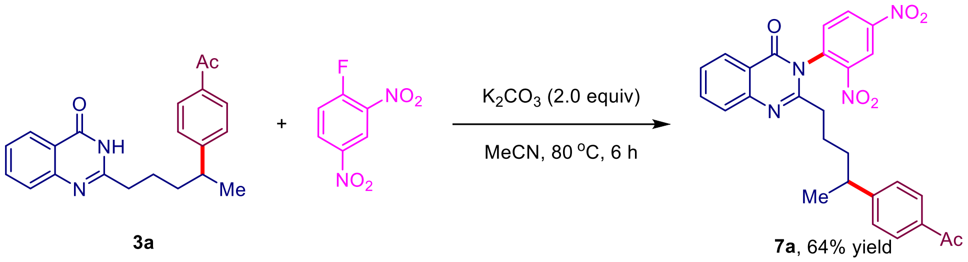
To a 10 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), **L2** (12 mol%) and K_2CO_3 (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1** (0.3 mmol, 1.5 equiv) and **2** or **4** (0.2 mmol, 1.0 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic extracts were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EtOAc = 3/1) on silica gel to afford compound **3**, **5** and **6**.

4. Scale-up Synthesis

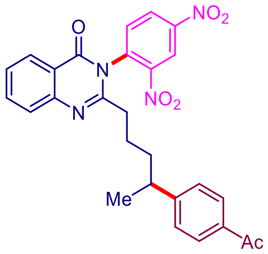


To a 100 mL oven-dried Schlenk tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), L2 (12 mol%) and K_2CO_3 (5 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (7.5 mmol, 1.5 equiv), **2a** (5.0 mmol, 1.0 equiv) in DMSO (50 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (20 mL) and extracted with EtOAc (3×10 mL). The combined organic extracts were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EtOAc =3/1) on silica gel to afford compound **3a** as a white solid (1.2 g, 72% yield).

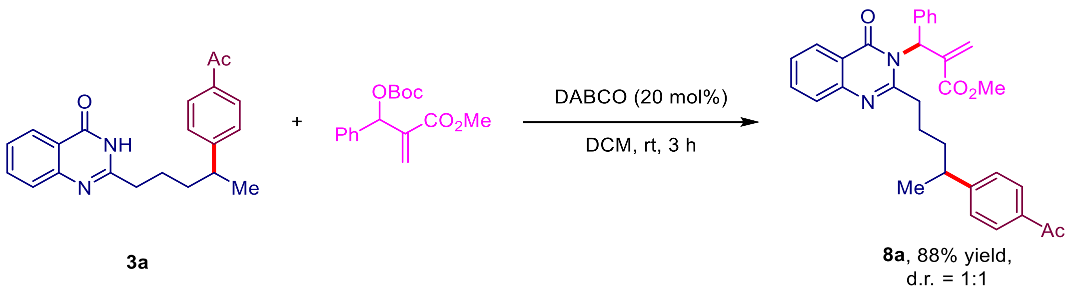
5. Diverse Derivatizations of 3a or 3b[5]



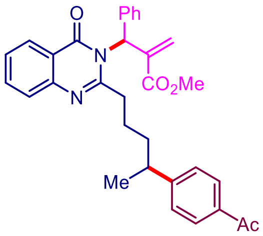
To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added **3a** (0.2 mmol, 1.0 equiv) and K_2CO_3 (0.4 mmol, 2.0 equiv). Subsequently, a solution of 2,4-dinitrofluorobenzene (0.24 mmol, 1.2 equiv) in MeCN (2 mL) was added by syringe. The resulting mixture was stirred at 80 °C for 6 h, and then the reaction mixture was directly subjected to flash column chromatography on silica gel (PE/EA = 4/1) to afford the corresponding product **7a** as a yellow oil (63.8 mg, 64% yield).



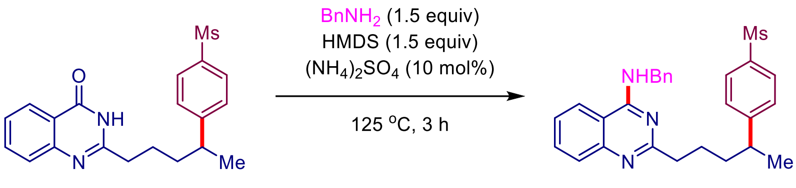
2-(4-(4-Acetylphenyl)pentyl)-3-(2,4-dinitrophenyl)quinazolin-4(3H)-one (**7a**): Yellow oil (63.8 mg, 64% yield); R_f = 0.2 (PE/EtOAc = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.98 (s, 1H), 8.54 (d, *J* = 8.8 Hz, 1H), 8.30 (d, *J* = 8.4 Hz, 1H), 7.96-7.90 (m, 2H), 7.85 (d, *J* = 8.4 Hz, 2H), 7.67-7.64 (m, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 2.78-2.72 (m, 3H), 2.58 (s, 3H), 1.66-1.49 (m, 4H), 1.20 (d, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.9, 165.8, 164.8, 153.2, 152.5, 150.2, 144.8, 142.3, 135.1, 134.8, 128.9, 128.5, 127.5, 127.4, 127.2, 126.6, 123.1, 121.6, 113.5, 39.9, 39.0, 37.4, 26.5, 26.1, 21.9 ppm; **HRMS** (ESI) calcd for $C_{27}H_{25}N_4O_6$ $[M+H]^+$ 501.1769, found 501.1775.



To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added **3a** (0.2 mmol, 1.0 equiv), Morita−Baylis−Hillman carbonates (0.24 mmol, 1.2 equiv) and DABCO (0.04 mmol, 0.2 equiv). Subsequently, MeCN (2 mL) was added by syringe. The resulting mixture was stirred at room temperature for 3 h, and then the reaction mixture was directly subjected to flash column chromatography on silica gel (PE/EA = 4/1) to afford the product **8a** as a colorless oil (89.5 mg, 88% yield, d.r. = 1:1).

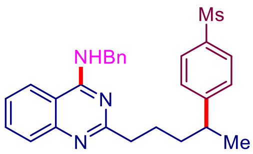


Methyl 2-((2-(4-(4-acetylphenyl)pentyl)-4-oxoquinazolin-3(4H)-yl)(phenyl)methyl)acrylate (8a): Colorless oil (89.5 mg, 88% yield); R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.20 (d, *J* = 8.0 Hz, 1H), 7.85 (m, 2H), 7.72-7.68 (m, 1H), 7.60 (d, *J* = 7.6 Hz, 1H), 7.42-7.38 (m, 1H), 7.34-7.27 (m, 3H), 7.22-7.20 (m, 4H), 6.79-6.64 (m, 1H), 6.54 (m, 1H), 5.63 (dd, *J* = 5.6 Hz, 1.6 Hz, 1H), 3.694 (s, 1.5H), 3.690 (s, 1.5H), 2.87-2.65 (m, 3H), 2.57 (s, 1.5H), 2.56 (s, 1.5H), 1.70-1.60 (m, 4H), 1.22-1.19 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 166.4, 162.5, 157.2, 152.91, 152.87, 146.8, 137.93, 137.88, 136.6, 135.1, 134.2, 128.9, 128.6, 128.5, 127.8, 127.1, 126.8, 126.7, 126.4, 121.1, 52.2, 39.84, 39.78, 37.4, 37.3, 35.8, 26.5, 25.1, 25.0, 21.9, 21.8 ppm; **HRMS** (ESI) calcd for $C_{32}H_{33}N_2O_4$ $[M+H]^+$ 509.2435, found 509.2437.

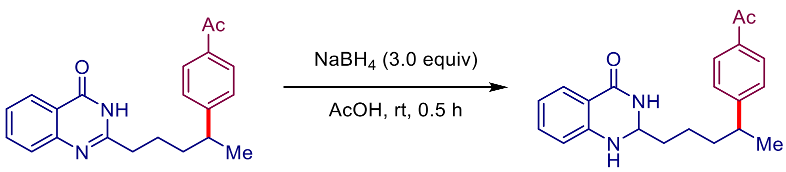


3b **9a**, 84% yield

To a 5 mL glass tube with magnetic stirring bar was added **3b** (0.2 mmol, 1.0 equiv), benzylamine (0.3 mmol, 1.5 equiv), hexamethyldisilazane (0.56 mmol, 1.5 equv.) and $(NH_4)_2SO_4$ (0.02 mmol, 10 mol%). Place the tub in an oil bath. Pre-heat the tube to 125 °C. Stir the mixture for 3 h. After completion of the reaction, the reaction mixture was cooled to room temperature. Dilute the reaction mixture with CH_2Cl_2 and purify by flash column chromatography on silica gel (PE/EA = 1/1) to afford the corresponding product **9a** (77.2 mg, 84% yield).

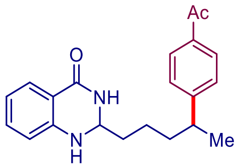


***N*-Benzyl-2-(4-(4-(methylsulfonyl)phenyl)pentyl)quinazolin-4-amine** (**9a**): colorless oil (77.2 mg, 84% yield); R_f = 0.2 (PE/EA = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 8.4 Hz, 2H), 7.75 (d, *J* = 8.4 Hz, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.68-7.64 (m, 1H), 7.37-7.28 (m, 8H), 6.27 (t, *J* = 5.2 Hz, 1H), 4.87-4.78 (m, 2H), 2.97 (s, 3H), 2.86-2.81 (m, 3H), 1.87-1.64 (m, 4H), 1.23 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 167.0, 159.3, 154.3, 149.9, 138.6, 137.7, 132.4, 128.6, 128.0, 127.9, 127.7, 127.5, 127.3, 125.1, 120.6, 113.1, 44.8, 44.5, 39.9, 39.7, 37.6, 26.4, 21.9 ppm; **HRMS** (ESI) calcd for $C_{27}H_{30}N_3O_2S$ $[M+H]^+$ 460.2053, found 460.2057.



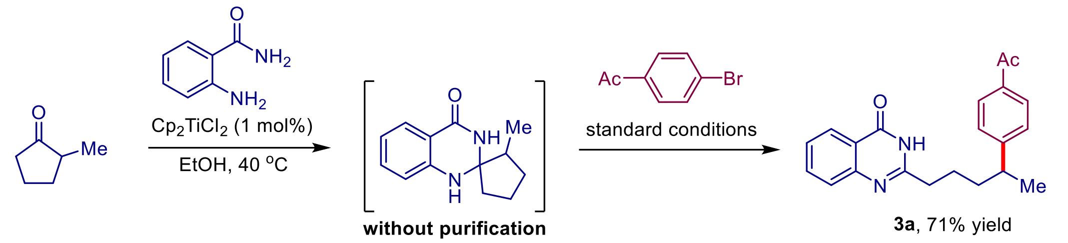
3a **10a**, 77% yield
d.r. = 1:1

A solution of **3a** (0.20 mmol, 1.0 equiv) in 2.0 mL AcOH was cooled to 0 ºC, and then $NaBH_4$ (0.4 mmol, 2.0 equiv) was added successively. The reaction mixture was stirred at 0 ºC for 0.5 h until the complete consumption of **3a** as monitored by thin layer chromatography. Then, saturated aq. NH_4Cl solution was added. The mixture was extracted with EA. The combined organic phase was dried over $MgSO_4$, filtered, concentrated and purified with silica gel column chromatography to obtain **10a** as a white solid (51.8 mg, 77% yield, d.r. = 1:1).



2-(4-(4-Acetylphenyl)pentyl)-2,3-dihydroquinazolin-4(1H)-one (**10a**): White solid (51.8 mg, 77% yield); m.p.: 177.2-179.4 ºC; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, DMSO-d_6) δ 7.89-7.86 (m, 3H), 7.57 (d, J = 8.0 Hz, 1H), 7.35 (d, J = 8.4 Hz, 2H), 7.25-7.19 (m, 1H), 6.71-6.62 (m, 2H), 6.53 (s, 1H), 4.70-4.61 (m, 1H), 2.79-2.74 (m, 1H), 2.54 (s, 3H), 1.65-1.54 (m, 4H), 1.43-1.26 (m, 2H), 1.20 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 197.9, 164.4, 153.51, 153.47, 149.0, 148.9, 135.3, 133.5, 128.9, 127.8, 127.7, 117.4, 115.5, 114.8, 64.81, 64.79, 37.89, 37.87, 35.5, 35.4, 27.1, 22.4, 22.3, 21.9, 21.8 ppm; **HRMS** (ESI) calcd for $C_{21}H_{25}N_2O_2$ $[M+H]^+$ 337.1910, found 337.1915.

6. Two-step Telescoping Procedure for the Formation of 3a

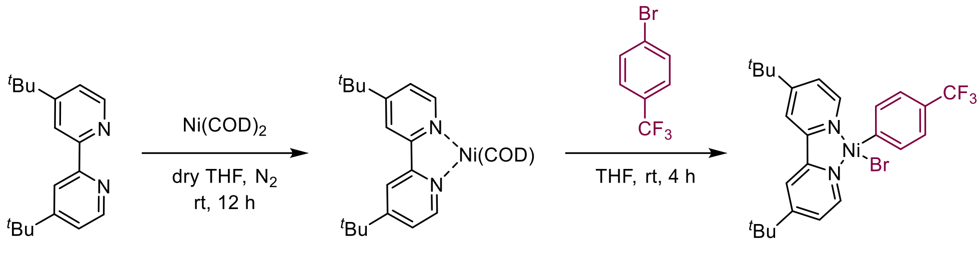


A 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was charged with 2-aminobenzamide (0.5 mmol, 1.0 equiv), and 2-Methylcyclopentanone (0.55 mmol, 1.1 equiv). Then a solution of Cp_2TiCl_2 (1 mol%) in 2 mL EtOH was added. The reaction mixture was stirred at 50 °C until the reaction was completed as indicated by TLC. The solvent was removed under reduced pressure. Then 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), **L2** (12 mol%) and K_2CO_3 (0.2 mmol, 1.0 equiv) were added. Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of 4'-bromoacetophenone **2a** (0.2 mmol, 1.0 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic layers were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EtOAc=3/1) on silica gel to afford compound **3a** (47.5 mg, 71% yield).

7. Investigation of the Reaction Mechanism

7.1 Active Ni(II)-Complex Species Experiment

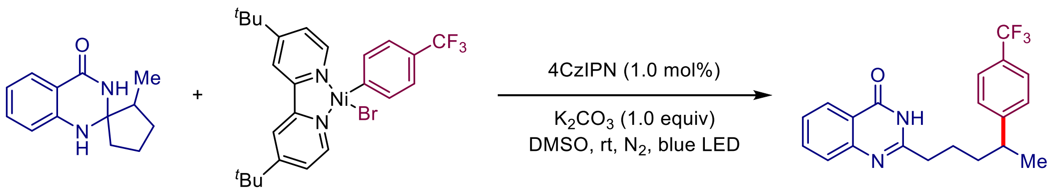
(a) Preparation of Ni(II) complex **C1**[6]



CI

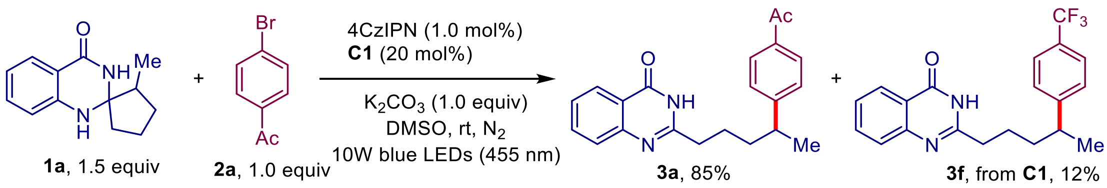
In a nitrogen filled glove box, a 50 mL round bottom flask containing a stirring bar was charged with Ni(COD)$_2$ (138 mg, 0.5 mmol, 1.0 equiv), 4,4'-di-tert-butyl-2,2'-bipyridine (134 mg, 0.5 mmol, 1.0 equiv) and dry THF (5 mL) giving a dark purple mixture which was stirred for 12 h at 25 ºC. 1-bromo-4-(trifluoromethyl)benzene (1.4 mL, 10 mmol, 10.0 equiv) was added and stirred for additional 4 h. Dry pentane (30 mL) was added to the deep red colored mixture and filtered. The resulting precipitate was washed with pentane (3×10 mL) and dried under vacum to afford Ni(II) complex **C1** as a brown solid (387 mg, 70% yield). The product was used without further purification.

(b) Stoichiometric reactions of Ni(II) complex **C1**



1a **CI** **3f**, 42%

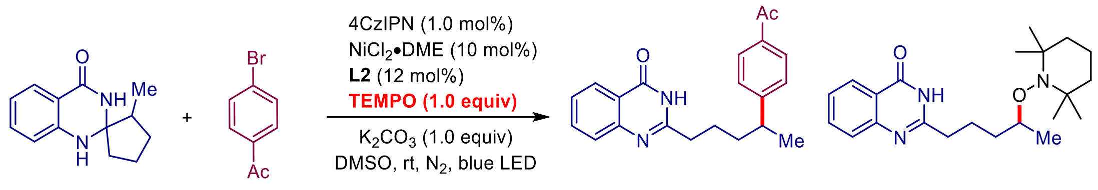
To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), **C1** (0.2 mmol, 1.0 equiv) and K_2CO_3 (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv), in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic extracts were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EA =3/1) on silica gel to afford compound **3f** as a white solid (30.3 mg, 42% yield).



1a, 1.5 equiv **2a**, 1.0 equiv **3a**, 85% **3f**, from **C1**, 12%

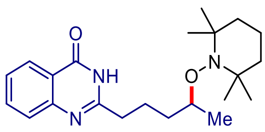
To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), **C1** (0.04 mmol, 20 mol%) and K_2CO_3 (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv) and **2a** (0.2 mmol, 1.0 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic extracts were dried (Na_2SO_4) and concentrated under reduced pressure. The crude product was purified by flash column chromatography (PE/EA = 3/1) on silica gel to afford compound **3a** and **3f** as a white solid.

7.2 Radical Trapping and Inhibition Experiments

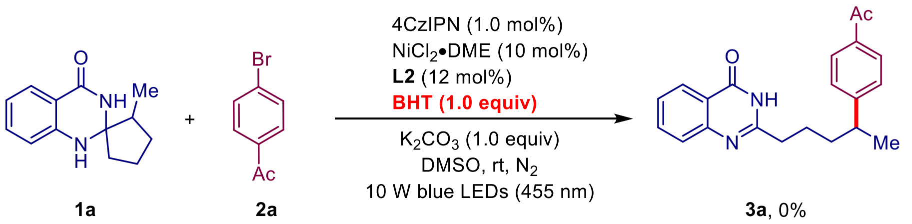


1a **2a** **3a**, 0% **11a**, 92%

To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), **L2** (12 mol%), K_2CO_3 (0.2 mmol, 1.0 equiv) and TEMPO (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv), and **2a** (0.2 mmol, 1.0 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. After that, it was found that the formation of **3a** was totally inhibited. The crude product was purified by flash column chromatography (PE/EA = 4/1) on silica gel to afford compound **11a** as a white solid (68.4 mg, 92% yield).



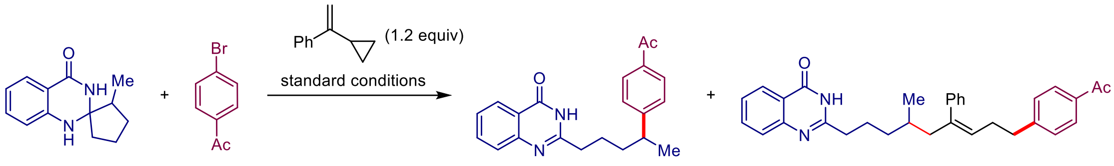
2-(4-((2,2,6,6-Tetramethylpiperidin-1-yl)oxy)pentyl)quinazolin-4(3H)-one (11a): White solid (70.0 mg, 86% yield); R_f = 0.2 (PE/EtOAc = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.06 (brs, 1H), 8.29 (d, J = 8.0 Hz, 1H), 7.79-7.75 (m, 1H), 7.70 (d, J = 7.6 Hz, 1H), 7.48-7.44 (m, 1H), 3.99-3.91 (m, 1H), 2.83 (t, J = 6.8 Hz, 2H), 2.03-1.91 (m, 2H), 1.87-1.79 (m, 1H), 1.61-1.37 (m, 6H), 1.33-1.25 (m, 1H), 1.19 (d, J = 6.4 Hz, 3H), 1.09 (s, 12H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.3, 156.8, 149.5, 134.7, 127.2, 126.26, 126.25, 120.5, 77.9, 40.2, 36.2, 35.8, 34.4, 23.9, 20.4, 19.7, 17.3 ppm; **HRMS** (ESI) calcd for $C_{22}H_{34}N_3O_2$ $[M+H]^+$ 372.2645, found 372.2649.



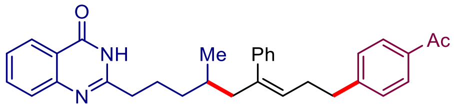
1a **2a** **3a**, 0%

To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), **L2** (12 mol%), K_2CO_3 (0.2 mmol, 1.0 equiv) and BHT (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv), and **2a** (0.2 mmol, 1.0 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. After that, it was found that the formation of **3a** was totally inhibited.

7.3 Radical Clock Experiments[7]



To a 10 mL oven-dried Schlenk-tube equipped with a magnetic stirrer was added 4CzIPN (1 mol%), $NiCl_2$•DME (10 mol%), **L2** (12 mol%), K_2CO_3 (0.2 mmol, 1.0 equiv). Then, the tube was evacuated and backfilled with nitrogen for three times. Subsequently, a solution of **1a** (0.3 mmol, 1.5 equiv), **2a** (0.2 mmol, 1.0 equiv) and α-cyclopropylstyrene (0.3 mmol, 1.5 equiv) in DMSO (2 mL) was added by syringe under nitrogen atmosphere. The reaction mixture was then irradiated with 10 W blue LEDs at room temperature for 12 h. The reaction mixture was quenched with brine (10 mL) and extracted with EtOAc (3×5 mL). The combined organic layers were dried (Na_2SO_4) and concentrated under reduced pressure yielding crude material, which was purified by silica gel chromatography (PE/EA=3/1), affording **12a** as a white solid (19.1 mg, 20%).



2-(9-(4-Acetylphenyl)-4-methyl-6-phenylnon-6-en-1-yl)quinazolin-4(3H)-one (12a): Colorless oil (19.1 mg, 20% yield, *Z/E* = 2.6:1), R_f = 0.2 (PE/EtOAc = 3/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.16 (brs, 1H), 8.25 (d, *J* = 7.2 Hz, 1H), 7.85-7.79(m, 2H), 7.75-7.71 (m, 1H), 7.66-7.63 (m, 1H), 7.43-7.38 (m, 1H), 7.24-7.19 (m, 5H), 7.17-7.11 (m, 2H), 5.62 (t, *J* = 7.2 Hz, 0.7H), 5.37 (t, *J* = 7.2 Hz, 0.3H), 2.75 (t, *J* = 7.6 Hz, 2H), 2.67-2.04 (m, 2H), 2.55 (s, 2H), 2.54 (s, 1H), 2.51-2.43 (m, 2H), 2.33-2.19 (m, 1H), 1.89-1.67 (m, 3H), 1.48-1.38 (m, 2H), 1.23-1.17 (m, 1H), 0.81 (d, *J* = 6.4 Hz, 1H), 0.76 (d, *J* = 6.0 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.9, 164.0, 156.6, 149.4, 147.7, 143.2, 140.3, 135.1, 134.7, 128.7, 128.6, 128.5, 128.4, 128.2, 128.0, 127.2, 126.7, 126.4, 126.3, 126.2, 120.5, 47.1, 36.9, 36.3, 36.1, 31.4, 30.3, 26.6, 25.0, 19.3.ppm; **HRMS** (ESI) calcd for $C_{32}H_{35}N_2O_2$ $[M+H]^+$ 479.2693, found 479.2695.

7.4 Steady-State Stern-Volmer Quenching Experiments

Stern-Volmer quenching experiments were carried by PerkinElmer LS-55 spectrofluorophotometer, using a 5×10^{-4} M solution of 4CzIPN with variable concentrations (0.2, 0.4, 0.6, 0.8, 1.0 mM) of **1a**, and **1b** in DMSO (**Figure S2-S4**). The samples were prepared in 20 mL quartz cuvettes. The intensity of the emission peak at 534 nm (λex = 365 nm) expressed as the ratio I_0/I, where I_0 is the emission intensity of photocatalyst at 534 nm in the absence of a quencher and I is the observed intensity, as a function of the quencher concentration was measured. Stern-Volmer plots for each component are given below. Stern-Volmer fluorescence quenching experiments revealed that only dihydroquinazolinones **1a** could quench the excited state of 4CzIPN*. These results support the proposed reductive quenching pathway.

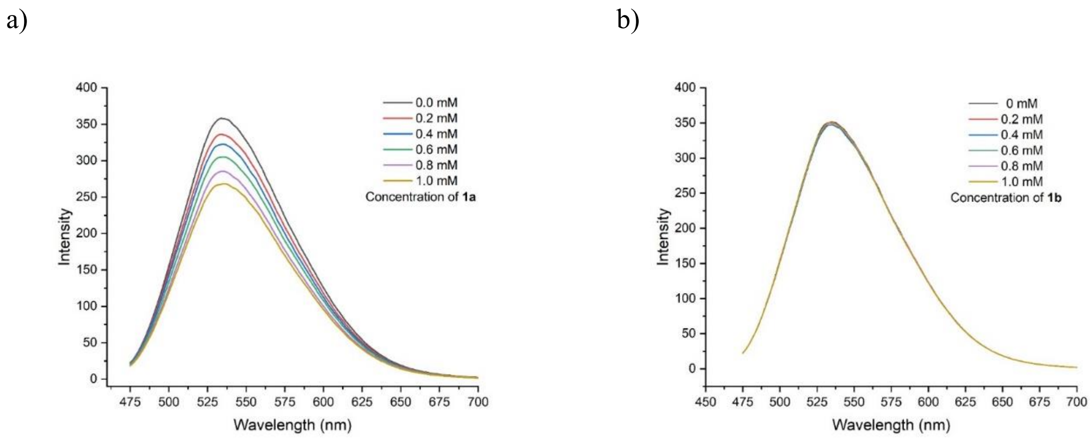


Figure S2. a) The fluorescence emission spectra of *4CzIPN with different concentration of **1a** added. (b) The fluorescence emission spectra of *4CzIPN with different concentration of **1a** added.

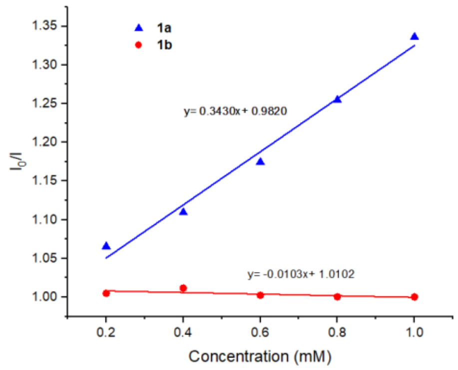
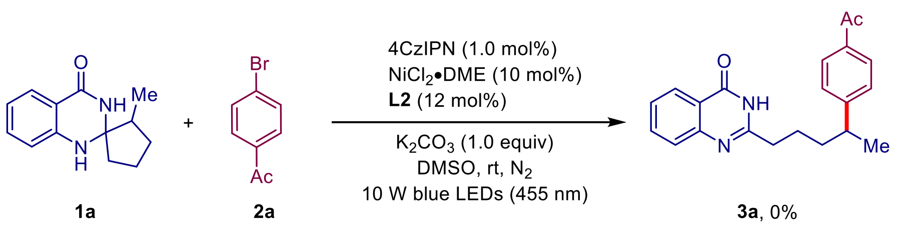


Figure S3. Stern–Volmer emission quenching studies of **1a** and **2a**. I_0 is the inherent fluorescence intensity of 4CzIPN. I is the fluorescence intensity of 4CzIPN in the presence of **1a** and **2a**.

7.5 Light on-off Experiments



Five parallel reactions were performed between **1a** (0.3 mmol, 1.5 equiv), **2a** (0.2 mmol, 1.0 equiv) and according to the General Procedure (**Figure S5**). The resulting residue was purified by silica gel column chromatography (PE/EA = 3/1) to afford the desired products **3a**. The white area indicates the light irradiation, while the grey area indicates time in the dark. The results of light on-off experiments indicated that the reaction proceeded only under the irradiation of light, and the reaction maybe proceed by a catalytic process rather than by a radical chain process.

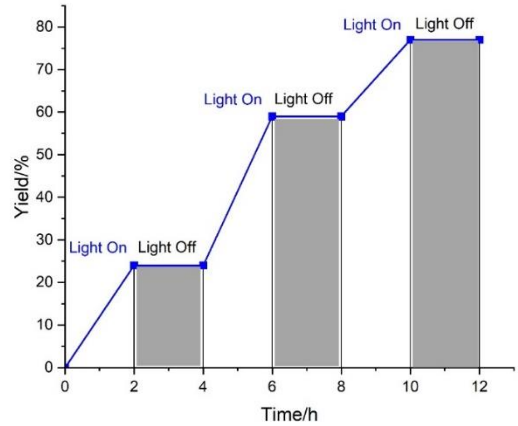


Figure S5. Light on-off Experiments of **1a** and **2a**

7.6 Cyclic Voltammetry Analysis

Cyclic voltammetry was conducted on an Electrochemical Workstation using a 3-electrode cell configuration. A glassy carbon working electrode was employed alongside a platinum wire counter electrode and a Ag/AgCl reference electrode. DMSO was degassed by bubbling N_2 prior to measurements. 0.01 M solutions of **1a** in DMSO were freshly prepared along with 0.1 M of $TBABF_4$ as supporting electrolyte and were examined at a scan 100 mV/s. The results of cyclic voltammetry experiments indicated that the oxidation potential of dihydroquinazolinone **1a** ($E_{1/2}^{ox}$ = +1.14 V vs SCE in DMSO) was measured using cyclic voltammetry and was shown to be within the oxidizing power of 4-CzIPN (+1.43 V vs SCE).

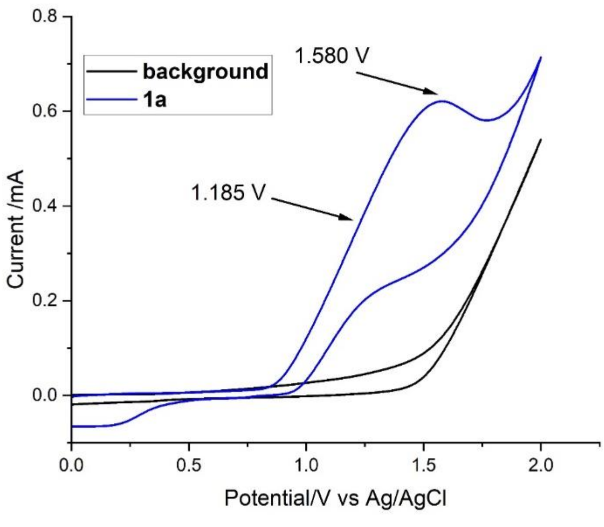
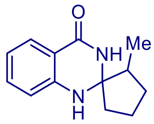
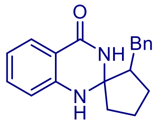


Figure S6. Cyclic voltammogram of **1a** in DMSO. Conditions: $TBABF_4$ (0.1 M), **1a** (10 mM). Scan rate: 100 mV/s.

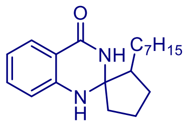
8. Characterization of Starting Materials Dihydroquinazolinones 1



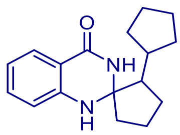
2-Methyl-1'H-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1a): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 7.91 (s, 1H), 7.54 (d, *J* =7.6 Hz, 1H), 7.20-7.16 (m 1H), 6.76-6.51 (m, 3H), 2.01-1.88 (m, 2H), 1.81-1.39 (m, 5H), 0.89-0.85 (m, 3H); **^{13}C NMR** (100 MHz, DMSO-*d$_6$*) δ 163.74, 163.69, 148.0, 147.7, 133.2, 127.2, 127.1, 116.2, 116.0, 114.02, 113.98, 113.8, 78.5, 78.2, 44.4, 44.2, 39.5, 29.4, 29.2, 19.0, 14.4, 13.8 ppm; **HRMS** (ESI) calcd for $C_{13}H_{17}N_2O$ $[M+H]^+$ 217.1335, found 217.1348.



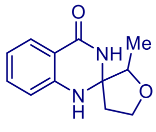
2-Benzyl-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1b): White solid; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.91-7.88 (m, 1H), 7.32-7.03 (m, 8H), 6.84-6.78 (m, 1H), 6.68-6.61 (m, 1H), 3.09-3.05 (m, 1H), 2.51-2.38 (m, 1H), 2.32-2.06 (m, 2H), 1.93-1.43 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 146.9, 146.2, 140.6, 134.0, 133.9, 128.8, 128.7, 128.33, 128.28, 125.9, 118.6, 118.4, 114.5, 114.0, 79.1, 78.6, 52.2, 51.6, 40.8, 39.8, 35.7, 27.3, 27.2 18.8, 18.6 ppm; **HRMS** (ESI) calcd for $C_{19}H_{21}N_2O$ $[M+H]^+$ 293.1648, found 293.1657.



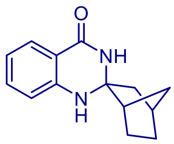
2-Heptyl-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1c): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 7.83 (s, 1H), 7.50-7.48 (m, 1H), 7.16-7.12 (m, 1H), 6.60-6.51 (m, 3H), 1.96-1.89 (m, 1H), 1.73-1.60 (m, 4H), 1.53-1.36 (m, 3H), 1.27-1.11 (m, 11H), 0.81-1.77 (m, 3H); ^{13}C NMR (100 MHz, DMSO-*d$_6$*) δ 163.4, 148.5, 133.6, 127.6, 116.5, 114.2, 79.0, 50.1, 31.8, 29.8, 29.6, 29.1, 28.3, 27.7, 22.6, 19.5, 14.5 ppm; **HRMS** (ESI) calcd for $C_{19}H_{29}N_2O$ $[M+H]^+$ 301.2274, found 301.2282.



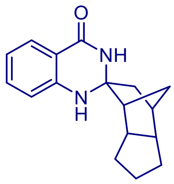
2-Cyclopentyl-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1d): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 7.87 (s, 1H), 7.53 (d, *J* =7.6 Hz, 1H), 7.19-7.15 (m, 1H), 6.74 (d, *J* =8.0 Hz, 1H), 6.61-6.51 (m, 1H), 6.47 (s, 1H), 1.99-1.94 (m, 1H), 1.88-1.51 (m, 11H), 1.41-1.32 (m, 2H), 1.26-1.17 (m, 1H), 1.09-1.04 (m, 1H); **^{13}C NMR** (100 MHz, DMSO-*d$_6$*) δ 163.3, 147.4, 133.1, 127.1, 115.9, 114.1, 113.6, 78.2, 53.3, 41.4, 31.8, 31.2, 27.2, 24.9, 24.1, 19.0 ppm; **HRMS** (ESI) calcd for $C_{17}H_{23}N_2O$ $[M+H]^+$ 271.1805 found 271.1800



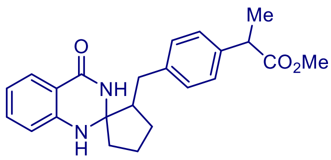
2-Methyl-4,5-dihydro-1'*H*,2*H*-spiro[furan-3,2'-quinazolin]-4'(3'*H*)-one (1e): Yellow solid; ^{1}**H NMR** (400 MHz, DMSO-d_6) δ 8.16 (s, 1H), 7.59-7.55 (m, 1H), 7.24-7.19 (m, 1H), 6.94 (s, 1H), 6.79-6.67 (m, 1H), 6.64-6.58 (m, 1H), 3.94-3.86 (m, 1H), 3.78-3.71 (m, 1H), 3.63-3.56 (m, 1H), 2.24-2.10 (m, 2H), 1.03-1.01 (m, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 163.4, 163.3, 147.5, 147.2, 133.6, 133.5, 127.23, 127.17, 116.8, 116.5, 114.0, 113.9, 113.6, 81.6, 81.5, 76.8, 76.5, 63.8, 63.6, 40.4, 39.5, 15.6, 14.3 ppm; **HRMS** (ESI) calcd for $C_{12}H_{15}N_2O_2$ $[M+H]^+$ 219.1128, found 219.1133.



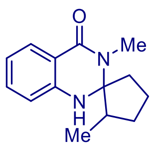
(*1R,2R,4S*)-1'*H*-spiro[bicyclo[2.2.1]heptane-2,2'-quinazolin]-4'(3'*H*)-one (1f): White solid; ^{1}**H NMR** (400 MHz, DMSO-d_6) δ 8.17 (s, 1H), 7.54 (d, *J* =7.2 Hz, 1H), 7.20-7.17 (m, 1H), 6.84 (s, 1H), 6.74 (d, *J* =7.6 Hz, 1H), 6.61-6.58 (m, 1H), 2.27 (s, 1H), 2.01 (s, 1H), 1.85-1.70 (m, 2H), 1.47-1.08 (m, 6H); ^{13}**C NMR** (100 MHz, DMSO-d_6) δ 163.8, 148.0, 133.6, 127.8, 117.0, 115.9, 114.6, 75.6, 46.5, 45.8, 36.0, 35.7, 28.2, 22.6 ppm; **HRMS** (ESI) calcd for $C_{14}H_{17}N_2O$ $[M+H]^+$ 229.1335, found 229.1342.



(2*S*,3a'*S*,4'*R*,7'*R*,7a'*S*)-1',2',3',3a',4',6',7',7a'-Octahydro-1*H*-spiro[quinazoline-2,5'-[4,7]methanoinden]-4(3*H*)-one (1g): White solid; ^{1}**H NMR** (400 MHz, DMSO-d_6) δ 8.19 (s, 1H), 7.53 (d, *J* =7.6 Hz, 1H), 7.21-7.17 (m, 1H), 6.80 (s, 1H), 6.73 (d, *J* = 7.6 Hz, 1H), 6.60 (t, *J* = 7.6 Hz, 1H), 2.14-2.07 (m, 1H), 2.04 (s, 1H), 1.92-1.76 (m, 4H), 1.65-1.53 (m, 2H), 1.48 (d, *J* = 10.8 Hz, 1H), 1.23 (d, *J* =10.0 Hz, 2H), 1.14-1.02 (m, 1H), 0.90-0.75 (m, 2H); ^{13}**C NMR** (100 MHz, DMSO-d_6) δ 163.9, 147.9, 133.6, 127.8, 117.0, 115.8, 114.7, 75.1, 51.1, 46.7, 45.2, 40.2, 40.1, 32.4, 31.5, 30.0, 27.7 ppm; **HRMS** (ESI) calcd for $C_{17}H_{21}N_2O$ $[M+H]^+$ 269.1648 found 269.1640.

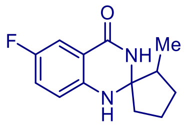


Methyl 2-(4-((4'-oxo-3',4'-dihydro-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-2-yl)methyl)phenyl)propanoate (1h): White solid; ^{1}**H NMR** (400 MHz, DMSO-d_6) δ 8.07-8.02 (m, 1H), 7.59-7.53 (m, 1H), 7.19-7.02 (m, 5H), 6.77-6.55 (m, 3H), 3.71-3.66 (m, 1H), 3.52 (s, 3H), 2.84-2.78 (m, 1H), 2.39-2.32 (m, 1H), 2.15-1.99 (m, 2H), 1.76-1.64 (m, 2H), 1.56-1.44 (m, 3H), 1.31 (d, *J* = 6.8 Hz, 3H); ^{13}**C NMR** (100 MHz, DMSO-d_6) δ 174.5, 163.8, 163.6, 161.9, 157.0, 149.0, 148.1, 147.5, 140.0, 138.0, 134.3, 133.3, 128.83, 128.78, 127.32, 127.27, 127.2, 126.9, 126.0, 125.7, 121.0, 116.3, 114.3, 114.0, 113.9, 78.5, 78.1, 51.8, 51.1, 50.5, 44.1, 39.9, 34.9, 33.7, 26.7, 26.6, 18.8, 18.71, 18.66, 18.6 ppm; **HRMS** (ESI) calcd for $C_{23}H_{26}N_2O_3$ $[M+H]^+$ 379.2016, found 379.2017

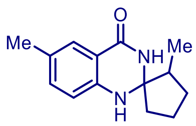


2,3'-Dimethyl-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1i): White solid; ^{1}**H NMR** (400

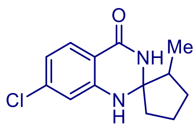
MHz, DMSO-d_6) δ 7.55-7.52 (m, 1H), 7.18-7.15 (m, 1H), 6.78-6.75 (m, 1H), 6.58-6.55 (m, 1H), 6.42 (s, 1H), 3.07-2.82 (m, 3H), 2.35-2.20 (m, 1H), 1.99-1.56 (m, 6H), 0.88-0.85 (m, 3H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 163.7, 147.1, 133.5, 127.9, 116.9, 114.7, 114.5, 82.3, 40.9, 35.2, 29.7, 27.2, 20.0, 13.7 ppm; **HRMS** (ESI) calcd for $C_{14}H_{19}N_2O$ [M+H]$^+$ 231.1492, found 231.1500.



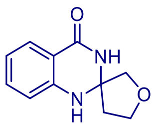
6'-Fluoro-2-methyl-1'H-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1j): White solid; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.01 (s, 1H), 7.30-7.19 (m, 1H), 7.14-7.03 (m, 1H), 6.79-6.51 (m, 2H), 2.07-1.86 (m, 2H), 1.77-1.43 (m, 5H), 0.88 (s, 1.4H), 0.86 (s,1.6H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 162.9, 155.3 (d, $J_{C\text{-}F}$ = 230.7 Hz), 144.8, 120.8, 120.5, 115.5, 115.4, 114.8, 114.7, 112.5, 112.2, 78.7, 44.2, 39.3, 29.4, 19.0, 14.5 ppm; **^{19}F NMR** (376 MHz, DMSO-d_6) δ -127.90 ppm; **HRMS** (ESI) calcd for $C_{13}H_{16}FN_2O$ [M+H]$^+$ 235.1241, found 235.1247.



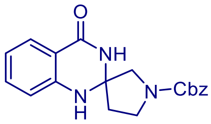
2,6'-Dimethyl-1'*H*-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1k): White solid; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 7.87-7.85 (m, 1H), 7.36 (s, 1H), 7.01 (d, *J* = 8.0 Hz, 1H), 6.69-6.56 (m, 1H), 6.40 (s, 0.5H), 6.32 (s, 0.5H), 2.15 (s, 3H), 1.99-1.86 (m, 2H), 1.76-1.52 (m, 4H), 1.46-1.38 (m, 1H), 0.89-0.84 (m, 3H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 163.9, 163.8, 145.9, 145.6, 134.02, 133.98, 127.1, 127.0, 124.7, 124.5, 114.13, 114.06, 114.0, 78.5, 78.2, 44.2, 44.0, 39.3 29.5, 29.2, 20.2, 19.04, 19.00, 14.5, 13.9 ppm; **HRMS** (ESI) calcd for $C_{14}H_{19}N_2O$ [M+H]$^+$ 231.1492, found 231.1504.



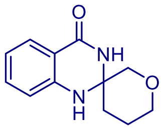
7'-Chloro-2-methyl-1'H-spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1l): White solid; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.00 (s, 1H), 7.51-7.48 (m, 1H), 6.89-6.54 (m, 3H), 1.95-1.40 (m, 7H), 0.85-0.81 (m, 3H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 163.2, 149.4, 149.1, 138.1, 129.6, 129.5, 116.5, 116.4, 113.4, 113.2, 79.1, 45.2, 44.9, 29.8, 29.5, 19.43, 19.37, 14.7, 14.1 ppm; **HRMS** (ESI) calcd for $C_{13}H_{16}ClN_2O$ [M+H]$^+$ 251.0946, found 251.0952.



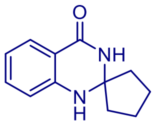
4,5-Dihydro-1'*H*,2*H*-spiro[furan-3,2'-quinazolin]-4'(3'*H*)-one (1m): Pale yellow solid; **^{1}H NMR** (400 MHz, DMSO-d_6) δ 8.31 (s, 1H), 7.27 (d, *J* =8.0 Hz, 1H), 7.23-7.19 (m, 1H), 7.06 (s, 1H), 6.71 (d, *J* = 8.0 Hz, 1H), 6.64 (t, *J* = 7.2 Hz, 1H), 3.90-3.79 (m, 2H), 3.64 (d, *J* = 8.8 Hz, 1H), 3.54 (d, *J* = 9.2 Hz, 1H), 2.16-2.01 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.9, 147.6, 133.9, 127.9, 117.7, 115.0, 114.8, 77.2, 76.4, 66.6, 39.8 ppm; **HRMS** (ESI) calcd for $C_{11}H_{13}N_2O_2$ [M+H]$^+$ 205.0972, found 205.0986.



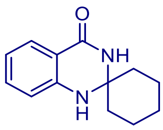
Benzyl 4'-oxo-3',4'-dihydro-1'*H*-spiro[pyrrolidine-3,2'-quinazoline]-1-carboxylate (1n): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 8.41 (s, 1H), 7.60 (d, *J* = 7.2 Hz, 1H), 7.35-7.22 (m, 6H), 7.11 (s, 1H), 6.73 (d, *J* = 8.4 Hz, 1H), 6.67 (t, *J* = 7.6 Hz, 1H), 5.09-5.03 (m, 2H), 3.53-3.36 (m, 4H), 2.12-2.02 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.9, 154.5, 147.3, 137.5, 134.0, 128.9, 128.3, 128.1, 128.0, 127.9, 118.0, 115.2, 114.9, 74.9, 74.1, 66.4, 57.1, 56.8, 43.9, 43.6, 40.0, 37.8, 37.0 ppm; **HRMS** (ESI) calcd for $C_{19}H_{20}N_3O_3$ $[M+H]^+$ 338.1499, found 338.1490.



5,6-Dihydro-1'*H*,2*H*,4*H*-spiro[pyran-3,2'-quinazolin]-4'(3'*H*)-one (1o): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 7.92 (s, 1H), 7.53 (d, *J* = 7.6 Hz, 1H), 7.22-7.17 (m, 1H), 6.81-6.79 (m, 2H), 6.62-6.58 (m, 1H), 3.66-3.62 (m, 1H),3.55 (d, *J* = 10.8 Hz, 1H), 3.36-3.29 (m, 1H), 3.24 (d, *J* =10.8 Hz, 1H), 1.88-1.60 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.6, 147.1, 133.9, 127.7, 117.3, 115.2, 114.6, 73.7, 67.5, 65.7, 35.0, 21.8 ppm; **HRMS** (ESI) calcd for $C_{12}H_{15}N_2O_2$ $[M+H]^+$ 219.1128, found 219.1135.

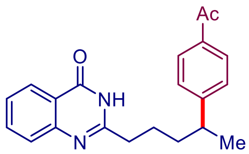


1'*H*-Spiro[cyclopentane-1,2'-quinazolin]-4'(3'*H*)-one (1p): White solid; **^{1}H NMR** (400 MHz, DMSO-*d$_6$*) δ 8.08 (s, 1H), 7.57 (d, *J* =8.0 Hz, 1H), 7.24-7.19 (m, 1H), 6.74-6.69 (m, 2H), 6.63 (t, *J* =7.2 Hz, 1H), 1.80-1.65 (m, 8H); **^{13}C NMR** (100 MHz, DMSO-*d$_6$*) δ 163.9, 148.0, 133.5, 127.7, 117.0, 115.0, 114.8, 77.5, 39.8, 22.5 ppm; **HRMS** (ESI) calcd for $C_{12}H_{15}N_2O$ $[M+H]^+$ 203.1179, found 203.1188.

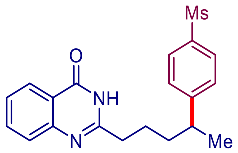


1'*H*-Spiro[cyclohexane-1,2'-quinazolin]-4'(3'*H*)-one (1q): White solid; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7,91 (s, 1H), 7.57 (d, *J* =7.6 Hz, 1H), 7.24-7.20 (m, 1H), 6.81 (d, *J* =8.0 Hz, 1H), 6.64-6.61 (m, 2H), 1.77-1.74 (m, 2H), 1.64-1.55 (m, 6H), 1.44-1.41 (m, 1H), 1.30-1.22 (1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.6, 147.2, 133.6, 127.5, 116.9, 115.0, 114.9, 68.3, 37.6, 25.1, 21.3 ppm; **HRMS** (ESI) calcd for $C_{13}H_{17}N_2O$ $[M+H]^+$ 217.1335, found 217.1348.

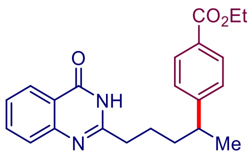
9. Characterization of Products



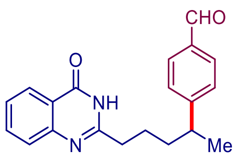
2-(4-(4-Acetylphenyl)pentyl)quinazolin-4(3H)-one (3a): White solid (60.2 mg, 90% yield), m.p.: 172.2-173.4 °C; R_f = 0.2 (PE/EA = 3/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.25 (brs, 1H), 8.24 (d, J = 7.2 Hz, 1H), 7.82 (d, J = 8.4 Hz, 2H), 7.77 (t, J = 8.4 Hz, 1H), 7.69 (d, J = 8.0 Hz, 1H), 7.47 (d, J = 8.0 Hz, 1H), 7.26 (d, J = 8.0 Hz, 2H), 2.87-2.77 (m, 3H), 2.51(s, 3H), 1.90-1.75 (m, 4H), 1.27 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 164.4, 156.6, 152.9, 149.3, 135.1, 134.8, 128.6, 127.1, 126.4, 126.1, 120.3, 39.8, 37.3, 35.6, 26.5, 25.5, 22.0 ppm; **HRMS** (ESI) calcd for $C_{21}H_{23}N_2O_2$ $[M+H]^+$ 335.1754, found 335.1763.



2-(4-(4-(Methylsulfonyl)phenyl)pentyl)quinazolin-4(3*H*)-one (3b): White solid (60.0 mg, 81% yield), m.p.: 180.6-182.1 °C; R_f = 0.2 (PE/EtOAc = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.16 (brs, 1H), 8.25 (d, J = 7.2 Hz, 1H), 7.81 (d, J = 8.4 Hz, 2H), 7.78 (t, J = 8.4 Hz, 1H) , 7.69 (d, J = 8.0 Hz, 1H), 7.48 (t, J = 8.0 Hz, 1H), 7.37 (d, J = 8.0 Hz, 2H), 3.01 (s, 3H), 2.90-2.83 (m, 1H), 2.78 (t, J = 6.4 Hz, 2H), 1.88-1.73 (m, 4H), 1.28 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.4, 156.4, 153.7, 149.3, 138.1, 134.9, 128.0, 127.5, 127.2, 126.4, 126.0, 120.4, 44.5, 39.8, 37.3, 35.5, 25.3, 21.9 ppm; **HRMS** (ESI) calcd for $C_{20}H_{23}N_2O_3S$ $[M+H]^+$ 371.1424, found 371.1430.

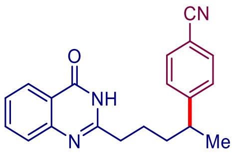


Ethyl 4-(5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzoate (3c): White solid (56.1 mg, 77% yield), m.p.: 165.7-167.1 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.16 (brs, 1H), 8.24 (d, J = 8.0 Hz, 1H), 7.91 (d, J = 8.0 Hz, 2H), 7.77 (t, J = 8.4 Hz, 1H), 7.69 (d, J = 8.0 Hz, 1H), 7.47 (t, J = 8.0 Hz, 1H), 7.24 (d, J = 8.0 Hz, 2H), 4.33 (q, J = 6.8 Hz, 2H), 2.87-2.81 (m, 1H), 2.78 (t, J = 7.2 Hz, 2H), 1.90-1.75 (m, 4H), 1.35 (t, J = 7.2 Hz, 3H), 1.27 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.5, 164.4, 156.6, 152.5, 149.3, 134.8, 129.7, 128.3, 127.1, 126.9, 126.4, 126.1, 120.3, 60.7, 39.8, 37.4, 35.6, 25.5, 22.0, 14.3 ppm; **HRMS** (ESI) calcd for $C_{22}H_{25}N_2O_3$ $[M+H]^+$ 365.1860, found 365.1865.

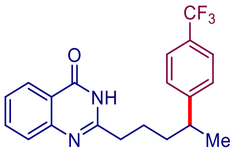


4-(5-(4-Oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzaldehyde (3d): White solid (50.6 mg, 79% yield), m.p.: 177.9-179.0 °C; R_f = 0.2 (PE/EtOAc = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.28 (brs, 1H), 9.89 (s, 1H), 8.23 (d, J = 7.6 Hz, 1H), 7.78 (t, J = 8.4 Hz, 1H), 7.73 (d, J = 8.0 Hz, 2H) , 7.69 (d, J = 8.0 Hz, 1H), 7.47 (t, J = 8.0 Hz, 1H), 7.33 (d, J = 8.0 Hz, 2H), 2.91-2.82 (m, 1H), 2.79 (t, J = 6.4 Hz, 2H), 1.91-1.75 (m, 4H), 1.28 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ

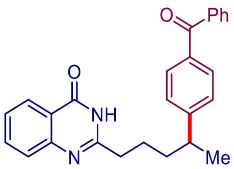
191.9, 164.5, 156.5, 154.5, 149.4, 134.8, 134.6, 130.0, 127.6, 127.2, 126.4, 126.0, 120.3, 40.0, 37.3, 35.6, 25.4, 21.9 ppm; **HRMS** (ESI) calcd for $C_{20}H_{21}N_2O_2$ $[M+H]^+$ 321.1598, found 321.1604.



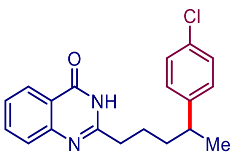
4-(5-(4-Oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzonitrile (3e): White solid (52.0 mg, 82% yield), m.p.: 185.0-187.2 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.05 (brs, 1H), 8.24 (d, J = 8.0 Hz, 1H), 7.79 (t, J = 8.4 Hz, 1H) , 7.69 (d, J = 8.0 Hz, 1H), 7.53-7.47 (m, 3H), 7.28 (d, J = 8.4 Hz, 2H), 2.88-2.82 (m, 1H), 2.78 (t, J = 6.4 Hz, 2H), 1.91-1.72 (m, 4H), 1.27 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.3, 156.5, 152.7, 149.0, 135.0, 132.3, 127.8, 127.1, 126.5, 126.1, 120.3, 119.0, 109.8, 39.9, 37.2, 35.4, 25.3, 21.9 ppm; **HRMS** (ESI) calcd for $C_{20}H_{20}N_3O$ $[M+H]^+$ 318.1601, found 318.1603.



2-(4-(4-(Trifluoromethyl)phenyl)pentyl)quinazolin-4(3*H*)-one (3f): White solid (47.6 mg, 66% yield), m.p.: 169.9-171.8 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.15 (brs, 1H), 8.24 (d, J = 8.0 Hz, 1H), 7.80-7.76 (m, 1H), 7.69 (d, J = 8.0 Hz, 1H), 7.49-7.46 (m, 3H), 7.29 (d, J = 8.0 Hz, 2H), 2.89-2.78 (m, 3H), 1.92-1.73 (m, 4H), 1.27 (d, J = 6.8 Hz, 3H); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -62.17 (s, 3F); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.6, 156.6, 151.2, 149.5, 134.8, 128.2 (q, J_{C-F} = 32.2 Hz), 127.2 (2C), 126.3, 126.0, 125.3 (q, J_{C-F} = 3.7 Hz), 124.2 (q, J_{C-F} = 270.3 Hz), 120.3, 39.6, 37.4, 35.6, 25.4, 22.0 ppm; **HRMS** (ESI) calcd for $C_{20}H_{20}F_3N_2O$ $[M+H]^+$ 361.1522 found 361.1525.

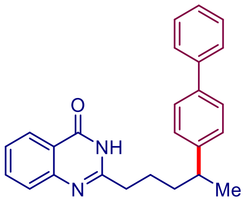


2-(4-(4-Benzoylphenyl)pentyl)quinazolin-4(3*H*)-one (3g): White solid (45.2 mg, 57% yield), m.p.: 190.9-192.0 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.32 (brs, 1H), 8.26 (d, J = 8.0 Hz, 1H), 7.77-7.67 (m, 6H), 7.56 (t, J = 8.0 Hz, 1H), 7.47-7.43 (m, 3H), 7.29 (d, J = 8.0 Hz, 2H), 2.89-2.84 (m, 1H), 2.80 (t, J = 6.4 Hz, 2H), 1.97-1.78 (m, 4H), 1.29 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 196.3, 164.5, 156.6, 152.3, 149.3, 137.7, 135.3, 134.8, 132.1, 130.4, 129.8, 128.1, 127.1, 126.9, 126.3, 126.0, 120.3, 39.8, 37.4, 35.6, 25.5, 22.0 ppm; **HRMS** (ESI) calcd for $C_{26}H_{25}N_2O_2$ $[M+H]^+$ 397.1911, found 397.1915.

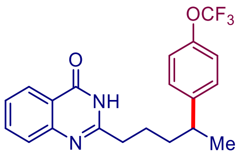


2-(4-(4-Chlorophenyl)pentyl)quinazolin-4(3*H*)-one (3h): White solid (41.2 mg, 63% yield), m.p.: 184.4-186.0 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.27 (brs, 1H), 8.25 (d, J = 8.0 Hz, 1H), 7.80, 7.80-7.76 (m, 1H), 7.70 (d, J = 8.0 Hz, 1H), 7.50-7.46 (m, 1H), 7.18 (d, J = 8.4

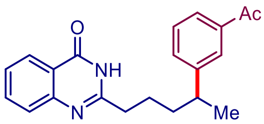
Hz, 2H), 7.09 (d, J = 8.4 Hz, 2H), 2.83-2.72 (m, 3H), 1.91-1.69 (m, 4H), 1.23 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.5, 156.6, 149.4, 145.5, 134.8, 131.5, 128.4, 128.3, 127.2, 126.3, 126.1, 120.4, 39.1, 37.6, 35.7, 25.5, 22.3 ppm; **HRMS** (ESI) calcd for $C_{19}H_{20}ClN_2O$ $[M+H]^+$ 327.1259, found 327.1262.



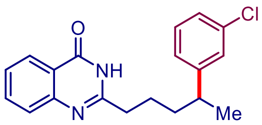
2-(4-([1,1'-Biphenyl]-4-yl)pentyl)quinazolin-4(3*H*)-one (3i): White solid (28.0 mg, 38% yield), m.p.: 187.6-189.2 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.26 (brs, 1H), 8.30 (d, J = 8.0 Hz, 1H), 7.79-7.75 (m, 1H), 7.71 (d, J = 7.6 Hz, 1H), 7.54-7.52 (m, 2H), 7.49-7.45 (m, 3H), 7.43-7.39 (m, 2H), 7.34-7.30 (m, 1H), 7.26 (d, J = 8.4 Hz, 2H), 2.87-2.79 (m, 3H), 1.94-1.76 (m, 4H), 1.31 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.5, 156.8, 149.5, 146.2, 140.9, 138.8, 134.7, 128.6, 127.3, 127.2, 127.0, 126.9, 126.3, 126.1, 120.4, 39.3, 37.7, 35.8, 25.7, 22.3 ppm; **HRMS** (ESI) calcd for $C_{25}H_{25}N_2O$ $[M+H]^+$ 369.1961, found 369.1964.



