Electronic Supplementary Information

Ni nanoparticles confined covalent organic polymer directed diaryl-selenides synthesis

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Materials All the reagents, starting materials and organic substrates for hydrogenation were purchased from Sigma-Aldrich USA /Spectrochem Pvt. Ltd. India and used as picked up. Double distilled water was used from USIC, University of Delhi by a Milli-Q pore water purification system.

Instrumentation IR experiments were carried out in the range of 400-4000 cm^{-1} (Thermo Scientific; Model: INCOLET iS50) spectrometer. PXRD experiments were performed using D8 DISCOVER X-ray diffractometer. N_2 adsorption-desorption isotherm and Pore size distribution was measured by Quantachrome Instruments; Model: ASI-CT-11. Thermo Gravimetric Analysis dataset was obtained through Perkin Elmer, Model: TG/DTA. UV/VIS and UV-DRS experiments were performed using Schimadzu instrument, Model: UV-2600. X-Ray photoelectron spectroscopy (XPS) results were obtained using OMICRON Multi probe Surface Analysis System in UHV. TEM images were obtained using FEI, Germany equipped with digital imaging and Field Emission Scanning Electron Microscope (FESEM) Model: ZEISS Gemini SEM-500 were used to study the sur-face morphological pattern of Pd@CCTP. ^{13}C CP-MAS, ^{1}H and ^{13}C NMR data was obtained through JEOLECX400 spectrophotometer.

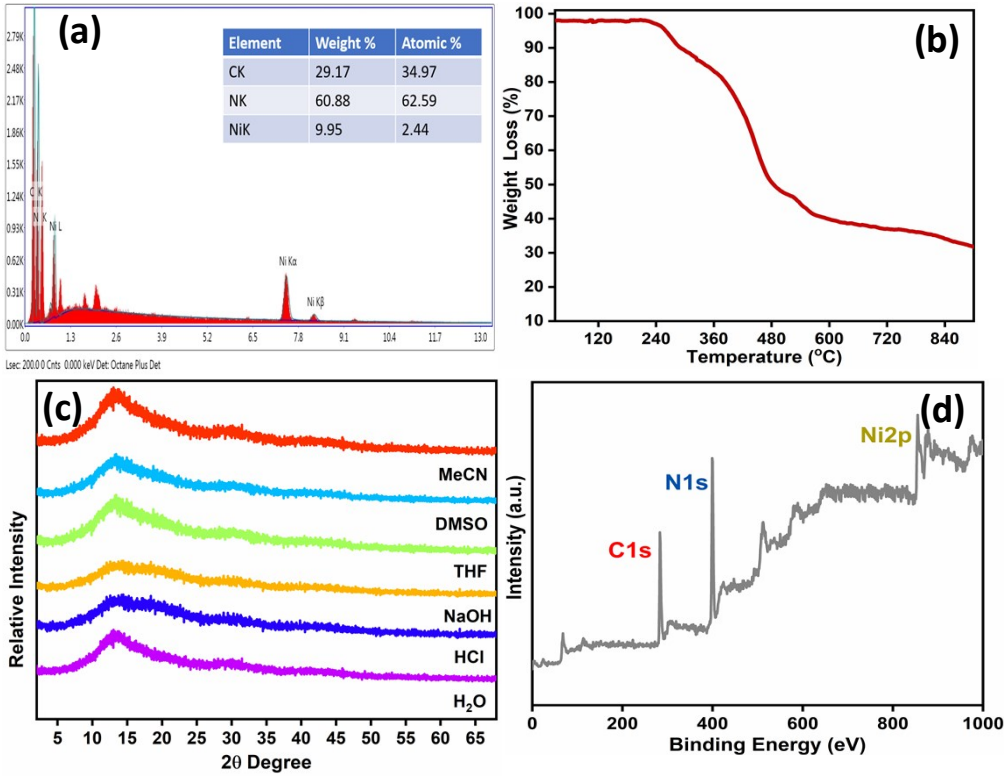


Figure S1. (a) EDX pattern and (b) TGA of Ni@CGP, (c) PXRD patterns of CCTP after successive treatments in MeCN, DMSO, THF, NaOH, HCl, and H_2O for 2 days, (d) XPS Complete survey spectrum of Ni@CGP.

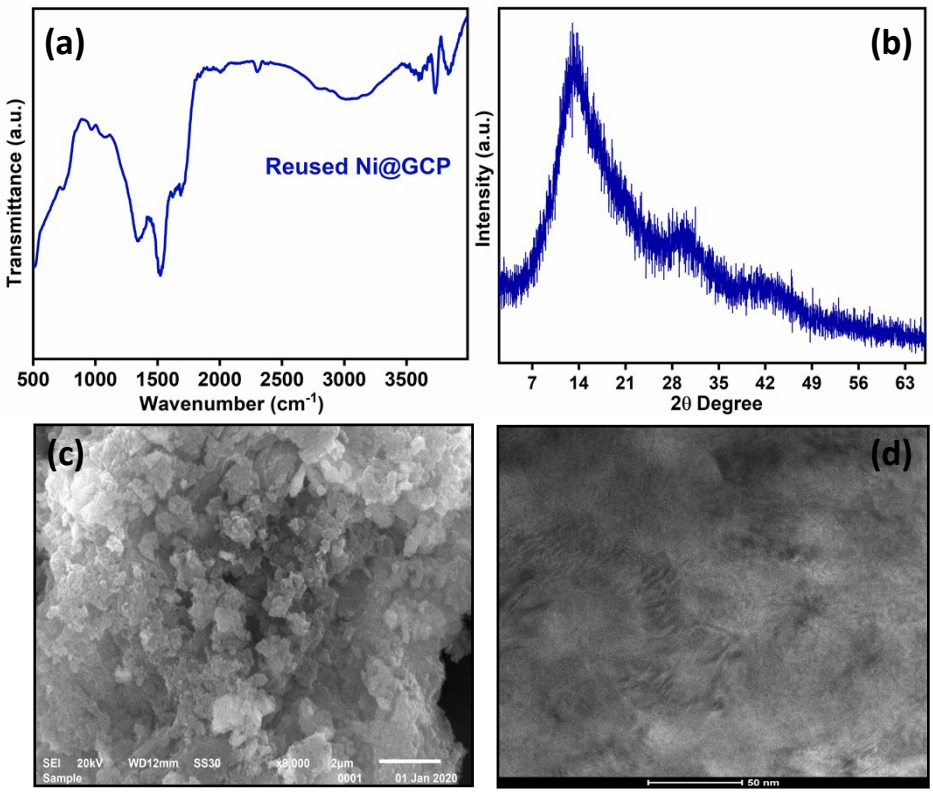


Figure S2. (a) FTIR spectrum, (b) PXRD pattern, (c) SEM and (d) TEM micrographs of reused Ni@CGP.

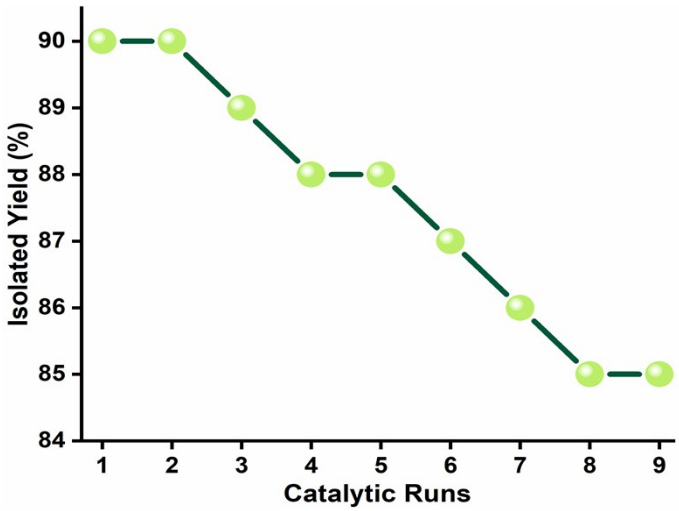


Figure S3. Recyclability graph of Ni@CGP.

Table S1. Reusability of Ni@CGP.

Runs	1	2	3	4	5	6	7	8	9
Yield %	90	90	89	88	88	87	86	85	85
[a]Reaction conditions: Iodobenzene (2 mmol), K_2CO_3 (1.5 eq), Se Powder (1 mmol) Ni@CGP (10 mg, 1.23 mol% Ni), DMSO: H_2O [1:1, (2.5 mL)].									

^{1}H and ^{13}C NMR chemical shifts for 1-14.

1) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.73 (d, J = 8.2 Hz, 4H), 7.33-7.37 (m, 2H), 7.12 (t, J = 7.8 Hz, 4H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 137.60, 130.39, 127.60

HRMS-ESI: calculated: 233.9902, Observed [M+H]: 234.8992.

2) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.38 (d, J = 8.4 Hz, 4H), 7.05 (d, J = 8.0 Hz, 4H), 2.31 (s, 6H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 136.87, 131.33, 130.92, 119.15, 21.03

HRMS-ESI: calculated: 262.0262, Observed [M+H]: 263.0992.

3) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.23 (d, J = 8.8 Hz, 4H), 6.55 (d, J = 8.7 Hz, 4H), 3.61 (s, 4H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 145.58, 131.83, 116.86, 110.23

HRMS-ESI: calculated: 264.0166, Observed [M+H]: 265.1227.

4) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.57 (d, J = 8.7 Hz, 4H), 7.42 (d, J = 8.7 Hz, 4H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 138.40, 132.80, 118.12, 111.57, 100.10

HRMS-ESI: calculated: 283.9853, Observed [M+H]: 284.9902.

5) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.35 (d, J = 8.5 Hz, 4H), 7.13 (d, J = 8.5 Hz, 4H), 3.45 (s, 2H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 132.19, 131.06, 130.04, 119.54

HRMS-ESI: calculated: 297.9489, Observed [M+H]: 298.9120.

6) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 9.86 (s, 2H), 7.63 (dd, J = 6.9, 1.8 Hz, 4H), 7.56 (dd, J = 6.9, 1.8 Hz, 4H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 191.22, 135.36, 132.51, 131.07, 129.87

HRMS-ESI: calculated: 289.9846, Observed [M+H]: 290.9753.

7) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.76 (d, J = 8.5 Hz, 4H), 6.60 (d, J = 8.5 Hz, 4H), 2.46 (s, 6H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 196.84, 151.30, 130.91, 127.67, 113.43, 26.19

HRMS-ESI: calculated: 318.0159, Observed [M+H]: 318.9702.

8) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.92 (ddd, J = 7.3, 1.8, 1.2 Hz, 2n), 7.59-7.67 (m, 4n), 2.64 (d, J = 1.8 Hz, 6n)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 198.60, 154.29, 141.05, 138.63, 131.86, 120.54, 25.82

HRMS-ESI: calculated: 320.0064, Observed [M+H]: 321.0023.

9) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 8.32 (d, J = 8.5 Hz, 2H), 7.81-7.87 (m, 6H), 7.64 (t, J = 7.1 Hz, 2H), 7.55-7.58 (m, 2H), 7.33 (t, J = 7.8 Hz, 2H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 134.80, 132.16, 130.09, 128.51, 128.14, 127.53, 127.26, 126.89, 126.36, 123.04

HRMS-ESI: calculated: 334.0261, Observed [M+H]: 335.0115.

10) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 10.03 (s, 2H), 8.54 (d, J = 8.2 Hz, 2H), 7.93 (d, J = 7.1 Hz, 4H), 7.49-7.59 (m, 8H), 7.36 (t, J = 8.5 Hz, 2H), 6.98-7.02 (t, 2H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 164.99, 135.89, 134.63, 132.32, 129.06, 128.63, 127.22, 125.42, 121.94

HRMS-ESI: calculated: 472.0690, Observed [M+H]: 473.0226.

11) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.46 (d, J = 10.6 Hz, 2H), 7.14 (d, J = 6.9 Hz, 2H), 6.71 (d, J = 33.5 Hz, 4H), 4.11 (s, 4H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 146.54, 134.83, 130.71, 121.64, 118.00

HRMS-ESI: calculated: 264.0166, Observed [M+H]: 265.0021.

12) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 7.95-7.89 (m, 8H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 148.63, 135.91, 131.85, 120.53

HRMS-ESI: calculated: 323.9649, Observed [M+H]: 324.9018.

13) **^{1}H**-NMR (400 MHz, $CDCl_3$-*d*) **δ** 9.84 (s, 2H), 7.78 (s, 2H), 7.39 (d, J = 8.0 Hz, 2H), 7.18 (d, J = 8.1 Hz, 2H), 7.12 (t, J = 8.0 Hz, 2H), 2.14 (s, 6H)

^{13}C-NMR (101 MHz, $CDCl_3$-*d*) **δ** 169.13, 130.29, 126.95, 122.53, 118.07, 40.73

HRMS-ESI: calculated: 348.0377, Observed [M+H]: 348.9902.

