Supporting Information

Continuous-flow Electrosynthesis of Selenium-substituted Iminoisobenzofuran via Oxidative Cyclization of Olefinic amides and Diselenides

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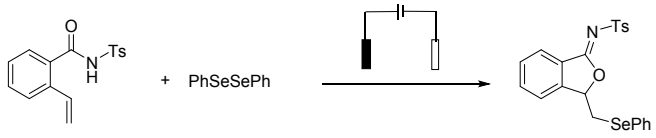
1.General information

Unless otherwise indicated, all the regents and solvents were purchased from commercial suppliers and used without any further purification. ^{1}H spectra were recorded in $CDCl_3$ or (Methyl sulfoxide)-d6 on 400MHz NMR spectrometers and resonances (•) are given in parts per million relatives to tetramethylsilane. Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q =quartet, p = penta, dd = doublet of doublets, dt = doublet of triplets, ddt = doublet of doublet of triplets, dtd = doublet of triplet of doublets, m = multiplet, br = broad), coupling constant (J) in Hertz (Hz), and integration. ^{13}C NMR were recorded at 100 MHz and chemical data for carbons are reported in parts per million (ppm, δ scale) downfield from tetramethylsilane and are referenced to the carbon resonance of the solvent. Column chromatography was generally performed on Silicycle silica gel (200-300 mesh). Analytical thin-layer chromatography (TLC) was performed on 0.2 mm coated silica gel plates (HSGF 254) and visualized the course of the reactions using a UV light (254 nm or 365 nm). High-resolution mass spectra (HRMS) were obtained on an Agilent mass spectrometer using ESI-TOF (electrosprayionization-time of flight).

2. Optimization of reaction conditions in electrolytic batch reactor

Table S1. Optimization of reaction conditions in electrolytic batch[a]



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

Entry	Solvent	Electrolyte	Electrode	I/mA	Yield (%)[b]
1	CH3CN/HFIP(4/1)	$LiClO_4$	C(+)/Pt(-)	15	74
2	CH_3CN/H_2O(4/1)	$LiClO_4$	C(+)/Pt(-)	15	20
3	CH_3CN/DCE(4/1)	$LiClO_4$	C(+)/Pt(-)	15	75
4	CH_3CN/CH_3OH(4/1)	$LiClO_4$	C(+)/Pt(-)	15	41
5	CH_3CN	$LiClO_4$	C(+)/Pt(-)	15	80
6	CH_3CN	$LiClO_4$	C(+)/Cu(-)	15	80
7	**CH_3CN**	**$LiClO_4$**	C(+)/Fe(-)	**15**	**80**
8	CH_3CN	$^nBu_4NBF_4$	C(+)/Fe(-)	15	78
9	CH_3CN	$^nBu_4NI$	C(+)/Fe(-)	15	57
10	CH_3CN	$^nBu_4NOAc$	C(+)/Fe(-)	15	33
11	CH_3CN	$LiClO_4$	C(+)/Fe(-)	10	61
12	CH_3CN	$LiClO_4$	C(+)/Fe(-)	5	44
13	CH_3CN	$LiClO_4$	C(+)/Fe(-)	20	63
14	CH_3CN	$LiClO_4$	C(+)/Fe(-)	0	0

[a] Optimization of the reaction conditions. standard conditions: **1a** (0.2 mmol), **2a** (0.1 mmol), $LiClO_4$ (2.0 eq.), CH_3CN = 8 mL, room temperature, 0.5 h, undivided cell. [b] isolated yield

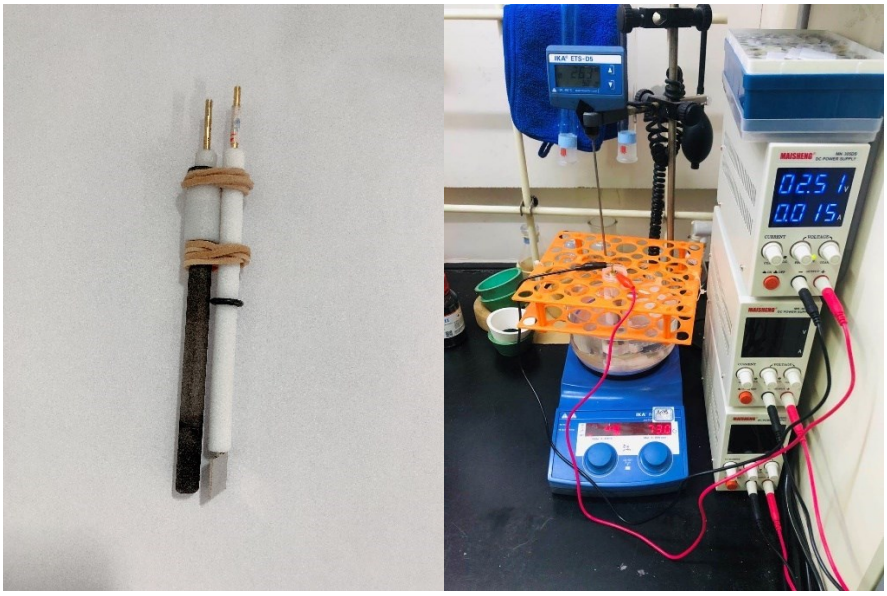


Fig. S1 electrodes and batch reactor

graphite rod anode：Φ 6 mm; iron plate cathode: 10 mm×10 mm×1 mm.

3. Electrochemistry continuous flow system

3.1 The Asia Flux module microreactor

Reactions are performed in a novel flow electrochemistry system (the Asia Flux module). This system includes pumps, flow cell, working prototype cell holder and control module. The flow cell consists of pairs of electrodes separated by a gasket. Electrode materials include stainless steel, carbon, magnesium and stainless steel with a platinum coating (also discussing copper, tin, and titanium) and the cell can be divided by a membrane to isolate the chemistry at the anode from the chemistry at the cathode. The working prototype cell holder holds the electrodes in place, enables quick fluidic and electrical connections and locates in the syrris range of temperature controllers (e.g. The Asia Chip Climate Controller). The control modulecontrols the current/voltage applied to the electrodes, displays the temperature and locates the holder on the front of the module for room temperature applications.

Fig. S2 the picture of the Asia Flux Module

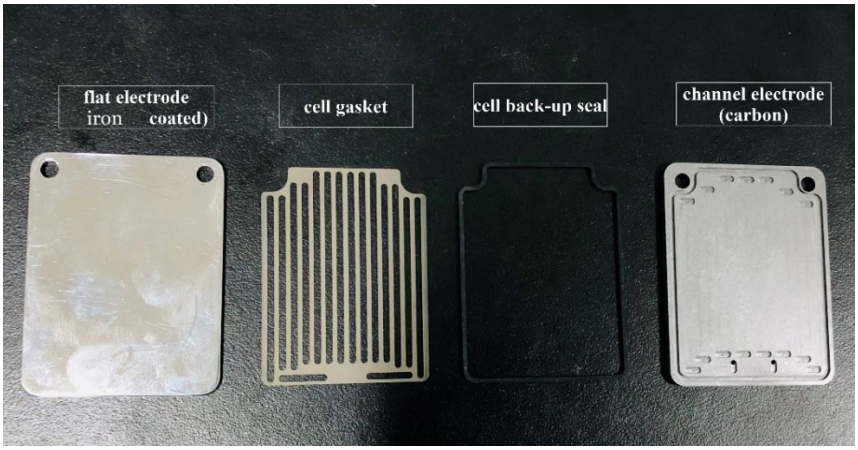


Fig. S3 the diagram of continuous-flow electrochemical reactor

3.2 The homemade microreactor

This system includes pumps, flow cell and working prototype cell holder. The flow cell consists of pairs of electrodes separated by a gasket. Electrode materials include carbon anode (50 mm x 50 mm x 0.5 mm), iron plate cathode (50 mm x 50 mm x 1 mm). The volume of the reactor is 1 ml.

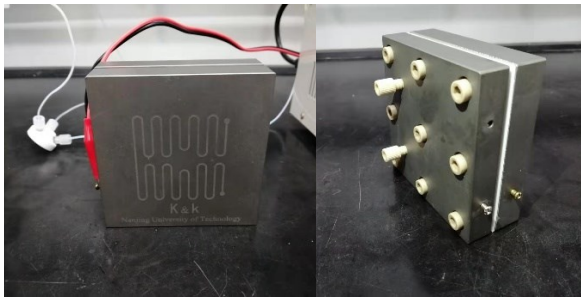


Fig. S4 the picture of the homemade microreactor

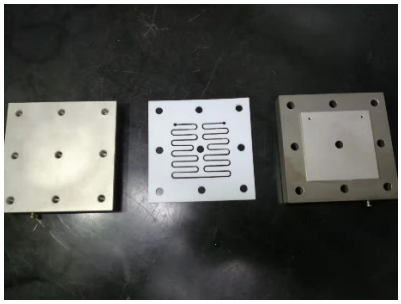
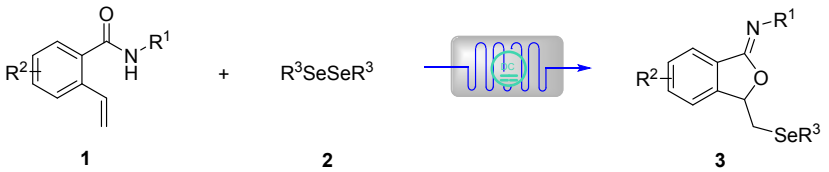


Fig. S5 the diagram of homemade electrochemical reactor

4. General procedure for the synthesis of product 3 in electrochemistry continuous flow system



1 **2** **3**

First, assembled and installed the flow electrochemistry device, the anode was carbon plate, cathode was iron plate and the cell volume were 225 μL. Second, in a 50 mL beaker the corresponding substrates **1a** (0.2 mmol, 1.0 equiv.), **2a** (0.1 mmol, 0.5 equiv.) and $LiClO_4$ (0.1 mmol, 0.5 equiv.) were dissolved in 8 mL CH_3CN under the air. Then adjustment the current

into 15 mA at the control module and the reaction mixture was pumped into the flow cell via a syringe. The flow rate was 225 μL/min and residence time 1 minute. The outflow of the reaction mixture was collected then mixture was washed by 5 mL H_2O and extracted with ethyl acetate (10 mL × 3). The organic layer was dried over anhydrous sodium sulfate, and solvent was removed under vacuum. The resulting residue was purified by flash column chromatography using n-hexane as the eluent to afford the product in good yield.

5. Procedure for cyclic voltammetry (CV)

Cyclic voltammetry was performed in a three-electrode cell connected to a schlenk line under nitrogen at room temperature. The working electrode was a steady glassy carbon disk electrode, the counter electrode a platinum wire. The reference was an Ag/AgCl electrode submerged in saturated aqueous KCl solution. (1) Solvent (MeCN, 8 mL) containing $LiClO_4$ (0.1 mmol) were poured into the electrochemical cell in cyclic voltammetry experiments. The scan rate was 0.10 V/s, ranging from 0 V to 2.5 V. (2) **1a** (0.2 mmol) and solvent (MeCN, 8 mL) containing $LiClO_4$ (0.1 mmol) were poured into the electrochemical cell in cyclic voltammetry experiments. The scan rate was 0.10 V/s, ranging from 0V to 2.5 V. (3) **2a** (0.1 mmol) and solvent (MeCN, 8 mL) containing $LiClO_4$ (0.1 mmol) were poured into the electrochemical cell in cyclic voltammetry experiments. The scan rate was 0.10 V/s, ranging from 0V to 2.5 V.

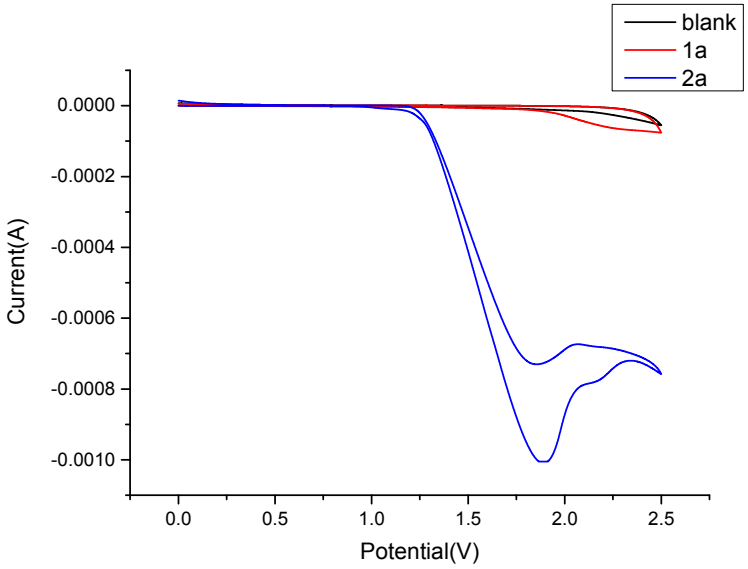


Fig. S6 Cyclic voltammogram: (1) blank; (2) **1a** 0.2 mmol; (3) **2a** 0.1 mmol.

6. X-ray crystallography structure of compound 3w

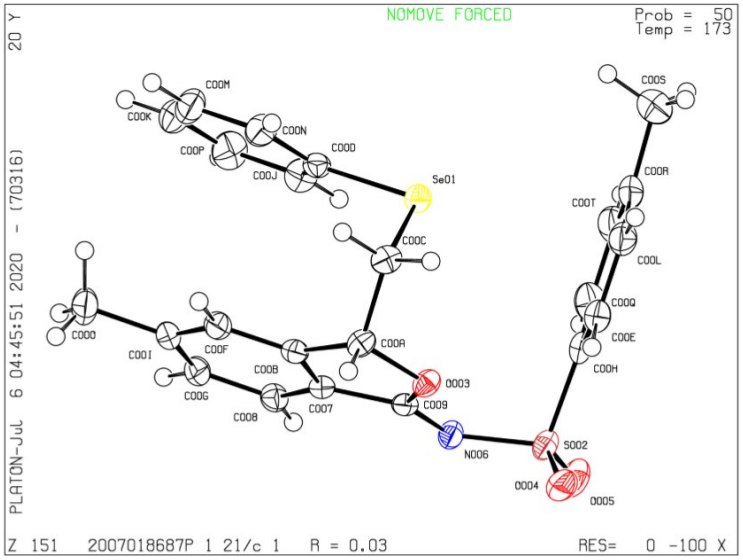
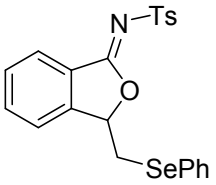
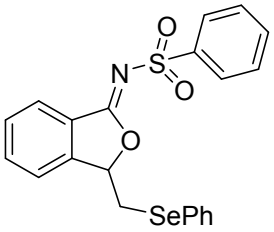


Fig. S7 X-ray structure of **3w**

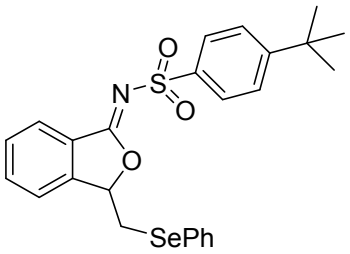
7. Characterization Data of 3



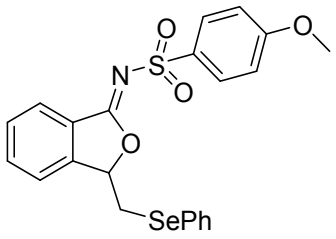
(Z)-4-methyl-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3a**) white solid (78.5 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 86% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.91 (d, J = 8.4 Hz, 2H), 7.82 (d, J = 6.4 Hz, 1H), 7.45 – 7.27 (m, 5H), 7.24 – 7.10 (m, 5H), 5.79 (dd, J = 6.7, 4.7 Hz, 1H), 3.31 (dd, J = 13.3, 4.7 Hz, 1H), 3.13 (dd, J = 13.3, 6.7 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 165.99, 145.51, 142.43, 137.37, 133.18, 132.80, 128.81, 128.29, 128.17, 127.57, 126.92, 126.83, 124.46, 121.14, 85.10, 30.25, 20.57. HRMS (TOF) m/z $[M + H]^+$ Calcd for $C_{22}H_{20}NO_3SSe^+$ 458.0324 found 458.0347.



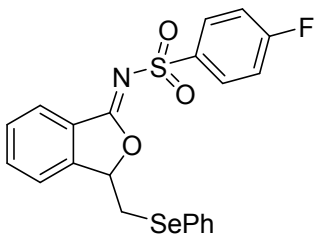
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide(**3b**) white solid (71.8 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 85% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.14 – 8.07 (m, 2H), 7.91 (d, J = 7.1 Hz, 1H), 7.60 – 7.47 (m, 5H), 7.44 – 7.41 (m, 1H), 7.39 – 7.35 (m, 2H), 7.26 (d, J = 3.8 Hz, 1H), 7.25 – 7.21 (m, 1H), 7.21 – 7.18 (m, 1H), 5.87 (dd, J = 6.7, 4.6 Hz, 1H), 3.38 (dd, J = 13.4, 4.6 Hz, 1H), 3.20 (dd, J = 13.3, 6.7 Hz, 1H). ^{13}C NMR (101 MHz, Chloroform-d) δ 167.26, 146.58, 141.29, 134.29, 133.83, 132.68, 129.86, 129.32, 129.27, 128.60, 128.52, 127.97, 127.75, 125.50, 122.19, 86.21, 31.21. HRMS (TOF) m/z $[M + H]^+$ Calcd for $C_{21}H_{18}NO_3SSe^+$ 444.0167 found 444.0158.



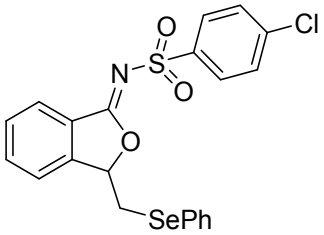
(Z)-4-(tert-butyl)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3c**) white solid (85.7 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 86% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.99 – 7.93 (m, 2H), 7.83 (d, J = 6.1 Hz, 1H), 7.47 – 7.38 (m, 4H), 7.35 – 7.27 (m, 3H), 7.19 – 7.11 (m, 3H), 5.79 (dd, J = 6.5, 4.8 Hz, 1H), 3.29 (dd, J = 13.3, 4.7 Hz, 1H), 3.13 (dd, J = 13.3, 6.7 Hz, 1H), 1.26 (s, 9H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.00, 155.40, 145.52, 137.25, 133.14, 132.85, 128.79, 128.38, 128.28, 126.93, 127.58, 126.65, 124.56, 124.48, 121.14, 85.06, 34.11, 30.25, 30.12. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{25}H_{26}NO_3SSe^{+}$ 500.0793 found 500.0763.



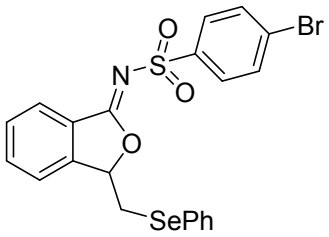
(Z)-4-methoxy-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3d**) white solid (83.1 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 88% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.04 (d, J = 8.9 Hz, 2H), 7.84 (s, 1H), 7.49 – 7.39 (m, 2H), 7.36 – 7.24 (m, 3H), 7.16 (dt, J = 14.4, 6.9 Hz, 3H), 6.96 (d, J = 9.0 Hz, 2H), 5.90 (t, J = 5.2 Hz, 1H), 3.81 (s, 3H), 3.32 (qd, J = 13.5, 5.3 Hz, 2H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.02, 163.05, 146.41, 134.30, 133.60, 132.86, 130.04, 129.82, 129.22, 128.79, 127.77, 125.14, 122.22, 113.83, 86.27, 55.70, 31.51. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{20}NO_4SSe^{+}$ 474.0273 found 474.0259.



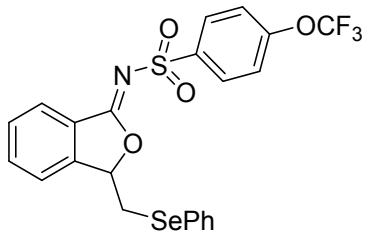
(Z)-4-fluoro-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3e**) white solid (76.4 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.05 – 7.97 (m, 2H), 7.79 – 7.71 (m, 1H), 7.36 (td, J = 6.8, 5.8, 3.4 Hz, 2H), 7.25 (m, J = 6.4, 2.2 Hz, 1H), 7.21 – 7.17 (m, 2H), 7.07 (m, J = 15.8, 8.4, 5.5, 2.0 Hz, 5H), 5.81 (t, J = 5.3 Hz, 1H), 3.26 (dd, J = 13.5, 4.8 Hz, 1H), 3.18 (dd, J = 13.5, 5.9 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.56, 165.15 (d, J = 253 Hz), 146.56, 137.35 (d, J = 3 Hz), 134.51, 133.70, 130.62 (d, J = 9 Hz), 129.93, 129.28, 129.05, 128.61, 127.89, 125.32, 122.24, 115.82 (d, J = 22 Hz), 86.51, 31.43. ^{19}F NMR (400 MHz, Chloroform-*d*) δ -105.29 (s, 1F). HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}FNO_3SSe^{+}$ 462.0073 found 462.0019.



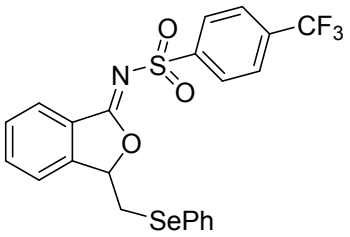
(Z)-4-chloro-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3f**) white solid (83.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 87% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.01 – 7.92 (m, 2H), 7.83 (d, J = 7.1 Hz, 1H), 7.49 – 7.39 (m, 4H), 7.38 – 7.35 (m, 1H), 7.34 – 7.29 (m, 2H), 7.20 – 7.12 (m, 3H), 5.82 (dd, J = 6.3, 5.0 Hz, 1H), 3.33 (dd, J = 13.3, 4.8 Hz, 1H), 3.18 (dd, J = 13.3, 6.6 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.46, 144.90, 138.83, 138.13, 133.44, 132.92, 128.94, 128.36, 128.29, 128.13, 127.87, 127.41, 127.04, 124.55, 121.16, 85.40, 30.21. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}ClNO_3SSe^{+}$ 477.9777 found 477.9759.



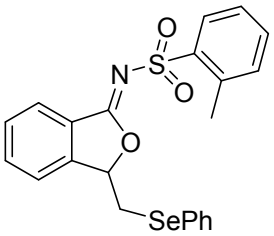
(Z)-4-bromo-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3g**) white solid (87.6 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 84% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.93 – 7.86 (m, 2H), 7.82 (d, J = 6.6 Hz, 1H), 7.60 – 7.54 (m, 2H), 7.44 (pd, J = 7.4, 1.4 Hz, 2H), 7.37 – 7.33 (m, 1H), 7.33 – 7.28 (m, 2H), 7.20 – 7.11 (m, 3H), 5.81 (dd, J = 6.5, 4.8 Hz, 1H), 3.32 (dd, J = 13.4, 4.8 Hz, 1H), 3.18 (dd, J = 13.3, 6.5 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.49, 145.64, 139.34, 133.46, 132.87, 130.86, 128.94, 128.39, 128.35, 128.10, 127.42, 127.02, 126.65, 124.53, 121.16, 85.42, 30.22. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}BrNO_3SSe^{+}$ 521.9272 found 521.9257.



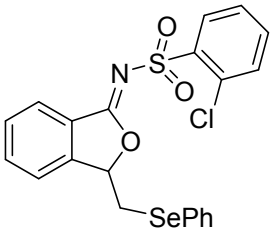
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-(trifluoromethoxy)benzene-sulfonamide (**3h**) white solid (84.2 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 80% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.11 – 8.02 (m, 2H), 7.82 – 7.75 (m, 1H), 7.43 – 7.34 (m, 2H), 7.32 – 7.27 (m, 1H), 7.26 – 7.20 (m, 4H), 7.15 – 7.04 (m, 3H), 5.82 (t, J = 5.4 Hz, 1H), 3.28 (dd, J = 13.4, 4.8 Hz, 1H), 3.19 (dd, J = 13.4, 6.1 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.73, 151.12, 145.62, 138.68, 133.53, 132.76, 128.99, 128.92, 128.26, 128.00, 127.48, 126.92, 124.40, 121.20, 120.02, 119.53, 119.23 (d, J = 258 Hz), 85.55, 30.28. ^{19}F NMR (400 MHz, Chloroform-*d*) δ -57.58 (s, 3F). HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{17}F_3NO_4SSe^{+}$ 527.9990 found 527.9984.



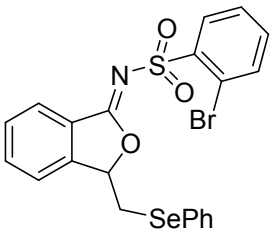
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-(trifluoromethyl)benzene-sulfonamide (**3i**) white solid (81.7 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 80% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.26 (d, J = 8.2 Hz, 2H), 7.87 (m, 1H), 7.78 (d, J = 8.3 Hz, 2H), 7.52 – 7.43 (m, 2H), 7.38 – 7.25 (m, 3H), 7.23 – 7.09 (m, 3H), 5.96 (t, J = 5.2 Hz, 1H), 3.45 – 3.26 (m, 2H). ^{13}C NMR (100 MHz, Chloroform-d) δ 168.25, 146.71, 144.77, 134.71, 134.13 (d, J = 32 Hz), 133.65, 129.97, 129.24, 128.82, 128.58, 128.39, 127.85, 125.81 (q, J = 4 Hz), 125.31, 123.41 (d, J = 271 Hz), 122.26, 86.81, 31.37. ^{19}F NMR (400 MHz, Chloroform-*d*) δ -62.88 (s, 3F). HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{17}F_3NO_3SSe^{+}$ 512.0041 found 512.0059.



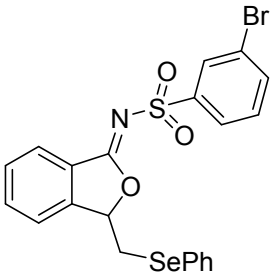
(Z)-2-methyl-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3j**) white solid (75.8 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.12 (dd, J = 7.9, 1.2 Hz, 1H), 7.84 (s, 1H), 7.45 – 7.35 (m, 4H), 7.31 – 7.21 (m, 4H), 7.19 – 7.10 (m, 3H), 5.79 (dd, J = 7.0, 4.2 Hz, 1H), 3.35 (dd, J = 13.3, 4.2 Hz, 1H), 3.08 (dd, J = 13.3, 7.1 Hz, 1H), 2.67 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.09, 145.62, 138.90, 136.89, 133.14, 132.82, 131.56, 131.08, 128.83, 128.40, 128.28, 127.86, 127.49, 126.93, 124.66, 124.30, 121.26, 85.00, 30.19, 19.67. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{20}NO_3SSe^{+}$ 458.0324 found 458.0375.



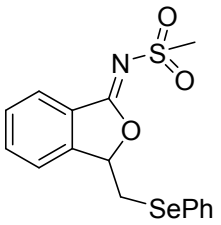
(Z)-2-chloro-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (3**k**) white solid (75.3 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 79% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.27 (d, J = 7.7 Hz, 1H), 7.92 (d, J = 6.6 Hz, 1H), 7.55 – 7.46 (m, 4H), 7.43 (m, 2H), 7.38 – 7.31 (m, 2H), 7.26 – 7.14 (m, 3H), 5.86 (dd, J = 6.7, 4.5 Hz, 1H), 3.38 (dd, J = 13.4, 4.5 Hz, 1H), 3.17 (dd, J = 13.3, 6.7 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.43, 146.13, 139.36, 134.42, 133.76, 133.51, 132.70, 131.57, 130.50, 129.92, 129.27, 129.07, 128.48, 127.89, 126.69, 125.49, 122.24, 86.36, 31.08. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}ClNO_3SSe^{+}$ 477.9777 found 477.9762.



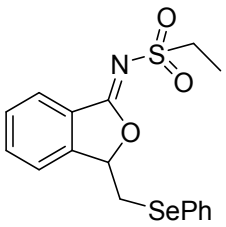
(Z)-2-bromo-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3l**) white solid (83.4 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 80% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.23 (dd, J = 7.9, 1.7 Hz, 1H), 7.86 (d, J = 6.5 Hz, 1H), 7.64 (dd, J = 7.9, 1.1 Hz, 1H), 7.47 – 7.35 (m, 4H), 7.31 (m, 3H), 7.19 – 7.08 (m, 3H), 5.78 (dd, J = 6.9, 4.4 Hz, 1H), 3.32 (dd, J = 13.3, 4.4 Hz, 1H), 3.09 (dd, J = 13.4, 6.9 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 166.36, 145.70, 140.14, 134.07, 133.39, 132.80, 132.43, 129.70, 128.94, 128.30, 128.15, 127.46, 126.93, 126.28, 124.56, 121.24, 119.87, 85.34, 30.07. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}BrNO_3SSe^{+}$ 521.9272 found 521.9218.



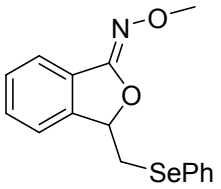
(Z)-3-bromo-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3m**) white solid (81.3 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 78% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.24 (t, J = 1.9 Hz, 1H), 8.04 (dt, J = 7.9, 1.4 Hz, 1H), 7.89 – 7.81 (m, 1H), 7.67 (dt, J = 8.0, 2.0, 1.0 Hz, 1H), 7.49 – 7.43 (m, 2H), 7.39 (t, J = 8.0 Hz, 1H), 7.35 – 7.31 (m, 1H), 7.29 – 7.23 (m, 2H), 7.22 – 7.10 (m, 3H), 5.94 (t, J = 5.2 Hz, 1H), 3.42 – 3.25 (m, 2H). ^{13}C NMR (100 MHz, Chloroform-d) δ 168.06, 146.62, 142.92, 135.80, 134.67, 133.64, 130.74, 130.43, 129.98, 129.26, 128.86, 128.64, 127.86, 126.46, 125.30, 122.45, 122.31, 86.68, 31.44. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{21}H_{17}BrNO_3SSe^{+}$ 521.9272 found 521.9293.



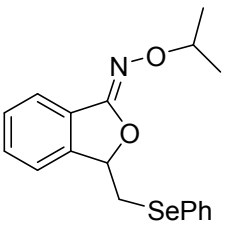
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)methanesulfonamide(**3n**) white solid (63.9 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 84% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.84 (d, J = 7.2 Hz, 1H), 7.55 – 7.42 (m, 3H), 7.38 – 7.32 (m, 2H), 7.23 – 7.12 (m, 3H), 6.00 (t, J = 1 Hz, 1H), 3.54 (dd, J = 13.5, 4.4 Hz, 1H), 3.42 (dd, J = 13.6, 6.1 Hz, 1H), 3.15 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.30, 146.73, 134.50, 133.55, 129.92, 129.28, 128.85, 128.68, 127.79, 125.04, 122.35, 86.41, 42.19, 31.37. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{16}H_{16}NO_3SSe^{+}$ 381.0011 found 381.0042.



