Electronic Supplementary Material (ESI) for ChemComm.

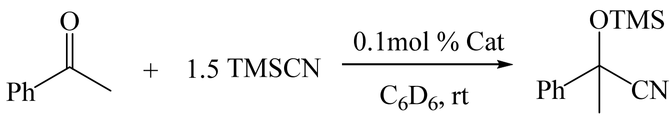
Supporting Information

Contents

All air-sensitive compounds were carried out using standard Schlenk-line or glove box techniques under high-purity argon. ^{1}H, $^{13}C\{^{1}H\}$ and $^{29}Si\{^{1}H\}$ NMR spectra were recorded at 25 ℃ on Bruker Avance III 600 MHz spectrometer in deuterated solvents and were referenced to the resonances of the solvent used. C_6D_6 was dried over sodium mirror and freeze–thawed twice prior to use. Complexes **1-3** were prepared according to the literature procedure. Aldehydes, ketones and Me_3SiCN were purchased from Sigma-Aldrich Ltd, Alfa–Aesar, and Acros and used without further purification.

Optimization of Catalytic Reaction Conditions

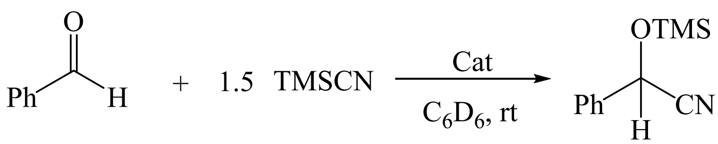
Table S1 Optimization of ketones cyanosilylation



Entry	Cat	Time (h)	Yield (%) [a]
1	**1**	1	>99
2	**2**	1.2	>99
3	**3**	1.3	>99

[a] The reaction was monitored by ^{1}H NMR spectroscopy.

Table S2 Optimization of aldehydes cyanosilylation



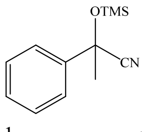
Entry	Cat	Catalyst loading (mol %)	Time (min)	Yield [a] (%)
1	**1**	0.1	<10	>99
2	**2**	0.1	< 15	>99
3	**3**	0.1	15	>99
4	**1**	0.05	30	>99

[a] The reaction was monitored by ^{1}H NMR spectroscopy.

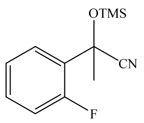
General Procedure for Catalytic Cyanosilylation of Aldehydes or Ketones

In a glove box, catalyst **1** (0.1 mol%) was added to a solution of aldehyde (1 mmol) and TMSCN (1.5 mmol) at room temperature or catalyst **1** was added to a solution of ketones (1 mmol) and TMSCN (1.5 mmol) at room temperature or 60℃ in a J. Young NMR tube equipped with a Teflon screw cap, which was charged with C_6D_6 (0.5 mL). The progress of the reaction was monitored by ^{1}H NMR, ^{13}C NMR and ^{29}Si NMR.

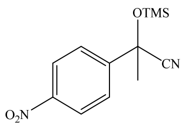
Spectroscopic data for Ketone or Aldehyde Cyanosilylation Products



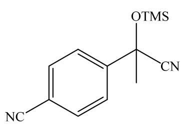
^{1}H NMR (600 MHz, C_6D_6): δ 7.48−7.46 (m, 2H, Ar−*H*), 7.07−7.01 (m, 3H, Ar−*H*), 1.56 (s, 3H, C*Me*), 0.12 (s, 9H, OSiMe_3). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 142.6, 128.9, 128.8, 124.9 (Ar−*C*), 121.8 (*C*N), 72.0 (*C*Me), 33.5 (C*Me*), 1.1 (OSiMe_3). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 19.8.



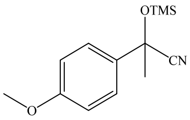
^{1}H NMR (600 MHz, C_6D_6): δ 7.53−7.52 (m, 1H, Ar−*H*), 6.85−6.69 (m, 3H, Ar−*H*), 1.71 (s, 3H, C*Me*), 0.17 (s, 9H, OSiMe_3). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 160.7, 159.1, 130.9, 127.0, 124.4, 120.9 (Ar−*C*), 116.8 (*C*N), 69.1 (*C*Me), 30.8 (C*Me*), 1.1 (OSiMe_3). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 20.2.



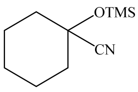
^{1}H NMR (600 MHz, C_6D_6): δ 7.14 (d, $^{3}J_{HH}$ = 7.2 Hz, 2H, Ar−*H*), 6.98 (d, $^{3}J_{HH}$ = 7.2 Hz, 2H, Ar−*H*), 1.36 (s, 3H, C*Me*), 0.08 (s, 9H, OSiMe_3). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 146.8, 132.5, 125.4, 120.9, 118.2 (Ar−*C*), 113.2 (*C*N), 71.2 (*C*Me), 33.0 (C*Me*), 1.0 (OSiMe_3). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 21.2.



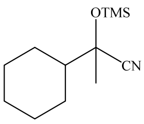
^{1}H NMR (600 MHz, C_6D_6): δ 7.74−7.73 (m, 2H, Ar−*H*), 7.20−7.19 (m, 2H, Ar−*H*), 1.40 (s, 3H, C*Me*), 0.11 (s, 9H, OSiMe_3). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 148.6, 129.1, 125.9, 125.6, 124.0, 123.5 (Ar−*C*), 120.9, 94.4 (*C*N), 71.1 (*C*Me), 33.1 (C*Me*), 1.0 (OSiMe_3). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 21.2.



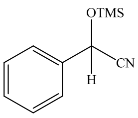
^{1}H NMR (600 MHz, C_6D_6): δ 7.39 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 6.67 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 3.28 (s, 3H, O*Me*), 1.62 (s, 3H, C*Me*), 0.14 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 160.3, 134.5, 130.7, 126.4, 122.1, 114.2 (Ar−*C*), 113.9 (*C*N), 71.7 (*C*Me), 54.9 (O*C*H$_3$), 33.4 (C*Me*), 1.1 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 19.3.



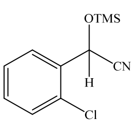
^{1}H NMR (600 MHz, C_6D_6): δ 1.39−1.35 (m, 10H, C$_6$*H*$_{10}$), 0.21 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 122.0 (*C*N), 103.6, 70.8, 39.6, 30.4, 24.7, 22.8 (*C*$_6$H$_{10}$), 1.5 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 16.9.



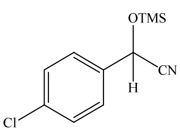
^{1}H NMR (600 MHz, C_6D_6): δ 2.41−2.40 (m, 2H, C$_6$*H*$_{10}$), 2.37 (s, 3H, C*Me*), 1.88−1.32 (m, 9H, C$_6$*H*$_{10}$), 0.03 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 119.0 (*C*N), 109.3 (*C*Me), 32.6 (C*Me*), 32.2, 24.8, 23.2, 22.5 (*C*$_6$H$_{11}$), 1.0 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 17.7.



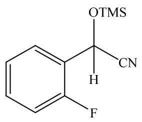
^{1}H NMR (600 MHz, C_6D_6): δ 7.29−7.28 (m, 2H, Ar−*H*), 7.06−7.02 (m, 3H, Ar−*H*), 5.08 (s, 1H, C*H*), 0.02 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 137.1, 129.4, 129.1, 126.7 (Ar−*C*), 119.5 (*C*N), 64.0 (*C*H), -0.4 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 23.6.



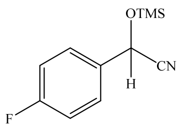
^{1}H NMR (600 MHz, C_6D_6): δ 7.62−6.71 (m, 4H, Ar−*H*), 5.71 (s, 1H, C*H*), 0.05 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 134.5, 132.4, 130.7, 129.9, 128.7, 127.7 (Ar−*C*), 118.5 (*C*N), 61.3 (*C*H), -0.5 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 24.8.



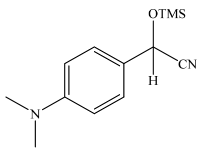
^{1}H NMR (600 MHz, C_6D_6): δ 6.99 (s, 4H, Ar-*H*), 4.92 (s, 1H, C*H*), 0.01 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 135.5, 135.4, 129.3 (Ar-*C*), 119.1 (*C*N), 63.2 (*C*H), -0.4 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 24.2.



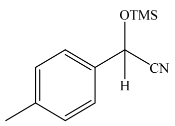
^{1}H NMR (600 MHz, C_6D_6): δ 7.52−7.49 (m, 1H, Ar−*H*), 6.80−6.62 (m, 3H, Ar−*H*), 5.52 (s, 1H, C*H*), 0.03 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 160.8, 159.1, 131.4, 128.8, 124.9, 118.6 (Ar−*C*), 115.8 (*C*N), 58.3 (*C*H), -0.6 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 24.7.



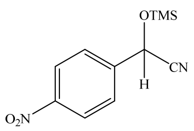
^{1}H NMR (600 MHz, C_6D_6): δ 7.07−7.05 (m, 2H, Ar−*H*), 6.69−6.66 (m, 2H, Ar−*H*), 4.96 (s, 1H, C*H*), 0.01 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 164.2, 162.7, 132.9, 128.7, 119.3, 116.1 (Ar−*C*), 115.9 (*C*N), 63.2 (*C*H), -0.4 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 23.9.



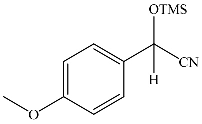
^{1}H NMR (600 MHz, C_6D_6): δ 7.27 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 6.42 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 5.15 (s, 1H, C*H*), 2.44 (s, 6H, N(C*H*$_3$)$_2$), 0.06 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 151.3, 128.3, 124.5, 120.1 (Ar−*C*), 112.5 (*C*N), 64.2 (*C*H), 39.9 (N(*C*H$_3$)$_2$), -0.1 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 22.0.



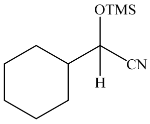
^{1}H NMR (600 MHz, C_6D_6): δ 7.23 (d, $^3J_{HH}$ = 7.2 Hz, 2H, Ar−*H*), 6.88 (d, $^3J_{HH}$ = 7.2 Hz, 2H, Ar−*H*), 5.09 (s, 1H, C*H*), 2.01 (s, Ar-*Me*) 0.03 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 139.3, 134.3,129.8, 126.8 (Ar−*C*), 119.7 (*C*N), 63.9 (*C*H), 21.0 (Ar-*Me*), -0.3 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 23.3.



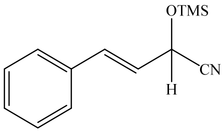
^{1}H NMR (600 MHz, C_6D_6): δ 7.73 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 7.01 (d, $^3J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 4.93 (s, 1H, C*H*), 0.04 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 148.6, 142.8, 127.0, 124.0 (Ar−*C*), 118.5 (*C*N), 62.8 (*C*H), -0.6 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 22.5.



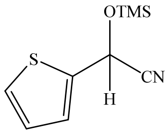
^{1}H NMR (600 MHz, C_6D_6): δ 7.21 (d, $^{3}J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 6.65 (d, $^{3}J_{HH}$ = 8.4 Hz, 2H, Ar−*H*), 5.08 (s, 1H, C*H*), 3.24 (s, 3H, OC*H*$_3$), 0.04 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 160.8, 129.2, 128.4, 119.7 (Ar−*C*), 114.5 (*C*N), 63.8 (*C*H), 54.9 (O*C*H$_3$), -0.3 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 23.0.



^{1}H NMR (600 MHz, C_6D_6): δ 3.82 (s, 1H, C*H*), 1.74−0.93 (m, 11H, C_6H_{11}), 0.07 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 119.5 (*C*N), 66.7 (*C*H), 43.2, 28.2, 26.3, 25.8 (C_6H_{11}), -0.5 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 17.7.



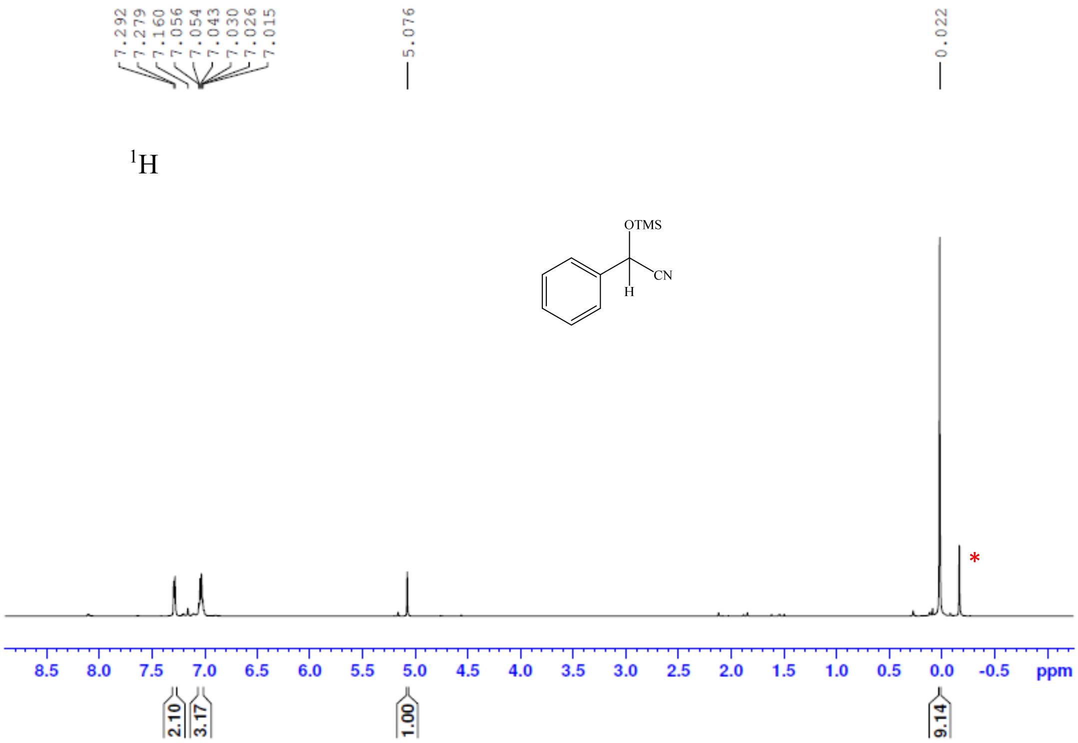
^{1}H NMR (600 MHz, C_6D_6): δ 7.07−7.04 (m, 5H, Ar−*H*), 6.59 (d, 1H, PhC*H*=CH), 5.94 (dd, 1H, PhCH=C*H*), 4.66 (m, 1H, C*H*), 0.08 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 135.5, 133.9, 128.9, 128.9 (Ar−*C*), 127.3, 124.3 (PhCH=CH), 118.8 (*C*N), 62.5 (*C*H), -0.2 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 23.3.

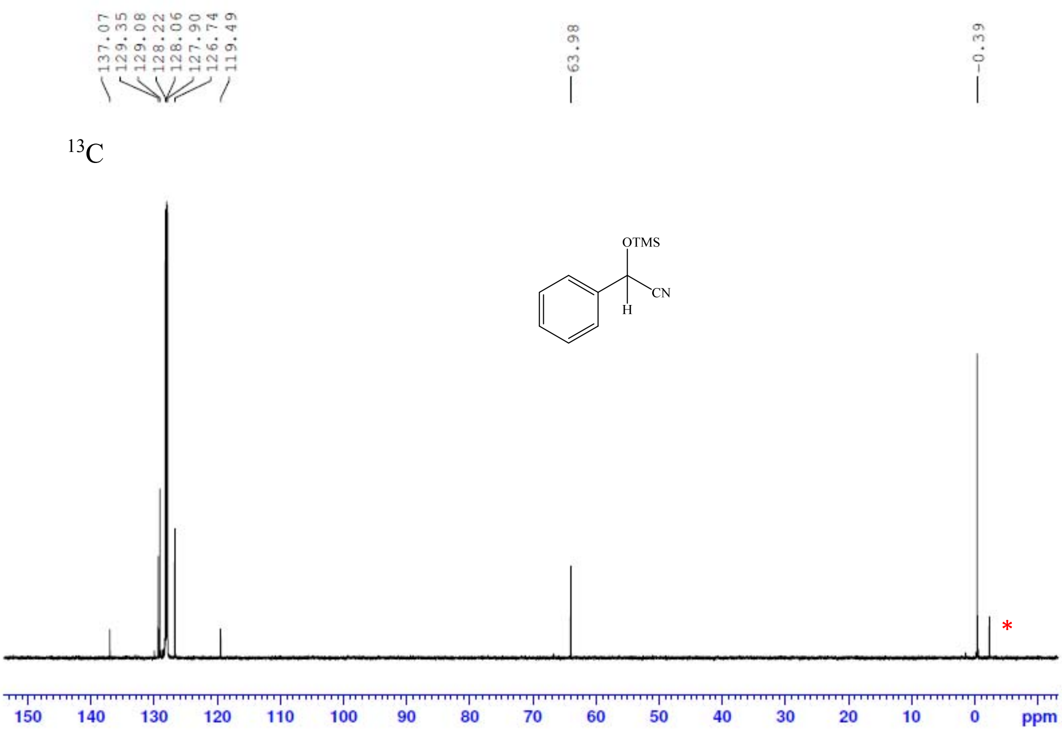


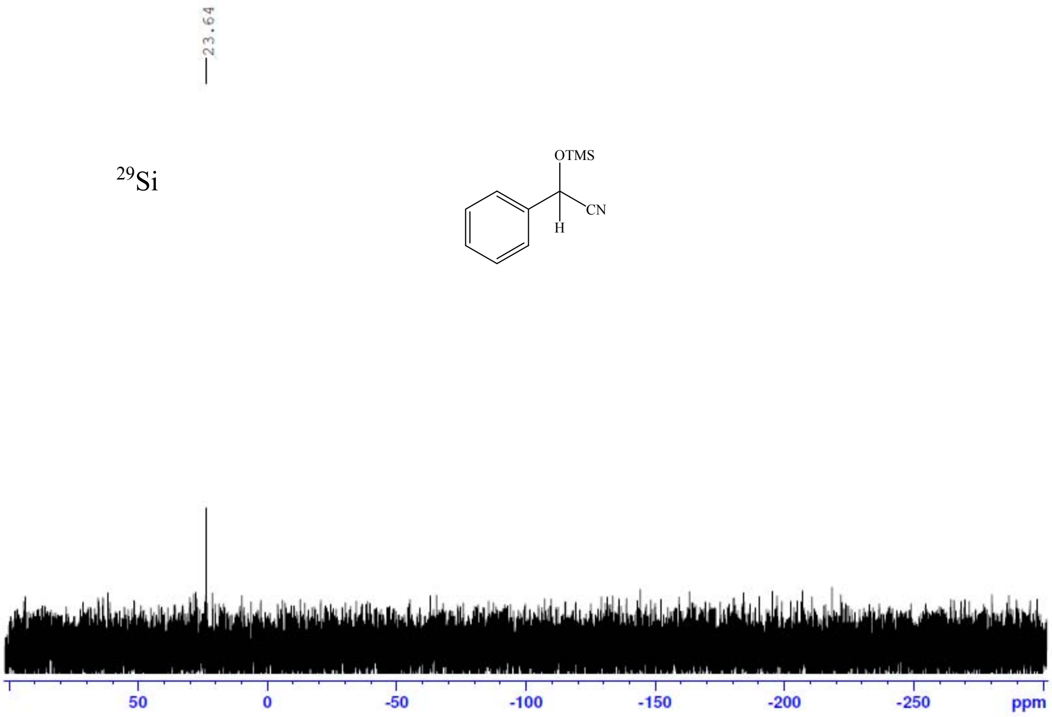
^{1}H NMR (600 MHz, C_6D_6): δ 6.86 (d, $^{3}J_{HH}$ = 4.8 Hz, 1H, C_4H_3S), 6.76 (d, $^{3}J_{HH}$ = 4.8 Hz, 1H, C_4*H*$_3$S), 6.54 (m, 1H, C_4H_3S), 5.22 (s, 1H, C*H*), 0.01 (s, 9H, OSi*Me*$_3$). ^{13}C{^{1}H} NMR (151 MHz, C_6D_6): δ 140.3, 127.2, 127.0, 126.6 (*C*$_4$H$_3$S), 118.7 (*C*N), 59.8 (*C*H), -0.5 (OSi*Me*$_3$). ^{29}Si{^{1}H} NMR (119 MHz, C_6D_6): δ 24.2.