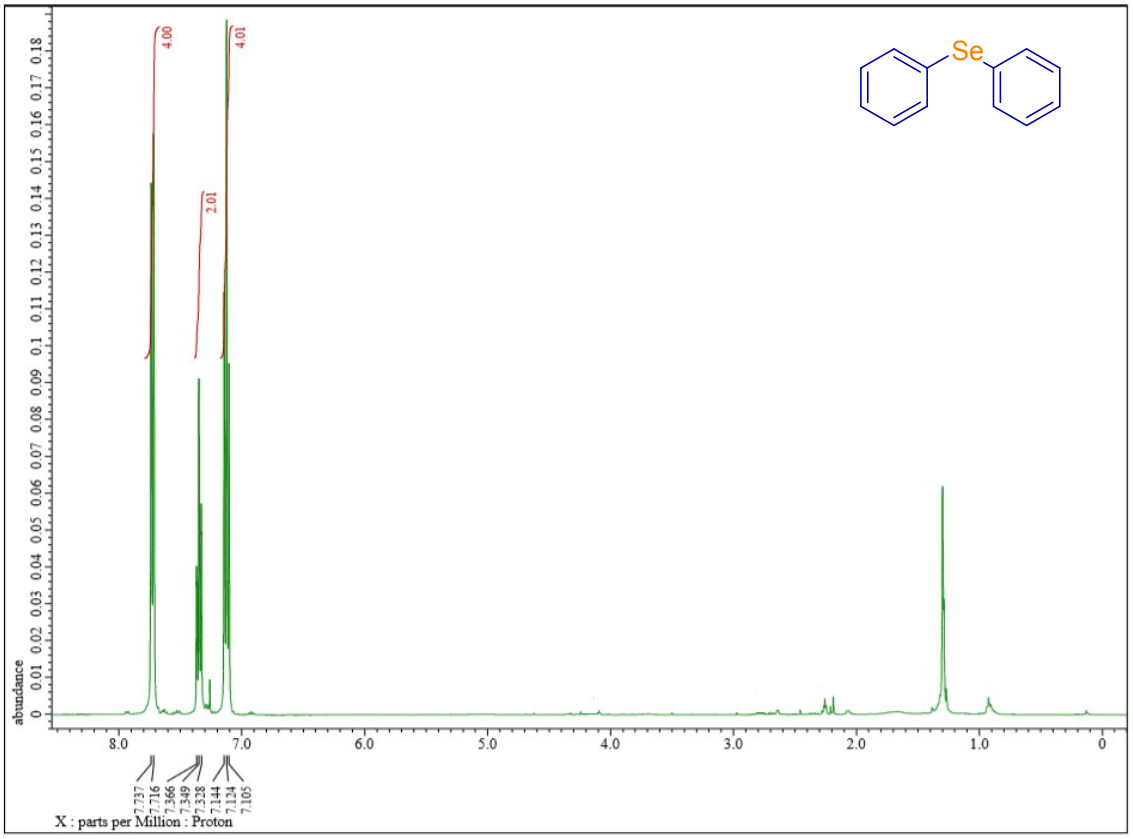
14) **^{1}H**-NMR (400 MHz, DMSO-d_6) **δ** 12.37 (s, 1H), 7.69-7.73 (m, 2H), 7.55 (d, J = 16.1 Hz, 1H), 7.19 (t, J = 8.9 Hz, 2H), 6.45 (d, J = 15.9 Hz, 1H)

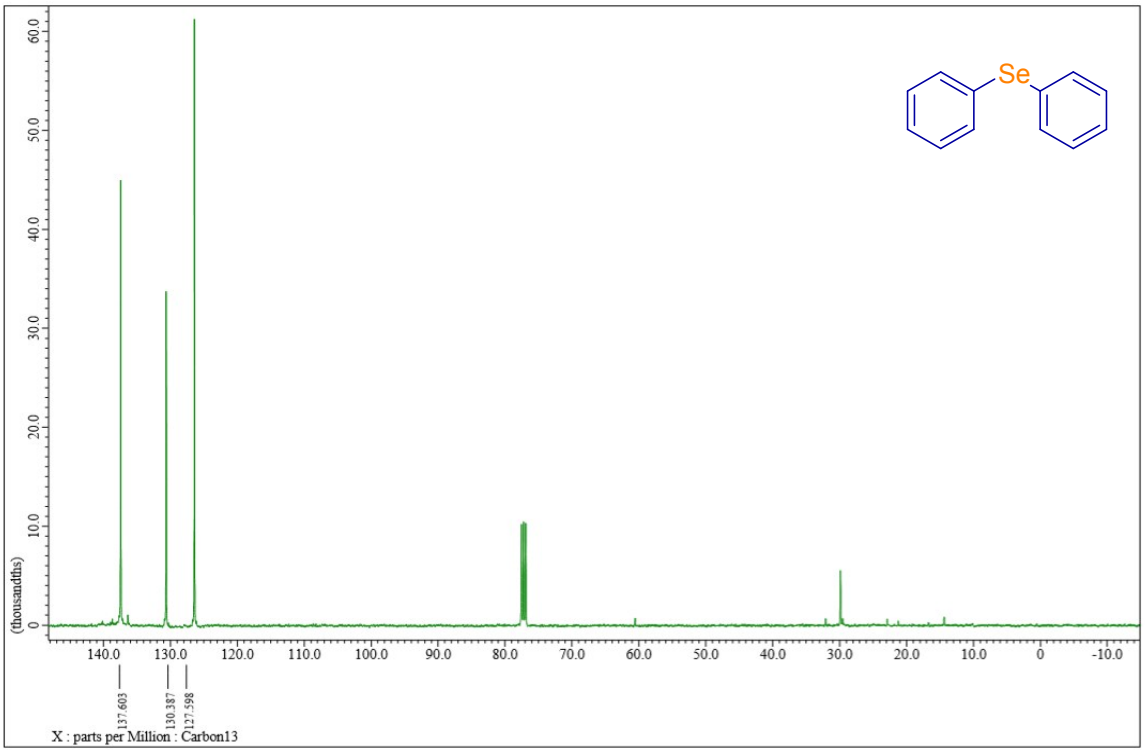
^{13}C-NMR (101 MHz, DMSO-d_6) **δ** 168.07, 162.59, 143.22, 131.42, 131.05, 116.48, 116.27

HRMS-ESI: calculated: 374.0057, Observed [M+H]: 374.9983.

^{1}H and ^{13}C NMR spectra.