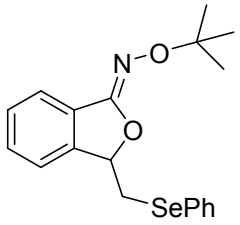
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)ethanesulfonamide (**3o**) white solid (67.8 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 86% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.76 (s, 1H), 7.41 (m, 3H), 7.29 (dt, J = 6.7, 1.4 Hz, 2H), 7.15 – 7.04 (m, 3H), 5.85 (dd, J = 6.6, 4.1 Hz, 1H), 3.47 (dd, J = 13.4, 4.1 Hz, 1H), 3.25 (dd, J = 13.4, 6.8 Hz, 1H), 3.15 (qd, J = 7.3, 2.1 Hz, 2H), 1.37 (t, J = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.44, 146.74, 134.37, 133.66, 133.64, 129.88, 129.29, 128.63, 127.82, 125.07, 122.39, 86.12, 48.81, 31.32, 8.29. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{17}H_{18}NO_3SSe^{+}$ 396.0167 found 396.0152.



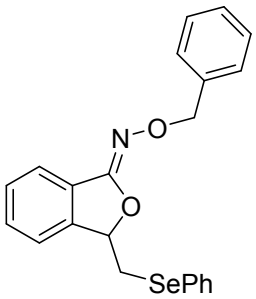
(Z)-N-(3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)ethanesulfonamide (**3p**) white solid (55.2 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.55 (dd, J = 6.5, 1.5 Hz, 1H), 7.38 – 7.34 (m, 2H), 7.34 – 7.31 (m, 1H), 7.24 (pd, J = 7.3, 1.2 Hz, 2H), 7.13 – 7.06 (m, 3H), 5.60 (dd, J = 7.0, 4.4 Hz, 1H), 3.82 (s, 3H), 3.36 (dd, J = 13.1, 4.4 Hz, 1H), 3.13 (dd, J = 13.1, 7.1 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 155.64, 143.28, 133.46, 130.65, 129.20, 129.15, 128.87, 127.55, 122.18, 121.58, 83.90, 62.69, 32.20. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{16}H_{16}NO_2Se^{+}$ 334.0341 found 334.0322.



(Z)-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-one O-isopropyl oxime (**3q**) white solid (62.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 86% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.60 (d, J = 1.8 Hz, 1H), 7.49 – 7.40 (m, 3H), 7.34 – 7.26 (m, 2H), 7.18 – 7.13 (m, 3H), 5.67 (dd, J = 7.5, 3.9 Hz, 1H), 4.26 (p, J = 6.2 Hz, 1H), 3.46 (dd, J = 13.1, 4.0 Hz, 1H), 3.15 (dd, J = 13.1, 7.6 Hz, 1H), 1.25 (d, J = 6.3 Hz, 6H). ^{13}C NMR (100 MHz, Chloroform-d) δ 153.86, 141.75, 132.57, 129.29, 128.37, 128.15, 128.09, 127.97, 126.49, 121.08, 120.47, 82.59, 75.01, 31.36, 20.61, 20.56. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{18}H_{20}NO_2Se^{+}$ 362.0654 found 362.0651.

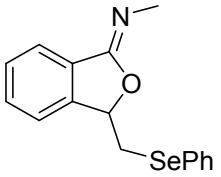


(Z)-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-one O-(tert-butyl) oxime (**3r**) white solid (62.1 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.68 (dd, J = 5.6, 2.5 Hz, 1H), 7.58 – 7.48 (m, 3H), 7.42 – 7.34 (m, 2H), 7.26 – 7.22 (m, 3H), 5.79 – 5.69 (m, 1H), 3.54 (dd, J = 13.0, 4.1 Hz, 1H), 3.23 (dd, J = 13.1, 7.6 Hz, 1H), 1.37 (s, 9H). ^{13}C NMR (100 MHz, Chloroform-d) δ 153.17, 142.10, 132.63, 129.11, 128.88, 128.26, 128.13, 127.90, 126.52, 121.10, 120.54, 82.50, 77.81, 31.46, 26.40. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{19}H_{22}NO_2Se^{+}$ 376.0810 found 376.0827.

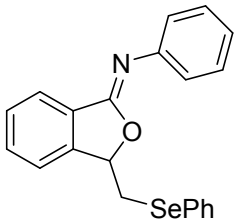


(Z)-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-one O-benzyl oxime (**3s**) white solid (67.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 82% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.55 (dd, J = 6.5, 1.5

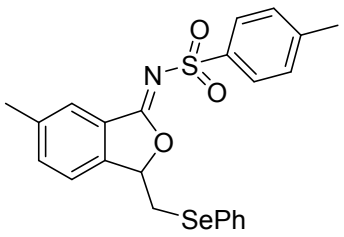
Hz, 1H), 7.38 – 7.34 (m, 2H), 7.34 – 7.31 (m, 1H), 7.24 (pd, J = 7.3, 1.2 Hz, 2H), 7.13 – 7.06 (m, 3H), 5.60 (dd, J = 7.0, 4.4 Hz, 1H), 3.82 (s, 3H), 3.36 (dd, J = 13.1, 4.4 Hz, 1H), 3.13 (dd, J = 13.1, 7.1 Hz, 1H). ^{13}C NMR (100 MHz, Chloroform-d) δ 154.85, 142.22, 136.84, 132.44, 129.53, 128.11, 128.00, 127.34, 127.23, 126.71, 126.47, 121.04, 120.66, 82.82, 75.67, 31.21. HRMS (TOF) m/z [M + H]$^+$ Calcd for $C_{22}H_{20}NO_2Se^+$ 410.0654 found 410.0632.



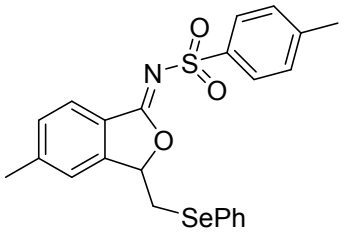
(Z)-N-methyl-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-imine (**3t**) yellow oil (51.9 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 3 : 1) in 82% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.76 (dt, J = 7.0, 3.7 Hz, 1H), 7.51 – 7.46 (m, 2H), 7.42 – 7.34 (m, 3H), 7.22 (dd, J = 4.9, 1.9 Hz, 3H), 5.64 (t, J = 5.5 Hz, 1H), 3.32 (d, J = 5.6 Hz, 2H), 3.09 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 159.63, 145.17, 133.31, 131.10, 129.67, 129.13, 129.05, 127.39, 123.00, 121.74, 81.68, 34.33, 32.77. HRMS (TOF) m/z [M + H]$^+$ Calcd for $C_{16}H_{16}NOSe^+$ 318.0392 found 318.0381.



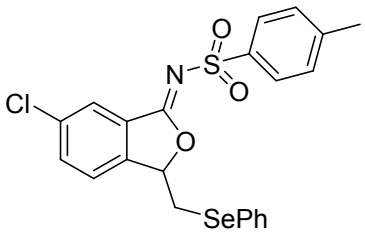
(Z)-N-phenyl-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-imine (**3u**) white solid (62.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 82% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 8.02 – 7.90 (m, 1H), 7.53 – 7.37 (m, 5H), 7.35 – 7.23 (m, 4H), 7.22 – 7.06 (m, 4H), 5.70 (t, J = 5.4 Hz, 1H), 3.44 – 3.27 (m, 2H).^{13}C NMR (100 MHz, Chloroform-d) δ 157.88, 146.52, 145.28, 133.48, 131.84, 131.53, 129.45, 129.31, 129.22, 128.70, 127.53, 124.09, 124.01, 123.57, 121.90, 82.30, 32.55. HRMS (TOF) m/z [M + H]$^+$ Calcd for $C_{21}H_{18}NOSe^+$ 380.0548 found 380.0581.



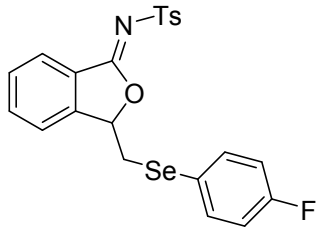
(Z)-4-methyl-N-(6-methyl-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzene-sulfonamide (**3v**) white solid (79.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 84% isolated yield. ^{1}H NMR (400 MHz, Chloroform-d) δ 7.87 (d, J = 8.4 Hz, 2H), 7.52 (s, 1H), 7.22 – 7.14 (m, 4H), 7.14 – 7.00 (m, 5H), 5.73 (t, J = 5.3 Hz, 1H), 3.23 (dd, J = 13.4, 4.7 Hz, 1H), 3.11 (dd, J = 13.4, 6.0 Hz, 1H), 2.25 (d, J = 12.8 Hz, 6H). ^{13}C NMR (100 MHz, Chloroform-d) δ 167.42, 144.01, 143.49, 140.18, 138.36, 135.49, 133.61, 129.35, 129.22, 129.16, 128.81, 127.84, 127.74, 125.12, 121.95, 86.21, 31.66, 21.61, 21.21. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{23}H_{22}NO_3SSe^{+}$ 472.0480 found 472.0492.



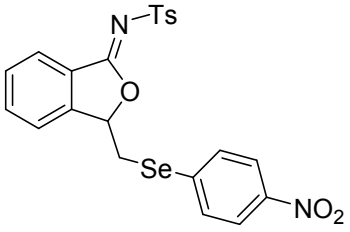
(Z)-4-methyl-N-(5-methyl-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzene-sulfonamide (**3w**) white solid (80.0 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 85% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.91 (d, J = 8.3 Hz, 2H), 7.69 (d, J = 8.0 Hz, 1H), 7.28 – 7.23 (m, 2H), 7.22 (s, 1H), 7.21 – 7.14 (m, 3H), 7.14 – 7.08 (m, 2H), 7.03 (s, 1H), 5.81 – 5.69 (m, 1H), 3.27 (dd, J = 13.4, 4.5 Hz, 1H), 3.14 (dd, J = 13.4, 6.4 Hz, 1H), 2.33 (s, 3H), 2.24 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.22, 145.91, 144.80, 142.33, 137.46, 132.83, 129.98, 128.16, 128.13, 127.68, 126.87, 126.83, 124.17, 121.52, 84.78, 30.41, 21.01, 20.57. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{23}H_{22}NO_3SSe^{+}$ 472.0480 found 372.0472.



(Z)-N-(6-chloro-3-((phenylselanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3x**) white solid (81.5 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.96 (d, J = 8.3 Hz, 2H), 7.79 (s, 1H), 7.34 – 7.26 (m, 4H), 7.25 – 7.19 (m, 3H), 7.18 – 7.12 (m, 2H), 5.91 (dd, J = 6.0, 4.2 Hz, 1H), 3.41 (dd, J = 13.6, 4.1 Hz, 1H), 3.25 (dd, J = 13.6, 6.2 Hz, 1H), 2.41 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.72, 144.62, 143.79, 137.97, 136.02, 134.18, 133.67, 131.14, 129.29, 129.23, 128.61, 127.92, 127.85, 124.85, 123.54, 86.02, 31.64, 21.65. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{19}NClO_3SSe^{+}$ 491.9934 found 491.9912.

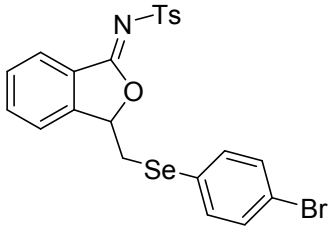


(Z)-N-(3-(((4-fluorophenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3y**) white solid (71.2 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 75% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.91 (d, J = 8.3 Hz, 2H), 7.83 (d, J = 6.6 Hz, 1H), 7.47 – 7.39 (m, 2H), 7.30 – 7.21 (m, 5H), 6.86 – 6.78 (m, 2H), 5.85 – 5.77 (m, 1H), 3.27 (dd, J = 13.4, 4.6 Hz, 1H), 3.20 (d, J = 6.1 Hz, 1H), 2.35 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-d) δ 165.91, 161.78 (d, J = 247 Hz), 145.36, 142.45, 137.36, 135.50, 135.42, 133.17, 128.85, 128.18, 126.79, 124.51, 122.18 (d, J = 3 Hz), 120.93, 115.44 (d, J = 22 Hz), 84.92, 31.17, 20.58. ^{19}F NMR (400 MHz, Chloroform-*d*) δ -112.98 (s, 1F).HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{22}H_{19}NFO_3SSe^{+}$ 476.0229 found 476.0236.

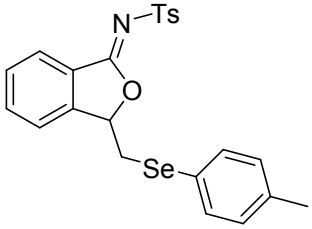


(Z)-4-methyl-N-(3-(((4-nitrophenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)benzene-sulfonamide (**3z**) white solid (58.2 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 58% isolated yield. ^{1}H NMR (400 MHz,

Chloroform-*d*) δ 7.98 – 7.93 (m, 2H), 7.86 (dd, J = 23.0, 7.1 Hz, 3H), 7.44 (ddt, J = 9.4, 6.2, 2.0 Hz, 4H), 7.32 – 7.26 (m, 1H), 7.23 (d, J = 8.0 Hz, 2H), 5.95 (t, J = 5.0 Hz, 1H), 3.47 (dd, J = 5.0, 2.0 Hz, 2H), 2.34 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.49, 145.94, 144.94, 142.55, 138.03, 137.35, 133.36, 131.36, 129.13, 128.51, 128.24, 126.65, 124.65, 122.94, 120.75, 84.62, 30.33, 20.58. HRMS (TOF) m/z [M + H]$^+$ Calcd for $C_{22}H_{19}N_2O_5SSe^+$ 503.0174 found 503.0177.

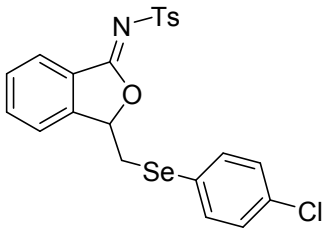


(Z)-N-(3-(((4-bromophenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3aa**) white solid (86.7 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 81% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.87 (d, J = 8.4 Hz, 2H), 7.74 (dd, J = 5.8, 3.2 Hz, 1H), 7.38 – 7.30 (m, 2H), 7.23 – 7.09 (m, 5H), 7.03 (d, J = 8.4 Hz, 2H), 5.84 (t, J = 5.0 Hz, 1H), 3.24 (dd, J = 5.0, 1.9 Hz, 2H), 2.28 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.15, 146.28, 143.59, 138.25, 135.33, 134.35, 132.17, 129.89, 129.25, 127.84, 127.81, 125.23, 122.13, 122.08, 86.14, 31.98, 21.64. HRMS (TOF) m/z [M + H]$^+$ Calcd for $C_{22}H_{19}NBrO_3SSe^+$ 535.9429 found 535.9435.

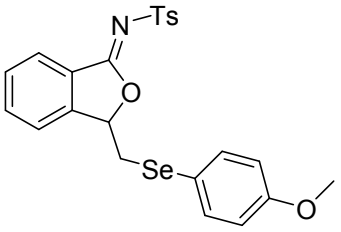


(Z)-4-methyl-N-(3-((p-tolylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3ab**) white solid (78.1 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.91 (d, J = 8.3 Hz, 2H), 7.83 (d, J = 7.4 Hz, 1H), 7.46 – 7.38 (m, 3H), 7.24 – 7.18 (m, 4H), 6.96 (d, J = 7.8 Hz, 2H), 5.76 (dd, J = 6.9, 4.8 Hz, 1H), 3.26 (dd, J = 13.2, 4.8 Hz, 1H), 3.06 (dd, J = 13.2, 6.9 Hz, 1H), 2.34 (s, 3H), 2.24 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.03, 145.69, 142.41, 137.39, 137.21, 133.23, 133.18, 129.13, 128.79, 128.34, 128.18, 126.83, 124.50,

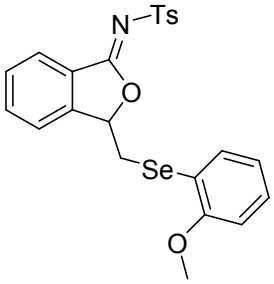
123.68, 121.22, 85.19, 30.33, 20.57, 20.10. HRMS (TOF) m/z $[M + H]^+$ Calcd for $C_{23}H_{22}NO_3SSe^+$ 472.0480 found 472.0461.



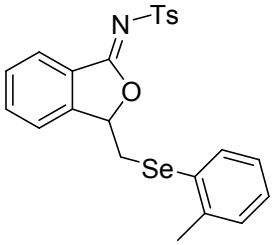
(Z)-N-(3-(((4-chlorophenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3ac**) white solid (82.5 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 84% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.91 (d, J = 8.3 Hz, 2H), 7.83 (d, J = 6.4 Hz, 1H), 7.45 – 7.39 (m, 2H), 7.29 – 7.25 (m, 1H), 7.25 – 7.16 (m, 5H), 7.11 – 7.06 (m, 2H), 5.83 (t, J = 5.3 Hz, 1H), 3.30 (dd, J = 13.5, 4.6 Hz, 1H), 3.21 (dd, J = 13.5, 6.0 Hz, 1H), 2.35 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.87, 145.28, 142.48, 137.36, 134.30, 133.31, 133.21, 128.89, 128.47, 128.39, 128.20, 126.79, 125.84, 124.52, 120.93, 84.87, 30.88, 20.58. HRMS (TOF) m/z $[M + H]^+$ Calcd for $C_{22}H_{19}NClO_3SSe^+$ 491.9934 found 491.9922.



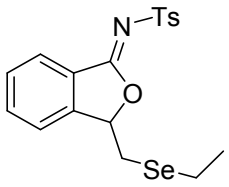
(Z)-N-(3-(((4-methoxyphenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3ad**) white solid (82.7 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 85% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 1H NMR (400 MHz, Chloroform-d) δ 7.91 (d, J = 8.3 Hz, 2H), 7.81 (d, J = 7.5 Hz, 1H), 7.47 – 7.33 (m, 3H), 7.25 – 7.18 (m, 4H), 6.69 – 6.63 (m, 2H), 5.75 (dd, J = 6.5, 4.7 Hz, 1H), 3.70 (s, 3H), 3.18 (dd, J = 13.3, 4.8 Hz, 1H), 3.06 (dd, J = 13.3, 6.6 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.11, 158.90, 145.67, 142.42, 137.36, 135.43, 133.21, 128.78, 128.34, 128.18, 126.83, 124.43, 121.16, 117.48, 113.97, 85.21, 54.33, 30.97, 20.58. HRMS (TOF) m/z $[M + H]^+$ Calcd for $C_{23}H_{22}NO_4SSe^+$ 488.0429 found 488.0431.



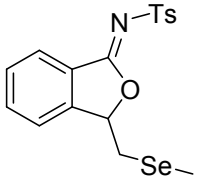
(Z)-N-(3-(((2-methoxyphenyl)selanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzene-sulfonamide (**3ae**) white solid (77.8 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 80% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.91 (d, J = 6.8 Hz, 2H), 7.85 – 7.76 (m, 1H), 7.45 – 7.30 (m, 3H), 7.22 (d, J = 7.6 Hz, 2H), 7.05 (t, J = 7.3 Hz, 1H), 6.88 (d, J = 6.5 Hz, 1H), 6.78 (s, 1H), 6.71 (d, J = 8.4 Hz, 1H), 5.85 – 5.74 (m, 1H), 3.68 (d, J = 1.4 Hz, 3H), 3.32 (dd, J = 13.3, 3.3 Hz, 1H), 3.14 (dd, J = 13.3, 5.2 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.17, 157.52, 145.83, 142.41, 137.31, 133.20, 132.94, 128.75, 128.44, 128.14, 128.02, 126.80, 124.26, 121.38, 120.38, 115.88, 109.80, 85.63, 54.85, 27.40, 20.56. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{23}H_{22}NO_4SSe^{+}$ 488.0429 found 488.0434.



(Z)-4-methyl-N-(3-((o-tolylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3af**) white solid (78.1 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 83% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.90 (d, J = 8.4 Hz, 2H), 7.79 (d, J = 7.4 Hz, 1H), 7.42 – 7.30 (m, 3H), 7.22 (dd, J = 21.8, 7.6 Hz, 3H), 7.04 (qd, J = 7.7, 1.8 Hz, 2H), 6.95 (td, J = 7.2, 2.2 Hz, 1H), 5.78 (dd, J = 6.4, 4.7 Hz, 1H), 3.25 (dd, J = 13.3, 4.7 Hz, 1H), 3.10 (dd, J = 13.2, 6.5 Hz, 1H), 2.30 (s, 3H), 2.19 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.06, 145.54, 142.46, 139.22, 137.29, 133.25, 132.43, 129.15, 128.79, 128.58, 128.16, 126.94, 126.81, 125.73, 125.36, 124.36, 121.07, 85.23, 29.19, 21.51, 20.56. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{23}H_{22}NO_3SSe^{+}$ 472.0480 found 472.0465.



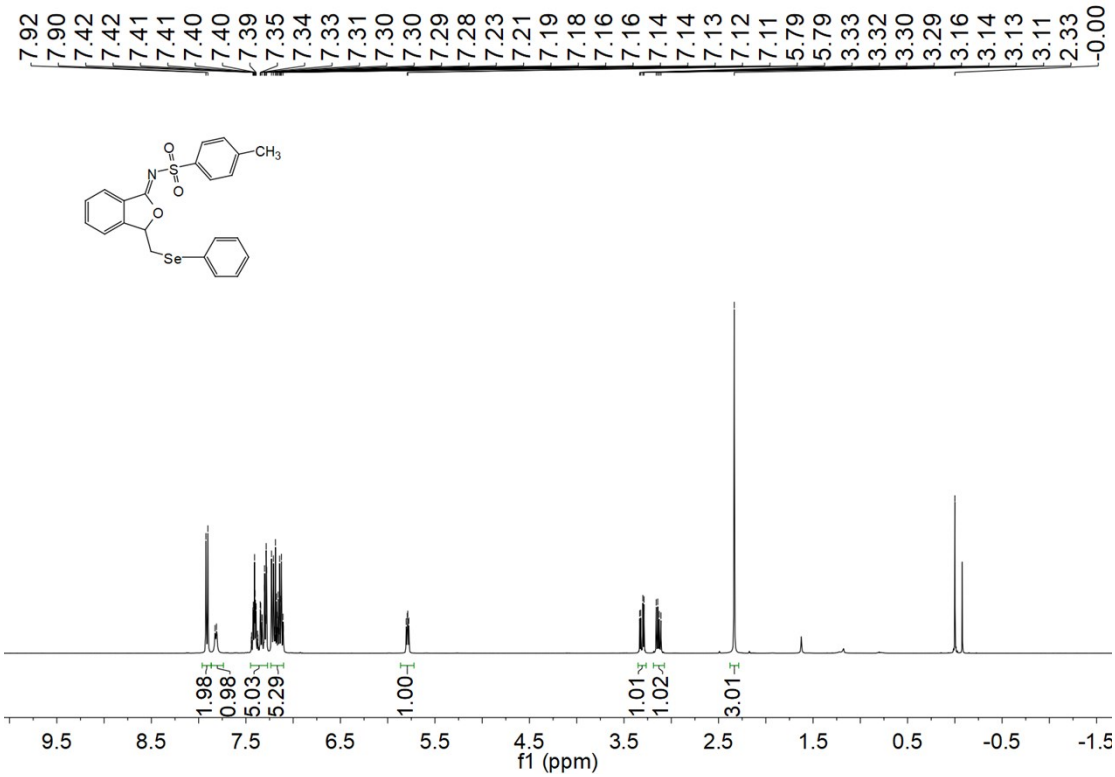
(Z)-N-(3-((ethylselanyl)methyl)isobenzofuran-1(3H)-ylidene)-4-methylbenzenesulfonamide (**3ag**) white solid (63.7 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 78% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.89 (d, J = 8.3 Hz, 2H), 7.82 (d, J = 7.8 Hz, 1H), 7.62 – 7.54 (m, 1H), 7.52 – 7.42 (m, 2H), 7.22 (d, J = 8.0 Hz, 2H), 5.88 (t, J = 5.6 Hz, 1H), 3.05 – 2.87 (m, 2H), 2.50 (td, J = 7.5, 2.4 Hz, 2H), 2.34 (s, 3H), 1.26 (t, J = 7.5 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.13, 146.13, 142.37, 137.51, 133.46, 128.84, 128.20, 126.62, 125.40, 124.50, 120.90, 86.48, 24.93, 20.56, 18.26, 14.63. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{18}H_{20}NO_3SSe^{+}$ 410.0324 found 410.0333.



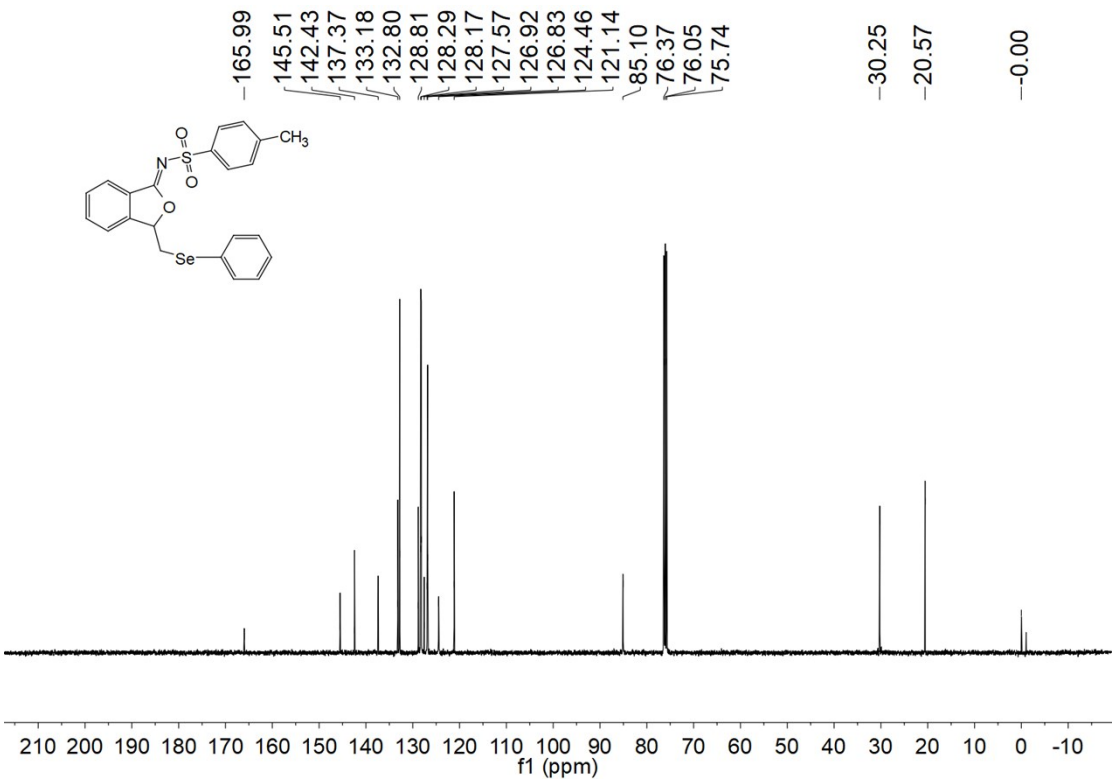
(Z)-4-methyl-N-(3-((methylselanyl)methyl)isobenzofuran-1(3H)-ylidene)benzenesulfonamide (**3ah**) white solid (63.1 mg) was obtained by column chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 2 : 1) in 80% isolated yield. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 1H NMR (400 MHz, Chloroform-d) δ 7.88 (dd, J = 8.3, 1.6 Hz, 2H), 7.80 (d, J = 7.8 Hz, 1H), 7.57 (t, J = 7.5 Hz, 1H), 7.50 – 7.40 (m, 2H), 7.25 – 7.16 (m, 2H), 5.89 (t, J = 5.3 Hz, 1H), 2.95 (d, J = 5.1 Hz, 2H), 2.32 (s, 3H), 1.89 (d, J = 3.2 Hz, 3H).^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.22, 147.04, 143.44, 138.47, 134.57, 129.88, 129.45, 129.24, 127.65, 125.44, 121.96, 87.46, 29.67, 28.17, 21.59, 6.31. HRMS (TOF) m/z [M + H]$^{+}$ Calcd for $C_{17}H_{18}NO_3SSe^{+}$ 396.0167 found 396.0177.

