Supporting Information

A photocatalytic sp^3 C–S, C-Se and C-B bonds formation through C–C bond cleavage of cycloketone oxime esters

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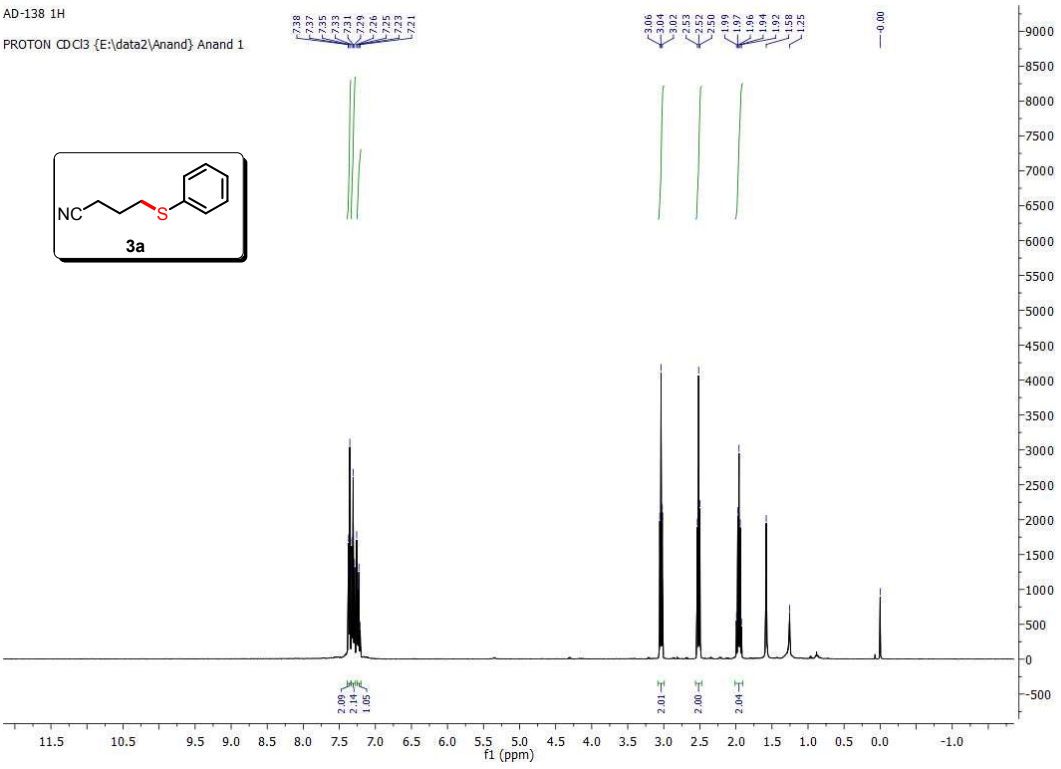
General Information.

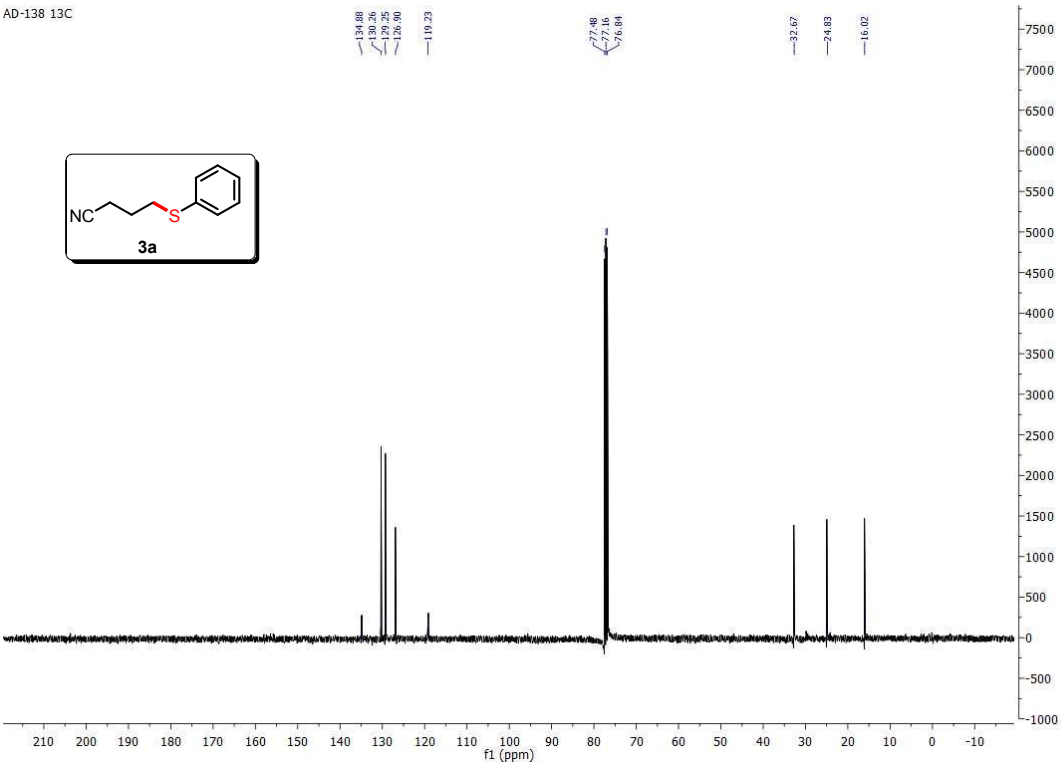
Unless otherwise noted, all reactions were performed in a 10 mL test tube at room temperature. Photo-irradiation was carried out with a 5 W blue LED. For chromatography, 200-300 mesh silica gel (Qindao, China) was employed. ^{1}H NMR and ^{13}C NMR spectra were measured in $CDCl_3$ and recorded on Brucker ARX 400 spectrometer. Chemical shifts (δ) were given in ppm, referenced to the residual proton resonance of $CDCl_3$ (7.26), to the carbon resonance of $CDCl_3$ (77.16). Coupling constants (*J*) were given in Hertz (Hz). The term, d, t, m, dd referred to doublet, triplet, multiplet, doublet of doublet. Exact masses (HRMS) were recorded on a high resolution magnetic mass spectrometer using ESI or APCI ionization techniques. Cyclobutanones[1] and *O*-acyl oximes[2] were prepared according to the previous reported procedures. Materials obtained from commercial suppliers were used without further purification.

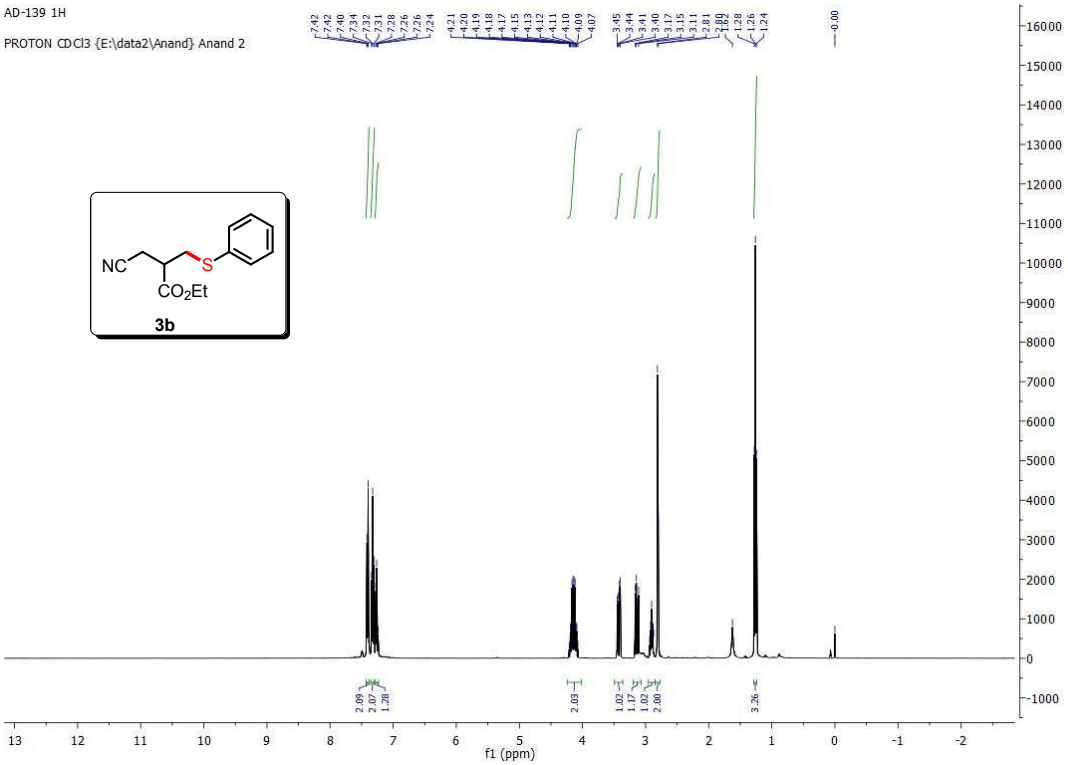
References:

1. J. Ramnauth and E. Lee-Ruff, *Can. J. Chem.,* 2001, **79**, 114.
2. T. Nishimura, Y. Nishiguchi, Y. Maeda and S. Uemura, *J. Org. Chem.,* 2004, **69**, 5342.