2-(4-(4-(Trifluoromethoxy)phenyl)pentyl)quinazolin-4(3*H*)-one (3j): White solid (14.3 mg, 19% yield), m.p.: 161.7-169.2 °C; R_f = 0.2 (PE/EtOAc = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.15 (brs, 1H), 8.26 (d, J = 8.0 Hz, 1H), 7.80-7.76 (m, 1H), 7.70 (d, J = 8.0 Hz, 1H), 7.50-7.46 (m, 1H), 7.19 (d, J = 8.8 Hz, 2H), 7.07 (d, J = 8.0 Hz, 2H), 2.81-2.77 (m, 3H), 1.93-1.70 (m, 4H), 1.25 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.4, 156.6, 149.3, 147.3, 145.8, 134.9, 128.1, 127.2, 126.4, 126.1, 120.9, 120.44 (q, $J_{C\text{-}F}$ = 254.9 Hz), 120.36, 39.1, 37.6, 35.7, 25.5, 22.2 ppm; **HRMS** (ESI) calcd for $C_{20}H_{20}F_3N_2O_2$ $[M+H]^+$ 377.1471, found 377.1475.

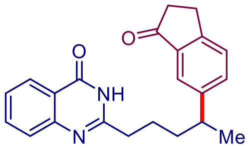


2-(4-(3-Acetylphenyl)pentyl)quinazolin-4(3*H*)-one (3k): Colorless oil (46.8 mg, 70% yield), R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.90 (brs, 1H), 8.24 (d, J = 8.0 Hz, 1H), 7.79-7.75 (m, 2H), 7.72 (dt, J = 7.6 Hz, 1.2 Hz, 1H), 7.68 (d, J = 8.0 Hz, 1H), 7.49-7.45 (m, 1H), 7.40-7.38 (m, 1H), 7.34-7.30 (m, 1H), 2.89-2.81 (m, 1H), 2.77 (t, J = 6.8 Hz, 2H), 2.56 (s, 3H), 1.91-1.74 (m, 4H), 1.28 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 198.2, 164.4, 156.6, 149.3, 147.6, 137.0, 134.6, 131.7, 128.4, 127.0, 126.5, 126.21, 126.16, 126.0, 120.2, 39.5, 37.4, 35.5, 26.5, 25.4, 22.0 ppm; **HRMS** (ESI) calcd for $C_{21}H_{23}N_2O_2$ $[M+H]^+$ 335.1754, found 335.1758.

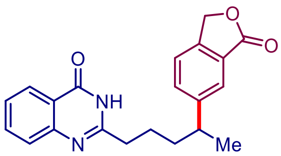


2-(4-(3-Chlorophenyl)pentyl)quinazolin-4(3*H*)-one (3l): White solid (38.5 mg, 59% yield), m.p.: 185.4-187.1 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.02 (brs, 1H), 8.26 (d, J = 8.0 Hz, 1H), 7.80-7.76 (m, 1H), 7.70 (d, J = 8.0 Hz, 1H), 7.48 (t, J = 8.0 Hz, 1H), 7.16-7.09 (m, 3H), 7.05 (d, J = 7.2 Hz, 1H), 2.82-2.71 (m, 3H), 1.92-1.72 (m, 4H), 1.25 (d, J = 6.8 Hz, 3H); **^{13}C**

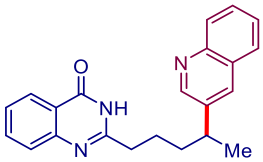
NMR (100 MHz, $CDCl_3$) δ 164.4, 156.5, 149.4, 149.2, 134.8, 134.1, 129.6, 127.2, 127.1, 126.4, 126.2, 126.1, 125.2, 120.4, 39.6, 37.5, 35.7, 25.4, 22.1; **HRMS** (ESI) calcd for $C_{19}H_{20}ClN_2O$ $[M+H]^+$ 327.1259, found 327.1260.



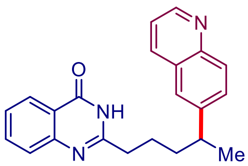
2-(4-(3-Oxo-2,3-dihydro-1H-inden-5-yl)pentyl)quinazolin-4(3*H*)-one (3m): White solid (58.9 mg, 85% yield), m.p.:188.0-190.1 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.85 (brs, 1H), 8.24 (d, *J* = 8.0 Hz, 1H), 7.77 (t, *J* = 8.4 Hz, 1H), 7.68 (d, *J* = 8.4 Hz, 1H), 7.64 (d, *J* = 8.0 Hz, 1H), 7.47 (t, *J* = 8.0 Hz, 1H), 7.27 (s, 1H), 7.19 (d, *J* = 8.0 Hz, 1H), 3.03 (t, *J* = 5.6 Hz, 2H), 2.91-2.83 (m, 1H), 2.78 (t, *J* = 6.4 Hz, 2H), 2.62 (t, *J* = 6.0 Hz, 2H), 1.92-1.76 (m, 4H), 1.28 (d, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 206.6, 164.3, 156.4, 155.8, 154.9, 149.4, 135.4, 134.9, 127.2, 126.5, 126.4, 126.1, 125.0, 123.8, 120.4, 40.2, 37.4, 36.4, 35.7, 25.7, 25.5, 22.2 ppm; **HRMS** (ESI) calcd for $C_{22}H_{23}N_2O_2$ $[M+H]^+$ 347.1754, found 347.1755.



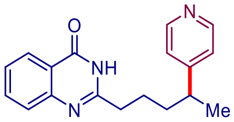
2-(4-(3-Oxo-1,3-dihydroisobenzofuran-5-yl)pentyl)quinazolin-4(3H)-one (3n): White solid (42.5 mg, 61% yield), m.p.:178.1-180.0 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.10 (brs, 1H), 8.23 (d, *J* = 8.0 Hz, 1H), 7.80-7.76 (m, 2H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.49-7.45 (m, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.28 (s, 1H), 5.19 (m, 2H), 2.96-2.76 (m, 3H), 1.92-1.73 (m, 4H), 1.30 (d, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.0, 164.4, 156.3, 154.4, 149.3, 147.2, 134.9, 128.3, 127.2, 126.5, 126.0, 125.7, 123.7, 120.4, 120.3, 69.5, 40.2, 37.4, 35.5, 25.3, 22.2 ppm; **HRMS** (ESI) calcd for $C_{21}H_{21}N_2O_3$ $[M+H]^+$ 349.1547, found 349.1550.



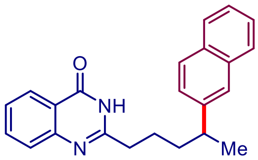
2-(4-(Quinolin-3-yl)pentyl)quinazolin-4(3H)-one (3o): Colorless oil (41.9 mg, 61% yield), R_f = 0.2 (PE/EA = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.35 (brs, 1H), 8.78 (d, *J* = 8.0 Hz, 1H), 8.21 (d, *J* = 8.0 Hz, 1H), 8.02 (d, *J* = 8.4 Hz, 1H), 7.88 (s, 1H), 7.76-7.72 (m, 1H), 7.68-7.65 (m, 2H), 7.61-7.57 (m, 1H), 7.46-7.41 (m, 2H), 3.02-2.96 (m, 1H), 2.80 (d, *J* = 6.0 Hz, 2H), 1.99-1.81 (m, 4H), 1.36 (d, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.4, 156.4, 151.0, 149.3, 146.8, 139.5, 134.7, 132.8, 128.8, 128.6, 128.1, 127.3, 127.1, 126.5, 126.3, 126.1, 120.3, 37.3, 37.3, 35.5, 25.3, 21.9 ppm; **HRMS** (ESI) calcd for $C_{22}H_{22}N_3O$ $[M+H]^+$ 344.1757, found 344.1760.



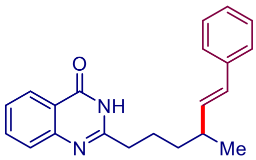
2-(4-(Quinolin-6-yl)pentyl)quinazolin-4(3H)-one (3p): Colorless oil (37.7 mg, 55% yield), R_f = 0.2 (PE/EA = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.30 (brs, 1H), 8.78 (dd, *J* = 4.4 Hz, 1.6 Hz, 1H), 8.21 (d, *J* = 8.0 Hz, 1H), 7.98 (d, *J* = 9.2 Hz, 2H), 7.75-7.71 (m, 1H), 7.65 (d, *J* = 7.6 Hz, 1H), 7.55-7.52 (m, 2H), 7.42 (t, J = 8.0 Hz, 1H), 7.28-7.25 (m, 1H), 2.98-2.90 (m, 1H), 2.78 (t, J = 6.4 Hz, 2H), 1.92-1.76 (m, 4H), 1.31 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.3, 156.6, 149.4, 149.3, 146.9, 145.4, 135.7, 134.7, 129.2, 129.1, 128.2, 127.1, 126.3, 126.0, 124.9, 120.9, 120.3, 39.6, 37.3, 35.6, 25.5, 22.2 ppm; **HRMS** (ESI) calcd for $C_{22}H_{22}N_3O$ $[M+H]^+$ 344.1757, found 344.1759.



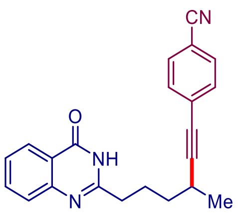
2-(4-(Pyridin-4-yl)pentyl)quinazolin-4(3H)-one (3q): Colorless oil (37.6 mg, 64% yield), R_f = 0.2 (PE/EA = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.53 (brs, 1H), 8.43 (d, J = 6.0 Hz, 2H), 8.23 (d, J = 8.0 Hz, 1H), 7.77-7.73 (m, 1H), 7.66 (d, J = 7.6 Hz, 1H), 7.47-7.43 (m, 1H), 7.09 (d, J = 6.0 Hz, 2H), 2.79-2.72 (m, 3H), 1.89-1.70 (m, 4H), 1.23 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.4, 156.5, 156.1, 149.5, 149.3, 134.7, 127.1, 126.3, 126.0, 122.5, 120.4, 39.1, 36.8, 35.5, 25.3, 21.4 ppm; **HRMS** (ESI) calcd for $C_{18}H_{20}N_3O$ $[M+H]^+$ 294.1601, found 294.1602.



2-(4-(Naphthalen-2-yl)pentyl)quinazolin-4(3H)-one (3r): White solid (15.1 mg, 22% yield), m.p.:187.8-190.0 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.22 (brs, 1H), 8.26 (d, J = 8.0 Hz, 1H), 7.79-7.69 (m, 5H), 7.60 (m, 1H), 7.48-7.44 (m, 1H), 7.41-7.32 (m, 3H), 2.99-2.90 (m, 1H), 2.80 (t, J = 6.8 Hz, 2H), 1.95-1.79 (m, 4H), 1.35 (d, J = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.4, 156.7, 149.4, 144.5, 134.7, 133.5, 132.1, 127.9, 127.5, 127.4, 127.2, 126.3, 126.1, 125.8, 125.5, 125.14, 125.05, 120.4, 39.8, 37.5, 35.8, 25.6, 22.3 ppm; **HRMS** (ESI) calcd for $C_{23}H_{23}N_2O$ $[M+H]^+$ 343.1805, found 343.1810.

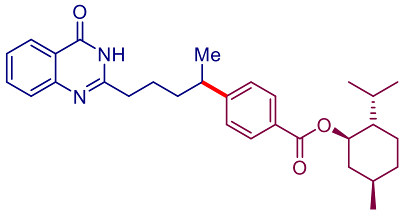


2-(4-Methyl-6-phenylhex-5-en-1-yl)quinazolin-4(3H)-one (3s): White solid (45.8 mg, 72% yield), m.p.:171.2-172.9 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.22 (brs, 1H), 8.29 (d, J = 8.0 Hz, 1H), 7.77 (t, J = 8.0 Hz, 1H), 7.71 (d, J = 8.0 Hz, 1H), 7.45 (d, J = 8.0 Hz, 1H), 7.29 (d, J = 8.0 Hz, 2H), 7.22 (d, J = 7.2 Hz, 2H), 7.15 (t, J = 7.2 Hz, 1H), 6.36 (d, J = 16.0 Hz, 1H), 6.11 (d, J = 8.0 Hz, 0.5H), 6.07 (d, J = 8.0 Hz, 0.4H), 2.82 (t, J = 8.0 Hz, 2H), 2.44-2.34 (m, 1H), 2.00-1.88 (m, 2H), 1.57 (m, 2H), 1.12 (d, J = 6.4 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.5, 156.8, 149.5, 137.6, 136.1, 134.7, 128.5, 128.4, 127.2, 126.8, 126.3, 126.2, 125.9, 120.4, 37.1, 36.5, 35.9, 25.4, 20.6 ppm; **HRMS** (ESI) calcd for $C_{21}H_{23}N_2O$ $[M+H]^+$ 319.1805, found 319.1807.

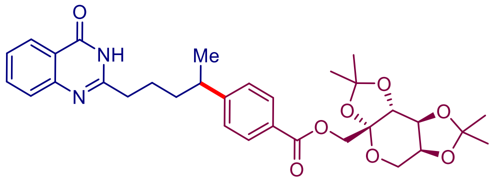


4-(3-Methyl-6-(4-oxo-3,4-dihydroquinazolin-2-yl)hex-1-yn-1-yl)benzonitrile (3t): White solid

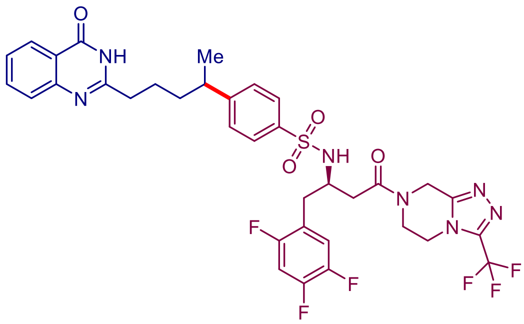
(49.8 mg, 73% yield), m.p.:176.3-177.9 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.31 (brs, 1H), 8.26 (d, *J* = 8.0 Hz, 1H), 7.77 (t, *J* = 8.0 Hz, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.47-7.45 (m, 3H), 7.38 (d, *J* = 8.0 Hz, 2H), 2.87 (t, *J* = 8.0 Hz, 2H), 2.82-2.74 (m, 1H), 2.22-2.02 (m, 2H), 1.71 (m, 2H), 1.29 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.5, 156.4, 149.4, 134.8, 132.0, 131.7, 128.8, 127.2, 126.4, 126.1, 120.4, 118.5, 110.7, 99.0, 80.0, 36.0, 35.5, 26.5, 25.3, 20.7 ppm; **HRMS** (ESI) calcd for $C_{22}H_{20}N_3O$ $[M+H]^+$ 342.1601, found 342.1603.



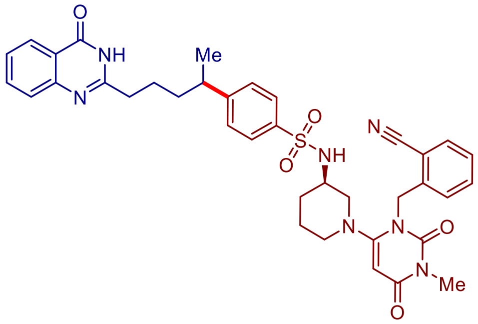
(*1R,2R,5R*)-2-isopropyl-5-methylcyclohexyl 4-(5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzoate (3v): Colorless oil (75.9 mg, 80% yield, d.r. = 1:1), R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.00 (brs, 1H), 8.29-8.25 (m, 1H), 7.94 (d, *J* = 8.4 Hz, 2H), 7.79-7.75 (m, 1H), 7.72-7.67 (m, 1H), 7.49-7.45 (m, 1H), 7.26 (d, *J* = 8.4 Hz, 2H), 4.90 (td, *J* = 11.2, 4.0 Hz, 1H), 2.87-2.75 (m, 3H), 1.96-1.70 (m, 8H), 1.58-1.38 (m, 5H), 1.27 (d, *J* = 6.8 Hz, 3H), 0.94-0.89 (m, 6H), 0.77 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.0, 164.5, 157.1, 156.6, 152.4, 149.4, 134.7, 129.7, 128.6, 127.2, 126.9, 126.3, 126.1, 120.4, 74.5, 47.2, 40.9, 39.7, 37.4, 35.8, 35.6, 34.3, 31.4, 27.2, 26.4, 25.5, 23.5, 22.3, 22.0, 20.7, 16.4, 13.9 ppm; **HRMS** (ESI) calcd for $C_{30}H_{39}N_2O_3$ $[M+H]^+$ 475.2955, found 475.2956.



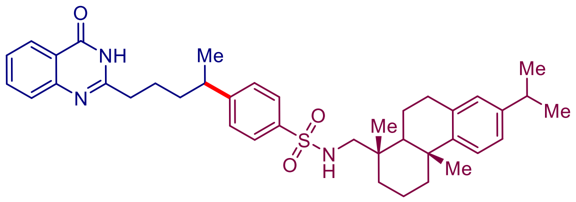
(2,2,7,7-Tetramethyltetrahydro-3aH-bis([1,3]dioxolo)[4,5-b:4',5'-d]pyran-3a-yl)methyl 4-(5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzoate (3w): Colorless paste (60.2 mg, 52% yield, d.r. = 1:1), R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.28 (brs, 1H), 8.24 (d, *J* = 8.0 Hz, 1H), 7.95 (d, *J* = 8.0 Hz, 2H), 7.76 (t, *J* = 8.0 Hz, 1H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 1H), 7.25 (d, *J* = 9.2 Hz, 2H), 4.64-4.61 (m, 2H), 4.44-4.43 (m, 1H), 4.30 (d, *J* = 12.0 Hz, 1H), 4.24 (d, *J* = 8.0 Hz, 1H), 3.94 (d, *J* = 12.8 Hz, 1H), 3.78 (d, *J* = 12.8 Hz, 1H), 2.86-2.76 (m, 3H), 1.91-1.74 (m, 4H), 1.52 (s, 3H), 1.45 (s, 3H), 1.35 (s, 3H), 1.32 (s, 3H), 1.26 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 165.8, 164.4, 156.5, 152.8, 149.4, 134.8, 129.9, 127.6, 127.2, 127.0, 126.3, 126.0, 120.4, 109.1, 108.7, 101.6, 70.7, 70.4, 70.0, 65.1, 61.3, 39.7, 37.4, 35.6, 26.5, 25.8, 25.5, 25.4, 24.0, 21.9; **HRMS** (ESI) calcd for $C_{32}H_{39}N_2O_8$ $[M+H]^+$ 579.2701, found 579.2712.



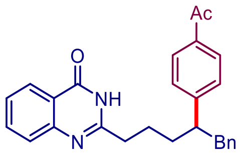
4-((*R*)-5-(4-Oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)-*N*-((*R*)-4-oxo-4-(3-(trifluoromethyl)-5,6-dihydro-[1,2,4]triazolo[4,3-a]pyrazin-7(8H)-yl)-1-(2,4,5-trifluorophenyl)butan-2-yl)benzenesulfonamide (3x): Colorless oli (82.2 mg, 54% yield, d.r. = 1.7/1), R_f = 0.1 (PE/EA = 1:3); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.91 (brs, 0.6H), 11.86 (brs, 0.4H), 8.24-8.17 (m, 1H), 7.76-7.61 (m, 2H), 7.45-7.37 (m, 3H), 7.28-7.26 (m, 1H), 7.15-7.07 (m, 2H), 6.87-6.79 (m, 1H), 6.61-6.44 (m, 1H), 5.40-4.88 (m, 2H), 4.45-4.08 (m, 3H), 3.98-3.78 (m, 2H), 2.94-2.62 (m, 7H), 1.80-1.68 (m, 4H), 1.26-1.21 (m, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.8, 169.5, 163.92, 163.89, 156.5, 152.4, 150.15, 149.3, 137.5, 134.7, 127.4, 127.1, 126.7, 126.3, 126.0, 120.9 (q, $J_{C\text{-}F}$ = 270.0 Hz), 120.41, 116.8, 105.3-104.8 (m), 60.3, 52.3, 43.0, 42.9, 39.5, 39.4, 38.8, 38.7, 38.1, 37.3, 37.3, 35.5, 33.8, 25.4, 25.3, 21.5, 21.4 ppm; **HRMS** (ESI) calcd for $C_{35}H_{34}F_6N_7O_4S$ $[M+H]^+$ 762.2292, found 762.2340.



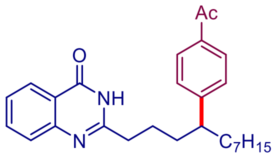
_N_-((*R*)-1-(3-(2-Cyanobenzyl)-1-methyl-2,6-dioxo-1,2,3,6-tetrahydropyrimidin-4-yl)piperidin-3-yl)-4-((*R*)-5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzenesulfonamide (3y): Colorless oil (94.4 mg, 68% yield, d.r. = 1:1), R_f = 0.1 (PE/EA = 1/3); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.51 (brs, 1H), 8.18 (d, *J* = 8.0 Hz, 1H), 7.75-7.69 (m, 3H), 7.63 (d, *J* = 8.4 Hz, 1H), 7.56-7.54 (m, 1H), 7.51-7.41 (m, 2H), 7.29-7.26 (m, 4H), 6.24 (s, 1H), 5.28 (s, 1H), 5.19 (s, 2H), 3.41-3.31 (m, 1H), 3.23 (s, 3H), 3.06-2.60 (m, 6H), 1.92-1.60 (m, 6H), 1.55-1.36 (m, 2H), 1.24-1.23 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.7, 163.1, 159.4, 156.3, 152.6, 152.2, 149.2, 140.3, 138.1, 134.7, 133.0, 133.0, 127.9, 127.8, 127.4, 127.1, 126.9, 126.4, 126.0, 120.3, 117.2, 110.7, 90.3, 56.2, 52.1, 48.8, 46.2, 39.6, 37.2, 35.5, 29.6, 27.9, 25.38, 25.35, 21.9 ppm; **HRMS** (ESI) calcd for $C_{37}H_{40}N_7O_5S$ $[M+H]^+$ 694.2806, found 694.2800.



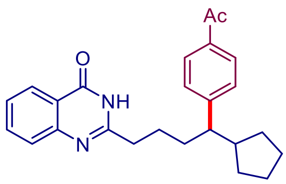
_N_-(((*1S,4aR*)-7-Isopropyl-1,4a-dimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthren-1-yl)methyl)-4-((*R*)-5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentan-2-yl)benzenesulfonamide (3): Colorless oil (39.7 mg, 31% yield, , d.r. = 1:1), R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.86 (brs, 1H), 8.22 (d, *J* = 8.0 Hz, 1H), 7.75-7.66 (m, 4H), 7.47-7.43 (m, 1H), 7.30-7.26 (m, 3H), 7.11 (d, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 8.0 Hz, 1H), 6.83 (s, 1H), 5.30 (s, 1H), 2.85-2.64 (m, 7H), 1.93-1.52 (m, 11H), 1.30-1.16 (m, 12H), 1.01-0.91 (m, 2H), 0.87 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 164.1, 156.4, 152.3, 149.3, 146.9, 145.5, 137.8, 134.8, 134.6, 128.1, 127.7, 127.1, 126.8, 126.4, 126.1, 124.1, 123.7, 120.5, 53.7, 44.5, 39.7, 38.1, 37.3, 37.0, 35.6, 33.38, 29.8, 29.6, 25.4, 25.2, 24.0, 23.9, 21.9, 18.6, 18.6, 18.5 ppm; **HRMS** (ESI) calcd for $C_{39}H_{50}N_3O_3S$ $[M+H]^+$ 640.3576, found 640.3581.



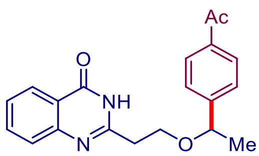
2-(4-(4-Acetylphenyl)-5-phenylpentyl)quinazolin-4(3H)-one (5a): White solid (63.2 mg, 69% yield), m.p.:186.8-187.9 ºC; R_f = 0.2 (PE/EA = 4/1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.28 (brs, 1H), 8.20 (d, *J* = 8.0 Hz, 1H), 7.80-7.76 (m, 3H), 7.69 (d, *J* = 8.0 Hz, 1H), 7.49-7.45 (m, 1H), 7.18 (d, *J* = 8.4 Hz, 2H), 7.16-7.09 (m, 3H), 6.97 (d, *J* = 8.0 Hz, 2H), 3.03-2.74 (m, 5H), 2.48 (s, 3H), 1.91-1.73 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 164.3, 156.5, 150.3, 149.1, 139.6, 135.2, 134.8, 128.9, 128.4, 128.0, 127.9, 127.0, 126.4, 126.0, 125.9, 120.2, 47.7, 43.3, 35.4, 34.6, 26.4, 25.2 ppm; **HRMS** (ESI) calcd for $C_{27}H_{27}N_2O_2$ $[M+H]^+$ 411.2067, found 411.2070.



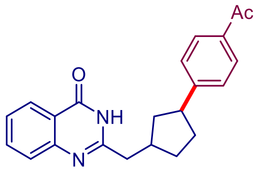
2-(4-(*p*-Tolyl)undecyl)quinazolin-4(3H)-one (5b): White solid (64.5 mg, 77% yield), m.p.:176.8-188.0 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.29 (brs, 1H), 8.24 (d, *J* = 8.0 Hz, 1H), 7.80 (d, *J* = 8.4 Hz, 2H), 7.76 (t, *J* = 8.4 Hz, 1H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 1H), 7.21 (d, *J* = 8.0 Hz, 2H), 2.81-2.73 (m, 2H), 2.69-2.61 (m, 1H), 2.50 (s, 3H), 1.85-1.61 (m, 5H), 1.58-1.50 (m, 1H), 1.24-1.04 (m, 10H), 0.81 (t, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 164.4, 156.6, 151.5, 149.4, 135.1, 134.8, 128.5, 127.8, 127.2, 126.3, 126.0, 120.3, 45.9, 36.6, 35.9, 35.7, 31.7, 29.5, 29.1, 27.4, 26.4, 25.4, 22.5, 14.0 ppm; **HRMS** (ESI) calcd for $C_{22}H_{35}N_2O_2$ $[M+H]^+$ 419.2693, found 419.2700.



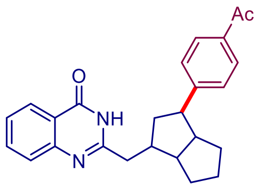
2-(4-(4-Acetylphenyl)-4-cyclopentylbutyl)quinazolin-4(3H)-one (5c): White solid (42.7 mg, 55% yield), m.p.:181.8-182.5 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.44 (brs, 1H), 8.23 (d, *J* = 8.0 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.77 (t, *J* = 8.0 Hz, 1H), 7.66 (d, *J* = 8.0 Hz, 1H), 7.47 (t, *J* = 8.0 Hz, 1H), 7.22 (d, *J* = 8.0 Hz, 2H), 2.78-2.63 (m, 2H), 2.51 (s, 3H), 2.42 (td, *J* = 10.4 Hz, 3.2 Hz, 1H), 2.01-1.87 (m, 3H), 1.79-1.71 (m, 1H), 1.66-1.57 (m, 3H), 1.56-1.46 (m, 2H), 1.42-1.35 (m, 1H), 1.30-1.19 (m, 2H), 0.96-0.88 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 163.9, 156.3, 151.2, 149.3, 135.2, 134.8, 128.4, 128.2, 127.2, 126.4, 126.1, 120.4, 52.1, 46.4, 35.8, 34.4, 31.6, 31.5, 26.5, 25.4, 25.1, 24.8 ppm; **HRMS** (ESI) calcd for $C_{25}H_{29}N_2O_2$ $[M+H]^+$ 389.2224, found 389.2226.



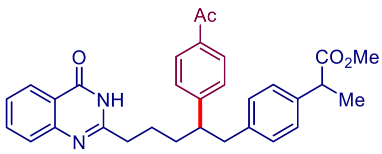
2-(2-(1-(4-Acetylphenyl)ethoxy)ethyl)quinazolin-4(3H)-one (5d): White solid (59.8 mg, 89% yield), m.p.:185.5-187.5 ºC; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.24 (brs, 1H), 8.26 (d, *J* = 8.0 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 2H), 7.75 (t, *J* = 8.0 Hz, 1H), 7.64 (d, *J* = 8.0 Hz, 1H), 7.46 (d, J = 8.0 Hz, 1H), 7.35 (d, J = 8.0 Hz, 2H), 4.53 (q, J = 6.4 Hz, 1H), 3.84-3.75 (m, 2H), 3.01 (t, J = 6.4 Hz, 2H), 2.52 (s, 3H), 1.44 (d, J = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.6, 162.9, 154.6, 149.0, 148.3, 136.5, 134.7, 128.6, 127.1, 126.5, 126.3, 126.2, 120.9, 78.4, 65.8, 36.1, 26.5, 23.7 ppm; **HRMS** (ESI) calcd for $C_{20}H_{21}N_2O_3$ $[M+H]^+$ 337.1547, found 337.1545.



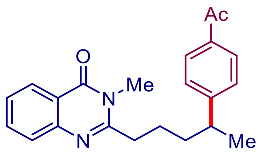
2-((3-(4-Acetylphenyl)cyclopentyl)methyl)quinazolin-4(3H)-one (5e): White solid (40.9 mg, 59% yield; d.r. = 1:1), m.p.:162.5-163.9 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.48 (brs, 1H), 8.29 (d, J = 8.0 Hz, 1H), 7.81 (d, J = 8.0 Hz, 2H), 7.78 (t, J = 8.0 Hz, 1H), 7.72 (d, J = 8.0 Hz, 1H), 7.47 (t, J = 8.0 Hz, 1H), 7.30-7.27(m, 2H), 3.36-3.28 (m, 0.5H), 3.18-3.09 (m, 0.5H), 2.99-2.69 (m, 3H), 2.54 (s, 1.5H), 2.53 (s, 1.5H), 2.34-1.91 (m, 4H), 1.81-1.51 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 164.5, 156.2, 152.2, 151.5, 149.5, 135.0, 134.9, 134.8, 128.4, 127.2, 127.14, 127.12, 126.4, 126.1, 120.4, 45.6, 44.2, 41.9, 41.7, 41.3, 39.6, 38.7, 37.9, 34.7, 33.1, 32.9, 31.6, 26.5 ppm; **HRMS** (ESI) calcd for $C_{22}H_{23}N_2O_2$ $[M+H]^+$ 347.1754, found 347.1750.



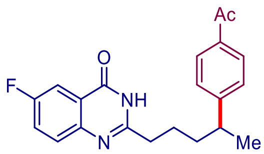
2-((3-(4-Acetylphenyl)octahydropentalen-1-yl)methyl)quinazolin-4(3H)-one (5f): White solid (54.1 mg, 70% yield; d.r. = 1:1), m.p.:177.5-178.9 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.58 (brs, 1H), 8.30 (d, J = 8.0 Hz, 1H), 7.80-7.77 (m, 3H), 7.72 (d, J = 7.6 Hz, 1H), 7.49 (d, J = 8.0 Hz, 1H), 7.26 (d, J = 8.0 Hz, 2H), 3.10 (m, 1H), 2.83 (m, 1H), 2.62-2.50 (m, 5H), 2.47-2.41 (m, 1H), 2.26-2.16 (m, 1H), 2.09-2.04 (m, 1H), 1.73-1.56 (m, 5H), 1.51-1.46 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 164.6, 156.3, 150.8, 149.5, 135.1, 134.8, 128.4, 127.4, 127.2, 126.4, 126.1, 120.3, 52.5, 52.2, 50.2, 46.0, 42.0, 41.2, 32.0, 26.5, 25.0 ppm; **HRMS** (ESI) calcd for $C_{25}H_{27}N_2O_2$ $[M+H]^+$ 387.2067, found 387.2070.



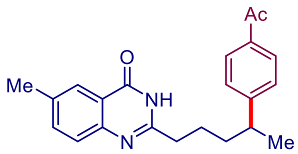
Methyl 2-(4-(2-(4-acetylphenyl)-5-(4-oxo-3,4-dihydroquinazolin-2-yl)pentyl)phenyl)propanoate (5g): White solid (70.5 mg, 71% yield), m.p.:187.0-188.5 ºC; R_f = 0.2 (PE/EA = 3/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.91 (brs, 1H), 8.20 (d, J = 8.0 Hz, 1H), 7.78-7.76 (m, 3H), 7.69 (d, J = 8.4 Hz, 1H), 7.49-7.45 (m, 1H), 7.19 (d, J = 8.4 Hz, 2H), 7.08 (d, J = 8.0 Hz, 2H), 6.94 (d, J = 7.6 Hz, 2H), 3.69-3.59 (m, 4H), 3.00-2.92 (m, 1H), 2.90-2.81 (m, 2H), 2.78-2.70 (m, 2H), 2.49 (s, 3H), 1.89-1.71 (m, 4H), 1.42 (d, J = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 175.0, 164.2, 156.6, 150.3, 138.6, 138.1, 135.3, 134.9, 129.2, 128.5, 127.9, 126.5, 126.1, 120.3, 51.9, 47.6, 44.9, 42.8, 35.4, 34.6, 26.4, 25.2, 18.5 ppm; **HRMS** (ESI) calcd for $C_{31}H_{33}N_2O_4$ $[M+H]^+$ 497.2435, found 497.2436.



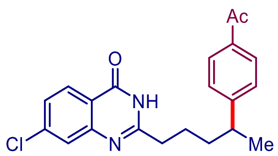
2-(4-(4-Acetylphenyl)pentyl)-3-methylquinazolin-4(3H)-one (5h): Colorless oil (62.6 mg, 91% yield), R_f = 0.2 (PE/EA = 5/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.19 (d, *J* = 8.0 Hz, 1H), 7.87 (d, *J* = 8.0 Hz, 2H), 7.69-7.64 (m, 1H), 7.56 (d, *J* = 8.0 Hz, 1H), 7.40-7.36 (m, 1H), 7.27 (d, *J* = 8.4 Hz, 2H), 3.50 (s, 3H), 2.87-2.79 (m, 1H), 2.77-2.71 (m, 2H), 2.55 (s, 3H), 1.79-1.64 (m, 4H), 1.27 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 162.3, 156.5, 152.7, 147.0, 135.1, 133.9, 128.5, 127.1, 126.7, 126.5, 126.2, 120.0, 39.8, 37.3, 35.3, 30.2, 26.4, 24.6, 22.0 ppm; **HRMS** (ESI) calcd for $C_{22}H_{25}N_2O_2$ $[M+H]^+$ 349.1911, found 349.1913.



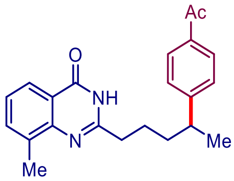
2-(4-(4-Acetylphenyl)pentyl)-6-fluoroquinazolin-4(3H)-one (5i): White solid (46.5 mg, 66% yield), m.p.:177.3-178.5 °C; R_f = 0.2 (PE/EA = 4/1);.**^{1}H NMR** (400 MHz, $CDCl_3$) δ =12.25 (brs, 1H), 7.86-7.82 (m, 3H), 7.68 (dd, *J* = 9.2 Hz, 4.8 Hz, 1H), 7.49 (td, *J* = 8.0 Hz, 3.2 Hz, 1H), 7.26 (d, *J* = 8.0 Hz, 2H), 2.88-2.80 (m, 1H), 2.76 (t, *J* = 6.8 Hz, 2H), 2.52 (s, 3H), 1.89-1.73 (m, 4H), 1.28 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.8, 163.8 (d, $J_{C\text{-}F}$ = 3.4 Hz), 160.5 (d, $J_{C\text{-}F}$ = 246.7 Hz), 155.8, 152.8, 146.1, 135.2, 129.6 (d, $J_{C\text{-}F}$ = 7.9 Hz), 128.6, 127.1, 123.4 (d, $J_{C\text{-}F}$ = 23.9 Hz), 121.4 (d, $J_{C\text{-}F}$ = 8.5 Hz), 110.8 (d, $J_{C\text{-}F}$ = 23.5 Hz), 39.8, 37.3, 35.5, 26.4, 25.3, 22.0 ppm; **HRMS** (ESI) calcd for $C_{21}H_{22}FN_2O_2$ $[M+H]^+$ 353.1660, found 353.1662.



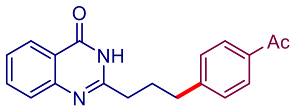
2-(4-(4-Acetylphenyl)pentyl)-6-methylquinazolin-4(3H)-one (5j): White solid (13.9 mg, 20% yield); m.p. = 186.4-187.9 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.18 (brs, 1H), 8.11 (d, *J* = 8.0 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.47 (s, 1H), 7.28-7.24 (m, 3H), 2.85-2.75 (m, 3H), 2.51 (s, 3H), 2.49 (s, 3H), 1.86-1.75 (m, 4H), 1.26 (d, *J* = 6.4 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 164.3, 156.6, 152.9, 149.5, 145.8, 135.2, 128.6, 127.9, 127.1, 127.0, 125.9, 117.9, 39.8, 37.3, 35.6, 26.5, 25.4, 22.01, 21.96; **HRMS** (ESI) calcd for $C_{22}H_{25}N_2O_2$ $[M+H]^+$ 349.1911, found 349.1920.



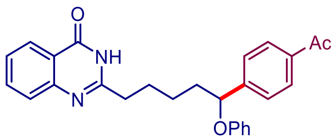
2-(4-(4-Acetylphenyl)pentyl)-7-chloroquinazolin-4(3H)-one (5k): White solid (55.3 mg, 75% yield), m.p. = 172.7-174.2 °C; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.76 (brs, 1H), 8.15 (d, *J* = 8.4 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 2H), 7.68 (d, *J* = 2.0 Hz, 1H), 7.41 (dd, *J* = 8.8 Hz, 2.0 Hz, 1H), 7.27 (d, *J* = 8.4 Hz, 2H), 2.86-2.81 (m, 1H), 2.74 (t, *J* = 6.8 Hz, 2H), 2.54 (s, 3H), 1.87-1.75 (m, 4H), 1.28 (d, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 163.5, 157.6, 152.8, 150.3, 141.1, 135.3, 128.6, 127.6, 127.2, 127.1, 126.9, 118.8, 39.8, 37.3, 35.6, 26.5, 25.2, 22.0 ppm; **HRMS** (ESI) calcd for $C_{21}H_{22}ClN_2O_2$ $[M+H]^+$ 369.1364, found 369.1369.



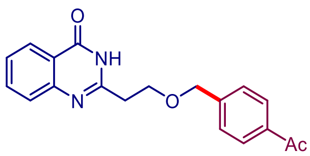
2-(4-(4-Acetylphenyl)pentyl)-8-methylquinazolin-4(3H)-one (5l): White solid (45.3 mg, 65% yield), m.p. = 185.7-186.9 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.28 (brs, 1H), 8.11 (d, *J* = 8.0 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.48 (s, 1H), 7.29-7.24 (m, 3H), 2.85-2.77 (m, 3H), 2.52 (s, 3H), 2.49 (s, 3H), 1.90-1.74 (m, 4H), 1.26 (d, *J* = 6.8 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 164.3, 156.7, 152.9, 149.3, 145.9, 135.1, 128.5, 127.9, 127.1, 126.8, 125.8, 117.8, 39.7, 37.3, 35.5, 26.4, 25.4, 21.95, 21.91 ppm; **HRMS** (ESI) calcd for $C_{22}H_{25}N_2O_2$ $[M+H]^+$ 349.1911, found 349.1912.



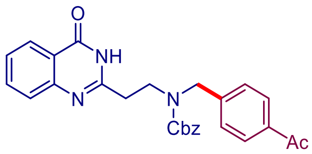
2-(3-(4-Acetylphenyl)propyl)quinazolin-4(3H)-one (5m): White solid (53.9 mg, 88% yield), m.p. = 176.1-177.9 ºC; R_f = 0.2 (PE/EA = 4/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.28 (brs, 1H), 8.23 (d, *J* = 8.0 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 2H), 7.79 (t, *J* = 8.4 Hz, 1H), 7.70 (d, *J* = 8.4 Hz, 1H), 7.48 (d, *J* = 8.0 Hz, 1H), 7.33 (d, *J* = 8.0 Hz, 2H) , 2.88-2.83 (m, 4H), 2.54 (s, 3H), 2.32-2.24 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 164.5, 156.2, 149.4, 147.1, 135.1, 134.9, 128.7, 128.5, 127.2, 126.5, 126.1, 120.4, 35.3, 35.2, 28.4, 26.5 ppm; **HRMS** (ESI) calcd for $C_{19}H_{19}N_2O_2$ $[M+H]^+$ 307.1441, found 307.1440.



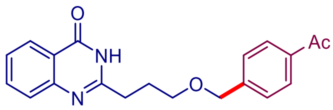
2-(5-(4-Acetylphenyl)-5-phenoxypentyl)quinazolin-4(3H)-one (5n): Colorless oil (68.2 mg, 80% yield), R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, DMSO-d_6) δ 12.16 (brs, 1H), 8.07 (d, *J* = 8.4 Hz, 1H), 7.88 (d, *J* = 8.4 Hz, 2H), 7.78-7.73 (m, 1H), 7.56 (m, 1H), 7.51 (d, *J* = 8.4 Hz, 2H), 7.46-7.42 (m, 1H), 7.19-7.15 (m, 2H), 6.87-6.81 (m, 3H), 5.41 (dd, *J* =7.2 Hz, 5.2 Hz, 1H), 2.59 (t, *J* = 7.2 Hz, 2H), 2.52 (s, 3H), 2.01-1.92 (m, 1H), 1.86-1.74 (m, 3H), 1.55-1.34 (m, 2H); **^{13}C NMR** (100 MHz, DMSO-d_6) δ 197.9, 162.3, 158.0, 157.8, 149.4, 147.7, 136.5, 134.8, 129.9, 128.9, 127.3, 126.9, 126.4, 126.2, 121.3, 121.2, 116.2, 78.4, 37.7, 34.8, 27.2, 27.0, 25.1 ppm; **HRMS** (ESI) calcd for $C_{27}H_{27}N_2O_3$ $[M+H]^+$ 427.2016, found 427.2015.



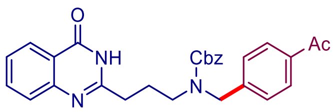
2-(4-(3-Oxo-1,3-dihydroisobenzofuran-5-yl)pentyl)quinazolin-4(3H)-one (6a): White solid (55.4 mg, 86% yield), m.p. = 190.5-192.1 ºC; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.57 (brs, 1H), 8.25 (d, *J* = 7.6 Hz, 1H), 7.80 (d, *J* = 8.0 Hz, 2H), 7.77-7.73 (m, 1H), 7.66 (d, *J* = 8.0 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 1H), 7.35 (d, *J* = 8.0 Hz, 2H), 4.62 (s, 2H), 3.98 (t, *J* = 6.0 Hz, 2H), 3.09 (t, *J* = 6.0 Hz, 2H), 2.52 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.7, 163.2, 154.6, 149.0, 142.9, 136.4, 134.7, 128.5, 127.4, 127.1, 126.5, 126.3, 120.8, 72.5, 67.4, 36.0, 26.6 ppm; **HRMS** (ESI) calcd for $C_{19}H_{19}N_2O_3$ $[M+H]^+$ 323.1390, found 323.1388.



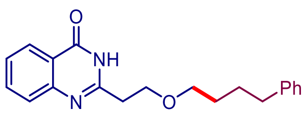
Benzyl (4-acetylbenzyl)(2-(4-oxo-3,4-dihydroquinazolin-2-yl)ethyl)carbamate (6b): Colorless oil (67.4 mg, 74% yield), R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.14 (brs, 1H), 8.22-8.14 (m, 1H), 7.80 (d, J = 8.0 Hz, 2H), 7.77-7.74 (m, 1H), 7.64 (d, J = 8.0 Hz, 1H), 7.46-7.42 (m, 1H), 7.33-7.22 (m, 7H), 5.15 (s, 2H), 4.65 (s, 2H), 3.87 (t, J = 6.8 Hz, 2H), 3.12-3.01 (m, 2H), 2.53 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.5, 153.9, 143.2, 136.2, 134.8, 130.9, 128.6, 128.5, 128.1, 127.8, 127.7, 127.2, 126.9, 126.6, 126.2, 120.4, 67.6, 51.2, 44.6, 37.8, 26.6 ppm; **HRMS** (ESI) calcd for $C_{27}H_{26}N_3O_4$ $[M+H]^+$ 456.1918, found 456.1919.



2-(3-((4-Acetylbenzyl)oxy)propyl)quinazolin-4(3H)-one (6c): White solid (48.4 mg, 72% yield), m.p. = 188.6-189.9 °C; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.71 (brs, 1H), 8.23 (d, J = 8.0 Hz, 1H), 7.87 (d, J = 8.0 Hz, 2H), 7.76 (t, J = 8.4 Hz, 1H), 7.68 (d, J = 8.0 Hz, 1H), 7.45 (t, J = 8.0 Hz, 1H), 7.39 (d, J = 8.4 Hz, 2H), 4.59 (s, 2H), 3.67 (t, J = 6.0 Hz, 2H), 2.93 (t, J = 7.2 Hz, 2H), 2.56 (s, 3H), 2.26-2.19 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.8, 163.9, 156.3, 149.3, 143.6, 136.3, 134.7, 128.4, 127.3, 127.1, 126.4, 126.2, 120.5, 72.2, 69.6, 32.8, 27.1, 26.6 ppm; **HRMS** (ESI) calcd for $C_{20}H_{21}N_2O_3$ $[M+H]^+$ 337.1547, found 337.1545.

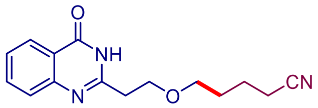


Benzyl (4-acetylbenzyl)(3-(4-oxo-3,4-dihydroquinazolin-2-yl)propyl)carbamate (6d): Colorless oil (61.0 mg, 65% yield); R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 12.19 (brs, 0.4H), 12.09 (brs, 0.5H), 8.26 (d, J = 7.6 Hz, 1H), 7.84 (d, J = 8.0 Hz, 2H), 7.79-7.71 (m, 1H), 7.65 (d, J = 8.0 Hz, 1H), 7.43 (t, J = 7.2 Hz, 1H), 7.33-7.23 (m, 7H), 5.19 (s, 0.9H), 5.14 (s, 1.1H), 4.65 (s, 0.9H), 4.59 (s, 1.1H), 3.51-3.40 (m, 2H), 2.81-2.70 (m, 2H), 2.55 (s, 3H), 2.18-2.11 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.6, 164.3, 163.8, 156.6, 156.5, 156.0, 155.6, 149.2, 143.1, 143.0, 136.4, 136.2, 136.1, 134.8, 134.7, 128.6, 128.4, 128.0, 127.8, 127.7, 127.1, 127.0, 126.5, 126.4, 126.2, 120.5, 120.4, 67.5, 67.4, 50.2, 49.9, 46.3, 45.7, 32.5, 32.4, 26.5, 25.3 ppm; a mixture of amide rotamers; **HRMS** (ESI) calcd for $C_{28}H_{28}N_3O_4$ $[M+H]^+$ 470.2074, found 470.2080.

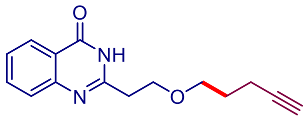


2-(2-(4-Phenylbutoxy)ethyl)quinazolin-4(3H)-one (6e): White solid (43.1 mg, 67% yield), m.p. = 183.1-185.0 °C; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 10.36 (brs, 1H), 8.27 (d, J = 8.0 Hz, 1H), 7.76-7.72 (m, 1H), 7.65 (d, J = 7.6 Hz, 1H), 7.47-7.43 (m, 1H), 7.28-7.24 (m, 2H), 7.18-7.16 (m, 3H), 3.82 (t, J = 6.0 Hz, 2H), 3.54 (t, J = 6.4 Hz, 2H), 2.99 (t, J = 5.6 Hz, 2H), 2.64 (t, J = 6.8 Hz, 2H), 1.74-1.66 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 162.1, 155.1, 148.8, 142.1, 134.6, 128.4, 128.3, 127.0, 126.5, 126.4, 125.7, 121.2, 71.5, 67.6, 35.9, 35.5, 29.0, 27.8 ppm;

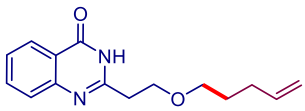
HRMS (ESI) calcd for $C_{20}H_{23}N_2O_2$ $[M+H]^+$ 323.1754, found 323.1760.



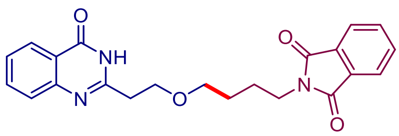
5-(2-(4-Oxo-3,4-dihydroquinazolin-2-yl)ethoxy)pentanenitrile (6f): White solid (27.1 mg, 50% yield), m.p. = 190.5-191.7 °C; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 11.21 (brs, 1H), 8.25 (d, J = 8.0 Hz, 1H), 7.77-7.73 (m, 1H), 7.66 (d, J = 7.6 Hz, 1H), 7.48-7.44 (m, 1H), 3.90 (t, J = 6.0 Hz, 2H), 3.56 (t, J = 6.0 Hz, 2H), 3.03 (t, J = 6.0 Hz, 2H), 2.33 (t, J = 6.8 Hz, 2H), 1.77-1.69 (m, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.0, 154.7, 148.9, 134.7, 127.0, 126.5, 126.2, 120.8, 119.5, 70.0, 67.7, 35.8, 28.3, 22.3, 16.8 ppm; **HRMS** (ESI) calcd for $C_{15}H_{18}N_3O_2$ $[M+H]^+$ 272.1394, found 272.1400.



2-(2-(Pent-4-yn-1-yloxy)ethyl)quinazolin-4(3H)-one (6g): White solid (26.6 mg, 52% yield), m.p. = 177.7-179.3 °C; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 10.90 (brs, 1H), 8.26 (d, J = 8.0 Hz, 1H), 7.76-7.72 (m, 1H), 7.65 (d, J = 8.0 Hz, 1H), 7.47-7.43 (m, 1H), 3.89 (t, J = 6.0 Hz, 2H), 3.63 (t, J = 6.4 Hz, 2H), 3.03 (t, J = 6.0 Hz, 2H), 2.28 (td, J = 6.8 Hz, 2.4 Hz, 2H), 1.92 (t, J = 2.4 Hz, 1H), 1.85-1.78 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 162.8, 154.8, 148.9, 134.6, 127.0, 126.5, 126.3, 120.9, 83.5, 69.7, 68.8, 67.8, 35.9, 28.2, 15.1 ppm; **HRMS** (ESI) calcd for $C_{15}H_{17}N_2O_2$ $[M+H]^+$ 257.1285, found 257.1288.



2-(2-(Pent-4-en-1-yloxy)ethyl)quinazolin-4(3H)-one (6h): White solid (23.2 mg, 45% yield); m.p. = 173.9-175.1 °C; R_f = 0.2 (PE/EA = 2/1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 10.53 (brs, 1H), 8.27 (d, J = 8.4 Hz, 1H), 7.76-7.72 (m, 1H), 7.65 (d, J = 8.4 Hz, 1H), 7.47-7.43 (m, 1H), 5.84-5.74 (m, 1H), 5.05-4.94 (m, 2H), 3.85 (t, J = 5.6 Hz, 2H), 3.54 (t, J = 6.8 Hz, 2H), 3.01 (t, J = 6.0 Hz, 2H), 2.14 (q, J = 7.2 Hz, 2H), 1.77-1.70 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 162.2, 155.1, 148.9, 137.8, 134.6, 127.0, 126.5, 126.4, 121.1, 115.1, 70.9, 67.6, 35.9, 30.2, 28.6 ppm; **HRMS** (ESI) calcd for $C_{15}H_{19}N_2O_2$ $[M+H]^+$ 259.1441, found 259.1443.



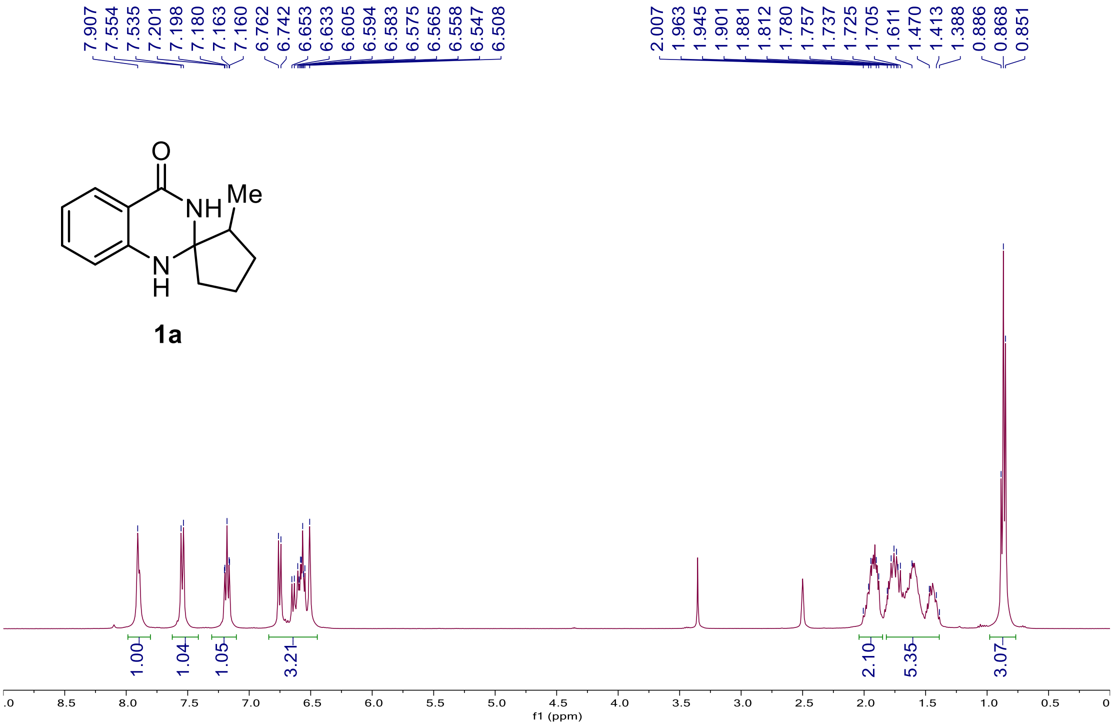
2-(4-(2-(4-Oxo-3,4-dihydroquinazolin-2-yl)ethoxy)butyl)isoindoline-1,3-dione (6i): White solid (43.1 mg, 55% yield), m.p. = 193.0-194.5 °C; R_f = 0.2 (PE/EA = 1:1); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 10.56 (brs, 1H), 8.22 (d, J = 8.0 Hz, 1H), 7.84-7.80 (m, 2H), 7.73-7.68 (m, 3H), 7.64 (d, J = 8.0 Hz, 1H), 7.44-7.40 (m, 1H), 3.86 (t, J = 6.0 Hz, 2H), 3.71 (t, J = 6.8 Hz, 2H), 3.57 (t, J = 6.4 Hz, 2H), 3.01 (t, J = 6.0 Hz, 2H), 1.81-1.73 (m, 2H), 1.70-1.63 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.4, 162.2, 155.0, 148.7, 134.5, 133.9, 132.0, 126.9, 126.5, 126.4, 123.2, 121.1, 70.8, 67.8, 37.5, 35.9, 26.5, 25.3 ppm; **HRMS** (ESI) calcd for $C_{22}H_{22}N_3O_4$ $[M+H]^+$ 392.1605, found 392.1607.

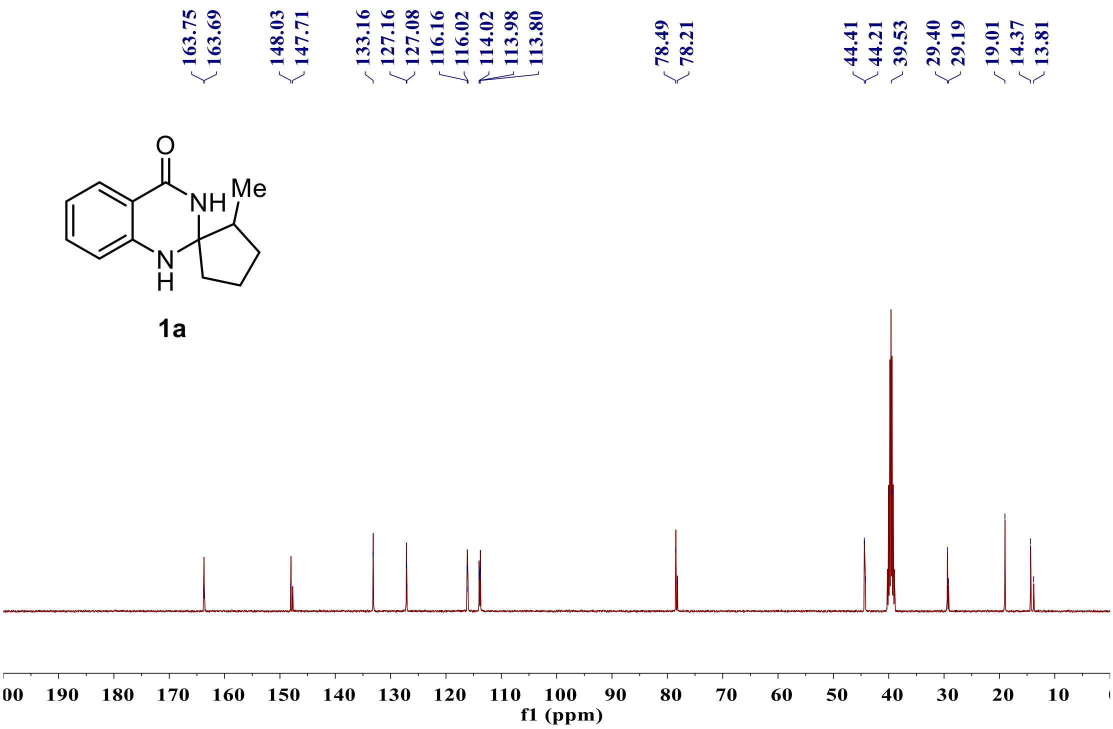
10. References

1. (a) Y.-L. Luo, Y. Wu, Y.-Y. Wang, H.-M. Sun, Z.-Y. Xie, W.-Q. Zhang and Z.-W. Gao, *RSC Adv*. 2016, **6**, 66074; (b) X.-Y. Lv, R. Abrams and R. Martin, *Nat. Commun.* 2022, **13**, 2394.
2. M. R. Mutra and J.-J. Wang, *Nat. Commun.* 2022, **13**, 2345.
3. (a) U. Jakob, S. Mundinger and W. Bannwarth, *Eur. J. Org. Chem*. 2014, 6963; (b) N. Radhoff and A. Studer, *Nat. Commun.* 2022, **13**, 3083.
4. J. Luo, X. Zhang, J.-Z. Lu and J. Zhang, *ACS Catal*. 2017, **7**, 5062.
5. (a) J. M. L. Elwood, M. C. Henry, J. D. Lopez-Fernandez, J. M. Mowat, M. Boyle, B. Buist, K. Livingstone and C. Jamieson, *Org. Lett.* 2022, **24**, 9491; (b) X.-Y. Yao, Z.-Y. Li, H.-B. Mei, J. Escorihuela, V. A. Soloshonok and J.-L. Han, *J. Org. Chem.* 2023, **88**, 13057; (c) Z.-L. Shen, X.-F. He, Y.-M. Hong, X.-Q. Hu, W.-M. Mo, B.-X. Hu and N. Sun, *Synth. Commun.* 2011, **41**, 3644; (d) F. A. Cabrera-Rivera, C. Ortíz-Nava, P. Román-Bravo and M. A. Leyva, J. Escalante, 2012, **85**, 2173.
6. L. Marie Kammer, S. O. Badir, R.-M. Hu and G. A. Molander, *Chem. Sci.* 2021, **12**, 5450.

