Supporting Information

Cu-catalysed Chan-Lam Synthesis of Unsymmetrical Aryl Chalcogenides under Aqueous Micellar Conditions

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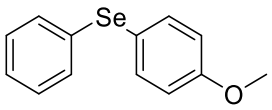
1. General remarks

The reaction substrates diorganyl diselenides and disulfides (**1b**, **1c**, **1d**, **1e**, **1f**, **1g**, **1h** and **4e**) were synthesized according to literature methods.[1-4] Water-soluble ligand PEG-1500-PyTa, PEG-2000-PyTa and PEG-5000-PyTa were synthesized according to our previously reported method.[5] Other chemicals were commercially available and used as purchased. All ^{1}H, ^{13}C and ^{77}Se NMR spectra were recorded on a Bruker ADVANCE III 500 MHz spectrometer in deuterated solvents with tetramethylsilane (TMS) as internal standard. The ^{77}Se NMR spectra were obtained with diphenyl diselenide (δ = 461 ppm) as external standard. All ^{19}F NMR spectra were obtained on a Bruker ADVANCE NEO 400 MHz spectrometer in deuterated solvents using $CFCl_3$ (δ = 0 ppm) as external standard. High resolution mass spectrum of **5gu** was recorded in the EI mode on an Agilent 8890 GC coupled with a 7250 Q-TOF mass spectrometer. Melting points (uncorrected) were determined on a BUCHI M-565 apparatus. UV-Vis spectrum analyses were performed on a Shimadzu UV-2600 spectrophotometer. TEM analyses were performed on a FEI Tecnai G2 F20 S-Twin microscope. Gas chromatography (GC) analyses were performed on a Shimadzu GC-2010 Plus instrument with FID detector using a Shimadzu SH-Rtx-5 capillary column (30 m x 0.32 mm (i.d.), 0.25 μm). Flash column chromatography was performed on silica gel (200-300 mesh) with petroleum ether/ethyl acetate as eluent.

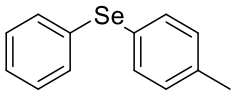
3. Characterization data for all synthesized arylselenides and arylsulfides

Note: The synthesized arylselenides and arylsulfides except for **5gu** in this paper are known compounds.

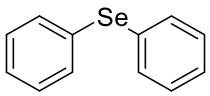


4-Methoxyphenyl phenyl selenide 3aa[6]: Yield: 96% (101 mg); Yellow oil; ^{1}H NMR (500 MHz,

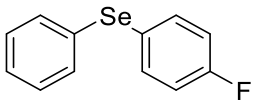
$CDCl_3$) δ 7.40-7.39 (m, 2H), 7.33 (dd, J = 7.7, 1.3 Hz, 1H), 7.27-7.19 (m, 5H), 7.06 (td, J = 7.5, 1.8 Hz, 1H), 2.39 (s, 3H) ppm; $^{13}C\{^1H\}$ NMR (125 MHz, $CDCl_3$) δ 159.9, 136.6, 133.3, 131.0, 129.3, 126.6, 120.1, 115.3, 55.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 419.69 ppm.



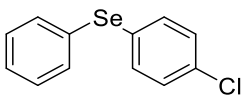
4-Methylphenyl phenyl selenide 3ab[6]: Yield: 94% (93 mg); Yellow oil; ^1H NMR (500 MHz, $CDCl_3$) δ 7.41-7.39 (m, 4H), 7.25-7.19 (m, 3H), 7.09 (d, J = 7.9 Hz, 2H), 2.32 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.8, 134.0, 132.2, 132.1, 130.3, 129.3, 127.0, 126.9, 21.3 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 424.97 ppm.



Diphenyl selenide 3ac[6]: Yellow oil; ^1H NMR (500 MHz, $CDCl_3$); δ 7.47-7.45 (m, 4H), 7.26-7.25 (m, 6H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 133.1, 131.3, 129.4, 127.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 421.37 ppm.

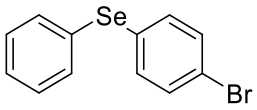


4-Fluorophenyl phenyl selenide 3ad[6]: Yield: 93% (93 mg); Yellow oil; ^1H NMR (500 MHz, $CDCl_3$) δ 7.47-7.44 (m, 2H), 7.38-7.35 (m, 2H), 7.29-7.27 (m, 3H), 7.24-7.21 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 162.7 (d, J = 247.7 Hz), 135.8 (d, J = 7.9 Hz), 132.4, 131.8, 129.5, 127.4, 125.3 (d, J = 3.4 Hz), 116.7 (d, J = 21.6 Hz) ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 418.44 ppm; ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.98 ppm.

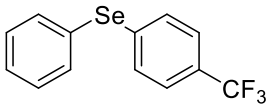


4-Chlorophenyl phenyl selenide 3ae[6]: Yield: 97% (104 mg); Yellow oil; ^1H NMR (500 MHz, $CDCl_3$)

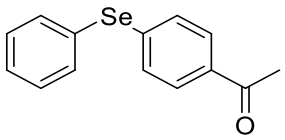
δ 7.50-7.48 (m, 2H), 7.41-7.39 (m, 2H), 7.32-7.30 (m, 3H), 7.28-7.25 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.2, 133.6, 133.3, 130.8, 129.7, 129.6, 127.8 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 415.05 ppm.



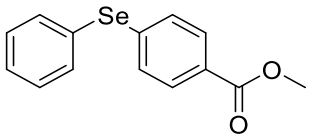
4-Bromophenyl phenyl selenide 3af[6]: Yield: 91% (114 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.47-7.44 (m, 2H), 7.37-7.35 (m, 2H), 7.29-7.26 (m, 5H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.4, 133.5, 132.5, 131.6, 129.6, 129.3, 127.9, 121.6 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 420.18 ppm.



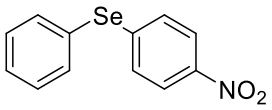
Phenyl 4-trifluoromethylphenyl selenide 3ag[6]: Yield: 93% (112 mg); Yellow solid, m.p. 59-62 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.58-7.56 (m, 2H), 7.43 (q, J = 8.5 Hz, 4H), 7.38-7.32 (m, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.9, 135.0, 131.2, 129.9, 128.9 (q, J = 32.7 Hz), 128.8, 128.7, 126.0 (q, J = 3.7 Hz), 124.3 (q, J = 272.0 Hz) ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 463.50 ppm; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.54 ppm.



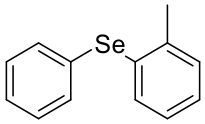
4-Acetylphenyl phenyl selenide 3ah[6]: Yield: 94% (104 mg); Yellow solid, m.p. 59-63 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79-7.77 (m, 2H), 7.60-7.58 (m, 2H), 7.40-7.33 (m, 5H), 2.55 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 197.4, 140.4, 135.3, 135.2, 130.4, 129.8, 129.0, 128.7, 128.6, 26.6 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 433.11 ppm.



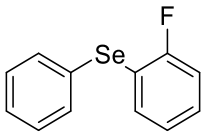
4-Methoxycarbonylphenyl phenyl selenide 3ai[6]: Yield: 95% (111 mg); White solid, m.p. 69-72 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88-7.86 (m, 2H), 7.59-7.57 (m, 2H), 7.39-7.33 (m, 5H), 3.89 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 166.9, 139.8, 135.1, 130.5, 130.3, 129.8, 128.9, 128.6, 128.4, 52.2 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 431.88 ppm.



4-Nitrophenyl phenyl selenide 3ak[6]: Yield: 92% (102 mg); Yellow solid, m.p. 56-58 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.03-8.01 (m, 2H), 7.46-7.43 (m, 2H), 7.41-7.39 (m, 3H), 7.36-7.33 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 146.3, 144.1, 136.0, 130.2, 129.8, 129.5, 127.3, 124.1 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 445.16 ppm.

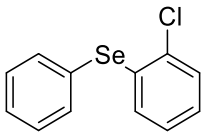


2-Methylphenyl phenyl selenide 3al[6]: Yield: 96% (95 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.40-7.38 (m, 2H), 7.33 (dd, J = 7.8, 1.3 Hz, 1H), 7.28-7.19 (m, 5H), 7.06 (dt, J = 7.5, 1.8 Hz, 1H), 2.39 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.0, 133.8, 132.9, 131.9, 130.9, 130.4, 129.5, 127.9, 127.3, 126.9, 22.5 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 380.16 ppm.

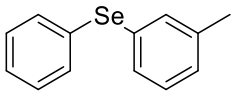


2-Fluorophenyl phenyl selenide 3am[6]: Yield: 93% (93 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53-7.51 (m, 2H), 7.33-7.28 (m, 3H), 7.26-7.21 (m, 2H), 7.06 (td, J = 8.5, 1.3 Hz, 1H), 7.00 (td, J =

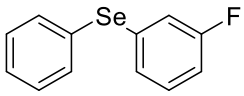
7.6, 1.3 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.1 (d, J = 243.7 Hz), 134.2, 134.0 (d, J = 2.7 Hz), 129.6, 129.3 (d, J = 7.6 Hz), 128.8 (d, J = 1.6 Hz), 128.1, 125.0 (d, J = 3.5 Hz), 118.7 (d, J = 22.0 Hz), 115.6 (d, J = 23.1 Hz) ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 351.05 ppm, ^{19}F NMR (376 MHz, $CDCl_3$) δ -103.90 ppm.



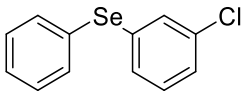
2-Chlorophenyl phenyl selenide 3an[6]: Yield: 95% (102 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.62-7.60 (m, 2H), 7.40-7.31 (m, 4H), 7.09 (td, J = 7.6, 1.6 Hz, 1H), 7.00 (td, J = 7.6, 1.4 Hz, 1H), 6.961 (dd, J = 7.9, 1.6 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.2, 134.0, 133.7, 130.9, 129.9, 129.6, 129.0, 128.1, 127.44, 127.43 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 417.00 ppm.



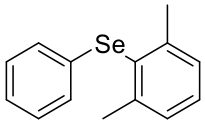
3-Methylphenyl phenyl selenide 3ao[6]: Yield: 95% (94 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.46-7.43 (m, 2H), 7.32 (s, 1H), 7.27-7.24 (m, 4H), 7.16 (t, J = 7.6 Hz, 1H), 7.08 (d, J = 7.5 Hz, 1H), 2.30 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 139.3, 133.9, 132.9, 131.5, 130.8, 130.4, 129.4, 129.3, 128.4, 127.3, 21.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 424.33 ppm.



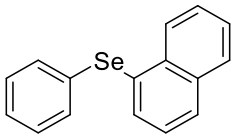
3-Fluorophenyl phenyl selenide 3ap[6]: Yield: 91% (91 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34-7.30 (m, 2H), 7.22-7.17 (m, 3H), 7.09 (d, J = 7.4 Hz, 1H), 6.91 (t, J = 8.1 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 163.6 (d, J = 206.2 Hz), 134.3, 133.9 (d, J = 6.9 Hz), 130.5 (d, J = 8.1 Hz), 129.8, 129.7, 128.2, 127.6 (d, J = 3.0 Hz), 118.9 (d, J = 22.6 Hz), 114.1 (d, J = 21.2 Hz) ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 431.59 ppm, ^{19}F NMR (376 MHz, $CDCl_3$) δ -111.81 ppm.



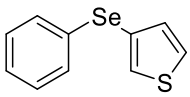
3-Chlorophenyl phenyl selenide 3aq[6]: Yield: 93% (100 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53-7.49 (m, 2H), 7.39 (t, J = 1.8 Hz, 1H), 7.32-7.27 (m, 4H), 7.22-7.15 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.1, 134.1, 133.6, 131.9, 130.4, 130.3, 129.9, 129.7, 128.2, 127.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 431.76 ppm.



2,6-Dimethylphenyl phenyl selenide 3ar[6]: Yield: 86% (90 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.24-7.20 (m, 1H), 7.17-7.14 (m, 4H), 7.12-7.07 (m, 3H), 2.48 (s, 6H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 143.8, 133.2, 130.4, 129.19, 129.17, 128.7, 128.0, 125.5, 24.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 305.15 ppm.

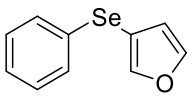


Naphthalen-1-yl phenyl selenide 3as[6]: Yield: 90% (102 mg); White solid, m.p. 50-53 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.34-8.32 (m, 1H), 7.84-7.82 (m, 2H), 7.60 (dd, J = 7.1, 1.2 Hz, 1H), 7.50-7.48 (m, 2H), 7.37-7.32 (m, 3H), 7.21-7.16 (m, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.3, 134.2, 134.0, 131.9, 131.8, 129.6 129.4, 129.3, 128.7, 127.8, 127.1, 126.9, 126.5, 126.2 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 358.46 ppm.

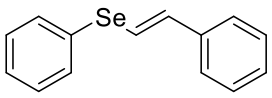


Phenyl thiophen-3-yl selenide 3at[6]: Yield: 95% (91 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.58 (dd, J = 2.8, 1.2 Hz, 1H), 7.57-7.55 (m, 2H), 7.58 (dd, J = 4.8, 2.8 Hz, 1H), 7.26-7.21 (m, 2H),

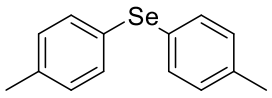
7.19-7.15 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 132.8, 132.3, 131.0, 129.2, 126.83, 126.75, 122.7 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 336.64 ppm.



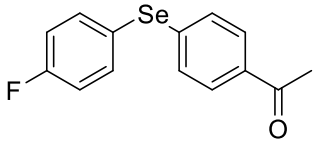
Furan-3-yl phenyl selenide 3au[6]: Yield: 96% (86 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.58 (s, 1H), 7.52-7.50 (m, 2H), 7.44 (t, J = 1.6 Hz, 1H), 7.21-7.18 (m, 1H), 7.16-7.13 (m, 2H), 6.58 (d, J = 1.7 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 146.8, 144.0, 131.6, 130.0, 129.2, 127.7, 126.4, 115.7 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 246.83 ppm.



(E)-Styryl phenyl selenide 3aw[7]: Yield: 94% (97 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.54-7.52 (m, 2H), 7.32-7.25 (m, 7H), 7.23-7.20 (m, 1H), 7.16 (d, J = 15.8 Hz, 1H), 6.86 (d, J = 15.8 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.1, 135.2, 132.6, 130.2, 129.4, 128.7, 127.7, 127.5, 126.1, 119.5 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 392.10 ppm.

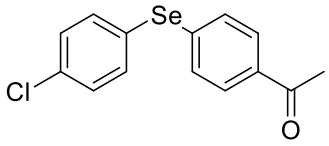


Bis(4-methylphenyl)selenide 3bb[6]: Yield: 92% (96 mg); Yellow solid, m.p. 48-53 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34 (d, J = 8.0 Hz, 4H), 7.05 (d, J = 7.9 Hz, 4H), 2.30 (s, 6H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.3, 133.1, 130.2, 127.9, 21.2 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 285.16 ppm.

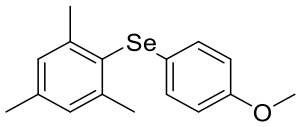


4-Acetylphenyl 4-fluorophenyl selenide 3ch[8]: Yield: 88% (103 mg); Yellow solid, m.p. 66-71 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.0 (d, J = 8.5 Hz, 2H), 7.51-7.48 (m, 2H), 7.39-7.36 (m, 2H), 7.32-7.30 (m,

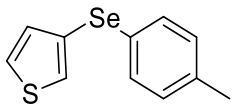
2H), 2.55 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 197.2, 163.2 (d, J = 247.5 Hz), 140.4, 137.6 (d, J = 8.7 Hz), 135.2, 129.8, 128.9, 122.9 (d, J = 3.7 Hz), 117.0 (d, J = 22.5 Hz), 26.9 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 424.85 ppm, ^{19}F NMR (376 MHz, $CDCl_3$) δ -111.87 ppm.



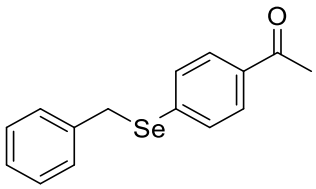
4-Acetylphenyl 4-chlorophenyl selenide 3dh[9]: Yield: 86% (107 mg); Yellow solid, m.p. 60-64 ^{o}C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81 (d, J = 8.5 Hz, 2H), 7.50 (d, J = 8.5 Hz, 2H), 7.39 (d, J = 8.4 Hz, 2H), 7.35-7.26 (m, 2H), 2.57 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 198.3, 139.4, 136.2, 135.5, 135.0, 130.6, 129.9, 129.0, 126.9, 27.4 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 428.43 ppm.



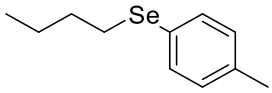
Mesityl 4-methoxyphenyl selenide 3ea[6]: Yield: 90% (110 mg); White solid, m.p. 60-64 ^{o}C, ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.07-7.04 (m, 2H), 6.95 (s, 2H), 6.72-6.69 (m, 2H), 3.70 (s, 3H), 2.43 (s, 6H), 2.27 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.1, 143.2, 138.7, 130.7, 128.8, 127.9, 123.2, 114.9, 55.2, 24.3, 21.0 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 285.02 ppm.



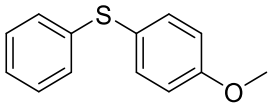
4-Methylphenyl thiophen-3-yl selenide 3fb[6]: Yield: 94% (95 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.33 (dd, J = 3.0, 1.2 Hz, 1H), 7.30-7.26 (m, 3H), 7.06-7.03 (m, 3H), 2.29 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.0, 132.3, 131.9, 130.1, 128.03, 128.00, 126.6, 123.6, 21.1 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 333.92 ppm.



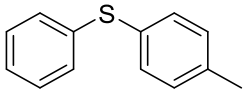
Benzyl 4-acetylphenyl selenide 3gh[10]: Yield: 92% (106 mg); White solid, m.p. 103-106 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81-7.78 (m, 2H), 7.49-7.46 (m, 2H), 7.27-7.21 (m, 5H), 4.19 (s, 2H), 2.56 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 197.4, 138.6, 137.6, 135.4, 131.4, 128.9, 128.7, 128.6, 127.2, 31.4, 26.5 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 377.05 ppm.



n-Butyl 4-methylphenyl selenide 3hb[6]: Yield: 91% (83 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.39 (d, J = 7.7 Hz, 2H), 7.06 (d, J = 7.7 Hz, 2H), 2.86 (t, J = 7.5 Hz, 2H), 2.31 (s, 3H), 1.66 (quint, J = 6.3 Hz, 2H), 1.41 (sext, J = 6.3 Hz, 2H), 0.89 (t, J = 6.3 Hz, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.8, 133.1, 129.9, 126.8, 32.4, 28.1, 23.1, 21.2, 13.7 ppm; ^{77}Se NMR (95.5 MHz, $CDCl_3$) δ 284.07 ppm.

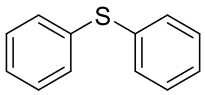


4-Methoxyphenyl phenyl sulfide 5aa[7]: Yield: 88% (76 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.42-7.39 (m, 2H), 7.23-7.20 (m, 2H), 7.17-7.10 (m, 3H), 6.90-6.87 (m, 2H), 3.80 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 159.9, 138.6, 135.3, 128.94, 128.30, 125.8, 124.4, 115.0, 55.4 ppm.

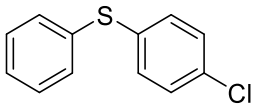


4-Methylphenyl phenyl sulfide 5ab[7]: Yield: 90% (72 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.29 (d, J = 8.2 Hz, 2H), 7.27-7.22 (m, 4H), 7.20 -7.15 (m, 1H), 7.11 (d, J = 8.0 Hz, 2H), 2.32 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.6, 137.2, 132.3, 131.4, 130.1, 129.85, 129.08, 126.5, 21.2

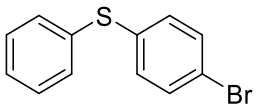
ppm.



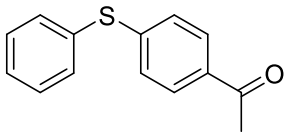
Diphenyl sulfide 5ac[7]: Yield: 89% (66 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34-7.32 (m, 4H), 7.29-7.25 (m, 4H), 7.23-7.20 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.9, 131.1, 129.2, 127.1 ppm.



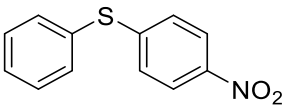
4-Chlorophenyl phenyl sulfide 5ae[7]: Yield: 80% (71 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.32-7.29 (m, 2H), 7.27-7.24 (m, 2H), 7.22-7.20 (m, 1H), 7.19 (s, 4H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.3, 134.8, 133.1, 132.1, 131.4, 129.46, 129.43, 127.5 ppm.



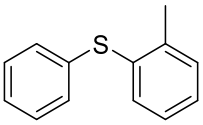
4-Bromophenyl phenyl sulfide 5af[7]: Yield: 74% (78 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.36-7.31 (m 4H), 7.28-7.25 (m, 2H), 7.24-7.20 (m, 1H), 7.13-7.11 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.6, 135.0, 132.33, 132.18, 131.7, 129.5, 127.7, 121.0 ppm.



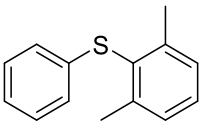
4-Acetylphenyl phenyl sulfide 5ah[11]: Yield: 75% (68 mg); White solid, m.p. 64-67 ^{o}C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81 (d, J = 8.4 Hz, 2H), 7.50-7.48 (m, 2H), 7.41-7.38 (m, 3H), 7.21 (d, J = 8.5 Hz, 2H), 2.54 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 197.0, 144.9, 134.6, 133.8, 132.2, 129.7, 128.89, 128.77, 127.5, 26.4 ppm.



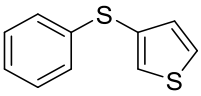
4-Nitrophenyl phenyl sulfide 5ak[12]: Yield: 51% (47 mg); White solid, m.p. 121-123 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.06-8.03 (m, 2H), 7.55-7.52 (m, 2H), 7.46-7.44 (m, 3H), 7.18-7.15 (m, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 148.5, 145.4, 134.7, 130.52, 130.04, 129.7, 126.7, 124.0 ppm.



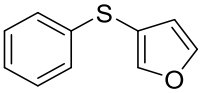
2-Methylphenyl phenyl sulfide 5al[7]: Yield: 83% (66 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.29 (dd, J = 7.7, 1.3 Hz, 1H), 7.26-7.22 (m, 3H), 7.21-7.15 (m, 4H), 7.12 (dt, J = 7.3, 1.3 Hz, 1H), 2.37 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.0, 136.3, 133.8, 133.1, 130.7, 129.7, 129.2, 128.0, 126.78, 126.39, 20.7 ppm.



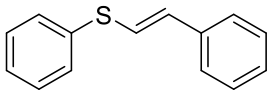
2,6-Dimethylphenyl phenyl sulfide 5ar[12]: Yield: 57% (49 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.24-7.15 (m, 5H), 7.05 (dt, J = 7.4, 1.2 Hz, 1H), 6.97-6.86 (m, 2H), 2.42 (s, 6H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 143.9, 138.1, 130.6, 129.3, 128.9, 128.5, 125.7, 124.6, 21.8 ppm.



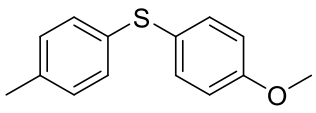
Phenyl thiophen-3-yl sulfide 5at[11]: Yield: 86% (66 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.35-7.32 (m, 2H), 7.24-7.19 (m, 4H), 7.16-7.12 (m, 1H), 7.02 (dd, J = 4.9, 1.3 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.4, 131.31, 129.44, 129.08, 128.52, 128.25, 126.8, 126.2 ppm.



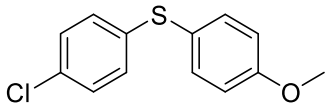
Furan-3-yl phenyl sulfide 5au[13]: Yield: 73% (51 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.61 (s, 1H), 7.50 (s, 1H), 7.26-7.19 (m, 4H), 7.14 (t, J = 7.2 Hz, 1H), 6.43 (d, J = 0.9 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 146.1, 144.2, 137.3, 128.9, 127.3, 125.8, 114.7, 114.0 ppm.



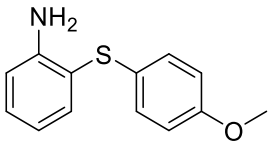
(E)-Styryl phenyl sulfide 5aw[7]: Yield: 60% (51 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.54-7.52 (m, 2H), 7.32-7.19 (m, 8H), 7.16 (d, J = 15.8 Hz, 1H), 6.86 (d, J = 15.8 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.1, 135.2, 132.6, 130.3, 129.4, 128.7, 127.72, 127.48, 126.2, 119.5 ppm.



4-Methoxyphenyl 4-methylphenyl sulfide 5ba[11]: Yield: 87% (80 mg); Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.36-7.33 (m, 2H), 7.12 (d, J = 8.0 Hz, 2H), 7.04 (d, J = 8.0 Hz, 2H), 6.86-6.83 (m, 2H), 3.77 (s, 3H), 2.28 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 159.5, 136.1, 134.40, 134.37, 129.82, 129.46, 125.7, 114.9, 55.4, 21.0.

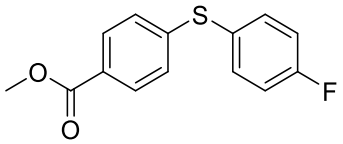


4-Chlorophenyl 4-methoxyphenyl sulfide 5ca[11]: Yield: 72% (72 mg); White solid, m.p. 59-62 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.41-7.38 (m, 2H), 7.20-7.17 (m, 2H), 7.08-7.05 (m, 2H), 6.91-6.88 (m, 2H), 3.81 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 160.1, 137.4, 135.5, 131.6, 129.36, 129.01, 123.8, 115.2, 55.4 ppm.

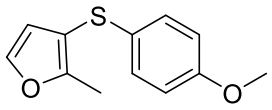


2-Aminophenyl 4-methoxyphenyl sulfide 5da[12]: Yield: 46% (43 mg); Yellow oil; ^{1}H NMR (500 MHz,

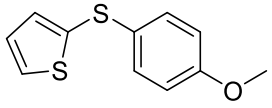
$CDCl_3$) δ 7.39 (dd, J = 7.7, 1.6 Hz, 1H), 7.16 (dt, J = 7.7, 1.6 Hz, 1H), 7.13-7.10 (m, 2H), 6.80-6.77 (m, 2H), 6.74-6.69 (m, 2H), 4.25 (s, br, 2H), 3.74 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.4, 148.1, 136.3, 130.4, 129.7, 126.9, 118.7, 116.8, 115.4, 114.8, 55.4 ppm.



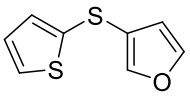
4-Methoxycarbonylphenyl 4-fluorophenyl sulfide 5ed[14]: Yield: 53% (56 mg); White solid, m.p. 81-85 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 (d, J = 8.6 Hz, 2H), 7.50-7.46 (m 2H), 7.141-7.07 (m, 4H), 3.88 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 166.6, 163.2 (d, J = 248.7 Hz), 144.7, 136.3 (d, J = 8.7 Hz), 130.1, 127.4, 127.2 (d, J = 3.7 Hz), 126.9, 116.9 (d, J = 22.5 Hz), 52.05 ppm, ^{19}F NMR (376 MHz, $CDCl_3$) δ -111.58 ppm.



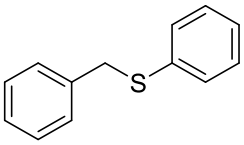
4-Methoxyphenyl 2-methylfuran-3-yl sulfide 5fa[15]: Yield: 87% (77 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.16 (d, J = 2.0 Hz, 1H), 7.14-7.11 (m, 2H), 6.81-6.78 (m, 2H), 6.32 (d, J = 2.0 Hz, 1H), 3.76 (s, 3H), 2.35 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.2, 155.7, 141.0, 129.4, 128.3, 115.1, 114.6, 109.8, 55.4, 11.8 ppm.



Thiophen-2-yl 4-methoxyphenyl sulfide 5ga[11]: Yield: 94% (84 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34 (dd, J = 5.4, 1.3 Hz, 1H), 7.28-7.25 (m, 2H), 7.19 (dd, J = 3.6, 1.3 Hz, 1H), 6.97 (dd, J = 5.4, 3.6 Hz, 1H), 6.81-6.78 (m, 2H), 3.80 (s, 3H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 159.0, 134.4, 133.9, 131.2, 130.1, 128.4, 127.7, 114.8, 55.4 ppm.



Furan-3-yl thiophen-2-yl sulfide 5gu: Yield: 92% (67 mg); Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.49 (s, 1H), 7.38 (t, J = 1.8 Hz, 1H), 7.31 (dd, J = 5.3, 1.3 Hz, 1H), 7.15 (dd, J = 3.6, 1.3 Hz, 1H), 6.94 (dd, J = 5.3, 3.6 Hz, 1H), 6.40 (dd, J = 1.9, 0.8 Hz, 1H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 143.7, 143.3, 134.3, 132.5, 129.2, 127.5, 118.2, 113.2 ppm. HRMS (EI-TOF) m/z: [M^+] Calculated for $C_8H_6OS_2$ 181.9860, found 181.9859.



Benzyl phenyl sulfide 5hc[16]: Yield: 43% (35 mg); Yellow solid, m.p. 41-44 ^{o}C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.30-7.26 (m, 6H), 7.24-7.20 (m, 3H), 7.17-7.14 (m, 1H), 4.09 (s, 2H) ppm; ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.5, 136.5, 129.9, 128.88, 128.87, 128.53, 127.2, 126.4, 39.1 ppm.

References:

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3. ^{1}H NMR and ^{13}C NMR Spectra