8. ^{1}H NMR, ^{13}C NMR and ^{19}F NMR spectra

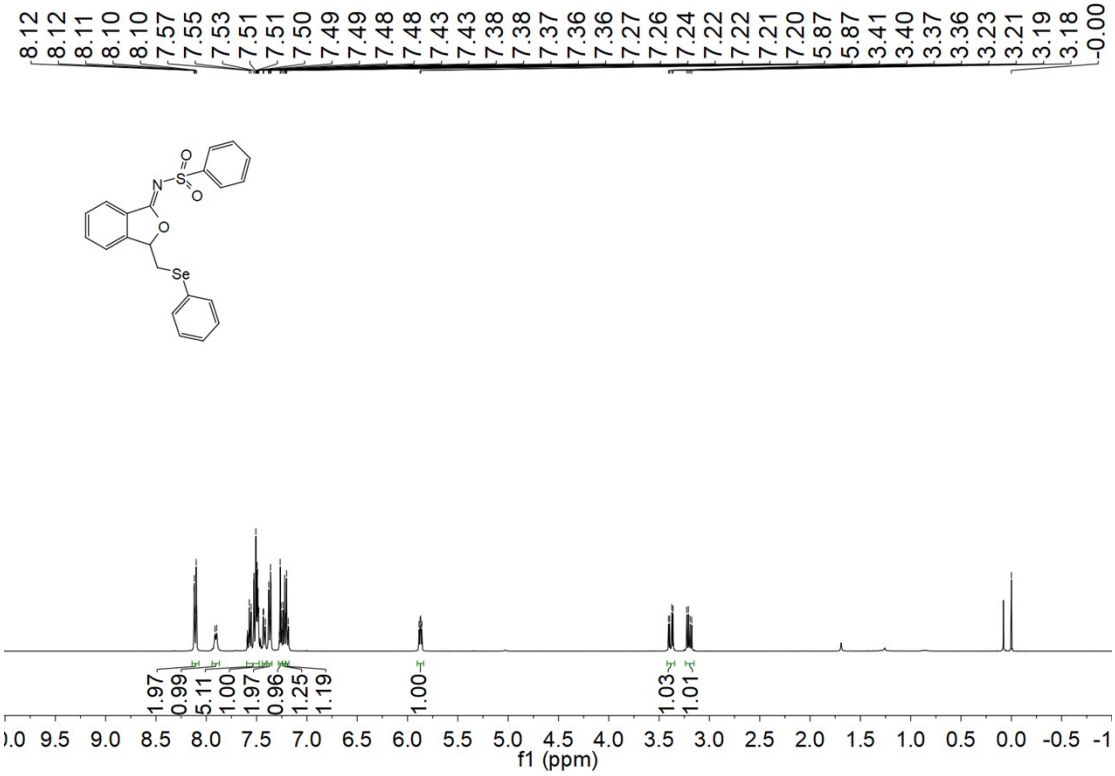
^{1}H NMR of compound **3a**



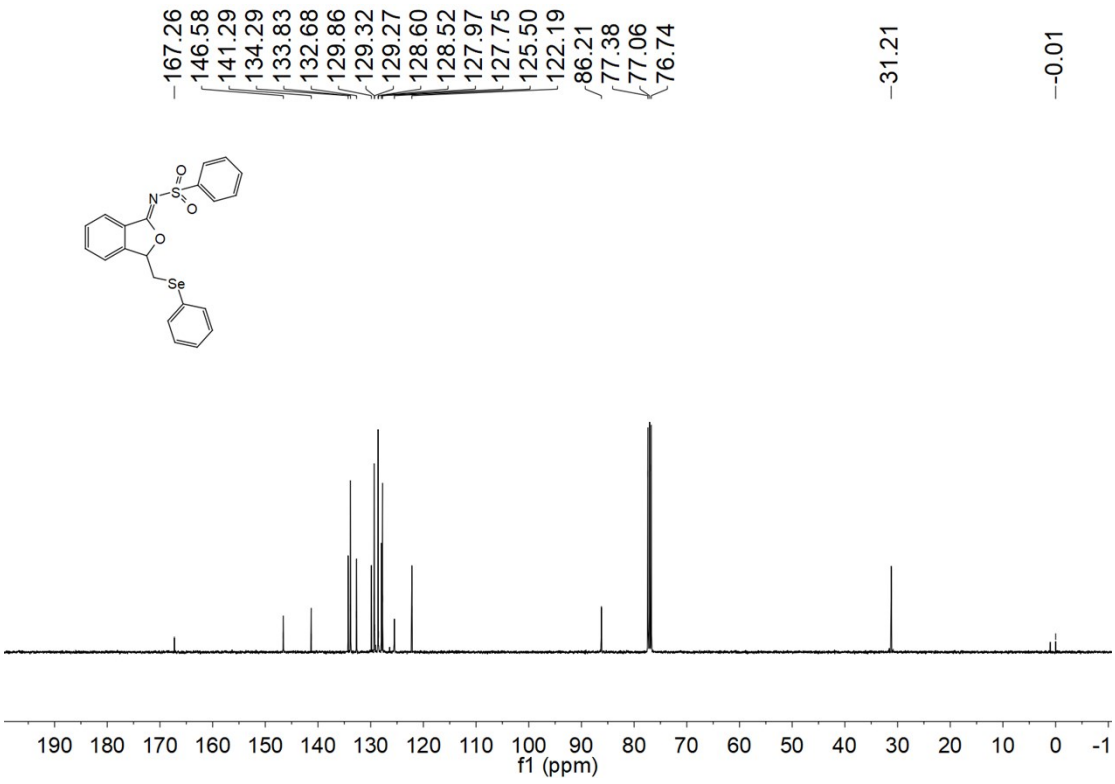
^{13}C NMR of compound **3a**



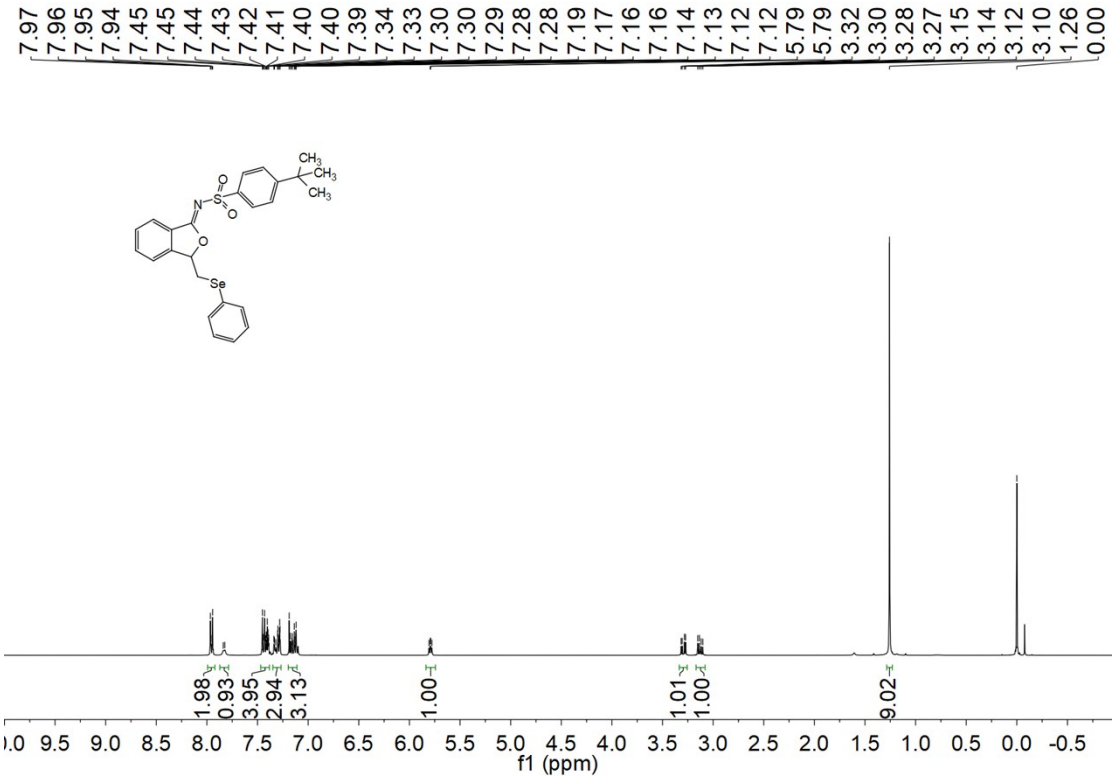
^{1}H NMR of compound **3b**



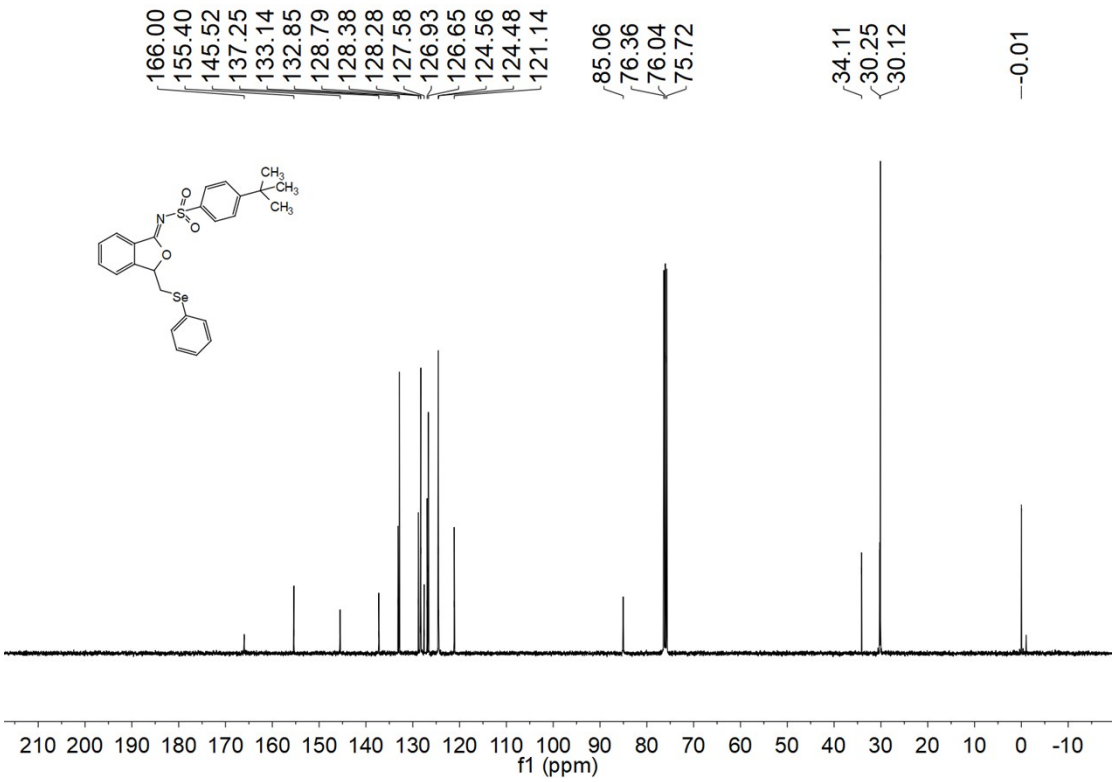
^{13}C NMR of compound **3b**



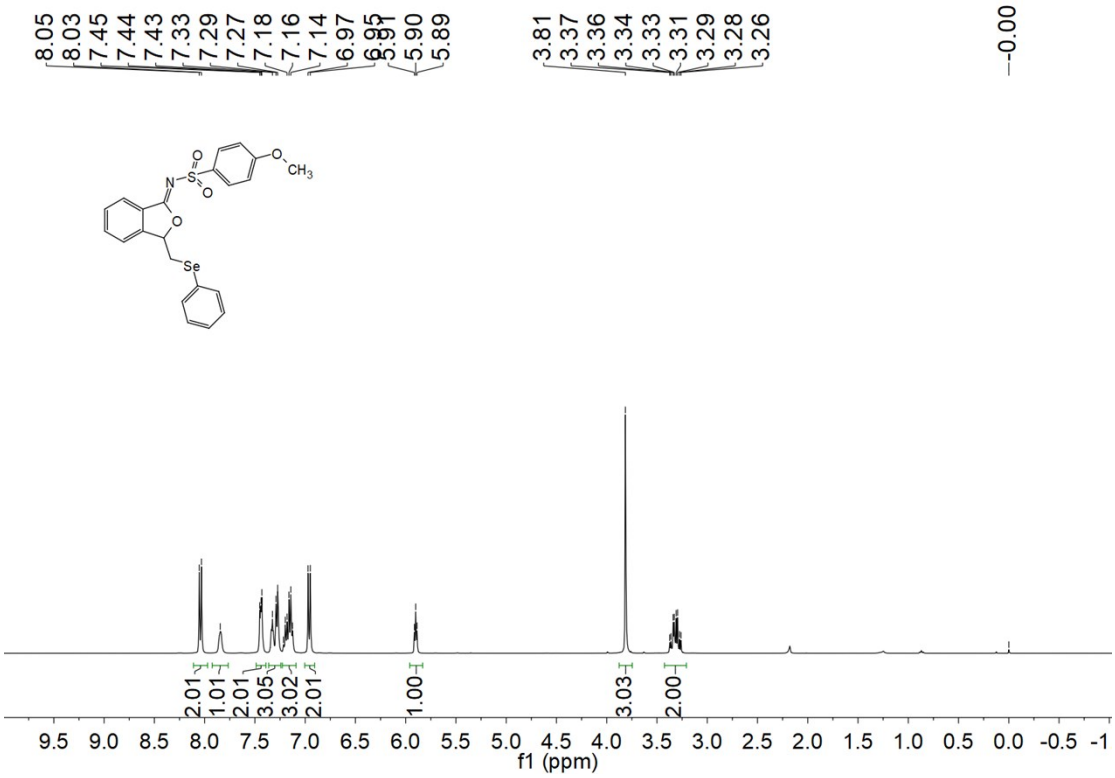
^{1}H NMR of compound **3c**



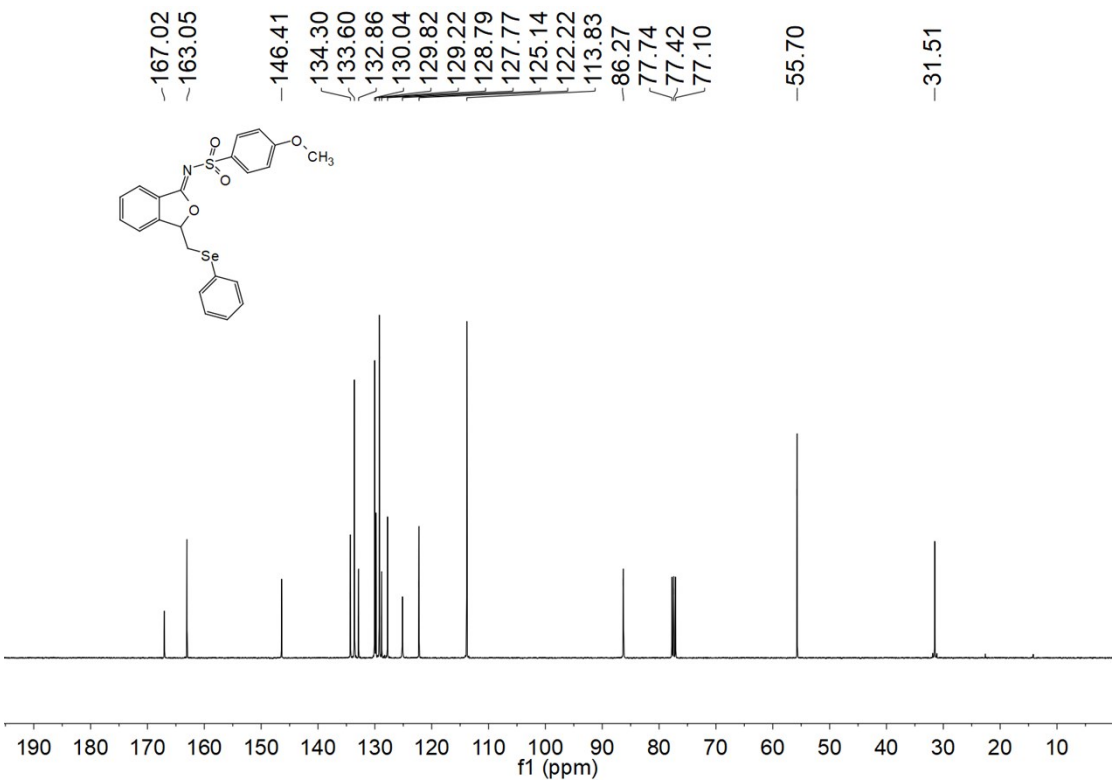
^{13}C NMR of compound **3c**



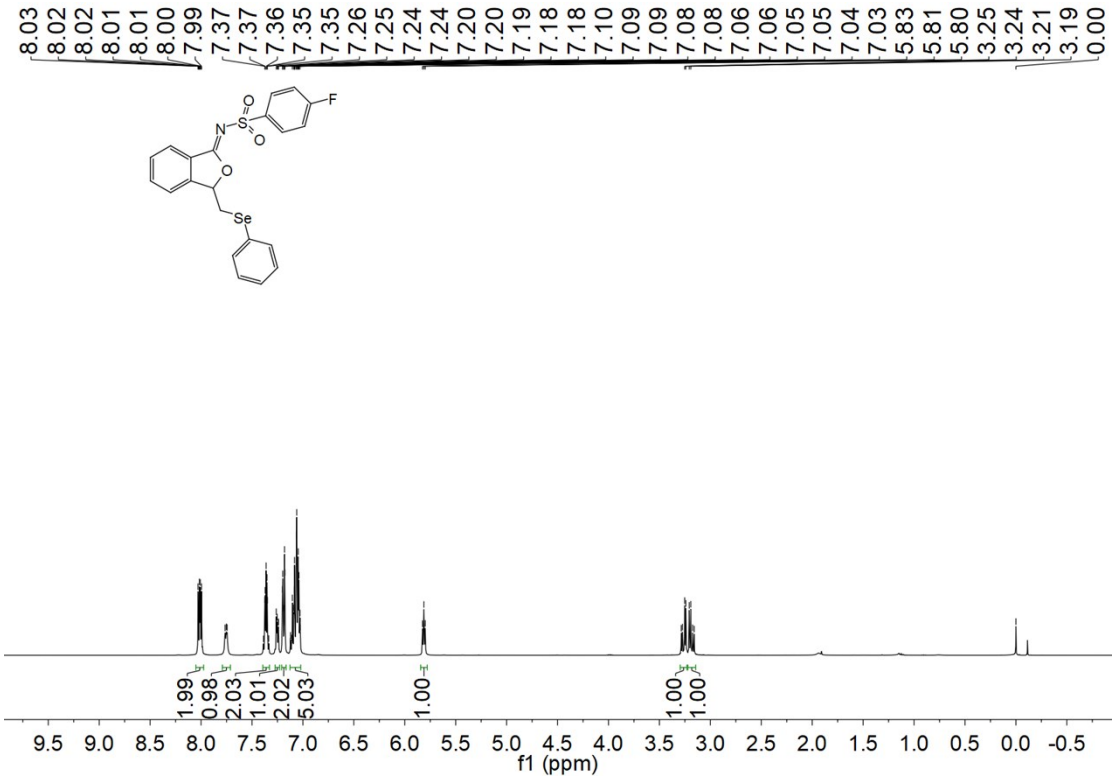
^{1}H NMR of compound **3d**



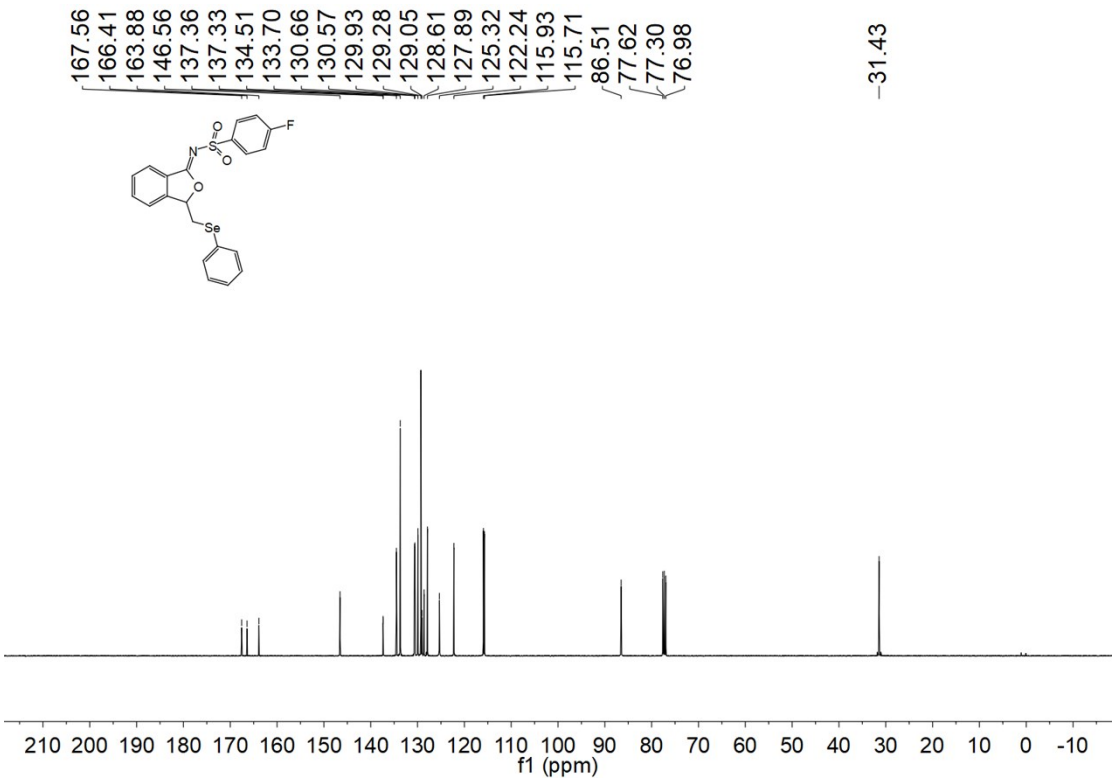
^{13}C NMR of compound **3d**



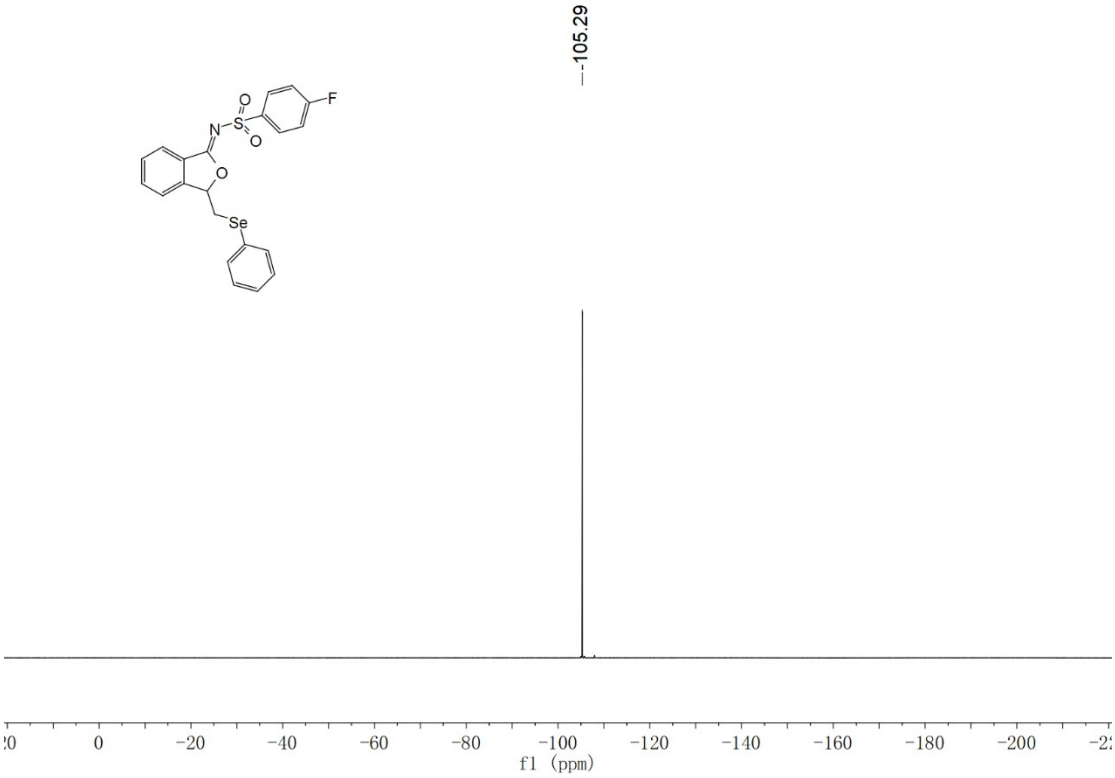
^{1}H NMR of compound **3e**



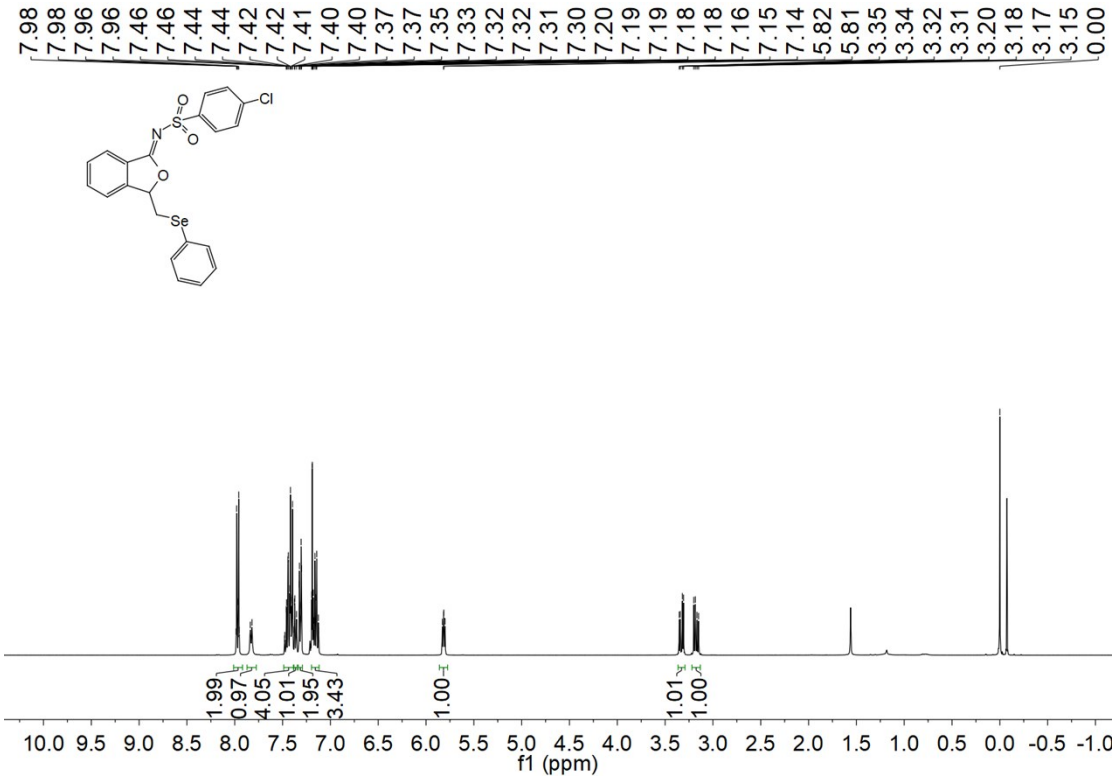
^{13}C NMR of compound **3e**