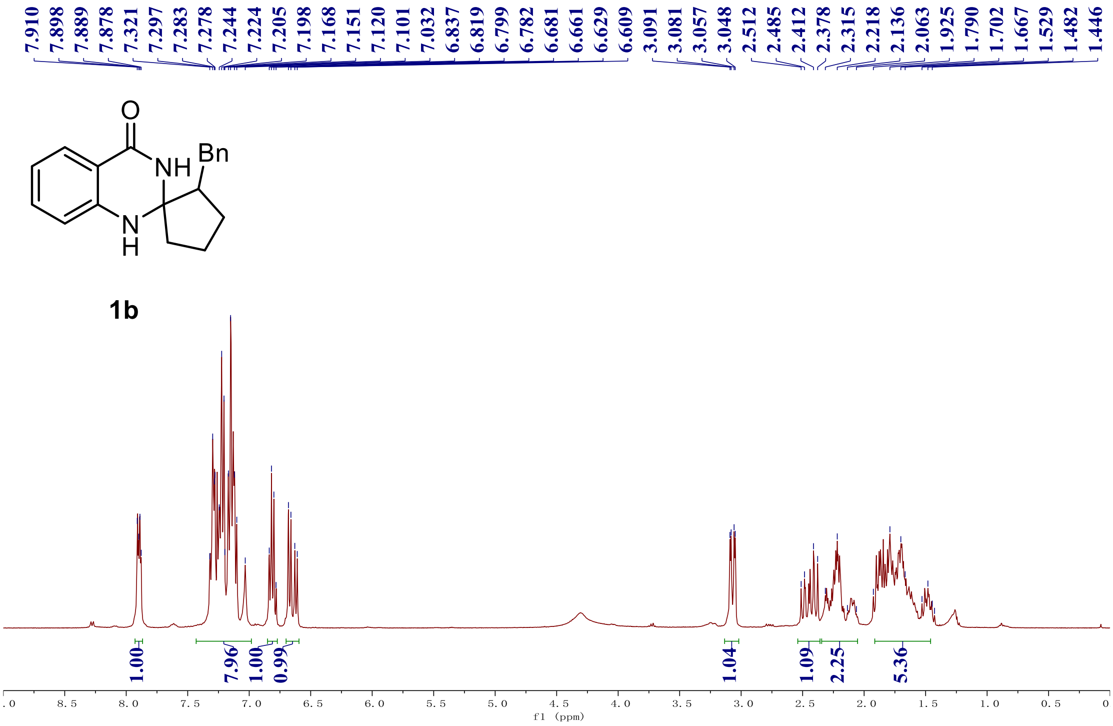
11. ^{1}H NMR and ^{13}C NMR Spectra of Materials and Products

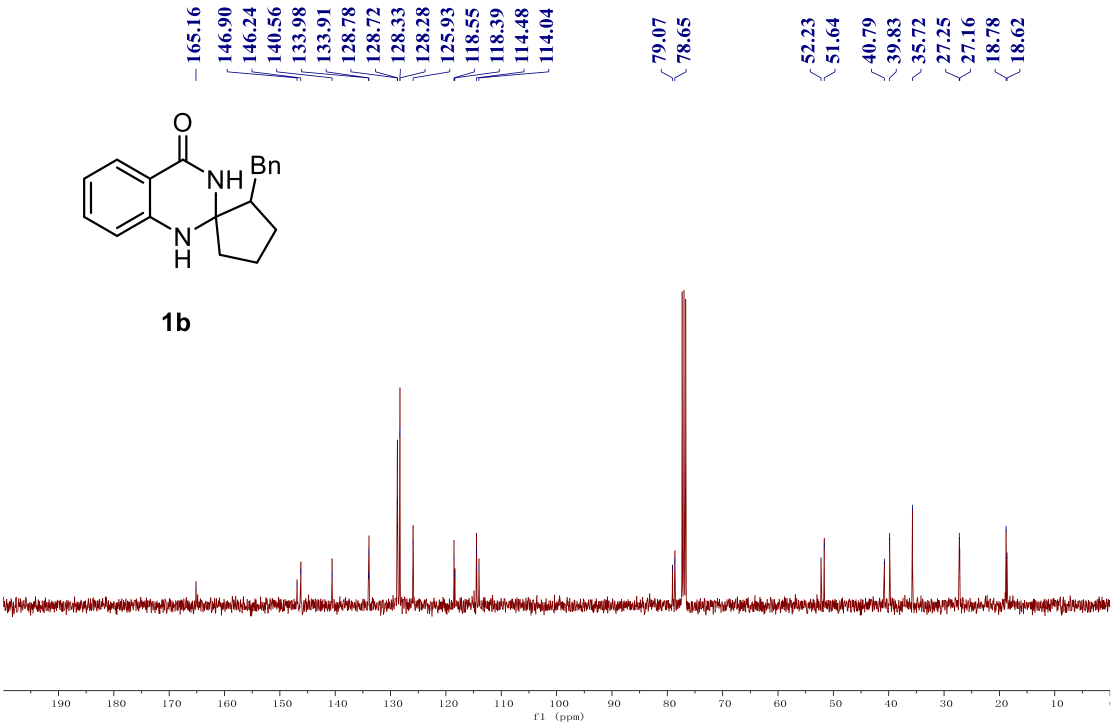
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6 spectra of product **1a**



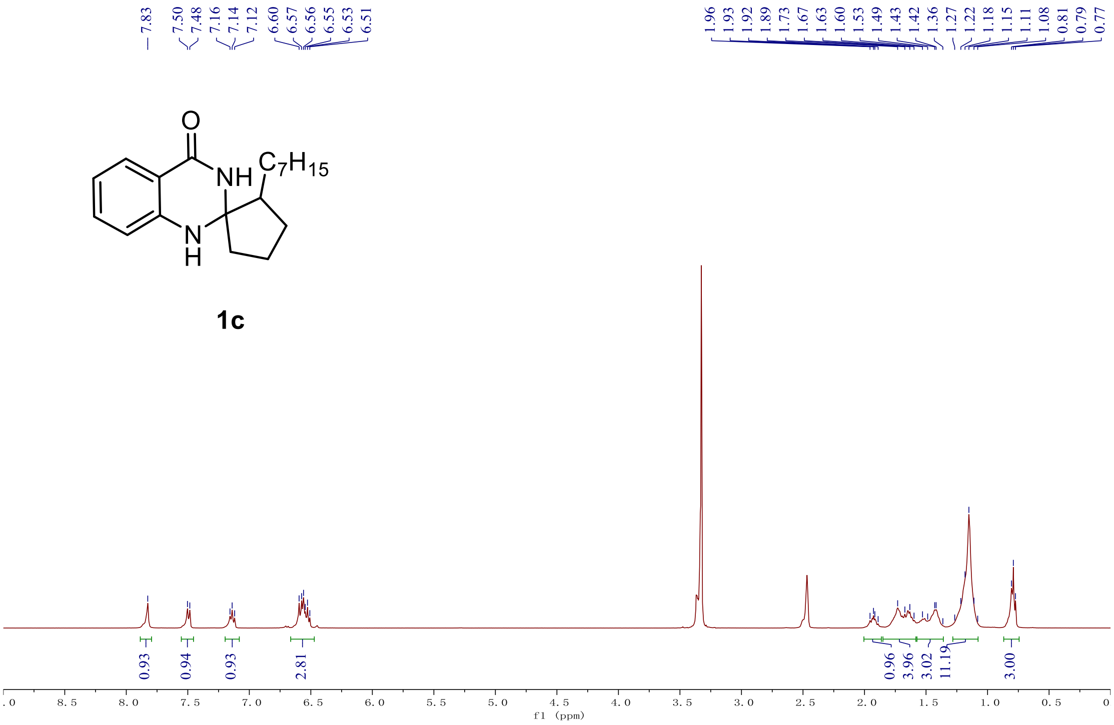


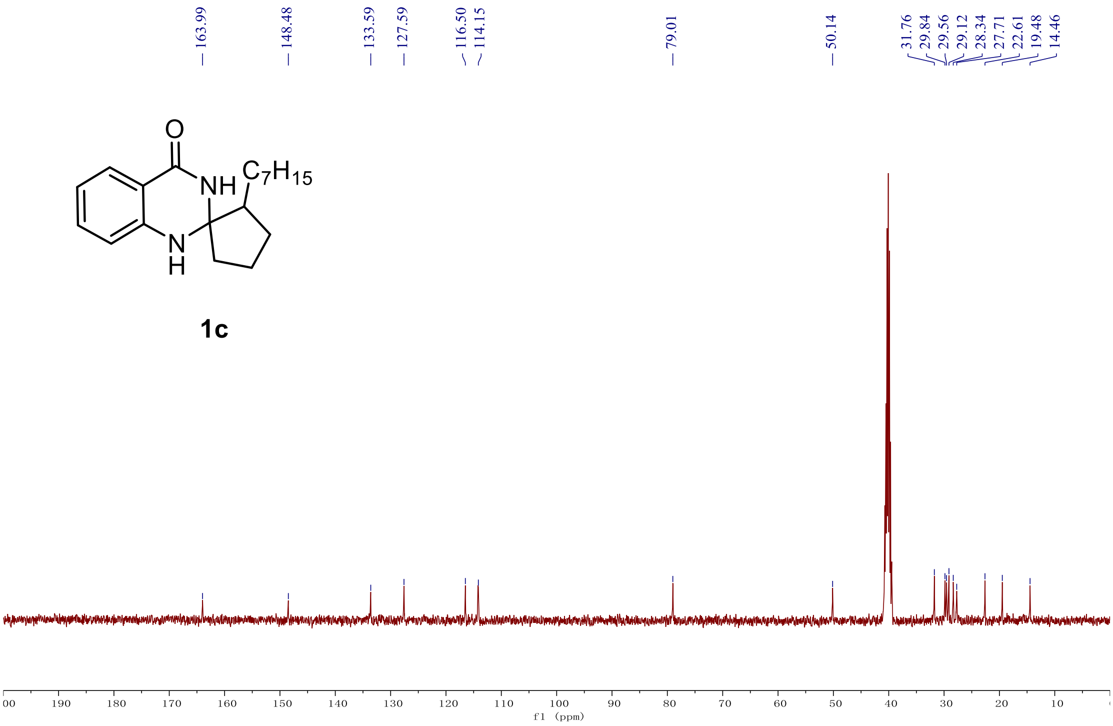
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6 spectra of product **1b**



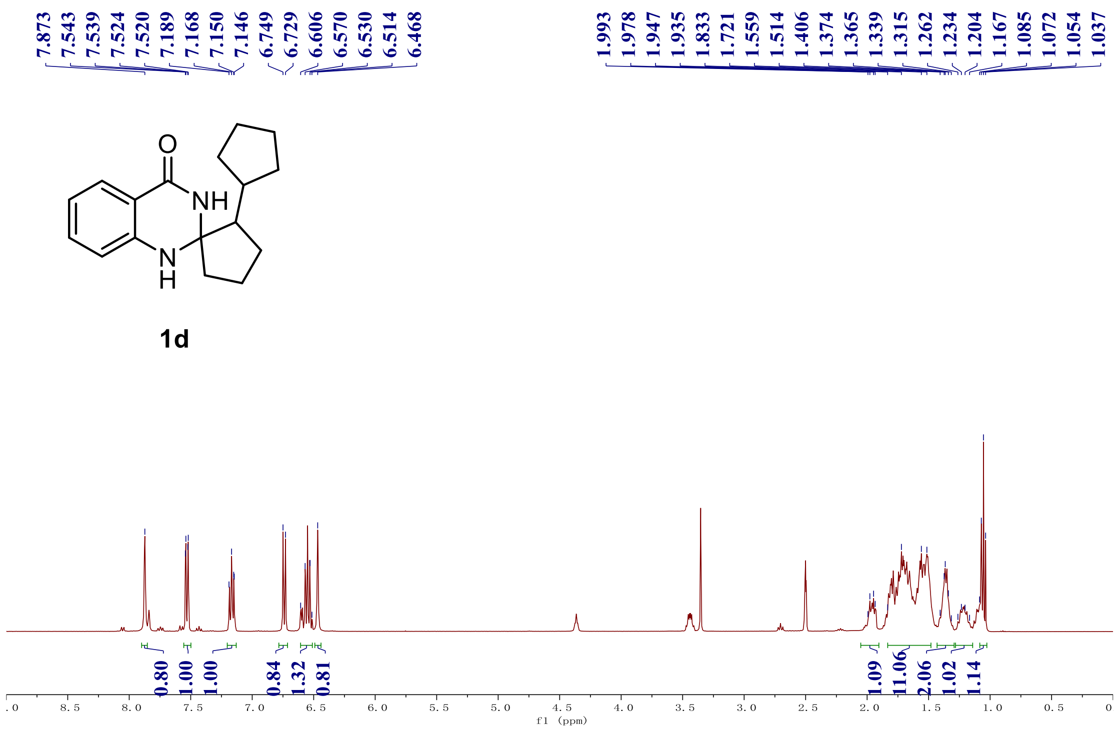


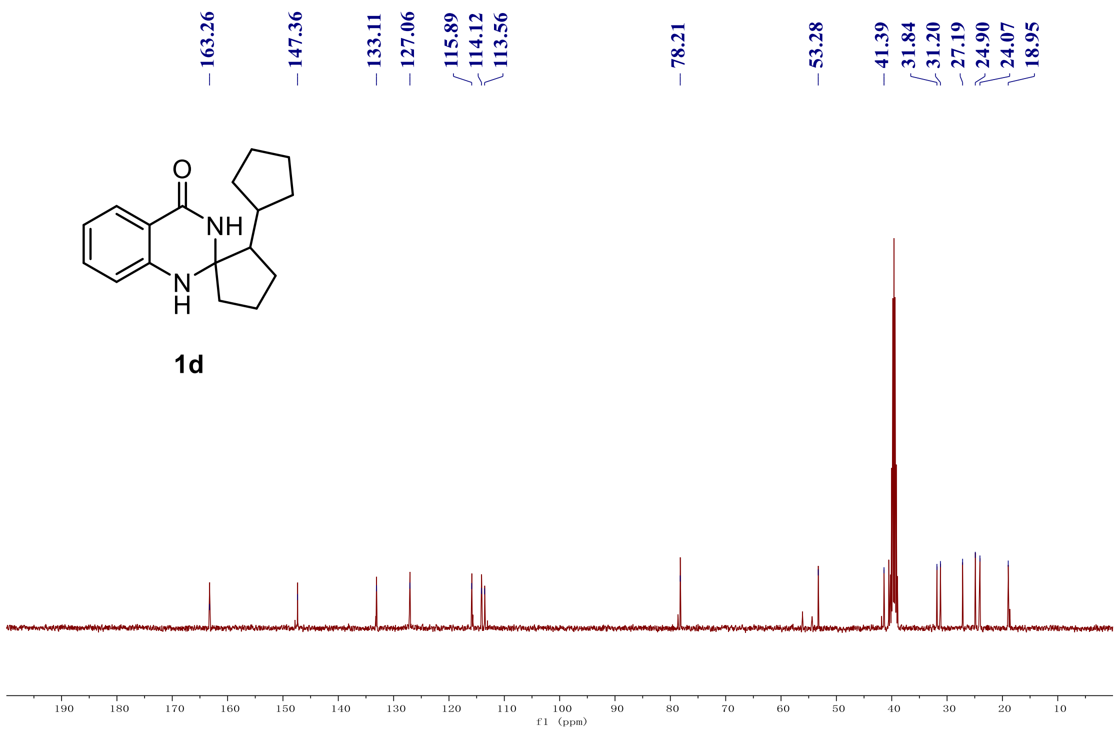
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **1c**



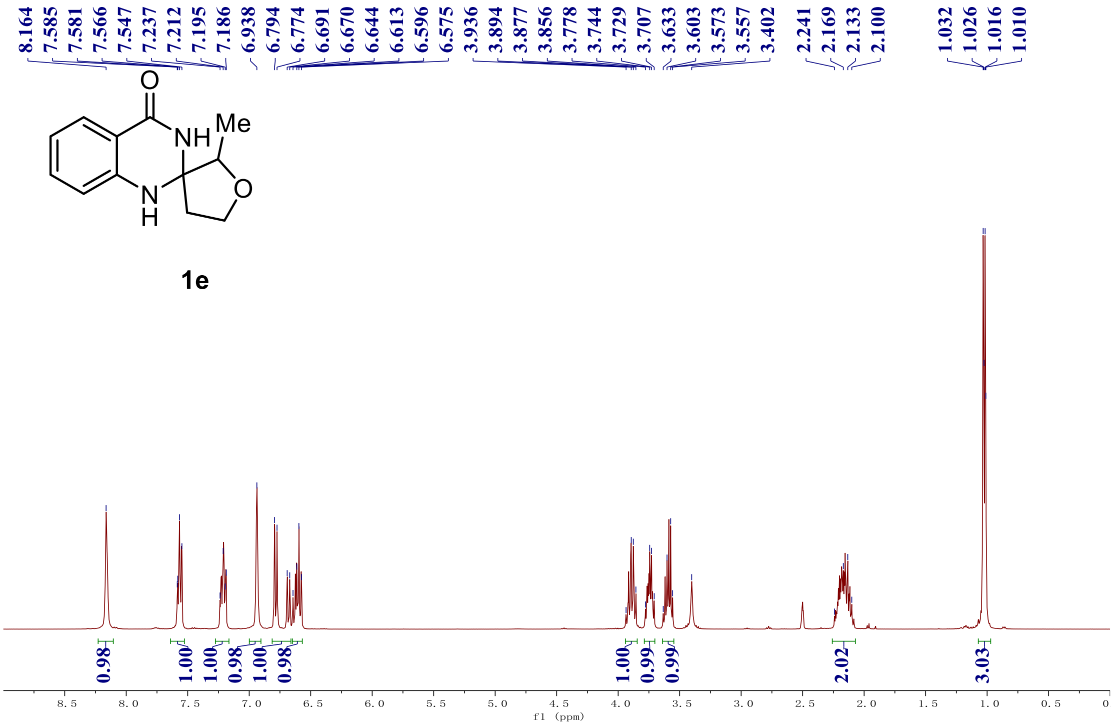


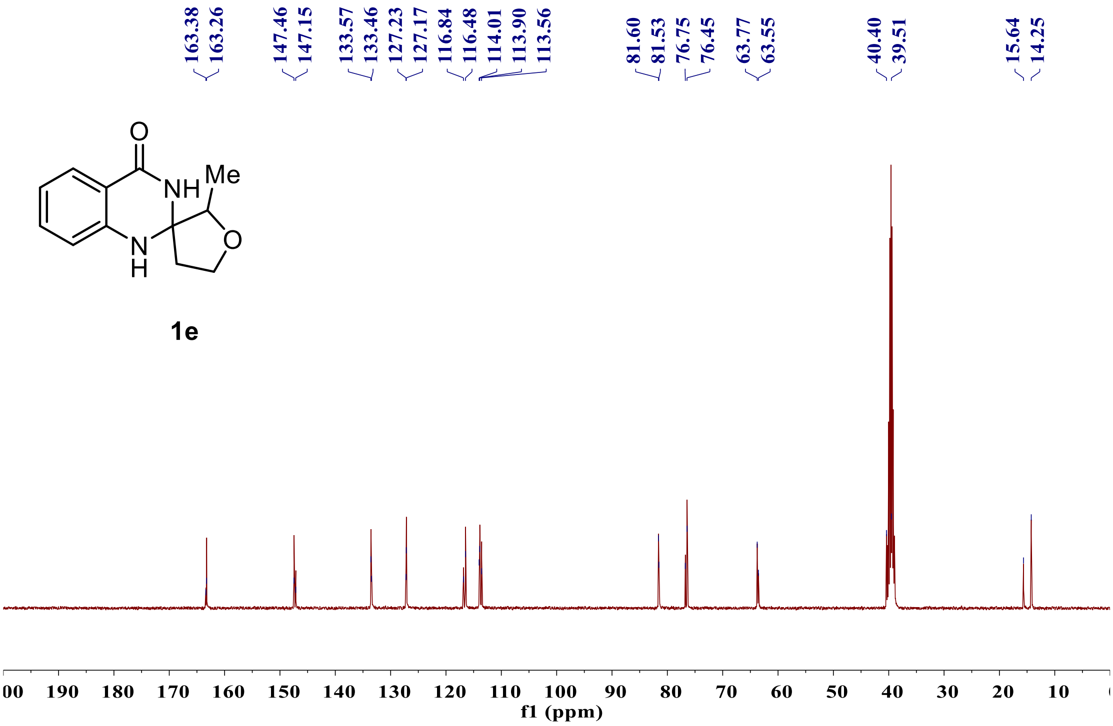
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1d**



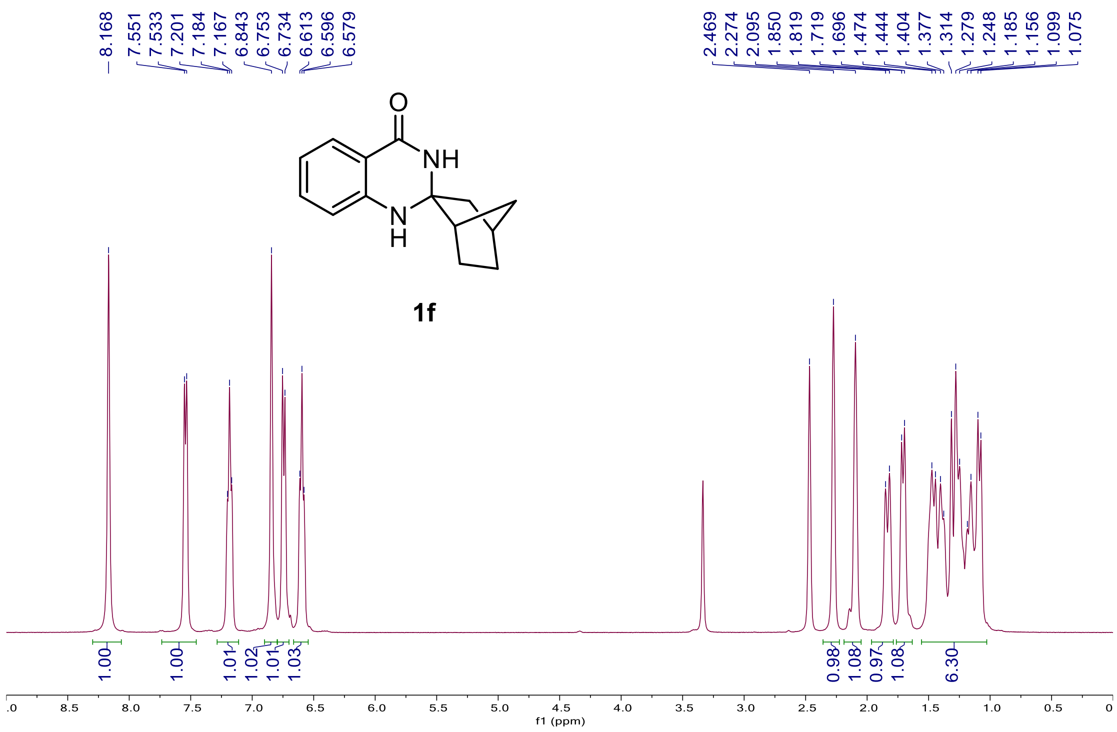


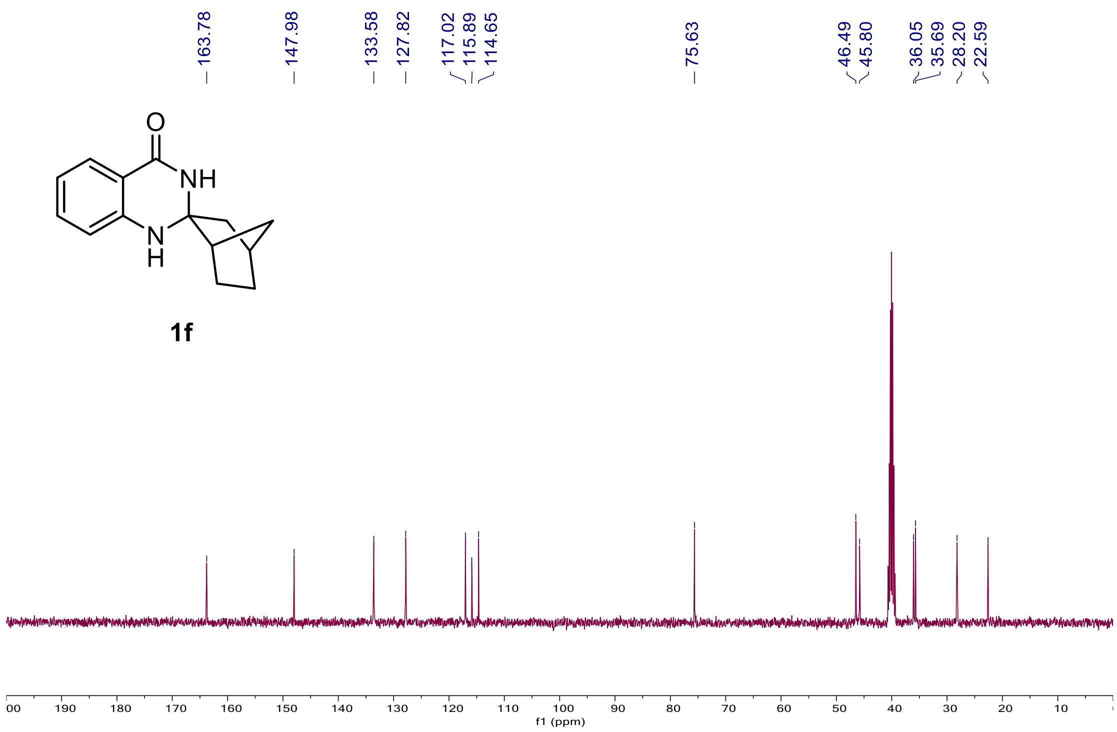
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **1e**



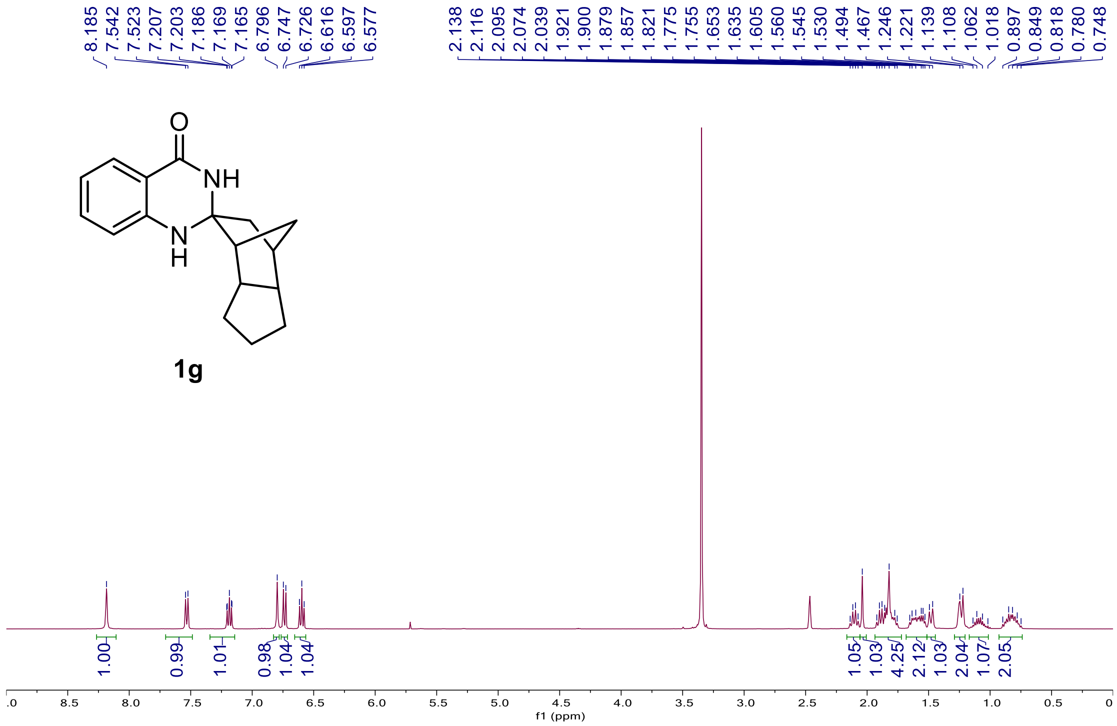


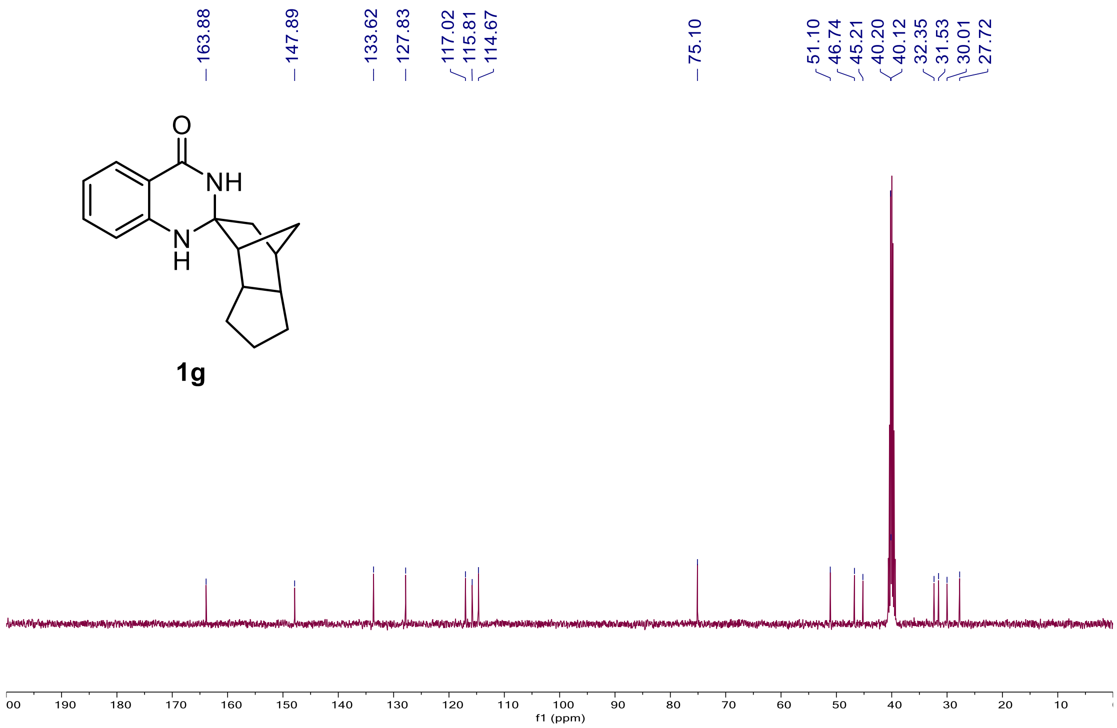
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **1f**



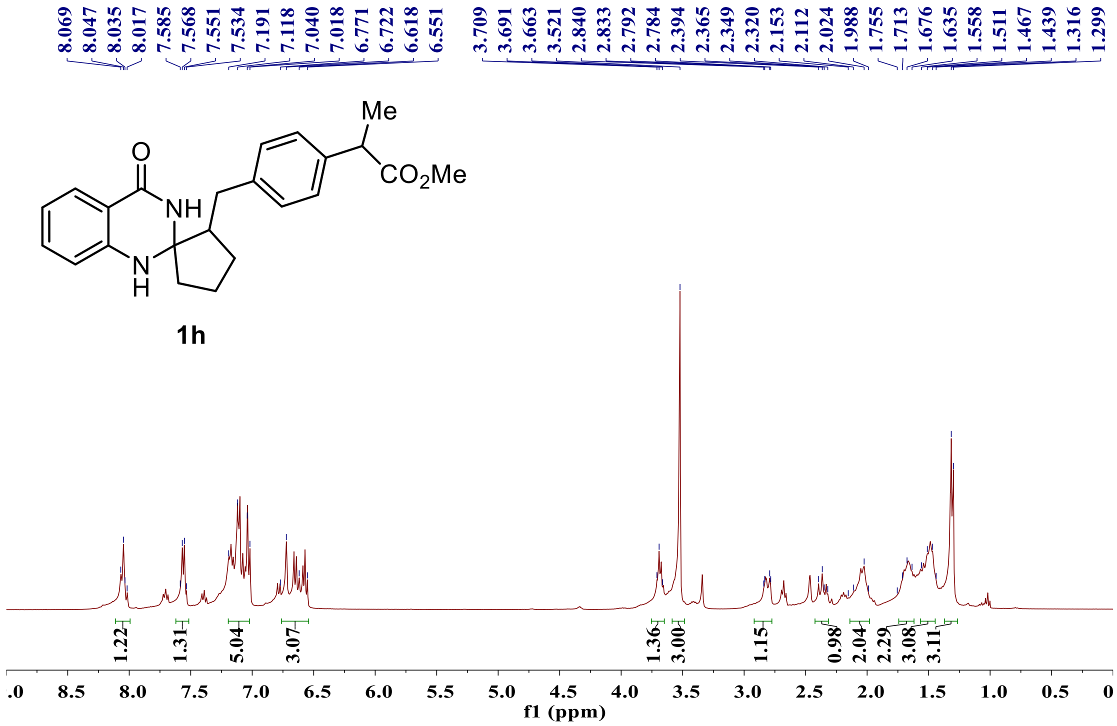


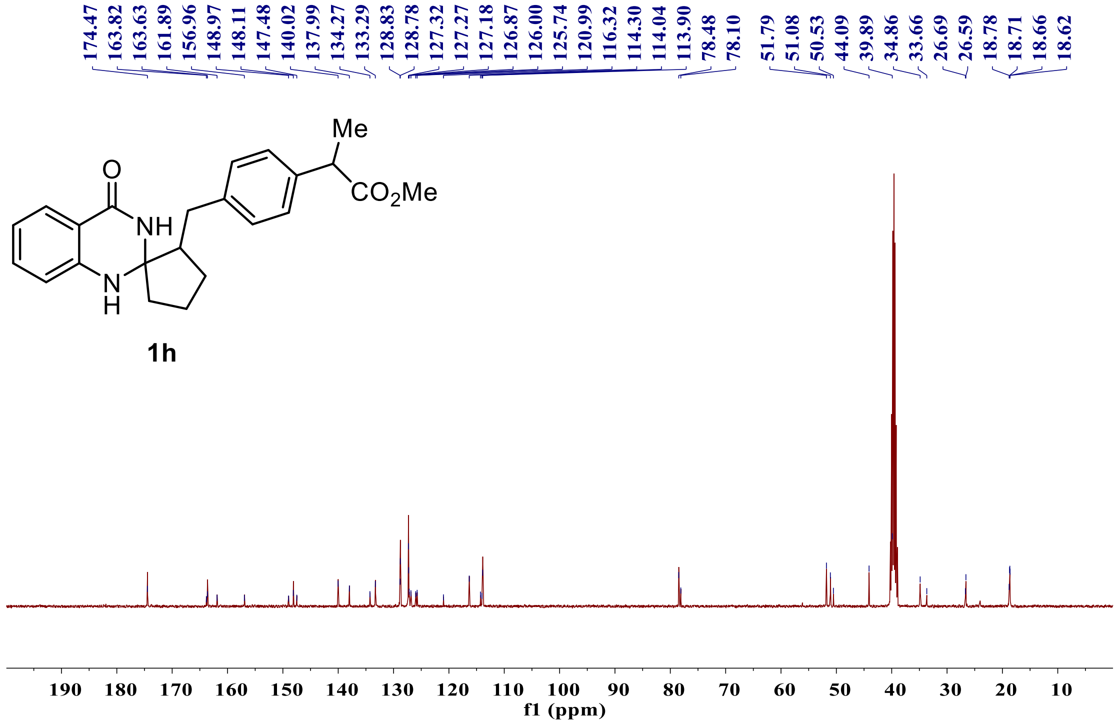
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1g**



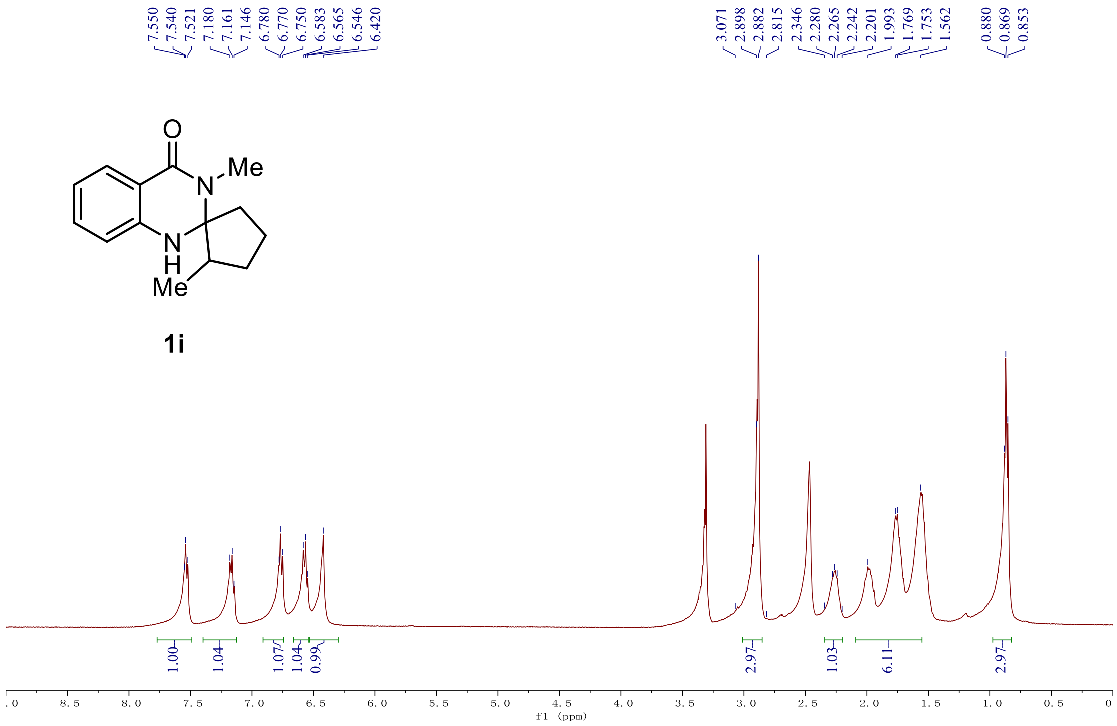


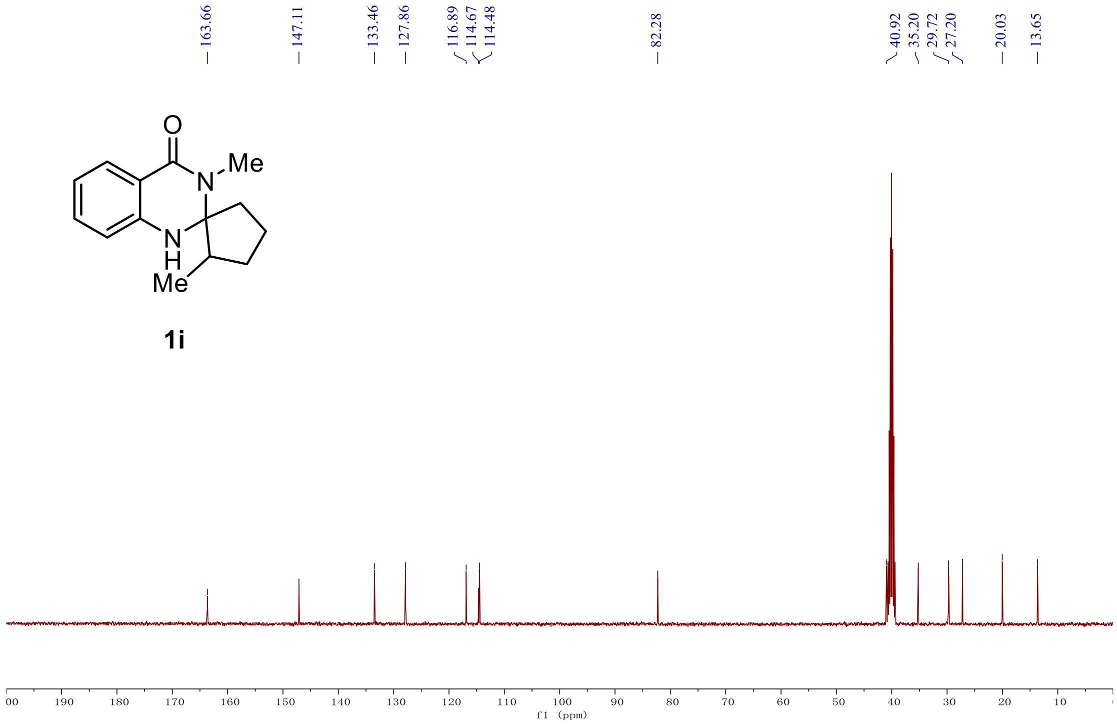
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1h**



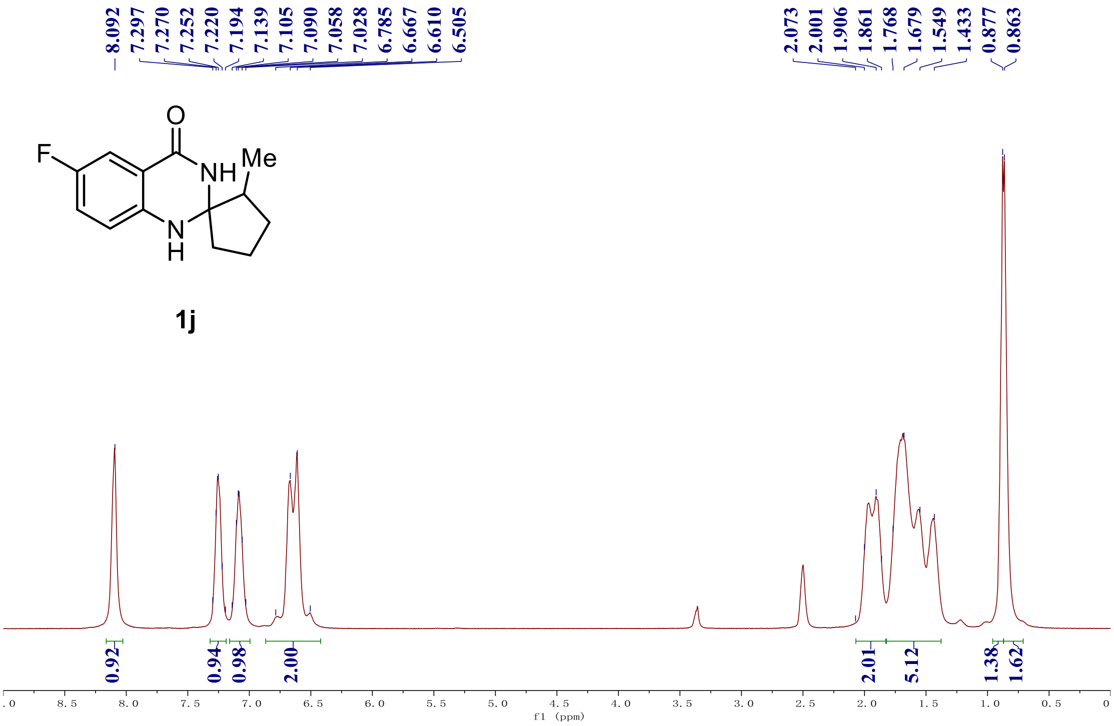


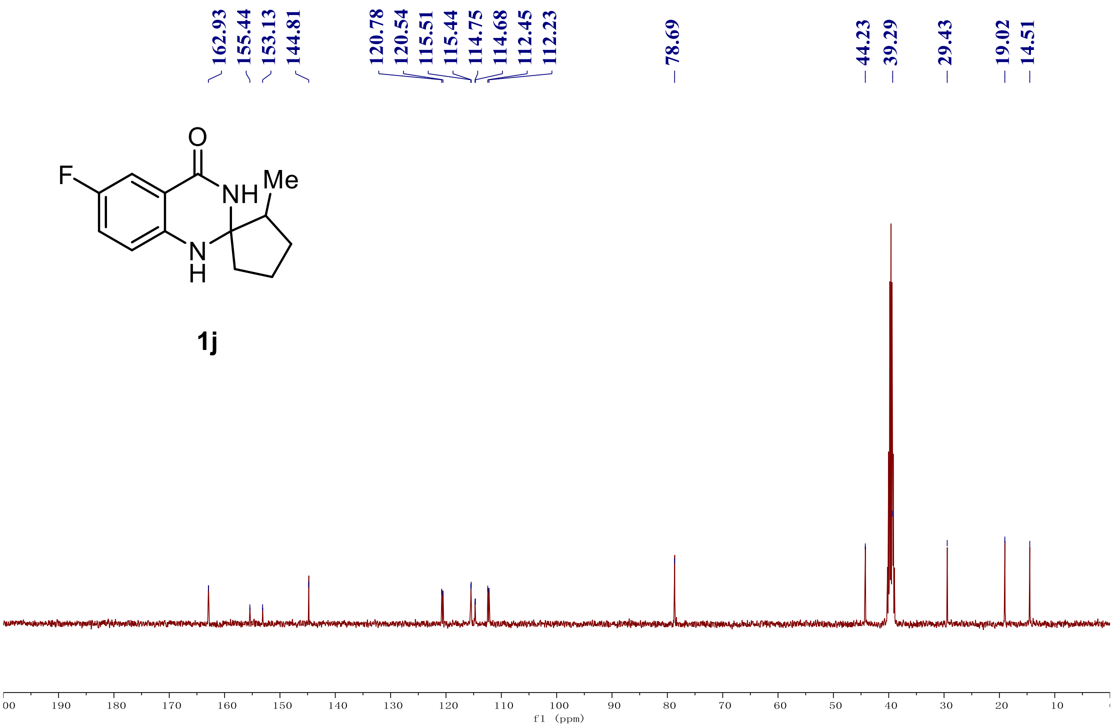
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1i**

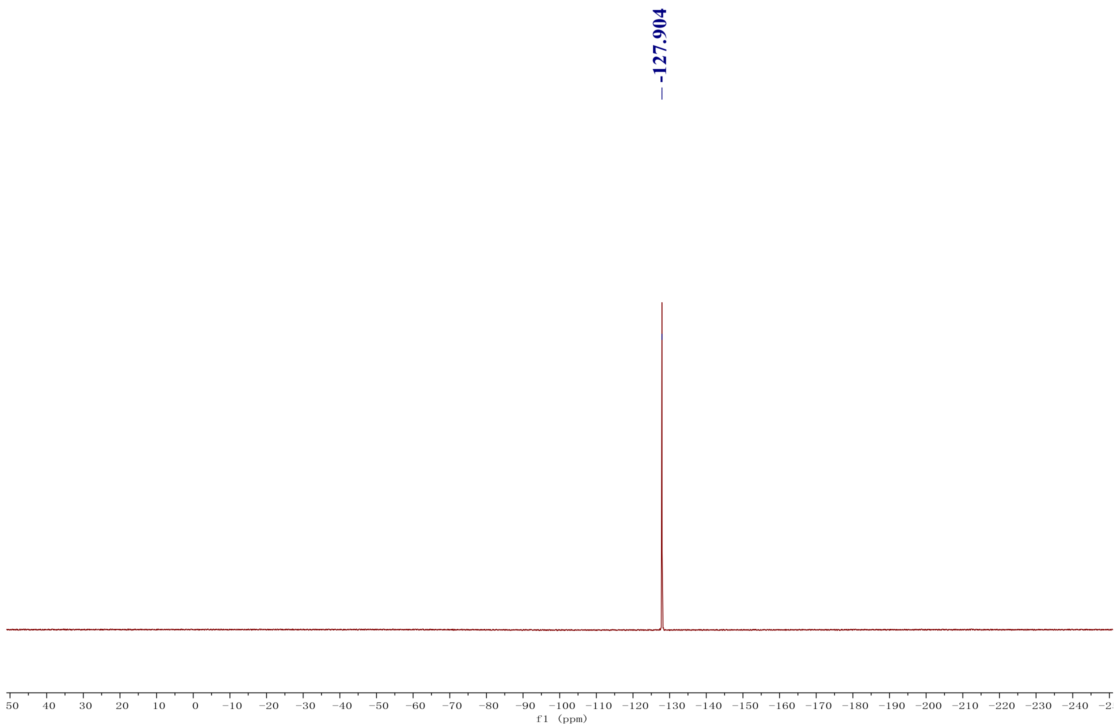




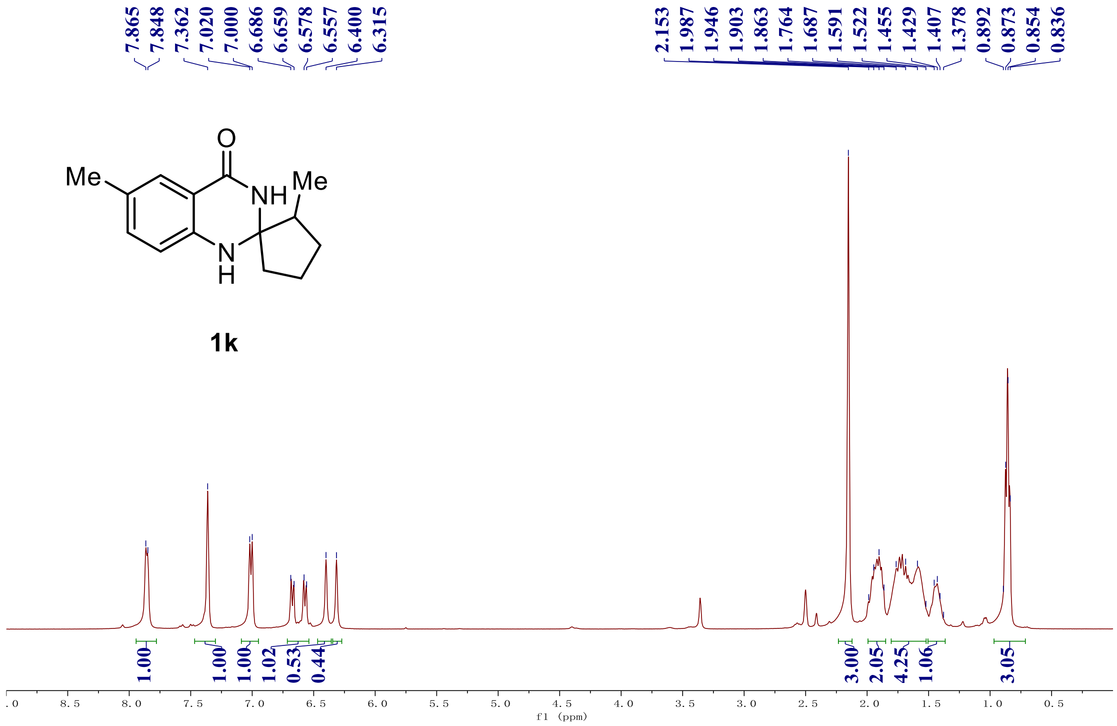
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1j**

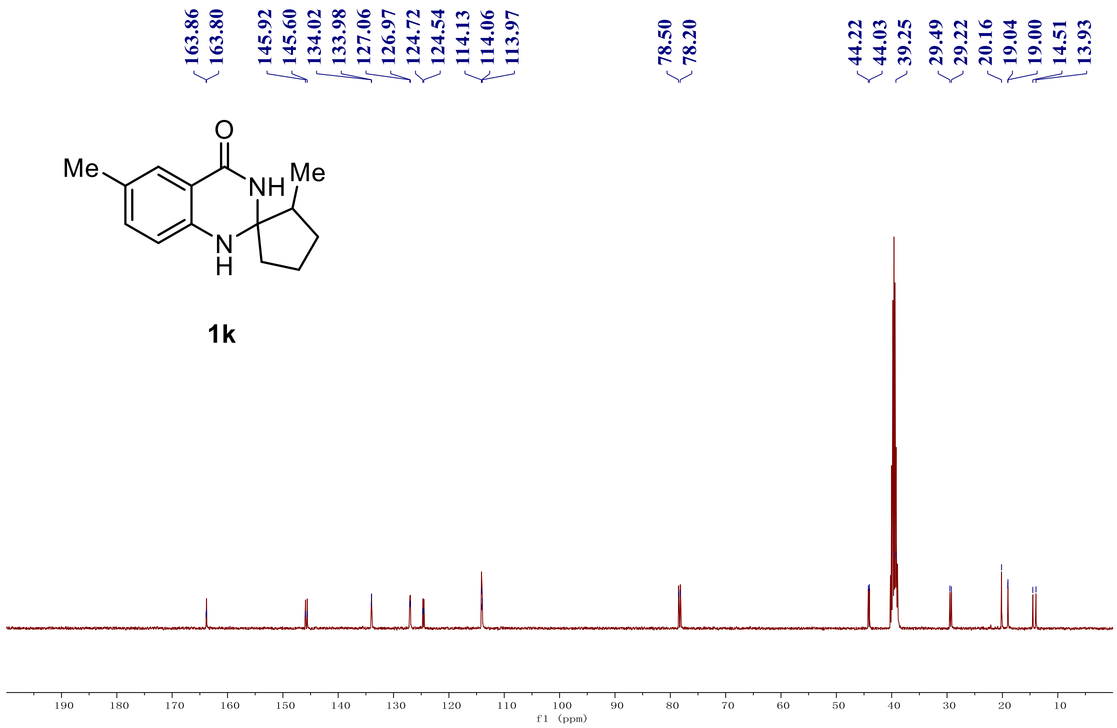




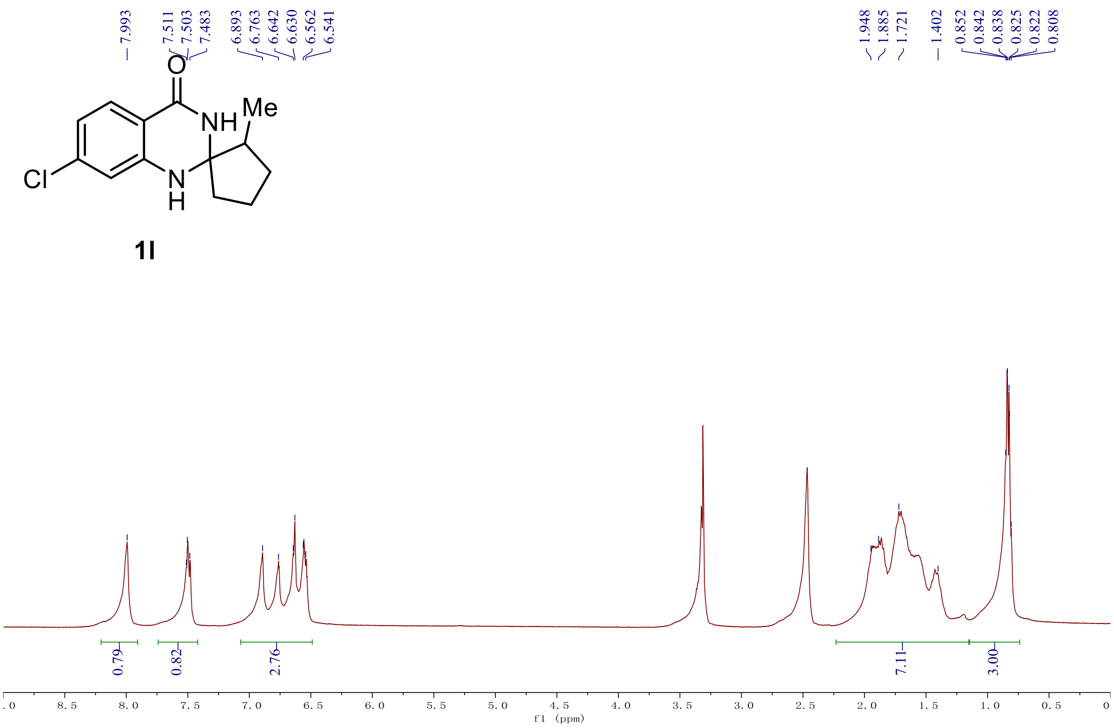

-127.904
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
-220
-230
-240
f1 (ppm)

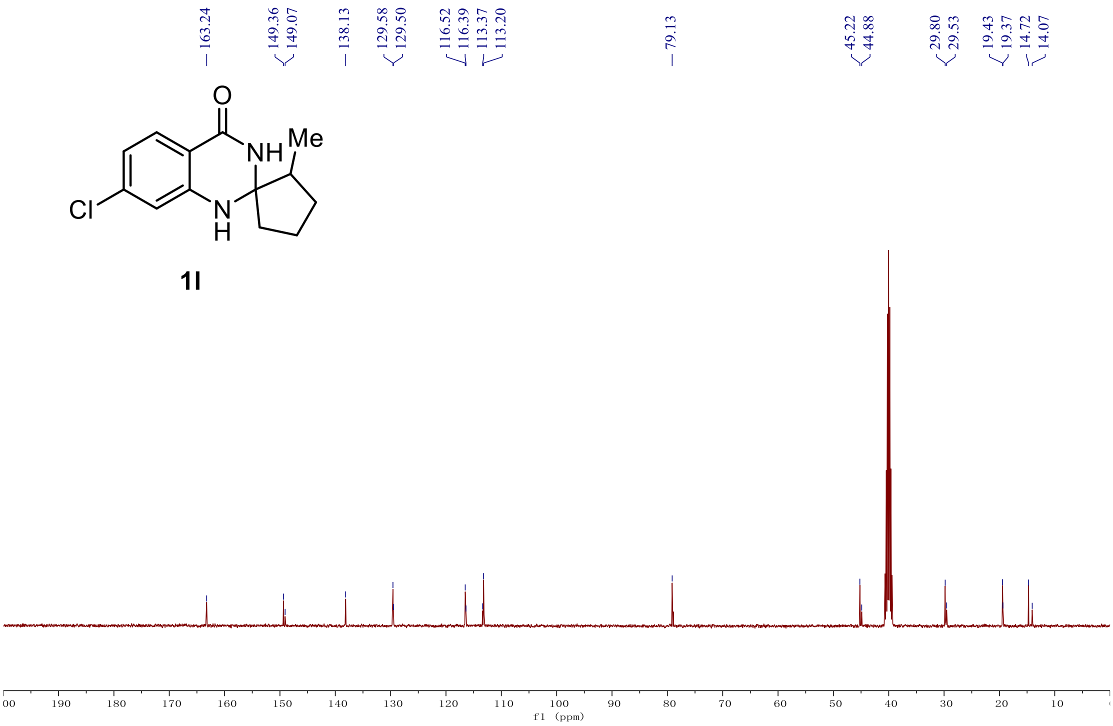
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1k**