[1]H NMR and [13]C NMR spectrum of products



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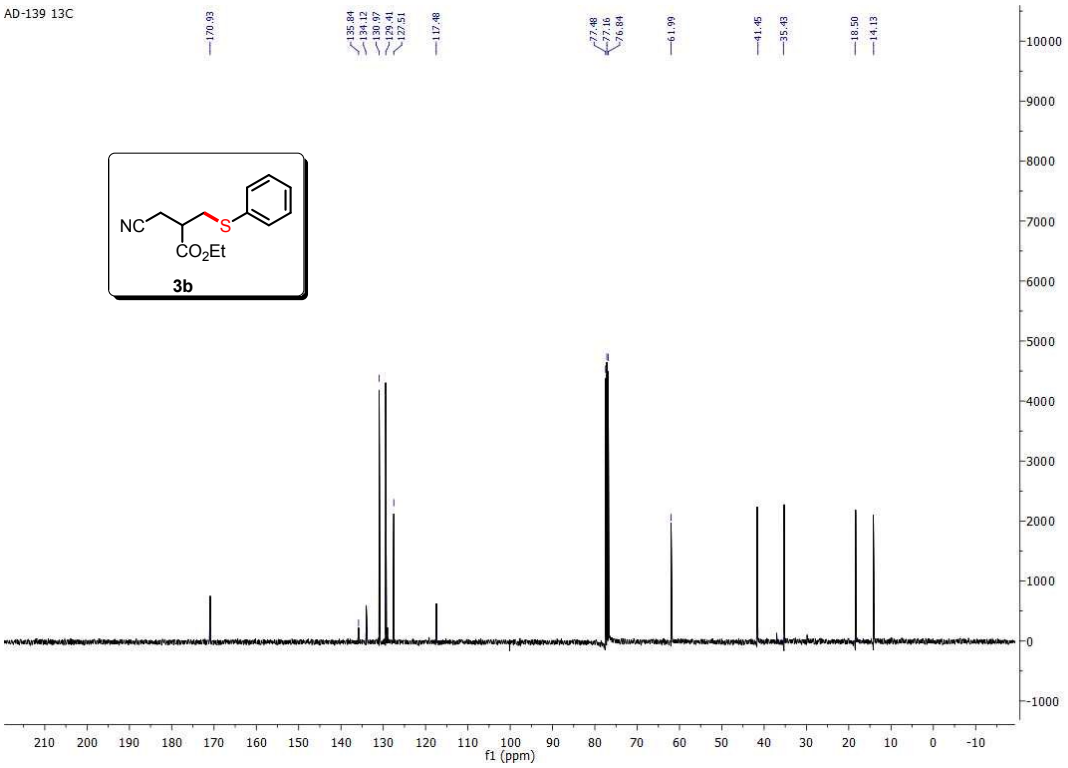
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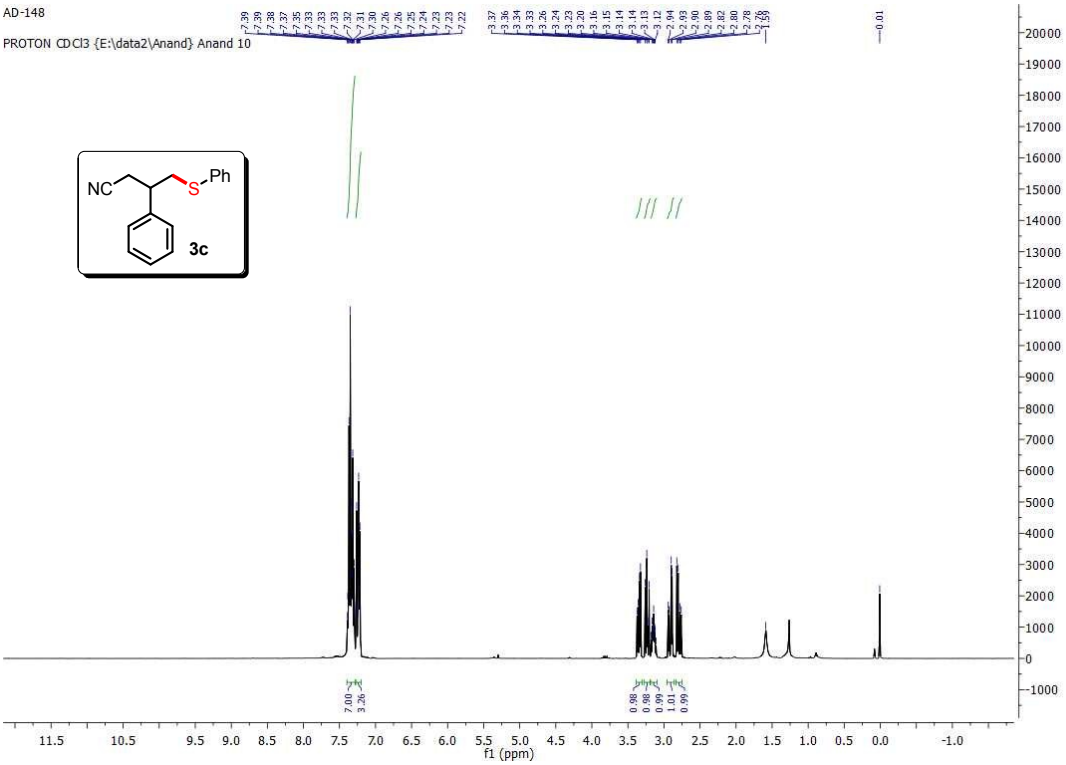
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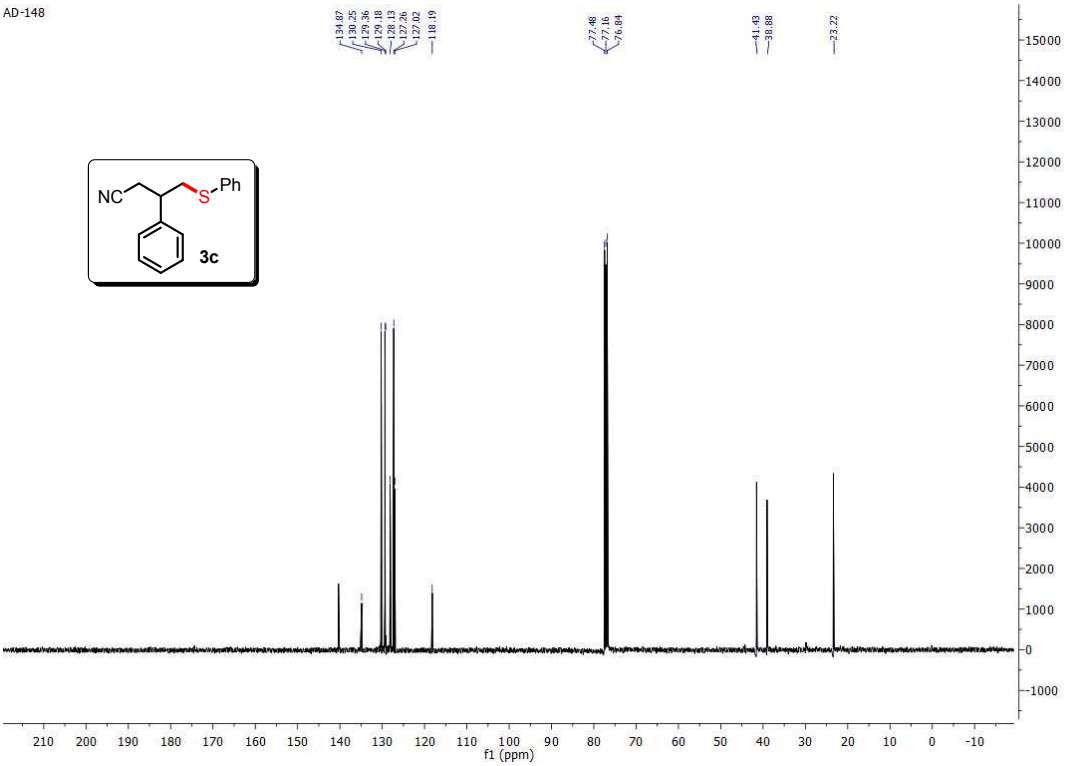
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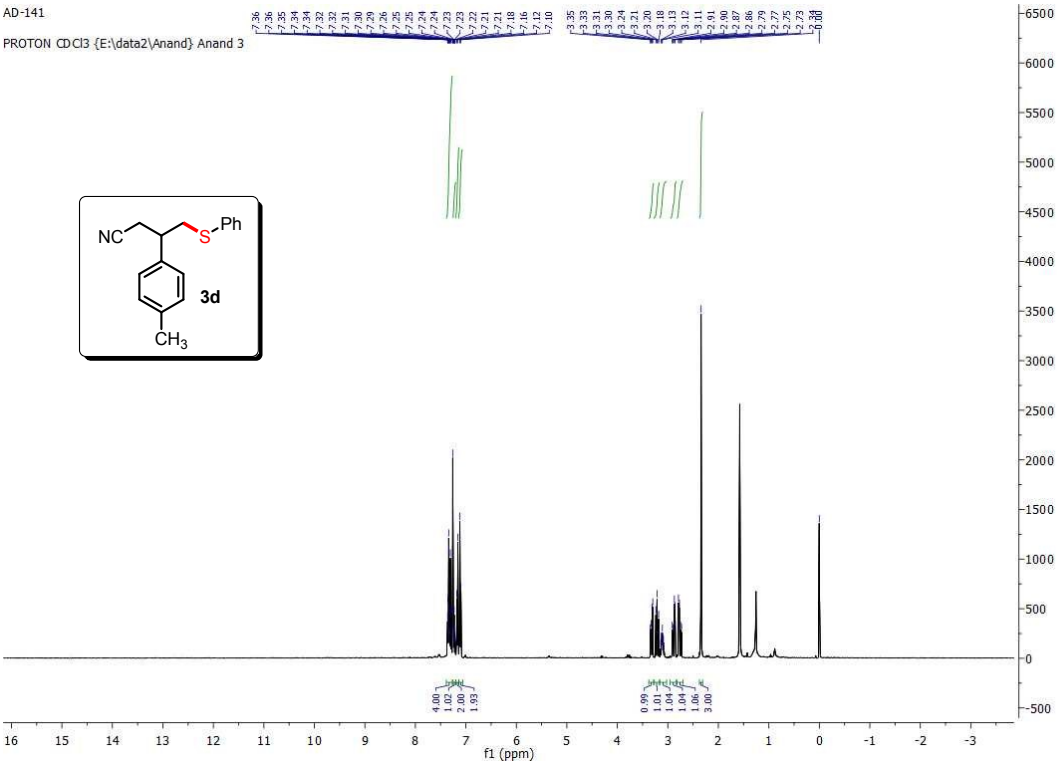
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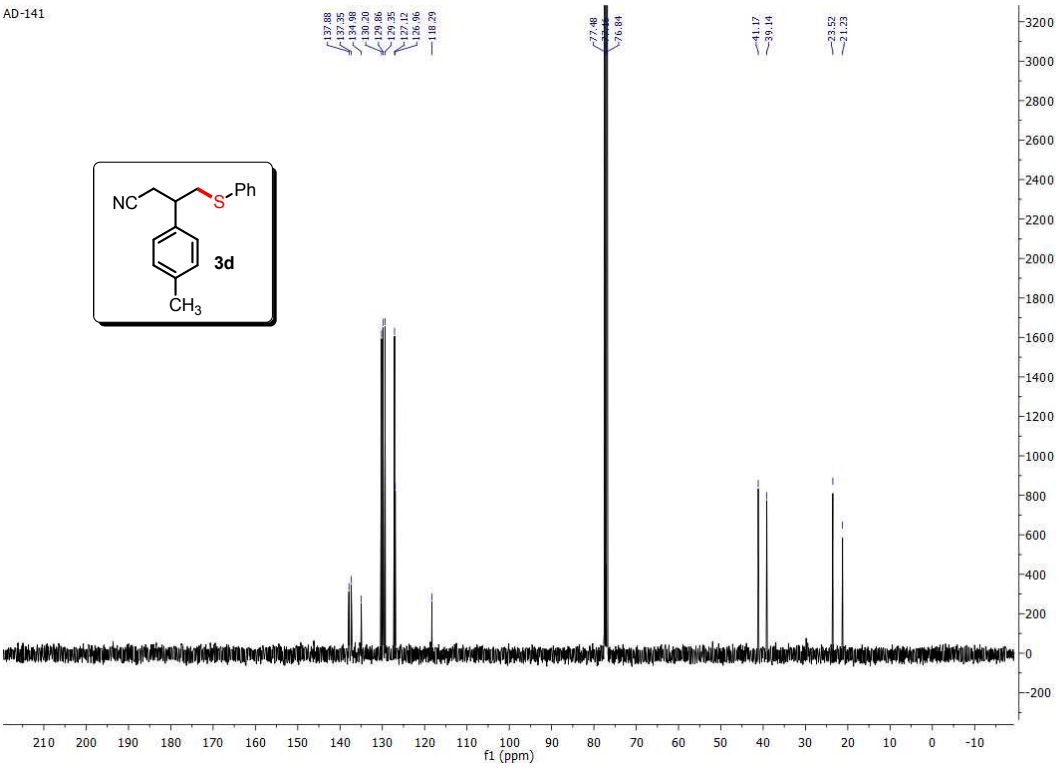
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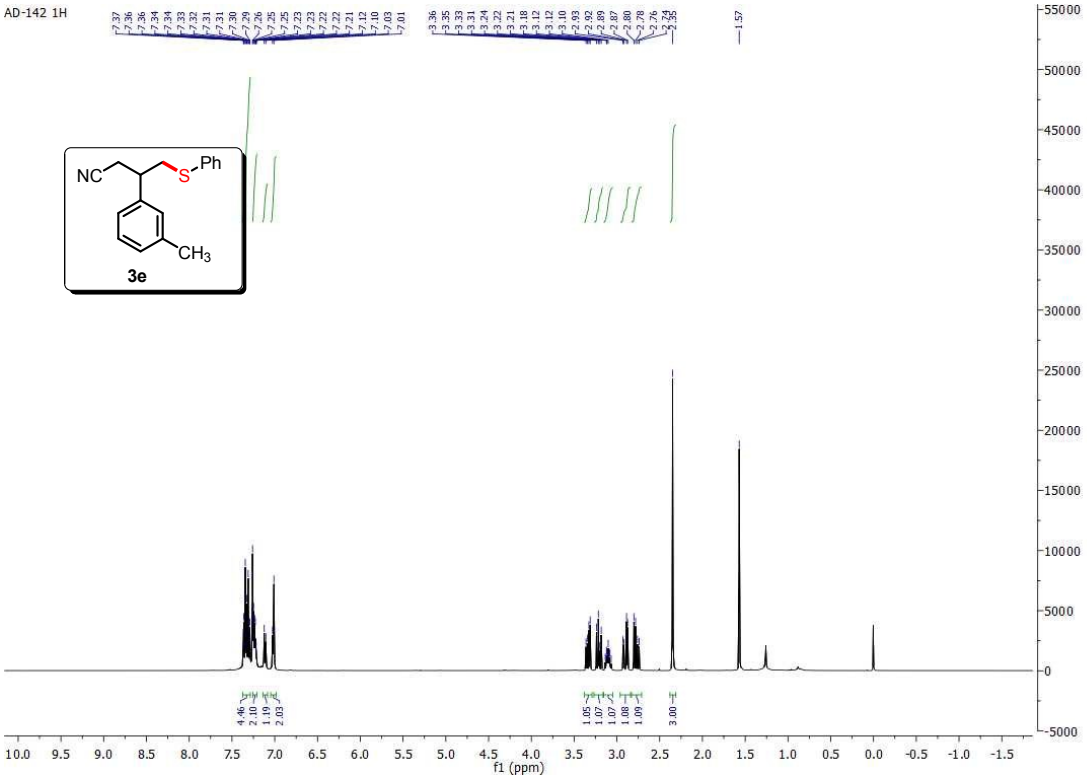
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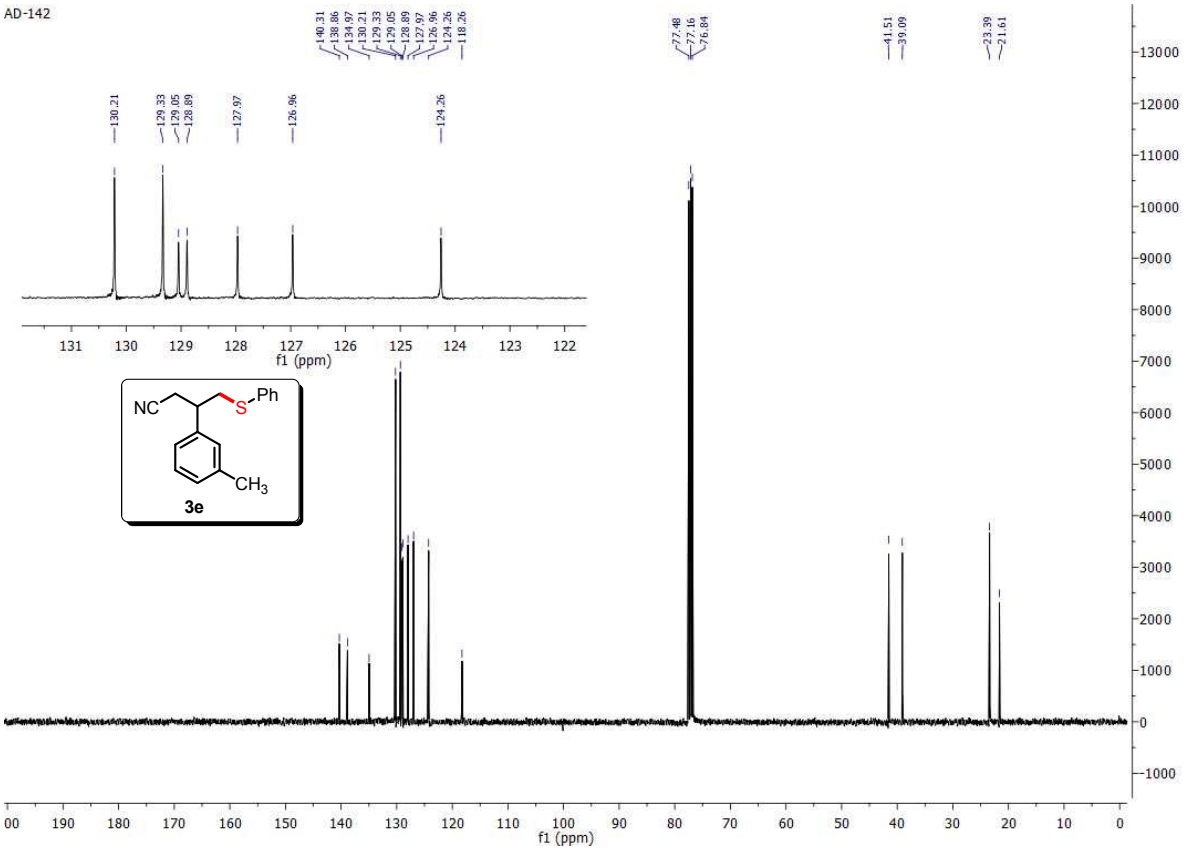
