Supporting Information for

Cobalt-Catalyzed Regioselective Stereoconvergent Markovnikov 1,2-Hydrosilylation of Conjugated Dienes

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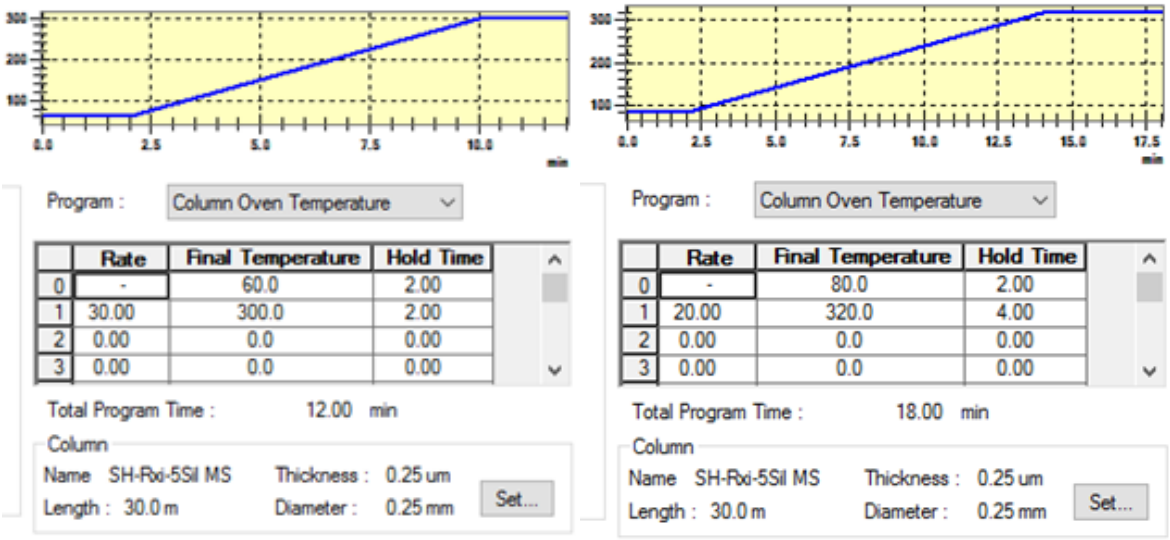
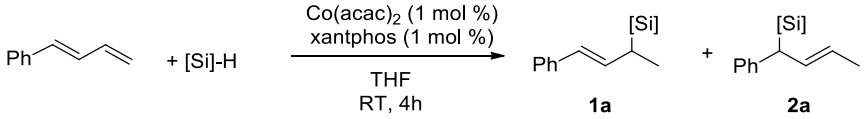
General Remarks

All the manipulations were performed in an argon-filled glovebox, unless mentioned otherwise. THF, toluene, and hexane were purified by passing the degassed solvents (N_2) through a column of activated alumina (solvent purification system purchased from Innovative Technologies, Newburyport, MA). The following chemicals were purchased and used as received: $Co(acac)_2$ (99%, Sigma-Aldrich), $CoCl_2$ (99.7%, Sigma-Aldrich), $CoBr_2$ (99%, Sigma-Aldrich), $Co(OAc)_2$ (99.99%, Sigma-Aldrich), $PhSiH_3$ (97%, Sigma-Aldrich), Ph_2SiH_2 (97%, Sigma-Aldrich), $MePhSiH_2$ (98%, Sigma-Aldrich), Me_2PhSiH (>98%, Sigma-Aldrich), Et_2SiH_2 (99%, Sigma-Aldrich), $(EtO)_3SiH$ (95%, Sigma-Aldrich). PhPDI, ^{TF}ADPI, PyBox were prepared according to previously reported procedures.[1] (*E*)-1,3-dienes were prepared by Wittig olefination[2] of the corresponding enals[3]. *E*/*Z*-1,3-dienes were prepared by Wittig olefination of the corresponding aldehydes with allyltripheylphosphonium bromide according to previously reported procedures.[4] All other reagents and solvents were purchased from commercial sources and used without purification.

^1H and ^{13}C spectra were recorded using Bruker 300 MHz, 400 MHz, or 500 MHz NMR spectrometers. ^1H NMR and ^{13}C NMR spectra were referenced to resonances of the residual signals of the deuterated solvents. As such, the ^1H and ^{13}C signals of $CDCl_3$ were calibrated to 7.26 ppm (singlet) and 77.16 ppm (triplet) respectively. Multiplicities are recorded as: s = singlet, d = doublet, t = triplet, dd = doublet of doublets, dt = doublet of triplets and m = multiplet. GC analysis was acquired on Agilent 6850 gas chromatograph equipped with a flame-ionization detector. HR-MS analyses were performed using Thermo Scientific Exactive (APCI). GC-MS analysis was performed on Shimadzu GC-2010 gas chromatograph coupled to a Shimadzu QP2010 mass selective detector. The details of the methods were illustrated as below.



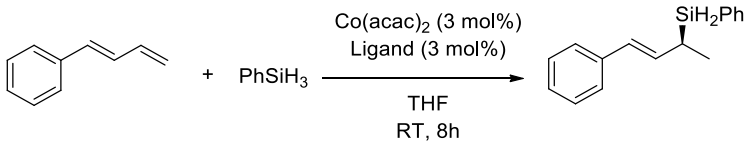
Reaction Screening of Silane for Hydrosilylation of (*E*)-1-phenyl-1,3-butadiene[a]



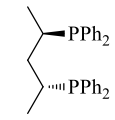
entry	[Si]-H	Yield of **1a** (%)	**1a/4a**
1	$PhSiH_3$	80	>99:-
2	Ph_2SiH_2	84	>99:-
3	Et_2SiH_2	-	-
4[b]	Et_2SiH_2	-	-
5	$MePhSiH_2$	Trace	-
6[c]	$MePhSiH_2$	80	>99:1
7	$(EtO)_3SiH$	-	-
8[b]	$(EtO)_3SiH$	-	-
9	Me_2PhSiH	-	-
10[b]	Me_2PhSiH	-	-

[a]Conditions: (*E*)- 1-phenylbutadiene (0.200 mmol), [Si]-H (0.250 mmol), $Co(acac)_2$ (2.0 μmol), xantphos (2.0 μmol), THF (0.500 mL), 4 h; yield of isolated product. [b]Reactions were conducted at 50 °C instead. [c]3 mol % catalyst loading was used.

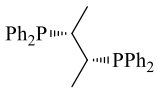
Reaction Screening of Ligands for Asymmetric Hydrosilylation of 1-phenylbutadiene[a]



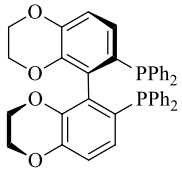
Entry	Ligand	Conversion (%)[b]	Enantiomeric Ratio[b]
1	(R,R)-BDPP	>98	59.5:40.5
2	(S,S)-Chiraphos	0	-
3	(R)-Synphos	>98	85:15
4	(R)-(+)-Segphos	>98	86:14
5	R-Ph-Garphos	>98	86:14
6	(R)-MeO-BIPHEP	>98	82.5:17.5
7	(S,S)-Norphos	0	-
8	(R)-(S)-Josiphos	>98	69:31
9	(R,R,S,S)-Duanphos	>98	65:35
10	(R)-difluorophos	77	89.5:10.5
11[c]	(R)-difluorophos	>98	89:11



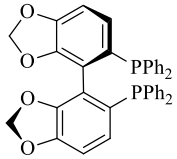
(R,R)-BDPP



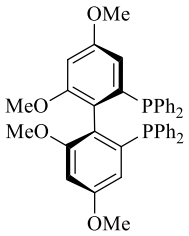
(S,S)-Chiraphos



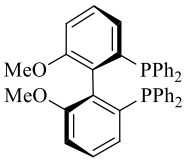
(R)-Synphos



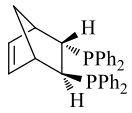
R-(+)-Segphos



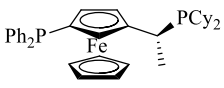
R-Ph-Garphos



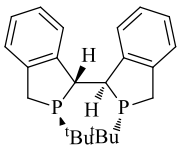
(R)-MeO-BIPHEP



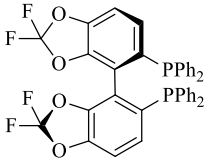
(S,S)-Norphos



(R)-(S)-Josiphos



(R,R,S,S)-Duanphos



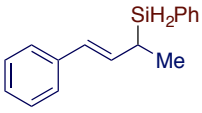
(R)-DIFLUOROPHOS

[a]Conditions: (*E*)-diene (0.200 mmol), $PhSiH_3$ (0.250 mmol), $Co(acac)_2$ (6.0 μmol), ligand (6.0 μmol), THF (0.5 mL), 8 h; [b]Conversion of diene were determined by GC analysis with tridecane as the internal standard; Enantiomeric ratio was determined by chiral HPLC. [c]Catalyst (5 mol %), 6 hours at room temperature.

General procedure for Co-catalyzed Markovnikov 1,2-hydrosilylation of *trans*-1,3-dienes

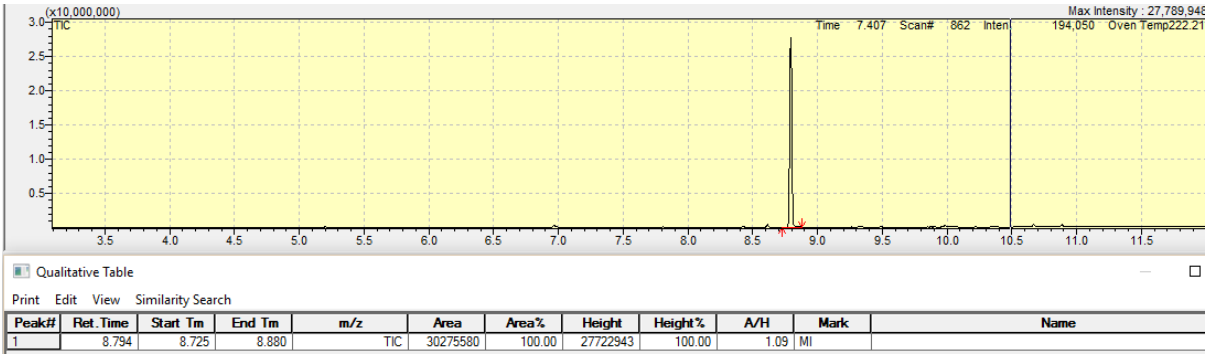
In an Ar-filled glovebox, a mixture of $Co(acac)_2$ (1.0 mg, 4.0 μmol) and xantphos (2.3 mg, 4.0 μmol) in THF (1 mL) was added into a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding phenylsilane (54.1 mg, 0.500 mmol) and *trans*-1,3-dienes (0.400 mmol) successively. The vial was removed from the glove box, and the mixture was stirred at room temperature for 4 hours. After that, GC-MS analysis was conducted to determine the selectivity of the crude reaction mixture prior concentrating it under vacuum. Subsequently, the residue was purified by flash column chromatography using a mixture of ethyl acetate and hexane as eluent. The details and characterization data of the products are stated below.

(*E*)-phenyl(4-phenylbut-3-en-2-yl)silane (1a)



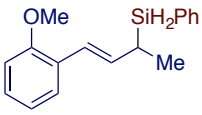
The title compound was isolated (76.3 mg, 80%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63-7.58 (m, 2H), 7.47–7.36 (m, 3H), 7.34–7.28 (m, 4H), 7.23–7.17 (m, 1H), 6.35 (dd, *J* = 15.9, 6.8 Hz, 1H), 6.29 (d, *J* = 16.0 Hz, 1H), 4.35 – 4.28 (m, 2H), 2.35 – 2.23 (m, 1H), 1.32 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.2, 135.9, 133.2, 131.30, 123.0, 128.6, 128.1, 127.4, 126.7, 125.9, 23.0, 15.3. HR-MS (APCI$^+$) *m/z* calcd for $C_{16}H_{18}Si$, [M+H$^+$]: 239.1256, Found: 239.1258.

The GC trace for the crude mixture of the reaction to make **1a**.



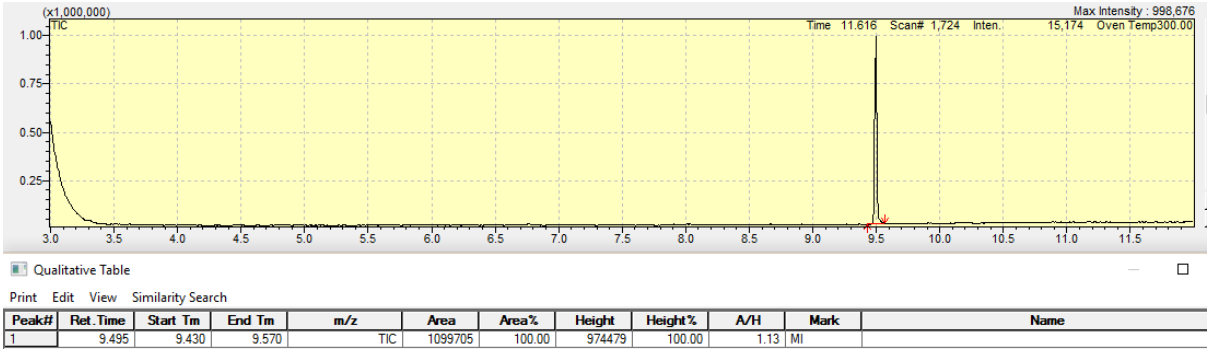
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.794	8.725	8.880	TIC	30275580	100.00	27722943	100.00	1.09	MI	

(*E*)-(4-(2-methoxyphenyl)but-3-en-2-yl)(phenyl)silane (1b)



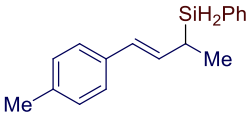
The title compound was isolated (90.2 mg, 84%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (20:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63–7.58 (m, 2H), 7.44–7.35 (m, 4H), 7.20–7.14 (m, 1H), 6.94–6.84 (m, 2H), 6.64 (dd, *J* = 16.0, 1.2 Hz, 1H), 6.33 (dd, *J* = 16.0, 7.8 Hz, 1H), 4.35–4.29 (m, 2H), 3.84 (s, 3H), 2.36–2.24 (m, 1H), 1.32 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 156.4, 135.9, 133.8, 131.5, 123.0, 128.1, 127.7, 127.3, 126.3, 122.1, 120.8, 111.0, 55.6, 23.5, 15.4. HR-MS (APCI$^+$) *m/z* calcd for $C_{17}H_{20}OSi$, [M+H$^+$]: 269.1362, Found: 269.1355.

The GC trace for the crude mixture of the reaction to make **1b**.



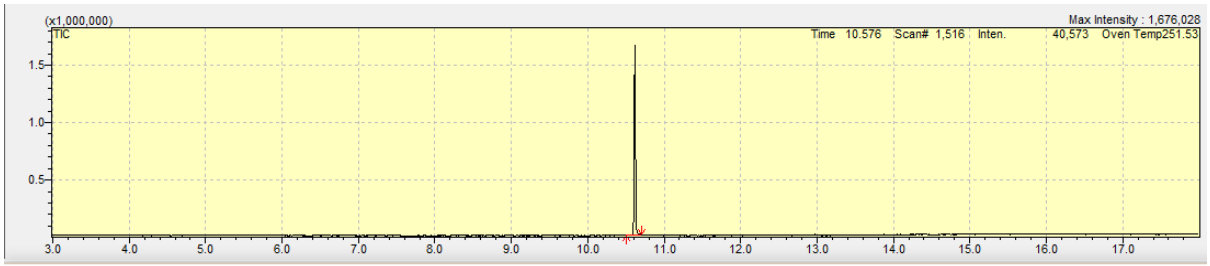
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.495	9.430	9.570	TIC	1099705	100.00	974479	100.00	1.13	MI	

(*E*)-phenyl(4-(p-tolyl)but-3-en-2-yl)silane (1c)



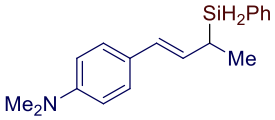
The title compound was isolated (91.9 mg, 91%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68–7.53 (m, 2H), 7.46–7.35 (m, 3H), 7.23 (d, *J* = 8.1 Hz, 2H), 7.11 (d, *J* = 7.9 Hz, 2H), 6.37–6.18 (m, 2H), 4.40–4.21 (m, 2H), 2.35 (s, 3H), 2.31–2.22 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 136.4, 135.9, 135.4, 132.1, 131.4, 129.9, 129.3, 128.1, 127.3, 125.8, 22.9, 21.3, 15.3. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{17}H_{20}Si$, [M+H$^+$]: 253.4341, Found: 253.1408.

The GC trace for the crude mixture of the reaction to make **1c**.



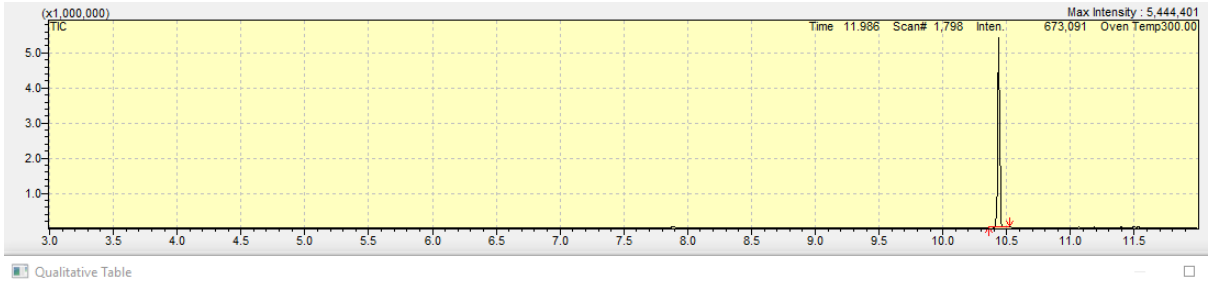
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.617	10.505	10.705	TIC	2027429	100.00	1656446	100.00	1.22	MI	

(*E*)-N,N-dimethyl-4-(3-(phenylsilyl)but-1-en-1-yl)aniline (1d)



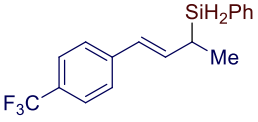
The title compound was isolated (96.7 mg, 86%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (20:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (dd, *J* = 7.8, 1.4 Hz, 2H), 7.29–7.17 (m, 3H), 7.08 (d, *J* = 8.7 Hz, 2H), 6.54 (d, *J* = 8.8 Hz, 2H), 6.08 (d, *J* = 15.9 Hz, 1H), 5.98 (dd, *J* = 15.8, 7.5 Hz, 1H), 4.23–4.09 (m, 2H), 2.79 (s, 6H), 2.15–2.03 (m, 1H), 1.15 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 149.7, 135.9, 131.7, 129.8, 128.9, 128.0, 127.3, 127.1, 126.7, 112.8, 40.8, 22.7, 15.5. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{18}H_{24}NSi$, [M+H$^+$]: 282.1678, Found: 282.1681.

The GC trace for the crude mixture of the reaction to make **1d**.



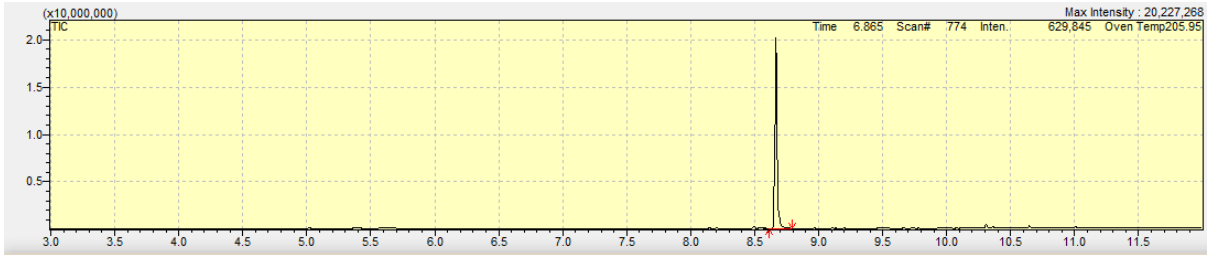
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.437	10.360	10.525	TIC	5886890	100.00	5413328	100.00	1.09	MI	

(*E*)-phenyl(4-(4-(trifluoromethyl)phenyl)but-3-en-2-yl)silane (1e)



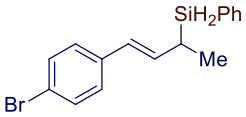
The title compound was isolated (108 mg, 88%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (50:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.58 (m, 2H), 7.55 (d, *J* = 8.2 Hz, 2H), 7.48–7.43 (m, 1H), 7.43–7.37 (m, 4H), 6.47 (dd, *J* = 15.9, 7.7 Hz, 1H), 6.31 (d, *J* = 16.3 Hz, 1H), 4.35 (d, *J* = 2.9 Hz, 2H), 2.39–2.29 (m, 1H), 1.35 (d, *J* = 7.1 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 141.7 (d, $J_{C\text{-}F}$ = 1.2 Hz), 136.2, 135.8, 130.9, 130.1, 128.5 (q, $J_{C\text{-}F}$ = 32.4 Hz), 128.2, 126.2, 126.0, 125.6 (q, $J_{C\text{-}F}$ = 3.8 Hz), 124.5 (q, $J_{C\text{-}F}$ = 271.7 Hz), 23.4, 15.1. ^{19}F NMR (377 MHz, $CDCl_3$) δ -62.30. GC-MS (EI) *m*/*z* calcd for $C_{17}H_{18}F_3Si$ [M]$^+$: 306.40, Found: 306.15

The GC trace for the crude mixture of the reaction to make **1e**.



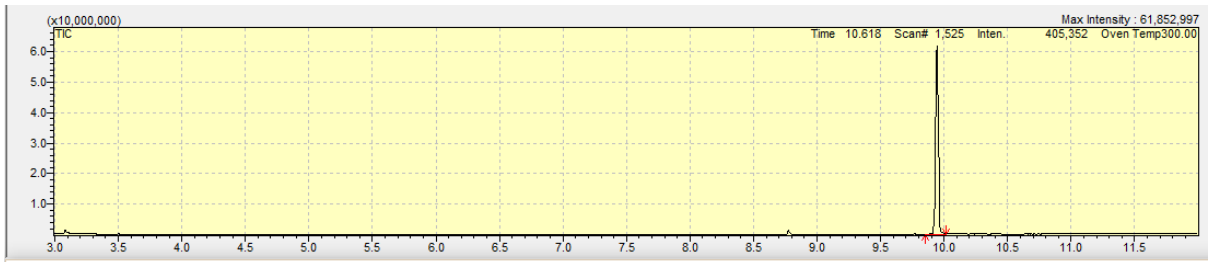
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.665	8.610	8.795	TIC	24923902	100.00	20140224	100.00	1.24	MI	

(*E*)-(4-(4-bromophenyl)but-3-en-2-yl)(phenyl)silane (1f)



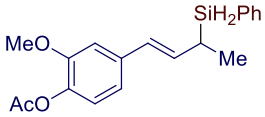
The title compound was isolated (101 mg, 80%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.54 (m, 2H), 7.47–7.31 (m, 5H), 7.21–7.10 (m, 2H), 6.33 (dd, *J* = 15.9, 7.6 Hz, 1H), 6.20 (d, *J* = 16.0 Hz, 1H), 4.39–4.22 (m, 2H), 2.41–2.17 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 137.1, 135.8, 134.1, 131.7, 131.1, 130.0, 128.1, 127.4, 126.2, 120.3, 23.2, 15.1. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{16}H_{18}BrSi$, [M+H$^+$]: 317.0361, Found: 317.0357.

The GC trace for the crude mixture of the reaction to make **1f**.



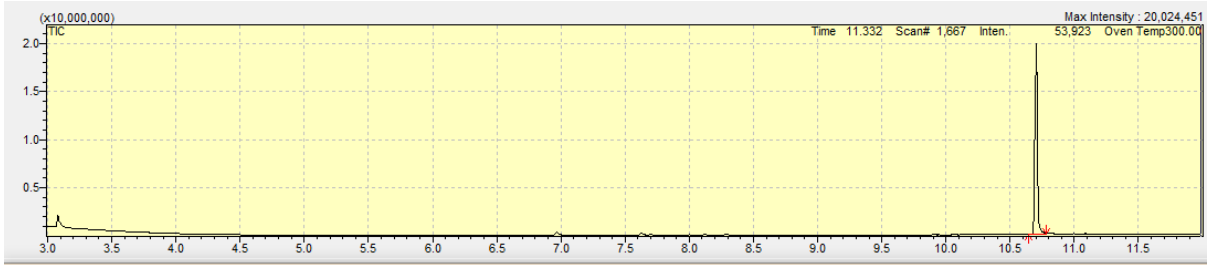
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.944	9.850	10.015	TIC	98848339	100.00	61674826	100.00	1.60	MI	

(*E*)-2-methoxy-4-(3-(phenylsilyl)but-1-en-1-yl)phenyl acetate (1g)



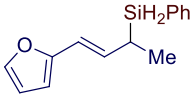
The title compound was isolated (104 mg, 80%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (10:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60–7.54 (m, 2H), 7.45–7.33 (m, 3H), 6.94 (d, *J* = 8.3 Hz, 1H), 6.89–6.84 (m, 2H), 6.29–6.19 (m, 2H), 4.30 (d, *J* = 2.9 Hz, 2H), 3.83 (s, 3H), 2.31 (s, 3H), 2.28–2.22 (m, 1H), 1.29 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 169.3, 151.2, 138.7, 137.3, 135.9, 133.6, 131.2, 130.0, 128.1, 126.8, 122.8, 118.4, 109.8, 56.0, 23.0, 20.8, 15.2. GC-MS (EI) *m*/*z* calcd for $C_{19}H_{22}O_3Si$ [M]$^+$: 326.13, Found: 326.20

The GC trace for the crude mixture of the reaction to make **1g**.



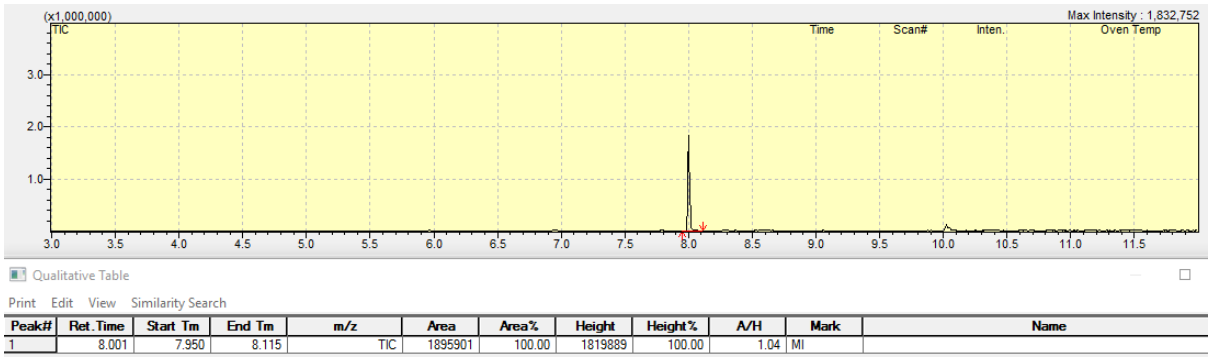
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.702	10.645	10.780	TIC	27168811	100.00	19850716	100.00	1.37	MI	

(*E*)-(4-(furan-2-yl)but-3-en-2-yl)(phenyl)silane (1h)



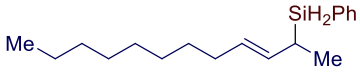
The title compound was isolated (78.6 mg, 86%, *E*/*Z* = >99:1) as pale yellow oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.54 (m, 2H), 7.44–7.33 (m, 3H), 7.30 (d, *J* = 1.5 Hz, 1H), 6.38–6.25 (m, 2H), 6.14–6.03 (m, 2H), 4.29 (qd, *J* = 6.7, 3.0 Hz, 2H), 2.28–2.17 (m, 1H), 1.27 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 153.7, 141.2, 135.8, 132.2, 131.2, 123.0, 128.1, 116.2, 111.2, 105.7, 22.9, 15.0. GC-MS (EI) *m*/*z*: calcd for $C_{14}H_{16}OSi$ [M]$^{+}$: 228.36, Found: 228.10.

The GC trace for the crude mixture of the reaction to make **1h**.



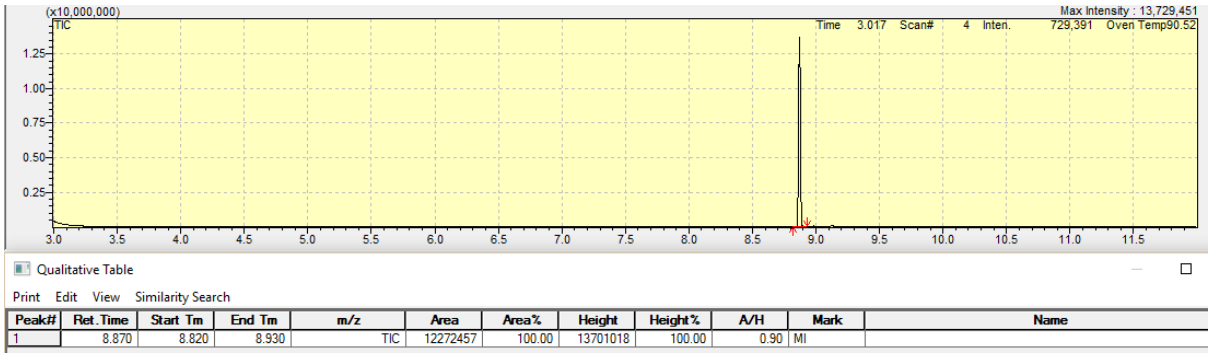
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.001	7.950	8.115	TIC	1895901	100.00	1819889	100.00	1.04	MI	

(*E*)-dodec-3-en-2-yl(phenyl)silane (1i)



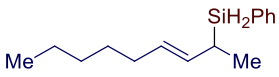
The title compound was isolated (48 mg, 87%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60–7.55 (m, 2H), 7.44–7.33 (m, 3H), 5.54–5.45 (m, 1H), 5.36–5.27 (m, 1H), 4.29–4.17 (m, 2H), 2.00 (m, 3H), 1.34–1.25 (m, 12H), 1.18 (d, *J* = 7.3 Hz, 3H), 0.91 (t, *J* = 6.9 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 135.8, 132.0, 131.9, 129.7, 128.5, 128.0, 32.9, 32.1, 30.0, 29.7, 29.5, 29.3, 22.9, 21.8, 15.6, 14.3. GC-MS (EI) *m*/*z*: calcd for $C_{18}H_{30}Si$ [M]$^{+}$: 274.21; Found: 274.30.

The GC trace for the crude mixture of the reaction to make **1i**.



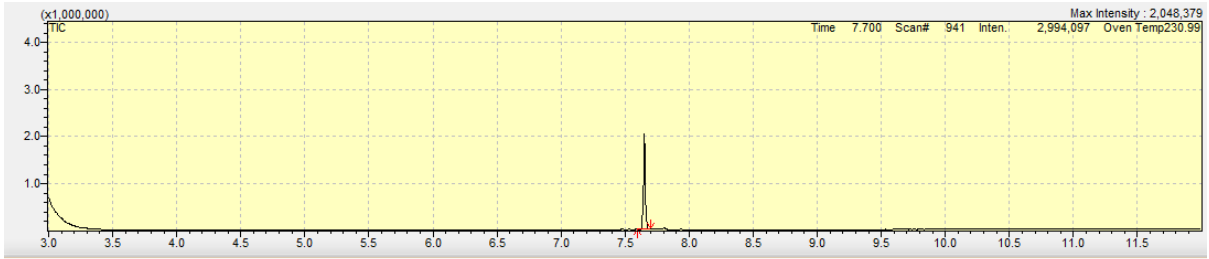
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.870	8.820	8.930	TIC	12272457	100.00	13701018	100.00	0.90	MI	

(*E*)-non-3-en-2-yl(phenyl)silane (1j)



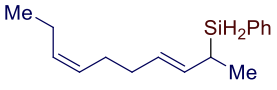
The title compound was isolated (71.0 mg, 76%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56 (dd, *J* = 7.8, 1.5 Hz, 2H), 7.42–7.33 (m, 3H), 5.52–5.45 (m, 1H), 5.34–5.27 (m, 1H), 4.24–4.19 (m, 2H), 2.05–1.97 (m, 3H), 1.35–1.23 (m, 6H), 1.17 (d, *J* = 7.3 Hz, 3H), 0.88 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 135.8, 132.0, 131.9, 129.7, 128.5, 128.0, 32.9, 31.5, 29.6, 22.7, 21.8, 15.6, 14.2. GC-MS (EI) *m*/*z*: calcd for $C_{15}H_{24}Si$ [M]$^{+}$: 232.16; Found: 232.20.

The GC trace for the crude mixture of the reaction to make **1j**.



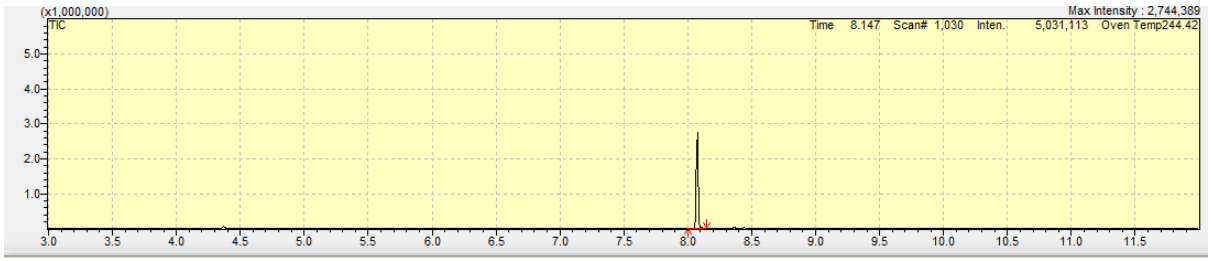
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	7.651	7.595	7.700	TIC	2017779	100.00	2015292	100.00	1.00	MI	

(3*E*,7*Z*)-deca-3,7-dien-2-yl(phenyl)silane (1k)



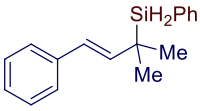
The title compound was isolated (62 mg, 64%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (dd, *J* = 7.8, 1.5 Hz, 2H), 7.44–7.33 (m, 3H), 5.53 (dd, *J* = 15.3, 7.4 Hz, 1H), 5.45–5.26 (m, 3H), 4.26–4.18 (m, 2H), 2.11–1.97 (m, 7H), 1.18 (d, *J* = 7.3 Hz, 3H), 0.97 (t, *J* = 7.5 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 135.8, 132.5, 132.0, 131.9, 129.8, 128.7, 128.0, 127.7, 33.1, 27.6, 21.8, 20.7, 15.5, 14.5. GC-MS (EI) *m*/*z*: calcd for $C_{16}H_{24}Si$ [M]$^{+}$: 244.16; Found: 244.20.

The GC trace for the crude mixture of the reaction to make **1k**.



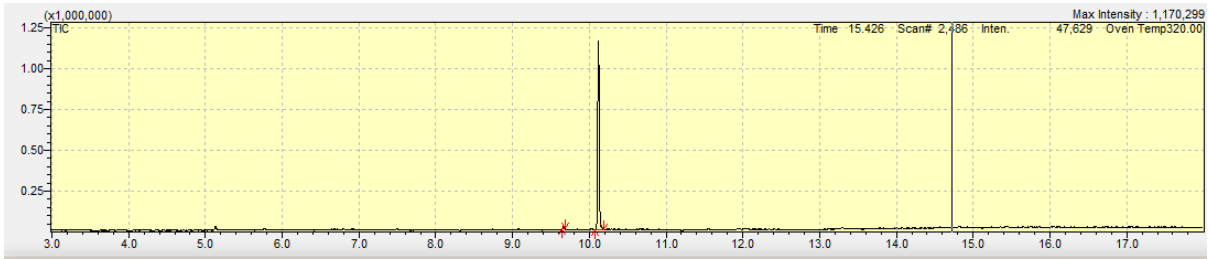
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.074	8.000	8.145	TIC	2750405	100.00	2728196	100.00	1.01	MI	

(*E*)-(2-methyl-4-phenylbut-3-en-2-yl)(phenyl)silane (1l)



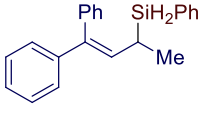
The title compound was isolated (71.0 mg, 70%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (dd, *J* = 7.9, 1.4 Hz, 2H), 7.47–7.24 (m, 7H), 7.22–7.16 (m, 1H), 6.34 (d, *J* = 16.1 Hz, 1H), 6.18 (d, *J* = 16.1 Hz, 1H), 4.25 (s, 2H), 1.27 (m, 6H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.3, 138.3, 136.2, 131.4, 130.0, 128.6, 128.0, 126.8, 126.1, 126.0, 25.7, 24.1. HR-MS(APCI^{+}) *m*/*z* calcd for $C_{17}H_{20}Si$, [M+H^{+}]: 253.1413, Found:253.1416.

The GC trace for the crude mixture of the reaction to make **1l**.



Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.668	9.650	9.680	TIC	17402	1.22	16896	1.44	1.03	MI	
2	10.119	10.070	10.190	TIC	1409699	98.78	1157047	98.56	1.22	MI	

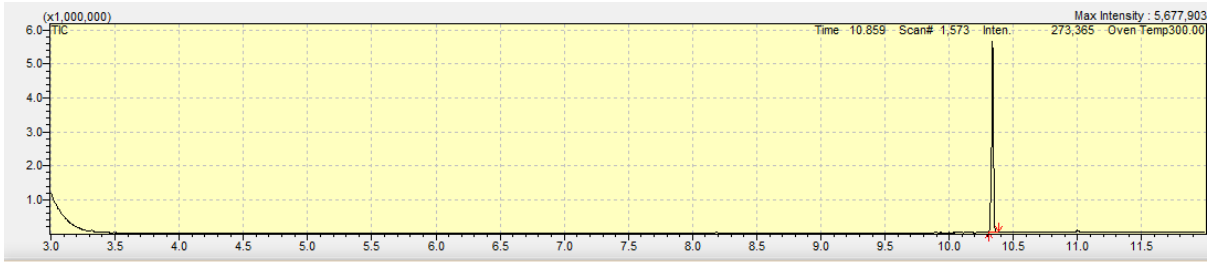
(4,4-diphenylbut-3-en-2-yl)(phenyl)silane (1m)



The title compound was isolated (106 mg, 84%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54–

7.49 (m, 2H), 7.45–7.27 (m, 6H), 7.27–7.16 (m, 5H), 7.08–7.02 (m, 2H), 6.02 (d, J = 11.5 Hz, 1H), 4.33 – 4.22 (m, 2H), 2.37 – 2.24 (m, 1H), 1.25 (d, J = 7.1 Hz, 3H). $\{^1H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 142.7, 140.4, 134.0, 135.9, 132.1, 131.4, 123.0, 129.9, 128.4, 128.2, 128.1, 127.1, 126.9, 126.8, 20.8, 16.9. HR-MS ($APCI^+$) m/z calcd for $C_{22}H_{23}Si$, $[M+H^+]$: 315.1569, Found: 315.1566.

The GC trace for the crude mixture of the reaction to make **1m**.

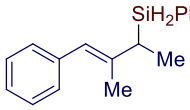


Qualitative Table

Print Edit View Similarity Search

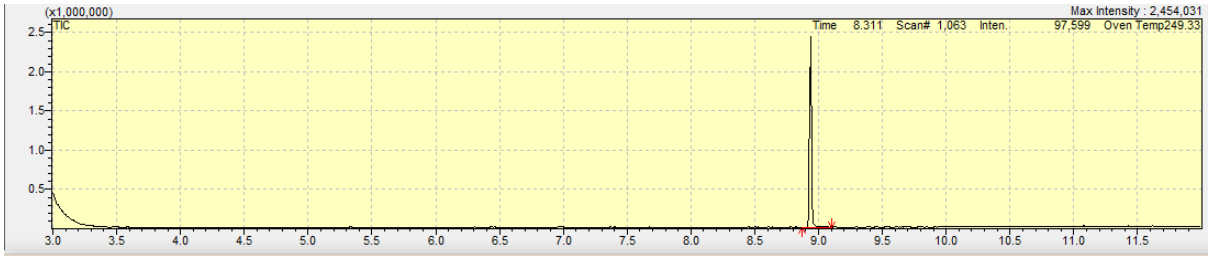
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.337	10.310	10.385	TIC	6123524	100.00	5640650	100.00	1.09	MI	

(*E*)-(3-methyl-4-phenylbut-3-en-2-yl)(phenyl)silane (1n)



The title compound was isolated (93.0 mg, 92%, E/Z = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^1H NMR (400 MHz, $CDCl_3$) δ 7.60 (d, J = 6.5 Hz, 2H), 7.46–7.27 (m, 5H), 7.19 (d, J = 6.9 Hz, 3H), 6.15 (s, 1H), 4.37 (m, 2H), 2.21–2.12 (m, 1H), 1.90 (s, 3H), 1.34 (d, J = 7.3 Hz, 3H). $\{^1H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 141.3, 139.0, 135.8, 132.0, 129.9, 129.0, 128.1, 128.1, 125.8, 123.5, 29.4, 18.8, 15.6. HR-MS ($APCI^+$) m/z calcd for $C_{17}H_{20}Si$, $[M+H^+]$: 253.1413, Found: 253.1413.

The GC trace for the crude mixture of the reaction to make **1n**.

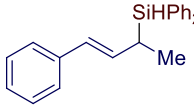


Qualitative Table

Print Edit View Similarity Search

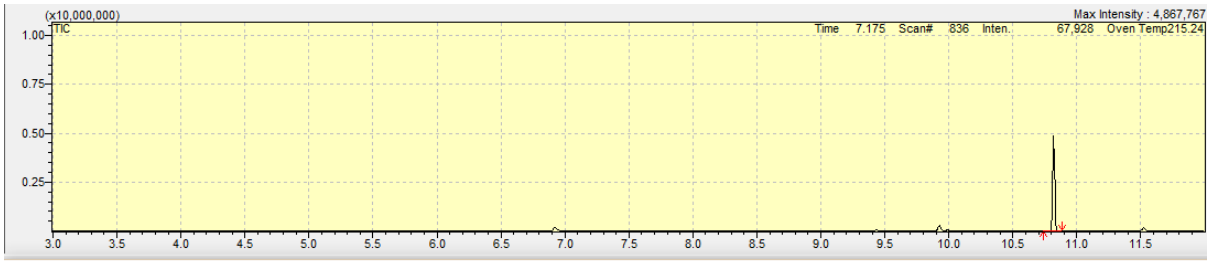
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.936	8.870	9.105	TIC	2586876	100.00	2434940	100.00	1.06	MI	

(*E*)-diphenyl(4-phenylbut-3-en-2-yl)silane (1a')



The title compound was isolated (106 mg, 84%, E/Z = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^1H NMR (400 MHz, $CDCl_3$) δ 7.67–7.58 (m, 4H), 7.46–7.32 (m, 6H), 7.27 (m, 3H), 7.24–7.11 (m, 2H), 6.36 (dd, J = 15.9, 7.4 Hz, 1H), 6.25 (dd, J = 16.0, 0.9 Hz, 1H), 4.83 (d, J = 2.8 Hz, 1H), 2.57–2.44 (m, 1H), 1.33 (d, J = 7.2 Hz, 3H). $\{^1H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 138.4, 135.8, 135.7, 134.5, 133.2, 133.1, 133.0, 130.0, 128.6, 128.1, 128.1, 127.6, 126.6, 125.9, 24.37, 14.9. HR-MS ($APCI^+$) m/z calcd for $C_{22}H_{23}Si$, $[M+H^+]$: 315.1569, Found: 315.1555.

