Supporting Information *for*

Base-Promoted Cascade Reaction of Isocyanides, Selenium and Amines: A Practical Approach to 2-aminobenzo[*d*][1,3]selenazines Under Metal-free Conditions

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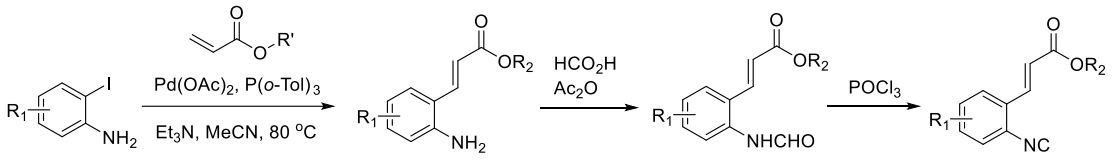
Ⅰ. General Information

All reagents were purchased without further purification unless otherwise noted. Reactions were monitored using thin-layer chromatography (TLC). Visualization of the developed plates was performed under UV light (254 nm). Flash column chromatography was performed on silica gel (300-400 mesh). ^{1}H and ^{13}C NMR spectra were recorded on a 400 MHz spectrometer. Chemical shifts (δ) were reported in ppm referenced to an internal tetramethylsilane standard or the $CDCl_3$ residual peak (δ 7.26) for ^{1}H NMR. Chemical shifts of ^{13}C NMR are reported relative to $CDCl_3$ (δ 77.16). The following abbreviations were used to describe peak splitting patterns when appropriate: br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet. Coupling constants, J, were reported in Hertz unit (Hz). High resolution mass spectra (HRMS) were obtained on an ESI-MS Spectrometer.

II. Synthesis of Substrates

1. General Procedure for the Synthesis of Isonitriles



Isocyanides were prepared according to the literatures[1] with minor modifications. A representative procedure (synthesis of **1a**) is shown below.

Mizoroki-Heck reaction of 2-iodoanilines. An Ar-purged 100 mL three-necked flask was charged with tri-*o*-tolyl phosphine (457 mg, 1.5 mmol), palladium (II) acetate (168 mg, 0.75 mmol), 2-iodoaniline (2.85 g, 13 mmol), methyl acrylate (1.62 mL, 18 mmol), NEt_3 (2.29 mL, 16.5 mmol) and CH_3CN (60 mL). The system was immersed in an oil bath at reflux. After 24 h, it was removed from the oil bath, diluted with EtOAc (180 mL) and extracted with water (2 x 60 mL) and brine (60 mL). The organic layer was dried over Na_2SO_4 and volatiles were removed in vacuo. The residue was subjected to column chromatography on silica-gel (eluent : PE/EtOAc = 5/1) to give 3-(2-aminophenyl) acrylic acid methyl ester as a white solid.

***N*-Formylation of 2-alkenylanilines.** Acetyl formyl anhydride (prepared by stirring 1 equiv of acetic anhydride and 1.1 equiv of formic acid for 2 h at 55 ℃; 5.45mL, 6.11 g, 40 mmol) was added dropwise at 0 ℃ to a stirred solution of 3-(2-aminophenyl)acrylic acid methyl ester (1.77g, 10 mmol), in THF (20 mL), and the mixture was stirred for 2 h at room temperature. volatiles were removed in vacuo to give 3-(2-formamidophenyl)acrylic acid methyl ester as a white solid.

Dehydration of formanilides. A THF solution (60 mL) of 3-(2-formamidophenyl)acrylic acid methyl ester (2.05 g, 10 mmol) and NEt_3 (4.80 mL, 30 mmol) was cooled at 0 ℃, then $POCl_3$ (1.27 mL, 12 mmol) was added dropwise. After the reaction was completed, an aqueous saturated Na_2CO_3 solution was added at 0 ℃ to quench the reaction and the mixture was extracted with $CHCl_3$. The residue was subjected to column chromatography on silica-gel (eluent : PE/EtOAc = 10/1) to give 3-(2-isocyanophenyl)acrylic acid methyl ester **1a** as a white solid.

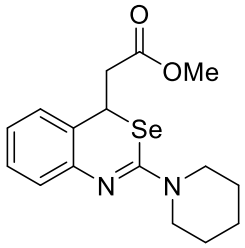
III .General Procedure and Product Characterization

1. General Procedure for the Formation of 2-aminobenzo[*d*][1,3]-selenazines

A representative procedure (synthesis of **4a**) is shown below.

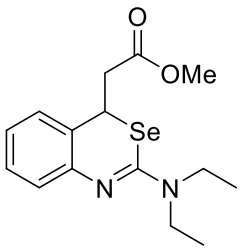
In a 10 mL round-bottom flask, 3-(2-isocyanophenyl)acrylic acid methyl ester **1a** (0.3 mmol, 1 equiv), elemental selenium **2** (0.45 mmol, 1.5 equiv), piperidine **3a** (0.45 mmol, 1.5 equiv) were dissolved in 2 mL DCE followed by addition of Et_3N (0.45 mmol, 1.5 equiv). The system was stirred in an oil bath at 25 ^oC. After 12h, it was removed from the oil bath. The reaction mixture was charged with silica gel and concentrated. The residue was purified by silica gel column chromatography (eluent : PE/EtOAc = 30 : 1) to obtain the desired product **4a** as a light yellow oil.

2. Product Characterization



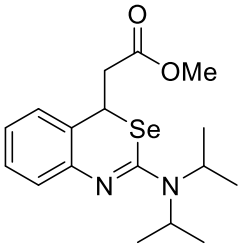
Methyl 2-(2-(piperidin-1-yl)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4a)

Yield: 90%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 2933, 2851, 1736, 1602, 1550, 1257, 1224, 1122, 758. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.24 – 7.16 (m, 1H), 7.11 (dd, J = 10.8, 8.5 Hz, 2H), 6.98 (t, J = 7.4 Hz, 1H), 4.51 (dd, J = 8.5, 7.0 Hz, 1H), 3.78 – 3.68 (m, 4H), 3.64 (s, 3H), 2.92 – 2.79 (m, 2H), 1.63 (ddt, J = 26.7, 10.6, 5.2 Hz, 6H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.20, 150.82, 146.83, 128.18, 125.67, 125.49, 122.99, 122.00, 77.48, 77.16, 76.84, 51.63, 48.68, 41.91, 35.59, 25.96, 25.08. **HRMS** (ESI^+, MeCN): found, 353.0765 $[M + H]^+$, calcd for $C_{16}H_{21}N_2O_2Se$, 353.0768.



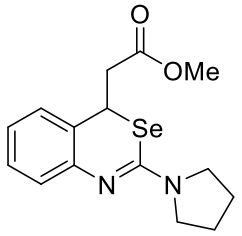
Methyl 2-(2-(diethylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4b)

Yield: 98%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 3061, 3028, 2978, 2904, 1730, 1603, 1546, 1411, 1372, 1189, 759, 697. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.26 – 7.07 (m, 3H), 6.98 (td, J = 7.3, 1.4 Hz, 1H), 4.51 (dd, J = 8.7, 6.9 Hz, 1H), 3.73 – 3.52 (m, 7H), 2.93 – 2.79 (m, 2H), 1.22 (t, J = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.43, 149.56, 147.19, 128.32, 125.75, 125.52, 122.73, 122.04, 77.48, 77.16, 76.84, 51.76, 44.35, 41.85, 35.69, 14.33. **HRMS** (ESI^+, MeCN): found, 341.0765 $[M + H]^+$, calcd for $C_{15}H_{21}N_2O_2Se$, 341.0768.



Methyl 2-(2-(diisopropylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4c)

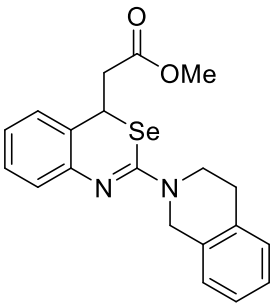
Yield: 95%. White solid. **Mp:** 53.4-54.2 °C. **IR :** ν_{max} (cm^{-1}) = 3004, 2968, 2952, 2923, 2853, 1742, 1549, 1365, 1221, 760. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.21 (td, *J* = 7.6, 1.6 Hz, 1H), 7.13 (ddd, *J* = 12.1, 7.7, 1.5 Hz, 2H), 6.98 (td, *J* = 7.3, 1.5 Hz, 1H), 4.49 (dd, *J* = 8.7, 7.0 Hz, 1H), 4.08 (h, *J* = 6.6 Hz, 2H), 3.69 (s, 3H), 2.95 – 2.84 (m, 2H), 1.43 (d, *J* = 6.8 Hz, 12H). **^{13}C NMR** (101 MHz, Chloroform-*d*) δ 171.55, 147.55, 146.94, 128.17, 125.64, 125.25, 122.62, 122.13, 77.48, 77.16, 76.84, 51.73, 41.75, 36.05, 21.65, 21.10. **HRMS** (ESI^+, MeCN): found, 369.1084 $[M + H]^+$, calcd for $C_{17}H_{25}N_2O_2Se$, 369.1081.



Methyl 2-(2-(pyrrolidin-1-yl)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4d)

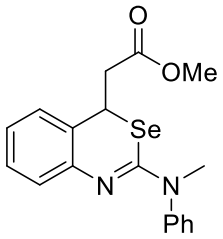
Yield: 85%. Orange solid. **Mp**: 83.7-84.7 °C. **IR :** ν_{max} (cm^{-1}) = 2965, 2946, 2867, 1728, 1553, 1474, 1357, 1214, 1169, 764, 736. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.19 (td, *J* = 7.6, 1.6 Hz, 1H), 7.11 (dd, *J* = 7.6, 1.5 Hz, 2H), 6.96 (td, *J* = 7.3, 1.5 Hz, 1H), 4.46 (t, *J* = 7.7 Hz, 1H), 3.71 (dd, *J* = 10.3, 5.8 Hz, 2H), 3.66 (s, 3H), 3.54 (d, *J* = 9.3 Hz, 2H), 2.90 (d, *J* = 7.7 Hz, 2H), 1.95 (td, *J* = 7.9, 6.7, 4.6 Hz, 4H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.45, 148.82, 147.07, 128.46, 126.01, 125.60, 122.80, 121.74,

77.48, 77.16, 76.84, 51.83, 48.54, 42.29, 35.70, 24.89. **HRMS** (ESI$^+$, MeCN): found, 339.0626 [M + H]$^+$, calcd for $C_{15}H_{21}N_2O_2Se$, 339.0612.



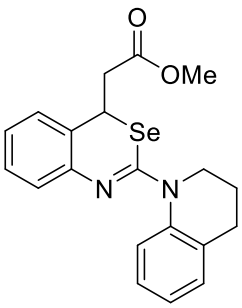
Methyl 2-(2-(3,4-dihydroisoquinolin-2(1H)-yl)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4e)

Yield: 88%. Orange solid. **Mp**: 37.1-37.6 °C. **IR :** ν_{max} (cm^{-1}) = 3061, 3024, 2948, 2841, 1733, 1655, 1549, 1168, 746. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.26 – 7.12 (m, 7H), 7.03 (td, *J* = 7.3, 1.5 Hz, 1H), 5.10 (d, *J* = 16.7 Hz, 1H), 4.87 (d, *J* = 16.7 Hz, 1H), 4.55 (p, *J* = 8.1 Hz, 1H), 3.99 (t, *J* = 5.9 Hz, 2H), 3.65 (s, 3H), 2.98 – 2.83 (m, 4H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.36, 151.13, 146.67, 134.93, 133.61, 128.69, 128.46, 126.63, 126.40, 126.40, 125.89, 125.76, 123.44, 122.14, 77.51, 77.19, 76.87, 51.82, 49.09, 45.44, 42.03, 35.93, 29.36. **HRMS** (ESI$^+$, MeCN): found, 401.0771 [M + H]$^+$, calcd for $C_{20}H_{21}N_2O_2Se$, 401.0768.



Methyl 2-(2-(methyl(phenyl)amino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4f)

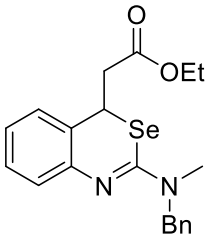
Yield: 92%. White solid. **Mp**: 127.5-128.4 °C. **IR :** ν_{max} (cm^{-1}) = 2980, 1736, 1605, 1555, 1492, 1230, 758, 701. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.43 – 7.26 (m, 4H), 7.25 – 7.14 (m, 5H), 7.04 (ddd, *J* = 7.5, 6.1, 2.6 Hz, 1H), 4.41 (dd, *J* = 8.7, 7.0 Hz, 1H), 3.62 (s, 3H), 3.60 (s, 3H), 2.89 – 2.77 (m, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.36, 150.51, 146.67, 144.92, 129.31, 128.40, 127.84, 127.65, 126.16, 125.90, 123.68, 122.73, 77.48, 77.16, 76.84, 51.78, 42.20, 39.70, 36.27. **HRMS** (ESI$^+$, MeCN): found, 375.0609 [M + H]$^+$, calcd for $C_{18}H_{19}N_2O_2Se$, 375.0612.



Methyl 2-(2-(3,4-dihydroquinolin-1(2H)-yl)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4g)

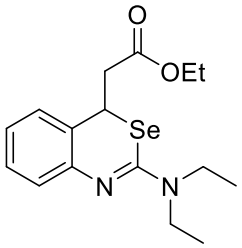
Yield: 90%. Light brown solid. **Mp:** 111.0-111.9 °C. **IR :** ν_{max} (cm^{-1}) = 2943, 2887, 1736, 1536, 1205, 1164, 760, 743. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.41 – 7.17 (m, 7H), 7.12 (d, *J* = 7.6 Hz, 1H), 4.66

– 4.56 (m, 1H), 4.51 (ddd, *J* = 12.6, 8.1, 5.9 Hz, 1H), 4.10 (dt, *J* = 12.2, 5.8 Hz, 1H), 3.66 (s, 3H), 2.96 – 2.76 (m, 4H), 2.25 (dq, *J* = 12.4, 6.0 Hz, 1H), 2.04 (dtd, *J* = 16.1, 8.2, 4.2 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.15, 148.74, 145.78, 139.48, 132.27, 128.41, 128.24, 126.03, 125.94, 125.83, 124.67, 124.08, 123.67, 123.34, 77.48, 77.16, 76.84, 51.70, 47.77, 41.96, 35.99, 27.41, 24.28. **HRMS** (ESI^+, MeCN): found, 401.0771 $[M + H]^+$, calcd for $C_{20}H_{21}N_2O_2Se$, 401.0768.



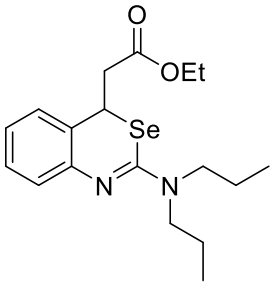
Ethyl 2-(2-(benzyl(methyl)amino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4h)

Yield: 98%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 3061, 3028, 2978, 2904, 1730, 1603, 1546, 1478, 1372, 1189, 759, 732, 697. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.39 – 7.26 (m, 5H), 7.26 – 7.16 (m, 3H), 7.03 (td, *J* = 7.3, 1.4 Hz, 1H), 4.86 (s, 2H), 4.63 – 4.51 (m, 1H), 4.14 (q, *J* = 7.1 Hz, 2H), 3.19 (s, 3H), 2.96 – 2.85 (m, 2H), 1.23 (t, *J* = 7.1 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.86, 151.69, 146.99, 137.62, 128.68, 128.39, 127.38, 125.89, 125.74, 123.21, 122.00, 77.48, 77.16, 76.84, 60.74, 55.00, 42.26, 37.02, 36.15, 14.27. **HRMS** (ESI^+, MeCN): found, 403.0929 $[M + H]^+$, calcd for $C_{20}H_{23}N_2O_2Se$, 403.0925.



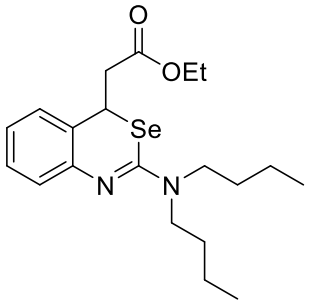
Ethyl 2-(2-(diethylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4i)

Yield: 92%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 2972, 2931, 1731, 1550, 1479, 1230, 1116, 757. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.24 – 7.08 (m, 3H), 6.97 (td, *J* = 7.4, 1.4 Hz, 1H), 4.51 (dd, *J* = 8.7, 6.9 Hz, 1H), 4.14 (qd, *J* = 7.1, 3.2 Hz, 2H), 3.62 (tp, *J* = 14.2, 7.1 Hz, 4H), 2.90 – 2.78 (m, 2H), 1.23 (td, *J* = 7.1, 3.4 Hz, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.00, 149.60, 147.24, 128.29, 125.81, 125.52, 122.70, 122.14, 77.48, 77.16, 76.84, 60.70, 44.35, 42.07, 35.78, 14.35, 14.28. **HRMS** (ESI^+, MeCN): found, 355.0926 $[M + H]^+$, calcd for $C_{16}H_{23}N_2O_2Se$, 355.0925.



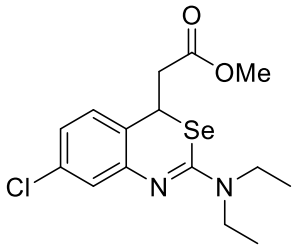
Ethyl 2-(2-(dipropylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4j)

Yield: 94%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 2961, 2931, 2873, 1732, 1603, 1551, 1368, 1214, 1122, 757. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.23 – 7.08 (m, 3H), 6.97 (t, *J* = 7.4 Hz, 1H), 4.51 (dd, *J* = 8.8, 6.8 Hz, 1H), 4.14 (qq, *J* = 7.3, 3.7 Hz, 2H), 3.53 (dddd, *J* = 43.2, 14.3, 8.9, 5.8 Hz, 4H), 2.83 (dd, *J* = 7.8, 4.9 Hz, 2H), 1.76 – 1.58 (m, 4H), 1.23 (t, *J* = 7.2 Hz, 3H), 0.94 (t, *J* = 7.4 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.00, 150.13, 147.19, 128.25, 125.77, 125.48, 122.66, 122.18, 77.48, 77.16, 76.84, 60.67, 51.87, 42.03, 35.88, 22.21, 14.26, 11.38. **HRMS** (ESI^+, MeCN): found, 383.1240 $[M + H]^+$, calcd for $C_{18}H_{27}N_2O_2Se$, 383.1238.



