Electronic Supplementary Information

for

Electrochemical Selenocyclization of 2-Ethynylanilines with Diselenides: A Facile and Efficient Access to 3-Selenylindoles

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1. General and experimental details

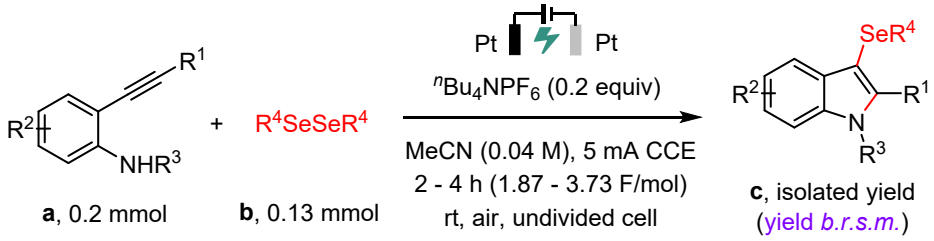
1.1 General information

All commercially available reagents (AR grade) were directly used as received without further purification. The electrochemical reactions were performed on DJS-292B potentiostats (made in China) in constant current mode with high purity metal or graphite electrodes (> 99.99%). All yields of products refer to the isolated yields after chromatography that performed on 200 ~ 300 mesh silica gel with PE (petroleum ether) / EtOAc or PE / DCM (dichloromethane) as eluents. After each electrochemical reaction, the electrodes were washed with EtOAc, DCM and/or acetone, then deionized water and/or 1.0 M HCl, and wiped with lens tissue; if necessary, gentle polish was further conducted using 2000 and 8000 mesh sandpapers.

^{1}H NMR (400 MHz), ^{13}C NMR (101 MHz) and ^{19}F NMR (376 MHz) spectra were recorded on a Bruker AV-400 spectrometer with $CDCl_3$ as the solvent. For ^{1}H NMR, the signal of $CDCl_3$ (δ = 7.26 ppm) or tetramethylsilane (TMS, δ = 0.00 ppm) serves as the internal standard; for proton decoupled ^{13}C $\{^{1}H\}$ NMR, the signal of $CDCl_3$ (δ = 77.16 ppm) serves as the internal standard. Data are reported as follows: chemical shift (in ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, p = quintet, hept = heptet, m = multiplet, br = broad), coupling constant (in Hz), and integration. GC-MS analysis was performed on a 7890A-5975C/Agilent. HR-MS spectra were recorded on a Bruker Esquire LC mass spectrometer using electrospray ionization. Cyclic voltammetry studies were conducted on an IKA ElectraSyn 2.0 with a glassy carbon working electrode, a Pt plate counter electrode and an Ag/AgCl reference electrode (filled with 3.0 M KCl aq.).

2-Ethynylaniline substrates **1a** – **38a** were prepared by the methods described in our previous work (and the references therein) [1]. Diselenide substrates **2b** – **4b** were synthesized by means of a reported method [2], while **1b**, **5b**, **6b**, disulfide **7b**, and ditelluride **8b** were purchased form commercial sources. All the characterization data of known substrates were in good agreement with those reported previously: (**1a** – **4a**, **6a** – **16a**, **18a** – **24a**, **26a**, **28a** – **38a**) [1], **5a** [3], **17a** [4], (**2b** – **4b**) [2].

1.2 General procedure for the electrochemical selenocyclization



To a 10 mL reaction tube with a magnetic stir bar were added substrates **a** (0.2 mmol) and **b** (0.13 mmol, 0.65 equiv), followed by electrolyte $^{n}Bu_4NPF_6$ (15.5 mg, 0.04 mmol, 0.2 equiv) and solvent MeCN (5.0 mL, 0.04 M to **a**, 0.008 M to $^{n}Bu_4NPF_6$). *For substrates **35a** and **38a** which showed poor solubility, additional 5.0 mL DCM and 0.2 equiv of $^{n}Bu_4NPF_6$ were added.* Then the tube was equipped with two platinum plate electrodes (10×10×0.2 mm, 6 mm apart, the plates were totally immersed in the solution). The 5 mA (5 mA/cm^2) constant current electrolysis was performed at room temperature under air atmosphere with 600 rpm magnetic stirring. After the indicated time as determined by TLC analysis (2 - 4 h, 1.87 - 3.73 F/mol, the voltages generally ranged from ~3.5 V to ~4.5 V during the electrolysis), the electrodes were detached from the power source and rinsed with EtOAc or DCM, and the resulting mixture was transferred to a flask to have the solvent removed under reduced pressure. Further purification by column chromatography on silica gel (eluted with EtOAc/PE or DCM/PE) afforded the desired product **c**.

For some substrates with distinct incomplete conversion (*in all these cases, no more obvious conversion of **a** was observed at 3 or 4 h, as monitored by TLC analysis*), the unreacted 2-ethynylanilines were recovered by column chromatography along with the isolation of desired products **c**.

On the basis of the isolated yield of **c** and the corresponding recovered **a**, the yields *b.r.s.m.* (based on the recovered starting material) were calculated as follows:

$$Yield\ b.r.s.m.\ of\ c\ =\ \frac{Isolated\ yield\ of\ c}{1-Recovered\ yield\ of\ a}$$

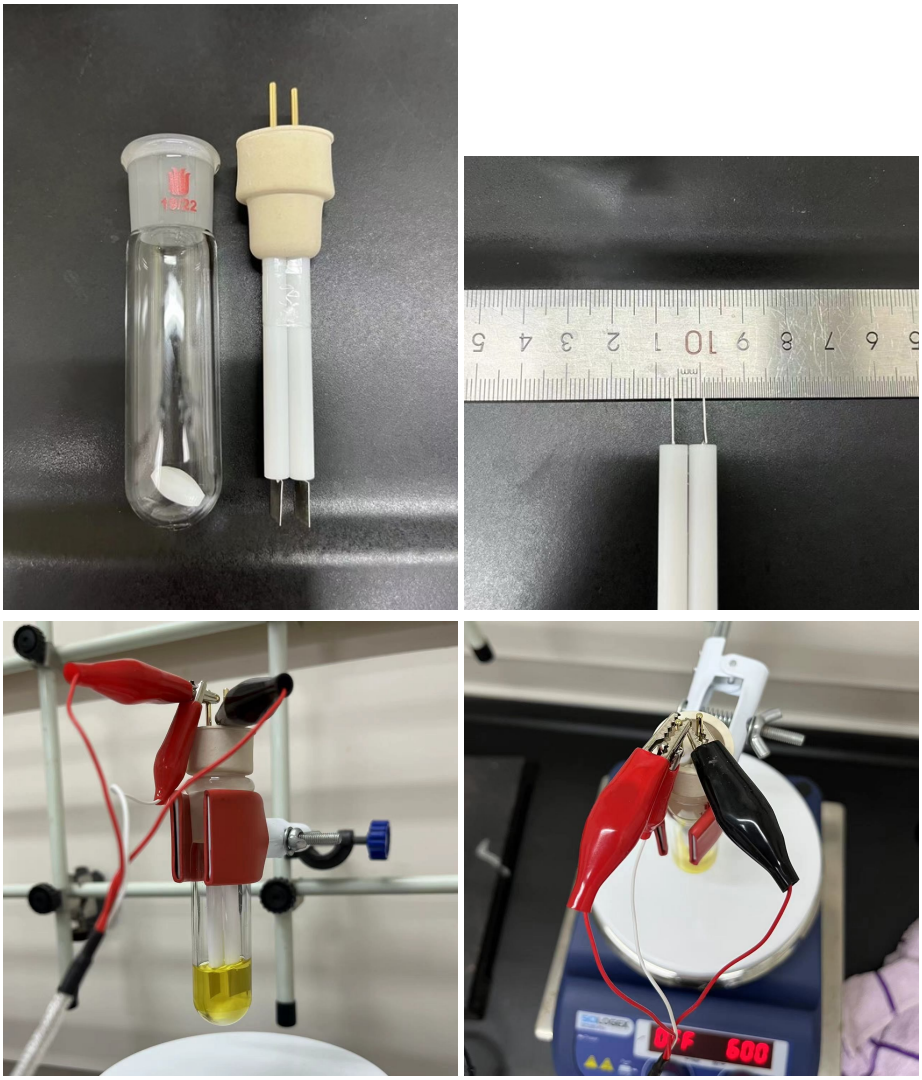
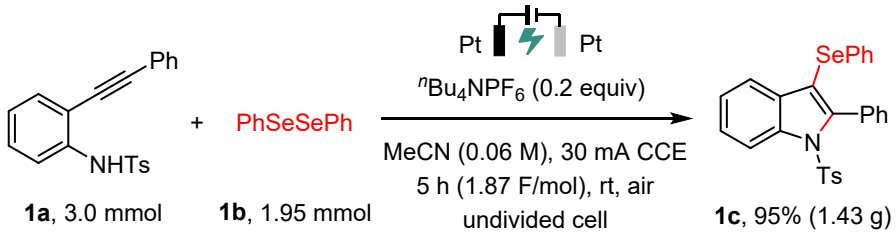


Fig. S1 Setup for the electrochemical selenocyclization.

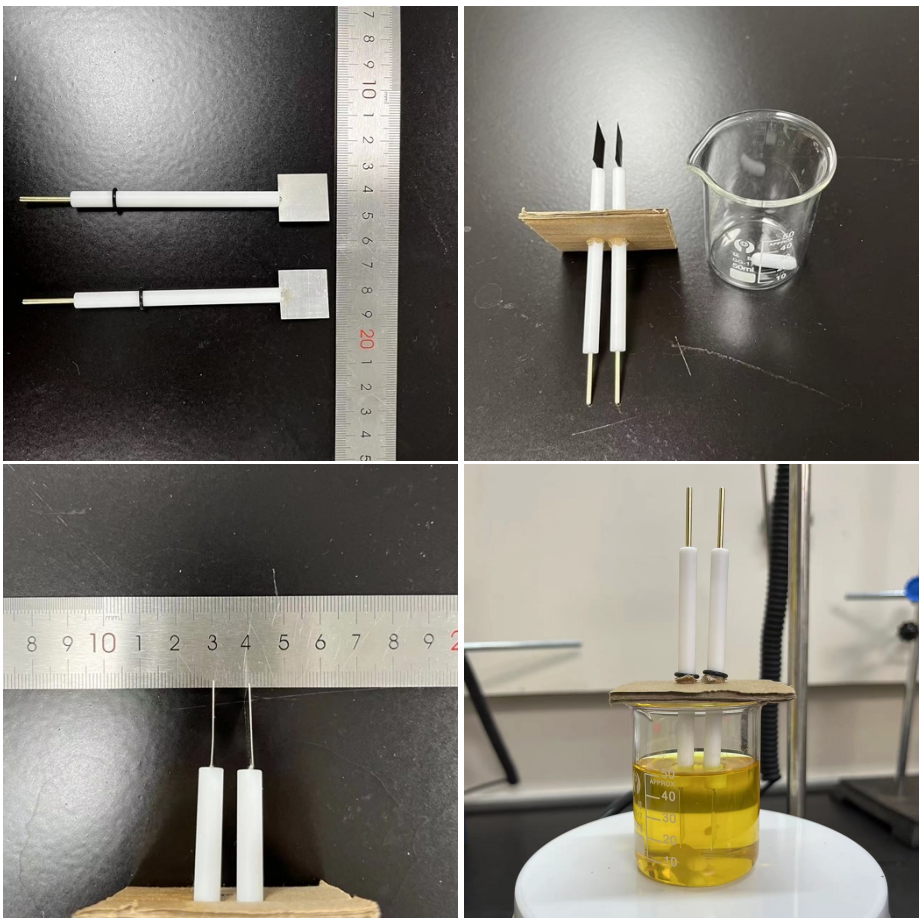
1.3 Procedure for the gram-scale electrosynthesis



1a, 3.0 mmol **1b**, 1.95 mmol **1c**, 95% (1.43 g)

Substrates **1a** (1.04 g, 3.0 mmol), **1b** (609 mg, 1.95 mmol, 0.65 equiv) and ^{n}Bu$_4$NPF$_6$ (232 mg, 0.6 mmol, 0.2 equiv) were placed in a 50 mL beaker with a magnetic stir bar. Solvent MeCN (50 mL, 0.06 M to **1a**, 0.012 M to ^{n}Bu$_4$NPF$_6$) was then added, after which the mixture was stirred for several minutes until the dissolution of all solid compounds. The beaker was equipped with two Pt

electrodes (20 x 20 x 0.2 mm, fixed on the paperboard, approximately 1 cm apart), and the system was electrolyzed with 30 mA (7.5 mA/cm^2) constant current. The reaction was monitored by TLC, which revealed the disappearance of **1a** at 5 h (1.87 F/mol, the voltage ranged from ~5.5 V to ~6.5 V during the electrolysis). The resulting mixture was then transferred to a flask to have the solvent removed under reduced pressure. Further purification by column chromatography on silica gel afforded the desired product **1c** as a white solid (1.43g, 95%).



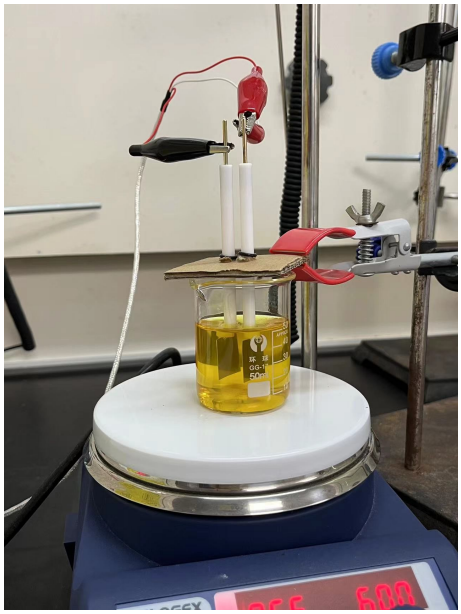
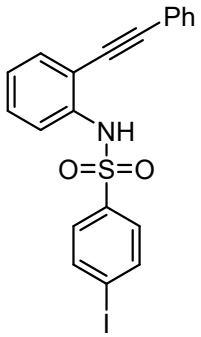


Fig. S2 Setup for the gram-scale electrosynthesis.

2. Characterization data

2.1 Characterization data for unreported substrates



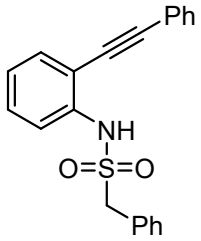
25a: 4-iodo-*N*-(2-(phenylethynyl)phenyl)benzenesulfonamide

Light yellow solid, m. p.: 112 – 115 ℃.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 – 7.65 (m, 2H), 7.62 (d, J = 8.3 Hz, 1H), 7.53 – 7.36 (m, 8H), 7.35 – 7.29 (m, 1H), 7.23 – 7.15 (m, 1H), 7.12 (t, J = 7.6 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 138.8, 138.4, 137.1, 132.3, 131.7, 129.9, 129.4, 128.8, 128.7, 125.4, 122.0, 121.4, 115.5, 101.0, 96.4, 83.7.

HRMS (ESI) calculated for $C_{20}H_{15}INO_2S^+$ m/z $[M+H]^+$: 459.9863, found: 459.9859.



27a: 1-phenyl-*N*-(2-(phenylethynyl)phenyl)methanesulfonamide

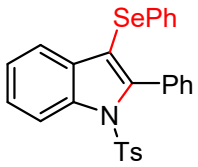
Light yellow solid, m. p.: 92 – 94 ℃.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (dd, J = 8.4, 1.1 Hz, 1H), 7.51 (dd, J = 7.8, 1.6 Hz, 1H), 7.39 – 7.30 (m, 6H), 7.29 – 7.20 (m, 5H), 7.12 (td, J = 7.6, 1.1 Hz, 1H), 6.98 (s, 1H), 4.39 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 138.1, 132.4, 131.7, 130.9, 130.1, 129.2, 129.0, 128.5, 128.2, 124.1, 121.9, 117.5, 113.2, 97.2, 83.4, 57.8.

HRMS (ESI) calculated for $C_{21}H_{18}NO_2S^+$ m/z $[M+H]^+$: 348.1053, found: 348.1049.

2.2 Characterization data for products



1c: 2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole [5]

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **1a** and **1b** as the substrates (in 0.2 mmol scale); the gram-scale reaction was run with 30 mA CCE for 5 h (1.87 F/mol) with **1a** and **1b** (in 3.0 mmol scale).

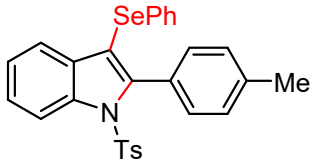
White solid, m. p.: 164 – 165 °C.

93.5 mg, 0.186 mmol, 93% isolated yield.

Gram-scale: 1.43g, 2.85 mmol, 95% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.42 – 8.33 (m, 1H), 7.49 – 7.36 (m, 5H), 7.36 – 7.30 (m, 4H), 7.29 – 7.23 (m, 1H), 7.13 – 7.00 (m, 5H), 6.98 – 6.89 (m, 2H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.0, 137.7, 135.2, 132.3, 132.0, 131.8, 131.1, 129.6, 129.4, 129.3, 129.2, 127.3, 127.1, 126.2, 125.9, 124.8, 121.4, 116.4, 110.7, 110.7, 21.8.



2c: 3-(phenylselanyl)-2-(*p*-tolyl)-1-tosyl-1*H*-indole [5]

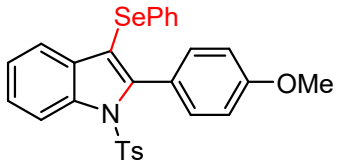
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **2a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 161 – 162 °C.

101.6 mg, 0.196 mmol, 98% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (dt, J = 8.5, 1.0 Hz, 1H), 7.46 – 7.36 (m, 2H), 7.32 (d, J = 8.1 Hz, 2H), 7.28 – 7.17 (m, 5H), 7.11 – 7.06 (m, 3H), 7.05 – 7.00 (m, 2H), 6.97 – 6.89 (m, 2H), 2.43 (s, 3H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.3, 145.0, 139.3, 137.7, 135.1, 132.4, 132.1, 131.6, 129.5, 129.3, 129.1, 128.1, 127.0, 126.1, 125.7, 124.8, 121.3, 116.5, 110.4, 21.7, 21.7.



3c: 2-(4-methoxyphenyl)-3-(phenylselanyl)-1-tosyl-1*H*-indole [5]

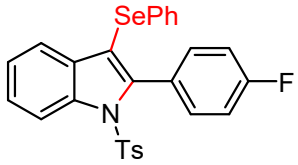
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **3a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 169 – 171 °C.

102.4 mg, 0.192 mmol, 96% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (d, J = 8.4 Hz, 1H), 7.47 – 7.36 (m, 2H), 7.33 – 7.21 (m, 5H), 7.12 – 7.00 (m, 5H), 6.97 – 6.86 (m, 4H), 3.86 (s, 3H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.4, 145.1, 144.9, 137.7, 135.1, 133.1, 132.4, 132.1, 129.5, 129.2, 129.1, 127.0, 126.1, 125.7, 124.8, 123.1, 121.2, 116.5, 112.8, 110.2, 77.5, 77.2, 76.8, 55.4, 21.7.



4c: 2-(4-fluorophenyl)-3-(phenylselanyl)-1-tosyl-1*H*-indole [5]

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **4a** and **1b** as the substrates (in 0.2 mmol scale).

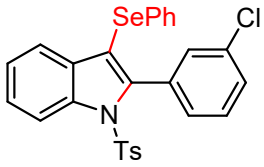
White solid, m. p.: 140 – 141 °C.

59.4 mg, 0.114 mmol, 57% isolated yield.

Recovered substrate **4a**:19.7 mg (0.054 mmol, 27%), 78% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (dt, J = 8.5, 0.9 Hz, 1H), 7.51 – 7.38 (m, 2H), 7.33 – 7.22 (m, 5H), 7.13 – 7.00 (m, 7H), 6.96 – 6.87 (m, 2H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 163.4 (d, J = 249.3 Hz), 145.2, 143.9, 137.7, 135.1, 133.7 (d, J = 8.3 Hz), 132.2, 131.8, 129.6, 129.4, 129.2, 127.0 (d, J = 4.4 Hz), 126.3, 126.0, 124.9, 121.4, 116.4, 114.5 (d, J = 21.9 Hz), 111.0, 21.8.



5c: 2-(3-chlorophenyl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 3 h (2.80 F/mol) with **5a** and **1b** as the substrates (in 0.2 mmol scale).

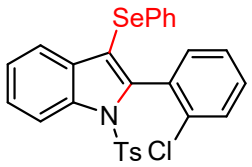
Light yellow solid, m. p.: 138 – 141 °C.

89.1 mg, 0.166 mmol, 83% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, J = 8.4 Hz, 1H), 7.51 – 7.46 (m, 1H), 7.46 – 7.38 (m, 2H), 7.35 – 7.26 (m, 4H), 7.26 – 7.21 (m, 1H), 7.15 – 7.02 (m, 6H), 7.00 – 6.92 (m, 2H), 2.35 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.3, 143.0, 137.6, 135.1, 133.2, 132.8, 132.0, 131.6, 130.0, 129.8, 129.7, 129.3, 129.2, 128.6, 127.0, 126.5, 126.2, 124.9, 121.5, 116.3, 111.4, 21.8.

HRMS (ESI) calculated for $C_{27}H_{21}ClNO_2SSe^+$ m/z $[M+H]^+$: 538.0141, found: 538.0143.



6c: 2-(2-chlorophenyl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 3 h (2.80 F/mol) with **6a** and **1b** as the substrates (in 0.2 mmol scale).

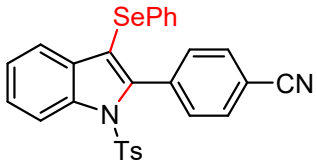
White solid, m. p.: 145 – 148 °C.

96.6 mg, 0.180 mmol, 90% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$)) δ 8.32 (d, J = 8.4 Hz, 1H), 7.53 – 7.44 (m, 4H), 7.41 (td, J = 7.4, 1.4 Hz, 2H), 7.30 (td, J = 7.4, 1.5 Hz, 1H), 7.27 – 7.19 (m, 2H), 7.14 (d, J = 8.1 Hz, 2H), 7.12 – 7.03 (m, 5H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.3, 140.7, 137.0, 136.2, 135.6, 133.5, 131.2, 131.1, 130.9, 130.8, 130.2, 129.7, 129.3, 129.1, 127.3, 126.4, 125.9, 125.8, 124.3, 121.5, 115.4, 110.9, 21.8.

HRMS (ESI) calculated for $C_{27}H_{21}ClNO_2SSe^+$ m/z $[M+H]^+$: 538.0141, found: 538.0141.



7c: 4-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)benzonitrile [5]

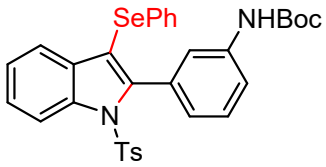
Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **7a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 218 – 220 ℃.

70.6 mg, 0.134 mmol, 67% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (dd, J = 8.5, 1.8 Hz, 1H), 7.67 (dd, J = 8.2, 2.0 Hz, 2H), 7.53 – 7.40 (m, 4H), 7.35 – 7.21 (m, 3H), 7.15 – 7.07 (m, 3H), 7.04 (td, J = 7.5, 7.1, 1.9 Hz, 2H), 6.89 (dd, J = 7.6, 2.1 Hz, 2H), 2.35 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.5, 142.5, 137.8, 135.9, 134.6, 132.3, 132.3, 131.4, 131.0, 129.7, 129.5, 129.3, 126.9, 126.6, 126.6, 125.2, 121.7, 118.8, 116.5, 112.8, 112.6, 21.8.



8c: *tert*-butyl (3-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)phenyl)carbamate

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **8a** and **1b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 71 – 74 ℃.

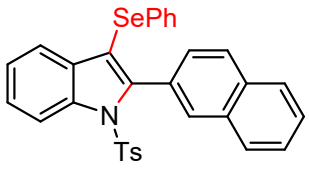
69.2 mg, 0.112 mmol, 56% isolated yield.

Recovered substrate **8a**: 37.0 mg (0.08 mmol, 40%), 93% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (d, J = 8.4 Hz, 1H), 7.57 (d, J = 8.2 Hz, 1H), 7.47 – 7.35 (m, 4H), 7.33 – 7.23 (m, 2H), 7.23 – 7.18 (m, 1H), 7.14 – 7.01 (m, 5H), 7.00 – 6.91 (m, 3H), 6.48 (s, 1H), 2.34 (s, 3H), 1.52 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 152.6, 145.0, 144.3, 137.6, 135.1, 132.1, 131.9, 131.8, 129.8, 129.7, 129.6, 129.1, 128.0, 127.2, 126.3, 126.2, 125.8, 124.7, 121.9, 121.4, 119.2, 116.3, 110.7, 80.7, 28.5, 21.7.

HRMS (ESI) calculated for $C_{32}H_{31}N_2O_4SSe^+$ m/z $[M+H]^+$: 619.1164, found: 619.1160.



9c: 2-(naphthalen-2-yl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **9a** and **1b** as the substrates (in 0.2 mmol scale).

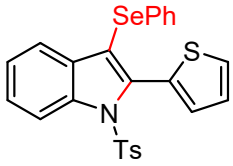
Light brown solid, m. p.: 157 – 159 ℃.

88.4 mg, 0.160 mmol, 80% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41 (d, J = 8.4 Hz, 1H), 7.94 – 7.83 (m, 2H), 7.75 (dd, J = 7.5, 1.7 Hz, 1H), 7.64 (s, 1H), 7.58 – 7.48 (m, 4H), 7.45 (ddd, J = 8.5, 7.2, 1.3 Hz, 1H), 7.33 – 7.27 (m, 3H), 7.14 – 7.02 (m, 5H), 7.01 – 6.93 (m, 2H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.1, 144.9, 137.8, 135.1, 133.6, 132.4, 132.3, 132.1, 131.2, 129.6, 129.5, 129.3, 129.2, 128.7, 128.5, 128.0, 127.1, 127.0, 126.7, 126.4, 126.3, 125.9, 124.8, 121.4, 116.5, 111.4, 21.7.

HRMS (ESI) calculated for $C_{31}H_{24}NO_2SSe^+$ m/z $[M+H]^+$: 554.0687, found: 554.0684.



10c: 3-(phenylselanyl)-2-(thiophen-2-yl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **10a** and **1b** as the substrates (in 0.2 mmol scale).

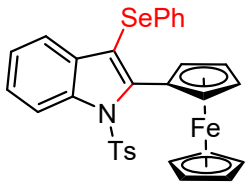
White solid, m. p.: 135 – 137 ℃.

80.3 mg, 0.158 mmol, 79% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, J = 8.5 Hz, 1H), 7.52 – 7.36 (m, 5H), 7.30 – 7.21 (m, 2H), 7.14 – 6.97 (m, 9H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.1, 137.9, 137.4, 135.2, 132.4, 131.9, 131.7, 130.7, 129.8, 129.6, 129.2, 128.8, 127.1, 126.4, 126.4, 126.2, 124.7, 121.5, 116.3, 113.1, 21.8.

HRMS (ESI) calculated for $C_{25}H_{20}NO_2S_2Se^+$ m/z $[M+H]^+$: 510.0095, found: 510.0094.



11c: 2-(ferrocen-1-yl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **11a** and **1b** as the substrates (in 0.2 mmol scale).

Red viscous oil.

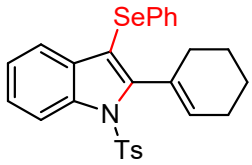
12.1 mg, 0.020 mmol, 10% isolated yield.

Recovered substrate **11a**: 45.5 mg (0.100 mmol, 50%), 20% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 (d, J = 8.3 Hz, 1H), 7.40 – 7.18 (m, 3H), 7.12 – 6.90 (m, 7H), 6.76 (d, J = 7.7 Hz, 2H), 5.02 (s, 2H), 4.43 (s, 2H), 4.16 (s, 5H), 2.31 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.7, 144.5, 139.1, 134.6, 133.3, 132.3, 129.2, 129.1, 128.9, 127.4, 126.0, 125.5, 125.2, 120.6, 118.5, 112.0, 72.7, 70.5, 68.3, 21.8.

HRMS (ESI) calculated for $C_{31}H_{26}FeNO_2SSe^+$ m/z $[M+H]^+$: 612.0193, found: 612.0192.



12c: 2-(cyclohex-1-en-1-yl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **12a** and **1b** as the substrates (in 0.2 mmol scale).

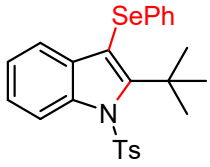
Light yellow solid, m. p.: 125 – 127 °C.

74.7 mg, 0.148 mmol, 74% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.27 (d, J = 8.3 Hz, 1H), 7.63 – 7.56 (m, 2H), 7.38 – 7.30 (m, 2H), 7.22 – 7.13 (m, 3H), 7.08 (d, J = 3.2 Hz, 5H), 5.45 (tt, J = 3.8, 1.6 Hz, 1H), 2.85 – 2.54 (m, 1H), 2.34 (s, 3H), 2.25 – 2.16 (m, 2H), 2.10 – 1.93 (m, 1H), 1.88 – 1.56 (m, 4H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 147.3, 144.9, 137.1, 135.6, 132.5, 132.2, 132.1, 130.9, 129.6, 129.5, 129.1, 127.0, 126.1, 125.3, 124.3, 121.3, 115.6, 108.4, 30.8, 25.7, 22.7, 21.9, 21.7.

HRMS (ESI) calculated for $C_{27}H_{26}NO_2SSe^+$ m/z $[M+H]^+$: 508.0844, found: 508.0847.



13c: 2-(*tert*-butyl)-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **13a** and **1b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 93 – 96 °C.

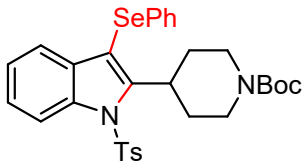
25.8 mg, 0.054 mmol, 27% isolated yield.

Recovered substrate **13a**: 30.1 mg (0.092 mmol, 46%), 50% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, J = 8.3 Hz, 1H), 7.33 (d, J = 8.3 Hz, 2H), 7.20 (dt, J = 8.4, 4.3 Hz, 1H), 7.11 (t, J = 7.2 Hz, 1H), 7.06 – 6.98 (m, 6H), 6.91 (d, J = 7.7 Hz, 2H), 2.30 (s, 3H), 1.79 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 155.7, 144.3, 140.1, 134.9, 133.0, 132.0, 129.7, 129.1, 128.9, 127.4, 126.3, 125.2, 125.1, 121.2, 118.4, 116.2, 37.5, 32.5, 21.7.

HRMS (ESI) calculated for $C_{25}H_{26}NO_2SSe^+$ m/z $[M+H]^+$: 484.0844, found: 508.0847.



14c: *tert*-butyl 4-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)piperidine-1-carboxylate

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **14a** and **1b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 77 – 80 ℃.

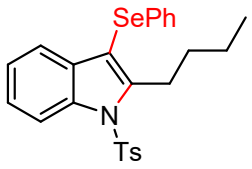
48.8 mg, 0.080 mmol, 40% isolated yield.

Recovered substrate **14a**: 39.2 mg (0.086 mmol, 43%), 70% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.32 (d, J = 8.4 Hz, 1H), 7.64 (d, J = 8.2 Hz, 2H), 7.41 (d, J = 7.8 Hz, 1H), 7.37 – 7.30 (m, 1H), 7.29 – 7.24 (m, 2H), 7.20 (t, J = 7.5 Hz, 1H), 7.13 – 7.08 (m, 3H), 7.04 – 6.98 (m, 2H), 4.11 (d, J = 13.1 Hz, 2H), 3.80 (tt, J = 12.1, 3.4 Hz, 1H), 2.65 (t, J = 13.0 Hz, 2H), 2.40 (s, 3H), 2.31 (qd, J = 12.5, 4.2 Hz, 2H), 1.48 – 1.36 (m, 11H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 155.1, 147.5, 145.5, 137.2, 137.0, 132.3, 131.9, 130.2, 129.3, 128.5, 126.5, 126.0, 125.4, 124.2, 120.6, 115.4, 105.9, 79.7, 44.9, 36.1, 30.9, 28.6, 21.8.

HRMS (ESI) calculated for $C_{31}H_{35}N_2O_4SSe^+$ m/z $[M+H]^+$: 611.1477, found: 611.1473.



15c: 2-butyl-3-(phenylselanyl)-1-tosyl-1*H*-indole [6]

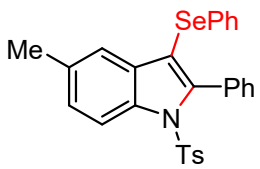
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **15a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 74 – 76 ℃.

90.7 mg, 0.188 mmol, 94% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (d, J = 8.3 Hz, 1H), 7.60 (d, J = 8.4 Hz, 2H), 7.42 (d, J = 7.7 Hz, 1H), 7.33 – 7.26 (m, 1H), 7.24 – 7.14 (m, 3H), 7.10 – 6.97 (m, 5H), 3.30 – 3.20 (m, 2H), 2.34 (s, 3H), 1.70 – 1.58 (m, 2H), 1.38 (h, J = 7.4 Hz, 2H), 0.89 (t, J = 7.3 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 147.3, 145.0, 137.2, 136.0, 132.1, 132.0, 129.9, 129.2, 129.0, 128.9, 128.9, 126.4, 126.1, 125.0, 124.3, 120.7, 115.4, 108.1, 33.4, 28.4, 22.8, 21.7, 13.9.



16c: 5-methyl-2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole [7]

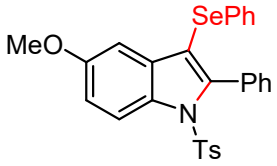
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **16a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 157 – 160 ℃.

96.7 mg, 0.192 mmol, 96% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 (d, J = 8.4 Hz, 1H), 7.47 – 7.40 (m, 1H), 7.40 – 7.34 (m, 2H), 7.34 – 7.27 (m, 4H), 7.27 – 7.20 (m, 2H), 7.12 – 6.99 (m, 5H), 6.91 (dt, J = 7.8, 1.1 Hz, 2H), 2.37 (s, 3H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.3, 144.9, 135.9, 135.1, 134.6, 132.6, 132.2, 131.7, 131.1, 129.5, 129.3, 129.1, 129.1, 127.3, 127.2, 127.0, 126.0, 121.1, 116.2, 110.4, 21.7, 21.5.



17c: 5-methoxy-2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **17a** and **1b** as the substrates (in 0.2 mmol scale).

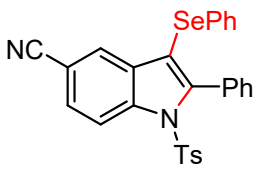
Light yellow solid, m. p.: 114 – 116 ℃.

104.4 mg, 0.196 mmol, 98% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (dd, J = 9.0, 1.7 Hz, 1H), 7.48 – 7.42 (m, 1H), 7.42 – 7.35 (m, 2H), 7.33 (d, J = 7.5 Hz, 2H), 7.27 (td, J = 7.6, 6.6, 1.8 Hz, 2H), 7.08 (d, J = 7.8 Hz, 3H), 7.07 – 6.97 (m, 3H), 6.93 (d, J = 7.8 Hz, 2H), 6.86 (s, 1H), 3.72 (s, 3H), 2.35 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.5, 145.8, 144.9, 134.9, 133.7, 132.1, 131.9, 131.7, 131.1, 129.5, 129.4, 129.3, 129.2, 127.3, 127.0, 126.2, 117.7, 114.9, 110.9, 103.4, 55.7, 21.8.

HRMS (ESI) calculated for $C_{28}H_{24}NO_3SSe^+$ m/z $[M+H]^+$: 534.0637, found: 534.0640.



18c: 2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole-5-carbonitrile

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **18a** and **1b** as the substrates (in 0.2 mmol scale).

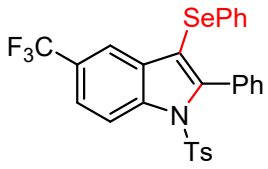
White solid, m. p.: 141 – 143 ℃.

87.1 mg, 0.166 mmol, 83% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.48 (dd, J = 8.8, 1.8 Hz, 1H), 7.81 (d, J = 1.8 Hz, 1H), 7.65 (dd, J = 8.7, 1.8 Hz, 1H), 7.52 – 7.45 (m, 1H), 7.39 (td, J = 7.7, 1.9 Hz, 2H), 7.32 – 7.21 (m, 4H), 7.16 – 7.05 (m, 5H), 7.00 – 6.94 (m, 2H), 2.37 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 146.9, 145.8, 139.5, 135.0, 132.3, 131.8, 130.8, 130.0, 129.9, 129.8, 129.4, 128.7, 127.5, 127.1, 126.9, 126.2, 119.3, 117.1, 109.9, 108.2, 21.8.

HRMS (ESI) calculated for $C_{28}H_{21}N_2O_2SSe^+$ m/z $[M+H]^+$: 529.0483, found: 529.0487.



19c: 2-phenyl-3-(phenylselanyl)-1-tosyl-5-(trifluoromethyl)-1*H*-indole [5]

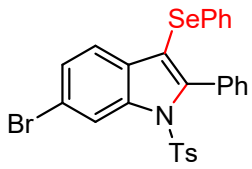
Following the General Procedure, the 5 mA CCE was kept for 3 h (2.80 F/mol) with **19a** and **1b** as the substrates (in 0.2 mmol scale).

Colorless viscous oil.

105.0 mg, 0.184 mmol, 92% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.49 (d, J = 8.8 Hz, 1H), 7.77 (s, 1H), 7.65 (d, J = 8.8 Hz, 1H), 7.46 (t, J = 7.5 Hz, 1H), 7.38 (t, J = 7.6 Hz, 2H), 7.33 – 7.21 (m, 4H), 7.13 – 7.02 (m, 5H), 6.99 – 6.91 (m, 2H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 146.5 145.6 139.1, 135.1 132.1, 131.8 131.3 130.4 129.9 129.8, 129.6, 129.3, 127.4, 127.1, 127.0 (q, J = 32.6 Hz), 126.6, 124.5 (q, J = 271.9 Hz), 122.4 (q, J = 3.5 Hz), 118.8 (q, J = 4.1 Hz), 116.6, 110.4, 21.8.



20c: 6-bromo-2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **20a** and **1b** as the substrates (in 0.2 mmol scale).

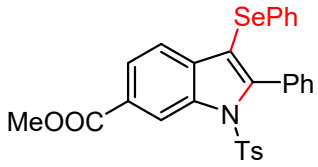
White solid, m. p.: 161 – 164 ℃.

94.2 mg, 0.162 mmol, 81% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (d, J = 1.9 Hz, 1H), 7.45 (t, J = 7.4 Hz, 1H), 7.41 – 7.33 (m, 3H), 7.33 – 7.22 (m, 5H), 7.15 – 7.01 (m, 5H), 6.97 – 6.88 (m, 2H), 2.36 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.4, 145.3, 138.2, 135.0, 131.8, 131.5, 131.0, 130.6, 129.7, 129.5, 129.2, 128.1, 127.3, 127.1, 126.4, 122.5, 119.4, 119.3, 110.2, 21.8.

HRMS (ESI) calculated for $C_{27}H_{21}BrNO_2SSe^+$ m/z $[M+H]^+$: 581.9636, found: 581.9641.



21c: methyl 2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-indole-6-carboxylate

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **21a** and **1b** as the substrates (in 0.2 mmol scale).

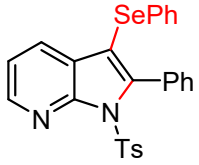
Light yellow solid, m. p.: 134 – 136 ℃.

91.9 mg, 0.164 mmol, 82% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 9.07 (d, J = 1.5 Hz, 1H), 7.97 (dd, J = 8.4, 1.6 Hz, 1H), 7.53 – 7.45 (m, 2H), 7.44 – 7.37 (m, 2H), 7.35 – 7.28 (m, 4H), 7.14 – 7.08 (m, 3H), 7.07 – 7.02 (m, 2H), 6.97 – 6.91 (m, 2H), 3.99 (s, 3H), 2.35 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 167.4, 147.7, 145.4, 137.1, 135.9, 135.0, 131.7, 131.5, 130.6, 129.7, 129.6, 129.2, 127.6, 127.4, 127.2, 126.5, 125.9, 121.1, 118.1, 110.5, 52.5, 21.8.

HRMS (ESI) calculated for $C_{29}H_{24}NO_4SSe^+$ m/z $[M+H]^+$: 562.0586, found: 562.0590.



22c: 2-phenyl-3-(phenylselanyl)-1-tosyl-1*H*-pyrrolo[2,3-b]pyridine [6]

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **22a** and **1b** as the substrates (in 0.2 mmol scale).

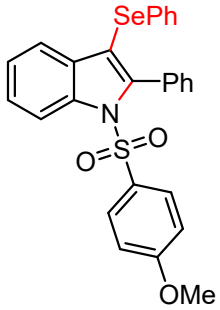
White solid, m. p.: 185 – 186 °C.

62.0 mg, 0.124 mmol, 62% isolated yield.

Recovered substrate **22a**: 20.9 mg (0.060 mmol, 30%), 89% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.52 (q, J = 2.1 Hz, 1H), 7.85 (d, J = 7.9 Hz, 2H), 7.71 (dd, J = 7.7, 2.0 Hz, 1H), 7.54 – 7.43 (m, 3H), 7.40 (d, J = 7.3 Hz, 2H), 7.24 – 7.16 (m, 3H), 7.14 – 7.02 (m, 5H), 2.37 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 149.5, 145.7, 145.2, 144.9, 135.9, 131.4, 131.3, 131.0, 130.1, 130.0, 129.6, 129.5, 129.4, 129.3, 128.1, 127.6, 126.6, 124.4, 120.1, 106.6, 21.8.



23c: 1-((4-methoxyphenyl)sulfonyl)-2-phenyl-3-(phenylselanyl)-1*H*-indole [5]

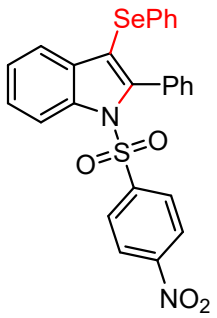
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **23a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 141 – 142 °C.

80.9 mg, 0.156 mmol, 78% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (d, J = 8.4 Hz, 1H), 7.49 – 7.30 (m, 9H), 7.30 – 7.23 (m, 1H), 7.11 – 6.99 (m, 3H), 6.97 – 6.89 (m, 2H), 6.79 – 6.69 (m, 2H), 3.78 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 163.9, 145.1, 137.7, 132.3, 132.0, 131.8, 131.1, 129.7, 129.3, 129.3, 129.2, 127.3, 126.2, 125.8, 124.8, 121.3, 116.5, 114.1, 110.6, 55.8.



24c: 1-((4-nitrophenyl)sulfonyl)-2-phenyl-3-(phenylselanyl)-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **24a** and **1b** as the substrates (in 0.2 mmol scale).

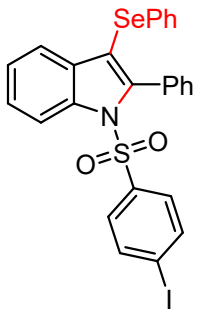
Light yellow solid, m. p.: 213 – 215 °C.

101.4 mg, 0.190 mmol, 95% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (d, J = 8.4 Hz, 1H), 8.13 (d, J = 8.6 Hz, 2H), 7.58 (d, J = 8.6 Hz, 2H), 7.53 – 7.37 (m, 5H), 7.36 – 7.28 (m, 3H), 7.11 (t, J = 7.2 Hz, 1H), 7.05 (t, J = 7.4 Hz, 2H), 6.97 (d, J = 7.1 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 150.7, 144.3, 142.9, 137.4, 132.5, 131.8, 131.3, 130.5, 129.9, 129.8, 129.3, 128.3, 127.6, 126.7, 126.4, 125.6, 124.1, 121.9, 116.4, 112.6.

HRMS (ESI) calculated for $C_{26}H_{19}N_2O_4SSe^+$ m/z $[M+H]^+$: 535.0225, found: 535.0222.



25c: 1-((4-iodophenyl)sulfonyl)-2-phenyl-3-(phenylselanyl)-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **25a** and **1b** as the substrates (in 0.2 mmol scale).

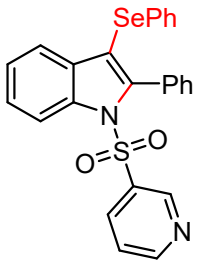
Light yellow solid, m. p.: 175 – 177 °C.

110.6 mg, 0.180 mmol, 90% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.34 (d, J = 8.6 Hz, 1H), 7.65 (dd, J = 8.6, 2.0 Hz, 2H), 7.49 – 7.36 (m, 5H), 7.34 – 7.24 (m, 3H), 7.14 – 7.04 (m, 5H), 6.93 (d, J = 6.9 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 144.7, 138.2, 137.6, 137.4, 132.5, 131.8, 130.8, 129.5, 129.3, 128.2, 127.4, 126.4, 126.1, 125.2, 121.6, 116.5, 111.6, 101.9.

HRMS (ESI) calculated for $C_{26}H_{19}INO_2SSe^+$ m/z $[M+H]^+$: 615.9341, found: 615.9342.



26c: 2-phenyl-3-(phenylselanyl)-1-(pyridin-3-ylsulfonyl)-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **26a** and **1b** as the substrates (in 0.2 mmol scale).

White solid, m. p.: 158 – 160 ℃.

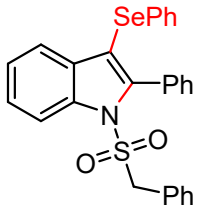
53.4 mg, 0.109 mmol, 55% isolated yield.

