Electronic Supplementary Information (ESI)

Palladium(0)-Catalyzed C(sp^3)-Si Bond Formation via Formal Carbene Insertion into Si-H Bond

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1) General.

All the reactions were performed under a nitrogen atmosphere in a flame-dried reaction flask. All solvents were distilled under a nitrogen atmosphere prior to use. Dioxane was dried over Na with benzophenone-ketyl intermediate as indicator. For chromatography, 200-300 mesh silica gel (Qingdao, China) was employed. ^{1}H and ^{13}C NMR spectra were recorded at 400 MHz and 100 MHz with Brucker ARX 400 spectrometer. Chemical shifts are reported in *ppm* using tetramethylsilane as internal standard and $CDCl_3$ as solvent. Mass spectra were obtained on an Agilent 5975C inert 350 EI mass spectrometer. HRMS were obtained on a Brucker Apex IV FTMS or Waters GCT Premier. The aldehydes and ketones were purchased from J&K, Adamas and Alfa. *N*-tosylhydrazones were prepared according to the literature procedure. [1] The palladium catalysts and ligands were purchased from Acros and TCI.

2) General procedure for Pd(0)-catalyzed Si-H bond insertions

a) General procedure for Si-H bond insertion

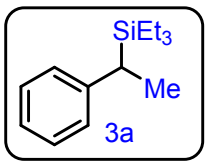
Under a nitrogen atmosphere, a solution of *N*-tosylhydrazone (0.3 mmol), Et_3SiH (0.45 mmol), $Pd(P^tBu_3)_2$ (0.006 mmol, 2 mol%), LiO^tBu (0.9 mmol, 3.0 equiv) in dioxane (4.0 mL) was heated at 120 ^oC for 2 h. Upon completion of the reaction, the solvent was removed in *vacuo* to provide a crude mixture, which was purified by silica gel column chromatography to afford the pure product.

b) General procedure for sequential Si-H bond insertion with Et_2SiH_2

Under a nitrogen atmosphere, a solution of *N*-tosylhydrazone **1d** (0.3 mmol), Et_2SiH_2 (0.45 mmol), $Pd(P^tBu_3)_2$ (0.006 mmol, 2 mol%), LiO^tBu (0.9 mmol, 3.0 equiv) in dioxane (4.0 mL) was heated at 120 ^oC for 2 h. The reaction vessel was then taken out of the oil bath and cooled to room temperature. Under a nitrogen atmosphere, $Pd(P^tBu_3)_2$ (0.006 mmol, 2 mol%), *N*-tosylhydrazone **1a** or **4a** (0.45 mmol), LiO^tBu (0.9 mmol, 3.0 equiv) were sequentially added to the same vessel. The vessel was put into the 120 ^oC oil bath again and heated for another 2 h. Upon completion of the reaction, the solvent was removed in *vacuo* to provide a crude mixture, which was purified by silica gel column chromatography to afford the pure product.

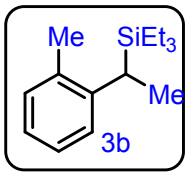
3) Spectral data of the Si-H insertion products

Triethyl(1-phenylethyl)silane[2]



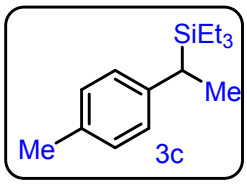
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24-7.20 (m, 2H), 7.08-7.06 (m, 3H), 2.30 (q, J = 7.6 Hz, 1H), 1.37 (d, J = 7.6 Hz, 3H), 0.88 (t, J = 7.9 Hz, 9H), 0.51 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.24, 127.97, 127.08, 124.15, 26.78, 15.37, 7.47, 2.02.

Triethyl(1-(*o*-tolyl)ethyl)silane[3]



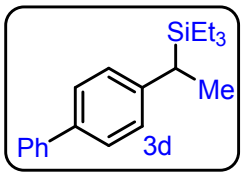
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12-7.08 (m, 3H), 7.00-6.96 (m, 1H), 2.52 (q, J = 7.5 Hz, 1H), 2.28 (s, 3H), 1.35 (d, J = 7.5 Hz, 3H), 0.87 (t, J = 7.9 Hz, 9H), 0.54 (q, J = 8.0 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.01, 134.46, 130.02, 126.81, 125.81, 123.97, 21.61, 20.42, 16.60, 7.48, 2.42.

Triethyl(1-(*p*-tolyl)ethyl)silane[3]



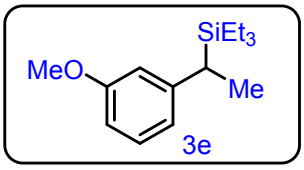
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.09 (d, J = 7.9 Hz, 2H), 7.01 (d, J = 8.0 Hz, 2H), 2.34-2.28 (m, 4H), 1.40 (d, J = 7.6 Hz, 3H), 0.94 (t, J = 7.9 Hz, 9H), 0.56 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.05, 130.42, 125.69, 123.98, 23.22, 17.87, 12.54, 4.51, -0.94.

(1-([1,1'-Biphenyl]-4-yl)ethyl)triethylsilane

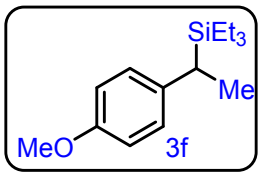


Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dd, J = 8.3, 1.2 Hz, 2H), 7.47 (dd, J = 6.5, 1.8 Hz, 2H), 7.40 (t, J = 7.6 Hz, 2H), 7.30-7.26 (m, 1H), 7.14-7.12 (m, 2H), 2.35 (q, J = 7.6 Hz, 1H), 1.40 (d, J = 7.6 Hz, 3H), 0.91 (t, J = 7.9 Hz, 9H), 0.54 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.50, 141.14, 136.97, 128.63, 127.46, 126.76, 126.71, 126.63, 26.54, 15.38, 7.51, 2.06; HRMS (ESI, *m/z*): calcd for $C_{20}H_{29}Si$ $[M+H]^+$ 297.2033, found 297.2032.

Triethyl(1-(3-methoxyphenyl)ethyl)silane



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.16-7.12 (m, 1H), 6.68-6.61 (m, 3H), 3.78 (s, 3H), 2.28 (q, J = 7.6 Hz, 1H), 1.36 (d, J = 7.6 Hz, 3H), 0.89 (t, J = 7.9 Hz, 9H), 0.52 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.40, 148.04, 128.80, 119.79, 113.07, 109.19, 55.02, 26.94, 15.36, 7.47, 2.08; LRMS (EI, *m/z*): 250 (M^+, 63), 221 (13), 115 (98), 87 (100), 59 (29).

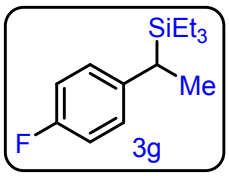


Triethyl(1-(4-methoxyphenyl)ethyl)silane[3]

Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.98 (d, J = 8.6 Hz, 2H), 6.79 (d, J = 8.7 Hz, 2H), 3.76 (s, 3H), 2.24 (q, J = 7.6 Hz,

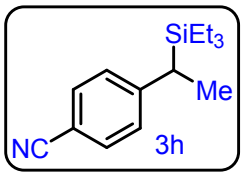
1H), 1.34 (d, J = 7.6 Hz, 3H), 0.89 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.59, 138.18, 127.80, 113.43, 55.13, 25.60, 15.69, 7.49, 2.03.

Triethyl(1-(4-fluorophenyl)ethyl)silane



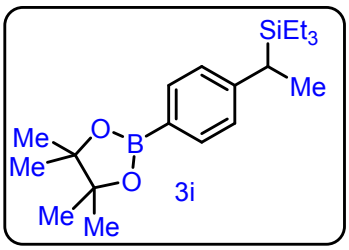
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.02-6.98 (m, 2H), 6.94-6.89 (m, 2H), 2.28 (q, J = 7.6 Hz, 1H), 1.35 (d, J = 7.6 Hz, 3H), 0.88 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.28 (d, J = 241.6 Hz), 141.78 (d, J = 241.6 Hz)，128.08 (d, J = 7.4 Hz), 114.67 (d, J = 21.0 Hz), 26.00, 15.63, 7.44, 1.97; HRMS (EI, *m/z*): calcd for $C_{14}H_{23}FSi$ $[M]^+$ 238.1553, found 238.1561.

4-(1-(Triethylsilyl)ethyl)benzonitrile



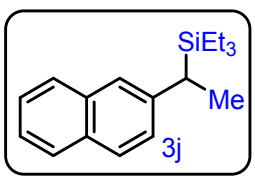
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, J = 8.4 Hz, 2H), 7.15 (d, J = 8.2 Hz, 2H), 2.40 (q, J = 7.4 Hz, 1H), 1.38 (d, J = 7.5 Hz, 3H), 0.89 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 8.0 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.65, 131.75, 127.53, 119.38, 107.59, 27.97, 14.79, 7.31, 1.81; HRMS (ESI, *m/z*): calcd for $C_{15}H_{24}NSi$ $[M+H]^+$ 246.1672, found 246.1671.

Pinacol 4-((1-Triethylsilyl)ethyl)phenylborinate



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (d, J = 8.1 Hz, 2H), 7.08 (d, J = 7.9 Hz, 2H), 2.33 (q, J = 7.5 Hz, 1H), 1.37 (d, J = 7.5 Hz, 3H), 1.33 (s, 12H), 0.88 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.05, 134.55, 128.31, 126.58, 83.47, 27.39, 24.85, 15.17, 7.47, 2.02; HRMS (EI, *m/z*): calcd for $C_{20}H_{35}O_2BSi$ $[M]^+$ 346.2494, found 346.2494.

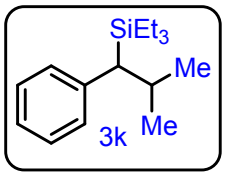
Triethyl(1-(naphthalen-2-yl)ethyl)silane[2]



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.78-7.69 (m, 3H), 7.48 (s, 1H), 7.44-7.34 (m, 2H), 7.25-7.23 (m, 1H), 2.47 (q, J = 7.5 Hz, 1H), 1.47 (d, J = 7.6 Hz, 3H), 0.90 (t, J = 7.9 Hz, 9H), 0.54 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.08,

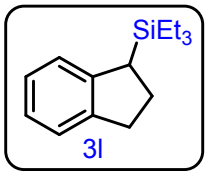
133.72, 131.22, 127.49, 127.22, 127.17, 127.05, 125.67, 124.39, 124.25, 27.08, 15.50, 7.53, 2.12.

Triethyl(2-methyl-1-phenylpropyl)silane[4]



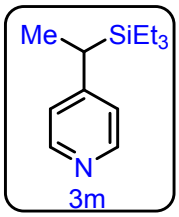
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.20 (t, J = 7.5 Hz, 2H), 7.08 (t, J = 7.3 Hz, 1H), 7.02 (d, J = 7.3 Hz, 2H), 2.23-2.14 (m, 1H), 1.86 (d, J = 9.9 Hz, 1H), 1.07 (d, J = 6.6 Hz, 3H), 0.87 (t, J = 7.9 Hz, 9H), 0.77 (d, J = 6.5 Hz, 3H), 0.51 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.54, 128.92, 127.88, 124.27, 42.75, 30.55, 23.61, 7.67, 3.94.

(2,3-Dihydro-1*H*-inden-1-yl)triethylsilane



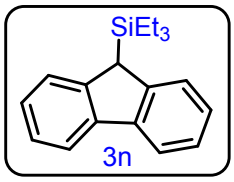
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.16 (d, J = 6.9 Hz, 1H), 7.10-7.00 (m, 3H), 2.92-2.88 (m, 2H), 2.66 (dd, J = 4.2, 9.7 Hz, 1H), 2.34-2.24 (m, 1H), 2.10-2.03 (m, 1H), 0.91 (t, J = 7.9 Hz, 9H), 0.59 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.72, 143.43, 125.82, 124.61, 124.24, 123.56, 32.99, 31.20, 27.42, 7.55, 2.74; HRMS (EI, *m/z*): calcd for $C_{15}H_{24}Si$ $[M]^+$ 232.1647, found 232.1644.

4-((Triethylsilyl)methyl)pyridine



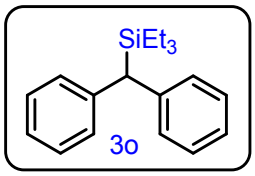
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41-8.39 (m, 2H), 6.99-6.97 (m, 2H), 2.33 (q, J = 7.4 Hz, 1H), 1.38 (d, J = 7.4 Hz, 3H), 0.90 (t, J = 7.9 Hz, 9H), 0.52 (q, J = 7.8 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.78, 149.19, 122.54, 27.04, 14.33, 7.39, 1.85; HRMS (ESI, *m/z*): calcd for $C_{13}H_{24}NSi$ $[M+H]^+$ 222.1672, found 222.1670.

Triethyl(9*H*-fluoren-9-yl)silane



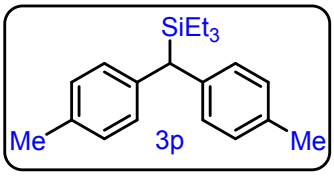
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85 (d, J = 7.5 Hz, 2H), 7.49 (d, J = 7.4 Hz, 2H), 7.33 (t, J = 7.3 Hz, 2H), 7.27 (t, J = 7.4 Hz, 2H), 4.01 (s, 1H), 0.81 (t, J = 7.9 Hz, 9H), 0.48 (q, J = 7.8 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.79, 140.48, 125.89, 125.09, 124.01, 119.85, 39.22, 7.30, 2.21; HRMS (ESI, *m/z*): calcd for $C_{19}H_{25}Si$ $[M+H]^+$ 281.1720, found 281.1719.

Benzhydryltriethylsilane[2]



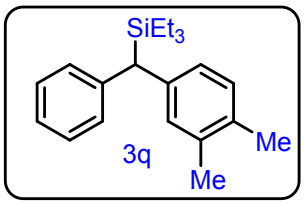
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27-7.21 (m, 8H), 7.13-7.09 (m, 2H), 3.65 (s, 1H), 0.84 (t, J = 7.9 Hz, 9H), 0.60 (q, J = 7.8 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.85, 128.74, 128.23, 124.99, 42.96, 7.45, 3.36.

(Di-*p*-tolylmethyl)triethylsilane



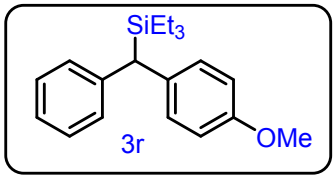
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12 (d, J = 8.1 Hz, 4H), 7.03 (d, J = 8.0 Hz, 4H), 3.56 (s, 1H), 2.27 (s, 6H), 0.85 (t, J = 7.9 Hz, 9H), 0.59 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.08, 134.21, 128.90, 128.61, 41.82, 20.87, 7.52, 3.40; HRMS (EI, *m/z*): calcd for $C_{21}H_{30}Si$ $[M]^+$ 310.2111, found 310.2111.

((3,4-Dimethylphenyl)(phenyl)methyl)triethylsilane

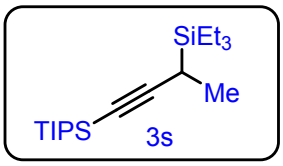


Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.22 (dd, J = 1.7, 8.2 Hz, 4H), 7.10-7.06 (m, 1H), 7.01-7.00 (m, 3H), 3.57 (s, 1H), 2.20 (s, 3H), 2.19 (s, 3H), 0.85 (t, J = 7.9 Hz, 9H), 0.60 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.34, 140.17, 136.19, 133.04, 130.37, 129.44, 128.57, 128.17, 126.25, 124.79, 42.40, 19.90, 19.19, 7.51, 3.41; HRMS (EI, *m/z*): calcd for $C_{21}H_{30}Si$ $[M]^+$ 310.2111, found 310.2110.

Triethyl((4-methoxyphenyl)(phenyl)methyl)silane



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24-7.22 (m, 4H), 7.19-7.16 (m, 2H), 7.12-7.08 (m, 1H), 6.81-6.79 (m, 2H), 3.76 (s, 3H), 3.59 (s, 1H), 0.85 (t, J = 7.8 Hz, 9H), 0.59 (q, J = 7.8 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.20, 143.39, 134.96, 129.80, 128.50, 128.20, 124.83, 113.66, 55.15, 41.75, 7.48, 3.38; HRMS (EI, *m/z*): calcd for $C_{20}H_{28}OSi$ $[M]^+$ 312.1904, found 312.1905.

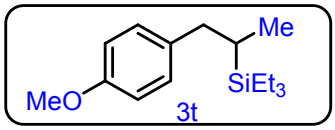


Triethyl(4-(triisopropylsilyl)but-3-yn-2-yl)silane

Pale yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.89 (q, J = 7.3 Hz, 1H), 1.21 (d, J = 7.3 Hz, 3H), 1.08-1.03 (m, 21H),

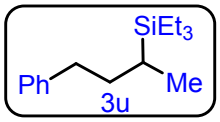
0.99 (t, J = 7.9 Hz, 9H), 0.69-0.62 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 112.95, 78.69, 18.64, 15.39, 11.46, 11.18, 7.49, 2.24; MS (EI, *m/z*): 324 (M^+, 2), 281 (100), 157 (58), 115 (60), 87 (49), 59 (33).

Triethyl(1-(4-methoxyphenyl)propan-2-yl)silane



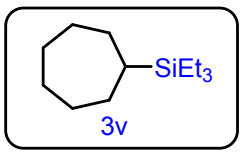
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.06 (d, J = 8.5 Hz, 2H), 6.82 (d, J = 8.6 Hz, 2H), 3.78 (s, 3H), 2.83 (dd, J = 3.4, 13.8 Hz, 1H), 2.20 (dd, J = 11.9, 13.7 Hz, 1H), 1.09-1.02 (m, 1H), 0.98 (t, J = 7.9 Hz, 9H), 0.83 (d, J = 7.4 Hz, 3H), 0.59 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.57, 134.90, 129.58, 113.47, 55.19, 37.24, 19.38, 13.75, 7.69, 2.15; MS (EI, *m/z*): 264 (M^+, 25), 235 (100), 193 (50), 115 (58), 87 (78), 59 (29).

Triethyl(4-phenylbutan-2-yl)silane[5]



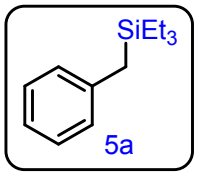
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28-7.24 (m, 2H), 7.20-7.14 (m, 3H), 2.87-2.79 (m, 1H), 2.51-2.43 (m, 1H), 1.83-1.75 (m, 1H), 1.49-1.39 (m, 1H), 1.03 (d, J = 7.4 Hz, 3H), 0.92 (t, J = 7.9 Hz, 9H), 0.85-0.77 (m, 1H), 0.53 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.04, 128.41, 128.23, 125.52, 35.15, 34.15, 16.43, 14.11, 7.67, 2.14.

Cycloheptyltriethylsilane



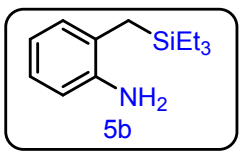
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.77-1.68 (m, 4H), 1.61-1.56 (m, 2H), 1.51-1.37 (m, 4H), 1.30-1.22 (m, 2H), 0.94 (t, J = 7.9 Hz, 9H), 0.77 (tt, J = 3.1, 11.1 Hz, 1H), 0.52 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 30.38, 29.13, 28.25, 23.71, 7.77, 2.27; HRMS (EI, *m/z*): calcd for $C_{13}H_{28}Si$ $[M]^+$ 212.1955, found 212.1955.

Benzyltriethylsilane[2]



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.19 (t, J = 7.6 Hz, 2H), 7.07-7.00 (m, 3H), 2.09 (s, 2H), 0.91 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 5.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.65, 128.12, 128.08, 123.65, 21.60, 7.27, 2.95.

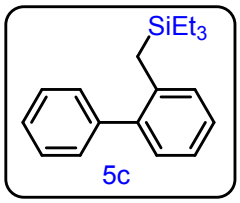
2-((Triethylsilyl)methyl)aniline



Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.94-6.90 (m, 2H),

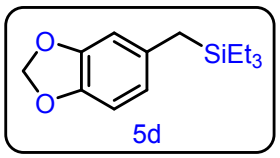
6.69-6.62 (m, 2H), 3.47 (s, 2H), 1.94 (s, 2H), 0.92 (t, J = 7.9 Hz, 9H), 0.57 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.13, 129.57, 125.17, 125.07, 118.77, 115.47, 16.31, 7.29, 3.54; HRMS (EI, *m/z*): calcd for $C_{13}H_{23}NSi$ $[M]^+$ 221.1594, found 221.1594.

([1,1'-Biphenyl]-2-ylmethyl)triethylsilane



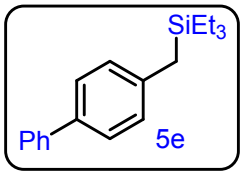
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40-7.28 (m, 5H), 7.21-7.08 (m, 4H), 2.23 (s, 2H), 0.69 (t, J = 7.9 Hz, 9H), 0.32 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.46, 140.68, 138.27, 130.28, 129.66, 129.34, 128.05, 126.99, 126.52, 123.96, 18.18, 7.02, 3.32; HRMS (EI, *m/z*): calcd for $C_{19}H_{26}Si$ $[M]^+$ 282.1798, found 282.1794.

(Benzo[*d*][1,3]dioxol-5-ylmethyl)triethylsilane

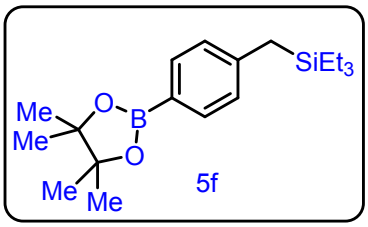


Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.66 (d, J = 7.9 Hz, 1H), 6.51 (d, J = 1.6 Hz, 1H), 6.45 (dd, J = 1.7, 7.9 Hz, 1H), 5.88 (s, 2H), 2.01 (s, 2H), 0.92 (t, J = 7.9 Hz, 9H), 0.50 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.37, 144.13, 134.23, 120.36, 108.67, 108.05, 100.50, 21.10, 7.28, 2.92; HRMS (EI, *m/z*): calcd for $C_{14}H_{22}O_2Si$ $[M]^+$ 250.1384, found 250.1380.

([1,1'-Biphenyl]-4-ylmethyl)triethylsilane[2]



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (d, J = 7.4 Hz, 2H), 7.46-7.39 (m, 4H), 7.29 (t, J = 7.3 Hz, 1H), 7.08 (d, J = 8.1 Hz, 2H), 2.14 (s, 2H), 0.94 (t, J = 7.9 Hz, 9H), 0.54 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.17, 139.92, 136.61, 128.75, 128.64, 128.47, 126.80, 126.74, 126.70, 21.28, 7.31, 2.96.

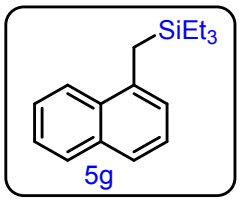


Pinacol 4-((Triethylsilyl)methyl)phenylborinate

Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64 (d, J = 8.0 Hz, 2H), 7.02 (d, J = 8.0 Hz, 2H), 2.12 (s, 2H), 1.33 (s, 12H), 0.91 (t, J = 7.9 Hz, 9H), 0.49 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.53, 134.71, 127.56, 83.48, 24.86, 22.28, 7.26, 2.94; HRMS (EI, *m/z*): calcd for $C_{19}H_{33}O_2BSi$ $[M]^+$

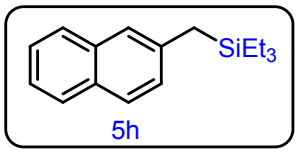
332.2337, found 332.2337.

Triethyl(naphthalen-1-ylmethyl)silane[6]



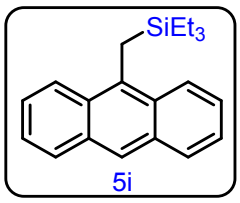
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, J = 7.9 Hz, 1H), 7.80 (d, J = 7.7 Hz, 1H), 7.58 (d, J = 8.1 Hz, 1H), 7.47-7.41 (m, 2H), 7.35-7.31 (m, 1H), 7.18 (d, J = 7.1 Hz, 1H), 2.56 (s, 2H), 0.87 (dt, J = 1.3, 7.9 Hz, 9H), 0.51 (dq, J = 1.3, 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.46, 140.68, 138.27, 130.28, 129.66, 129.34, 128.05, 126.99, 126.52, 123.96, 18.18, 7.02, 3.32.

Triethyl(naphthalen-2-ylmethyl)silane[6]



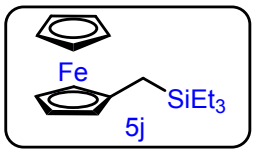
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, J = 8.1 Hz, 1H), 7.69 (t, J = 8.0 Hz, 2H), 7.43-7.38 (m, 2H), 7.34 (t, J = 7.9 Hz, 1H), 7.175 (d, J = 8.4 Hz, 1H), 2.26 (s, 2H), 0.93 (t, J = 7.9 Hz, 9H), 0.53 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.41, 133.83, 130.91, 127.90, 127.54, 127.49, 126.92, 125.71, 125.20, 124.26, 21.94, 7.32, 3.04.

(Anthracen-9-ylmethyl)triethylsilane



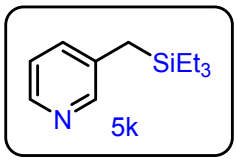
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21-8.19 (m, 3H), 7.96 (d, J = 8.7 Hz, 2H), 7.47-7.41 (m, 4H), 3.15 (s, 2H), 0.79 (t, J = 7.8 Hz, 9H), 0.51 (q, J = 7.8 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 134.46, 131.61, 129.10, 129.04, 125.22, 124.71, 124.45, 123.57, 14.66, 7.25, 4.24; HRMS (EI, *m/z*): calcd for $C_{21}H_{26}Si$ $[M]^+$ 306.1798, found 306.1795.

((Triethylsilyl)methyl)ferrocene



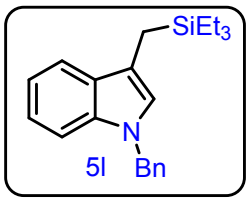
Orange oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.05 (s, 5H), 3.96 (t, J = 1.7 Hz, 2H), 3.94 (d, J = 1.7 Hz, 2H), 1.73 (s, 2H), 0.88 (t, J = 7.9 Hz, 9H), 0.43 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 87.29, 68.67, 67.99, 66.51, 14.18, 7.32, 3.06; HRMS (EI, *m/z*): calcd for $C_{17}H_{26}FeSi$ $[M]^+$ 314.1148, found 314.1146.

3-((Triethylsilyl)methyl)pyridine



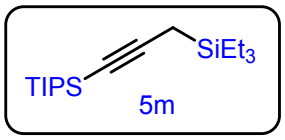
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 2H), 7.33-7.31 (m, 1H), 7.12 (dd, J = 4.8, 7.7 Hz, 1H), 2.07 (s, 2H), 0.92 (t, J = 7.9 Hz, 9H), 0.52 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.27, 145.36, 136.34, 135.08, 123.03, 18.54, 7.17, 2.82; HRMS (EI, *m/z*): calcd for $C_{12}H_{21}NSi$ $[M]^+$ 207.1438, found 207.1437.

1-Benzyl-3-((triethylsilyl)methyl)-1*H*-indole



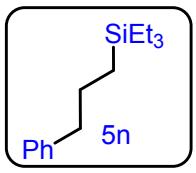
Pale yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (d, J = 7.8 Hz, 1H), 7.25-7.19 (m, 4H), 7.13-7.05 (m, 4H), 6.77 (s, 1H), 5.26 (s, 2H), 2.13 (s, 2H), 0.92 (t, J = 7.9 Hz, 9H), 0.53 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.10, 136.38, 128.84, 128.61, 127.33, 126.52, 124.45, 121.31, 119.25, 118.35, 112.64, 109.28, 77.31, 49.67, 8.19, 7.44, 3.41; HRMS (ESI, *m/z*): calcd for $C_{22}H_{30}NSi$ $[M+H]^+$ 336.2142, found 336.2146.

Triethyl(3-(triisopropylsilyl)prop-2-yn-1-yl)silane[2]



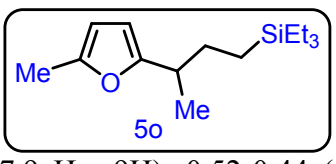
Orange oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.60 (s, 2H), 1.09-1.02 (m, 21H), 0.97 (t, J = 7.9 Hz, 9H), 0.64 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 106.64, 78.40, 18.64, 11.49, 7.24, 3.40, 3.16.

Triethyl(3-phenylpropyl)silane[7]



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29-7.22 (m, 2H), 7.18-7.16 (m, 3H), 2.61 (t, J = 7.7 Hz, 2H), 1.65-1.57 (m, 2H), 0.91 (t, J = 7.9 Hz, 9H), 0.58-0.54 (m, 2H), 0.49 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.74, 128.43, 128.19, 125.57, 40.24, 26.07, 11.32, 7.44, 3.28.

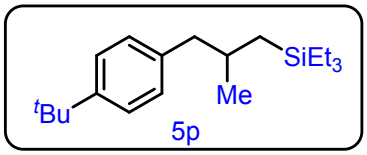
Triethyl(3-(5-methylfuran-2-yl)butyl)silane



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.82 (s, 2H), 2.66 (h, J = 6.8 Hz, 1H), 2.24 (s, 3H), 1.69-1.60 (m, 1H), 1.52-1.41 (m, 1H), 1.20 (d, J = 7.0 Hz, 3H), 0.90 (t, J = 7.9 Hz, 9H), 0.52-0.44 (m, 8H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.94, 149.88, 105.47, 104.13, 36.19, 29.84, 18.51, 13.48, 8.22, 7.38, 3.21; HRMS (EI, *m/z*): calcd

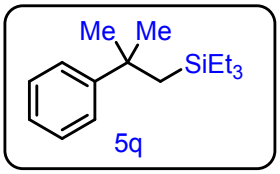
for $C_{15}H_{28}OSi$ $[M]^+$ 252.1904, found 252.1902.

(3-(4-(*tert*-Butyl)phenyl)-2-methylpropyl)triethylsilane



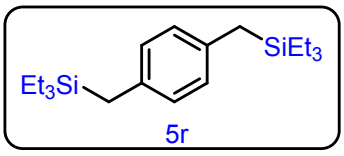
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (d, J = 8.3 Hz, 2H), 7.06 (d, J = 8.1 Hz, 2H), 2.59 (dd, J = 5.8, 13.2 Hz, 1H), 2.35 (dd, J = 8.4, 13.2 Hz, 1H), 1.92-1.80 (m, 1H), 1.30 (s, 9H), 0.92-0.88 (m, 12H), 0.55-0.43 (m, 8H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 148.37, 138.72, 128.84, 124.95, 47.03, 34.35, 31.62, 31.46, 22.84, 19.68, 7.50, 4.05; HRMS (EI, *m/z*): calcd for $C_{18}H_{31}Si$ $[M-C_2H_5]^+$ 275.2190, found 275.2188.

Triethyl(2-methyl-2-phenylpropyl)silane



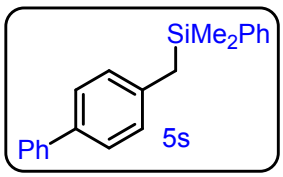
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 (d, J = 8.3 Hz, 2H), 7.27 (t, J = 7.6 Hz, 2H), 7.14 (t, J = 6.9 Hz, 1H), 1.38 (s, 6H), 1.12 (s, 2H), 0.80 (t, J = 7.9 Hz, 9H), 0.31 (q, J = 7.9 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.51, 127.88, 125.41, 125.32, 37.09, 32.43, 29.41, 7.38, 4.51; HRMS (EI, *m/z*): calcd for $C_{14}H_{23}Si$ $[M-C_2H_5]^+$ 219.1564, found 219.1564.

1,4-Bis((triethylsilyl)methyl)benzene



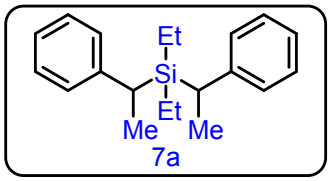
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.85 (s, 4H), 2.02 (s, 4H), 0.89 (t, J = 7.9 Hz, 18H), 0.49 (q, J = 7.9 Hz, 12H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 135.58, 127.91, 20.79, 7.28, 3.00; HRMS (EI, *m/z*): calcd for $C_{20}H_{38}Si_2$ $[M]^+$ 334.2507, found 334.2506.

([1,1'-Biphenyl]-4-ylmethyl)dimethyl(phenyl)silane



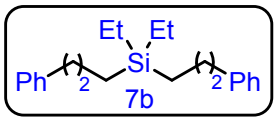
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58-7.56 (m, 2H), 7.49-7.47 (m, 2H), 7.43-7.27 (m, 8H), 6.99 (d, J = 7.6 Hz, 2H), 2.34 (s, 2H), 0.28 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.12, 138.88, 138.38, 136.91, 133.71, 129.06, 128.68, 128.65, 127.73, 126.76, 25.87, -3.43; HRMS (ESI, *m/z*): calcd for $C_{21}H_{22}NaSi$ $[M+Na]^+$ 325.1383, found 325.1384.

Diethylbis(1-phenylethyl)silane (mixture of racemate and mesomer)



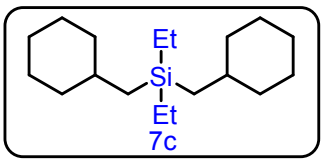
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25-7.20 (m, 4H), 7.10-7.03 (m, 6H), 2.35 (q, J = 7.6 Hz, 1H), 2.30 (q, J = 7.6 Hz, 1H), 1.35 (d, J = 7.6 Hz, 3H), 1.29 (d, J = 7.6 Hz, 3H), 1.01 (t, J = 7.9 Hz, 1.5H), 0.78 (t, J = 7.8 Hz, 3H), 0.69 (q, J = 8.0 Hz, 1H), 0.61 (t, J = 7.8 Hz, 1.5H), 0.52 (q, J = 7.7 Hz, 2H), 0.40 (q, J = 7.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.09, 146.04, 128.08, 127.42, 127.40, 124.39, 26.73, 26.29, 16.12, 15.95, 7.88, 7.42, 7.16, 2.46, 1.56, 1.02; MS (EI, *m/z*): 296 (M^+, 3), 191 (100), 149 (61), 121 (40), 73 (32).

Diethylbis(3-phenylpropyl)silane



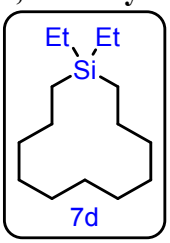
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32-7.28 (m, 4H), 7.22-7.18 (m, 6H), 2.63 (t, J = 7.6 Hz, 4H), 1.65-1.57 (m, 4H), 0.91 (t, J = 7.9 Hz, 6H), 0.60-0.56 (m, 4H), 0.54-0.48 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.66, 128.43, 128.19, 125.59, 40.16, 26.03, 11.57, 7.46, 3.59; HRMS (EI, *m/z*): calcd for $C_{20}H_{27}Si$ $[M\text{-}C_2H_5]^+$ 295.1876, found 295.1873.

Bis(cyclohexylmethyl)diethylsilane



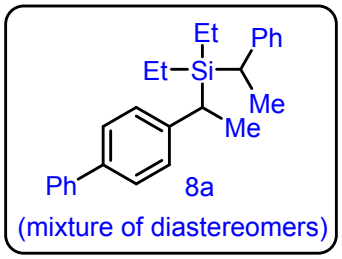
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.69-1.64 (m, 10H), 1.39-1.31 (m, 2H), 1.26-1.09 (m, 8H), 0.97-0.87 (m, 8H), 0.55-0.47 (m, 8H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 37.13, 34.20, 26.70, 26.28, 21.35, 7.65, 5.35; HRMS (EI, *m/z*): calcd for $C_{16}H_{31}Si$ $[M\text{-}C_2H_5]^+$ 251.2190, found 251.2189.

1,1-Diethylsilacyclododecane



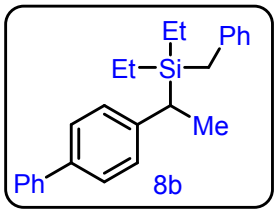
Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.36-1.26 (m, 18H), 0.92 (t, J = 7.9 Hz, 6H), 0.55-0.46 (m, 8H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 30.97, 26.29, 25.55, 25.45, 21.56, 10.54, 7.46, 4.00.

(1-([1,1'-Biphenyl]-4-yl)ethyl)diethyl(1-phenylethyl)silane



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (dd, J = 2.0, 7.7 Hz, 2H), 7.50-7.46 (m, 2H), 7.42 (t, J = 7.6 Hz, 2H), 7.31 (t, J = 7.3 Hz, 1H), 7.24-7.21 (m, 2H), 7.15-7.05 (m, 5H), 2.44-2.31 (m, 2H), 1.39 (dd, J = 2.7, 7.6 Hz, 3H), 1.33 (dd, J = 1.8, 7.6 Hz, 3H), 1.04 (t, J = 7.9 Hz, 1.5H), 0.84-0.79 (m, 3H), 0.73 (q, J = 7.9 Hz, 1H), 0.66 (t, J = 7.8 Hz, 1.5H), 0.56 (q, J = 7.6 Hz, 2H), 0.47-0.41 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.03, 145.97, 145.32, 145.27, 141.07, 141.06, 137.17, 128.66, 128.10, 127.78, 127.75, 127.42, 127.40, 126.78, 126.70, 124.41, 26.70, 26.42, 26.29, 26.00, 16.16, 16.11, 16.02, 15.93, 7.91, 7.50, 7.48, 7.23, 2.46, 1.61, 1.59, 1.06; HRMS (EI, *m/z*): calcd for $C_{26}H_{32}Si$ $[M]^+$ 372.2268, found 372.2270.

(1-([1,1'-Biphenyl]-4-yl)ethyl)(benzyl)diethylsilane



Colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (dd, J = 1.3, 8.4 Hz, 2H), 7.51-7.48 (m, 2H), 7.42 (t, J = 7.6 Hz, 2H), 7.34-7.29 (m, 1H), 7.18 (t, J = 7.6 Hz, 2H), 7.14-7.11 (m, 2H), 7.06 (t, J = 7.9 Hz, 1H), 7.06 (d, J = 7.4 Hz, 2H), 2.38 (q, J = 7.6 Hz, 1H), 2.12 (s, 2H), 1.41 (d, J = 7.6 Hz, 3H), 0.89 (t, J = 7.9 Hz, 3H), 0.82 (t, J = 7.9 Hz, 3H), 0.59-0.48 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.94, 141.08, 140.12, 137.24, 128.67, 128.30, 128.18, 127.68, 126.79, 126.75, 126.49, 123.96, 26.51, 20.43, 15.51, 7.38, 7.31, 2.54, 2.04; HRMS (EI, *m/z*): calcd for $C_{25}H_{30}Si$ $[M]^+$ 358.2111, found 358.2114.