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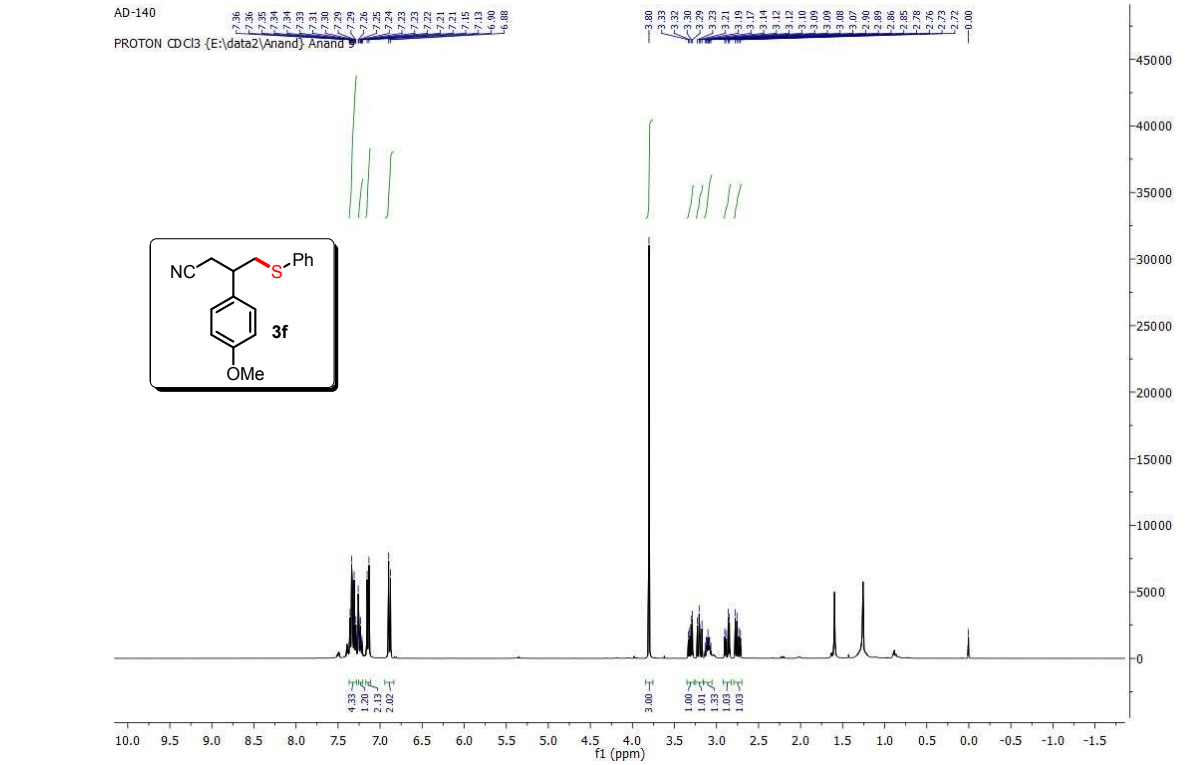
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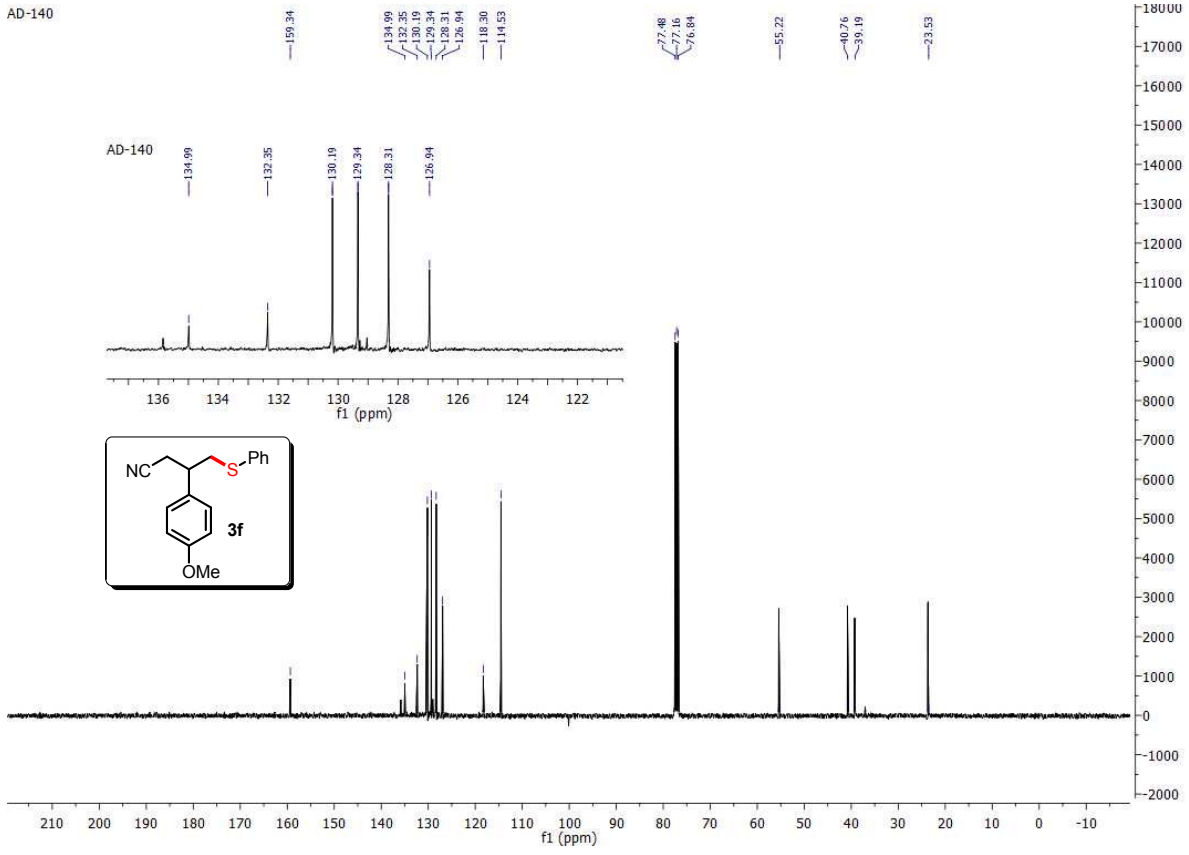
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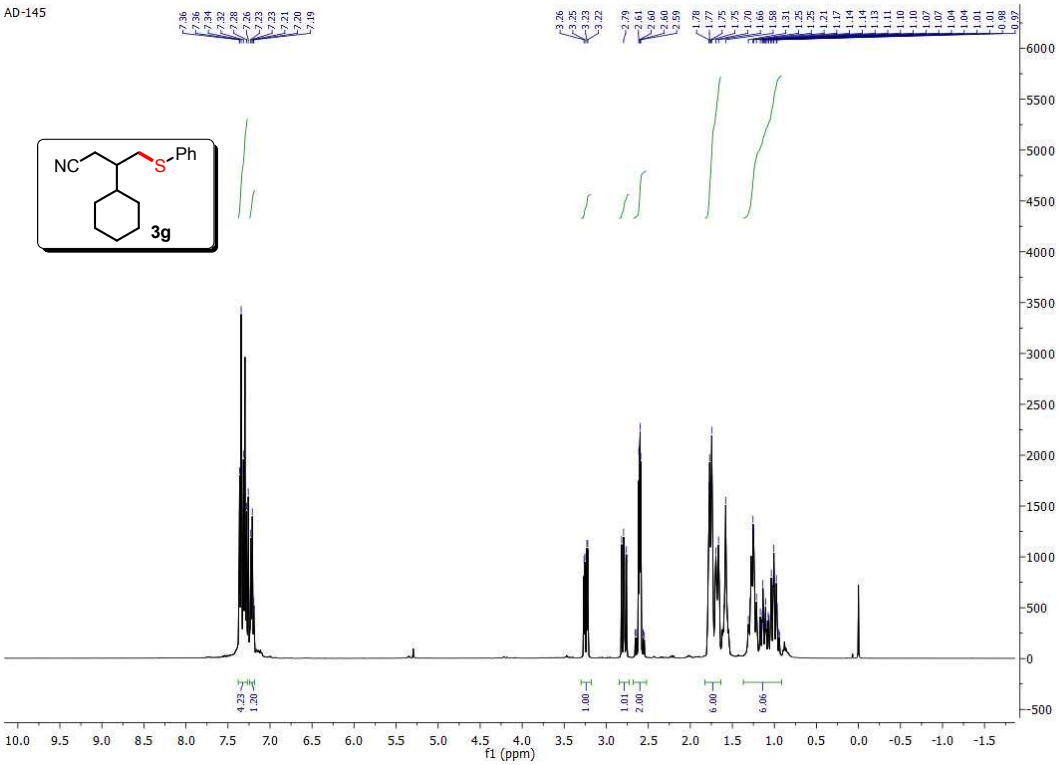
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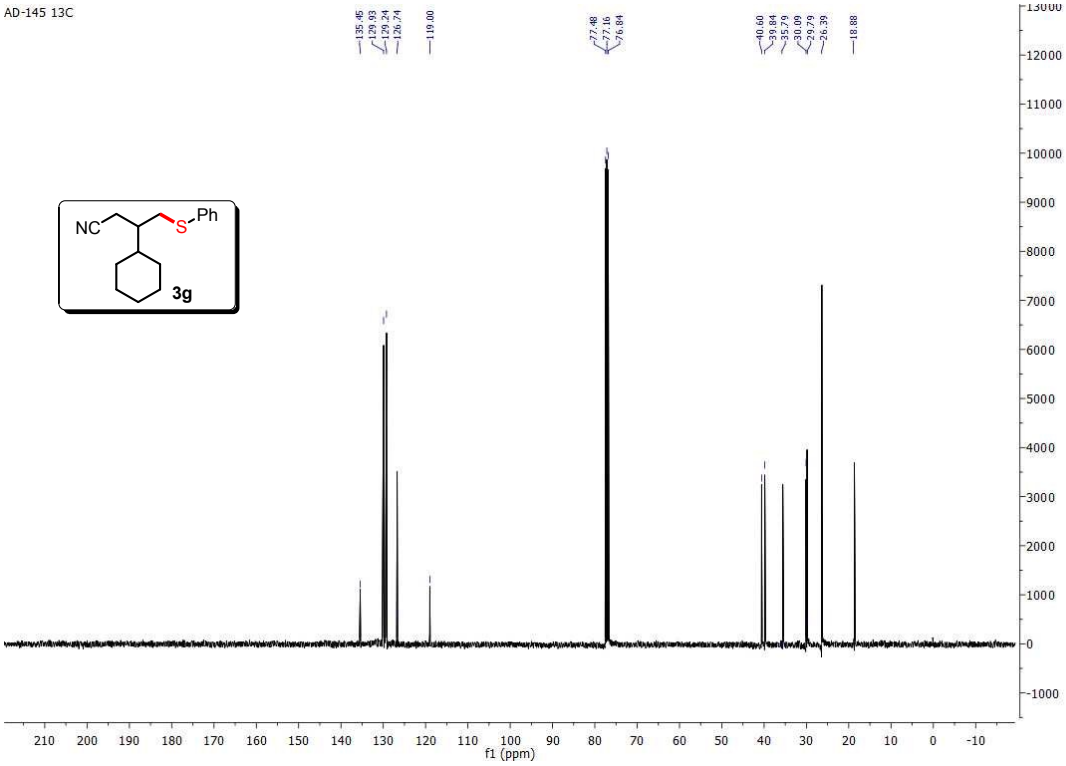
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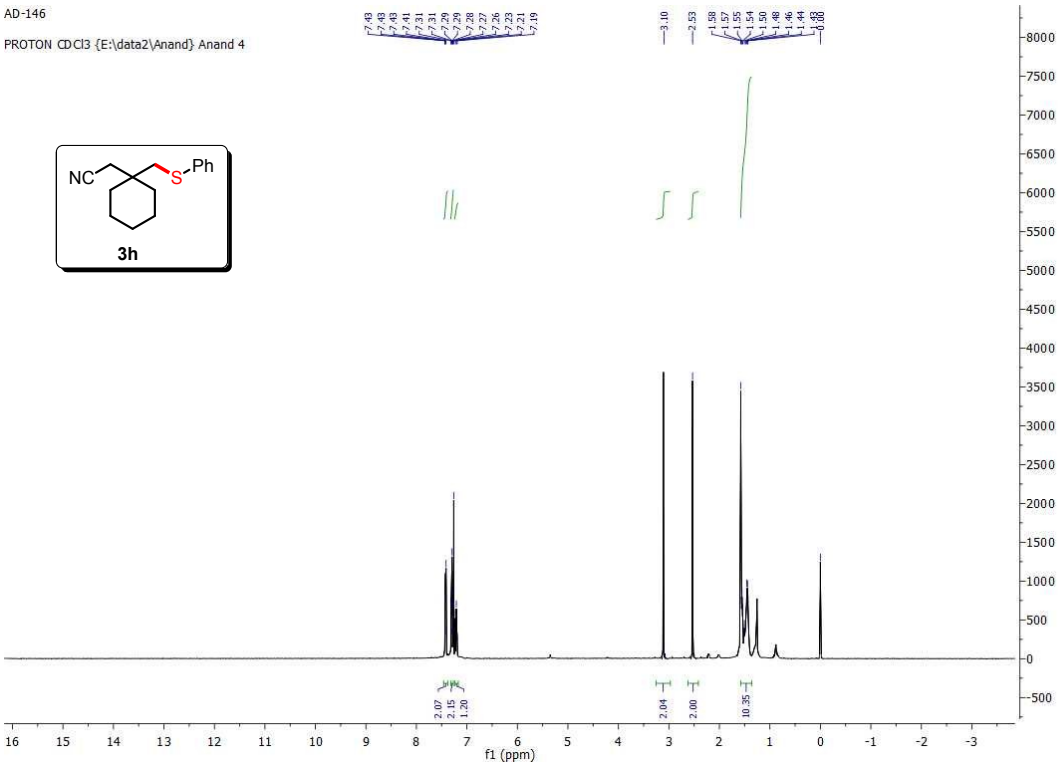
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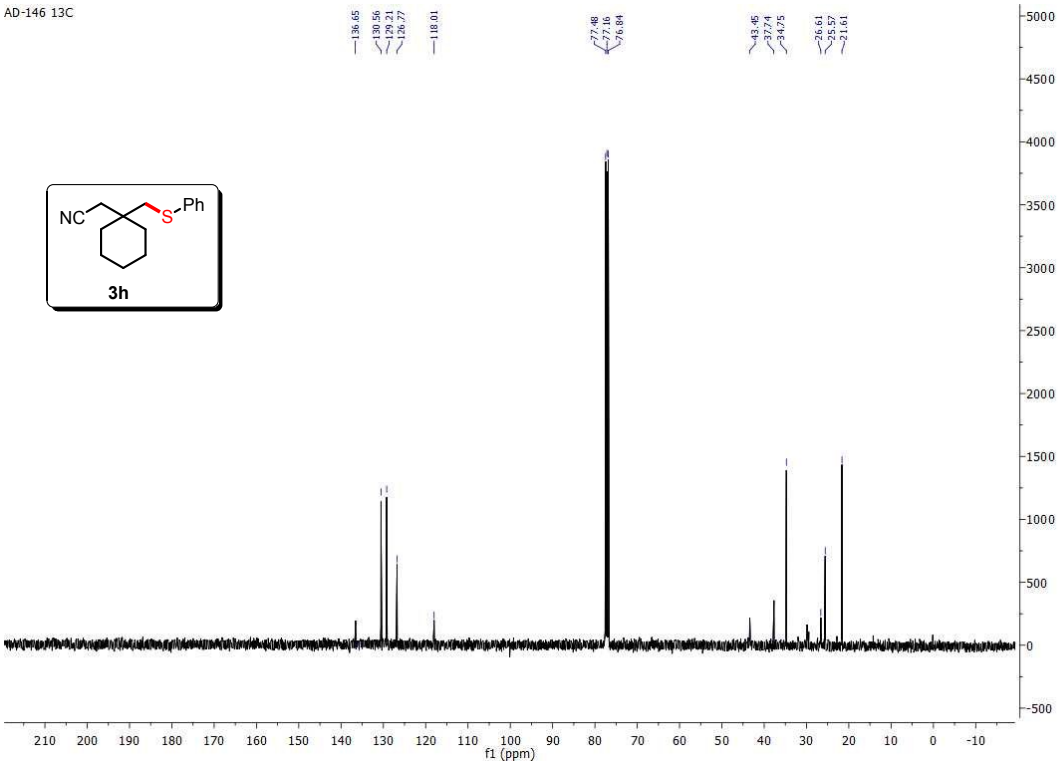
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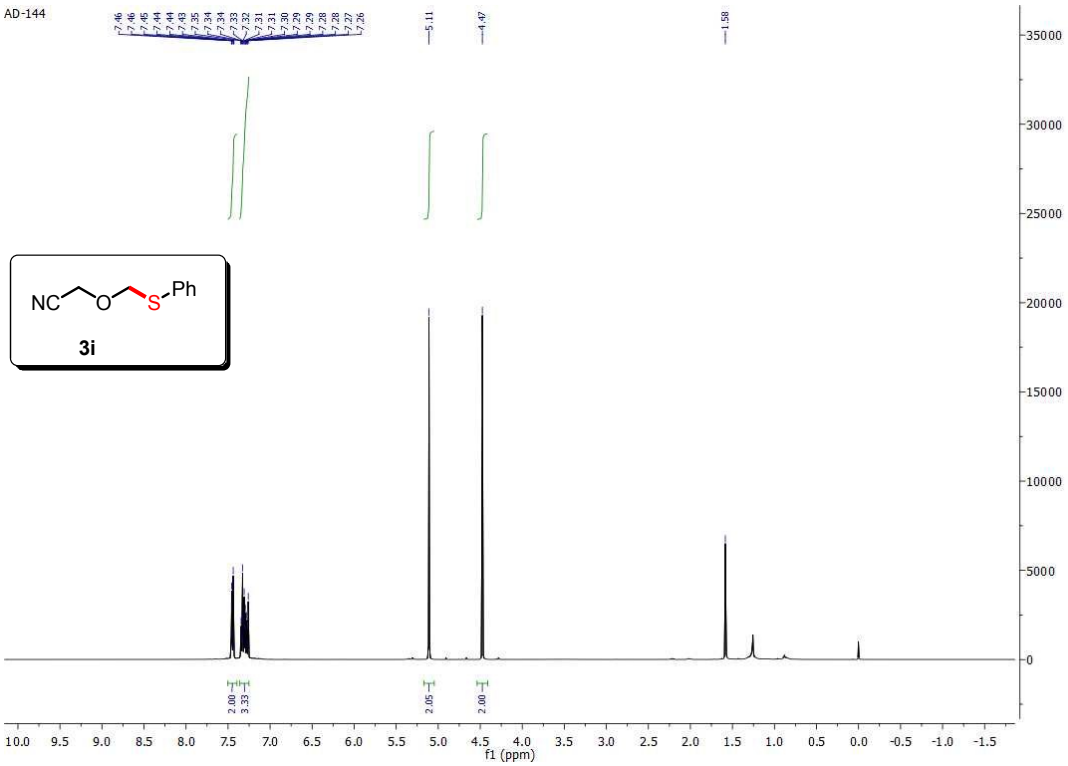
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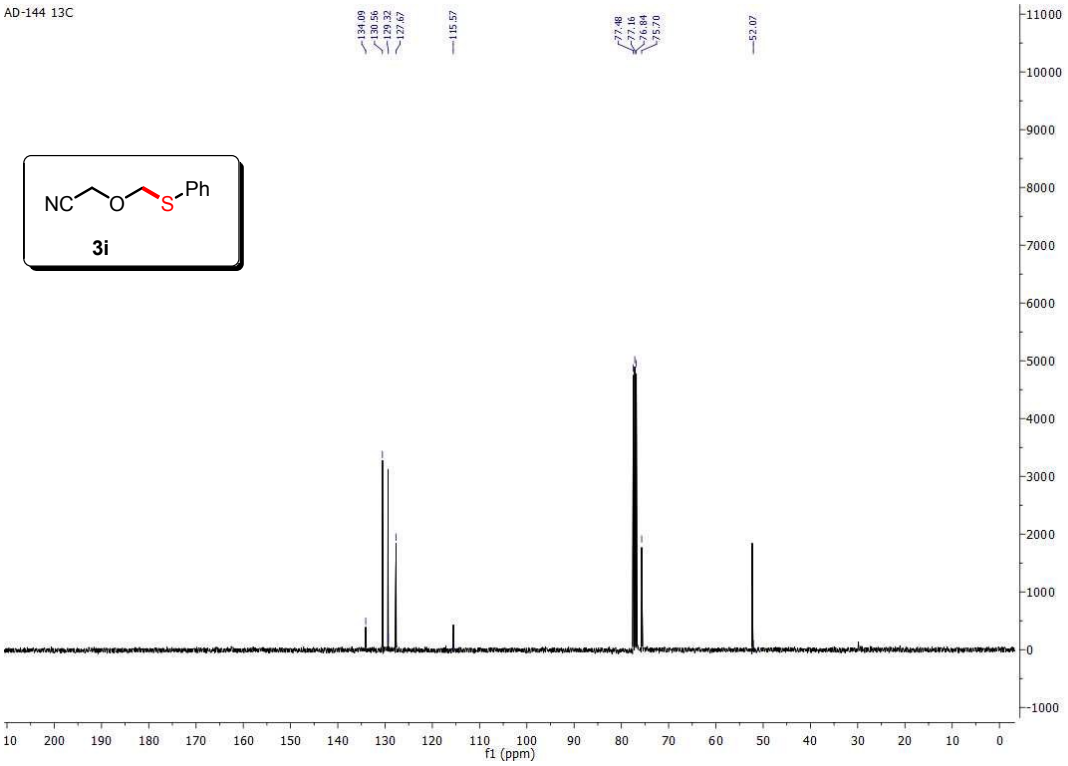