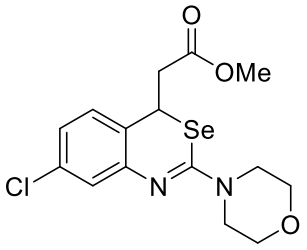
Ethyl 2-(2-(dibutylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4k)

Yield: 90%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 2957, 2930, 2871, 1733, 1603, 1552, 1479, 1369, 1203, 1189, 1124, 1108, 757. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.25 – 7.01 (m, 3H), 7.01 – 6.92 (m, 1H), 4.51 (dd, *J* = 8.7, 6.8 Hz, 1H), 4.14 (q, *J* = 7.3 Hz, 2H), 3.76 – 3.35 (m, 4H), 2.91 – 2.73 (m, 2H), 1.73 – 1.53 (m, 4H), 1.36 (h, *J* = 7.4 Hz, 4H), 1.24 (t, *J* = 7.1 Hz, 3H), 0.97 (t, *J* = 7.4 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.02, 150.05, 147.24, 128.26, 125.79, 125.50, 122.64, 122.15, 77.48, 77.16, 76.84, 60.68, 49.86, 42.08, 35.86, 31.12, 20.20, 14.28, 14.02. **HRMS** (ESI^+, MeCN): found, 411.1553 $[M + H]^+$, calcd for $C_{20}H_{31}N_2O_2Se$, 411.1551.



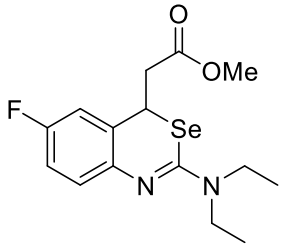
Methyl 2-(7-chloro-2-(diethylamino)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4l)

Yield: 88%. Colorless oil. **IR :** ν_{max} (cm^{-1}) = 2971, 2931, 1736, 1542, 1461, 1357, 1227, 1118, 844, 686. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.14 – 7.01 (m, 2H), 6.92 (dd, *J* = 8.1, 2.3 Hz, 1H), 4.47 (t, *J* = 7.8 Hz, 1H), 3.69 – 3.51 (m, 7H), 2.86 – 2.76 (m, 2H), 1.21 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.24, 150.52, 148.56, 133.56, 126.83, 125.28, 122.35, 120.51, 77.48, 77.16, 76.84, 51.87, 44.59, 41.82, 35.04, 14.32. **HRMS** (ESI^+, MeCN): found, 401.0390 $[M + H]^+$, calcd for $C_{15}H_{20}N_2O_2SeCl$, 375.0379.



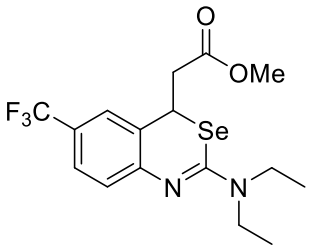
Methyl 2-(7-chloro-2-morpholino-4H-benzo[d][1,3]selenazin-4-yl)acetate (4m)

Yield: 68%. White solid. **Mp:** 85.3-86.1 °C. **IR :** ν_{max} (cm^{-1}) = 2956, 2898, 2858, 1729, 1547, 1208, 1145, 1023, 874, 805. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.13 – 7.03 (m, 2H), 6.97 (dd, *J* = 8.1, 2.2 Hz, 1H), 4.50 (p, *J* = 7.7 Hz, 1H), 3.82 – 3.70 (m, 8H), 3.65 (s, 3H), 2.82 (dd, *J* = 7.7, 1.8 Hz, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.02, 152.65, 147.63, 133.72, 126.96, 125.55, 123.46, 120.55, 77.48, 77.16, 76.84, 66.77, 51.95, 48.11, 42.00, 35.24. **HRMS** (ESI^+, MeCN): found, 389.0179 $[M + H]^+$, calcd for $C_{15}H_{18}N_2O_3SeCl$, 389.0171.



Methyl 2-(2-(diethylamino)-6-fluoro-4H-benzo[d][1,3]selenazin-4-yl)acetate (4n)

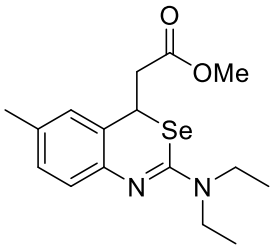
Yield: 94%. Orange-yellow oil. **IR :** ν_{max} (cm^{-1}) = 2971, 2932, 2871, 1736, 1611, 1559, 1484, 1230, 1117, 862, 821, 766. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.03 (dd, *J* = 8.6, 5.5 Hz, 1H), 6.89 (ddd, *J* = 17.2, 8.6, 2.9 Hz, 2H), 4.43 (dd, *J* = 8.5, 7.0 Hz, 1H), 3.67 (s, 3H), 3.59 (dq, *J* = 24.4, 7.1 Hz, 4H), 2.89 – 2.77 (m, 2H), 1.20 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.19, 159.64, 157.23, 149.24, 143.57, 143.55, 126.73, 126.66, 123.30, 123.23, 115.09, 114.88, 112.37, 112.14, 77.48, 77.16, 76.84, 51.86, 44.38, 41.51, 35.25, 14.33. **HRMS** (ESI^+, MeCN): found, 401.0675 $[M + H]^+$, calcd for $C_{15}H_{20}N_2O_2SeF$, 359.0674.



Methyl 2-(2-(diethylamino)-6-(trifluoromethyl)-4H-benzo[d][1,3]selenazin-4-yl)acetate (4o)

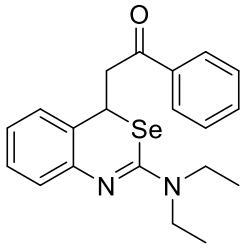
Yield: 80%. Light yellow solid. **Mp:** 49.5-50.3 °C. **IR :** ν_{max} (cm^{-1}) = 2971, 2933, 1741, 1533, 1327, 1301, 1231, 1163, 1101, 1067, 836. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.43 (dd, *J* = 10.3, 2.2 Hz, 2H), 7.15 (d, *J* = 8.2 Hz, 1H), 4.58 – 4.47 (m, 1H), 3.67 (s, 3H), 3.58 (dq, *J* = 13.8, 6.8 Hz, 4H), 2.90 – 2.79 (m, 2H), 1.23 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.06, 151.20, 150.31, 125.72, 125.30, 125.26, 125.22, 125.19, 124.20, 123.88, 123.22, 123.18, 123.15, 123.11, 122.13, 77.48, 77.16,

76.84, 51.92, 44.71, 41.69, 35.29, 14.32. **HRMS** (ESI$^+$, MeCN): found, 409.0646 [M + H]$^+$, calcd for $C_{16}H_{20}N_2O_2SeF_3$, 409.0642.



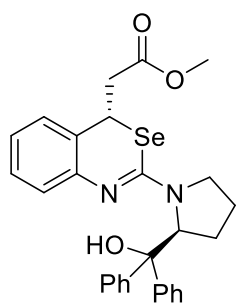
Methyl 2-(2-(diethylamino)-6-methyl-4H-benzo[d][1,3]selenazin-4-yl)acetate (4p)

Yield: 95%. Light yellow oil. **IR :** ν_{max} (cm^{-1}) = 2968, 2931, 1736, 1557, 1491, 1232, 1114, 821, 767. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.05 – 6.93 (m, 3H), 4.46 (dd, *J* = 8.8, 6.7 Hz, 1H), 3.70 – 3.52 (m, 7H), 2.85 (dd, *J* = 7.8, 3.1 Hz, 2H), 2.30 (s, 3H), 1.22 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.43, 148.91, 144.78, 132.11, 128.98, 126.19, 125.37, 121.77, 77.48, 77.16, 76.84, 51.69, 44.23, 41.87, 35.74, 20.84, 14.29. **HRMS** (ESI$^+$, MeCN): found, 355.0934 [M + H]$^+$, calcd for $C_{16}H_{23}N_2O_2Se$, 355.0925.



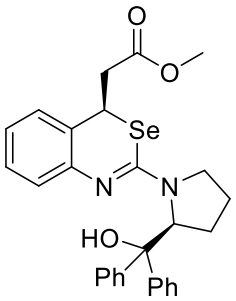
2-(2-(diethylamino)-4H-benzo[d][1,3]selenazin-4-yl)-1-phenylethan-1-one (4q)

Yield: 94%. Yellow oil. **IR :** ν_{max} (cm^{-1}) = 2969, 2929, 1682, 1599, 1547, 1357, 1231, 1116, 756, 689. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.91 – 7.84 (m, 2H), 7.54 (t, *J* = 7.4 Hz, 1H), 7.42 (t, *J* = 7.6 Hz, 2H), 7.25 – 7.14 (m, 3H), 6.99 (td, *J* = 7.4, 1.5 Hz, 1H), 4.78 (dd, *J* = 9.4, 5.1 Hz, 1H), 3.68 (tt, *J* = 14.2, 8.3 Hz, 3H), 3.52 (dq, *J* = 14.1, 7.0 Hz, 2H), 3.37 (dd, *J* = 17.3, 5.1 Hz, 1H), 1.19 (t, *J* = 7.1 Hz, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 197.67, 150.50, 147.43, 136.93, 133.29, 128.61, 128.20, 128.14, 125.85, 125.50, 122.87, 122.67, 77.48, 77.16, 76.84, 45.12, 44.16, 34.95, 14.36. **HRMS** (ESI$^+$, MeCN): found, 387.0983 [M + H]$^+$, calcd for $C_{20}H_{23}N_2OSe$, 387.0976.



methyl 2-((S)-2-((S)-2-(hydroxydiphenylmethyl)pyrrolidin-1-yl)-4H-benzo[d][1,3]selenazin-4-yl) acetate （4t）

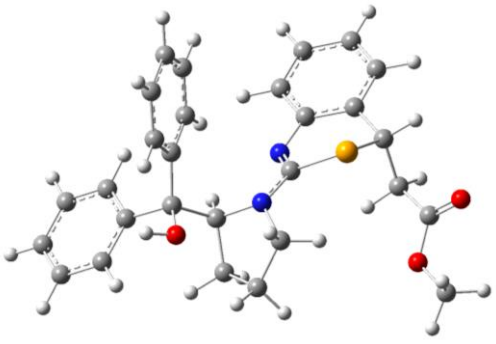
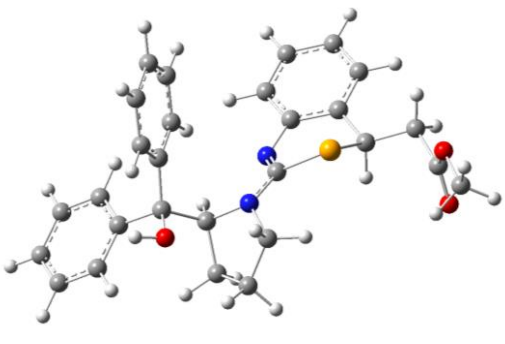
Yield: 66%. White solid. **Mp:** 48.7-50.1 °C. **IR :** ν_{max} (cm^{-1}) = 3058, 3023, 2950, 2920, 2849, 1734, 1542, 1480, 1363, 1224, 755, 700. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.77 (s, 1H), 7.43 (t, *J* = 9.5 Hz, 4H), 7.31 (dd, *J* = 16.2, 8.4 Hz, 6H), 7.18 – 7.06 (m, 3H), 6.97 (t, *J* = 7.3 Hz, 1H), 5.30 (dd, *J* = 8.9, 5.0 Hz, 1H), 4.38 (t, *J* = 7.7 Hz, 1H), 3.70 (s, 3H), 3.38 (q, *J* = 8.0 Hz, 1H), 3.24 (td, *J* = 8.8, 5.9 Hz, 1H), 2.81 – 2.69 (m, 2H), 2.19 – 2.03 (m, 2H), 1.48 (hept, *J* = 8.0 Hz, 1H), 0.93 (dq, *J* = 13.6, 7.4 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.37, 146.85, 143.96, 128.59, 128.23, 127.97, 127.81, 127.36, 127.13, 126.01, 124.94, 123.66, 122.42, 81.65, 69.29, 51.82, 50.75, 41.97, 35.79, 31.17, 22.09. **HRMS** (ESI^+, MeCN): found, 521.1336 $[M + H]^+$, calcd for $C_{28}H_{29}N_2O_3Se$, 521.1343.



methyl 2-((R)-2-((S)-2-(hydroxydiphenylmethyl)pyrrolidin-1-yl)-4H-benzo[d][1,3]selenazin-4-yl) acetate (4t')

Yield: 25%. White solid. **Mp:** 162.1-163.3 °C. **IR :** ν_{max} (cm^{-1}) = 3061, 3032, 2960, 2851, 1724, 1539, 1481, 1371, 1222, 767, 704. **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.92 (s, 1H), 7.48 – 7.40 (m, 4H), 7.38 – 7.29 (m, 3H), 7.26 – 7.19 (m, 5H), 7.14 (d, *J* = 7.1 Hz, 1H), 7.03 (dt, *J* = 7.6, 4.2 Hz, 1H), 5.63 (dd, *J* = 8.9, 4.5 Hz, 1H), 4.52 (dd, *J* = 9.1, 6.3 Hz, 1H), 3.67 (s, 3H), 2.92 – 2.79 (m, 2H), 2.75 (ddd, *J* = 9.9, 8.0, 5.9 Hz, 1H), 2.23 (dq, *J* = 13.3, 8.5 Hz, 1H), 2.08 (ddt, *J* = 13.3, 8.1, 5.1 Hz, 1H), 1.73 – 1.40 (m, 2H), 1.00 – 0.91 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.58, 146.19, 128.18, 127.90, 127.53, 127.42, 126.79, 126.66, 126.60, 125.46, 124.76, 123.31, 120.60, 81.94, 68.44, 51.44, 50.72, 42.03, 35.50, 29.24, 22.36. **HRMS** (ESI^+, MeCN): found, 521.1344 $[M + H]^+$, calcd for $C_{28}H_{29}N_2O_3Se$, 521.1343.

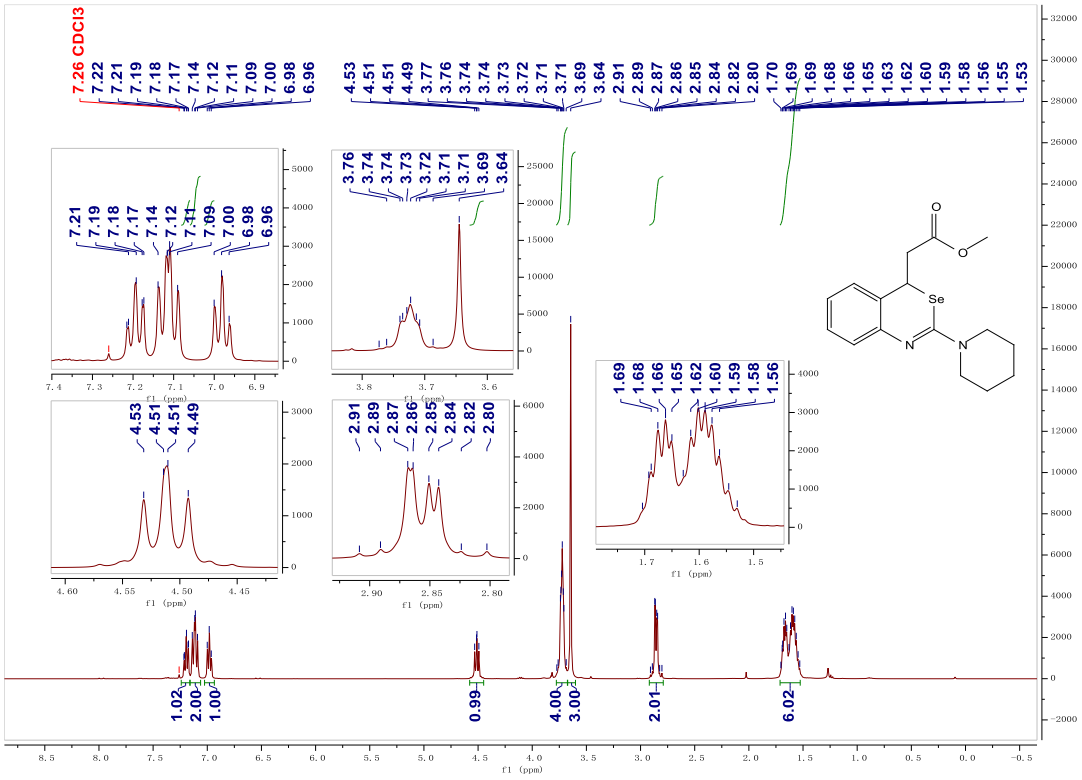
IV. Computational studies

	
S (**4t**)	*R* (**4t'**)

Computational studies at the B3LYP/6-311++G(d,p)//B3LYP/6-31G(d,p) level of theory indicate that the *S* configuration (**4t**) is 3.3 kcal/mol lower in energy than the *R* configuration (**4t'**). Thus, the *S* configuration (**4t**) is more likely to be the major product. Structural inspection shows that the methylene group is present in an axial position for the *S* configuration and in an equatorial position for the *R* configuration, respectively. Therefore, the *S* configuration is preferred due to the less steric effect between the methylene group and the *ortho*-C-H bond.