4) References

1 Z. Liu, H. Tan, L. Wang, T. Fu, Y. Xia, Y. Zhang, J. Wang, *Angew. Chem. Int. Ed*., 2015, **54**, 3056.
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4 K. Jakobsson, T. Chu, G. I. Nikonov, *ACS. Catal.,* 2016, **6**, 7350.
5 B. Vulovic, A. P. Cinderella, D. A. Watson, *ACS. Catal.*, 2017, **7**, 8113.
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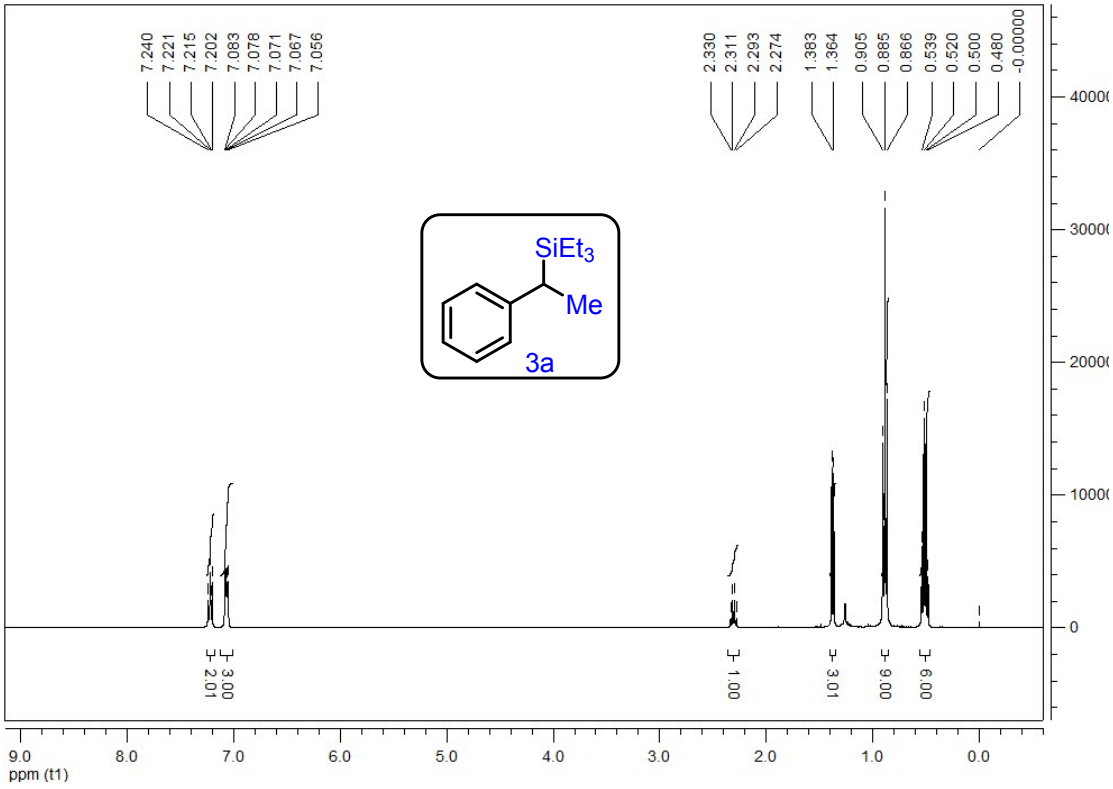
5) ^{1}H and ^{13}C NMR Spectra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7.202
7.083
7.078
7.071
7.067
7.056
2.330
2.311
2.293
2.274
1.383
1.364
0.905
0.885
0.866
0.539
0.520
0.500
0.480
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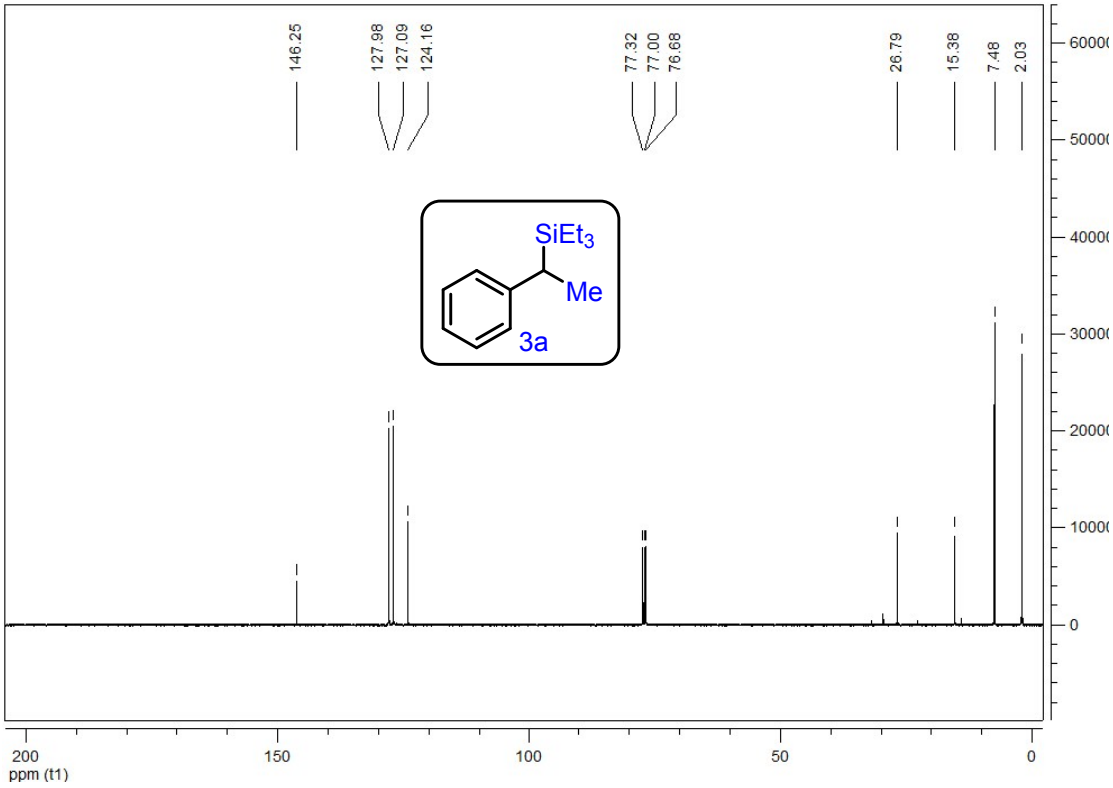
SiEt3
Me
3a
2.01
3.00
1.00
3.01
9.00
6.00
ppm (t1)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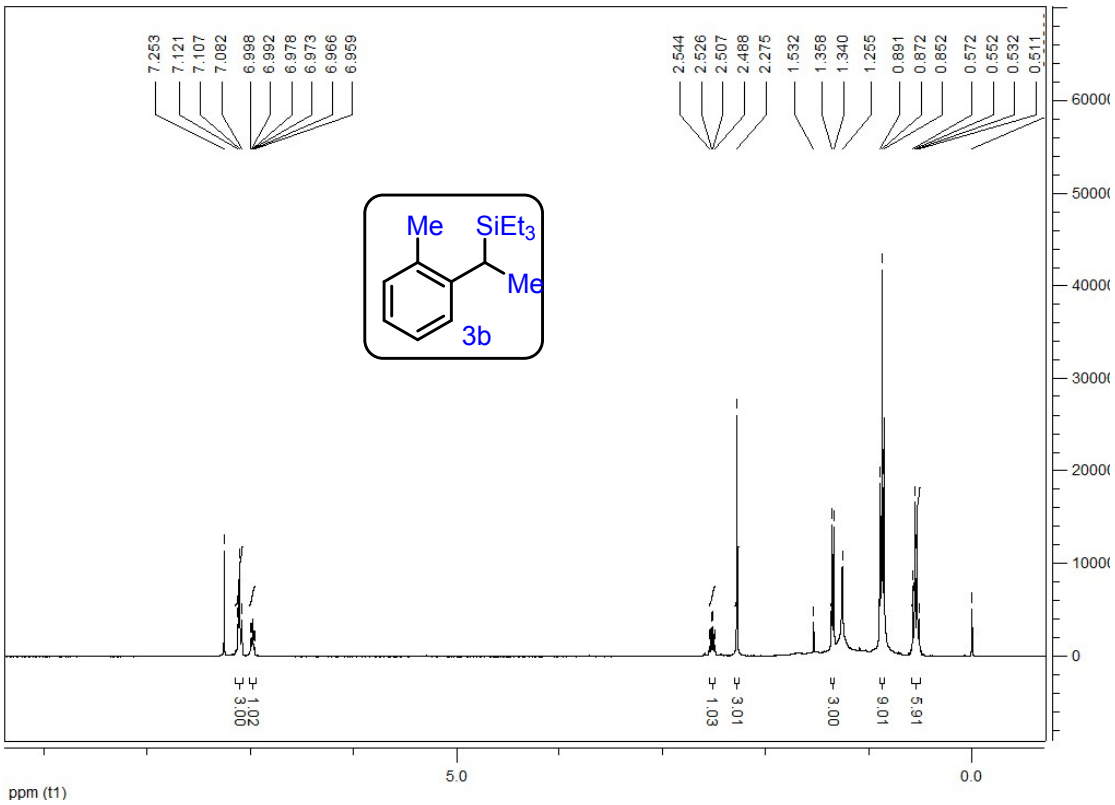
26.79
15.38
7.48
2.03
SiEt3
Me
3a
ppm (t1)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2.507
2.488
2.275
1.532
1.358
1.340
1.255
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0.872
0.852
0.572
0.552
0.532
0.511
Me
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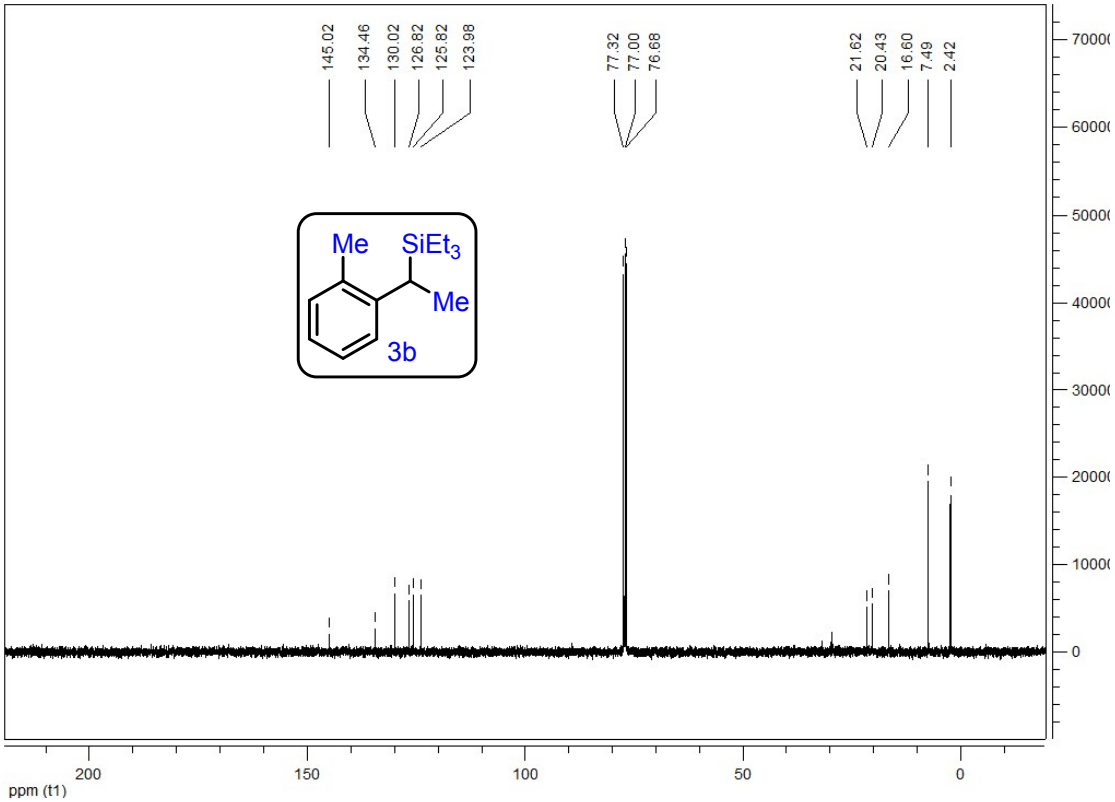
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Me
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3b
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150
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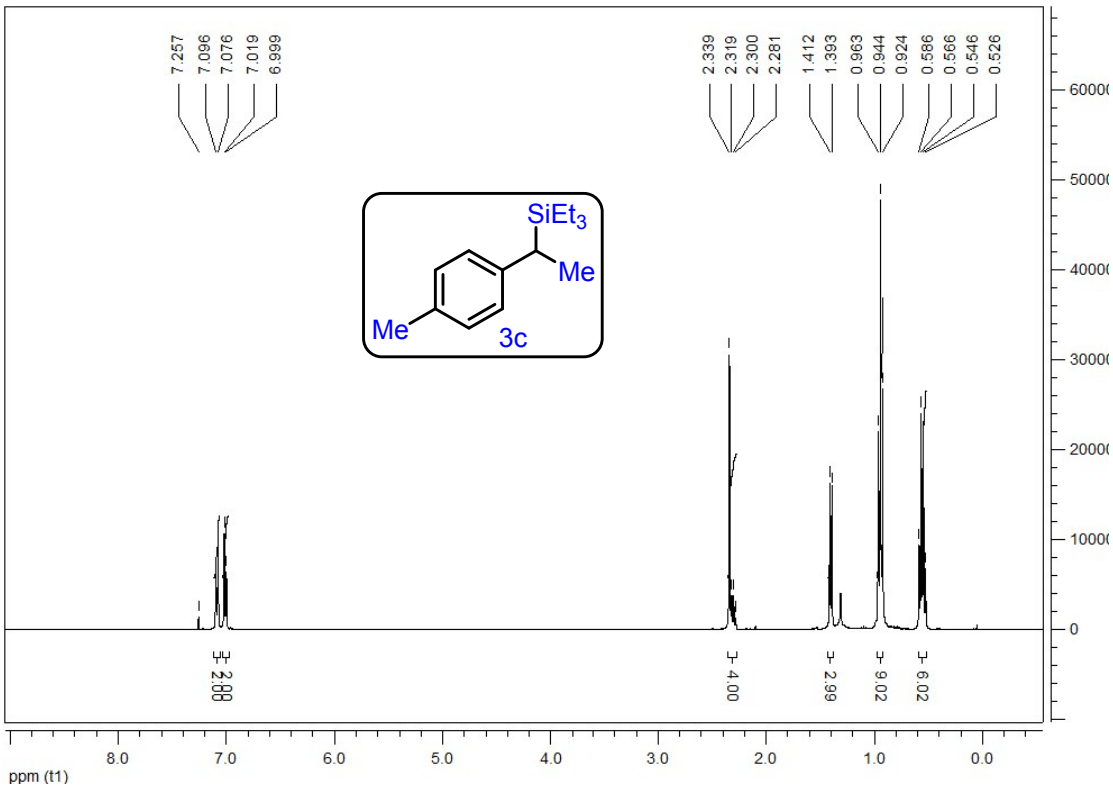
50
0
ppm (t1)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0.944
0.924
0.586
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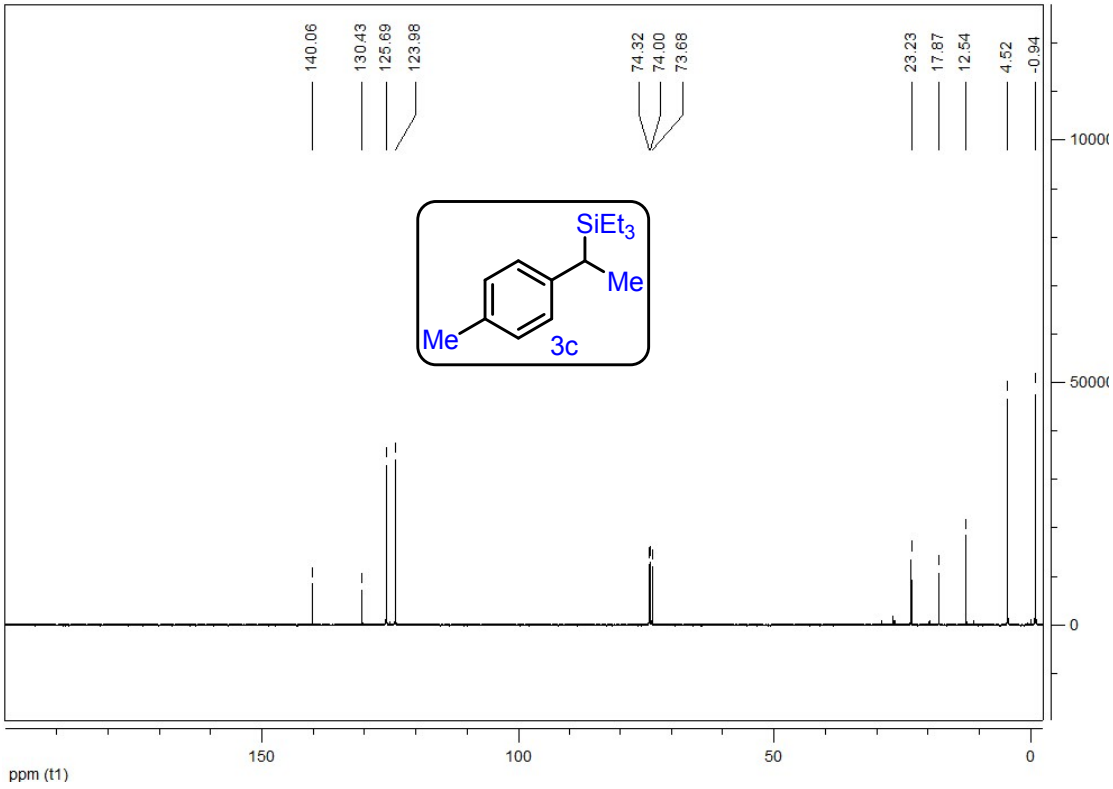
ppm (t1)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Me
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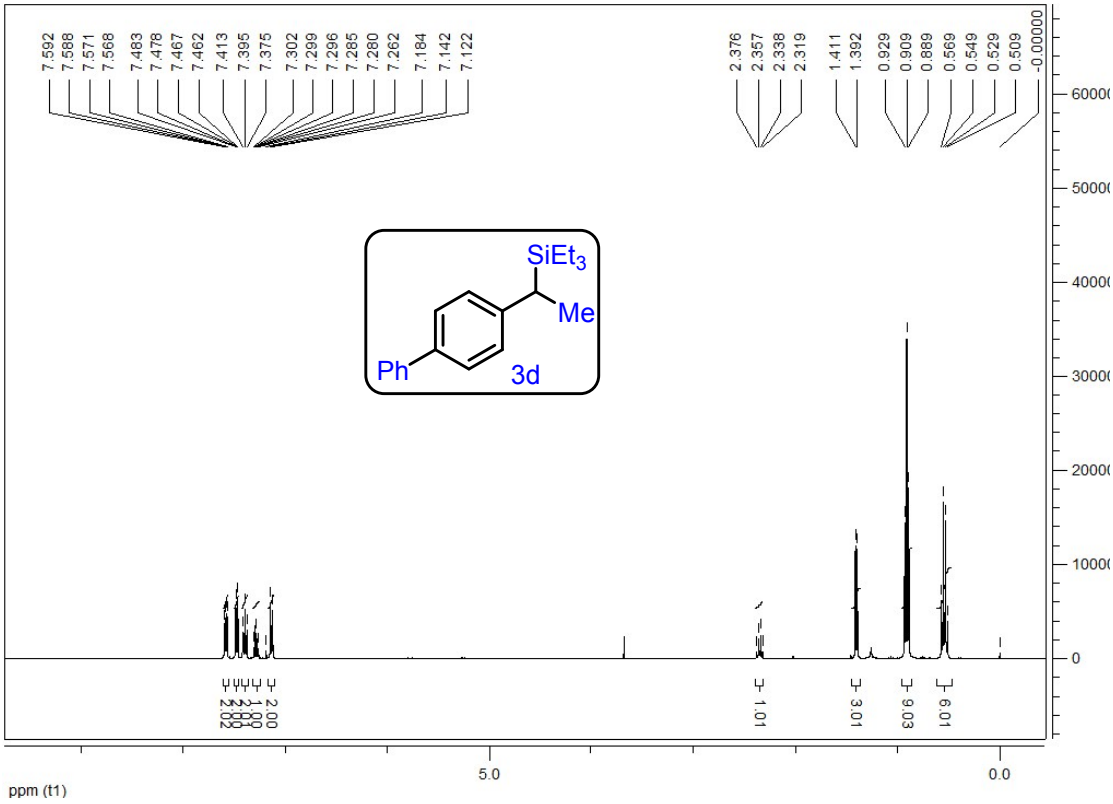
ppm (t1)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7.285
7.280
7.262
7.184
7.142
7.122
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2.338
2.319
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1.392
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Ph
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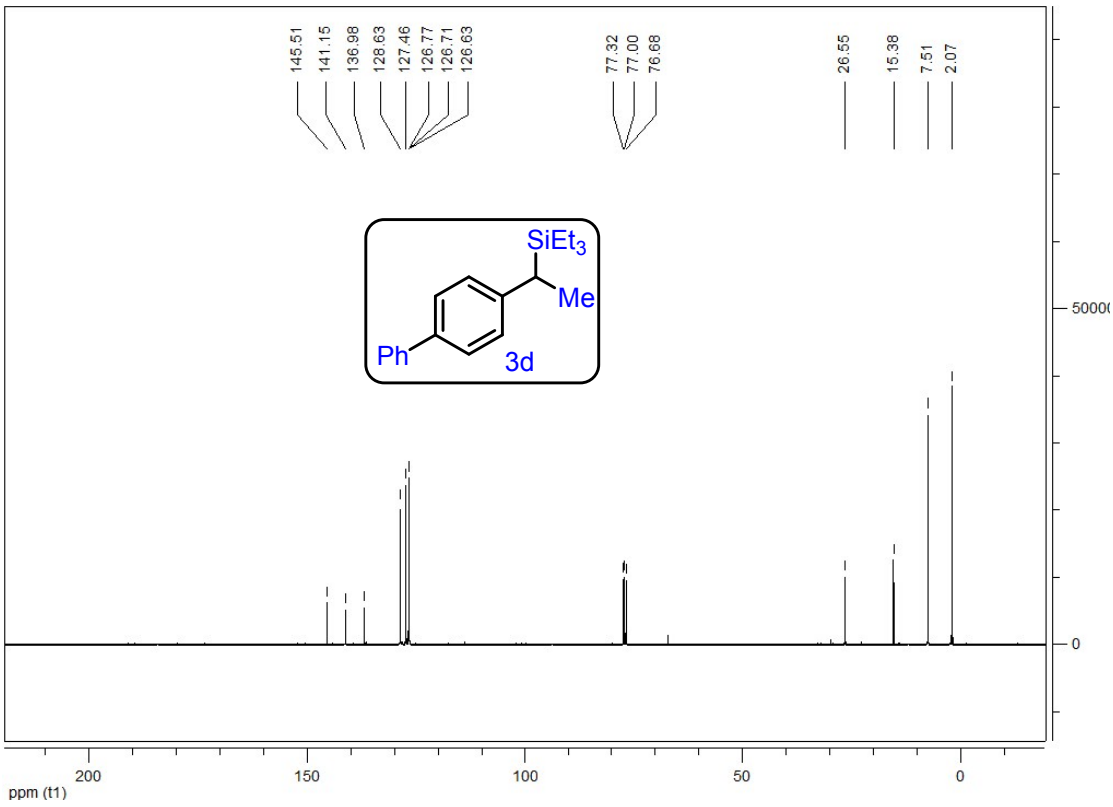
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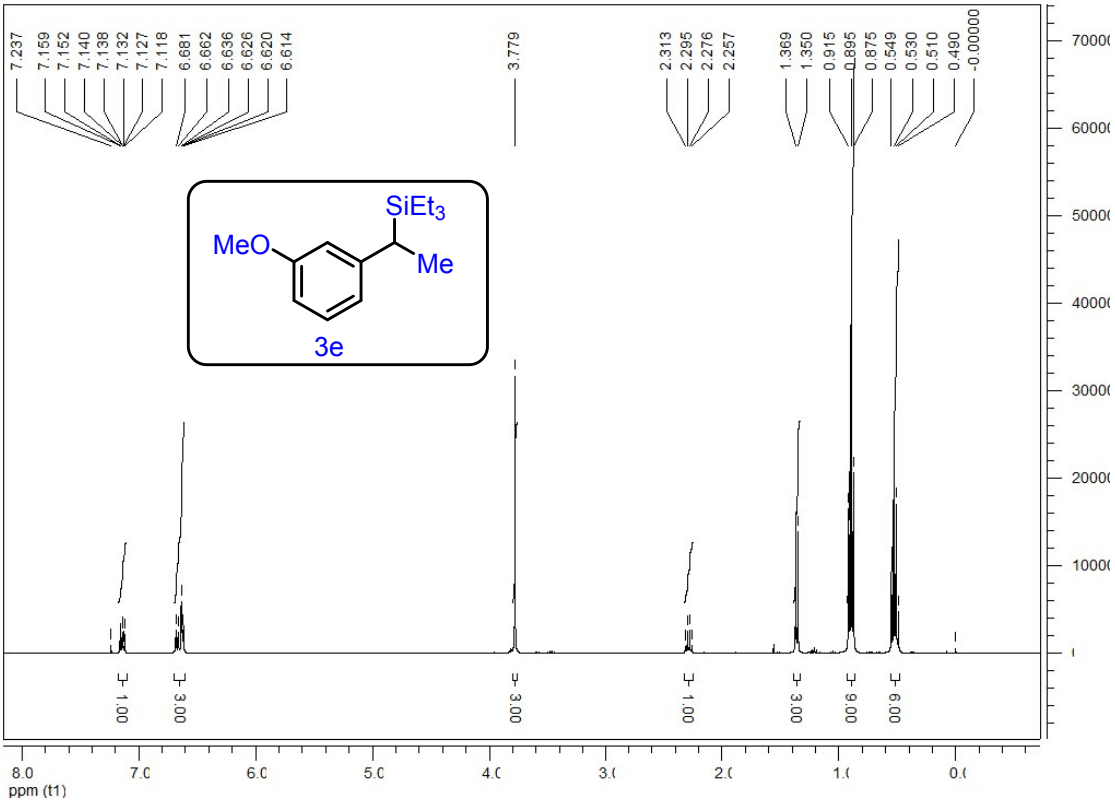
ppm (t1)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6.620
6.614
3.779
2.313
2.295
2.276
2.257
1.369
1.350
0.915
0.895
0.875
0.549
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0.490
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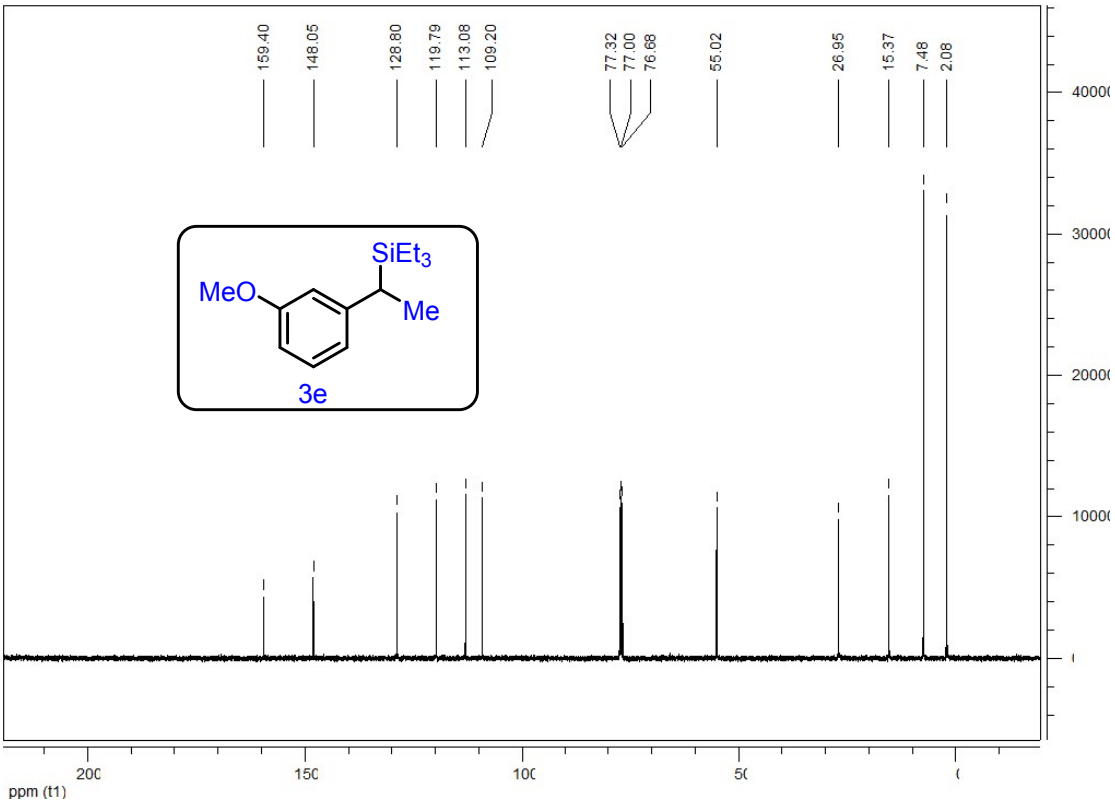
9.00
6.00
ppm (t1)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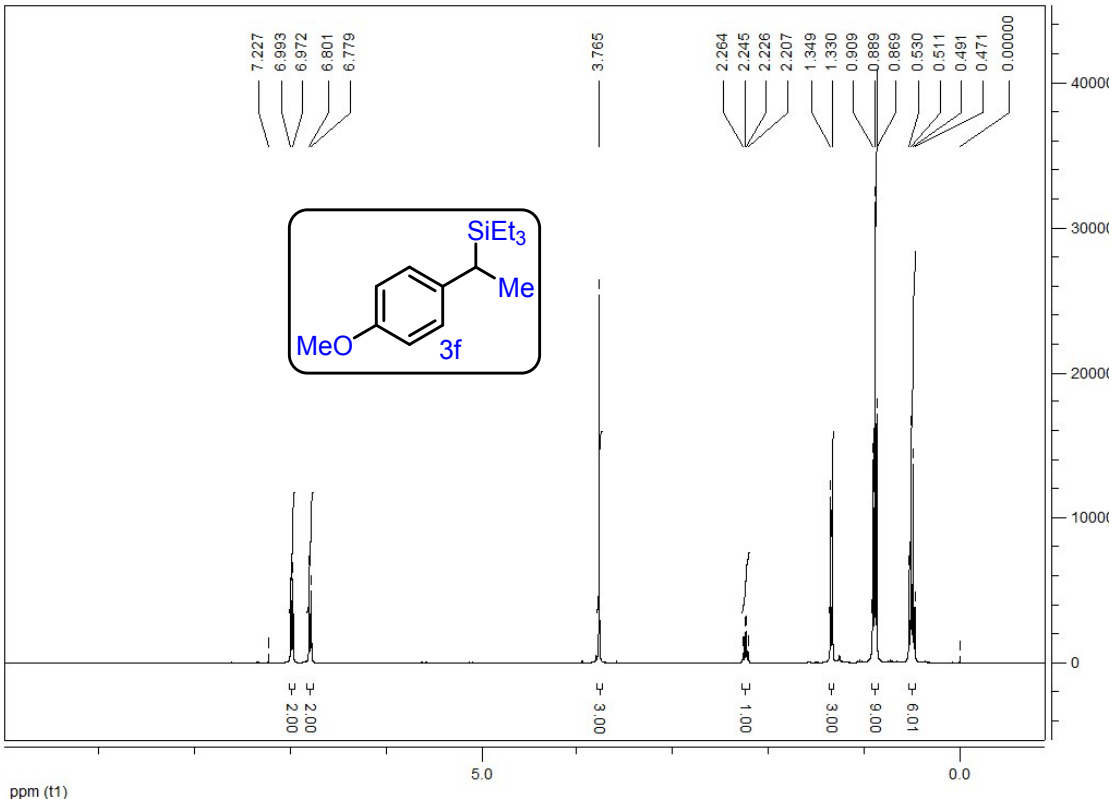
ppm (t1)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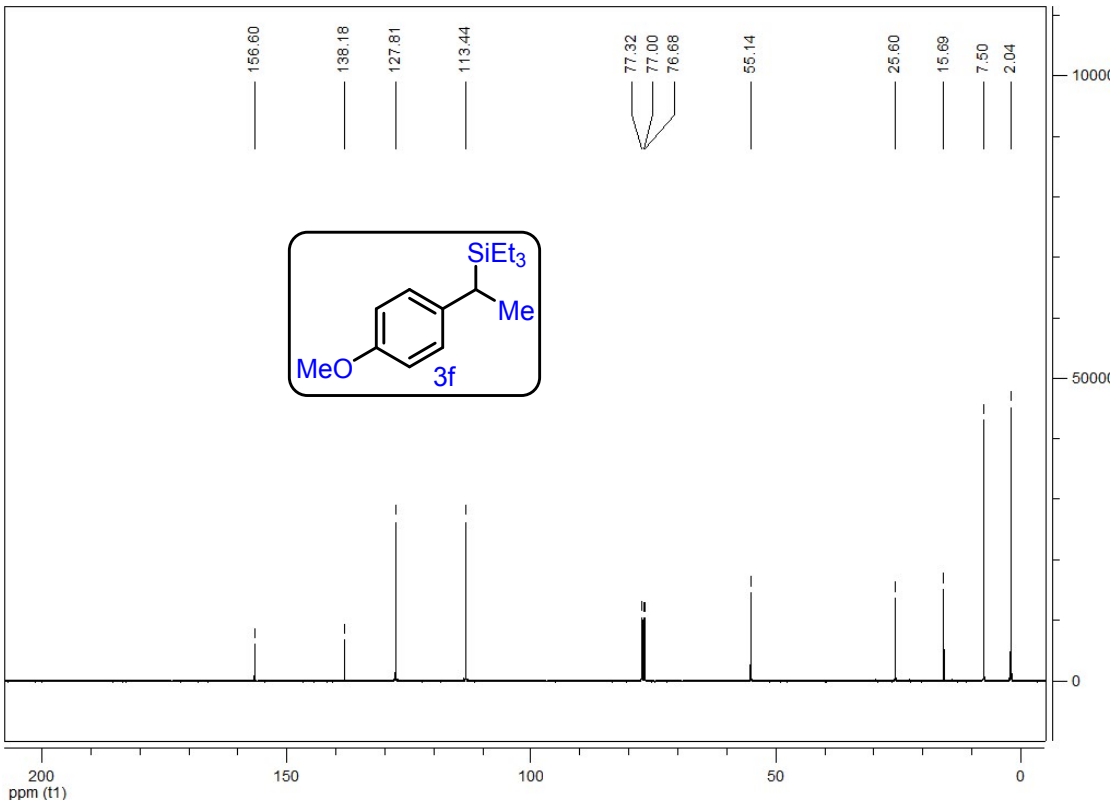
ppm (t1)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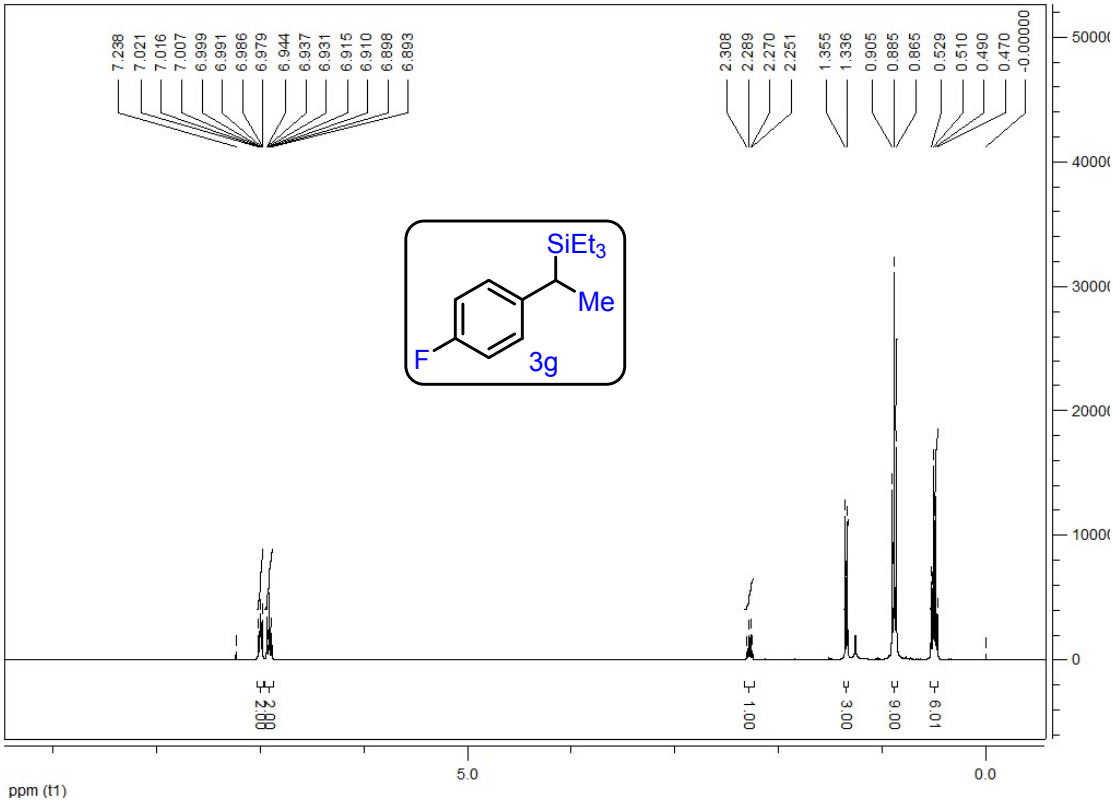
ppm (t1)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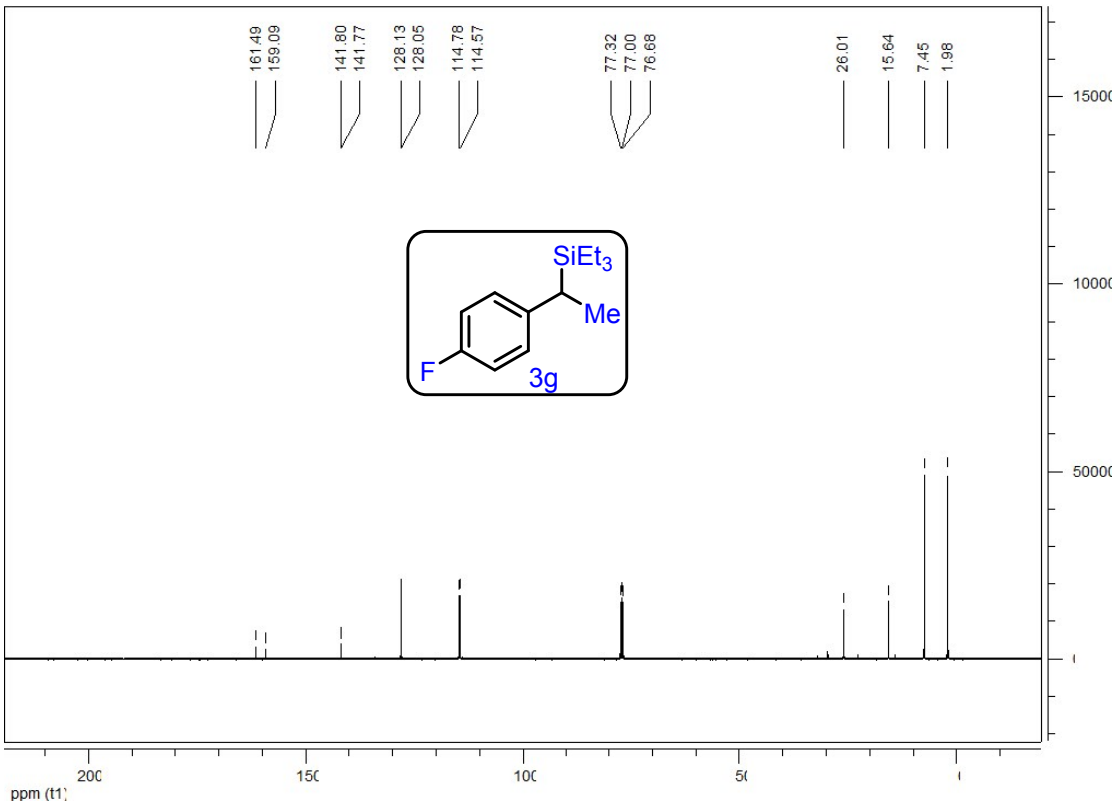
ppm (t1)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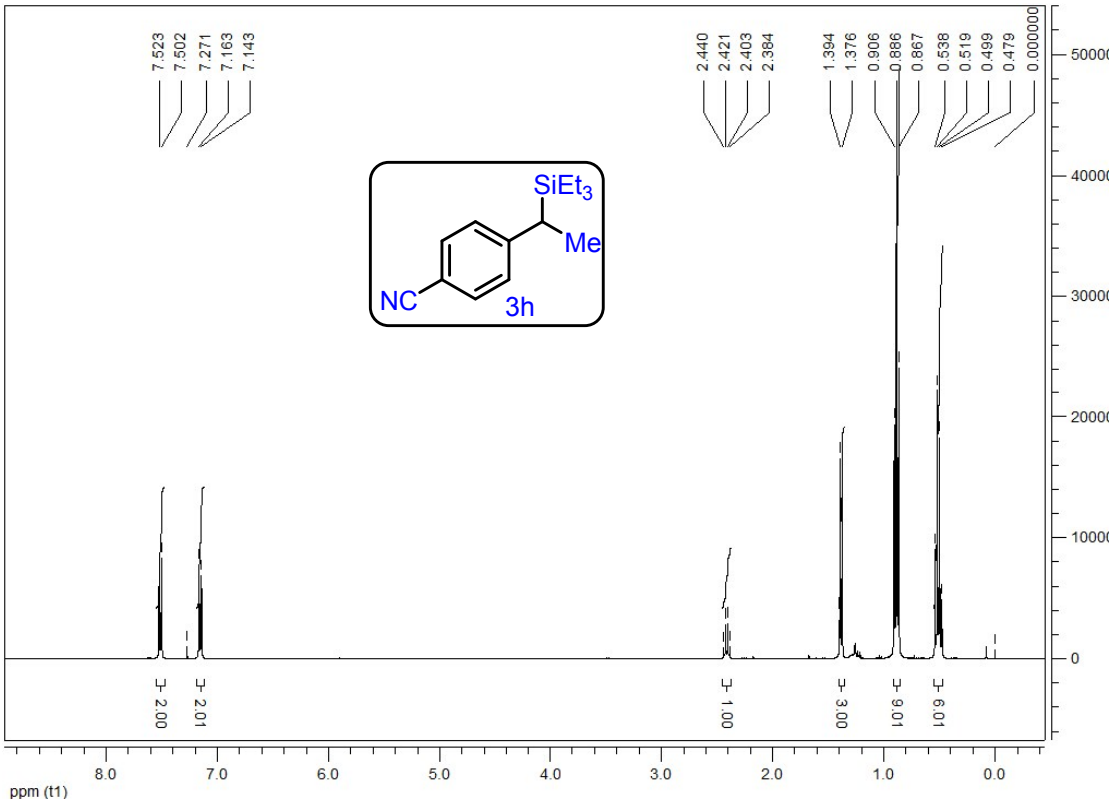
ppm (t1)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0.867
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0.499
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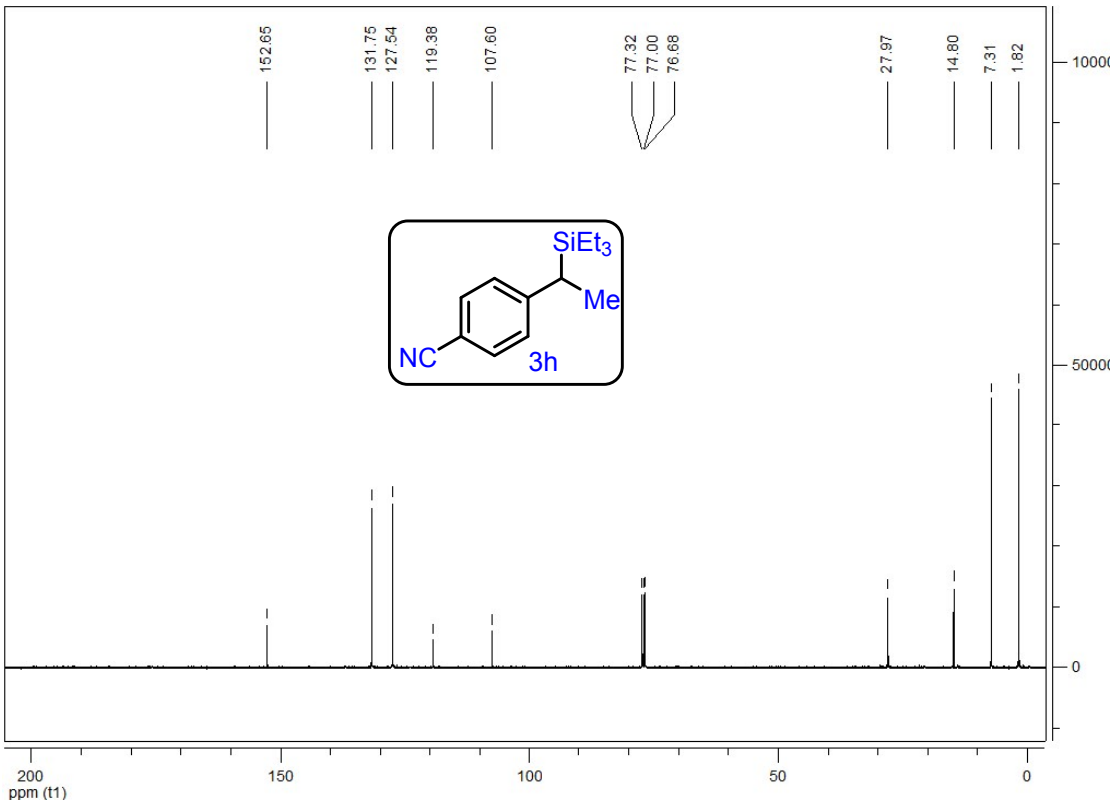
ppm (t1)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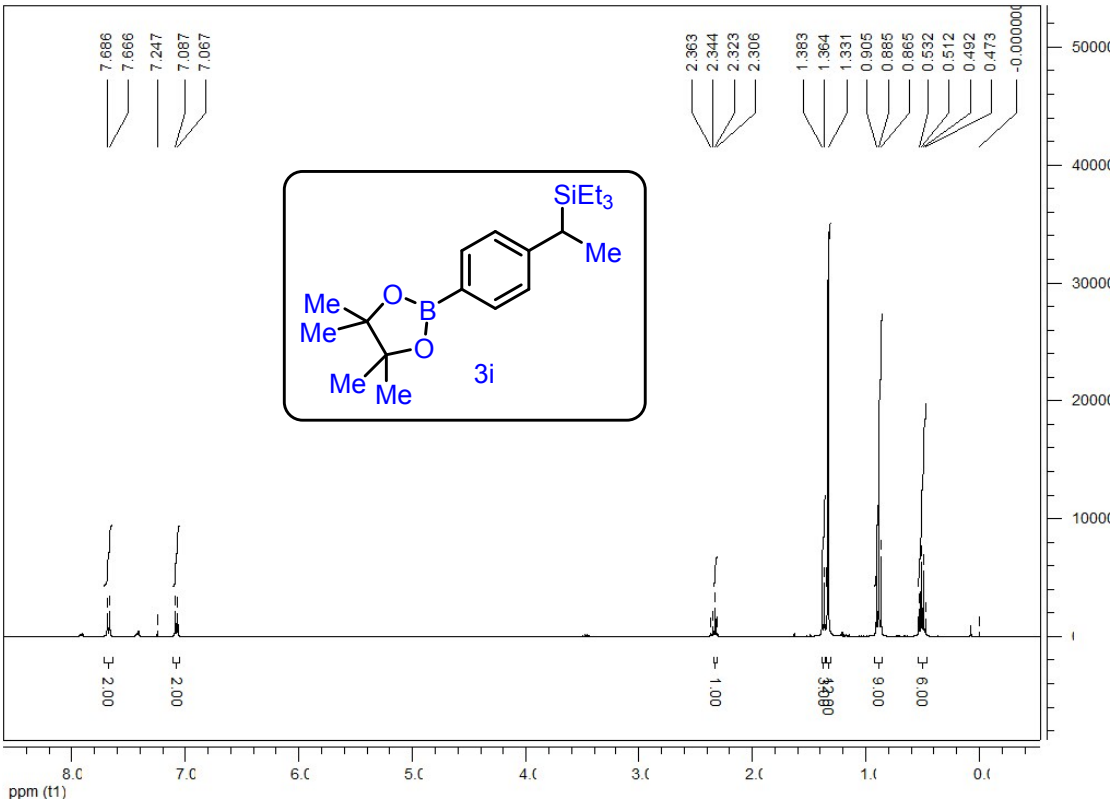
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B
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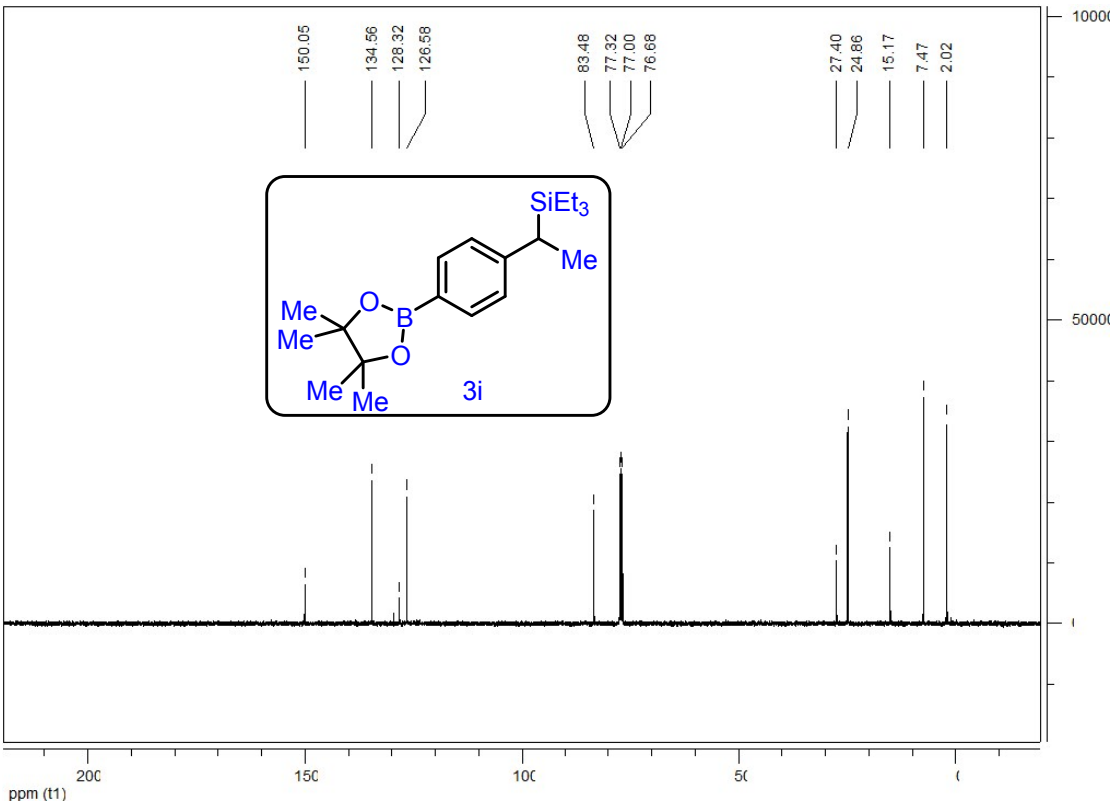
6.00
ppm (t1)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Me
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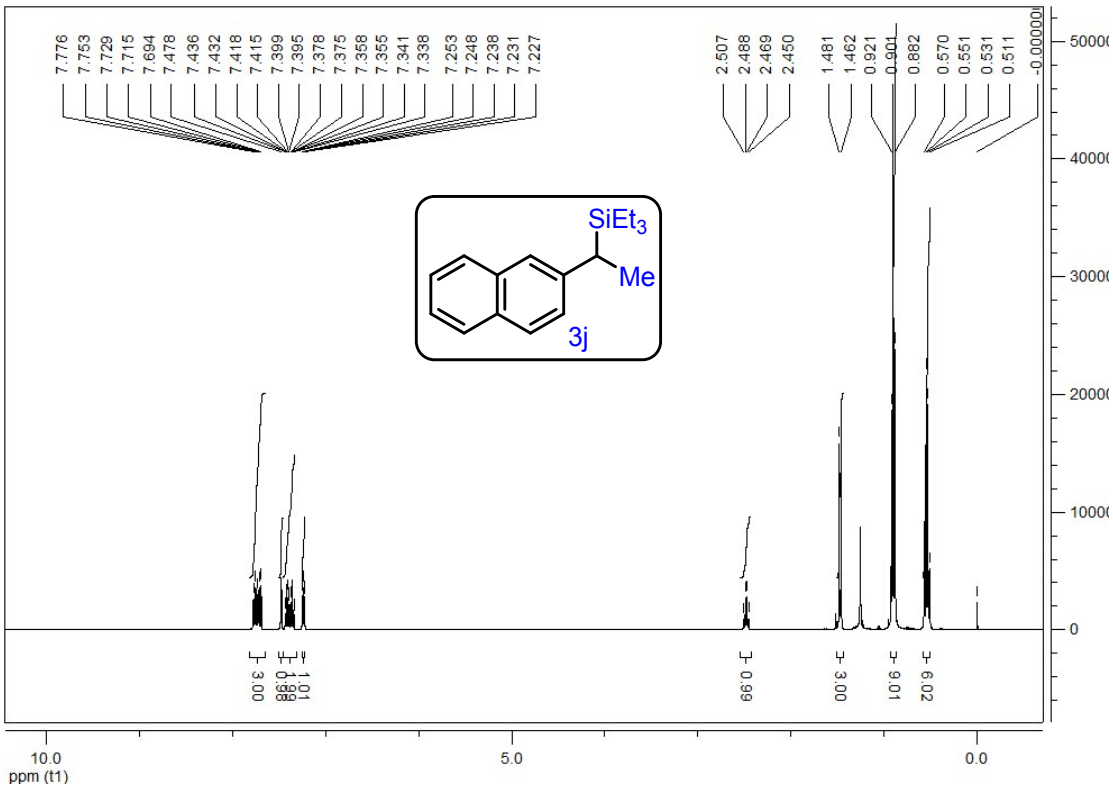
B
O
3i
ppm (t1)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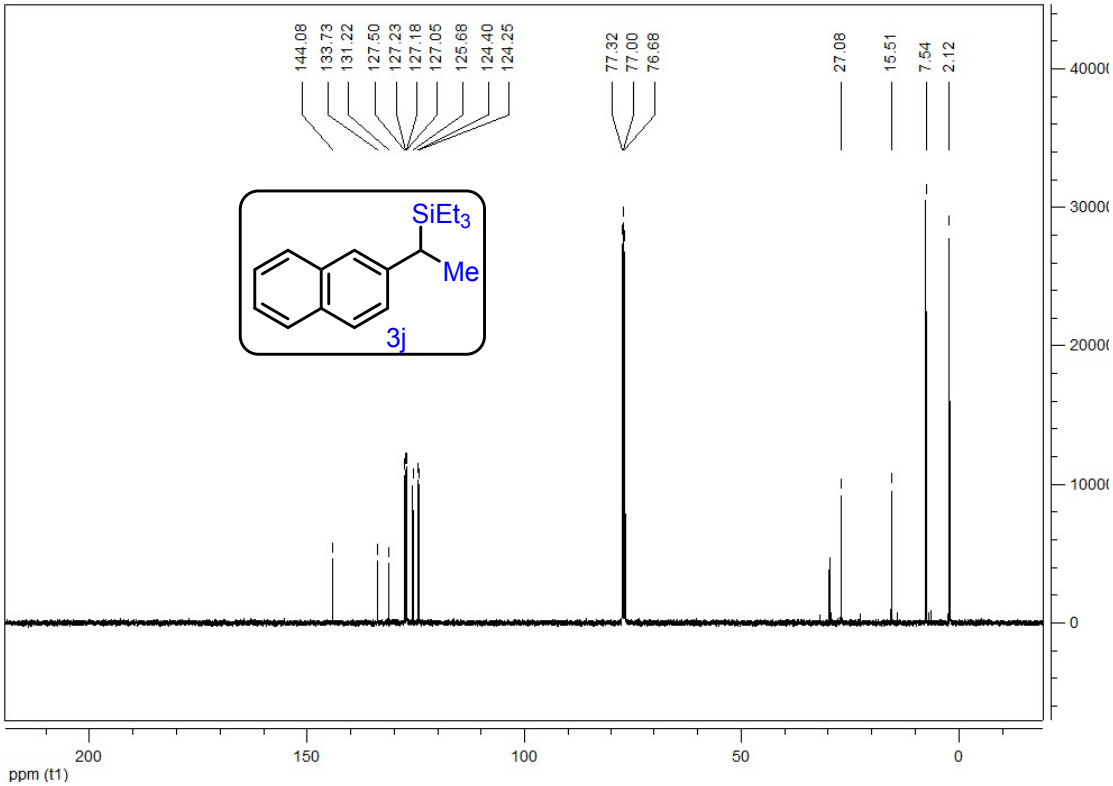
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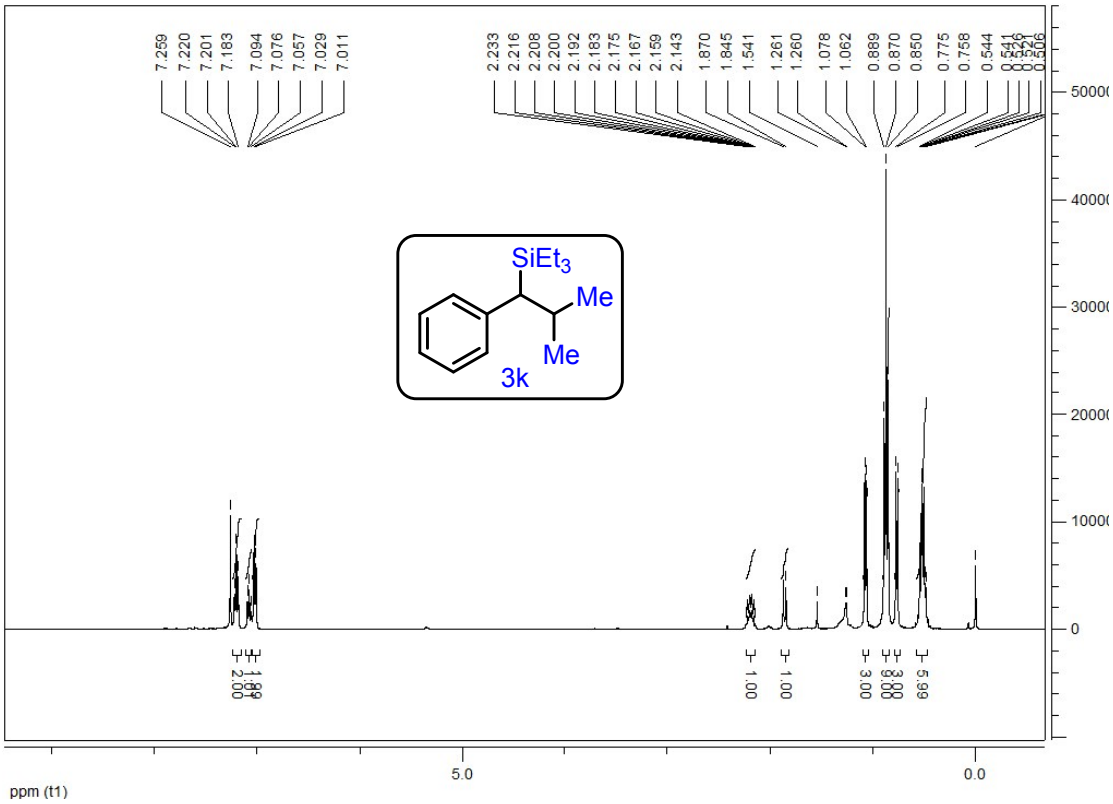
ppm (t1)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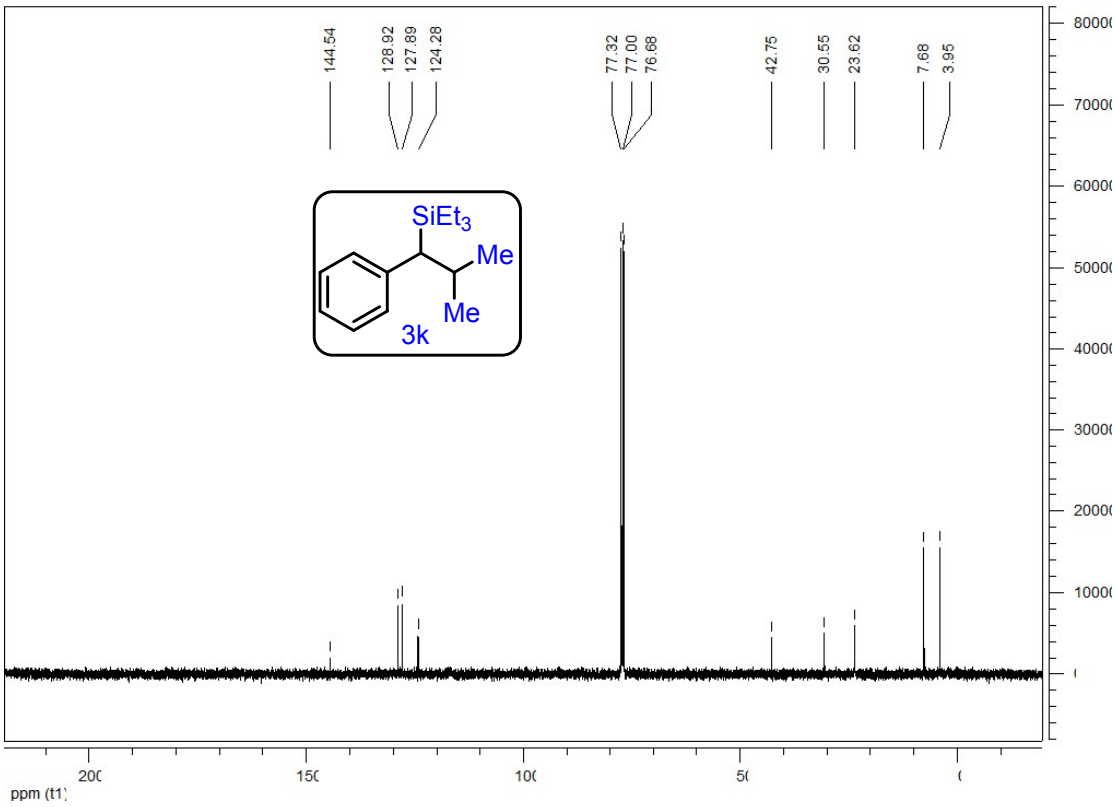
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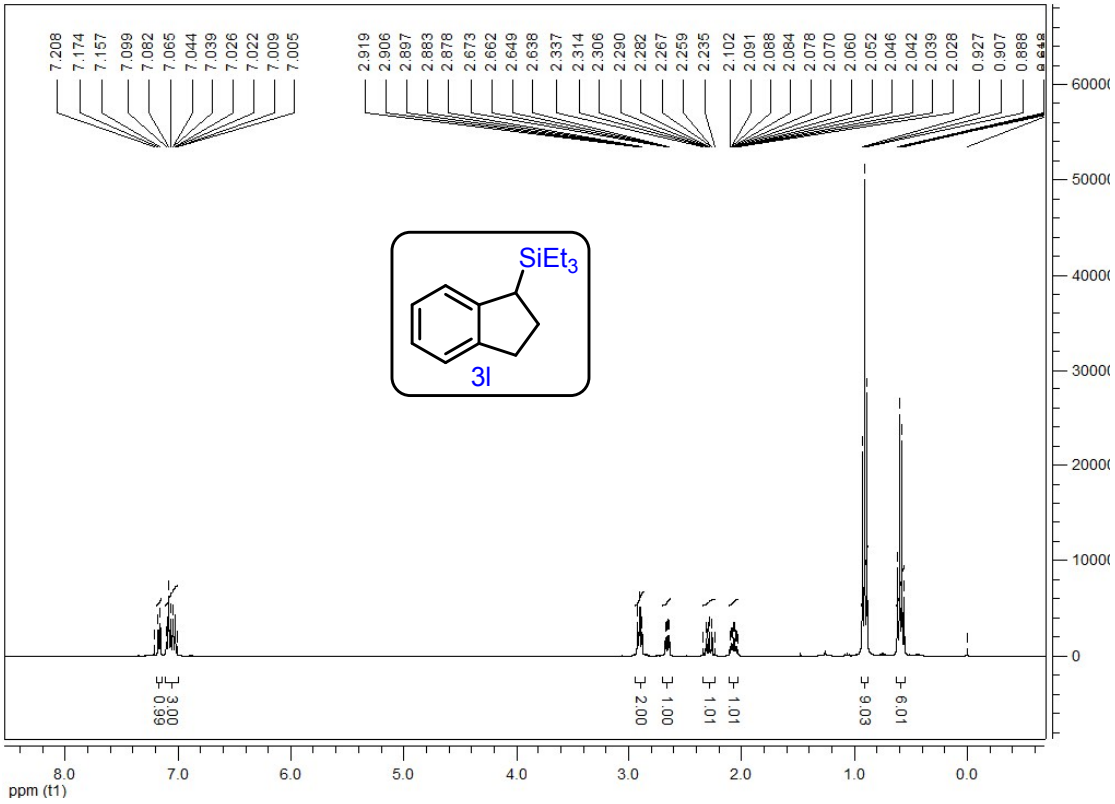
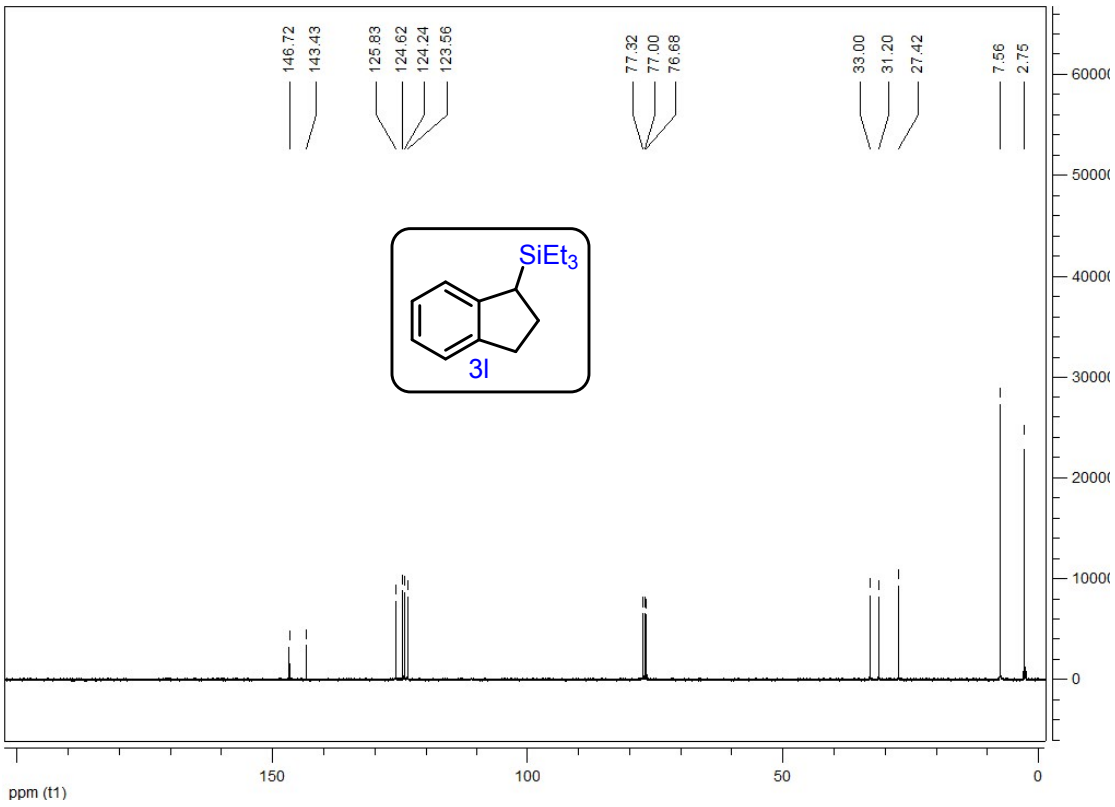
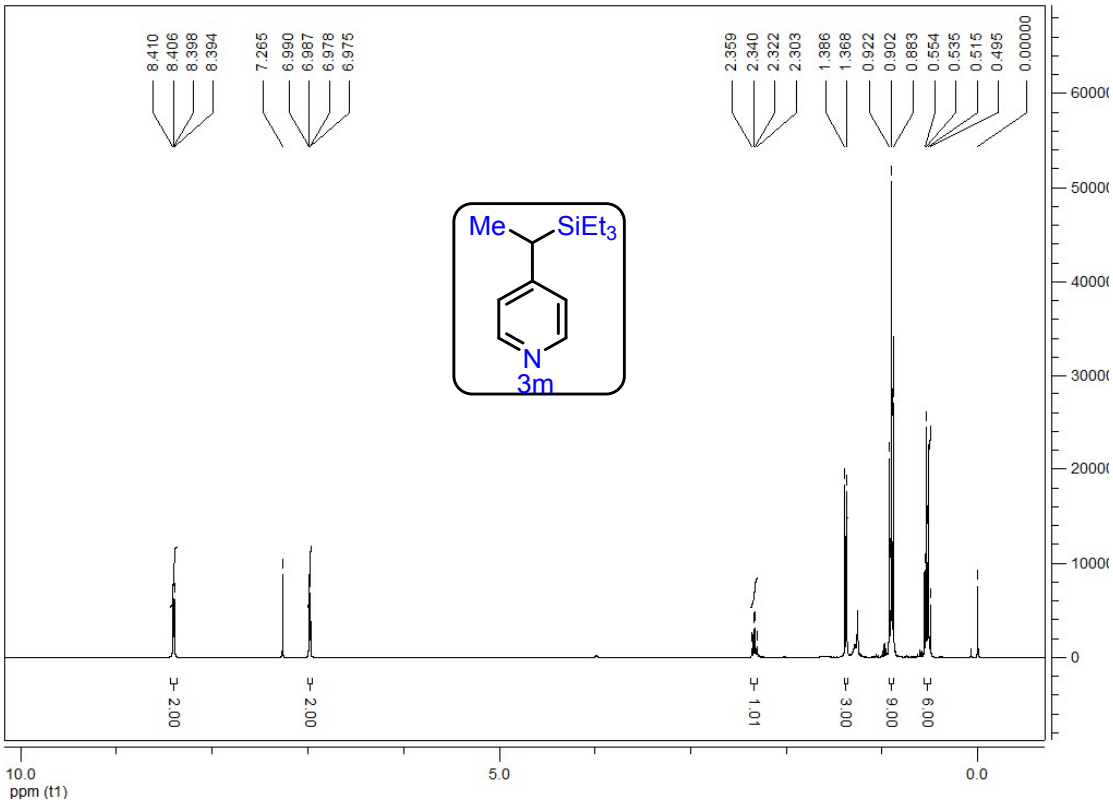
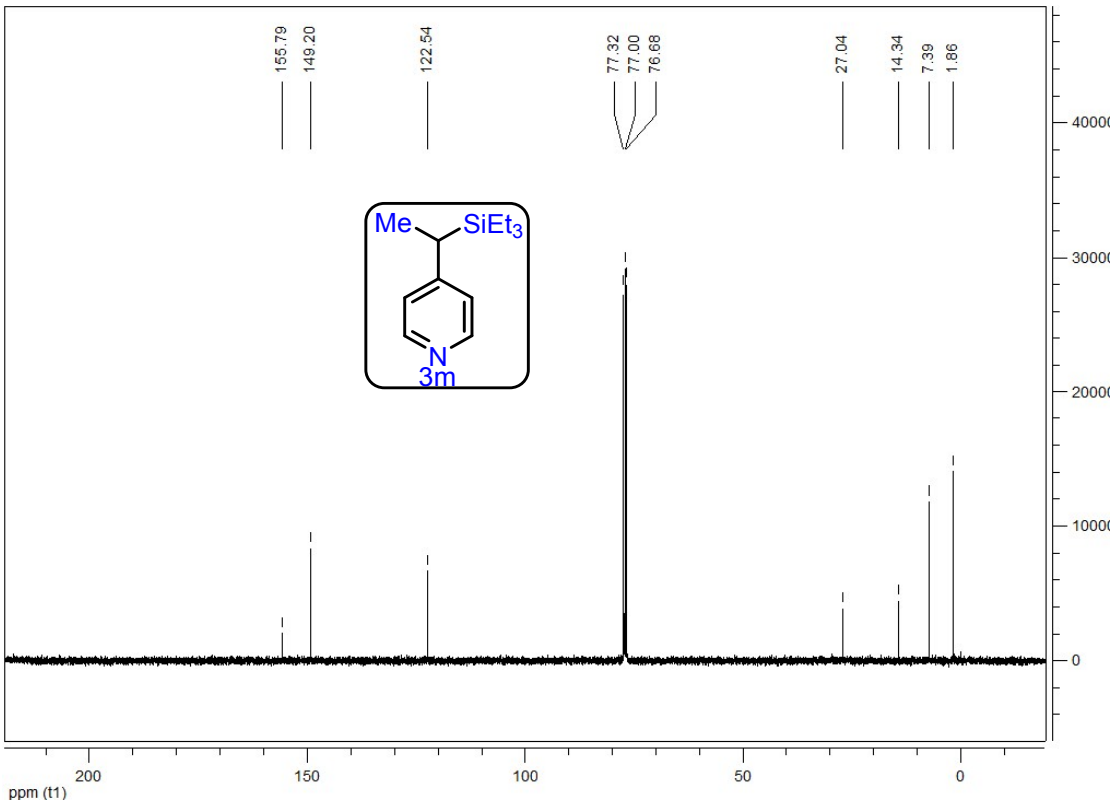
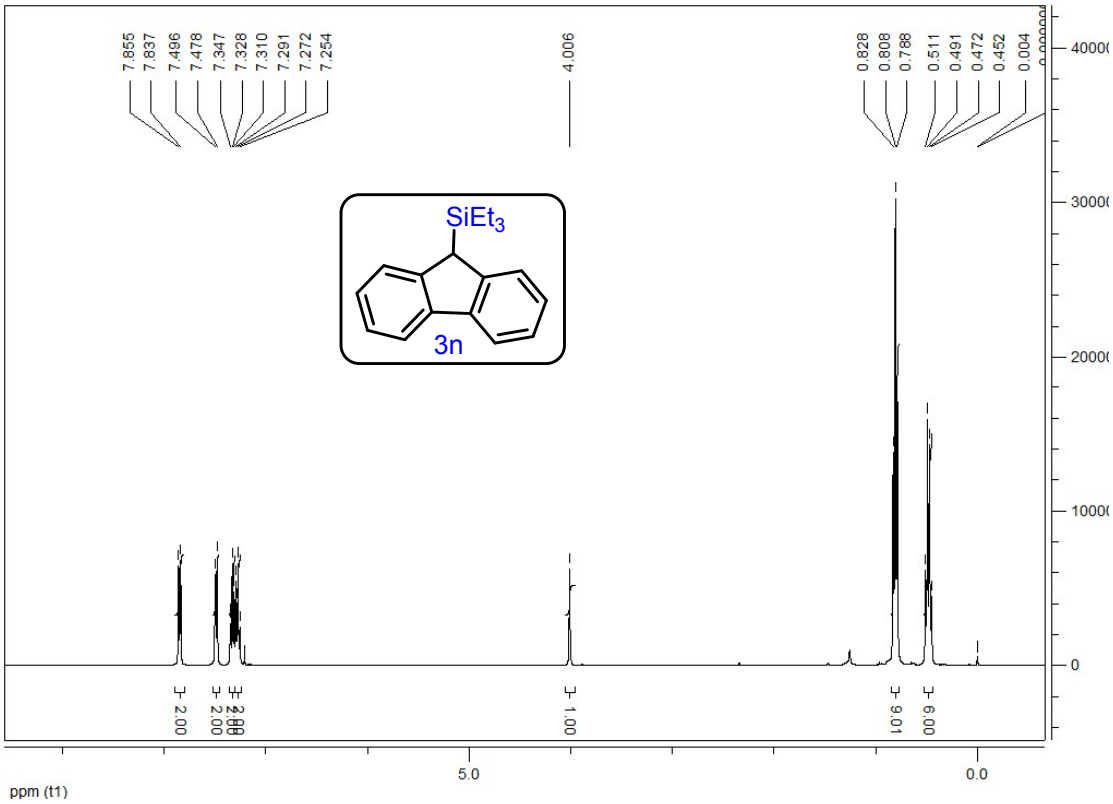
Me
3k
ppm (t1)