Recovered substrate **26a**: 26.1 mg (0.078 mmol, 39%), 90% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.71 (d, J = 4.8 Hz, 1H), 8.63 (d, J = 2.4 Hz, 1H), 8.36 (d, J = 8.4 Hz, 1H), 7.67 (dt, J = 8.2, 2.0 Hz, 1H), 7.51 – 7.37 (m, 5H), 7.36 – 7.27 (m, 3H), 7.26 – 7.20 (m, 1H), 7.12 – 7.02 (m, 3H), 6.96 (d, J = 7.3 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 154.4, 147.8, 144.4, 137.4, 134.6, 134.5, 132.4, 131.8, 131.4, 130.6, 129.8, 129.7, 129.3, 127.6, 126.5, 126.3, 125.4, 123.5, 121.7, 116.3, 112.0.

HRMS (ESI) calculated for $C_{25}H_{19}N_2O_2SSe^+$ m/z $[M+H]^+$: 491.0327, found: 491.0322.



27c: 1-(benzylsulfonyl)-2-phenyl-3-(phenylselanyl)-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **27a** and **1b** as the substrates (in 0.2 mmol scale).

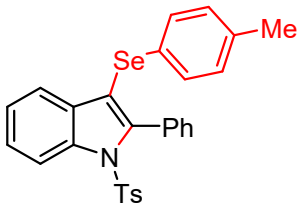
Light yellow solid, m. p.: 89 – 91 ℃.

93.2 mg, 0.186 mmol, 93% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (dd, J = 8.2, 1.0 Hz, 1H), 7.59 – 7.52 (m, 1H), 7.40 – 7.33 (m, 2H), 7.32 – 7.21 (m, 4H), 7.18 – 7.07 (m, 7H), 6.87 (dt, J = 7.0, 1.4 Hz, 2H), 6.72 (dd, J = 8.1, 1.4 Hz, 2H), 4.36 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.4, 136.9, 131.5, 131.3, 131.2, 130.8, 130.3, 129.4, 129.2, 129.1, 128.8, 127.1, 126.6, 126.5, 125.7, 124.5, 121.6, 114.8, 108.8, 59.5.

HRMS (ESI) calculated for $C_{27}H_{22}NO_2SSe^+$ m/z $[M+H]^+$: 504.0531, found: 504.0526.



28c: 2-phenyl-3-(*p*-tolylselanyl)-1-tosyl-1*H*-indole [5]

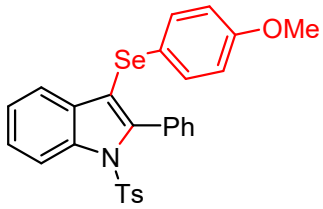
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **1a** and **2b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 181 – 183 ℃.

95.0 mg, 0.184 mmol, 92% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (dt, J = 8.4, 0.9 Hz, 1H), 7.48 – 7.43 (m, 2H), 7.42 – 7.36 (m, 3H), 7.35 – 7.29 (m, 4H), 7.28 – 7.23 (m, 1H), 7.09 (d, J = 8.2 Hz, 2H), 6.86 (s, 4H), 2.34 (s, 3H), 2.22 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 145.0, 144.7, 137.7, 136.1, 135.2, 132.3, 131.8, 131.1, 130.0, 129.8, 129.5, 129.3, 127.9, 127.3, 127.0, 125.8, 124.7, 121.4, 116.4, 111.1, 21.7, 21.1.



29c: 3-((4-methoxyphenyl)selanyl)-2-phenyl-1-tosyl-1*H*-indole [5]

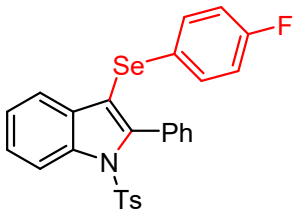
Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **1a** and **3b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 106 – 108 ℃.

103.3 mg, 0.194 mmol, 97% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.34 (d, J = 8.4 Hz, 1H), 7.50 – 7.35 (m, 5H), 7.35 – 7.27 (m, 4H), 7.27 – 7.21 (m, 1H), 7.06 (d, J = 7.9 Hz, 2H), 6.95 (dd, J = 8.7, 1.9 Hz, 2H), 6.65 – 6.54 (m, 2H), 3.69 (s, 3H), 2.31 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 158.8, 144.9, 144.1, 137.5, 135.2, 132.3, 132.2, 131.9, 131.2, 129.5, 129.2, 127.2, 127.0, 125.7, 124.6, 121.3, 121.3, 116.3, 114.9, 111.8, 55.3, 21.7.



30c: 3-((4-fluorophenyl)selanyl)-2-phenyl-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **1a** and **4b** as the substrates (in 0.2 mmol scale).

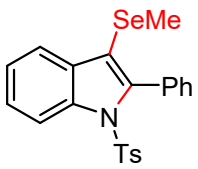
White solid, m. p.: 128 – 130 ℃.

92.6 mg, 0.178 mmol, 89% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, J = 8.4 Hz, 1H), 7.49 – 7.35 (m, 5H), 7.34 – 7.21 (m, 5H), 7.07 (d, J = 8.0 Hz, 2H), 6.94 (dd, J = 8.3, 5.2 Hz, 2H), 6.74 (t, J = 8.5 Hz, 2H), 2.32 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 161.8 (d, J = 245.7 Hz), 145.1, 144.7, 137.5, 135.2, 131.9, 131.9 (d, J = 7.4 Hz), 131.8, 131.0, 129.5, 129.3, 127.3, 127.0, 126.0 (d, J = 3.1 Hz), 125.9, 124.7, 121.1, 116.3, 116.3 (d, J = 21.7 Hz), 111.0, 21.7.

HRMS (ESI) calculated for $C_{27}H_{21}FNO_2SSe^+$ m/z $[M+H]^+$: 522.0437, found: 522.0433.



31c: 3-(methylselanyl)-2-phenyl-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **1a** and **5b** as the substrates (in 0.2 mmol scale).

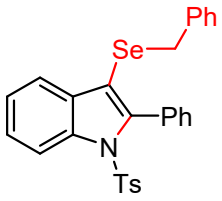
White solid, m. p.: 102 – 104 ℃.

84.5 mg, 0.192 mmol, 96% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, J = 8.3 Hz, 1H), 7.66 (dd, J = 7.7, 1.6 Hz, 1H), 7.52 – 7.40 (m, 4H), 7.40 – 7.33 (m, 3H), 7.33 – 7.27 (m, 2H), 7.08 (d, J = 8.0 Hz, 2H), 2.31 (s, 3H), 1.91 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 144.9, 143.0, 137.3, 135.4, 132.2, 132.0, 131.5, 129.5, 129.2, 127.3, 127.0, 125.6, 124.4, 121.0, 116.2, 111.5, 21.7, 8.1.

HRMS (ESI) calculated for $C_{22}H_{20}NO_2SSe^+$ m/z $[M+H]^+$: 442.0374, found: 442.0371.



32c: 3-(benzylselanyl)-2-phenyl-1-tosyl-1*H*-indole

Following the General Procedure, the 5 mA CCE was kept for 4 h (3.73 F/mol) with **1a** and **6b** as the substrates (in 0.2 mmol scale).

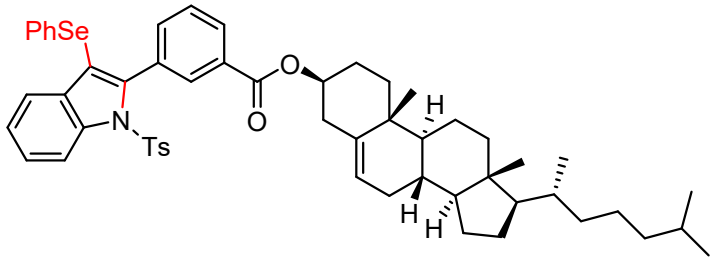
Light yellow oil.

79.6 mg, 0.154 mmol, 77% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (dd, J = 8.3, 1.0 Hz, 1H), 7.62 – 7.56 (m, 1H), 7.47 – 7.39 (m, 2H), 7.37 – 7.28 (m, 5H), 7.13 – 7.06 (m, 3H), 7.05 – 6.99 (m, 2H), 6.99 – 6.94 (m, 2H), 6.76 – 6.68 (m, 2H), 3.71 (s, 2H), 2.34 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 144.9, 144.6, 138.7, 137.1, 135.5, 132.4, 131.9, 131.1, 129.5, 129.0, 128.7, 128.3, 127.0, 127.0, 126.7, 125.5, 124.4, 121.0, 116.0, 110.2, 31.0, 21.7.

HRMS (ESI) calculated for $C_{28}H_{24}NO_2SSe^+$ m/z $[M+H]^+$: 518.0687, found: 518.0686.



35c: (3S,8S,9S,10R,13R,14S,17R)-10,13-dimethyl-17-((R)-6-methylheptan-2-yl)-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1*H*-cyclopenta[*a*]phenanthren-3-yl-3-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)benzoate

Following the General Procedure, with additional 5.0 mL DCM as co-solvent (10 mL solvent in total) and 0.2 equiv of $^{n}Bu_4NPF_6$ (0.4 equiv in total), the 5 mA CCE was kept for 4 h (3.73 F/mol) with **35a** and **1b** as the substrates (in 0.2 mmol scale).

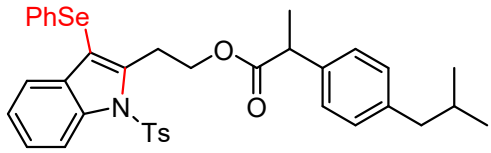
White solid, m. p.: 172 – 174 °C.

155.6 mg, 0.170 mmol, 85% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.38 (d, J = 8.4 Hz, 1H), 8.13 (d, J = 7.7 Hz, 1H), 7.89 (s, 1H), 7.58 – 7.39 (m, 4H), 7.33 – 7.23 (m, 3H), 7.13 – 6.99 (m, 5H), 6.94 (dd, J = 7.6, 2.6 Hz, 2H), 5.42 (s, 1H), 4.85 (tt, J = 10.8, 4.8 Hz, 1H), 2.47 – 2.28 (m, 5H), 2.08 – 1.88 (m, 4H), 1.87 – 1.79 (m, 1H), 1.71 – 1.43 (m, 7H), 1.41 – 1.30 (m, 3H), 1.27 – 0.96 (m, 14H), 0.93 (d, J = 6.5 Hz, 3H), 0.88 (s, 3H), 0.86 (s, 3H), 0.69 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 165.6, 145.2, 143.8, 139.8, 137.7, 136.0, 135.1, 132.6, 132.2, 131.7, 131.4, 130.4, 130.1, 129.7, 129.5, 129.2, 127.4, 127.0, 126.3, 126.1, 124.9, 122.9, 121.5, 116.4, 111.2, 74.8, 56.8, 56.3, 50.2, 42.5, 39.9, 39.7, 38.4, 37.2, 36.8, 36.3, 35.9, 32.1, 32.0, 28.4, 28.2, 28.0, 24.4, 24.0, 23.0, 22.7, 21.8, 21.2, 19.6, 18.9, 12.0.

HRMS (ESI) calculated for $C_{55}H_{66}NO_4SSe^+$ m/z $[M+H]^+$: 916.3872, found: 916.3873.



36c: 2-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)ethyl 2-(4-isobutylphenyl)propanoate

Following the General Procedure, the 5 mA CCE was kept for 3 h (2.80 F/mol) with **36a** and **1b** as the substrates (in 0.2 mmol scale).

Light yellow viscous oil.

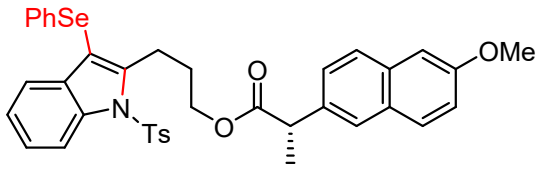
94.8 mg, 0.144 mmol, 72% isolated yield.

Recovered substrate **36a**:12.1 mg (0.024 mmol, 12%), 82% yield *b.r.s.m.*

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19 (d, J = 8.4 Hz, 1H), 7.56 (d, J = 8.0 Hz, 2H), 7.41 (d, J = 7.8 Hz, 1H), 7.32 (t, J = 7.8 Hz, 1H), 7.21 (t, J = 7.4 Hz, 1H), 7.16 – 7.00 (m, 7H), 6.97 (d, J = 7.5 Hz, 4H), 4.44 (dt, J = 11.8, 6.3 Hz, 1H), 4.28 (dt, J = 11.4, 6.4 Hz, 1H), 3.63 (hept, J = 8.0, 7.2 Hz, 2H), 3.54 (q, J = 7.2 Hz, 1H), 2.39 (d, J = 7.2 Hz, 2H), 2.33 (s, 3H), 1.80 (hept, J = 6.7 Hz, 1H), 1.41 (d, J = 7.1 Hz, 3H), 0.87 (s, 3H), 0.86 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 174.5, 145.2, 141.8, 140.5, 137.7, 137.3, 135.7, 131.7, 131.6, 130.0, 129.3, 129.2, 129.0, 127.3, 126.4, 126.2, 125.5, 124.4, 121.0, 115.4, 110.8, 64.1, 45.1, 45.1, 30.2, 28.1, 22.5, 21.7, 18.6.

HRMS (ESI) calculated for $C_{36}H_{38}NO_4SSe^+$ m/z $[M+H]^+$: 660.1681, found: 660.1680.



37c: 3-(3-(phenylselanyl)-1-tosyl-1*H*-indol-2-yl)propyl (S)-2-(6-methoxynaphthalen-2-yl)propanoate

Following the General Procedure, the 5 mA CCE was kept for 2 h (1.87 F/mol) with **37a** and **1b** as the substrates (in 0.2 mmol scale).

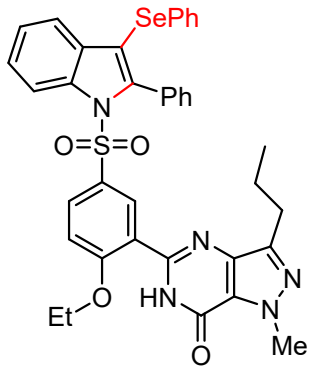
Light yellow viscous oil.

110.1 mg, 0.158 mmol, 79% isolated yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19 (d, J = 8.4 Hz, 1H), 7.70 – 7.60 (m, 3H), 7.53 (d, J = 8.0 Hz, 2H), 7.41 (t, J = 7.4 Hz, 2H), 7.30 (t, J = 7.8 Hz, 1H), 7.20 (q, J = 7.3 Hz, 1H), 7.13 – 6.97 (m, 7H), 6.93 (d, J = 7.5 Hz, 2H), 4.17 (dt, J = 11.5, 5.9 Hz, 1H), 4.08 (dt, J = 11.4, 5.8 Hz, 1H), 3.93 – 3.79 (m, 4H), 3.28 (td, J = 8.5, 4.3 Hz, 2H), 2.30 (s, 3H), 1.99 (td, J = 13.4, 6.6 Hz, 2H), 1.57 (d, J = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 157.7, 145.6, 145.1, 137.2, 135.9, 135.7, 133.8, 131.9, 131.7, 130.0, 129.5, 129.2, 129.1, 129.0, 127.2, 126.5, 126.4, 126.2, 126.1, 125.2, 124.4, 120.8, 119.0, 115.4, 108.9, 105.7, 64.3, 55.4, 45.6, 30.1, 25.6, 21.7, 18.7.

HRMS (ESI) calculated for $C_{38}H_{36}NO_5SSe^+$ m/z $[M+H]^+$: 698.1474, found: 698.1470.



38c: 5-(2-ethoxy-5-((2-phenyl-3-(phenylselanyl)-1*H*-indol-1-yl)sulfonyl)phenyl)-1-methyl-3-propyl-1,6-dihydro-7*H*-pyrazolo[4,3-*d*]pyrimidin-7-one

Following the General Procedure, with additional 5.0 mL DCM as co-solvent (10 mL solvent in total) and 0.2 equiv of ^{n}Bu$_4$NPF$_6$ (0.4 equiv in total), the 5 mA CCE was kept for 4 h (3.73 F/mol) with **38a** and **1b** as the substrates (in 0.2 mmol scale).

Light yellow solid, m. p.: 177 – 179 °C.

125.0 mg, 0.173 mmol, 87% isolated yield.

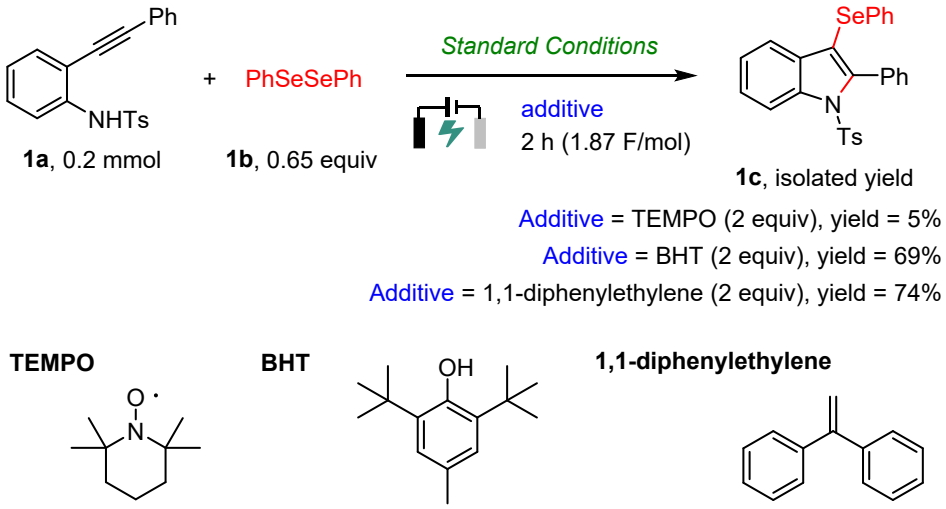
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.71 (s, 1H), 8.56 (t, J = 2.0 Hz, 1H), 8.37 (d, J = 8.4 Hz, 1H), 7.54 (dt, J = 8.8, 1.9 Hz, 1H), 7.49 – 7.35 (m, 7H), 7.31 – 7.22 (m, 1H), 7.05 – 6.94 (m, 5H), 6.92 (dd, J = 9.0, 1.4 Hz, 1H), 4.34 – 4.21 (m, 5H), 2.90 (t, J = 7.5 Hz, 2H), 1.83 (h, J = 7.3 Hz, 2H), 1.62 – 1.57 (m, 4H), 1.03 (td, J = 7.4, 1.4 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.0, 153.6, 147.2, 146.0, 144.8, 138.4, 137.5, 132.2, 131.7, 131.6, 131.2, 131.1, 131.1, 130.5, 129.7, 129.3, 129.1, 127.4, 126.3, 125.9, 124.9, 124.5, 121.5, 121.1, 116.2, 112.8, 111.1, 66.3, 38.4, 27.6, 22.4, 14.6, 14.2.

HRMS (ESI) calculated for $C_{37}H_{34}N_5O_4SSe^+$ m/z $[M+H]^+$: 724.1491, found: 724.1495.

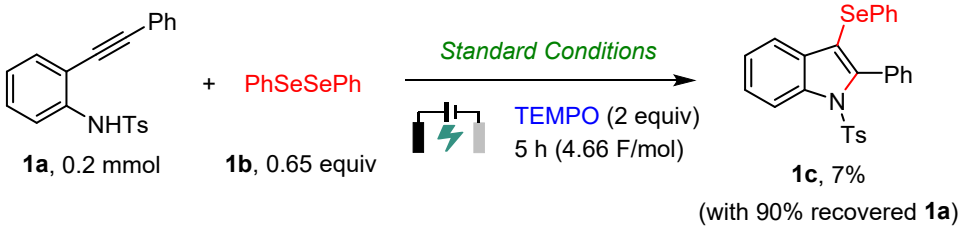
3. Mechanistic studies

3.1 Control experiments



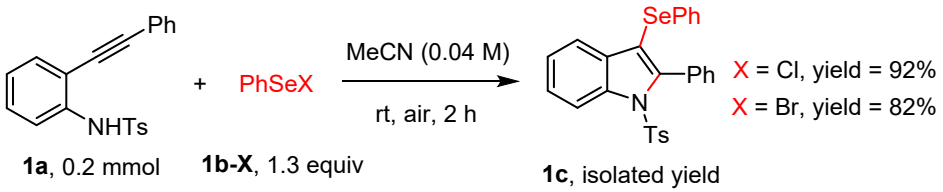
Three additives (2 equiv, usually used as "radical trapping reagents") were added to the reaction systems of **1a** and **1b** before electrolysis. After standard electrochemical procedures (5 mA CCE for 2 h, 1.87 F/mol), the desired product **1c** was isolated from the mixtures. The reaction efficiencies were affected to different degree (5% isolated yield of **1c** with TEMPO, 69% with BHT, and 74% with 1,1-diphenylethylene) with incomplete conversion of substrate **1a**. However, no radical adduct were detected in all these reaction systems.

Since electrochemical reactions are based on net redox processes on electrodes, we further measured the oxidation potentials of these additives as well as the substrates (see Section **3.2** below), to see whether competitive oxidations at anode would occur (for the most effective TEMPO, the answer should be yes).



The control reaction with 2 equiv of TEMPO was carried out once again, this time under a prolonged 5 mA CCE for 5 h (4.66 F/mol). However, the isolated yield of **1c** (7%) did not improve

obviously, and substrate **1a** was recovered in 90% yield. Such a result indicated that the preferentially oxidized TEMPO at anode might be continuously regenerated by cathodic reduction.



The selenocyclization carried out with phenylselenenyl halides (1.3 equiv) as $PhSe^+$ equivalents proceeded smoothly under non-electrochemical conditions. The reaction with PhSeCl provided the desired product **1c** in higher yield (while the system of PhSeBr showed a bit incomplete conversion of **1a**), which was exactly in accordance with the reactivity of two reagents (Se-Cl bond is more polarized than the corresponding Se-Br bond). This result suggest such an electrochemical selenocyclization is very like to proceed via RSe^+ intermediates.

3.2 Cyclic voltammetry studies

The electrolyte solution for CV studies was prepared with $^nBu_4NPF_6$ (0.1 M) in MeCN. The samples were prepared with 0.05 mmol of corresponding compound in 5 mL electrolyte solution (0.01 M). Measurements employed a glassy carbon working electrode, platinum plate counter electrode and an Ag/AgCl reference electrode. The applied scan rate was 100 mV/s, and the scans started from 0 V (initial E) to +2.5 V (high E), then back to 0 V (low E).

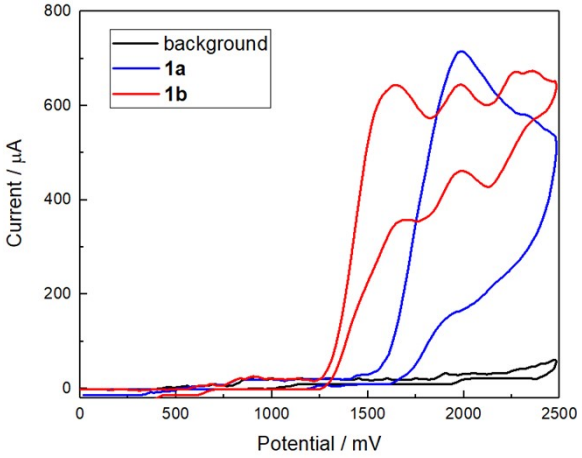


Fig S3. CV plots of **1a** and **1b**

The oxidation peak of **1a** appeared at +1.99 V; while for **1b**, clear oxidation peaks were observed at +1.64 V and +1.98 V. These results indicated that diselenide **1b** would be more easily oxidized at anode than 2-ethynylaniline **1a**, and a two-stage oxidation process of **1b** could be conceived.

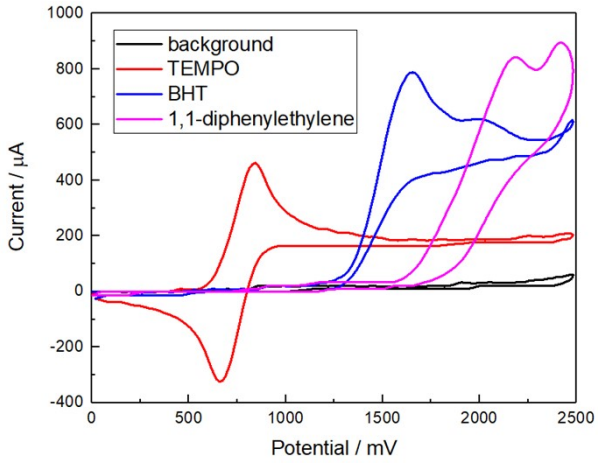


Fig S4. CV plots of TEMPO, BHT and 1,1-diphenylethylene

The oxidation peaks of TEMPO, BHT and 1,1-diphenylethylene appeared at + 0.84 V, +1.65 V and +2.18 V, respectively. The results revealed that TEMPO with significantly lower oxidation potential would be preferentially oxidized at anode when it was added to the model reaction, thereby suppressing the conversion.

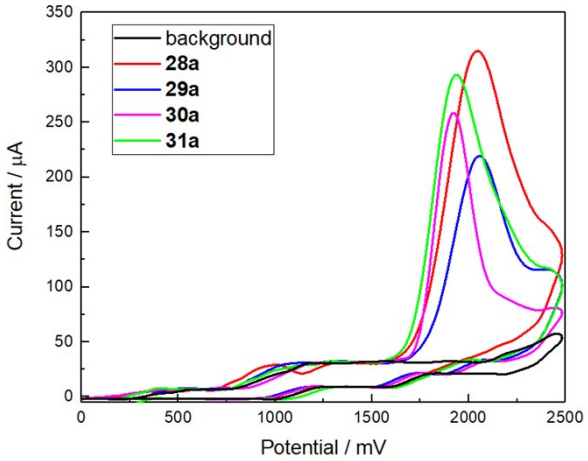


Fig S5. CV plots of 2-ethynylanilines **28a** – **31a**

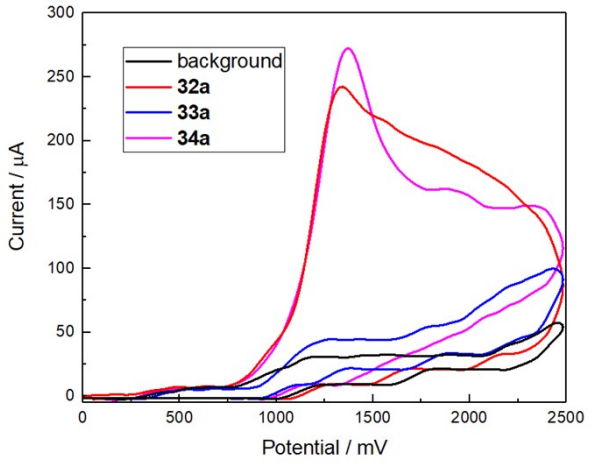


Fig S6. CV plots of 2-ethynylanilines **32a** – **34a**

The CV plots of unproductive 2-ethynylanilines **28a** – **34a** were then recorded, aiming to account for their inertness under the standard electrochemical conditions. From the plots, we can speculate that in the presence of **1b** (oxidation peak at +1.64 V), 2-ethynylanilines **32a** – **34a** that possessing lower oxidation potentials (oxidation peaks at +1.34 V, +1.28 V and +1.37 V, respectively) would get oxidized preferentially at the anode. Consequently, the key intermediate $PhSe^+$ would not be generated from **1b** in these systems to trigger the desired selenocyclization. While for other 2-ethynylanilines that possess close potentials (**28a** – **31a**, oxidation peaks at +2.05 V, +2.06 V, +1.93 V and +1.94 V, respectively) to **1a** (oxidation peak at +1.99 V), the inertness should be explained from other aspects (e.g. the reactivity of the alkyne part, etc.).

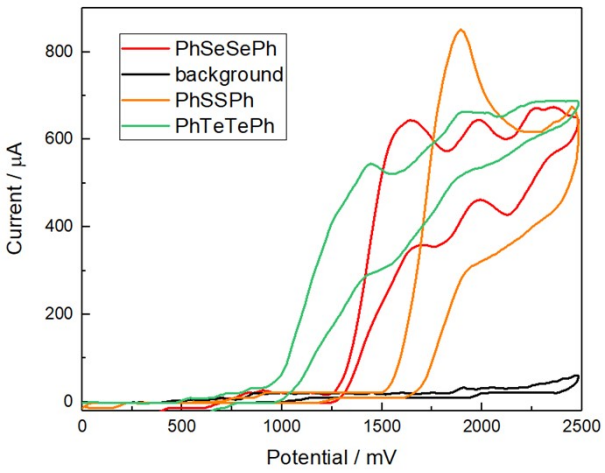


Fig S7. CV plots of PhSeSePh (**1b**), PhSSPh (**7b**) and PhTeTePh (**8b**)

The CV plots of PhSSPh (**7b**) and PhTeTePh (**8b**) were also recorded. The oxidation peak of **7b** appeared at +1.89 V, higher than the +1.64 V of **1b**; while the first oxidation peak of **8b** appeared at +1.44 V, lower than that of **1b**. Unfortunately, from these results, we could not reach any reasonable explanation for the incompatibility of these dichalcogenides.

4. References

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5. Copies of NM

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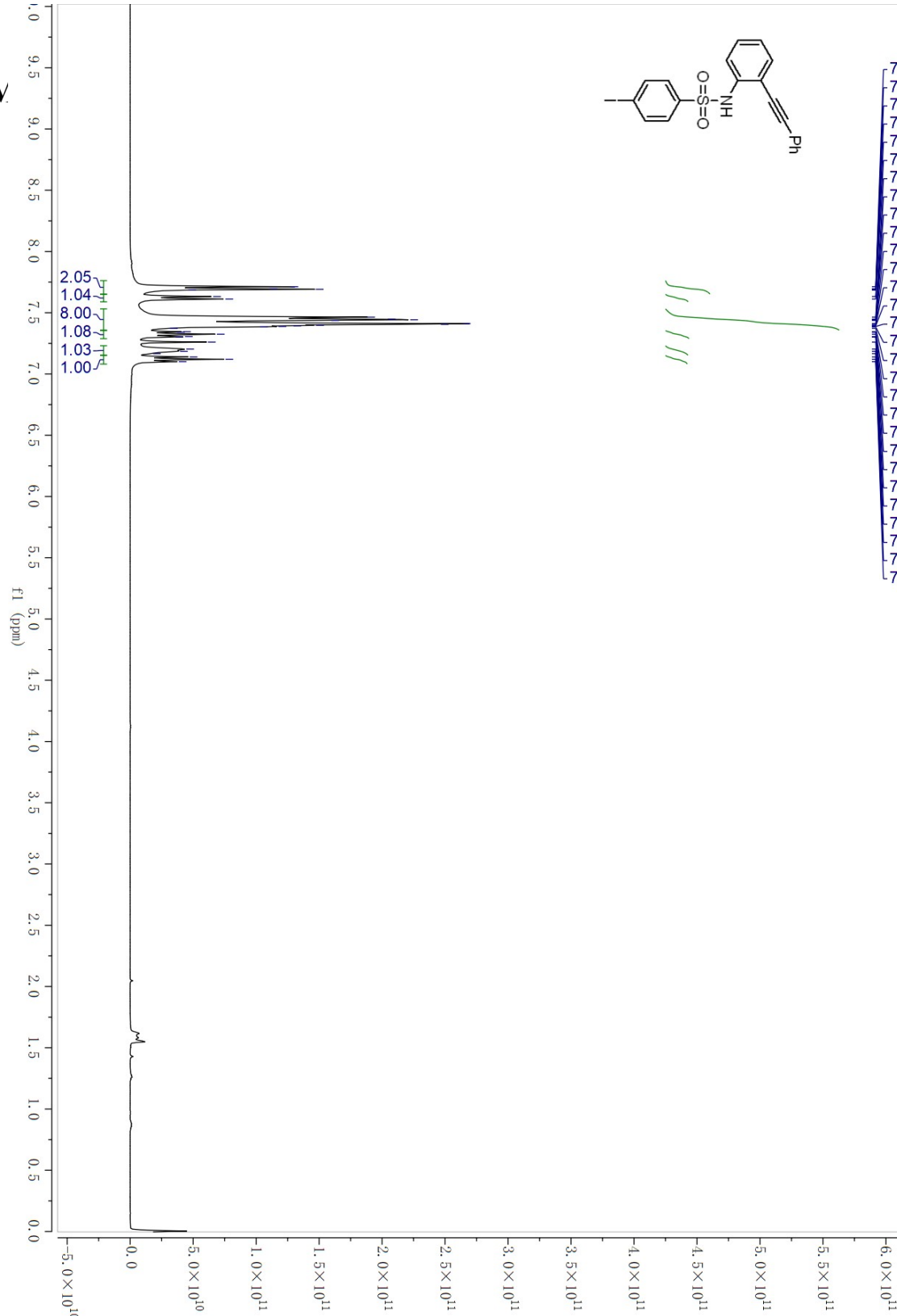
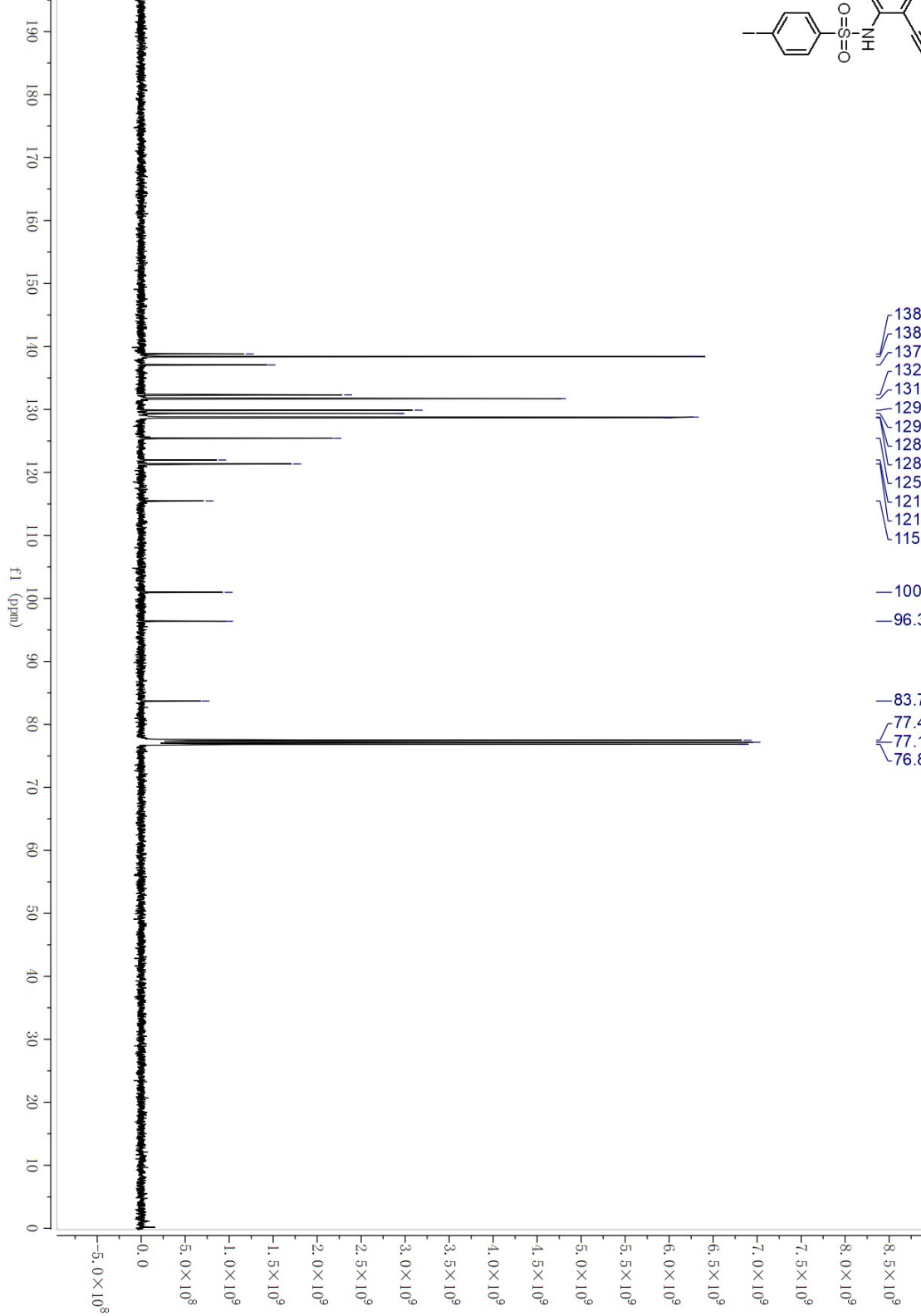


25a, ^{13}C

27a, ^{1}H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137
132
131
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129
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121
115
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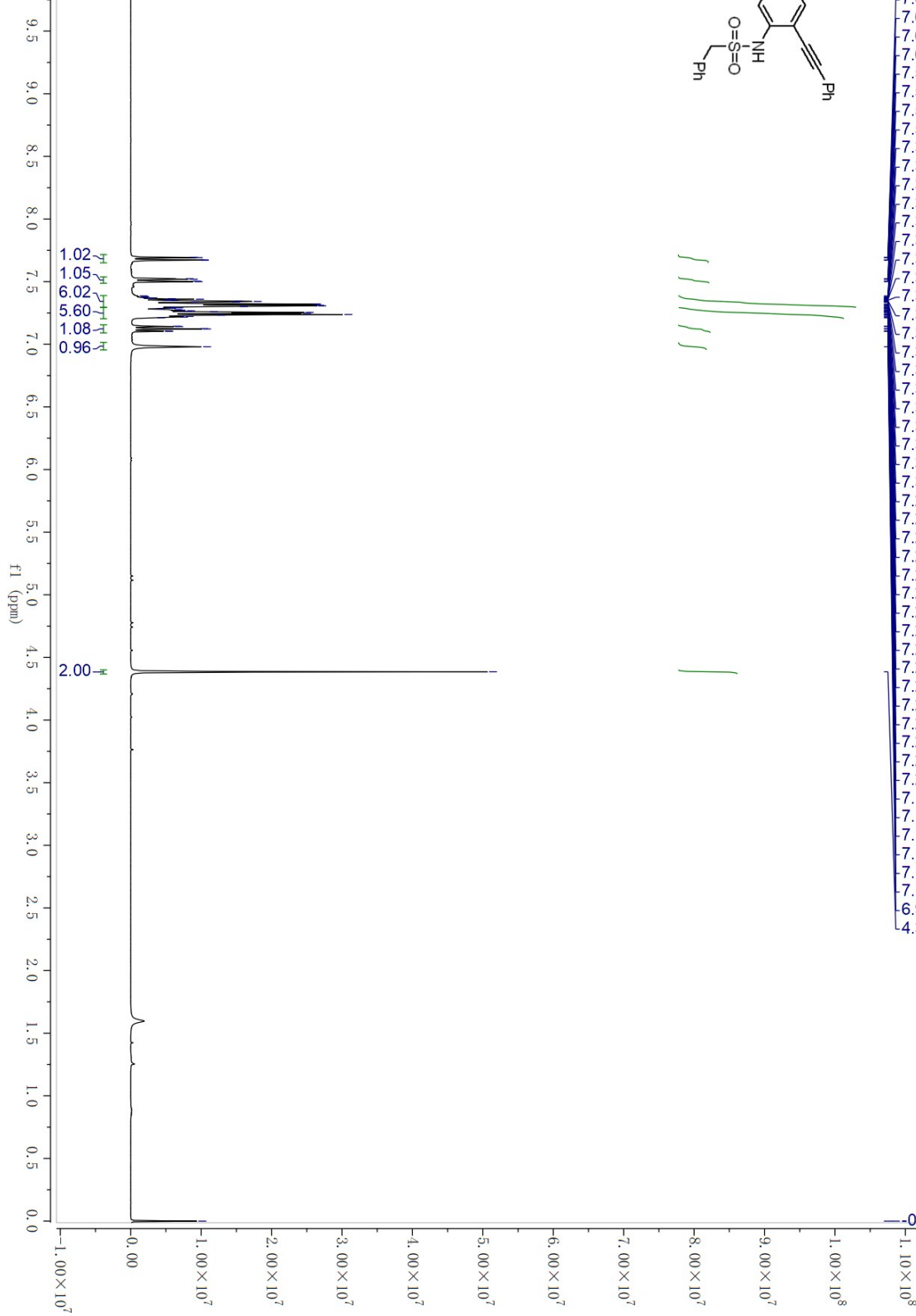
77.4
77.1
76.8

27a, ^{13}C



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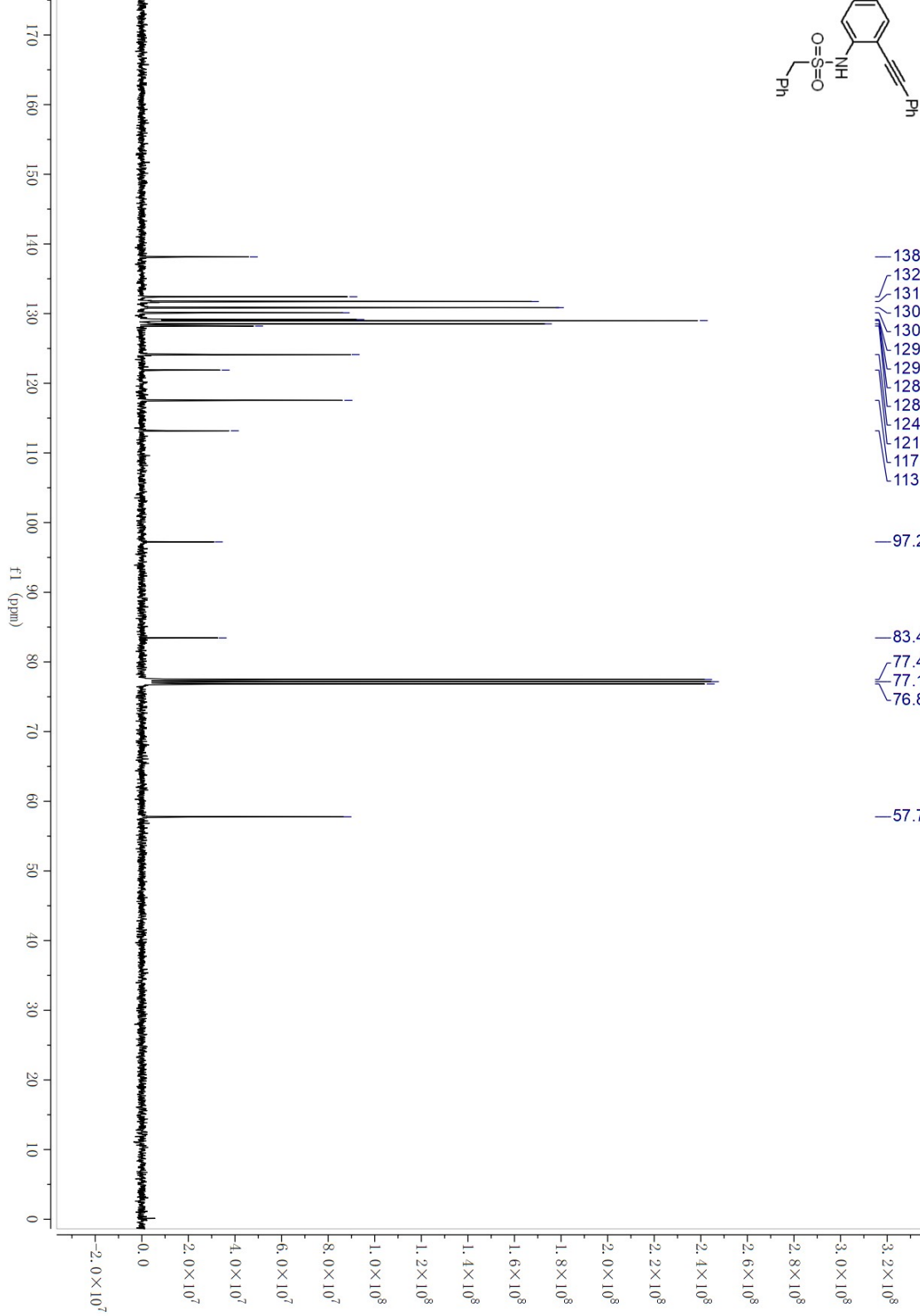
NH
O=S=O
Ph
Ph
138
132
131
130
130
129
129
128
128
124
121
117
113
97.2
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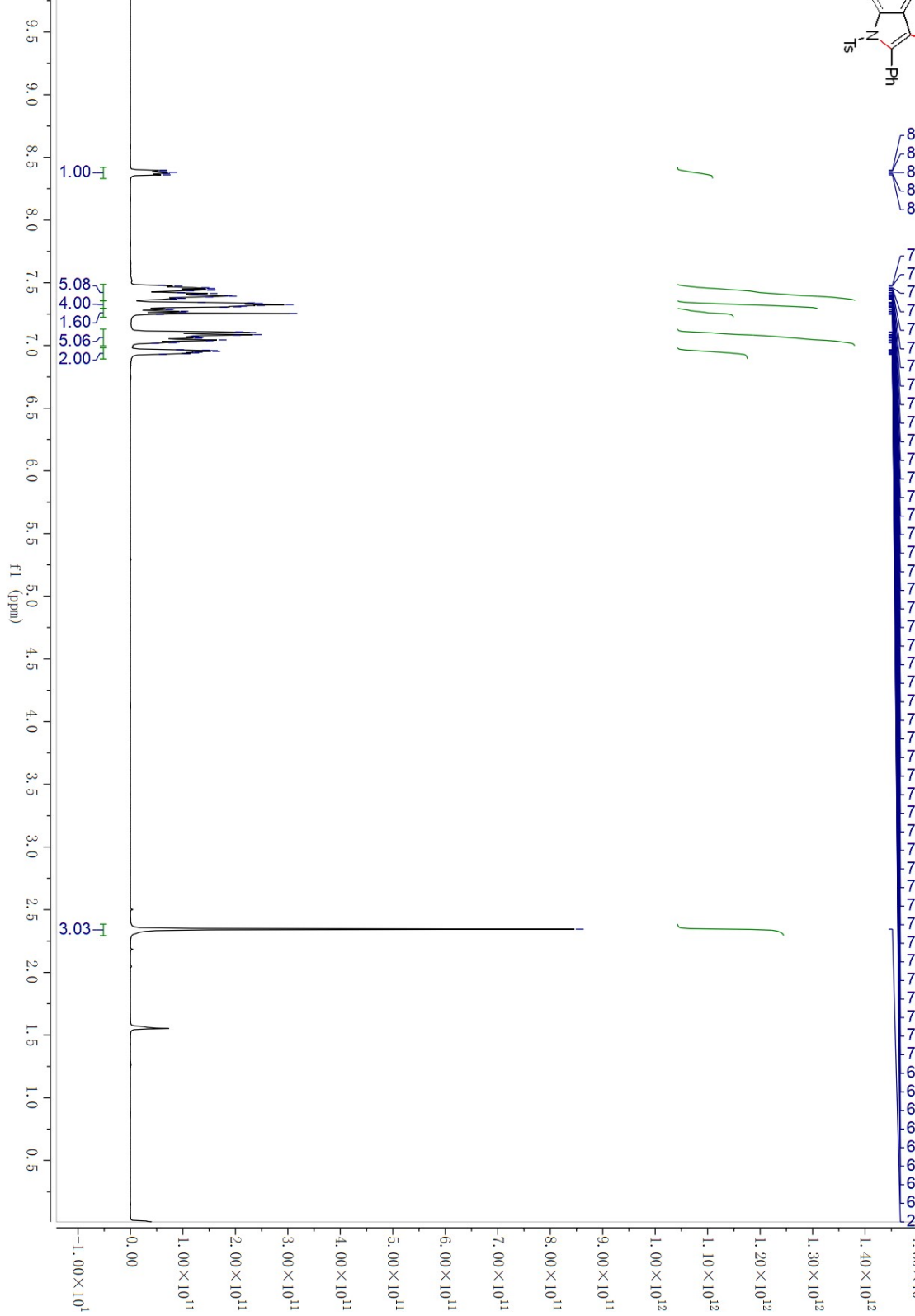
76.8
57.7
f1 (ppm)