The GC trace for the crude mixture of the reaction to make **1a'**.

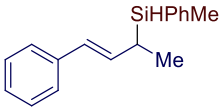


Qualitative Table

Print Edit View Similarity Search

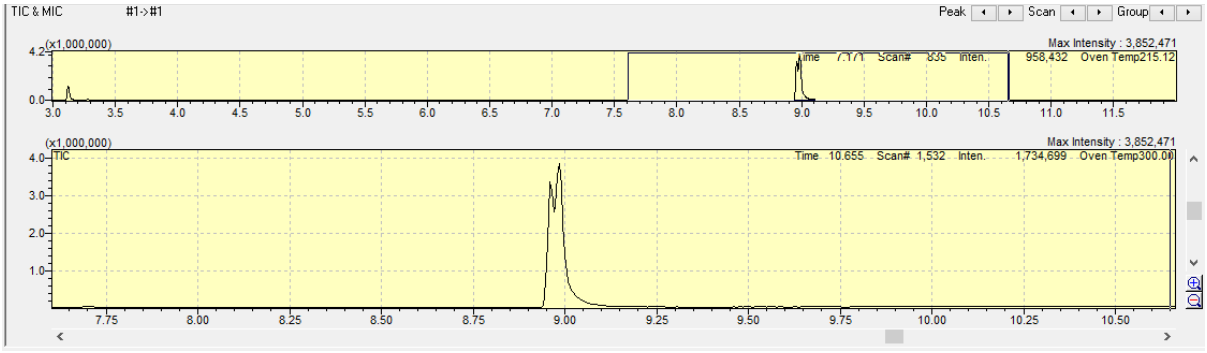
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.820	10.740	10.885	TIC	5333527	100.00	4844821	100.00	1.10	MI	

(*E*)-Methyl(phenyl)(4-phenylbut-3-en-2-yl)silane (1a'')

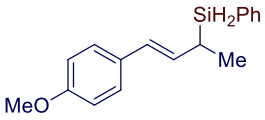


The reaction was conducted with 3 mol % catalyst loading at 0.2 mmol scale. The title compound was isolated (40.3 mg, 80%, *E*/*Z* = >99:1 dr = 1:1 determined by ^{1}H NMR analysis) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58–7.54 (m, 2H), 7.44–7.35 (m, 3H), 7.34–7.27 (m, 4H), 7.21–7.16 (m, 1H), 6.35–6.27 (m, 1H), 6.24 (d, *J* = 16.0 Hz, 1H), 4.38–4.30 (m, 1H), 2.20–2.10 (m, 1H), 1.27–1.22 (m, 3H), 0.40 (t, *J* = 3.6 Hz, 3H).{^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.4, 135.0, 135.0, 134.9, 134.8, 133.6, 133.5, 129.6, 128.6, 128.0, 128.0, 127.0, 126.9, 126.6, 125.8, 25.3, 25.2, 14.6, 14.2, -7.5, -7.7. GC-MS (EI) *m*/*z*: calcd for $C_{17}H_{20}Si$ [M]$^+$: 252.43; Found: 252.15.

The GC trace for the crude mixture of the reaction to make **1a''**.

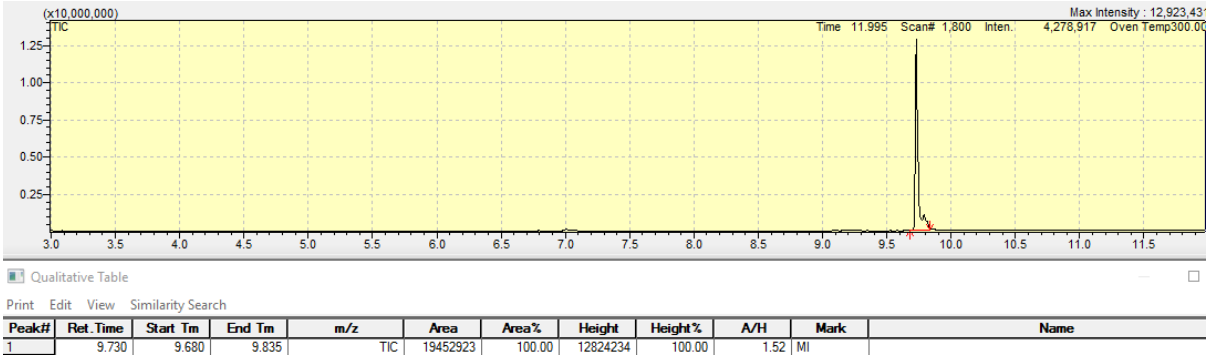


(*E*)-(4-(4-methoxyphenyl)but-3-en-2-yl)(phenyl)silane



The title compound was isolated (96.0 mg, 90%, *E*/*Z* = >99:1.) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.51 (m, 2H), 7.45–7.31 (m, 3H), 7.26–7.22 (m, 2H), 6.85–6.79 (m, 2H), 6.23 (d, *J* = 16.0 Hz, 1H), 6.16 (dd, *J* = 15.9, 6.9 Hz, 1H), 4.35–4.19 (m, 2H), 3.80 (s, 3H), 2.28–2.19 (m, 1H), 1.28 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 158.7, 135.9, 131.5, 131.1, 131.0, 129.9, 128.1, 127.0, 126.8, 114.1, 55.5, 22.8, 15.4. HR-MS (APCI $^+$) *m*/*z* calcd for $C_{17}H_{21}OSi$, [M+H$^+$]: 269.1362, Found: 269.1354.

The GC trace for the crude mixture of the reaction to make this compound.

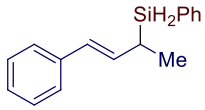


Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.730	9.680	9.835	TIC	19452923	100.00	12824234	100.00	1.52	MI	

General procedure for Co-catalyzed Markovnikov 1,2-hydrosilylation of *trans*/*cis*-1,3-dienes mixture

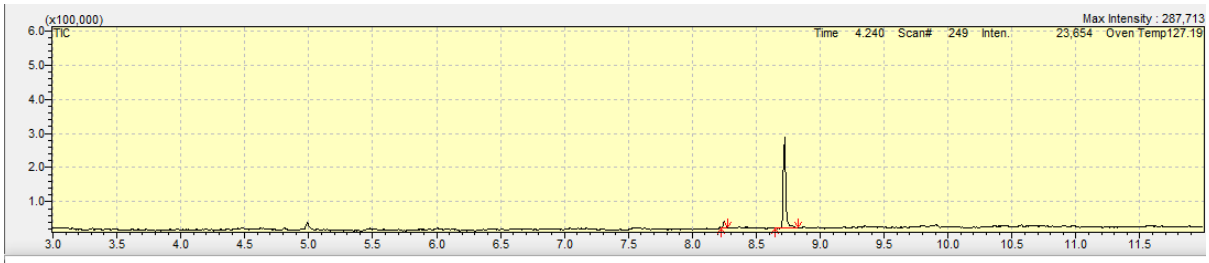
In an Ar-filled glovebox, a mixture of $Co(acac)_2$ (1.0 mg, 4.0 μmol) and xantphos (2.3 mg, 4.0 μmol) in THF (1 mL) was added into a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding phenylsilane (54.1 mg ,0.500 mmol) and *trans*/*cis*-1,3-dienes (0.400 mmol) successively. The vial was removed from the glove box, and the mixture was stirred at room temperature for 6 hours or 5 ºC for 24 hours. After that, GC-MS analysis was conducted to determine the selectivity of the crude reaction mixture prior concentrating it under vacuum. The residue was then purified by flash column chromatography using a mixture of ethyl acetate and hexane as eluent. The details and characterization data of the products are stated below.

(*E*)-phenyl(4-phenylbut-3-en-2-yl)silane (1a)



The reaction was stirred for 6 h at 24 ˚C. The title compound was isolated (76.3 mg, 80%, *E*/*Z* = >99:1, 1,2/1,4 = 95:5) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63–7.58 (m, 2H), 7.47–7.36 (m, 3H), 7.34–7.28 (m, 4H), 7.23–7.17 (m, 1H), 6.35 (dd, *J* = 15.9, 6.8 Hz, 1H), 6.29 (d, *J* = 16.0 Hz, 1H), 4.35–4.28 (m, 2H), 2.35–2.23 (m, 1H), 1.32 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.2, 135.9, 133.2, 131.3, 123.0, 128.6, 128.1, 127.4, 126.7, 125.9, 23.0, 15.3. HR-MS (APCI $^+$) *m*/*z* calcd for $C_{16}H_{18}Si$, [M+H$^+$]: 239.1256, Found: 239.1258.

The GC trace for the crude mixture of the reaction to make **1a**.

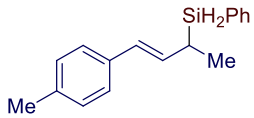


Qualitative Table

Print Edit View Similarity Search

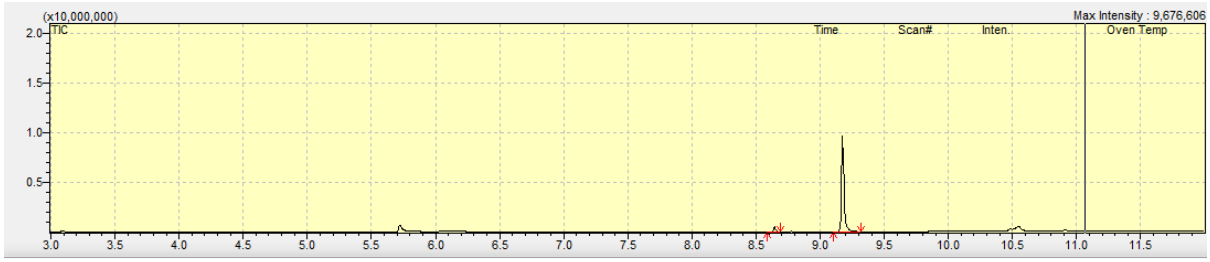
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.249	8.225	8.275	TIC	19534	5.31	16449	5.86	1.19	MI	
2	8.720	8.645	8.825	TIC	348544	94.69	264461	94.14	1.32	MI	

(*E*)-phenyl(4-(p-tolyl)but-3-en-2-yl)silane (1c)



The reaction was stirred for 24 h at 5 ˚C. The title compound was isolated (77.7 mg, 77%, *E*/*Z* = >99:1, 1.2/1,4= 95:5) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68–7.53 (m, 2H), 7.46–7.35 (m, 3H), 7.23 (d, *J* = 8.1 Hz, 2H), 7.11 (d, *J* = 7.9 Hz, 2H), 6.28 (m, 2H), 4.40–4.21 (m, 2H), 2.35 (s, 3H), 2.31–2.22 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 136.4, 135.9, 135.4, 132.1, 131.4, 129.9, 129.3, 128.1, 127.3, 125.8, 22.9, 21.3, 15.3. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{17}H_{20}Si$, [M+H$^+$]: 253.4341, Found: 253.1408.

The GC trace for the crude mixture of the reaction to make **1c**.

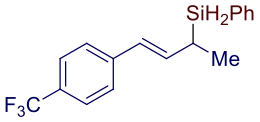


Qualitative Table

Print Edit View Similarity Search

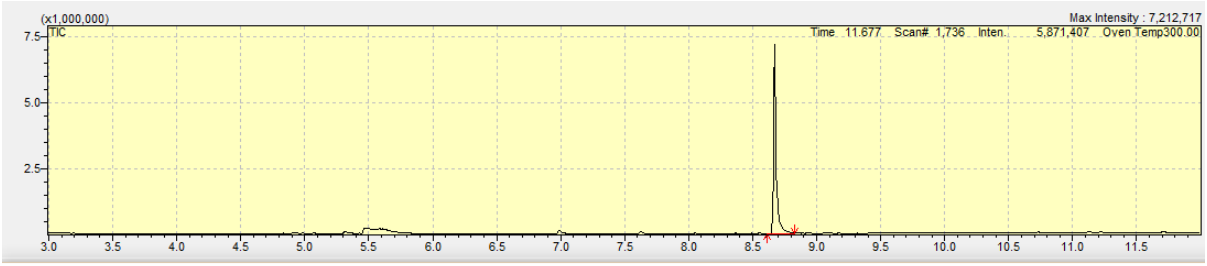
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.645	8.585	8.690	TIC	703495	4.95	600521	5.88	1.17	MI	
2	9.174	9.100	9.320	TIC	13497263	95.05	9609546	94.12	1.40	MI	

(*E*)-phenyl(4-(4-(trifluoromethyl)phenyl)but-3-en-2-yl)silane (1e)



The reaction was stirred for 6 h at 24 °C. The title compound was isolated (79.0 mg, 65%, *E*/*Z* = >99:1, 1.2/1,4= 99:1) as colourless oil after chromatography on silica gel (50:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.58 (m, 2H), 7.55 (d, *J* = 8.2 Hz, 2H), 7.48–7.43 (m, 1H), 7.43–7.37 (m, 4H), 6.47 (dd, *J* = 15.9, 7.7 Hz, 1H), 6.31 (d, *J* = 16.3 Hz, 1H), 4.35 (d, *J* = 2.9 Hz, 2H), 2.39 – 2.29 (m, 1H), 1.35 (d, *J* = 7.1 Hz, 3H). $\{^{1}H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 141.7 (d, J_{C-F} = 1.2 Hz), 136.2, 135.8, 130.9, 130.1, 128.5 (q, J_{C-F} = 32.4 Hz), 128.2, 126.2, 126.0, 125.6 (q, J_{C-F} = 3.8 Hz), 124.5 (q, J_{C-F} = 271.7 Hz), 23.4, 15.1. ^{19}F NMR (377 MHz, $CDCl_3$) δ -62.30. GC-MS (EI) *m*/*z* calcd for $C_{17}H_{18}F_3Si$ $[M]^+$: 306.40, Found: 306.15

The GC trace for the crude mixture of the reaction to make **1e**.



Qualitative Table

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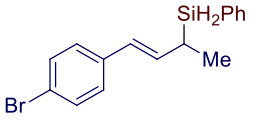
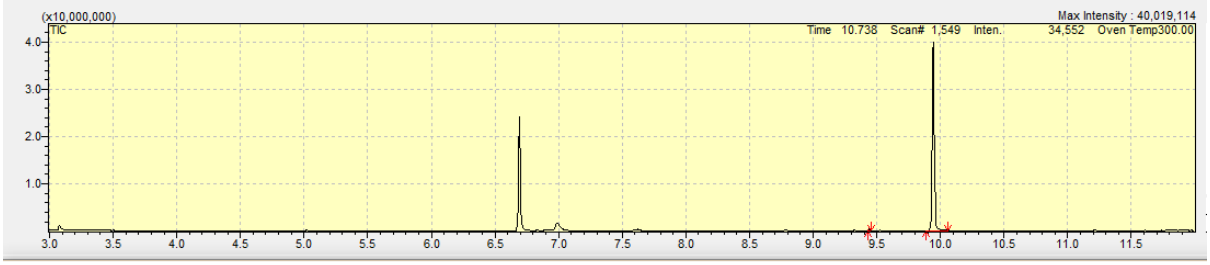
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.671	8.610	8.825	TIC	10871644	100.00	7168690	100.00	1.52	MI	

(*E*)-(4-(4-bromophenyl)but-3-en-2-yl)(phenyl)silane (1f)



The reaction was stirred for 6 h at 24 °C. The title compound was isolated (66.0 mg, 52%, *E*/*Z* = >99:1. 1.2/1,4 = 99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.54 (m, 2H), 7.47–7.31 (m, 5H), 7.21–7.10 (m, 2H), 6.33 (dd, *J* = 15.9, 7.6 Hz, 1H), 6.20 (d, *J* = 16.0 Hz, 1H), 4.39 – 4.22 (m, 2H), 2.41 – 2.17 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). $\{^{1}H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 137.1, 135.8, 134.1, 131.7, 131.1, 130.0, 128.1, 127.4, 126.2, 120.3, 23.2, 15.1. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{16}H_{18}BrSi$, $[M+H^+]$: 317.0361, Found: 317.0357.

The GC trace for the crude mixture of the reaction to make **1f**.

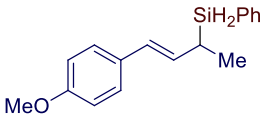


Qualitative Table

Print Edit View Similarity Search

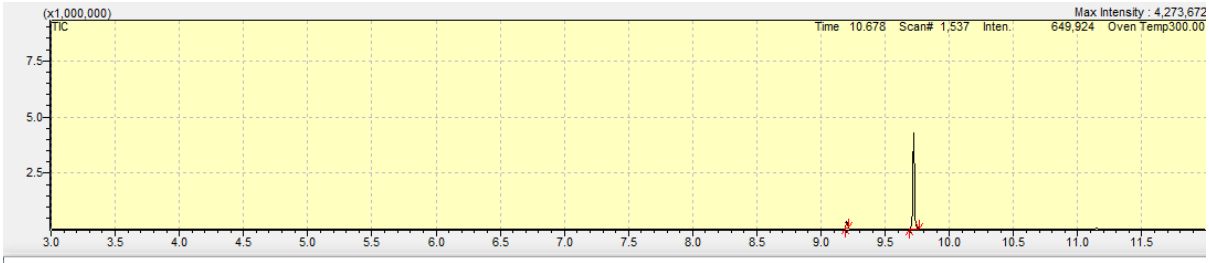
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.442	9.430	9.460	TIC	340806	0.69	339798	0.84	1.00	MI	
2	9.943	9.885	10.060	TIC	49099775	99.31	39890559	99.16	1.23	MI	

(*E*)-(4-(4-methoxyphenyl)but-3-en-2-yl)(phenyl)silane (1o)



The reaction was stirred for 6 h at 24 °C. The title compound was isolated (97.6 mg, 91%, *E*/*Z* = >99:1. 1.2/1,4 = 95:5) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.51 (m, 2H), 7.45–7.31 (m, 3H), 7.26–7.22 (m, 2H), 6.85–6.79 (m, 2H), 6.23 (d, *J* = 16.0 Hz, 1H), 6.16 (dd, *J* = 15.9, 6.9 Hz, 1H), 4.35–4.19 (m, 2H), 3.80 (s, 3H), 2.28–2.19 (m, 1H), 1.28 (d, *J* = 7.2 Hz, 3H). $\{^{1}H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 158.7, 135.9, 131.5, 131.1, 131.0, 129.9, 128.1, 127.0, 126.8, 114.1, 55.5, 22.8, 15.4. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{17}H_{21}OSi$, $[M+H^+]$: 269.1362, Found: 269.1354.

The GC trace for the crude mixture of the reaction to make **1o**.



Qualitative Table

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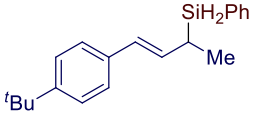
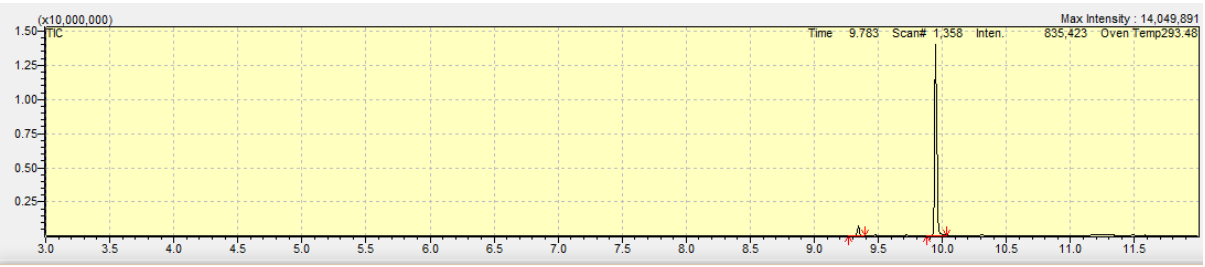
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.202	9.190	9.215	TIC	237343	5.12	274429	6.06	0.86	MI	
2	9.721	9.690	9.765	TIC	4398767	94.88	4251134	93.94	1.03	MI	

(*E*)-(4-(4-(tert-butyl)phenyl)but-3-en-2-yl)(phenyl)silane (1p)



The reaction was stirred for 24 h at 5 °C. The title compound was isolated (98.1 mg, 83%, *E*/*Z* = >99:1, 1,2/1.4 = 95:5) as colourless oil after chromatography on silica gel (200:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51–7.45 (m, 2H), 7.34–7.27 (m, 2H), 7.25–7.13 (m, 5H), 6.21–6.17 (m, 2H), 4.26–4.15 (m, 2H), 2.22–2.10 (m, 1H), 1.25–1.18 (m, 12H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 149.8, 135.9, 135.4, 132.4, 131.4, 129.9, 128.1, 127.2, 125.6, 125.5, 34.1, 31.5, 22.9, 15.3. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{20}H_{26}Si$, [M+H$^+$]: 295.5139, Found: 295.1875.

The GC trace for the crude mixture of the reaction to make **1p**.



Qualitative Table

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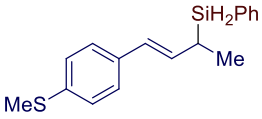
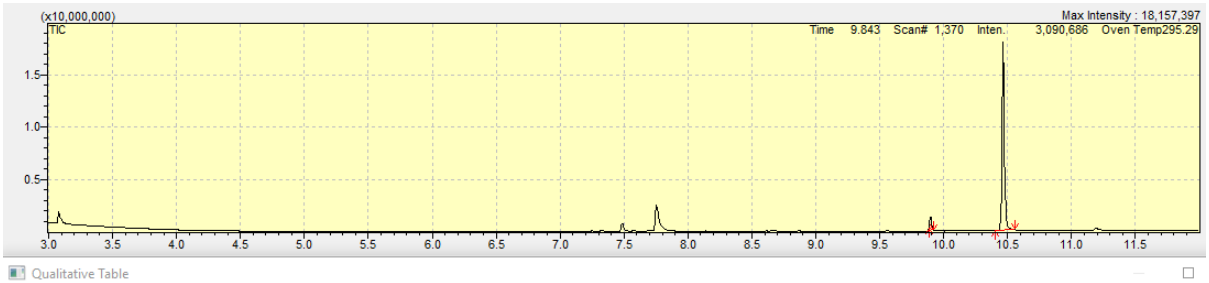
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.344	9.270	9.395	TIC	842600	4.79	722508	4.91	1.17	MI	
2	9.947	9.880	10.030	TIC	16734523	95.21	14001945	95.09	1.20	MI	

(*E*)-(4-(4-(methylthio)phenyl)but-3-en-2-yl)(phenyl)silane (1q)



The reaction was stirred for 24 h at 5 °C. The title compound was isolated (76.7 mg, 67%, *E*/*Z* = >99:1, 1,2/1.4 = 94:6) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.55 (m, 2H), 7.47–7.34 (m, 3H), 7.28–7.17 (m, 4H), 6.31 (dd, *J* = 15.9, 7.1 Hz, 1H), 6.23 (d, *J* = 16.0 Hz, 1H), 4.35–4.27 (m, 2H), 2.49 (s, 3H), 2.32–2.22 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 136.5, 135.8, 135.4, 132.8, 131.3, 130.0, 128.1, 127.2, 126.8, 126.3, 23.0, 16.3, 15.2. GC-MS (EI) *m*/*z*: calcd for $C_{17}H_{20}OSSi$ [M]$^+$: 284.11; Found: 284.15.

The GC trace for the crude mixture of the reaction to make **1q**.

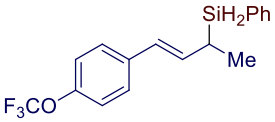


Qualitative Table

Print Edit View Similarity Search

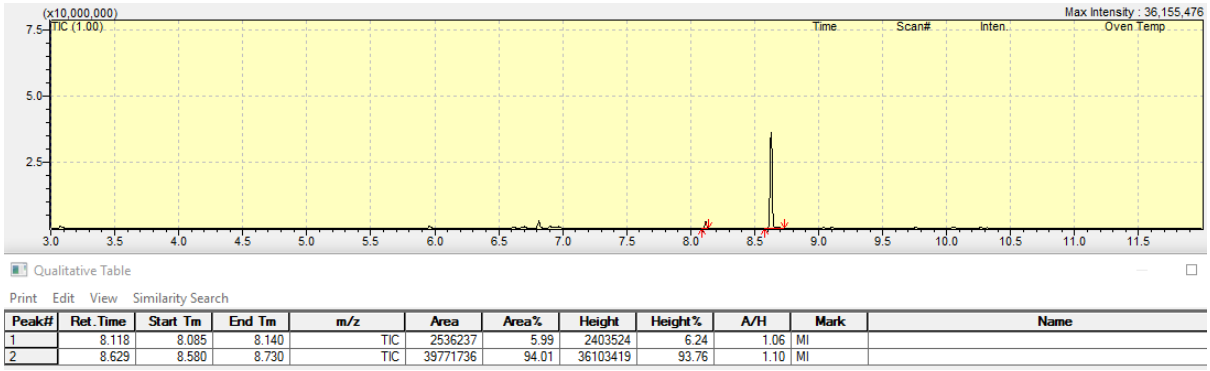
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.898	9.885	9.920	TIC	1060878	4.22	1103987	5.78	0.96	MI	
2	10.464	10.405	10.560	TIC	24100792	95.78	18001022	94.22	1.34	MI	

(*E*)-phenyl(4-(4-(trifluoromethoxy)phenyl)but-3-en-2-yl)silane (1r)



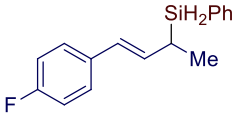
The reaction was stirred for 24 h at 5 °C. The title compound was isolated (87.7 mg, 68%, *E*/*Z* = >99:1, 1,2/1.4 = 94:6) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 (dd, *J* = 7.8, 1.4 Hz, 2H), 7.44–7.27 (m, 5H), 7.16–7.07 (m, 2H), 6.31 (dd, *J* = 15.9, 7.1 Hz, 1H), 6.24 (d, *J* = 16.0 Hz, 1H), 4.30 (d, *J* = 2.9 Hz, 2H), 2.33–2.18 (m, 1H), 1.30 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 148.0, 137.0, 135.8, 134.4, 131.1, 130.1, 128.2, 127.0, 126.0, 121.2, 120.7 (q, $J_{C\text{-}F}$ = 256.7 Hz), 23.2, 15.2. ^{19}F NMR (377 MHz, $CDCl_3$) δ -57.88. GC-MS (EI) *m*/*z*: calcd for $C_{17}H_{17}F_3OSi$ [M]$^+$: 322.10; Found: 322.10.

The GC trace for the crude mixture of the reaction to make **1r**.



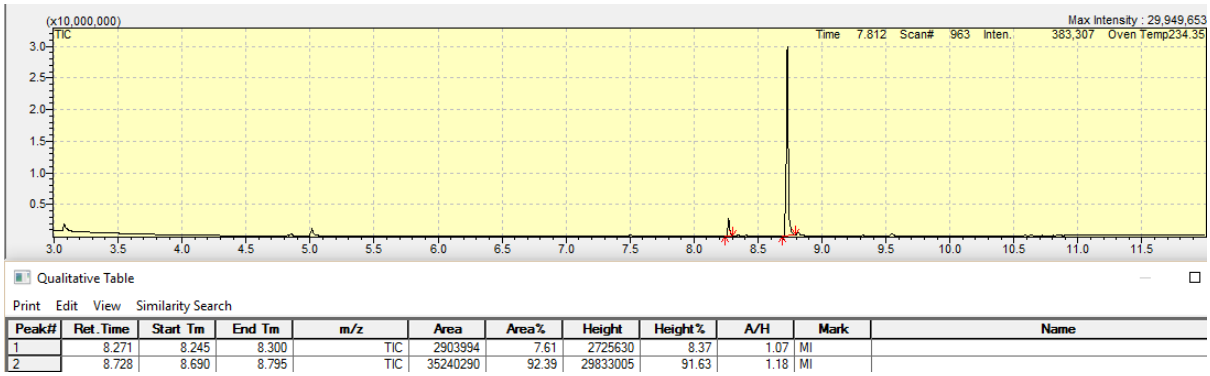
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.118	8.085	8.140	TIC	2536237	5.99	2403524	6.24	1.06	MI	
2	8.629	8.580	8.730	TIC	39771736	94.01	36103419	93.76	1.10	MI	

(*E*)-(4-(4-fluorophenyl)but-3-en-2-yl)(phenyl)silane (1s)



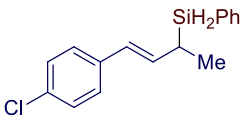
The reaction was stirred for 24 h at 5 °C. The title compound was isolated (76.7 mg, 75%, *E*/*Z* = >99:1, 1,2/1.4 = 92:8) as colourless oil after chromatography on silica gel (50:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64–7.56 (m, 2H), 7.44–7.34 (m, 3H), 7.29–7.23 (m, 2H), 7.03–6.95 (m, 2H), 6.25 (m, 2H), 4.41–4.27 (m, 2H), 2.34–2.20 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 161.9 (d, $J_{C\text{-}F}$ = 245.4 Hz), 135.8, 134.4 (d, $J_{C\text{-}F}$ = 3.3 Hz), 132.9 (d, $J_{C\text{-}F}$ = 2.2 Hz), 131.2, 130.0, 128.1, 127.3 (d, $J_{C\text{-}F}$ = 7.8 Hz), 126.3, 115.4 (d, $J_{C\text{-}F}$ = 21.5 Hz), 23.0, 15.3. ^{19}F NMR (377 MHz, $CDCl_3$) δ -116.01. HR-MS (APCI $^{+}$) *m*/*z* calcd for $C_{16}H_{18}FSi$, [M+H$^+$]: 257.3980, Found: 257.1162.

The GC trace for the crude mixture of the reaction to make **1s**.



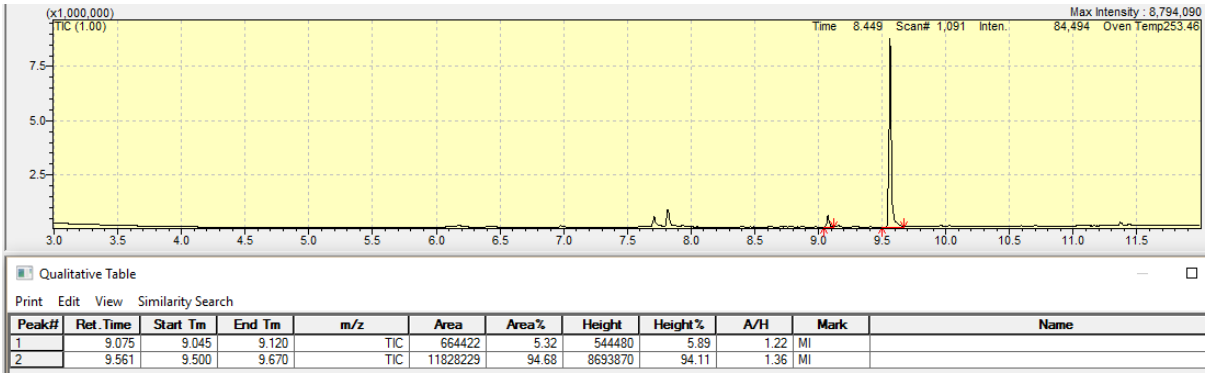
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.271	8.245	8.300	TIC	2903994	7.61	2725630	8.37	1.07	MI	
2	8.728	8.690	8.795	TIC	35240290	92.39	29833005	91.63	1.18	MI	

(*E*)-(4-(4-chlorophenyl)but-3-en-2-yl)(phenyl)silane (1t)



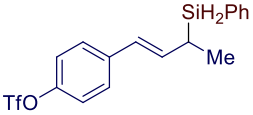
The reaction was stirred for 24 h at 5 °C. The title compound was isolated (71.5 mg, 66%, *E*/*Z* = >99:1, 1,2/1.4 = 95:5) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 (dd, *J* = 7.8, 1.4 Hz, 2H), 7.49–7.39 (m, 3H), 7.31–7.22 (m, 4H), 6.35 (dd, *J* = 15.9, 7.4 Hz, 1H), 6.25 (d, *J* = 16.1 Hz, 1H), 4.35 (d, *J* = 2.7 Hz, 2H), 2.36 – 2.24 (m, 1H), 1.34 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 136.7, 135.8, 134.0, 132.2, 131.1, 130.0, 128.7, 128.1, 127.1, 126.2, 23.1, 15.2. HR-MS (APCI^{+}) *m*/*z* calcd for $C_{16}H_{18}ClSi$, [M+H$^+$]: 273.8526, Found: 273.0860.

The GC trace for the crude mixture of the reaction to make **1t**.



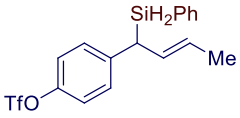
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.075	9.045	9.120	TIC	664422	5.32	544480	5.89	1.22	MI	
2	9.561	9.500	9.670	TIC	11828229	94.68	8693870	94.11	1.36	MI	

(*E*)-4-(3-(phenylsilyl)but-1-en-1-yl)phenyl trifluoromethanesulfonate (1u)



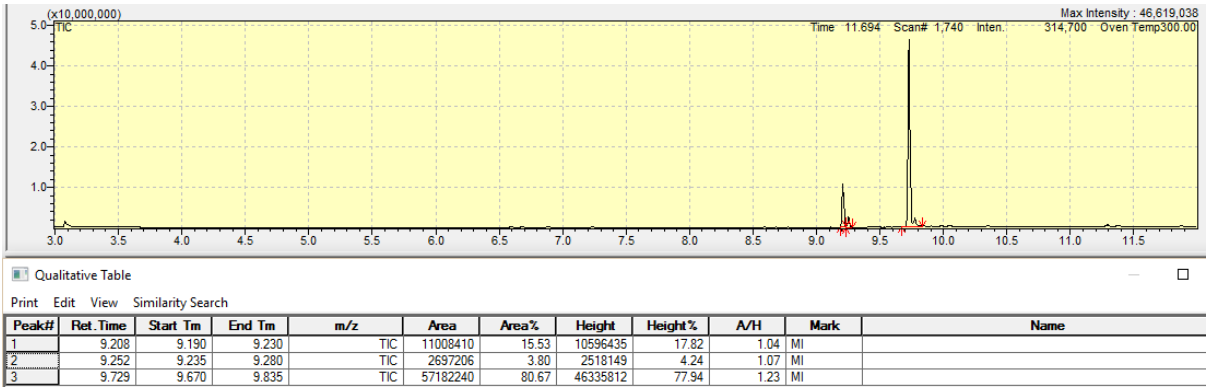
The reaction was stirred for 6 h at 24 °C. The title compound was isolated (140.8 mg, 91%, *E*/*Z* = >99:1, 1,2/1,4(and minor isomer) = 80:20) as colourless oil after chromatography on silica gel (10:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (dd, *J* = 7.8, 1.4 Hz, 2H), 7.43–7.33 (m, 4H), 7.20–7.12 (m, 3H), 6.35 (dd, *J* = 15.9, 7.5 Hz, 1H), 6.24 (d, *J* = 16.0 Hz, 1H), 4.30 (d, *J* = 2.9 Hz, 2H), 2.35 – 2.22 (m, 1H), 1.30 (d, *J* = 7.1 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 148.2, 138.6, 135.8, 130.9, 130.1, 129.2, 128.2, 127.3, 125.5, 122.1 (q, $J_{C\text{-}F}$ = 311.7 Hz), 121.5, 23.3, 15.1. ^{19}F NMR (377 MHz, $CDCl_3$) δ -72.83. HR-MS (APCI^{+}) *m*/*z* calcd for $C_{17}H_{18}F_3O_3SSi$, [M+H^{+}]: 387.0698, Found: 387.0698.

(*E*)-4-(1-(phenylsilyl)but-2-en-1-yl)phenyl trifluoromethanesulfonate (2u)



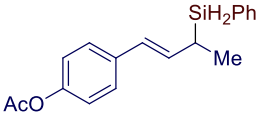
The title minor compound was isolated via chromatography on silica gel (10:1 hexane/EtOAc) together with the major 1,2-hydrosilylation product. ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.77 (ddq, *J* = 15.0, 8.6, 1.5 Hz, 1H), 5.58 – 5.48 (m, 1H).

The GC trace for the crude mixture of the reaction to make **1u**.



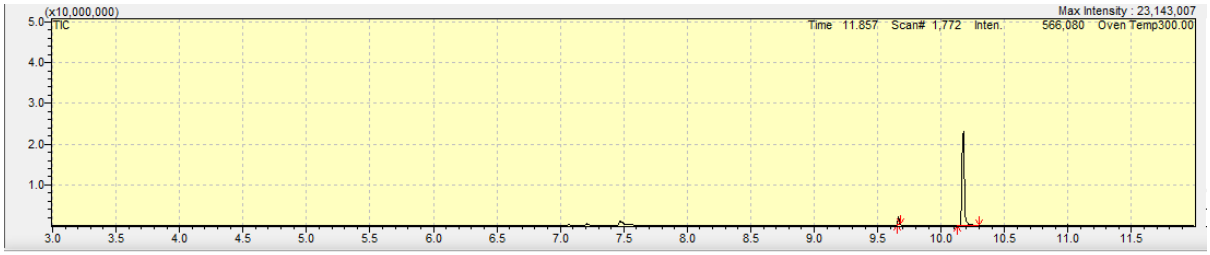
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.208	9.190	9.230	TIC	11008410	15.53	10596435	17.82	1.04	MI	
2	9.252	9.235	9.280	TIC	2697206	3.80	2518149	4.24	1.07	MI	
3	9.729	9.670	9.835	TIC	57182240	80.67	46335812	77.94	1.23	MI	

(*E*)-4-(3-(phenylsilyl)but-1-en-1-yl)phenyl acetate (1v)



The reaction was stirred for 24 h at 5 °C. The title compound was isolated (106 mg, 89%, *E*/*Z* = >99:1, 1,2/1.4 = 95:5) as colourless oil after chromatography on silica gel (25:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (dd, *J* = 7.9, 1.5 Hz, 2H), 7.45–7.33 (m, 3H), 7.31–7.27 (m, 2H), 7.00 (d, *J* = 8.7 Hz, 2H), 6.31–6.21 (m, 2H), 4.29 (d, *J* = 2.9 Hz, 2H), 2.32–2.25 (m, 4H), 1.29 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 169.7, 149.5, 136.1, 135.8, 133.5, 131.2, 130. 0, 128.1, 126.8, 126.5, 121.7, 23.0, 21.3, 15.2. GC-MS (EI) *m*/*z*: calcd for $C_{18}H_{20}O_2Si$ [M]$^{+}$: 296.12; Found: 296.15.

The GC trace for the crude mixture of the reaction to make **1v**.

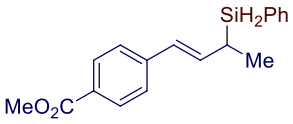


Qualitative Table

Print Edit View Similarity Search

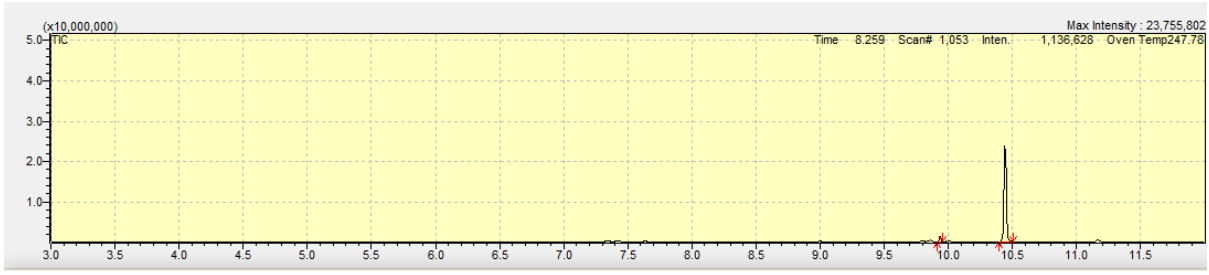
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.664	9.650	9.680	TIC	1672307	5.48	1775098	7.15	0.94	MI	
2	10.173	10.130	10.295	TIC	28870718	94.52	23050286	92.85	1.25	MI	

(*E*)-methyl 4-(3-(phenylsilyl)but-1-en-1-yl)benzoate (1w)



The reaction was stirred for 24 h at 5 °C with 0.2 mmol scale. The title compound was isolated (43.0 mg, 73%, *E*/*Z* = >99:1, 1,2/1.4 = 95:5) as colourless oil after chromatography on silica gel (25:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00–7.93 (m, 3H), 7.59–7.55 (m, 2H), 7.41–7.34 (m, 3H), 7.28–7.23 (m, 1H), 6.47 (dd, *J* = 15.9, 7.7 Hz, 1H), 6.29 (d, *J* = 16.6 Hz, 1H), 4.31 (dd, *J* = 2.9, 0.8 Hz, 2H), 3.91 (s, 3H), 2.36–2.26 (m, 1H), 1.31 (d, *J* = 7.1 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 167.2, 142.7, 136.4, 135.8, 130.9, 130.0, 129.8, 128.5, 128.2, 126.6, 125.7, 52.1, 23.5, 15.1. GC-MS (EI) *m*/*z*: calcd for $C_{18}H_{20}O_2Si$ [M]$^+$: 296.12; Found: 296.15.

The GC trace for the crude mixture of the reaction to make **1w**.