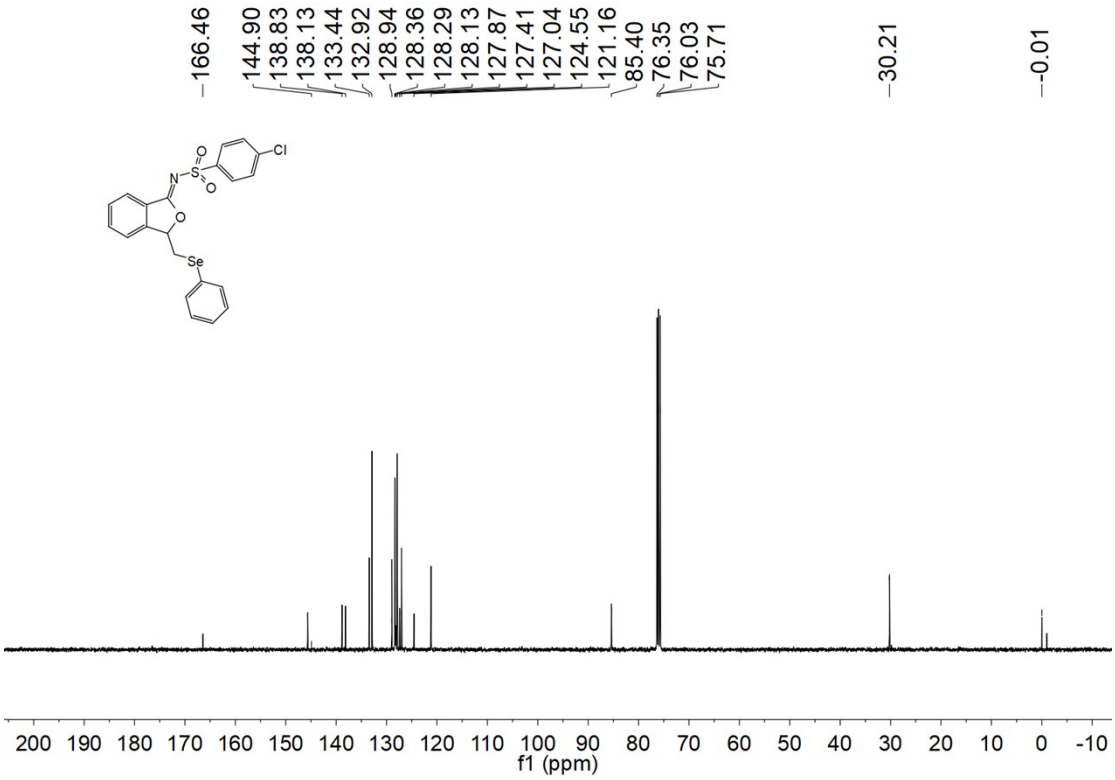
^{19}F NMR of compound **3e**



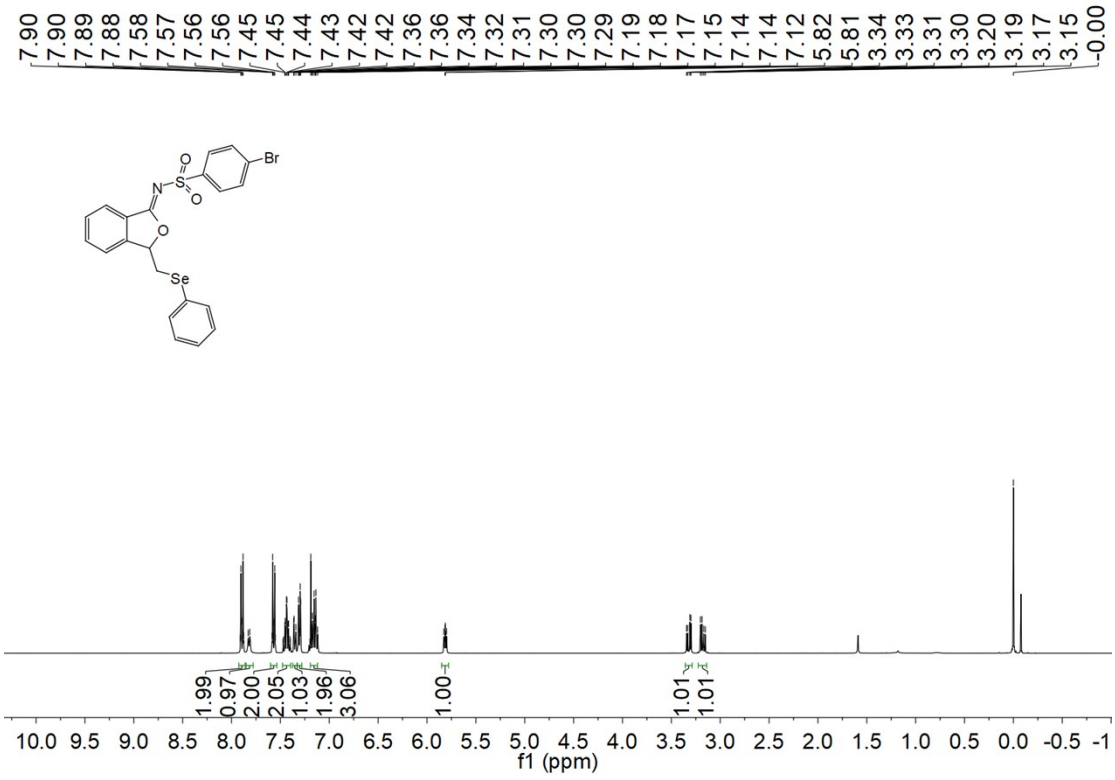
^{1}H NMR of compound **3f**



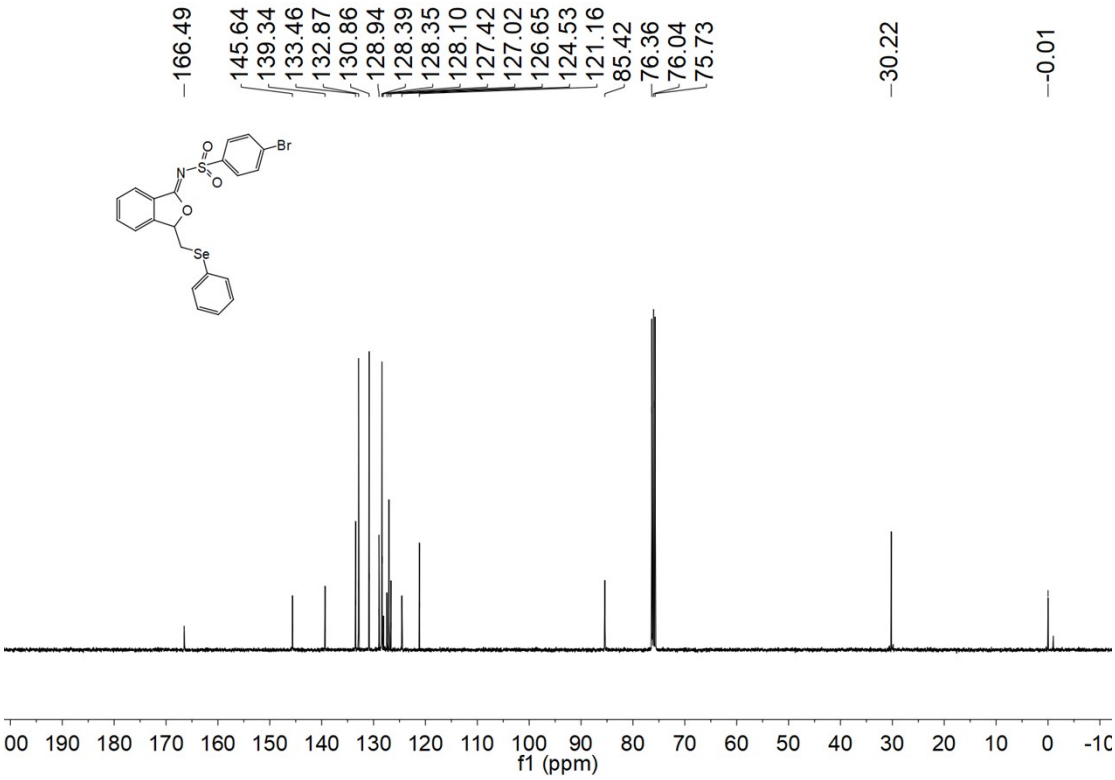
^{13}C NMR of compound **3f**



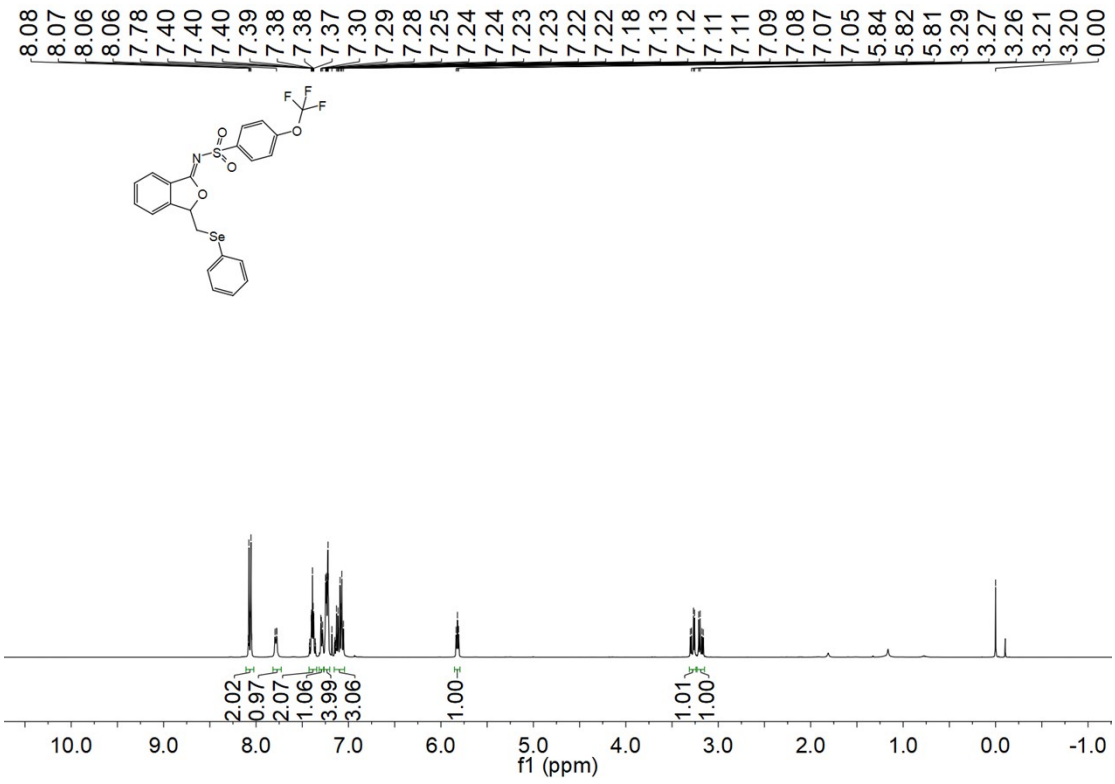
^{1}H NMR of compound **3g**



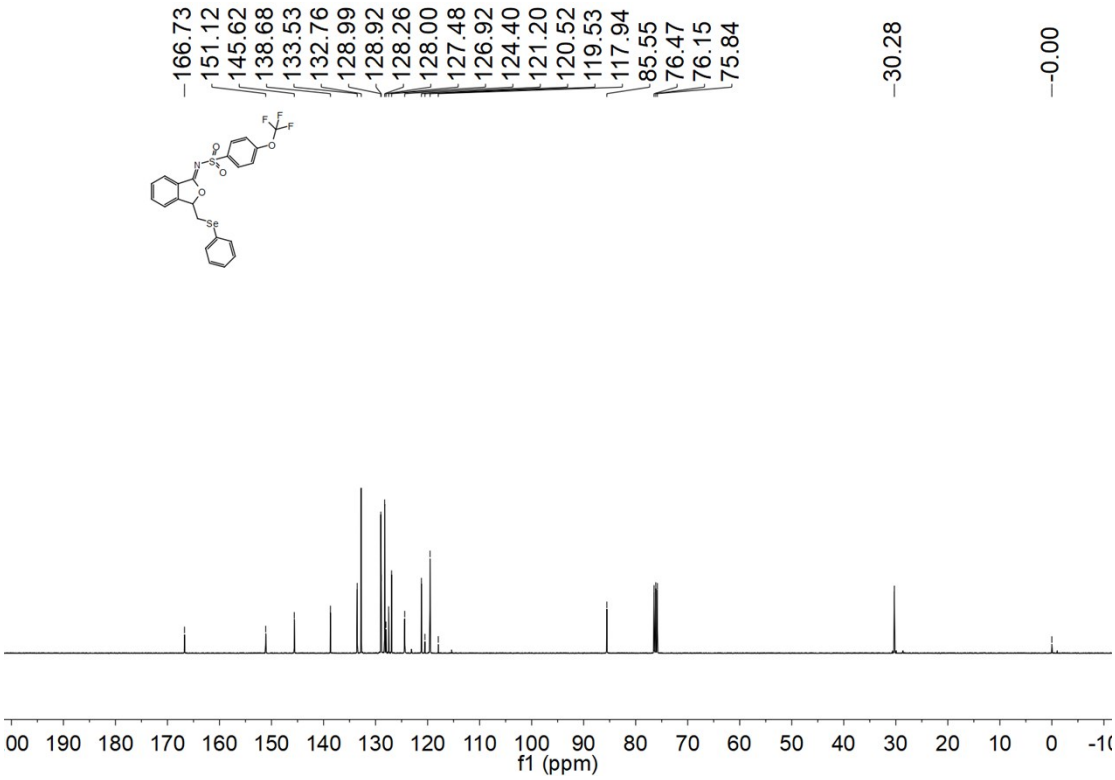
^{13}C NMR of compound **3g**



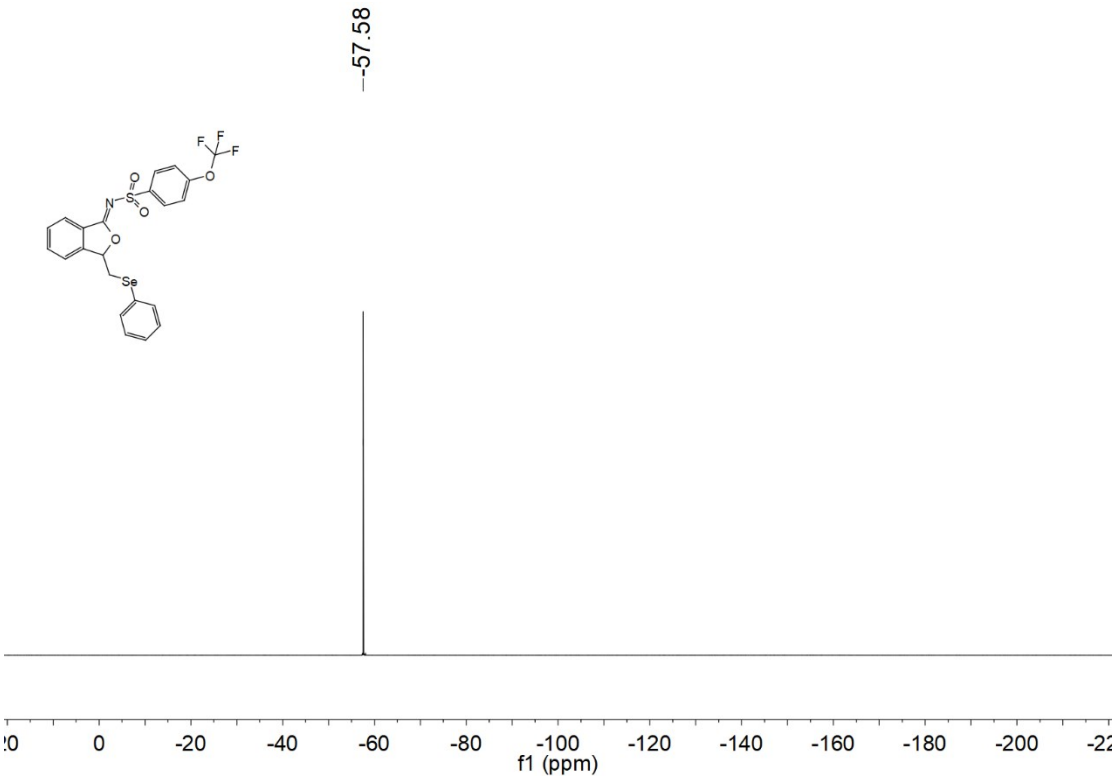
^{1}H NMR of compound **3h**



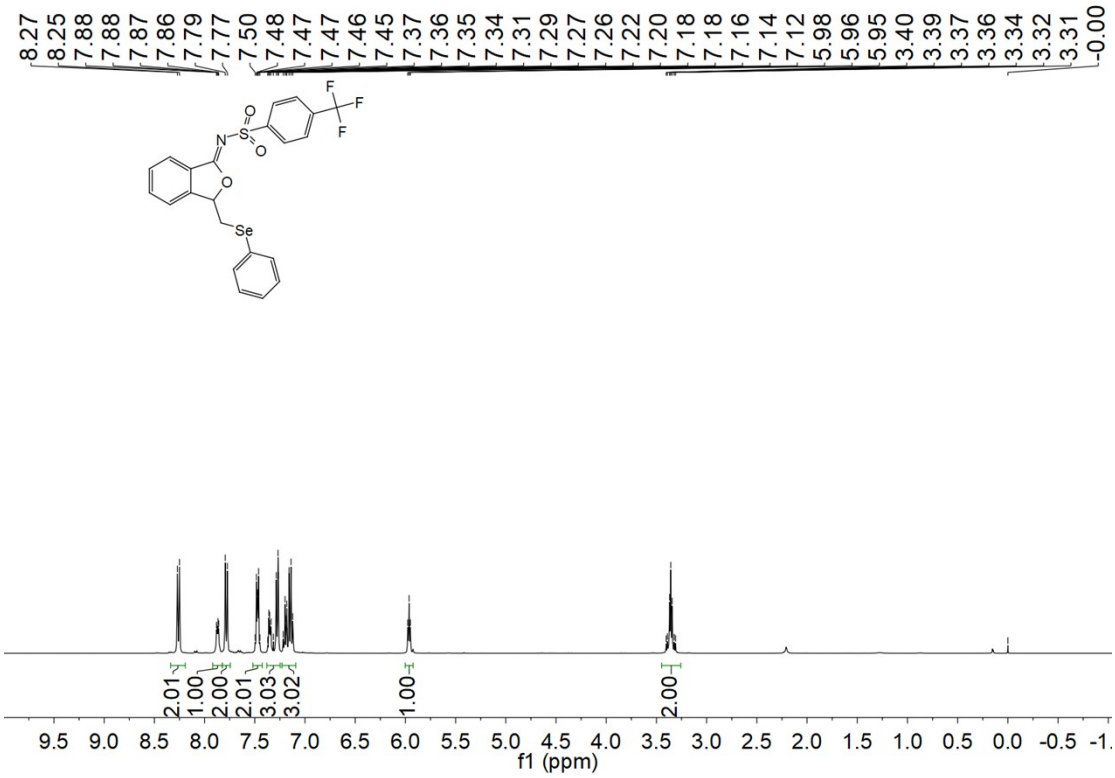
^{13}C NMR of compound **3h**



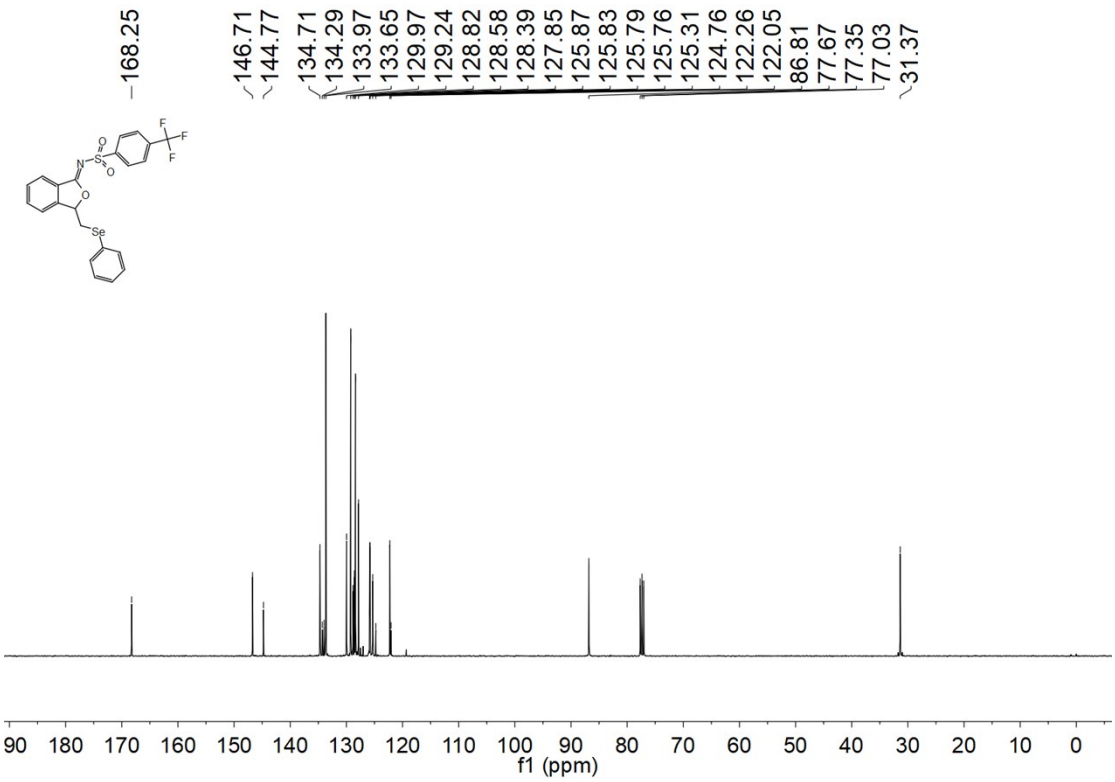
^{19}F NMR of compound **3h**



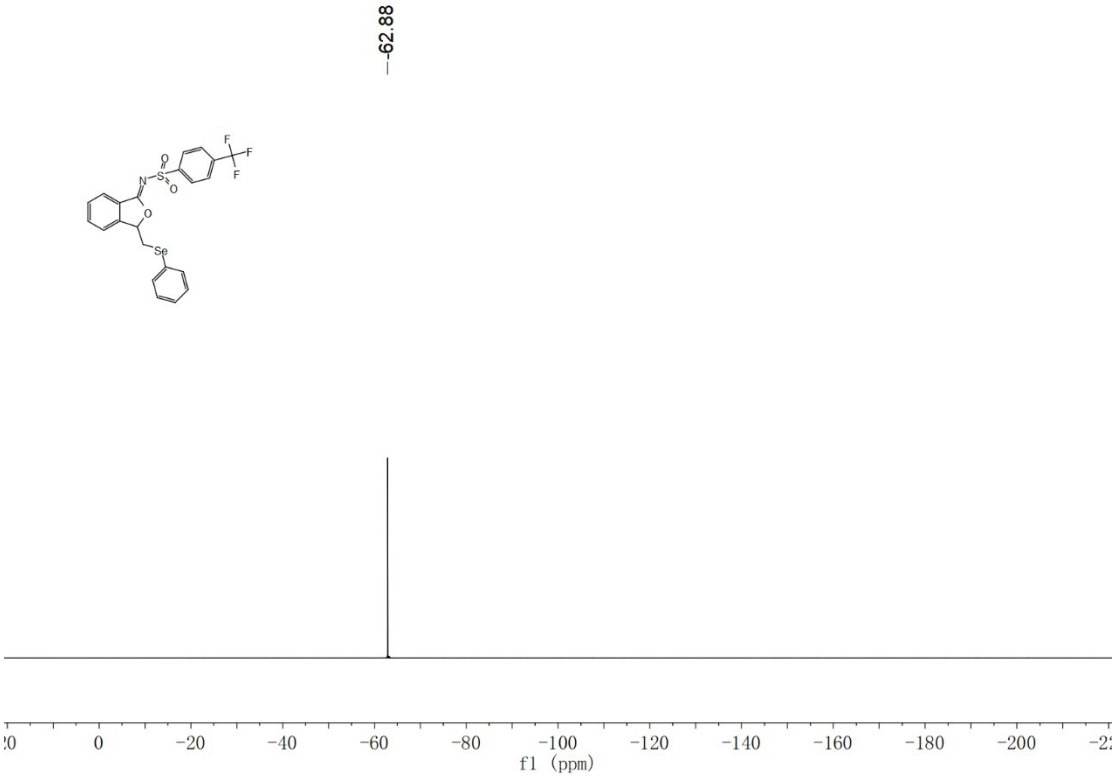
^{1}H NMR of compound **3i**



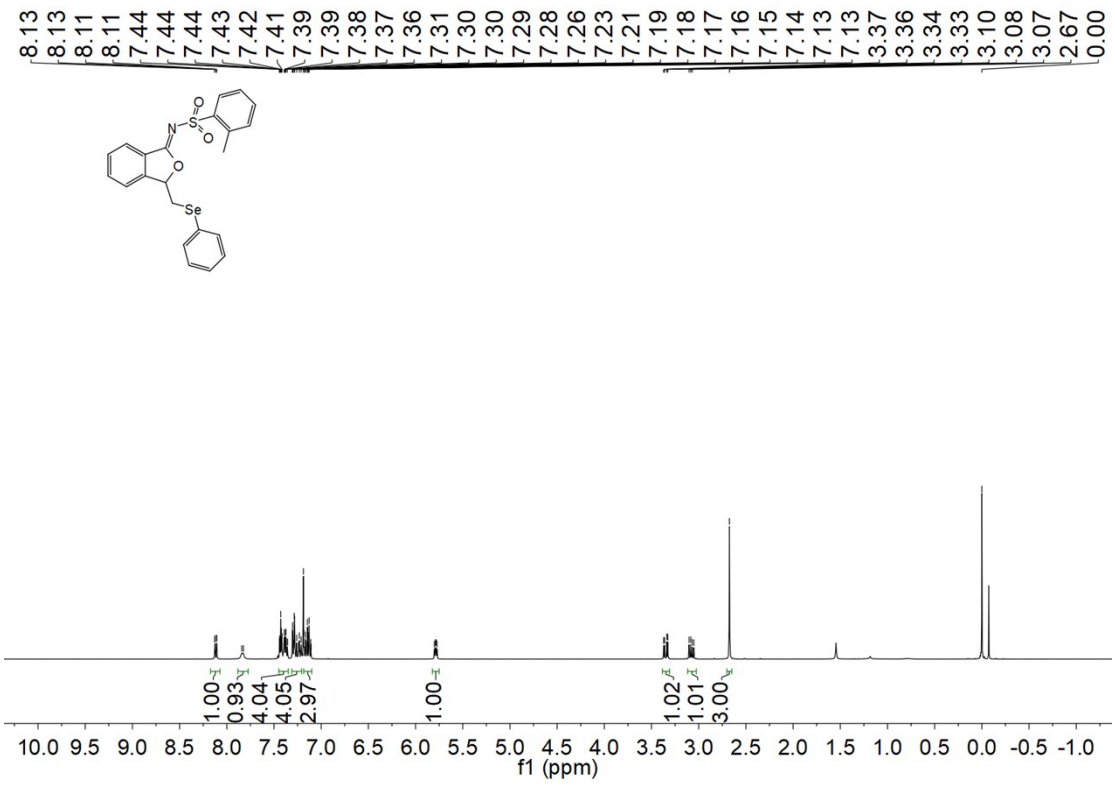
^{13}C NMR of compound **3i**



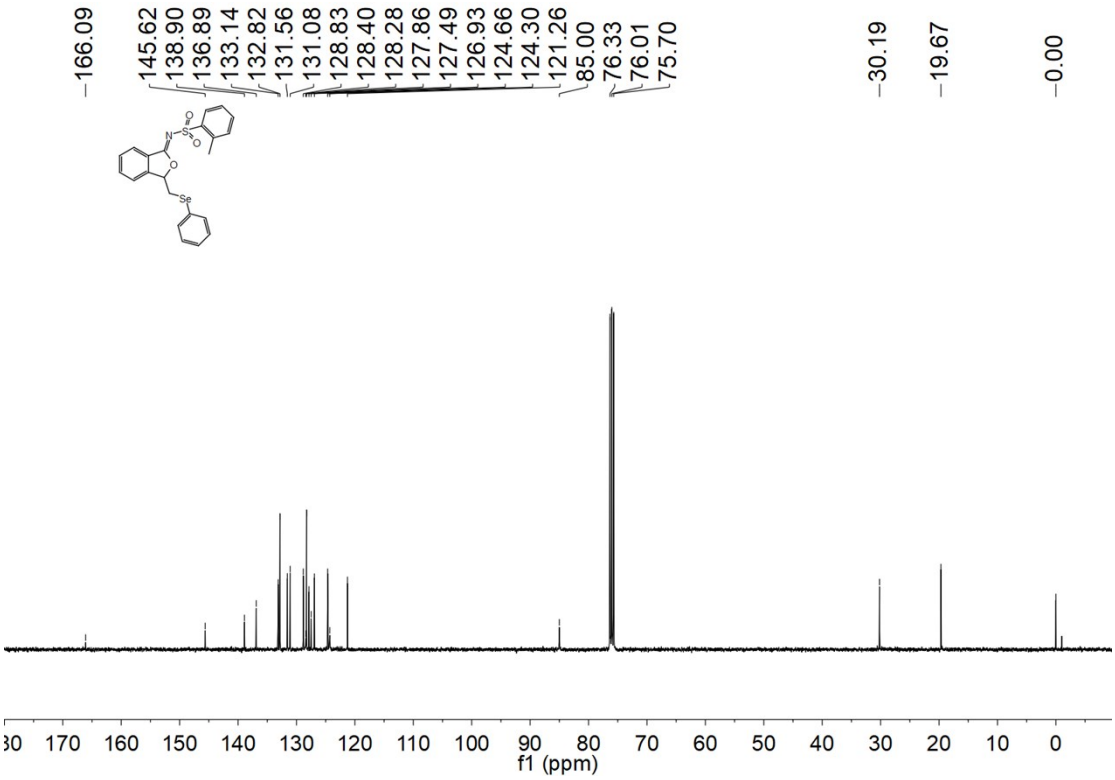