V. References

[1] M. Tobisu, H. Fujihara, K. Koh and N. Chatani. *J. Org. Chem.*, **2010**, *75*, 4841- 4847.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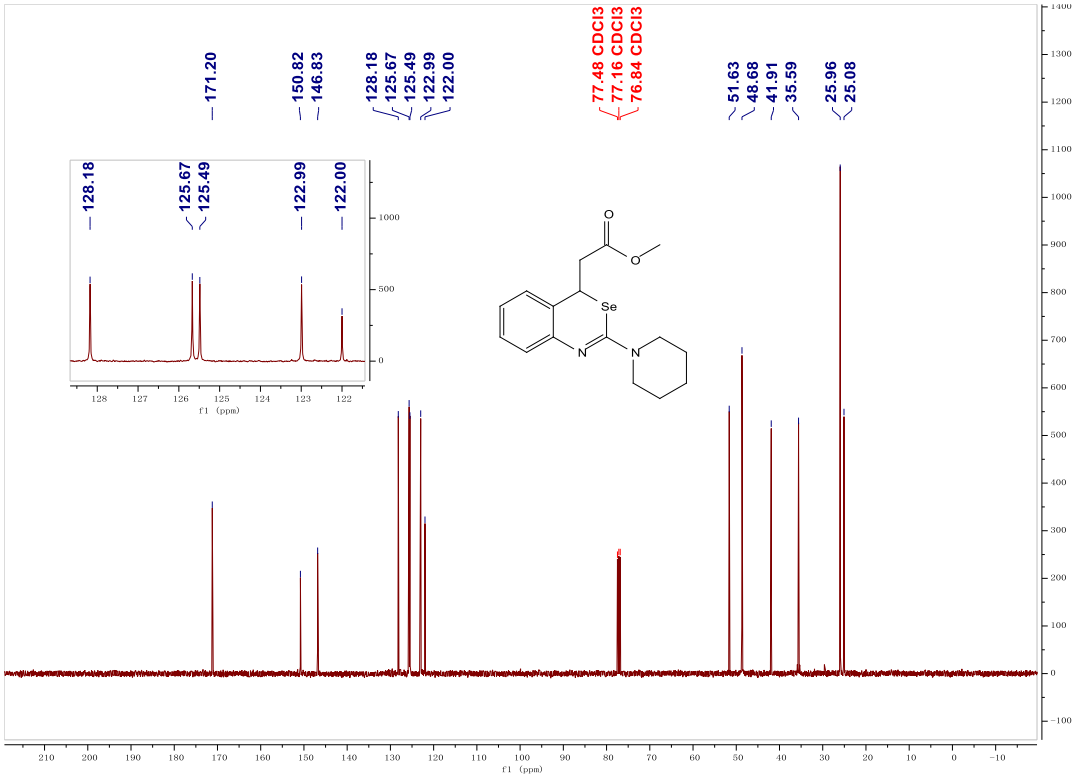
4.53 4.51 4.51 4.49 3.77 3.76 3.74 3.74 3.73 3.72 3.71 3.71 3.69 3.64
2.91 2.89 2.87 2.86 2.85 2.84 2.82 2.80
1.70 1.69 1.69 1.68 1.66 1.65 1.63 1.62 1.60 1.59 1.58 1.56 1.55 1.53
Se
N
O
1.02 2.00 1.00 0.99 4.00 3.00 2.01 6.02
f1 (ppm)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128.18 125.67 125.49 122.99 122.00
77.48 CDCl3 77.16 CDCl3 76.84 CDCl3
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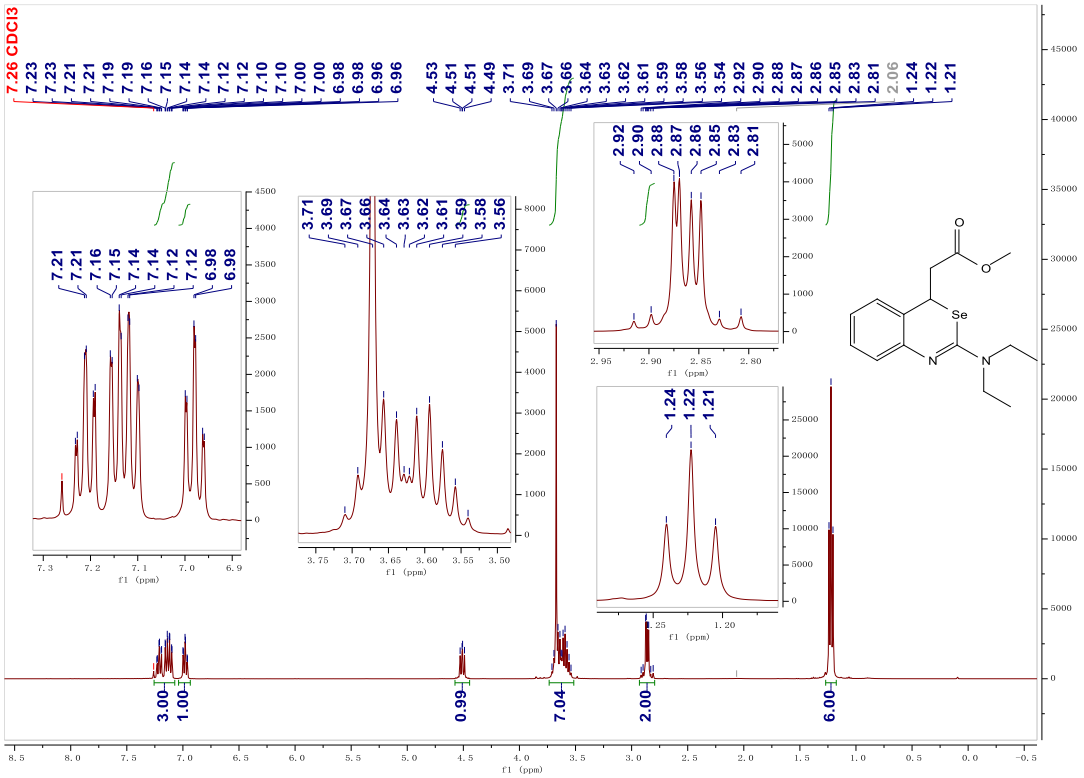
Se
N
O
f1 (ppm)


