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Facile approach to chiral phenylselenides – synthesis and activity evaluation

Supplemental Information

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1. Analysis data of phenylselenides **6-19**

N-(*S*)-(+)-*sec*-butyl-2-(phenylselanyl)benzamide **6**

Yield: 53%; mp 128-129 °C; $[\propto]_D^{20}$ =14 (c=0.78, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 0.89 (t, J=7.2 Hz, 3H), 1.13 (d, J=6.8 Hz, 3H), 1.43-1.57 (m, 2H), 3.83-3.92 (m, 1H), 6.86-6.91 (m, 1H_{ar}), 7.18-7.25 (m, 2H_{ar}), 7.38-7.45 (m, 3H_{ar}), 7.55-7.63 (m, 3H_{ar}) 8.25 (d, J=10.0 Hz, 1H) ^{13}C NMR (300 MHz, DMSO) δ= 11.20 (CH_3), 20.65 (CH_3), 29.30 (CH_2), 47.03 (CH), 125.80 (CH_{ar}), 128.41 (CH_{ar}), 129.20 (CH_{ar}), 129.92 (CH_{ar}), 130.20 (C_{ar}), 130.28 (2xCH_{ar}), 131.09 (CH_{ar}), 135.20 (C_{ar}), 135.24 (C_{ar}), 136.61 (2xCH_{ar}), 167.41 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 435.47 ppm; IR**=**3306, 3047, 2967, 2872, 1625, 1583, 1562, 1456, 1437, 1352, 1303, 1282, 1253, 1165, 1146, 1063, 1050, 1022 cm^{-1}. Elemental Anal. Calcd for $C_{17}H_{19}NOSe$ (332.30): C, 61.45; H, 5.76; N, 4.22; Found C, 61.39; H, 5.76; N, 4.24;.

N-(*R*)-(-)-*sec*-butyl-2-(phenylselanyl)benzamide **7**

Yield: 75%; mp 127-128 °C; $[\propto]_D^{20}$ =-16 (c=0.82, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 0.89 (t, J=7.6 Hz, 3H), 1.13 (d, J=6.8 Hz, 3H), 1.43-1.58 (m, 2H), 3.84-3.92 (m, 1H), 6.85-6.91 (m, 1H_{ar}), 7.19-7.24 (m, 2H_{ar}), 7.37-7.47 (m, 3H_{ar}), 7.55-7.64 (m, 3H_{ar}) 8.26 (d, J=10.4 Hz, 1H) ^{13}C NMR (300 MHz, DMSO) δ= 11.20 (CH_3), 20.65 (CH_3), 29.30 (CH_2), 47.01 (CH), 125.78 (CH_{ar}), 128.41 (CH_{ar}), 129.20 (CH_{ar}), 129.89 (CH_{ar}), 130.17 (C_{ar}), 130.27 (2xCH_{ar}), 131.09 (CH_{ar}), 135.16 (C_{ar}), 135.26 (C_{ar}), 136.62 (2xCH_{ar}), 167.40 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 435.53 ppm; IR**=**3308, 3047, 2965, 2872, 1625, 1583, 1562, 1477, 1437, 1350, 1302, 1282, 1253, 1164, 1146, 1078, 1050, 1021 cm^{-1}. Elemental Anal. Calcd for $C_{17}H_{19}NOSe$ (332.30): C, 61.45; H, 5.76; N, 4.22; Found C, 61.33; H, 5.79; N, 4.20;.

N-(*R*)-(-)-1-hydroxy-2-butanyl-2-(phenylselanyl)benzamide **8**

Yield: 74%; mp 134-136 °C; $[\propto]_D^{20}$ =-11 (c=1.15, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 0.90 (t, J=7.6 Hz, 3H), 1.38-1.49 (m, 1H), 1.62-1.72 (m, 1H), 3.40-3.53 (m, 2H), 3.78-3.89 (m, 1H), 4.69 (t, J= 5.6 Hz, 1H), 6.84-6.89 (m, 1H_{ar}), 7.18-7.24 (m, 2H_{ar}), 7.37-7.44 (m, 3H_{ar}), 7.56-7.61 (m, 2H_{ar}), 7.65-7.69 (m, 1H_{ar}), 8.12 (d, J= 8.4 Hz, 1H_{ar}) ^{13}C NMR (300 MHz, DMSO) δ= 11.09 (CH_3), 24.11 (CH_2), 53.61 (CH), 63.50 (CH_2), 125.72 (CH_{ar}), 128.54 (CH_{ar}), 129.22 (CH_{ar}), 129.81 (CH_{ar}), 130.20 (C_{ar}), 130.28 (2xCH_{ar}), 131.14 (CH_{ar}), 134.96 (C_{ar}), 135.41 (C_{ar}), 136.66 (2xCH_{ar}), 167.94 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 437.11 ppm; IR**=**3280,

3069, 2967, 2920. 2873, 1628, 1584, 1561, 1458, 1378, 1336, 1316, 1282, 1254, 1223, 1167, 1096, 1048, 1022 cm^{-1}. Elemental Anal. Calcd for $C_{17}H_{19}NO_2Se$ (348.30): C, 58.62; H, 5.50; N, 4.02; Found C, 58.60; H, 5.48; N, 3.99;.

N-(*S*)-(+)-1-hydroxy-2-butanyl-2-(phenylselanyl)benzamide **9**

Yield: 68%; mp 134-135 °C; $[\propto]_D^{20}$ =12 (c=1.04, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 0.90 (t, J=8 Hz, 3H), 1.37-1.50 (m, 1H), 1.60-1.71 (m, 1H), 3.35-3.51 (m, 2H), 3.77-3.88 (m, 1H), 4.68 (t, J= 6 Hz, 1H), 6.85-6.90 (m, $1H_{ar}$), 7.19-7.24 (m, $2H_{ar}$), 7.37-7.42 (m, $3H_{ar}$), 7.56-7.62 (m, $2H_{ar}$), 7.64-7.69 (m, $1H_{ar}$), 8.12 (d, J= 8.4 Hz, $1H_{ar}$) ^{13}C NMR (300 MHz, DMSO) δ= 11.09 (CH_3), 24.11 (CH_2), 53.61 (CH), 63.50 (CH_2), 125.73 (CH_{ar}), 128.55 (CH_{ar}), 129.22 (CH_{ar}), 129.81 (CH_{ar}), 130.19 (C_{ar}), 130.28 ($2xCH_{ar}$), 131.15 (CH_{ar}), 134.96 (C_{ar}), 135.40 (C_{ar}), 136.67 ($2xCH_{ar}$), 167.94 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 436.97 ppm; IR**=**3279, 3068, 2967, 2920. 2873, 1628, 1584, 1561, 1458, 1377, 1337, 1316, 1282, 1255, 1228, 1166, 1095, 1048, 1022 cm^{-1}. Elemental Anal. Calcd for $C_{17}H_{19}NO_2Se$ (348.30): C, 58.62; H, 5.50; N, 4.02; Found C, 58.55; H, 5.53; N, 4.02;.

N-(*R*)-(-)-1,2,3,4-tetrahydro-1-napthyl-2-(phenylselanyl)benzamide **10**

Yield: 59 %; mp 100-103 °C; $[\propto]_D^{20}$ =-20 (c=1.28, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 1.72-1.81 (m, 2H), 1.89-2.03 (m, 2H), 2.71-2.82 (m, 2H), 5.13-5.27 (m, 1H), 6.87-6.93 (m, $1H_{ar}$), 7.09-7.29 (m, $6H_{ar}$), 7.38-7.44 (m, $3H_{ar}$), 7.58-7.69 (m, $3H_{ar}$), 8.89 (d, J=8.8 Hz, 1H) ^{13}C NMR (700 MHz, DMSO) δ= 20.84 (CH_2), 29.35 (CH_2), 30.33 (CH_2), 47.71 (CH), 125.86 (CH_{ar}), 126.33 (CH_{ar}), 127.17 (CH_{ar}), 128.40 (CH_{ar}), 128.63 (CH_{ar}), 129.24 ($2xCH_{ar}$), 130.05 (C_{ar}), 130.31 ($3xCH_{ar}$), 131.28 (CH_{ar}), 134.82 (C_{ar}), 135.45 (C_{ar}), 136.60 ($2xCH_{ar}$), 137.68 (C_{ar}), 137.87 (C_{ar}), 167.66 (C=O) ^{77}Se NMR **(**700 MHz, DMSO) δ= 437.50 ppm; IR**=**3282, 3054, 2924, 2854, 1627, 1583, 1561, 1492, 1435, 1336, 1320, 1273, 1257, 1208, 1157, 1114, 1081, 1040, 1019 cm^{-1}. Elemental Anal. Calcd for $C_{23}H_{21}NOSe$ (406.38): C, 67.98; H, 5.21; N, 3.45; Found C, 67.88; H, 5.17; N, 3.41;

N-(*S*)-(+)-1,2,3,4-tetrahydro-1-napthyl-2-(phenylselanyl)benzamide **11**

Yield: 47 %; mp 101-102 °C; $[\propto]_D^{20}$ =24 (c=1.03, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 1.70-1.80 (m, 2H), 1.94-2.03 (m, 2H), 2.71-2.81 (m, 2H), 5.15-5.26 (m, 1H), 6.89-6.93 (m, $1H_{ar}$), 7.09-7.29 (m, $6H_{ar}$), 7.39-7.46 (m, $3H_{ar}$), 7.60-7.69 (m, $3H_{ar}$), 8.89 (d, J=8.8 Hz, 1H) ^{13}C NMR (400 MHz, DMSO) δ= 20.84 (CH_2), 29.35 (CH_2), 30.32 (CH_2), 47.70 (CH), 125.85 (CH_{ar}), 126.33 (CH_{ar}), 127.18 (CH_{ar}), 128.40 (CH_{ar}), 128.63 (CH_{ar}), 129.25 ($2xCH_{ar}$), 130.02 (C_{ar}), 130.32 ($3xCH_{ar}$), 131.30 (CH_{ar}),

134.76 (C_{ar}), 135.49 (C_{ar}), 136.63 (2xCH_{ar}), 137.68 (C_{ar}), 137.86 (C_{ar}), 167.65 (C=O) ^{77}Se NMR **(**700 MHz, DMSO) δ= 436.95 ppm; IR**=**3280, 3058, 2921, 2852, 1626, 1583, 1562, 1493, 1436, 1338, 1320, 1271, 1258, 1201, 1181, 1115, 1081, 1030, 1018 cm^{-1}. Elemental Anal. Calcd for $C_{23}H_{21}NOSe$ (406.38): C, 67.98; H, 5.21; N, 3.45; Found C, 67.92; H, 5.22; N, 3.43;

N-(R)-(+)-α-metylbenzyl- 2-(phenylselanyl)benzamide **12**

Yield: 74 %; mp 147-148°C; $[\propto]_D^{20}$ =22 (c=0.52, $CHCl_3$);

^{1}H NMR (700 MHz, DMSO) δ= 1.49 (d, J=7 Hz, 3H), 5.14-5.19 (m, 1H), 6.88-6.91 (m, 1H_{ar}) 7.23-7.29 (m, 3H_{ar}), 7.34-7.37 (m, 2H_{ar}), 7.41-7.46 (m, 5H_{ar}), 7.58-7.61 (m, 2H_{ar}), 7.75-7.77 (m, 1H_{ar}), 8.96 (d, J=7.7 Hz, 1H) ^{13}C NMR (300 MHz, DMSO) δ= 22.82 (CH_3), 43.04 (CH), 125.78 (CH_{ar}), 126.57 (2xCH_{ar}), 127.13 (CH_{ar}), 128.73 (3xCH_{ar}), 129.29 (CH_{ar}), 129.85 (CH_{ar}), 130.13 (C_{ar}), 130.31 (2xCH_{ar}), 131.38 (CH_{ar}), 134.29 (C_{ar}), 135.71 (C_{ar}), 136.72 (2xCH_{ar}), 145.13 (C_{ar}), 167.12 (C=O) ^{77}Se NMR (400 MHz, DMSO) δ= 437.91 ppm; IR**=**3325, 3063, 2977, 2928, 1627, 1584, 1564, 1522, 1493, 1462, 1434, 1374, 1320, 1278, 1259, 1210, 1157, 1133, 1096, 1063, 1030, 1013. Elemental Anal. Calcd for $C_{21}H_{19}NOSe$ (380.43): C, 66.32; H, 5.04; N, 3.68; Found C, 66.28; H, 5.05; N, 3.71;.

N-(S)-(-)-α-metylbenzyl-2-(phenylselanyl)benzamide **13**

Yield: 87 %; mp 147-149°C; $[\propto]_D^{20}$ =-18 (c=0.51, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 1.46 (d, J=7.2 Hz, 3H), 5.10-5.18 (m, 1H), 6.85-6.89 (m, 1H_{ar}) 7.20-7.26 (m, 2H_{ar}), 7.30-7.35 (m, 2H_{ar}), 7.39-7.45 (m, 5H_{ar}), 7.55-7.61 (m, 2H_{ar}), 7.72-7.76 (m, 1H_{ar}), 8.94 (d, J=8 Hz, 1H) ^{13}C NMR (300 MHz, DMSO) δ= 22.81 (CH_3), 49.04 (CH), 125.79 (CH_{ar}), 126.54 (2xCH_{ar}), 127.13 (CH_{ar}), 128.73 (3xCH_{ar}), 129.28 (CH_{ar}), 129.88 (CH_{ar}), 130.14 (C_{ar}), 130.30 (2xCH_{ar}), 131.36 (CH_{ar}), 134.34 (C_{ar}), 135.67 (C_{ar}), 136.70 (2xCH_{ar}), 145.12 (C_{ar}), 167.13 (C=O) ^{77}Se NMR (400 MHz, DMSO) δ= 437.90 ppm; IR**=**3327, 3063, 2977, 2869, 1628, 1584, 1565, 1523, 1493, 1461, 1434, 1374, 1320, 1278, 1259, 1210, 1158, 1133, 1073, 1062, 1030, 1013. Elemental Anal. Calcd for $C_{21}H_{19}NOSe$ (380.43): C, 66.32; H, 5.04; N, 3.68; Found C, 66.34; H, 5.03; N, 3.73;.

N-(*S*)-(-)-1-(1-napthyl)etyl-2-(phenylselanyl)benzamide **14**

Yield: 67%; mp 58-59°C; $[\propto]_D^{20}$ =-14 (c=1.42, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 1.62 (d, J=6.8 Hz, 3H), 5.93 (p, J=7.2 Hz, 1H), 6.87-6.92 (m, 1H_{ar}), 7.21-7.28 (m, 2H_{ar}), 7.38-7.48 (m, 3H_{ar}), 7.49-7.61 (m, 5H_{ar}), 7.63-7.69 (m, 1H_{ar}), 7.71-7.76 (m, 1H_{ar}), 7.81-7.87 (m, 1H_{ar}), 7.92-7.97 (m, 1H_{ar}), 8.24 (d, J=8.4 Hz, 1H_{ar}), 9.10 (d, J=8.0 Hz, 1H_{ar}) ^{13}C NMR (300 MHz, DMSO) δ= 21.96 (CH_3), 45.36 (CH), 123.07 (CH_{ar}), 123.70 (CH_{ar}), 125.80 (CH_{ar}), 125.96 (CH_{ar}) 126.08 (CH_{ar}), 126.68 (CH_{ar}), 127.77 (CH_{ar}), 128.74 (CH_{ar}), 129.13 (CH_{ar}), 129.26 (CH_{ar}), 129.93 (CH_{ar}), 130.20 (C_{ar}), 130.30 (2xCH_{ar}), 130.88 (C_{ar}), 131.36 (CH_{ar}), 133.85 (C_{ar}), 134.47 (C_{ar}), 135.59 (C_{ar}), 136.67 (2xCH_{ar}), 140.58 (C_{ar}), 167.10 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 437.54 ppm; IR**=**3276, 3052, 2969, 2852, 1621, 1583, 1526, 1477, 1455, 1374, 1337, 1308, 1277, 1181, 1156, 1123, 1081, 1031, 1021 cm^{-1}. Elemental Anal. Calcd for $C_{26}H_{21}NOSe$ (430.30): C, 69.76; H, 4.92; N, 3.25; Found C, 69.85; H, 4.83; N, 3.18;.

N-(*R*)-(+)-1-(1-napthyl)etyl-2-(phenylselanyl)benzamide **15**

Yield: 92%; mp 59-60°C; $[\propto]_D^{20}$ =16 (c=1.24, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 1.61 (d, J=6.8 Hz, 3H), 5.93 (p, J=7.2 Hz, 1H), 6.82-6.91 (m, 1H_{ar}), 7.21-7.26 (m, 2H_{ar}), 7.38-7.45 (m, 3H_{ar}), 7.48-7.61 (m, 5H_{ar}), 7.64-7.67 (m, 1H_{ar}), 7.72-7.76 (m, 1H_{ar}), 7.81-7.86 (m, 1H_{ar}), 7.93-7.97 (m, 1H_{ar}), 8.24 (d, J=8 Hz, 1H_{ar}), 9.12 (d, J=7.6 Hz, 1H_{ar}) ^{13}C NMR (300 MHz, DMSO) δ= 21.96 (CH_3), 45.36 (CH), 123.08 (CH_{ar}), 123.70 (CH_{ar}), 125.81 (CH_{ar}), 125.96 (CH_{ar}) 126.08 (CH_{ar}), 126.68 (CH_{ar}), 127.76 (CH_{ar}), 128.74 (CH_{ar}), 129.13 (CH_{ar}), 129.26 (CH_{ar}), 129.95 (CH_{ar}), 130.18 (C_{ar}), 130.30 (2xCH_{ar}), 130.85 (C_{ar}), 131.36 (CH_{ar}), 133.86 (C_{ar}), 134.48 (C_{ar}), 135.60 (C_{ar}), 136.66 (2xCH_{ar}), 140.58 (C_{ar}), 167.11 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 437.40 ppm; IR**=**3278, 3050, 2970, 2852, 1621, 1584, 1526, 1476, 1451, 1373, 1337, 1307, 1277, 1180, 1156, 1123, 1080, 1031, 1020 cm^{-1}. Elemental Anal. Calcd for $C_{26}H_{21}NOSe$ (430.30): C, 69.76; H, 4.92; N, 3.25; Found C, 69.89; H, 4.94; N, 3.29;.

N-(*1S,2R*)-(-)-*cis*-2-hydroksy-1-indanyl-2-(phenylselanyl)benzamide **16**

Yield: 51%; mp 172-173 °C; $[\propto]_D^{20}$ =-17 (c=0.77, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 2.83-2.92 (m, 1H), 3.05-3.15 (m, 1H), 4.50-4.57 (m, 1H), 5.12 (d, J=4.4 Hz, 1H), 5.38-5.45 (m, 1H), 6.87-6.92 (m, 1H_{ar}), 7.17-7.30 (m, 6H_{ar}), 7.39-7.48 (m, 3H_{ar}), 7.60-7.66 (m, 2H_{ar}), 7.80-7.85 (m, 1H_{ar}), 8.34 (d, J=8.8 Hz, 1H) ^{13}C NMR (400 MHz, DMSO) δ= 39.23 (CH_2), 57.89 (CH), 72.58 (CH), 124.84 (CH_{ar}), 125.34 (CH_{ar}), 125.82 (CH_{ar}), 126.82 (CH_{ar}), 127.91 (CH_{ar}), 129.05 (CH_{ar}), 129.31 (CH_{ar}), 129.83 (CH_{ar}) 130.22 (C_{ar}), 130.34 (2xCH_{ar}), 131.46 (CH_{ar}), 134.18 (C_{ar}), 135.82 (C_{ar}), 136.73 (2xCH_{ar}), 141.35 (C_{ar}), 142.17 (C_{ar}), 168.22 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 439.55 ppm; IR**=**3286, 3052, 2921, 2852, 1629, 1584, 1561, 1478, 1437, 1349, 1318, 1295, 1278, 1186, 1080, 1058, 1019cm^{-1}. Elemental Anal. Calcd for $C_{22}H_{19}NO_2Se$ (408.35): C, 64.71; H, 5.04; N, 3.43; Found C, 64.63; H, 4.68; N, 3.47;.

N-(*1R,2S*)-(+)-*cis*-2-hydroksy-1-indanyl-2-(phenylselanyl)benzamide **17**

Yield: 45%; mp 173-174 °C; $[\propto]_D^{20}$ =16 (c=0.87, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 2.74-2.82 (m, 1H), 3.06-3.15 (m, 1H), 4.50-4.58 (m, 1H), 5.11 (d, J=4.4 Hz, 1H), 5.39-5.47 (m, 1H), 6.88-6.92(m, 1H_{ar}), 7.18-7.31 (m, 6H_{ar}), 7.41-7.46 (m, 3H_{ar}), 7.61-7.65 (m, 2H_{ar}), 7.80-7.85 (m, 1H_{ar}), 8.34 (d, J=8.8 Hz, 1H) ^{13}C NMR (300 MHz, DMSO) δ= 39.06 (CH_2), 57.89 (CH), 72.57 (CH), 124.83 (CH_{ar}), 125.33 (CH_{ar}), 125.81 (CH_{ar}), 126.82 (CH_{ar}), 127.90 (CH_{ar}), 129.05 (CH_{ar}), 129.31 (CH_{ar}), 129.81 (CH_{ar}) 130.21 (C_{ar}), 130.34 (2xCH_{ar}), 131.45 (CH_{ar}), 134.17 (C_{ar}), 135.87 (C_{ar}), 136.73 (2xCH_{ar}), 141.34 (C_{ar}), 142.21 (C_{ar}), 168.21 (C=O) ^{77}Se NMR **(**400 MHz, DMSO) δ= 438.74 ppm; IR**=**3284, 3052, 2921, 2852, 1629, 1583, 1560, 1477, 1437, 1348, 1318, 1295, 1278, 1214, 1185, 1080, 1058, 1019 cm^{-1}. Elemental Anal. Calcd for $C_{22}H_{19}NO_2Se$ (408.35): C, 64.71; H, 5.04; N, 3.43; Found C, 64.74; H, 4.70; N, 3.45;.

N-(*1S,2S*)-(+)-*trans*-2-hydroksy-1-indanyl- 2-(phenylselanyl)benzamide **18**

Yield: 30%; mp 143-144 °C; $[\propto]_D^{20}$ =27 (c=0.51, $CHCl_3$);

^{1}H NMR (400 MHz, DMSO) δ= 2.70-2.80 (m, 1H), 3.11-3.21 (m, 1H), 4.38-4.48 (m, 1H), 5.25 (t, J=8 Hz, 1H), 5.40 (d, J=5.6 Hz, 1H), 6.89-6.93(m, 1H_{ar}), 7.18-7.26 (m, 6H_{ar}), 7.40-7.47 (m, 3H_{ar}), 7.61-7.64 (m, 2H_{ar}), 7.72-7.76 (m, 1H_{ar}), 8.87 (d, J=8.4 Hz, 1H) ^{13}C NMR (700 MHz, DMSO) δ= 39.22 (CH_2), 62.01 (CH), 77.80 (CH), 124.40 (CH_{ar}), 125.12 (CH_{ar}), 125.75 (CH_{ar}), 127.17 (CH_{ar}), 128.10 (CH_{ar}), 128.73 (CH_{ar}), 129.32 (CH_{ar}), 129.82 (CH_{ar}) 130.22 (C_{ar}), 130.34 (2xCH_{ar}), 131.41 (CH_{ar}), 134.34 (C_{ar}), 135.85 (C_{ar}), 136.78 (2xCH_{ar}), 140.30 (C_{ar}), 142.30 (C_{ar}), 168.34 (C=O) ^{77}Se NMR **(**700 MHz, DMSO) δ= 438.84 ppm; IR**=**3263, 3069, 2957, 2872, 1637, 1586, 1531, 1459, 1447, 1371, 1342, 1257, 1120, 1099, 1072, 1020 cm^{-1}. Elemental Anal. Calcd for $C_{22}H_{19}NO_2Se$ (408.35): C, 64.71; H, 5.04; N, 3.43; Found C, 64.79; H, 4.70; N, 3.45;.