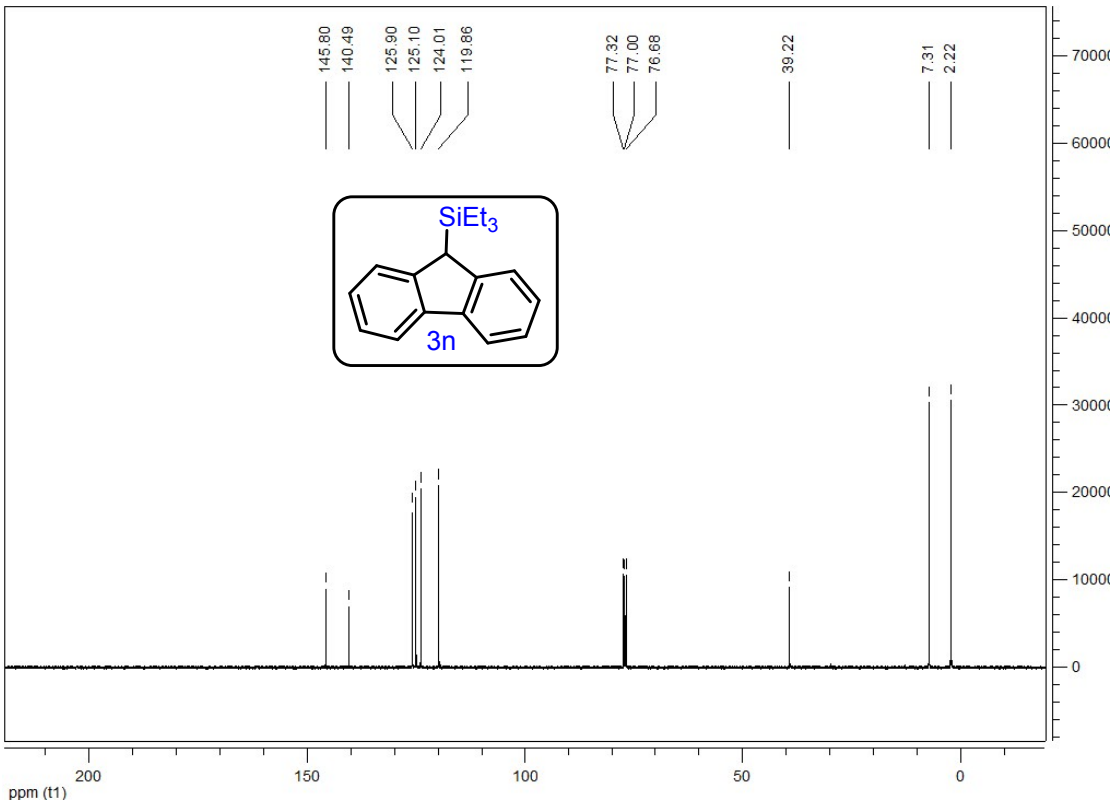

7.208
7.174
7.157
7.099
7.082
7.065
7.044
7.039
7.026
7.022
7.009
7.005
2.919
2.906
2.897
2.883
2.878
2.673
2.662
2.649
2.638
2.337
2.314
2.306
2.290
2.282
2.267
2.259
2.235
2.102
2.091
2.088
2.084
2.078
2.070
2.060
2.052
2.046
2.042
2.039
2.028
0.927
0.907
0.888
SiEt3
3l
3.00
0.99
2.00
1.00
1.01
1.01
9.03
6.01
ppm (t1)

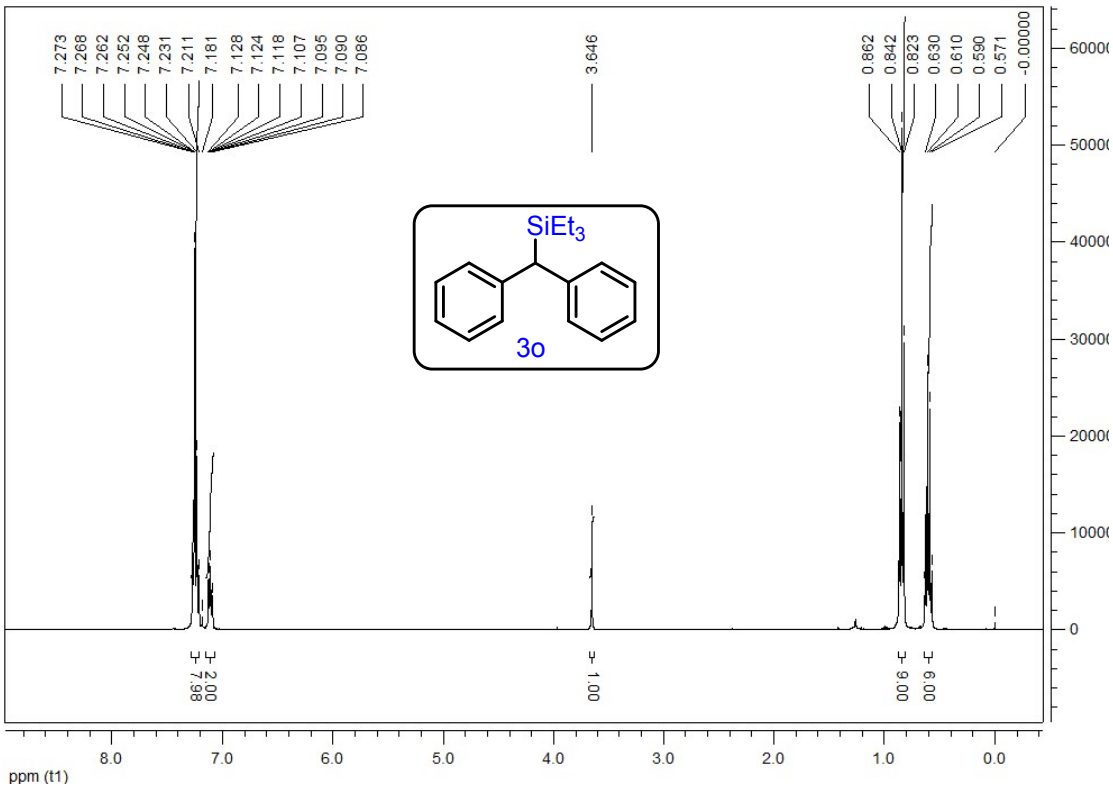

146.72
143.43
125.83
124.62
124.24
123.56
77.32
77.00
76.68
33.00
31.20
27.42
7.56
2.75
SiEt3
3l
ppm (t1)