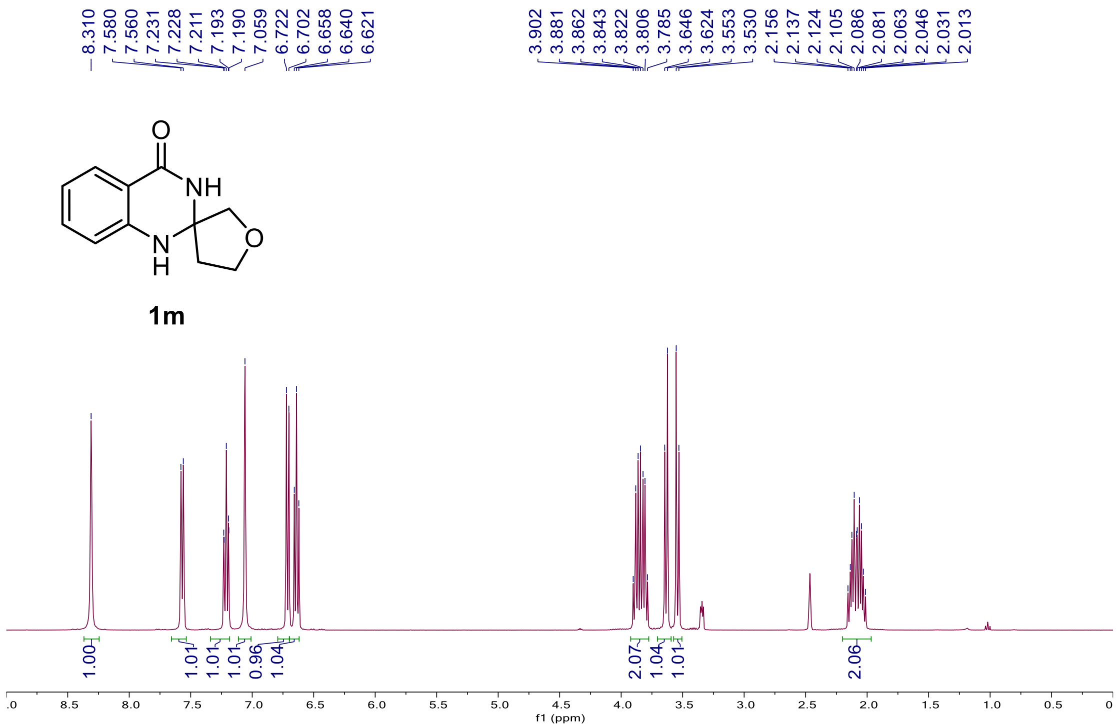


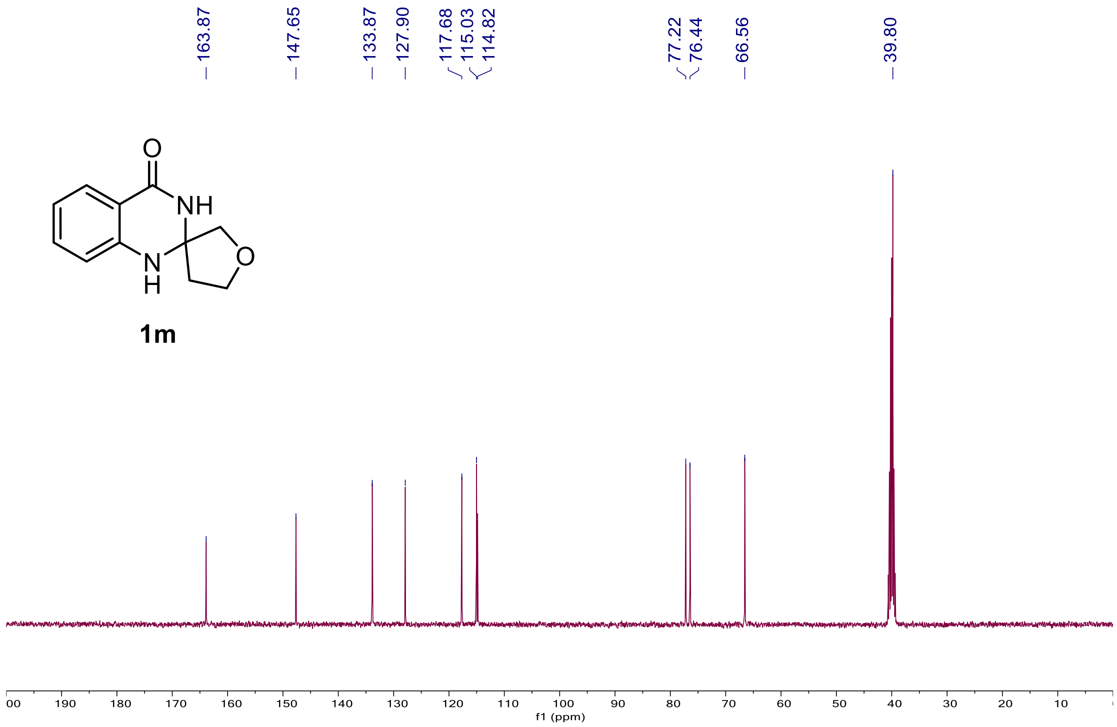
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1l**



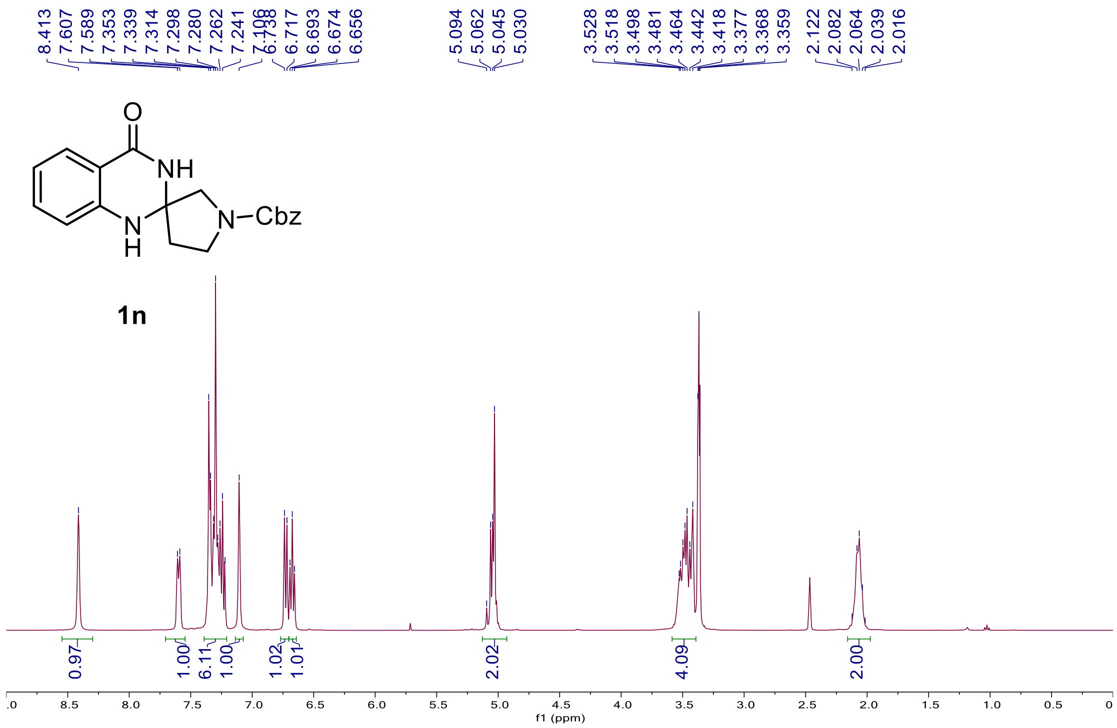


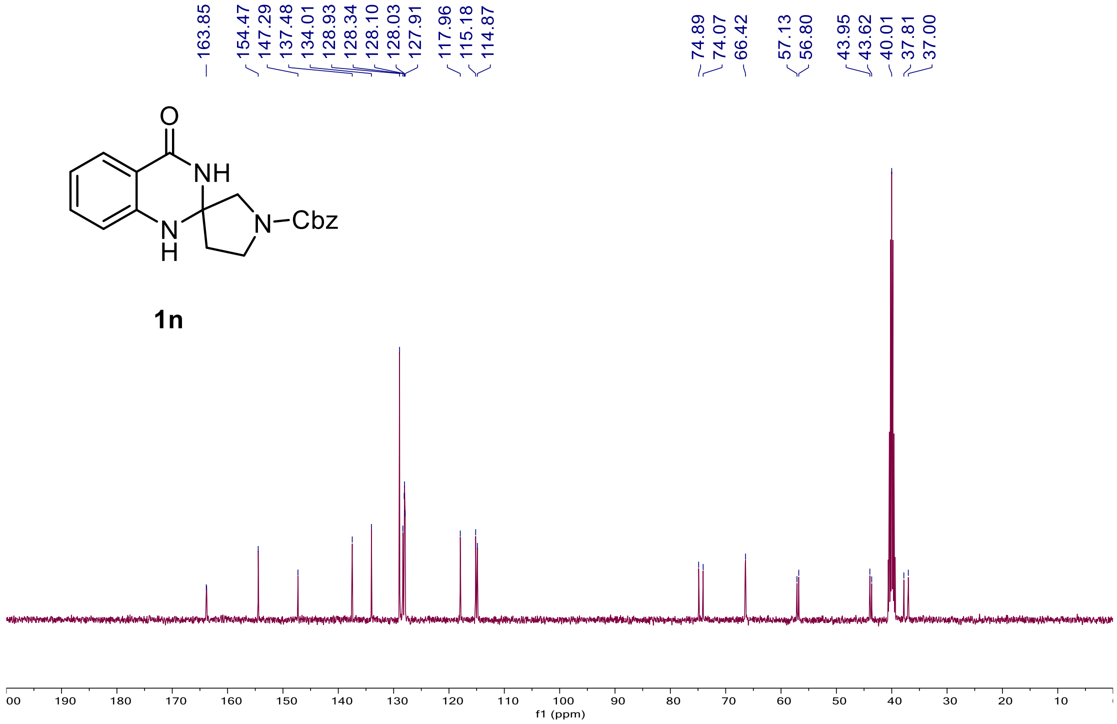
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1m**



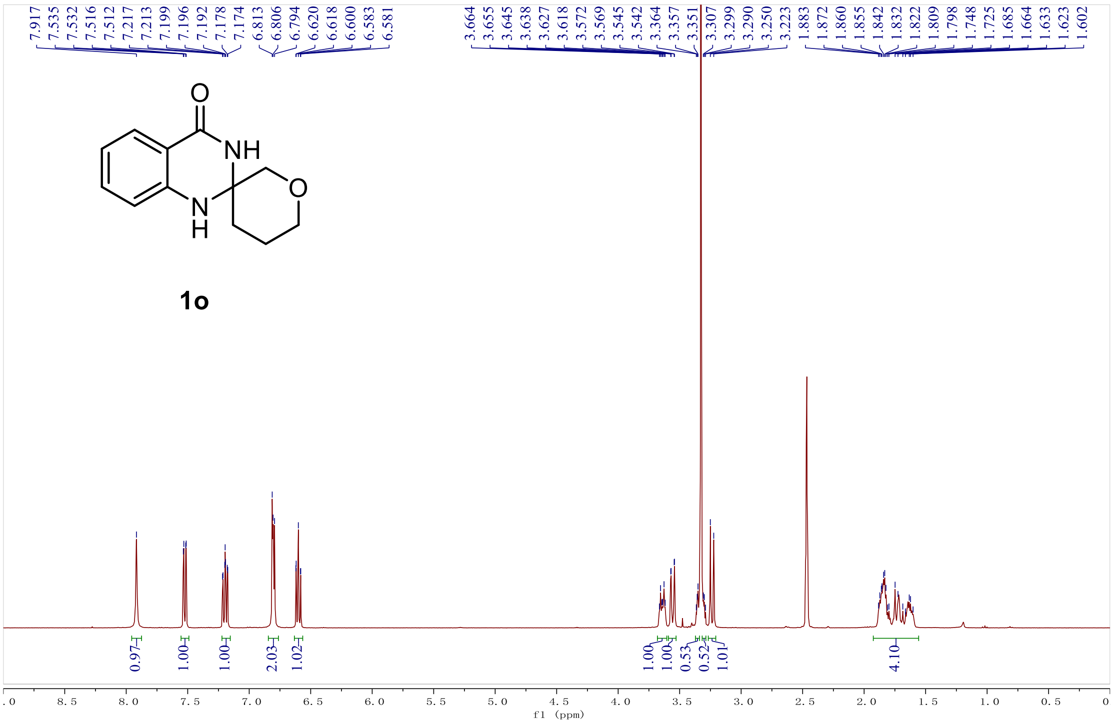


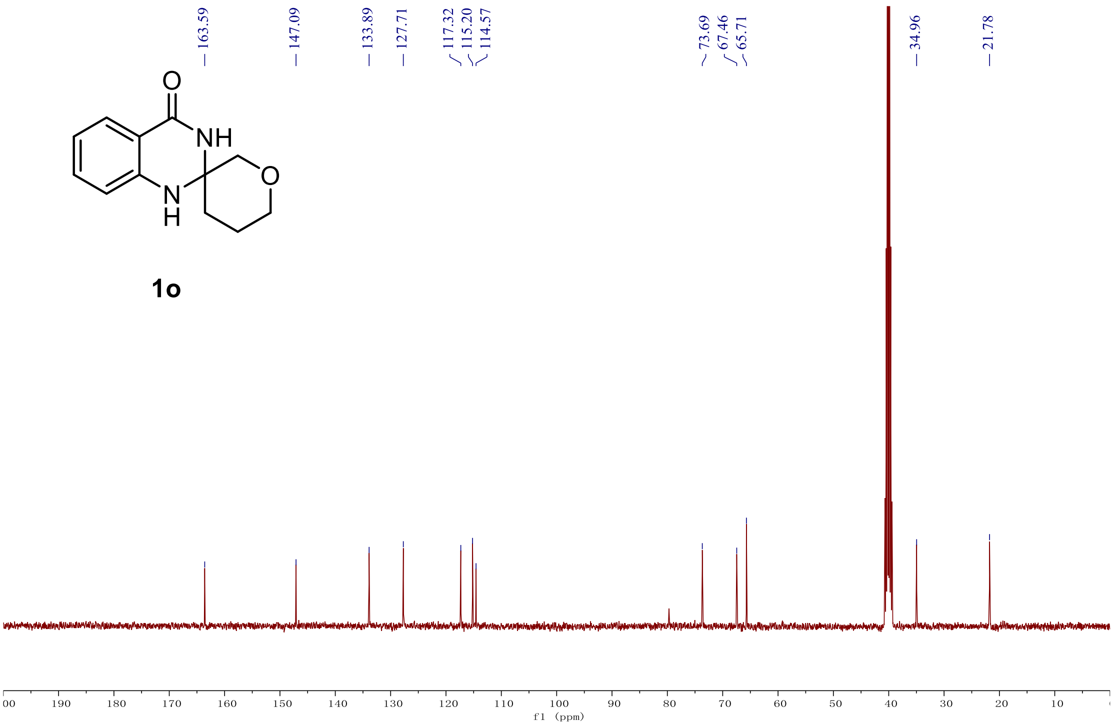
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1n**



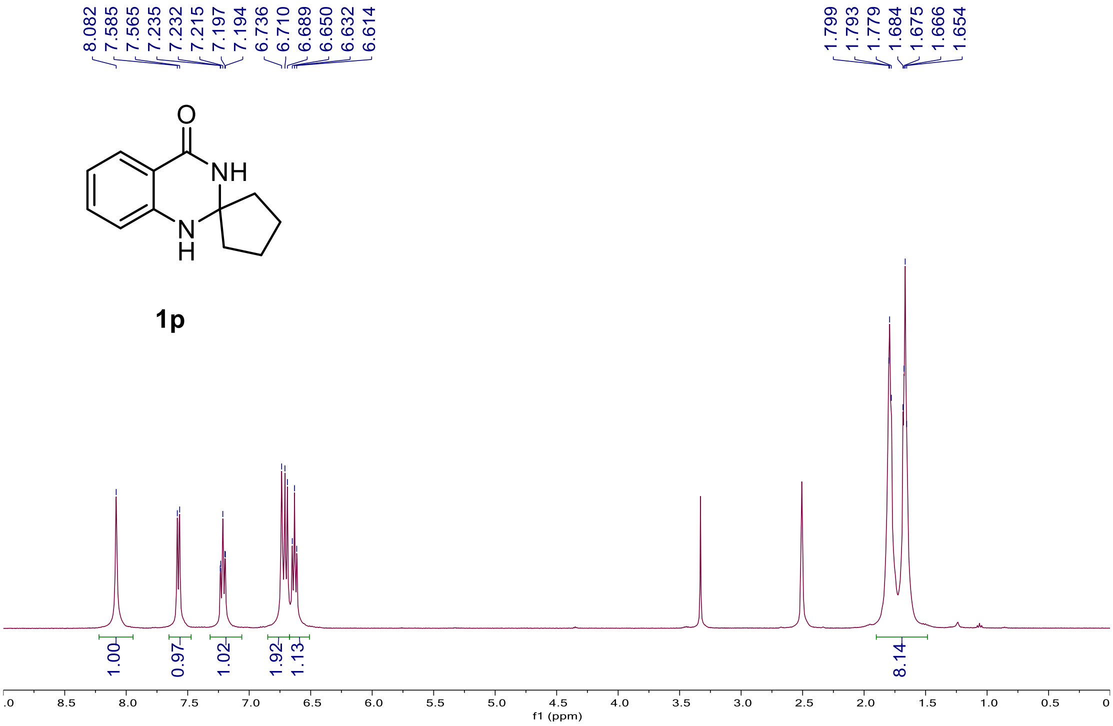


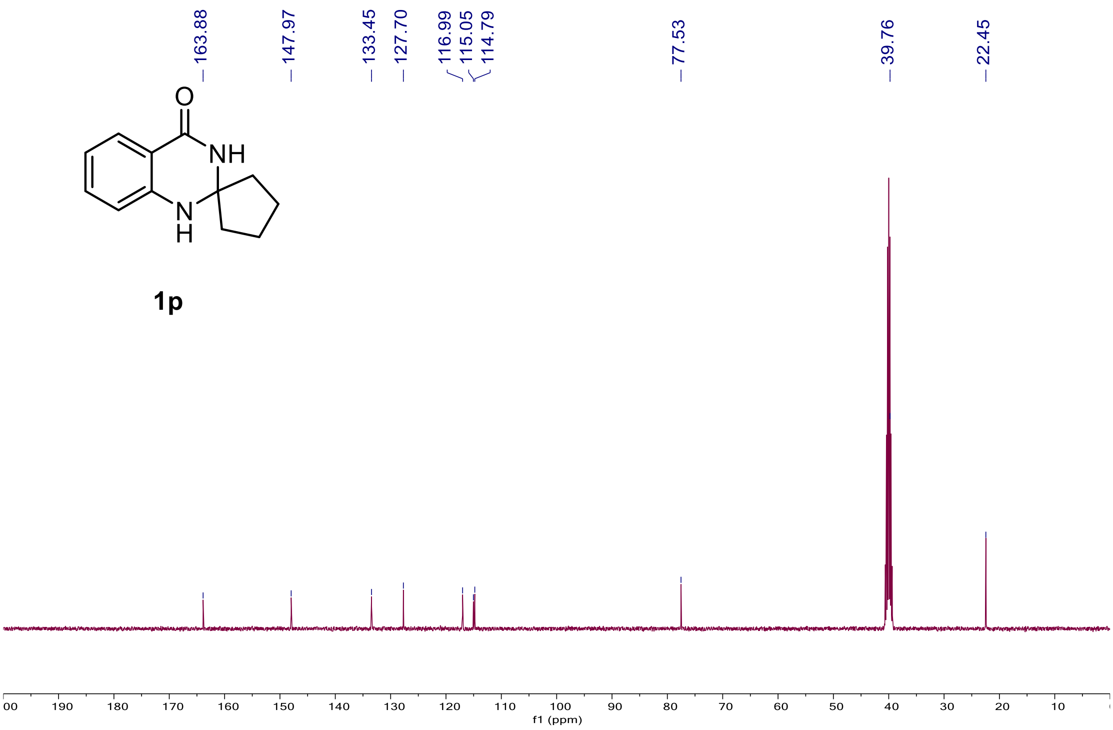
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **1o**



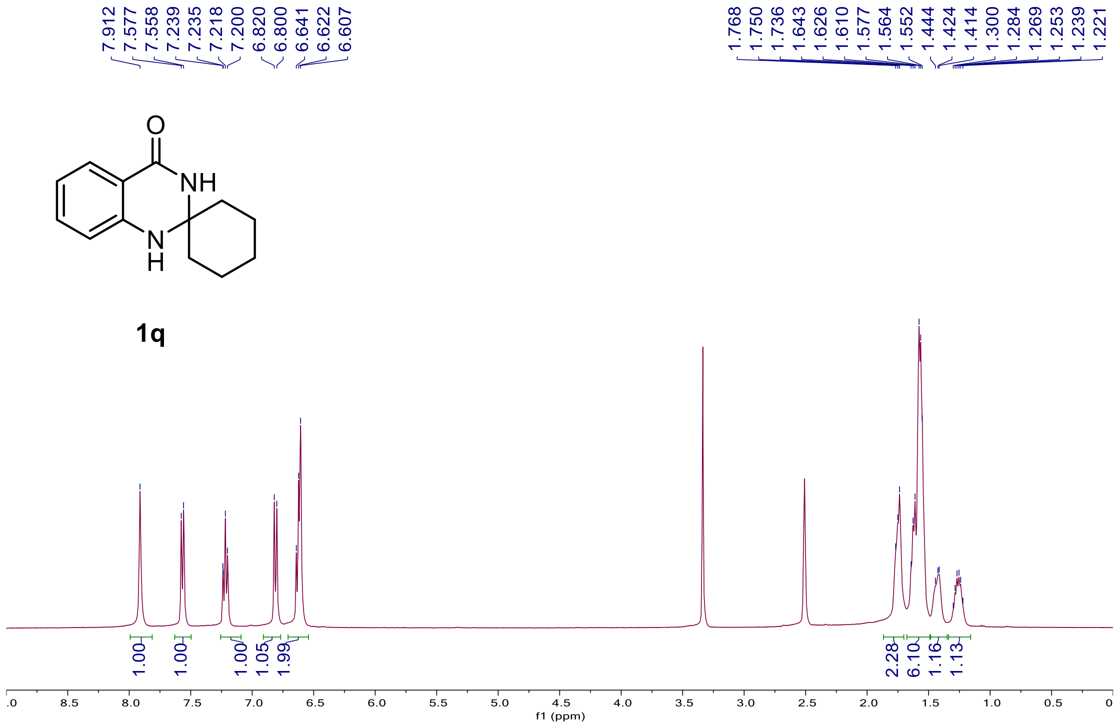


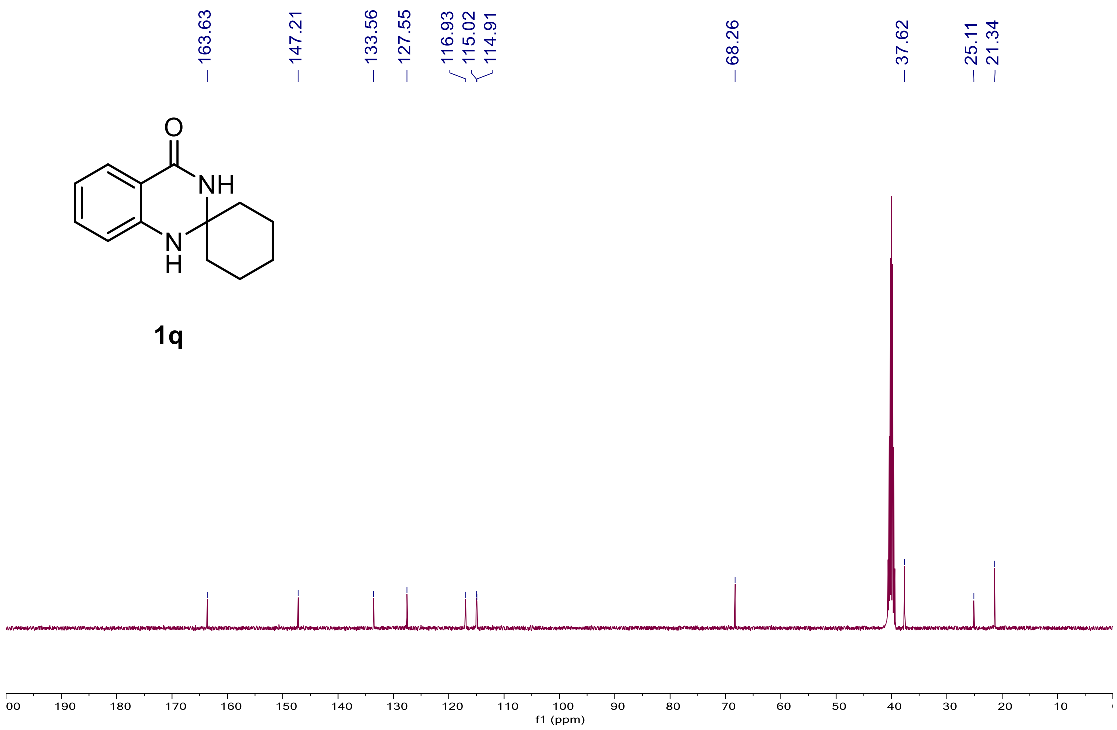
^{1}H NMR (400 MHz, DMSO-d_6) and ^{13}C NMR (100 MHz, DMSO-d_6) spectra of product **1p**





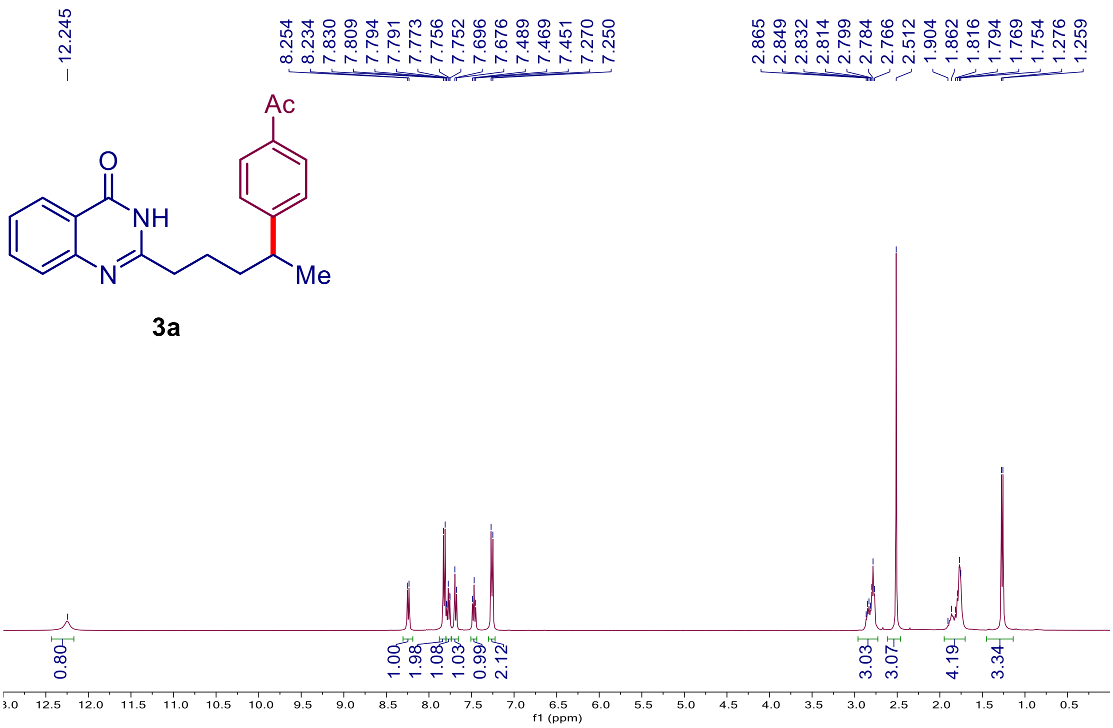
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **1q**

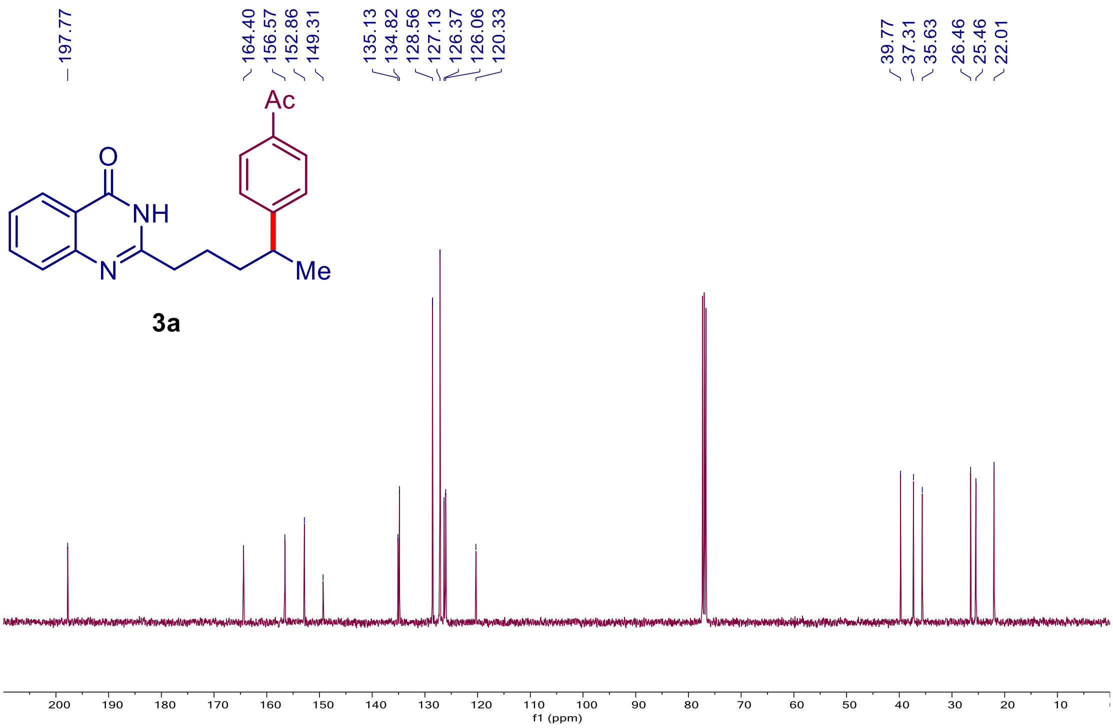




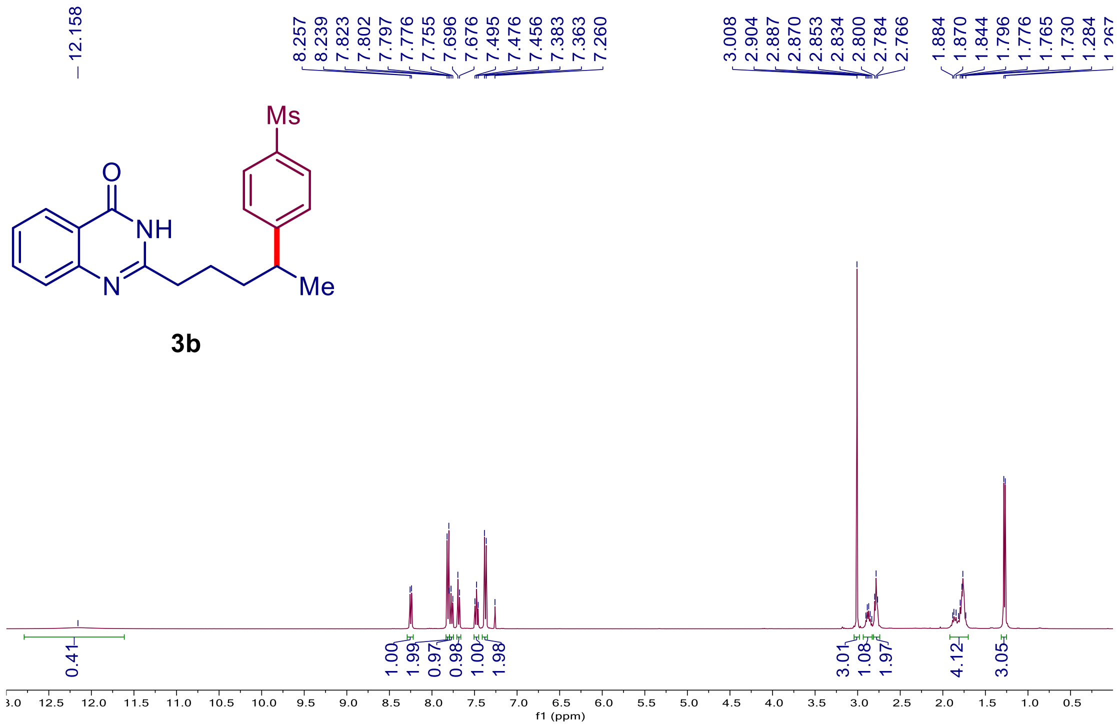
9. Characterization of Products

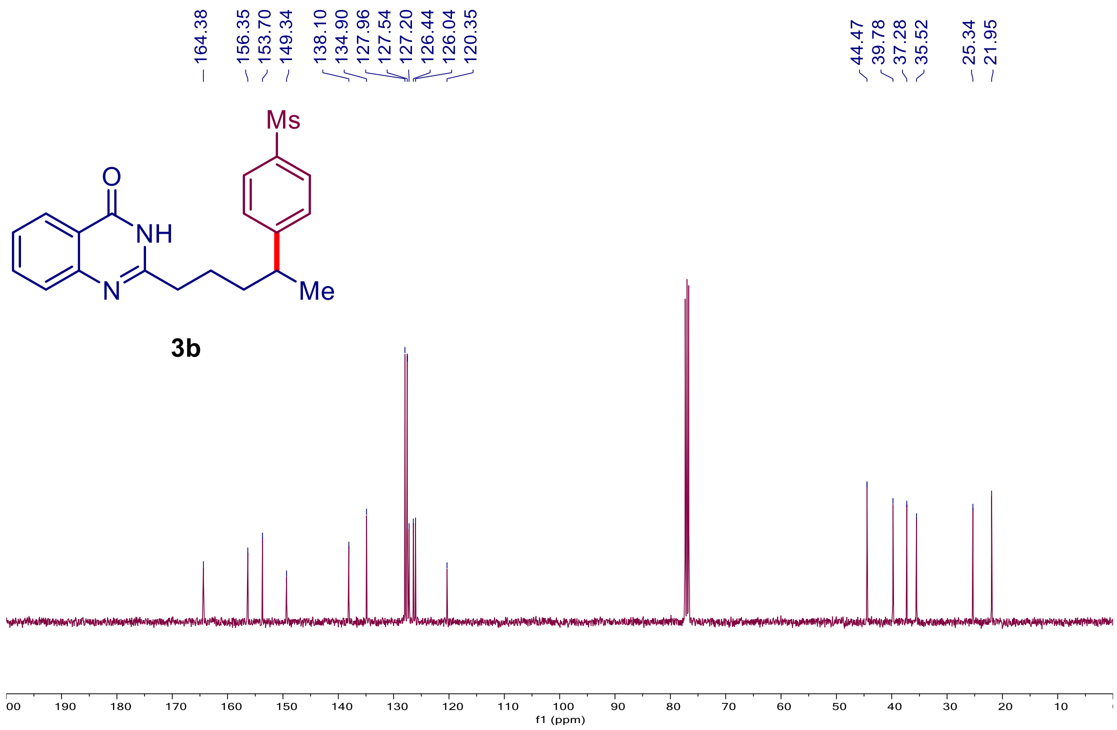
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3a**



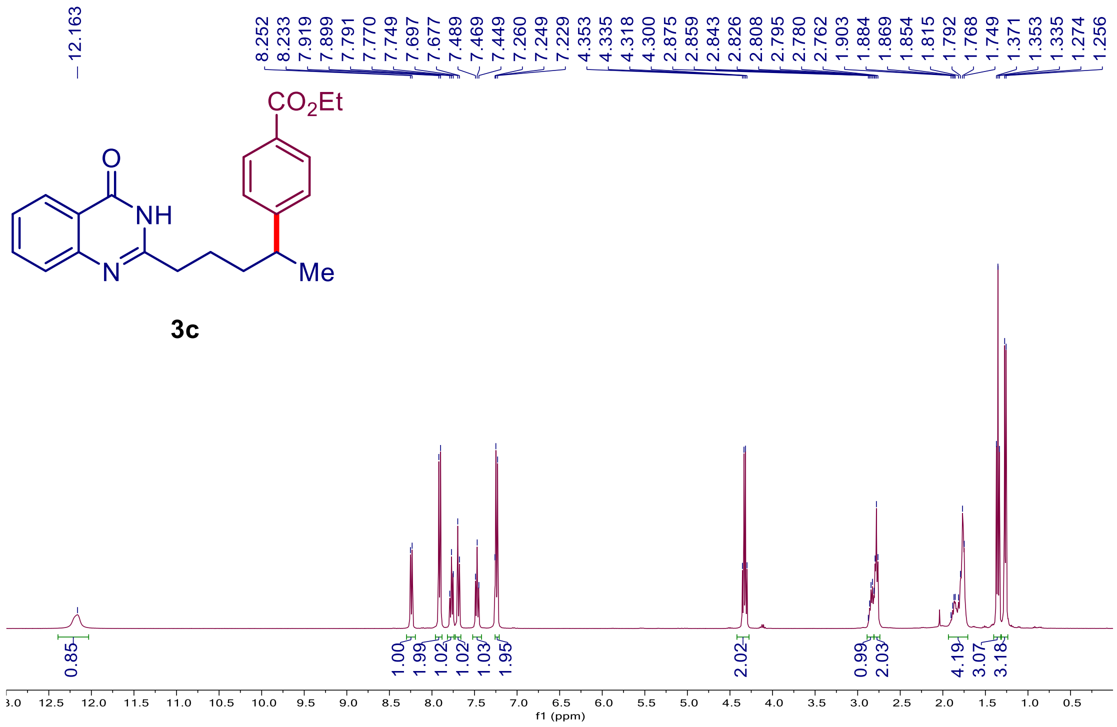


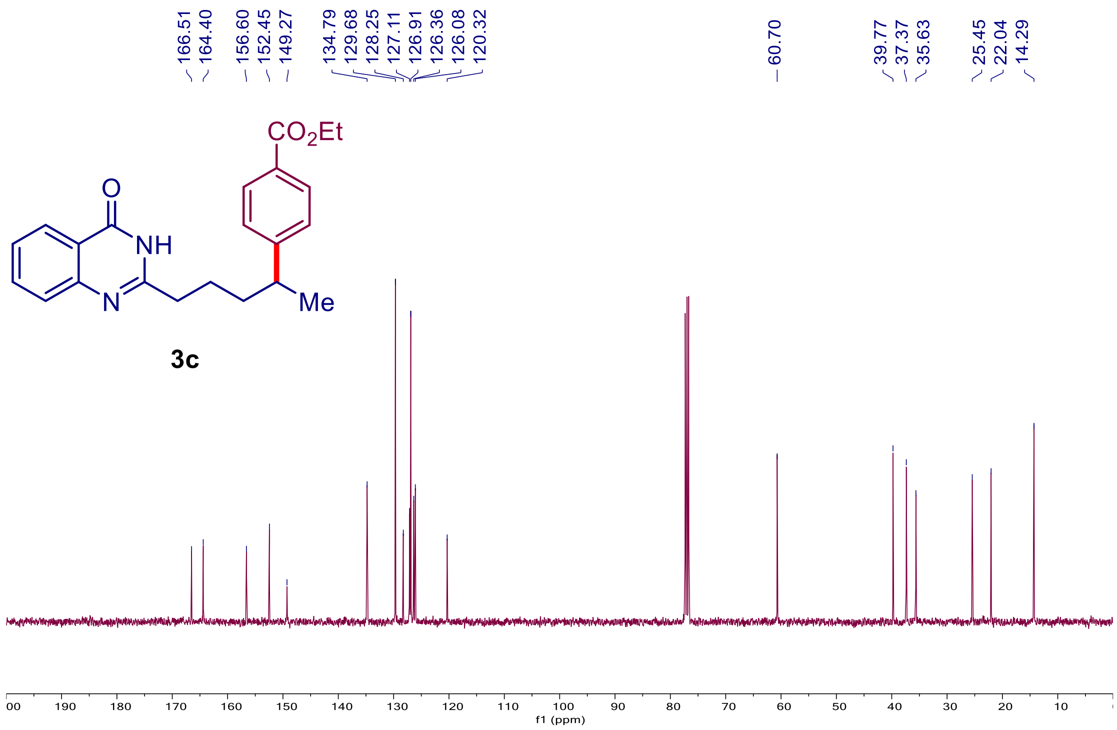
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3b**



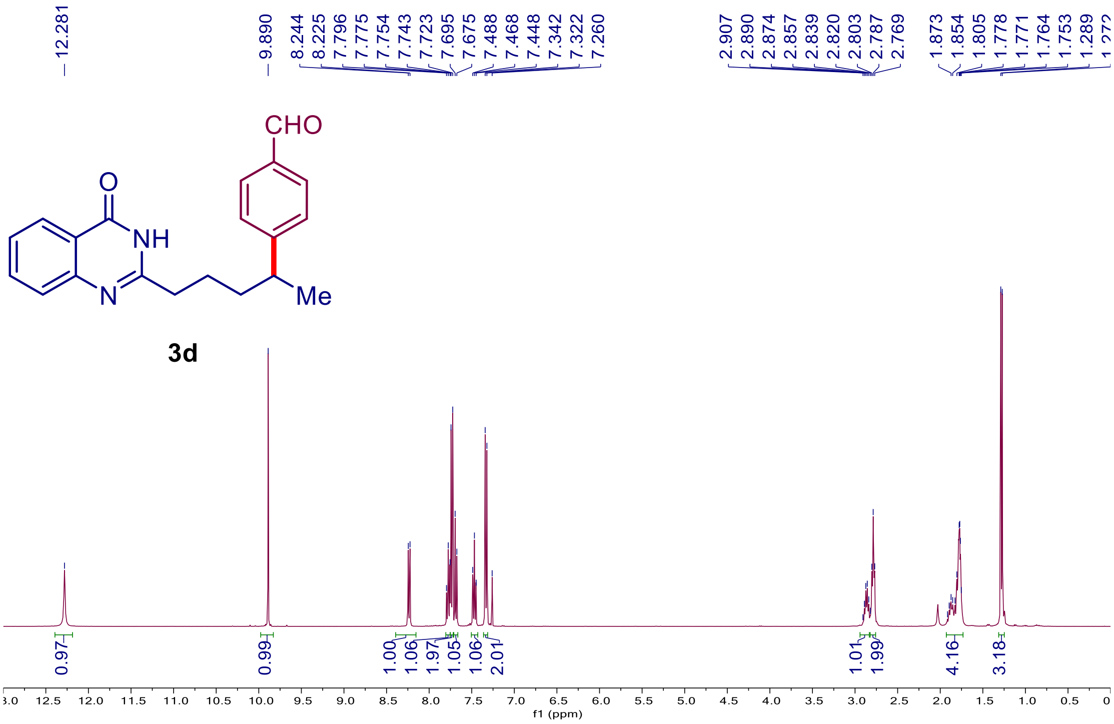


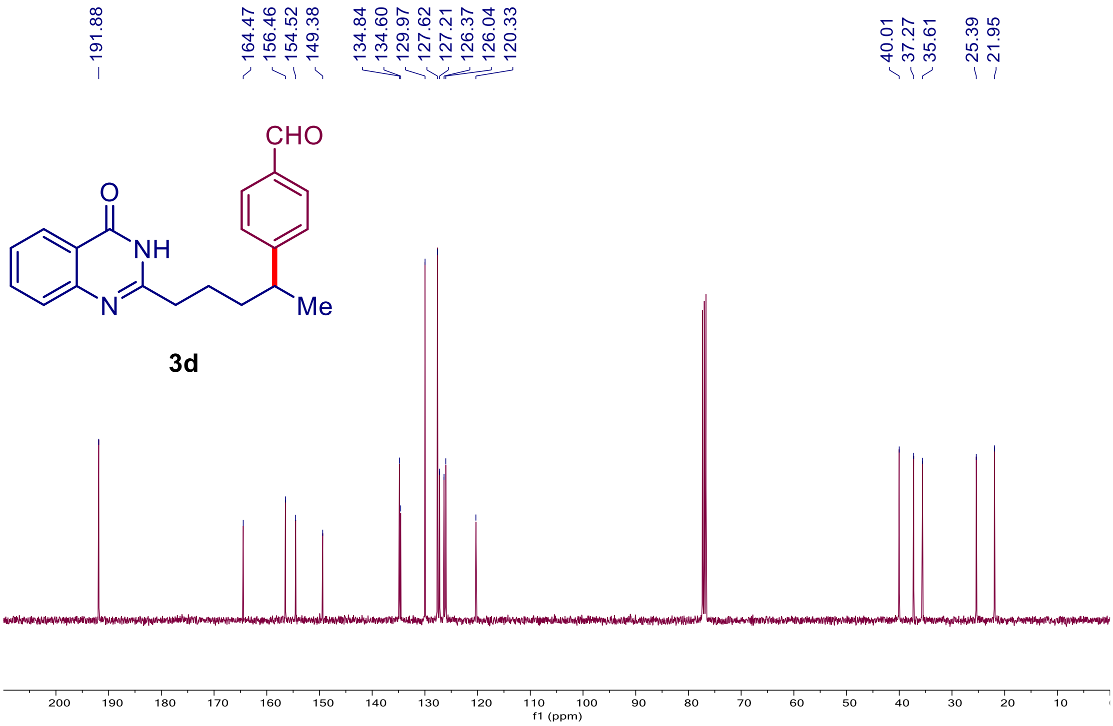
[1]H NMR (400 MHz, CDCl3) and [13]C NMR (100 MHz, CDCl3) spectra of product **3c**



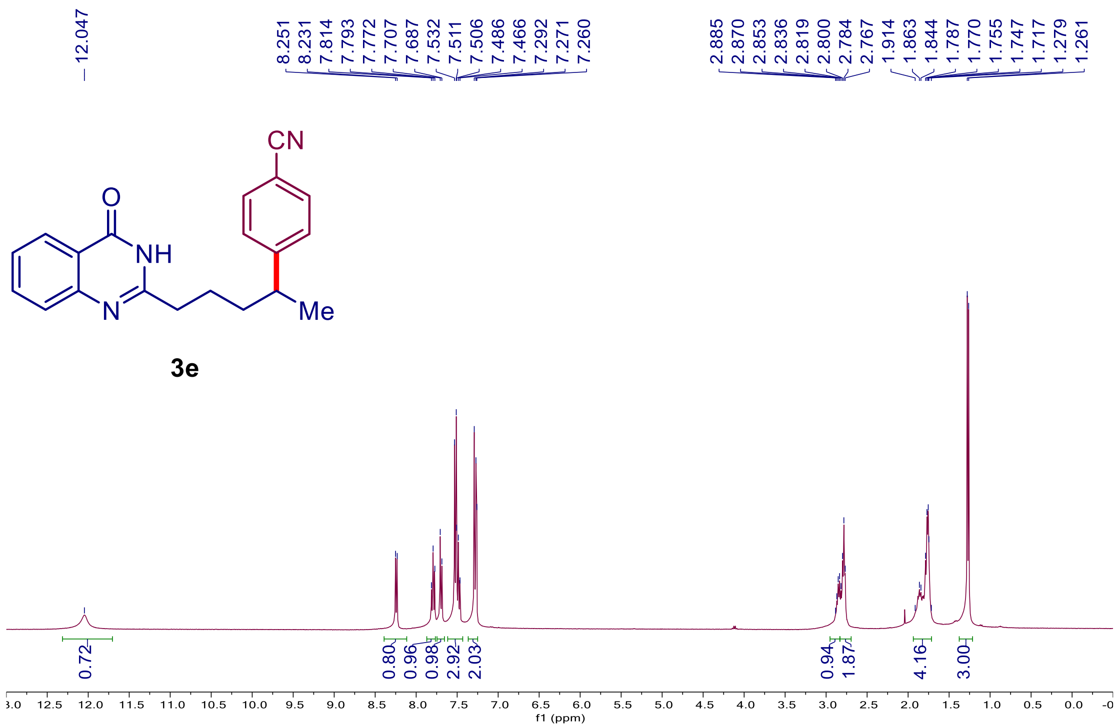


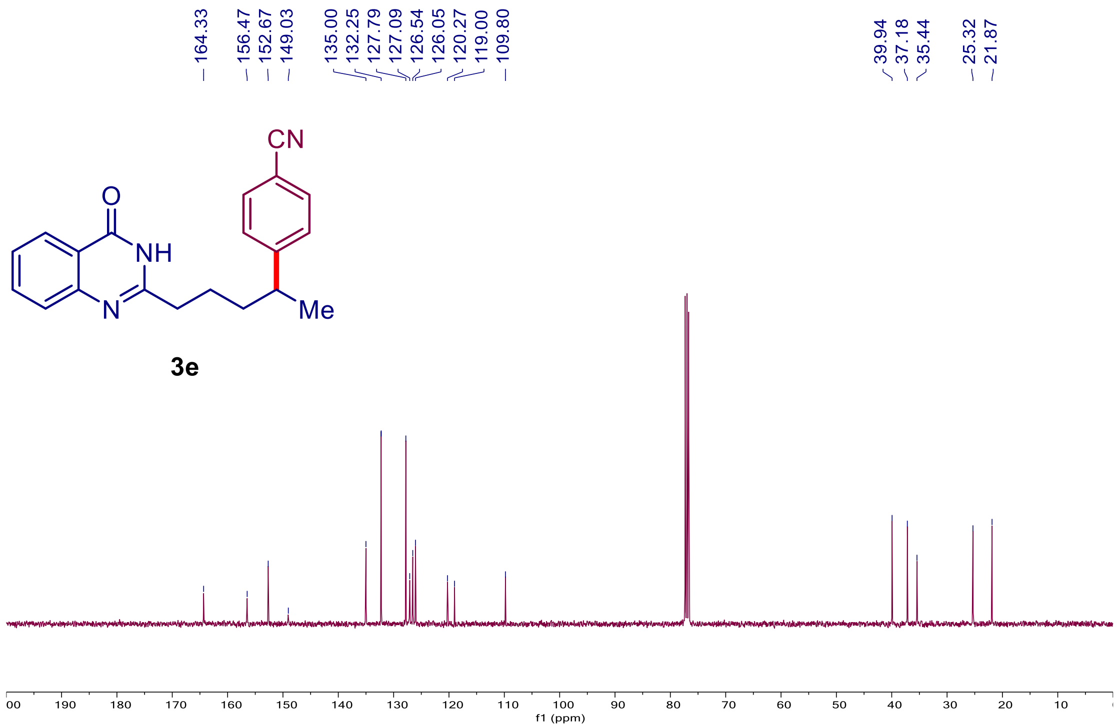
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3d**



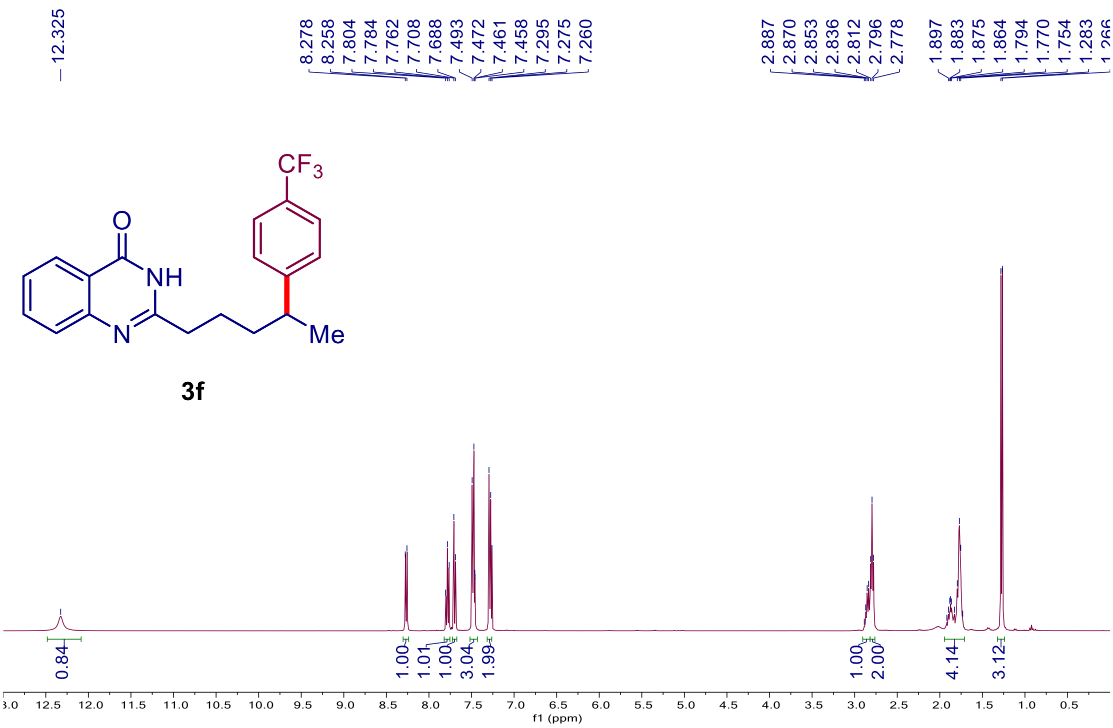


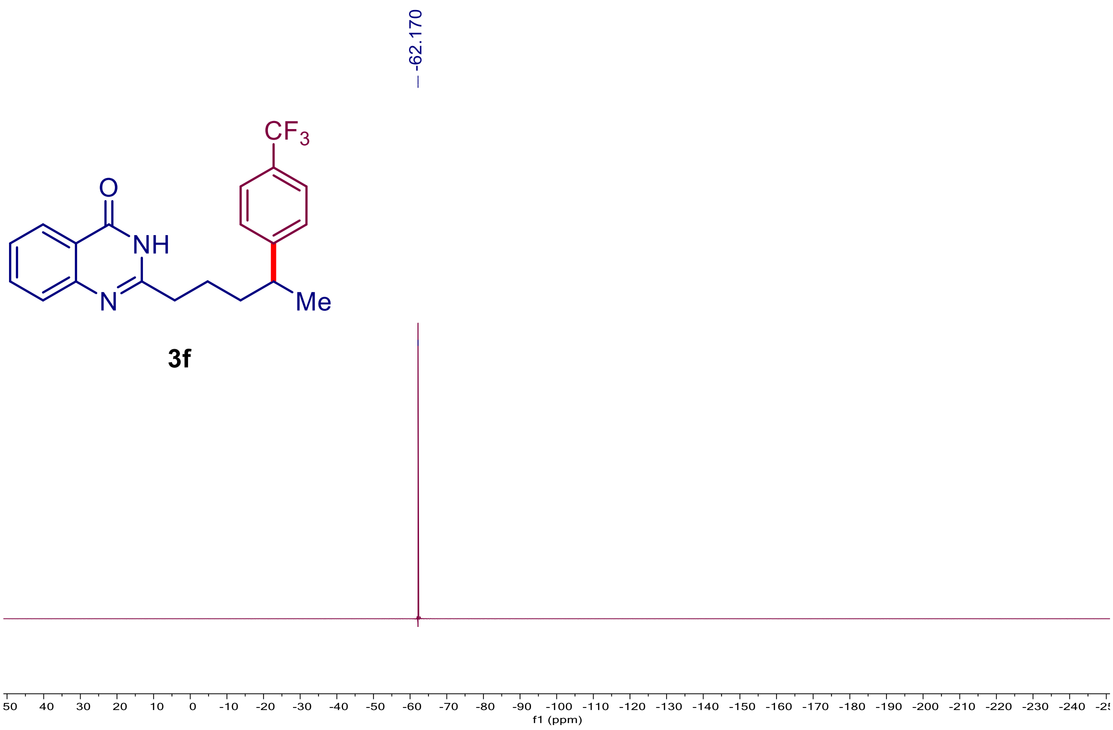
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3e**

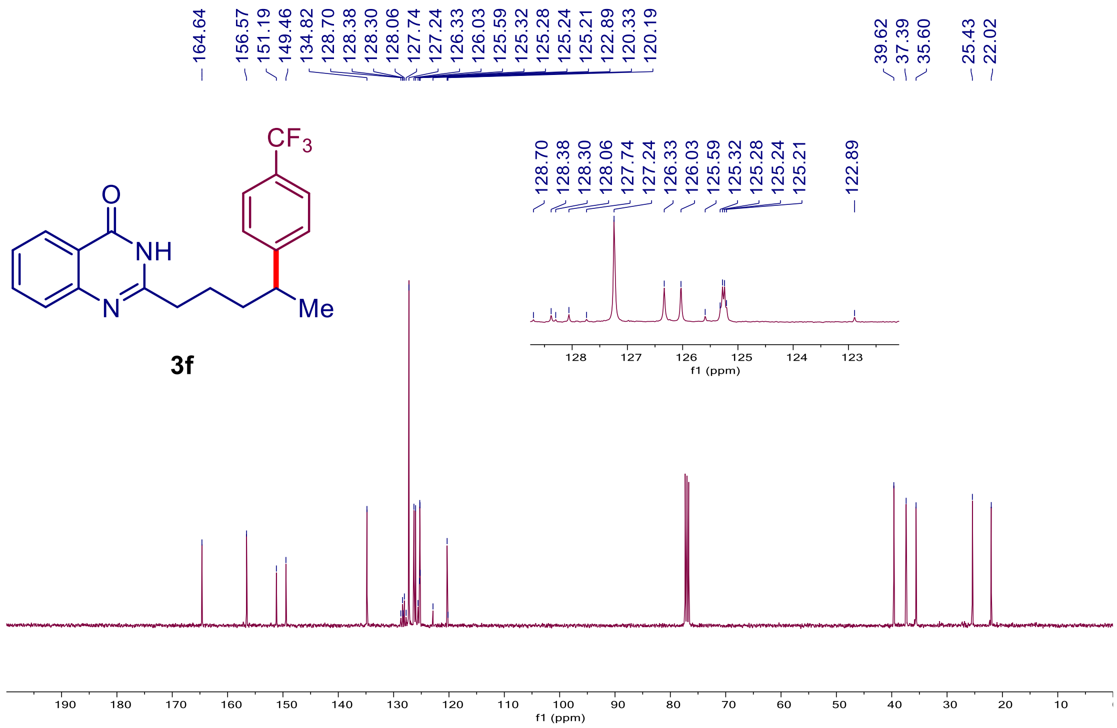




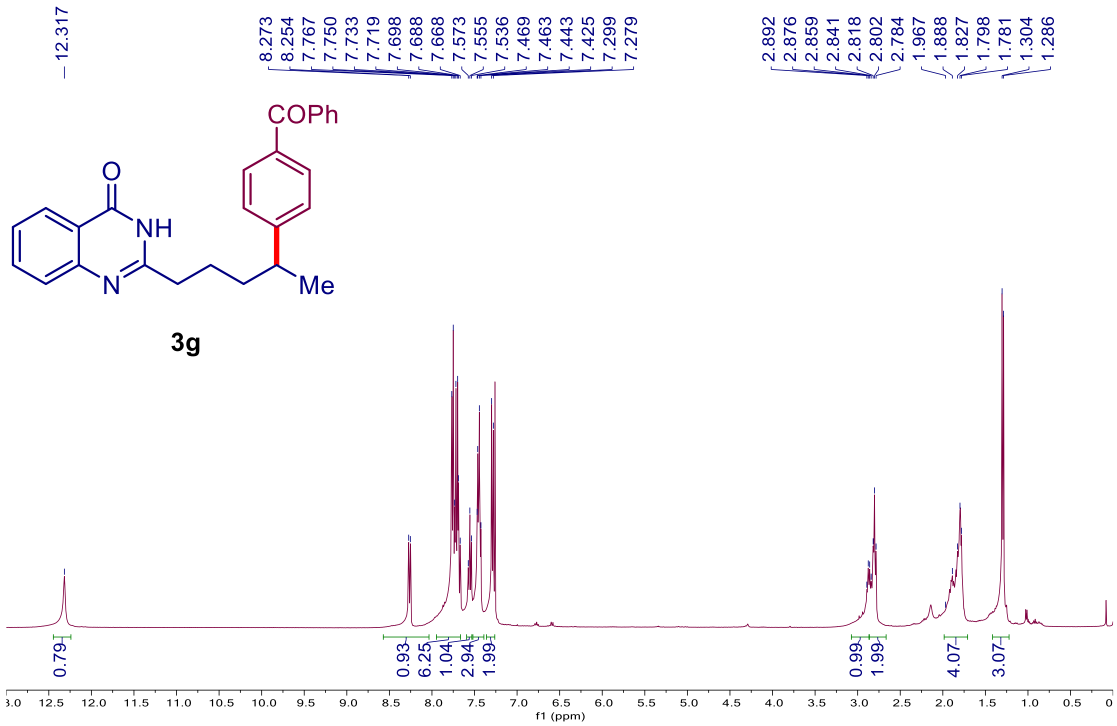
[1]H NMR (400 MHz, $CDCl_3$), [19]F NMR (376 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3f**