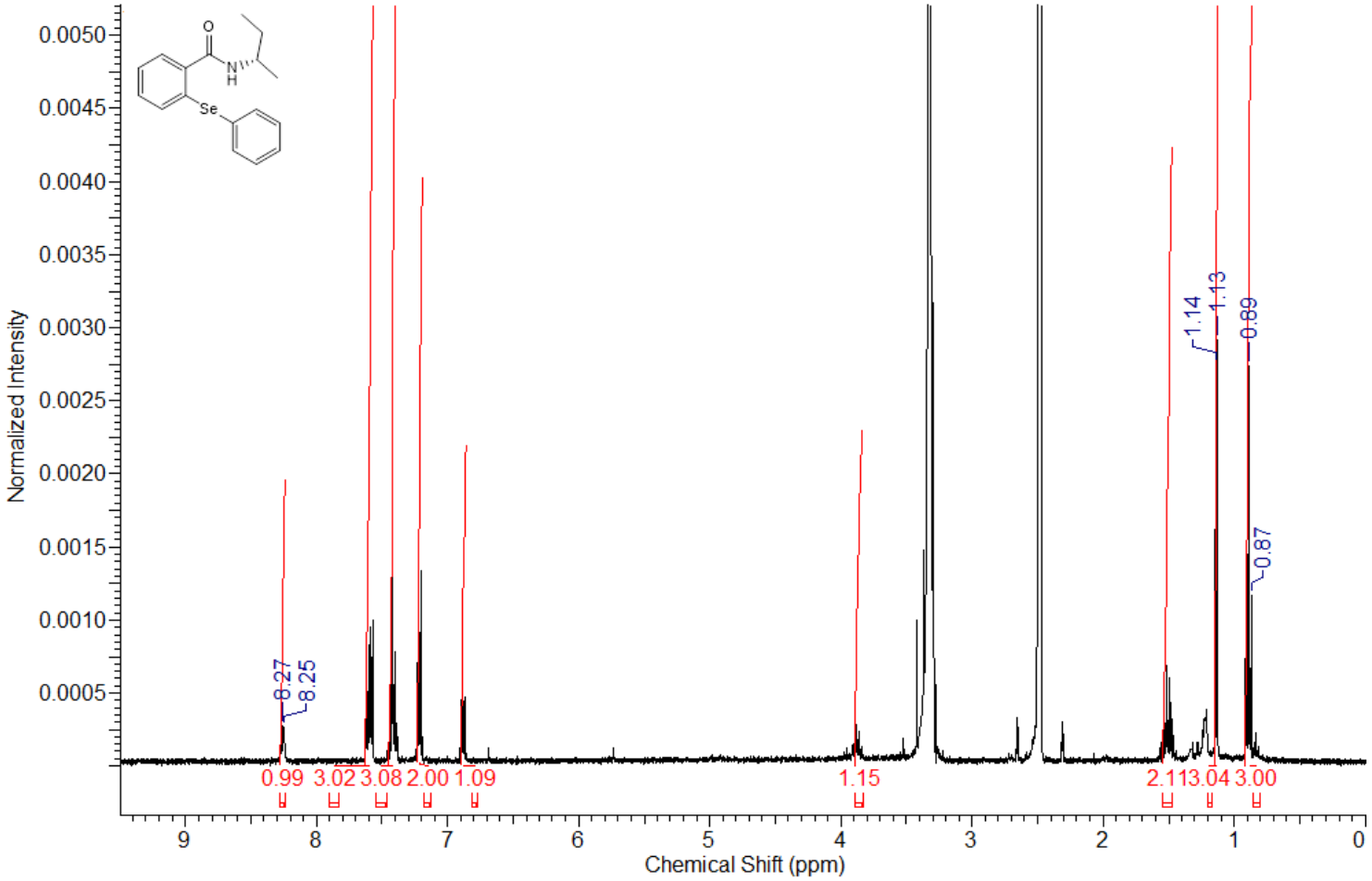
N-(*1R,2R*)-(-)-*trans*-2-hydroksy-1-indanyl- 2-(phenylselanyl)benzamide **19**

Yield: 35%; mp 145-146 °C; $[\propto]_D^{20}$ = -25 (c=0.57, $CHCl_3$);

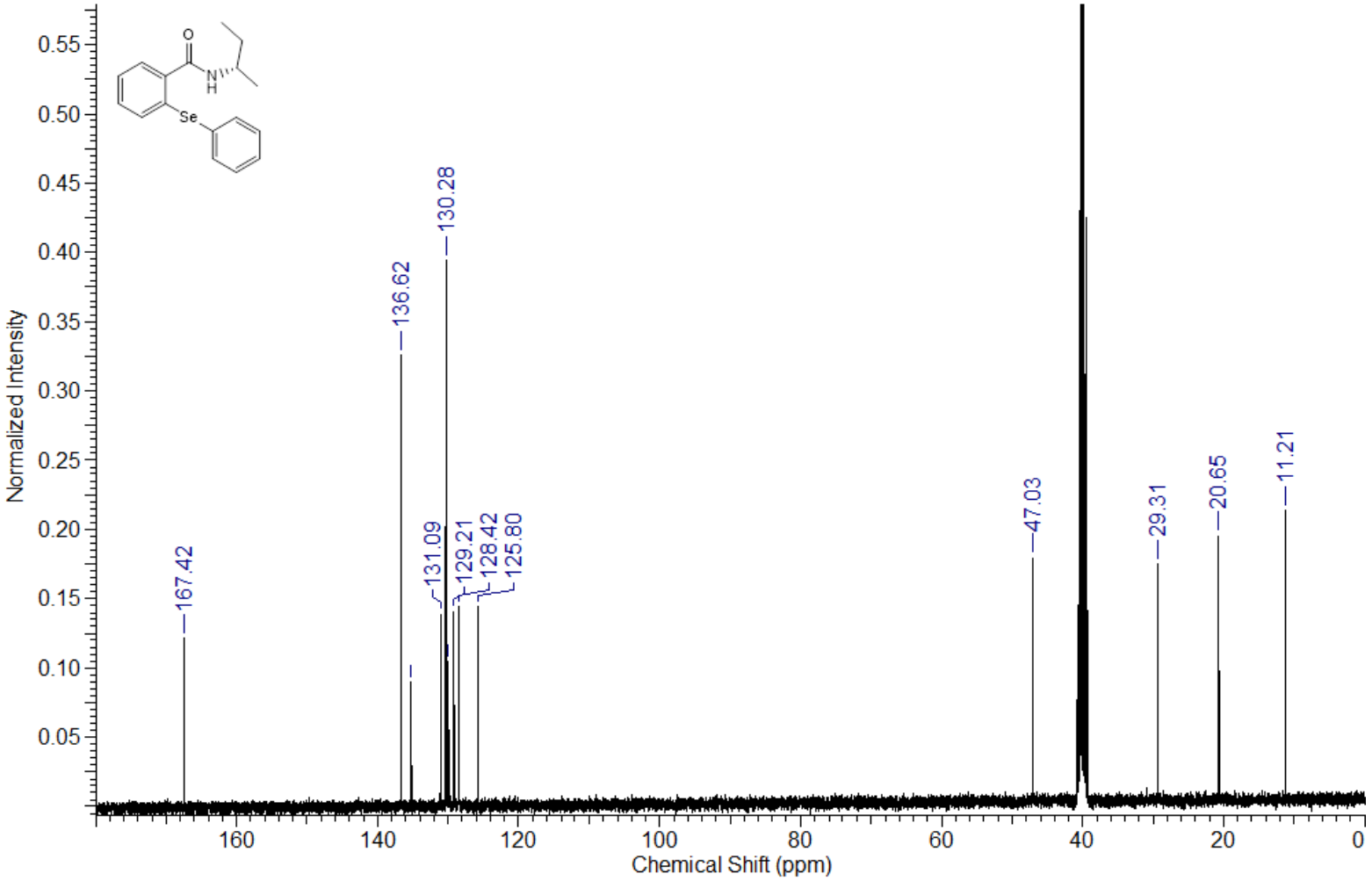
^{1}H NMR (400 MHz, DMSO) δ= 2.70-2.80 (m, 1H), 3.10-3.20 (m, 1H), 4.39-4.46 (m, 1H), 5.24 (t, J=7.6 Hz, 1H), 5.39 (d, J=6 Hz, 1H), 6.89-6.93(m, 1H_{ar}), 7.18-7.27 (m, 6H_{ar}), 7.40-7.47 (m, 3H_{ar}), 7.60-7.64 (m, 2H_{ar}), 7.71-7.77 (m, 1H_{ar}), 8.86 (d, J=8.4 Hz, 1H) ^{13}C NMR (700 MHz, DMSO) δ= 39.24 (CH_2), 62.05 (CH), 77.81 (CH), 124.43 (CH_{ar}), 125.12 (CH_{ar}), 125.76 (CH_{ar}), 127.17 (CH_{ar}), 128.10 (CH_{ar}), 128.73 (CH_{ar}), 129.30 (CH_{ar}), 129.87 (CH_{ar}) 130.25 (C_{ar}), 130.34 (2xCH_{ar}), 131.40 (CH_{ar}), 134.42 (C_{ar}), 135.80 (C_{ar}), 136.75 (2xCH_{ar}), 140.33 (C_{ar}), 142.31 (C_{ar}), 168.36 (C=O) ^{77}Se NMR **(**700 MHz, DMSO) δ= 439.99 ppm; IR**=**3256, 3045, 2923, 2846, 1634, 1584, 1528, 1477, 1435, 1342, 1309, 1285, 1215, 1173, 1123, 1062, 1021 cm^{-1}. Elemental Anal. Calcd for $C_{22}H_{19}NO_2Se$ (408.35): C, 64.71; H, 5.04; N, 3.43; Found C, 64.78; H, 4.72; N, 3.40;.

2. ^{1}H, ^{13}C and ^{77}Se NMR spectra of phenylselenides **6**-**19**

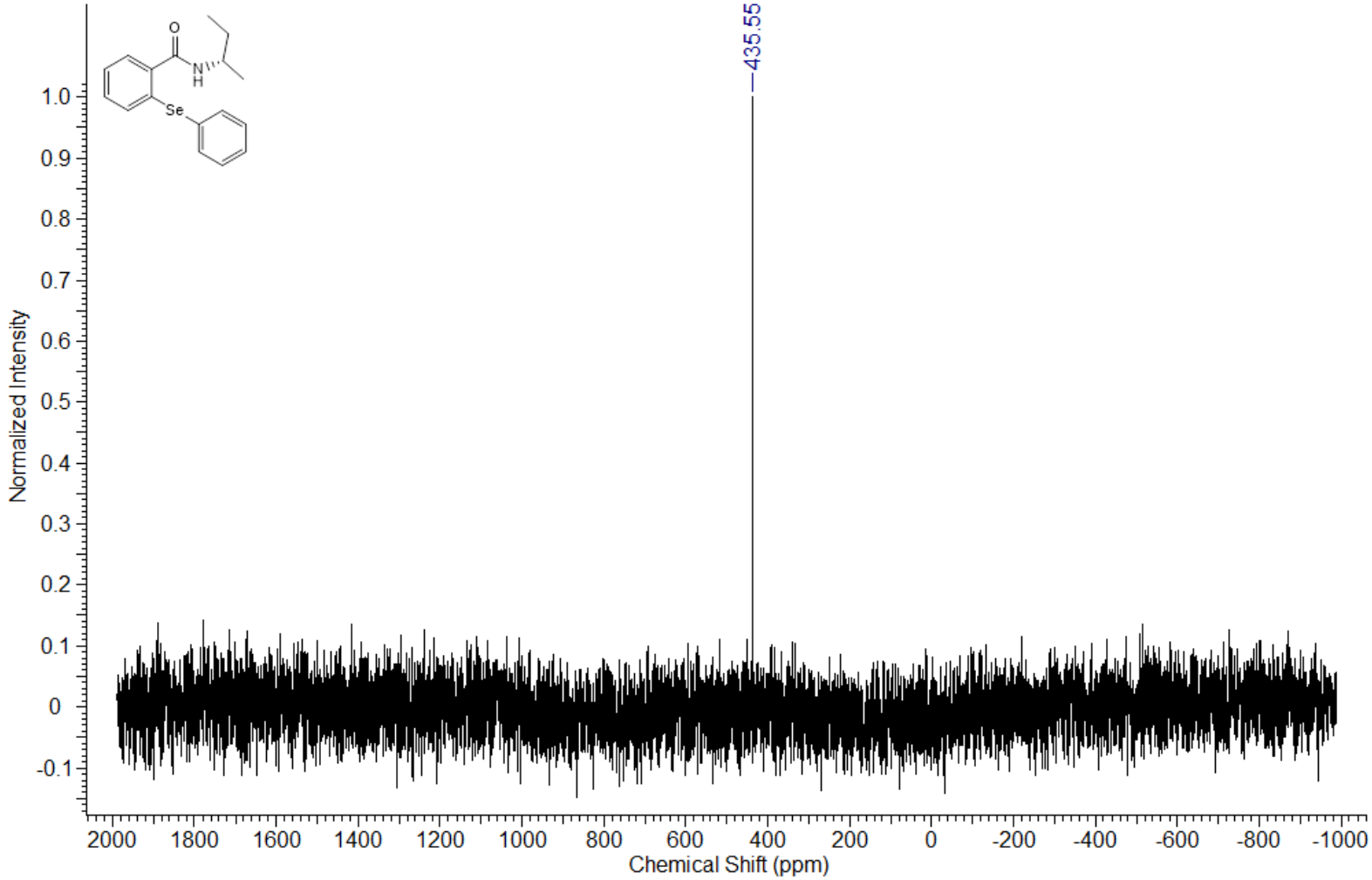
N-(*S*)-(+)-*sec*-butyl-2-(phenylselanyl)benzamide **6**



^{1}H NMR spectra

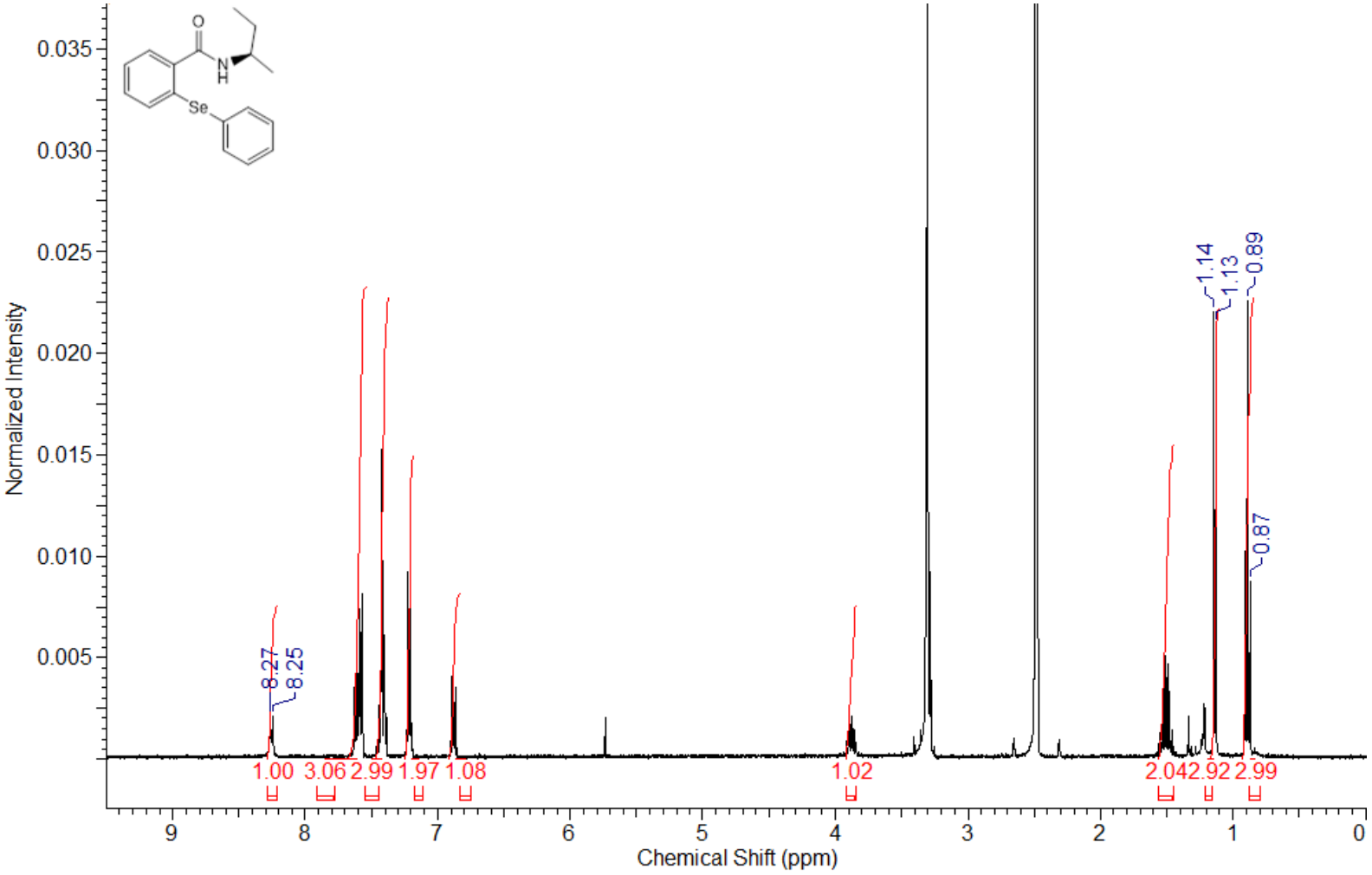


^{13}C NMR spectra

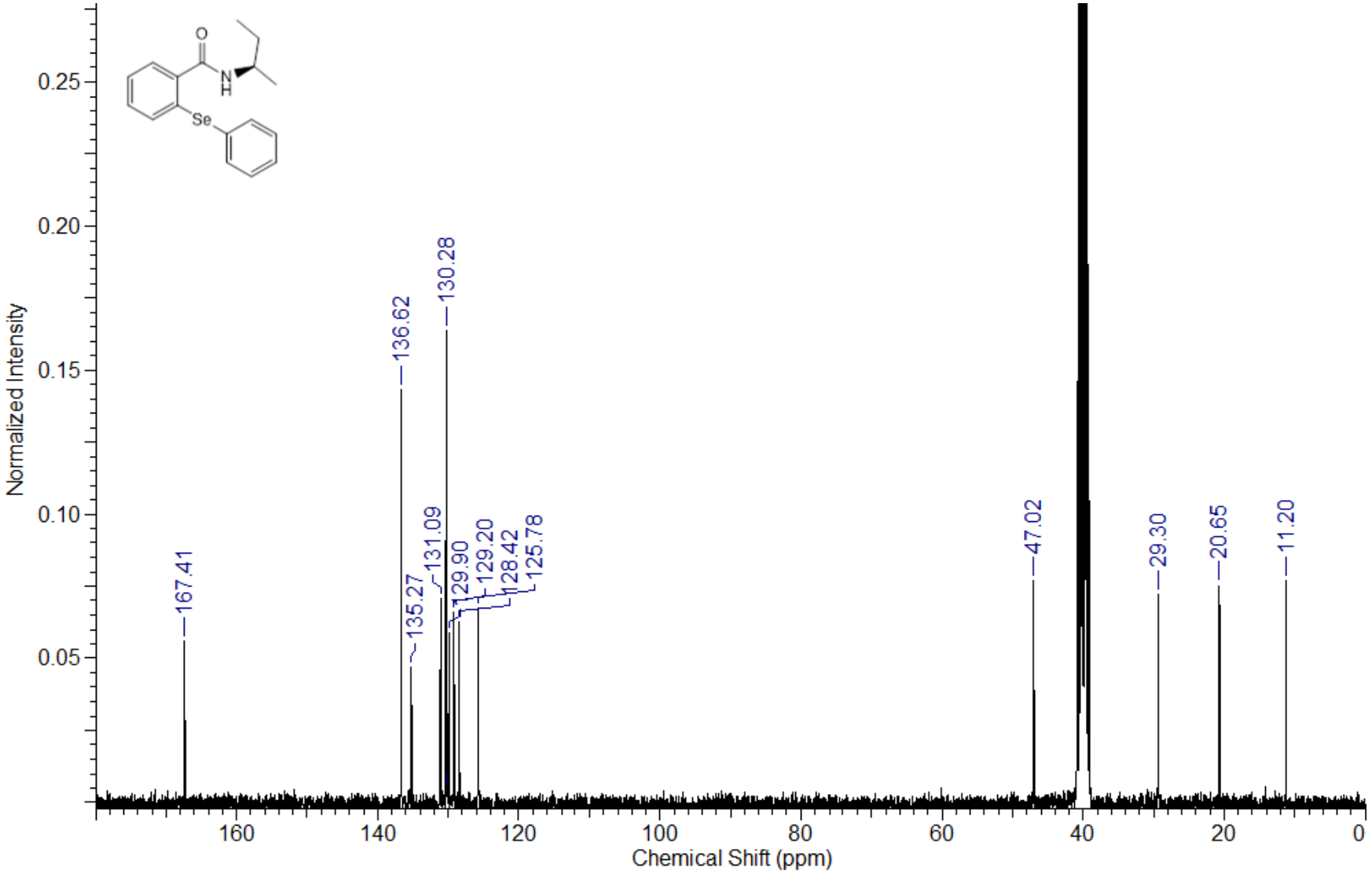


^{77}Se NMR spectra

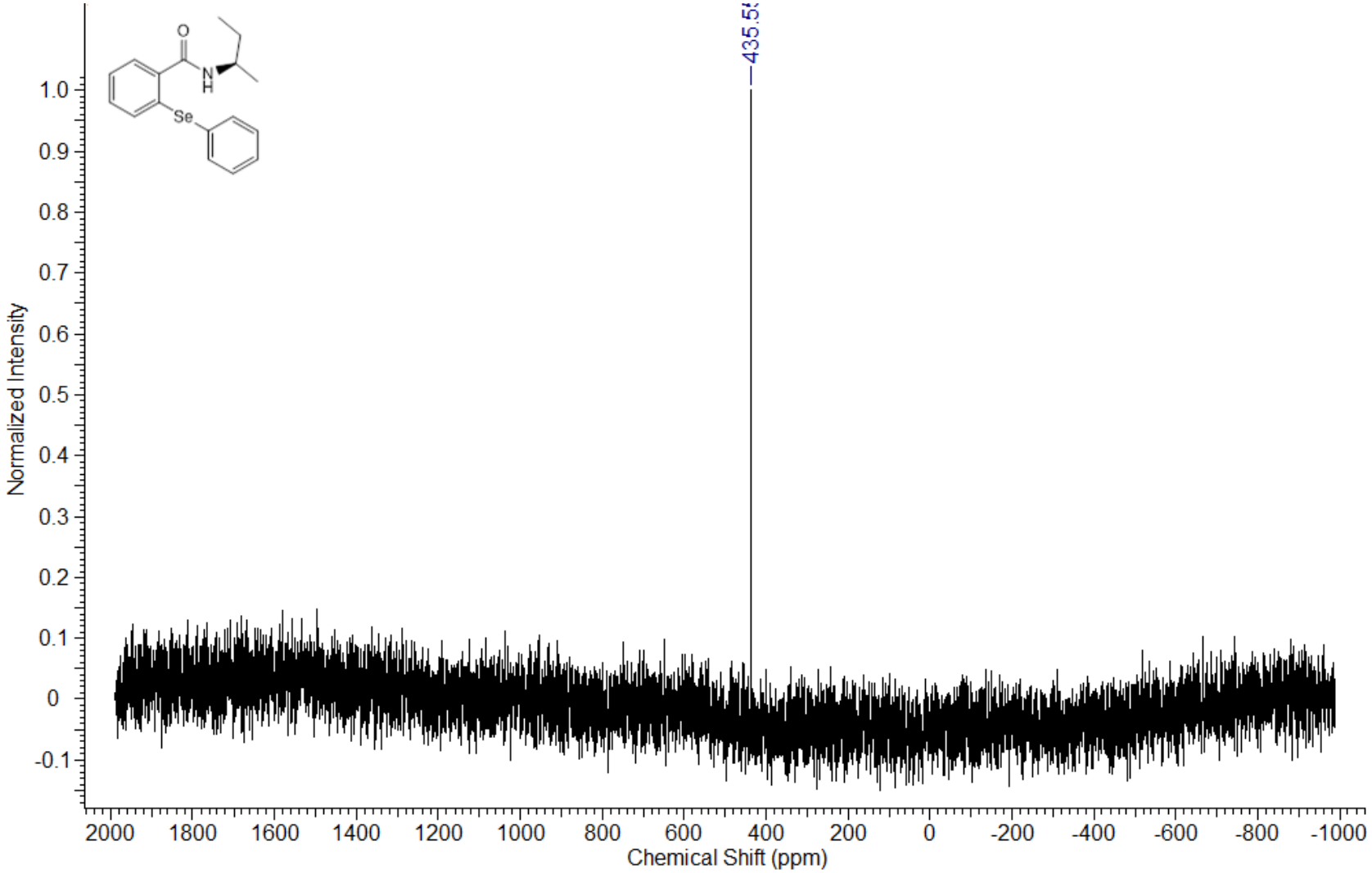
N-(*R*)-(-)-*sec*-butyl-2-(phenylselanyl)benzamide **7**