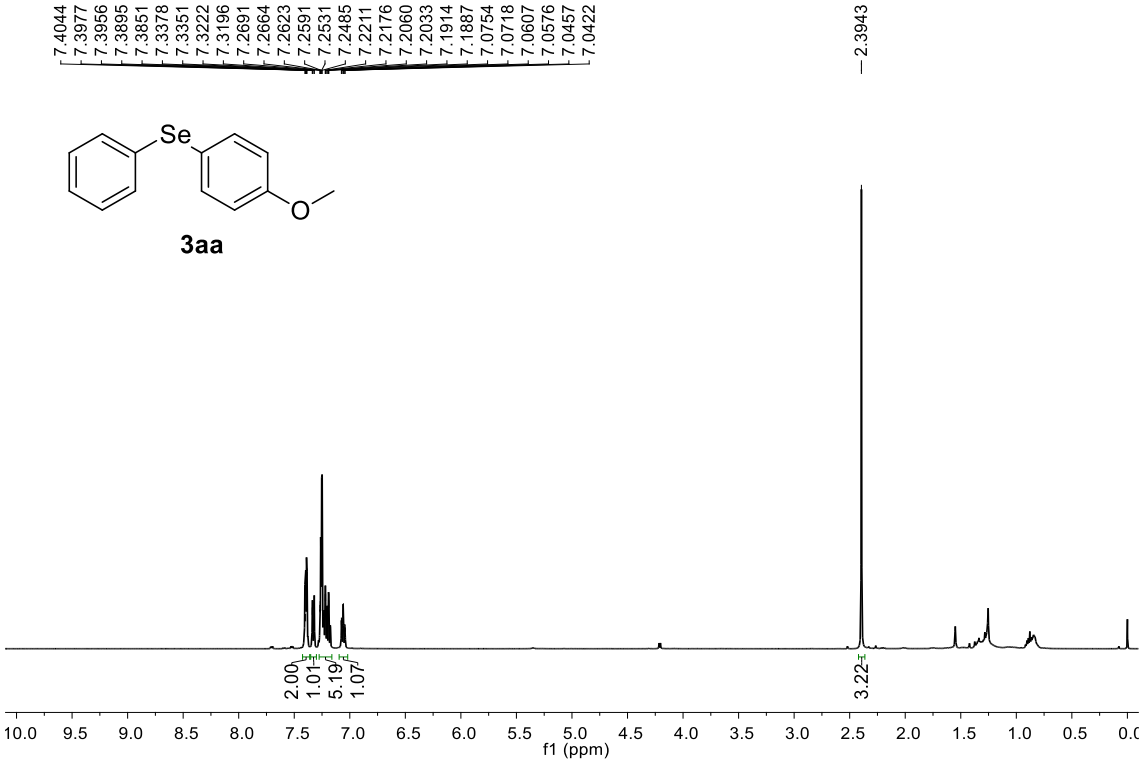

Figure S1 ^{1}H NMR (500 MHz) spectrum of **3aa** in $CDCl_3$

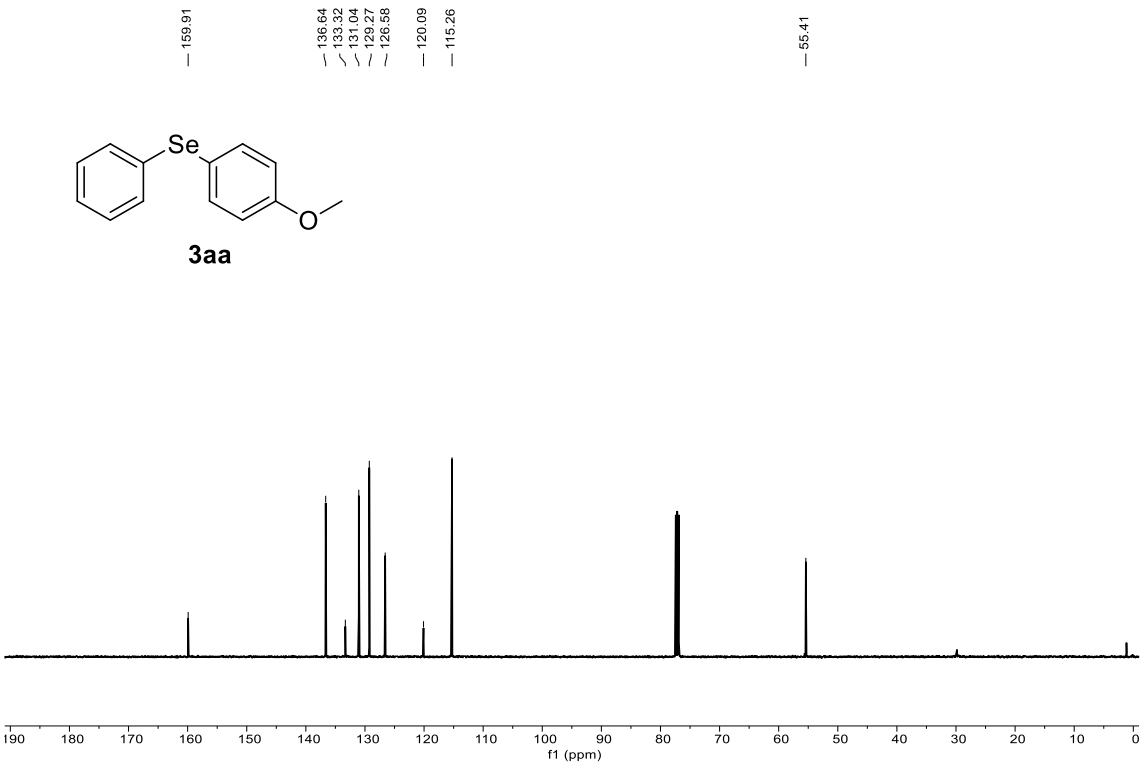

Figure S2 ^{13}C NMR (125 MHz) spectrum of **3aa** in $CDCl_3$

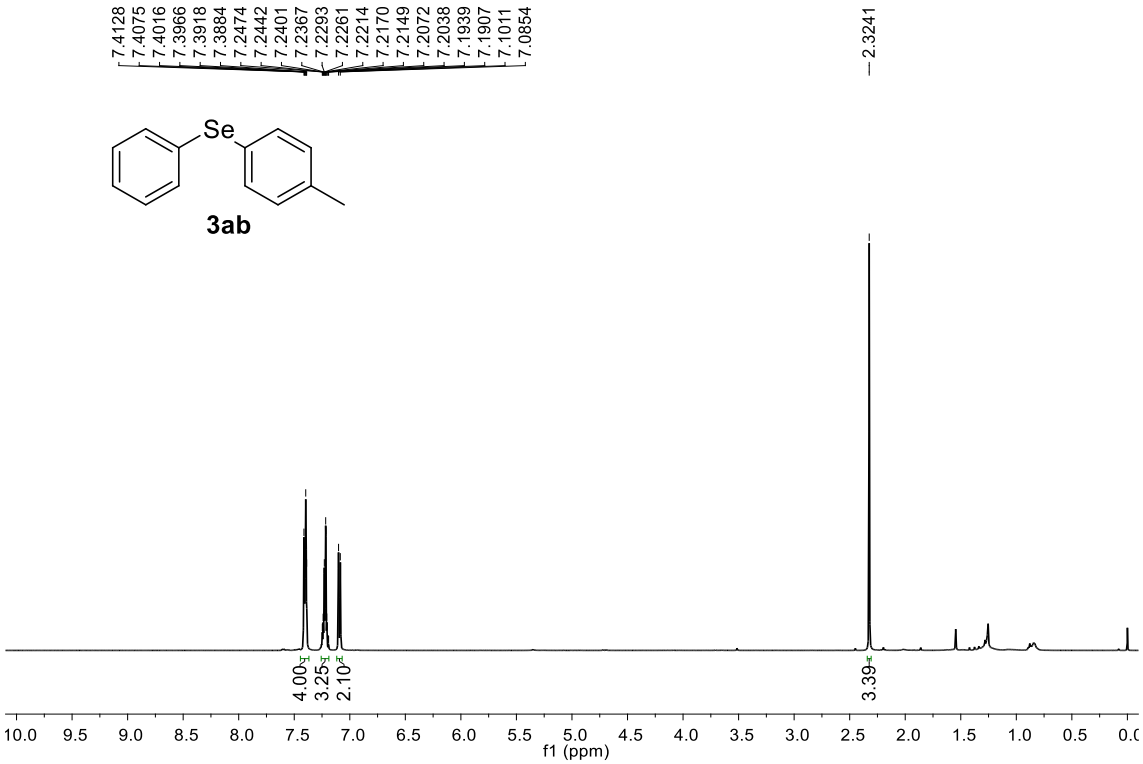

Figure S3 ^{1}H NMR (500 MHz) spectrum of **3ab** in $CDCl_3$

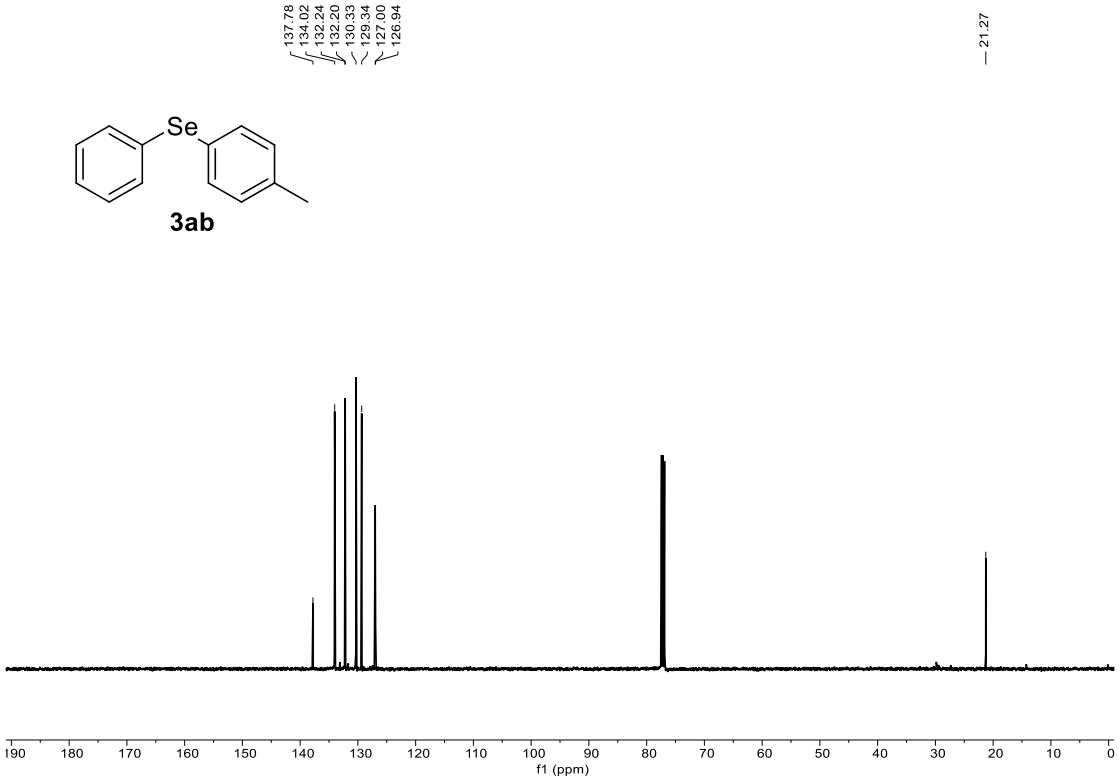

Figure S4 ^{1}H NMR (500 MHz) spectrum of **3ab** in $CDCl_3$

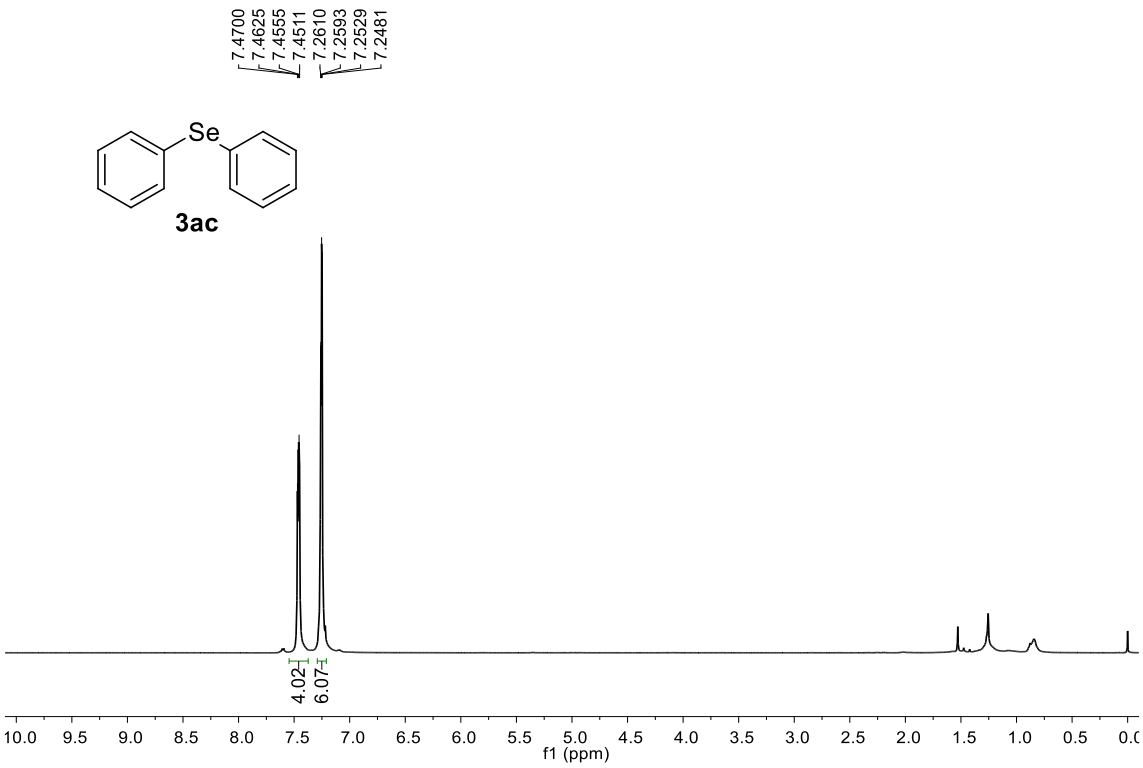

Figure S5 ^{1}H NMR (500 MHz) spectrum of **3ac** in $CDCl_3$

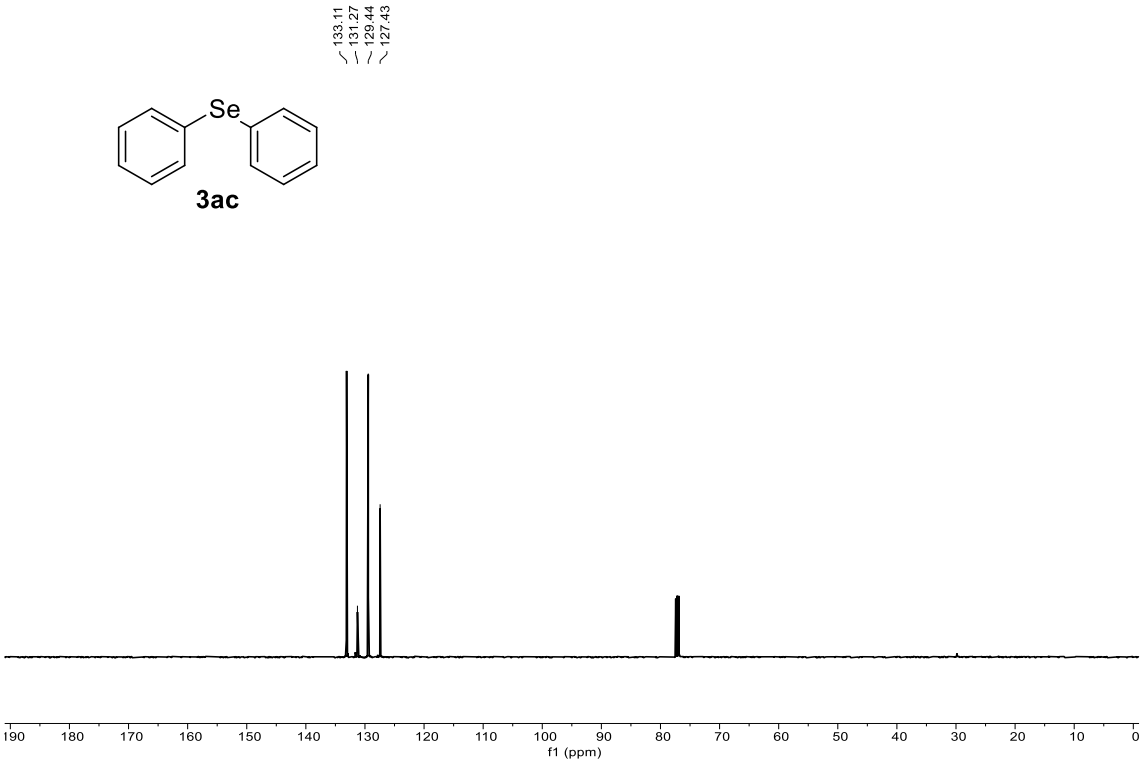

Figure S6 ^{13}C NMR (125 MHz) spectrum of **3ac** in $CDCl_3$

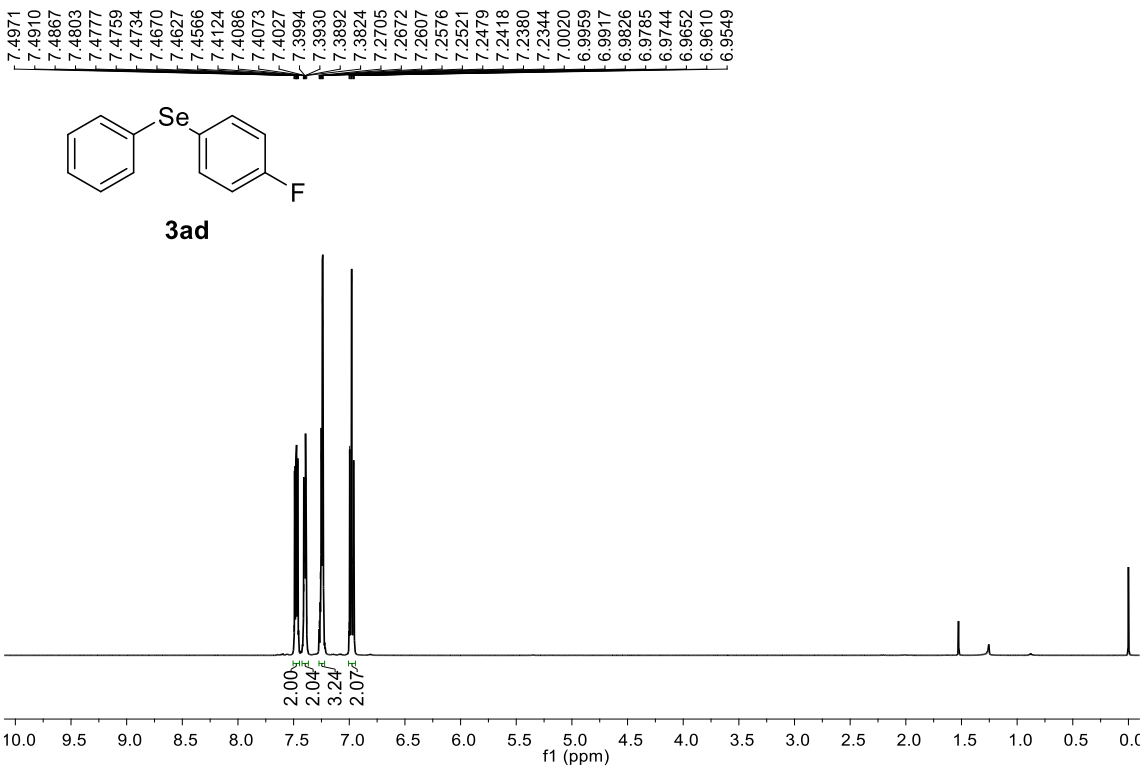

Figure S7 ^{1}H NMR (500 MHz) spectrum of **3ad** in $CDCl_3$

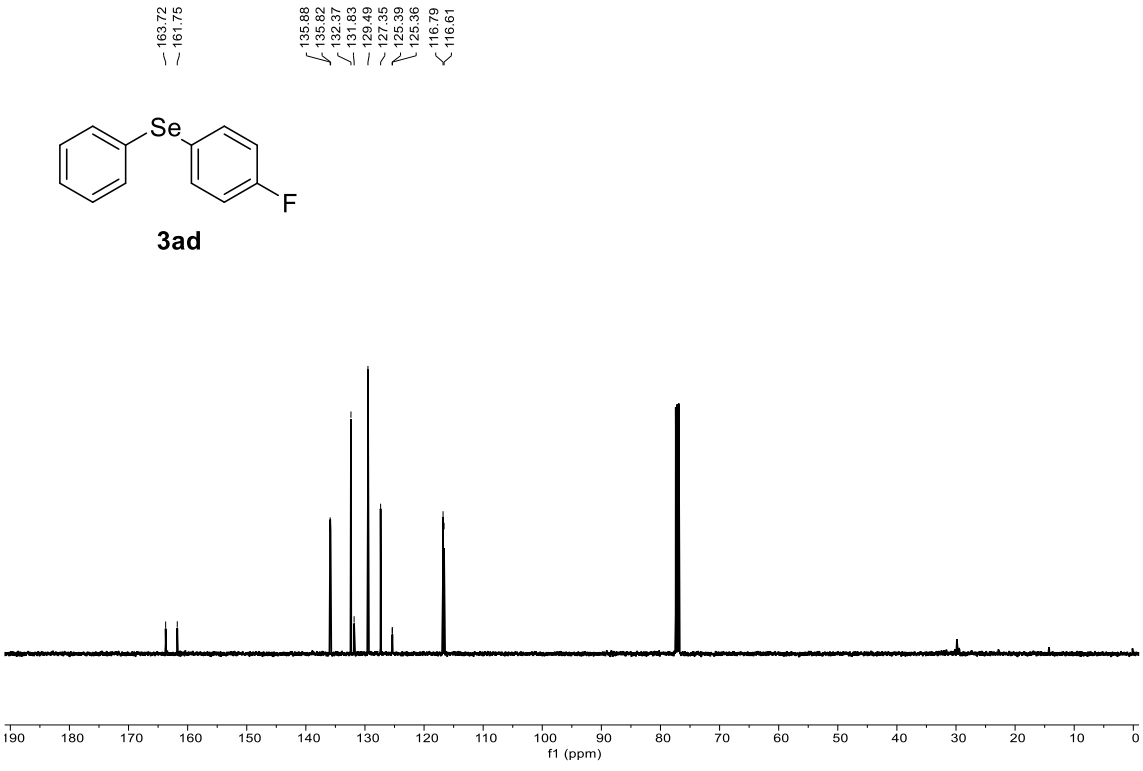

Figure S8 ^{13}C NMR (125 MHz) spectrum of **3ad** in $CDCl_3$

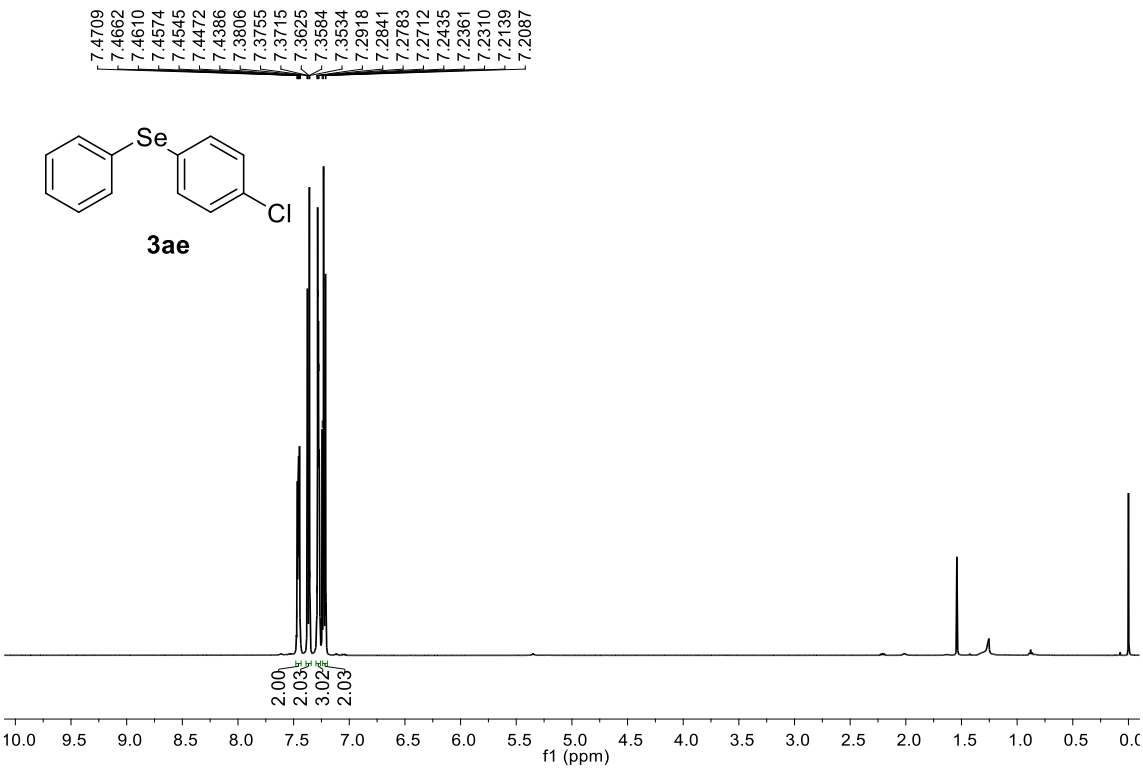

Figure S9 ^{1}H NMR (500 MHz) spectrum of **3ae** in $CDCl_3$

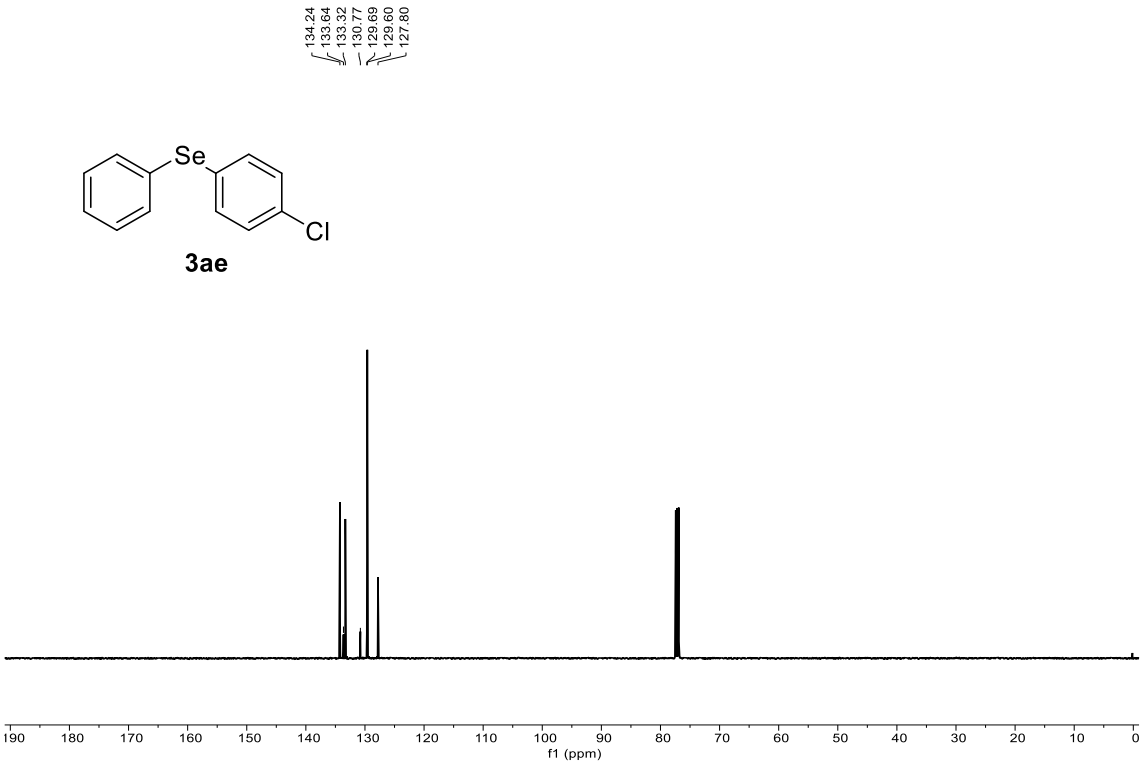

Figure S10 ^{13}C NMR (125 MHz) spectrum of **3ae** in $CDCl_3$

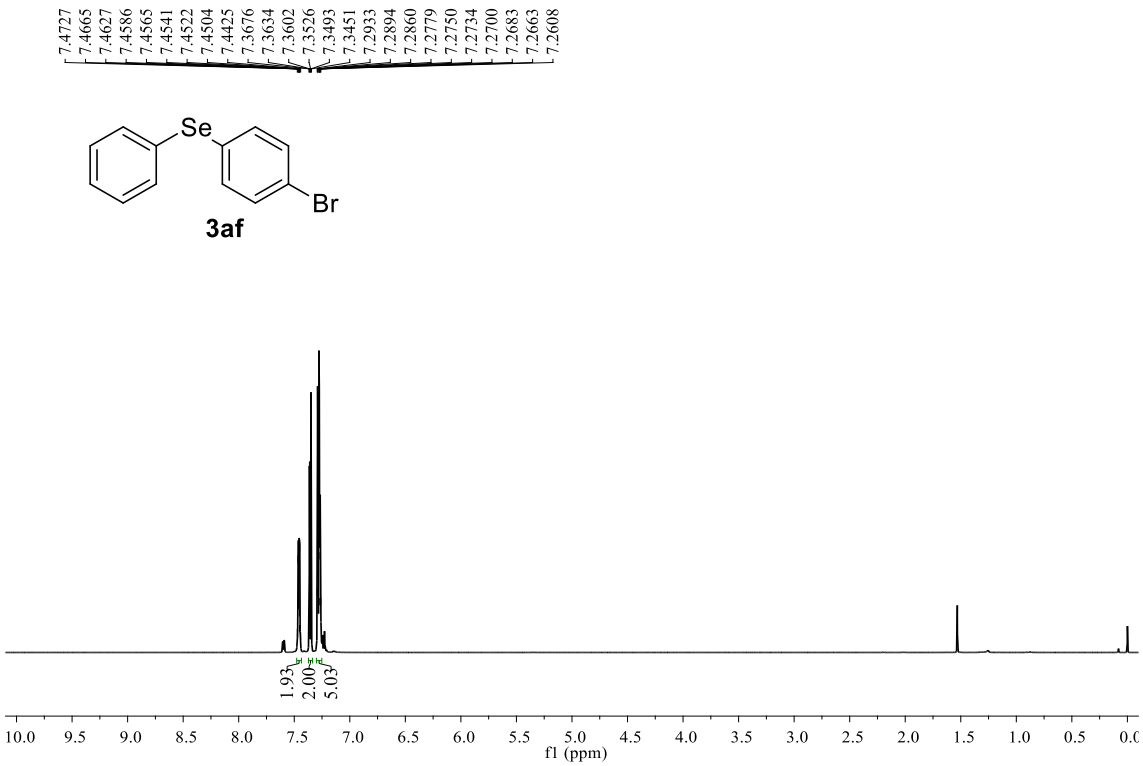

Figure S11 ^{1}H NMR (500 MHz) spectrum of **3af** in $CDCl_3$

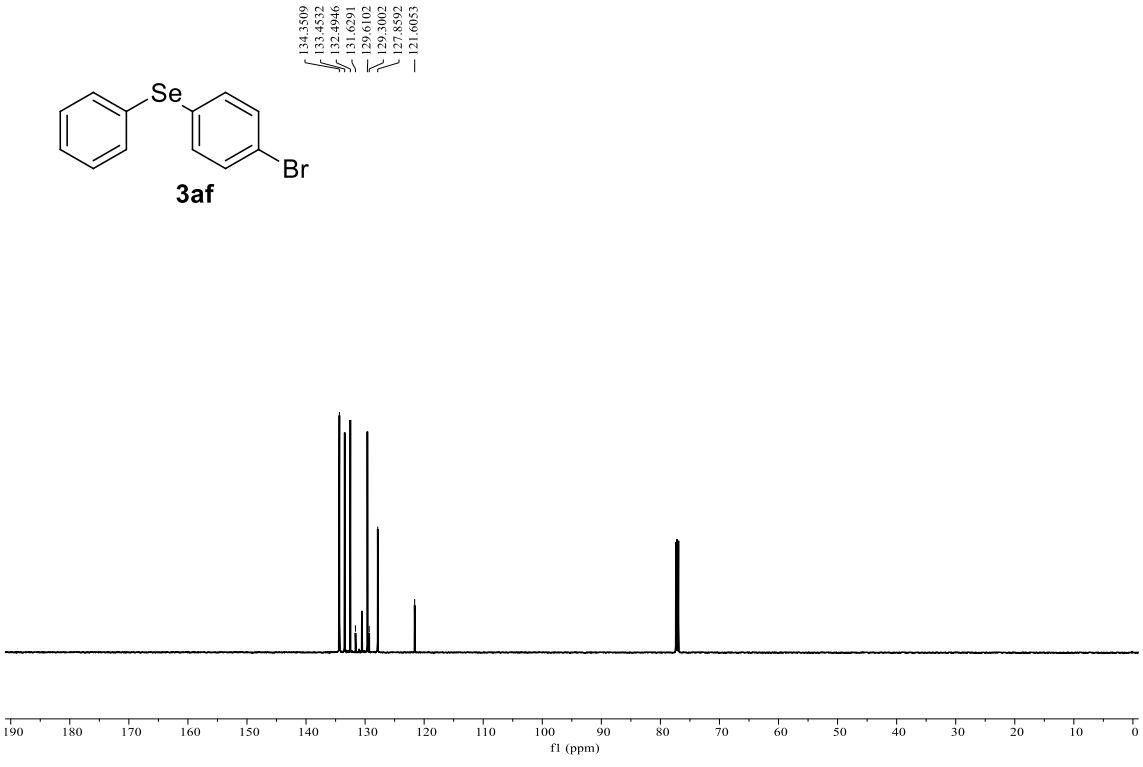

Figure S12 ^{1}H NMR (500 MHz) spectrum of **3af** in $CDCl_3$

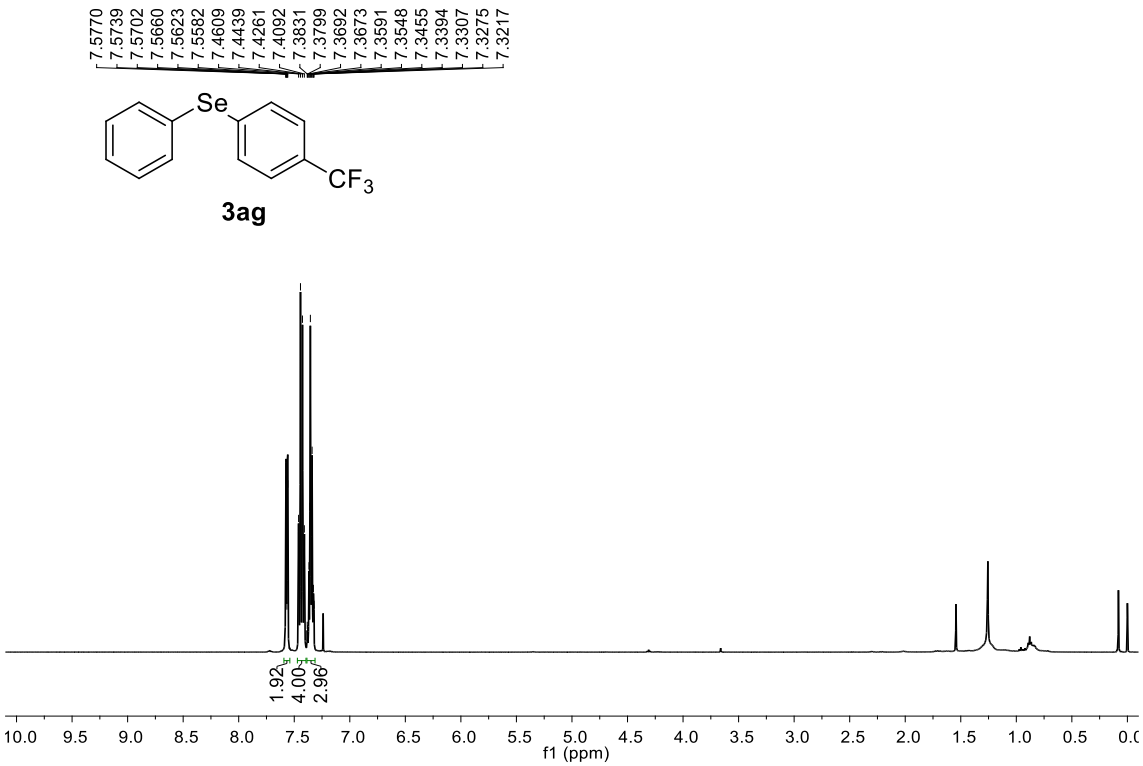

Figure S13 ^{1}H NMR (500 MHz) spectrum of **3ag** in $CDCl_3$

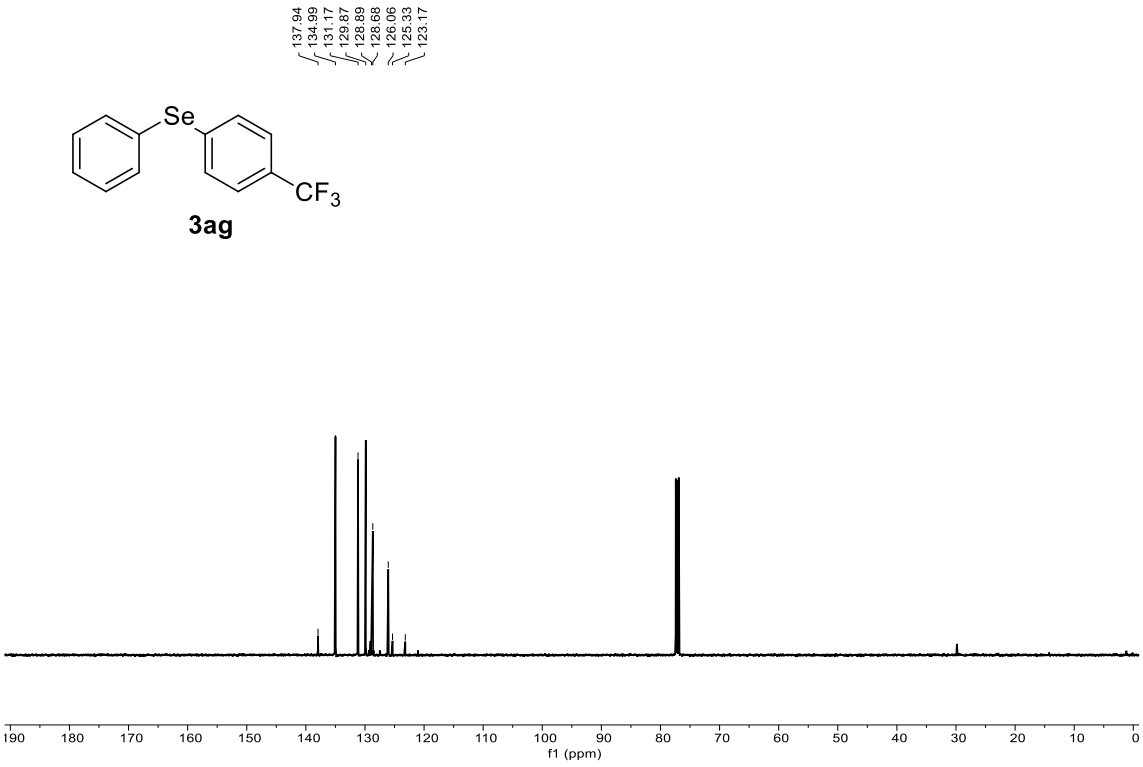

Figure S14 ^{13}C NMR (125 MHz) spectrum of **3ag** in $CDCl_3$

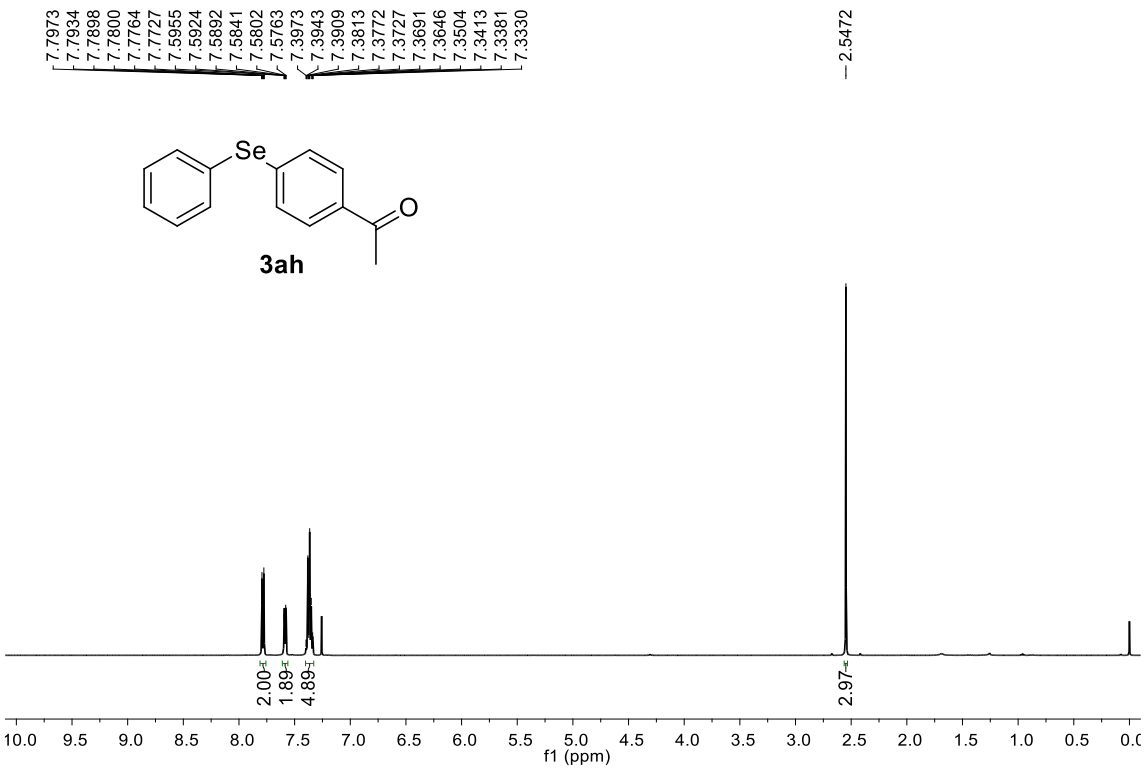

Figure S15 ^{1}H NMR (500 MHz) spectrum of **3ah** in $CDCl_3$

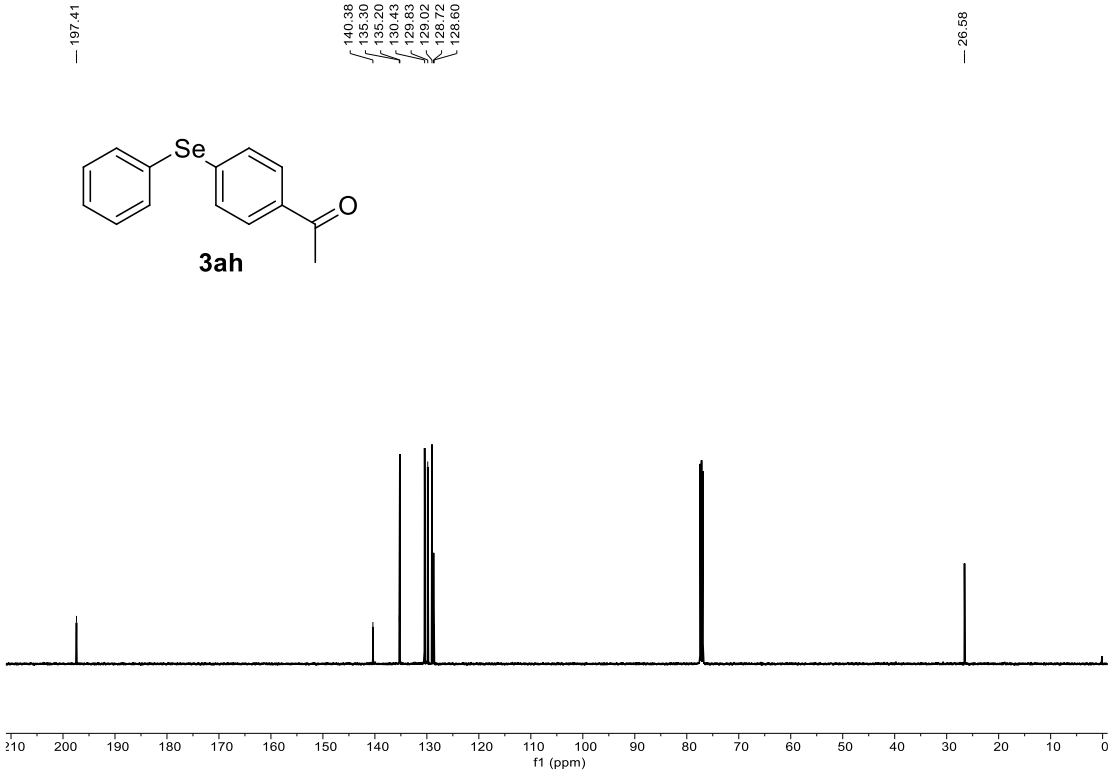

Figure S16 ^{13}C NMR (125 MHz) spectrum of **3ah** in $CDCl_3$

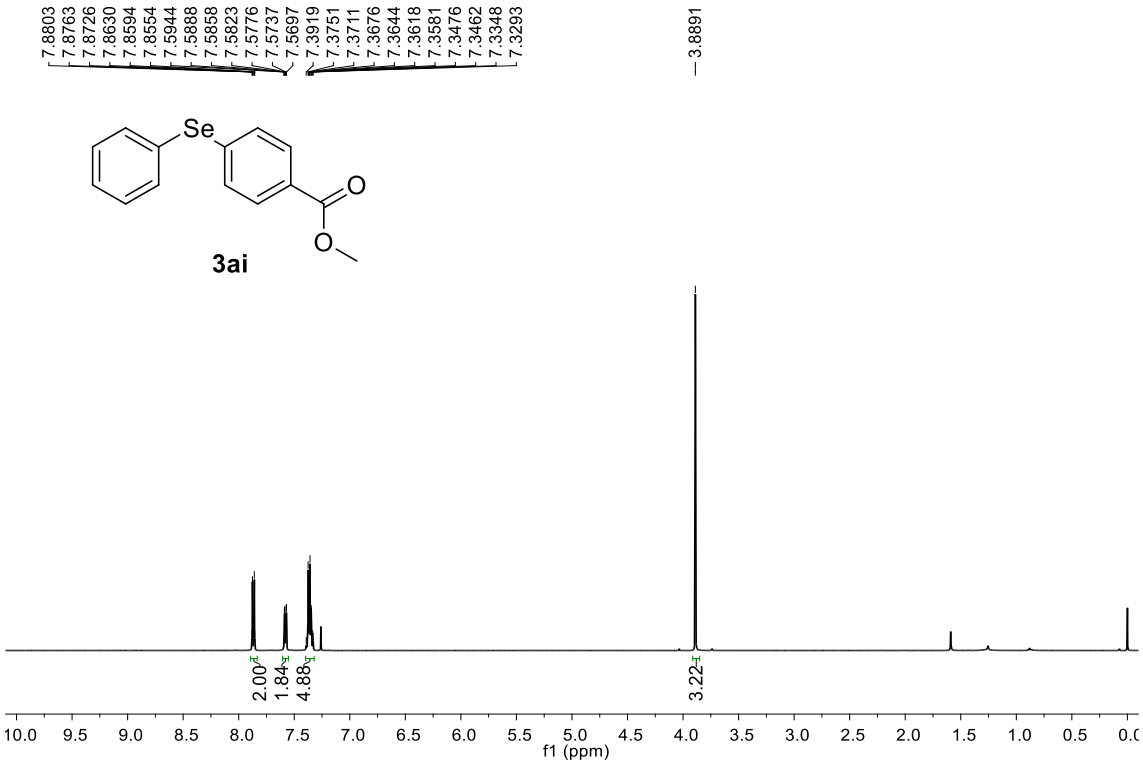

Figure S17 ^{1}H NMR (500 MHz) spectrum of **3ai** in $CDCl_3$

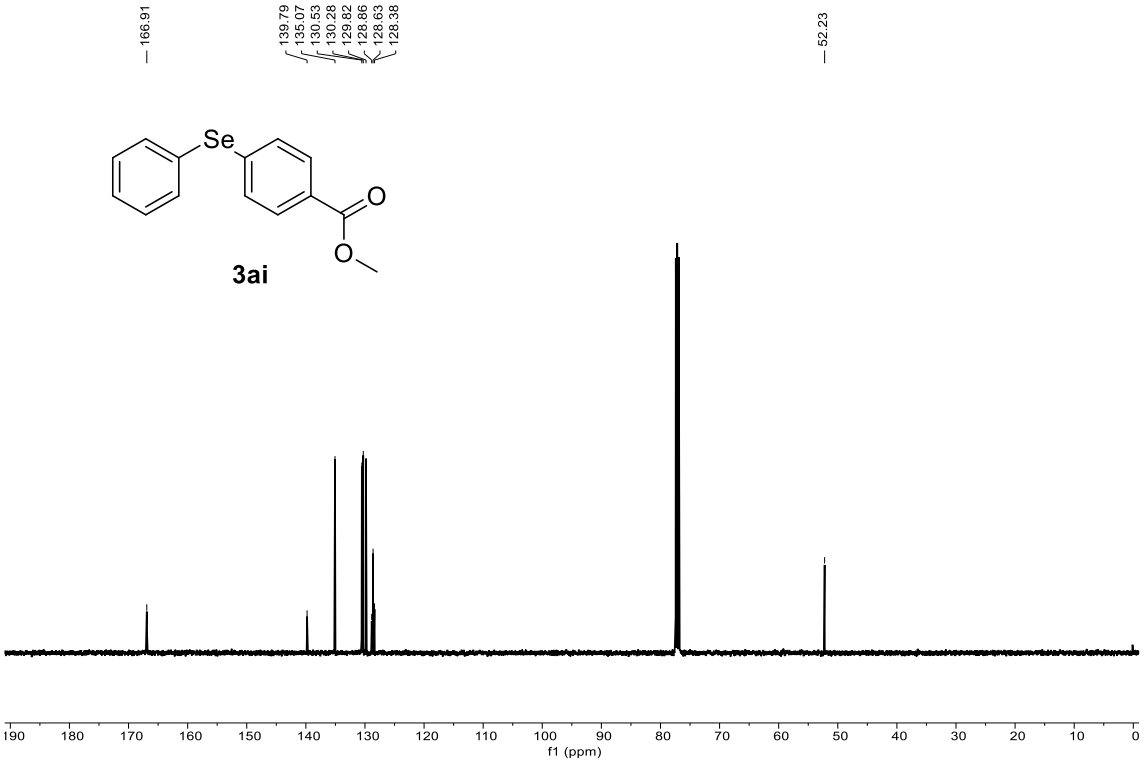

Figure S18 ^{13}C NMR (125 MHz) spectrum of **3ai** in $CDCl_3$

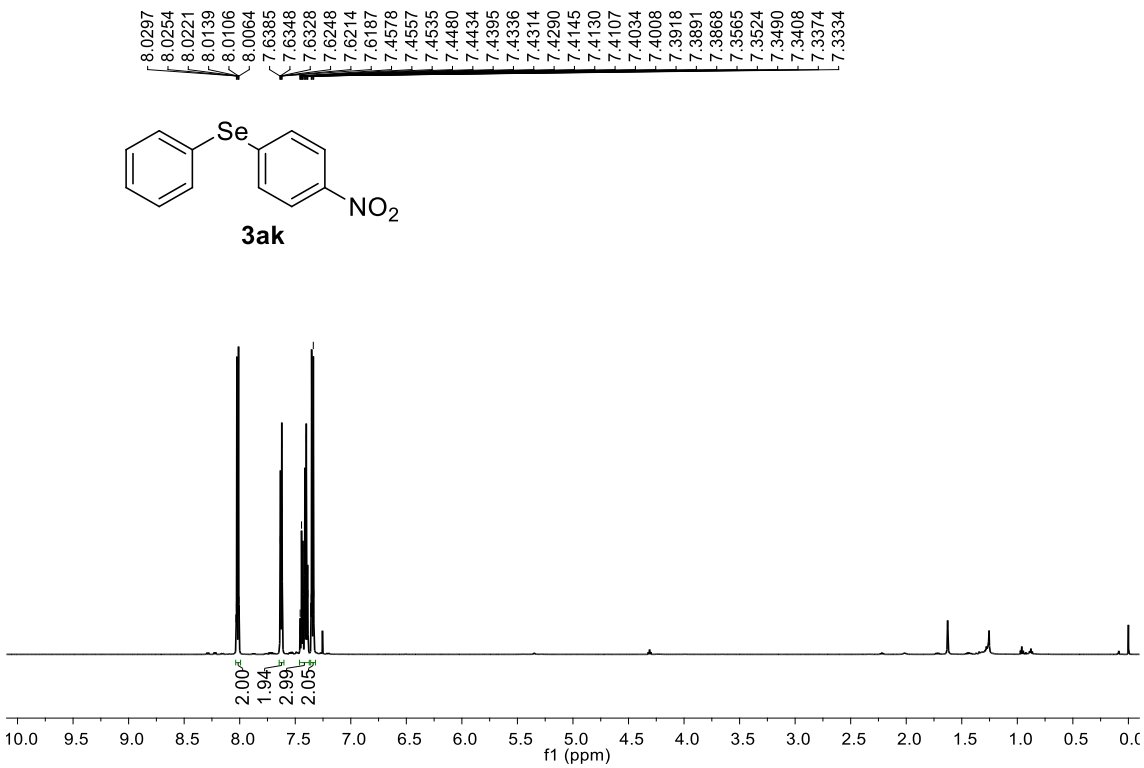

Figure S19 ^{1}H NMR (500 MHz) spectrum of **3ak** in $CDCl_3$