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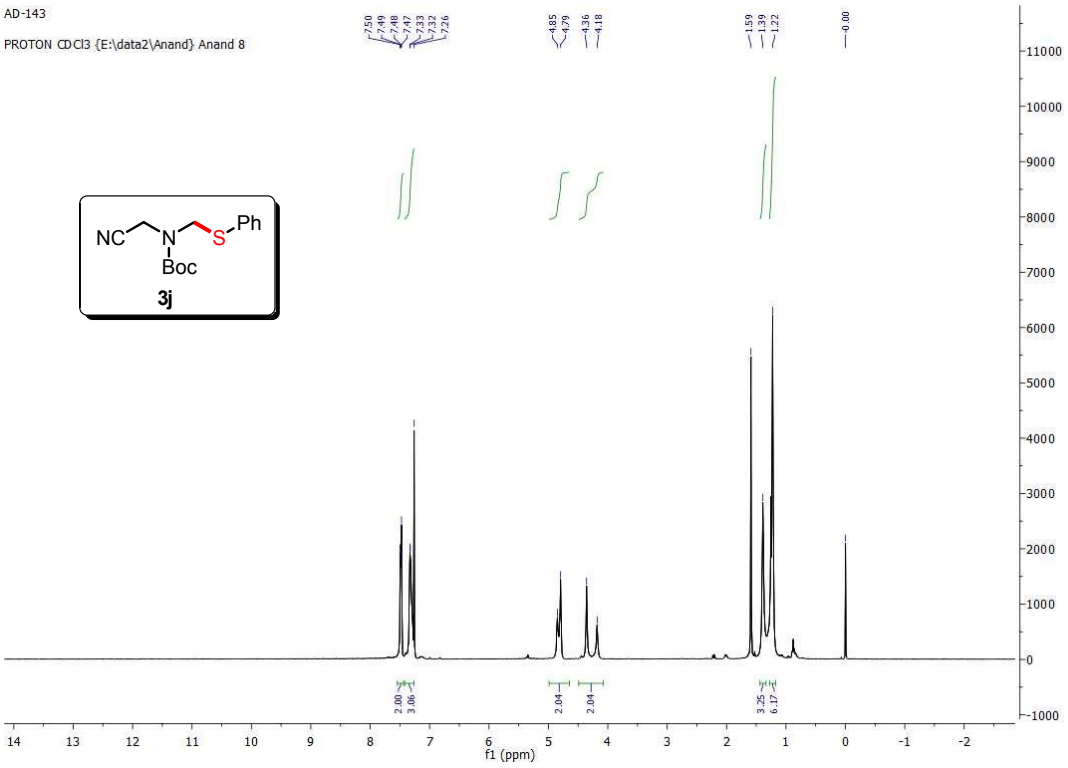
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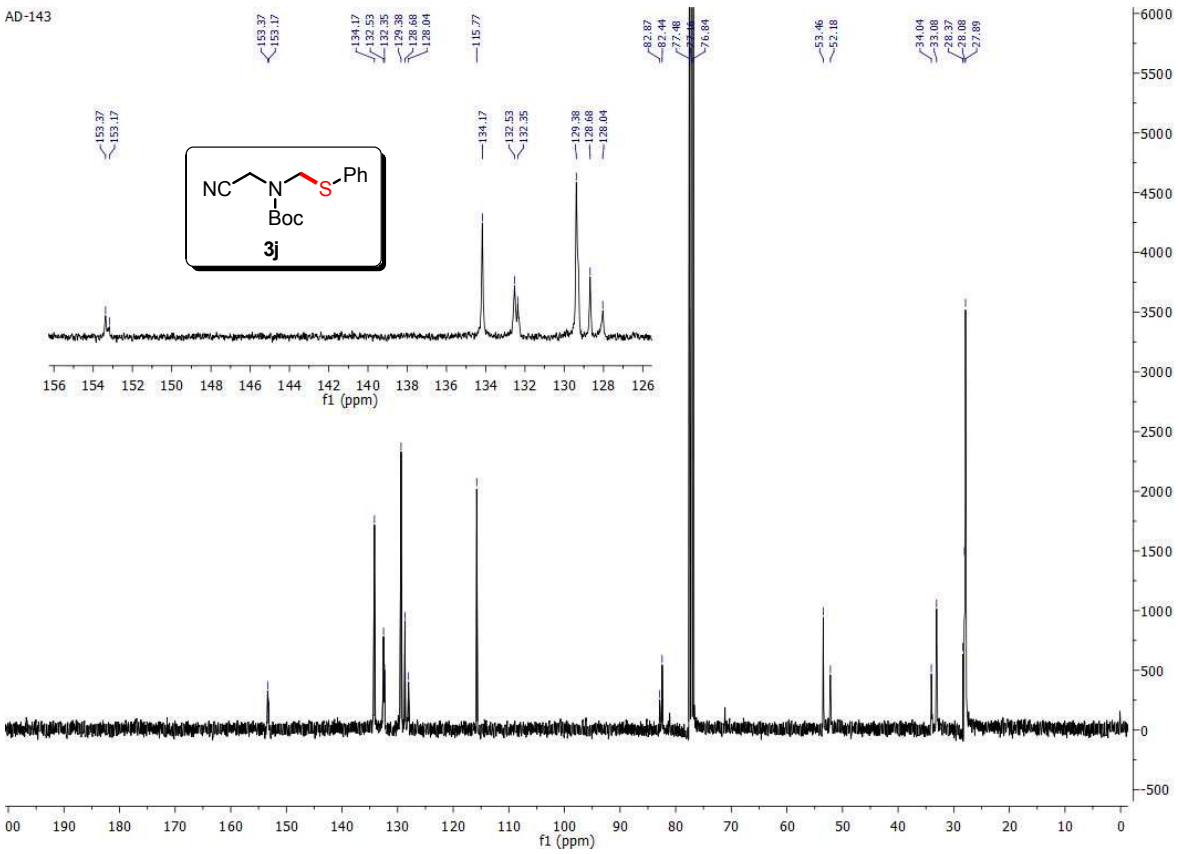
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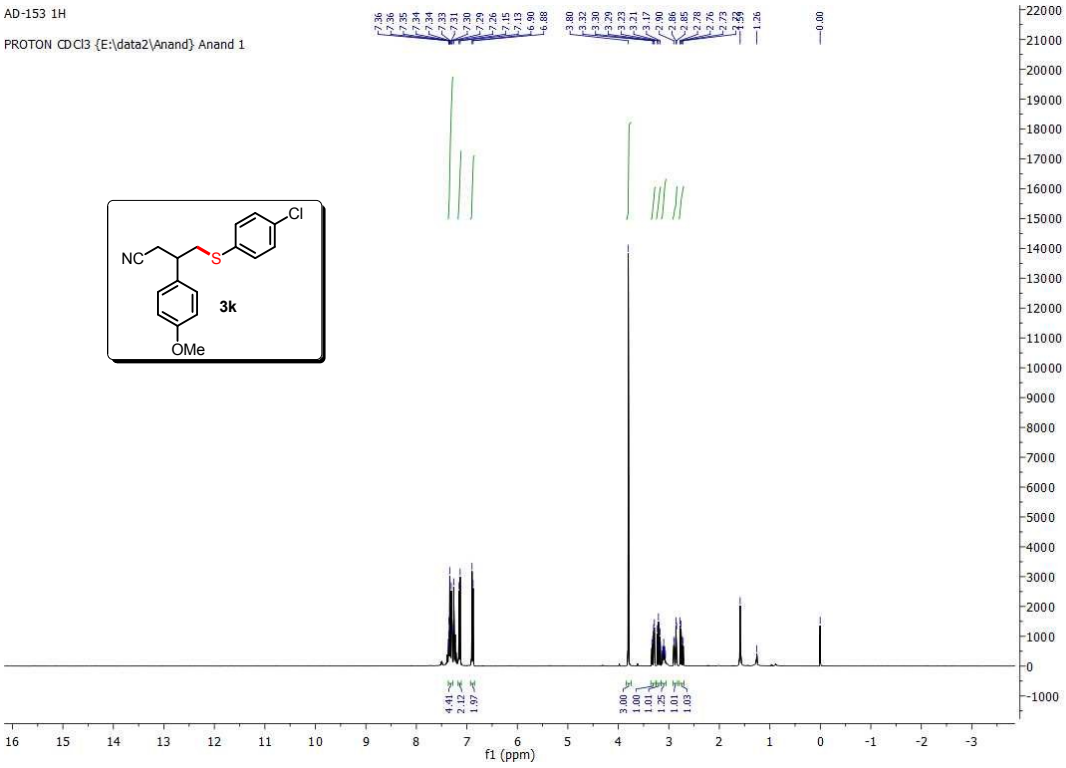
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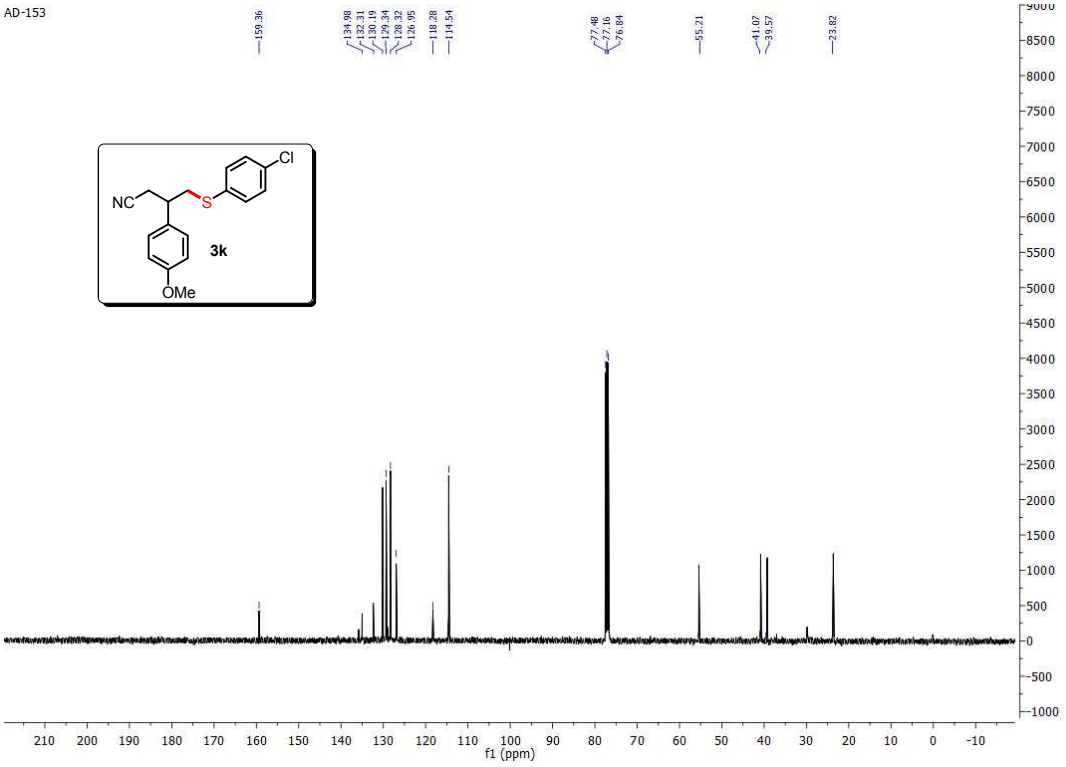
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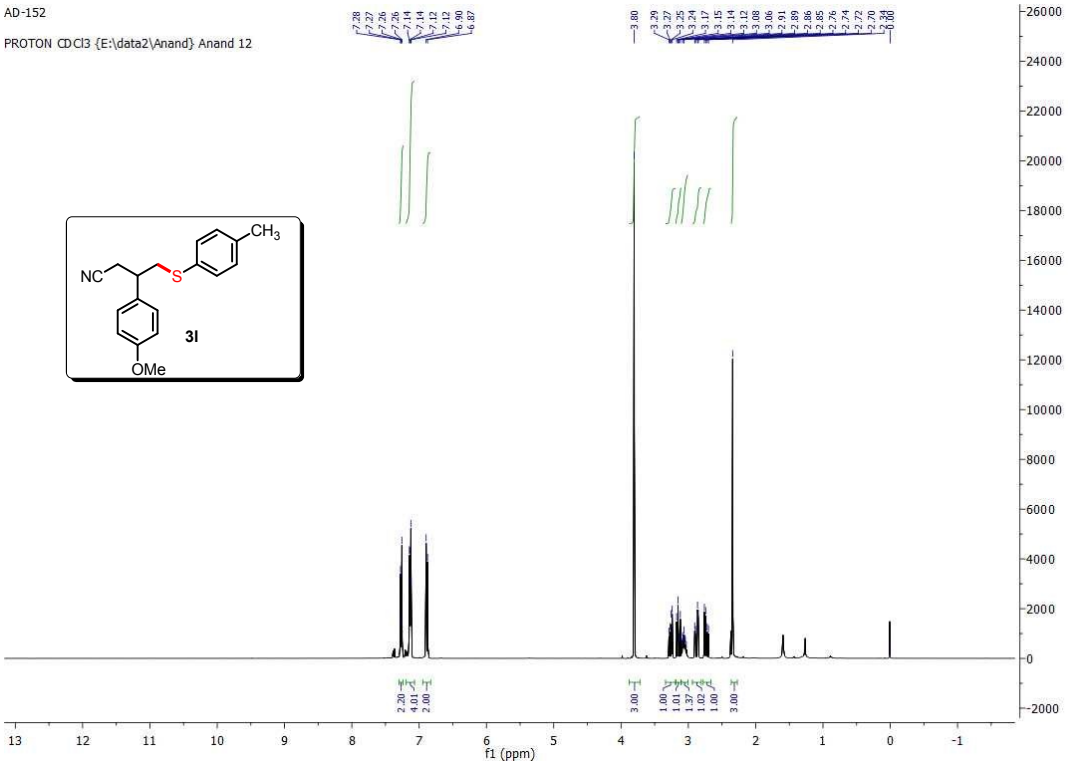
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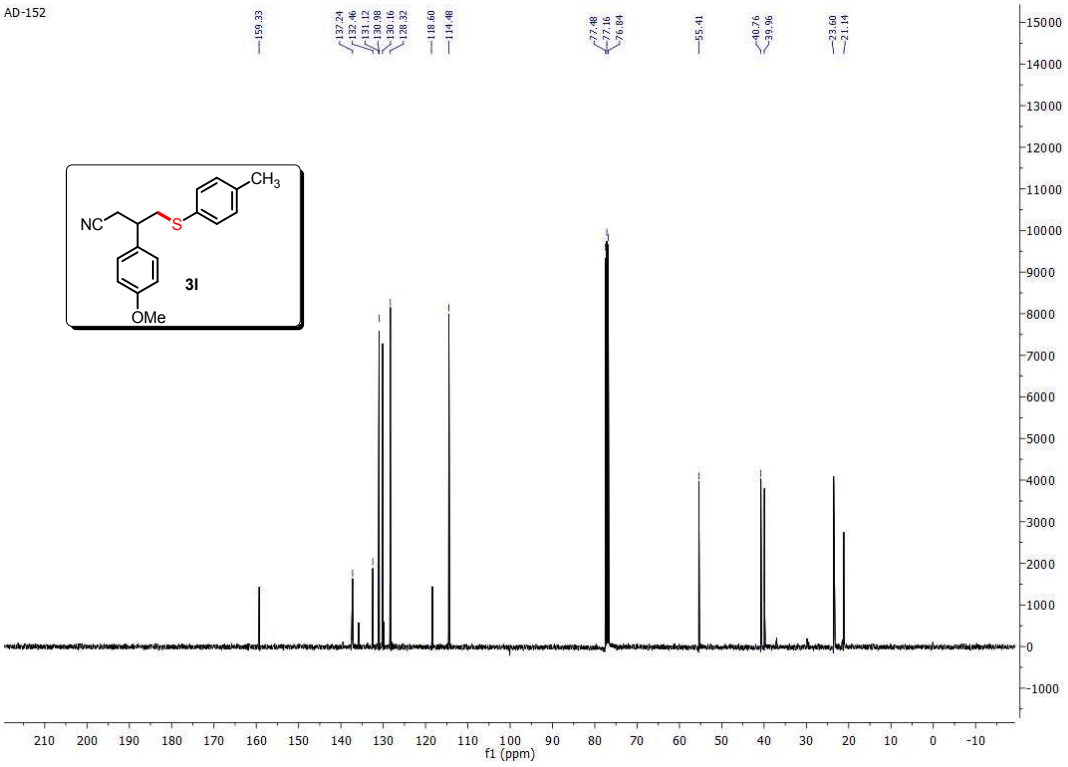
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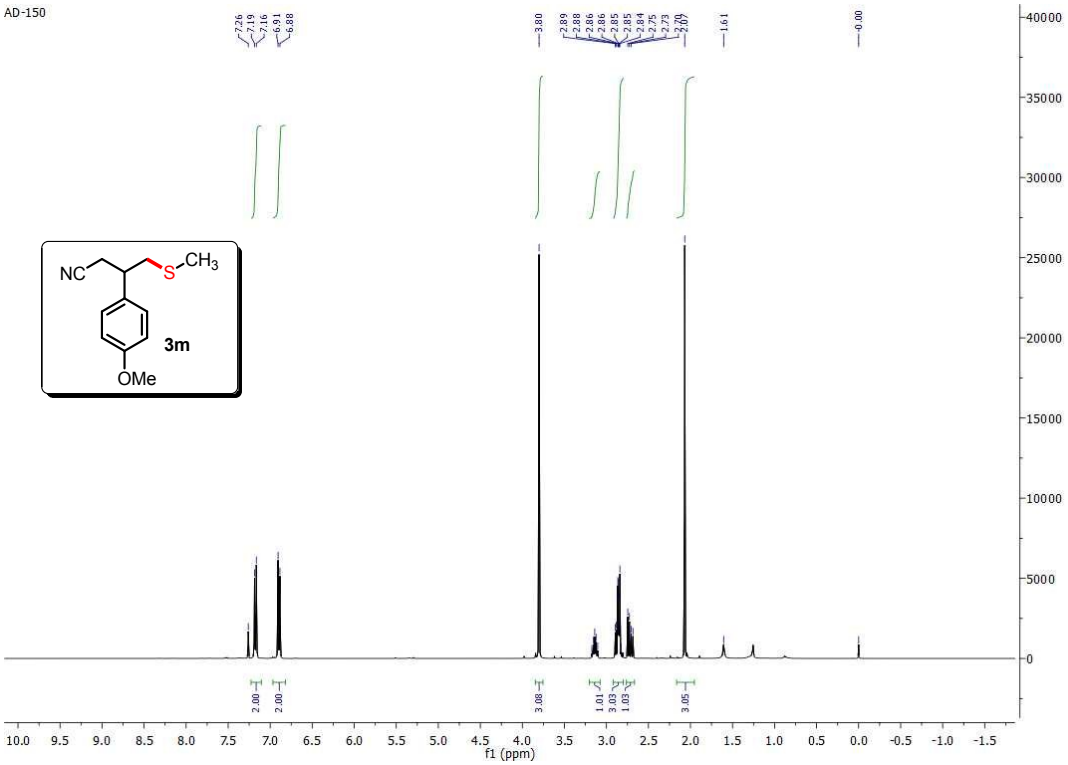
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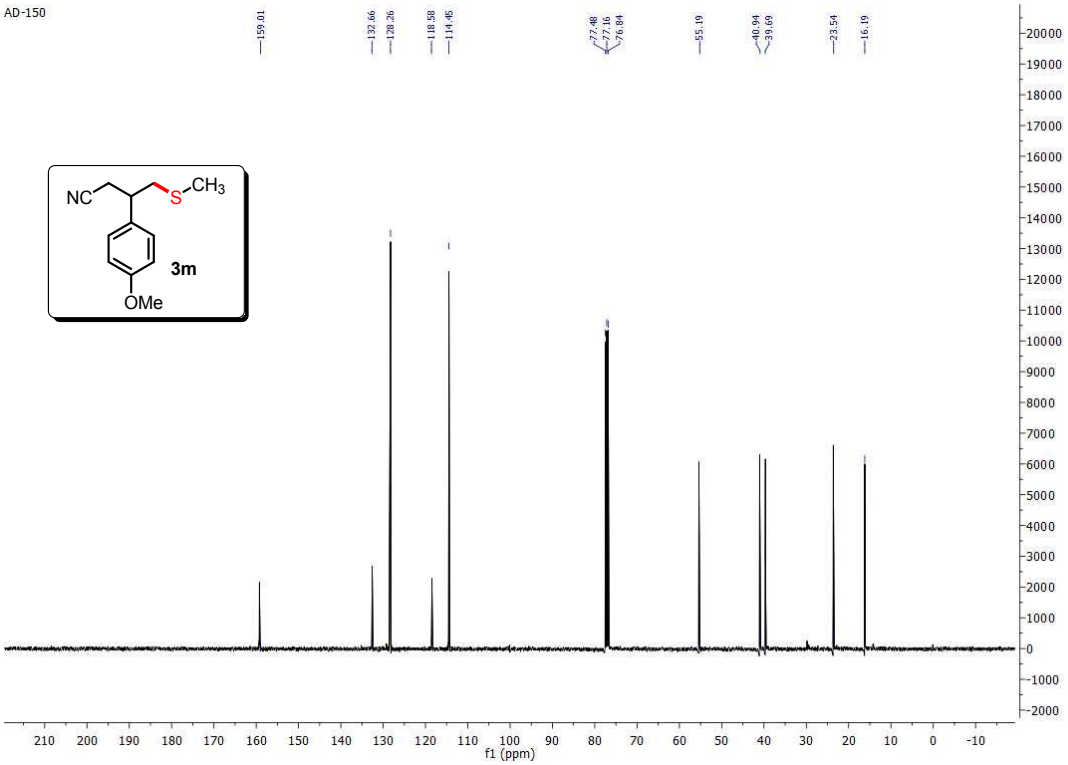