NMR Spectra of Cyanosilylation Products

General: The cyanosilylation products are shown along with the spectra. Resonances are denoted as follows: excess TMSCN (*).



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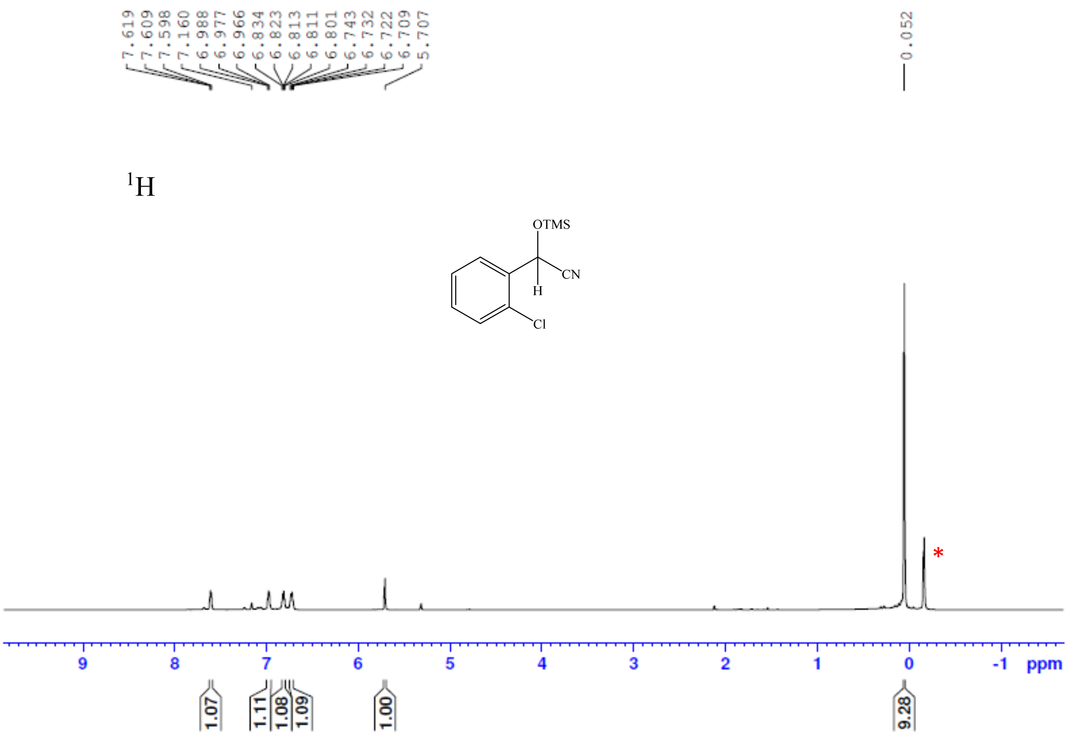
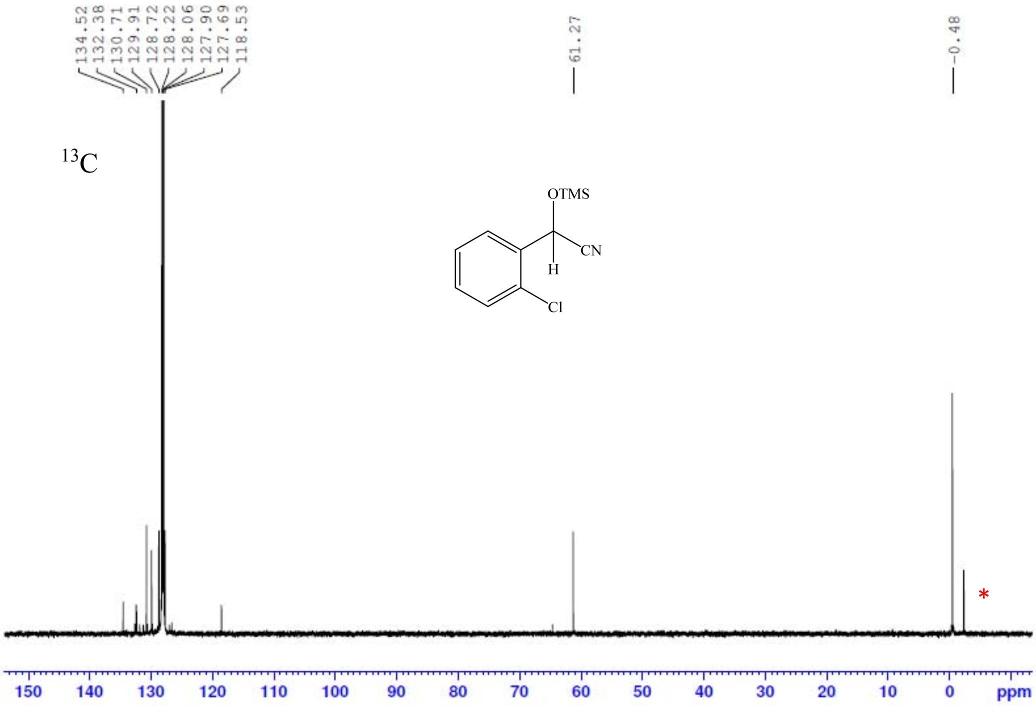
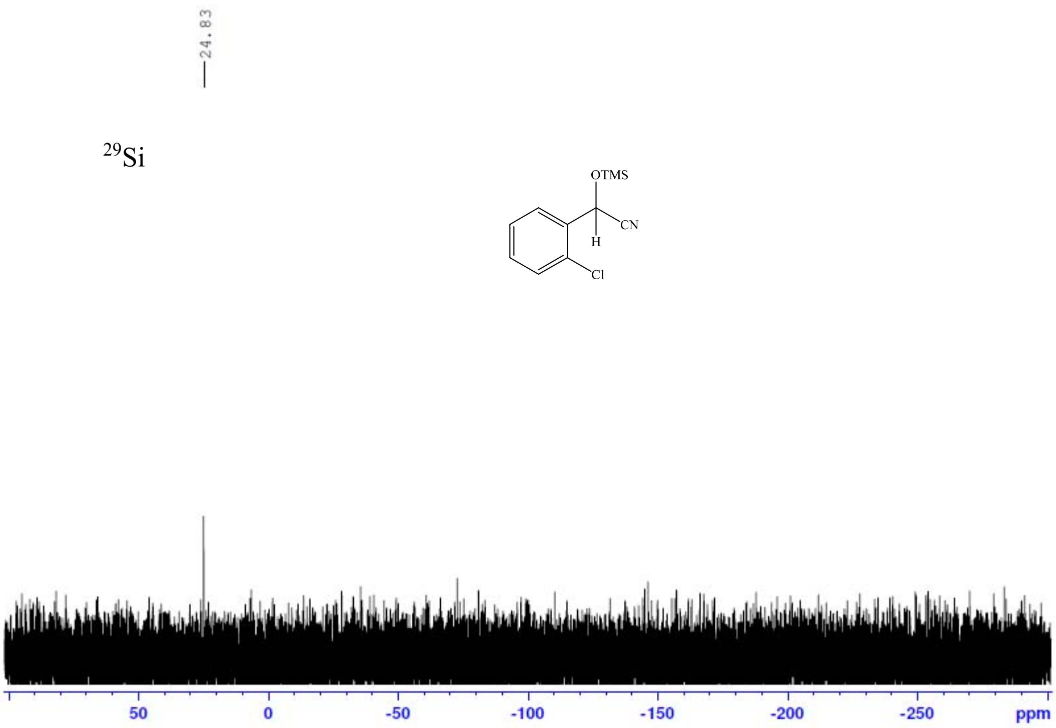
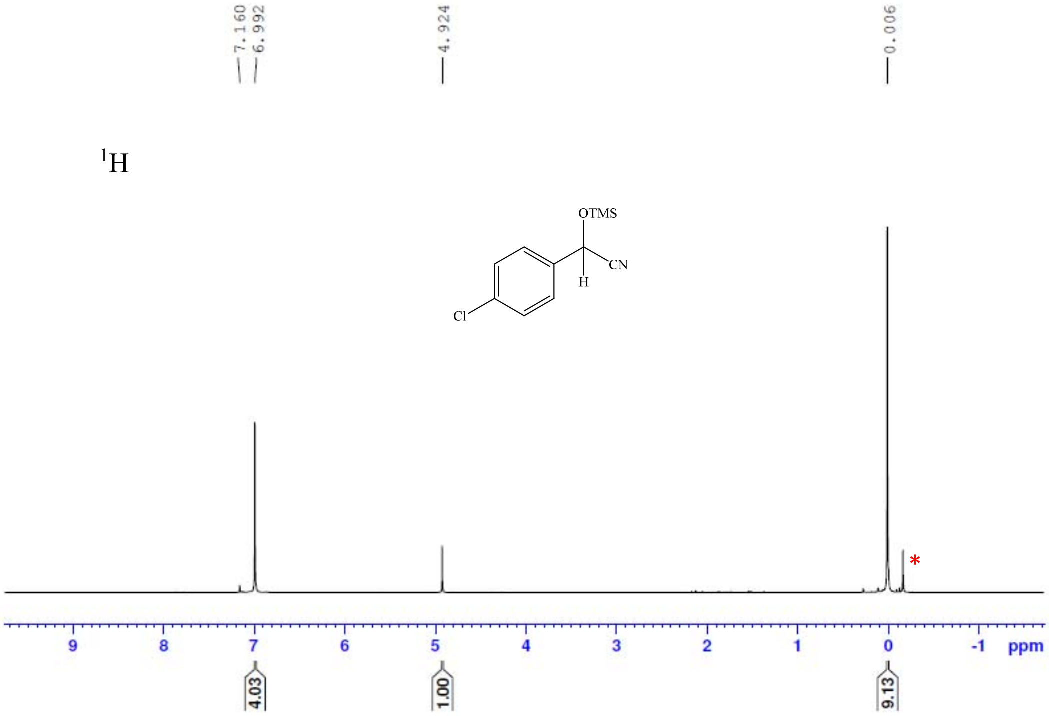
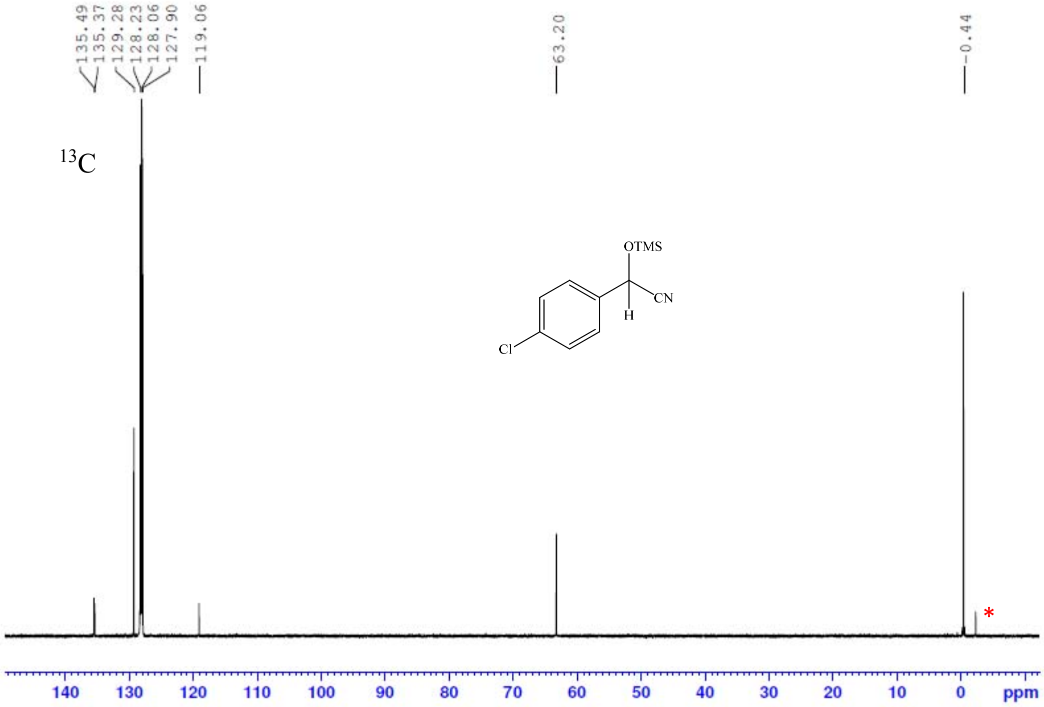
29Si
OTMS
H
CN
50
0
-50
-100
-150
-200
-250
ppm

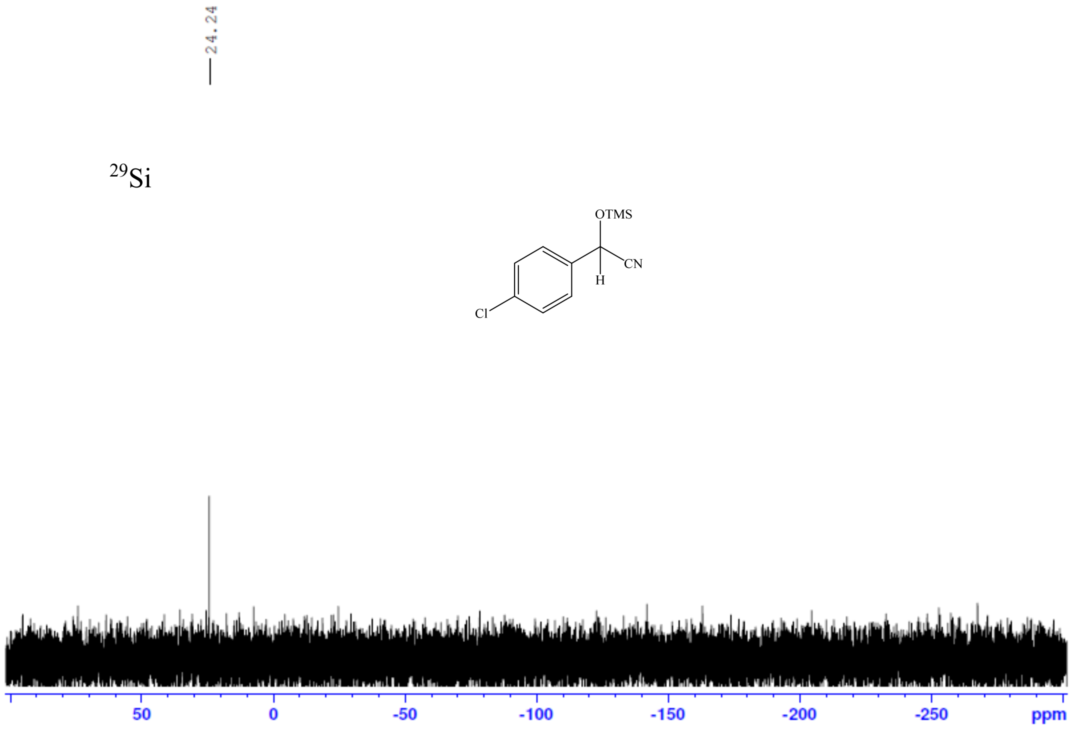

7.619
7.609
7.598
7.160
6.988
6.977
6.966
6.834
6.823
6.813
6.811
6.801
6.743
6.732
6.722
6.709
5.707
0.052
1H
OTMS
H
CN
Cl
*
9
8
7
6
5
4
3
2
1
0
-1
ppm
1.07
1.11
1.08
1.09
1.00
9.28

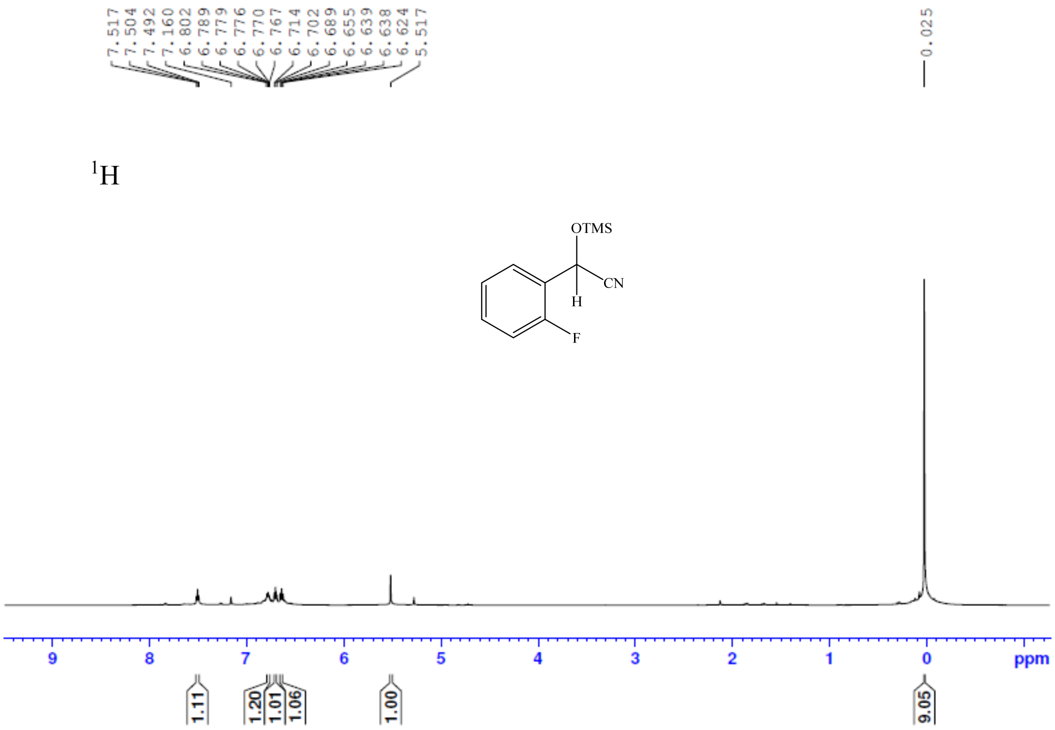

134.52
132.38
130.71
129.91
128.72
128.22
128.06
127.90
127.69
118.53
61.27
-0.48
13C
OTMS
CN
H
Cl
*
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

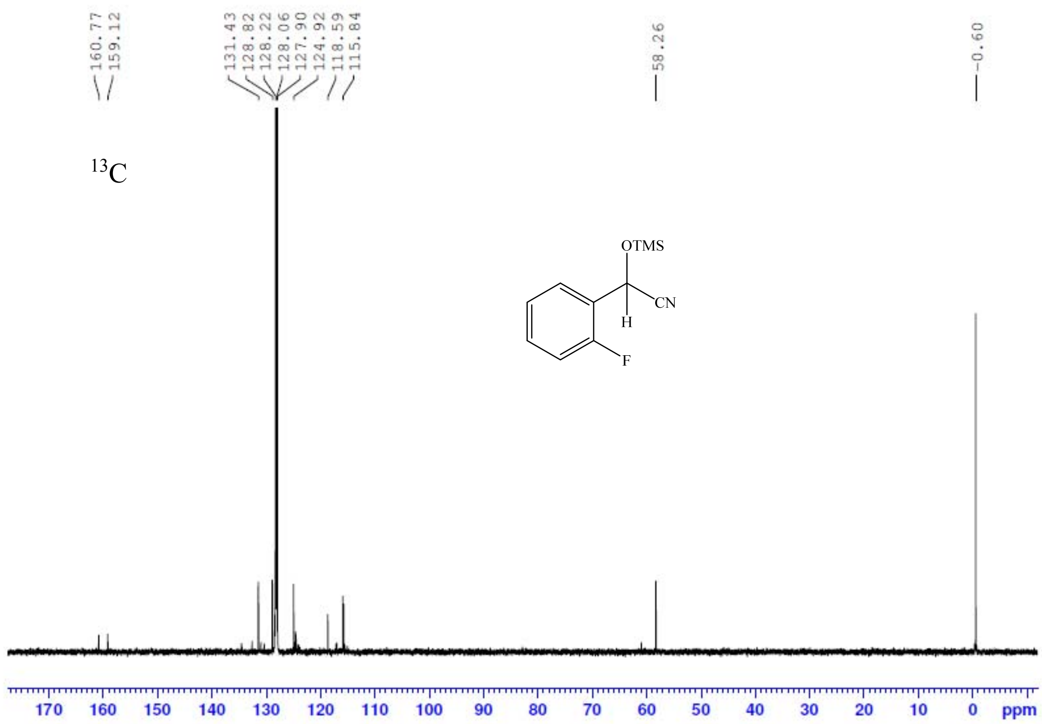

24.83
29Si
OTMS
CN
H
Cl
50 0 -50 -100 -150 -200 -250 ppm


7.160
6.992
4.924
0.006
1H
OTMS
CN
H
Cl
*
9
8
7
6
5
4
3
2
1
0
-1
ppm
4.03
1.00
9.13