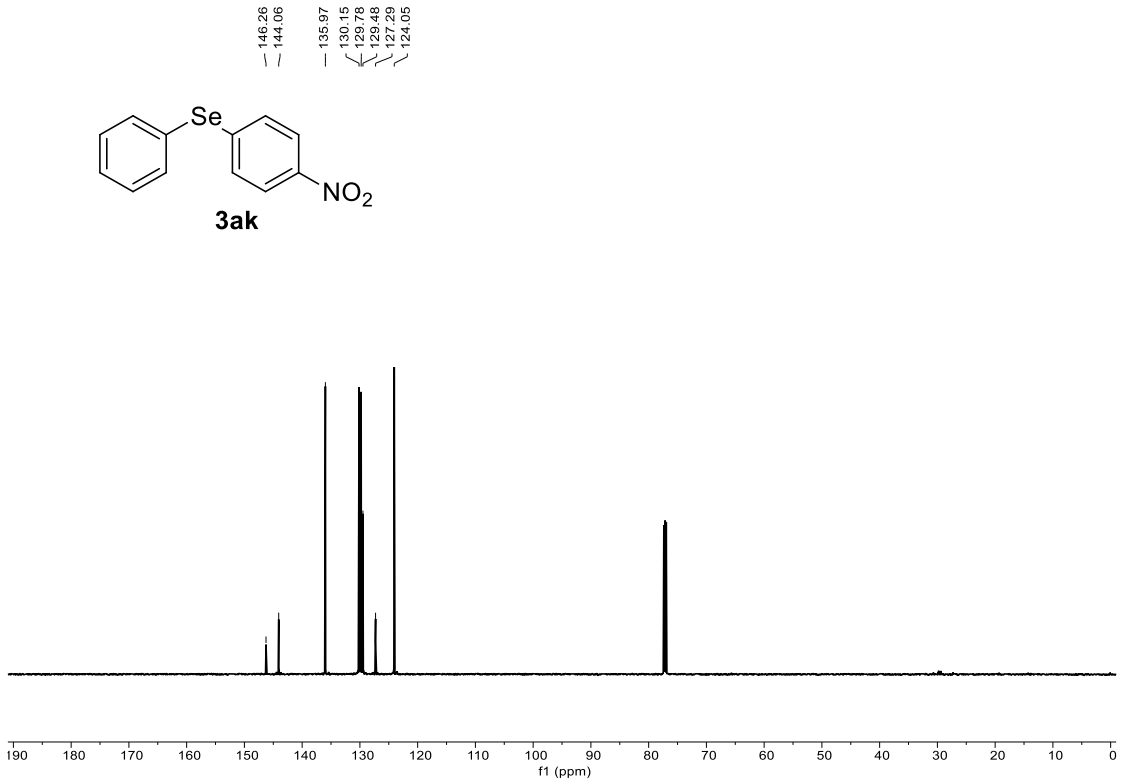

Figure S20 ^{13}C NMR (125 MHz) spectrum of **3ak** in $CDCl_3$

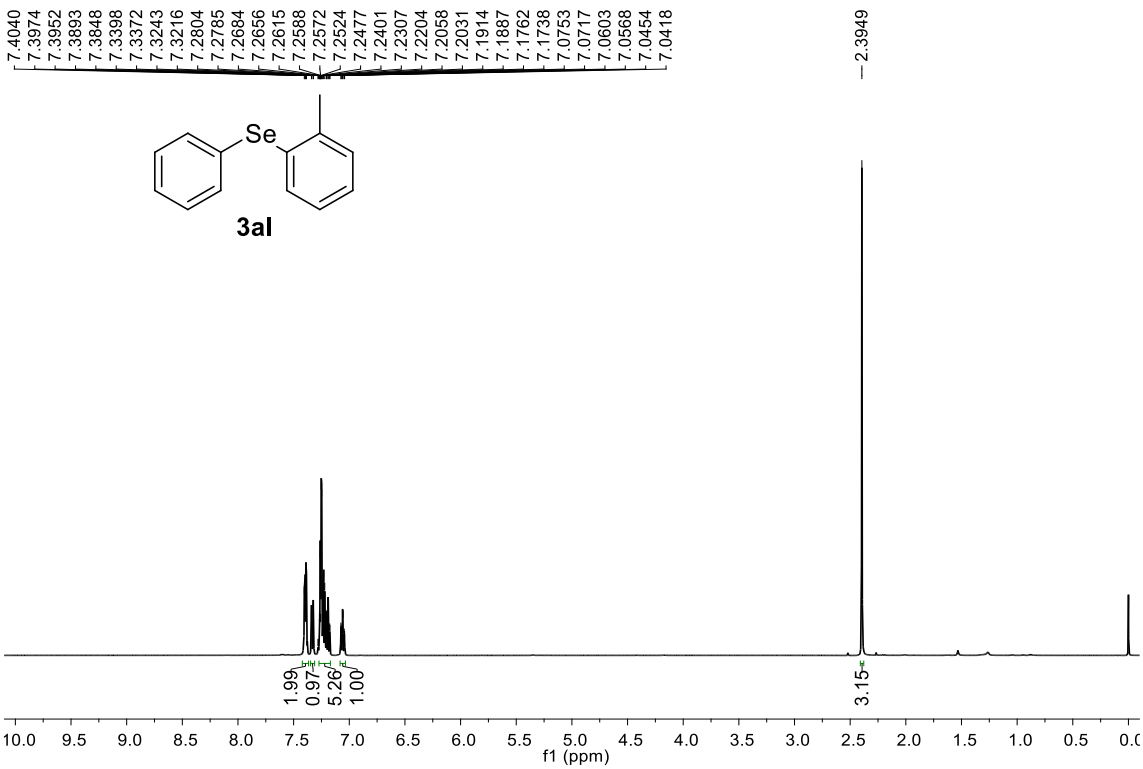

Figure S21 ^{1}H NMR (500 MHz) spectrum of **3al** in $CDCl_3$

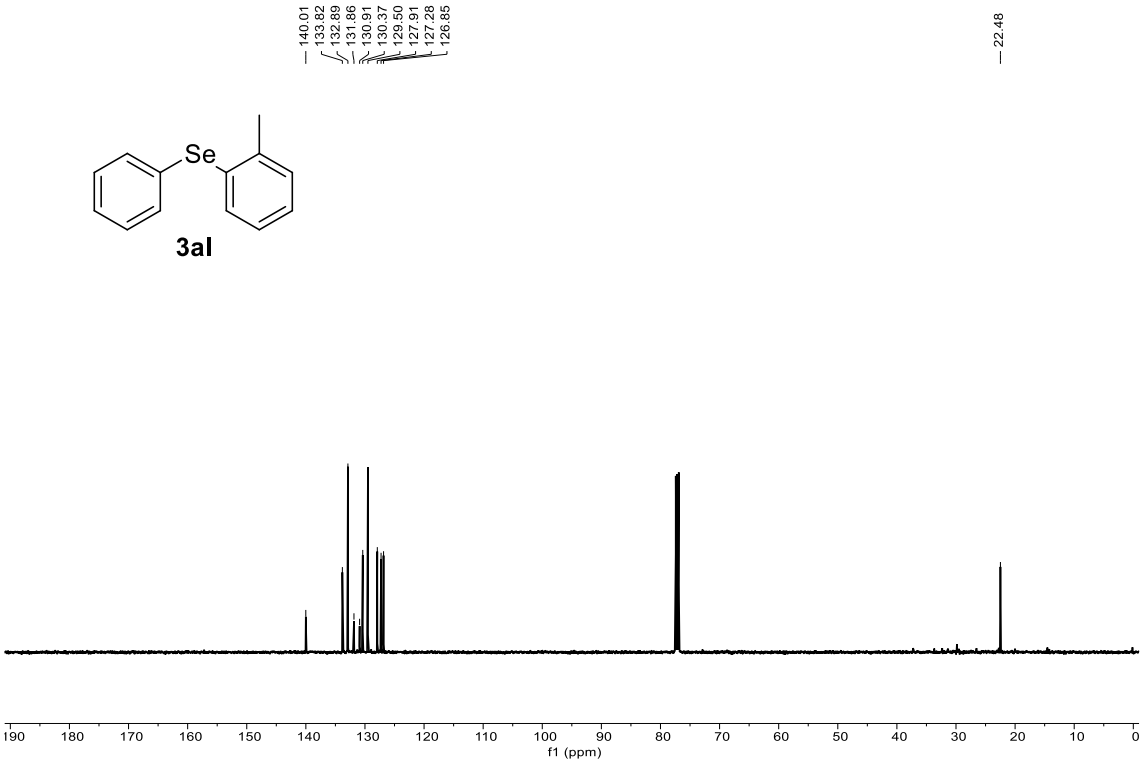

Figure S22 ^{13}C NMR (125 MHz) spectrum of **3al** in $CDCl_3$

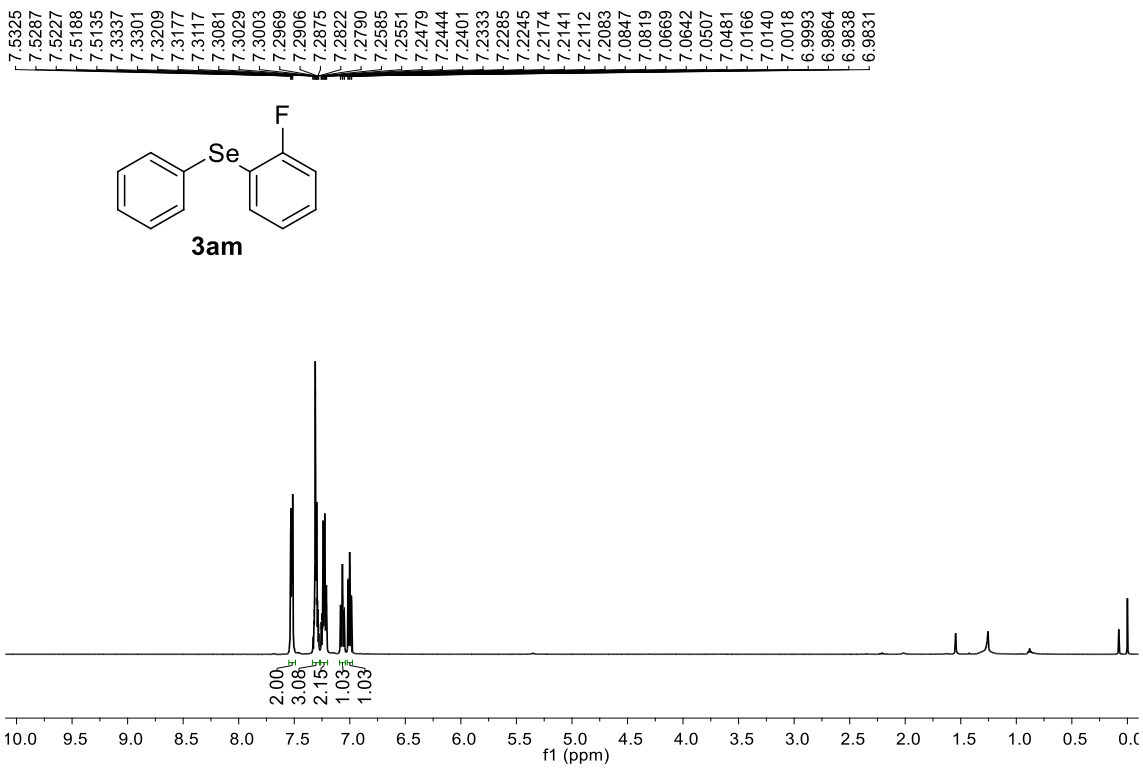

Figure S23 ^{1}H NMR (500 MHz) spectrum of **3am** in $CDCl_3$

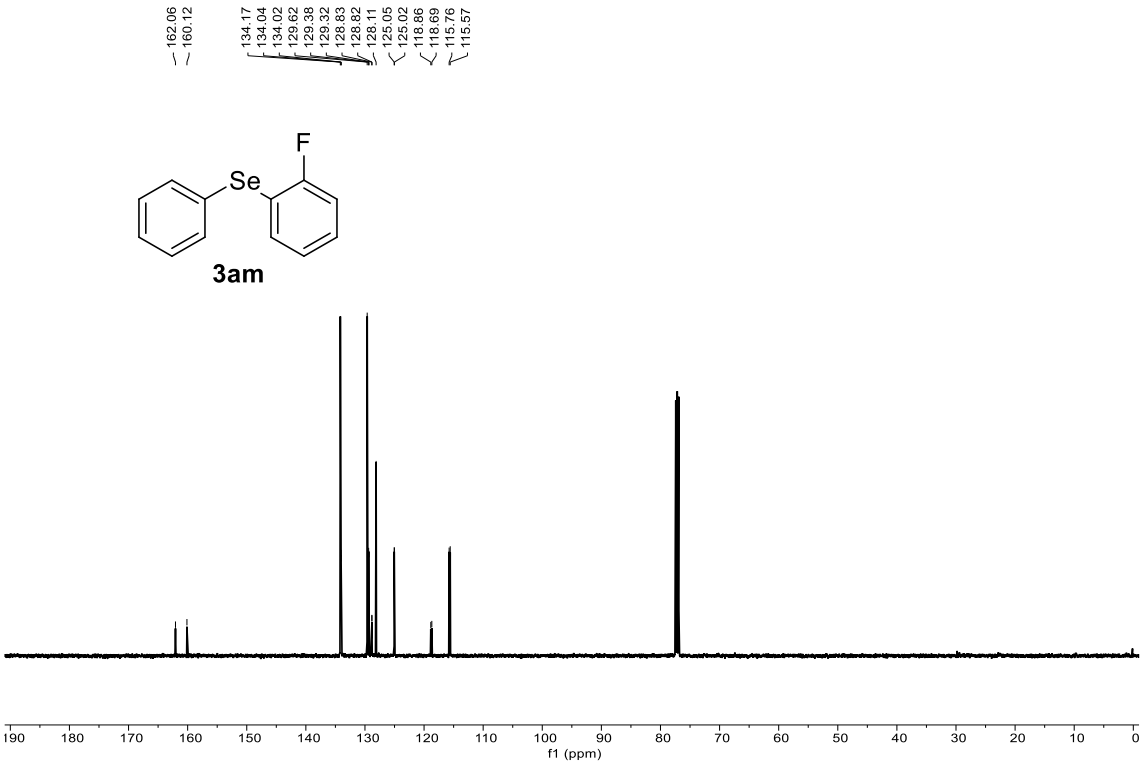

Figure S24 ^{13}C NMR (125 MHz) spectrum of **3am** in $CDCl_3$

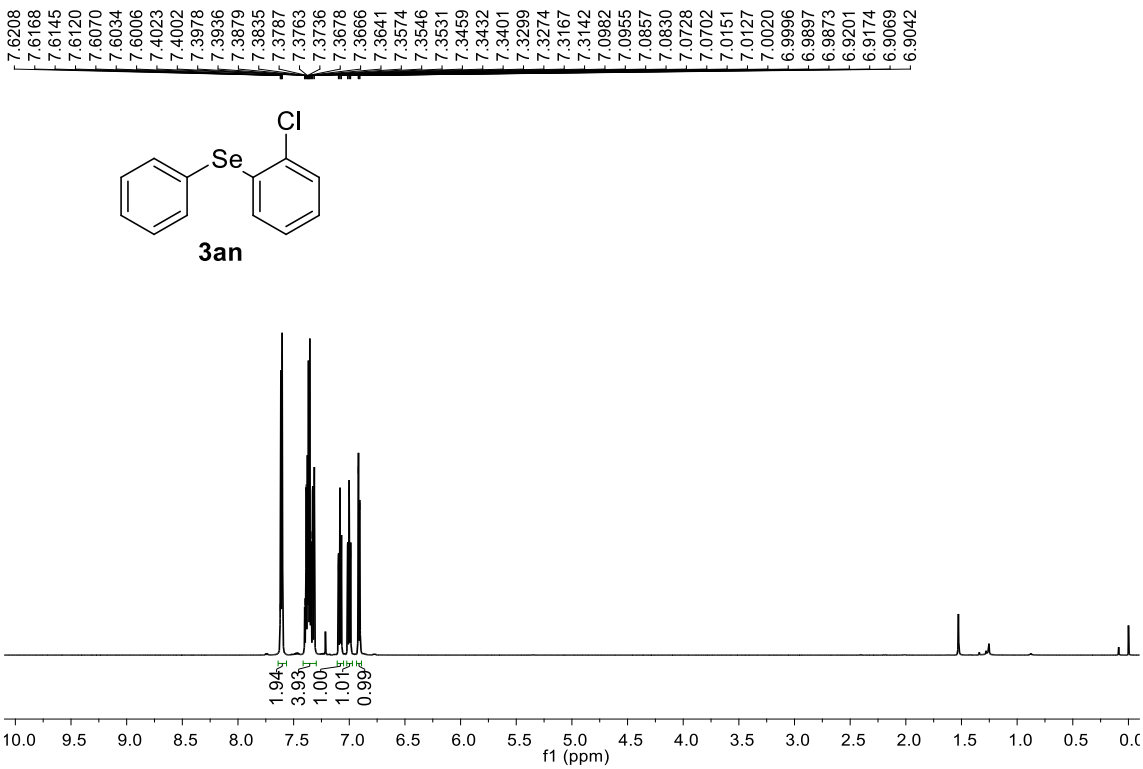

Figure S25 ^{1}H NMR (500 MHz) spectrum of **3an** in $CDCl_3$

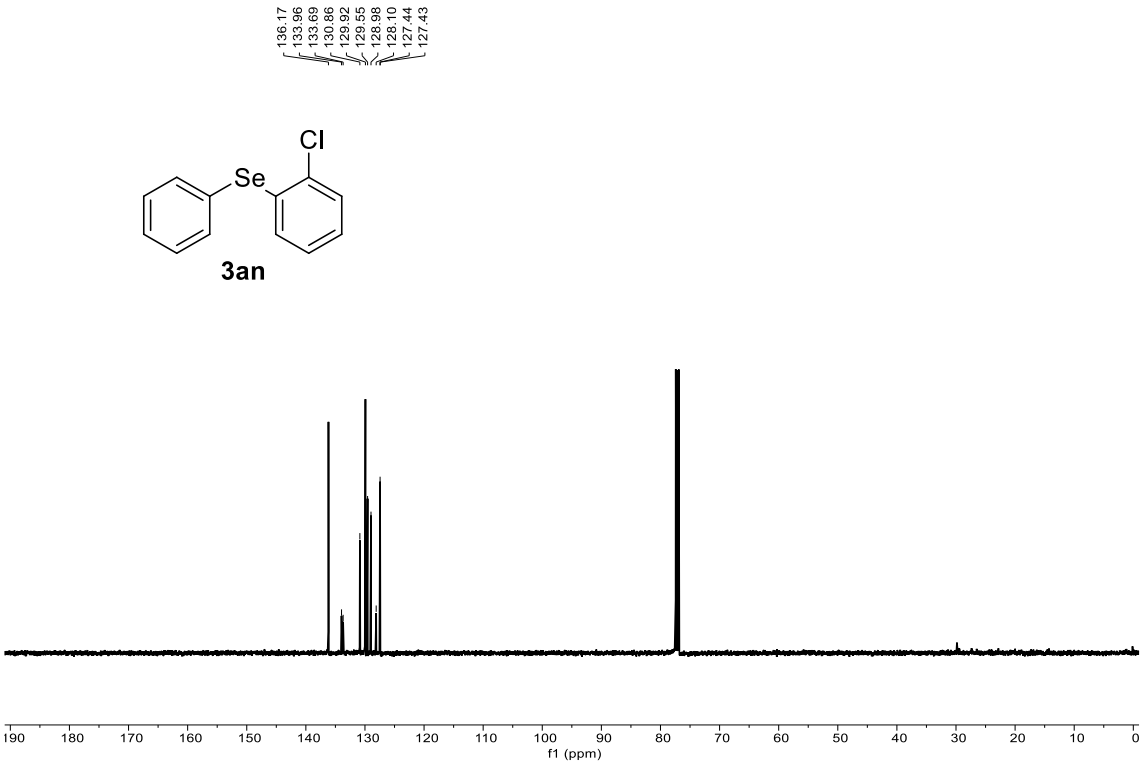

Figure S26 ^{13}C NMR (125 MHz) spectrum of **3an** in $CDCl_3$

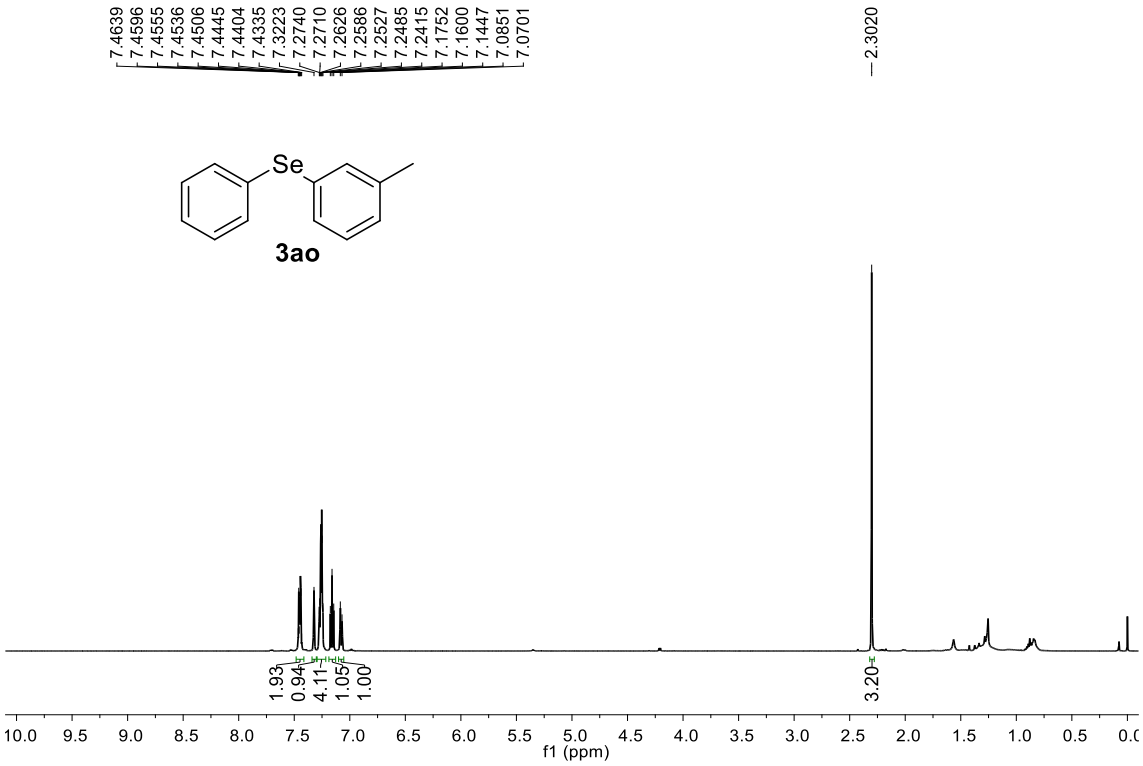

Figure S27 ^{1}H NMR (500 MHz) spectrum of **3ao** in $CDCl_3$

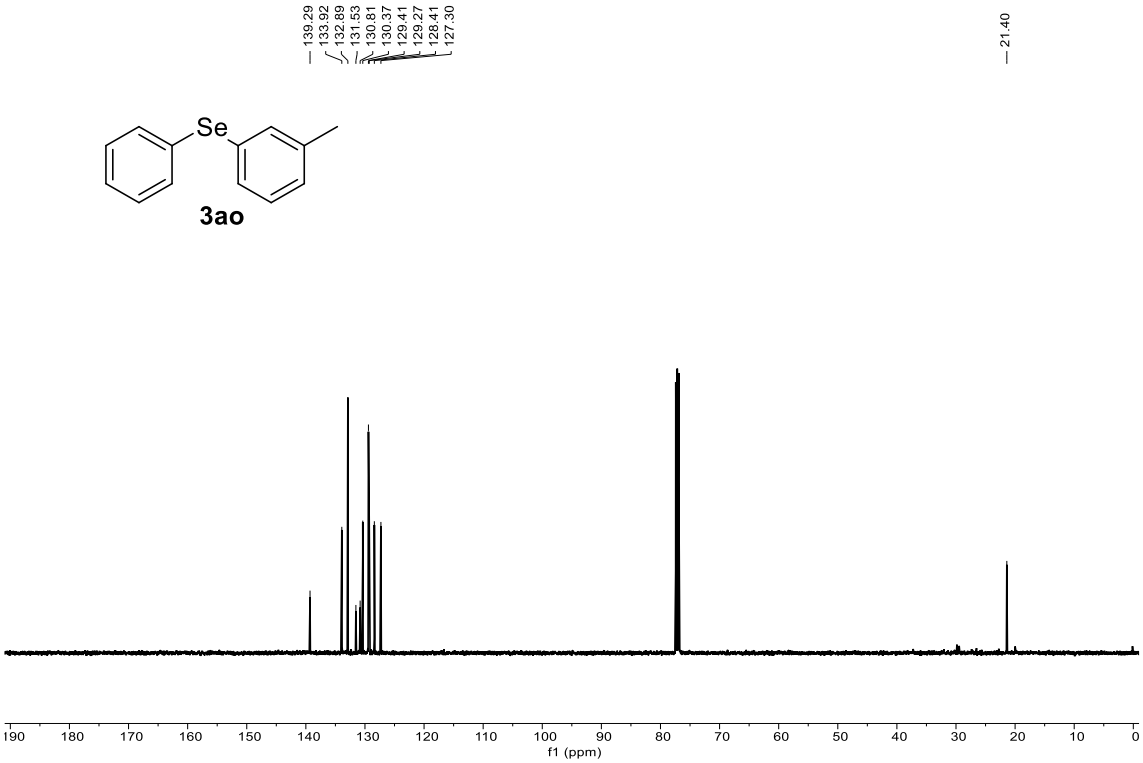

Figure S28 ^{13}C NMR (125 MHz) spectrum of **3ao** in $CDCl_3$

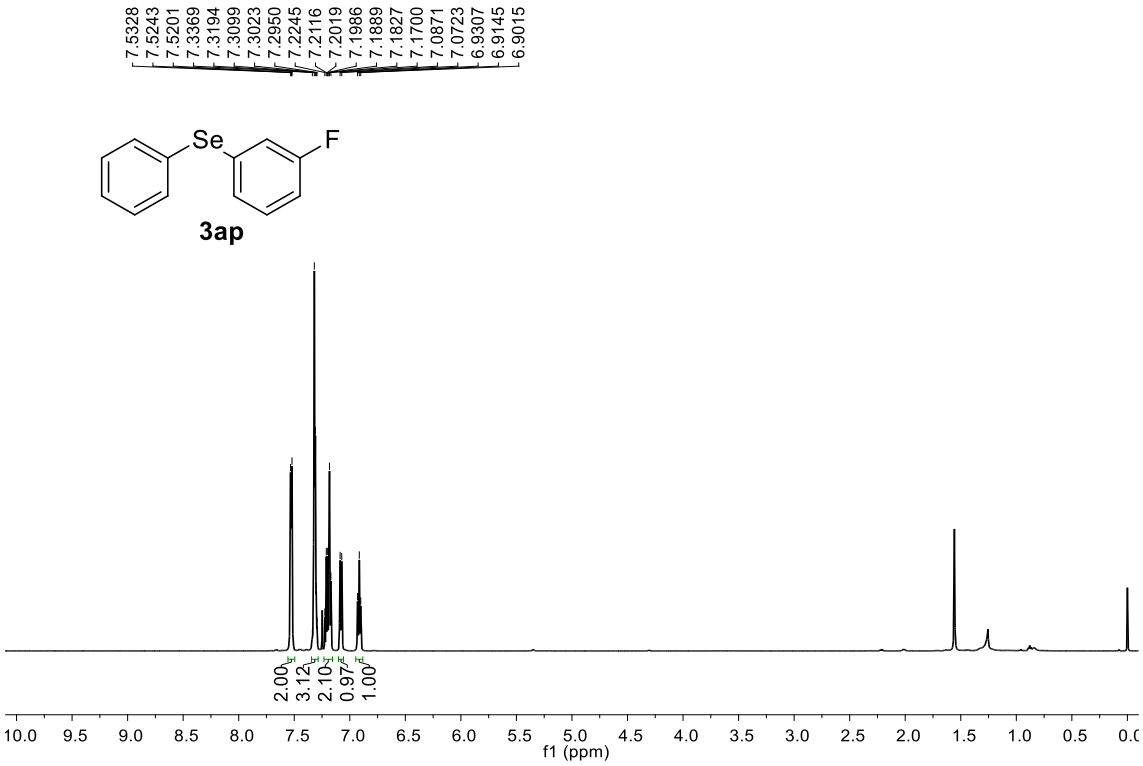

Figure S29 ^{1}H NMR (500 MHz) spectrum of **3ap** in $CDCl_3$

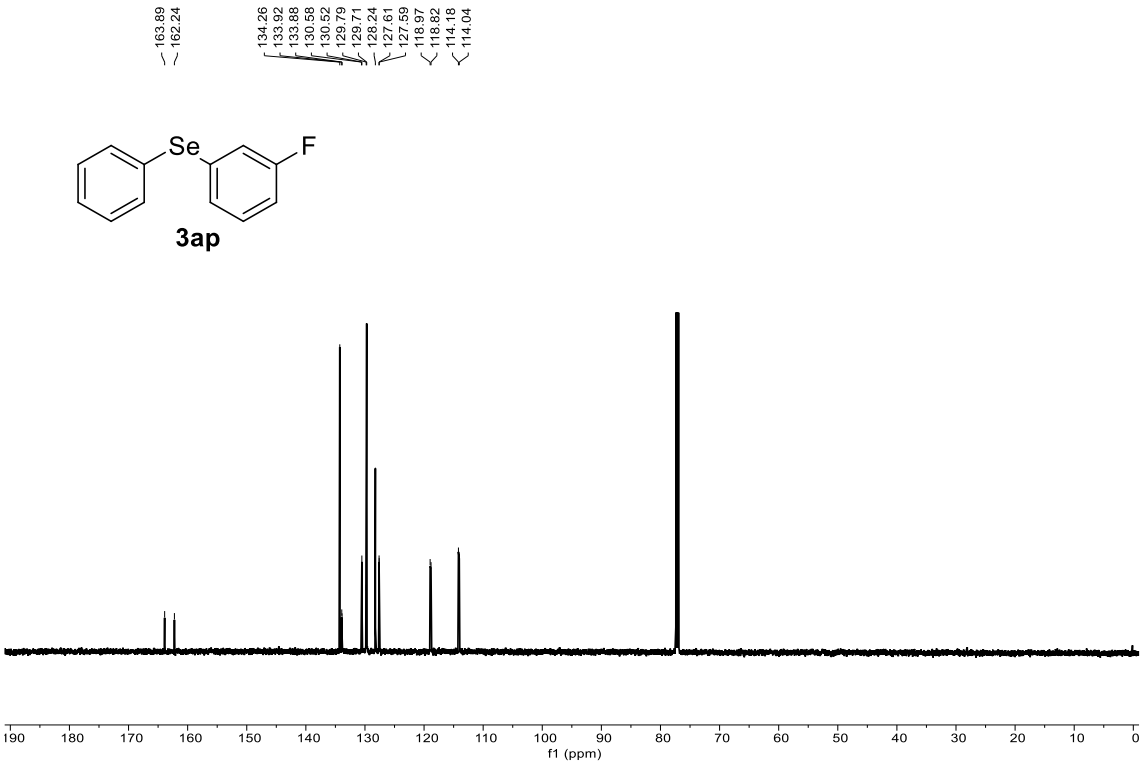

Figure S30 ^{13}C NMR (125 MHz) spectrum of **3ap** in $CDCl_3$

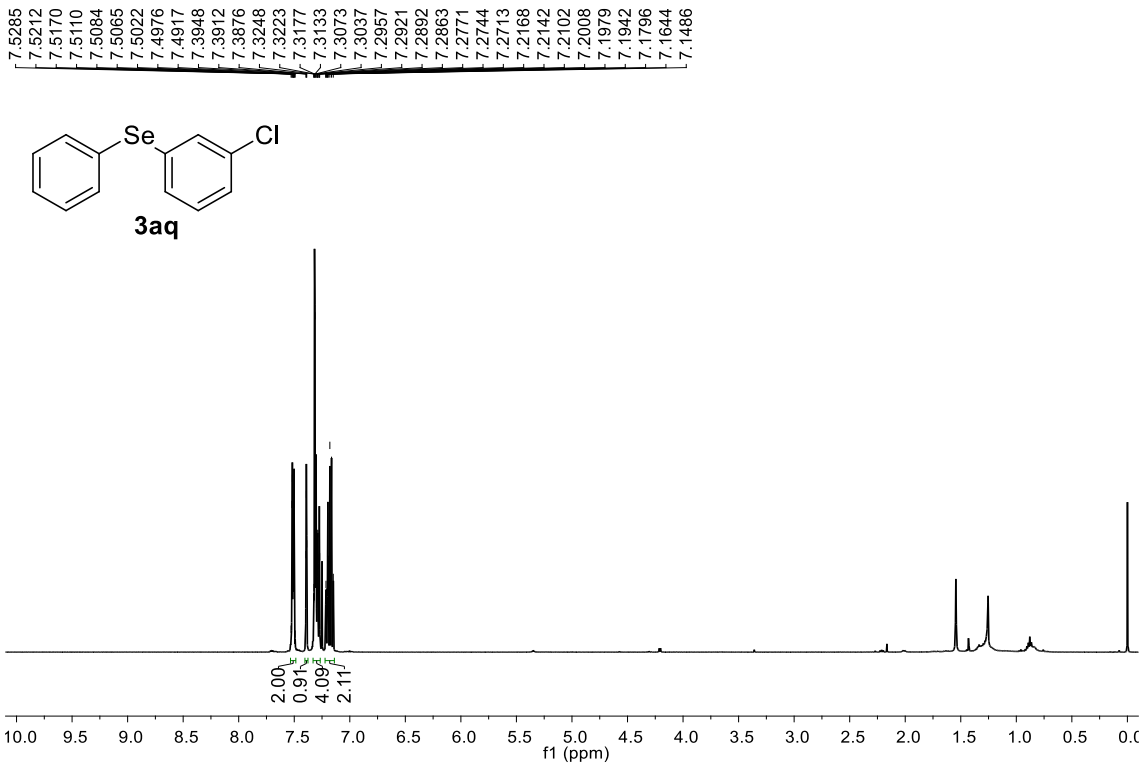

Figure S31 ^{1}H NMR (500 MHz) spectrum of **3aq** in $CDCl_3$

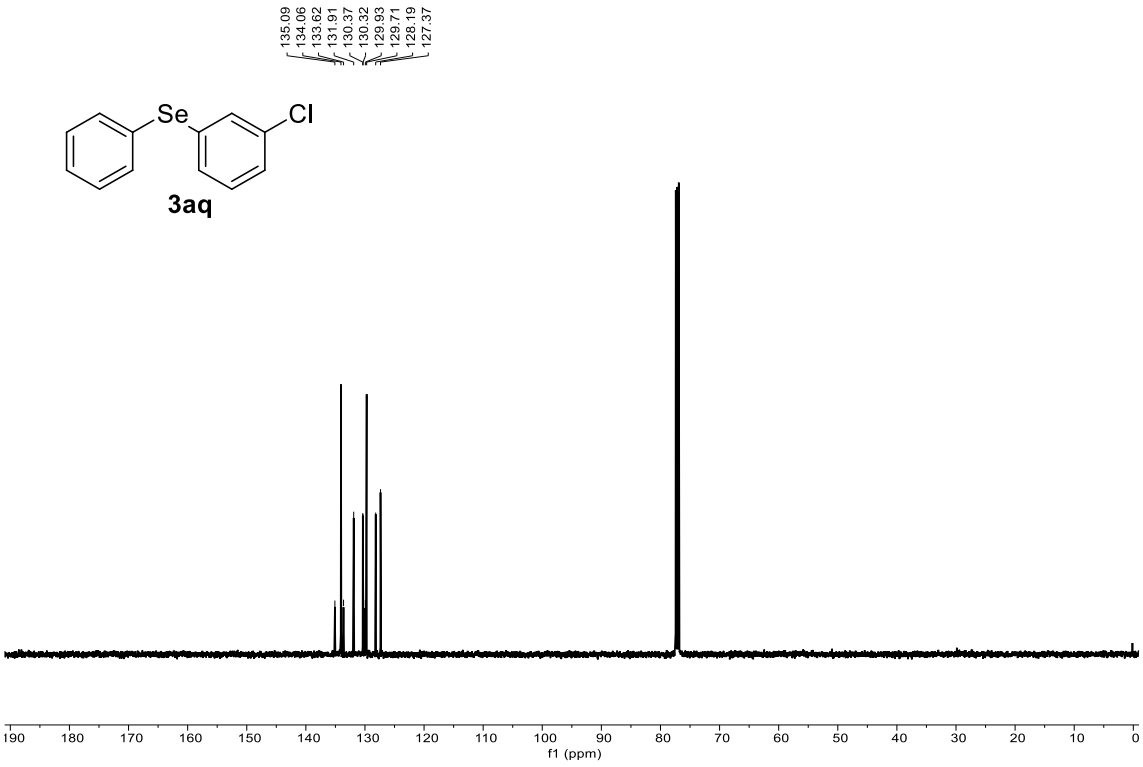

Figure S32 ^{13}C NMR (125 MHz) spectrum of **3aq** in $CDCl_3$

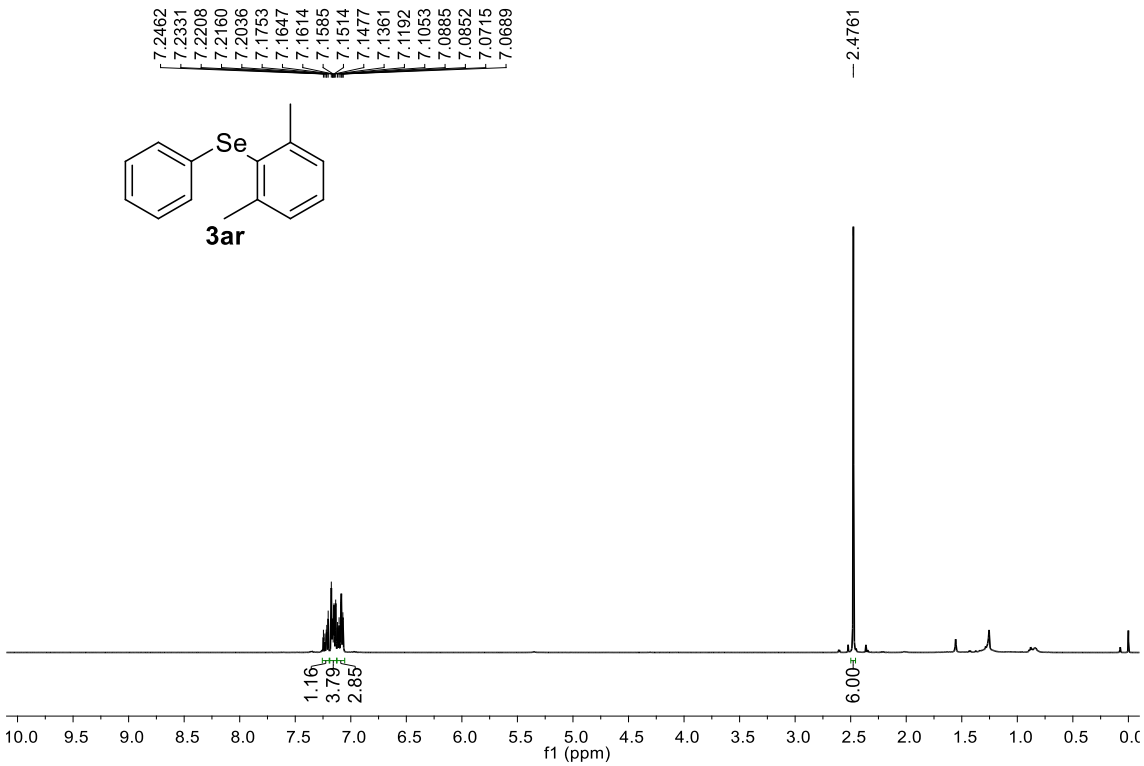

Figure S33 ^{1}H NMR (500 MHz) spectrum of **3ar** in $CDCl_3$

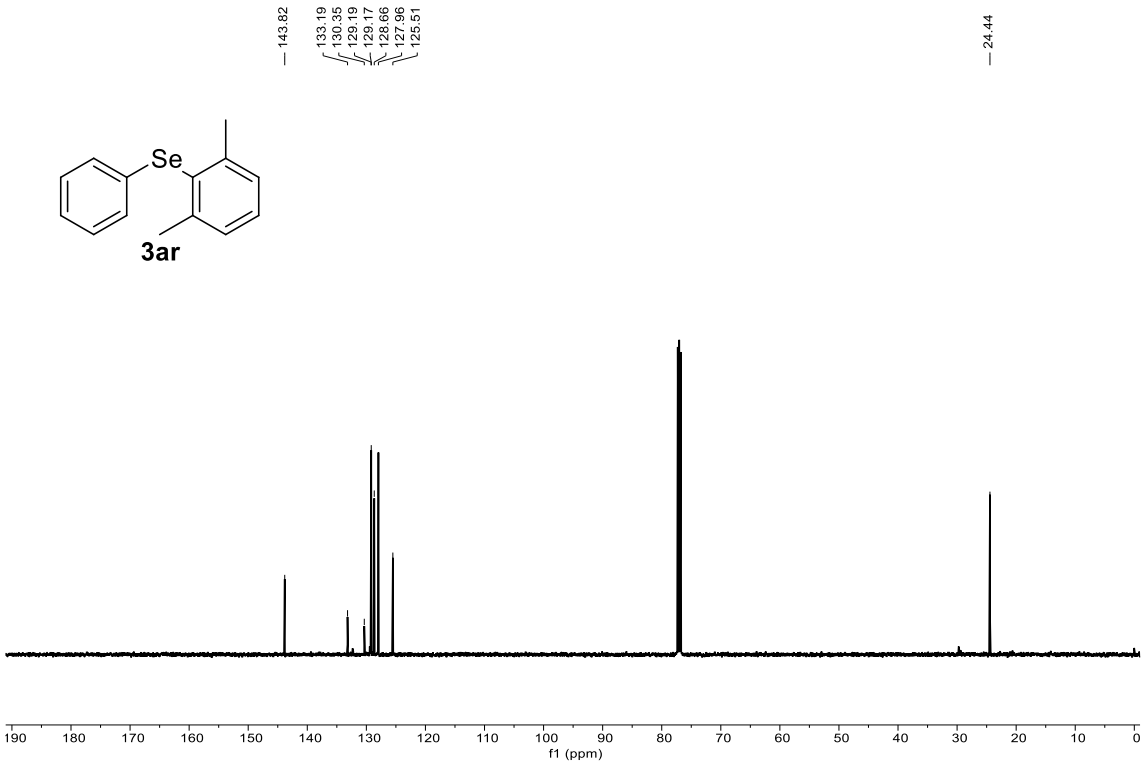

Figure S34 ^{13}C NMR (125 MHz) spectrum of **3ar** in $CDCl_3$

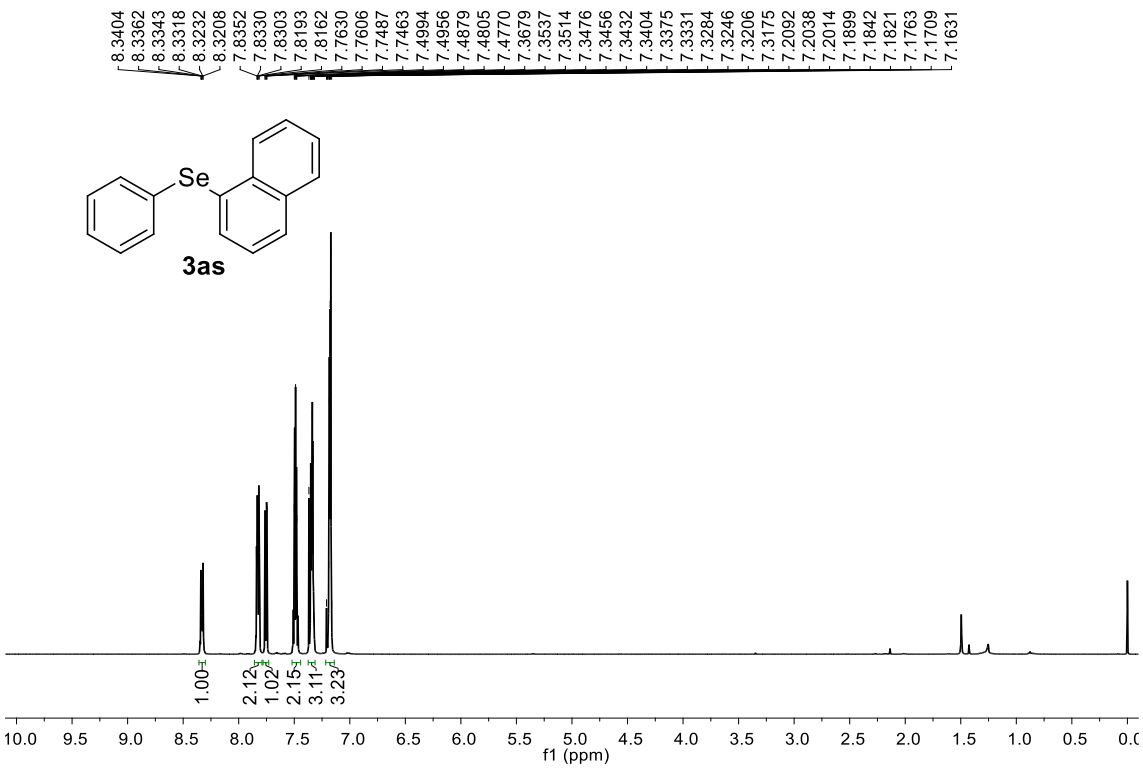

Figure S35 ^{1}H NMR (500 MHz) spectrum of **3as** in $CDCl_3$

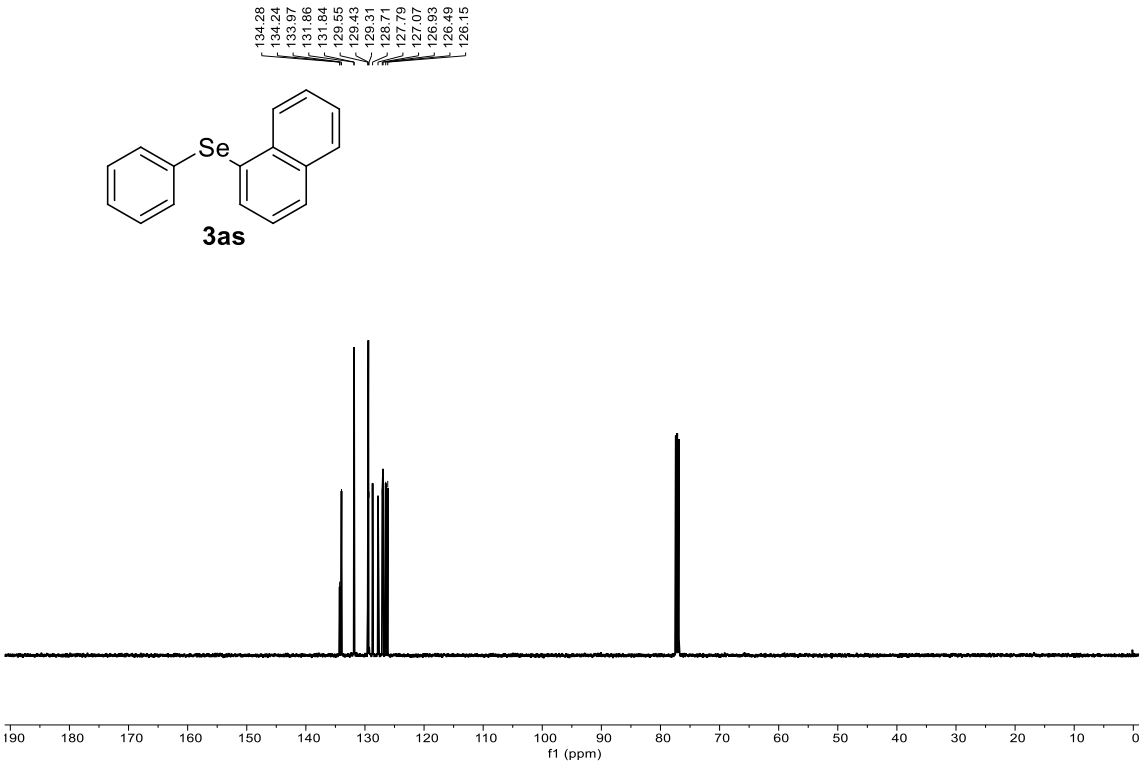

Figure S36 ^{13}C NMR (125 MHz) spectrum of **3as** in $CDCl_3$

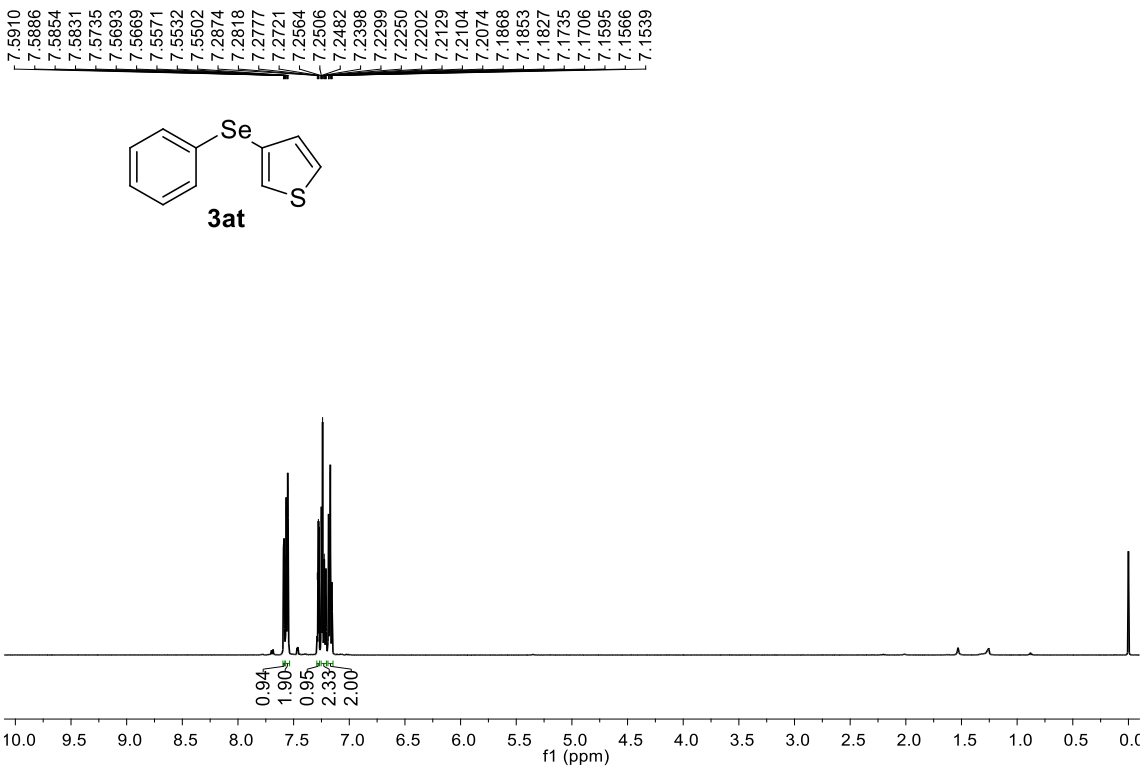

Figure S37 ^{1}H NMR (500 MHz) spectrum of **3at** in $CDCl_3$

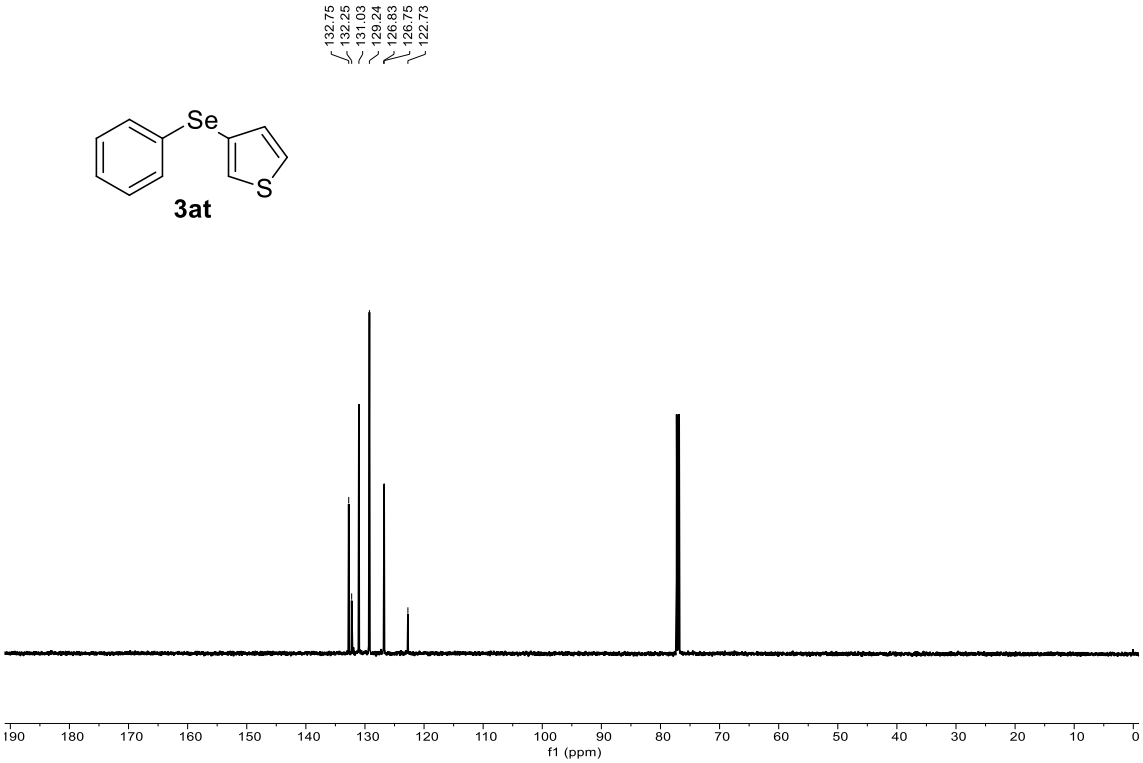

Figure S38 ^{13}C NMR (125 MHz) spectrum of **3at** in $CDCl_3$