Qualitative Table

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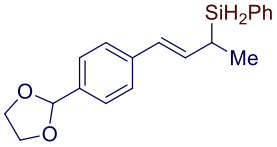
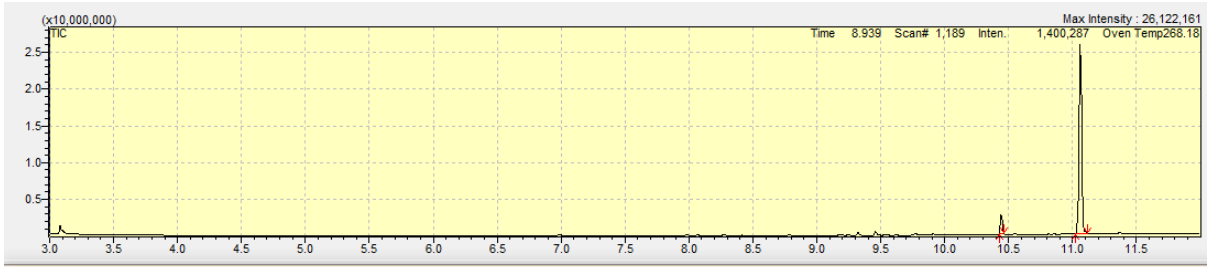
Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.936	9.915	9.955	TIC	1476599	4.61	1396243	5.59	1.06	MI	
2	10.442	10.395	10.510	TIC	30534573	95.39	23601477	94.41	1.29	MI	

(*E*)-(4-(4-(1,3-dioxolan-2-yl)phenyl)but-3-en-2-yl)(phenyl)silane (1x)



The reaction was stirred for 6 h at 24 °C. The title compound was isolated (94.8 mg, 76%, *E*/*Z* = >99:1, 1,2/1.4 = 93:7) as colourless oil after chromatography on silica gel (10:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61–7.55 (m, 2H), 7.42–7.32 (m, 7H), 6.37 (dd, *J* = 15.9, 7.3 Hz, 1H), 6.28 (d, *J* = 16.0 Hz, 1H), 5.81 (s, 1H), 4.32 (d, *J* = 2.9 Hz, 2H), 4.16–4.11 (m, 2H), 4.06–4.01 (m, 2H), 2.34–2.24 (m, 1H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 139.1, 136.2, 135.8, 133.9, 131.2, 130.0, 128.1, 127.0, 126.8, 125.8, 103.8, 65.4, 23.1, 15.2. GC-MS (EI) *m*/*z*: calcd for $C_{19}H_{22}O_2Si$ ([M]$^+$): 310.14; Found: 309.15.

The GC trace for the crude mixture of the reaction to make **1x**.



Qualitative Table

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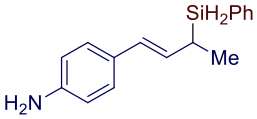
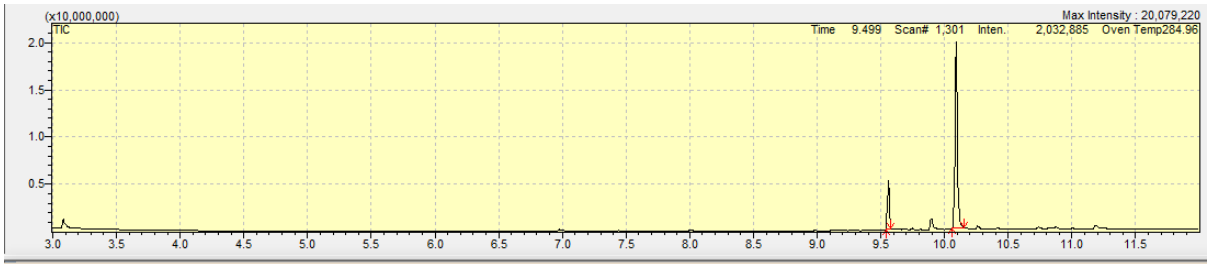
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.442	10.425	10.465	TIC	2922499	7.45	2628635	9.25	1.11	MI	
2	11.060	11.025	11.115	TIC	36290521	92.55	25791573	90.75	1.41	MI	

(*E*)-4-(3-(phenylsilyl)but-1-en-1-yl)aniline (1y)



The reaction was stirred for 6 h at 24 °C. The title compound was isolated (83.0 mg, 82%, *E*/*Z* = >99:1, 1,2/1.4 = 83:17) as colourless oil after chromatography on silica gel (5:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61–7.56 (m, 2H), 7.42–7.34 (m, 3H), 7.15–7.07 (m, 2H), 6.63–6.60 (m, 2H), 6.19 (d, *J* = 16.0 Hz, 1H), 6.11 (dd, *J* = 15.9, 7.3 Hz, 1H), 4.32–4.22 (m, 2H), 3.61 (s, 2H), 2.26–2.17 (m, 1H), 1.27 (d, *J* = 7.1 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 145.3, 135.9, 131.6, 129.9, 129.5, 128.7, 128.1, 127.2, 127.0, 115.3, 22.7, 15.4. GC-MS (EI) *m*/*z*: calcd for $C_{16}H_{19}NSi$ [M]$^{+}$: 253.41; Found: 253.15.

The GC trace for the crude mixture of the reaction to make **1y**.



Qualitative Table

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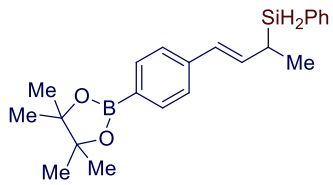
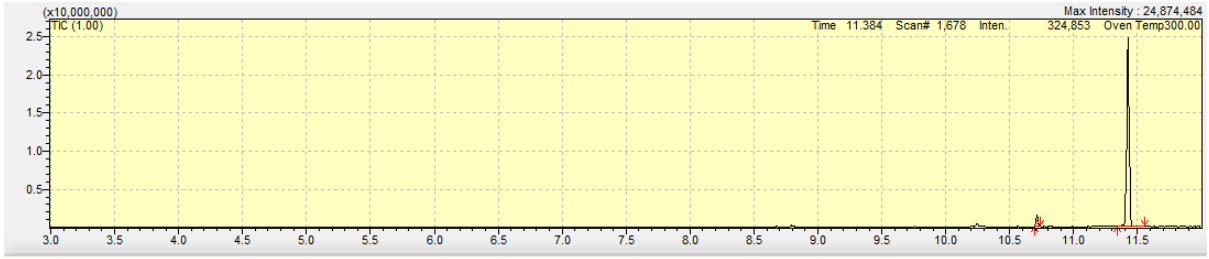
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.559	9.540	9.580	TIC	5685967	17.29	5099578	20.59	1.11	MI	
2	10.090	10.060	10.150	TIC	27198596	82.71	19669292	79.41	1.38	MI	



(*E*)-phenyl(4-(4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl)but-3-en-2-yl)silane (1z)

The reaction was stirred for 6 h at 24 °C. The title compound was isolated (127 mg, 87%, *E*/*Z* = >99:1, 1,2/1.4 = 95:5) as colourless oil after chromatography on silica gel (30:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 8.1 Hz, 2H), 7.58 (dd, *J* = 7.9, 1.5 Hz, 2H), 7.45–7.29 (m, 5H), 6.42 (dd, *J* = 15.9, 7.6 Hz, 1H), 6.28 (d, *J* = 16.0 Hz, 1H), 4.32 (d, *J* = 2.8 Hz, 2H), 2.34–2.23 (m, 1H), 1.36 (s, 12H), 1.31 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (75 MHz, $CDCl_3$) δ 140.9, 135.8, 135.2, 134.4, 131.1, 130.0, 128.1, 127.5, 125.2, 83.8, 25.0, 23.2, 15.1. The carbon connected with boron could not be observed due to quadrupole of boron. GC-MS (EI) *m*/*z*: calcd for $C_{22}H_{29}BO_2Si$ ([M]$^{+}$): 364.20; Found: 364.25.

The GC trace for the crude mixture of the reaction to make **1z**.

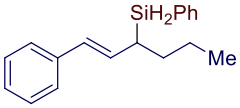


Qualitative Table

Print Edit View Similarity Search

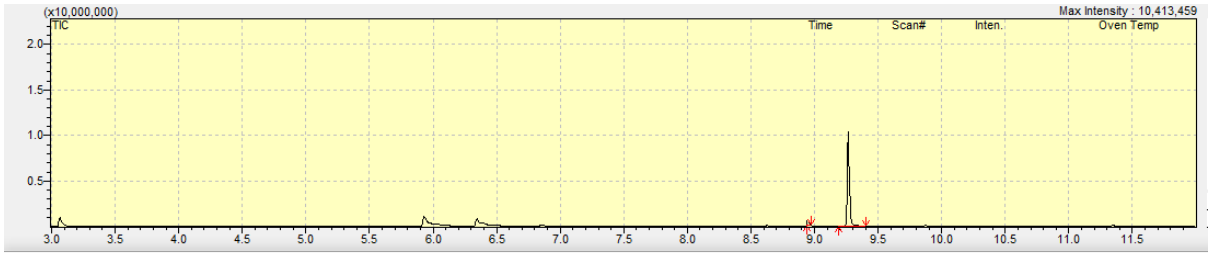
Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	10.714	10.695	10.735	TIC	1700120	4.94	1542682	5.87	1.10	MI	
2	11.425	11.345	11.560	TIC	32712704	95.06	24751194	94.13	1.32	MI	

(*E*)-phenyl(1-phenylhex-1-en-3-yl)silane (1aa)



The reaction was stirred for 48 h at 24 °C. The title compound was isolated (61.0 mg, 57%, *E*/*Z* = >99:1, 1,2/1.4 = 94:6) as colourless oil after chromatography on silica gel (100:0 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (dd, *J* = 7.9, 1.4 Hz, 2H), 7.38–7.31 (m, 3H), 7.25 (d, *J* = 3.3 Hz, 4H), 7.17–7.11 (m, 1H), 6.24 (d, *J* = 15.9 Hz, 1H), 6.11 (dd, *J* = 15.8, 9.2 Hz, 1H), 4.31–4.26 (m, 2H), 2.21–2.13 (m, 1H), 1.62–1.54 (m, 2H), 1.49–1.39 (m, 1H), 1.37–1.27 (m, 1H), 0.86 (t, *J* = 7.3 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.2, 135.9, 132.1, 131.4, 129.9, 128.9, 128.6, 128.1, 126.7, 125.9, 32.9, 29.5, 22.6, 14.0. GC-MS (EI) *m*/*z*: calcd for $C_{18}H_{22}Si$ $[M]^+$: 266.45; Found: 266.20.

The GC trace for the crude mixture of the reaction to make **1aa**.

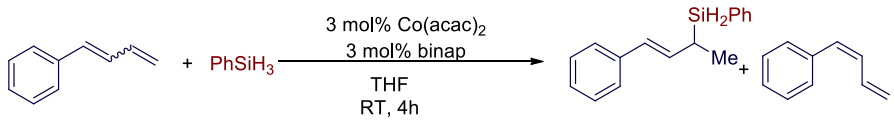


Qualitative Table

Print Edit View Similarity Search

Peak#	Ret.Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.949	8.935	8.970	TIC	726190	5.53	659303	5.99	1.10	MI	
2	9.265	9.190	9.405	TIC	12408588	94.47	10344330	94.01	1.20	MI	

General procedure for Separation of *cis*-1,3-dienes via hydrosilylation reaction



4.00 mmol
E:*Z* = 45:55

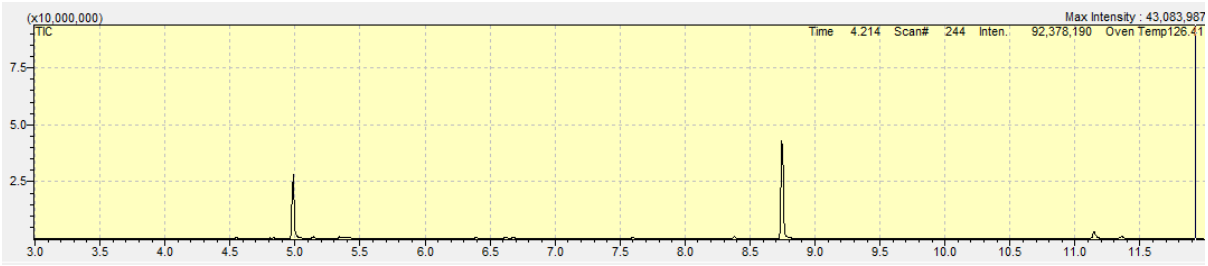
2.40 mmol

250 mg
1.05 mmol
58%

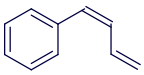
130 mg
1.00 mmol
45%

In an Ar-filled glovebox, a mixture of $Co(acac)_2$ (19.0 mg, 0.120 mmol) and binap (45.0 mg, 0.120 mmol) in THF (5 mL) was added into a 20-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding phenylsilane (0.260 g, 2.40 mmol) and *trans*/*cis*-1,3-dienes (0.520 g, 4.00 mmol) successively. The vial was removed from the glove box, and the mixture was stirred at room temperature for 6 hours. After that, a GC-MS analysis was done and the crude reaction mixture was concentrated under vacuum using a 30 °C water bath and the residue was purified by flash column chromatography using hexane and ethyl acetate (100:1) as eluents yielding (*E*)-allylsilane **1a** (0.250 g, 1.05 mmol, 58%) as a colorless oil and recovering (*Z*)-1-phenyl-1,3-diene (Z/E = 98:2, 0.130 g, 1.0 mmol, 45%).

The GC trace for the crude reaction mixture to form **1a** (t_R = 5.0 min) and **(*Z*)-1-phenyl-1,3-diene** (t_R = 8.8 min)**.**



(*Z*)-1-phenyl-1,3-diene

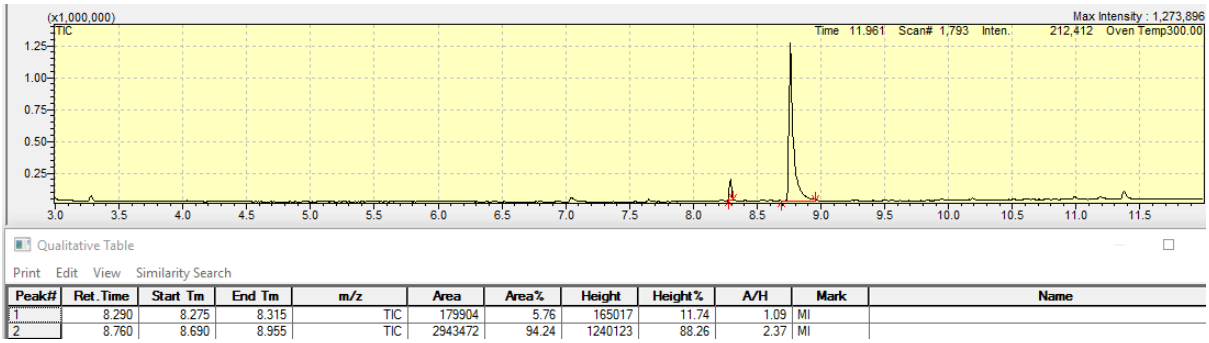


^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36–7.31 (m, 4H), 7.28–7.22 (m, 1H), 6.89 (dddd, *J* = 16.9, 11.2, 10.1, 1.0 Hz, 1H), 6.47 (d, *J* = 11.5 Hz, 1H), 6.27 (t, *J* = 11.3 Hz, 1H), 5.38 (ddd, *J* = 16.9, 1.8, 0.9 Hz, 1H), 5.23 (dt, *J* = 10.1, 2.1 Hz, 1H). $\{^{1}H\}^{13}C$ NMR (101 MHz, $CDCl_3$) δ 137.5, 133.4, 130.9, 130.6, 129.2, 128.4, 127.2, 119.8. GC-MS (EI) *m/z*: calcd for $C_{10}H_{10}$ $[M]^+$: 130.08; Found: 129.15.

General procedure for Co-catalyzed Markovnikov 1,2-hydrosilylation of trans/cis 1,3-dienes (Outside glovebox under nitrogen protection)

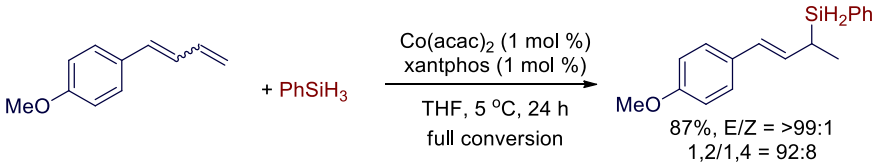
$Co(acac)_2$ (1.0 mg, 4.0 μmol) and xantphos (2.3 mg, 4.0 μmol) were pre-weighted in air on the open bench and added into a 25 mL Schlenk flask. The Schlenk flask was back-filled with N_2 thrice and dry THF (1 mL) was then added. The resulting mixture was stirred for 2 mins to give a pale pink solution. Subsequently, phenylsilane (54.1 mg, 0.500 mmol) and 1-phenylbutadiene (51.6 mg, 0.400 mmol) were added with the aid of a microsyringe which gave a pale-yellow solution. Upon stirring the mixture for 6 hours, a GC-MS analysis was conducted to determine the selectivity of the crude reaction mixture prior concentrating it under vacuum. Subsequently, the residue was purified by flash column chromatography using a mixture of ethyl acetate and hexane as eluent yielding (*E*)-phenyl(4-phenylbut-3-en-2-yl)silane **1a** (74.7mg, 78%, *E*/*Z* = >99:1, 1,2/1.4 = 94:6) as a colorless oil.

The GC trace for the crude mixture of the reaction to form **1a**.



Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	8.290	8.275	8.315	TIC	179904	5.76	165017	11.74	1.09	MI	
2	8.760	8.690	8.955	TIC	2943472	94.24	1240123	88.26	2.37	MI	

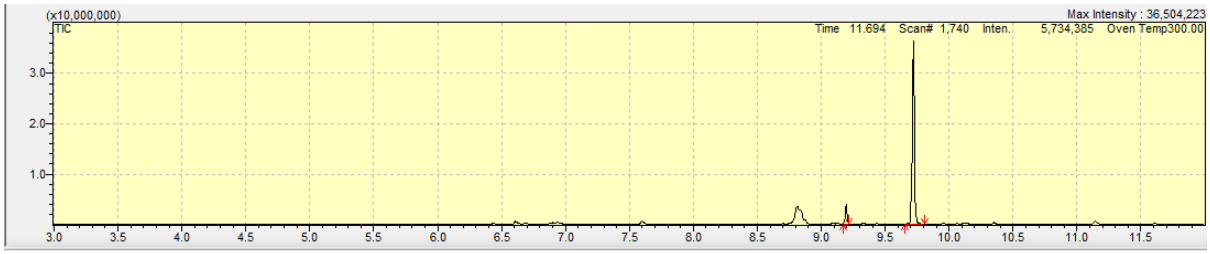
General procedure for gram scale Co-catalyzed Markovnikov 1,2-hydrosilylation of 1,3-dienes



$Co(acac)_2$ (25.7 mg, 0.100 mmol) and xantphos (57.9 mg, 0.100 mmol) were weighted in air on the open bench and added into a 100 mL Schlenk flask. The Schlenk flask was back-filled with N_2 thrice and dry THF (25 mL) was then added. The resulting mixture was stirred for 2 mins to give a pale pink solution prior adding phenylsilane (1.35 g, 12.5 mmol) and 1-(buta-1,3-dien-1-yl)-4-methoxybenzene (1.60 g, 10.0 mmol) successively. The Schlenk flask was removed from the glove box, and the mixture was stirred at room

temperature for 6 hours. Subsequently, a GC-MS analysis was conducted to determine the selectivity of the crude reaction mixture prior concentrating it under vacuum. The residue was then purified by flash column chromatography using a mixture of ethyl acetate and hexane as eluent yielding (*E*)-(4-(4-methoxyphenyl)but-3-en-2-yl)(phenyl)silane **1o** (2.34 g, 87 %, *E*/*Z* = >99:1, 1,2/1.4 = 92:8) as a colorless oil.

The GC trace for the crude reaction mixture to form **1o.**



Qualitative Table

Print Edit View Similarity Search

Peak#	Ret. Time	Start Tm	End Tm	m/z	Area	Area%	Height	Height%	A/H	Mark	Name
1	9.195	9.175	9.215	TIC	3903588	7.75	3820825	9.49	1.02	MI	
2	9.721	9.655	9.810	TIC	46447584	92.25	36430526	90.51	1.27	MI	

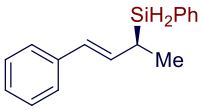
General procedure for asymmetric Co-catalyzed Markovnikov 1,2-hydrosilylation of *trans*-1,3-dienes

In an Ar-filled glovebox, a mixture of $Co(acac)_2$ (5.1 mg, 20 μmol) and (*R*)-difluorphos (14.0 mg, 20 μmol) in THF (1 mL) was added into a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding phenylsilane (54.1 mg, 0.500 mmol) and *trans*-1,3-dienes (0.400 mmol) successively. The vial was removed from the glove box, and the mixture was stirred at room temperature for 6 hours. After that, the crude reaction mixture was concentrated under vacuum and the residue was purified by flash column chromatography using a mixture of ethyl acetate and hexane as eluent. The details and characterization data of the products are stated below. The enantiopurity of the product was analyzed by chiral HPLC or oxidized to (*E*)-allylic alcohol prior analysing with chiral HPLC.

Procedure for oxidation of (*E*)-allylsilanes

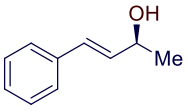
A mixture of (*E*)-allylsilane (0.200 mmol) and $KHCO_3$ (0.200 mmol) was added into a mixture of THF (0.5 mL) and methanol (0.5 mL) in a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins. Subsequently, 30% aqueous H_2O_2 (0.500 mmol) was dropwise slowly into the reaction mixture and then stirred at room temperature for 5 hours. Anhydrous sodium thiosulfate was then added to quenched the excess oxidant prior it was extracted with ethyl acetate, dried over sodium sulfate, filtered and concentrated under vacuum. The residue was then purified by flash column chromatography using hexane and ethyl acetate as eluents yielding (*E*)-allylic alcohol.

(*S*,*E*)-phenyl(4-phenylbut-3-en-2-yl)silane (1a)

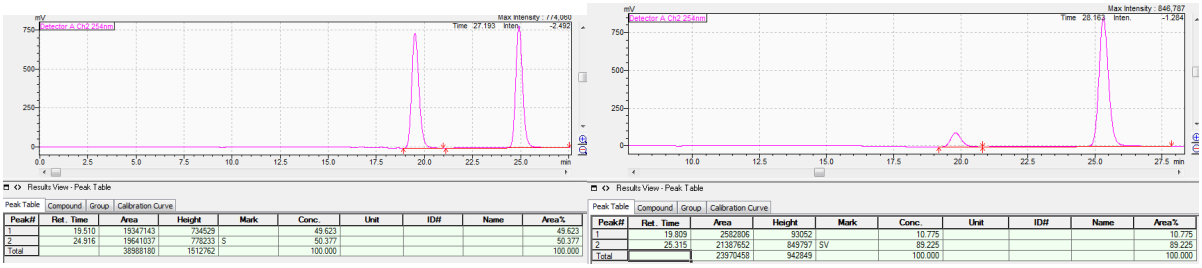


The reaction was stirred for 6 h at 24 °C. The title compound was isolated (68.0 mg, 71%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63–7.58 (m, 2H), 7.47–7.36 (m, 3H), 7.34–7.28 (m, 4H), 7.23–7.17 (m, 1H), 6.35 (dd, *J* = 15.9, 6.8 Hz, 1H), 6.29 (d, *J* = 16.0 Hz, 1H), 4.35–4.28 (m, 2H), 2.35–2.23 (m, 1H), 1.32 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 138.2, 135.9, 133.2, 131.30, 123.0, 128.6, 128.1, 127.4, 126.7, 125.9, 23.0, 15.3. HR-MS (APCI$^+$) *m/z* calcd for $C_{16}H_{18}Si$, [M+H$^+$]: 239.1256, Found: 239.1258. Optical Rotation: $[\alpha]^{20}_D$ = -15.00 (c = 0.20 g/cm^3, $CHCl_3$). The absolute configuration was assigned by oxidizing it to the corresponding allylic alcohol (**1a'''**).

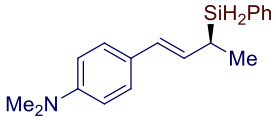
(*S*,*E*)-4-phenylbut-3-en-2-ol (1a''')



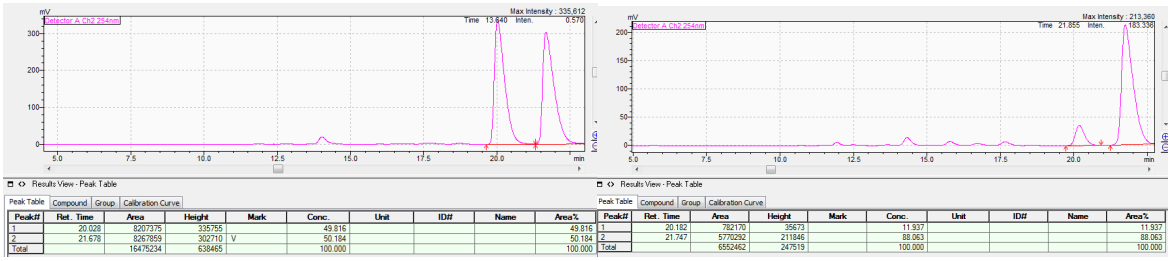
The title compound was isolated (34.5 mg, 82%, 88:11 er) as colourless oil after chromatography on silica gel (10:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 (dd, *J* = 5.3, 3.4 Hz, 2H), 7.34–7.29 (m, 2H), 7.26–7.21 (m, 1H), 6.57 (d, *J* = 16.0 Hz, 1H), 6.27 (dd, *J* = 15.9, 6.4 Hz, 1H), 4.55–4.44 (m, 1H), 1.38 (d, *J* = 6.4 Hz, 3H).{^{1}H} ^{13}C NMR (101 MHz, $CDCl_3$) δ 136.9, 133.7, 129.6, 128.7, 127.8, 126.6, 69.1, 23.6. Optical Rotation: $[\alpha]^{20}_{D}$ = -16.10 (c = 0.20 g/cm^3, $CHCl_3$). The absolute configuration was assigned by comparing with the optical rotation reported in the literature.[5] HPLC condition: Chiral column IB, n-hexane/i-PrOH = 90:10, flow rate = 0.35 mL/min, wavelength = 254 nm, t_R = 19.8 min for minor isomer, t_R = 25.3 min for major isomer.



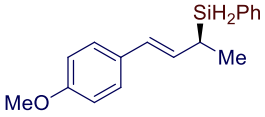
(*S*,*E*)-N,N-dimethyl-4-(3-(phenylsilyl)but-1-en-1-yl)aniline (1d)



The title compound was isolated (91.0 mg, 80%, *E*/*Z* = >99:1) as colourless oil after chromatography on silica gel (20:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (dd, *J* = 7.8, 1.4 Hz, 2H), 7.29 – 7.17 (m, 3H), 7.08 (d, *J* = 8.7 Hz, 2H), 6.54 (d, *J* = 8.8 Hz, 2H), 6.08 (d, *J* = 15.9 Hz, 1H), 5.98 (dd, *J* = 15.8, 7.5 Hz, 1H), 4.23 – 4.09 (m, 2H), 2.79 (s, 6H), 2.15 – 2.03 (m, 1H), 1.15 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 149.7, 135.9, 131.7, 129.8, 128.9, 128.0, 127.3, 127.1, 126.7, 112.8, 40.8, 22.7, 15.5. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{18}H_{24}NSi$, [M+H$^+$]: 282.1678, Found: 282.1681. The absolute configuration was assigned by analog to that of **1a.** Optical Rotation: $[\alpha]^{20}_{D}$ = -21.00 (c = 0.30 g/cm^3, $CHCl_3$). HPLC condition: Chiral column IB, n-hexane/i-PrOH = 99.9:0.1, flow rate = 0.35 mL/min, wavelength = 254 nm, t_R = 20.2 min for minor isomer, t_R = 21.7 min for major isomer.

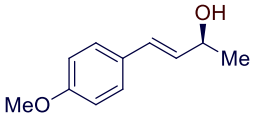


(*S*,*E*)-(4-(4-methoxyphenyl)but-3-en-2-yl)(phenyl)silane (1o)

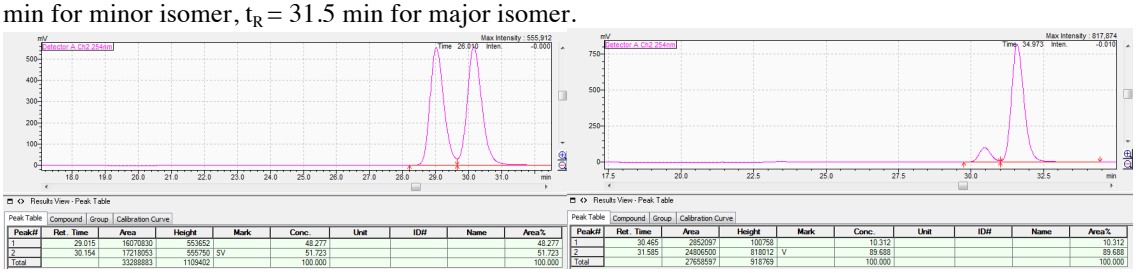


The reaction was stirred for 12 h at 24 °C. The title compound was isolated (42.0 mg, 61%, *E*/*Z* = >99:1.) as colourless oil after chromatography on silica gel (100:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62–7.51 (m, 2H), 7.45–7.31 (m, 3H), 7.26–7.22 (m, 2H), 6.85–6.79 (m, 2H), 6.23 (d, *J* = 16.0 Hz, 1H), 6.16 (dd, *J* = 15.9, 6.9 Hz, 1H), 4.35–4.19 (m, 2H), 3.80 (s, 3H), 2.28–2.19 (m, 1H), 1.28 (d, *J* = 7.2 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 158.7, 135.9, 131.5, 131.1, 131.0, 129.9, 128.1, 127.0, 126.8, 114.1, 55.5, 22.8, 15.4. HR-MS (APCI$^+$) *m*/*z* calcd for $C_{17}H_{21}OSi$, [M+H$^+$]: 269.1362, Found: 269.1354. Optical Rotation: $[\alpha]^{20}_{D}$ = -21.00 (c = 0.30 g/cm^3, $CHCl_3$). The absolute configuration was assigned by oxidizing it to the corresponding allylic alcohol (**1o''**).

(*S*,*E*)-4-(4-methoxyphenyl)but-3-en-2-ol (1o''')



The title compound was isolated (31.7 mg, 73%, 90:10 er) as colourless oil after chromatography on silica gel (10:1 hexane/EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35–7.28 (m, 2H), 6.88–6.83 (m, 2H), 6.51 (d, *J* = 15.9 Hz, 1H), 6.13 (dd, *J* = 15.9, 6.6 Hz, 1H), 4.47 (p, *J* = 6.3 Hz, 1H), 3.81 (s, 3H), 1.37 (d, *J* = 6.4 Hz, 3H). {^{1}H}^{13}C NMR (101 MHz, $CDCl_3$) δ 159.5, 131.6, 129.6, 129.2, 127.8, 114.2, 69.3, 55.5, 23.6. Optical Rotation: $[\alpha]^{20}_D$ = -10.70 (c = 0.30 g/cm^3, $CHCl_3$). The absolute configuration was assigned by analog to that of **1a"**. HPLC condition: Chiral column IB, n-hexane/i-PrOH = 93:7, flow rate = 0.35 mL/min, wavelength = 254 nm, t_R = 30.4 min for minor isomer, t_R = 31.5 min for major isomer.

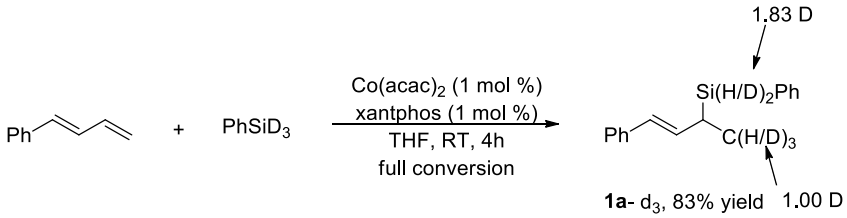


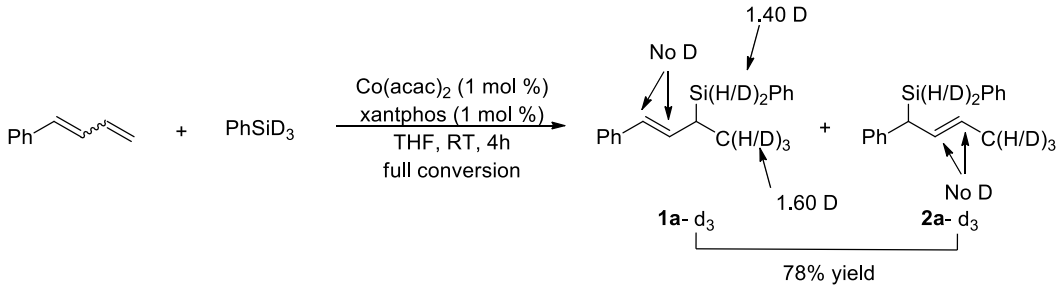
Mechanistic studies

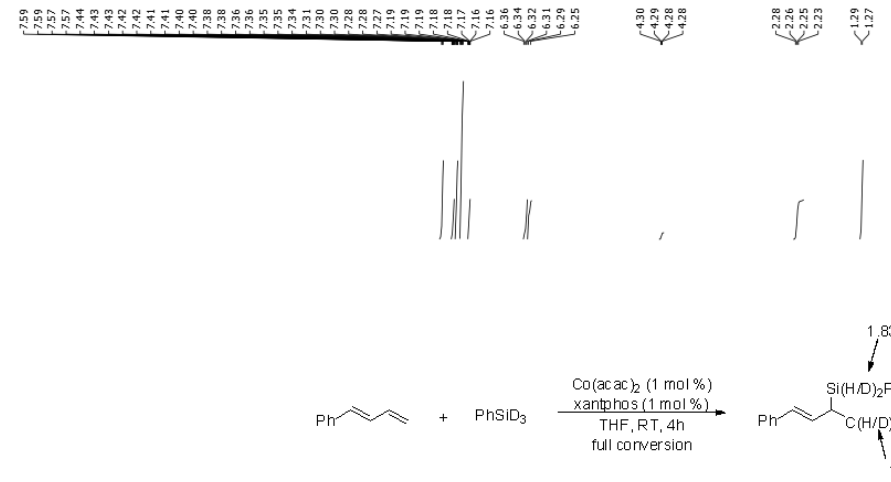
Procedure for Deuterium-labeling Experiments

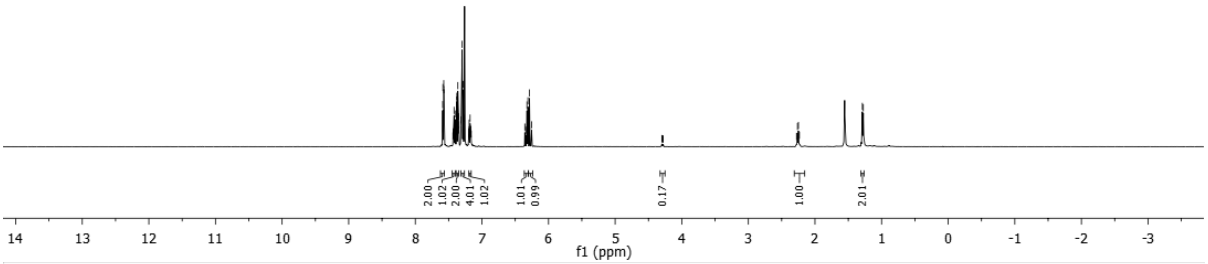
Note: $PhSiD_3$[6] was synthesized based on previously reported procedure.

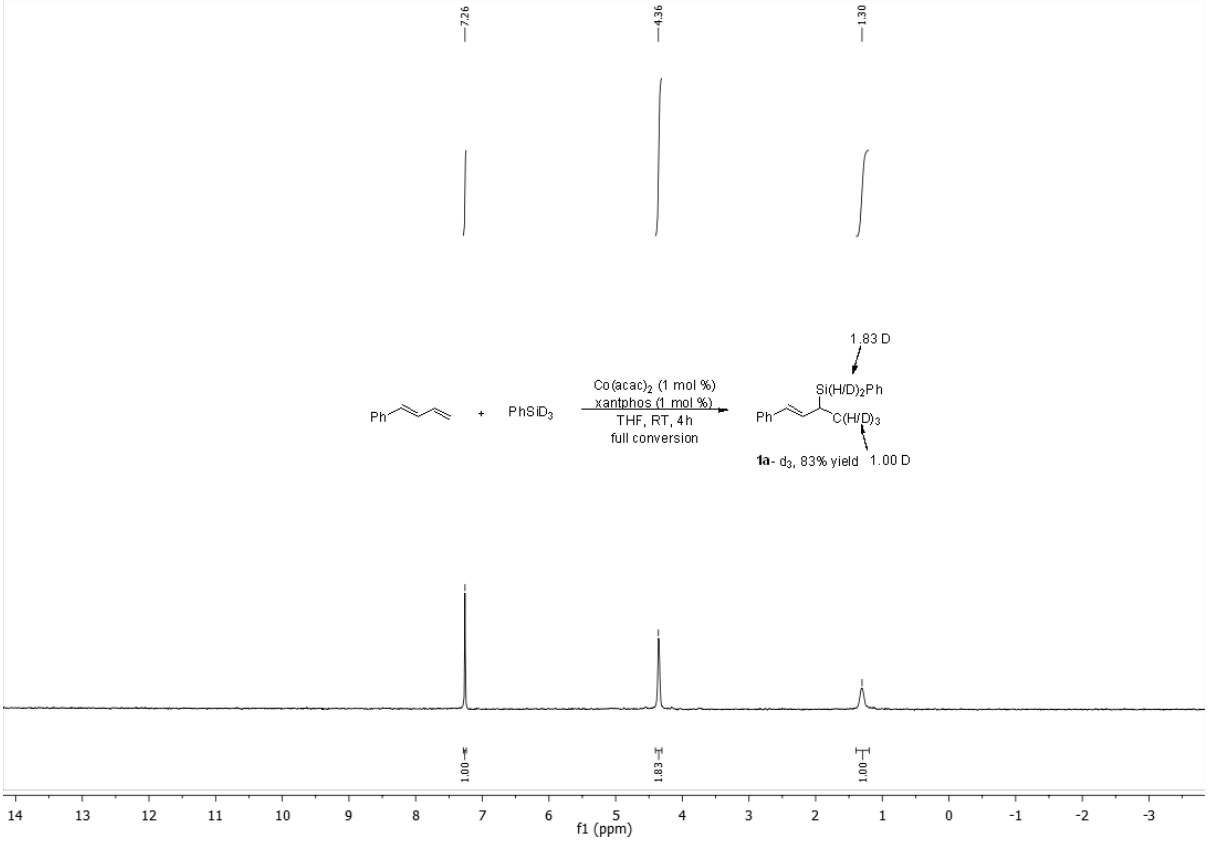
In an Ar-filled glovebox, a mixture of $Co(acac)_2$ (0.5 mg, 2.0 μmol) and xantphos (1.2 mg, 2.0 μmol) in THF (0.5 mL) was added into a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding $PhSiD_3$ (27.8 mg, 0.25 mmol) and 1,3-dienes (0.2 mmol) successively. The vial was removed from the glove box, and the mixture was stirred at room temperature for 4 hours. After that, the crude reaction mixture was concentrated under vacuum and the residue was purified by flash column chromatography using a mixture of ethyl acetate and hexane (100:1) as eluent. The details and characterization data of the products are stated below. Equimolar of chloroform-*d* was added as the internal standard for ^{2}H NMR analysis.