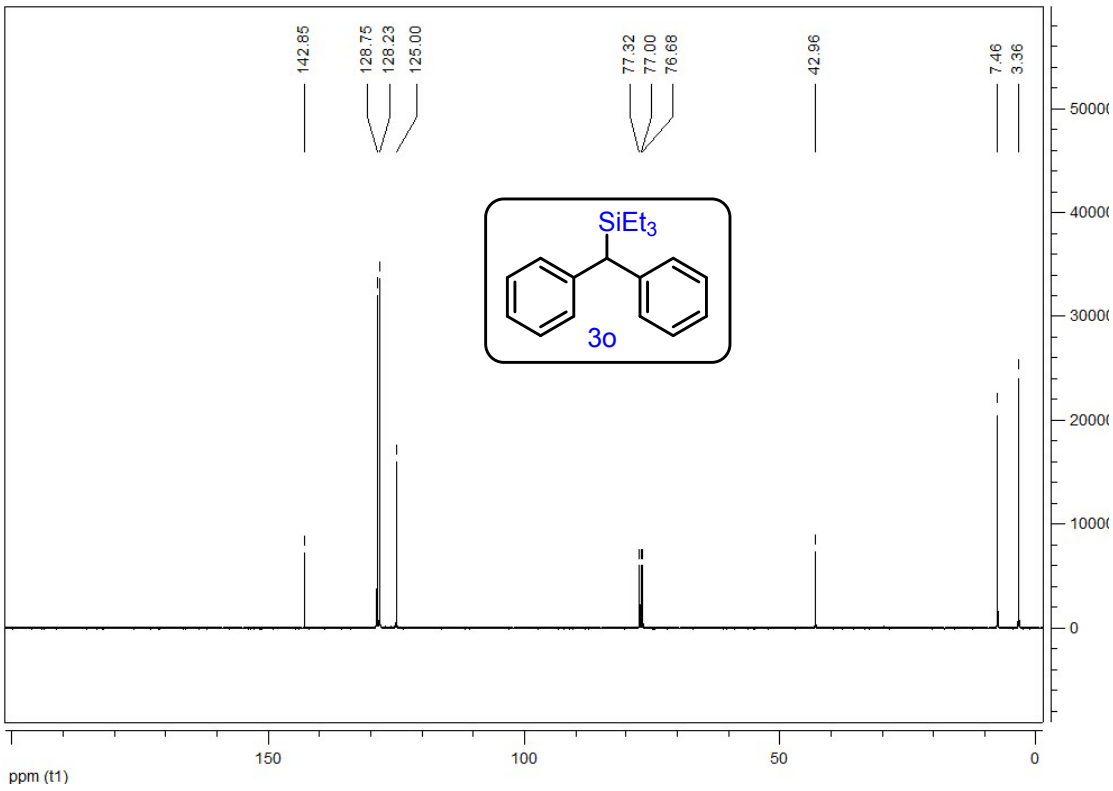

8.410
8.406
8.398
8.394
7.265
6.990
6.987
6.978
6.975
2.359
2.340
2.322
2.303
1.386
1.368
0.922
0.902
0.883
0.554
0.535
0.515
0.495
0.00000
Me
SiEt3
N
3m
2.00
2.00
1.01
3.00
9.00
6.00
10.0
5.0
0.0
ppm (t1)

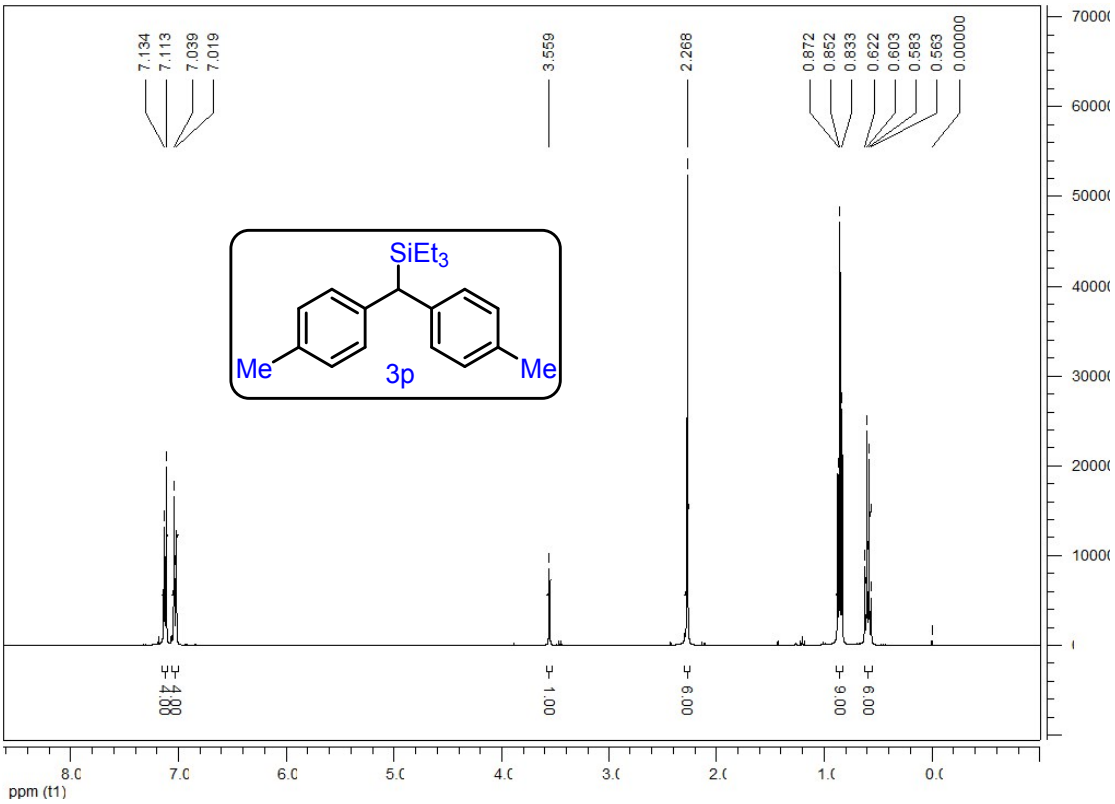

155.79
149.20
122.54
77.32
77.00
76.68
27.04
14.34
7.39
1.86
Me
SiEt3
N
3m
200
150
100
50
0
ppm (t1)

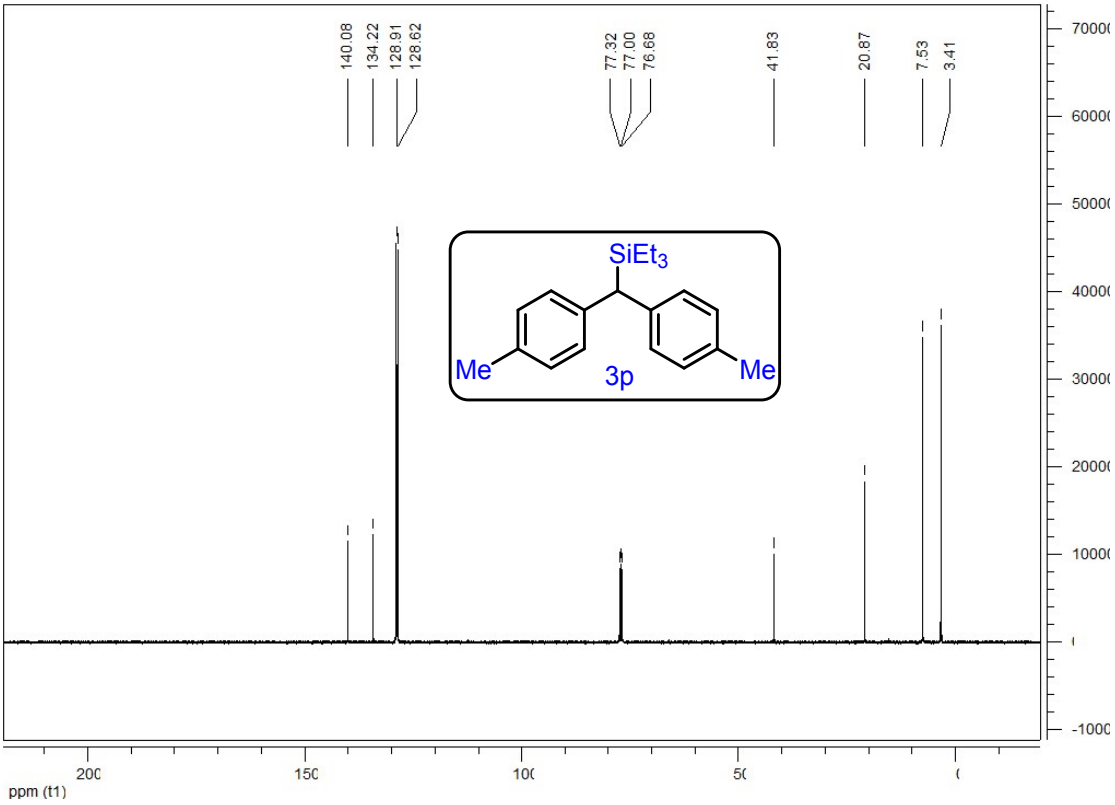

7.855
7.837
7.496
7.478
7.347
7.328
7.310
7.291
7.272
7.254
4.006
0.828
0.808
0.788
0.511
0.491
0.472
0.452
0.004
SiEt3
3n
2.00
2.00
2.00
1.00
9.01
6.00
5.0
0.0
ppm (t1)

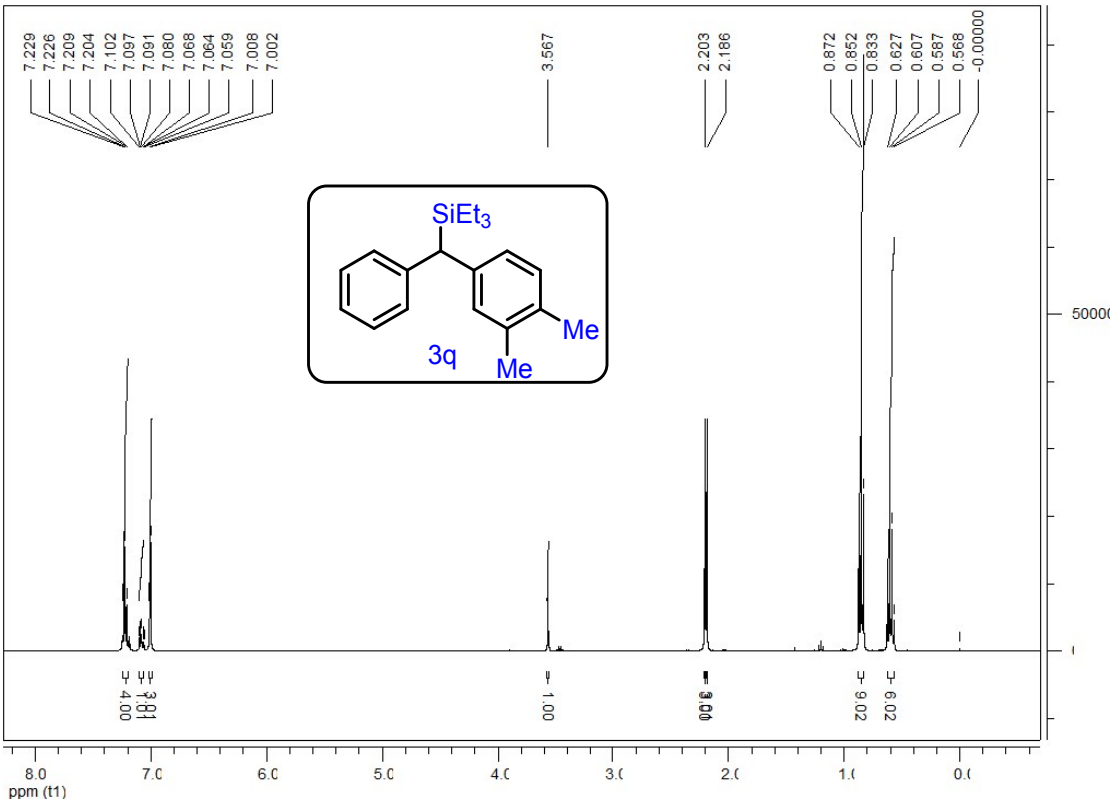

145.80
140.49
125.90
125.10
124.01
119.86
77.32
77.00
76.68
39.22
7.31
2.22
SiEt3
3n
200
150
100
50
0
ppm (t1)

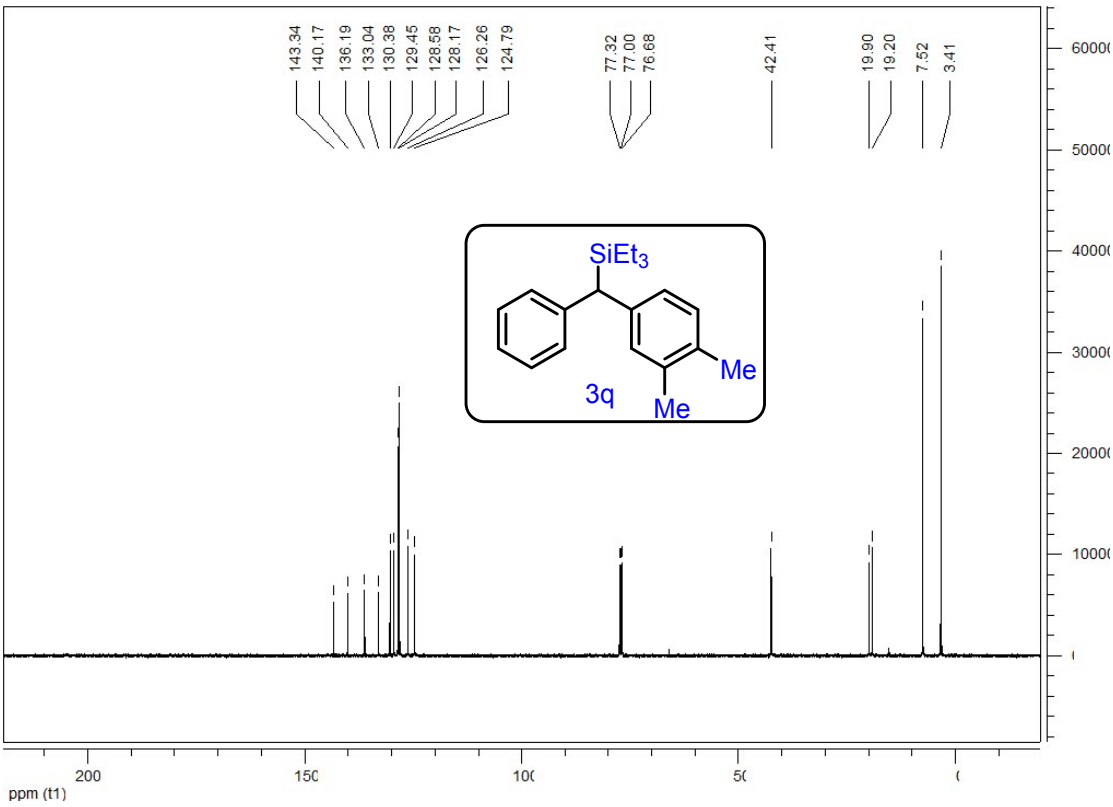

7.273
7.268
7.262
7.252
7.248
7.231
7.211
7.181
7.128
7.124
7.118
7.107
7.095
7.090
7.086
3.646
0.862
0.842
0.823
0.630
0.610
0.590
0.571
-0.00000
SiEt3
3o
7.98
2.00
1.00
9.00
6.00
ppm (t1)

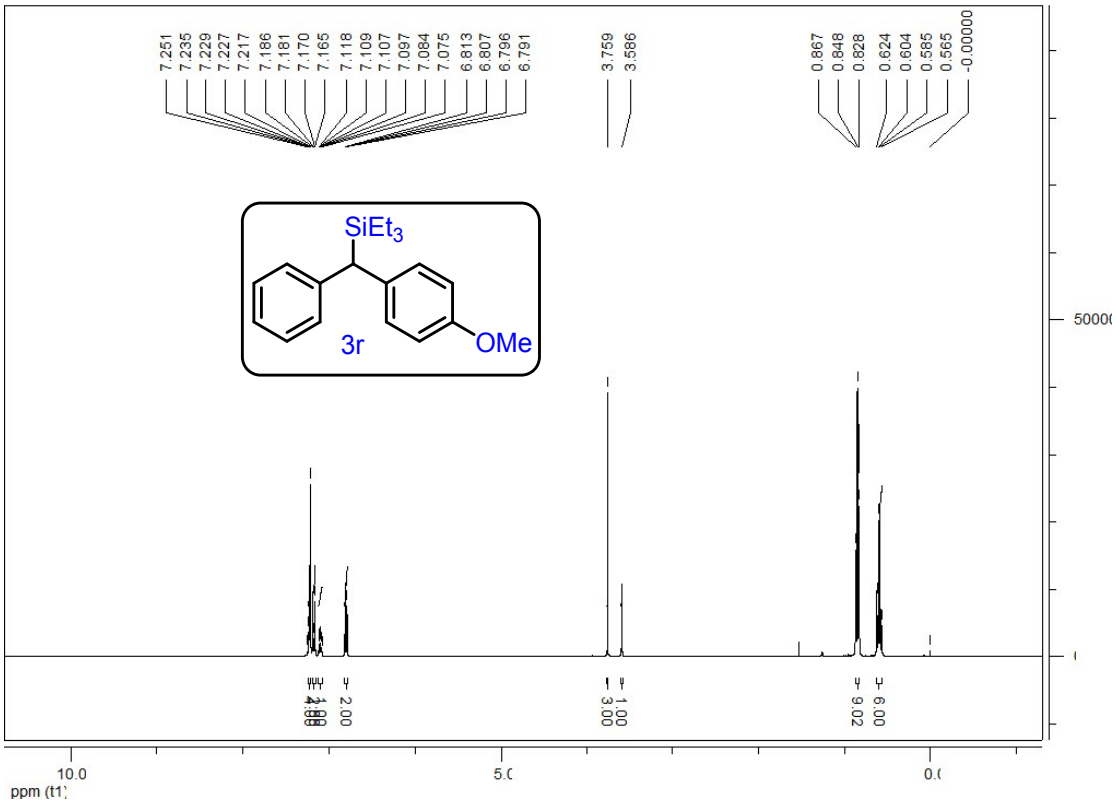

142.85
128.75
128.23
125.00
77.32
77.00
76.68
42.96
7.46
3.36
SiEt3
3o
ppm (t1)

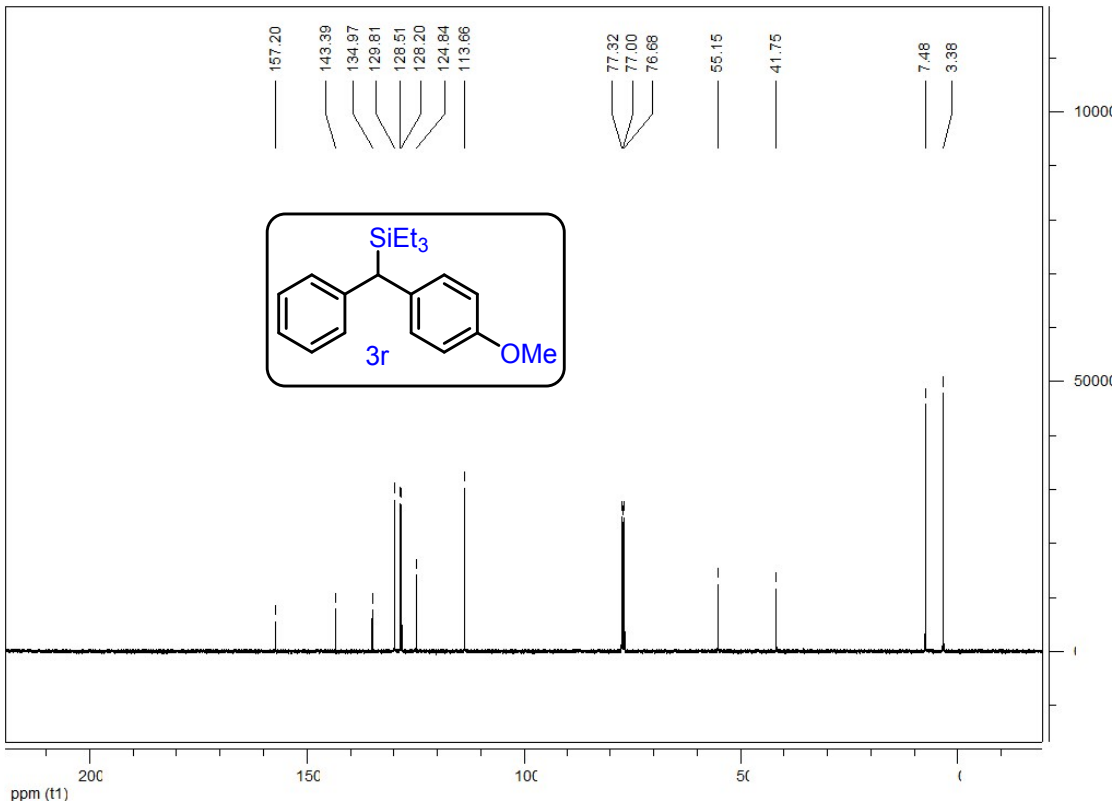

7.134
7.113
7.039
7.019
3.559
2.268
0.872
0.852
0.833
0.622
0.603
0.583
0.563
0.00000
SiEt3
Me
Me
3p
4.00
1.00
6.00
9.00
6.00
ppm (t1)

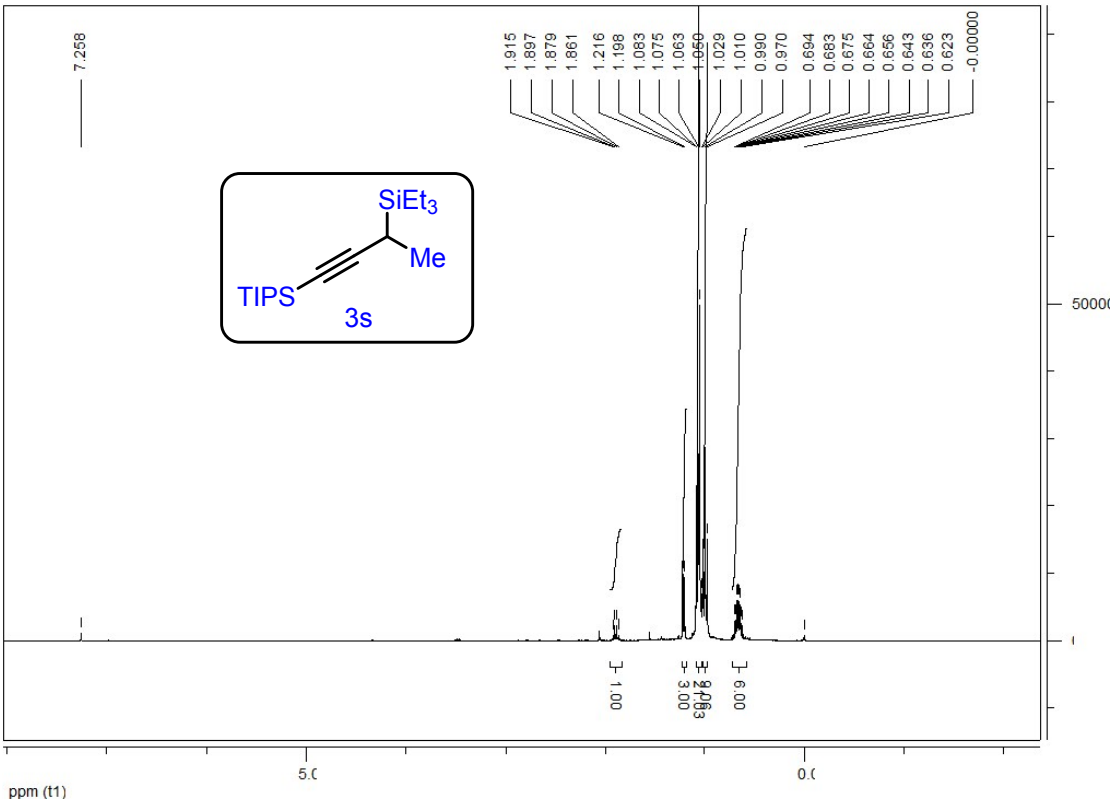

140.08
134.22
128.91
128.62
77.32
77.00
76.68
41.83
20.87
7.53
3.41
SiEt3
Me
Me
3p
ppm (t1)

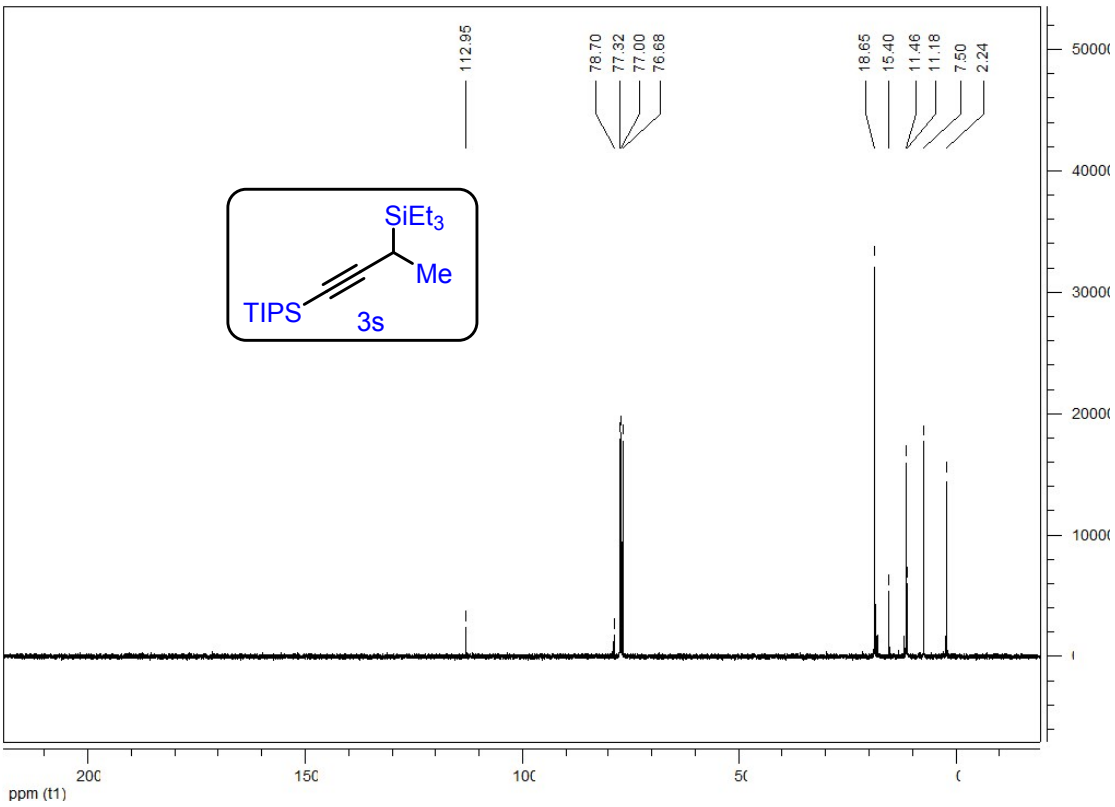

7.229
7.226
7.209
7.204
7.102
7.097
7.091
7.080
7.068
7.064
7.059
7.008
7.002
3.567
2.203
2.186
0.872
0.852
0.833
0.627
0.607
0.587
0.568
-0.00000
SiEt3
Me
3q
Me
4.00
3.81
1.00
9.00
9.02
6.02
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)
50000

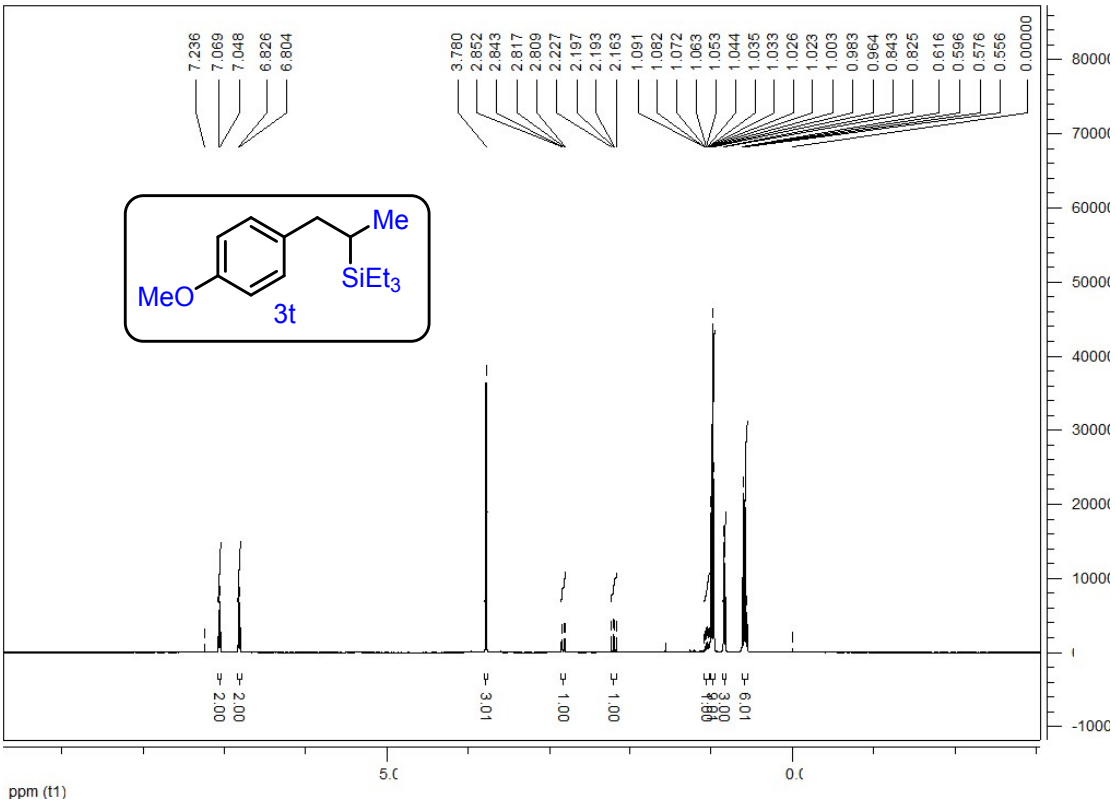

143.34
140.17
136.19
133.04
130.38
129.45
128.58
128.17
126.26
124.79
77.32
77.00
76.68
42.41
19.90
19.20
7.52
3.41
SiEt3
Me
3q
Me
200
150
100
50
0
ppm (t1)
60000
50000
40000
30000
20000
10000

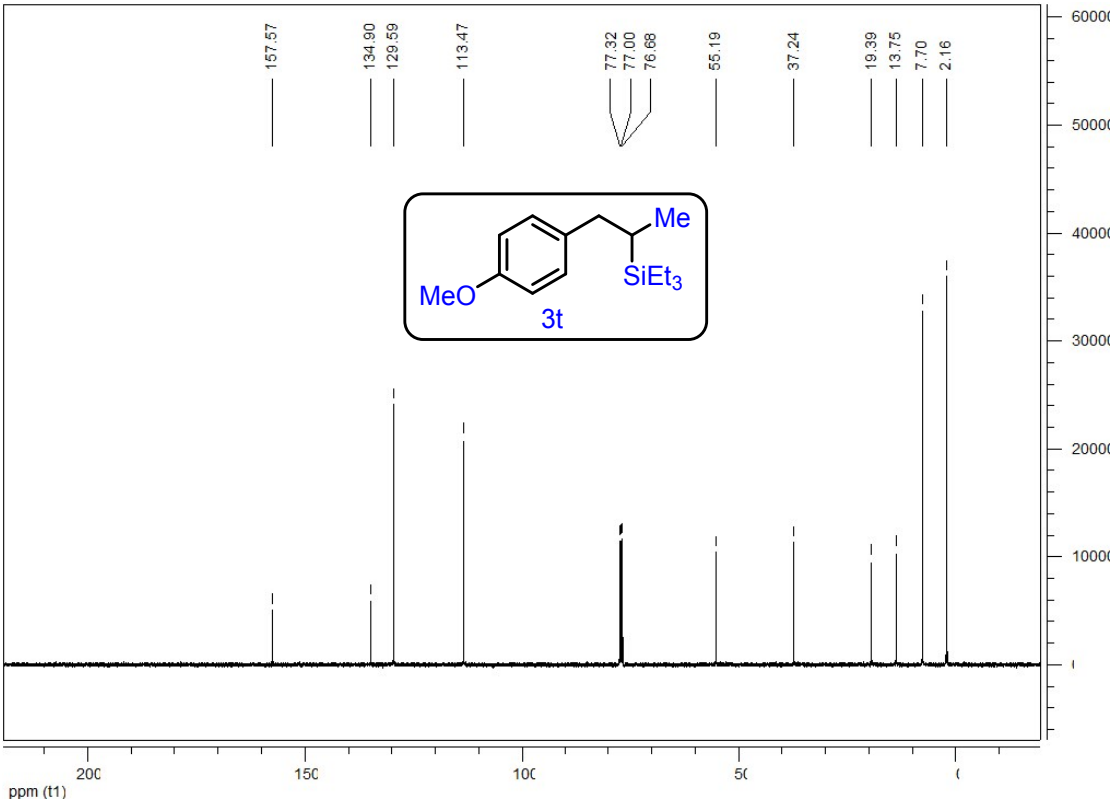

7.251
7.235
7.229
7.227
7.217
7.186
7.181
7.170
7.165
7.118
7.109
7.107
7.097
7.084
7.075
6.813
6.807
6.796
6.791
3.759
3.586
0.867
0.848
0.828
0.624
0.604
0.585
0.565
-0.00000
SiEt3
3r
OMe
2.00
1.00
3.00
6.00
9.02
10.0
5.0
0.0
ppm (t1)

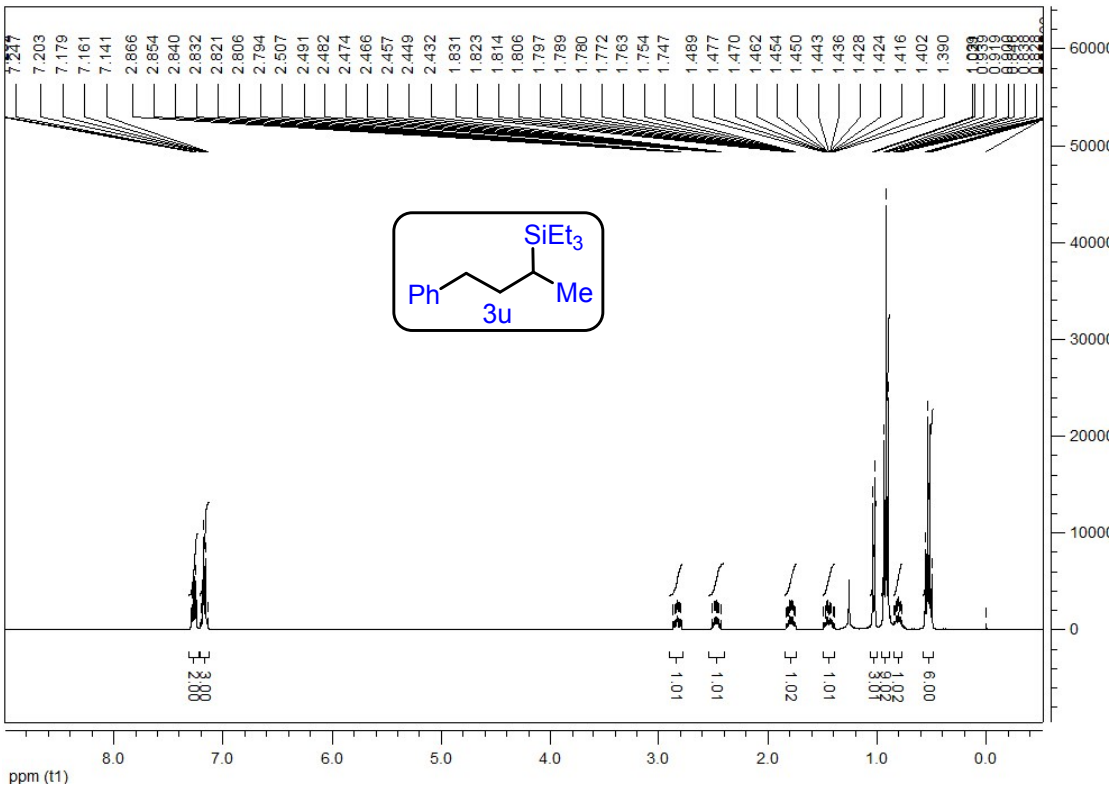

157.20
143.39
134.97
129.81
128.51
128.20
124.84
113.66
77.32
77.00
76.68
55.15
41.75
7.48
3.38
SiEt3
3r
OMe
200
150
100
50
ppm (t1)

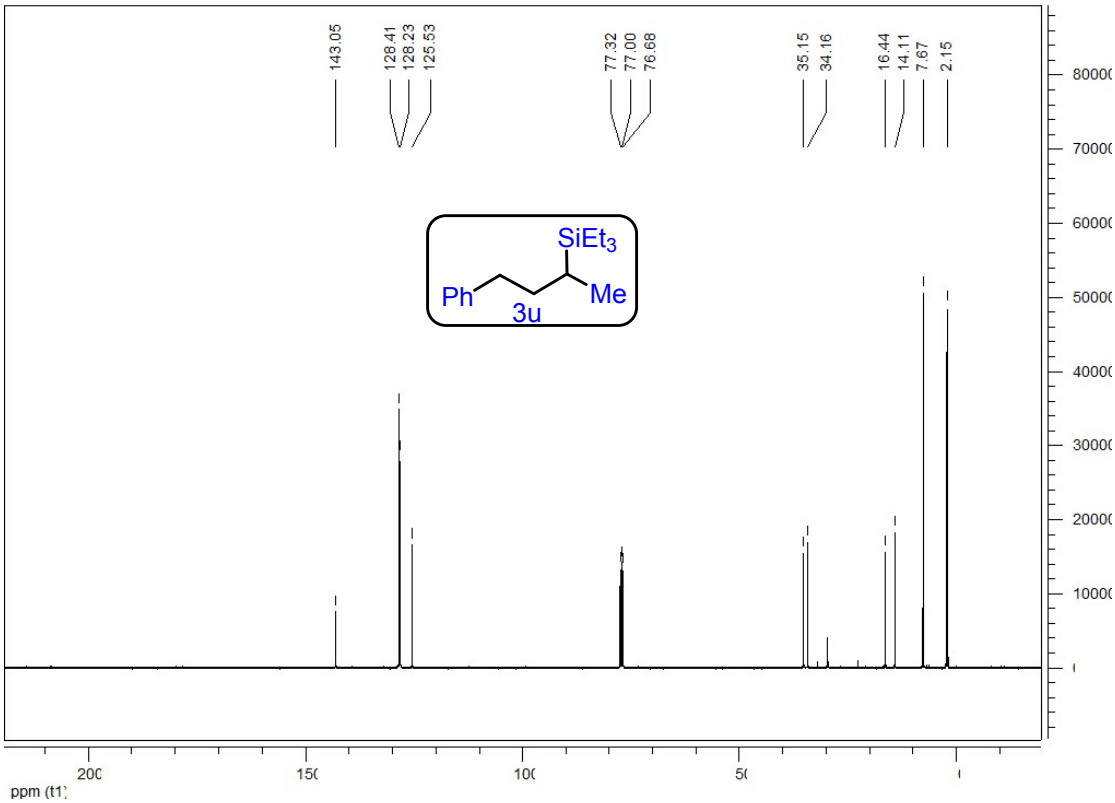

7.258
1.915
1.897
1.879
1.861
1.216
1.198
1.083
1.075
1.063
1.050
1.029
1.010
0.990
0.970
0.694
0.683
0.675
0.664
0.656
0.643
0.636
0.623
-0.00000
SiEt3
Me
TIPS
3s
1.00
3.00
6.00
5.0
0.0
ppm (t1)

