Supporting information for

Highly efficient synthesis of diselenides and ditellurides catalyzed by polyoxomolybdate-based copper

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Experimental procedures and analytical data

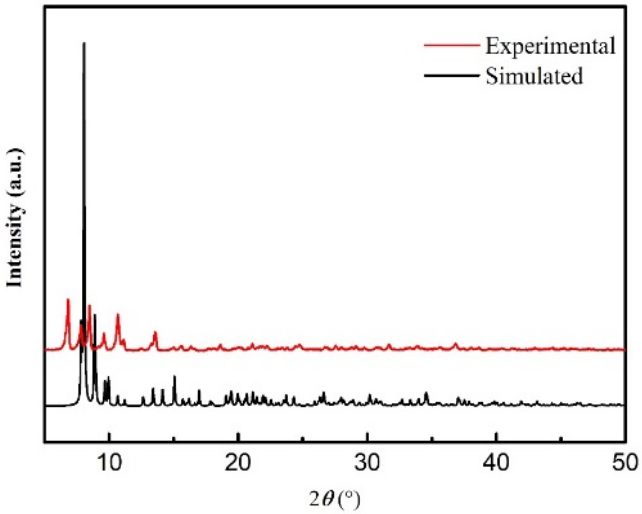
1. General information

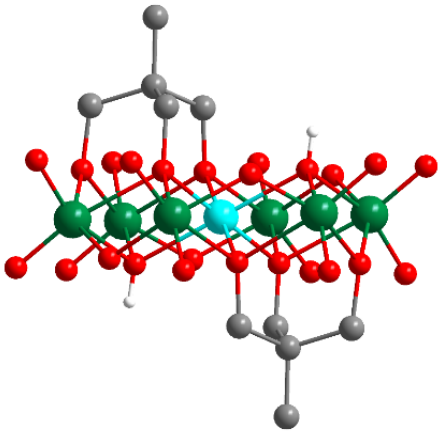
All commercial reagents and available compounds were obtained from Energy Chemical, Sinopharm Chemical Reagent Co., Ltd and TCI, and used without further purification. ^{1}H and ^{13}C NMR spectra were recorded on Varian 400 MHz NMR spectrometer using $CDCl_3$ as solvent and TMS as an internal standard. Reactions were monitored using thin-layer chromatography (TLC) on commercial silica gel plates (GF 254), and were performed under UV light (254 nm).

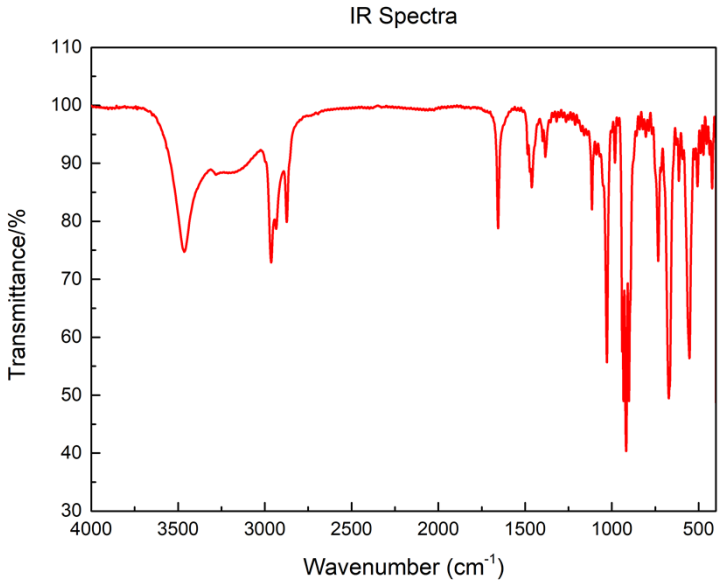
2. General procedure for synthesis of $CuMo_6$ catalyst[1]

$[(n\text{-}C_4H_9)_4N]_2\{H_2CuMo_6O_{18}[(OCH_2)_3CCH_3]_2\}\cdot(CH_3CN)_4$.

A mixture of $Cu(CH_3COO)_2$ (0.60 g, 2.75 mmol), $TBA_4Mo_8O_{26}$ (3.55 g, 1.65 mmol), and $(HOCH_2)_3CCH_3$ (0.65 g, 5.5 mmol) in 75 mL of acetonitrile was heated to reflux for 12 h. The blue solution was cooled to room temperature and kept for several days to obtain blue crystals (2.76 g, yield 69% based on Mo). IR (KBr, cm^{-1}): 3463.26, 2963.16, 2932.19, 2873.85, 1655.46, 1461.98, 1115.09, 1028.55, 940.94, 917.68, 901.64, 733.08, 671.96, 553.14, 422.48.


Experimental
Simulated
Intensity (a.u.)
10
20
30
40
50
2θ(°)




IR Spectra
Transmittance/%
110
100
90
80
70
60
50
40
30
4000
3500
3000
2500
2000
1500
1000
500
Wavenumber (cm-1)

3. General procedure for the synthesis of diselenides

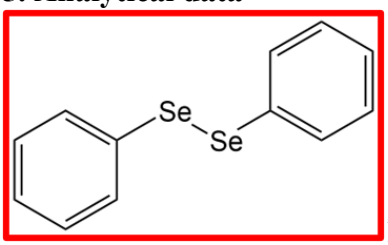
To a stirred solution of Se (Te) powder (1.0 mmol) and halides (0.5 mmol) in DMF (1.0 mL) was added $CuMo_6$ catalyst (0.5 mol %) followed by KOH (2.0 equiv) under air atmosphere at 120 ℃ for 12 h . The progress of the reaction was monitored by TLC. After the reaction was complete, the reaction mixture was allowed to cool, which was subjected to column chromatographic separation to give pure Diselenides. The identity and purity of the product was confirmed by ^{1}H and ^{13}C NMR spectroscopic analysis. The same procedure was followed for the synthesis of Ditellurides.

4. Scale-up reaction

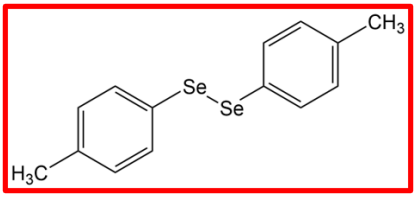
5 mmol scale: To a stirred solution of Se powder (10.0 mmol) and halides (5 mmol) in DMF (10 mL) was added $CuMo_6$ catalyst (0.5 mol %) followed by KOH (2.0 equiv) under air atmosphere at 120 ^{o}C for 12 h .

50 mmol scale: To a stirred solution of Se powder (100.0 mmol) and halides 50 mmol) in DMF (50 mL) was added $CuMo_6$ catalyst (0.2 mol %) followed by KOH (2.0 equiv) under air atmosphere at 120 ^{o}C for 48 h .

5. Analytical data

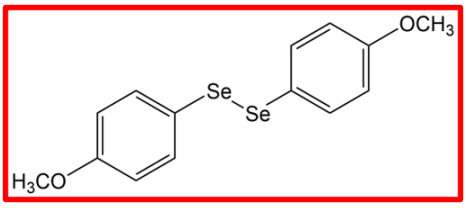


1,2-diphenyldiselenide(2a) : The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Orange solid,R_f = 0.50; Yield : 71.99 mg (92.3%); ^{1} H NMR ($CDCl_3$, 400 MHz) : δ = 7.61-7.59 (m, 4H), 7.25-7.23 (m, 6H) ; ^{13} C NMR($CDCl_3$,100MHz) δ = 131.50,130.90, 129.19,127.73; Spectral data were in accordance with the literature. [2]

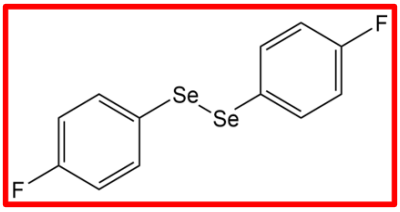


1, 2-dip-tolyldiselenide (2b): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title

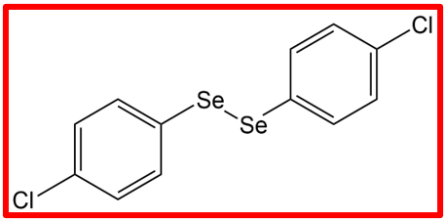
compound as a Pale yellow oil, R_f = 0.48; Yield: 77.35mg (91%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.49 (d, J= 8.4 Hz, 4H), 7.07 (d, J= 8.4 Hz, 4H), 2.33 (s, 6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 137.99, 133.38, 129.93, 127.65,22.13; Spectral data were in accordance with the literature. [2]



1,2-bis(4-methoxyphenyl)diselenide(2c): The crude product was purified by column chromatography on silica gel (PE/EA = 20:1) to afford the title compound as a Brownish-orange solid, R_f = 0.28;Yield: 79.53 mg (86%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.51 (d, J = 8.8 Hz, 4H), 6.81(d, J = 8.8 Hz, 4H), 3.80 (s, 6H); ^{13}C NMR ($CDCl_3$,100 MHz) δ = 160.05, 135.44, 121.95,114.72, 55.30; Spectral data were in accordance with the literature. [2]

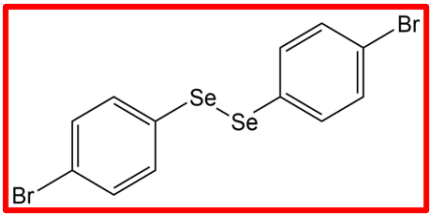


1,2-bis(4-fluorophenyl)diselane (2d): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil,R_f = 0.58 ;Yield: 79.17 mg (91%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ (ppm) 7.56-7.53 (m, 4H), 7.00-6.95 (m, 4H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ (ppm) 164.20 (d, J = 247 Hz), 134.85, 125.62,116.49(d, J = 22 Hz); ^{19}F NMR ($CDCl_3$, 376 MHz): δ (ppm) -113.08. Spectral data were in accordance with the literature. [4]

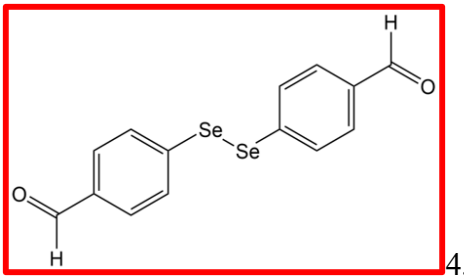


1,2-bis(4-chlorophenyl)diselenide(2e): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Orange oil, R_f = 0.52; Yield: 91.44 mg (96%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.51-7.49 (d, J= 8.6 Hz, 4H), 7.24-7.22(d, J= 8.6 Hz,

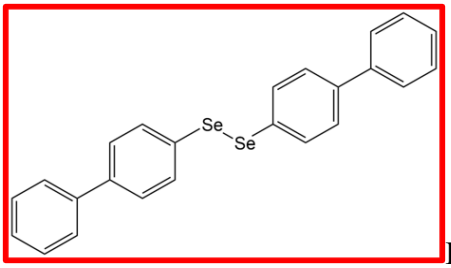
4H); ^{13}C NMR ($CDCl_3$, 100MHz) δ = 134.31, 133.27, 129.38,128.77; Spectral data were in accordance with the literature. [2]



1,2-bis(4-bromophenyl)diselenide(2f): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil, R_f = 0.52; Yield: 90.47 mg (77%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.45 – 7.427(m, 4H) ,7.40 – 7.37(m, 4H); ^{13}C NMR ($CDCl_3$, 100MHz)δ=134.57,133.40,132.56,132.31,129.44,122.39; Spectral data were in accordance with the literature. [2]

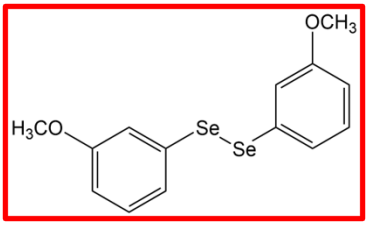


4,4'-diselenidediyldibenzaldehyde(2g): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Brown oil, R_f = 0.38; Yield: 52.44 mg (57%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 9.98 (s, 2H), 7.80 (d, J= 8.4 Hz, 4H), 7.59 (d, J= 8.4 Hz, 4H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 191.35, 138.79, 135.50, 133.03, 130.48; Spectral data were in accordance with the literature. [2,3]

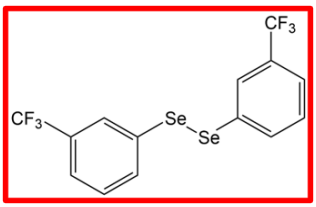


Bis([1,1′-biphenyl]-4-yl)diselenide (2h): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Yellowish powder. R_f = 0.52;Yield: 52.20 mg (45%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.78 – 7.76 (m, 4H), 7.57 – 7.55 (m, 4H), 7.47 – 7.43 (ddd, J = 8.7, 4.3, 2.2 Hz, 4H), 7.39 – 7.35 (m, 2H), 7.35 – 7.33(dd, J = 13.5, 6.4 Hz,

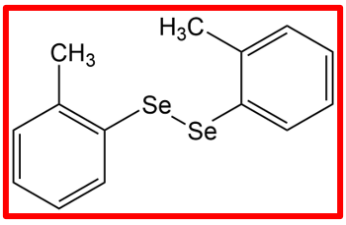
4H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 140.72,140.05,137.85, 129.02, 128.92, 127.71, 126.91. Spectral data were in accordance with the literature. [5]



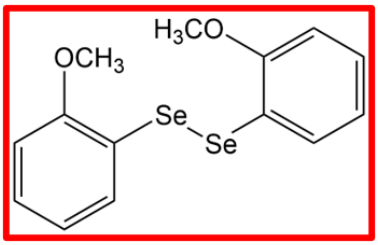
1,2-bis(3-methoxyphenyl)diselenide(2i): The crude product was purified by column chromatography on silica gel (PE/EA = 20:1) to afford the title compound as a Pale yellow oil, R_f = 0.28; Yield: 81.84 mg (88.5%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.18 – 7.16 (m, 6H), 6.79 – 6.78 (m, 1H), 3.76 (s,6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 159.86, 131.84, 129.89, 123.49, 116.56, 113.83, 55.27; Spectral data were in accordance with the literature. [2,3]



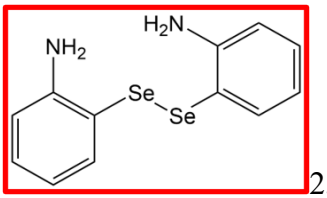
1,2-bis(3-(trifluoromethyl)phenyl)diselane (2j): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil, R_f = 0.52;Yield: 89.60mg (80%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ (ppm) 7.85-7.75 (m, 1H), 7.62-7.61 (m, 2H), 7.57-7.51 (m, 3H), 7.41-7.37 (m, 2H), ^{13}C NMR ($CDCl_3$, 100 MHz): δ (ppm) 136.25, 134.87, 131.35 (2C), 129.90, 129.66 129.61, 128.35 (q, *J* = 4 Hz), 124.89 (2C), 124.65 (2C), 122.17; ^{19}F NMR ($CDCl_3$, 376 MHz): δ (ppm) -62.89. Spectral data were in accordance with the literature. [4]



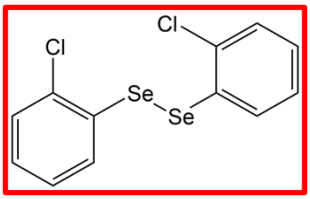
1, 2-dio-tolyldiselenide (2k) : The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a orange oil, R_f = 0.54;Yield: 79.90 mg (94%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.65-7.63 (d, J= 7.2 Hz, 2H), 7.17 – 7.16 (m, 4H), 7.10 – 7.07 (m, 2H), 2.47 (s, 6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 138.76, 132.59, 130.87,129.96, 127.95, 126.82, 22.23; Spectral data were in accordance with the literature. [2]



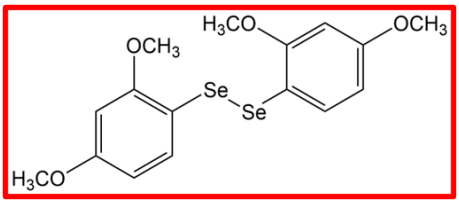
1,2-bis(2-methoxyphenyl)diselenide (2l) The crude product was purified by column chromatography on silica gel (PE/EA = 25:1) to afford the title compound as a:pale orange oil, R_f = 0.35; Yield: 80.91 mg (87%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.56 – 7.54 (m, 2H), 7.23 – 7.19 (m, 2H), 6.89 – 6.8 1(m, 4H), 3.91 (s, 6H); ^{13}C NMR ($CDCl_3$,100 MHz) δ = 156.82,130.53,128.16,121.91,118.62,110.13 ,55.94; Spectral data were in accordance with the literature. [2]



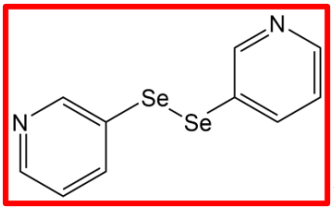
2,2'-diselenidediyldianiline (2m): T The crude product was purified by column chromatography on silica gel (PE/EA = 20:1) to afford the title compound as a Drak yellow oil, R_f = 0.38;Yield: 52.15 mg (93%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.35 (dd, J 1 = 7.8 Hz, J 2 = 1.4 Hz, 2H), 7.16 – 7.12 (m,2H), 6.73 (dd, J 1 = 7.8 Hz, J 2 = 1.4 Hz, 2H), 6.58 – 6.54 (m, 2H), 4.27(s, 4H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 146.74, 138.99, 129.35,119.98, 114.74, 84.20; Spectral data were in accordance with the literature. [2]



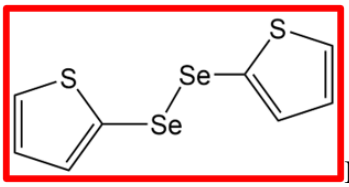
1, 2-bis (2-chlorophenyl)diselenide (2n) : The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Yellow crystals, R_f = 0.58; Yield: 83.82 mg (88%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.62 – 7.61(m, 2H), 7.35 – 7.34 (m, 2H), 7.19 – 7.17 (m,4H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 133.21, 130.66, 129.33, 129.13, 128.39, 127.95; Spectral data were in accordance with the literature. [2]



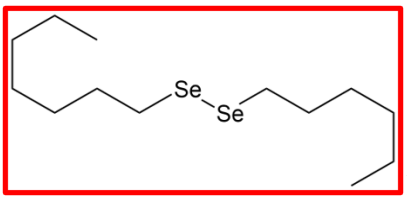
1,2-bis(2,4-dimethoxyphenyl)diselenide (2o) : The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil, R_f = 0.36; Yield:87.48 mg (81%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.52 – 7.50 (m, 2H), 6.44 – 6.42 (m, 4H), 3.82 (s,6H), 3.79 (s,6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 161.22, 158.55, 133.78, 110.01, 105.60, 98.56, 55.88, 55.50; Spectral data were in accordance with the literature. [2]



1,2-di(pyridin-3-yl)diselenide (2p): The crude product was purified by column chromatography on silica gel (PE/EA = 10:1) to afford the title compound as a Orange oil,R_f = 0.28;Yield: 51.42 mg (79%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 8.84-8.82 (m, 2H), 8.55-8.53 (m, 2H), 8.02-7.97 (m, 2H), 7.11-7.06 (m, 2H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 157.37, 149.11, 145.48, 124.0,111.34; Spectral data were in accordance with the literature. [2,5]

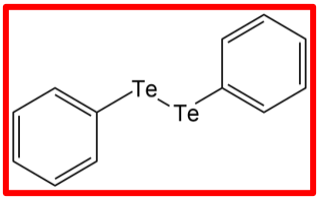


Dithiophen-2-yl Diselenide (2q): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil, R_f = 0.40;yield: 60.75 mg (75%). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.37-7.36(m, 2 H), 7.30-7.29 (m, 2 H), 6.96-6.94 (m, 2 H). ^{13}C NMR ($CDCl_3$,100 MHz,): δ = 134.74,130.95,127,94,126.31. Spectral data were in accordance with the literature. [3,4]

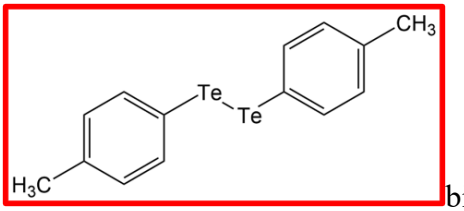


1,2-diheptyldiselenide (2r) [1]: The crude product was

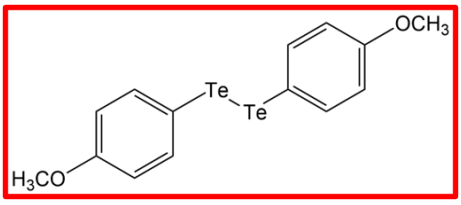
purified by column chromatography on silica gel petroleum ether to afford the title compound as a Light yellow oil, R_f = 0.48; Yield: 28.48 mg (32%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.93 (t, J= 7.2 Hz, 2H), 1.72 (qui, J= 7.2 Hz, 2H), 1.33 – 1.28 (m, 8H), 0.90 – 0.87(m, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 31.73, 30.98, 30.27, 29.49, 28.81, 22.62, 14.10. Spectral data were in accordance with the literature. [2]



1,2-diphenylditelluride (3a): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Yellow oil R_f = 0.52; Yield: 42.94 mg (42%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.72 – 7.70 (m, 4H), 7.28 – 7.20 (m, 6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 137.98, 129.52, 127.85, 114.67; Spectral data were in accordance with the literature. [2,3]

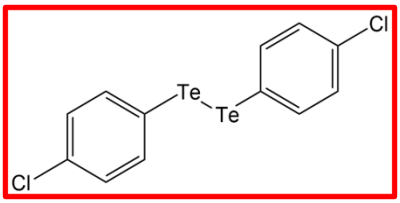


bis(4-methylphenyl) ditelluride (3b): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Yellow oil, R_f = 0.46; yield: 57.90 (53%).^{1}H NMR (400 MHz, $CDCl_3$): δ = 2.31 (s, 6 H), 6.95-6.93 (d, J = 7.8 Hz, 4 H), 7.58-7.56 (d, J = 7.8 Hz, 4 H). ^{13}C NMR (100 MHz, CDCl3): δ = 21.07, 90.27, 131.23,137.23, 137.45. Spectral data were in accordance with the literature. [3]

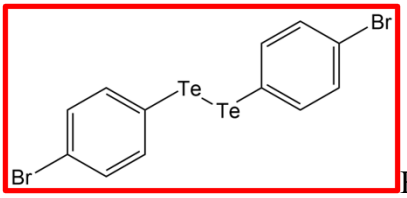


1,2-bis(4-methoxyphenyl)ditelluride (3c): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Orange yellow, R_f = 0.56;Yield: 104.35 mg (89%); ^{1}H NMR ($CDCl_3$, ,400 MHz): δ = 7.64 (d, J= 8.8 Hz, 4H), 6.77 (d, J= 8.8 Hz, 4H), 3.78 (s, 6H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 159.65, 139.73, 115.38, 104.30, 55.17;