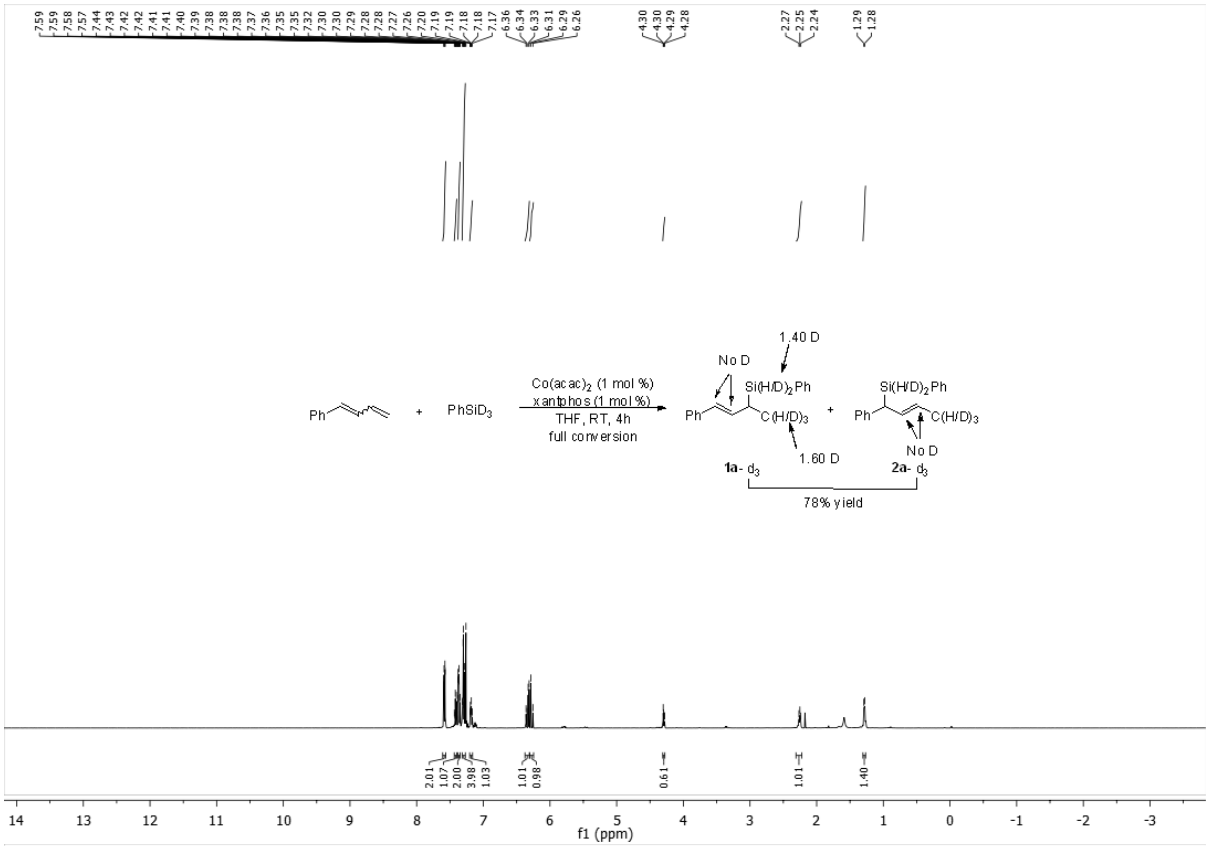


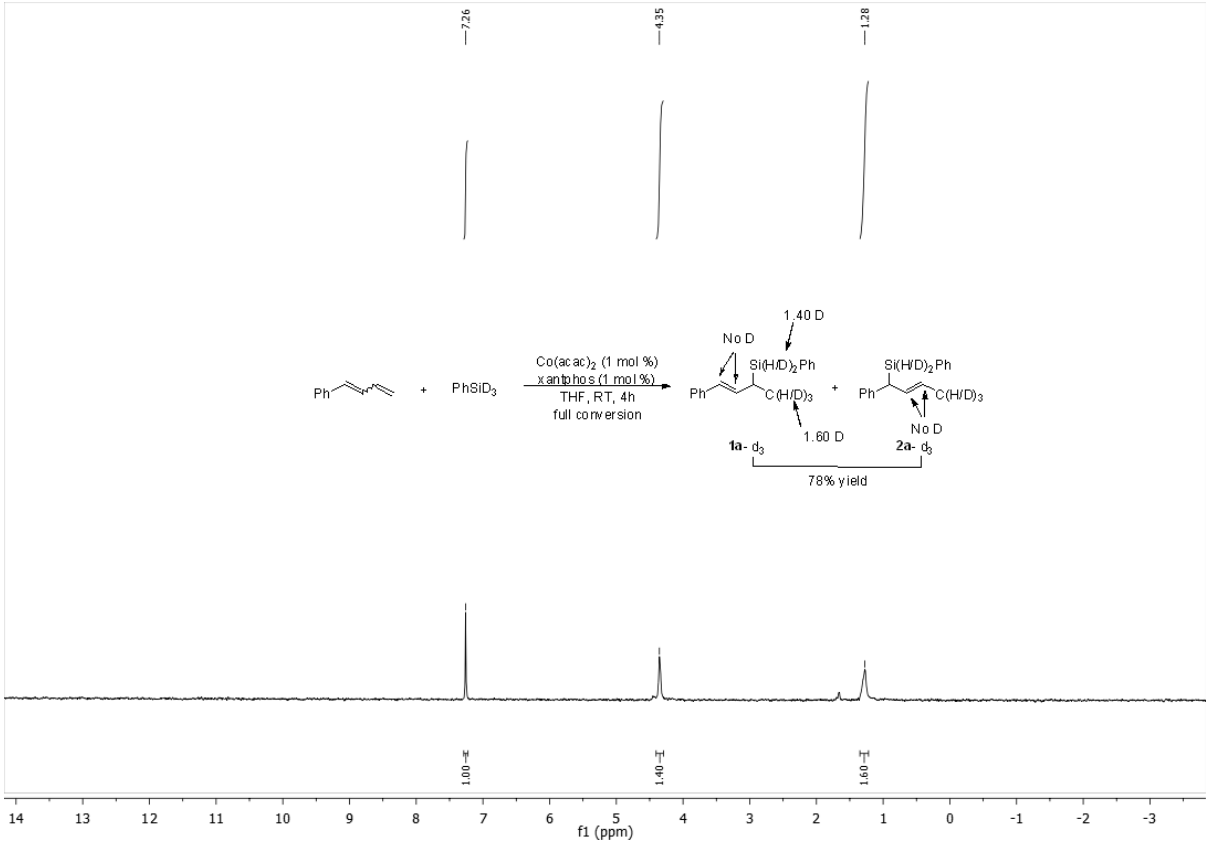



Ph
+ PhSiD3
Co(acac)2 (1 mol %)
xantphos (1 mol %)
THF, RT, 4h
full conversion
Si(H/D)2Ph
C(H/D)3
1.83 D
1.00 D


f1 (ppm)

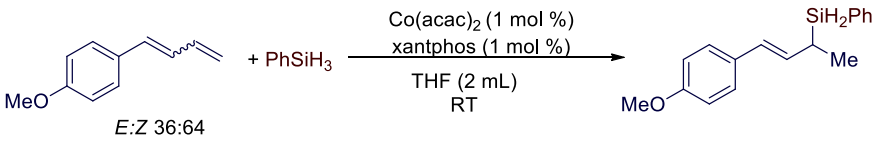

Ph
+ PhSiD3
Co(acac)2 (1 mol %)
xantphos (1 mol %)
THF, RT, 4h
full conversion
Si(H/D)2Ph
C(H/D)3
1.83 D
1.00 D
1a- d3, 83% yield
f1 (ppm)


Ph
+
PhSiD3
Co(acac)2 (1 mol %)
xantphos (1 mol %)
THF, RT, 4h
full conversion
1.40 D
No D
Si(H/D)2Ph
C(H/D)3
1.60 D
No D
1a- d3
2a- d3
78% yield
f1 (ppm)

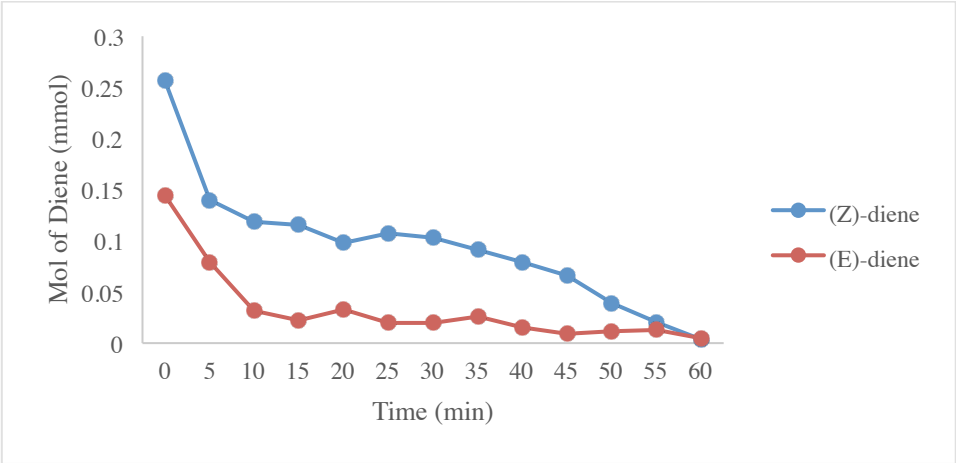

Ph
+
PhSiD3
Co(acac)2 (1 mol %)
xantphos (1 mol %)
THF, RT, 4h
full conversion
1.40 D
No D
Si(H/D)2Ph
C(H/D)3
1.60 D
No D
1a- d3
2a- d3
78% yield
f1 (ppm)

Reaction monitoring

General Procedure for Reaction monitoring of (*E*/*Z*)-1-(buta-1,3-dien-1-yl)-4-methoxybenzene with phenylsilane



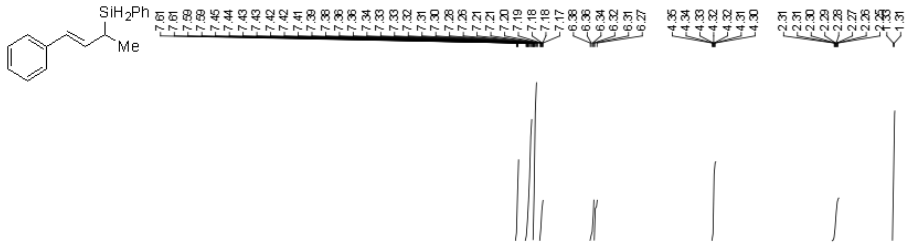
In an Ar-filled glovebox, a mixture of (1.0 mg, 4.0 μmol) and xantphos (2.3 mg, 4.0 μmol) in THF (2 mL) was added into a 4-mL screw-capped vial containing a magnetic stirring bar. The resulting mixture was stirred for 2 mins prior adding phenylsilane (54.1 mg, 0.5 mmol) and 1-(buta-1,3-dien-1-yl)-4-methoxybenzene (64.1 mg, 0.4 mmol) successively. Lastly, tridecane (27.7 mg, 0.15 mmol) was added into the reaction mixture as an internal standard. The mixture was stirred at room temperature. A GC analysis was done for the crude mixture for every 5 minutes to monitor the reaction. It was found that the (*E*)-1-(buta-1,3-dien-1-yl)-4-methoxybenzene was consumed at a significantly higher rate than (*Z*)-1-(buta-1,3-dien-1-yl)-4-methoxybenzene.

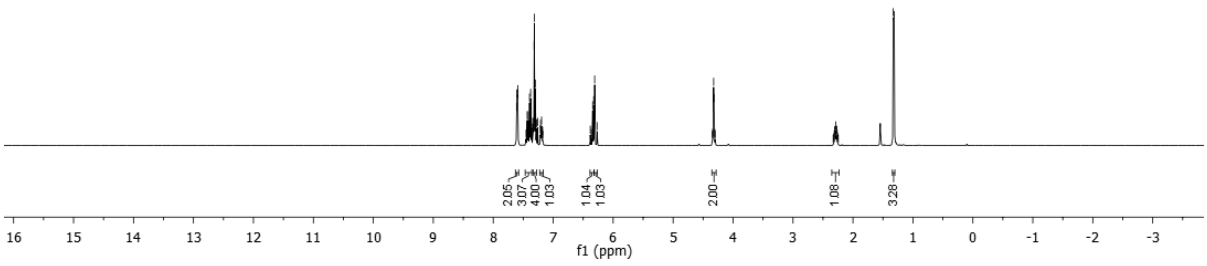


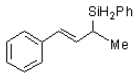
References

1. C. H. Schuster, T. Diao, I. Pappas and P. J. Chirik, *ACS Catalysis*, 2016, **6**, 2632-2636.
2. K. B. Urkalan and M. S. Sigman, *Angewandte Chemie International Edition*, 2009, **48**, 3146-3149.
3. G. Battistuzzi, S. Cacchi and G. Fabrizi, *Organic Letters*, 2003, **5**, 777-780.
4. P. Röse, S. Emge, J.-i. Yoshida and G. Hilt, *Beilstein Journal of Organic Chemistry*, 2015, **11**, 174-183.
5. L. Sun, Y. Guo, G. Peng and C. Li, *Synthesis*, 2008, **2008**, 3487-3491.
6. V. Avrorin, G. Fominykh, I. Ignat'ev, E. Sinotova and T. Kochina, *Russian Journal of General Chemistry*, 2014, **84**, 2125-2129.

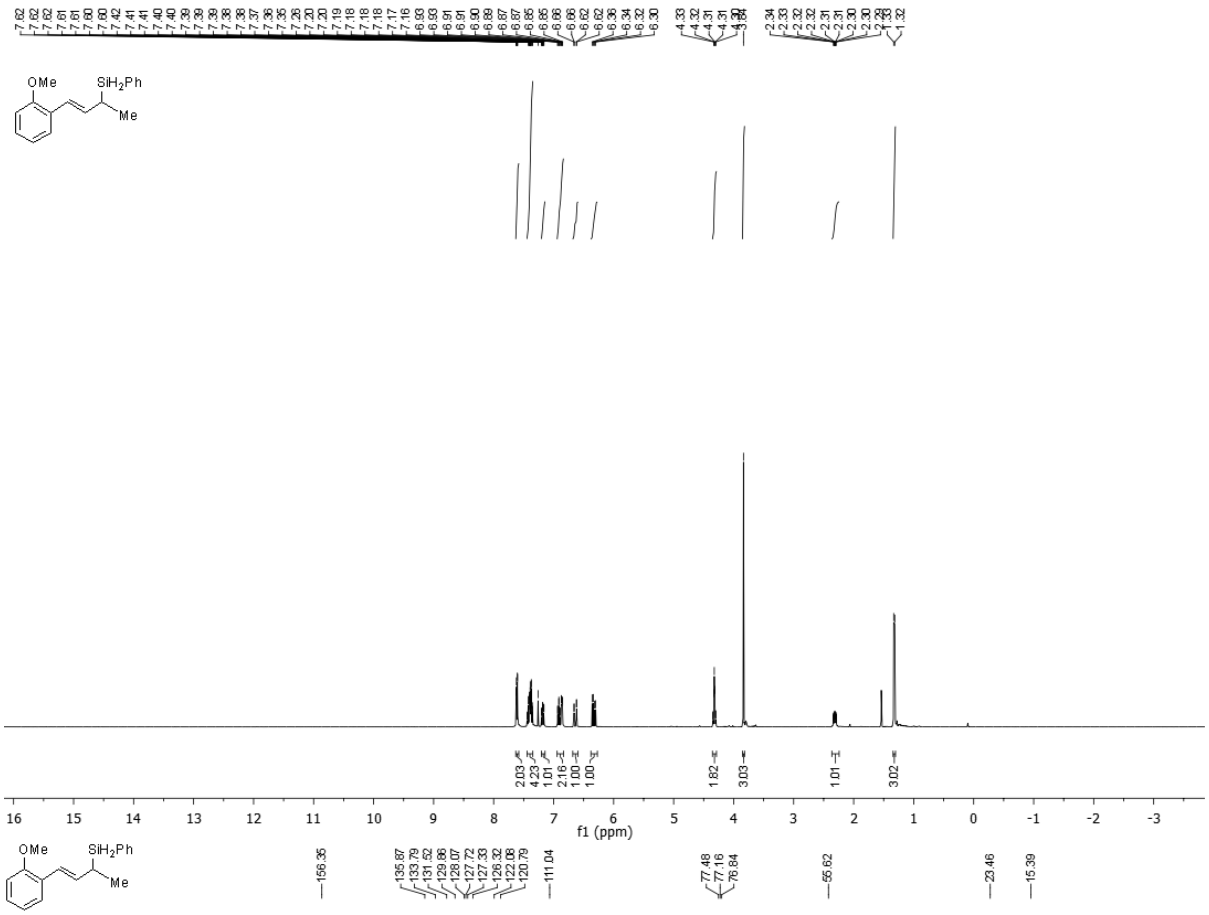
NMR Spectra

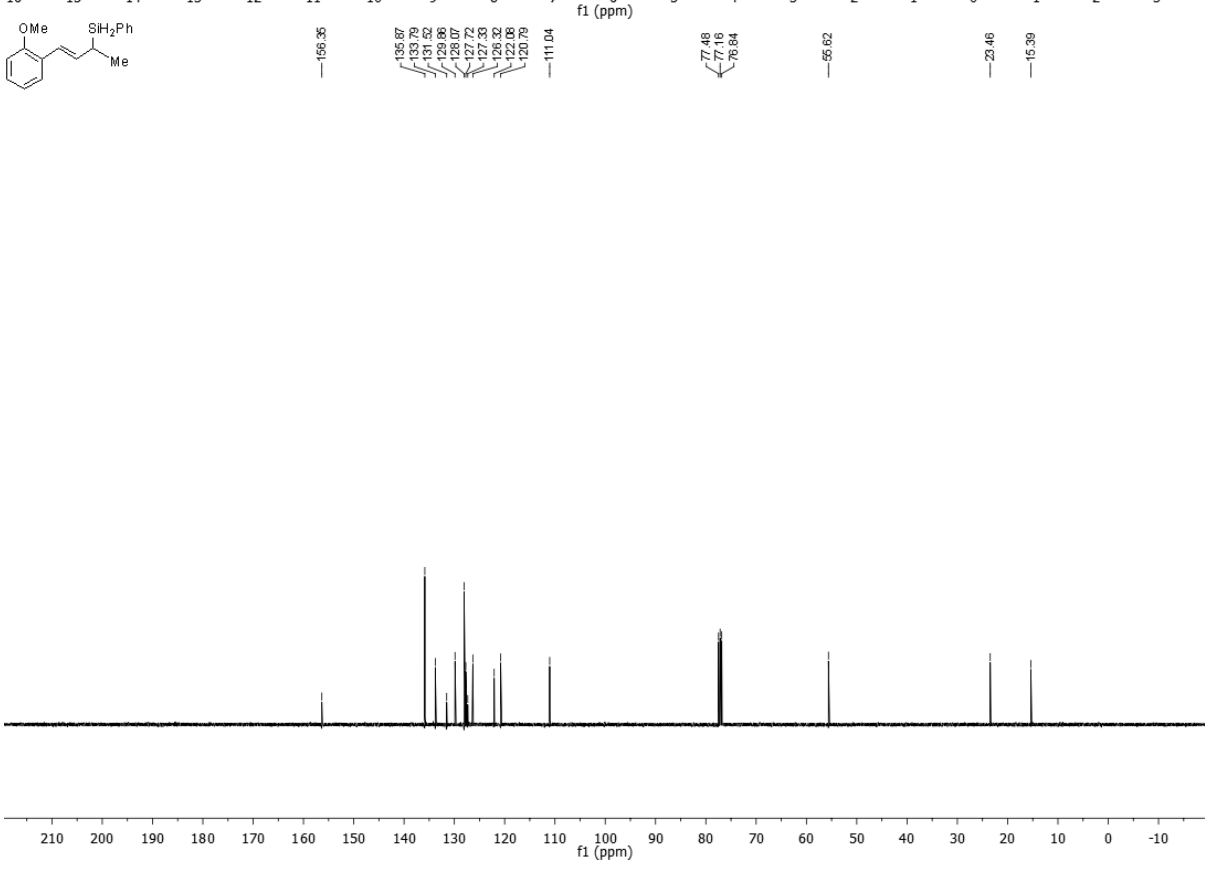

SiH2Ph
Me

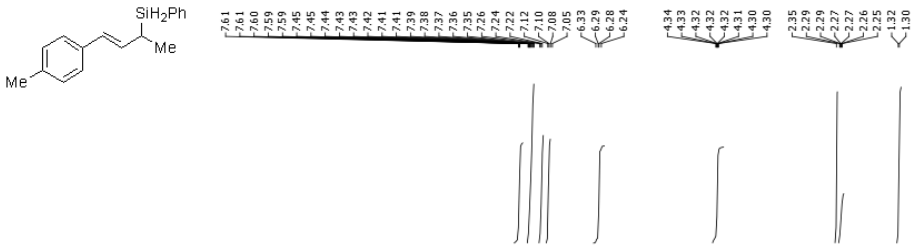

2.05
3.07
4.00
1.03
1.04
1.03
2.00
1.08
3.28
f1 (ppm)


SiH2Ph
Me

138.21
135.85
133.20
131.30
129.96
128.62
128.12
127.44
126.73
125.90
77.48
77.16
76.84
23.03
15.27
f1 (ppm)


OMe
SiH2Ph
Me
f1 (ppm)


OMe
SiH2Ph
Me
f1 (ppm)


SiH2Ph
Me
Me
7.61
7.61
7.60
7.59
7.59
7.45
7.45
7.44
7.43
7.43
7.42
7.41
7.41
7.39
7.38
7.37
7.36
7.35
7.26
7.24
7.22
7.12
7.10
7.08
7.05
6.33
6.29
6.28
6.24
4.34
4.33
4.32
4.32
4.32
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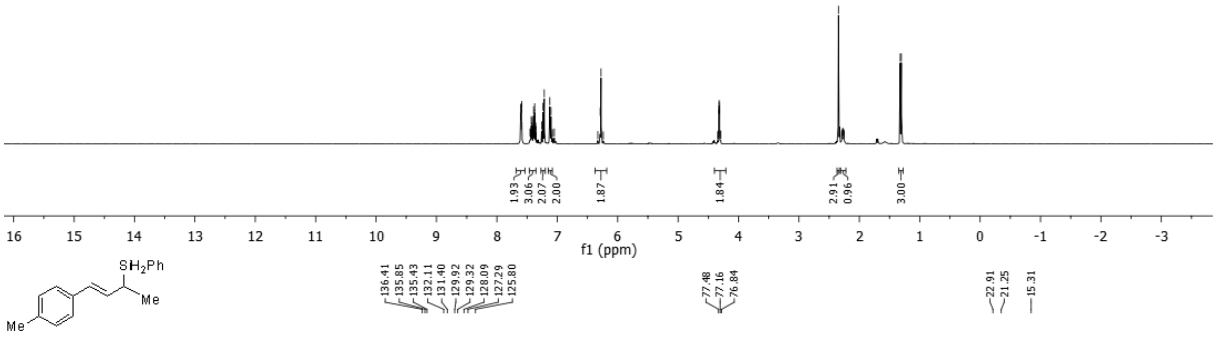
2.27
2.27
2.26
2.25
1.32
1.30


1.93
3.06
2.07
2.00
1.87
1.84
2.91
0.96
3.00
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
f1 (ppm)

SiH2Ph
Me
Me
136.41
135.85
135.43
132.11
131.46
129.92
129.32
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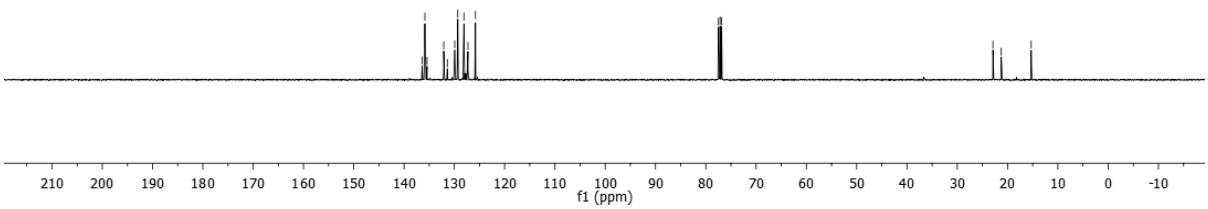
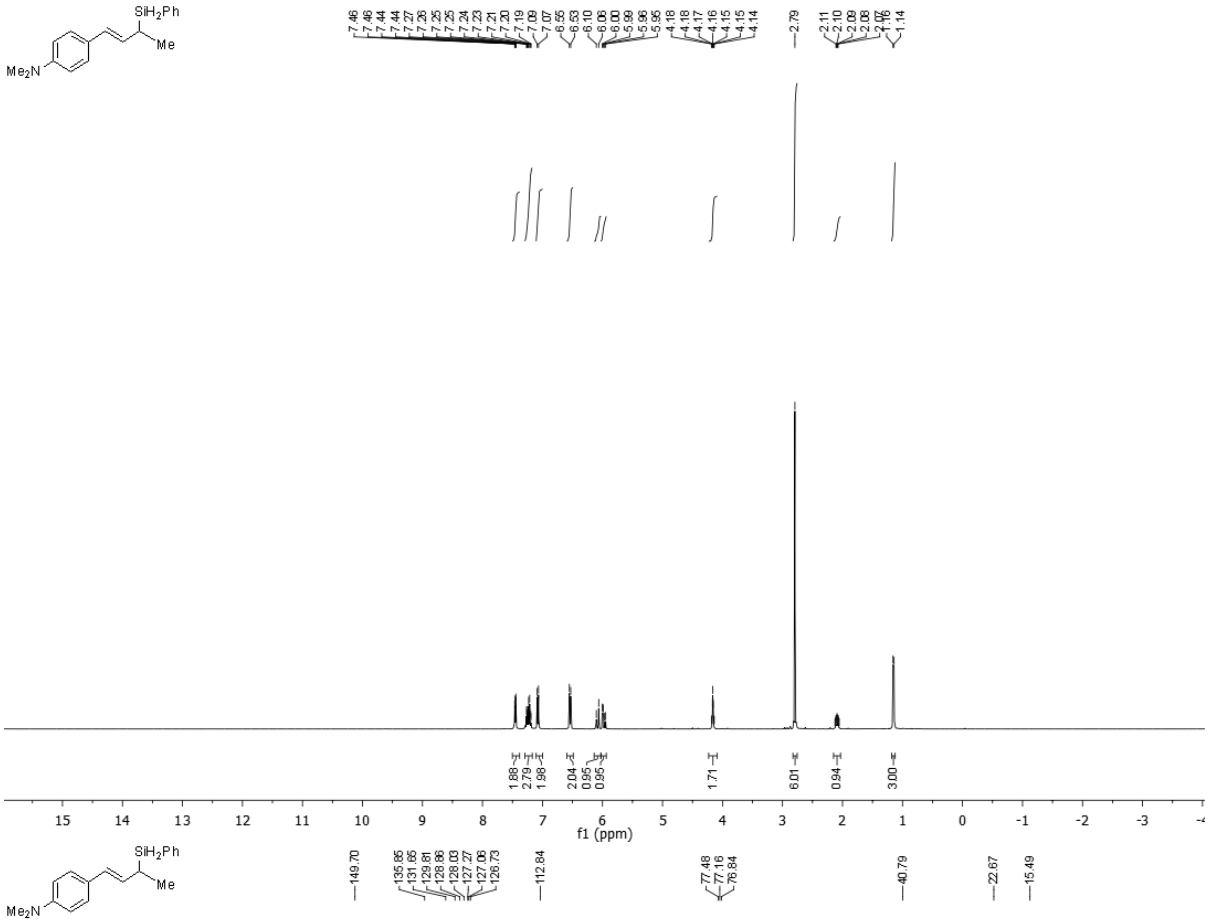
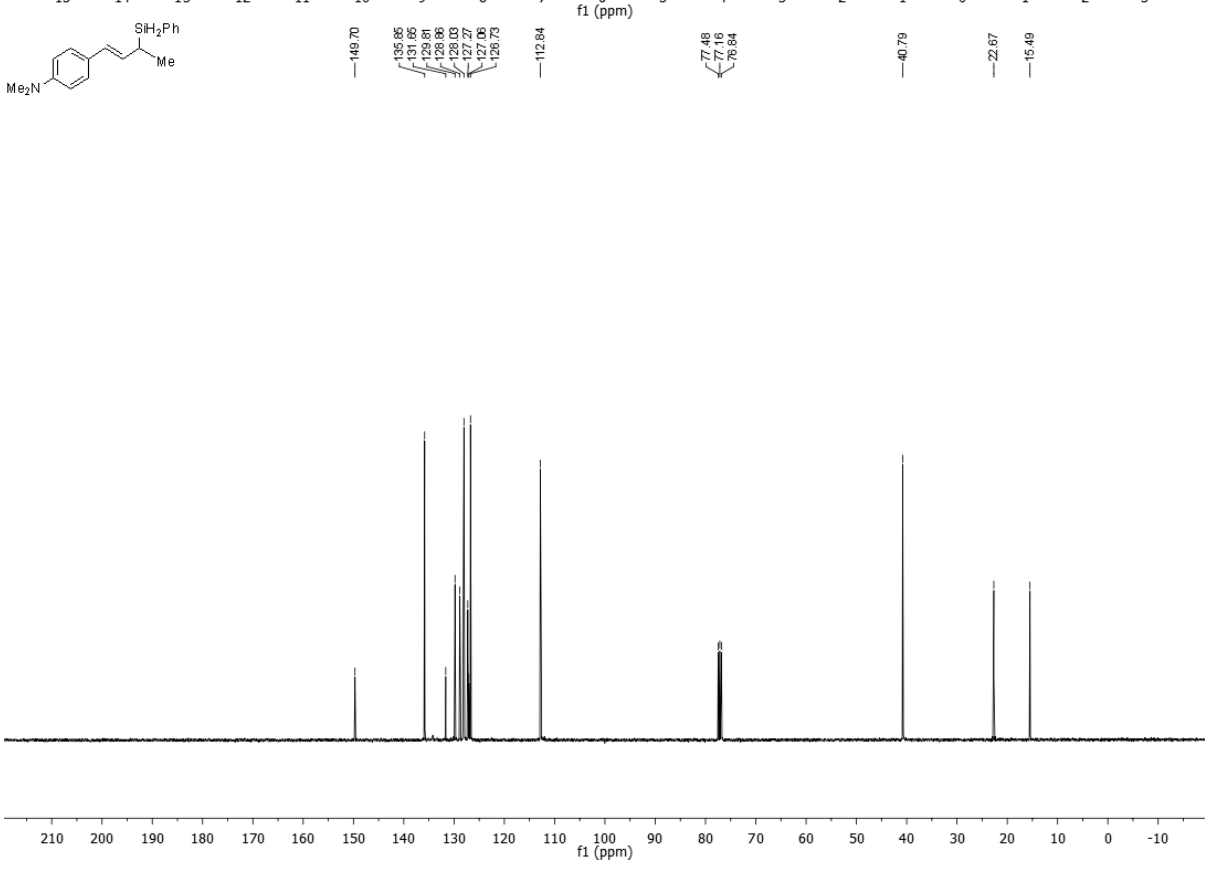
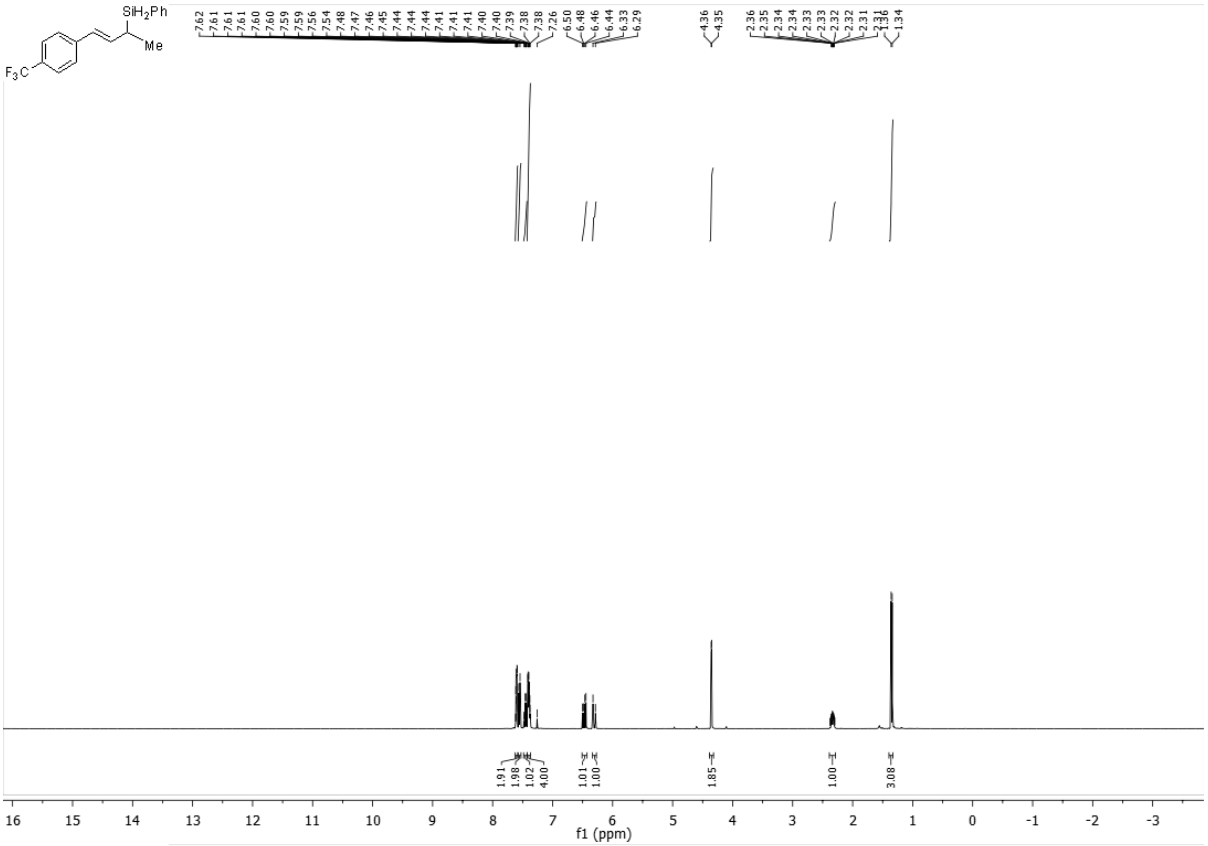
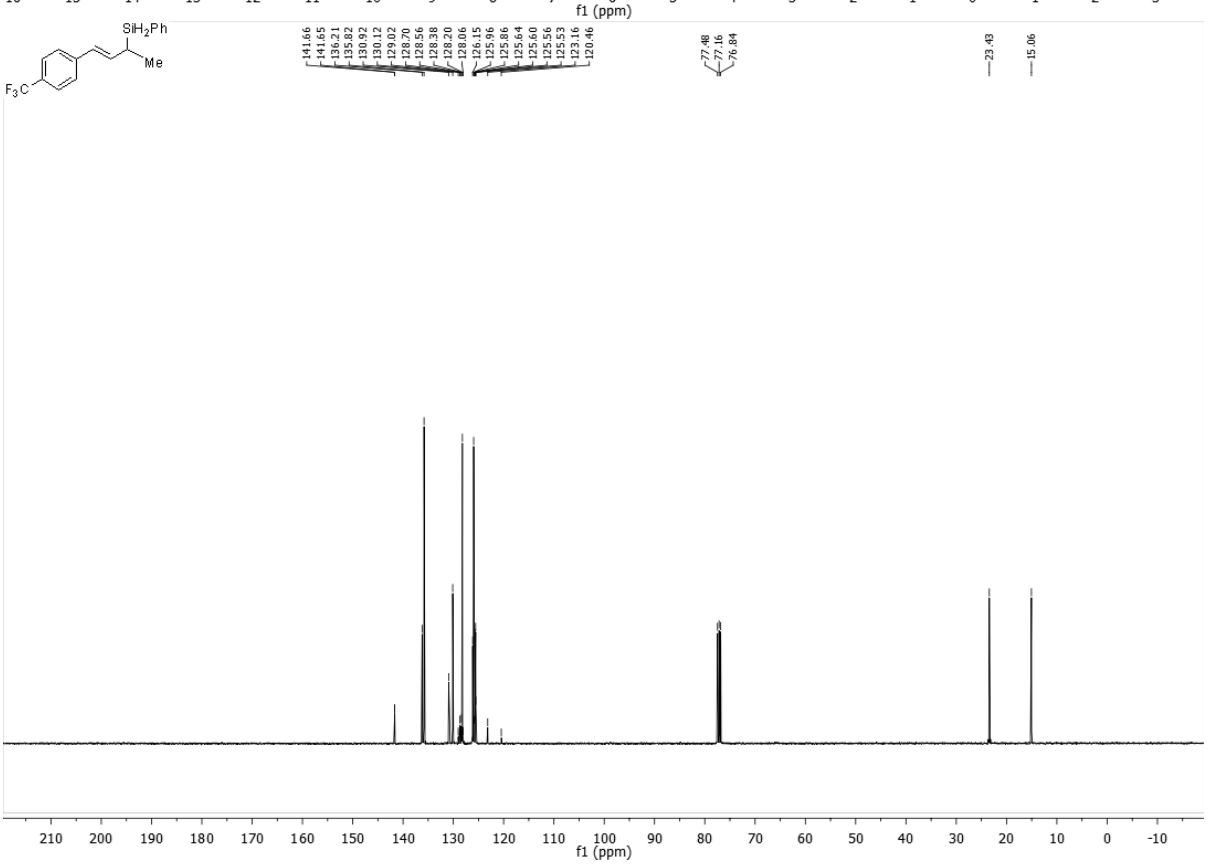
77.48
77.16
76.84
22.91
21.25
15.31

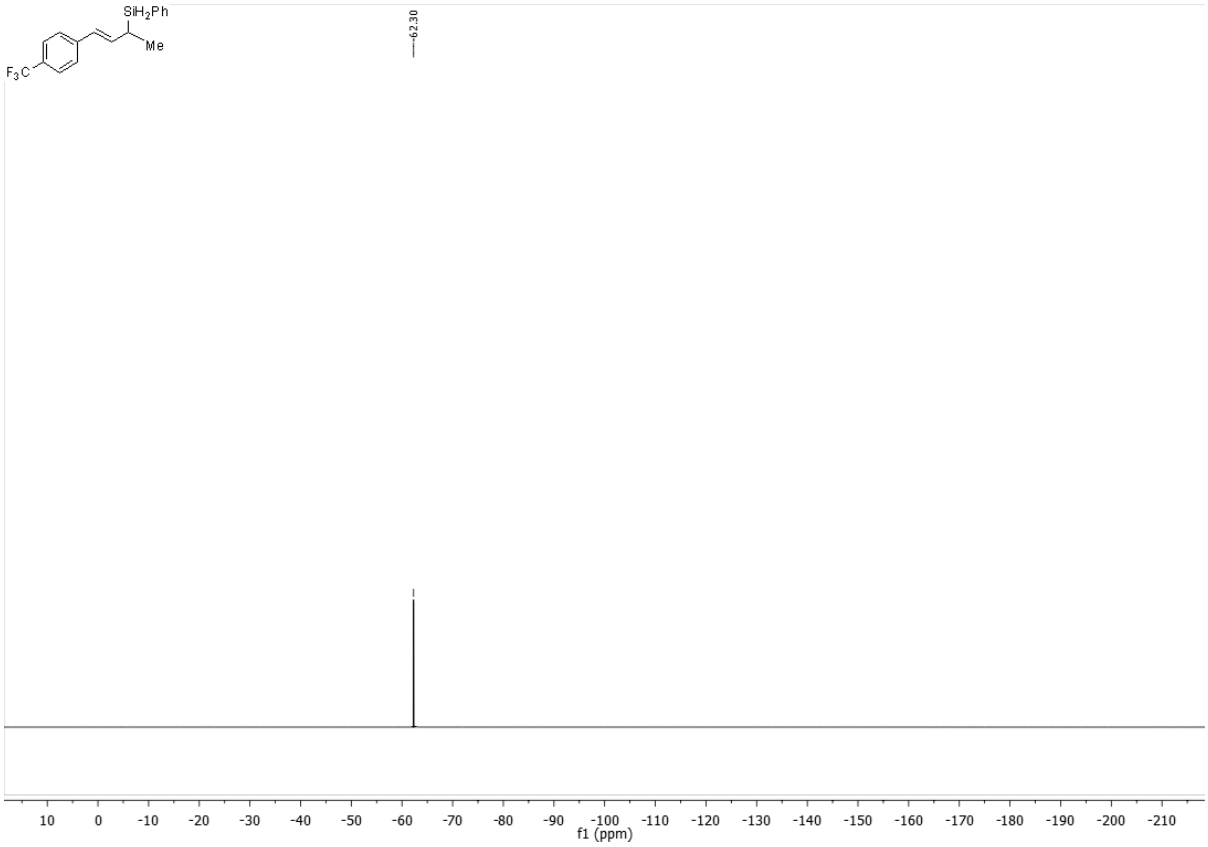

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

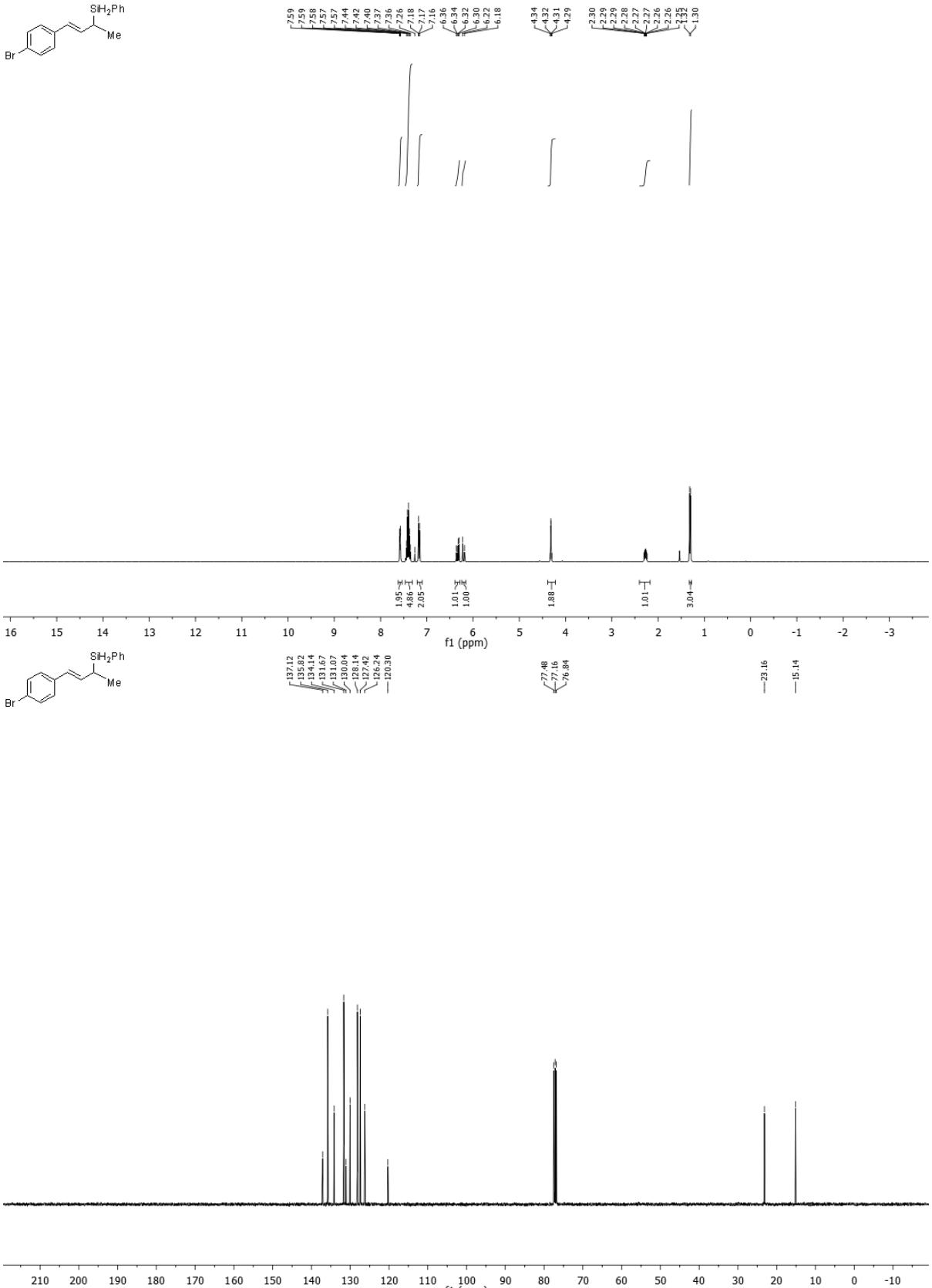

SiH2Ph
Me
Me2N
7.46
7.46
7.44
7.44
7.27
7.26
7.25
7.25
7.24
7.23
7.21
7.20
7.19
7.09
7.07
6.55
6.53
6.10
6.06
6.00
5.99
5.96
5.95
4.18
4.18
4.17
4.16
4.15
4.15
4.14
2.79
2.11
2.10
2.09
2.08
2.07
2.06
1.14
1.68
2.79
1.98
2.04
0.95
0.95
1.71
6.01
0.94
3.00
f1 (ppm)