1c, ^{13}C



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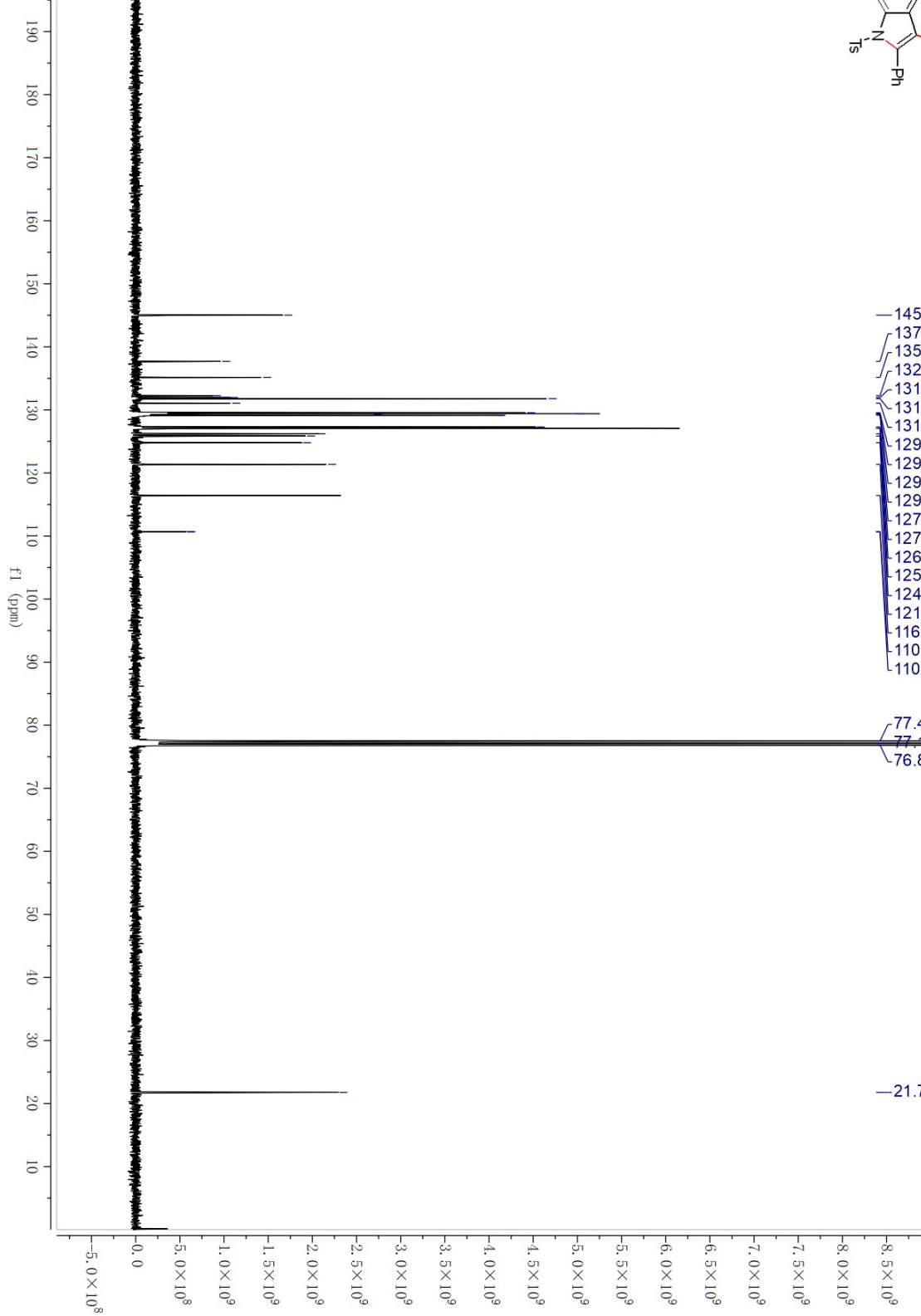
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Ph
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137
135
132
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131
131
129
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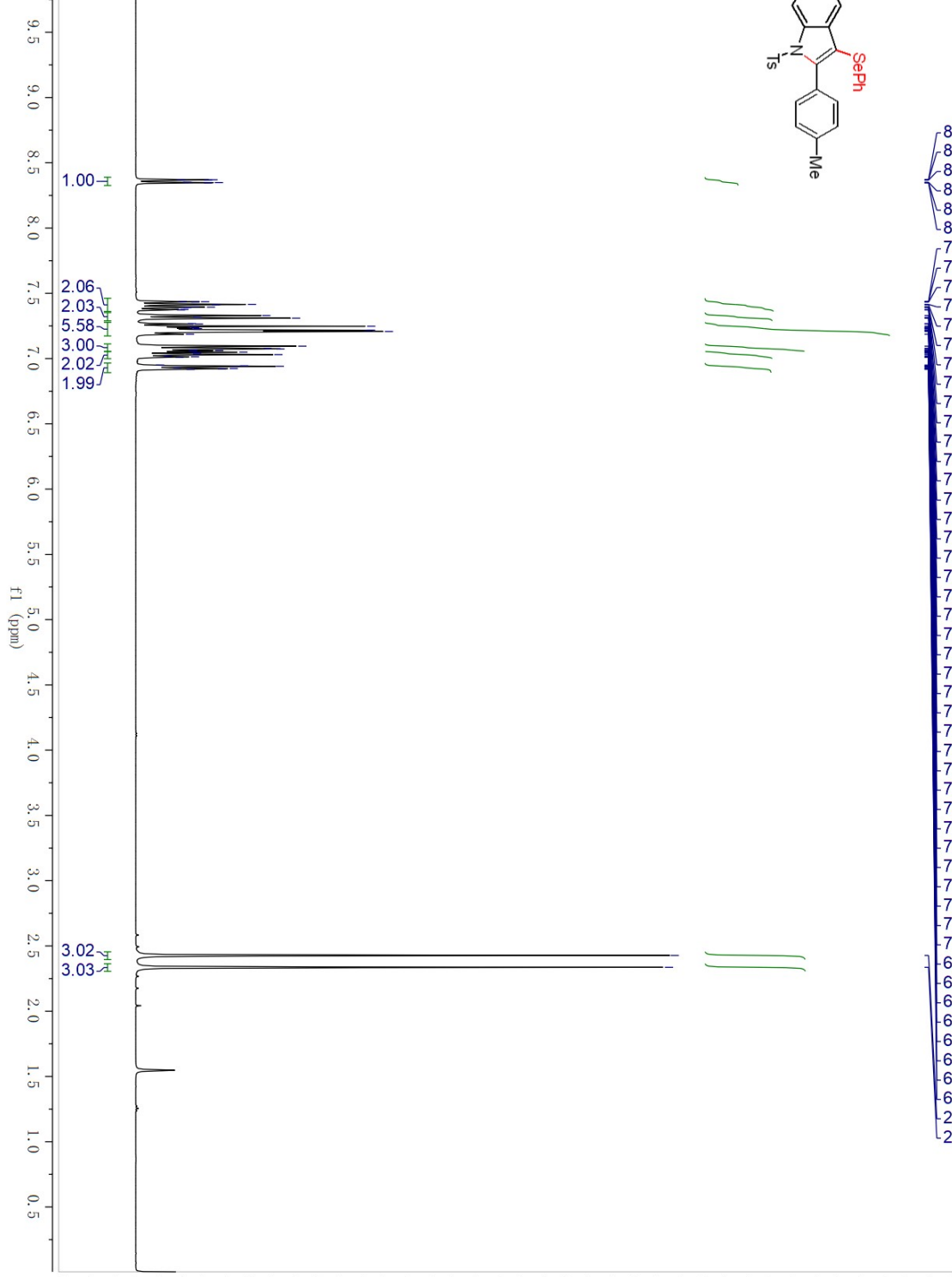
124
121
116
110
110
77.4
76.8
21.7

2c, ^{13}C



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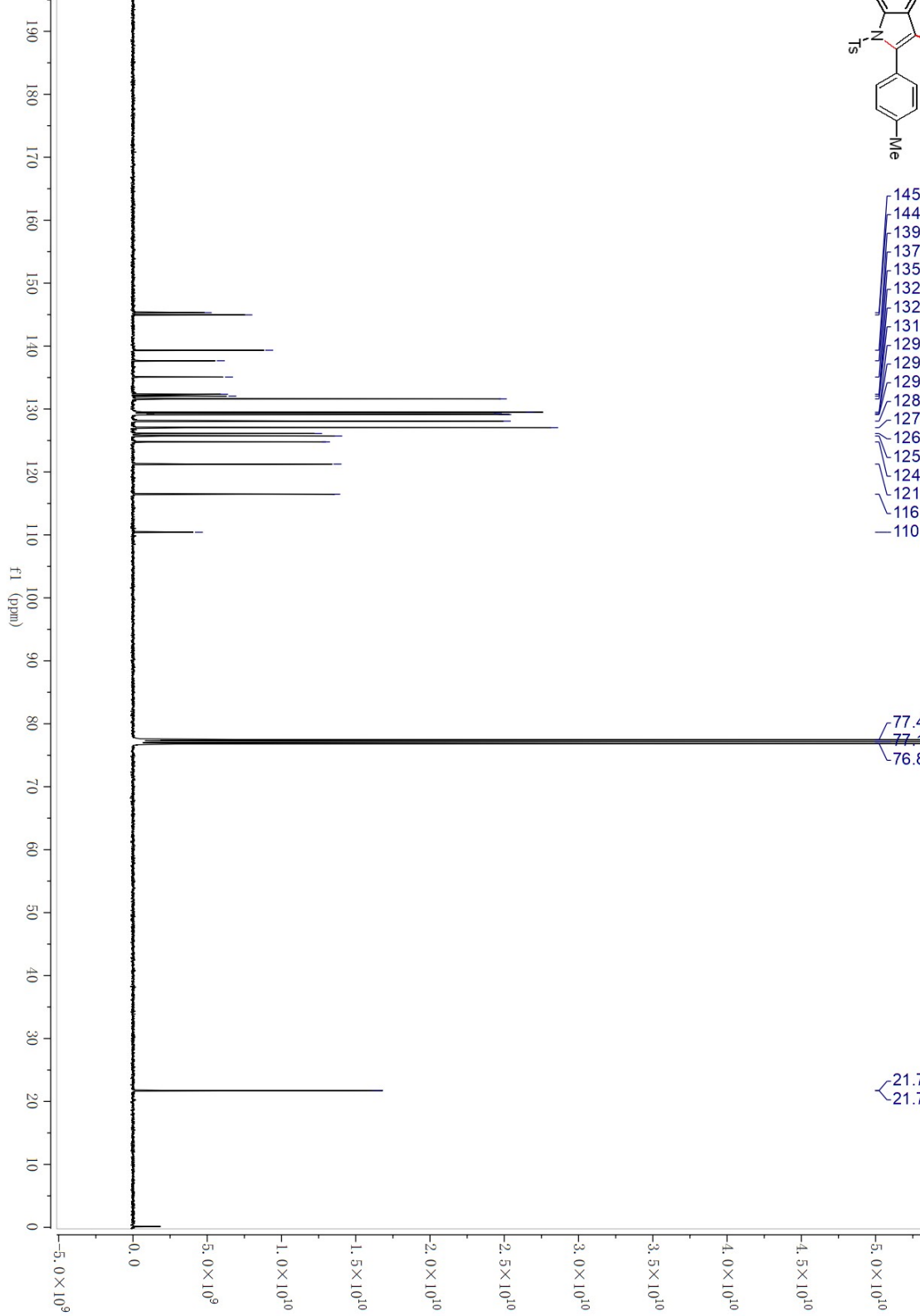
Ts
Me
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135
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129
129
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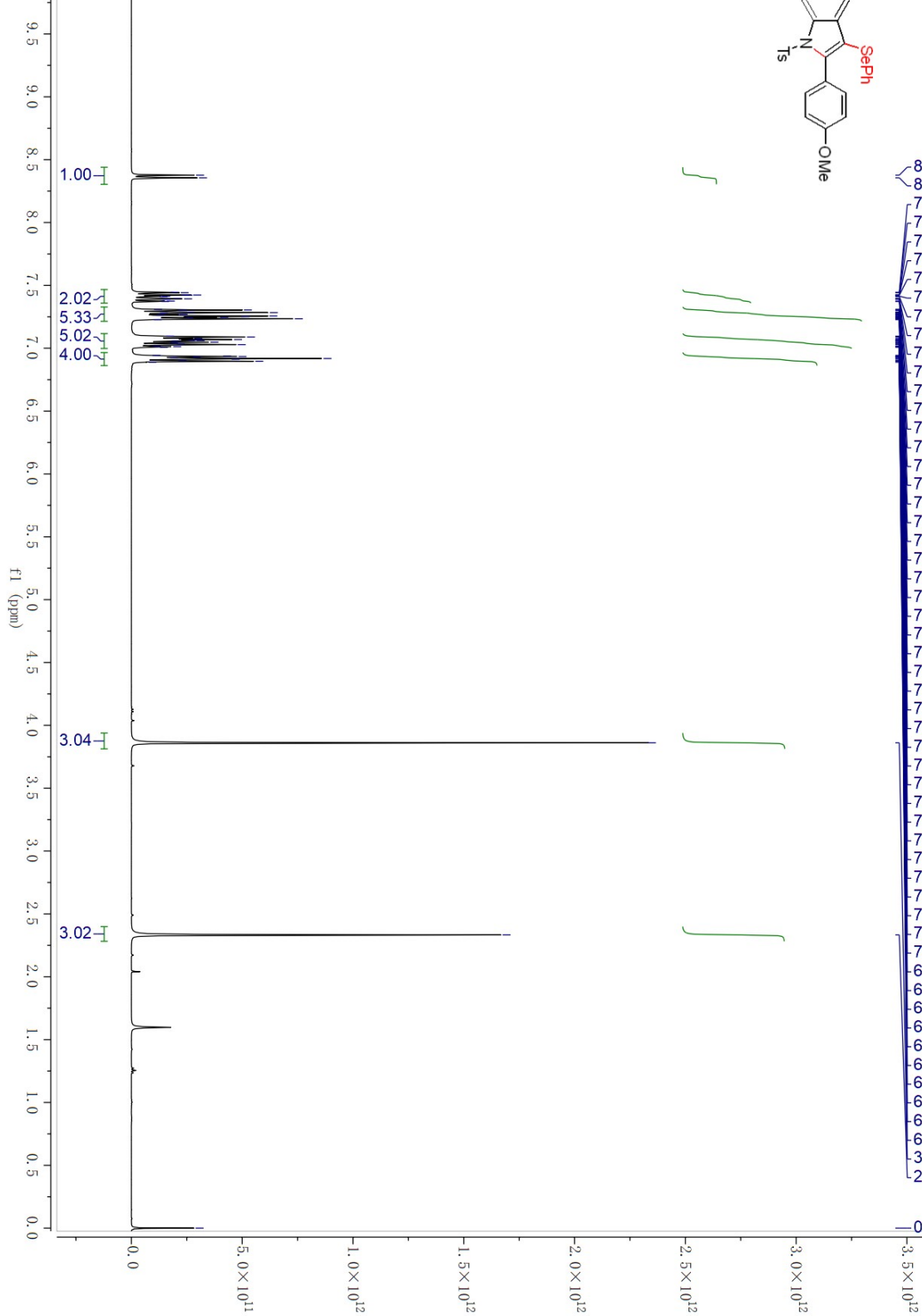
21.7
21.7
f1 (ppm)

3c, ^{13}C



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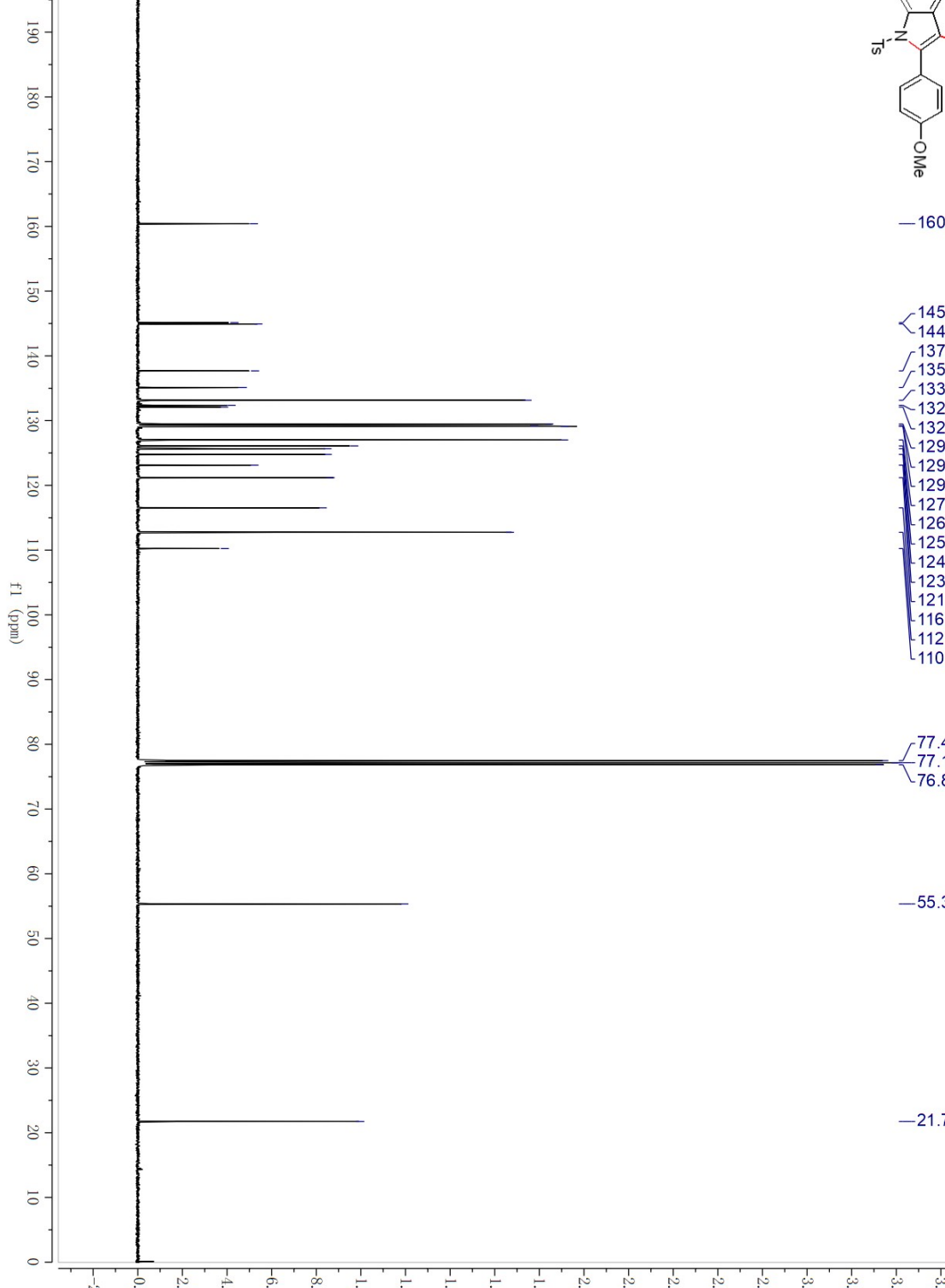
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OMe
Ts
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145
144
137
135
133
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132
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129
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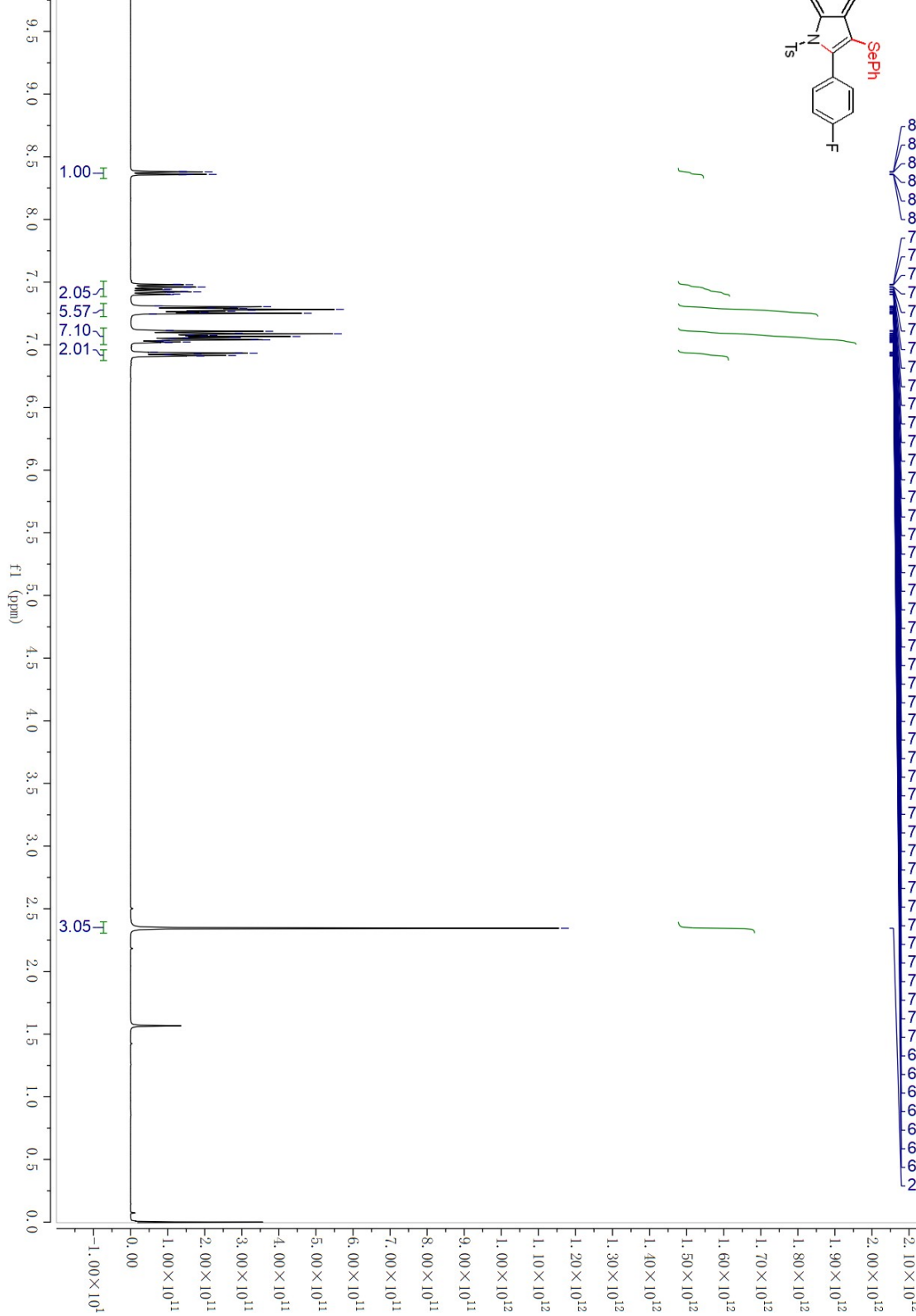
76.8
55.3
21.7

4c, ^{13}C



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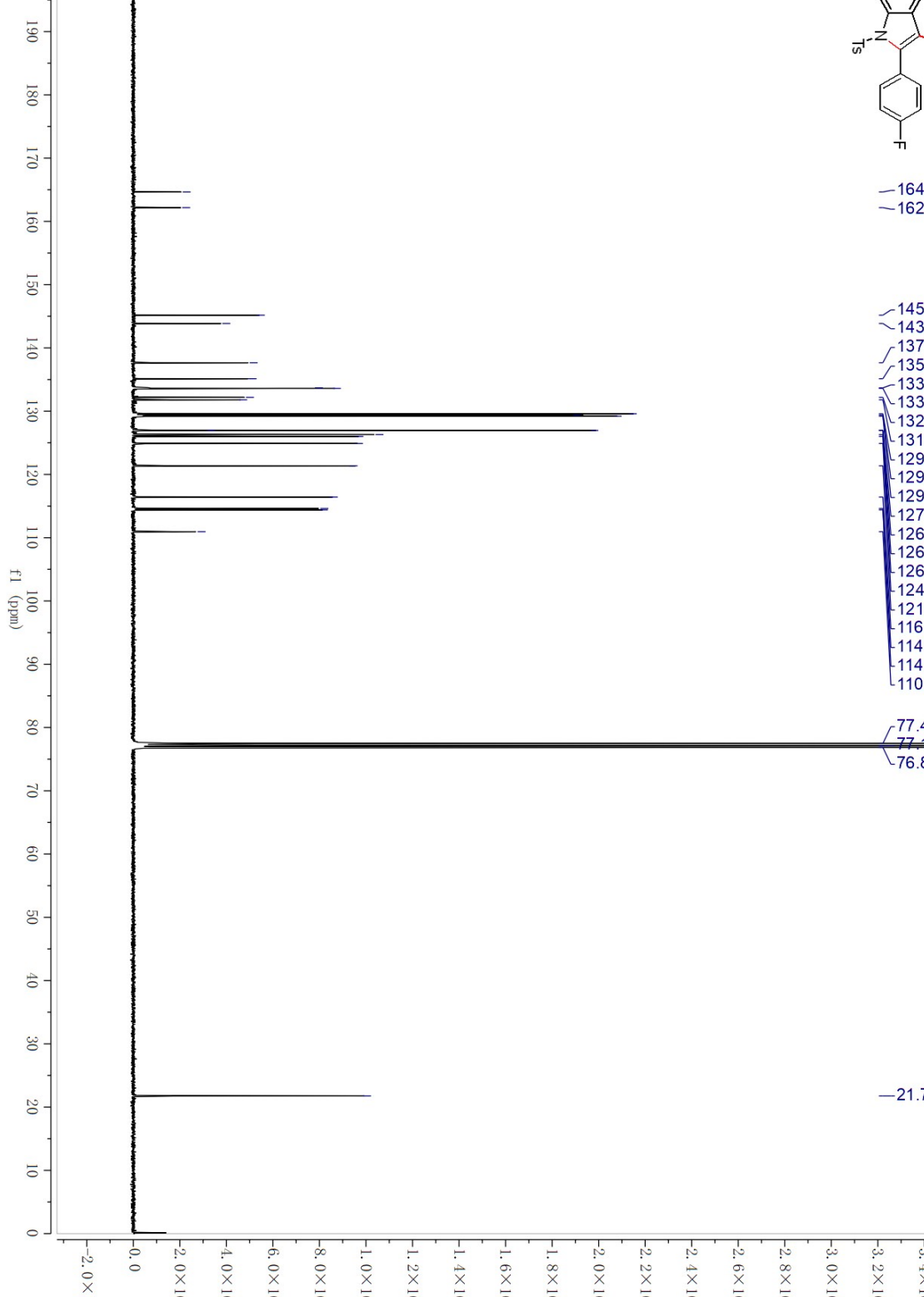
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Ts
F
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143
137
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133
132
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114
110
77.4
76.8
21.7

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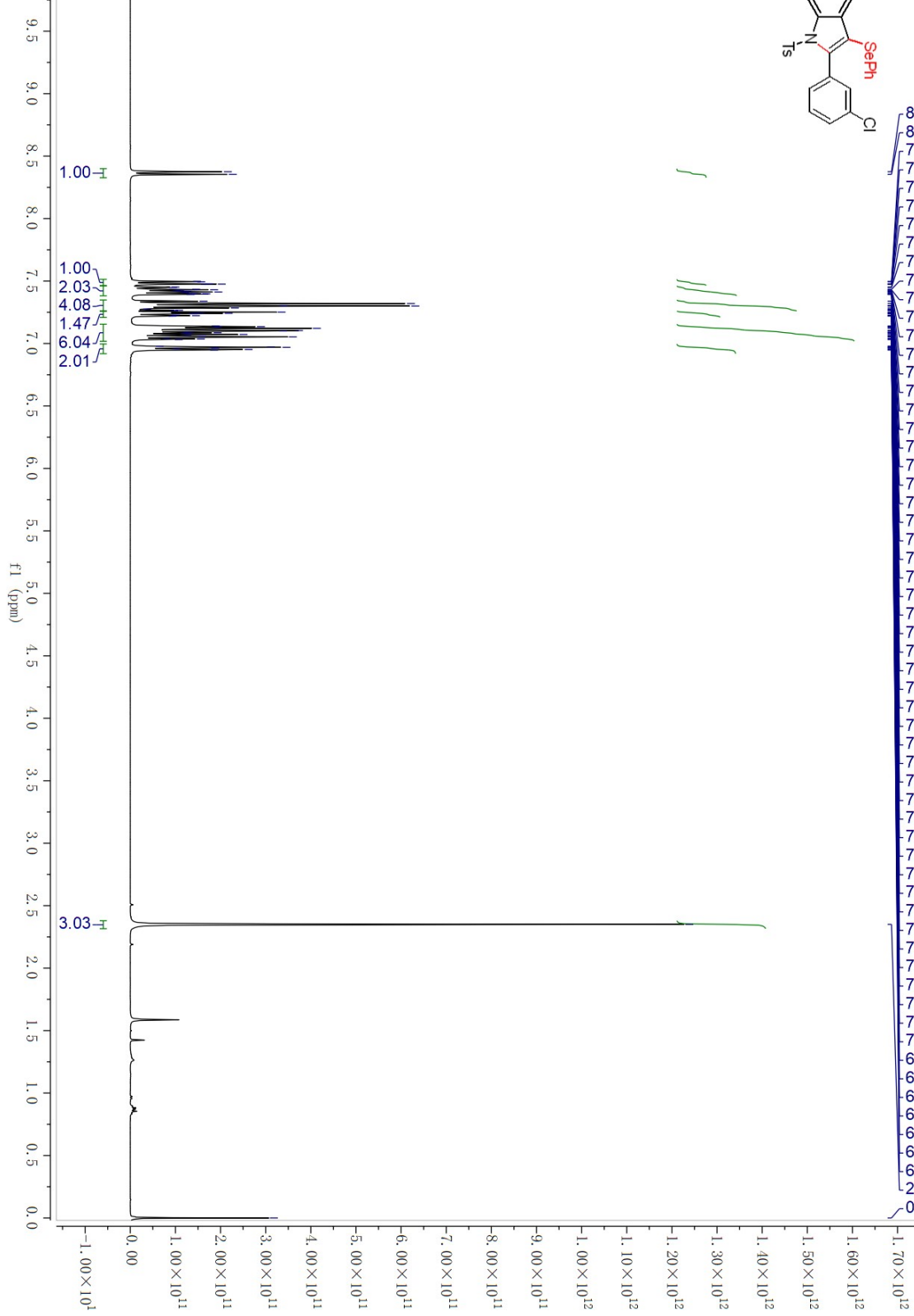

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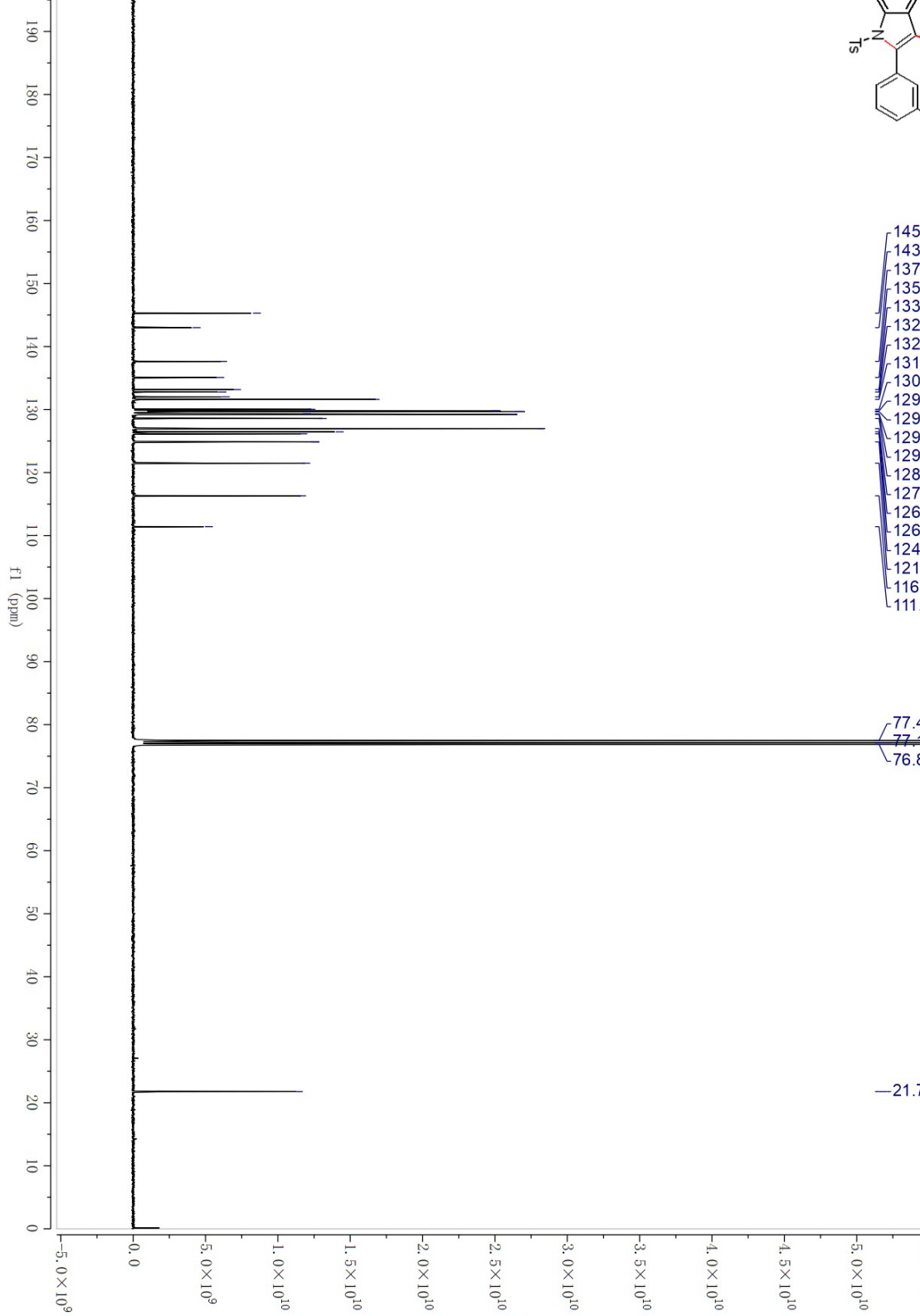
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143
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132
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121
116
111
77.4
77.
76.8
21.7
f1 (ppm)
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10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
-5.0×10^9
0.0
5.0×10^9
1.0×10^10
1.5×10^10
2.0×10^10
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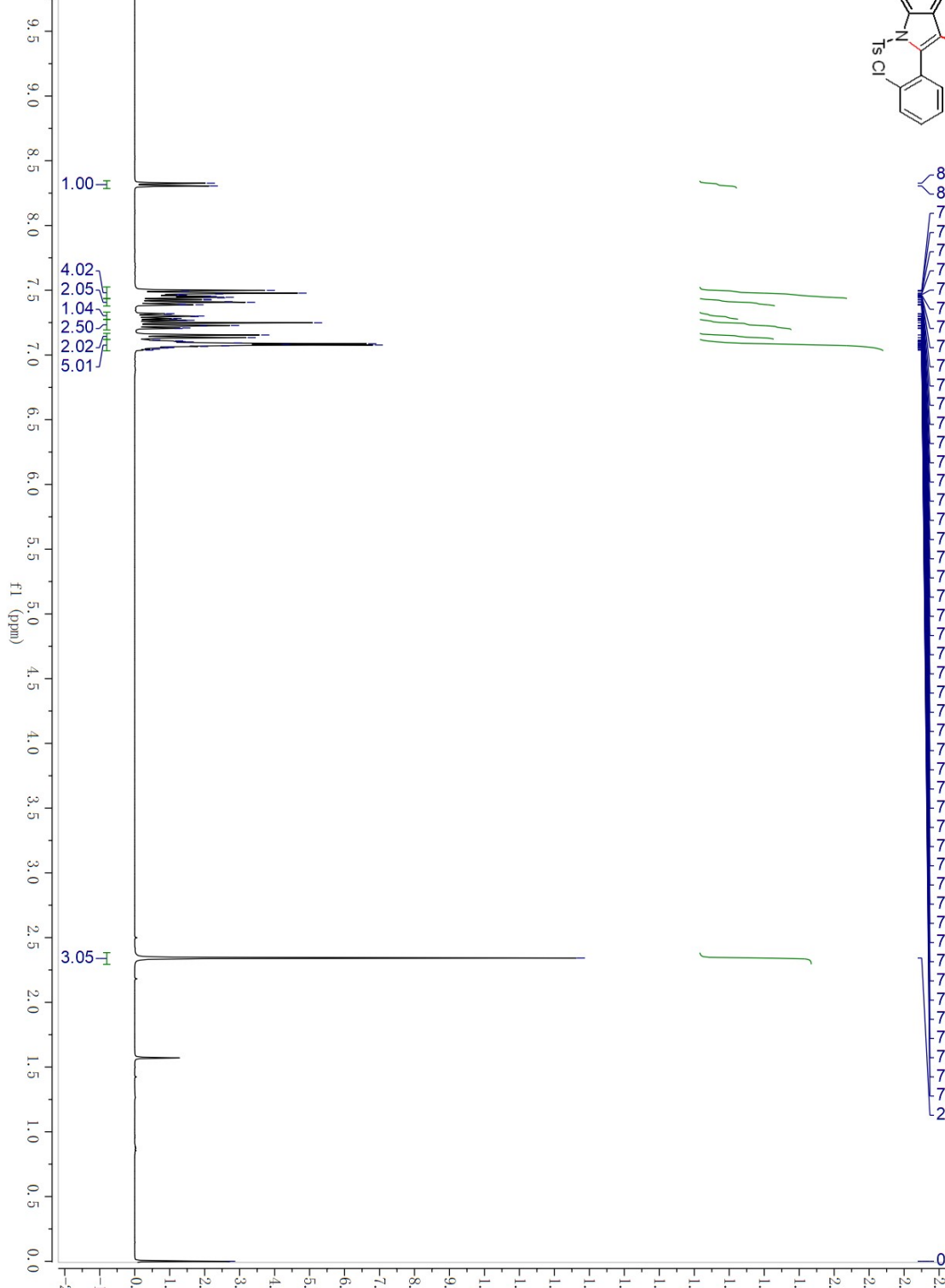
4.5×10^10
5.0×10^10

6c, ^{13}C



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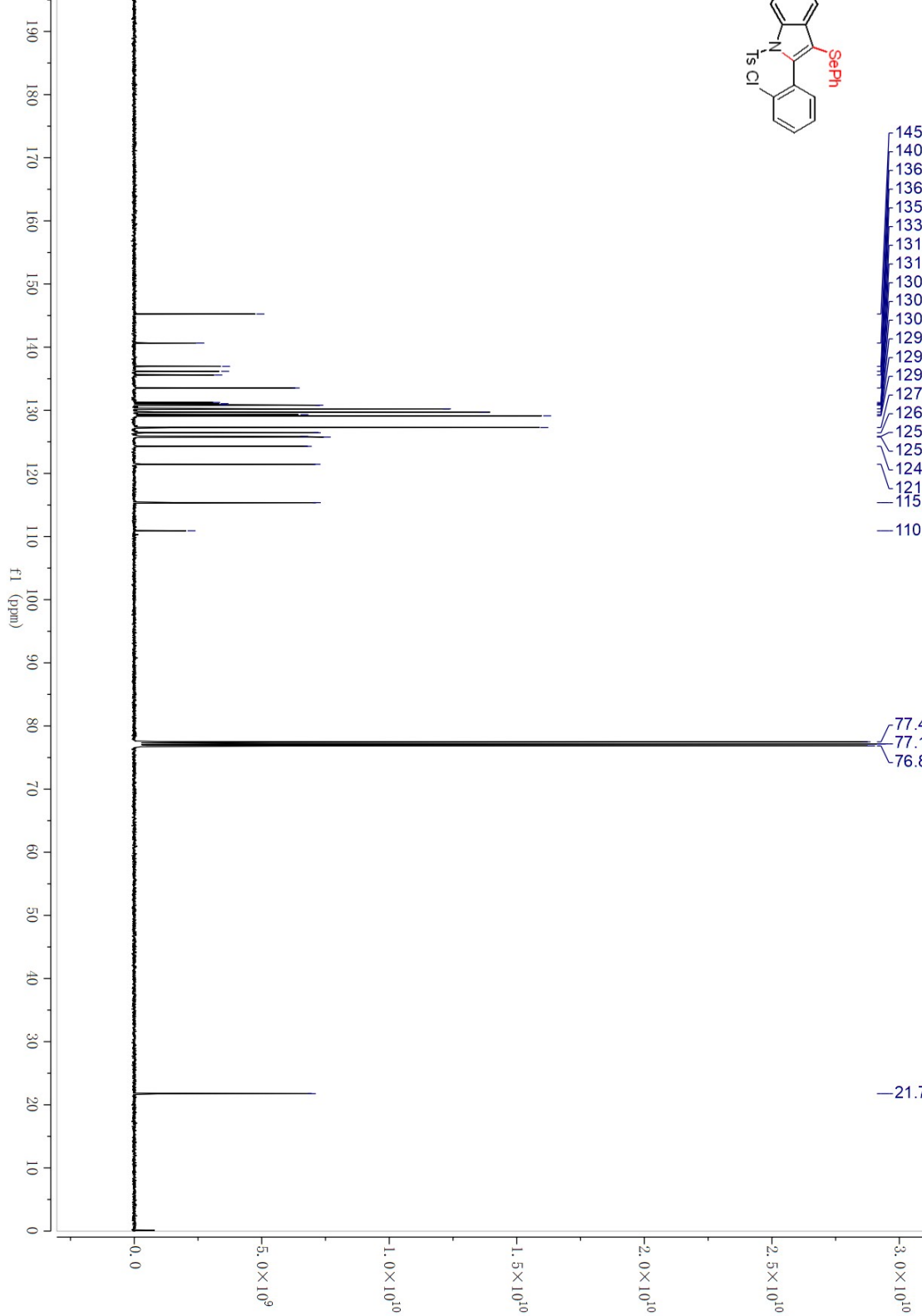
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Ts Cl
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140
136
136
135
133
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131
130
130
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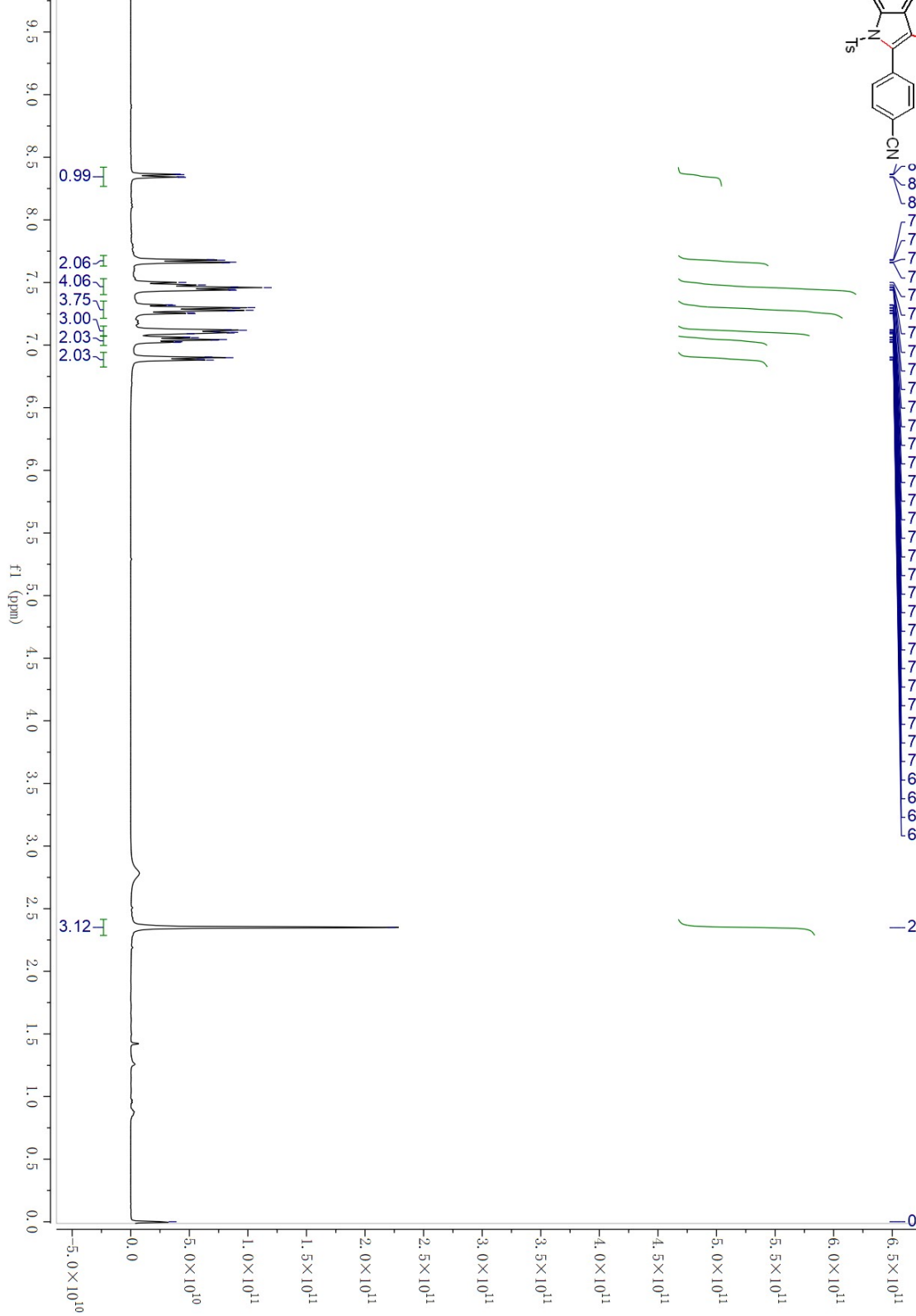
77.4
77.1
76.8
21.7