^{19}F NMR of compound **3i**



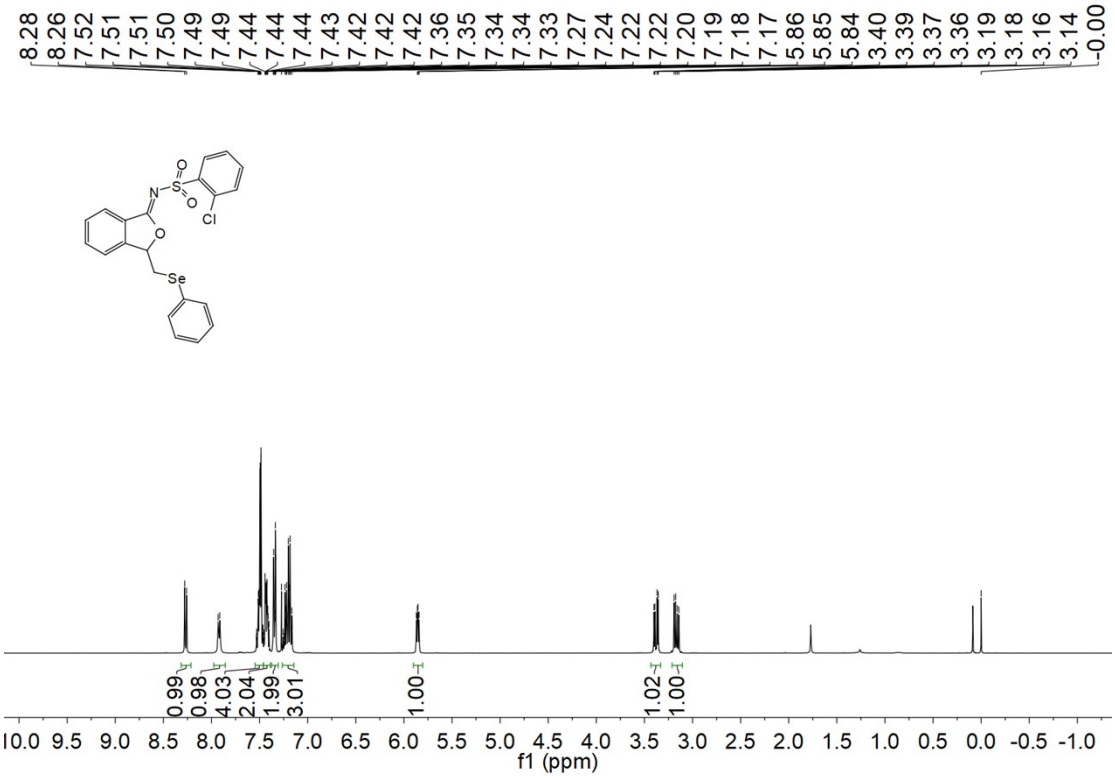
^{1}H NMR of compound **3j**



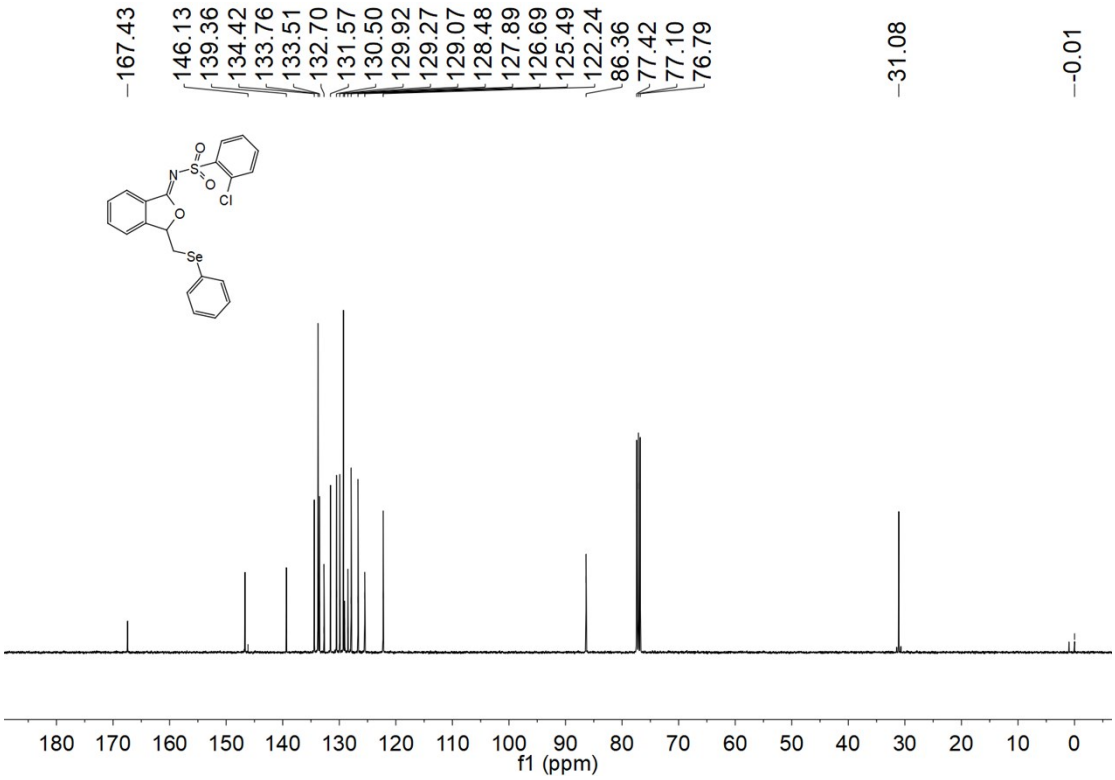
^{13}C NMR of compound **3j**



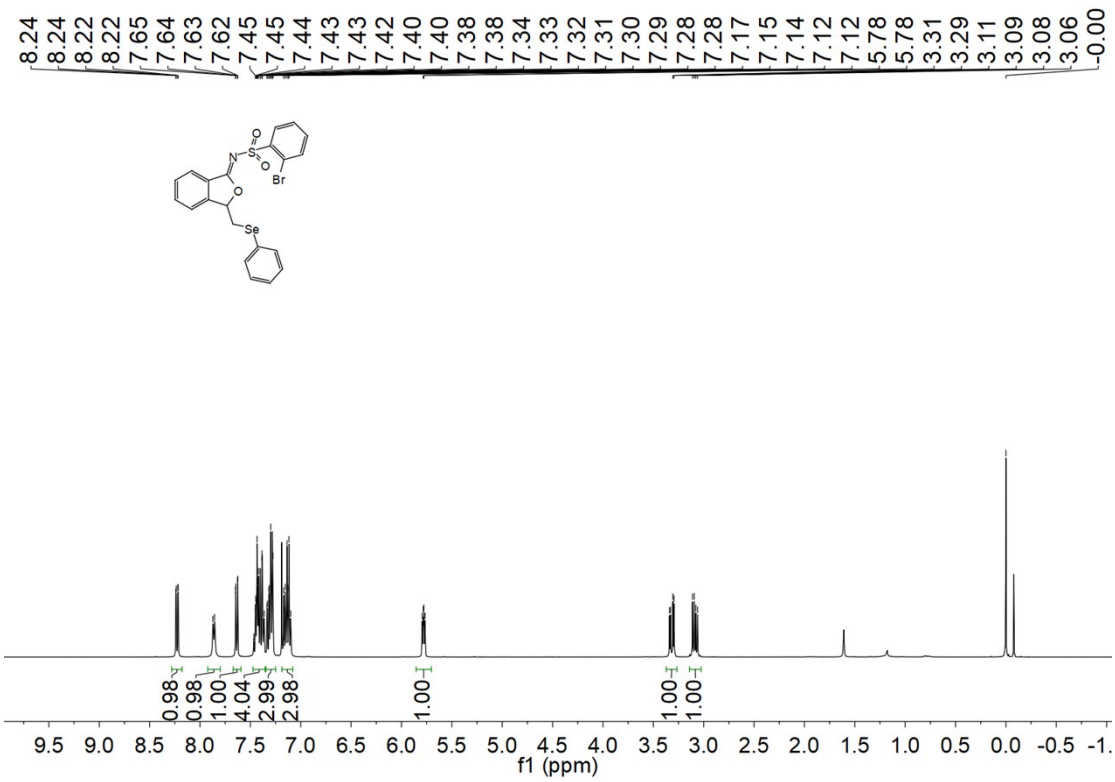
^{1}H NMR of compound **3k**



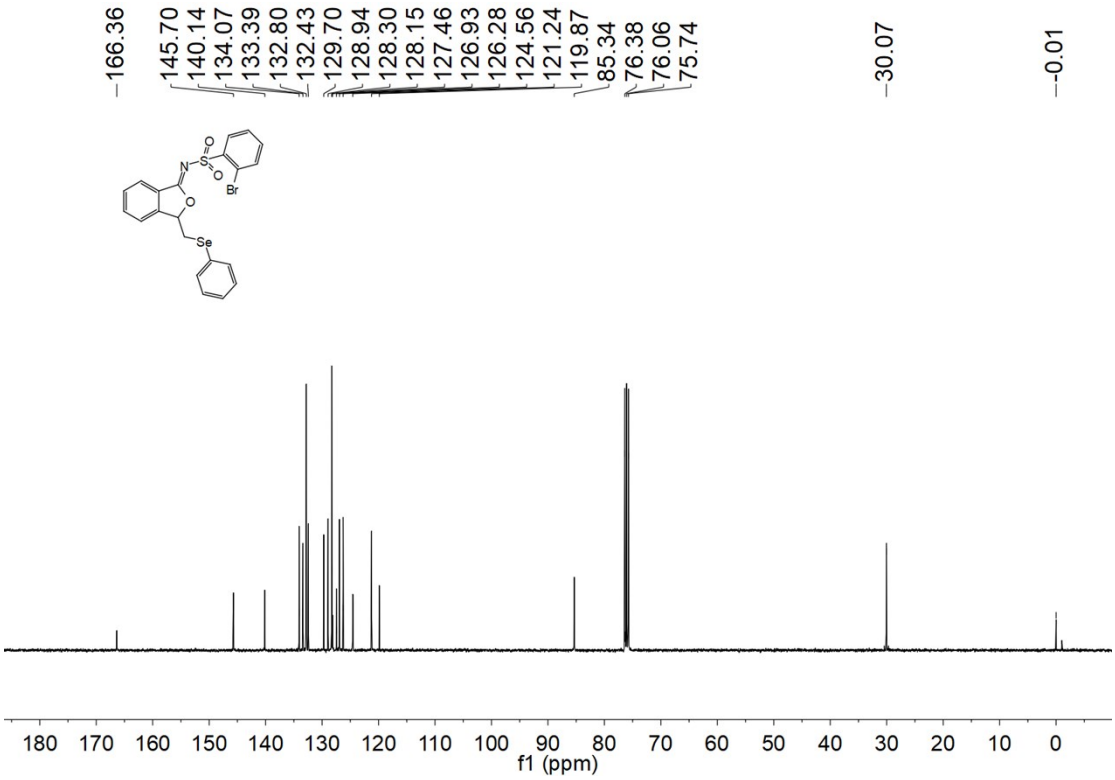
^{1}H NMR of compound **3k**



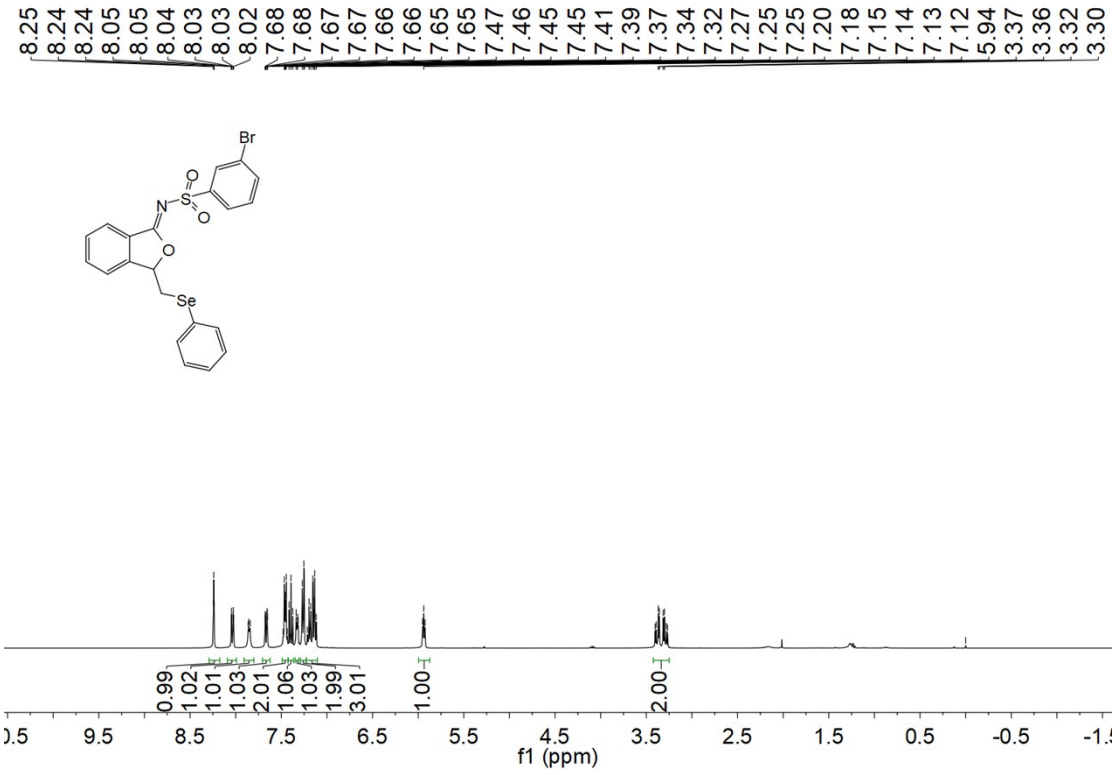
^{1}H NMR of compound **3l**



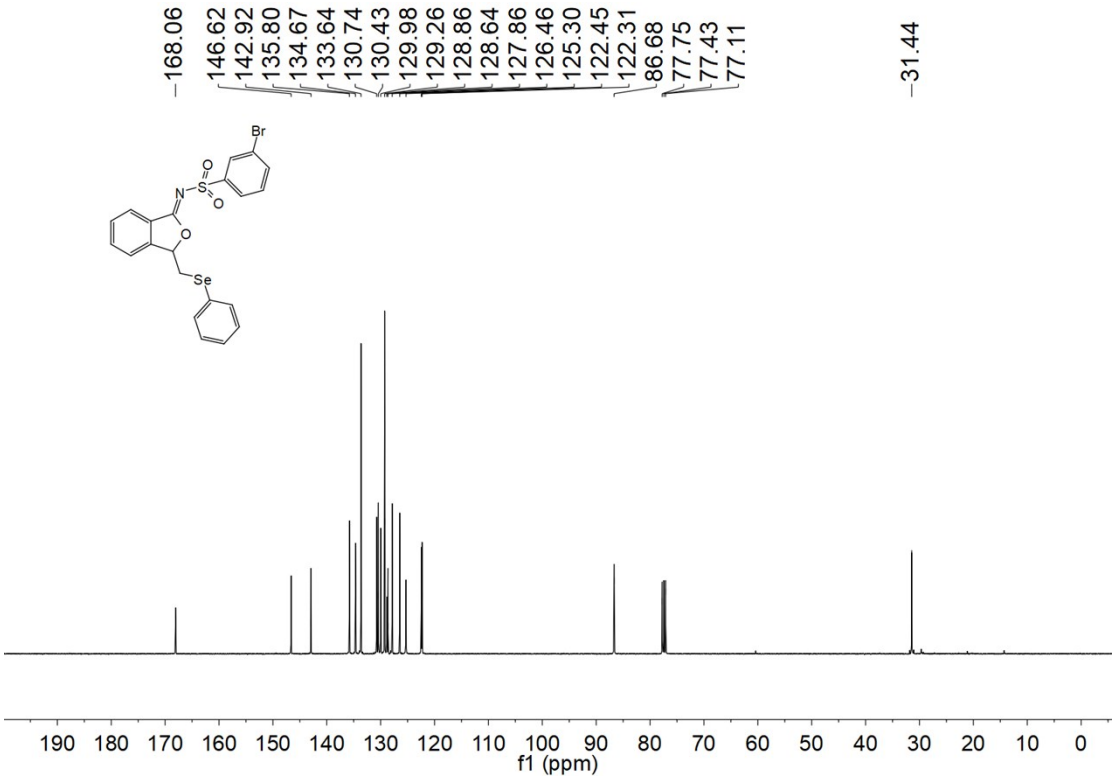
^{13}C NMR of compound **3l**



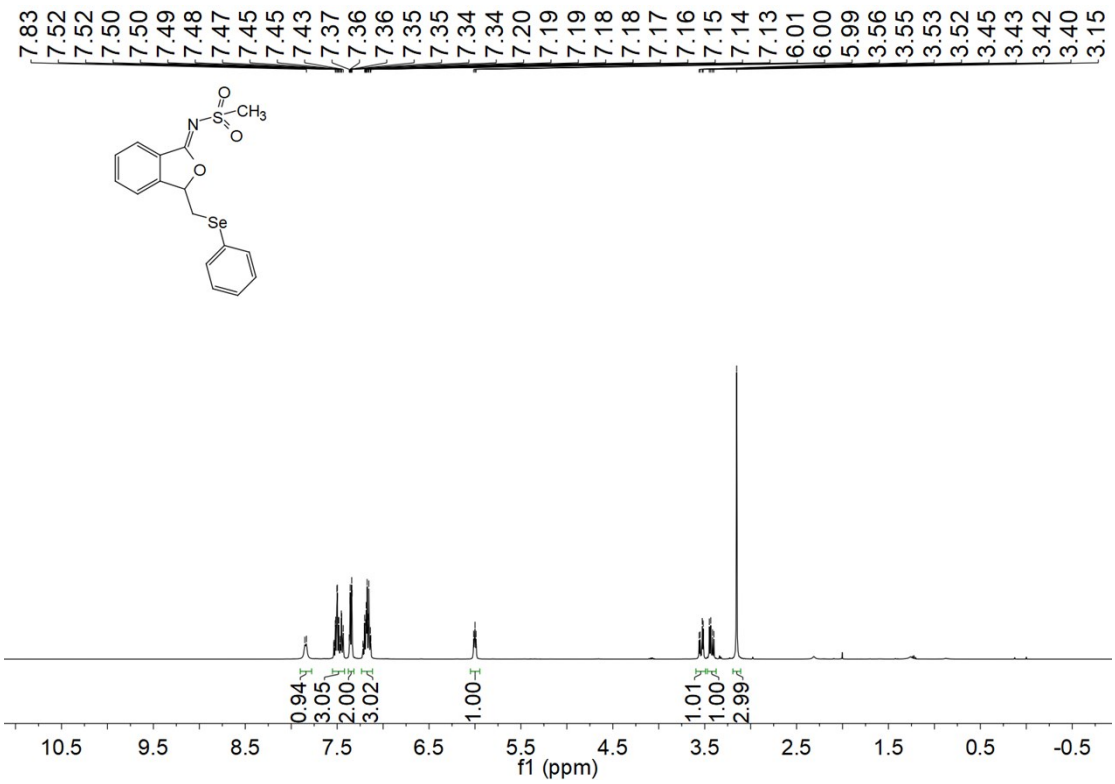
^{1}H NMR of compound **3m**



^{13}C NMR of compound **3m**



^{1}H NMR of compound **3n**



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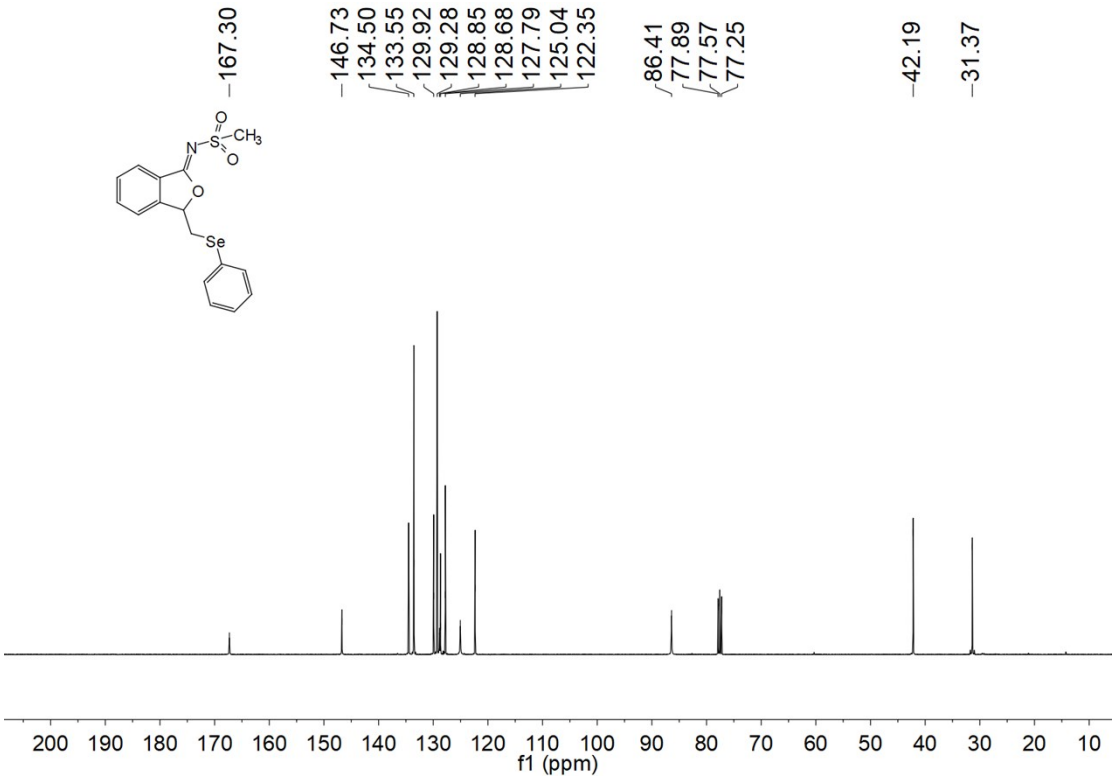
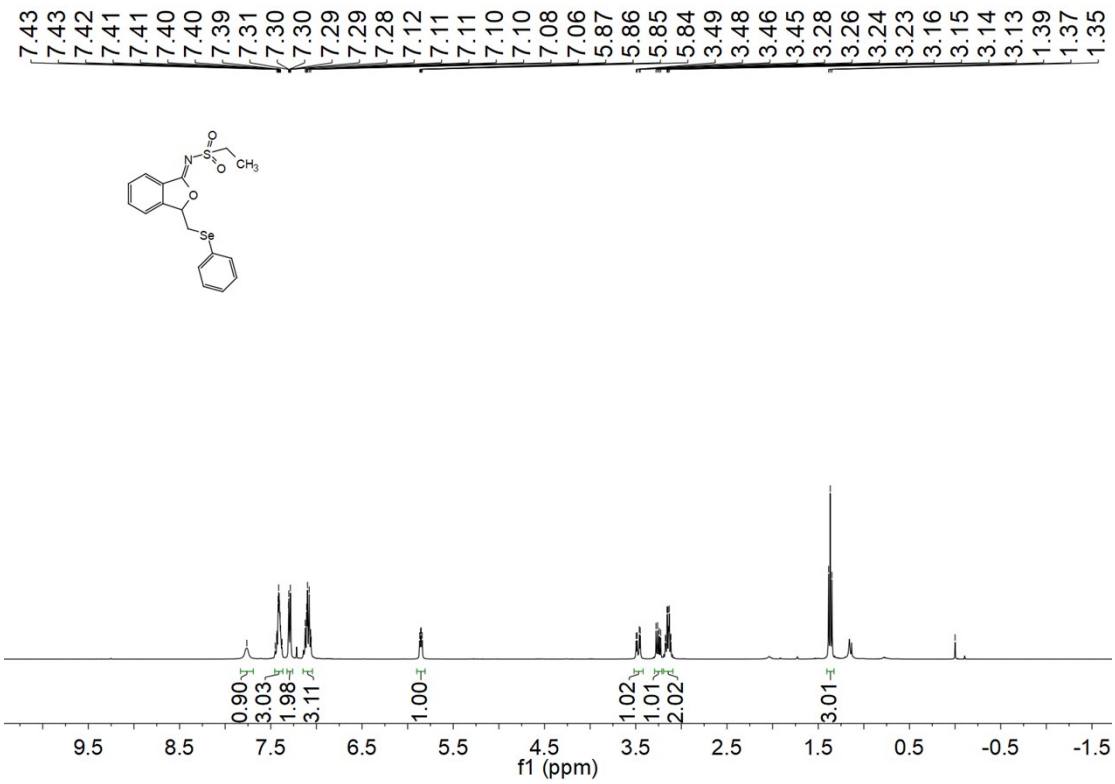
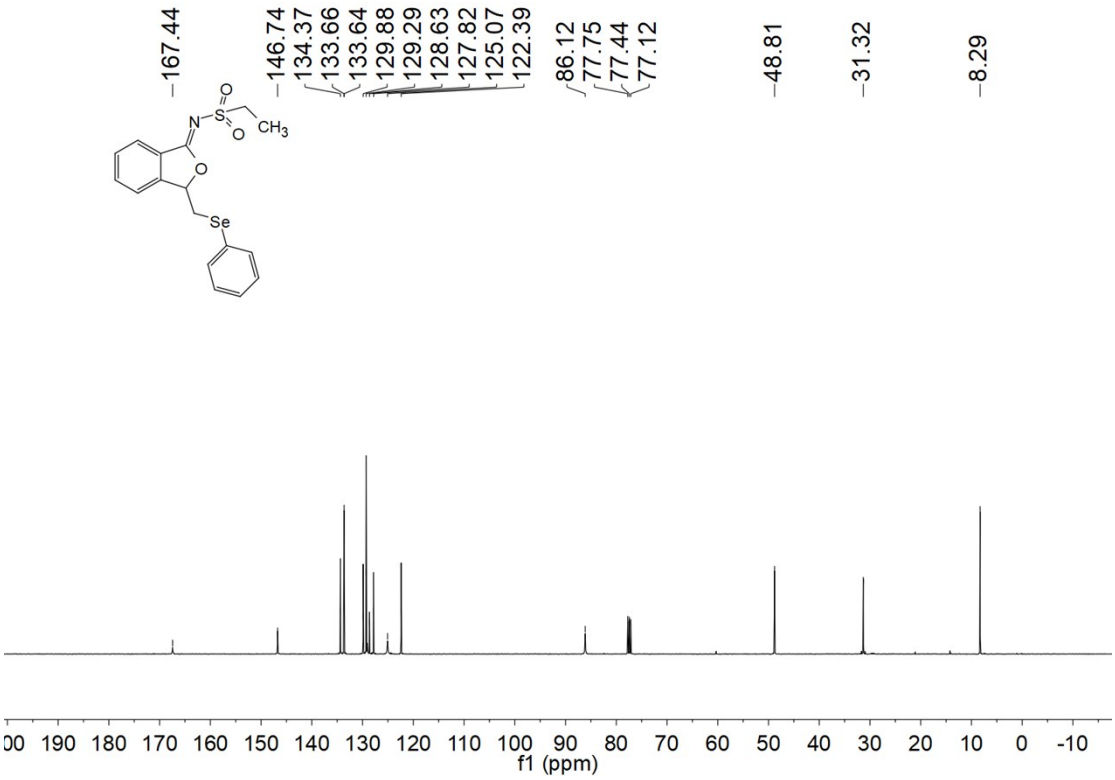