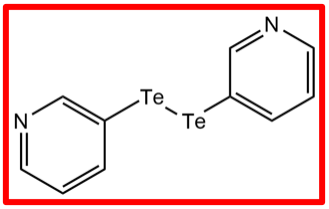
Spectral data were in accordance with the literature. [2,3]



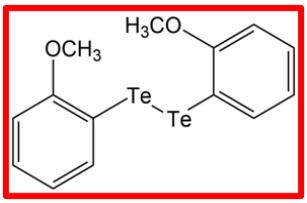
1,2-bis(4-chlorophenyl)ditelluride (3d): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil, R_f = 0.52; Yield: 54.97mg (46%); ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.62 (d, J= 8.4 Hz, 4H), 7.10 (d, J= 8.4 Hz, 4H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 138.73, 134.21, 130.55, 91.19. Spectral data were in accordance with the literature. [2,3]



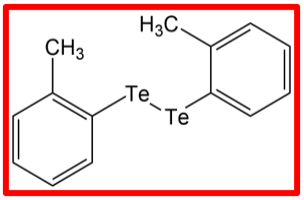
Bis(4-bromophenyl) Ditelluride (3e) : The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Dark orange oil,R_f = 0.50; yield: 82.21 mg (58%). ^{1}H NMR ($CDCl_3$,400 MHz): δ = 7.53 (d, J = 8.3 Hz, 4 H), 7.35 (d, J = 8.3 Hz, 4 H). ^{13}C NMR ($CDCl_3$,100 MHz,): δ = 112.71, 122.92, 132.80, 139.60. Spectral data were in accordance with the literature. [3]



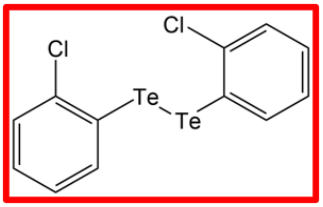
1,2-di(pyridin-3-yl)ditelluride (3f): The crude product was purified by column chromatography on silica gel (PE/EA = 15:1) to afford the title compound as a Light yellow oil, R_f = 0.36;Yield: 91.89 mg (89%); ^{1}H NMR (CDCl3, 200 MHz): δ = 8.81 (m,2H), 8.53 – 8.52 (m, 2H), 7.99 – 7.97 (m, 2H), 7.09 – 7.06(m, 1H); ^{13}C NMR (CDCl3, 50 MHz) δ = 153.10, 149.28 , 140.67,127.78 124.48. Spectral data were in accordance with the literature. [2]



1,2-bis(2-methoxyphenyl)ditelluride (3g): The crude product was purified by column chromatography on silica gel (PE/EA = 30:1) to afford the title compound as a Light yellow oil, R_f = 0.42;Yield: 99.66 mg (85%); ^{1} Hz NMR ($CDCl_3$, 400 MHz): δ = 7.77 (d, J= 8.8 Hz, 1H), 7.32(d, J= 8.8 Hz, 1H),6.82 (d, J= 8.8 Hz, 1H),6.72(d, J= 8.8 Hz, 1H), 3.86 (s, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 158.02, 139.47, 129.57, 122.52,100.99, 86.00,56.30;



1,2-dio-tolylditelluride (3h): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Yellow oil, R_f = 0.46;Yield: 46.98 mg (43%); ^{1} H NMR ($CDCl_3$, 400 MHz): δ = 7.51 (d, J= 7.6 Hz, 2H), 7.29 – 7.22 (m, 4H), 7.00 – 6.97 (m, 2H), 2.45 (s, 6H); ^{13} C NMR ($CDCl_3$, 100 MHz) δ = 142.61, 138.21, 129.43, 128.41, 126.89, 118.50, 26.27; Spectral data were in accordance with the literature. [2]



1,2-bis(2-chlorophenyl)ditelluride (3i): The crude product was purified by column chromatography on silica gel petroleum ether to afford the title compound as a Light yellow oil, R_f = 0.50;Yield: 58.56 mg (49%); ^{1} H NMR ($CDCl_3$, 400 MHz): δ = 7.48 (d, J= 8.4 Hz, 2H), 7.46(d, J= 8.4 Hz, 2H)7.27(d, J= 8.4 Hz, 2H),7.08 (d, J= 8.4 Hz, 2H); ^{13} C NMR ($CDCl_3$,100 MHz) δ = 139.33, 138.71, 129.82, 128.98,127.76,118.69. Spectral data were in accordance with the literature. [6]

6. References

[1] Y Wang, B Li, H Qian, et al. *Inorganic Chemistry*, 2016, **55**, 4271-4277.

[2] D Singh ,A M Deobald, L R S Camargo, et al. *Organic Letters*, 2010, **12**,3288-3291.

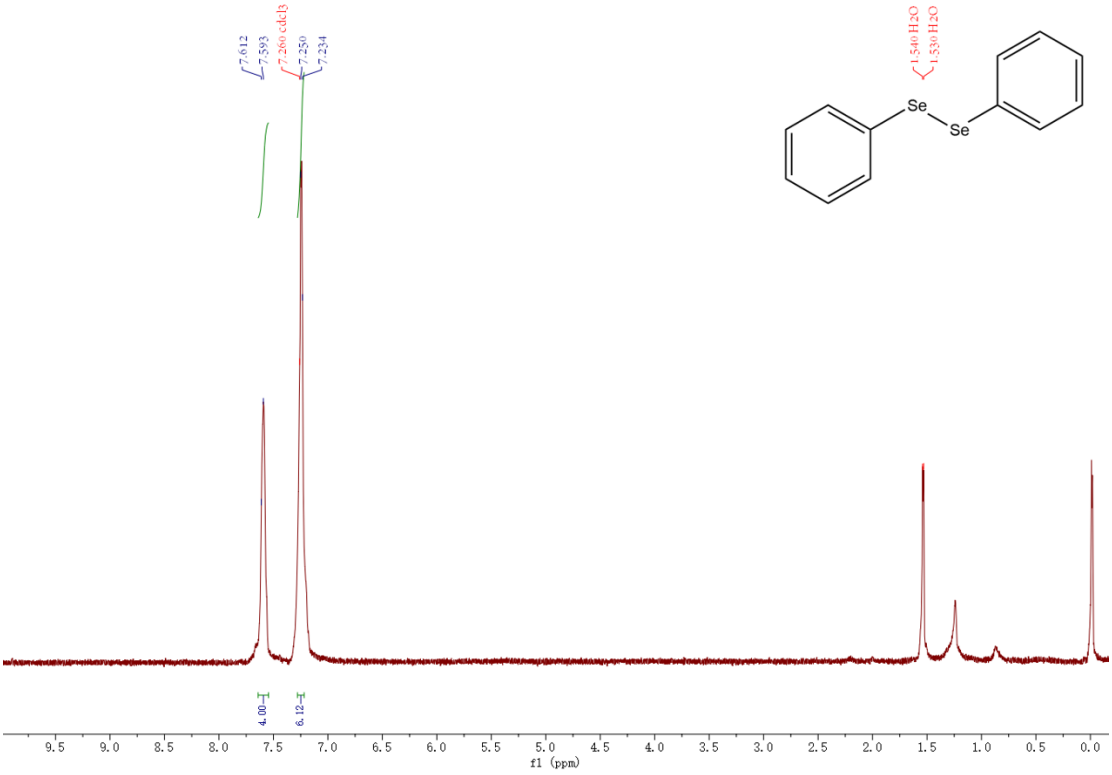
[3] M Z Kassaee, E Motamedi, B Movassagh, et al. *Synthesis*, 2013, **45**, 2337-2342.

[4] T Das, R Chatterjee, A Majee, et al. *Dalton Transactions*, 2019, **48**,17874-17886.

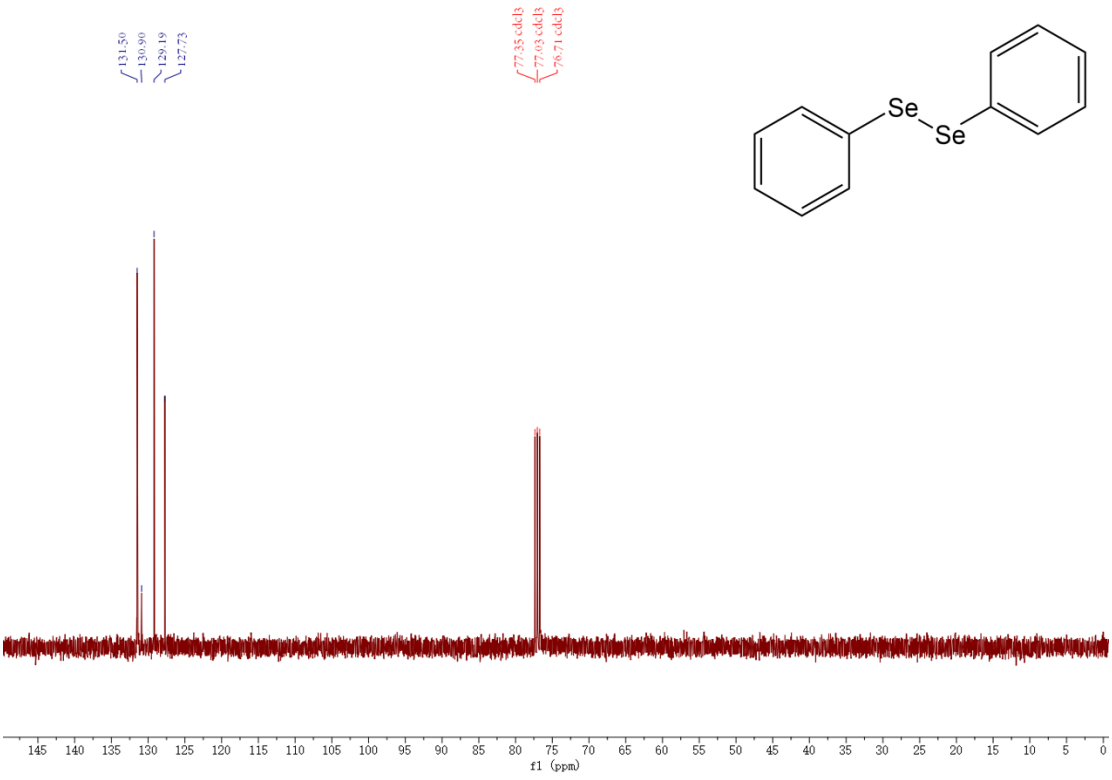
[5] D Kommula, Q Li, S, Ning et al. *Synthetic Communications*, 2020, **50**, 1026-1034.

[6] A R Clark, R Nair, F R Fronczek, et al. *Tetrahedron letters*, 2002, **43**, 1387-1389.

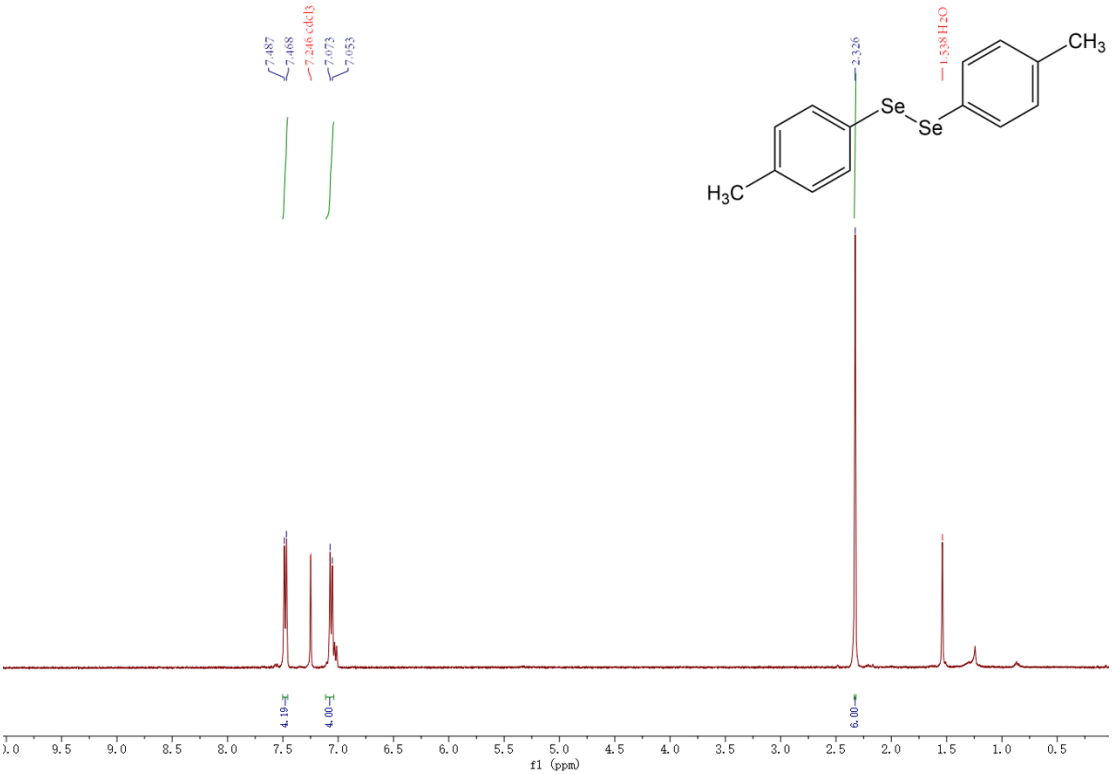
7. Copies of NMR spectra



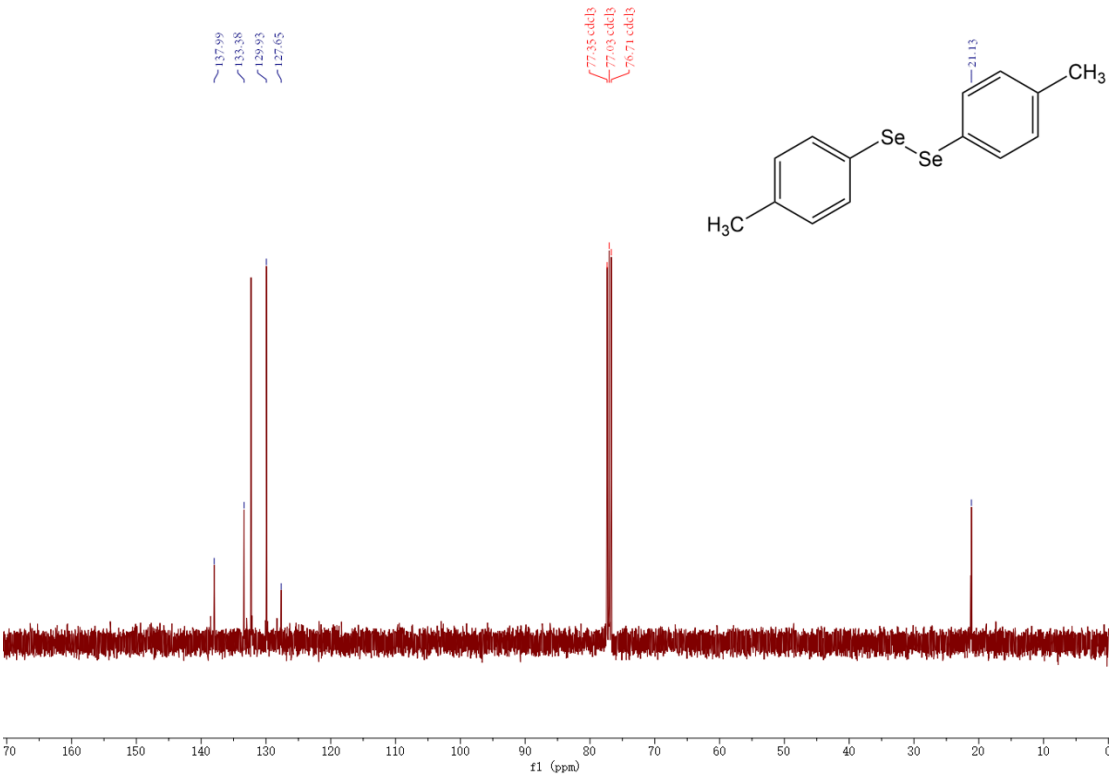
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1, 2-diphenyldiselenide (2a).



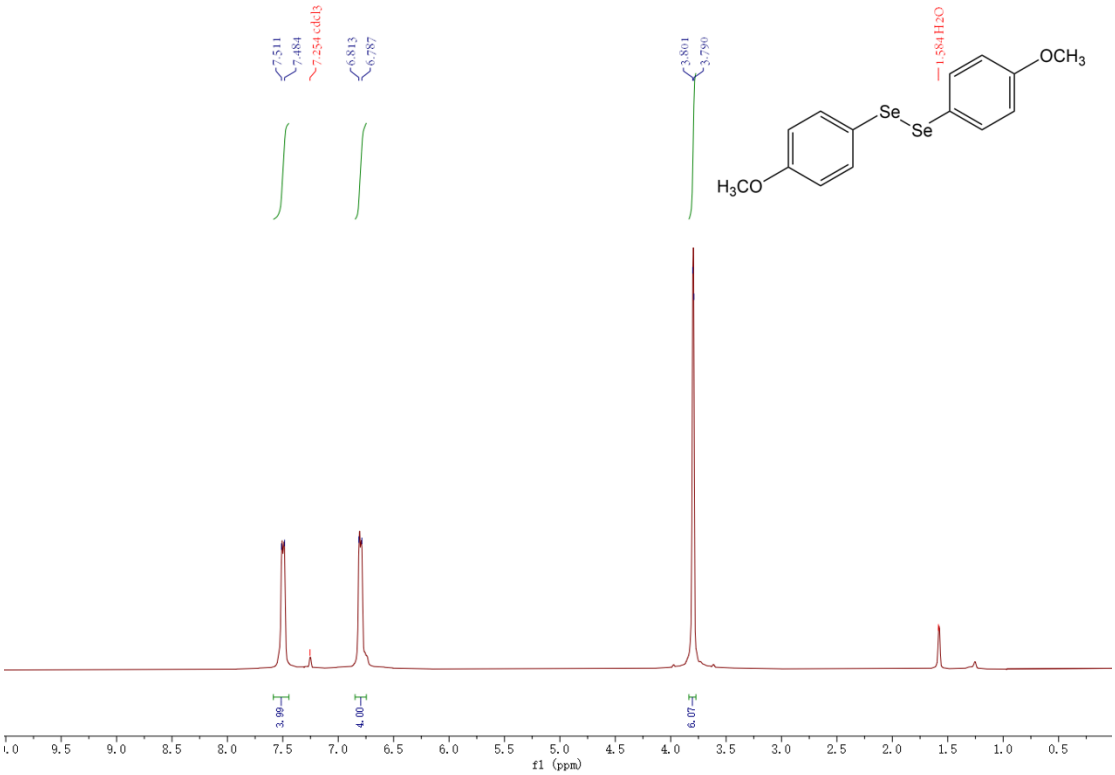
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-diphenyldiselenide (2a).



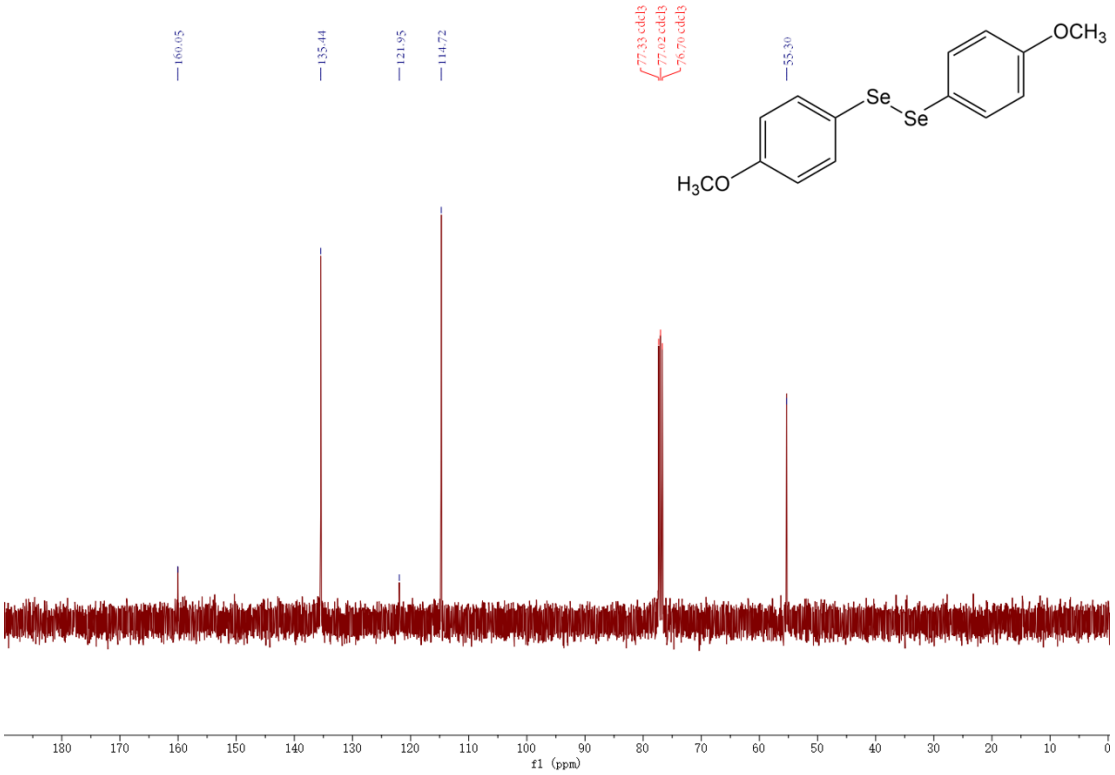
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl)diselenide(2b).



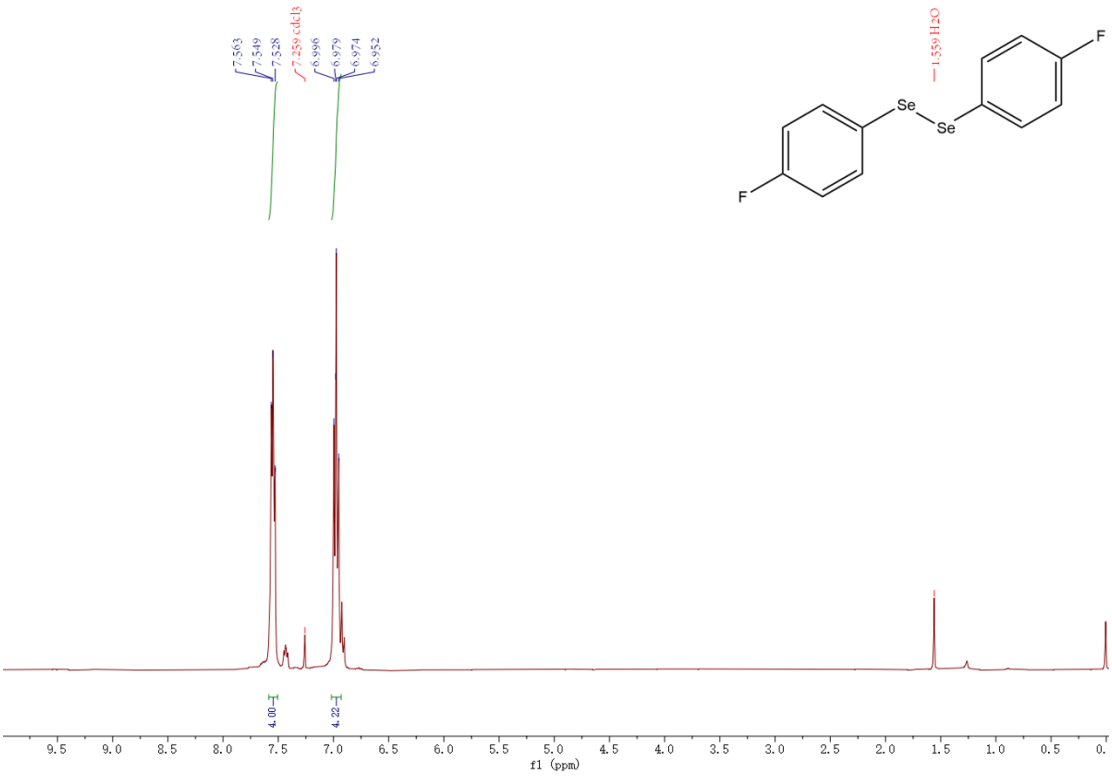
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl)diselenide(2b).