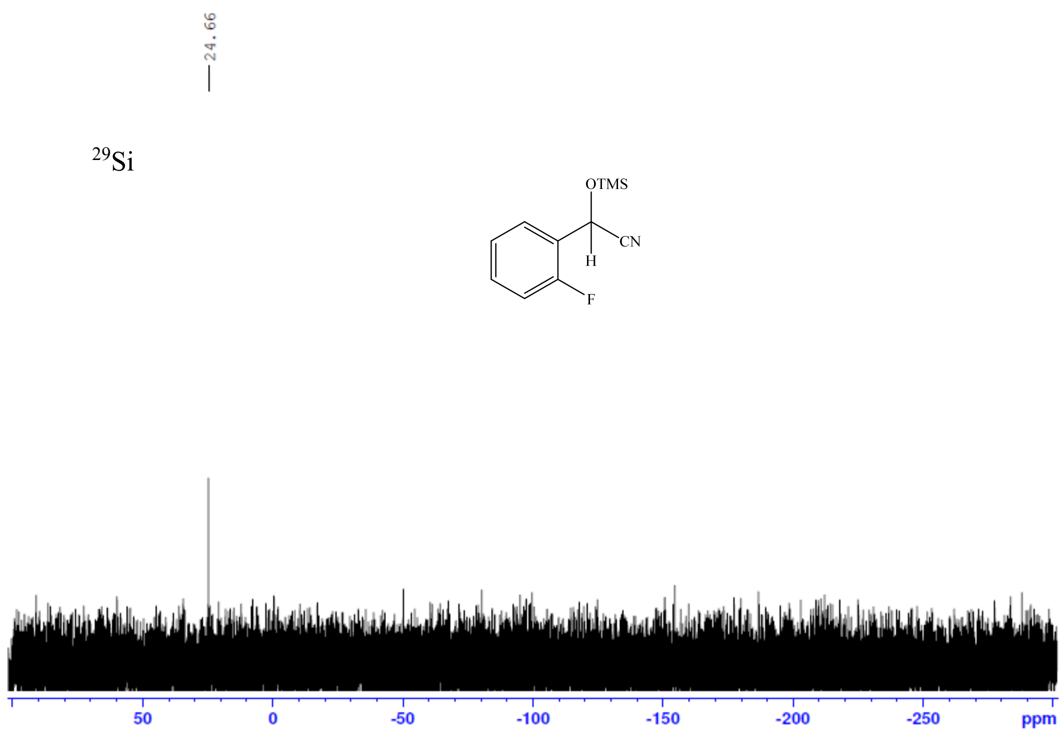

135.49
135.37
129.28
128.23
128.06
127.90
119.06
63.20
-0.44
13C
OTMS
CN
H
Cl
*
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


24.24
29Si
OTMS
CN
H
Cl
50
0
-50
-100
-150
-200
-250
ppm

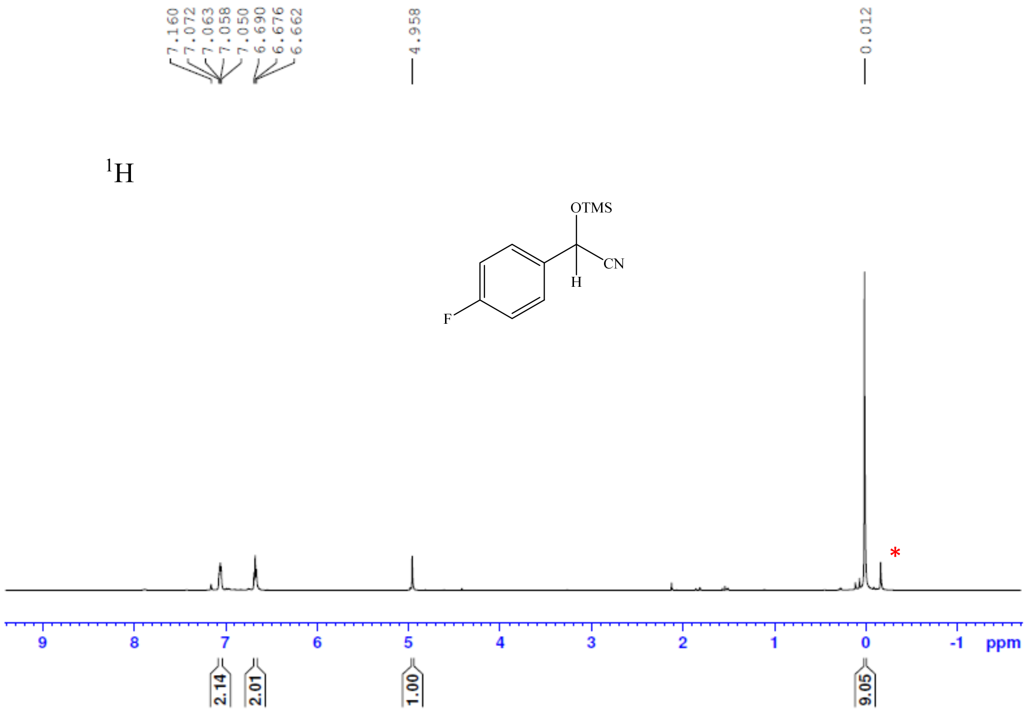

7.517
7.504
7.492
7.160
6.802
6.789
6.779
6.776
6.770
6.767
6.714
6.702
6.689
6.655
6.639
6.638
6.624
5.517
0.025
1H
OTMS
CN
H
F
9
8
7
6
5
4
3
2
1
0
ppm
1.11
1.20
1.01
1.06
1.00
9.05

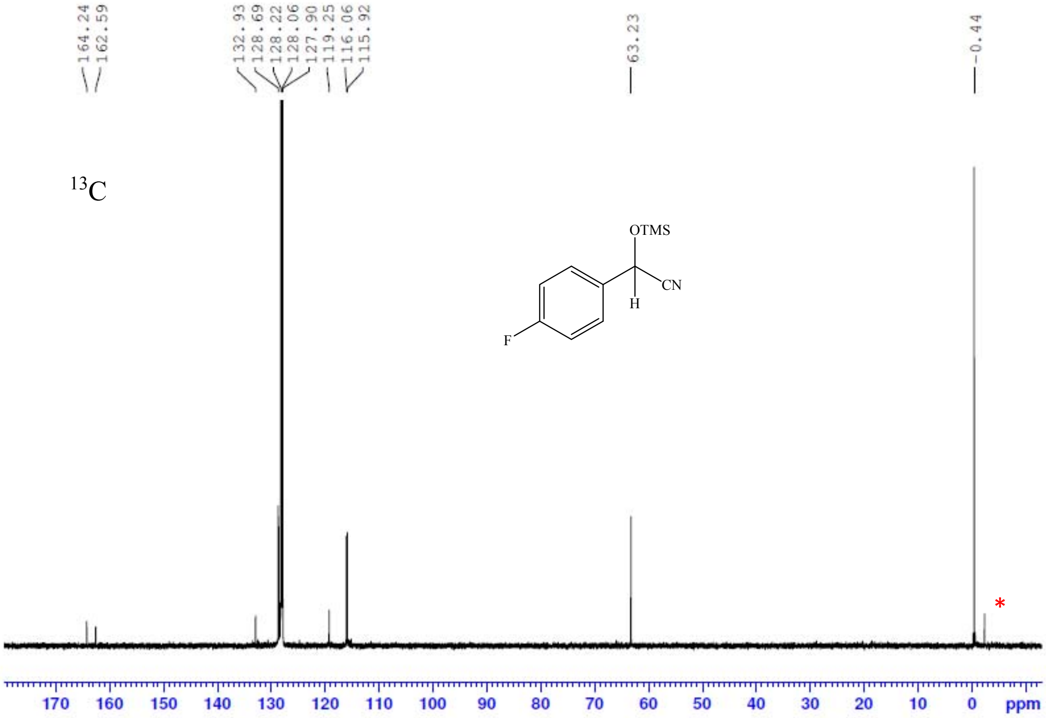


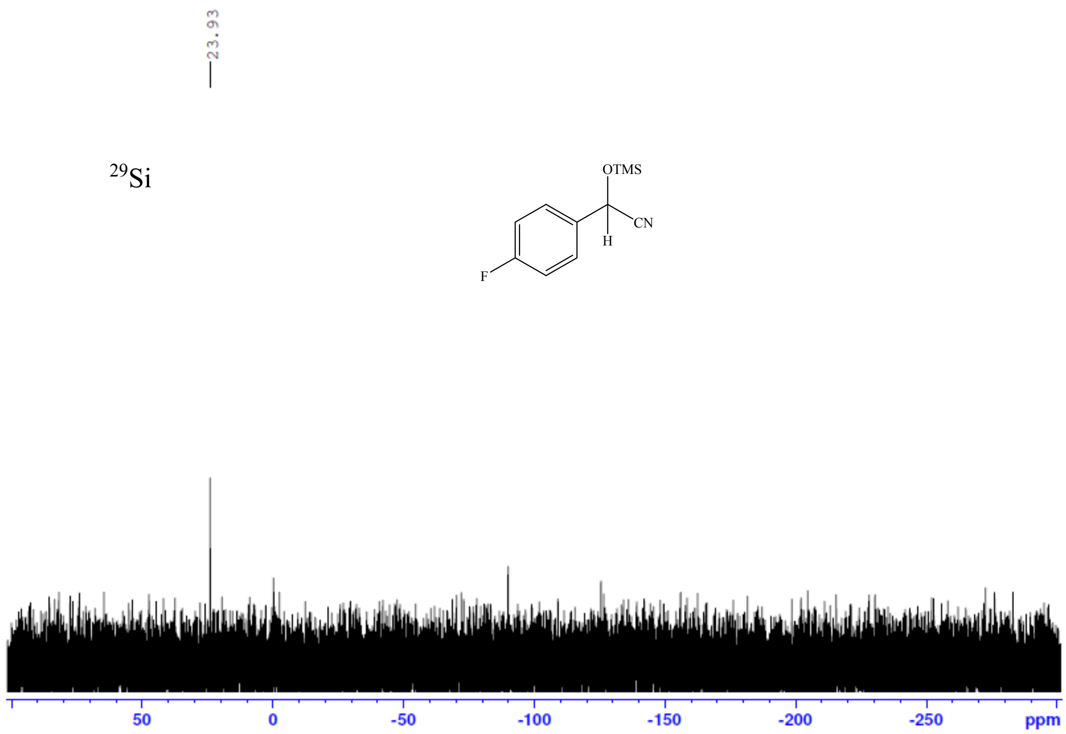
160.77
159.12
131.43
128.82
128.22
128.06
127.90
124.92
118.59
115.84
58.26
-0.60
^{13}C
OTMS
CN
H
F
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

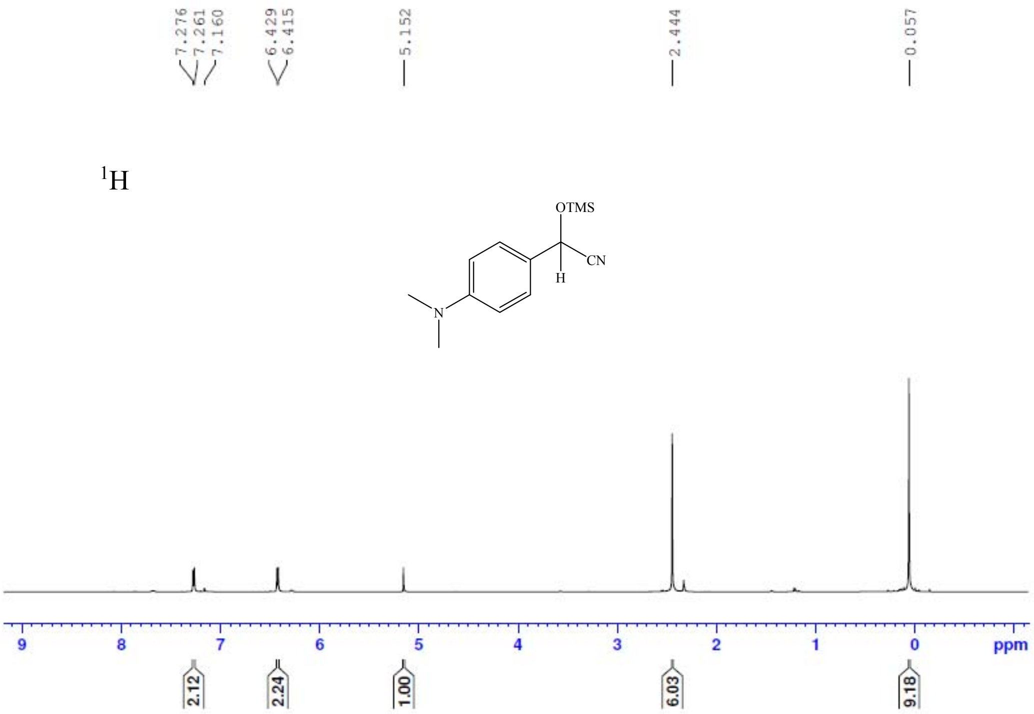


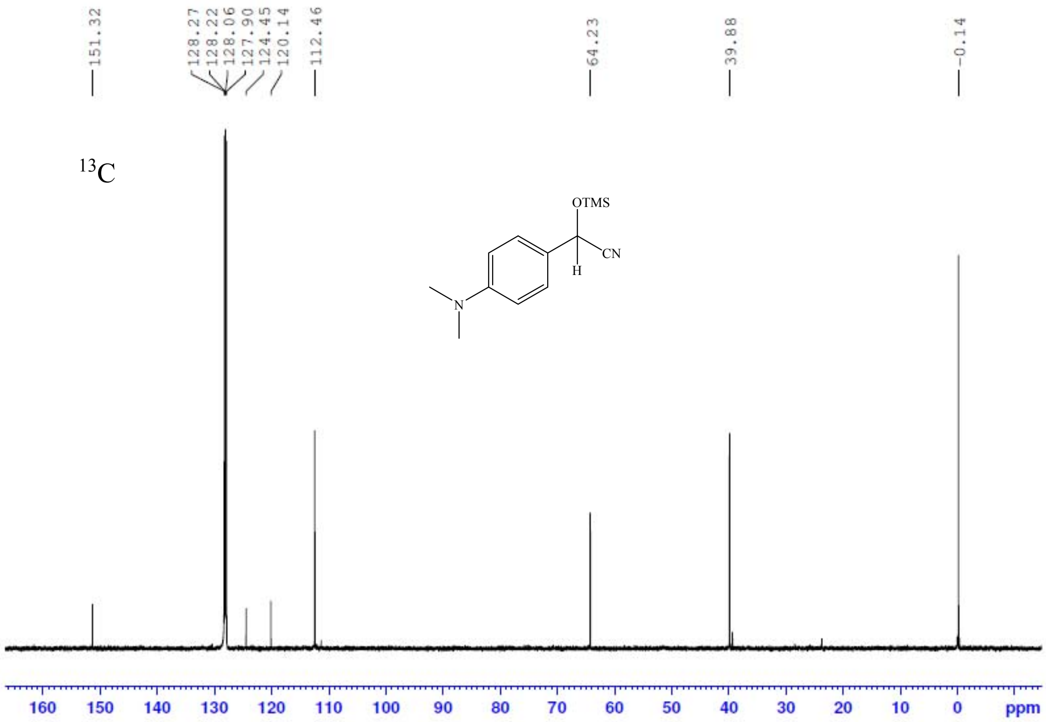
24.66
^{29}Si
OTMS
CN
H
F
50 0 -50 -100 -150 -200 -250 ppm

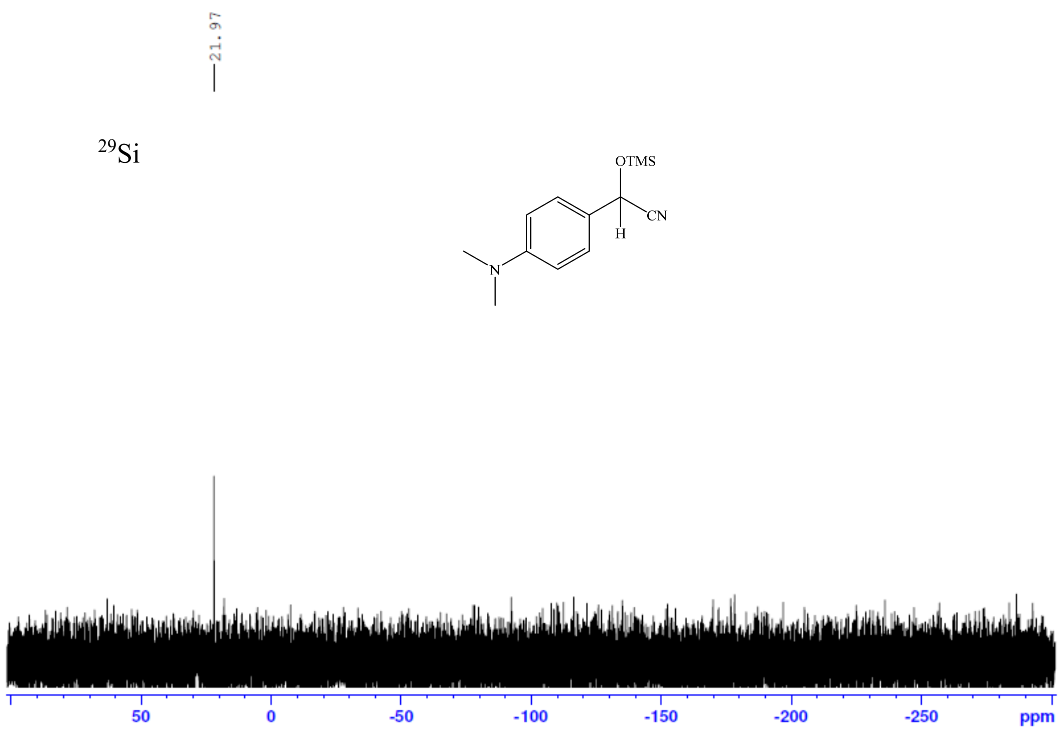

7.160
7.072
7.063
7.058
7.050
6.690
6.676
6.662
4.958
0.012
1H
OTMS
CN
H
F
*
9
8
7
6
5
4
3
2
1
0
-1
ppm
2.14
2.01
1.00
9.05

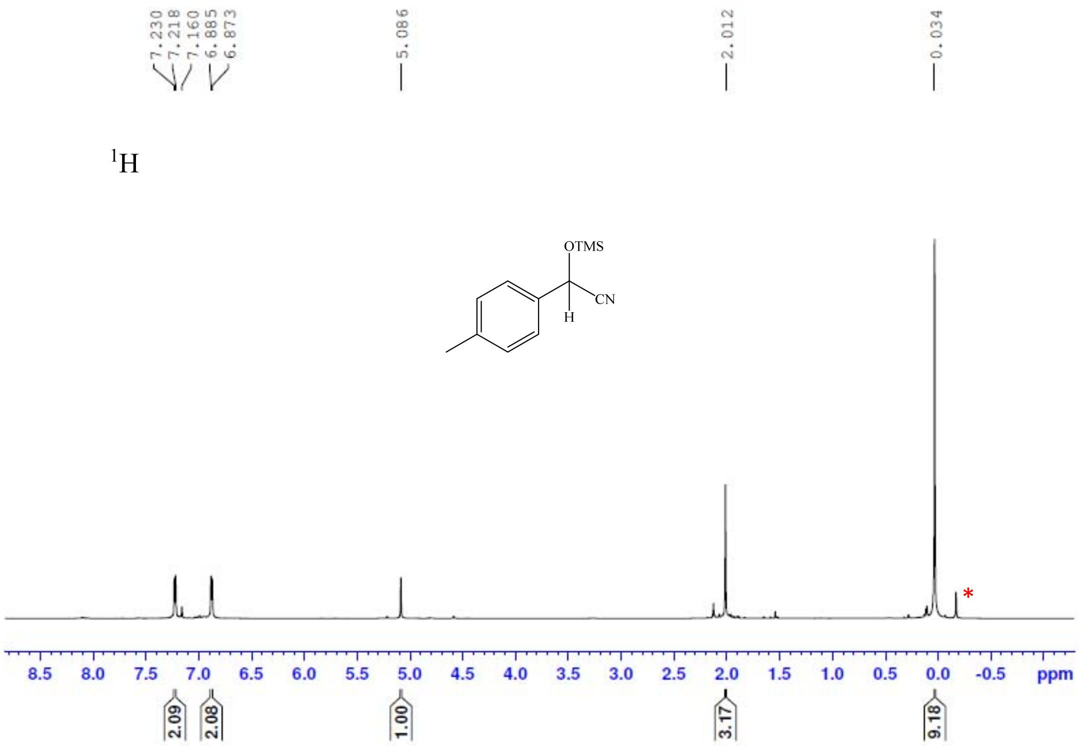

164.24
162.59
132.93
128.69
128.22
128.06
127.90
119.25
116.06
115.92
63.23
-0.44
13C
OTMS
CN
H
F
*
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