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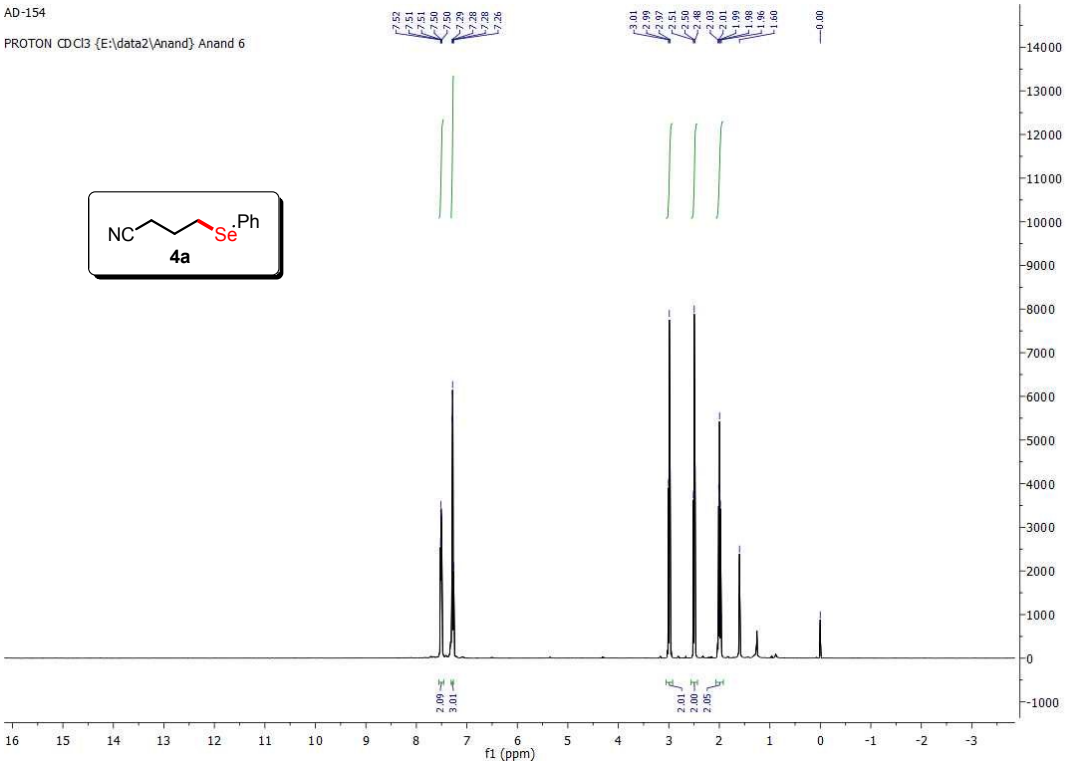
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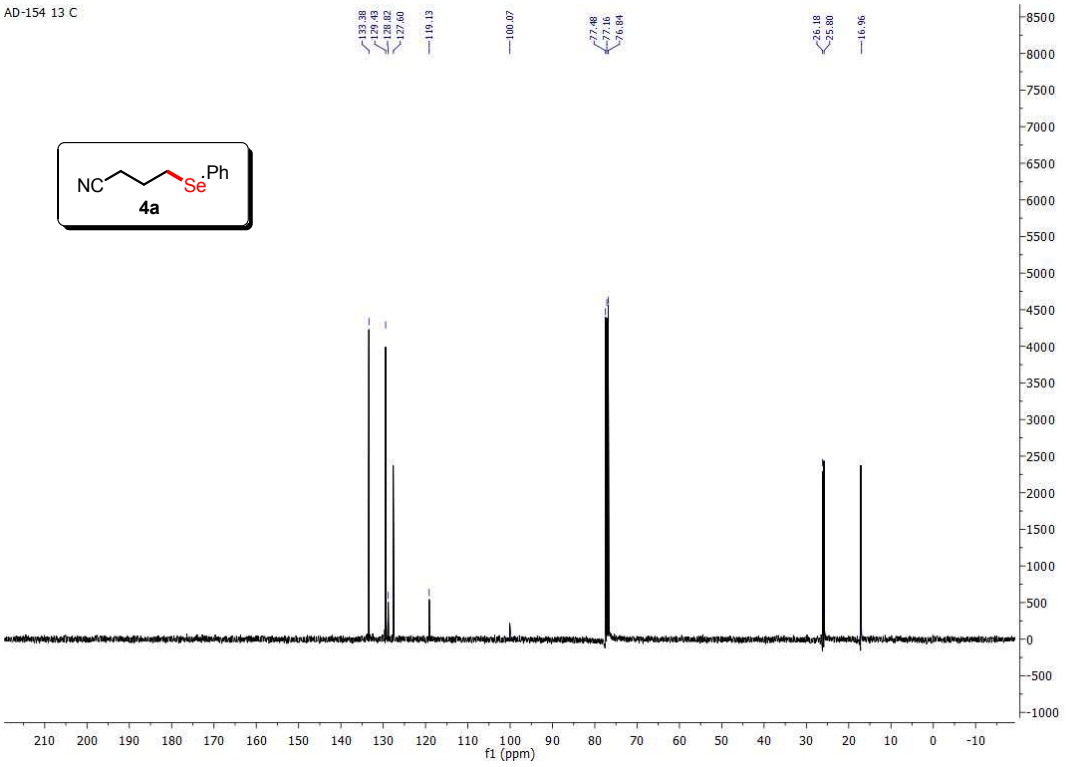
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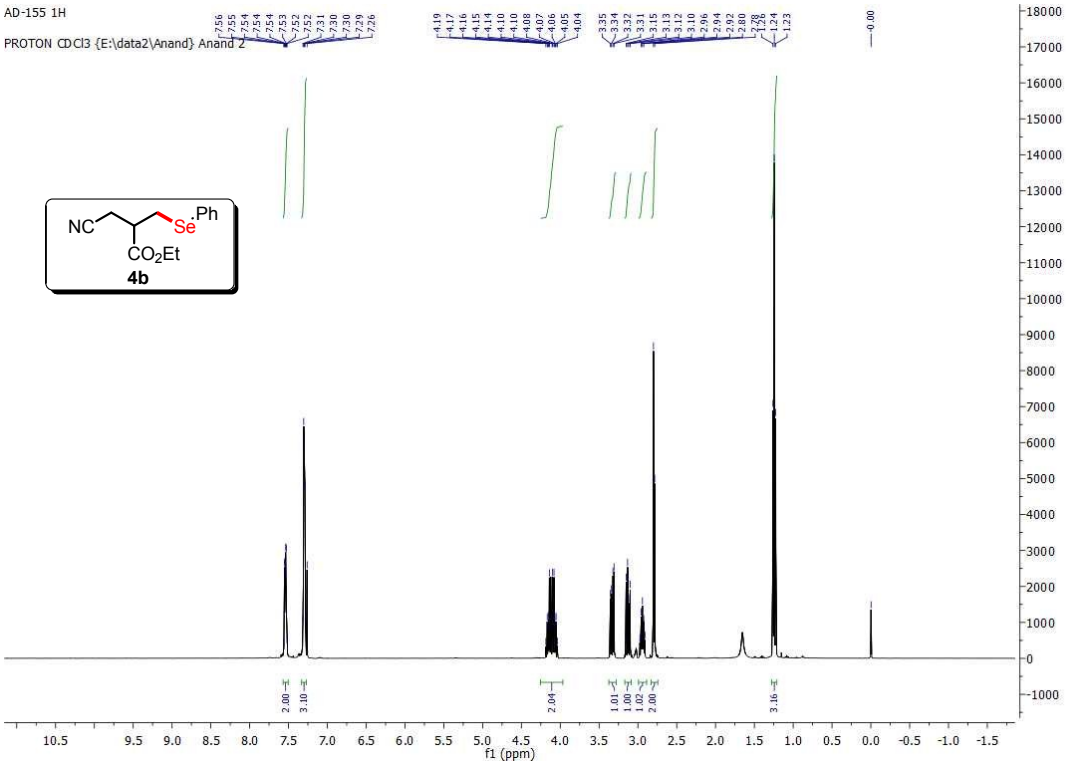
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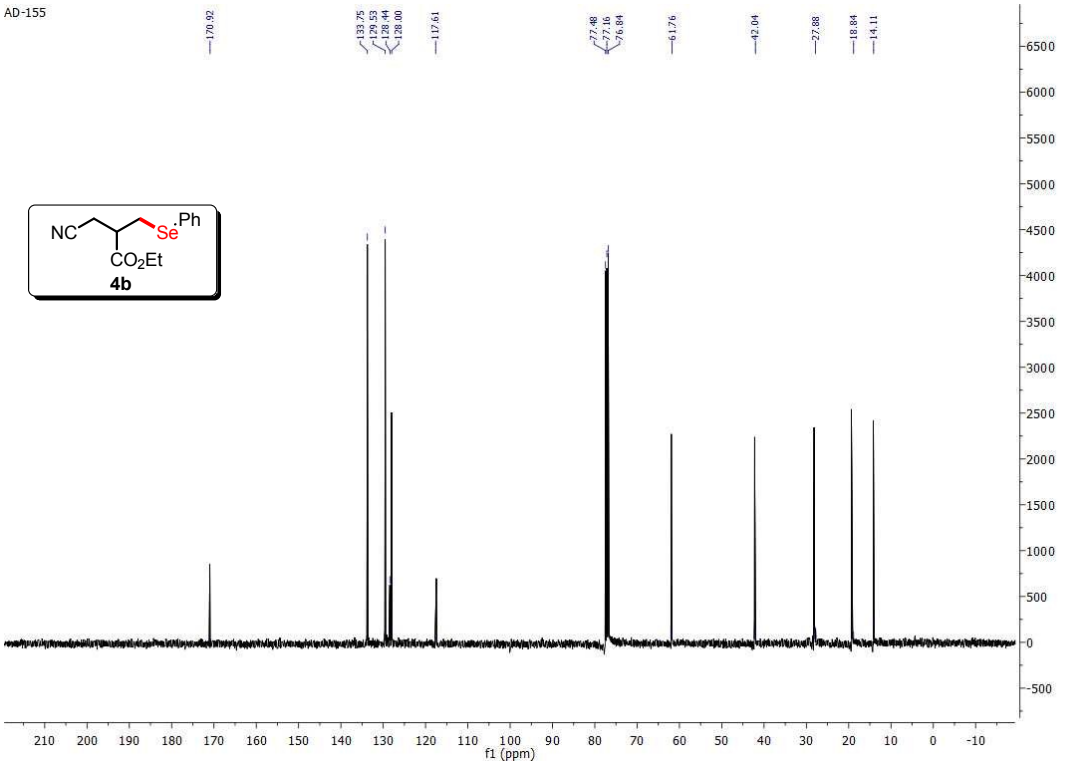
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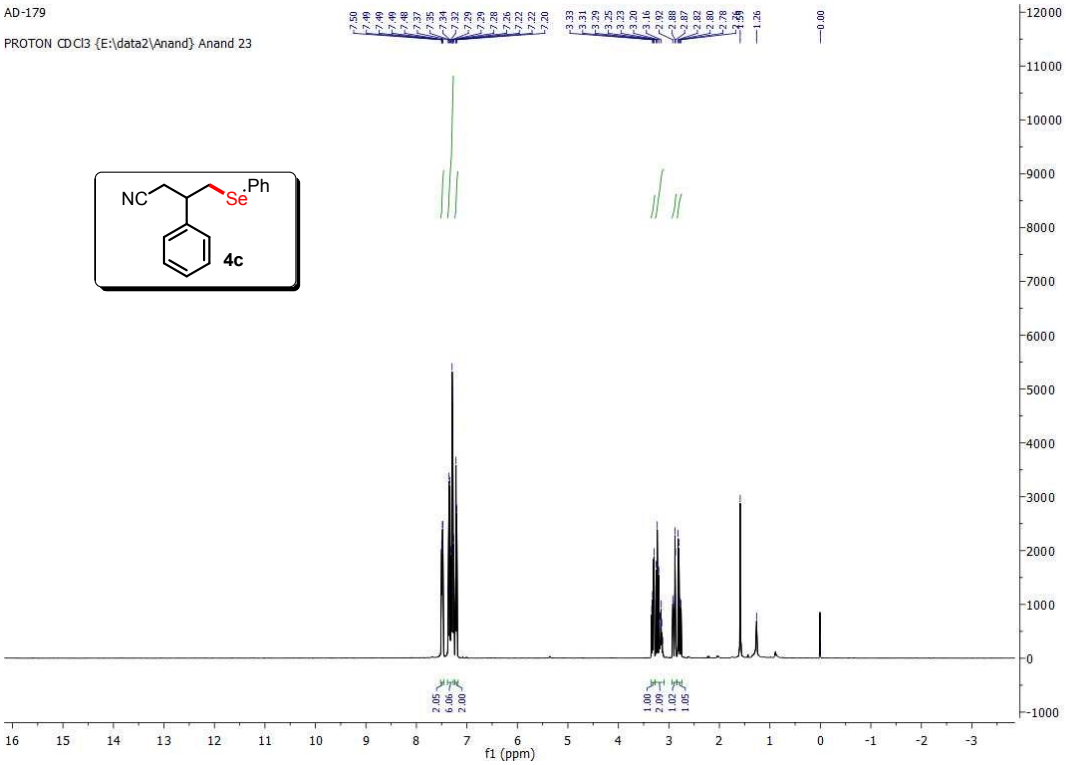
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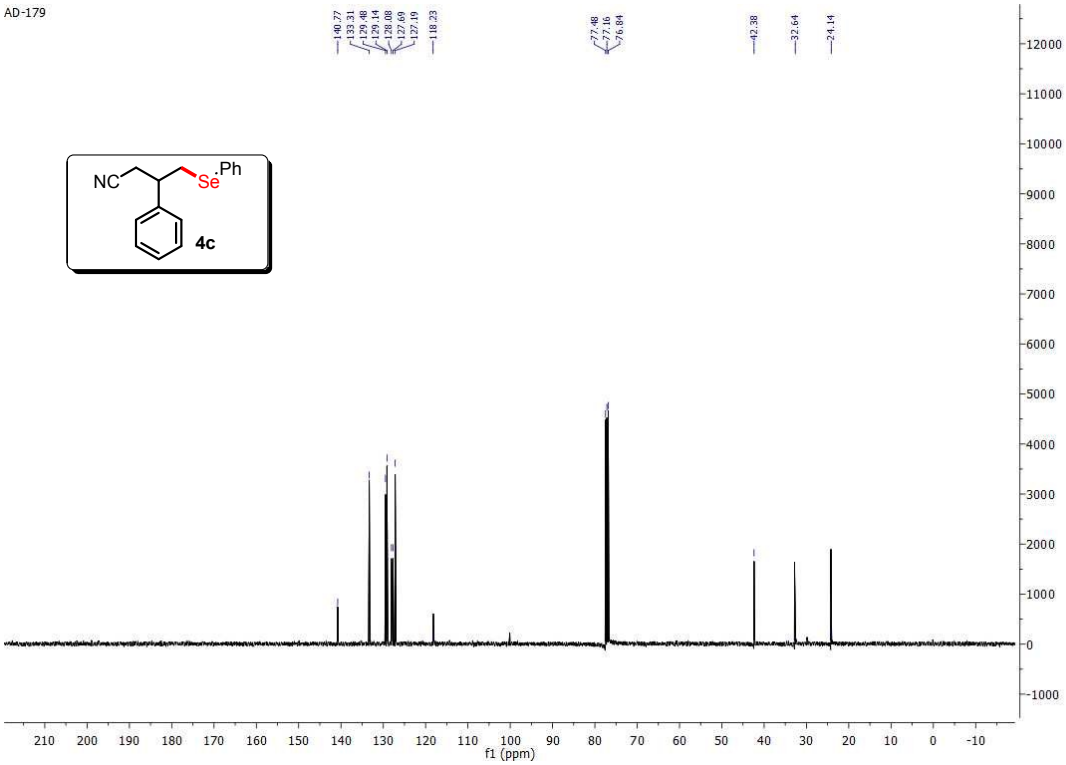
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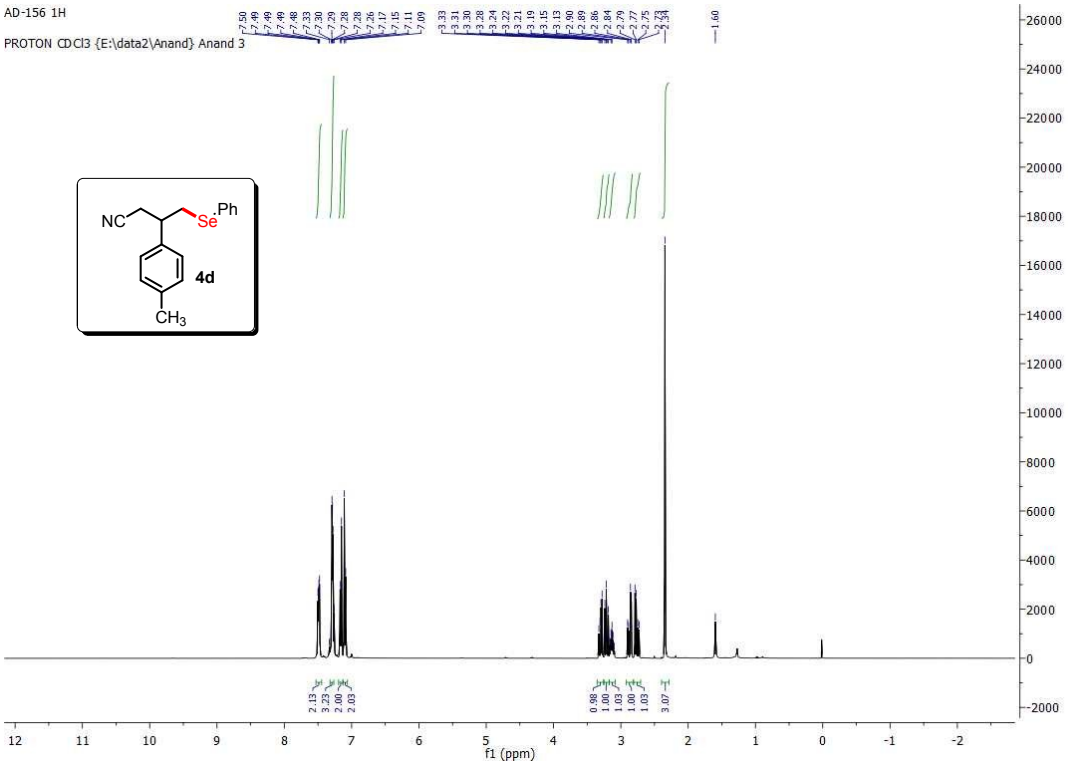
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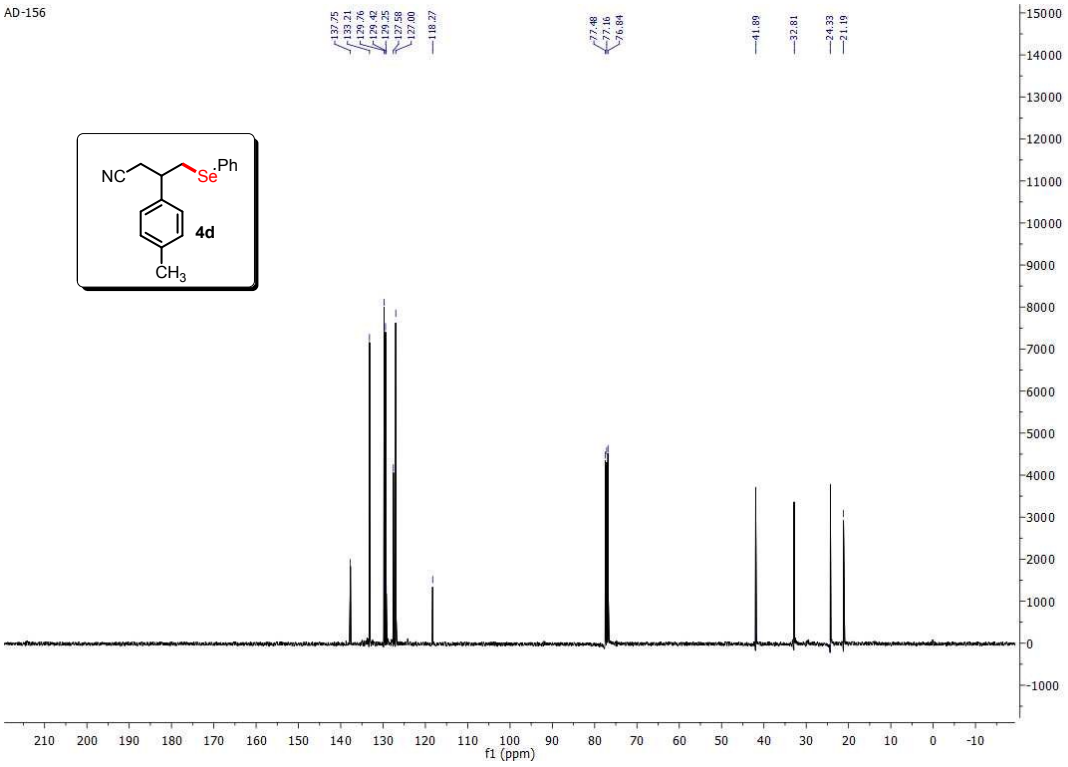