7c, ^{13}C



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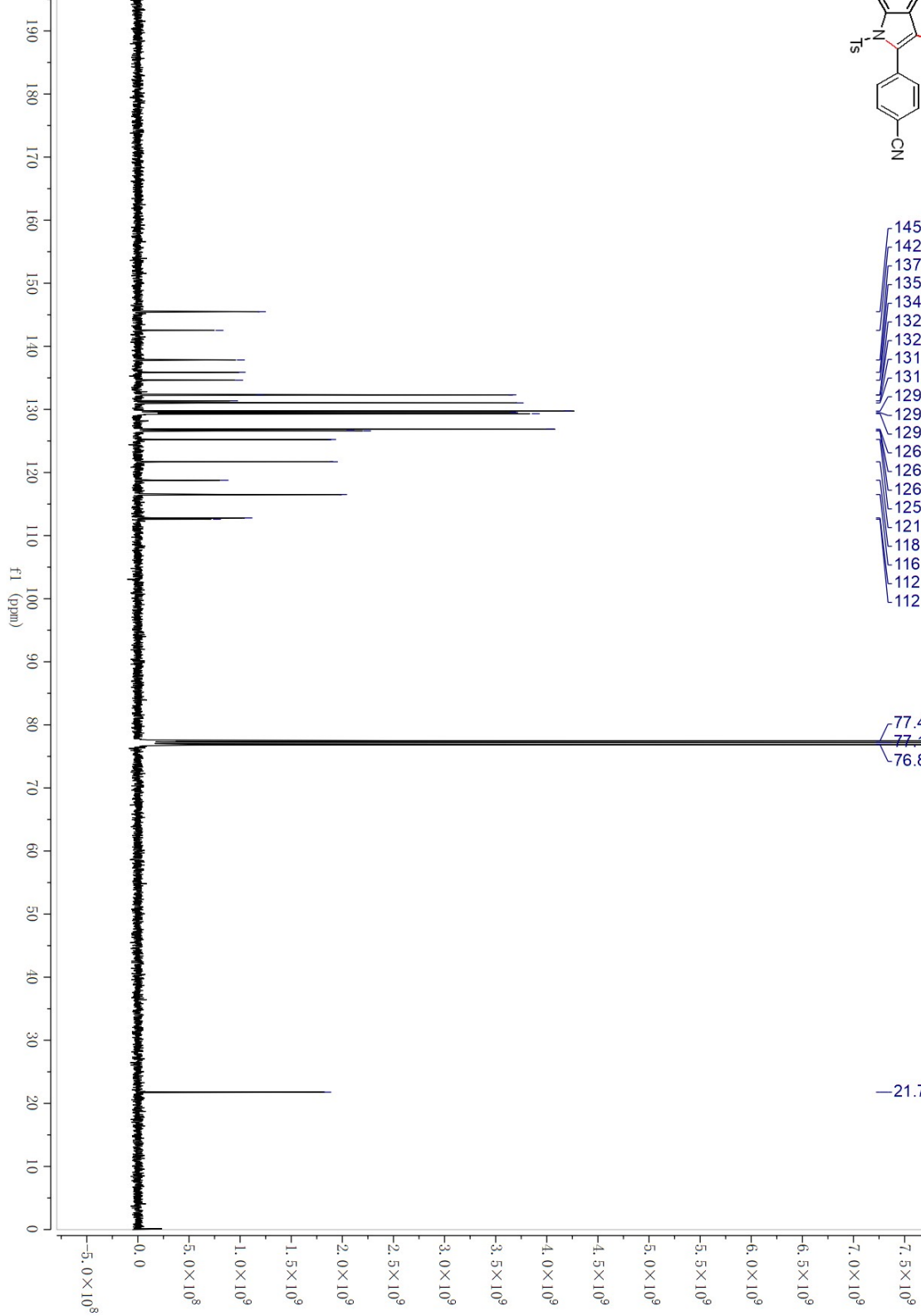
f1 (ppm)
Ts
N
CN
145
142
137
135
134
132
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131
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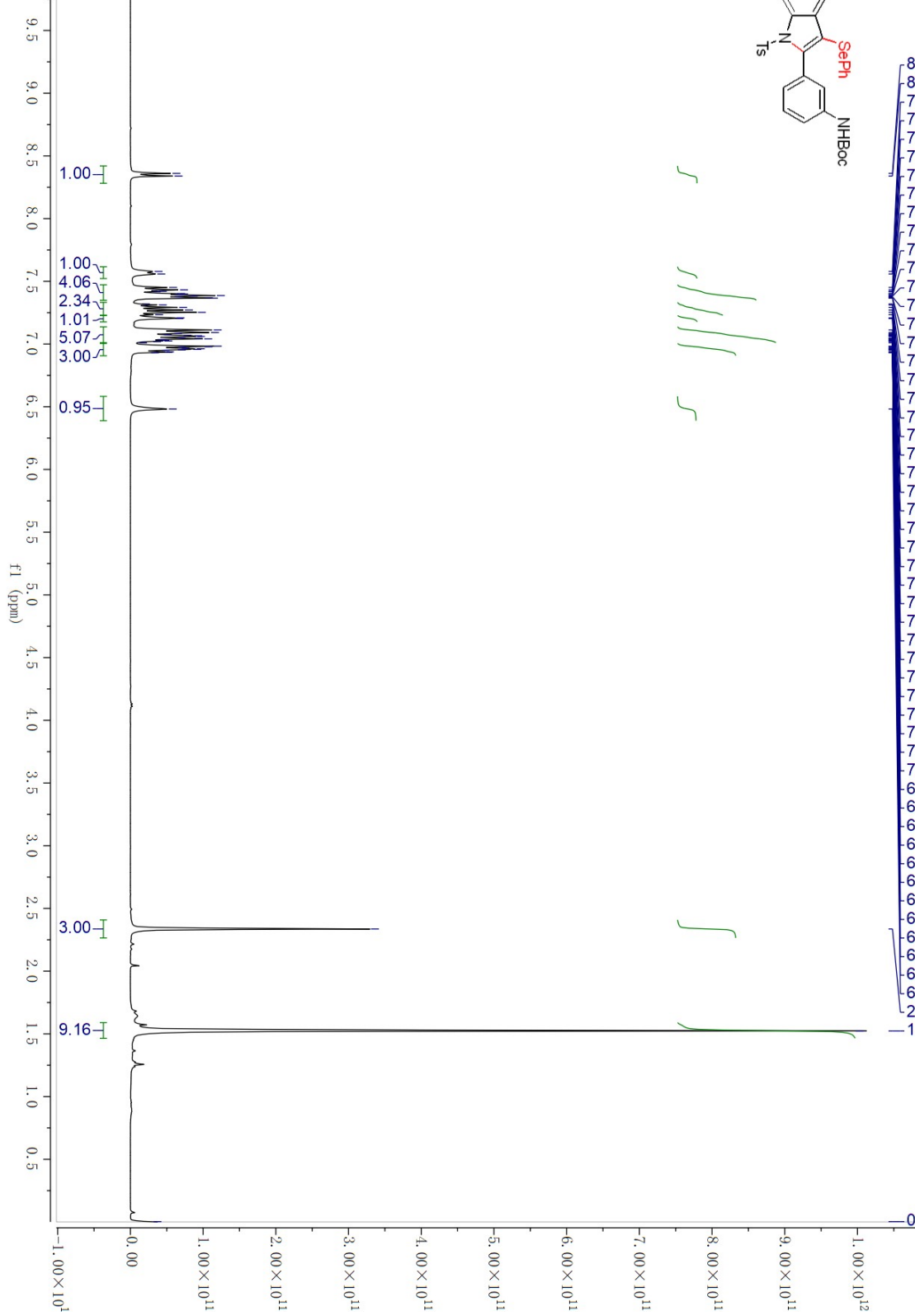
112
112
77.4
76.8
21.7

8c, ^{13}C



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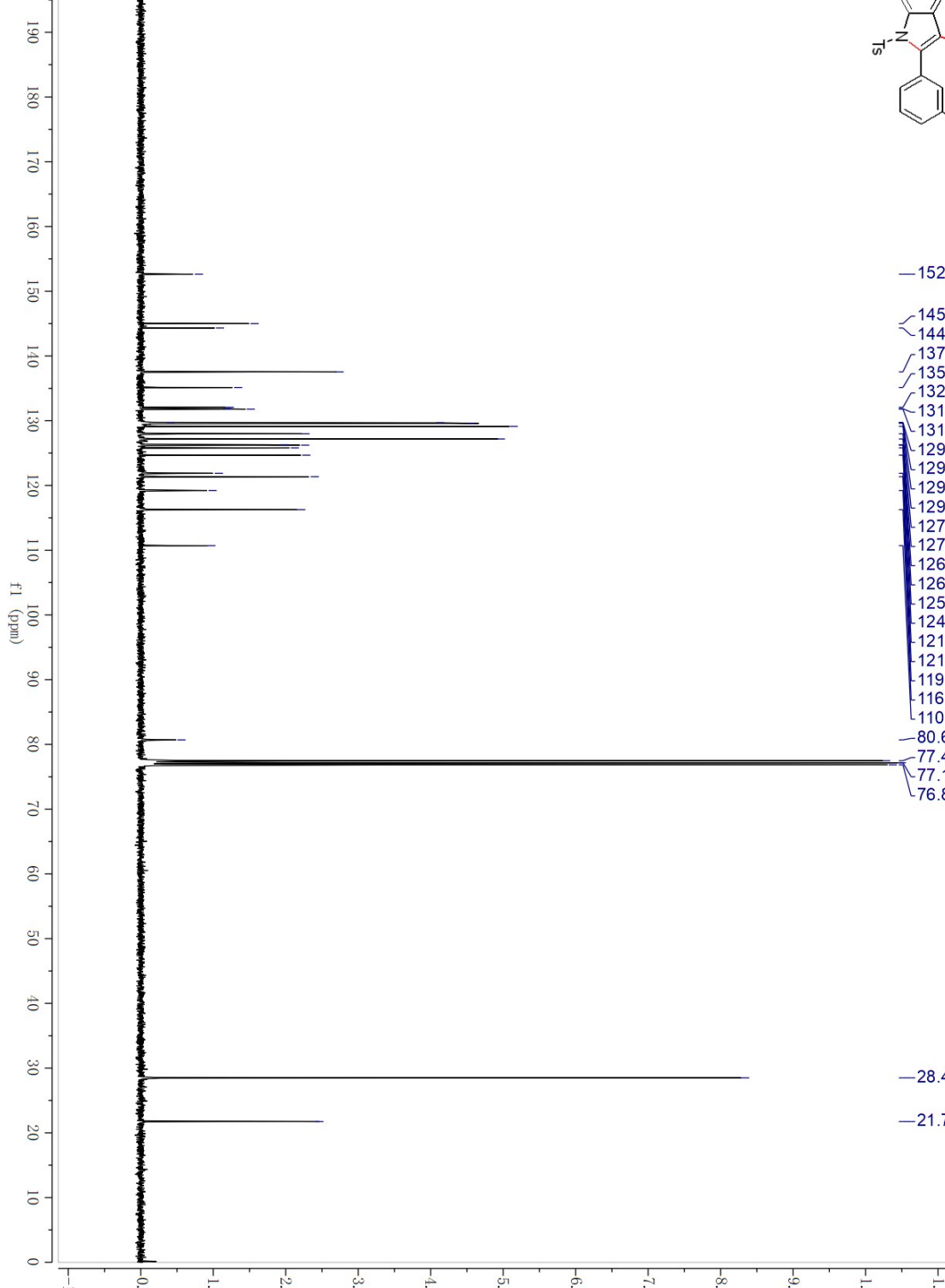
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Ts
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145
144
137
135
132
131
131
129
129
129
129
127
127
126
126
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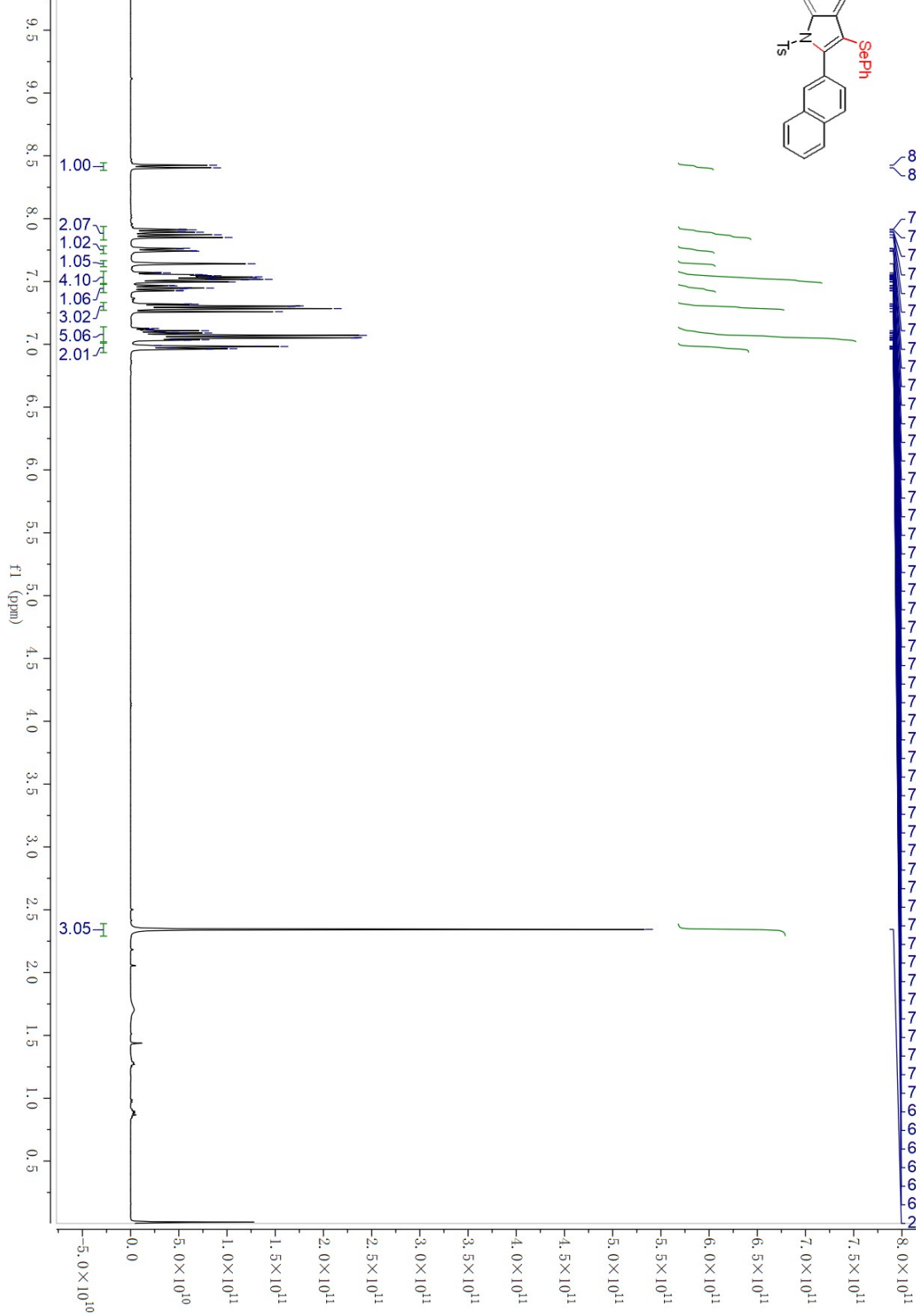
77.1
76.8
28.4
21.7

9c, ^{13}C



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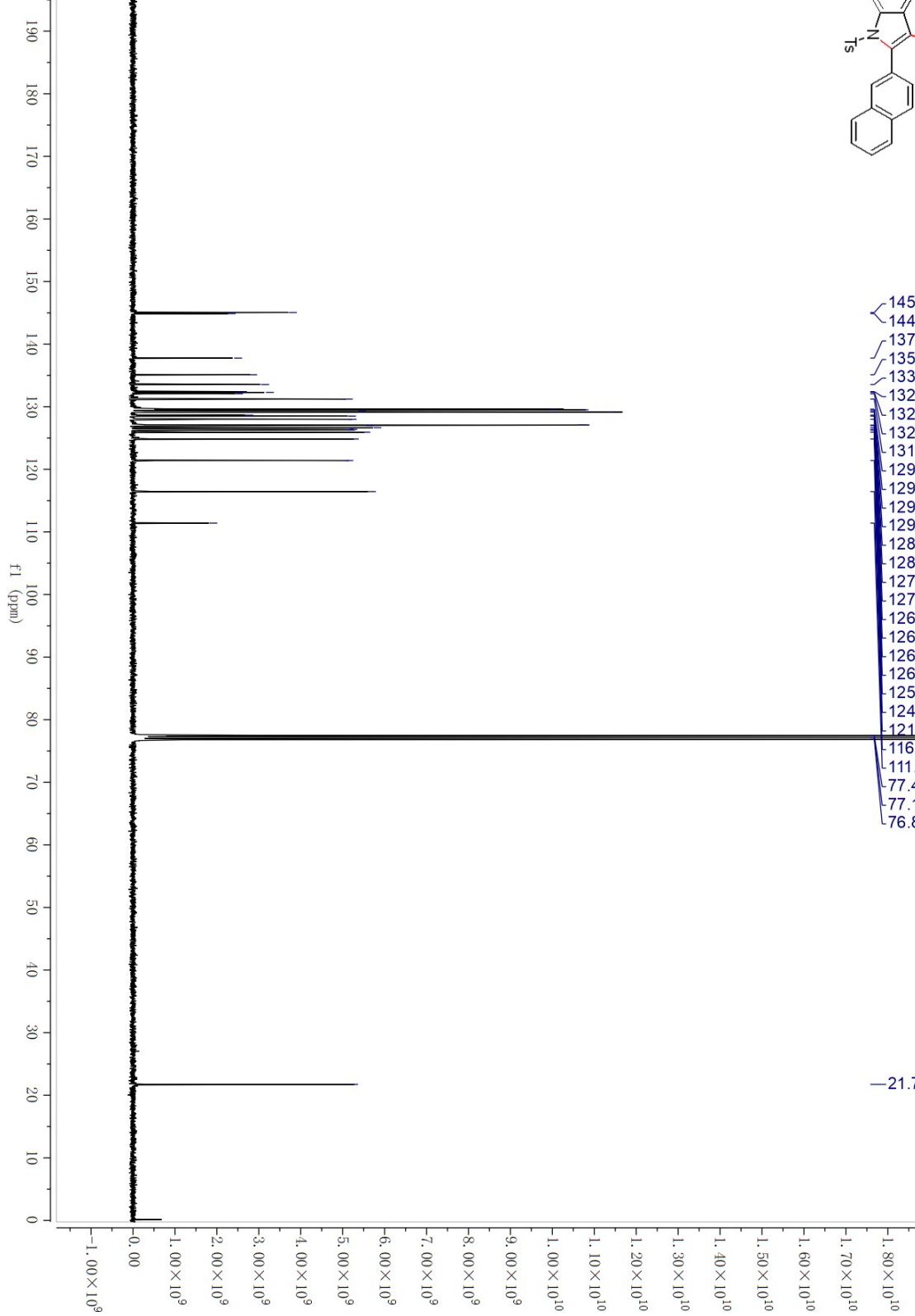
f1 (ppm)
Ts
145
144
137
135
133
132
132
132
131
129
129
129
129
128
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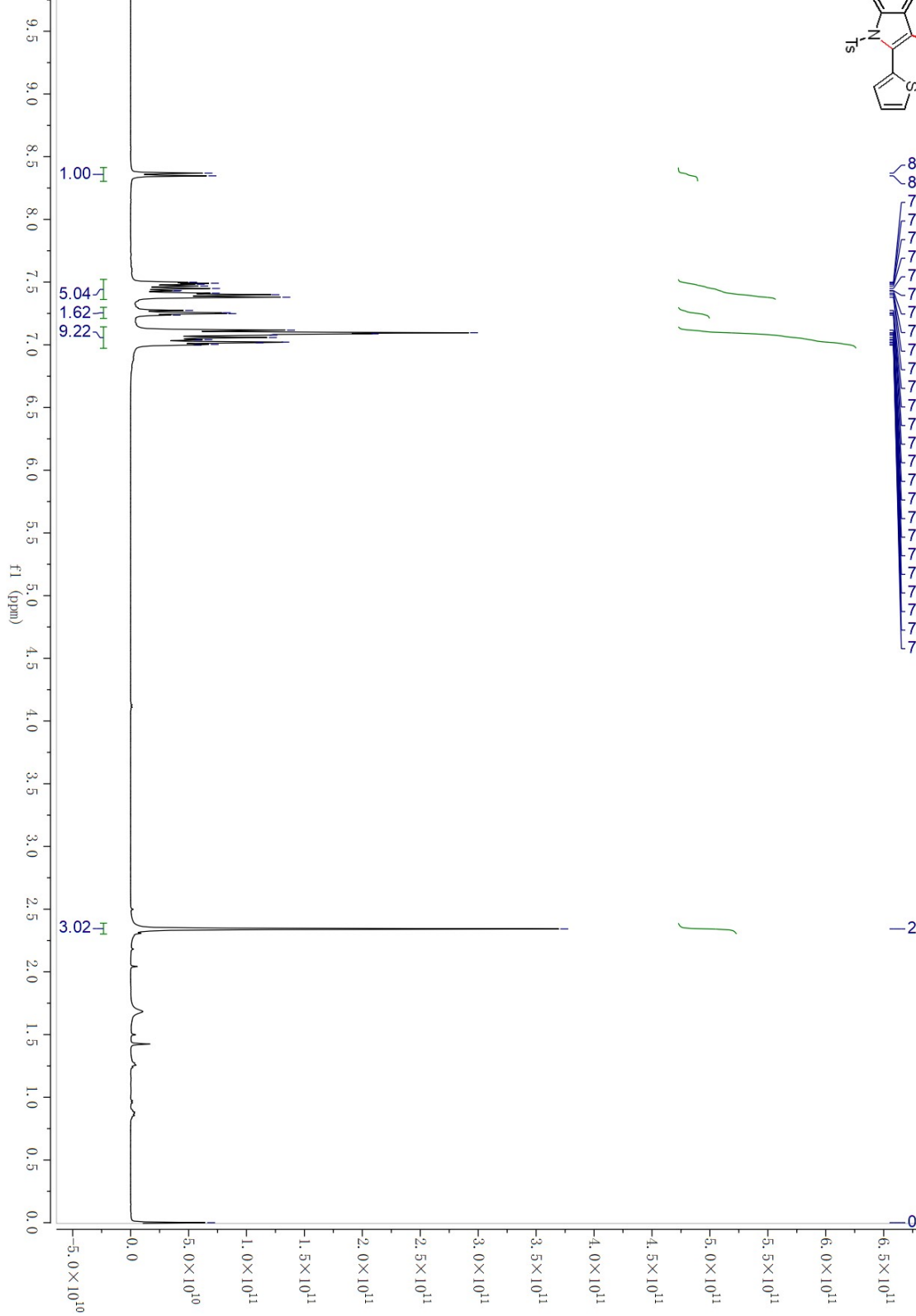
77.4
77.
76.8
21.7

10c, ^{13}C



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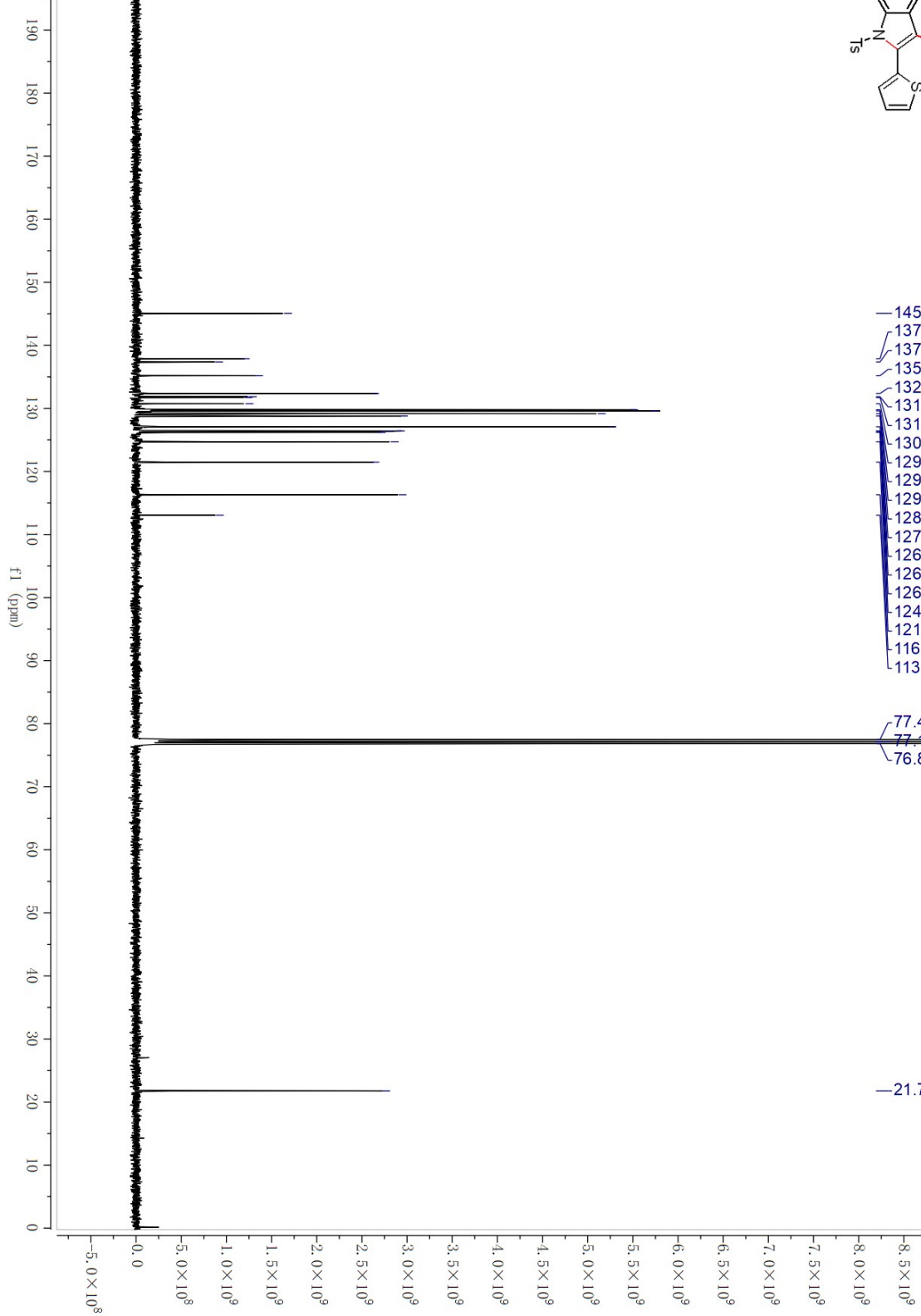
f1 (ppm)
Ts
145
137
137
135
132
131
131
130
129
129
129
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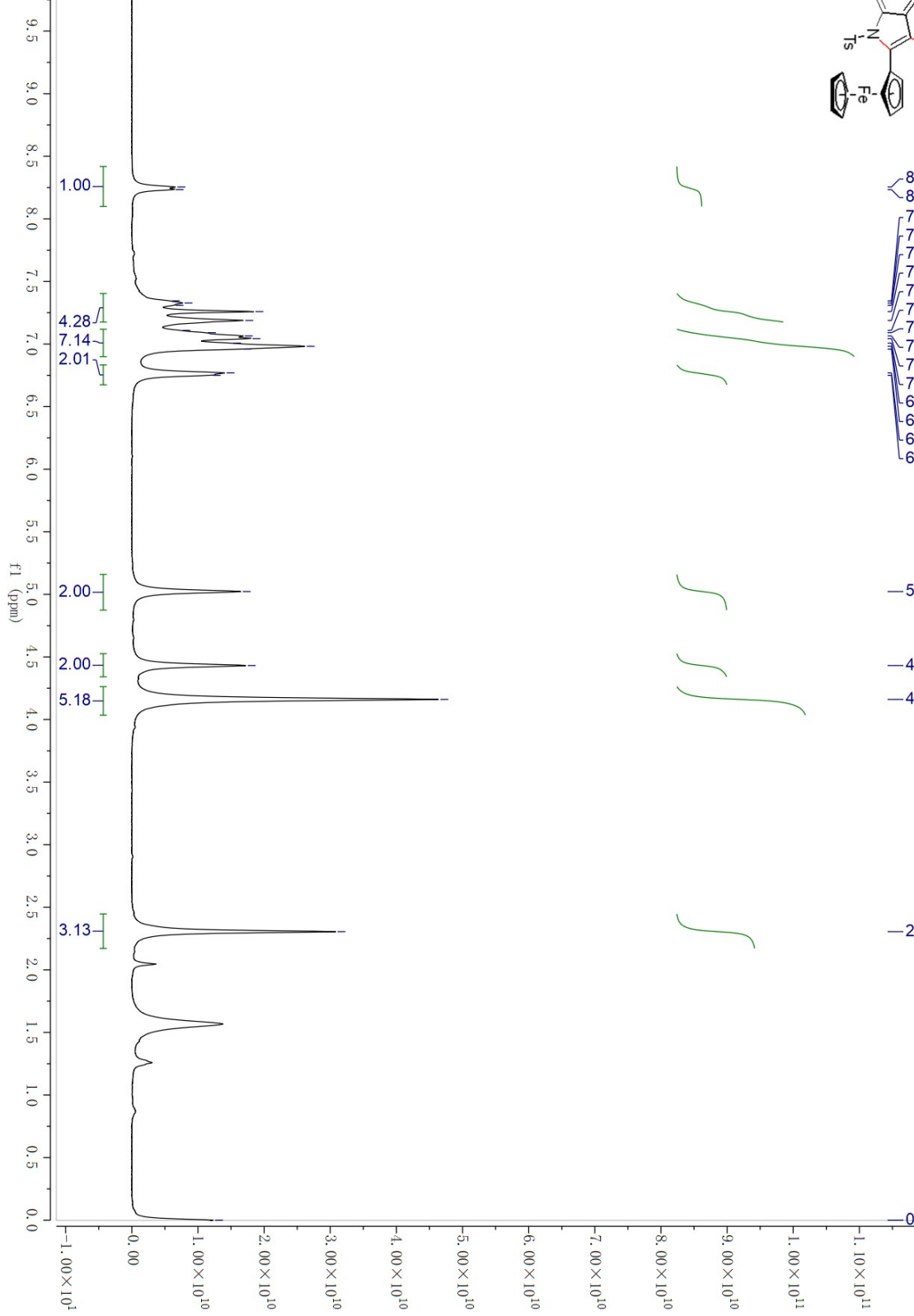
127
126
126
126
124
121
116
113
77.4
77.
76.8
21.7

11c, ^{13}C



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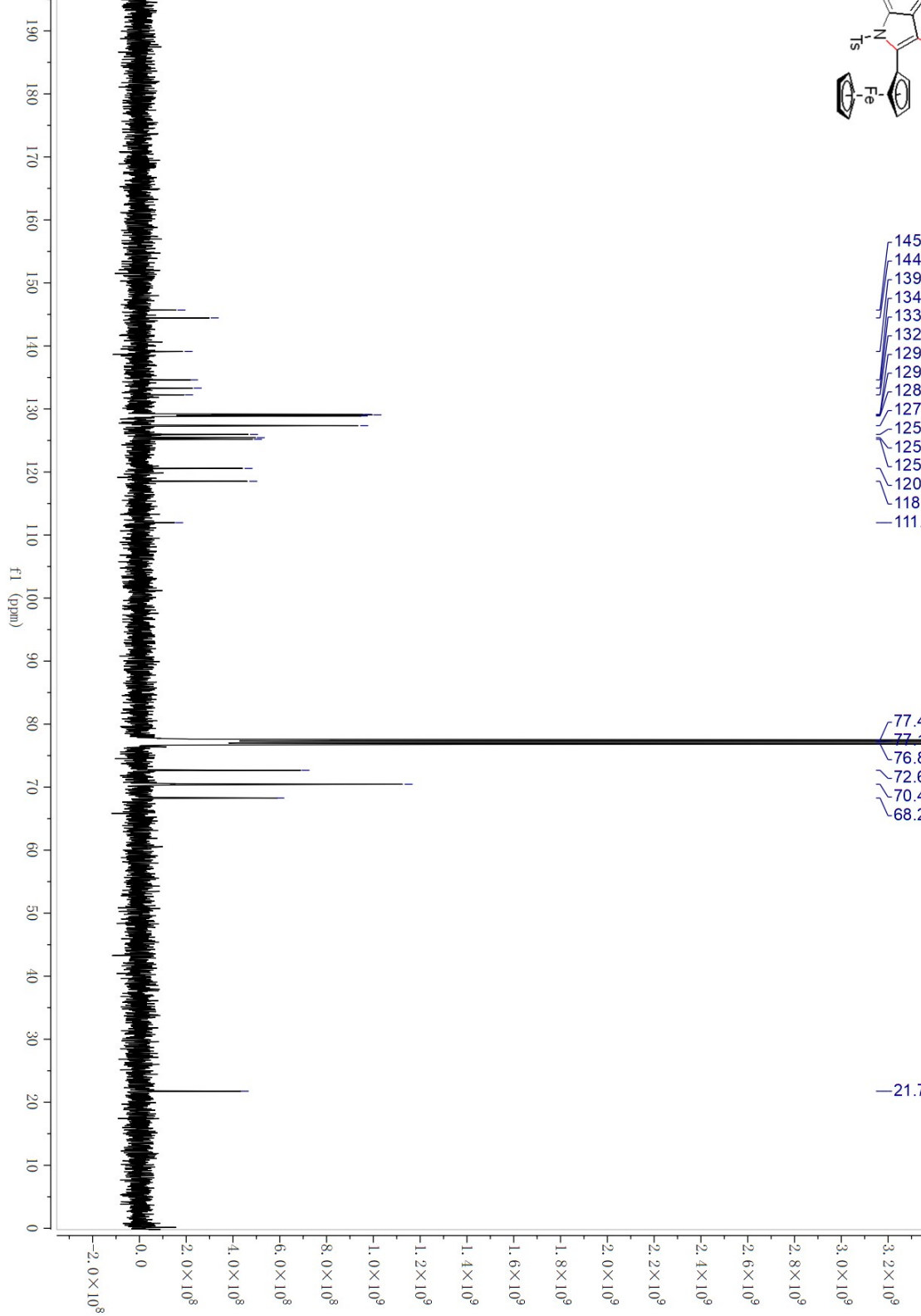
f1 (ppm)
Ts
Fe
145
144
139
134
133
132
129
129
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127
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120
118
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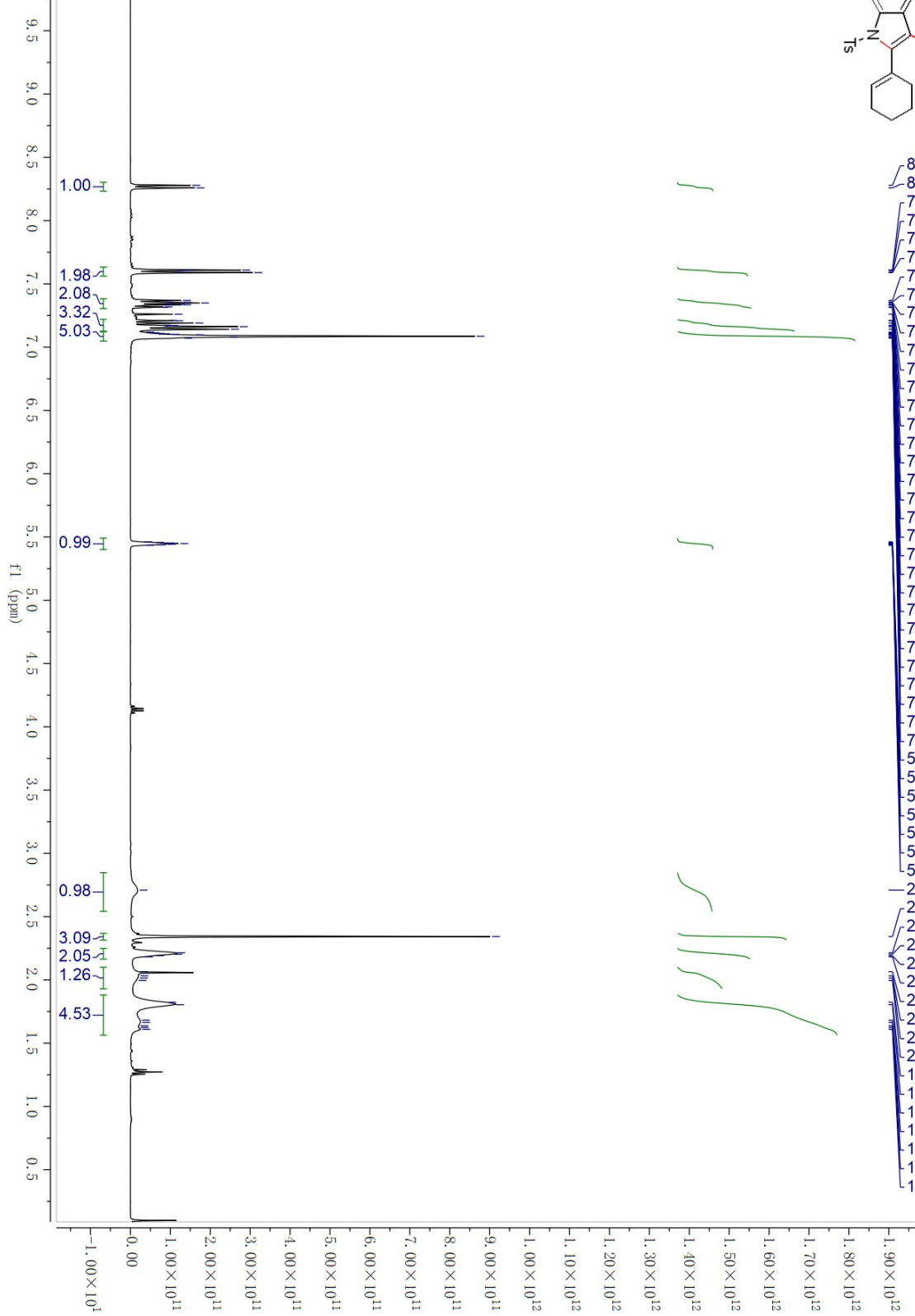
72.6
70.4
68.2
21.7

12c, ^{13}C



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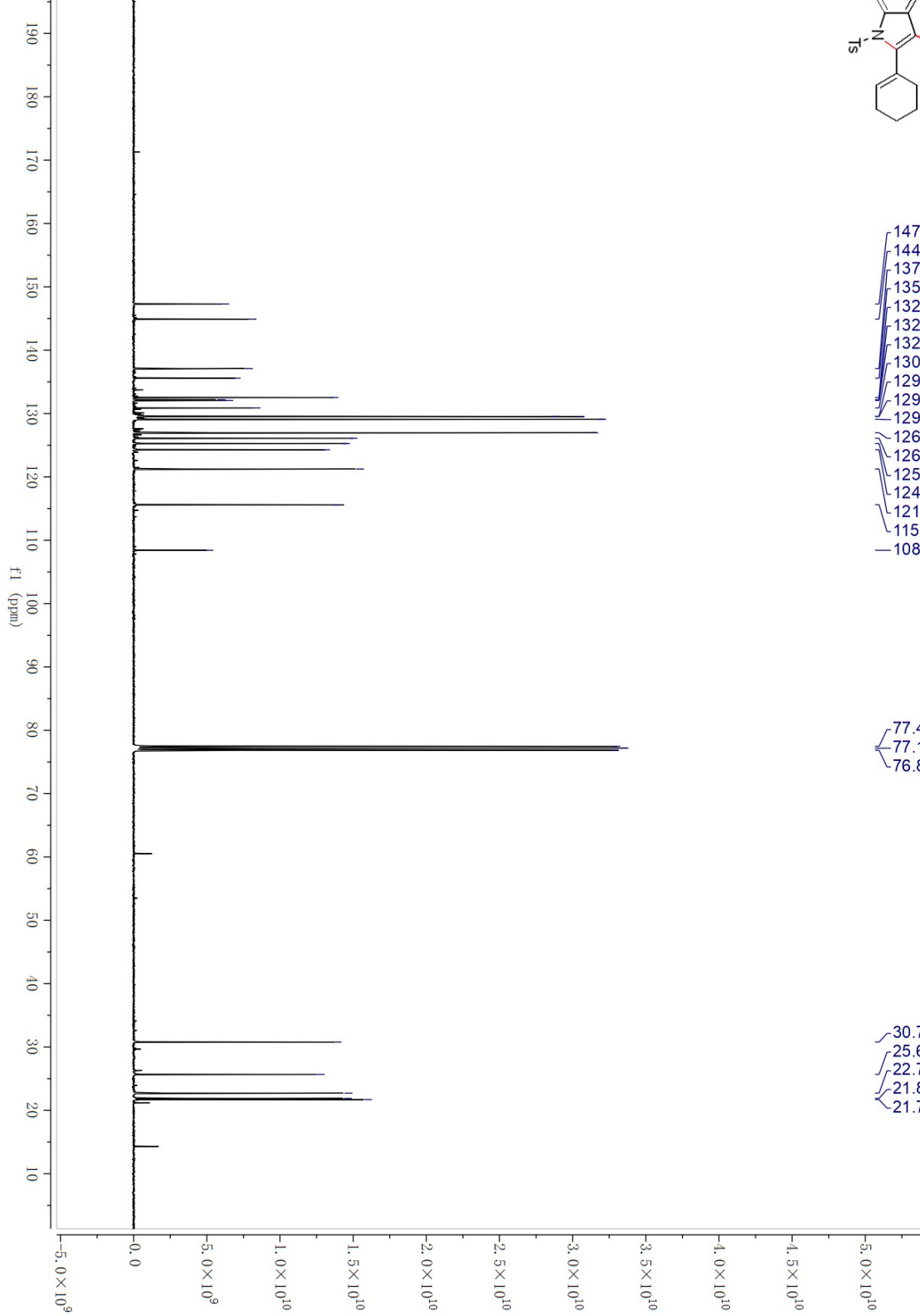
Ts
147
144
137
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132
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125
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121
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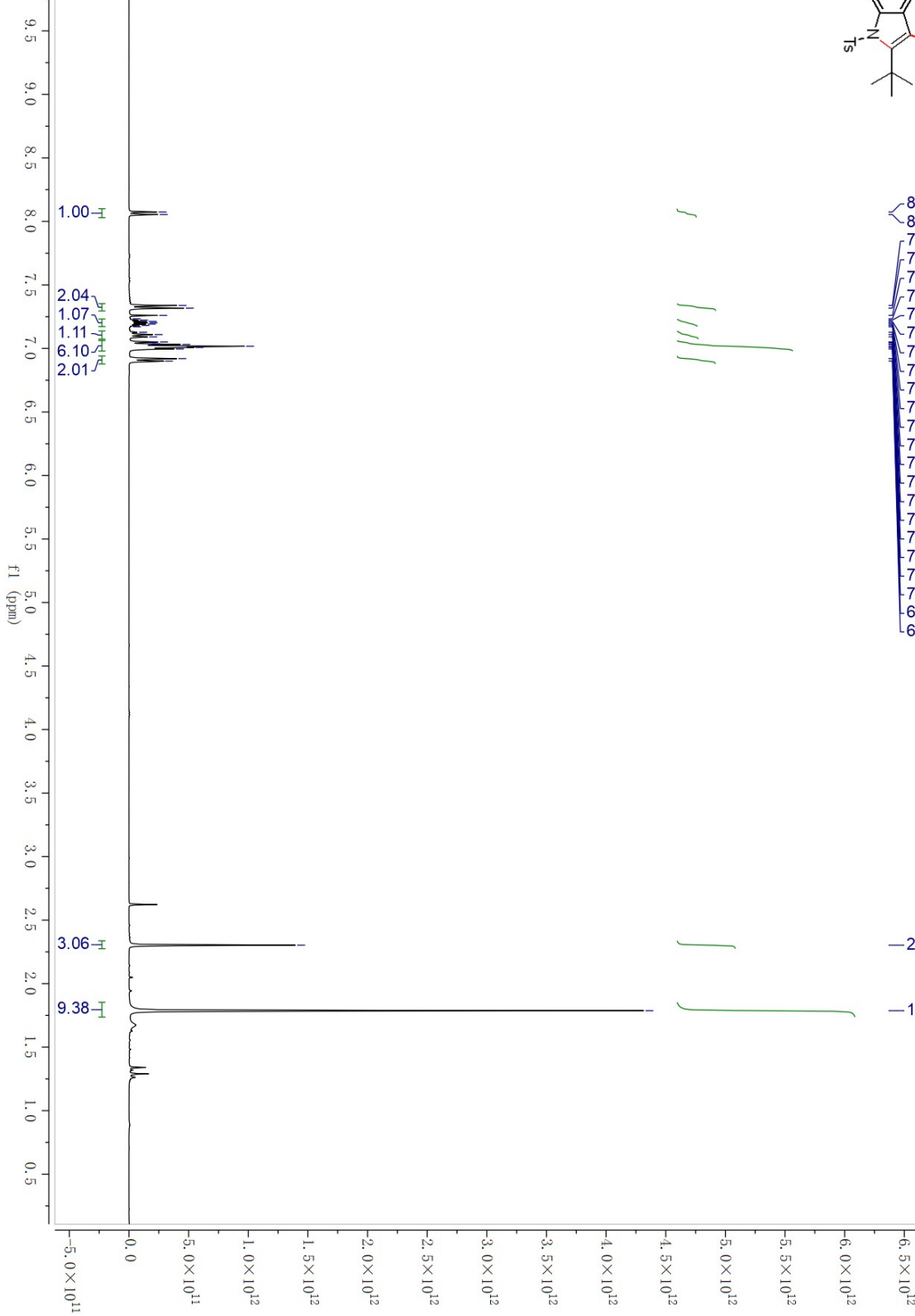
76.8
30.7
25.6
22.7
21.8
21.7
f1 (ppm)