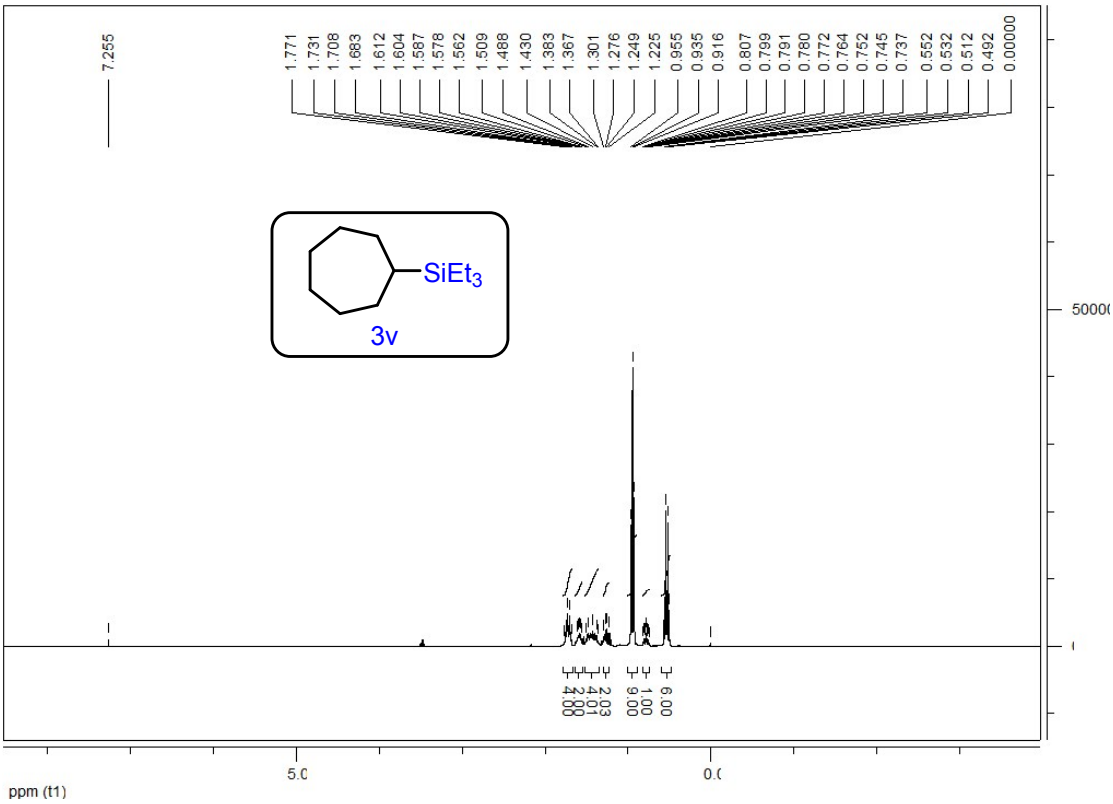

112.95
78.70
77.32
77.00
76.68
18.65
15.40
11.46
11.18
7.50
2.24
SiEt3
Me
TIPS
3s
200
150
100
50
ppm (t1)

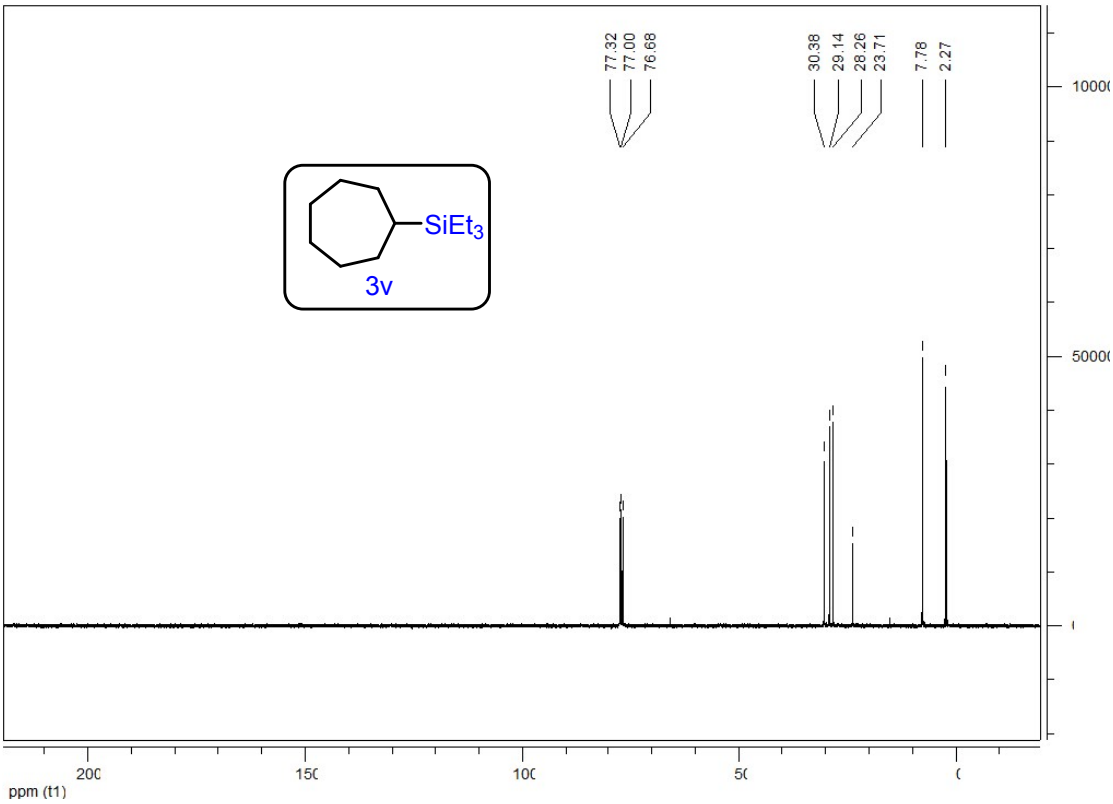

7.236
7.069
7.048
6.826
6.804
3.780
2.852
2.843
2.817
2.809
2.227
2.197
2.193
2.163
1.091
1.082
1.072
1.063
1.053
1.044
1.035
1.033
1.026
1.023
1.003
0.983
0.964
0.843
0.825
0.616
0.596
0.576
0.556
0.00000
Me
SiEt3
MeO
3t
2.00
2.00
3.01
1.00
1.00
6.01
ppm (t1)

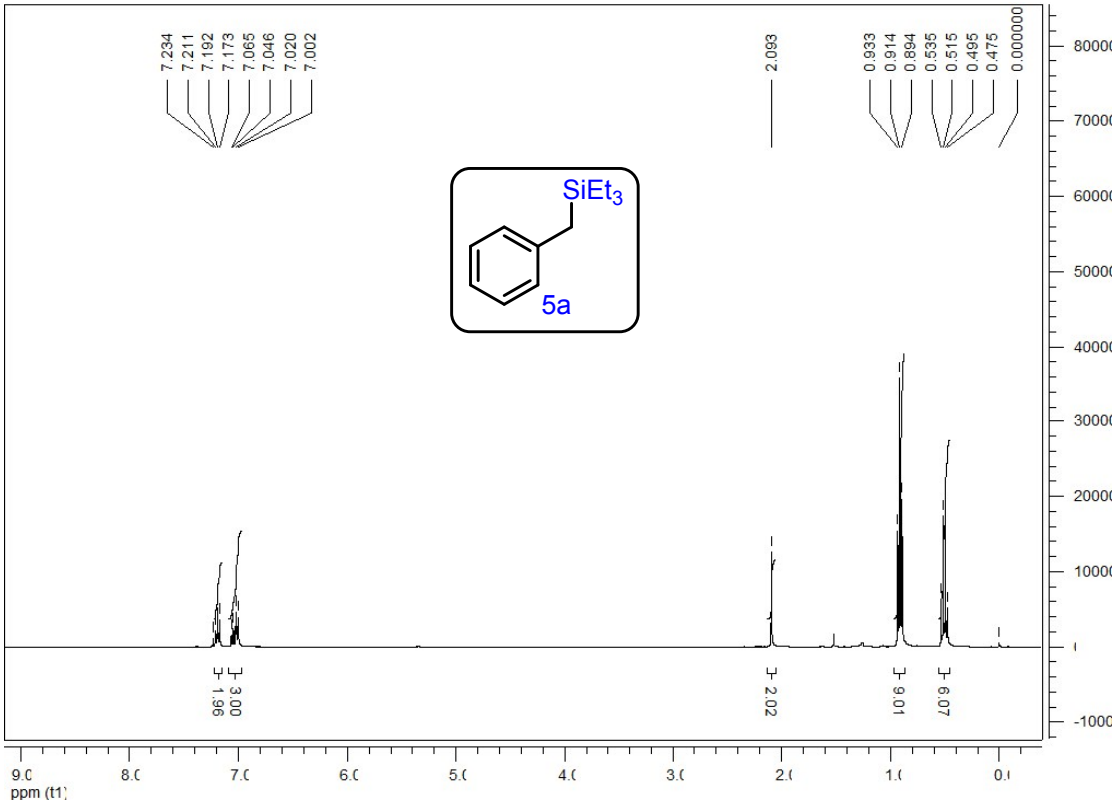

157.57
134.90
129.59
113.47
77.32
77.00
76.68
55.19
37.24
19.39
13.75
7.70
2.16
Me
SiEt3
MeO
3t
ppm (t1)

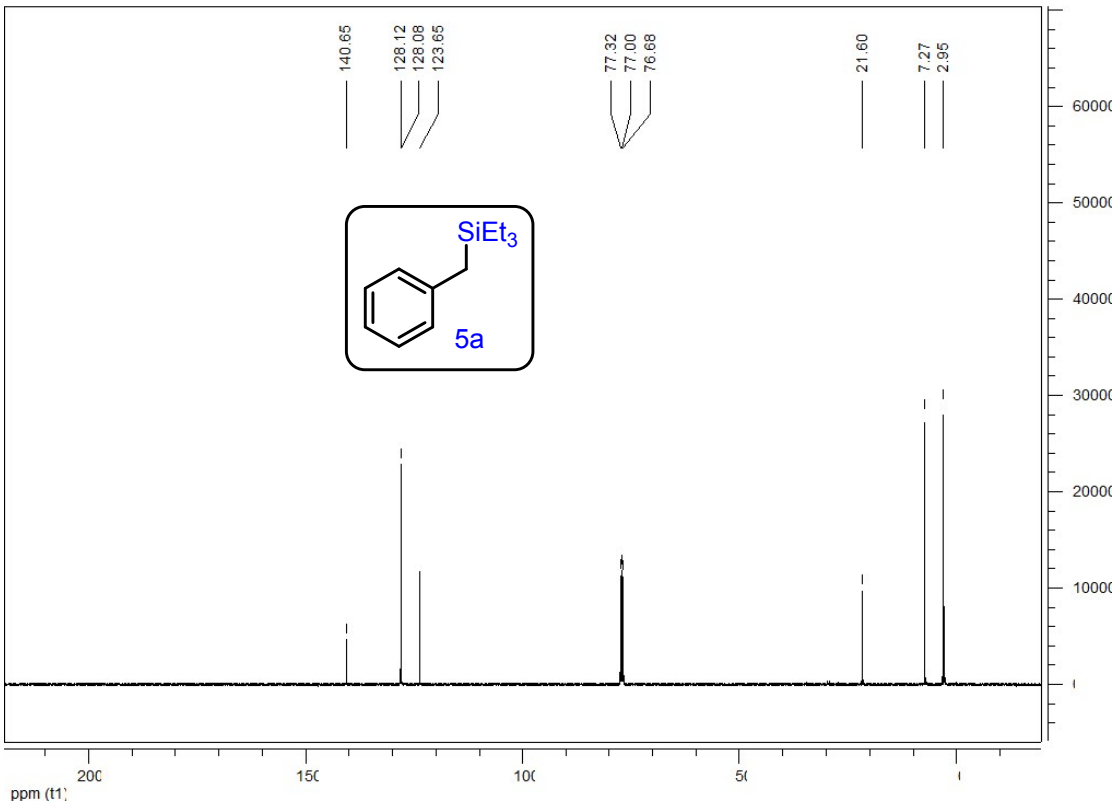

SiEt3
Ph
Me
3u
ppm (t1)

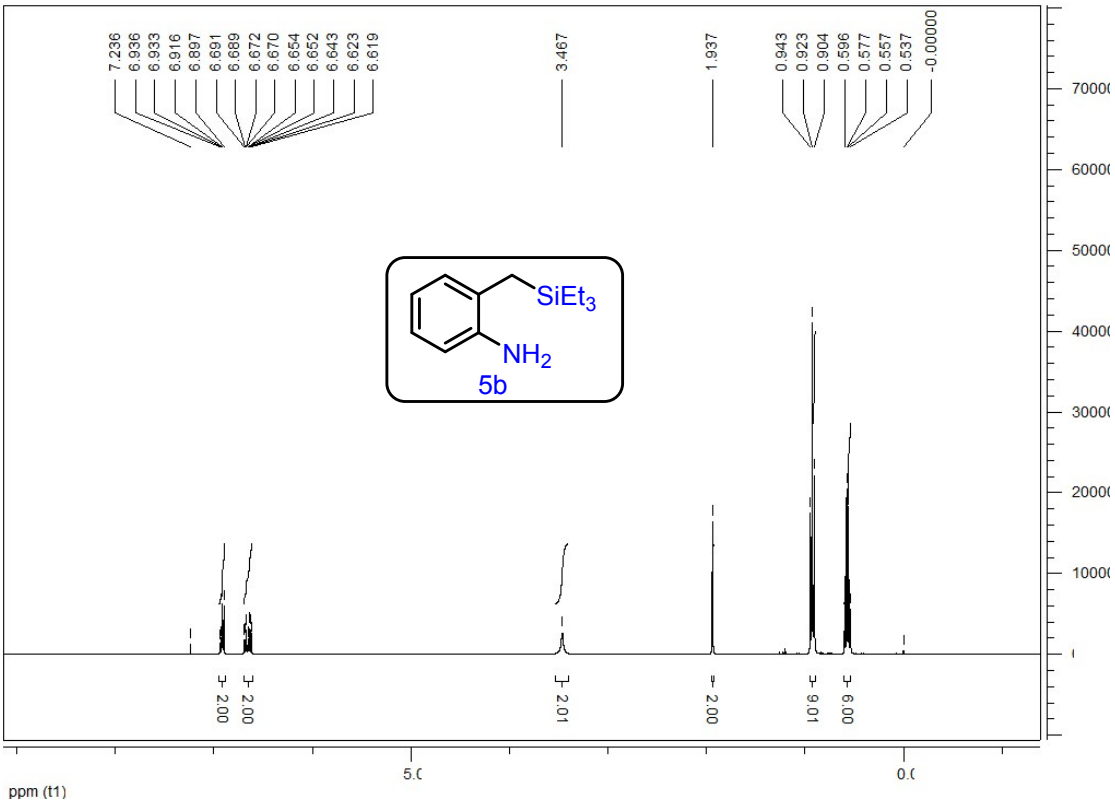

143.05
128.41
128.23
125.53
77.32
77.00
76.68
35.15
34.16
16.44
14.11
7.67
2.15
SiEt3
Ph
Me
3u
ppm (t1)


7.255
1.771
1.731
1.708
1.683
1.612
1.604
1.587
1.578
1.562
1.509
1.488
1.430
1.383
1.367
1.301
1.276
1.249
1.225
0.955
0.935
0.916
0.807
0.799
0.791
0.780
0.772
0.764
0.752
0.745
0.737
0.552
0.532
0.512
0.492
0.00000
SiEt3
3v
5000
5.0
0.0
ppm (t1)


77.32
77.00
76.68
30.38
29.14
28.26
23.71
7.78
2.27
SiEt3
3v
10000
5000
200
150
100
50
0
ppm (t1)


7.234
7.211
7.192
7.173
7.065
7.046
7.020
7.002
2.093
0.933
0.914
0.894
0.535
0.515
0.495
0.475
0.000000
SiEt3
5a
3.00
1.96
2.02
9.01
6.07
ppm (t1)


140.65
128.12
128.08
123.65
77.32
77.00
76.68
21.60
7.27
2.95
SiEt3
5a
ppm (t1)


7.236
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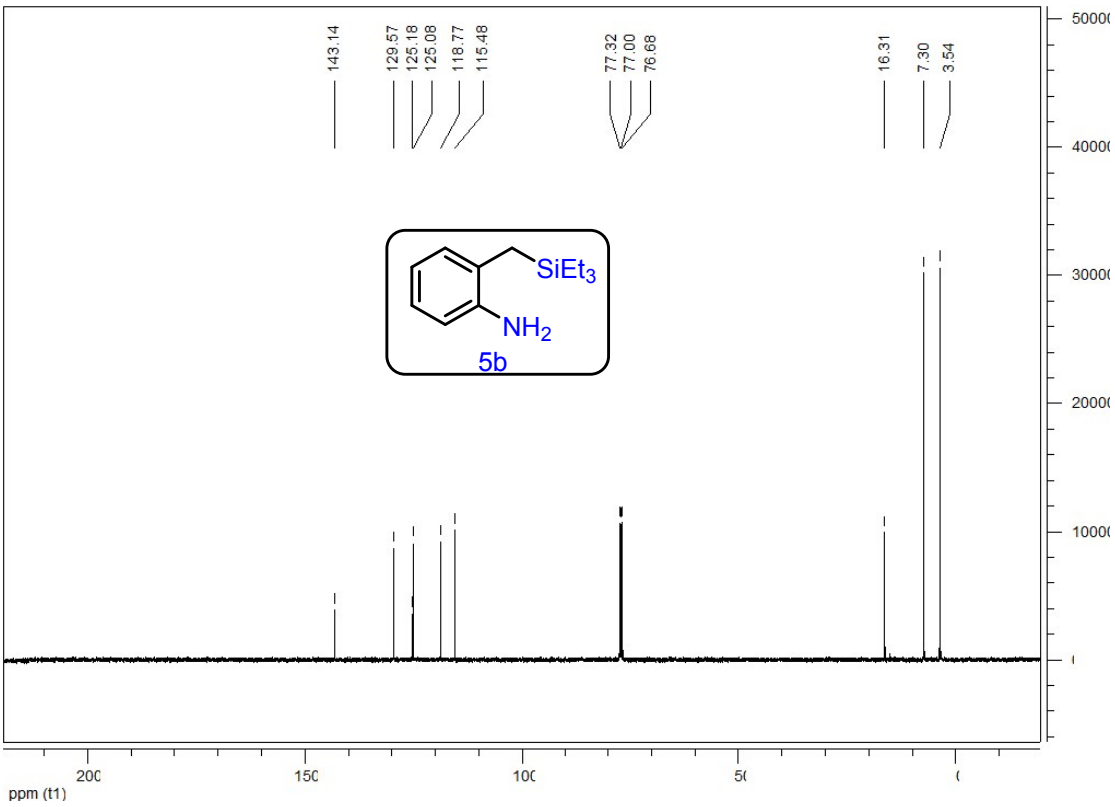
6.933
6.916
6.897
6.691
6.689
6.672
6.670
6.654
6.652
6.643
6.623
6.619
3.467
1.937
0.943
0.923
0.904
0.596
0.577
0.557
0.537
-0.00000
SiEt3
NH2
5b
2.00
2.00
2.01
2.00
9.01
6.00
ppm (t1)


143.14
129.57
125.18
125.08
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115.48
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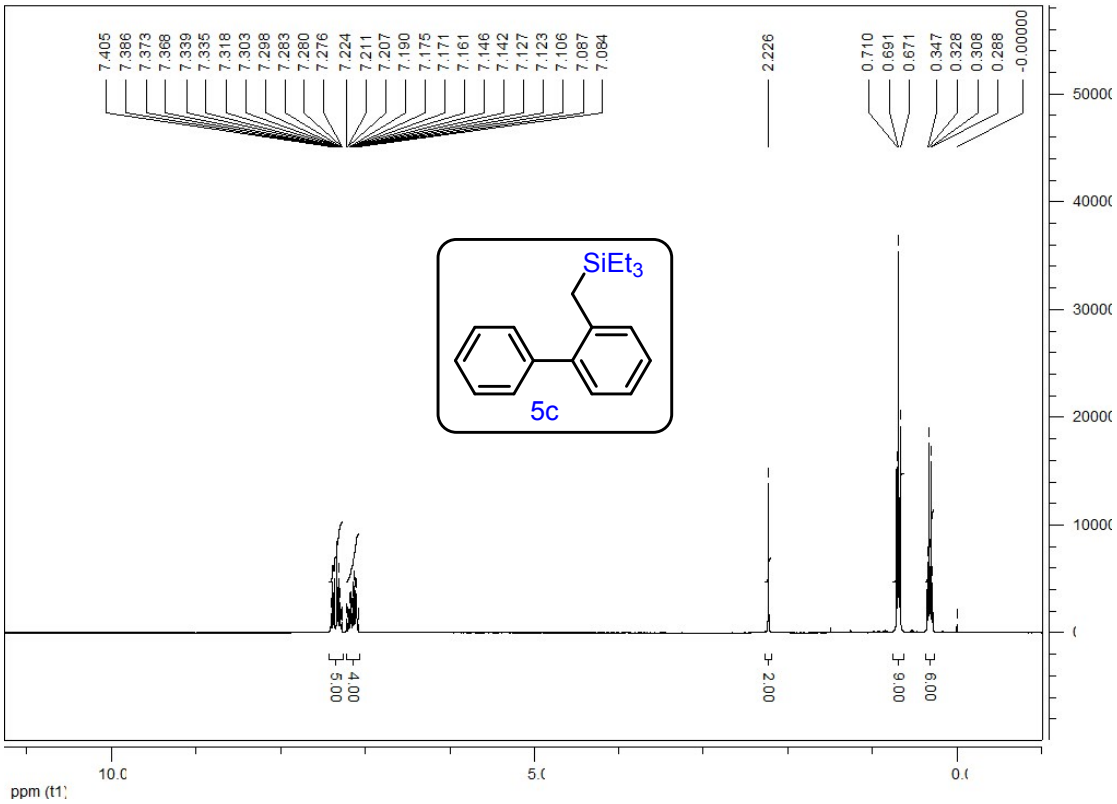
77.00
76.68
16.31
7.30
3.54
SiEt3
NH2
5b
ppm (t1)


7.405
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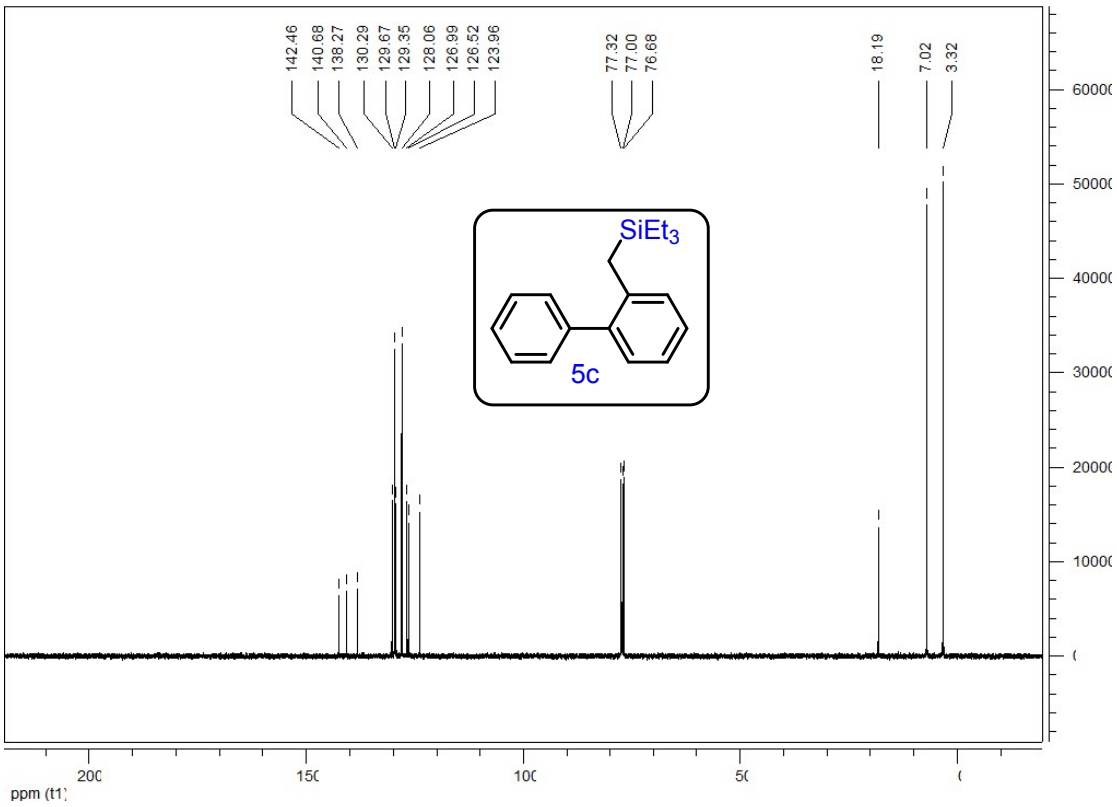
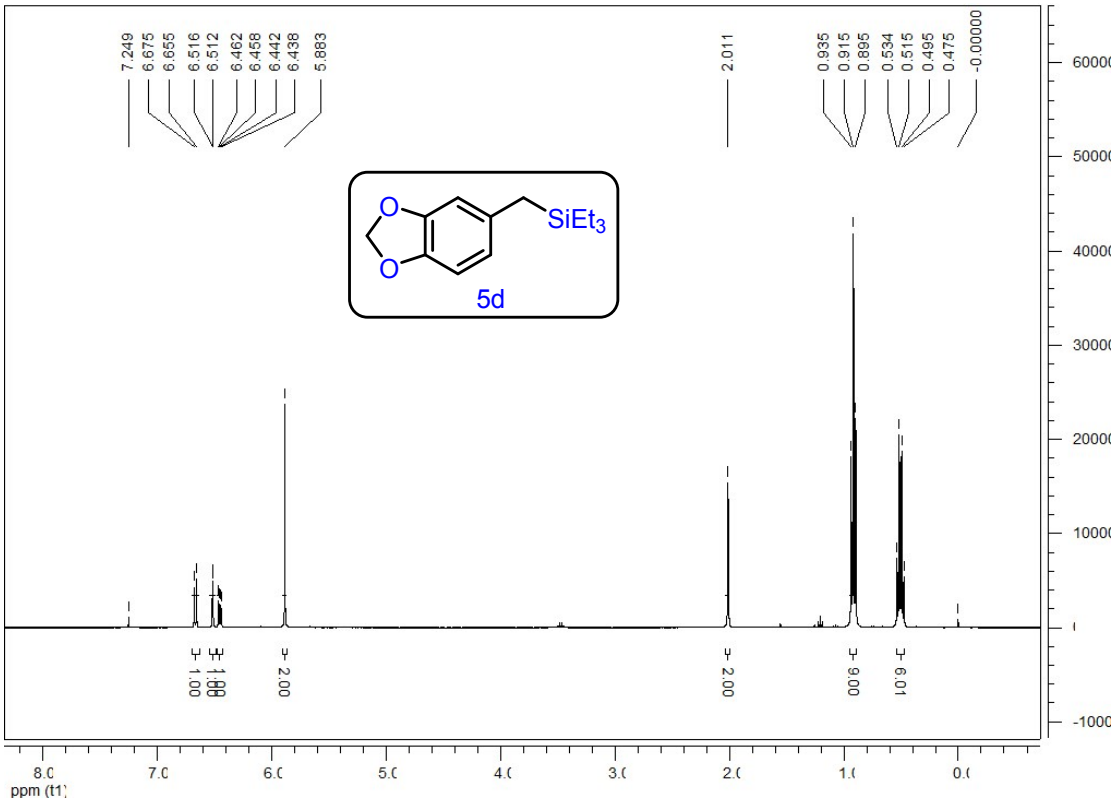
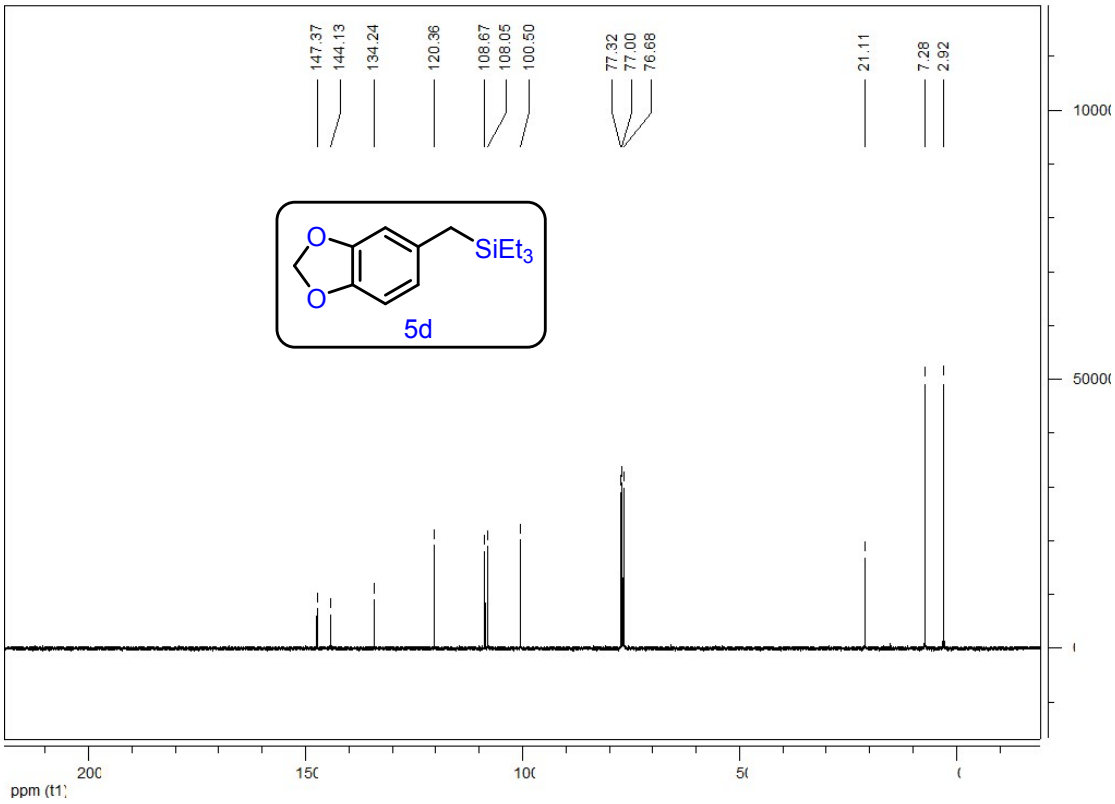
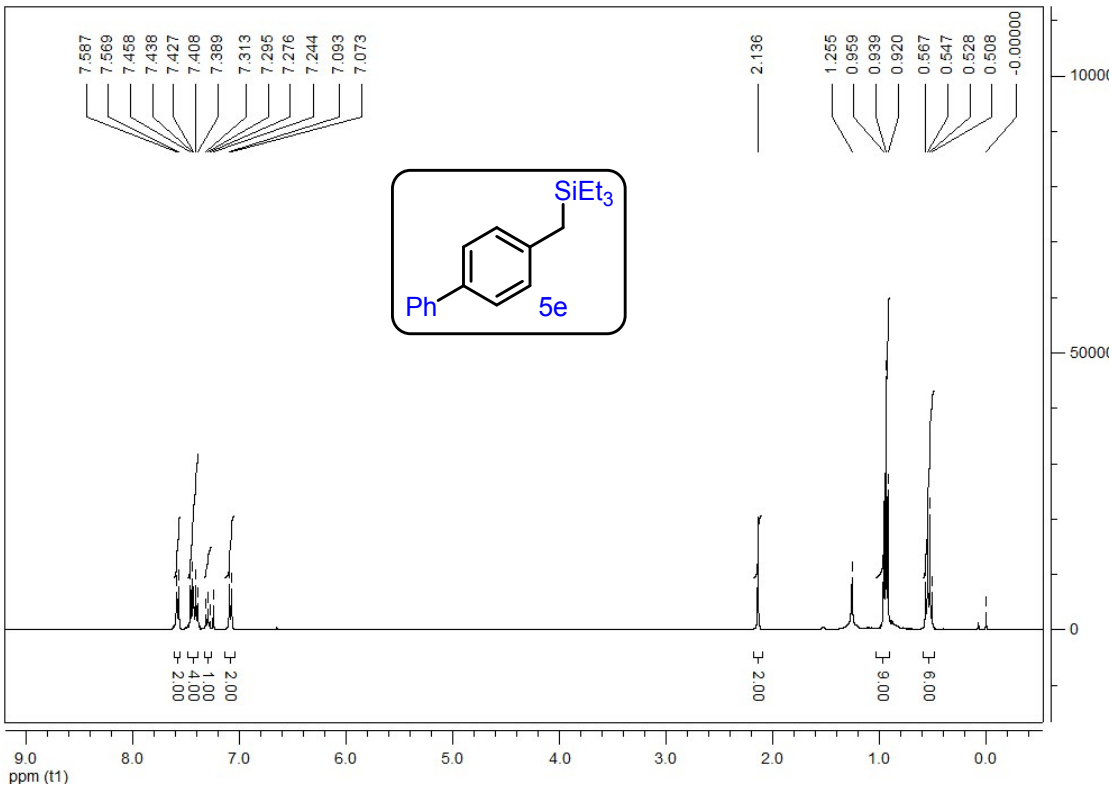
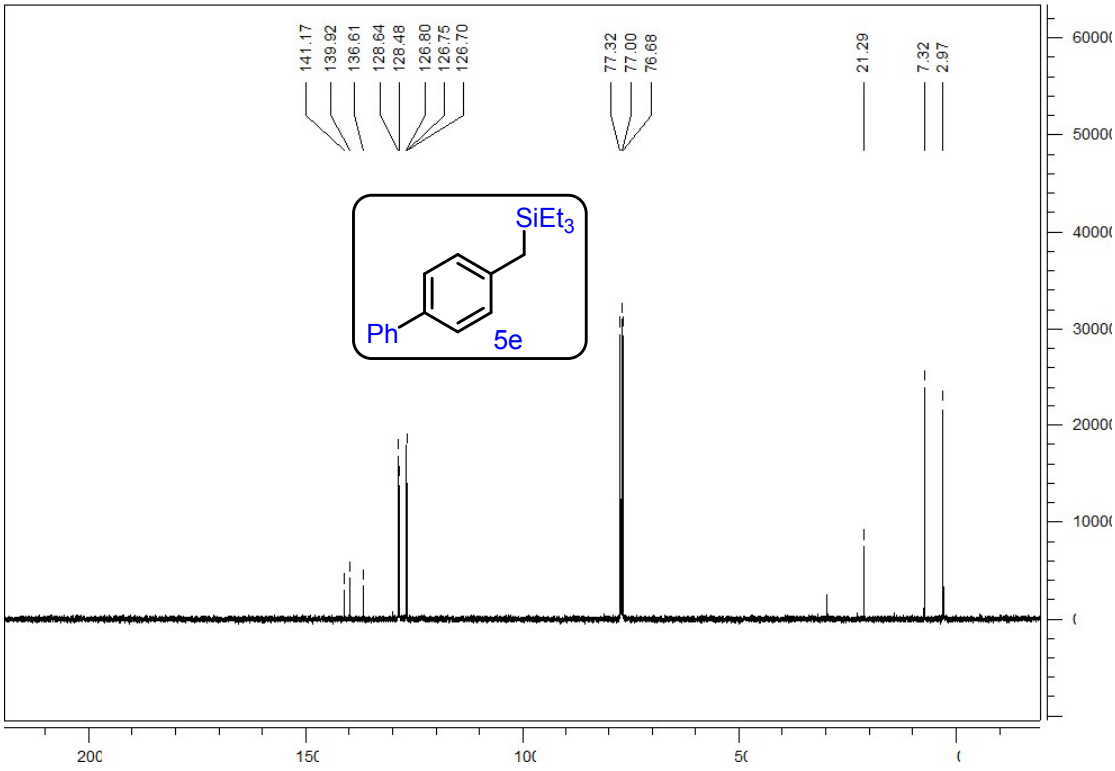
7.373
7.368
7.339
7.335
7.318
7.303
7.298
7.283
7.280
7.276
7.224
7.211
7.207
7.190
7.175
7.171
7.161
7.146
7.142
7.127
7.123
7.106
7.087
7.084
2.226
0.710
0.691
0.671
0.347
0.328
0.308
0.288
-0.00000
SiEt3
5c
5.00
4.00
2.00
9.00
6.00
ppm (t1)

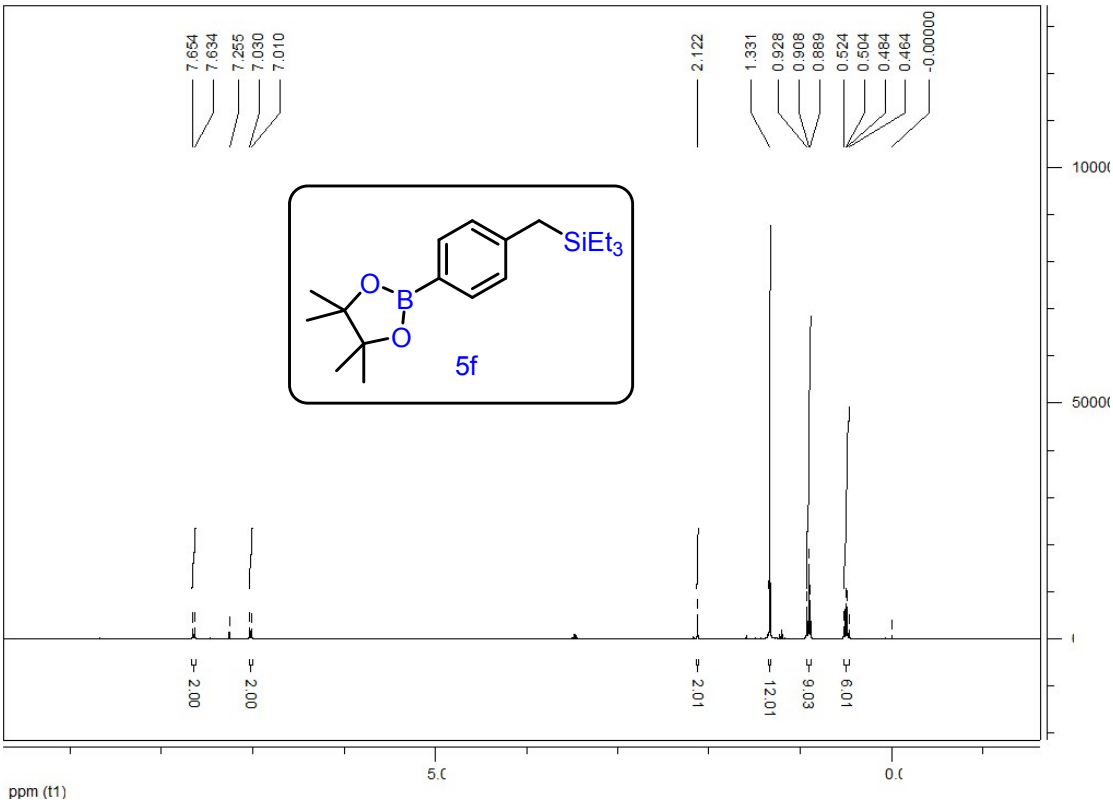

142.46
140.68
138.27
130.29
129.67
129.35
128.06
126.99
126.52
123.96
77.32
77.00
76.68
18.19
7.02
3.32
SiEt3
5c
ppm (t1)