1





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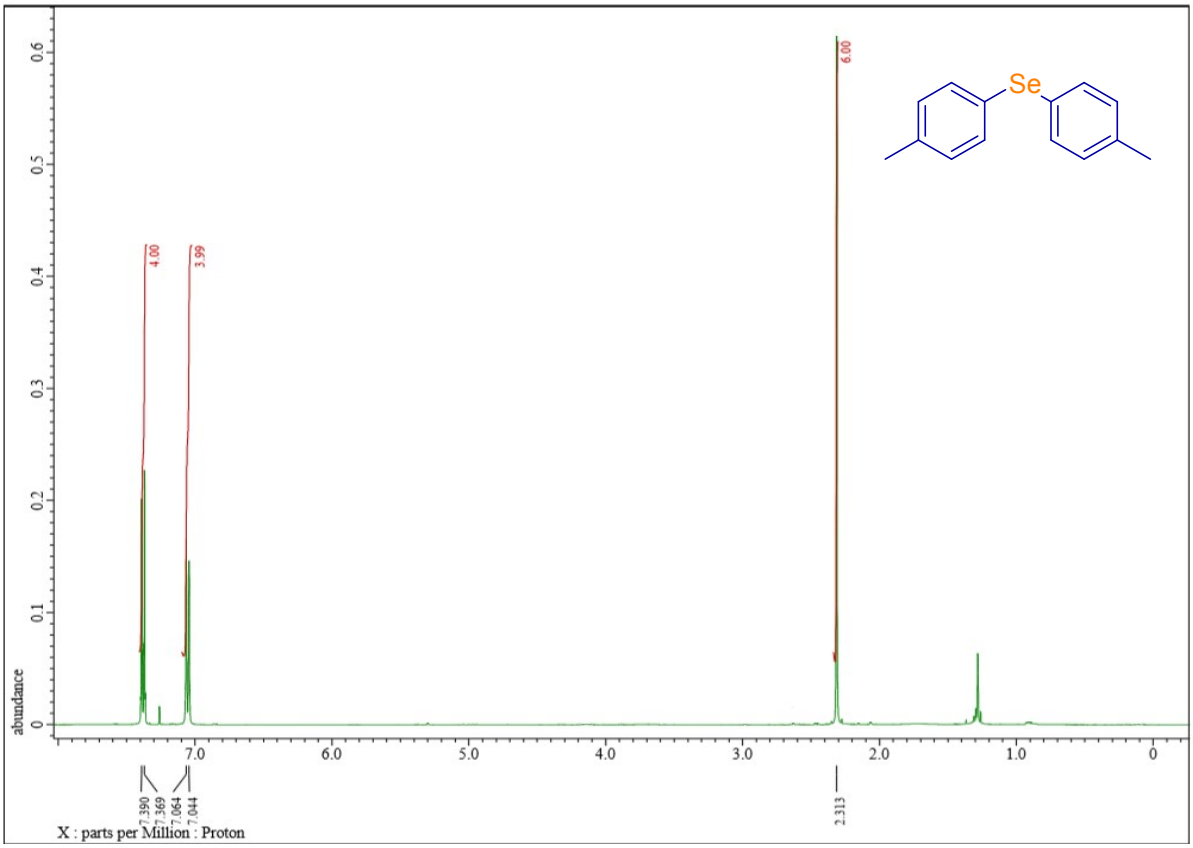
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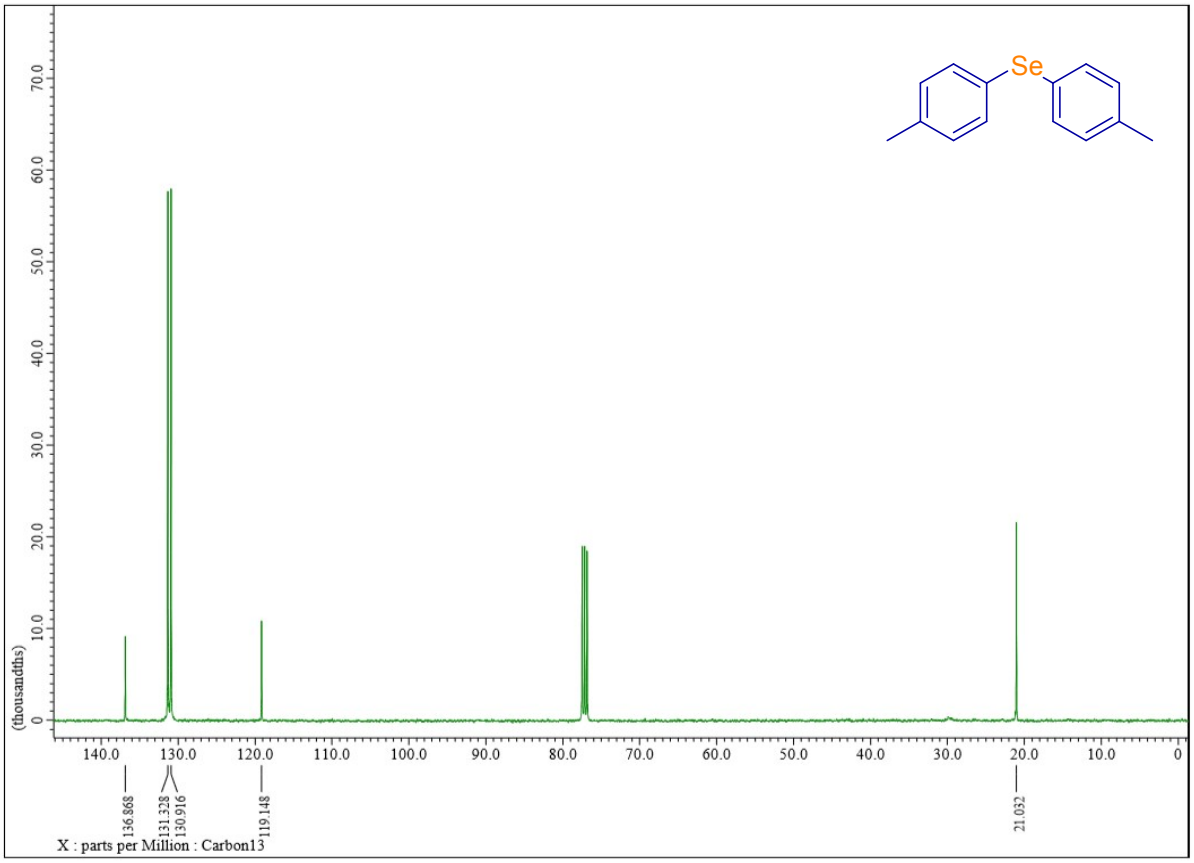
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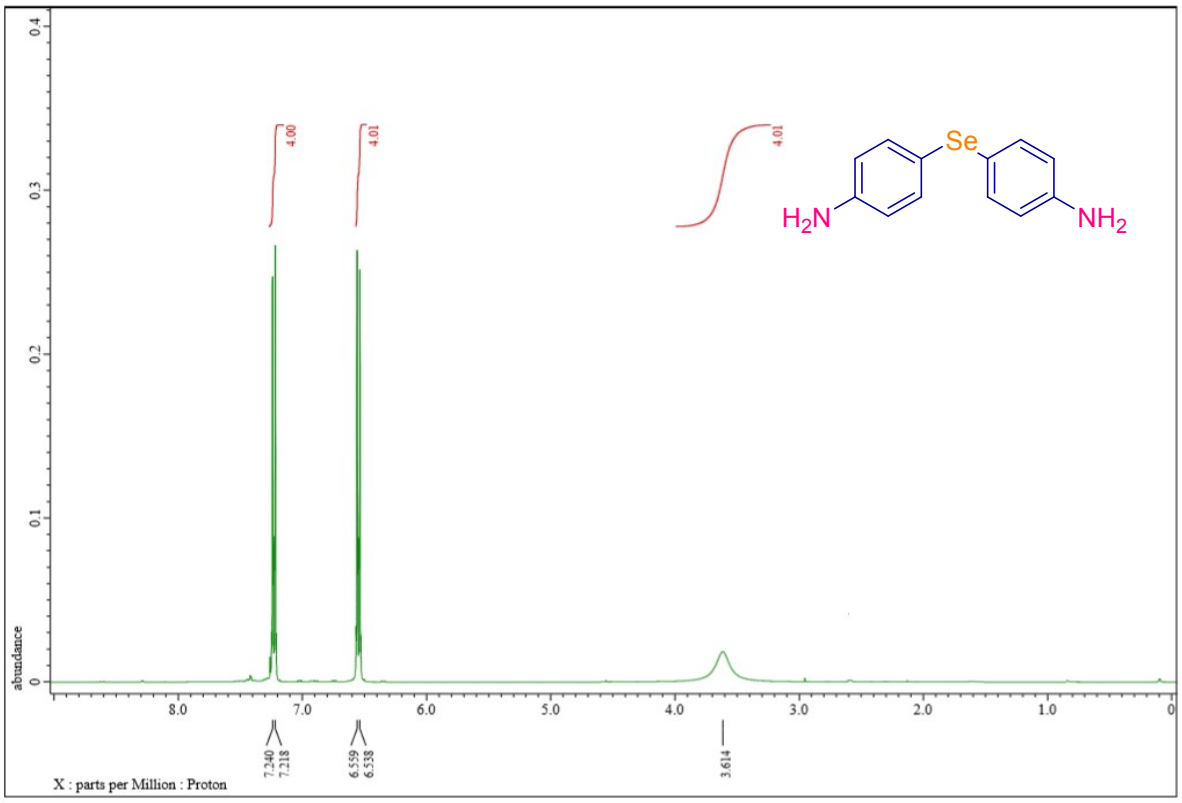
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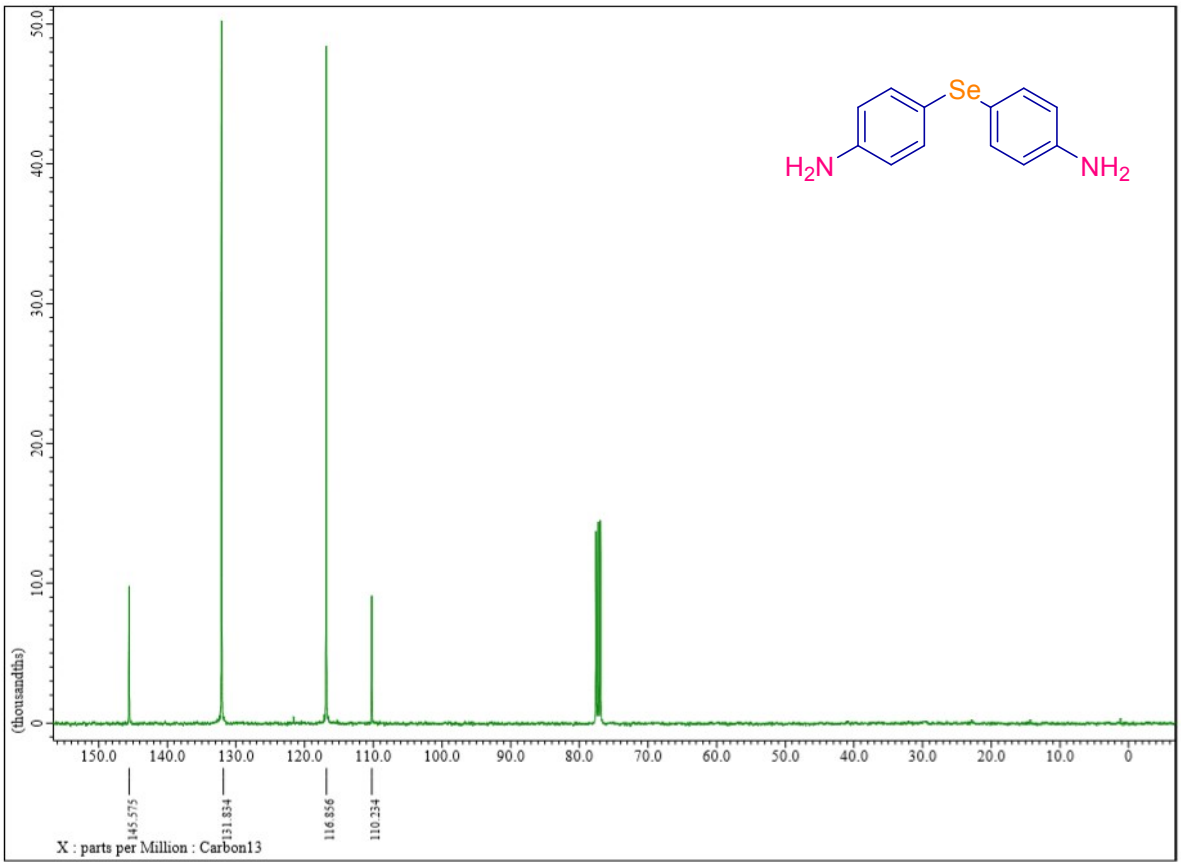