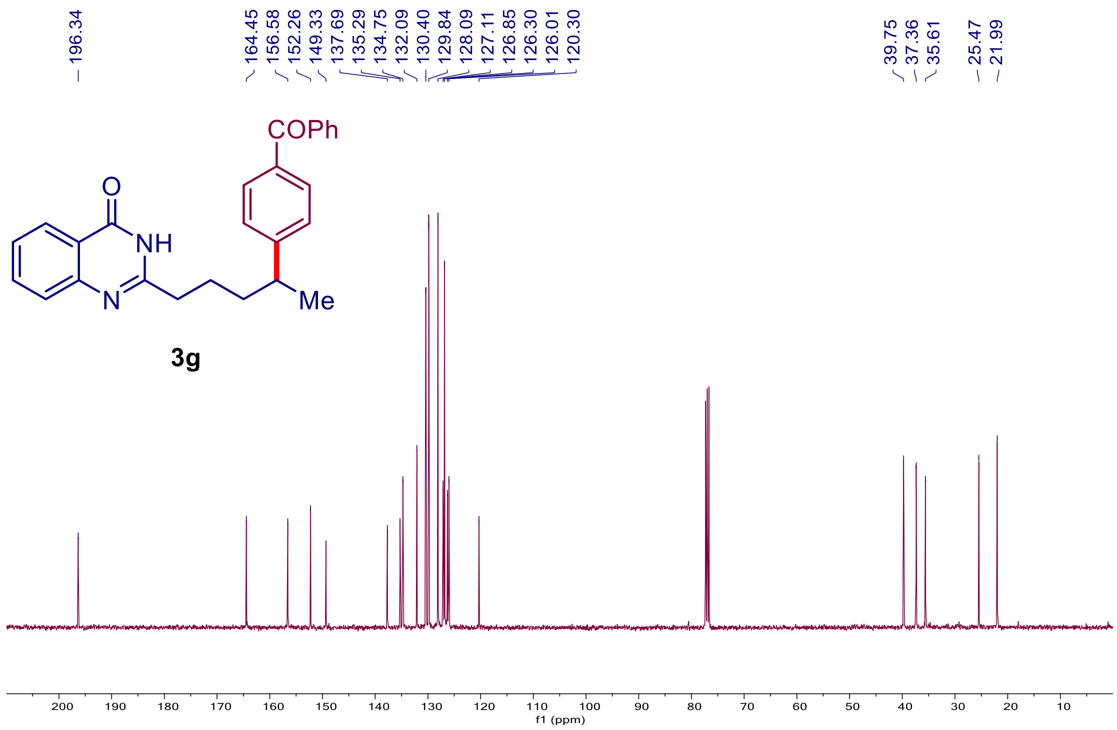




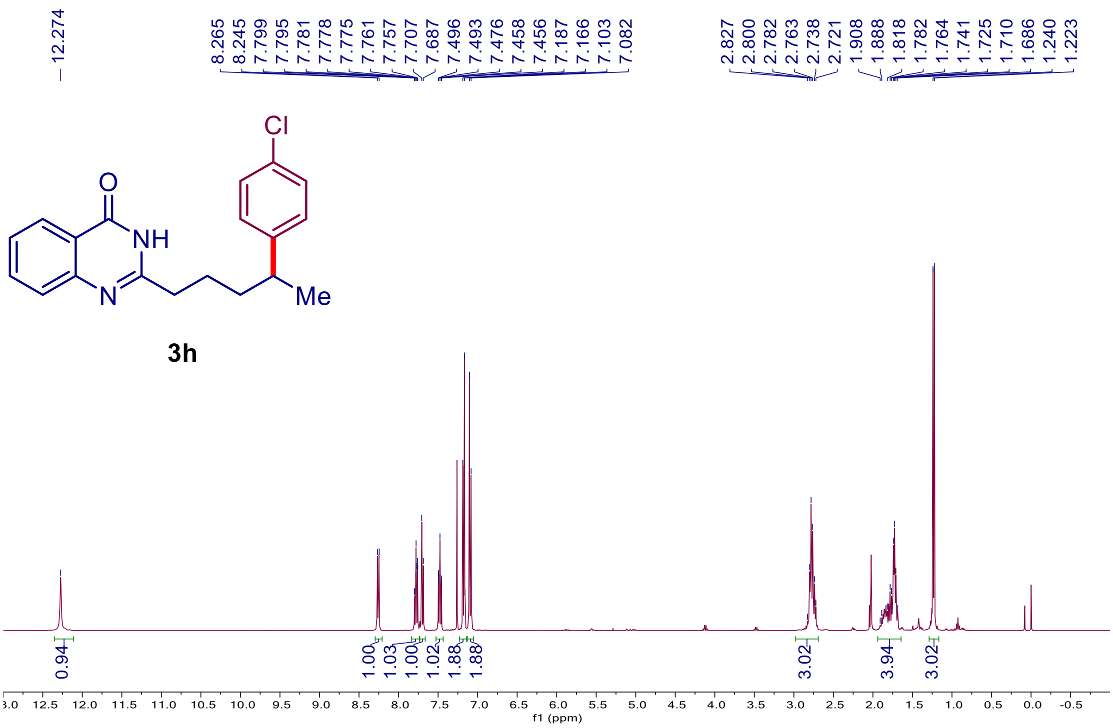

164.64
156.57
151.19
149.46
134.82
128.70
128.38
128.30
128.06
127.74
127.24
126.33
126.03
125.59
125.32
125.28
125.24
125.21
122.89
120.33
120.19
39.62
37.39
35.60
25.43
22.02
CF3
O
NH
N
Me
3f
122.89
f1 (ppm)
f1 (ppm)

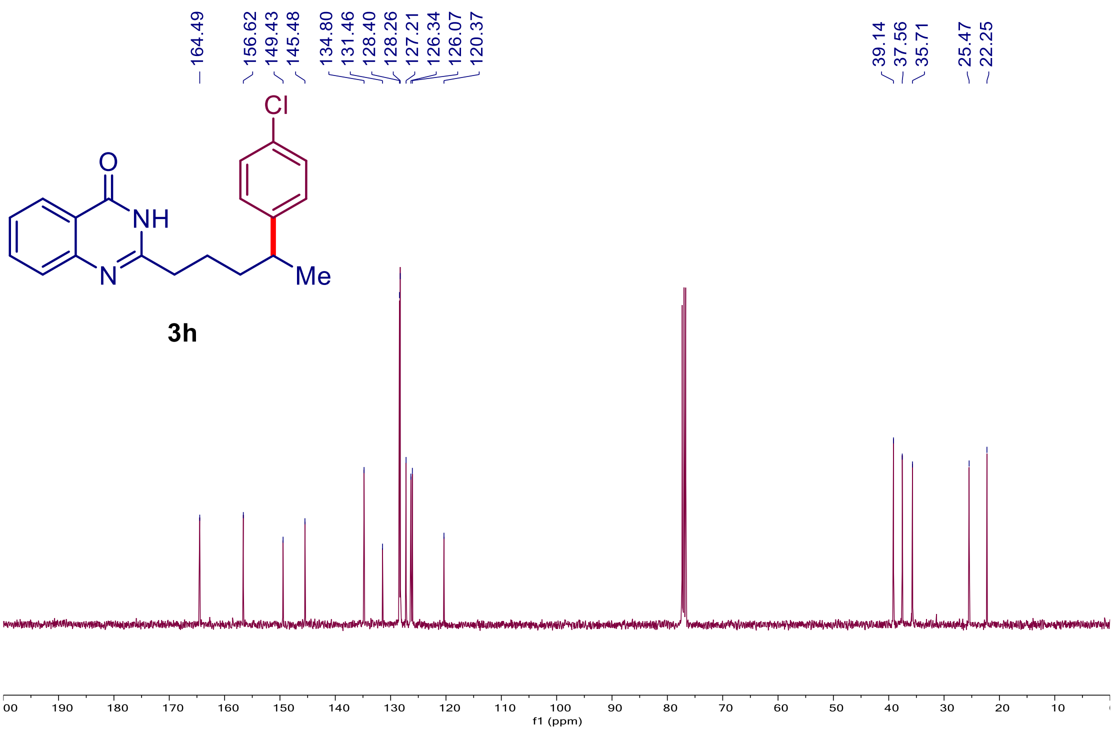
[1]H NMR (400 MHz, CDCl3) and [13]C NMR (100 MHz, CDCl3) spectra of product **3g**



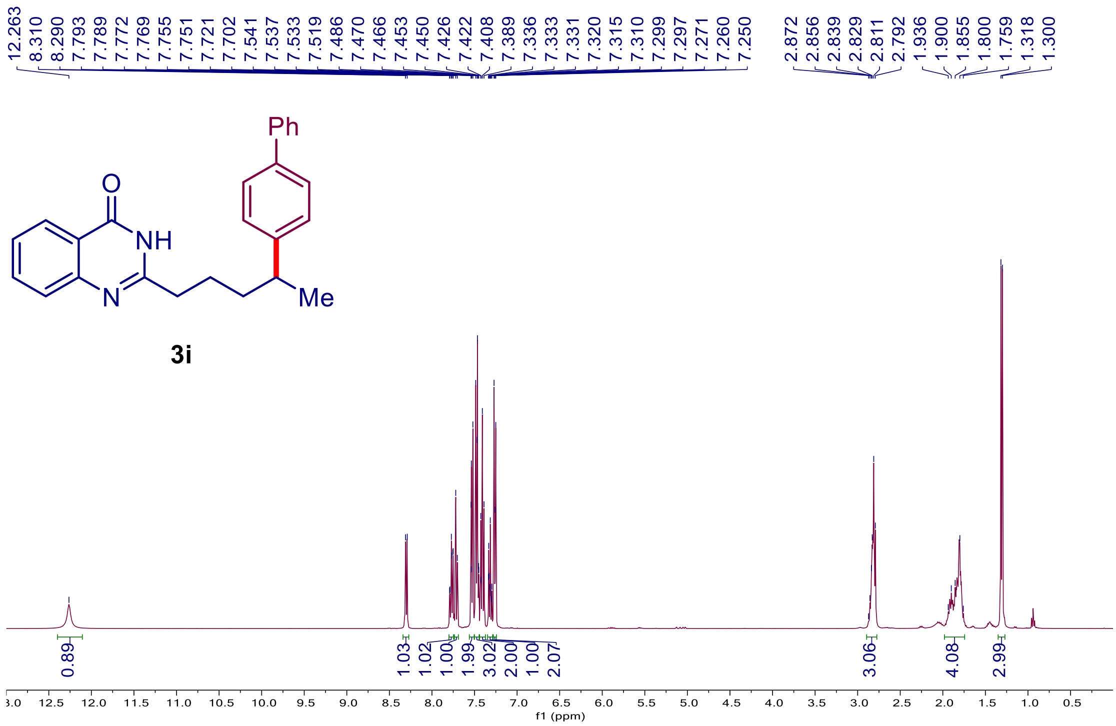


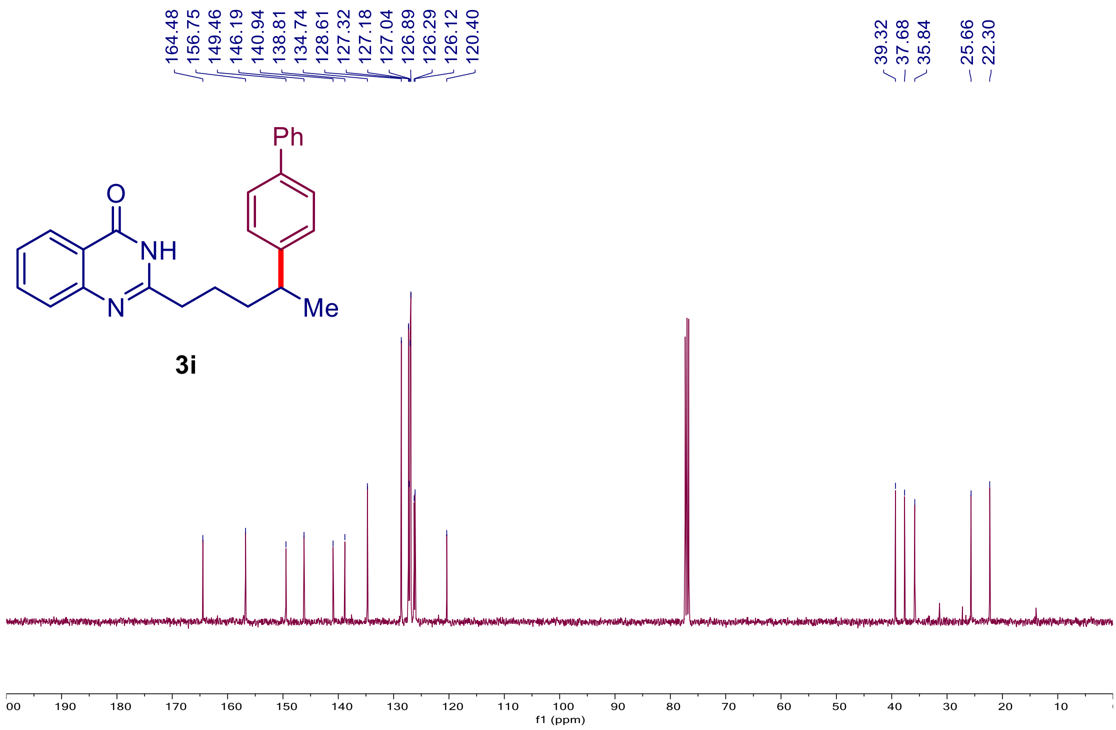
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3h**



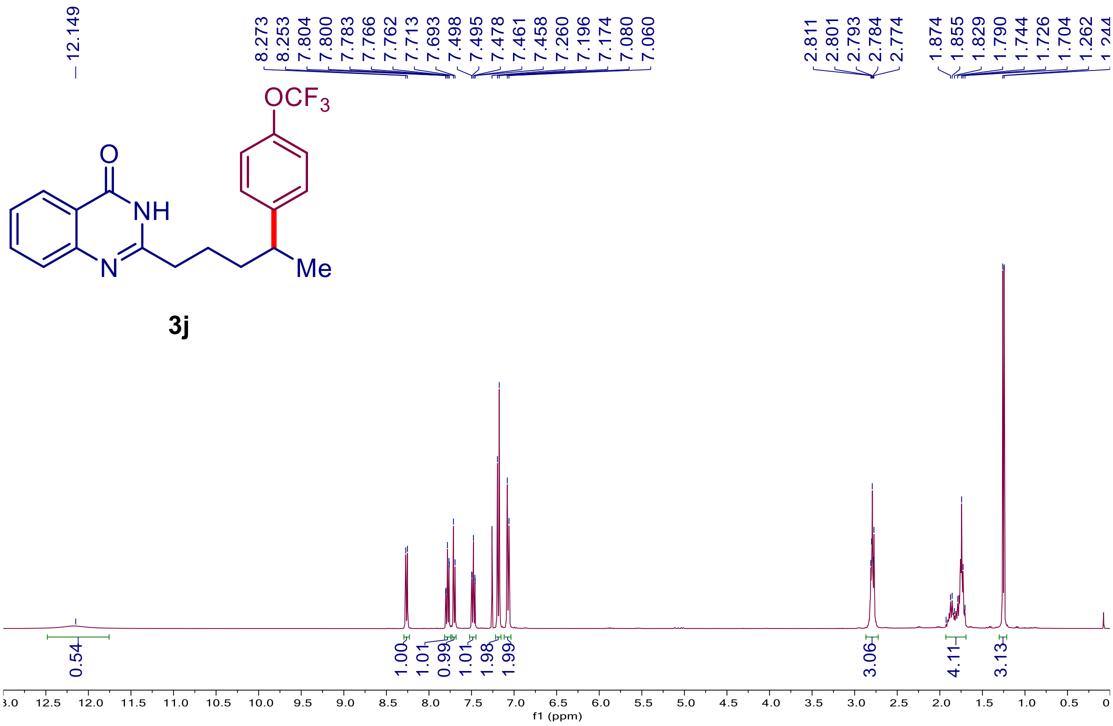


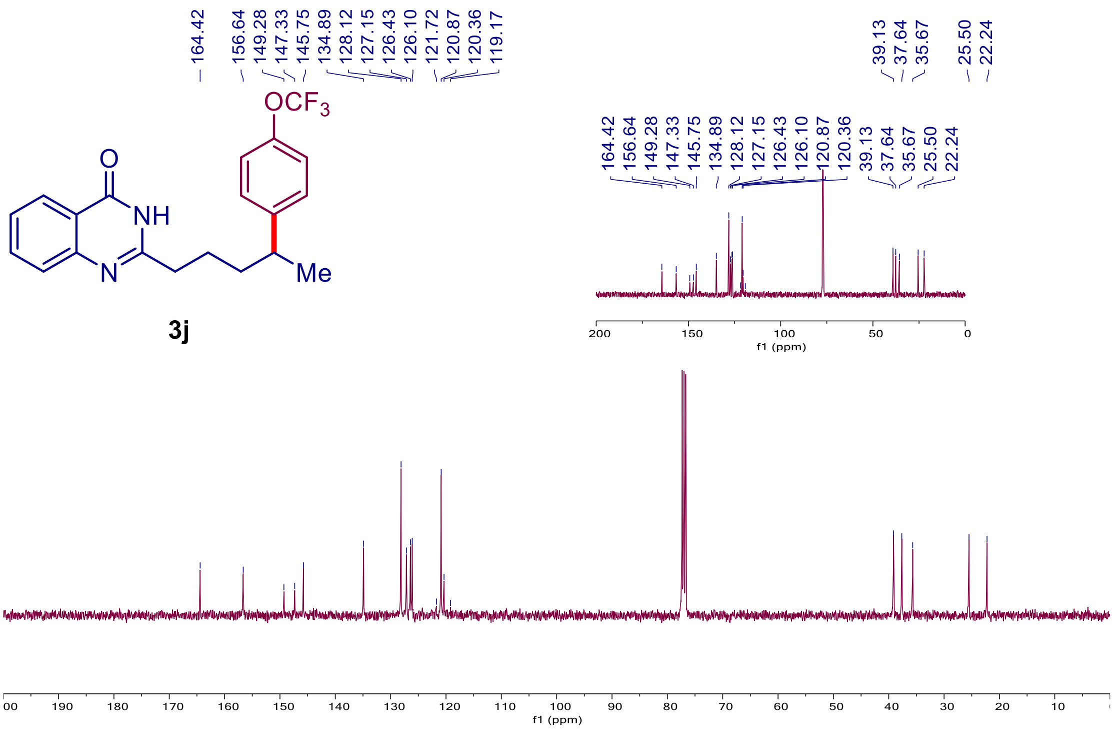
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3i**



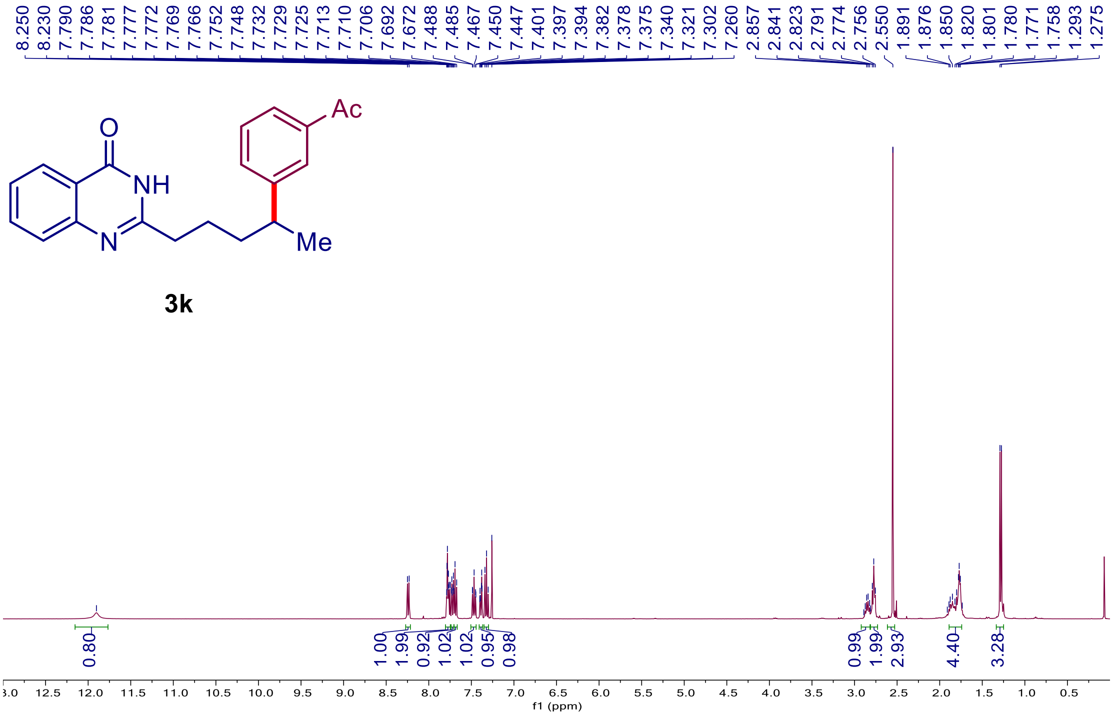


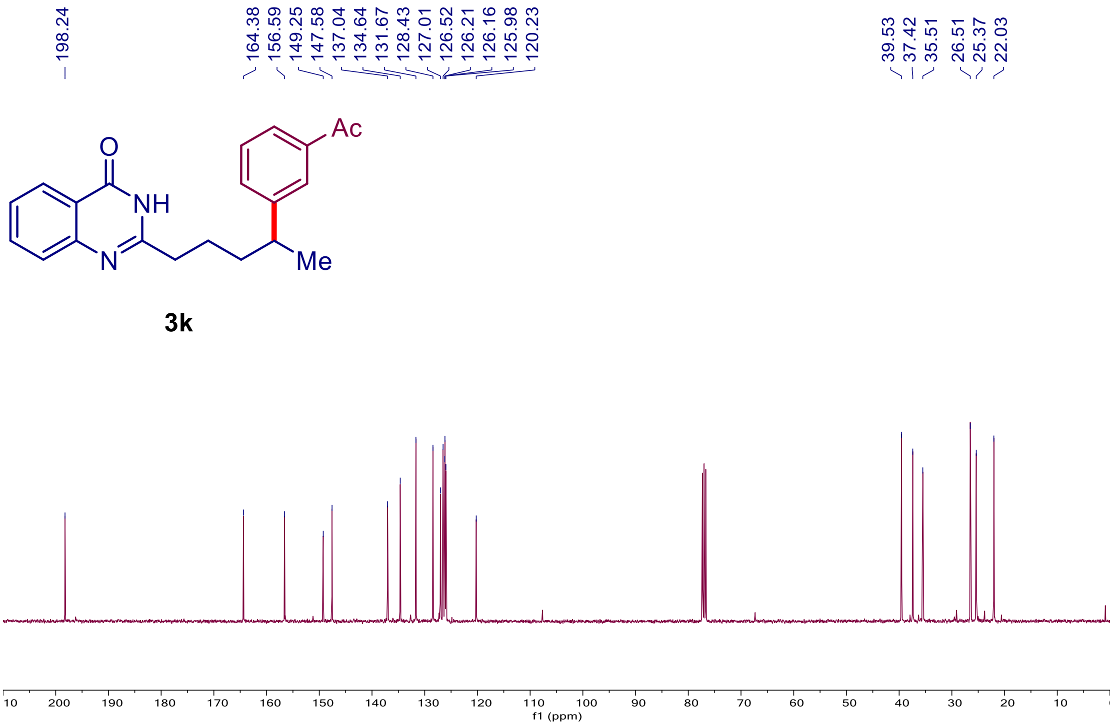
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3j**



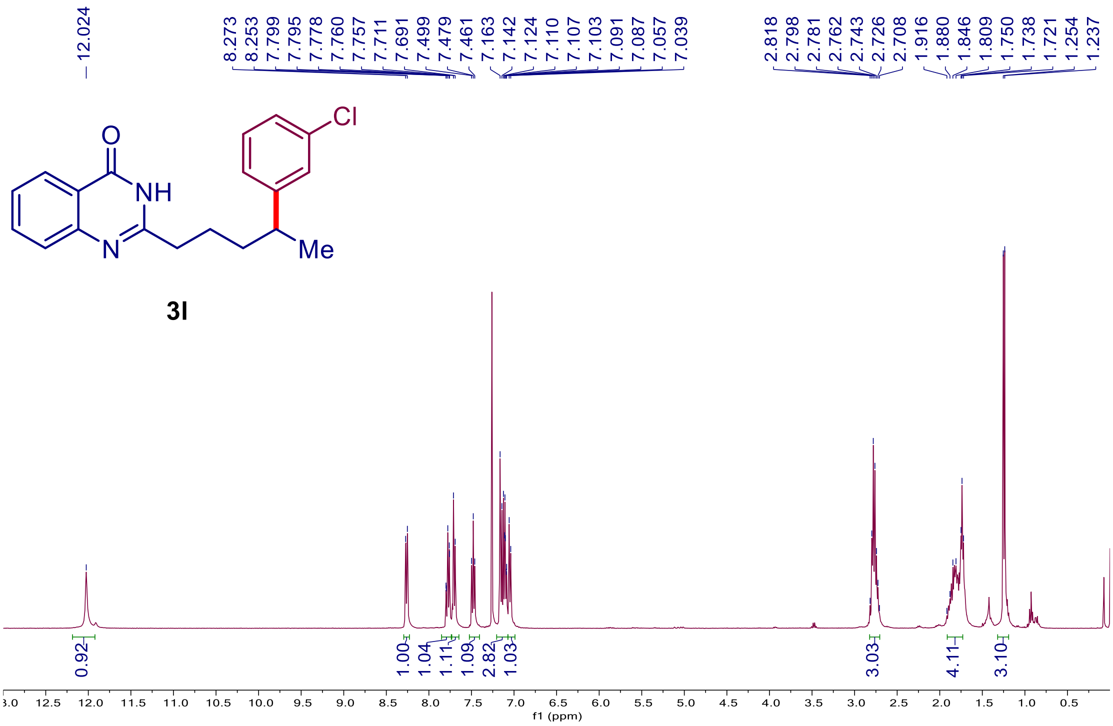


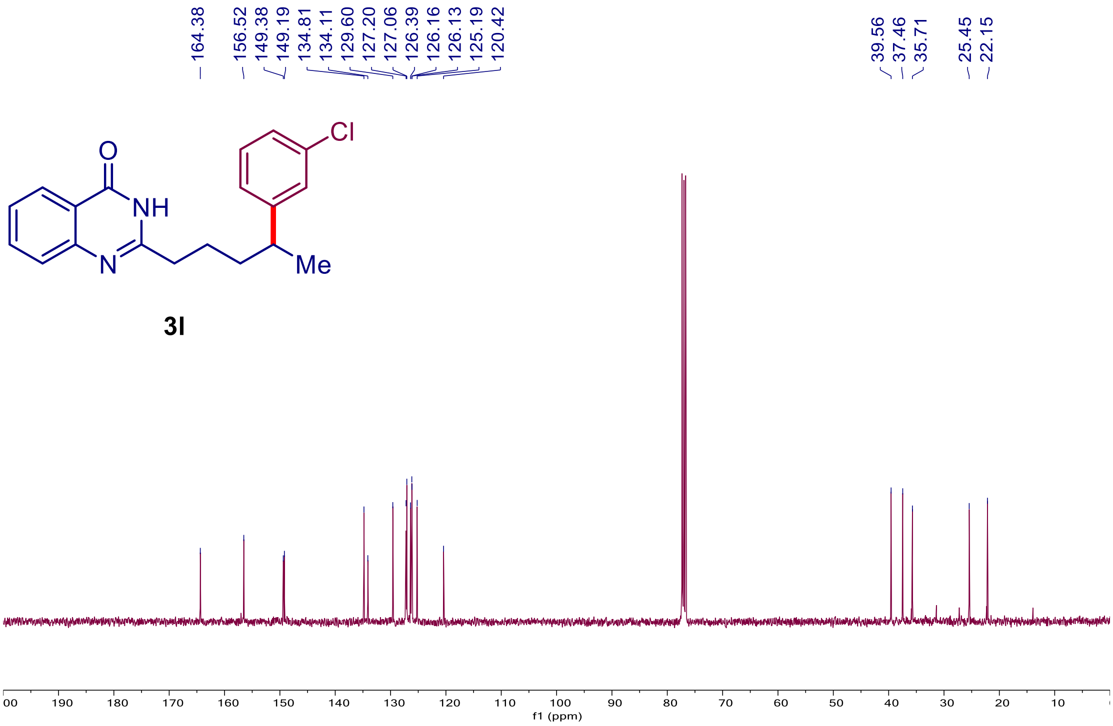
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3k**



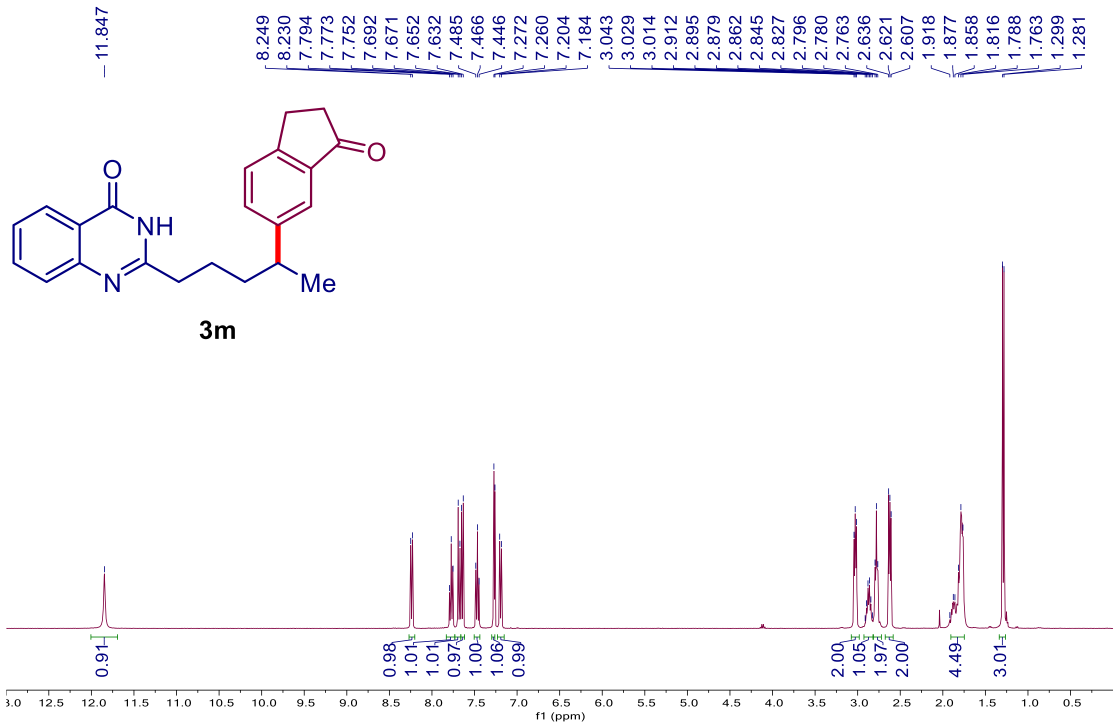


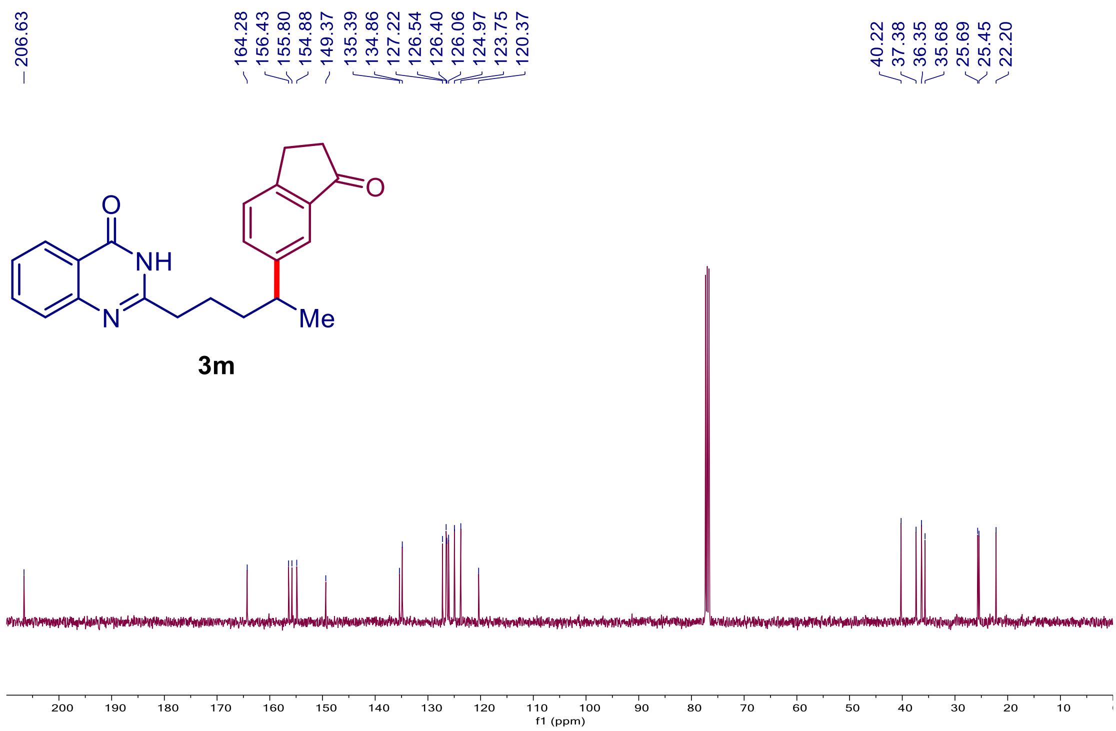
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3l**



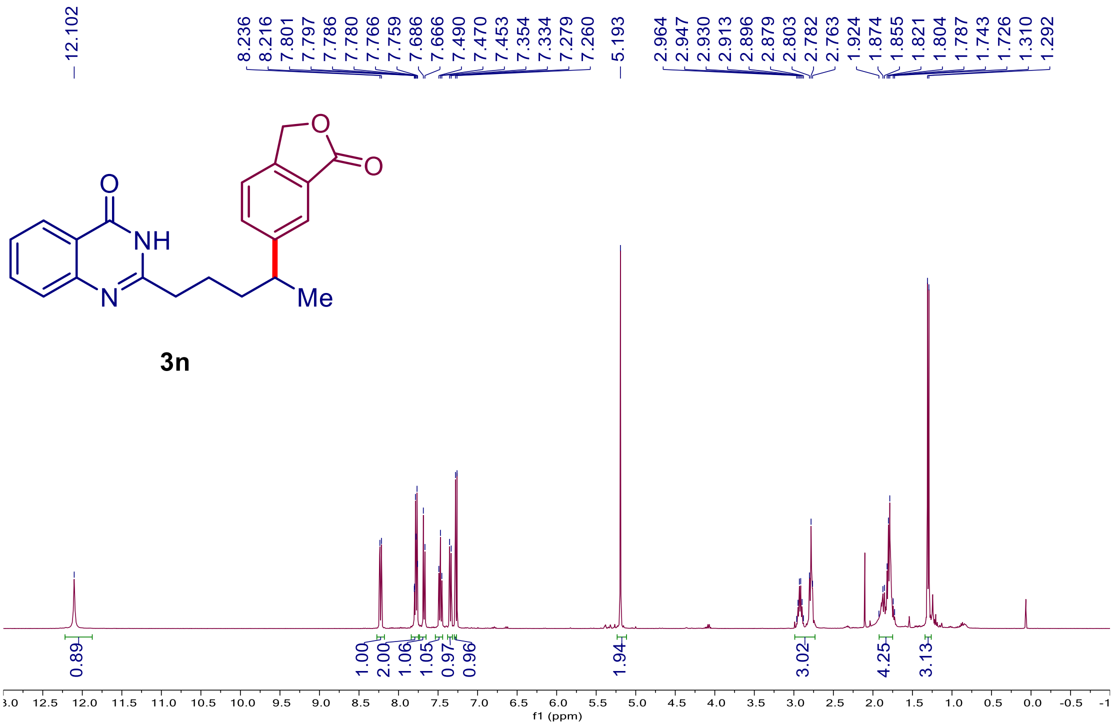


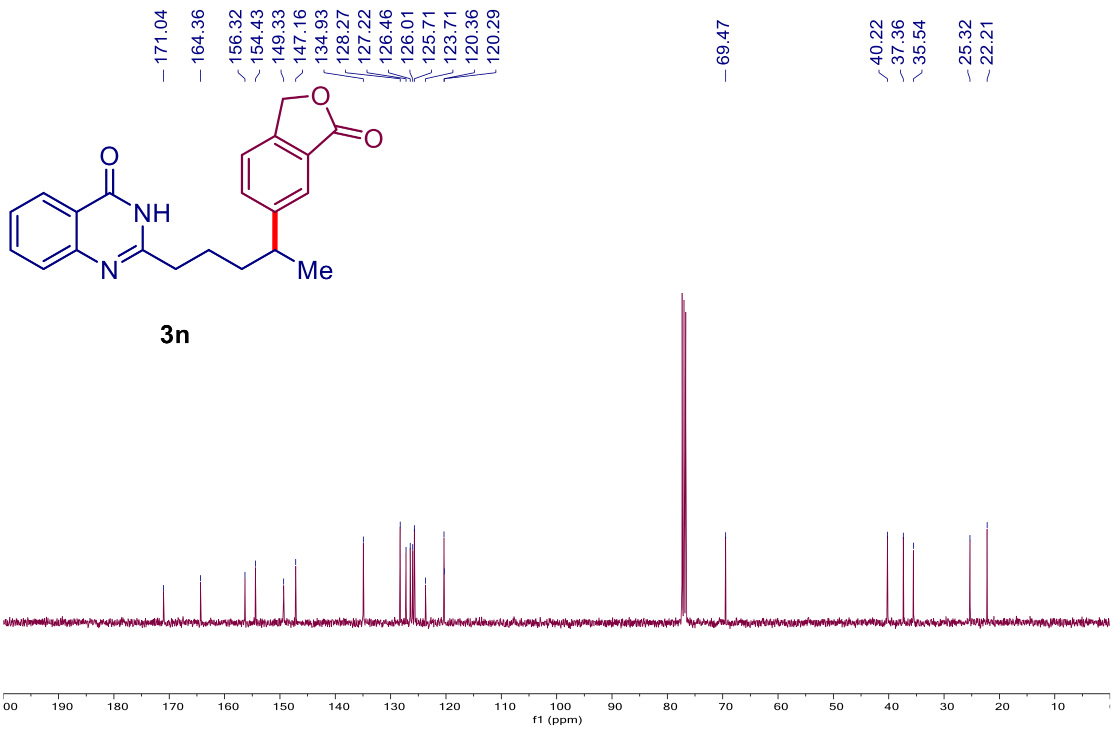
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3m**



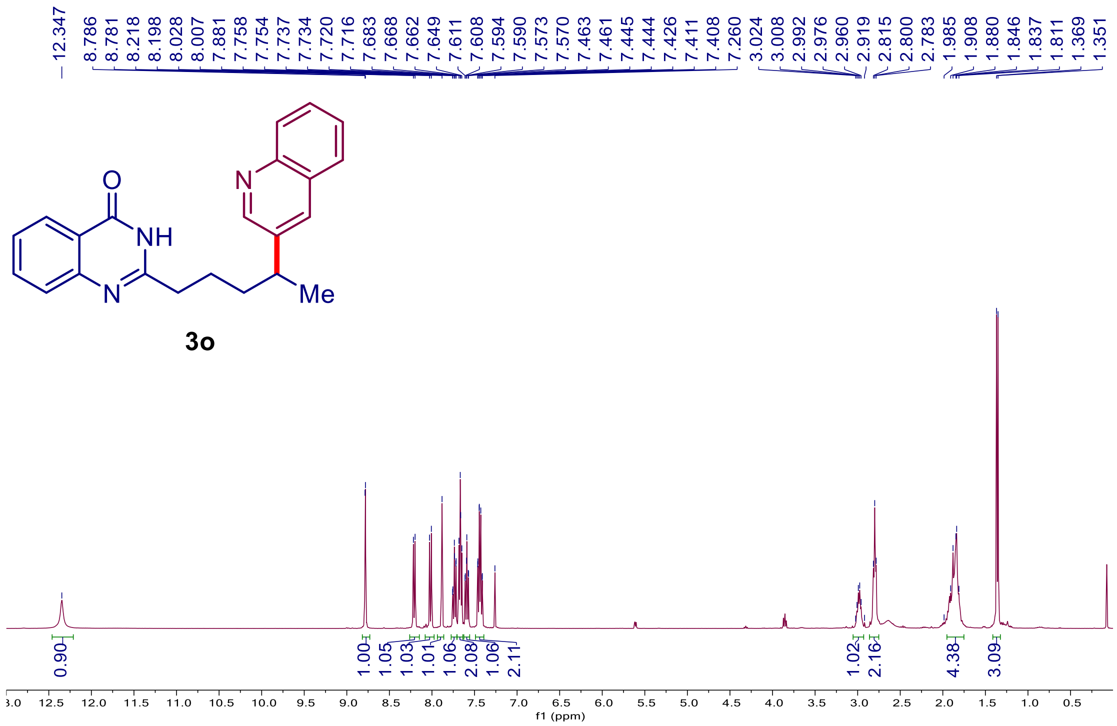


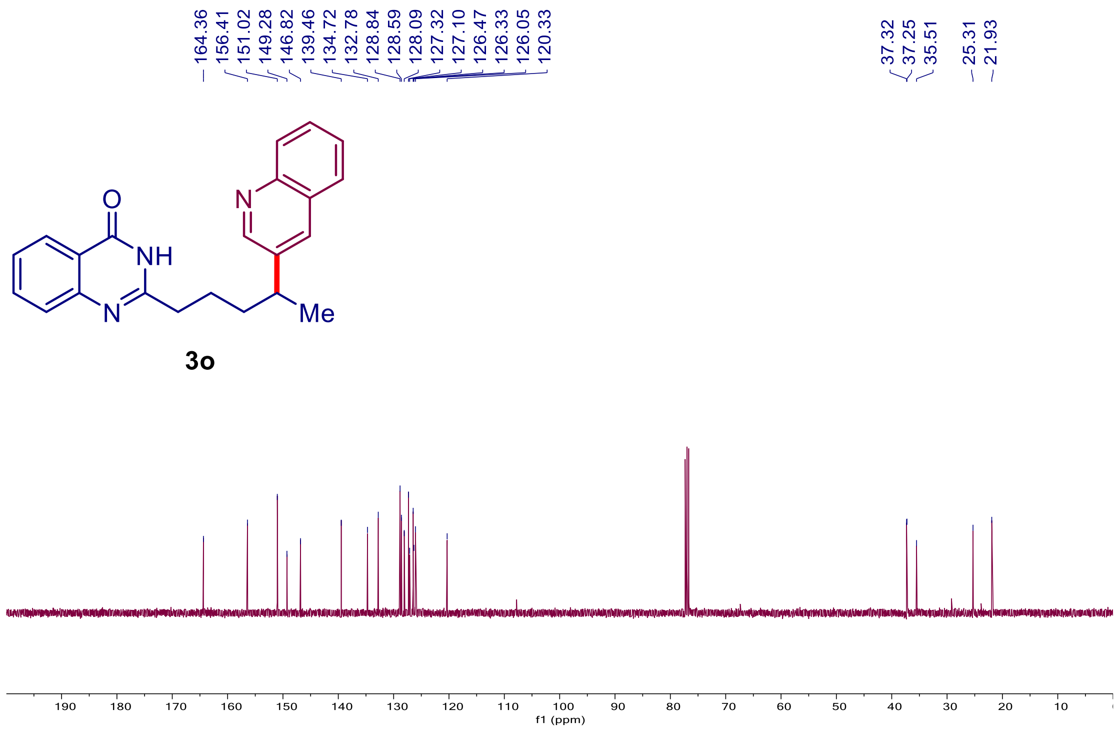
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3n**



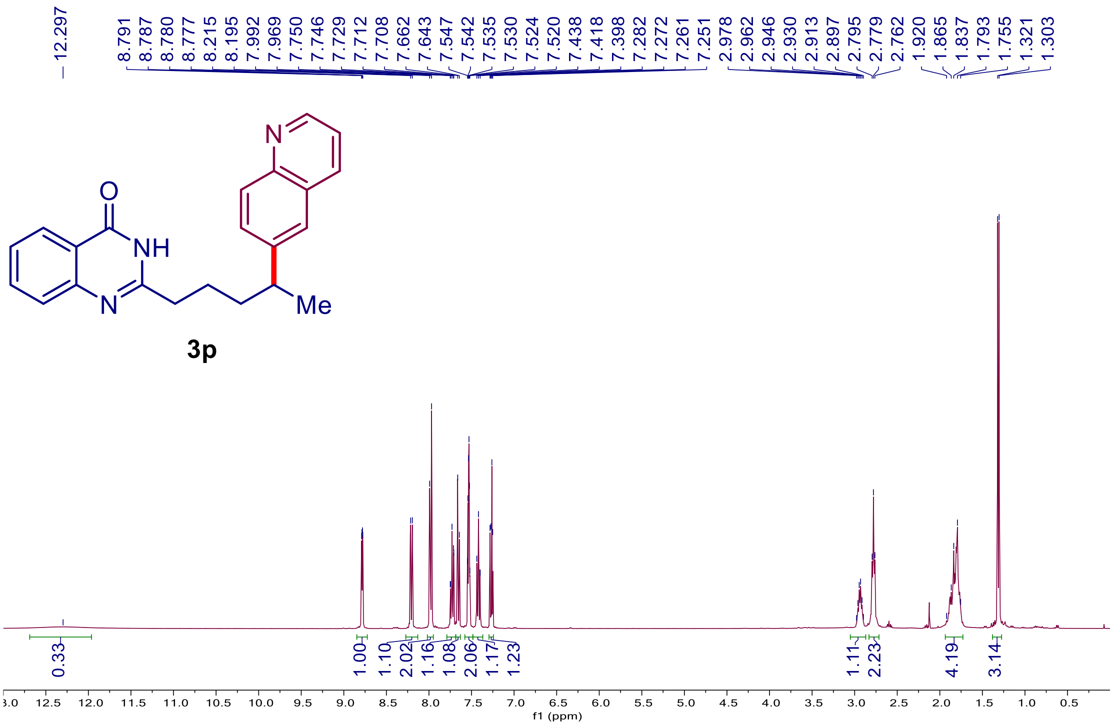


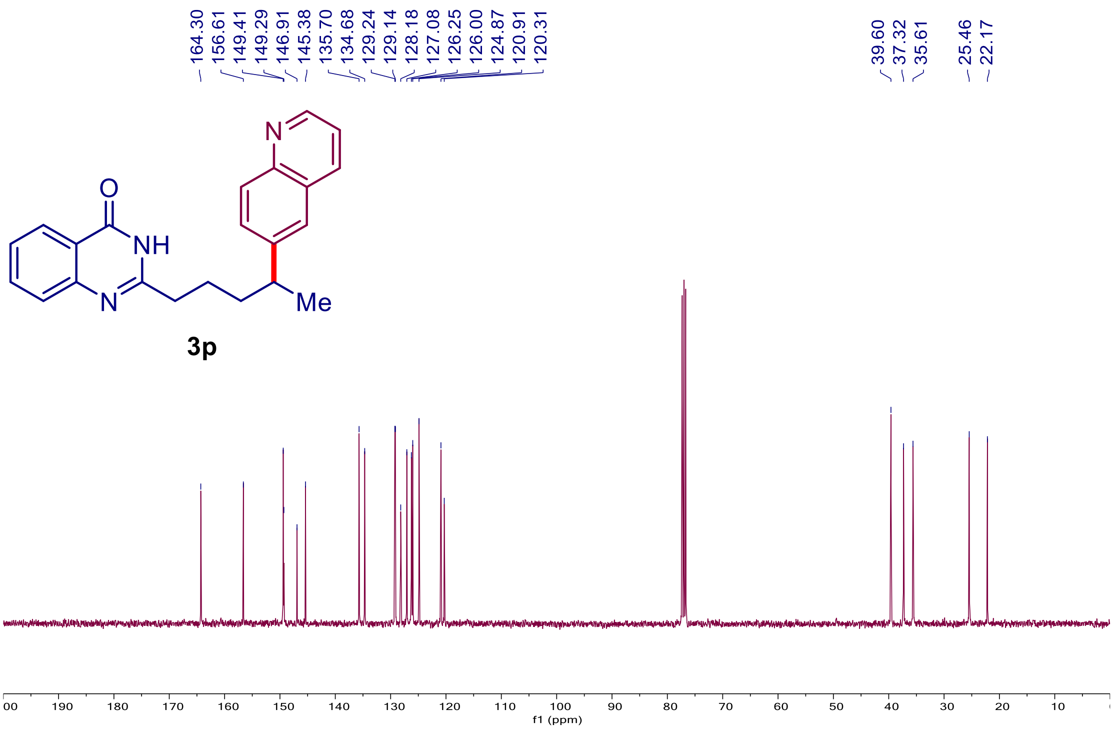
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3o**



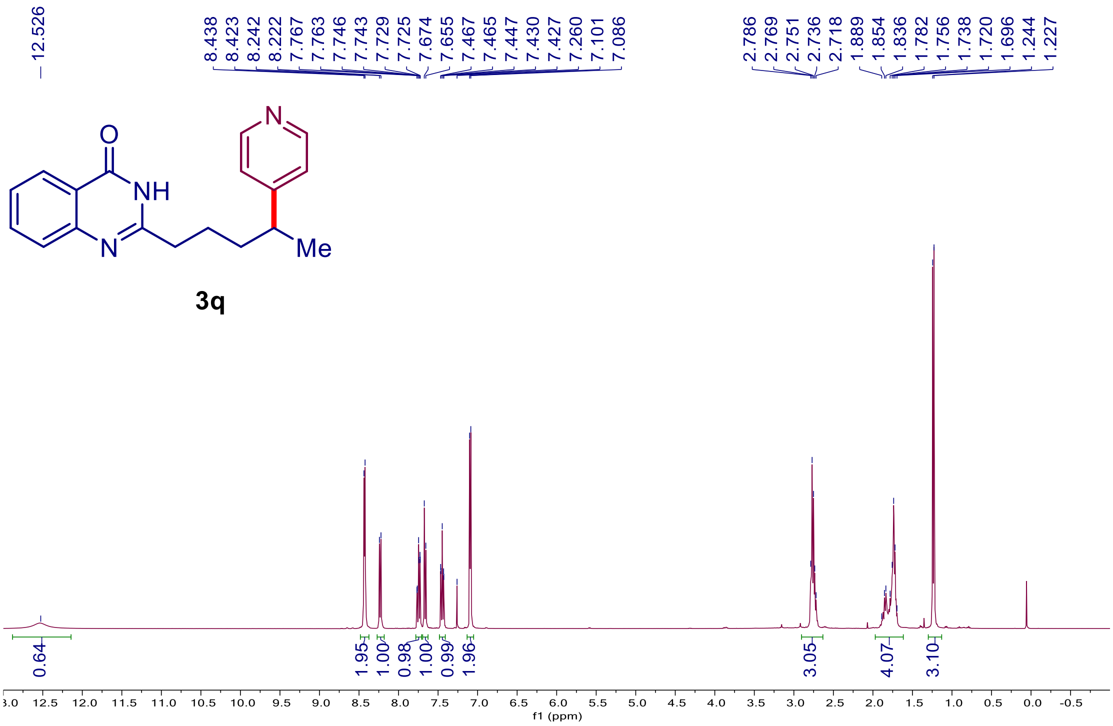


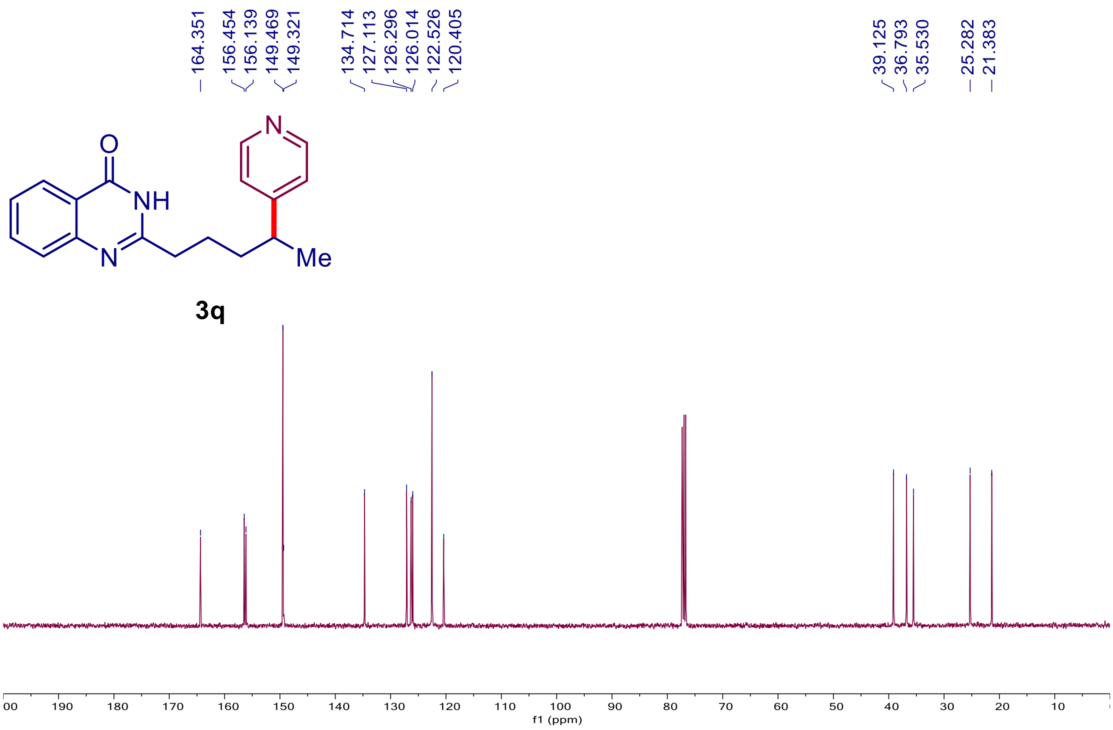
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3p**



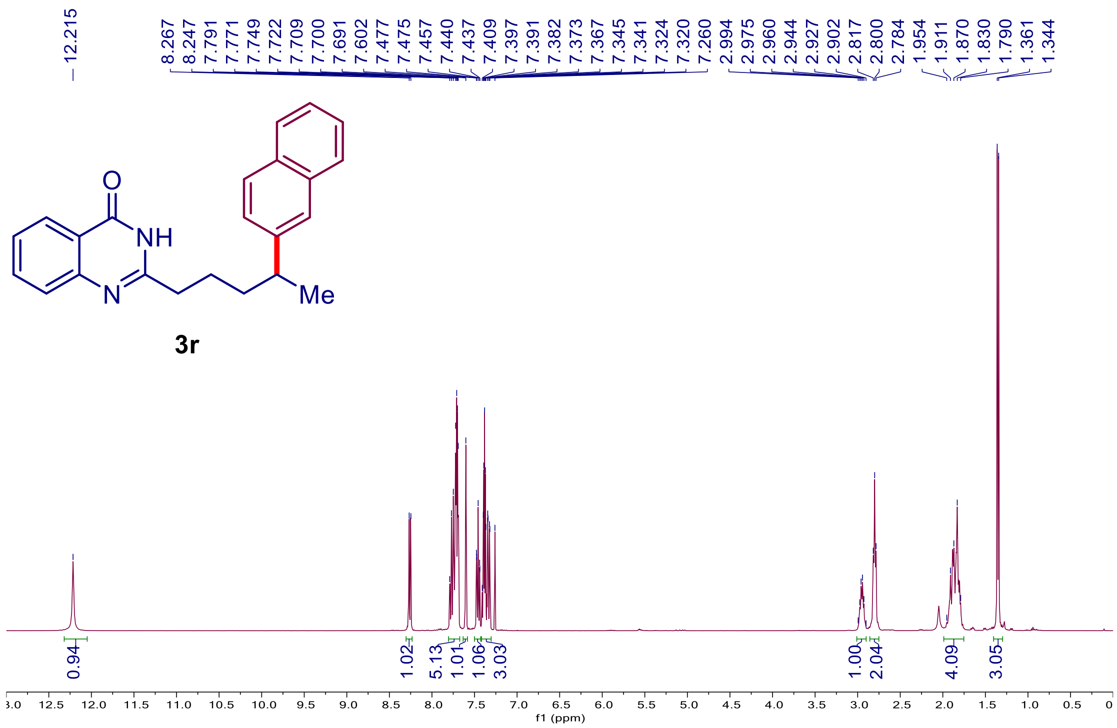


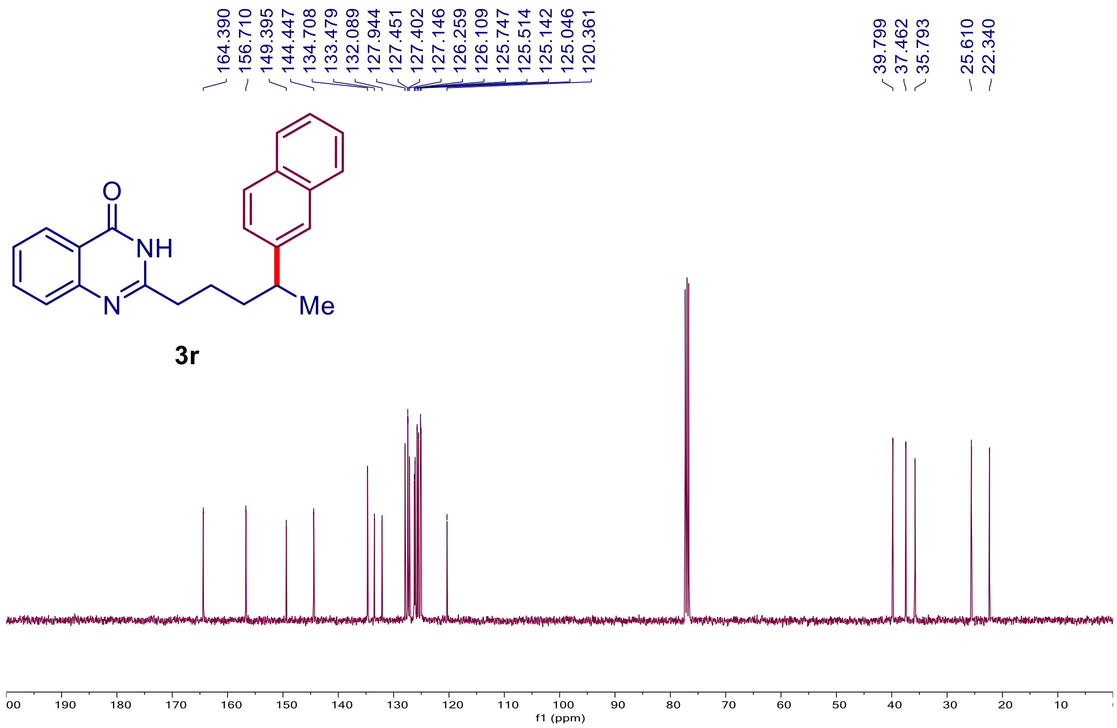
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3q**



