Approach to the Hyacinthacines: First Non-Chiral Pool Synthesis of (+)-Hyacinthacine A_1

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Electronic Supplementary Information

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(2*R*,3*R*)-*tert*-Butyl 2-Allyl-5-oxo-3-[(*S*)-1-(2,4,6-triisopropylphenyl)ethoxy]-pyrrolidine-1-carboxylate (6): mp 146.9-147.4 °C (pentane); $[\alpha]_D^{21}$ –98.4 (*c* 0.64, $CHCl_3$); IR (KBr) 2960, 2928, 2868, 1756, 1726, 1368, 1303, 1204, 1157, 1102, 1058 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$) δ 1.05-1.35 (m, 18 H), 1.49 (s, 9 H), 1.56 (d, *J* = 6.8 Hz, 3 H), 2.35-2.50 (m, 1 H), 2.61 (A of ABX, *J* = 16.7, 10.1 Hz, 1 H), 2.68 (m, 1H), 2.70 (B of ABX, *J* = 16.7, 7.9 Hz, 1 H), 2.85 (sept, *J* = 6.9 Hz, 1 H), 3.02-3.20 (m, 1 H), 3.77-3.95 (m, 1 H), 4.09 (ddd, *J* = 10.1, 7.9, 7.9 Hz, 1 H), 4.24 (ddd, *J* = 7.9, 5.1, 5.1 Hz, 1 H), 4.98-5.15 (m, 3 H), 5.90 (dddd, *J* = 17.5, 10.2, 7.5, 7.5 Hz, 1 H), 6.95 (s, 1 H), 7.05 (s, 1 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ 23.1 (CH_3), 23.8 (CH_3), 24.2 (CH_3) 24.9 (CH_3), 27.9 (CH_3), 29.1 (CH), 33.2 (CH_2), 33.9 (CH), 38.8 (CH_2), 59.9 (CH), 69.3 (CH), 71.5 (CH), 82.9 (C), 118.5 (CH_2), 120.6 (CH), 123.4 (CH), 131.8 (C), 134.2 (CH), 145.9 (C), 147.8 (C), 148.7 (C), 149.5 (C) 170.9 (C); MS (ESI) *m/z* 966 ($2MNa^+$), 494 (MNa^+, 100); Anal. calcd for $C_{29}H_{45}NO_4$: C, 73.85; H, 9.62; N, 2.97. Found: C, 73.67; H, 9.65; N, 3.06.

(2*R*,3*R*)-*tert*-Butyl 2-Allyl-5-methoxy-3-[(*S*)-1-(2,4,6-triisopropylphenyl)ethoxy]-pyrrolidine-1-carboxylate (7): Minor diastereomer in mixture: ^1H NMR (500 MHz, 85 °C, DMSO) δ 1.16-1.26 (m, 18 H), 1.42 (s, 9 H), 1.51 (d, *J* = 6.8 Hz, 3 H), 1.79-1.90 (m, 1 H), 2.14-2.24 (m, 2 H), 2.45-2.54 (m, 1 H), 2.86 (sept, *J* = 6.8 Hz, 1 H), 3.20 (s, 3 H), 3.05-3.94 (m, 2 H), 3.78-3.87 (m, 1 H), 4.11 (ddd, *J* = 11.2, 6.8, 6.8 Hz, 1 H), 4.85-4.97 (m, 3 H), 5.13 (q, *J* = 6.8 Hz, 1 H), 5.71-5.86 (m, 1 H), 7.02 (s, 2 H). Major diastereomer in mixture: IR (film) 2960, 2929, 2869, 1703, 1389, 1366, 1168, 1079 cm^{-1}; ^1H NMR (500 MHz, 85 °C, DMSO) δ 1.16-1.26 (m, 18 H), 1.40 (s, 9 H), 1.47 (d, *J* = 6.8 Hz, 3 H), 1.79-1.90 (m, 1 H), 2.14-2.24 (m, 1 H), 2.27-2.35 (m, 1 H), 2.58 (ddd, *J* = 13.7, 7.3, 7.3 Hz, 1 H), 2.85 (sept, *J* = 6.8 Hz, 1 H), 3.05-3.94 (m, 2 H), 3.28 (s, 3 H), 3.90 (ddd, *J* = 7.3, 7.3, 7.3 Hz, 1 H), 3.96 (ddd, *J* = 9.3, 7.3, 4.9 Hz, 1 H), 4.85-4.97 (m, 2 H), 5.05 (q, *J* = 6.8 Hz, 1 H), 5.05-5.09 (m, 1 H), 5.71-5.86 (m, 1 H), 7.00 (s, 2 H); MS (ESI) *m/z* 998 ($2MNa^+$), 588, 510 (MNa^+, 100), 231; HRMS calcd for $C_{30}H_{49}NO_4Na$: 510.3554. Found: 510.3548 (MNa^+).

(2*R*,3*R*)-*tert*-Butyl 2-Allyl-5-{[dimethyl(phenyl)silyl]methyl}-3-[(*S*)-1-(2,4,6-triisopropylphenyl)ethoxy]pyrrolidine-1-carboxylate (8): IR (film) 2959, 2927, 2868, 1693, 1458, 1387, 1364, 1249, 1177, 1080, 834 cm^{-1}. Enriched minor diastereomer: ^1H NMR (500 MHz, 85 °C, DMSO) δ 0.31 (s, 3 H), 0.32 (s, 3 H), 0.95 (dd, *J* = 13.7, 11.6 Hz, 1 H), 1.15 (d, *J* = 6.9 Hz, 6 H), 1.20 (d, *J* = 6.9 Hz, 12 H), 1.36 (s, 9 H), 1.43 (d, *J* = 6.9 Hz, 3

H), 1.43-1.50 (m, 1 H), 1.75 (dd, *J* = 13.7, 2.6 Hz, 1 H), 2.05 (ddd, *J* = 14.8, 7.4, 7.4 Hz, 1 H), 2.21 (ddd, *J* = 12.1, 6.9, 6.9 Hz, 1 H), 2.26-2.33 (m, 1 H), 2.84 (sept, *J* = 6.9 Hz, 1 H), 3.10-4.00 (m, 2 H), 3.64-3.73 (m, 1 H), 3.74-3.89 (m, 2 H), 4.84-4.93 (m, 2 H), 4.98 (q, *J* = 6.9 Hz, 1 H), 5.76 (dddd, *J* = 17.4, 10.0, 7.4, 7.4 Hz, 1 H), 6.98 (s, 2 H), 7.35-7.41 (m, 3 H), 7.50-7.58 (m, 2 H). Enriched major diastereomer: ^{1}H NMR (500 MHz, 85 °C, DMSO) δ 0.31 (s, 6 H), 0.80 (dd, *J* = 14.3, 11.6 Hz, 1 H), 1.16 (d, *J* = 6.9 Hz, 6 H), 1.19-1.24 (m, 12 H), 1.39 (s, 9 H), 1.44 (d, *J* = 6.7 Hz, 3 H), 1.53 (br d, 1 H), 1.77-1.83 (m, 1 H), 1.88-1.99 (m, 1 H), 2.12-2.18 (m, 1 H), 2.44 (ddd, *J* = 14.3, 6.9, 6.9 Hz, 1 H), 2.85 (sept, *J* = 6.9 Hz, 1 H), 3.05-3.75 (m, 2 H), 3.76-3.83 (m, 1 H), 3.83-3.90 (m, 1 H), 4.10 (ddd, *J* = 10.6, 6.9, 6.9 Hz, 1 H), 4.86-4.93 (m, 2 H), 5.02 (q, *J* = 6.7 Hz, 1 H), 5.72-5.83 (m, 1 H), 7.00 (s, 2 H), 7.35-7.41 (m, 3 H), 7.50-7.58 (m, 2 H**)**; ^{13}C NMR (75.5 MHz, $CDCl_3$) mixture of rotamers δ -2.3 (CH_3), 23.1 (CH_3), 23.9 (CH_3), 24.4 (CH_3), 24.9 (CH_3), 25.2 (CH_3), 28.2 (CH_3), 28.6 (CH_3), 29.2 (CH), 32.4 (CH_2), 34.0 (CH), 35.5 (CH_2), 36.5 (CH_2), 52.4 (CH), 52.8 (CH), 58.7 (CH), 58.9 (CH), 71.4 (CH), 74.0 (CH), 75.0 (CH), 79.0 (C), 116.4 (CH_2), 120.3 (CH), 123.3 (CH), 127.8 (CH), 129.0 (CH), 133.1 (C), 133.6 (CH), 136.6 (CH), 139.1 (C), 145.3 (C), 147.3 (C), 148.9 (C), 153.6 (C). MS **(**ESI**)** *m/z* 1234 ($2MNa^+$), 628 (MNa^+, 100); Anal. calcd for $C_{38}H_{59}NO_3Si$: C, 75.32; H, 9.82; N, 2.32. Found: C, 75.51; H, 10.14; N, 2.58.

(2*R*,3*R*)-tert-Butyl 3-((*S*)-1-(2,4,6-Triisopropylphenyl)ethoxy)-2-(2-(methoxy-carbonyl)ethyl)-5-((dimethyl(phenyl)silyl)methyl)pyrrolidine-1-carboxylate (9): Major diastereomer in mixture: IR (film) 2960, 2869, 1740, 1692, 1386, 1365, 1250, 1173, 1080, 834 cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$) δ 0.33 (s, 6 H), 0.56-0.77 (m, 1 H), 1.10-1.33 (m, 19 H), 1.34-1.57 (m, 12 H), 1.64-1.99 (m, 3 H), 1.99-2.16 (m, 1 H), 2.24-2.53 (m, 2 H), 2.85 (sept, *J* = 6.7 Hz, 1 H), 3.00-3.25 (m, 1 H), 3.63 (s, 3 H), 3.67- 4.08 (m, 4 H), 4.85-5.05 (m, 1 H), 6.92 (s, 1 H), 7.03 (s, 1 H), 7.29-7.41 (m, 3 H), 7.41-7.58 (m, 2 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ -2.4 (CH_3), 23.2 (CH_3), 23.9 (CH_3), 24.4 (CH_3), 24.9 (CH_3), 28.2 (CH), 28.5 (CH_3), 29.2 (CH), 31.3 (CH_2), 33.9 (CH), 35.4 (CH_2), 35.9 (CH_2), 51.3 (CH), 52.0 (CH), 57.7 (CH), 71.3 (CH), 74.0 (CH), 74.9 (CH), 79.3 (C), 120.3 (CH), 123.3 (CH), 127.8 (CH), 129.0 (CH), 133.0 (C) 133.5 (CH), 138.9 (C), 145.4 (C), 147.4 (C), 148.8 (C), 153.8 (C), 174.3 (C); MS (ESI) *m/z* 694 (MK^+), 674 (MNa^+), 652 (MH^+, 100).

(5*S*,7*R*,7a*R*)-7-((*S*)-1-(2,4,6-Triisopropylphenyl)ethoxy)-hexahydro-5-((dimethyl-(phenyl)silyl)methyl)pyrrolizin-3-one (10): mp 116.6-117.3 °C (pentane); $[\alpha]_D^{21}$ –82.9 (*c*

1.4, $CHCl_3$); IR (film) 2959, 2928, 2869, 1692, 1405, 1247, 1112, 1075, 835, 731 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$) δ 0.33 (s, 3 H), 0.40 (s, 3 H), 0.94 (A of ABX, *J* = 14.3, 10.2 Hz, 1 H), 1.09-1.30 (m, 18 H), 1.37-1.51 (m, 4 H), 1.55 (B of ABX, *J* = 14.3, 4.5 Hz, 1 H), 1.75-1.86 (m, 1 H), 2.17-2.28 (m, 1 H), 2.30-2.42 (m, 2 H), 2.48 (ddd, *J* = 18.8, 16.2, 9.4 Hz, 1 H), 2.78 (sept, *J* = 6.8 Hz, 1 H), 3.04 (sept, *J* = 7.5 Hz, 1 H), 3.58 (t, *J* = 3.4 Hz, 1 H), 3.73-3.90 (m, 2 H), 4.00-4.10 (m, 1 H), 4.97 (q, *J* = 6.4 Hz, 1 H), 6.94 (s, 1 H), 7.03 (s, 1 H), 7.32-7.41 (m, 3 H), 7.53-7.61 (m, 2 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) δ -2.5 (CH_3), -2.3 (CH_3), 18.4 (CH_2), 23.1 (CH_3), 23.3 (CH_2), 23.8 (CH_3), 24.2 (CH_3), 24.8 (CH_3), 24.9 (CH_3), 25.3 (CH_3), 27.8 (CH), 28.9 (CH), 33.8 (CH), 34.4 (CH_2), 41.2 (CH_2), 49.9 (CH), 64.5 (CH), 69.3 (CH), 74.3 (C), 120.53 (CH), 123.0 (CH), 127.7 (CH), 128.9 (CH), 132.1 (C), 133.5 (CH), 138.8 (C), 145.7 (C), 147.4 (C), 148.7 (C), 175.8 (C); MS (ESI) *m/z* 558 (MK^+), 542 (MNa^+), 442 (100); Anal. calcd for $C_{33}H_{49}NO_2Si$: C, 76.25; H, 9.50; N, 2.69. Found: C, 75.85; H, 9.43; N, 2.55; HRMS calcd for $C_{33}H_{49}O_2NNaSi$: 542.3425. Found: 542.3429.

(5*S*,7*R*,7a*R*)-Hexahydro-7-hydroxy-5-((dimethyl(phenyl)silyl)methyl)pyrrolizin-3-one (11): $[\alpha]_D^{21}$ –73.4 (*c* 1.6, $CHCl_3$); IR (film) 3369, 2954, 2927, 1666, 1426, 1249, 1112, 834, 730 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$) δ 0.31 (s, 3 H), 0.33 (s, 3 H), 0.95 (A of ABX, *J* = 14.4, 10.2 Hz, 1 H), 1.48 (B of ABX, *J* = 14.4, 4.9 Hz, 1 H), 1.65 (ddd, *J* = 8.7, 4.7, 4.2 Hz, 1 H), 1.82-1.93 (m, 1 H), 2.03-2.15 (m, 1 H), 2.18 (dd, *J* = 14.0, 7.6 Hz, 1 H), 2.31 (ddd, *J* = 16.8, 10.2, 3.6 Hz, 1 H), 2.46-2.64 (m, 2 H), 3.26 (br s, 1 H), 3.81 (ddd, *J* = 8.3, 5.9, 2.8 Hz, 1 H), 3.93 (br s, 1 H), 4.00-4.10 (m, 1 H), 7.32-7.38 (m, 3 H), 7.49-7.55 (m, 2 H); ^{13}C NMR (75.5 MHz, $CDCl_3$) ™ -2.1 (CH_3), -2.0 (CH_3), 18.1 (CH_2), 24.1 (CH_2), 34.8 (CH_2), 46.2 (CH_2), 50.0 (CH), 65.6 (CH), 70.8 (CH), 128.0 (CH), 129.3 (CH), 133.8 (CH), 139.2 (C), 176.4 (C); MS (ESI) *m/z* 328 (MK^+), 312 (MNa^+), 212 (100); Anal. calcd for $C_{16}H_{23}NO_2Si$: C, 66.39; H, 8.01; N, 4.84. Found: C, 66.18; H, 8.29; N, 4.64; HRMS calcd for $C_{16}H_{23}O_2NNaSi$: 312.1390. Found: 312.1394.

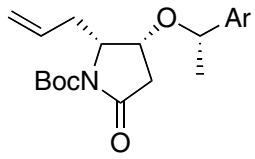
(5*S*,7a*R*)-1,2-Dihydro-5-((dimethyl(phenyl)silyl)methyl)-5*H*-pyrrolizin-3(7a*H*)-one (12): $[\alpha]_D^{21}$ –177.2 (*c* 0.66, $CHCl_3$); IR (film) 2959, 2928, 2869, 1692, 1405, 1247, 1112, 1075, 835, 731 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$) δ 0.34 (s, 3 H), 0.38 (s, 3 H), 1.05 (A of ABX, *J* = 14.5, 7.8 Hz, 1 H), 1.19 (B of ABX, *J* = 14.6, 6.9 Hz, 1 H), 1.62-1.76 (m, 1 H), 2.20-2.34 (m, 2 H), 2.57 (dddd, *J* = 16.2, 12.8, 8.3, 8.3, Hz, 1 H), 4.47-4.54 (m, 1 H) 4.70-4.76 (m, 1 H), 5.69-5.73 (m, 2 H), 7.31-7.36 (m, 3 H), 7.48-7.56 (m, 2 H); ^{13}C NMR (75.5

MHz, $CDCl_3$) δ -2.6 (CH_3), -2.5 (CH_3), 22.9 (CH_2), 29.1 (CH_2), 34.2 (CH_2), 58.5 (CH), 66.0 (CH), 127.7 (CH), 128.87 (CH), 128.91 (CH), 133.6 (CH), 134.2 (CH), 138.9 (C), 177.1 (C); MS (ESI) *m/z* 294 (MNa^+, 100); HRMS calcd for $C_{16}H_{21}ONNaSi$: 294.1285. Found: 294.1288.