7.26 CDCl3
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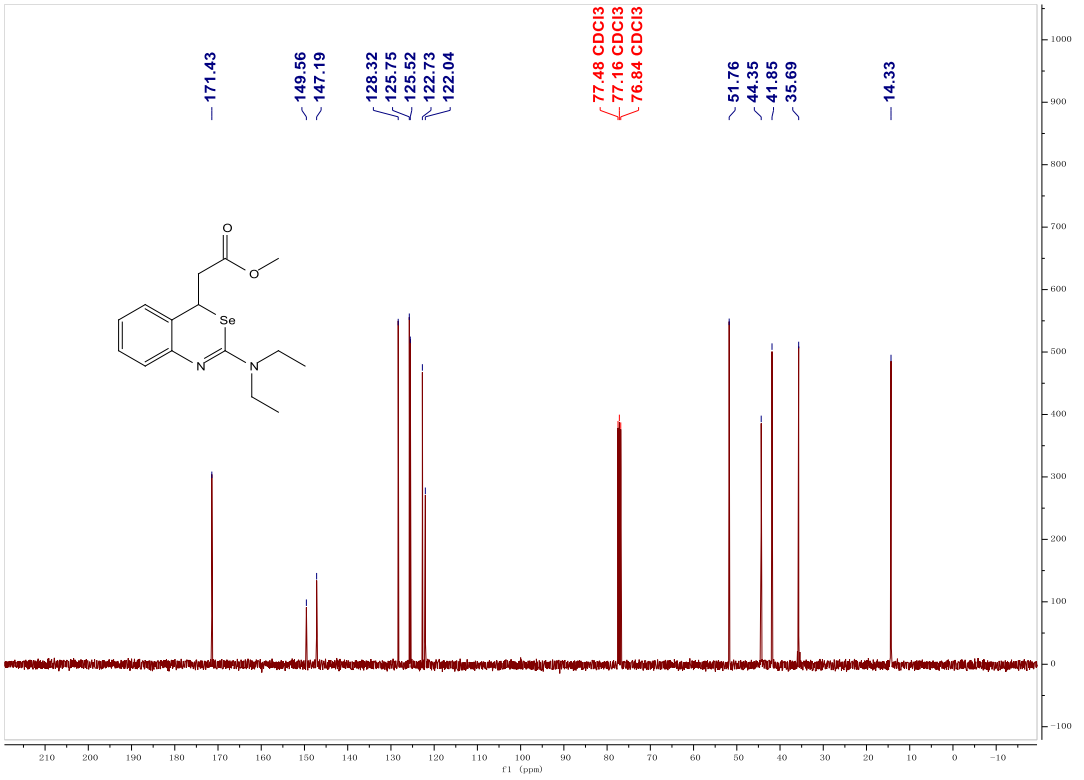
4.53 4.51 4.51 4.49 3.71 3.69 3.67 3.66 3.64 3.63 3.62 3.61 3.59 3.58 3.56 3.54 2.92 2.90 2.88 2.87 2.86 2.85 2.83 2.81 2.06 1.24 1.22 1.21
3.00
1.00
0.99
7.04
2.00
6.00
f1 (ppm)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125.52
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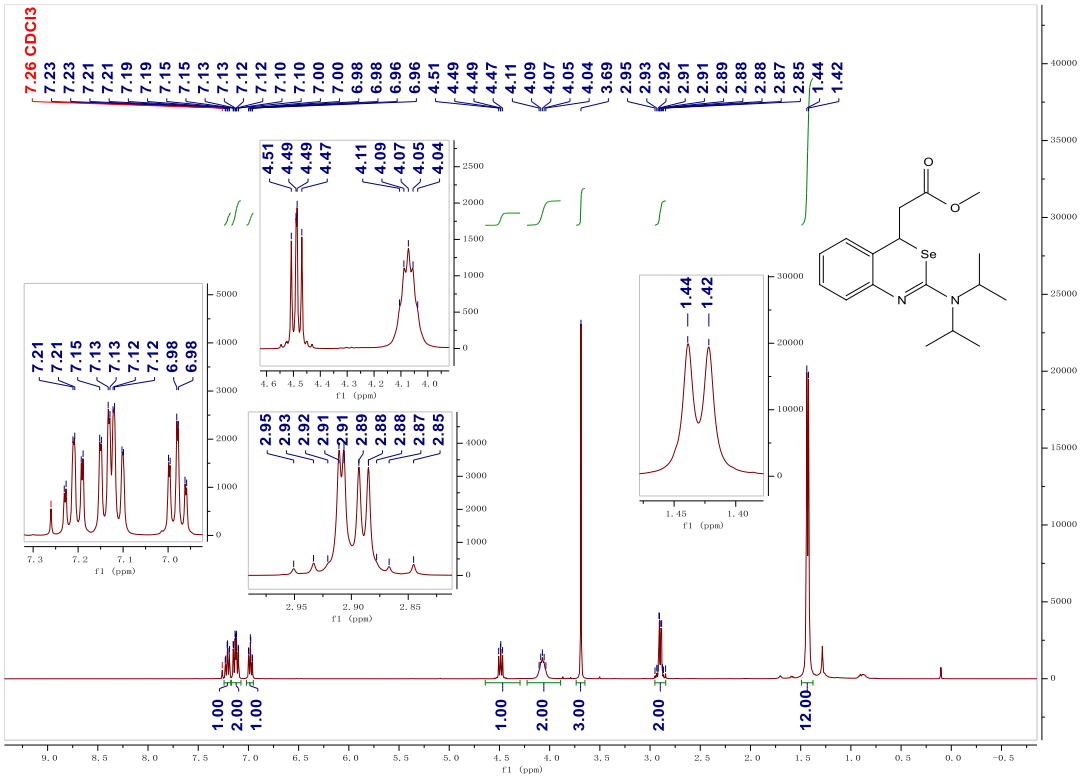
35.69
14.33
f1 (ppm)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4.51 4.49 4.49 4.47 4.11 4.09 4.07 4.05 4.04
3.69
2.95 2.93 2.92 2.91 2.91 2.89 2.88 2.88 2.87 2.85
1.44 1.42
7.21 7.21 7.15 7.13 7.13 7.12 7.12 6.98 6.98
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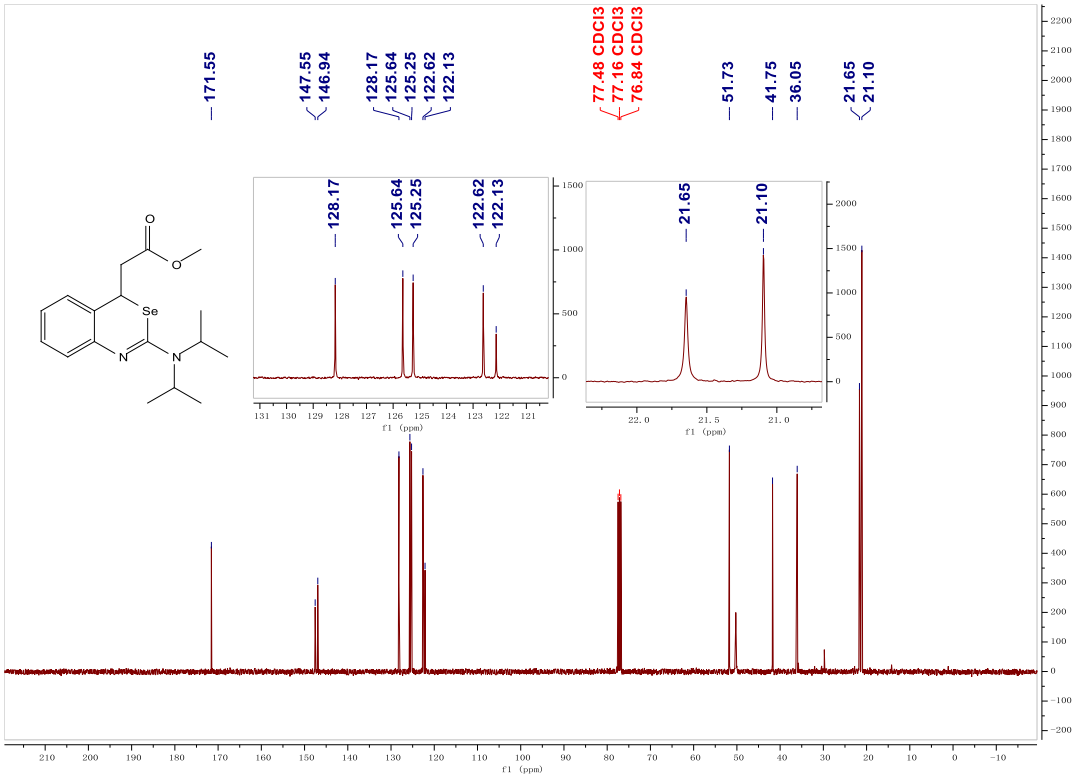
f1 (ppm)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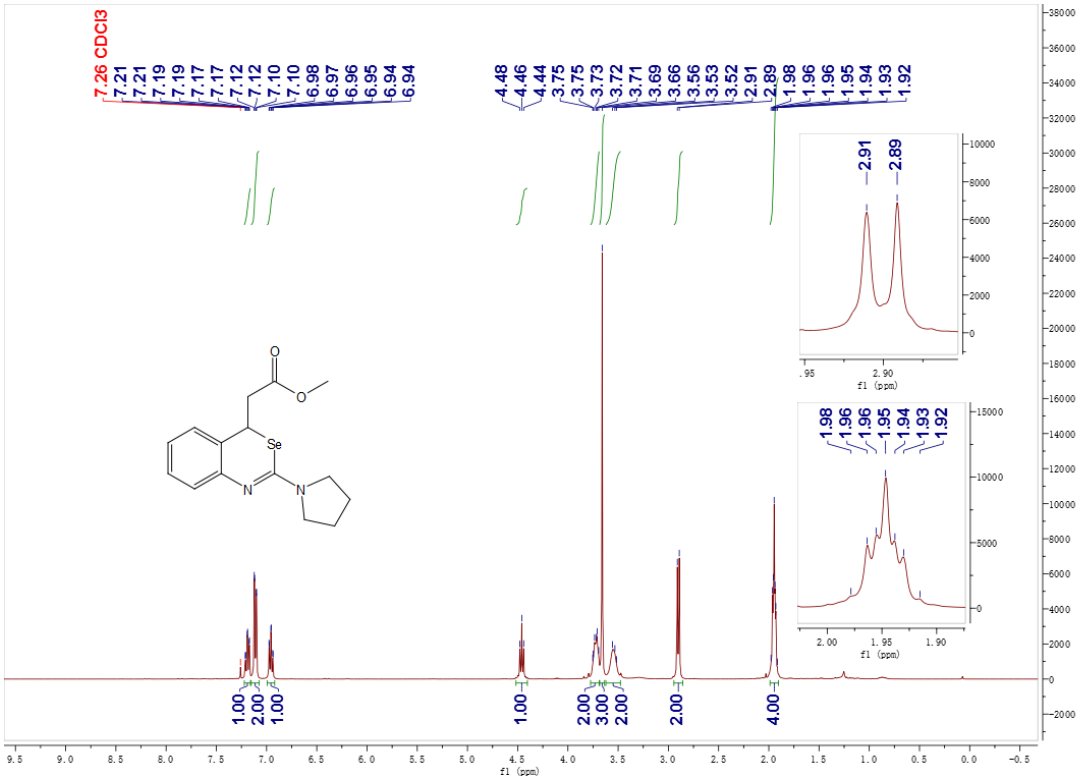
f1 (ppm)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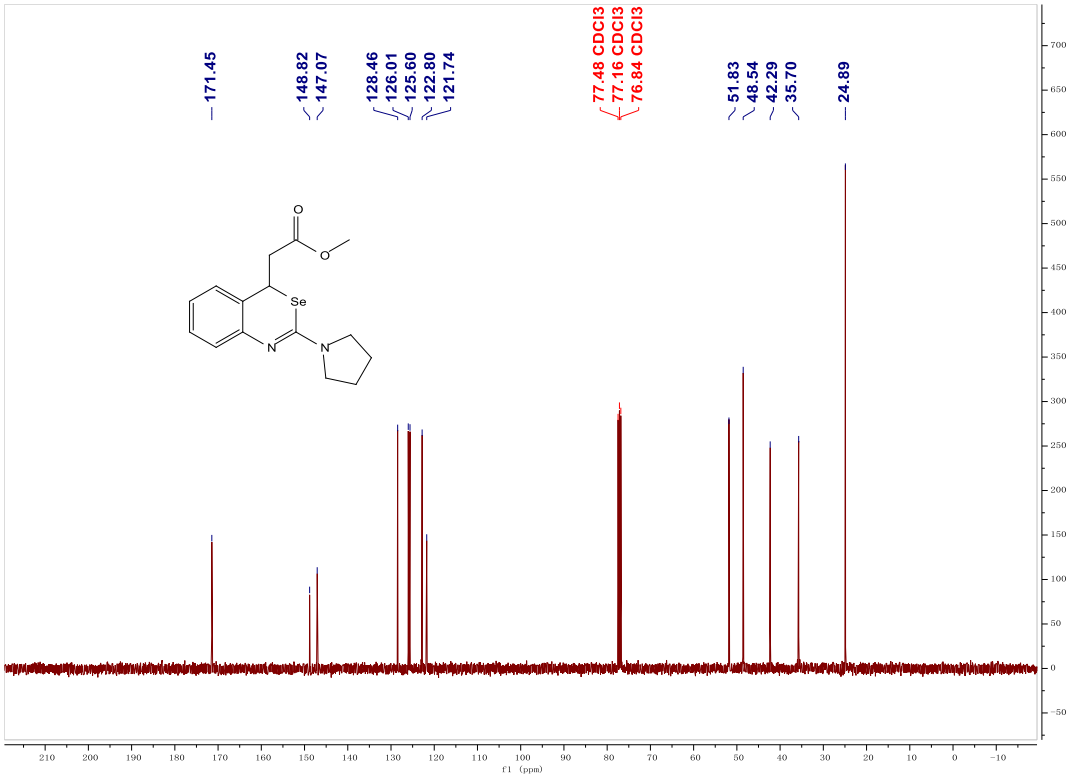
f1 (ppm)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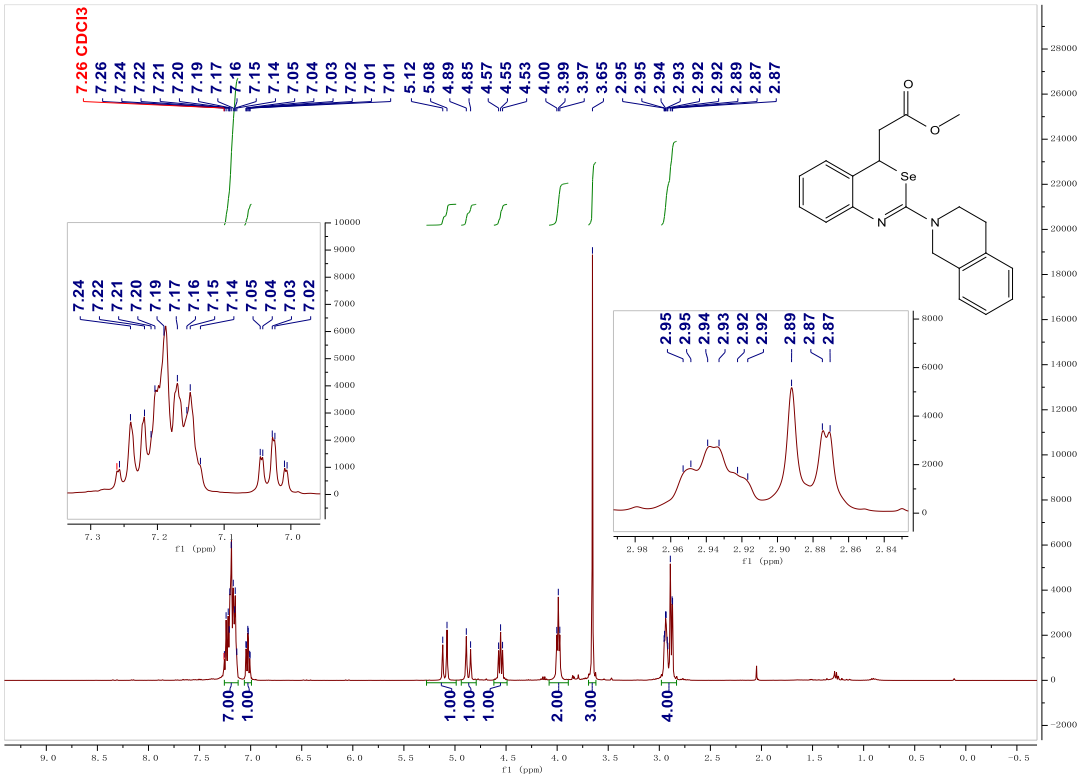
f1 (ppm)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2.95 2.95 2.94 2.93 2.92 2.92 2.89 2.87 2.87
7.24 7.22 7.21 7.20 7.19 7.17 7.16 7.15 7.14 7.05 7.04 7.03 7.02
2.95 2.95 2.94 2.93 2.92 2.92 2.89 2.87 2.87
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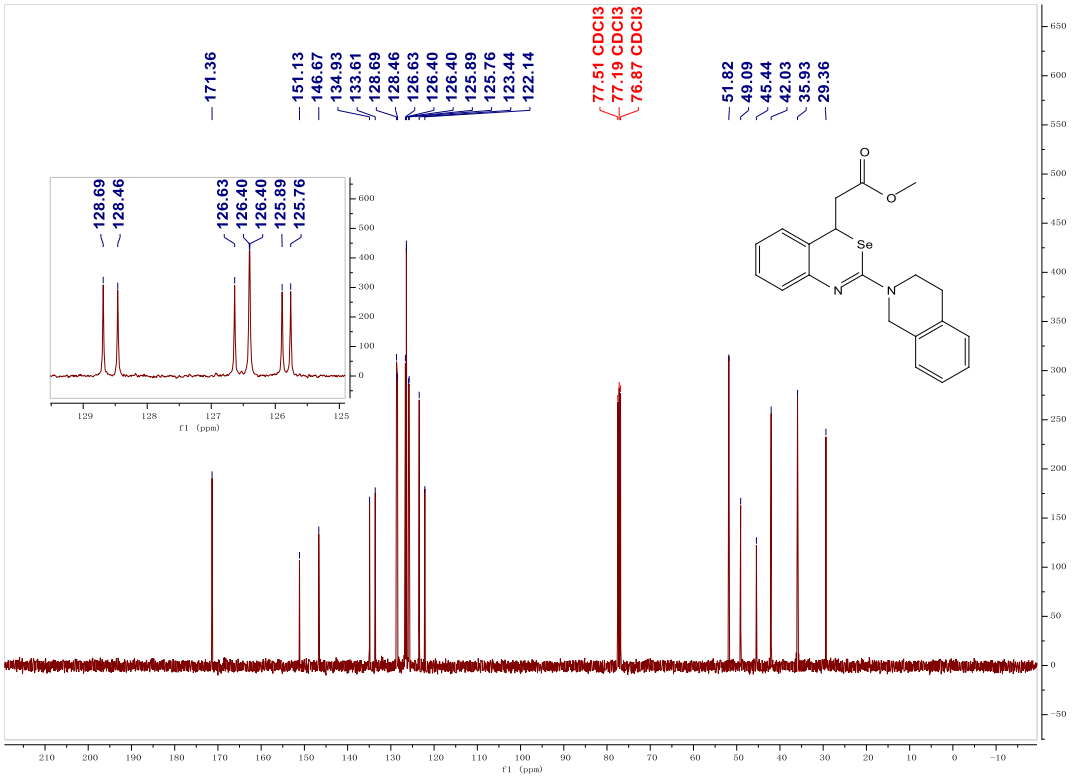
f1 (ppm)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151.13 146.67 134.93 133.61 128.69 128.46 126.63 126.40 126.40 125.89 125.76 123.44 122.14
77.51 CDCl3
77.19 CDCl3
76.87 CDCl3
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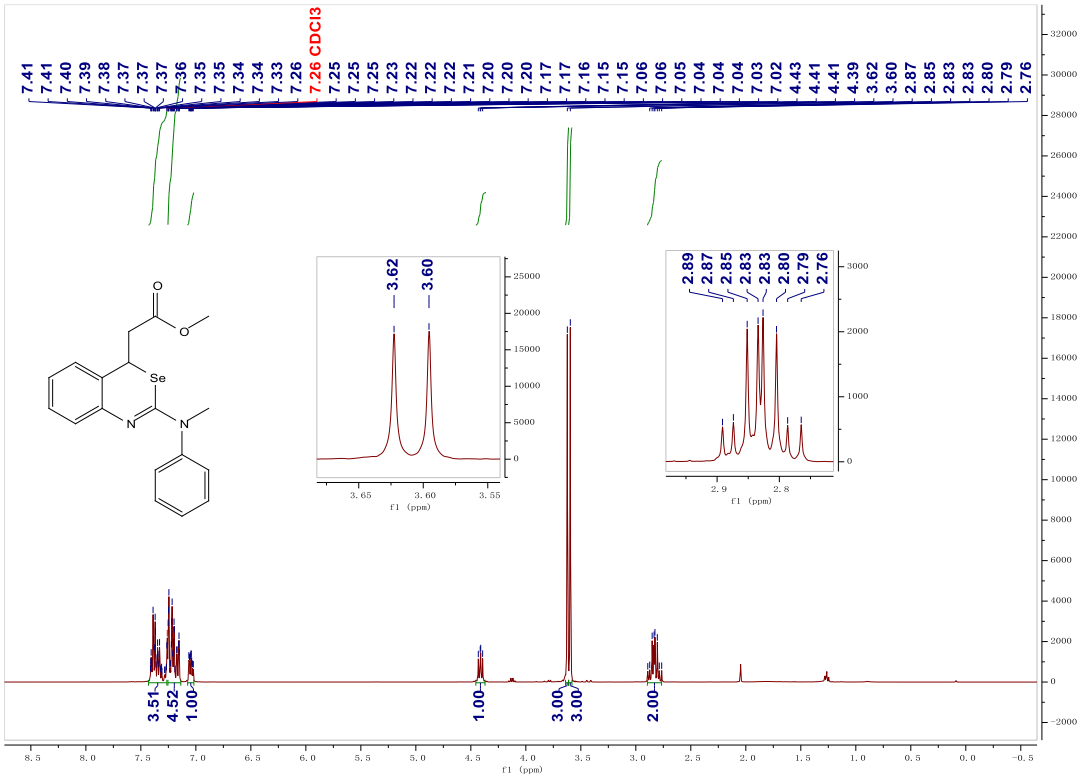
f1 (ppm)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3.00