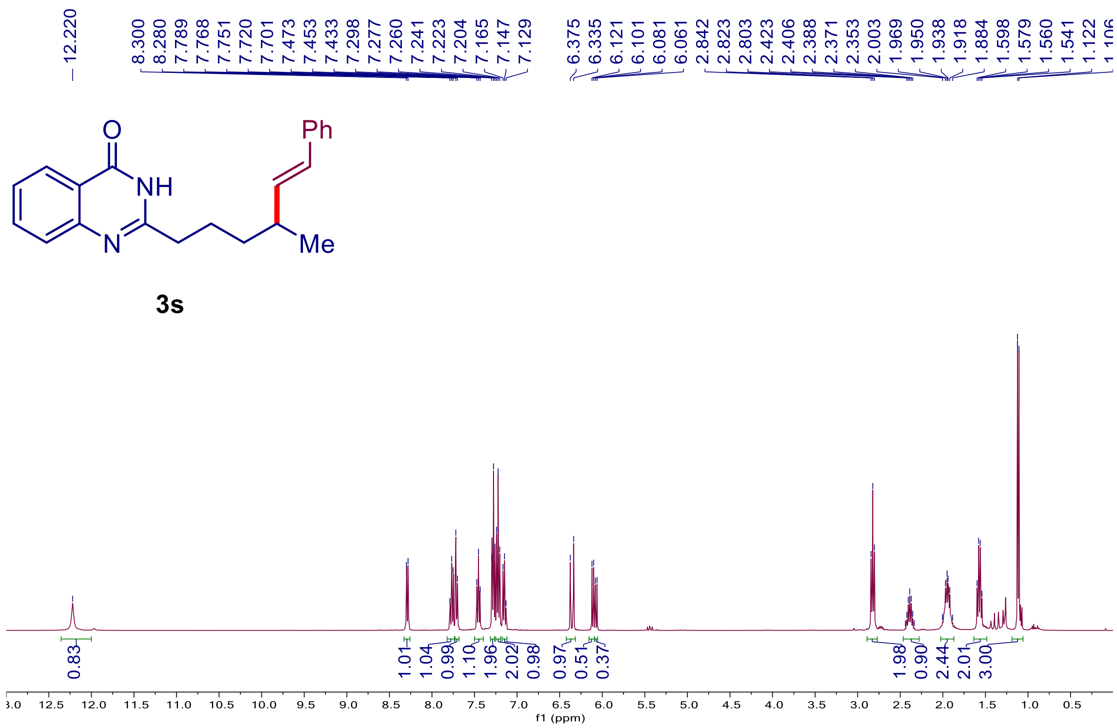


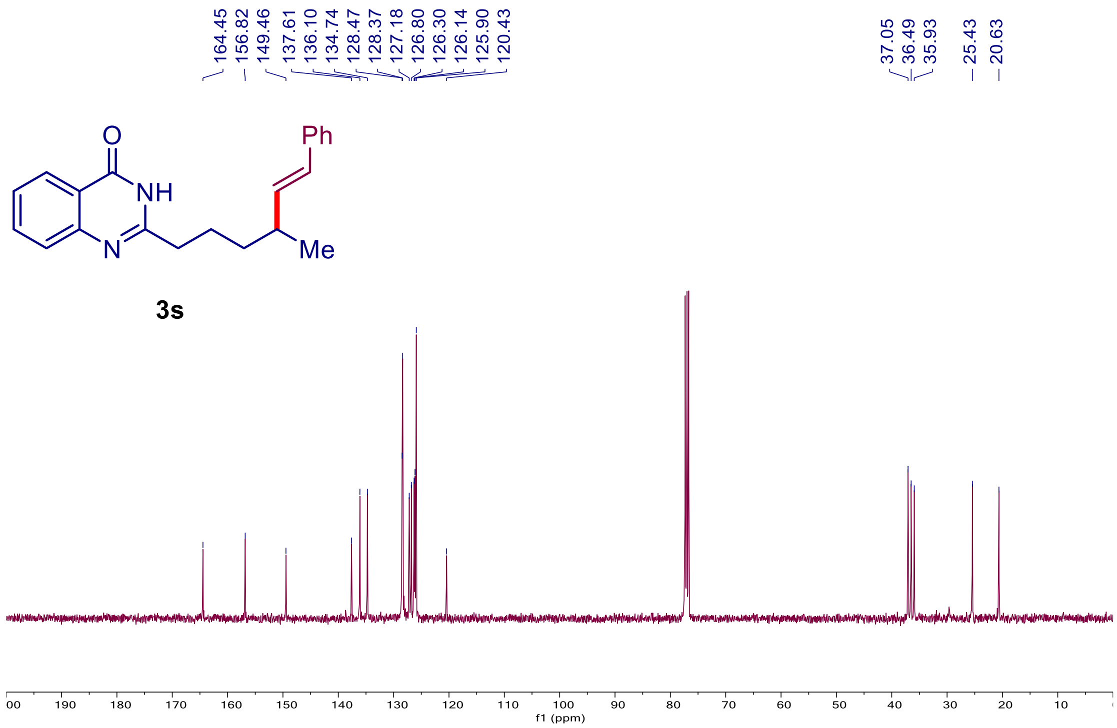
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3r**



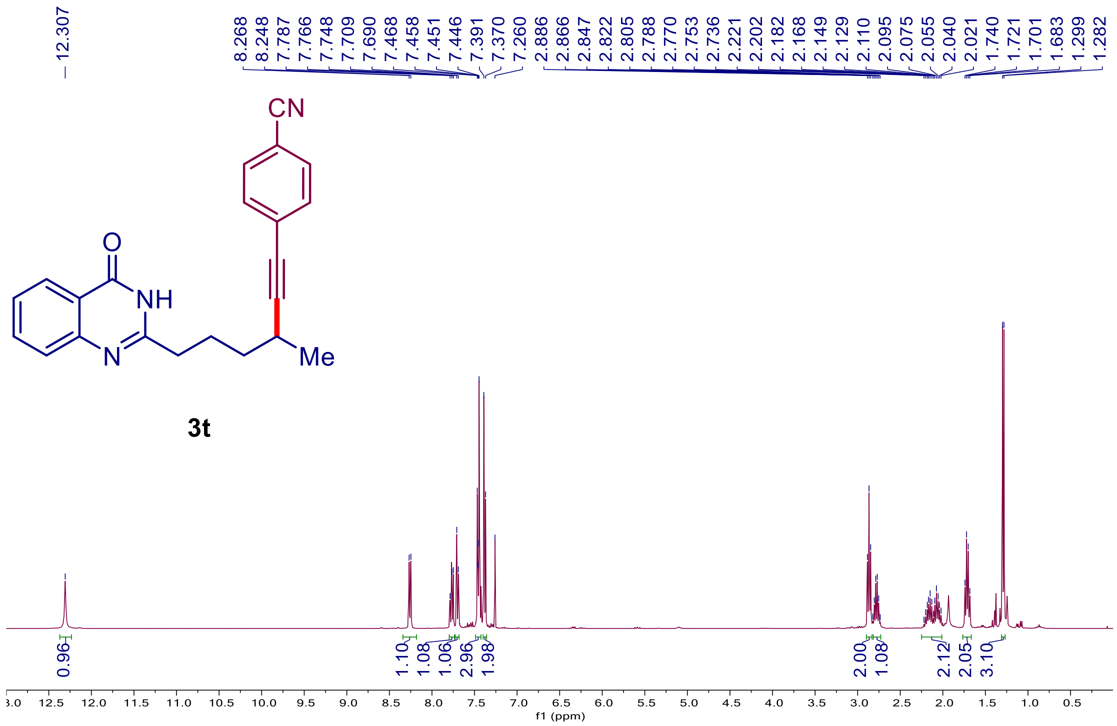


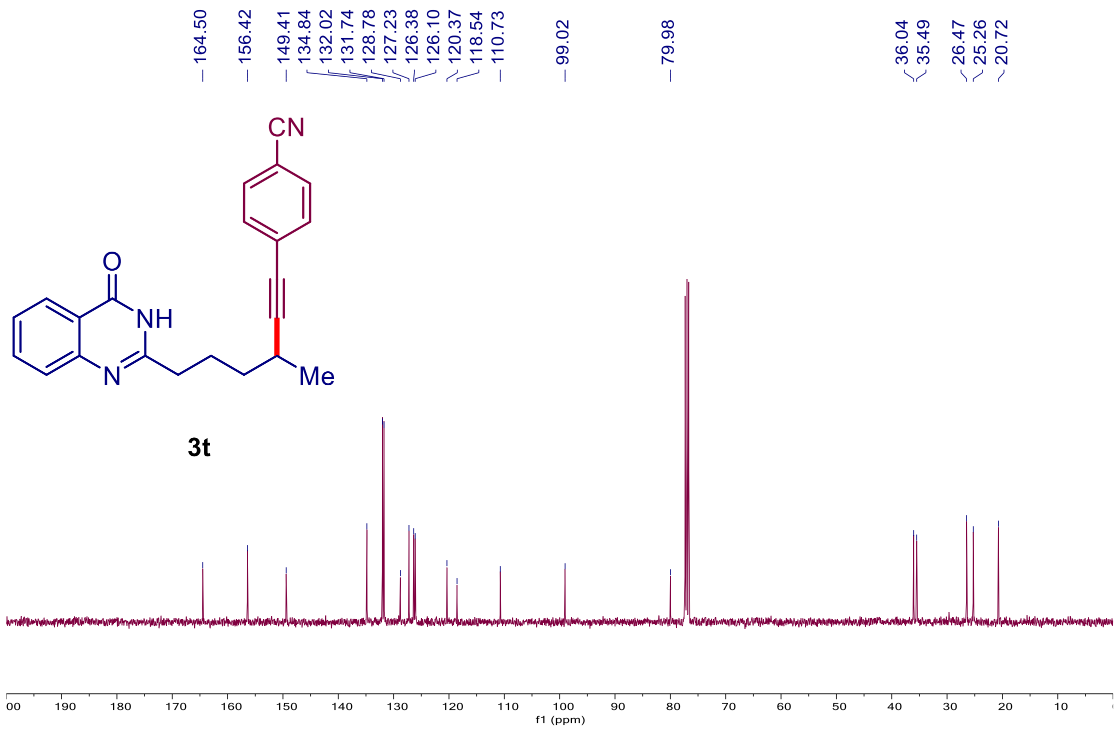
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3s**



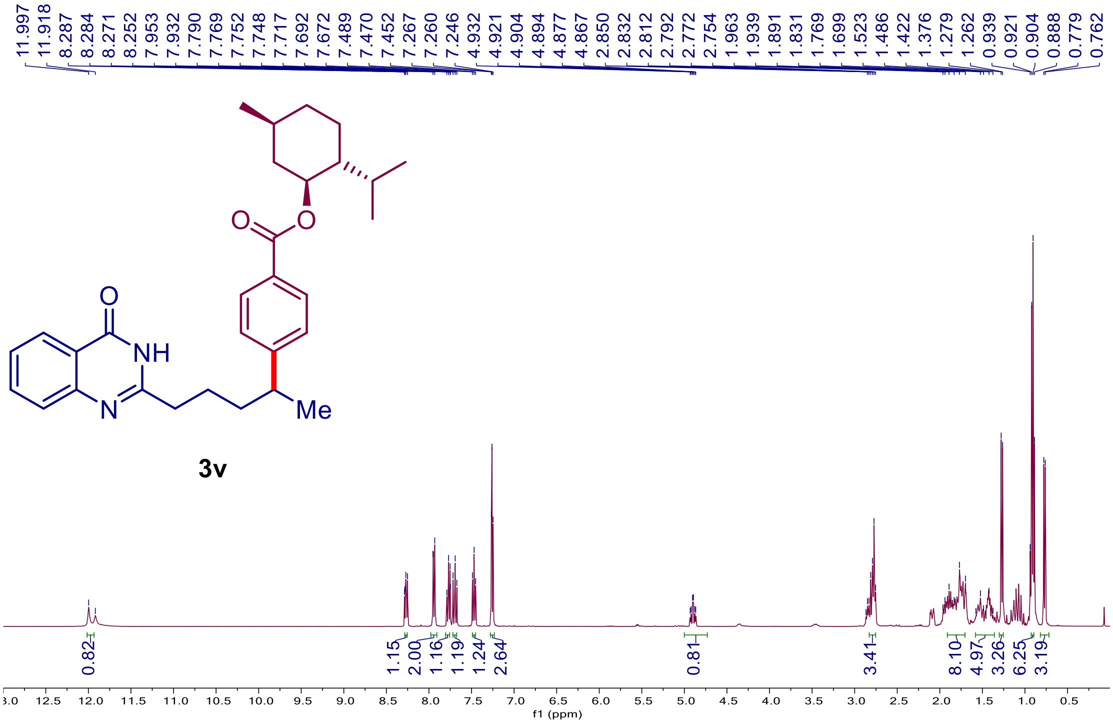


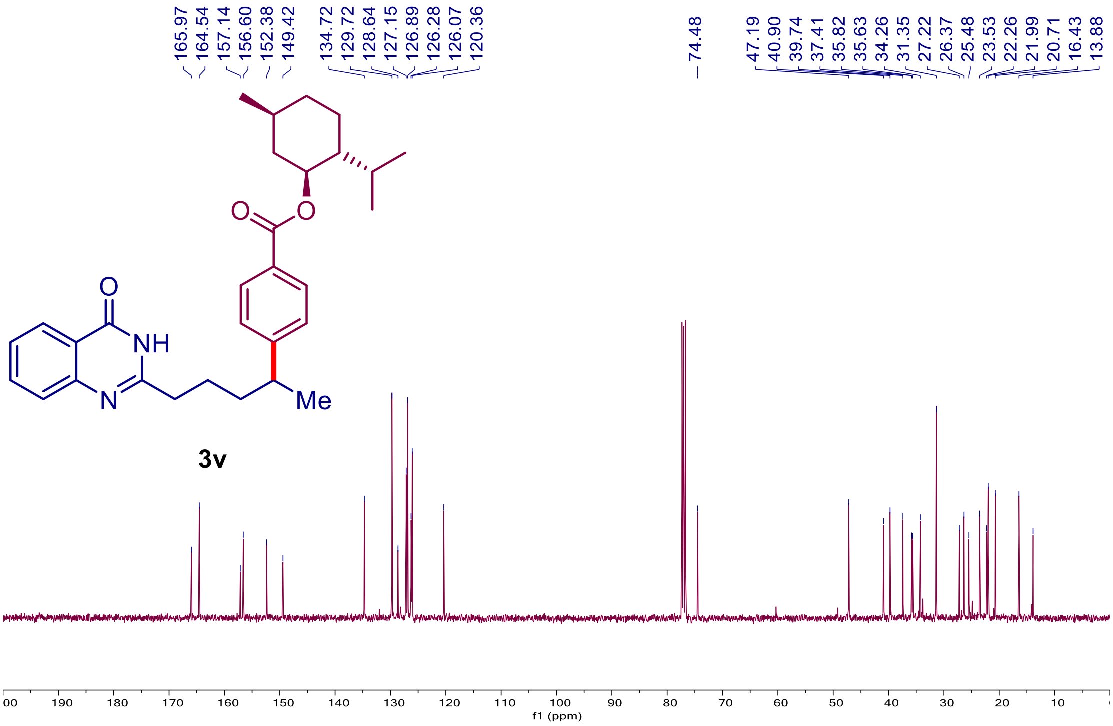
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3t**



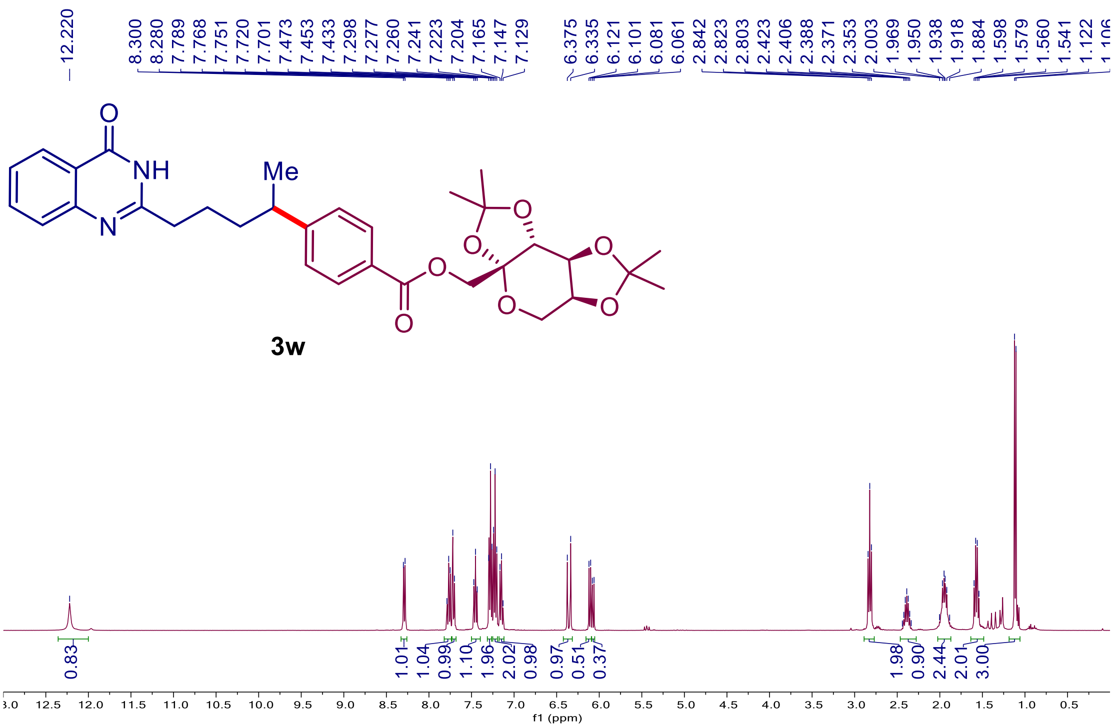


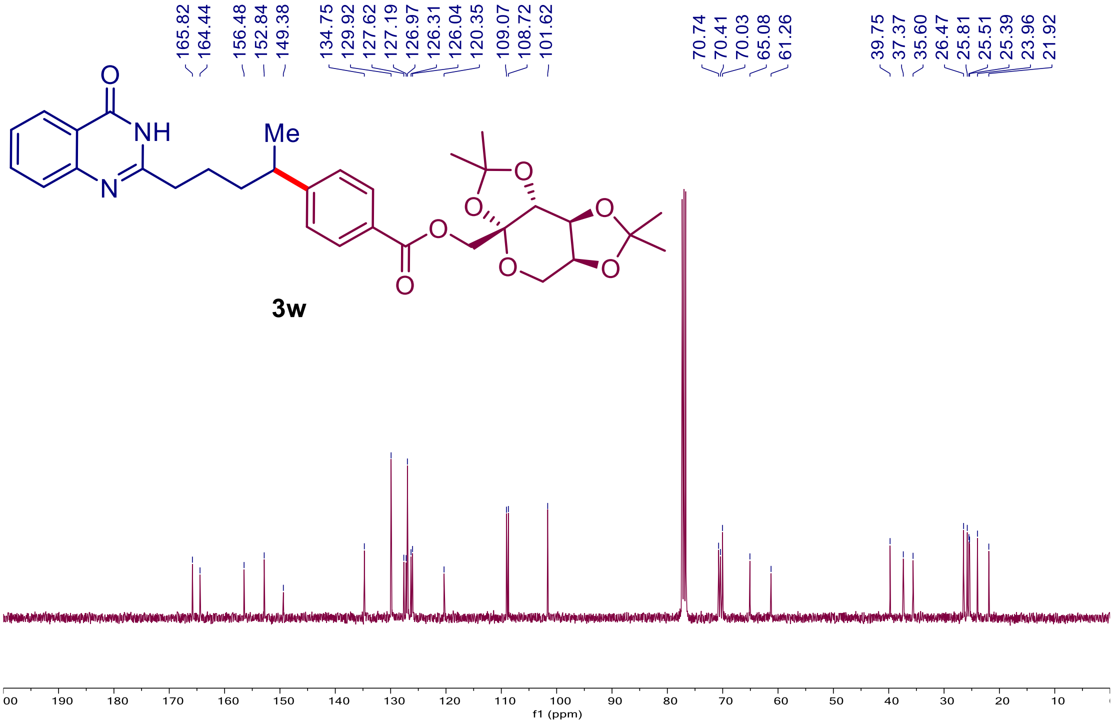
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3v**



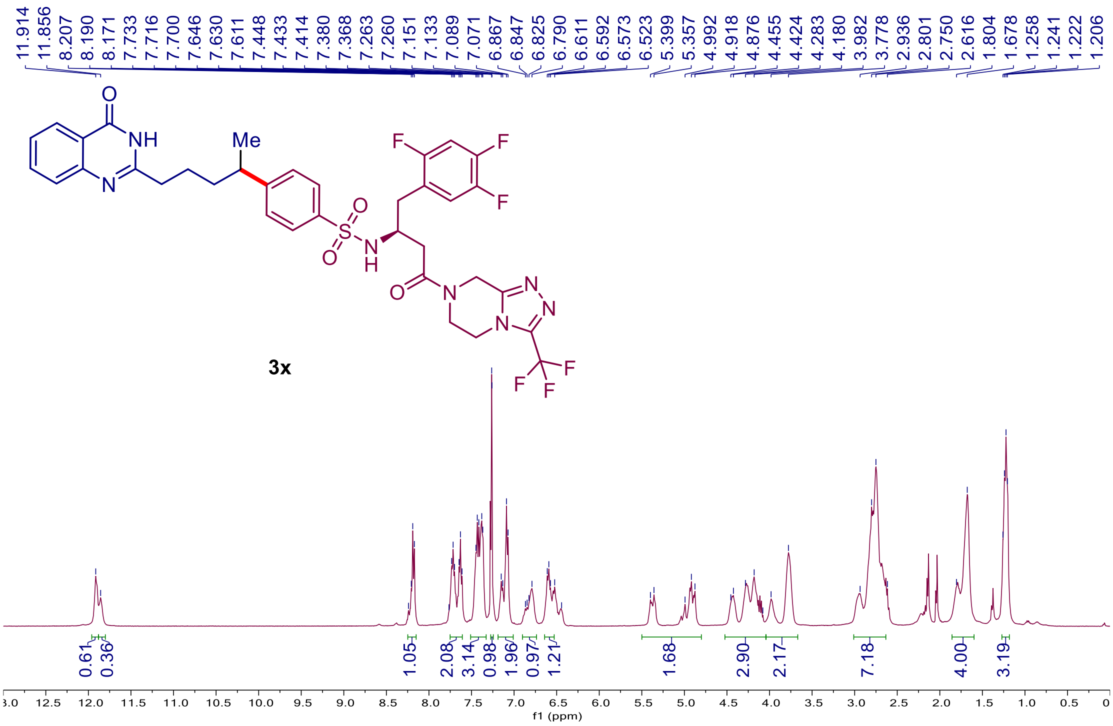


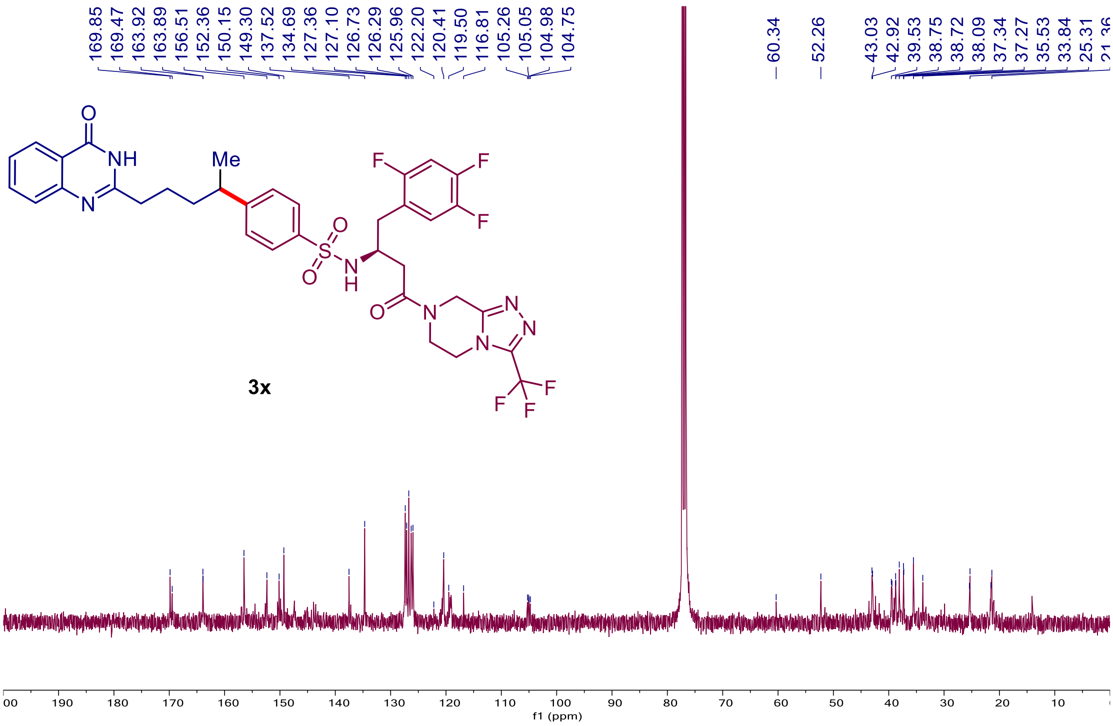
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3w**



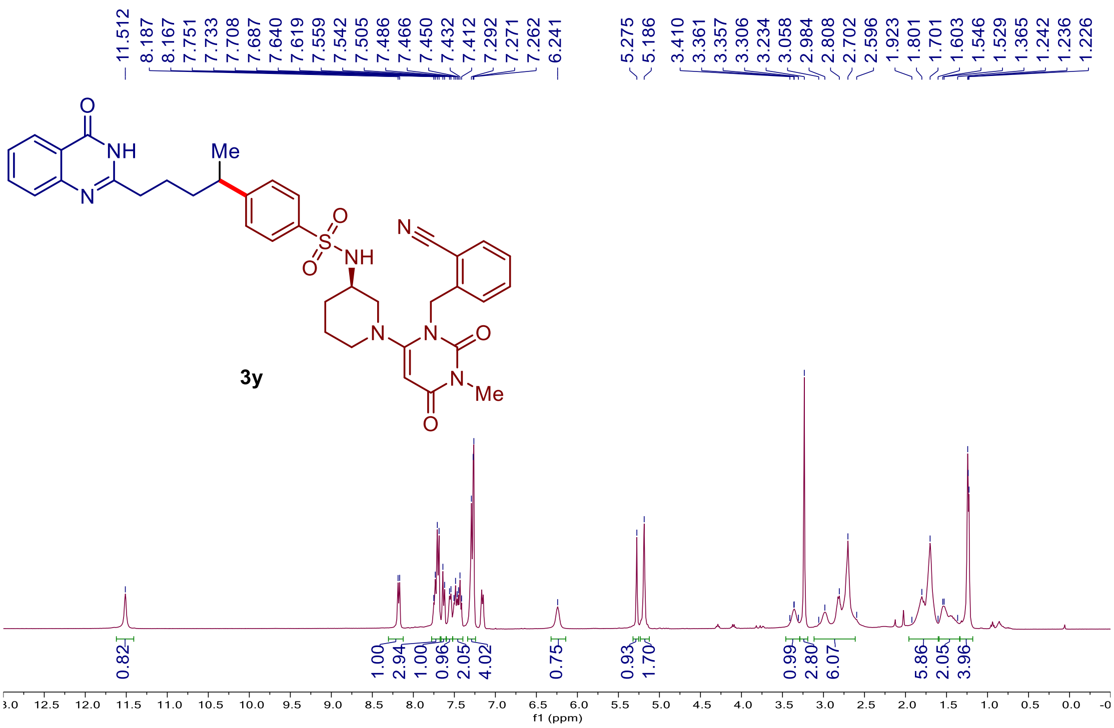


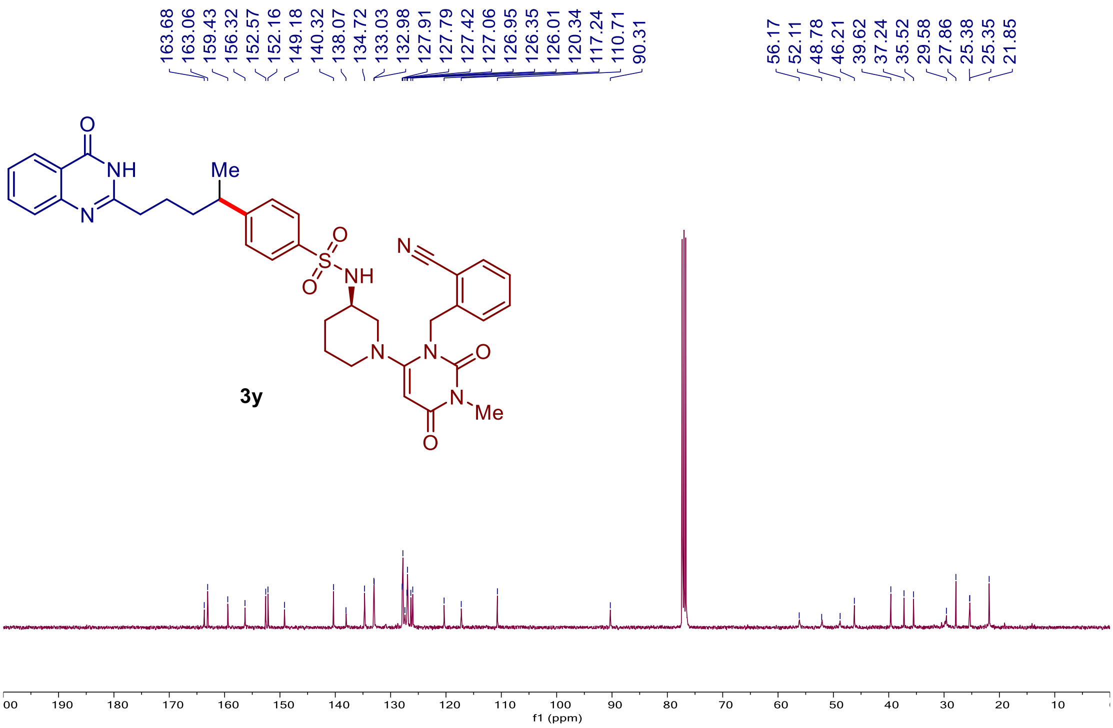
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **3x**



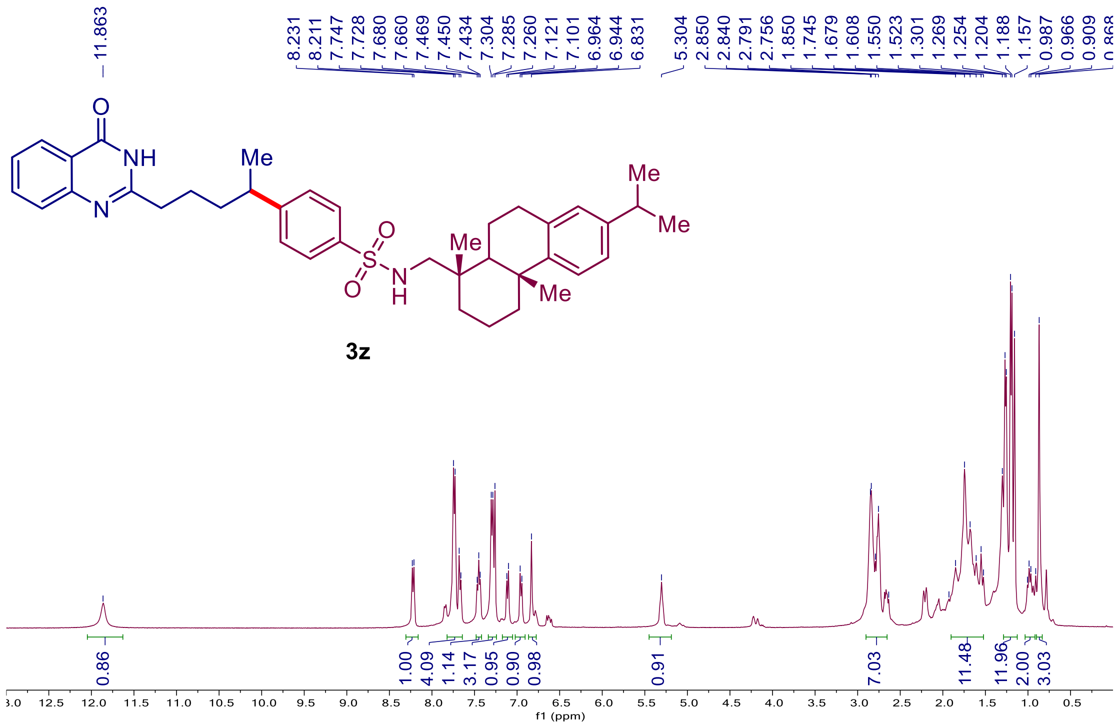


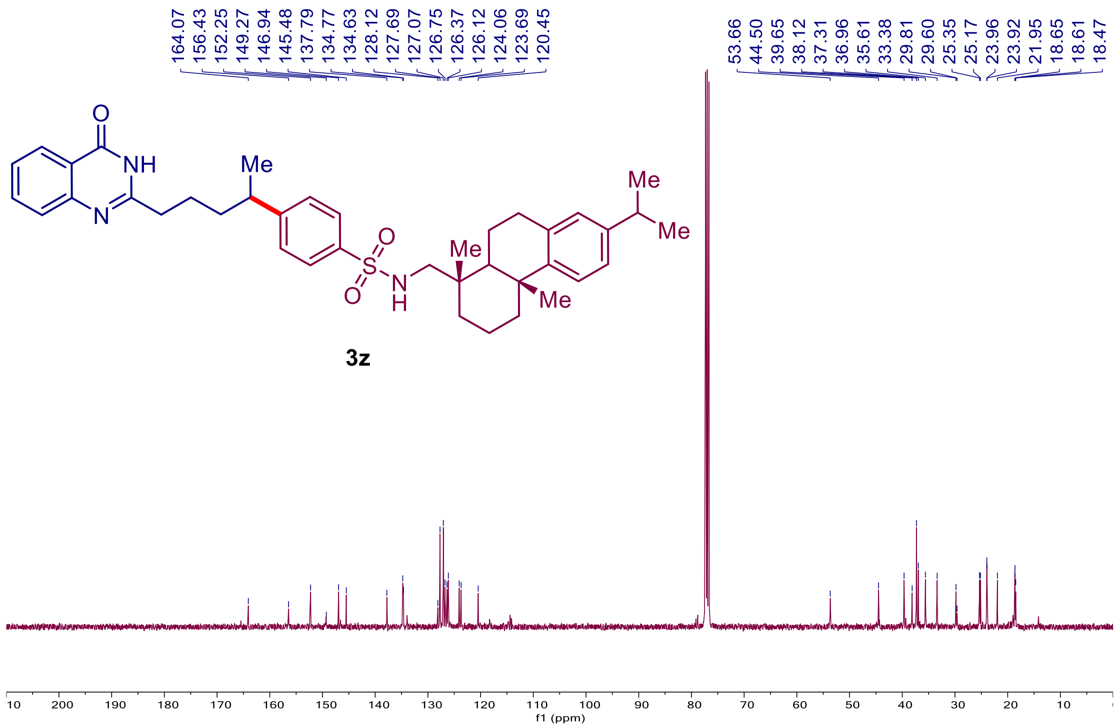
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **3y**



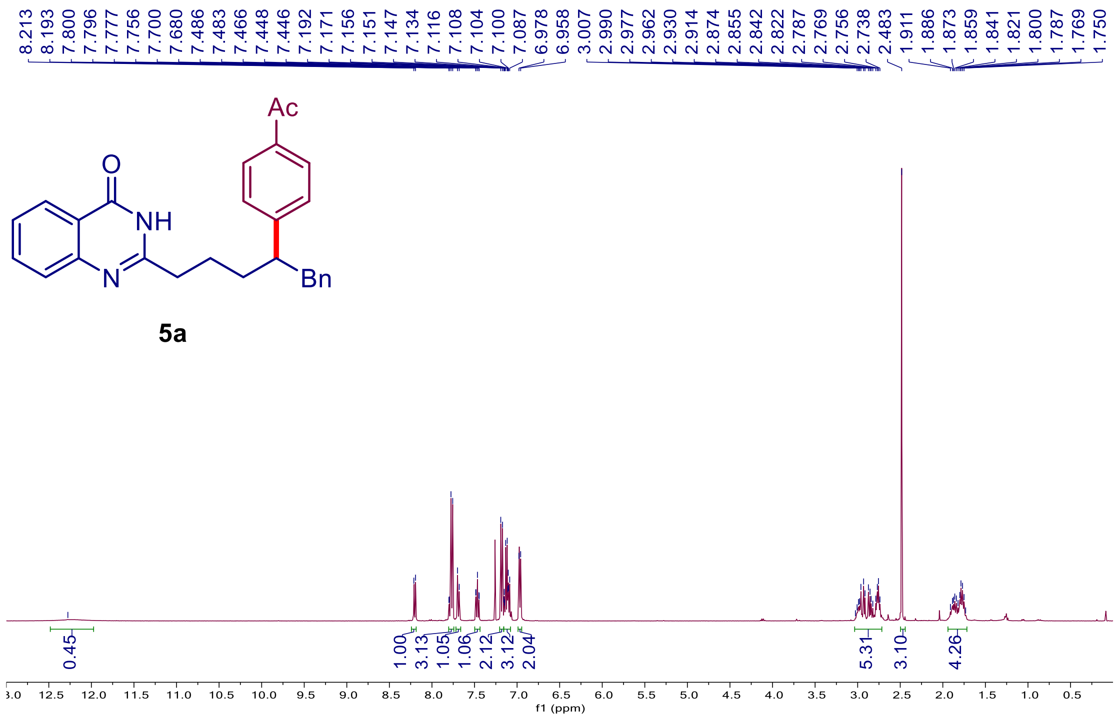


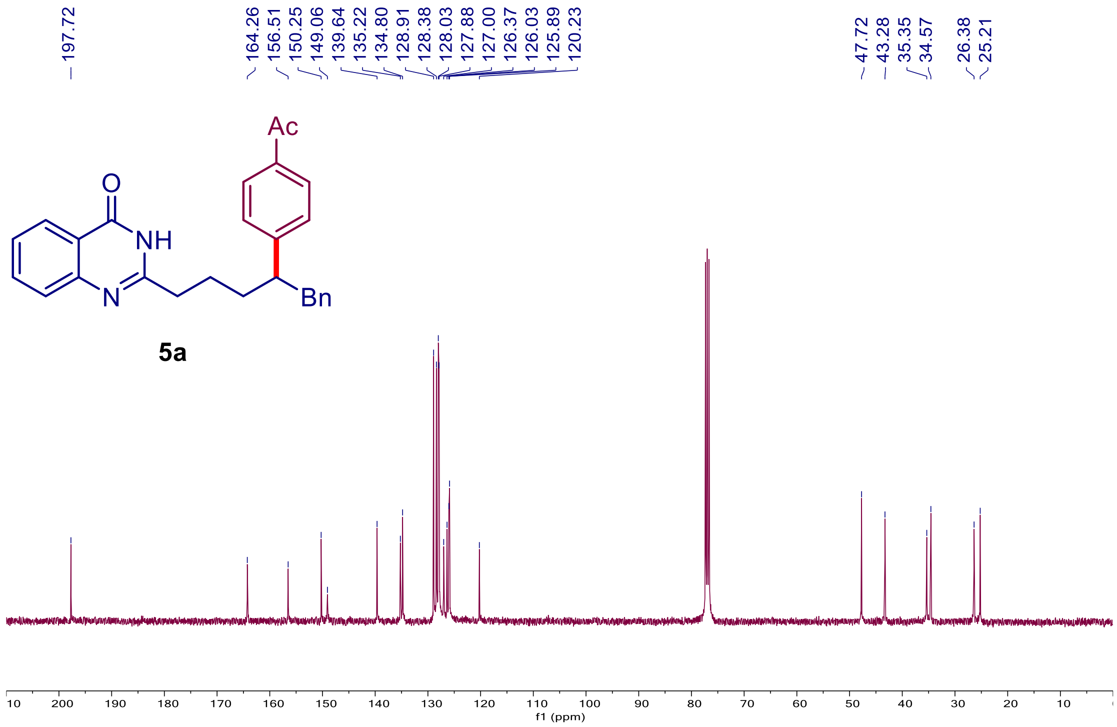
^{1}H NMR (400 MHz, CDCl$_3$) and ^{13}C NMR (100 MHz, CDCl$_3$) spectra of product **3z**



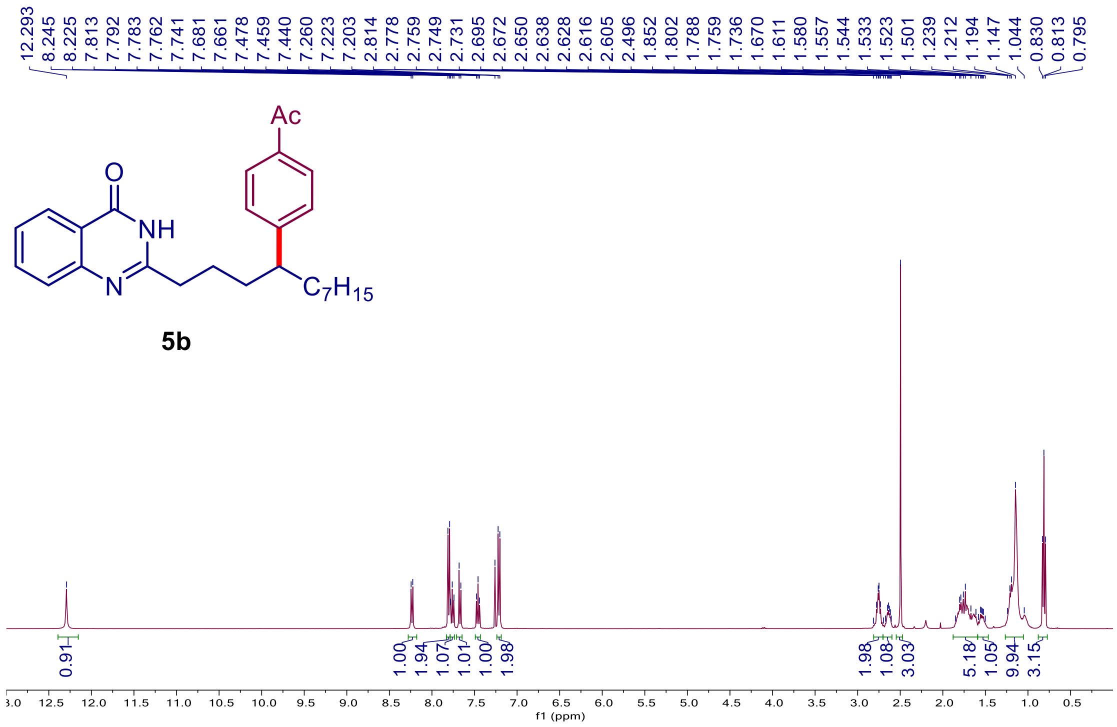


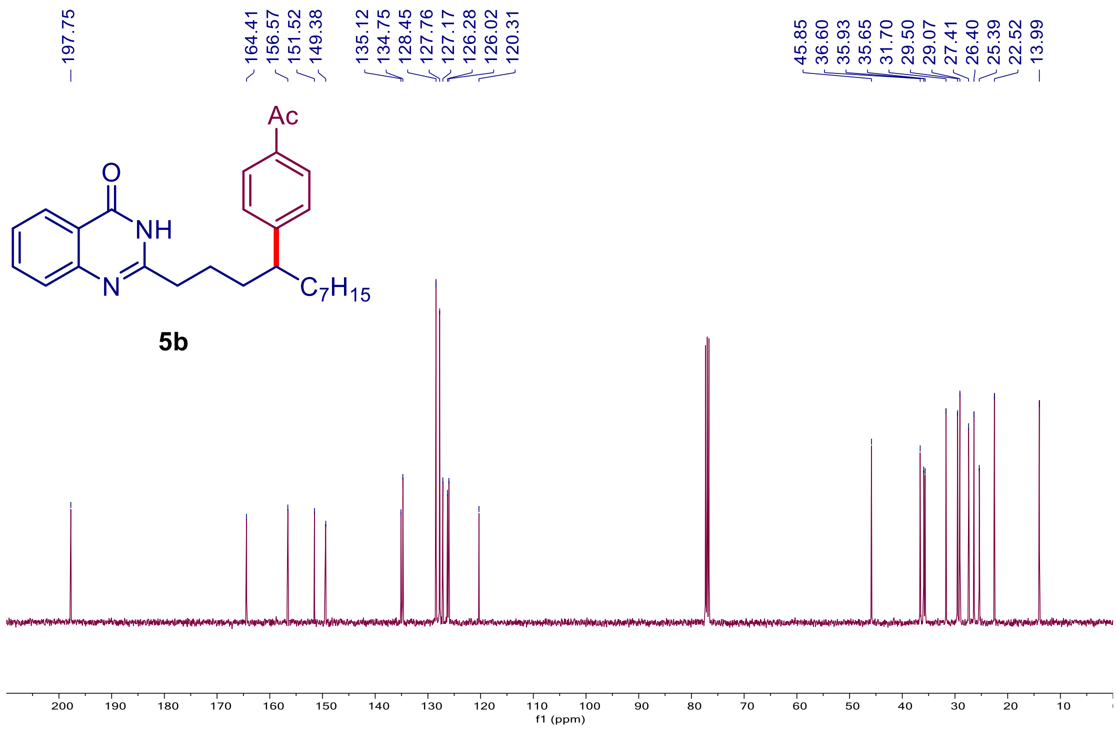
[1]H NMR (400 MHz, CDCl3) and [13]C NMR (100 MHz, CDCl3) spectra of product **5a**



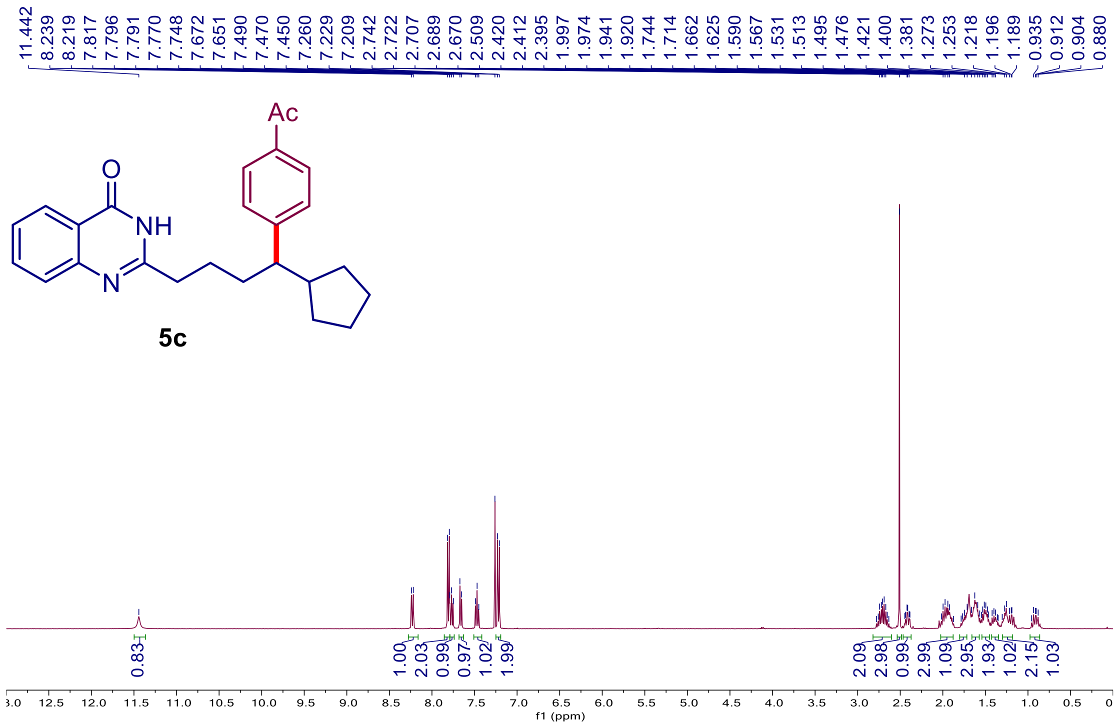


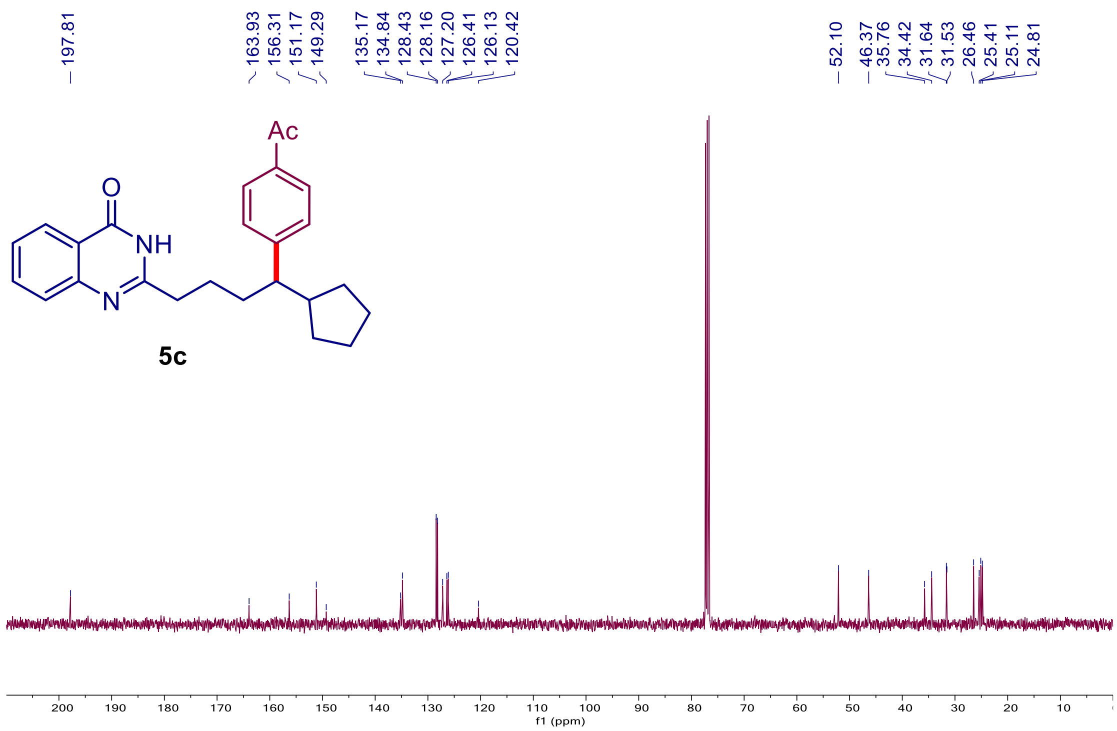
^{1}H NMR (400 MHz, CDCl$_3$) and ^{13}C NMR (100 MHz, CDCl$_3$) spectra of product **5b**



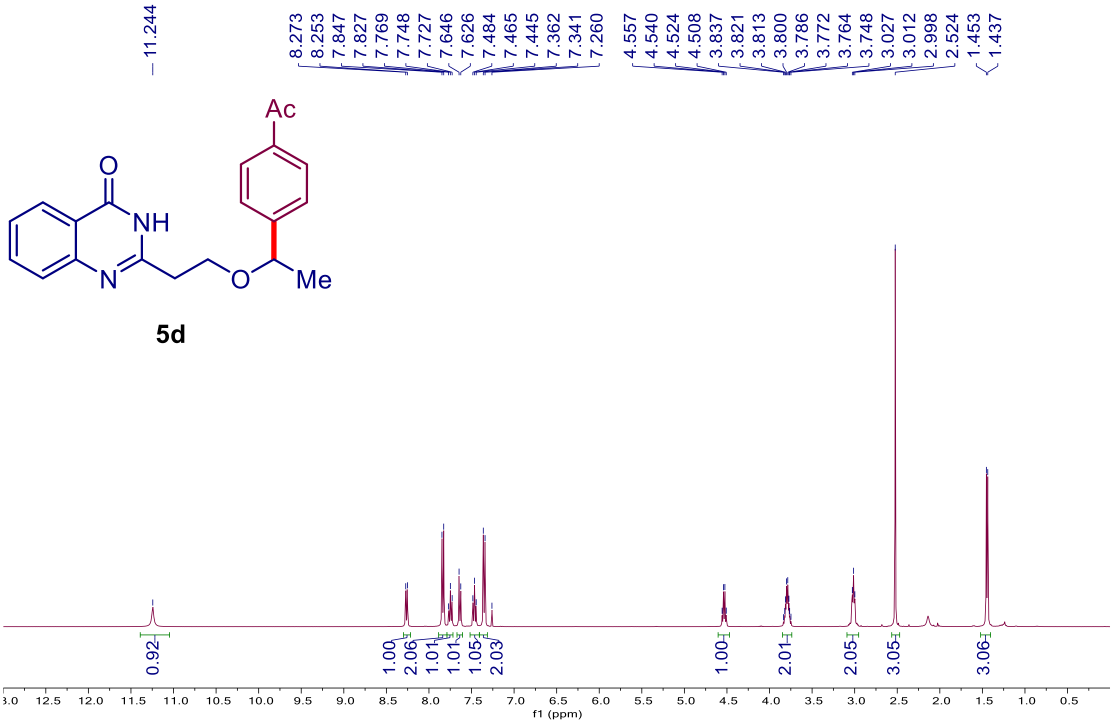


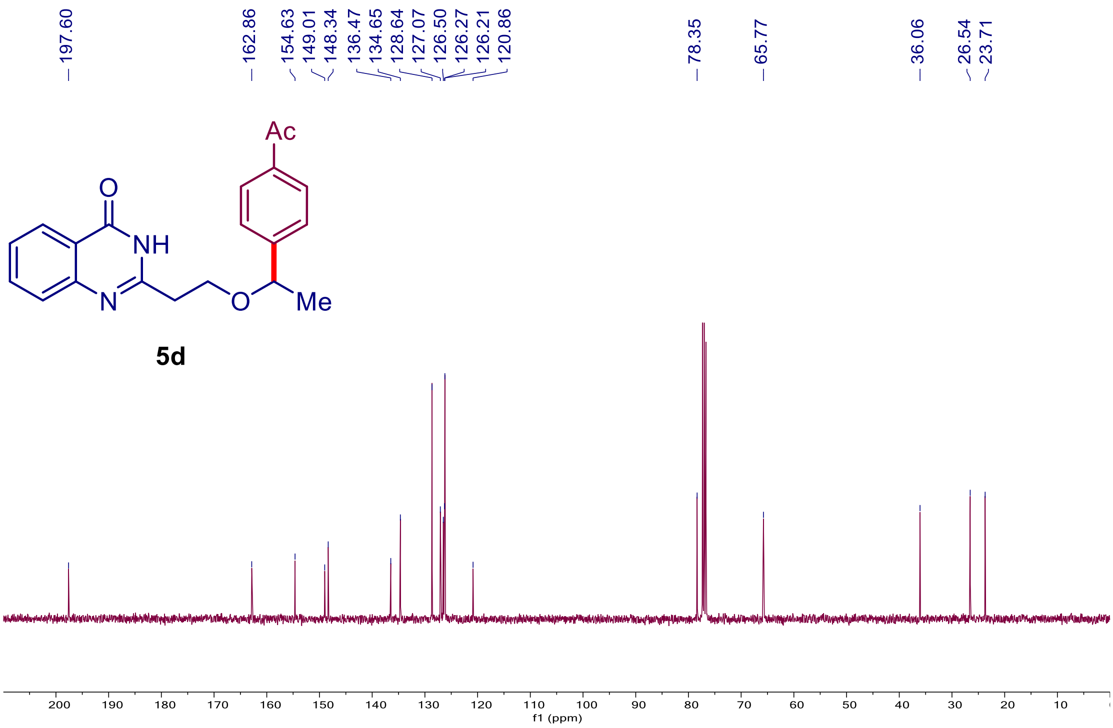
[1]H NMR (400 MHz, CDCl3) and [13]C NMR (100 MHz, CDCl3) spectra of product **5c**



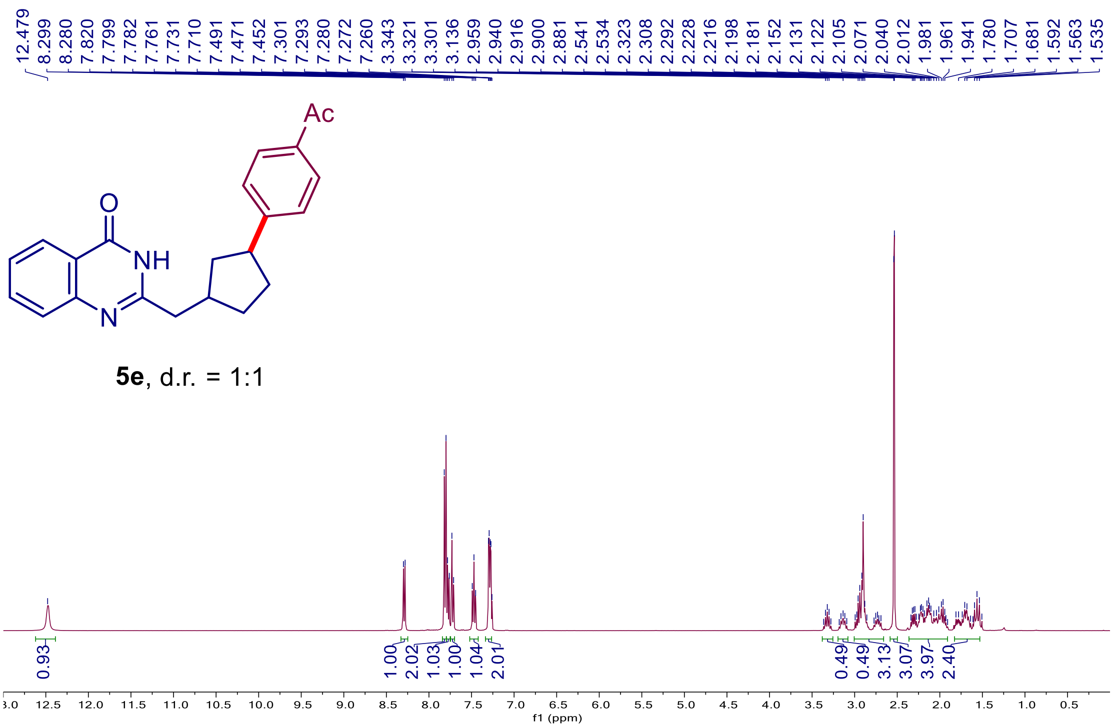


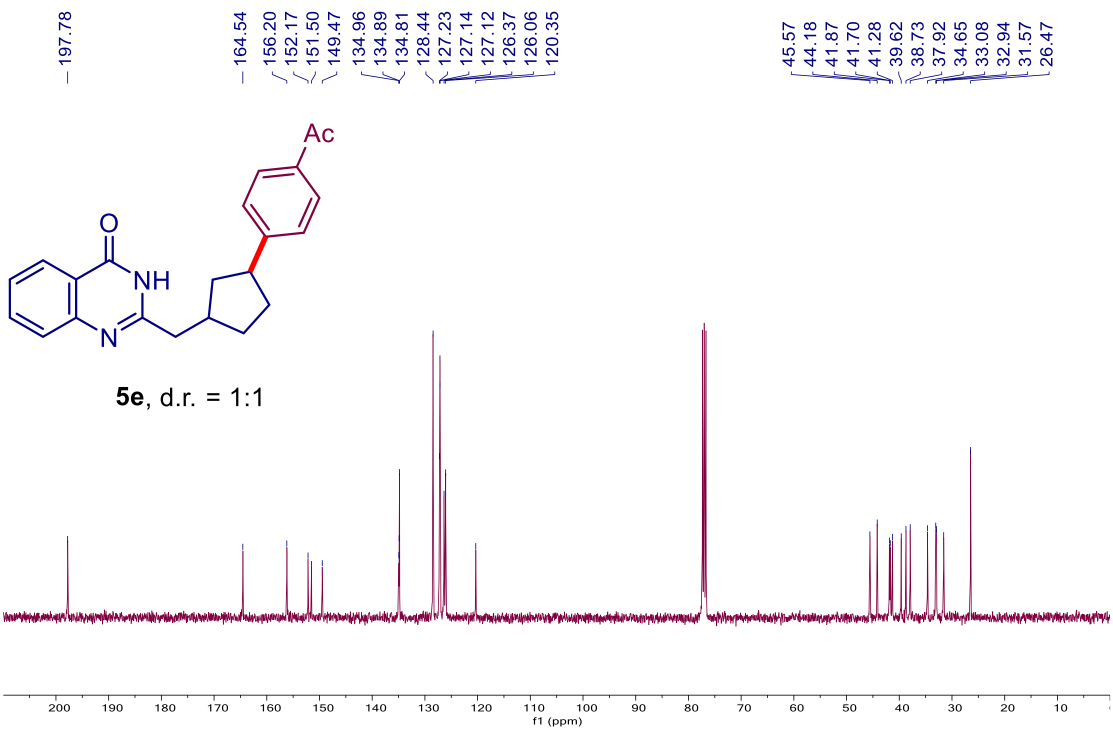
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **5d**