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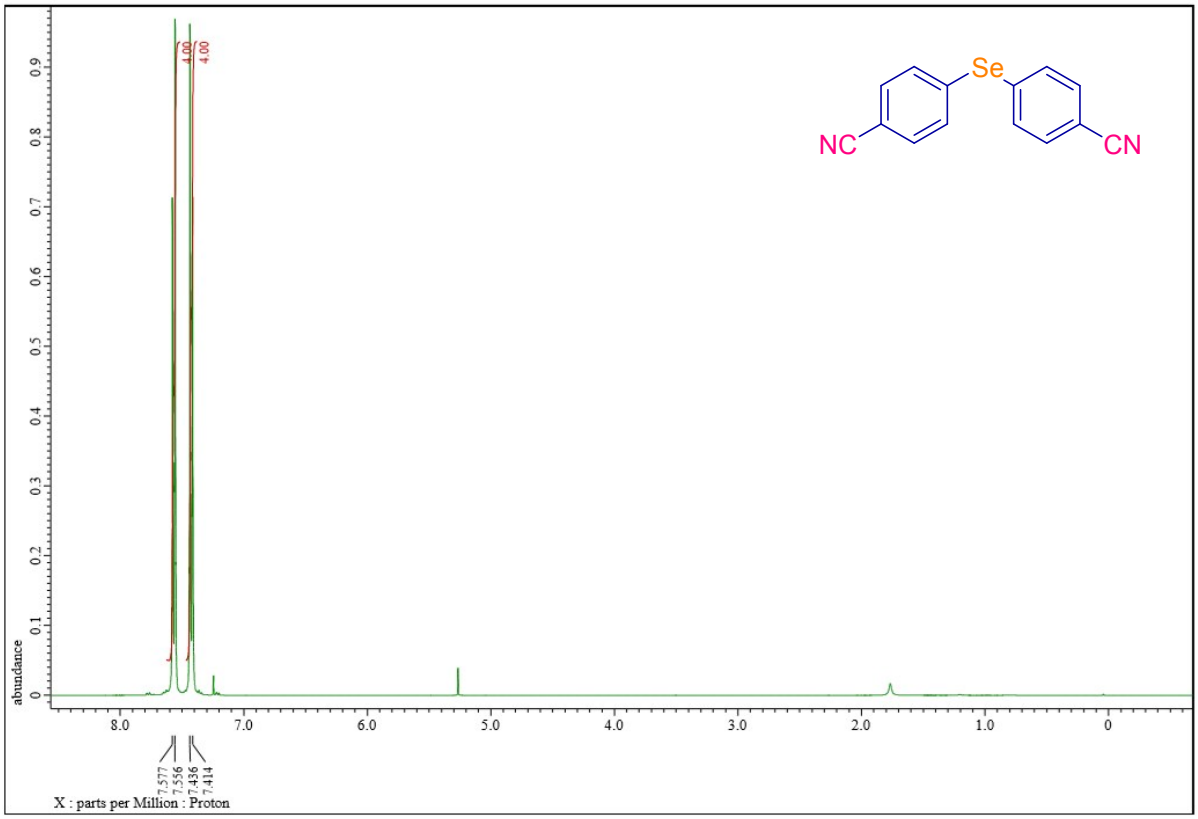
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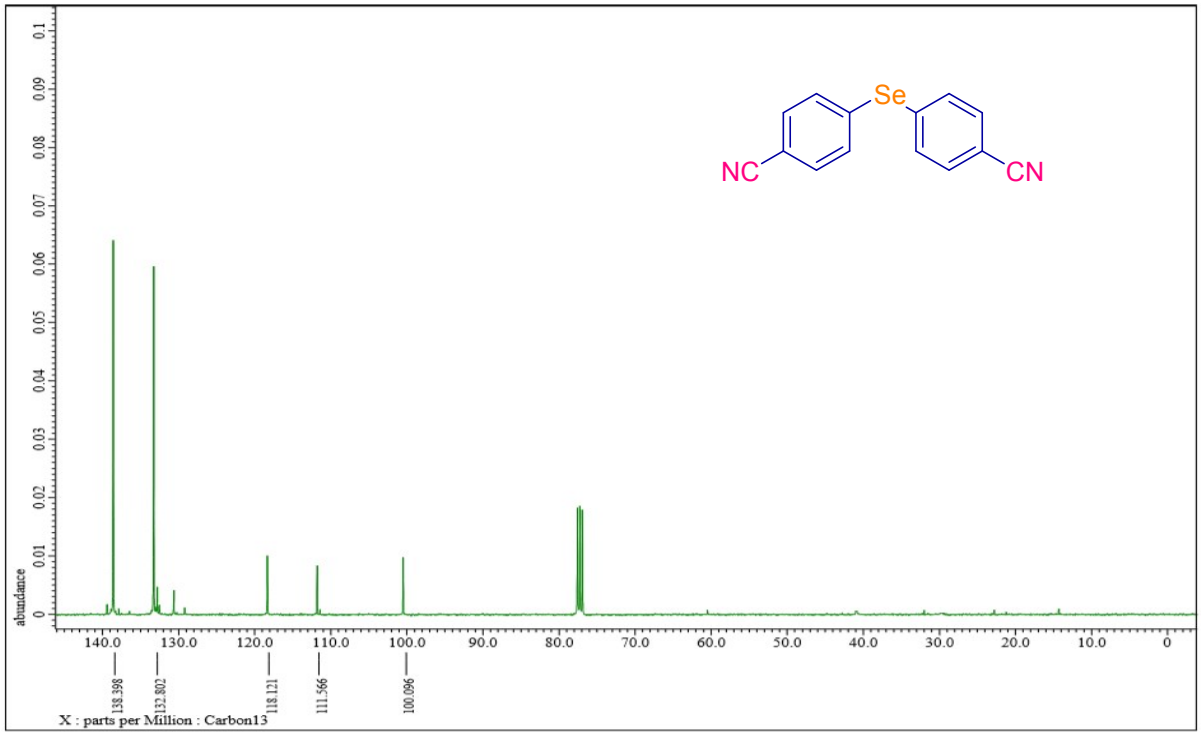
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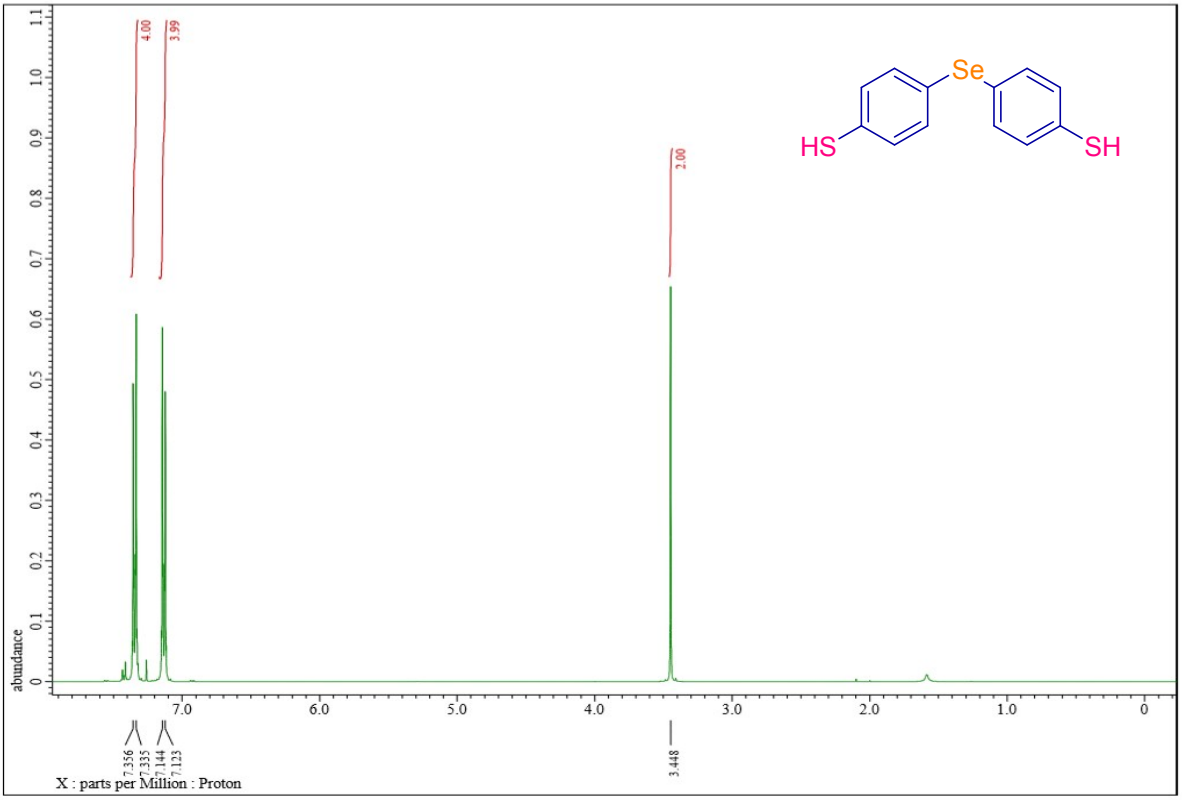
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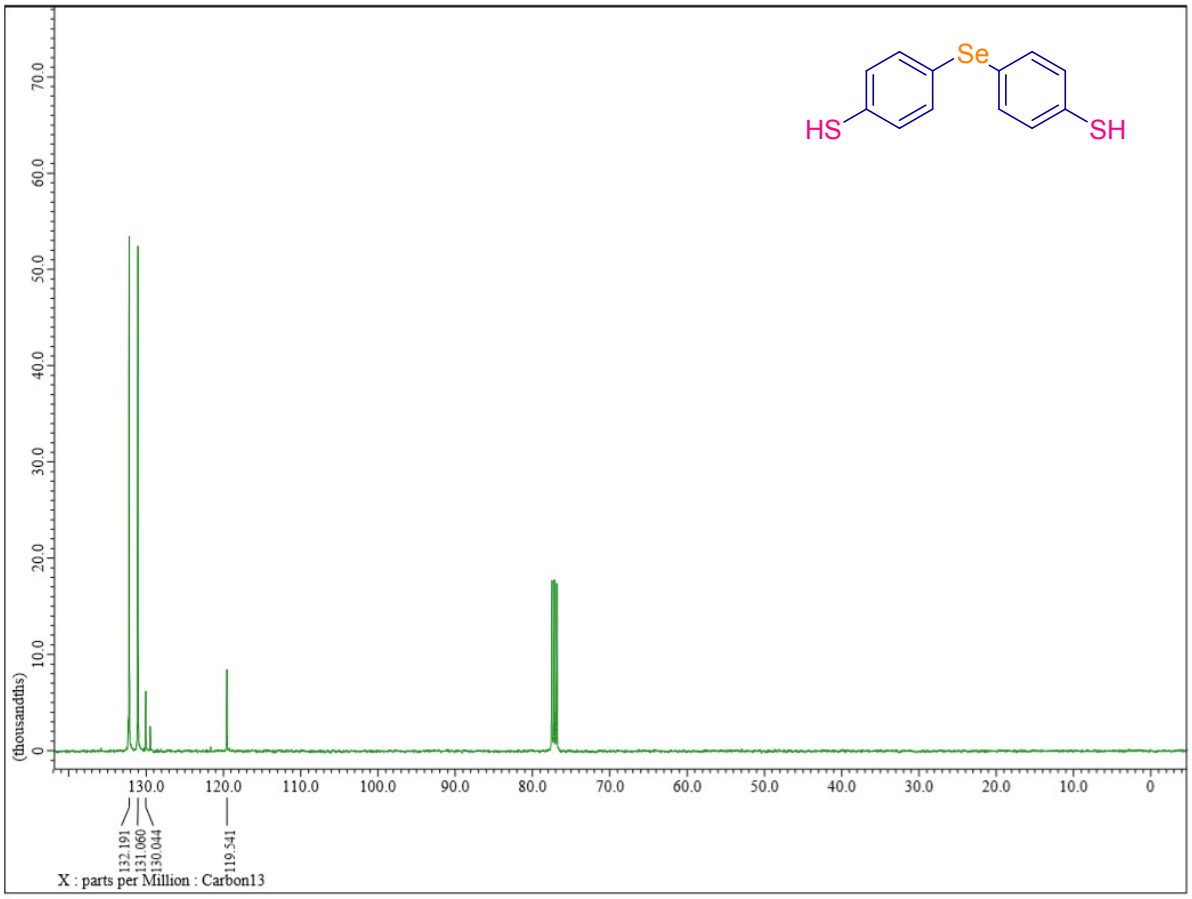
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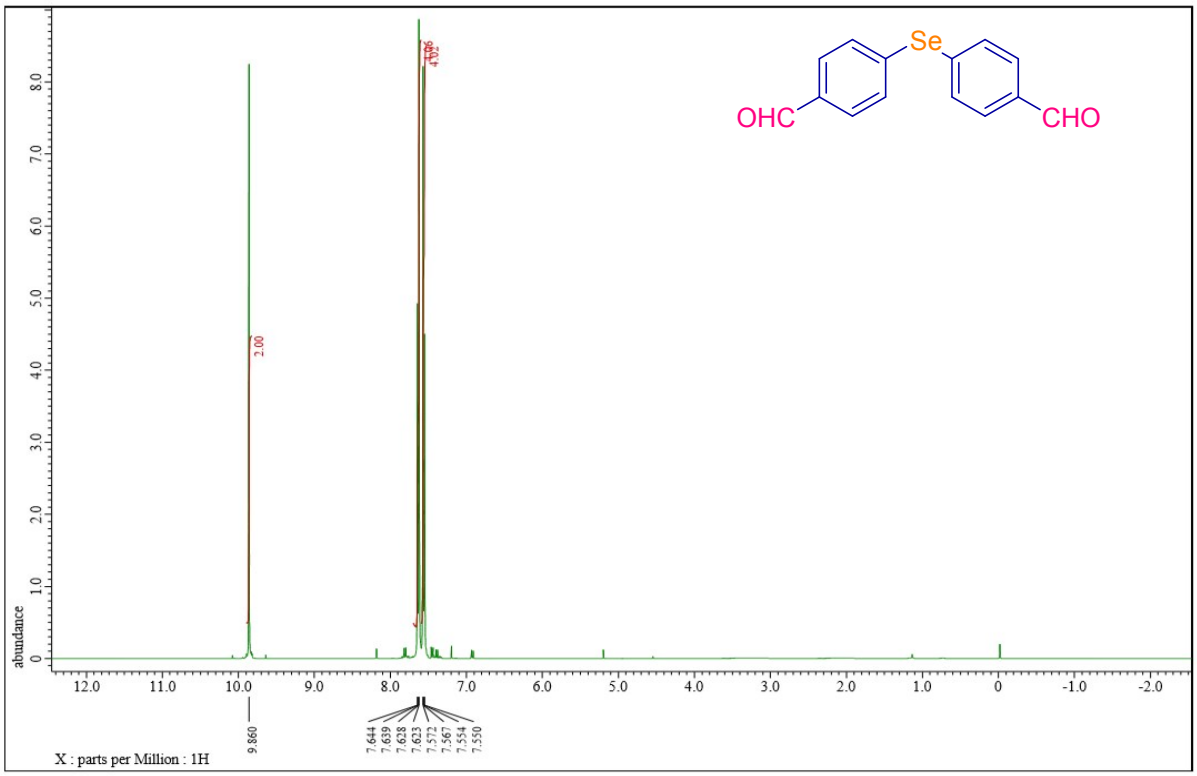
