Supporting Information

Tunable selective electrochemical selenization of tetrahydroquinolines with diselenides

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Contents

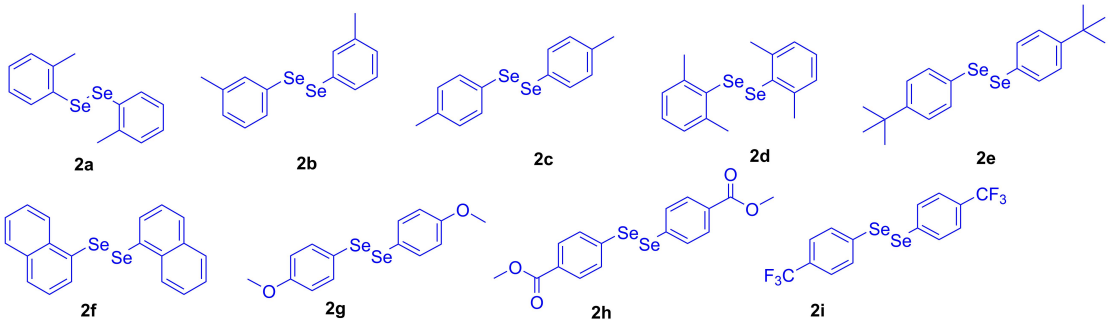
1. General methods

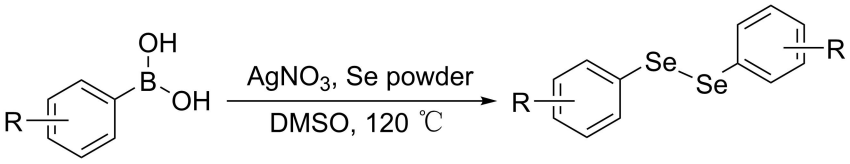
Unless otherwise noted, all reagents were purchased from commercial suppliers and used without further purification. Reactions were monitored by thin-layer chromatography (TLC) with Hai yang GF 254 silica gel plates (Qingdao Haiyang chemical industry Co Ltd, Qingdao, China) using UV light and vanillic aldehyde or phosphomolybdic acid as visualizing agents. flash column chromatography was performed using 200-300 mesh silica gel at increased pressure. ^{1}HNMR and ^{13}CNMR spectra were recorded on 600 MHz or 400 MHz NMR spectrometers. Chemical shifts (δ) were expressed in ppm with TMS as the internal standard, and coupling constants (*J*) were reported in Hz. High-resolution mass spectra were obtained by using ESI ionization sources (quadrupole time-of-flight mass spectrometer, Bruker Impact II, Bremen, Germany). Cyclic voltammograms were obtained on a CHI 700E potentiostat (CH Instruments, Inc.).

Abbreviations: DMF = *N,N*-dimethylformamide, DMSO = dimethyl sulfoxide, DCE = dichloroethane, DCM = dichloromethane, MeCN = acetonitrile, MeOH= methanol, THF = tetrahydrofuran, DMSO= Dimethyl sulfoxide, DMA = *N,N*-Dimethylaniline, TEMPO = 2,2,6,6-tetramethylpiperidinooxy, BHT = butylated hydroxytoluene, DPE = 1,1-diphenyl-ethylene, N.D. = no detected, N.R. = no reaction.

2. Experimental procedures

2.1 General procedure for the preparation of diselenides[1.2]



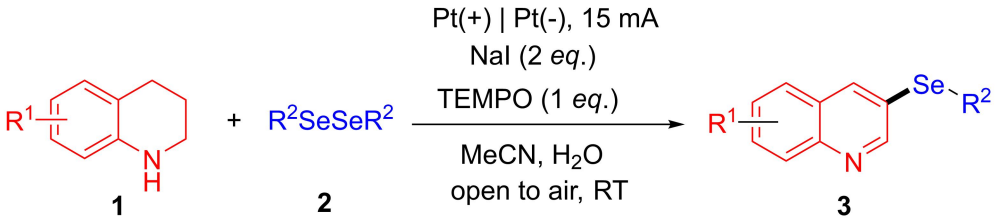


The mixture of phenylboronic acid (10.0 mmol, 1.0 *equiv.*), selenium (15.0 mmol, 1.5 *equiv.*), and silver nitrate (2.0 mmol, 0.2 *equiv.*) in 40 mL of DMSO was stirred and refluxed at 120 ℃ (oil bath), and monitored by TLC. After the reaction was complete, 20 mL of H_2O and 20 mL of ethyl acetate were added to the reaction mixture. The organic layer was then separated, dried with Na_2SO_4, filtered, and concentrated under vacuum. The crude product was purified by flash column chromatography to provide diselenide.

Caution! Organoselenides are known to be toxic and should be handled in a well ventilated fume hood and using proper personal protective equipment.

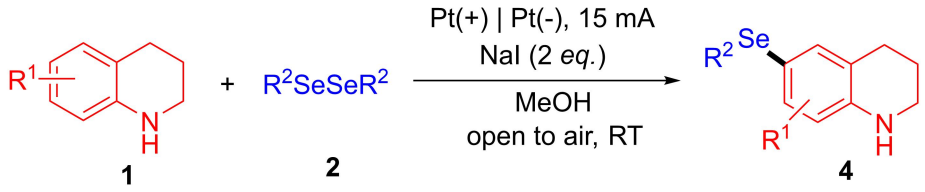
2.2 General procedure for the electrochemical selenization of tetrahydroquinolines

2.2.1 Synthesis of C-3 selenylated quinolines 3



Substrate **1** (0.3 mmol, 1 *equiv.*), substrate **2** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, *2 equiv.*), TEMPO (0.3 mmol, 1 *equiv.*), H_2O (0.2 mL) and MeCN (6 mL) were added to an undivided beaker-type electrolysis cell (10 mL) equipped with a magnetic stirring bar. Two platinum plates (1 cm x 1 cm x 0.2 mm, each) were used as anode and cathode respectively (the electrodes were immersed 1 cm in the reaction solution). The reaction mixture was stirred and electrolyzed at a constant current of 15 mA at RT. After reaction completion (monitored by TLC), the reaction mixture was concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel with petroleum ether/ethyl acetate as the eluent to obtain the target product **3**.

2.2.2 Synthesis of C-6 selenylated tetrahydroquinolines 4



1 2 4

Substrate **1** (0.2 mmol, 1 *equiv*.), substrate **2** (0.6 mmol, 3 *equiv*.), NaI (0.4 mmol, 2 *equiv*.), and MeOH (6 mL) were added to an undivided beaker-type electrolysis cell (10 mL) equipped with a magnetic stirring bar. Two platinum plates (1 cm x 1 cm x 0.2 mm, each) were used as anode and cathode respectively (the electrodes were immersed 1 cm in the reaction mixture). The reaction mixture was stirred and electrolyzed at a constant current of 15 mA at RT. After reaction completion (monitored by TLC), the reaction mixture was diluted with water, and extracted with ethyl acetate. The organic layers were combined, washed with brine, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel with petroleum ether/ethyl acetate as the eluent to obtain the target product **4**.

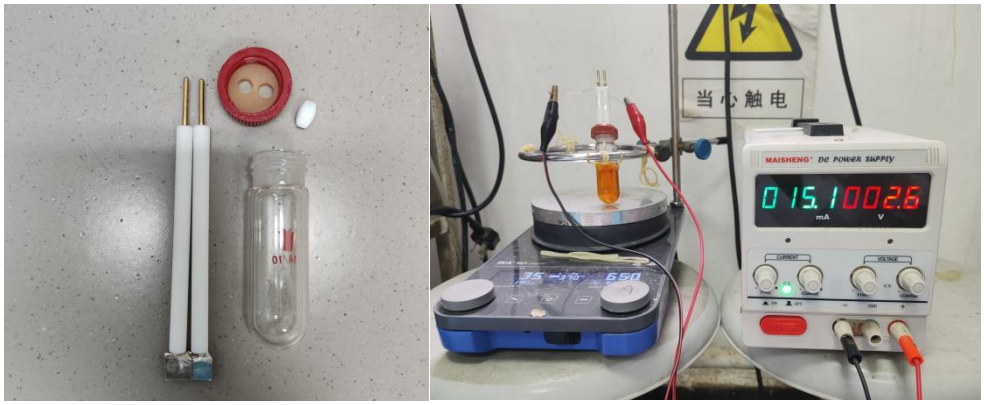
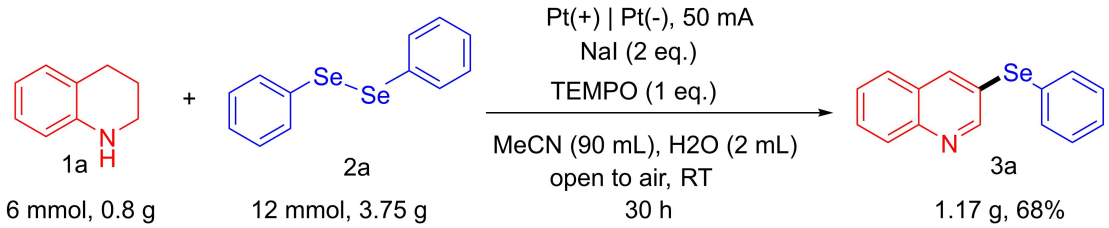


Figure S1. Electrochemical setup used

The experimental setup consisted of two platinum sheet electrodes (10 mm × 10 mm × 0.2 mm, each), a beaker-type electrolysis cell (10 mL), an adjustable DC regulated power supply (MS-150V 100 mA), a magnetic stirrer.

2.3 Gram-scale synthesis of 3a



Substrate **1a** (6 mmol, 1 *equiv.*), substrate **2a** (12 mmol, 2 *equiv.*), NaI (12 mmol, 2 *equiv.*), TEMPO (6 mmol, 1 *equiv.*), H_2O (2.0 mL), and MeCN (90 mL) were added to a beaker-type electrolysis cell (100 mL) equipped with a magnetic stir bar. Two platinum plates (3 cm x 3 cm x 0.2 mm, each) were used as anode and cathode respectively (the electrodes were immersed 3 cm in the reaction solution). The reaction mixture was stirred and electrolyzed at a constant current of 50 mA at RT. After reaction completion (monitored by TLC), the reaction mixture was diluted with water, and extracted with ethyl acetate. The organic layers were combined, washed with brine, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel with petroleum ether/ethyl acetate as the eluent to obtain the target product **3a** (1.17 g, 68% yield). In addition, **2a** (1.66 g) was recovered.

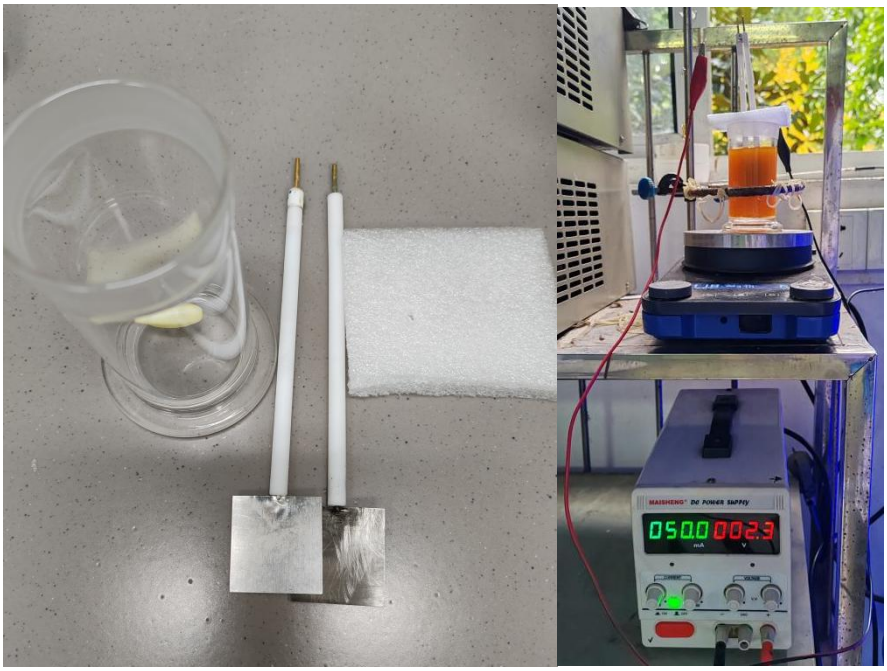


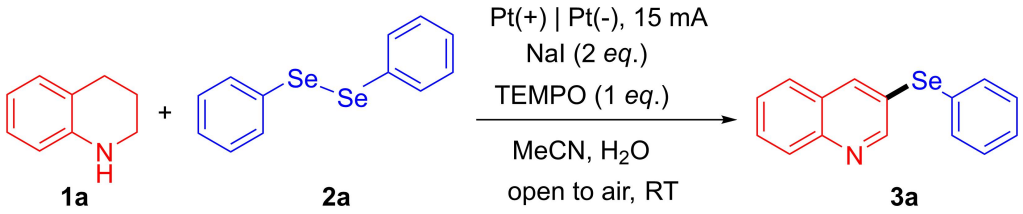
Figure S2. Electrochemical setup for the scale-up experiment.

The electrochemical setup for the scale-up experiment consisted of two platinum sheet electrodes (30 mm × 30 mm × 0.2 mm, each), a beaker-type electrolysis cell (100 mL), an adjustable DC regulated power supply (MS-150V 100 mA), and a magnetic stirrer.

3. Optimization of reaction conditions

3.1 Optimization of reaction conditions for the synthesis of 3

Table S1. Screening of the amount of **2a**[a]

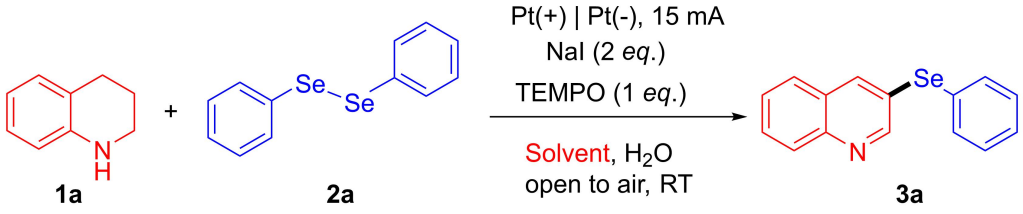


1a **2a** **3a**

Entry	**2a** (*equiv.*)	Yield (%)[b]
1	0.5	40
2	0.6	41
3	0.8	47
4	1.0	55
5	1.1	62
6	1.3	59
7	1.5	65
8	2.0	64
9	2.5	78
10	**3.0**	**85**
11	4.0	75

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (x *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield.

Table S2. Solvent screening[a]



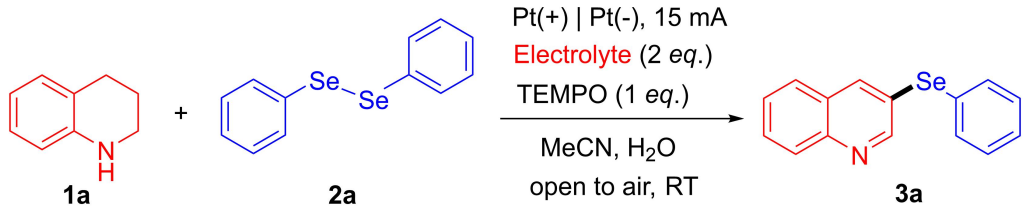
1a **2a** **3a**

Entry	Solvent	Yield (%)[b]

1	**MeCN**	**85**
2	DMF	33
3	DMSO	18
4	THF	70
5	MeOH	25
6	DCM	voltage overload
7	1,4-dioxane	voltage overload
8	acetone	45

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in solvent (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield.

Table S3. Electrolyte screening[a]

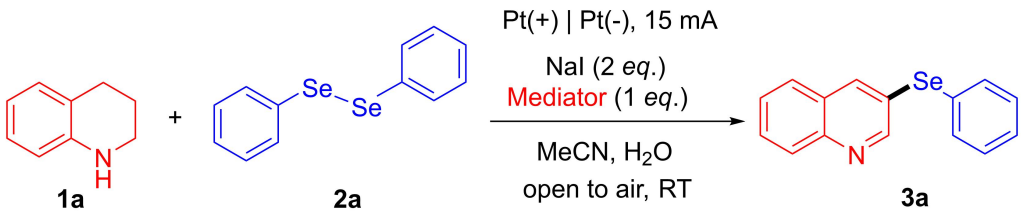


1a **2a** **3a**

Entry	Electrolyte	Yield (%)[b]
1	without	voltage overload
2	**NaI**	**85**
3	KI	voltage overload
4	NaBr	49
5	NaCl	53
6	NH_4I	49
7	LiBr	53
8	$LiBF_4$	trace[c]
9	$NaClO_4$	trace
10	nBu$_4$NCl	trace
11	nBu$_4$NBr	trace
12	nBu$_4$NI	trace
13	nBu$_4$NClO$_4$	trace[c]
14	nBu$_4$NBF$_4$	trace[c]

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), electrolyte (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield. [c] The main product was quinoline.

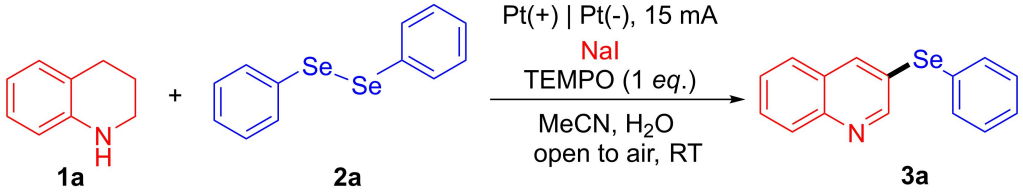
Table S4. Mediator screening[a]



Entry	Mediator	Yield (%)[b]
1	without	trace[c]
2	**TEMPO**	**85**
3	ferrocene	trace
4	*N*,*N*,*N*-triphenylamine	trace
5	*N*,*N*-bis(4-bromophenyl)-4-bromoaniline	trace
6	9-azabicyclo[3.3.1]nonane *N*-oxyl	45

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), mediator (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield. [c] **4a** was obtained in 40% yield.

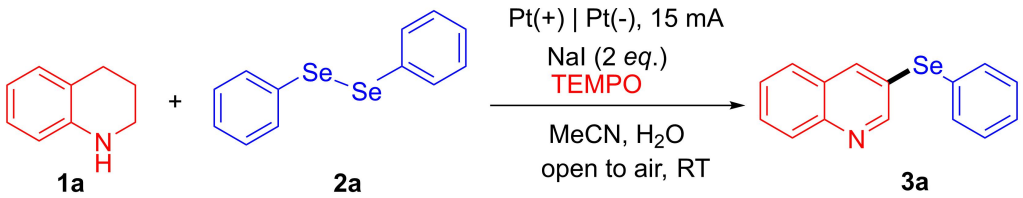
Table S5. Screening of the amount of NaI[a]



Entry	NaI (*equiv.*)	Yield (%)[b]
1	1	57
2	**2**	**85**
3	3	68
4	4	trace

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (x *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield.

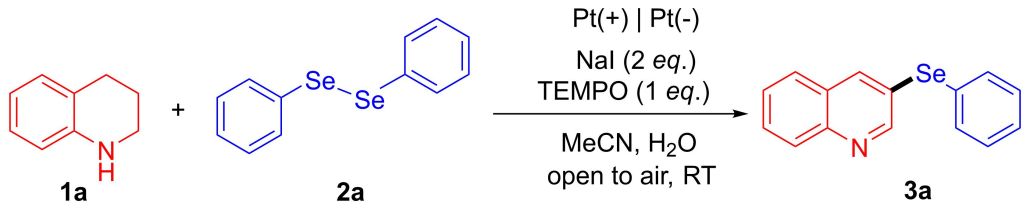
Table S6. Screening of the amount of TEMPO[a]



Entry	TEMPO (*equiv.*)	Yield (%)[b]
1	0	trace[c]
2	0.2	60
3	0.5	62
4	0.8	65
5	**1.0**	**85**
6	1.5	79
7	2.0	75

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (x *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield. [C] **4a** was obtained in 40% yield.

Table S7. Current screening[a]

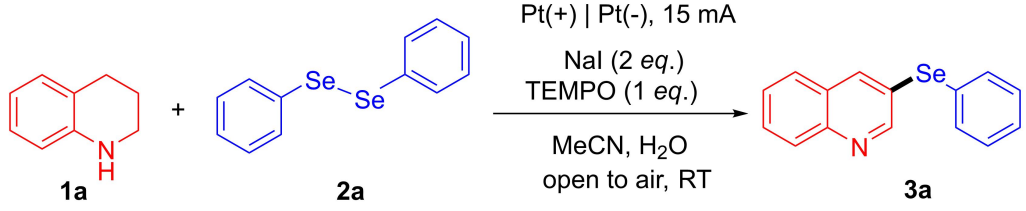


1a **2a** **3a**

Entry	Current (mA)	Yield (%)[b]
1	9	33
2	12	51
3	**15**	**85**
4	18	57
5	21	46

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield.

Table S8. Electrode material screening[a]



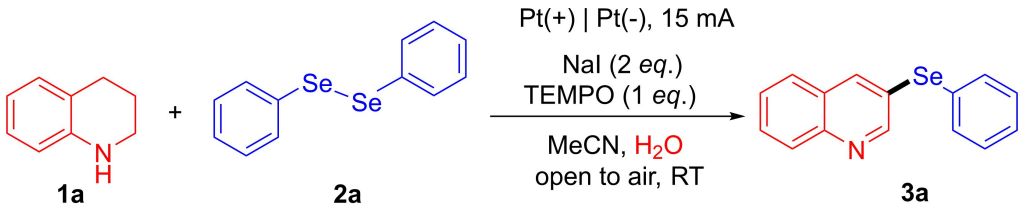
1a **2a** **3a**

Entry	Electrode	Yield (%)[b]
1	**Pt(+) | Pt(-)**	**85**

2	Pt(+) | C(-)	46
3	C(+) | Pt(-)	64
4	C(+) | C(-)	67

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (0.2 mL) in MeCN (6 mL) under a constant current of 15 mA (x anode, x cathode) in an undivided cell at RT for 6 h. b Isolated yield.

Table S9. Screening of the amount of H_2O[a]

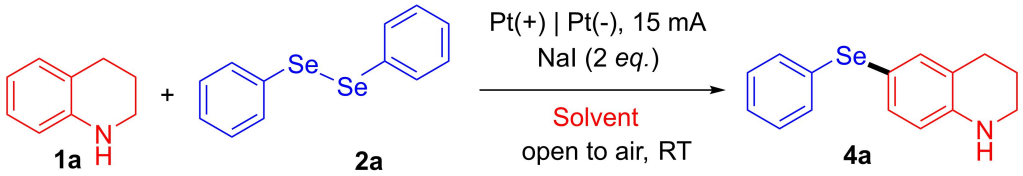


Entry	H_2O (mL)	Yield (%)[b]
1	0	voltage was excessively high
2	0.1	61
3	0.15	68
4	**0.2**	**85**
5	0.25	70

[a] Reaction conditions: A mixture of **1a** (0.3 mmol, 1 *equiv.*), **2a** (0.9 mmol, 3 *equiv.*), NaI (0.6 mmol, 2 *equiv.*), TEMPO (0.3 mmol, 1 *equiv.*) and H_2O (x mL) in MeCN (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 6 h. [b] Isolated yield.

3.2 Optimization of the reaction conditions for the synthesis of 4

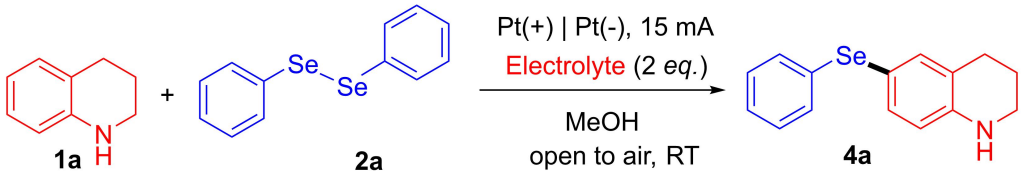
Table S10. Solvent screening[a]



Entry	Solvent	Yield (%)[b]
1	MeCN	40
2	DCM	41
3	DMF	47
4	DMSO	55
5	DMA	62
7	**MeOH**	**74**

[a] Reaction conditions: A mixture of **1a** (0.2 mmol, 1 *equiv.*), **2a** (0.6 mmol, 3 *equiv.*), NaI (0.4 mmol, 2 *equiv.*) in solvent (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 5 h. [b] Isolated yield. [c] Without H_2O

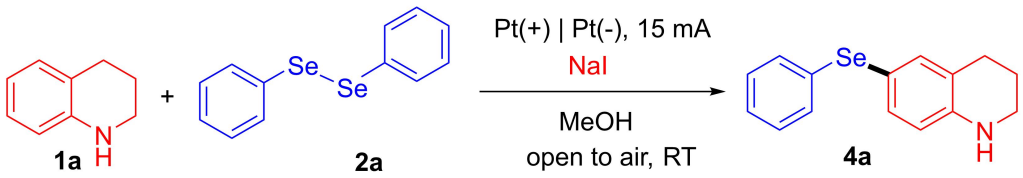
Table S11. Electrolyte screening[a]



Entry	Electrolyte	Yield (%)[b]
1	without	voltage overload
2	nBu$_4$NBr	35
3	nBu$_4$NI	50
4	nBu$_4$NPF$_6$	trace
5	nBu$_4$NBF$_4$	trace
6	nBu$_4$NClO$_4$	trace
7	NH$_4$I	64
8	**NaI**	**74**
9[c]	NaI	N.D.

[a] Reaction conditions: A mixture of **1a** (0.2 mmol, 1 *equiv.*), **2a** (0.6 mmol, 3 *equiv.*), Electrolyte (0.4 mmol, 2 *equiv.*) in MeOH (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 5 h. [b] Isolated yield. [c] Without current.

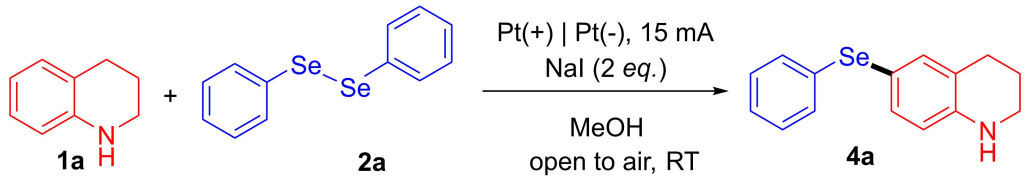
Table S12. Screening of the amount of electrolyte[a]



Entry	NaI (*equiv.*)	Yield (%)[b]
1	1	36
2	1.5	39
3	**2**	**74**
4	2.5	35
5	3	31

[a] Reaction conditions: A mixture of **1a** (0.2 mmol, 1 *equiv.*), **2a** (0.6 mmol, 3 *equiv.*), NaI (x *equiv.*) in MeOH (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 5 h. [b] Isolated yield.

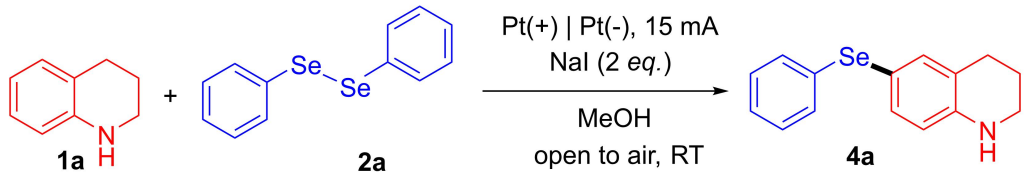
Table S13. Screening of the amount of **2a**[a]



Entry	**2a** (*equiv.*)	Yield (%)[b]
1	0.5	trace
2	1	23
3	2	43
4	2.5	61
5	**3**	**74**
6	3.5	52

[a] Reaction conditions: A mixture of **1a** (0.2 mmol, 1 *equiv.*), **2a** (x *equiv.*), NaI (0.4 mmol, 2 *equiv.*) in MeOH (6 mL) under a constant current of 15 mA (Pt anode: 1 cm x 1 cm x 0.2 mm; Pt cathode: 1 cm x 1 cm x 0.2 mm) in an undivided cell at RT for 5 h. [b] Isolated yield.

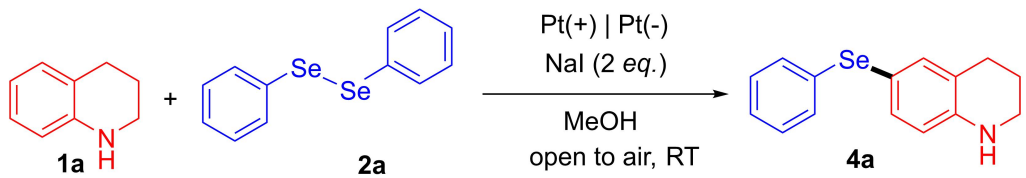
Table S14. Electrode material screening[a]



Entry	Electrode	Yield (%)[b]
1	C(+) | Pt(-)	23
2	C(+) | C(-)	voltage overload
3	**Pt(+) | Pt(-)**	**74**
4	Pt(+) | C(-)	35

[a] Reaction conditions: A mixture of **1aa** (0.2 mmol, 1 *equiv.*), **2a** (0.6 mmol, 3 *equiv.*), NaI (0.4 mmol, 2 *equiv.*) in MeOH (6 mL) under a constant current of 15 mA (x anode; x cathode) in an undivided cell at RT for 5 h. [b] Isolated yield.

Table S15. Current screening[a]



Entry	Current	Yield (%)[b]

1	12	29
2	**15**	**74**
3	18	50
4	21	20

[a] Reaction conditions: A mixture of **1a** (0.2 mmol, 1 *equiv.*), **2a** (0.6 mmol, 3 *equiv.*), NaI (0.4 mmol, 2 *equiv.*) in MeOH (6 mL) under a constant current (x anode; x cathode) in an undivided cell at RT for 5 h. [b] Isolated yield.

4. Mechanistic investigation

4.1 Cyclic voltammetry experiments

The electrochemical measurement was performed by a computer-controlled electrochemical analyzer. The cyclic voltammetry experiment was conducted in a three-electrode cell (volume 15 mL; MeCN as the solvent, 0.05 M of nBu$_4$NClO$_4$ as the supporting electrolyte, 2 mM concentration of test compound), and glassy carbon (diameter 3 mm) as working electrode, platinum wire as auxiliary electrode, Hg/Hg_2Cl_2 (3 M KCl) as reference electrode. The scanning speed was 100 mV·s^{-1}. For tetrahydroquinoline (**1a**), 1,2-diphenyldiselane (**2a**), NaI, and TEMPO, the oxidation potential range studied was from 0.0 V to +3.0 V, relative to Hg/Hg_2Cl_2 (3 M KCl). Meanwhile, the reduction potentials were determined for **1a** and **2a**. The reduction potential range studied was from 0.0 V to -3.0 V, relative to Hg/Hg_2Cl_2 (3 M KCl).

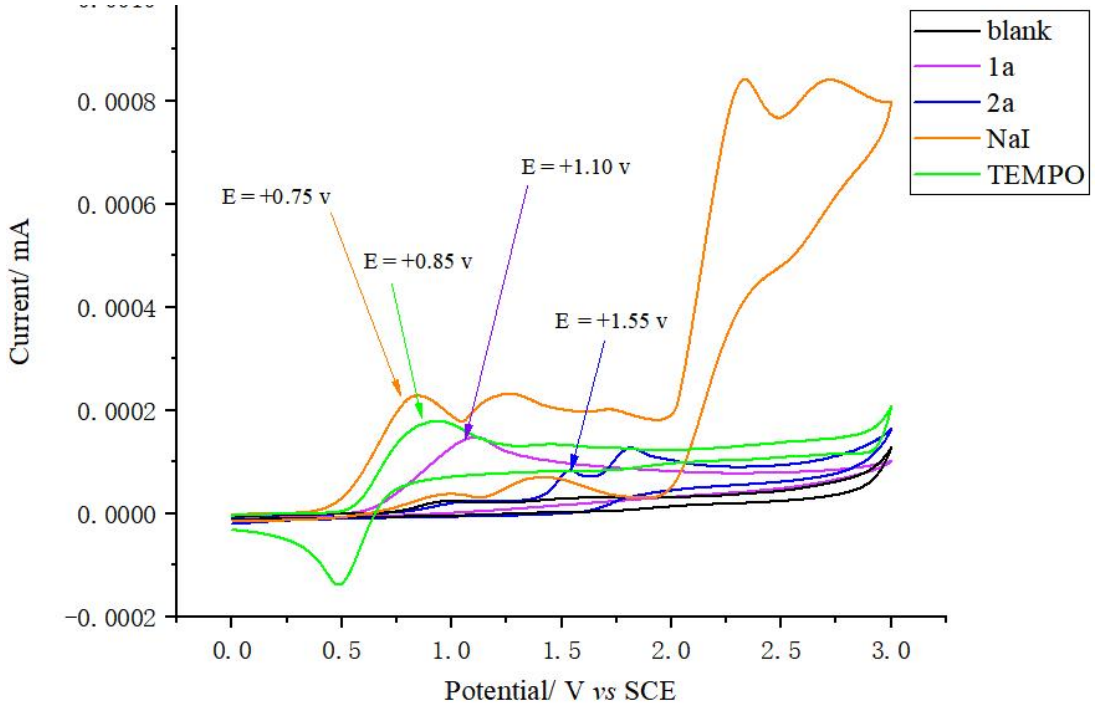


Figure S4. Cyclic voltammogram of NaI, TEMPO, **1a**, and **2a** in an electrolyte of nBu$_4$NClO$_4$ (0.05 M) in MeCN from 0 to +3.0 V.

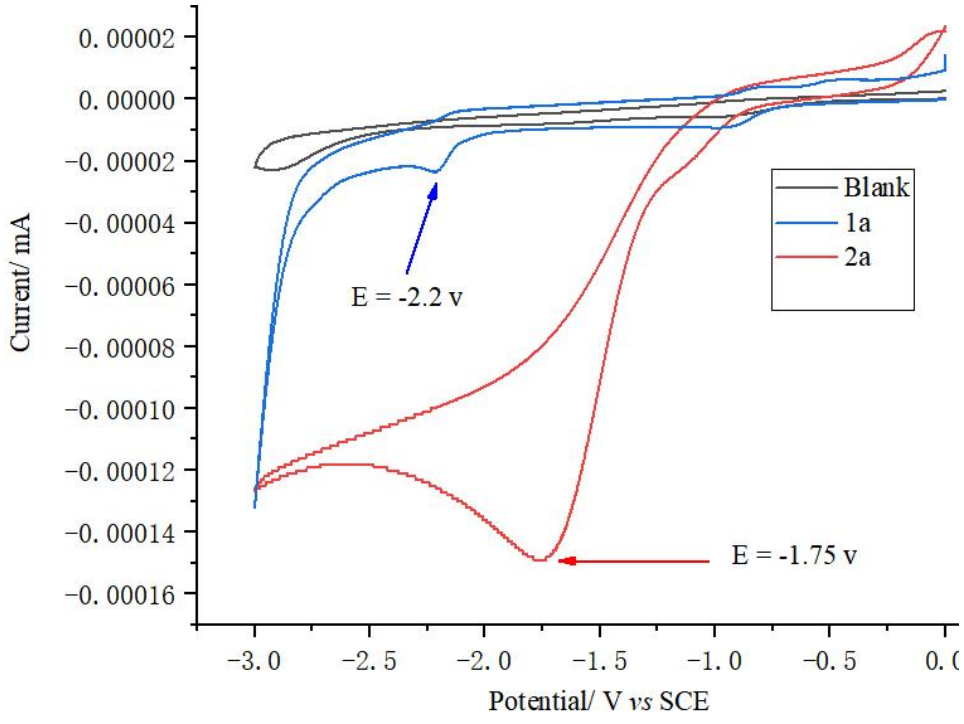
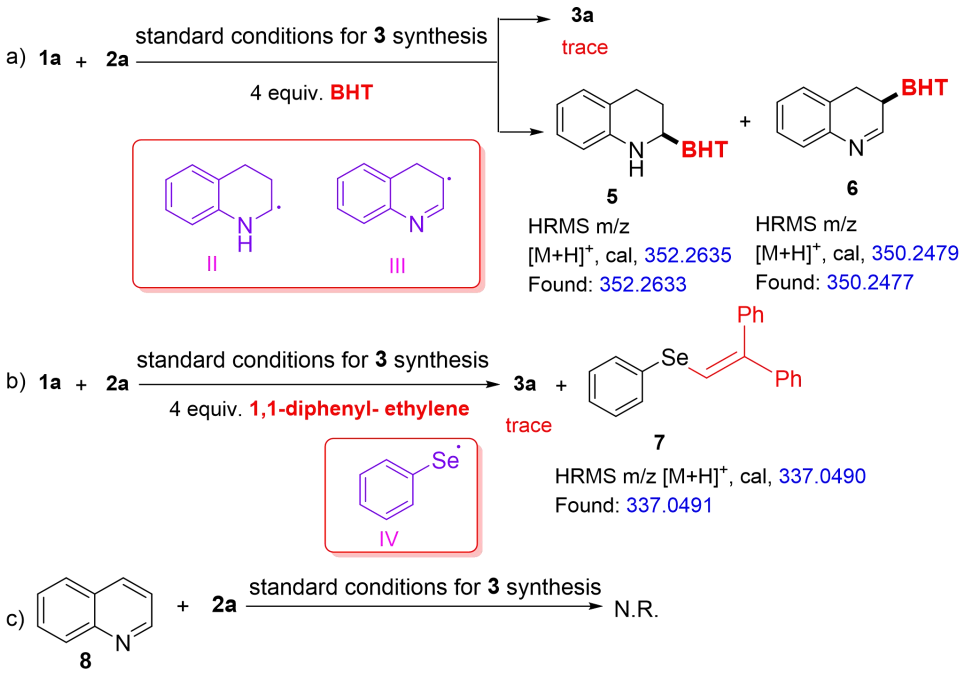


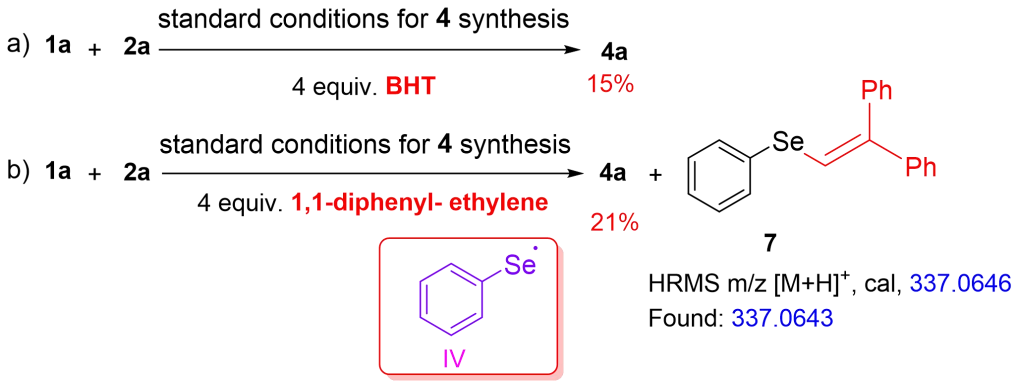
Fig. S5. Cyclic voltammogram of **1a** and **2a** in an electrolyte of nBu$_4$NClO$_4$ (0.05 M) in MeCN from 0 to -3.0 V.