(5*S*,6*R*,7*S*,7a*R*)-Hexahydro-6,7-dihydroxy-5-((dimethyl(phenyl)silyl)methyl)-pyrrolizin-3-one (15): mp 93.2-93.9 °C (pentane); $[\alpha]_D^{21}$ –58.7 (*c* 1.1, $CHCl_3$); IR (film) 3385, 2955, 2922, 1659, 1426, 1113, 840 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$) ™ 0.35 (s, 3 H), 0.40 (s, 3 H), 1.10 (A of ABX, *J* = 14.5, 8.8 Hz, 1 H), 1.35 (B of ABX, *J* = 14.5, 5.8 Hz, 1 H), 1.84-1.93 (m, 1 H), 2.11-2.20 (m, 1 H), 2.23-2.31 (m, 1 H), 2.37-2.46 (m, 1 H), 3.00 (br s, 2 H), 3.66-3.71 (m, 1 H), 3.75-3.79 (m, 1 H), 3.82 (t, *J* = 3.8 Hz, 1 H), 3.84-3.88 (m, 1 H), 7.33-7.35 (m, 3 H), 7.53-7.56 (m, 2 H); ^{13}C NMR (100.6 MHz, $CDCl_3$) ™ -2.7 (CH_3), -2.5 (CH_3), 18.1 (CH_2), 21.1 (CH_2), 33.0 (CH_2), 57.1 (CH), 62.3 (CH), 71.4 (CH), 81.9 (CH), 127.8 (CH), 129.0 (CH), 133.6 (CH), 139.0 (C), 176.8 (C); MS (ESI) *m/z* 344 (MK^+), 328 (MNa^+, 100); HRMS calcd for $C_{16}H_{23}O_3NNaSi$: 328.1339. Found: 328.1343.

(5*R*,6*R*,7*S*,7a*R*)-Hexahydro-6,7-dihydroxy-5-(hydroxymethyl)pyrrolizin-3-one (16): $[\alpha]_D^{21}$ –49.9 (*c* 0.67, MeOH); IR (film) 3363, 2924, 1659, 1650, 1419, 1380, 1289, 1120, 833 cm^{-1}; ^1H NMR (300 MHz, CD_3OD) ™ 2.01-2.20 (m, 1 H), 2.23-2.42 (m, 2 H), 2.59-2.74 (m, 1 H), 3.54-3.58 (m, 1 H), 3.68 (dd, *J* = 11.3, 4.1 Hz, 1 H), 3.88 (t, *J* = 3.2 Hz, 1 H), 3.93 (dd, *J* = 11.3, 3.4 Hz, 1 H), 4.02 (ddd, *J* = 9.8, 7.3, 3.2 Hz, 1 H), 4.38 (dd, *J* = 7.9, 3.2 Hz, 1 H); ^{13}C NMR (75.5 MHz, CD_3OD) ™ 20.1 (CH_2), 34.6 (CH_2), 62.6 (CH_2), 62.7 (CH), 66.0 (CH), 72.7 (CH), 77.4 (CH), 180.0 (C); MS (DCI) *m/z* 188 (MH^+); HRMS calcd for $C_8H_{13}O_4NNa$: 210.0737. Found: 210.0739.