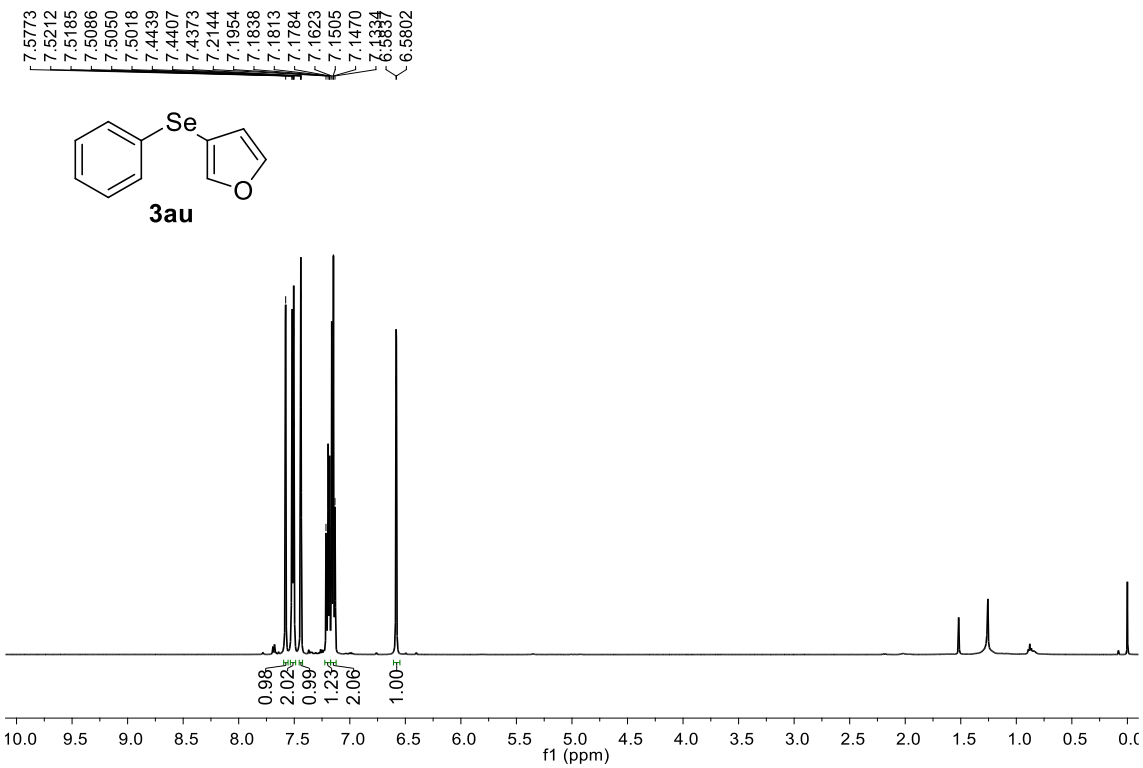

Figure S39 ^{1}H NMR (500 MHz) spectrum of **3au** in $CDCl_3$

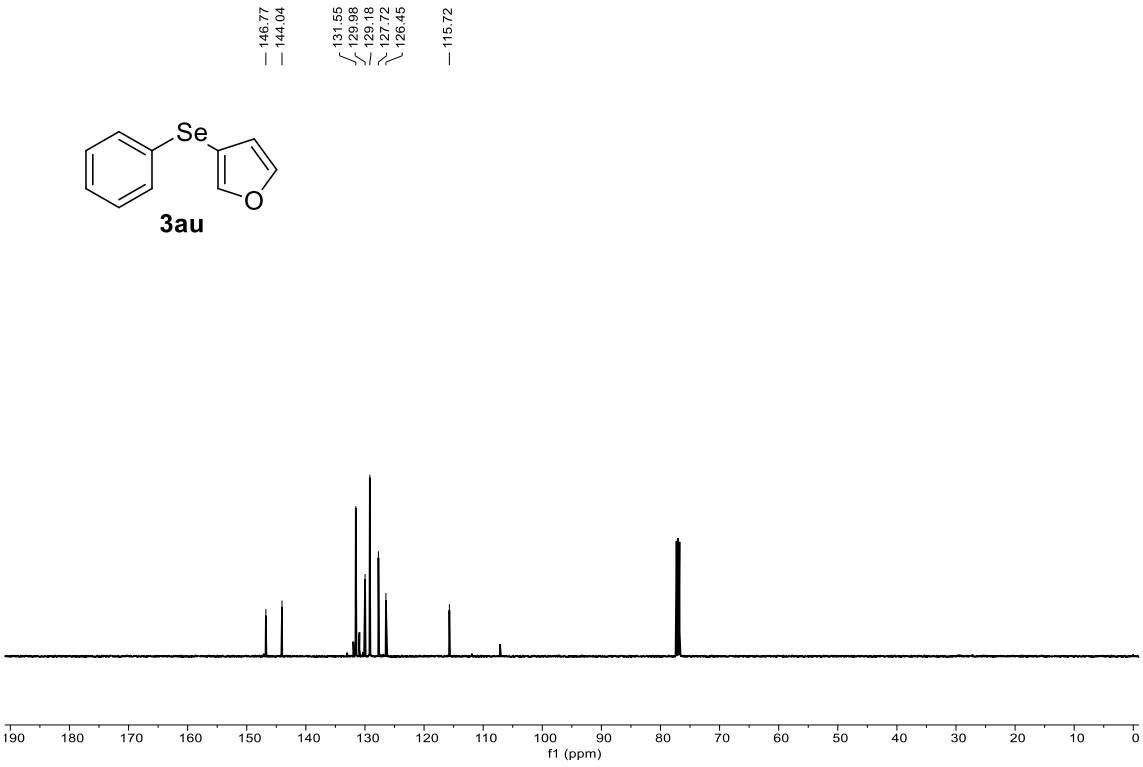

Figure S40 ^{13}C NMR (125 MHz) spectrum of **3au** in $CDCl_3$

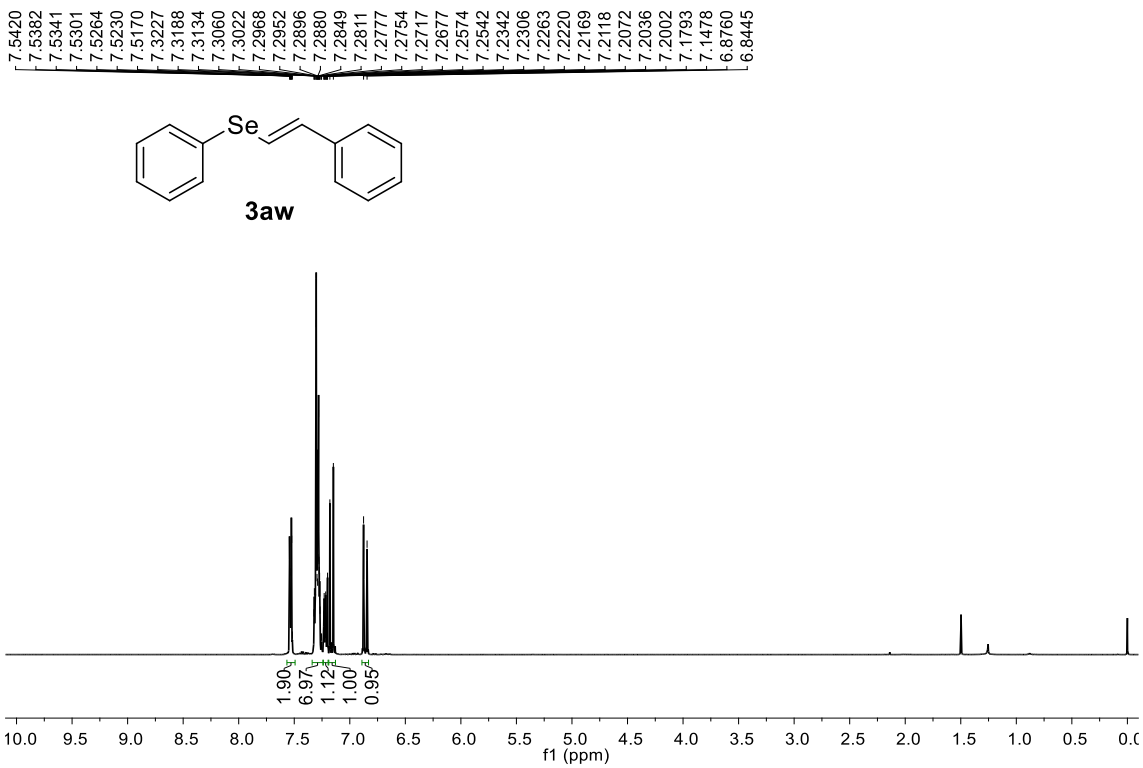

Figure S41 ^{1}H NMR (500 MHz) spectrum of **3aw** in $CDCl_3$

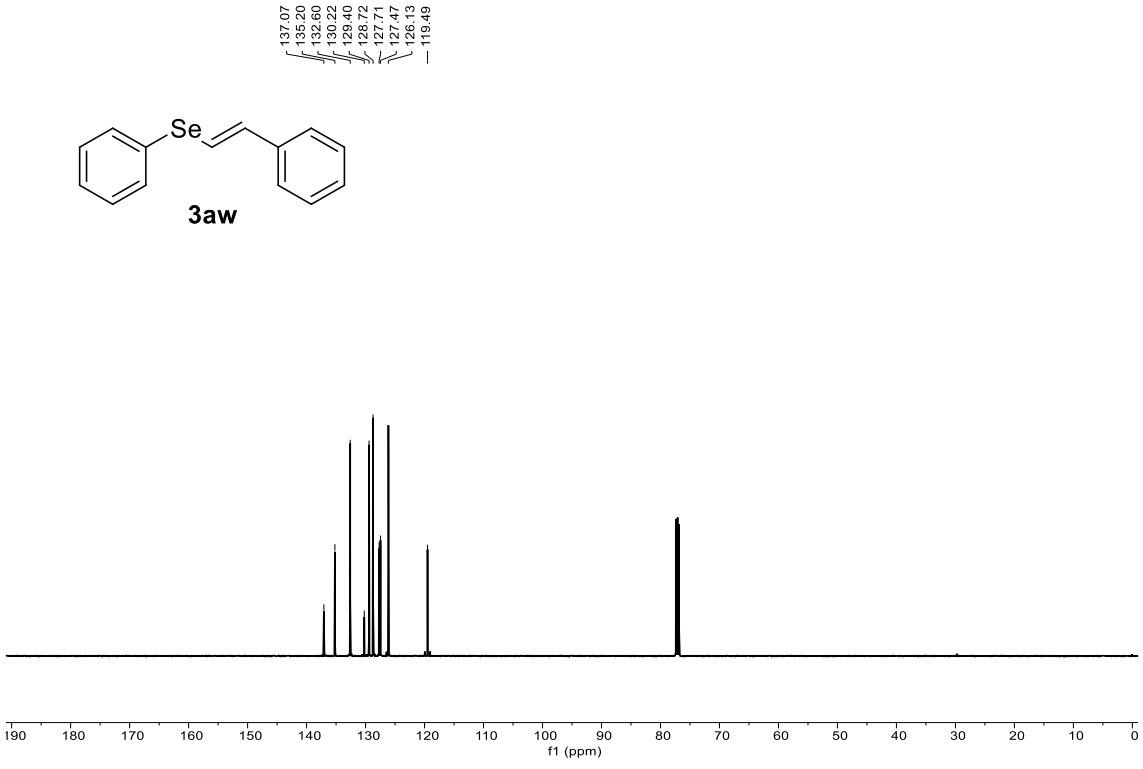

Figure S42 ^{13}C NMR (125 MHz) spectrum of **3aw** in $CDCl_3$

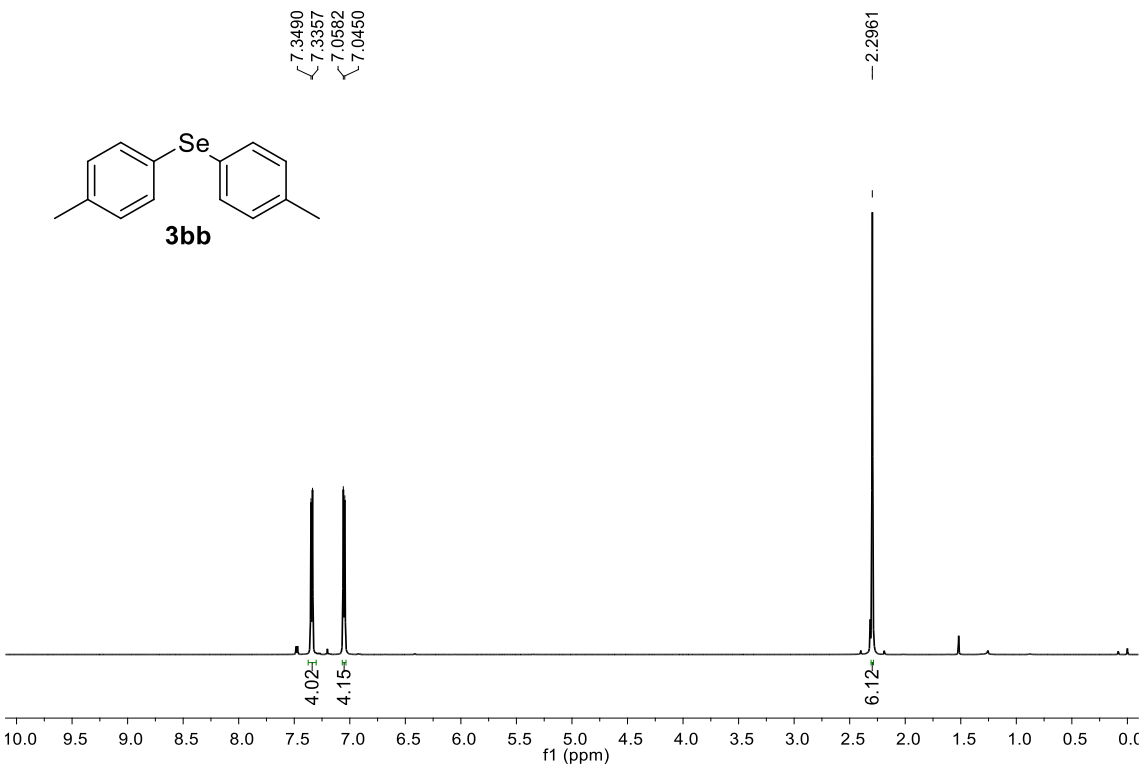

Figure S43 ^{1}H NMR (500 MHz) spectrum of **3bb** in $CDCl_3$

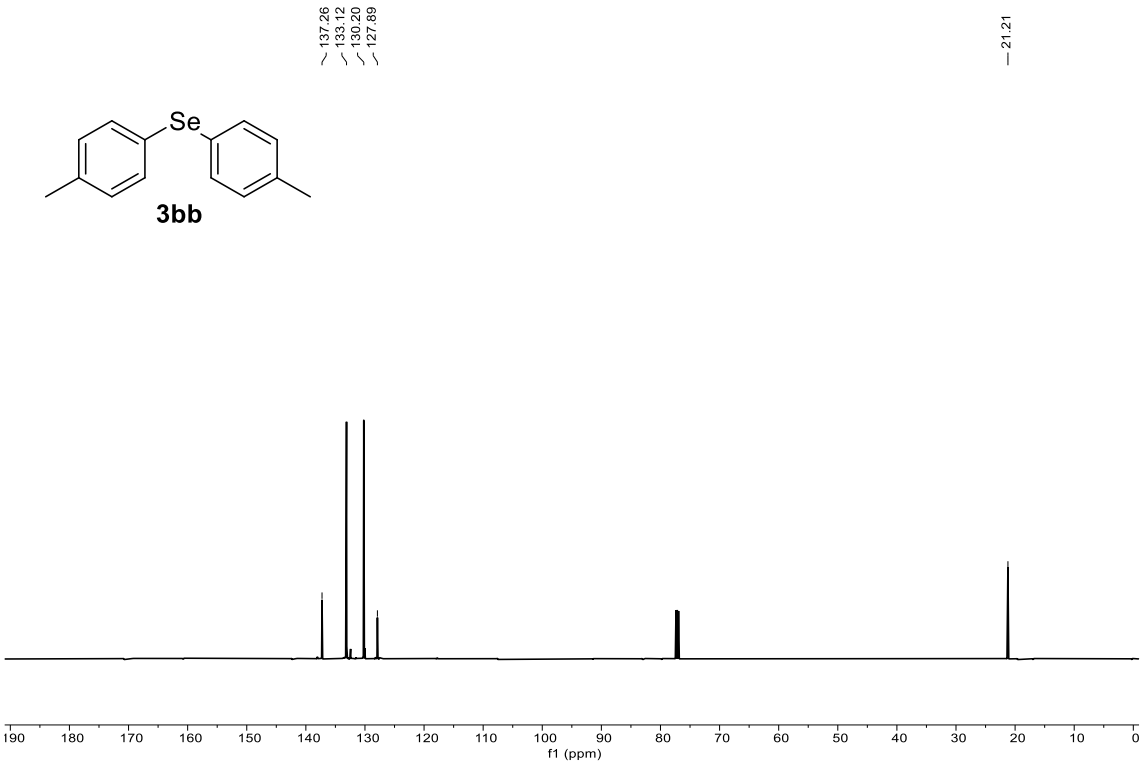

Figure S44 ^{13}C NMR (125 MHz) spectrum of **3bb** in $CDCl_3$

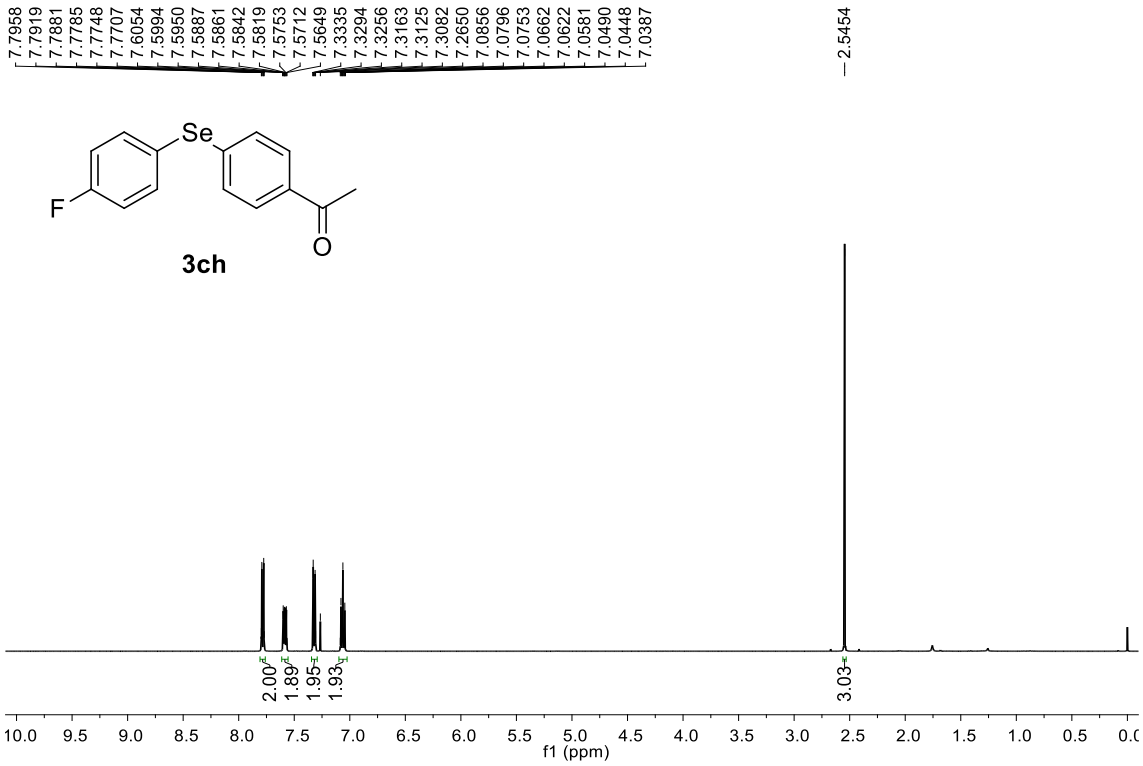

Figure S45 ^{1}H NMR (500 MHz) spectrum of **3ch** in $CDCl_3$

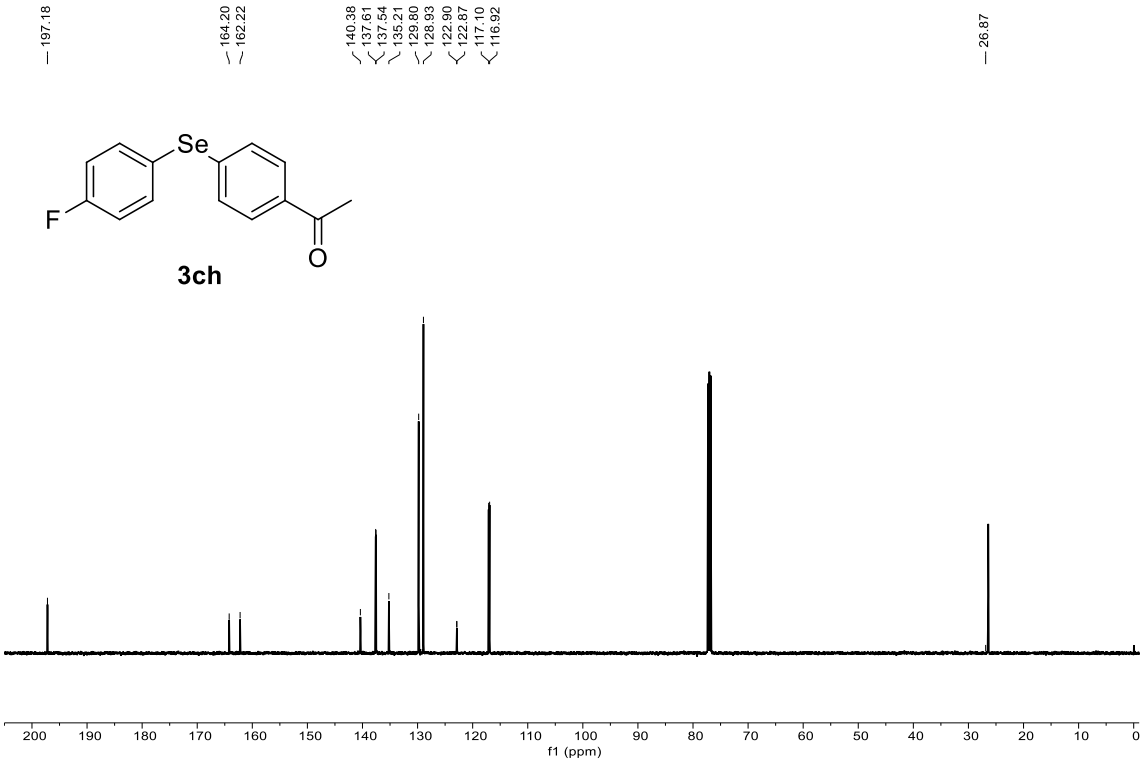

Figure S46 ^{13}C NMR (125 MHz) spectrum of **3ch** in $CDCl_3$

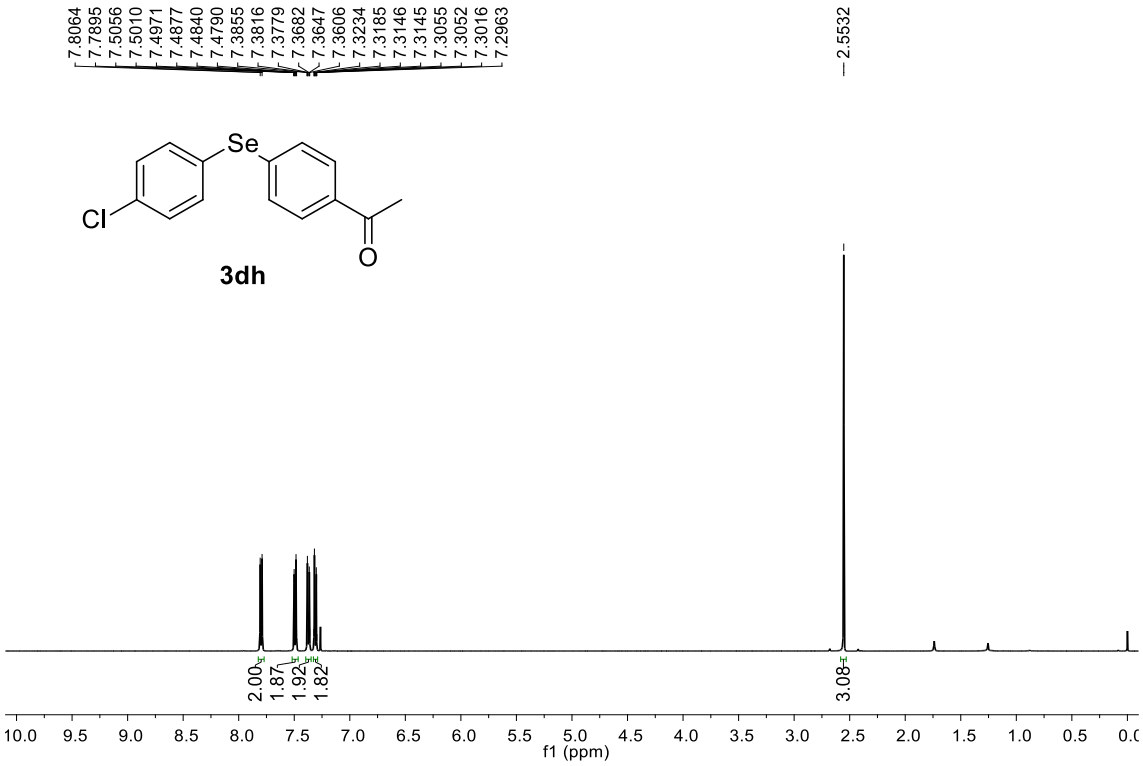

Figure S47 ^{1}H NMR (500 MHz) spectrum of **3dh** in $CDCl_3$

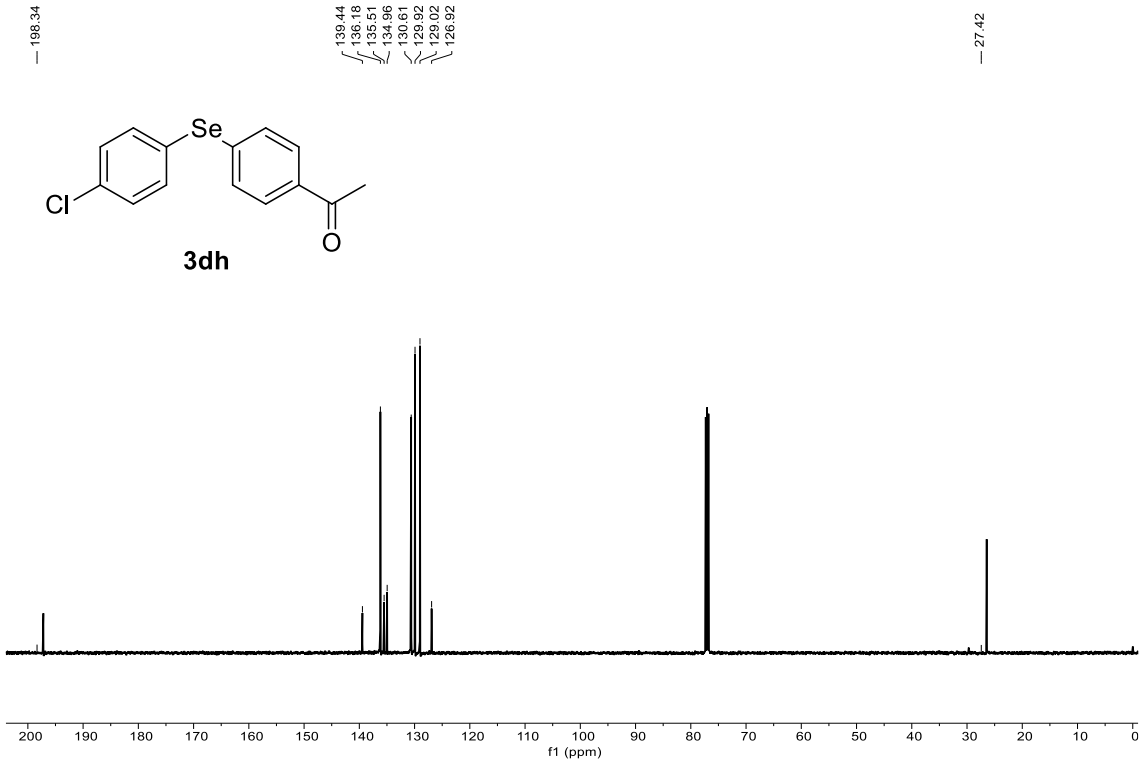

Figure S48 ^{13}C NMR (125 MHz) spectrum of **3dh** in $CDCl_3$

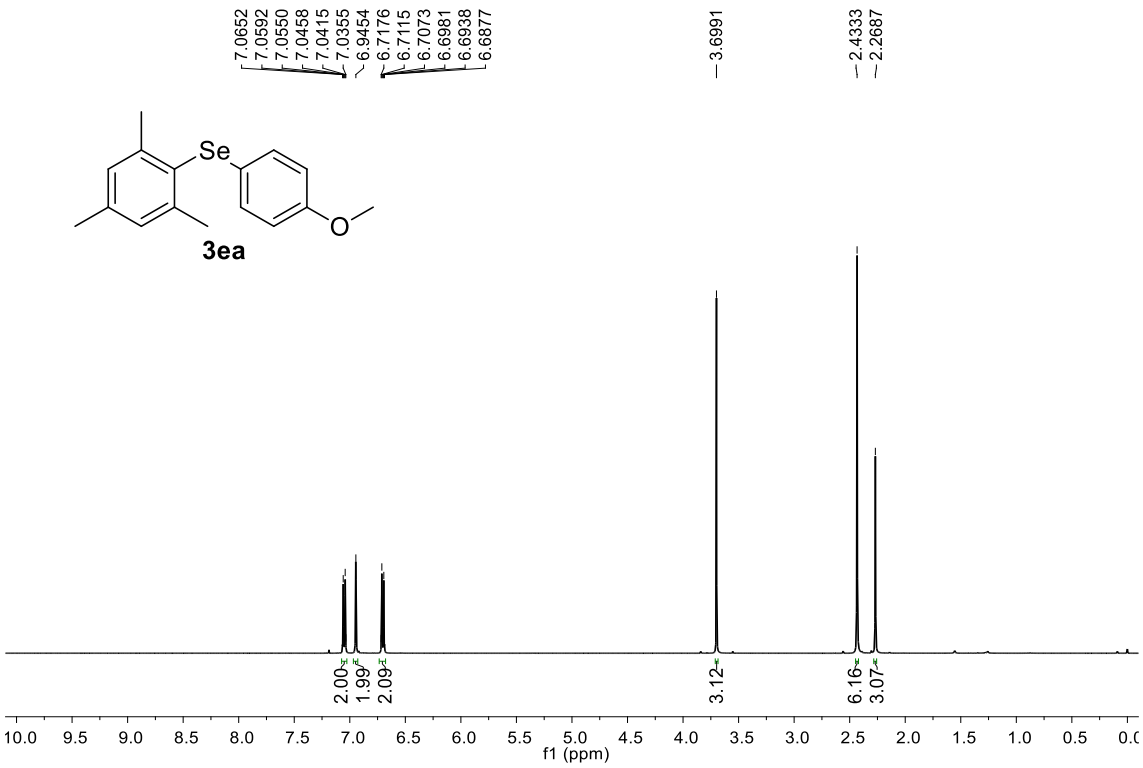

Figure S49 ^{1}H NMR (500 MHz) spectrum of **3ea** in $CDCl_3$

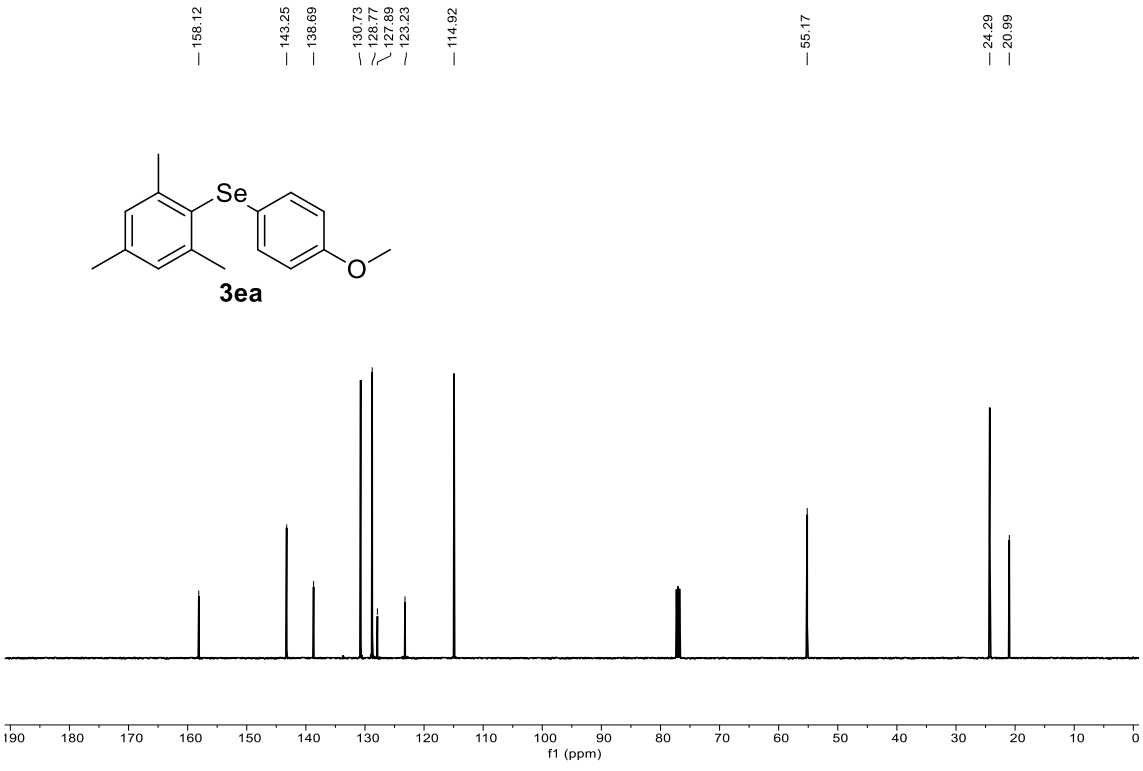

Figure S50 ^{13}C NMR (125 MHz) spectrum of **3ea** in $CDCl_3$

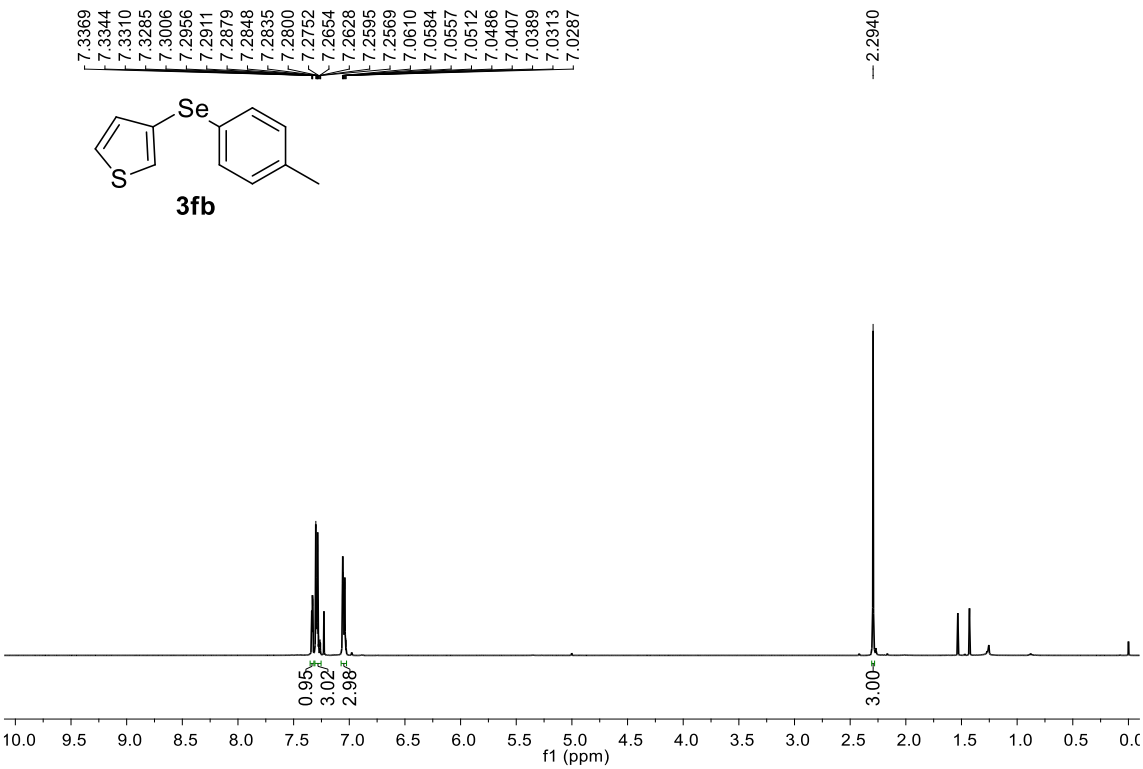

Figure S51 ^{1}H NMR (500 MHz) spectrum of **3fb** in $CDCl_3$

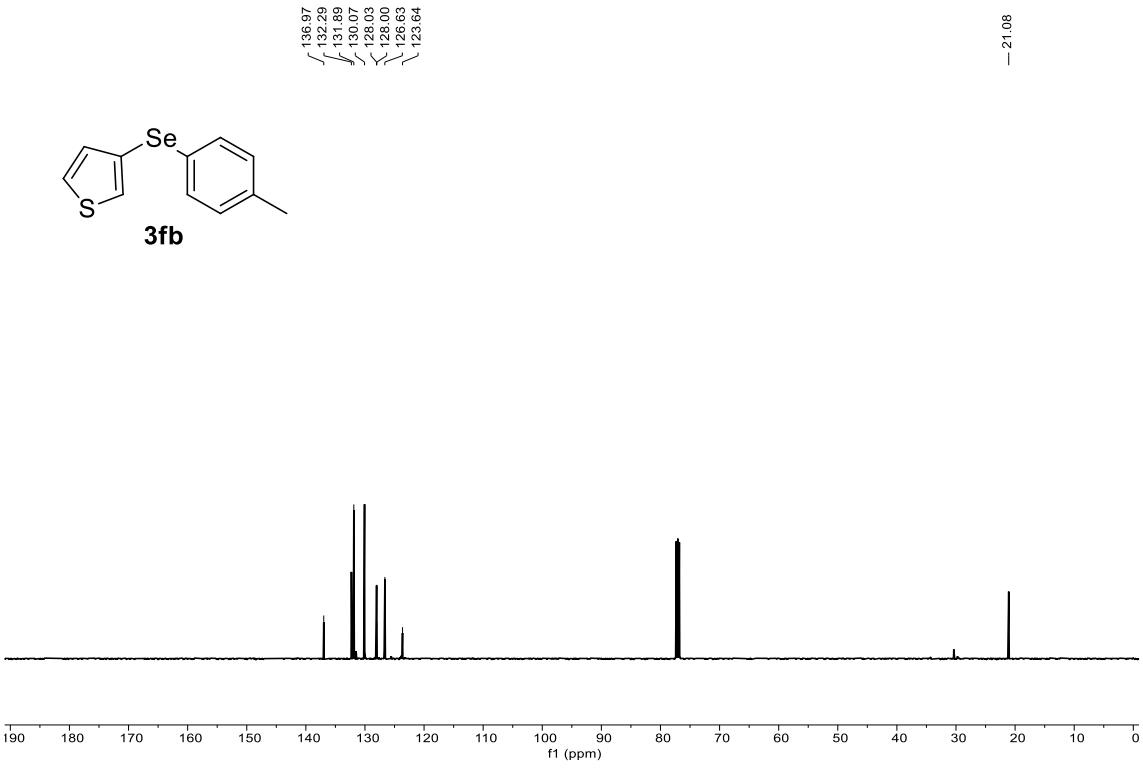

Figure S52 ^{13}C NMR (125 MHz) spectrum of **3fb** in $CDCl_3$

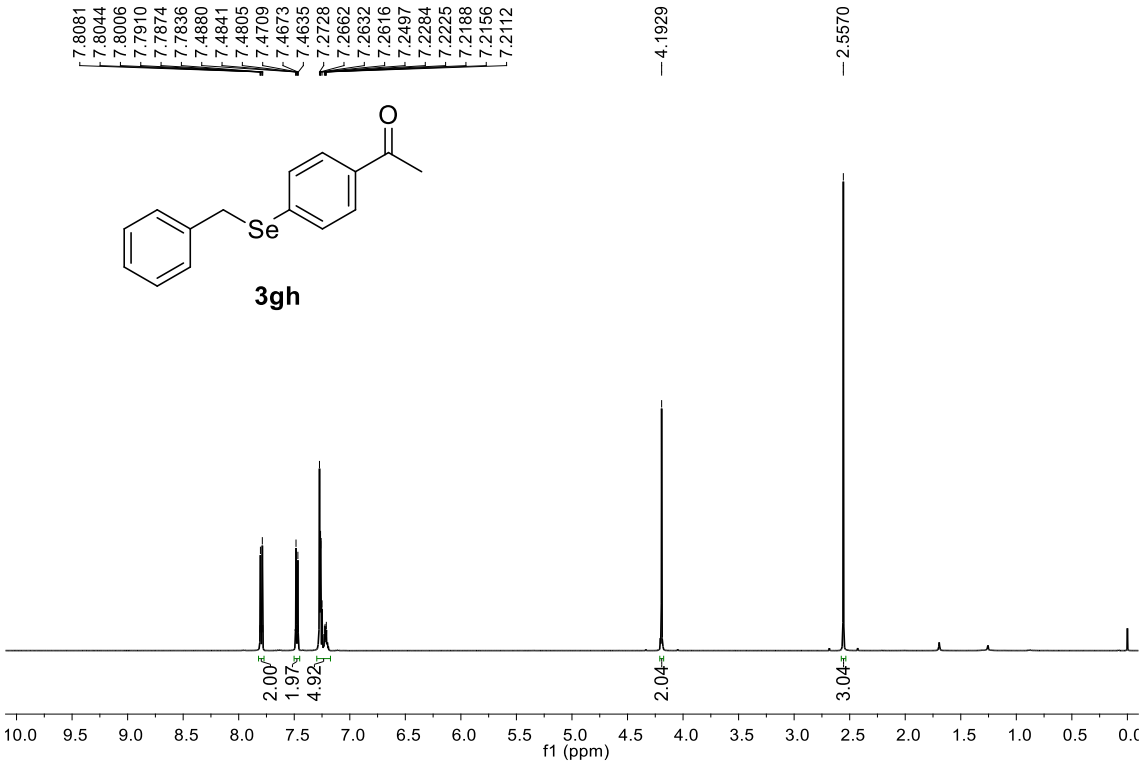

Figure S53 ^{1}H NMR (500 MHz) spectrum of **3gh** in $CDCl_3$

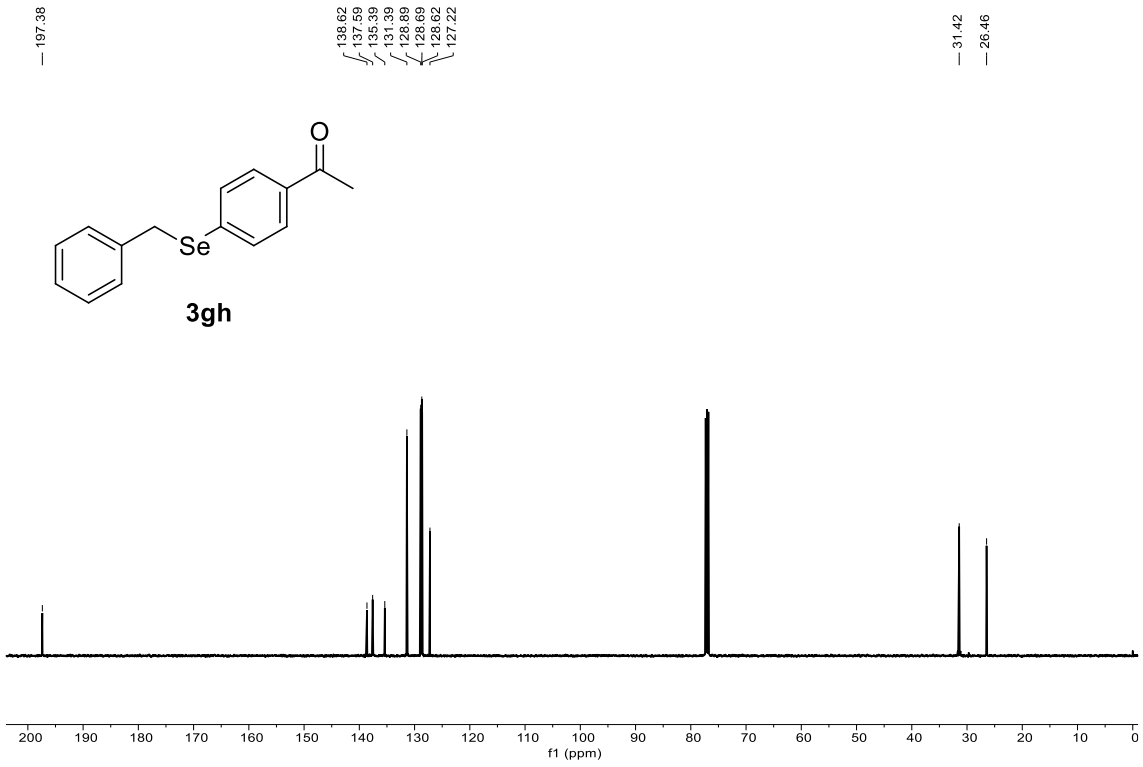

Figure S54 ^{13}C NMR (125 MHz) spectrum of **3gh** in $CDCl_3$

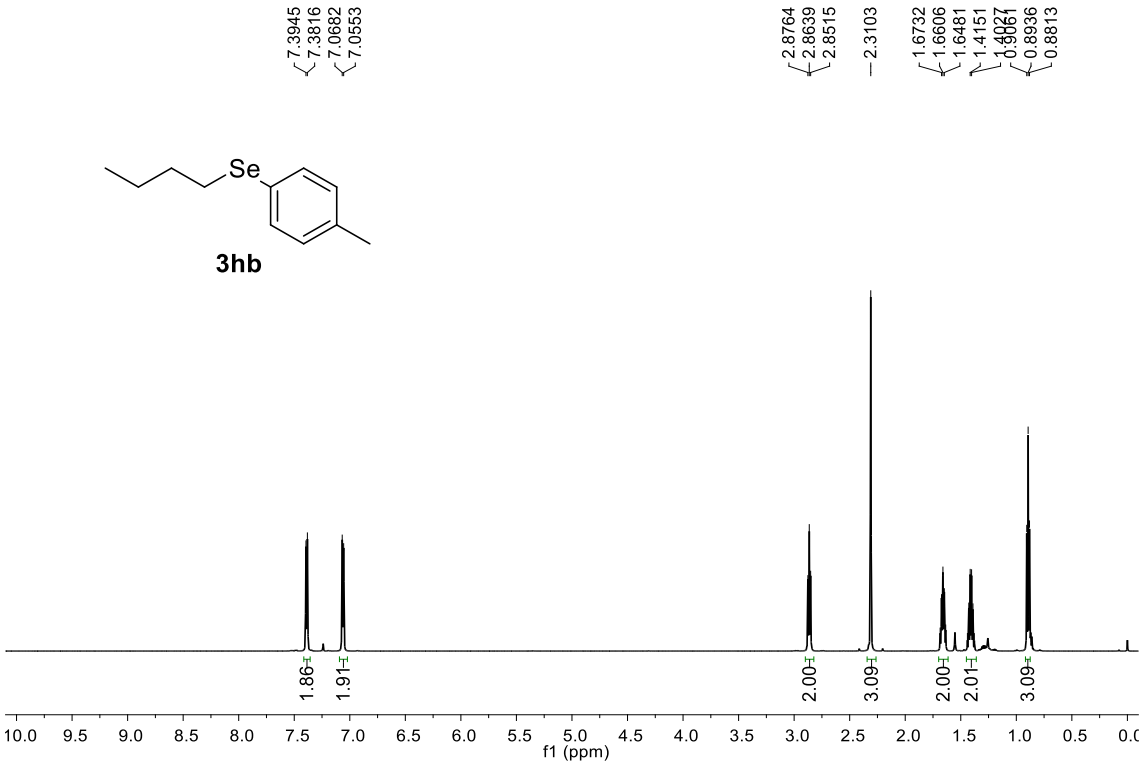

Figure S55 ^{1}H NMR (500 MHz) spectrum of **3hb** in $CDCl_3$

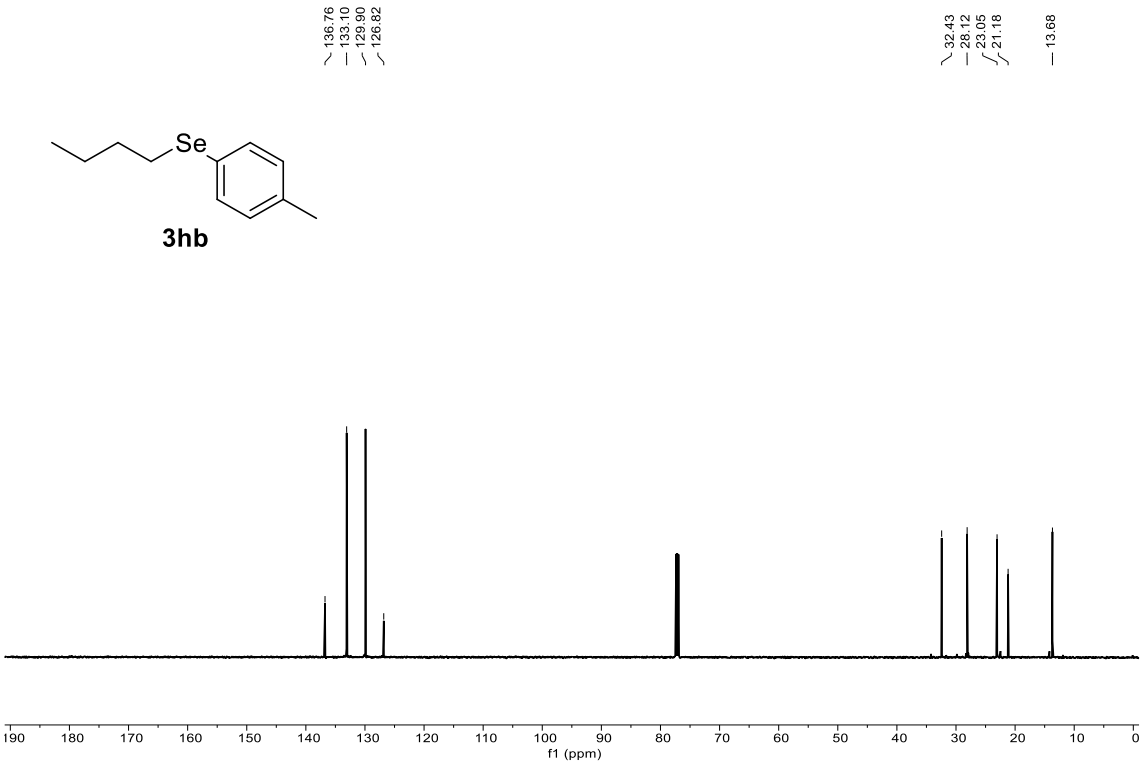

Figure S56 ^{13}C NMR (125 MHz) spectrum of **3hb** in $CDCl_3$

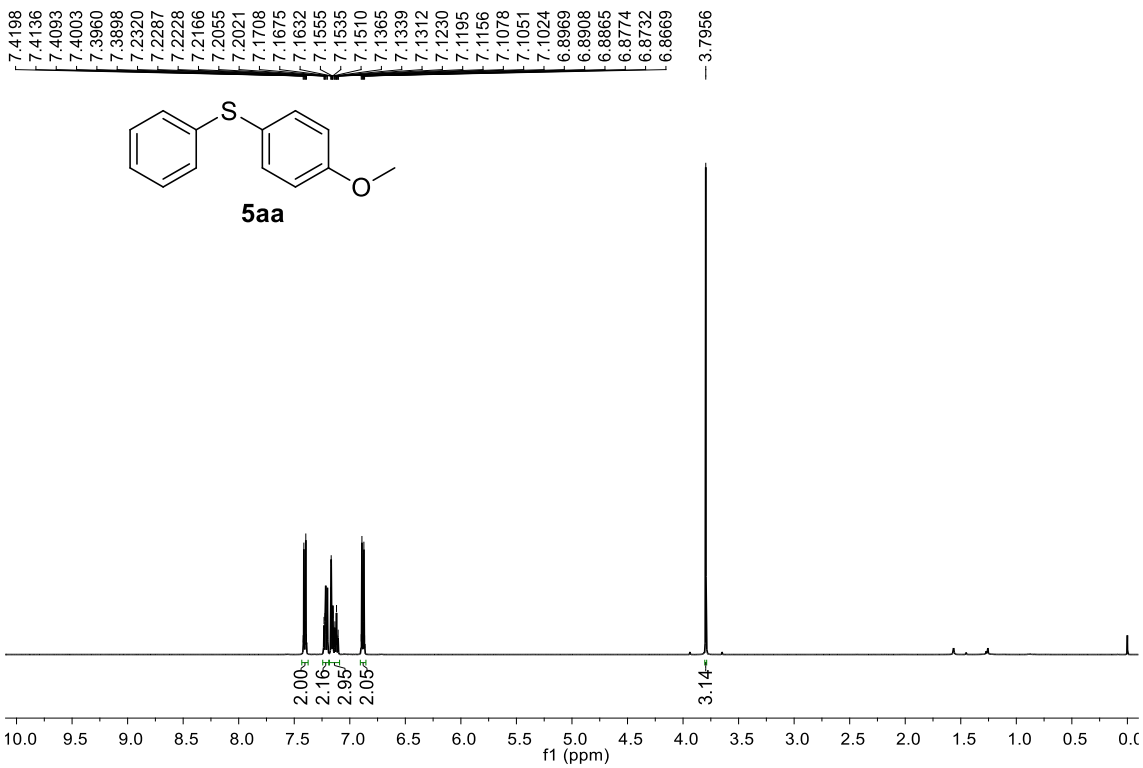