4.2 Radical trapping experiments

Under standard conditions for **3** synthesis, BHT and DPE (4.0 equiv to **1a**) were added separately to the model reaction system at the beginning of the reaction. After 3 h, a small amount of reaction mixture was taken for high-resolution mass spectrometry (HRMS) analysis. From TLC, only trace amounts of product **3a** was observed. Meanwhile, under standard conditions for 4 synthesis, BHT and DPE (4.0 equiv to **1a**) were added separately to the model reaction system at the beginning of the reaction. After 3 h, a small amount of reaction mixture was taken for high-resolution mass spectrometry (HRMS) analysis. In the presence of BHT, **4a** was isolated in 15% yield. And in the presence of DPE, **4a** was isolated in 21% yield.



Scheme S1. Mechanism exploration of Synthesis of **3a**.



Scheme S2. Mechanism exploration of Synthesis of **4a**.

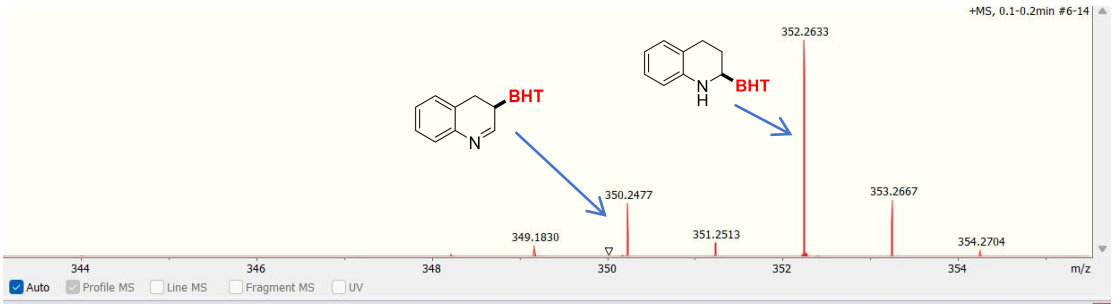


Figure S6. Mass spectrometry (HRMS) data of the radical trapping experiments (with BHT).

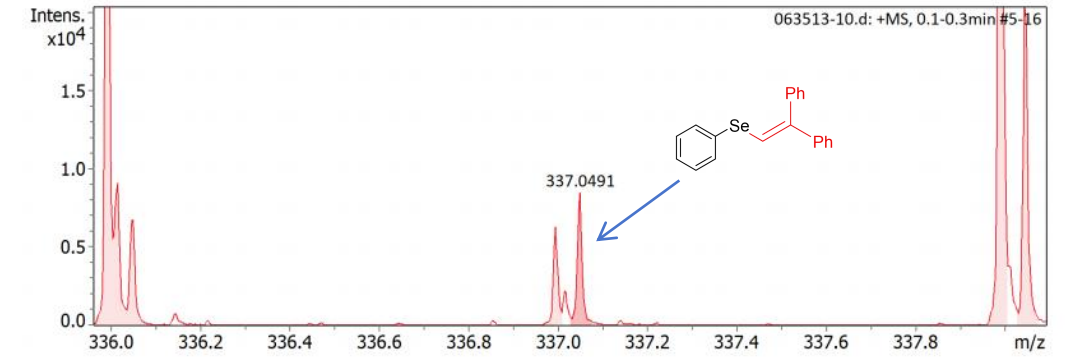


Figure S7. Mass spectrometry (HRMS) data of the radical trapping experiments (with DPE).

4.3 Possible reaction mechanism for the formation of **4a'**

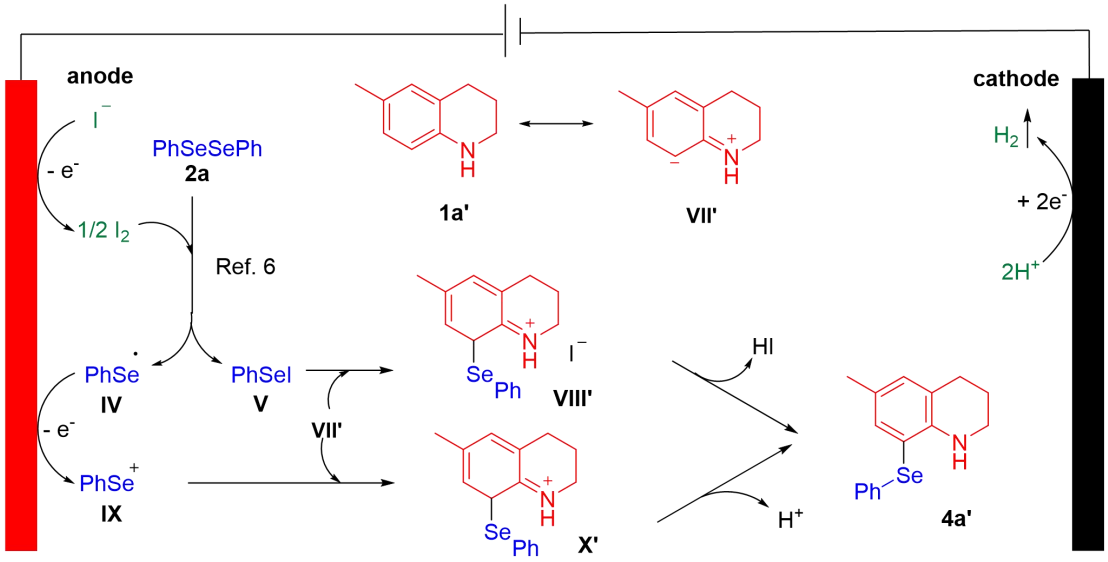


Figure S8. Possible reaction mechanism for the formation of **4a'**

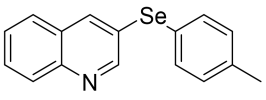
5. Characterization data of the products

5.1 Characterization data of the products 3

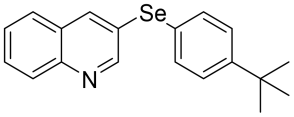
3-(phenylselanyl)quinoline (3a)[3]: R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 75.9 mg, 85% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.91 (s, 1H), 8.25 (s, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 7.71 (m, 2H), 7.57 – 7.49 (m, 3H), 7.30 (m, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.4, 146.7, 139.7, 133.3, 129.9, 129.8, 129.7, 129.3, 128.7, 127.9, 127.3, 127.2, 125.5.

3-(*o*-tolylselanyl)quinoline (3b): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 60.1 mg, 67% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.86 (s, 1H), 8.14 (s, 1H), 8.08 (d, *J* = 6.0 Hz, 1H), 7.69 (d, *J* = 6.0 Hz, 2H), 7.54 (m, 1H), 7.38 (m, 1H), 7.27 (m, 2H), 7.10 (m, 1H), 2.44 (s, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.2, 146.7, 140.1, 139.2, 134.1, 130.6, 130.4, 129.7, 129.3, 128.8, 128.45, 127.2, 127.2, 127.1, 125.2, 22.5. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NSe^+$ $[M + H]^+$: 300.0286, found 300.0281.

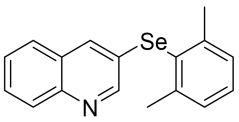
3-(*p*-tolylselanyl)quinoline (3c)[4]: R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 71.8 mg, 75% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.88 (s, 1H), 8.17 (s, 1H), 8.06 (d, *J* = 8.6 Hz, 1H), 7.68 (m, 2H), 7.54 – 7.50 (m, 1H), 7.47 – 7.43 (m, 2H), 7.12 (m, 2H), 2.34 (s, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 152.9, 146.6, 138.7. 138.4, 134.0, 130.5, 129.5, 129.3, 128.7, 127.2, 127.2, 126.3, 125.7, 21.2.



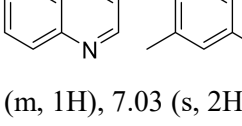
3-((4-(*tert*-butyl)phenyl)selanyl)quinoline (3d): R_f = 0.25 (Petroleum ether/EtOAc, 50: 1). 67.4 mg, 66% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.88 (s, 1H), 8.23 (s, 1H), 8.06 (d, *J* = 8.3 Hz, 1H), 7.69 (m, 2H), 7.53 (m, 1H), 7.49 – 7.46 (m, 2H), 7.33 (d, *J* = 7.9 Hz, 2H), 1.31 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.3, 151.5, 146.7, 139.1, 133.6, 129.6, 129.4, 128.7, 127.3, 127.2, 126.8, 34.7, 31.3. HRMS (ESI-TOF) m/z: Calcd for $C_{19}H_{20}NSe^+$ $[M + H]^+$: 342.0755, found 342.0749.



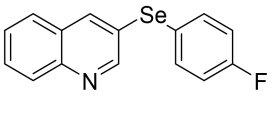
3-((2,6-dimethylphenyl)selanyl)quinoline (3e): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 33.9 mg, 36% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.66 (s, 1H), 8.03 (s, 1H), 7.72 (m, 1H), 7.66 – 7.56 (m, 2H), 7.48 (m, 1H), 7.26 – 7.17 (m, 3H), 2.51 (s, 6H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 150.6, 143.7, 134.4, 129.7, 129.2, 129.1, 128.9, 128.8, 128.3, 127.1, 126.8, 24.4. HRMS (ESI-TOF) m/z: Calcd for $C_{17}H_{16}NSe^+$ $[M + H]^+$: 314.0442, found 314.0438.



3-(mesitylselanyl)quinoline (3f): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 19.8 mg,20% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.66 (s, 1H), 8.01 (s, 1H), 7.69 (m, 1H), 7.64 – 7.55 (m, 2H), 7.49 – 7.44 (m, 1H), 7.03 (s, 2H), 2.47 (s, 6H), 2.33 (s, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 150.7, 143.6, 139.7, 134.1, 129.3, 129.2, 129.0, 128.7, 127.7, 126.9, 126.8, 24.2, 21.1. HRMS (ESI-TOF) m/z: Calcd for $C_{18}H_{18}NSe^+$ $[M + H]^+$: 328.0599, found 328.0595.



3-((4-fluorophenyl)selanyl)quinoline (3g): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 73.6 mg, 81% yield. Yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.88 (s, 1H), 8.18 (s, 1H), 8.07 (m, 1H), 7.69 (m, 2H), 7.53 (m, 3H),



7.01 (m, 2H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 162.9 (d, *J* = 249.5), 152.9, 146.8, 138.9, 135.9, (d, *J* = 8.1), 129.7, 129.4, 128.7, 127.2 ((d, *J* = 2.0), 125.8, 117.0 (d, *J* = 21.2). ^{19}F NMR (565 MHz, Chloroform-*d*) δ -112.9. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}FNSe^+$ [M + H]$^+$: 304.0035, found 304.0037.

3-((4-chlorophenyl)selanyl)quinoline (3h): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 58.5 mg, 61% yield. Yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.90 (s, 1H), 8.25 (s, 1H), 8.08 (d, *J* = 8.6 Hz, 1H), 7.71 (m, 2H), 7.55 (m, 1H), 7.39 (d, *J* = 8.3 Hz, 2H), 7.34 (d, *J* = 8.6 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.5, 147.0, 140.1, 134.5, 132.7, 130.0, 129.4, 129.1, 128.6, 127.4, 127.3, 124.7, 122.2. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}ClNSe^+$ [M + H]$^+$: 319.9740, found 319.9733.

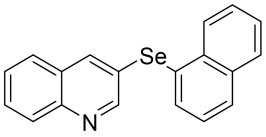
3-((4-bromophenyl)selanyl)quinoline (3i): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 61.4 mg, 55% yield. Yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.90 (s, 1H), 8.24 (s, 1H), 8.08 (d, *J* = 8.6 Hz, 1H), 7.71 (d, *J* = 7.8 Hz, 2H), 7.55 (m, 1H), 7.41 (d, *J* = 8.1 Hz, 2H), 7.24 (s, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 153.5, 147.0, 140.0, 134.4, 134.3, 130.0, 129.9, 129.5, 128.7, 128.4, 127.4, 127.4, 124.9. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}BrNSe^+$ [M + H]$^+$: 363.9235, found 363.9227.

4-(quinolin-3-ylselanyl)benzoate (3j): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 53.4 mg, 52% yield. Orange-yellow oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.97 (s, 1H), 8.39 (s, 1H), 8.12 (d, *J* = 8.5 Hz, 1H), 7.89 (d, *J* = 8.7 Hz, 2H), 7.77 (d, *J* = 8.3 Hz, 2H), 7.59 (m, 1H), 7.42 (d, *J* = 6.3 Hz, 2H), 3.89 (s, 3H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 166.6, 154.4, 147.3, 141.8, 138.0, 130.9, 130.4, 130.3, 129.5, 129.0 128.7, 127.5, 127.4, 123.1, 52.2. HRMS (ESI-TOF) m/z: Calcd for $C_{17}H_{14}NO_2Se^+$ [M + H]$^+$: 344.0184, found 344.0187.

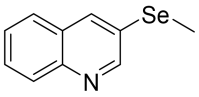
3-((4-(trifluoromethyl)phenyl)selanyl)quinoline (3k): R_f = 0.25 (Petroleum ether/EtOAc, 100:1). 18.9 mg, 18% yield. Light-yellow oil. 1H NMR (600 MHz, Chloroform-d) δ 8.97 (s, 1H), 8.40 (s, 1H), 8.12 (d, *J* = 8.4 Hz, 1H),

7.79 – 7.58 (m, 3H), 7.56 - 7.49 (m, 4H). 13C NMR (151 MHz, Chloroform-d) δ 154.3, 147.3, 141.9, 136.3, 131.5, 130.4, 129.5, 129.5 (q, *J* = 33.2), 128.6, 127.6, 127.5, 126.2 (q, *J* = 4.5), 124.0 (q, *J* = 273.3), 123.1. 19F NMR (565 MHz, Chloroform-d) δ -62.7. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{11}F_3NSe^+$ $[M + H]^+$: 354.0003, found 353.9998.

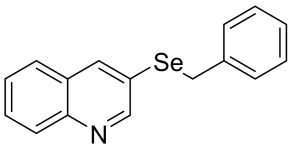
3-(naphthalen-1-ylselanyl)quinoline (3l): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 49.2 mg, 49% yield. Orange-yellow oil. ^1H NMR (600 MHz, Chloroform-*d*) δ 8.85 (s, 1H), 8.38 – 8.34 (m, 1H), 8.07 (s, 1H), 8.03 (m, 1H), 7.91 – 7.85 (m, 2H), 7.83 (m, 1H), 7.67 – 7.63 (m, 1H), 7.59 (m, 1H), 7.52 (m, 2H), 7.47 (m, 1H), 7.39 (m, 1H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 152.5, 146.6, 138.2, 134.4, 134.3, 134.0, 129.8, 129.5, 129.3, 128.8, 128.2, 127.4, 127.3, 127.2, 127.1, 126.6, 126.0, 126.0. HRMS (ESI-TOF) m/z: Calcd for $C_{19}H_{14}NSe^+$ $[M + H]^+$: 336.0286, found 336.0281.



3-(methylselanyl)quinoline (3m): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 60.3 mg, 90% yield. Orange-yellow oil. ^1H NMR (600 MHz, Chloroform-*d*) δ 8.92 (s, 1H), 8.14 (s, 1H), 8.07 (d, *J* = 8.4 Hz, 1H), 7.72 (d, *J* = 8.1 Hz, 1H), 7.66 (m, 1H), 7.53 (m, 1H), 2.45 (s, 3H).^{13}C NMR (151 MHz, Chloroform-*d*) δ 152.2, 146.4, 136.7, 129.3, 129.2, 128.7, 127.2, 126.9, 126.0, 7.7. HRMS (ESI-TOF) m/z: Calcd for $C_{10}H_{10}NSe^+$ $[M + H]^+$: 223.9973, found 223.9970.



3-(benzylselanyl)quinoline (3n): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 81.6 mg, 91%. Orange-yellow oil. ^1H NMR (600 MHz, Chloroform-d) δ 8.86 (s, 1H), 8.10 (s, 1H), 8.06 (d, J = 6, 1H), 7.66 (m, 2H), 7.53 – 7.50 (m, 1H), 7.22 – 7.17 (m, 3H), 7.16 – 7.12 (m, 2H), 4.14 (s, 2H).13C NMR (151 MHz, Chloroform-d) δ 154.5, 146.9, 141.2, 138.0, 129.8, 129.3, 129.0, 128.6, 128.4, 127.3, 127.2, 127.1, 123.8, 32.7. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NSe^+$ $[M + H]^+$: 300.0286, found 300.0285.



6-methyl-3-(phenylselanyl)quinoline (3o): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 45.5 mg, 51% yield. Orange-yellow oil. ^1H NMR (400 MHz, Chloroform-*d*) δ 8.84 (s, 1H), 8.16 (s, 1H), 7.97 (s, 1H), 7.58 – 7.43 (m, 4H), 7.29 (m, 3H), 2.51 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 152.6, 145.4,

139.2, 137.2, 133.1, 132.1, 129.6, 129.0, 128.8, 127.8, 126.1, 125.3, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NSe^+$ $[M + H]^+$: 300.0286, found 300.0280.

8-methyl-3-(phenylselanyl)quinoline (3p): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 66.9 mg, 75% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.92 (s, 1H), 8.23 (s, 1H), 7.52 (m, 5H), 7.41 (m, 1H), 7.28 (d, *J* = 2.4 Hz, 2H), 2.78 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 152.4, 139.9, 137.3, 133.2, 129.9, 129.6, 128.7, 127.8, 126.9, 125.4, 125.1, 17.9. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NSe^+$ $[M + H]^+$: 300.0286, found 300.0291.

6-methoxy-3-(phenylselanyl)quinoline (3q): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 77.2 mg, 82% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.76 (s, 1H), 8.10 (s, 1H), 7.95 (s, 1H), 7.50 (d, *J* = 6.6, 3.0 Hz, 2H), 7.32 – 7.24 (m, 4H), 6.92 (m, 1H), 3.88 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 158.2, 150.9, 143.0, 138.2, 133.2, 130.8, 130.0, 129.8, 129.6, 127.9, 125.8, 122.4, 104.7, 55.6. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NOSe^+$ $[M + H]^+$: 316.0235, found 316.0229.

8-methoxy-3-(phenylselanyl)quinoline (3r): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 61.5 mg, 65% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.91 (s, 1H), 8.19 (s, 1H), 7.51 – 7.42 (m, 3H), 7.28 (m, 4H), 7.03 (m, 1H), 4.07 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 155.5, 152.2, 139.3, 133.2, 129.8, 129.6, 127.9, 127.5, 126.3, 119.0, 107.9, 56.0. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{14}NOSe^+$ $[M + H]^+$: 316.0235, found 316.0238.

6-chloro-3-(phenylselanyl)quinoline (3s): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 36 mg, 38% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.85 (s, 1H), 8.06 (s, 1H), 7.99 (s, 1H), 7.66 (d, *J* = 2.3 Hz, 1H), 7.61 (m, 1H), 7.56 – 7.52 (m, 2H), 7.36 – 7.31 (m, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.1, 145.1, 137.4, 134.0, 133.0, 131.0, 130.4, 129.8, 129.3, 129.0, 128.4, 127.5, 125.8. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}ClNSe^+$ $[M + H]^+$: 319.9740, found 319.9734.

7-chloro-3-(phenylselanyl)quinoline (3t): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 48.6 mg, 51% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.88 (s, 1H), 8.16 (s, 1H), 8.05 (s, 1H), 7.61 (d, *J* = 8.7 Hz, 1H), 7.55 – 7.50 (m, 2H), 7.47 (m, 1H), 7.31 (m, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 154.2, 147.1, 138.7, 135.4, 133.6, 129.7, 128.4, 128.4, 128.2, 127.0, 126.2. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}ClNSe^+$ $[M + H]^+$: 319.9740, found 319.9734.

5-bromo-3-(phenylselanyl)quinoline (3u): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 51.1 mg, 47% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.85 (s, 1H), 8.58 (s, 1H), 8.02 (d, *J* = 8.4 Hz, 1H), 7.79 (d, *J* = 7.5 Hz, 1H), 7.59 – 7.55 (m, 2H), 7.52 (m, 1H), 7.33 (m, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.7, 147.5, 137.9, 133.9, 130.9, 129.8, 129.6, 129.3, 128.4, 128.0, 127.9, 121.2. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}BrNSe^+$ $[M + H]^+$: 363.9235, found 363.9228.

7-bromo-3-(phenylselanyl)quinoline (3v): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 64.7 mg, 59% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.87 (s, 1H), 8.24 (s, 1H), 8.14 (s, 1H), 7.60 (m, 1H), 7.55 – 7.50 (m, 3H), 7.32 (m, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 154.0, 147.2, 138.7, 133.7, 131.7, 130.7, 129.7, 128.4, 128.3, 127.3, 126.4, 123.6. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{11}BrNSe^+$ $[M + H]^+$: 363.9235, found 363.9236.

3-(phenylselanyl)quinoline-6-carbonitrile (3w): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 10.8 mg, 12% yield. Orange-yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.96 (s, 1H), 8.16 – 8.09 (m, 2H), 8.06 (s, 1H), 7.80 (s, 1H), 7.62 – 7.57 (m, 2H), 7.38 (m, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 155.2, 147.4, 137.4, 134.6, 133.2, 130.9, 130.0, 129.9, 129.3, 128.9, 128.1, 128.0, 118.3, 111.0. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{11}N_2Se^+$ $[M + H]^+$: 311.0082, found 311.0081.

5.2 Characterization data of the products 4

6-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4a)[5]**:** R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 42.5 mg, 74% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.30 – 7.26 (m, 2H), 7.24 – 7.16 (m, 4H), 7.14 – 7.10 (m, 1H), 6.41 (d, *J* = 8.1 Hz, 1H), 3.31 (t, 2H), 2.73 (t, *J* = 6.3 Hz, 2H), 1.95 – 1.90 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.1, 137.3, 134.8, 134.7, 129.7, 128.9, 125.7, 122.4, 114.8, 113.9, 41.8, 26.8, 21.7.

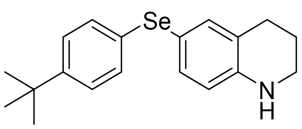
6-(*p*-tolylselanyl)-1,2,3,4-tetrahydroquinoline (4b): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 50.1 mg, 83% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.24 – 7.15 (m, 4H), 7.01 (d, *J* = 7.9 Hz, 2H), 6.41 (s, 1H), 3.30 (s, 2H), 2.72 (s, 2H), 2.27 (s, 3H), 1.95 – 1.89 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 144.6, 136.7, 135.8, 134.2, 130.5, 130.4, 129.8, 122.5, 115.0, 114.9, 41.8, 26.8, 21.7, 20.9. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0597.

6-(*m*-tolylselanyl)-1,2,3,4-tetrahydroquinoline (4c): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 53.2 mg, 88% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.22 – 7.18 (m, 2H), 7.15 (s, 1H), 7.07 (d, *J* = 4.8 Hz, 2H), 6.96 – 6.93 (m, 1H), 6.40 (d, *J* = 8.1 Hz, 1H), 3.31 (t, 2H), 2.73 (t, *J* = 6.3 Hz, 2H), 2.26 (s, 3H), 1.95 – 1.90 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.0, 138.7, 137.1, 134.7, 134.3, 130.5, 128.8, 127.0, 126.7, 122.4, 114.8, 114.1, 41.8, 26.8, 21.7, 21.3. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0597.

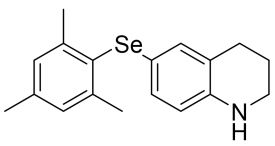
6-(*o*-tolylselanyl)-1,2,3,4-tetrahydroquinoline (4d): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 44.7 mg, 74% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.21 – 7.16 (m, 2H), 7.12 (d, *J* = 7.4 Hz, 1H), 7.08 – 6.95 (m, 3H), 6.45 (d, *J* = 8.1 Hz, 1H), 3.35 – 3.31 (m, 2H), 2.74 (t, *J* = 6.3 Hz, 2H), 2.37 (s, 3H), 1.96 – 1.92 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 144.9,

137.5, 136.8, 135.4, 135.1, 129.7, 129.3, 126.4, 125.7, 122.7, 115.1, 113.3, 41.8, 26.8, 21.7, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0596.

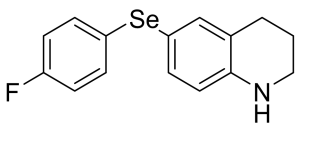
6-((4-(*tert*-butyl)phenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4e): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 59.2 mg, 86% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.24 – 7.19 (m, 6H), 6.41 (d, *J* = 8.0 Hz, 1H), 3.31 (s, 2H), 2.72 (t, *J* = 5.5 Hz, 2H), 1.95 – 1.89 (m, 2H), 1.27 (s, 9H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 149.0, 144.8, 137.1, 134.6, 130.8, 129.8, 126.0, 122.4, 114.9, 114.5, 41.8, 34.4, 31.3, 26.8, 21.7. HRMS (ESI-TOF) m/z: Calcd for $C_{19}H_{24}NSe^+$ $[M + H]^+$: 346.1068, found 346.1067.



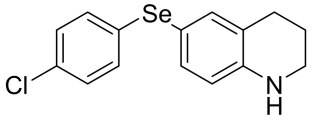
6-(mesitylselanyl)-1,2,3,4-tetrahydroquinoline (4f): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 41.6 mg, 63% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 6.93 (s, 2H), 6.85 (s, 1H), 6.76 (d, *J* = 10.0 Hz, 1H), 6.29 (d, *J* = 8.1 Hz, 1H), 3.24 (s, 2H), 2.67 – 2.62 (m, 4H), 2.46 (s, 6H), 2.27 (s, 3H), 1.87 (p, *J* = 6.3 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 143.1, 138.2, 131.7, 129.1, 128.6, 128.5, 122.6, 118.2, 115.2, 41.9, 26.8, 24.4, 21.9, 21.0. HRMS (ESI-TOF) m/z: Calcd for $C_{18}H_{22}NSe^+$ $[M + H]^+$: 332.0912, found 332.0909.



6-((4-fluorophenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4g): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 46.4 mg, 76% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 – 7.26 (m, 2H), 7.21 – 7.15 (m, 2H), 6.90 (t, *J* = 8.6 Hz, 2H), 6.40 (d, *J* = 7.9 Hz, 1H), 3.31 (s, 2H), 2.72 (s, 2H), 1.95 – 1.90 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 161.7 (d, *J* = 245.3 Hz), 145.0, 136.8, 134.3, 132.1 (d, *J* = 7.5 Hz), 128.7 (d, *J* = 3.1 Hz), 122.4, 116.0 (d, *J* = 21.5 Hz), 114.9, 114.6, 41.8, 26.8, 21.6. ^{19}F NMR (565 MHz, Chloroform-*d*) δ -116.8. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeF^+$ $[M + H]^+$: 308.0348, found 308.0346.

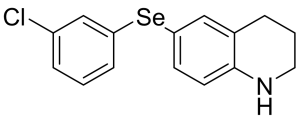


6-((4-chlorophenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4h): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 43.8mg, 68% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.21 – 7.17 (m, 4H), 7.14 (d, *J* = 8.5 Hz, 2H), 6.41 (d, *J* = 8.1 Hz, 1H), 3.34 – 3.30 (m, 2H), 2.73 (t, *J* = 6.3

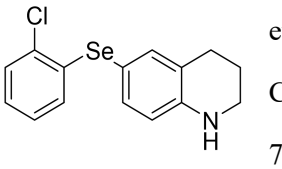


Hz, 2H), 1.96 – 1.90 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.2, 137.3, 134.8, 133.0, 131.7, 131.0, 129.0, 122.5, 114.9, 113.6, 41.7, 26.8, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeCl^+$ $[M + H]^+$: 324.0053, found 324.0049.

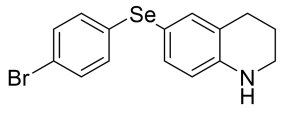
6-((3-chlorophenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4i): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 43.1mg, 67% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.24 – 7.18 (m, 3H), 7.15 – 7.07 (m, 3H), 6.43 (d, *J* = 8.1 Hz, 1H), 3.35 – 3.32 (m, 2H), 2.74 (t, *J* = 6.3 Hz, 2H), 1.98 – 1.91 (m, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.4, 137.6, 136.9, 135.2, 134.7, 129.8, 129.0, 127.4, 125.7, 122.5, 114.9, 112.8, 41.7, 26.8, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeCl^+$ $[M + H]^+$: 324.0053, found 324.0049.



6-((2-chlorophenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4j): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 50.2mg, 78% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.28 – 7.21 (m, 3H), 7.06 – 6.98 (m, 2H), 6.83 (d, *J* = 7.8 Hz, 1H), 6.46 (d, *J* = 8.1 Hz, 1H), 3.37 – 3.33 (m, 2H), 2.76 (t, *J* = 6.3 Hz, 2H), 1.95 (p, *J* = 6.2 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.7, 138.6, 136.2, 136.1, 132.0, 129.0, 129.0, 127.0, 126.2, 122.7, 115.0, 111.7, 41.7, 26.8, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeCl^+$ $[M + H]^+$: 324.0053, found 324.0048.



6-((4-bromophenyl)selanyl)-1,2,3,4-tetrahydroquinoline (4k): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 47.6mg, 65% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.28 (d, *J* = 8.5 Hz, 2H), 7.20 – 7.17 (m, 2H), 7.12 (d, *J* = 8.5 Hz, 2H), 6.42 (d, *J* = 8.1 Hz, 1H), 3.35 – 3.29 (m, 2H), 2.73 (t, *J* = 6.3 Hz, 2H), 1.93 (p, *J* = 6.3 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.2, 137.3, 134.9, 133.8, 131.9, 131.3, 122.6, 119.6, 114.9, 113.5, 41.7, 26.8, 21.6. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeBr^+$ $[M + H]^+$: 367.9548, found 367.9545.



5-bromo-6-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4l): R_f = 0.25 (Petroleum ether/EtOAc, 100:1). 5.0 mg, 5% yield. Light-yellow oil. 1H NMR (600 MHz, Chloroform-d) δ 7.43 (d, *J* = 6.1 Hz, 2H), 7.26 (m, 3H), 6.97 (d, *J* = 6.0 Hz, 1H), 6.37 (d, *J* = 12 Hz,1H), 3.26 (t, *J* = 6.0 Hz,

2H), 2.81 (t, *J* = 6.0 Hz, 2H), 1.97 (q, *J* = 5.8 Hz, 2H). 13C NMR (151 MHz, Chloroform-d) δ 145.5, 132.9, 132.5, 132.1, 129.3, 127.1, 124.8, 122.4, 119.8, 114.3, 41.2, 29.0, 22.2. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}BrNSe^+$ $[M + H]^+$: 354.0004, found 353.9998.

7-chloro-6-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4m): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 39.4 mg, 61% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 (d, *J* = 7.2 Hz, 2H), 7.24 – 7.17 (m, 3H), 7.12 (s, 1H), 6.58 (s, 1H), 3.29 (s, 2H), 2.64 (t, *J* = 6.0 Hz, 2H), 1.89 (p, *J* = 6.2 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.9, 137.7, 136.4, 132.7, 130.8, 129.1, 126.4, 121.0, 114.5, 114.3, 41.5, 26.3, 21.4. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeCl^+$ $[M + H]^+$: 324.0053, found 324.0049.

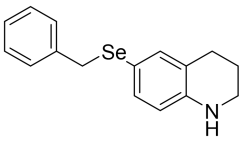
7-bromo-6-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4n): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 43.2 mg, 59% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 (d, *J* = 7.2 Hz, 2H), 7.25 – 7.17 (m, 3H), 7.11 (s, 1H), 6.74 (s, 1H), 3.27 (s, 2H), 2.61 (t, *J* = 5.4 Hz, 2H), 1.87 (p, *J* = 6.2 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 146.0, 137.4, 132.9, 130.9, 129.1, 127.1, 126.5, 121.6, 117.5, 116.7, 41.5, 26.4, 21.4. HRMS (ESI-TOF) m/z: Calcd for $C_{15}H_{15}NSeBr^+$ $[M + H]^+$: 367.9548, found 367.9543.

8-methyl-6-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4o): R_f = 0.25 (Petroleum ether/EtOAc, 100:1). 24 mg, 26% yield. Light-yellow oil. 1H NMR (600 MHz, Chloroform-d) δ 7.29 (s, 1H), 7.28 (s, 1H), 7.23 – 7.04 (m, 5H), 3.39 (t, *J* = 6.4 Hz, 2H), 2.76 (t, *J* = 6.4 Hz, 2H), 2.05 (s, 3H), 1.93 (q, *J* = 5.6 Hz, 2H). 13C NMR (151 MHz, Chloroform-d) δ 143.2, 135.7, 135.3, 134.9, 129.7, 129.0, 125.7, 122.1, 121.8, 113.3, 42.2, 27.1, 21.8, 17.0. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0593.

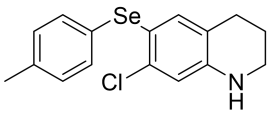
6-(methylselanyl)-1,2,3,4-tetrahydroquinoline (4p): R_f = 0.25 (Petroleum ether/EtOAc, 100:1). 39 mg, 57% yield. Light-yellow oil. 1H NMR (600 MHz, Chloroform-d) δ 7.12 (d, *J* = 12 Hz, 2H), 6.38 (s, 1H), 3.28 (t, *J* = 5.4 Hz, 2H), 2.73 (t, *J* = 6.4 Hz, 2H), 2.25 (s, 3H), 1.91 (p, *J* = 6.1 Hz, 2H). 13C NMR (151 MHz,

Chloroform-d) δ 144.1, 134.4, 131.8, 122.3, 116.4, 114.8, 41.9, 26.9, 21.9, 9.4. HRMS (ESI-TOF) m/z: Calcd for $C_{10}H_{14}NSe^+$ $[M + H]^+$: 228.0286, found 228.0281.

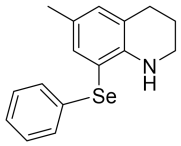
6-(benzylselanyl)-1,2,3,4-tetrahydroquinoline (4q): R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 49.1 mg, 81% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.22 (d, *J* = 7.5 Hz, 2H), 7.19 – 7.12 (m, 3H), 7.06 (d, *J* = 9.7 Hz, 1H), 7.02 (s, 1H), 6.33 (d, *J* = 8.2 Hz, 1H), 3.95 (s, 2H), 3.31 – 3.27 (m, 2H), 2.67 (t, *J* = 6.3 Hz, 2H), 1.90 (p, *J* = 6.3 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 144.6, 139.5, 136.9, 134.2, 128.8, 128.2, 126.5, 122.0, 114.5, 41.8, 33.5, 26.7, 21.8. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0596.



7-**chloro-6-(*p*-tolylselanyl)-1,2,3,4-tetrahydroquinoline (4r):** R_f = 0.25 (Petroleum ether/EtOAc, 50:1). 42.8 mg, 64% yield. Brown oil. ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.28 (d, *J* = 8.0 Hz, 2H), 7.08 – 7.03 (m, 6H), 6.53 (s, 1H), 3.26 (s, 2H), 2.62 (t, *J* = 5.7 Hz, 2H), 2.30 (s, 3H), 1.86 (p, *J* = 6.2 Hz, 2H). ^{13}C NMR (151 MHz, Chloroform-*d*) δ 145.8, 136.8, 136.6, 135.7, 131.7, 130.0, 128.4, 120.9, 115.1, 114.2, 41.5, 26.3, 21.5, 21.1. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{17}NSeCl^+$ $[M + H]^+$: 338.0209, found 338.0205.



6-**methyl-8-(phenylselanyl)-1,2,3,4-tetrahydroquinoline (4a'):** R_f = 0.25 (Petroleum ether/EtOAc, 200:1). 24.8 mg, 27% yield. Light-yellow oil. 1H NMR (600 MHz, Chloroform-d) δ 7.29 – 7.13 (m, 5H), 7.19 (s, 1H), 6.84 (s, 1H), 3.26 (t, *J* = 5.5 Hz, 2H), 2.75 (t, *J* = 6.4 Hz, 2H), 2.18 (s, 3H), 1.88 (p, *J* = 5.9 Hz, 2H). 13C NMR (151 MHz, Chloroform-d) δ 143.9, 136.5, 132.2, 132.0, 129.2, 129.0, 125.9, 125.6, 121.7, 111.2, 42.2, 27.6, 22.1, 20.1. HRMS (ESI-TOF) m/z: Calcd for $C_{16}H_{18}NSe^+$ $[M + H]^+$: 304.0599, found 304.0595.



6. References

[1] A. B. Dapkekar and G. Satyanarayana. *Chem. Commun.,* 2023, 59, 8719 – 8722.