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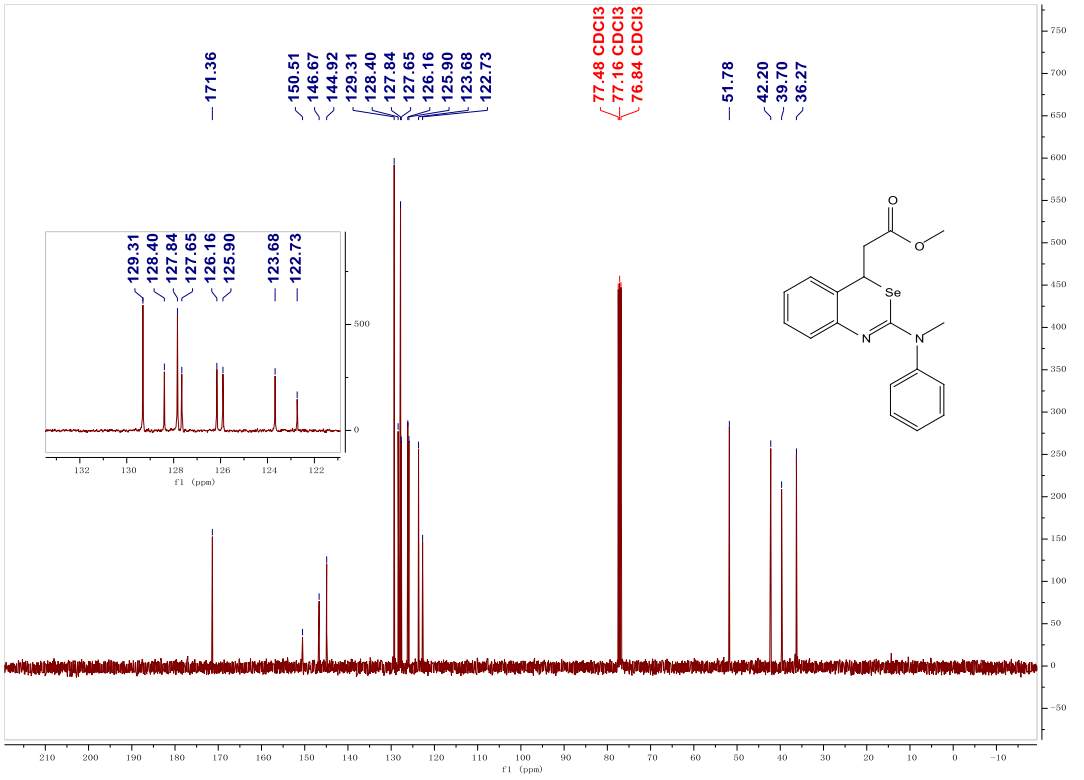
2.00
f1 (ppm)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77.48 CDCl3 77.16 CDCl3 76.84 CDCl3
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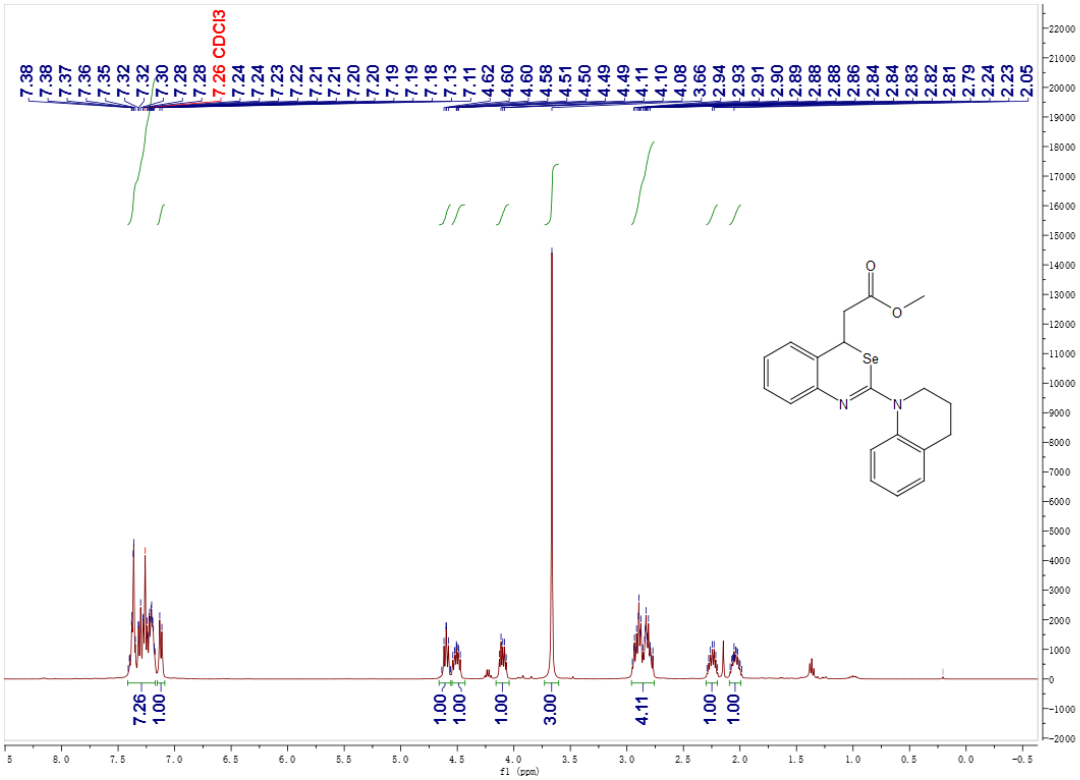
f1 (ppm)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7.19
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4.60
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4.49
4.11
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3.66
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2.93
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2.89
2.88
2.88
2.86
2.84
2.84
2.83
2.82
2.81
2.79
2.24
2.23
2.05
O
O
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1.00
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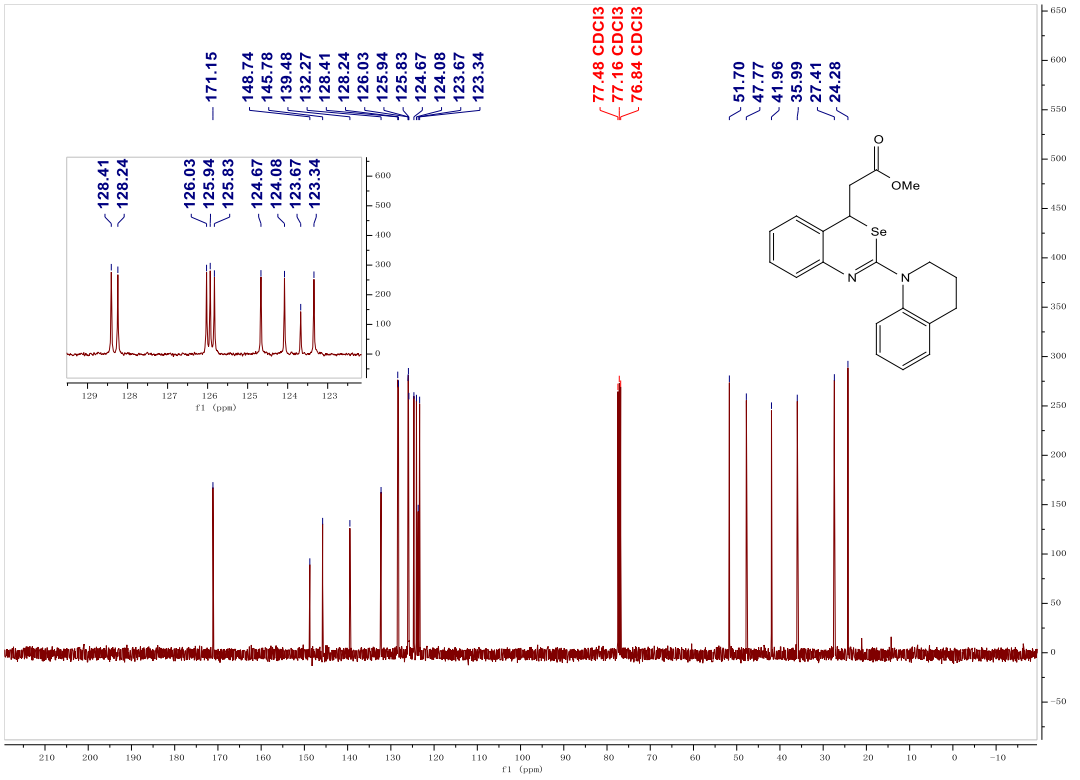
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124.67
124.08
123.67
123.34
77.48 CDCl3
77.16 CDCl3
76.84 CDCl3
51.70
47.77
41.96
35.99
27.41
24.28
128.41
128.24
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Se
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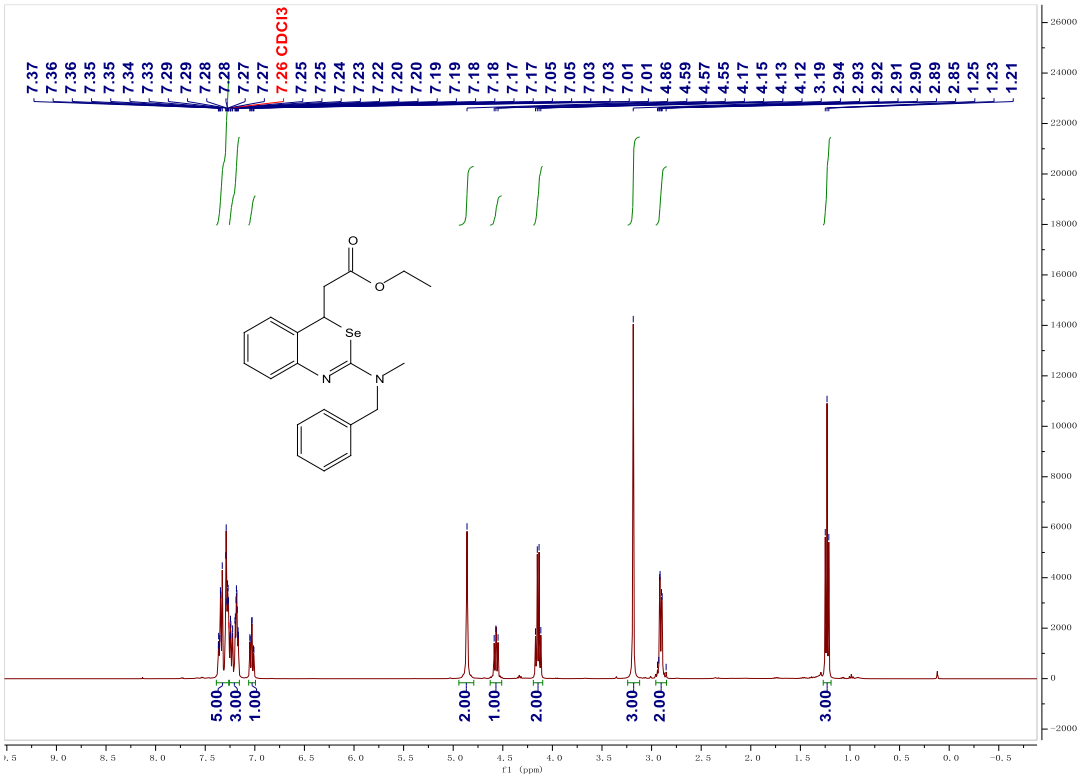
f1 (ppm)
f1 (ppm)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7.26 CDCl3
7.25
7.25
7.24
7.23
7.22
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7.19
7.19
7.18
7.18
7.17
7.17
7.05
7.03
7.03
7.01
7.01
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4.57
4.55
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4.13
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3.19
2.94
2.93
2.92
2.91
2.90
2.89
2.85
1.25
1.23
1.21
O
O
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2.00
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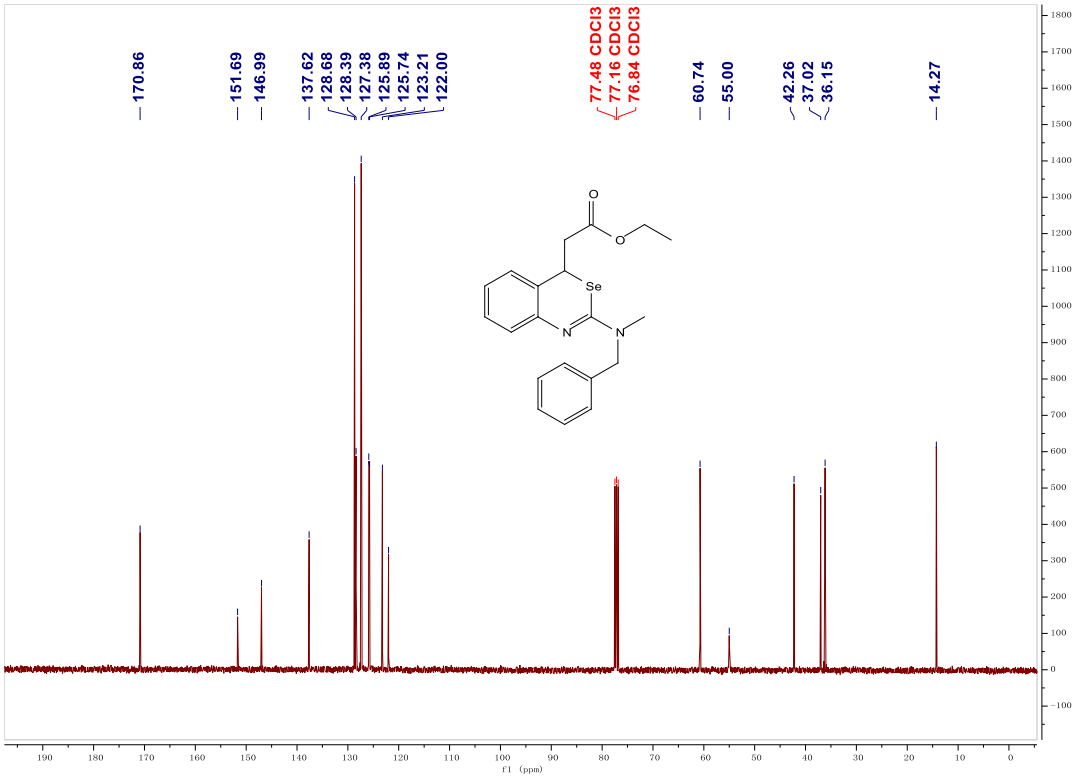
3.00