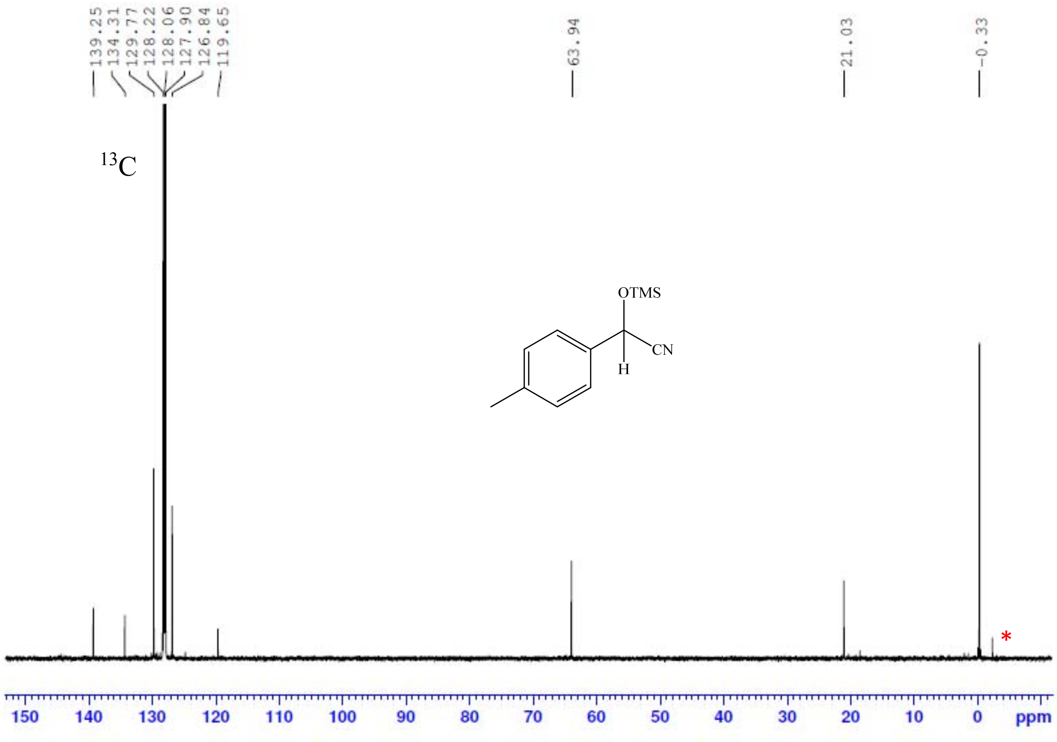

23.93
29Si
OTMS
CN
H
F
50
0
-50
-100
-150
-200
-250
ppm

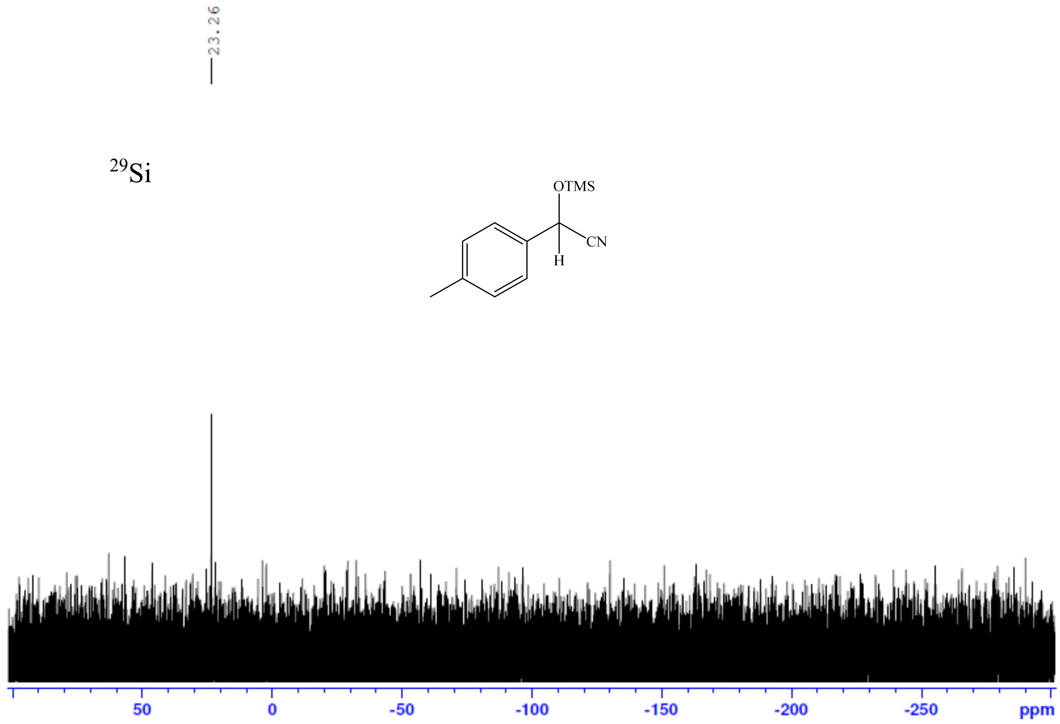

7.276
7.261
7.160
6.429
6.415
5.152
2.444
0.057
1H
OTMS
CN
H
N
9
8
7
6
5
4
3
2
1
0
ppm
2.12
2.24
1.00
6.03
9.18

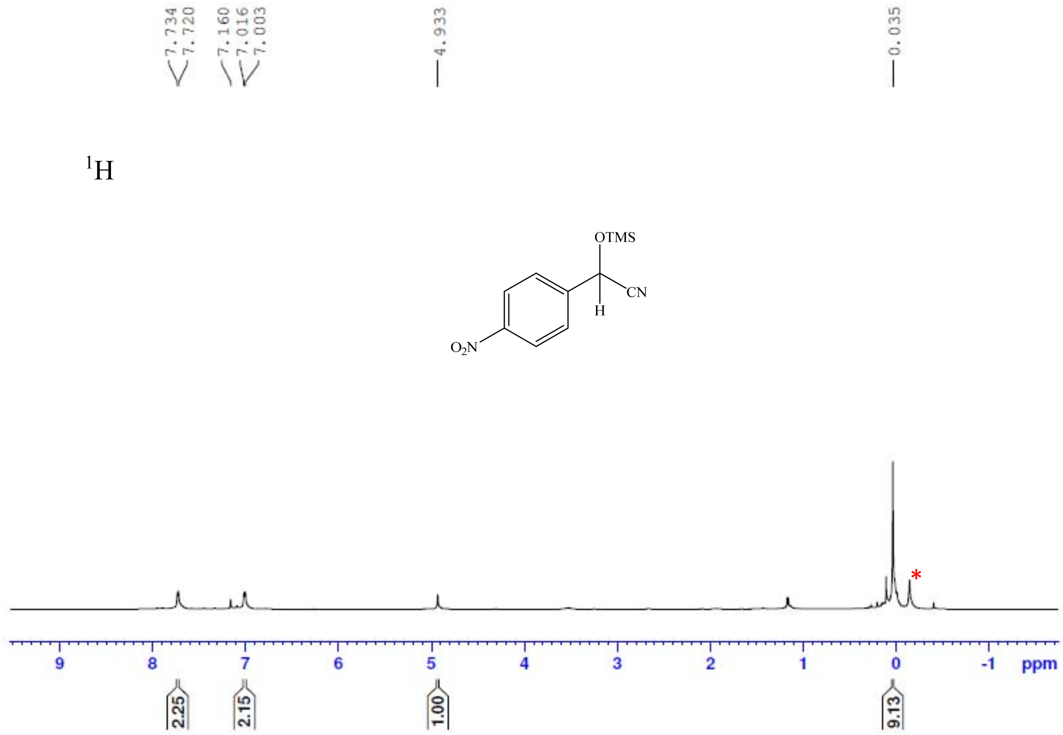

151.32
128.27
128.22
128.06
127.90
124.45
120.14
112.46
64.23
39.88
-0.14
13C
OTMS
CN
H
N
160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

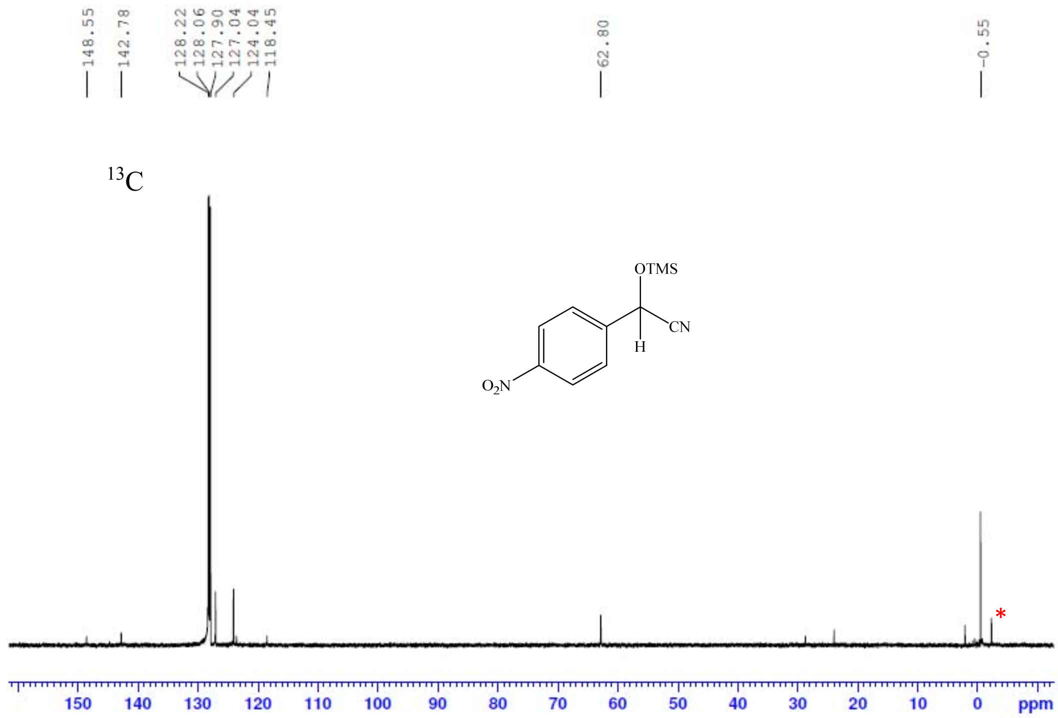

21.97
29Si
OTMS
CN
H
N
50 0 -50 -100 -150 -200 -250 ppm


7.230
7.218
7.160
6.885
6.873
5.086
2.012
0.034
1H
OTMS
CN
H
*
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 ppm
2.09
2.08
1.00
3.17
9.18

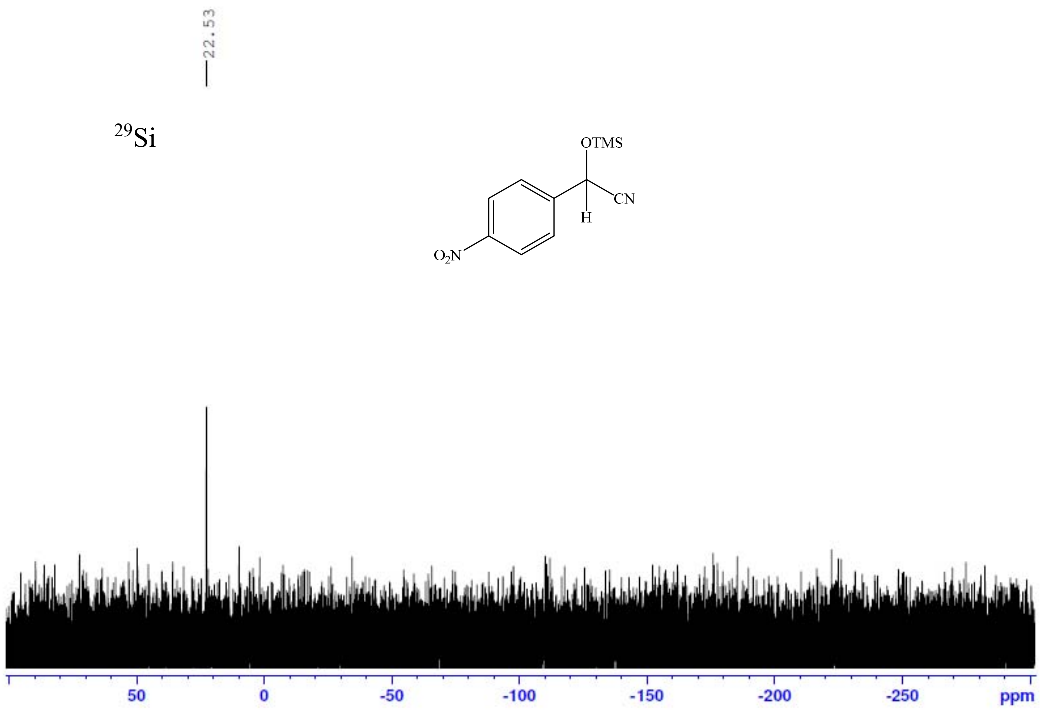

139.25
134.31
129.77
128.22
128.06
127.90
126.84
119.65
63.94
21.03
-0.33
13C
OTMS
CN
H
*
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


23.26
29Si
OTMS
H
CN
50
0
-50
-100
-150
-200
-250
ppm


7.734
7.720
7.160
7.016
7.003
4.933
0.035
1H
OTMS
H
CN
O2N
*
9
8
7
6
5
4
3
2
1
0
-1
ppm
2.25
2.15
1.00
9.13

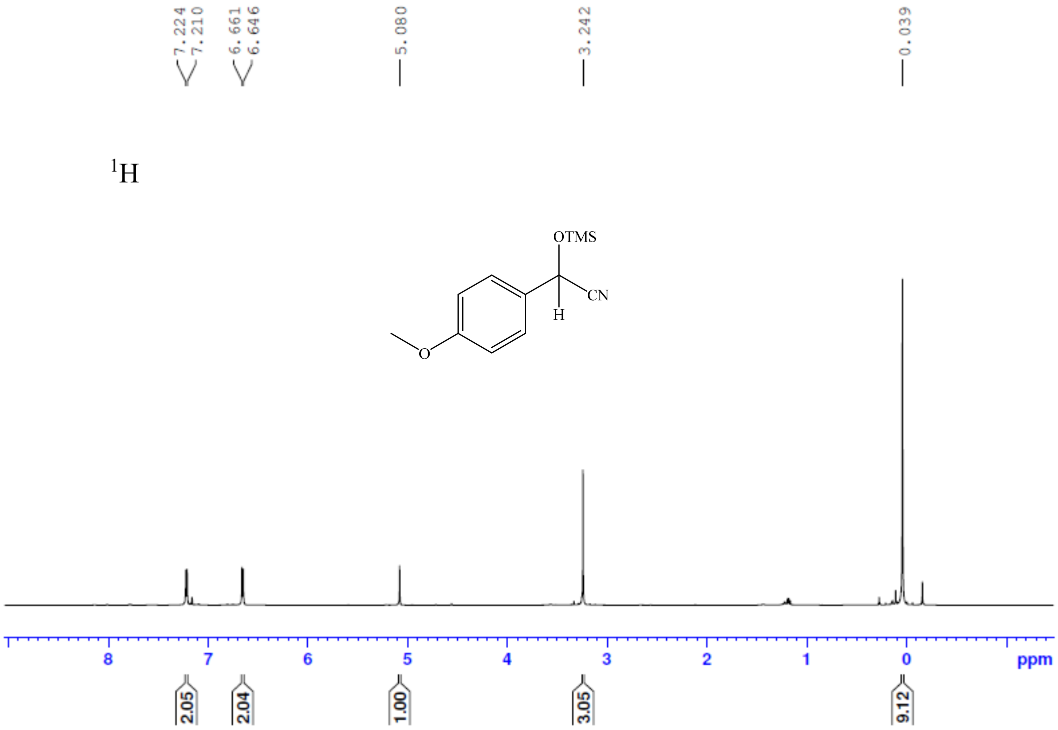


148.55
142.78
128.22
128.06
127.90
127.04
124.04
118.45
62.80
-0.55
^{13}C
OTMS
CN
H
O_2N
*
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm



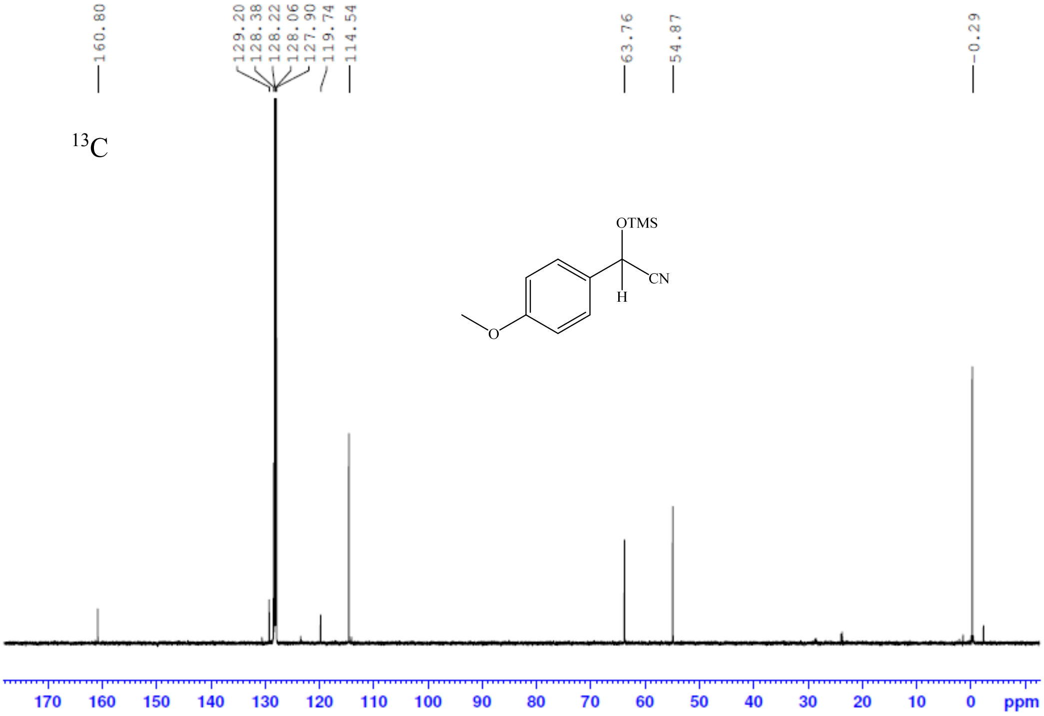
22.53
^{29}Si
OTMS
CN
H
O_2N
50 0 -50 -100 -150 -200 -250 ppm