^{1}H NMR spectra

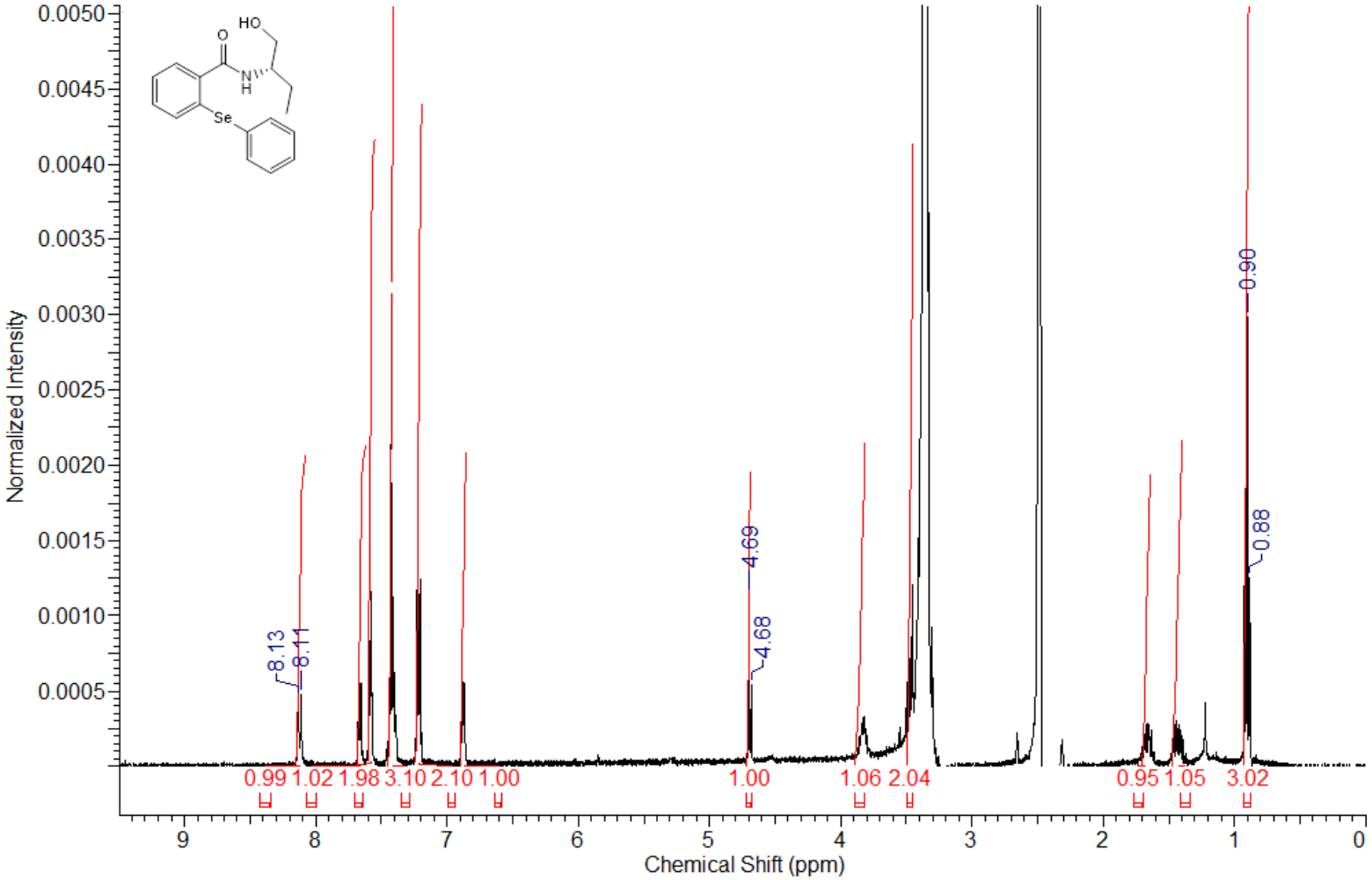


^{13}C NMR spectra

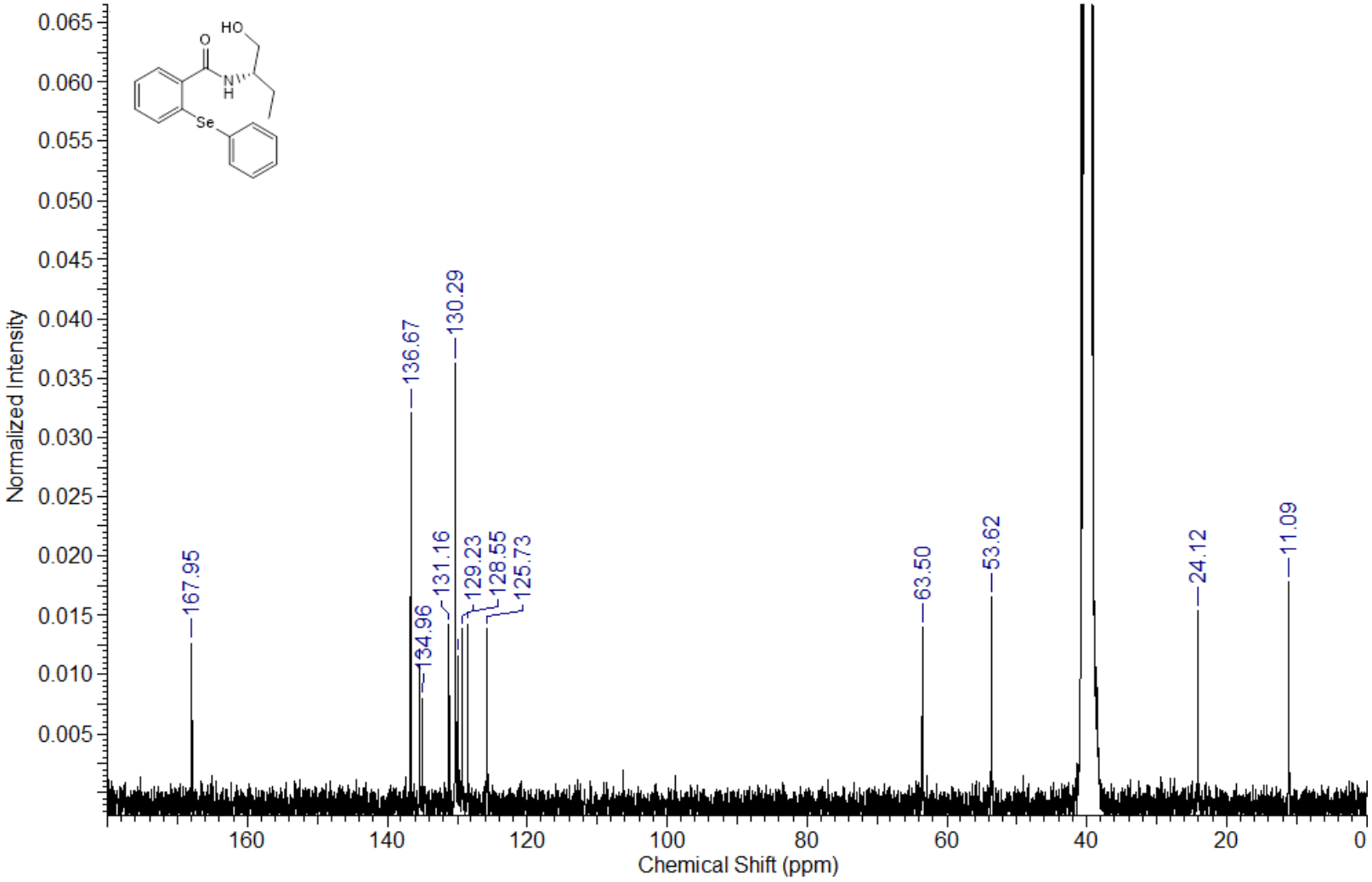


^{77}Se NMR spectra

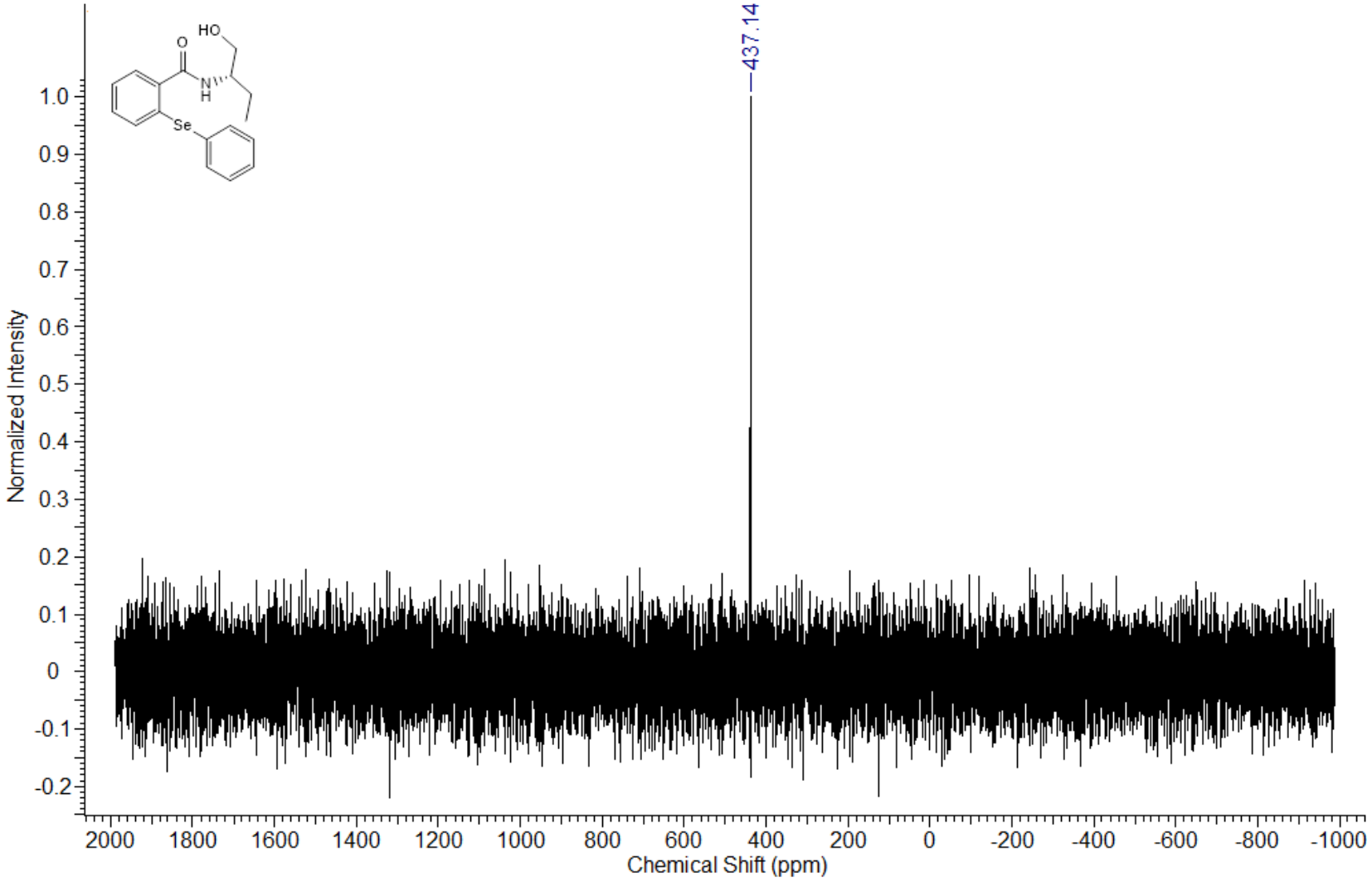
N-(*R*)-(-)-1-hydroksy-2-butanyl-2-(phenylselanyl)benzamide **8**



[1] HNMR spectra

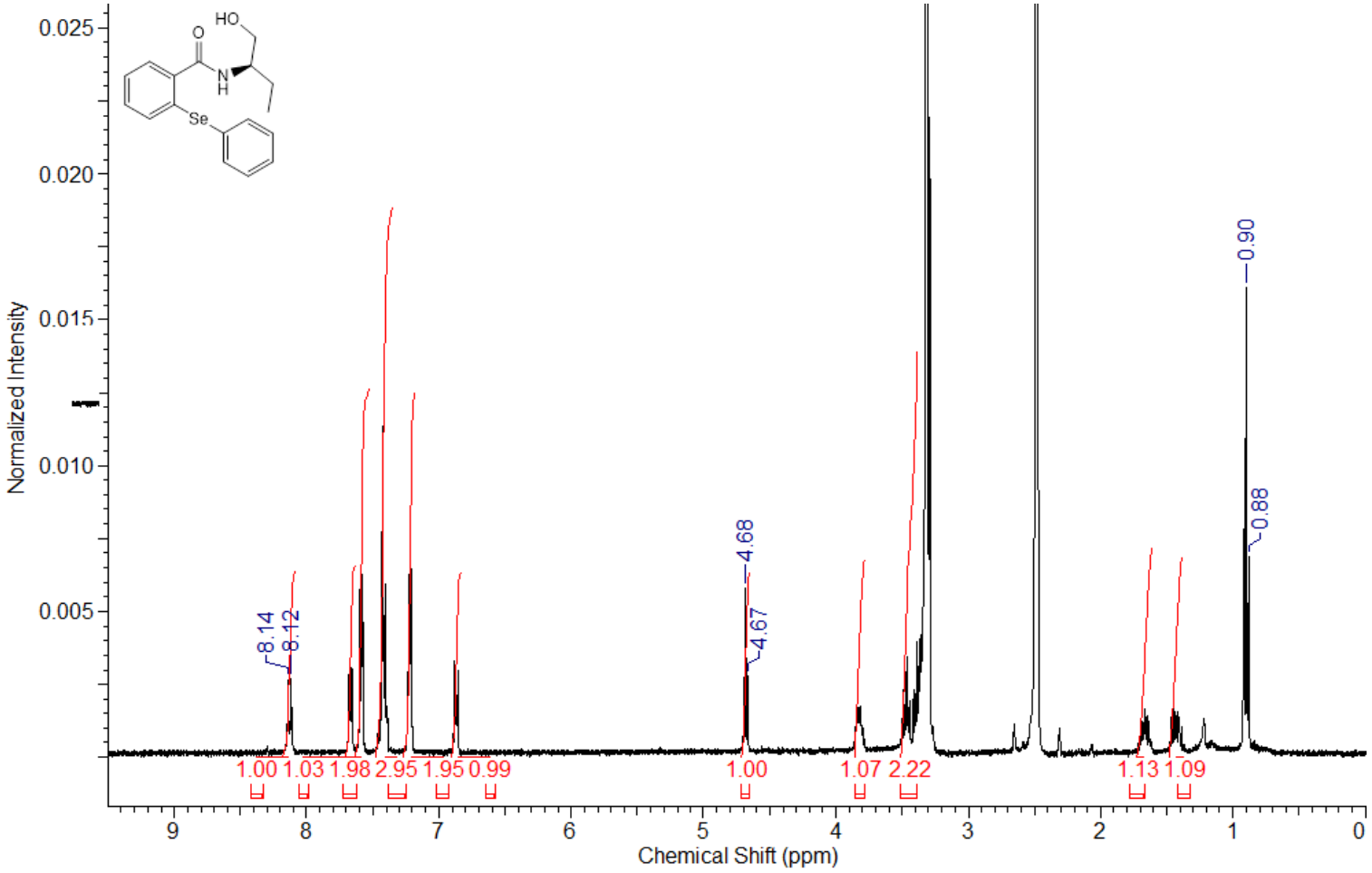


^{13}C NMR spectra

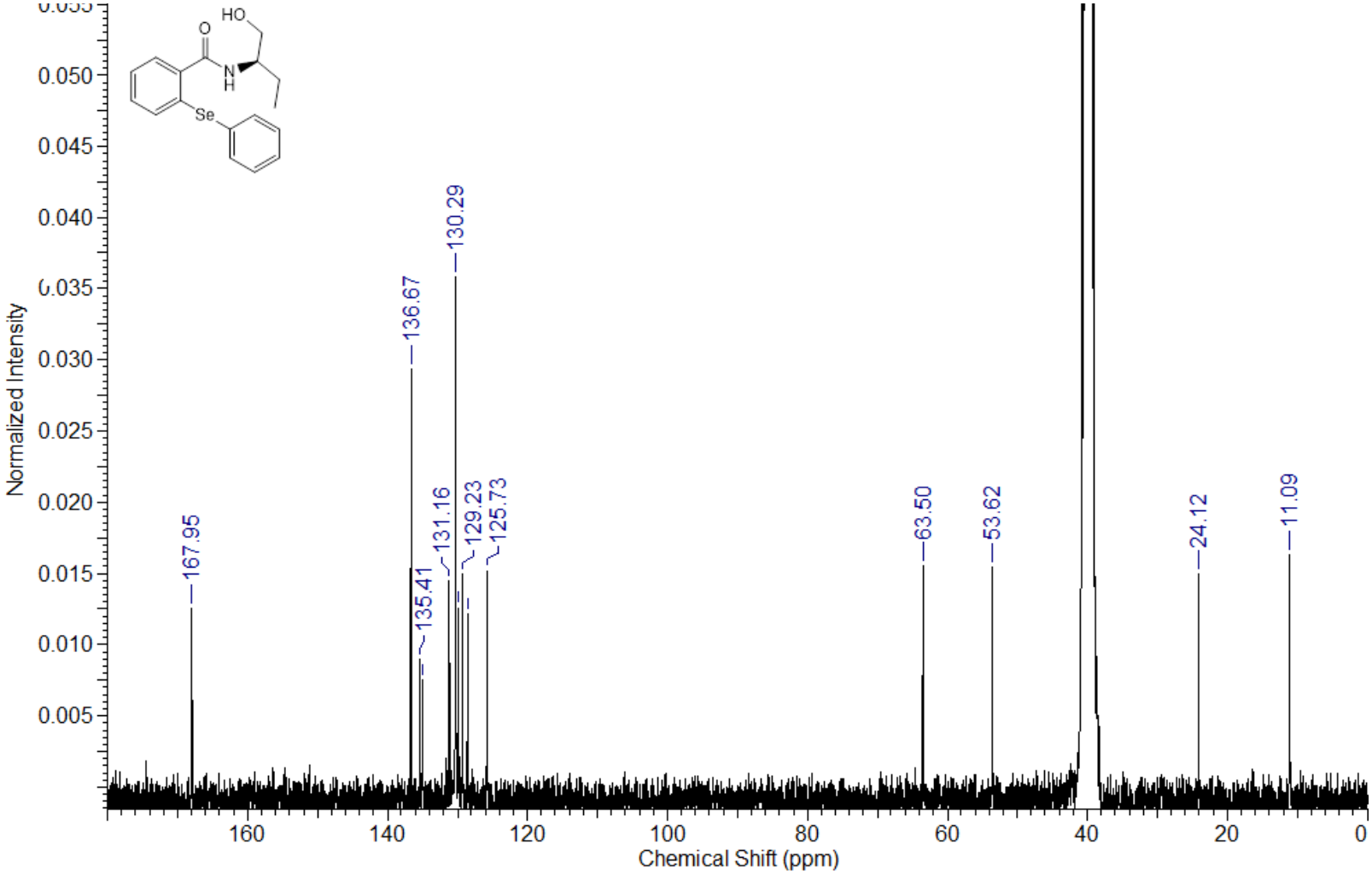


^{77} Se NMR spectra

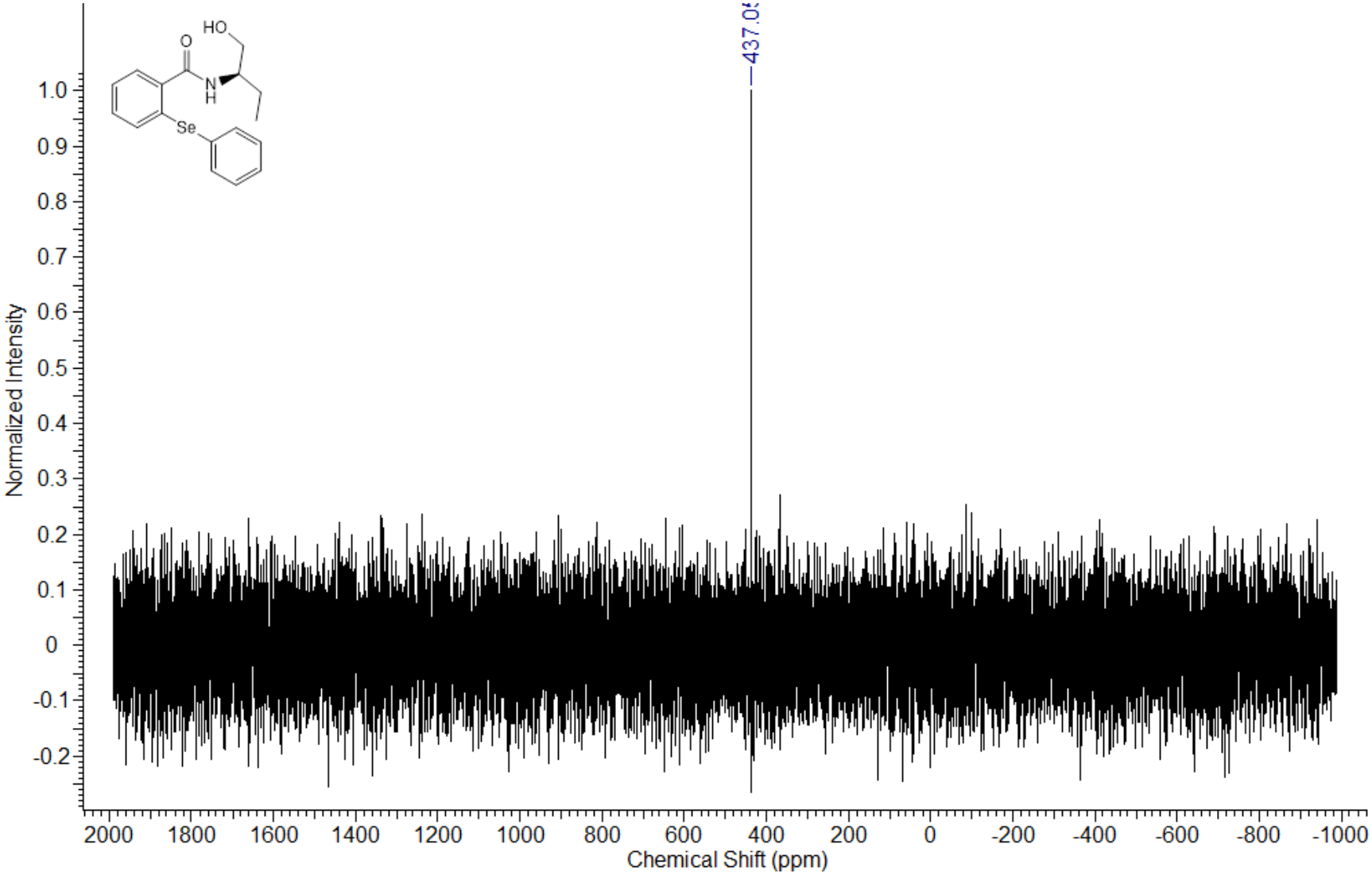
N-(*S*)-(+)-1-hydroksy-2-butanyl-2-(phenylselanyl)benzamide **9**