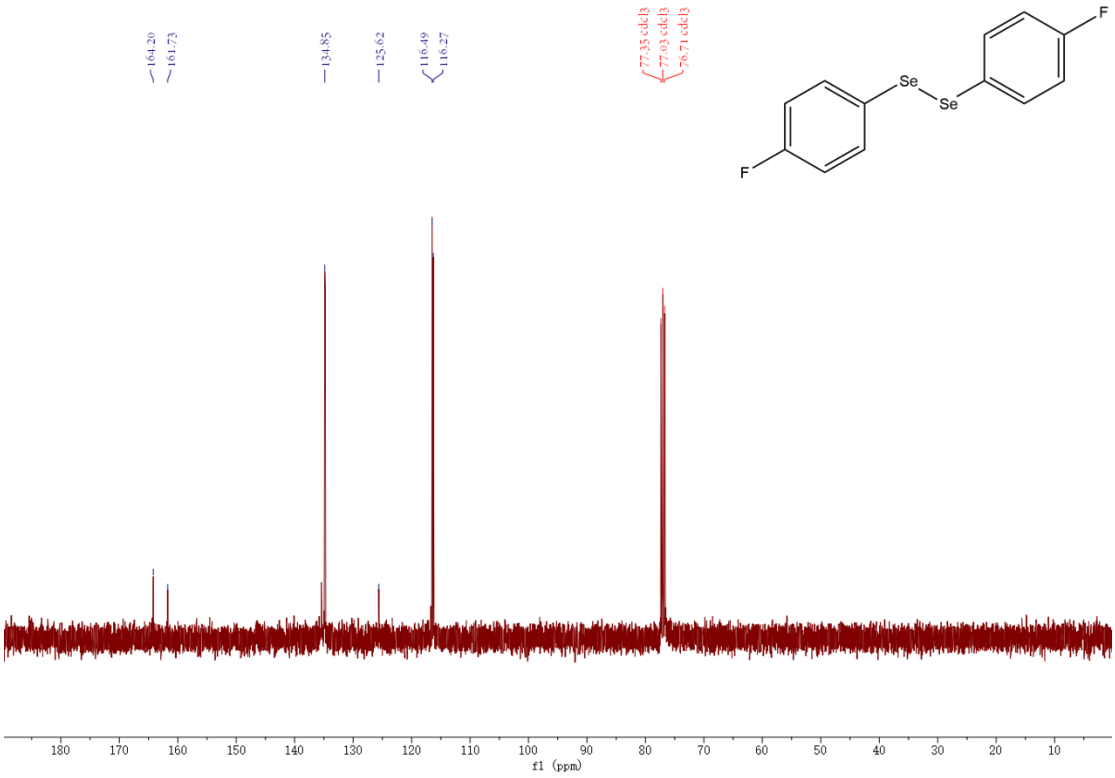
[1] H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl)diselenide(2c).



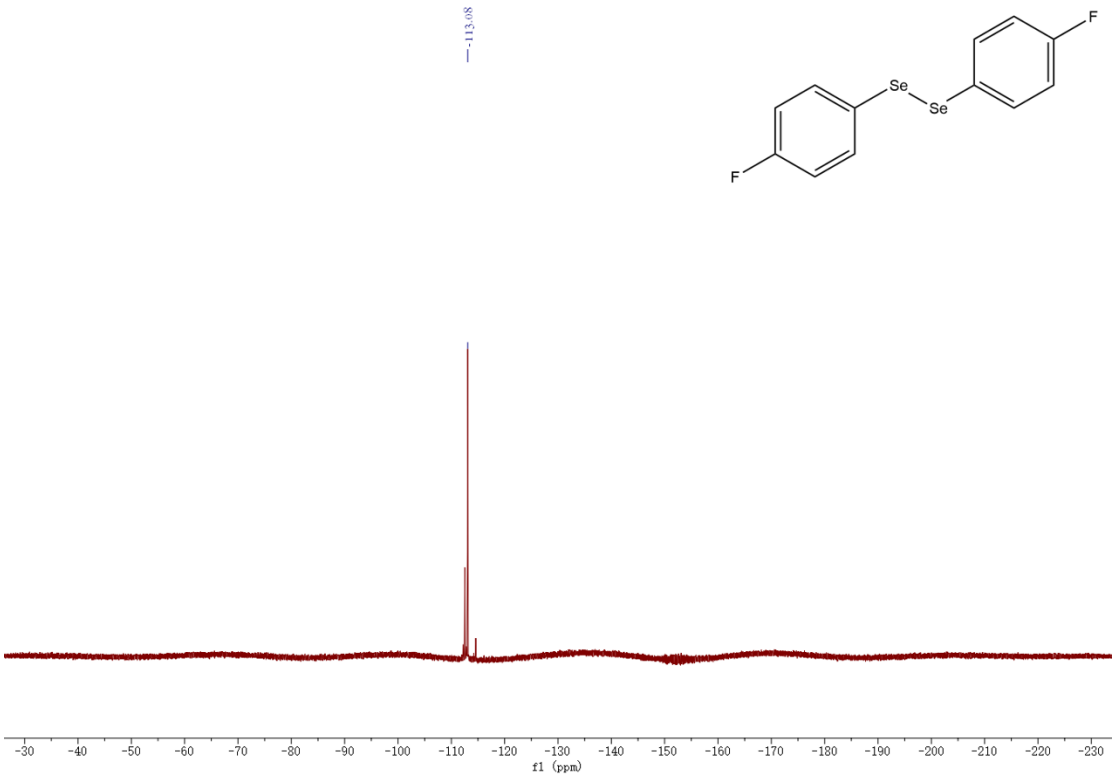
[13] C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl)diselenide(2c).



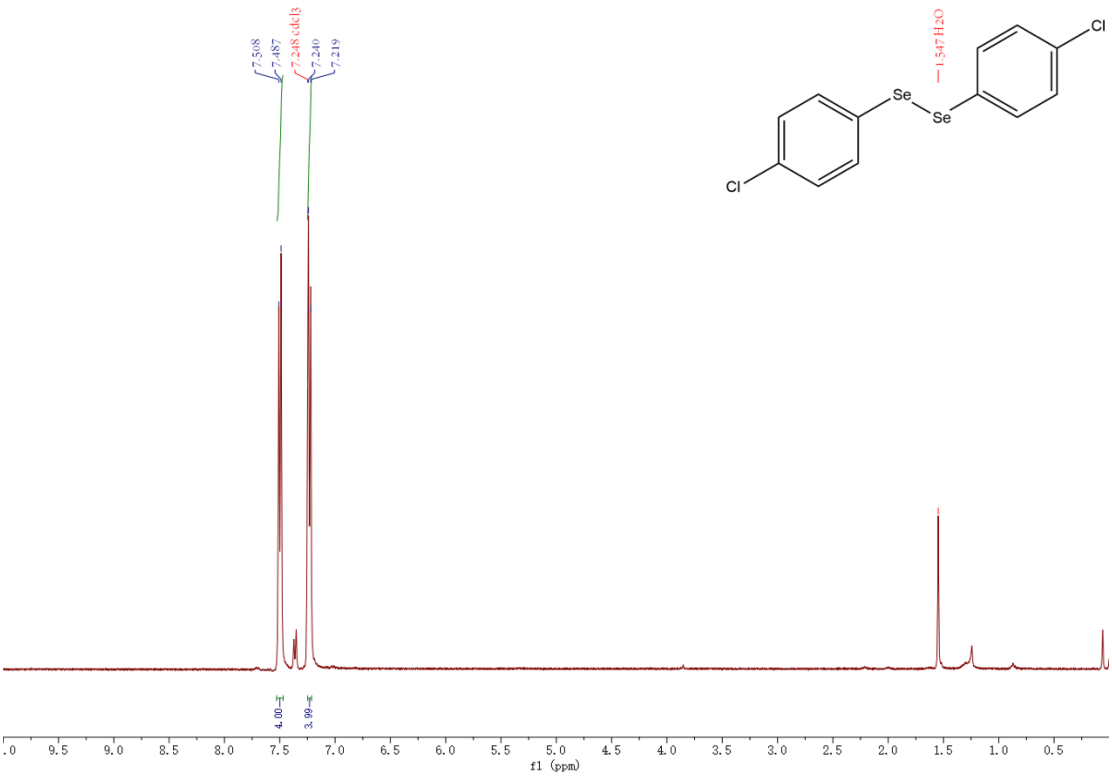
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-fluorophenyl)diselane(2d).



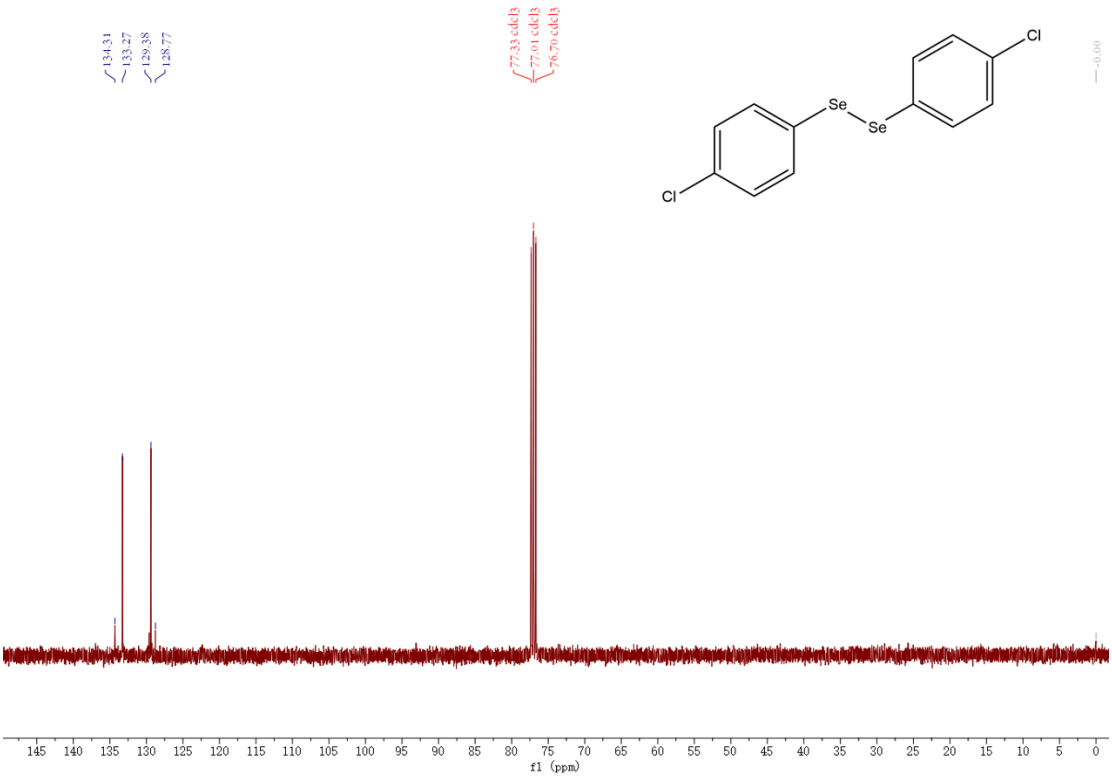
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(4-fluorophenyl)diselane(2d).



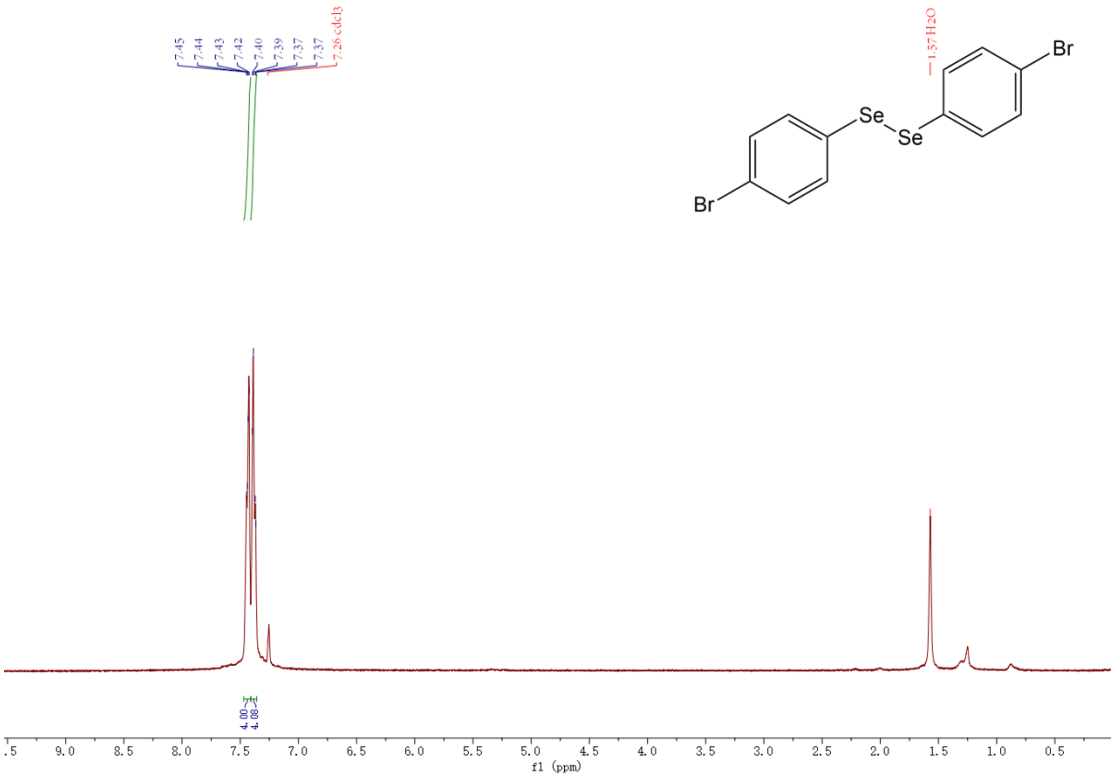
^{1}F NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-fluorophenyl)diselane(2d).



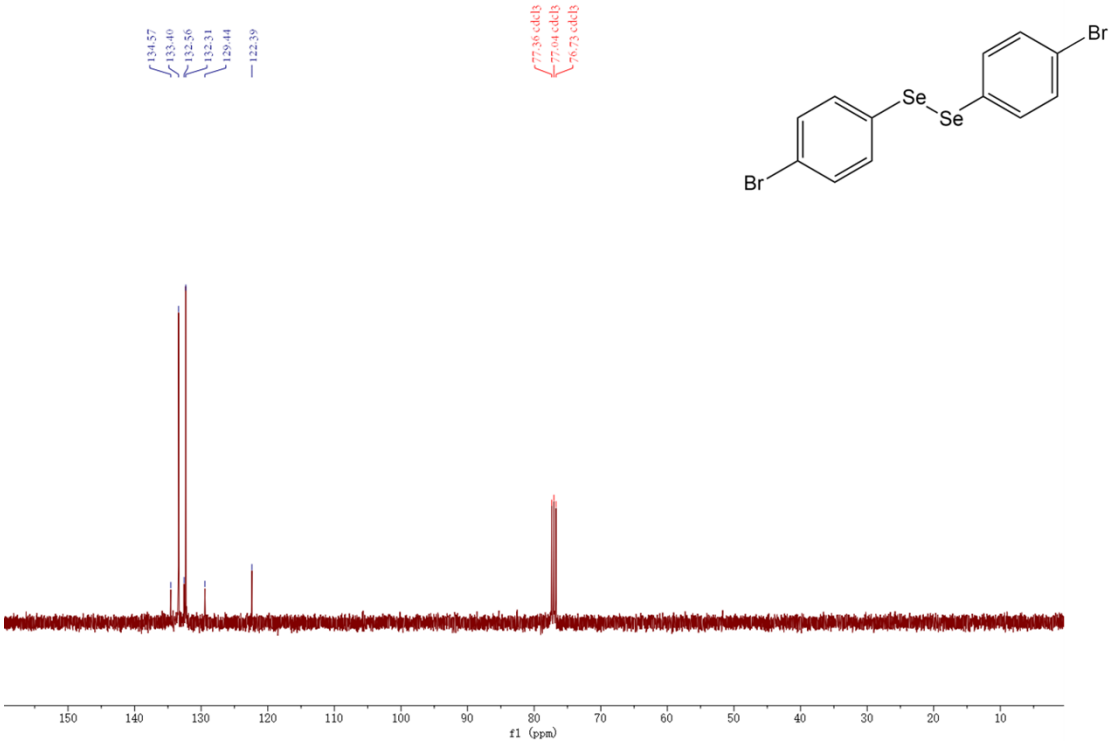
[1] H NMR (400 MHz, $CDCl_3$) spectrumof 1,2-bis(4-chlorophenyl)diselenide(2e).



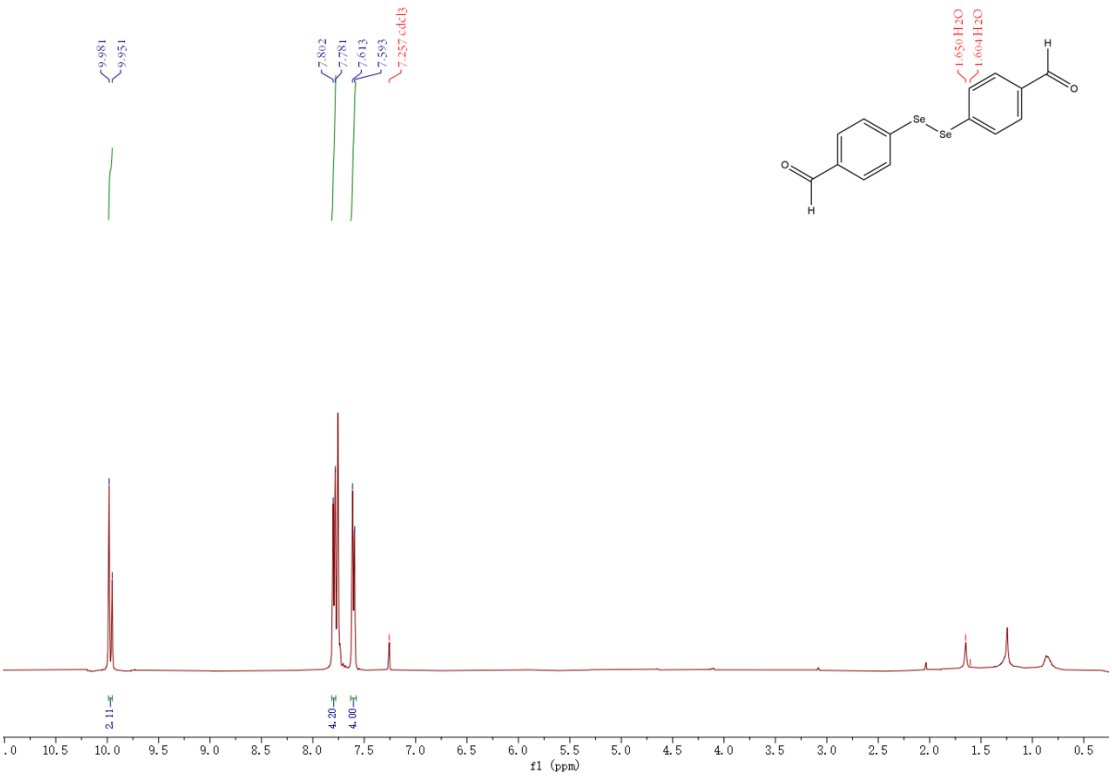
[13] C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(4-chlorophenyl)diselenide(2e).



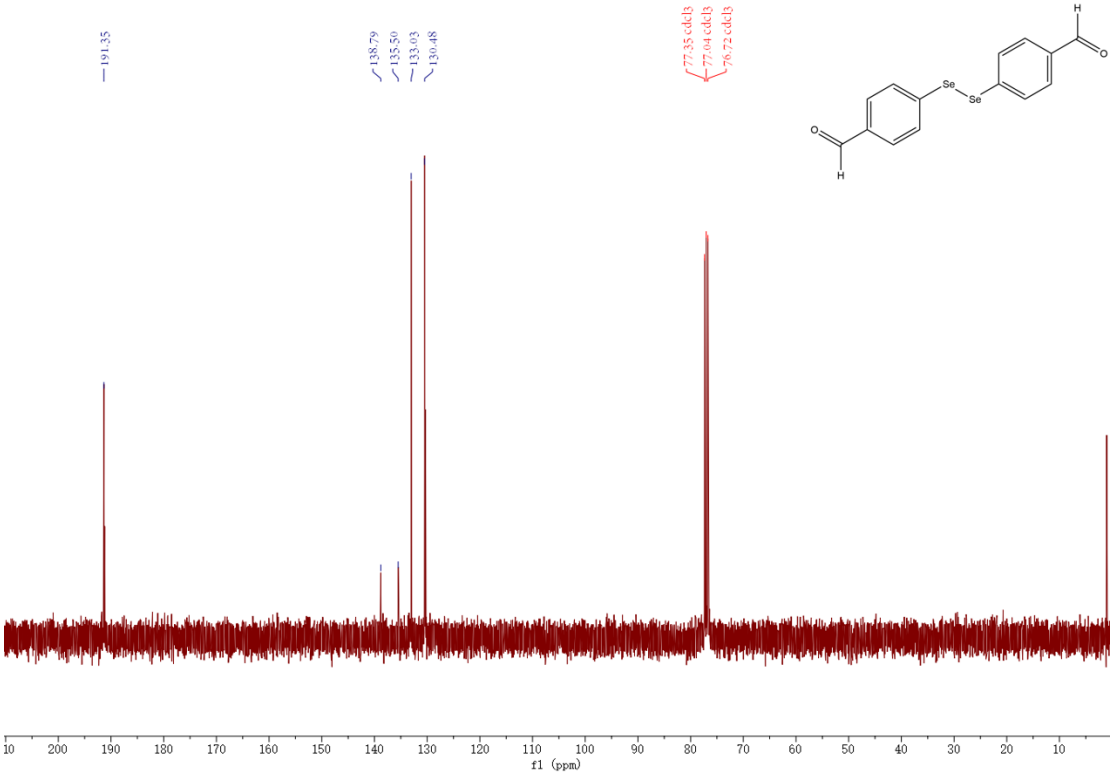
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-bromophenyl)diselenide(2f).