[2] J. F. Lv, Y. Deng, X. Y. Liang, Y. F. Tan, Y. H. He and Z. Guan., *J. Org. Chem.* 2024, 89, 3931 −3940

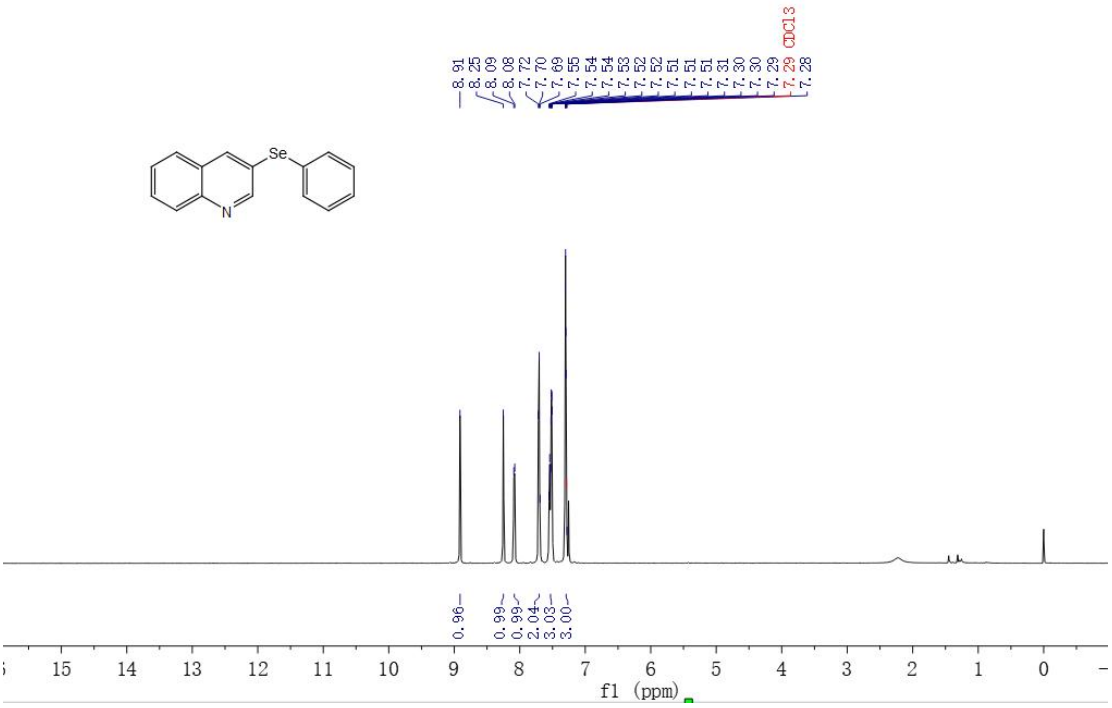
[3] J. J. Liu, M. M. Tian, Y. X. Li, X. W. Shan, A. K. Li, K. Lu, M. Fagnoni, S. Protti, and X. Zhao. *Eur. J. Org. Chem.,* 2020, 7358 – 7367.

[4] S. Panja, P. Maity, D. Kundu, B. C. Ranu. *Tetrahedron Lett.,* 2017, 58, 3441 – 3445.

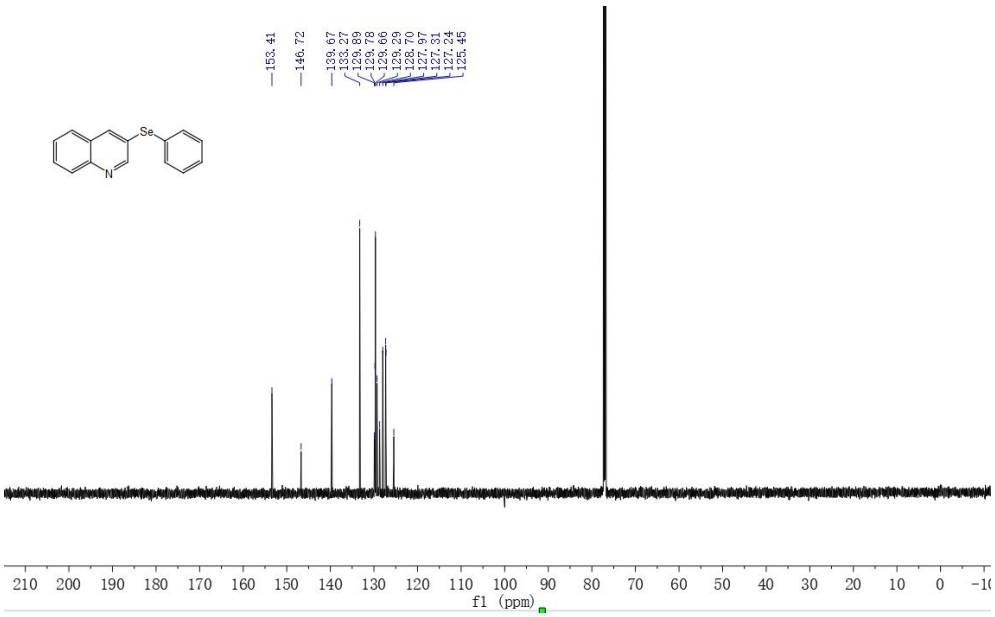
[5] Q. B. Zhang, Y. L. Ban, P. F. Yuan, S. J. Peng, J. G. Fang, L. Z. Wu and Q. Liu, *Green Chem.,* 2017, 19, 5559 − 5563.

7. NMR of Products

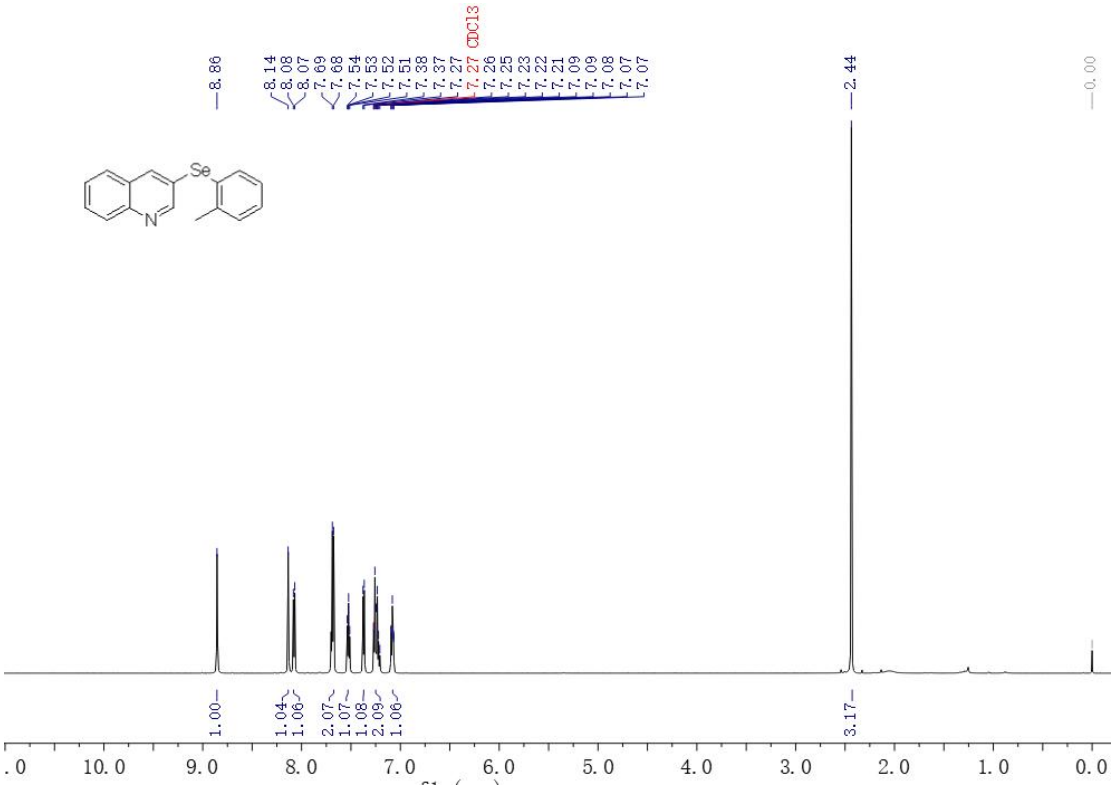
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3a



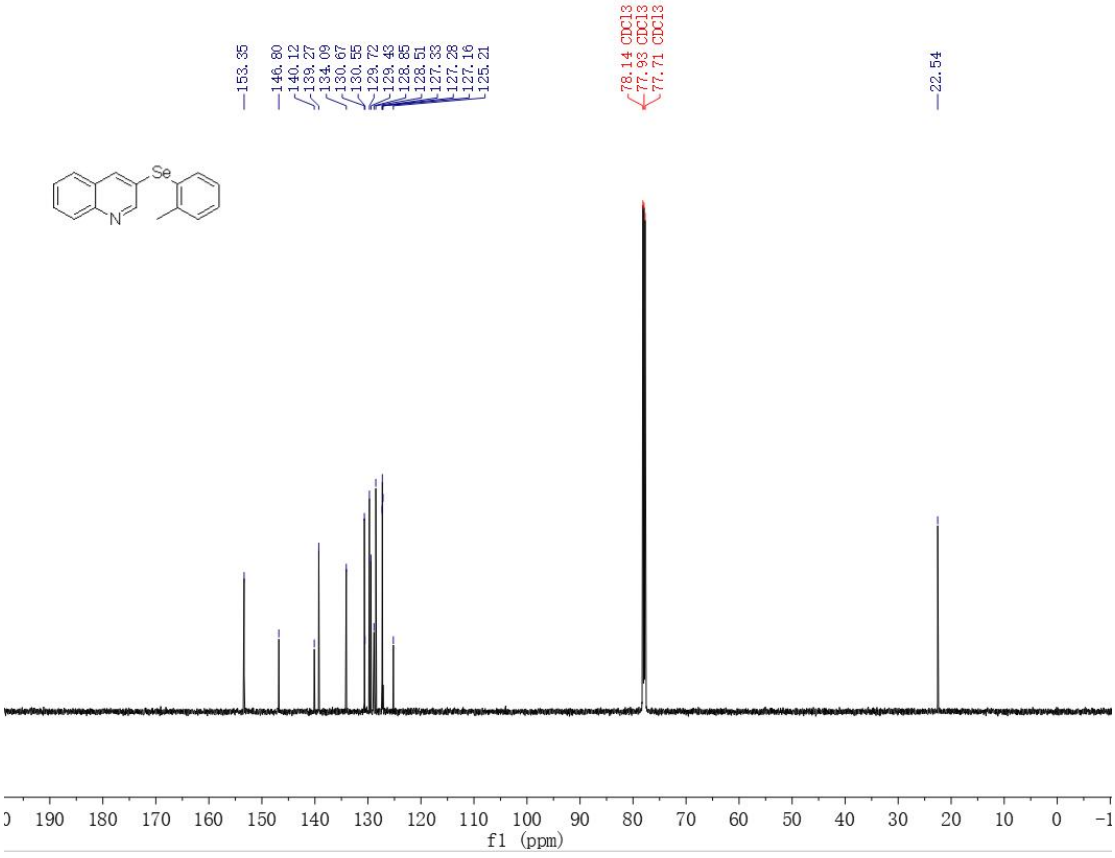
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3a



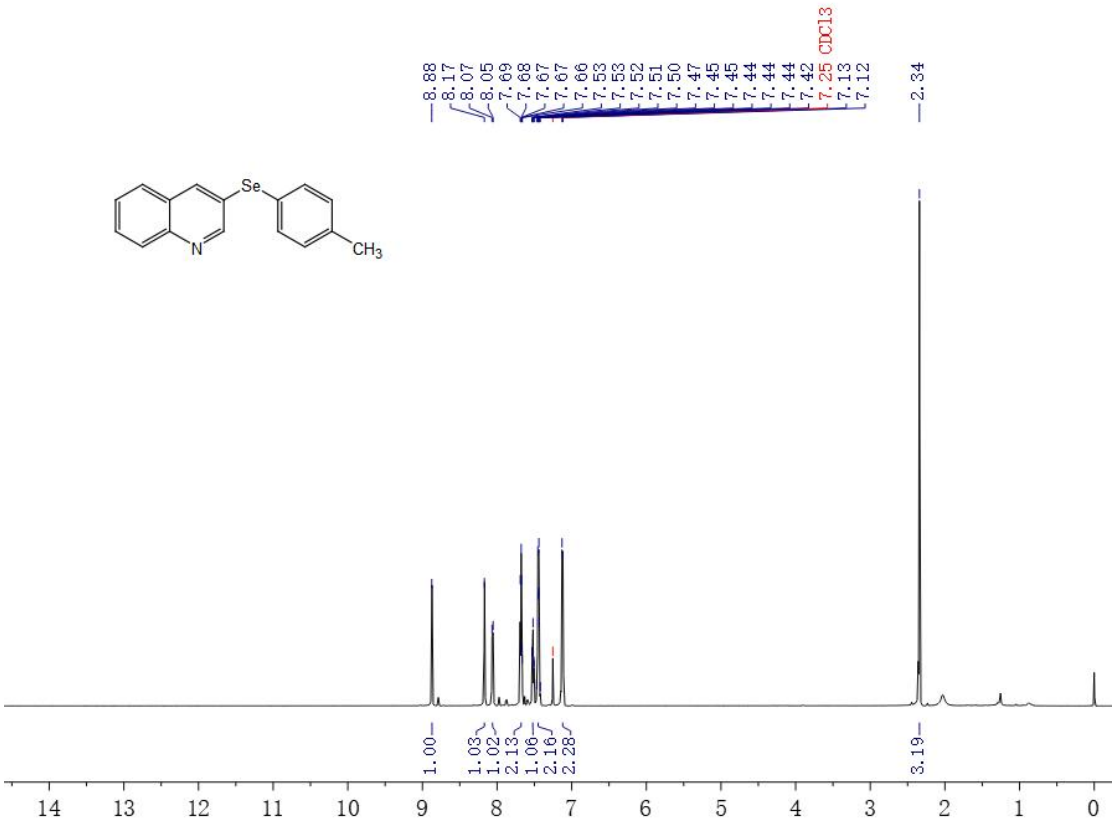
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3b



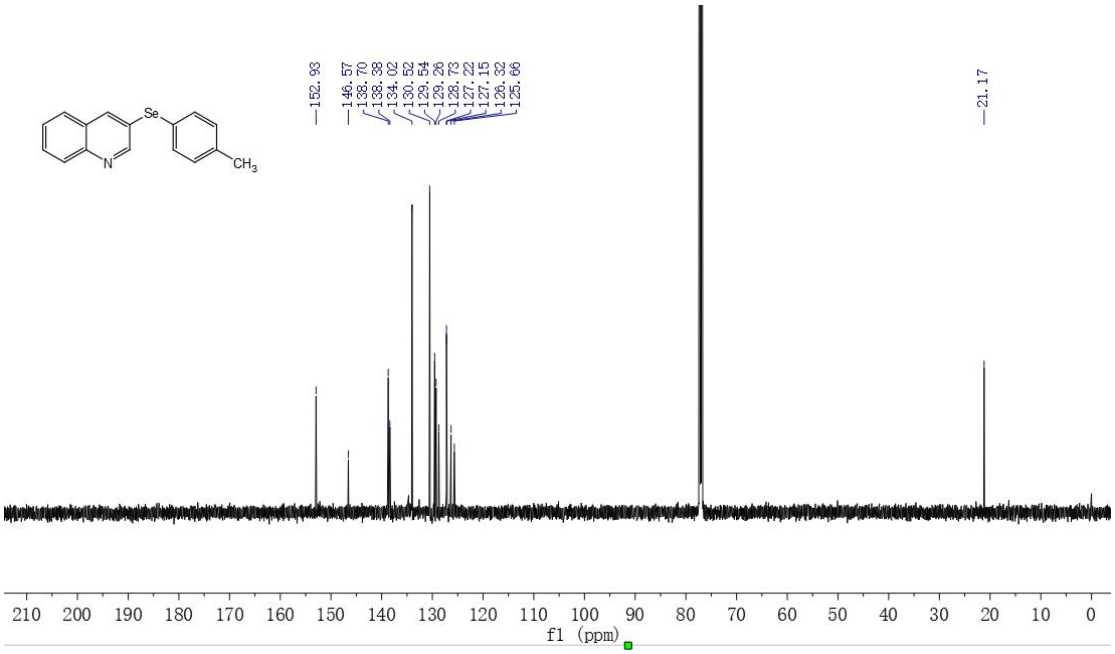
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3b



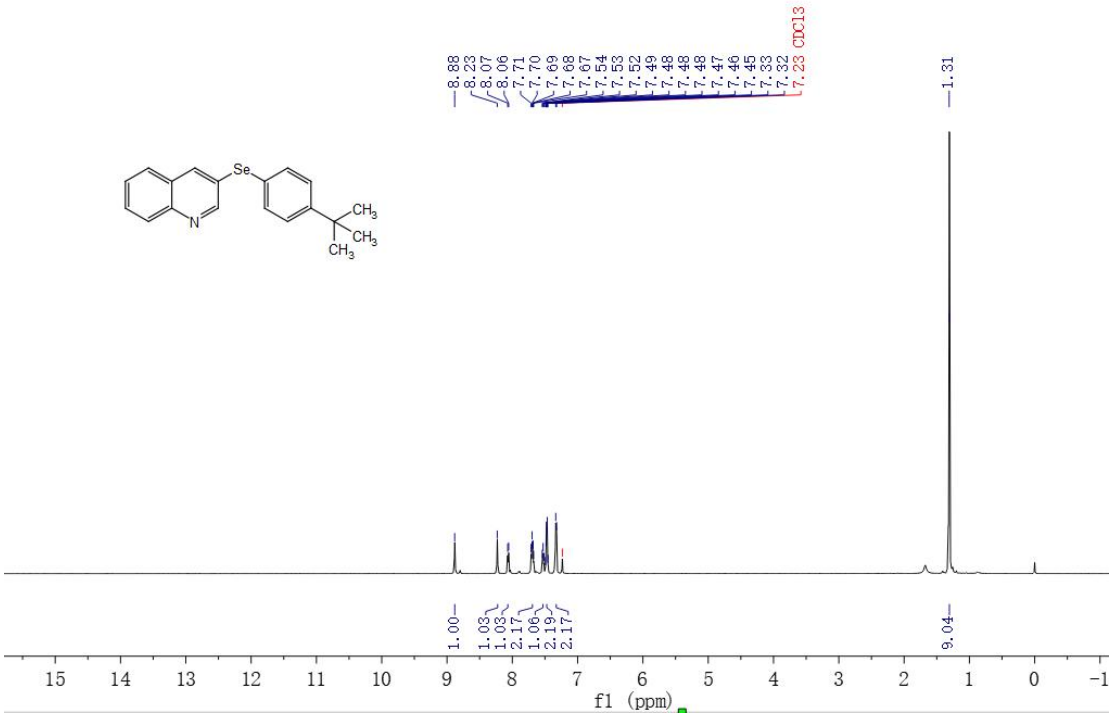
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3c



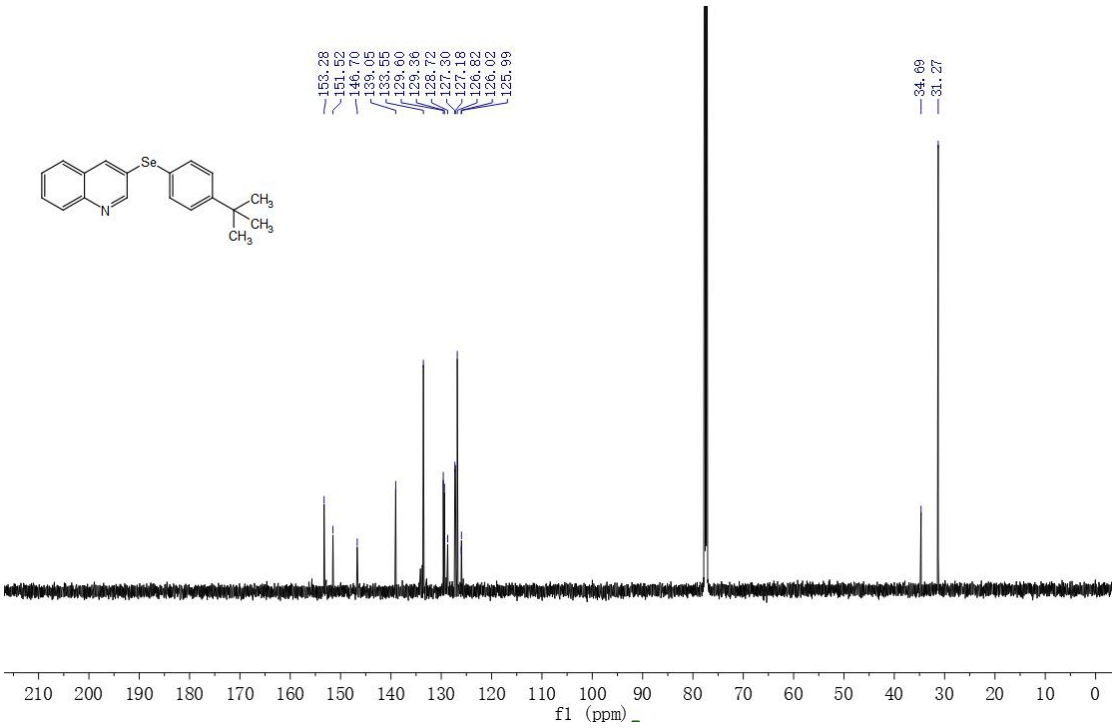
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3c



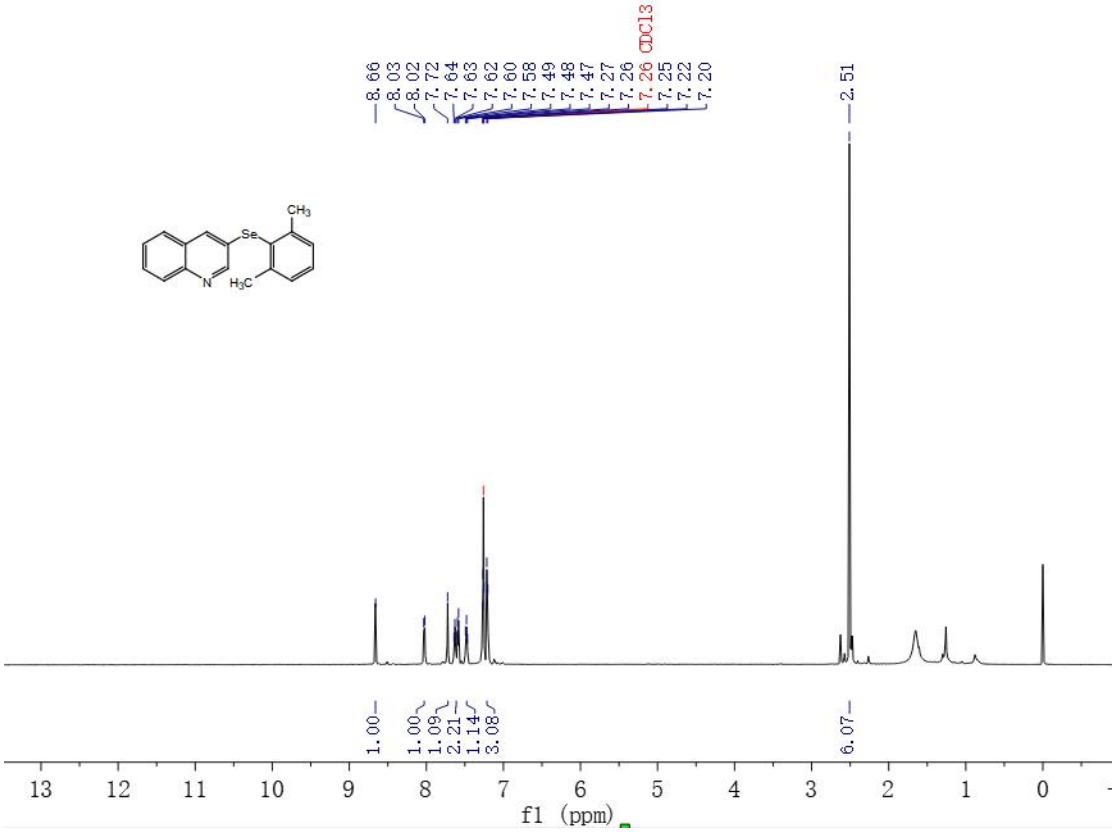
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3d



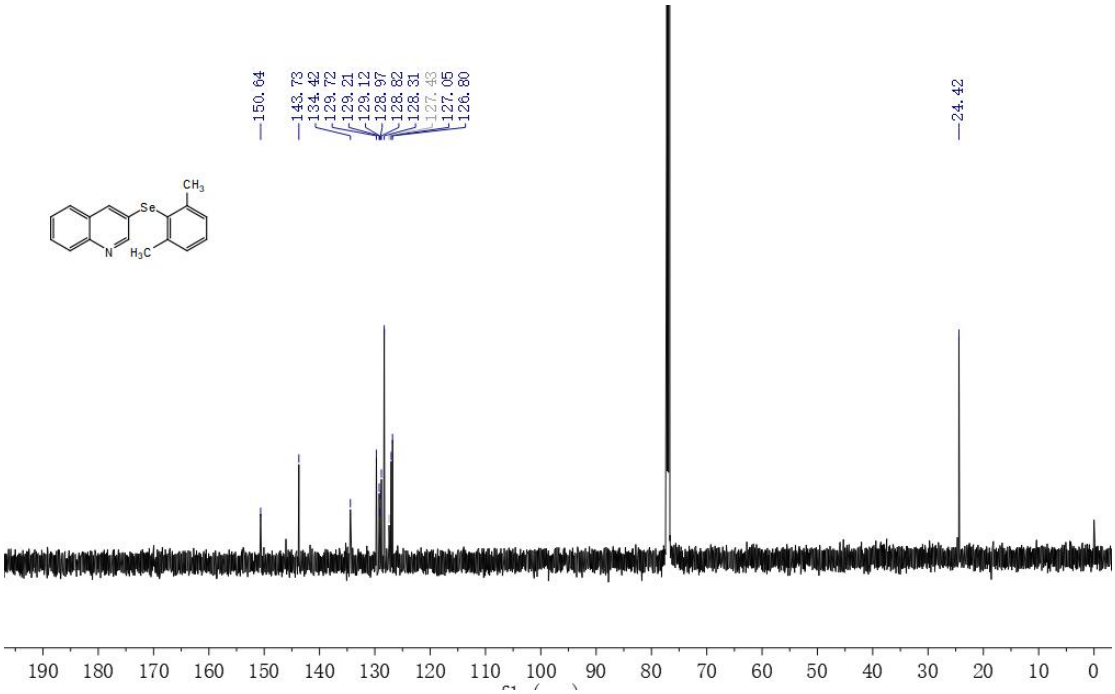
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3d



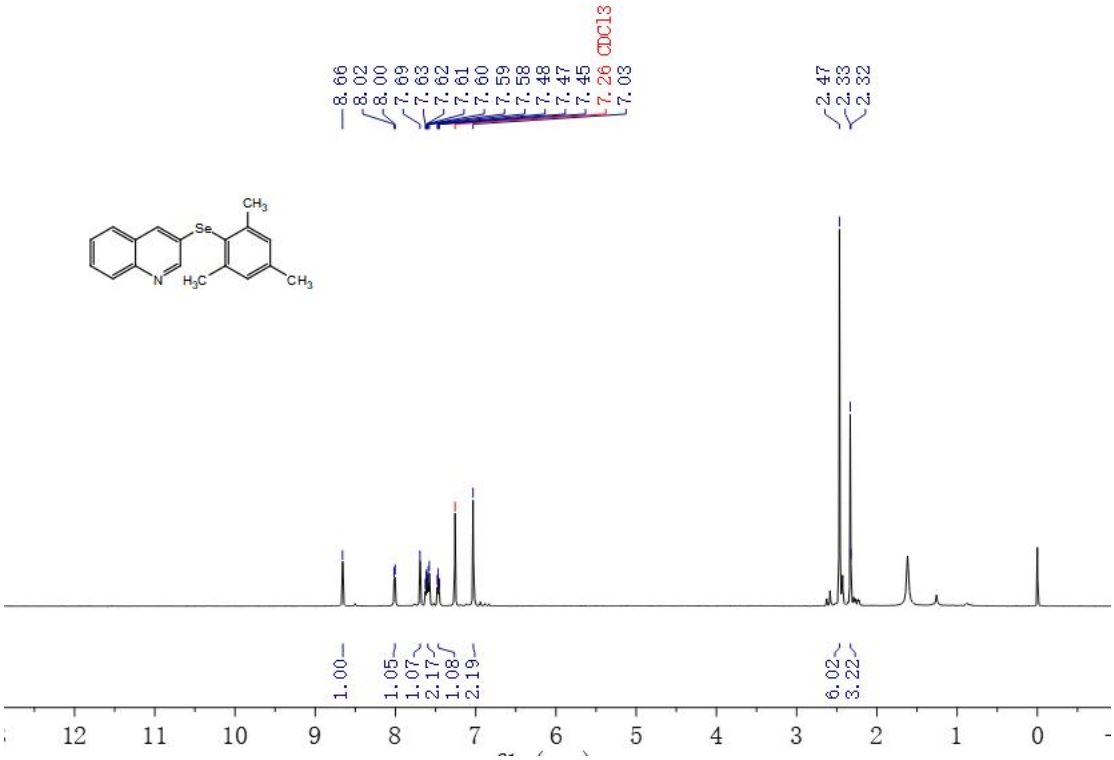
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3e



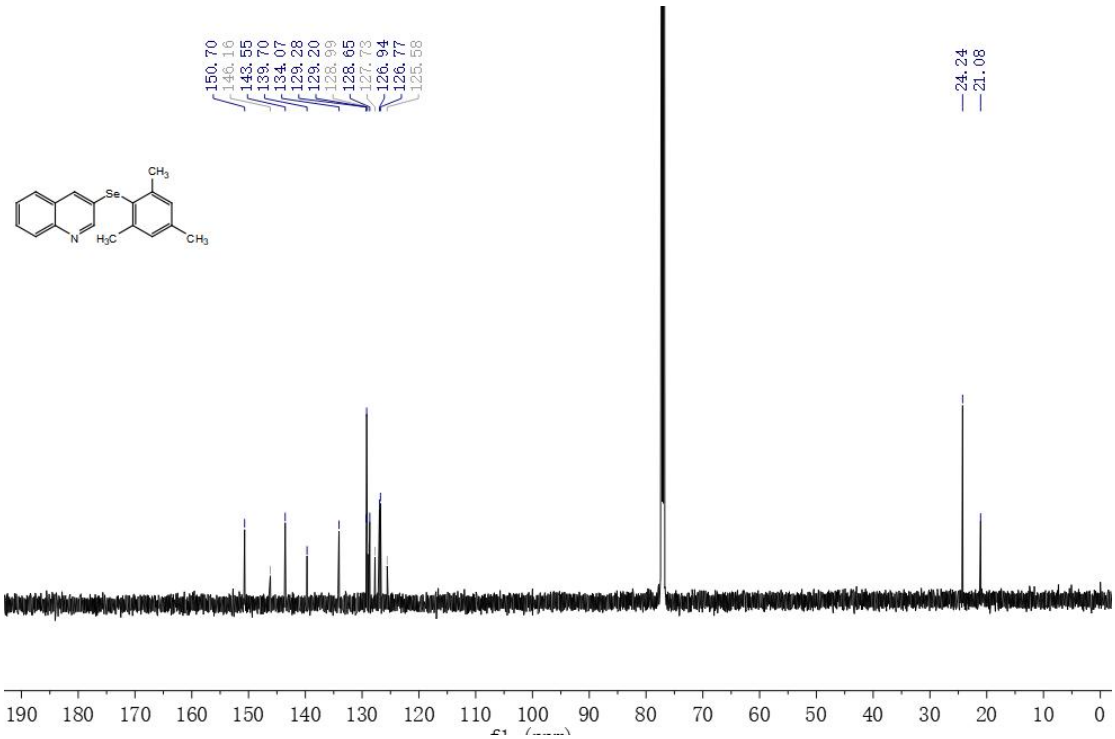
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3e



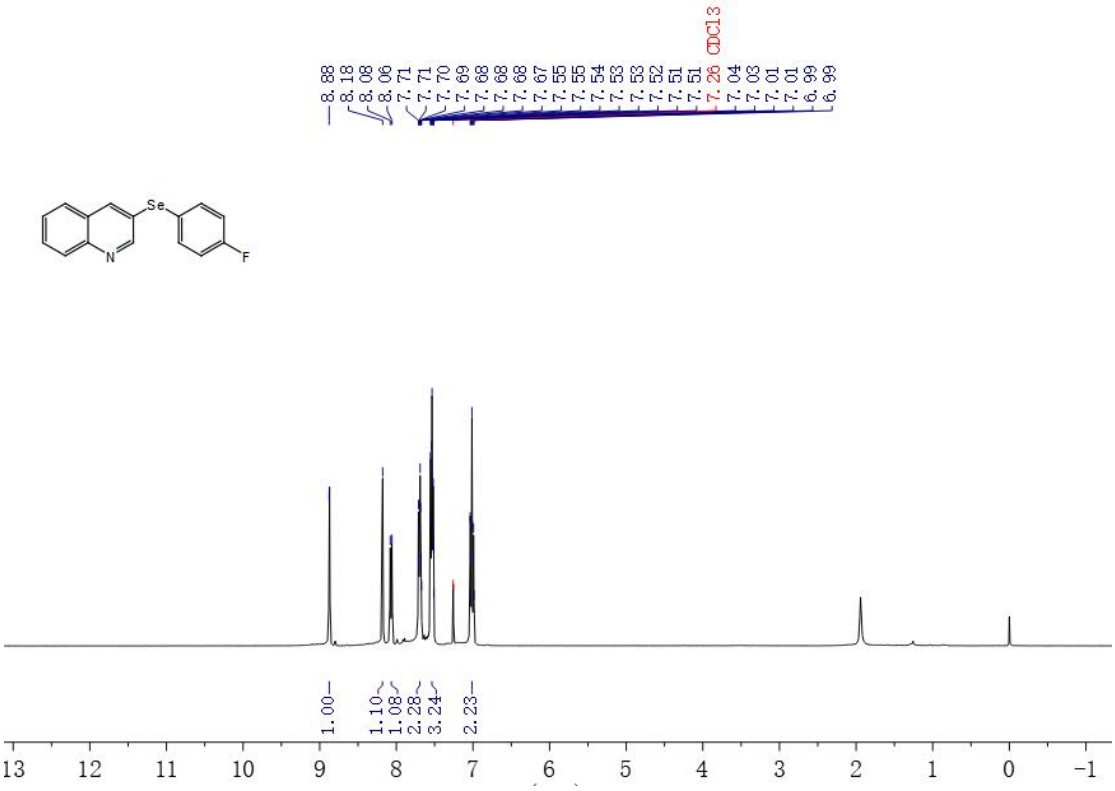
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3f



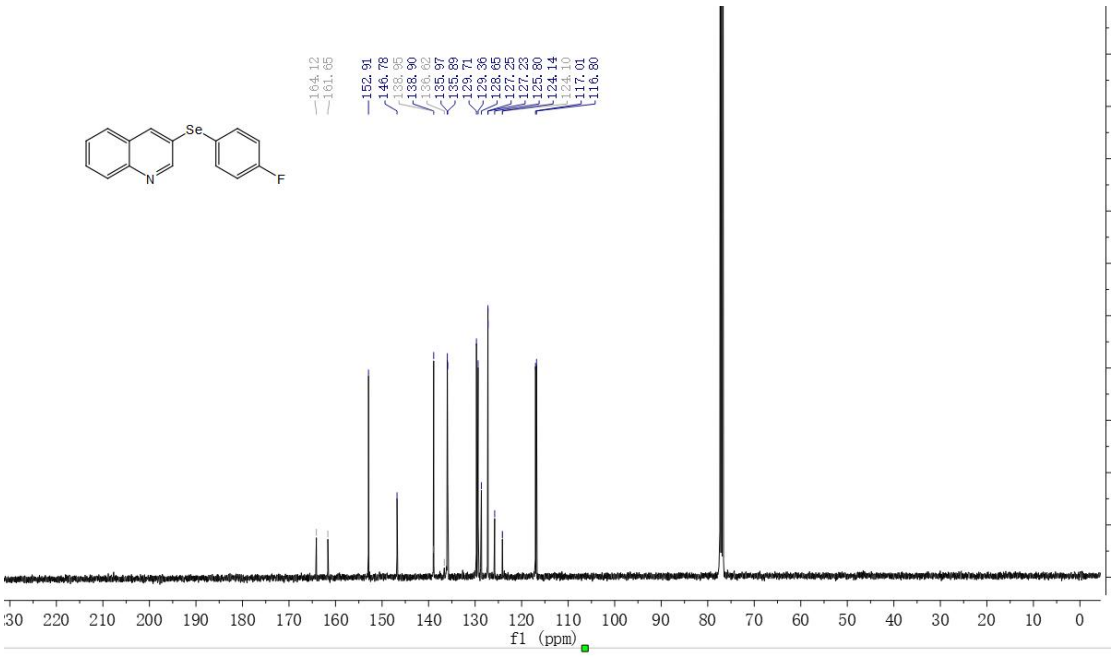
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3f