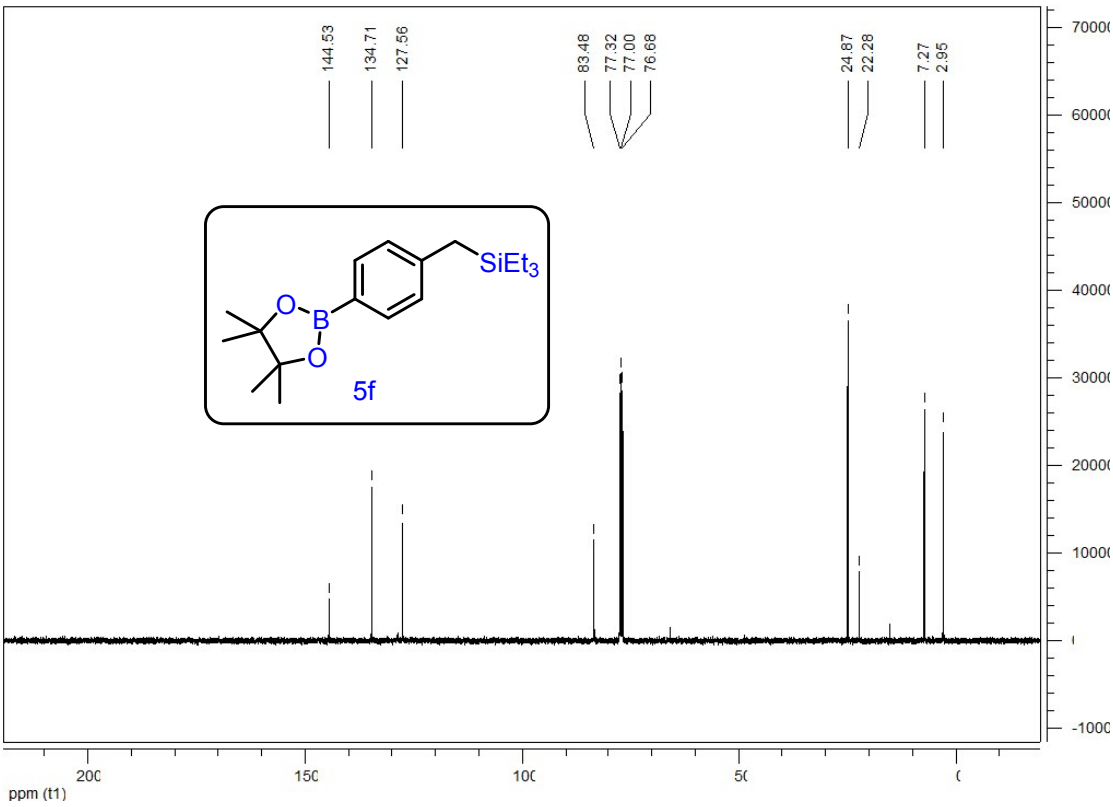

7.249
6.675
6.655
6.516
6.512
6.462
6.458
6.442
6.438
5.883
2.011
0.935
0.915
0.895
0.534
0.515
0.495
0.475
-0.00000
SiEt3
5d
ppm (t1)

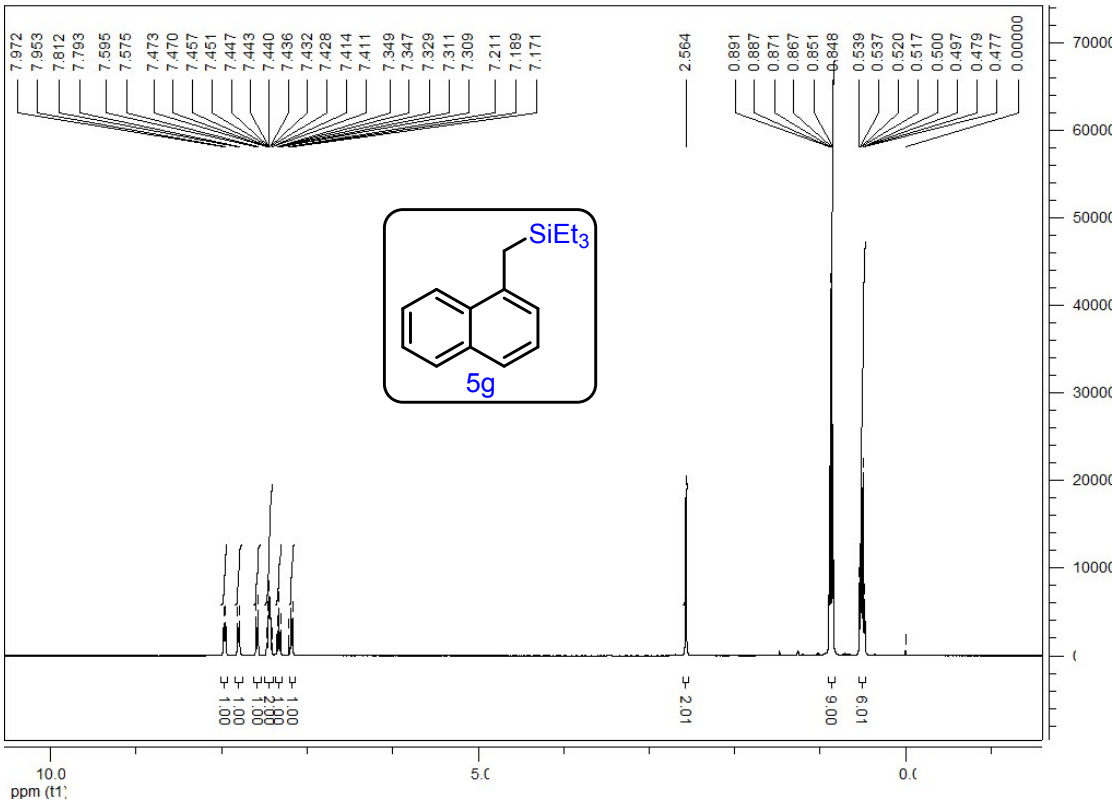

147.37
144.13
134.24
120.36
108.67
108.05
100.50
77.32
77.00
76.68
21.11
7.28
2.92
SiEt3
5d
ppm (t1)

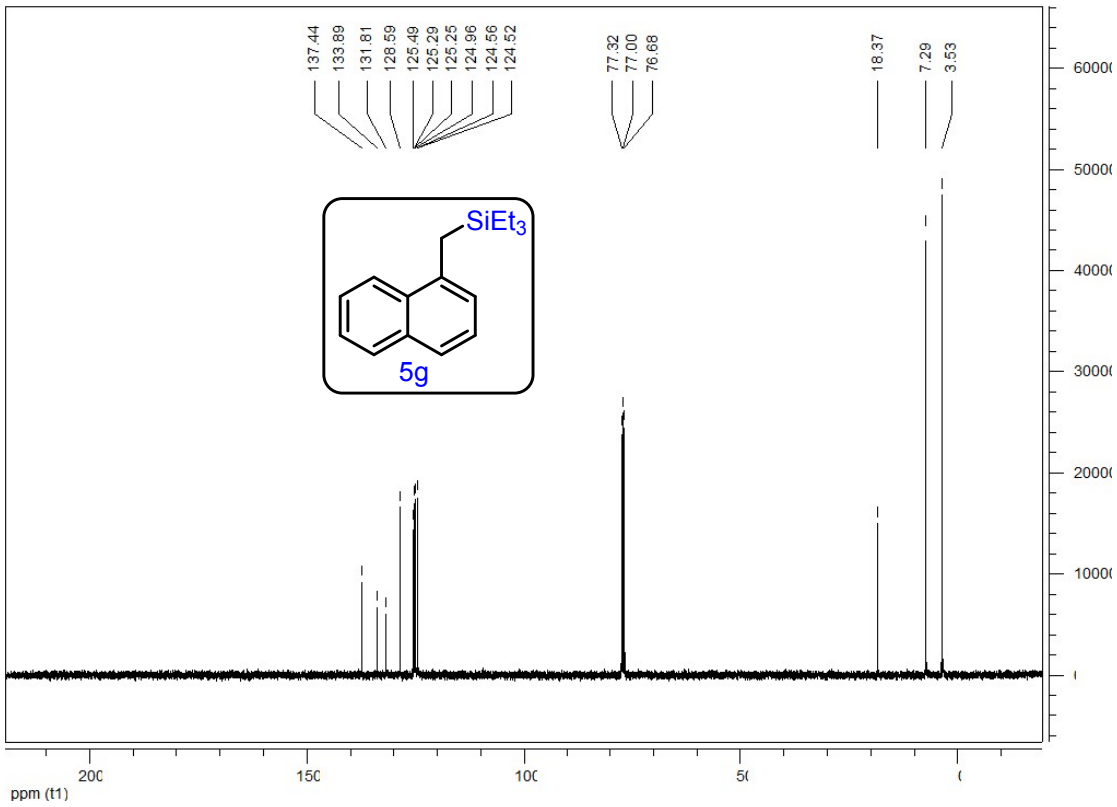

7.587
7.569
7.458
7.438
7.427
7.408
7.389
7.313
7.295
7.276
7.244
7.093
7.073
2.136
1.255
0.959
0.939
0.920
0.567
0.547
0.528
0.508
-0.00000
SiEt3
Ph
5e
2.00
4.00
1.00
2.00
2.00
9.00
6.00
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

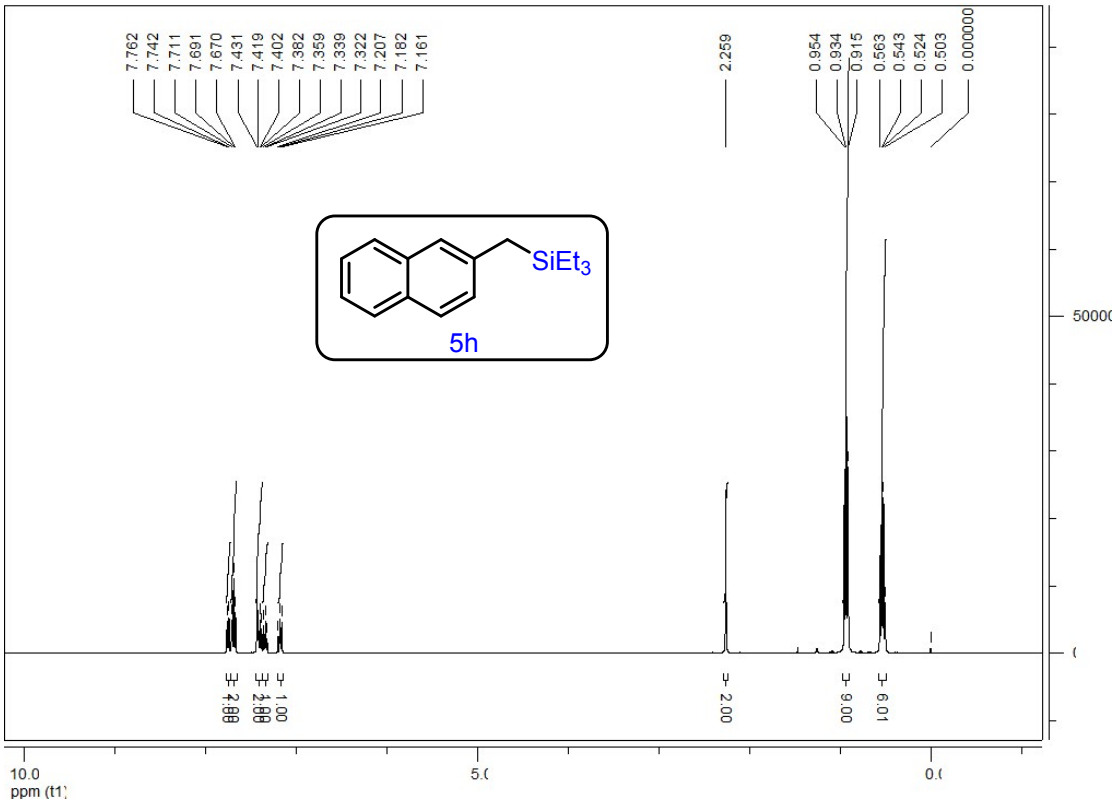

141.17
139.92
136.61
128.64
128.48
126.80
126.75
126.70
77.32
77.00
76.68
21.29
7.32
2.97
SiEt3
Ph
5e

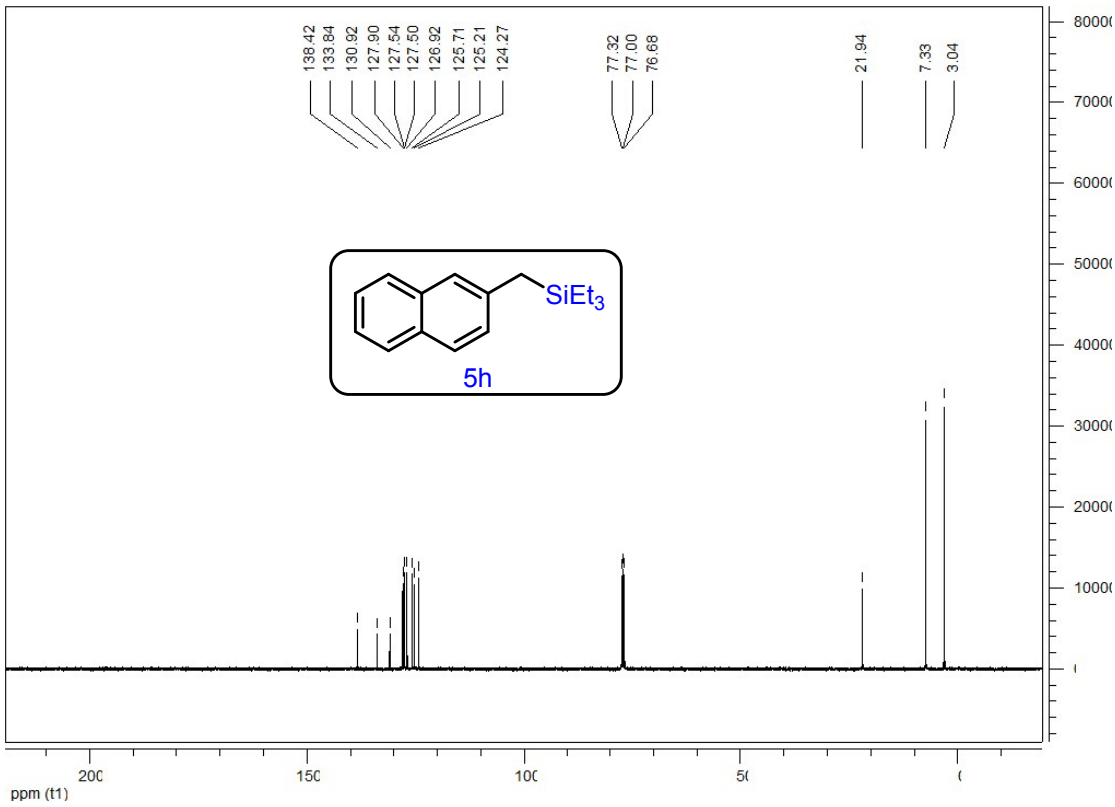

7.654
7.634
7.255
7.030
7.010
2.122
1.331
0.928
0.908
0.889
0.524
0.504
0.484
0.464
-0.00000
SiEt3
O
B
O
5f
2.00
2.00
2.01
12.01
9.03
6.01
ppm (t1)

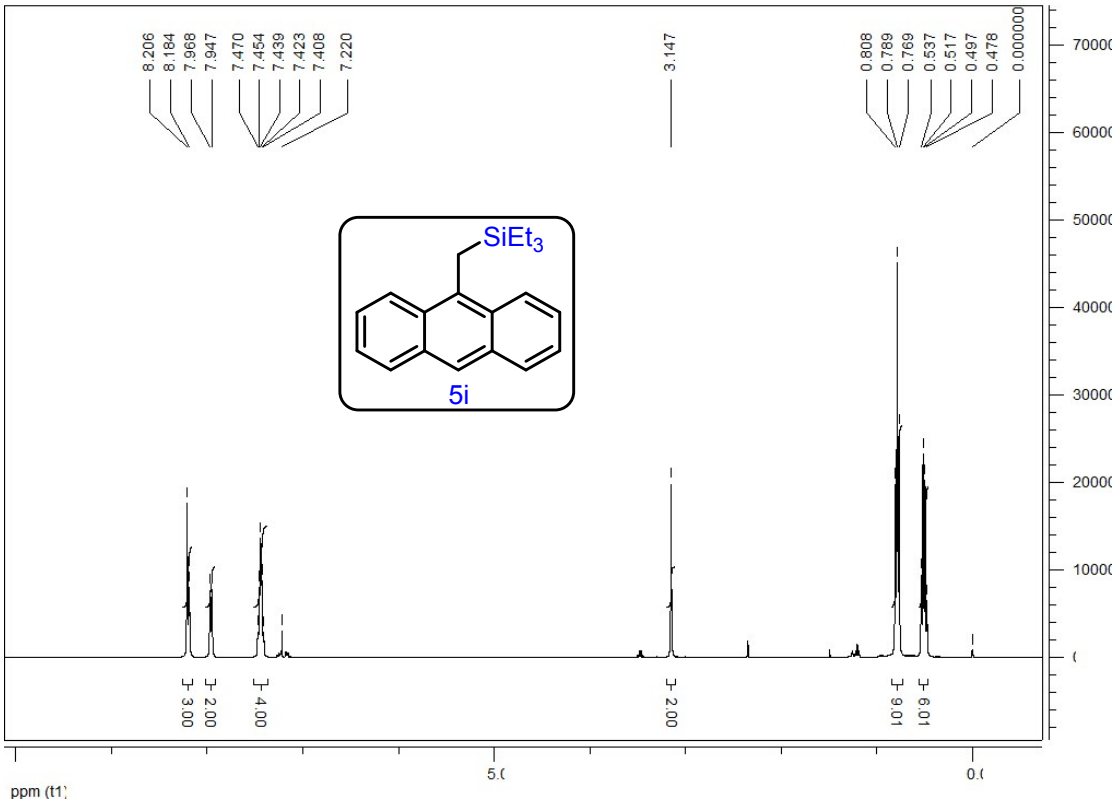

144.53
134.71
127.56
83.48
77.32
77.00
76.68
24.87
22.28
7.27
2.95
SiEt3
O
B
O
5f
ppm (t1)

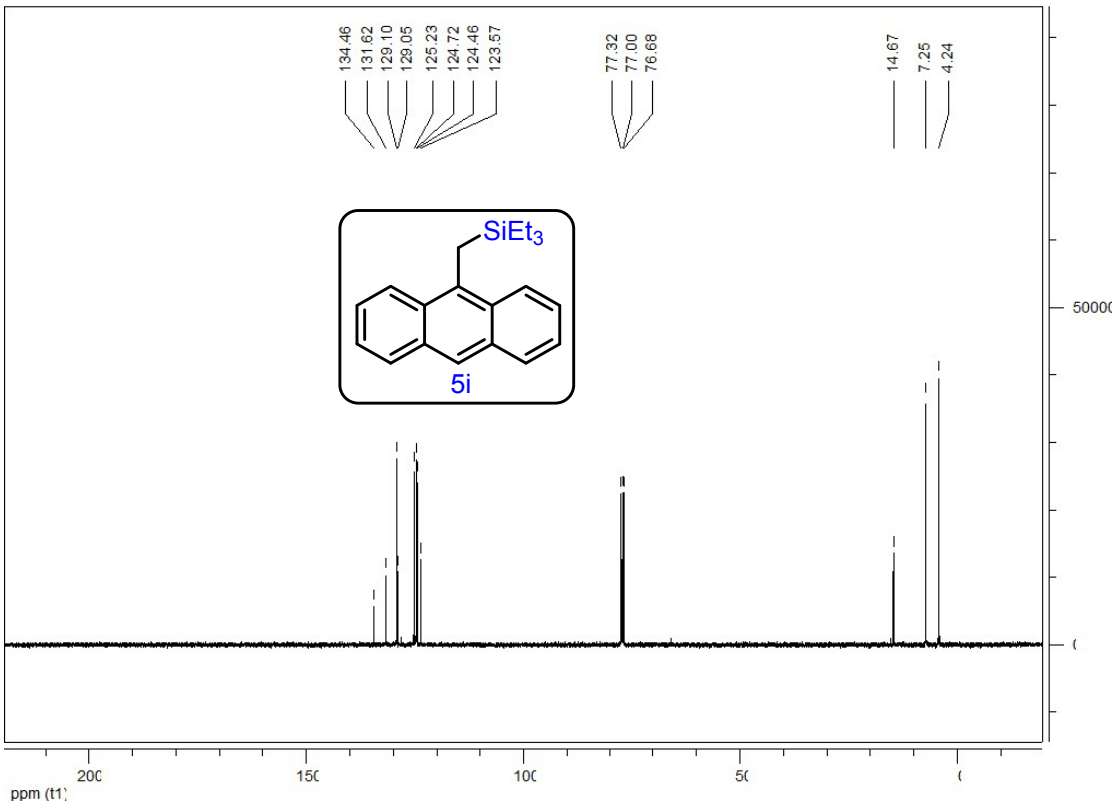

7.972
7.953
7.812
7.793
7.595
7.575
7.473
7.470
7.457
7.451
7.447
7.443
7.440
7.436
7.432
7.428
7.414
7.411
7.349
7.347
7.329
7.311
7.309
7.211
7.189
7.171
2.564
0.891
0.887
0.871
0.867
0.851
0.848
0.539
0.537
0.520
0.517
0.500
0.497
0.479
0.477
0.00000
SiEt3
5g
ppm (t1)

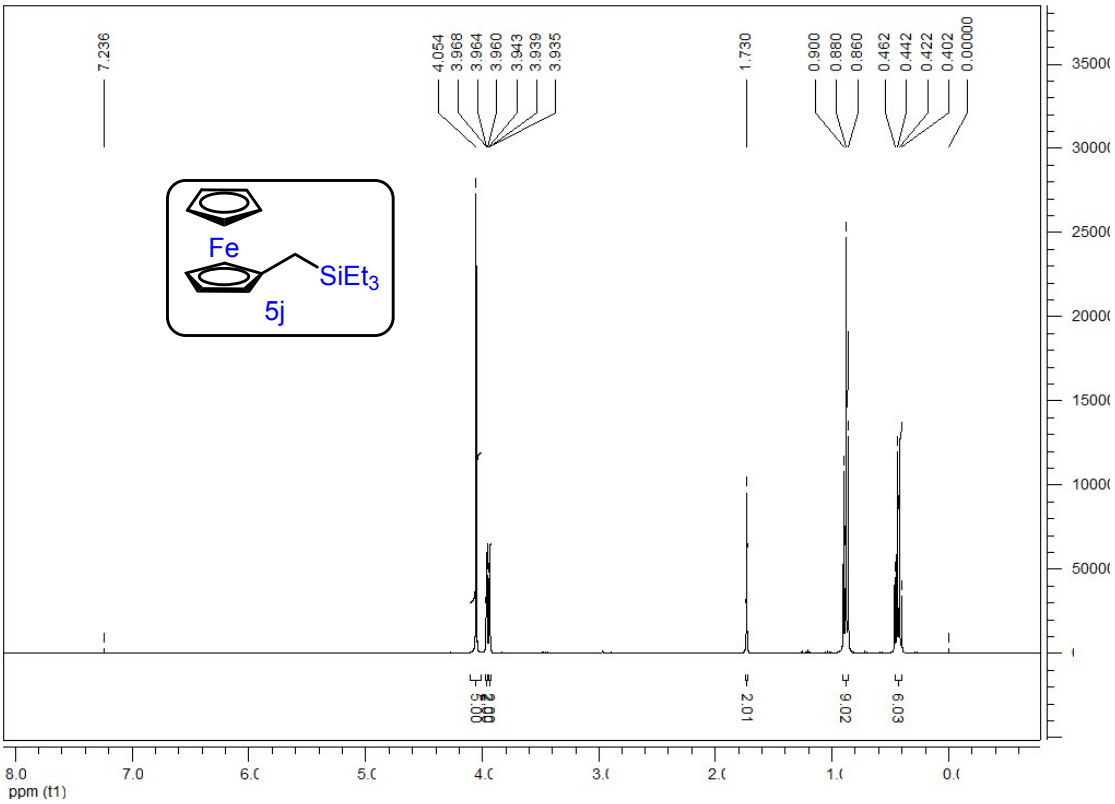

137.44
133.89
131.81
128.59
125.49
125.29
125.25
124.96
124.56
124.52
77.32
77.00
76.68
18.37
7.29
3.53
SiEt3
5g
ppm (t1)

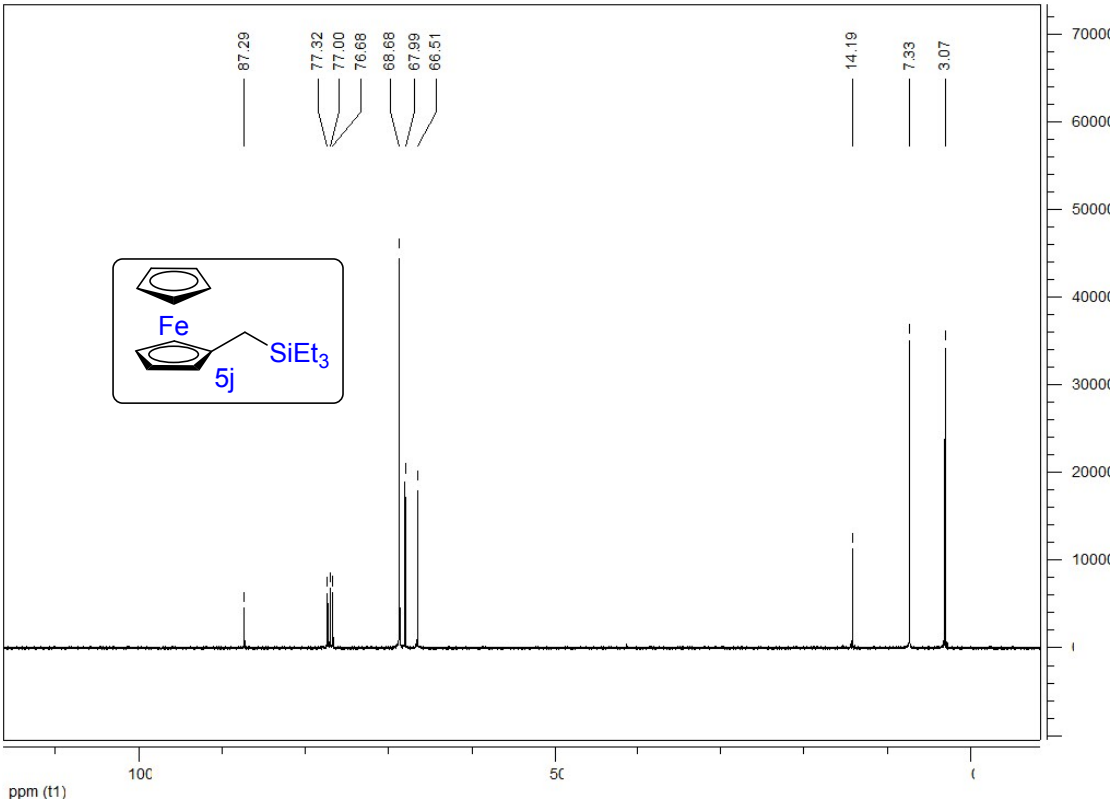

7.762
7.742
7.711
7.691
7.670
7.431
7.419
7.402
7.382
7.359
7.339
7.322
7.207
7.182
7.161
2.259
0.954
0.934
0.915
0.563
0.543
0.524
0.503
0.000000
SiEt3
5h
50000
2.00
9.00
6.01
10.0
ppm (t1)

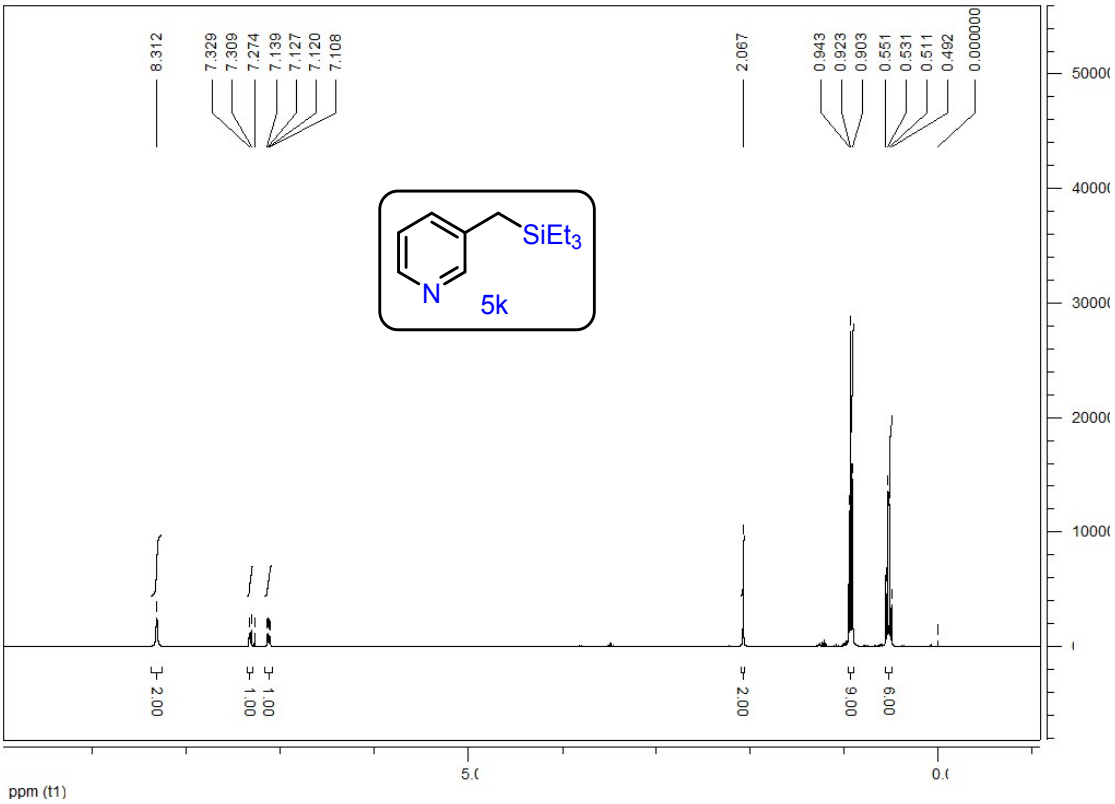

138.42
133.84
130.92
127.90
127.54
127.50
126.92
125.71
125.21
124.27
77.32
77.00
76.68
21.94
7.33
3.04
SiEt3
5h
80000
70000
60000
50000
40000
30000
20000
10000
200
150
100
50
ppm (t1)

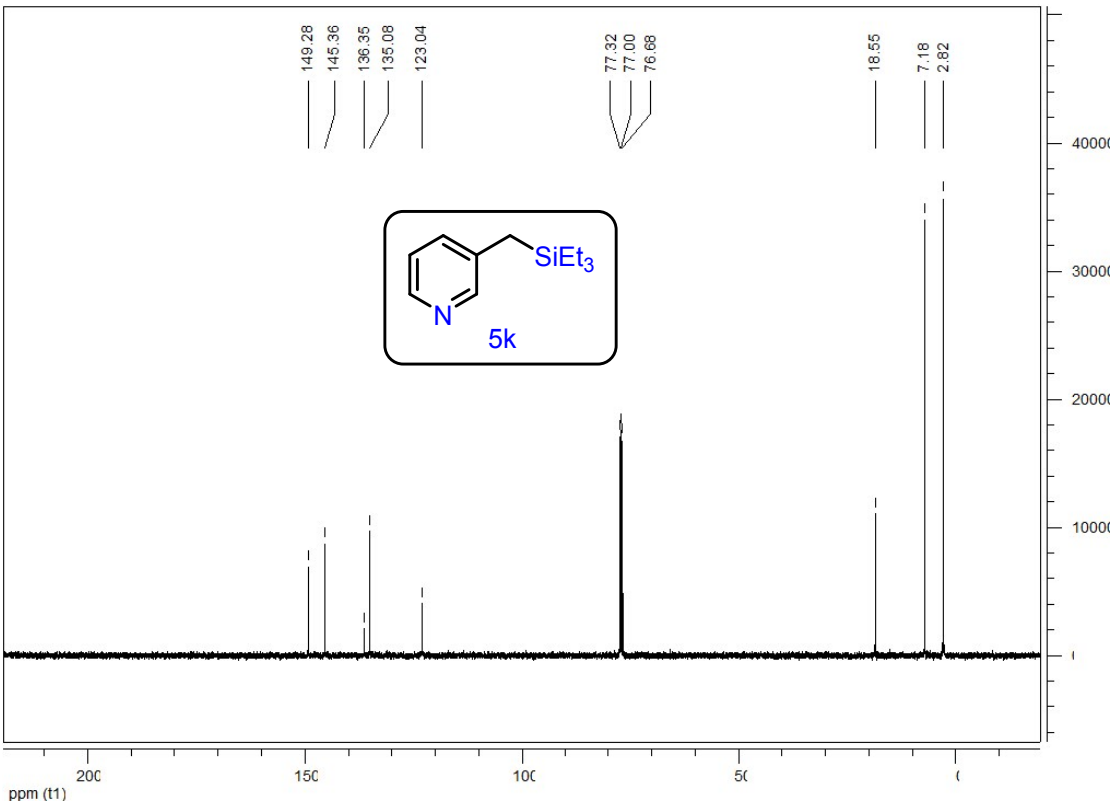

8.206
8.184
7.968
7.947
7.470
7.454
7.439
7.423
7.408
7.220
3.147
0.808
0.789
0.769
0.537
0.517
0.497
0.478
0.000000
SiEt3
5i
3.00
2.00
4.00
2.00
9.01
6.01
ppm (t1)

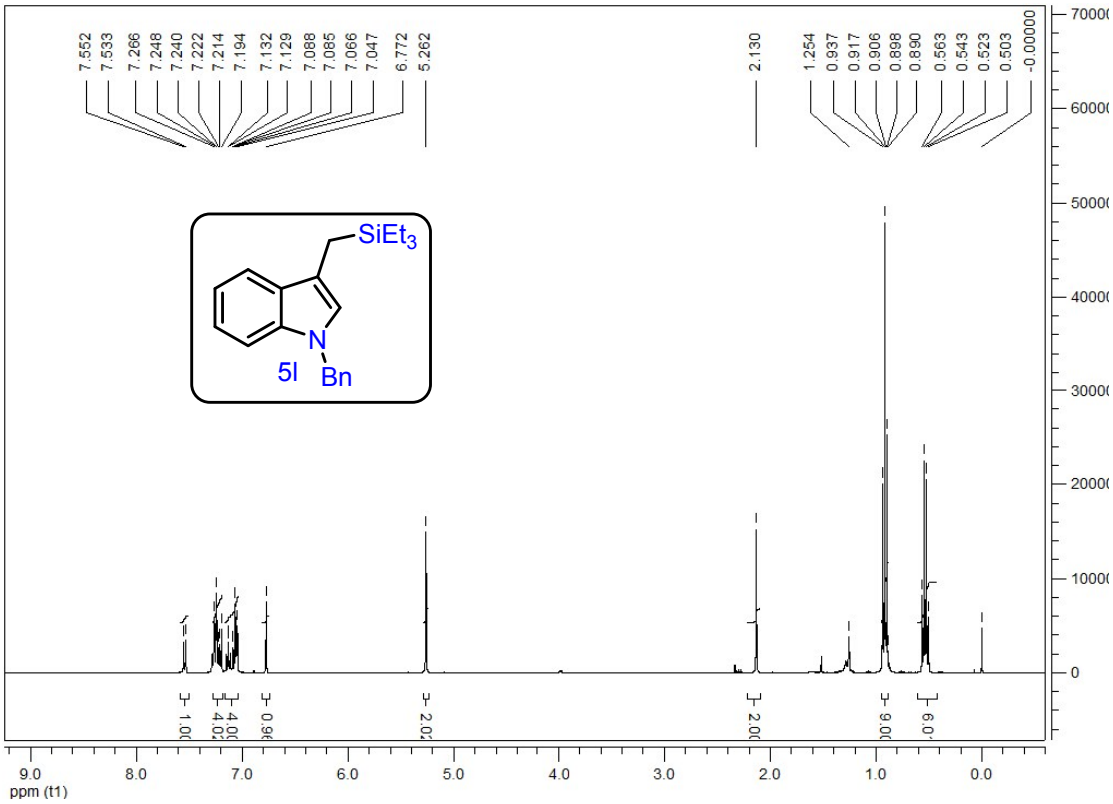

134.46
131.62
129.10
129.05
125.23
124.72
124.46
123.57
77.32
77.00
76.68
14.67
7.25
4.24
SiEt3
5i
ppm (t1)

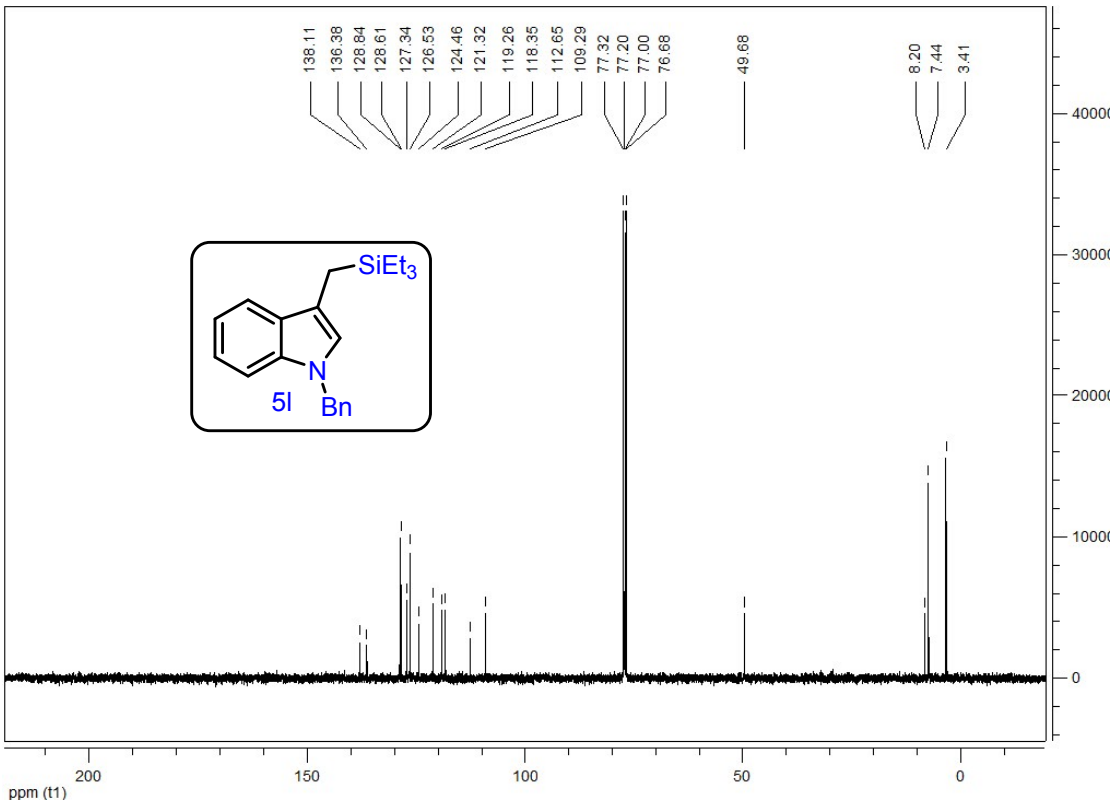

7.236
4.054
3.968
3.964
3.960
3.943
3.939
3.935
1.730
0.900
0.880
0.860
0.462
0.442
0.422
0.402
0.00000
Fe
SiEt3
5j
2.01
9.02
6.03
ppm (t1)