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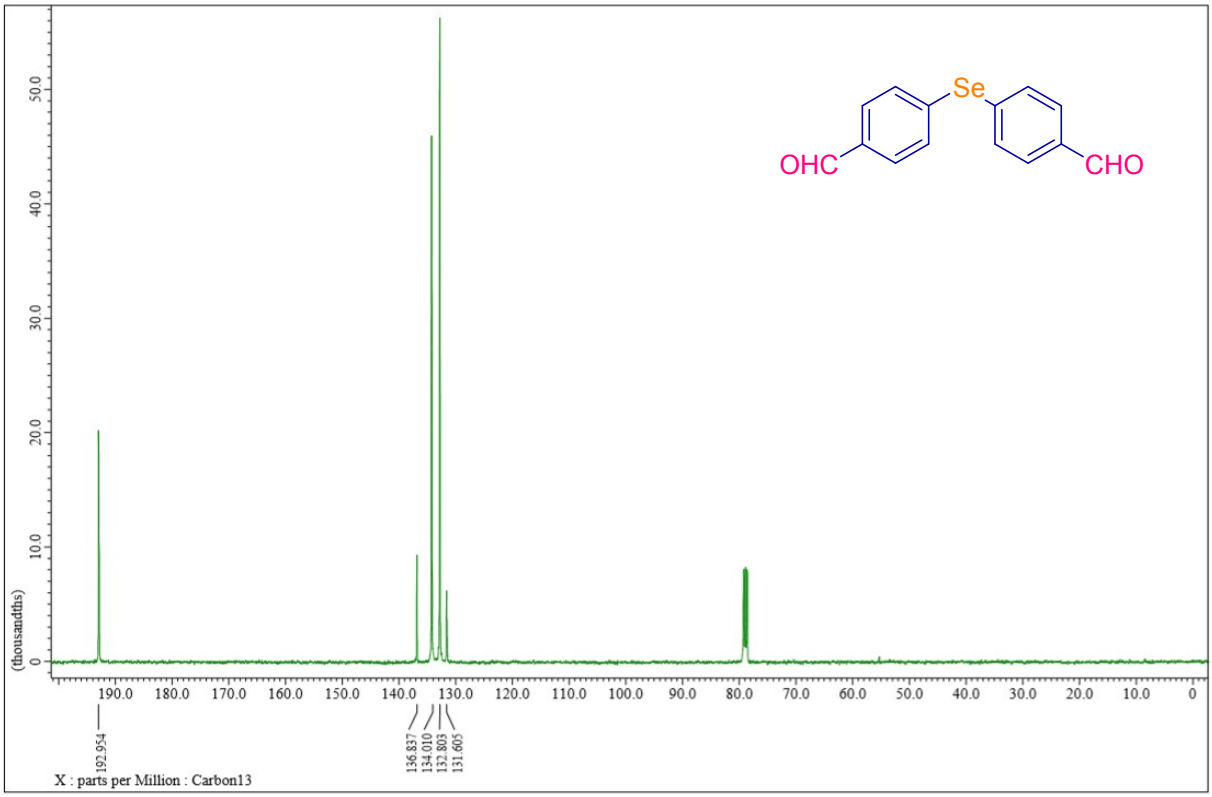
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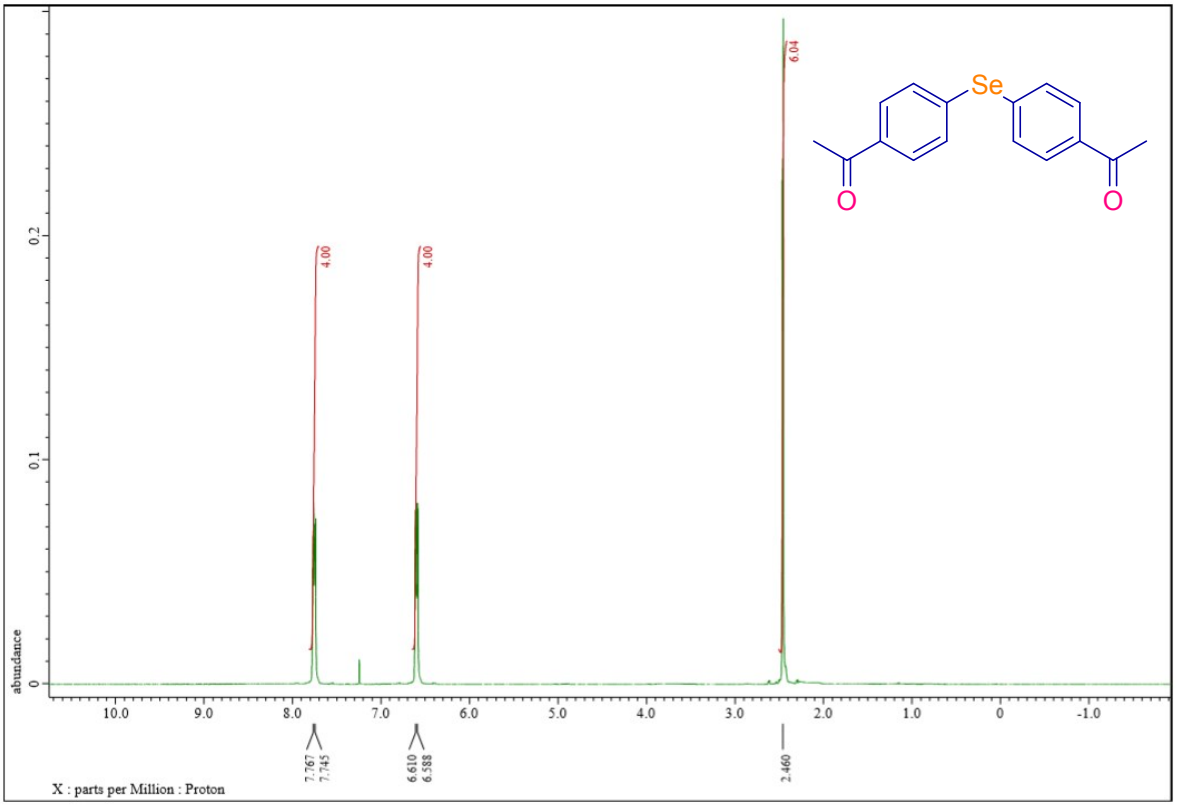
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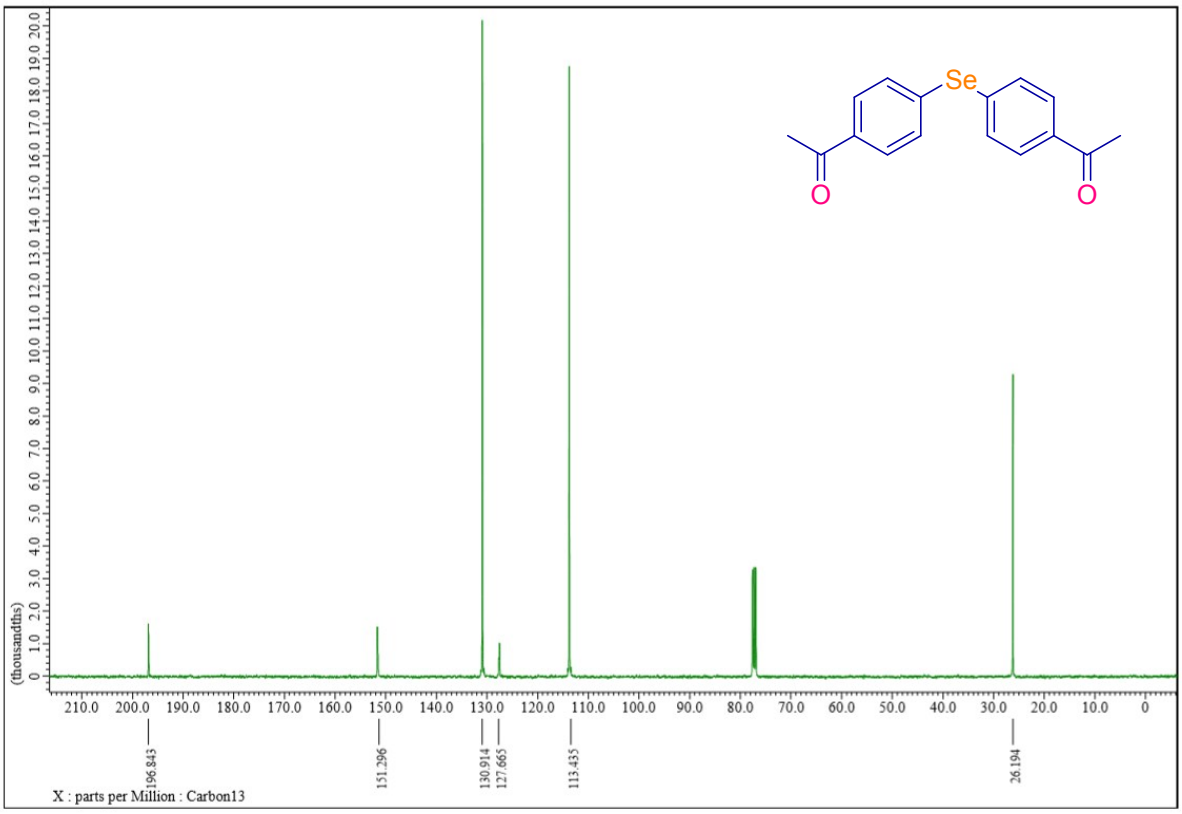
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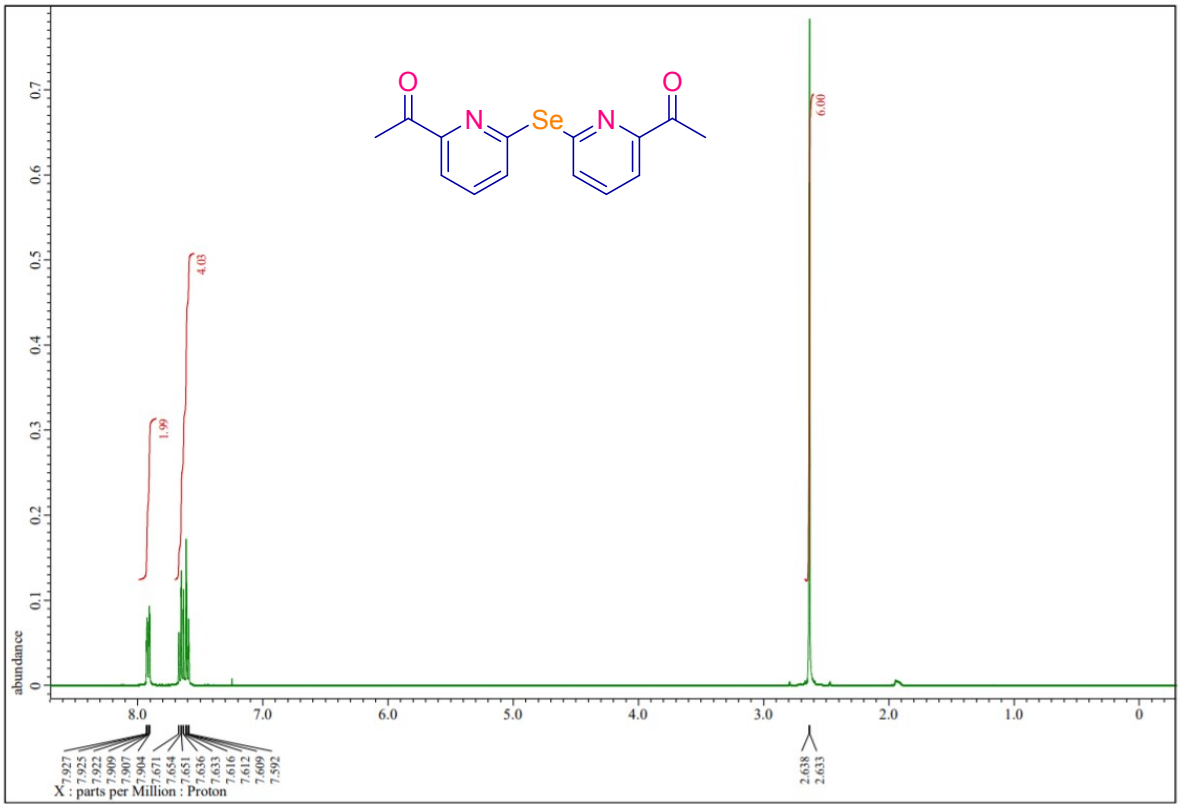