^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3g

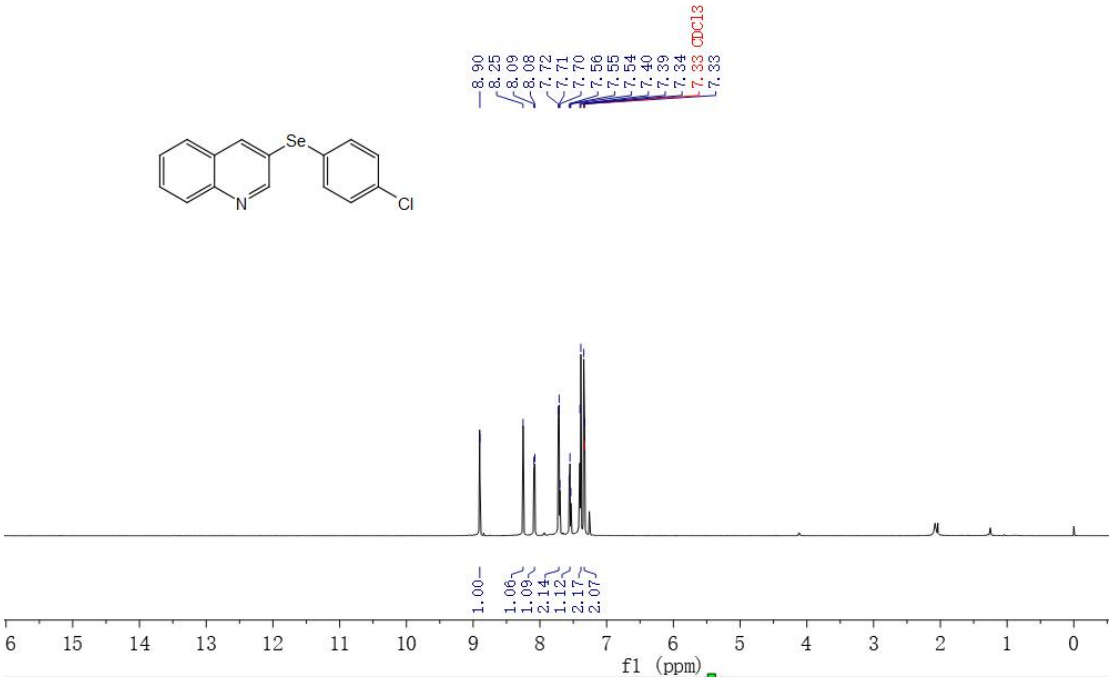


^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3g

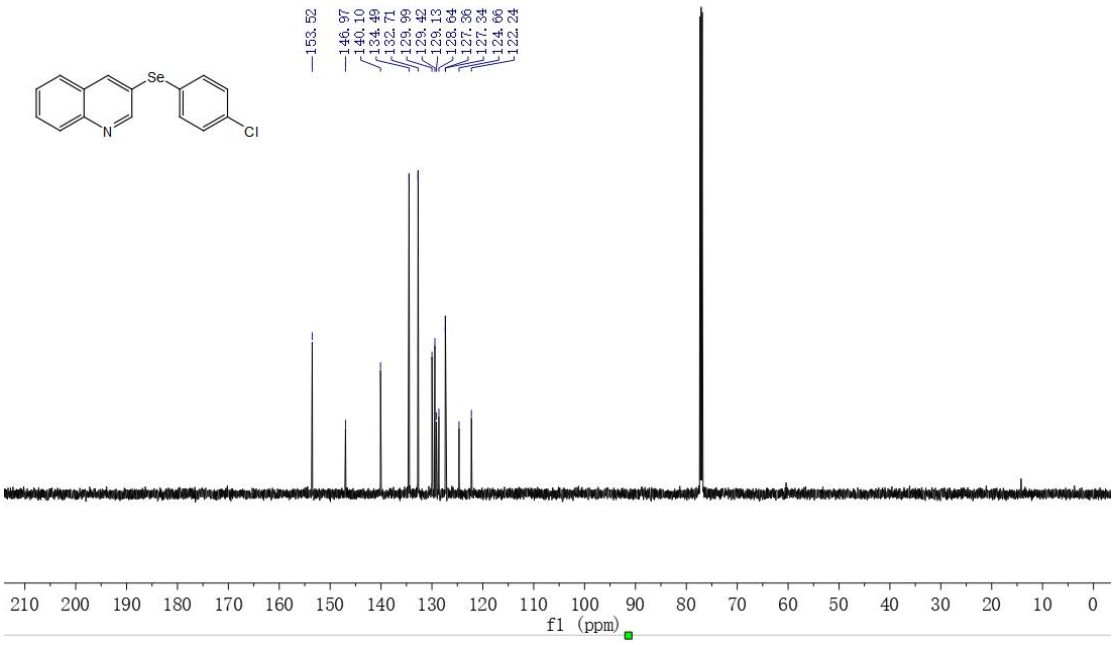


^{19}F-NMR Spectrum (565 MHz, $CDCl_3$) of 3g

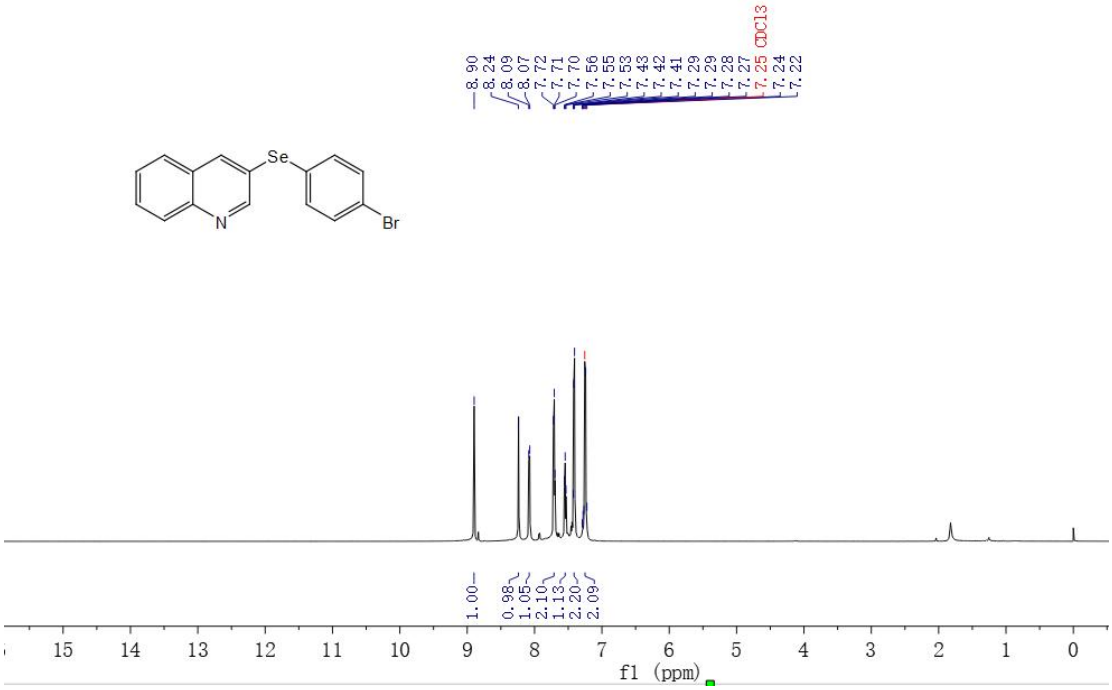
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3h



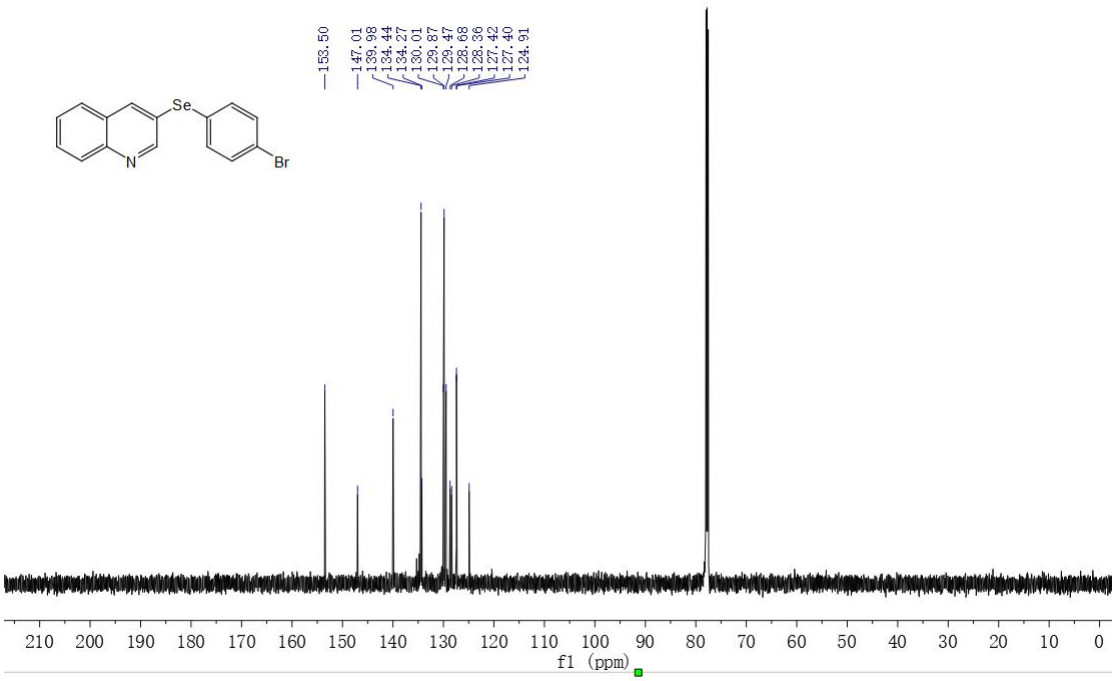
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3h



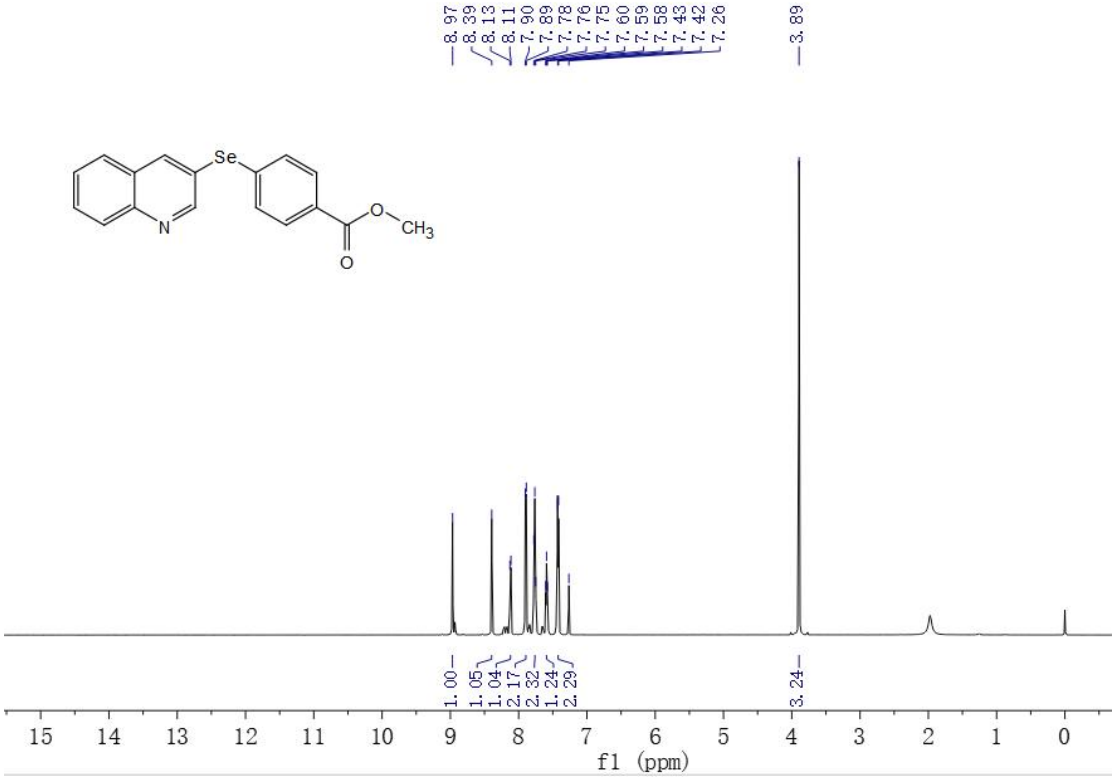
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3i



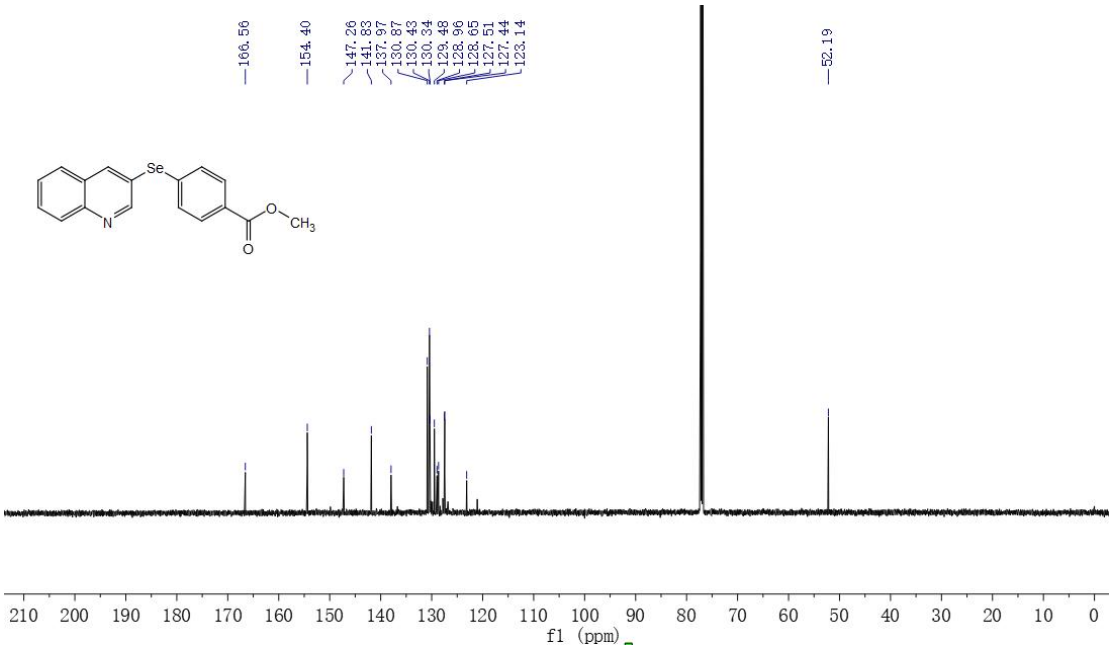
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3i



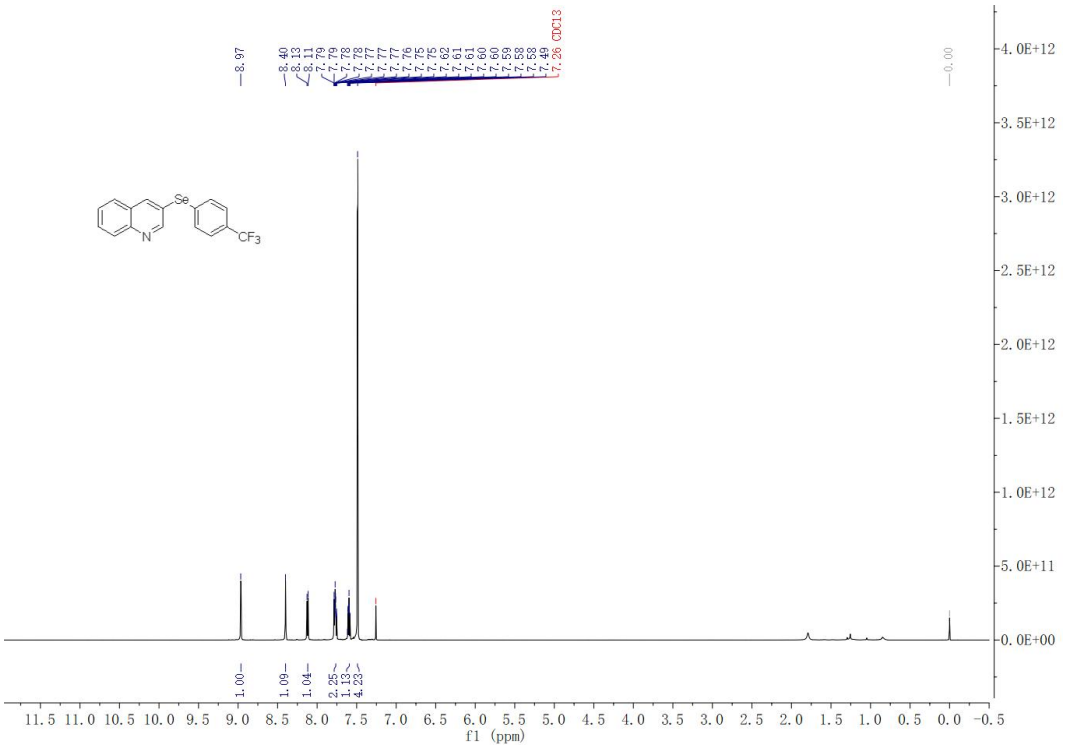
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3j



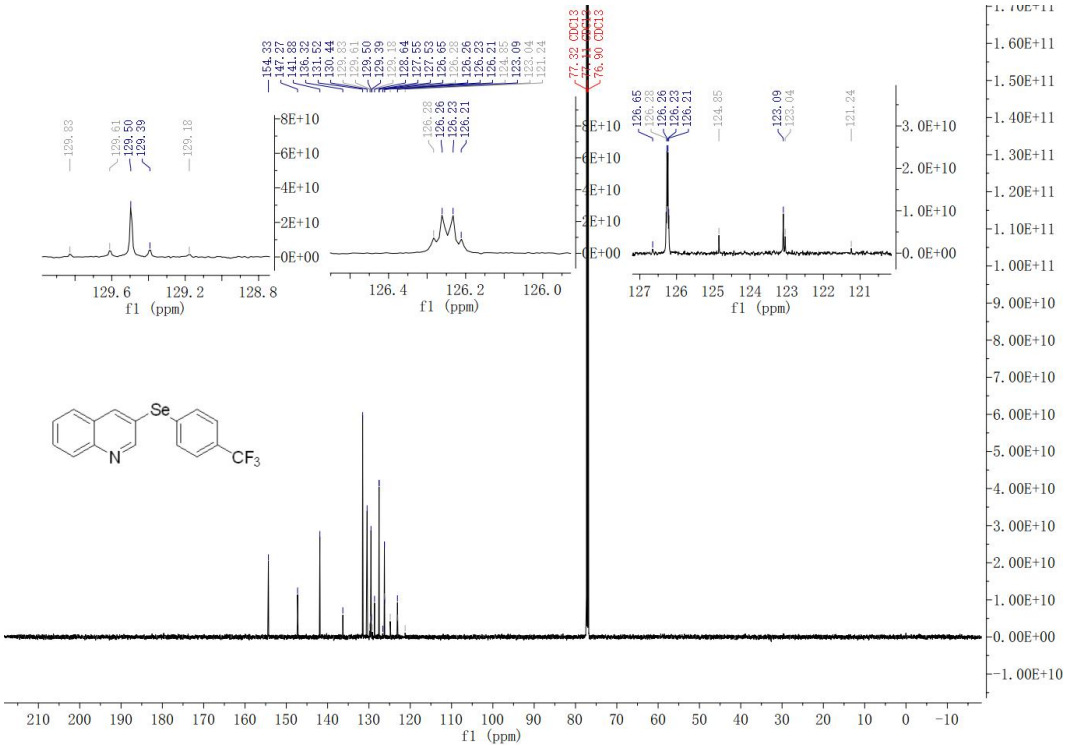
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3j



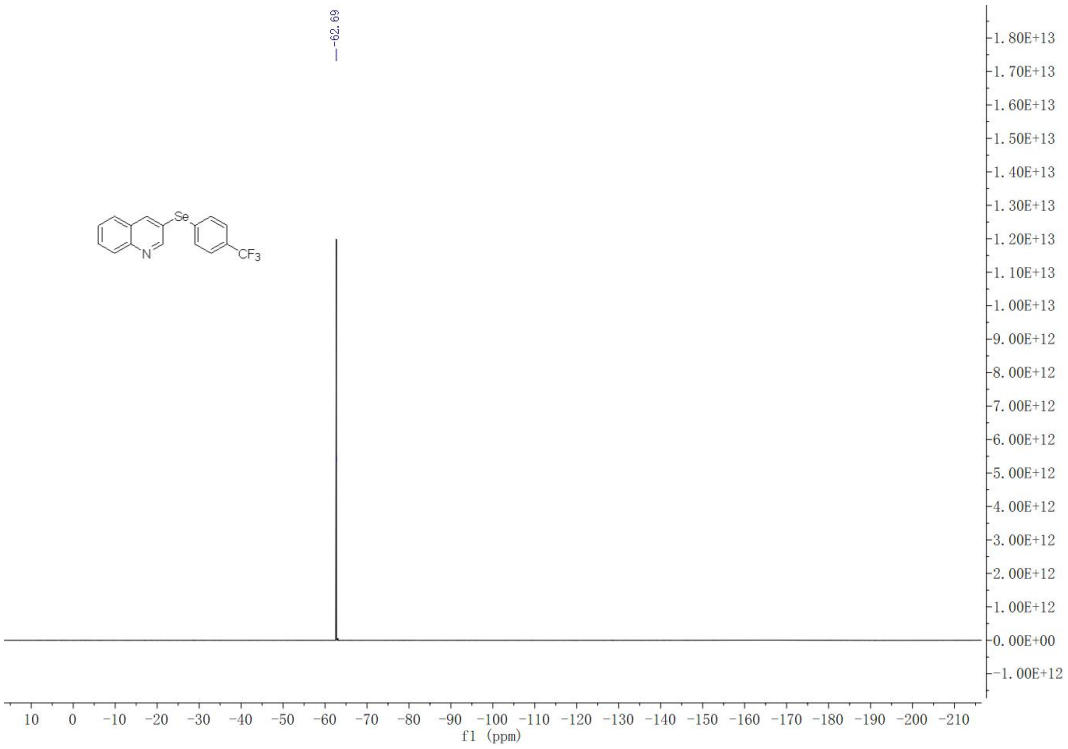
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3k



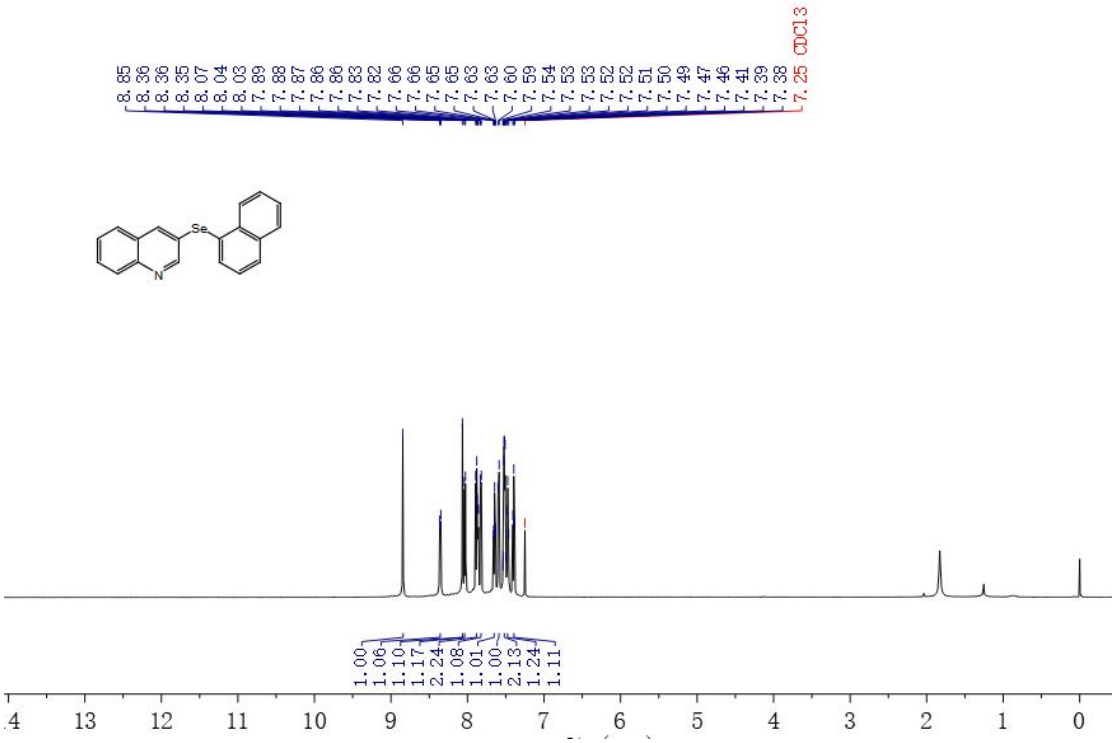
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3k



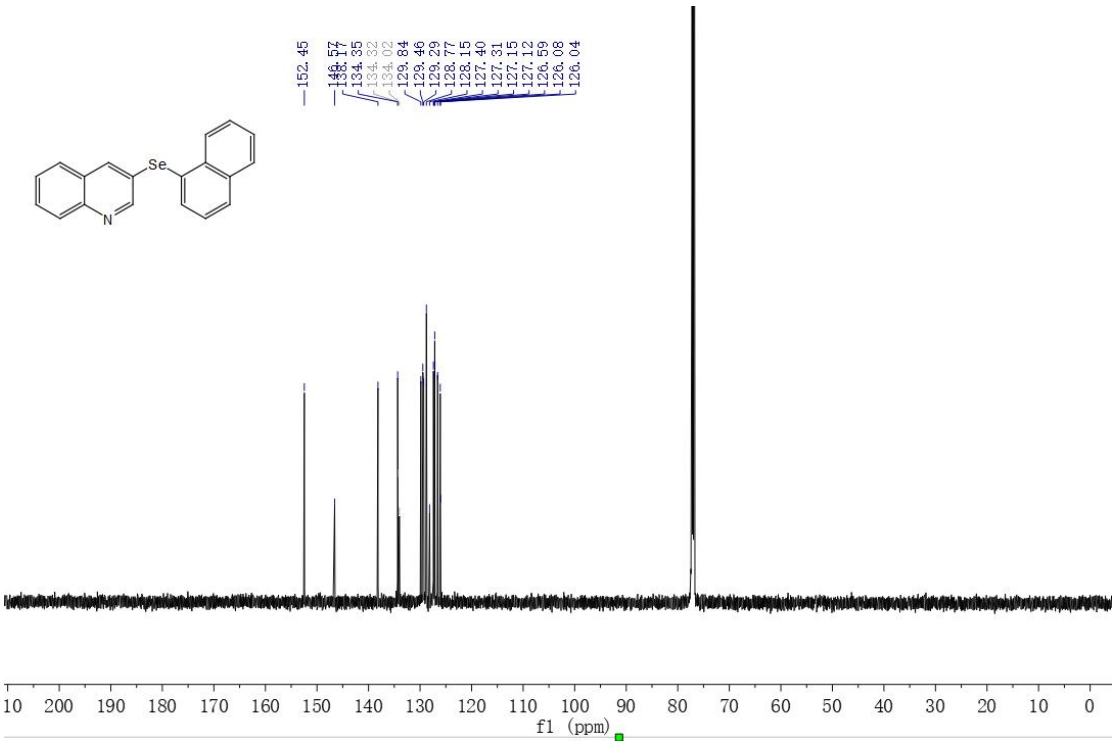
^{19}F-NMR Spectrum (565 MHz, $CDCl_3$) of 3k



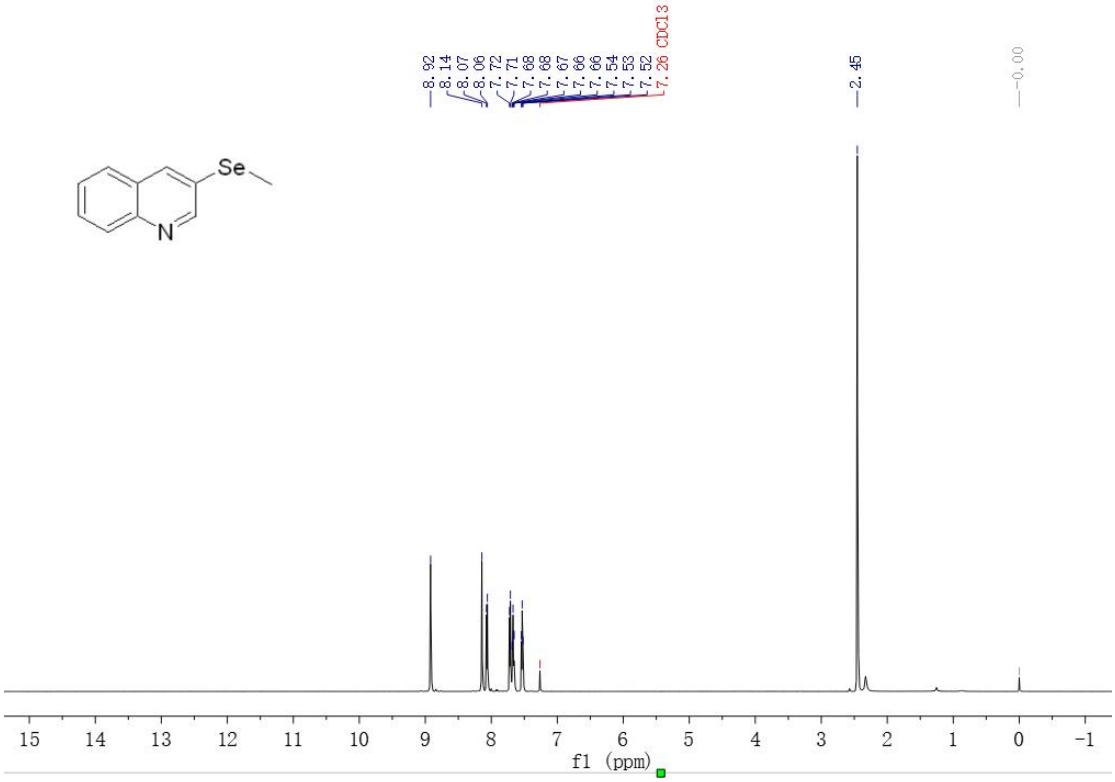
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3l



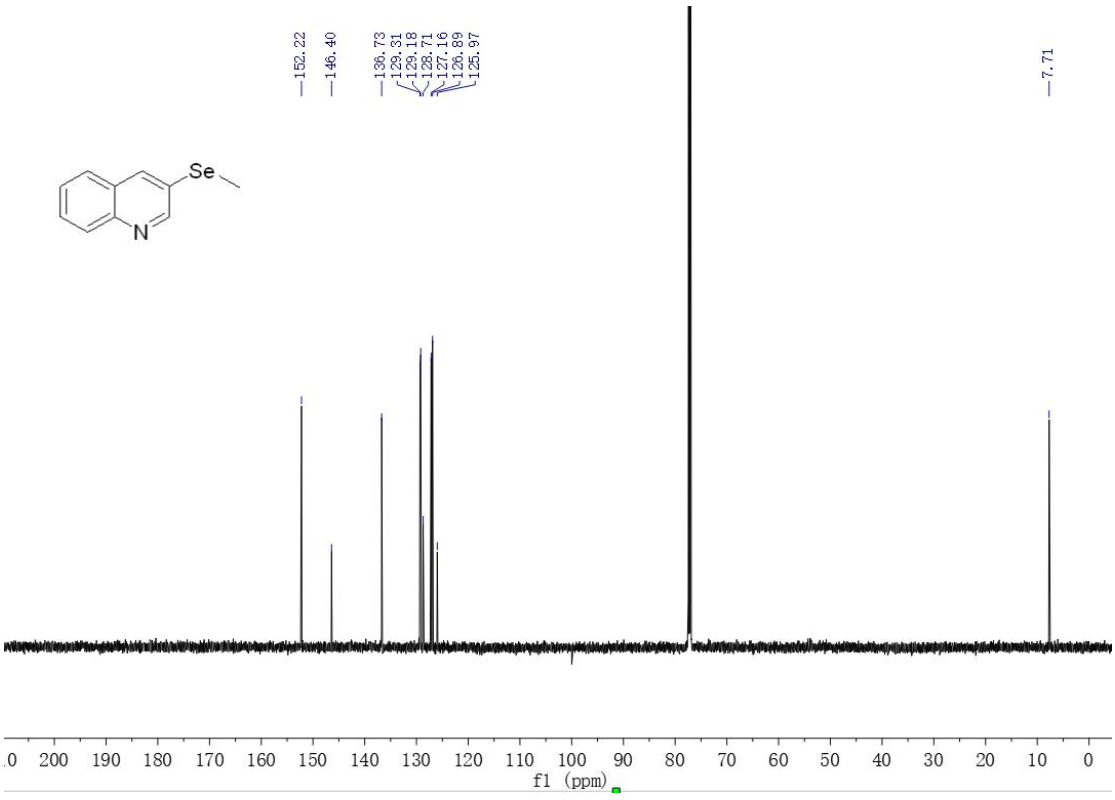
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3l



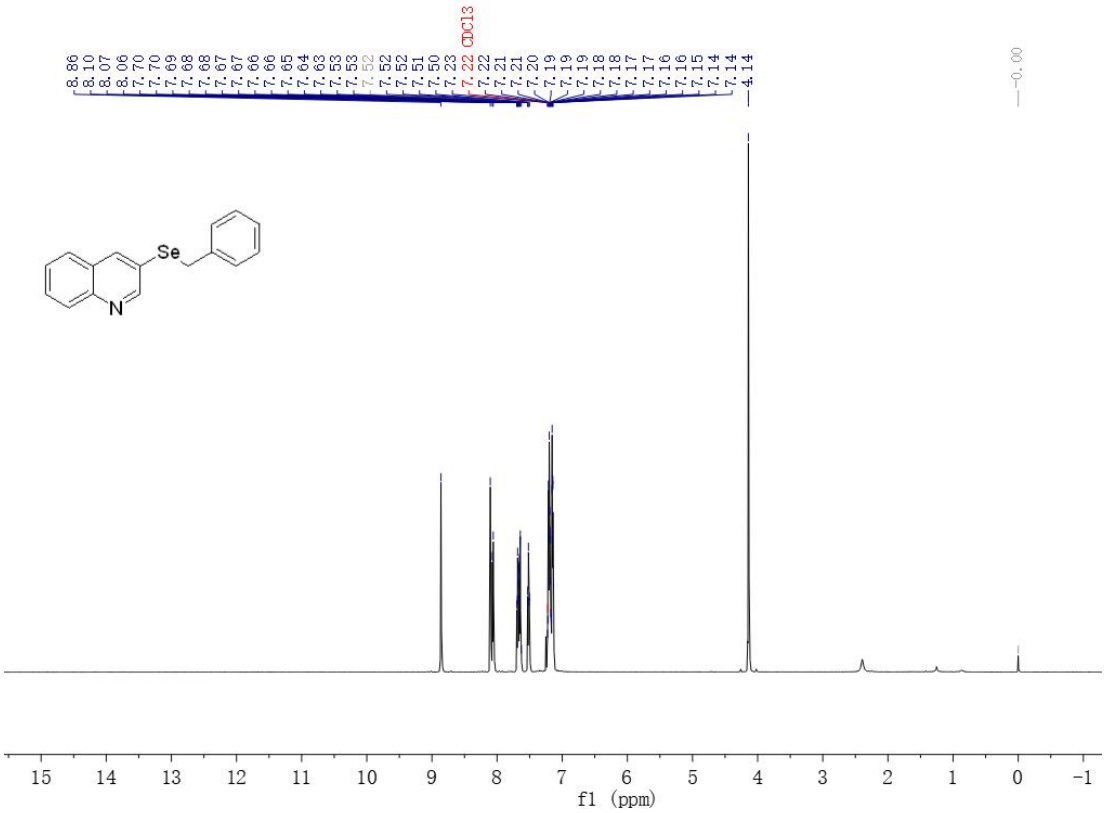
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3m



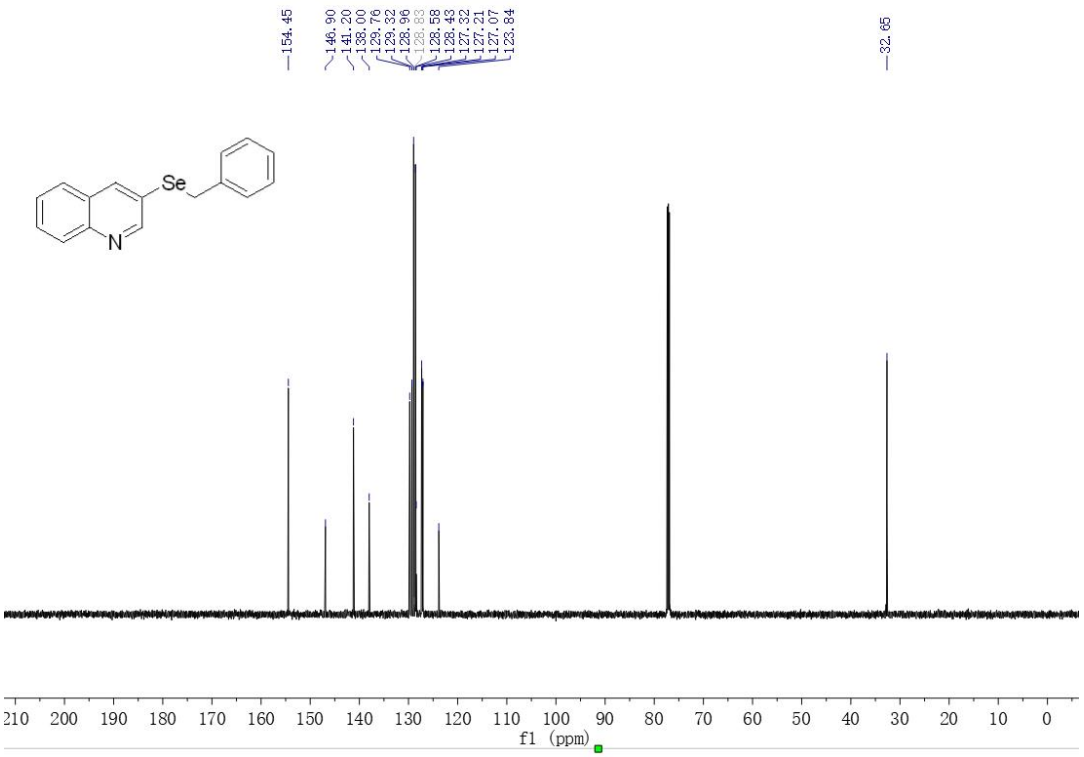
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3m