(+)-Hyacinthacine A_1 (1): $[\alpha]_D^{21}$ +43.9 (*c* 0.29, H_2O); ^1H NMR (400 MHz, CD_3OD) ™ 1.66-1.74 (m, 1 H), 1.75-1.84 (m, 1 H), 1.92-2.00 (m, 1 H), 2.06-2.15 (m, 1 H), 2.63-2.69 (m, 1 H), 2.75-2.81 (m, 1 H), 3.05-3.10 (m, 1 H), 3.45-3.52 (m, 1 H), 3.60 (dd, *J* = 11.0, 6.5 Hz, 1 H), 3.81 (dd, *J* = 11.0, 3.4 Hz, 1 H), 3.88-3.91 (m, 2 H); ^{13}C NMR (75.5 MHz, CD_3OD) ™ 25.9 (CH_2), 28.8 (CH_2), 57.5 (CH_2), 65.4 (CH_2), 67.7 (CH), 71.8 (CH), 73.7 (CH), 77.5 (CH); MS (ESI) *m/z* 174 (MH^+, 100).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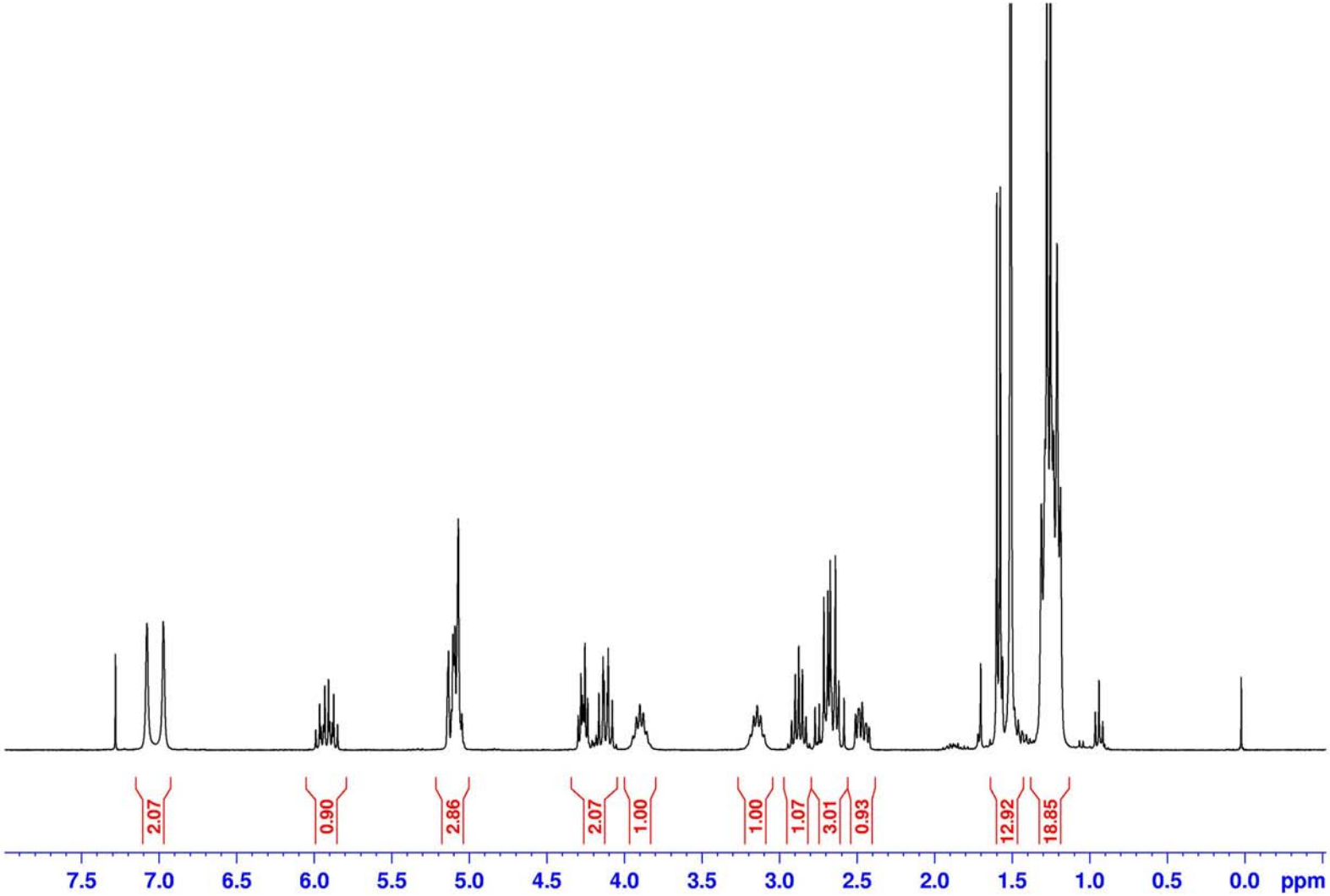
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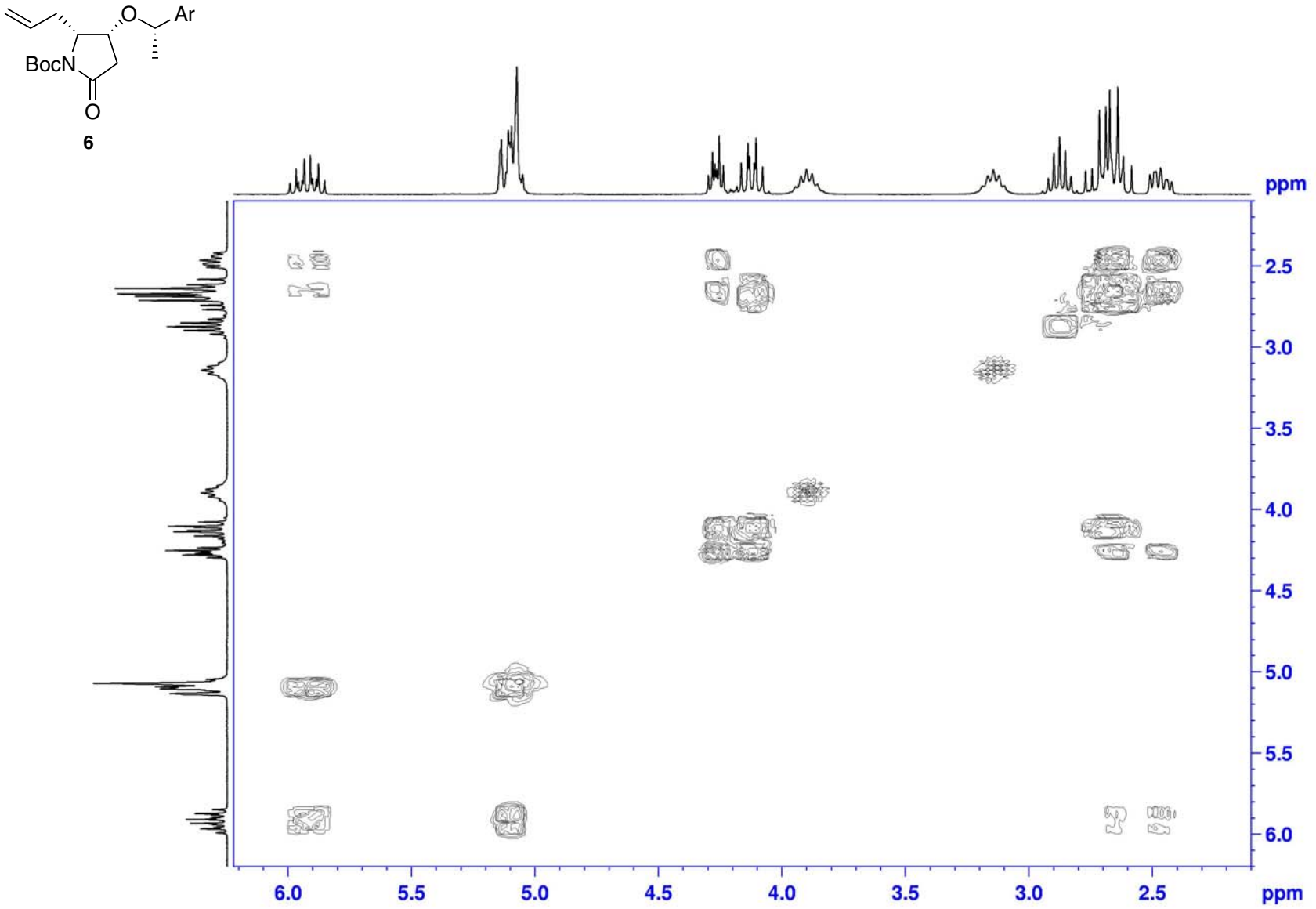
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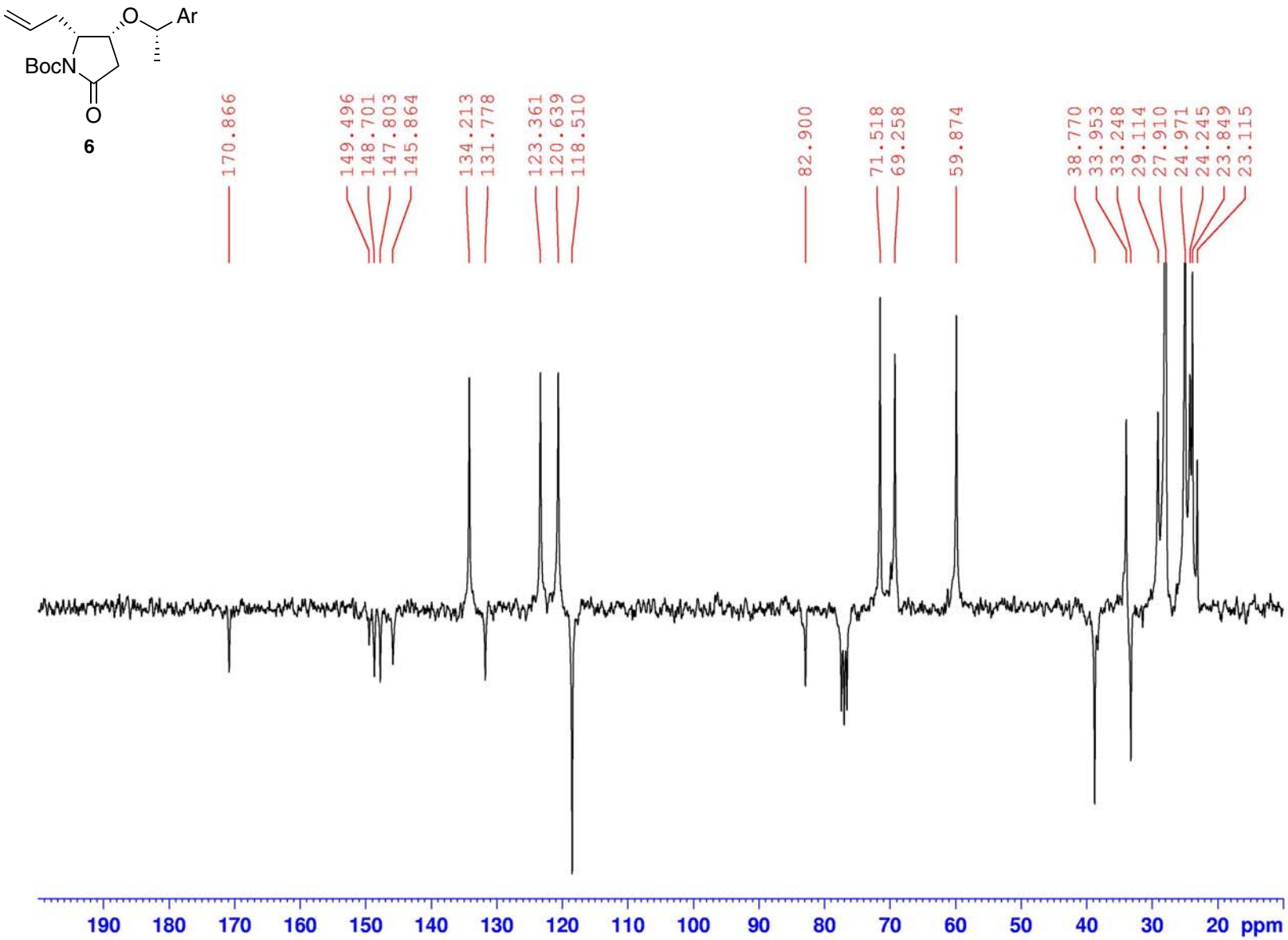
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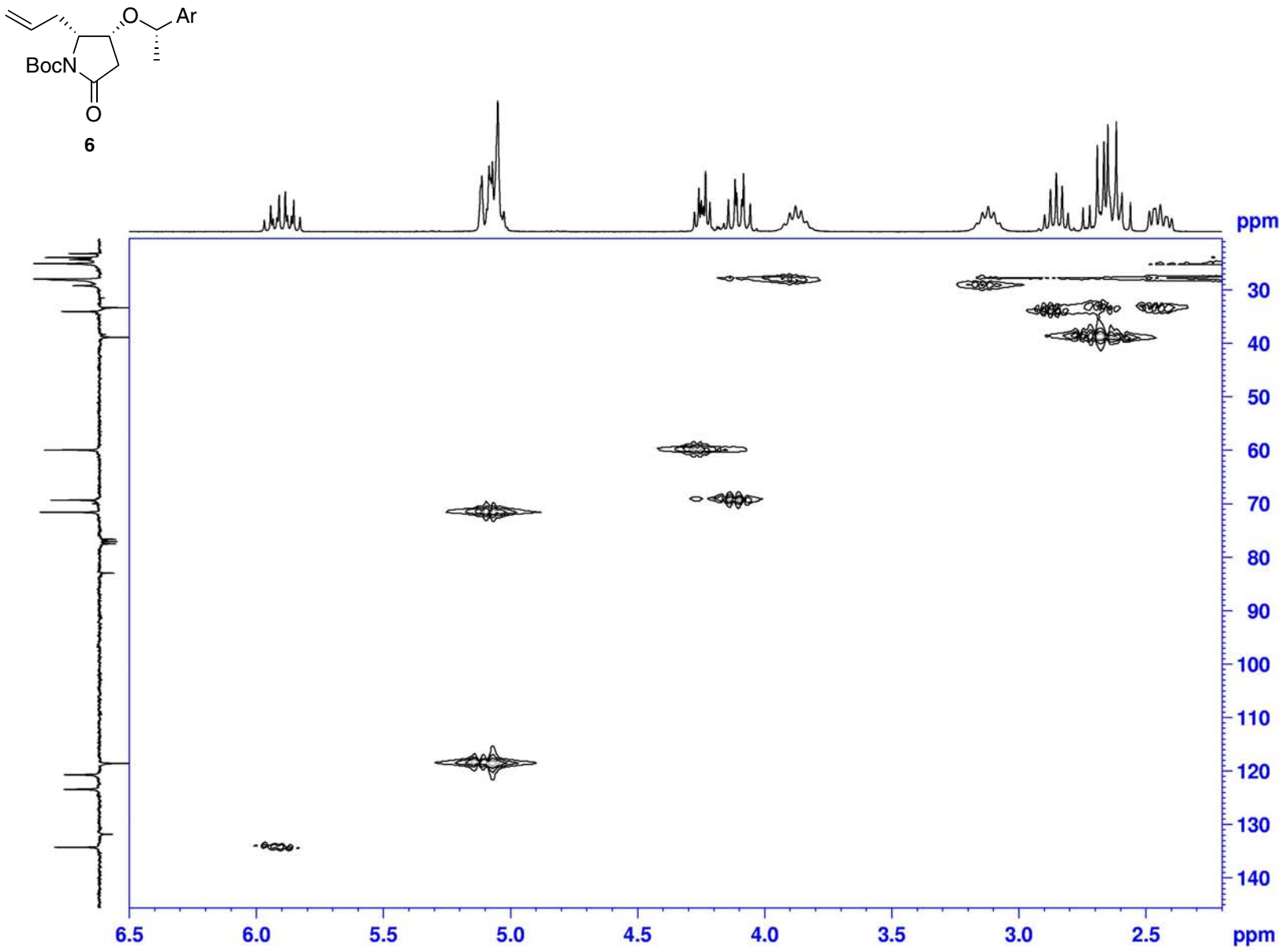
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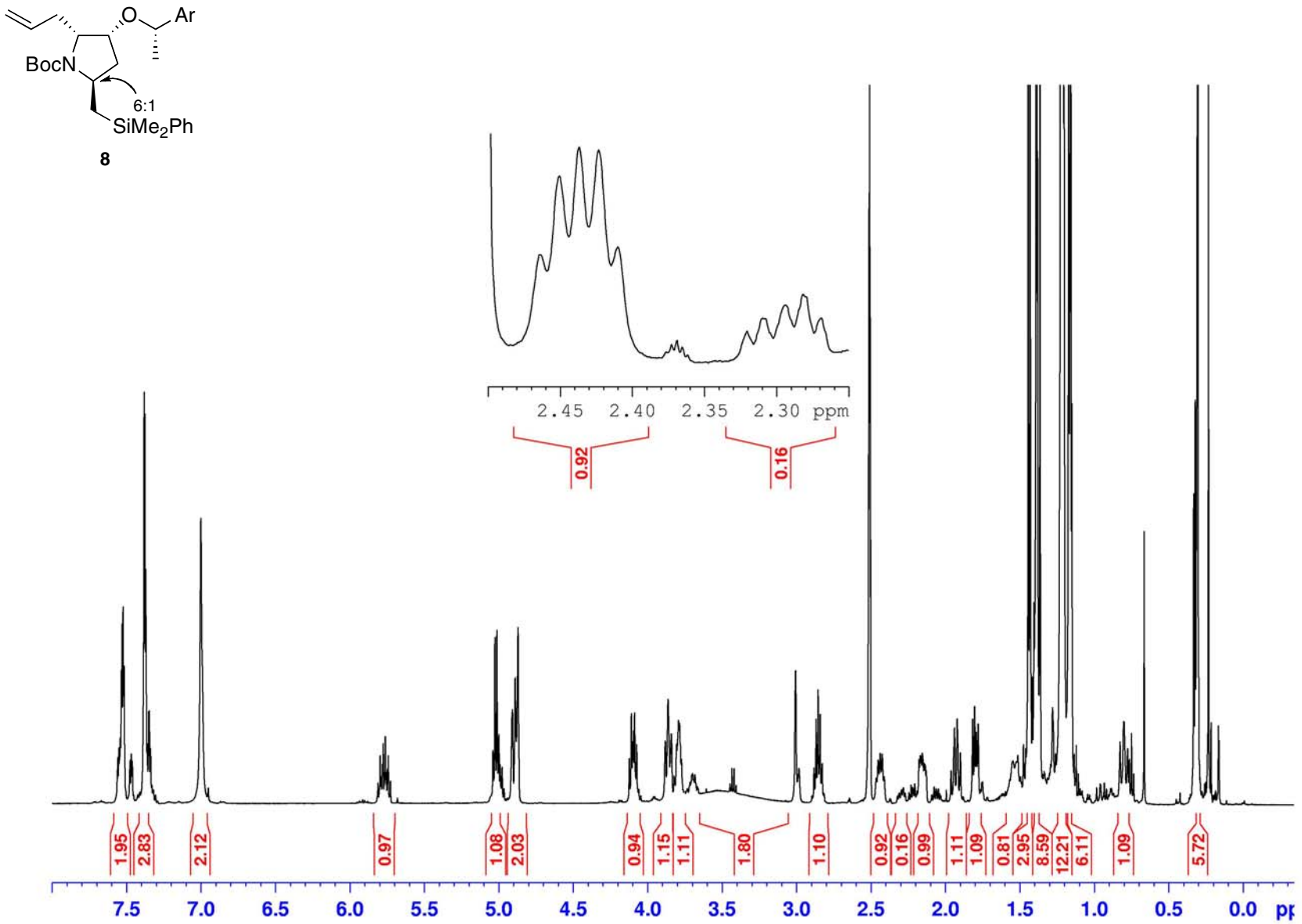
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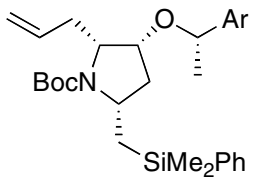
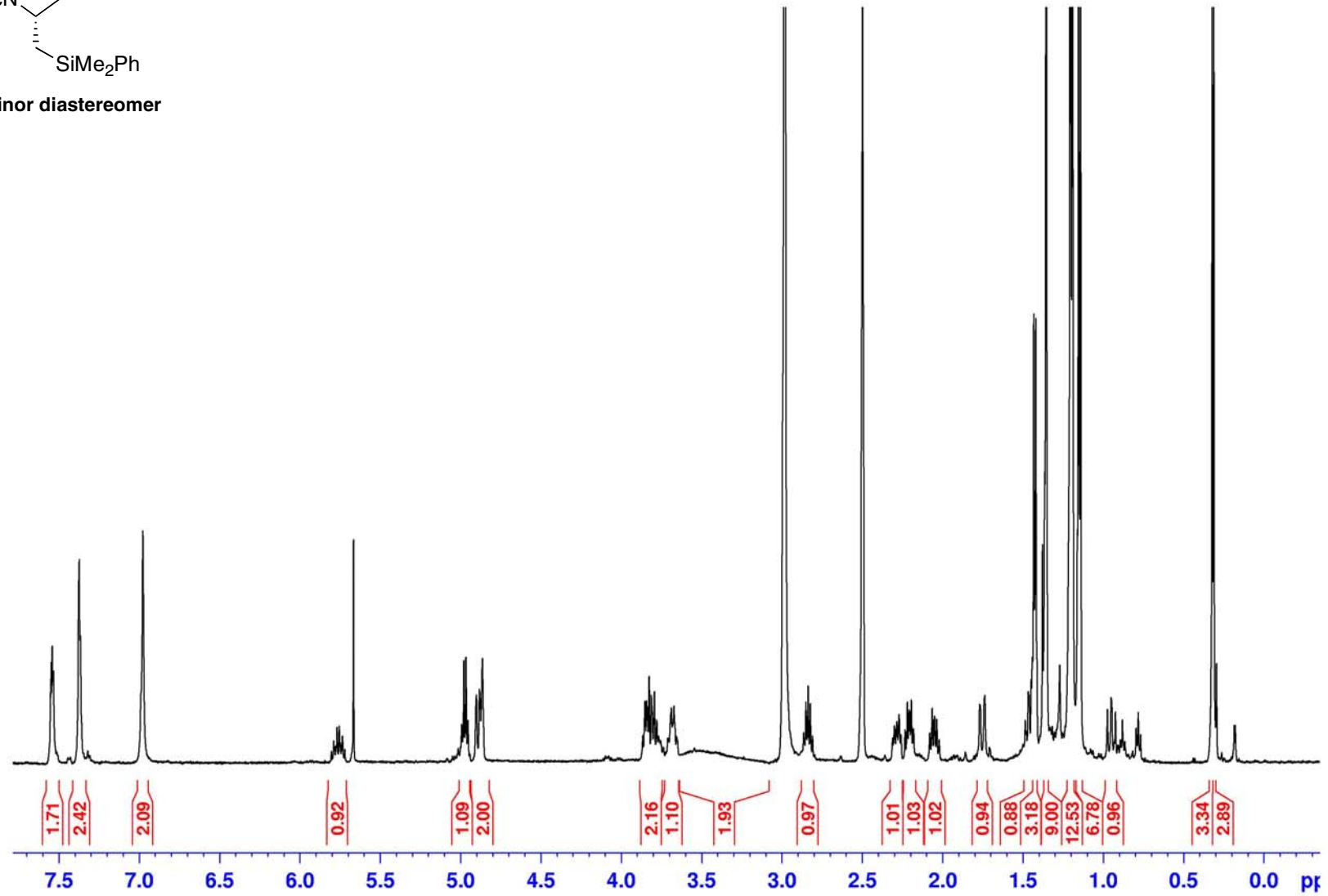
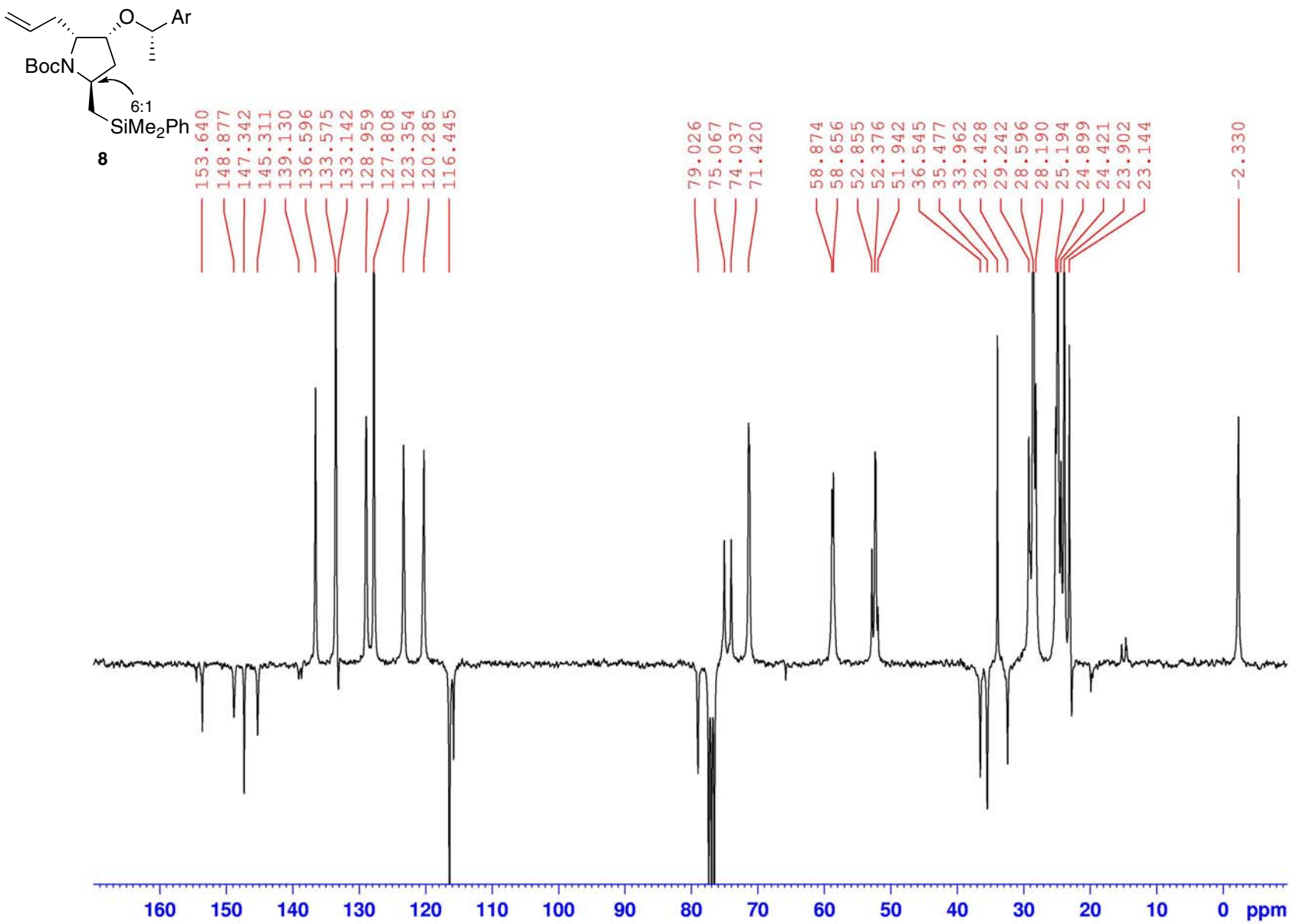
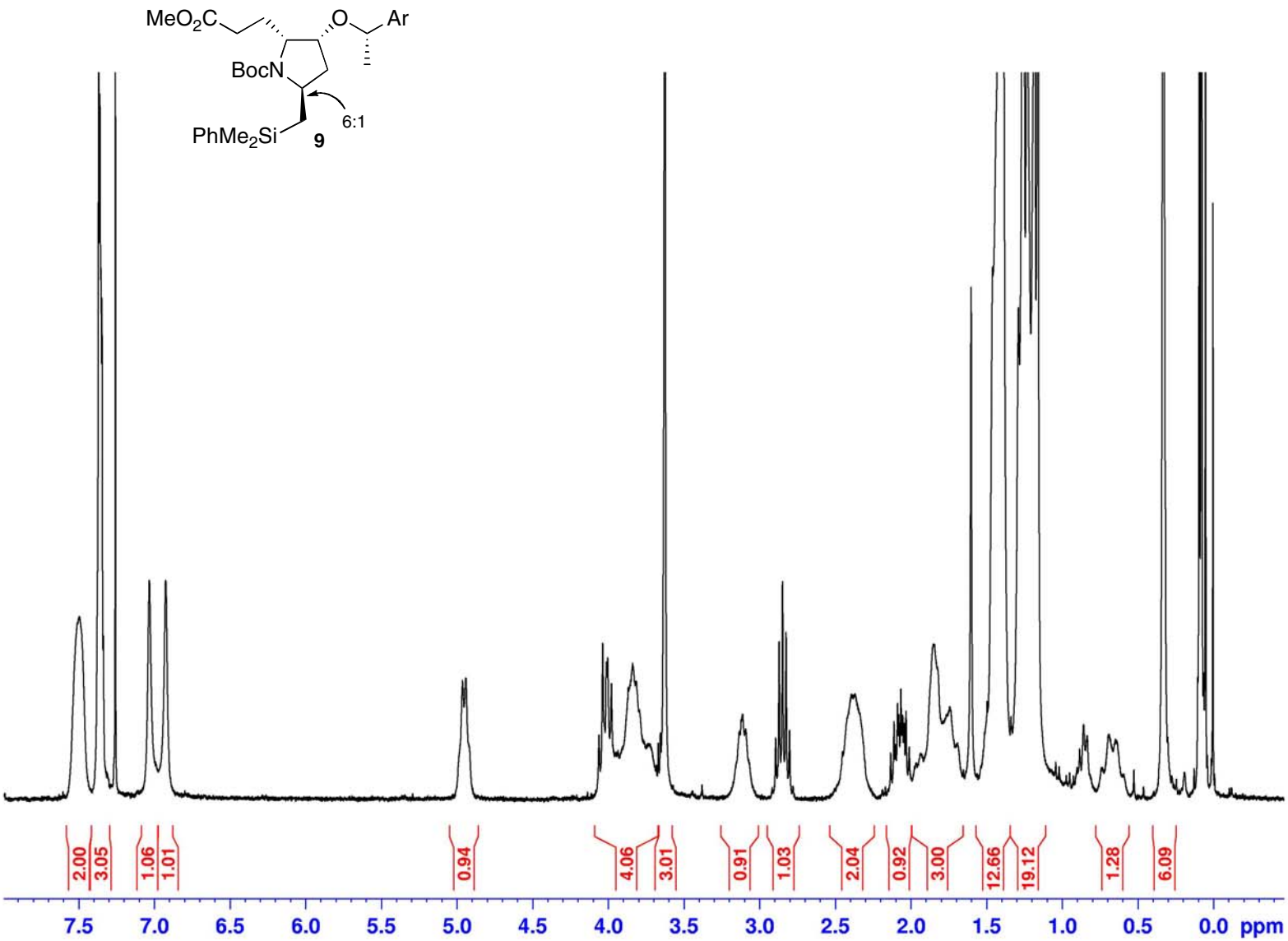
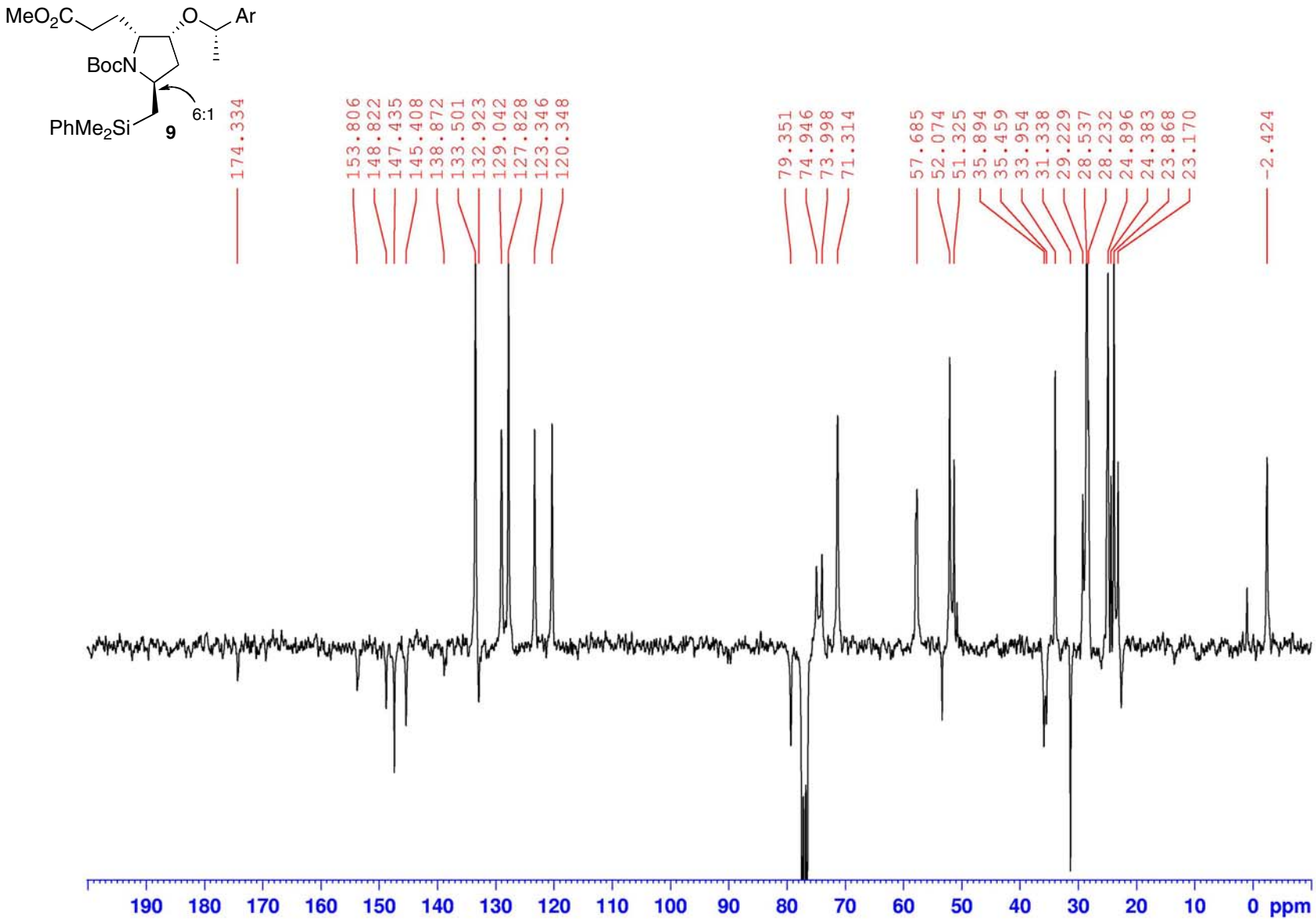