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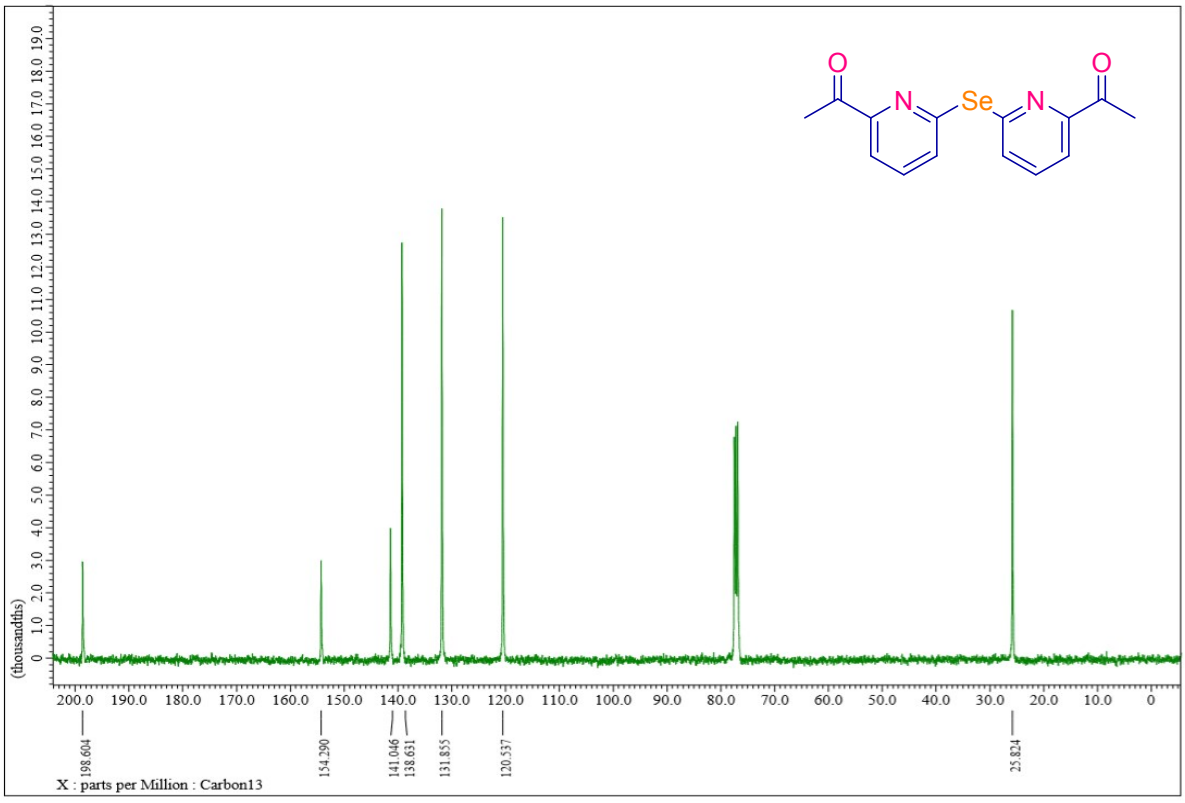
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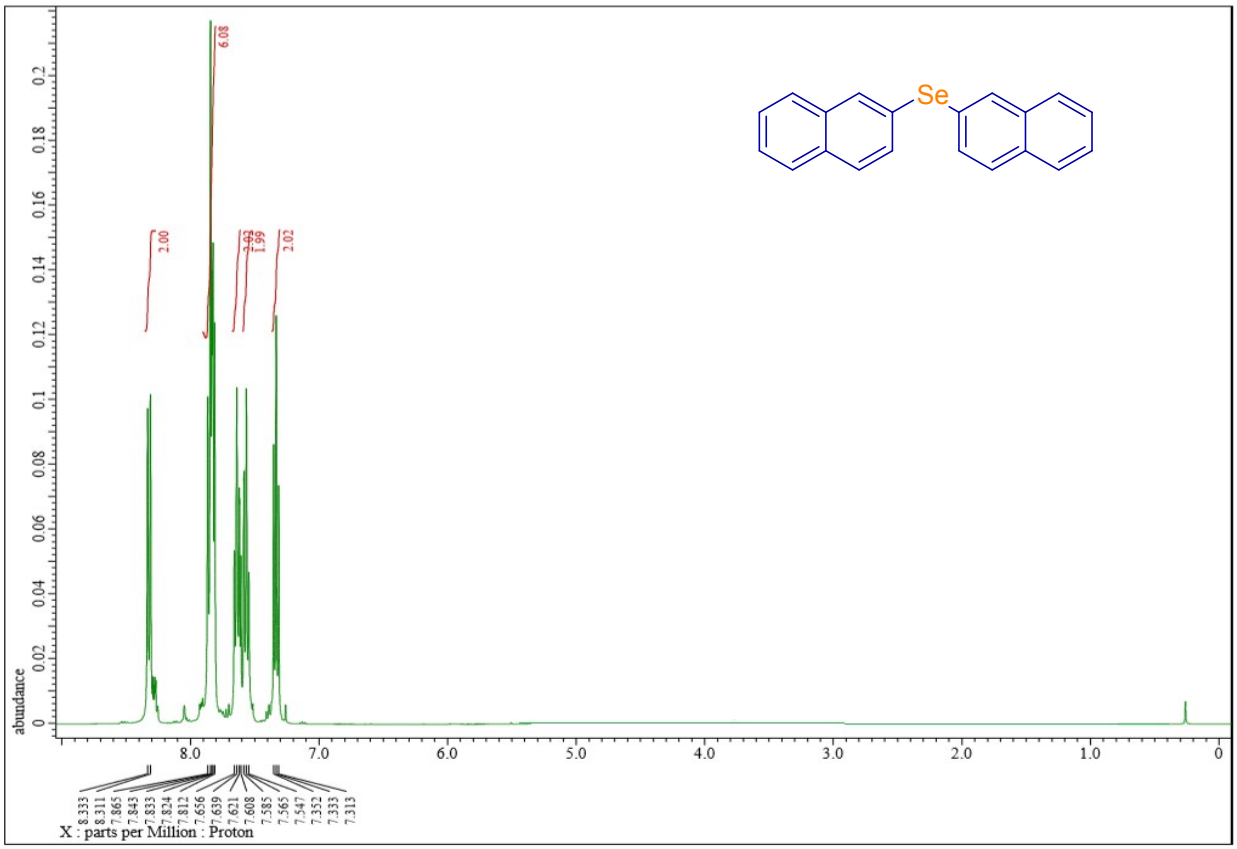
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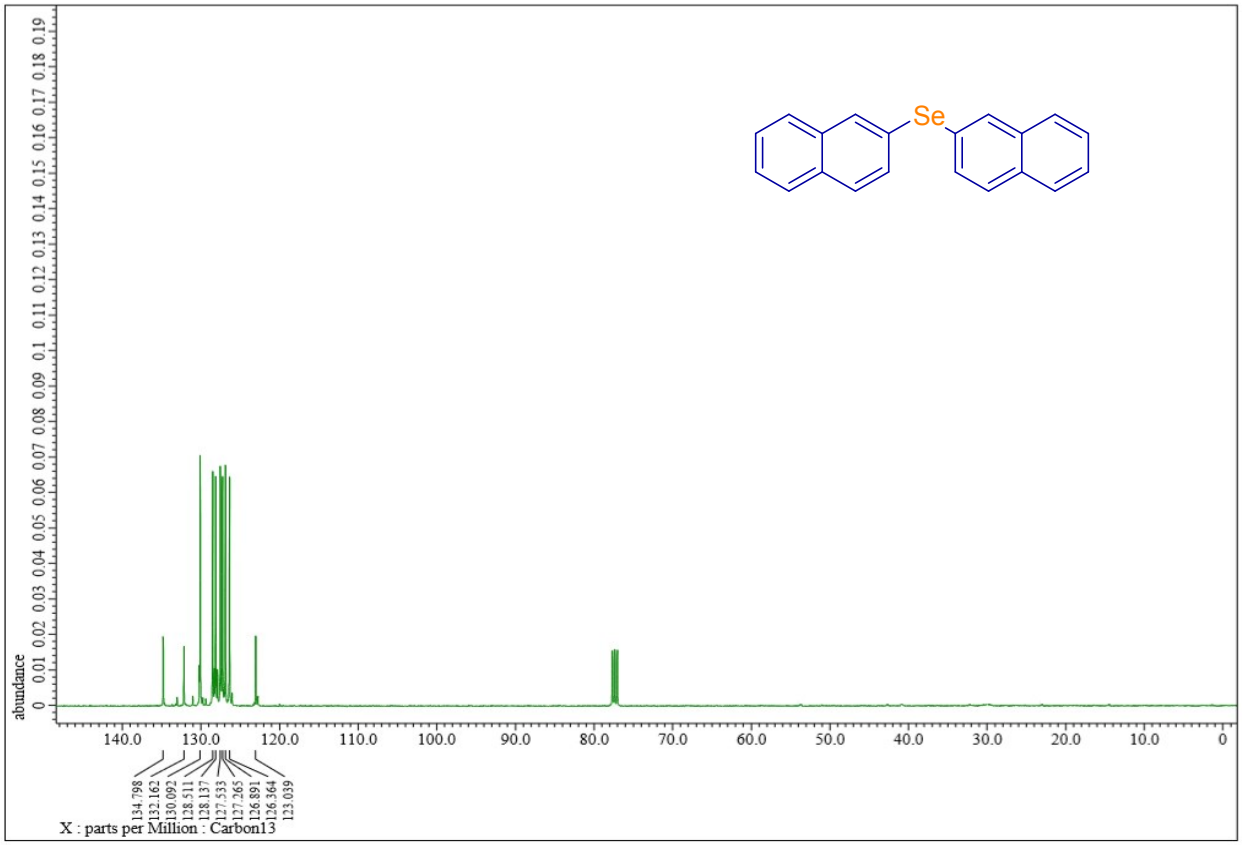
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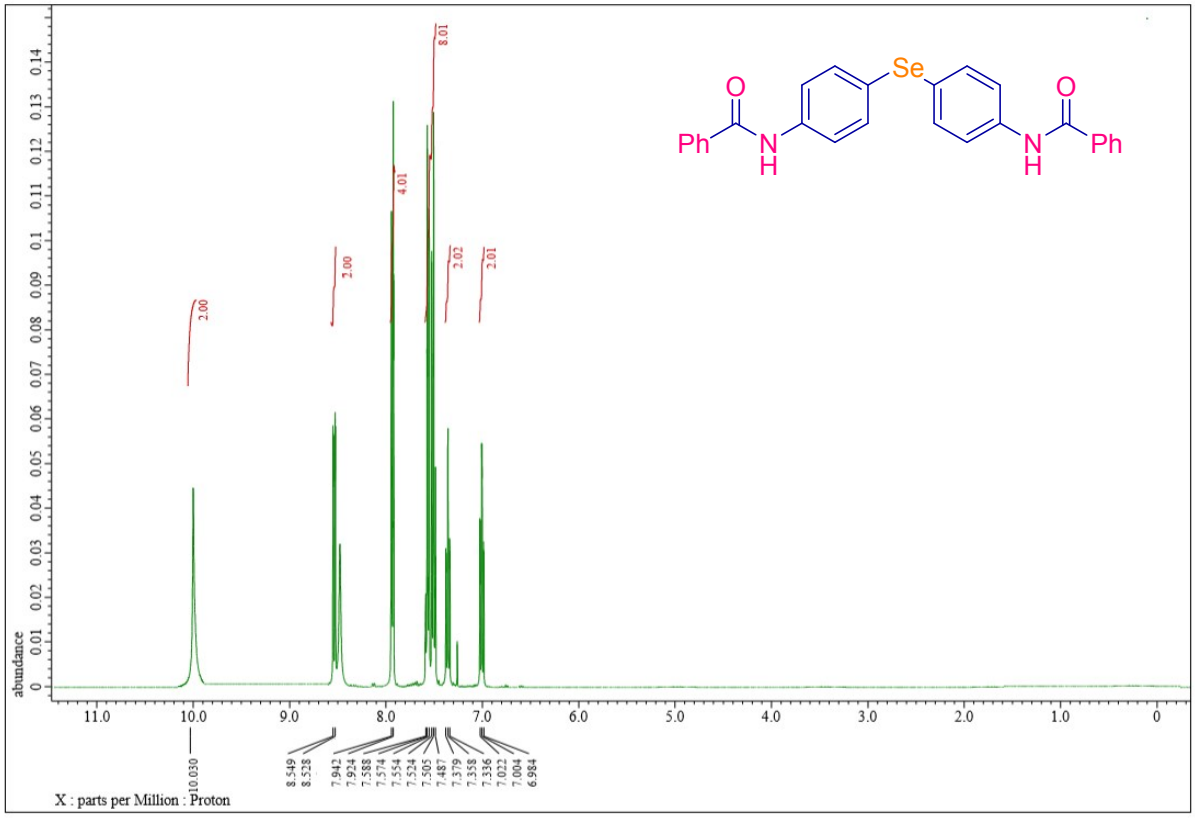
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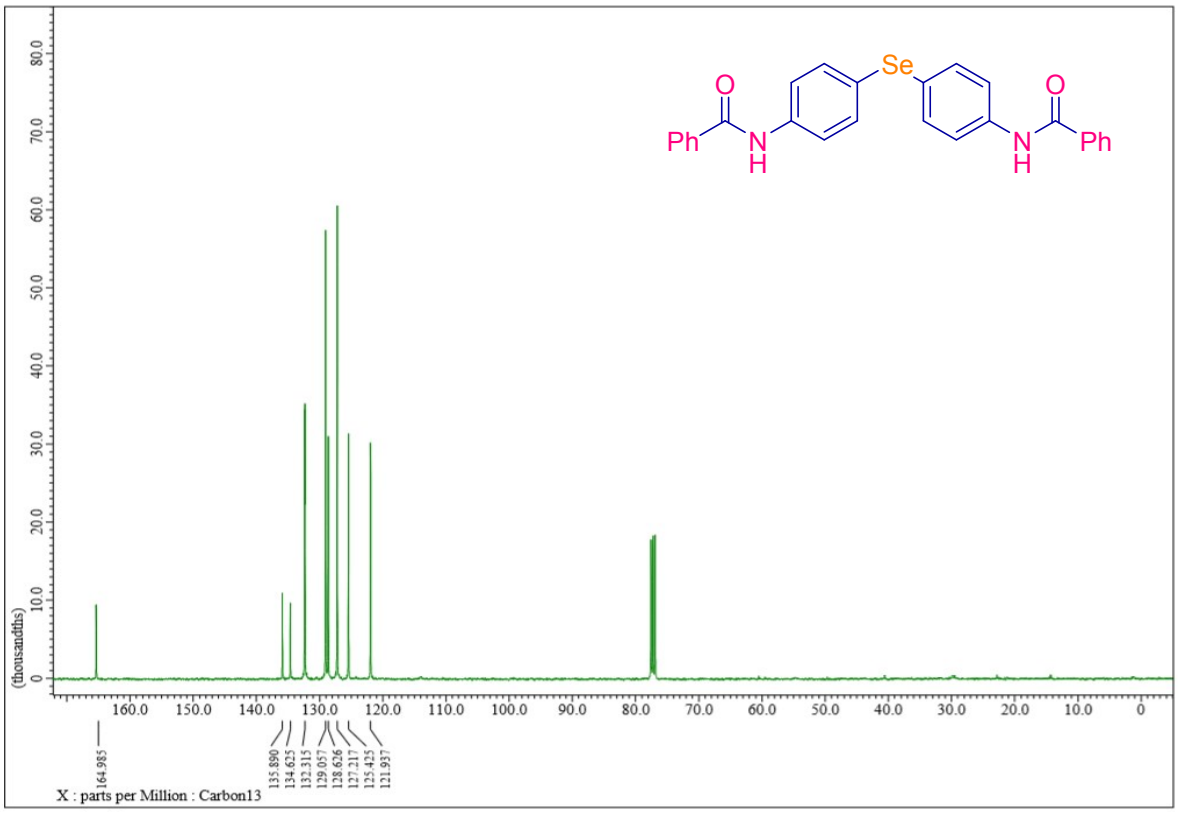