^{1}H NMR spectra

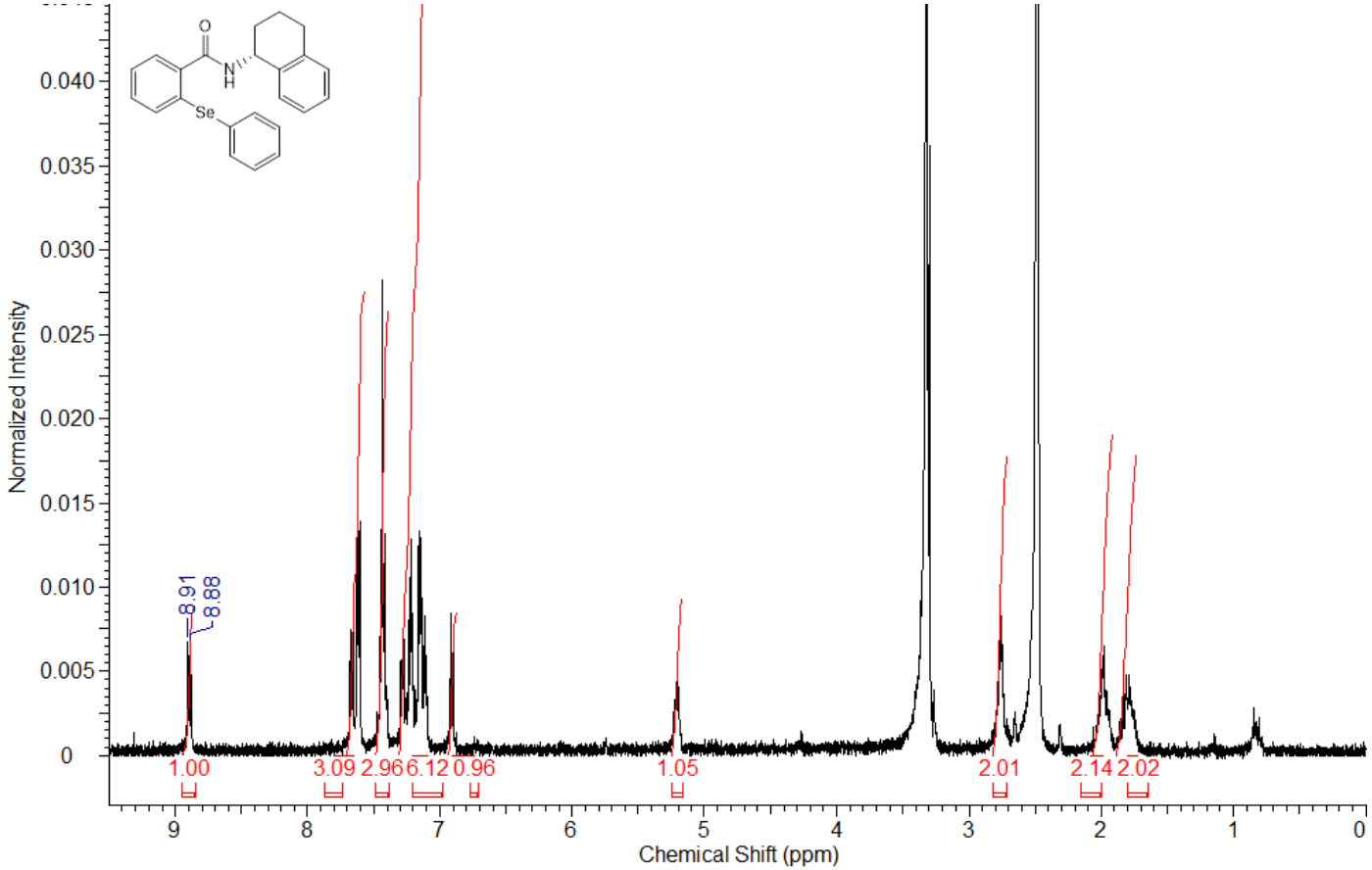


^{13}C NMR spectra

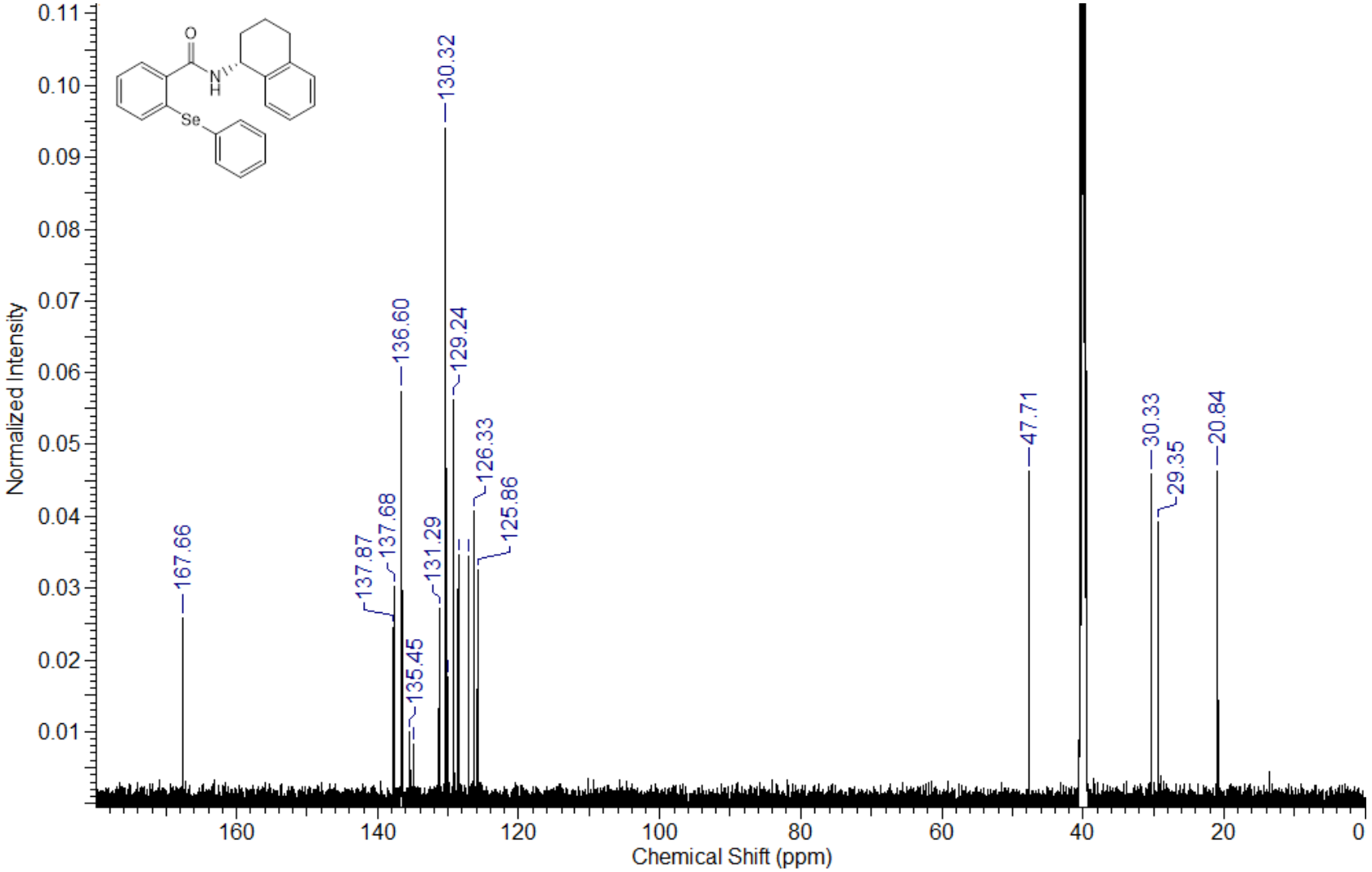


^{77} Se NMR spectra

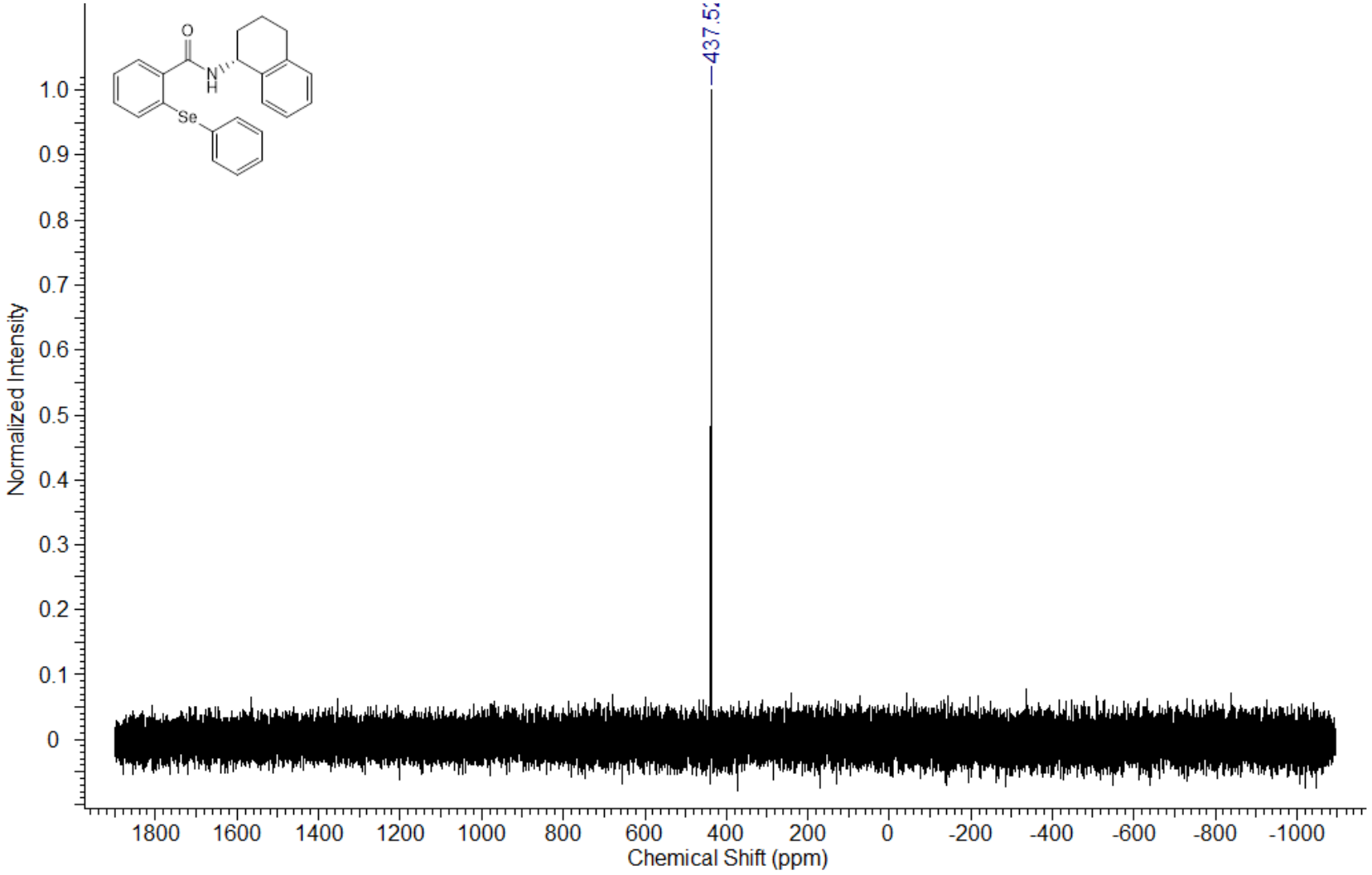
N-(*R*)-(-)-1,2,3,4-tetrahydro-1-napthyl-2-(phenylselanyl)benzamide **10**



^{1}H NMR spectra

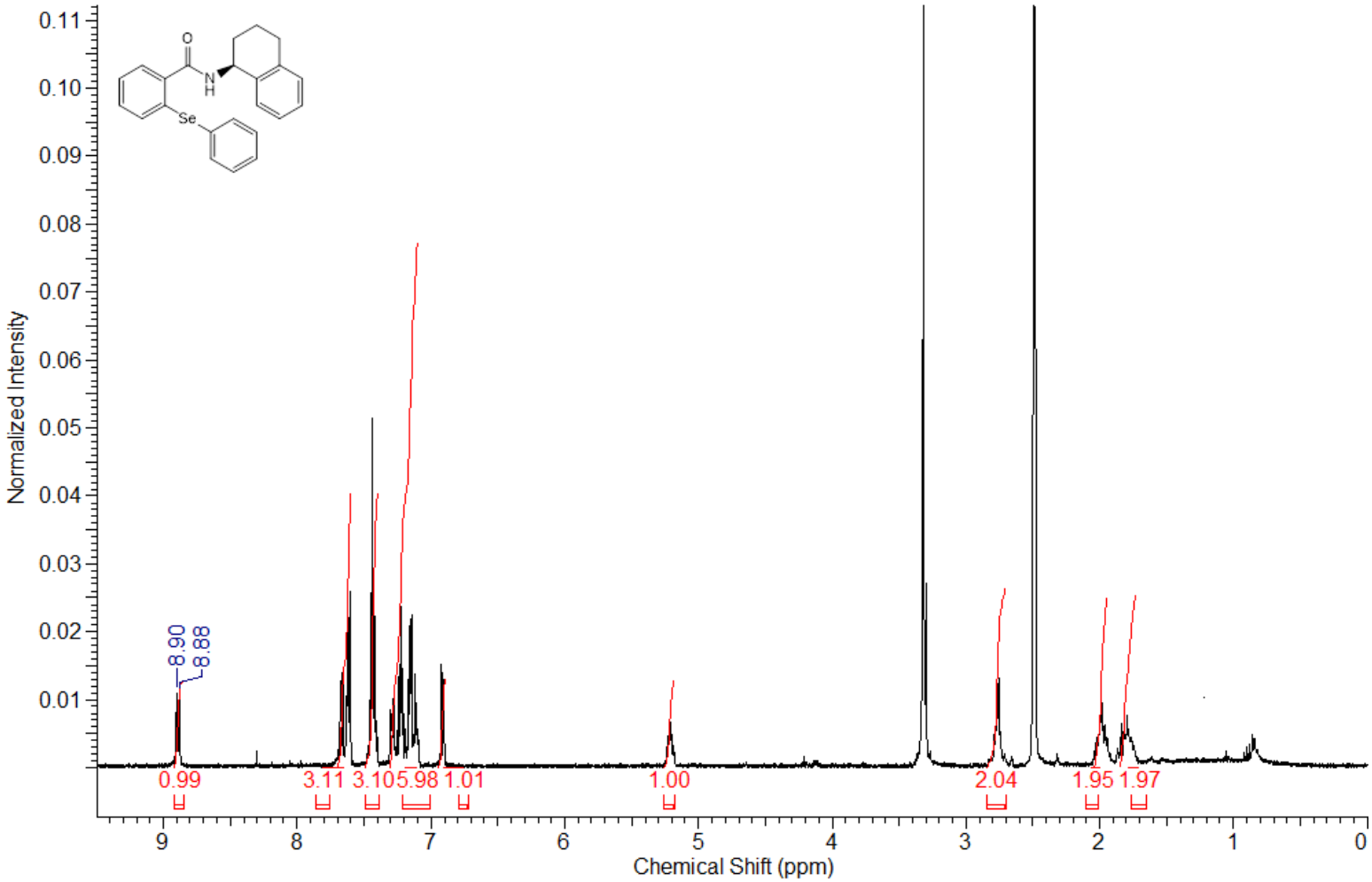


^{13}C NMR spectra

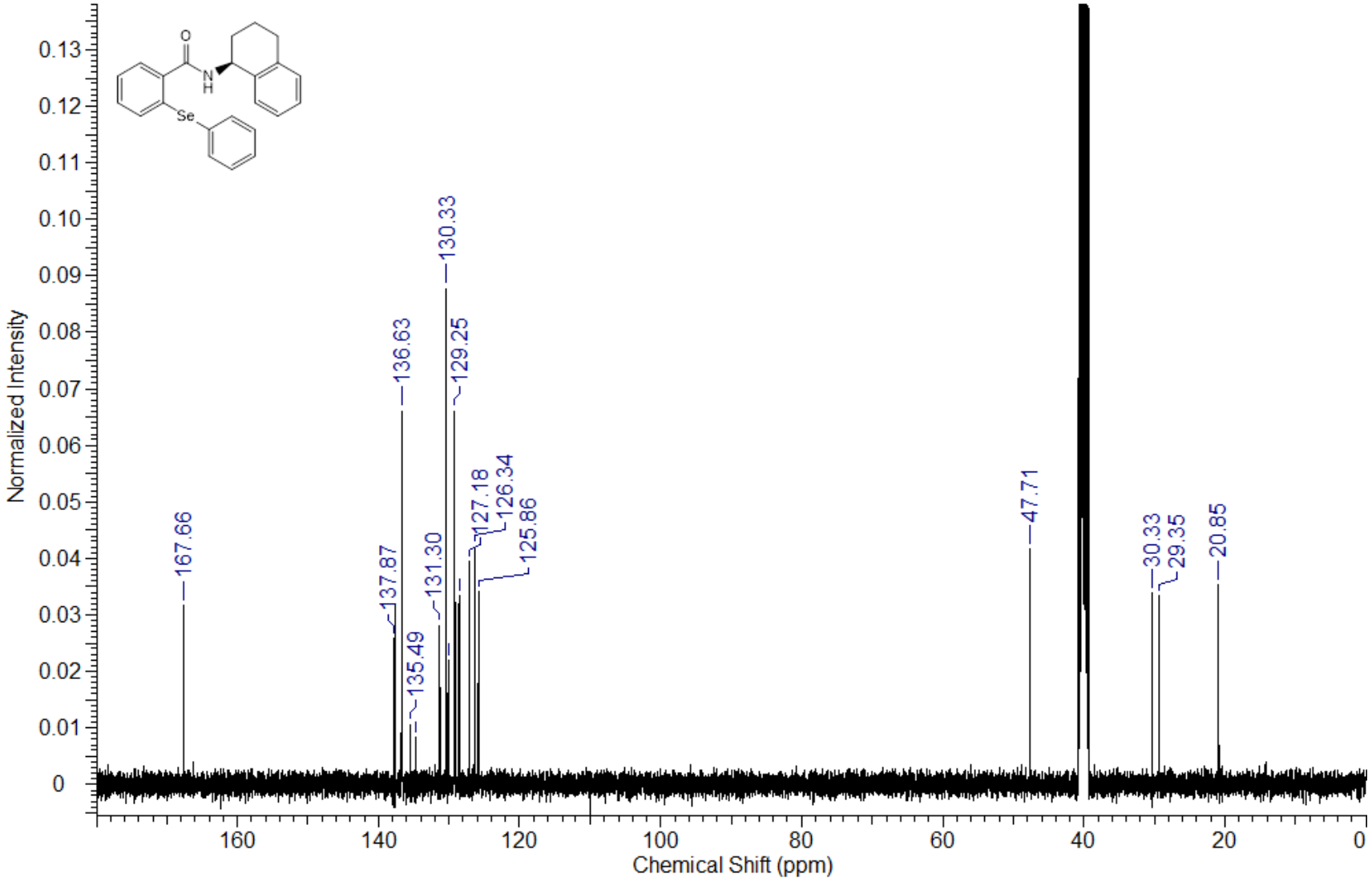


^{77}Se NMR spectra

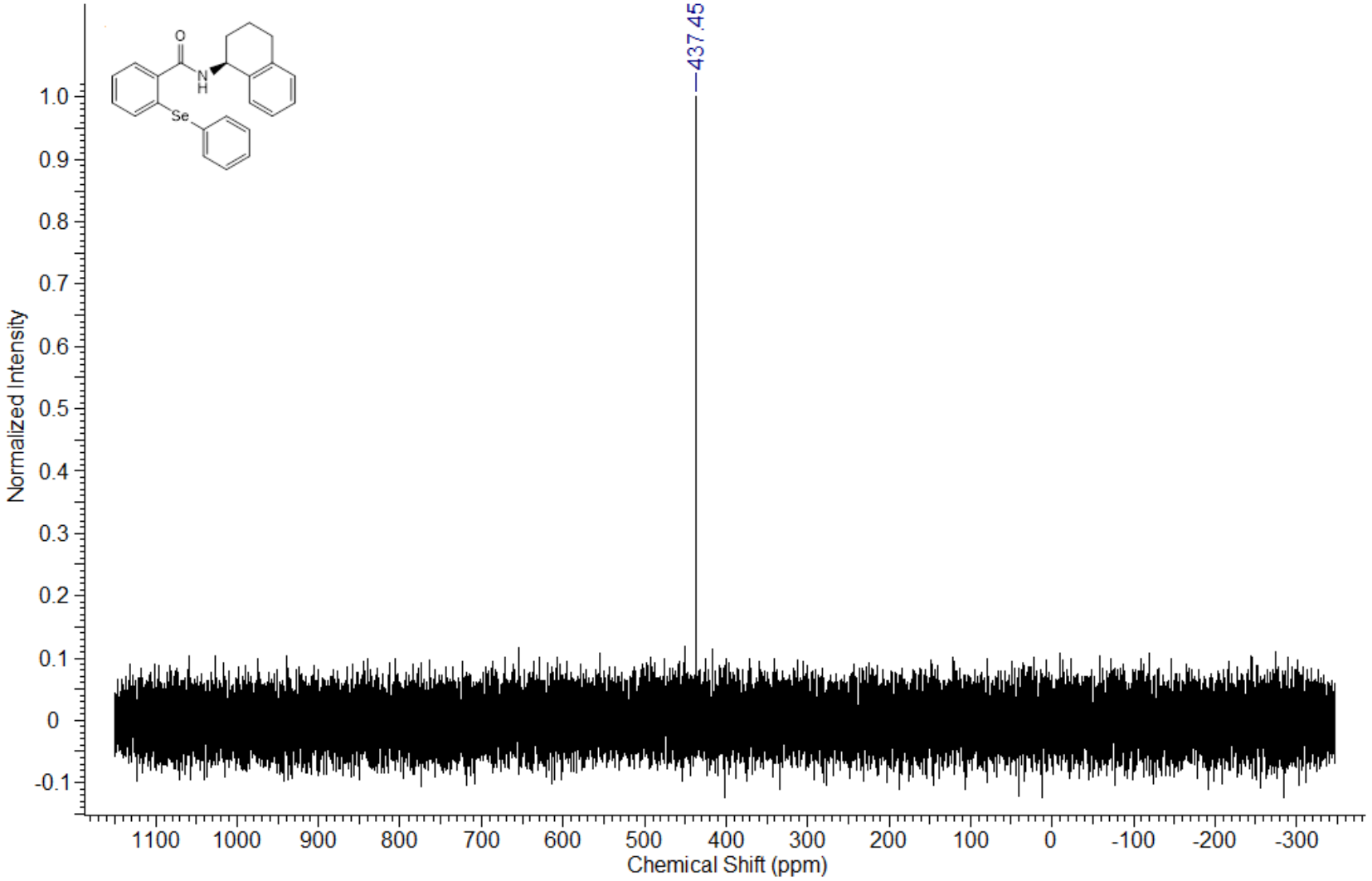
N-(*S*)-(+)-1,2,3,4-tetrahydro-1-napthyl-2-(phenylselanyl)benzamide **11**