^{1}H



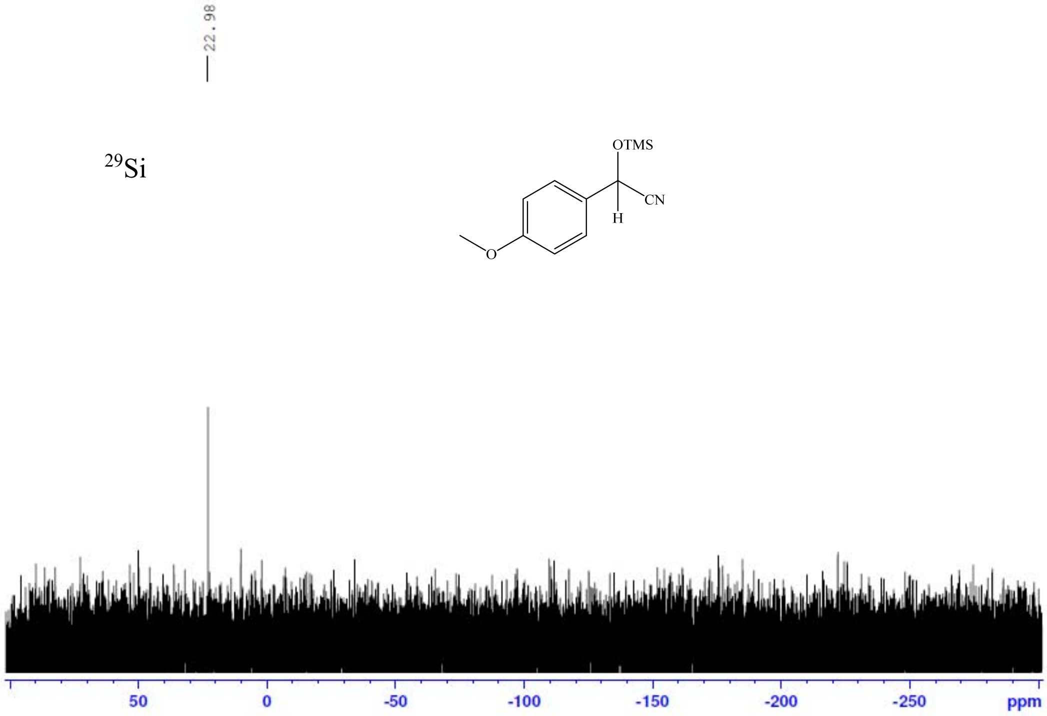
7.224
7.210
6.661
6.646
5.080
3.242
0.039
OTMS
CN
H
O
8 7 6 5 4 3 2 1 0 ppm
2.05
2.04
1.00
3.05
9.12

^{13}C



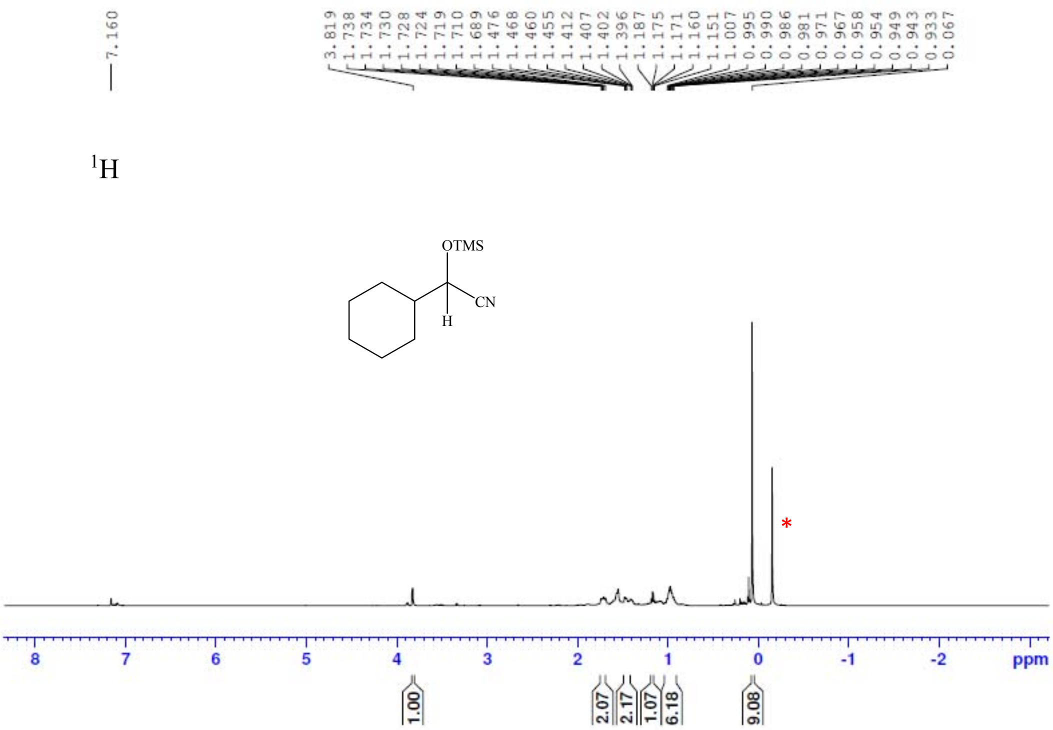
160.80
129.20
128.38
128.22
128.06
127.90
119.74
114.54
63.76
54.87
-0.29
OTMS
CN
H
O
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

^{29}Si

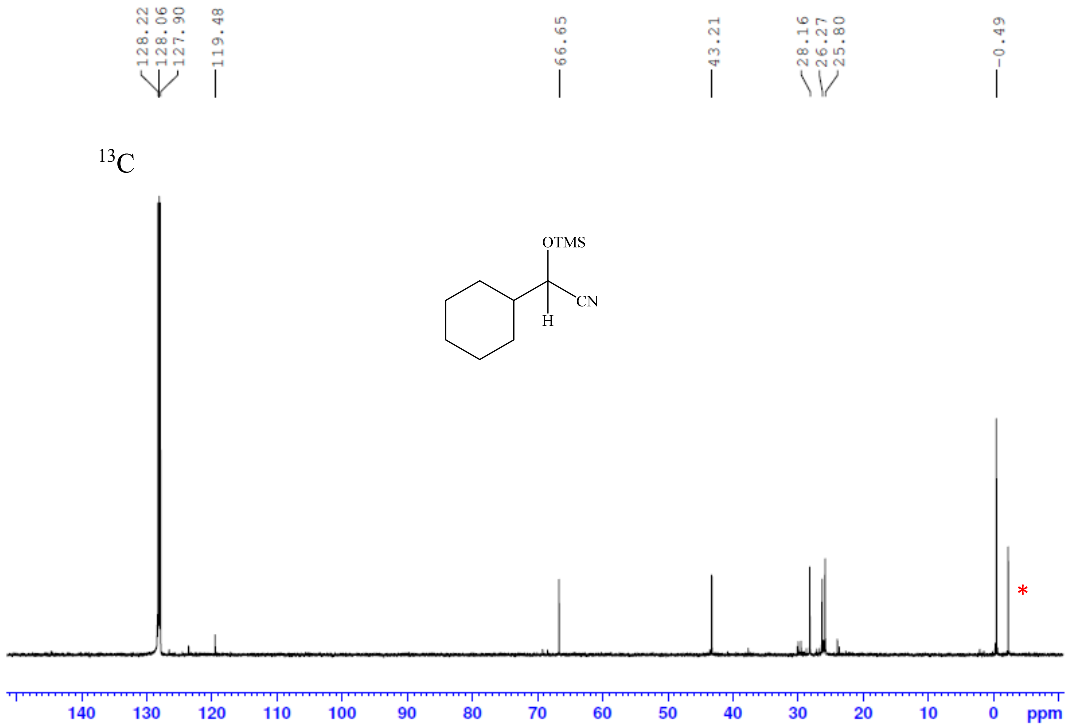


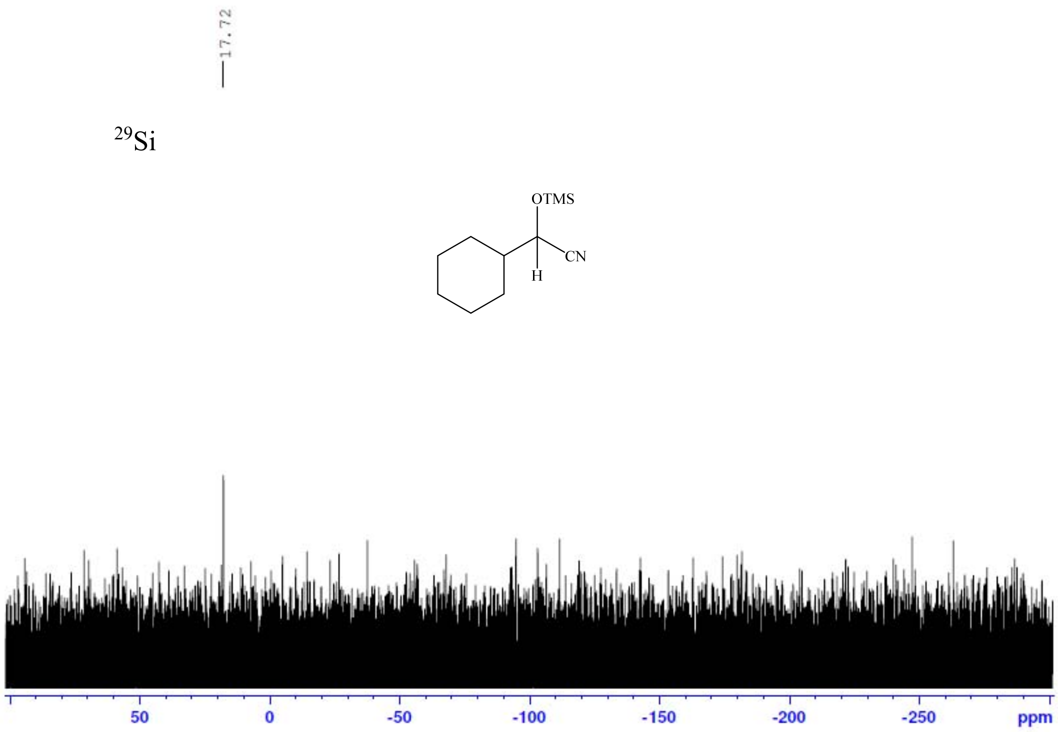
22.98
OTMS
CN
H
O
50
0
-50
-100
-150
-200
-250
ppm

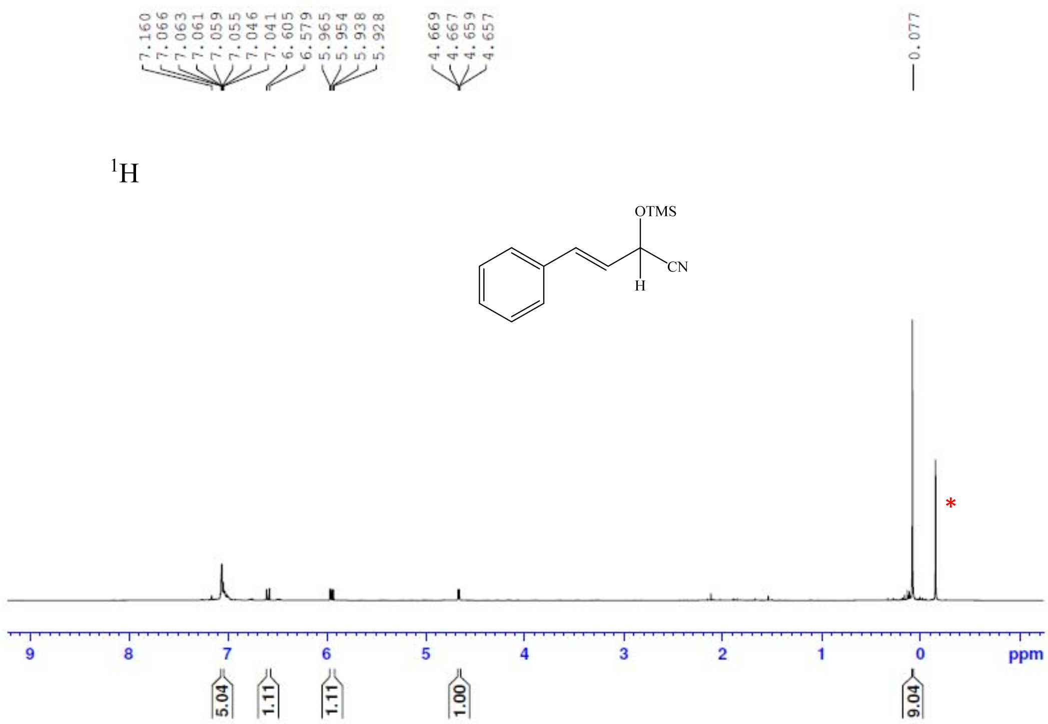
^{1}H

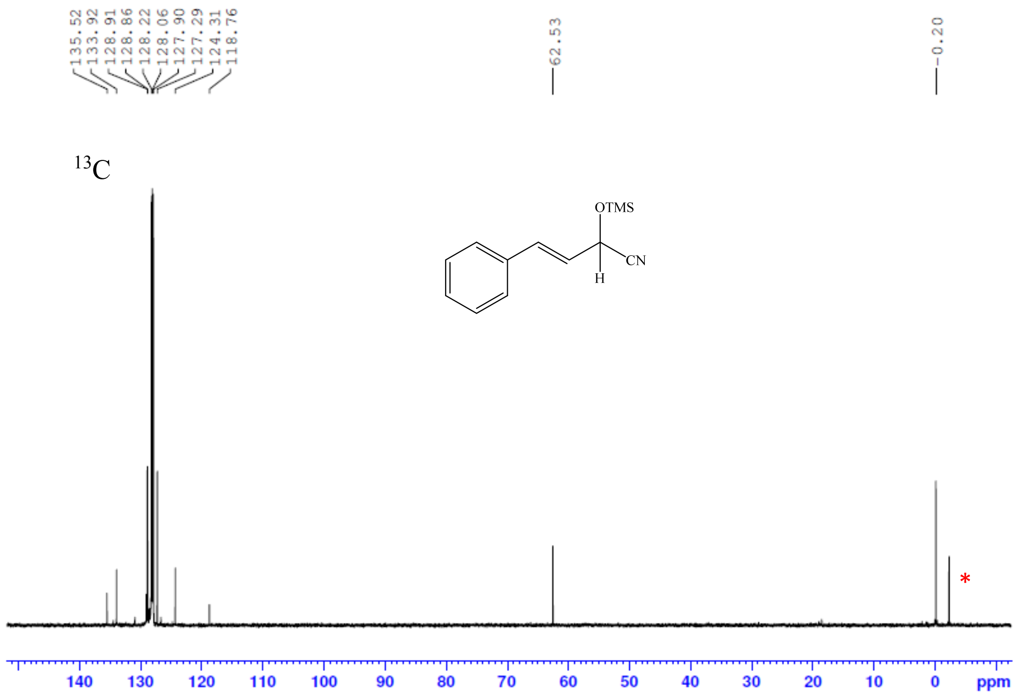


7.160
3.819
1.738
1.734
1.730
1.728
1.724
1.719
1.710
1.689
1.476
1.468
1.460
1.455
1.412
1.407
1.402
1.396
1.187
1.175
1.171
1.160
1.151
1.007
0.995
0.990
0.986
0.981
0.971
0.967
0.958
0.954
0.949
0.943
0.933
0.067
OTMS
CN
H
*
8
7
6
5
4
3
2
1
0
-1
-2
ppm
1.00
2.07
2.17
1.07
6.18
9.08

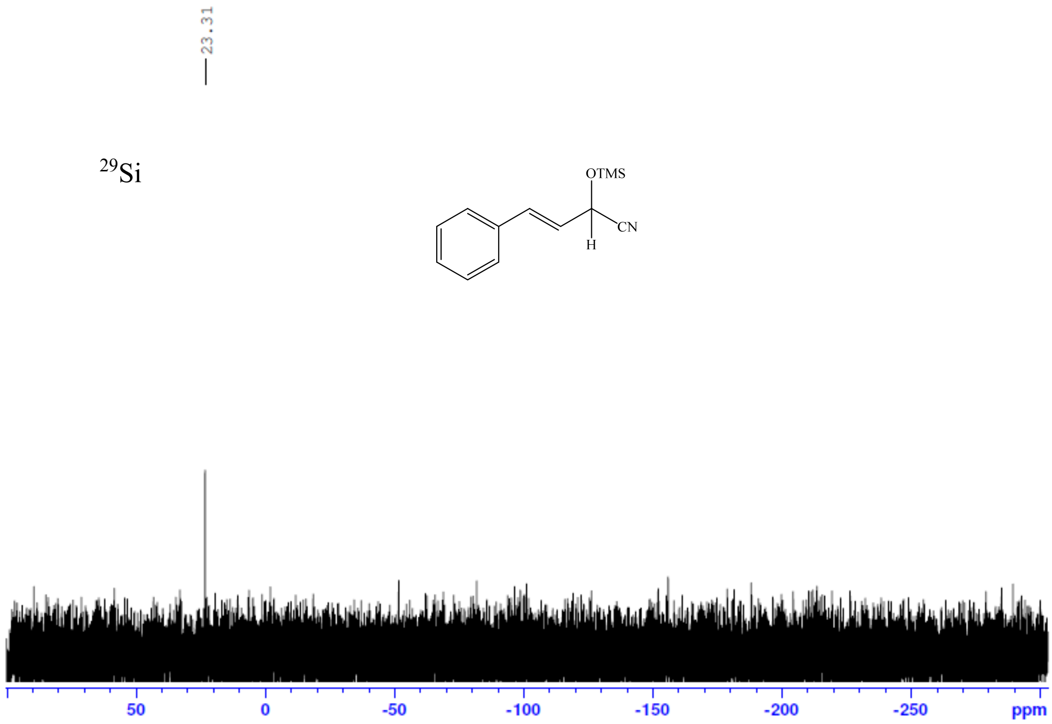

128.22
128.06
127.90
119.48
66.65
43.21
28.16
26.27
25.80
-0.49
13C
OTMS
H
CN
*
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


17.72
29Si
OTMS
H
CN
50
0
-50
-100
-150
-200
-250
ppm

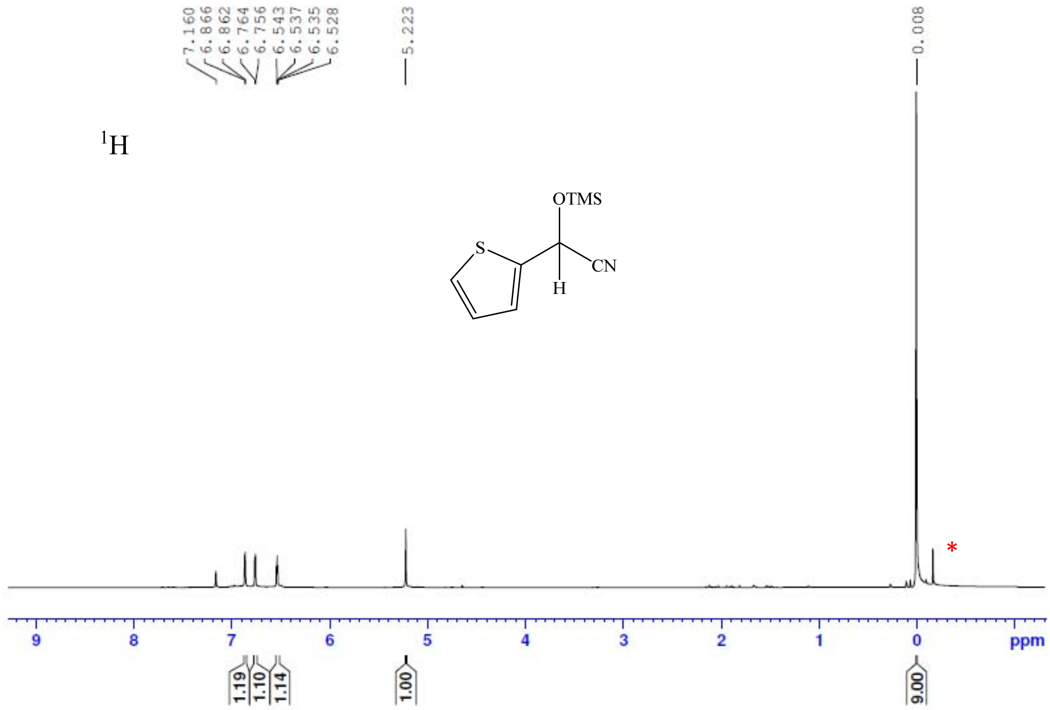

7.160
7.066
7.063
7.061
7.059
7.055
7.046
7.041
6.605
6.579
5.965
5.954
5.938
5.928
4.669
4.667
4.659
4.657
0.077
1H
OTMS
CN
H
*
9
8
7
6
5
4
3
2
1
0
ppm
5.04
1.11
1.11
1.00
9.04