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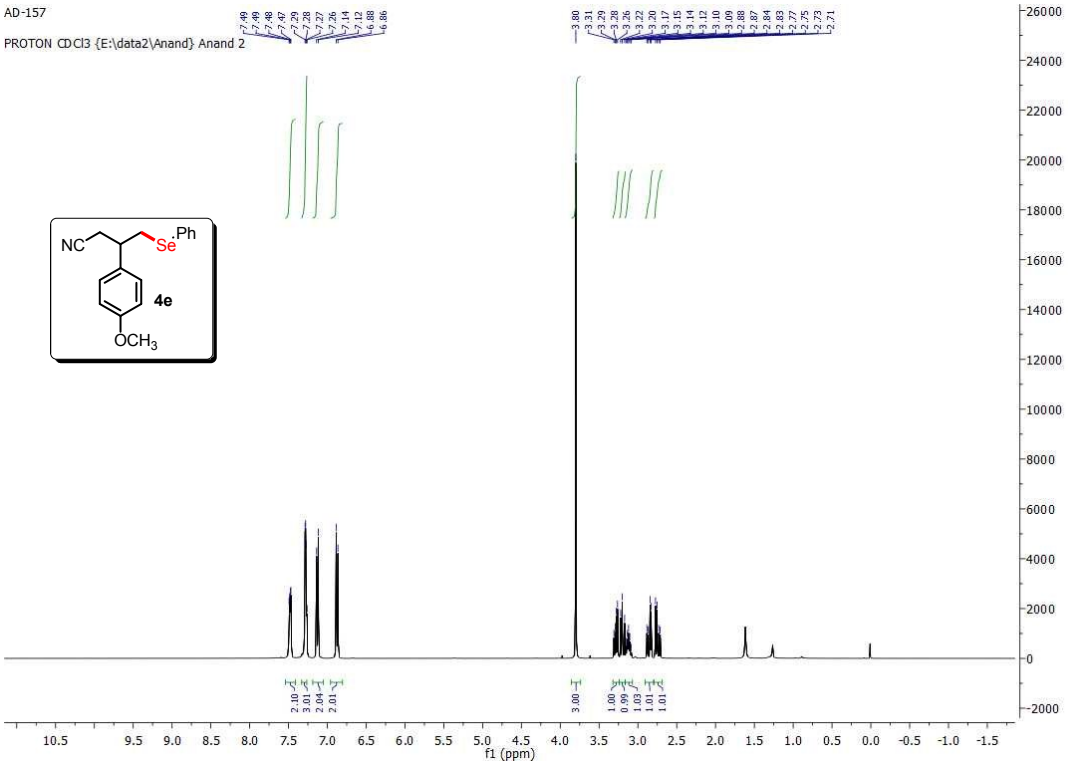
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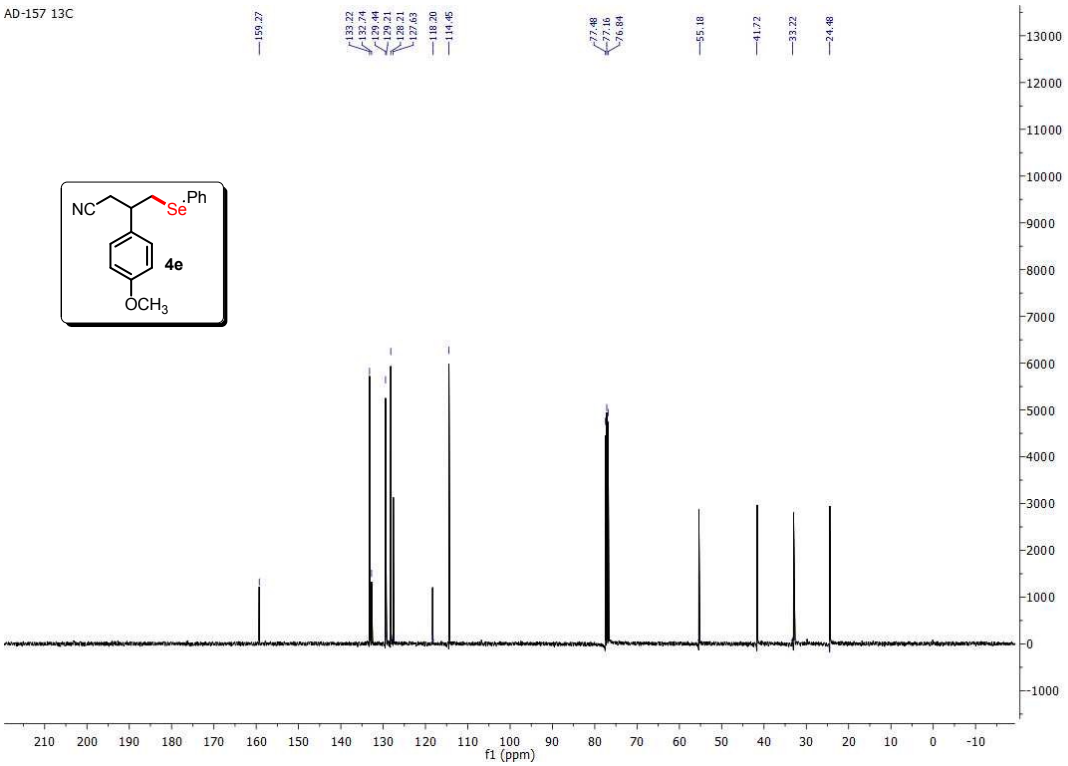
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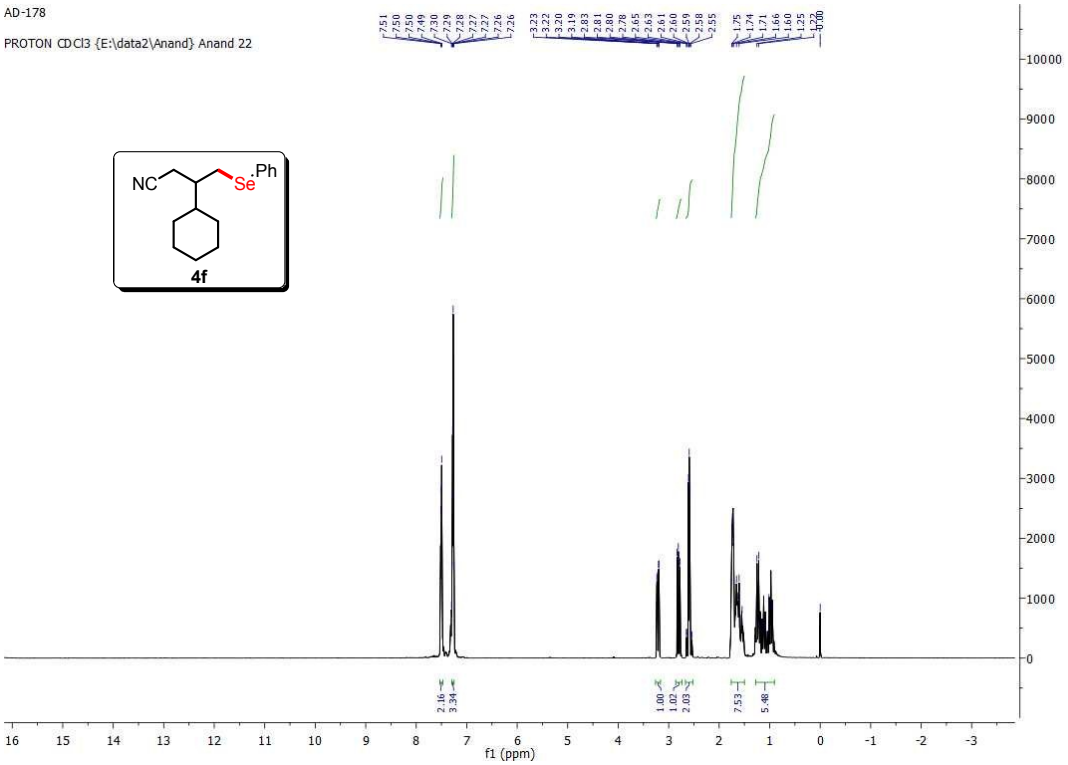
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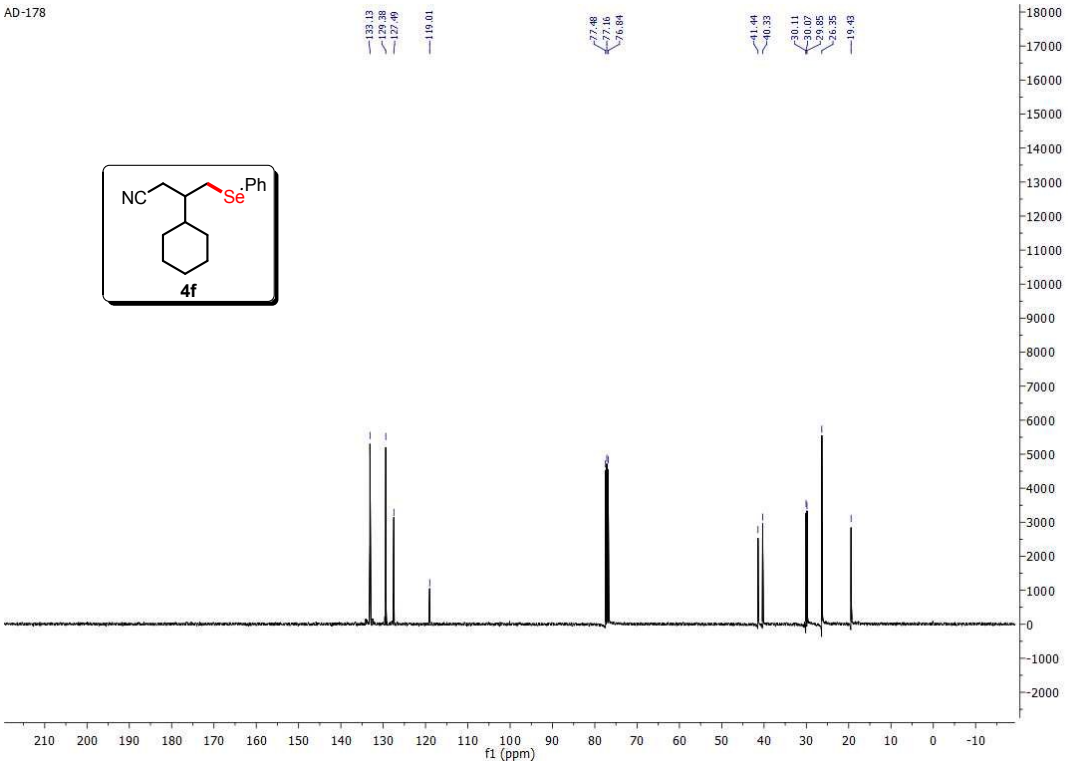
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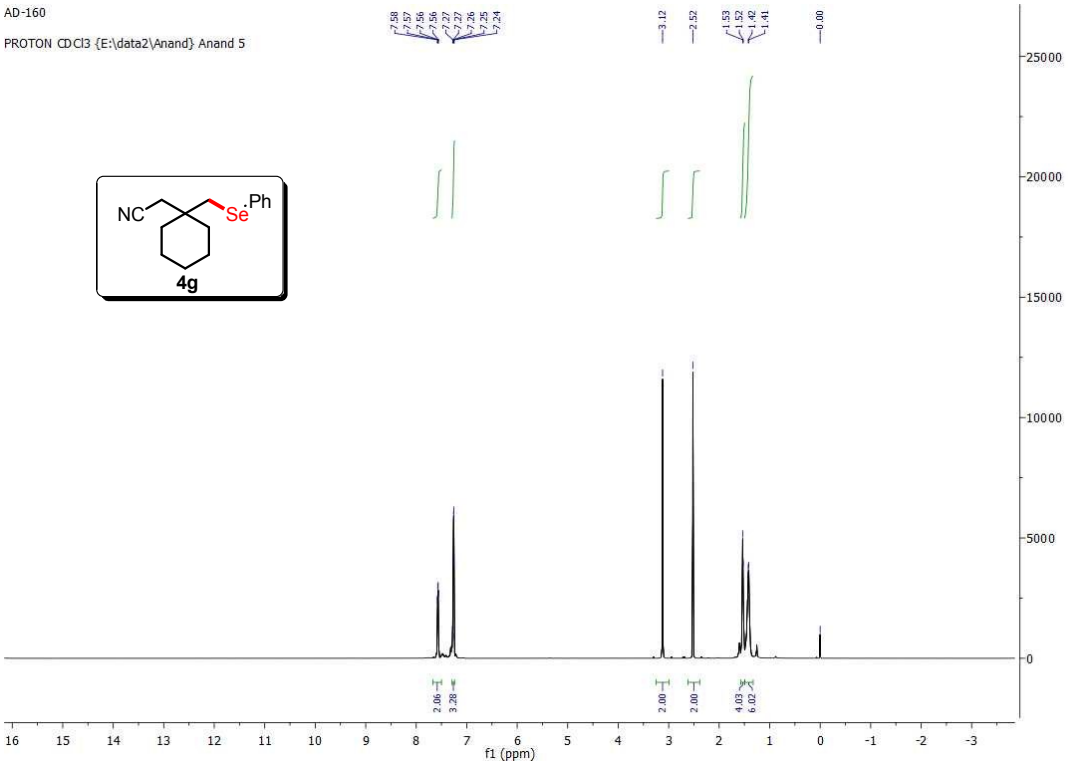
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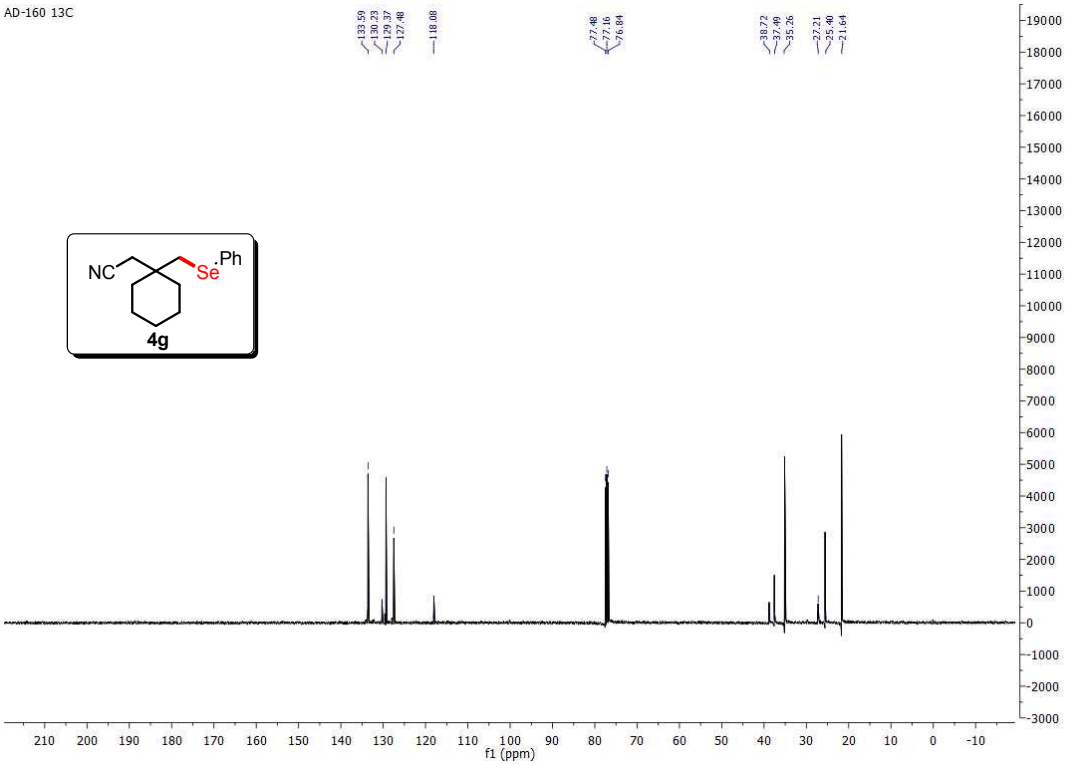
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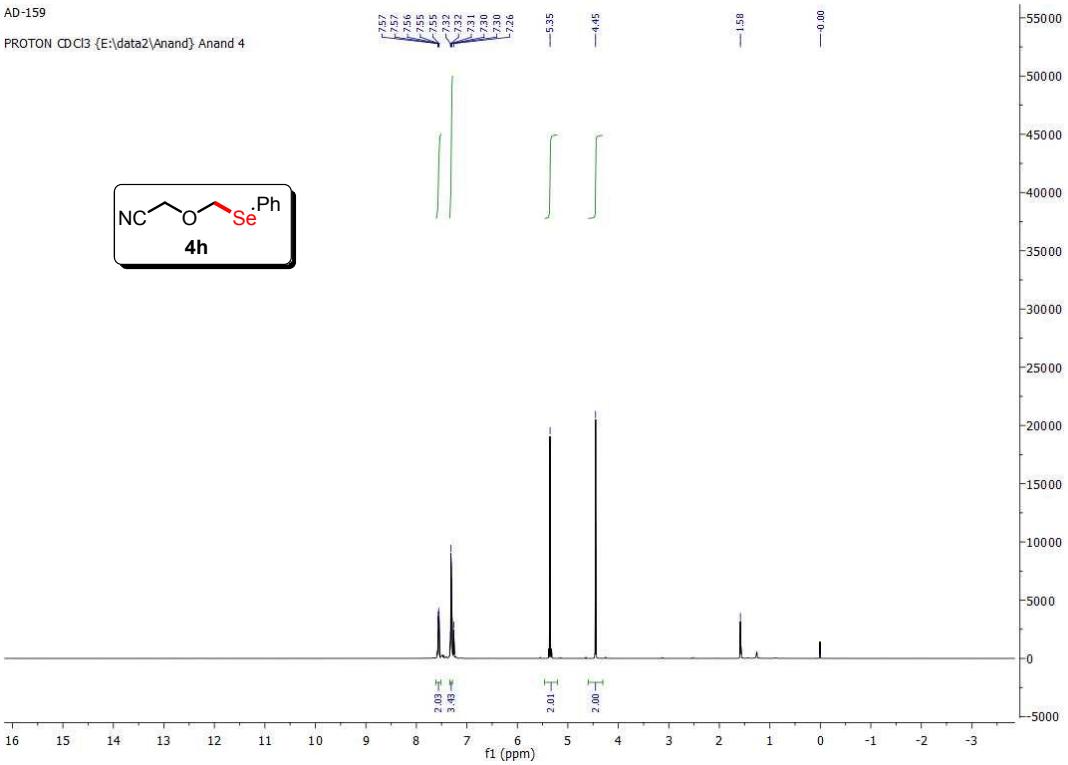
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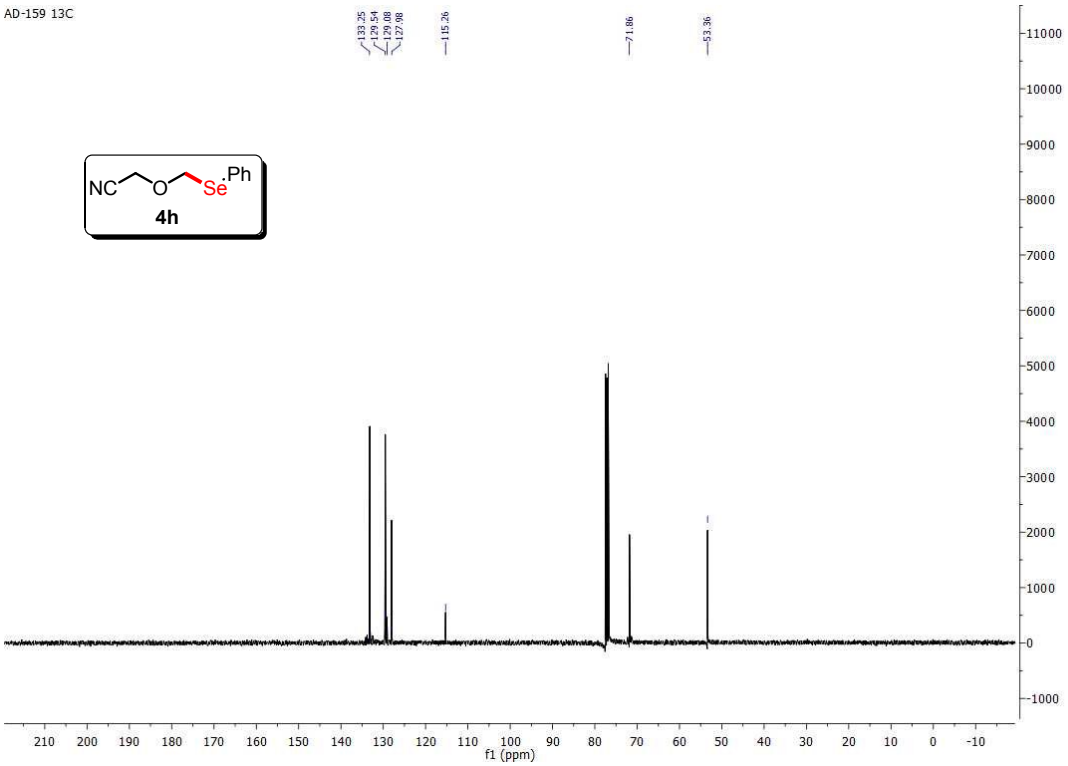