Figure S57 ^{1}H NMR (500 MHz) spectrum of **5aa** in $CDCl_3$

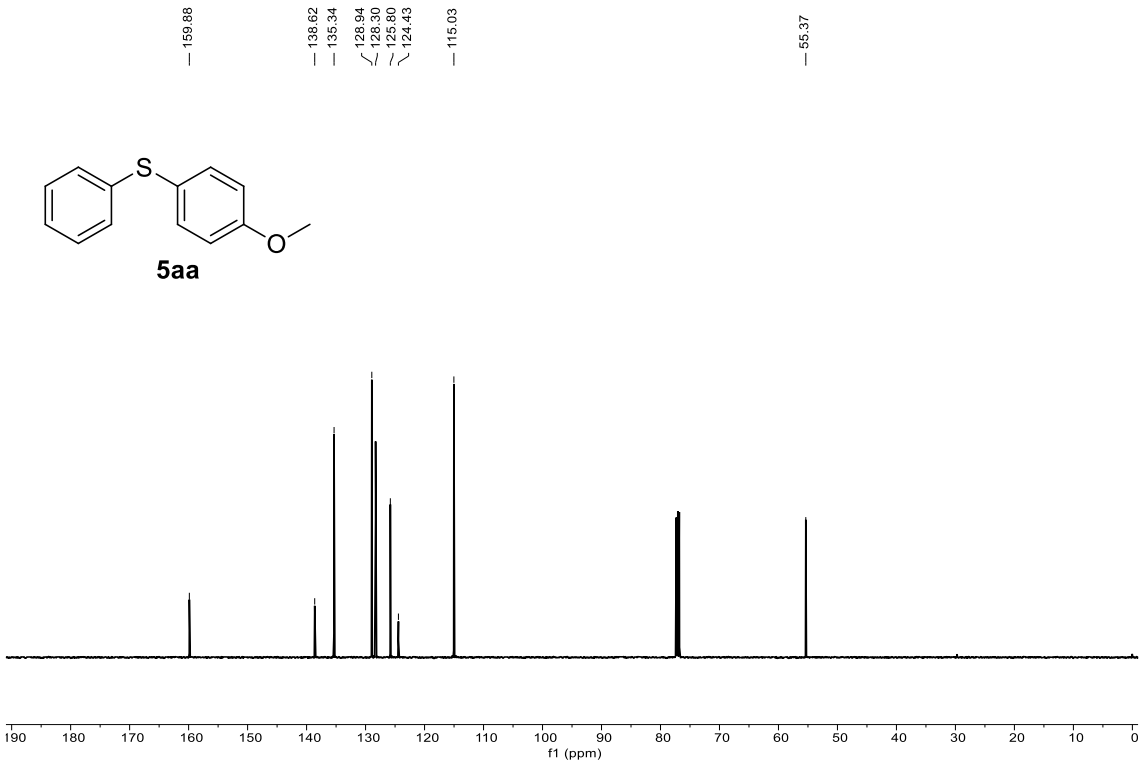

Figure S58 ^{13}C NMR (125 MHz) spectrum of **5aa** in $CDCl_3$

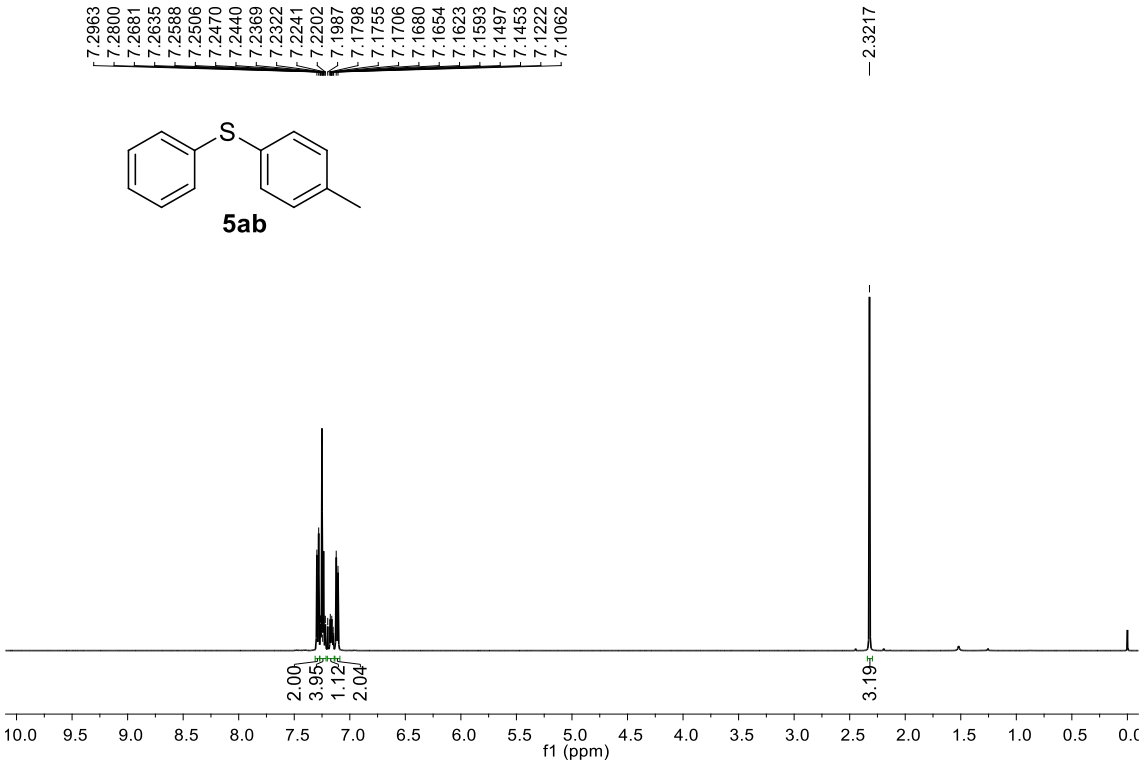

Figure S59 ^{1}H NMR (500 MHz) spectrum of **5ab** in $CDCl_3$

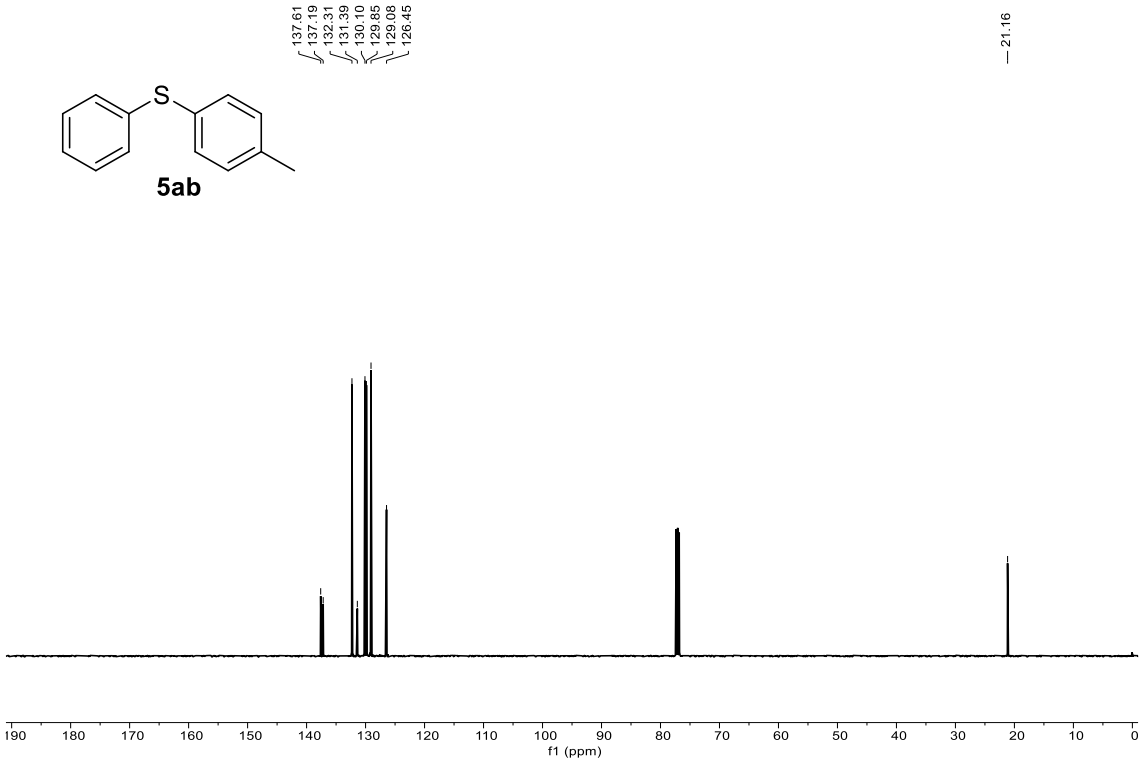

Figure S60 ^{13}C NMR (125 MHz) spectrum of **5ab** in $CDCl_3$

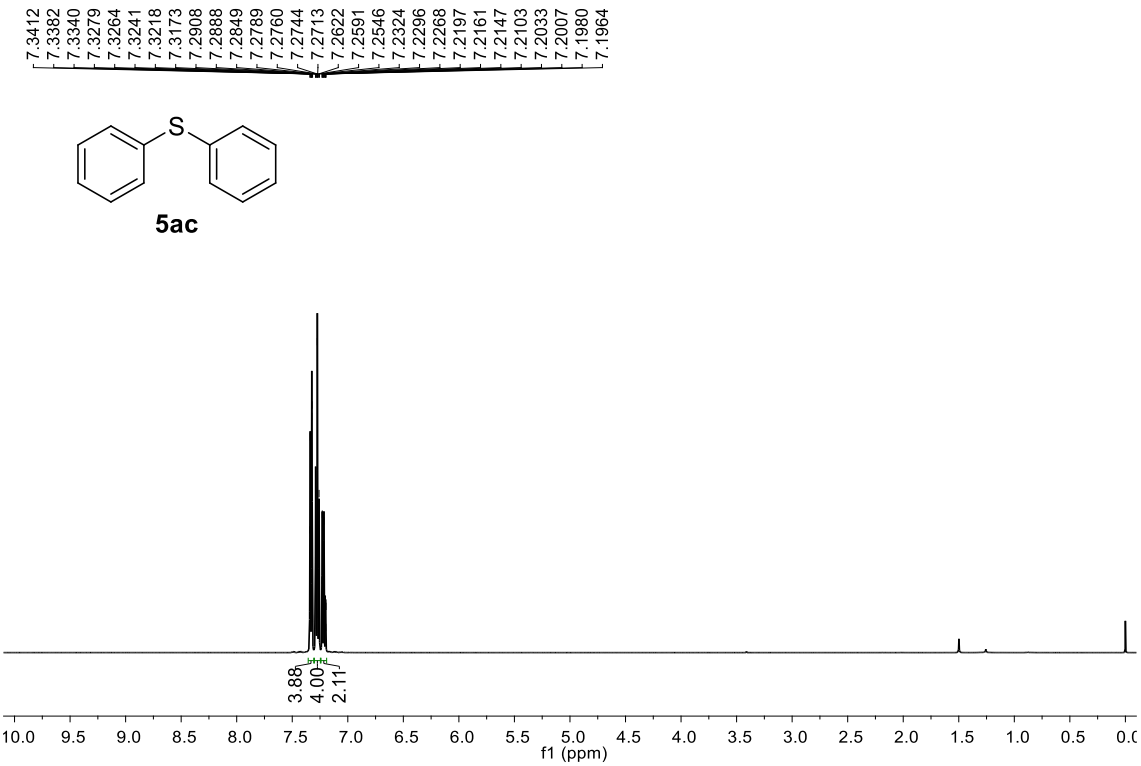

Figure S61 ^{1}H NMR (500 MHz) spectrum of **5ac** in $CDCl_3$

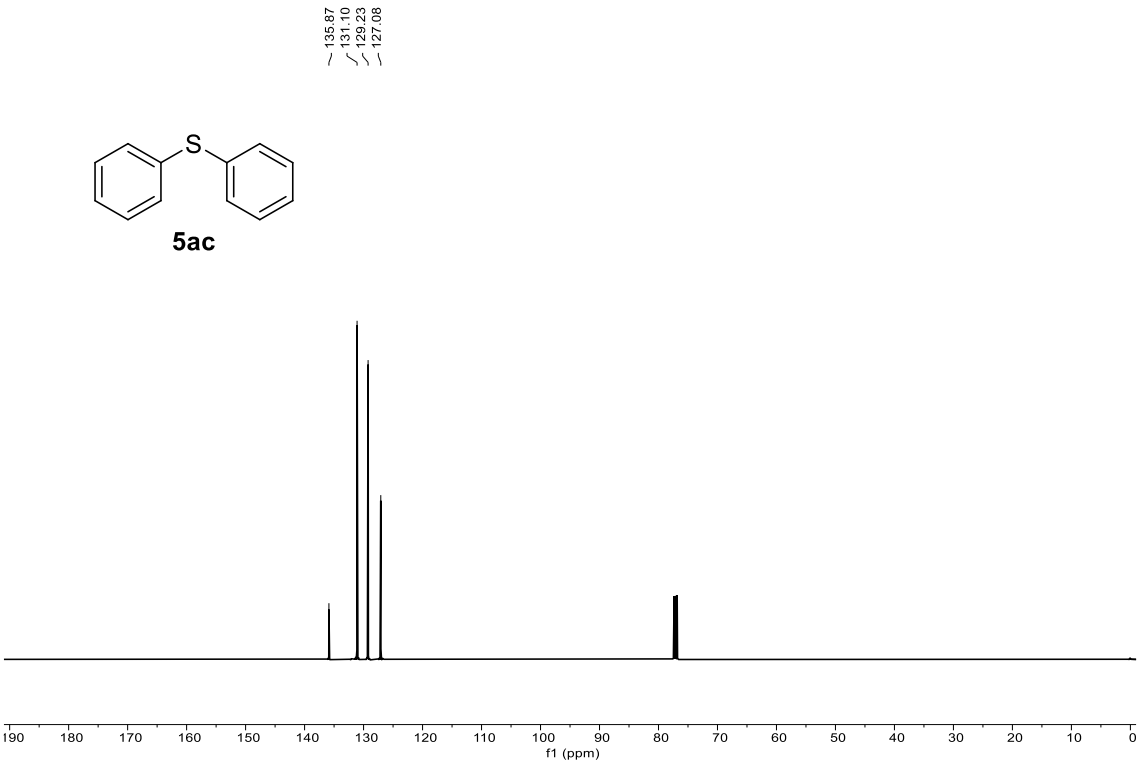

Figure S62 ^{13}C NMR (125 MHz) spectrum of **5ac** in $CDCl_3$

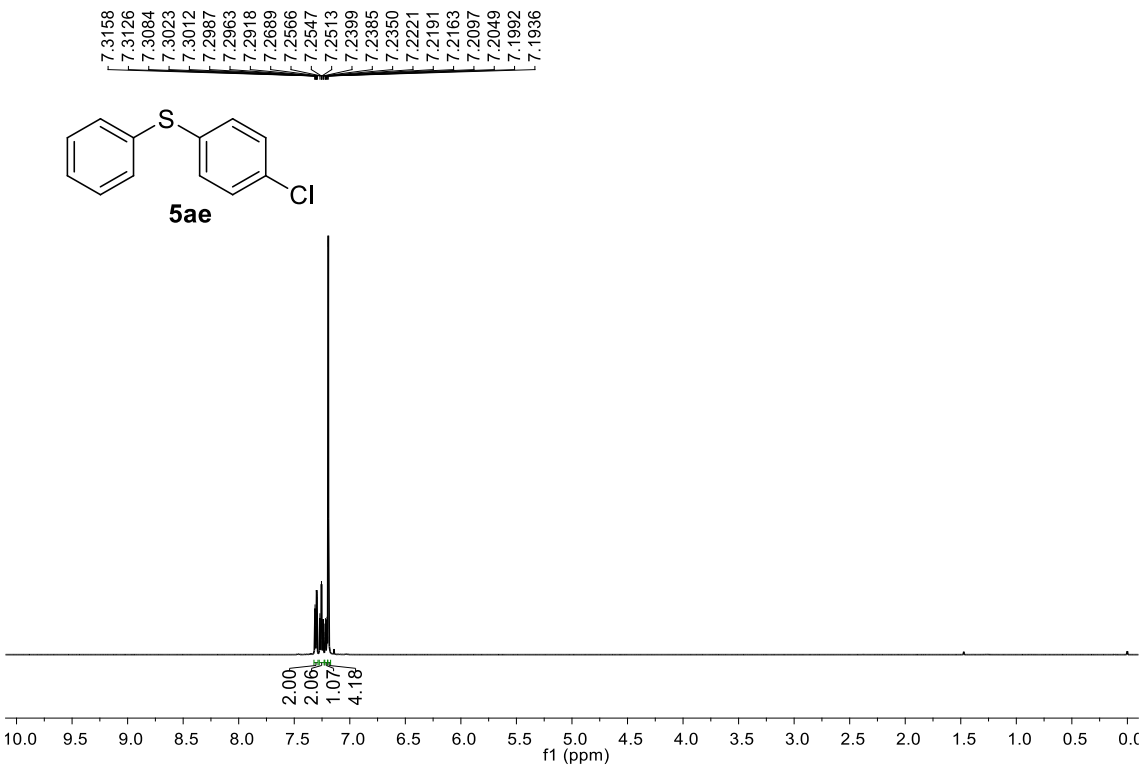

Figure S63 ^{1}H NMR (500 MHz) spectrum of **5ae** in $CDCl_3$

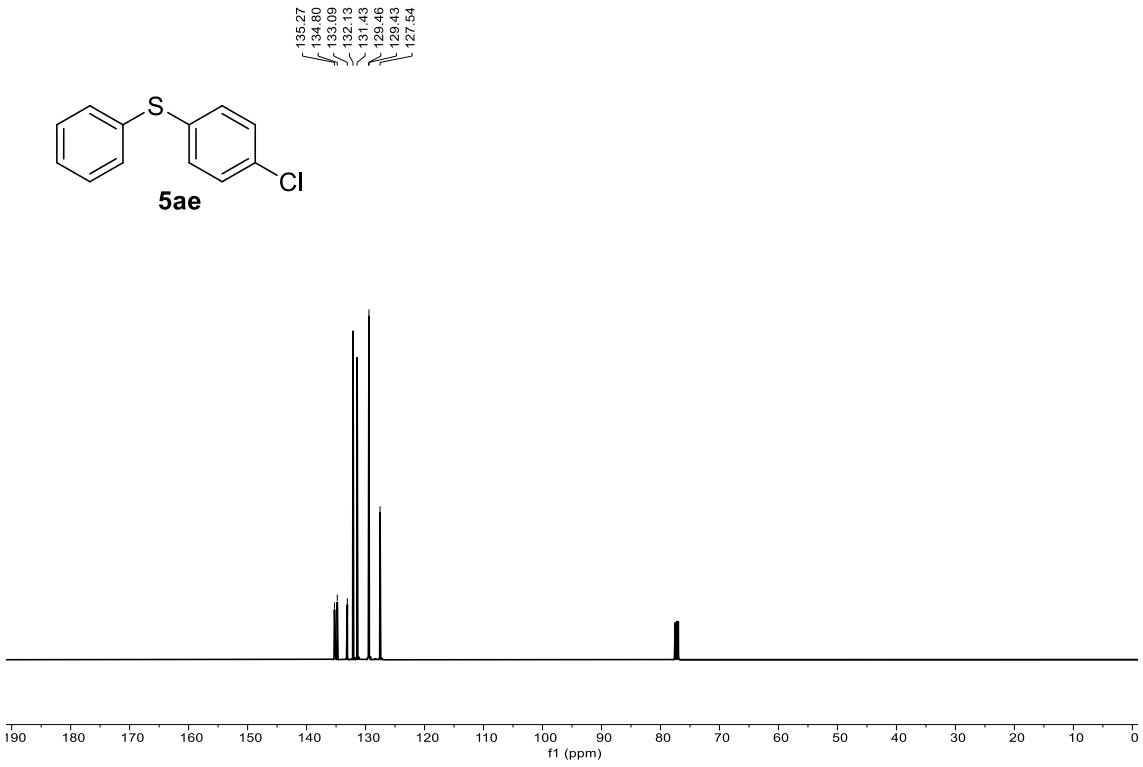

Figure S64 ^{13}C NMR (125 MHz) spectrum of **5ae** in $CDCl_3$

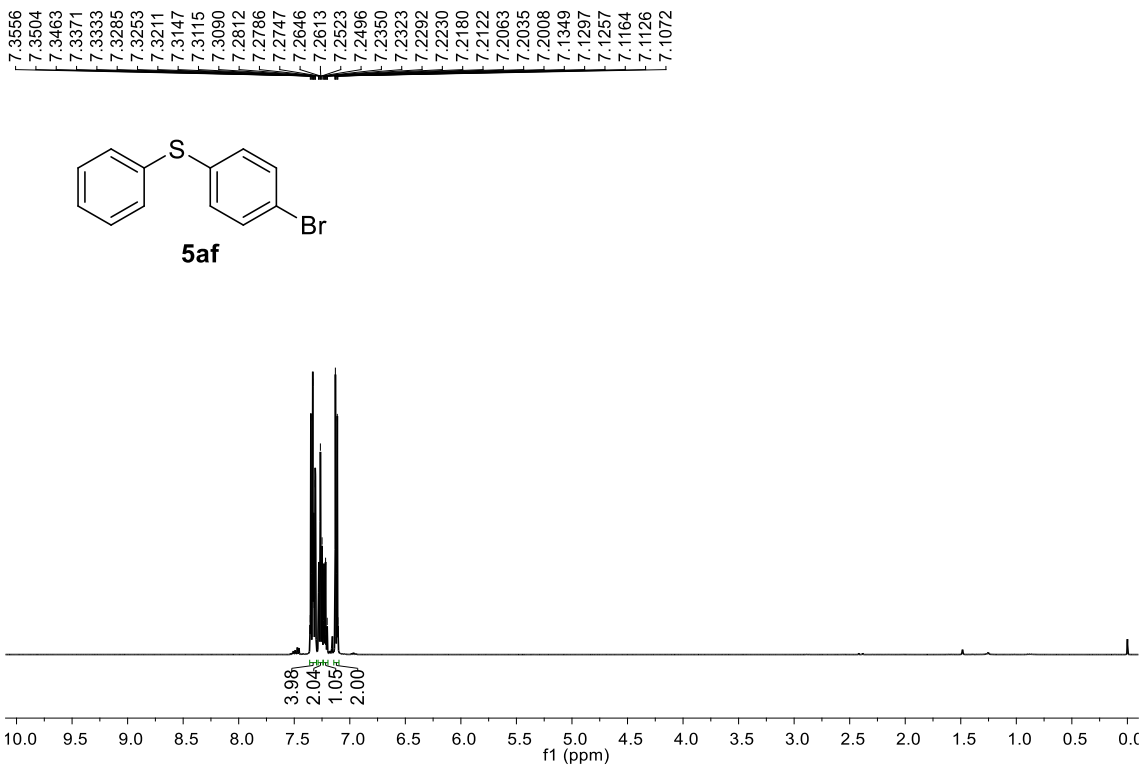

Figure S65 ^{1}H NMR (500 MHz) spectrum of **5af** in $CDCl_3$

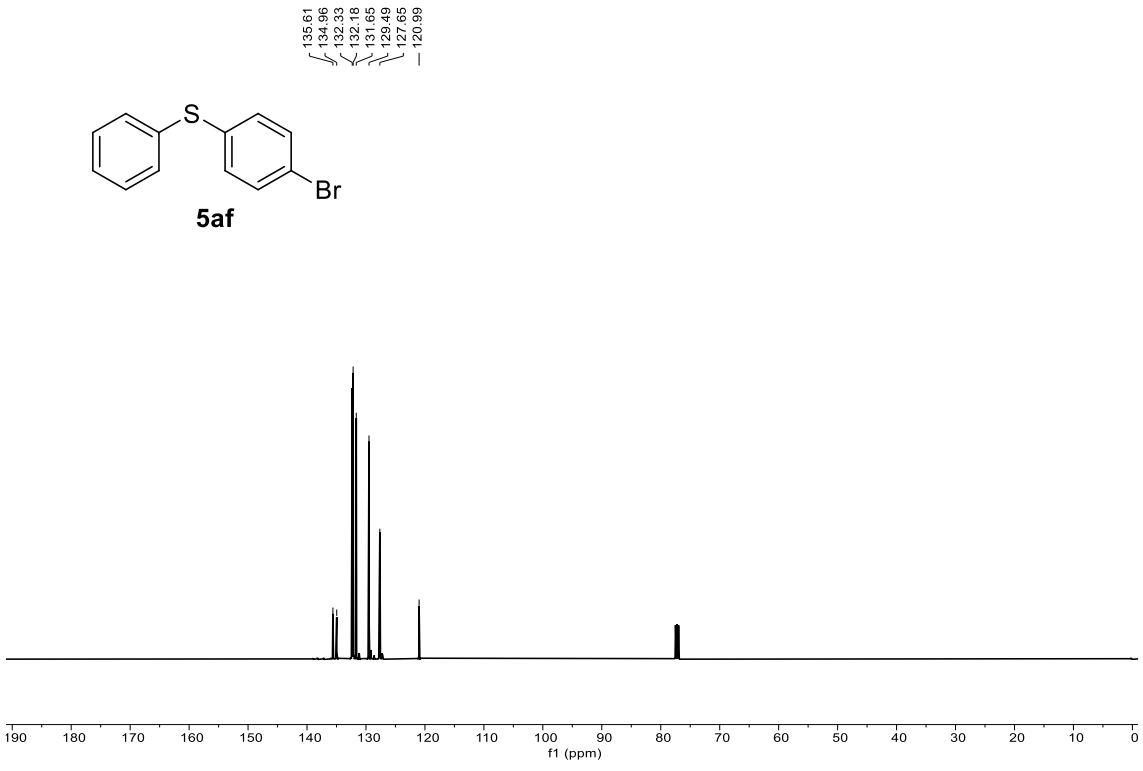

Figure S66 ^{13}C NMR (125 MHz) spectrum of **5af** in $CDCl_3$

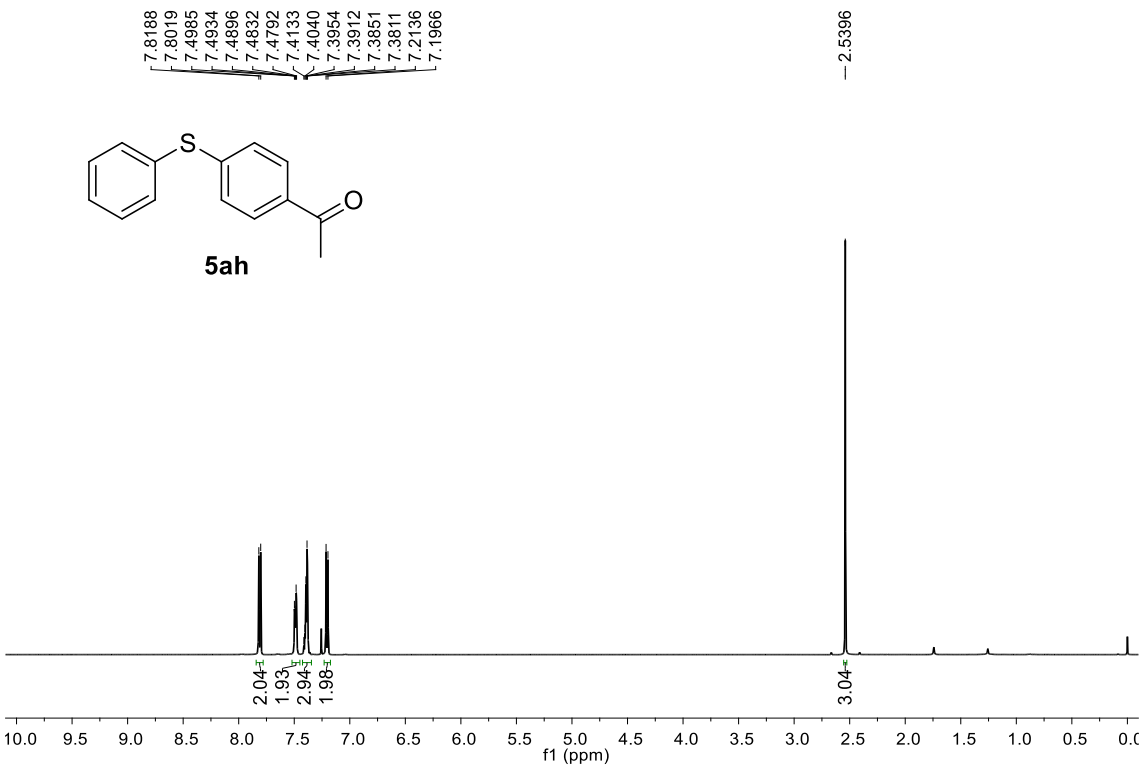

Figure S67 ^{1}H NMR (500 MHz) spectrum of **5ah** in $CDCl_3$

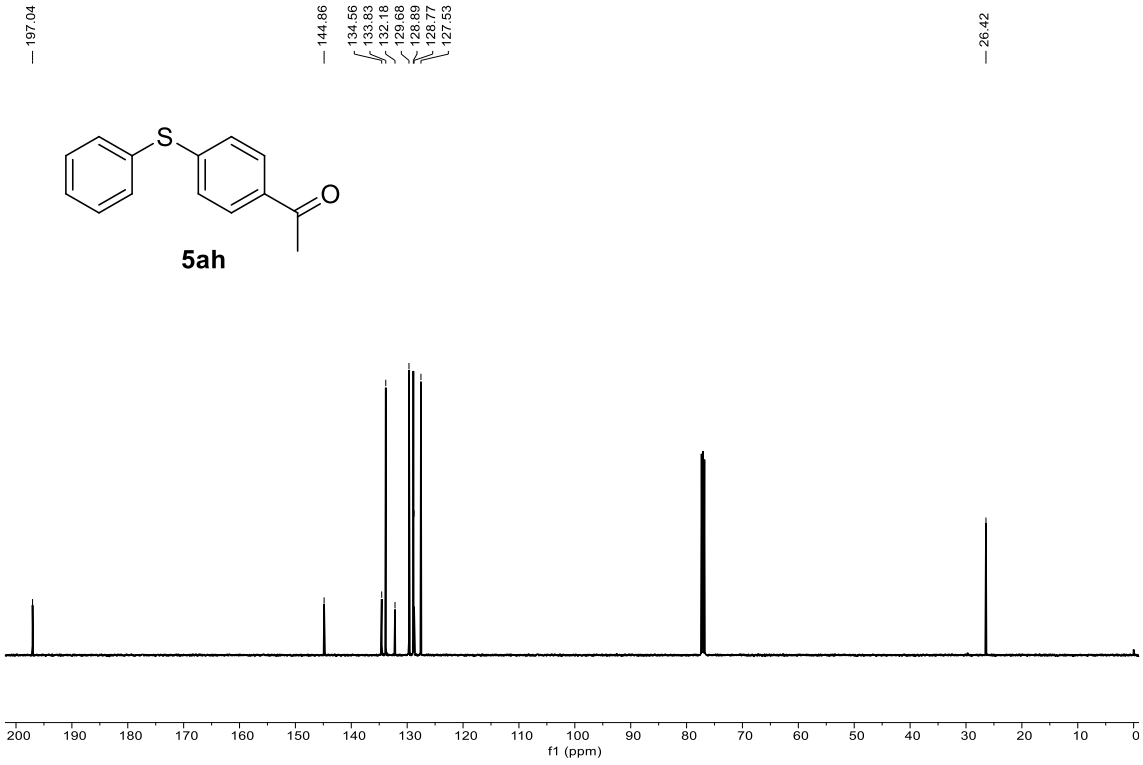

Figure S68 ^{13}C NMR (125 MHz) spectrum of **5ah** in $CDCl_3$

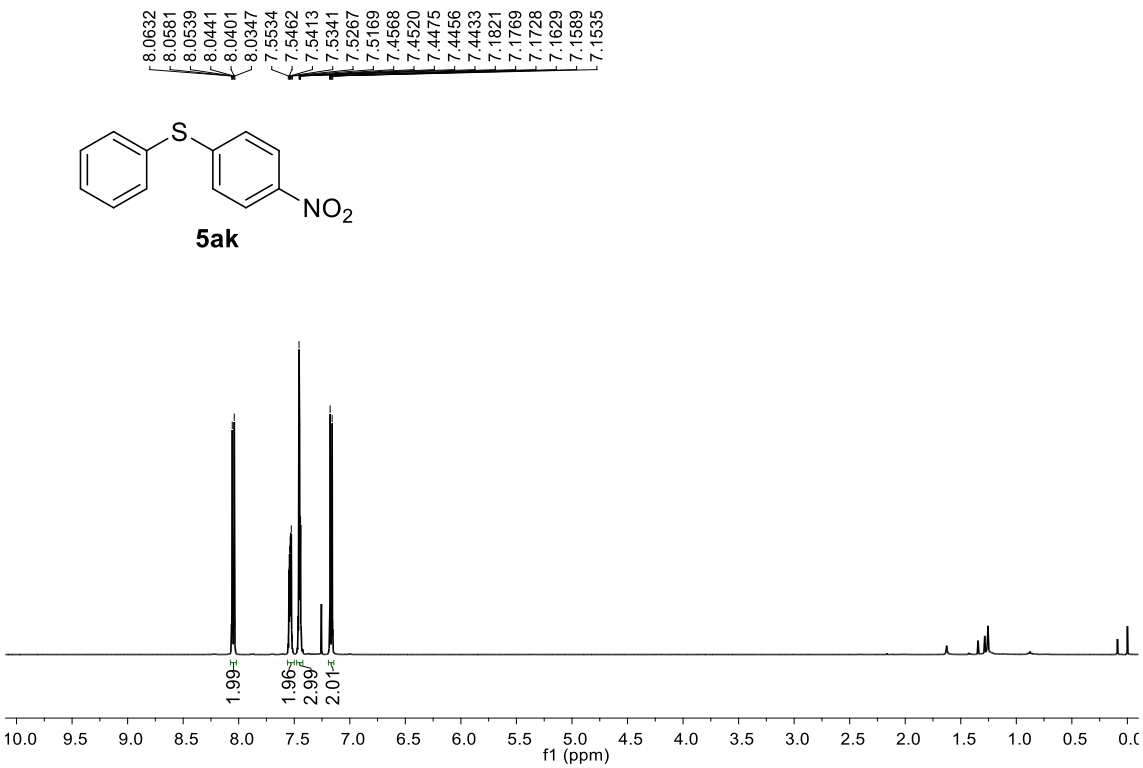

Figure S69 ^{1}H NMR (500 MHz) spectrum of **5ak** in $CDCl_3$

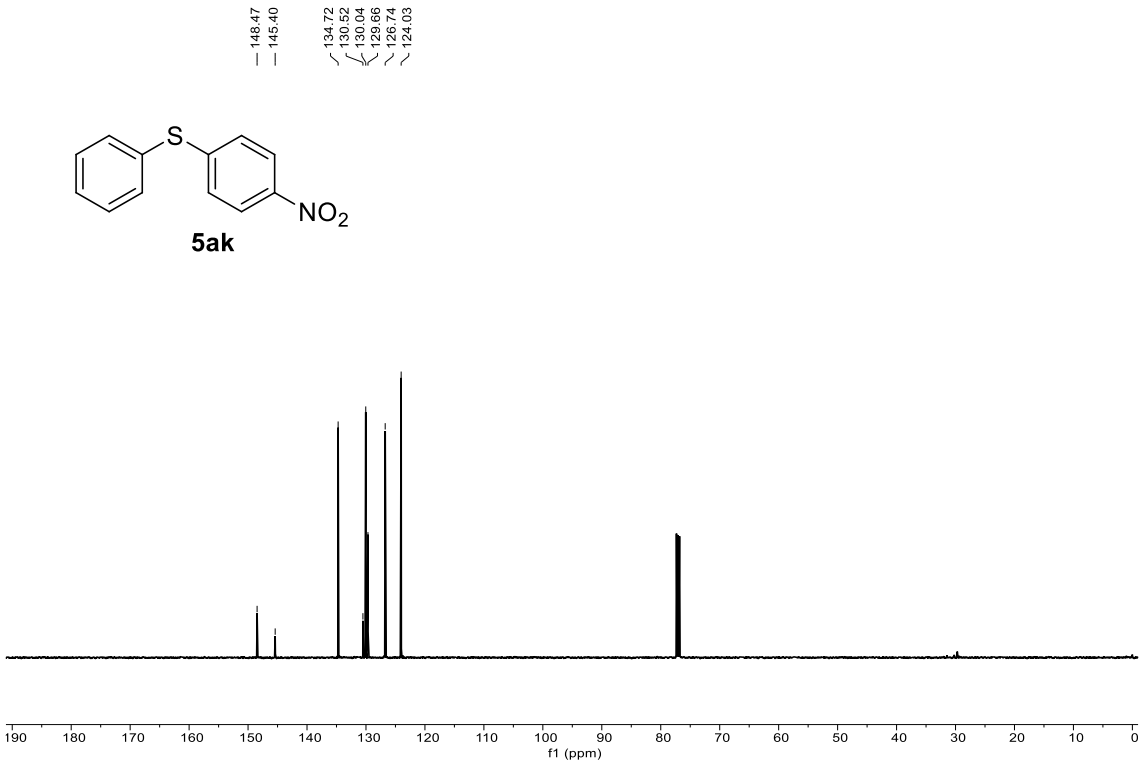

Figure S70 ^{13}C NMR (125 MHz) spectrum of **5ak** in $CDCl_3$

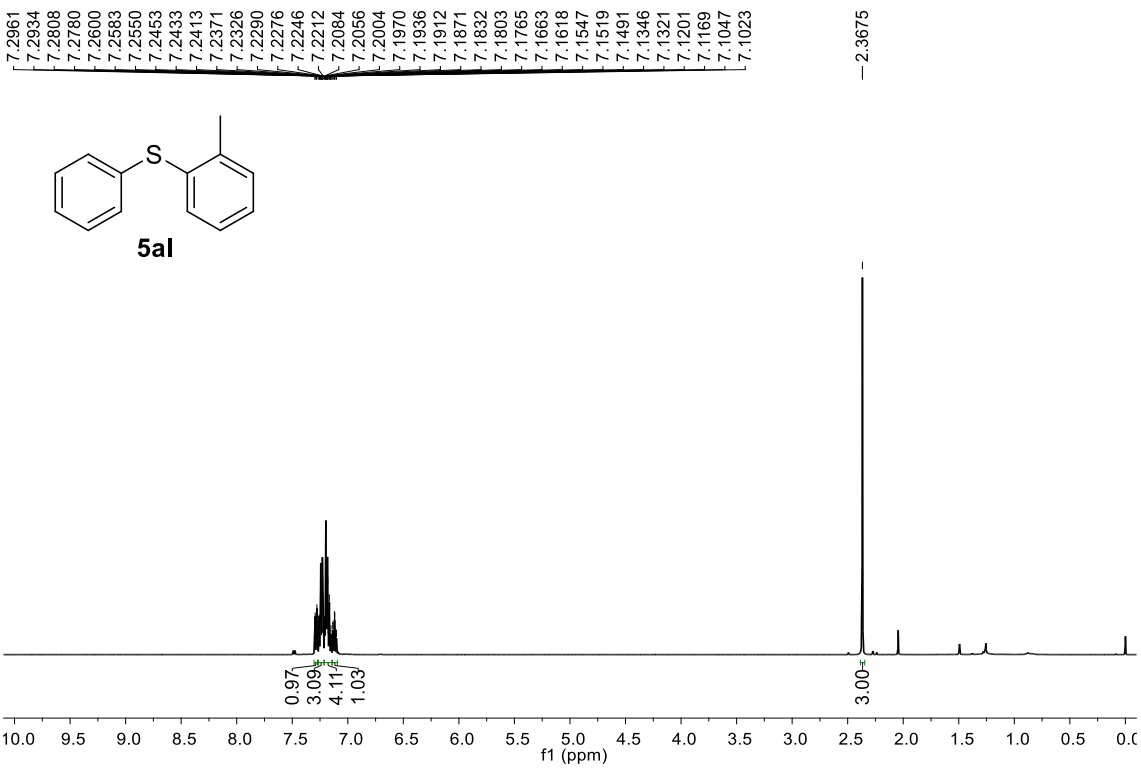

Figure S71 ^{1}H NMR (500 MHz) spectrum of **5al** in $CDCl_3$

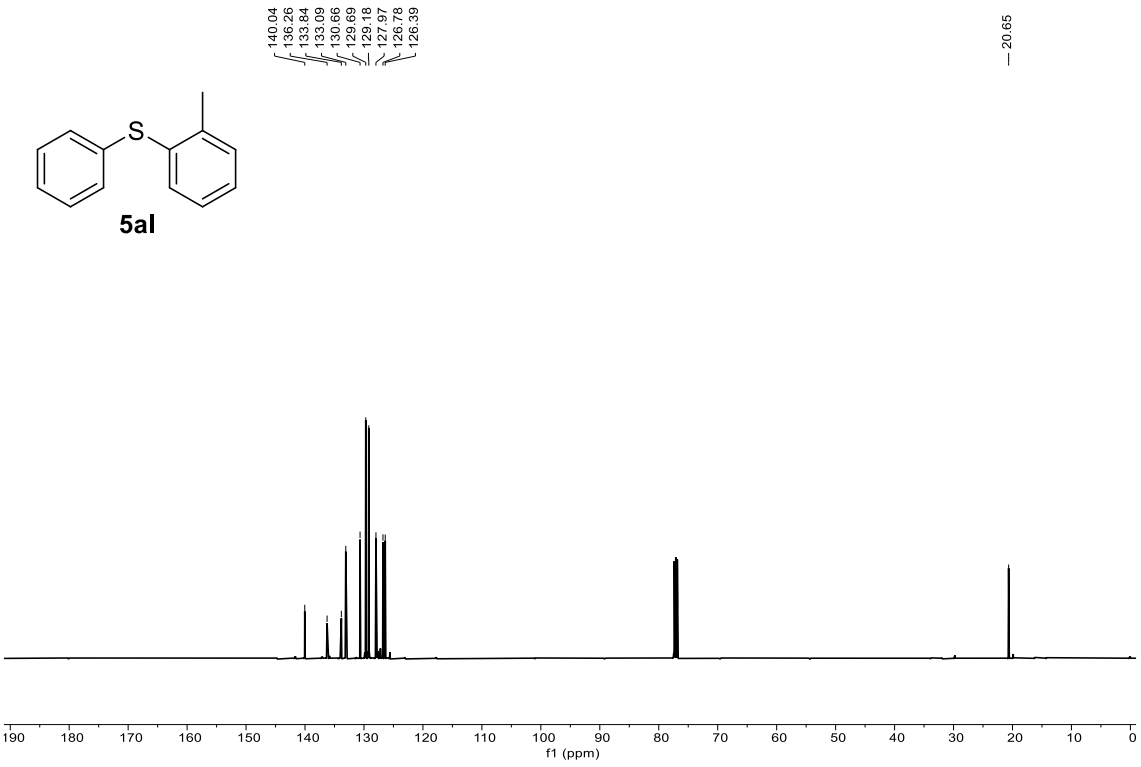

Figure S72 ^{13}C NMR (125 MHz) spectrum of **5al** in $CDCl_3$

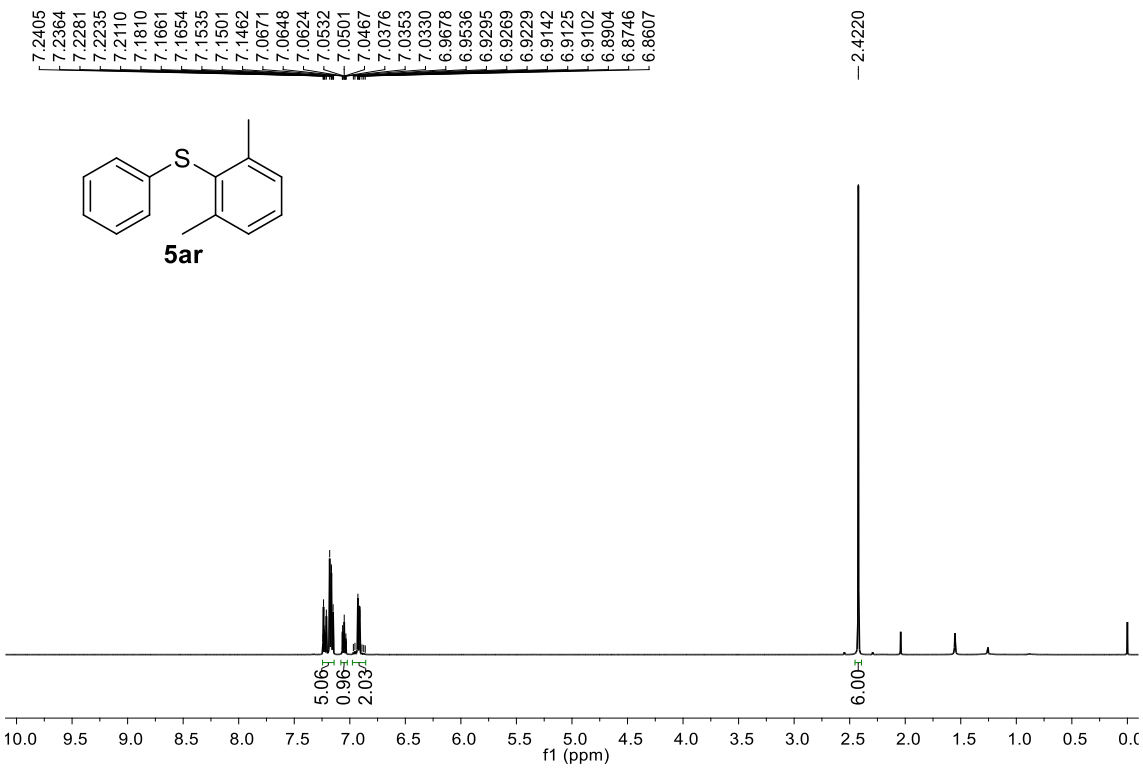

Figure S73 ^{1}H NMR (500 MHz) spectrum of **5ar** in $CDCl_3$

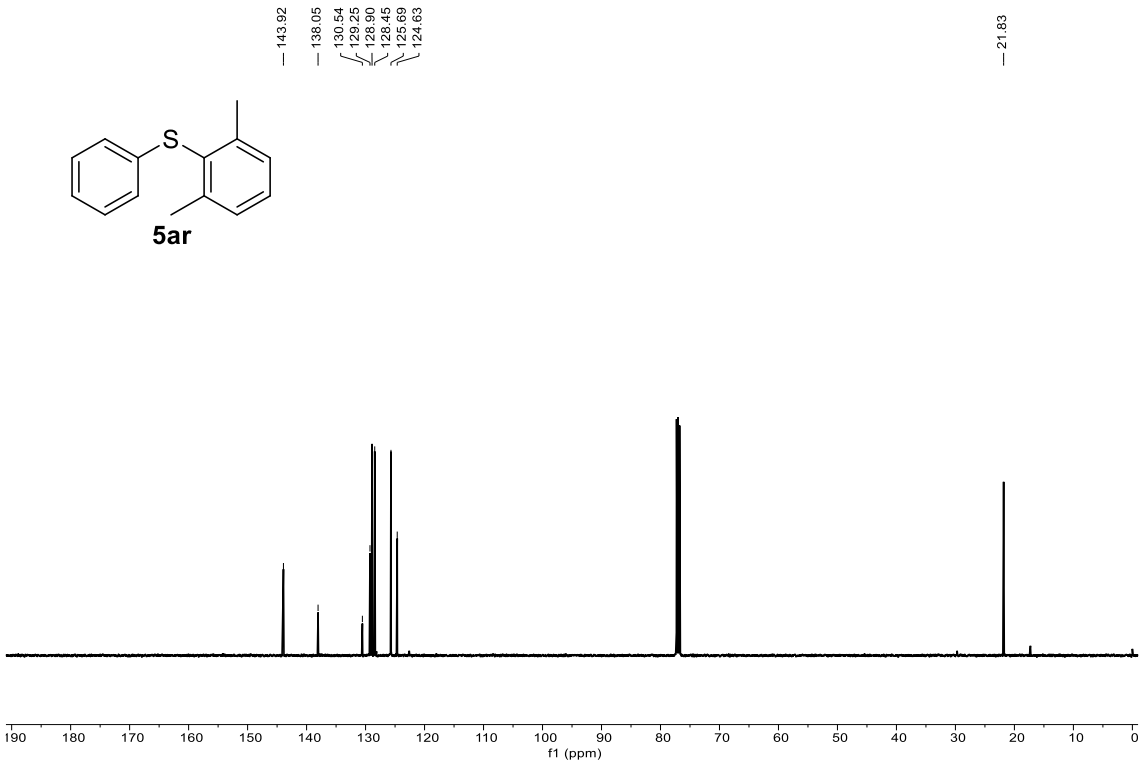

Figure S74 ^{13}C NMR (125 MHz) spectrum of **5ar** in $CDCl_3$

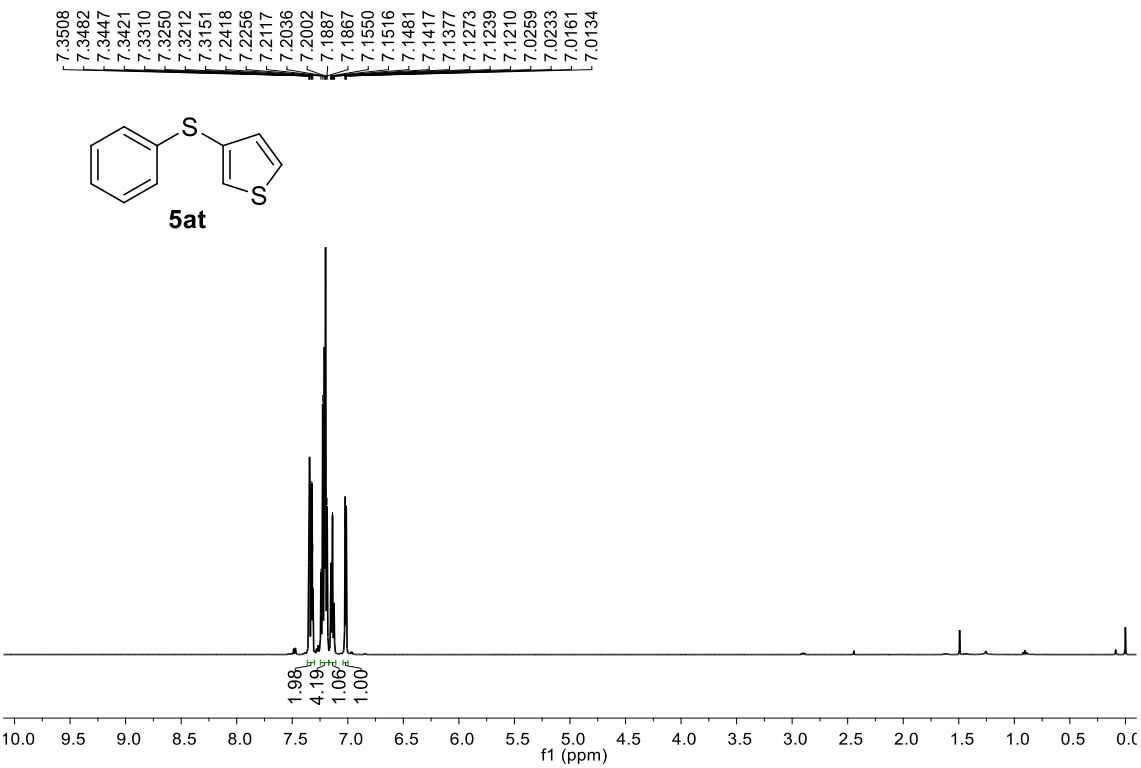

Figure S75 ^{1}H NMR (500 MHz) spectrum of **5at** in $CDCl_3$

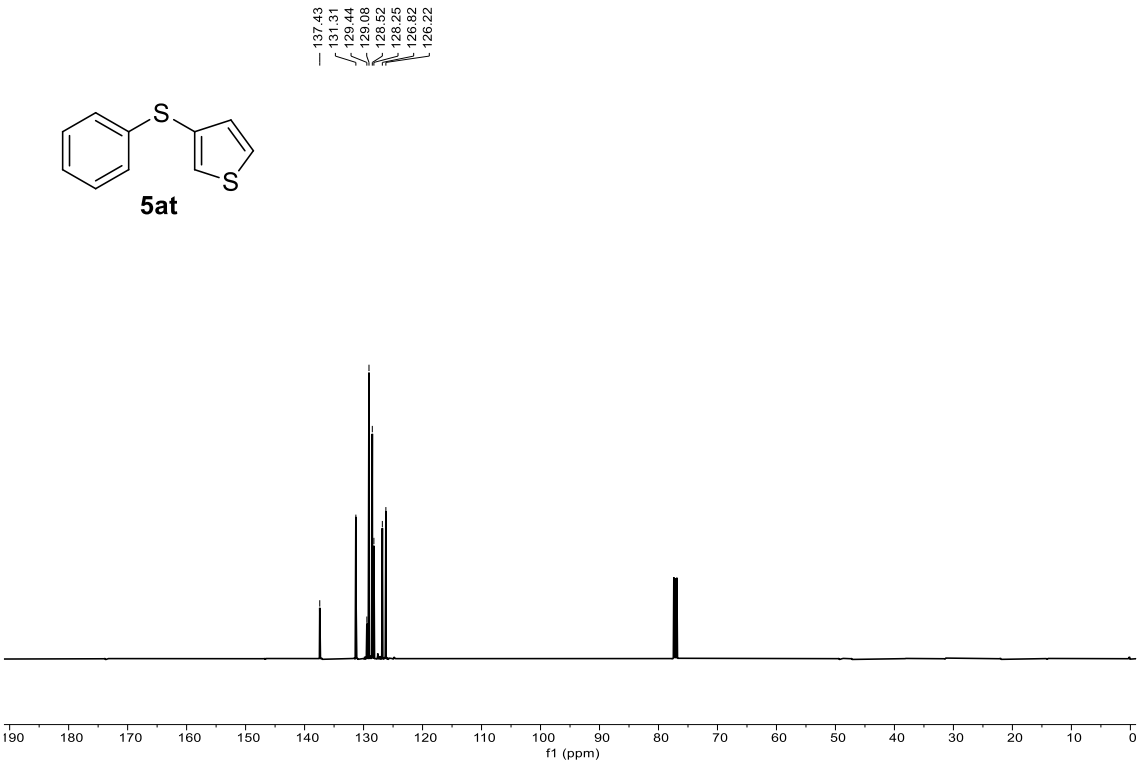