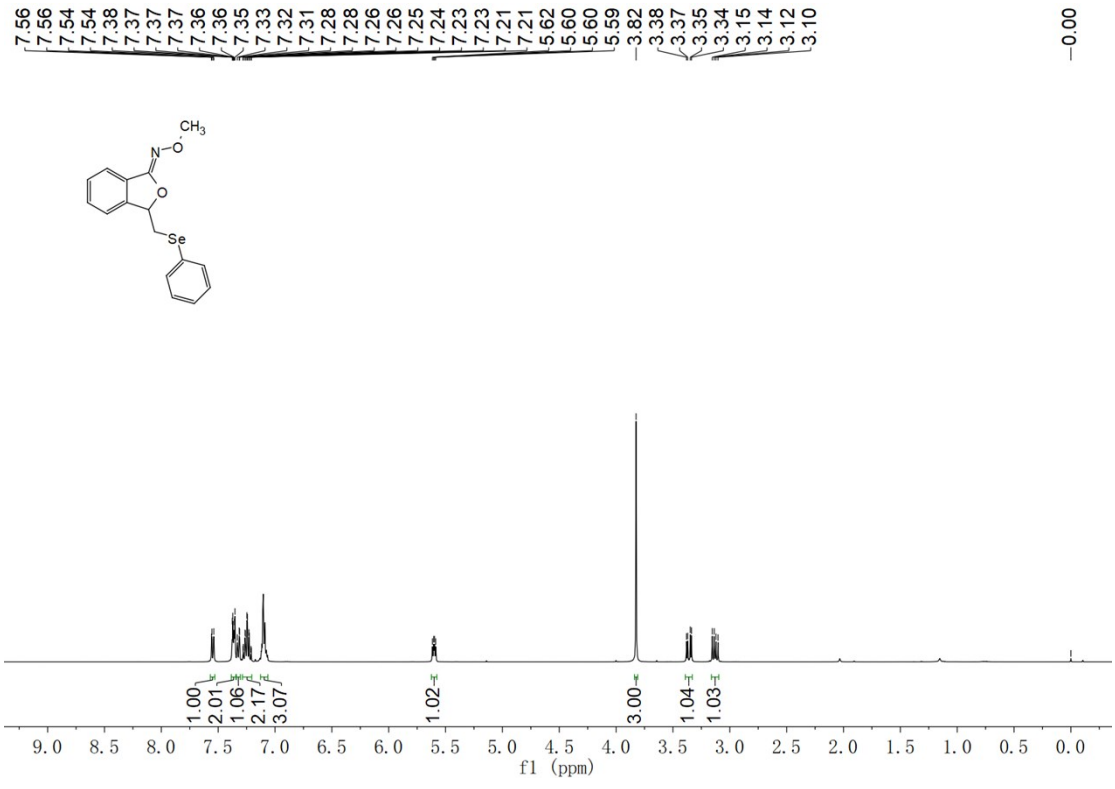
^{1}H NMR of compound **3o**



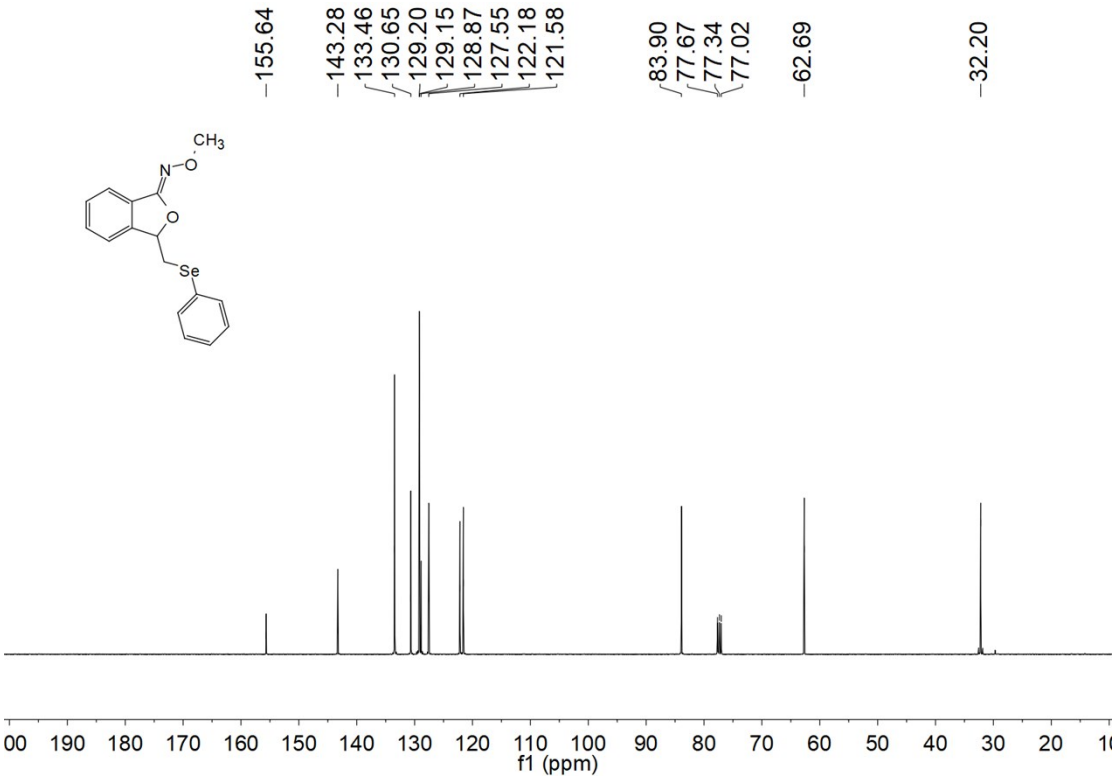
^{13}C NMR of compound **3o**



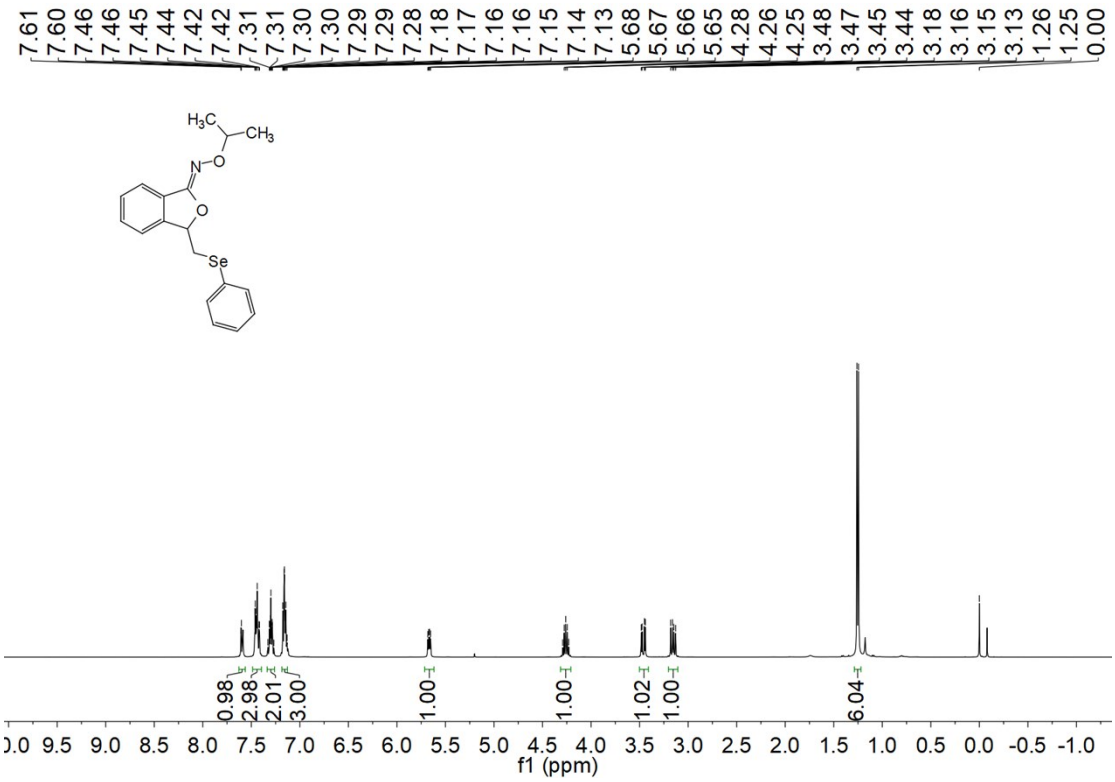
^{1}H NMR of compound **3p**



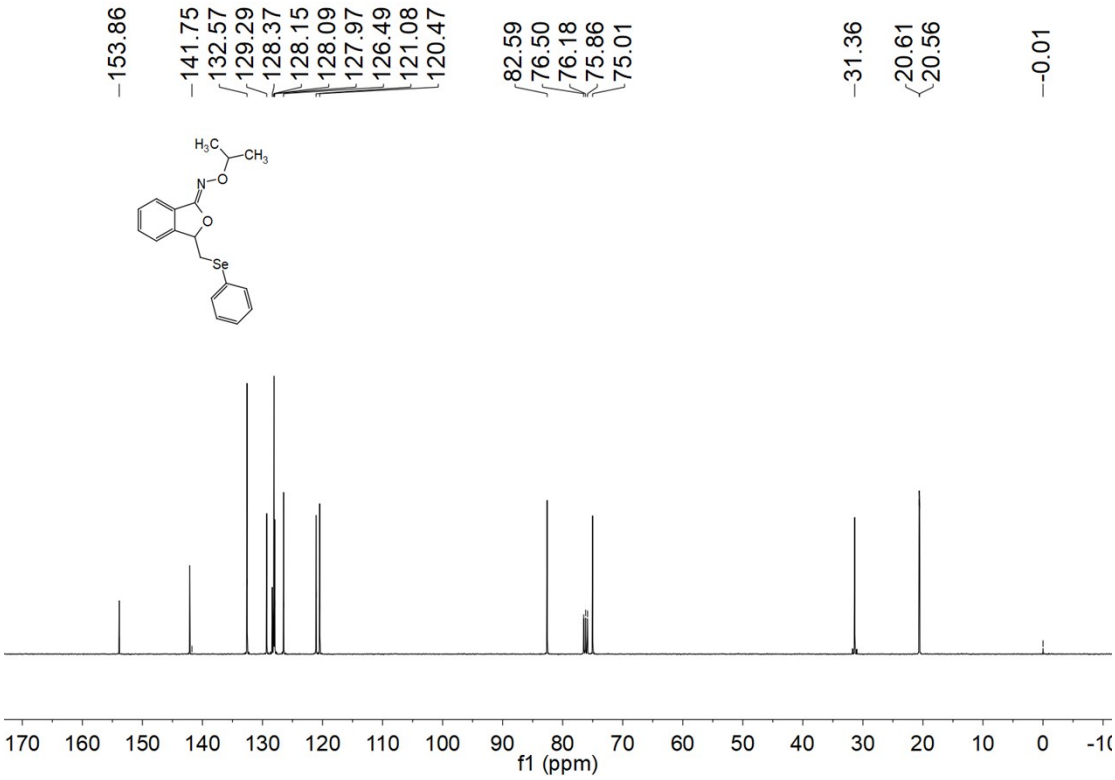
^{13}C NMR of compound **3p**



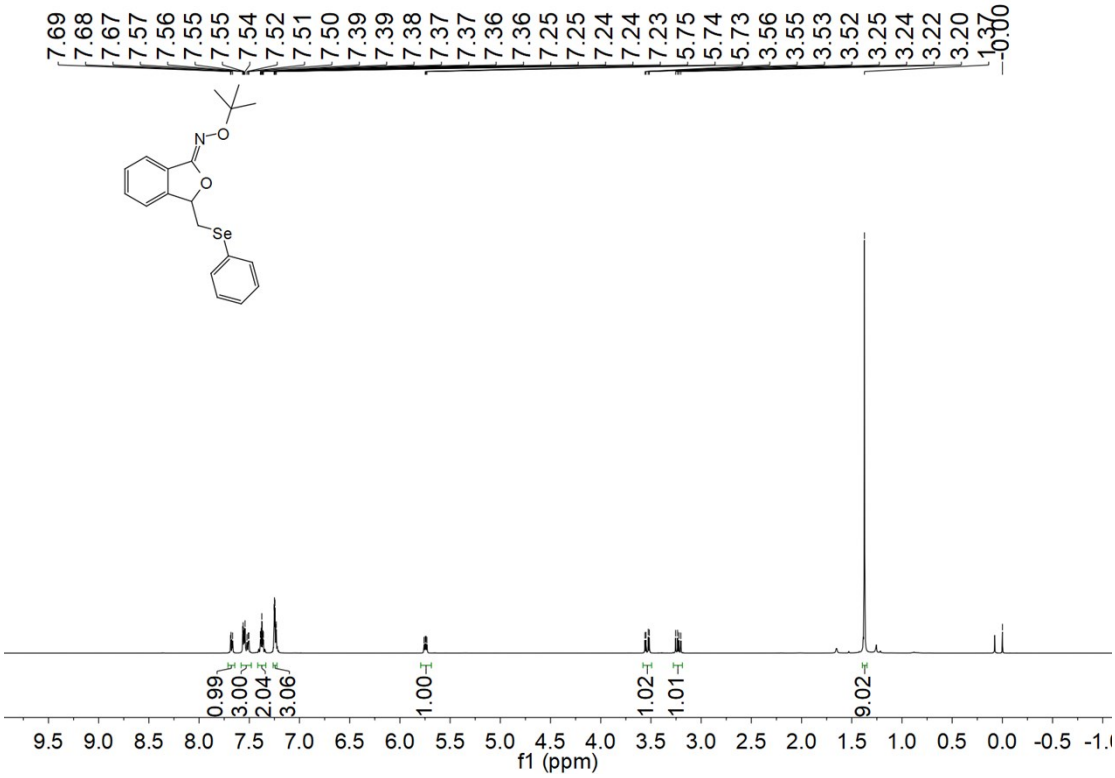
^{1}H NMR of compound **3q**



^{13}C NMR of compound **3q**



^{1}H NMR of compound **3r**



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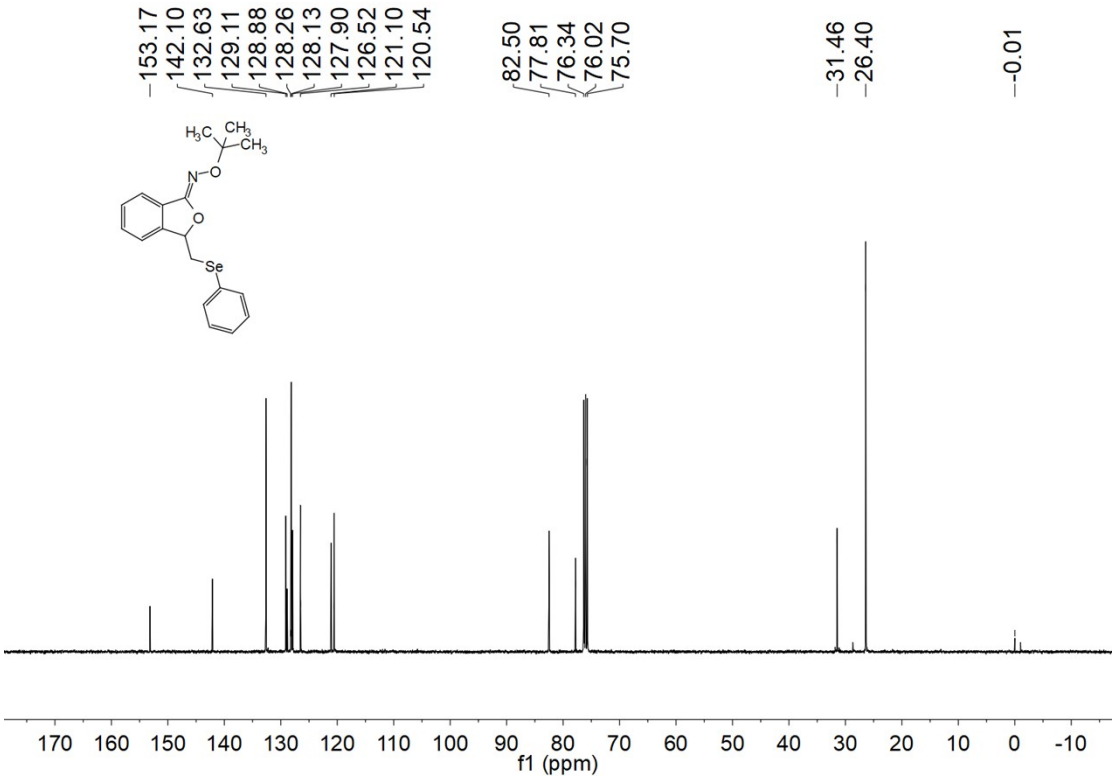
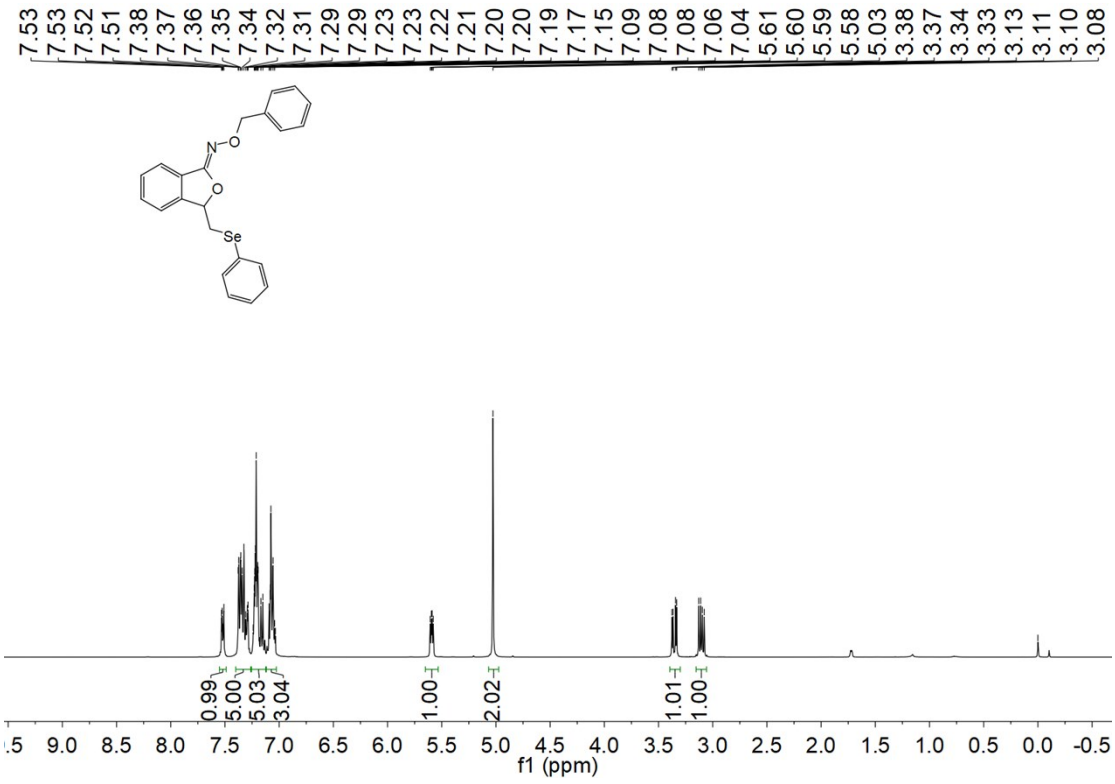
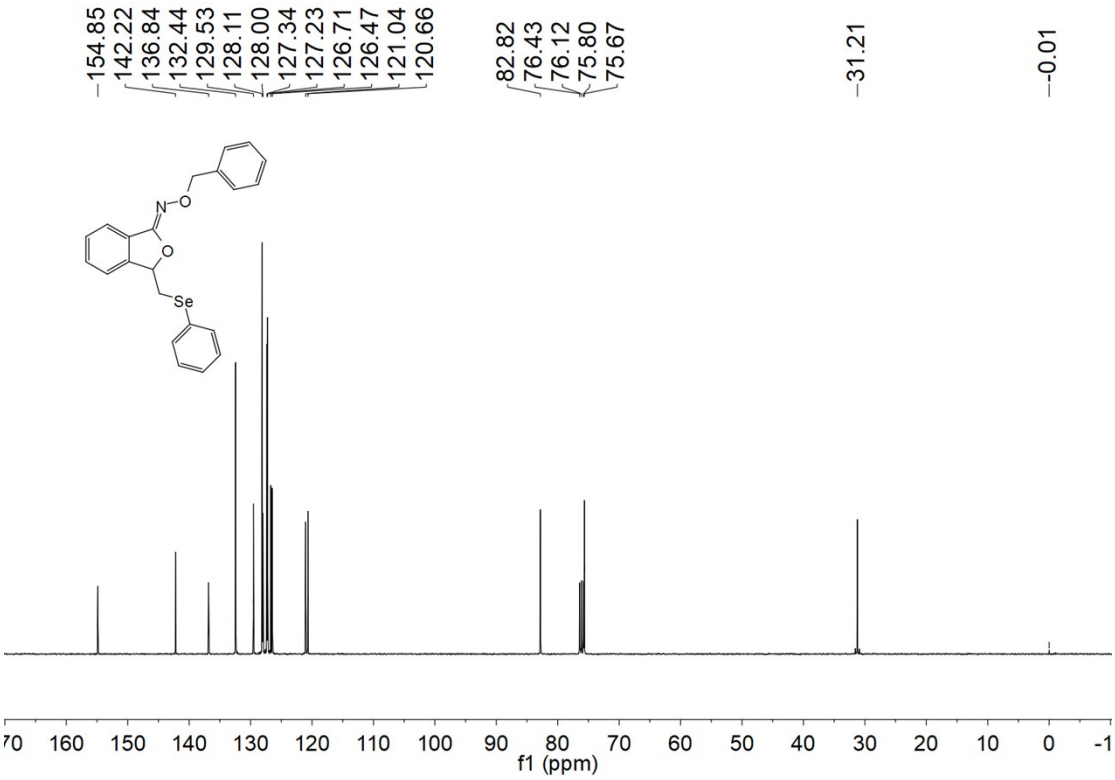


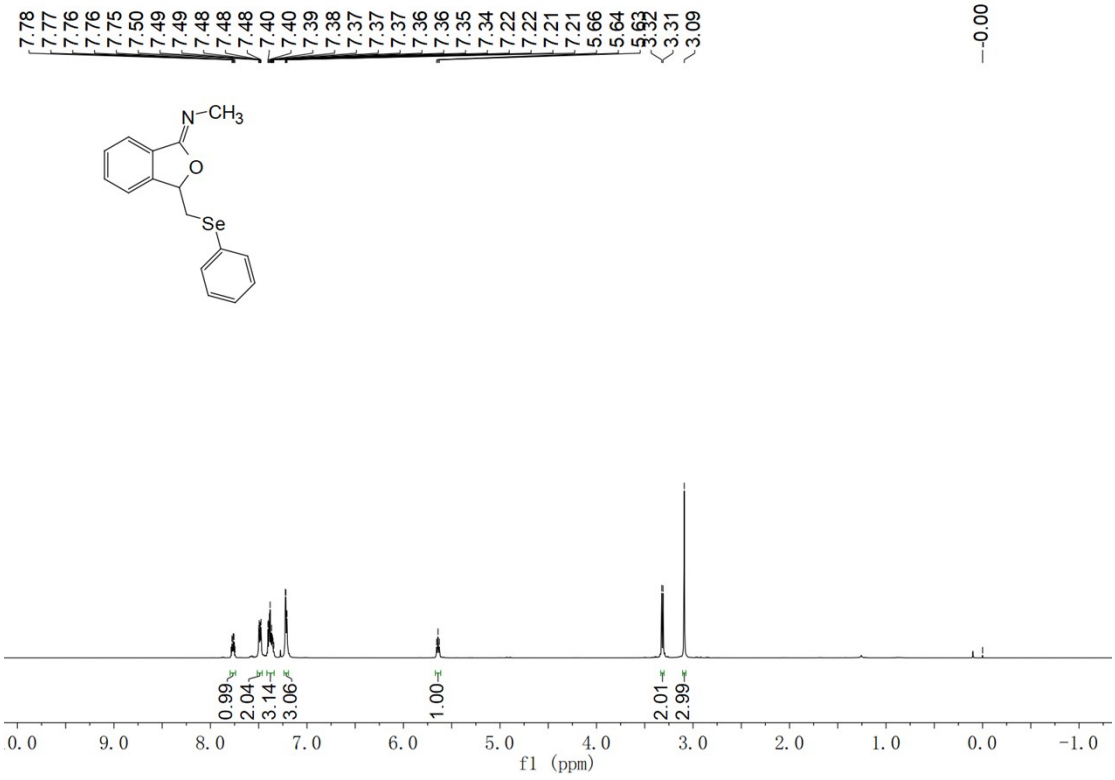
^{1}H NMR of compound **3s**



^{13}C NMR of compound **3s**



^{1}H NMR of compound **3t**



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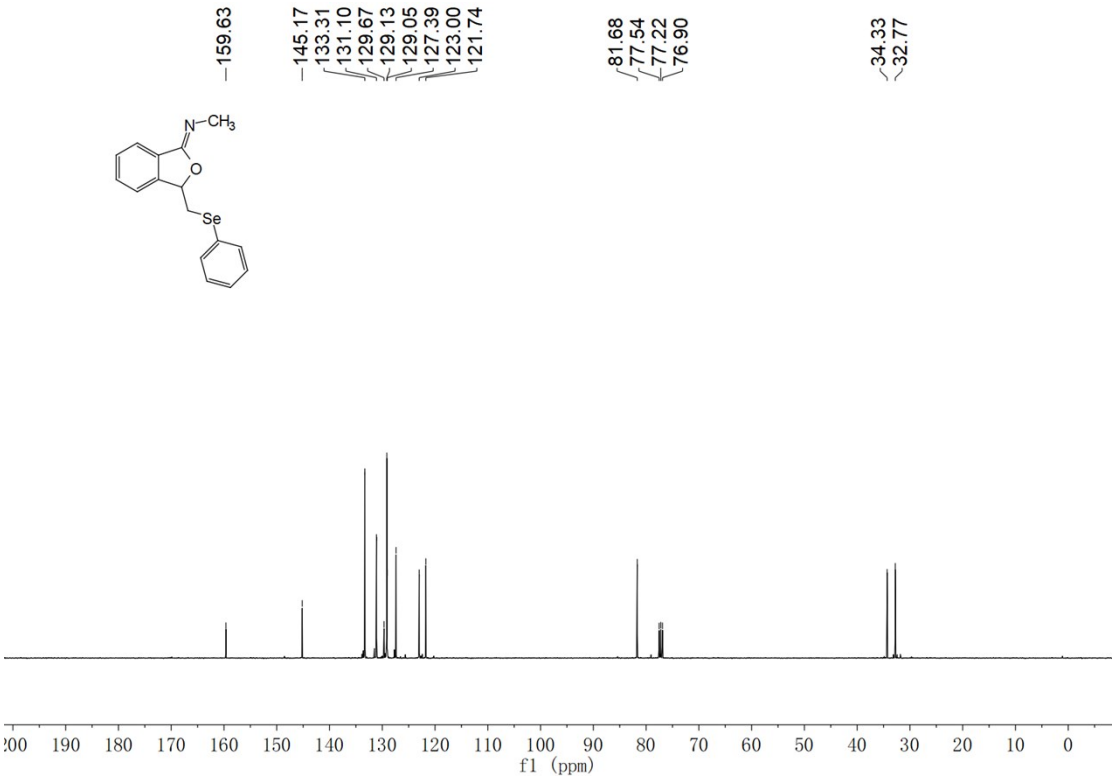
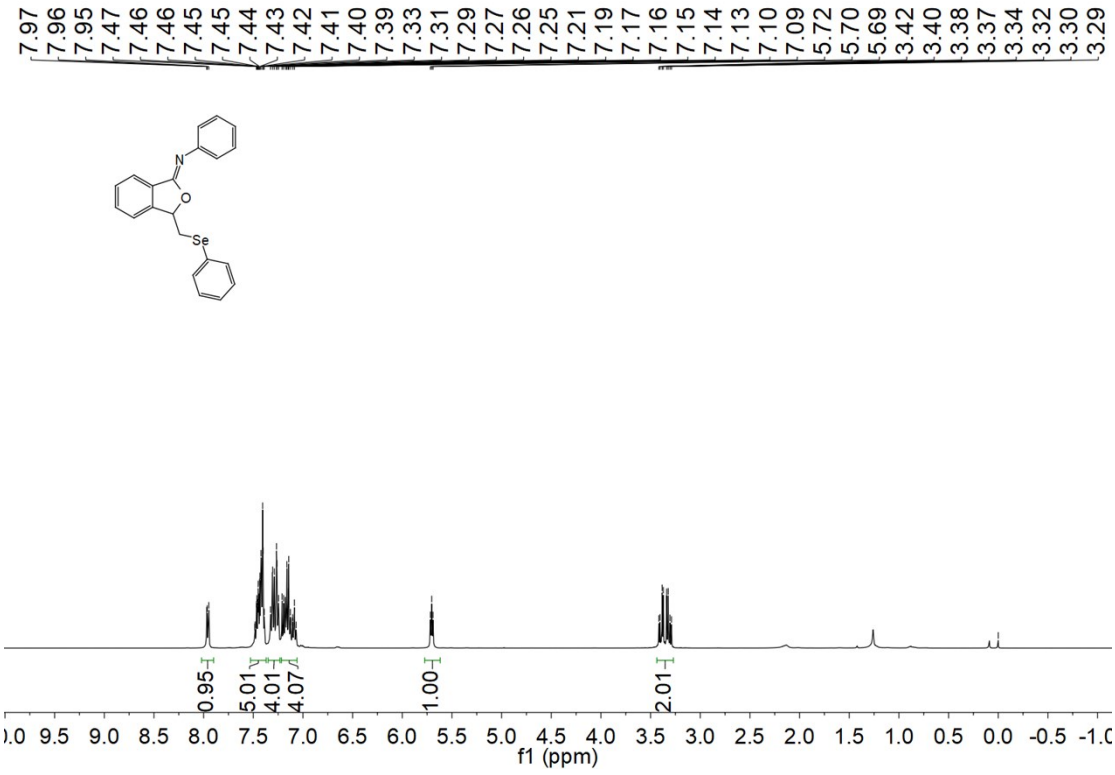
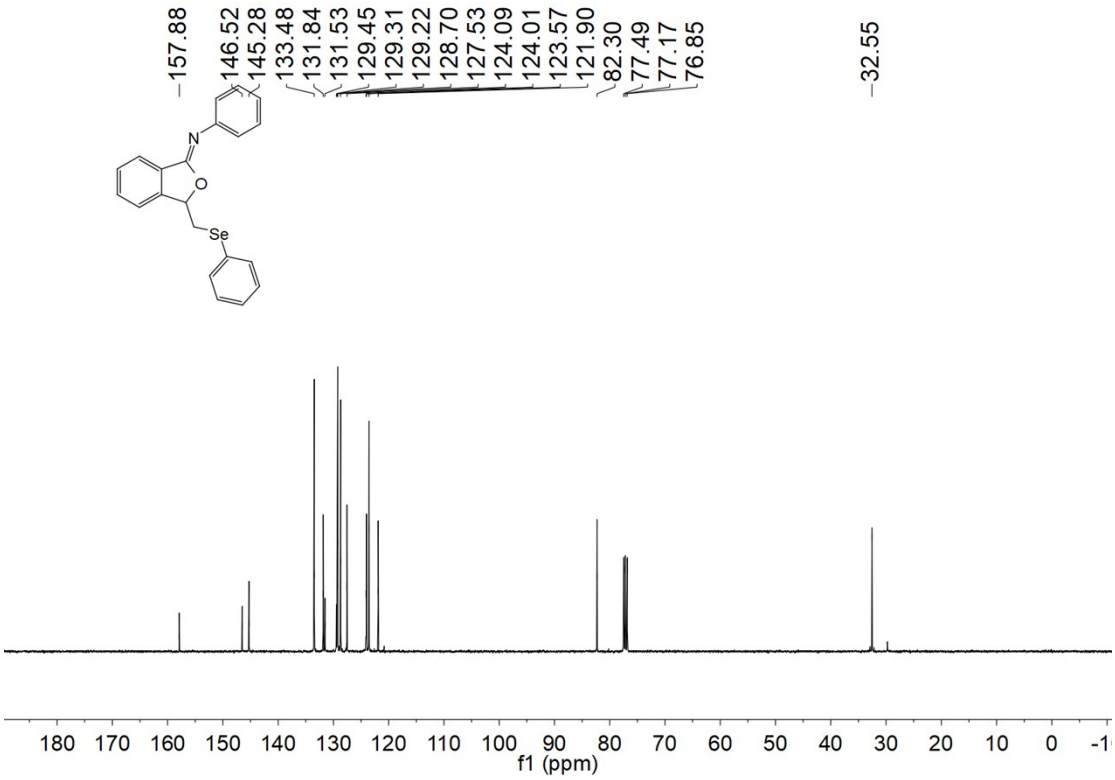