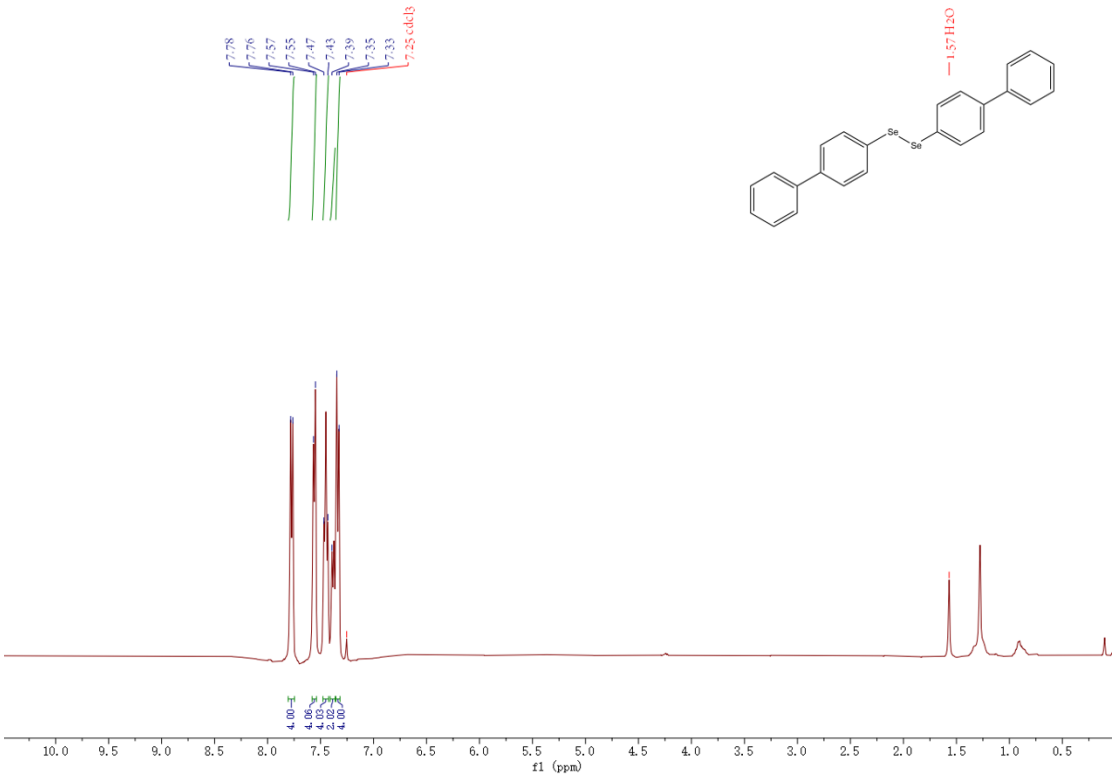
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(4-bromophenyl)diselenide(f).



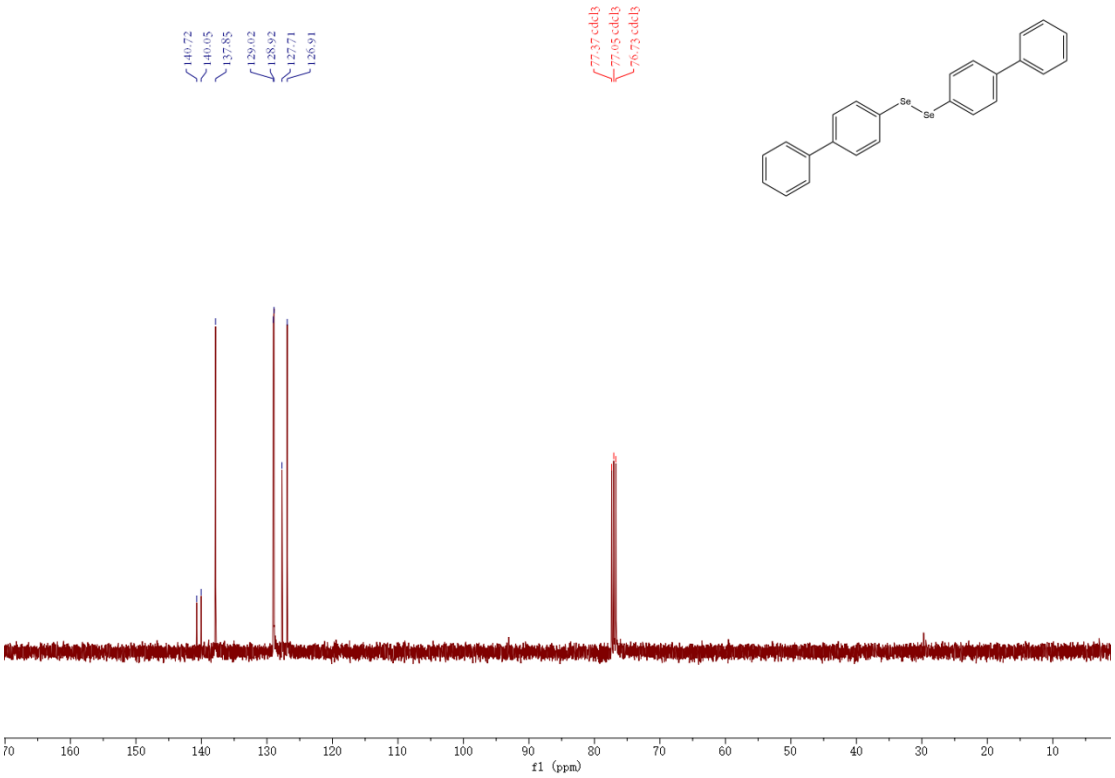
[1] H NMR (400 MHz, $CDCl_3$) spectrum of 4,4'-diselenidediyldibenzaldehyde(2g).



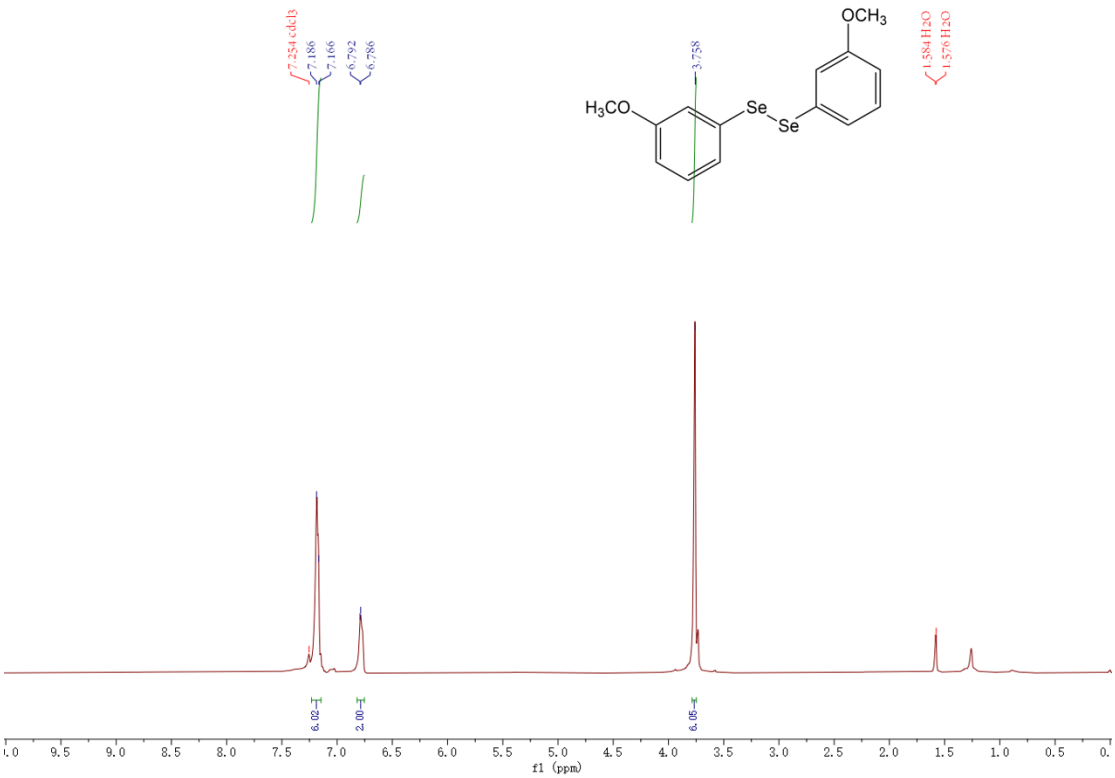
[13] C NMR (100MHz, $CDCl_3$) spectrum of 4,4'-diselenidediyldibenzaldehyde(2g).



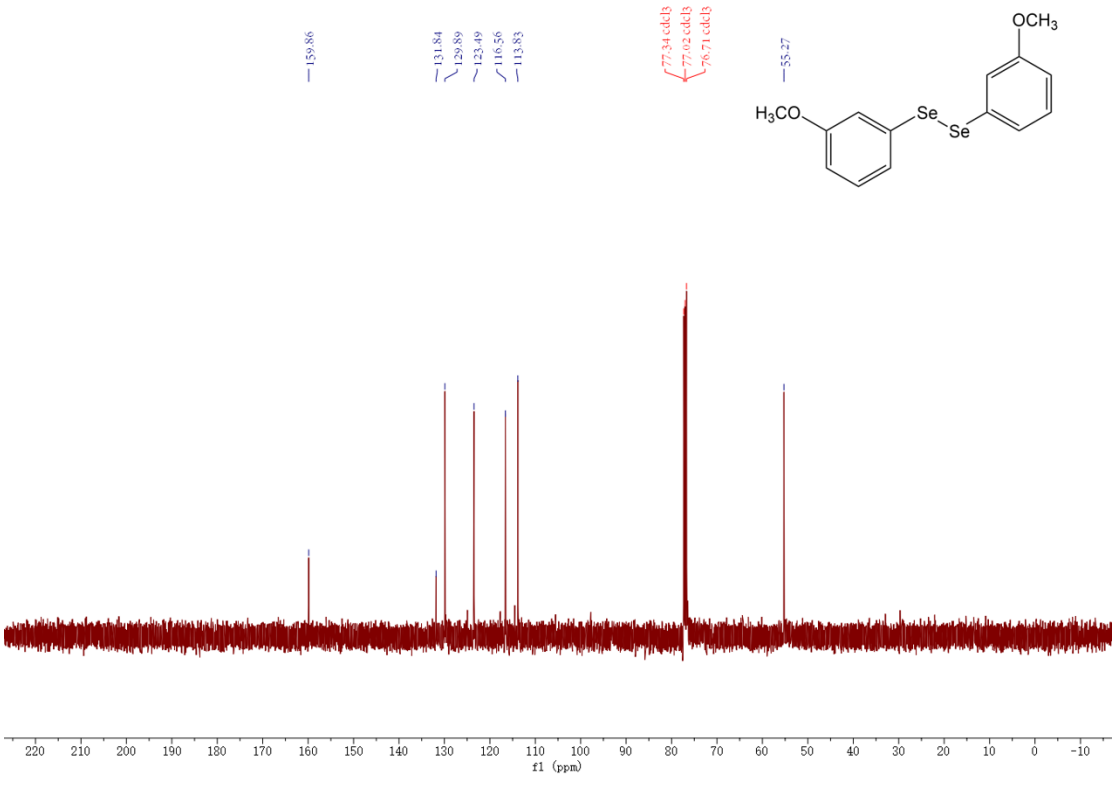
[1] H NMR (400 MHz, $CDCl_3$) spectrum of Bis([1,1′-biphenyl]-4-yl)diselenide(2h).



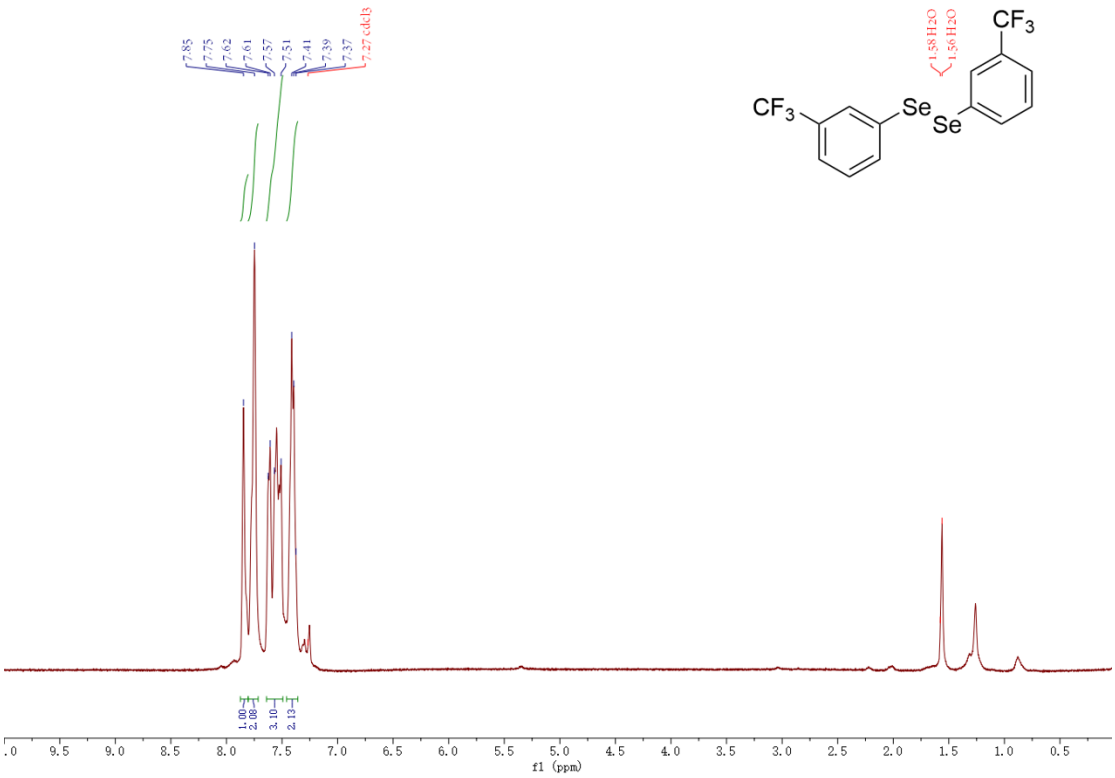
[13] C NMR (100MHz, $CDCl_3$) spectrum of Bis([1,1′-biphenyl]-4-yl)diselenide(2h).



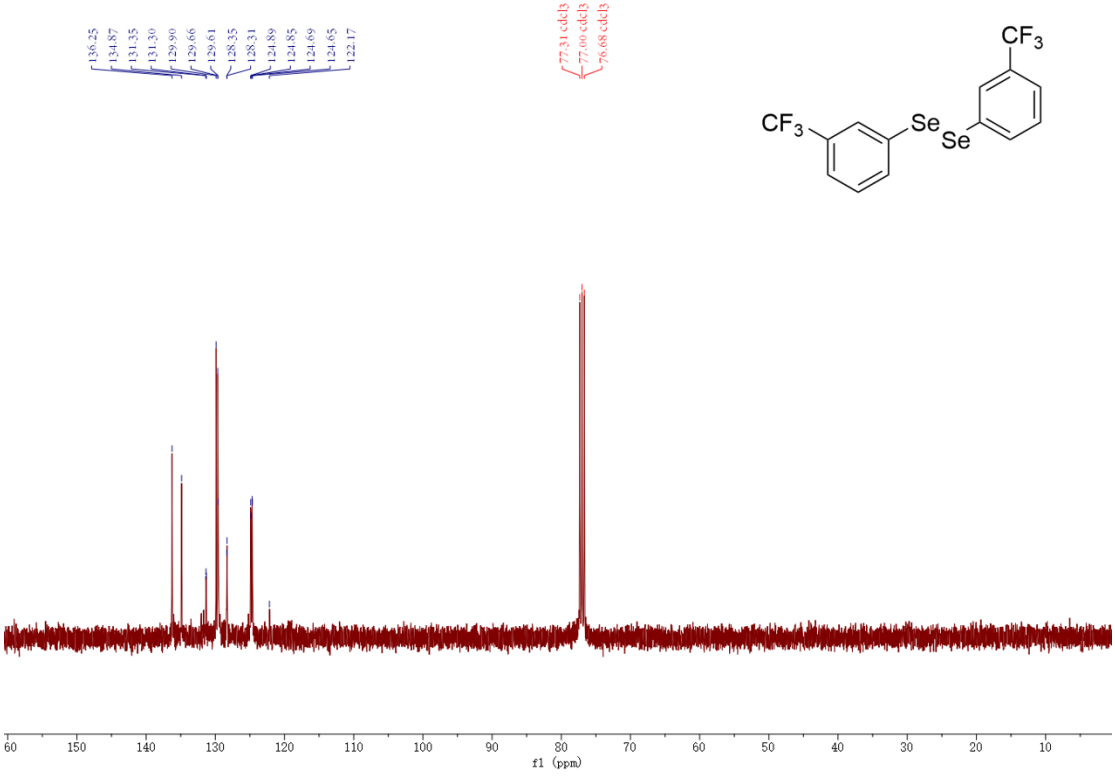
[1] H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(3-methoxyphenyl)diselenide(2i).



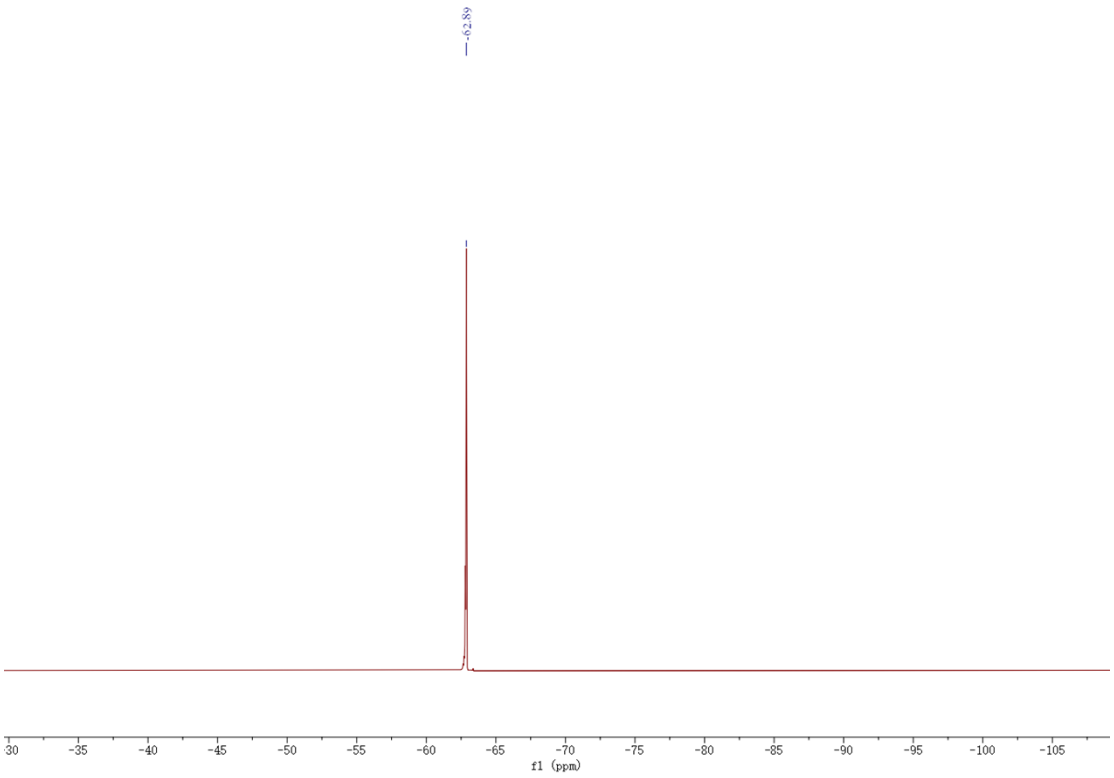
[13] C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(3-methoxyphenyl)diselenide(2i).



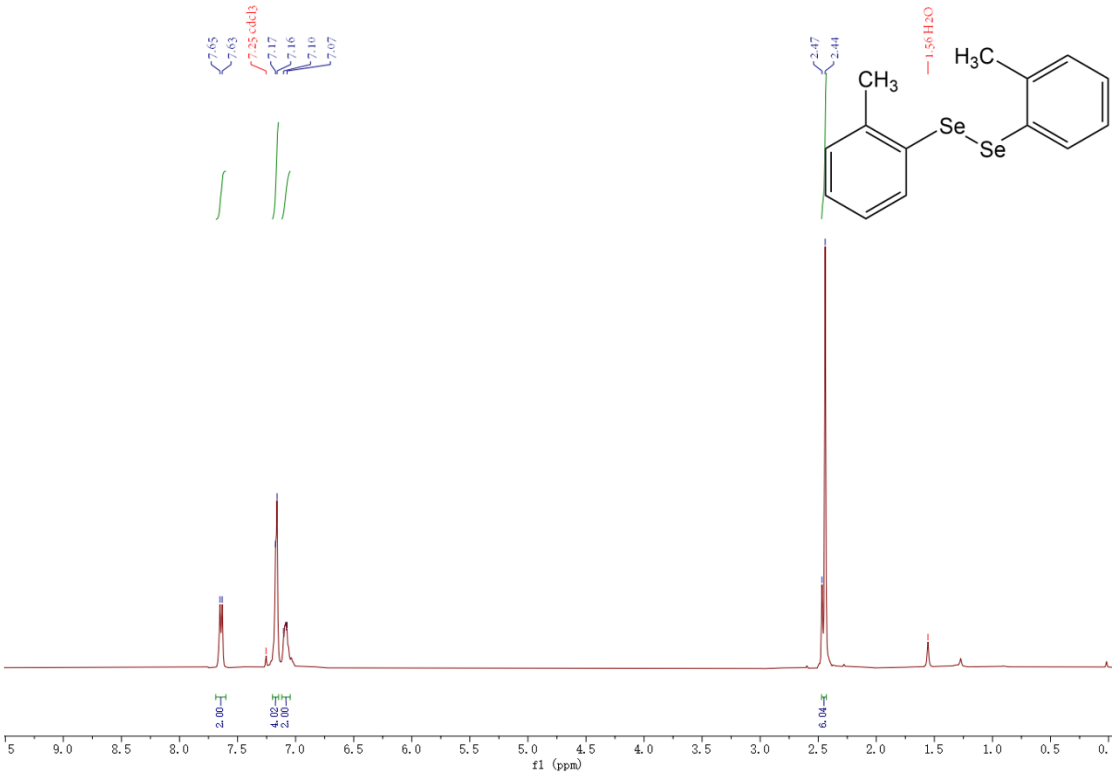
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(3-(trifluoromethyl)phenyl)diselane(2j).