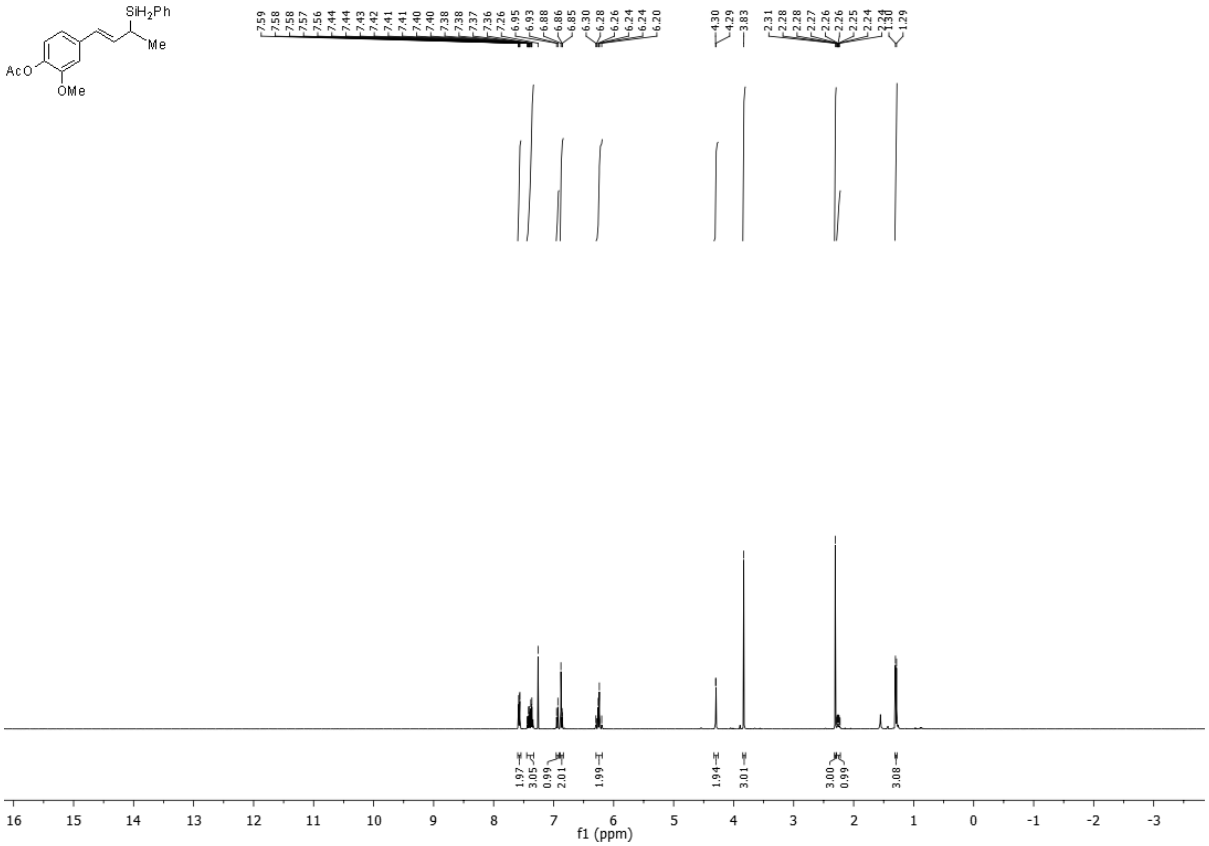

SiH2Ph
Me
Me2N
149.70
135.85
131.65
129.81
128.86
128.03
127.27
127.06
126.73
112.84
77.48
77.16
76.84
40.79
22.67
15.49
f1 (ppm)

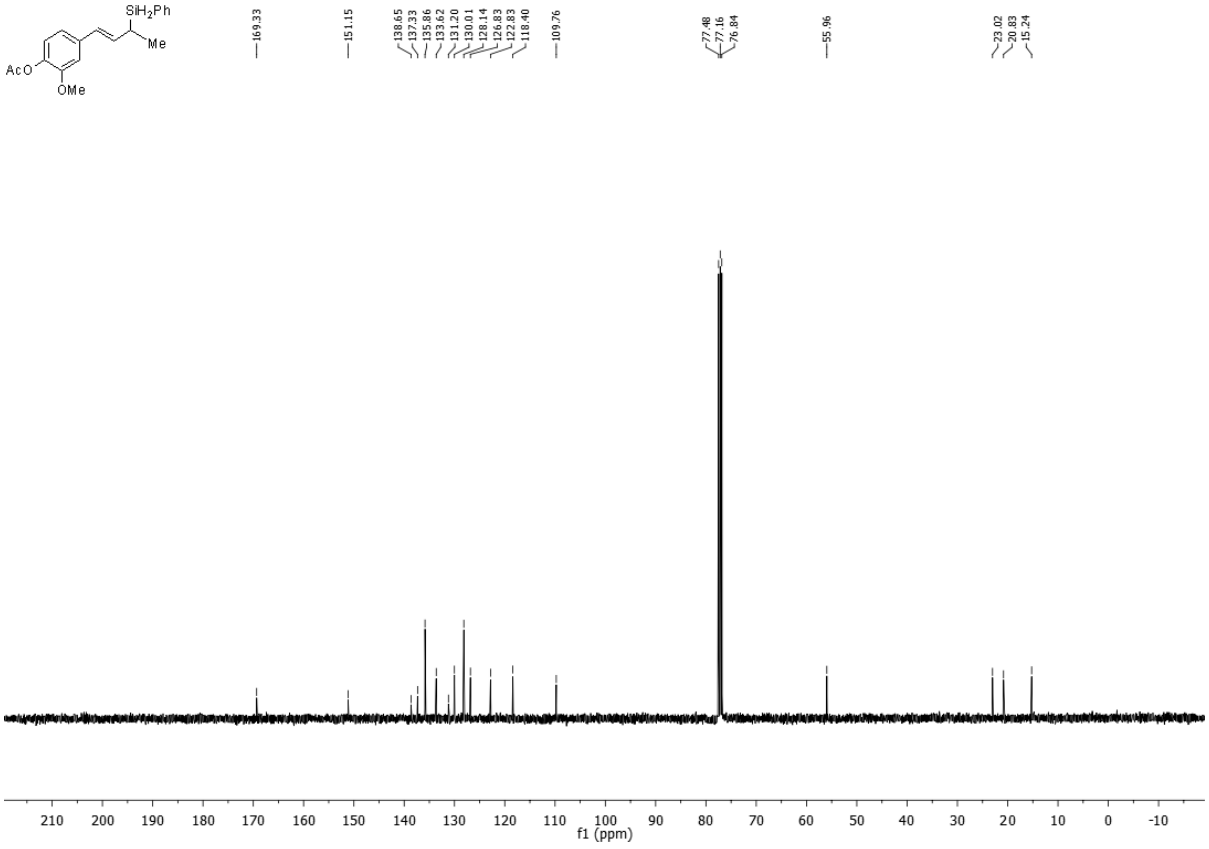

SiH2Ph
Me
F3C
7.62 7.61 7.61 7.61 7.60 7.60 7.59 7.59 7.56 7.54 7.48 7.47 7.46 7.45 7.44 7.44 7.44 7.41 7.41 7.41 7.40 7.40 7.39 7.38 7.38 7.26 6.50 6.48 6.46 6.44 6.33 6.29
4.36 4.35
2.36 2.35 2.34 2.34 2.33 2.33 2.32 2.32 2.31 1.36 1.34
1.91 1.98 1.02 4.00 1.01 1.00 1.85 1.00 3.08
f1 (ppm)

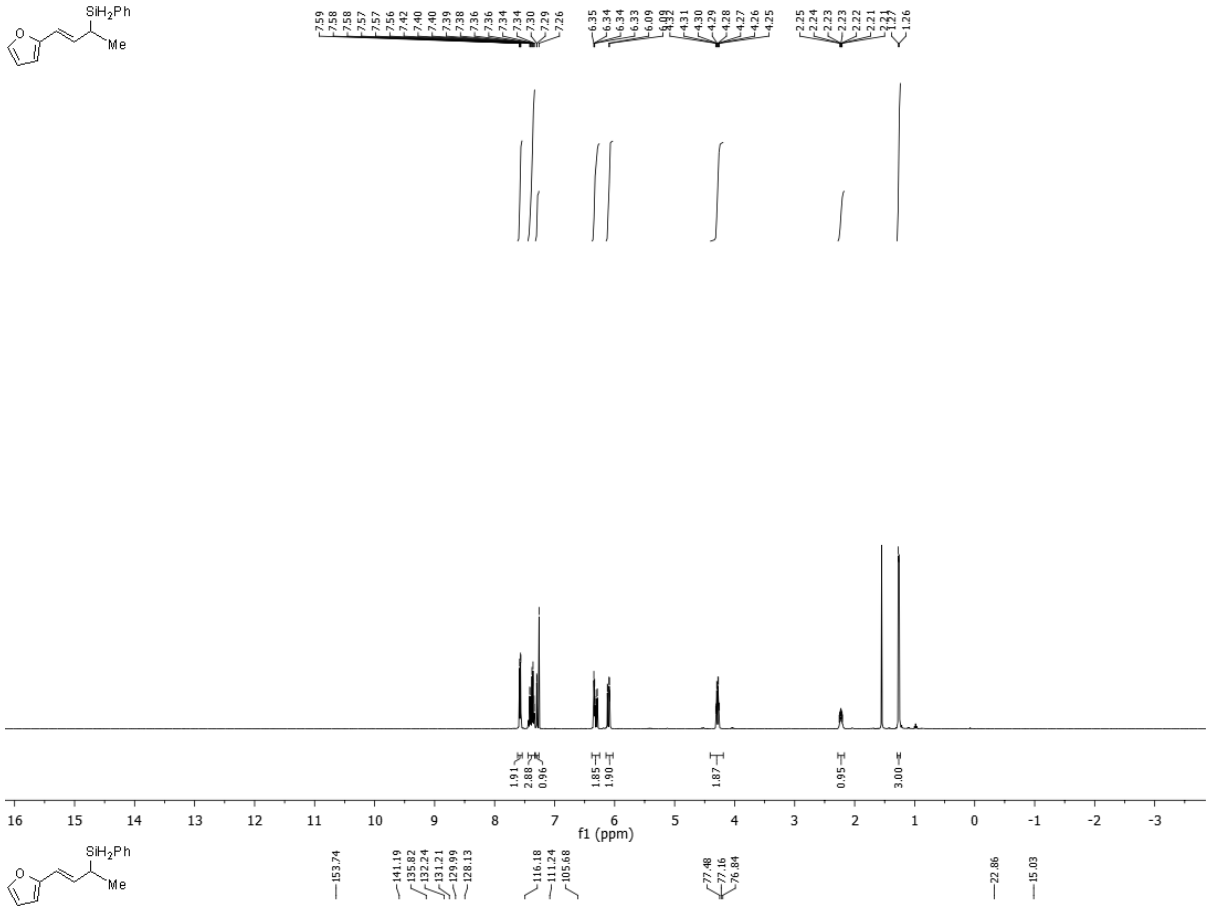

SiH2Ph
Me
F3C
141.66 141.65 136.21 135.82 130.92 130.12 129.02 128.70 128.56 128.38 128.20 128.06 126.15 125.96 125.86 125.64 125.60 125.56 125.53 123.16 120.46
77.48 77.16 76.84
29.43
15.06
f1 (ppm)

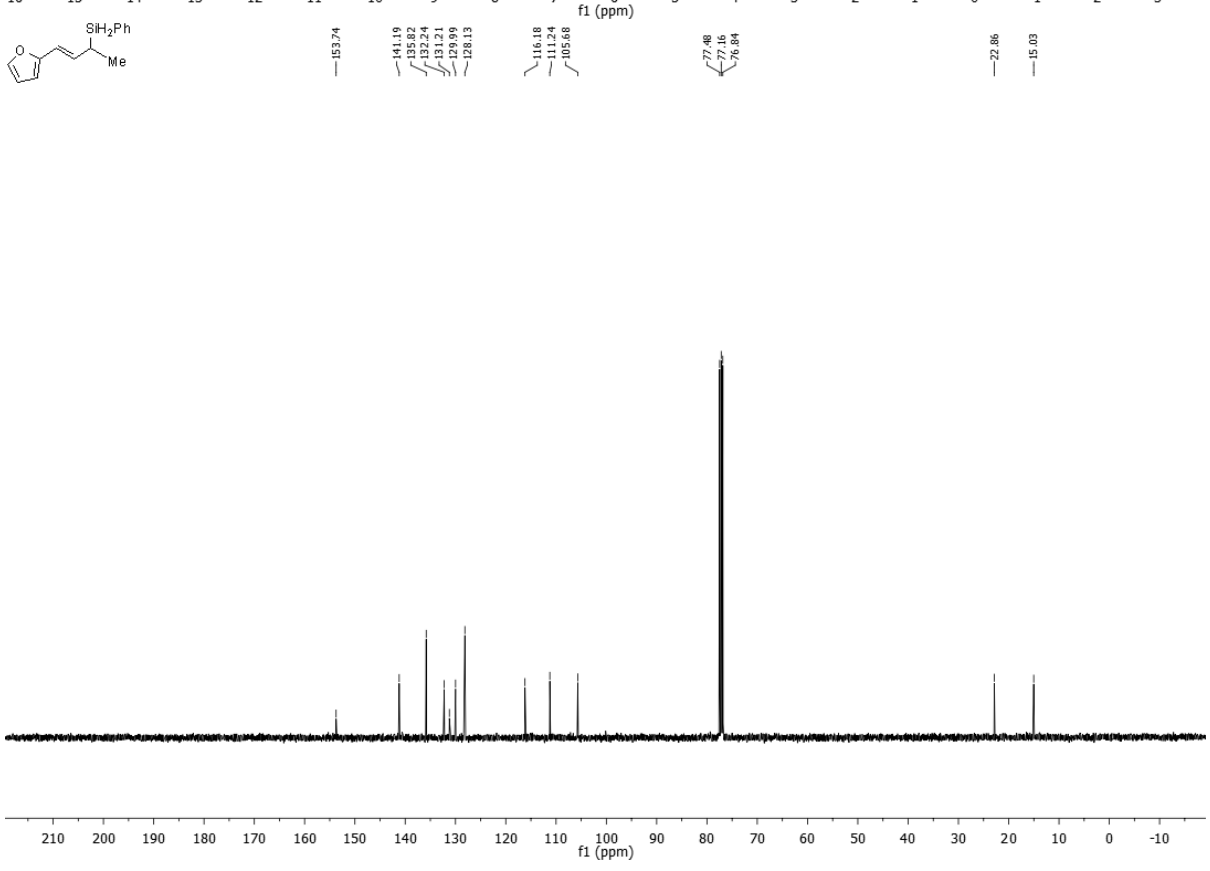

SiH2Ph
Me
F3C
-62.30
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

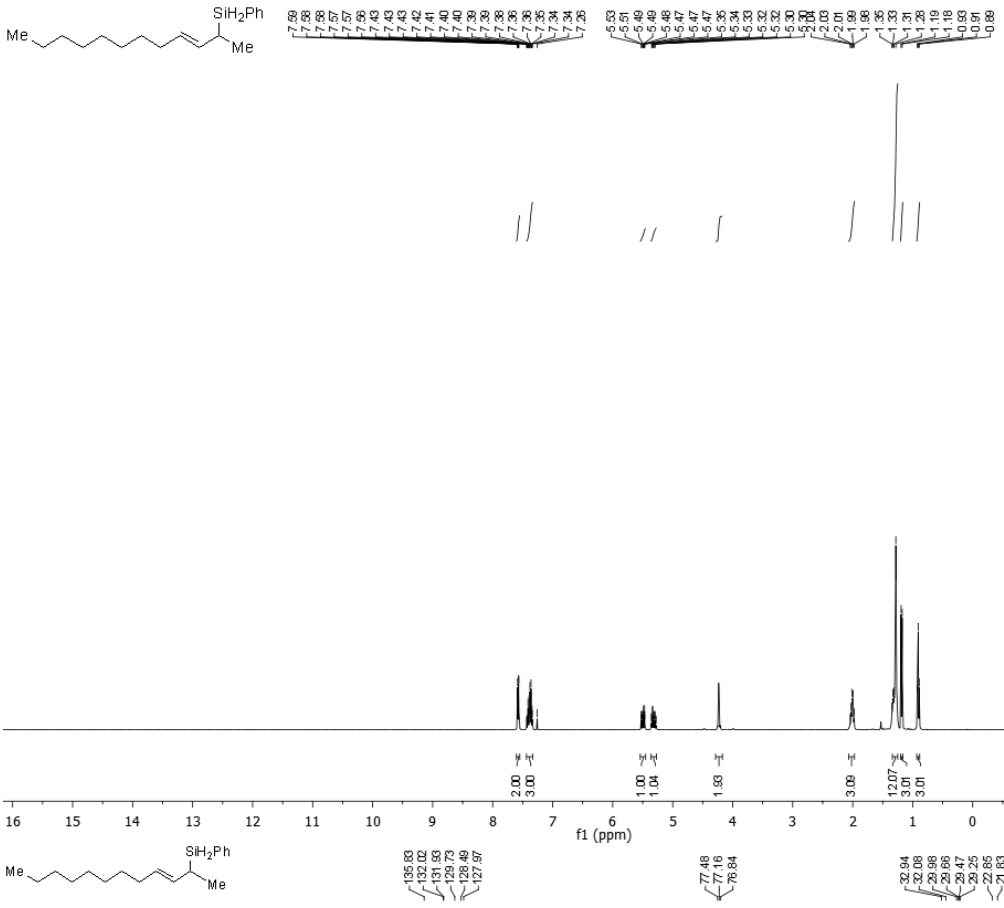

SiH2Ph
Me
Br
7.59
7.59
7.58
7.57
7.57
7.44
7.42
7.40
7.37
7.36
7.26
7.18
7.17
7.16
6.36
6.34
6.32
6.30
6.22
6.18
4.34
4.32
4.31
4.29
2.30
2.29
2.29
2.28
2.27
2.27
2.26
2.26
1.32
1.30
1.95
4.86
2.05
1.01
1.00
1.88
1.01
3.04
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3
f1 (ppm)
SiH2Ph
Me
Br
137.12
135.82
134.14
131.67
131.07
130.04
128.14
127.42
126.24
120.30
77.48
77.16
76.84
23.16
15.14
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

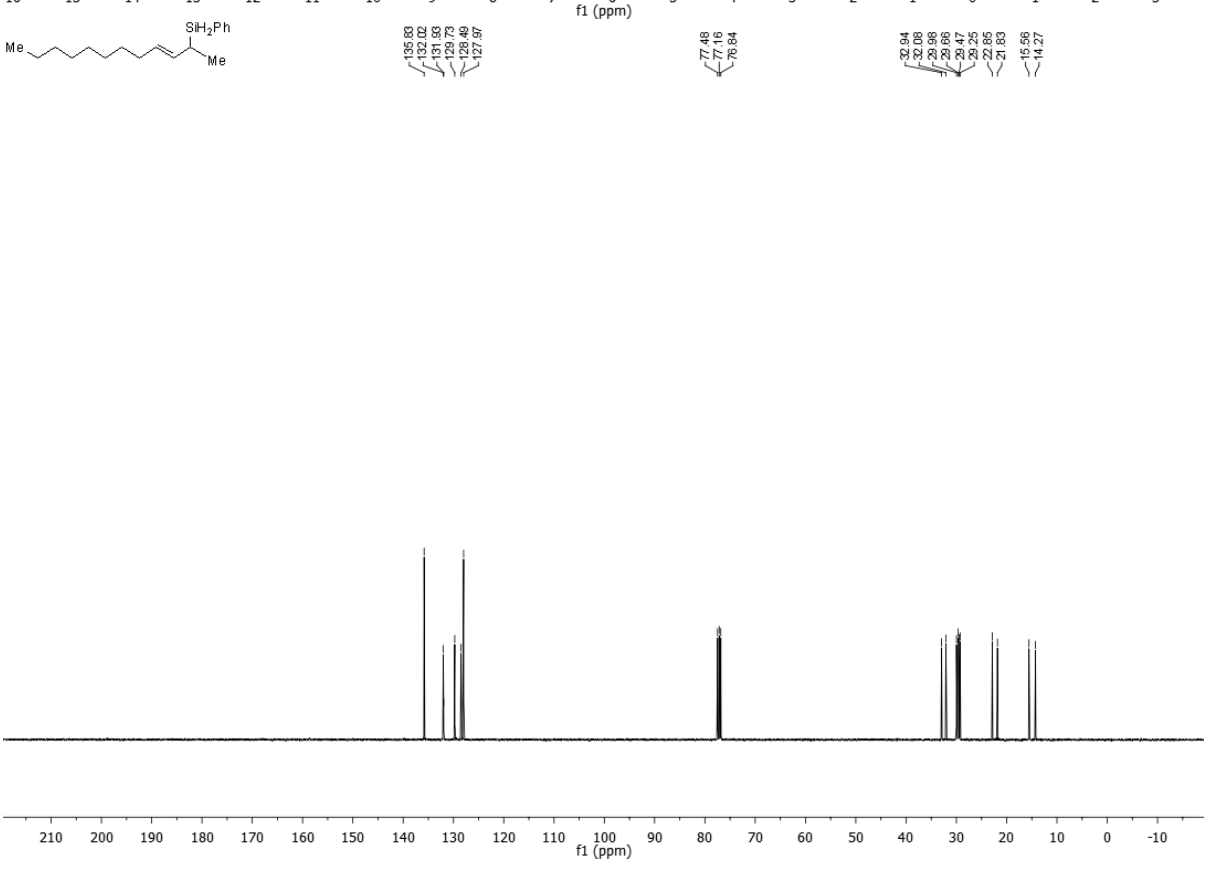

SiH2Ph
Me
AcO
OMe
7.59
7.58
7.58
7.57
7.56
7.44
7.44
7.43
7.42
7.41
7.41
7.40
7.40
7.38
7.38
7.37
7.36
7.26
6.95
6.93
6.88
6.86
6.85
6.30
6.28
6.26
6.24
6.24
6.20
4.30
4.29
3.83
2.31
2.28
2.28
2.27
2.26
2.26
2.25
2.24
1.30
1.29
1.97
3.05
0.99
2.01
1.99
1.94
3.01
3.00
0.99
3.08
f1 (ppm)

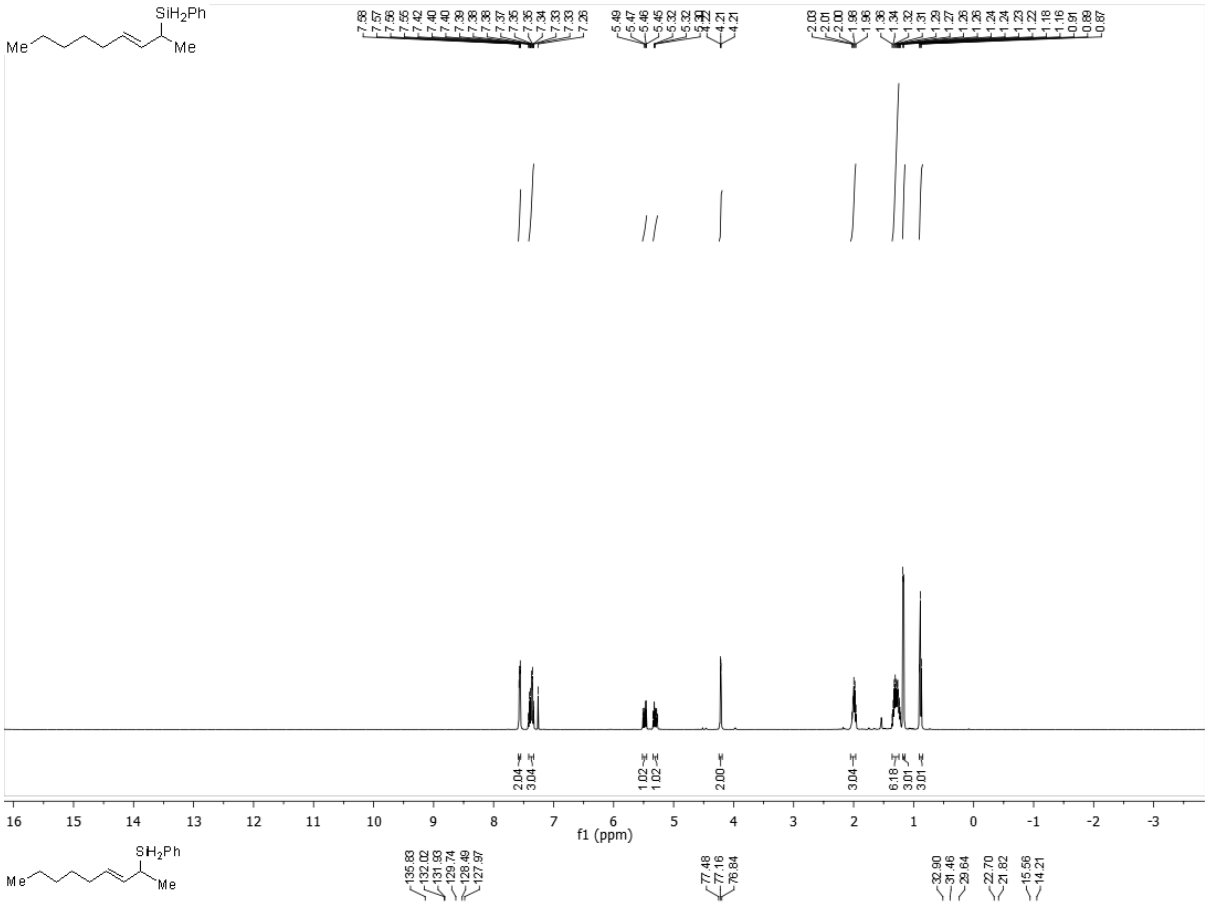

SiH2Ph
Me
AcO
OMe
169.33
151.15
138.65
137.33
135.86
133.62
131.20
130.01
128.14
126.83
122.83
118.40
109.76
77.48
77.16
76.84
55.96
23.02
20.83
15.24
f1 (ppm)

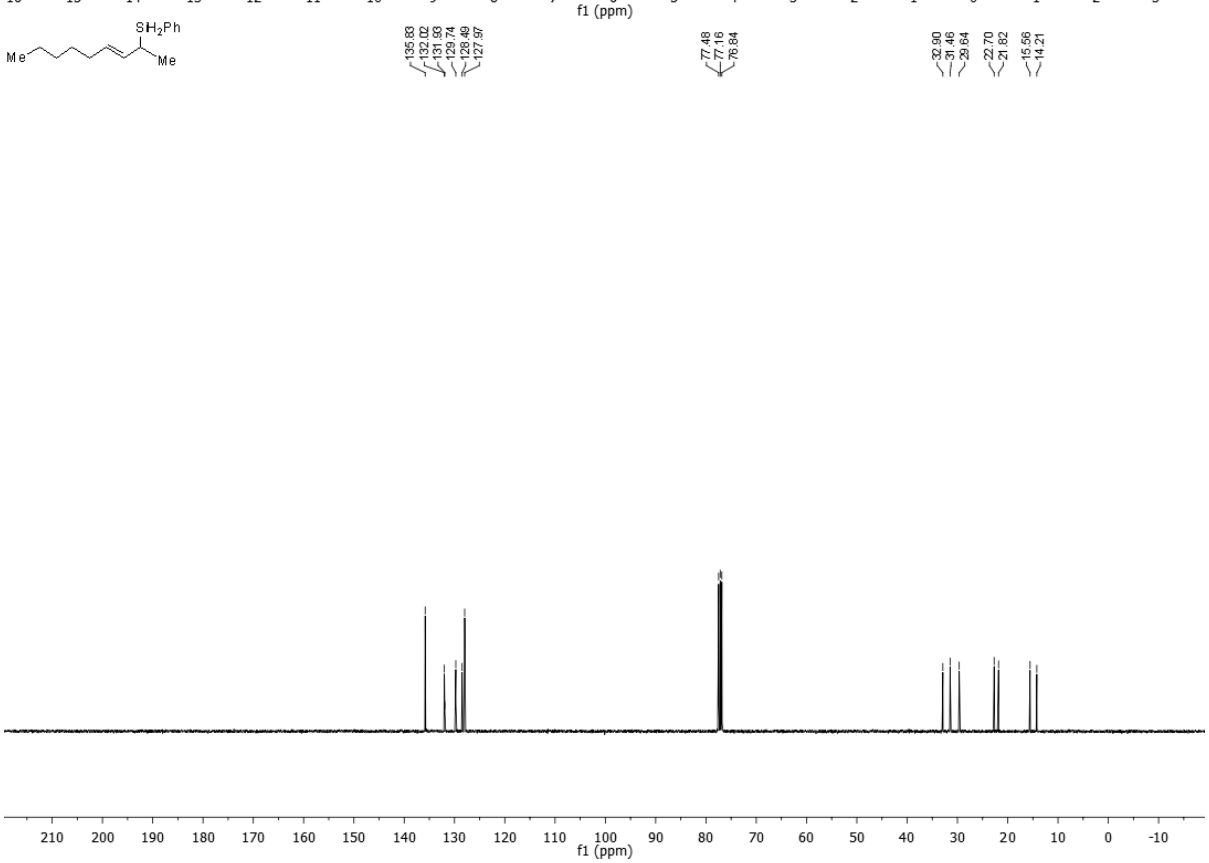

SiH2Ph
Me
7.59
7.58
7.58
7.57
7.57
7.57
7.56
7.42
7.40
7.40
7.39
7.38
7.36
7.36
7.34
7.34
7.30
7.29
7.26
6.35
6.34
6.34
6.33
6.09
4.32
4.31
4.30
4.29
4.28
4.27
4.26
4.25
2.25
2.24
2.23
2.23
2.22
2.21
1.27
1.26
1.91
2.88
0.96
1.85
1.90
1.87
0.95
3.00
f1 (ppm)

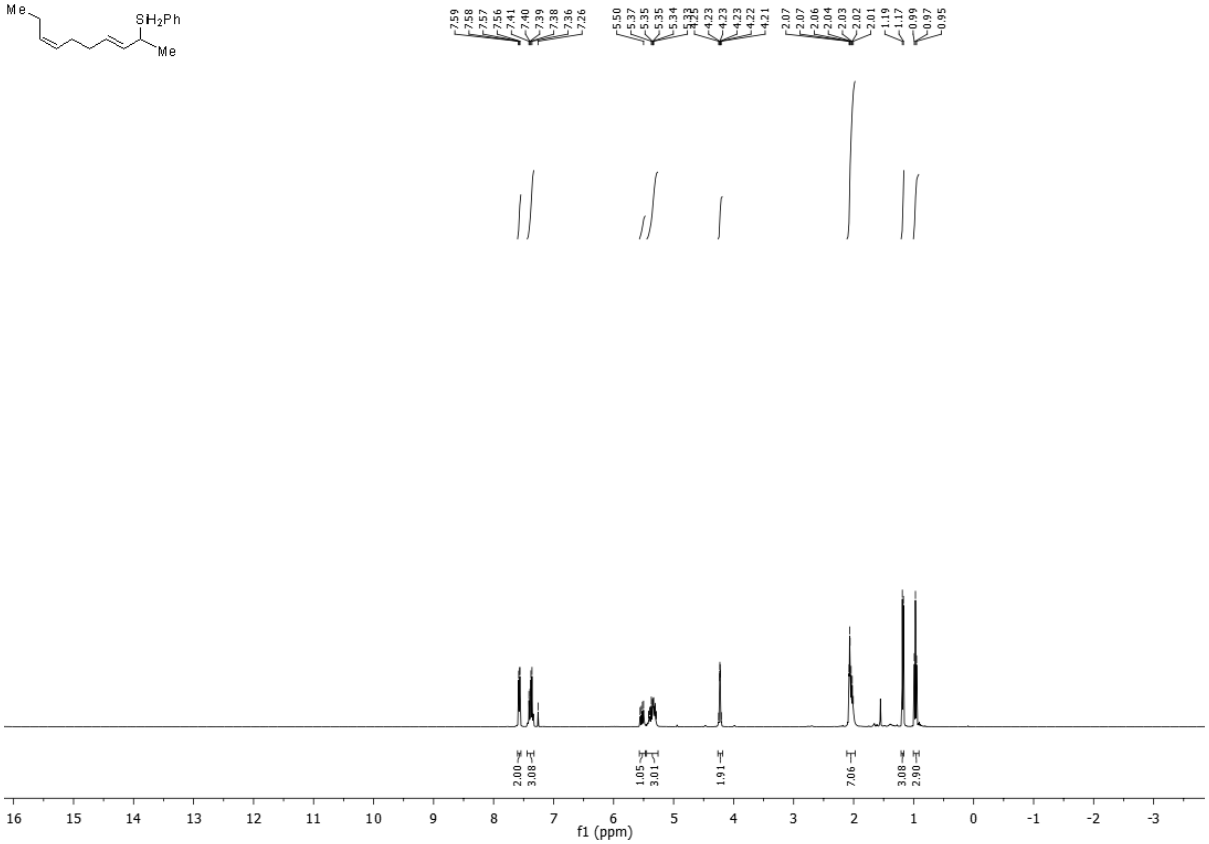

SiH2Ph
Me
153.74
141.19
135.82
132.24
131.21
129.99
128.13
116.18
111.24
105.68
77.48
77.16
76.84
22.86
15.03
f1 (ppm)

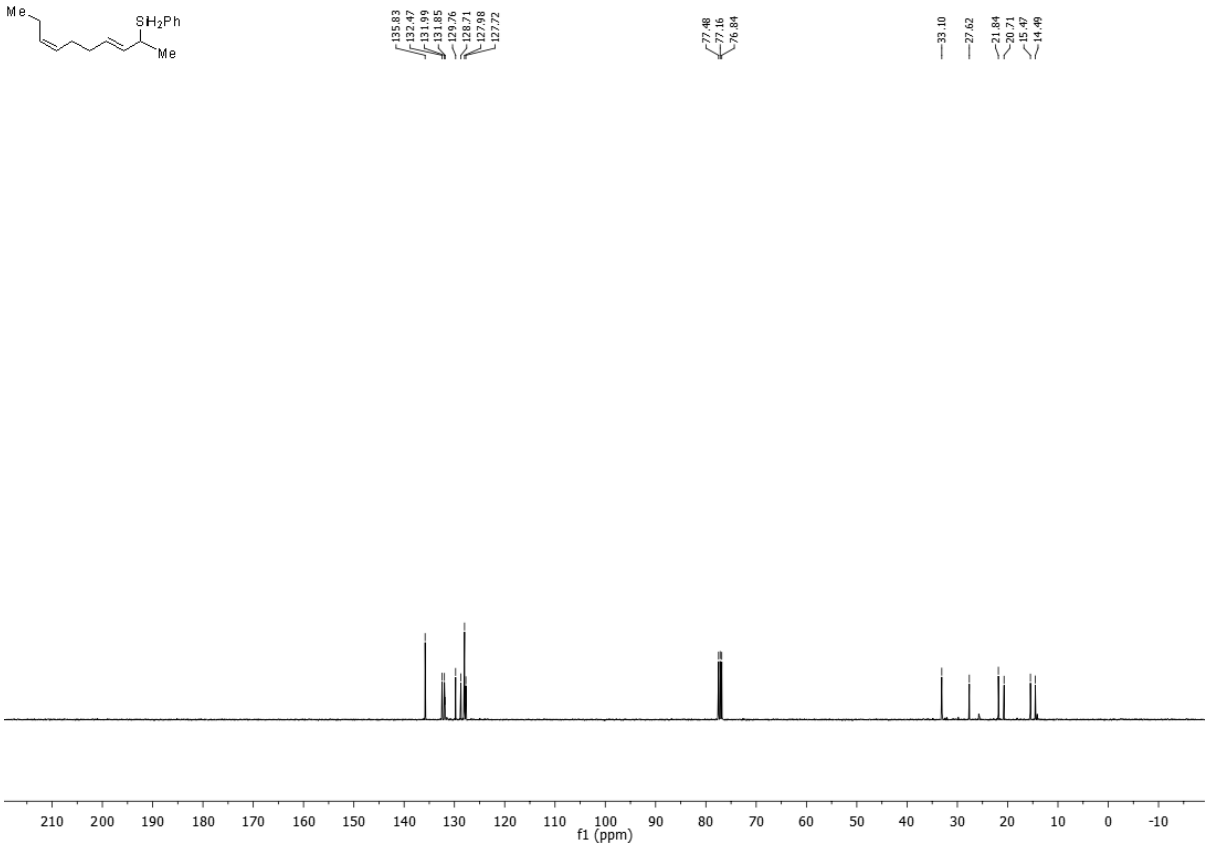

SiH2Ph
Me
Me
f1 (ppm)

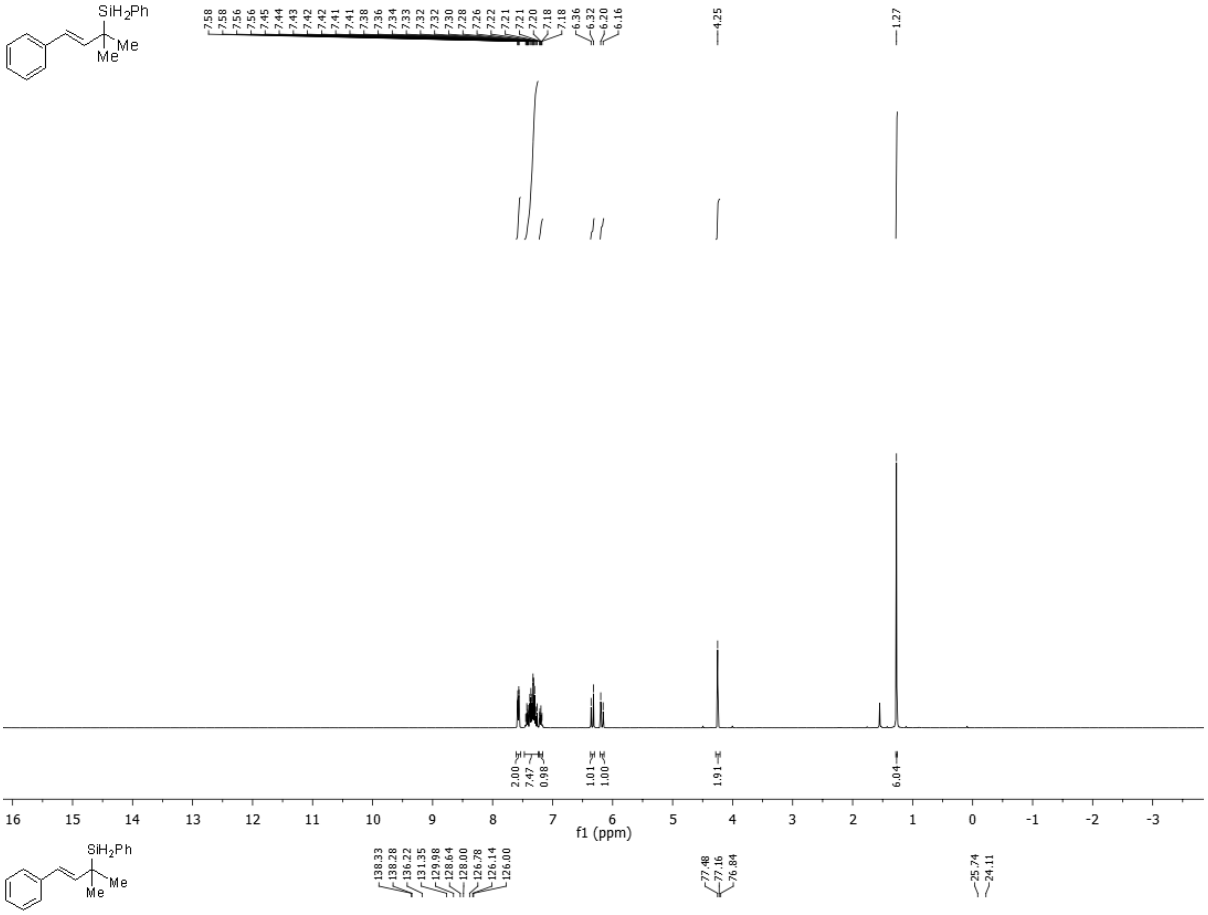

SiH2Ph
Me
Me
f1 (ppm)

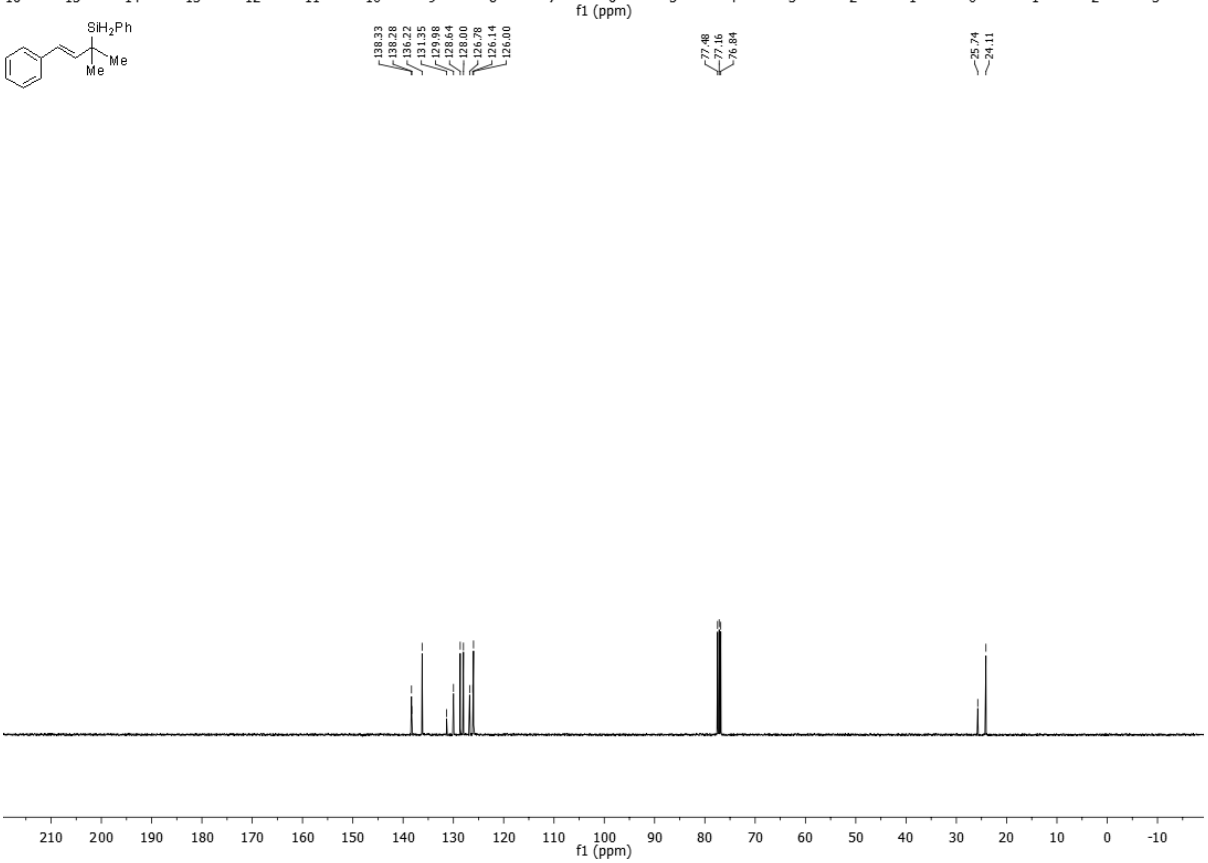

SiH2Ph
Me
Me
f1 (ppm)