^{1}H NMR spectra

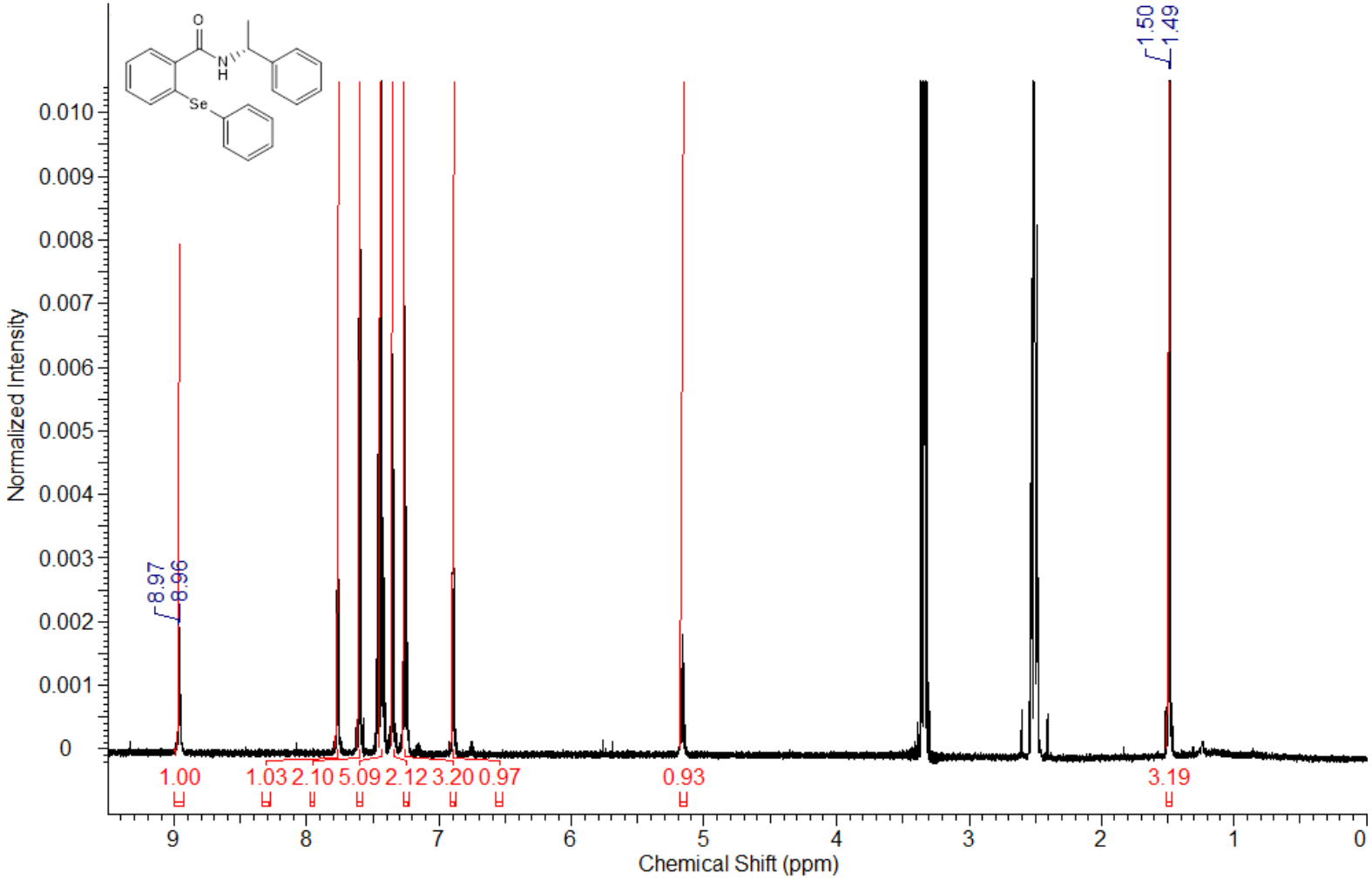


^{13}C NMR spectra

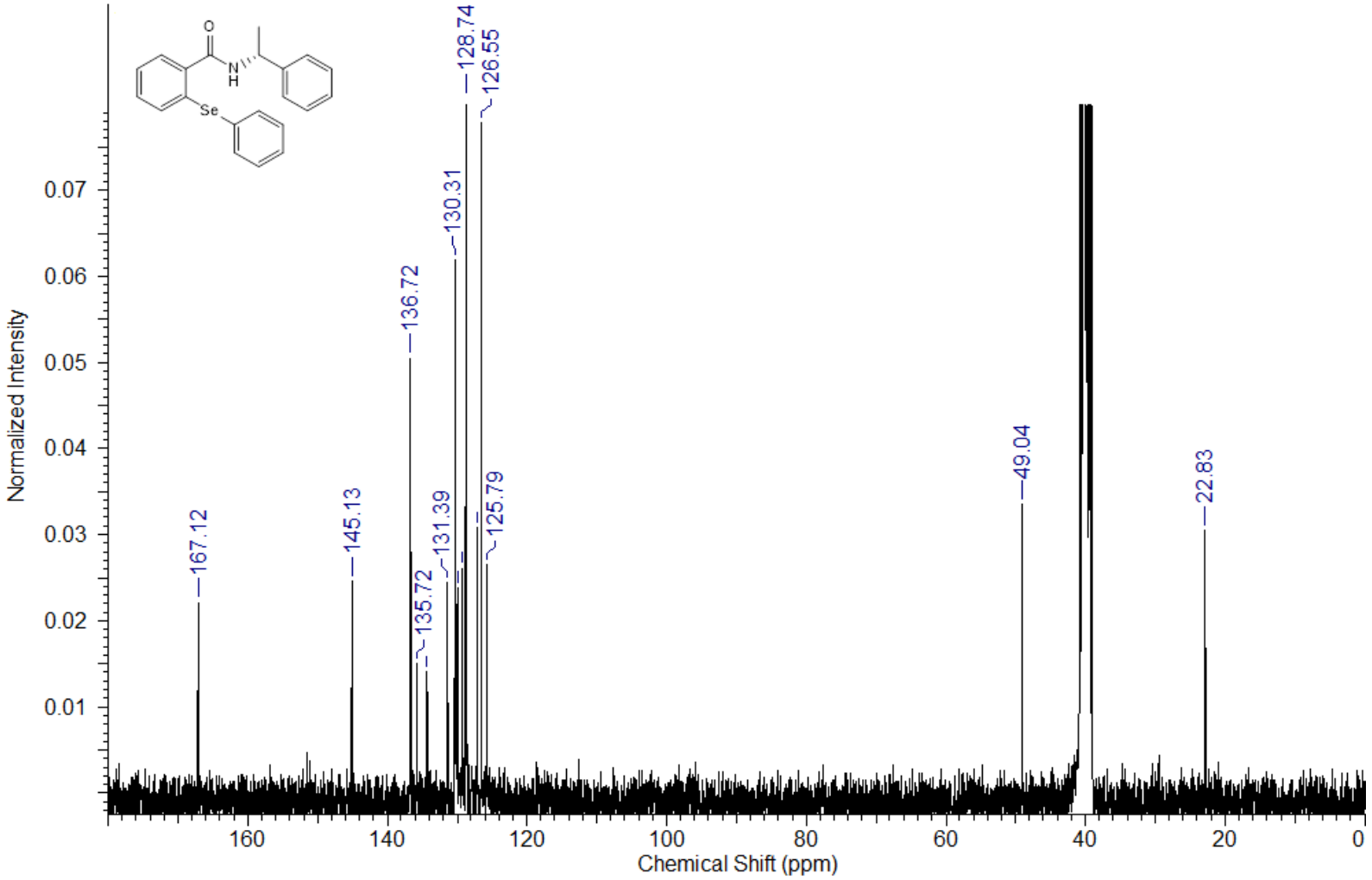


^{77}Se NMR spectra

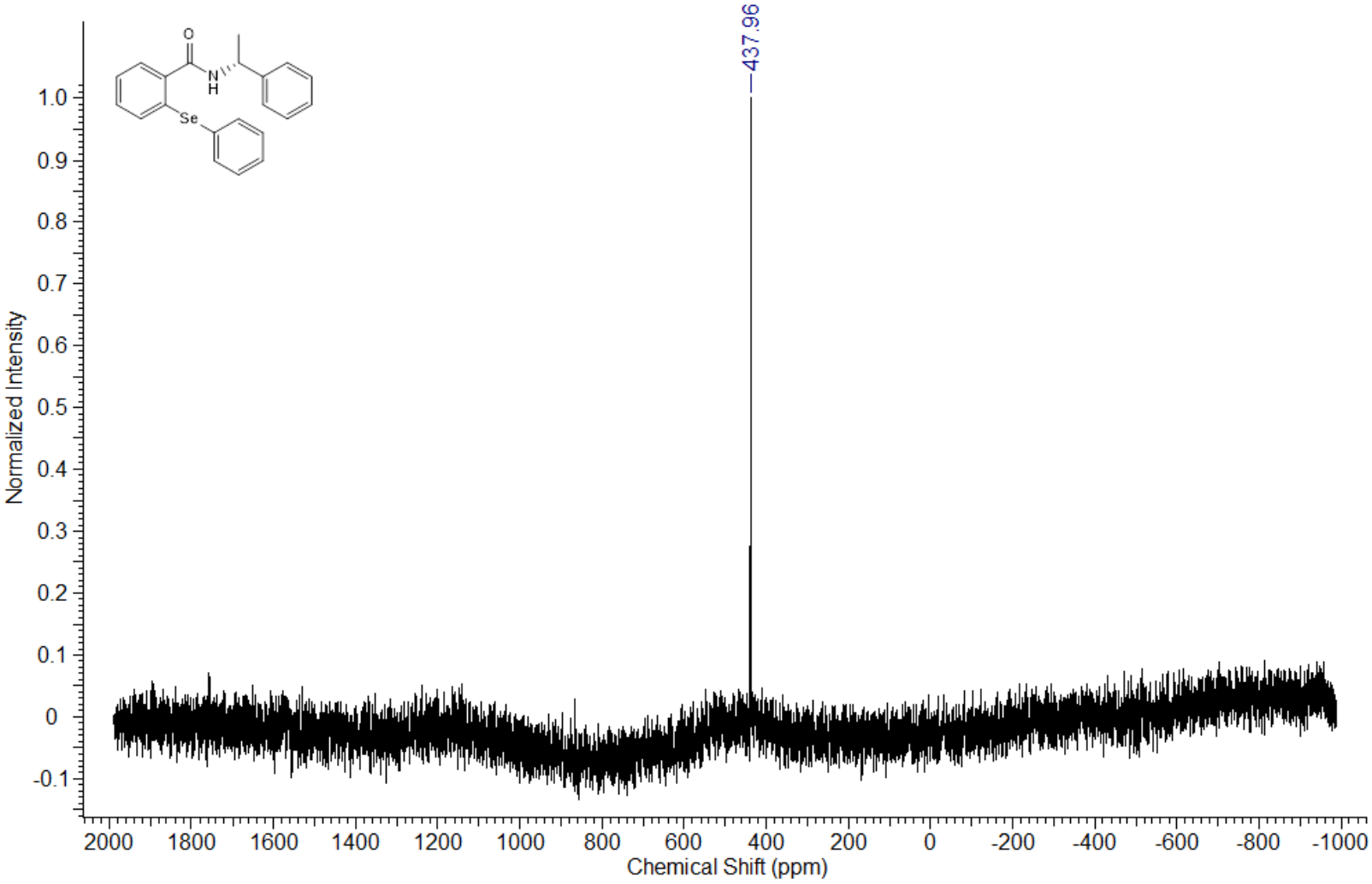
N-(R)-(+)-α-metylbenzyl- 2-(phenylselanyl)benzamide **12**



^{1}H NMR spectra

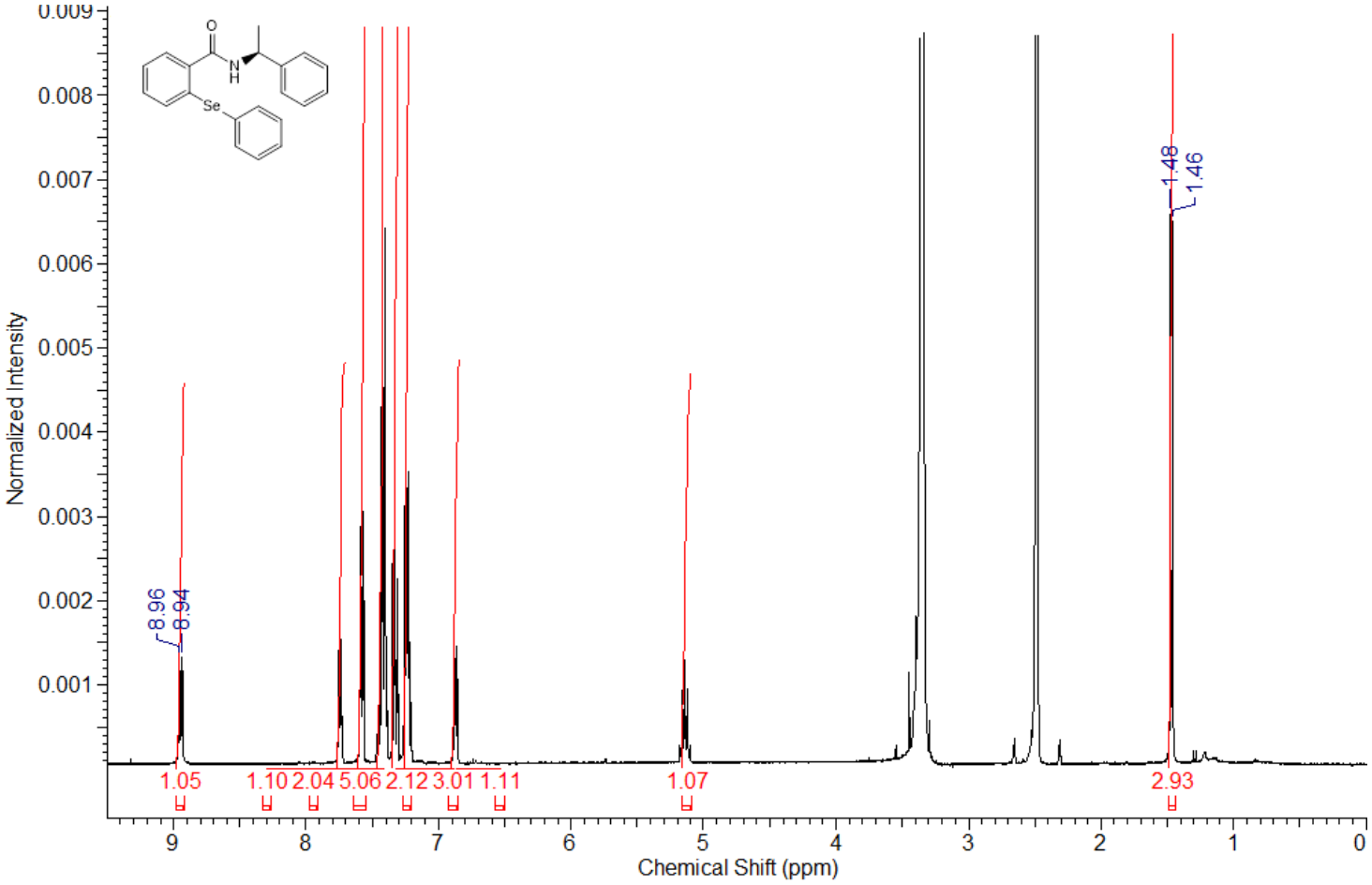


^{13}C NMR spectra

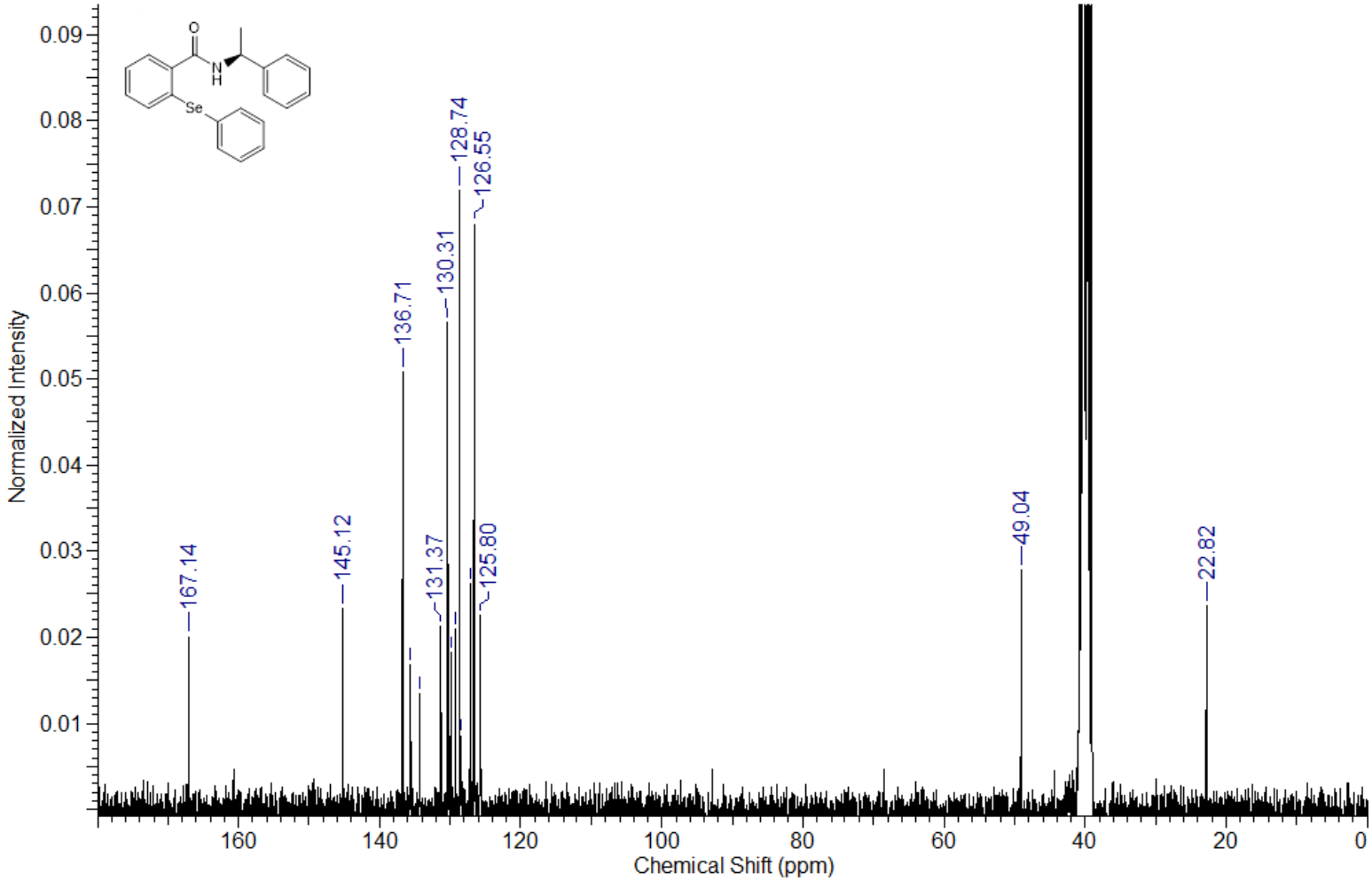


^{77}Se NMR spectra

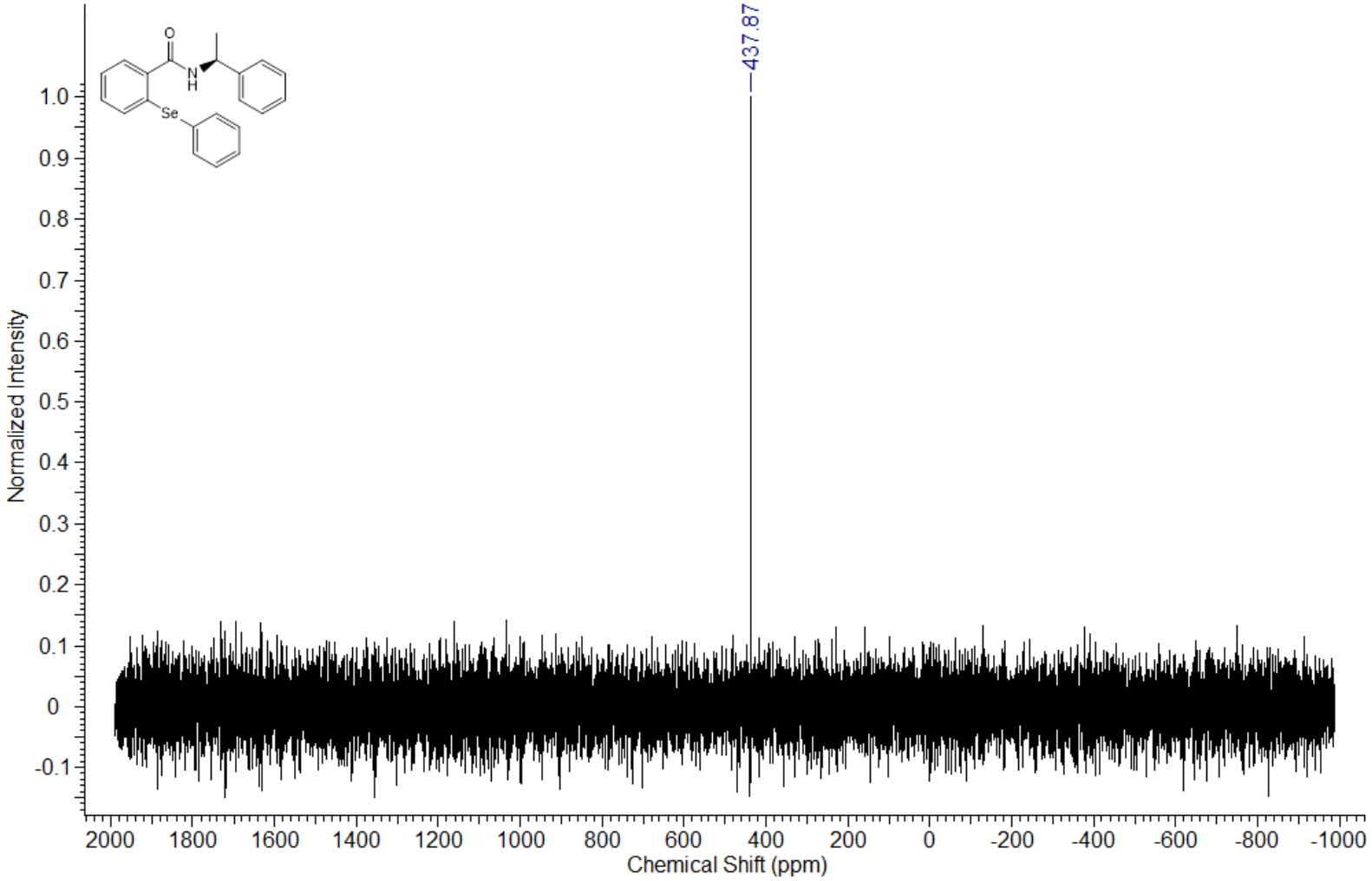
N-(S)-(-)-α-metylbenzyl- 2-(phenylselanyl)benzamide **13**