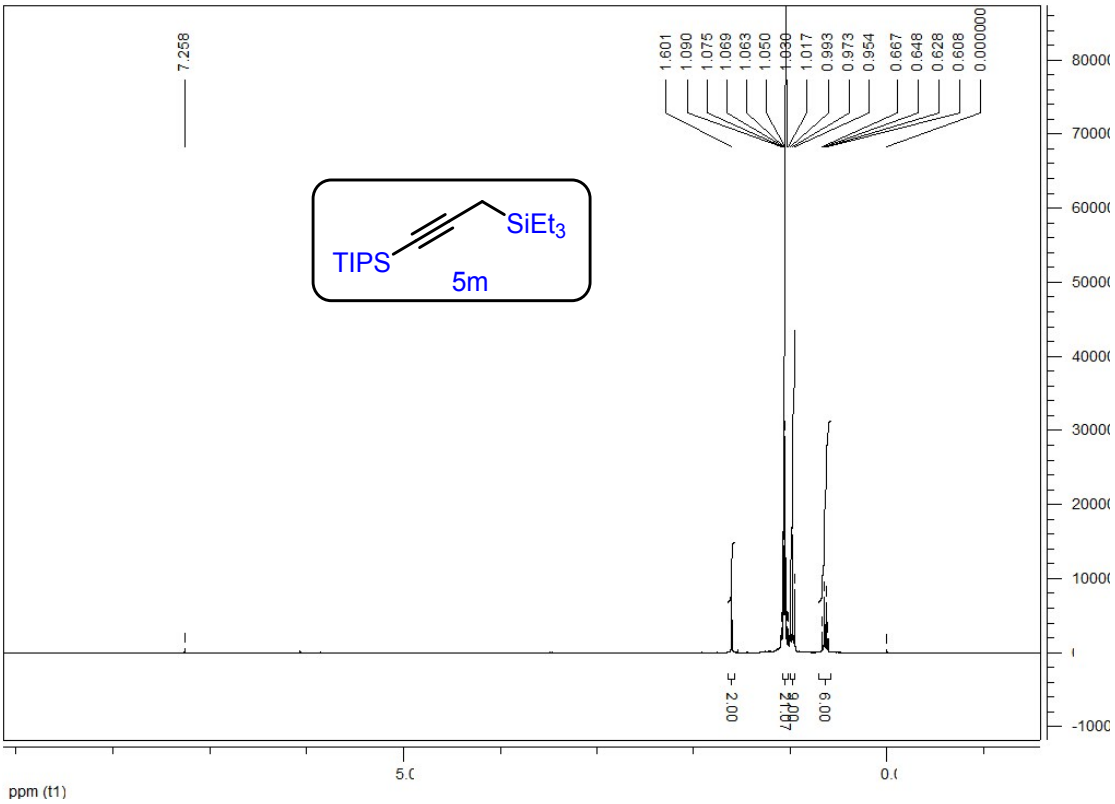

87.29
77.32
77.00
76.68
68.68
67.99
66.51
14.19
7.33
3.07
Fe
SiEt3
5j
ppm (t1)

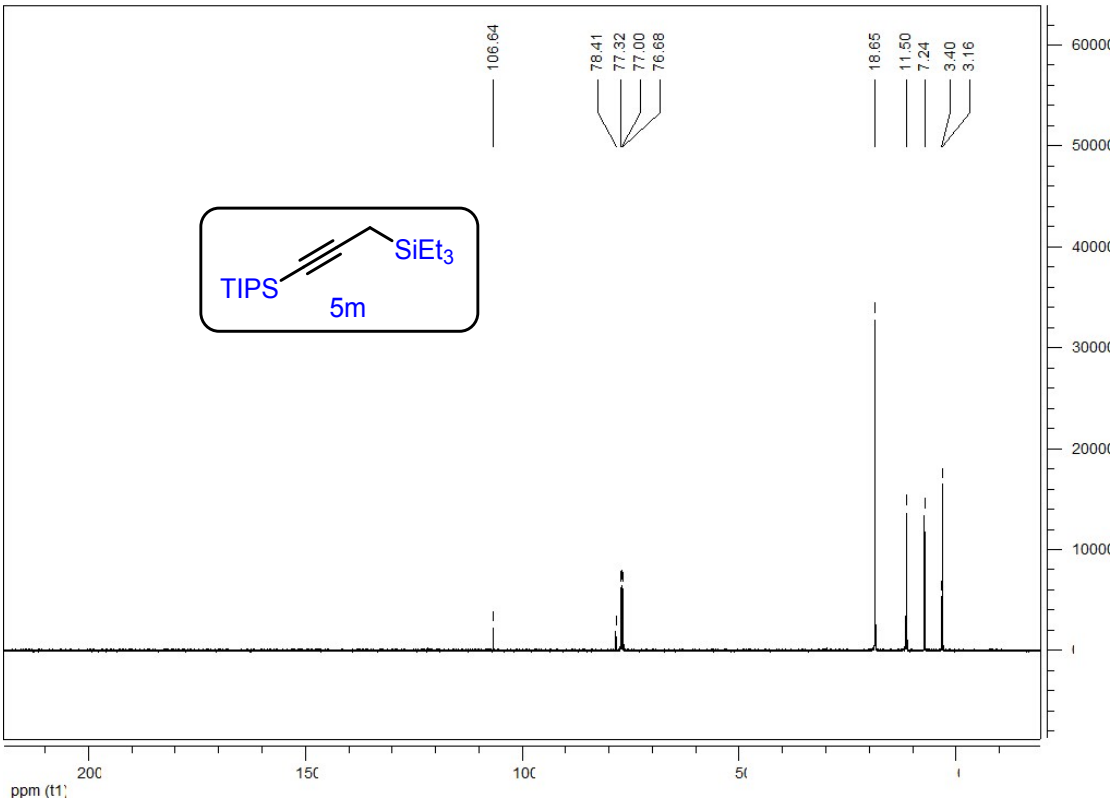

8.312
7.329
7.309
7.274
7.139
7.127
7.120
7.108
2.067
0.943
0.923
0.903
0.551
0.531
0.511
0.492
0.000000
SiEt3
N
5k
2.00
1.00
1.00
2.00
9.00
6.00
ppm (t1)

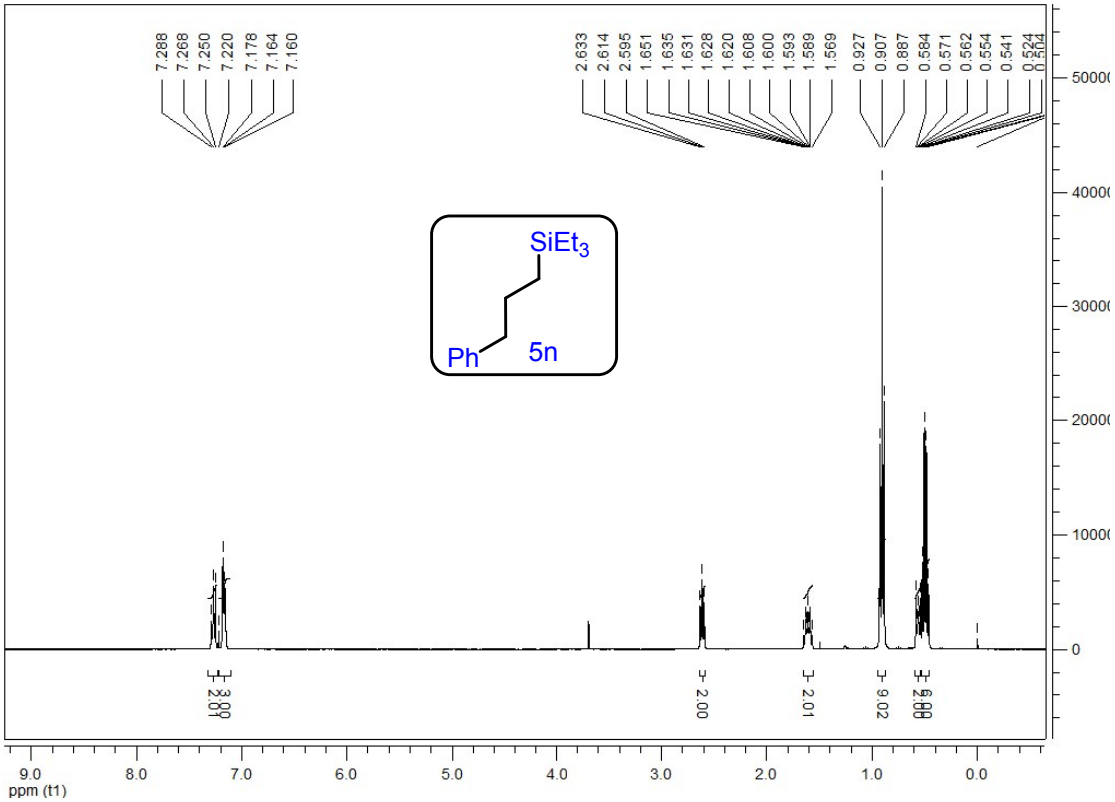

149.28
145.36
136.35
135.08
123.04
77.32
77.00
76.68
18.55
7.18
2.82
SiEt3
N
5k
ppm (t1)

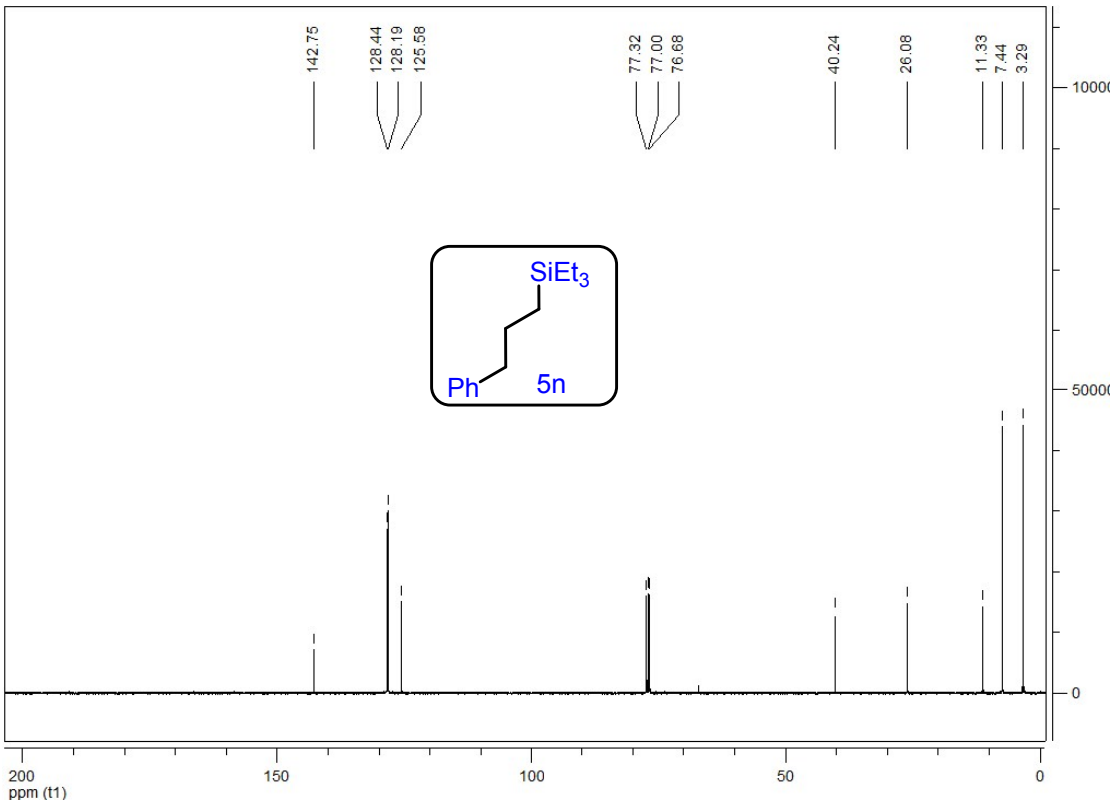

7.552
7.533
7.266
7.248
7.240
7.222
7.214
7.194
7.132
7.129
7.088
7.085
7.066
7.047
6.772
5.262
2.130
1.254
0.937
0.917
0.906
0.898
0.890
0.563
0.543
0.523
0.503
-0.00000
SiEt3
N
5l
Bn
ppm (t1)

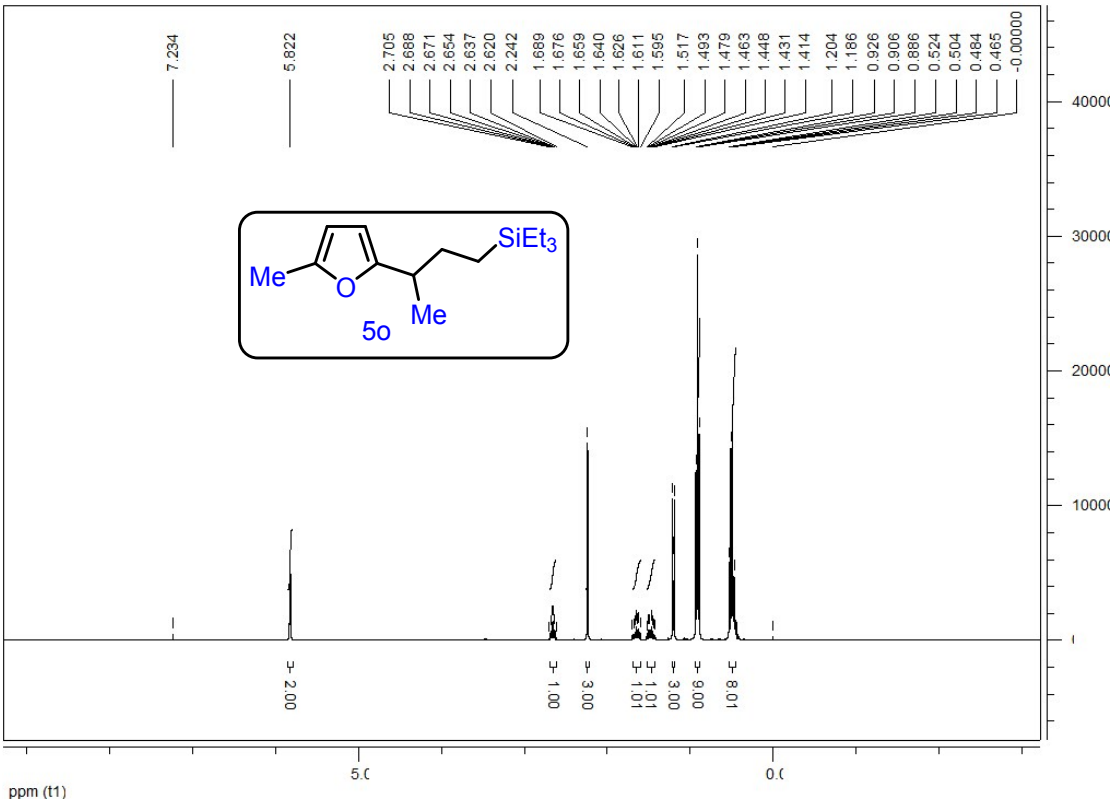

138.11
136.38
128.84
128.61
127.34
126.53
124.46
121.32
119.26
118.35
112.65
109.29
77.32
77.20
77.00
76.68
49.68
8.20
7.44
3.41
SiEt3
N
5l
Bn
ppm (t1)

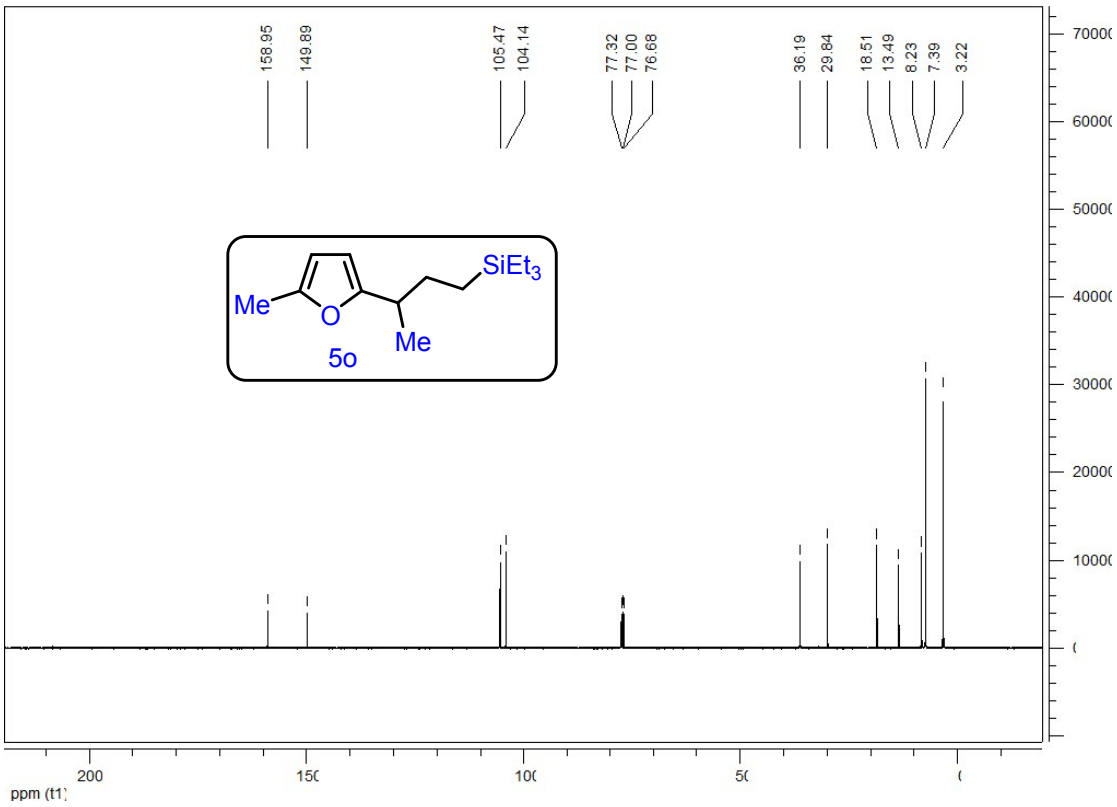

7.258
1.601
1.090
1.075
1.069
1.063
1.050
1.030
1.017
0.993
0.973
0.954
0.667
0.648
0.628
0.608
0.000000
TIPS
SiEt3
5m
2.00
2.07
6.00
ppm (t1)

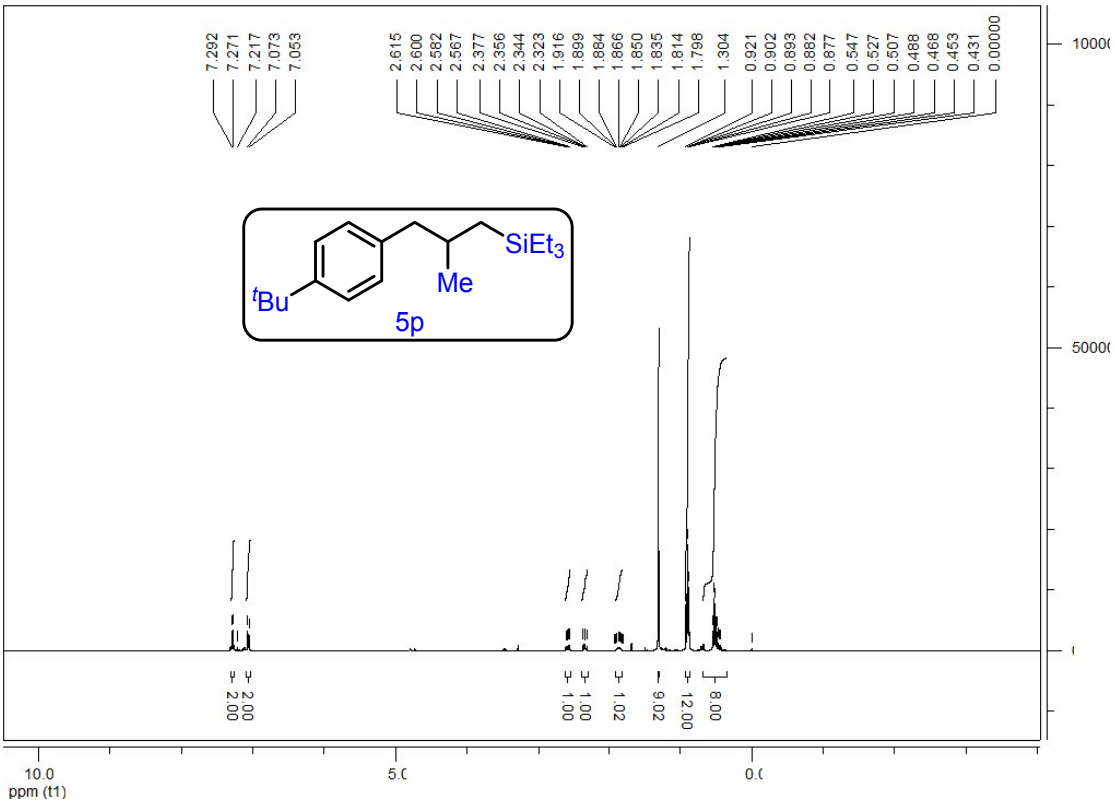

106.64
78.41
77.32
77.00
76.68
18.65
11.50
7.24
3.40
3.16
TIPS
SiEt3
5m
ppm (t1)

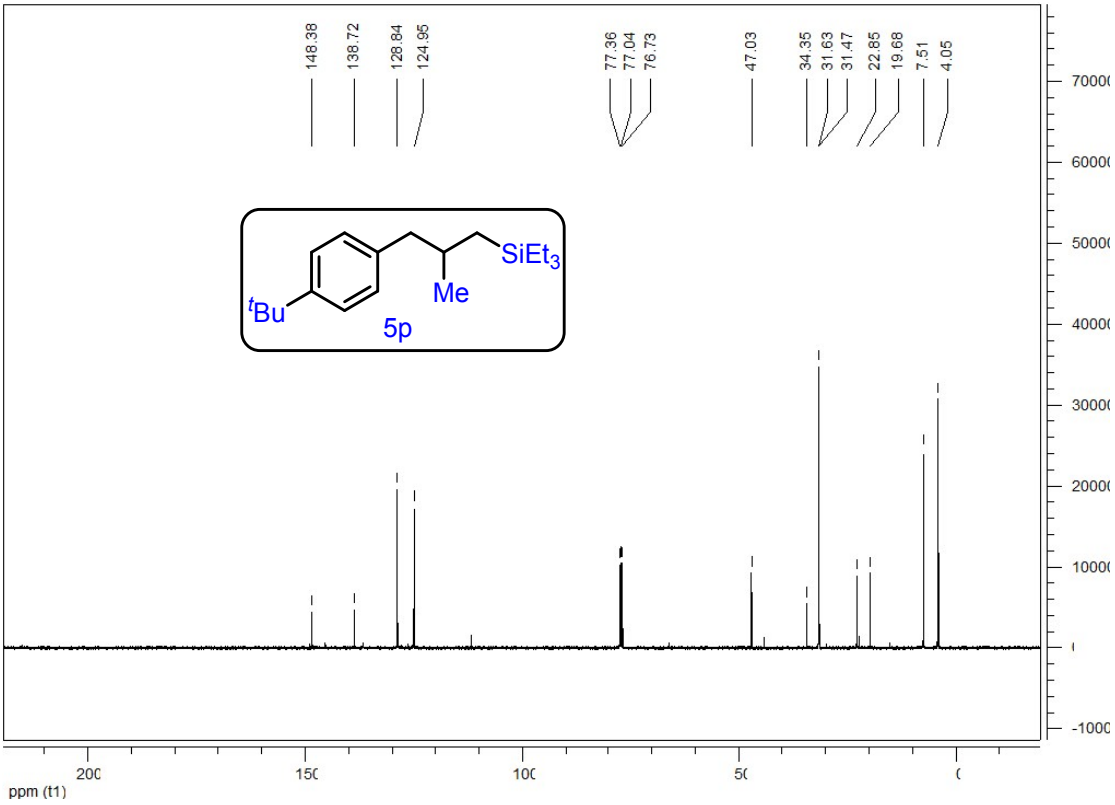

7.288
7.268
7.250
7.220
7.178
7.164
7.160
2.633
2.614
2.595
1.651
1.635
1.631
1.628
1.620
1.608
1.600
1.593
1.589
1.569
0.927
0.907
0.887
0.584
0.571
0.562
0.554
0.541
0.524
0.504
SiEt3
Ph
5n
3.09
2.00
2.01
9.02
6.00
ppm (t1)

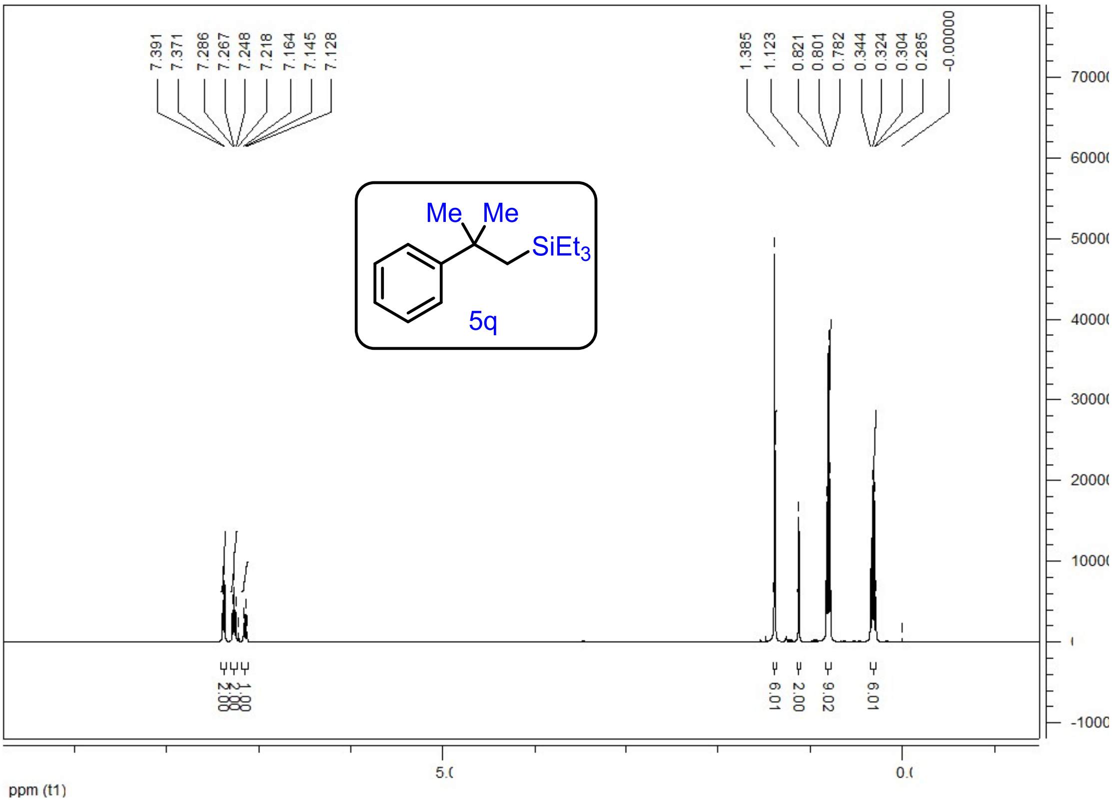

142.75
128.44
128.19
125.58
77.32
77.00
76.68
40.24
26.08
11.33
7.44
3.29
SiEt3
Ph
5n
ppm (t1)

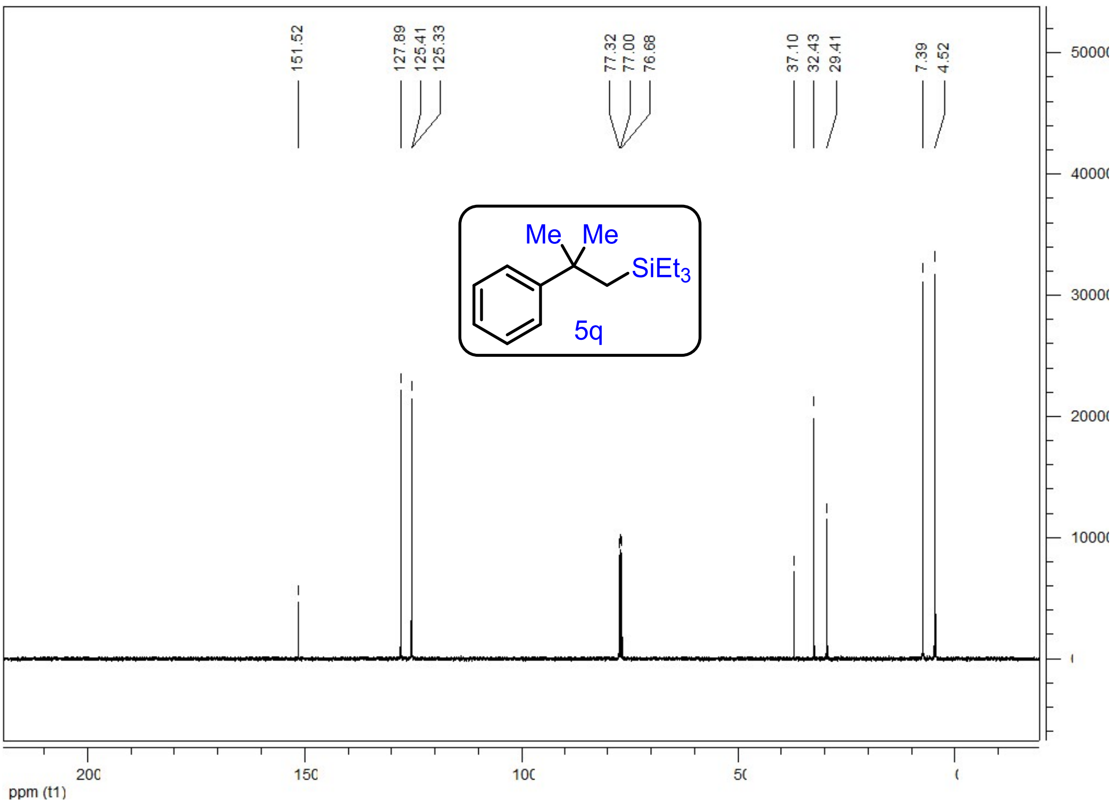

7.234
5.822
2.705
2.688
2.671
2.654
2.637
2.620
2.242
1.689
1.676
1.659
1.640
1.626
1.611
1.595
1.517
1.493
1.479
1.463
1.448
1.431
1.414
1.204
1.186
0.926
0.906
0.886
0.524
0.504
0.484
0.465
-0.00000
Me
O
SiEt3
Me
5o
2.00
1.00
3.00
1.01
1.01
3.00
9.00
8.01
ppm (t1)

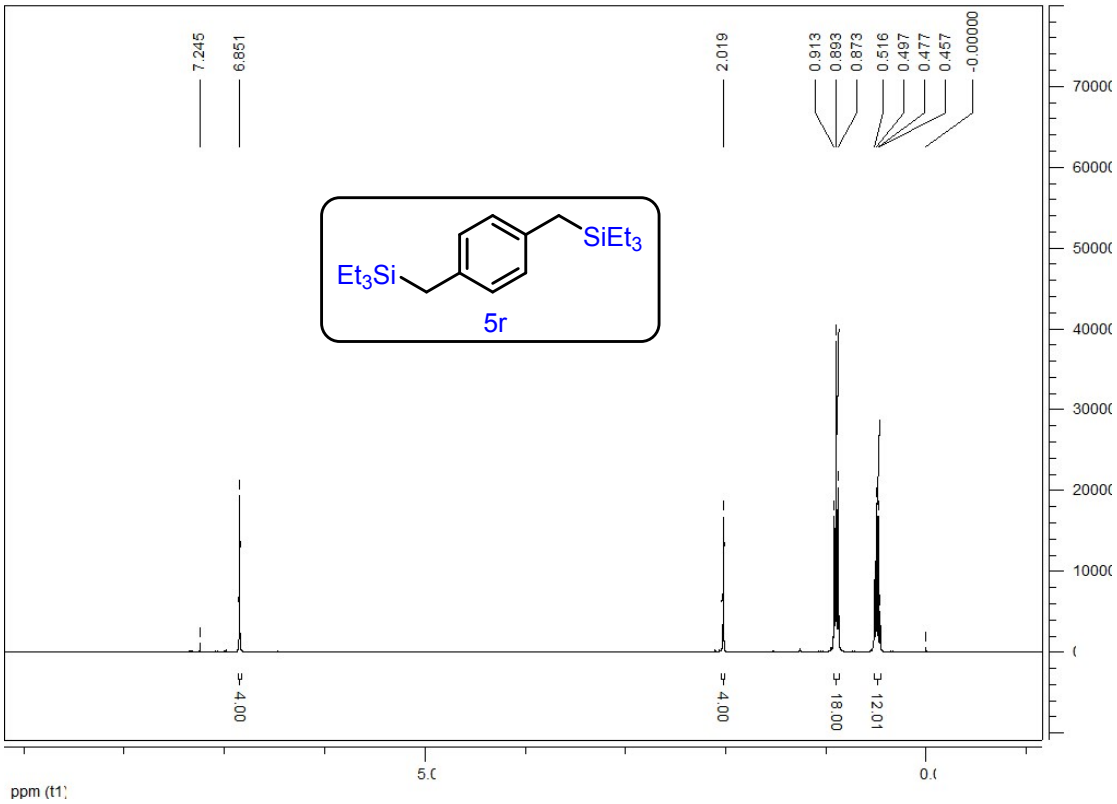

158.95
149.89
105.47
104.14
77.32
77.00
76.68
36.19
29.84
18.51
13.49
8.23
7.39
3.22
Me
O
SiEt3
Me
5o
ppm (t1)

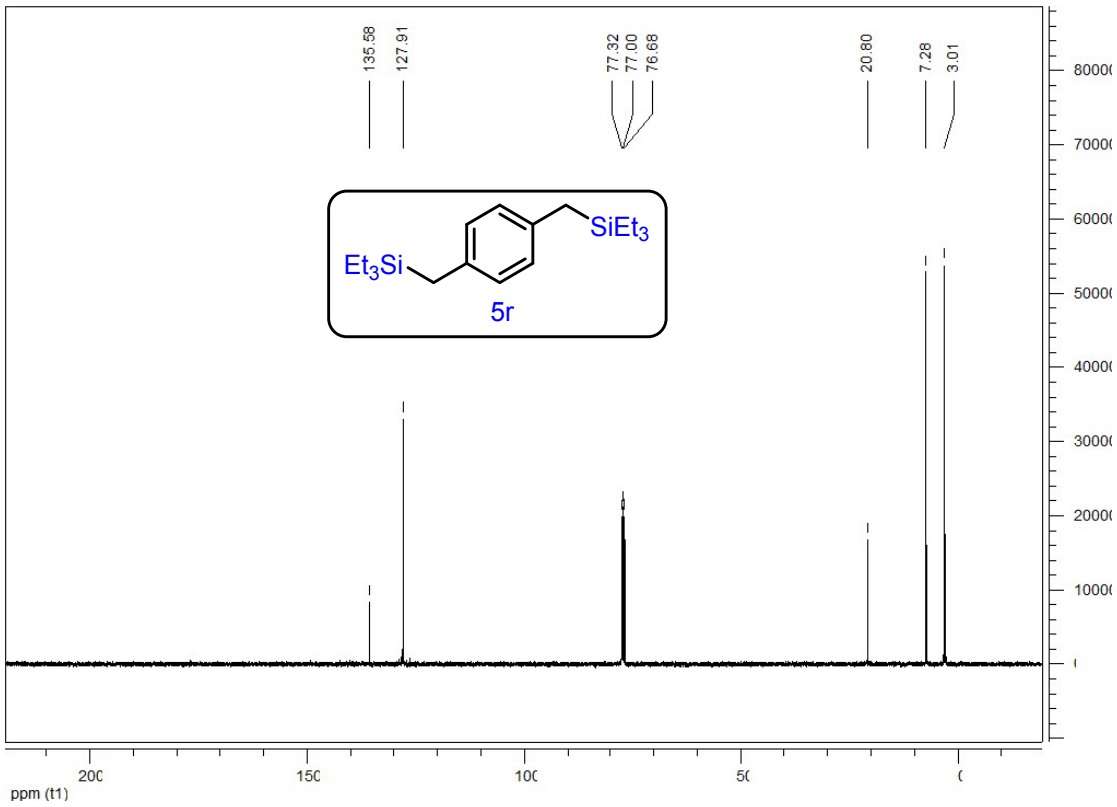

7.292
7.271
7.217
7.073
7.053
2.615
2.600
2.582
2.567
2.377
2.356
2.344
2.323
1.916
1.899
1.884
1.866
1.850
1.835
1.814
1.798
1.304
0.921
0.902
0.893
0.882
0.877
0.547
0.527
0.507
0.488
0.468
0.453
0.431
0.00000
SiEt3
Me
tBu
5p
2.00
2.00
1.00
1.00
1.02
9.02
12.00
8.00
10.0
ppm (t1)
5.0
0.0

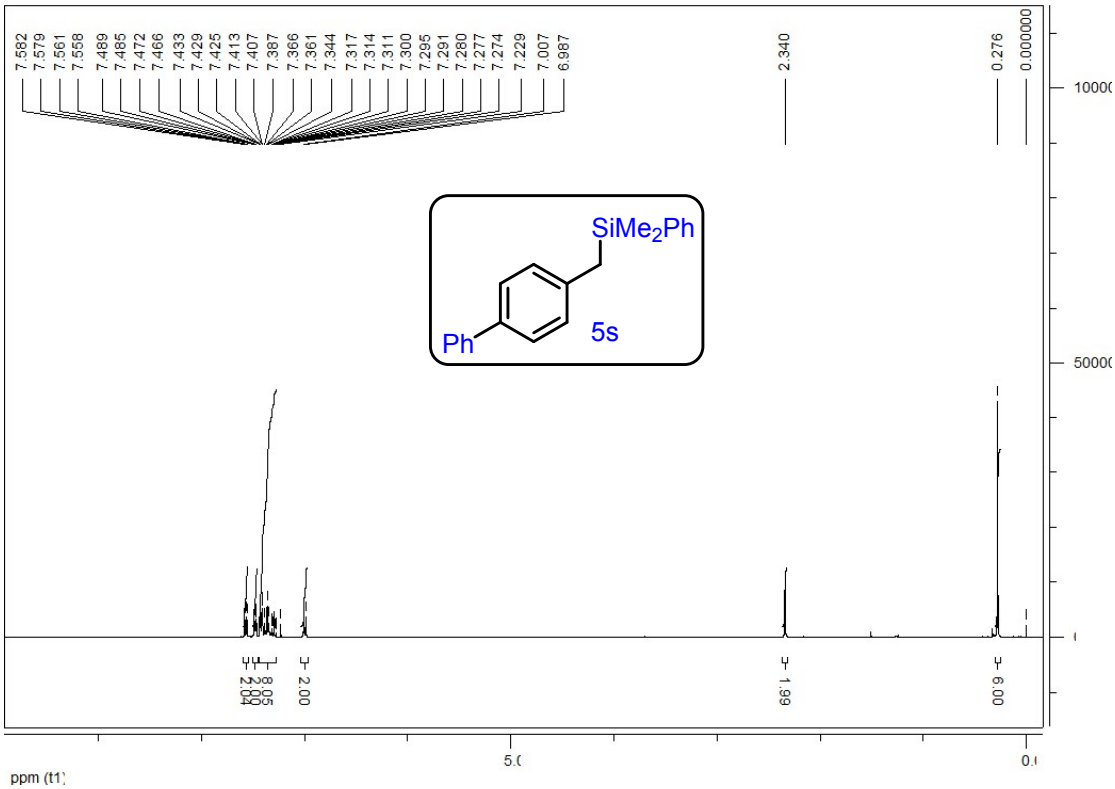

148.38
138.72
128.84
124.95
77.36
77.04
76.73
47.03
34.35
31.63
31.47
22.85
19.68
7.51
4.05
SiEt3
Me
tBu
5p
ppm (t1)