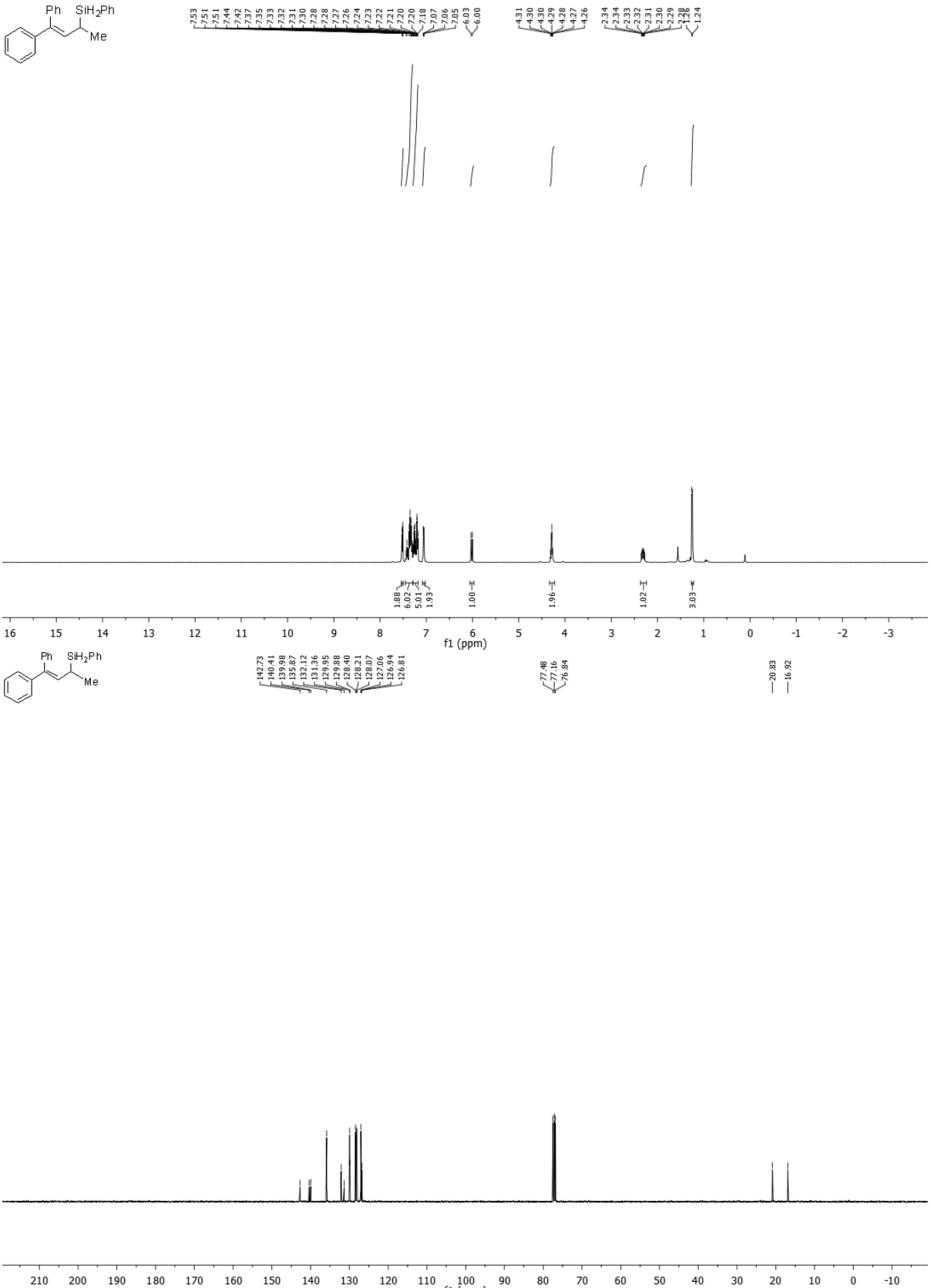

SiH2Ph
Me
Me
f1 (ppm)

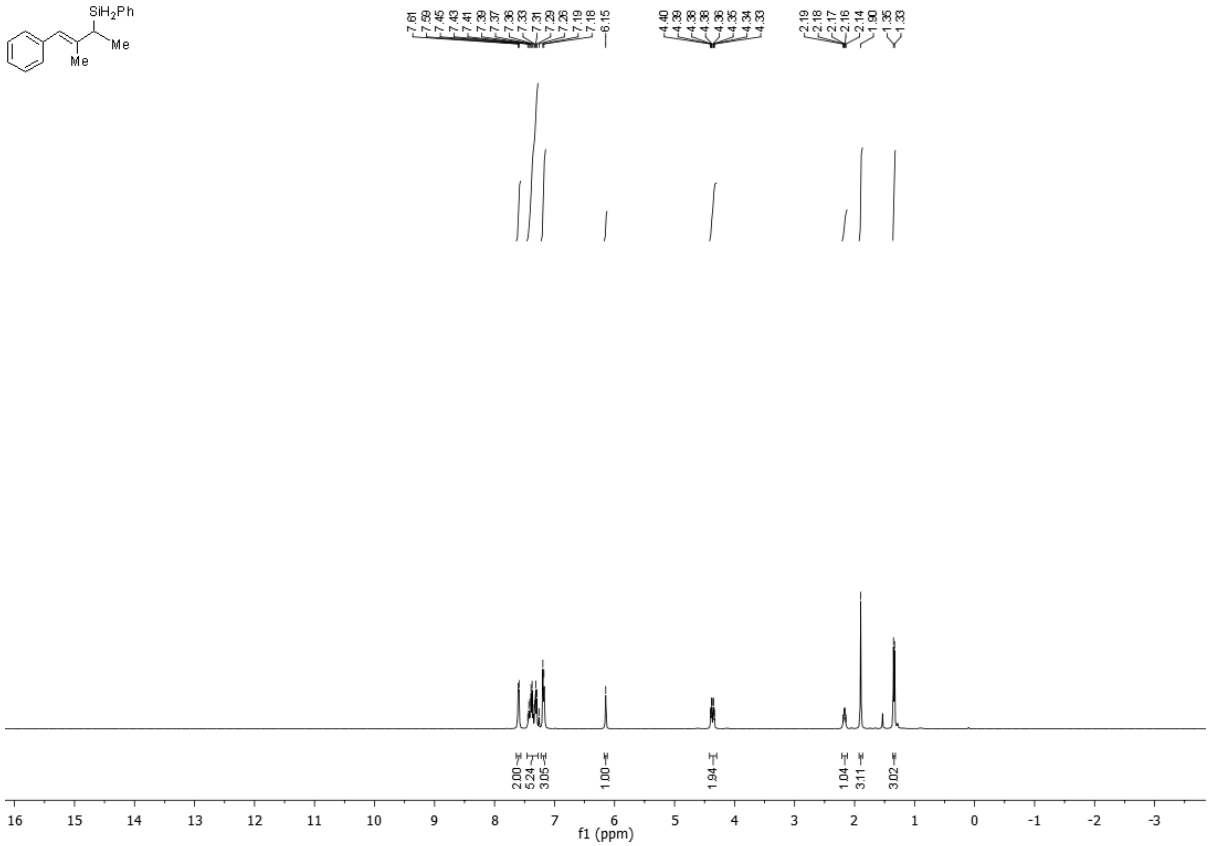

Me
SH2Ph
Me
7.59
7.58
7.57
7.56
7.41
7.40
7.39
7.38
7.36
7.26
5.50
5.37
5.35
5.35
5.34
5.33
5.33
4.23
4.23
4.23
4.22
4.21
2.07
2.07
2.06
2.04
2.03
2.02
2.01
1.19
1.17
0.99
0.97
0.95
2.00
3.08
1.05
3.01
1.91
7.06
3.08
2.90
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3
f1 (ppm)

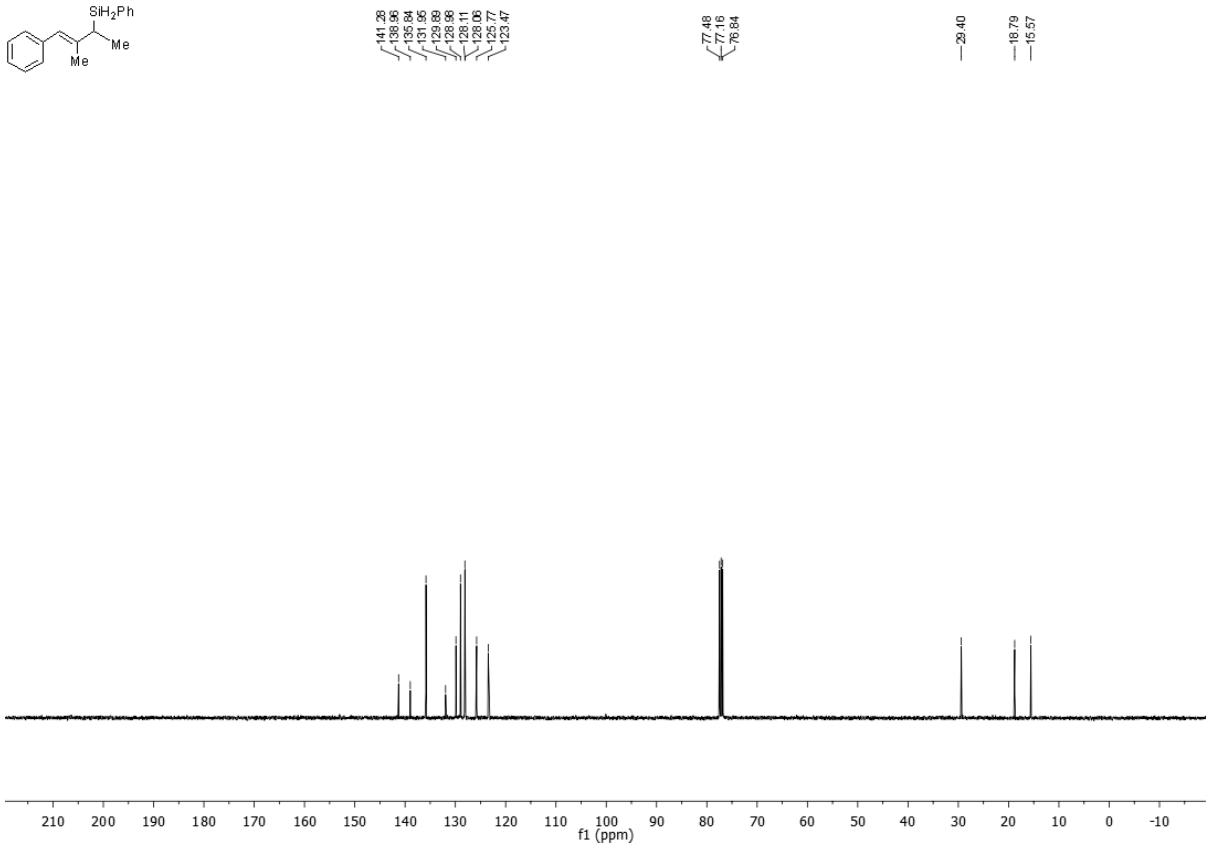

Me
SH2Ph
Me
135.83
132.47
131.99
131.85
129.76
128.71
127.98
127.72
77.48
77.16
76.84
33.10
27.62
21.84
20.71
15.47
14.49
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

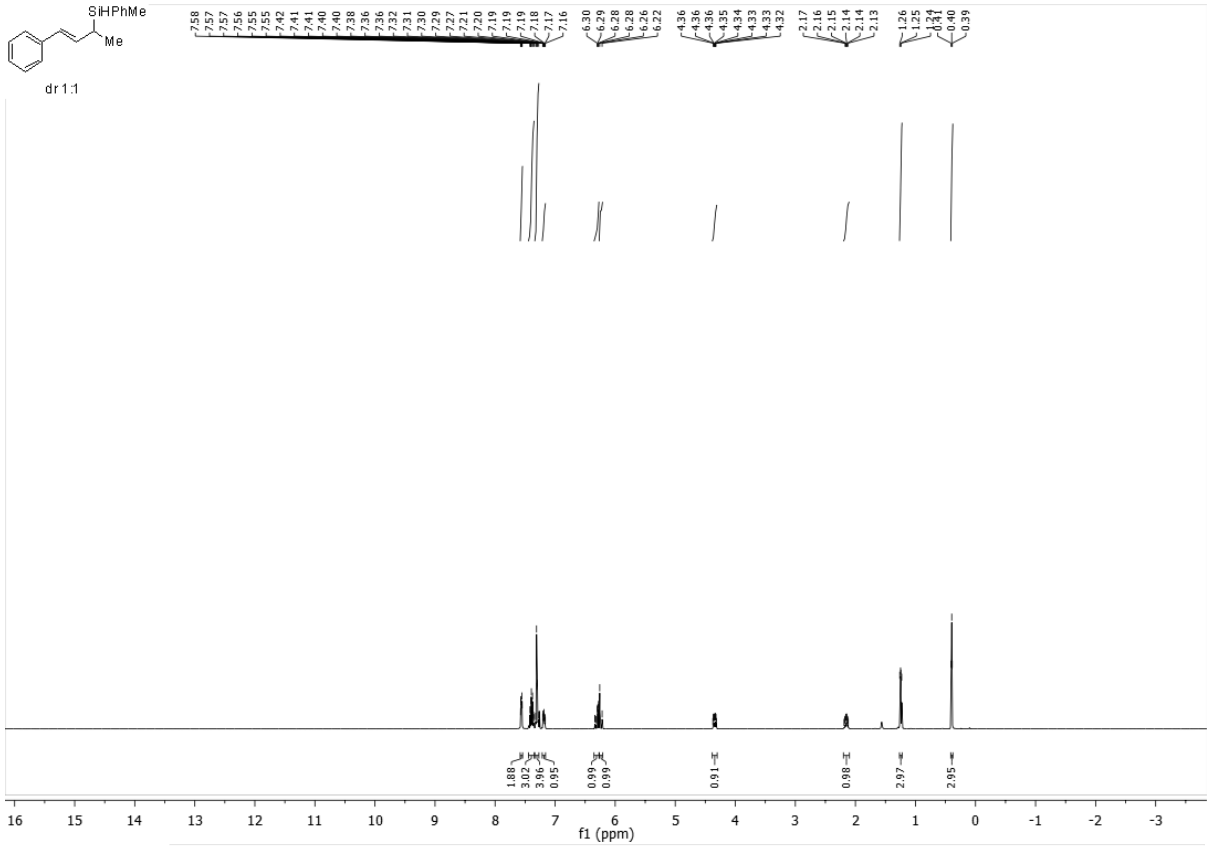

SiH2Ph
Me
Me
7.58
7.58
7.56
7.56
7.45
7.44
7.43
7.42
7.42
7.41
7.41
7.38
7.36
7.34
7.33
7.32
7.32
7.30
7.28
7.26
7.22
7.21
7.21
7.20
7.18
6.36
6.32
6.20
6.16
4.25
1.27
2.00
7.47
0.98
1.01
1.00
1.91
6.04
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3
f1 (ppm)

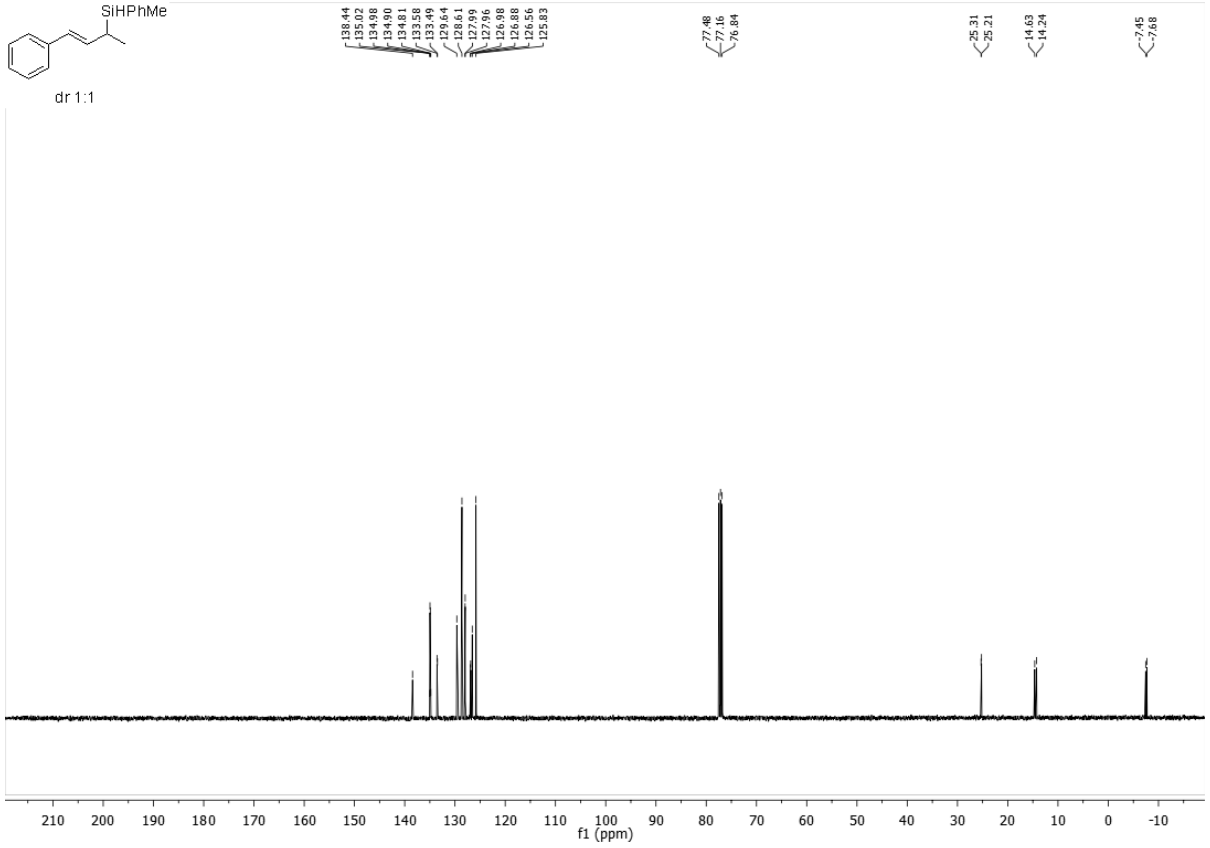

SiH2Ph
Me
Me
138.33
138.28
136.22
131.35
129.98
128.64
128.00
126.78
126.14
126.00
77.48
77.16
76.84
25.74
24.11
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

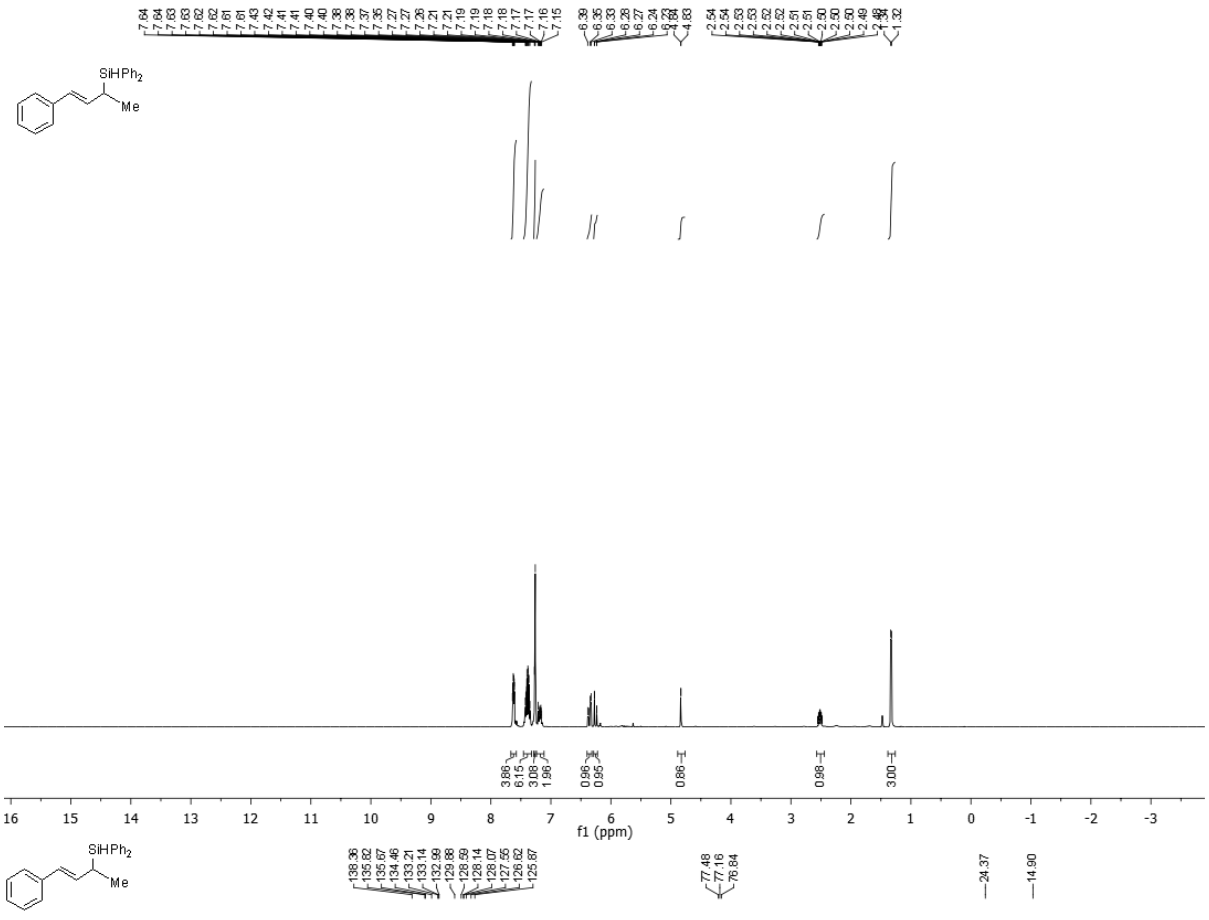

Ph
SiH2Ph
Me
f1 (ppm)
f1 (ppm)

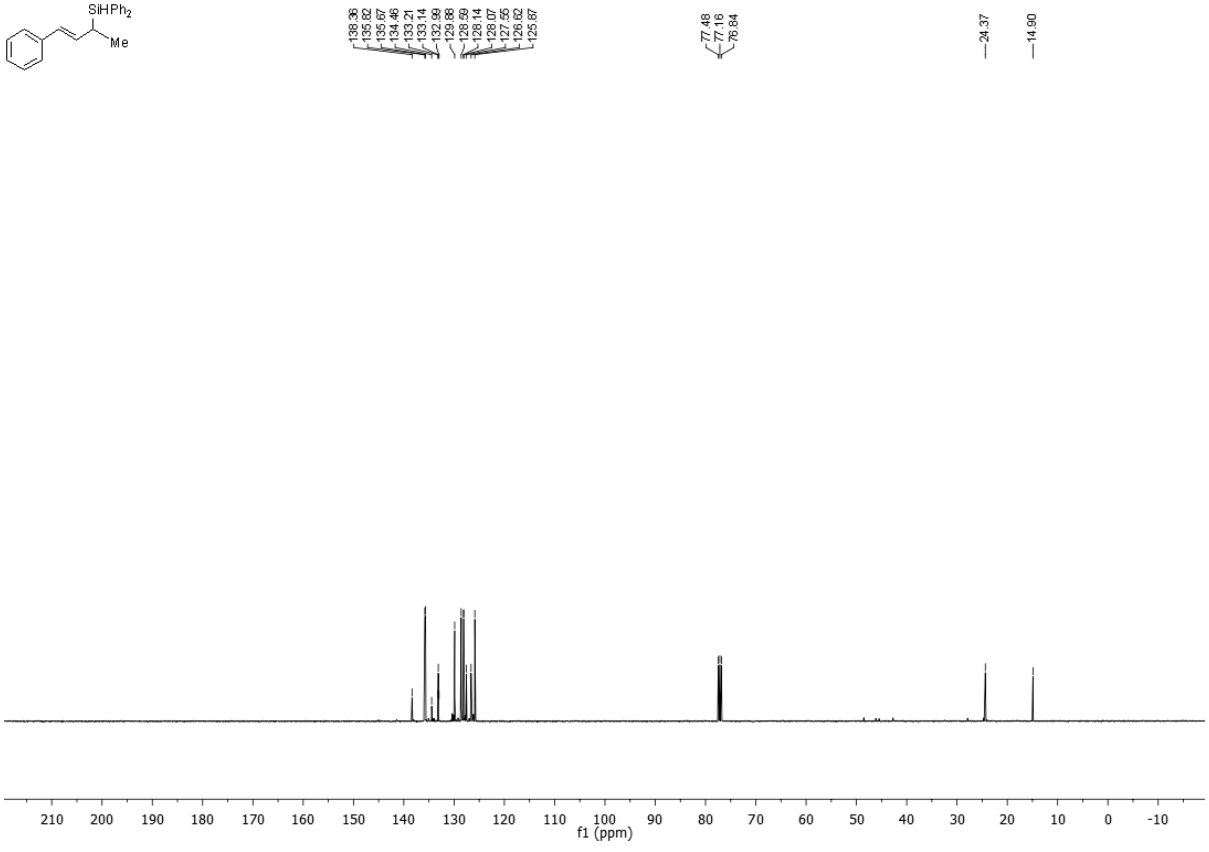

SiH2Ph
Me
Me
7.61
7.59
7.45
7.43
7.41
7.39
7.37
7.36
7.33
7.31
7.29
7.26
7.19
7.18
6.15
4.40
4.39
4.38
4.36
4.35
4.34
4.33
2.19
2.18
2.17
2.16
2.14
1.90
1.36
1.33
2.00
5.24
3.05
1.00
1.94
1.04
3.11
3.02
f1 (ppm)

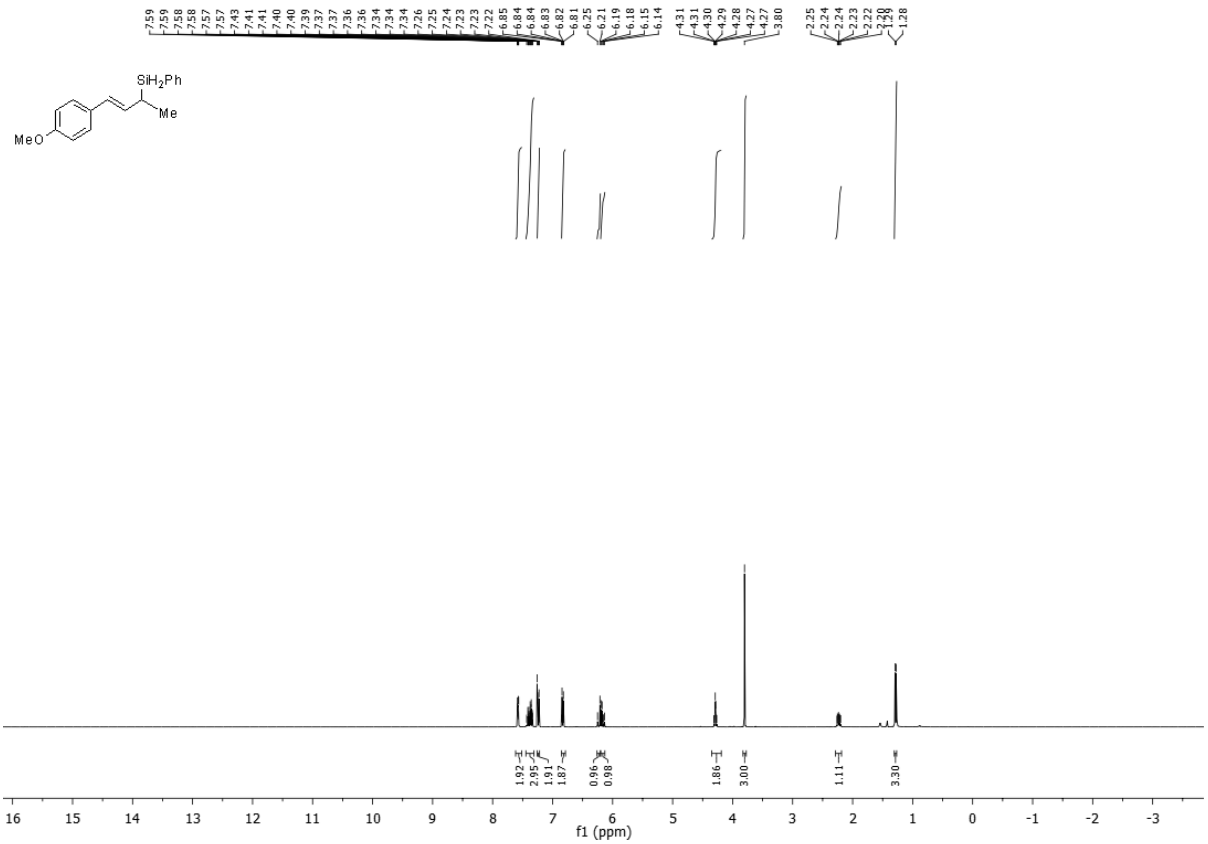

SiH2Ph
Me
Me
141.28
138.96
135.84
131.95
129.89
128.98
128.11
128.06
125.77
123.47
77.48
77.16
76.84
29.40
18.79
15.57
f1 (ppm)

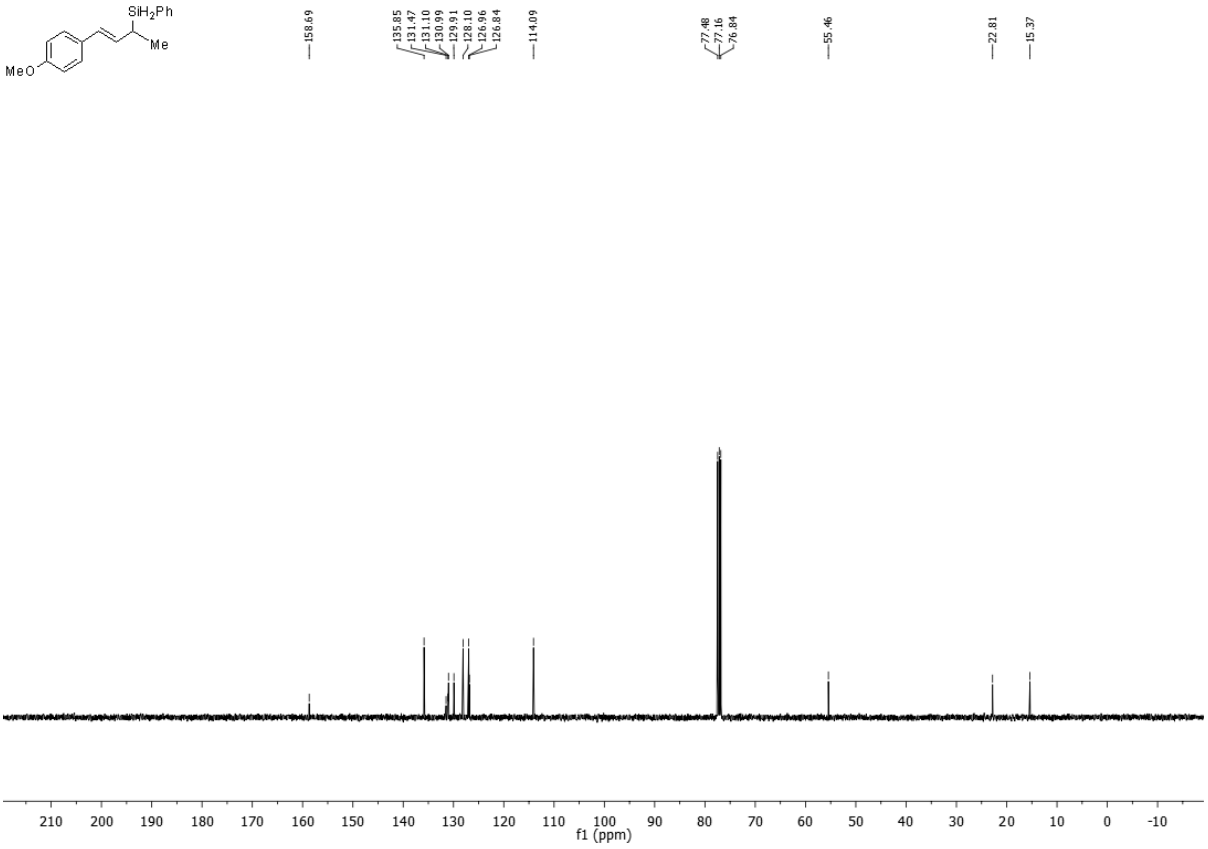

SiHPhMe
Me
dr 1:1
f1 (ppm)

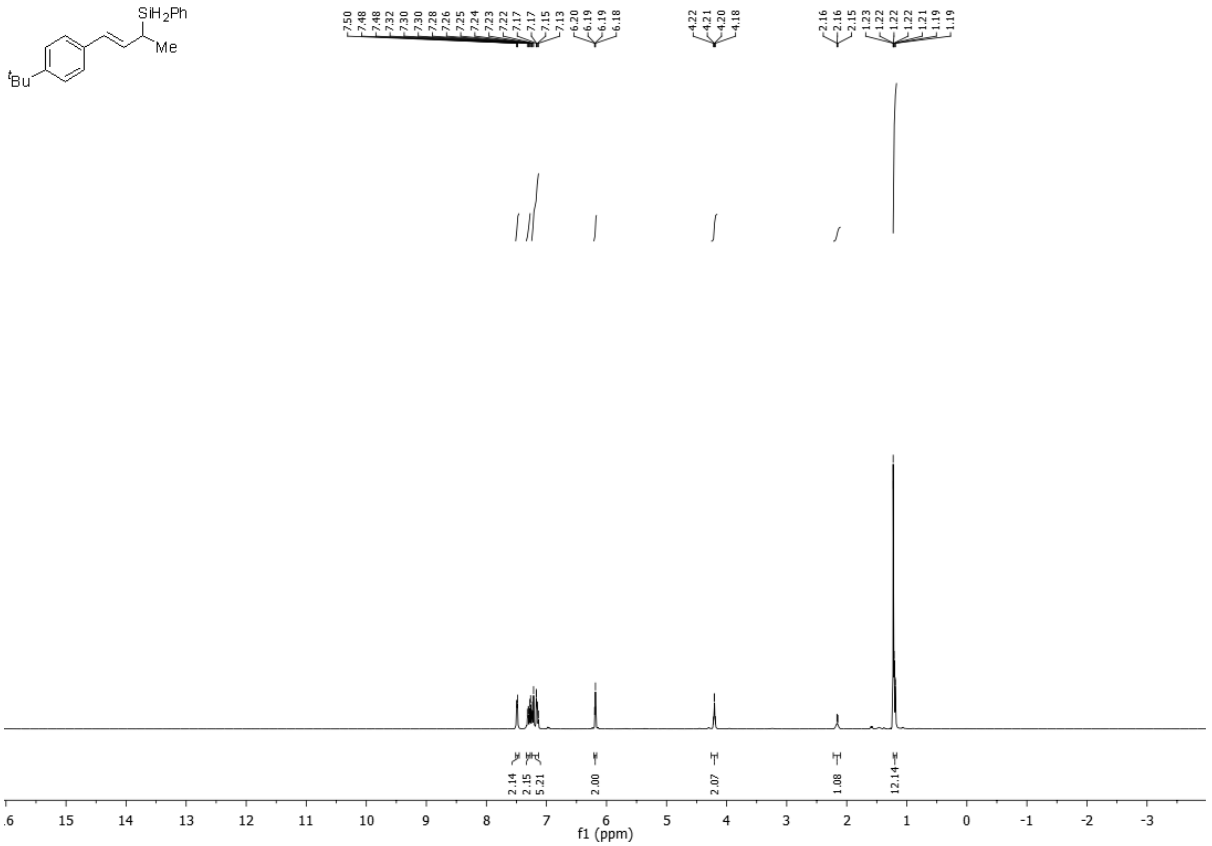

SiHPhMe
dr 1:1
f1 (ppm)

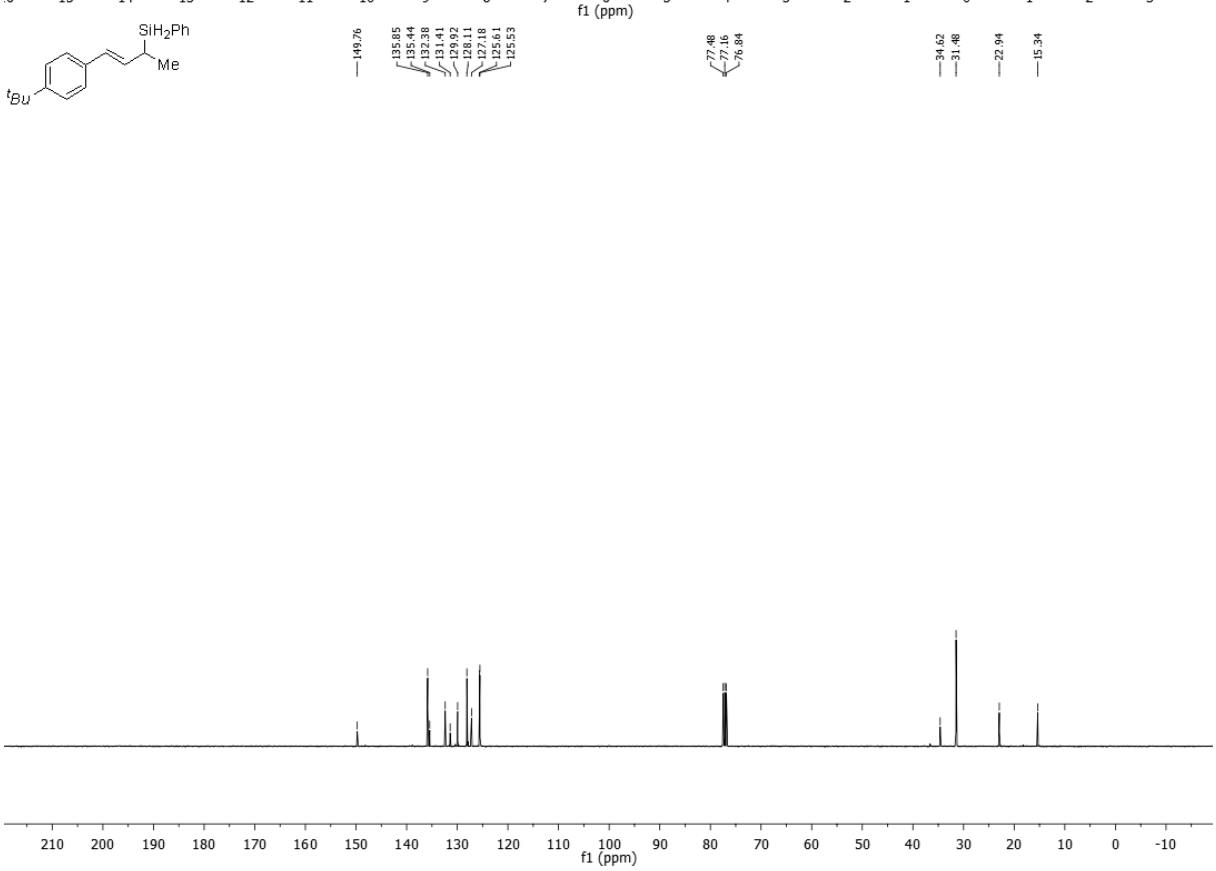

SiHPh2
Me
f1 (ppm)

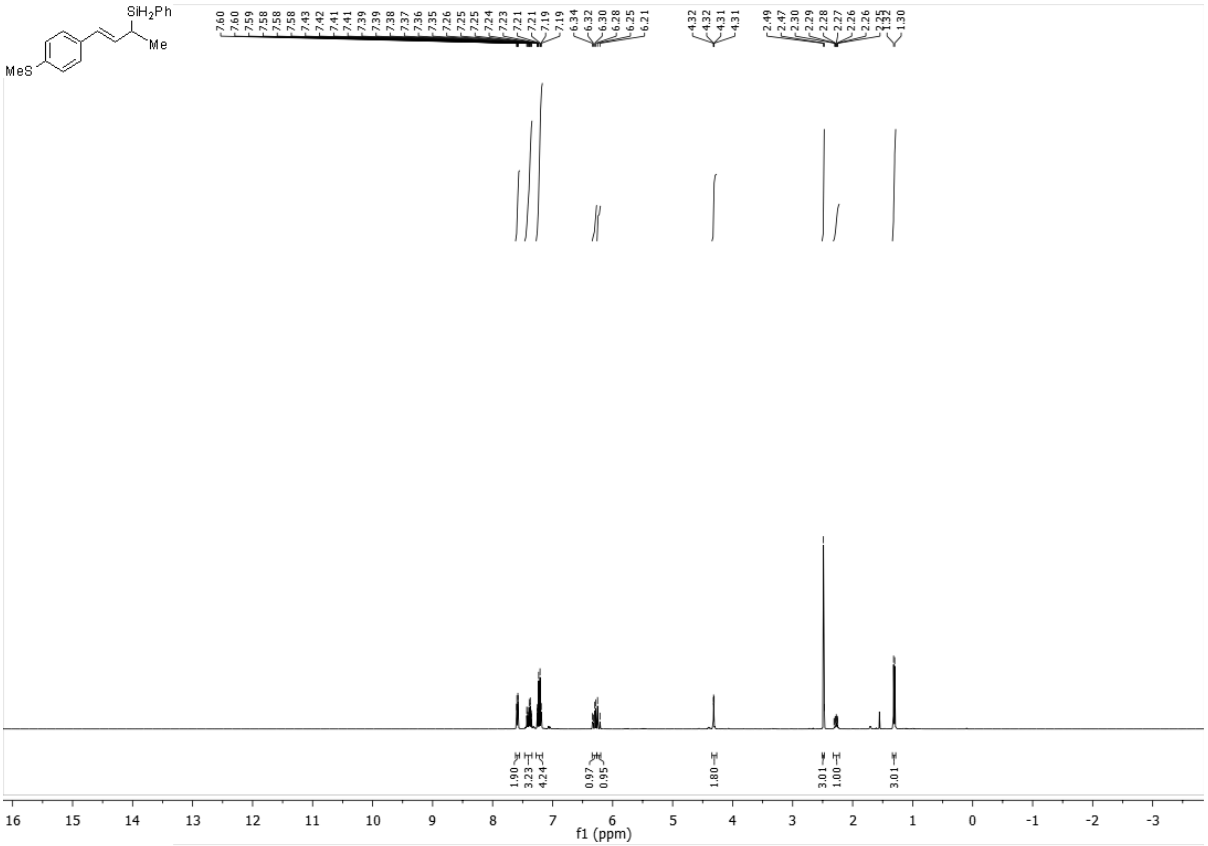

SiHPh2
Me
f1 (ppm)