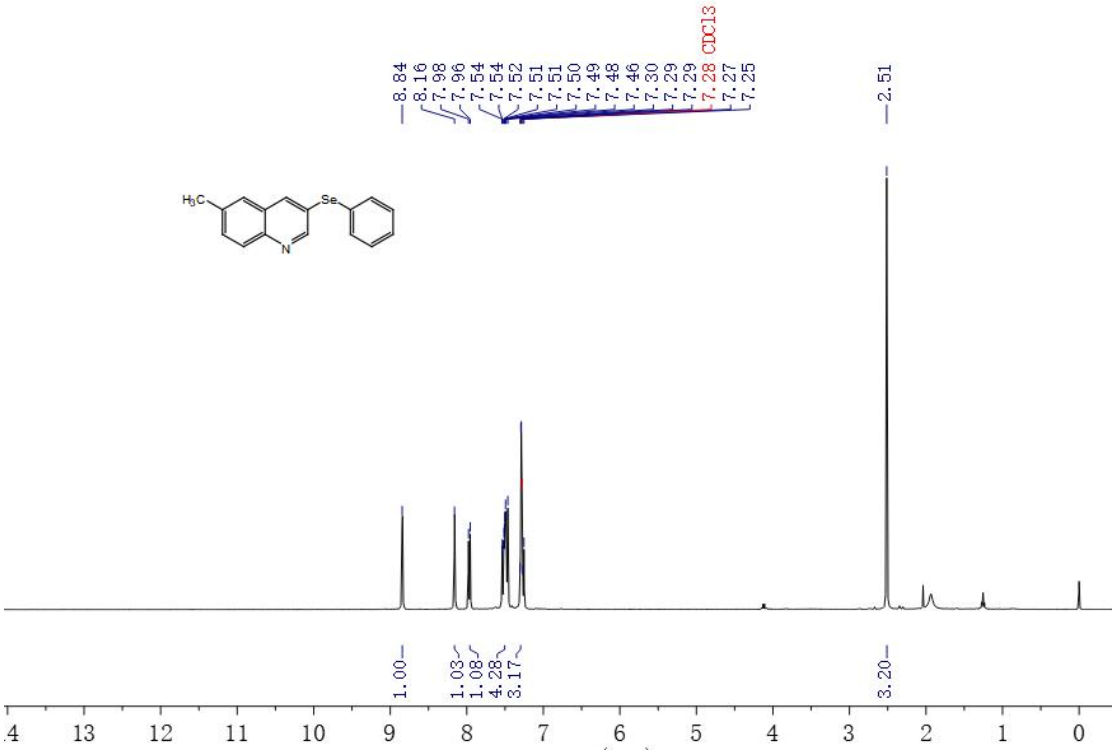
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3n



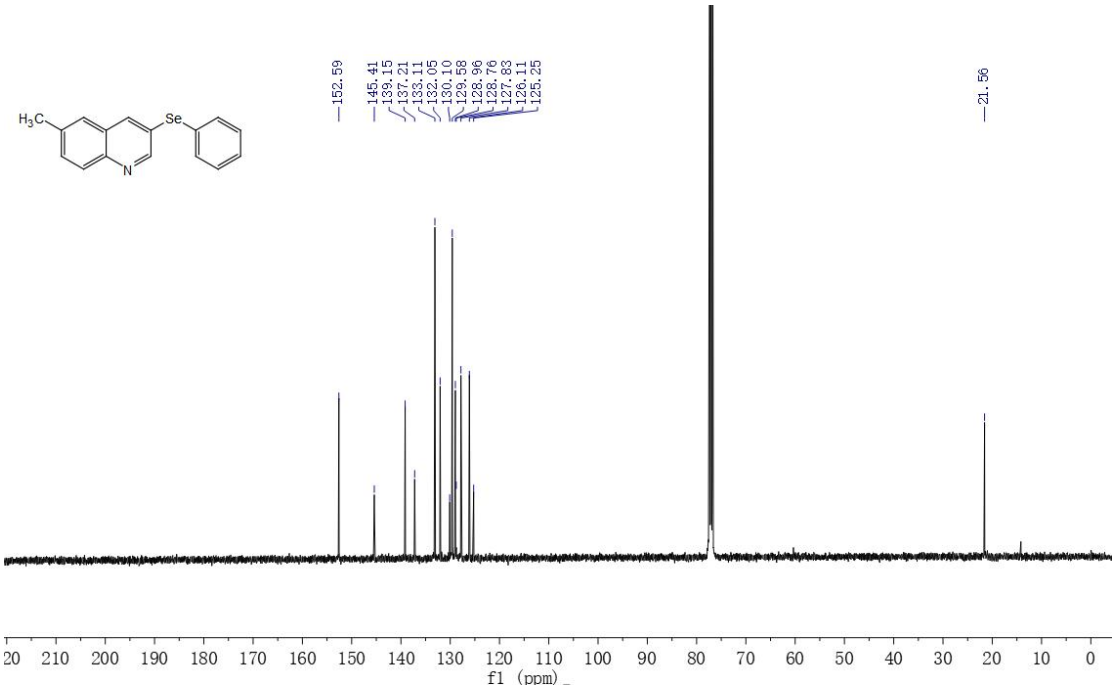
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3n



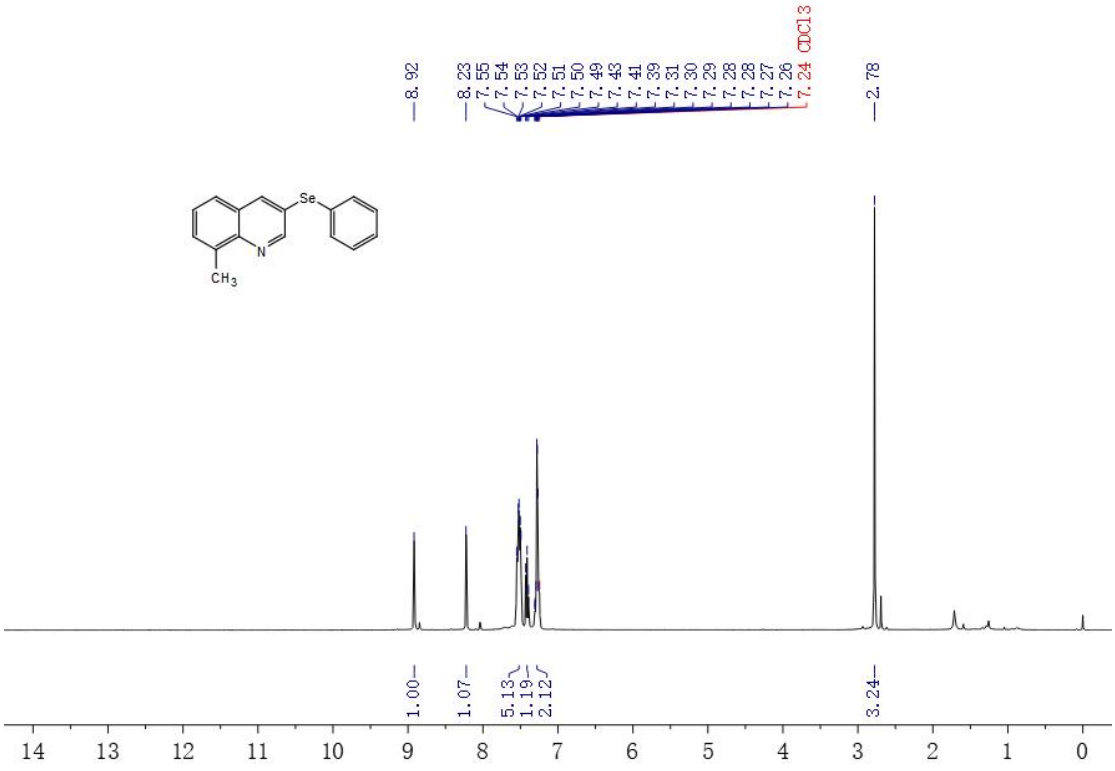
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3o



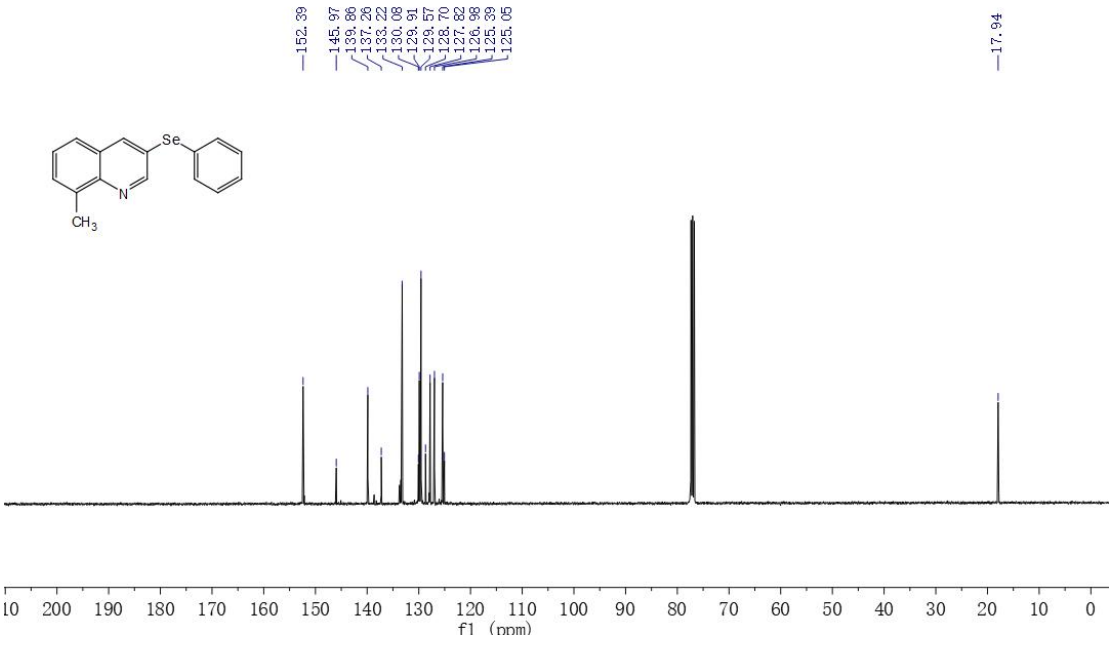
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3o



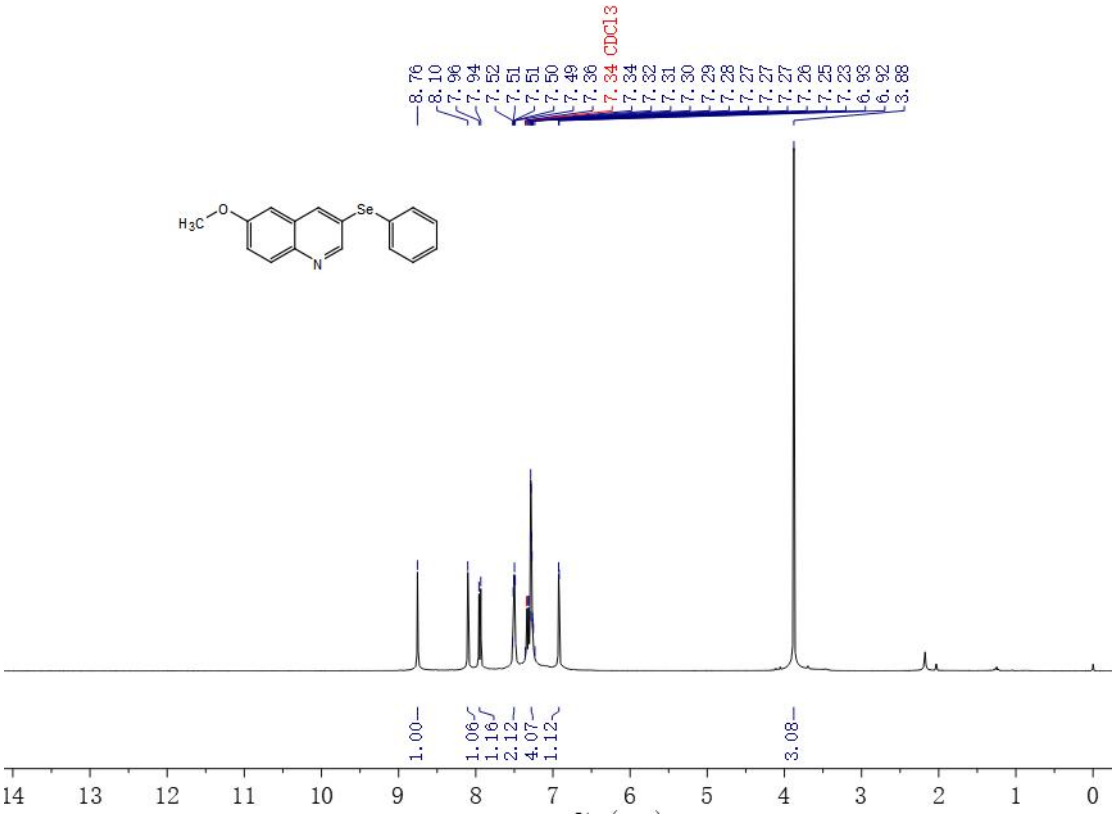
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3p



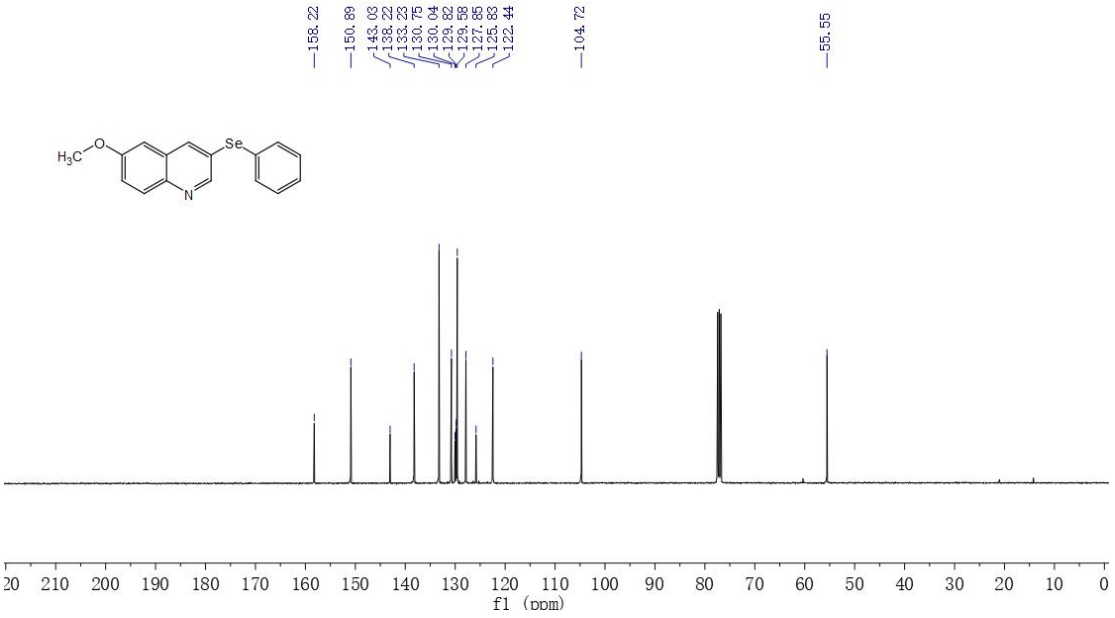
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3p



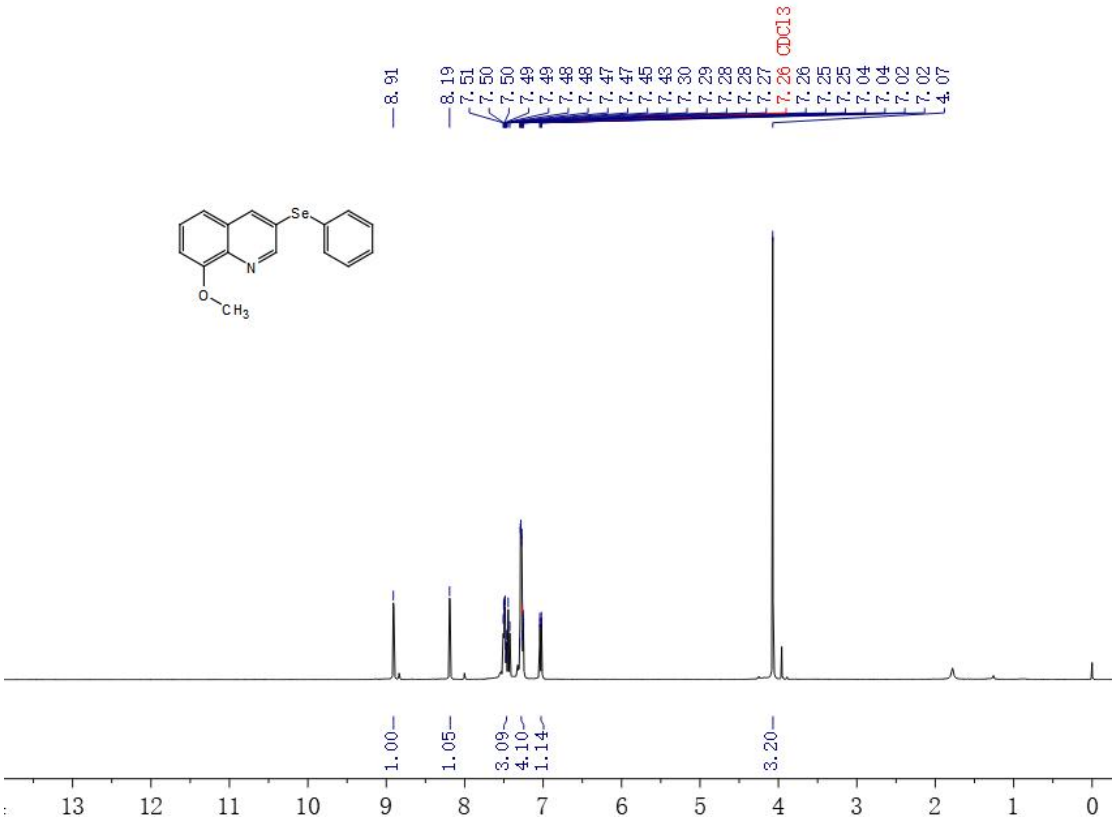
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3q



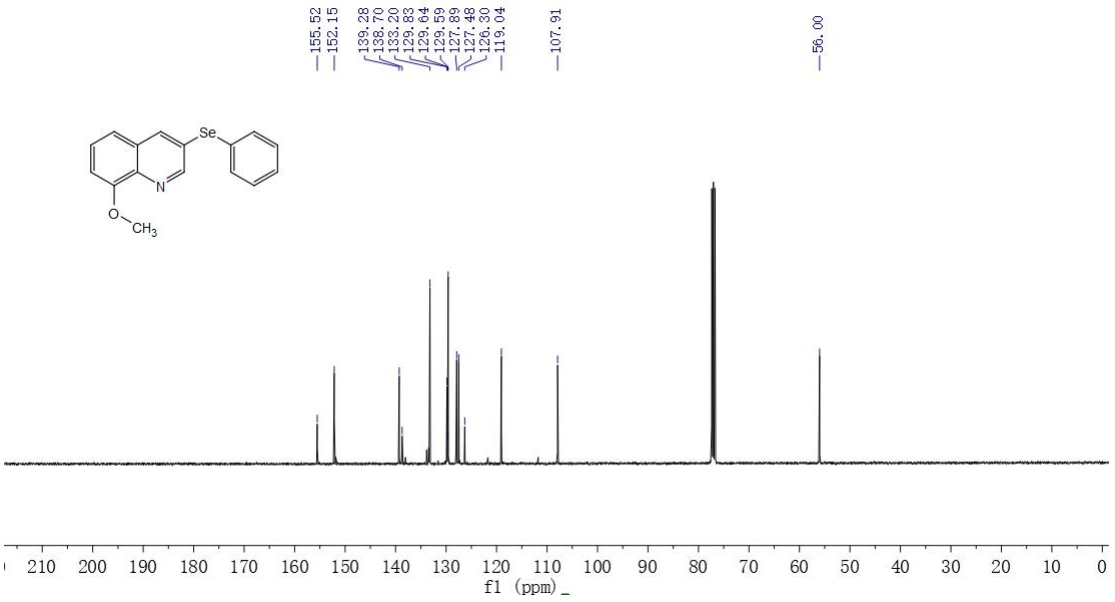
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3q



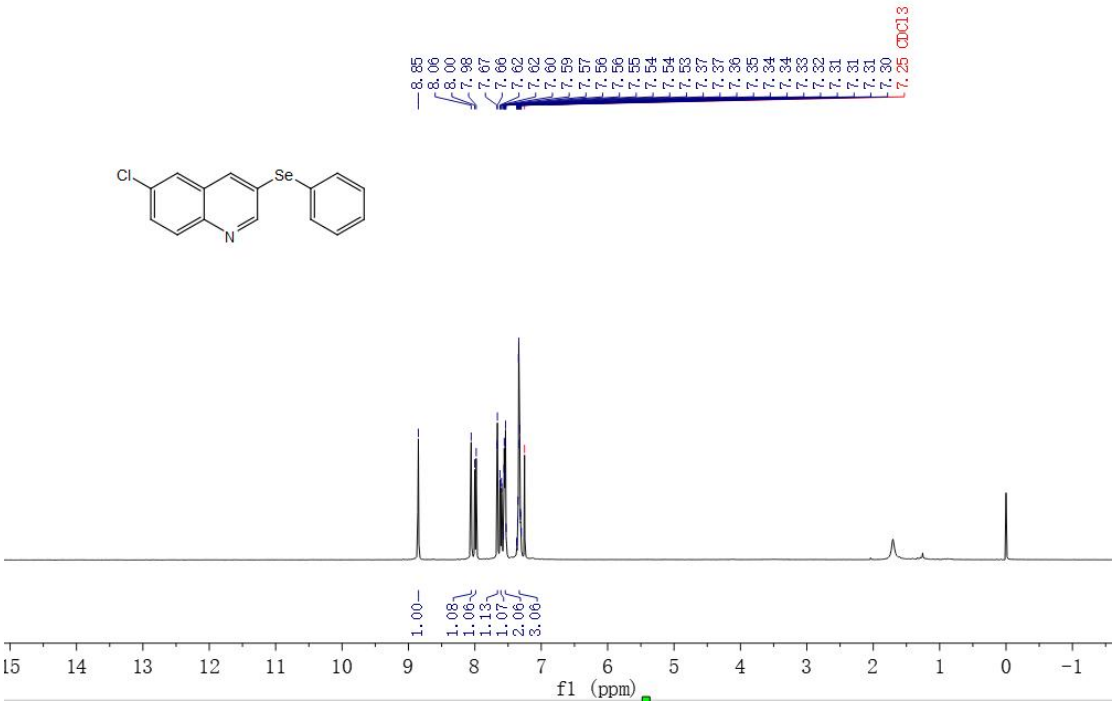
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3r



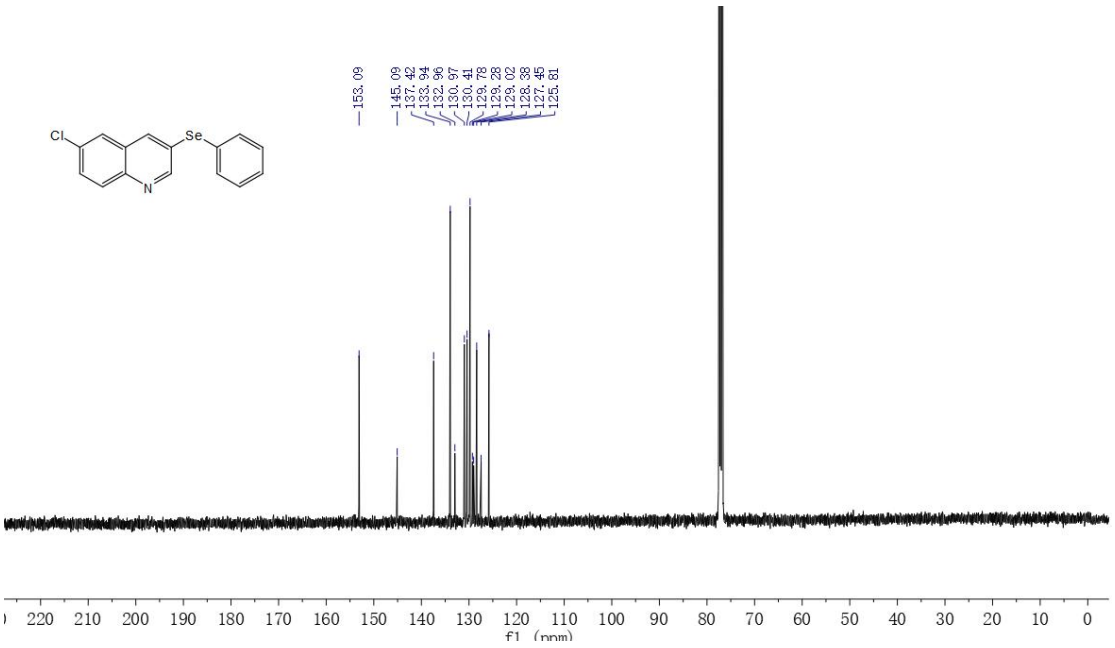
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3r



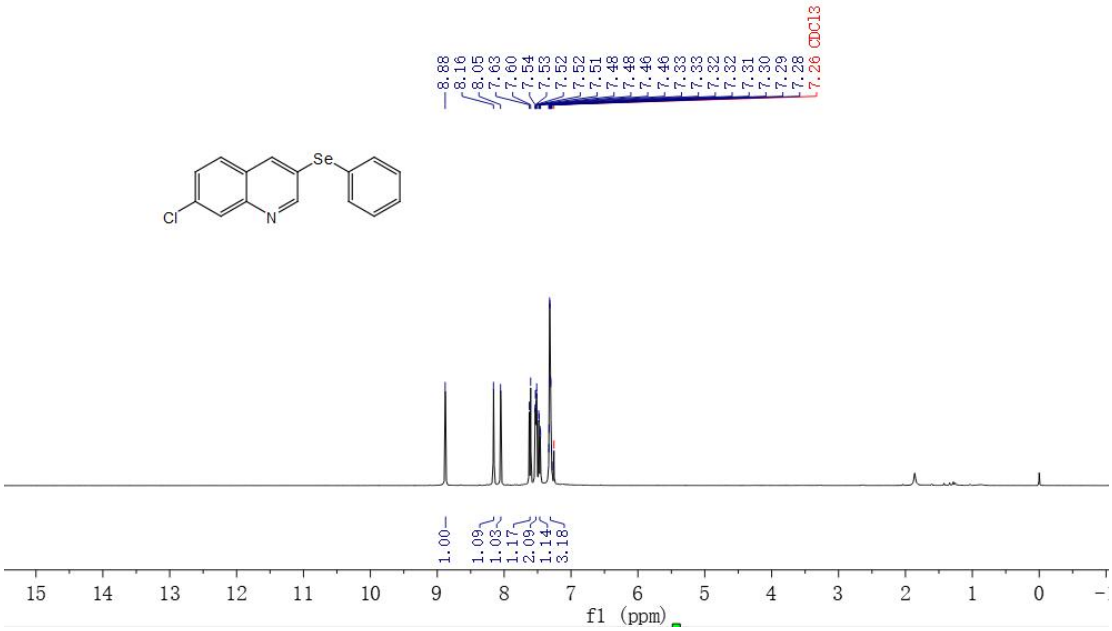
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3s



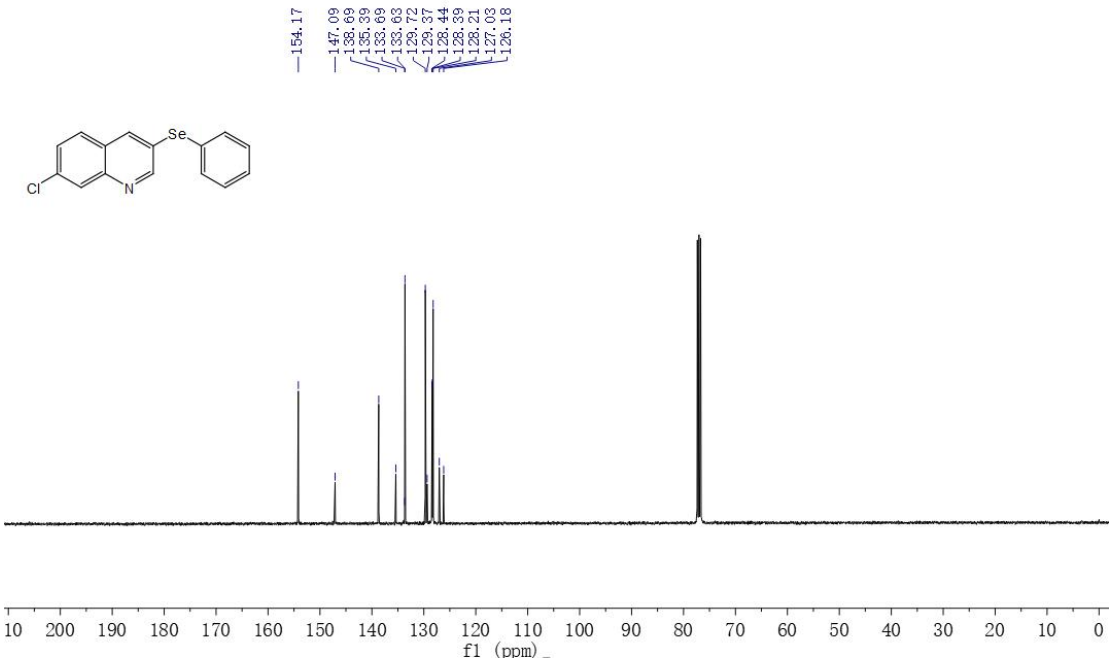
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3s



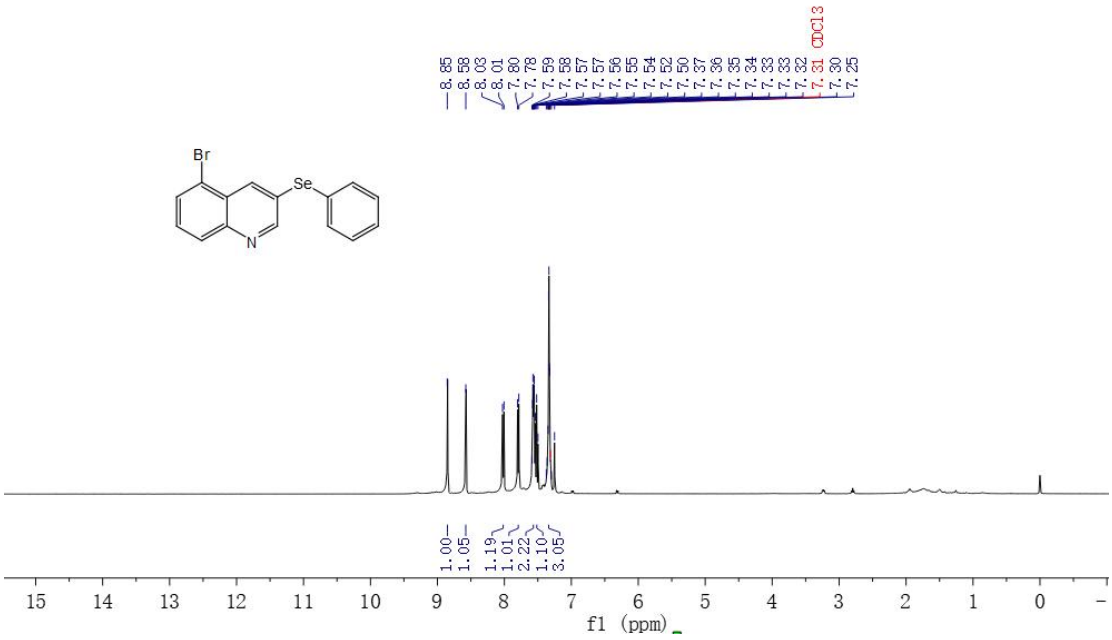
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3t



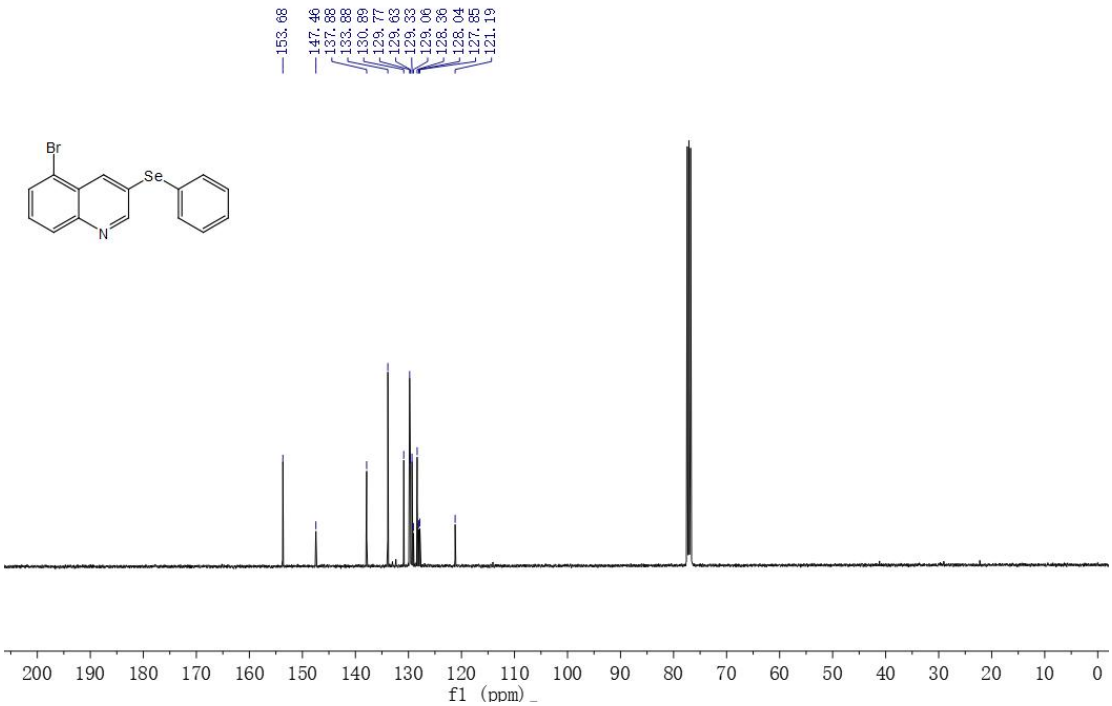
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3t



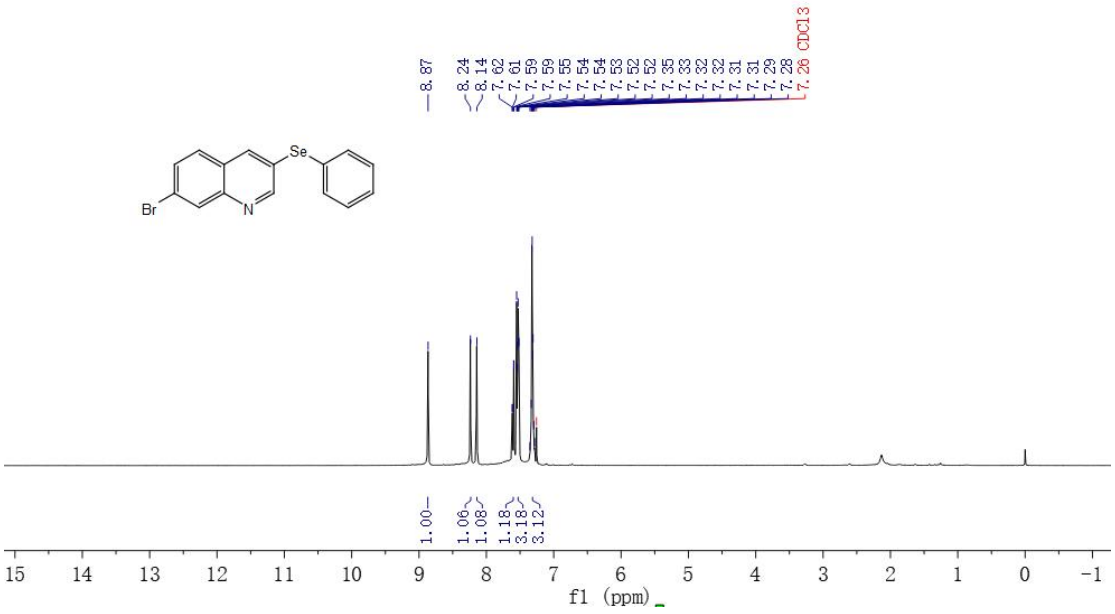
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3u



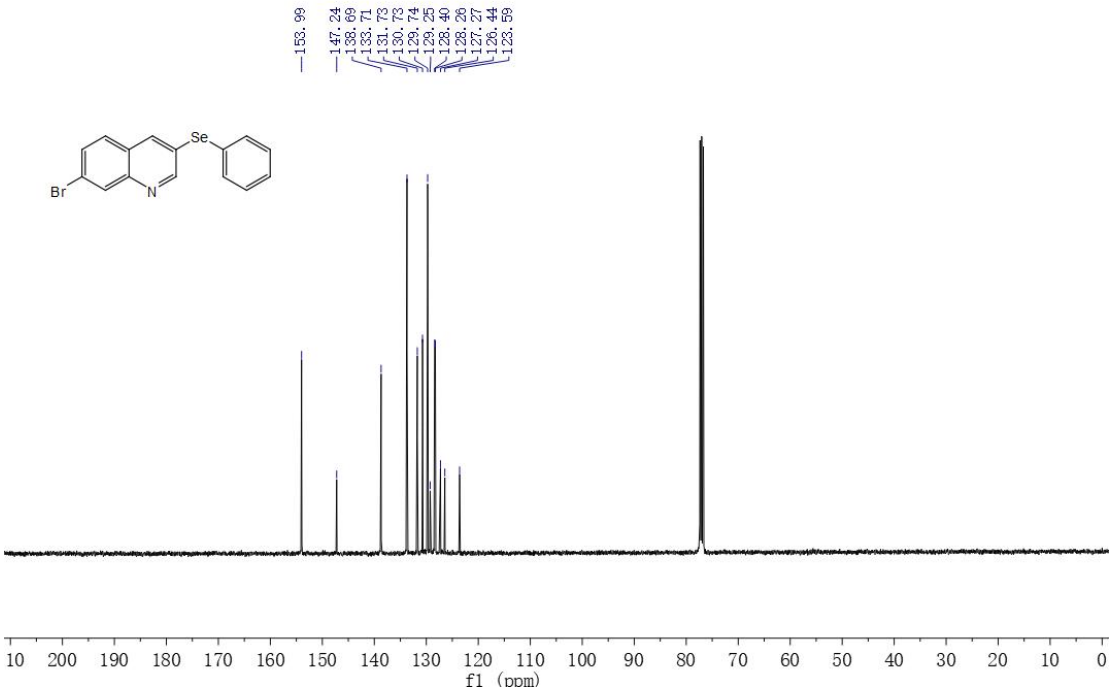
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3u