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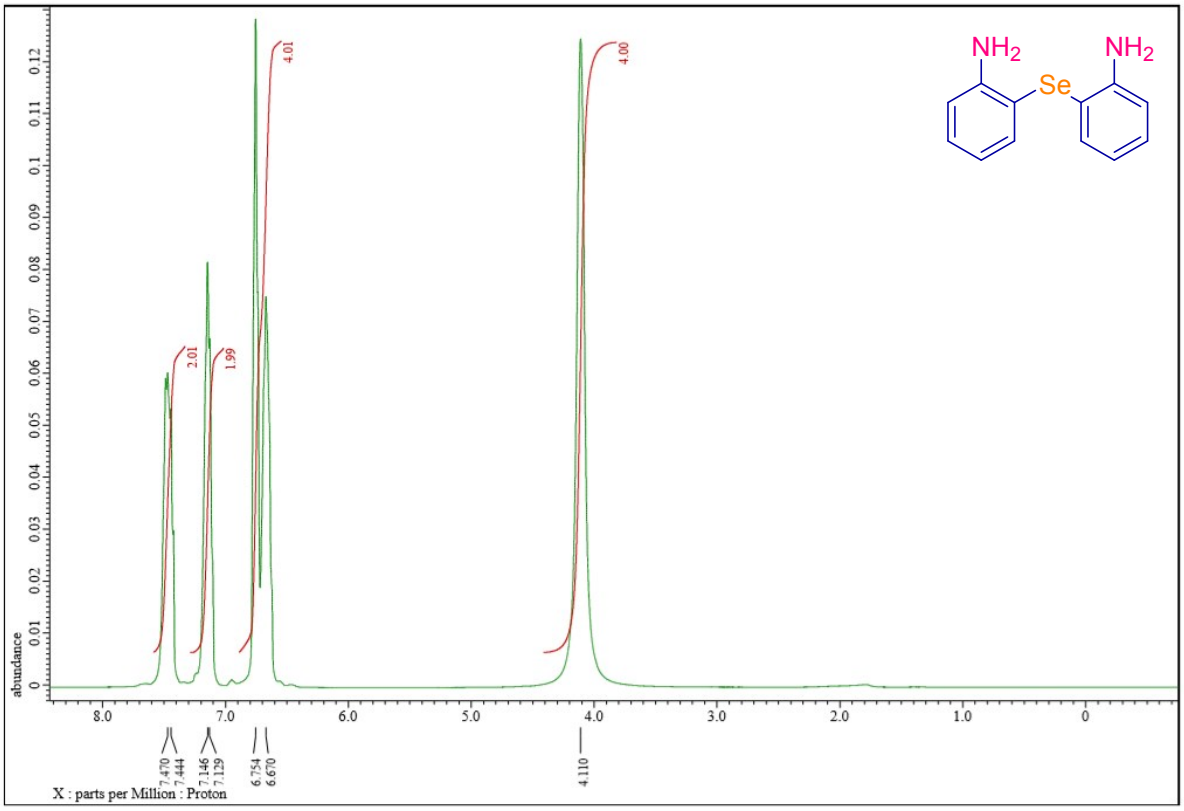
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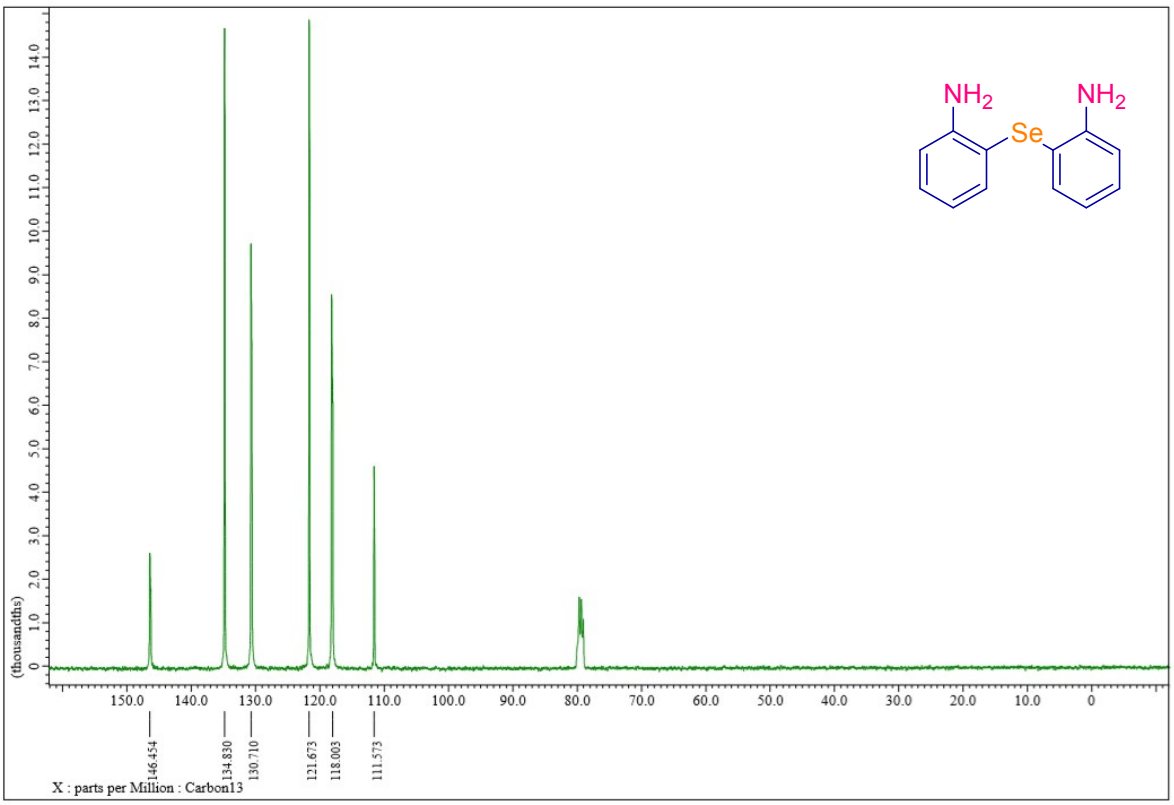
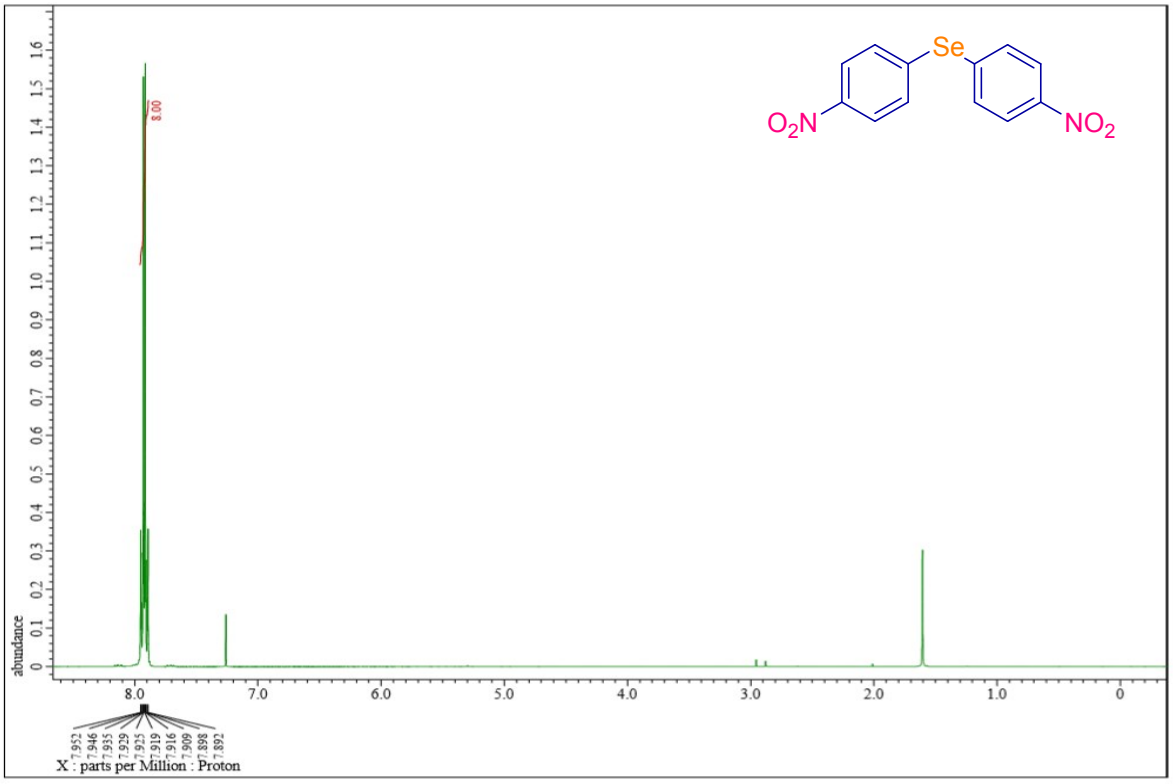
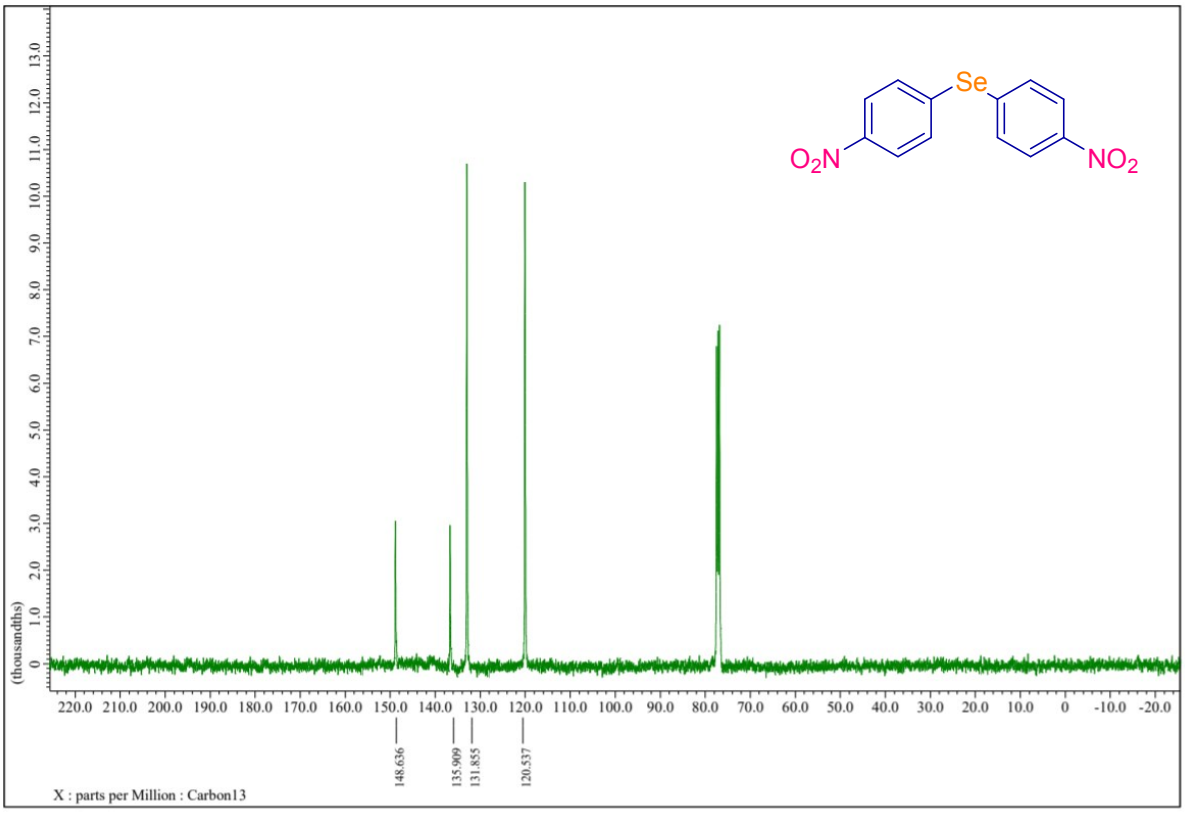
1.99
abundance
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
7.470
7.444
7.146
7.129
6.754
6.670
4.110
X : parts per Million : Proton