13c, ^{13}C



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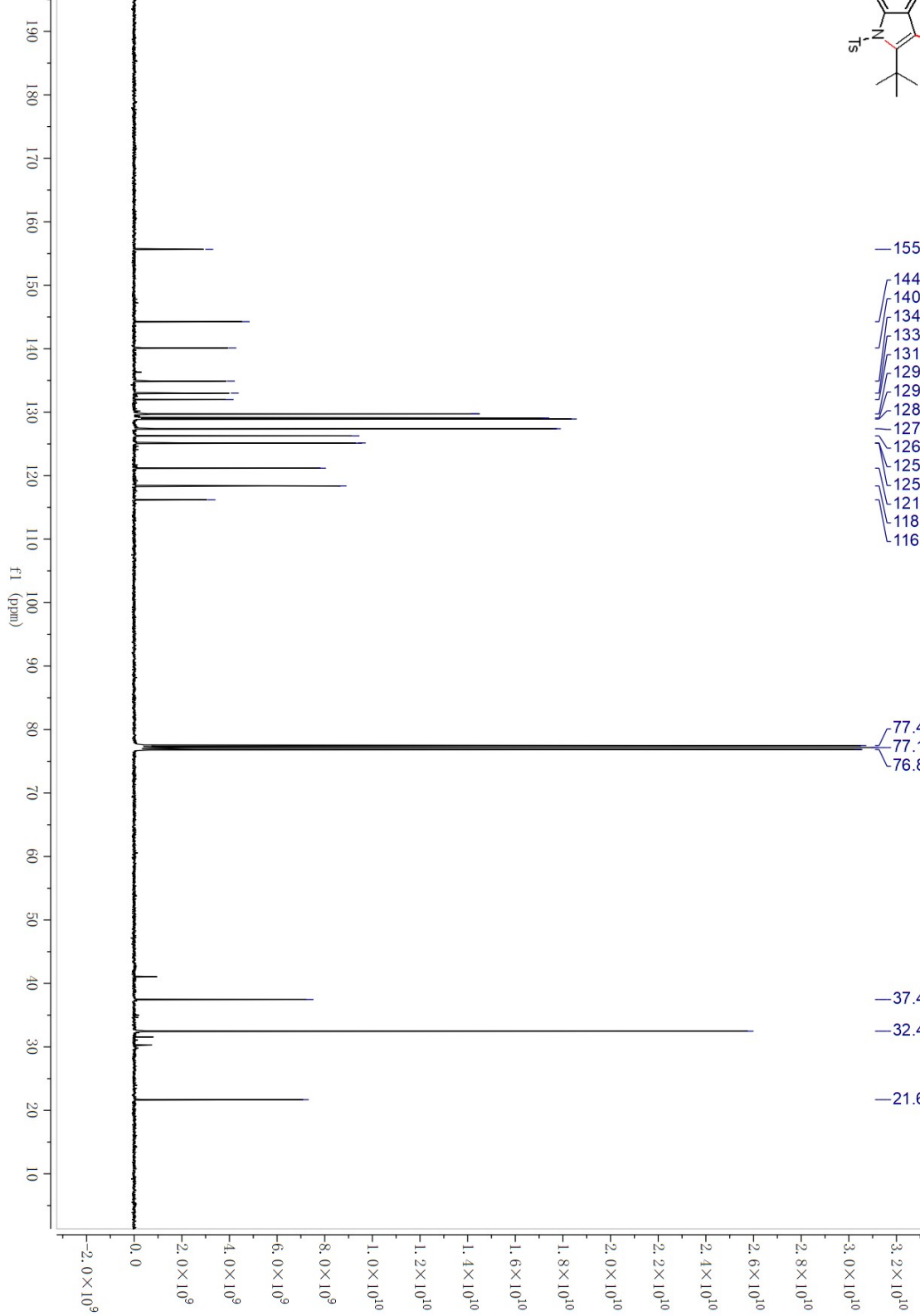
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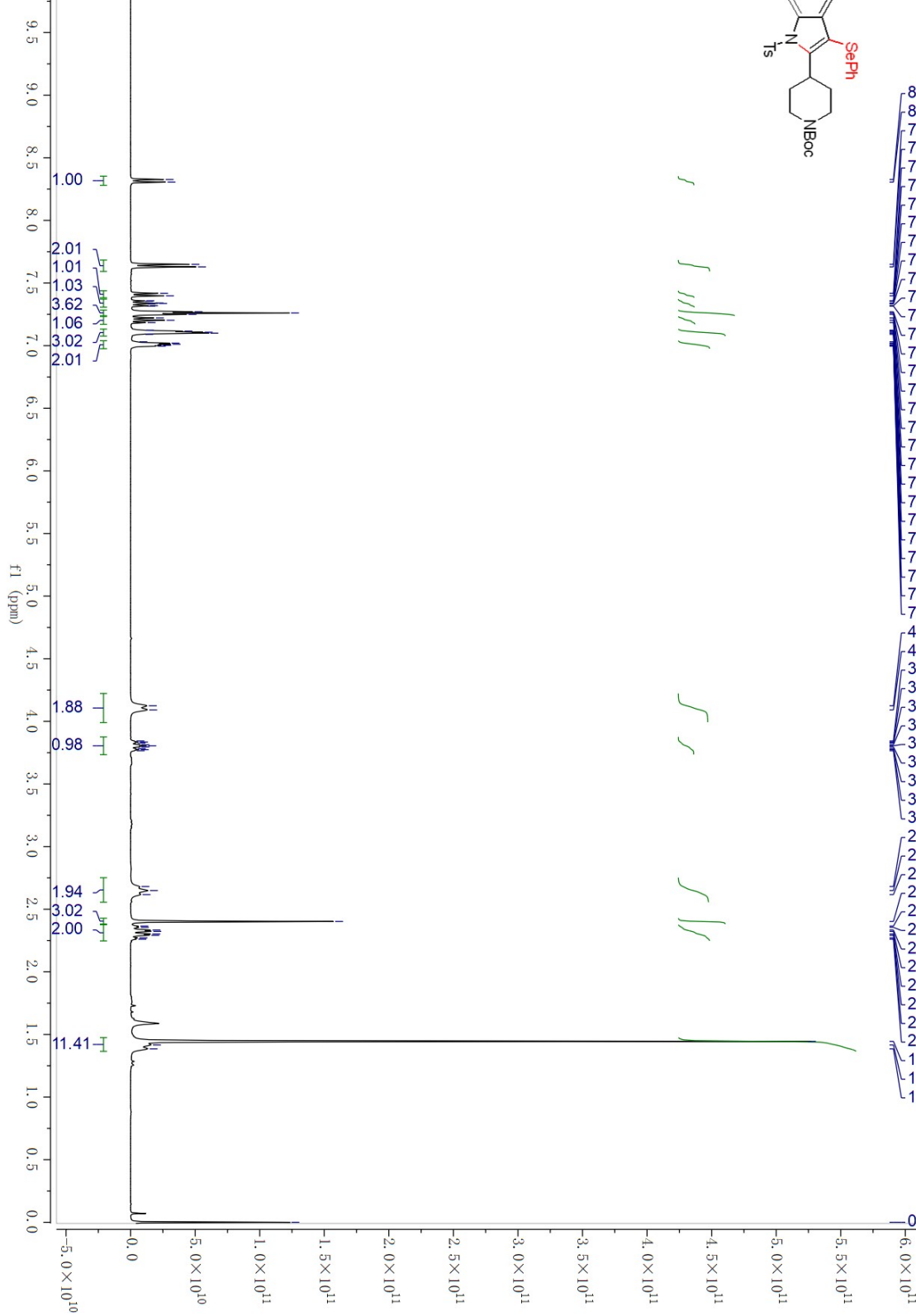
32.4
21.6
f1 (ppm)

14c, ^{13}C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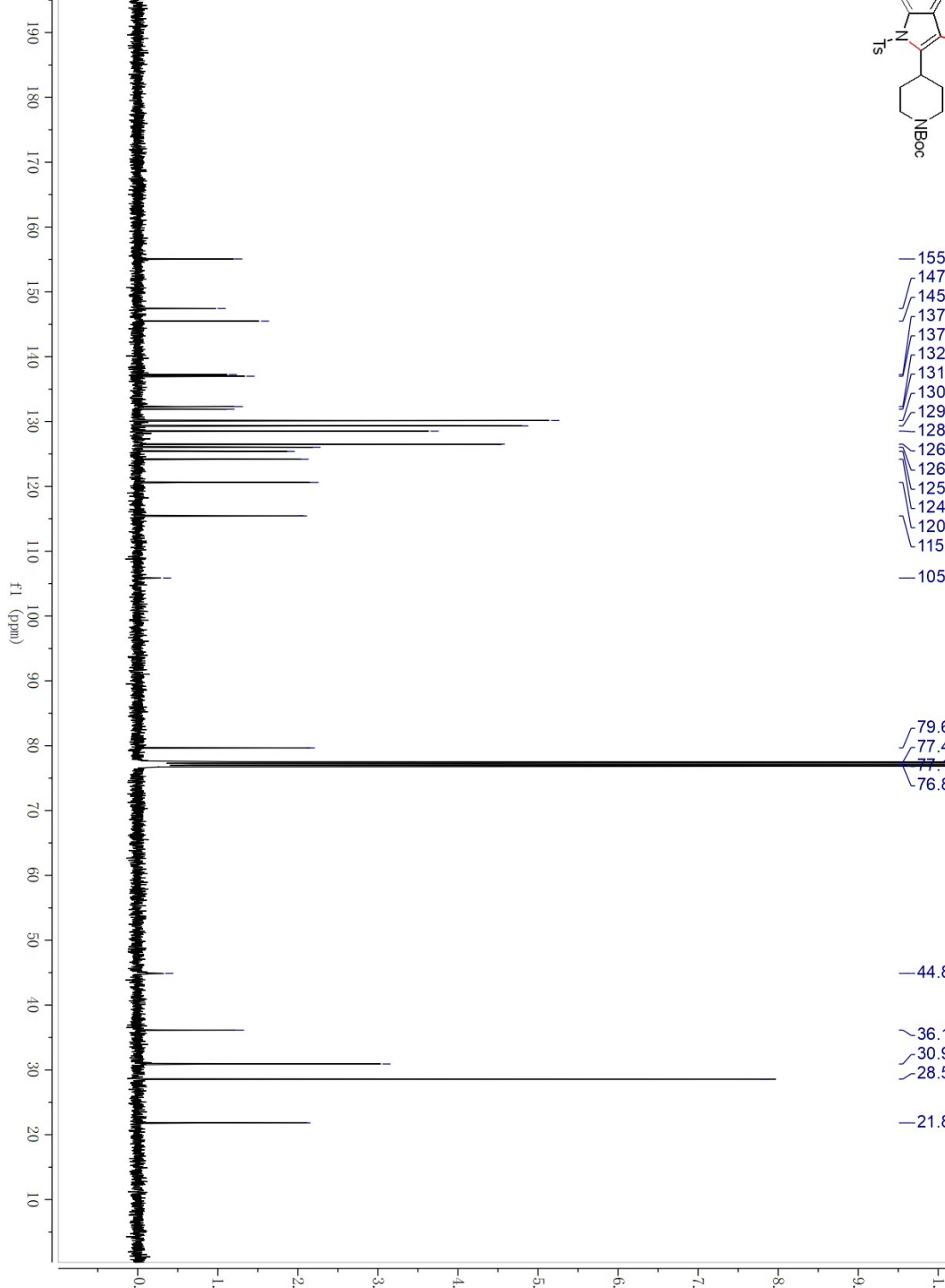
2.00
11.41
f1 (ppm)

15c, ^{1}H


Ts
NBoc
f1 (ppm)
155
147
145
137
137
132
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125
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30.9
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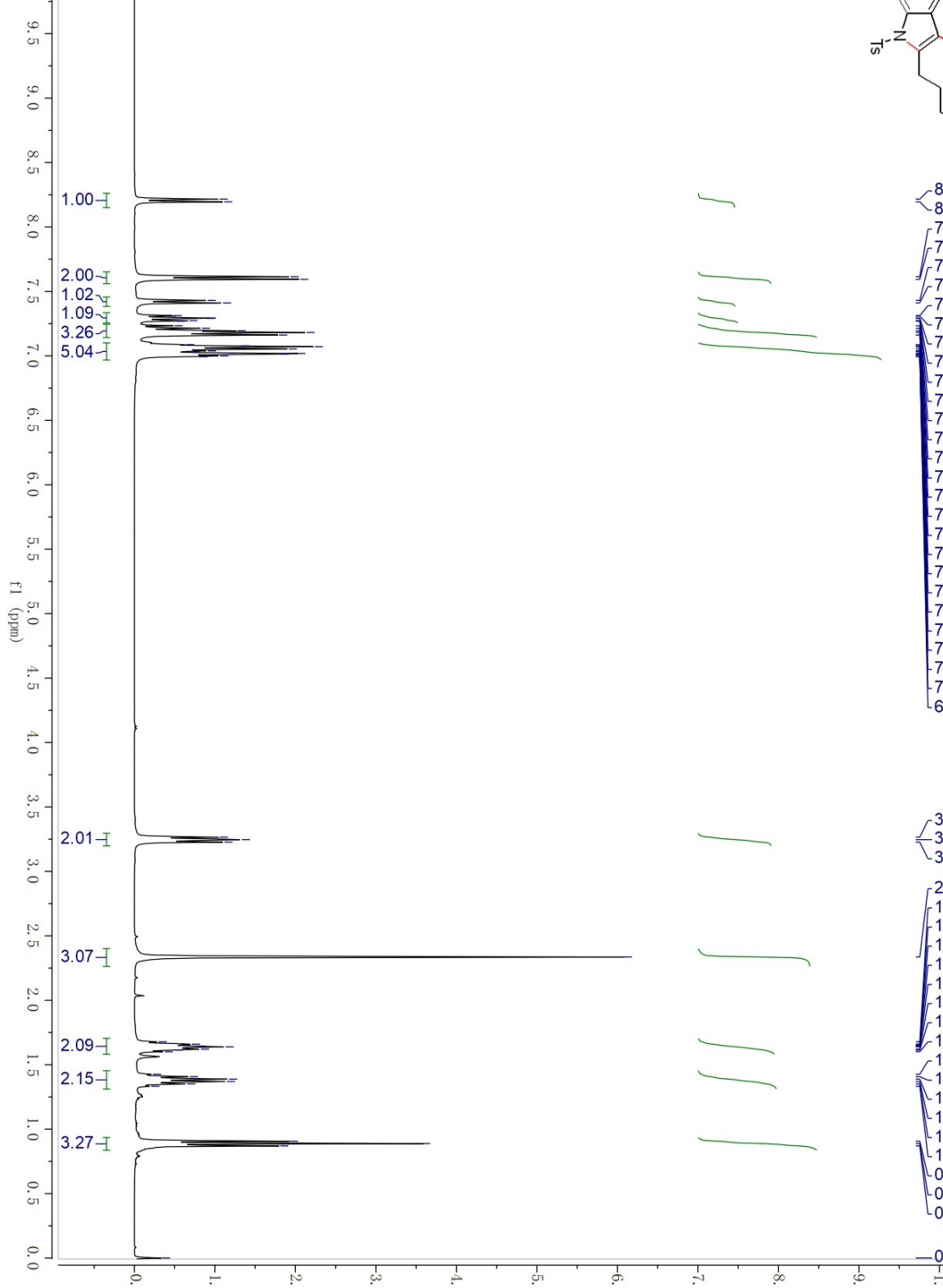
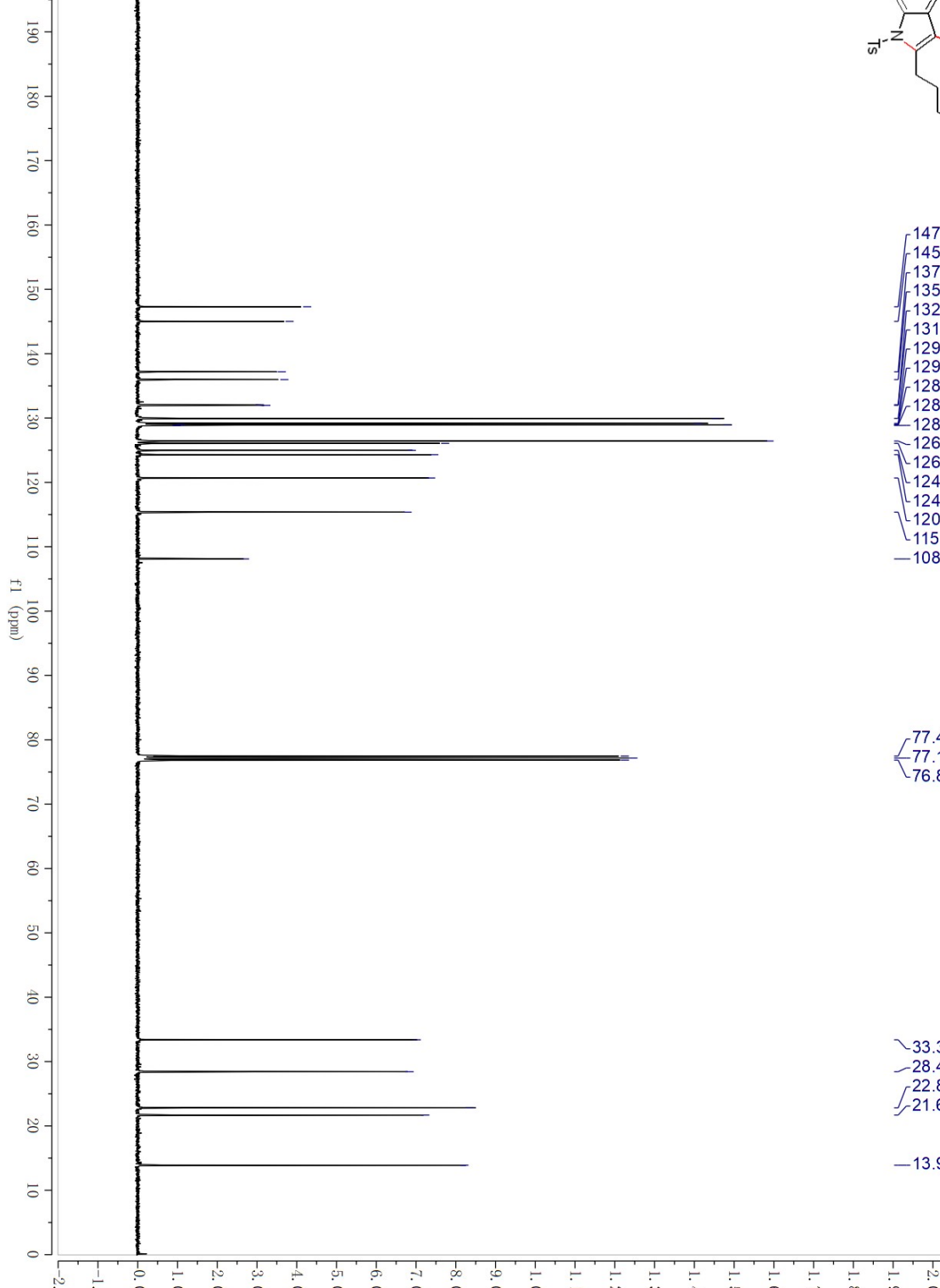
21.8

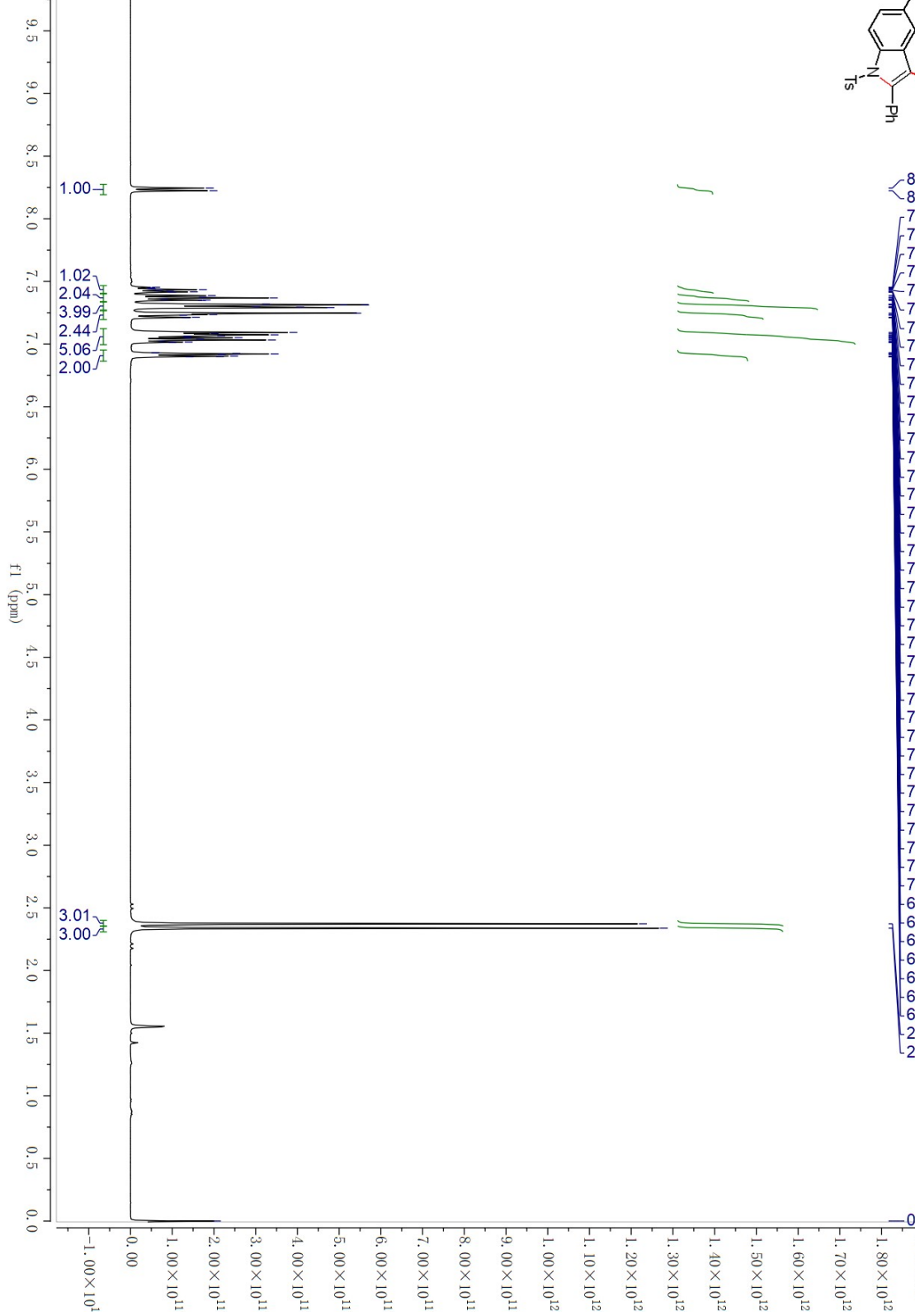
15c, ^{13}C



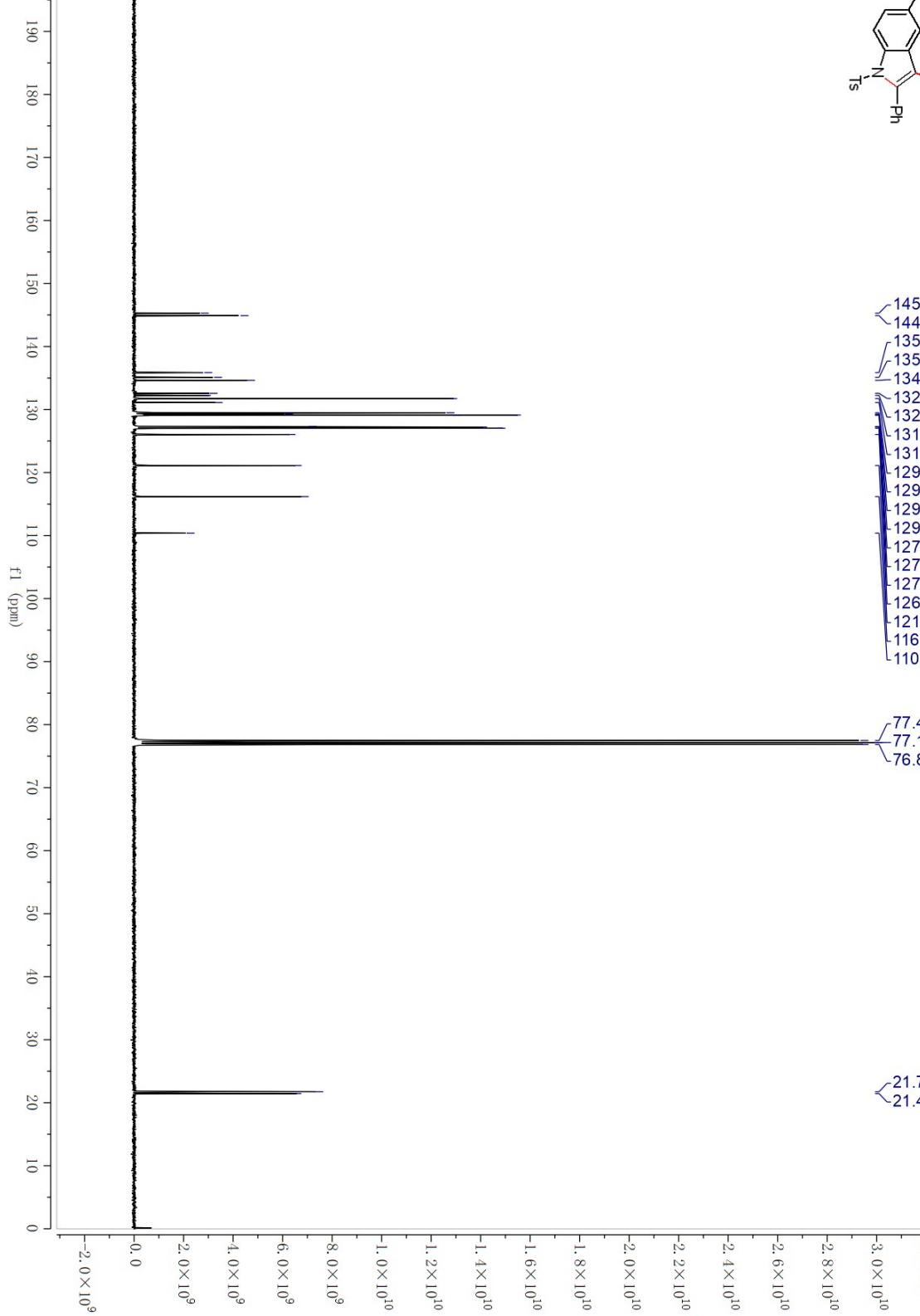
16c, ^{1}H


f1 (ppm)
147
145
137
135
132
131
129
129
128
128
128
126
126
124
124
120
115
108
77.4
77.1
76.8
33.3
28.4
22.8
21.6
13.9
Ts
N

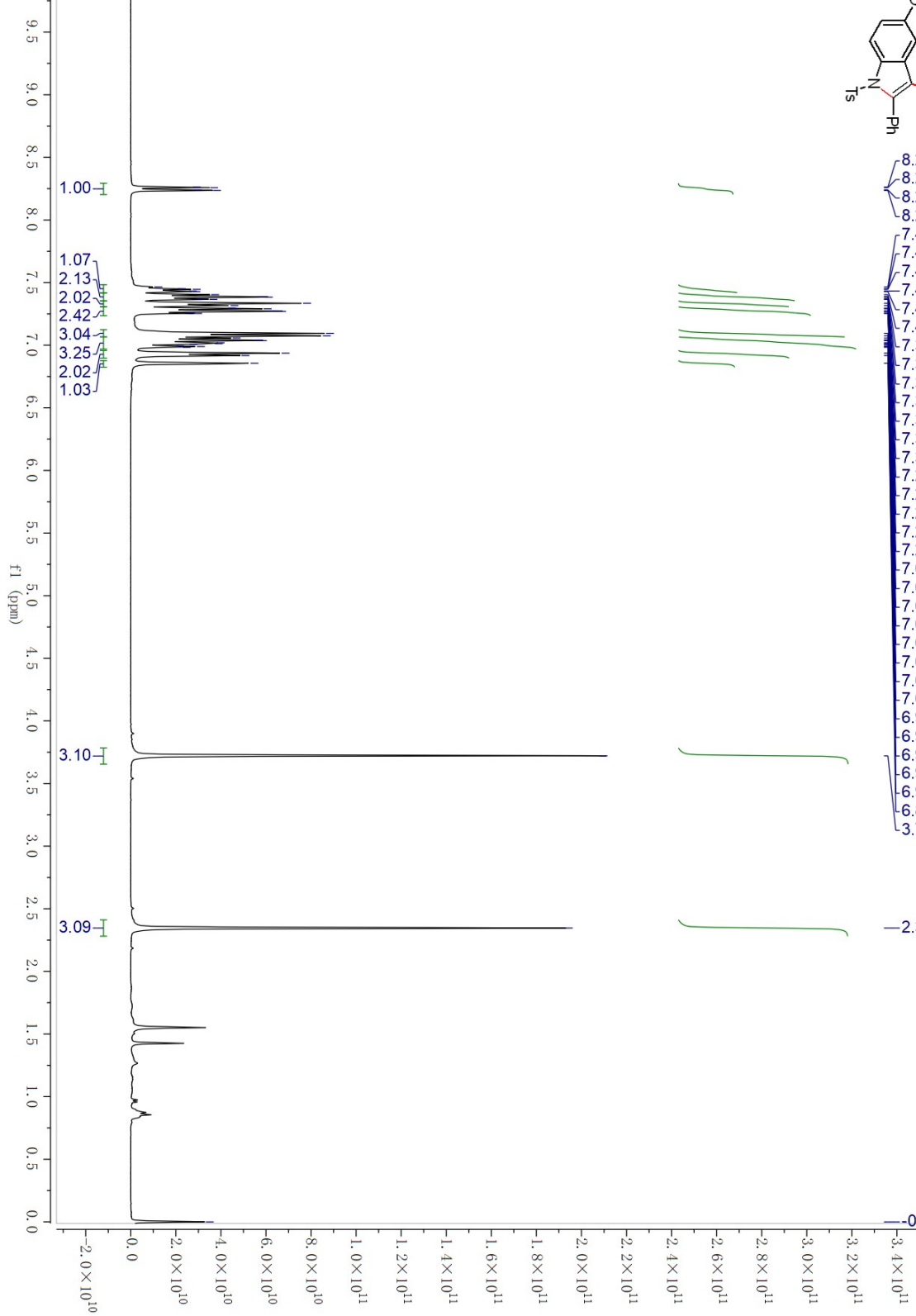
16c, ^{13}C



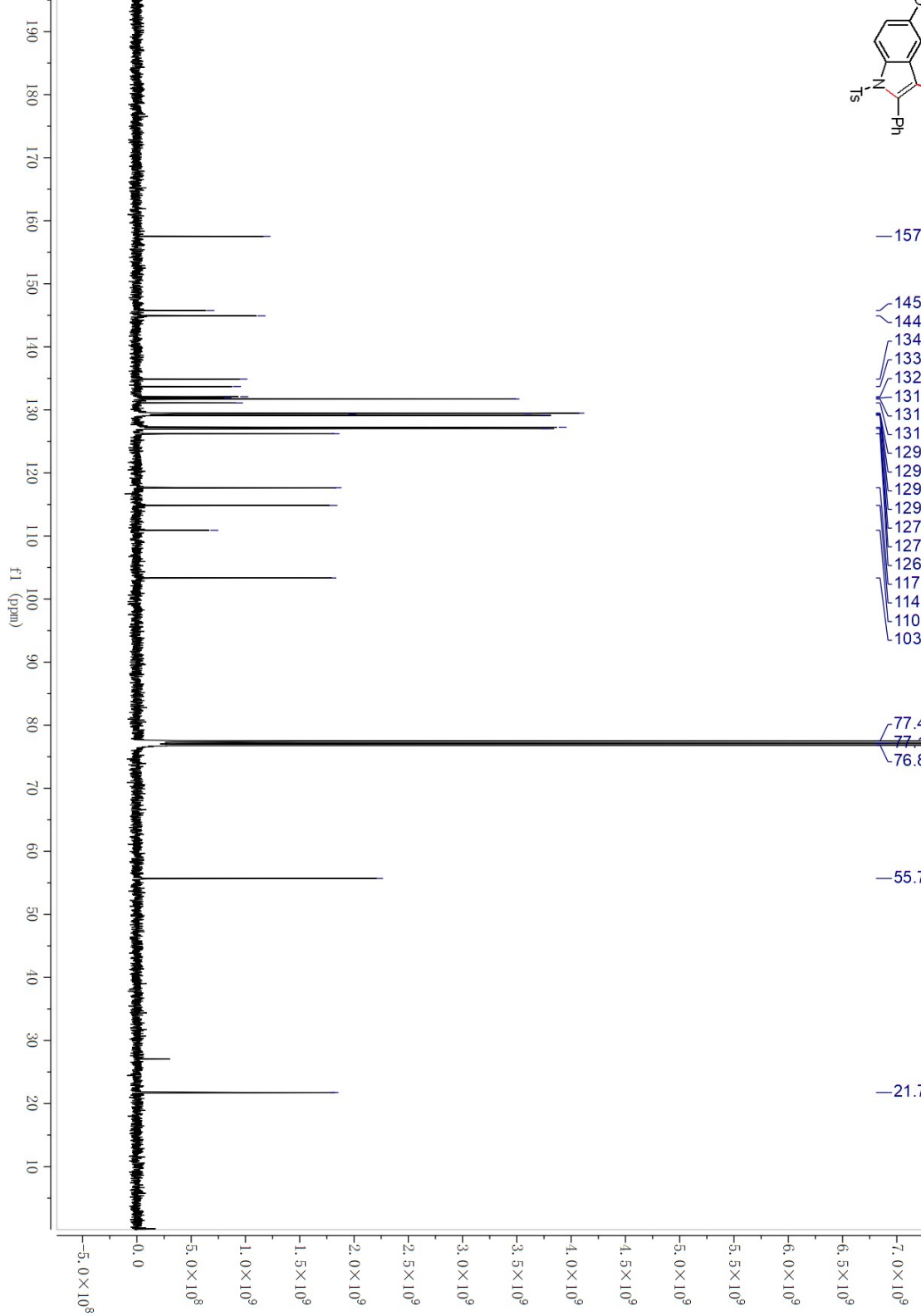
17c, ^{1}H


f1 (ppm)
Ts
Ph
145
144
135
135
134
132
132
131
131
129
129
129
129
127
127
127
126
121
116
110
77.4
77.1
76.8
21.7
21.4

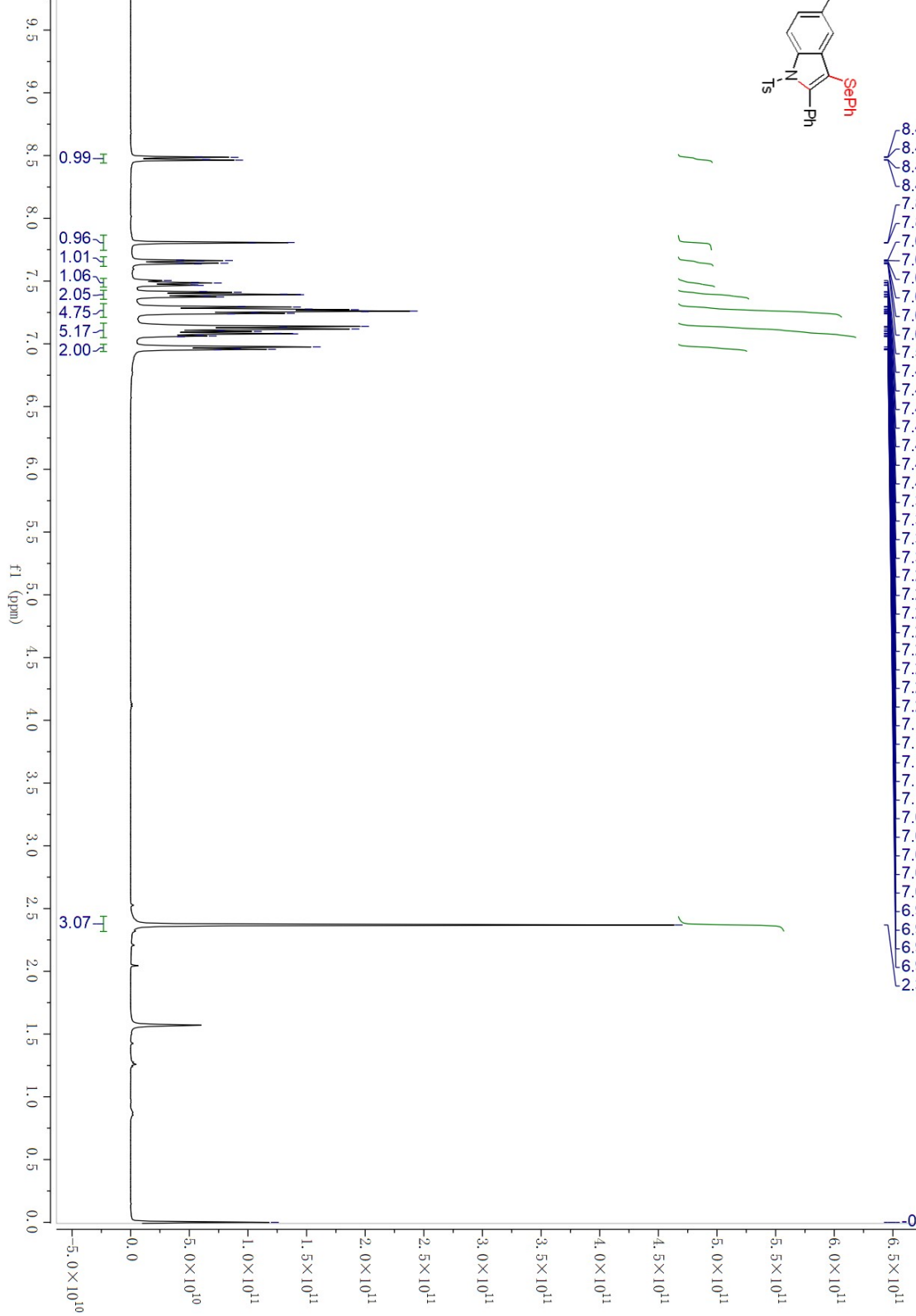
17c, ^{13}C



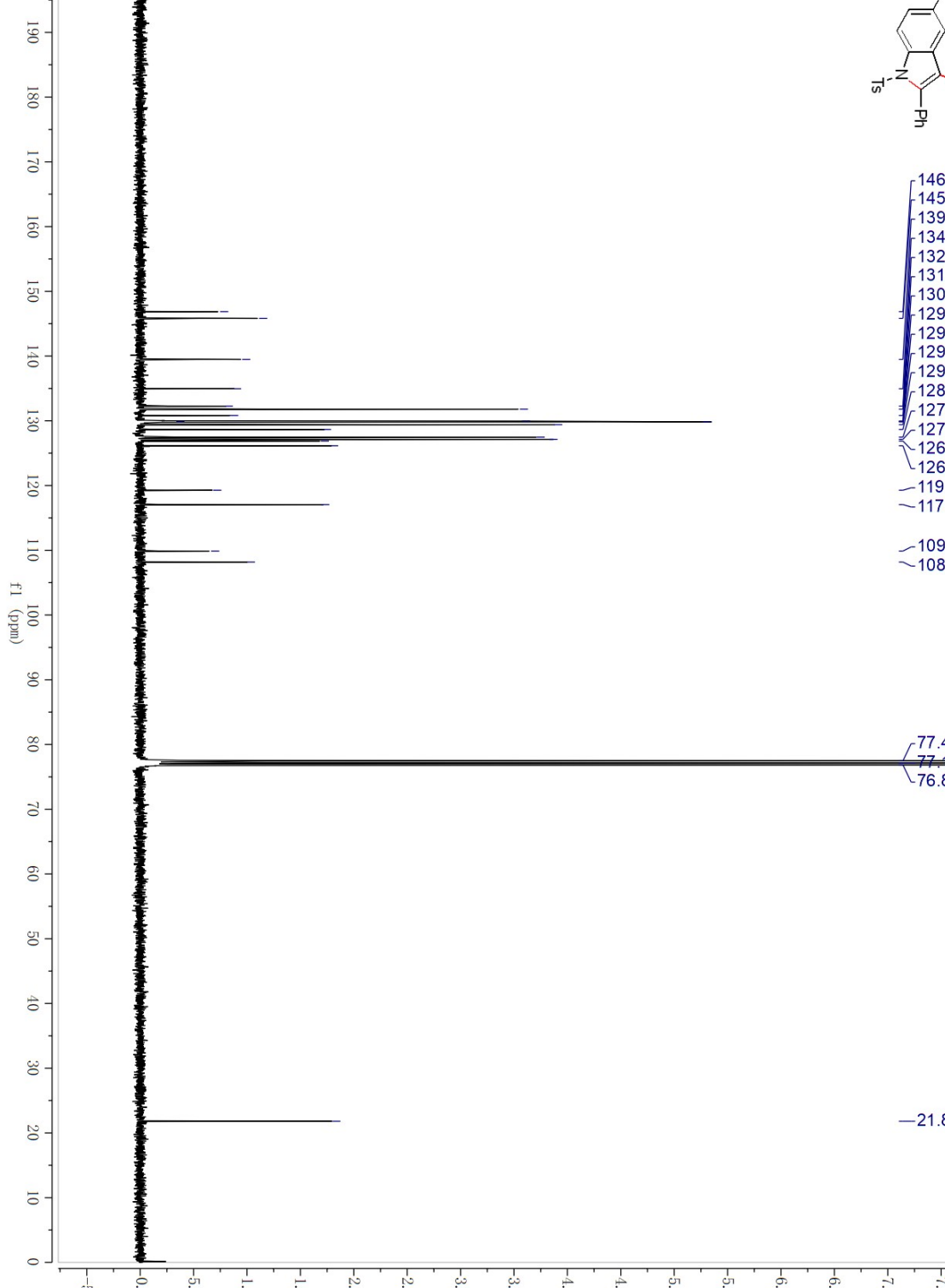
18c, ^{1}H


f1 (ppm)
Ts
Ph
157
145
144
134
133
132
131
131
131
129
129
129
129
127
127
126
117
114
110
103
77.4
76.8
55.7
21.7