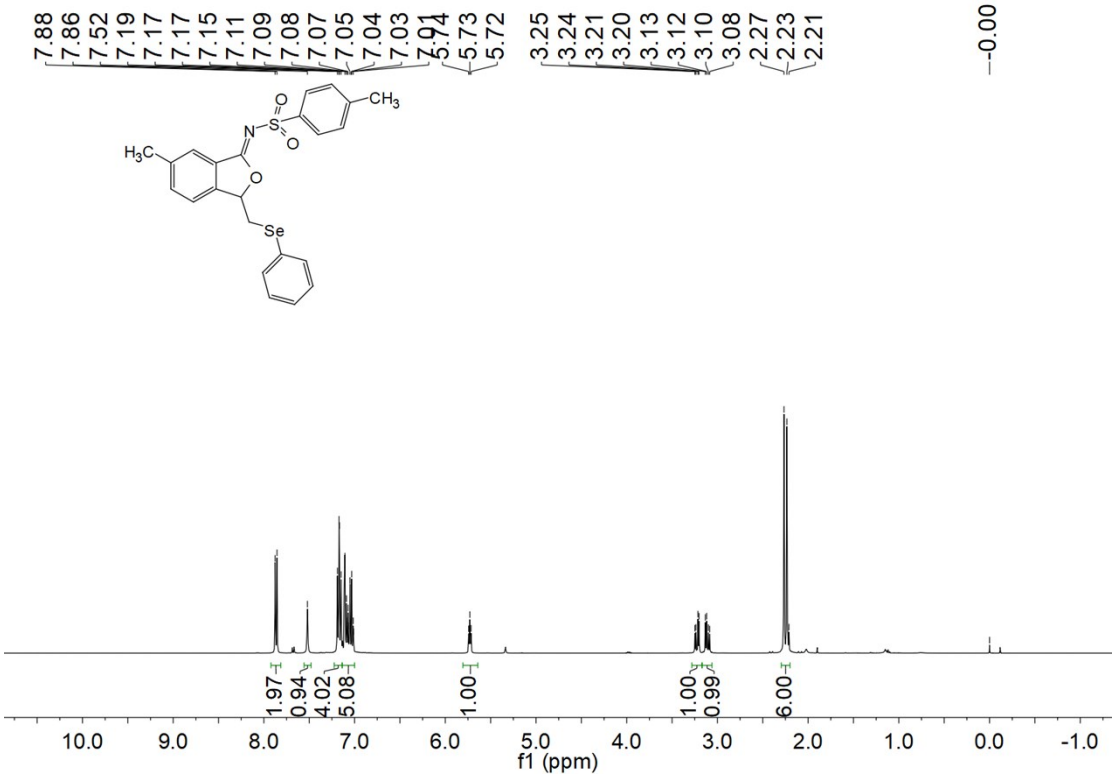
^{1}H NMR of compound **3u**



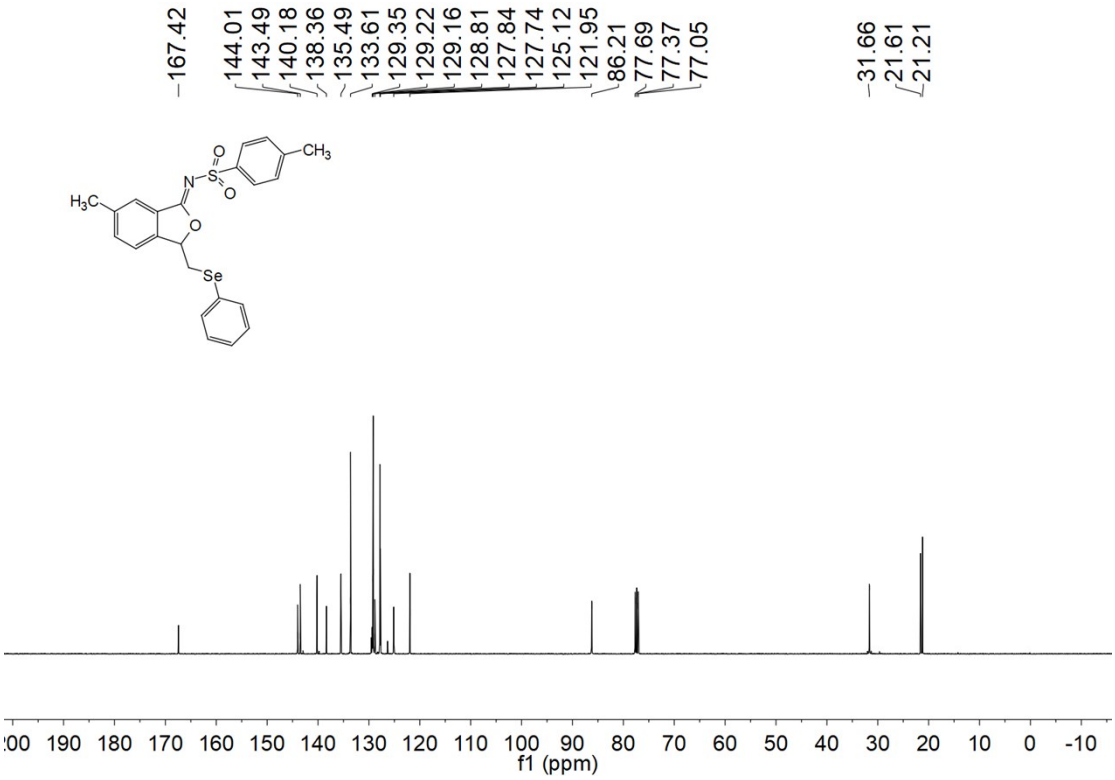
^{13}C NMR of compound **3u**



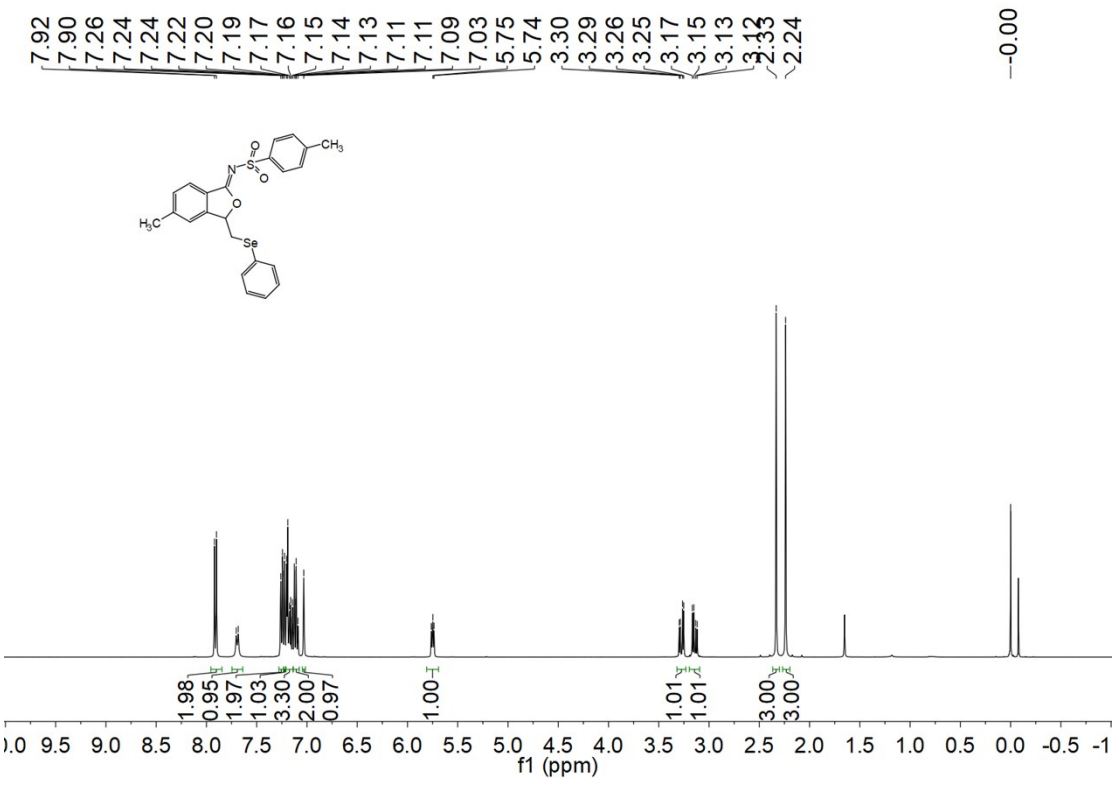
^{1}H NMR of compound **3v**



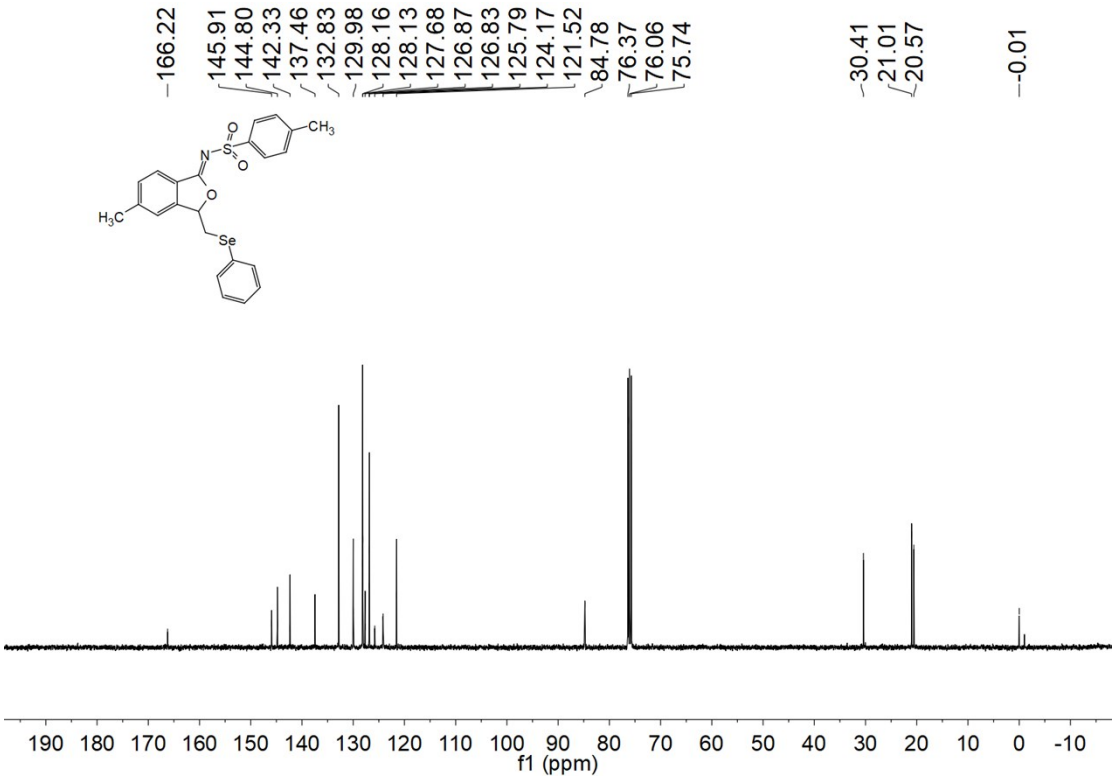
^{13}C NMR of compound **3v**



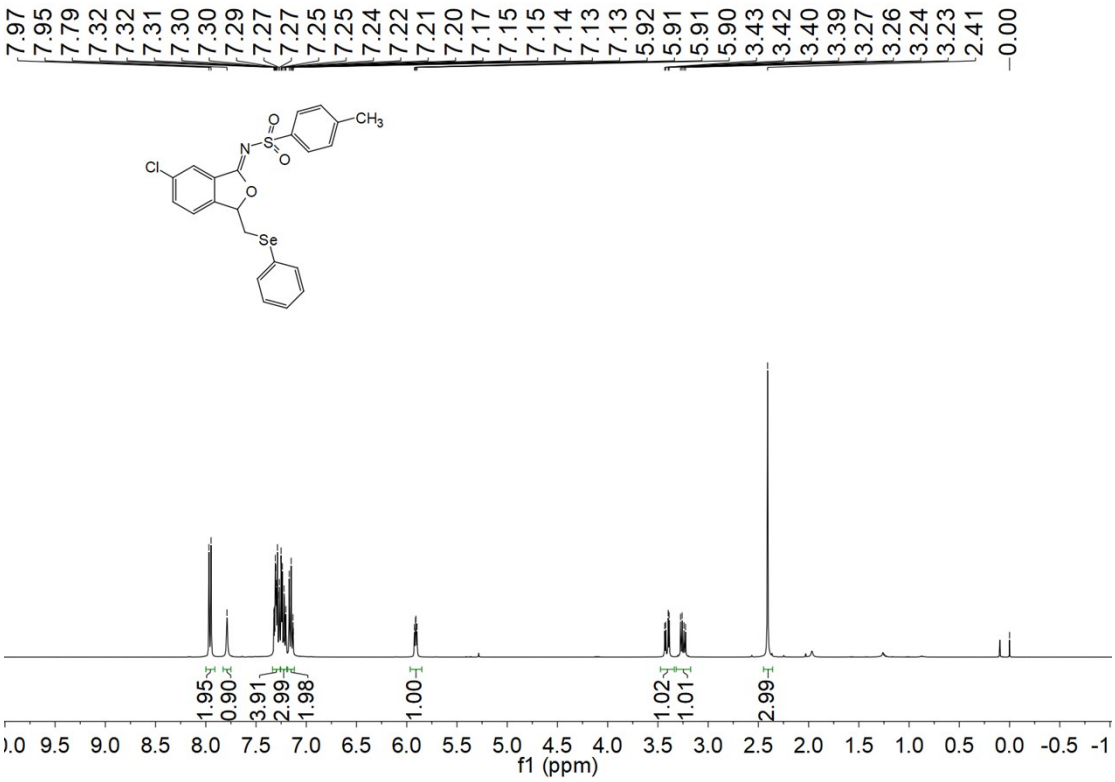
^{1}H NMR of compound **3w**



^{13}C NMR of compound **3w**



^{1}H NMR of compound **3x**



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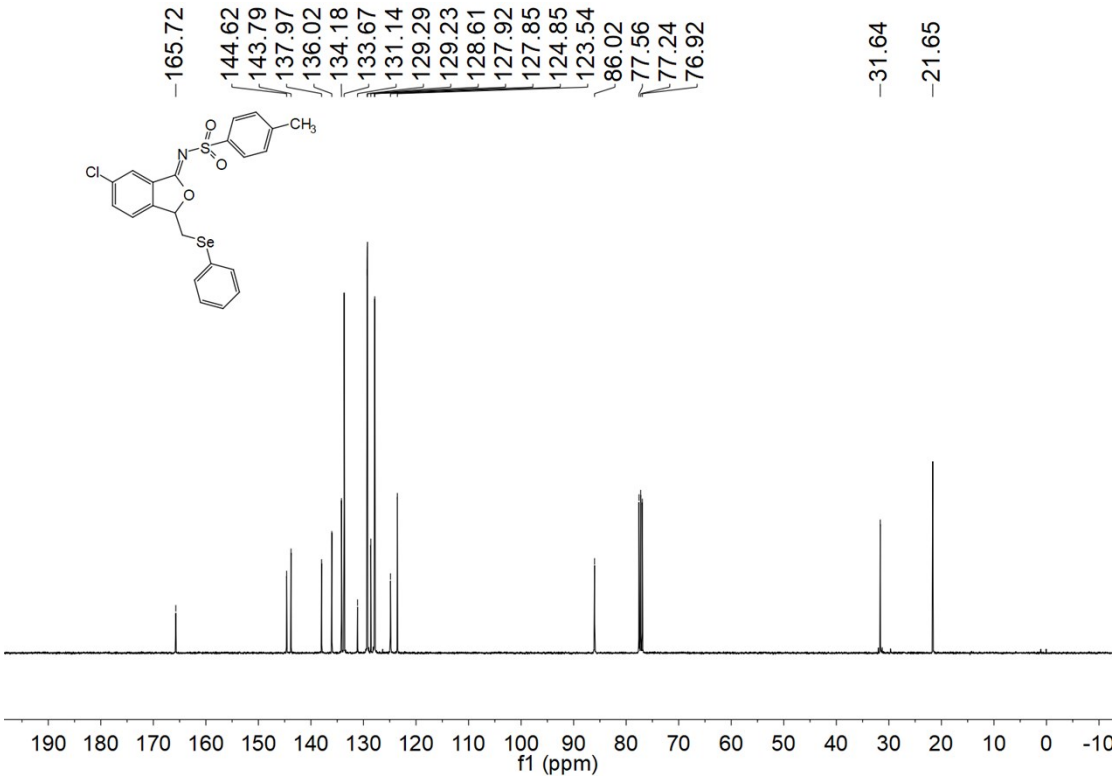
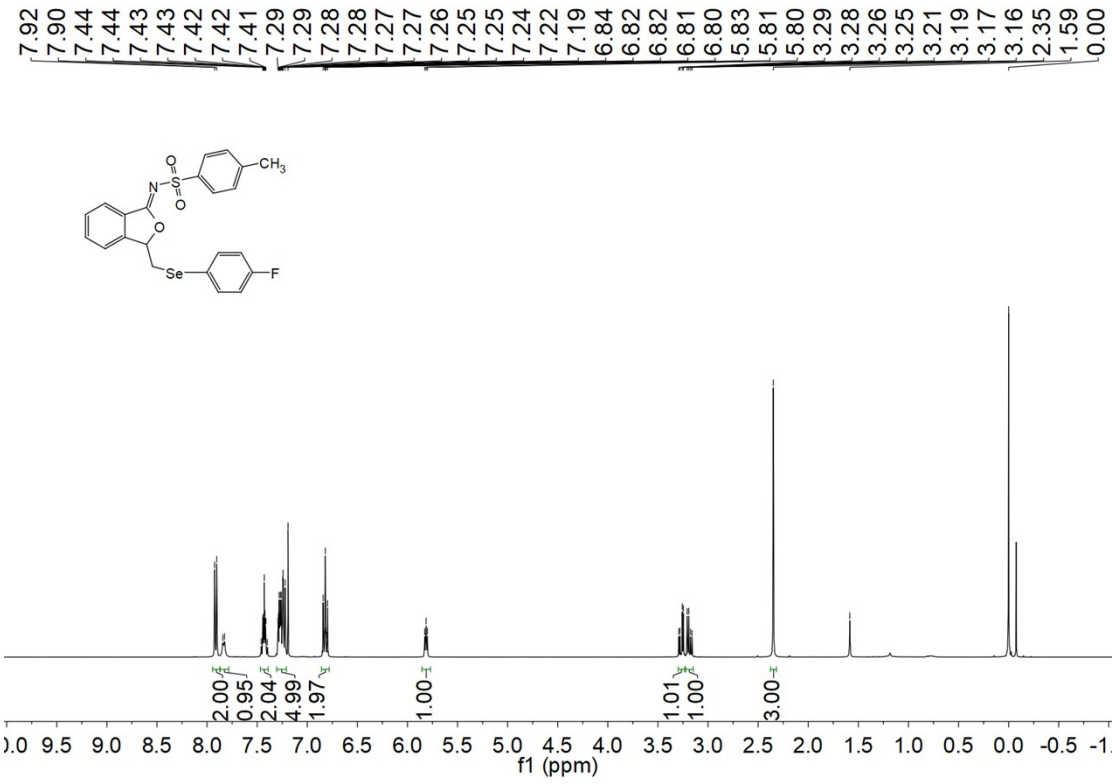


^{1}H NMR of compound **3y**



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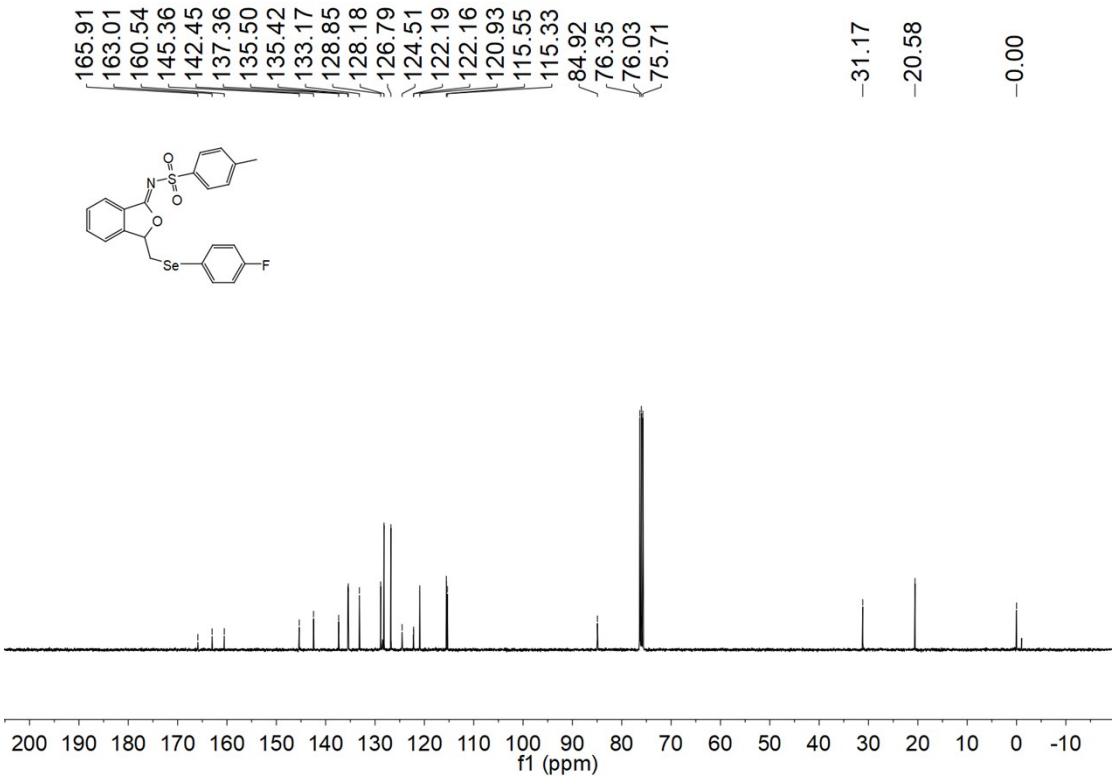
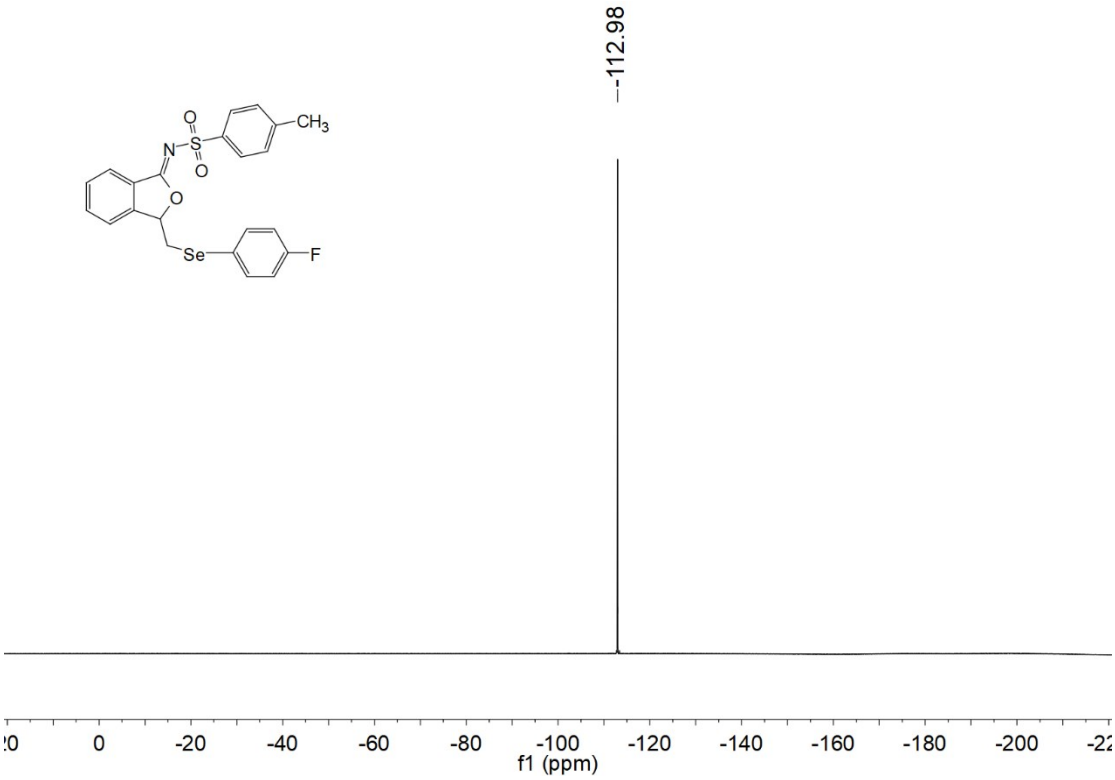
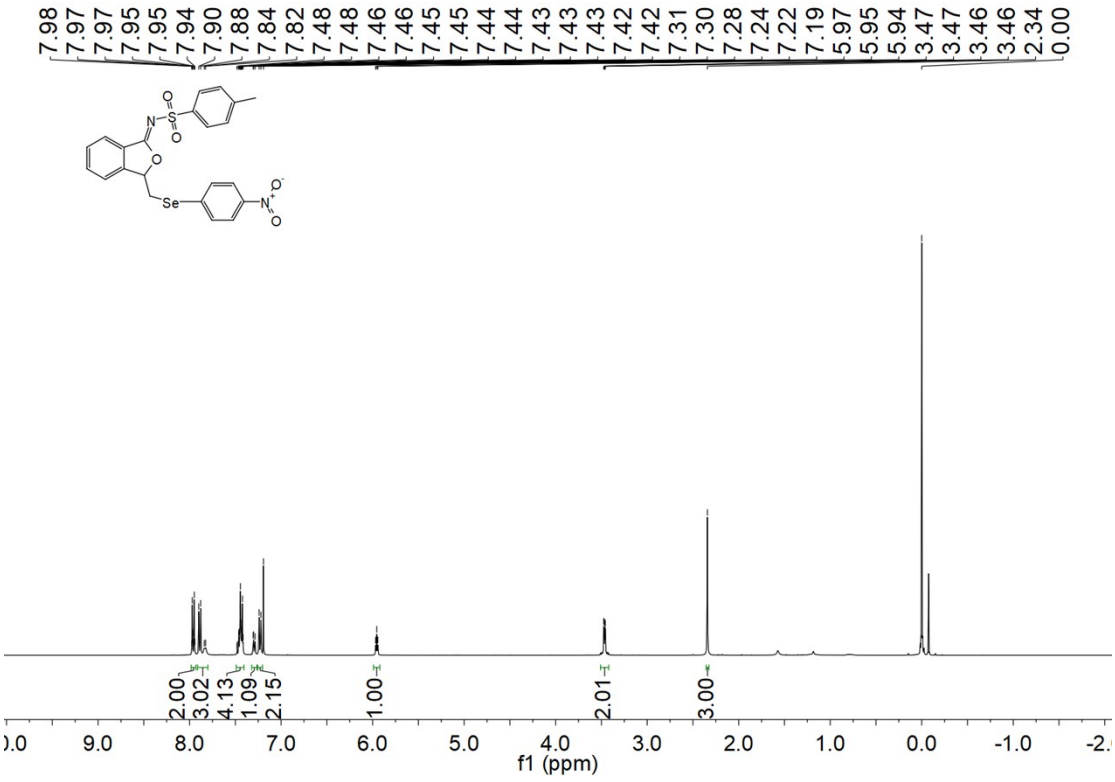