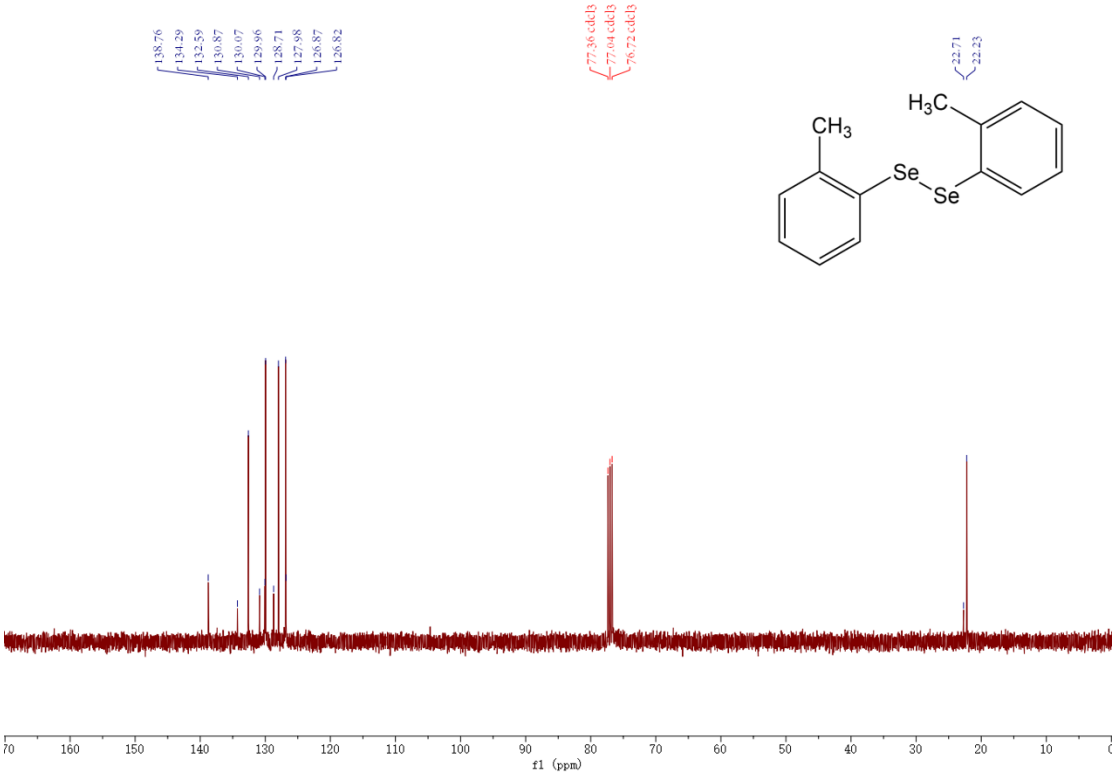
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(3-(trifluoromethyl)phenyl)diselane(2j).



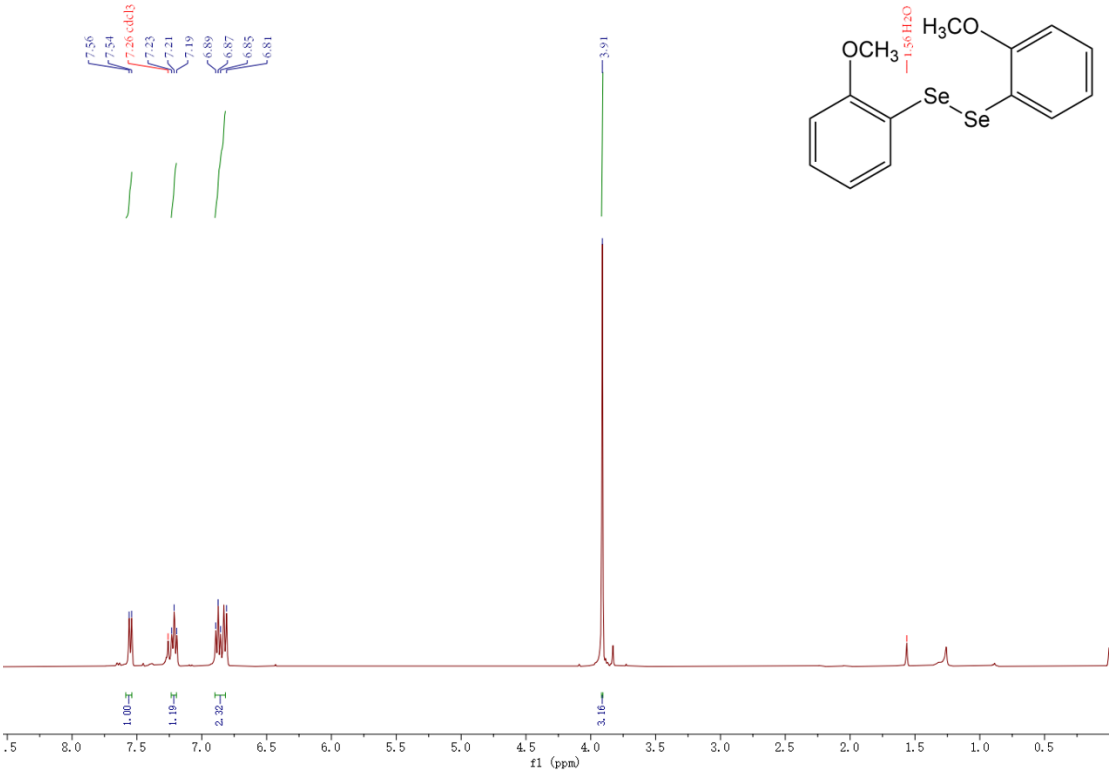
^{19}F NMR (376 MHz, $CDCl_3$) spectrum of 1,2-bis(3-(trifluoromethyl)phenyl)diselane(2j).



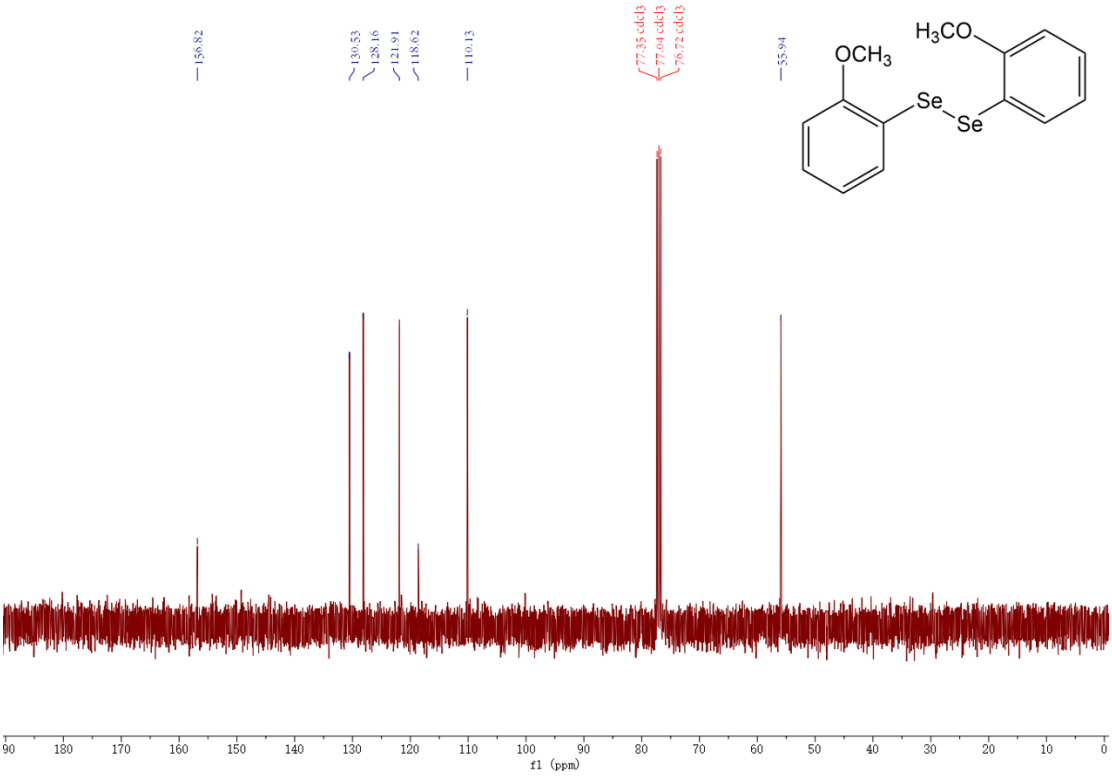
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(3-methoxyphenyl)diselenide(2k).



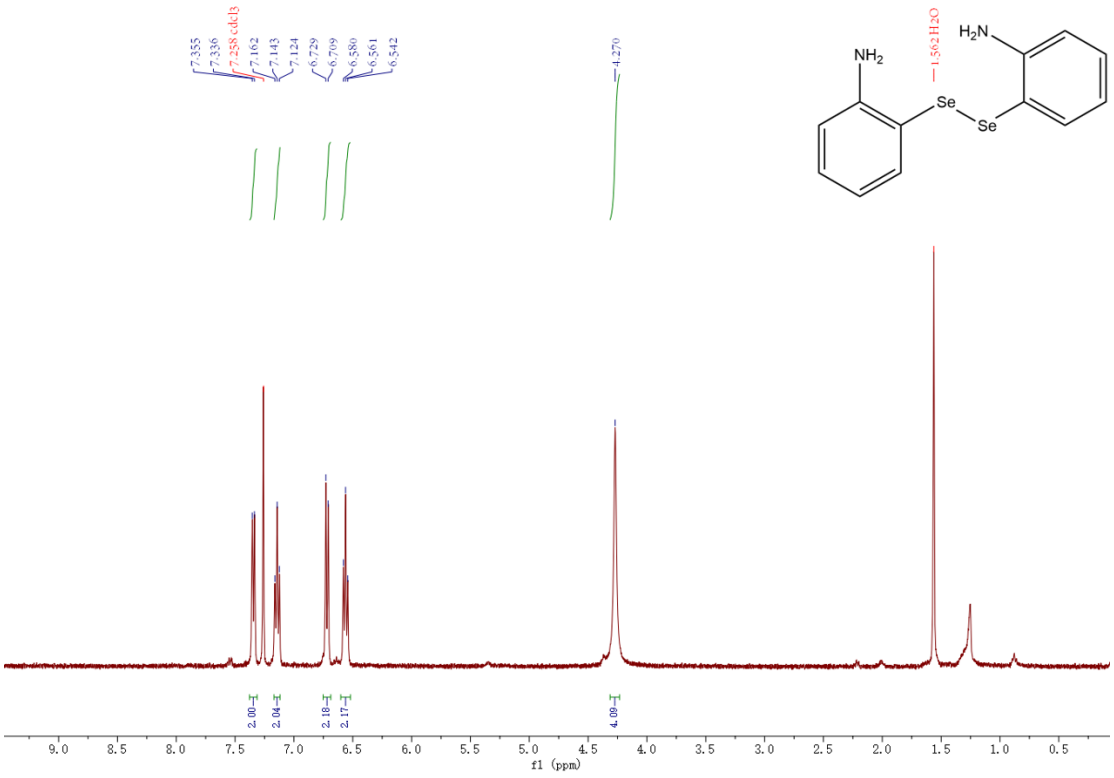
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(3-methoxyphenyl)diselenide(2k).



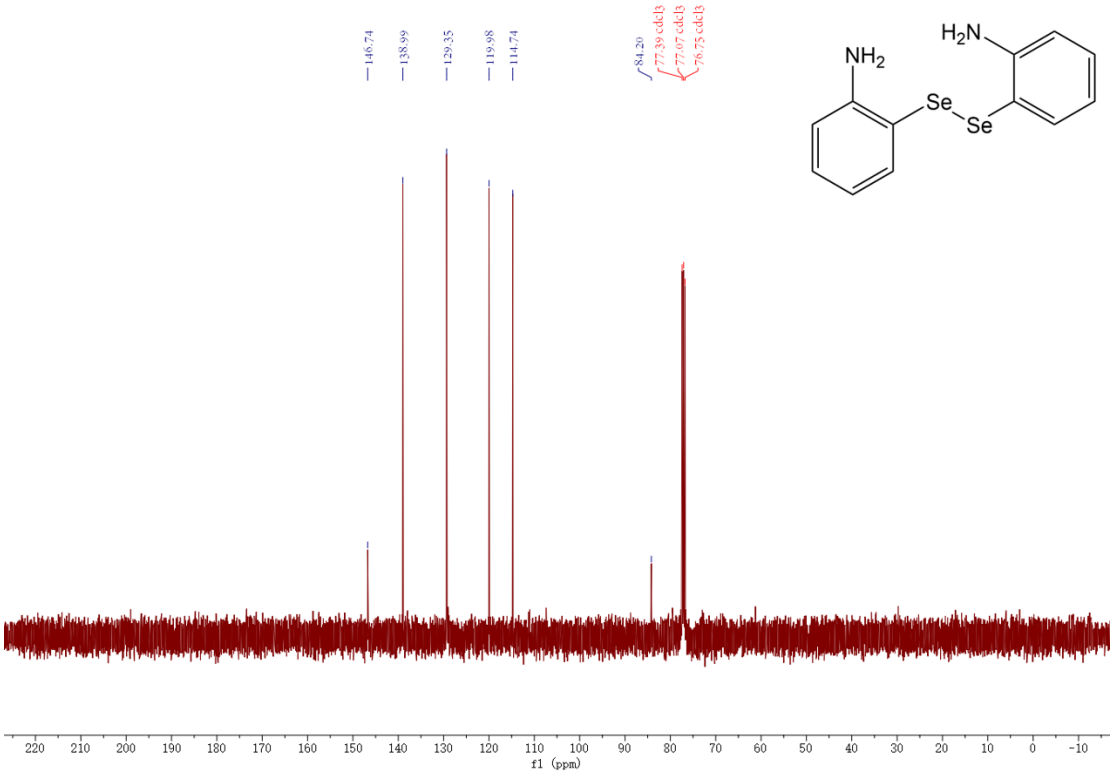
[1] H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-bromophenyl)diselenide(2l).



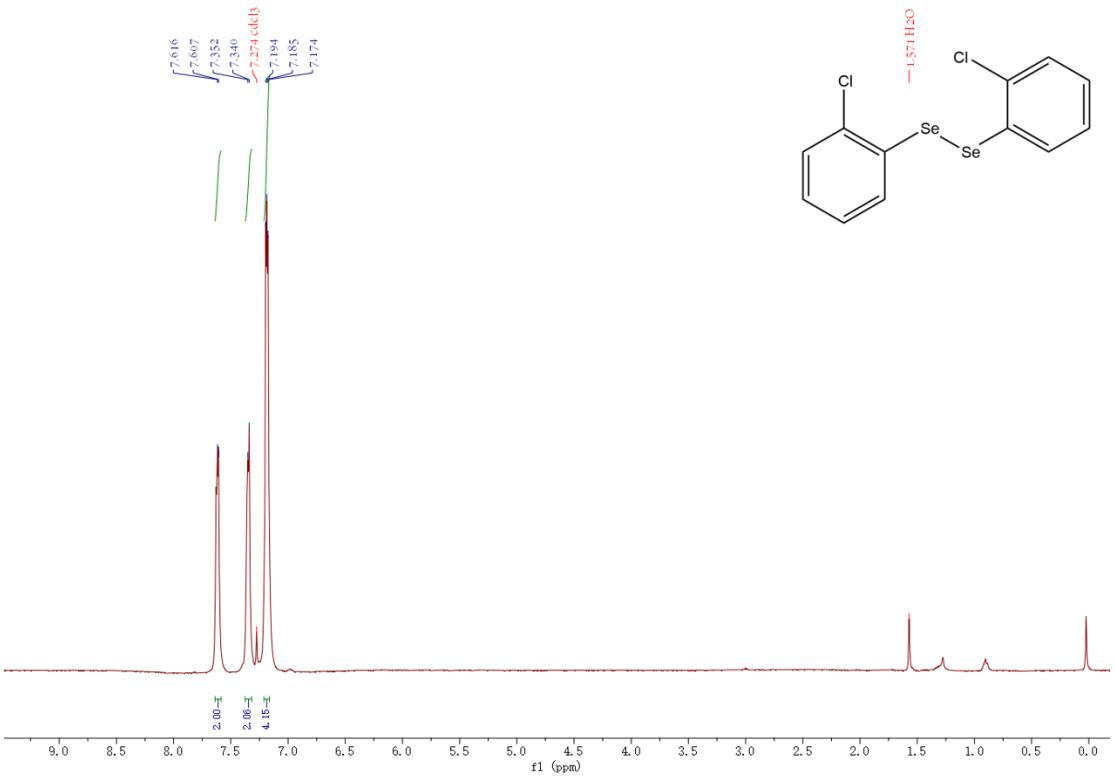
[13] C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(4-bromophenyl)diselenide(2l).



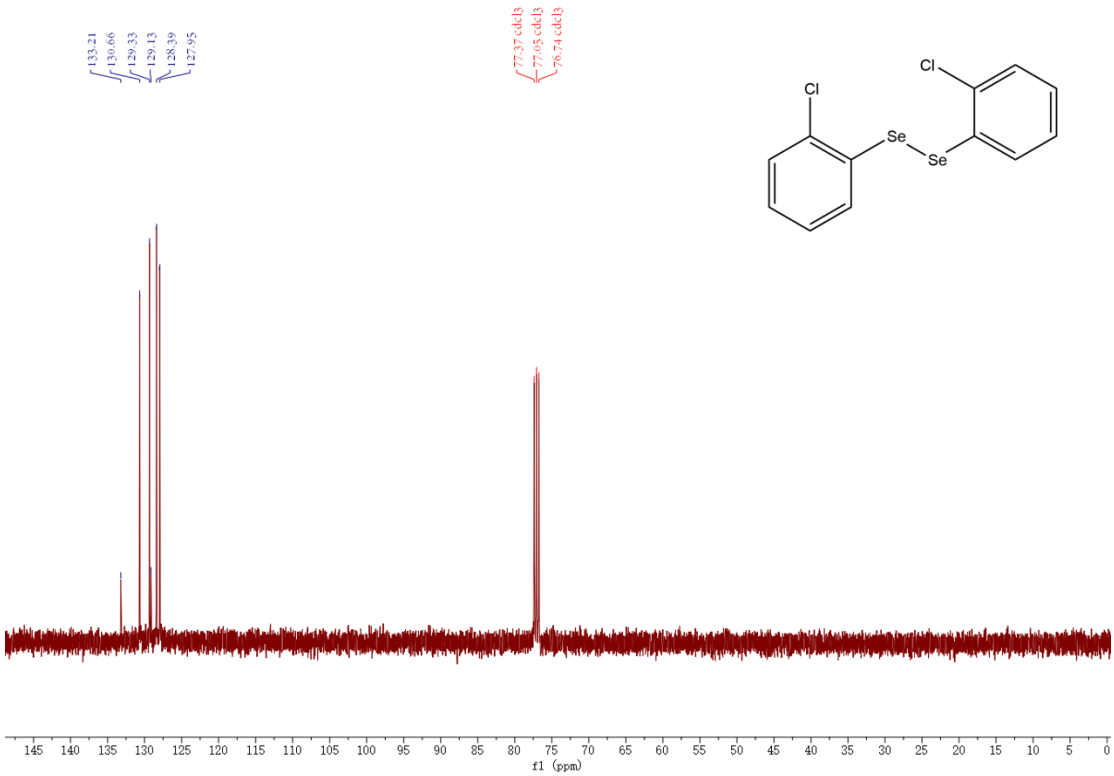
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 2,2'-diselenidediyldianiline(2m).



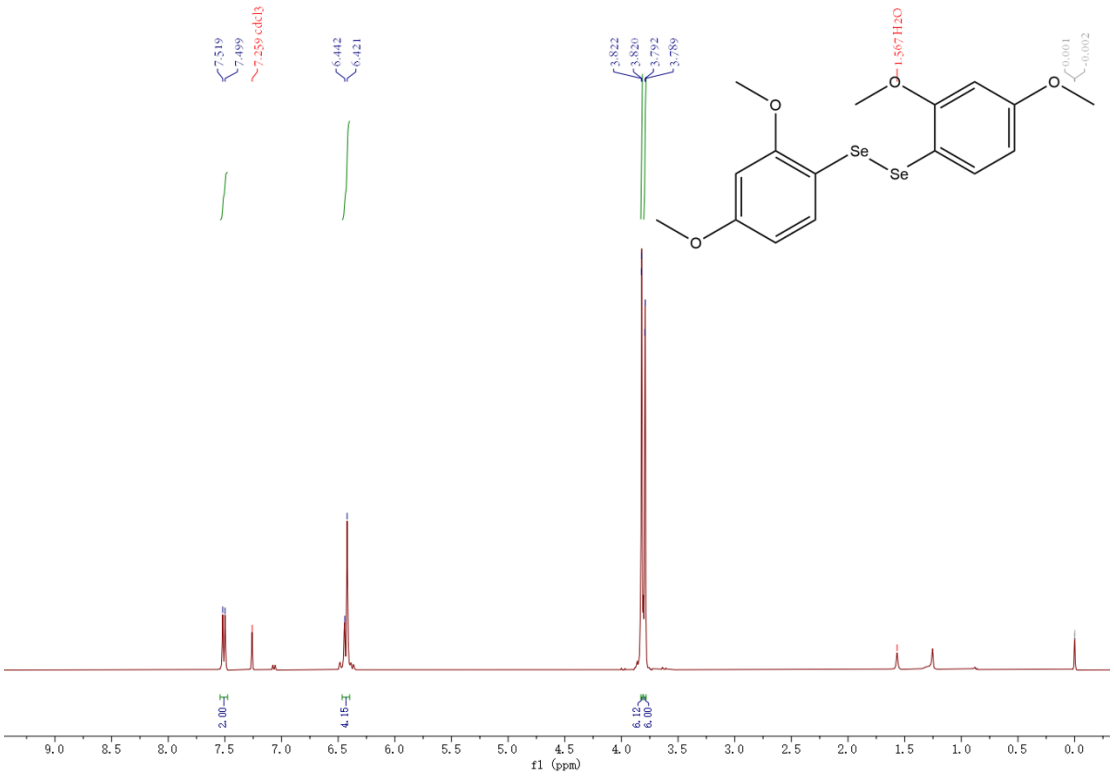
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 2,2'-diselenidediyldianiline(2m).