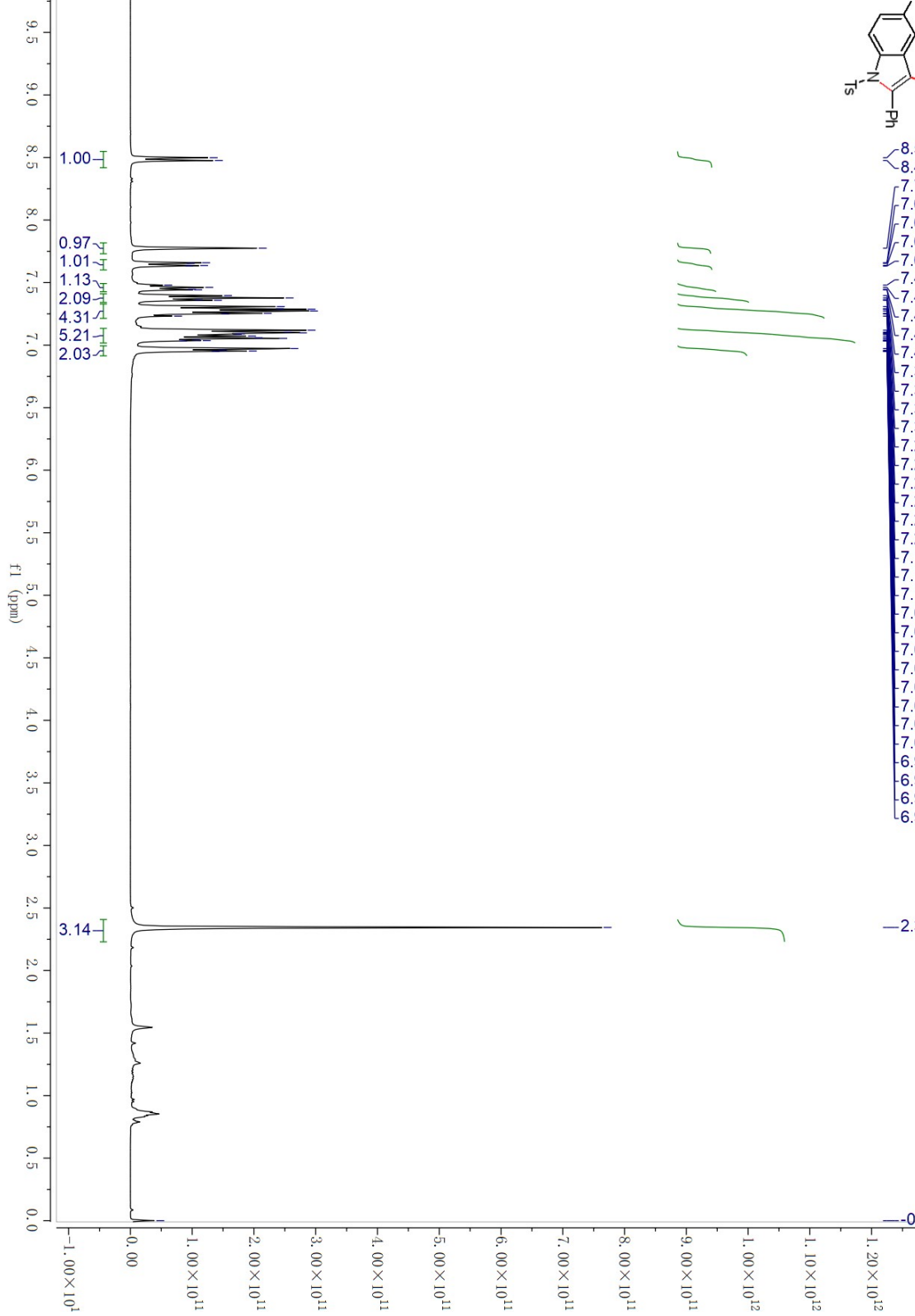
18c, ^{13}C



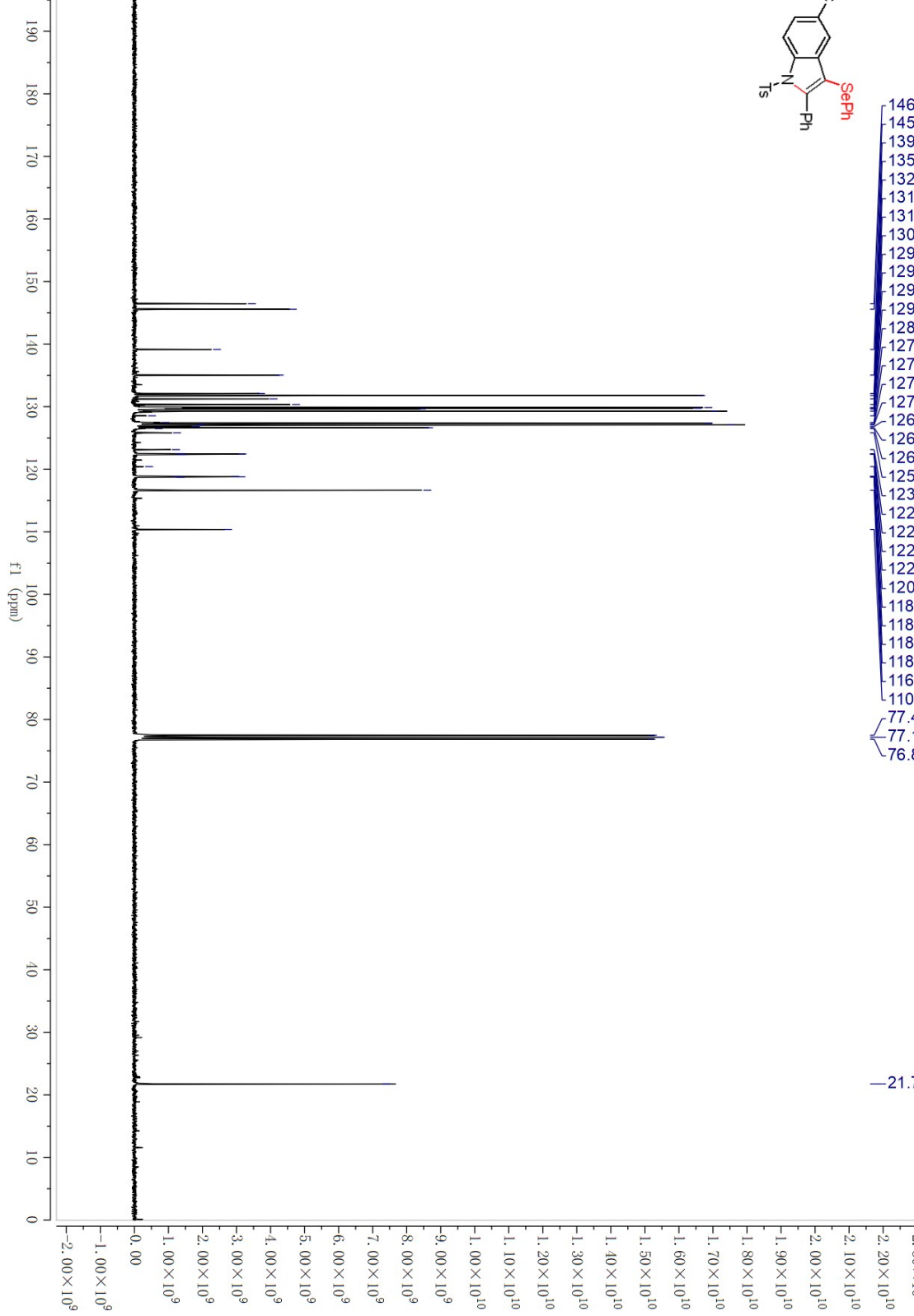
19c, ^{1}H


f1 (ppm)
N
Ts
Ph
146
145
139
134
132
131
130
129
129
129
129
128
127
127
126
126
119
117
109
108
77.4
76.8
21.8

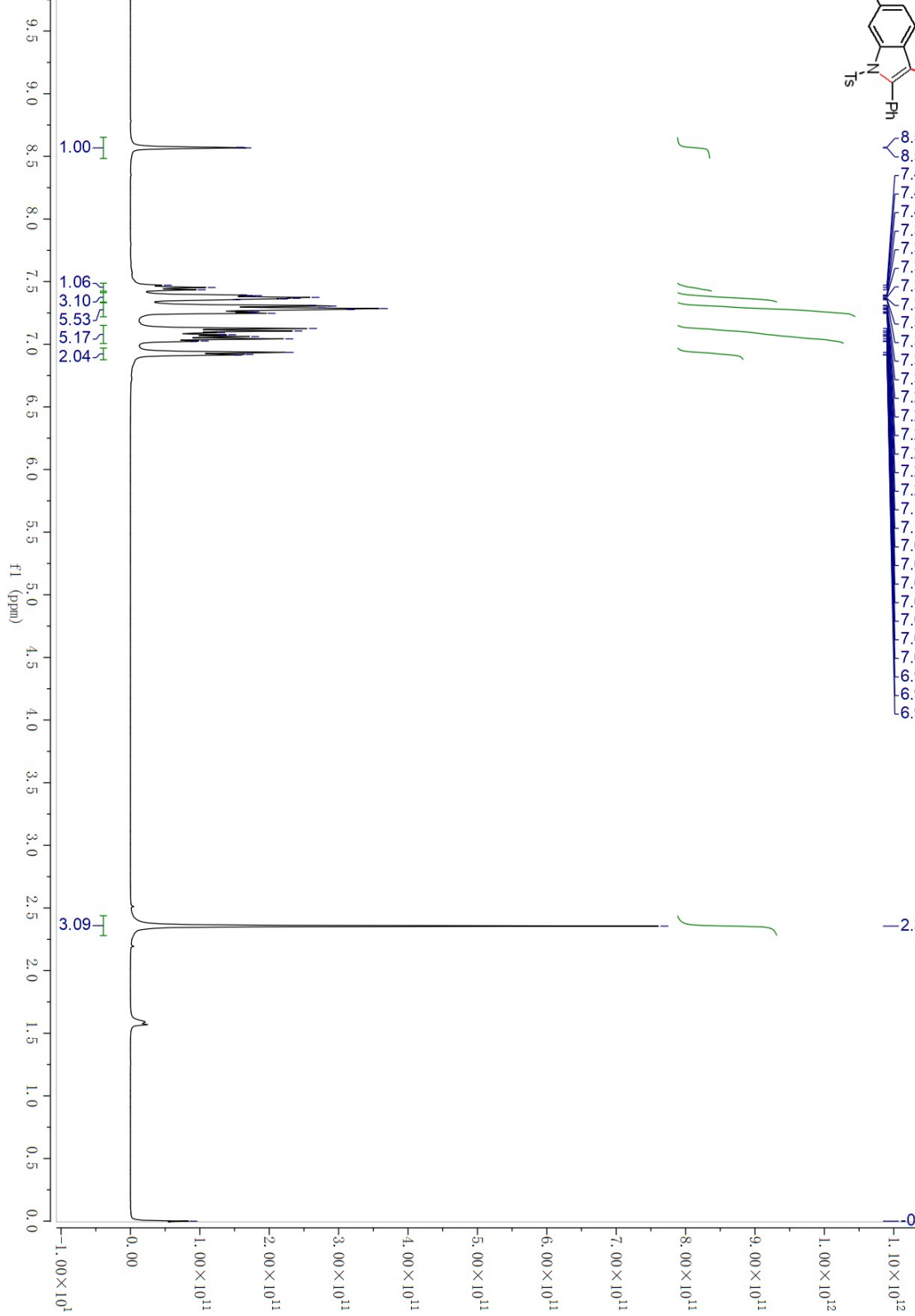
19c, ^{13}C



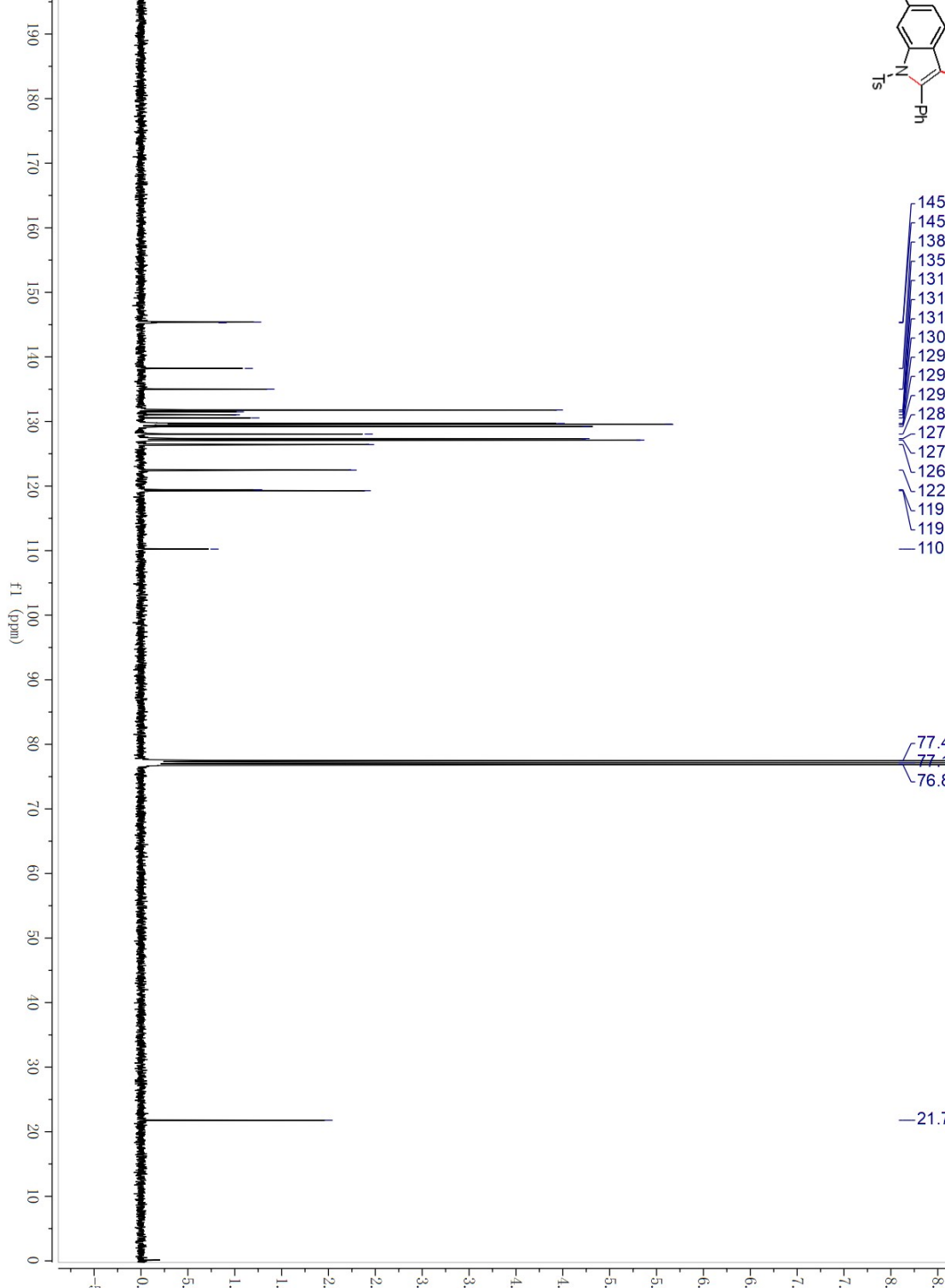
20c, ^{1}H



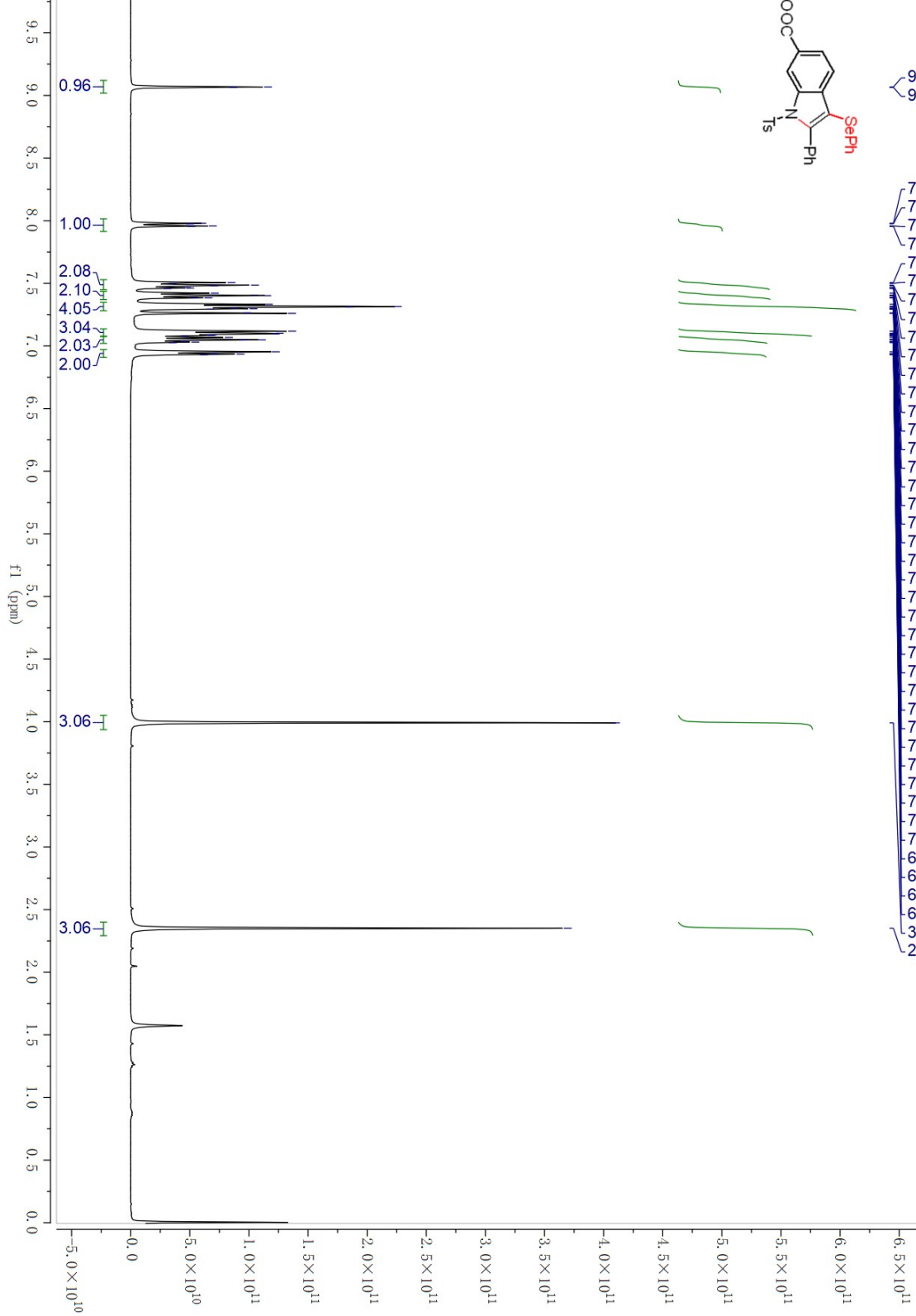
20c, ^{13}C



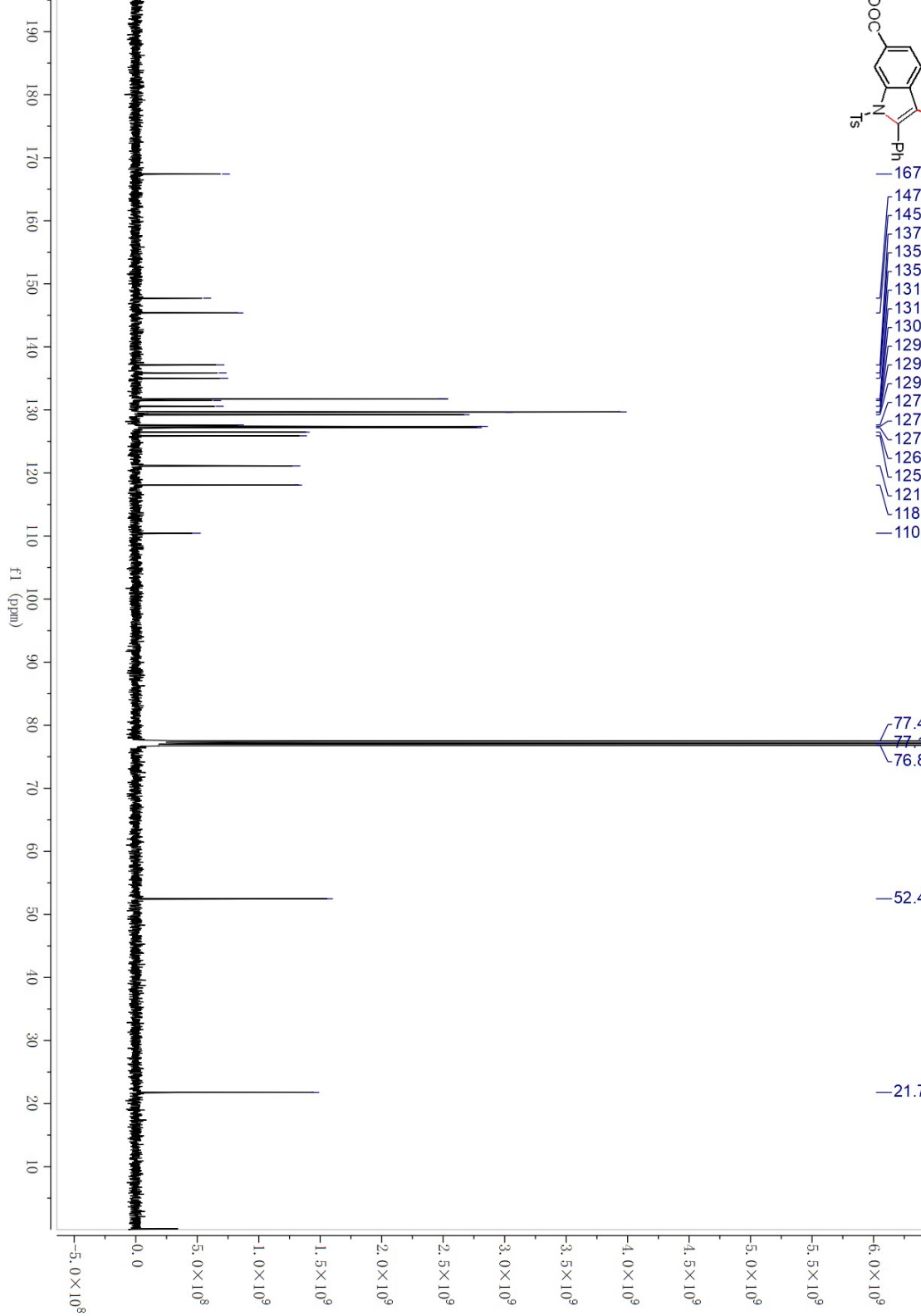
21c, ^{1}H


Ts
Ph
145
145
138
135
131
131
131
130
129
129
129
128
127
127
126
122
119
119
110
77.4
77.
76.8
21.7
f1 (ppm)

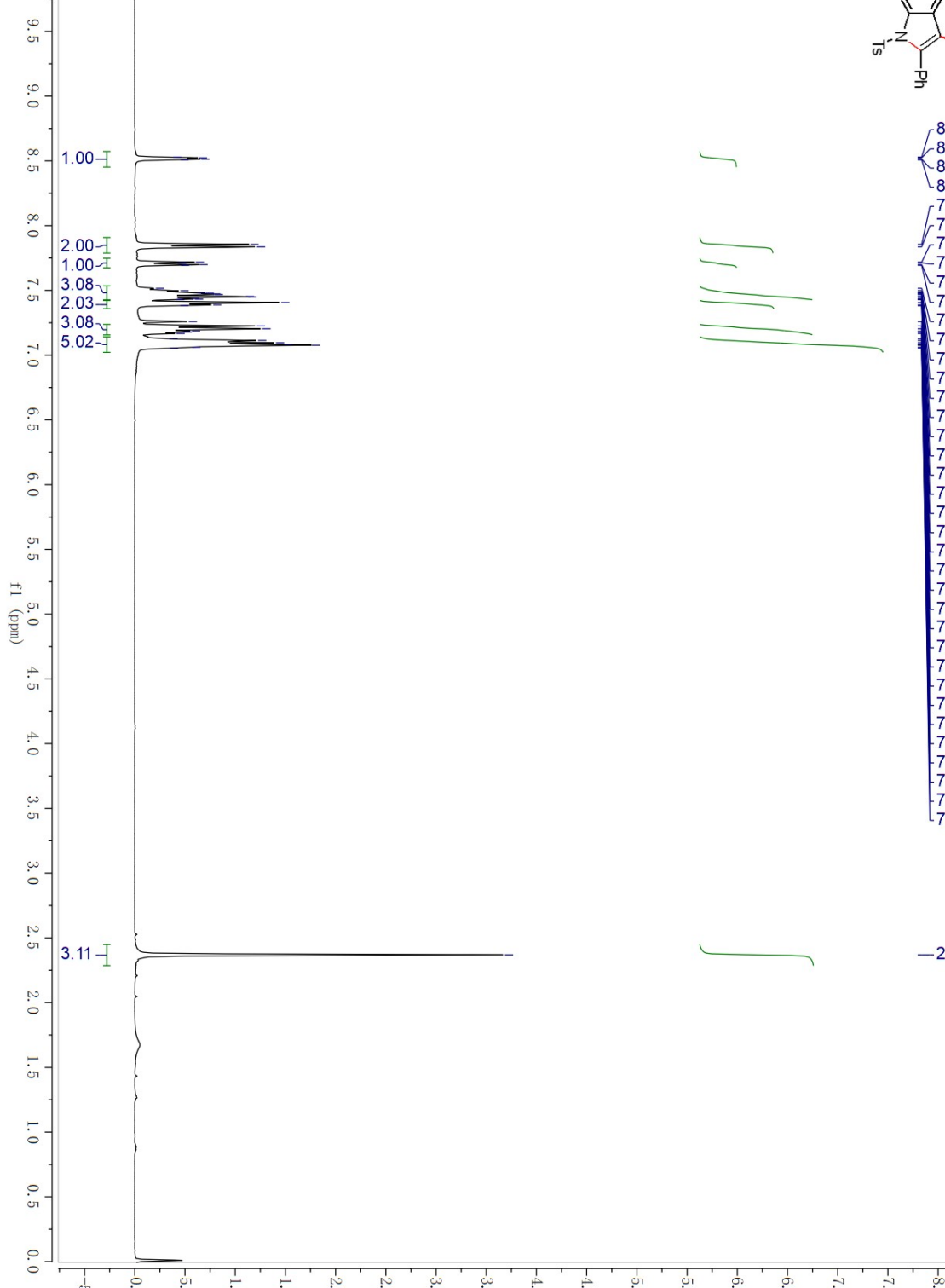
21c, ^{13}C



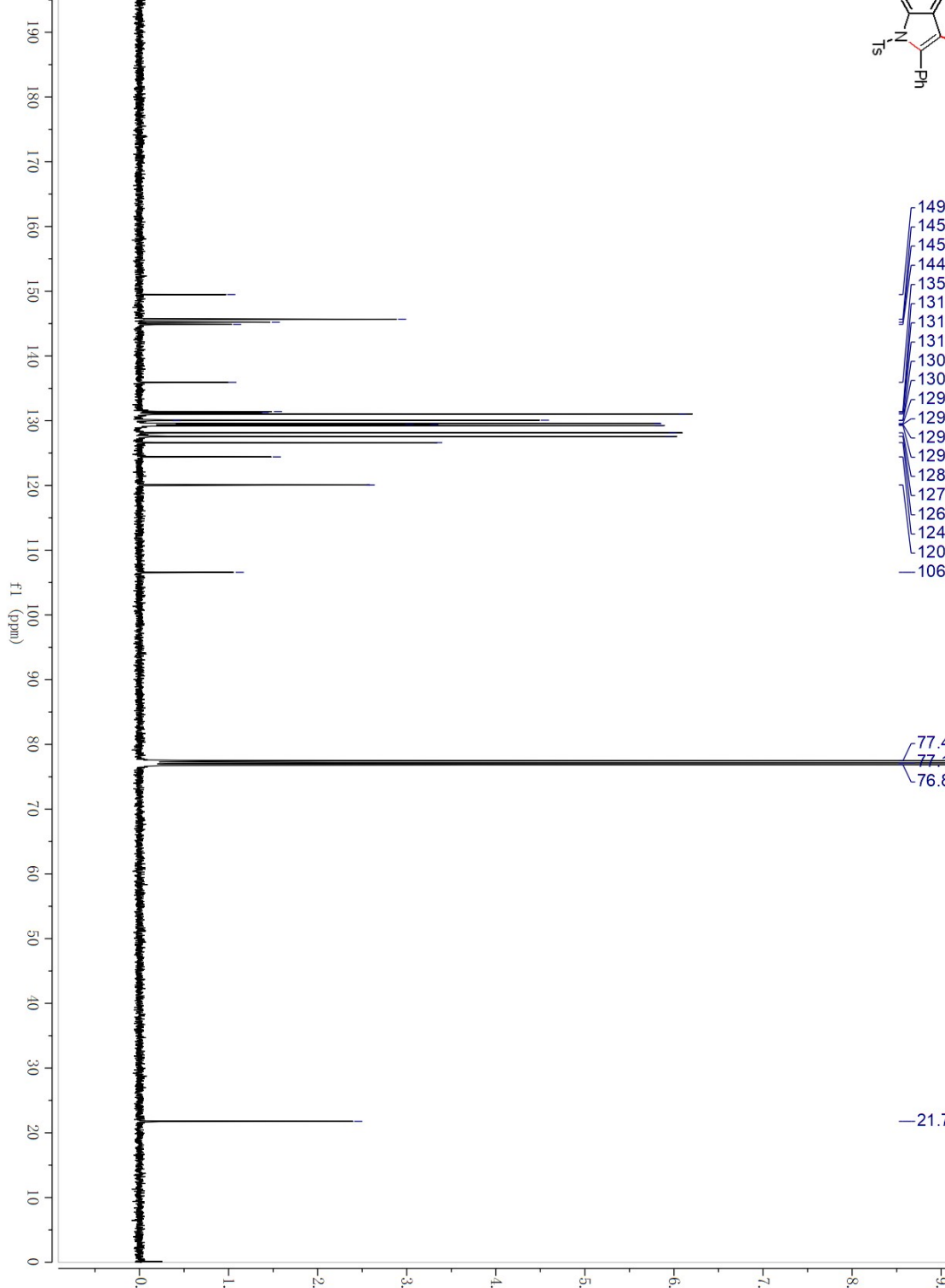
22c, ^{1}H



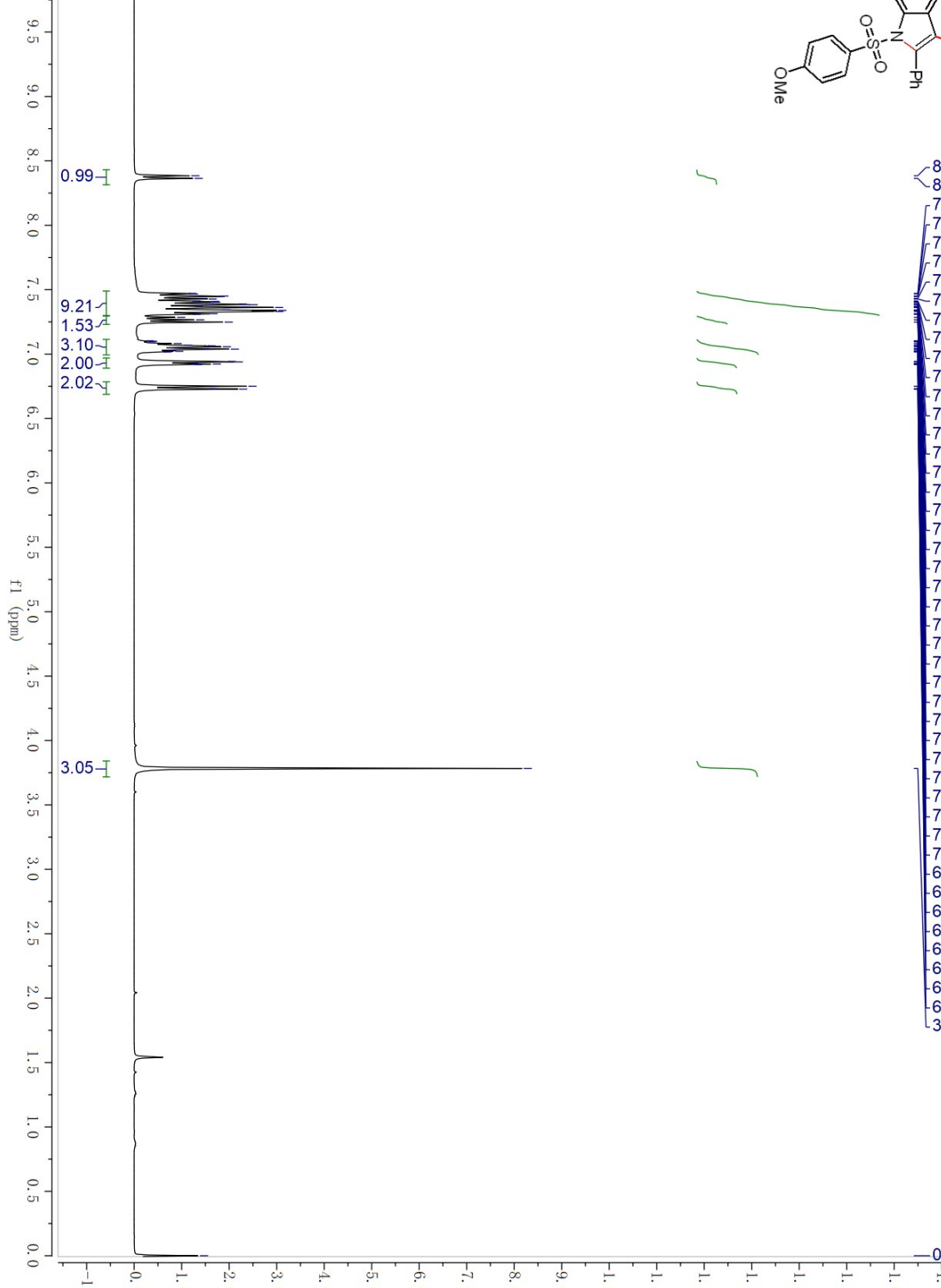
22c, ^{13}C



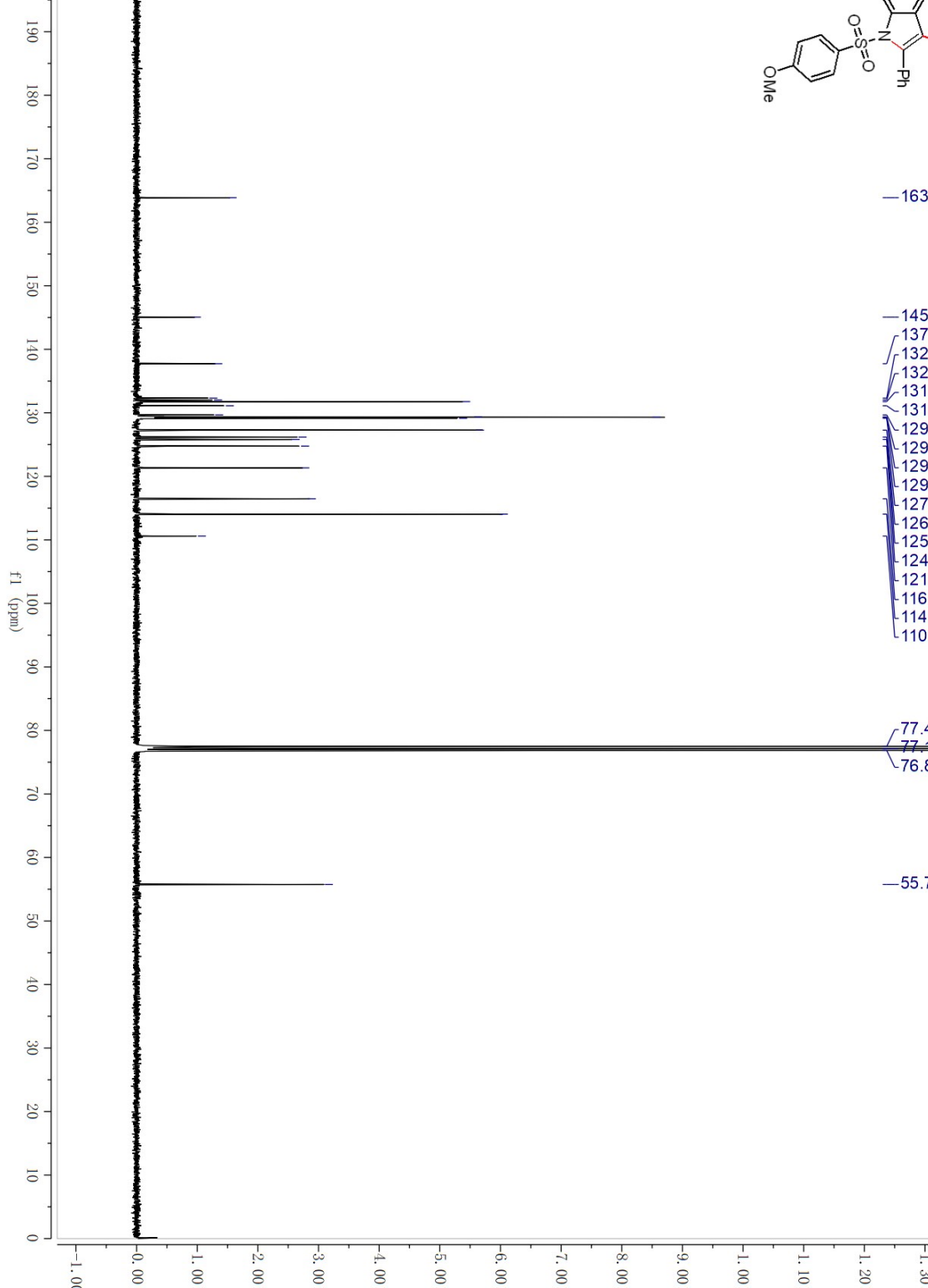
23c, ^{1}H


Ts
Ph
149
145
145
144
135
131
131
131
130
130
129
129
129
129
128
127
126
124
120
106
77.4
76.8
21.7
f1 (ppm)

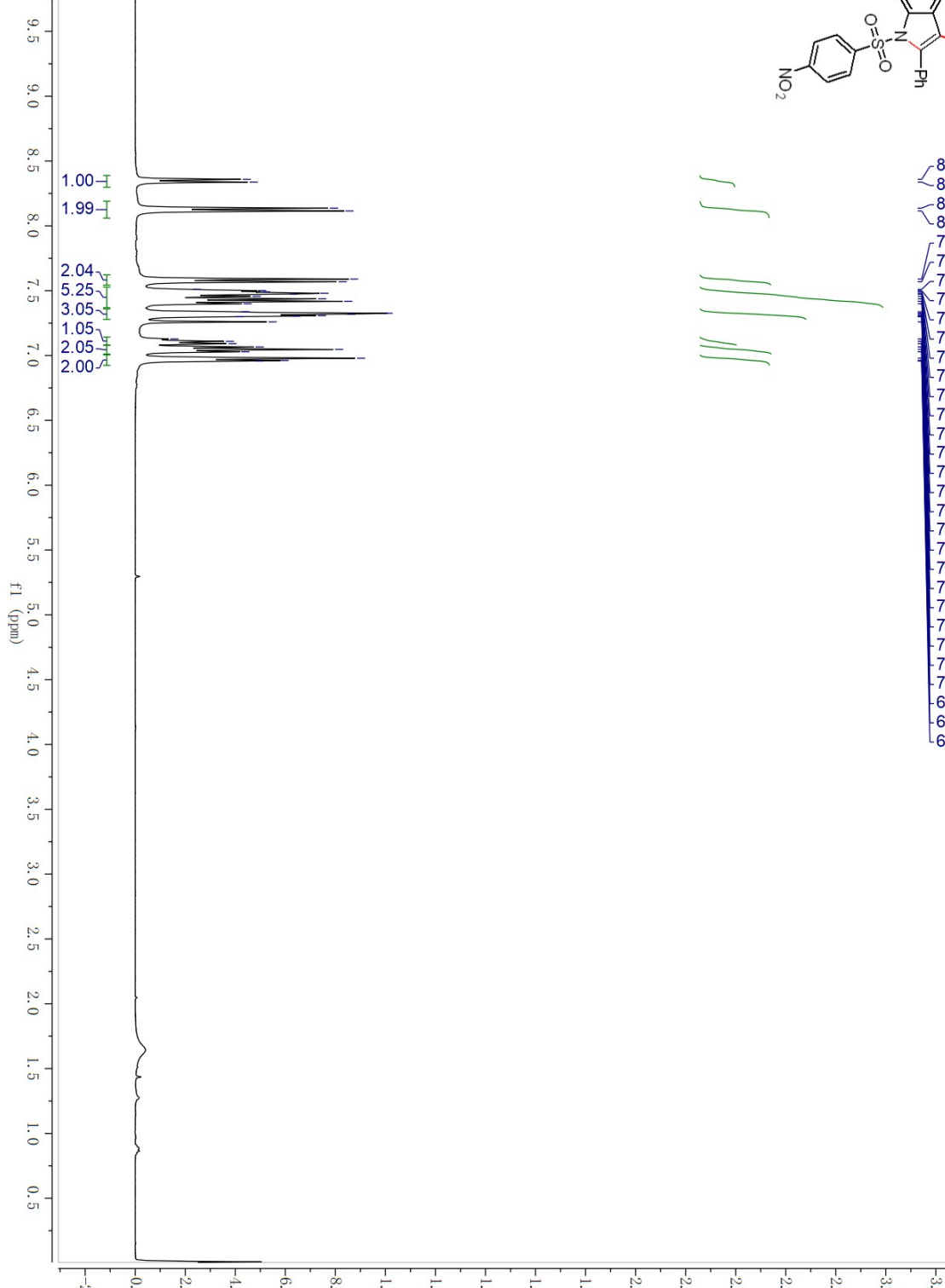
23c, ^{13}C



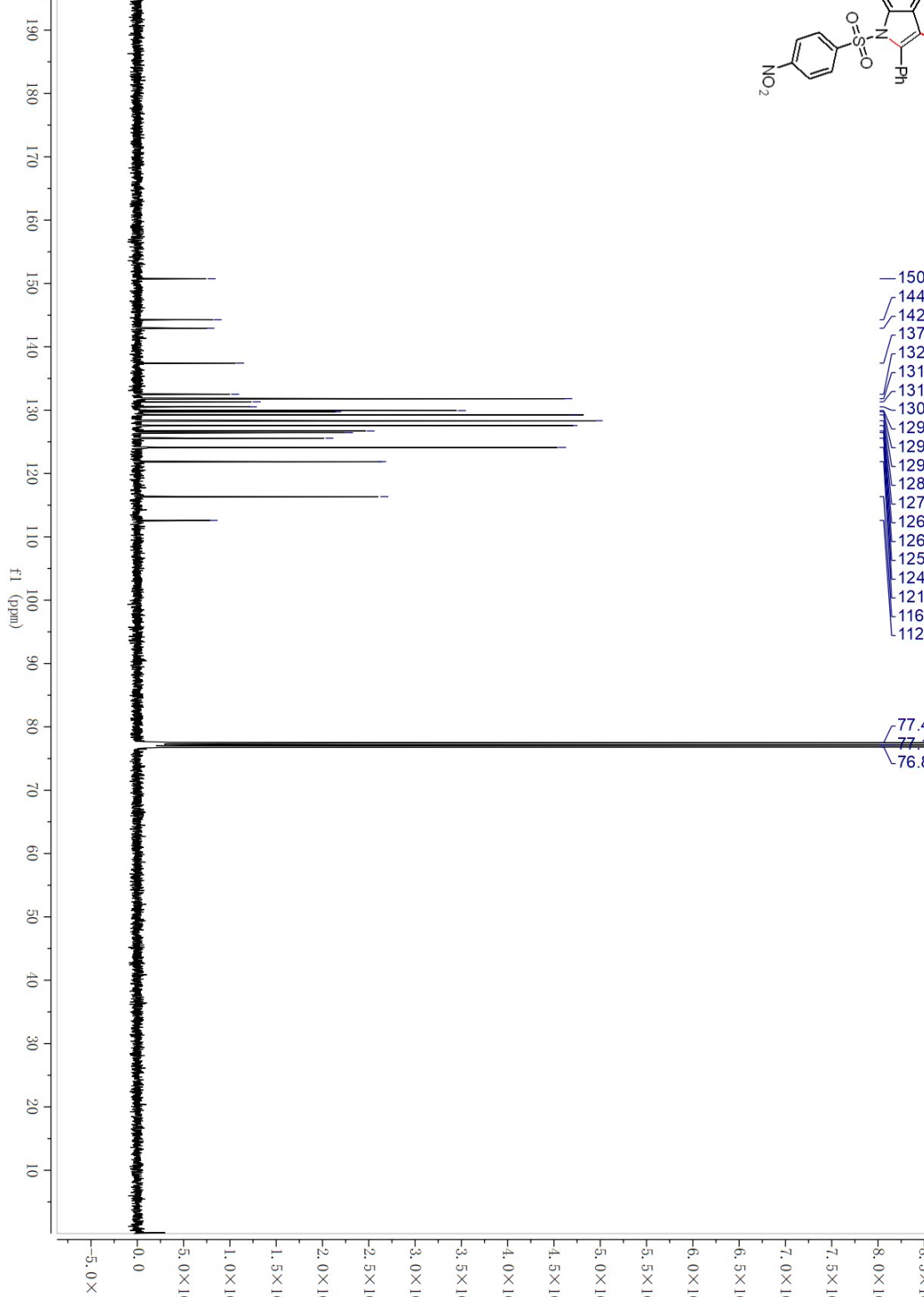
24c, ^{1}H


f1 (ppm)
OMe
Ph
163
145
137
132
132
131
131
129
129
129
129
127
126
125
124
121
116
114
110
77.4
76.8
55.7