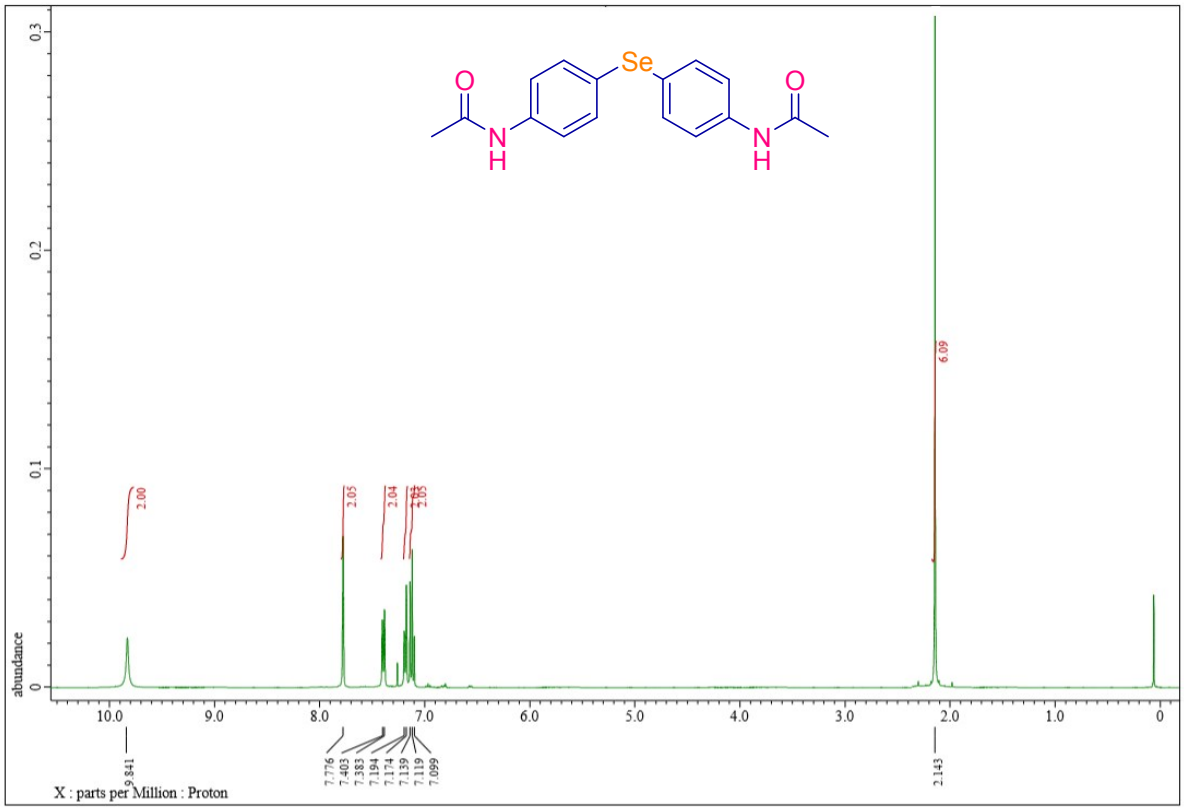

NH2
Se
NH2
(thousandths)
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
146.454
134.830
130.710
121.673
118.003
111.573
X : parts per Million : Carbon13

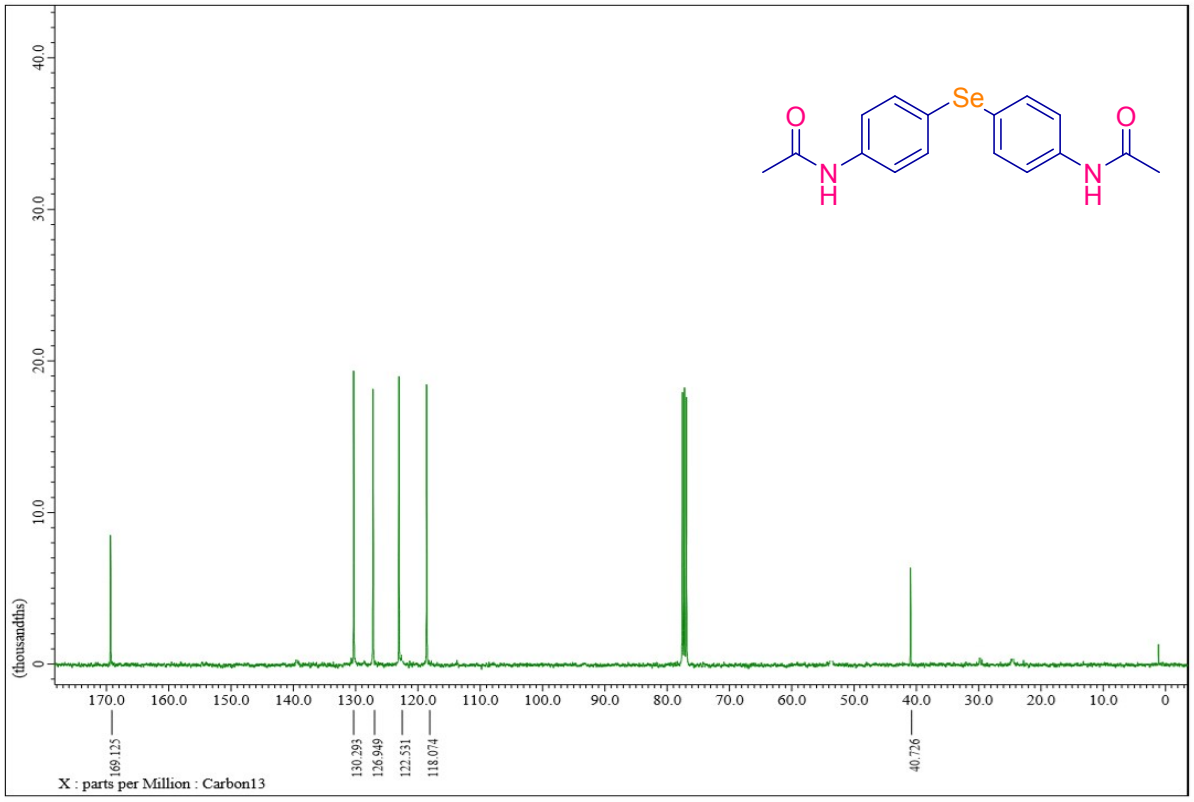
12


Se
O2N
NO2
abundance
8.00
X : parts per Million : Proton

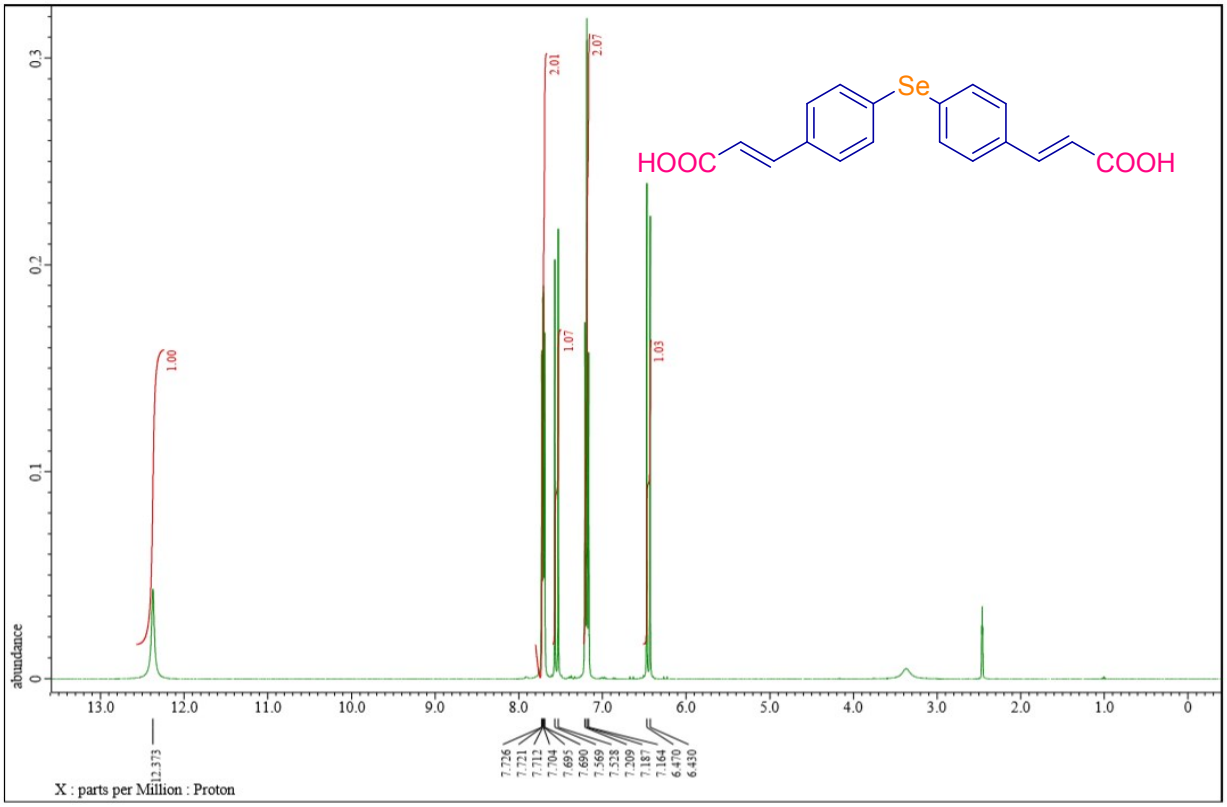

Se
O2N
NO2
(thousandths)
148.636
135.909
131.855
120.537
X : parts per Million : Carbon13

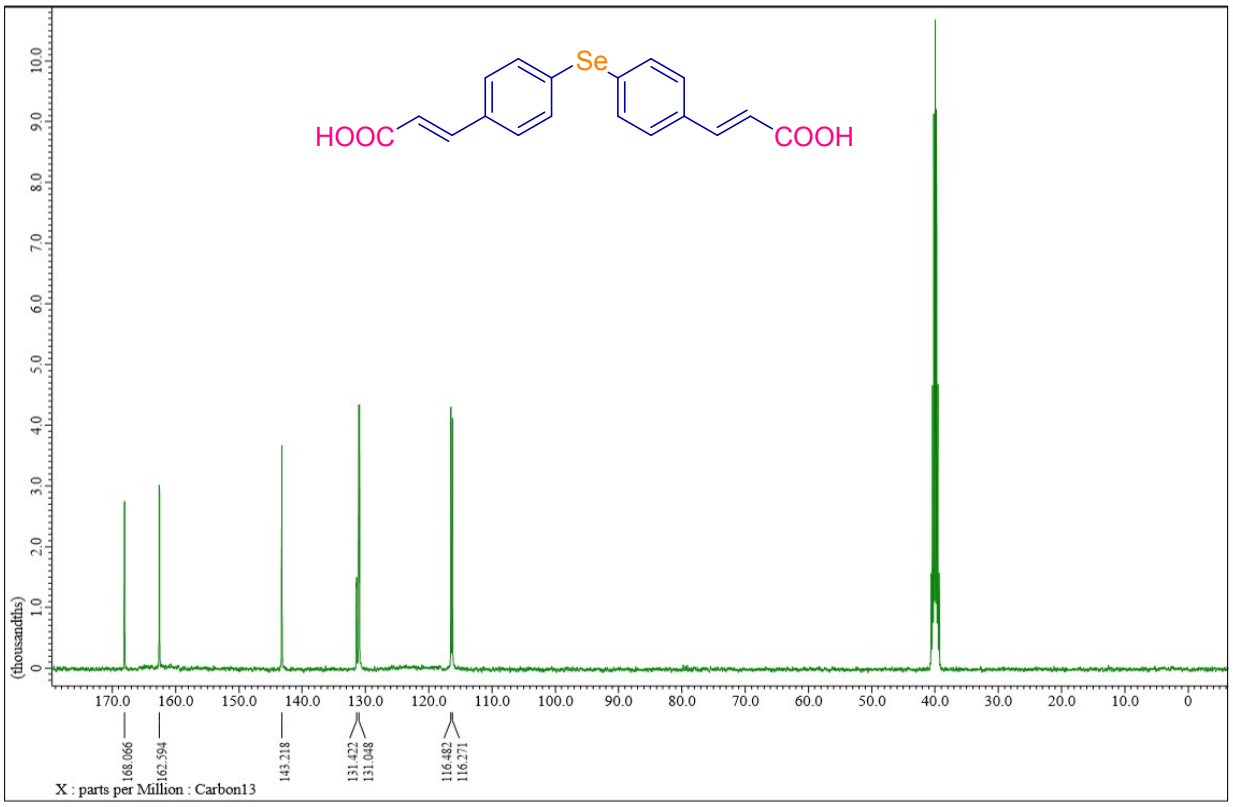
13


Se
O
N
H
O
N
H
abundance
X : parts per Million : Proton
9.841
7.776
7.403
7.383
7.194
7.174
7.139
7.119
7.099
2.143
6.09
2.00
2.05
2.04


Se
O
N
H
O
N
H
(thousandths)
X : parts per Million : Carbon13
169.125
130.293
126.949
122.531
118.074
40.726

14


Se
HOOC
COOH
abundance
X : parts per Million : Proton


Se
HOOC
COOH
(thousandths)
X : parts per Million : Carbon13