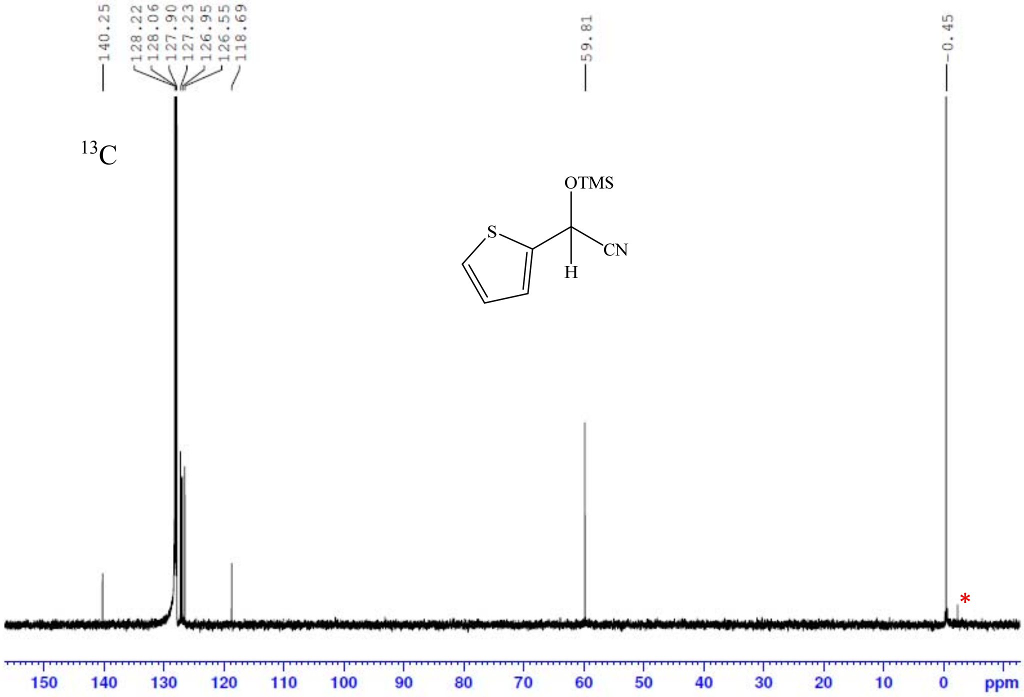

135.52
133.92
128.91
128.86
128.22
128.06
127.90
127.29
124.31
118.76
62.53
-0.20
13C
OTMS
CN
H
*
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

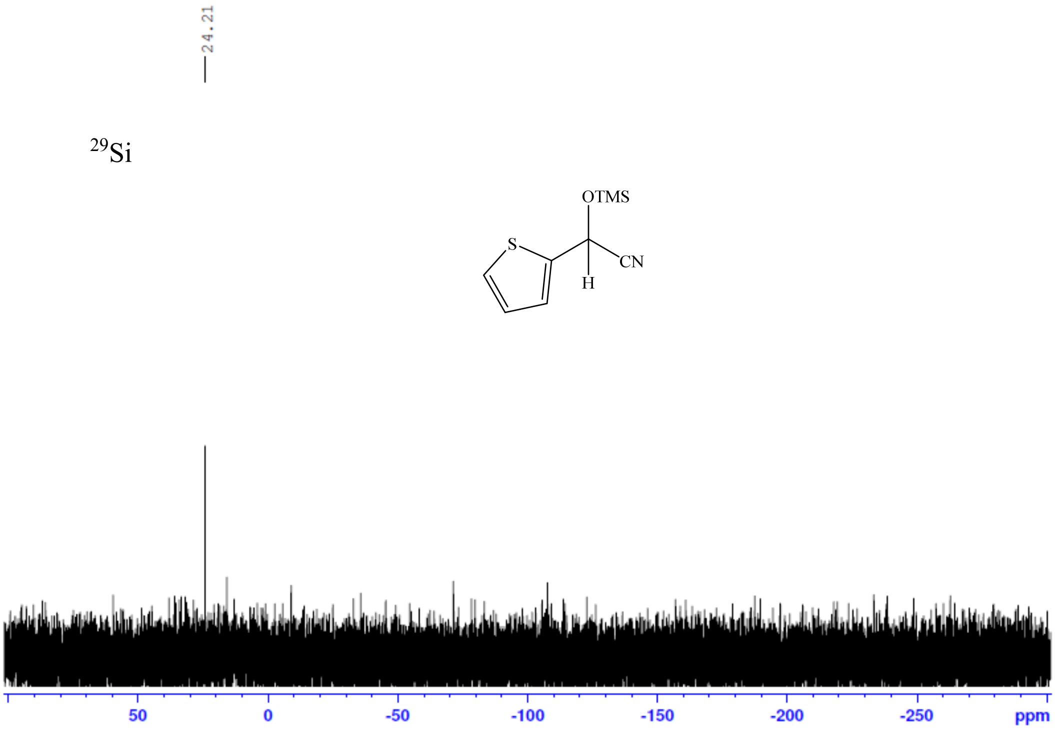
^{29}Si

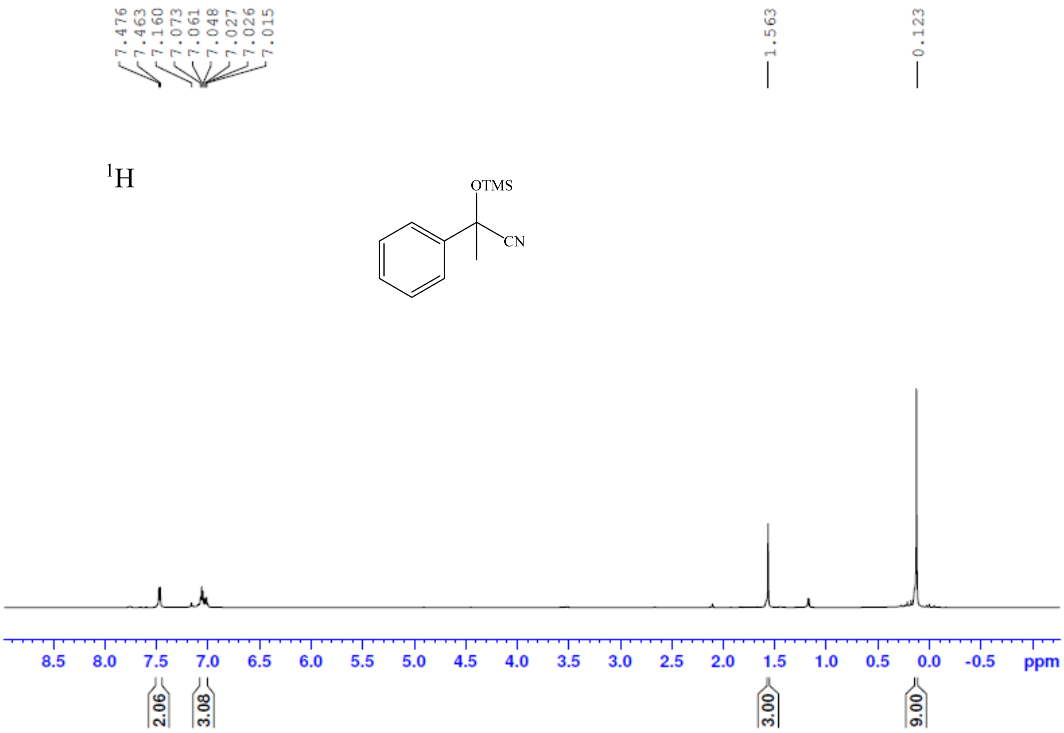

23.31
OTMS
H
CN
50
0
-50
-100
-150
-200
-250
ppm

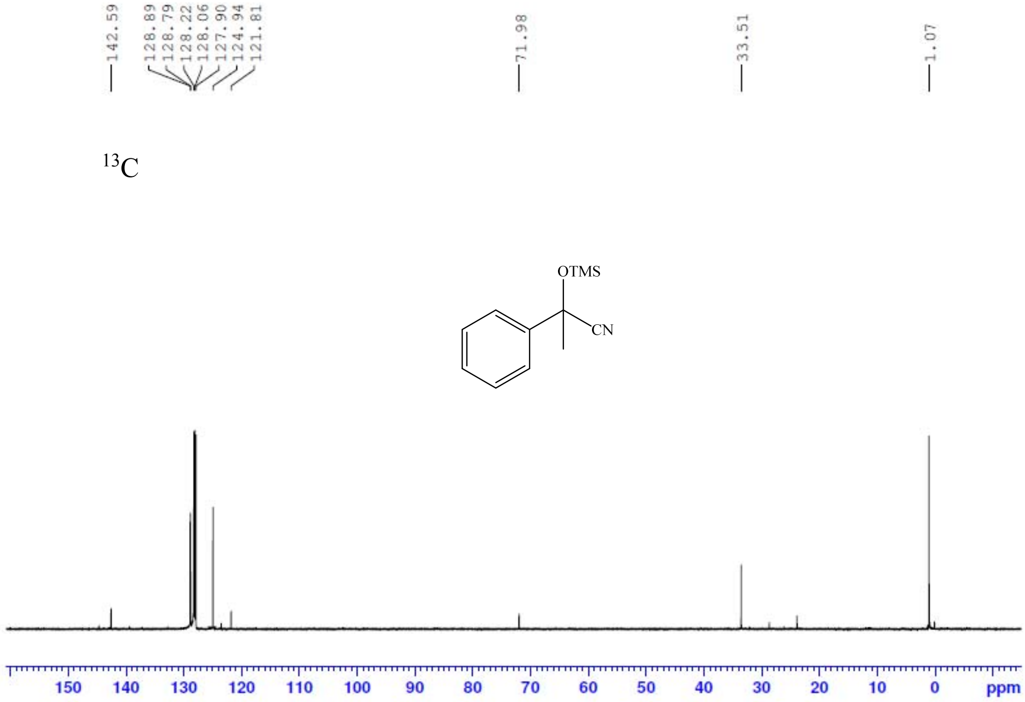
^{1}H

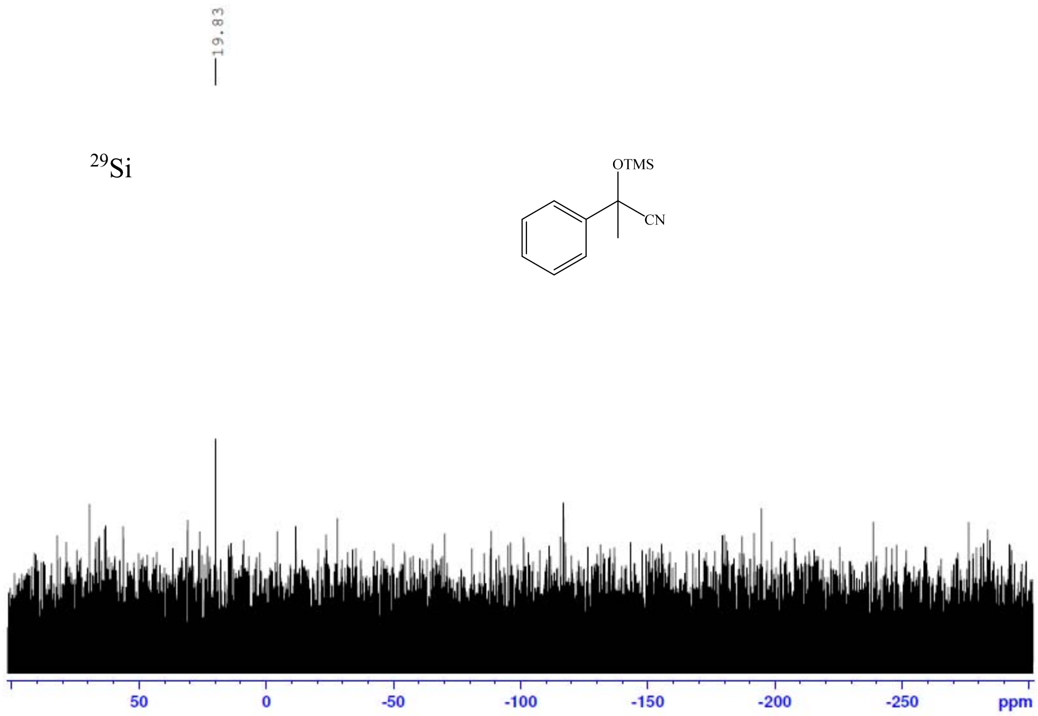

7.160
6.866
6.862
6.764
6.756
6.543
6.537
6.535
6.528
5.223
0.008
OTMS
S
H
CN
*
9
8
7
6
5
4
3
2
1
0
ppm
1.19
1.10
1.14
1.00
9.00

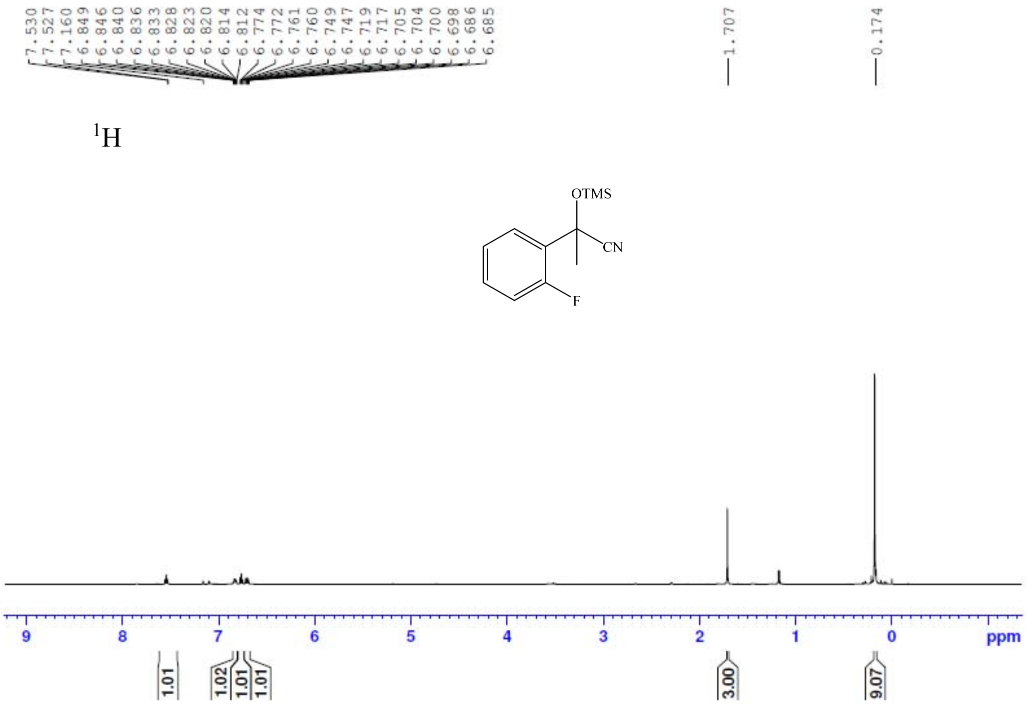

140.25
128.22
128.06
127.90
127.23
126.95
126.55
118.69
59.81
-0.45
13C
OTMS
S
CN
H
*
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

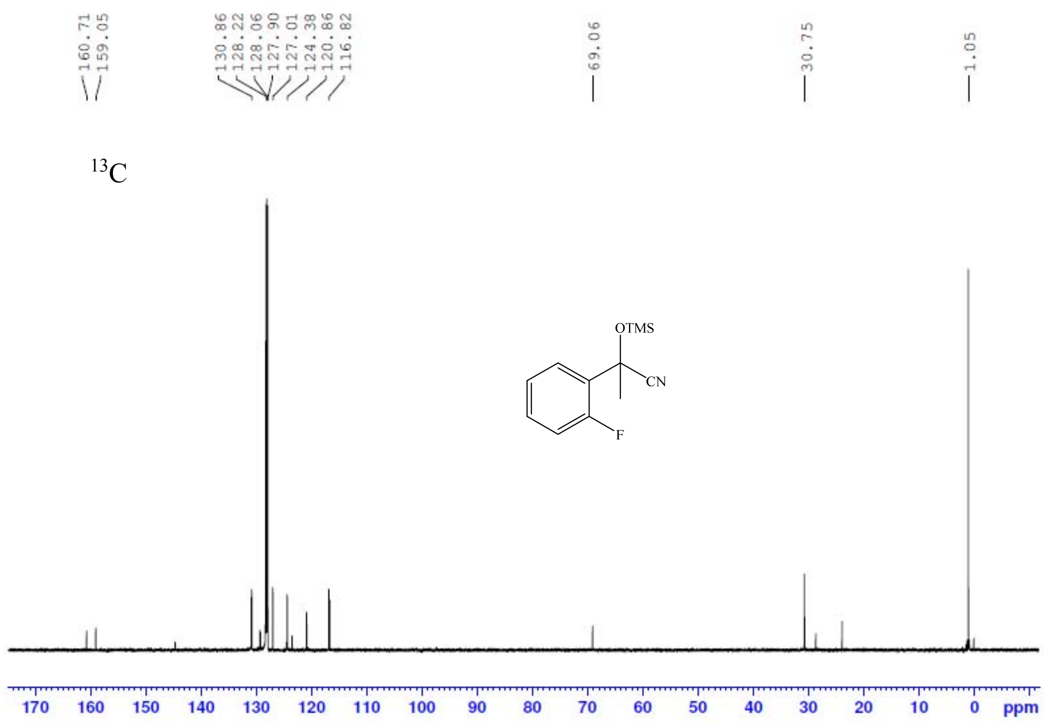

24.21
29Si
OTMS
S
CN
H
50
0
-50
-100
-150
-200
-250
ppm

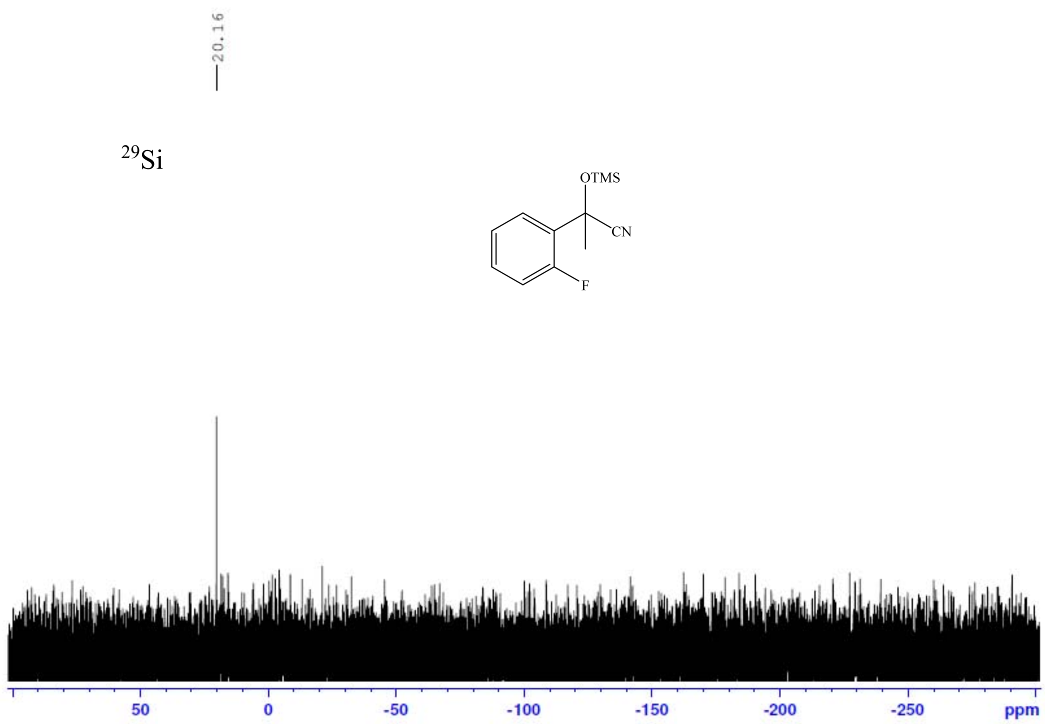

7.476
7.463
7.160
7.073
7.061
7.048
7.027
7.026
7.015
1.563
0.123
^{1}H
OTMS
CN
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 ppm
2.06
3.08
3.00
9.00