^{1}H NMR spectra

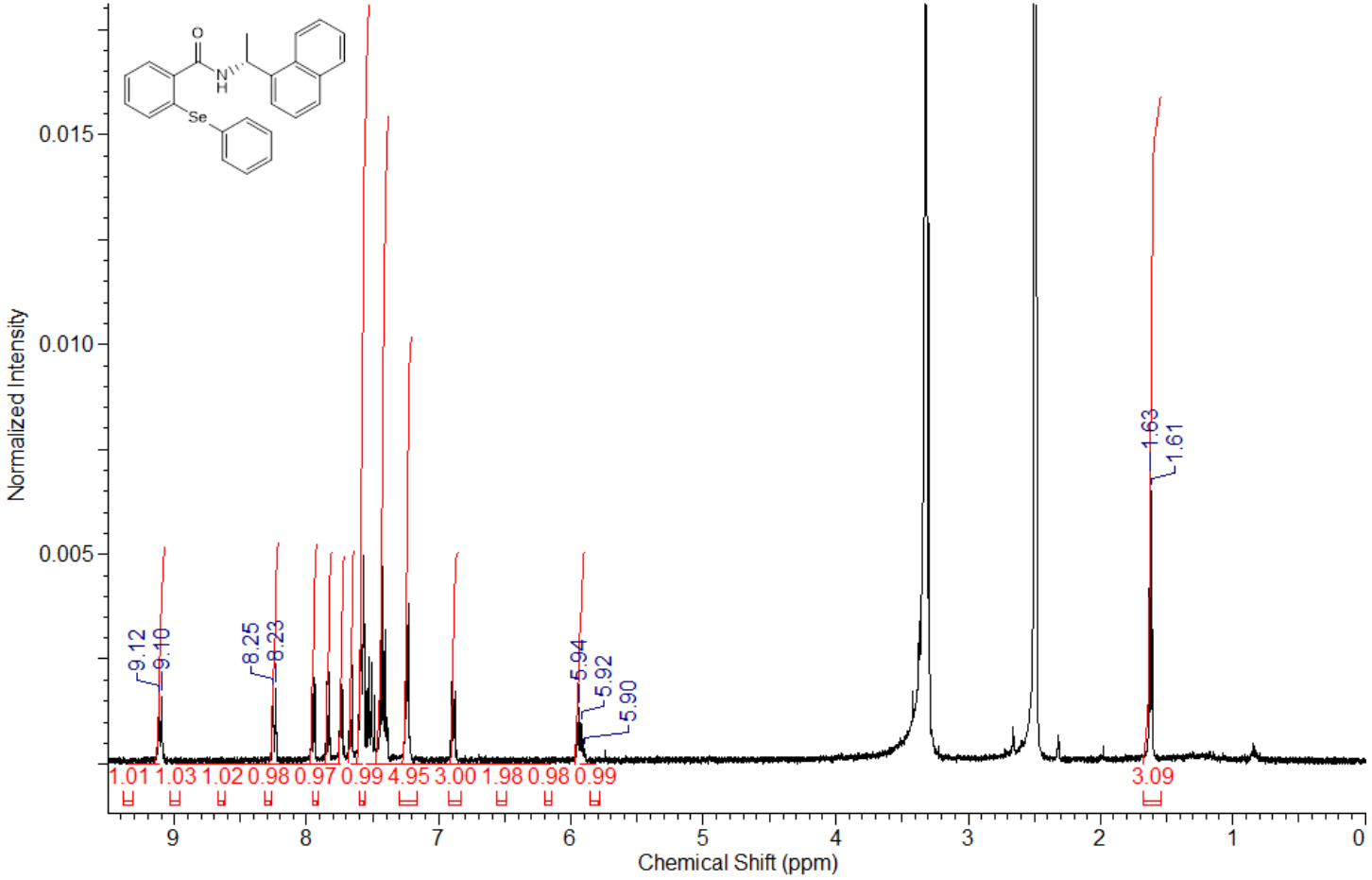


^{13}C NMR spectra

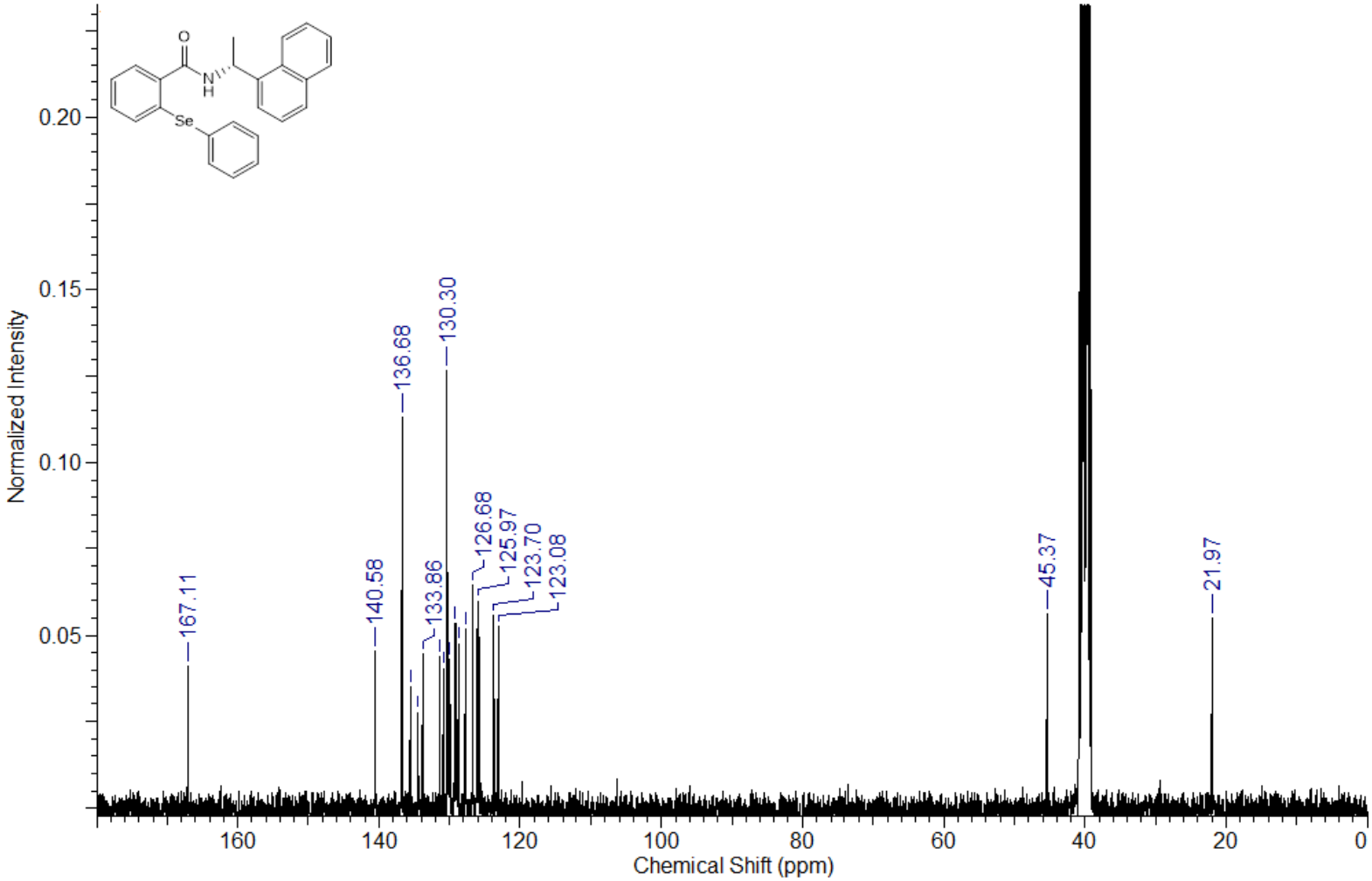


^{77}Se NMR spectra

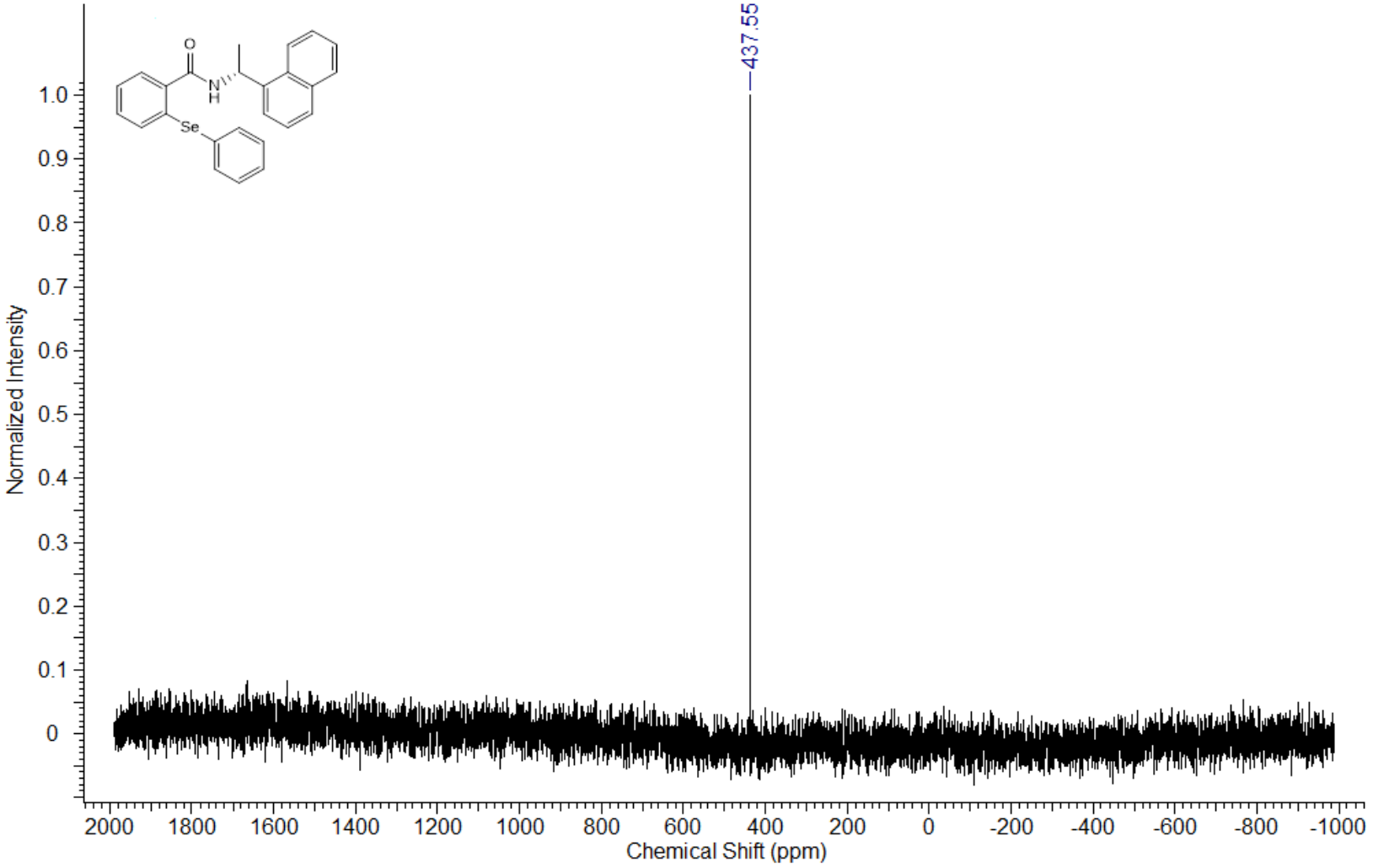
N-(*S*)-(-)-1-(1-napthyl)etyl-2-(phenylselanyl)benzamide **14**



^{1}H NMR spectra

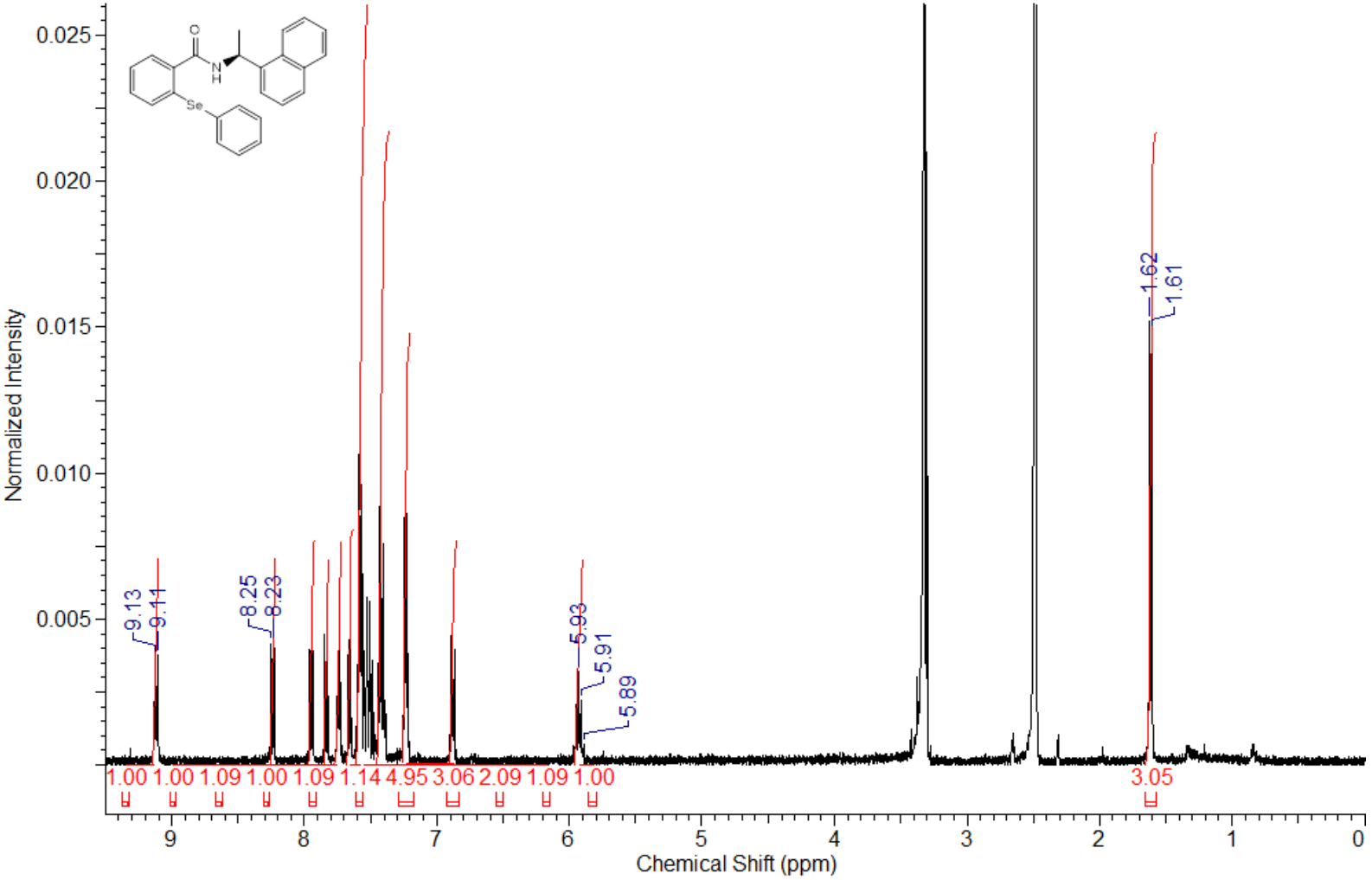


^{13}C NMR spectra

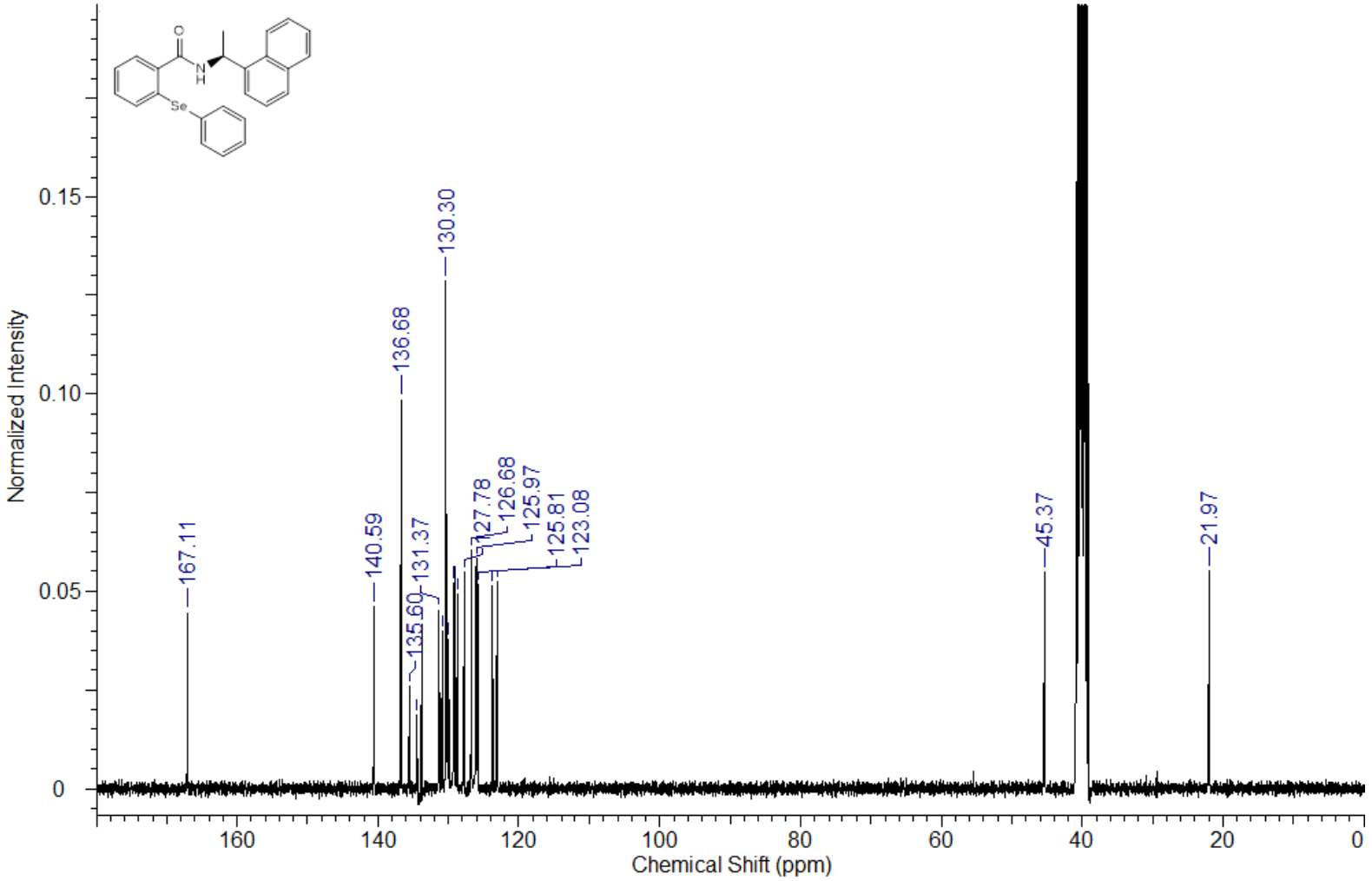


^{77}Se NMR spectra

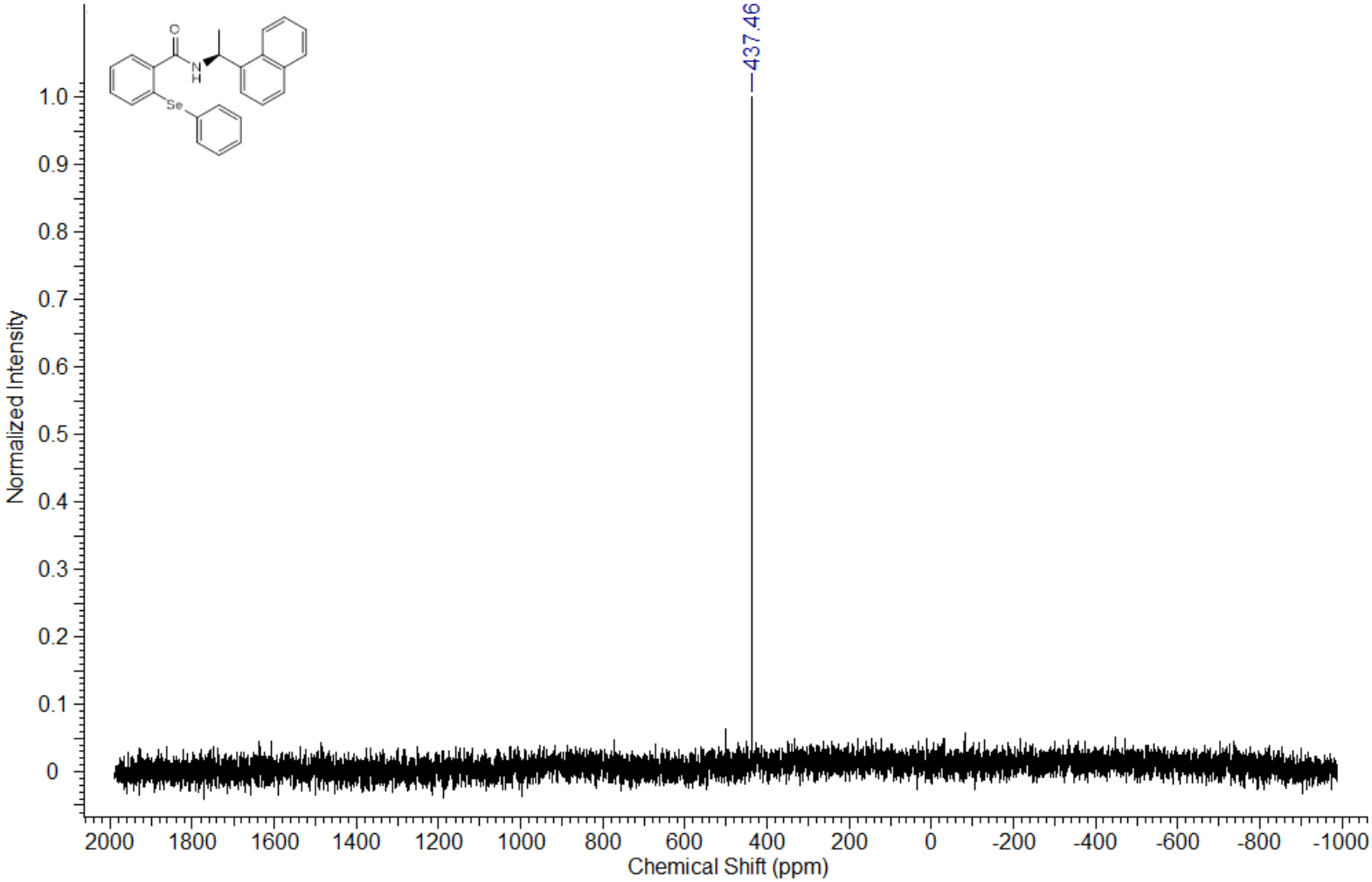
N-(*R*)-(+)-1-(1-napthyl)etyl-2-(phenylselanyl)benzamide **15**