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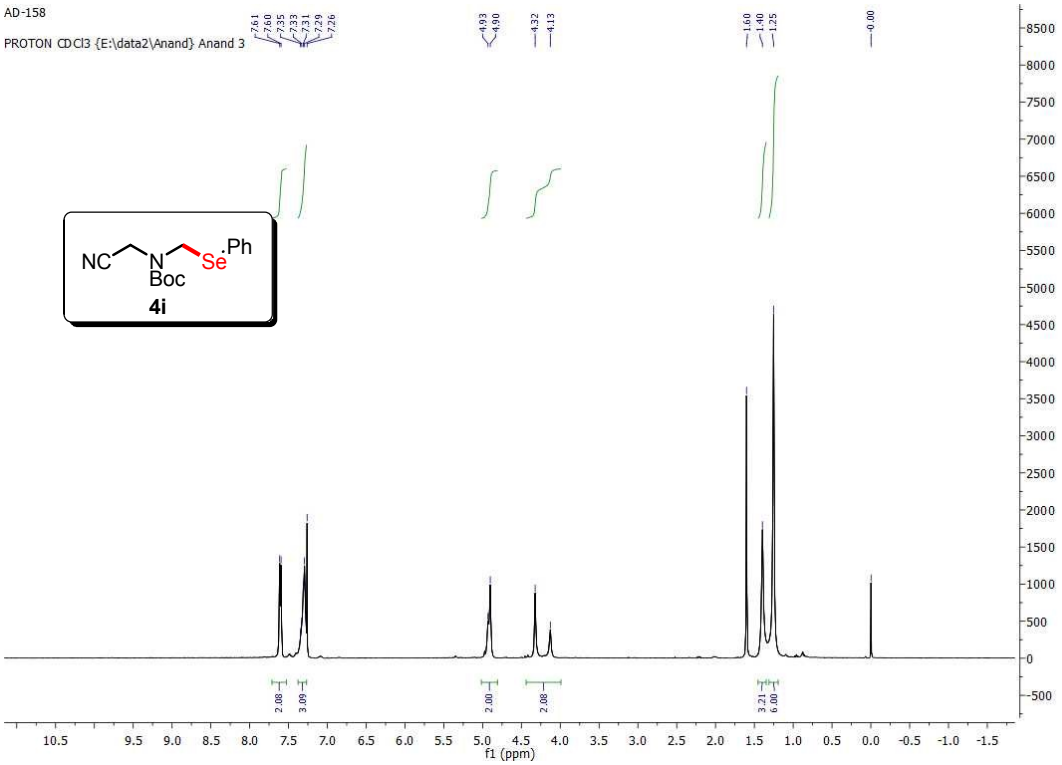
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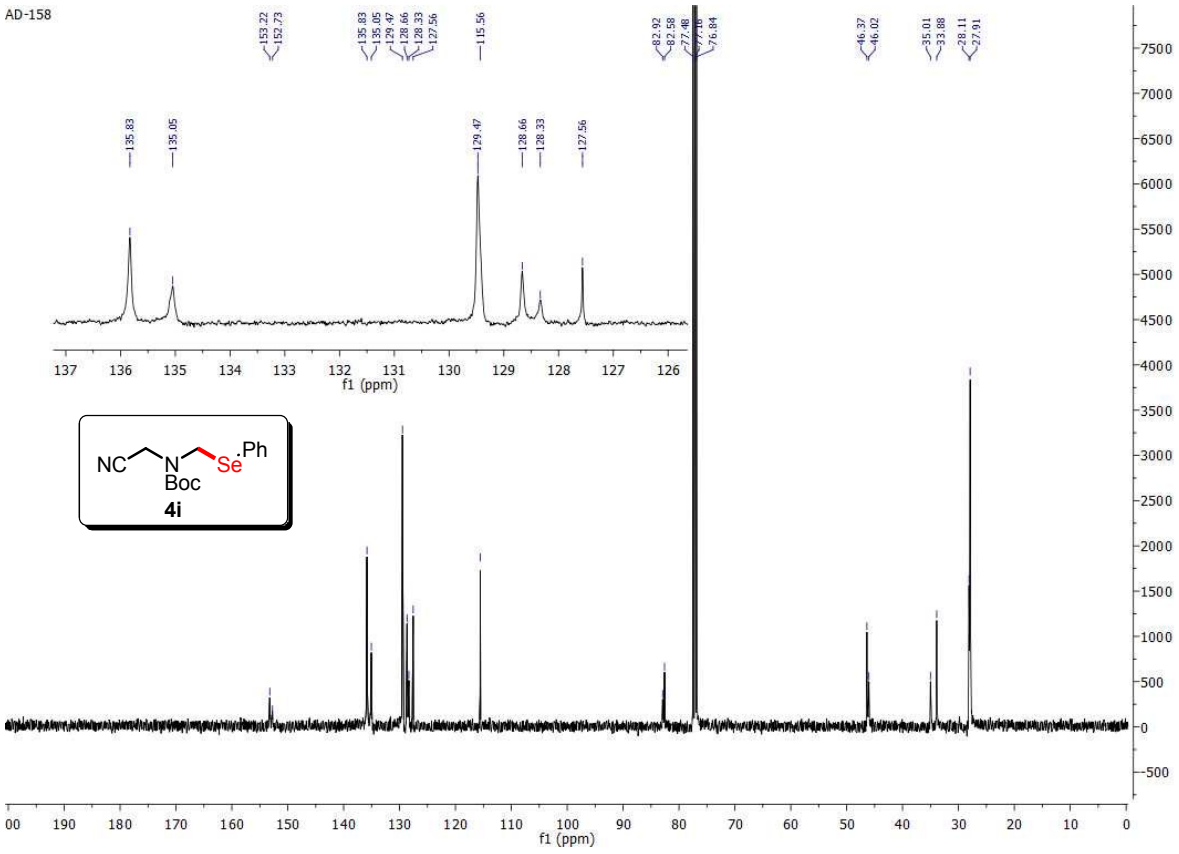
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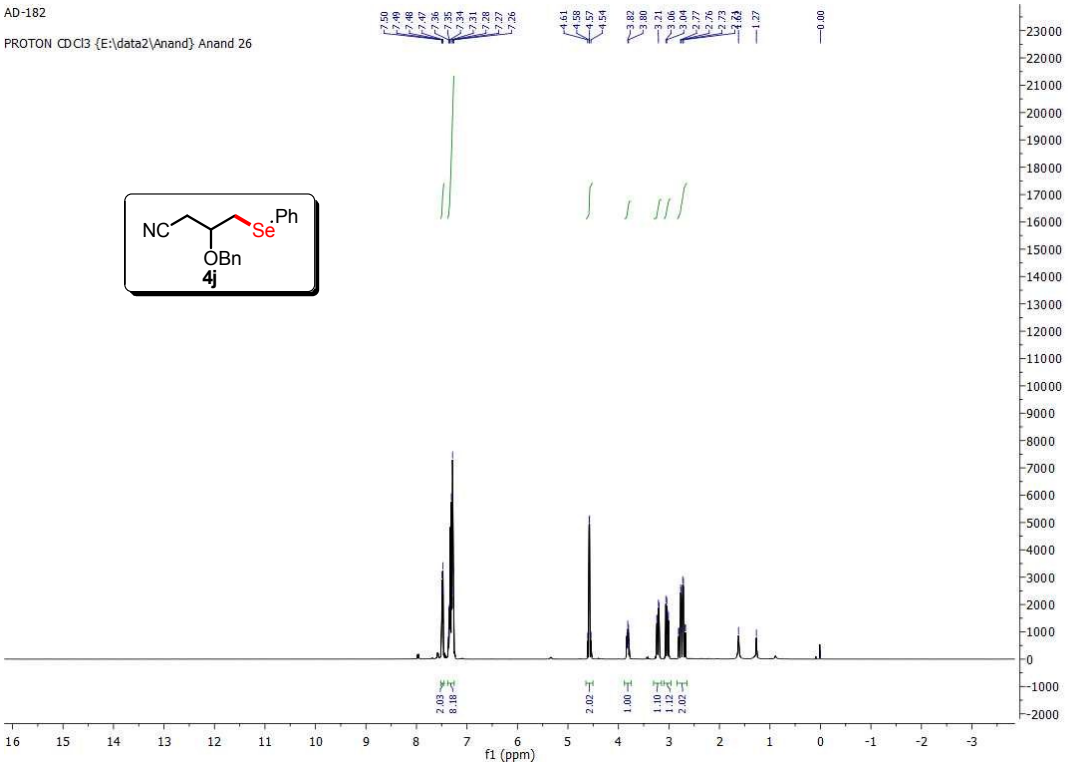
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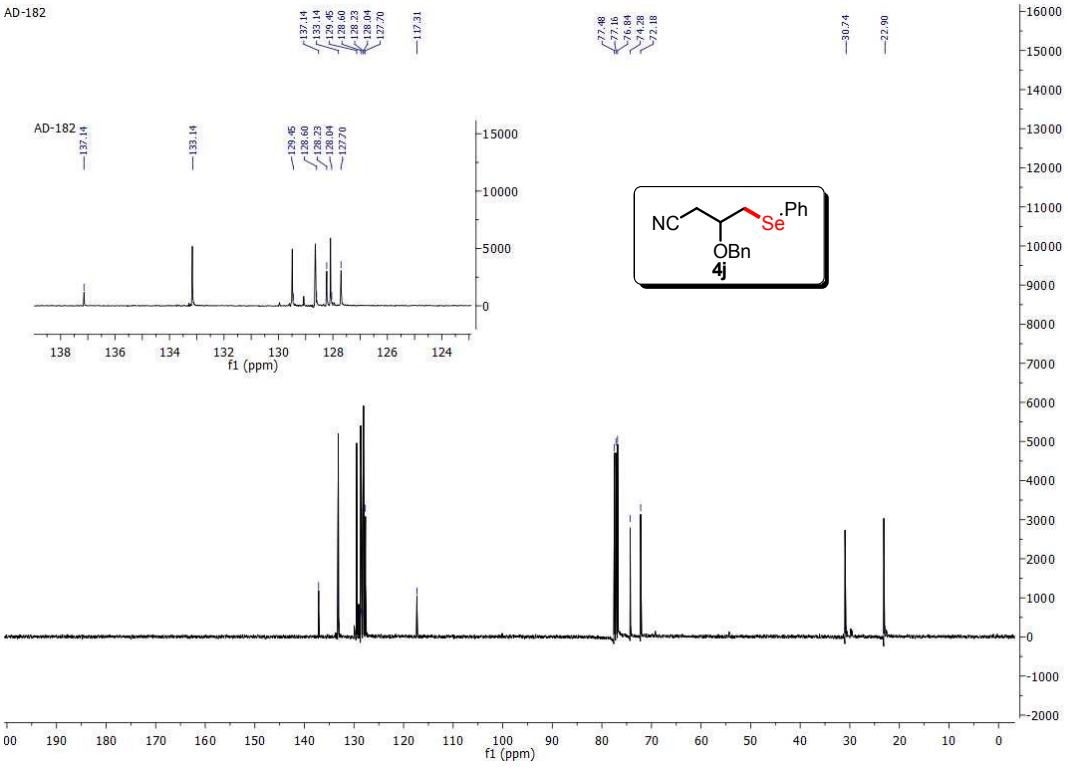
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AD-182
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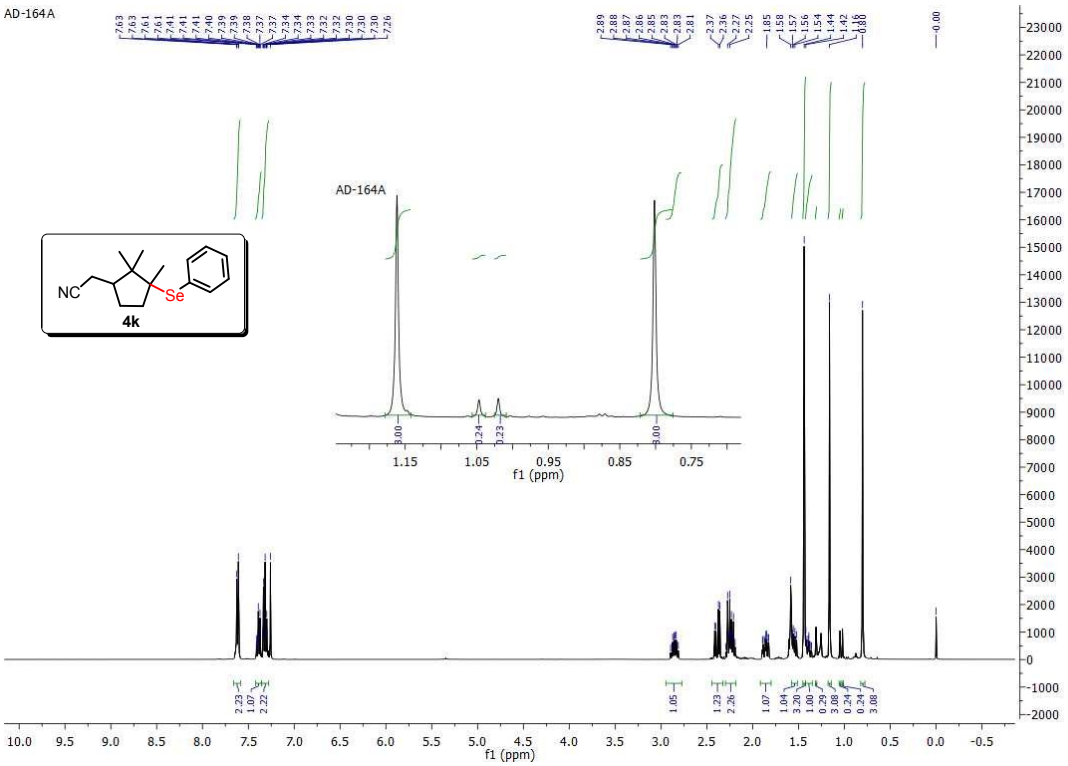
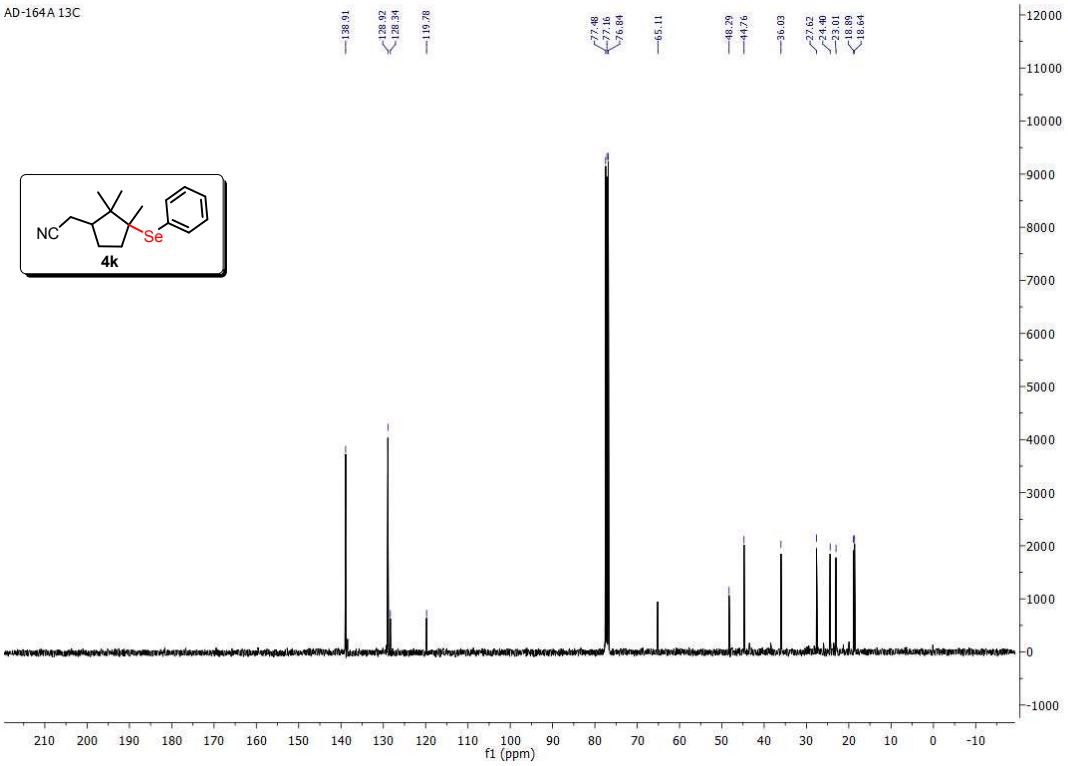
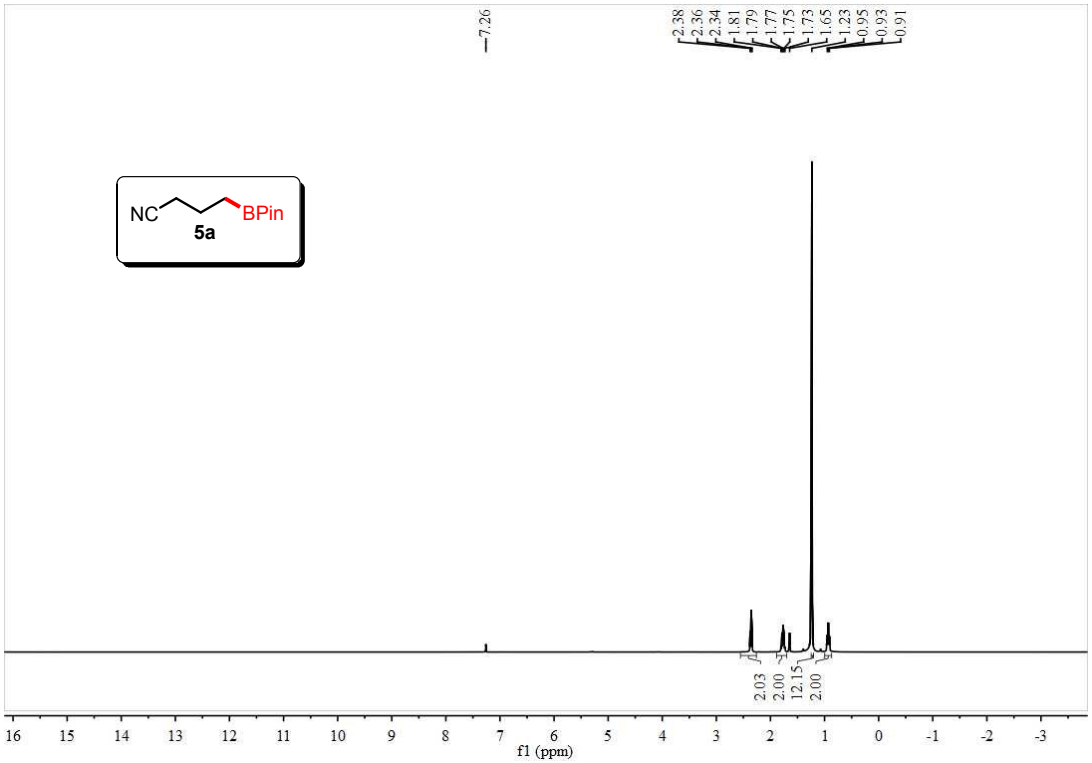
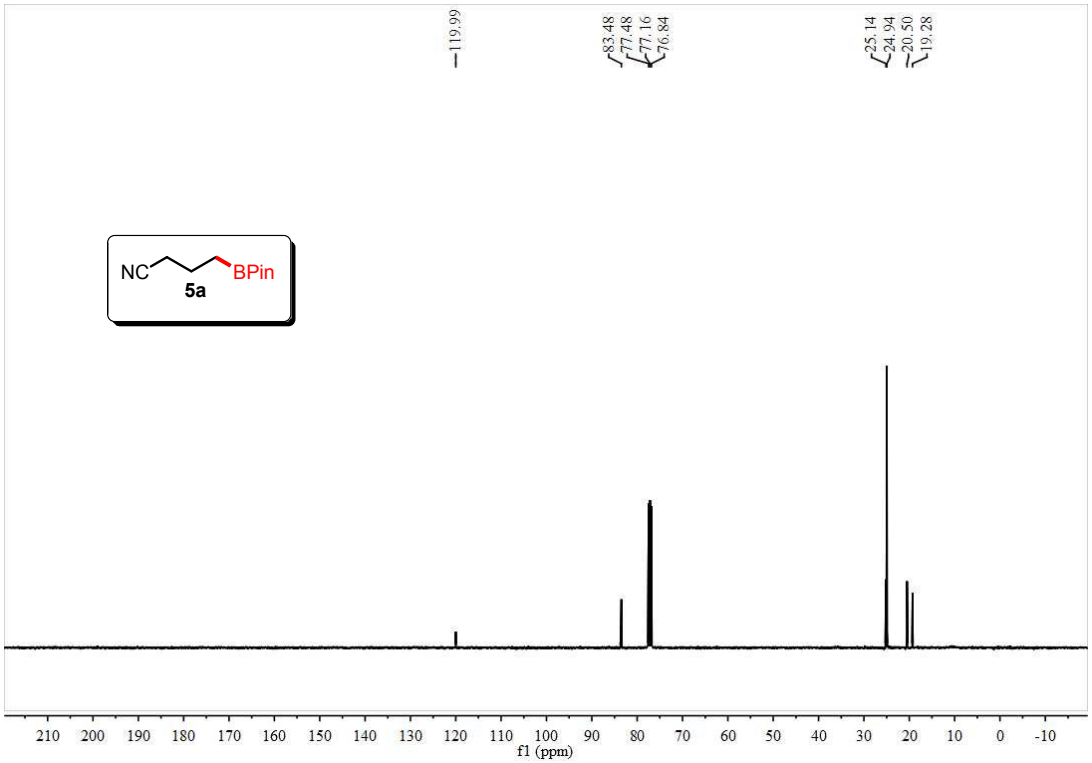
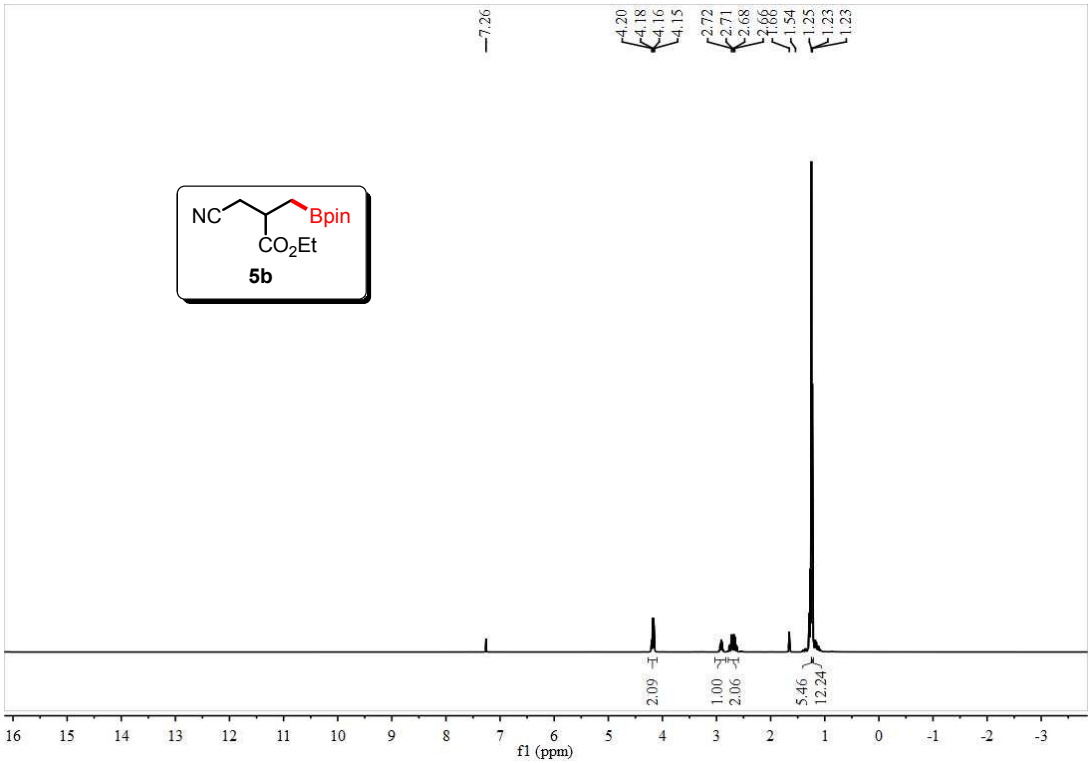
Se
Ph
OBn
4j
f1 (ppm)