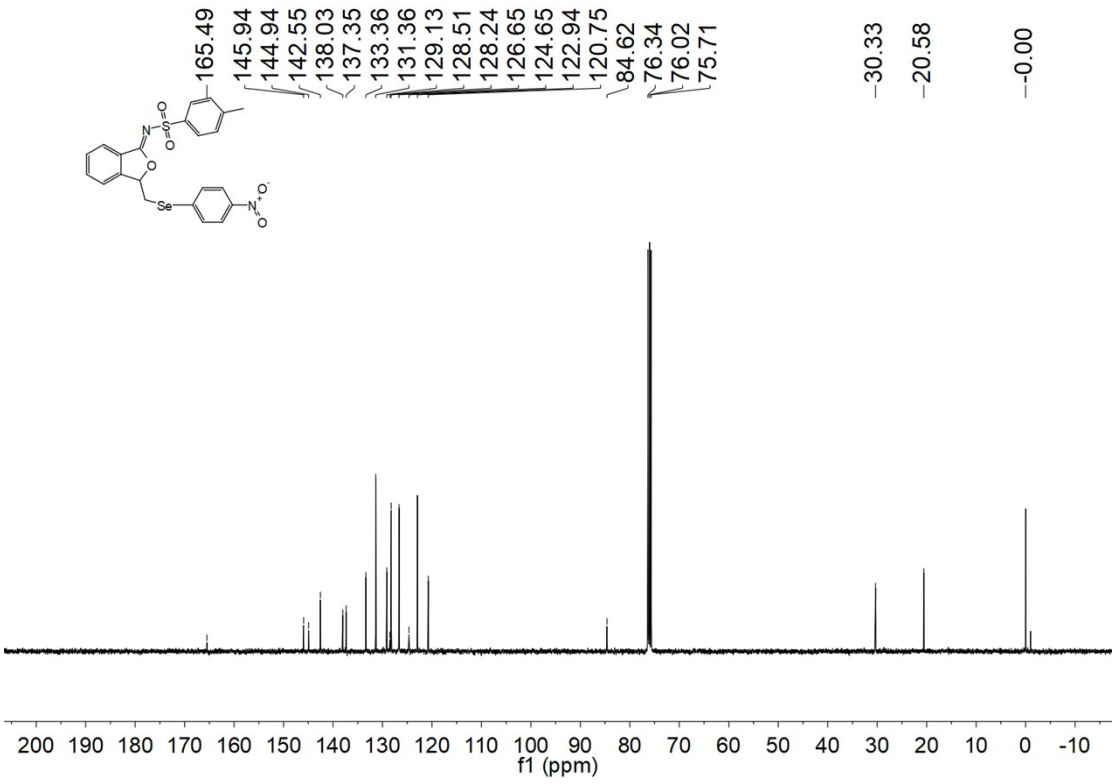
^{19}F NMR of compound **3y**



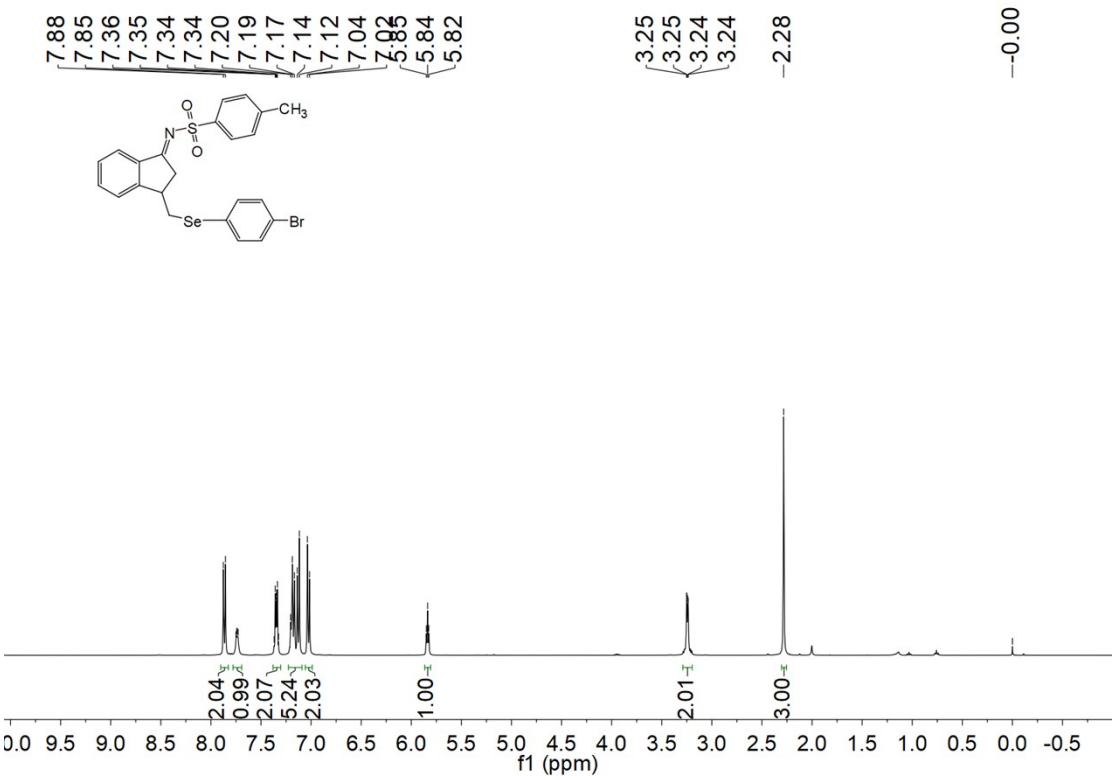
^{1}H NMR of compound **3z**



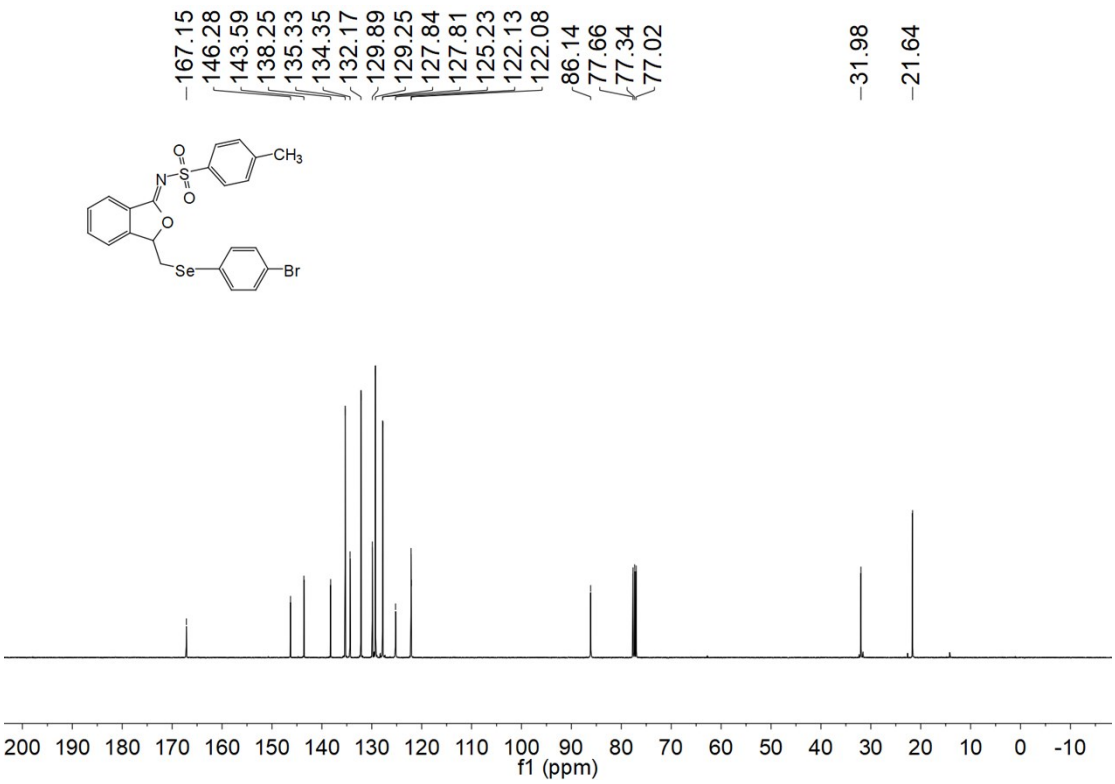
^{13}C NMR of compound **3z**



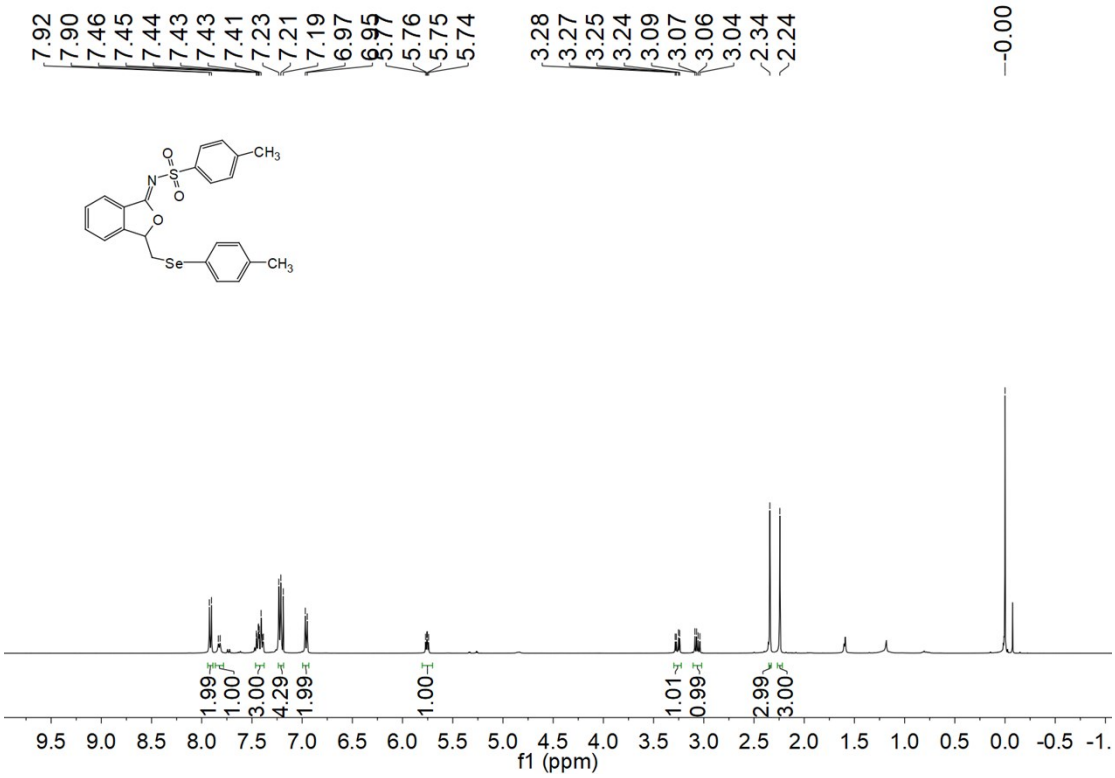
^{1}H NMR of compound **3aa**



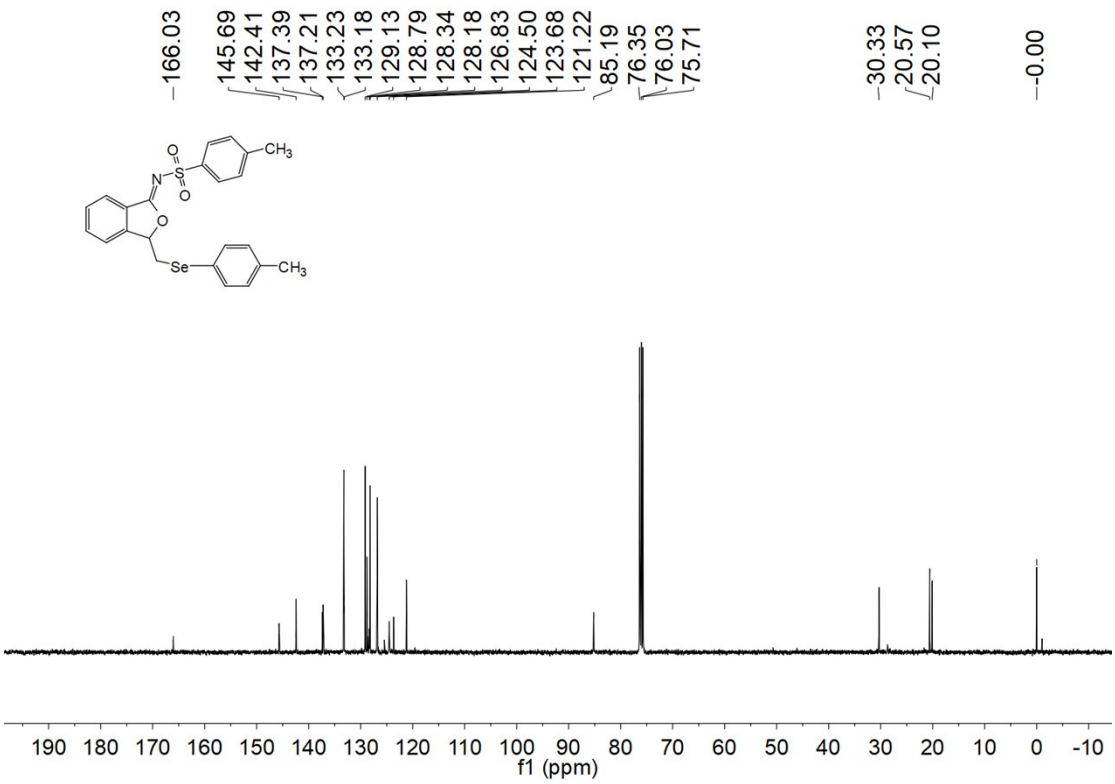
^{13}C NMR of compound **3aa**



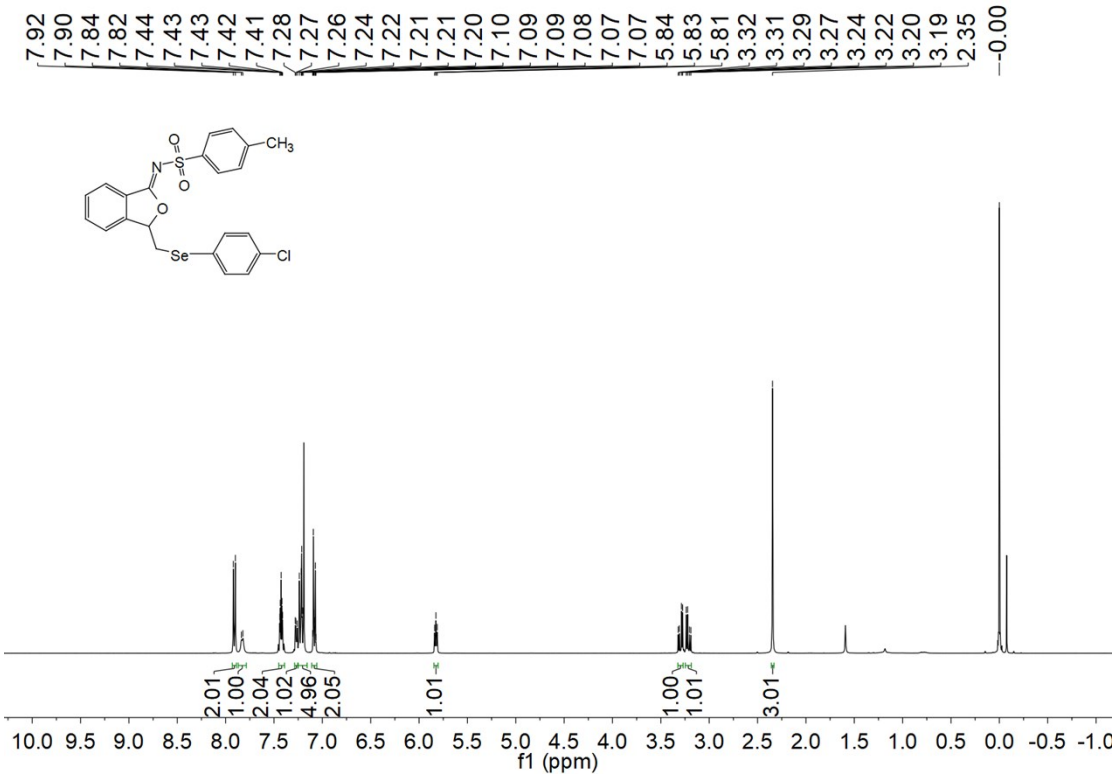
^{1}H NMR of compound **3ab**



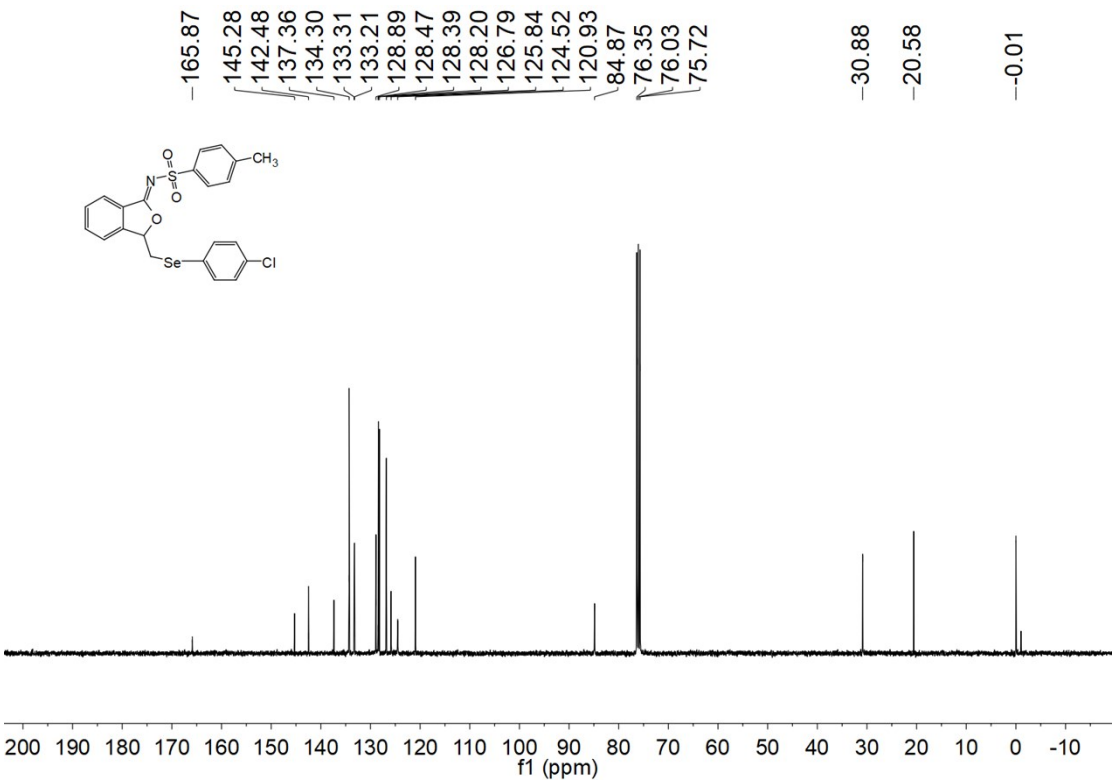
^{13}C NMR of compound **3ab**



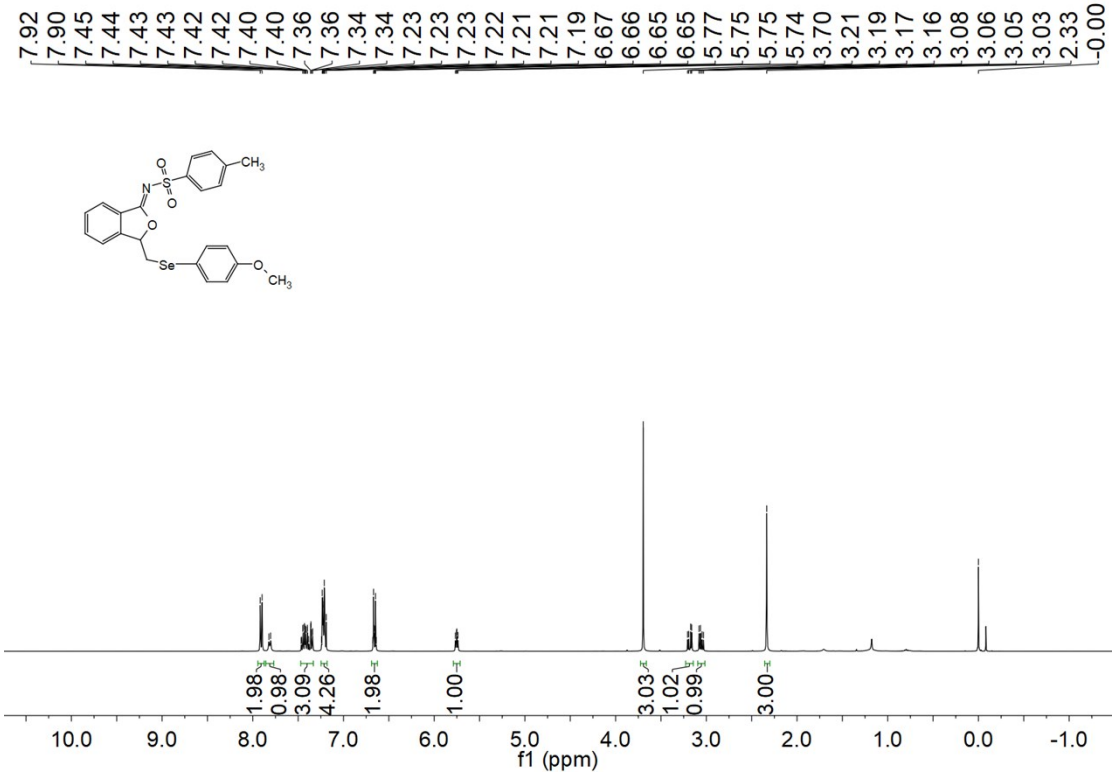
^{1}H NMR of compound **3ac**



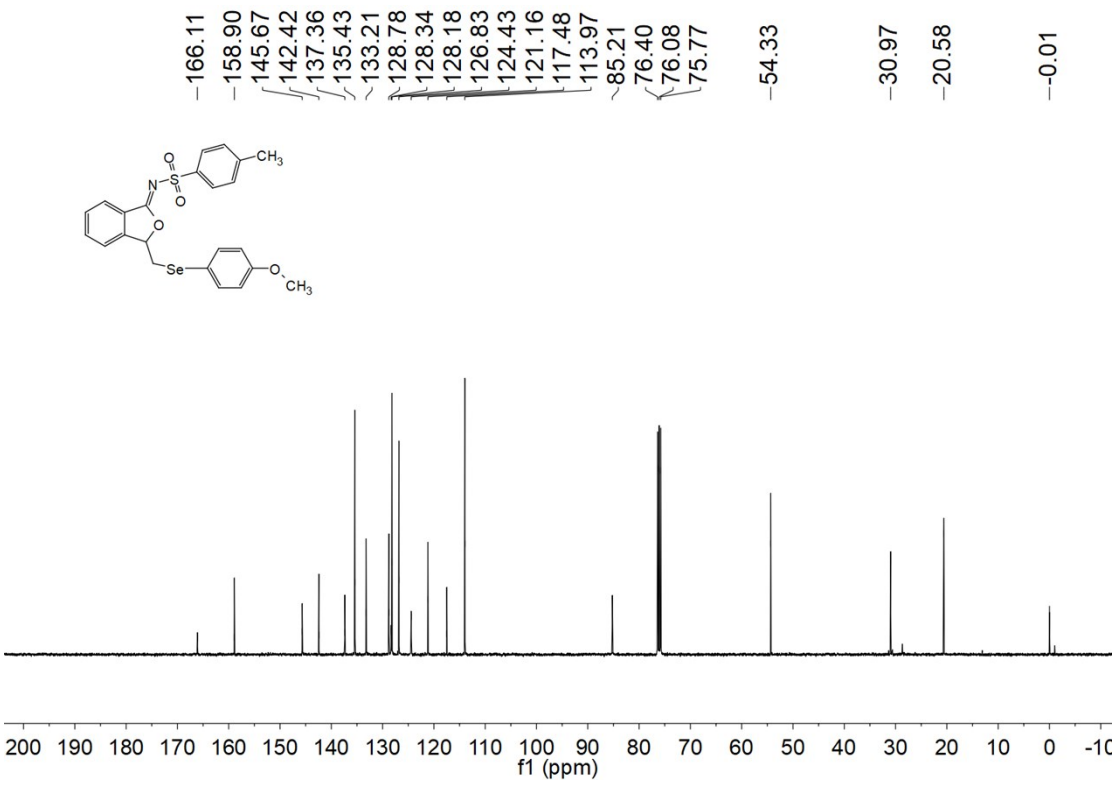
^{13}C NMR of compound **3ac**



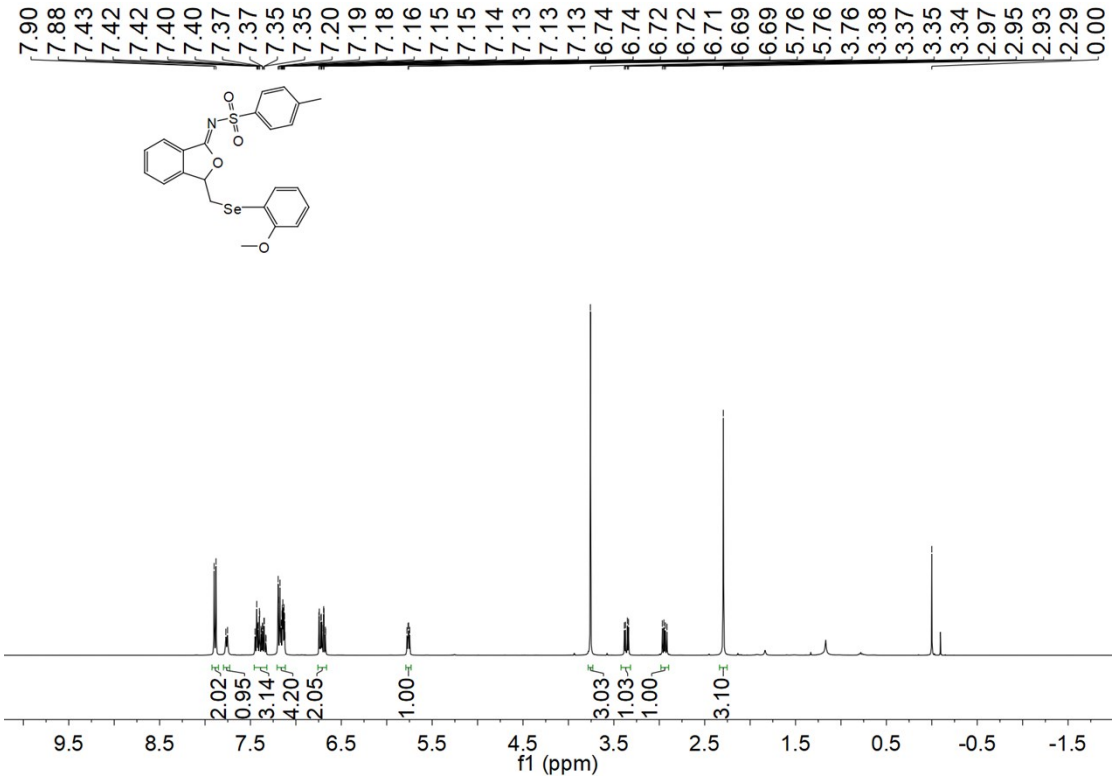
^{1}H NMR of compound **3ad**



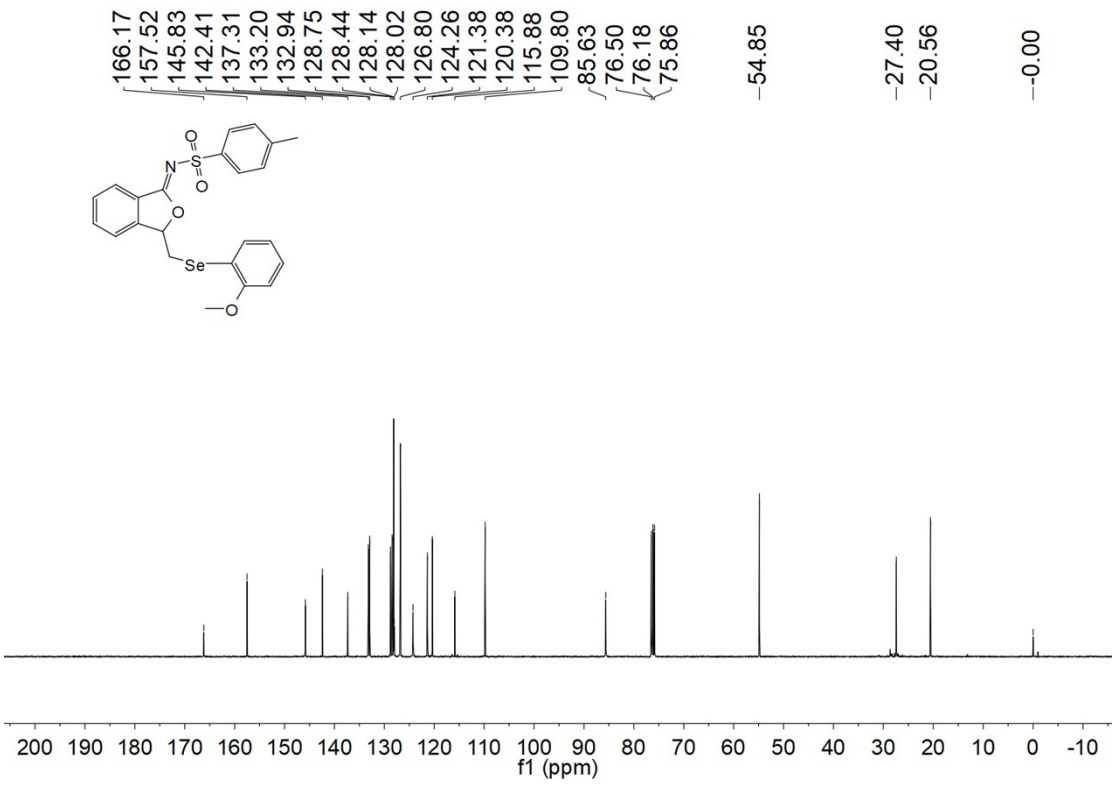
^{13}C NMR of compound **3ad**



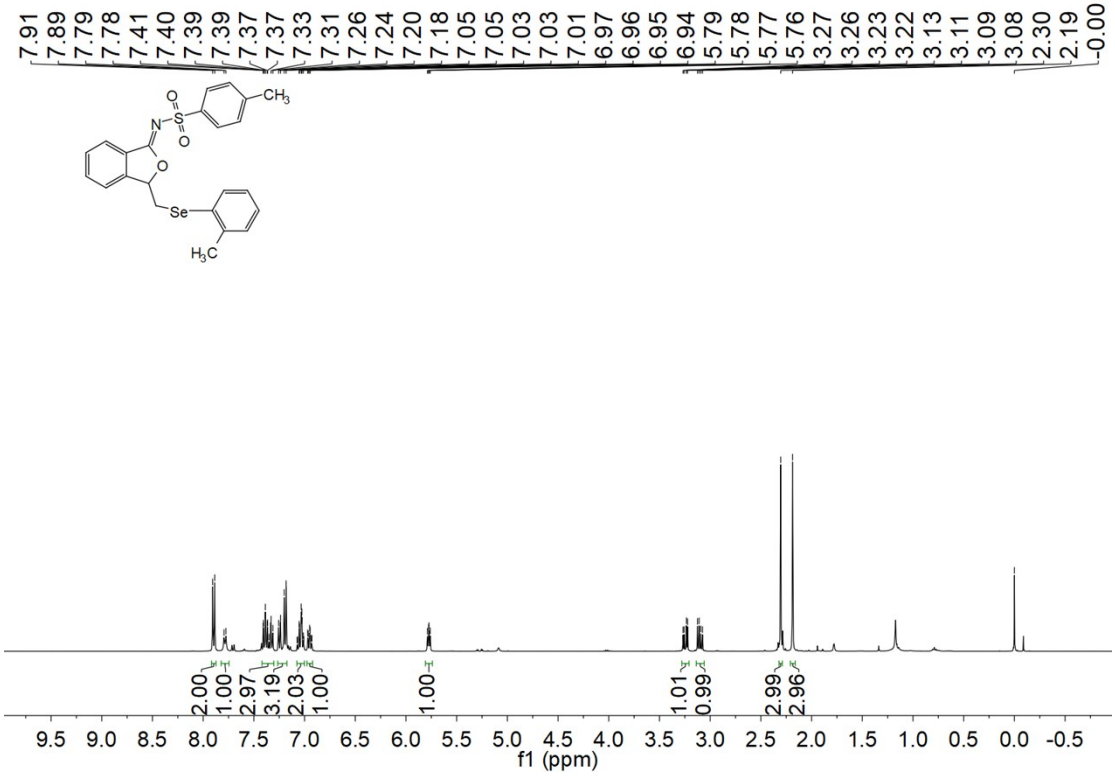
^{1}H NMR of compound **3ae**



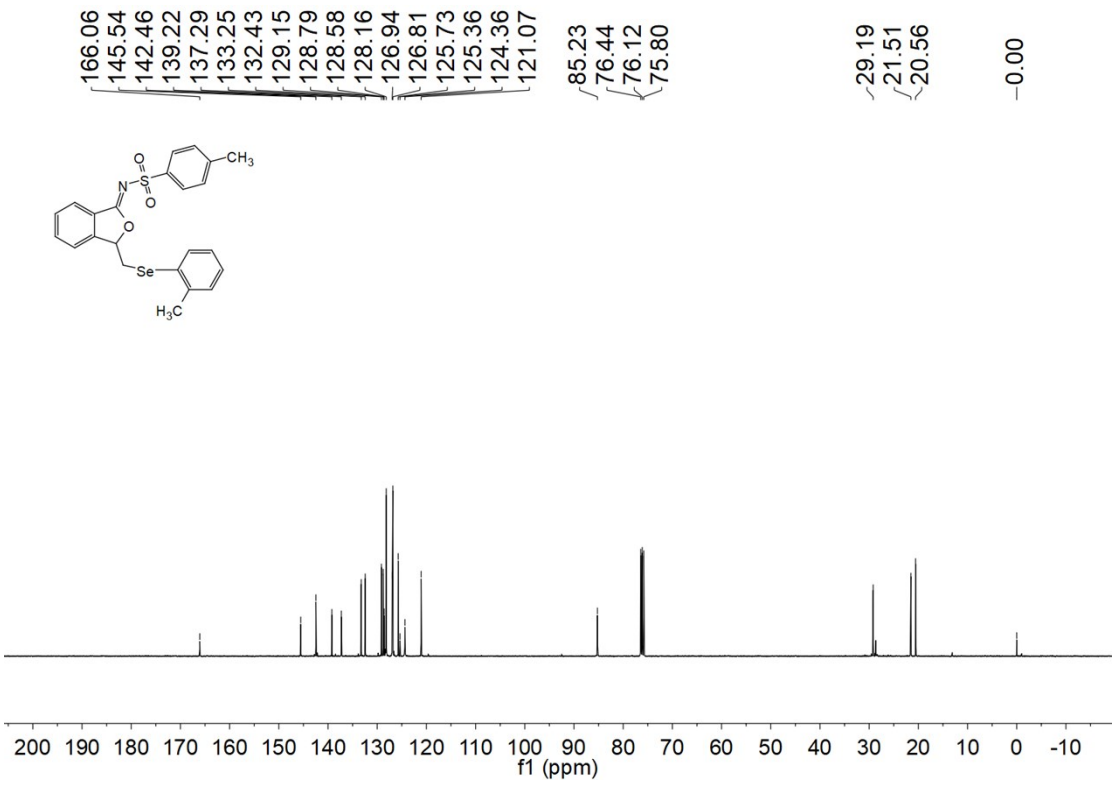
^{13}C NMR of compound **3ae**



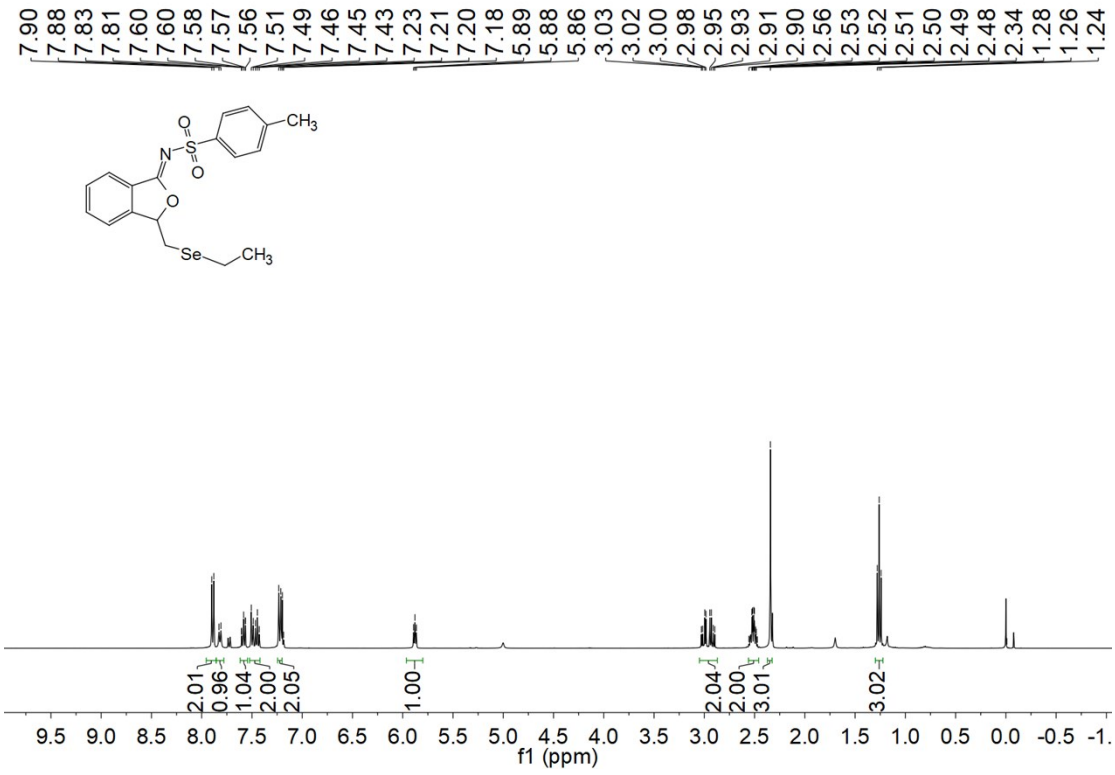
^{1}H NMR of compound **3af**



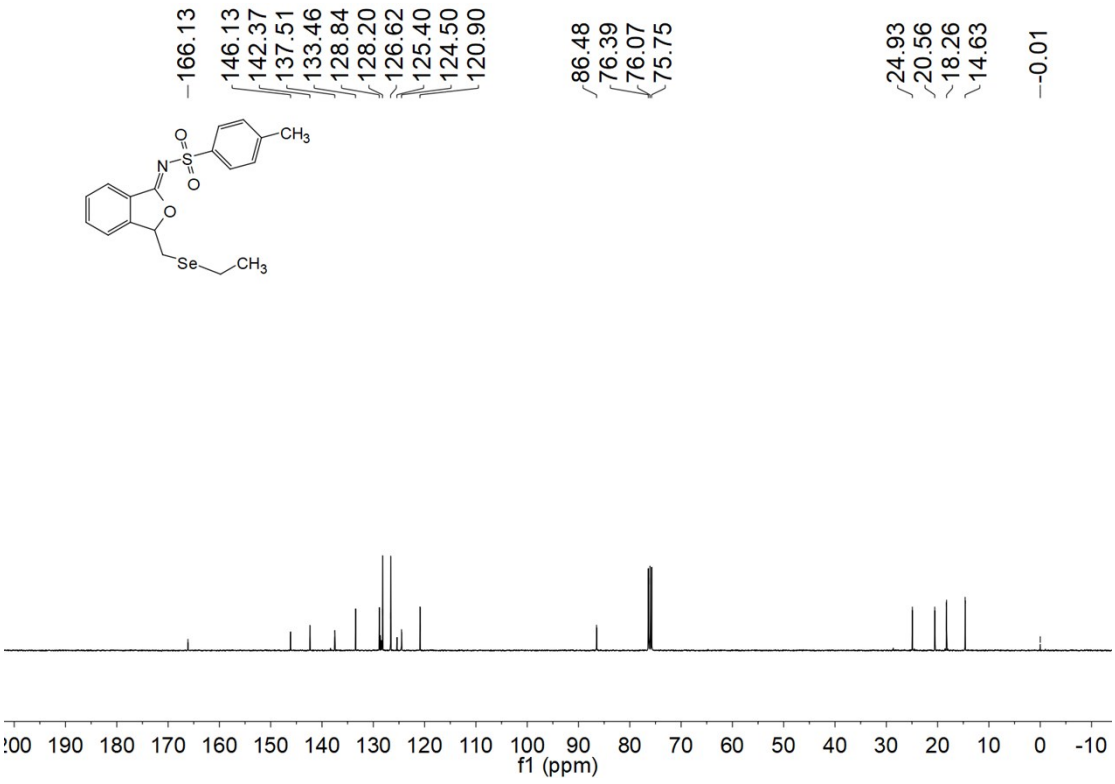
^{13}C NMR of compound **3af**



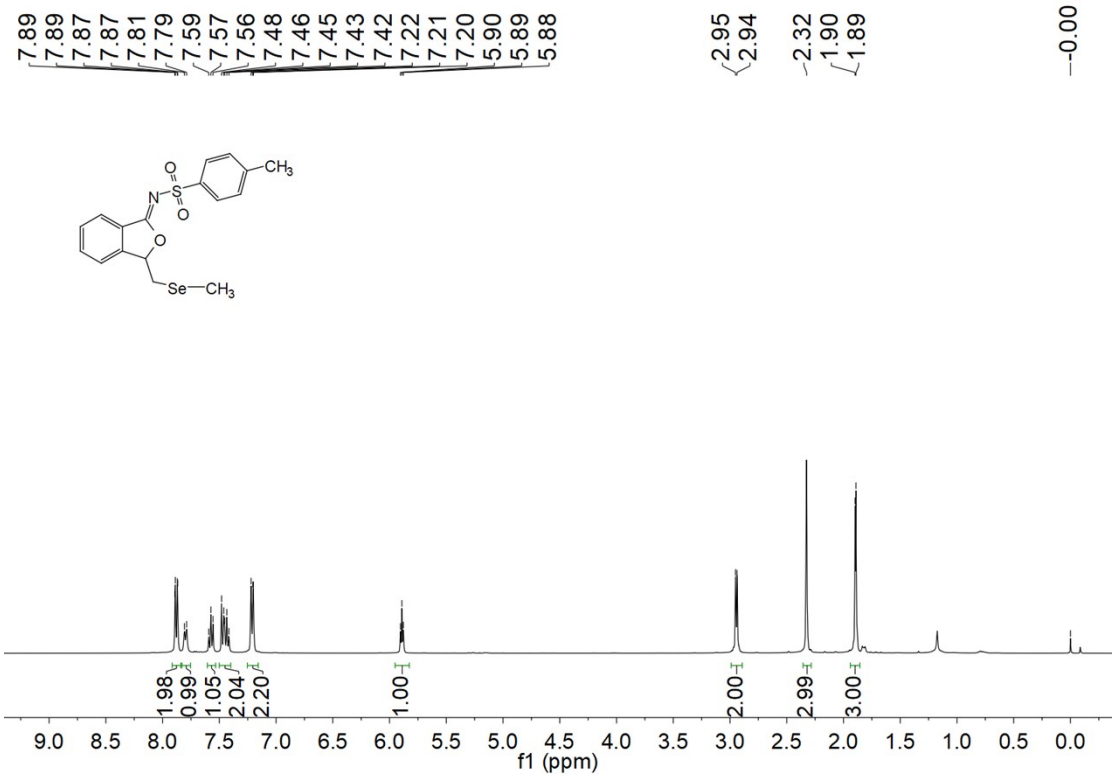
^{1}H NMR of compound **3ag**



^{13}C NMR of compound **3ag**



^{1}H NMR of compound **3ah**



^{13}C NMR of compound **3ah**