^{1}H NMR spectra

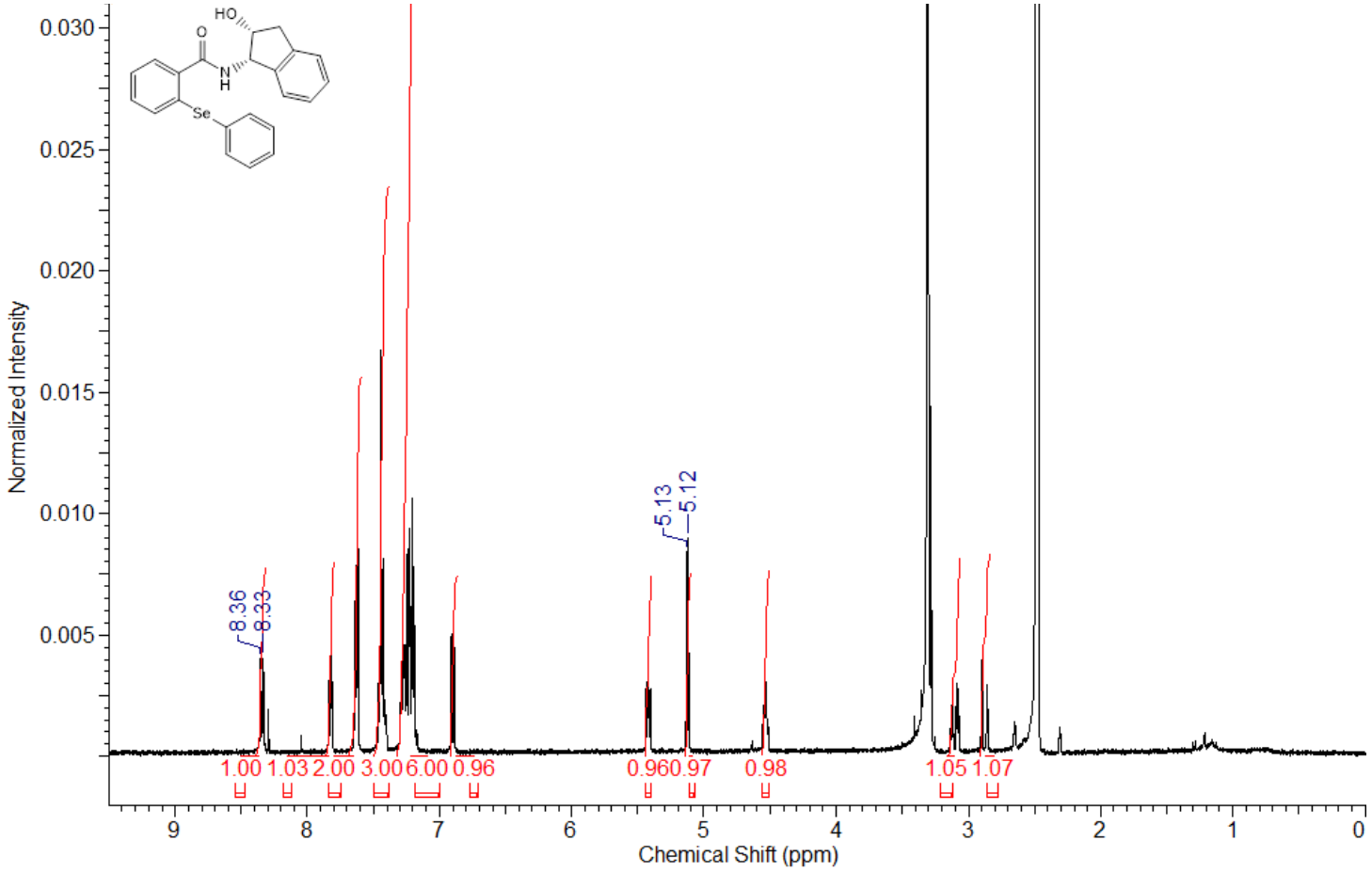


^{13}C NMR spectra

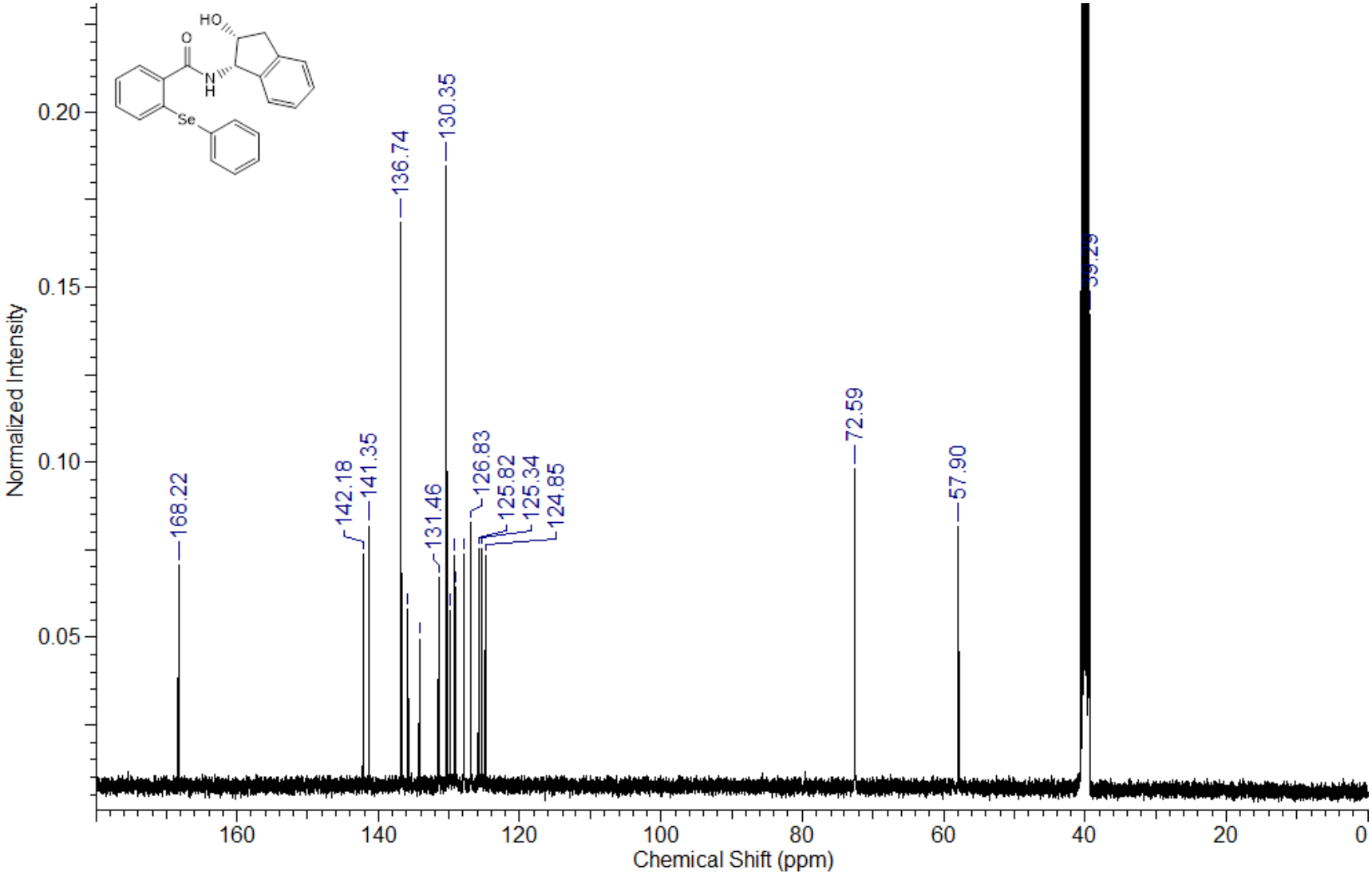


^{77}Se NMR spectra

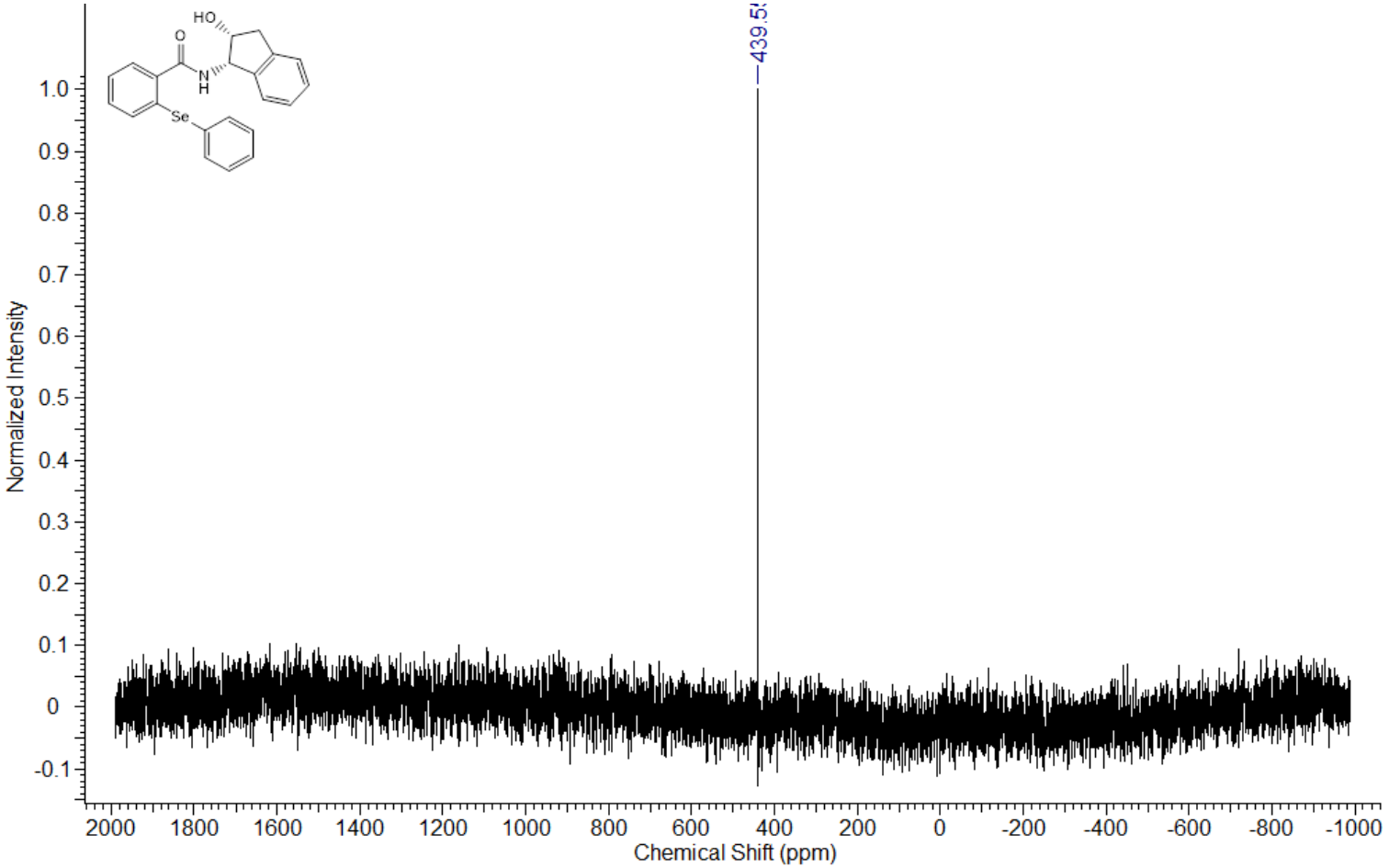
N-(*1S,2R*)-(-)-*cis*-2-hydroksy-1-indanyl-2-(phenylselanyl)benzamide **16**



^{1}H NMR spectra

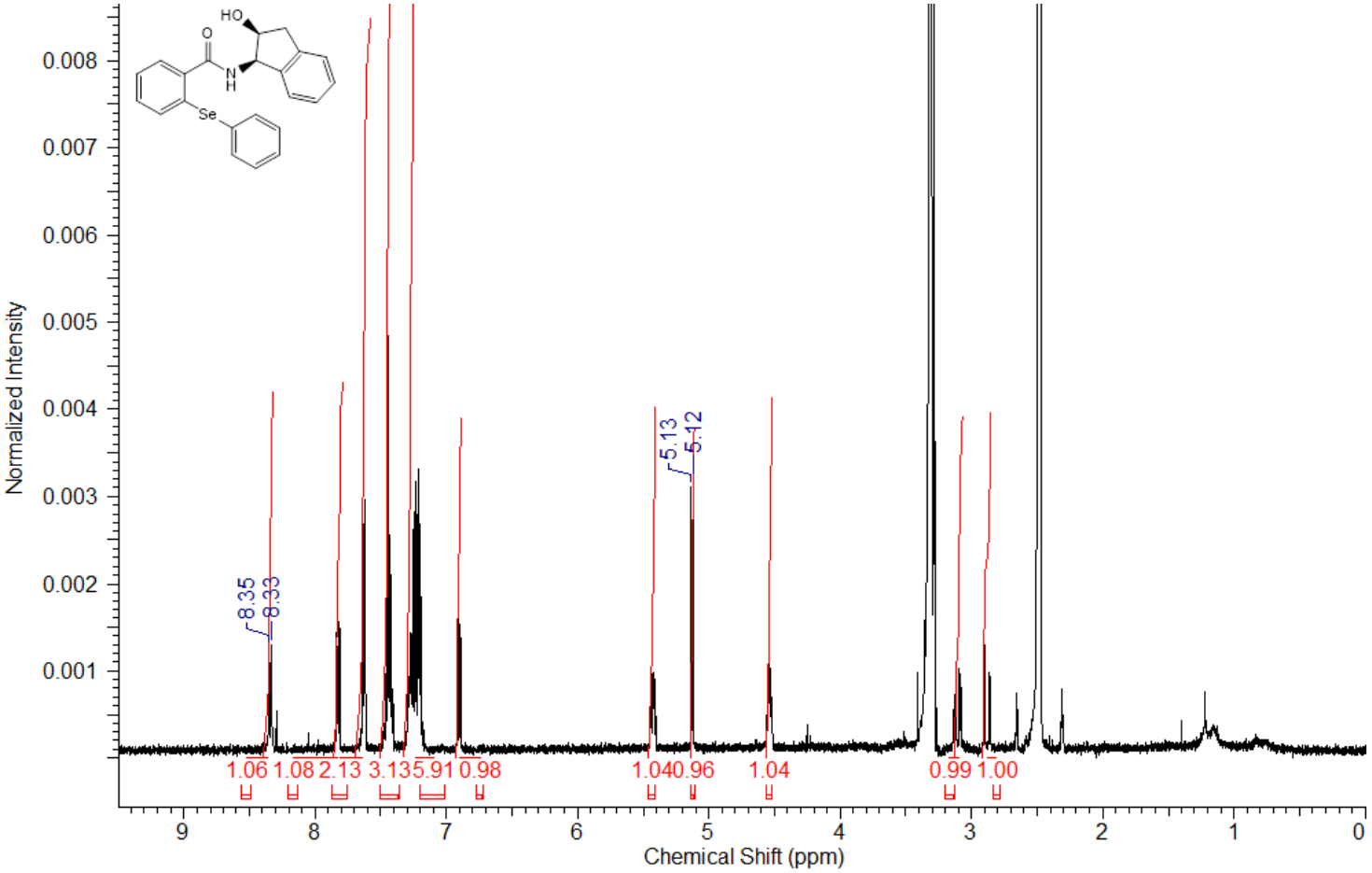


^{13}C NMR spectra

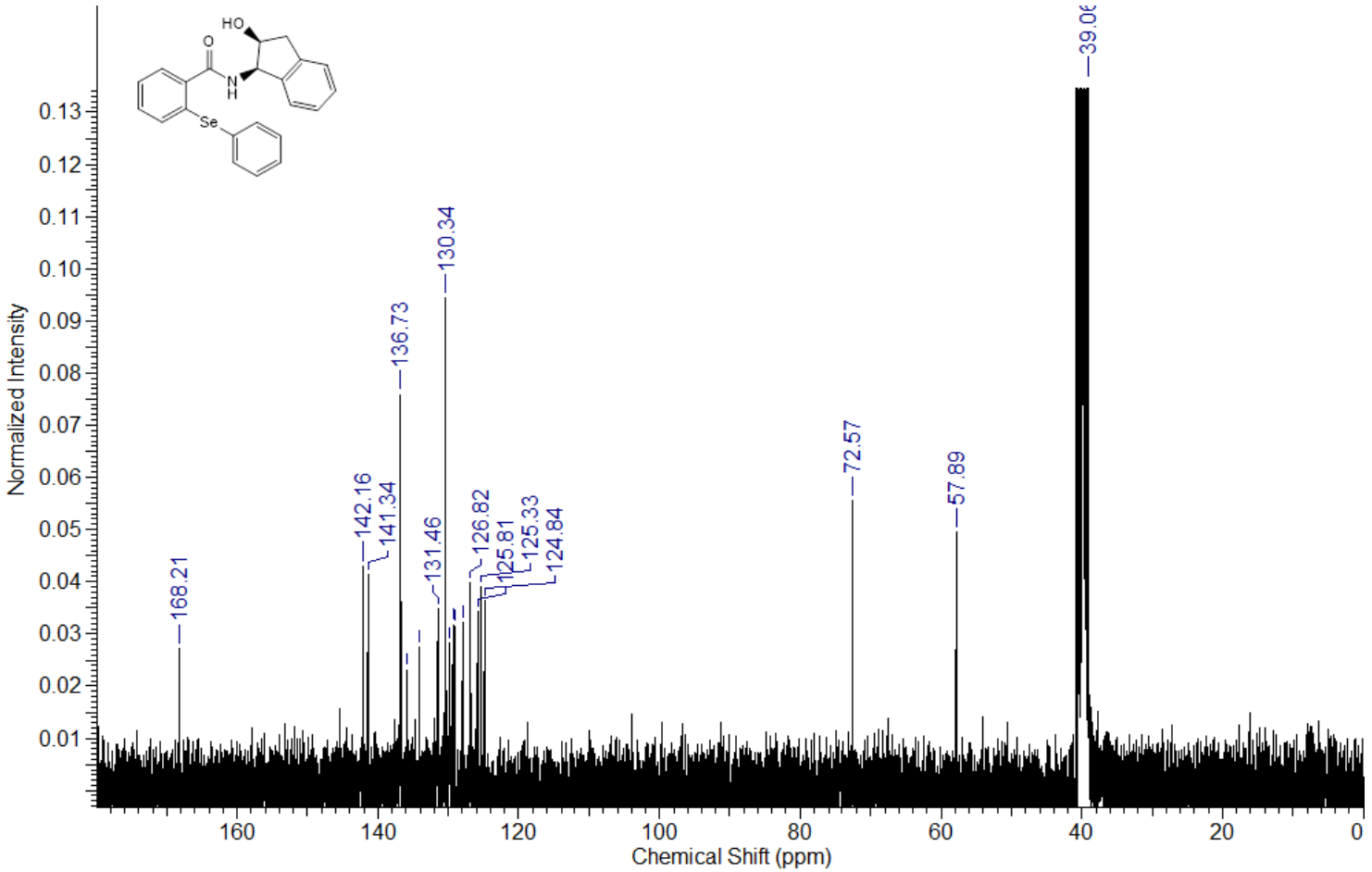


^{77}Se NMR spectra

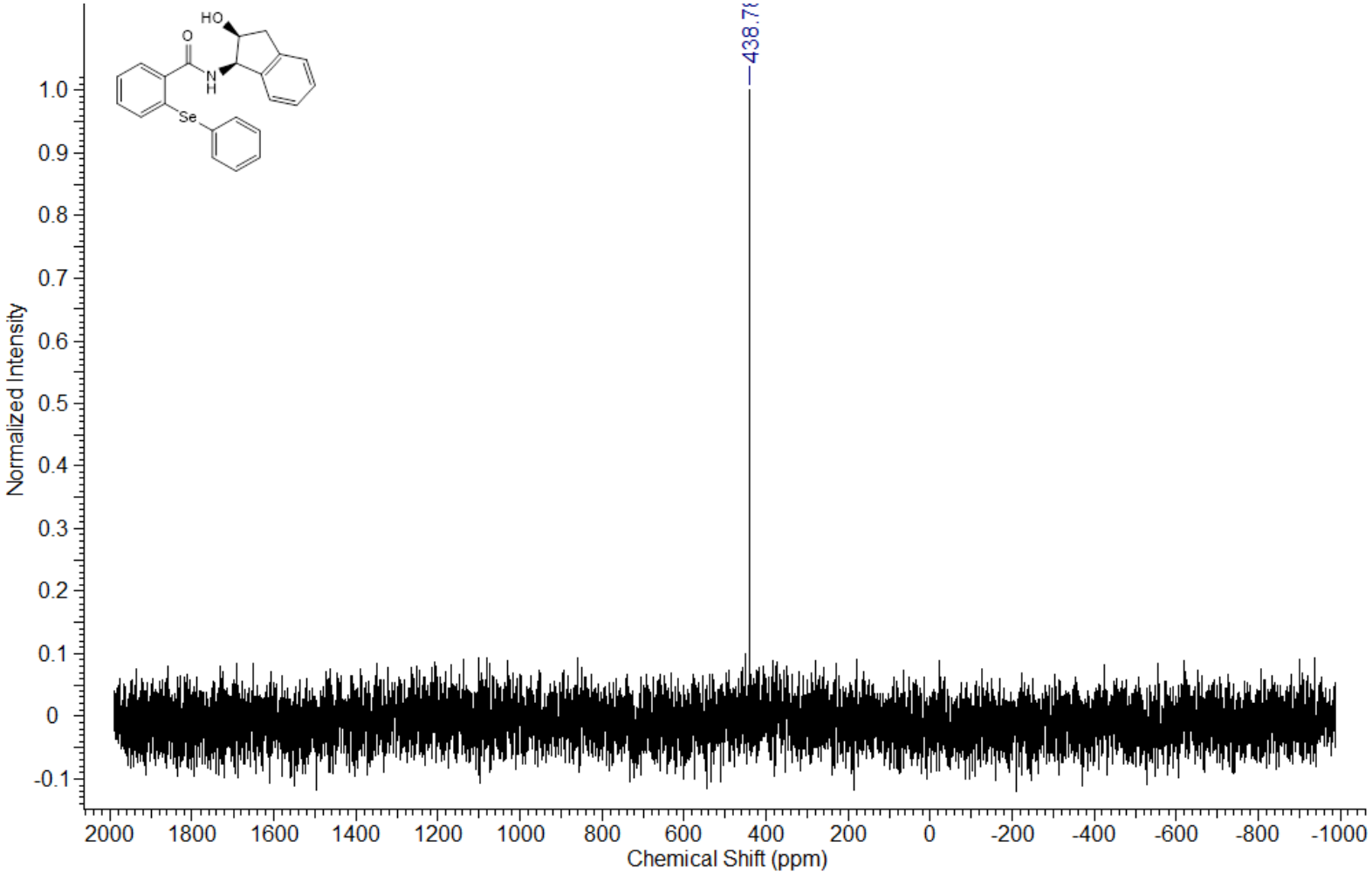
N-(*1R,2S*)-(+)-*cis*-2-hydroksy-1-indanyl-2-(phenylselanyl)benzamide **17**