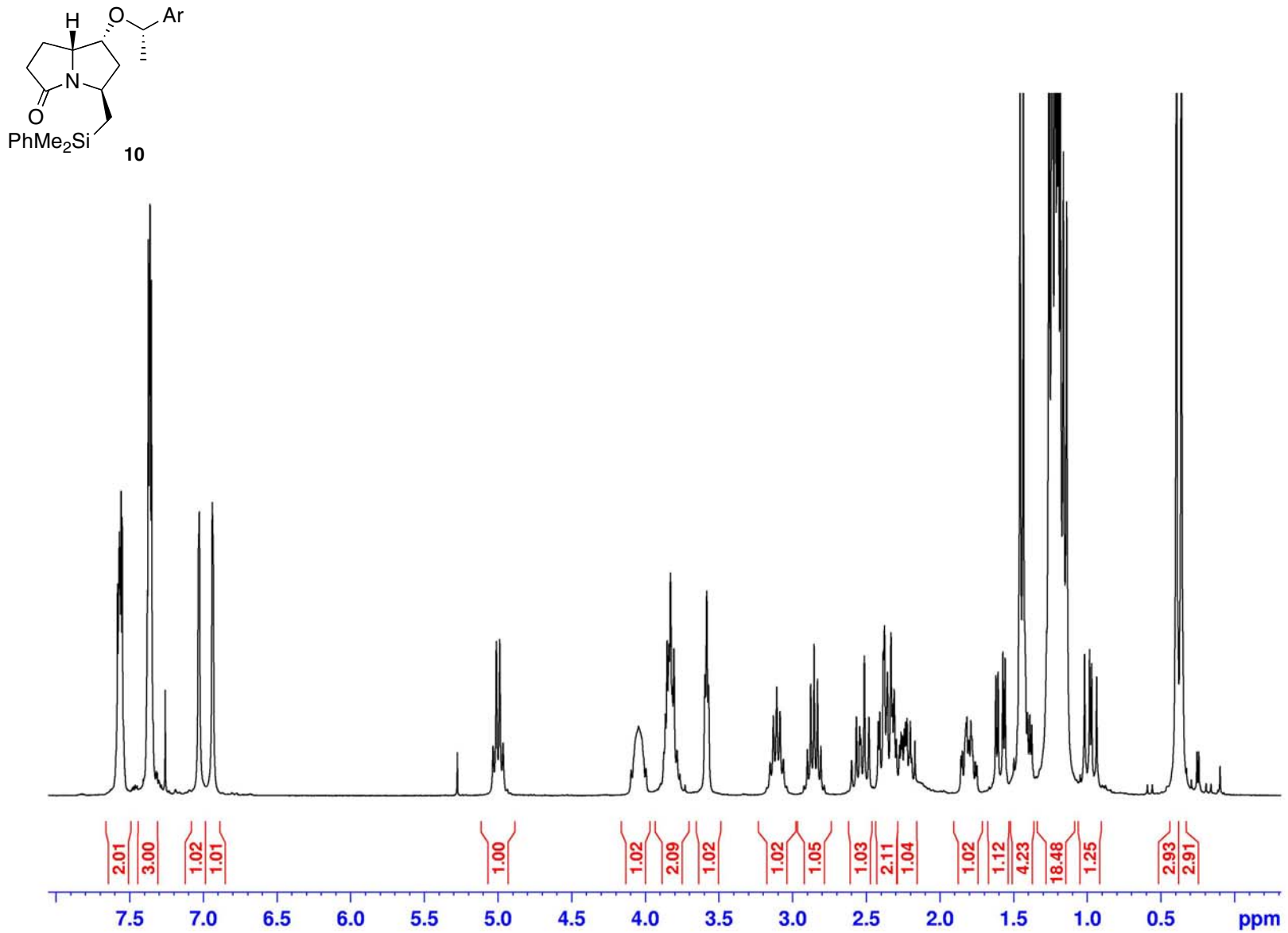
8 : minor diastereomer

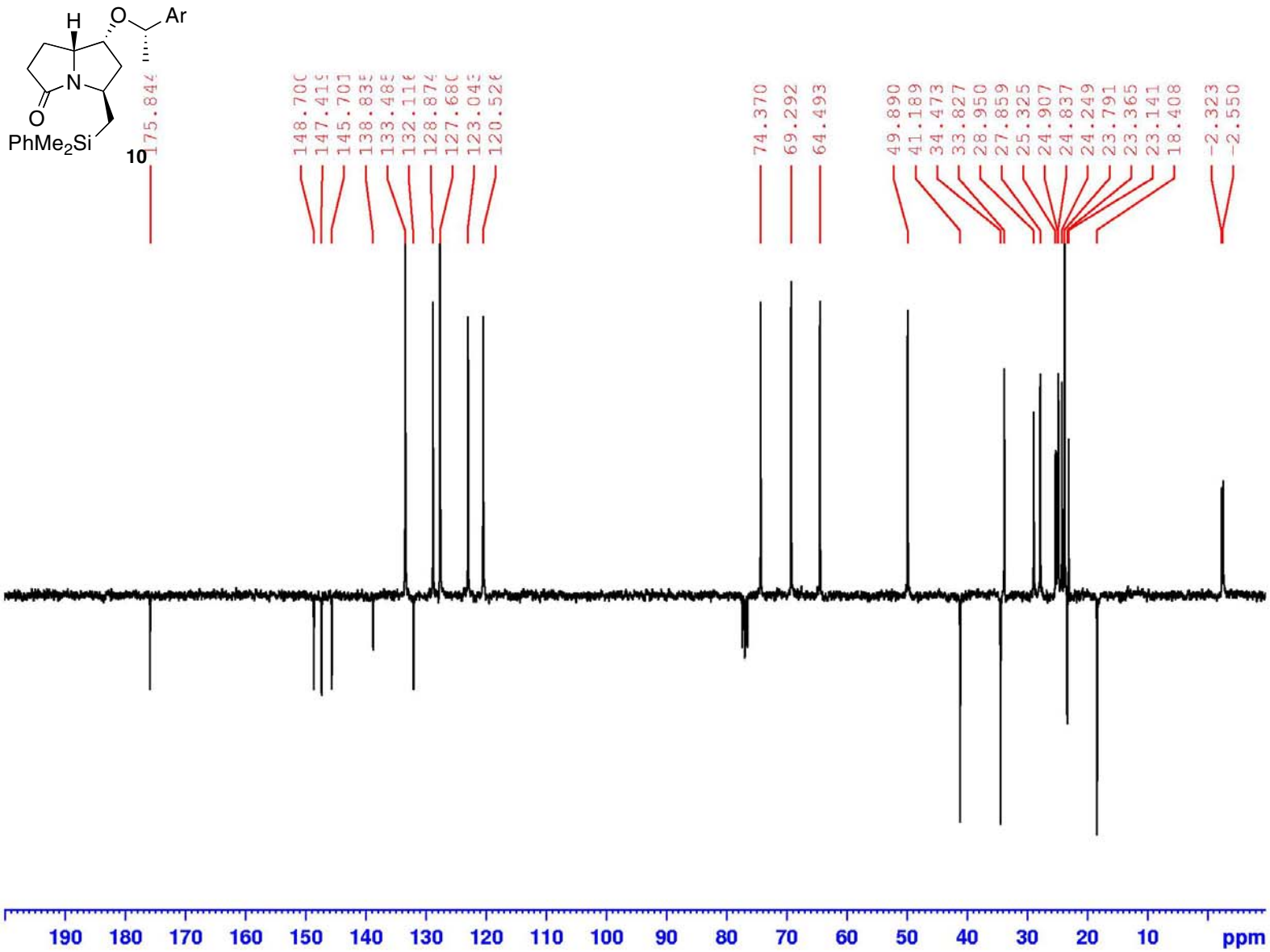


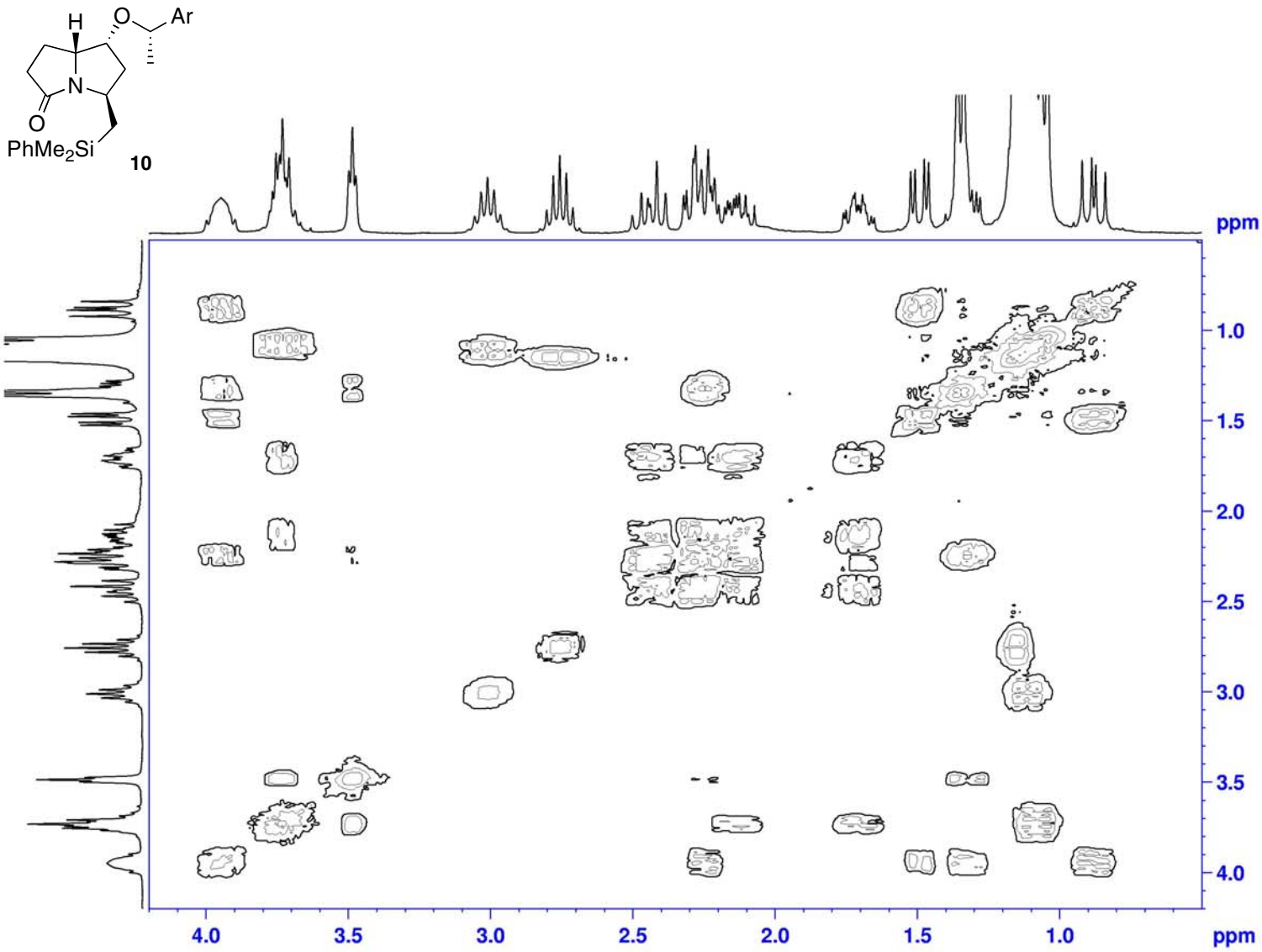

O
Ar
BocN
6:1
SiMe2Ph
8
153.640
148.877
147.342
145.311
139.130
136.596
133.575
133.142
128.959
127.808
123.354
120.285
116.445
79.026
75.067
74.037
71.420
58.874
58.656
52.855
52.376
51.942
36.545
35.477
33.962
32.428
29.242
28.596
28.190
25.194
24.899
24.421
23.902
23.144
-2.330
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

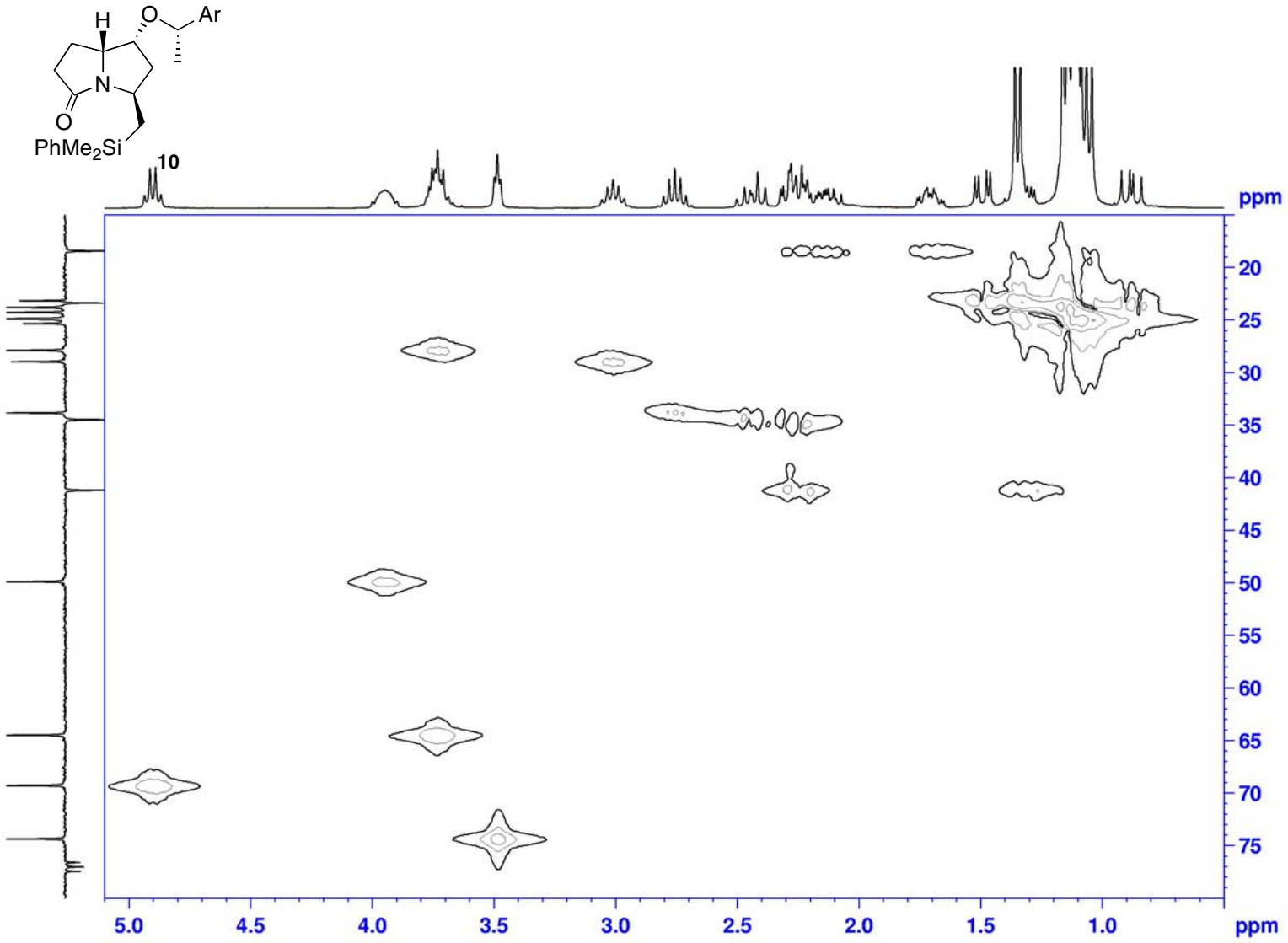

MeO2C
O
Ar
BocN
6:1
PhMe2Si
9
2.00
3.05
1.06
1.01
0.94
4.06
3.01
0.91
1.03
2.04
0.92
3.00
12.66
19.12
1.28
6.09
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm