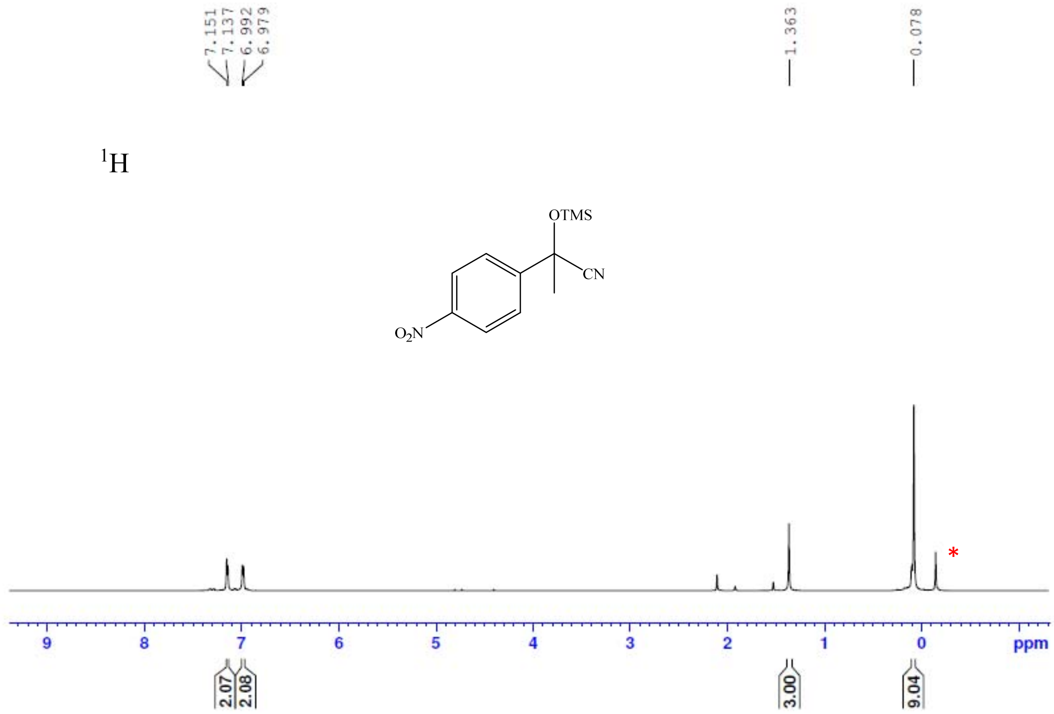

142.59
128.89
128.79
128.22
128.06
127.90
124.94
121.81
71.98
33.51
1.07
^{13}C
OTMS
CN
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


19.83
^{29}Si
OTMS
CN
50
0
-50
-100
-150
-200
-250
ppm

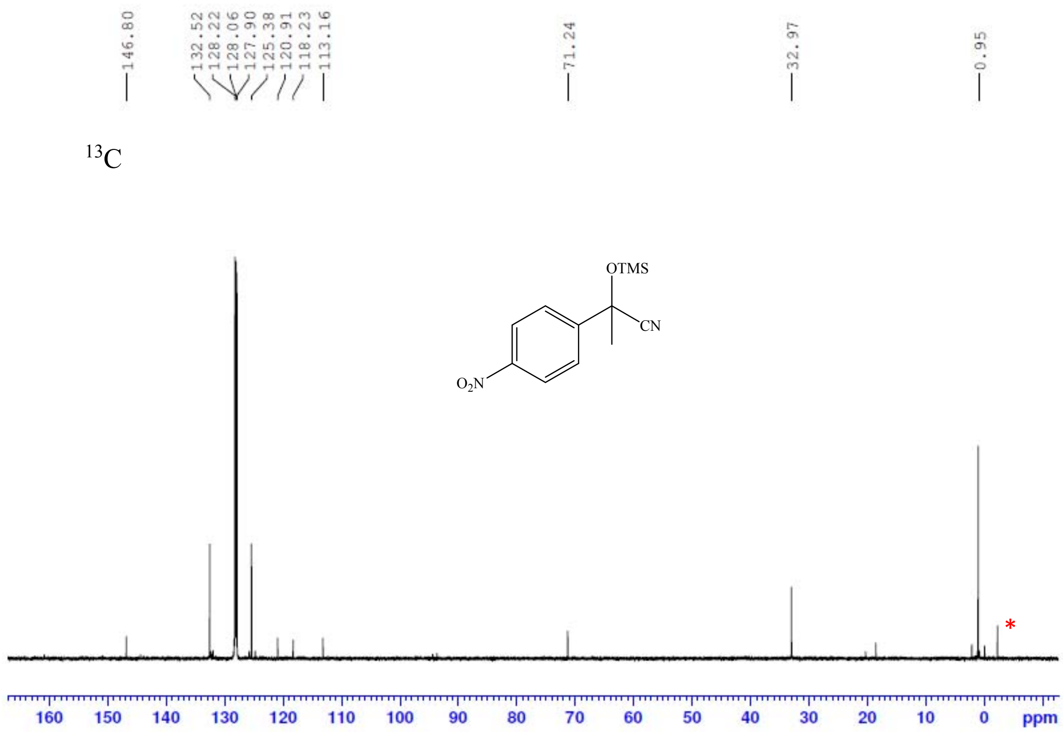

7.530
7.527
7.160
6.849
6.846
6.840
6.836
6.833
6.828
6.823
6.820
6.814
6.812
6.774
6.772
6.761
6.760
6.749
6.747
6.719
6.717
6.705
6.704
6.700
6.698
6.686
6.685
1.707
0.174
^{1}H
OTMS
CN
F
9
8
7
6
5
4
3
2
1
0
ppm
1.01
1.02
1.01
1.01
3.00
9.07


160.71
159.05
130.86
128.22
128.06
127.90
127.01
124.38
120.86
116.82
69.06
30.75
1.05
13C
OTMS
CN
F
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

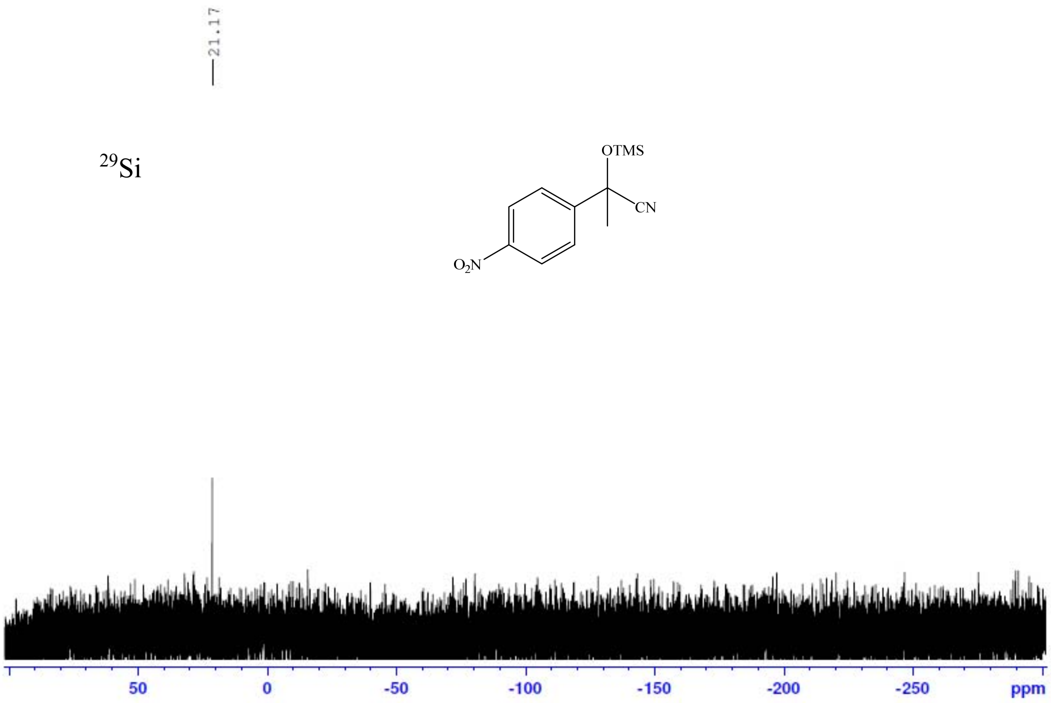

20.16
29Si
OTMS
CN
F
50 0 -50 -100 -150 -200 -250 ppm

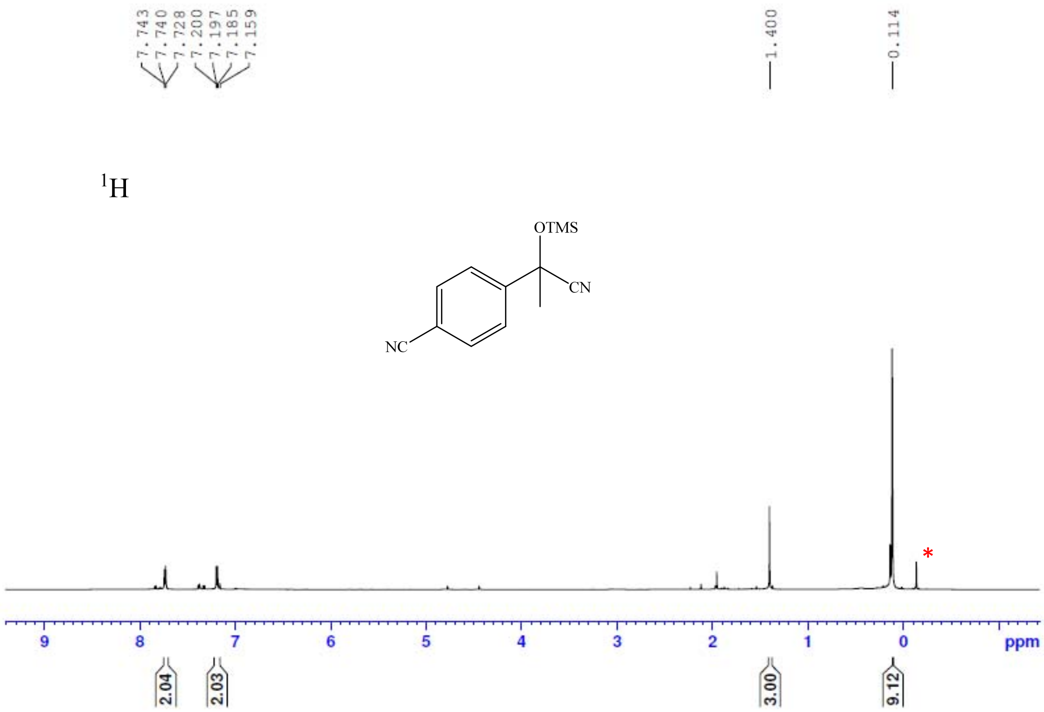


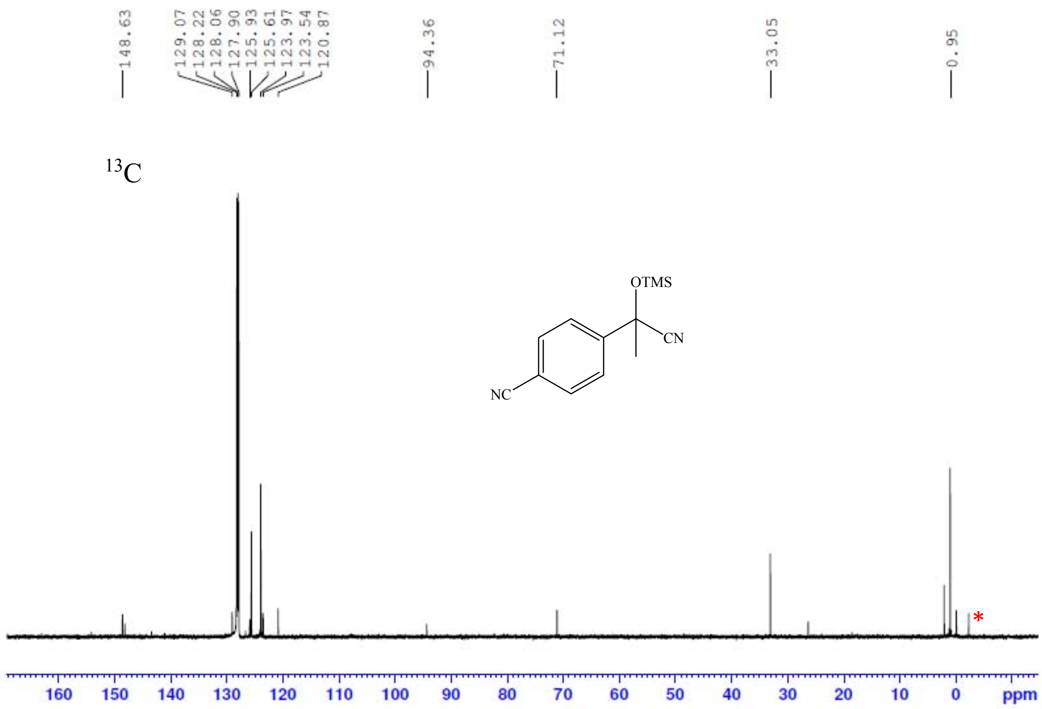
7.151
7.137
6.992
6.979
1.363
0.078
^{1}H
OTMS
CN
O_2N
*
9
8
7
6
5
4
3
2
1
0
ppm
2.07
2.08
3.00
9.04

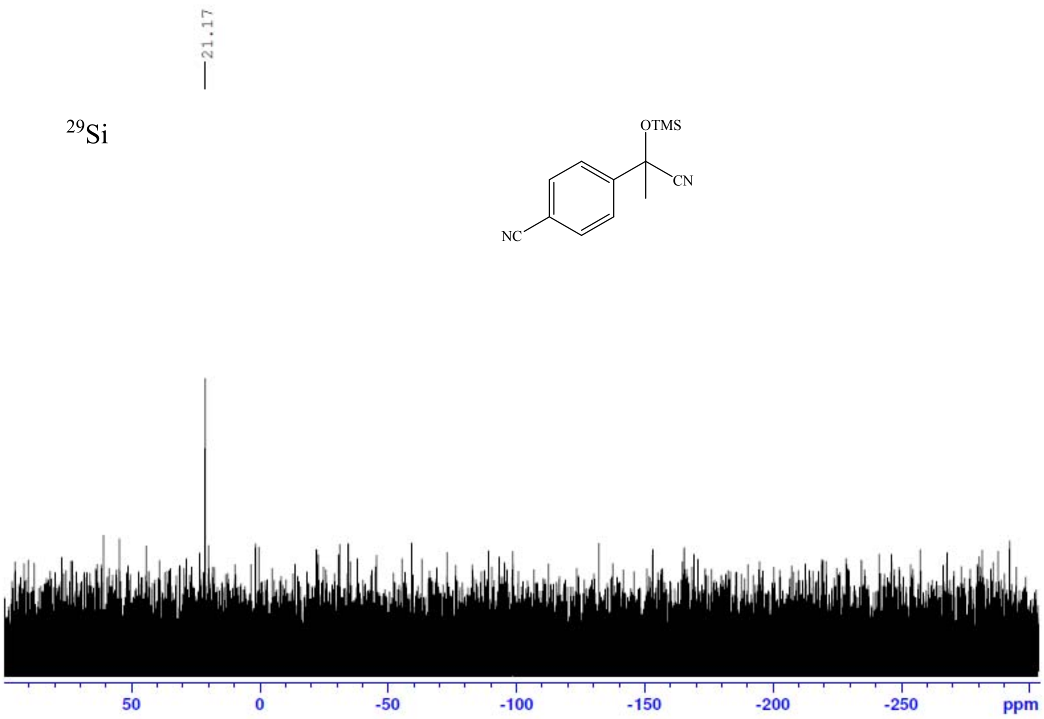


146.80
132.52
128.22
128.06
127.90
125.38
120.91
118.23
113.16
71.24
32.97
0.95
^{13}C
OTMS
CN
O_2N
*
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm

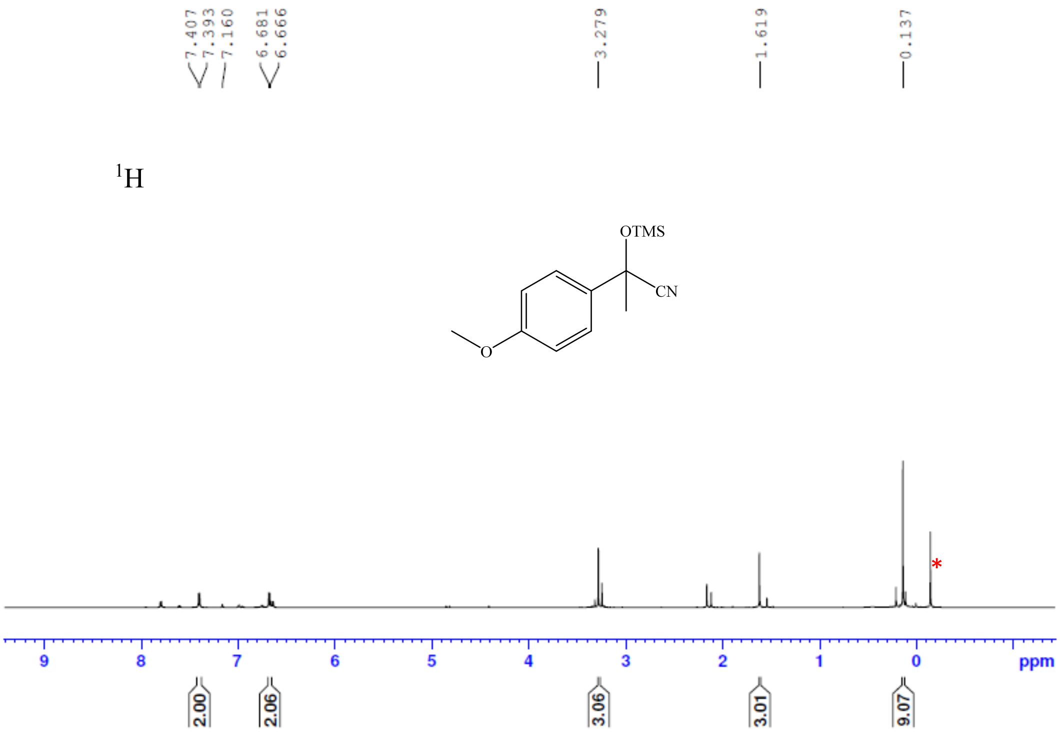

21.17
29Si
OTMS
CN
O2N
50
0
-50
-100
-150
-200
-250
ppm


7.743
7.740
7.728
7.200
7.197
7.185
7.159
1.400
0.114
1H
OTMS
CN
NC
*
9
8
7
6
5
4
3
2
1
0
ppm
2.04
2.03
3.00
9.12


148.63
129.07
128.22
128.06
127.90
125.93
125.61
123.97
123.54
120.87
94.36
71.12
33.05
0.95
13C
OTMS
CN
NC
*
160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