Figure S76 ^{13}C NMR (125 MHz) spectrum of **5at** in $CDCl_3$

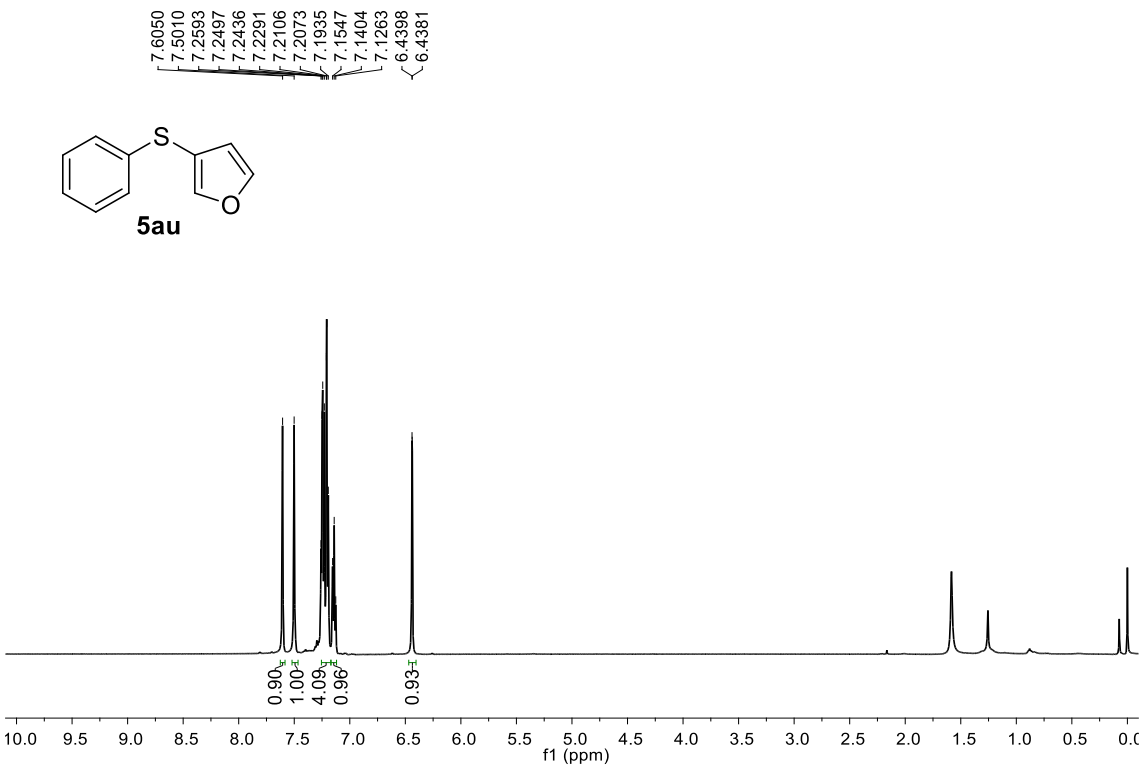

Figure S77 ^{1}H NMR (500 MHz) spectrum of **5au** in $CDCl_3$

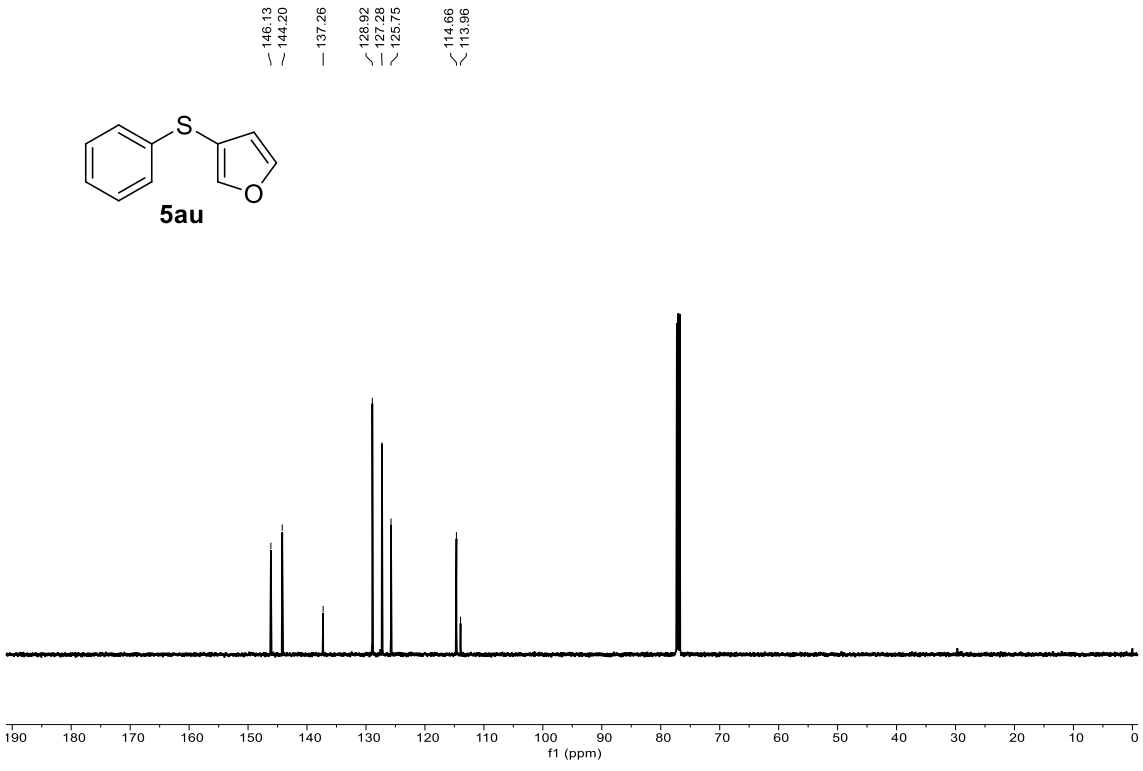

Figure S78 ^{13}C NMR (125 MHz) spectrum of **5au** in $CDCl_3$

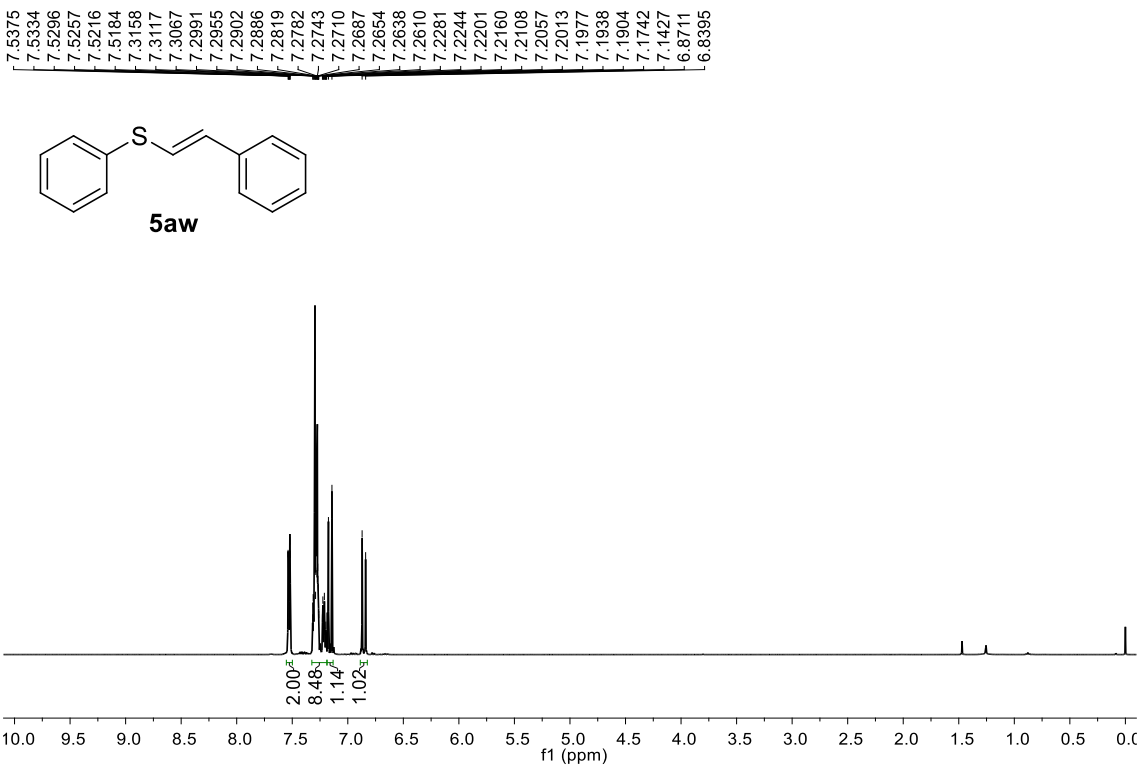

Figure S79 ^{1}H NMR (500 MHz) spectrum of **5aw** in $CDCl_3$

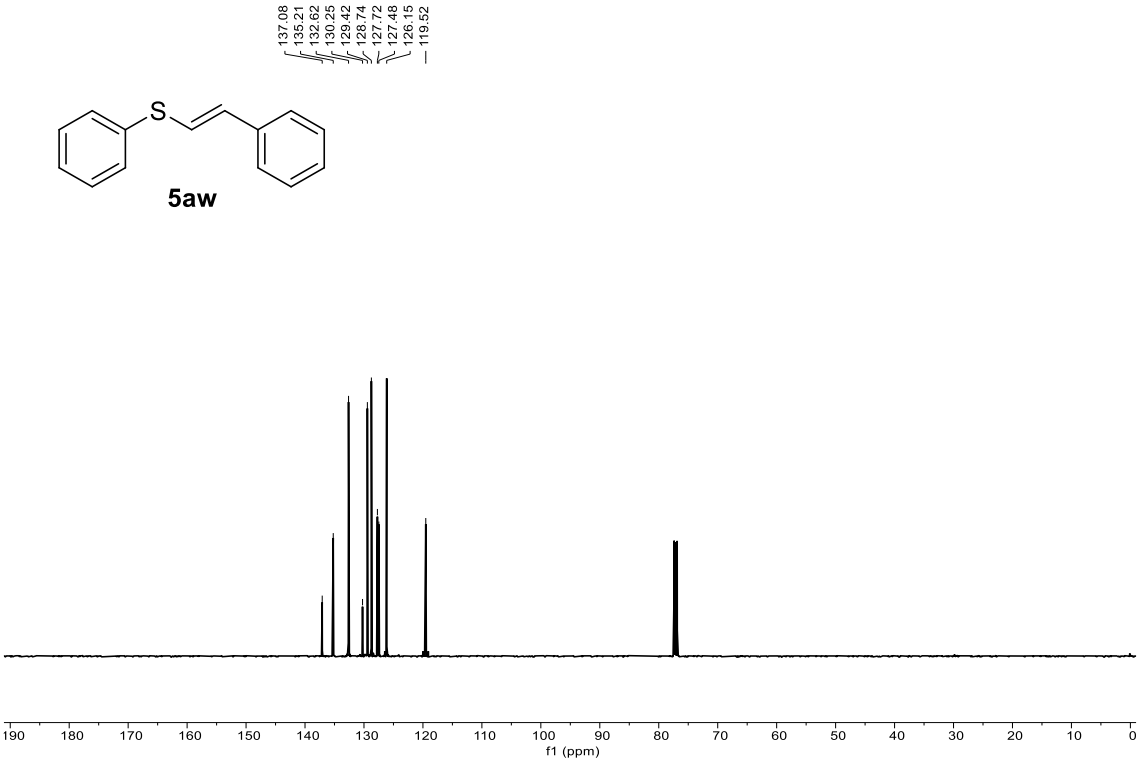

Figure S80 ^{13}C NMR (125 MHz) spectrum of **5aw** in $CDCl_3$

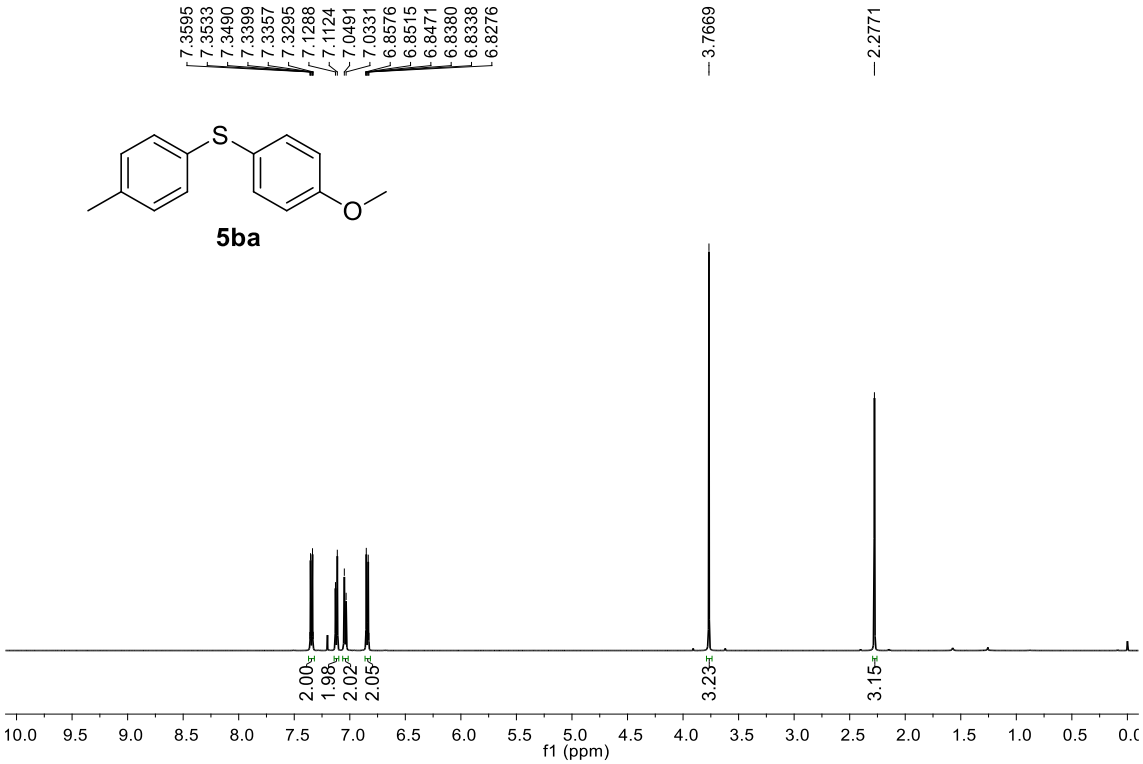

Figure S81 ^{1}H NMR (500 MHz) spectrum of **5ba** in $CDCl_3$

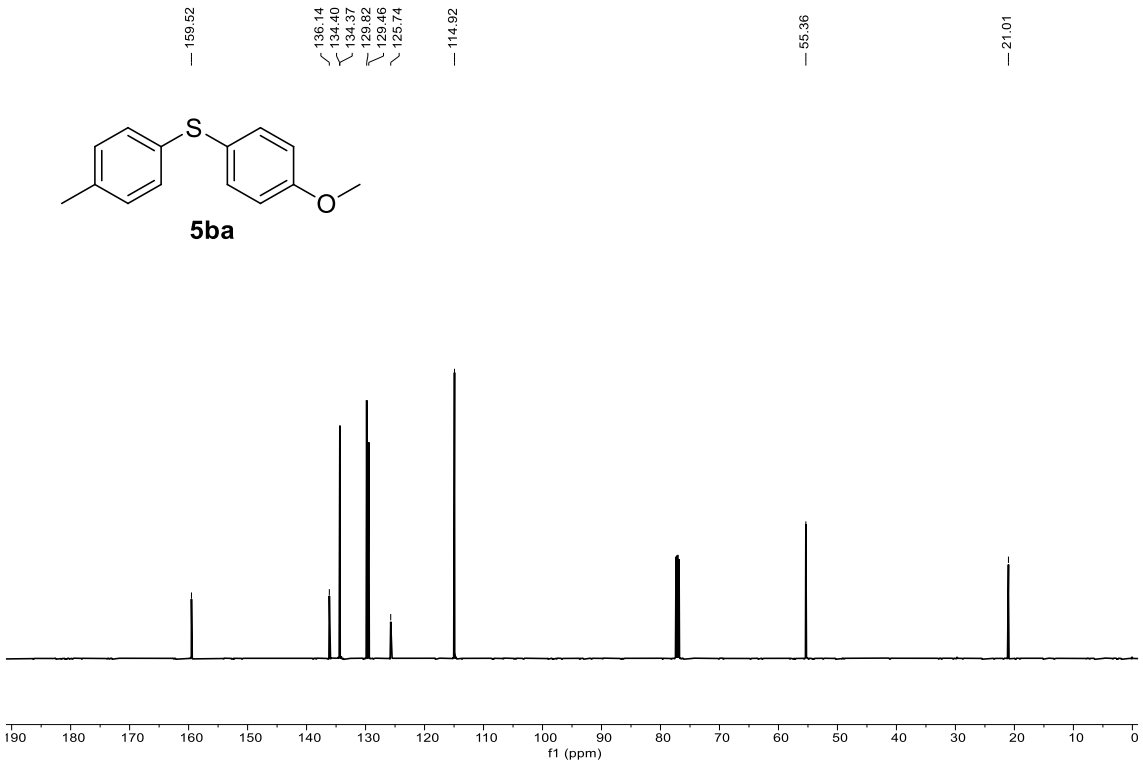

Figure S82 ^{13}C NMR (125 MHz) spectrum of **5ba** in $CDCl_3$

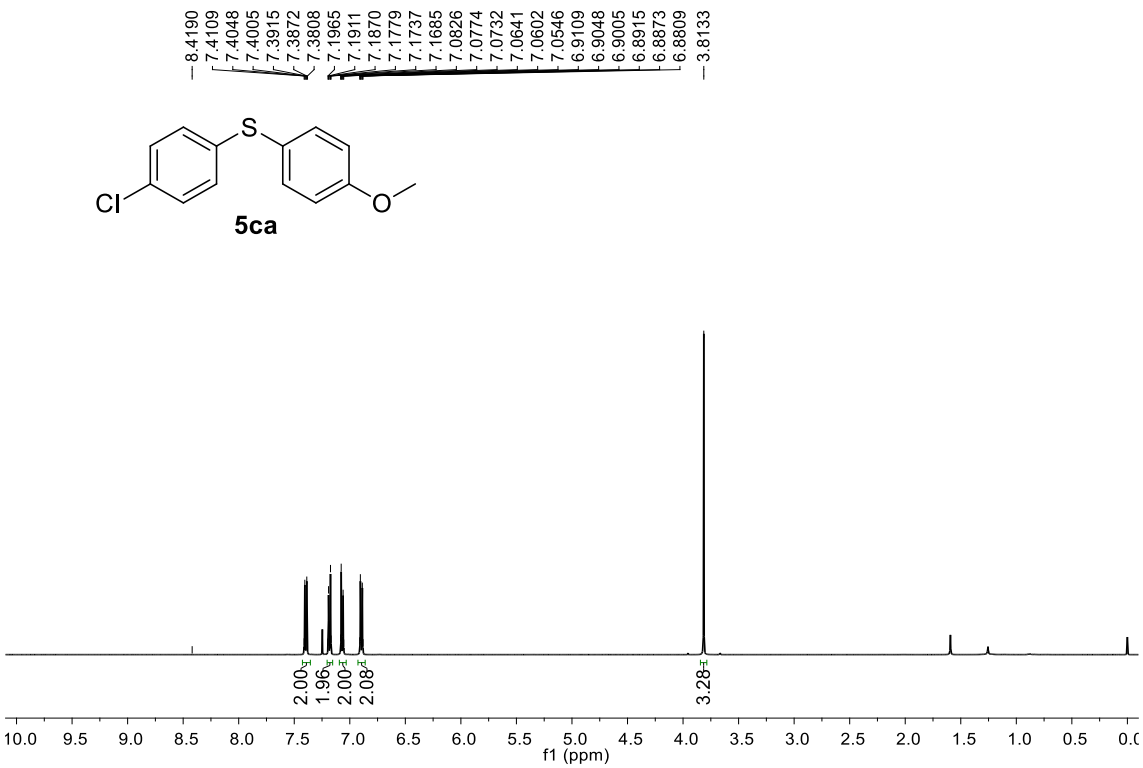

Figure S83 ^{1}H NMR (500 MHz) spectrum of **5ca** in $CDCl_3$

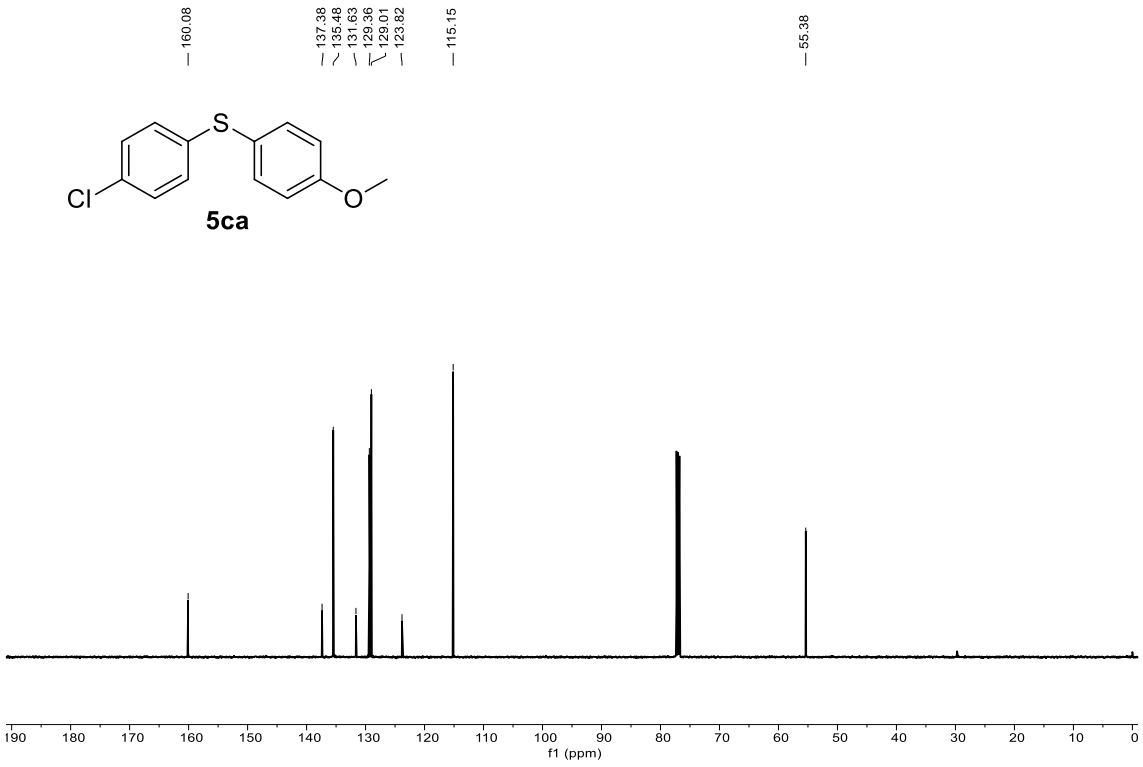

Figure S84 ^{13}C NMR (125 MHz) spectrum of **5ca** in $CDCl_3$

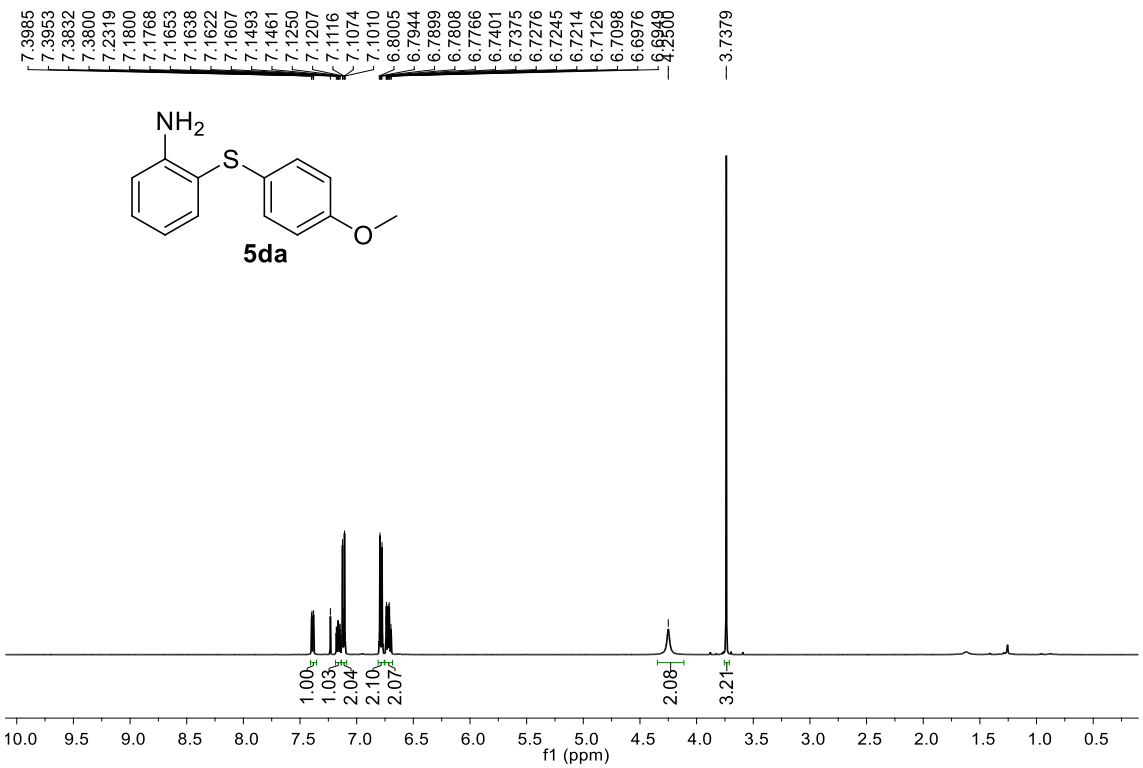

Figure S85 ^{1}H NMR (500 MHz) spectrum of **5da** in $CDCl_3$

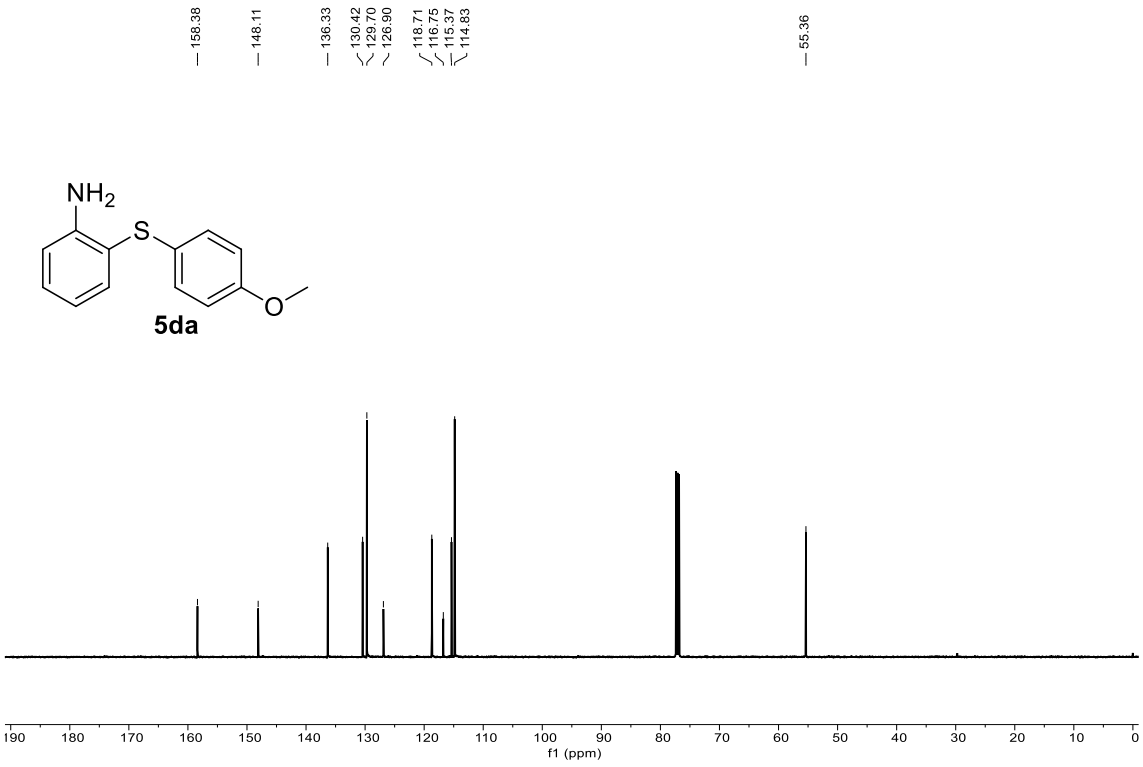

Figure S86 ^{13}C NMR (125 MHz) spectrum of **5da** in $CDCl_3$

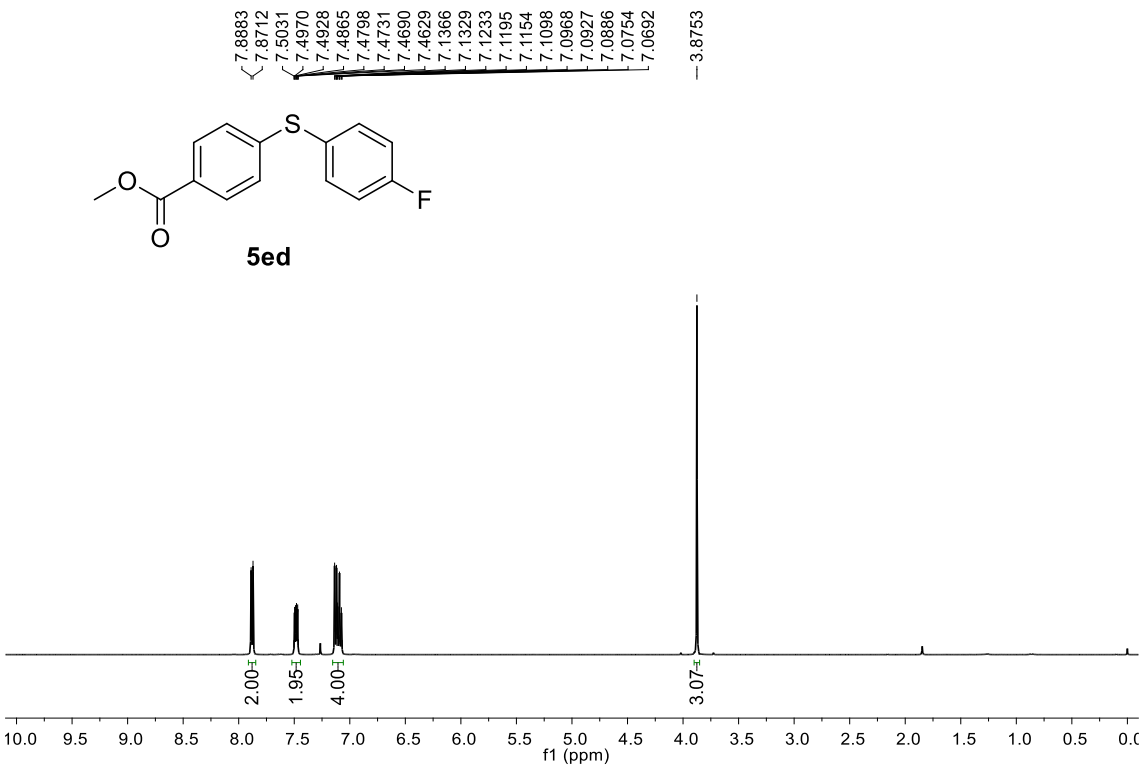

Figure S87 ^{1}H NMR (500 MHz) spectrum of **5ed** in $CDCl_3$

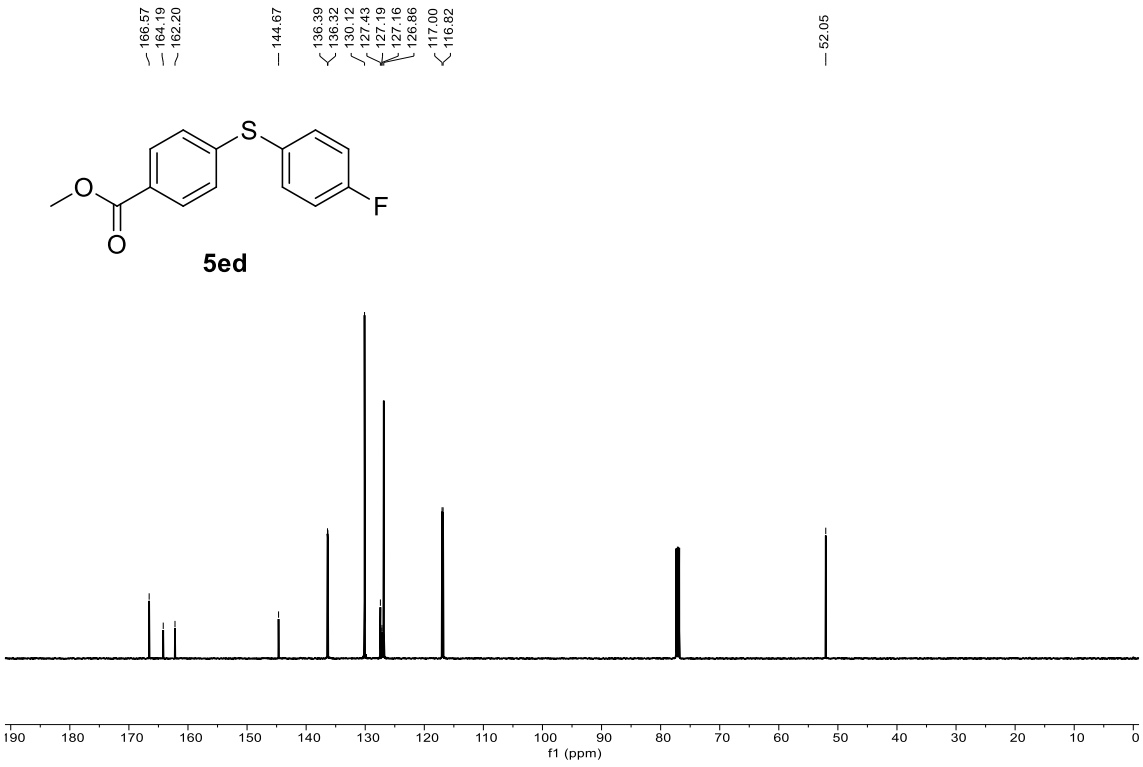

Figure S88 ^{13}C NMR (125 MHz) spectrum of **5ed** in $CDCl_3$

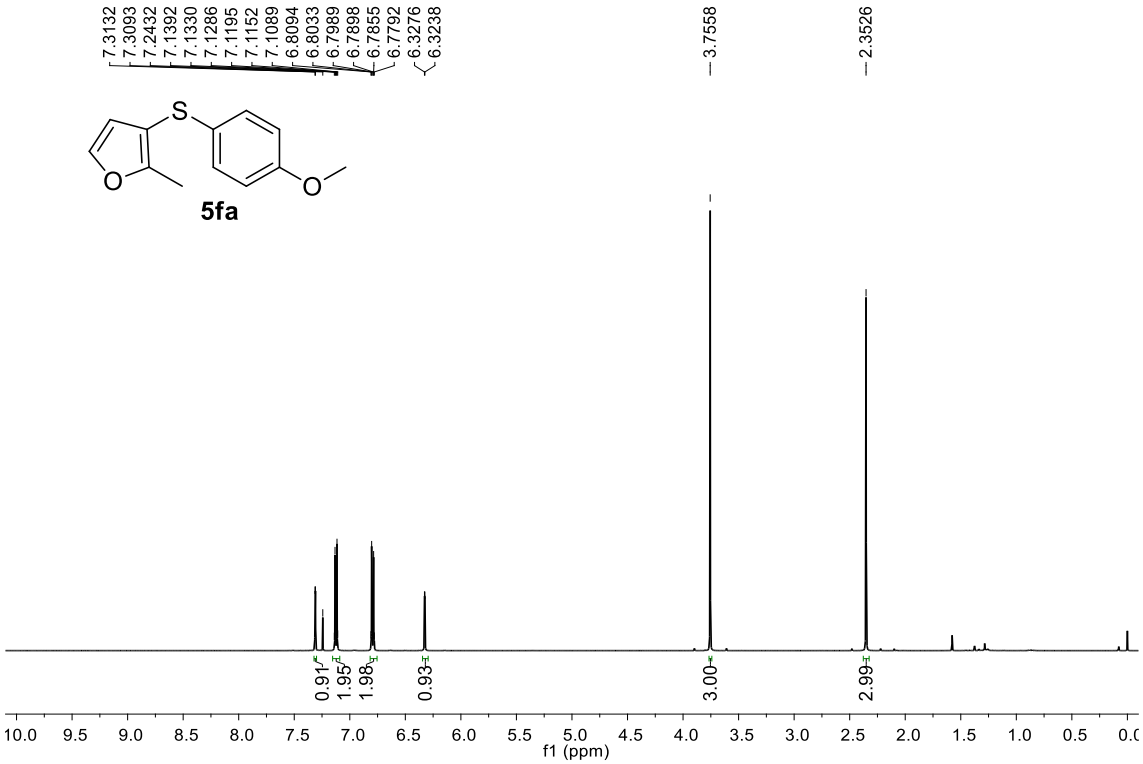

Figure S89 ^{1}H NMR (500 MHz) spectrum of **5fa** in $CDCl_3$

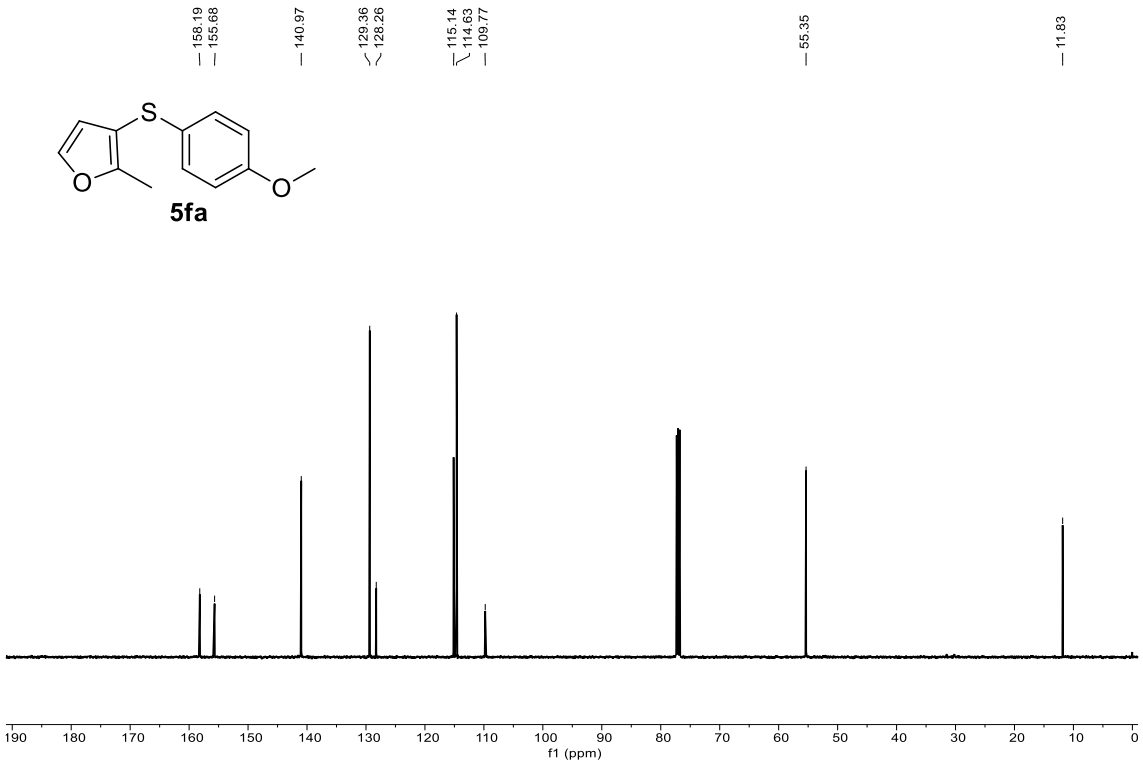

Figure S90 ^{13}C NMR (125 MHz) spectrum of **5fa** in $CDCl_3$

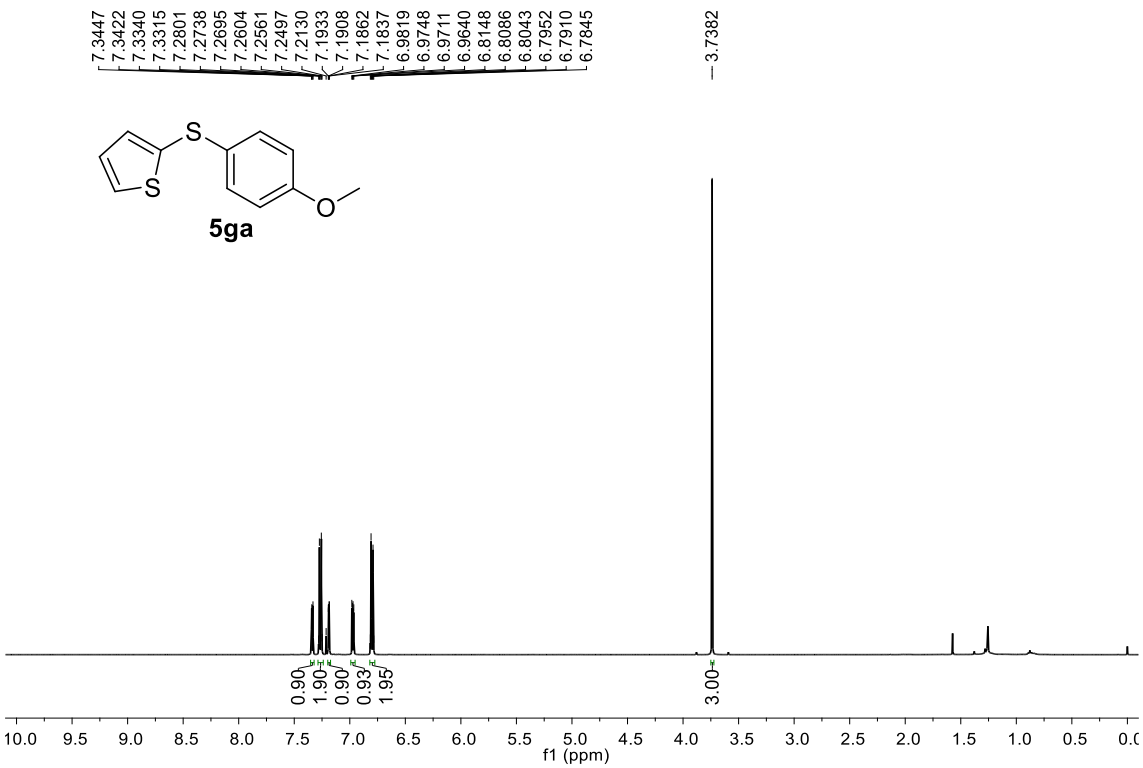

Figure S91 ^{1}H NMR (500 MHz) spectrum of **5ga** in $CDCl_3$

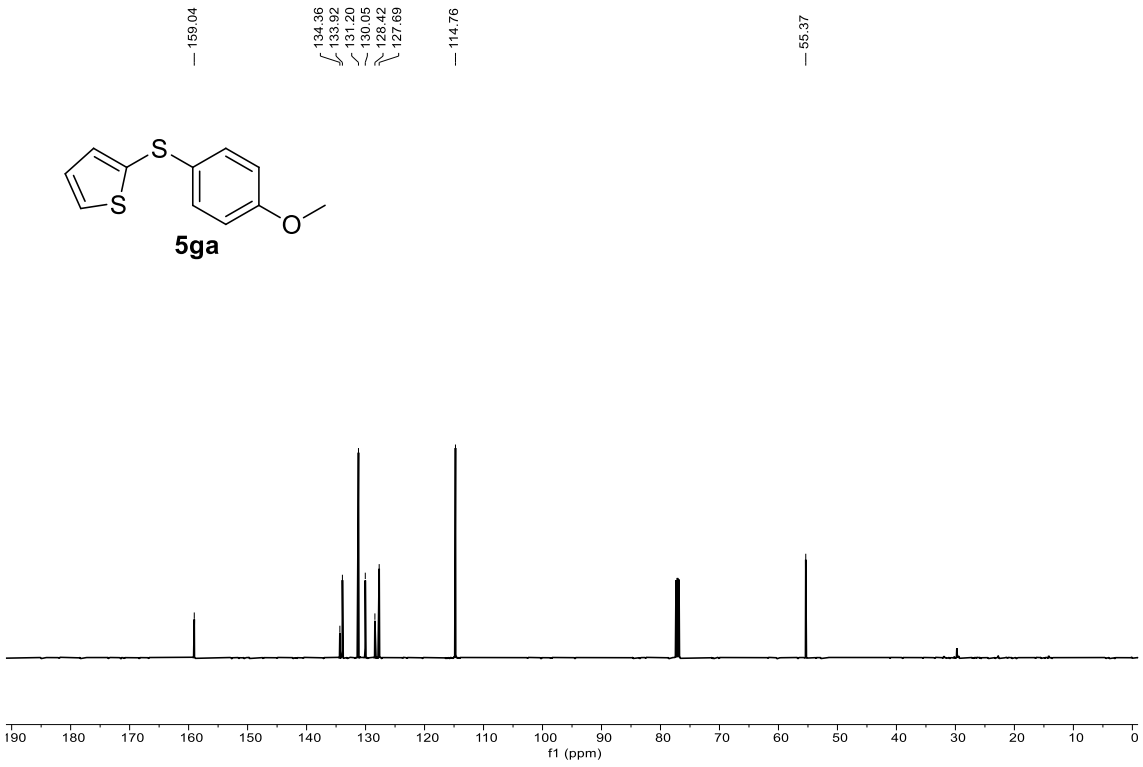

Figure S92 ^{13}C NMR (125 MHz) spectrum of **5ga** in $CDCl_3$

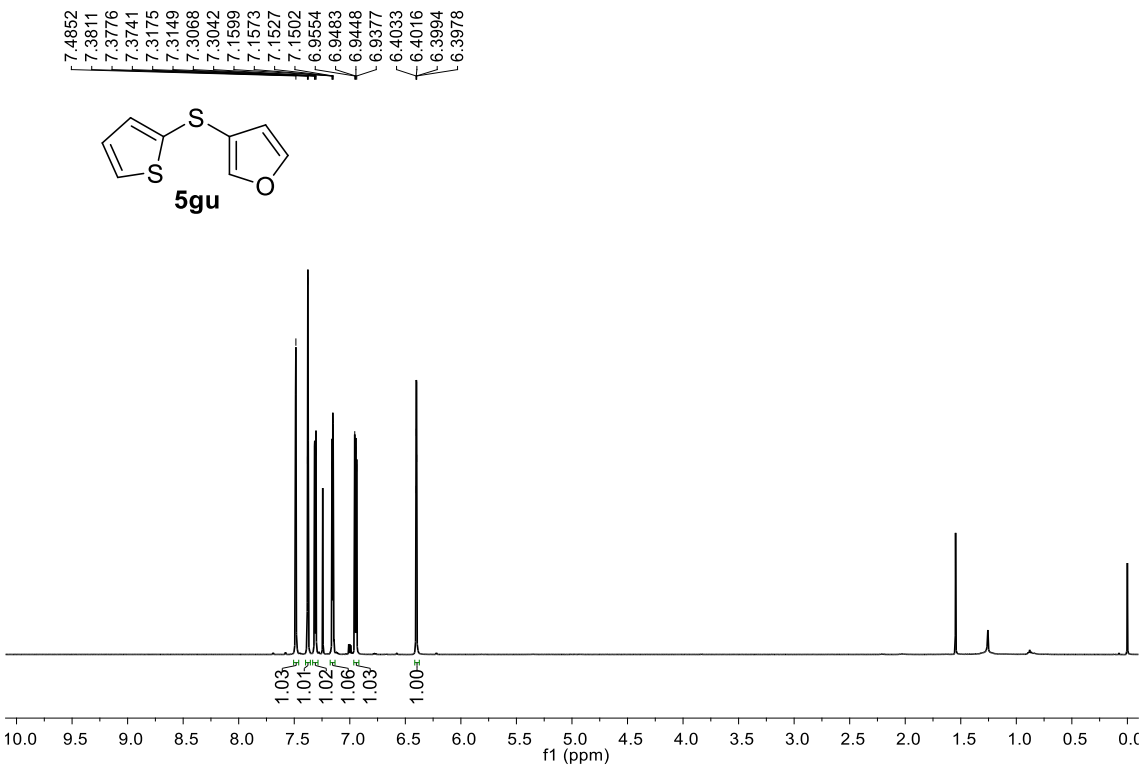

Figure S93 ^{1}H NMR (500 MHz) spectrum of **5gu** in $CDCl_3$

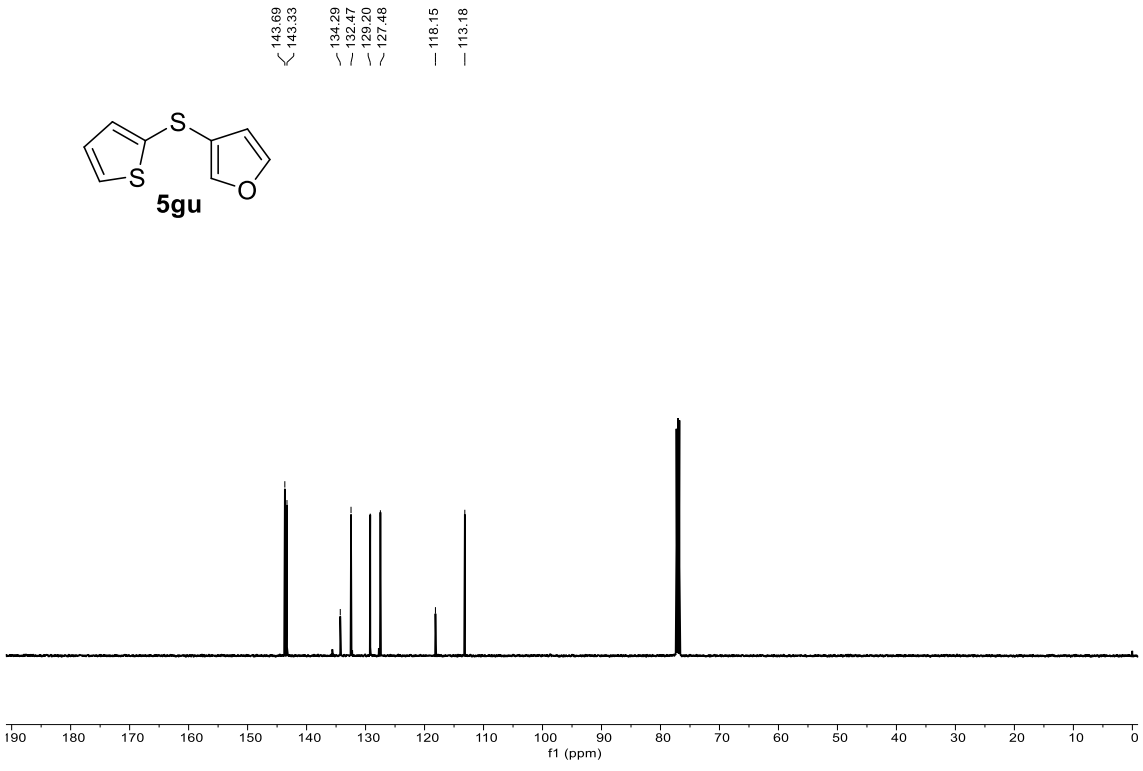

Figure S94 ^{13}C NMR (125 MHz) spectrum of **5gu** in $CDCl_3$

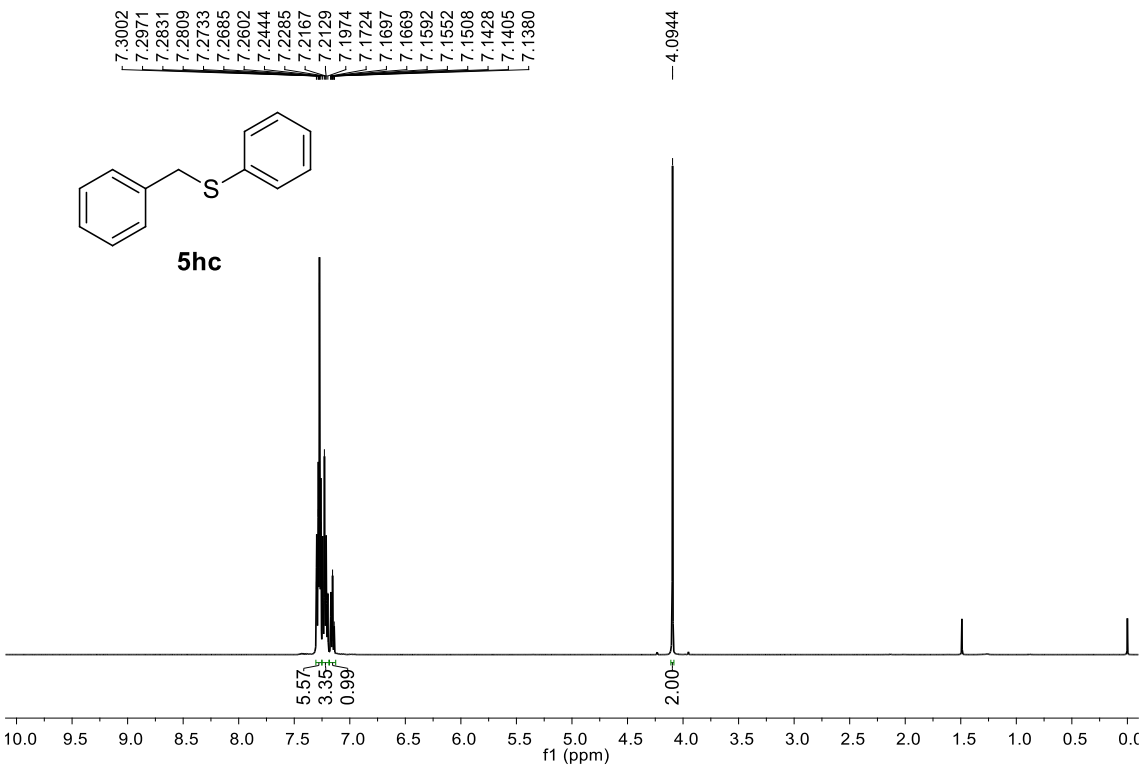