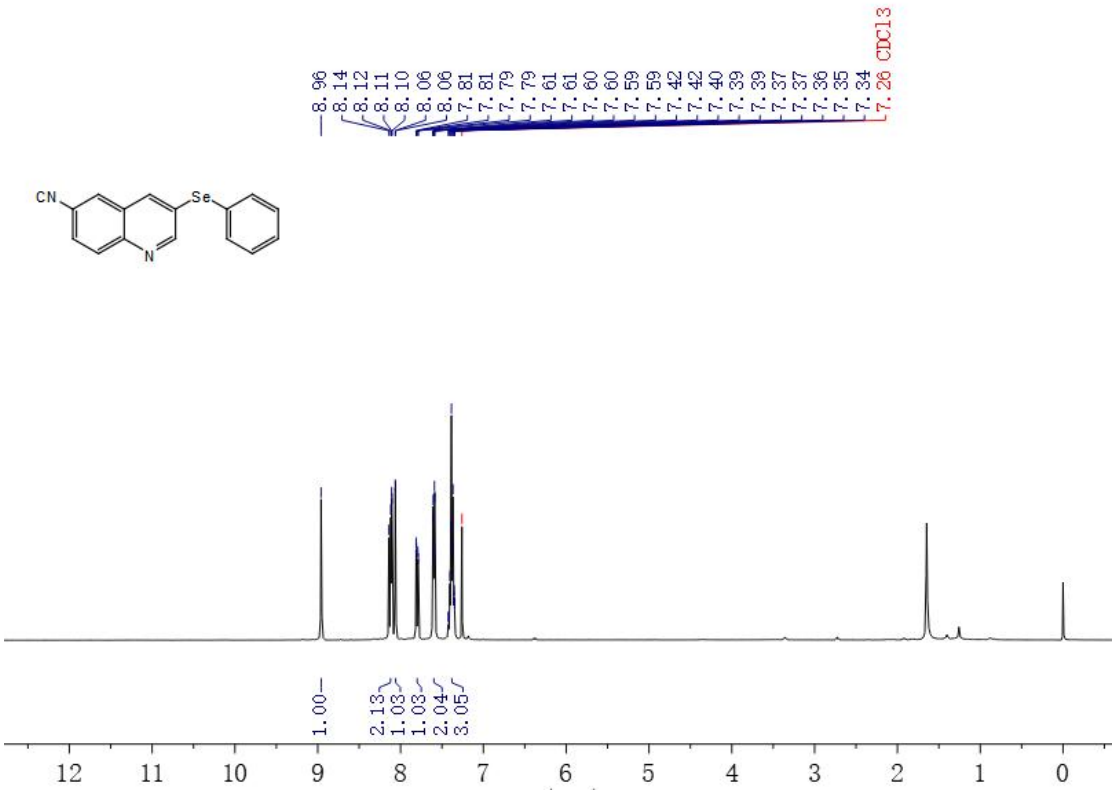
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3v



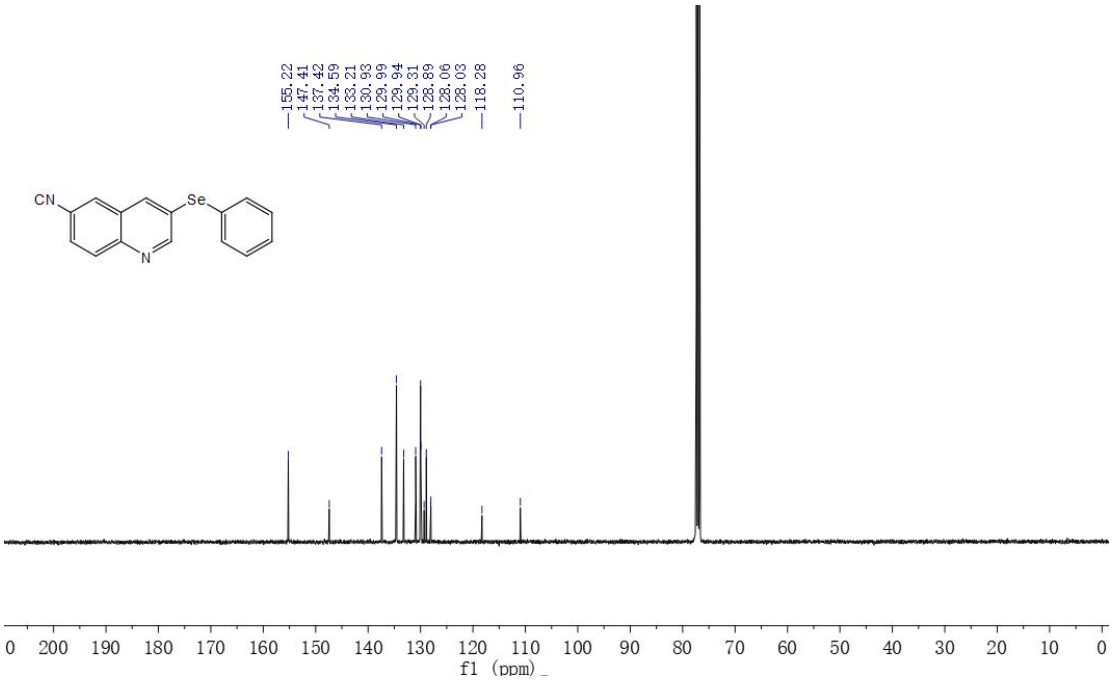
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3v



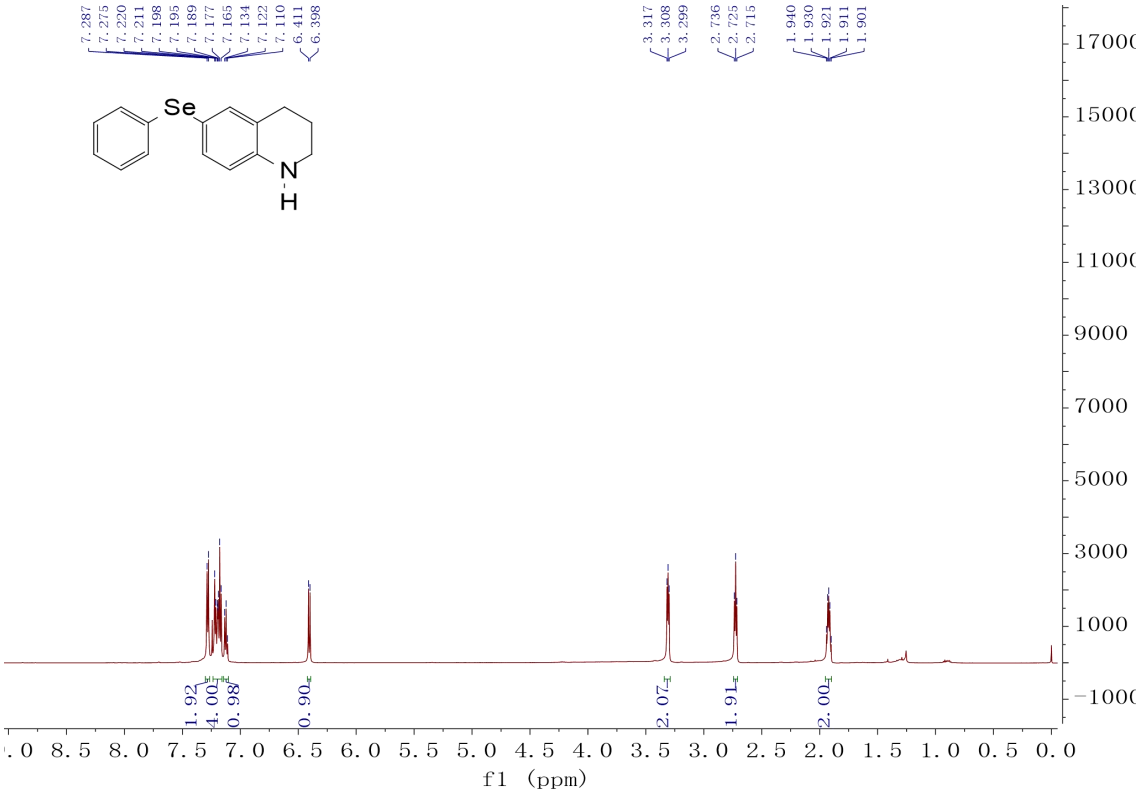
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 3w



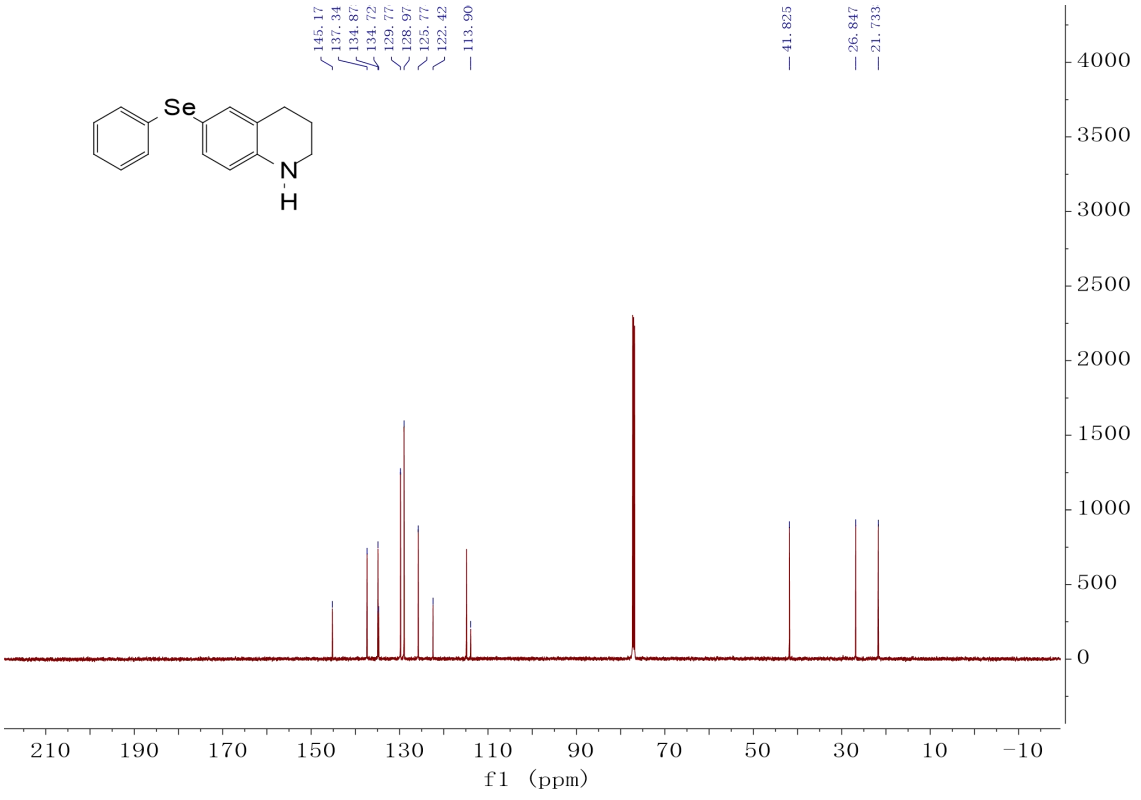
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 3w



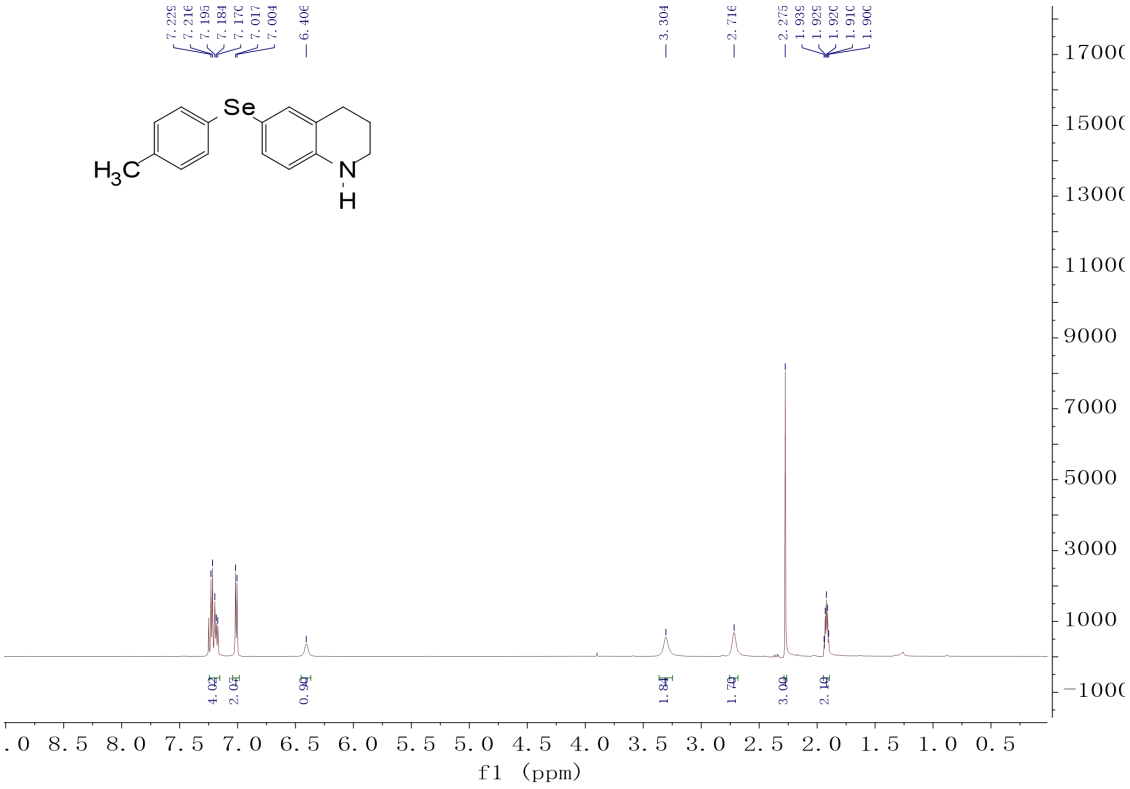
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4a



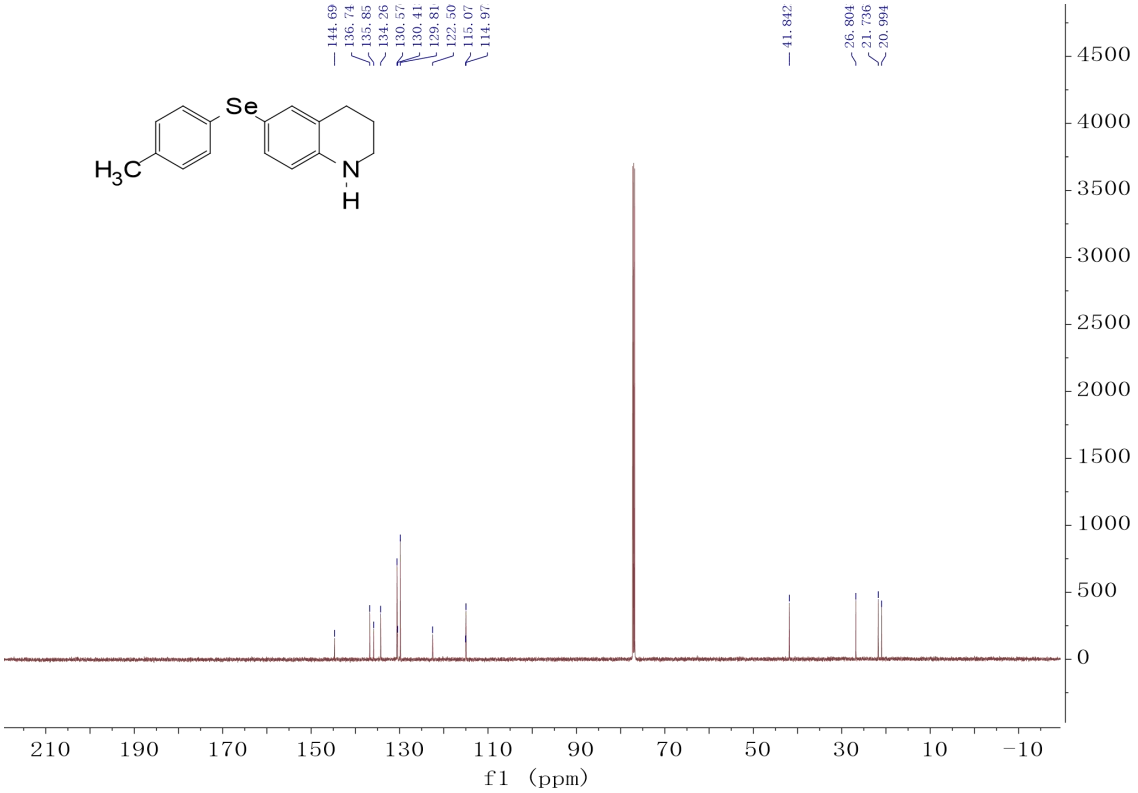
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4a



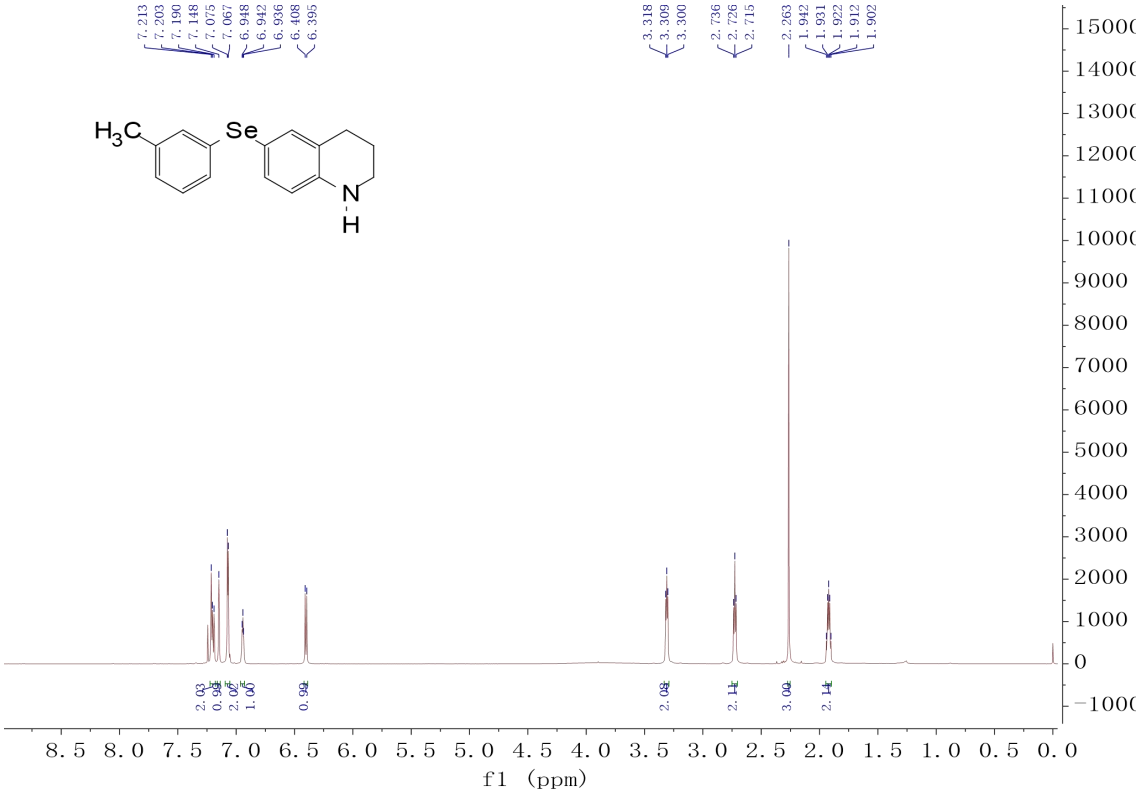
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4b



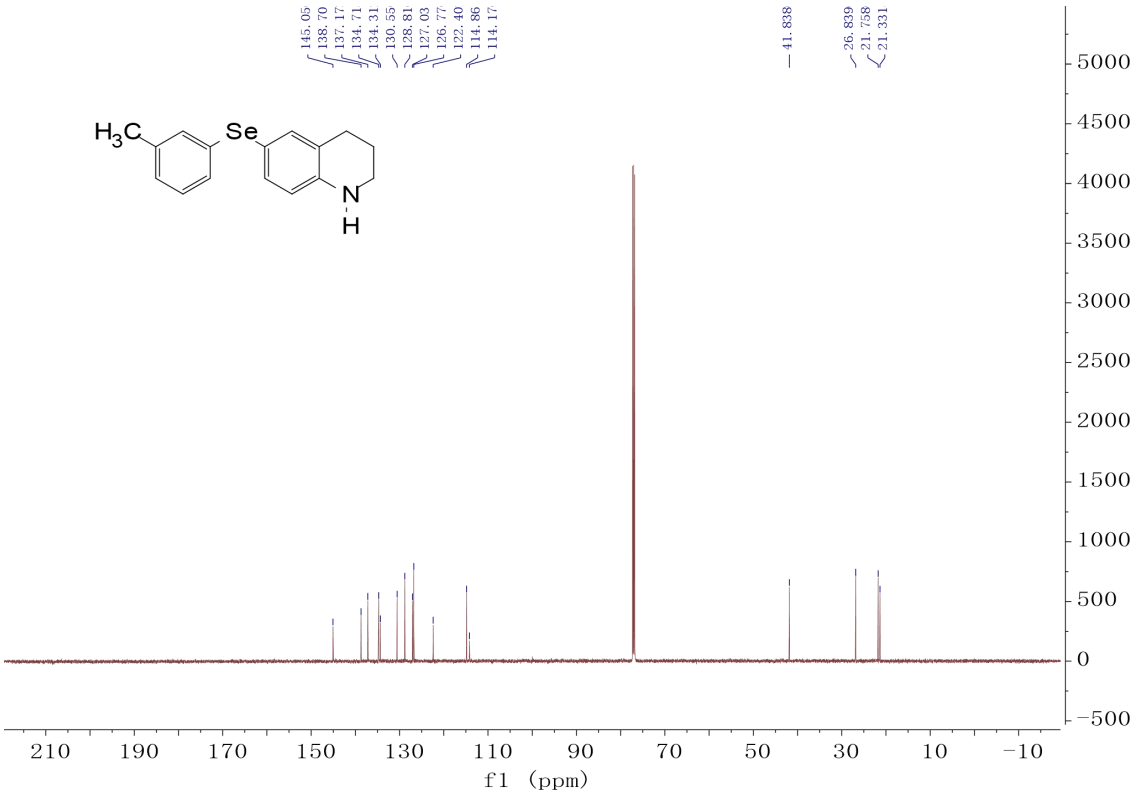
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4b



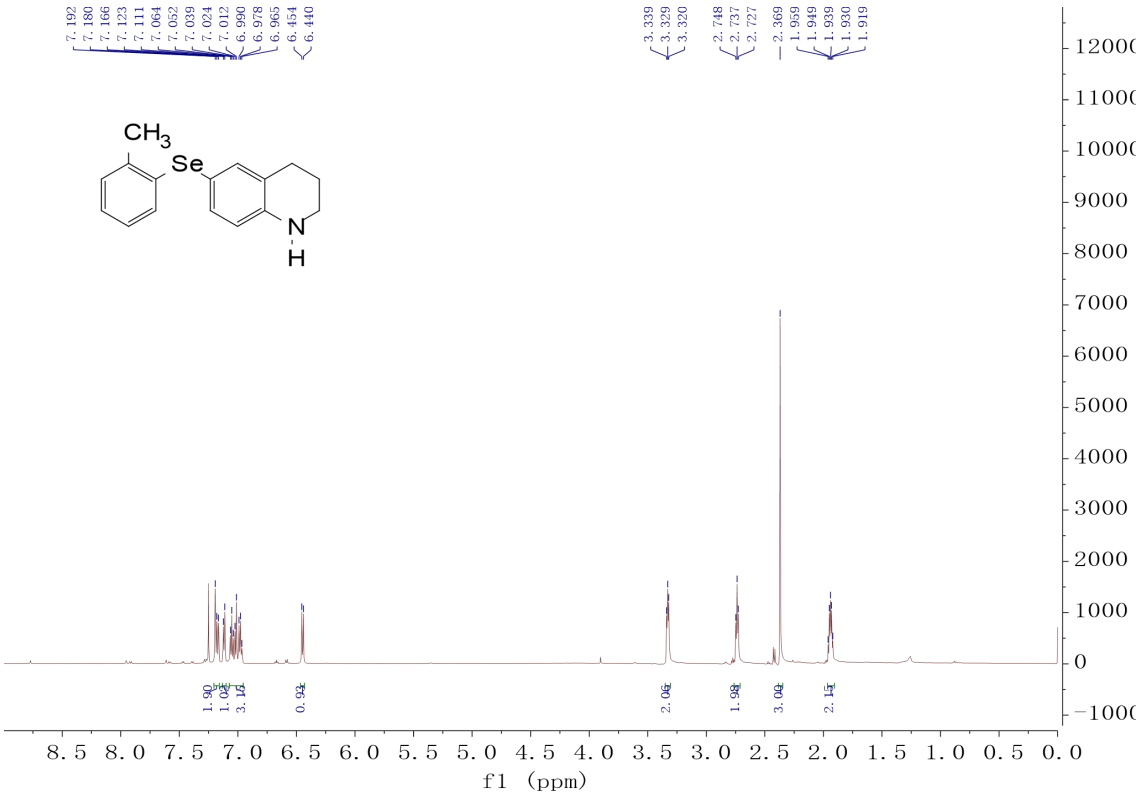
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4c



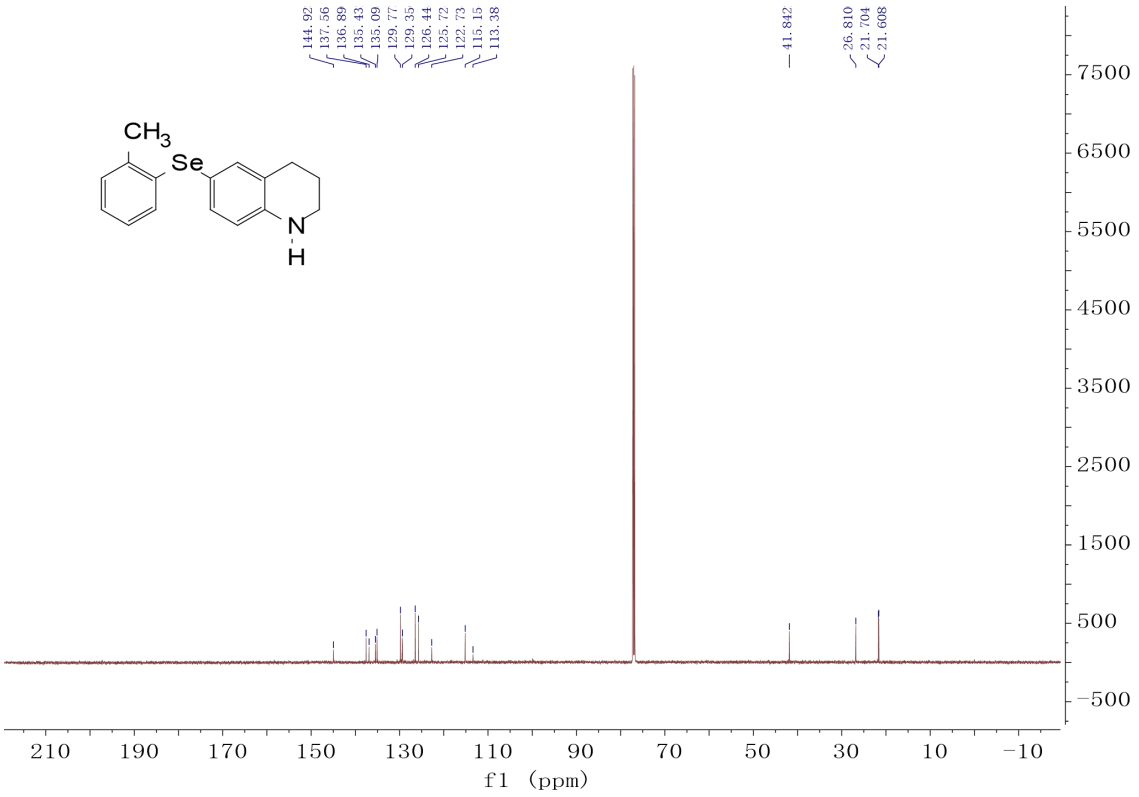
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4c



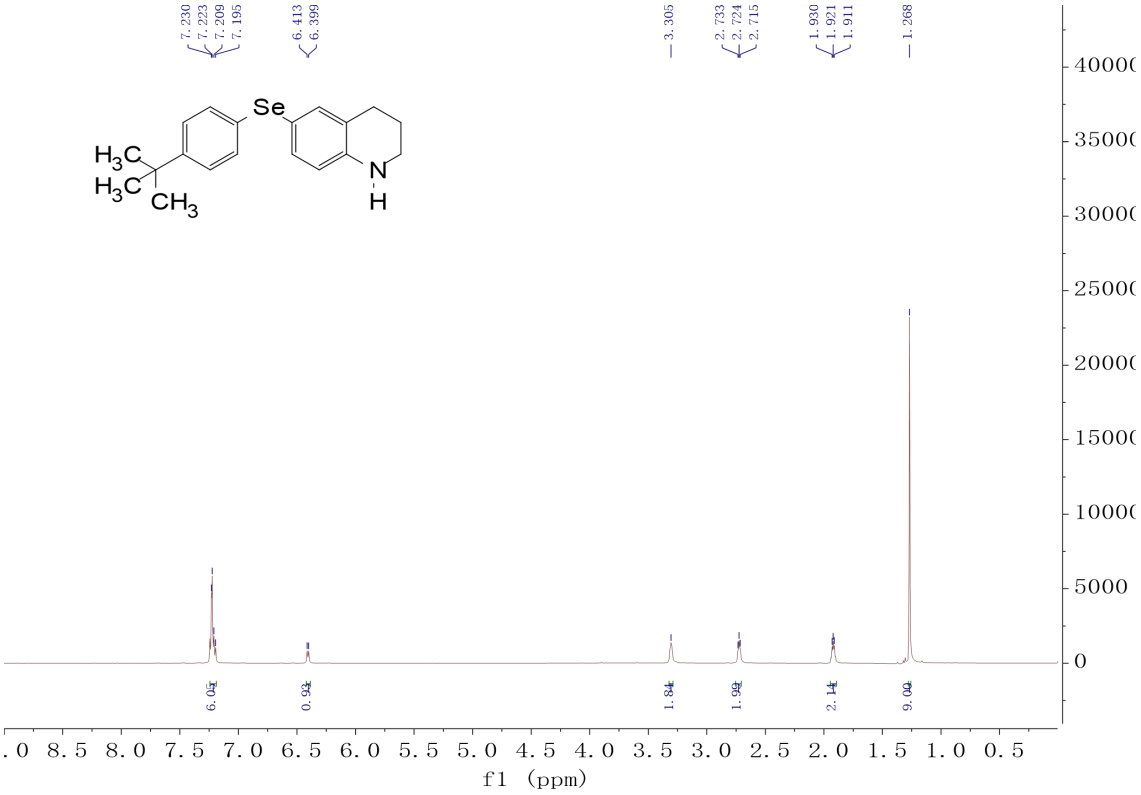
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4d



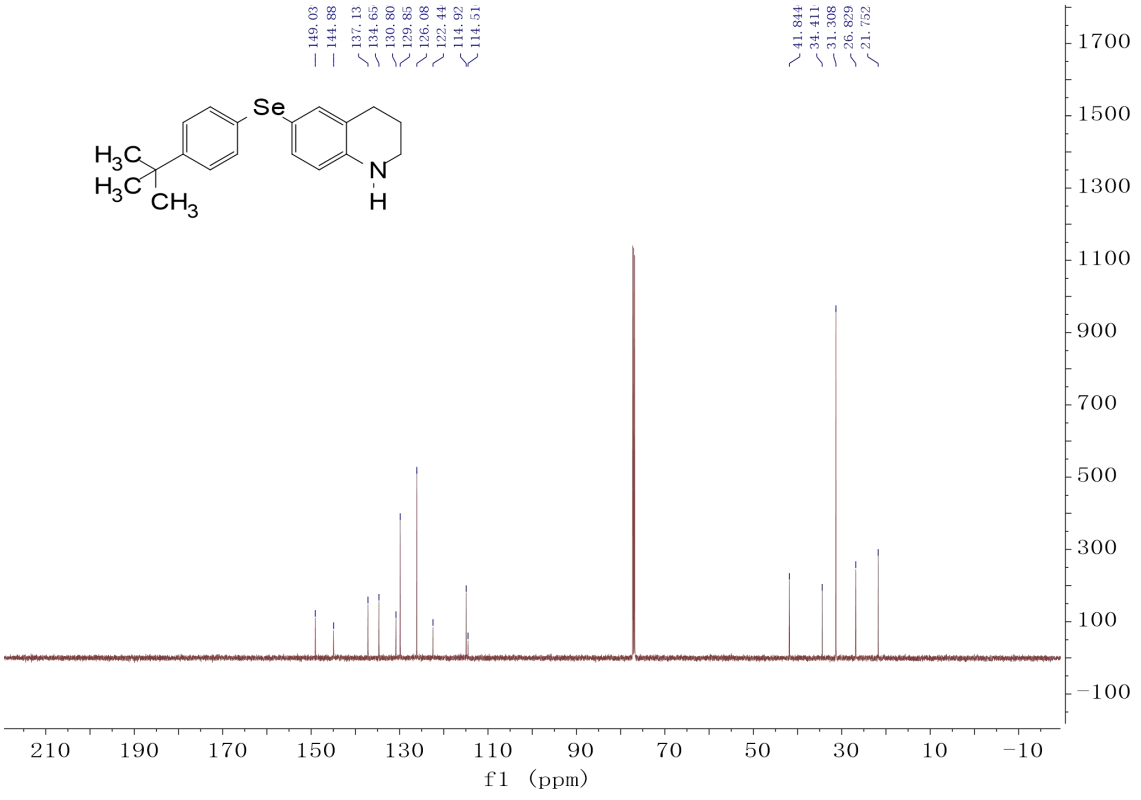
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4d



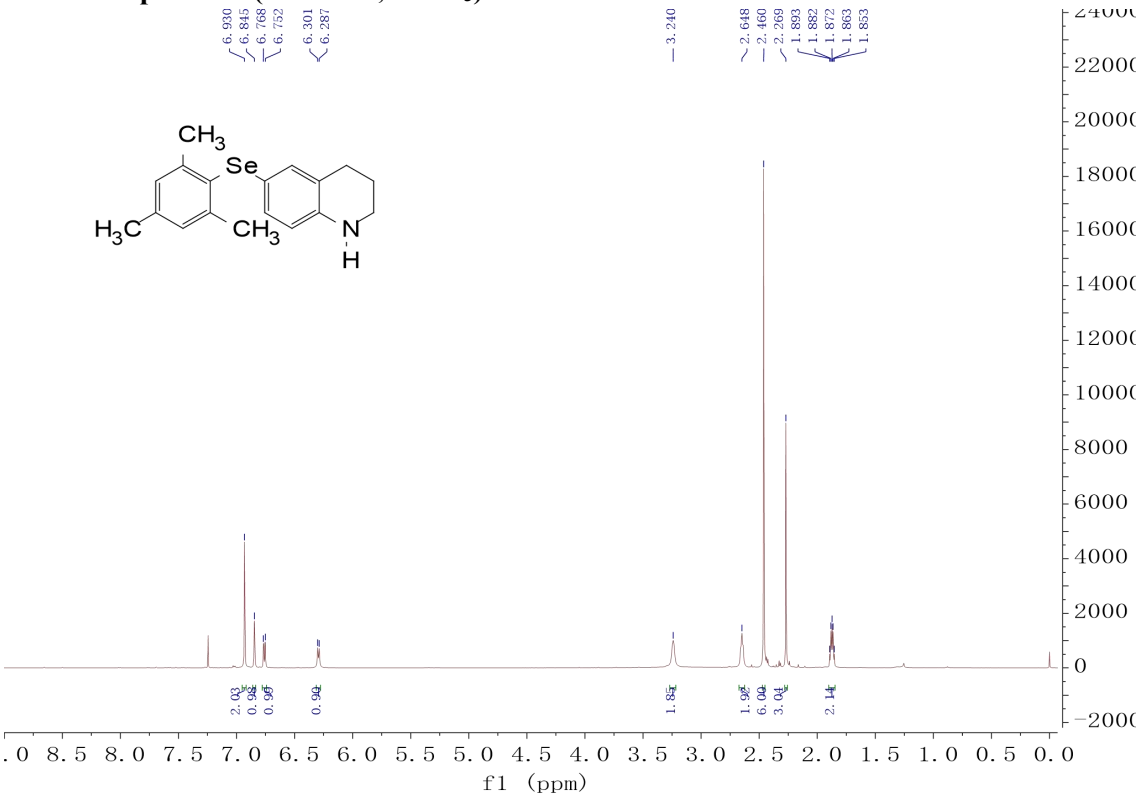
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4e