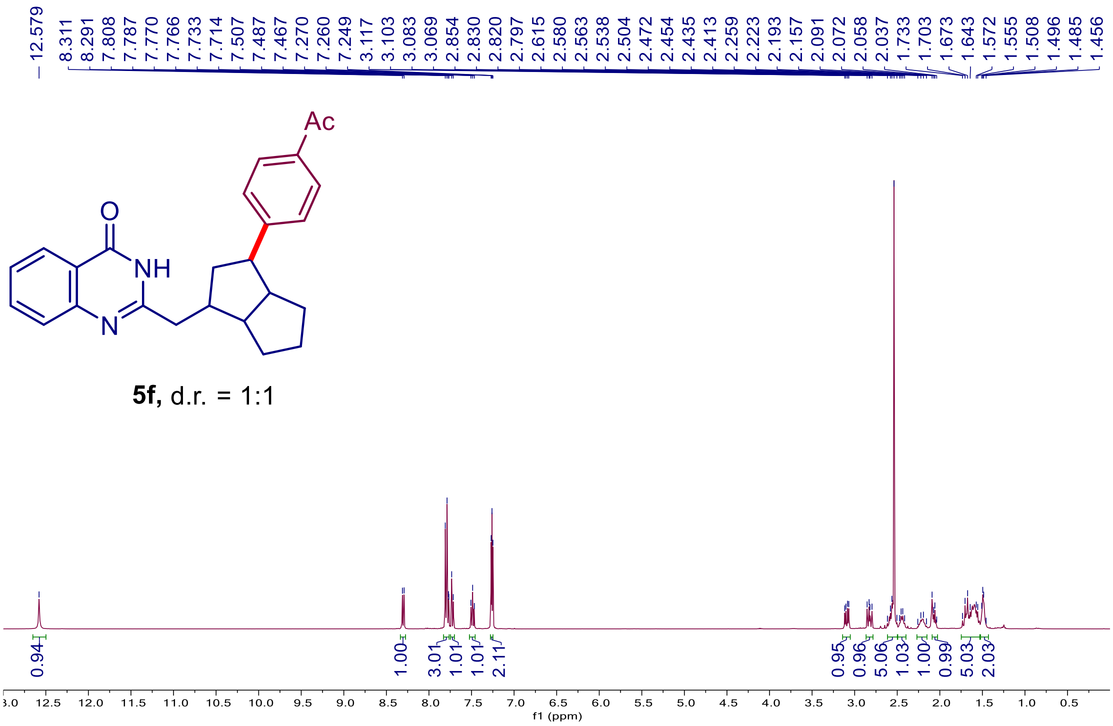


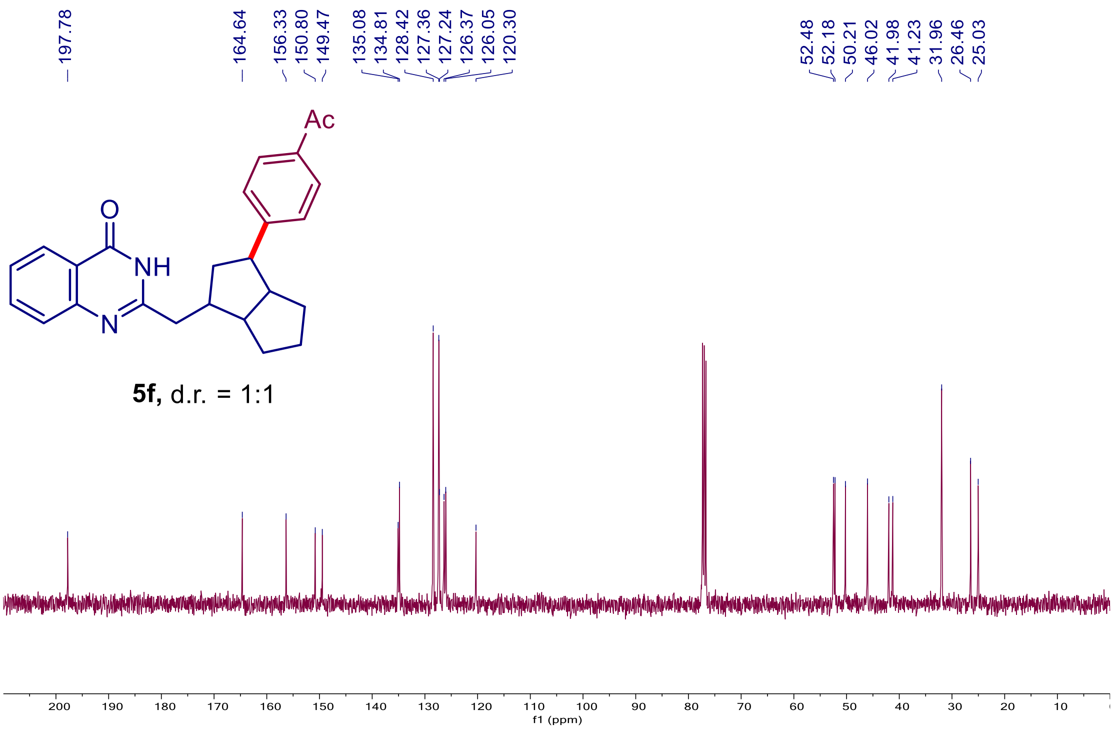
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **5e**



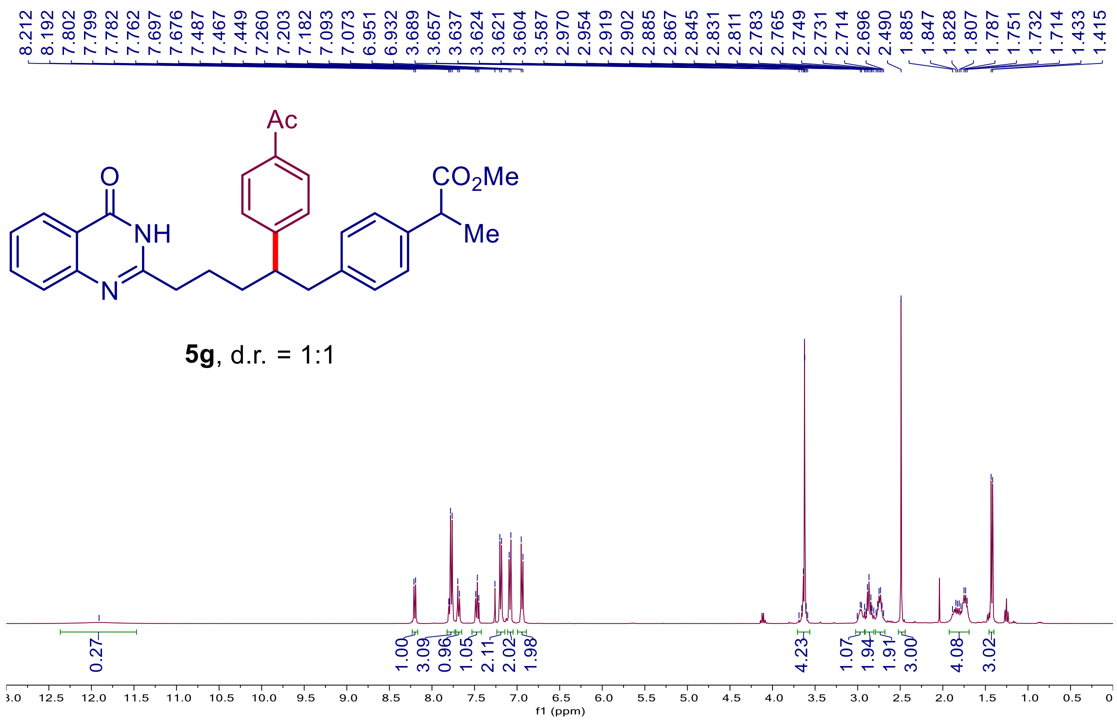


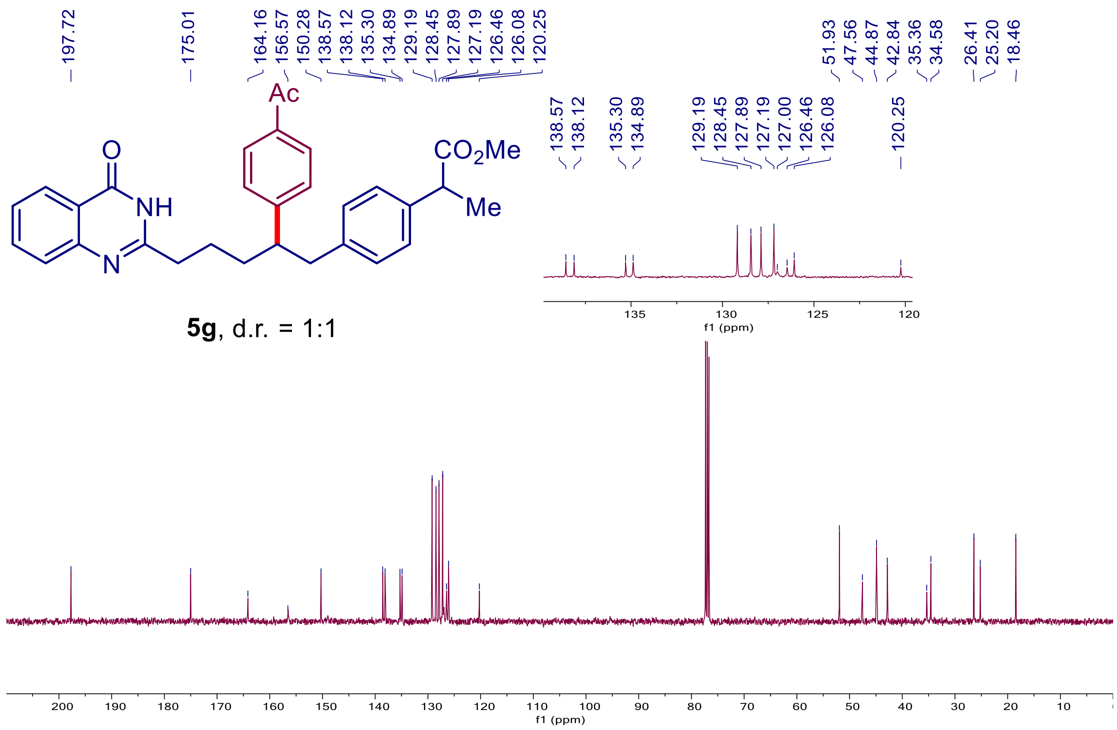
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **5f**



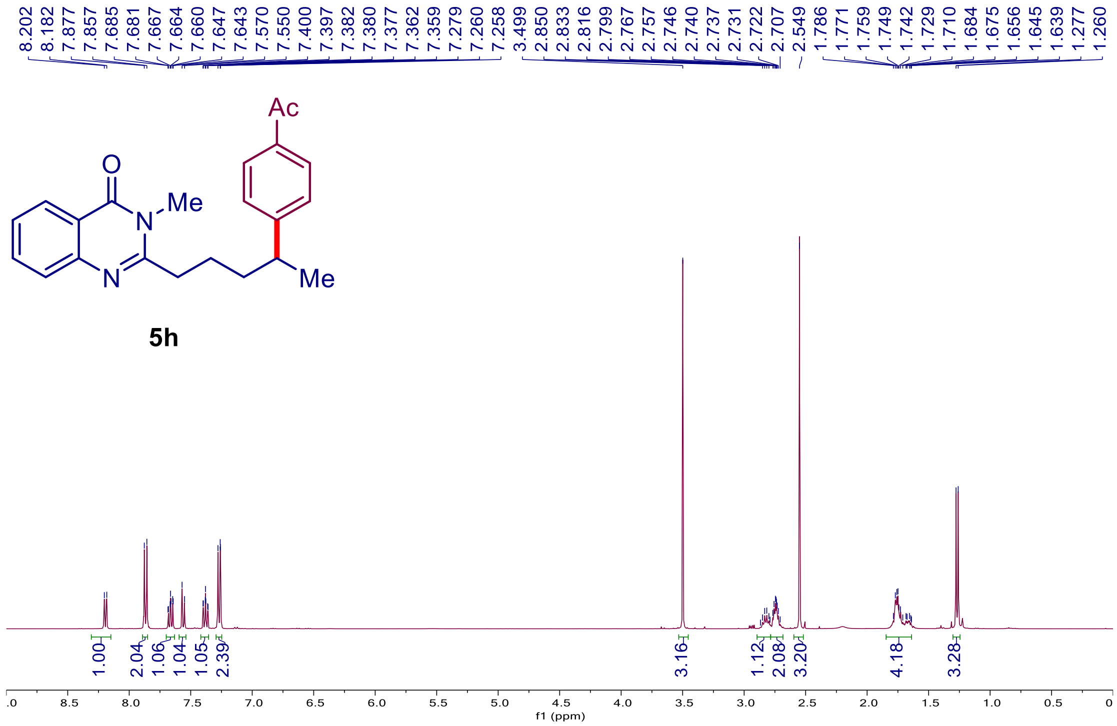


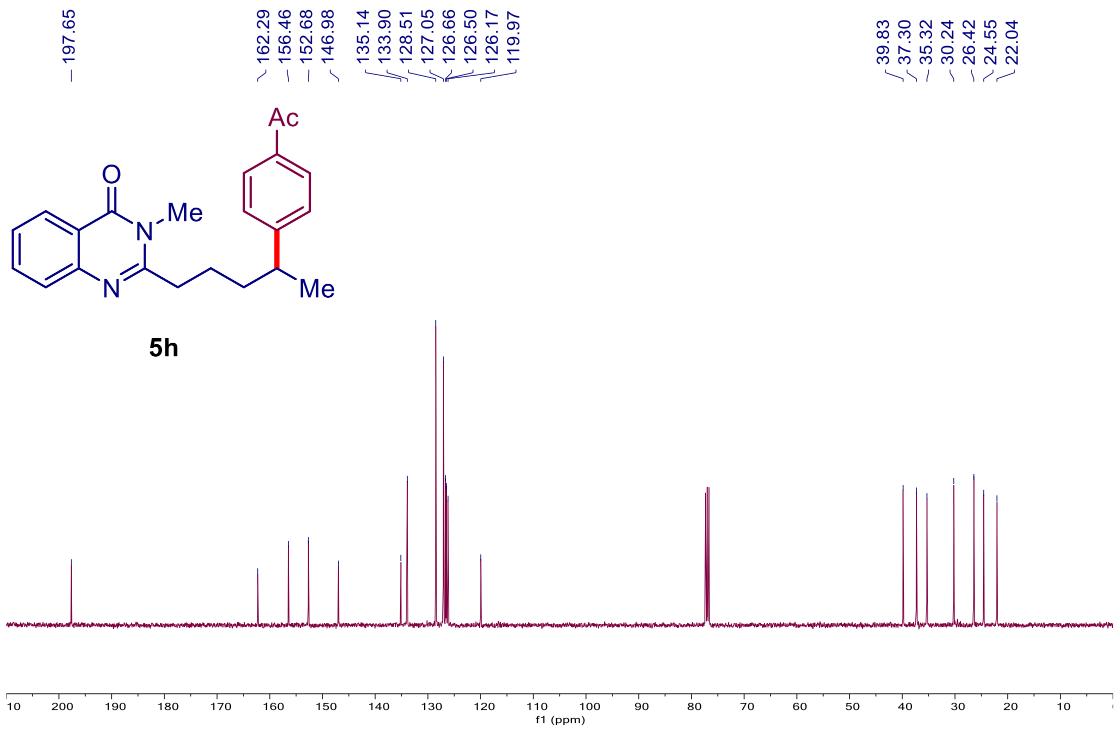
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **5g**



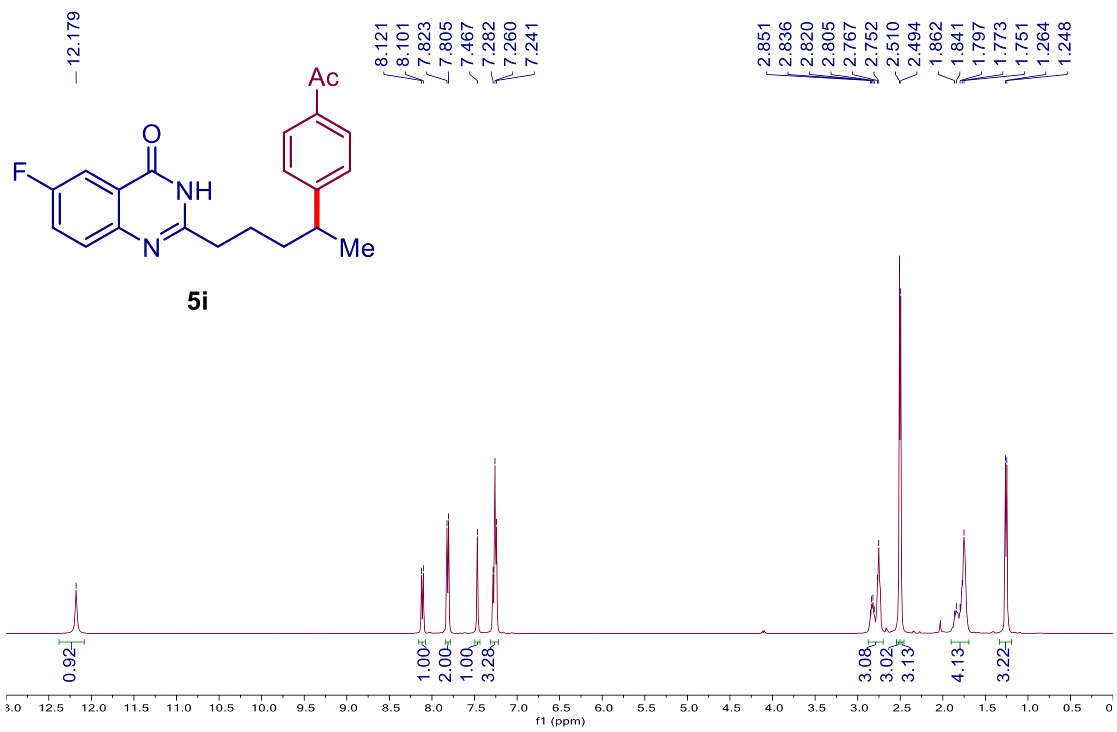


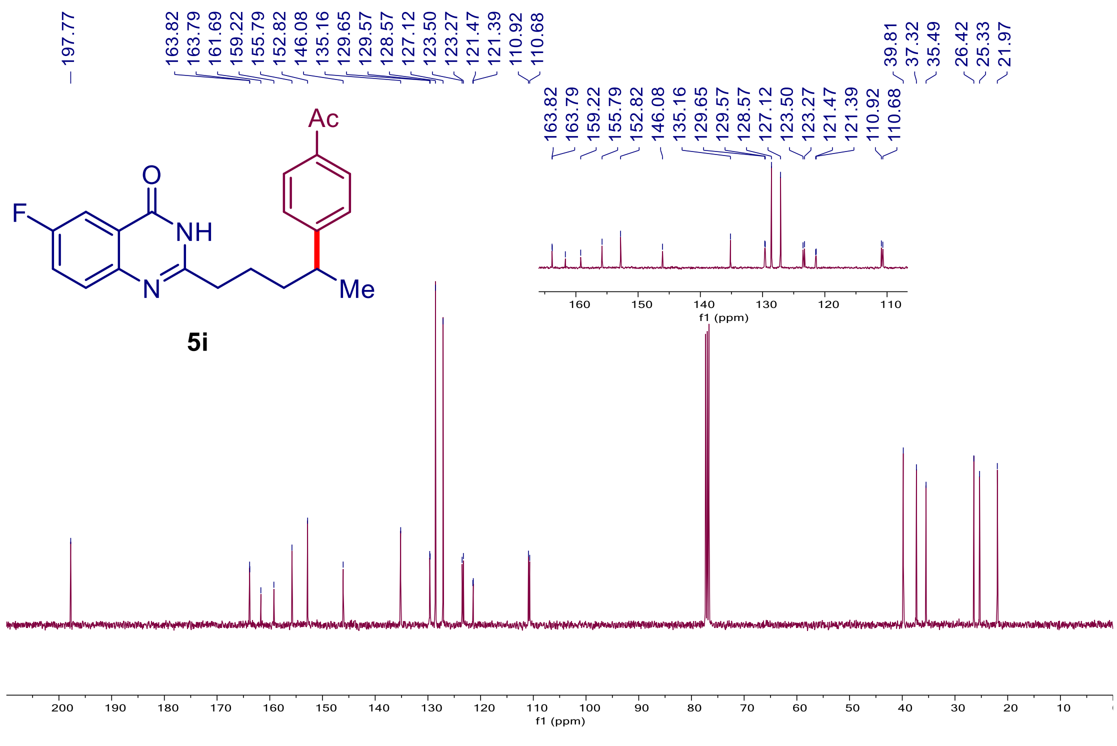
^1H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **5h**



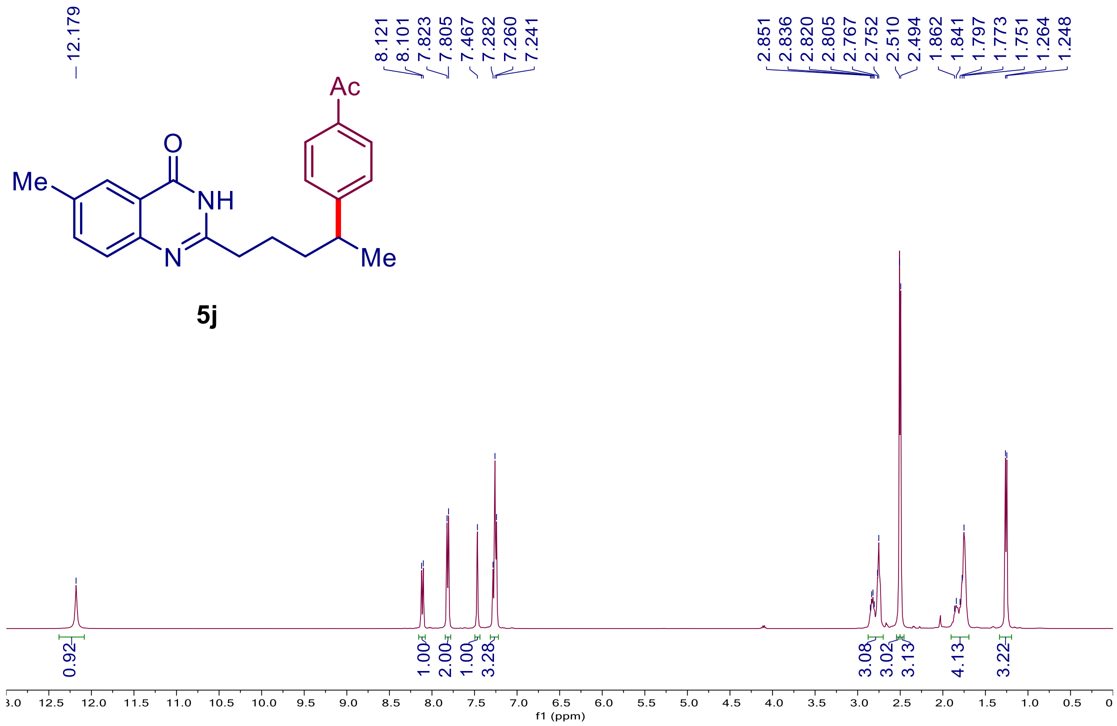


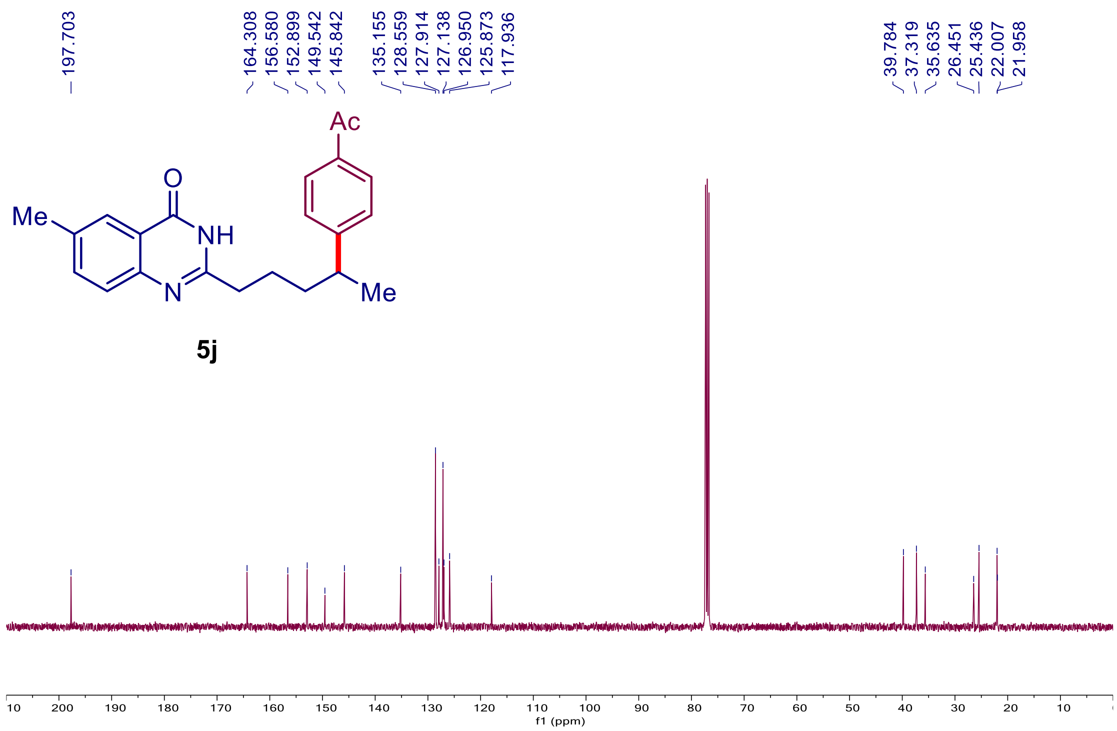
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **5i**



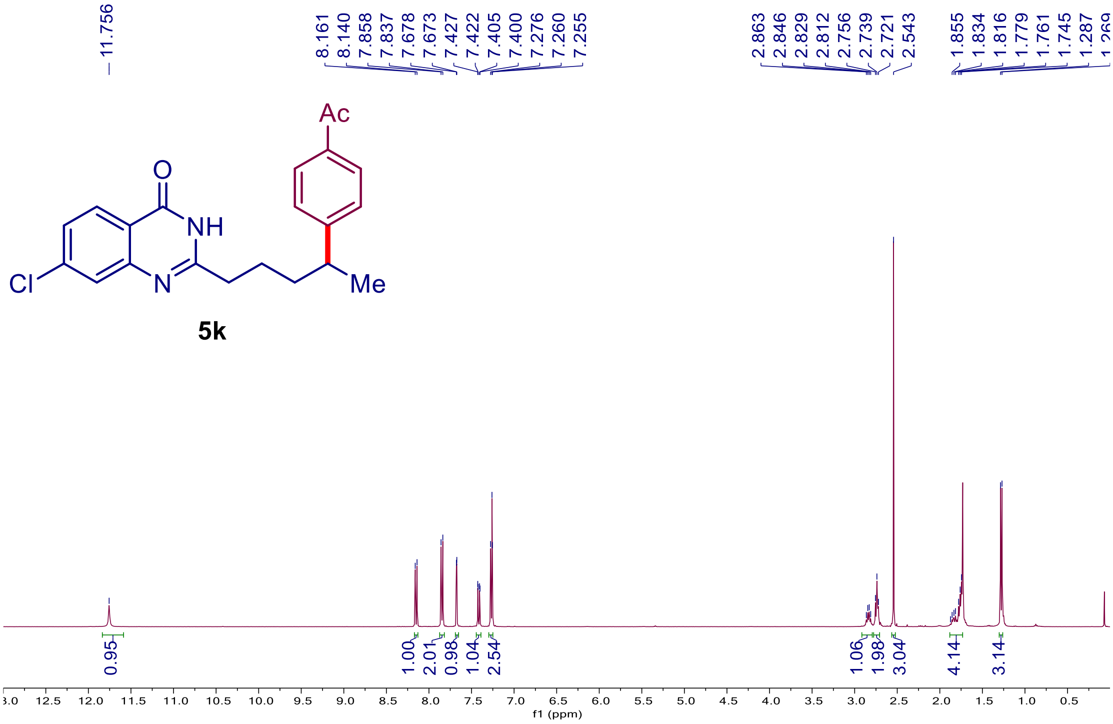


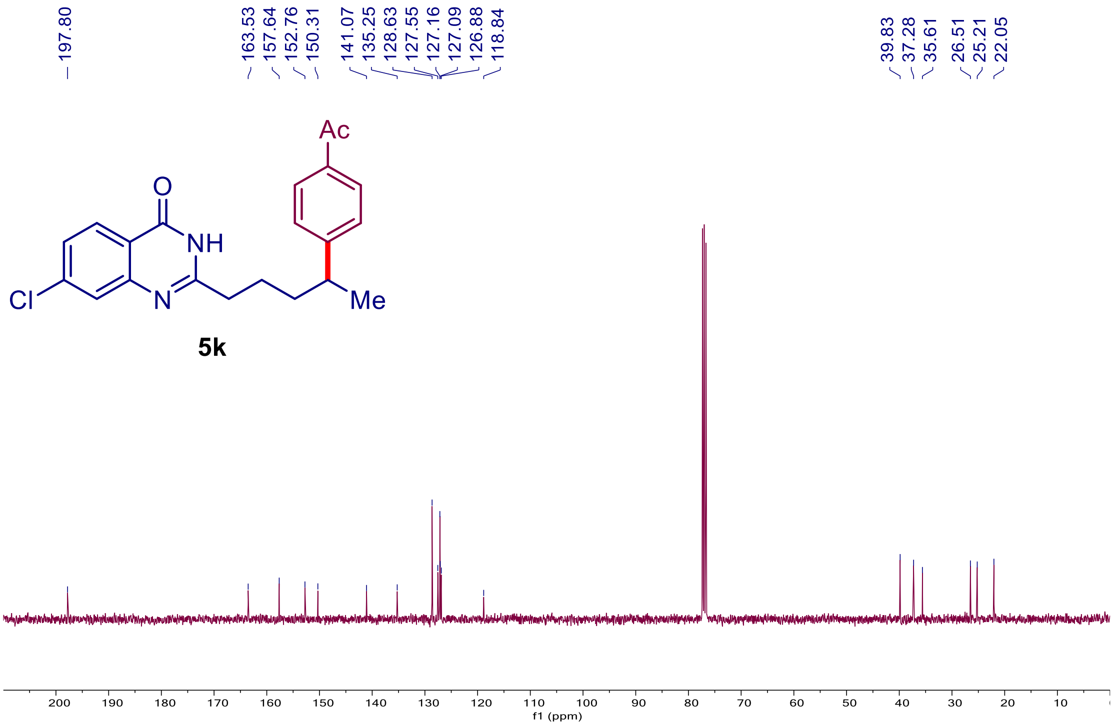
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **5j**



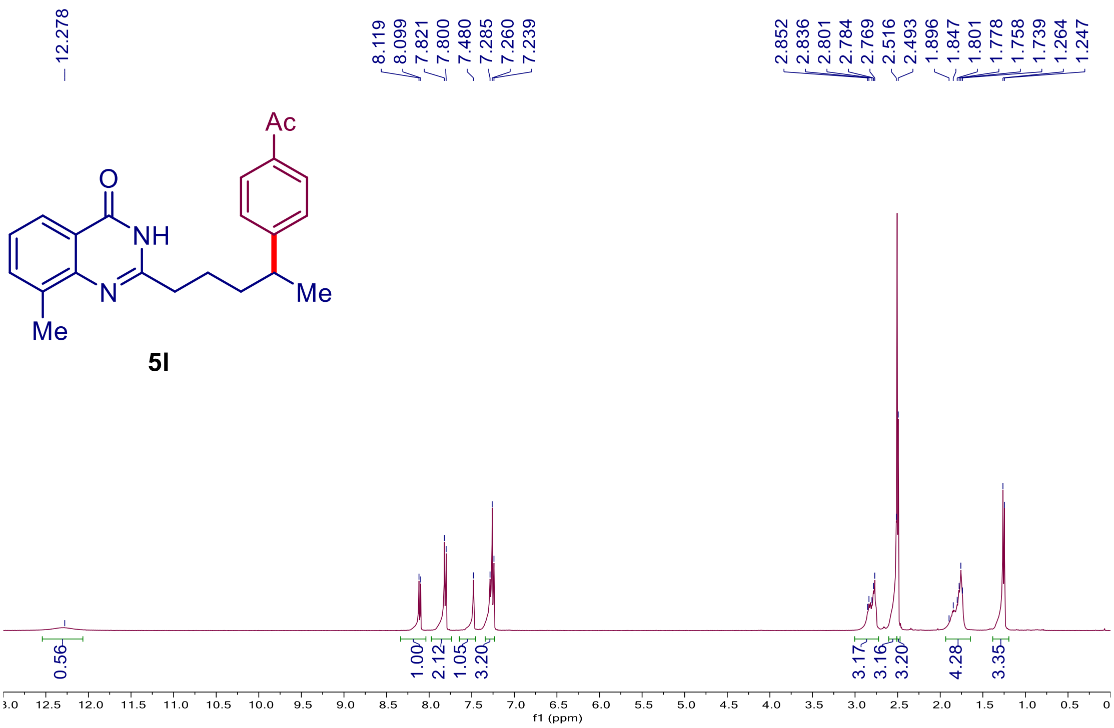


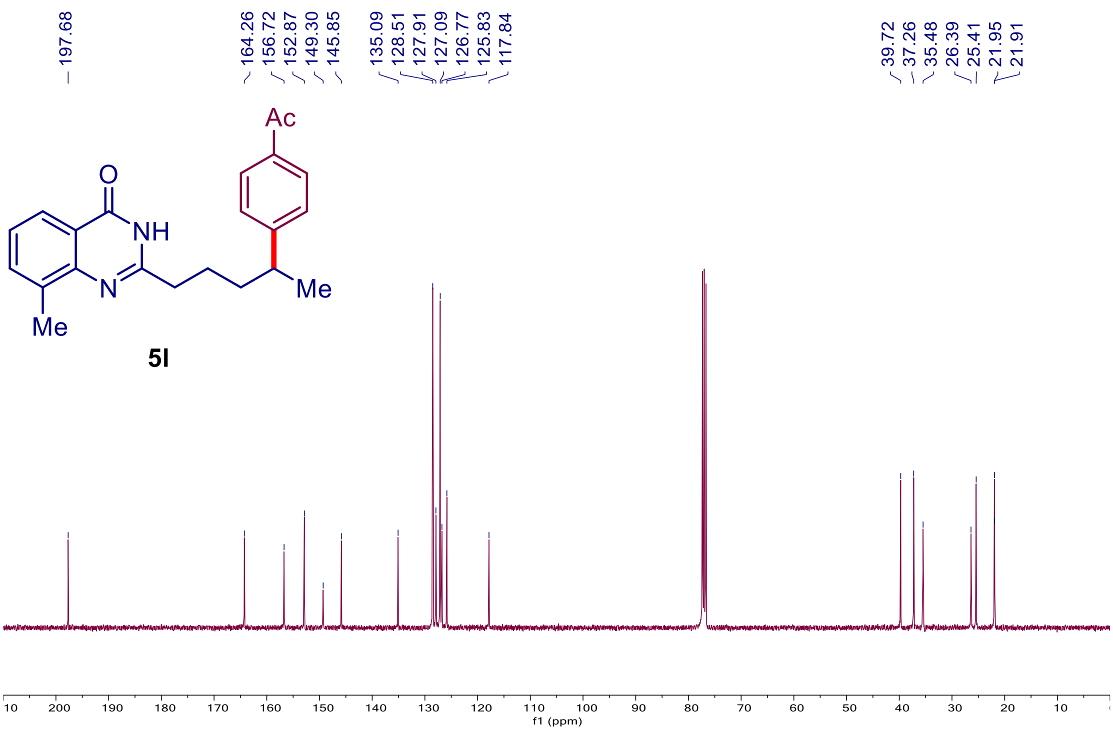
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **5k**



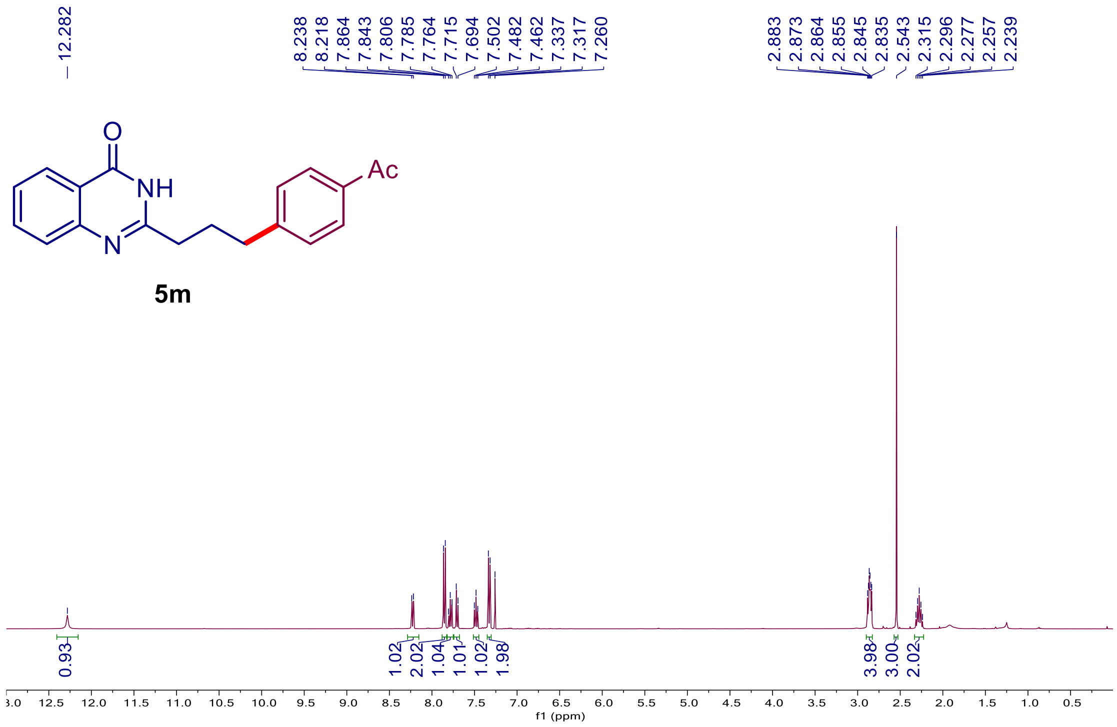


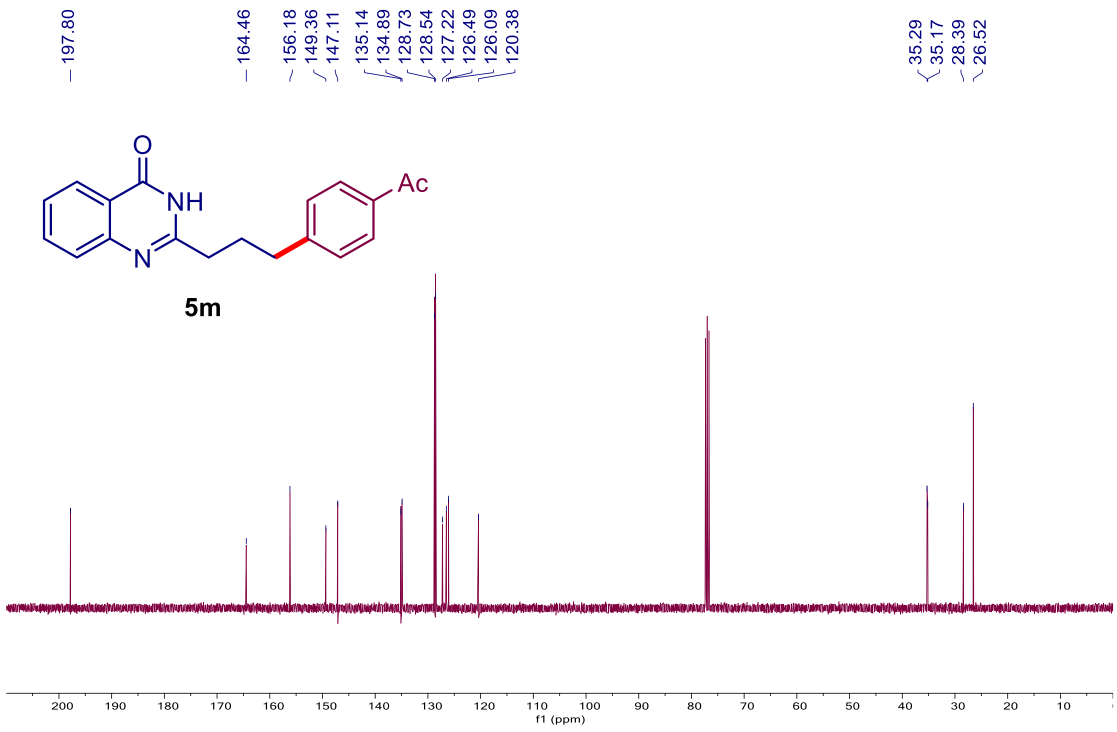
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **5l**



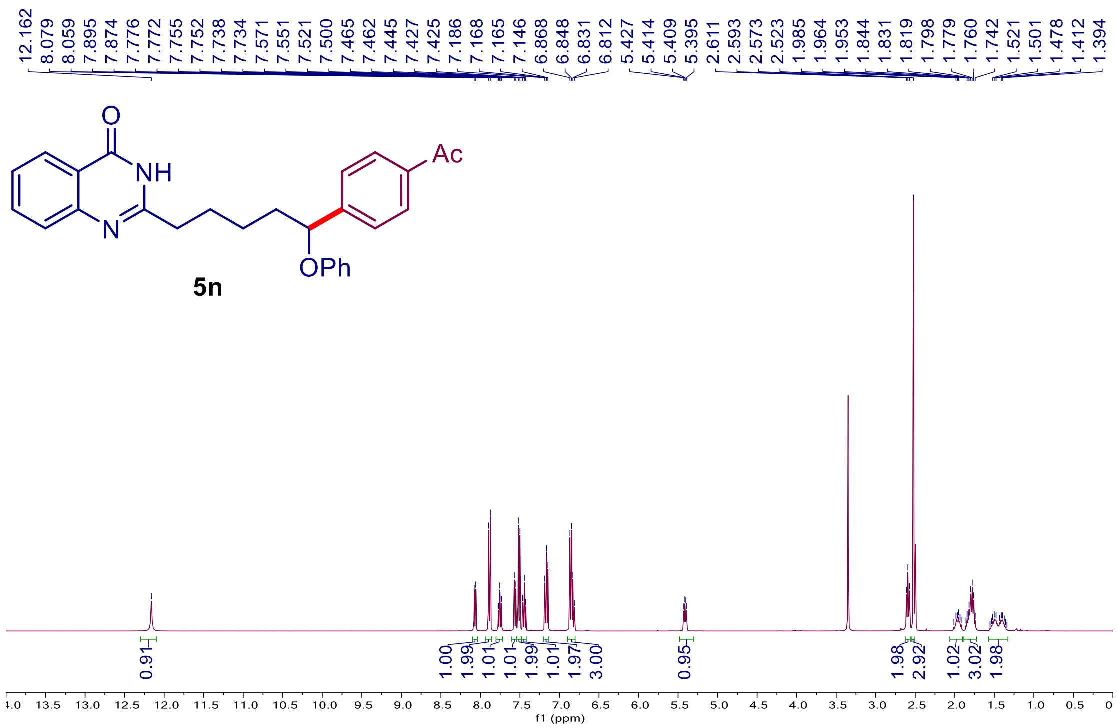


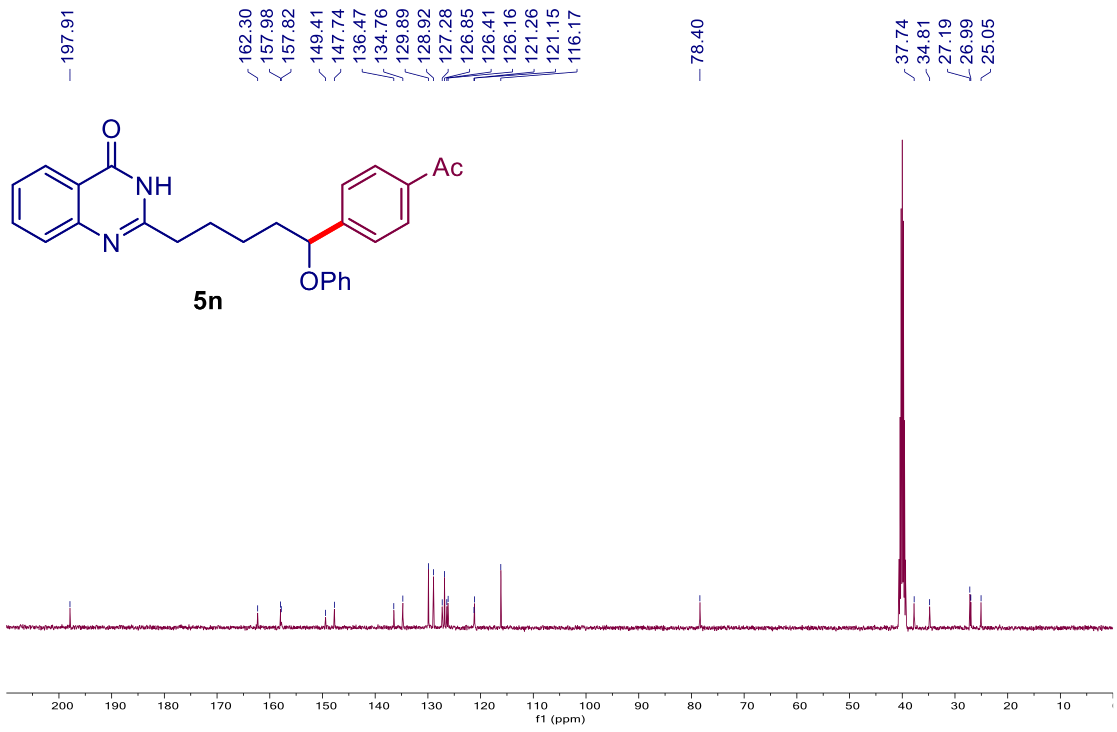
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **5m**



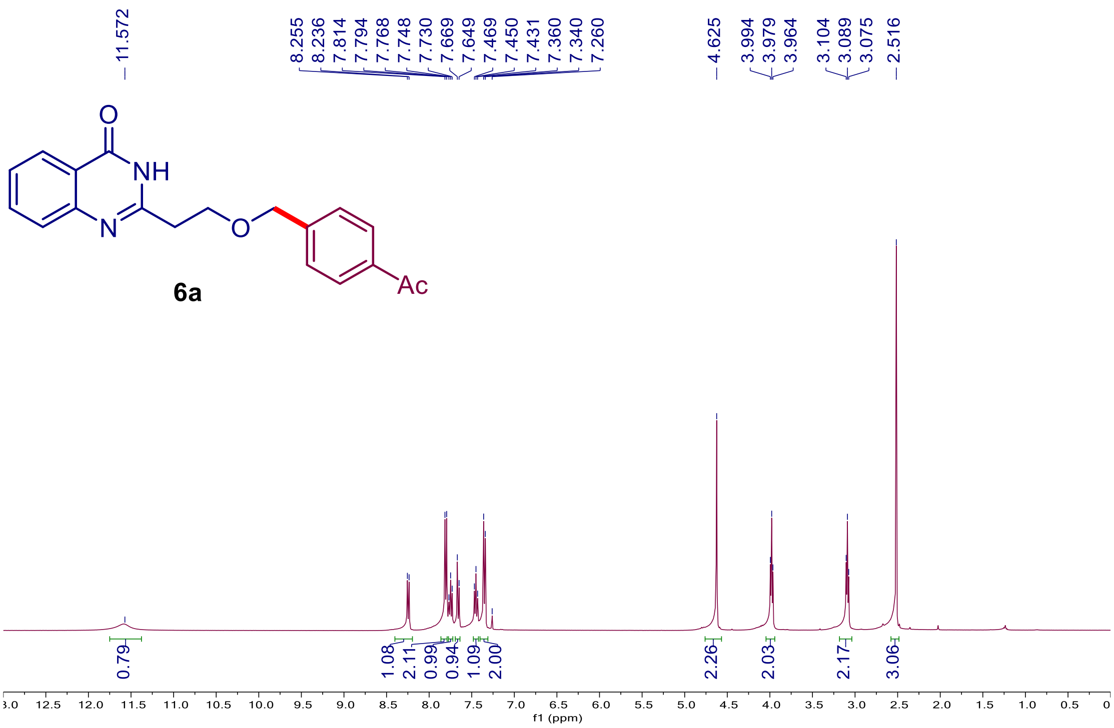


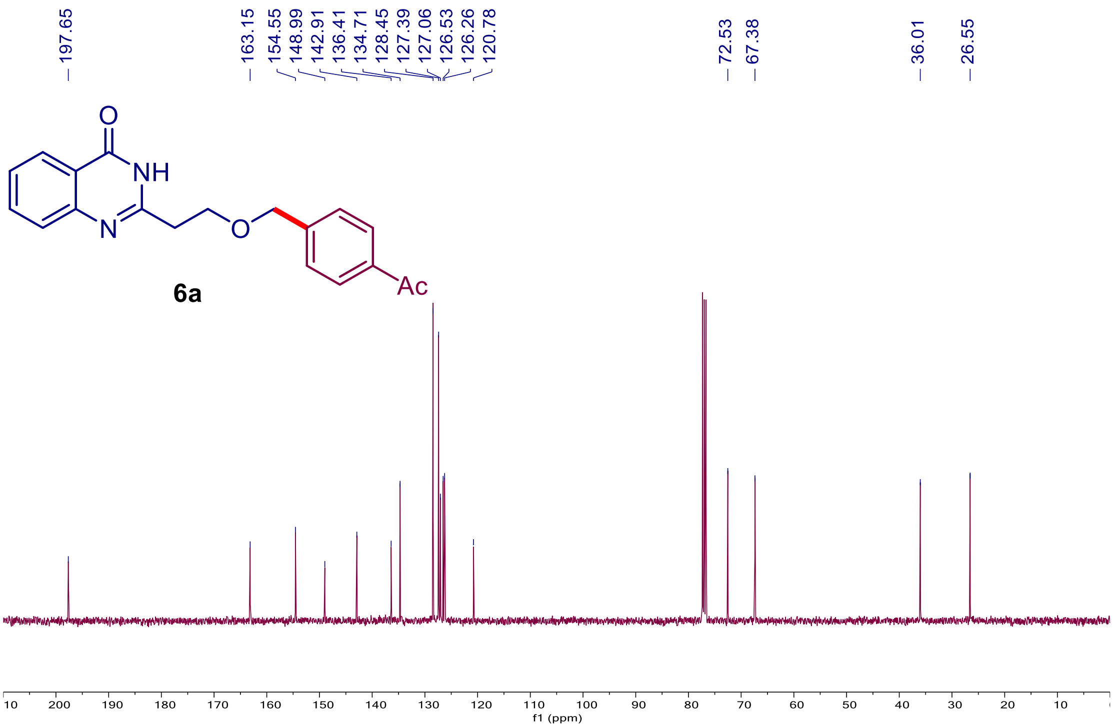
[1]H NMR (400 MHz, DMSO-d_6) and [13]C NMR (100 MHz, DMSO-d_6) spectra of product **5n**



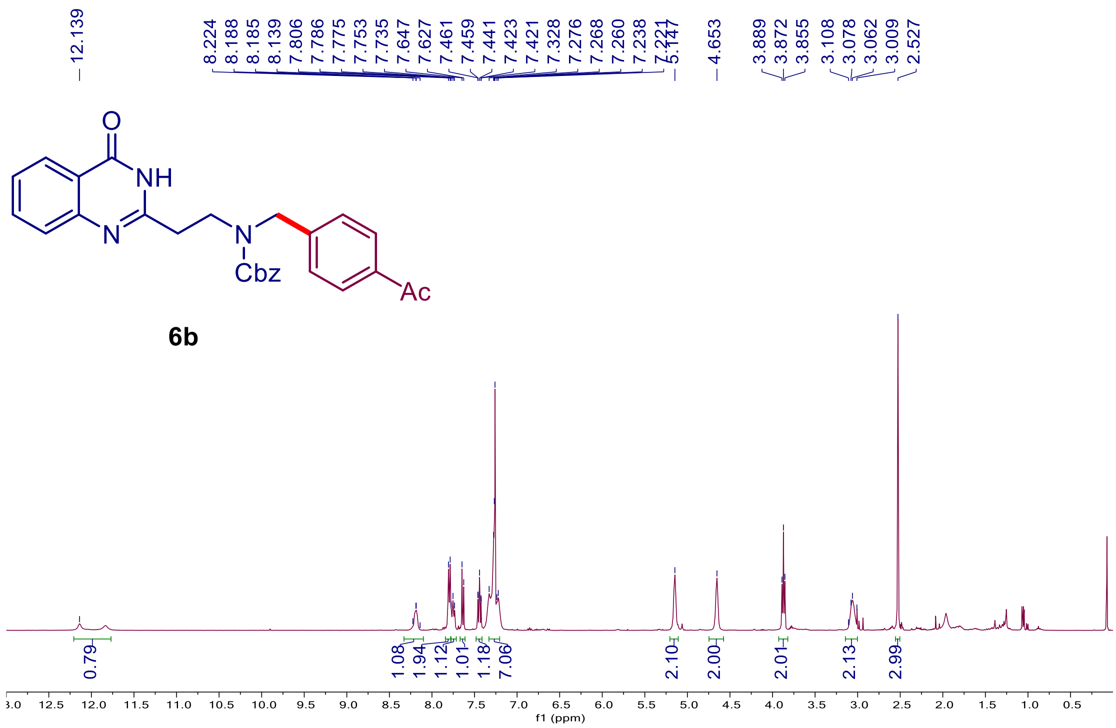


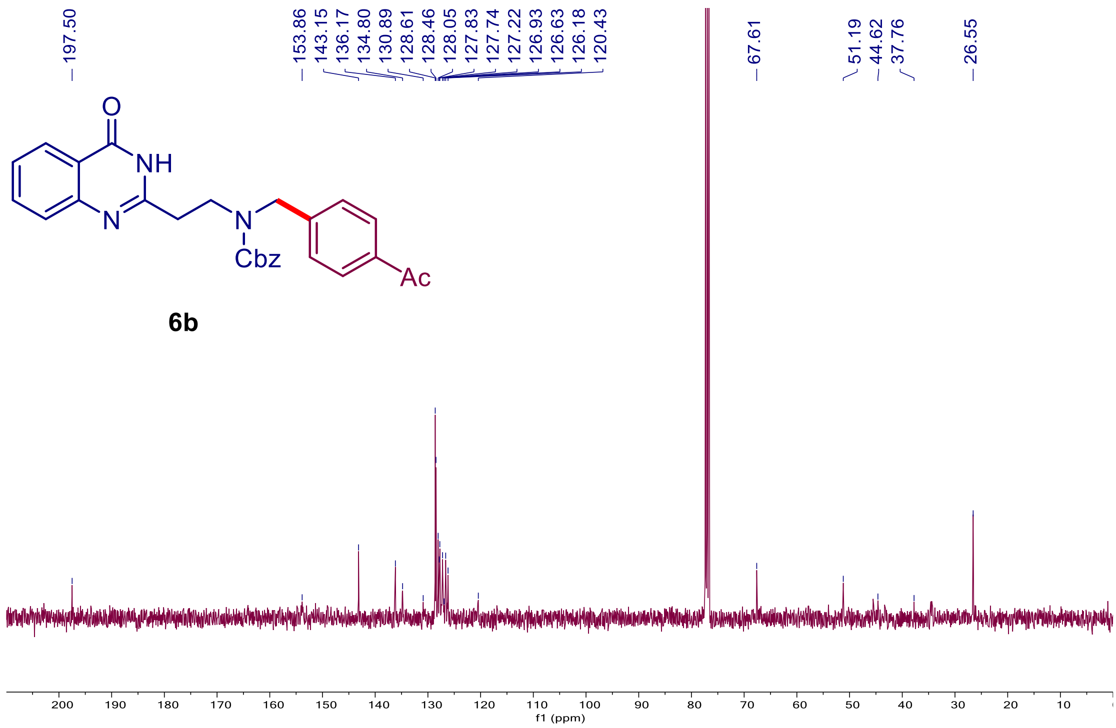
^1H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6a**