f1 (ppm)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77.48 CDCl3
77.16 CDCl3
76.84 CDCl3
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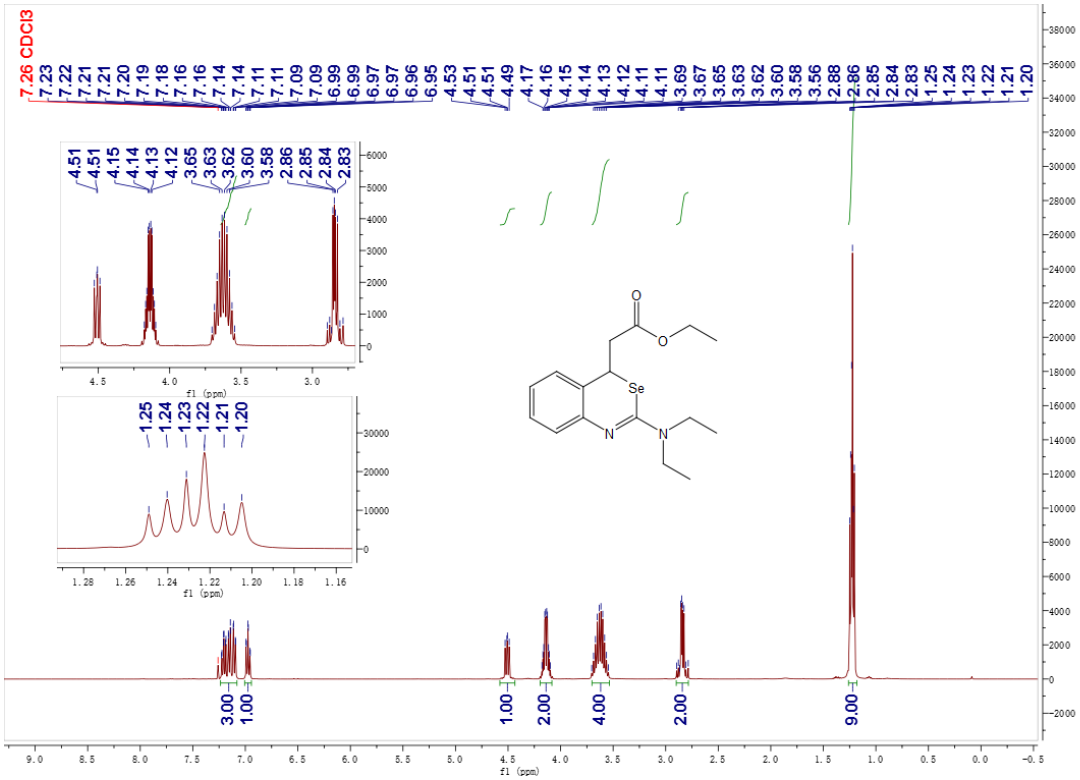
Se
N
N
f1 (ppm)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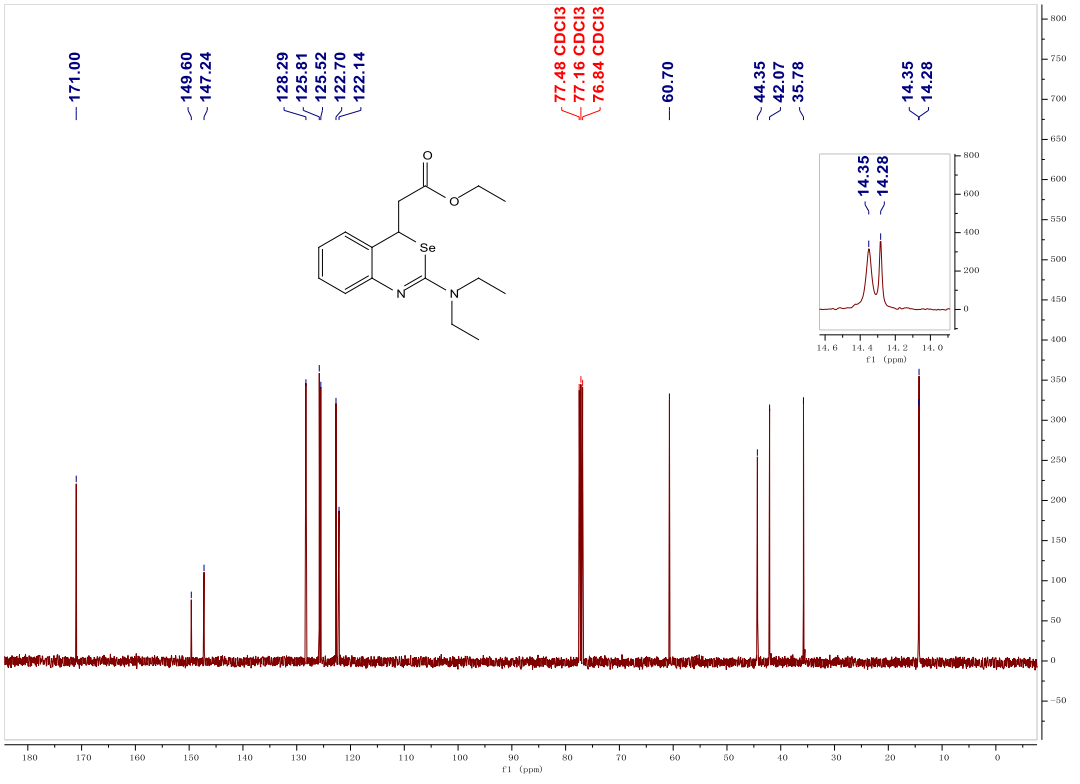
4.51 4.51 4.15 4.14 4.13 4.12 3.65 3.63 3.62 3.60 3.58 2.86 2.85 2.84 2.83
1.25 1.24 1.23 1.22 1.21 1.20
O
O
Se
N
N
3.00 1.00 1.00 2.00 4.00 2.00 9.00
f1 (ppm)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122.14
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77.16 CDCl3
76.84 CDCl3
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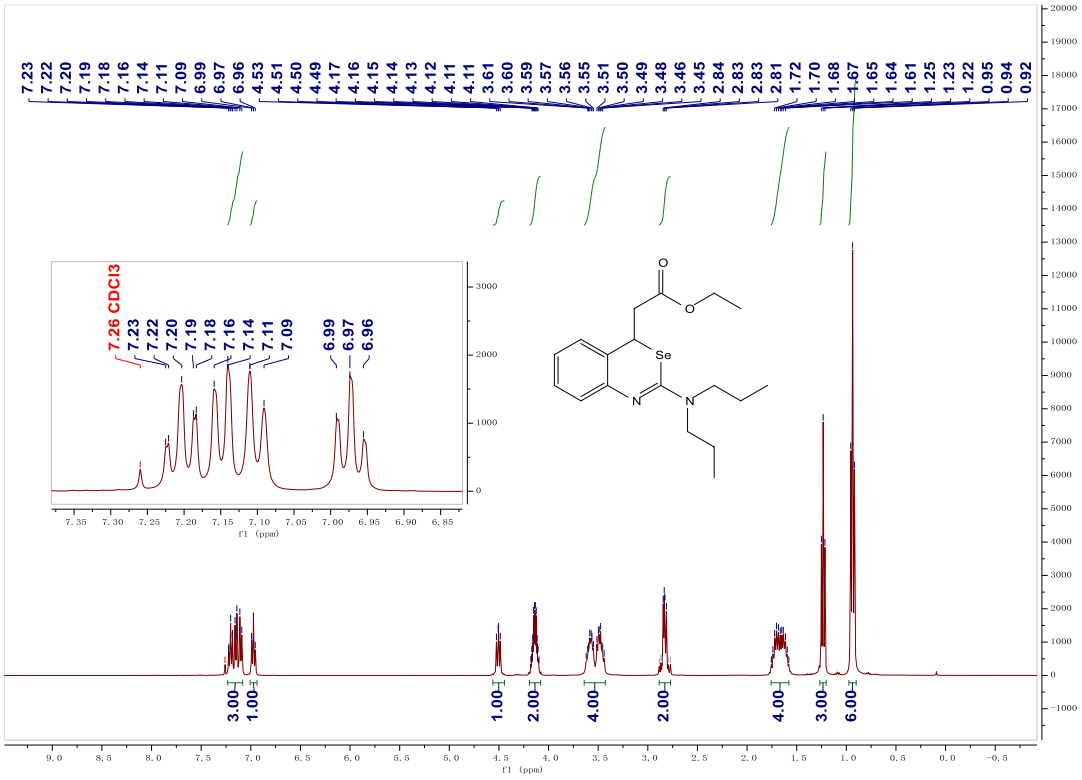
35.78
14.35
14.28
O
O
Se
N
N
f1 (ppm)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6.97
6.96
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4.50
4.49
4.17
4.16
4.15
4.14
4.13
4.12
4.11
4.11
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3.60
3.59
3.57
3.56
3.55
3.51
3.50
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2.83
2.81
1.72
1.70
1.68
1.67
1.65
1.64
1.61
1.25
1.23
1.22
0.95
0.94
0.92
7.26 CDCl3
f1 (ppm)
O
O
Se
N
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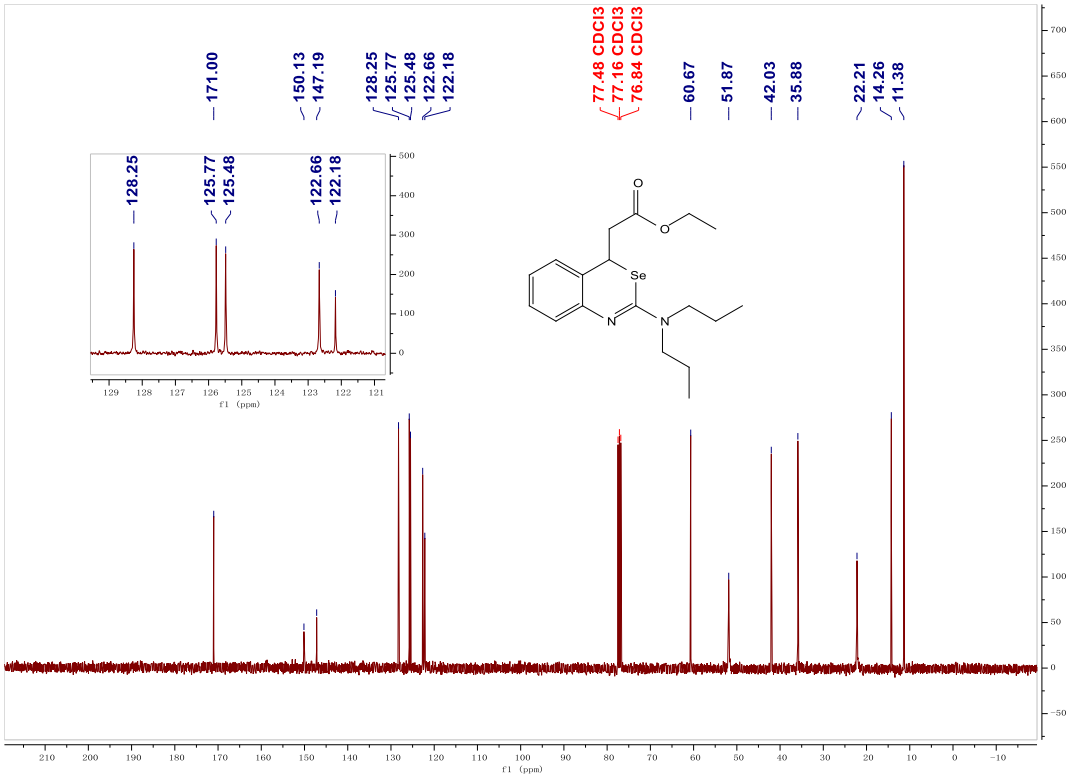
1.00
1.00
2.00
4.00
2.00
4.00
3.00
6.00
f1 (ppm)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125.48
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122.18
77.48 CDCl3
77.16 CDCl3
76.84 CDCl3
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51.87
42.03
35.88
22.21
14.26
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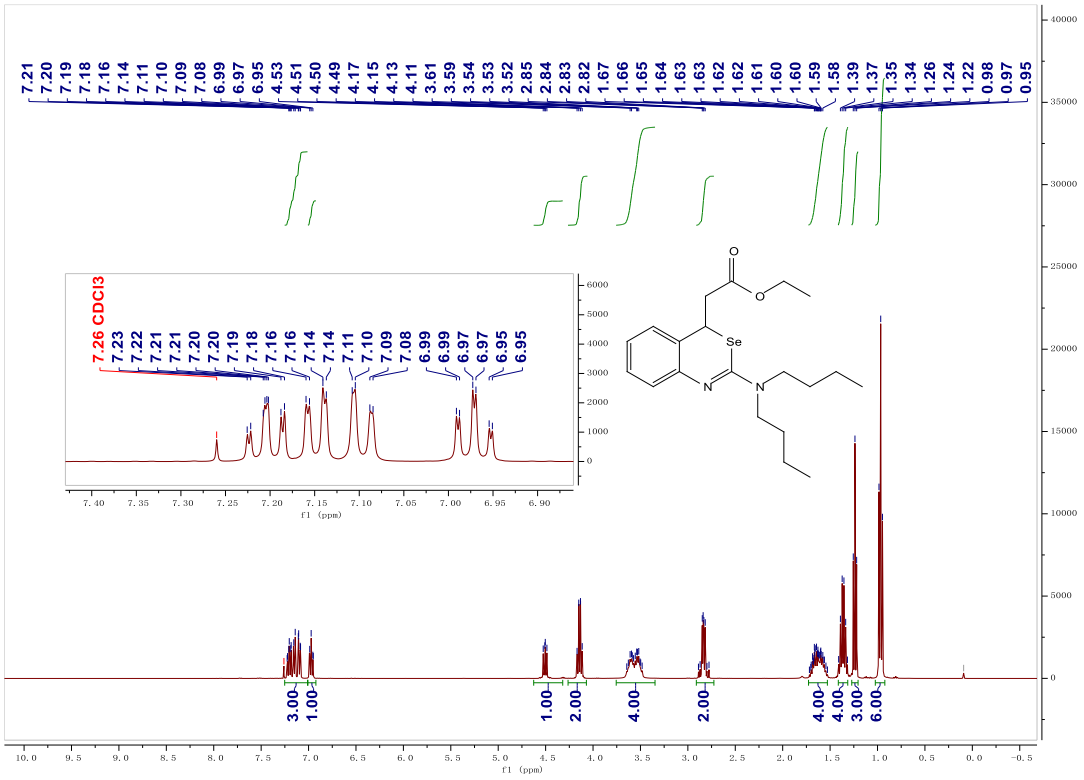
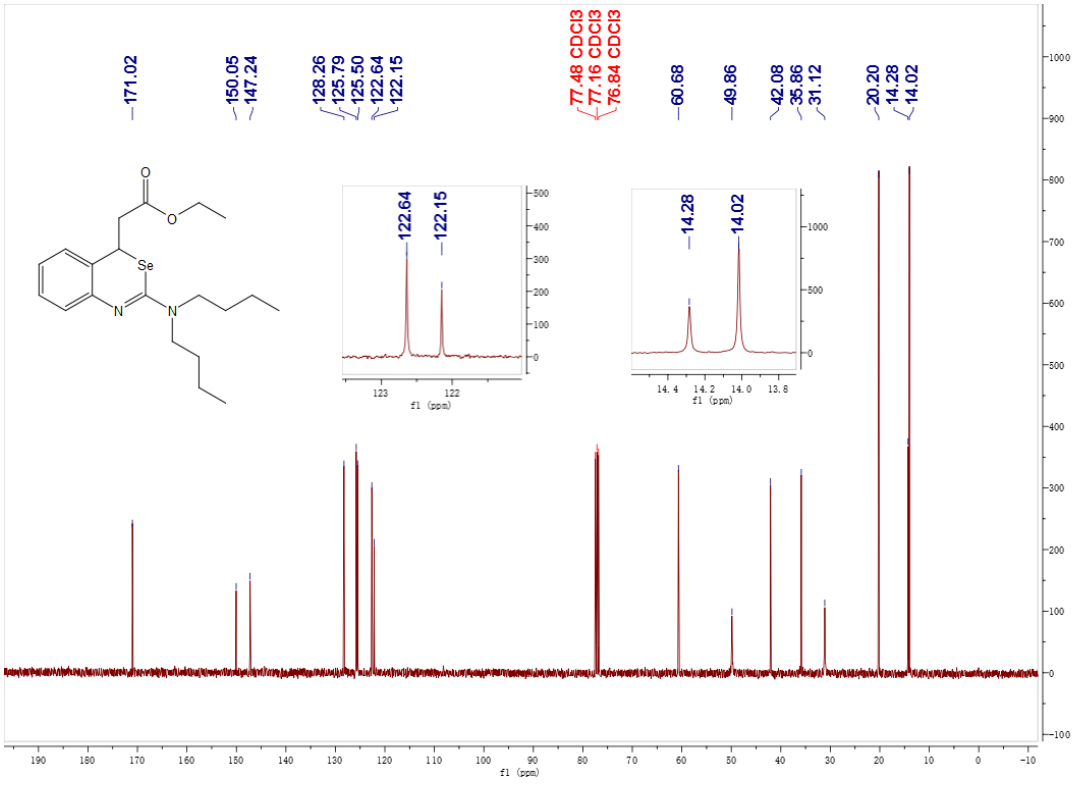
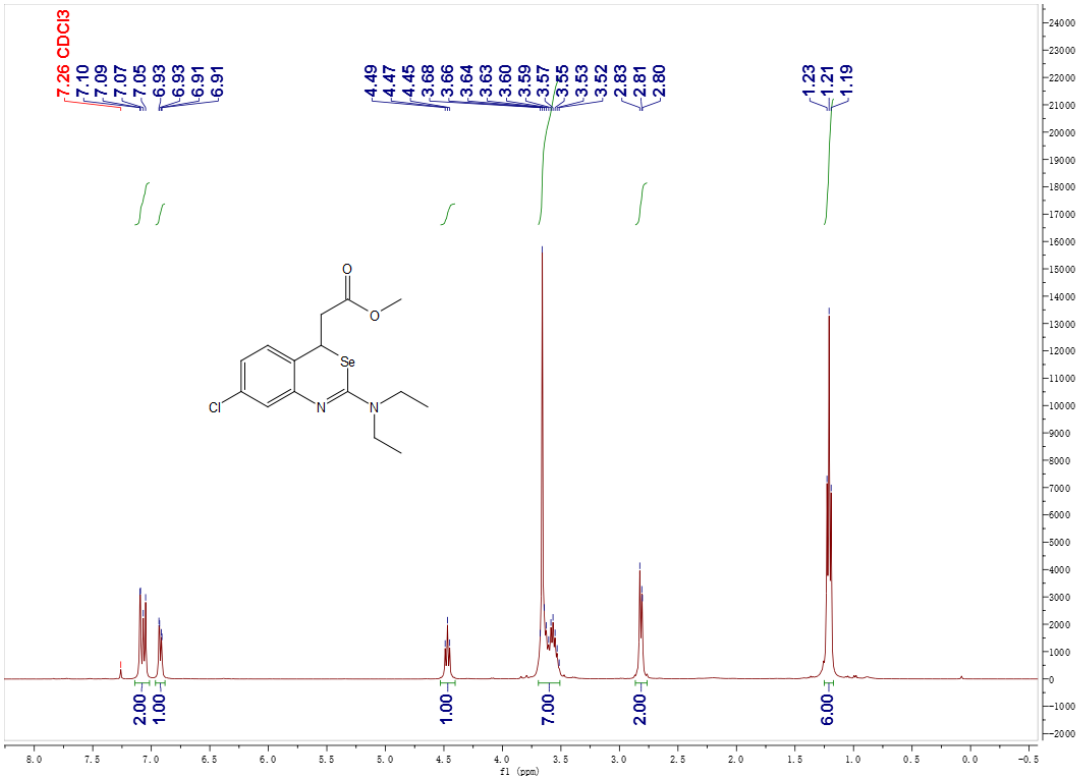
128.25
125.77
125.48
122.66
122.18
f1 (ppm)
O
O
Se
N
N
f1 (ppm)