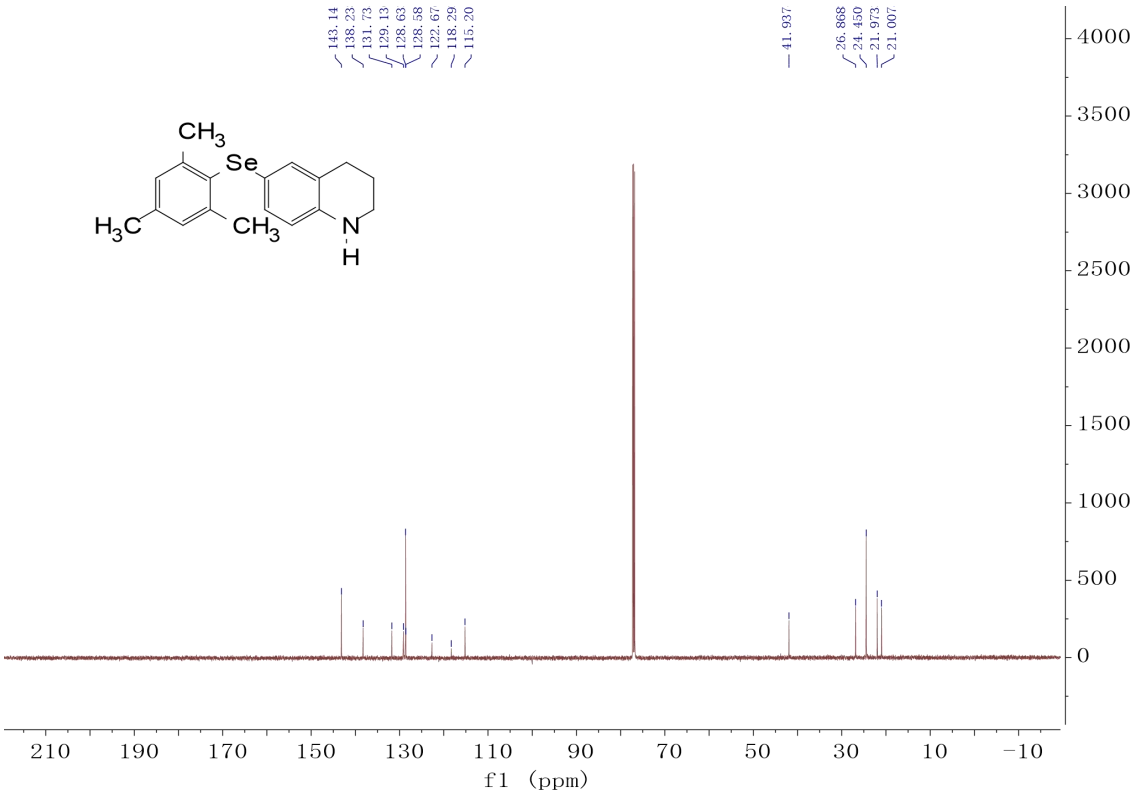
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4e



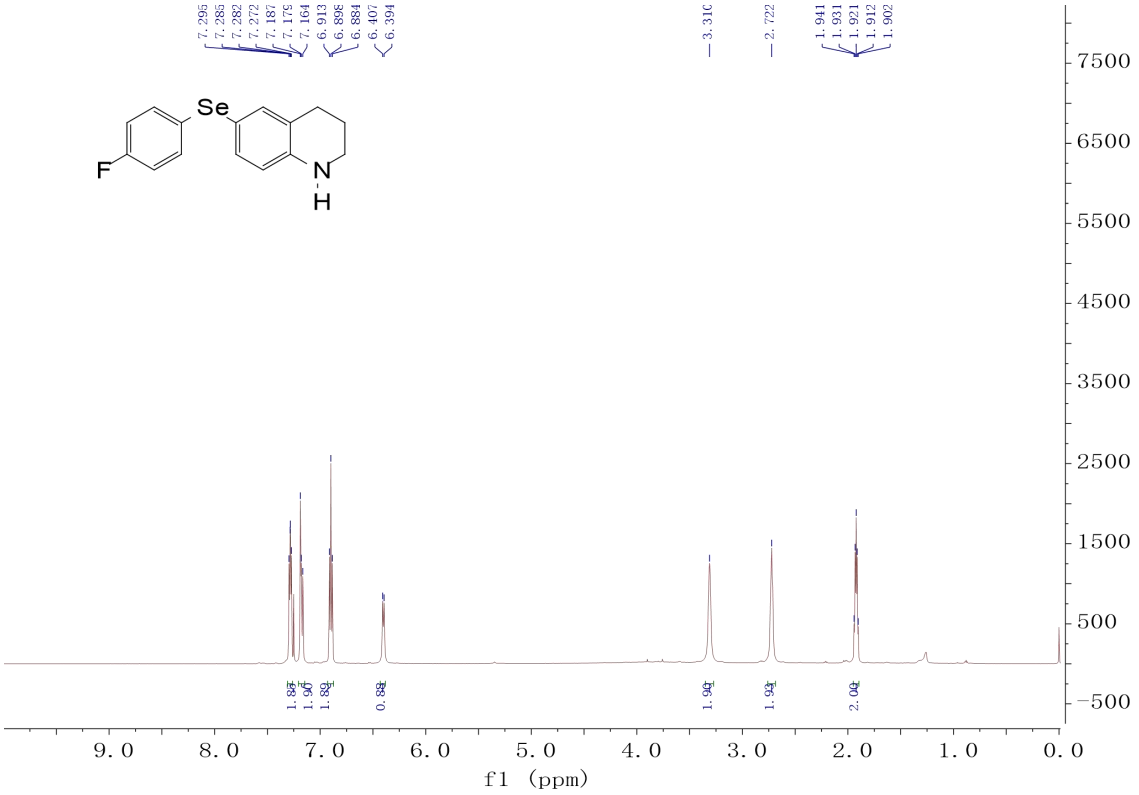
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4f



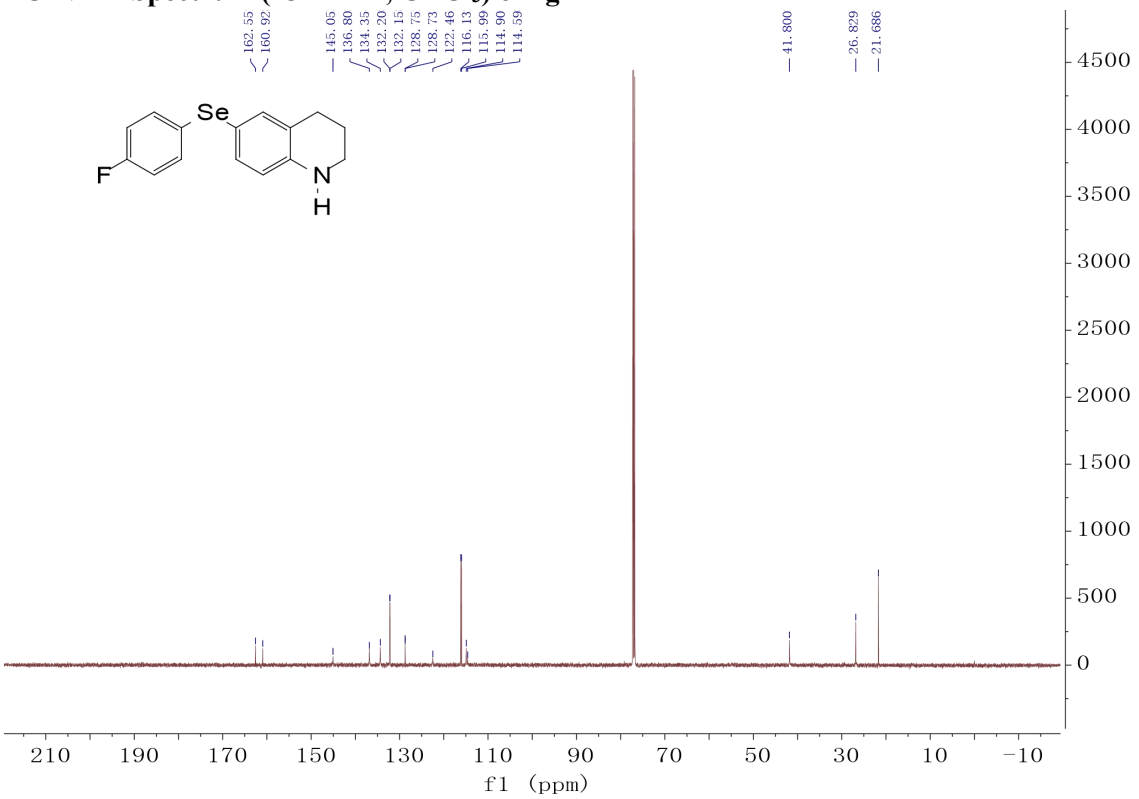
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4f



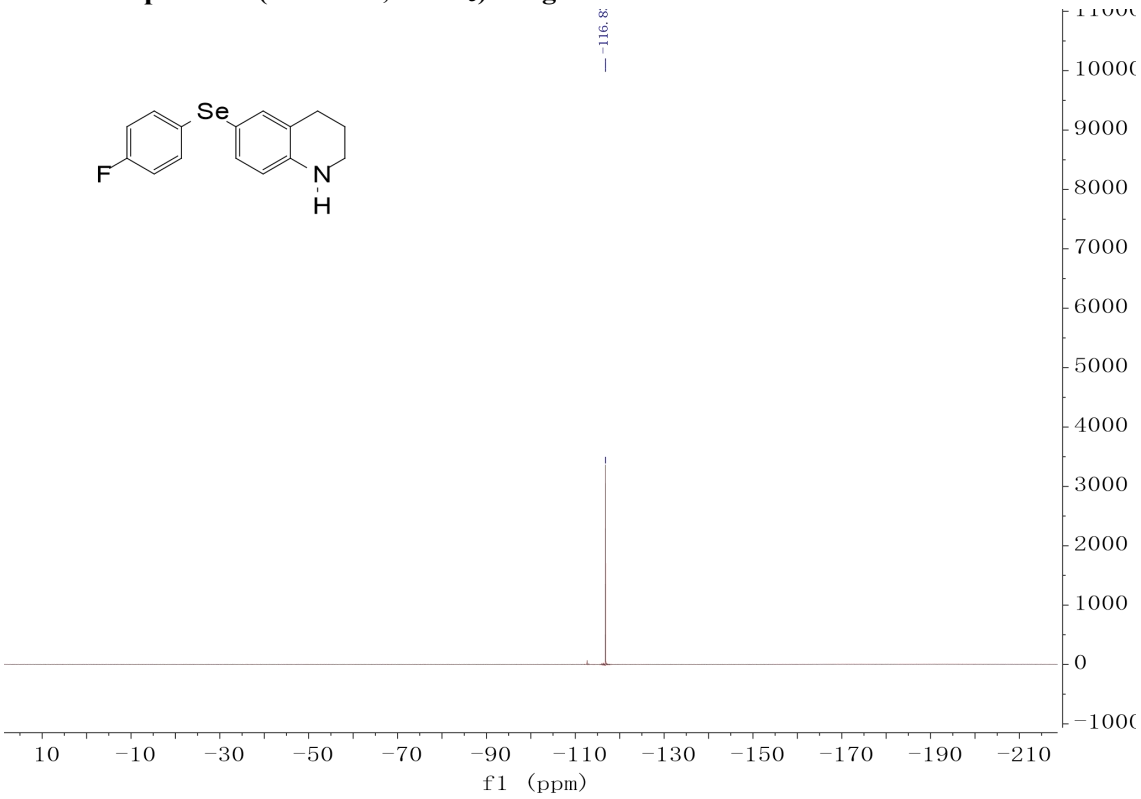
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4g



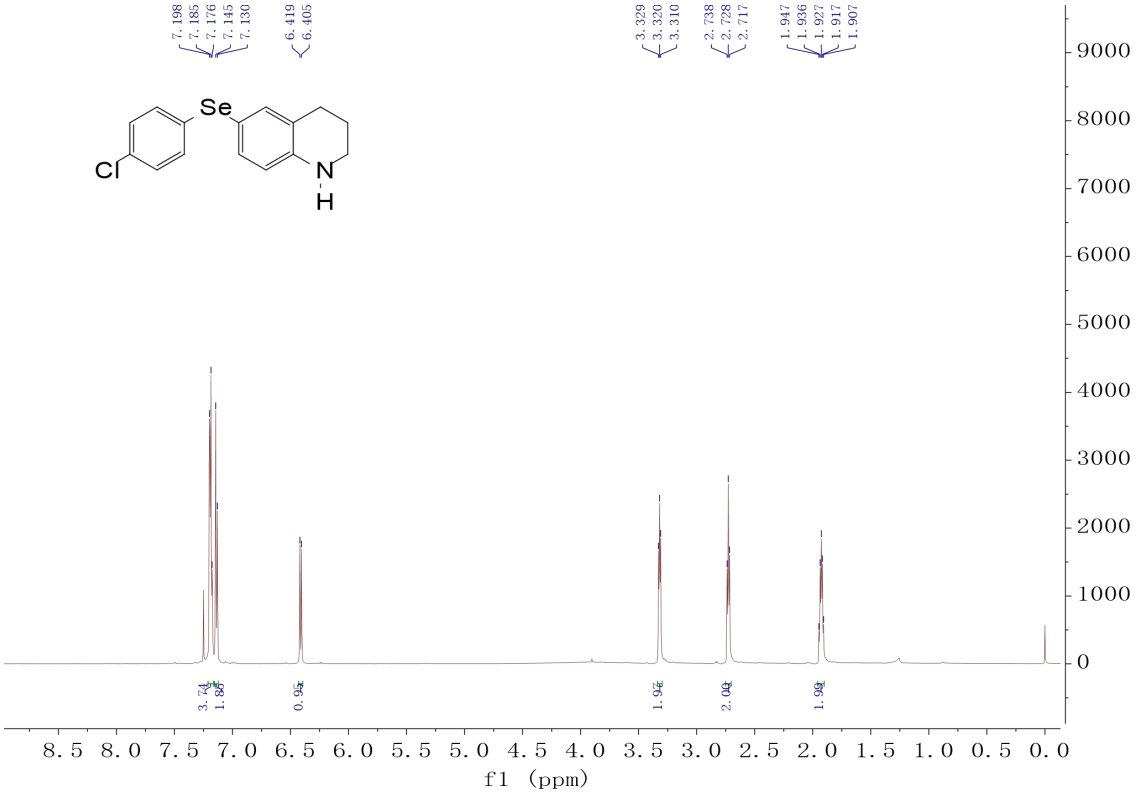
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4g



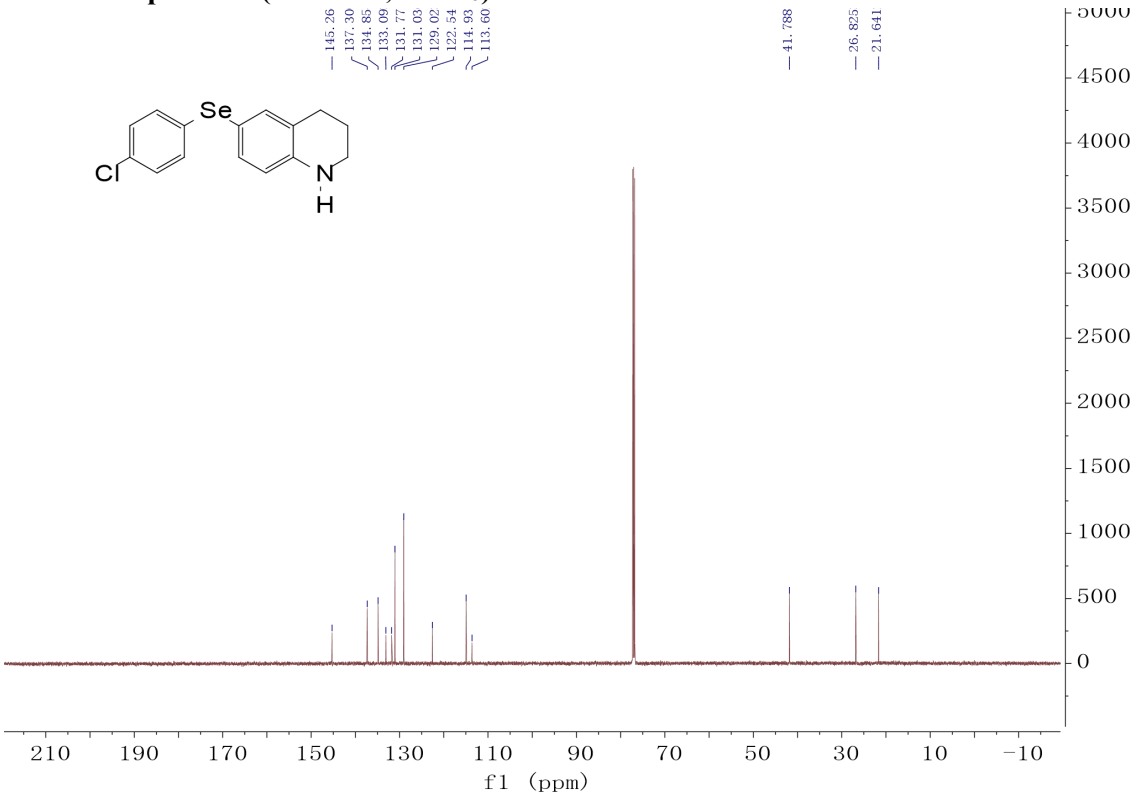
^{19}F-NMR Spectrum (565 MHz, $CDCl_3$) of 4g



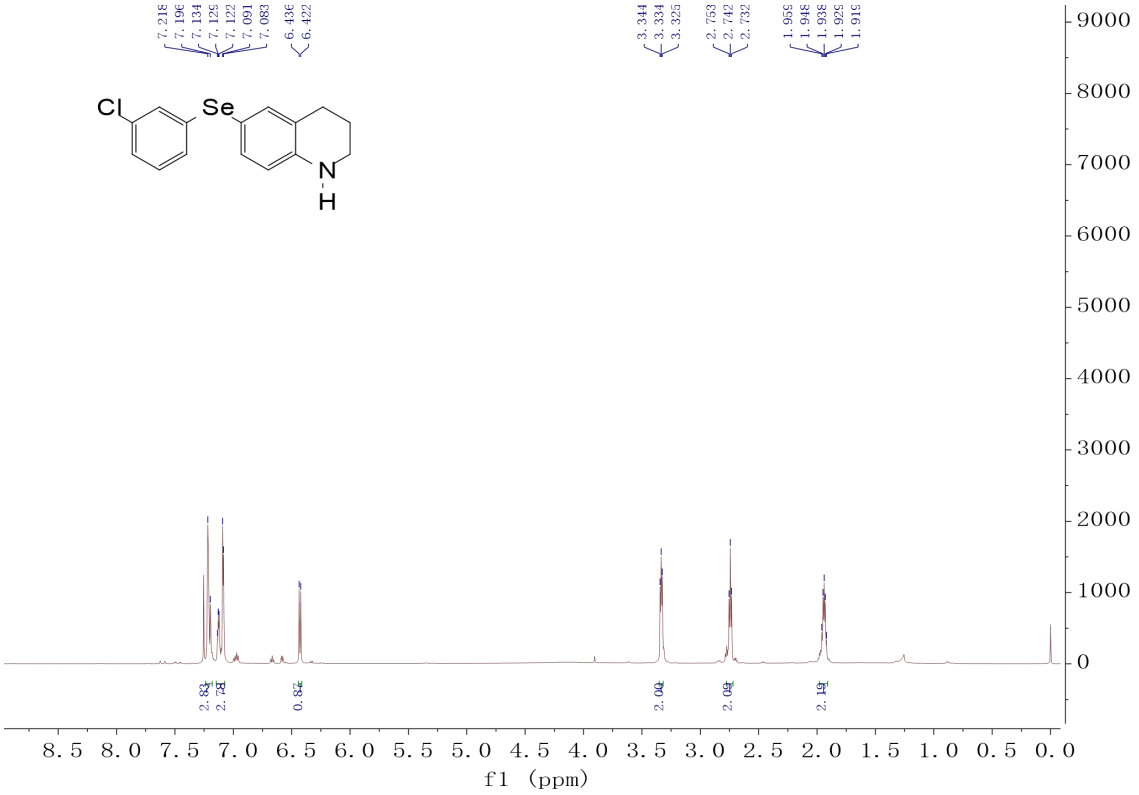
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4h



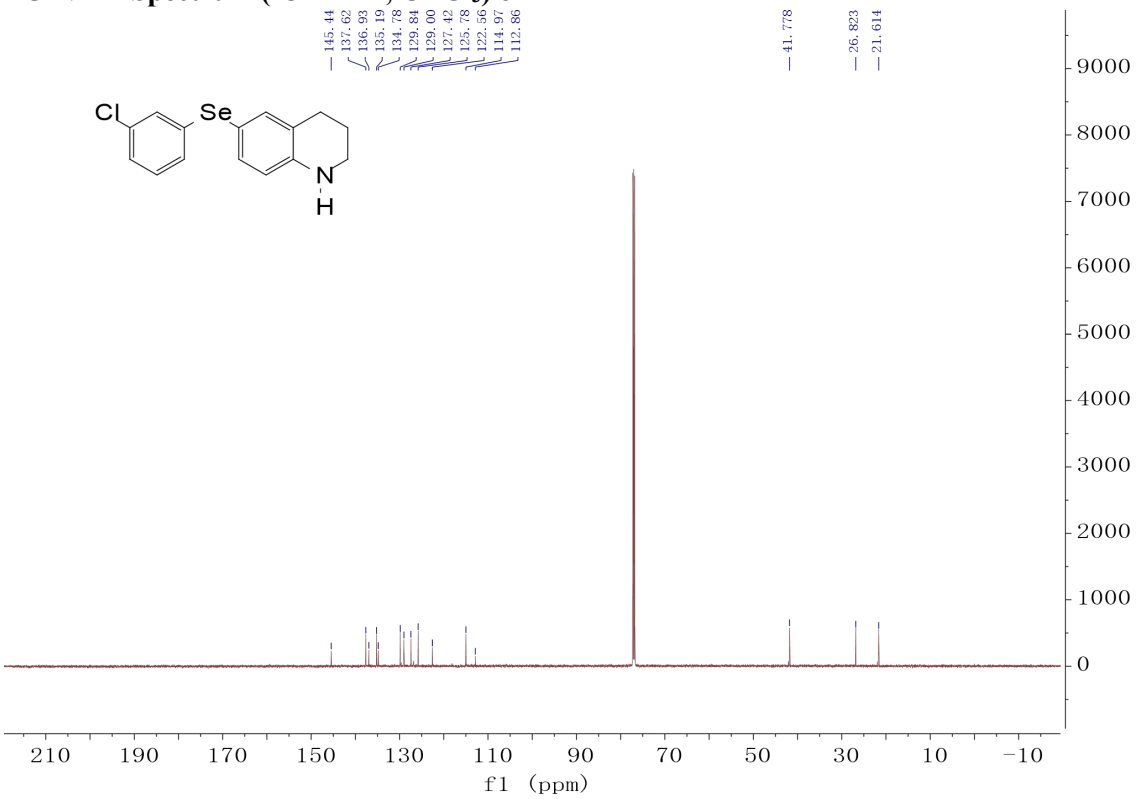
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4h



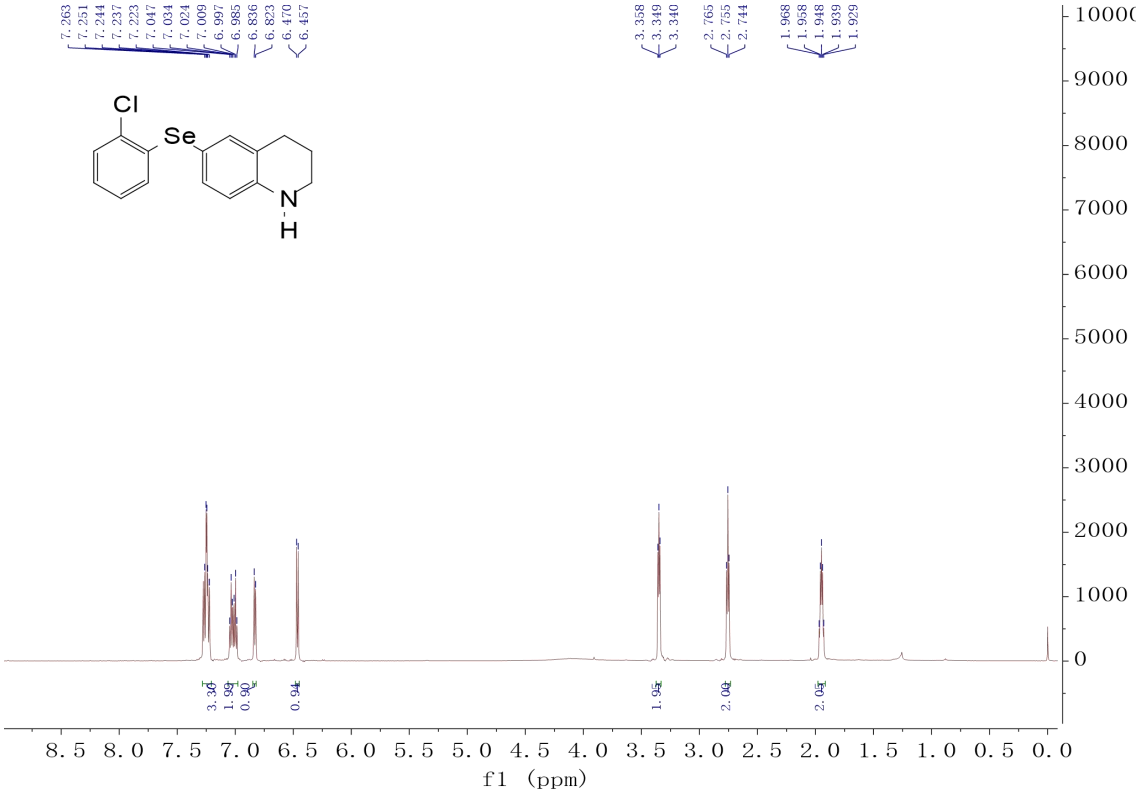
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4i



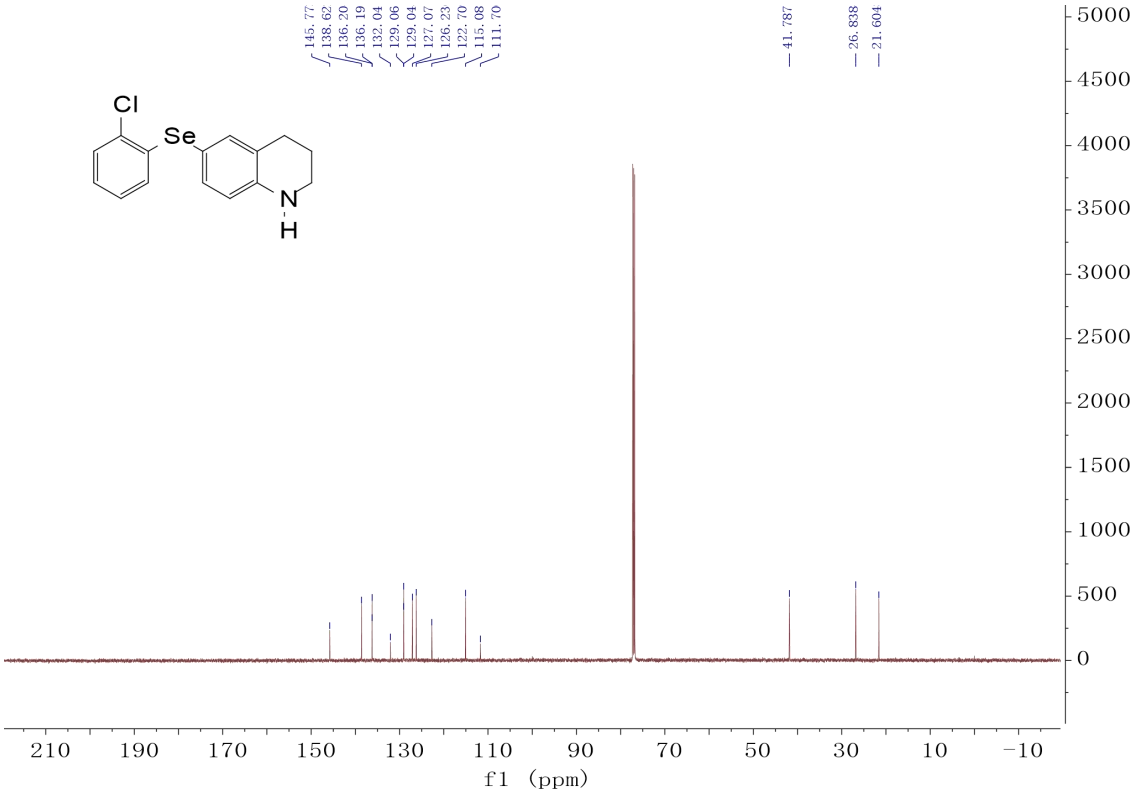
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4i



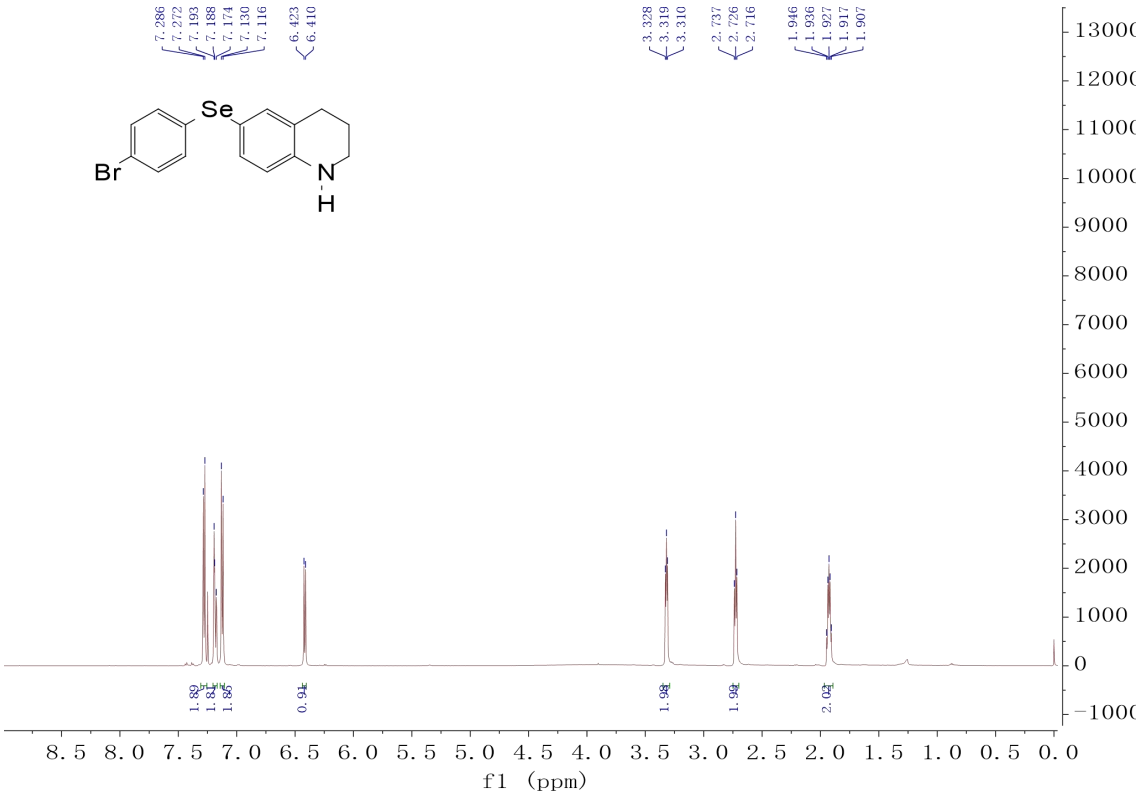
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4j



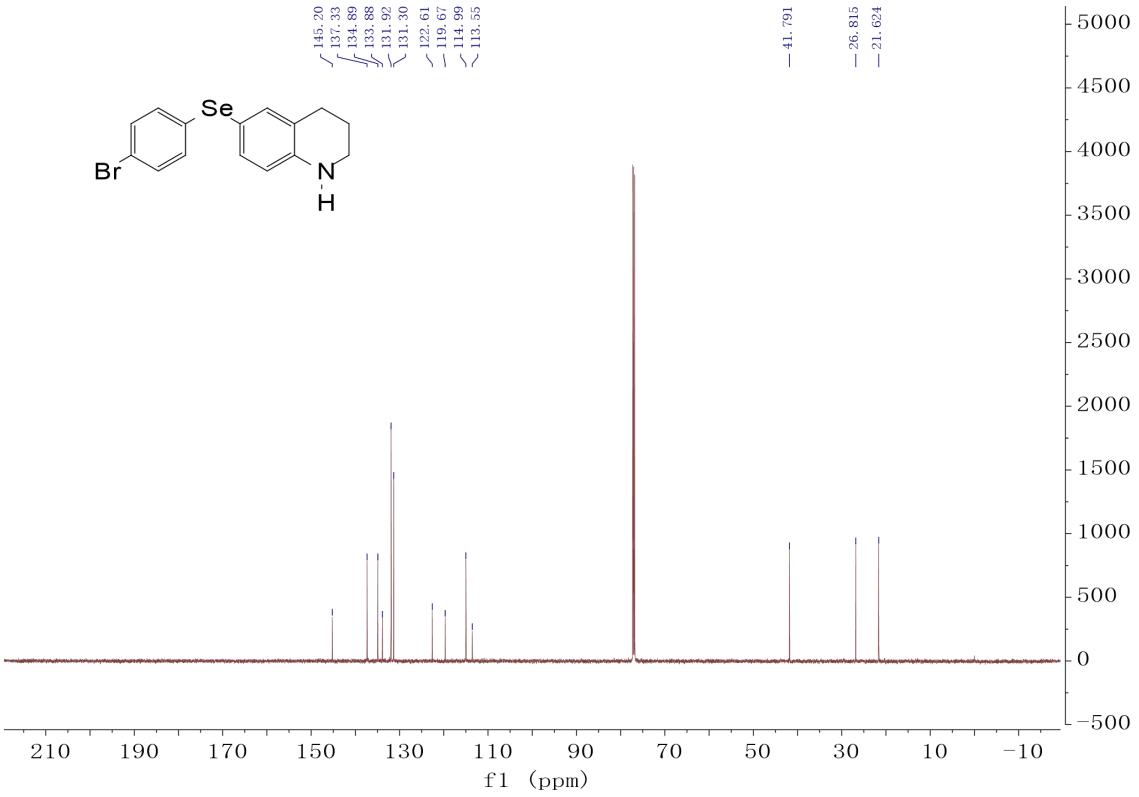
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4j



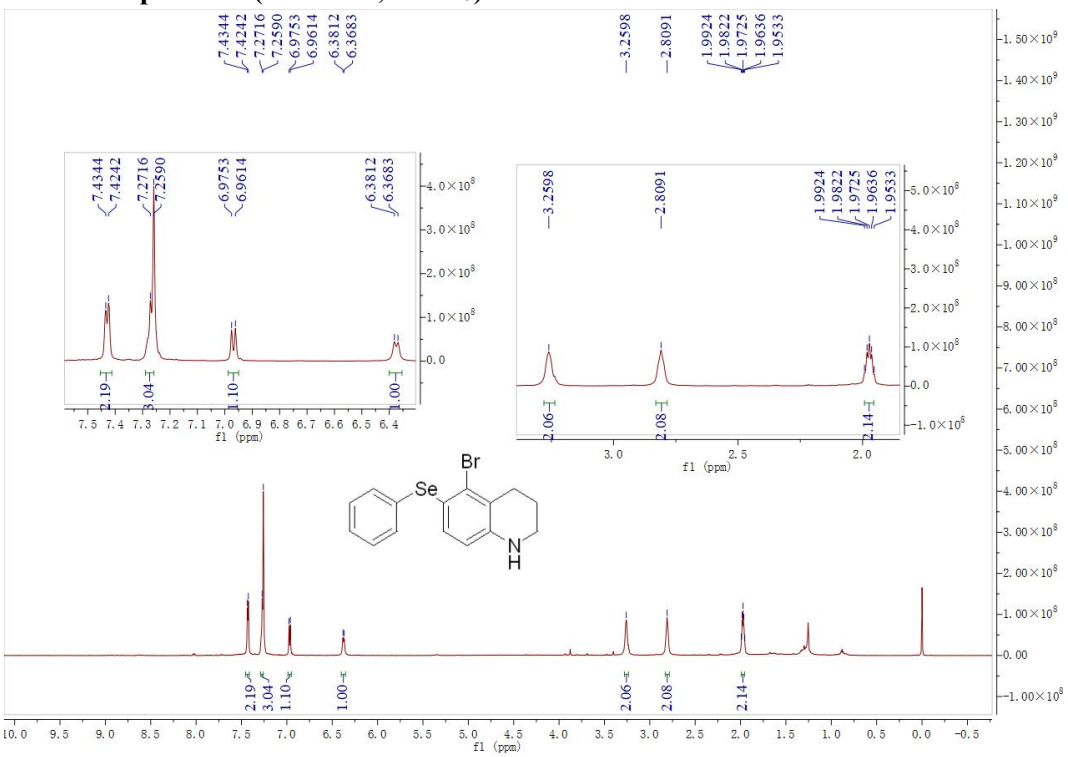
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4k