21.17
29Si
OTMS
CN
NC
50 0 -50 -100 -150 -200 -250 ppm

^{1}H


7.407
7.393
7.160
6.681
6.666
3.279
1.619
0.137
OTMS
CN
O
*
9
8
7
6
5
4
3
2
1
0
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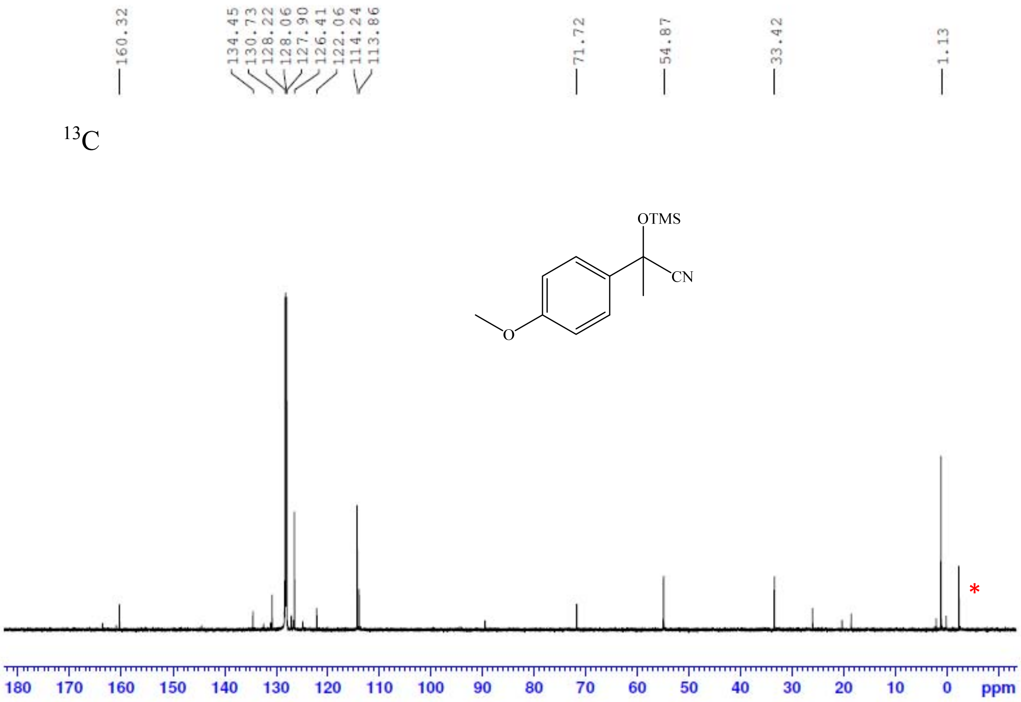
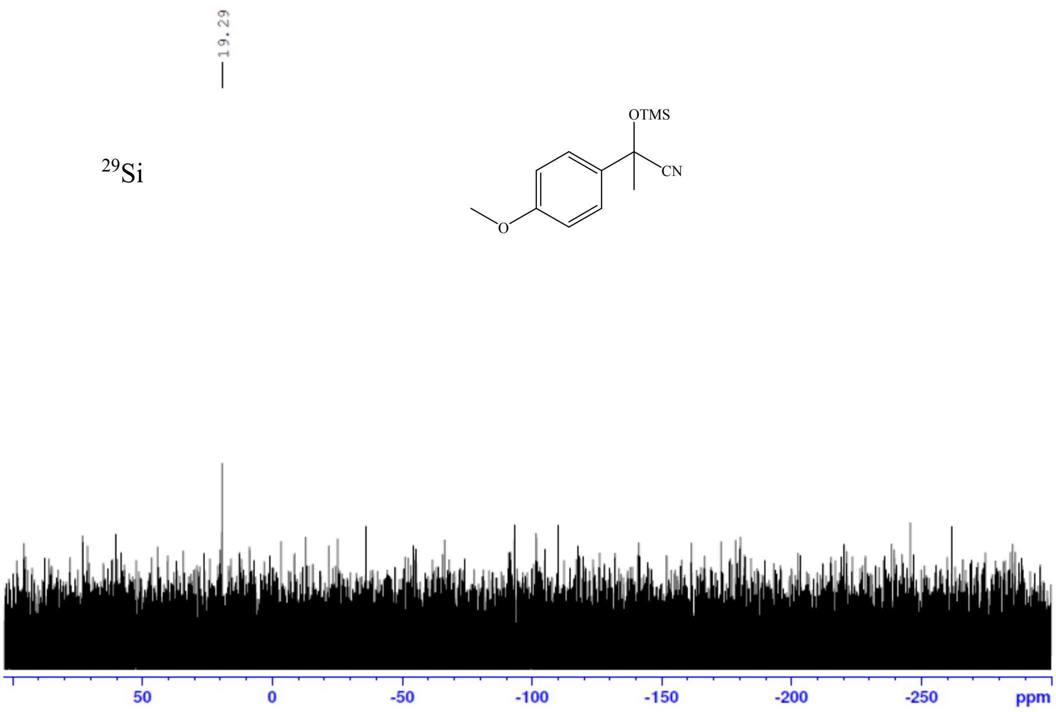
2.00
2.06
3.06
3.01
9.07

^{13}C


160.32
134.45
130.73
128.22
128.06
127.90
126.41
122.06
114.24
113.86
71.72
54.87
33.42
1.13
OTMS
CN
O
*
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


19.29
29Si
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CN
O
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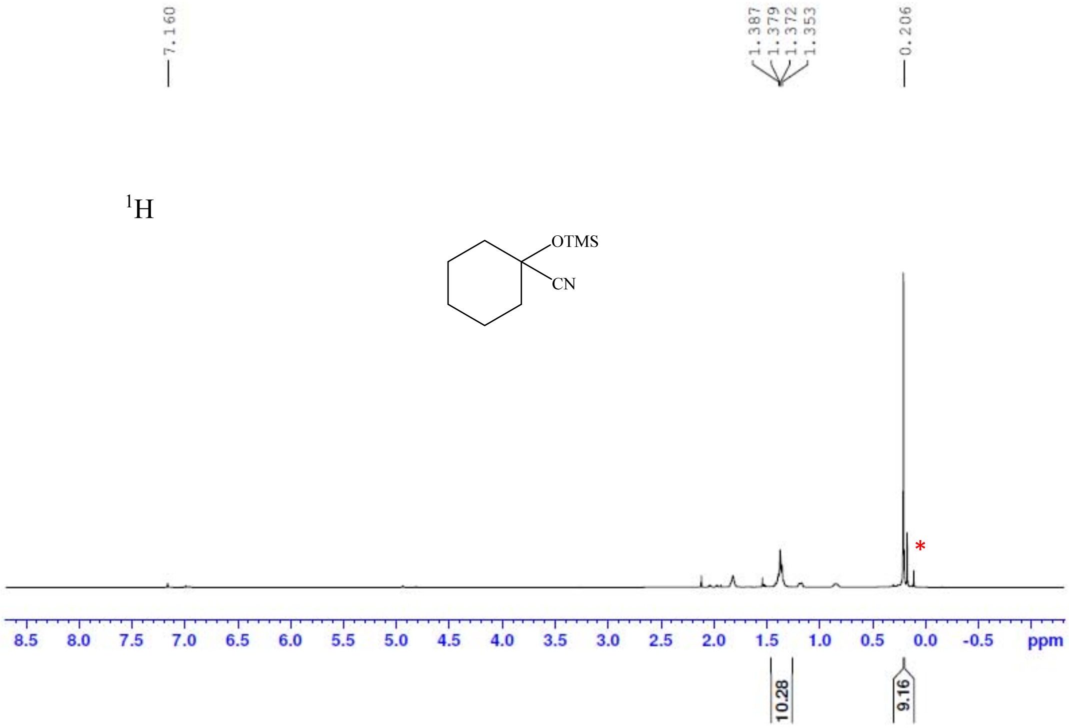
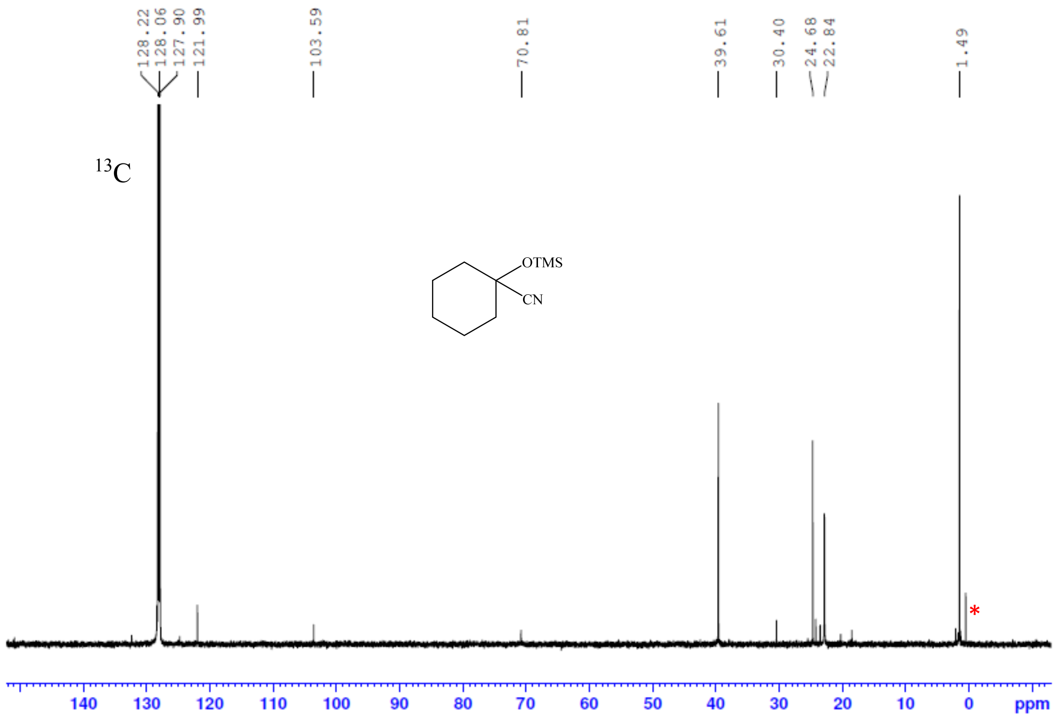
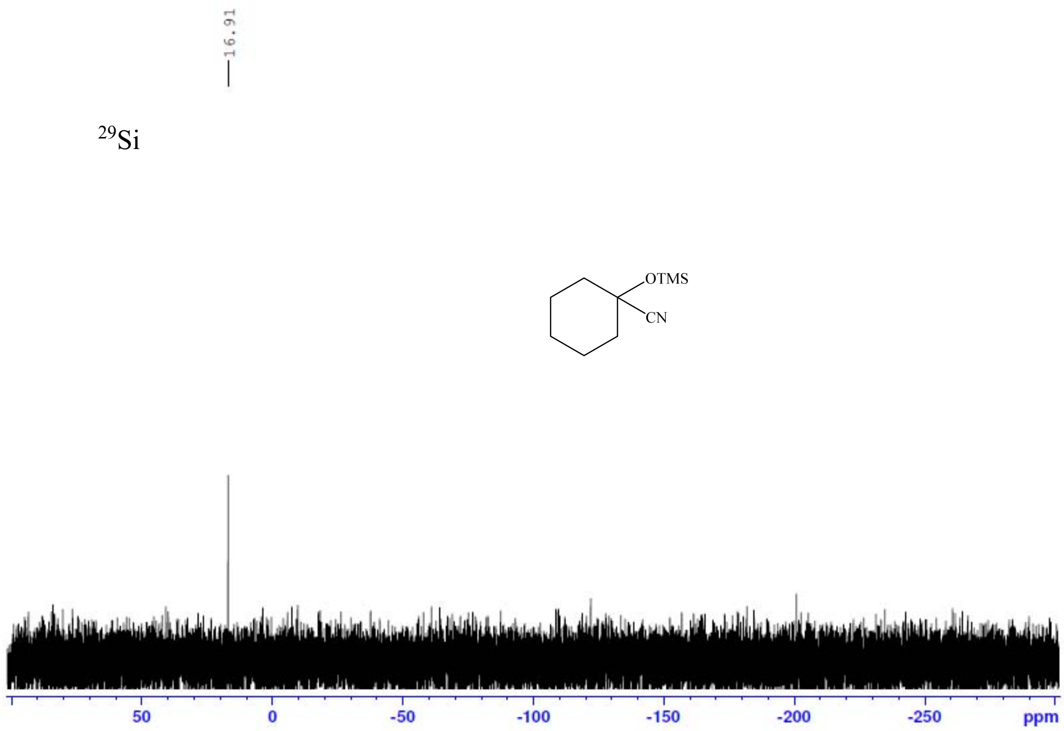
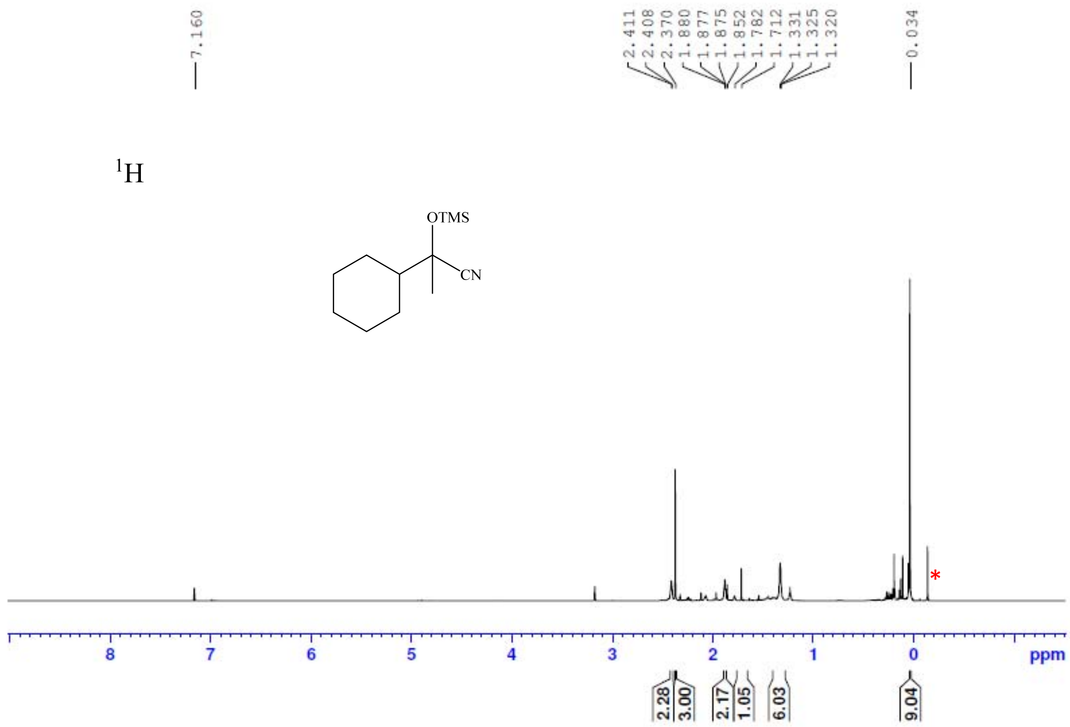
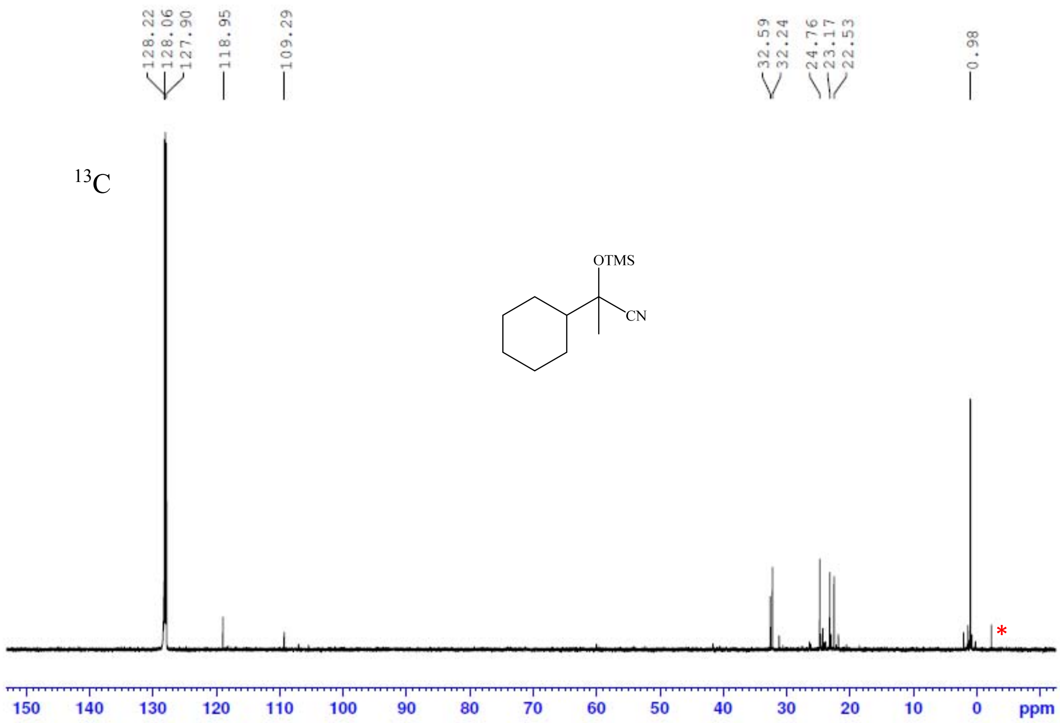
0
-50
-100
-150
-200
-250
ppm

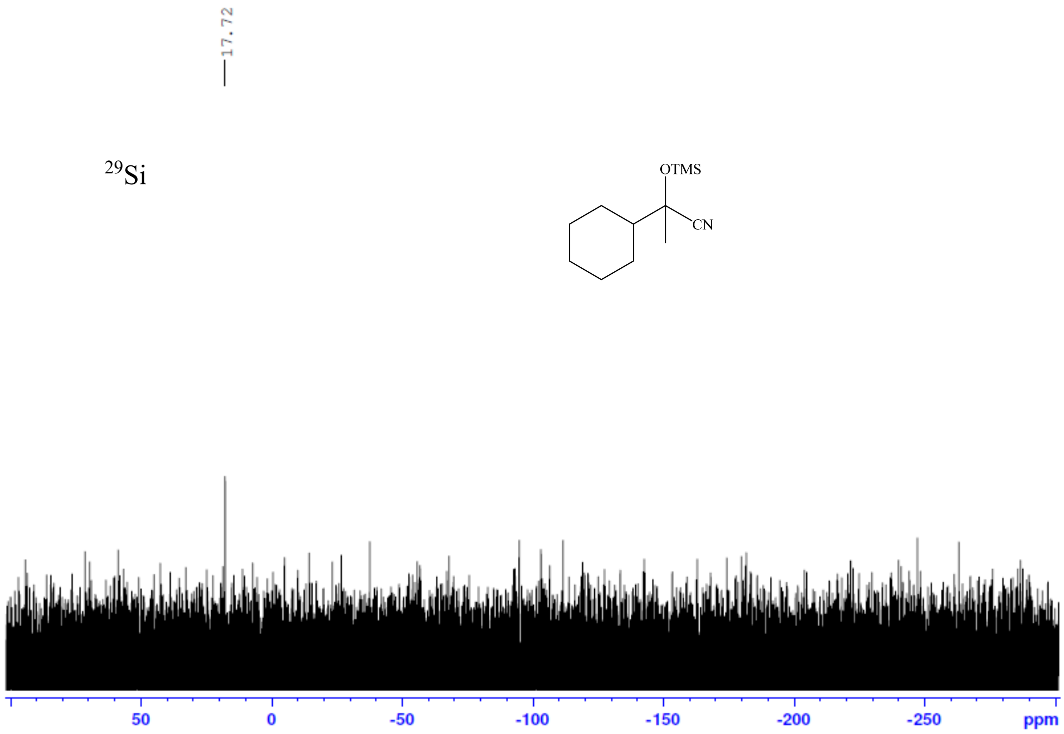

7.160
1.387
1.379
1.372
1.353
0.206
1H
OTMS
CN
*
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
ppm
10.28
9.16


128.22
128.06
127.90
121.99
103.59
70.81
39.61
30.40
24.68
22.84
1.49
13C
OTMS
CN
*
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


16.91
29Si
OTMS
CN
50
0
-50
-100
-150
-200
-250
ppm


7.160
2.411
2.408
2.370
1.880
1.877
1.875
1.852
1.782
1.712
1.331
1.325
1.320
0.034
1H
OTMS
CN
*
8
7
6
5
4
3
2
1
0
ppm
2.28
3.00
2.17
1.05
6.03
9.04


128.22
128.06
127.90
118.95
109.29
32.59
32.24
24.76
23.17
22.53
0.98
13C
OTMS
CN
*
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm



17.72
^{29}Si
OTMS
CN
50
0
-50
-100
-150
-200
-250
ppm