Figure S95 ^{1}H NMR (500 MHz) spectrum of **5hc** in $CDCl_3$

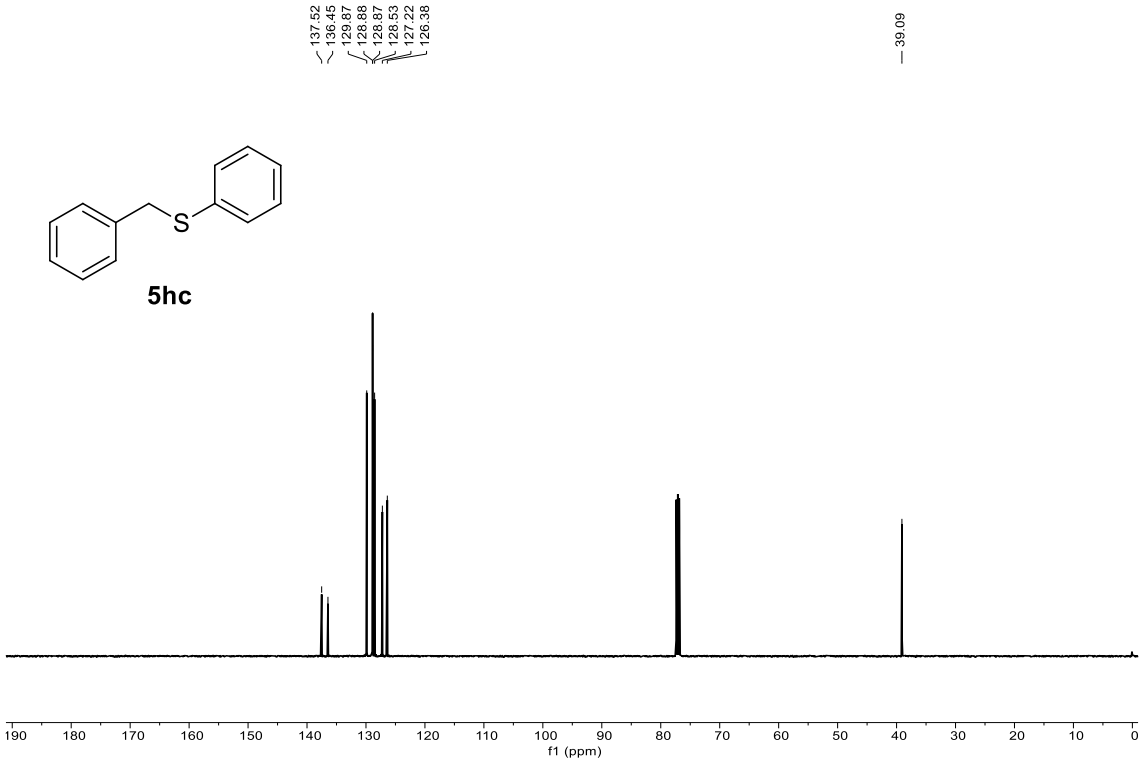

Figure S96 ^{13}C NMR (125 MHz) spectrum of **5hc** in $CDCl_3$

4. ^{77}Se NMR spectra

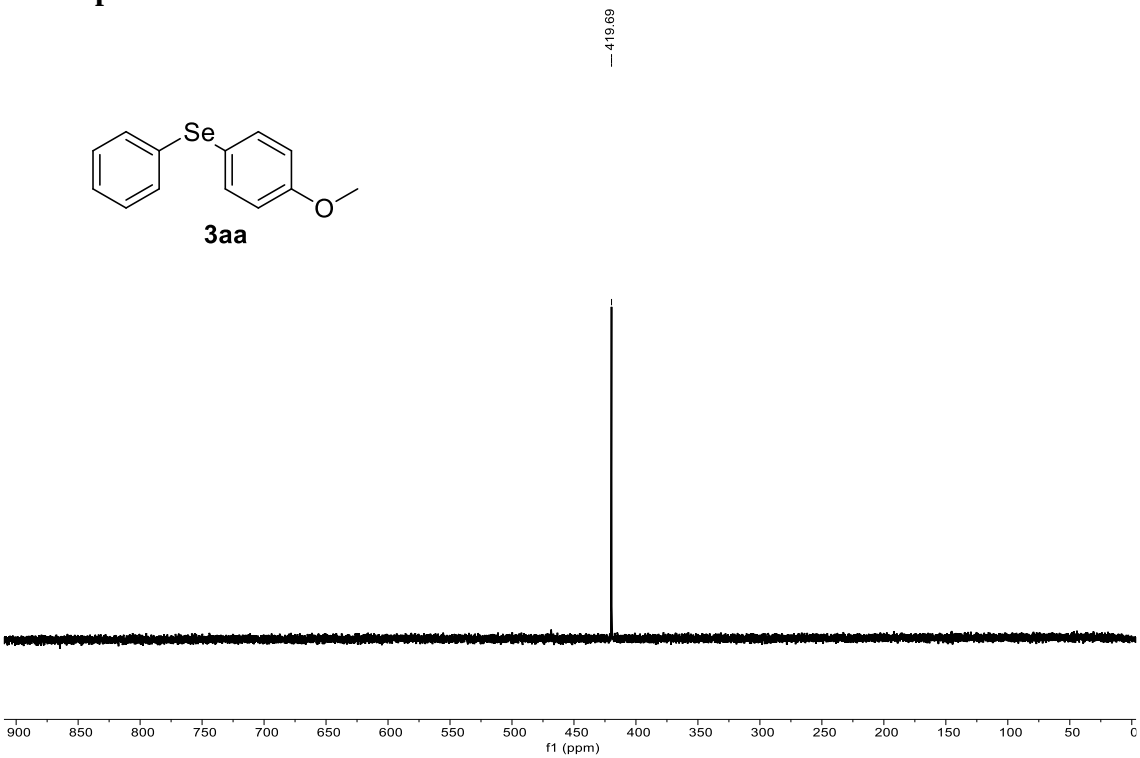

Figure S97 ^{77}Se NMR (95.5 MHz) spectrum of **3aa** in $CDCl_3$

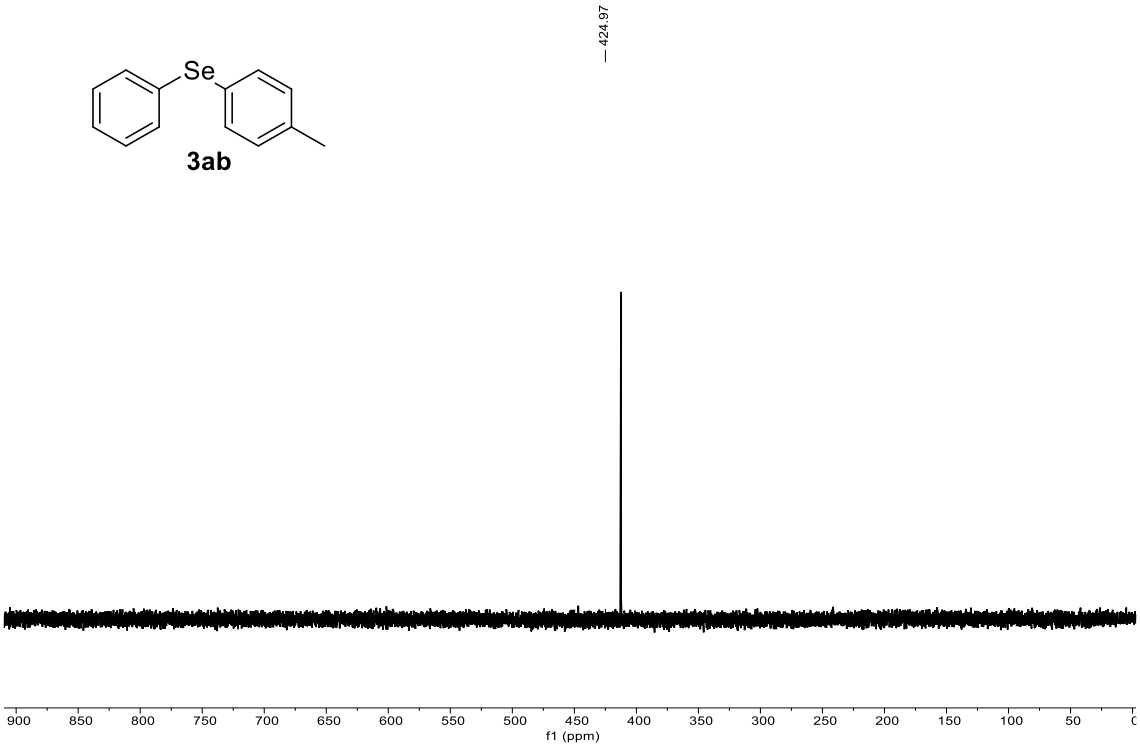

Figure S98 ^{77}Se NMR (95.5 MHz) spectrum of **3ab** in $CDCl_3$

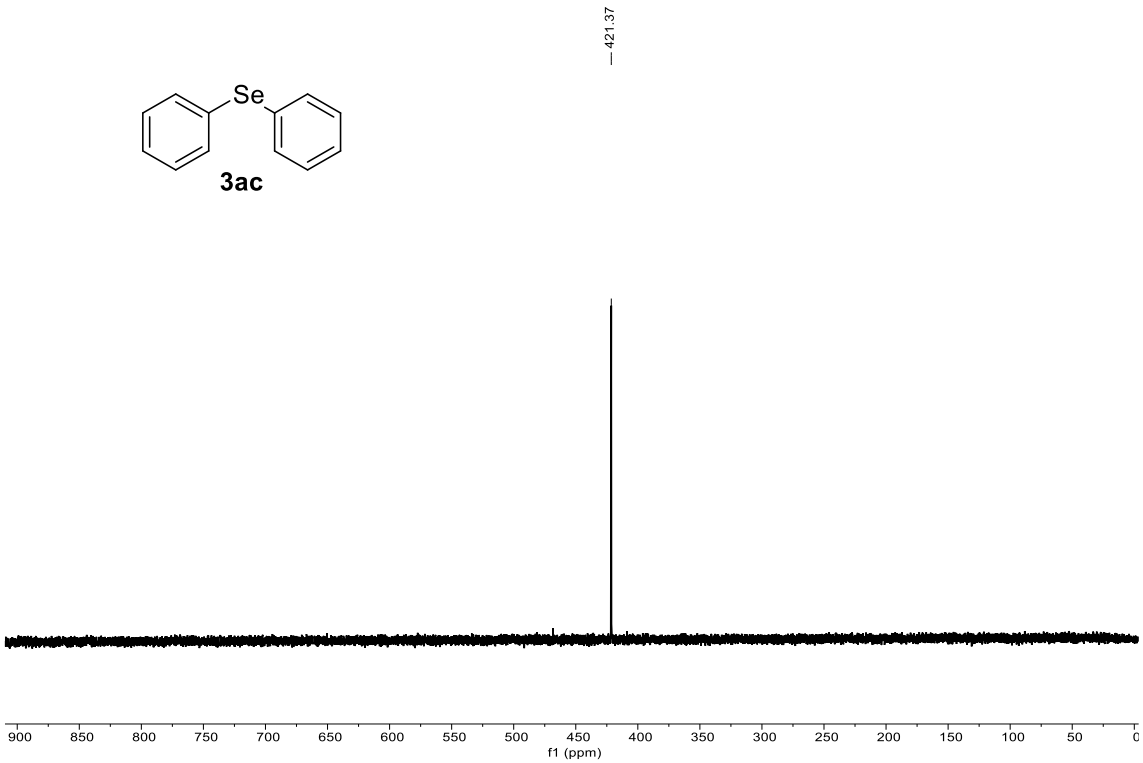

Figure S99 ^{77}Se NMR (95.5 MHz) spectrum of **3ac** in $CDCl_3$

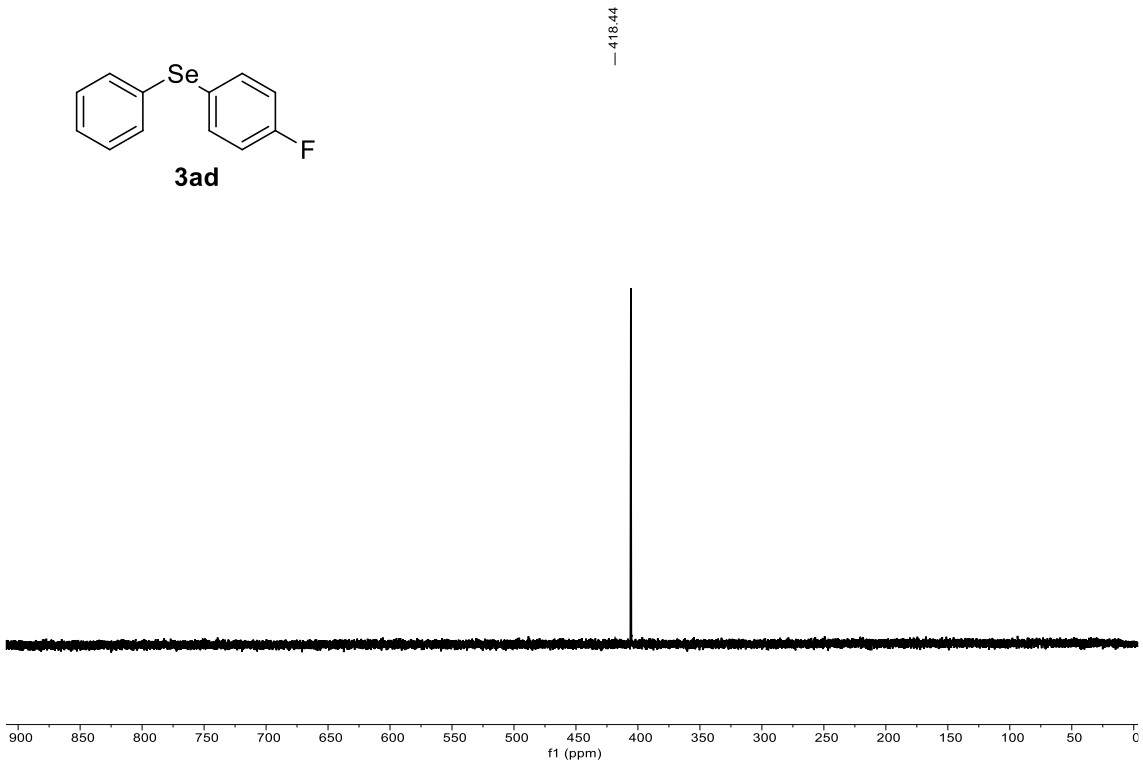

Figure S100 ^{77}Se NMR (95.5 MHz) spectrum of **3ad** in $CDCl_3$

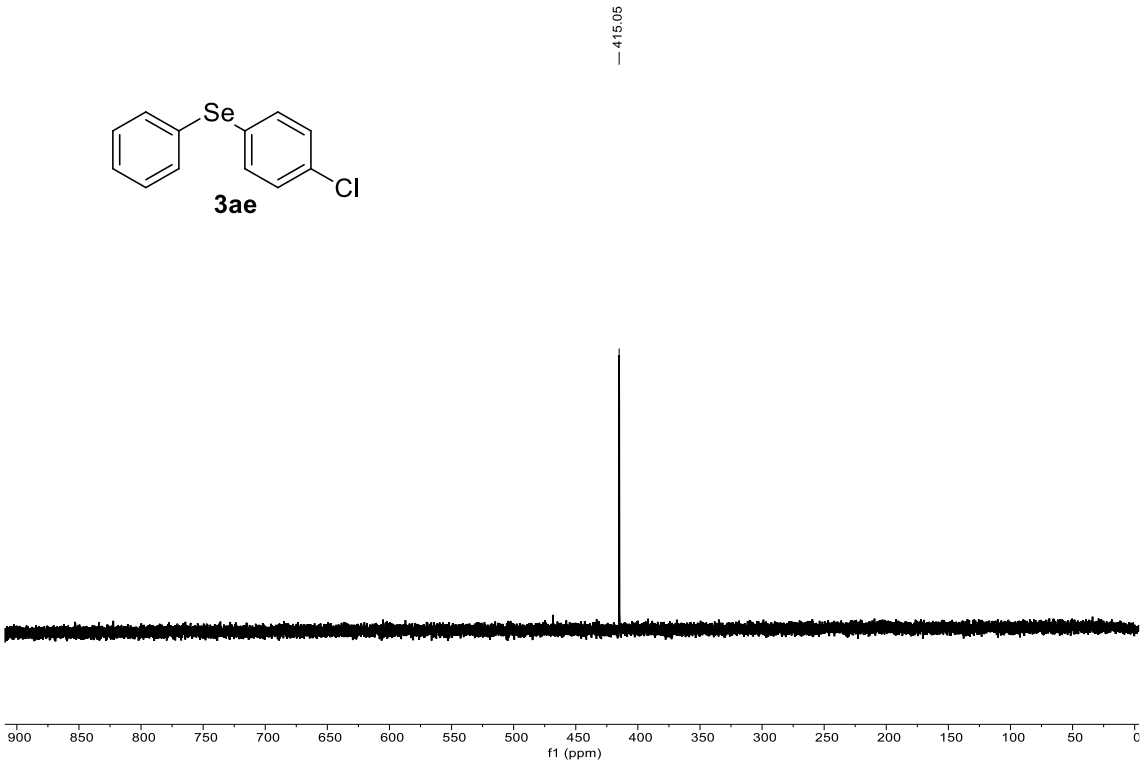

Figure S101 ^{77}Se NMR (95.5 MHz) spectrum of **3ae** in $CDCl_3$

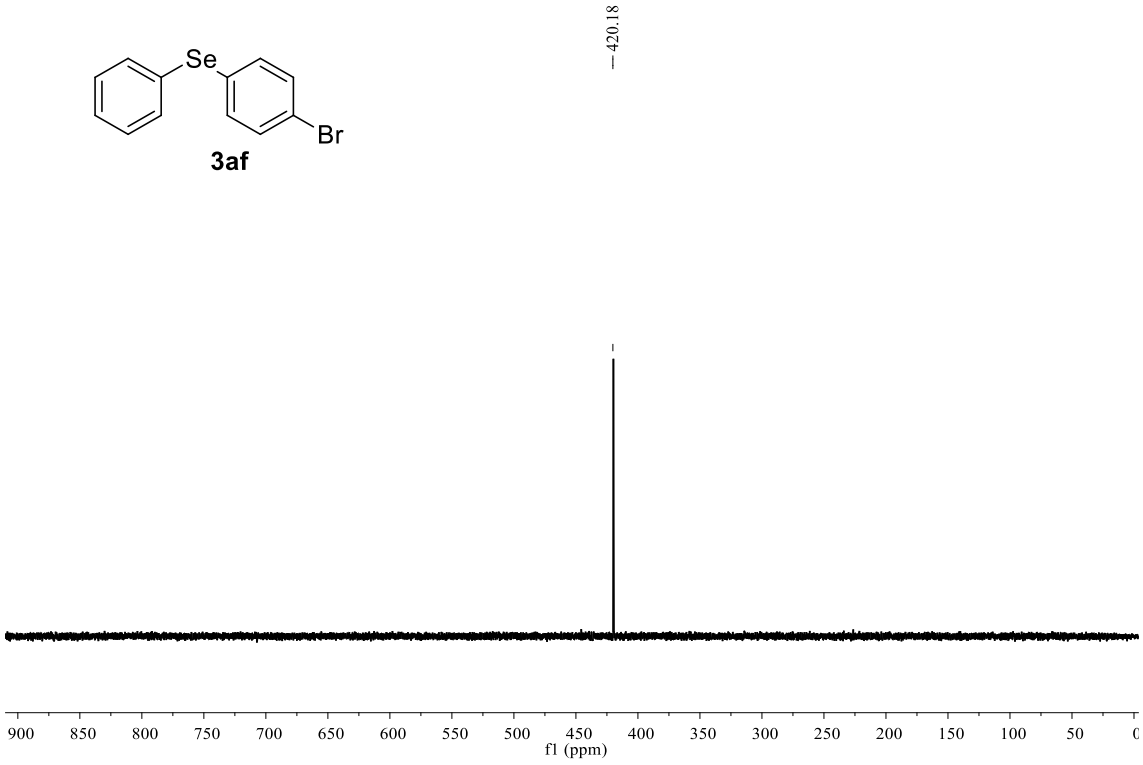

Figure S102 ^{77}Se NMR (95.5 MHz) spectrum of **3af** in $CDCl_3$

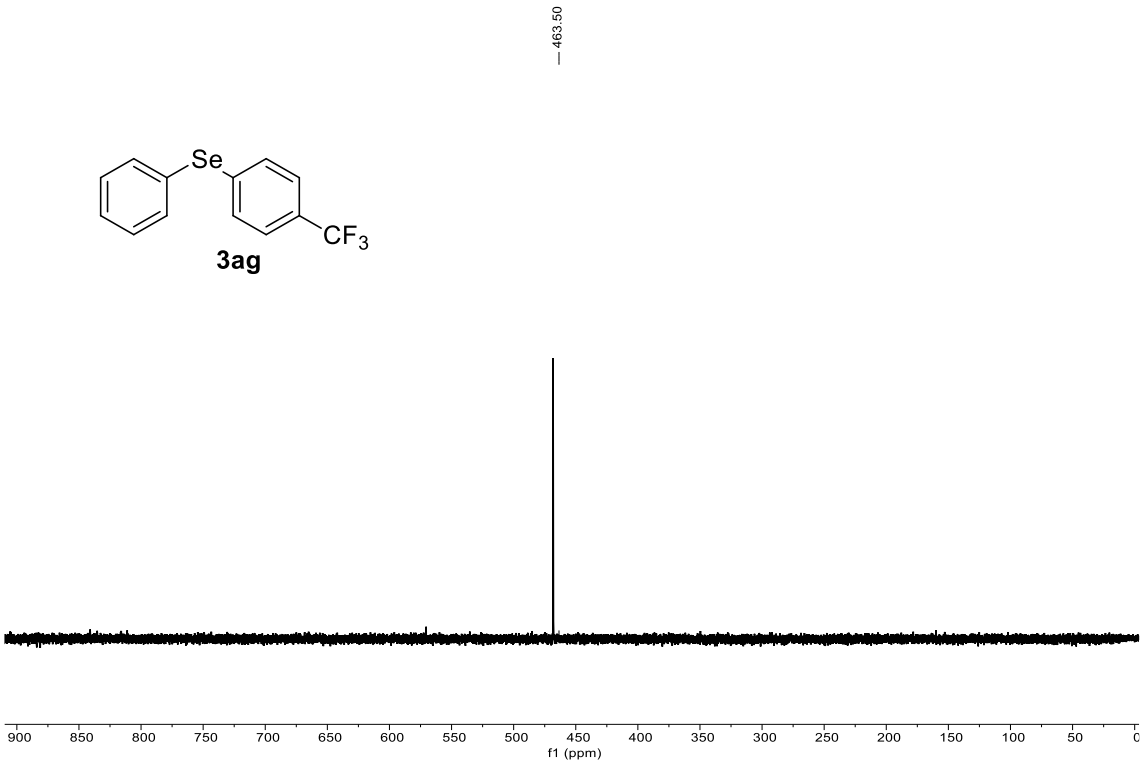

Figure S103 ^{77}Se NMR (95.5 MHz) spectrum of **3ag** in $CDCl_3$

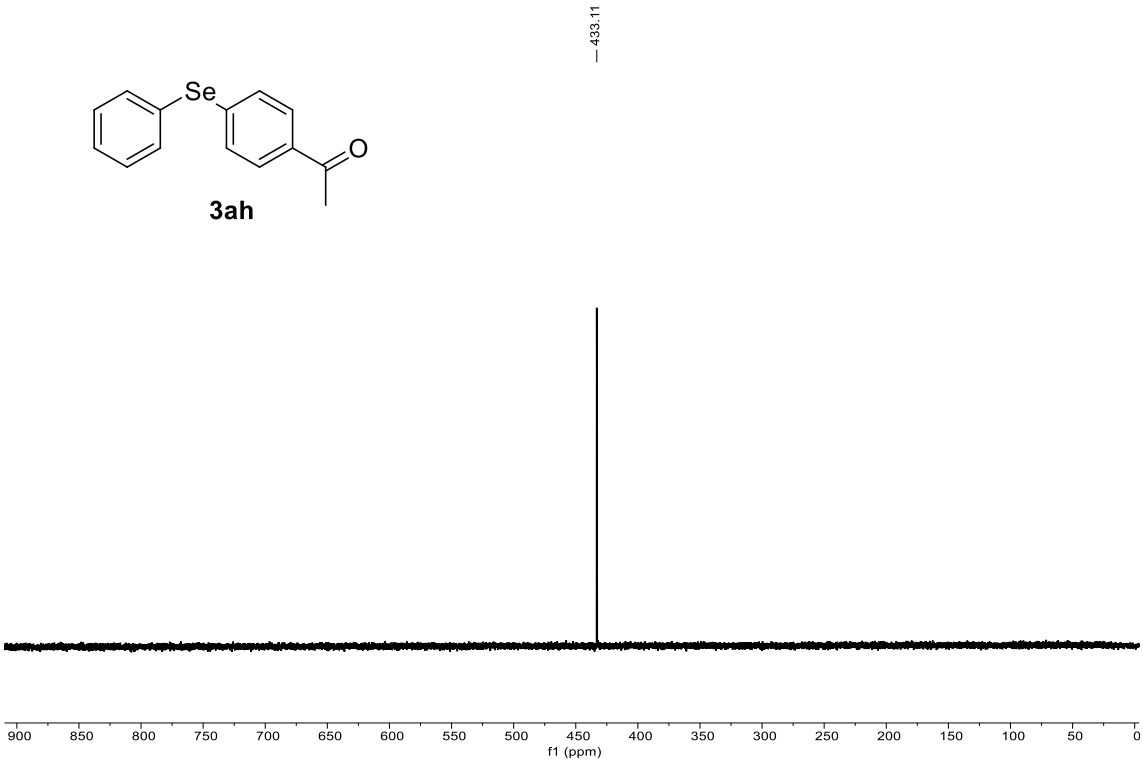

Figure S104 ^{77}Se NMR (95.5 MHz) spectrum of **3ah** in $CDCl_3$

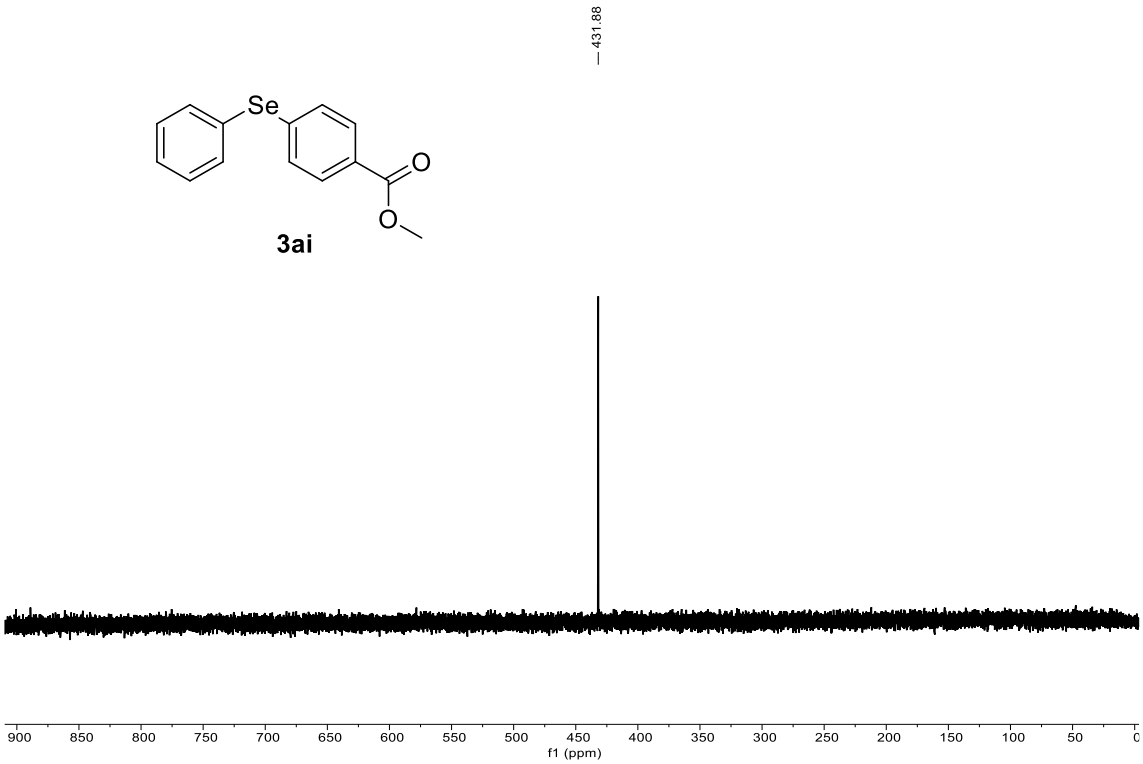

Figure S105 ^{77}Se NMR (95.5 MHz) spectrum of **3ai** in $CDCl_3$

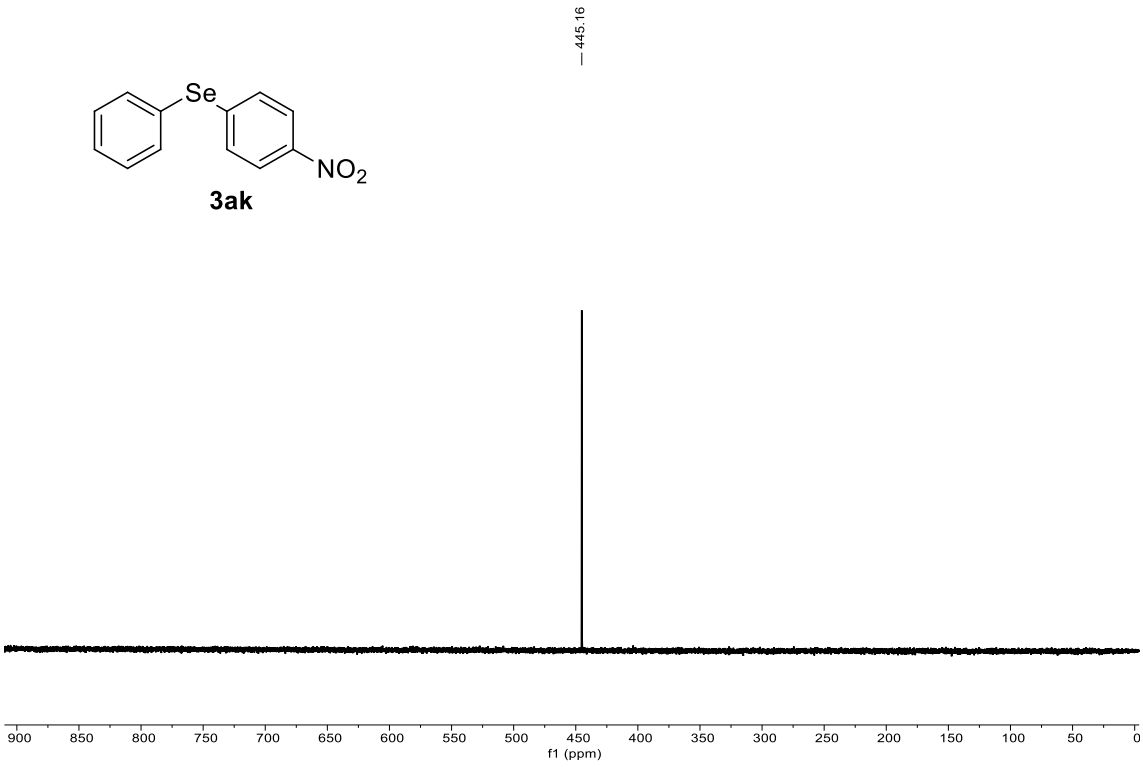

Figure S106 ^{77}Se NMR (95.5 MHz) spectrum of **3ak** in $CDCl_3$

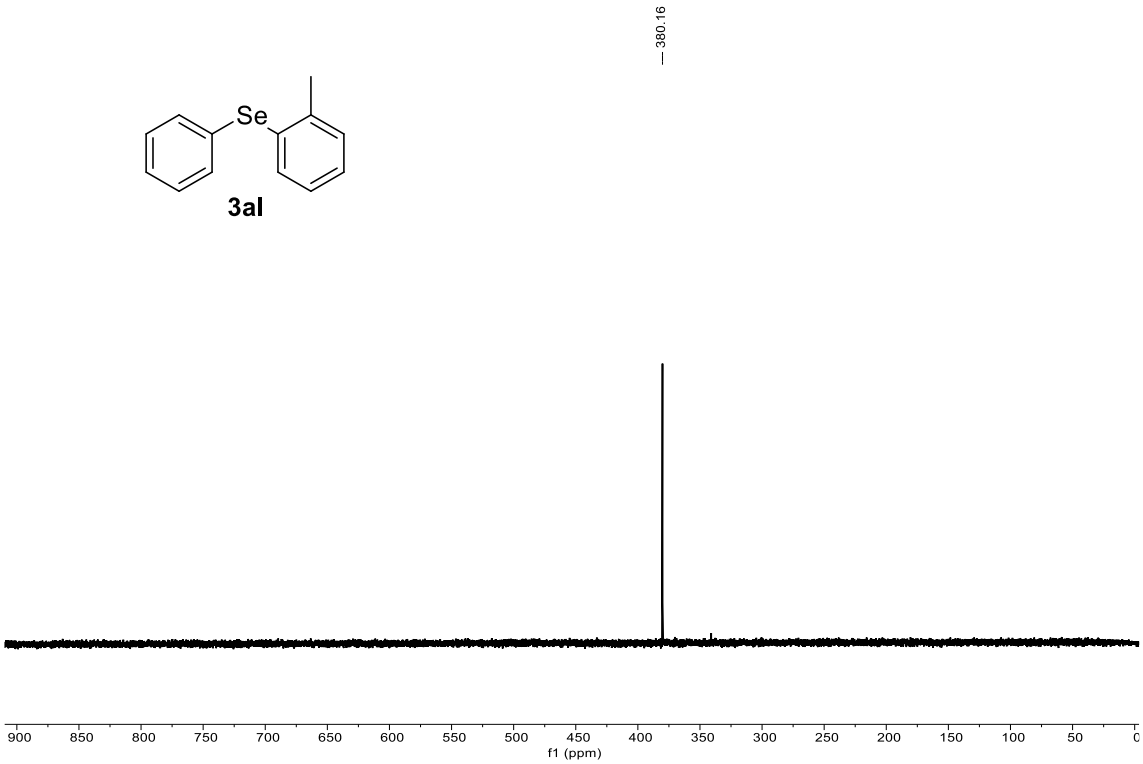

Figure S107 ^{77}Se NMR (95.5 MHz) spectrum of **3al** in $CDCl_3$

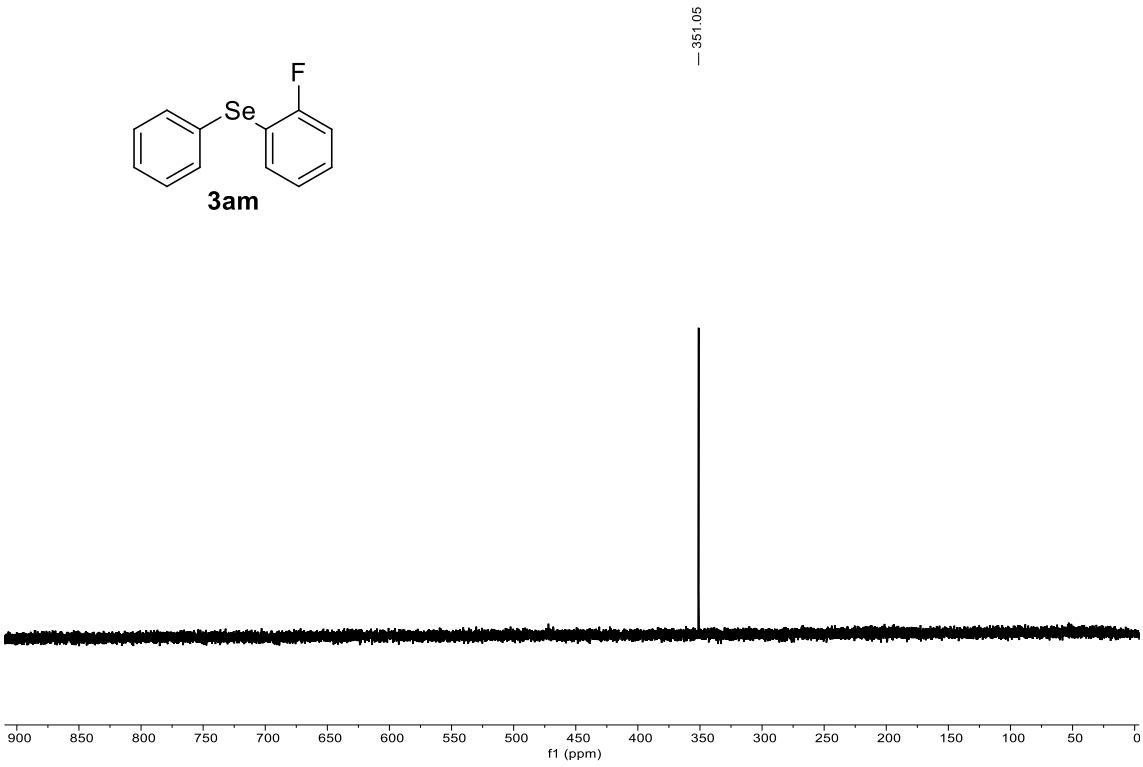

Figure S108 ^{77}Se NMR (95.5 MHz) spectrum of **3am** in $CDCl_3$

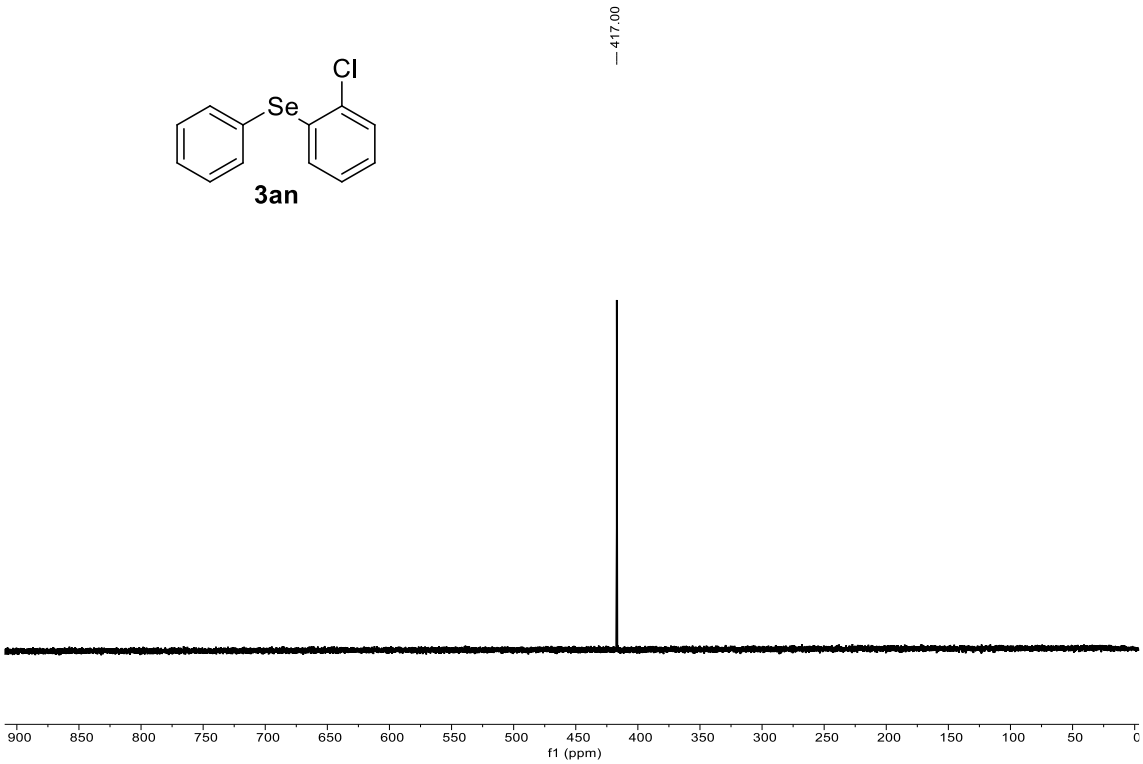

Figure S109 ^{77}Se NMR (95.5 MHz) spectrum of **3an** in $CDCl_3$

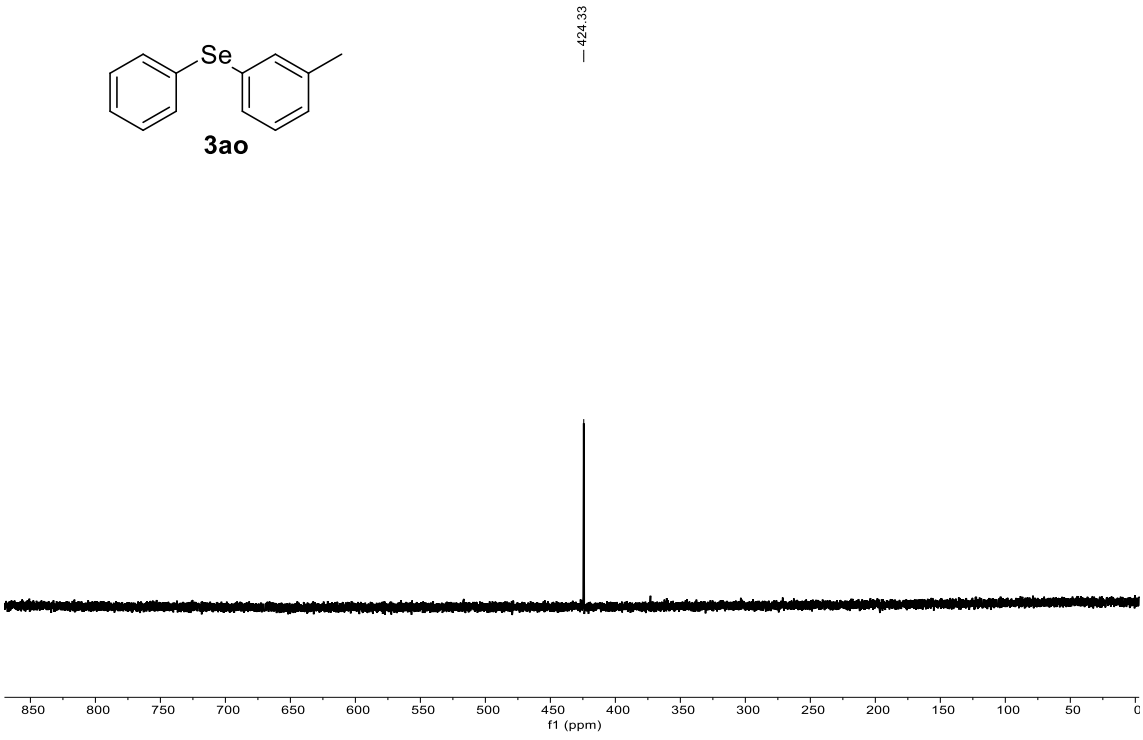

Figure S110 ^{77}Se NMR (95.5 MHz) spectrum of **3ao** in $CDCl_3$

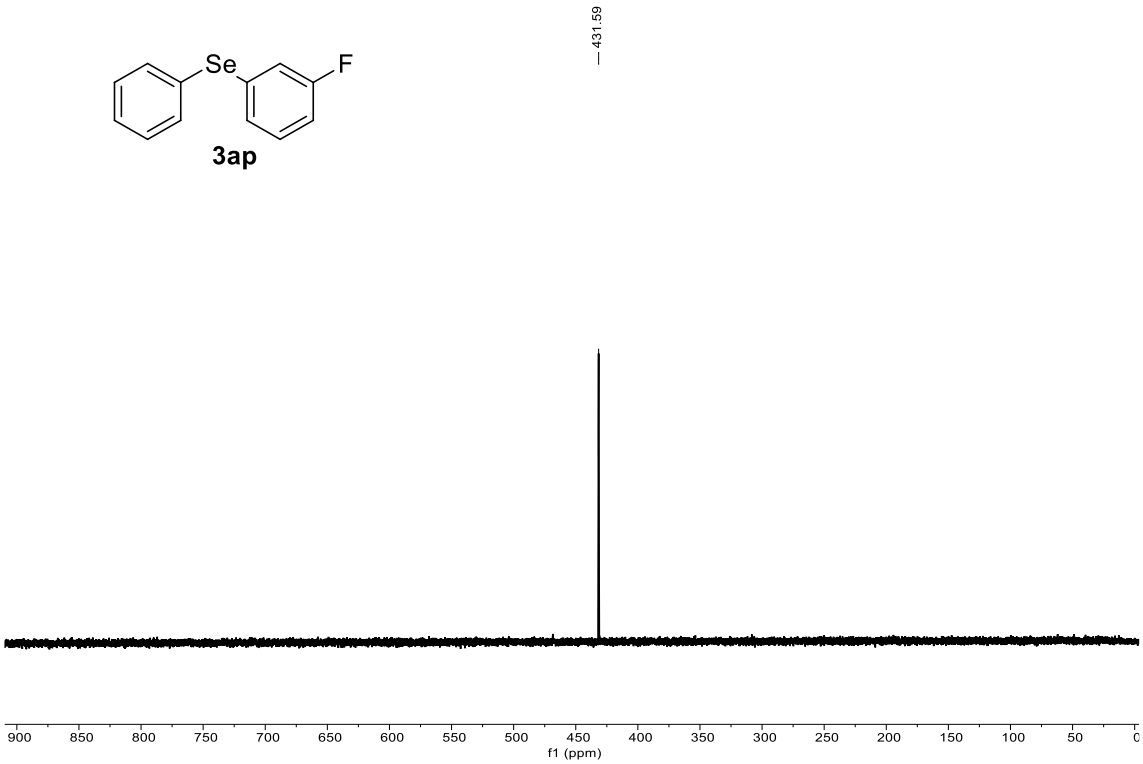

Figure S111 ^{77}Se NMR (95.5 MHz) spectrum of **3ap** in $CDCl_3$

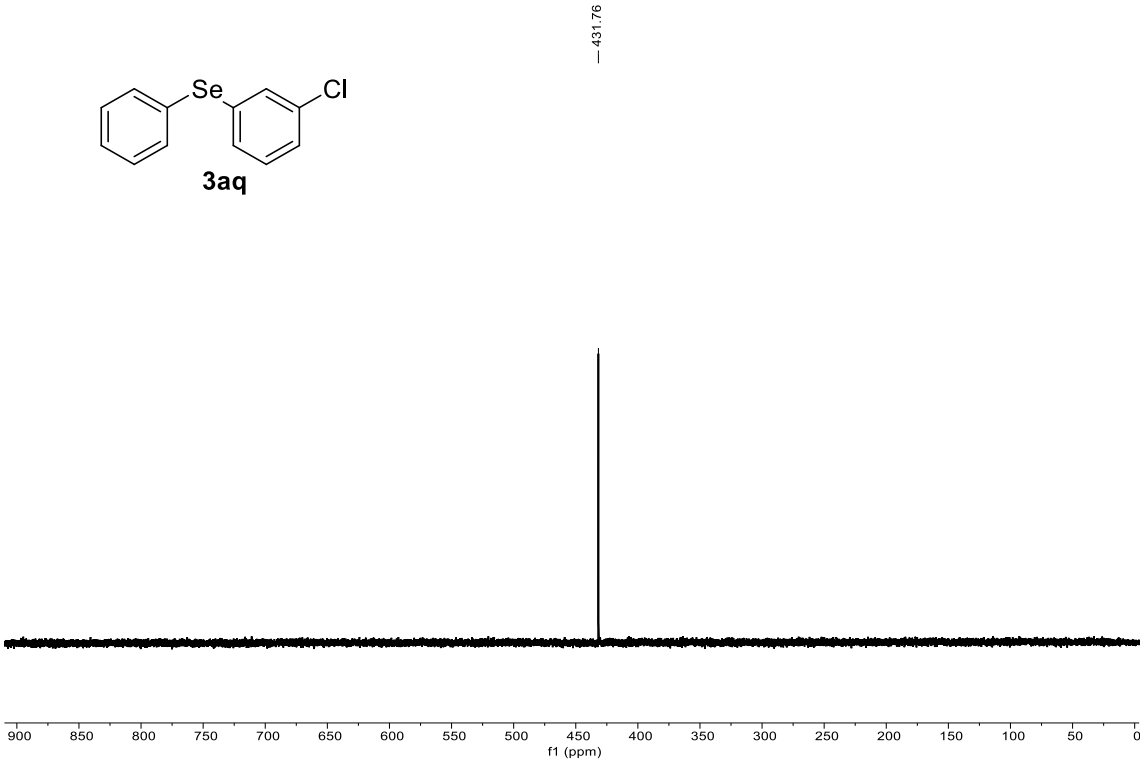

Figure S112 ^{77}Se NMR (95.5 MHz) spectrum of **3aq** in $CDCl_3$

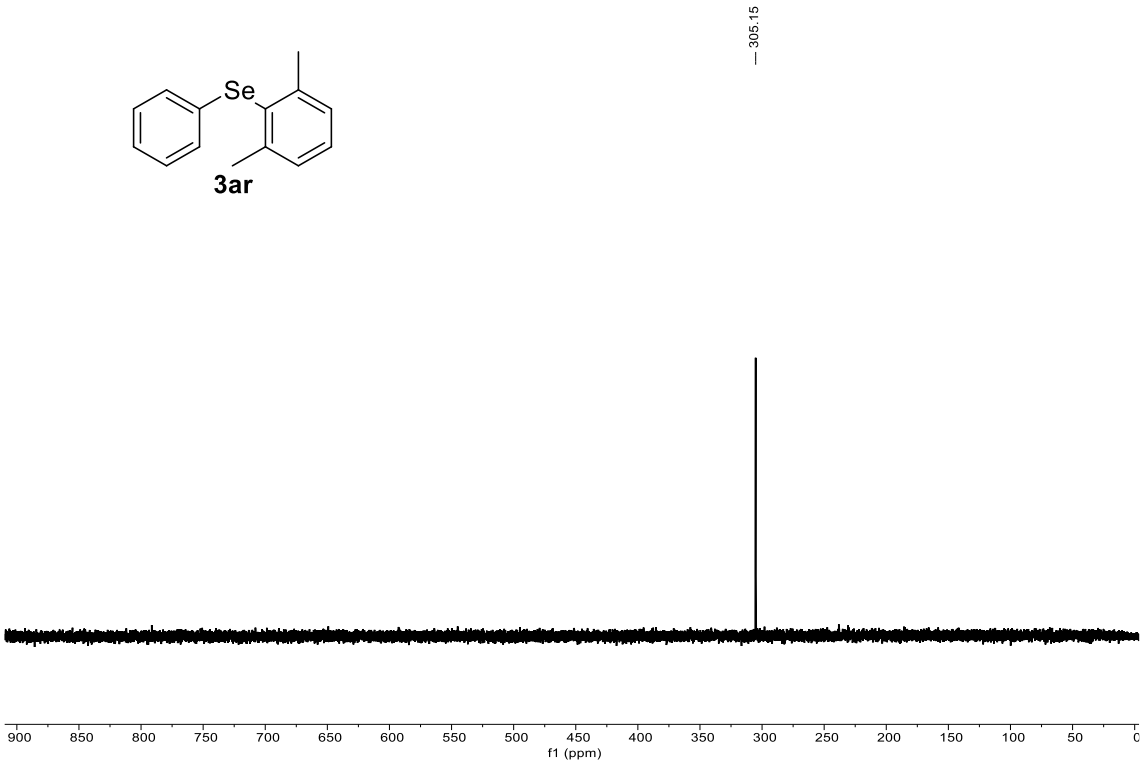