^{1}H NMR spectra

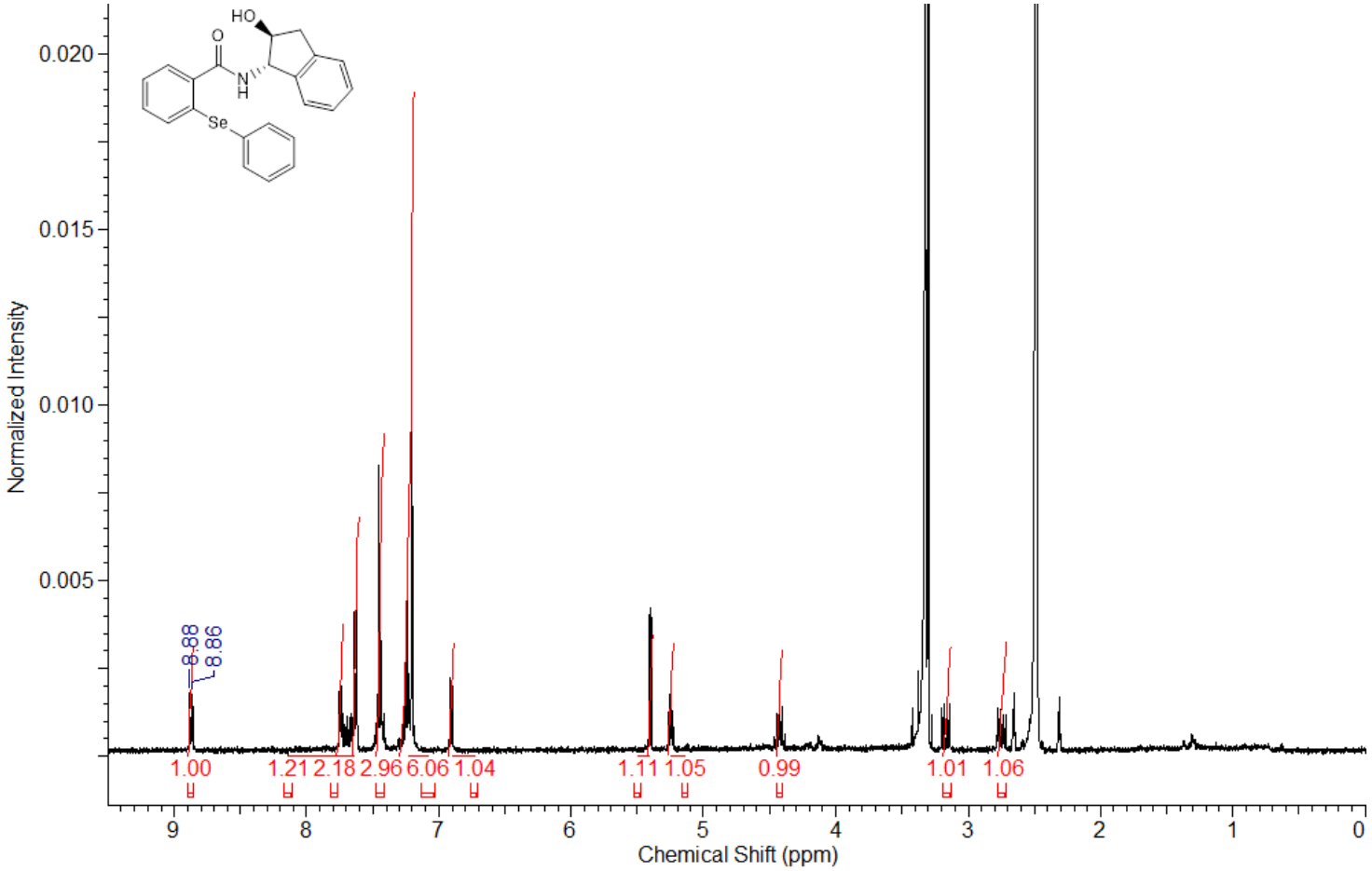


^{13}C NMR spectra

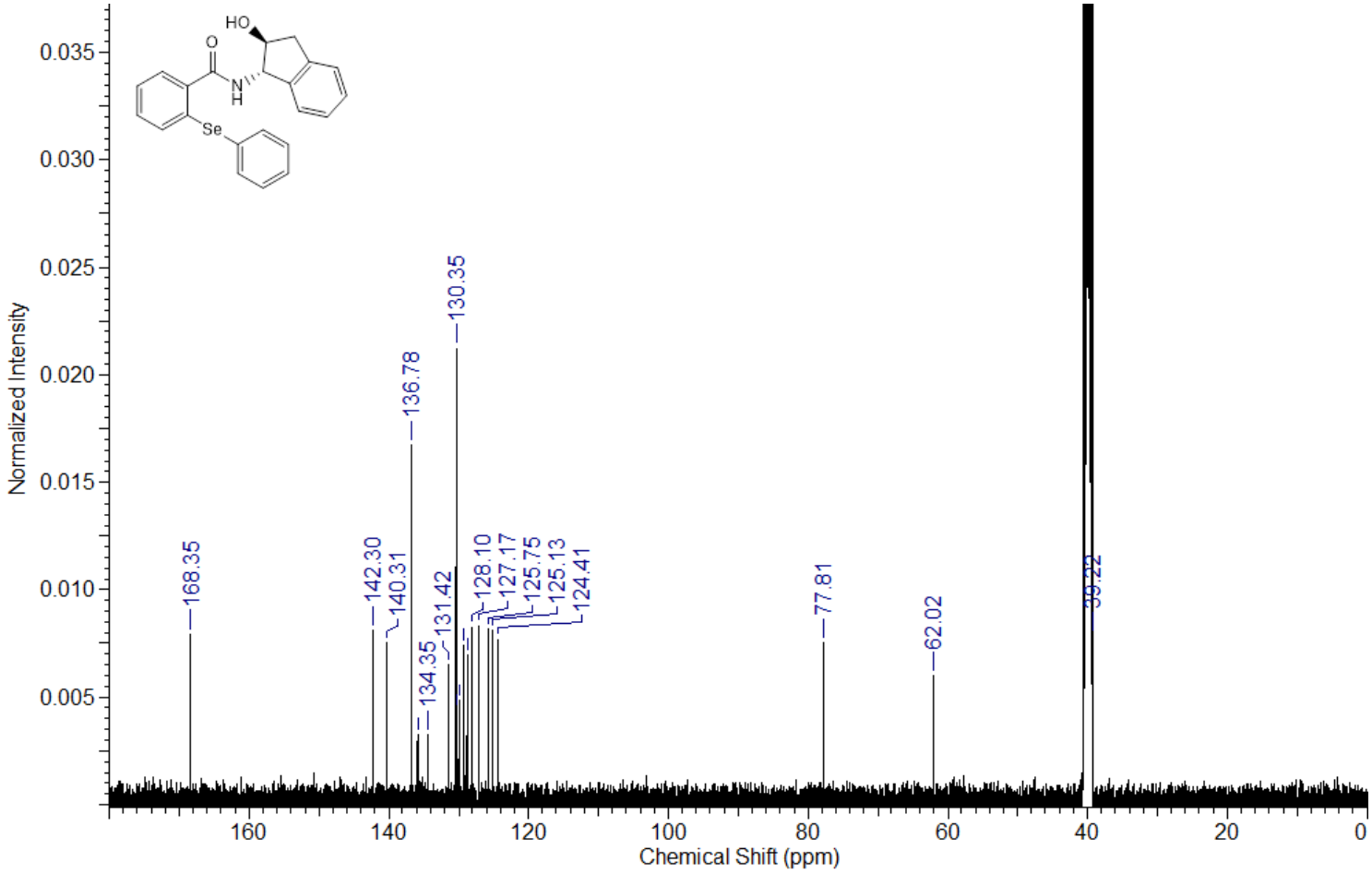


^{77}Se NMR spectra

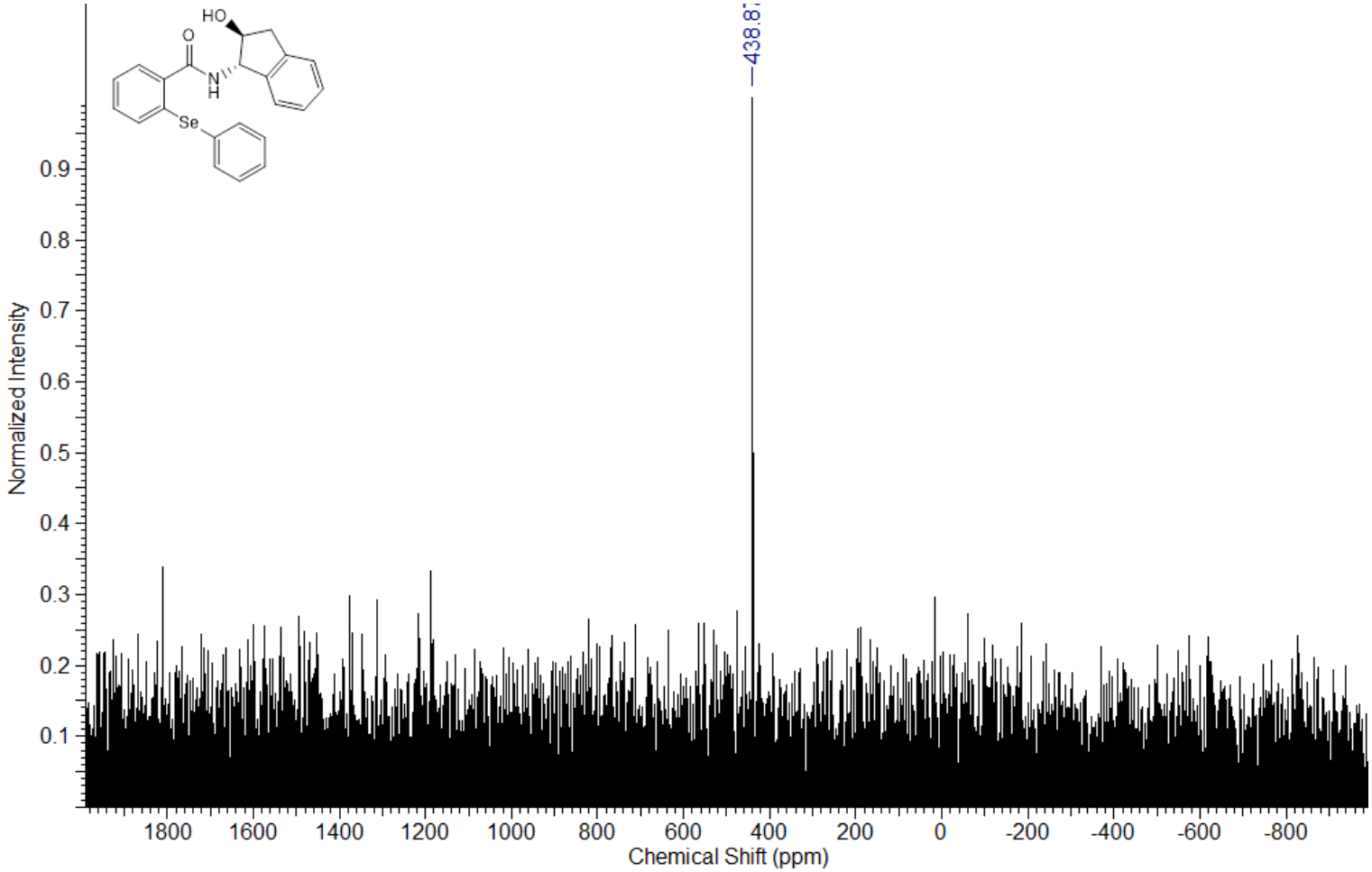
N-(*1S,2S*)-(+)-*trans*-2-hydroksy-1-indanyl- 2-(phenylselanyl)benzamide **18**



^{1}H NMR spectra

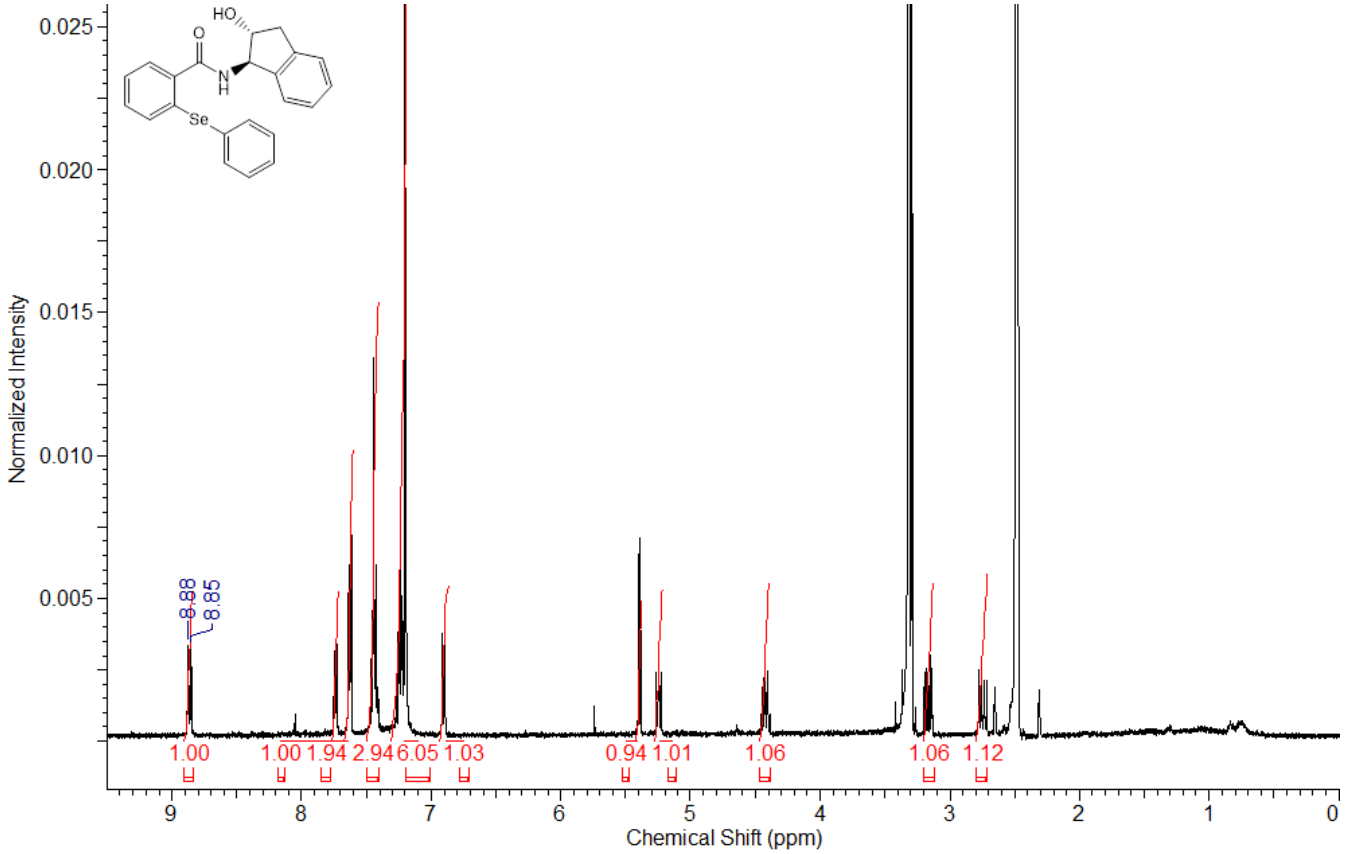


^{13}C NMR spectra

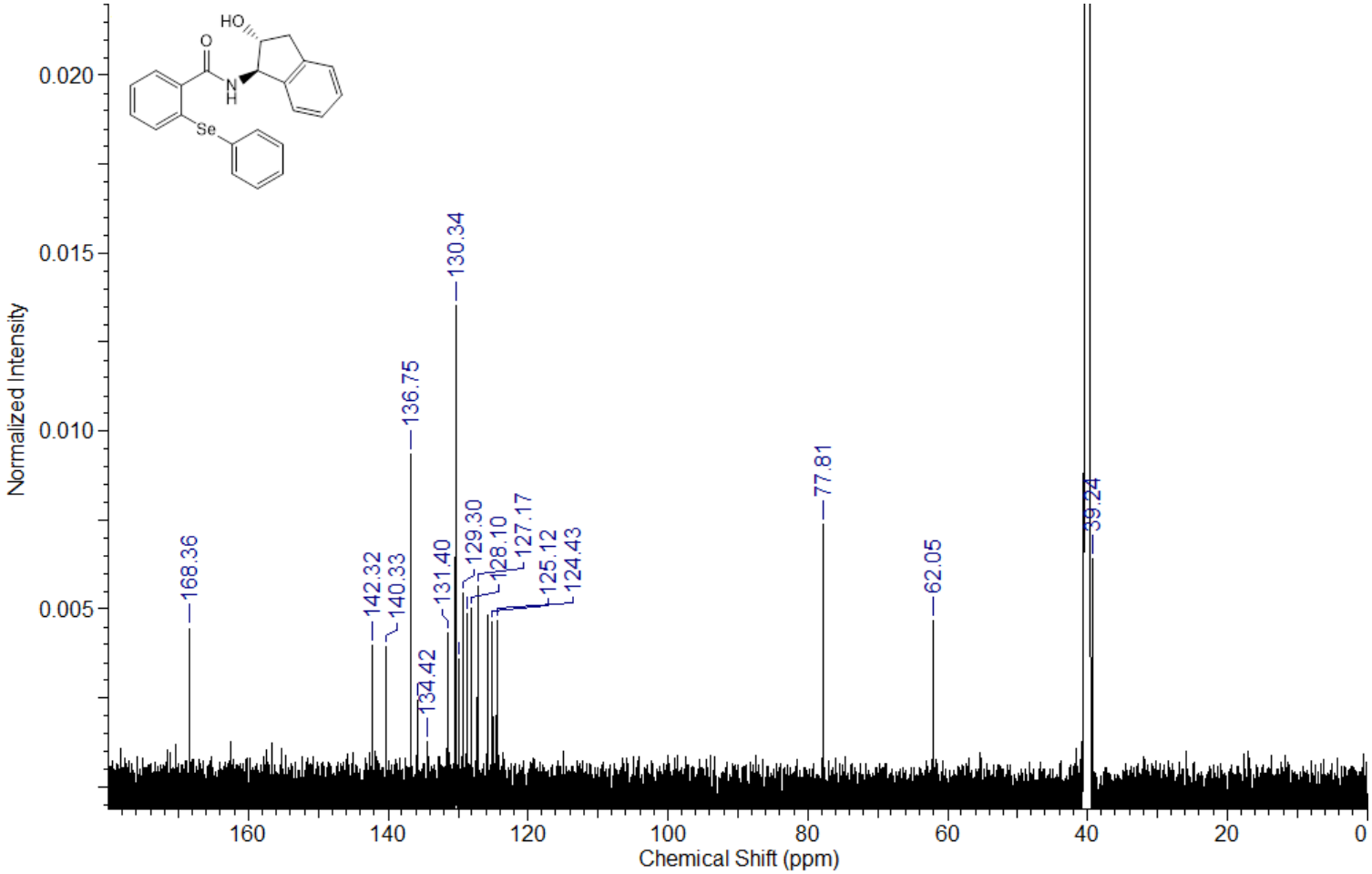


^{77}Se NMR spectra

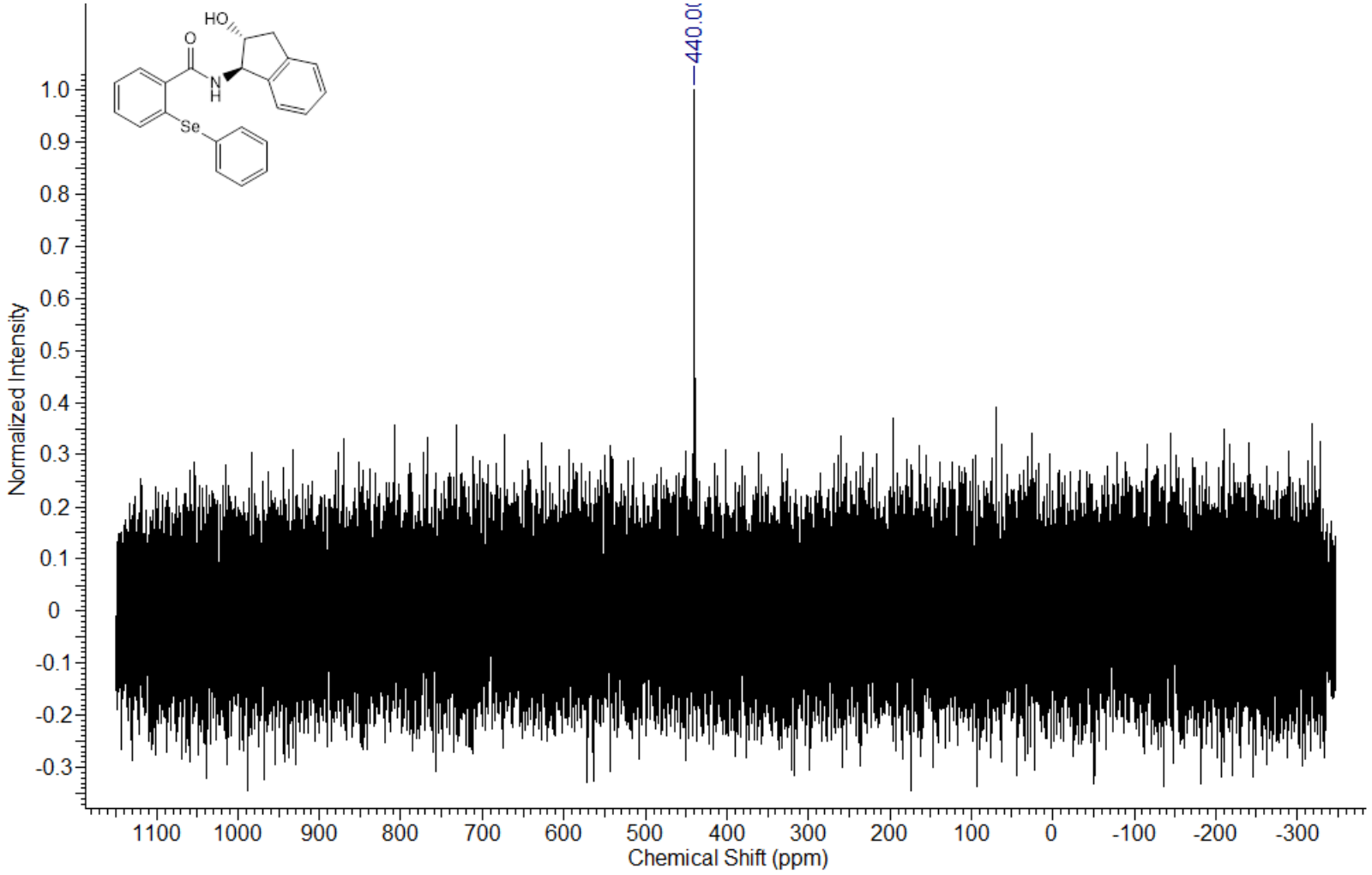
N-(*1R,2R*)-(-)-*trans*-2-hydroksy-1-indanyl- 2-(phenylselanyl)benzamide **19**



^{1}H NMR spectra



^{13}C NMR spectra



^{77}Se NMR spectra

3. **Cell lines and cell culture:**

The promyelocytic leukemia (HL-60) and breast cancer adenocarcinoma (MCF-7) cell lines were purchased from the European Collection of Cell Cultures (ECACC). Leukemia cells were cultured in RPMI 1640 plus GlutaMax I medium (Gibco/Life Technologies, Carlsbad, CA, USA). MCF-7 cells were maintained in Minimum Essential Medium Eagle (Sigma Aldrich, St. Louis, MO, USA) supplemented with 2 mM glutamine and Men Non-essential amino acid solution (Sigma Aldrich, St. Louis, MO, USA). Both media were supplemented with 10% heat-inactivated fetal bovine serum (Biological Industries, Beit-Haemek, Israel) and antibiotics (100 U/mL penicillin and 100 µg/mL streptomycin)(Sigma-Aldrich, St. Louis, MO, USA). Cells were maintained at 37°C in 5% CO_2 atmosphere and grown until 80% confluent.