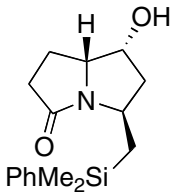

MeO2C
O
Ar
BocN
PhMe2Si
9
6:1
174.334
153.806
148.822
147.435
145.408
138.872
133.501
132.923
129.042
127.828
123.346
120.348
79.351
74.946
73.998
71.314
57.685
52.074
51.325
35.894
35.459
33.954
31.338
29.229
28.537
28.232
24.896
24.383
23.868
23.170
-2.424
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


H
O
Ar
N
O
PhMe2Si
10
2.01
3.00
1.02
1.01
1.00
1.02
2.09
1.02
1.02
1.05
1.03
2.11
1.04
1.02
1.12
4.23
18.48
1.25
2.93
2.91
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
ppm

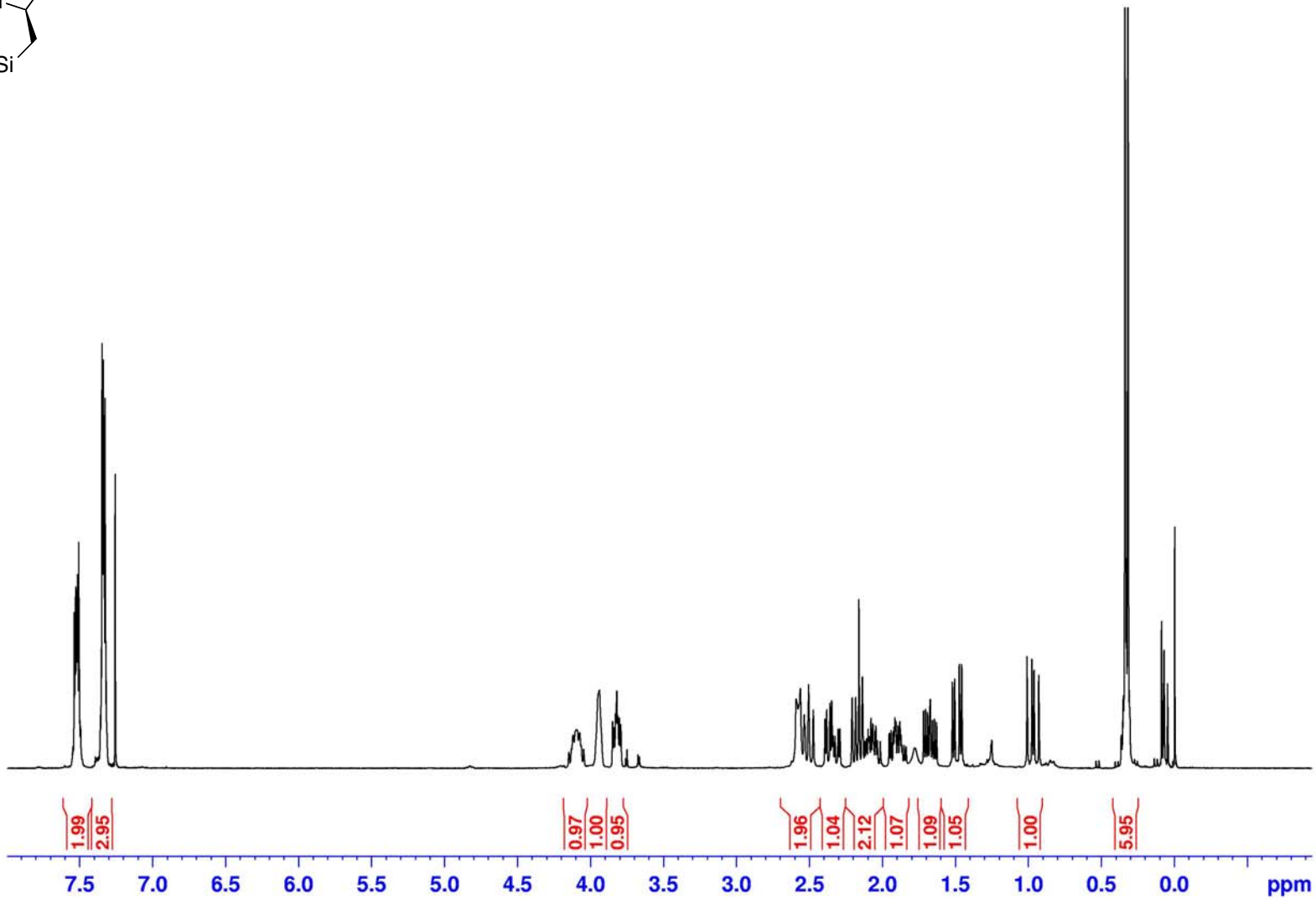

H
O
Ar
N
O
PhMe2Si
10
175.844
148.700
147.419
145.701
138.835
133.485
132.116
128.874
127.680
123.045
120.528
74.370
69.292
64.493
49.890
41.189
34.473
33.827
28.950
27.859
25.325
24.907
24.837
24.249
23.791
23.365
23.141
18.408
-2.323
-2.550
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

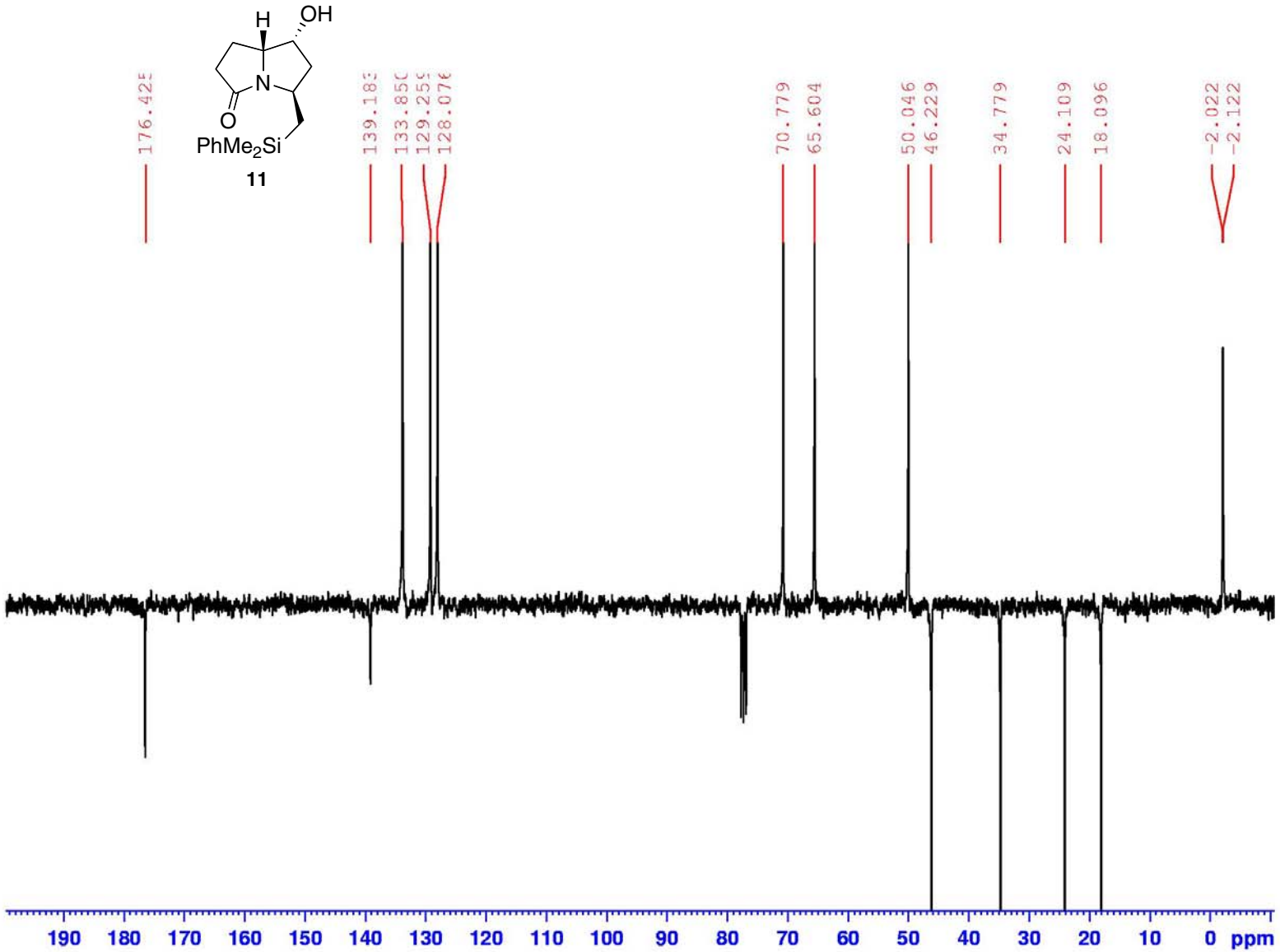

H
O
Ar
N
O
PhMe2Si
10
ppm
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm

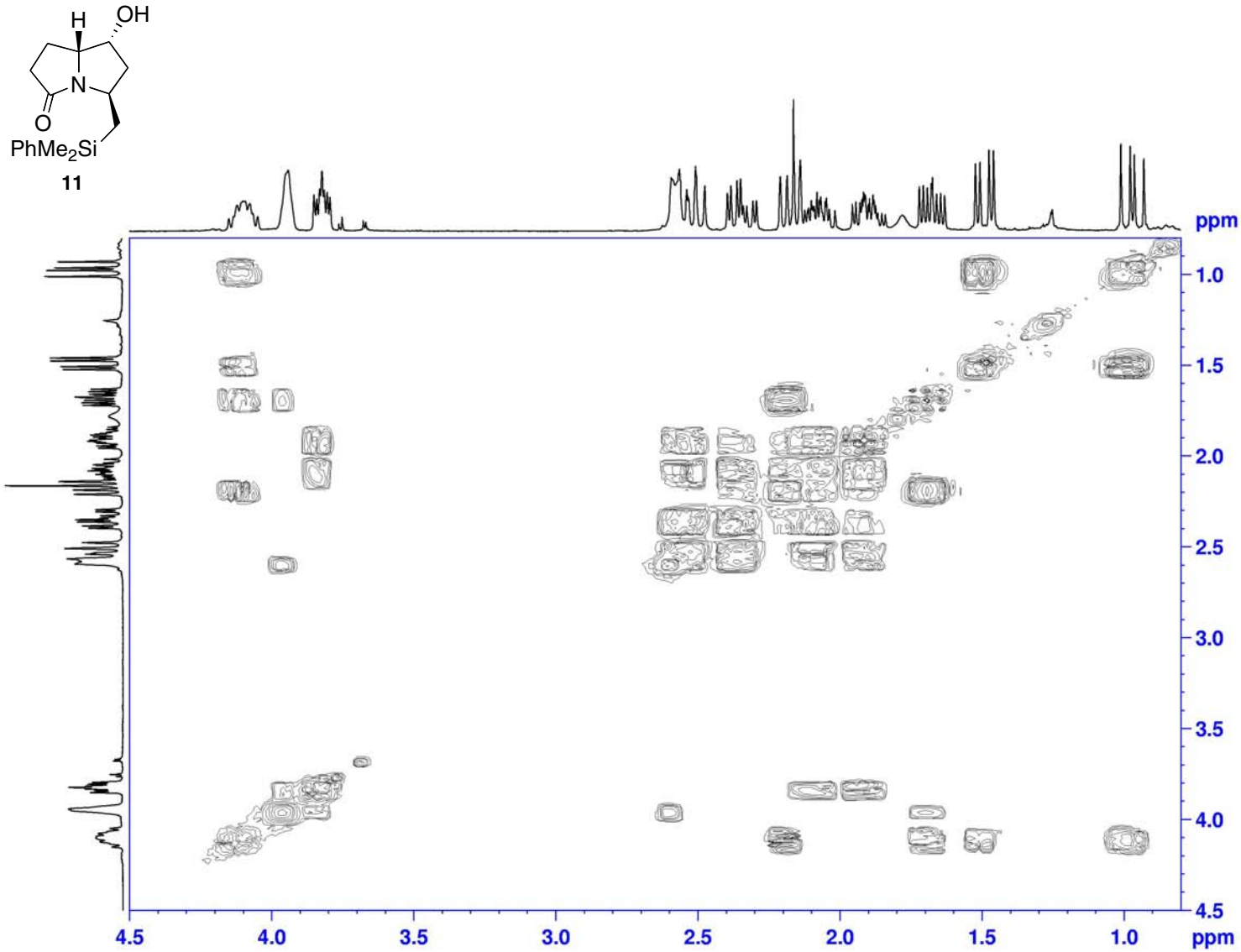

H
O
Ar
N
O
PhMe2Si
10
ppm
20
25
30
35
40
45
50
55
60
65
70
75
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm