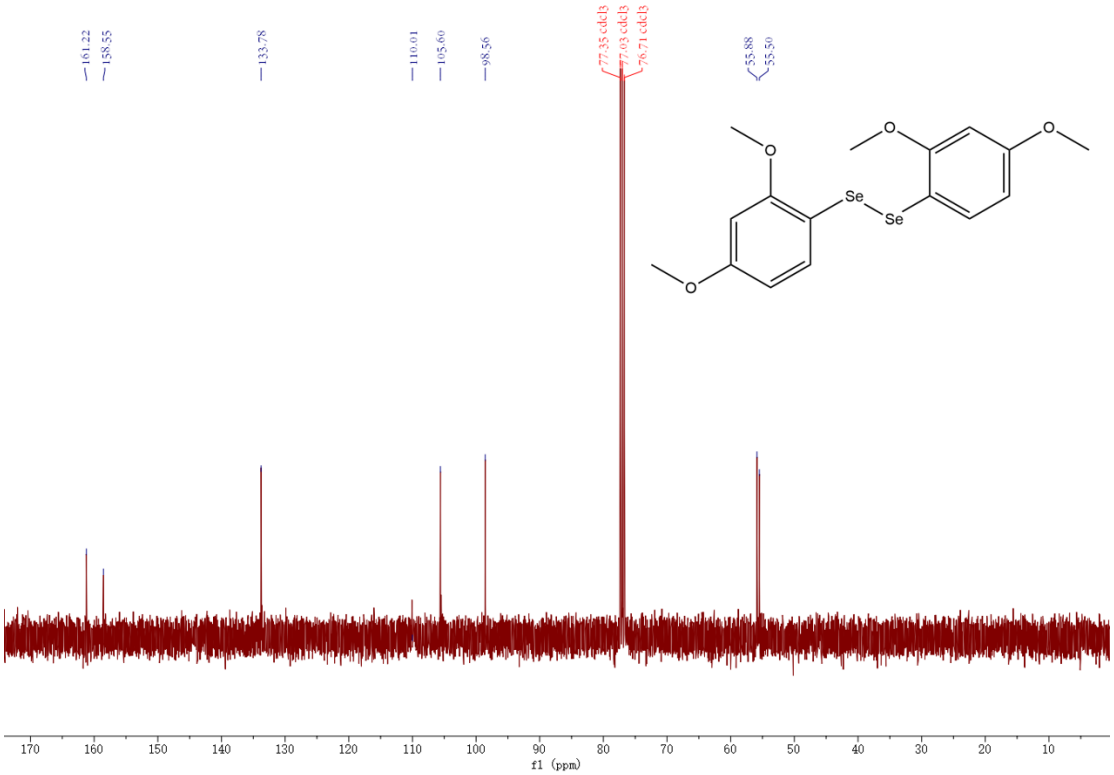
[1] H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(2-chlorophenyl)diselenide(2n).



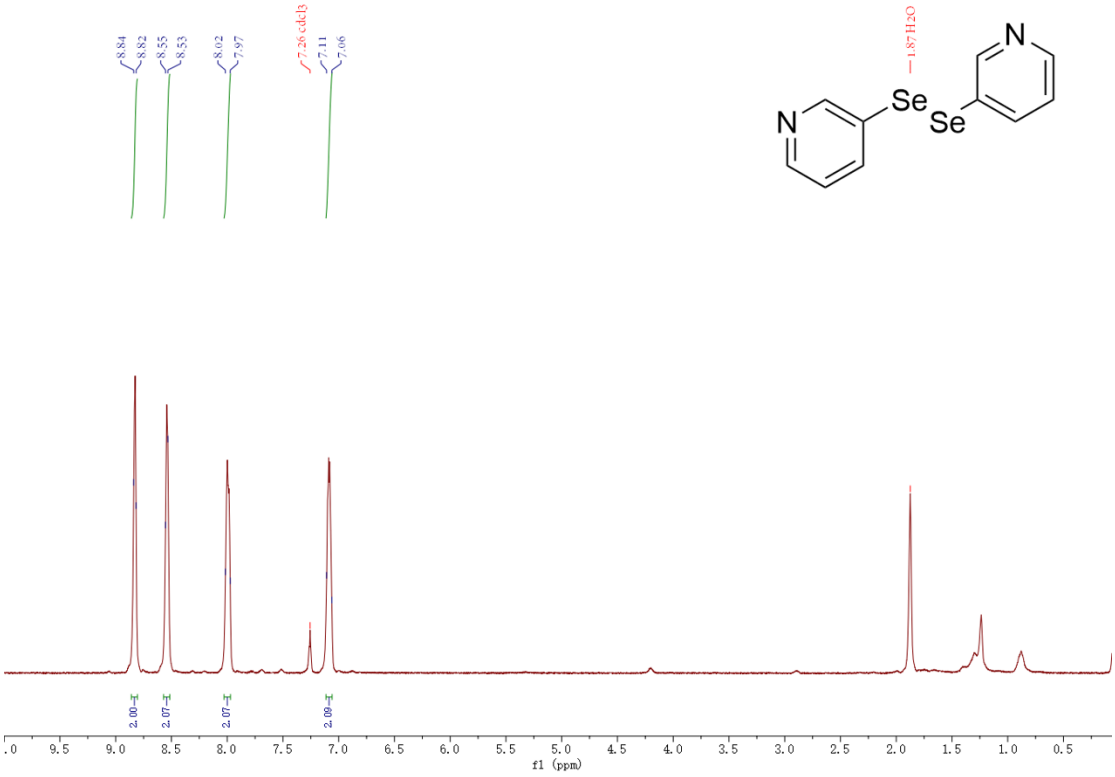
[13] C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(2-chlorophenyl)diselenide(2n).



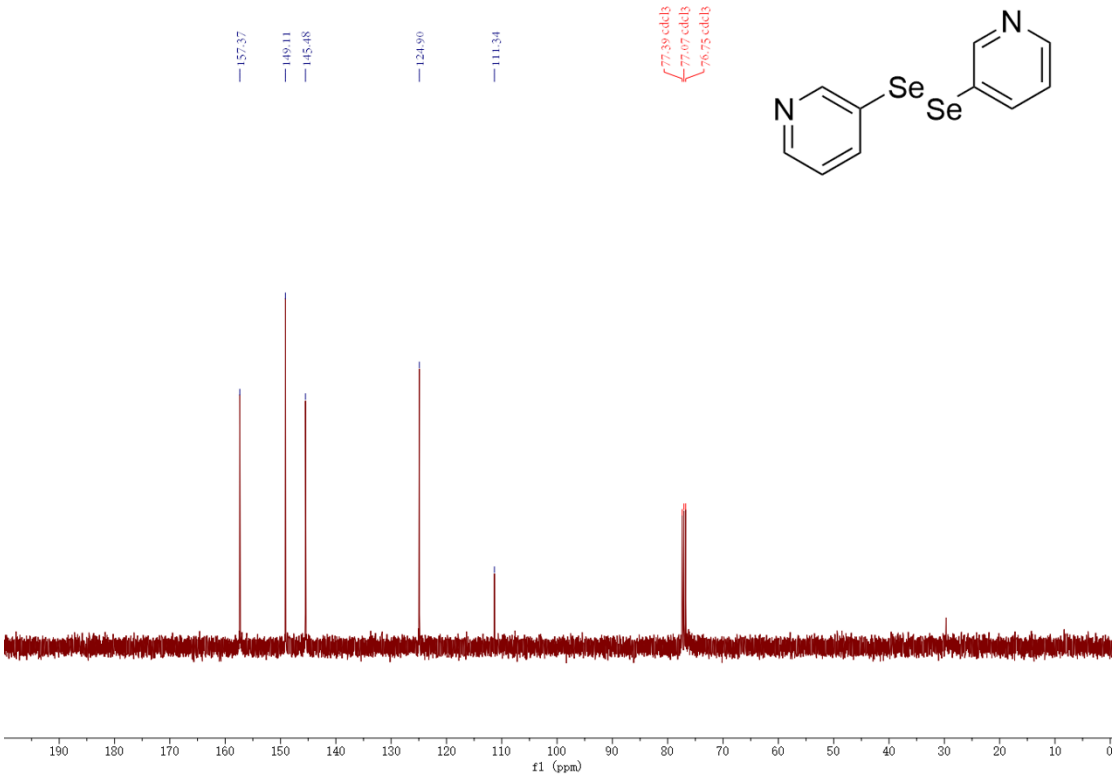
[1] H NMR (400MHz, $CDCl_3$) spectrum of 1,2-bis(2,4-dimethoxyphenyl)diselenide(2o).



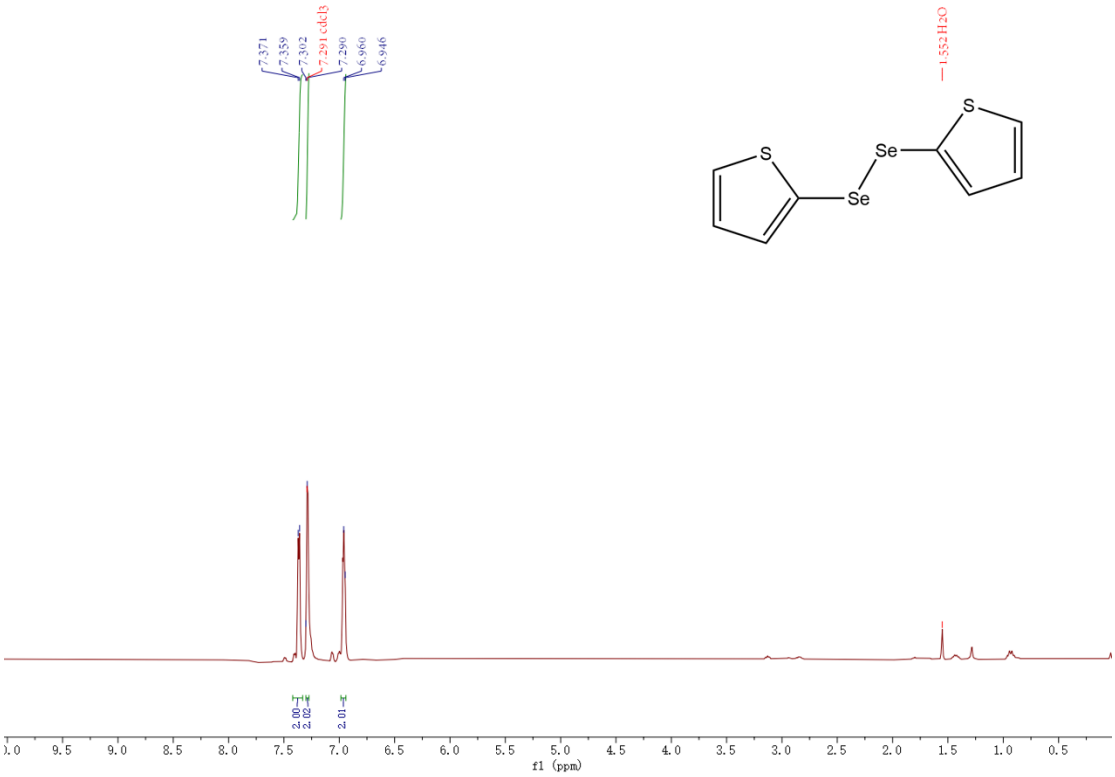
[13]C NMR (100MHz, $CDCl_3$) spectrum of 1,2-bis(2,4-dimethoxyphenyl)diselenide(2o).



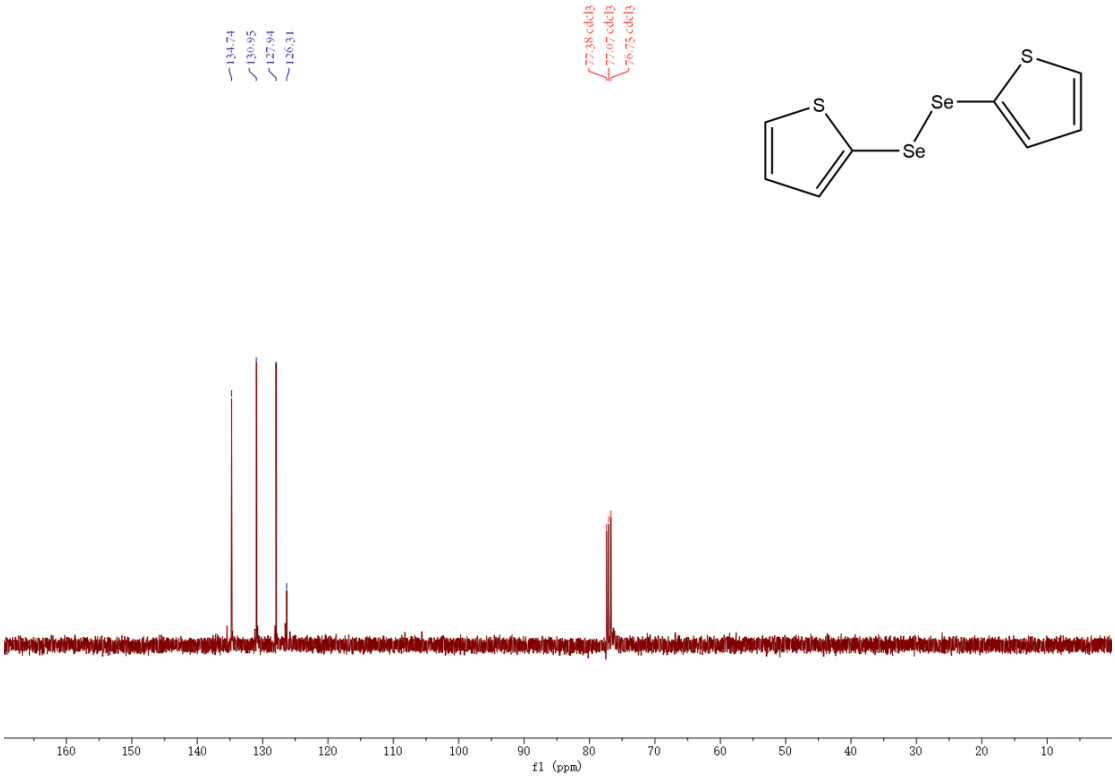
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-di(pyridin-3-yl)diselenide (2p).



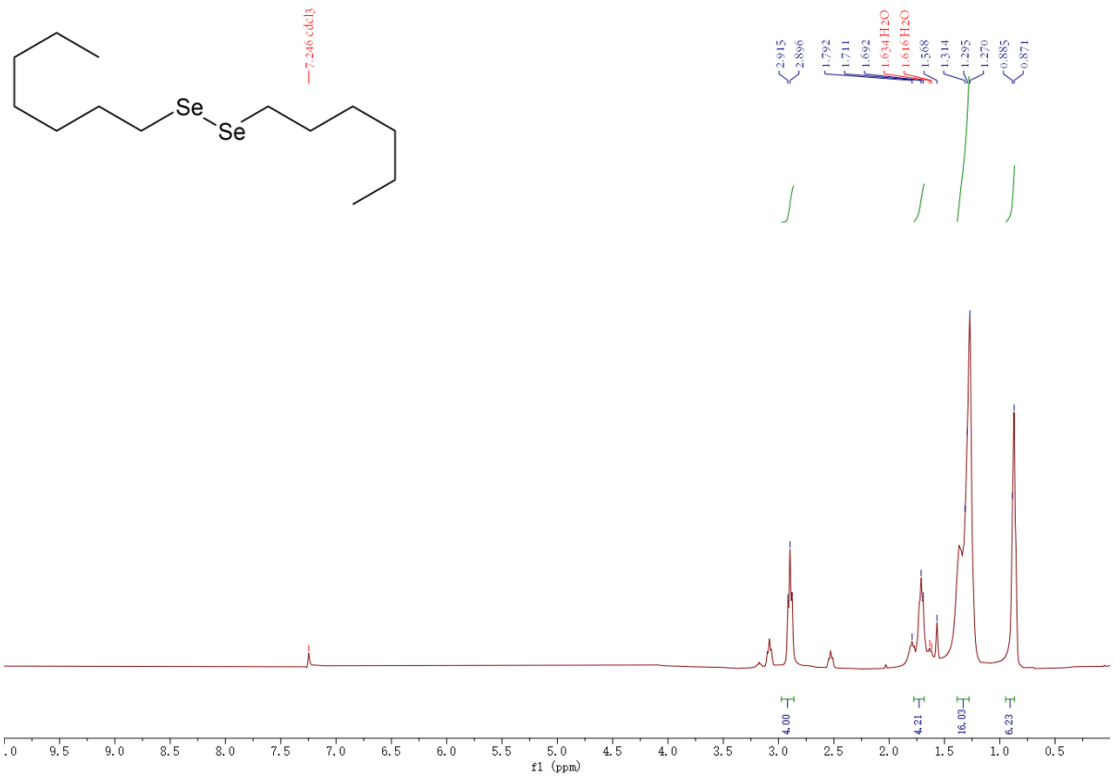
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-di(pyridin-3-yl)diselenide (2p).



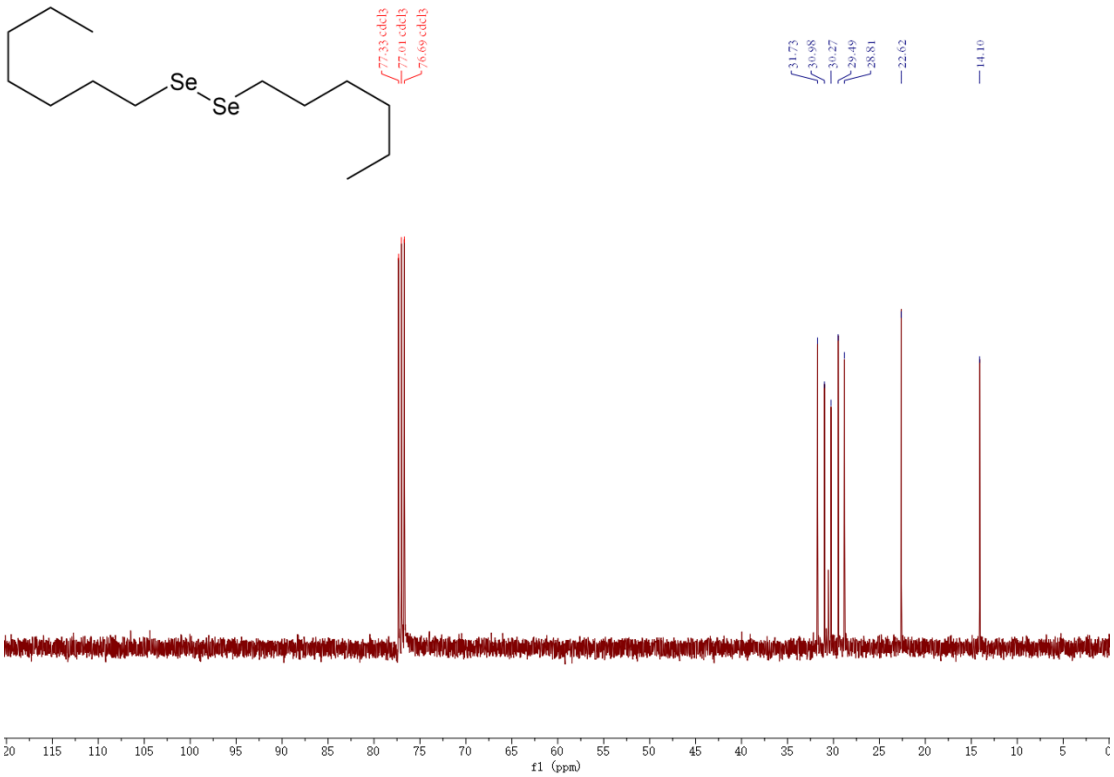
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of Dithiophen-2-yl Diselenide (2q).



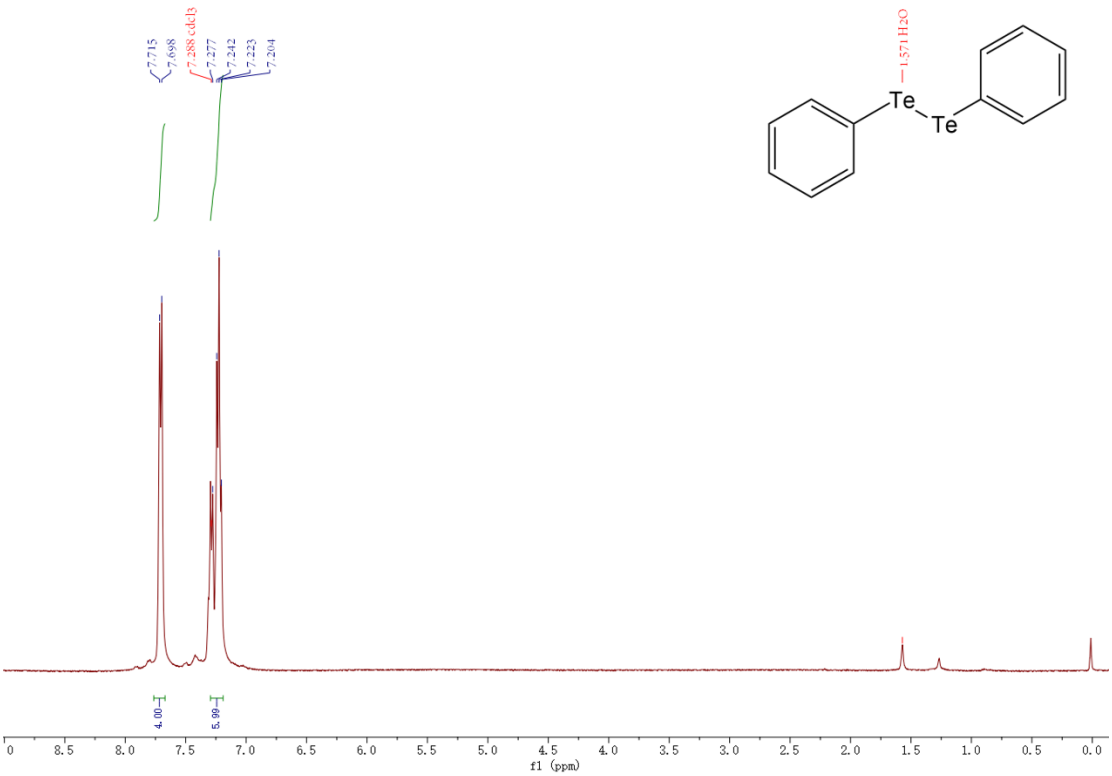
^{13}C NMR (100MHz, $CDCl_3$) spectrum of Dithiophen-2-yl Diselenide (2q).