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3.66
3.64
3.63
3.60
3.59
3.57
3.55
3.53
3.52
2.83
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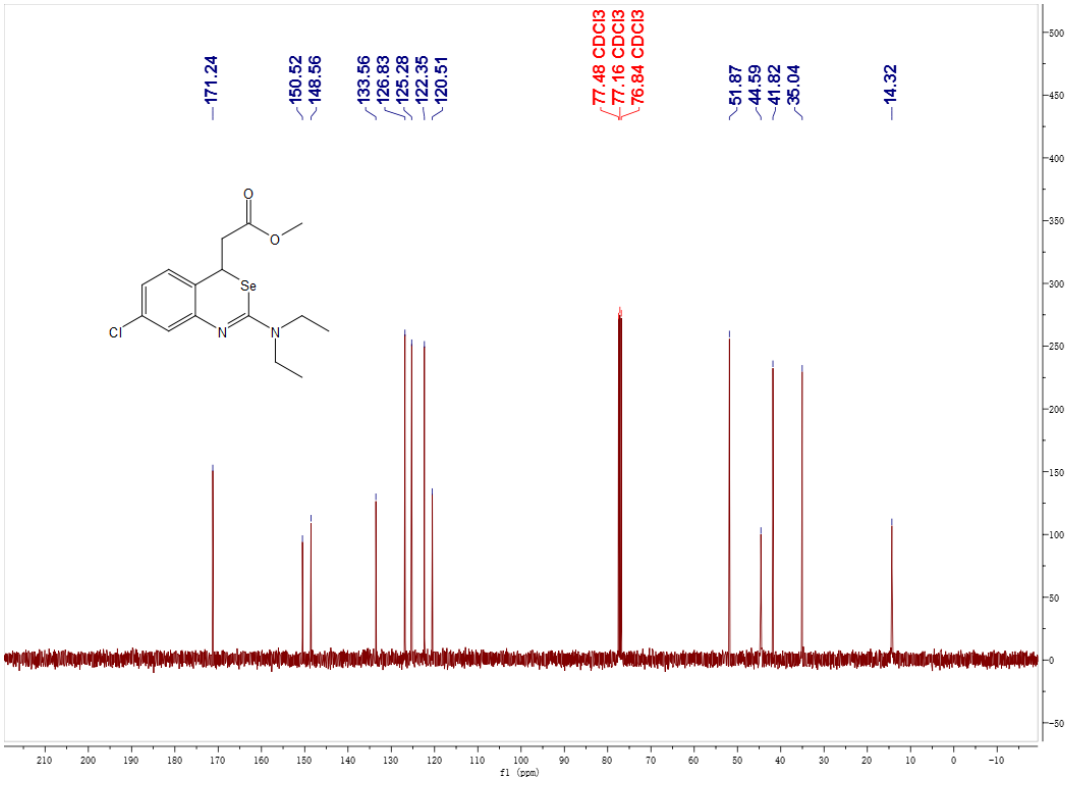
7.00
2.00
6.00
f1 (ppm)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77.16 CDCl3
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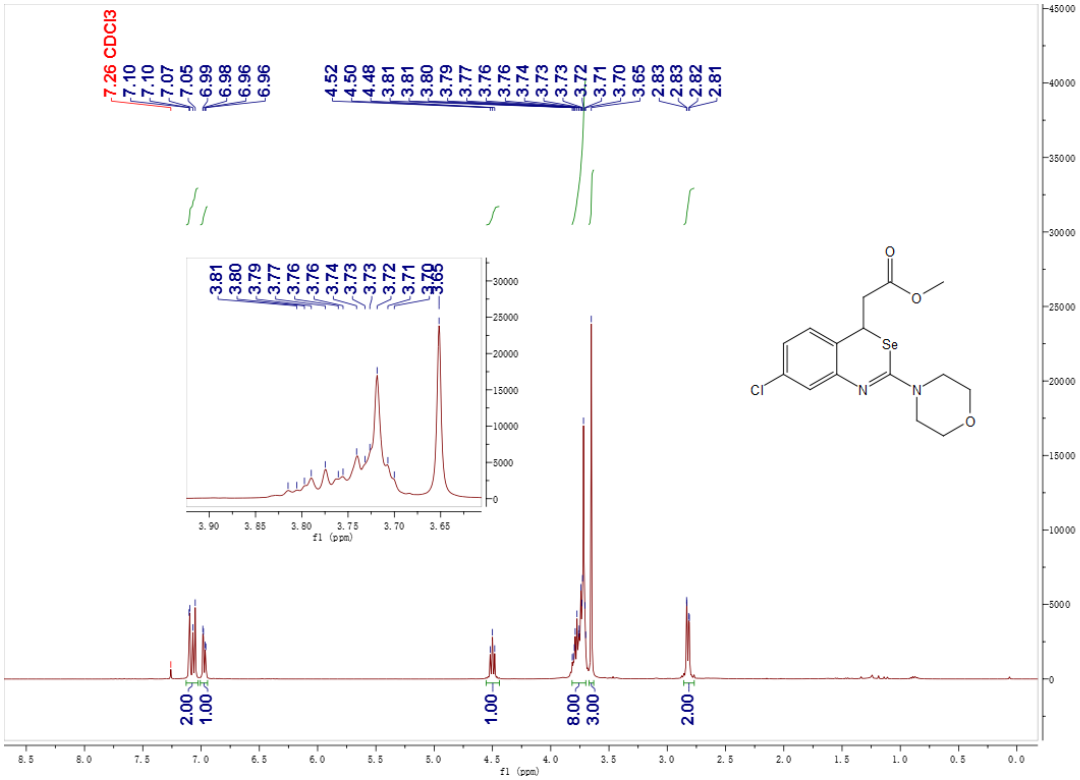
41.82
35.04
14.32
f1 (ppm)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3.81
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3.76
3.76
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3.73
3.72
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3.70
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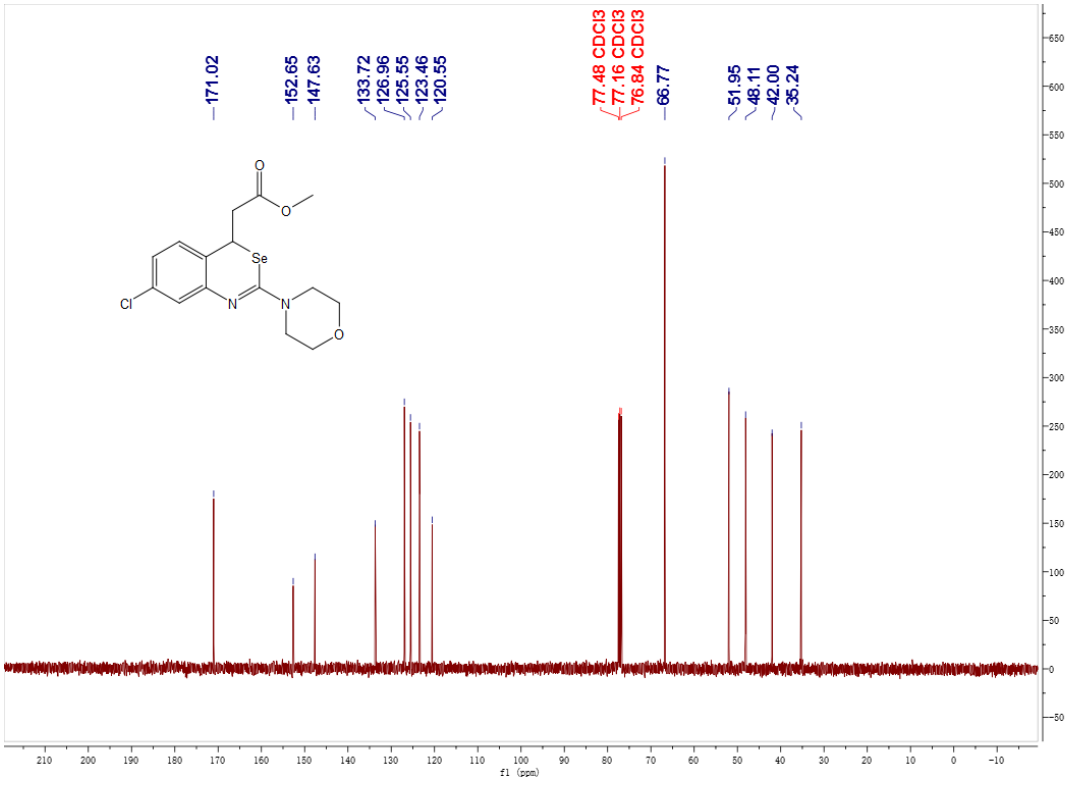
3.00
2.00
f1 (ppm)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77.16 CDCl3
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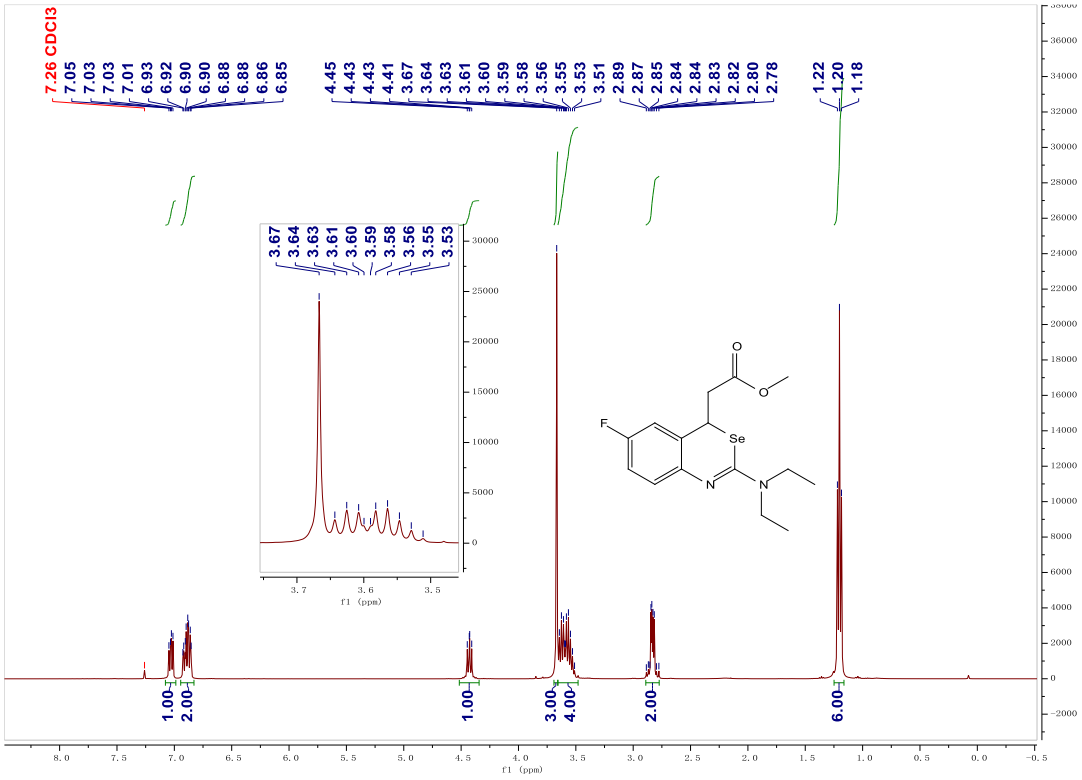
35.24
f1 (ppm)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4.43
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3.67
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3.63
3.61
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3.58
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3.53
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2.87
2.85
2.84
2.84
2.83
2.82
2.80
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2.00
1.00
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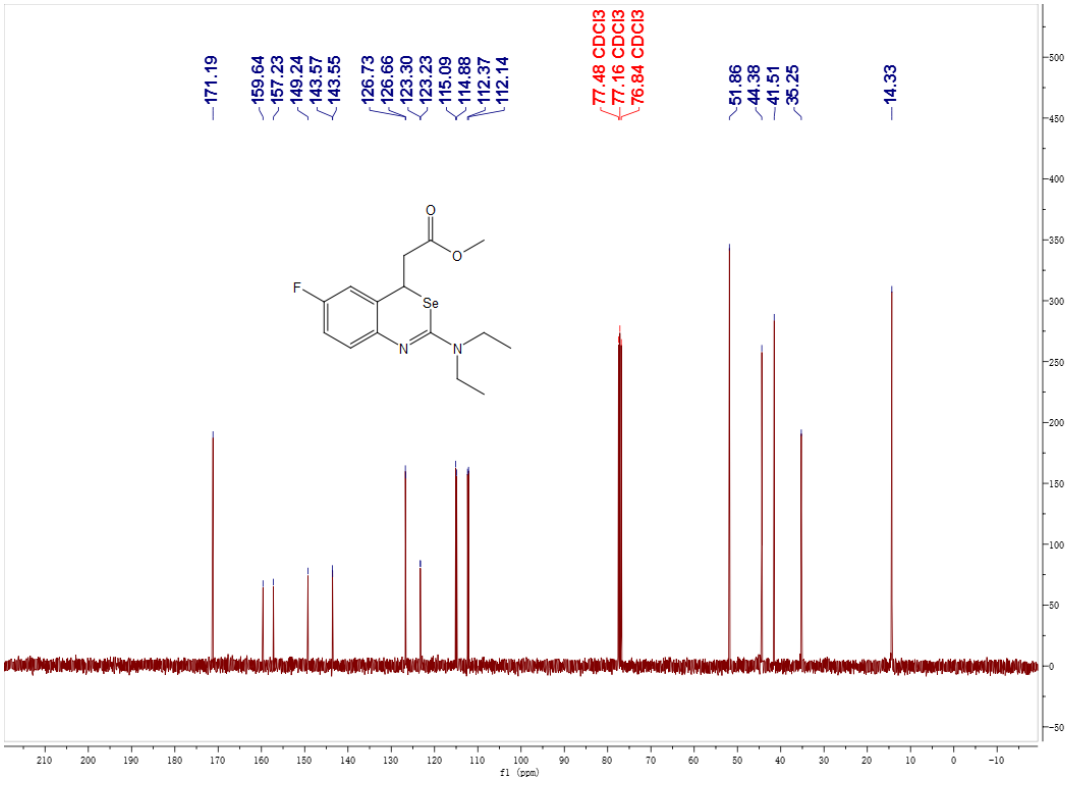
6.00
f1 (ppm)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112.37
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77.16 CDCl3
76.84 CDCl3
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41.51
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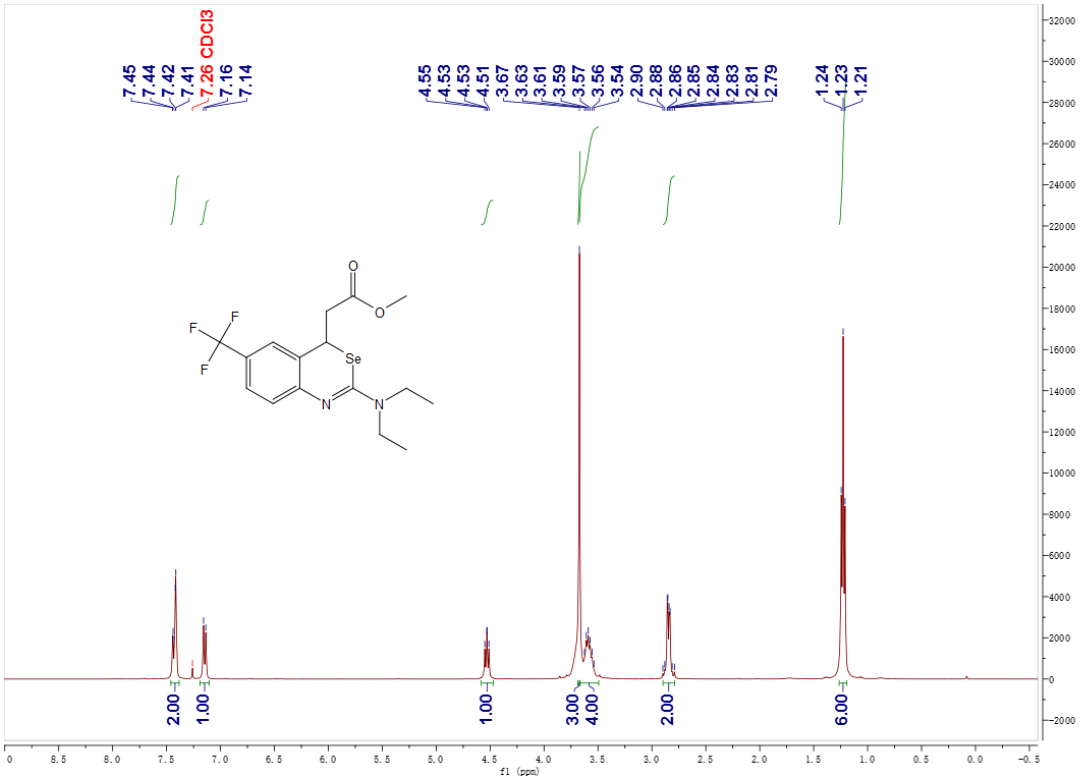
14.33
f1 (ppm)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3.57
3.56
3.54
2.90
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2.86
2.85
2.84
2.83
2.81
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6.00
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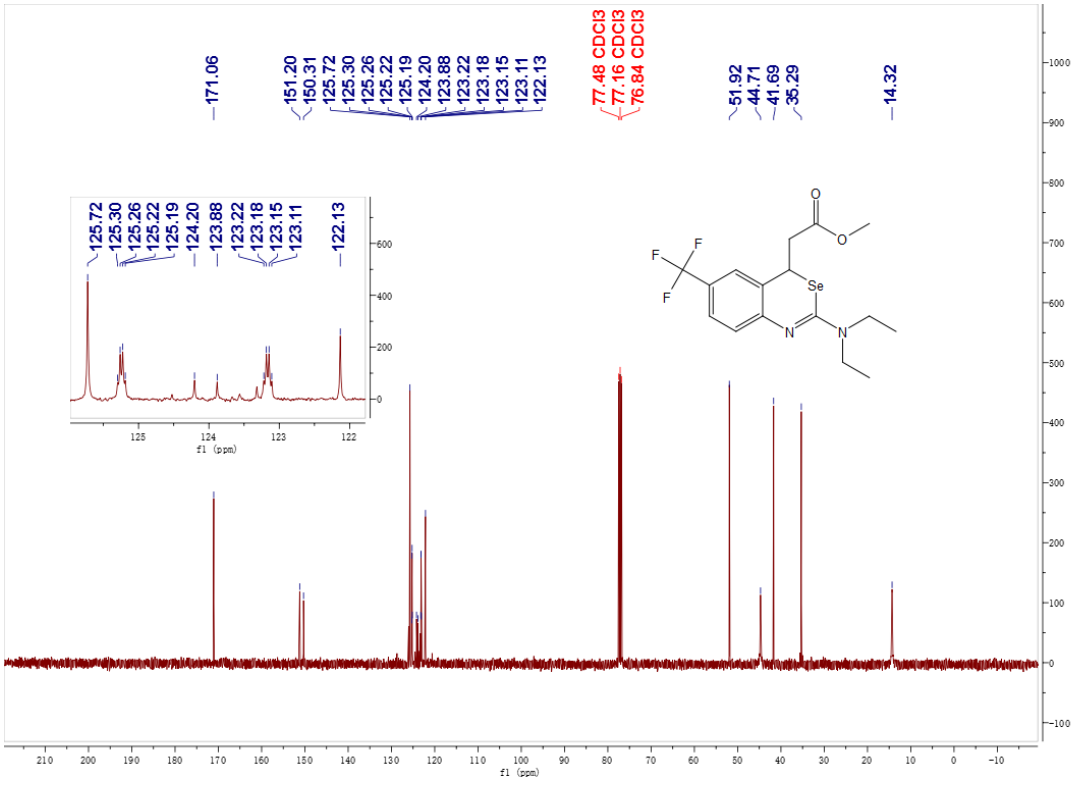
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123.15
123.11
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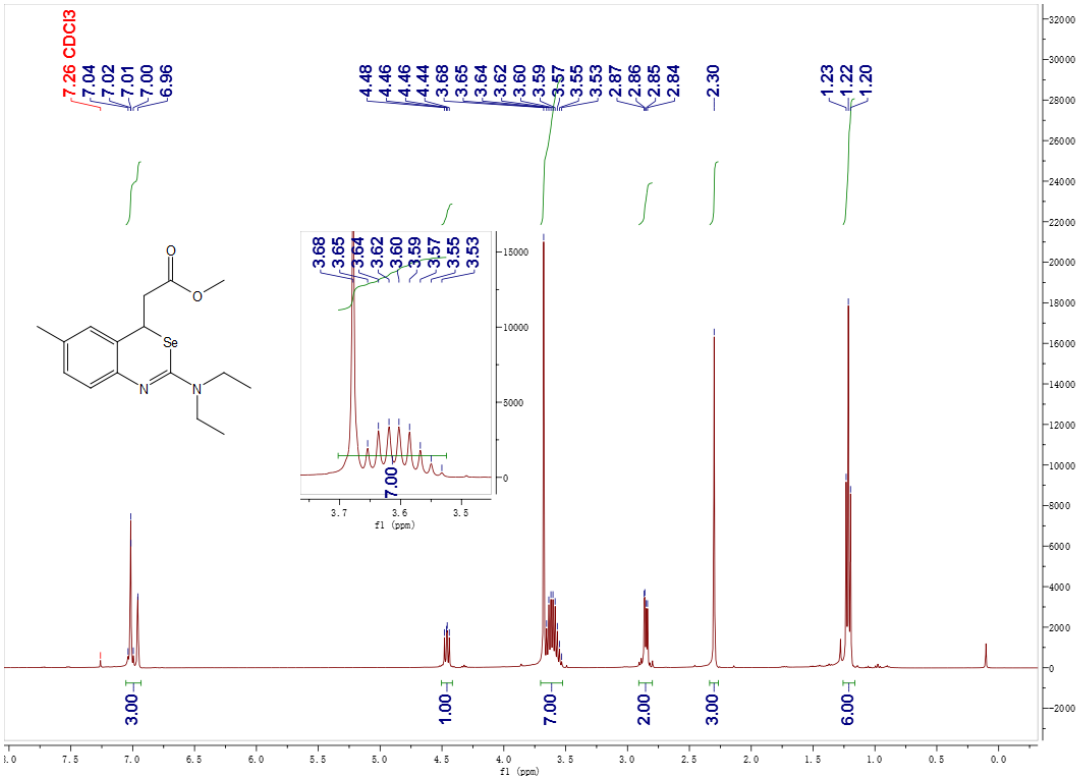
77.16 CDCl3
76.84 CDCl3
51.92
44.71
41.69
35.29
14.32