Figure S113 ^{77}Se NMR (95.5 MHz) spectrum of **3ar** in $CDCl_3$

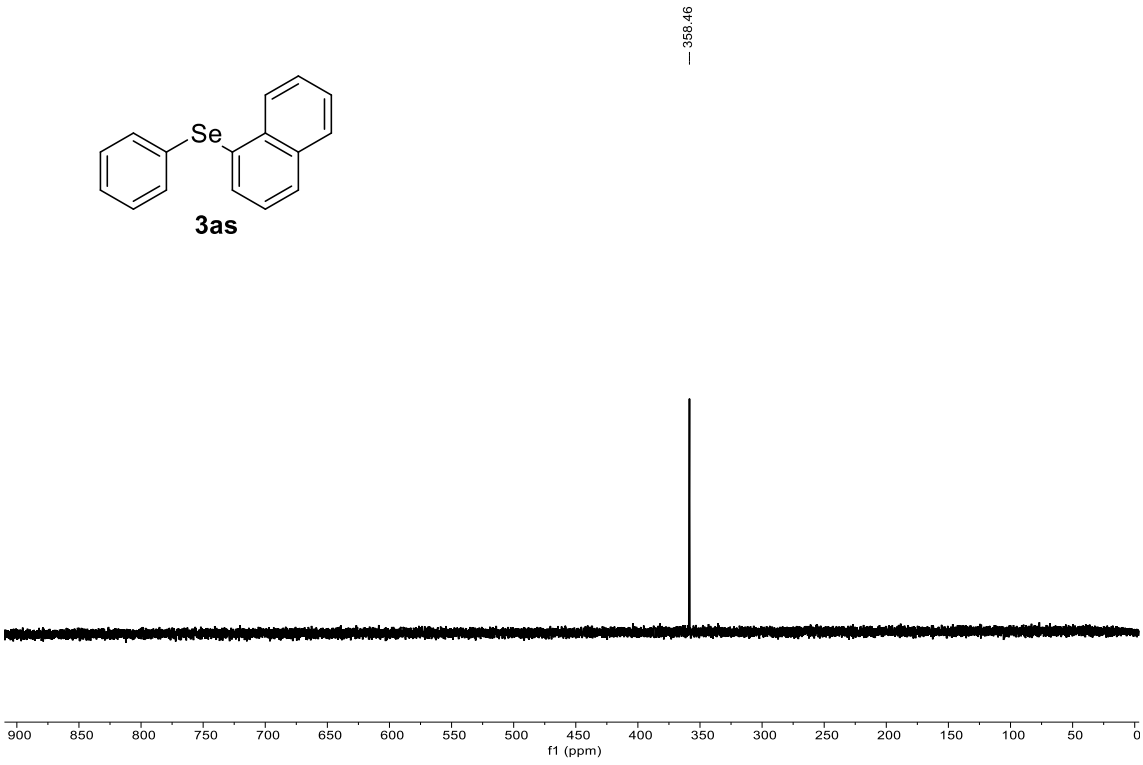

Figure S114 ^{77}Se NMR (95.5 MHz) spectrum of **3as** in $CDCl_3$

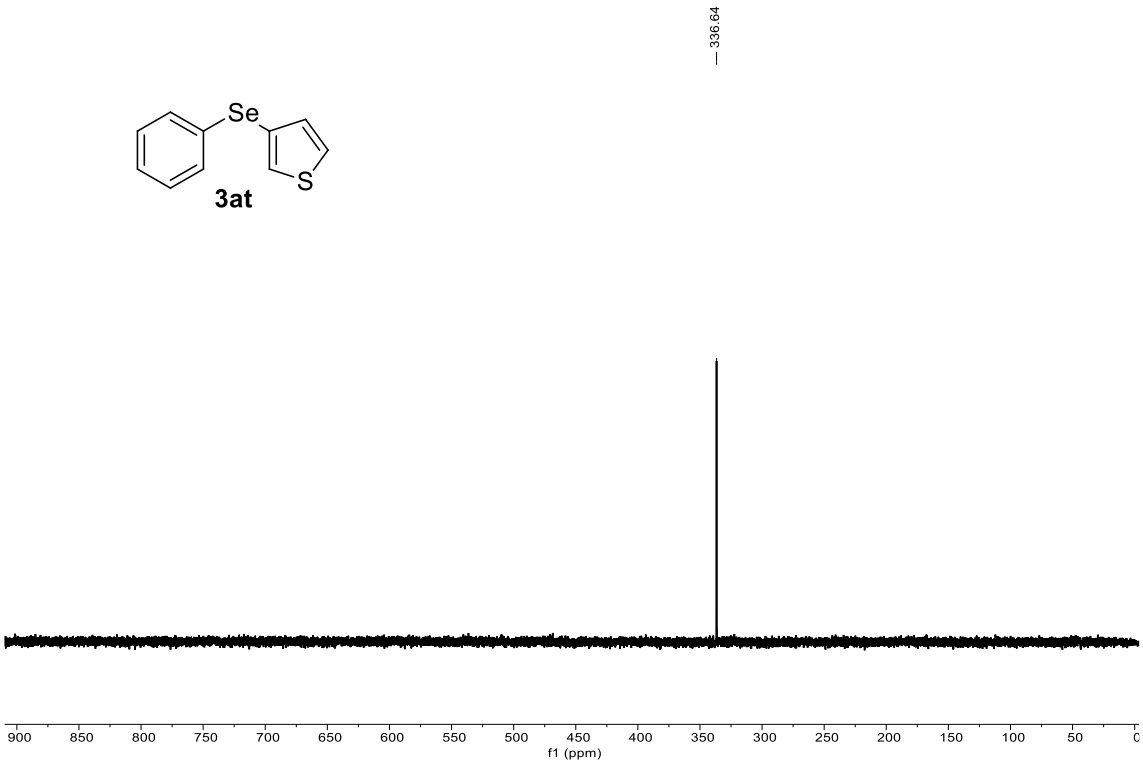

Figure S115 ^{77}Se NMR (95.5 MHz) spectrum of **3at** in $CDCl_3$

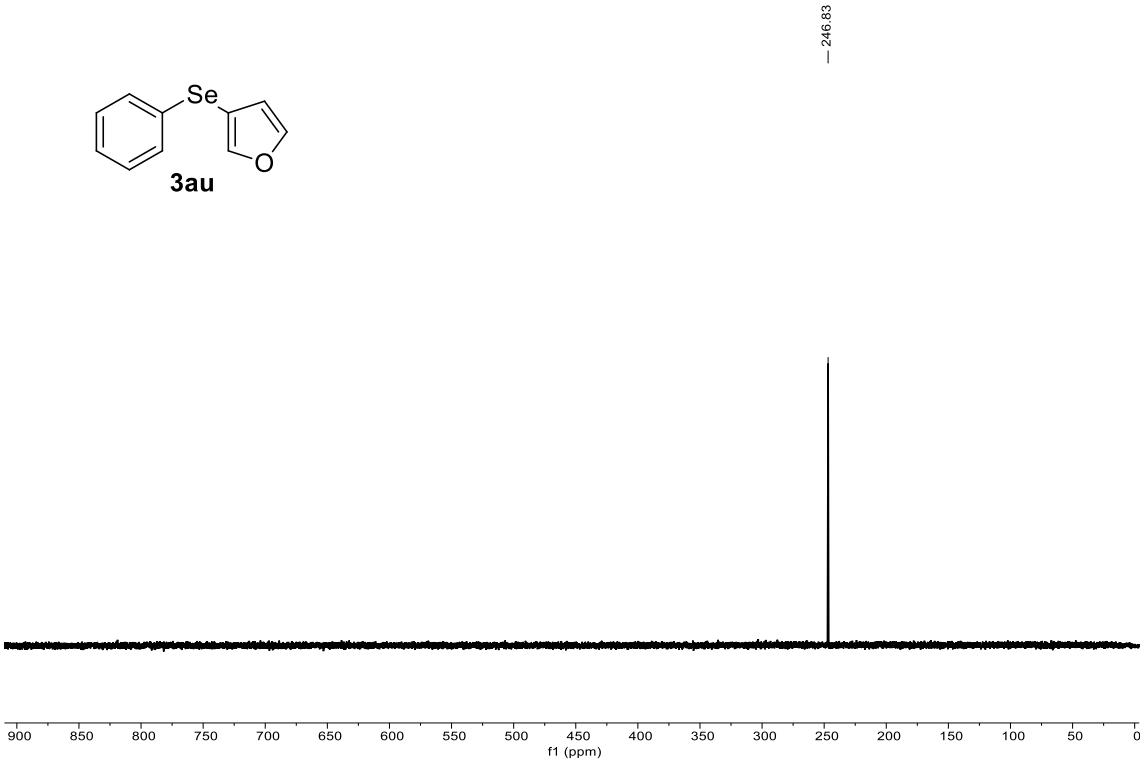

Figure S116 ^{77}Se NMR (95.5 MHz) spectrum of **3au** in $CDCl_3$

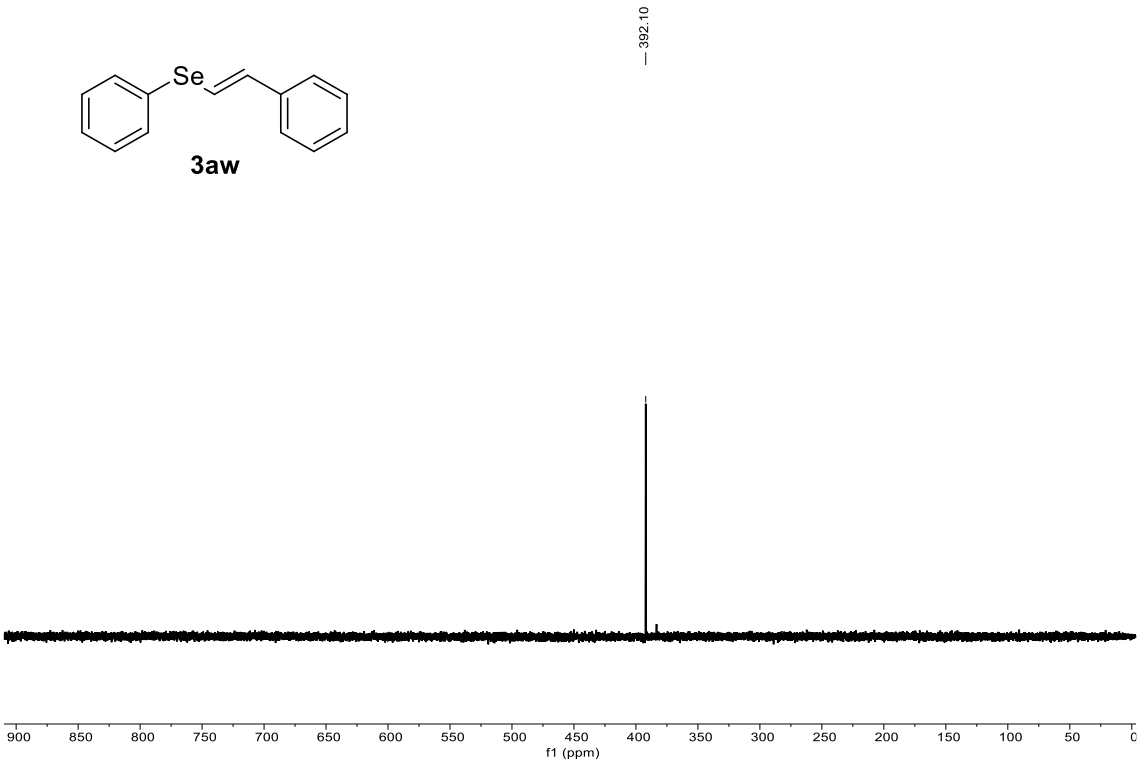

Figure S117 ^{77}Se NMR (95.5 MHz) spectrum of **3aw** in $CDCl_3$

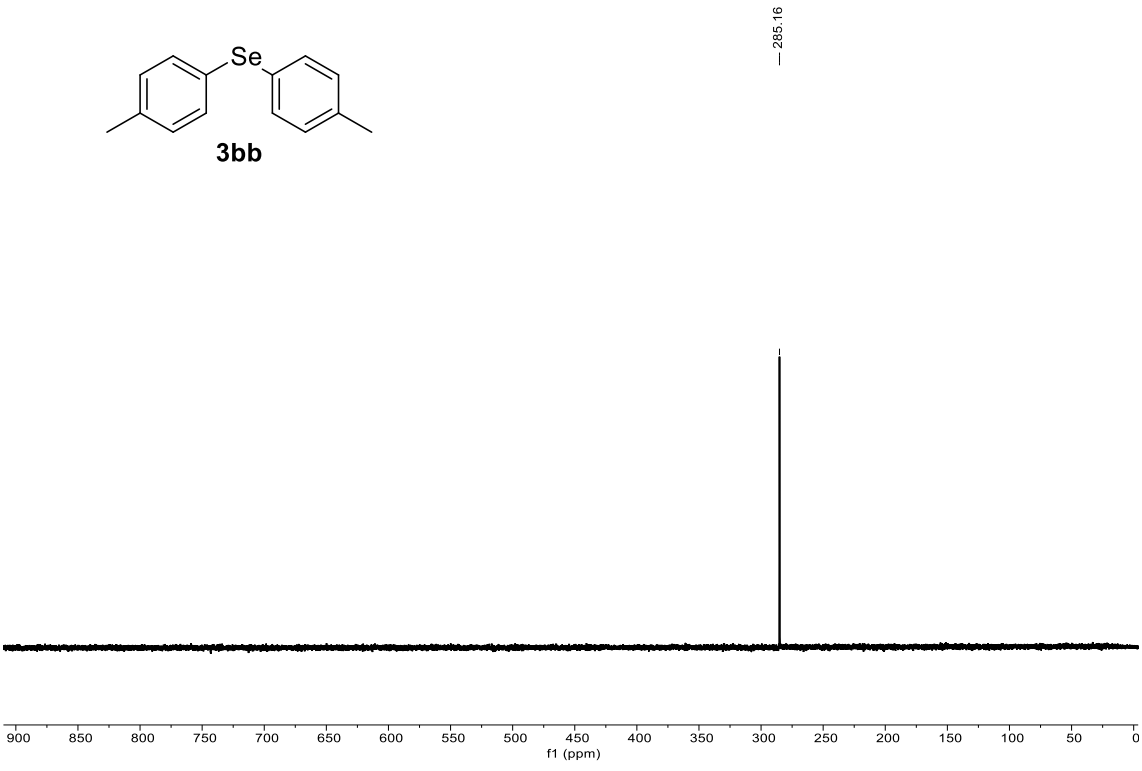

Figure S118 ^{77}Se NMR (95.5 MHz) spectrum of **3bb** in $CDCl_3$

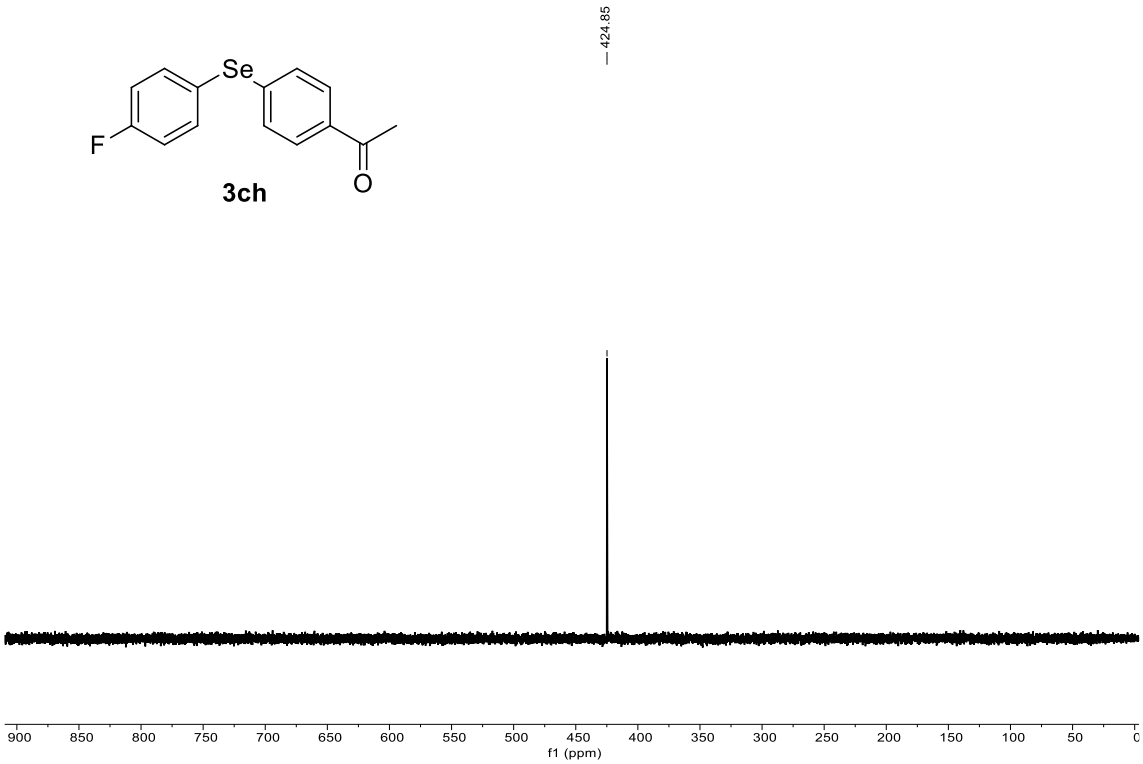

Figure S119 ^{77}Se NMR (95.5 MHz) spectrum of **3ch** in $CDCl_3$

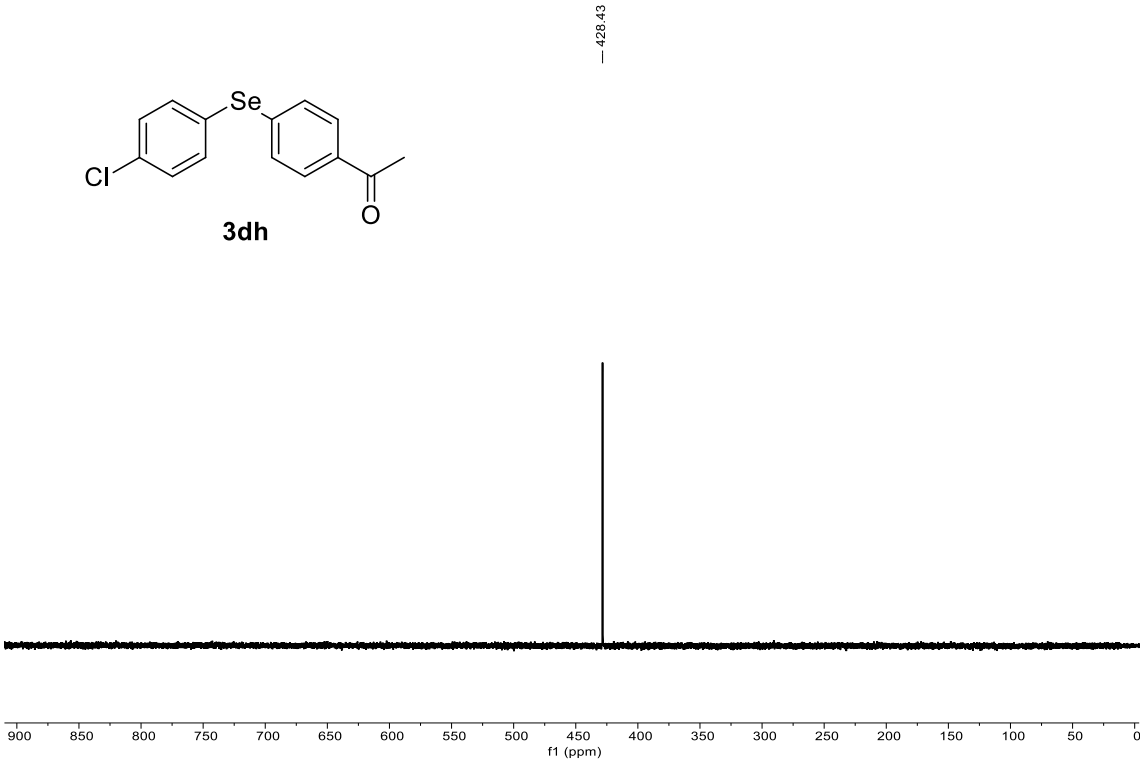

Figure S120 ^{77}Se NMR (95.5 MHz) spectrum of **3dh** in $CDCl_3$

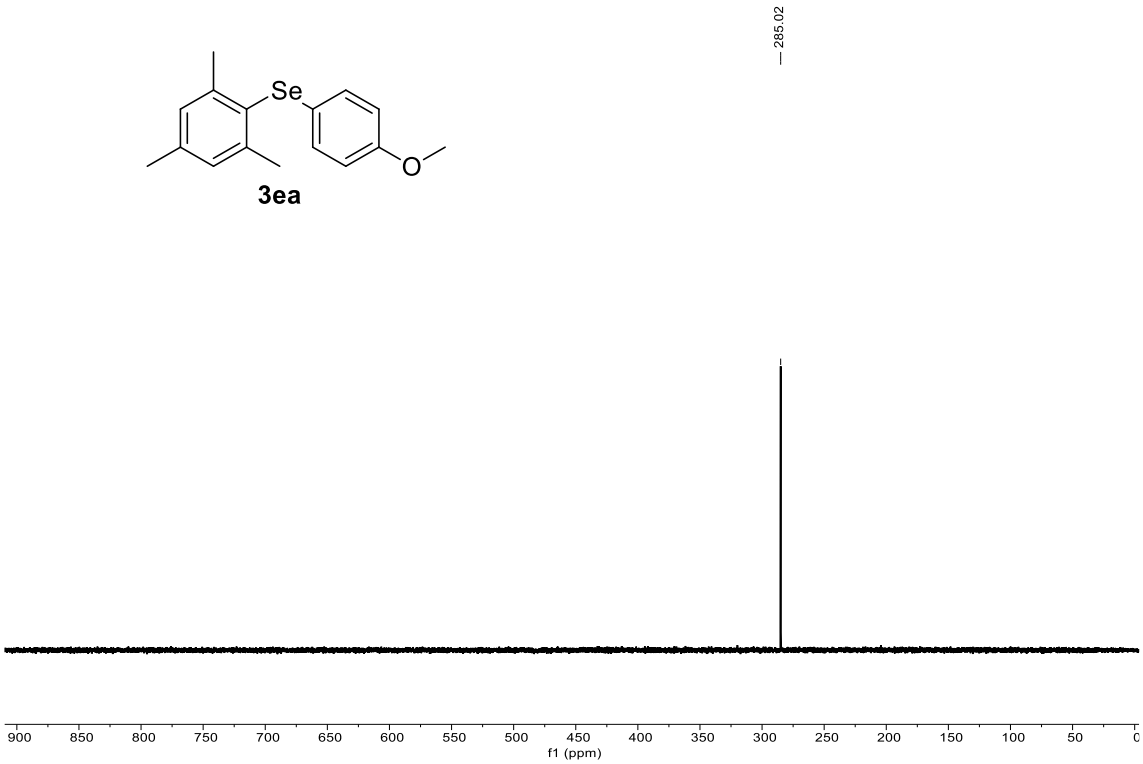

Figure S121 ^{77}Se NMR (95.5 MHz) spectrum of **3ea** in $CDCl_3$

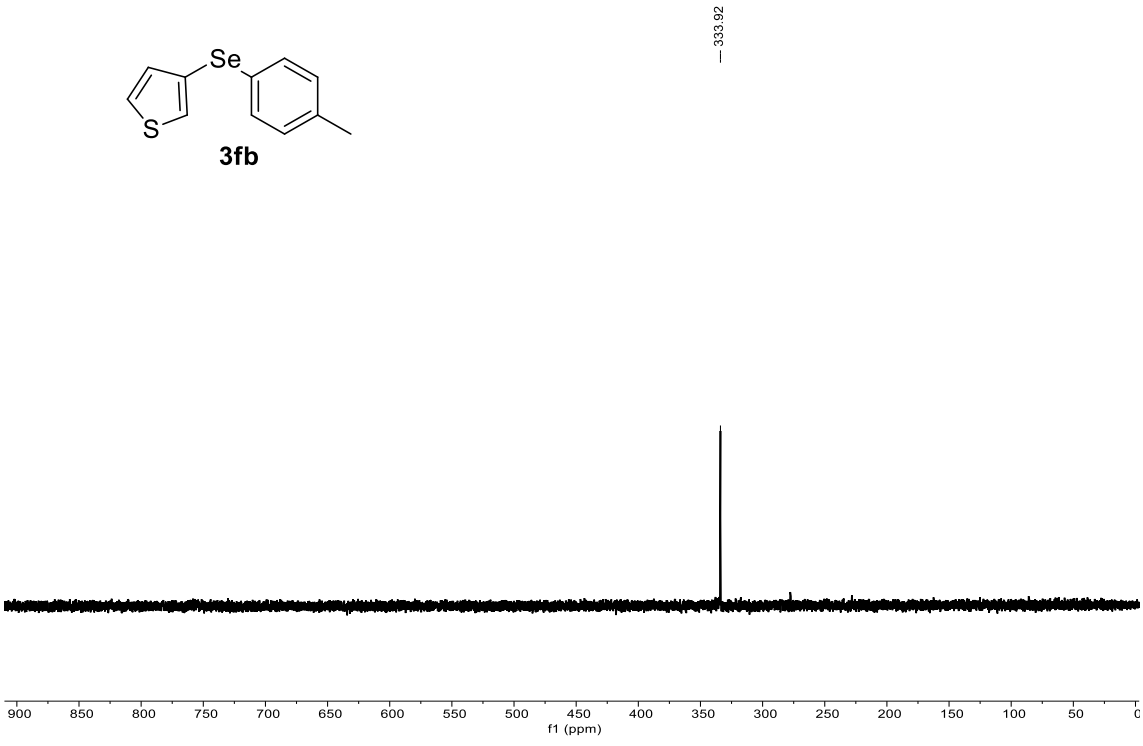

Figure S122 ^{77}Se NMR (95.5 MHz) spectrum of **3fb** in $CDCl_3$

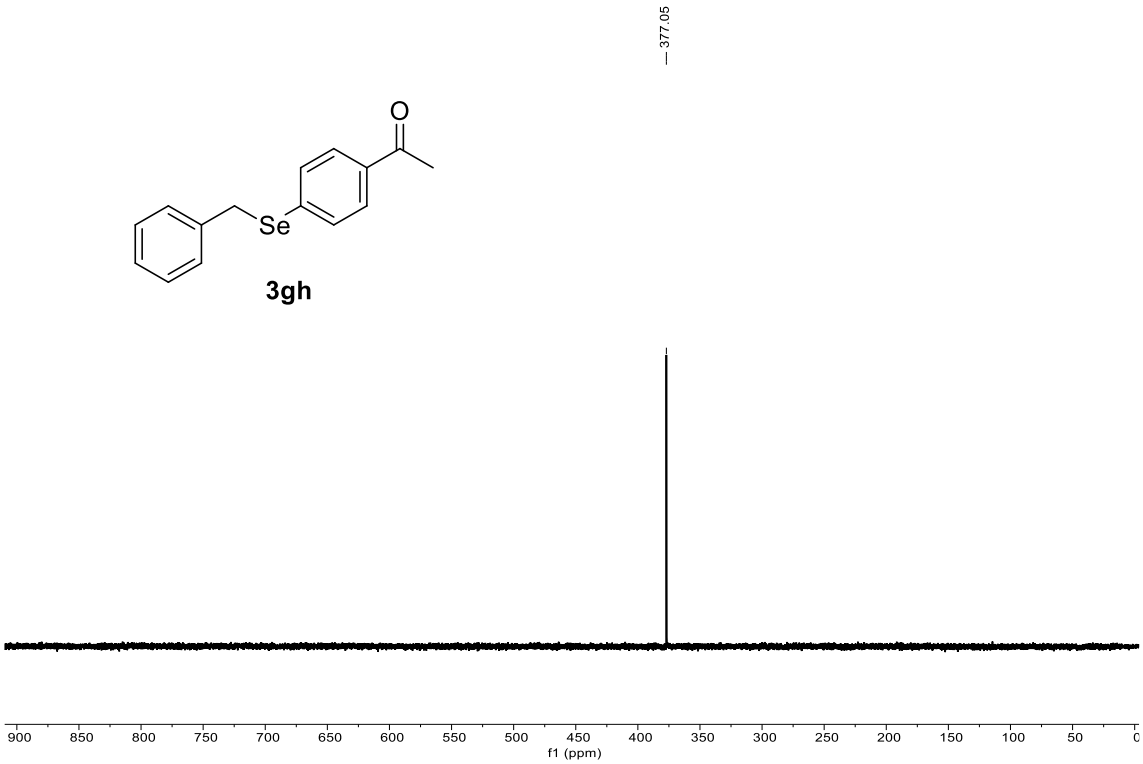

Figure S123 ^{77}Se NMR (95.5 MHz) spectrum of **3gh** in $CDCl_3$

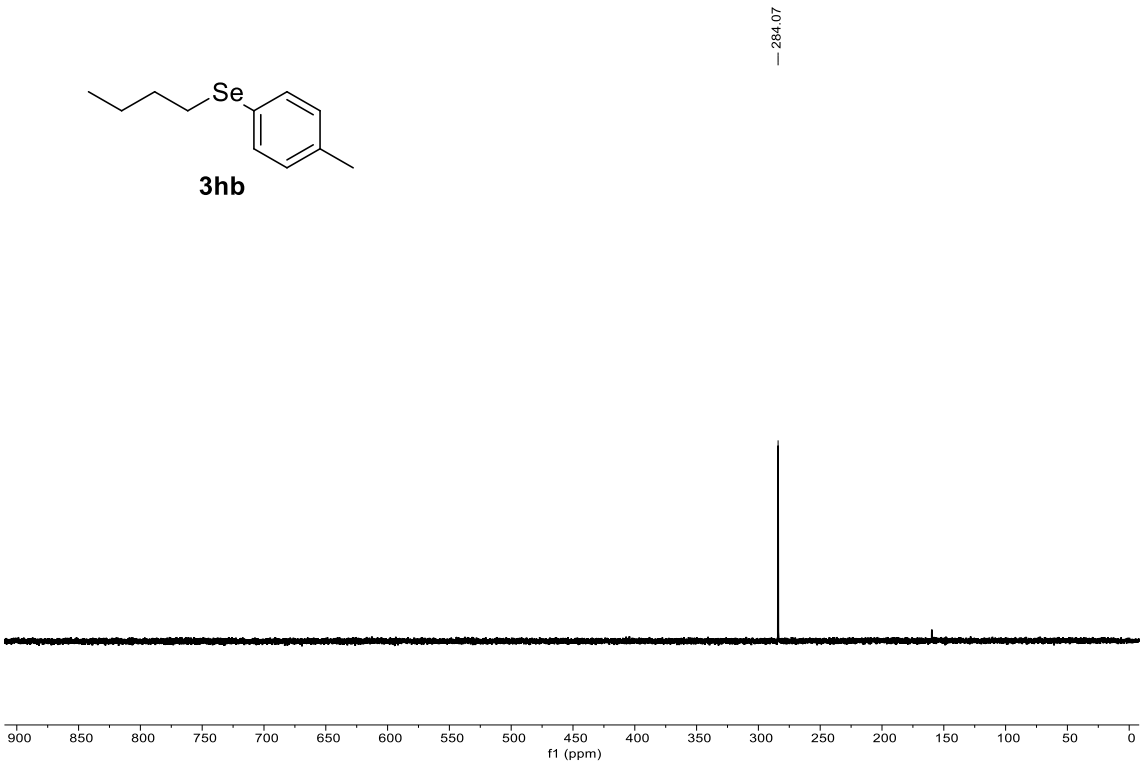

Figure S124 ^{77}Se NMR (95.5 MHz) spectrum of **3hb** in $CDCl_3$

5. ^{19}F NMR Spectra of **3ad**, **3ag**, **3am**, **3ap**, **3ch** and **5ed**

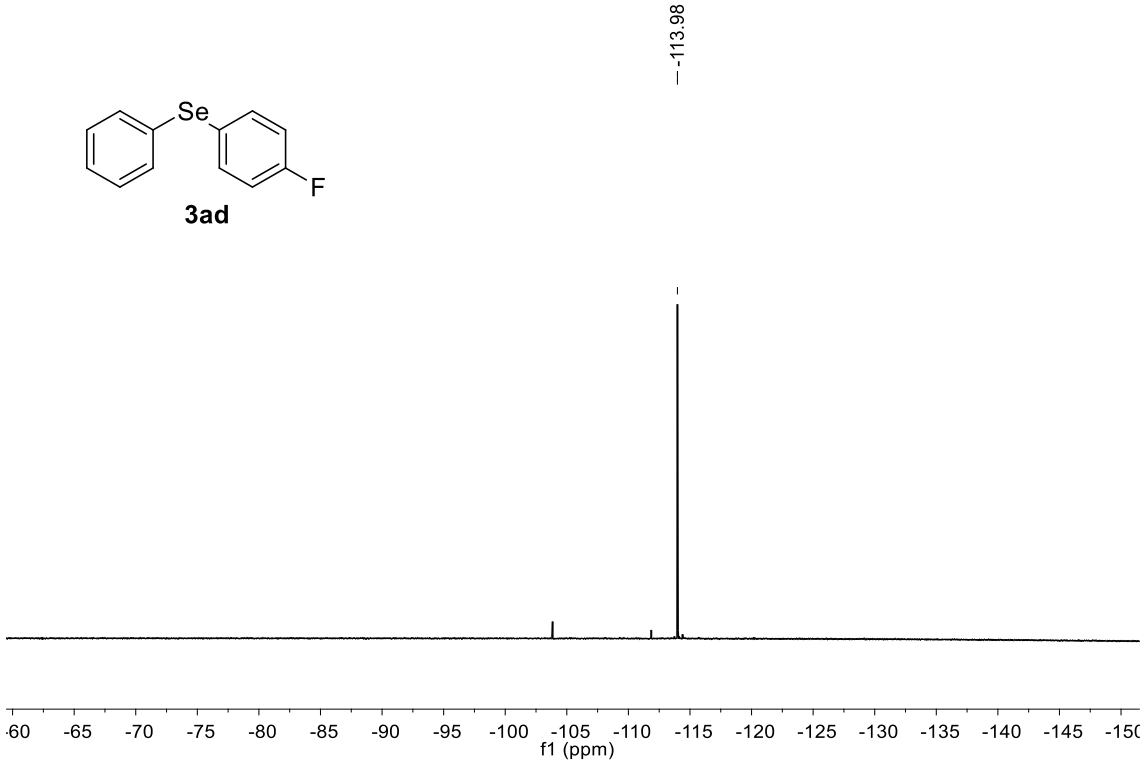

Figure S125 ^{19}F NMR (376 MHz) spectrum of **3ad** in $CDCl_3$

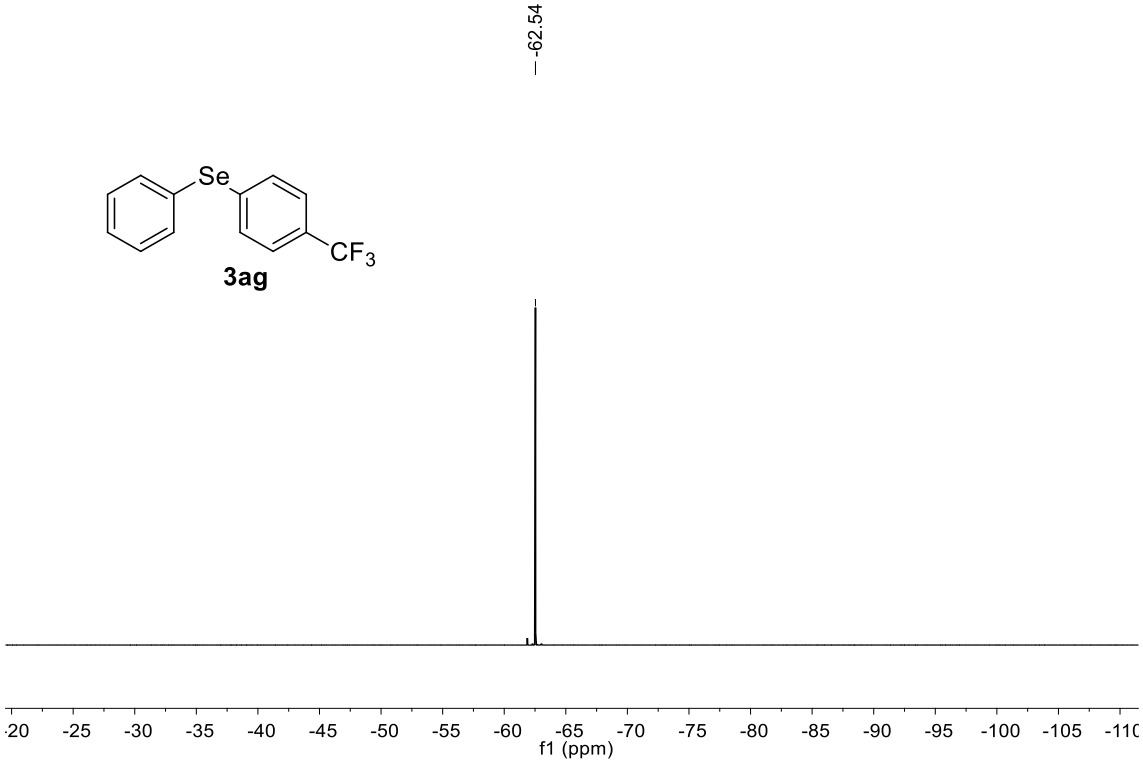

Figure S126 ^{19}F NMR (376 MHz) spectrum of **3ad** in $CDCl_3$

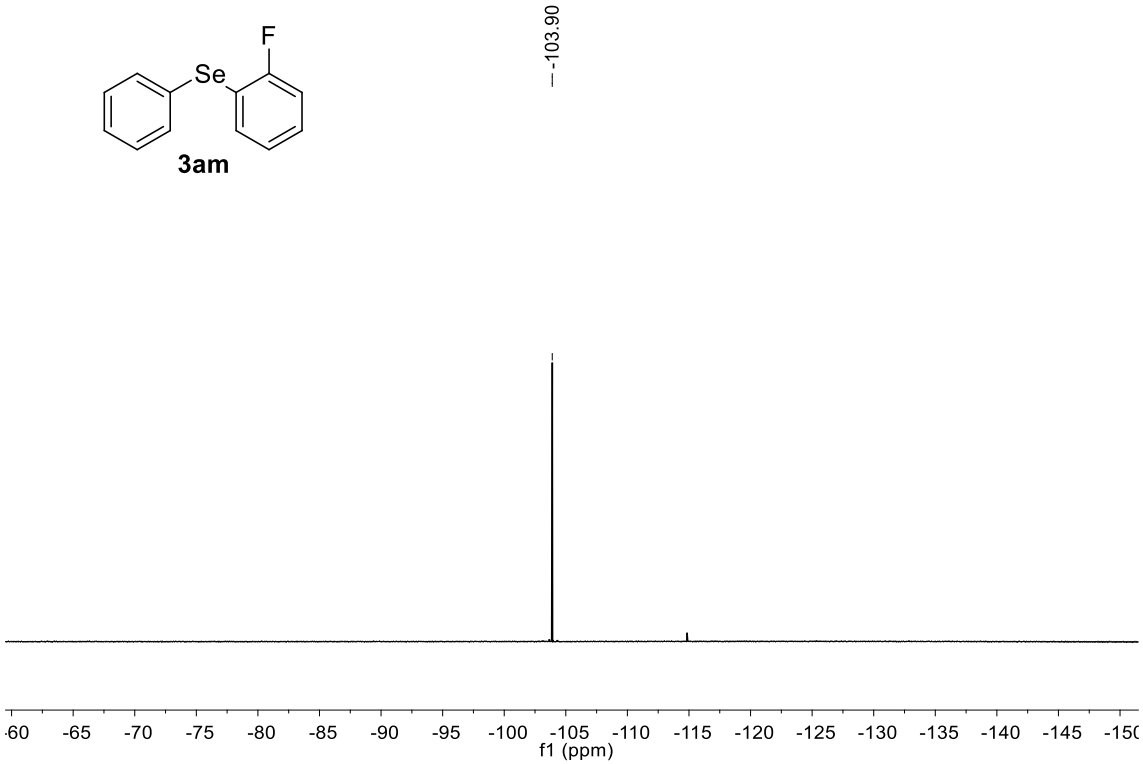

Figure S127 ^{19}F NMR (376 MHz) spectrum of **3am** in $CDCl_3$

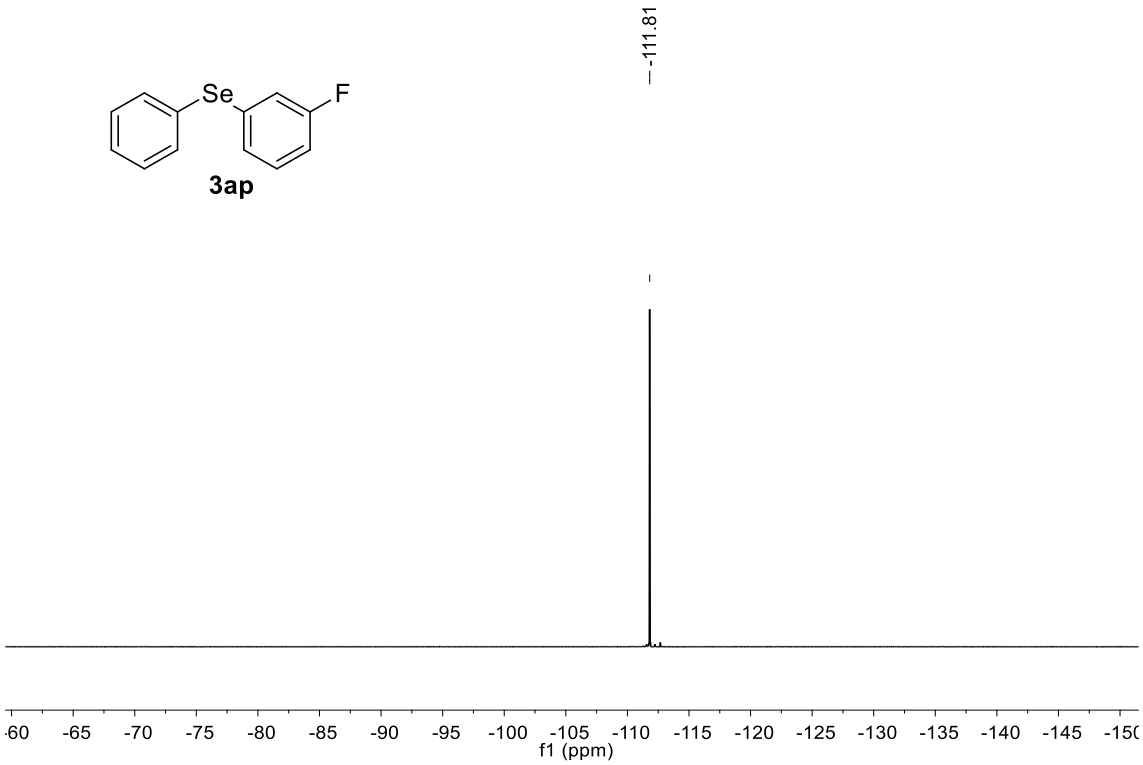

Figure S128 ^{19}F NMR (376 MHz) spectrum of **3ap** in $CDCl_3$

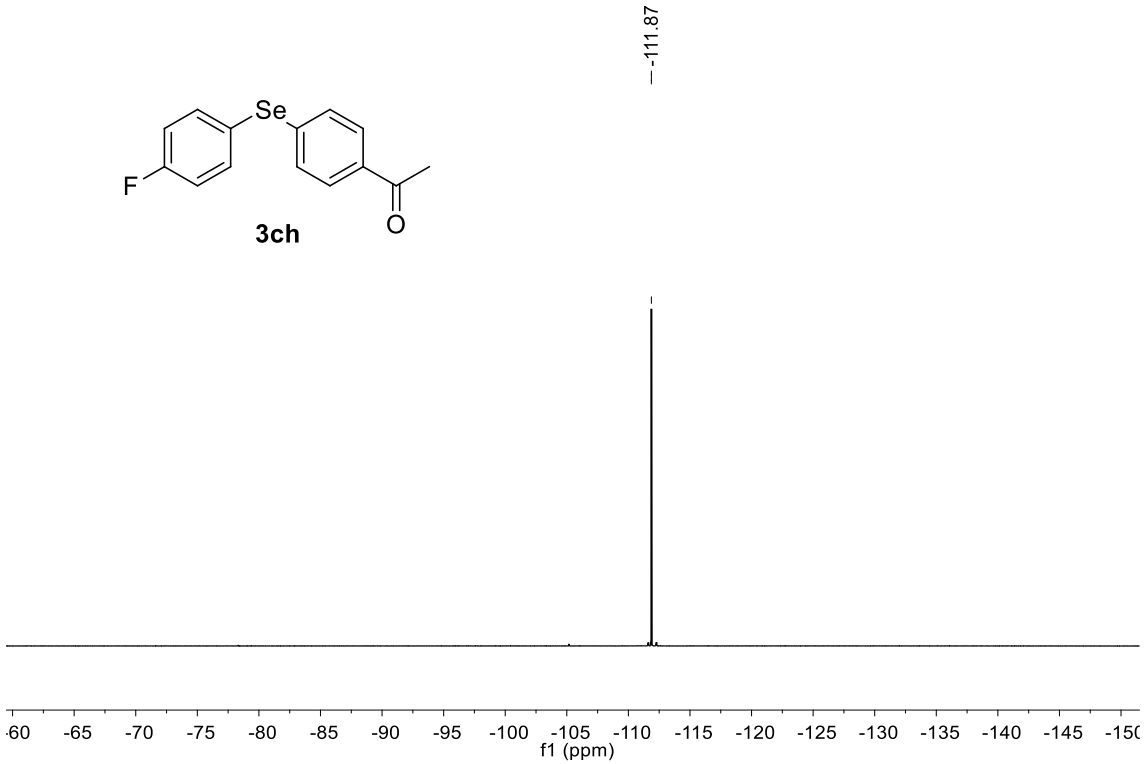

Figure S129 ^{19}F NMR (376 MHz) spectrum of **3ch** in $CDCl_3$

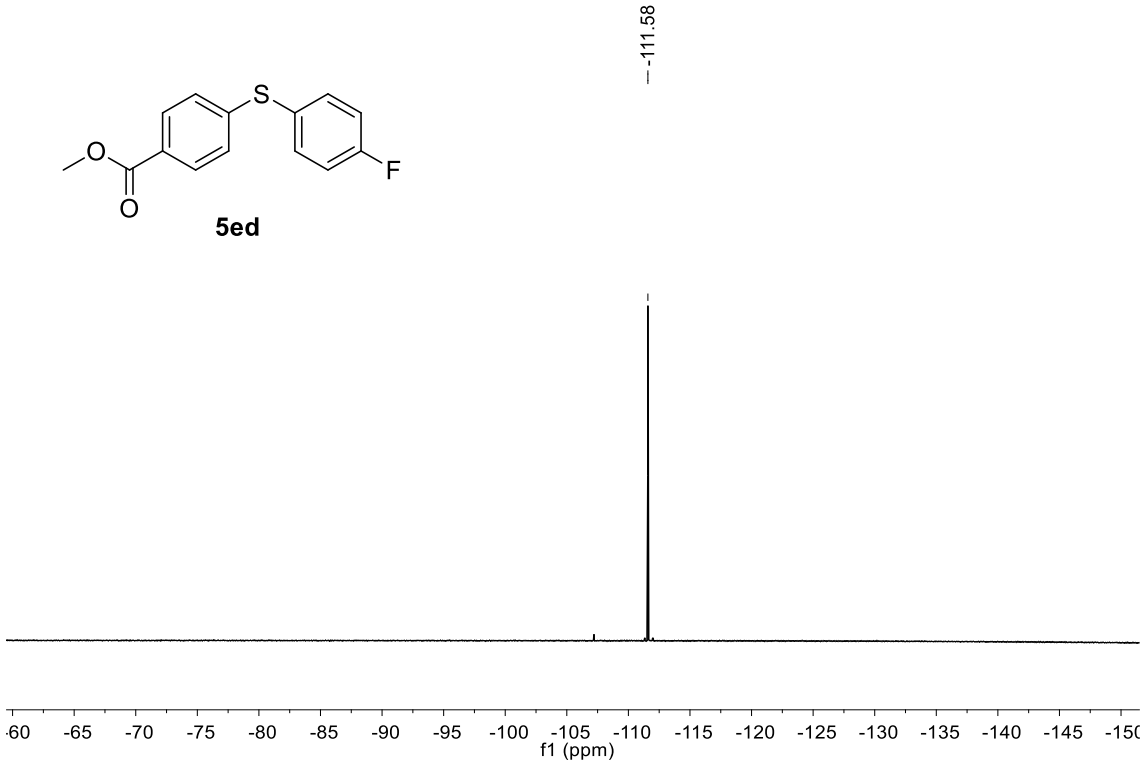

Figure S130 ^{19}F NMR (376 MHz) spectrum of **5ed** in $CDCl_3$