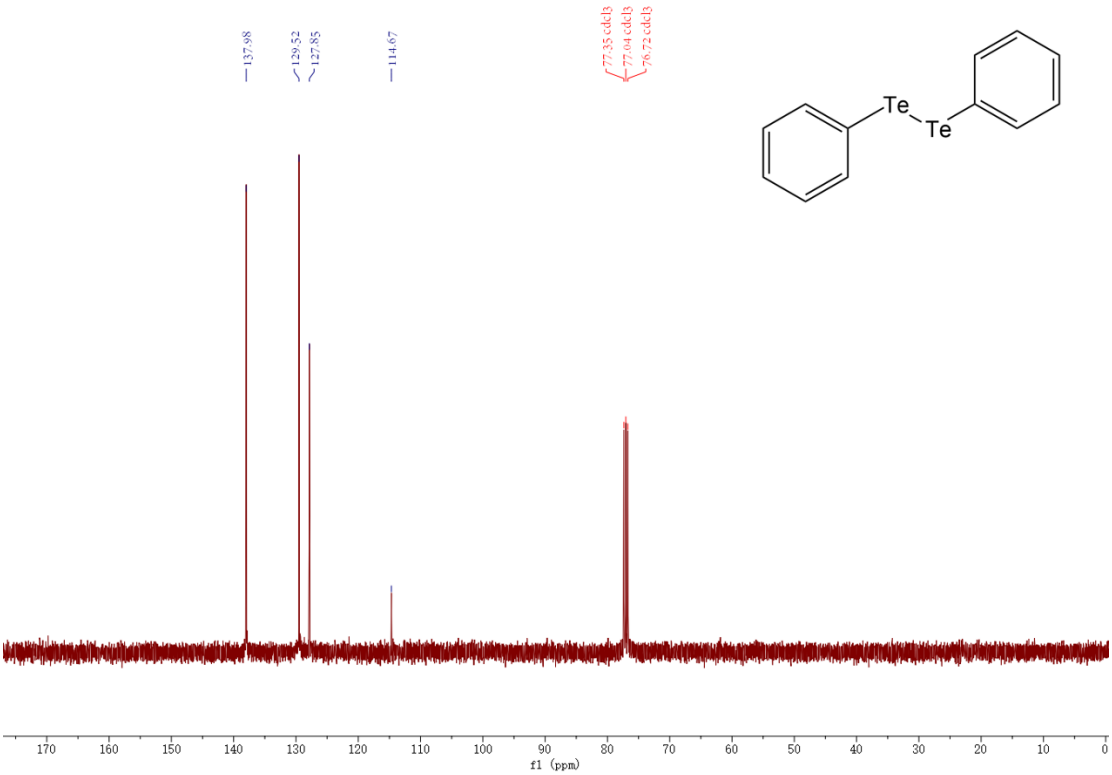
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-diheptyldiselenide (2r).



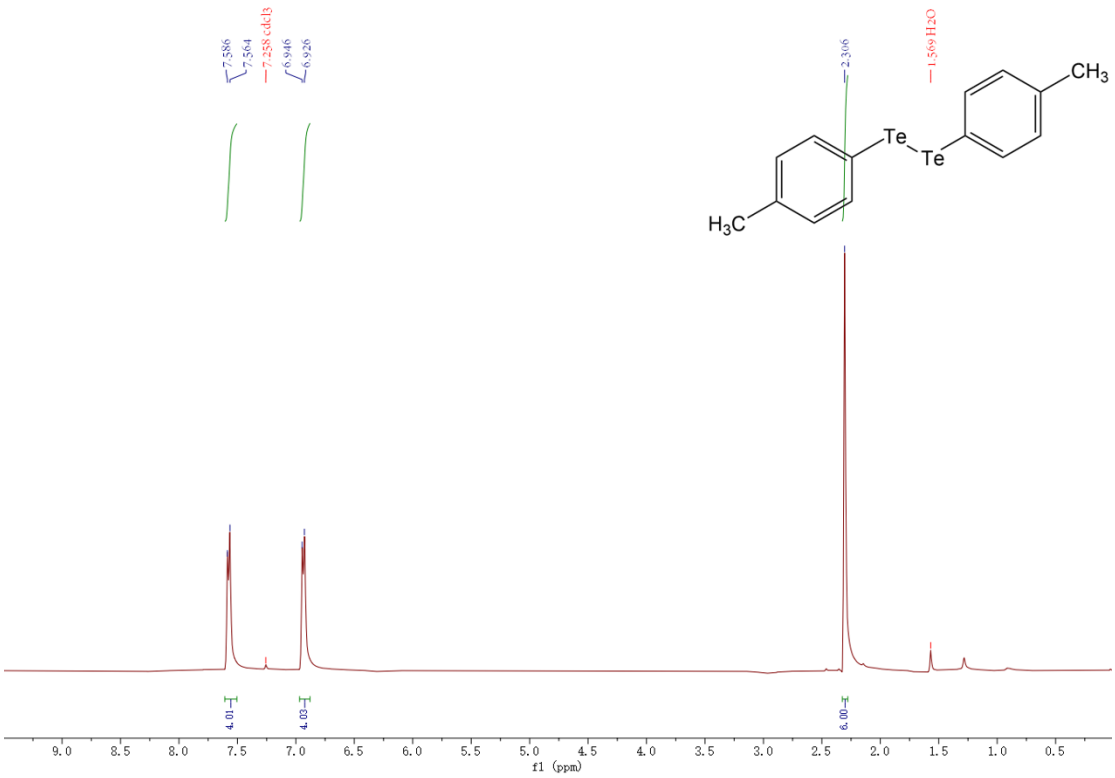
^{13}C NMR (100MHz, $CDCl_3$) spectrum of 1,2-diheptyldiselenide (2r).



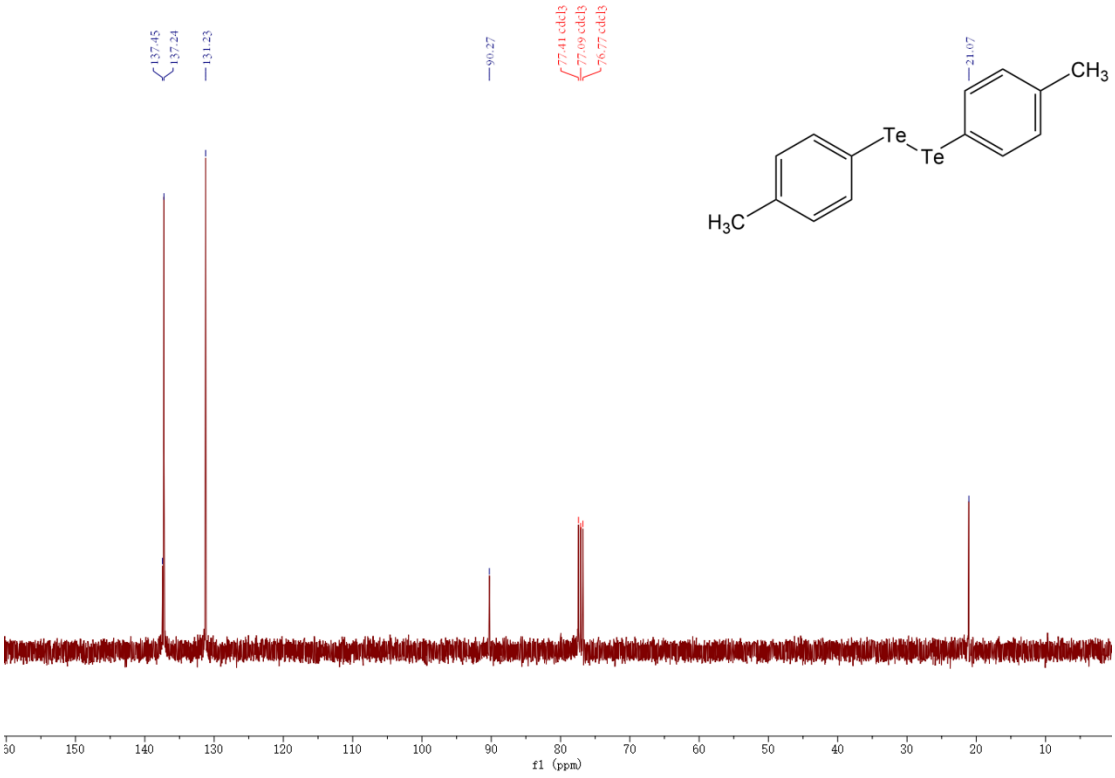
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-diphenyl ditelluride (3a).



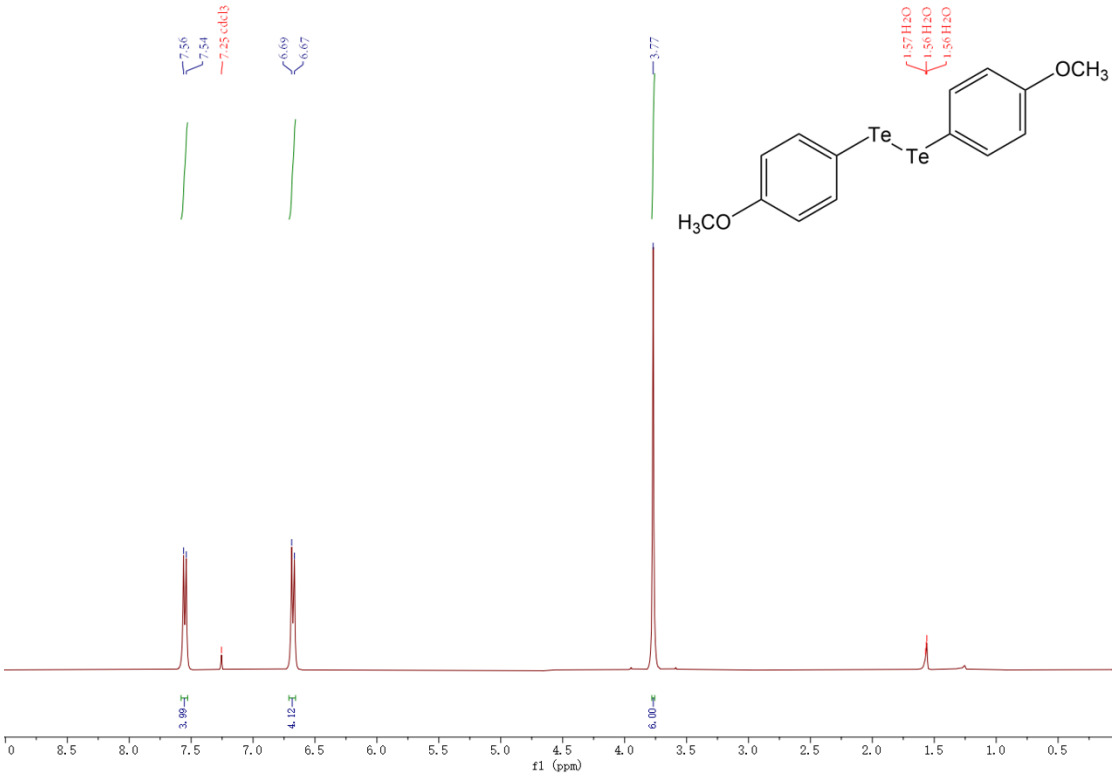
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-diphenyl ditelluride (3a).



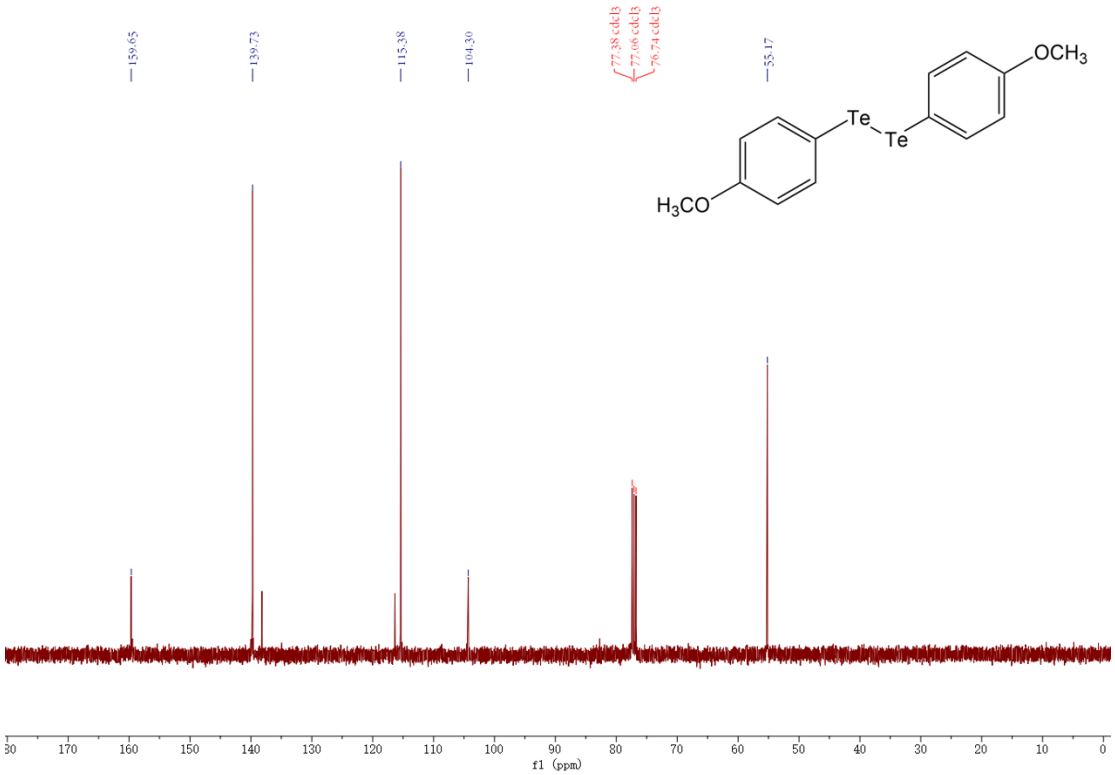
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of bis(4-methylphenyl) ditelluride (3b).



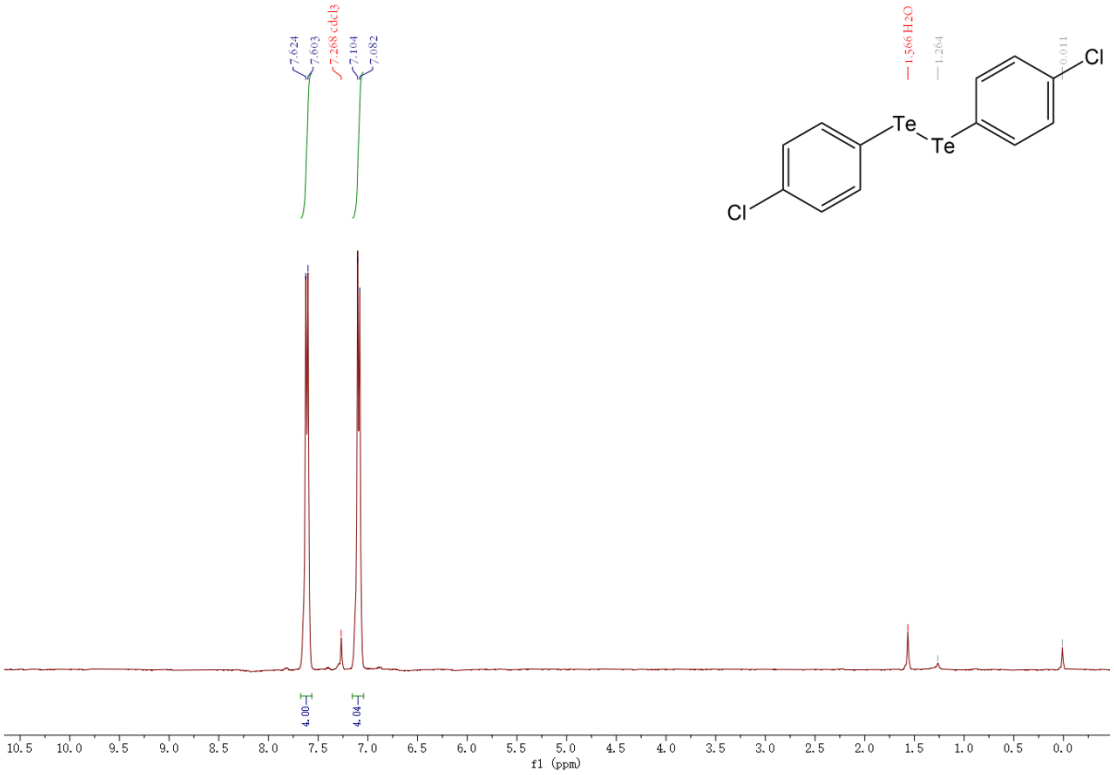
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of bis(4-methylphenyl) ditelluride (3b).



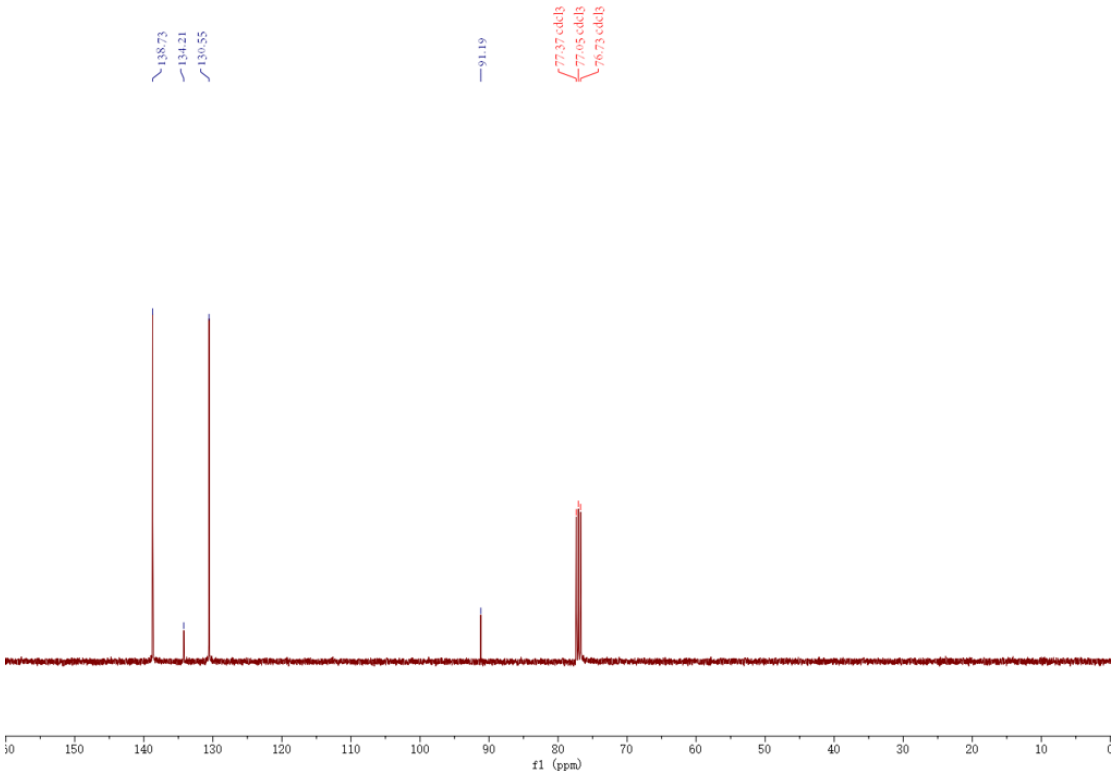
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl) ditelluride (3c).



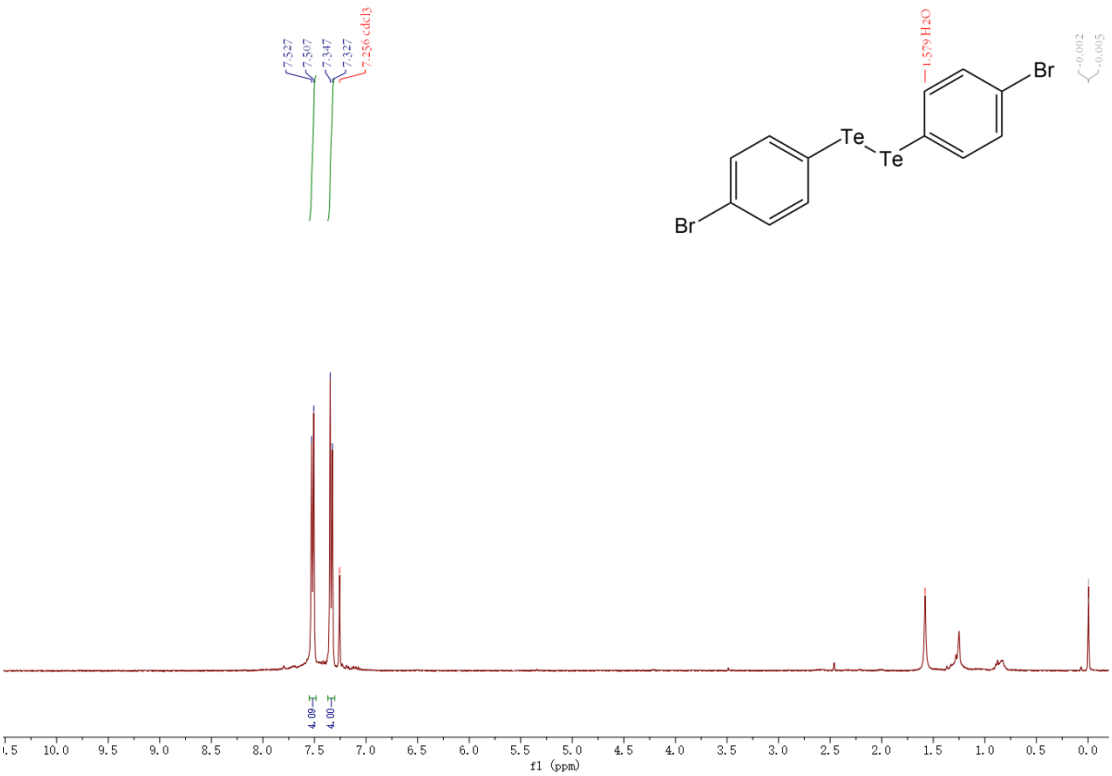
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(4-methoxyphenyl) ditelluride (3c).



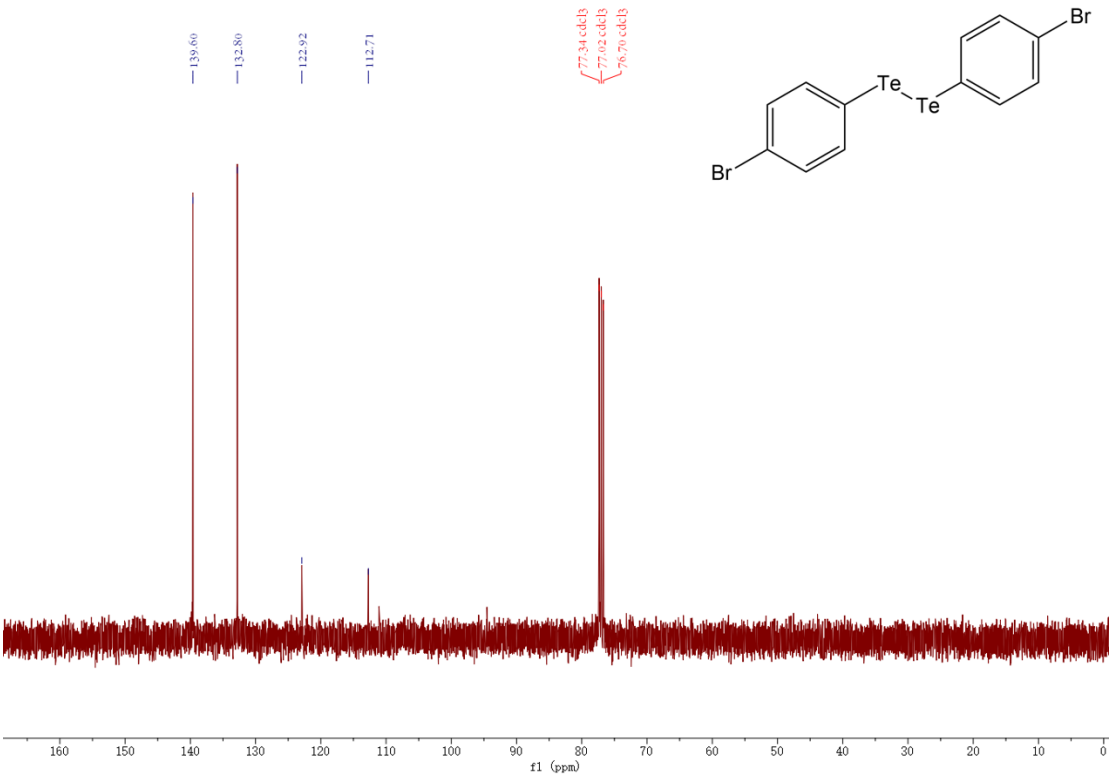
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(4-chlorophenyl) ditelluride (3d).