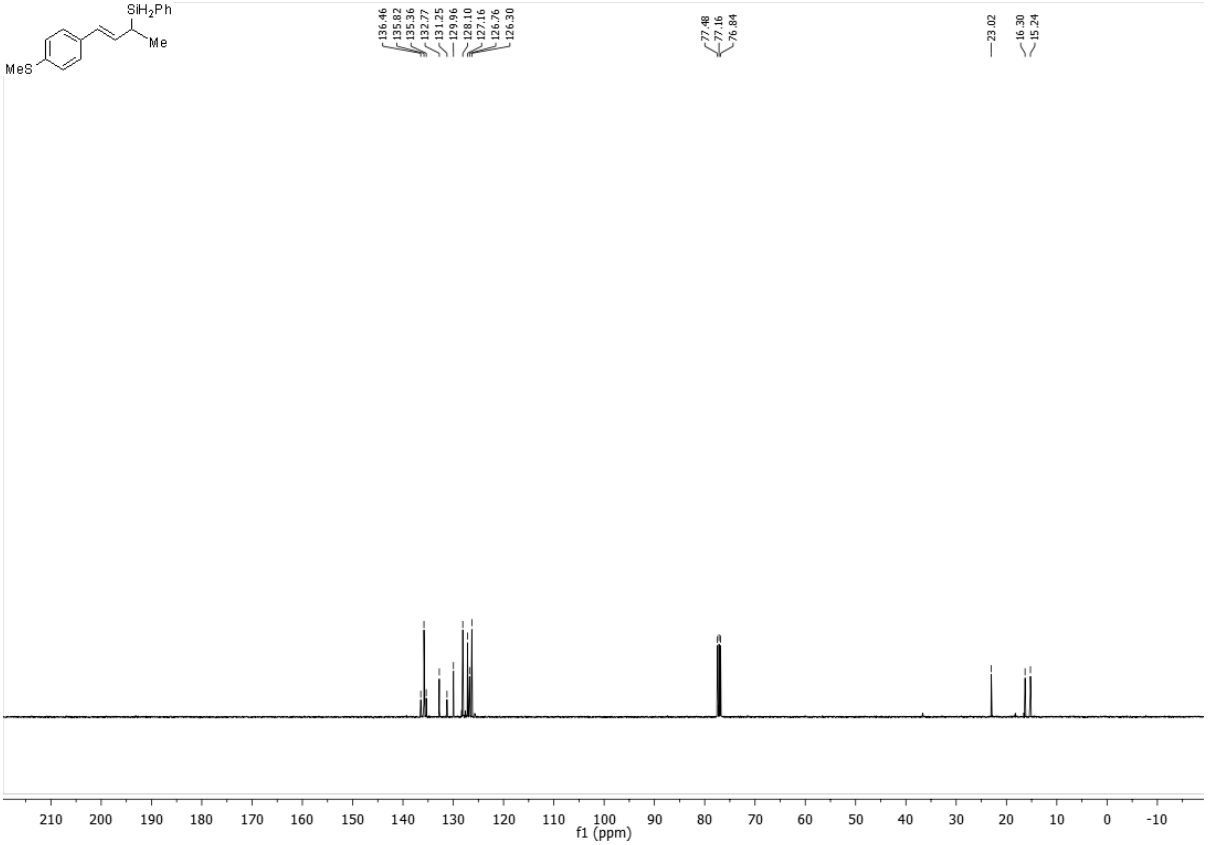

SiH2Ph
Me
MeO
f1 (ppm)

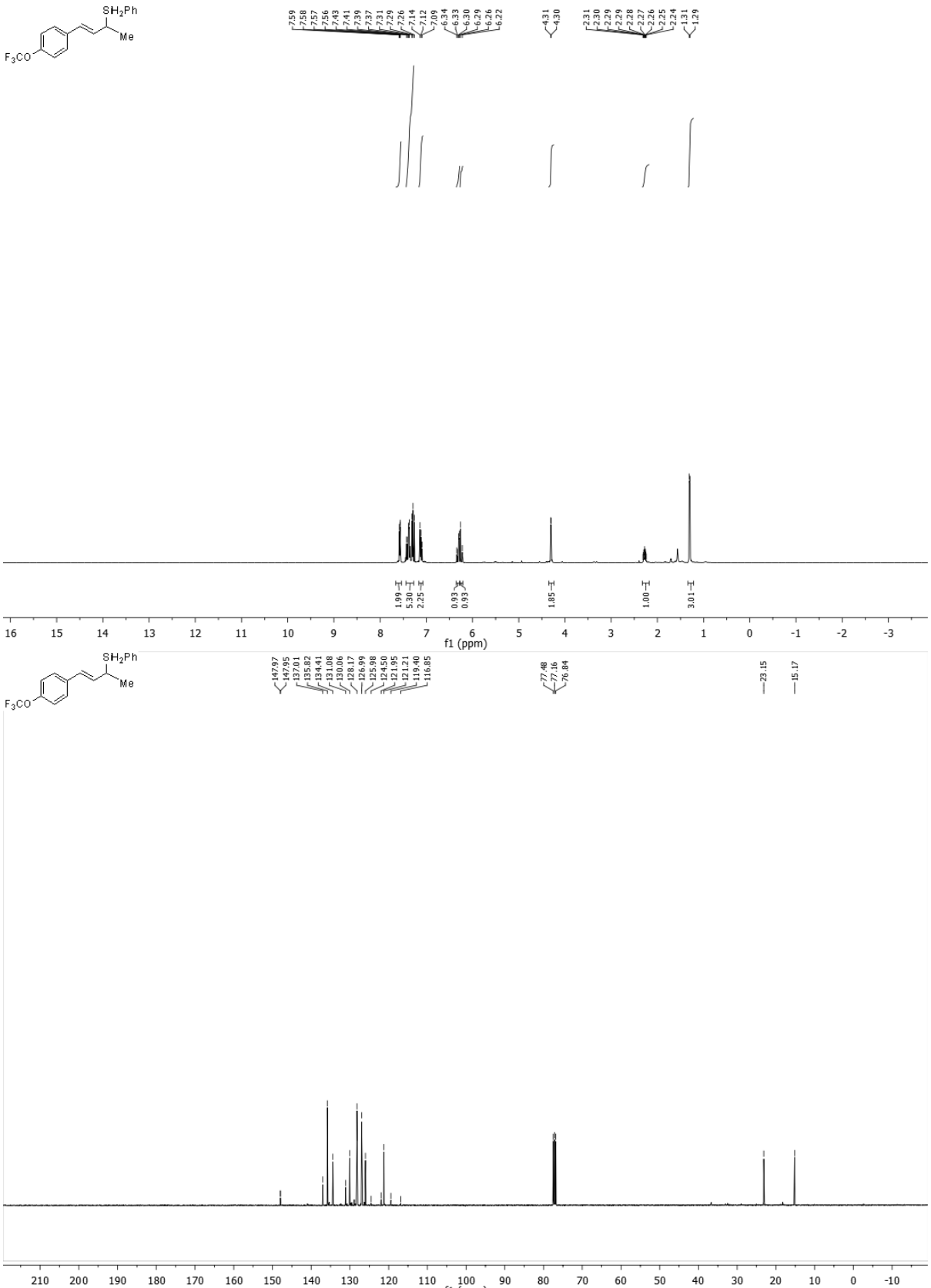

SiH2Ph
Me
MeO
f1 (ppm)

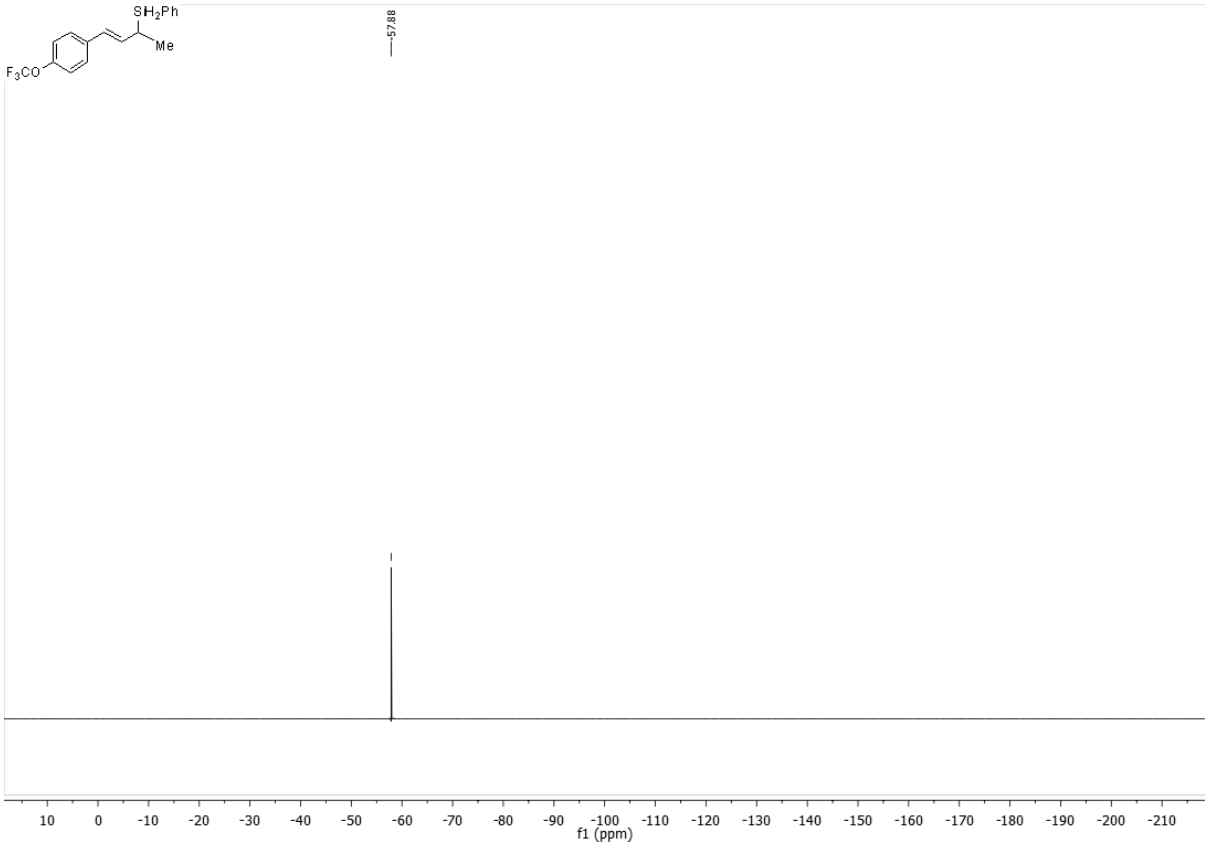

SiH2Ph
Me
tBu
7.50
7.48
7.48
7.32
7.30
7.30
7.28
7.26
7.25
7.24
7.23
7.22
7.17
7.17
7.15
7.13
6.20
6.19
6.19
6.18
4.22
4.21
4.20
4.18
2.16
2.16
2.15
1.23
1.22
1.22
1.22
1.21
1.19
1.19
2.14
2.15
5.21
2.00
2.07
1.08
12.14
f1 (ppm)

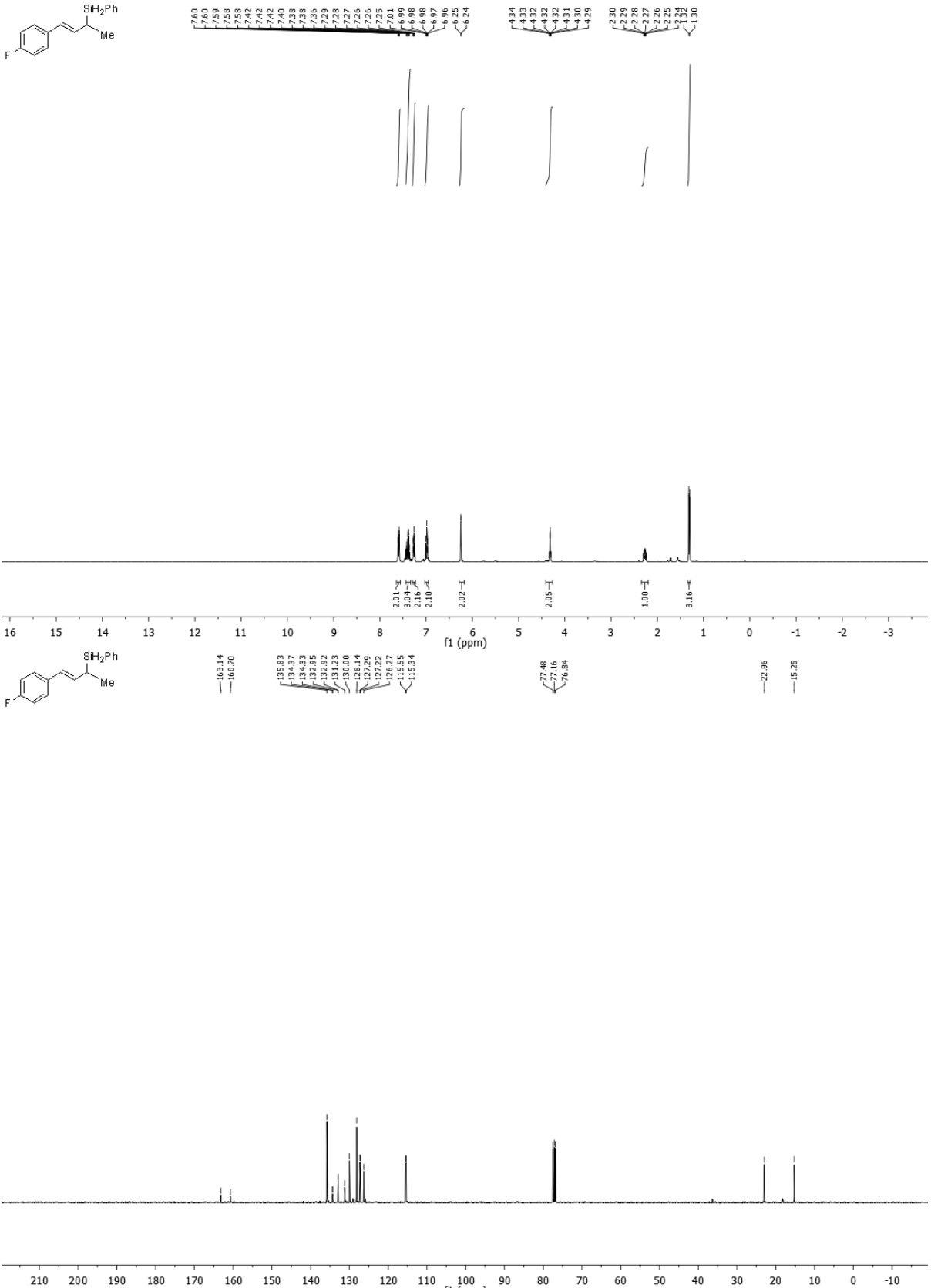

SiH2Ph
Me
tBu
149.76
135.85
135.44
132.38
131.41
129.92
128.11
127.18
125.61
125.53
77.48
77.16
76.84
34.62
31.48
22.94
15.34
f1 (ppm)

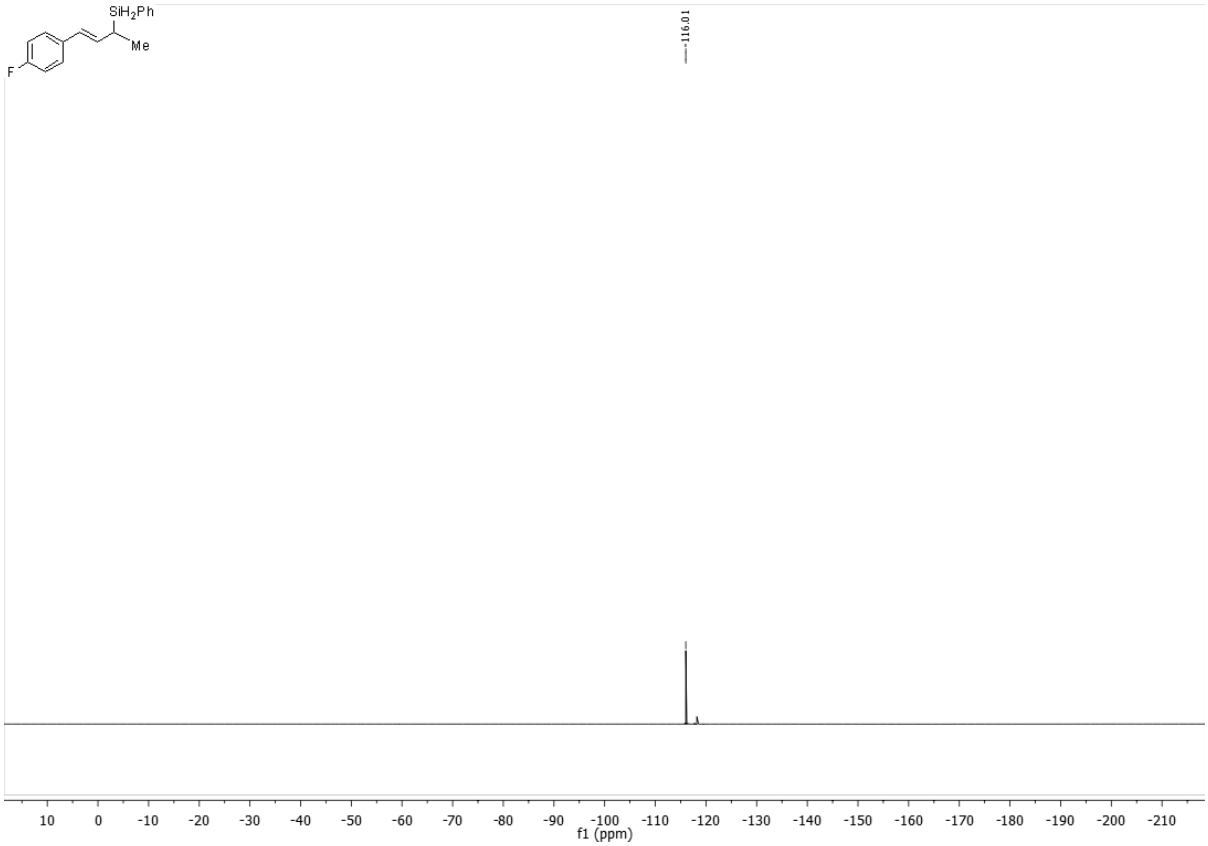

SiH2Ph
Me
MeS
f1 (ppm)

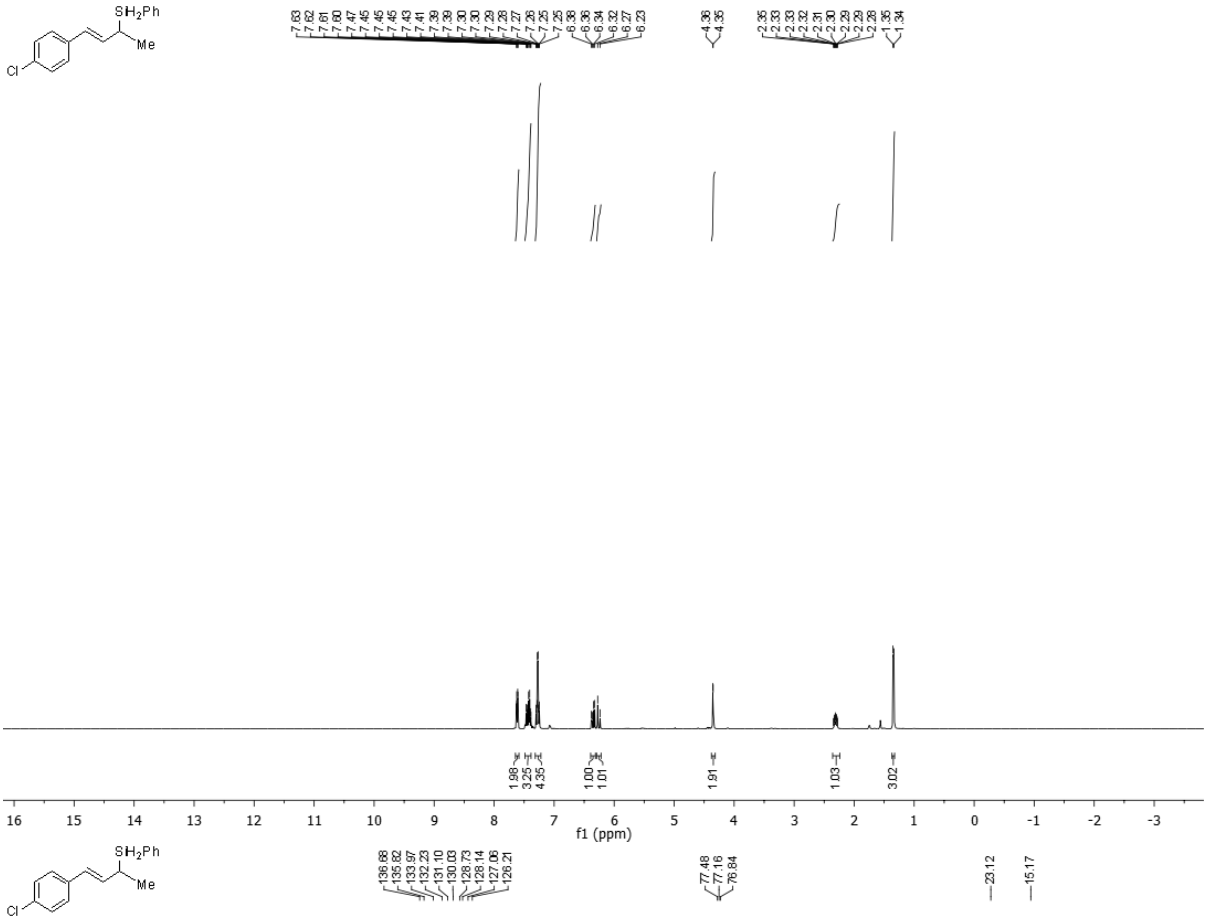

SiH2Ph
Me
MeS
f1 (ppm)

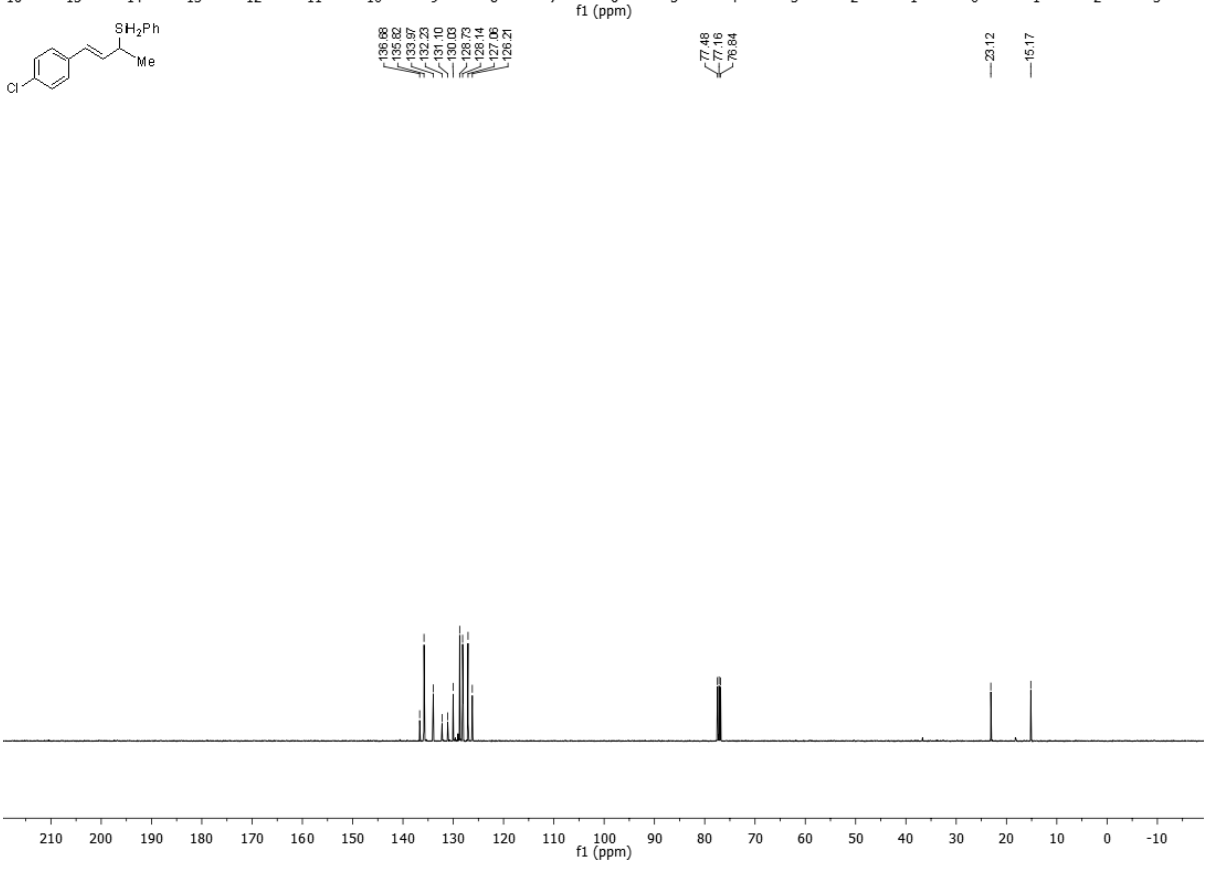

SH2Ph
Me
F3CO
7.59
7.58
7.57
7.56
7.43
7.41
7.39
7.37
7.31
7.29
7.26
7.14
7.12
7.09
6.34
6.33
6.30
6.29
6.26
6.22
4.31
4.30
2.31
2.30
2.29
2.29
2.28
2.27
2.26
2.25
2.24
1.31
1.29
1.99
5.30
2.25
0.93
0.93
1.85
1.00
3.01
f1 (ppm)
147.97
147.95
137.01
135.82
134.41
131.08
130.06
128.17
126.99
125.98
124.50
121.95
121.21
119.40
116.85
77.48
77.16
76.84
23.15
15.17
f1 (ppm)

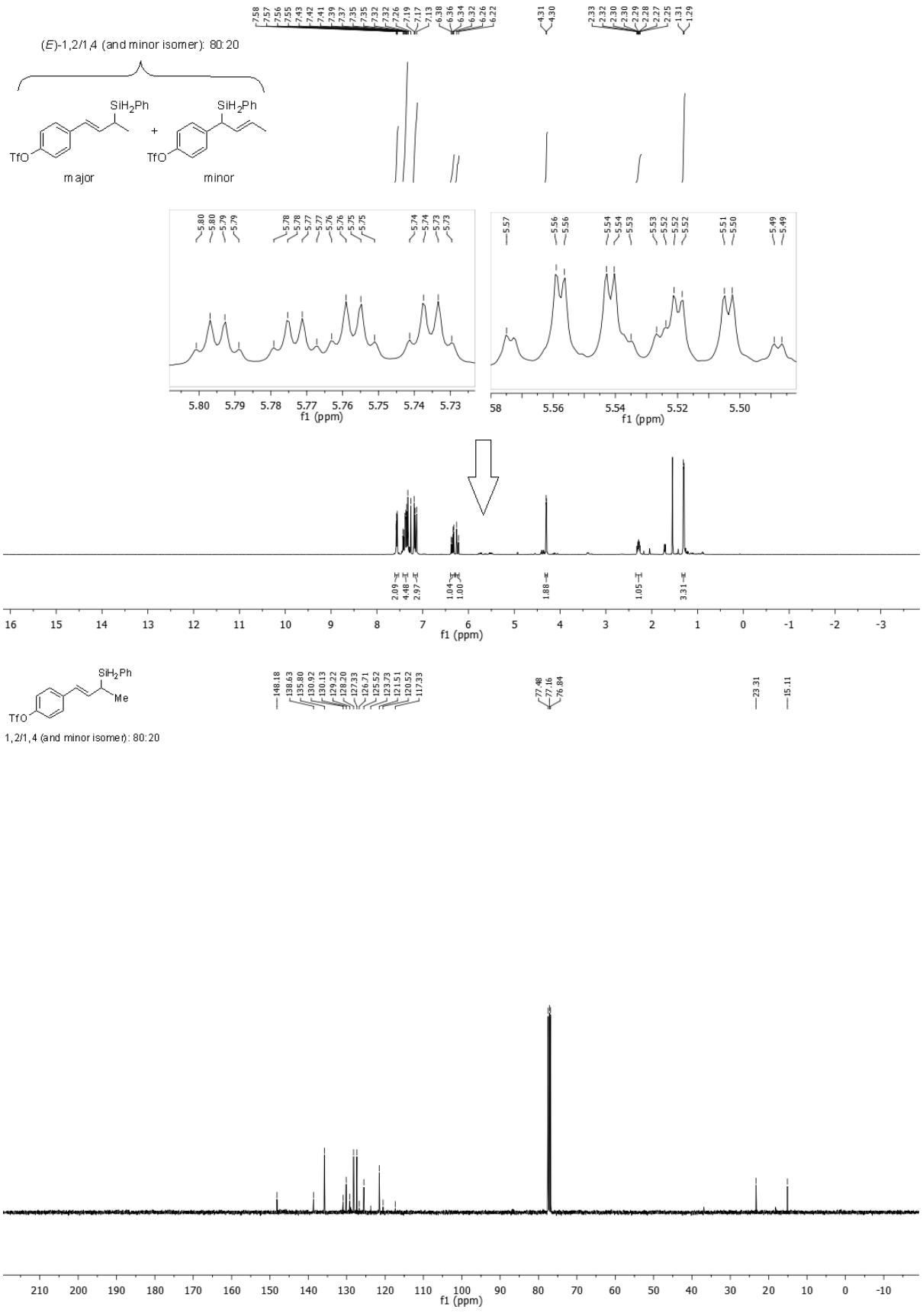

SH2Ph
Me
F3CO
-57.88
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

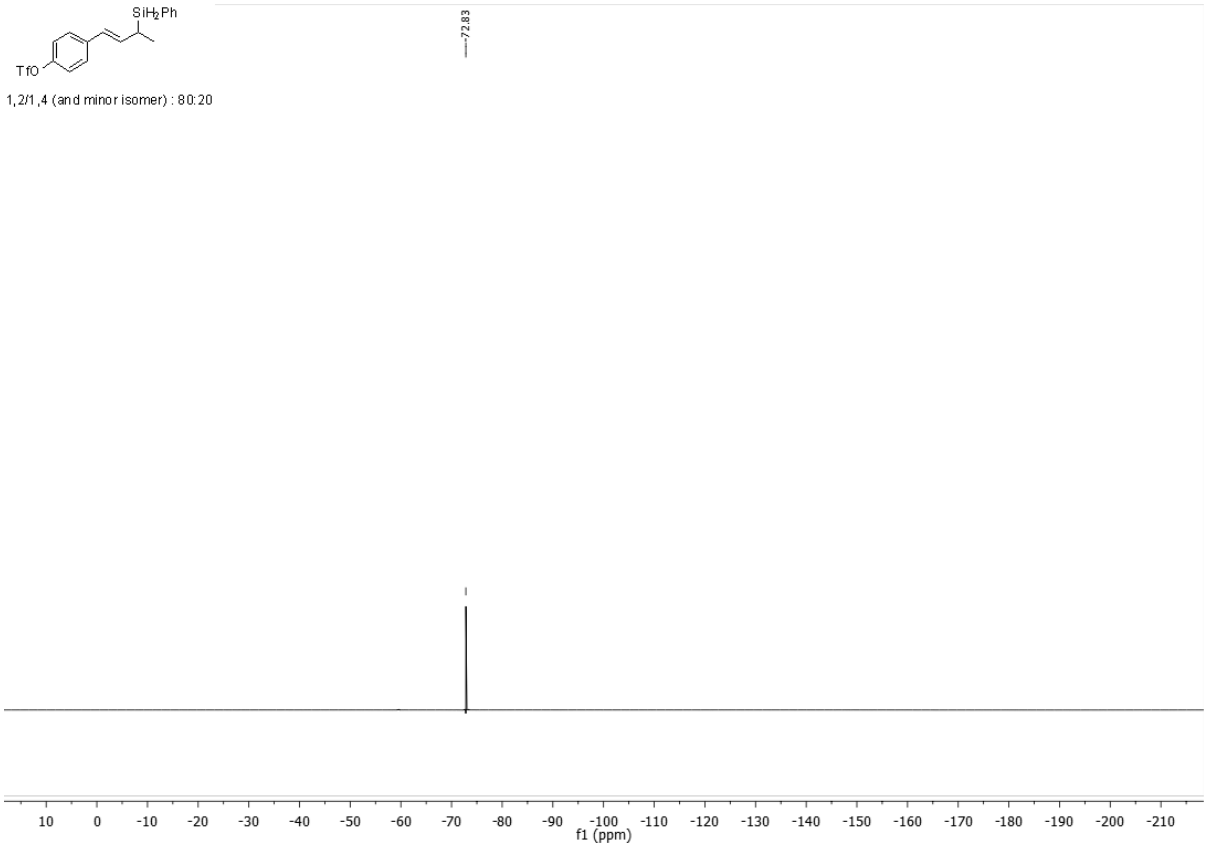

SiH2Ph
Me
F
f1 (ppm)

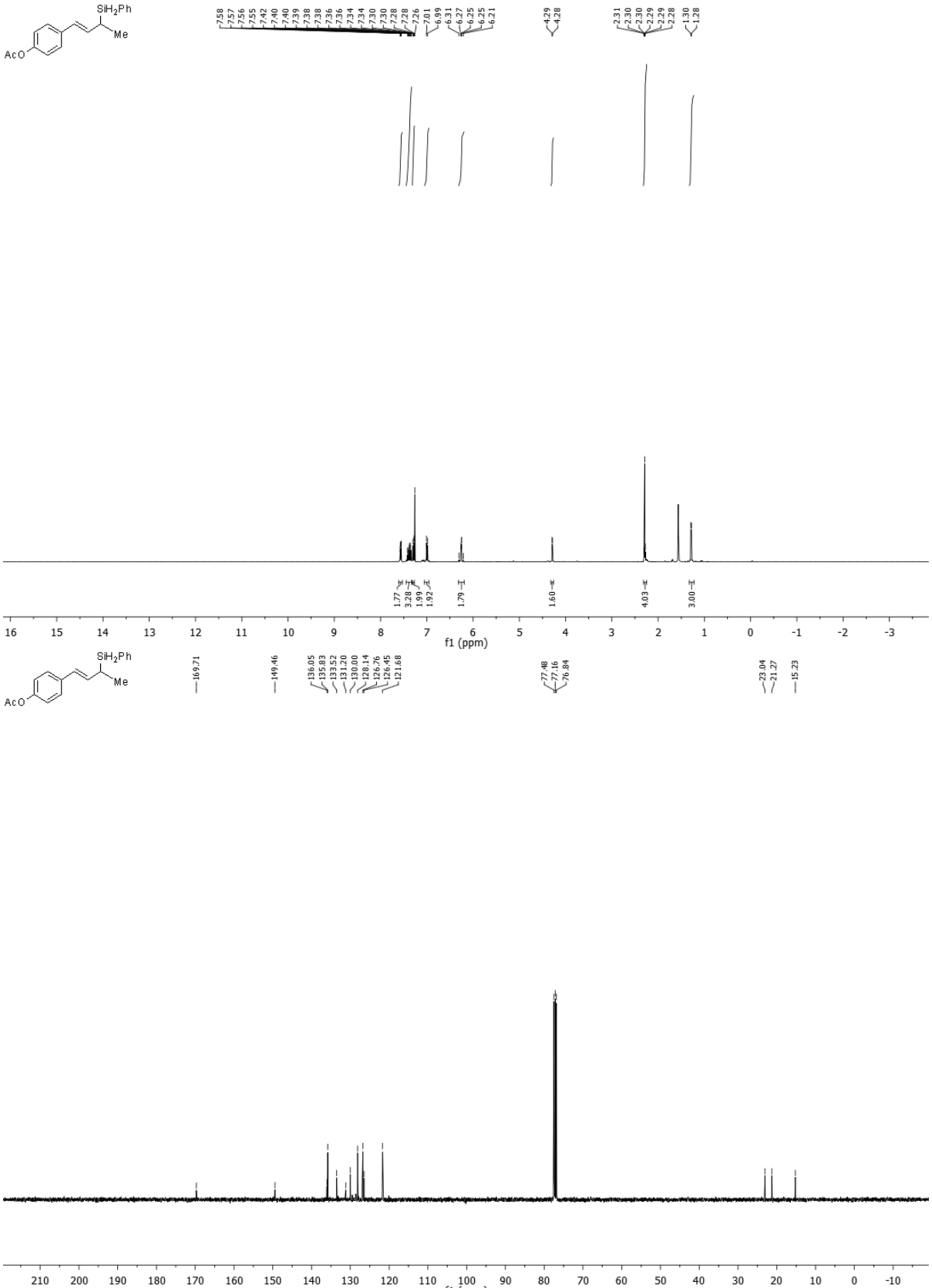

SiH2Ph
Me
F
-116.01
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

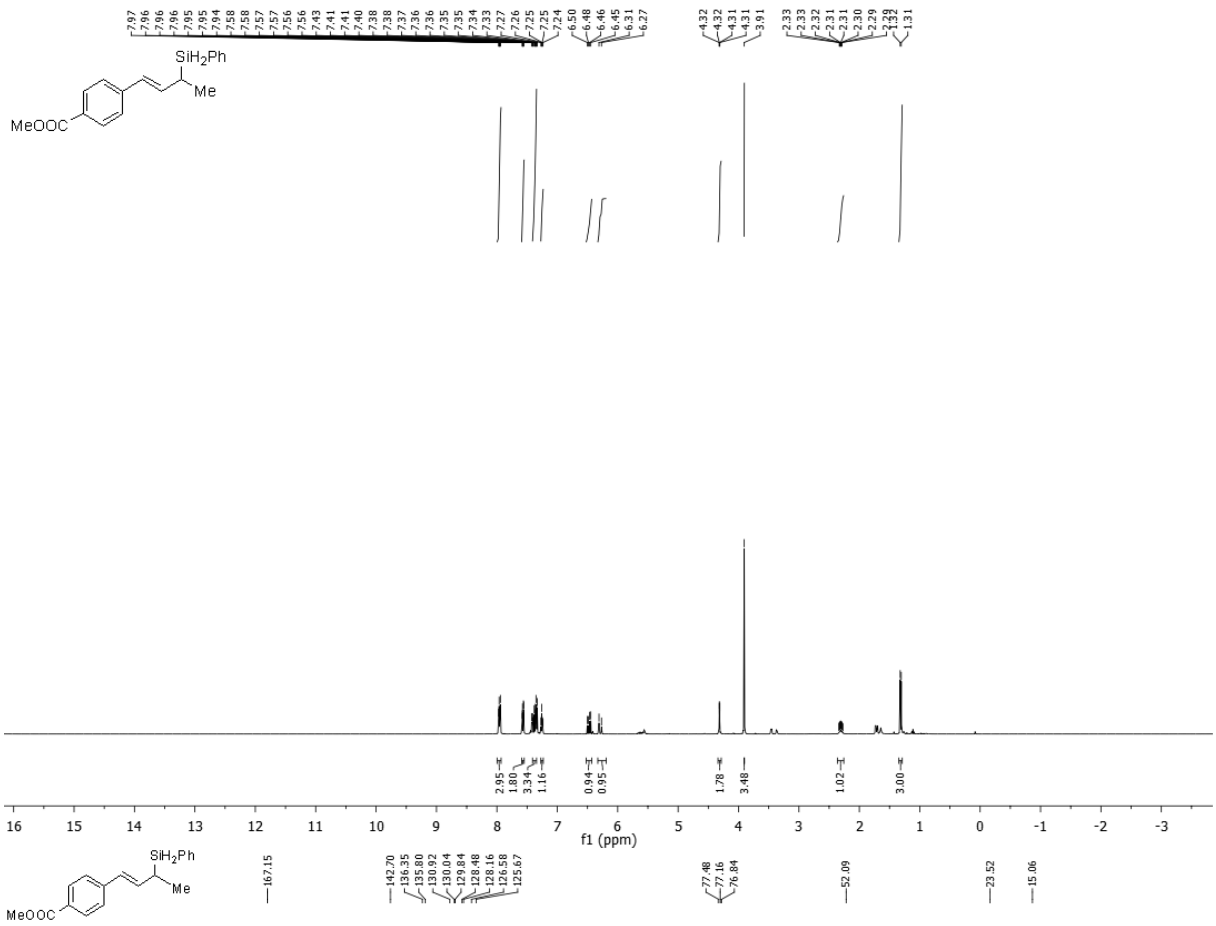

SH2Ph
Me
Cl
7.63
7.62
7.61
7.60
7.47
7.45
7.45
7.45
7.43
7.41
7.39
7.39
7.30
7.30
7.29
7.28
7.27
7.26
7.25
7.25
6.38
6.36
6.34
6.32
6.27
6.23
4.36
4.35
2.35
2.33
2.33
2.32
2.31
2.30
2.29
2.29
2.28
1.35
1.34
1.98
3.25
4.35
1.00
1.01
1.91
1.03
3.02
f1 (ppm)