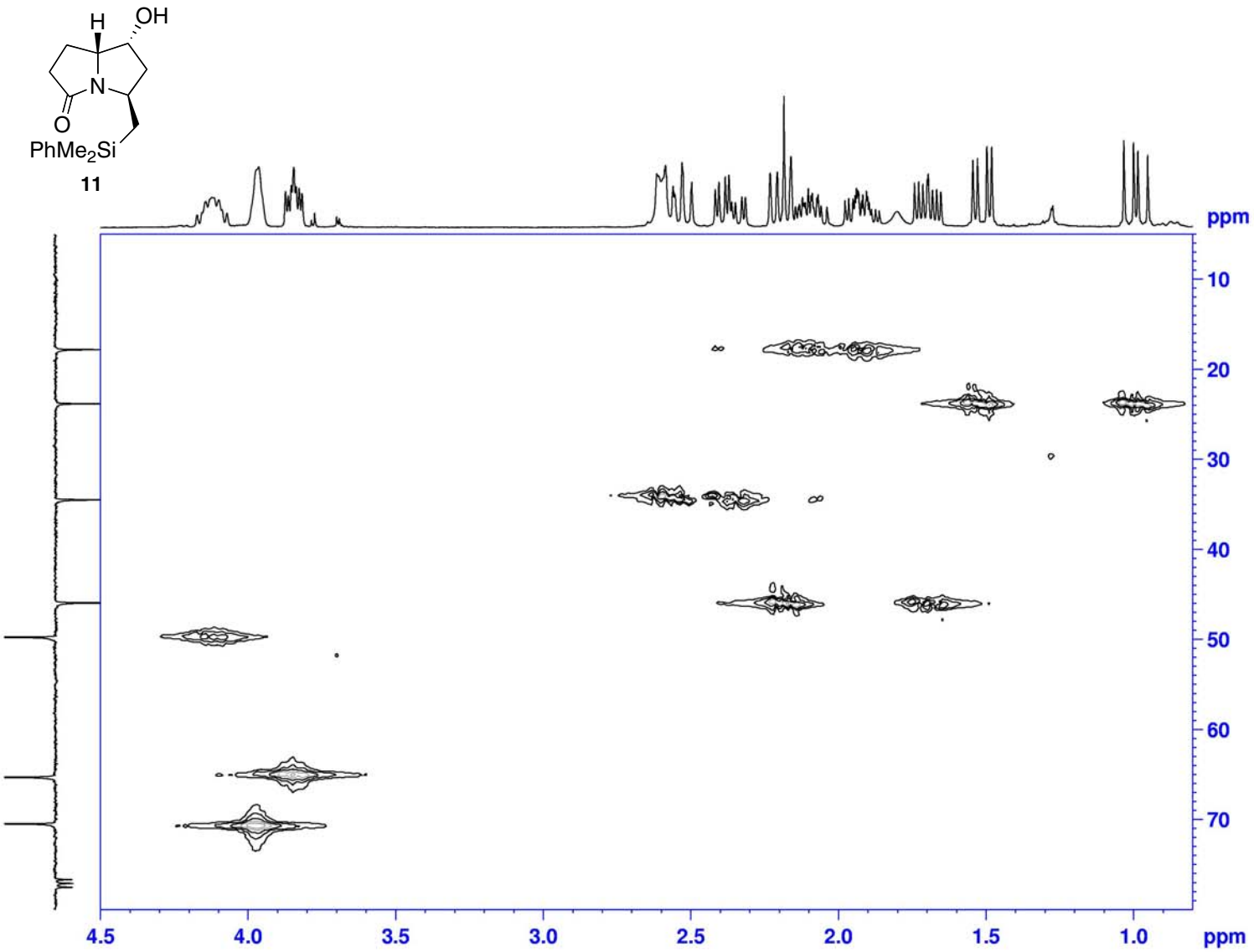

H
OH
N
O
PhMe2Si

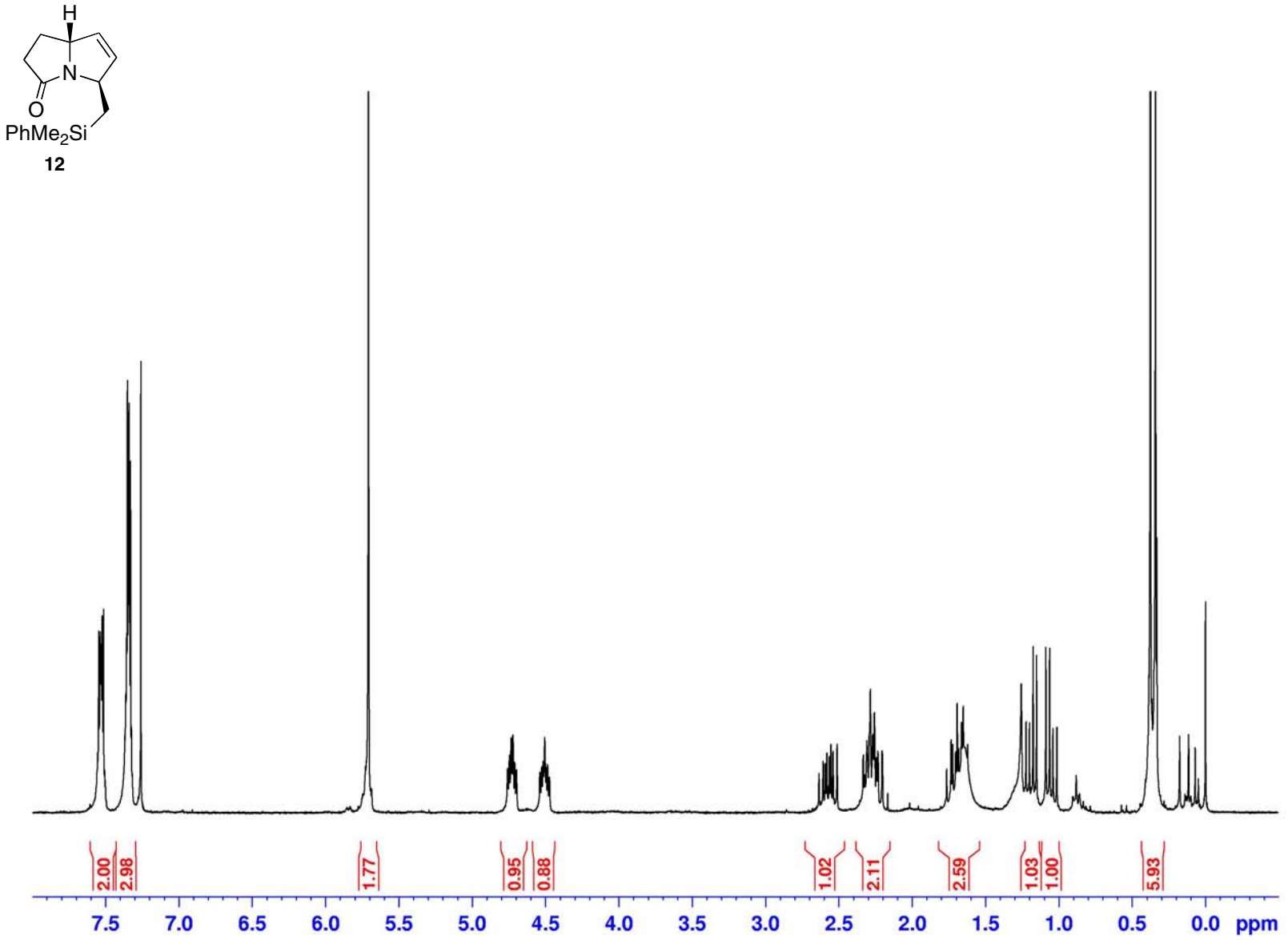
11

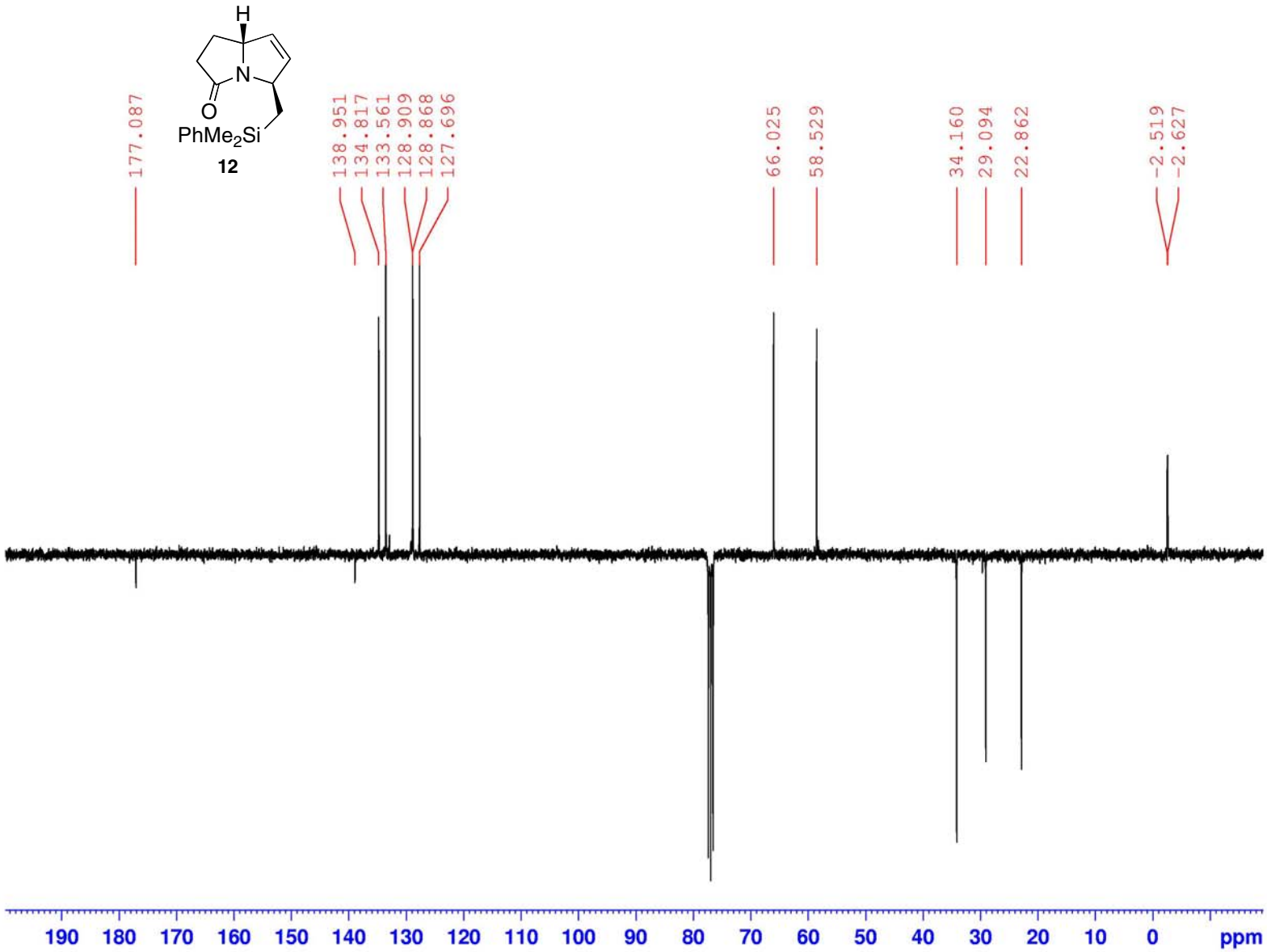

1.99
2.95
0.97
1.00
0.95
1.96
1.04
2.12
1.07
1.09
1.05
1.00
5.95
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm

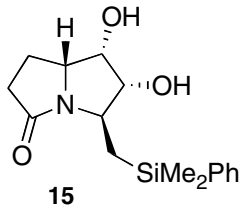

H
OH
N
O
PhMe2Si
11
176.425
139.183
133.850
129.259
128.076
70.779
65.604
50.046
46.229
34.779
24.109
18.096
-2.022
-2.122
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


H
OH
N
O
PhMe2Si
11
ppm
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm

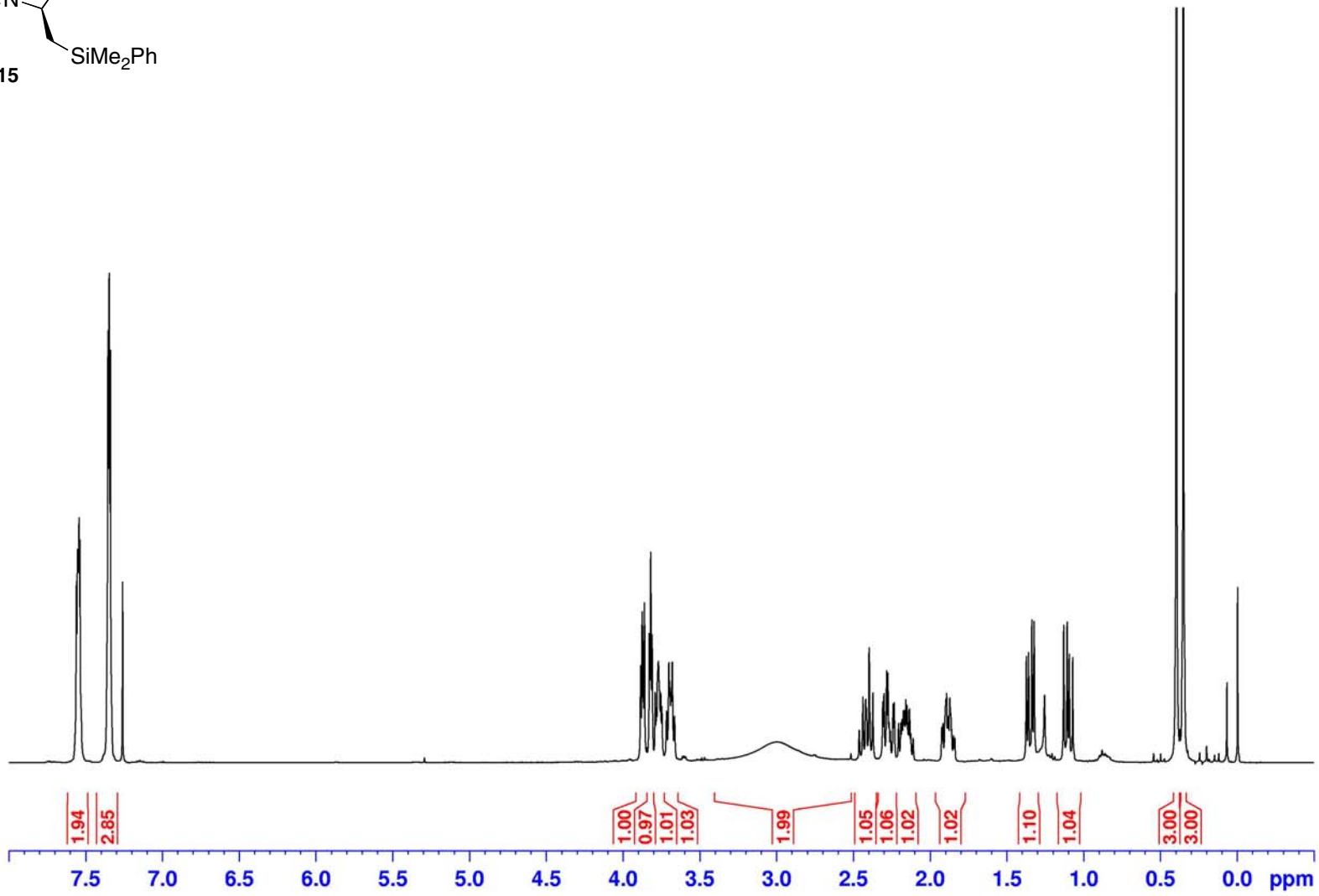

H
OH
N
O
PhMe2Si
11
ppm
10
20
30
40
50
60
70
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm

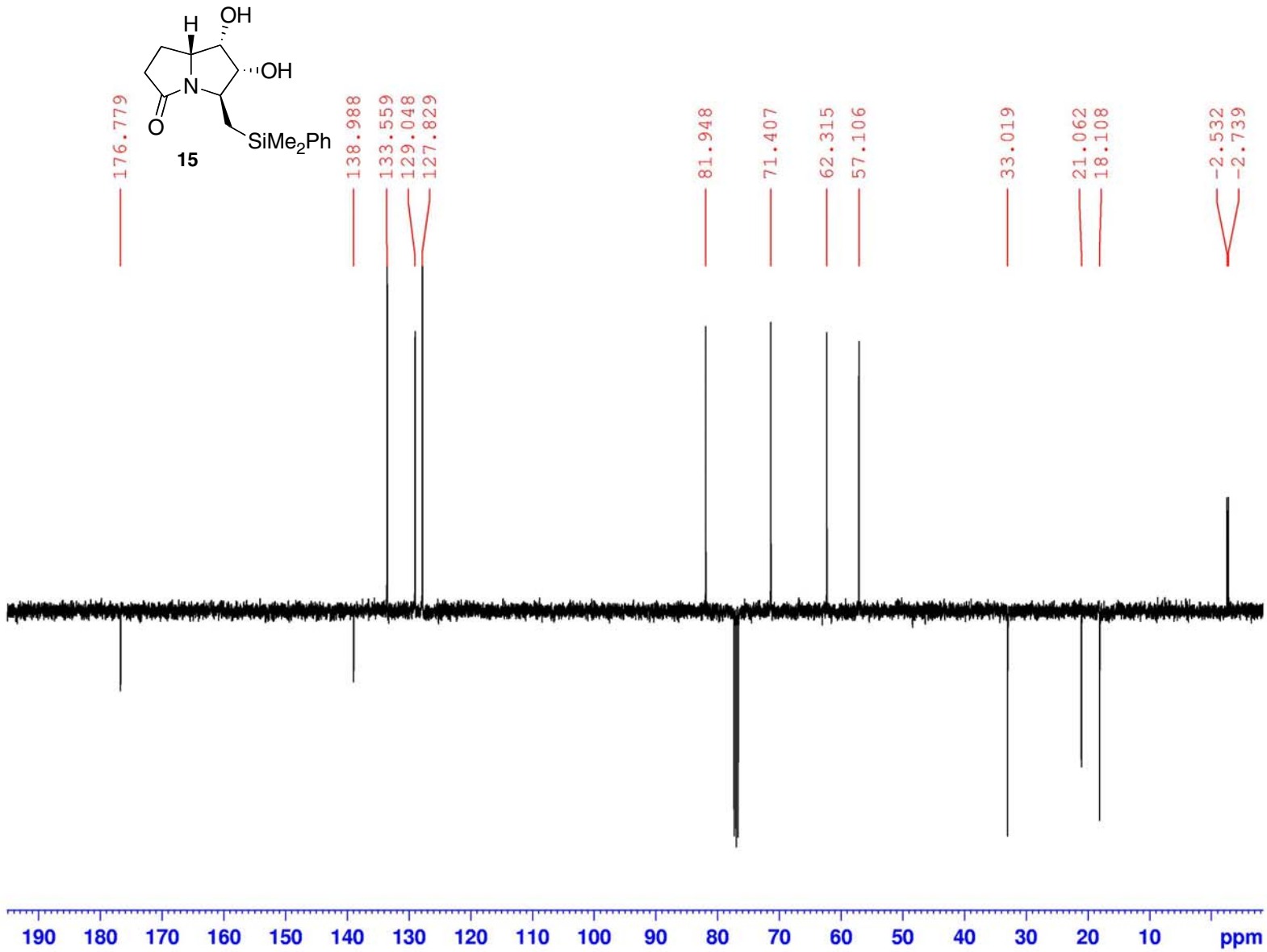

H
N
O
PhMe2Si
12
2.00
2.98
1.77
0.95
0.88
1.02
2.11
2.59
1.03
1.00
5.93
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm