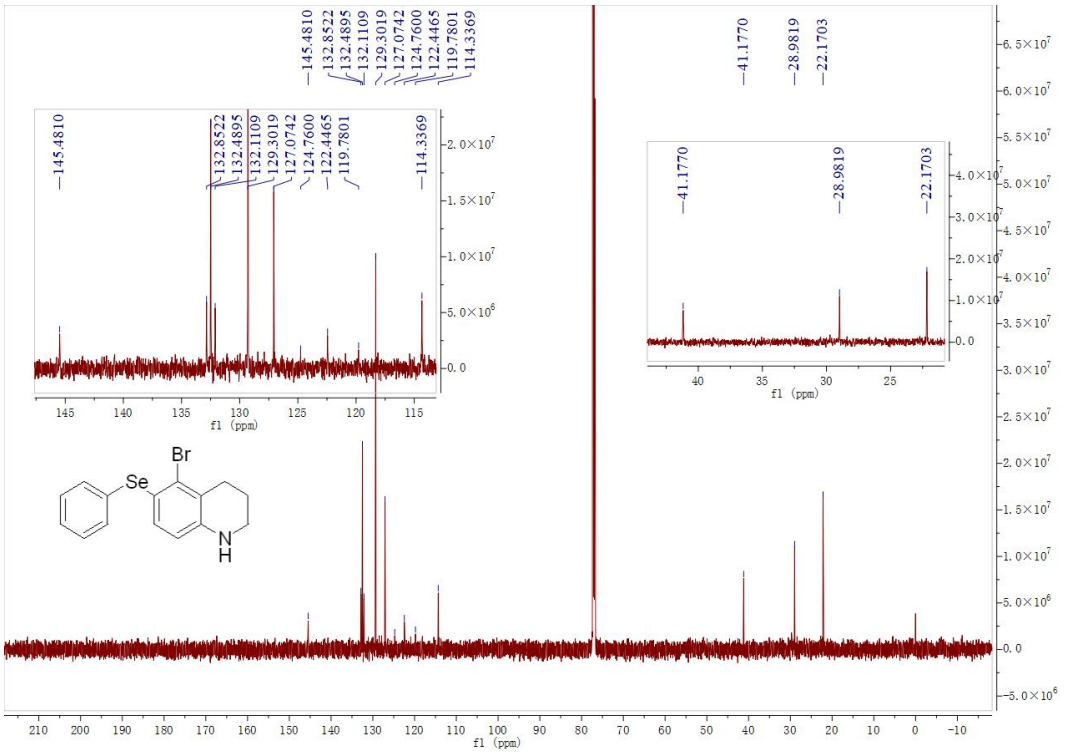
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4k



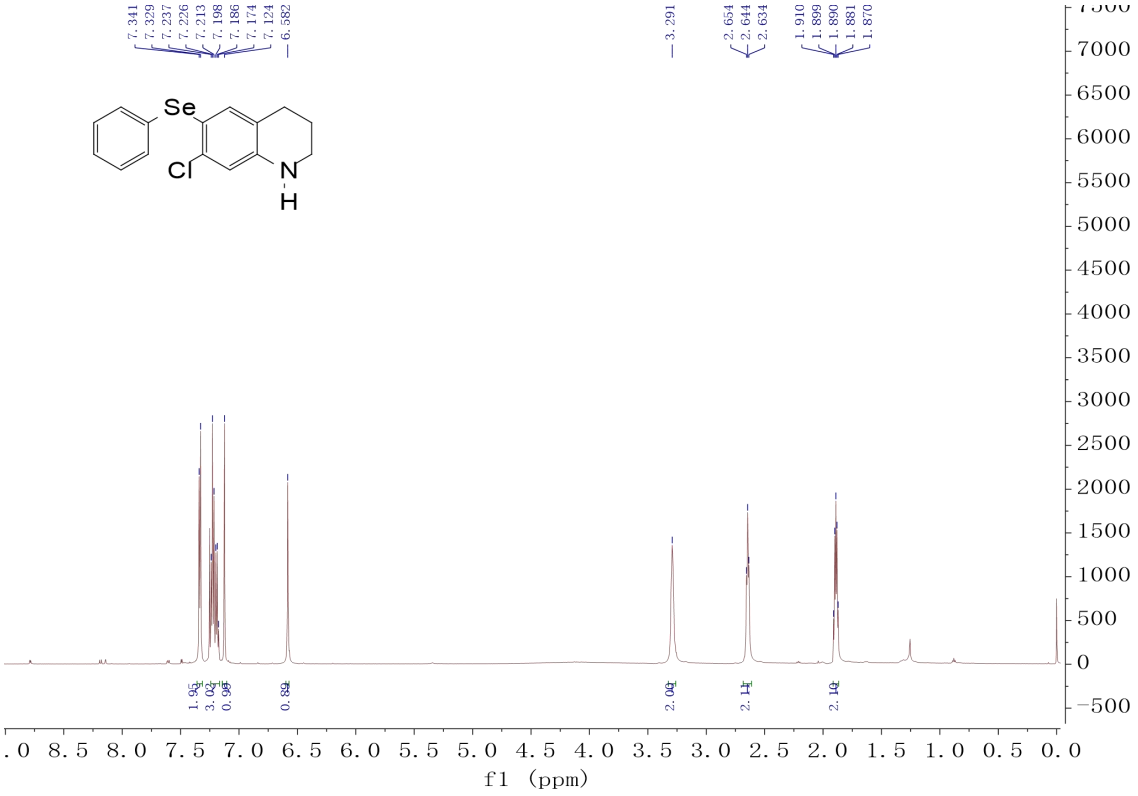
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4l



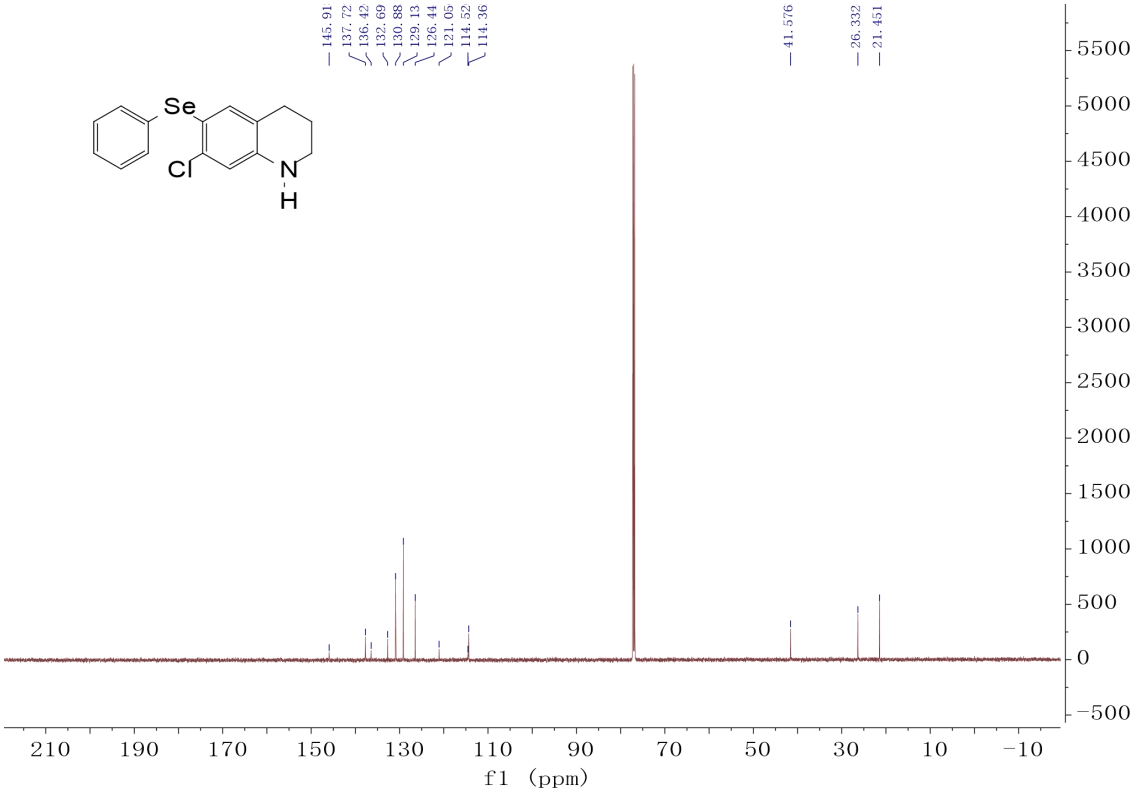
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4l



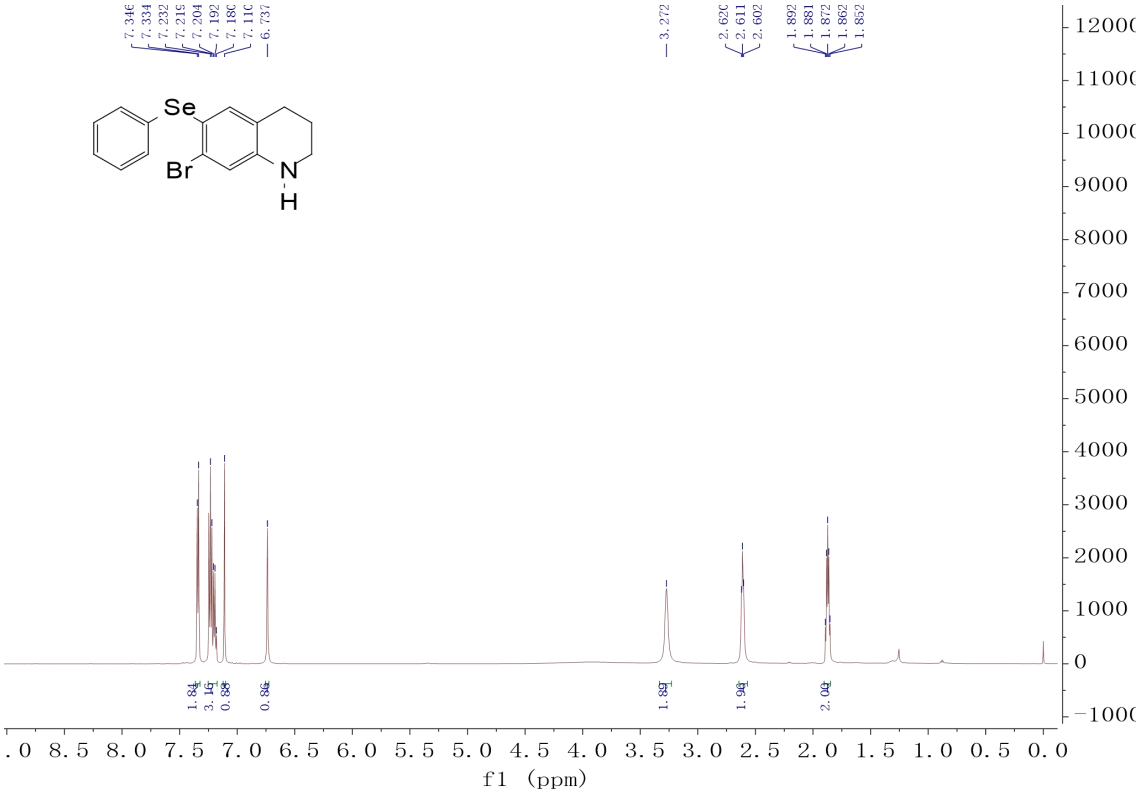
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4m



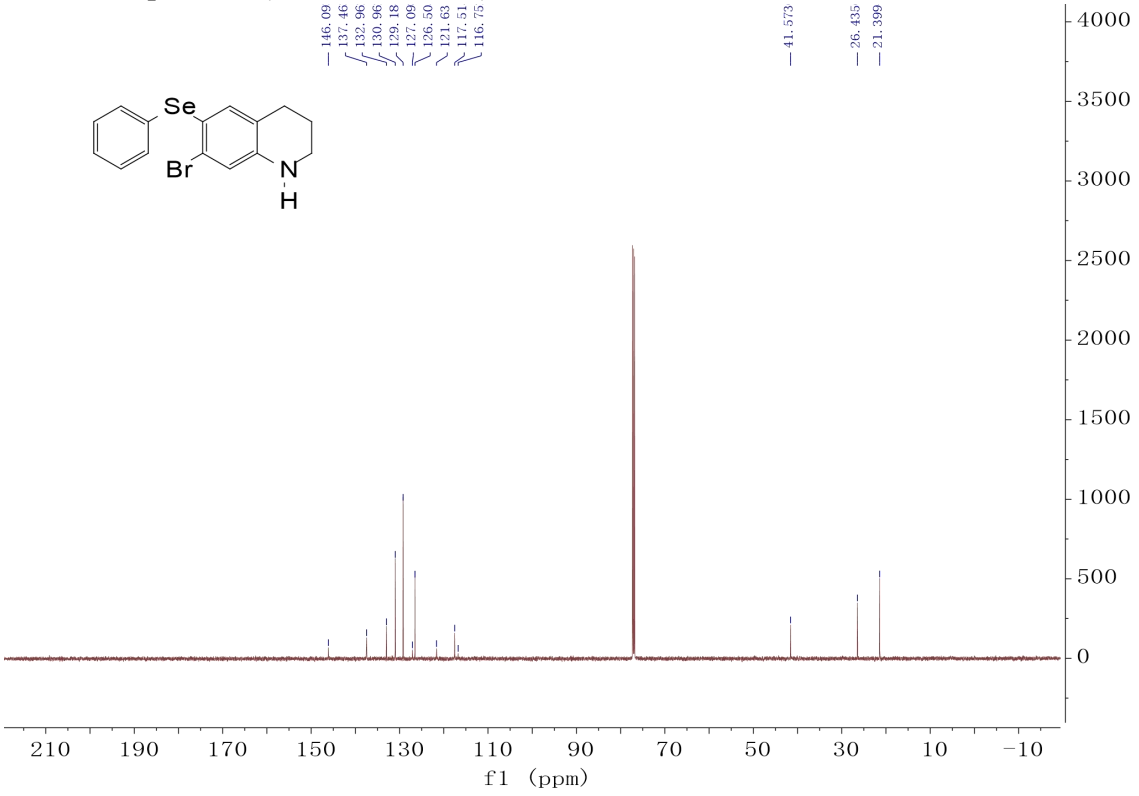
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4m



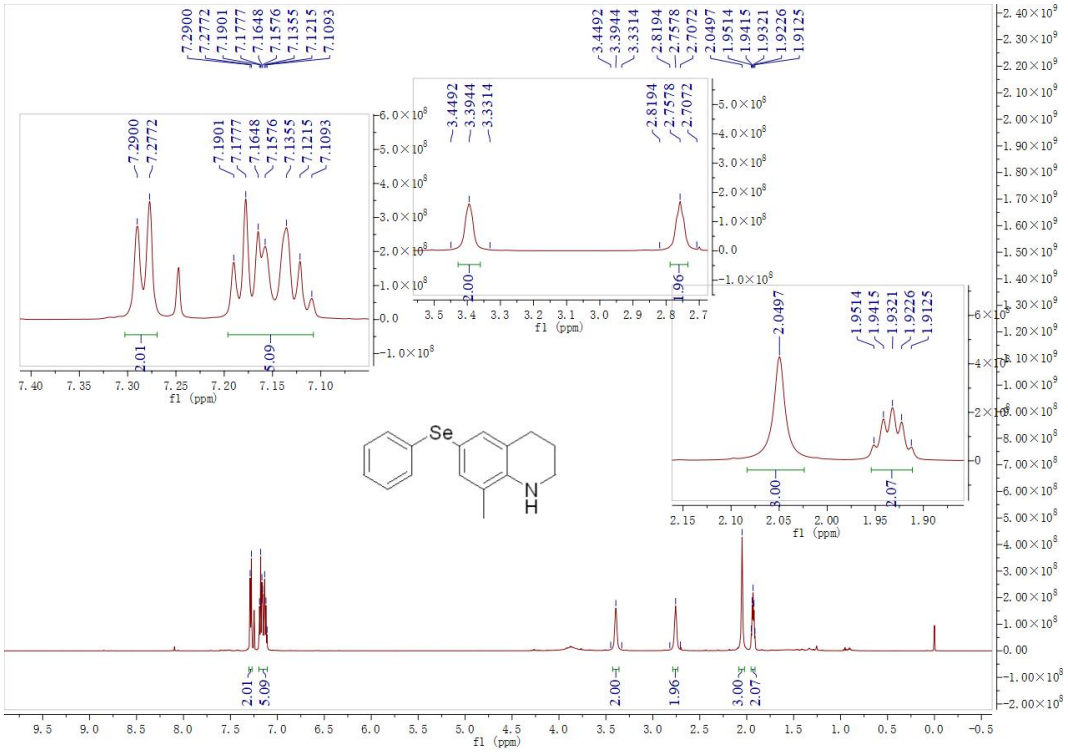
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4n



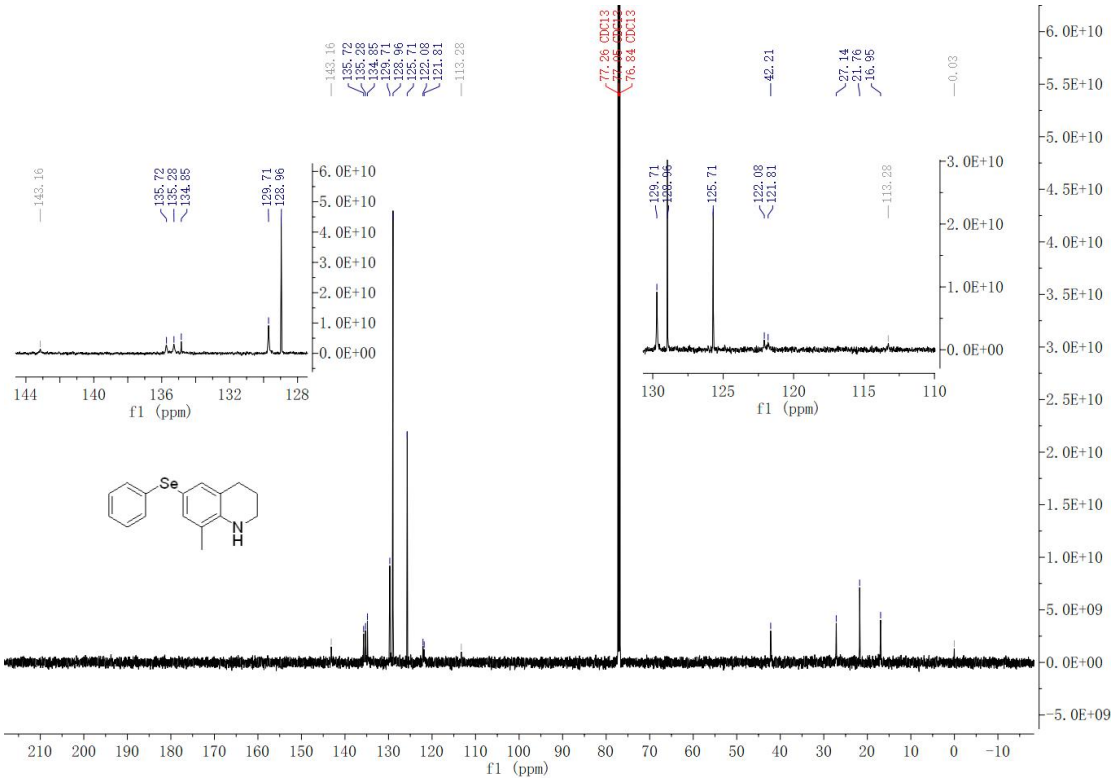
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4n



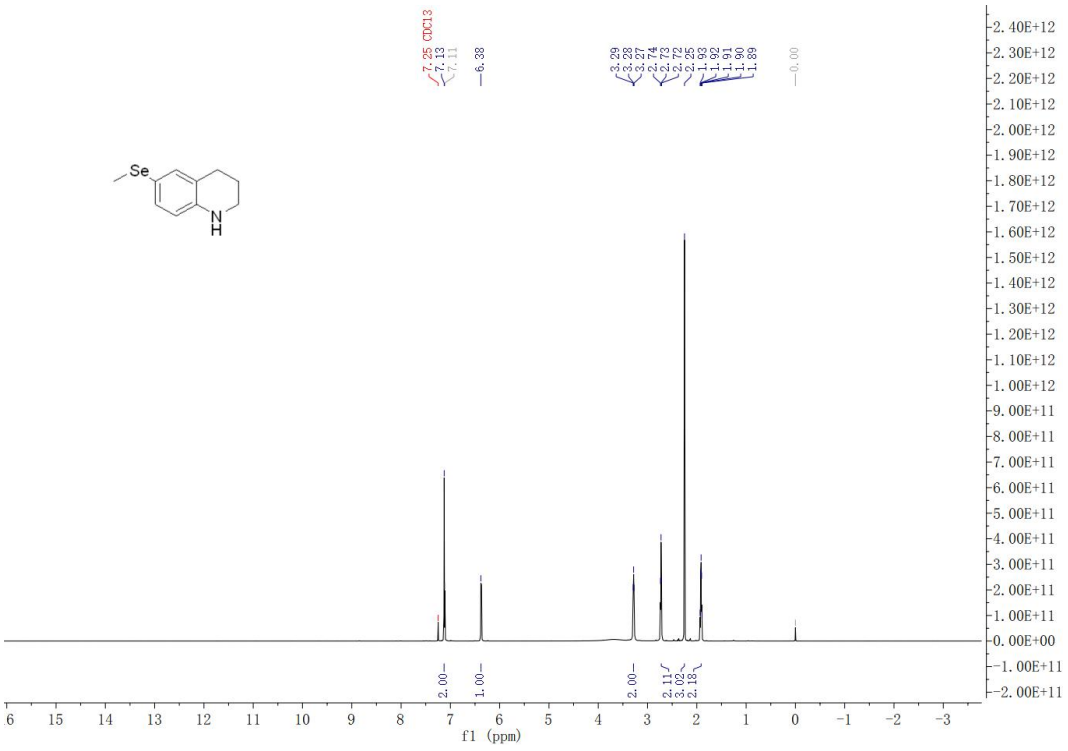
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4o



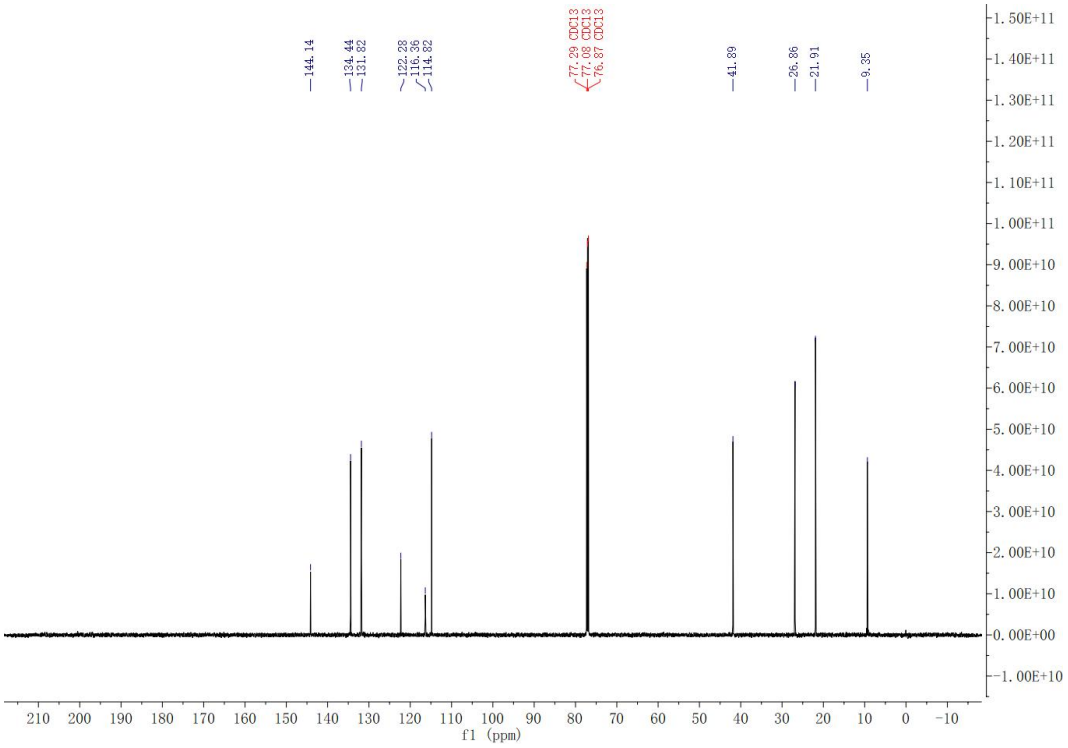
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4o



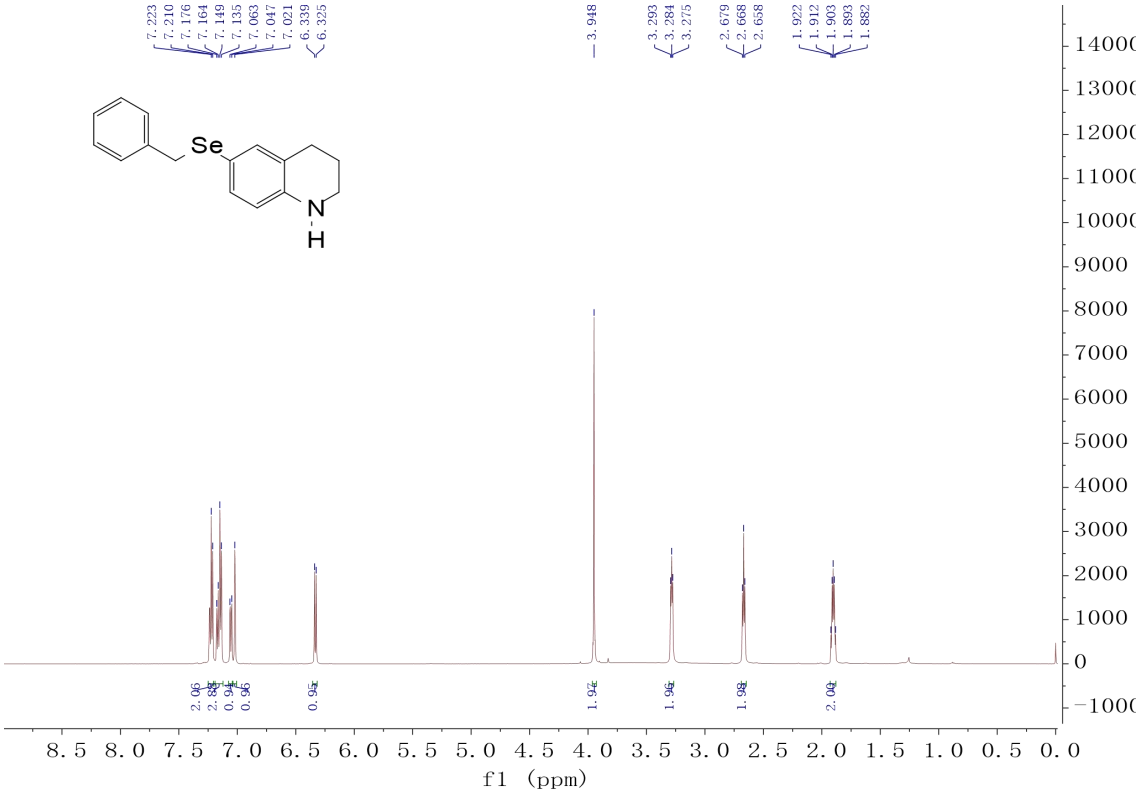
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4p



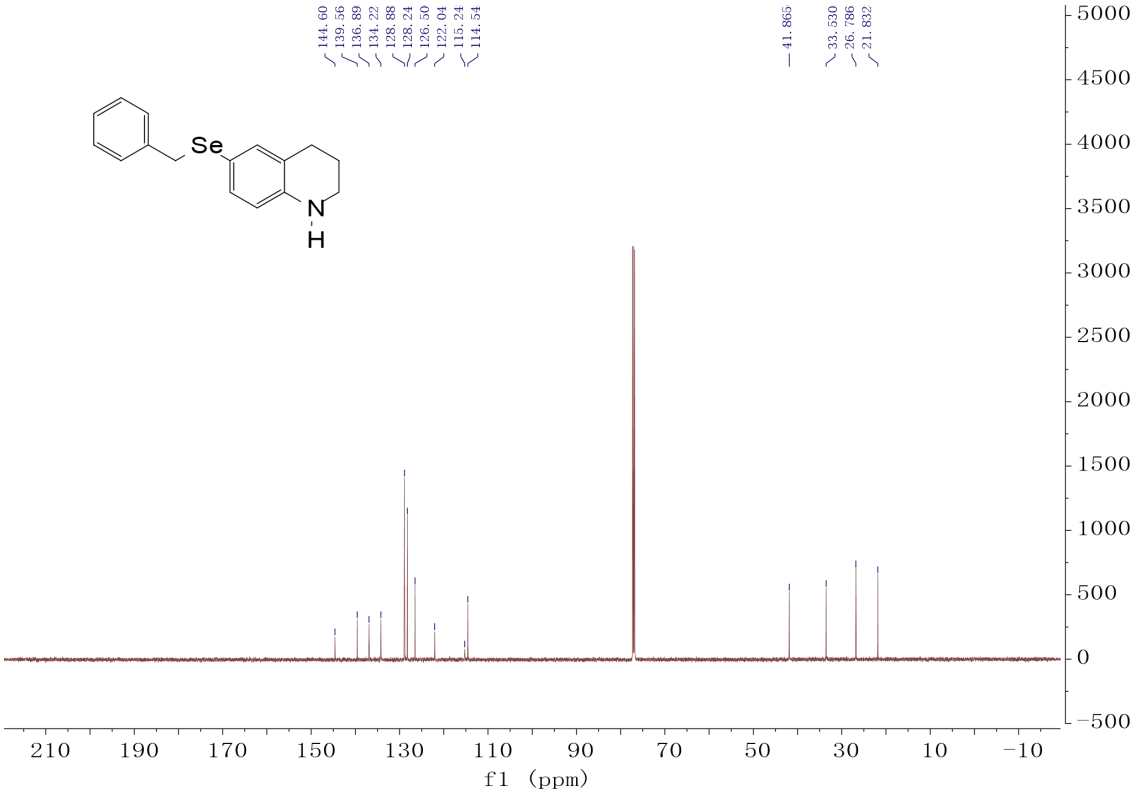
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4p



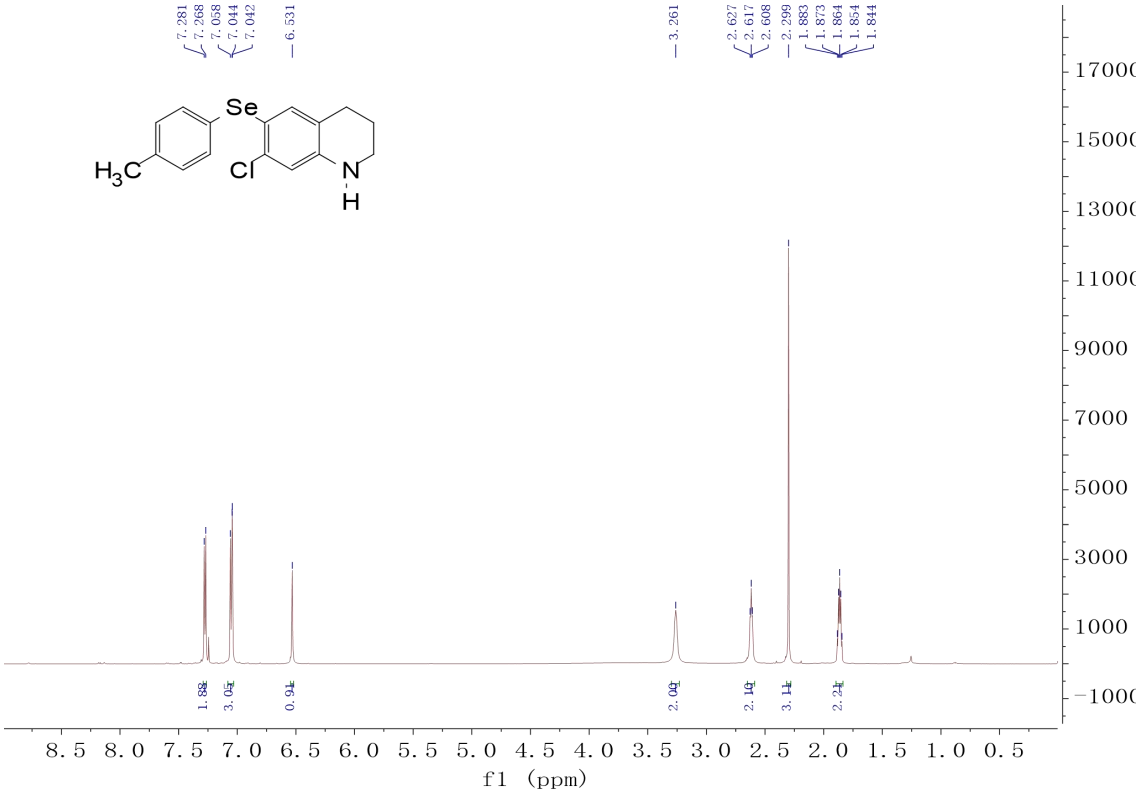
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4q



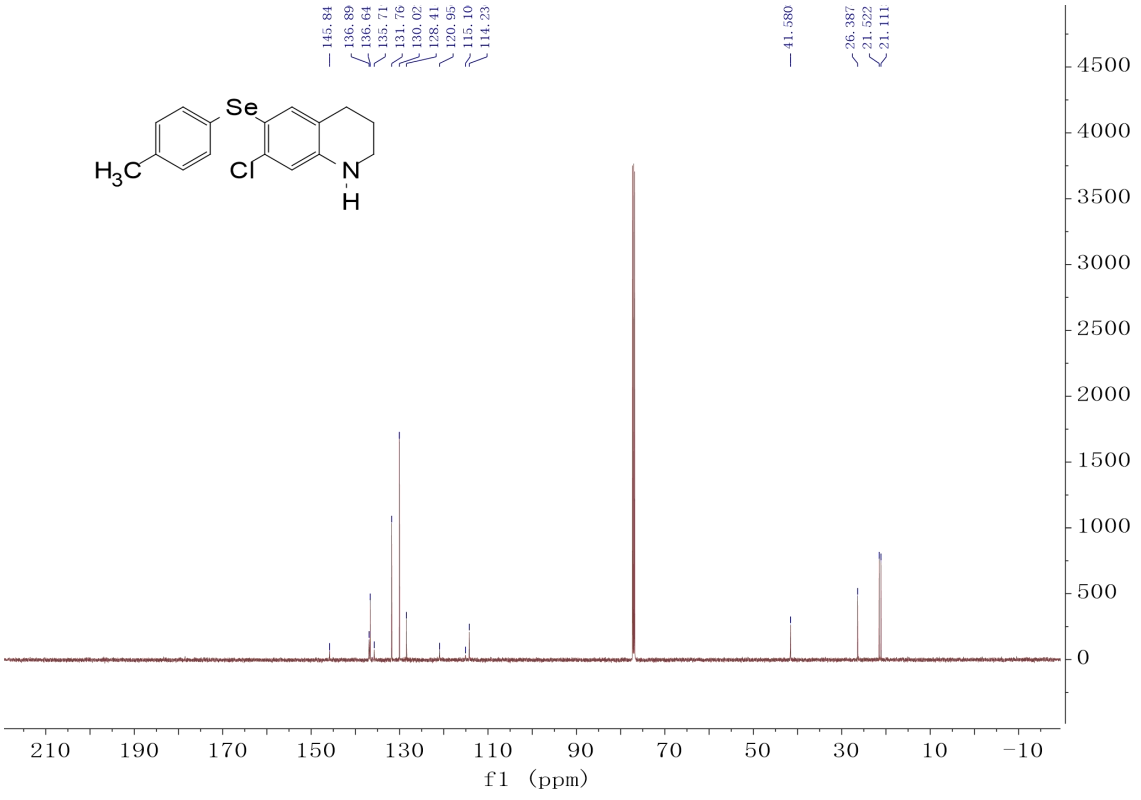
^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4q



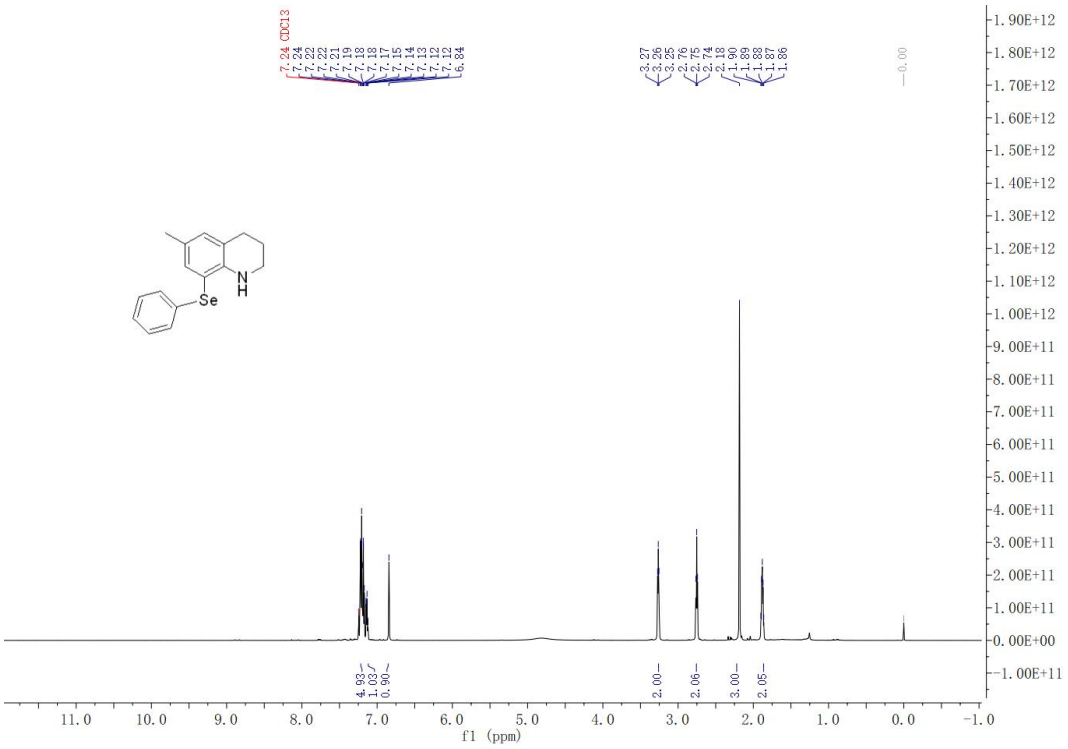
^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4r



^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4r



^{1}H-NMR Spectrum (600 MHz, $CDCl_3$) of 4a'



^{13}C-NMR Spectrum (151 MHz, $CDCl_3$) of 4a'