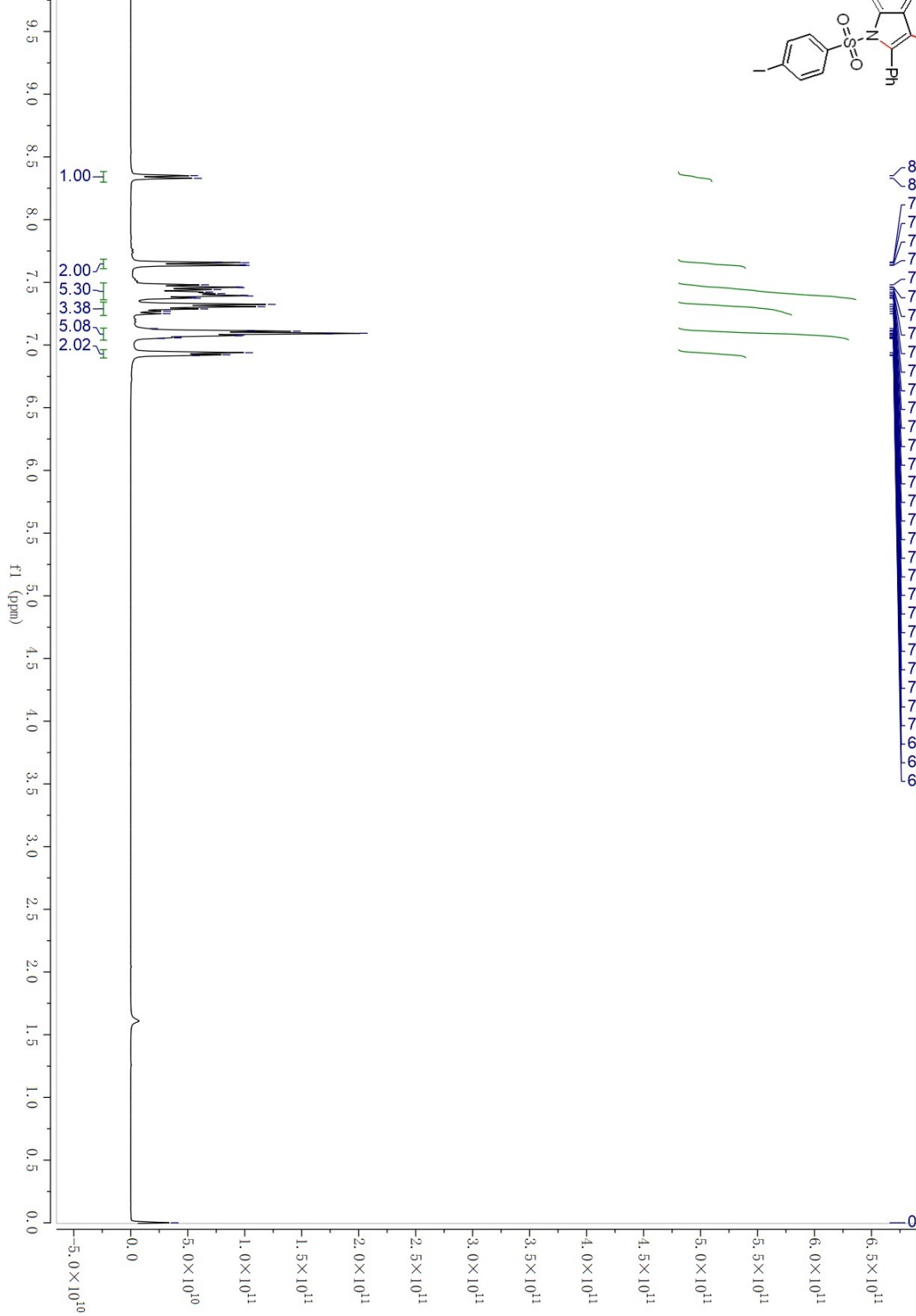
24c, ^{13}C



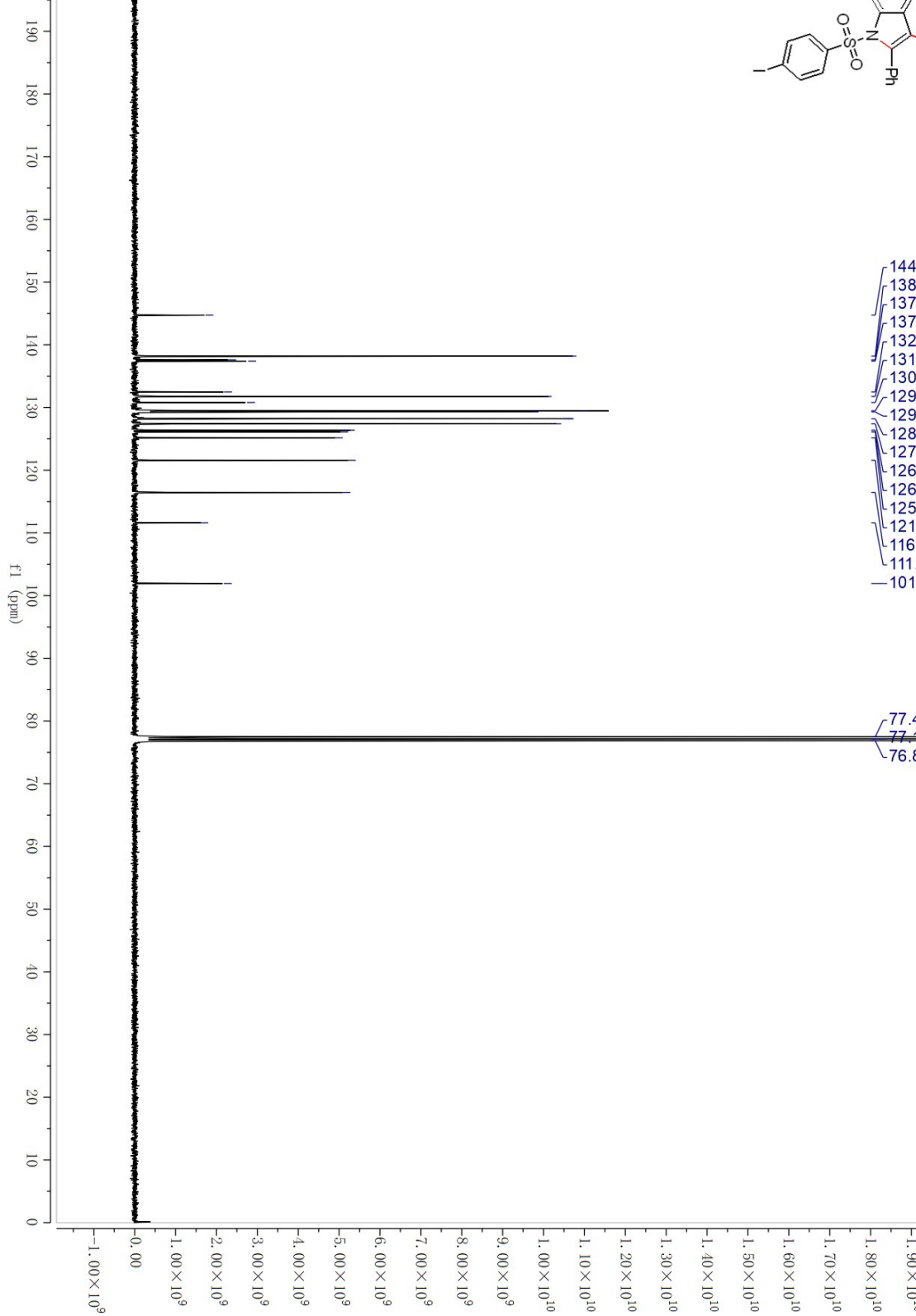
25c, ^{1}H


f1 (ppm)
150
144
142
137
132
131
131
130
129
129
129
128
127
126
126
125
124
121
116
112
77.4
77.
76.8
NO2
Ph

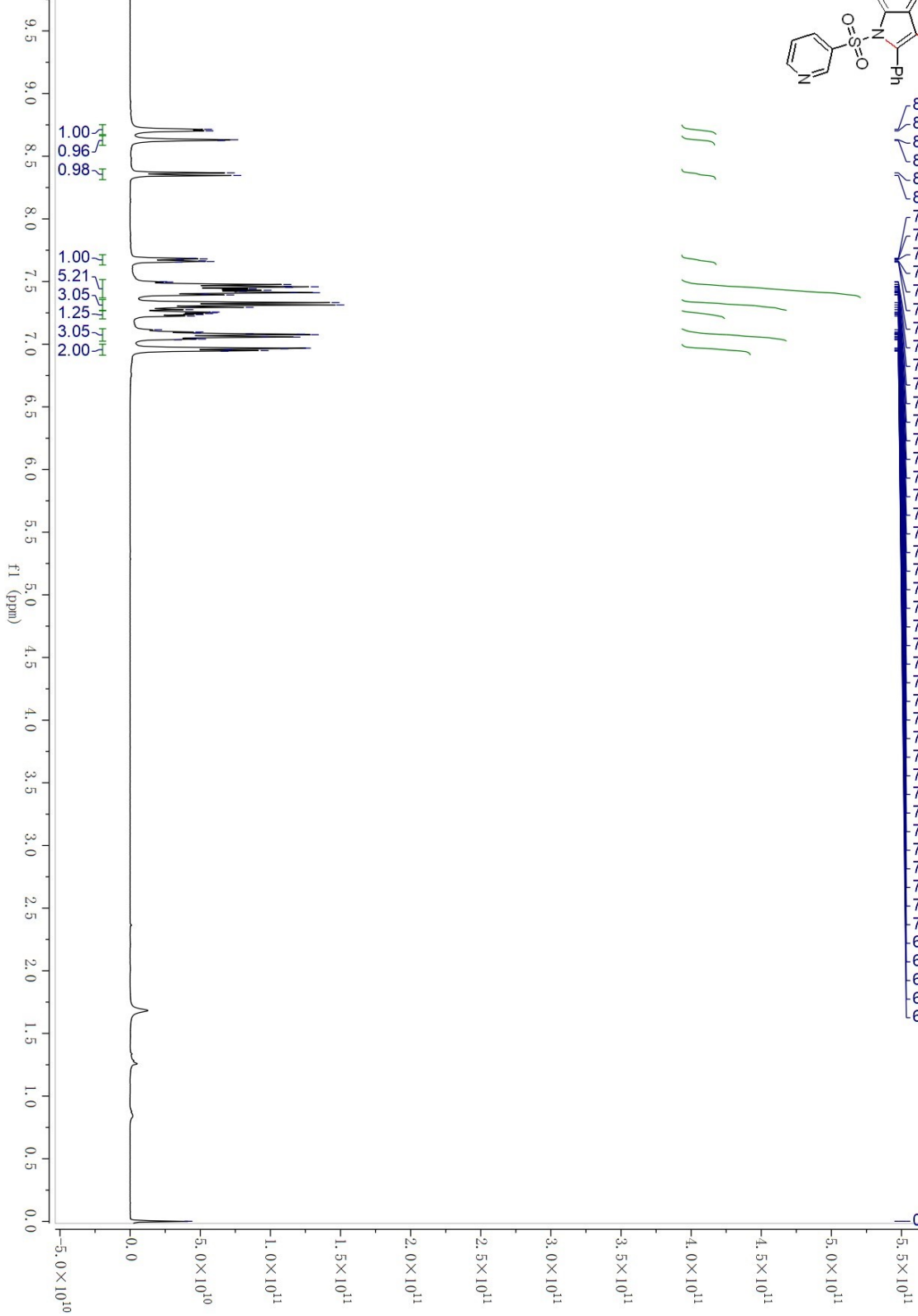
25c, ^{13}C



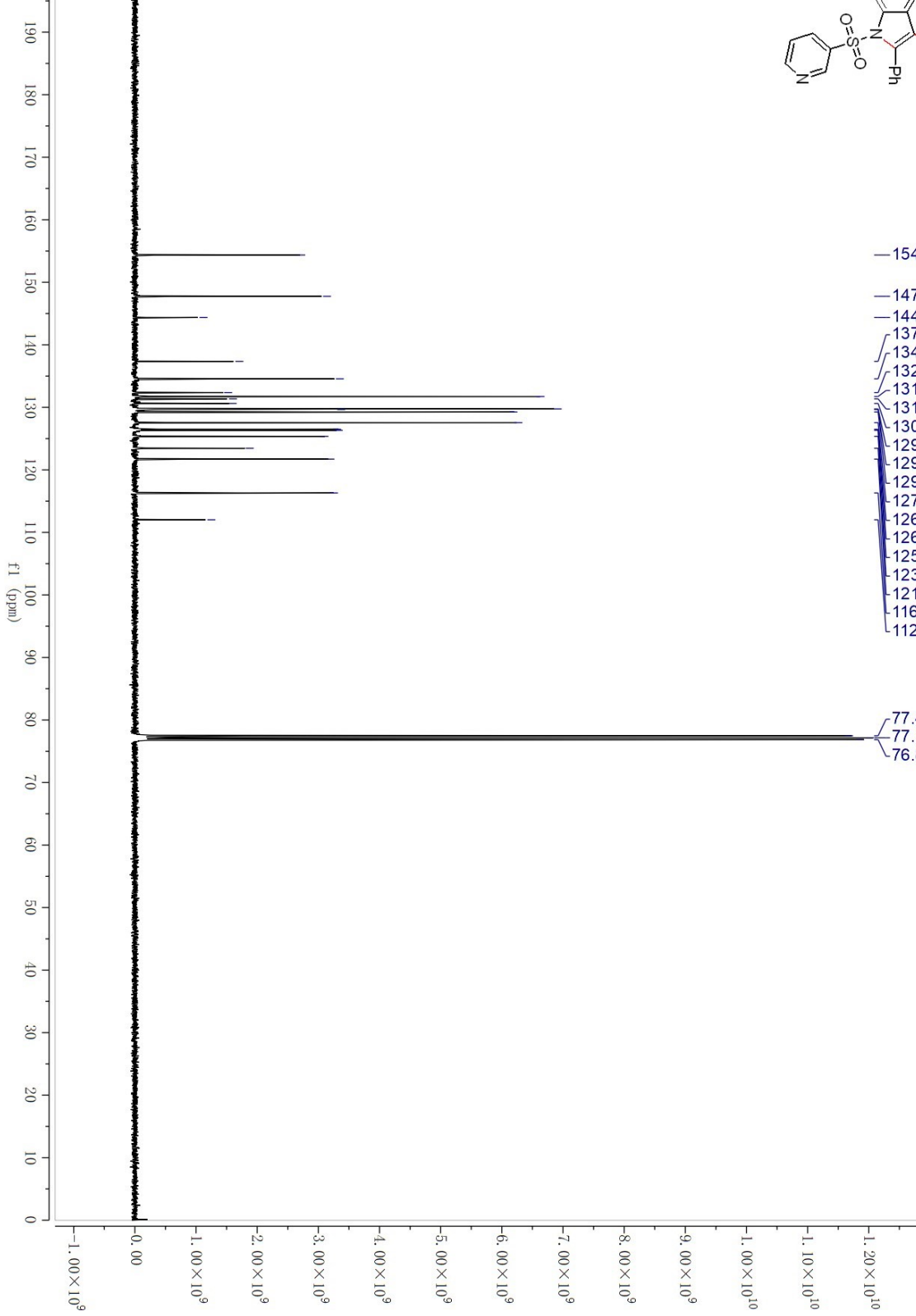
26c, ^{1}H


f1 (ppm)
144
138
137
137
132
131
130
129
129
128
127
126
126
125
121
116
111
101
77.4
77.
76.8
Ph

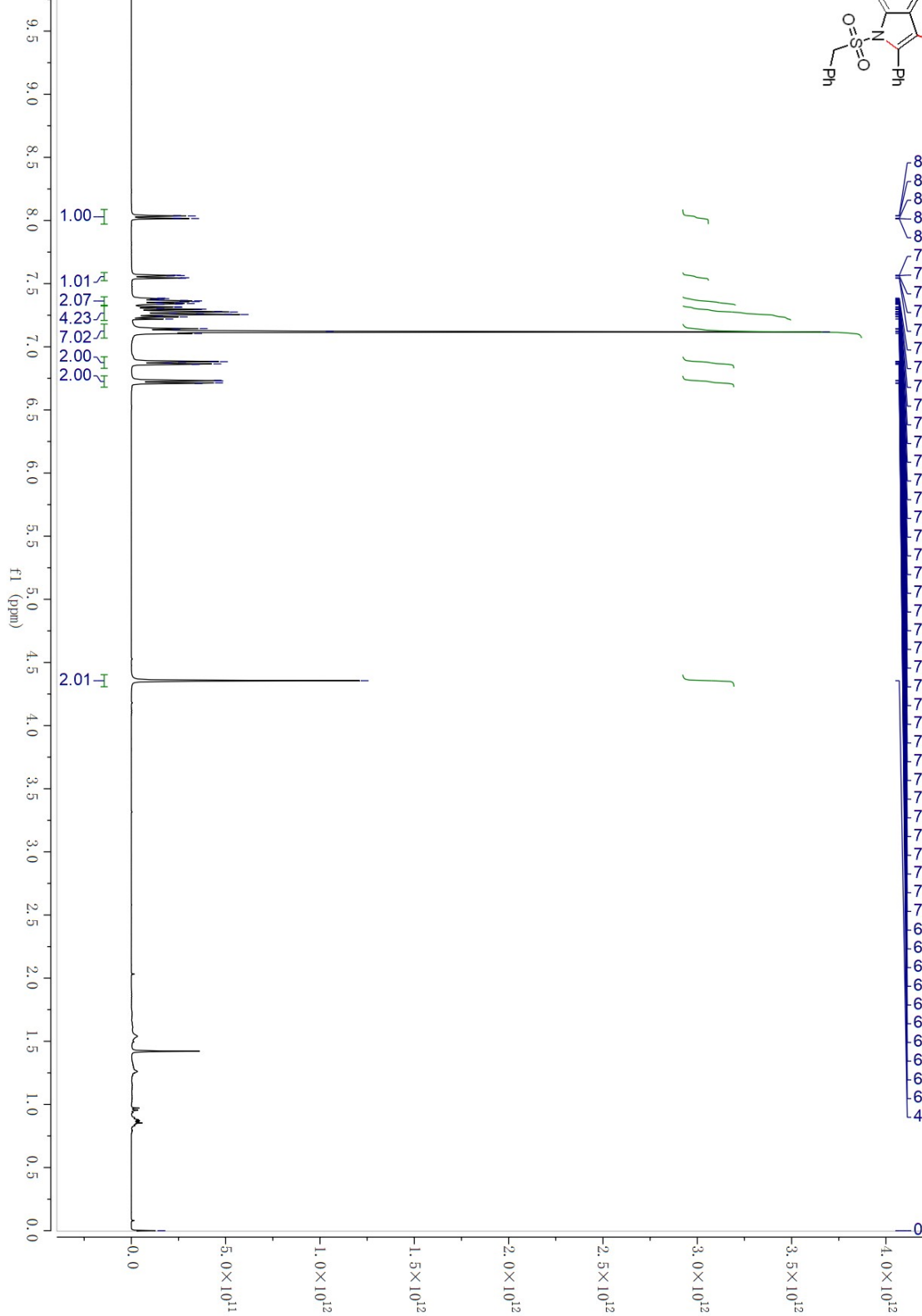
26c, ^{13}C



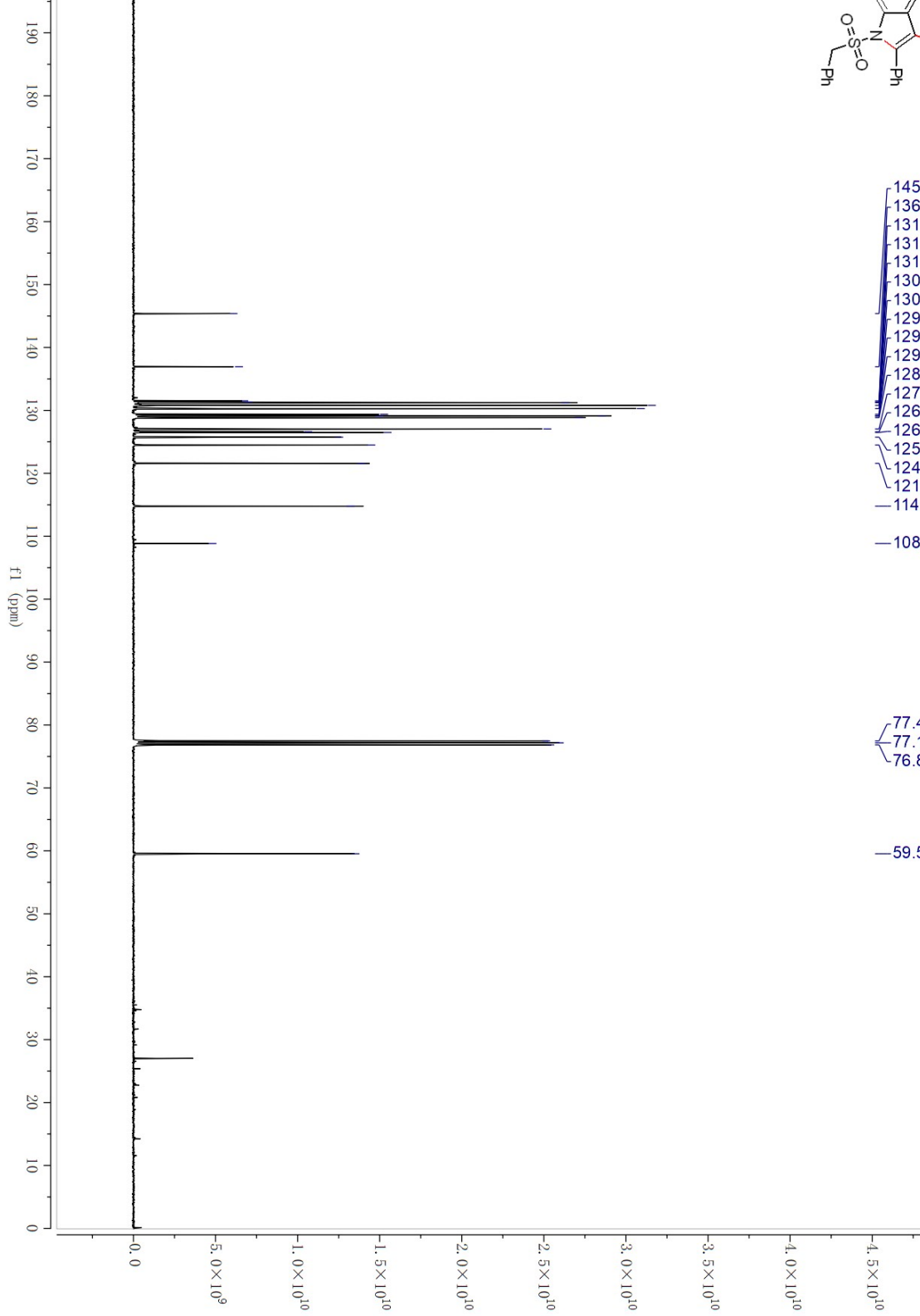
27c, ^{1}H



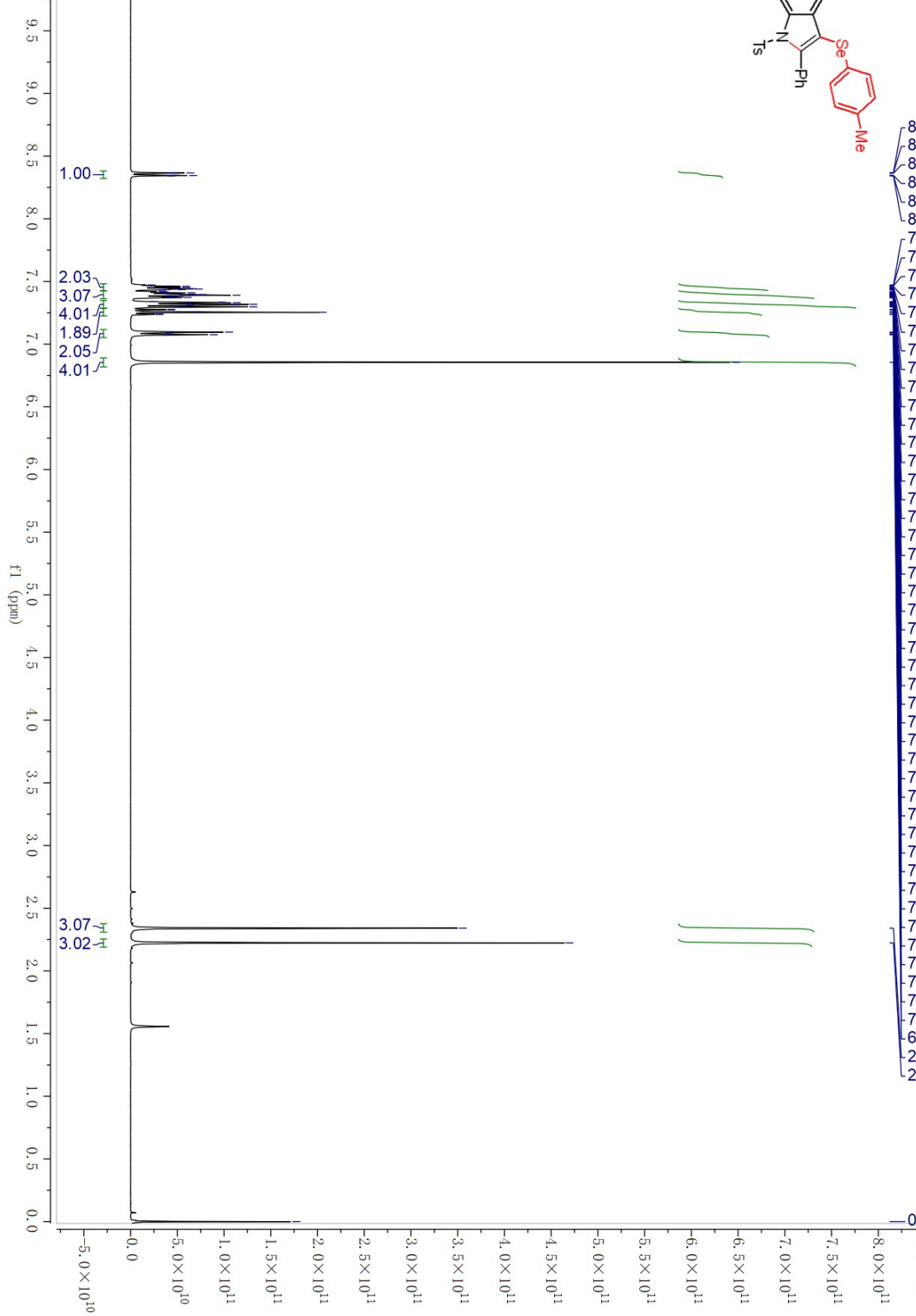
27c, ^{13}C



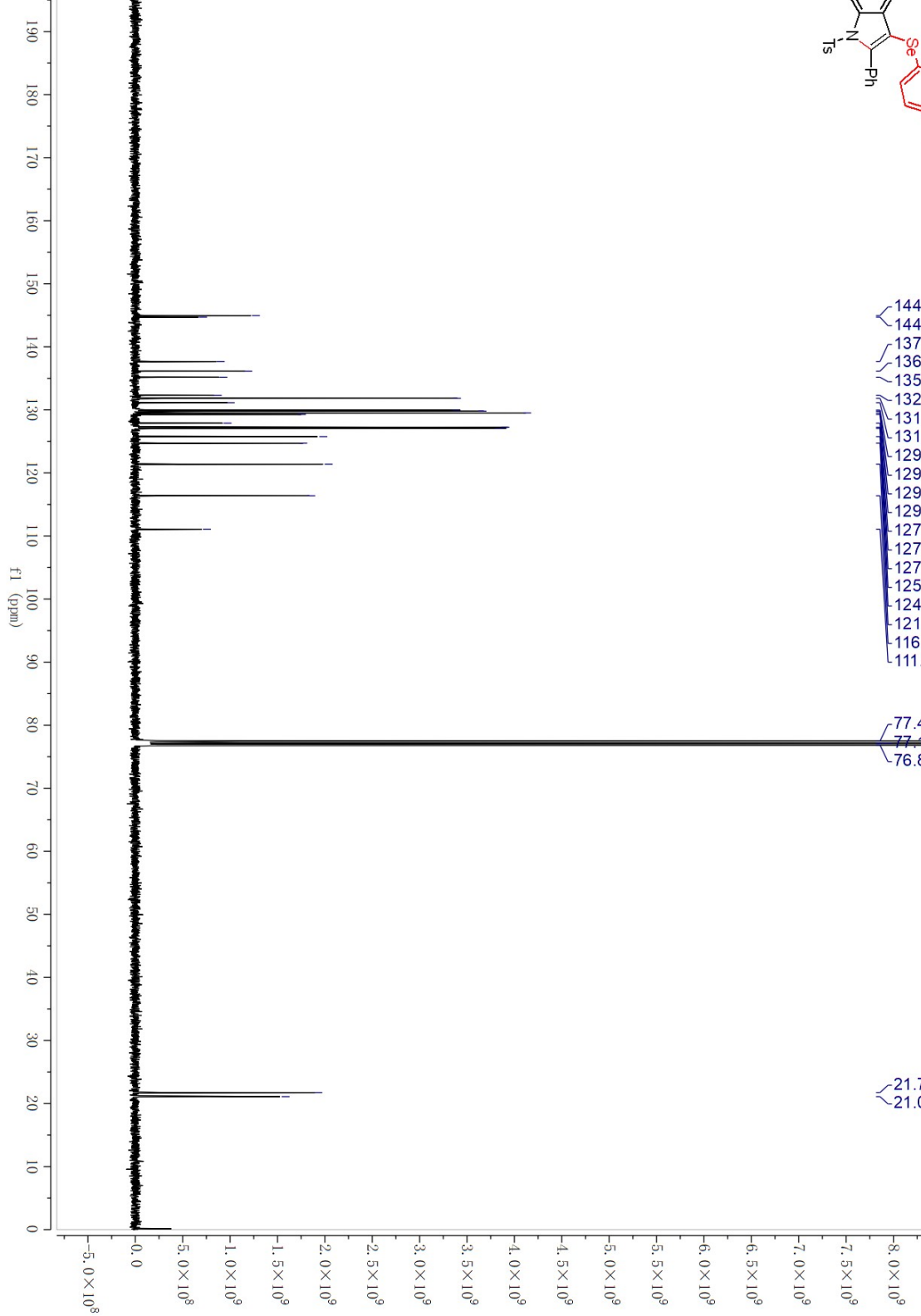
28c, ^{1}H


f1 (ppm)
145
136
131
131
131
130
130
129
129
129
128
127
126
126
125
124
121
114
108
77.4
77.1
76.8
59.5

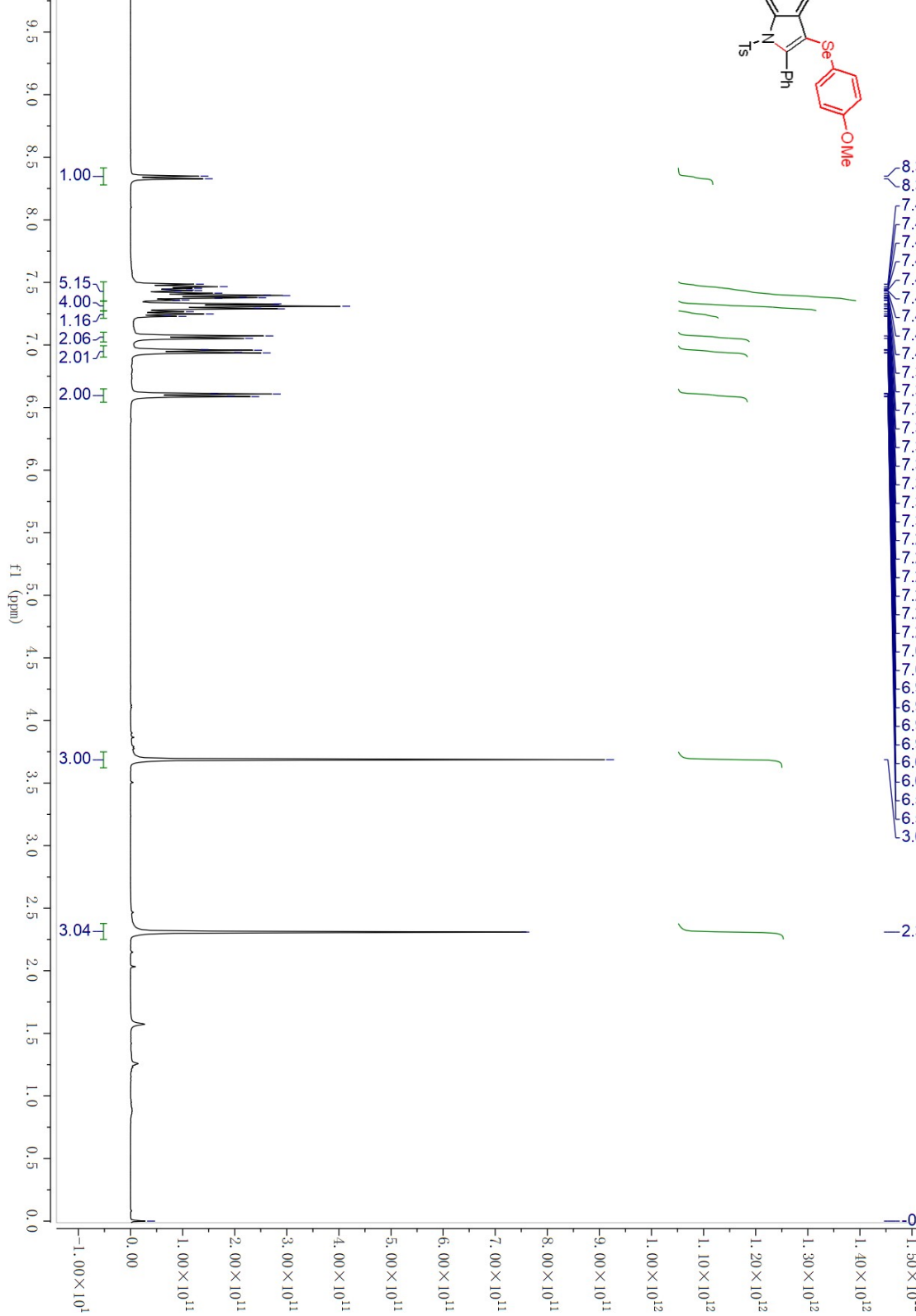
28c, ^{13}C



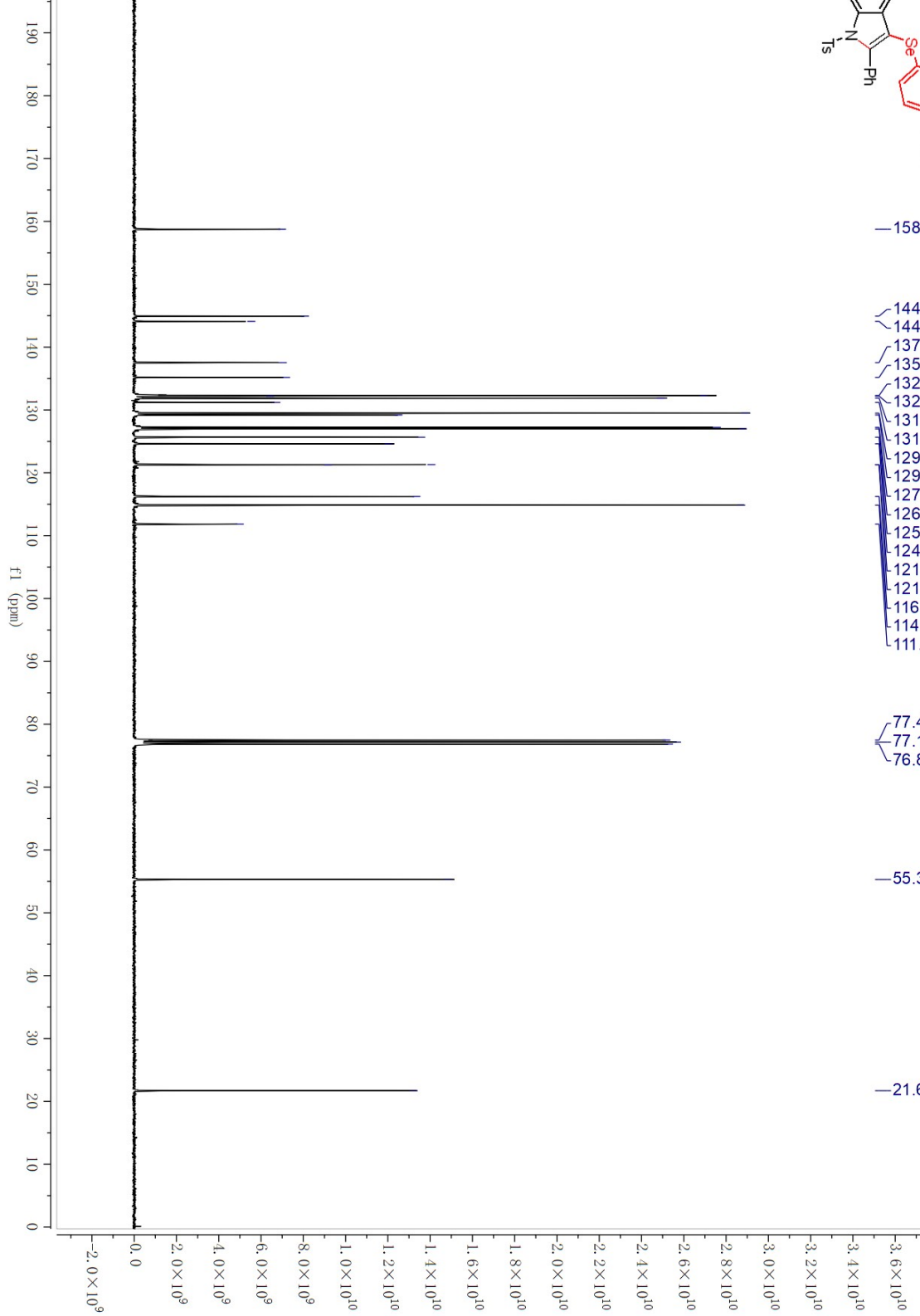
29c, ^{1}H


Ts
N
Ph
Se
f1 (ppm)
144
144
137
136
135
132
131
131
129
129
129
129
127
127
127
125
124
121
116
111
77.4
77.
76.8
21.7
21.0

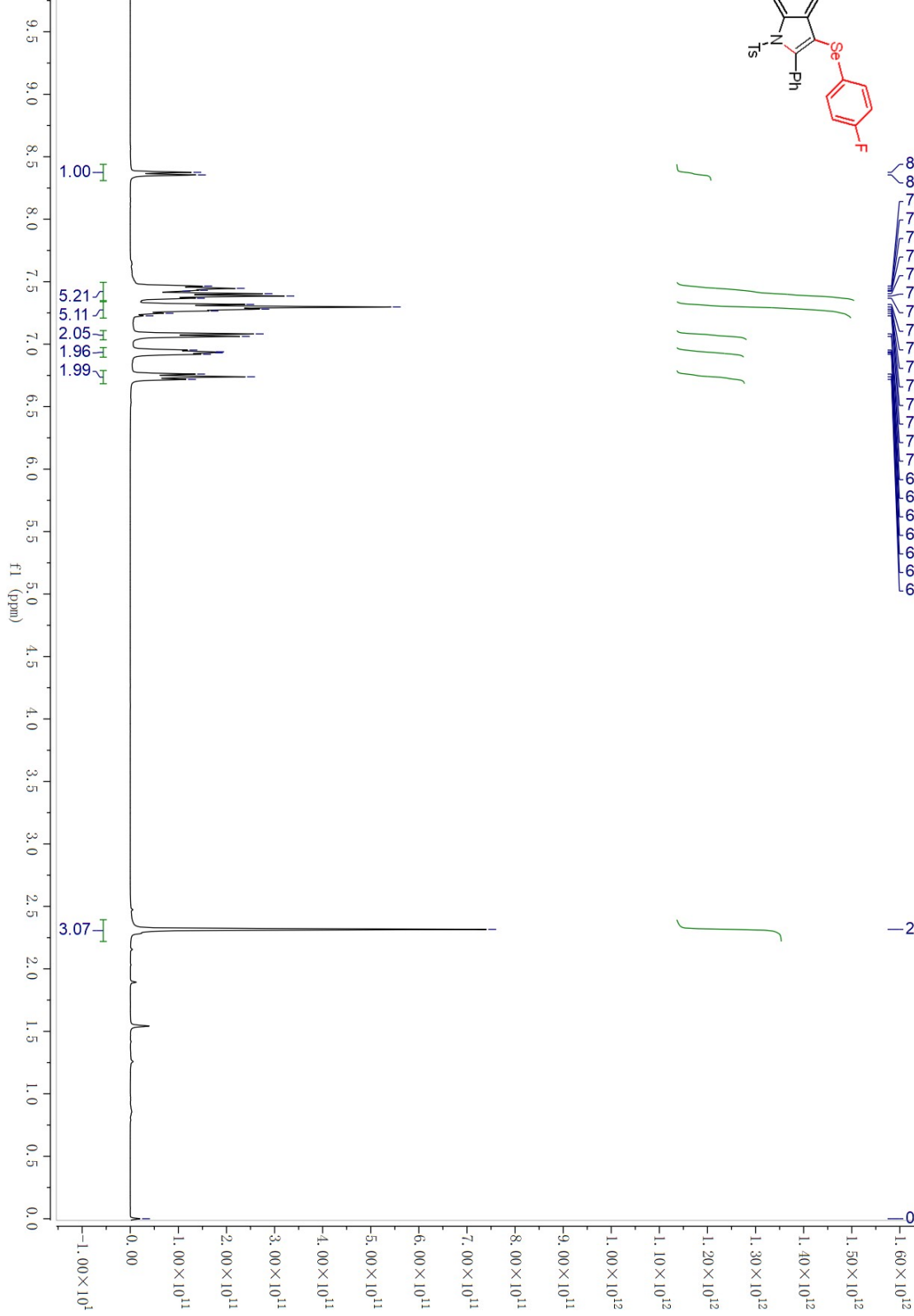
29c, ^{13}C



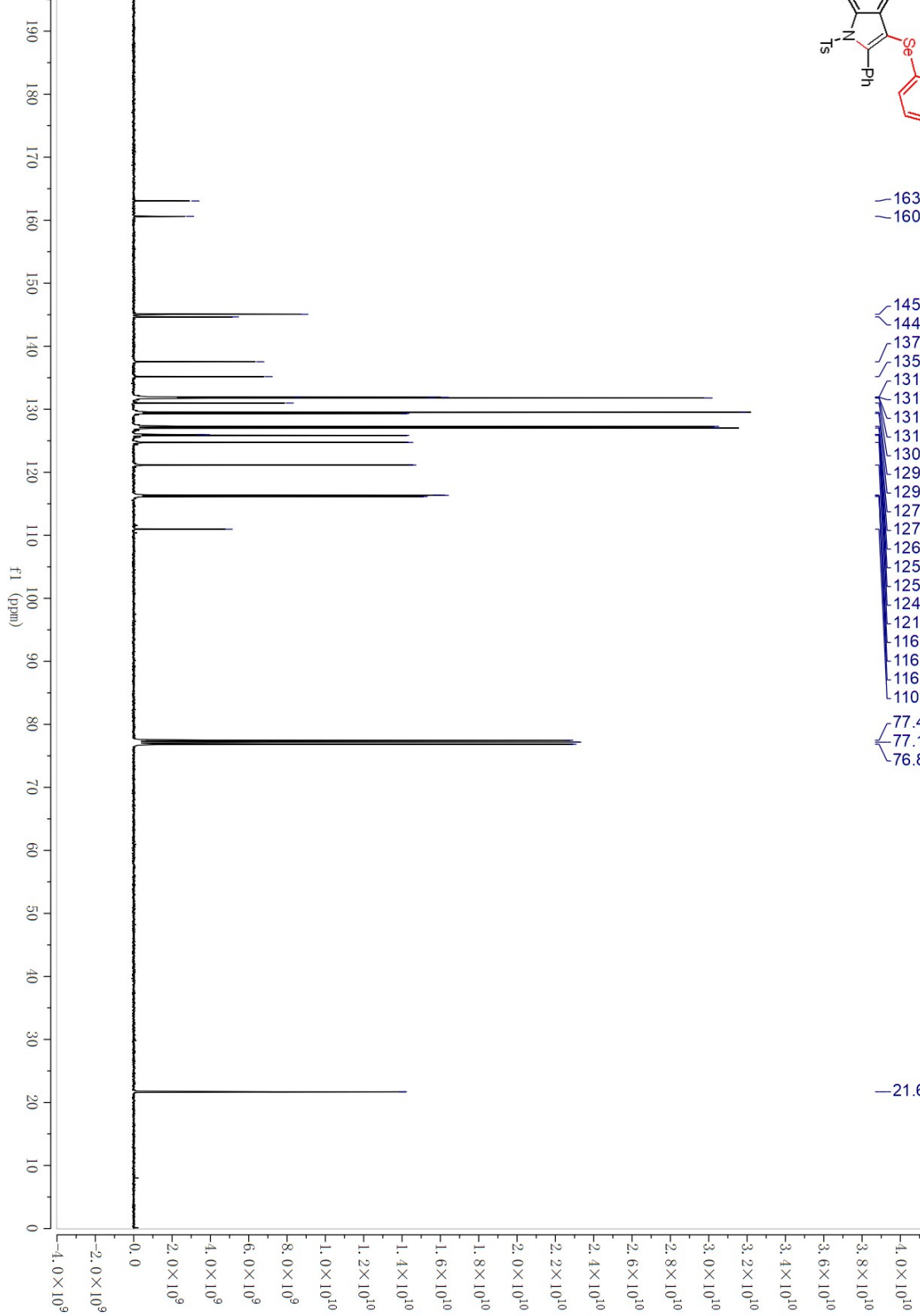
30c, ^{1}H


f1 (ppm)
158
144
144
137
135
132
132
131
131
129
129
127
126
125
124
121
121
116
114
111
77.4
77.1
76.8
55.3
21.6