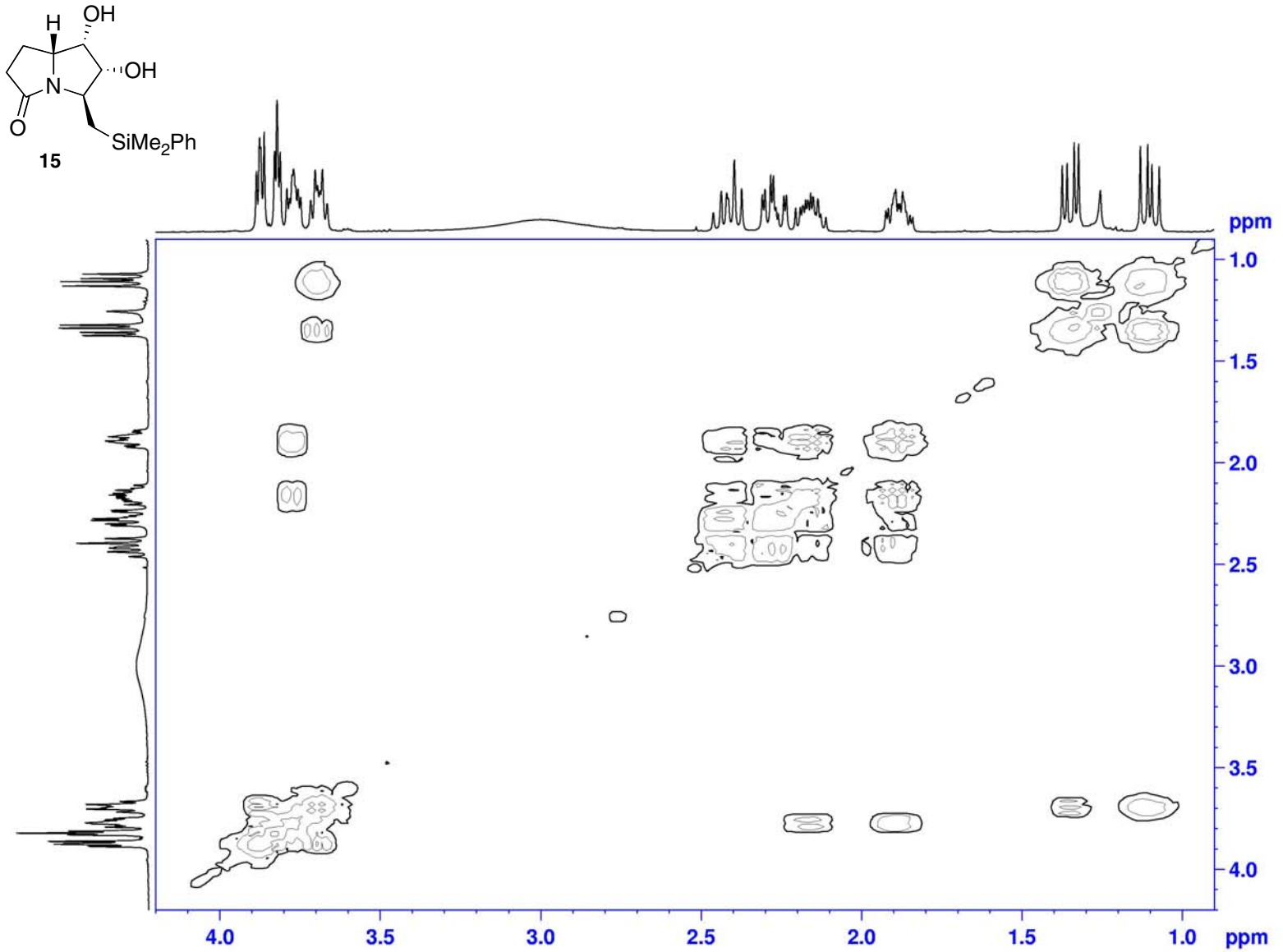

H
N
O
PhMe2Si
12
177.087
138.951
134.817
133.561
128.909
128.868
127.696
66.025
58.529
34.160
29.094
22.862
-2.519
-2.627
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

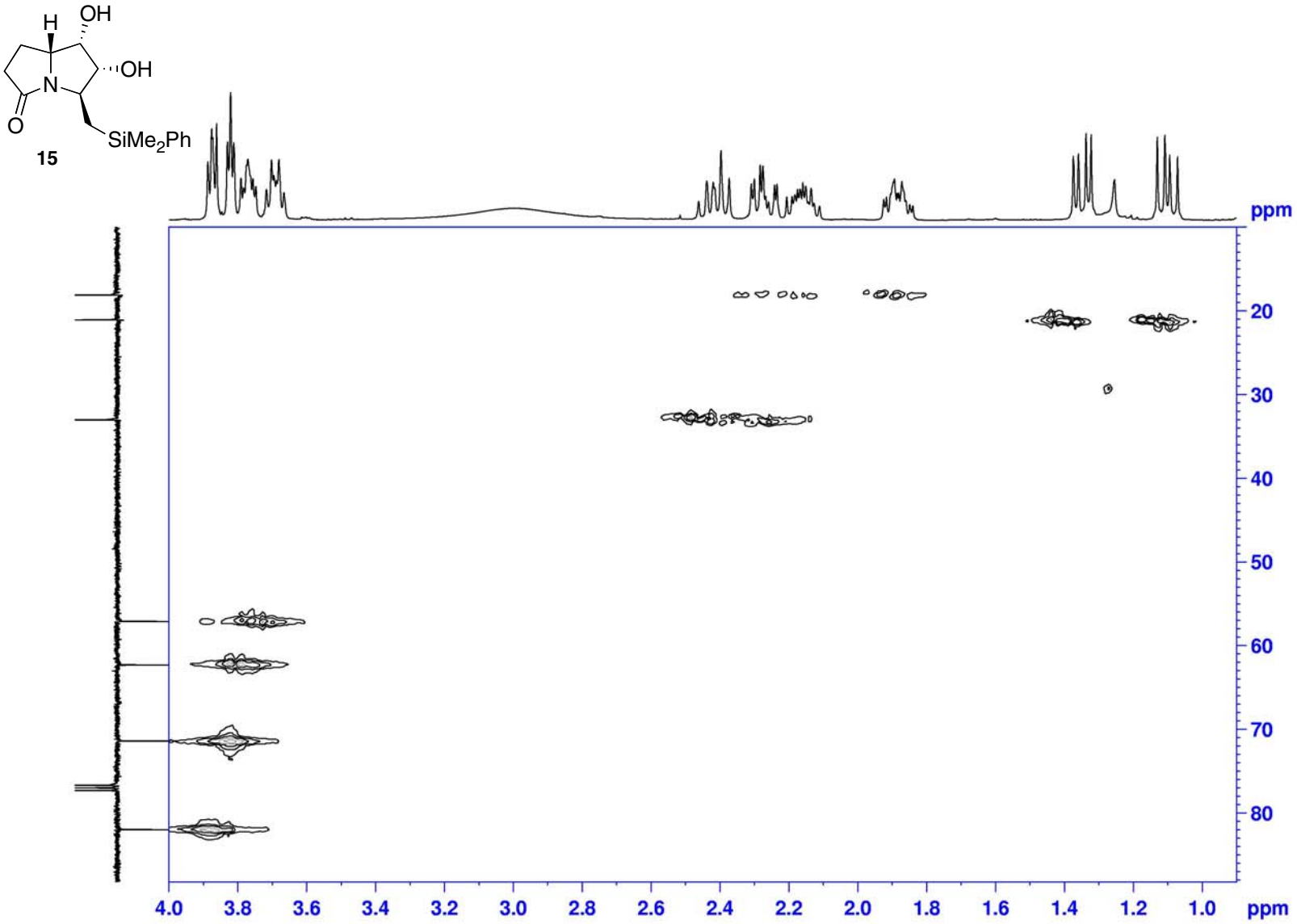

H
OH
OH
N
O
SiMe2Ph

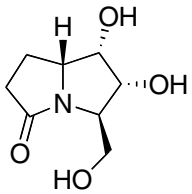
15


1.94
2.85
1.00
0.97
1.01
1.03
1.99
1.05
1.06
1.02
1.02
1.10
1.04
3.00
3.00
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm

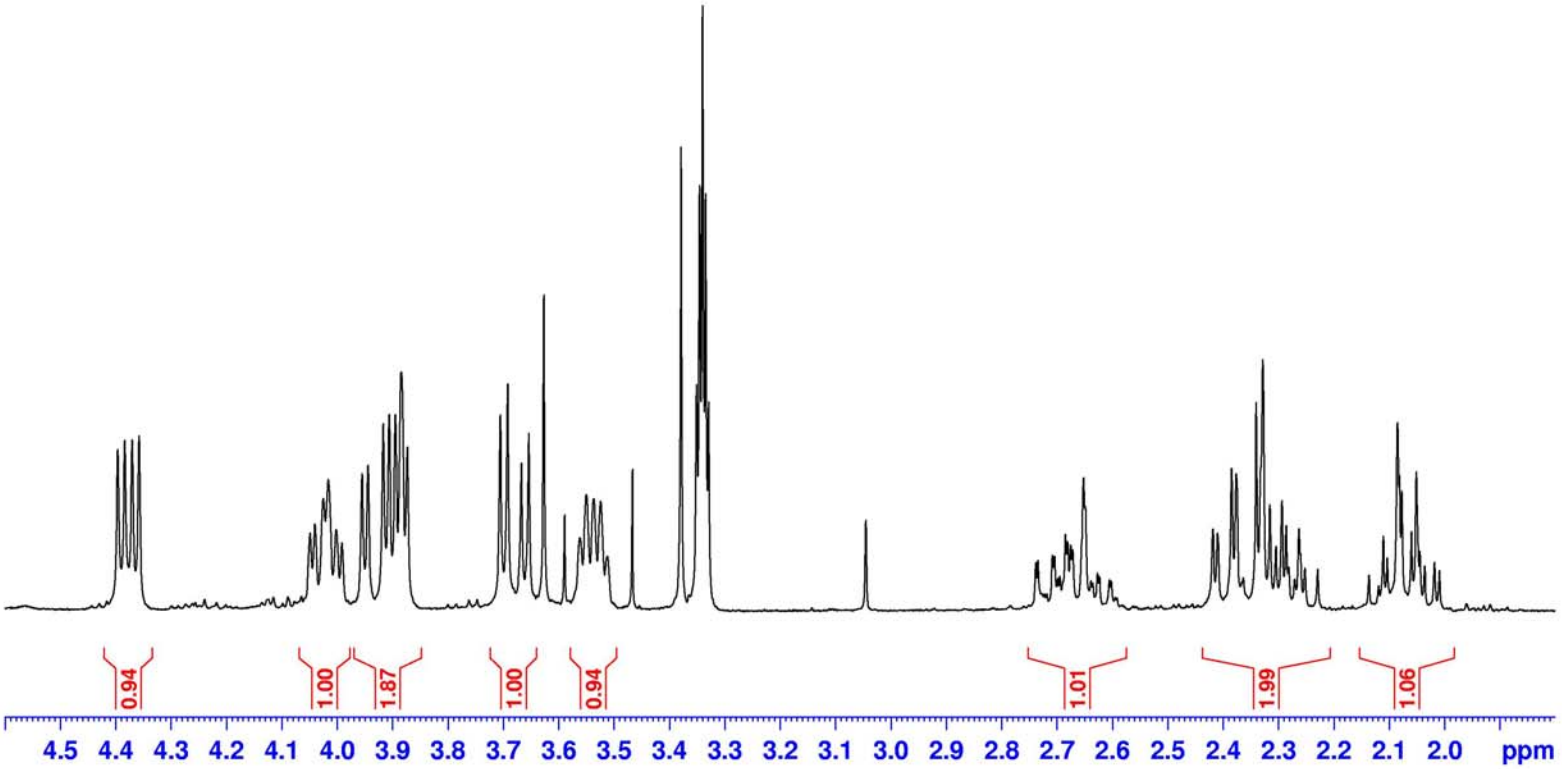

H
OH
OH
N
O
SiMe2Ph
15
176.779
138.988
133.559
129.048
127.829
81.948
71.407
62.315
57.106
33.019
21.062
18.108
-2.532
-2.739
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

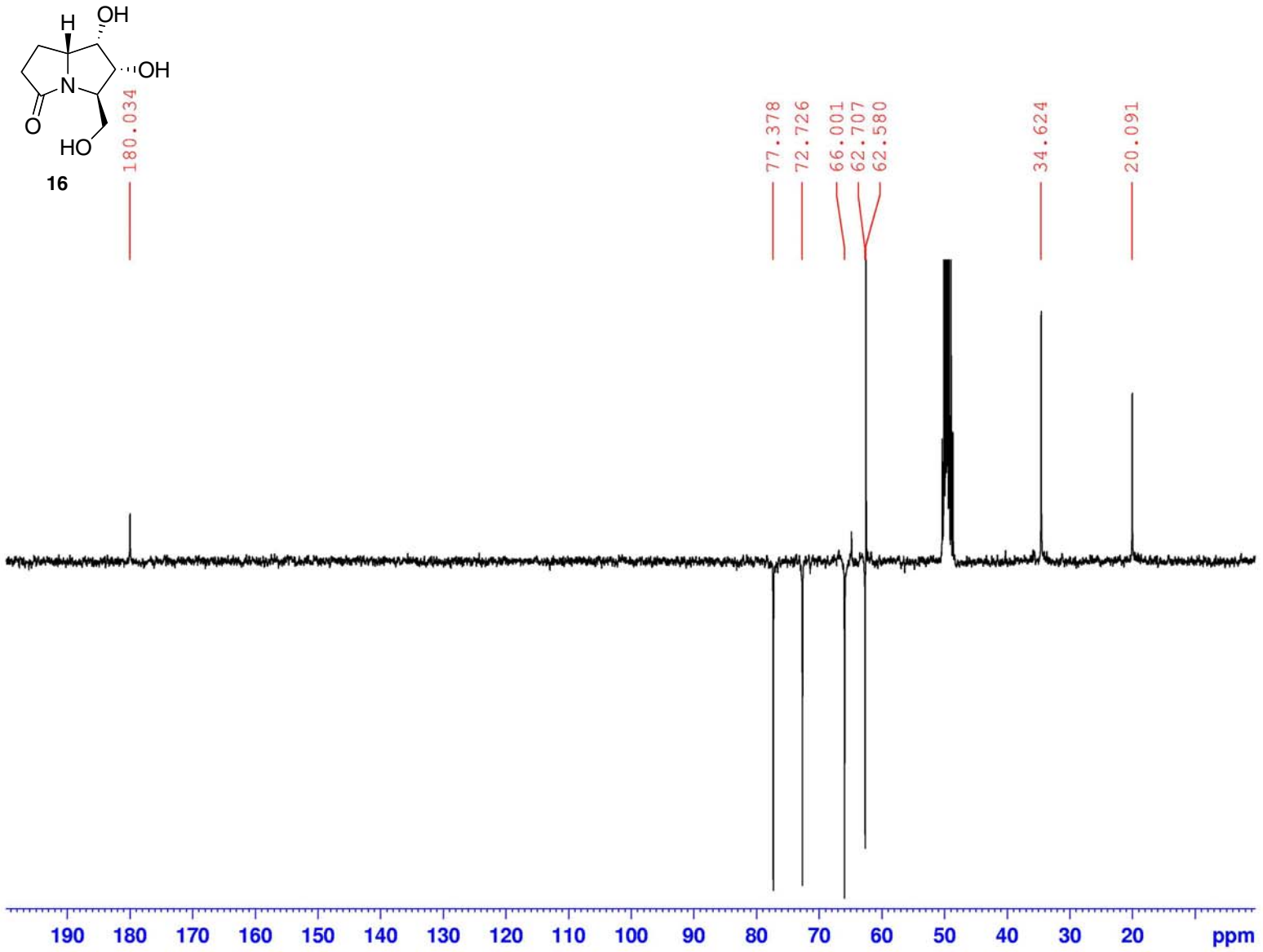

H
OH
OH
N
O
SiMe2Ph
15
ppm
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm

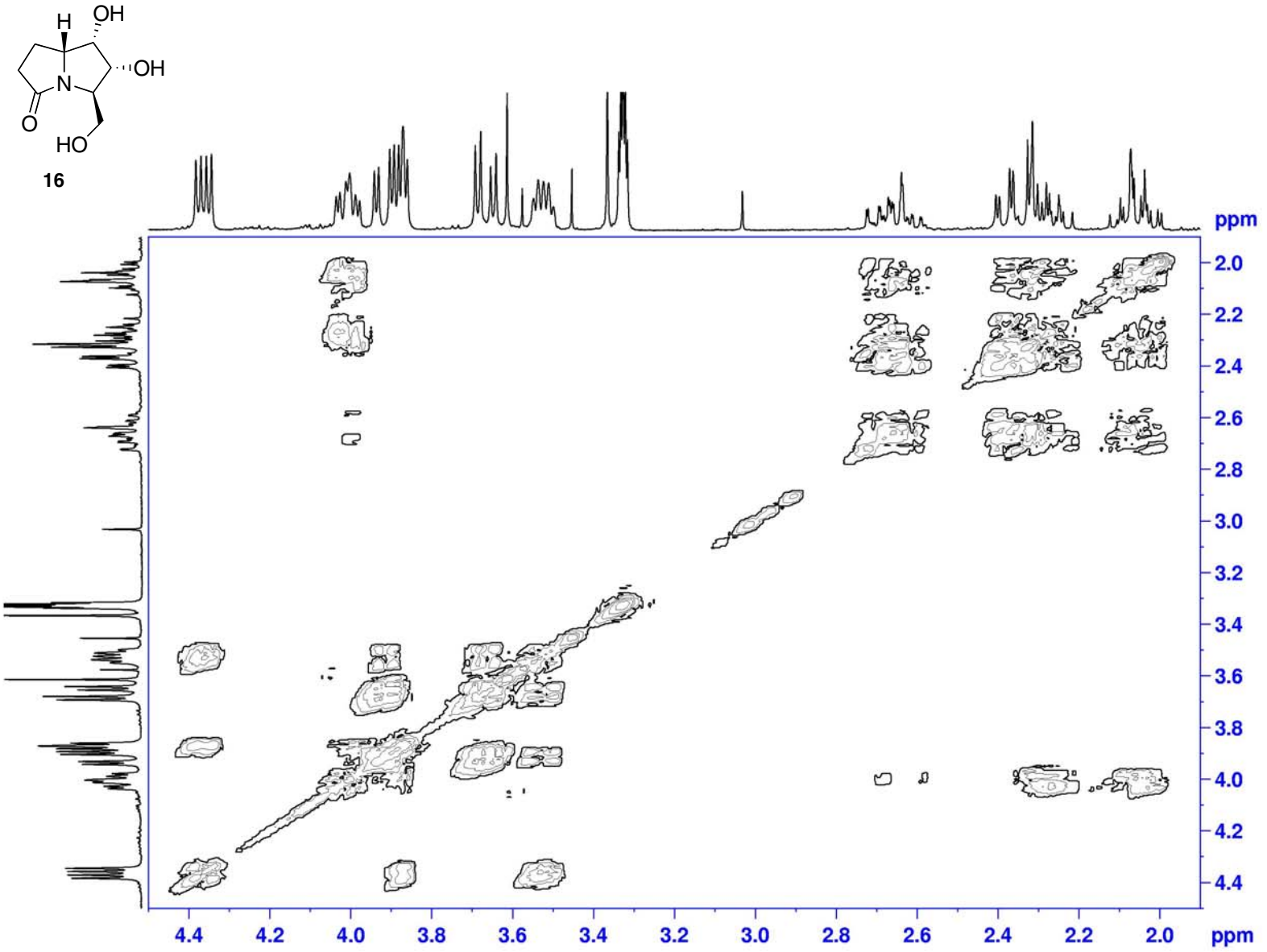

H
OH
OH
N
O
SiMe2Ph
15
ppm
20
30
40
50
60
70
80
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
ppm