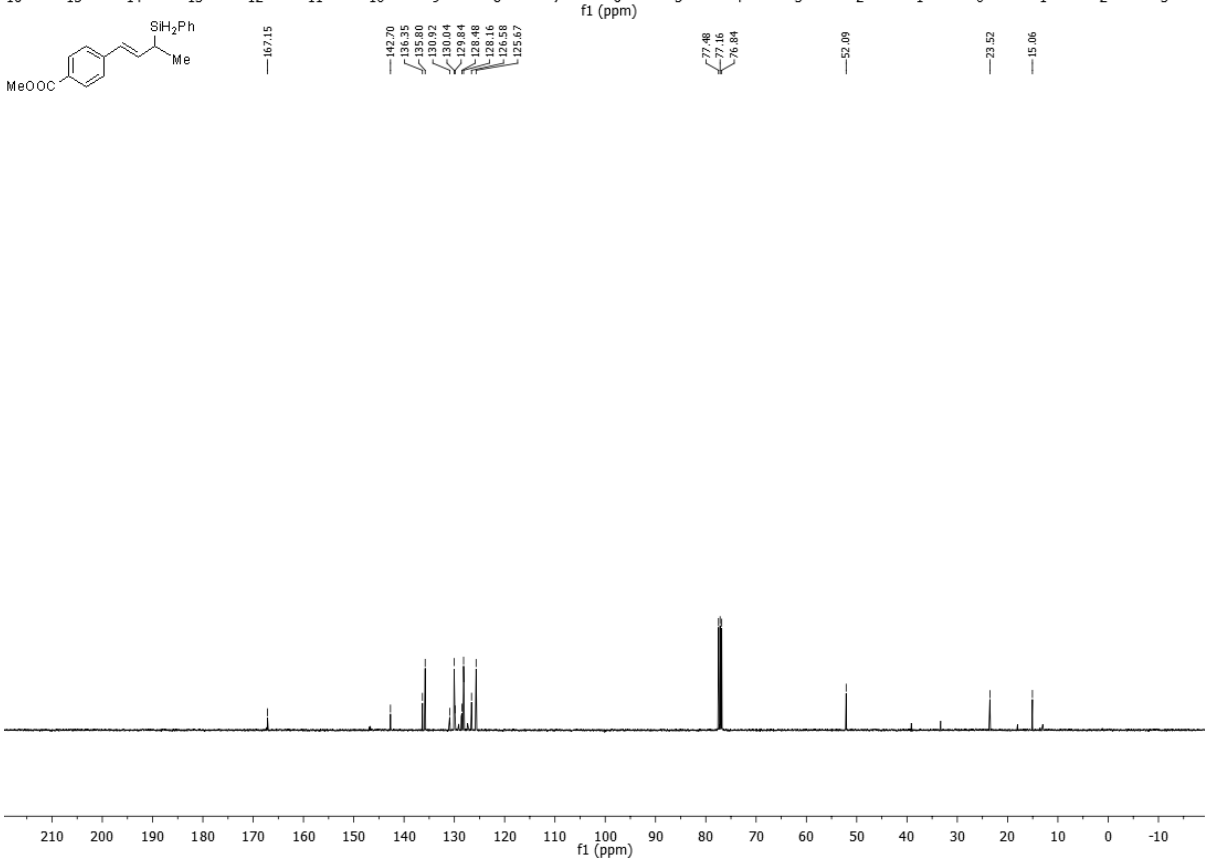

SH2Ph
Me
Cl
136.88
135.82
133.97
132.23
131.10
130.03
128.73
128.14
127.06
126.21
77.48
77.16
76.84
23.12
15.17
f1 (ppm)

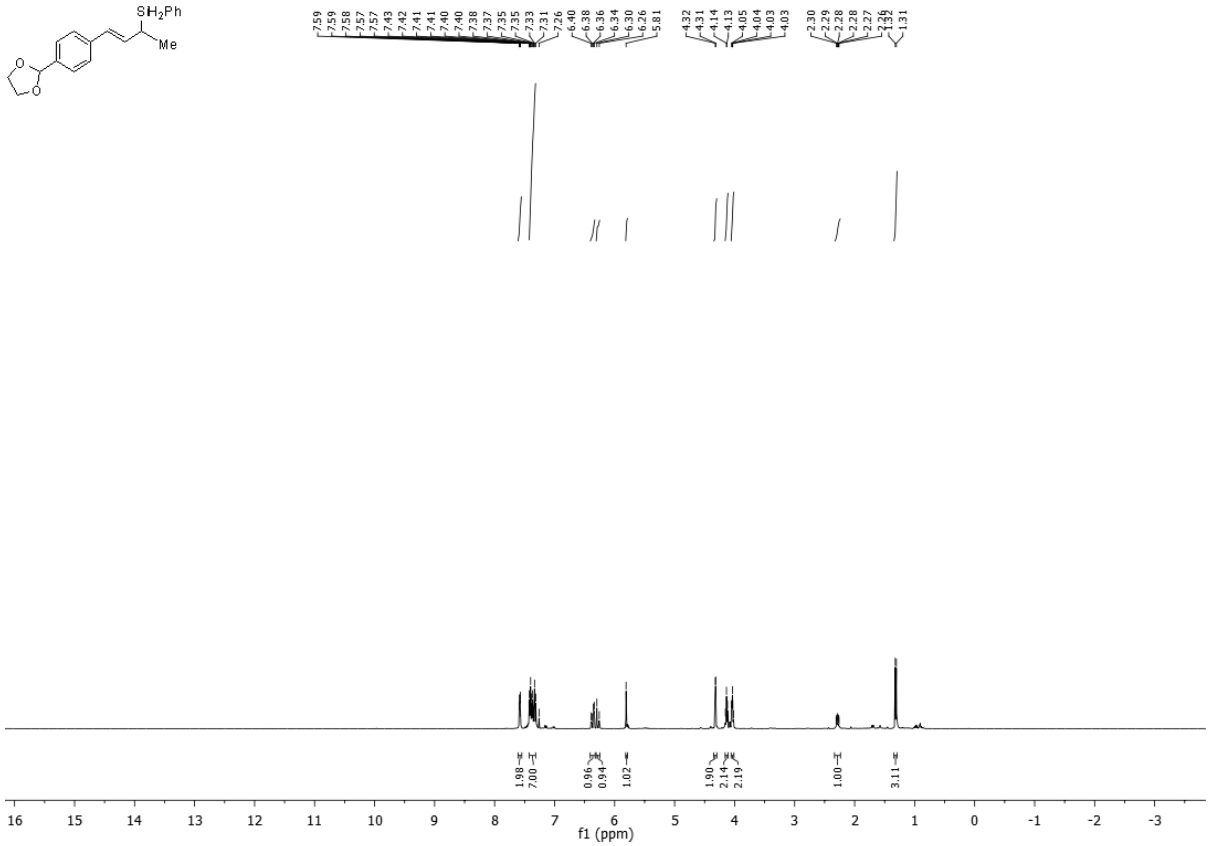

(E)-1,2/1,4 (and minor isomer): 80:20
SiH2Ph
TfO
major
minor
f1 (ppm)
1,2/1,4 (and minor isomer): 80:20

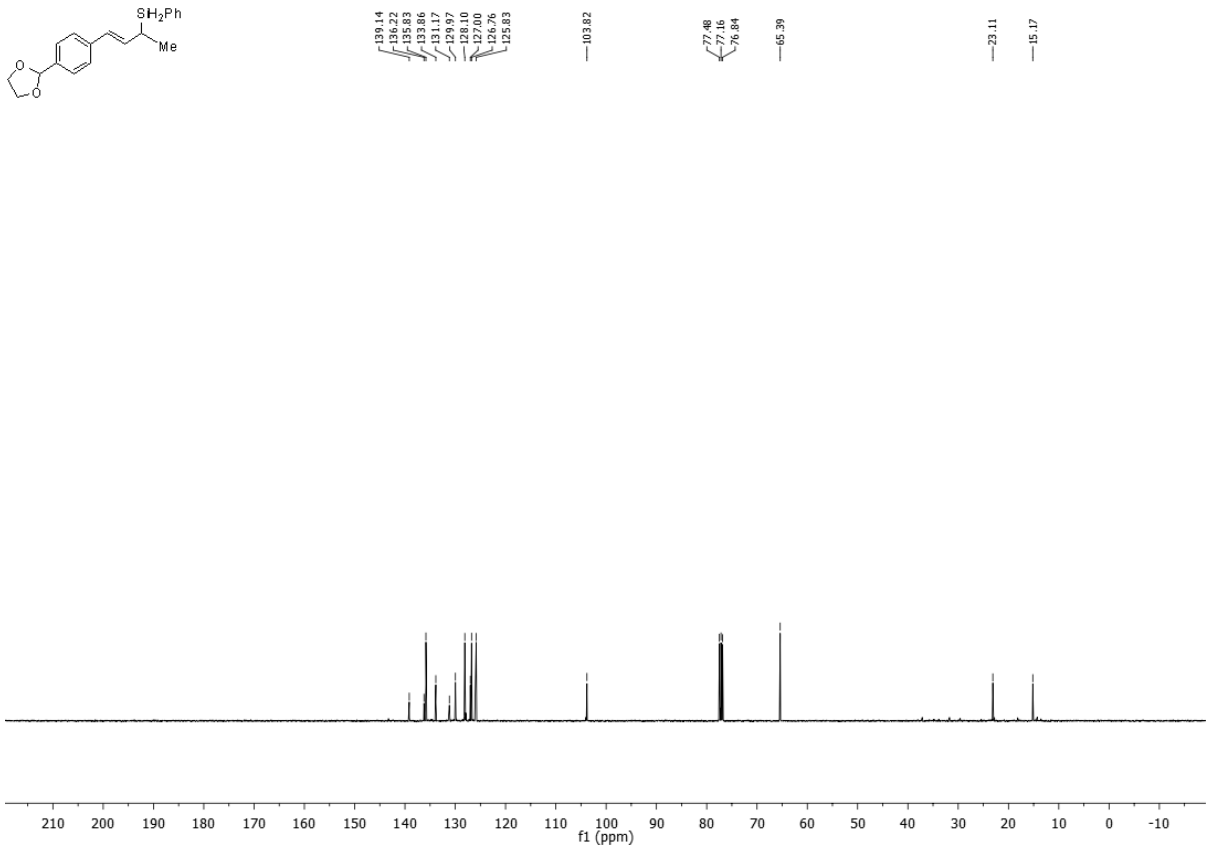

SiH2Ph
TfO
-72.83
1,2/1,4 (and minor isomer) : 80:20
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

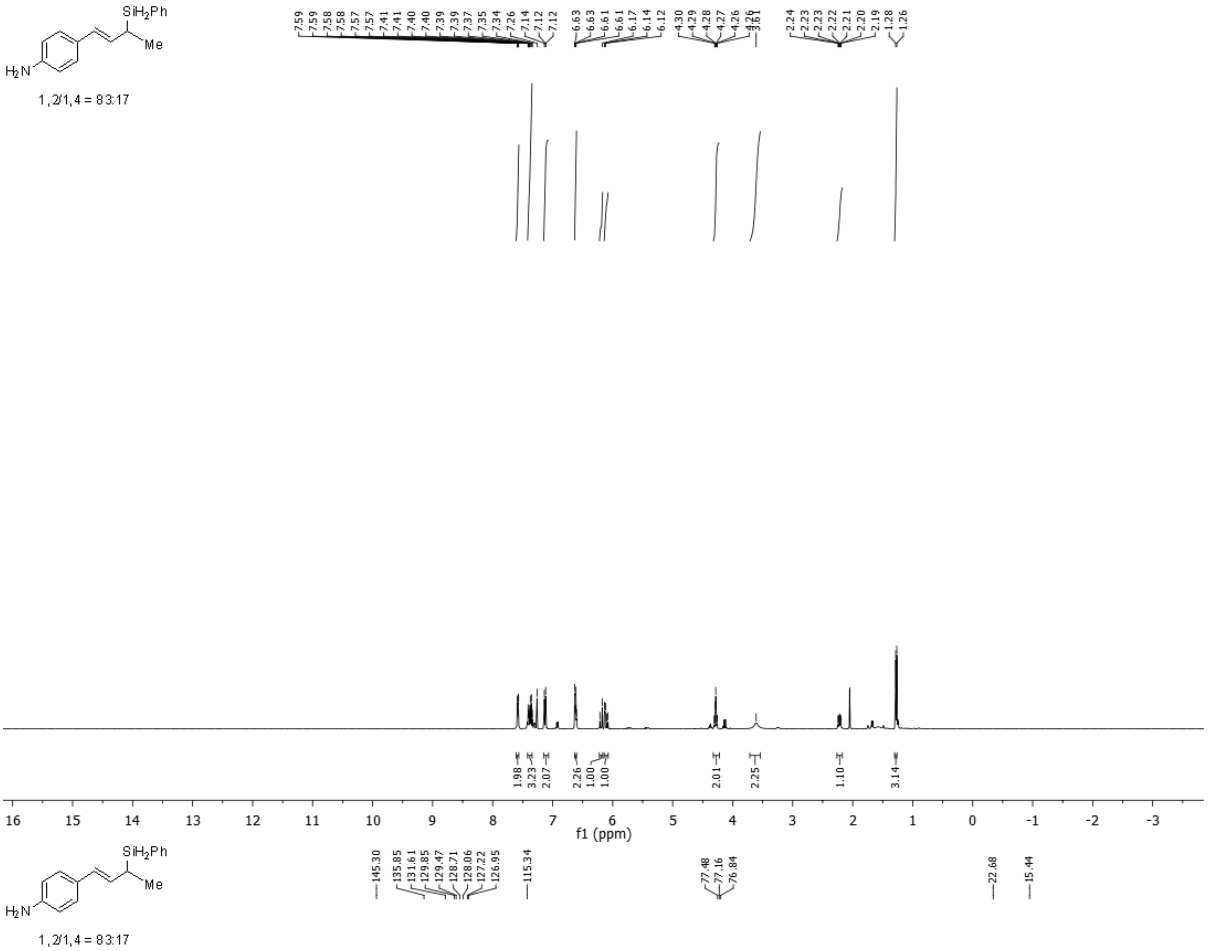

SiH2Ph
Me
AcO
7.58
7.57
7.56
7.55
7.42
7.40
7.40
7.39
7.38
7.38
7.36
7.36
7.34
7.34
7.30
7.30
7.28
7.28
7.26
7.01
6.99
6.31
6.27
6.25
6.25
6.21
4.29
4.28
2.31
2.30
2.30
2.29
2.29
2.28
1.30
1.28
1.77
3.28
1.99
1.92
1.79
1.60
4.03
3.00
f1 (ppm)
169.71
149.46
136.05
135.83
133.52
131.20
130.00
128.14
126.76
126.45
121.68
77.48
77.16
76.84
23.04
21.27
15.23

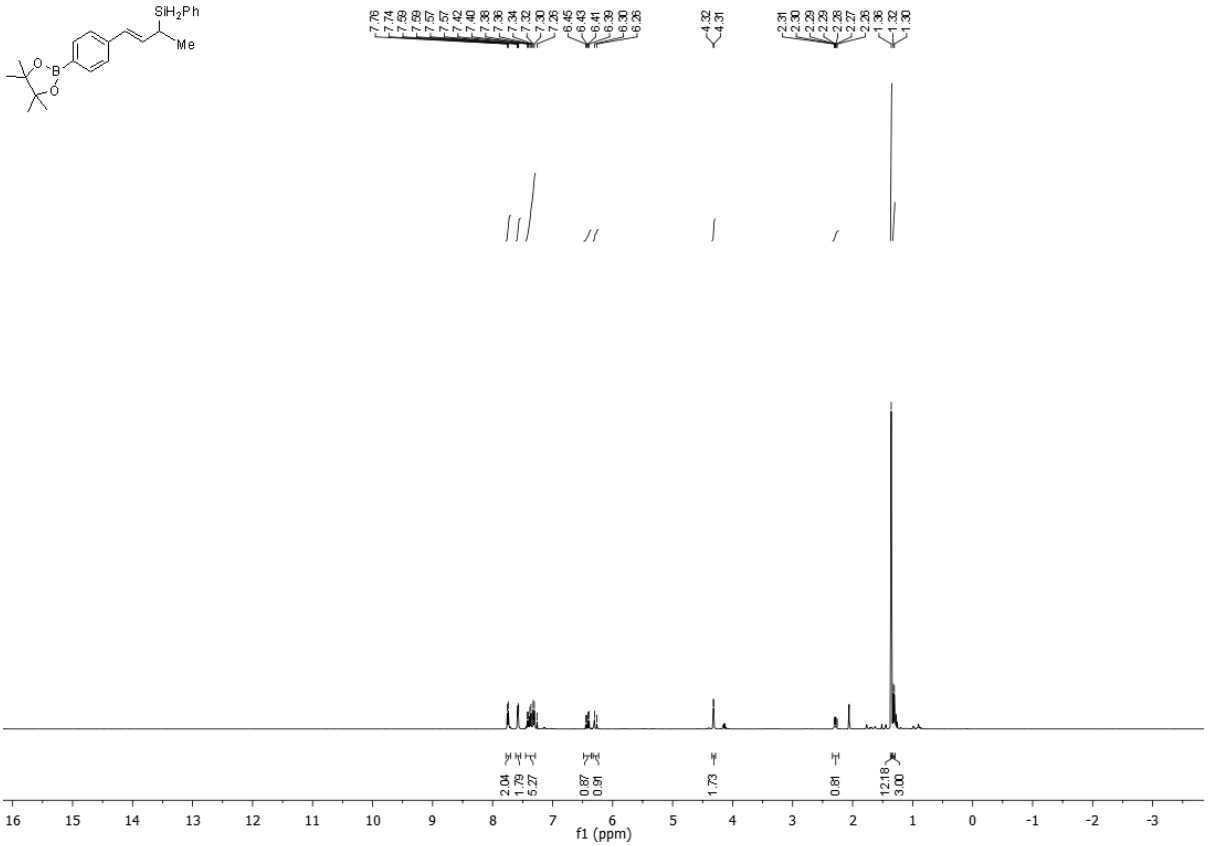

SiH2Ph
Me
MeOOC
f1 (ppm)

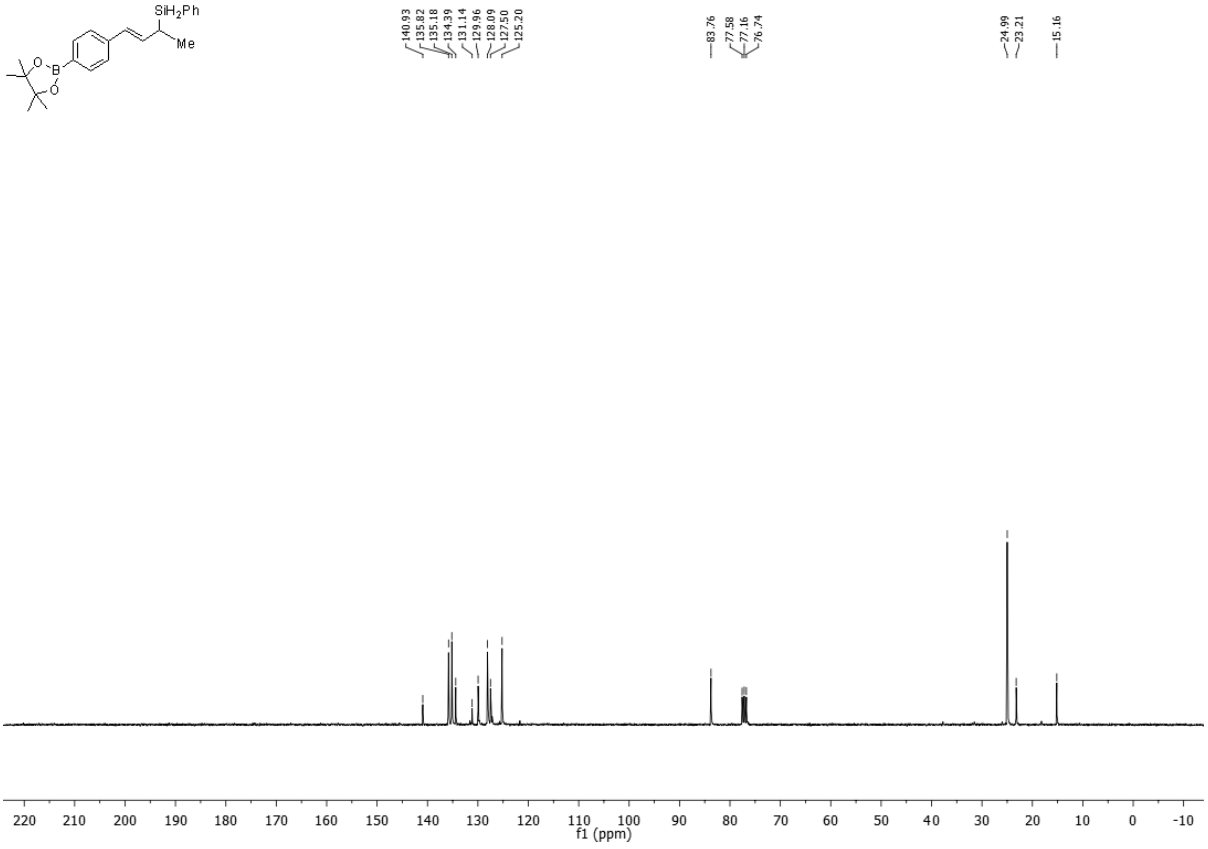

SiH2Ph
Me
MeOOC
f1 (ppm)

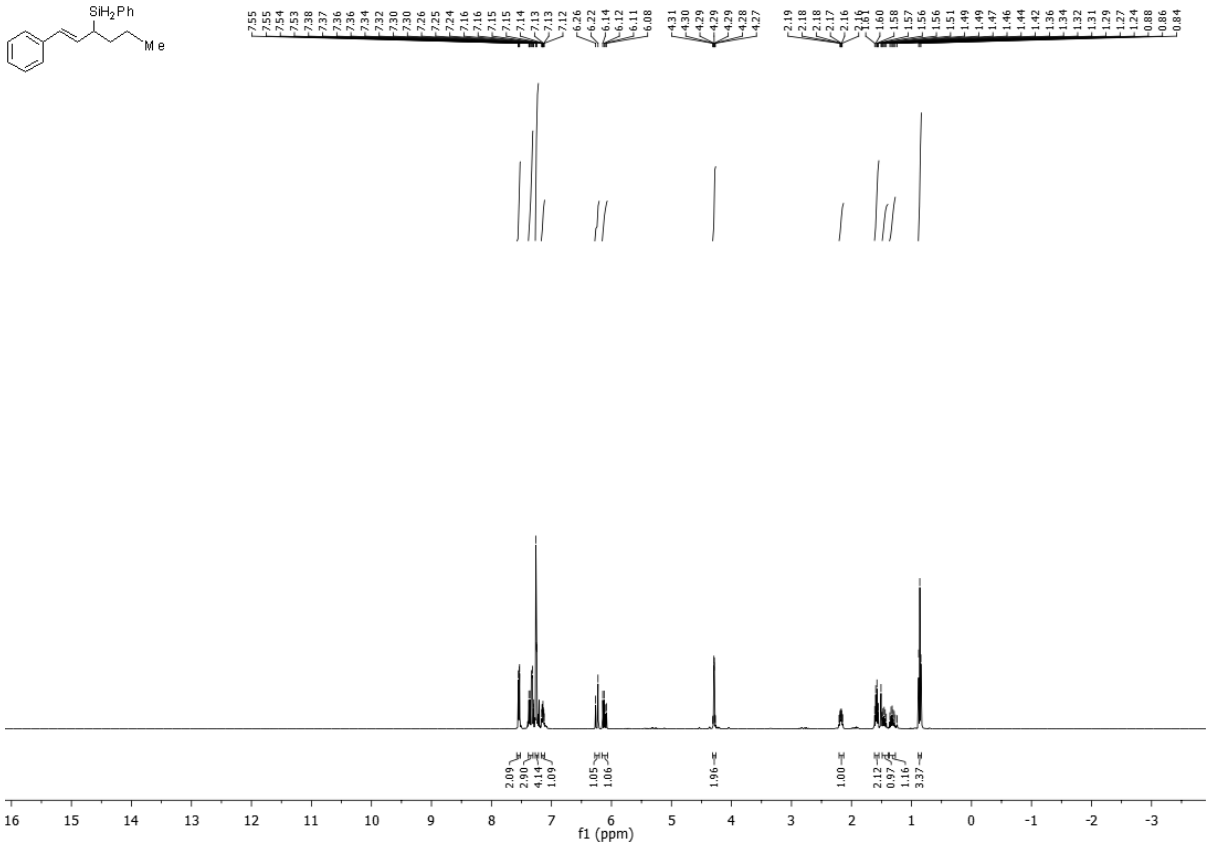

SH2Ph
Me
7.59
7.59
7.58
7.57
7.57
7.43
7.42
7.41
7.41
7.40
7.40
7.38
7.37
7.35
7.35
7.33
7.31
7.26
6.40
6.38
6.36
6.34
6.30
6.26
5.81
4.32
4.31
4.14
4.13
4.05
4.04
4.03
4.03
2.30
2.29
2.28
2.28
2.27
1.32
1.31
1.98
7.00
0.96
0.94
1.02
1.90
2.14
2.19
1.00
3.11
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3
f1 (ppm)

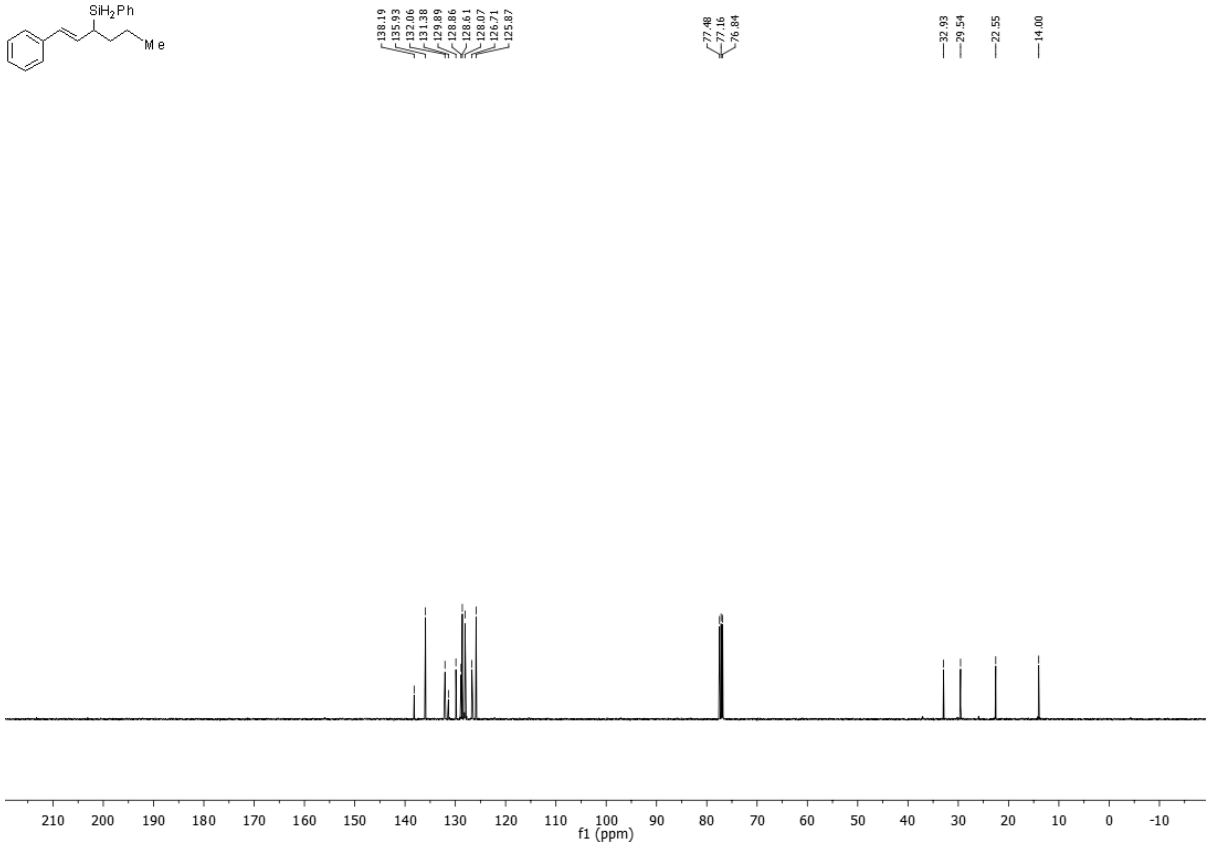

SH2Ph
Me
139.14
136.22
135.83
133.86
131.17
129.97
128.10
127.00
126.76
125.83
103.82
77.48
77.16
76.84
65.39
23.11
15.17
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

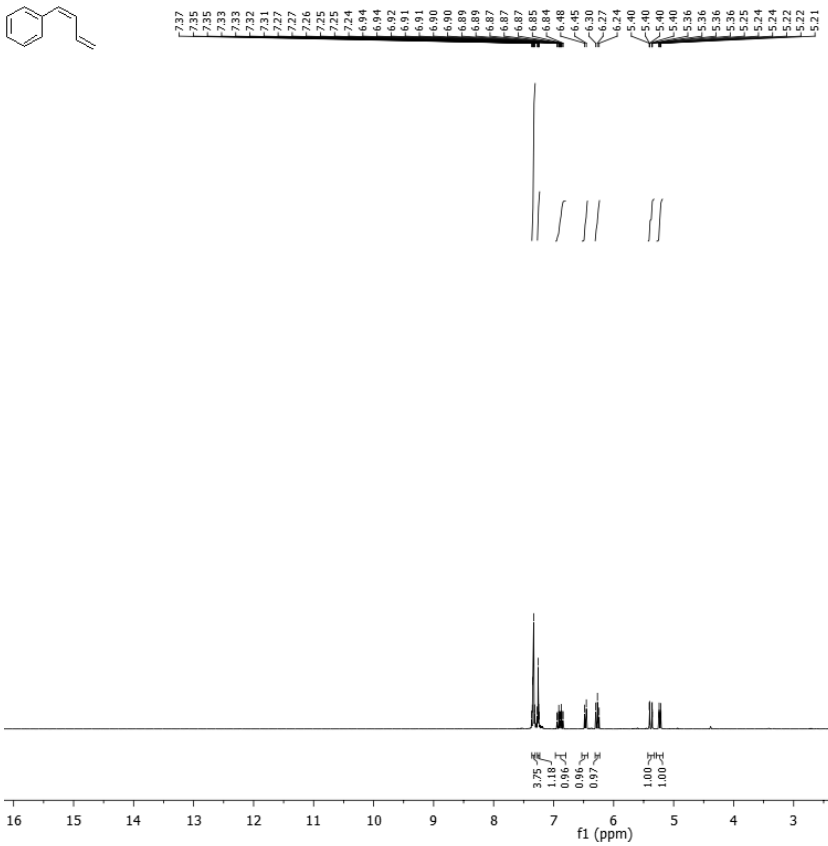

SiH2Ph
Me
H2N
1, 2/1, 4 = 83:17
f1 (ppm)
SiH2Ph
Me
H2N
1, 2/1, 4 = 83:17
f1 (ppm)

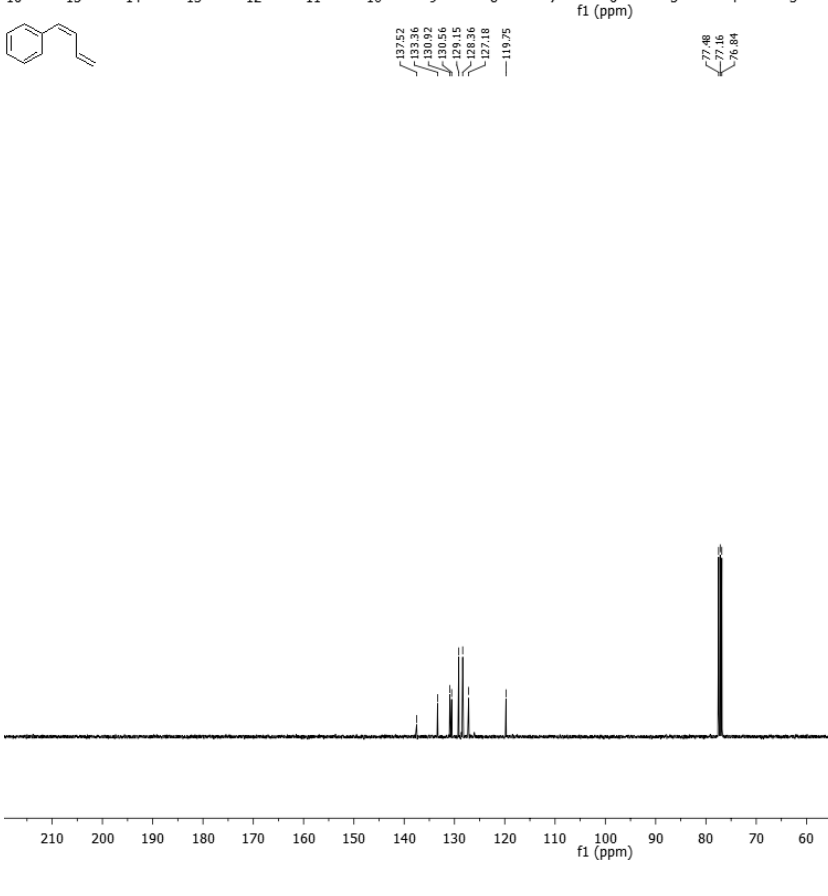

SiH2Ph
Me
7.76
7.74
7.59
7.59
7.57
7.57
7.42
7.40
7.38
7.36
7.34
7.32
7.30
7.26
6.45
6.43
6.41
6.39
6.30
6.28
4.32
4.31
2.31
2.30
2.29
2.29
2.28
2.27
2.26
1.36
1.32
1.30
2.04
1.79
5.27
0.87
0.91
1.73
0.81
12.18
3.00
f1 (ppm)

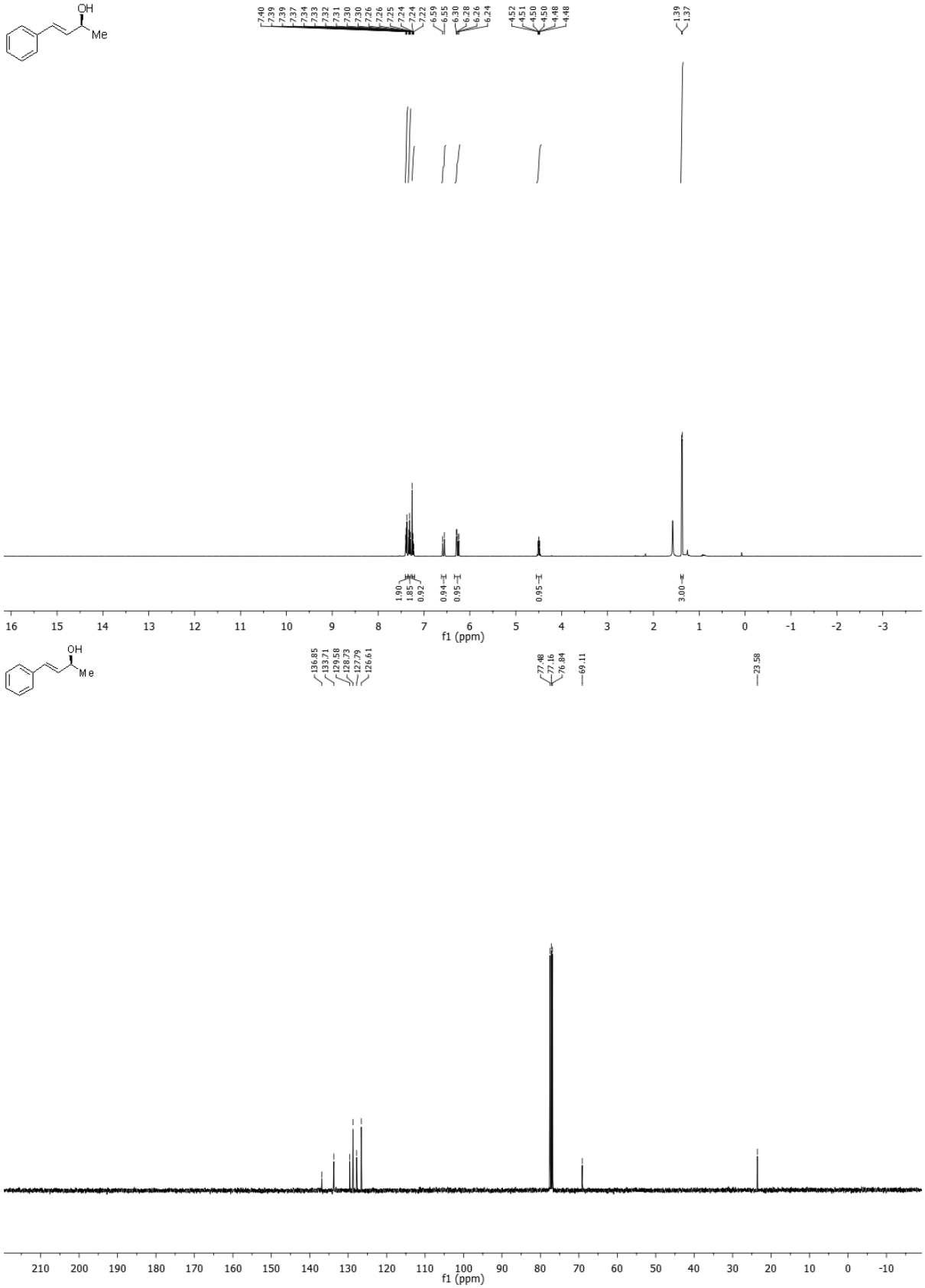

SiH2Ph
Me
140.93
135.82
135.18
134.39
131.14
129.96
128.09
127.50
125.20
83.76
77.58
77.16
76.74
24.99
23.21
15.16
f1 (ppm)

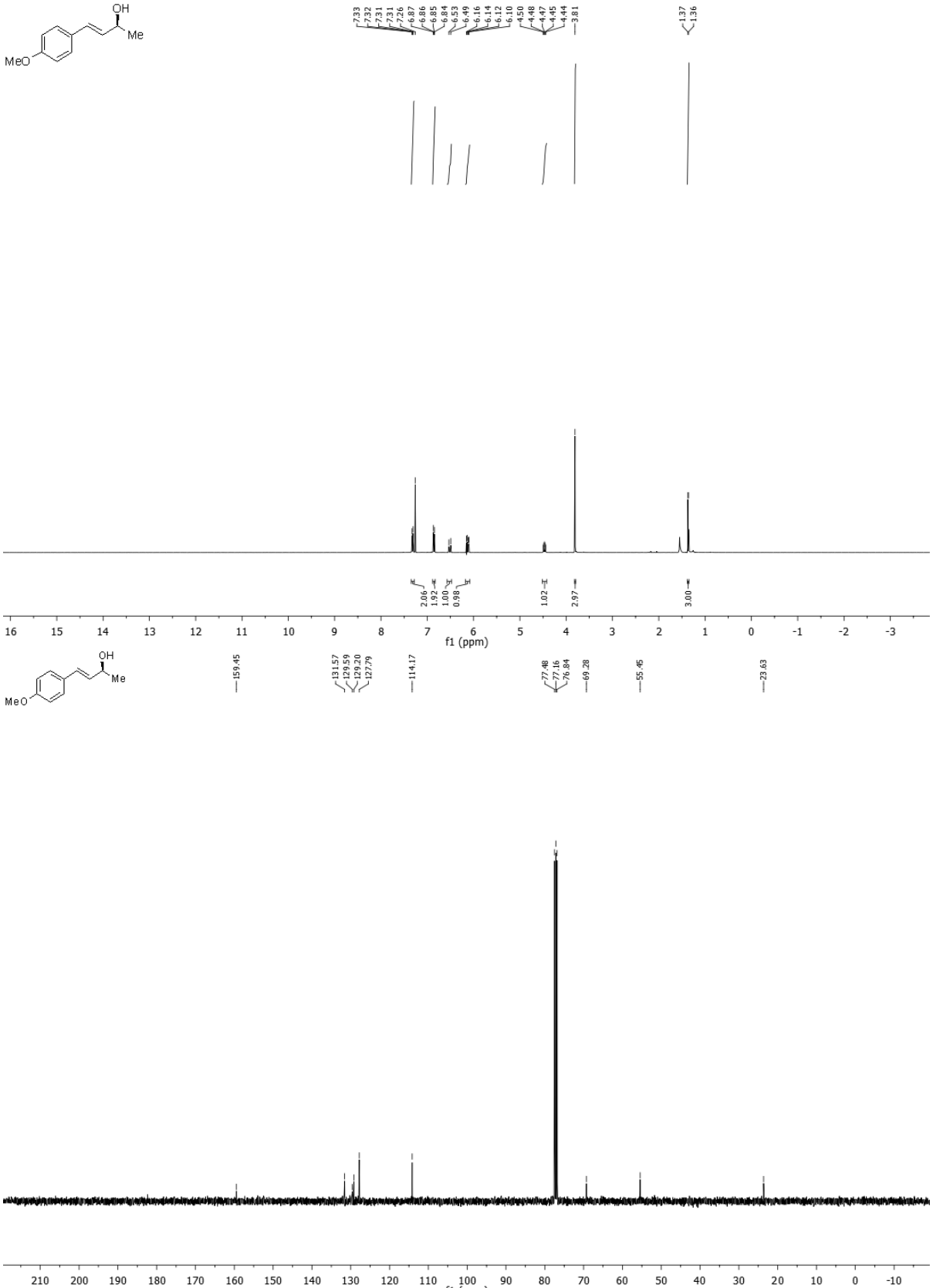

SiH2Ph
Me
f1 (ppm)


SiH2Ph
Me
f1 (ppm)


7.37
7.35
7.35
7.33
7.33
7.32
7.31
7.27
7.27
7.26
7.25
7.25
7.24
6.94
6.94
6.92
6.91
6.91
6.90
6.90
6.89
6.89
6.87
6.87
6.87
6.85
6.84
6.48
6.45
6.30
6.27
6.24
5.40
5.40
5.40
5.36
5.36
5.36
5.25
5.24
5.24
5.22
5.22
5.21
3.75
1.18
0.96
0.96
0.97
1.00
1.00
f1 (ppm)


137.52
133.36
130.92
130.56
129.15
128.36
127.18
119.75
77.48
77.16
76.84
f1 (ppm)


OH
Me
7.40
7.39
7.39
7.37
7.34
7.33
7.32
7.31
7.30
7.30
7.26
7.26
7.25
7.24
7.24
7.22
6.59
6.55
6.30
6.28
6.26
6.24
4.52
4.51
4.50
4.50
4.48
4.48
1.39
1.37
1.90
1.85
0.92
0.84
0.95
0.95
3.00
f1 (ppm)
136.85
133.71
129.58
128.73
127.79
126.61
77.48
77.16
76.84
69.11
23.58


OH
Me
MeO
7.33
7.32
7.31
7.31
7.26
6.87
6.86
6.85
6.84
6.53
6.49
6.16
6.14
6.12
6.10
4.50
4.48
4.47
4.45
4.44
3.81
1.37
1.36
2.06
1.92
1.00
0.98
1.02
2.97
3.00
f1 (ppm)
159.45
131.57
129.59
129.20
127.79
114.17
77.48
77.16
76.84
69.28
55.45
23.63