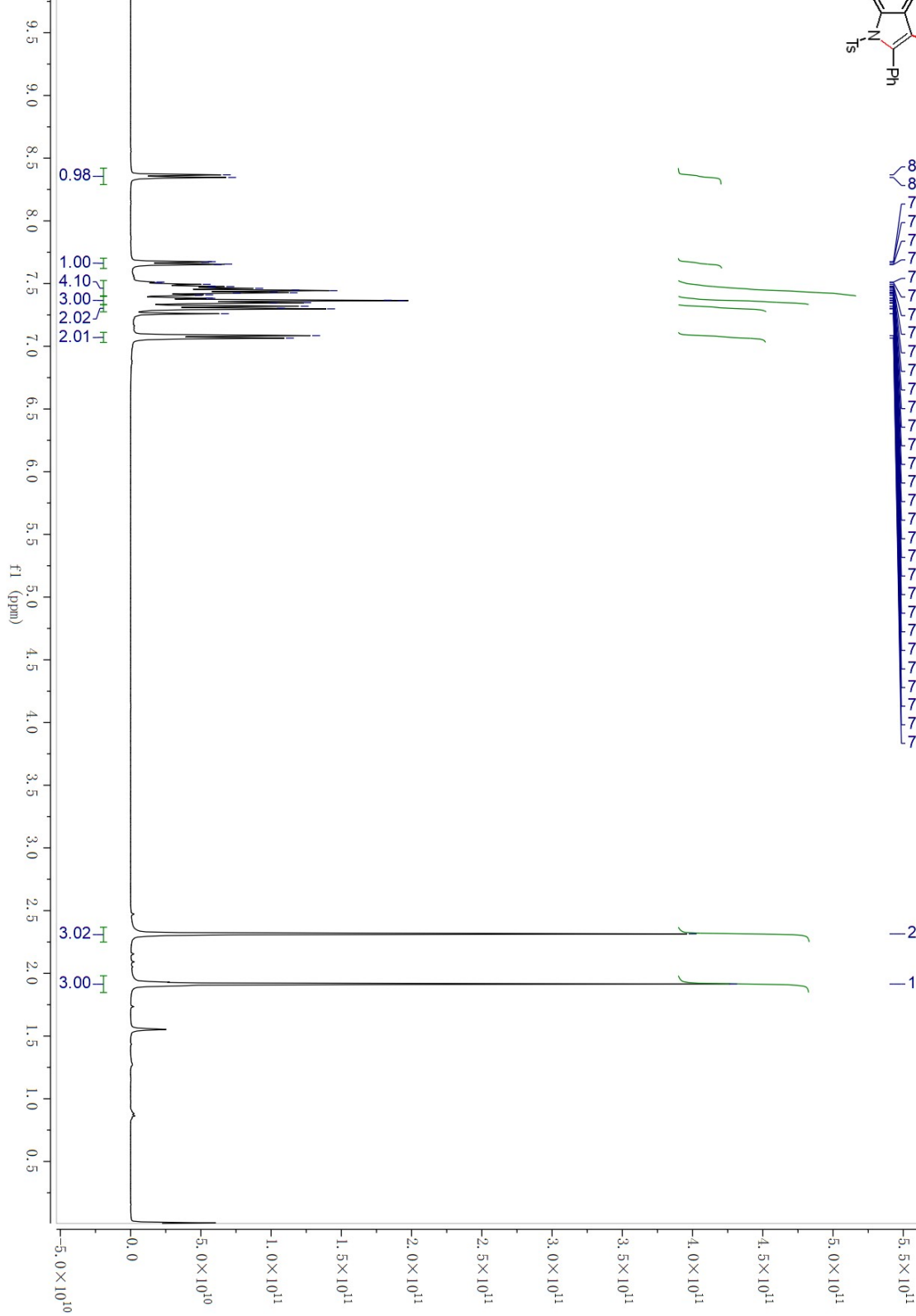
30c, ^{13}C



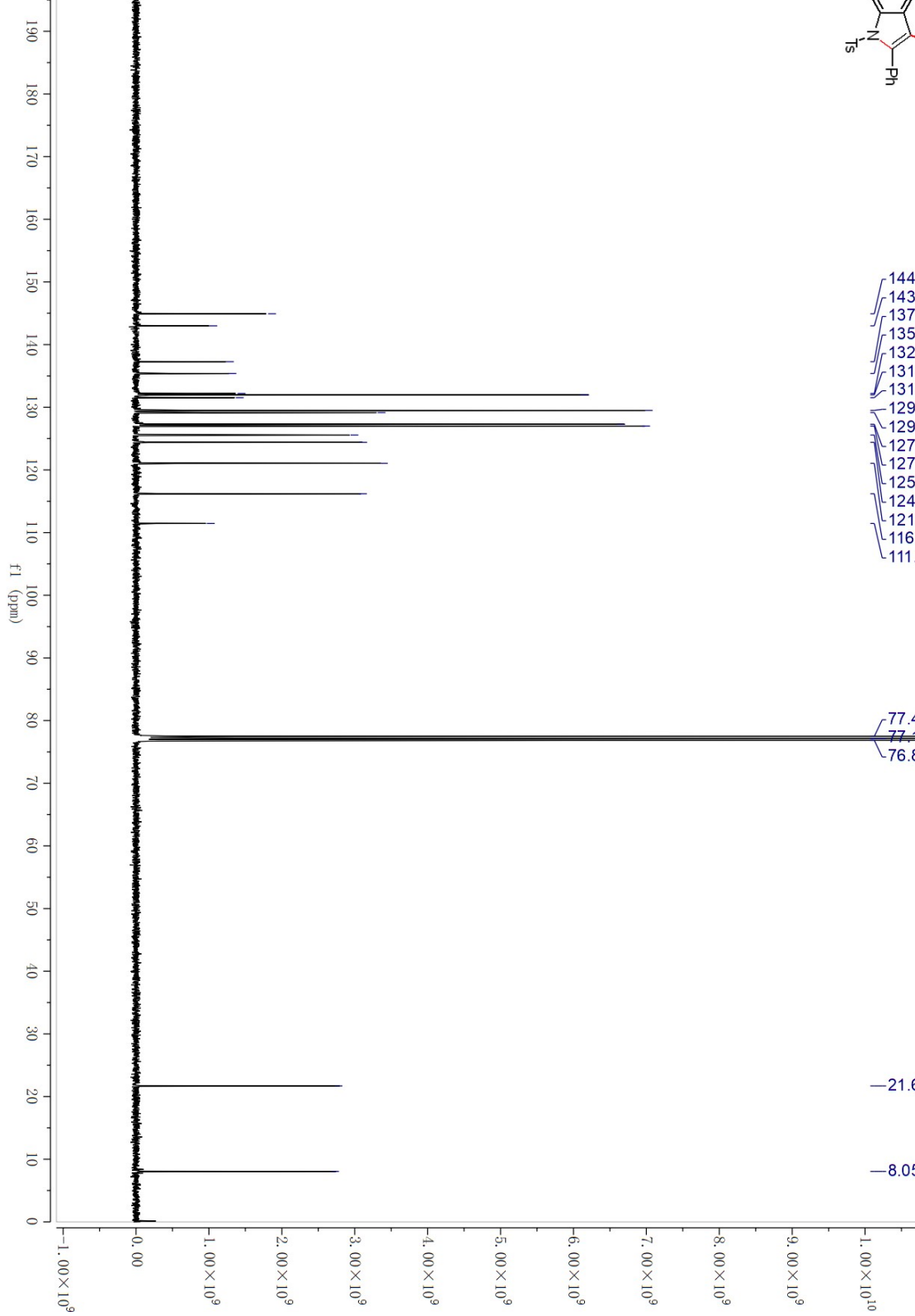
31c, ^{1}H


Ts
N
Ph
Se
f1 (ppm)
163
160
145
144
137
135
131
131
131
131
130
129
129
127
127
126
125
125
124
121
116
116
116
110
77.4
77.1
76.8
21.6

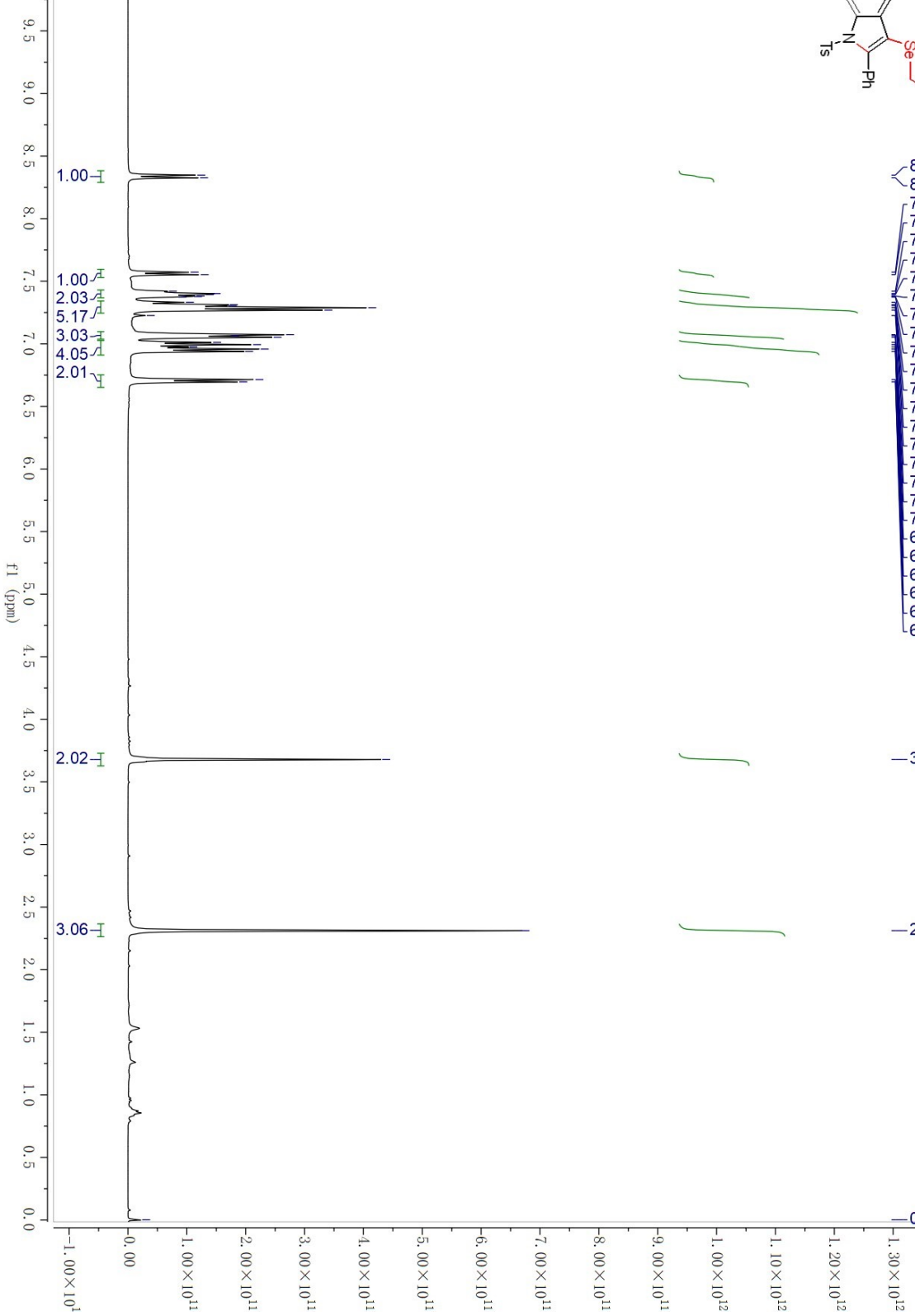
31c, ^{13}C



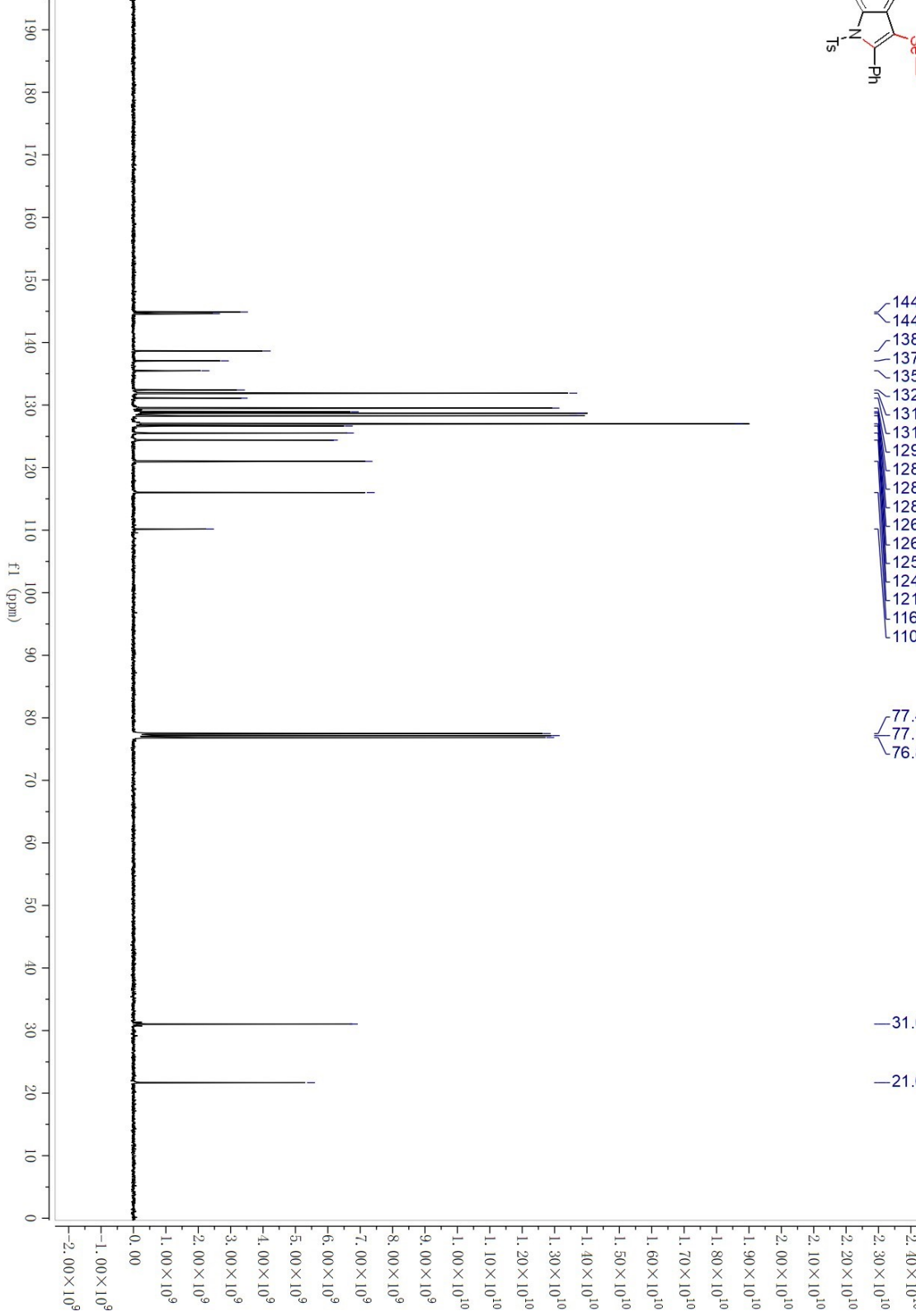
32c, ^{1}H


Ts
Ph
144
143
137
135
132
131
131
129
129
127
127
125
124
121
116
111
77.4
77.
76.8
21.6
8.05
f1 (ppm)

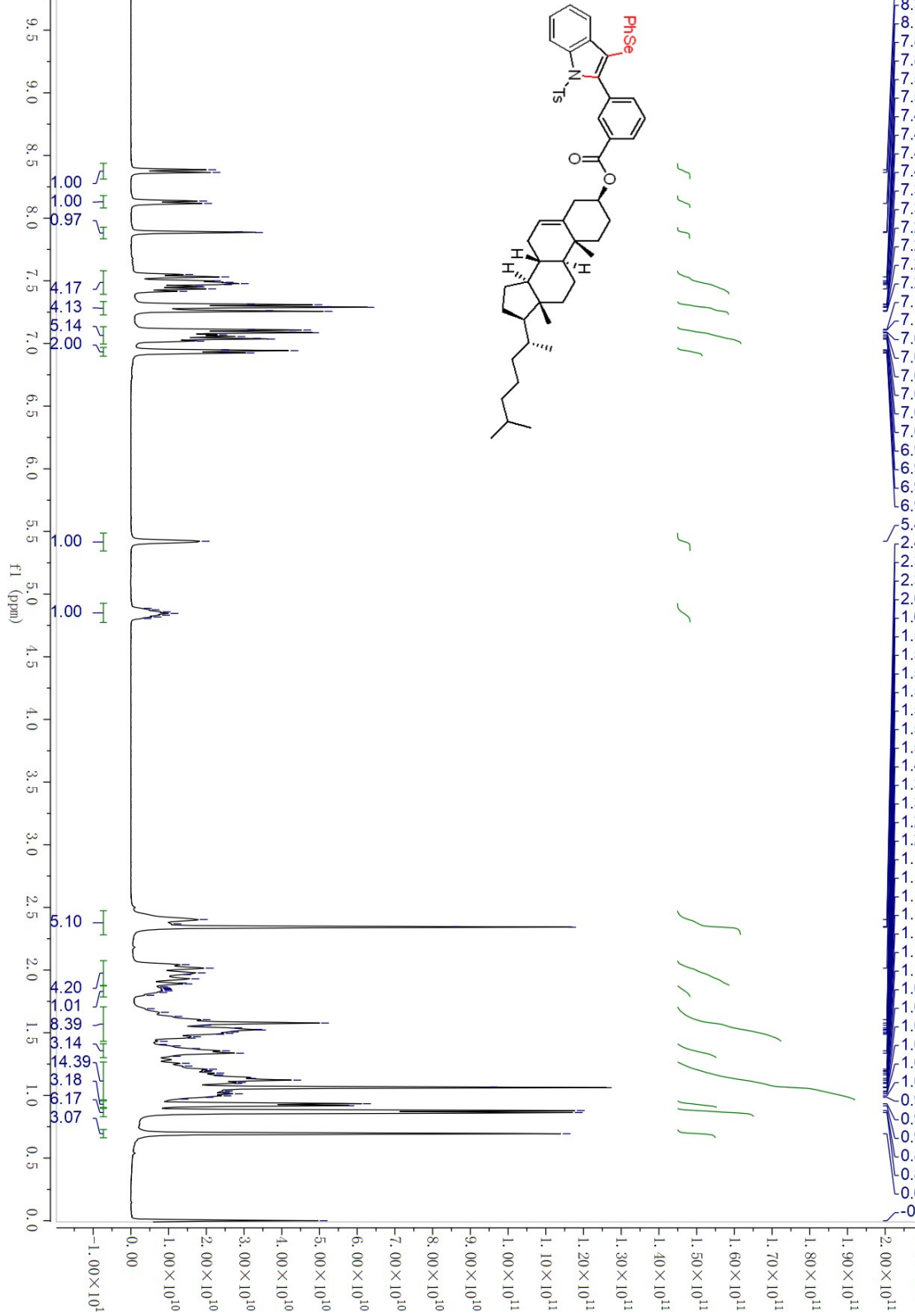
32c, ^{13}C



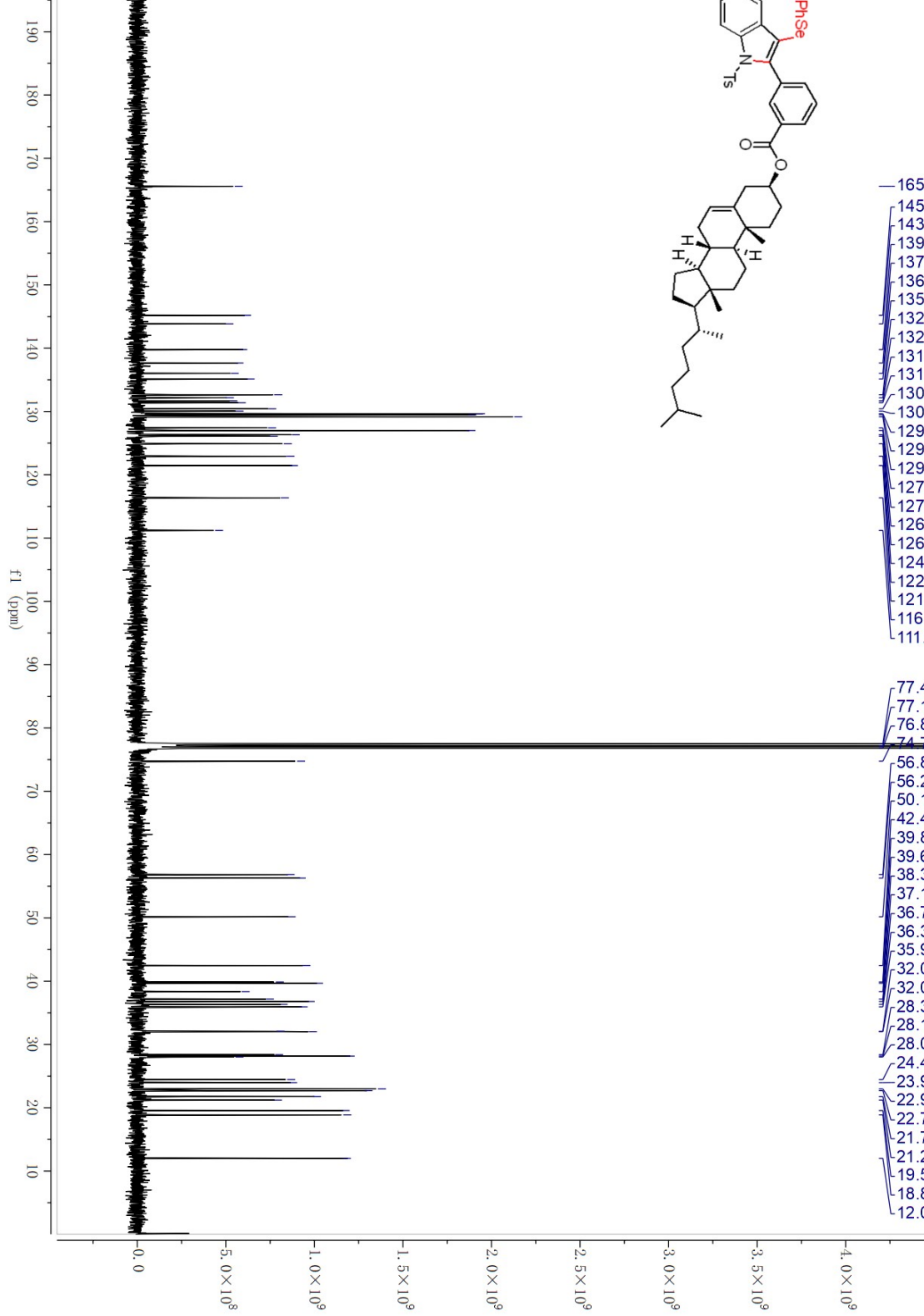
35c, ^{1}H



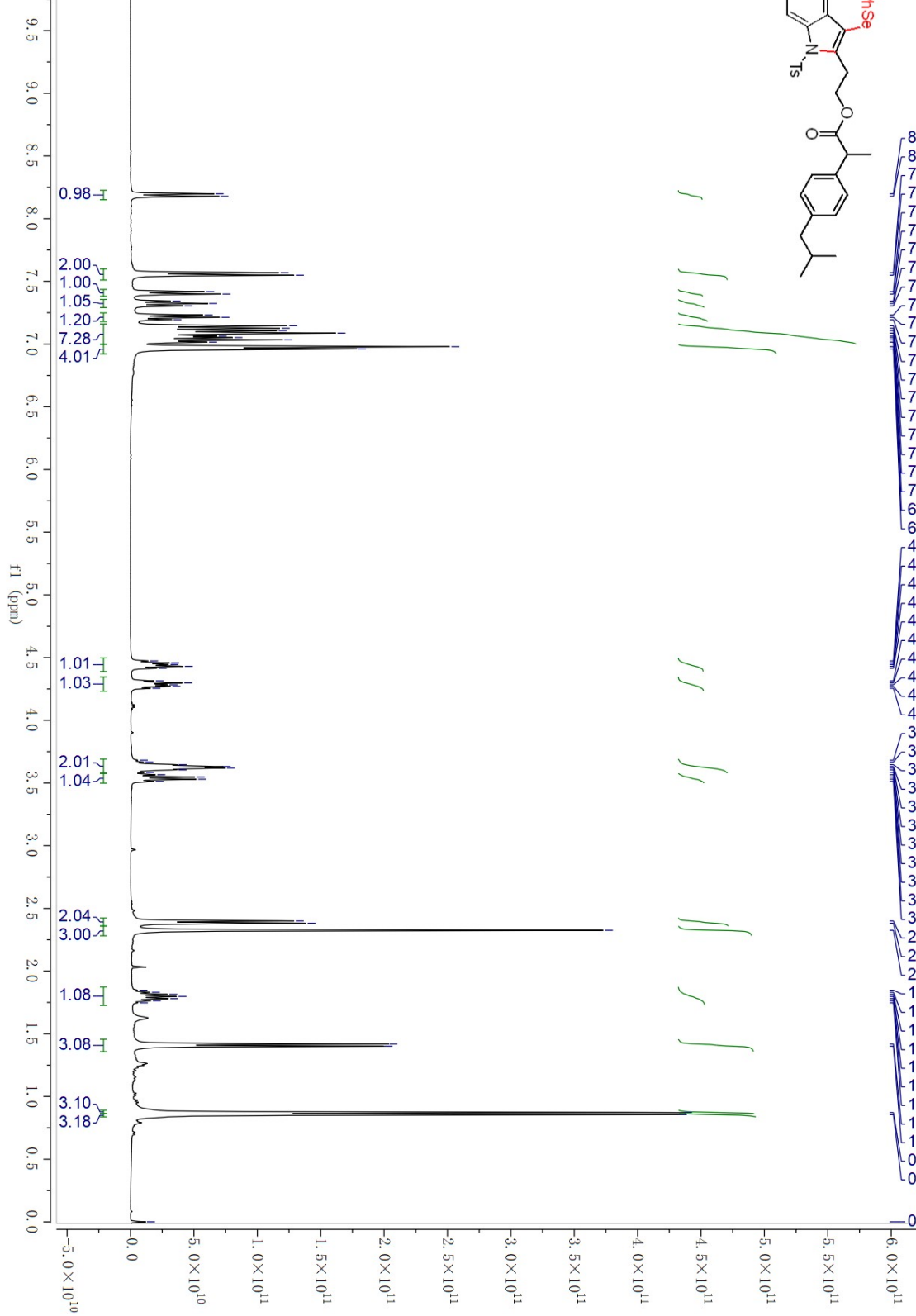
35c, ^{13}C



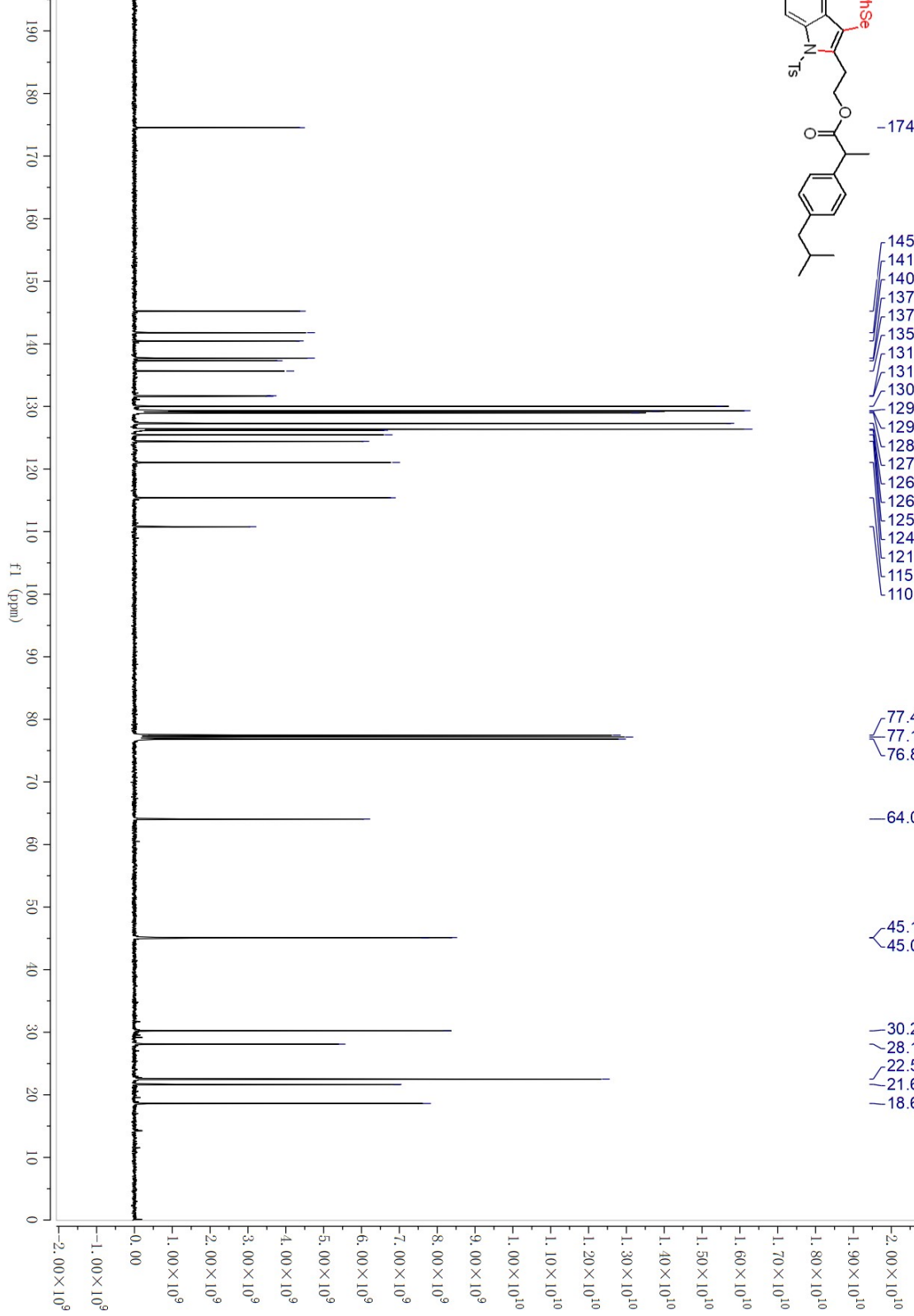
36c, ^{1}H



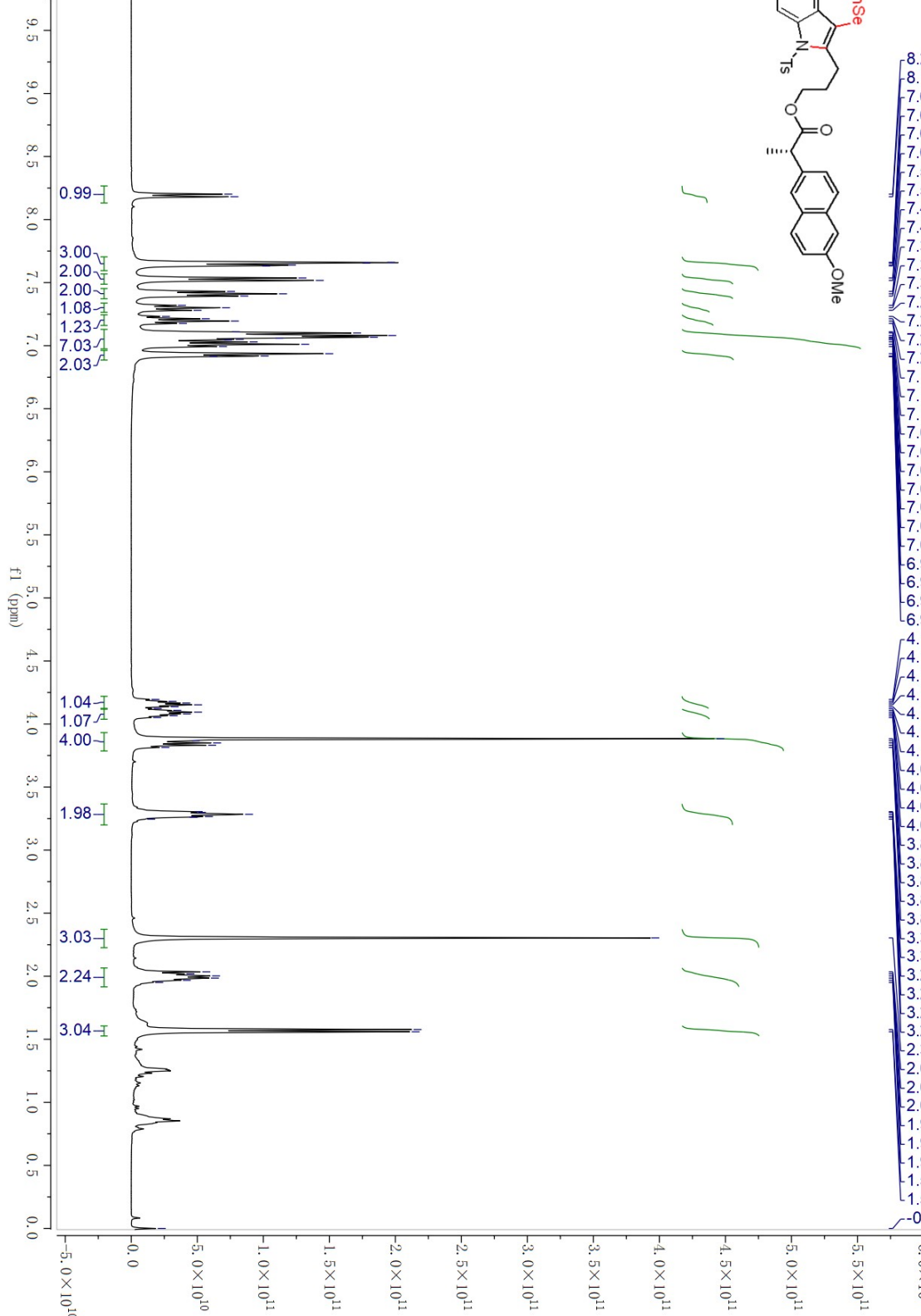
36c, ^{13}C


0.98
2.00
1.00
1.05
1.20
7.28
4.01
1.01
1.03
2.01
1.04
2.04
3.00
1.08
3.08
3.10
3.18
f1 (ppm)
PhSe
Ts
N
O
O

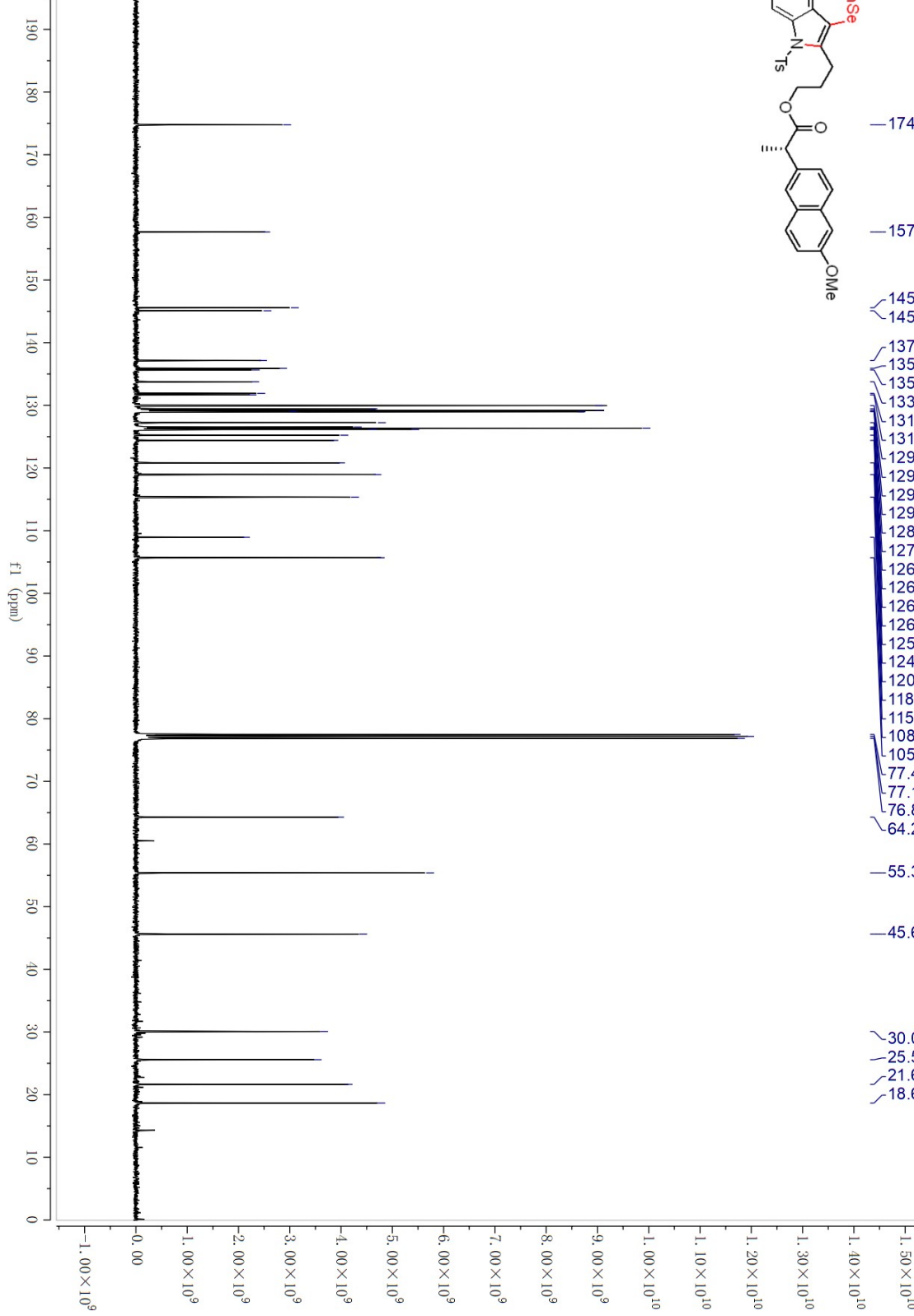
37c, ^{1}H


f1 (ppm)
Ts
PhSe
O
O
174
145
141
140
137
137
135
131
131
130
129
129
128
127
126
126
125
124
121
115
110
77.4
77.1
76.8
64.0
45.1
45.0
30.2
28.1
22.5
21.6
18.6

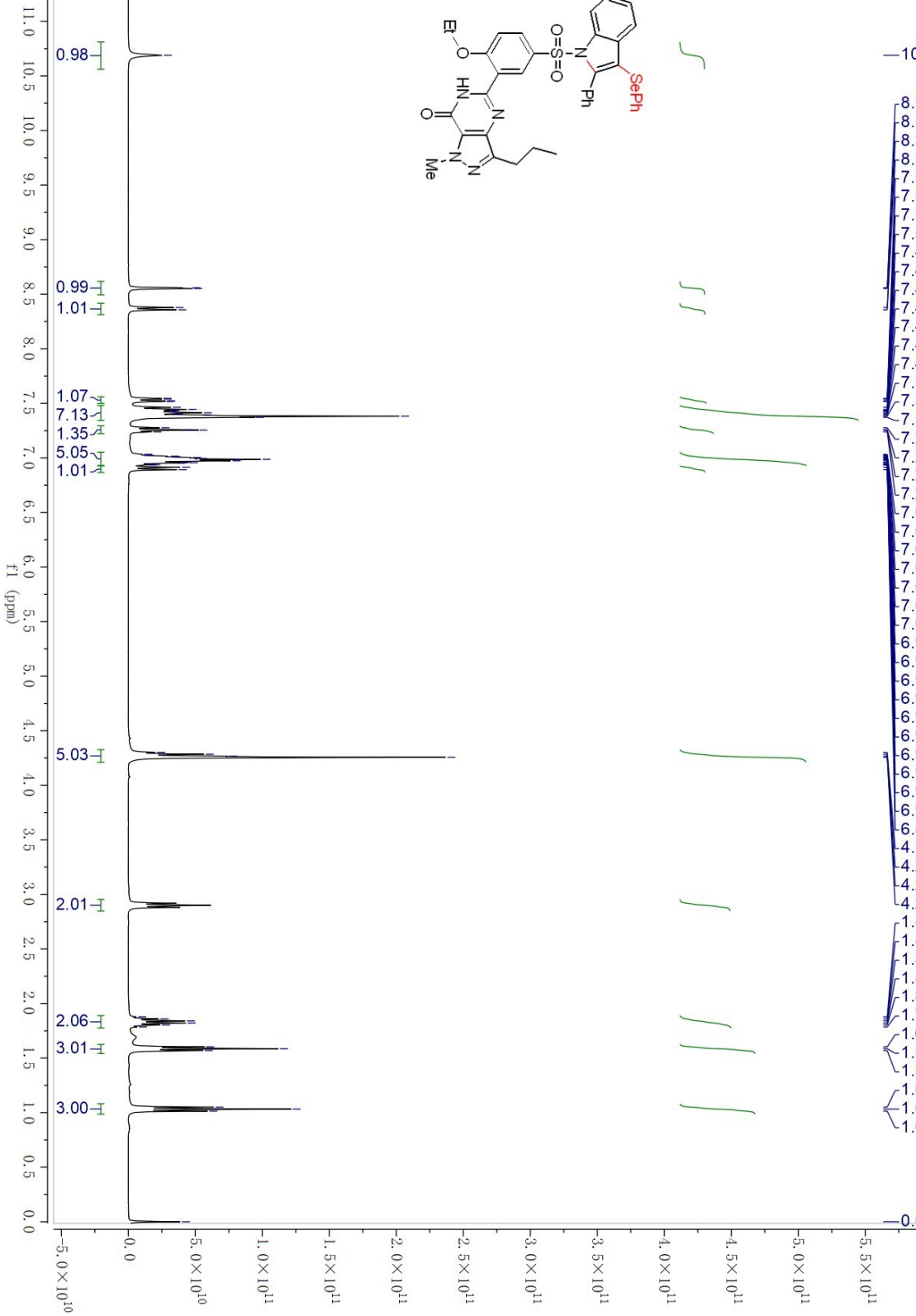
37c, ^{13}C

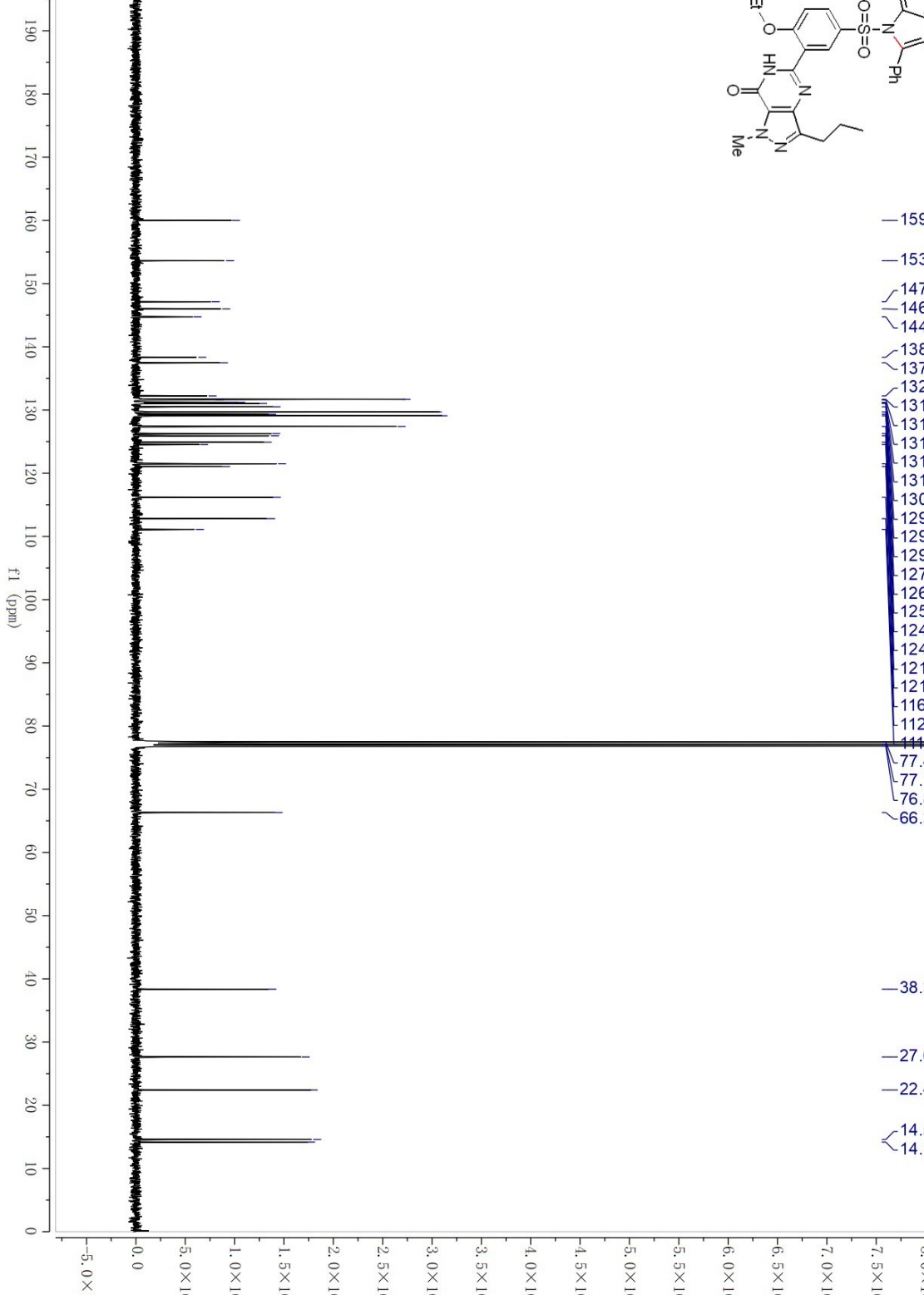

f1 (ppm)
0.99
3.00
2.00
2.00
1.08
1.23
7.03
2.03
1.04
1.07
4.00
1.98
3.03
2.24
3.04
Ts
O
O
OMe
nSe

38c, ^{1}H



38c, ^{13}C


0.98
0.99
1.01
1.07
7.13
1.35
5.05
1.01
5.03
2.01
2.06
3.01
3.00
f1 (ppm)
Et
O
HN
O
N
N
N
Me
O=S=O
N
Ph
SePh


f1 (ppm)
Et
O
HN
O
N
N
N
Me
O=S=O
N
Ph
159
153
147
146
144
138
137
132
131
131
131
131
131
130
129
129
129
127
126
125
124
124
121
121
116
112
77.
77.
76.
66.
38.
27.
22.
14.
14.