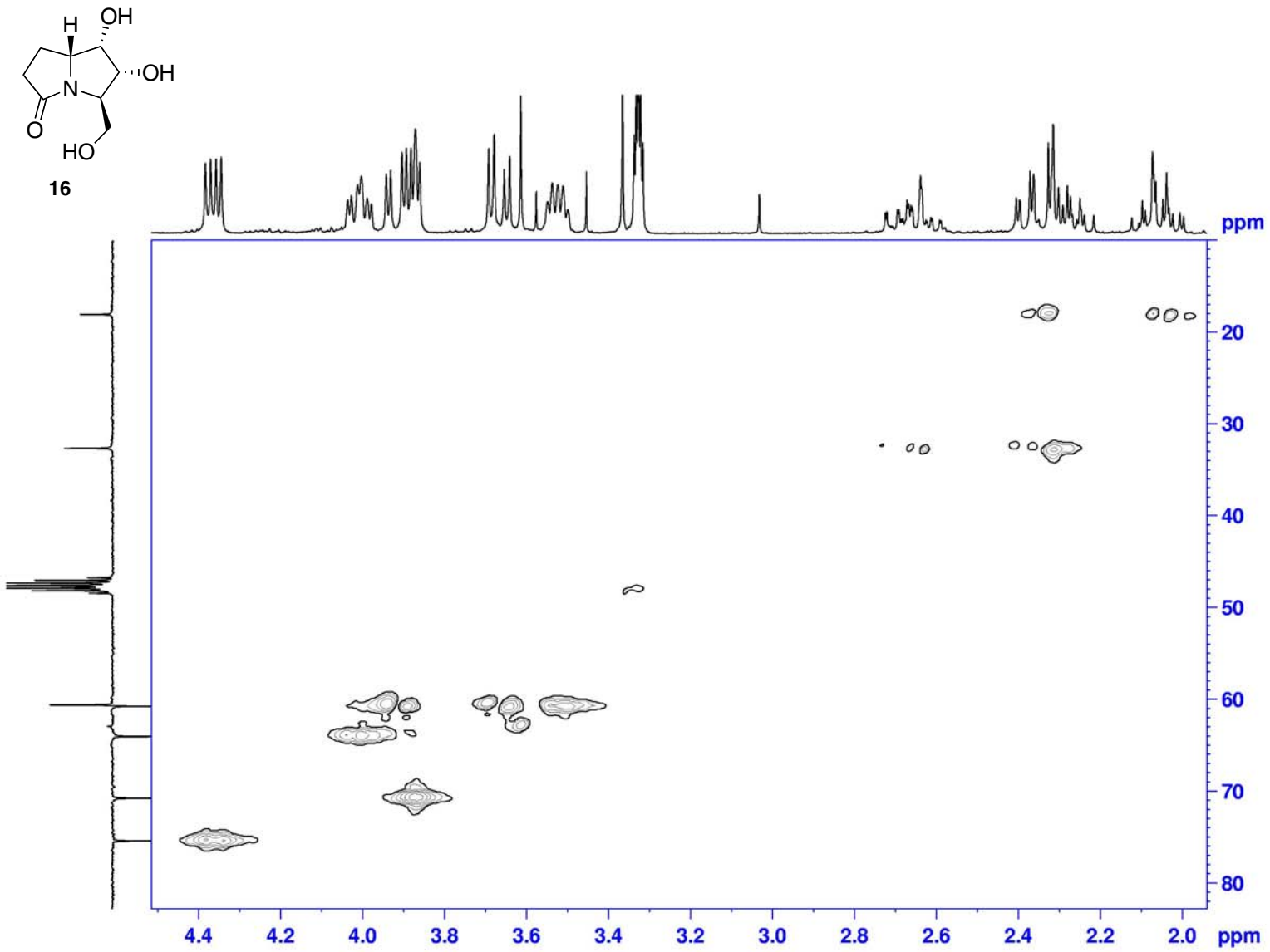

H
OH
OH
N
O
HO

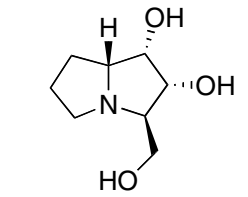
16


0.94
1.00
1.87
1.00
0.94
1.01
1.99
1.06
4.5 4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6 3.5 3.4 3.3 3.2 3.1 3.0 2.9 2.8 2.7 2.6 2.5 2.4 2.3 2.2 2.1 2.0 ppm


H
OH
OH
N
O
HO
16
180.034
77.378
72.726
66.001
62.707
62.580
34.624
20.091
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
ppm

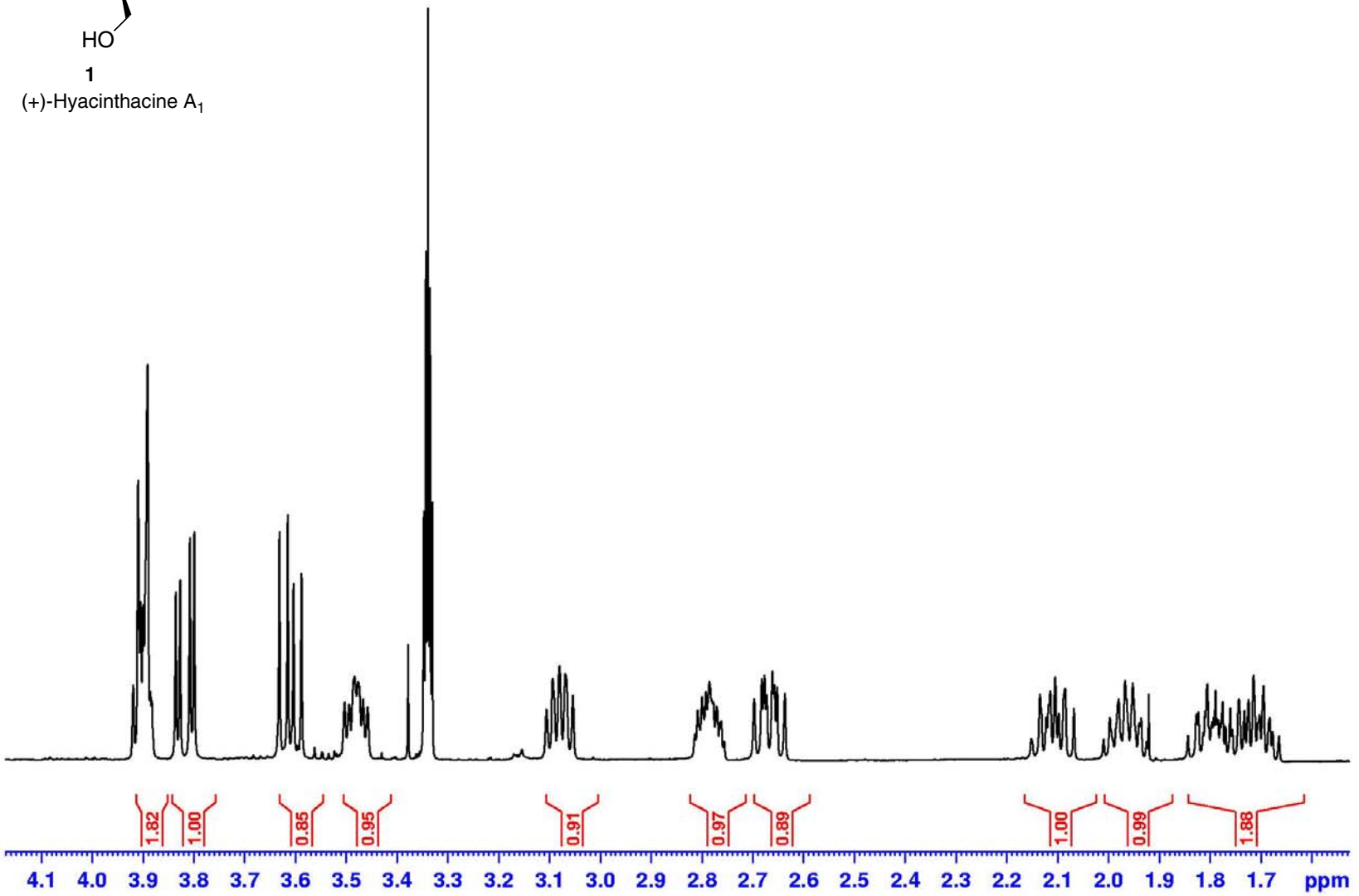

H
OH
OH
N
O
HO
16
ppm
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
ppm

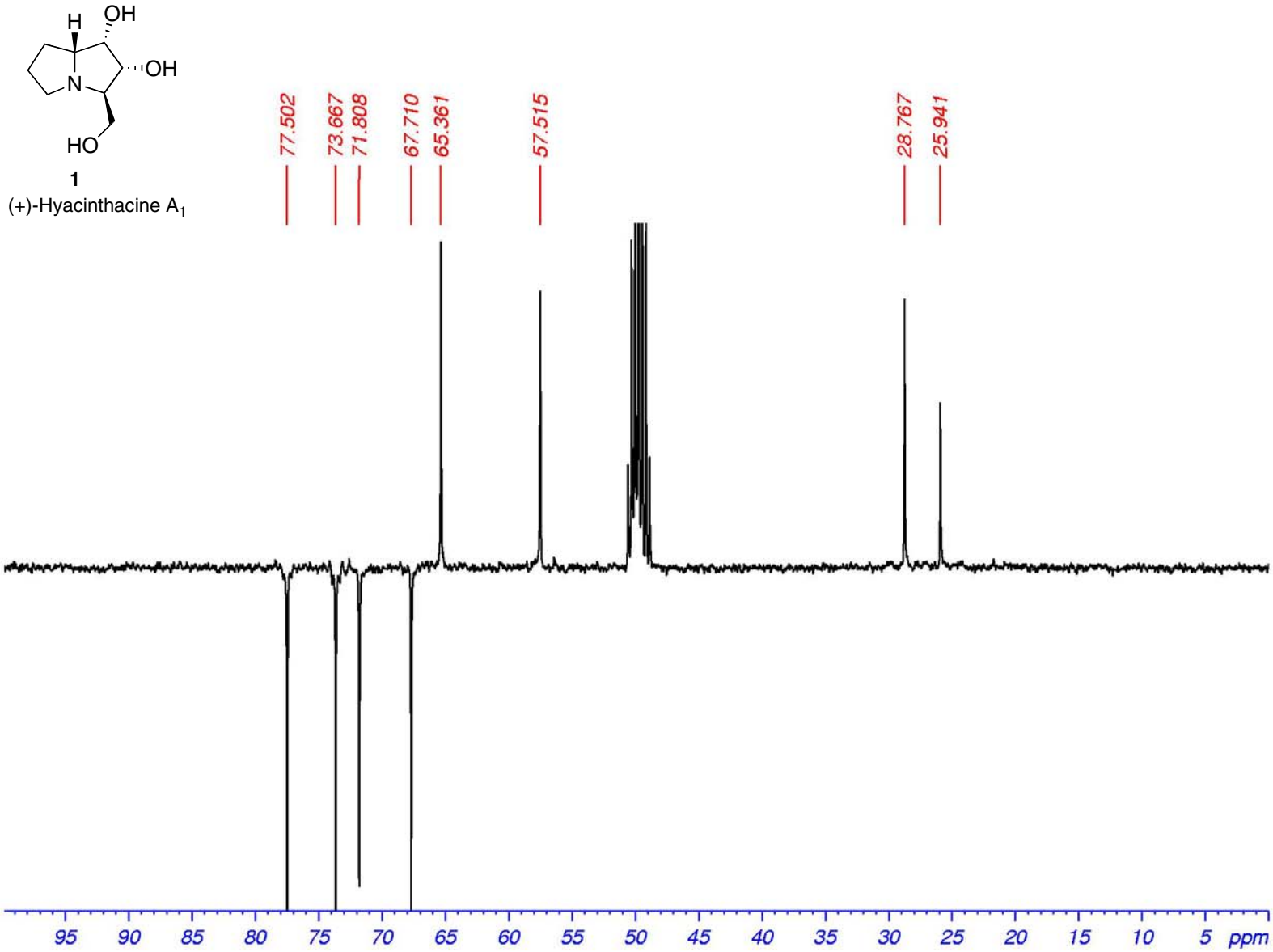

H
OH
OH
N
O
HO
16
ppm
20
30
40
50
60
70
80
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
ppm

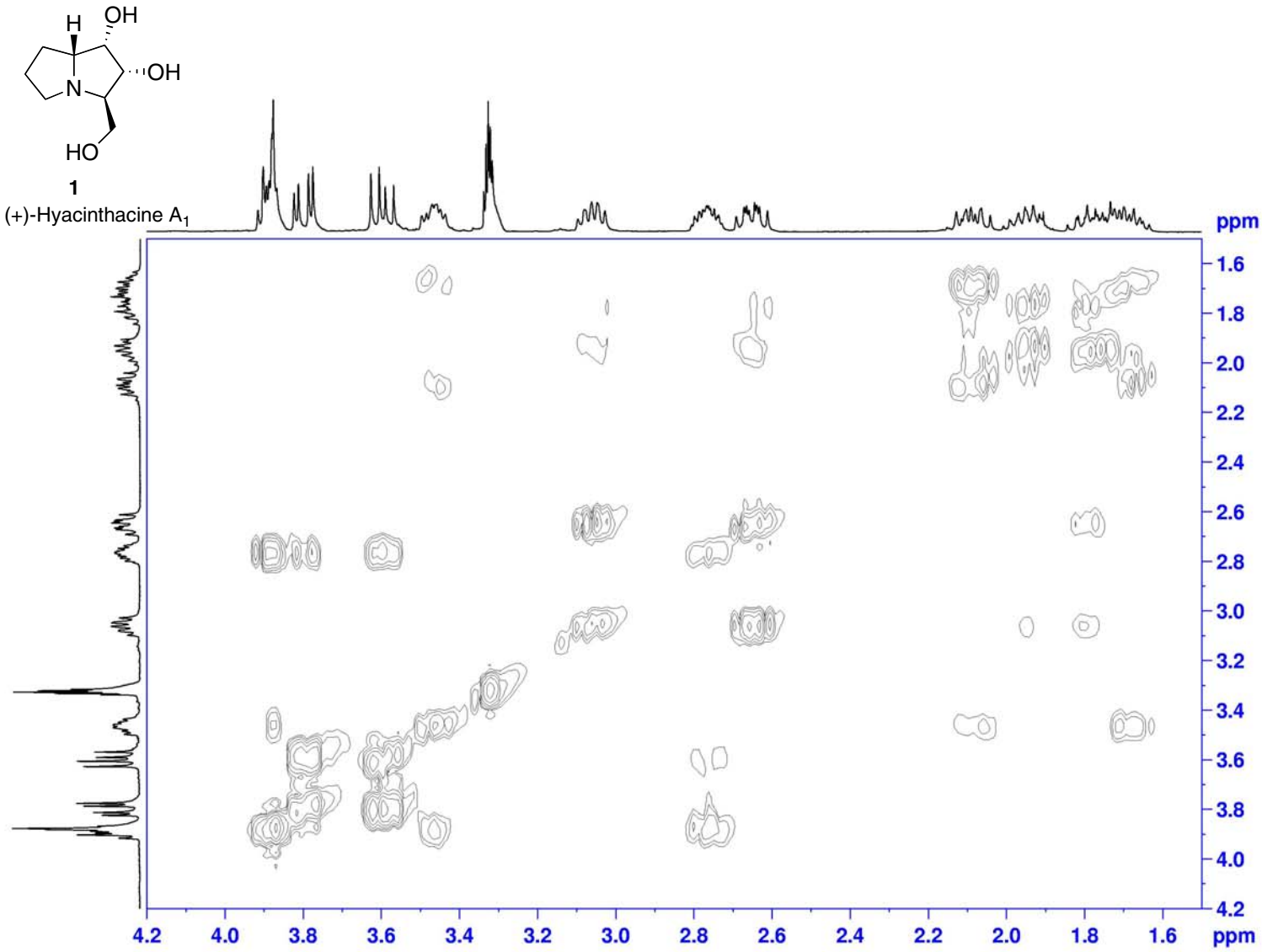


1

(+)-Hyacinthacine A_1




H
OH
OH
N
HO
1
(+)-Hyacinthacine A1
77.502
73.667
71.808
67.710
65.361
57.515
28.767
25.941
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
ppm


H
OH
OH
N
HO
1
(+)-Hyacinthacine A1
ppm
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
ppm