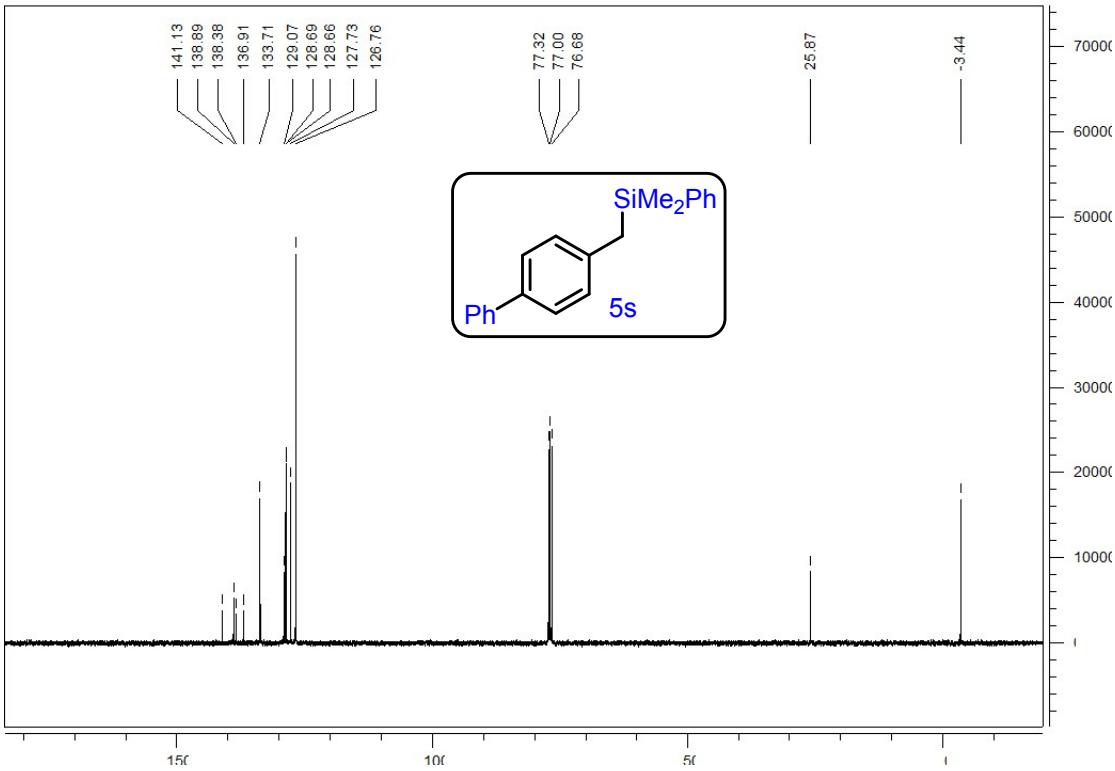

7.391
7.371
7.286
7.267
7.248
7.218
7.164
7.145
7.128
1.385
1.123
0.821
0.801
0.782
0.344
0.324
0.304
0.285
-0.000000
Me Me
SiEt3
5q
2.00
2.00
1.00
6.01
2.00
9.02
6.01
5.0
0.0
ppm (t1)

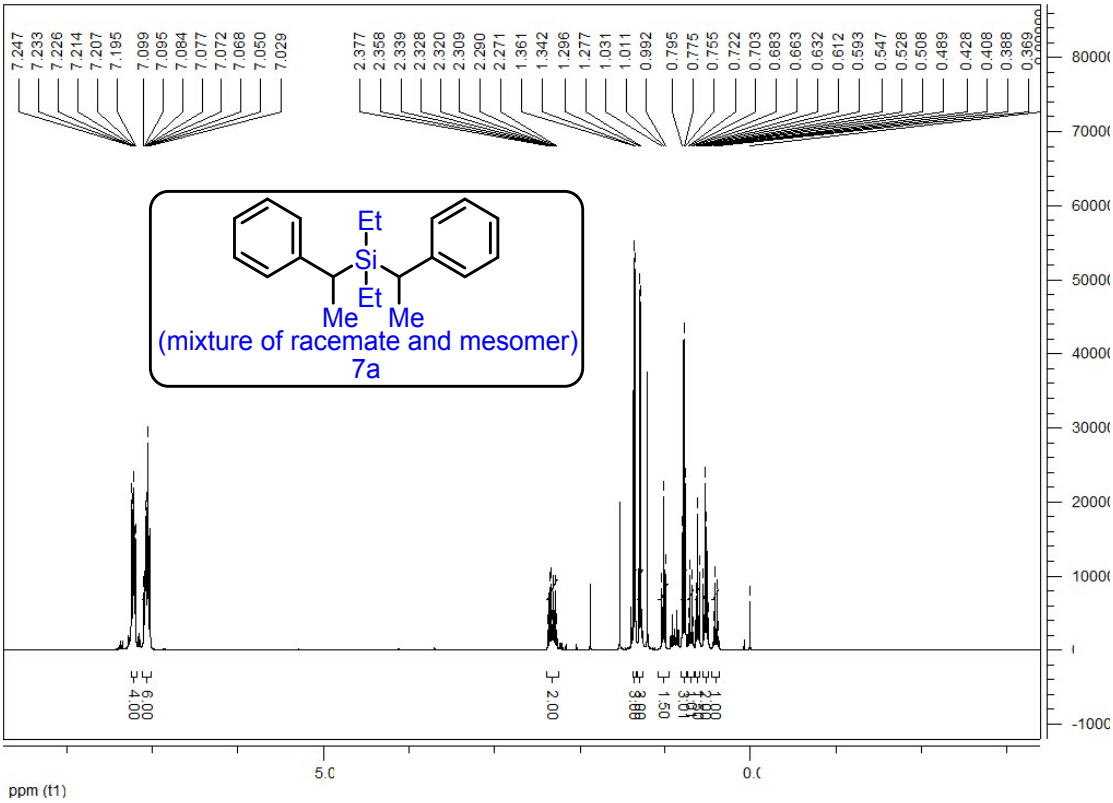

151.52
127.89
125.41
125.33
77.32
77.00
76.68
37.10
32.43
29.41
7.39
4.52
Me Me
SiEt3
5q
200
150
100
50
ppm (t1)

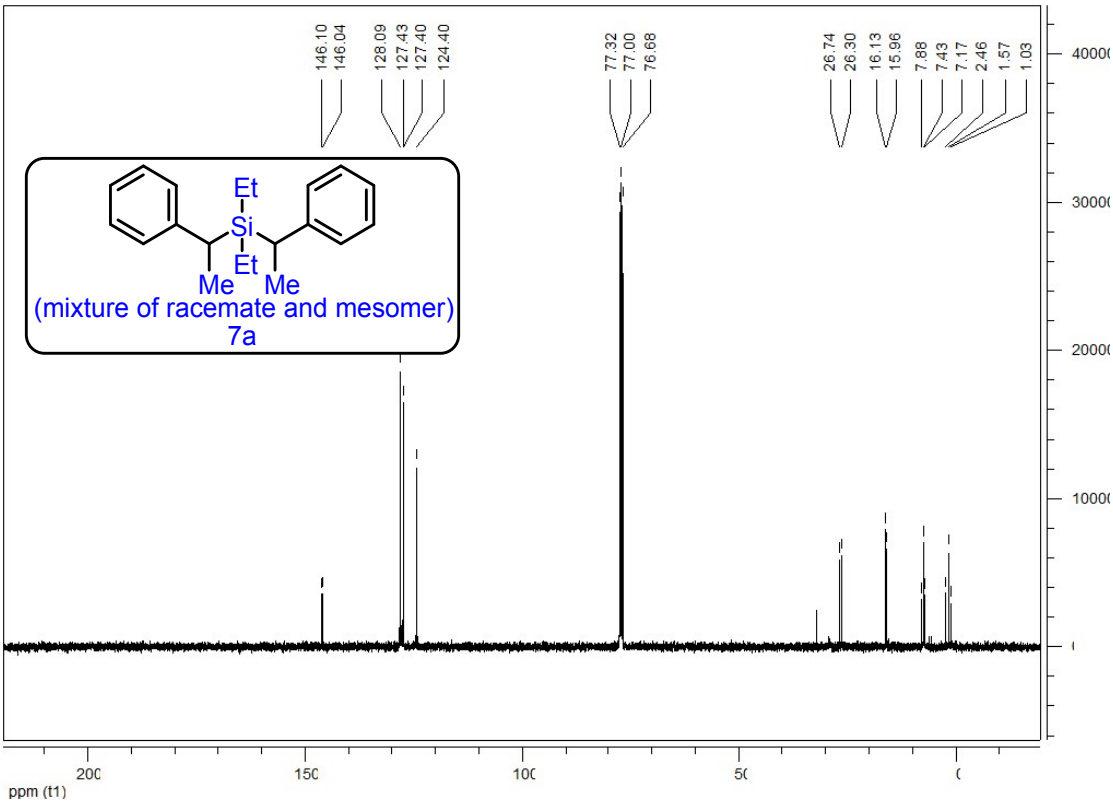

7.245
6.851
2.019
0.913
0.893
0.873
0.516
0.497
0.477
0.457
-0.00000
SiEt3
Et3Si
5r
4.00
4.00
18.00
12.01
ppm (t1)

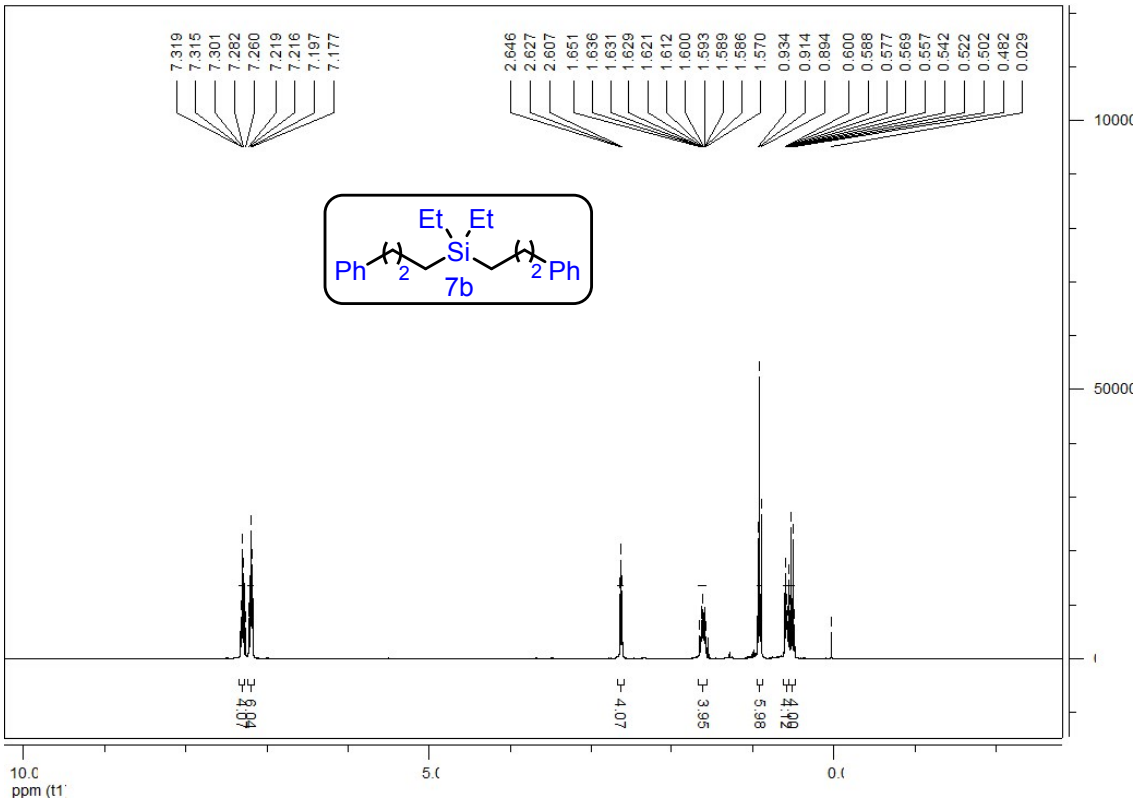

135.58
127.91
77.32
77.00
76.68
20.80
7.28
3.01
SiEt3
Et3Si
5r
ppm (t1)

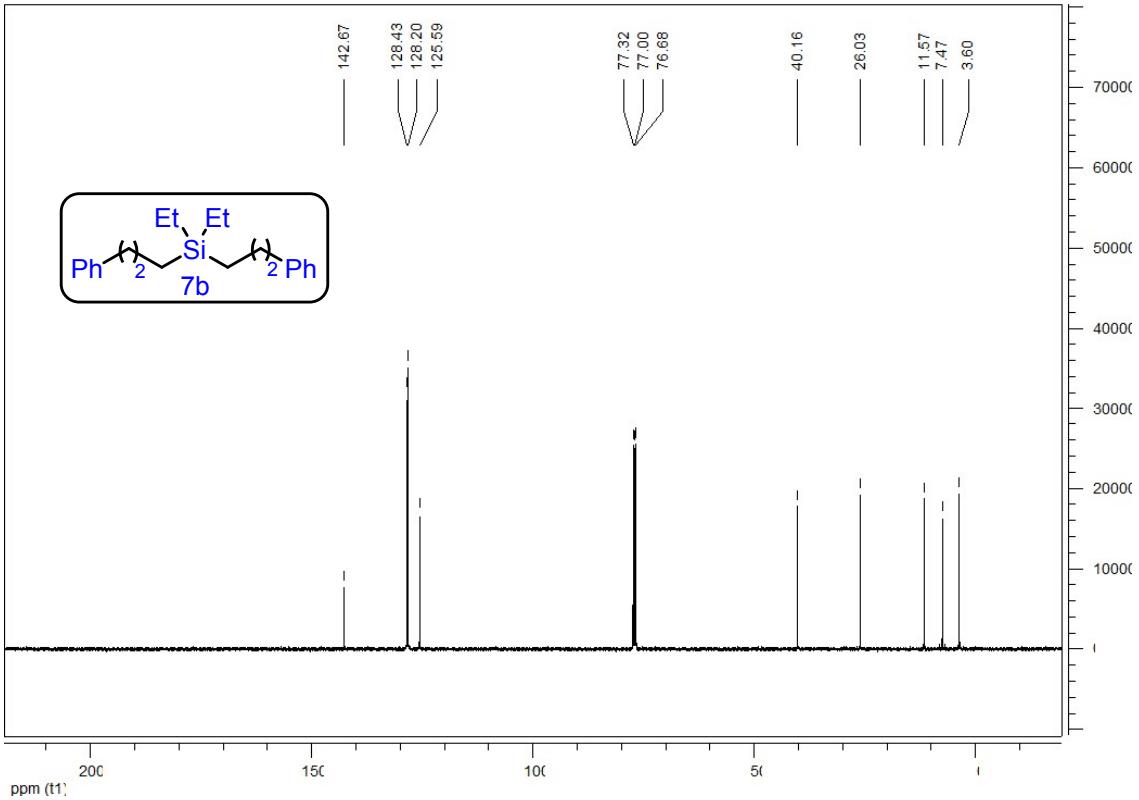

7.582
7.579
7.561
7.558
7.489
7.485
7.472
7.466
7.433
7.429
7.425
7.413
7.407
7.387
7.366
7.361
7.344
7.317
7.314
7.311
7.300
7.295
7.291
7.280
7.277
7.274
7.229
7.007
6.987
2.340
0.276
0.000000
SiMe2Ph
Ph
5s
2.00
1.99
6.00
ppm (t1)

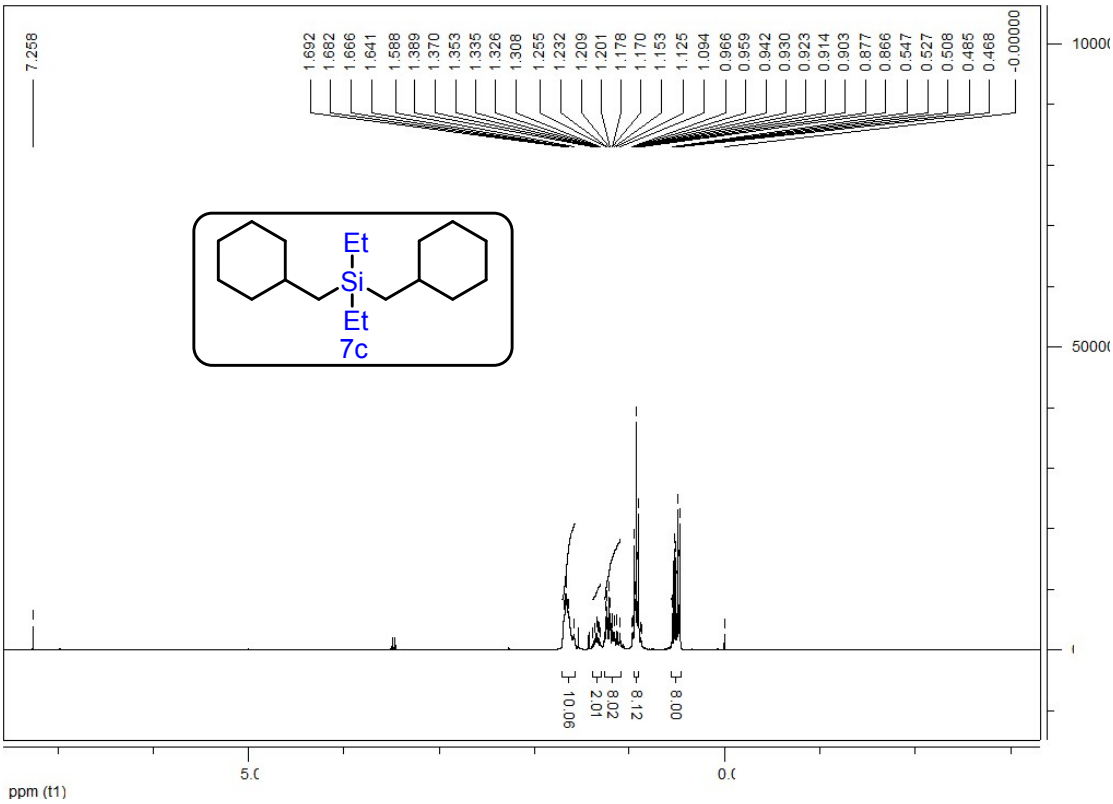

141.13
138.89
138.38
136.91
133.71
129.07
128.69
128.66
127.73
126.76
77.32
77.00
76.68
25.87
-3.44
SiMe2Ph
Ph
5s


Et
Si
Et
Me Me
(mixture of racemate and mesomer)
7a
ppm (t1)


Et
Si
Et
Me Me
(mixture of racemate and mesomer)
7a
ppm (t1)


7.319
7.315
7.301
7.282
7.260
7.219
7.216
7.197
7.177
2.646
2.627
2.607
1.651
1.636
1.631
1.629
1.621
1.612
1.600
1.593
1.589
1.586
1.570
0.934
0.914
0.894
0.600
0.588
0.577
0.569
0.557
0.542
0.522
0.502
0.482
0.029
Et Et
Ph 2 Si 2 Ph
7b
10000
50000
4.09
4.07
3.95
5.98
4.12
10.0
5.0
0.0
ppm (t1)


142.67
128.43
128.20
125.59
77.32
77.00
76.68
40.16
26.03
11.57
7.47
3.60
Et Et
Ph 2 Si 2 Ph
7b
70000
60000
50000
40000
30000
20000
10000
200
150
100
50
ppm (t1)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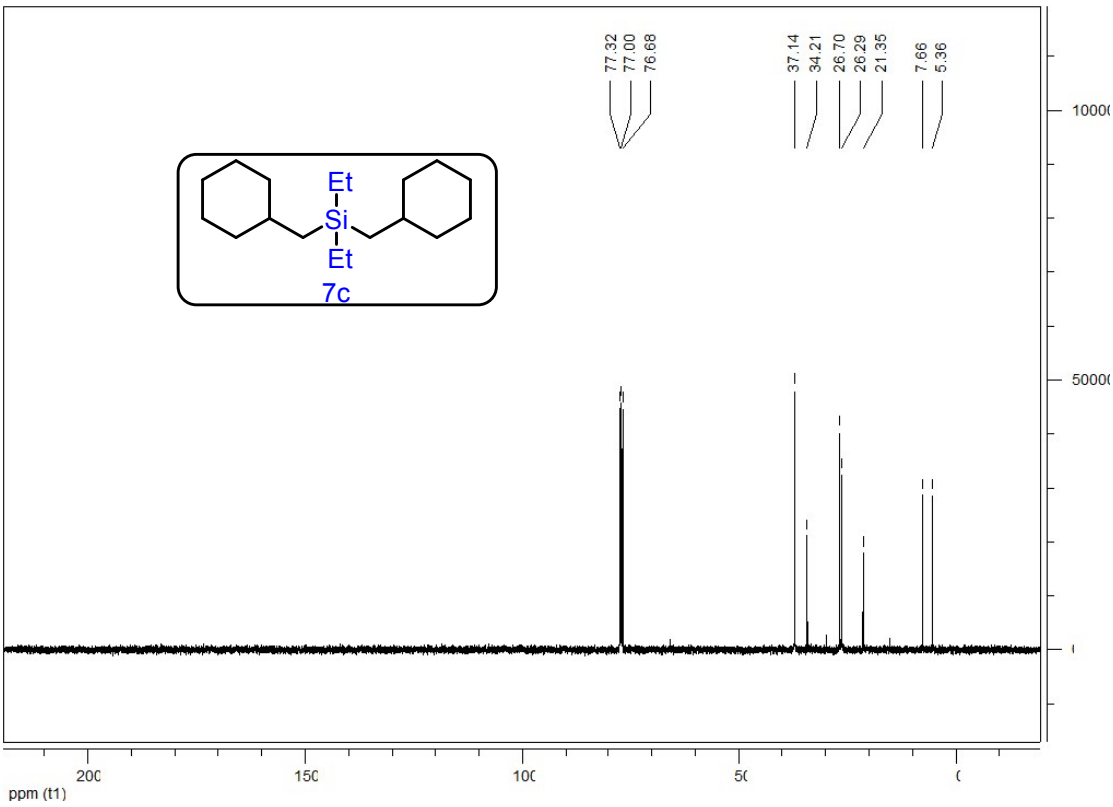
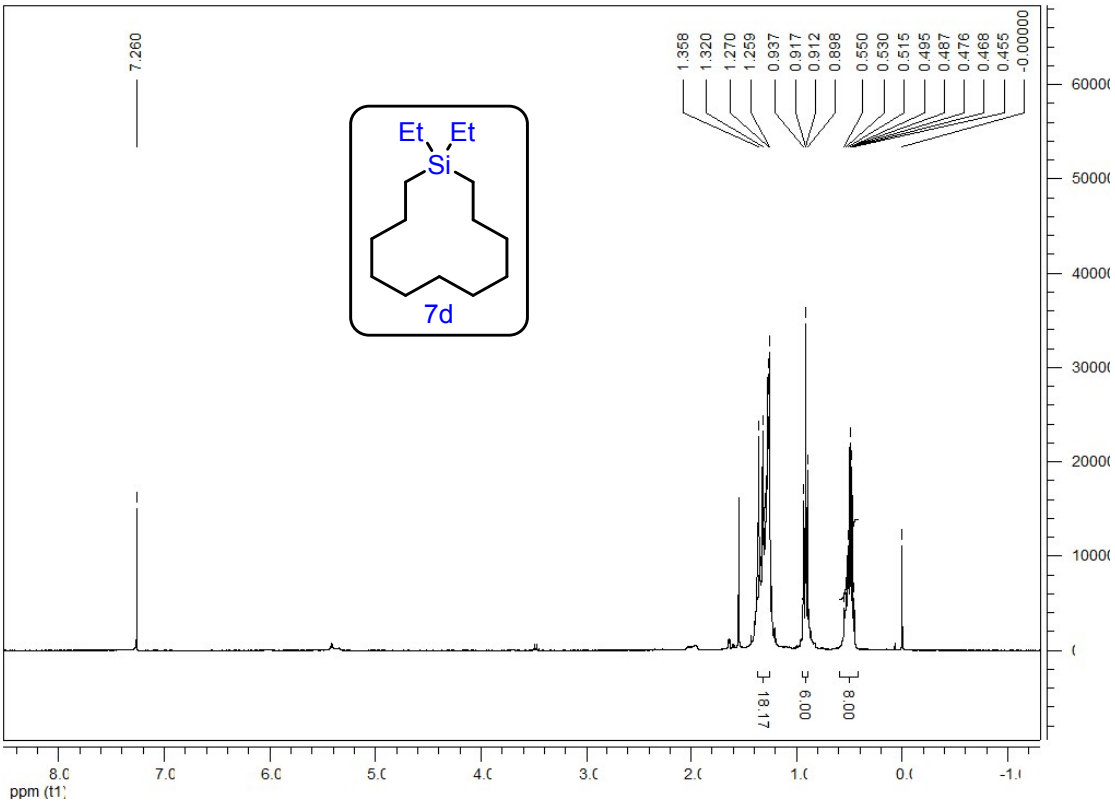
1.692
1.682
1.666
1.641
1.588
1.389
1.370
1.353
1.335
1.326
1.308
1.255
1.232
1.209
1.201
1.178
1.170
1.153
1.125
1.094
0.966
0.959
0.942
0.930
0.923
0.914
0.903
0.877
0.866
0.547
0.527
0.508
0.485
0.468
-0.00000
Et
Si
Et
7c
10.06
2.01
8.02
8.12
8.00
ppm (t1)


77.32
77.00
76.68
37.14
34.21
26.70
26.29
21.35
7.66
5.36
Et
Si
Et
7c
ppm (t1)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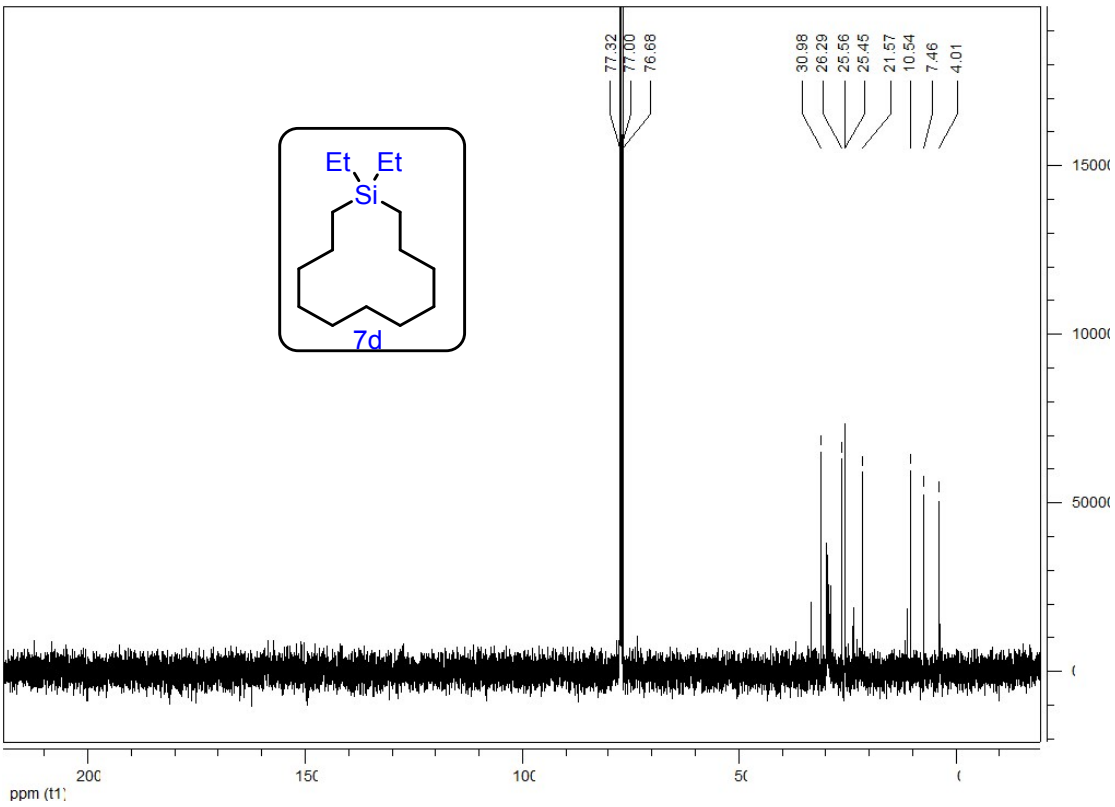
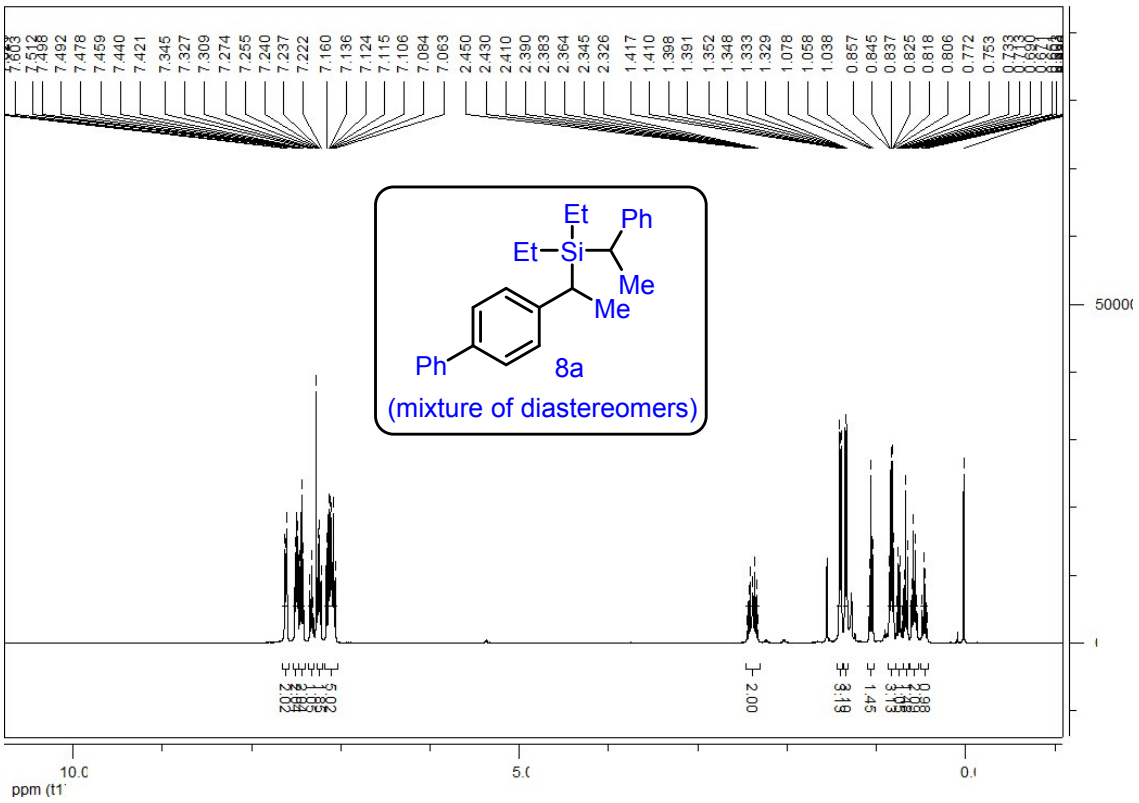
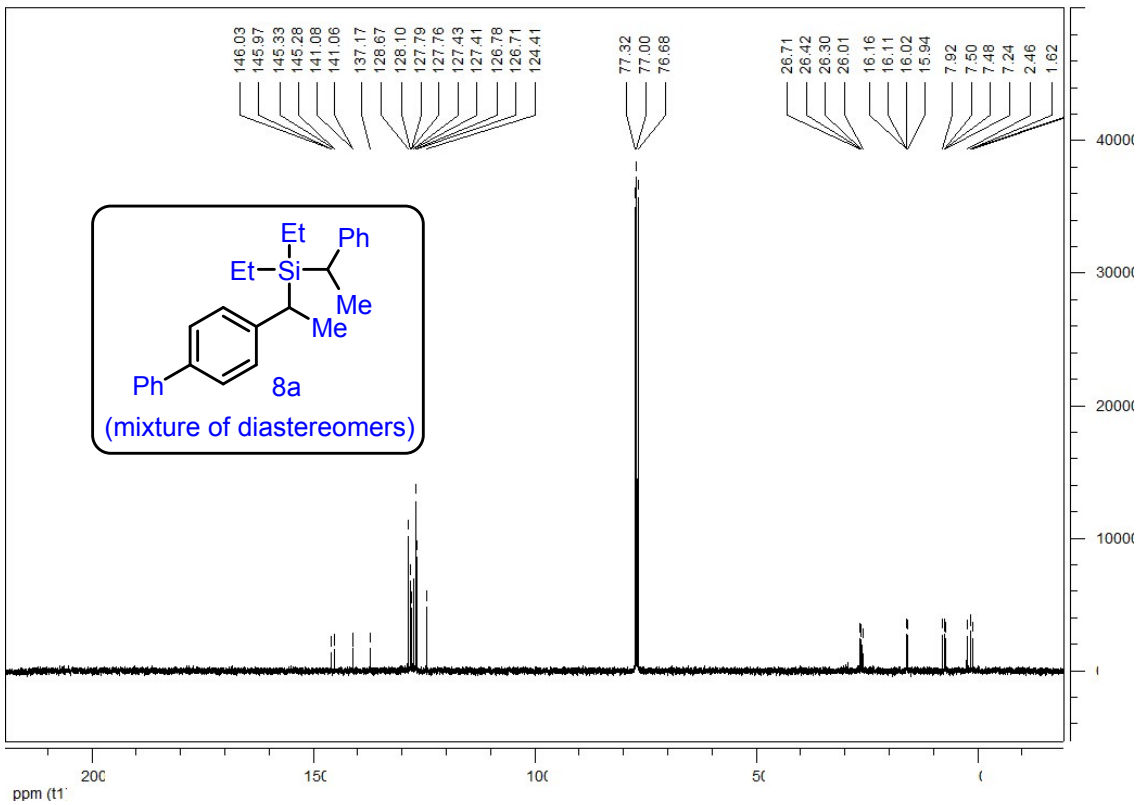
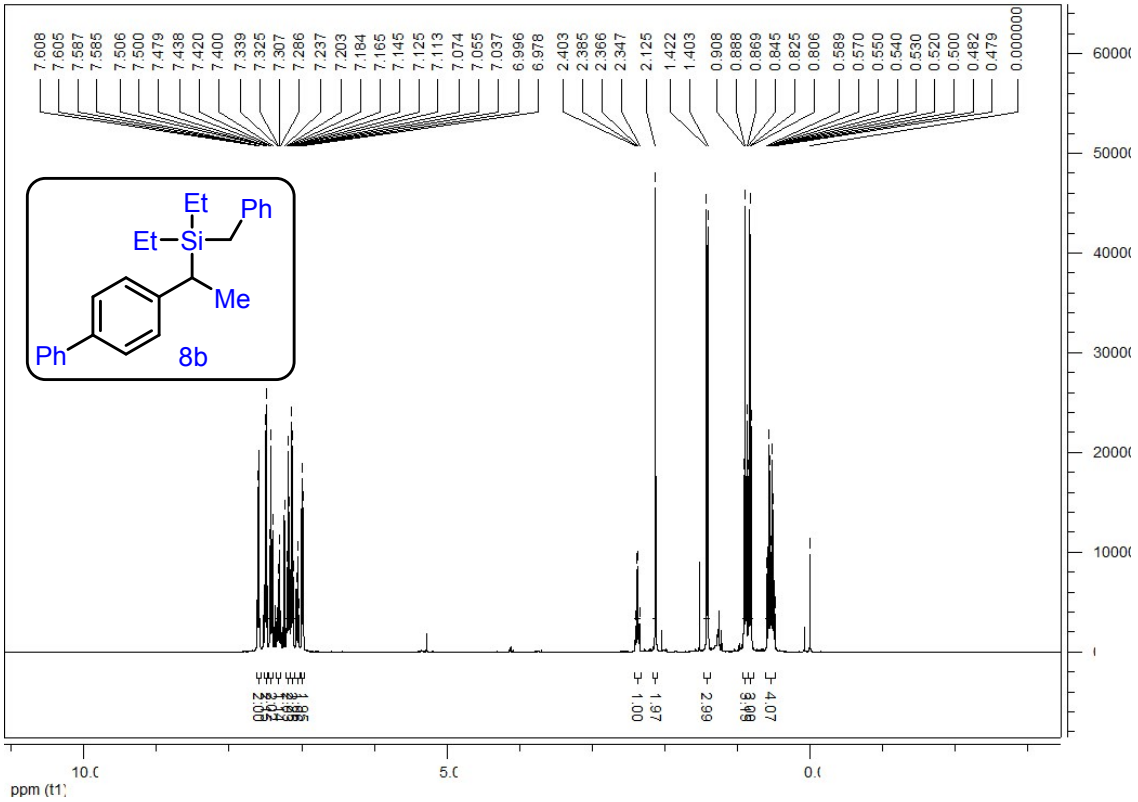
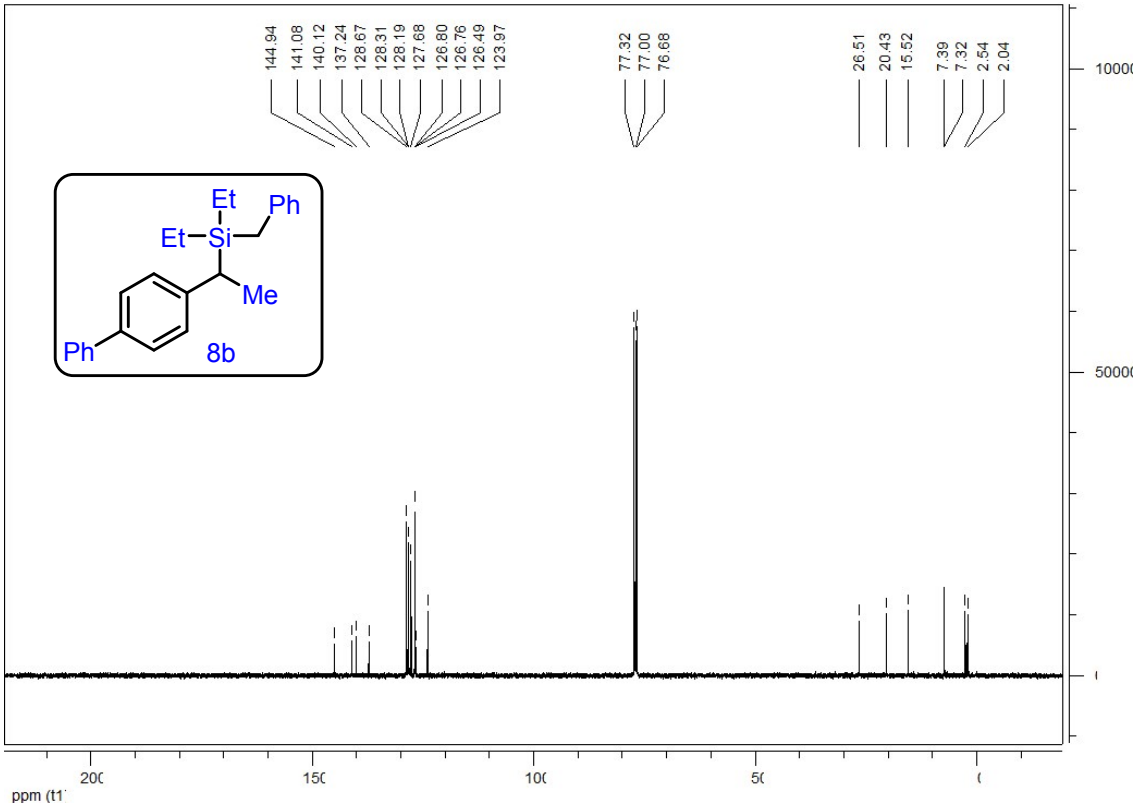
1.358
1.320
1.270
1.259
0.937
0.917
0.912
0.898
0.550
0.530
0.515
0.495
0.487
0.476
0.468
0.455
-0.00000
Et
Et
Si
7d
18.17
6.00
8.00
ppm (t1)


77.32
77.00
76.68
30.98
26.29
25.56
25.45
21.57
10.54
7.46
4.01
Et
Et
Si
7d
ppm (t1)


Et
Ph
Et
Si
Me
Me
Ph
8a
(mixture of diastereomers)
ppm (t1


Et
Ph
Et
Si
Me
Me
Ph
8a
(mixture of diastereomers)
ppm (t1


7.608
7.605
7.587
7.585
7.506
7.500
7.479
7.438
7.420
7.400
7.339
7.325
7.307
7.286
7.237
7.203
7.184
7.165
7.145
7.125
7.113
7.074
7.055
7.037
6.996
6.978
2.403
2.385
2.366
2.347
2.125
1.422
1.403
0.908
0.888
0.869
0.845
0.825
0.806
0.589
0.570
0.550
0.540
0.530
0.520
0.500
0.482
0.479
0.000000
Et
Ph
Et
Si
Me
Ph
8b
1.00
1.97
2.99
3.09
4.07
10.0
5.0
0.0
ppm (t1)


144.94
141.08
140.12
137.24
128.67
128.31
128.19
127.68
126.80
126.76
126.49
123.97
77.32
77.00
76.68
26.51
20.43
15.52
7.39
7.32
2.54
2.04
Et
Ph
Et
Si
Me
Ph
8b
200
150
100
50
ppm (t1)