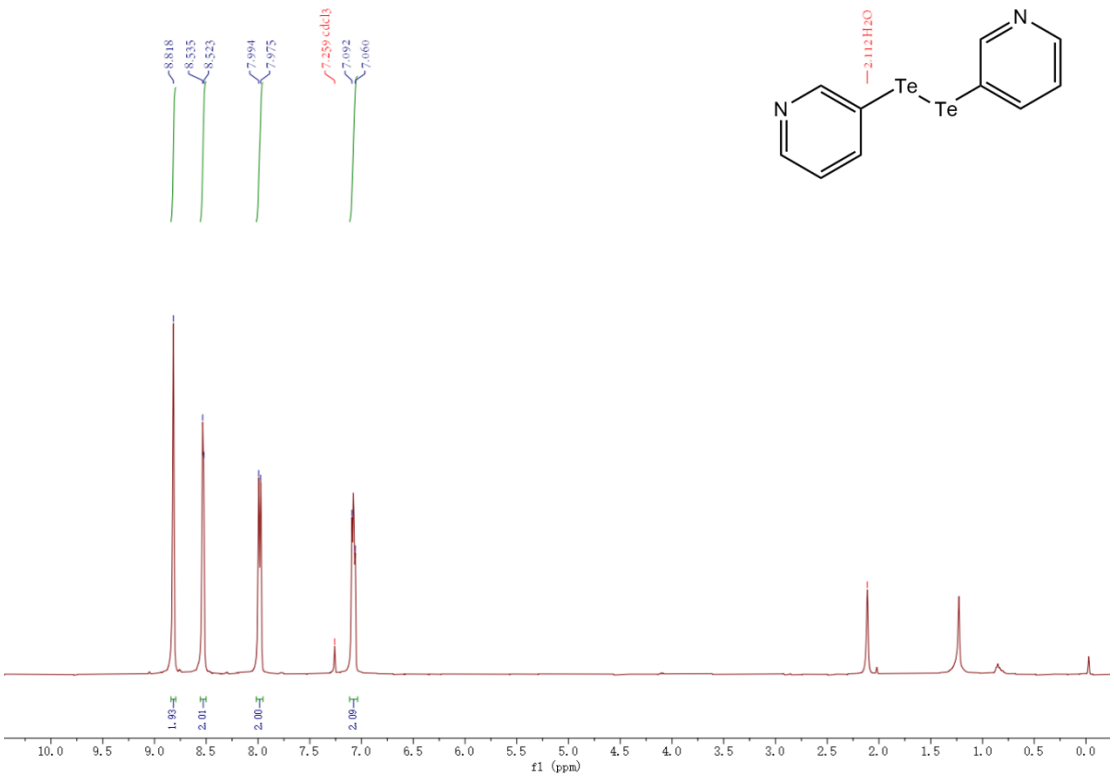
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(4-chlorophenyl)ditelluride (3d).



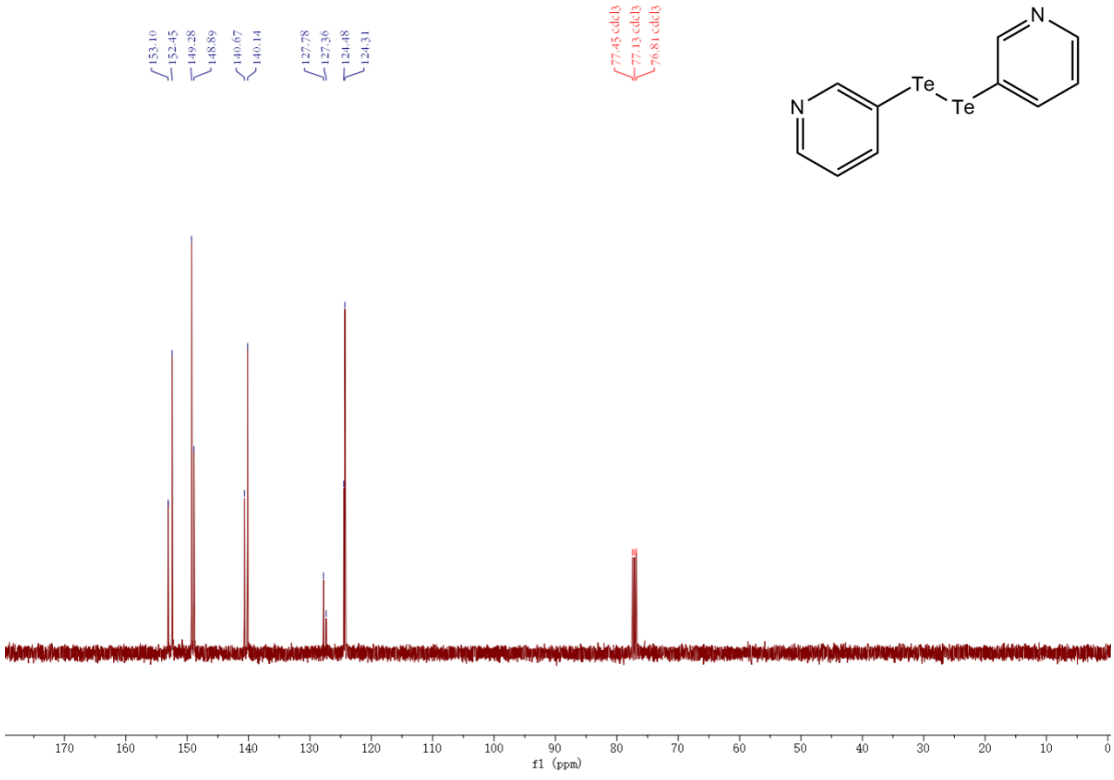
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of bis(4-bromophenyl) ditelluride (3e).



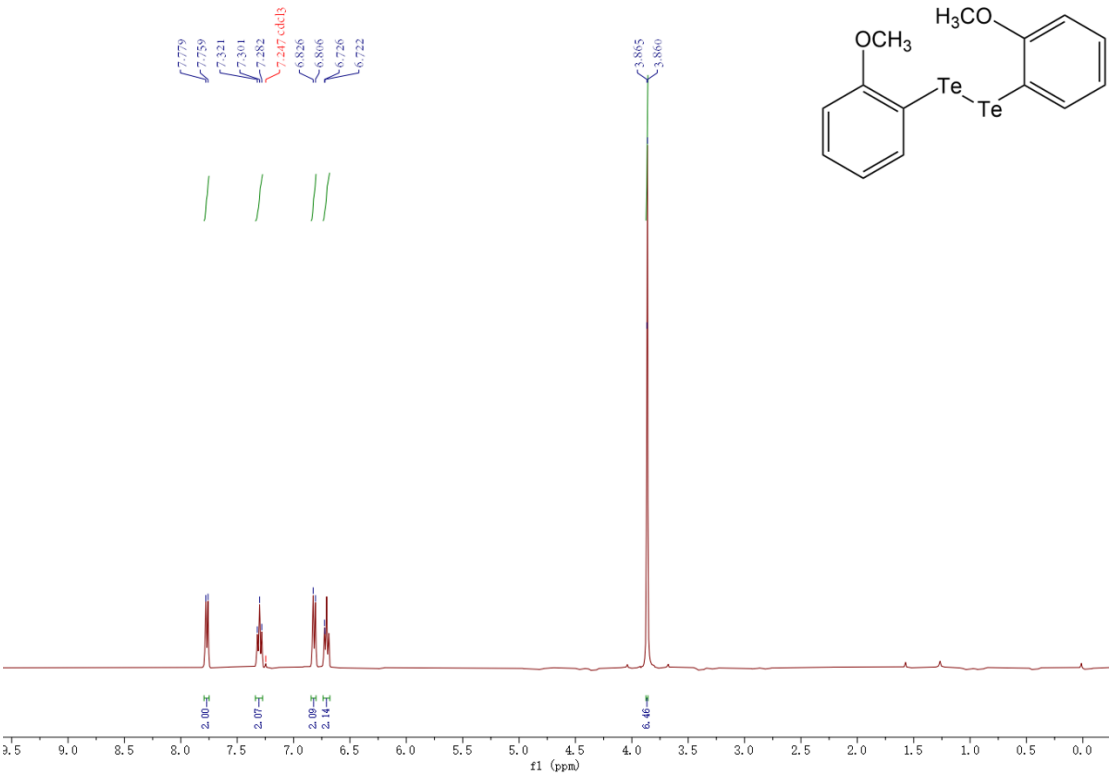
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of bis(4-bromophenyl) ditelluride (3e).



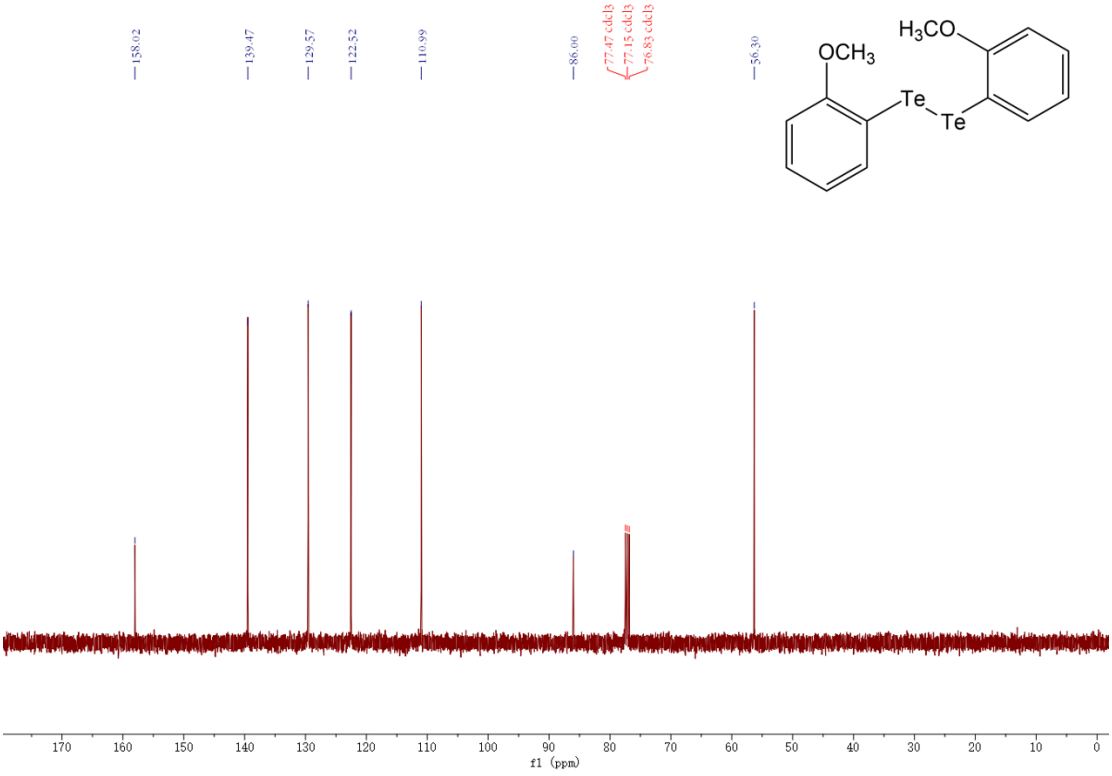
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-di(pyridin-3-yl)ditelluride (3f)



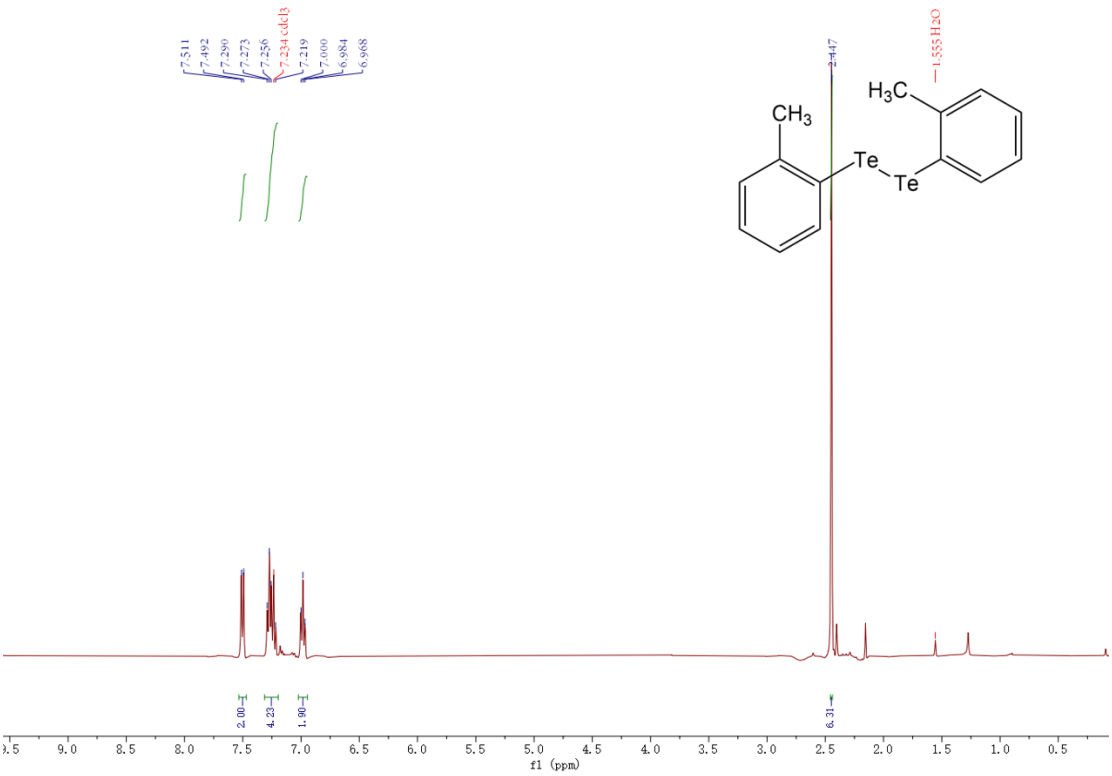
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-di(pyridin-3-yl)ditelluride (3f)



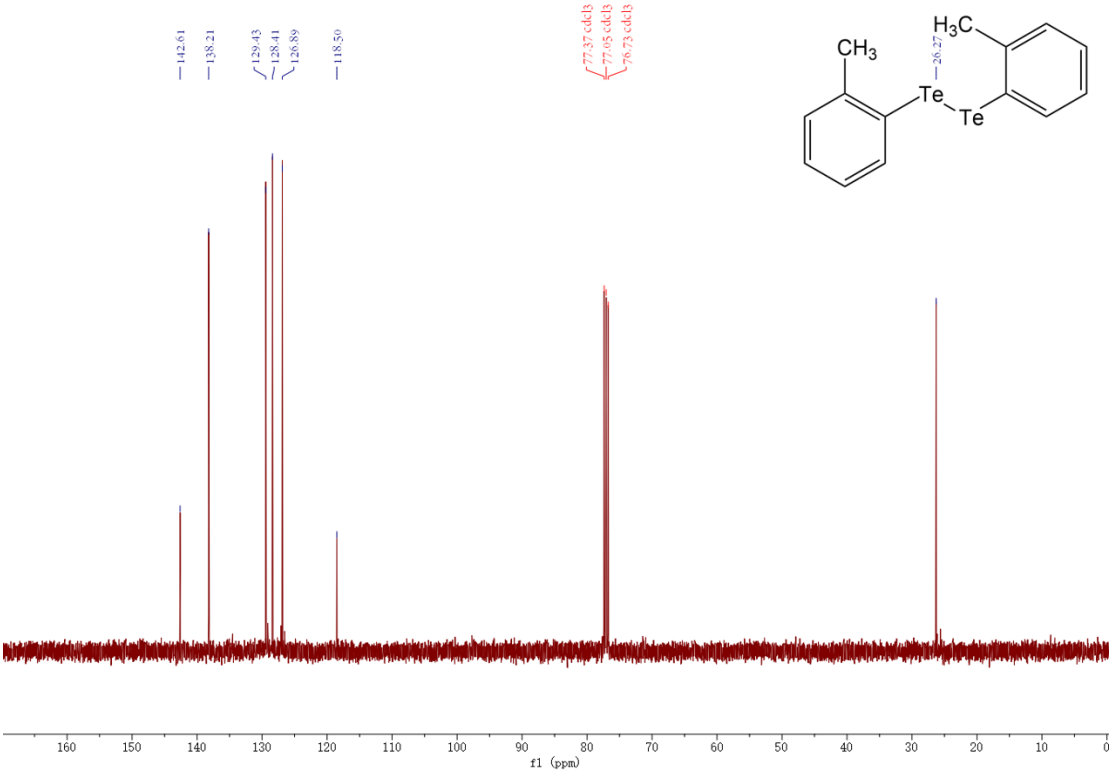
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(2-methoxyphenyl) ditelluride (3g).



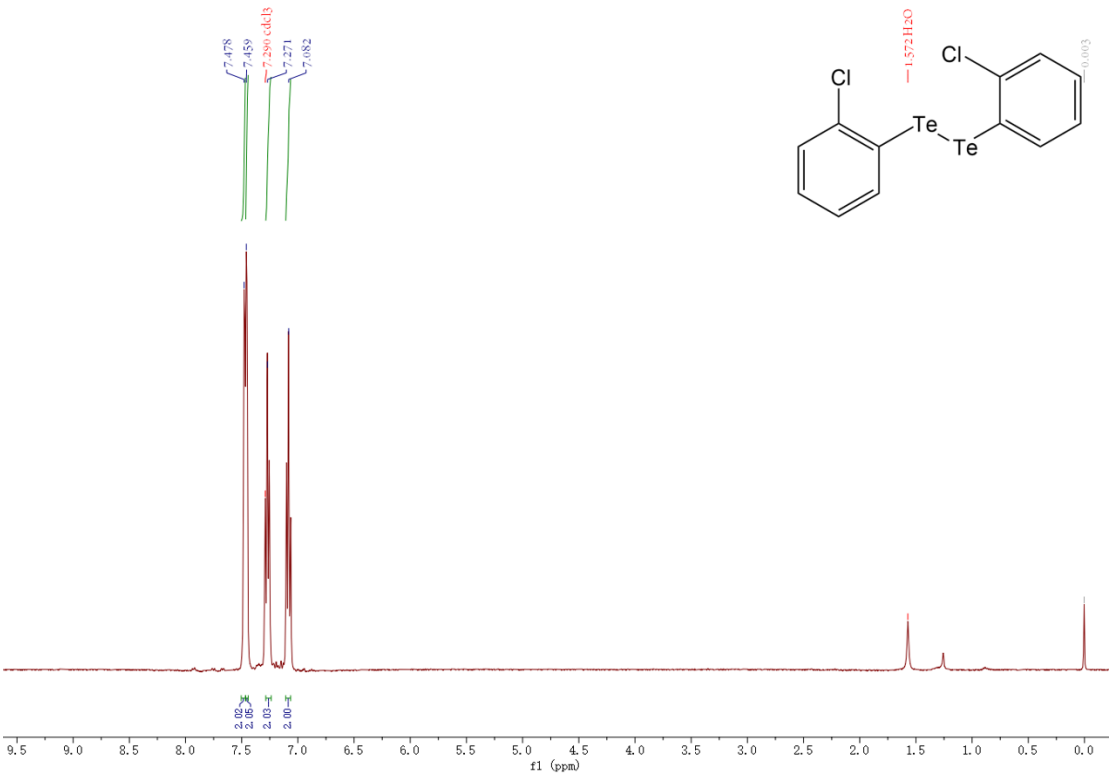
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(2-methoxyphenyl) ditelluride (3g).



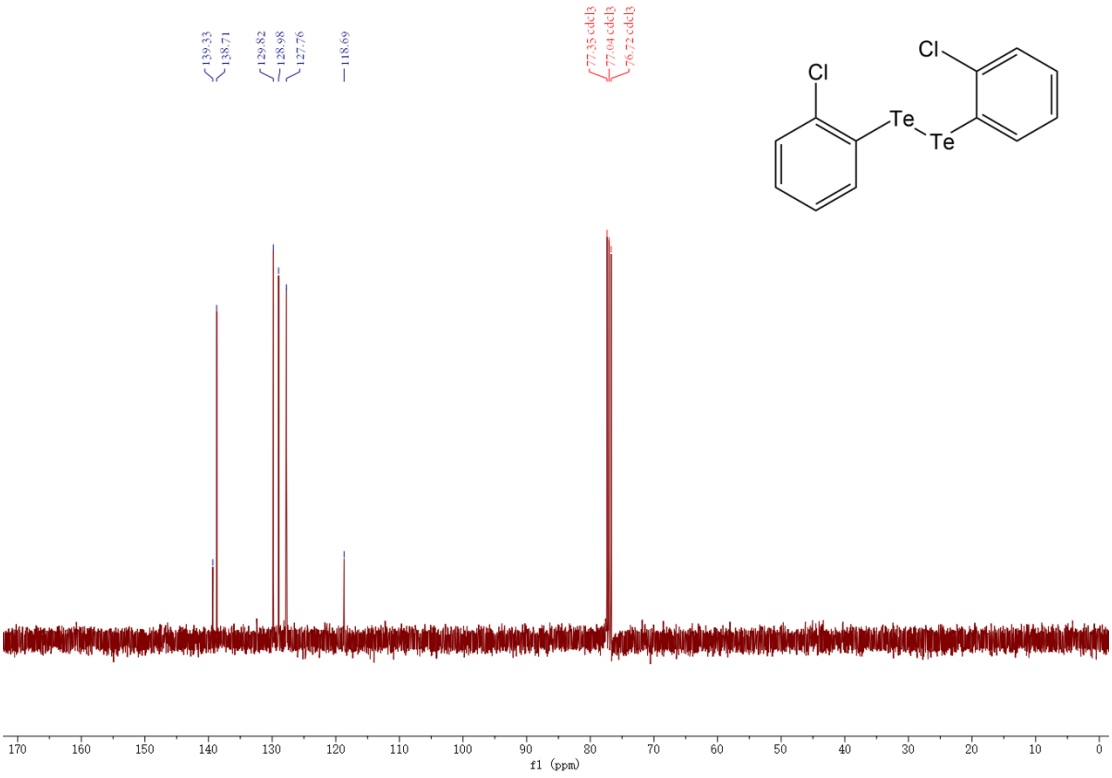
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-dio-tolylditelluride (3h).



^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-dio-tolylditelluride (3h).



^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 1,2-bis(2-chlorophenyl)ditelluride (3i).



^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 1,2-bis(2-chlorophenyl)ditelluride (3i).