f1 (ppm)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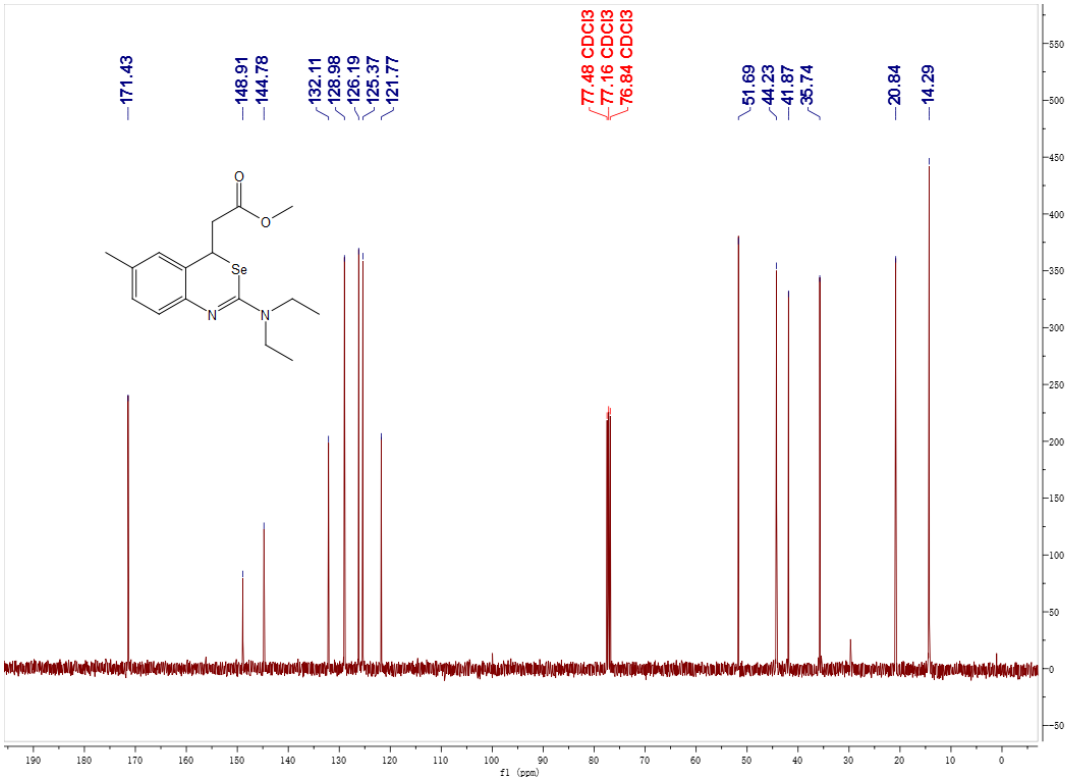
6.00
f1 (ppm)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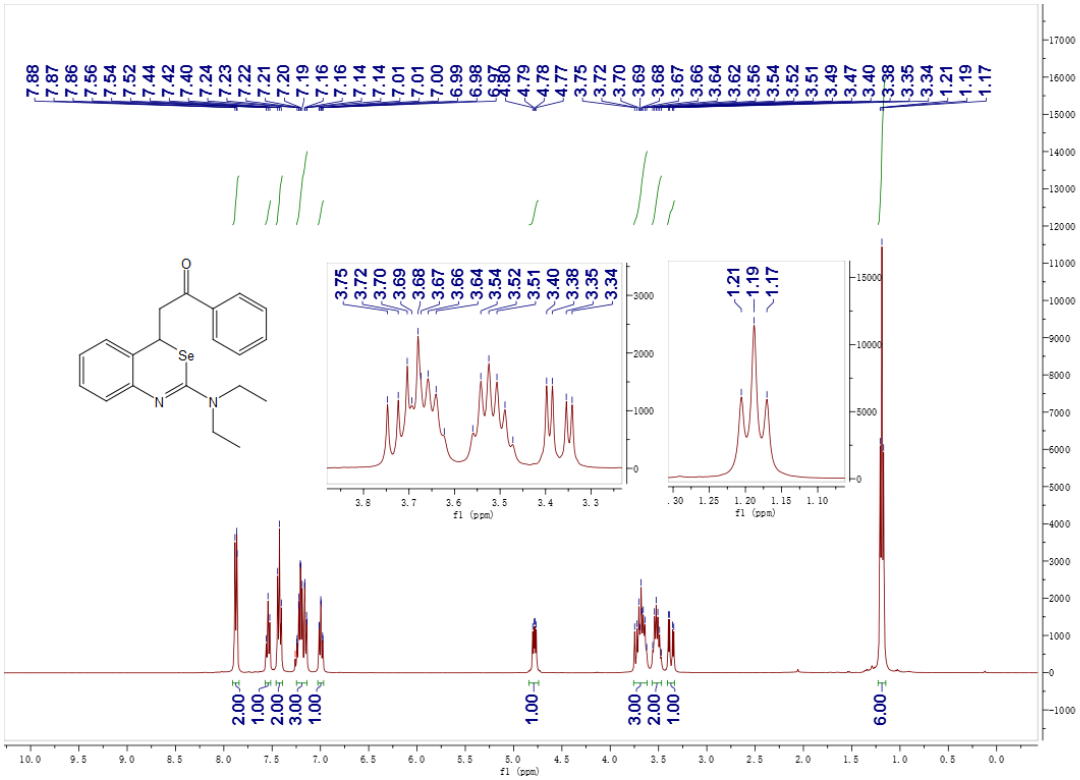
f1 (ppm)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7.19
7.16
7.16
7.14
7.14
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7.01
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3.52
3.51
3.49
3.47
3.40
3.38
3.35
3.34
1.21
1.19
1.17
O
Se
N
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3.00
1.00
1.00
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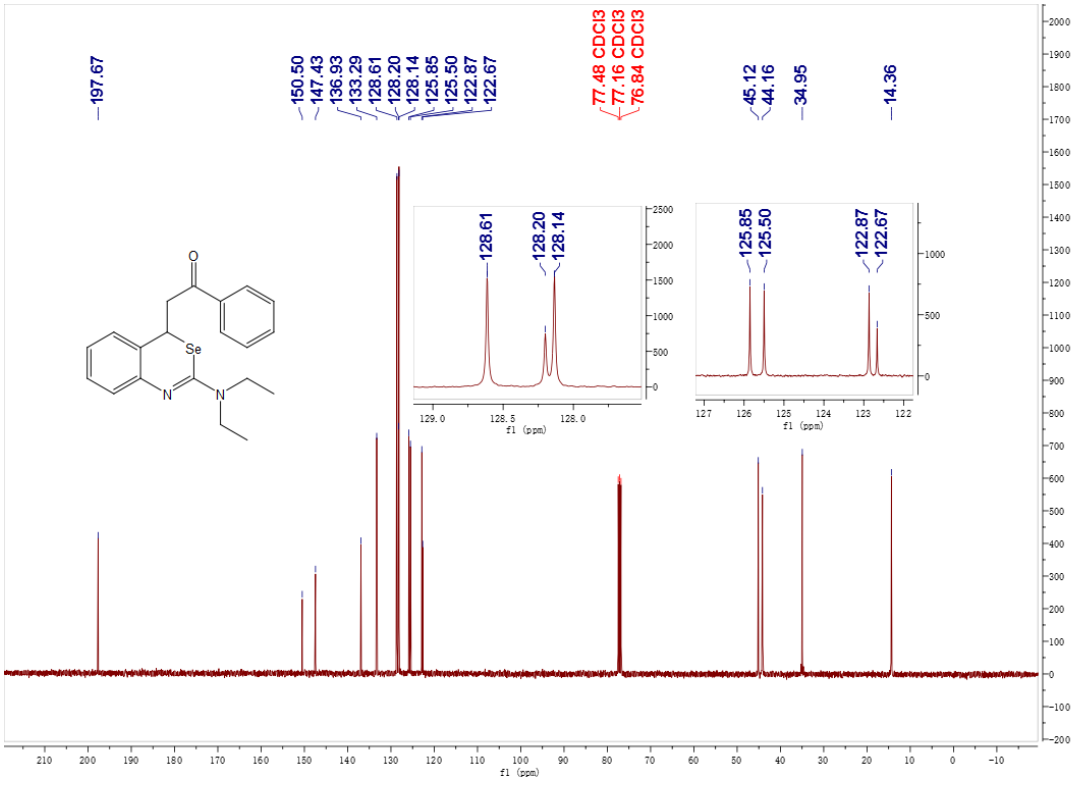
6.00
f1 (ppm)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122.67
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76.84 CDCl3
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44.16
34.95
14.36
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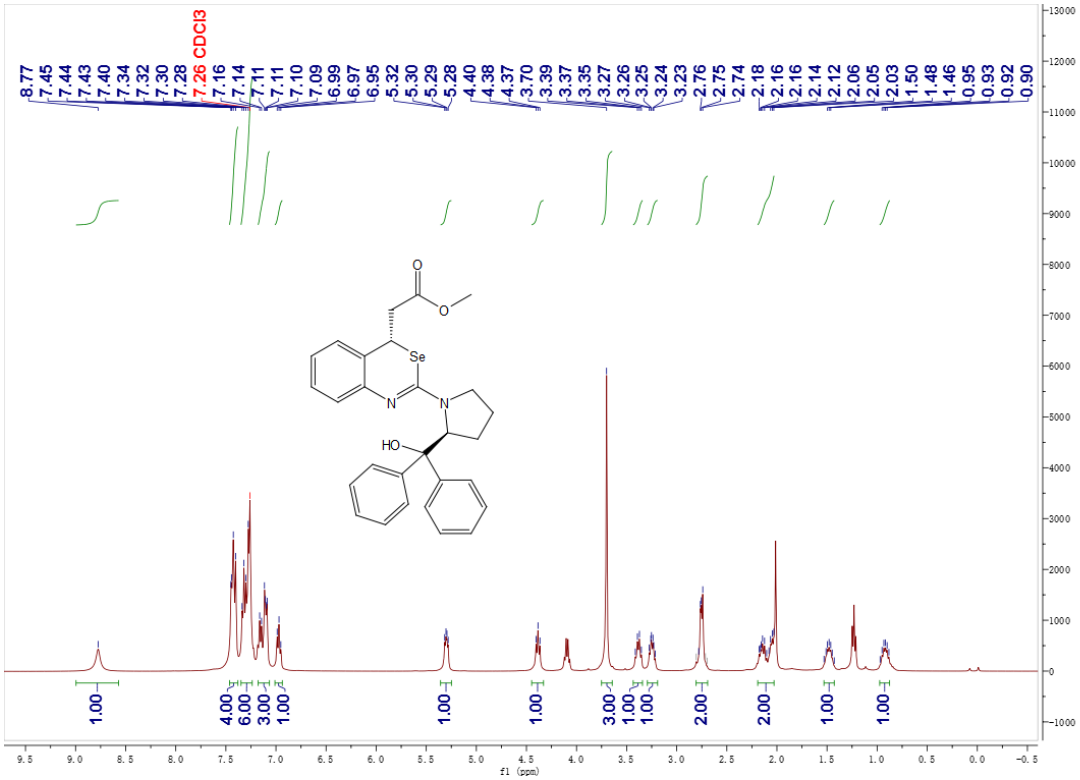
Se
N
N
f1 (ppm)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7.26 CDCl3
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7.14
7.11
7.11
7.10
7.09
6.99
6.97
6.95
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5.28
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3.35
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3.24
3.23
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1.46
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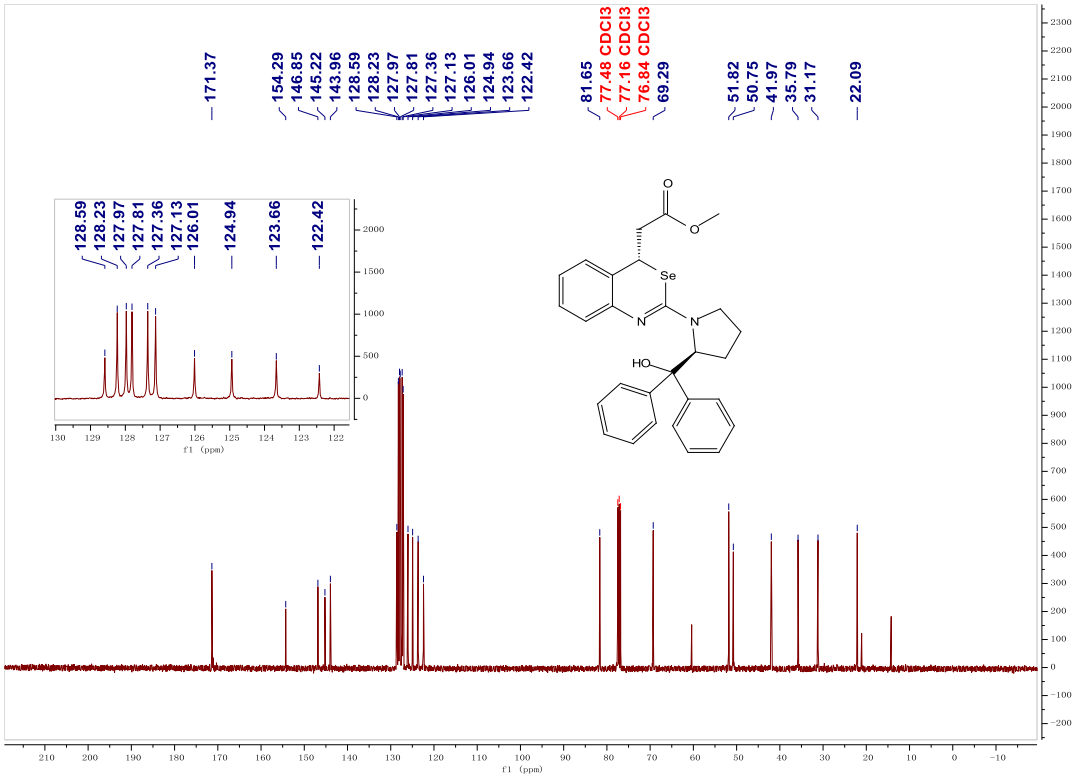
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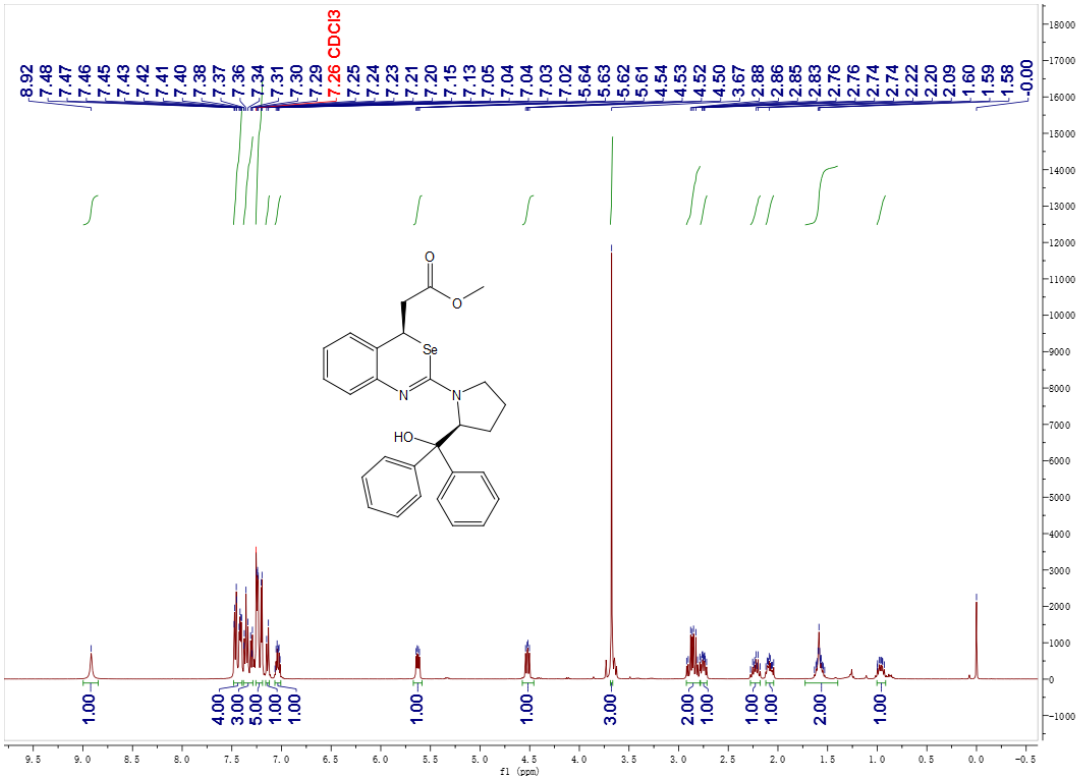
124.94
123.66
122.42
81.65
77.48 CDCl3
77.16 CDCl3
76.84 CDCl3
69.29
51.82
50.75
41.97
35.79
31.17
22.09
f1 (ppm)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7.34
7.31
7.30
7.29
7.26 CDCl3
7.25
7.24
7.23
7.21
7.20
7.15
7.13
7.05
7.04
7.04
7.03
7.02
5.64
5.63
5.62
5.61
4.54
4.53
4.52
4.50
3.67
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2.86
2.85
2.83
2.76
2.76
2.74
2.74
2.22
2.20
2.09
1.60
1.59
1.58
-0.00
O
O
Se
N
N
HO
1.00
4.00
3.00
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1.00
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1.00
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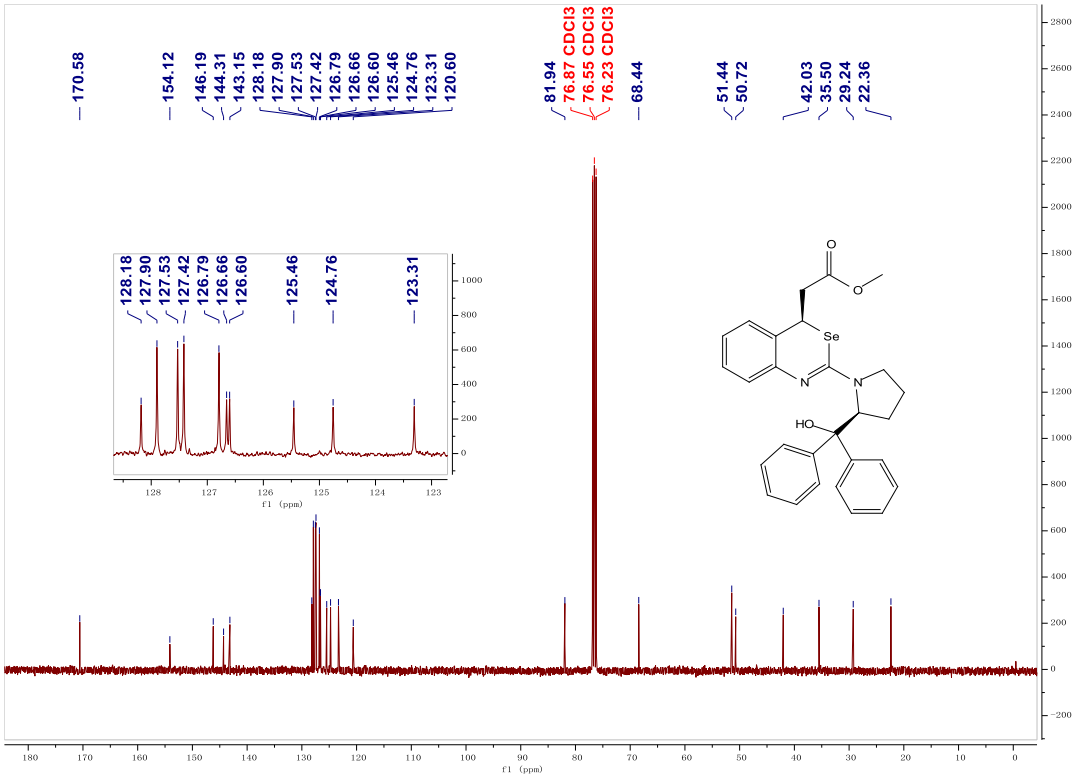
1.00
f1 (ppm)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125.46
124.76
123.31
120.60
81.94
76.87 CDCl3
76.55 CDCl3
76.23 CDCl3
68.44
51.44
50.72
42.03
35.50
29.24
22.36
O
O
Se
N
N
HO
f1 (ppm)