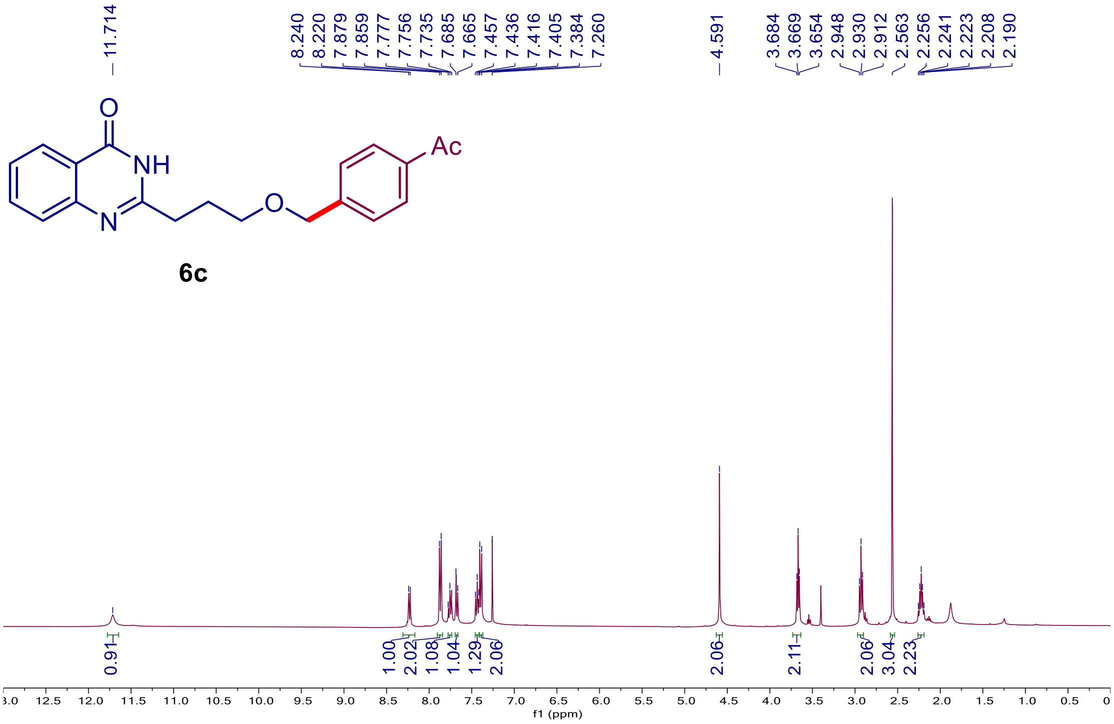


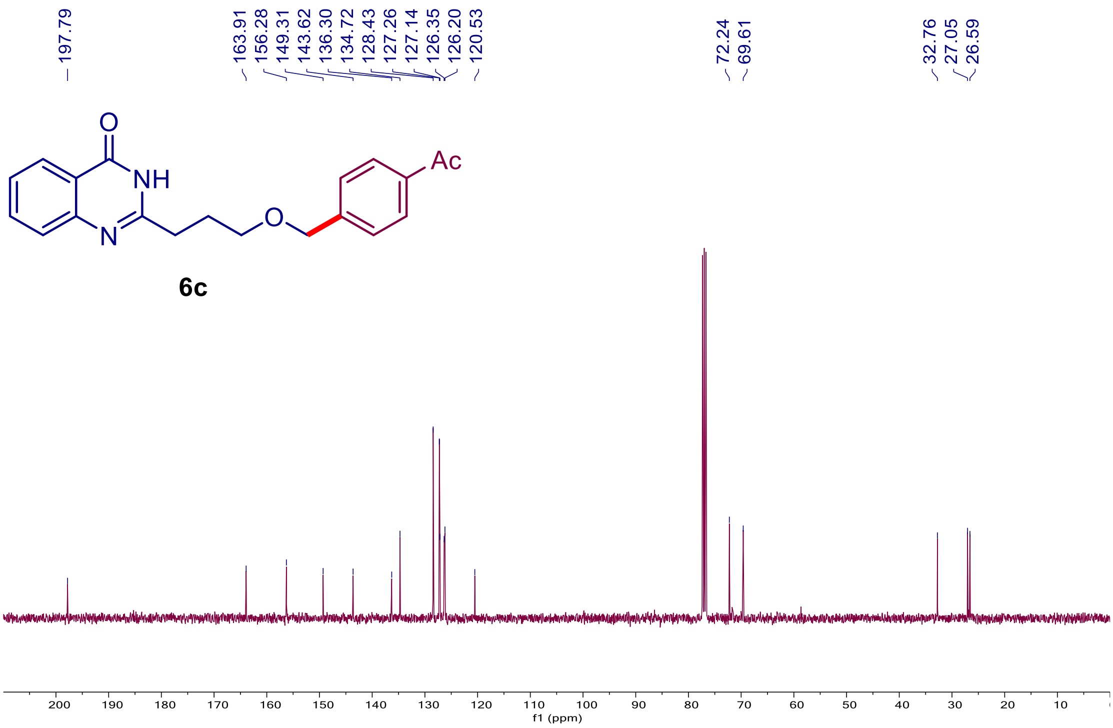
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6b**



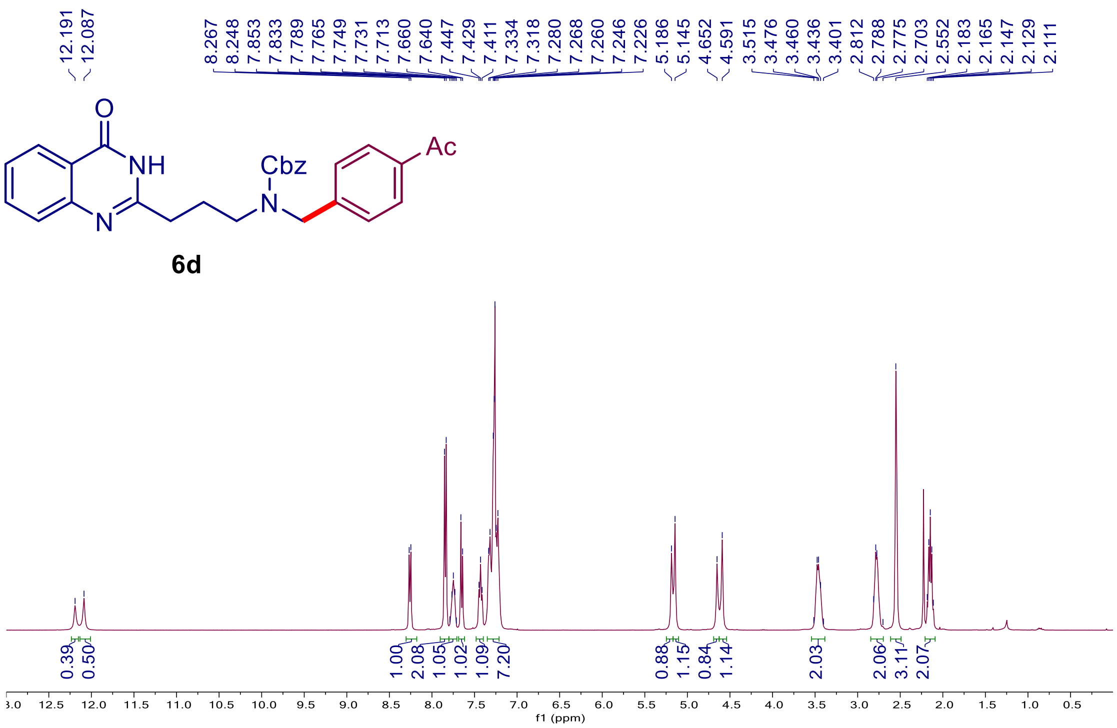


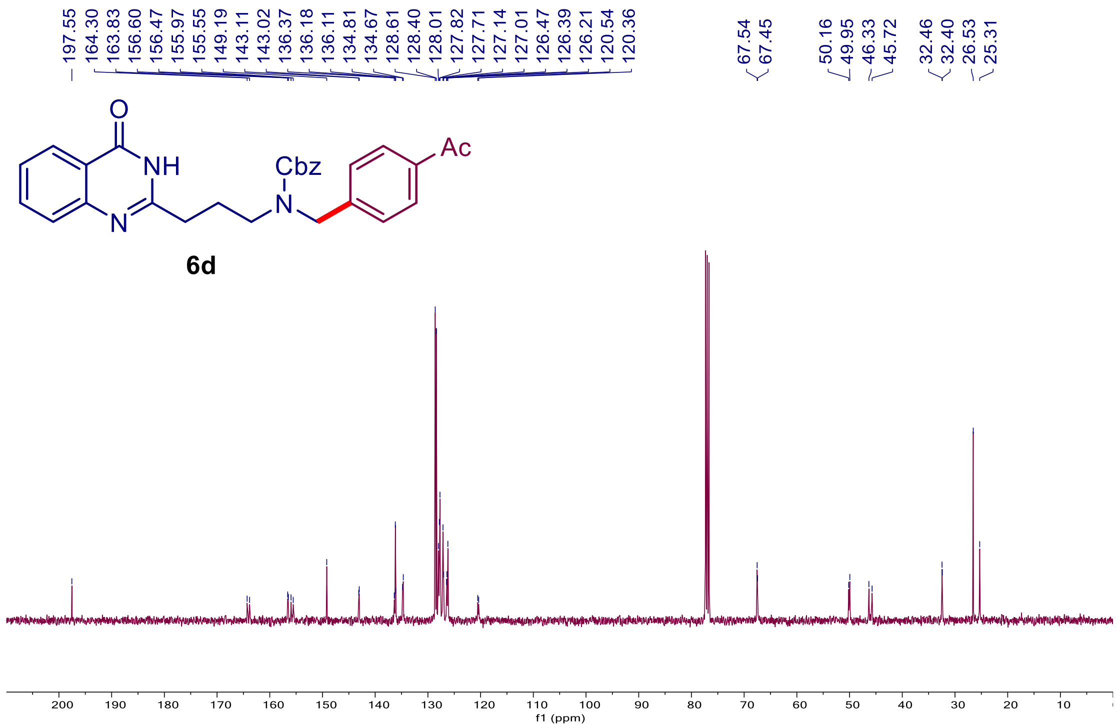
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6c**



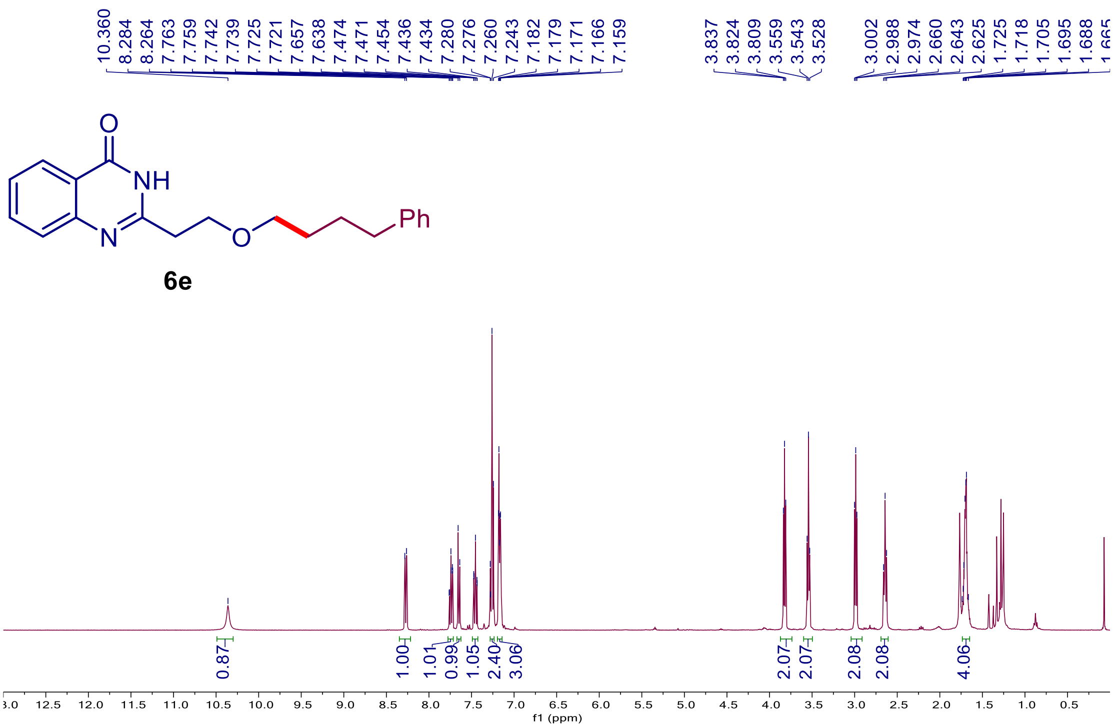


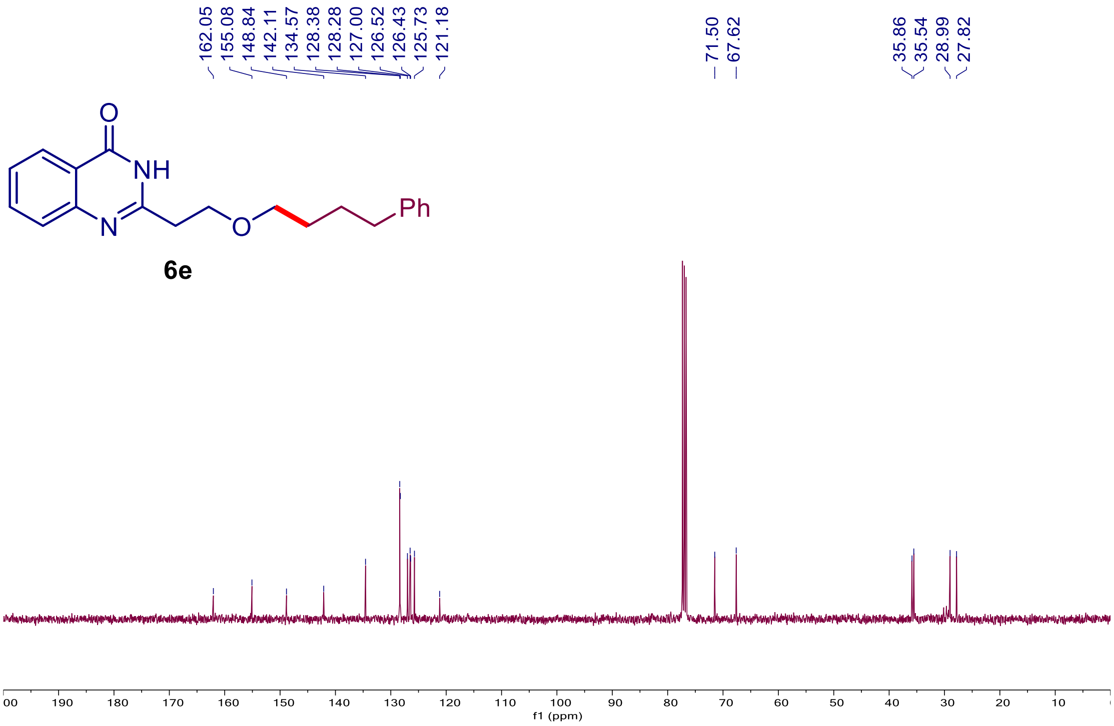
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **6d**



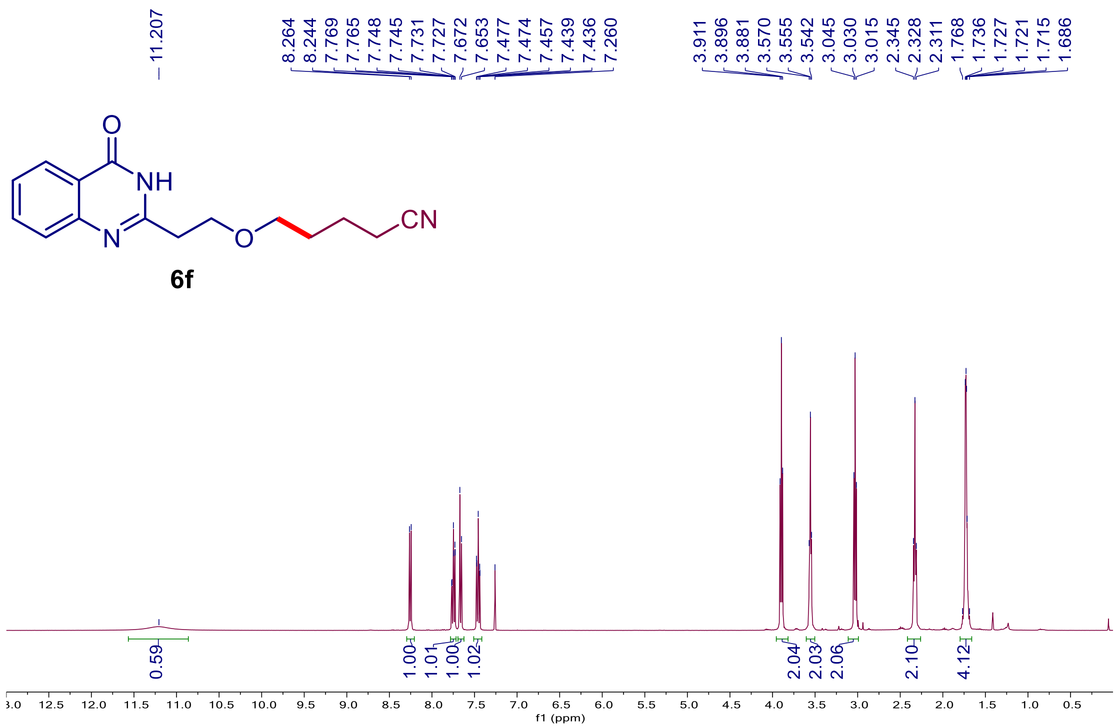


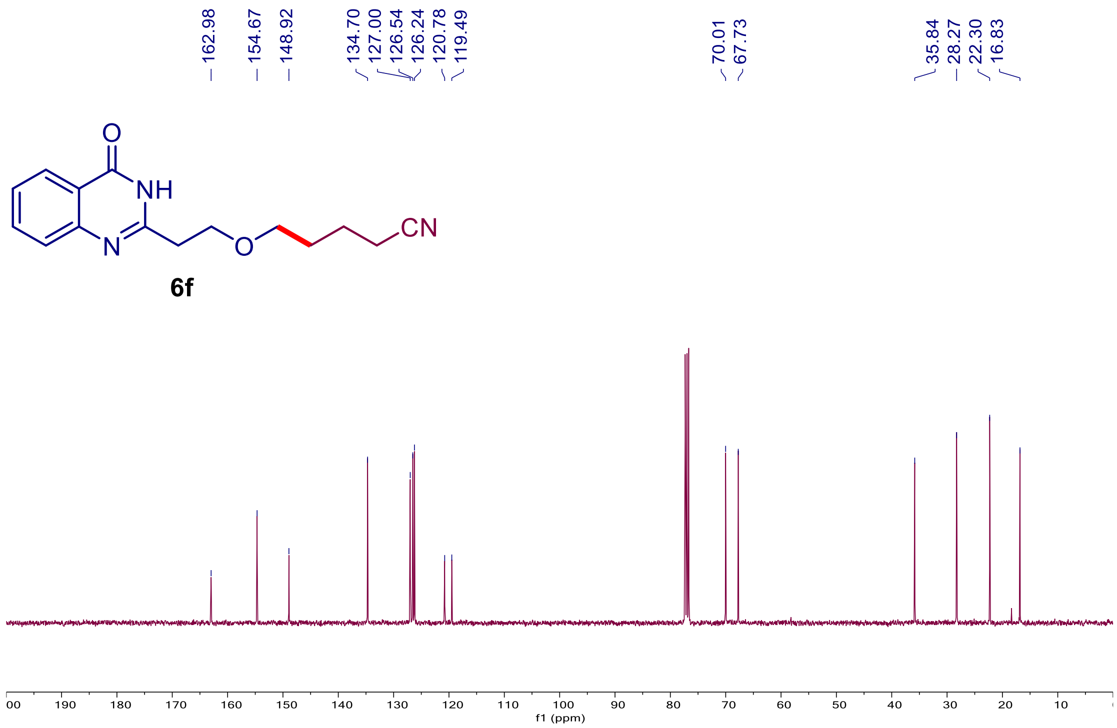
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6e**



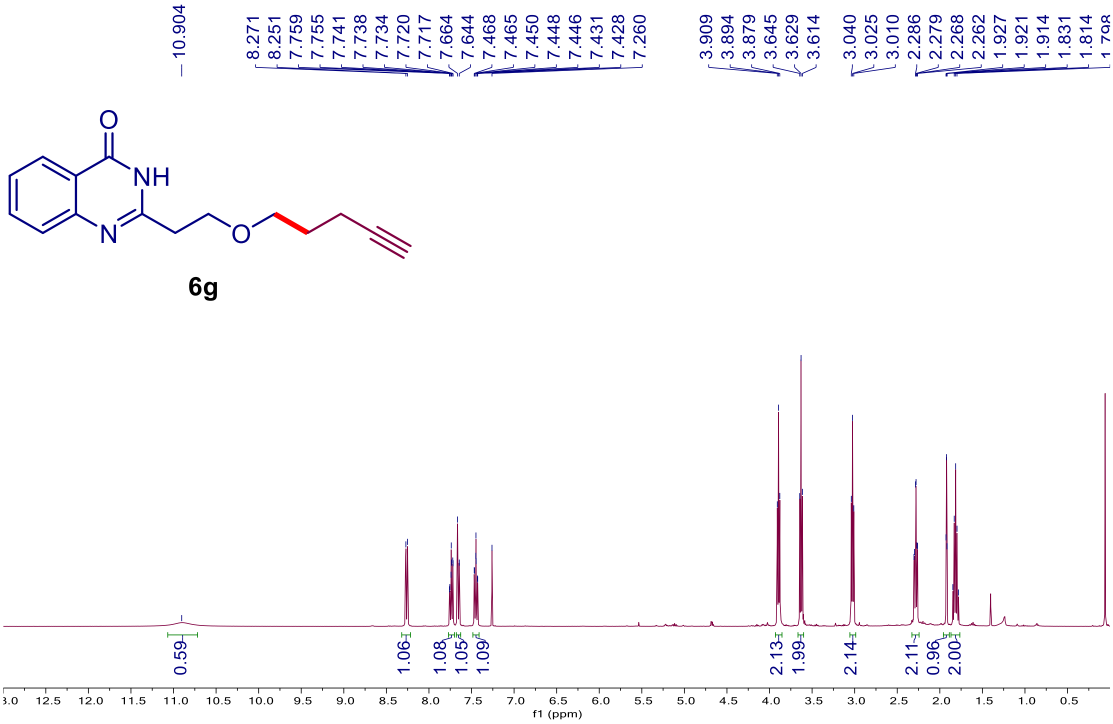


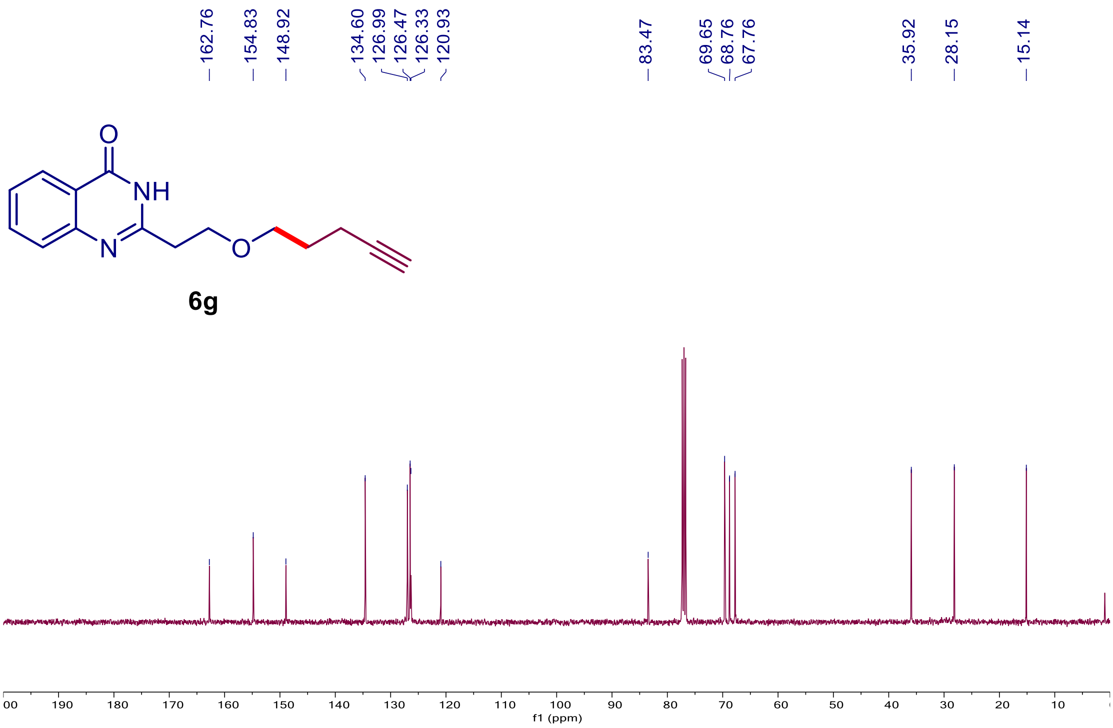
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6f**



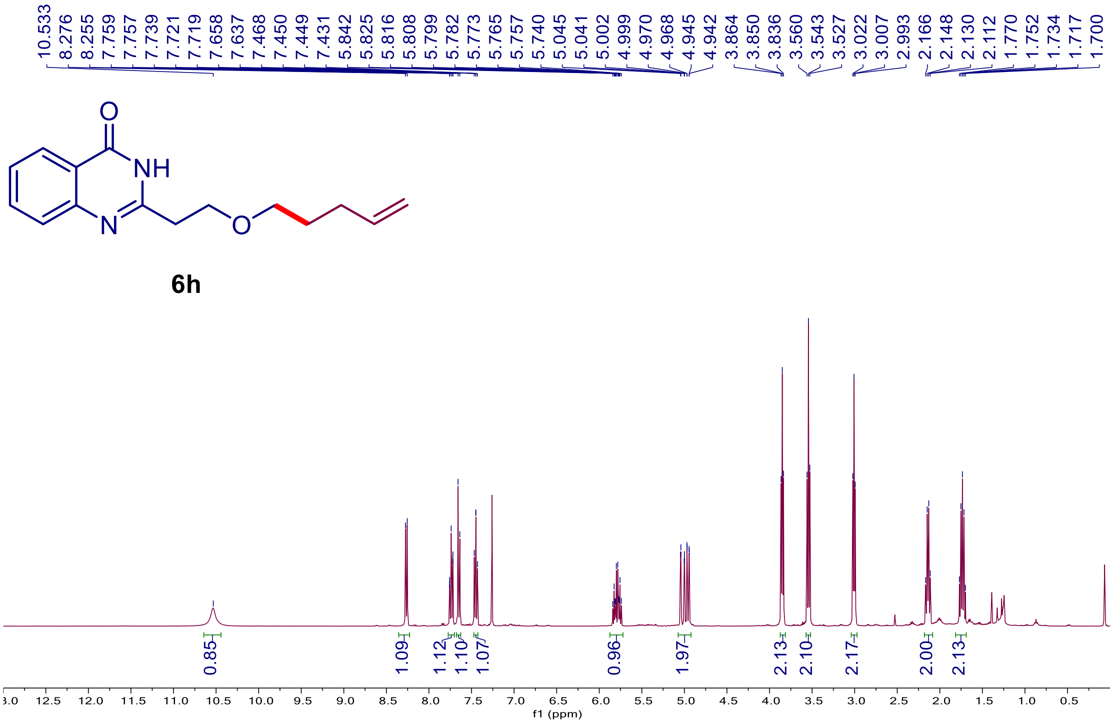


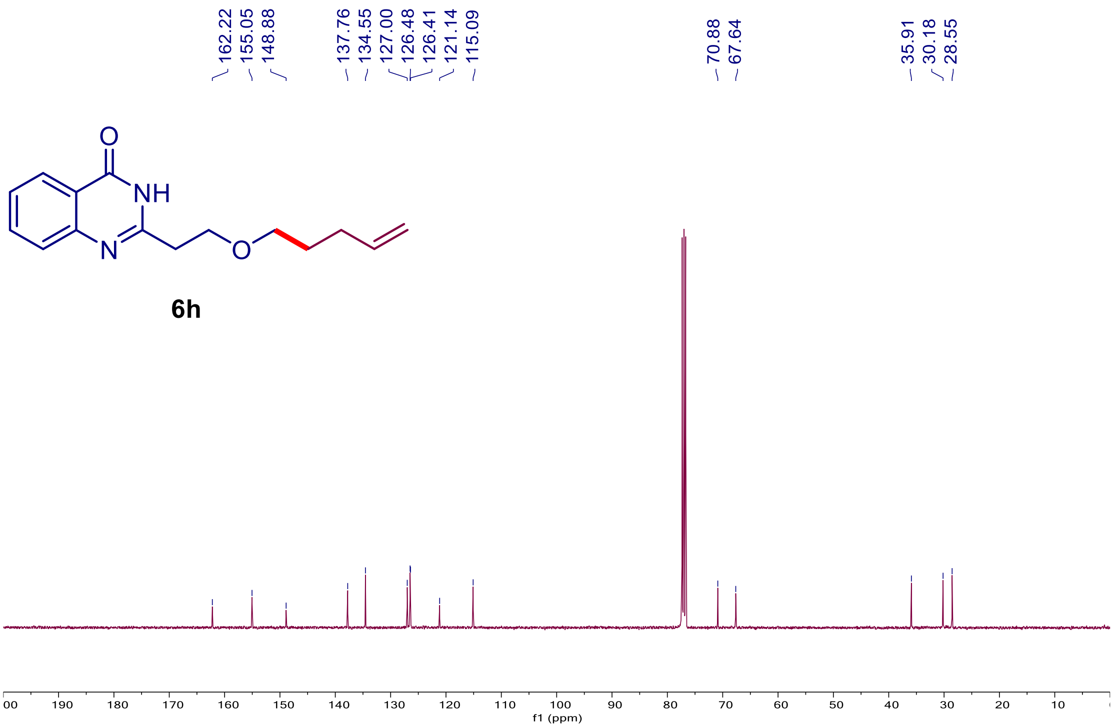
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6g**



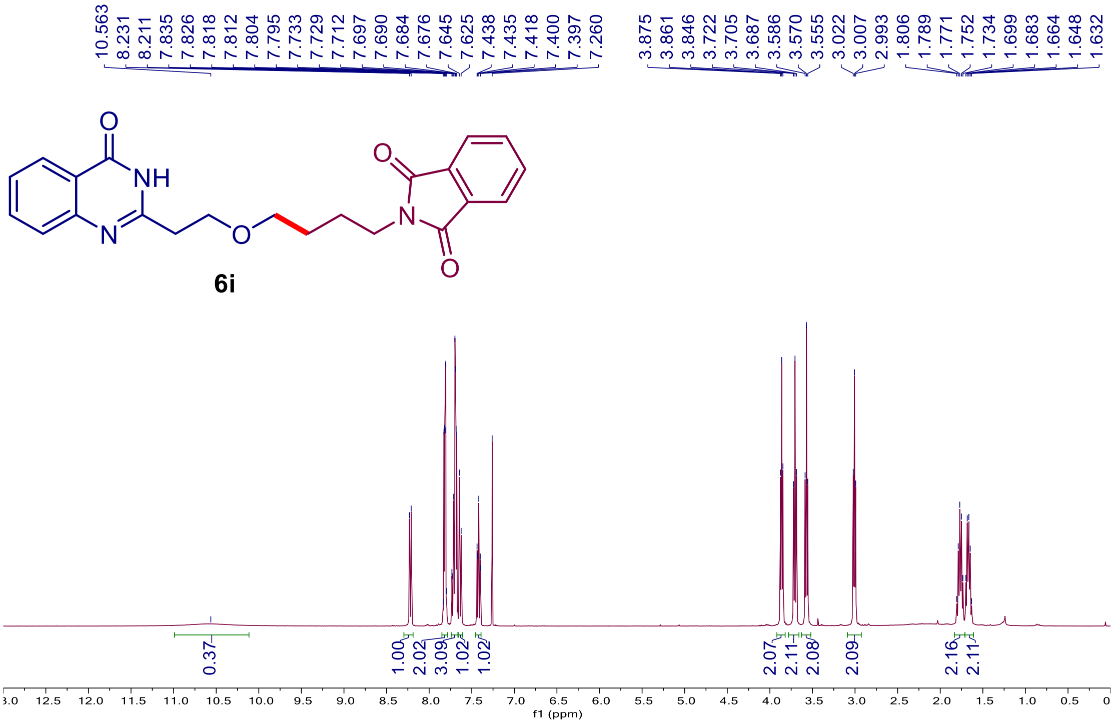


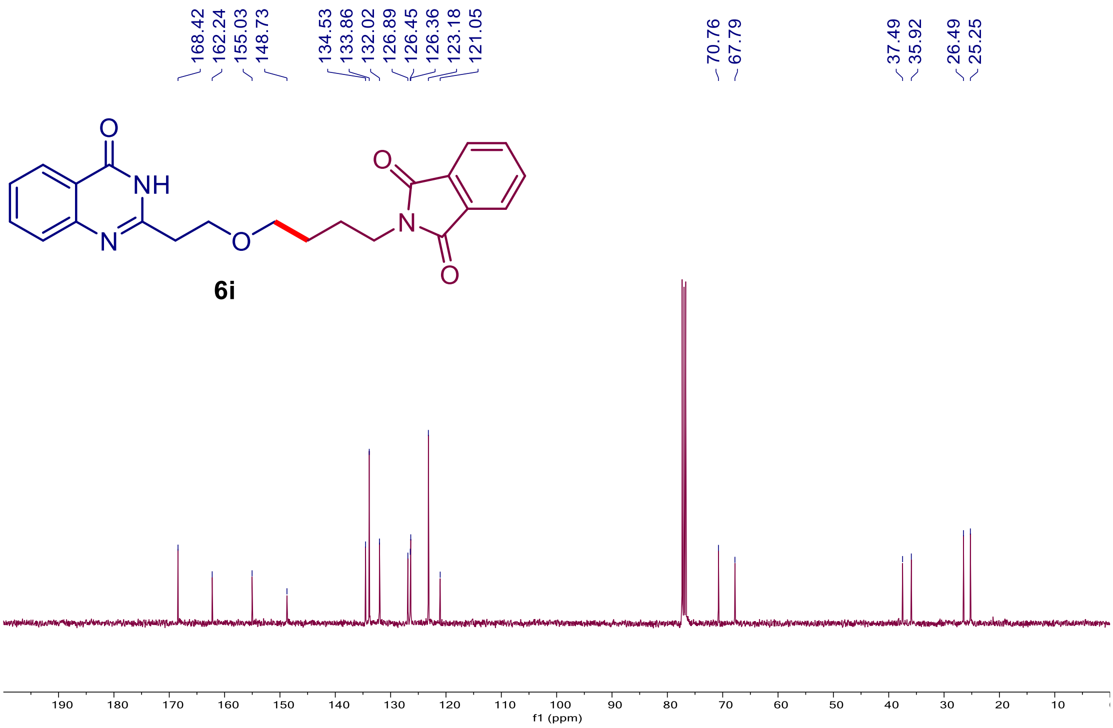
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **6h**



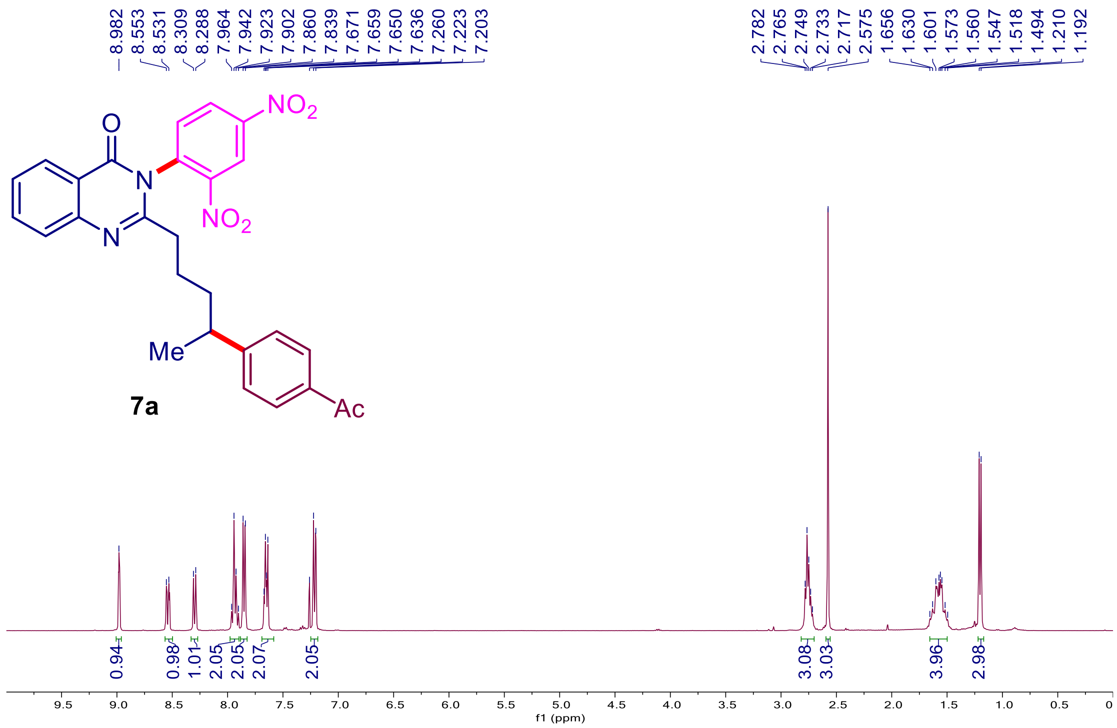


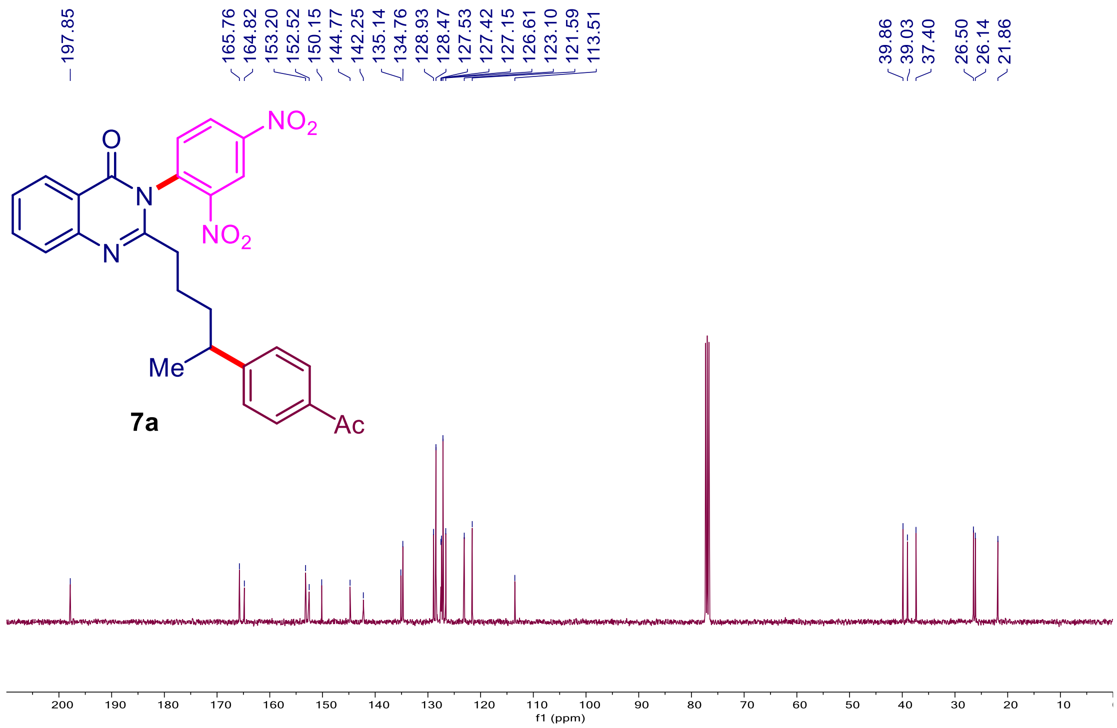
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **6i**



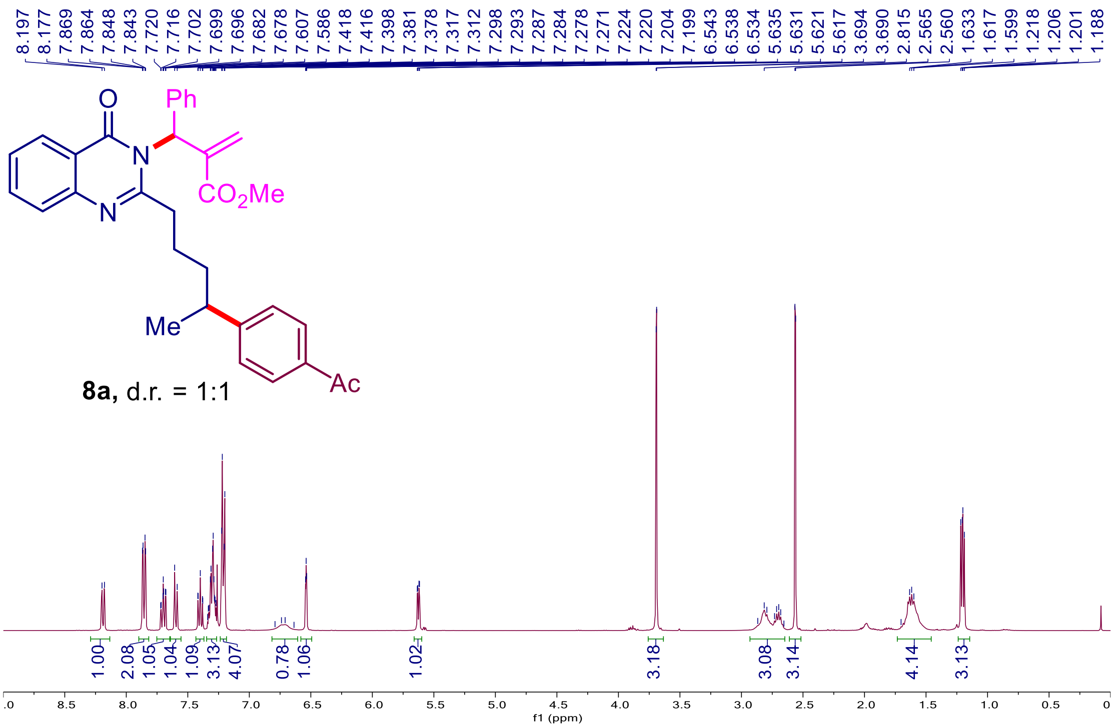


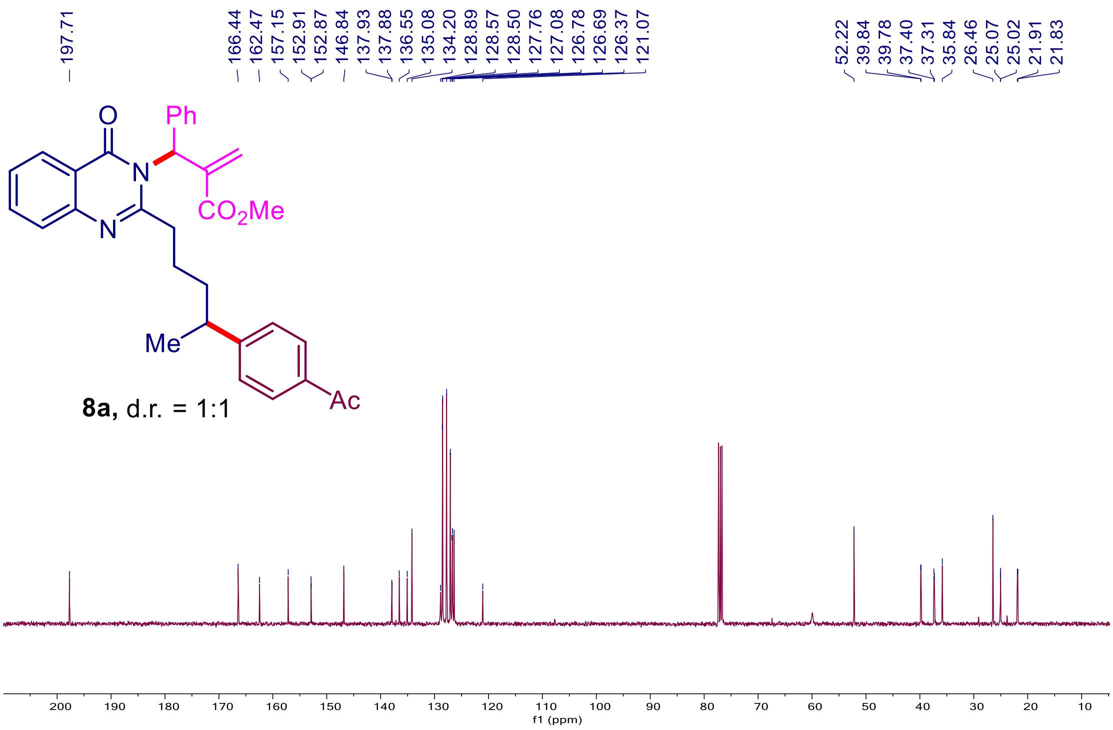
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **7a**



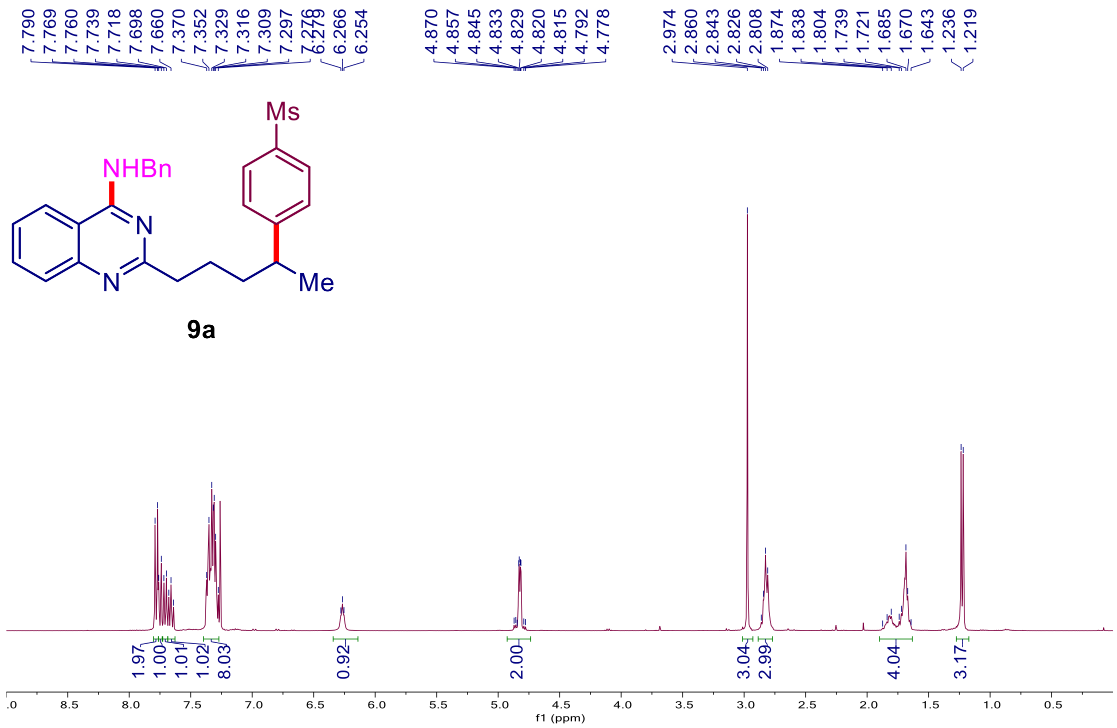


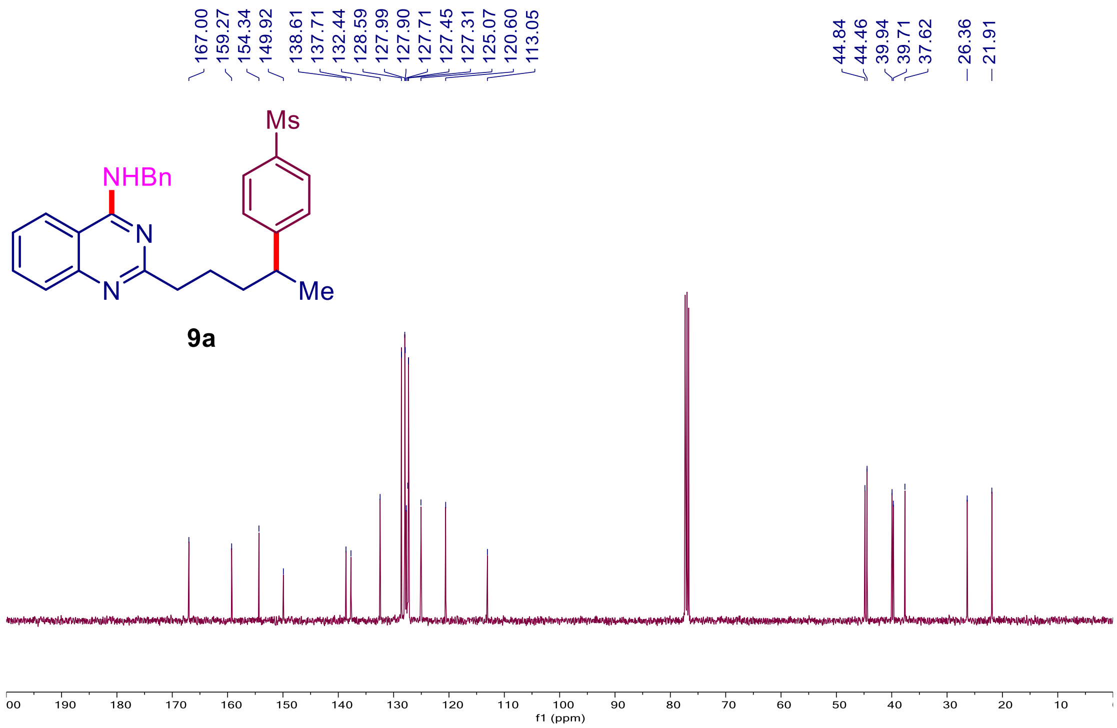
[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **8a**



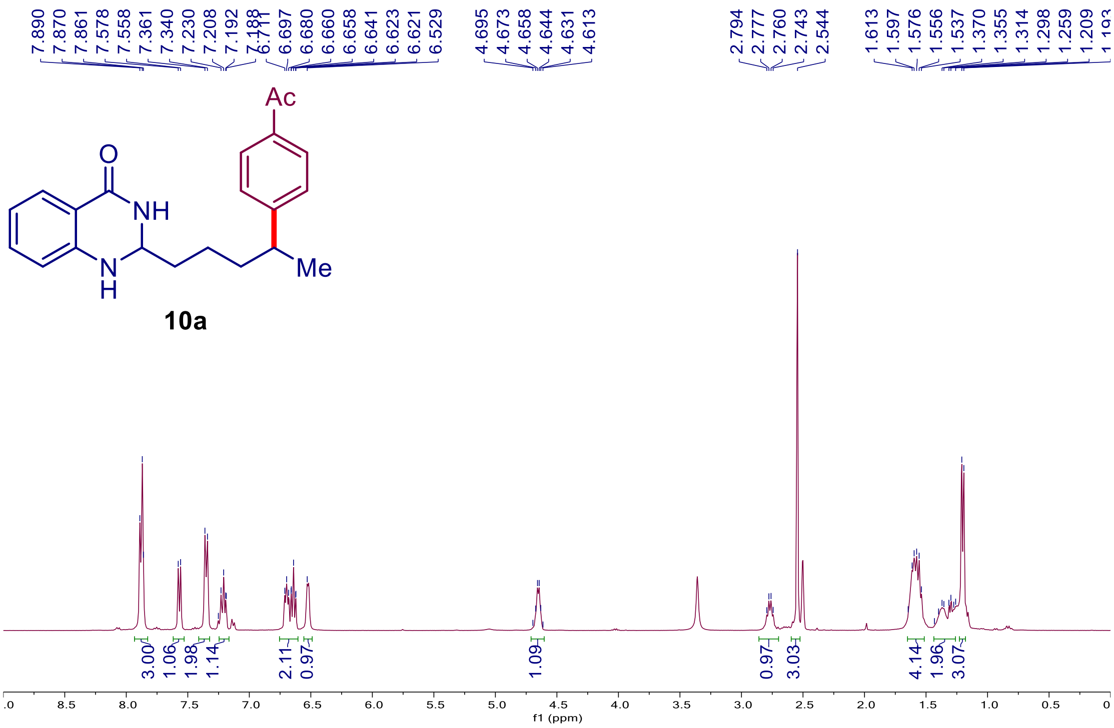


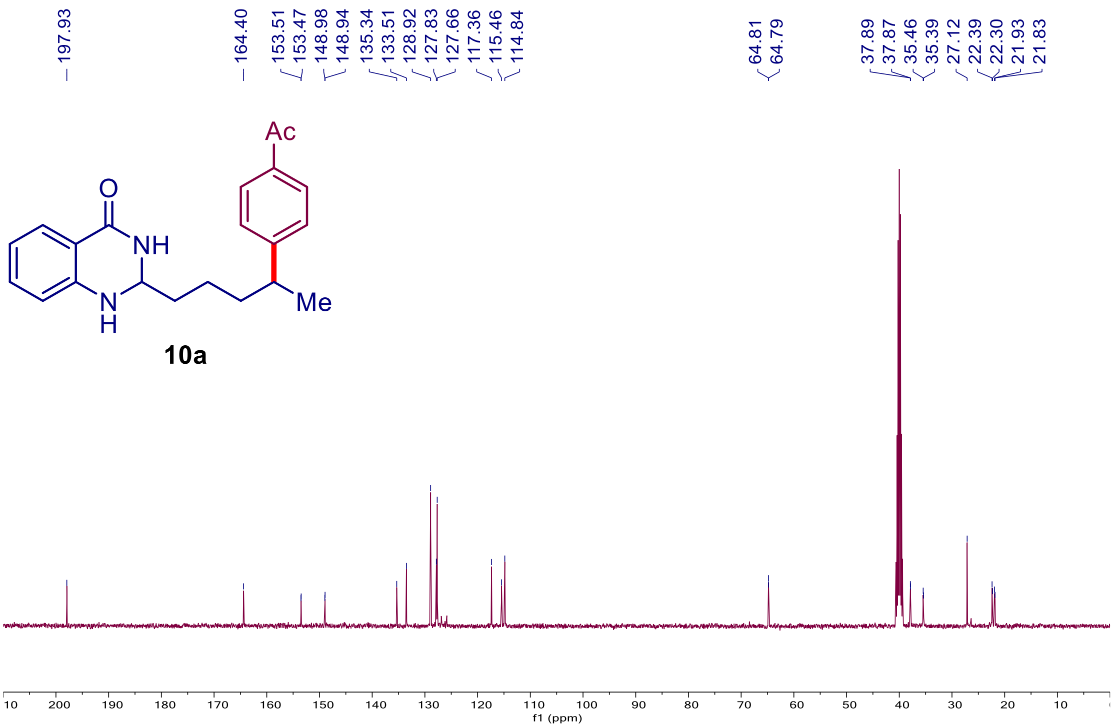
^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **9a**



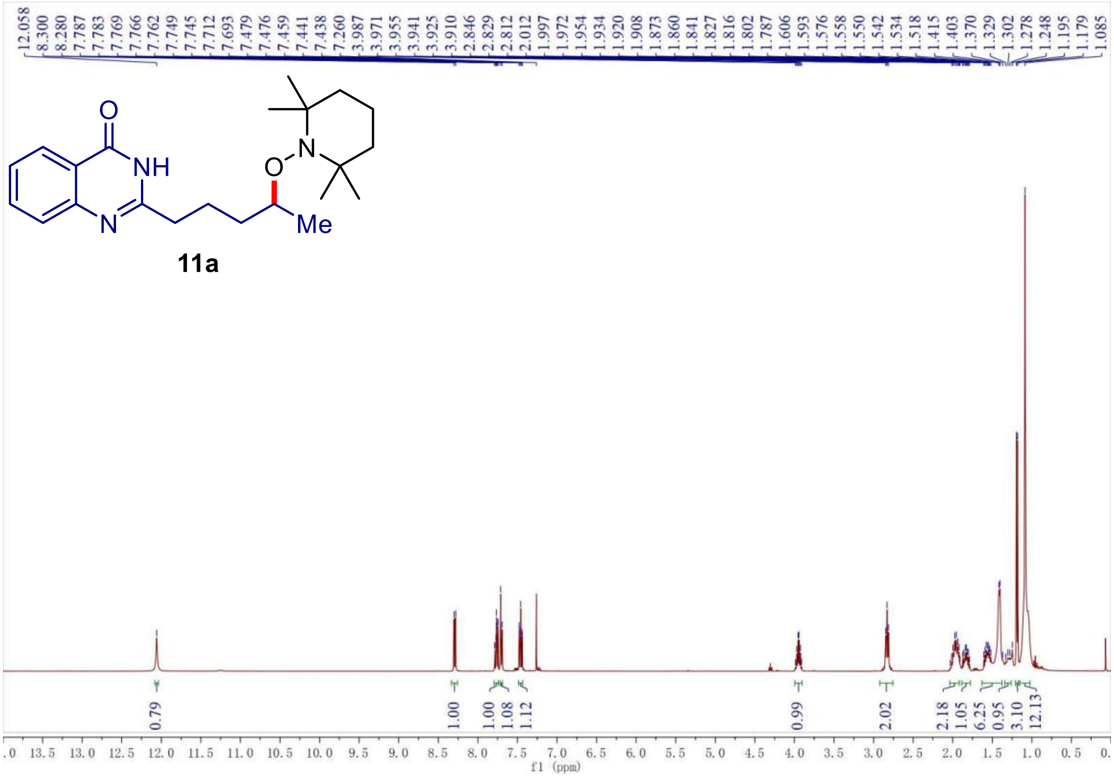


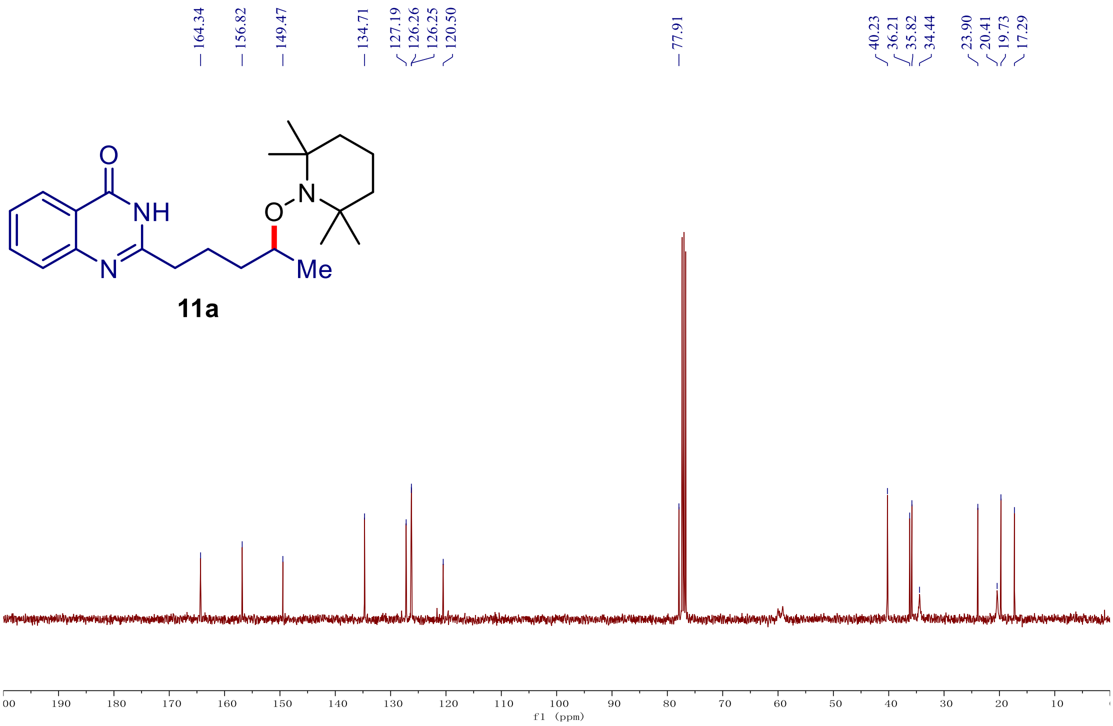
[1]H NMR (400 MHz, CDCl3) and [13]C NMR (100 MHz, CDCl3) spectra of product **10a**





^{1}H NMR (400 MHz, $CDCl_3$) and ^{13}C NMR (100 MHz, $CDCl_3$) spectra of product **11a**





[1]H NMR (400 MHz, $CDCl_3$) and [13]C NMR (100 MHz, $CDCl_3$) spectra of product **12a**