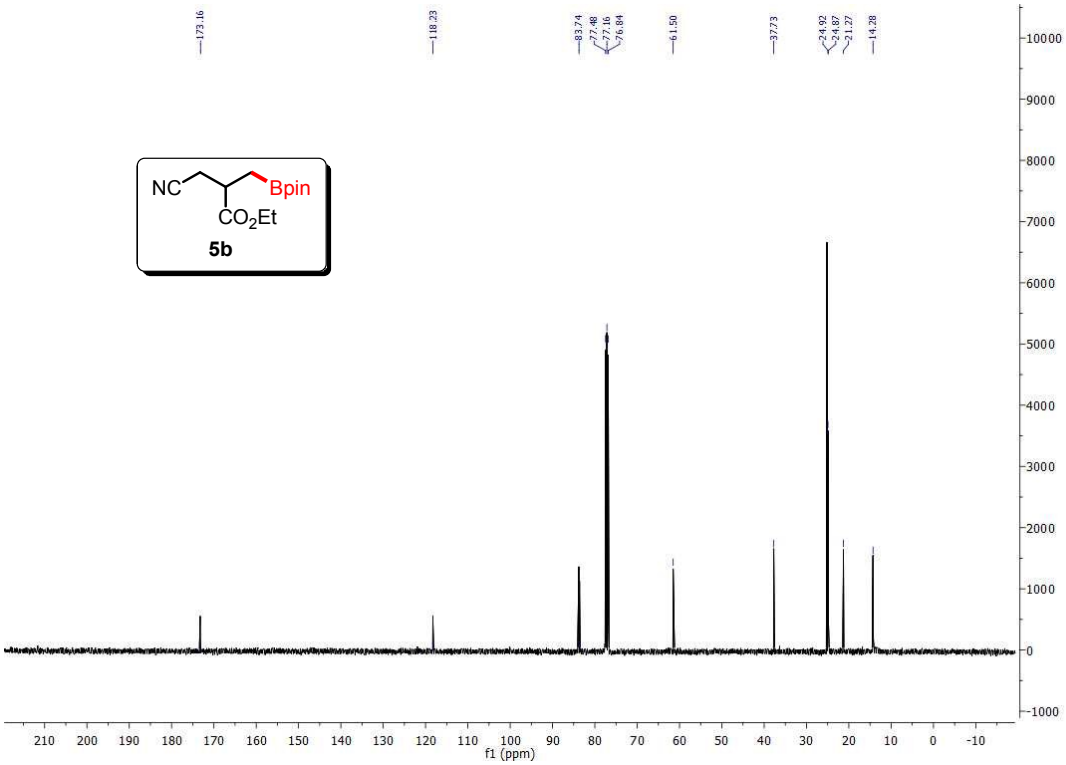

AD-164A
NC
Se
4k
AD-164A
f1 (ppm)
f1 (ppm)

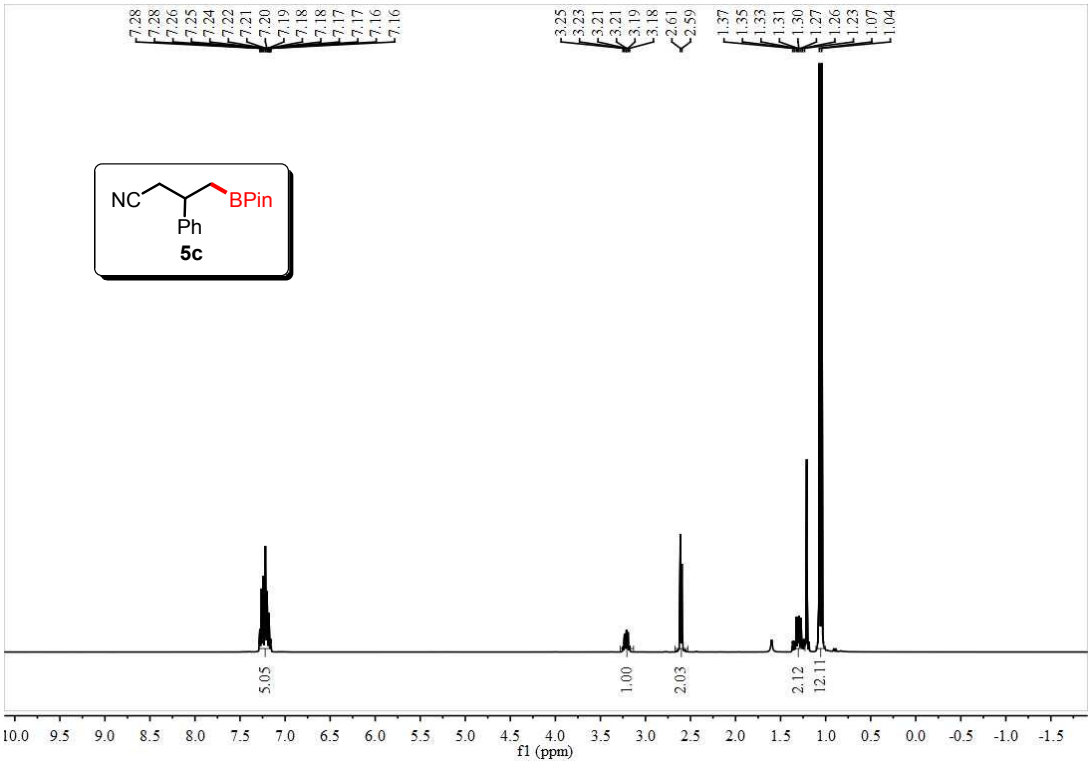

AD-164A 13C
NC
Se
4k
f1 (ppm)

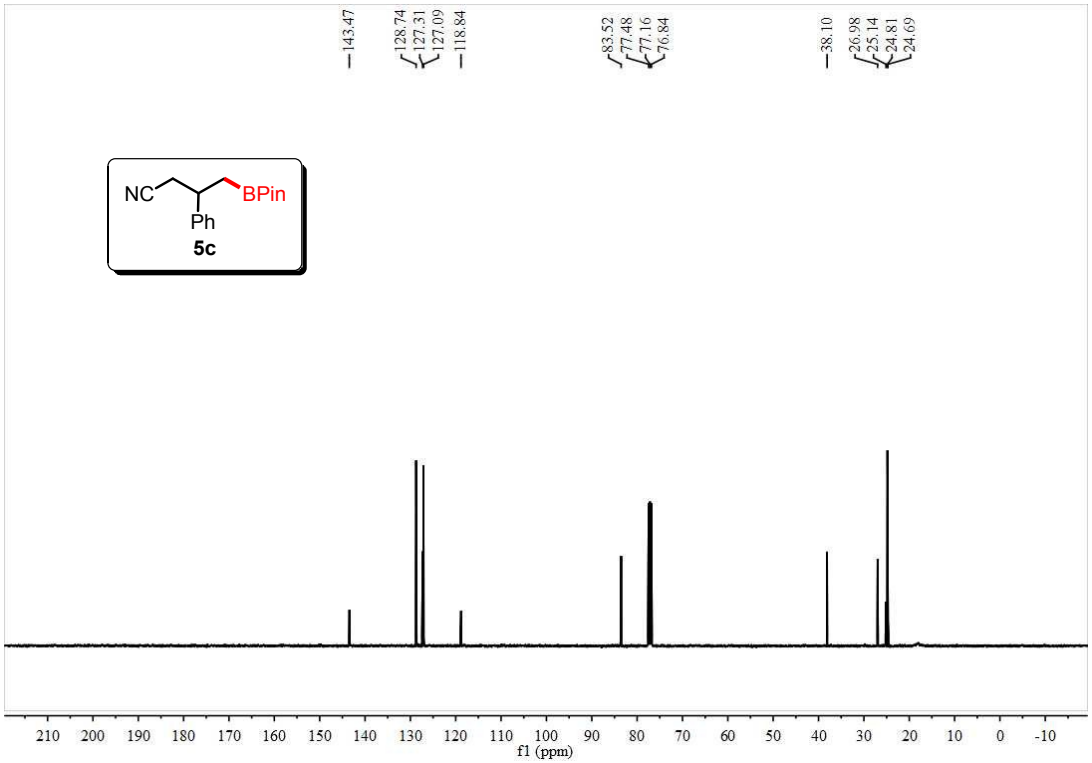

7.26
2.38
2.36
2.34
1.81
1.79
1.77
1.75
1.73
1.65
1.23
0.95
0.93
0.91
NC
BPin
5a
2.03
2.00
12.15
2.00
f1 (ppm)

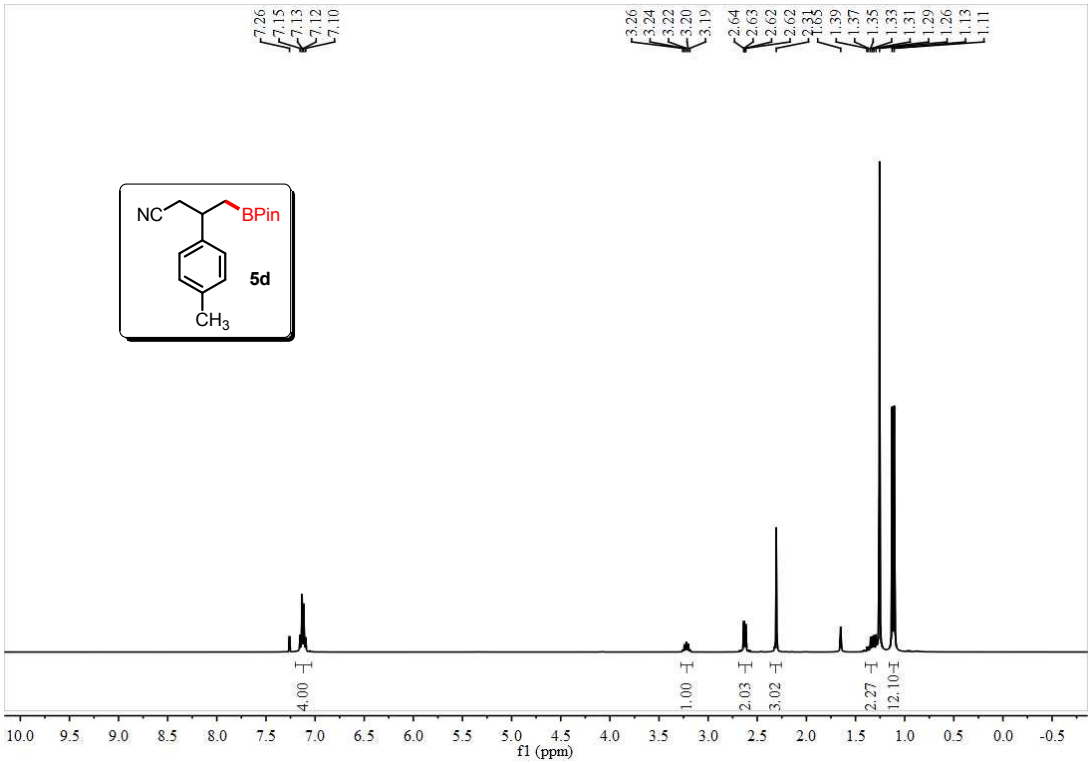

119.99
83.48
77.48
77.16
76.84
25.14
24.94
20.50
19.28
NC
BPin
5a
f1 (ppm)

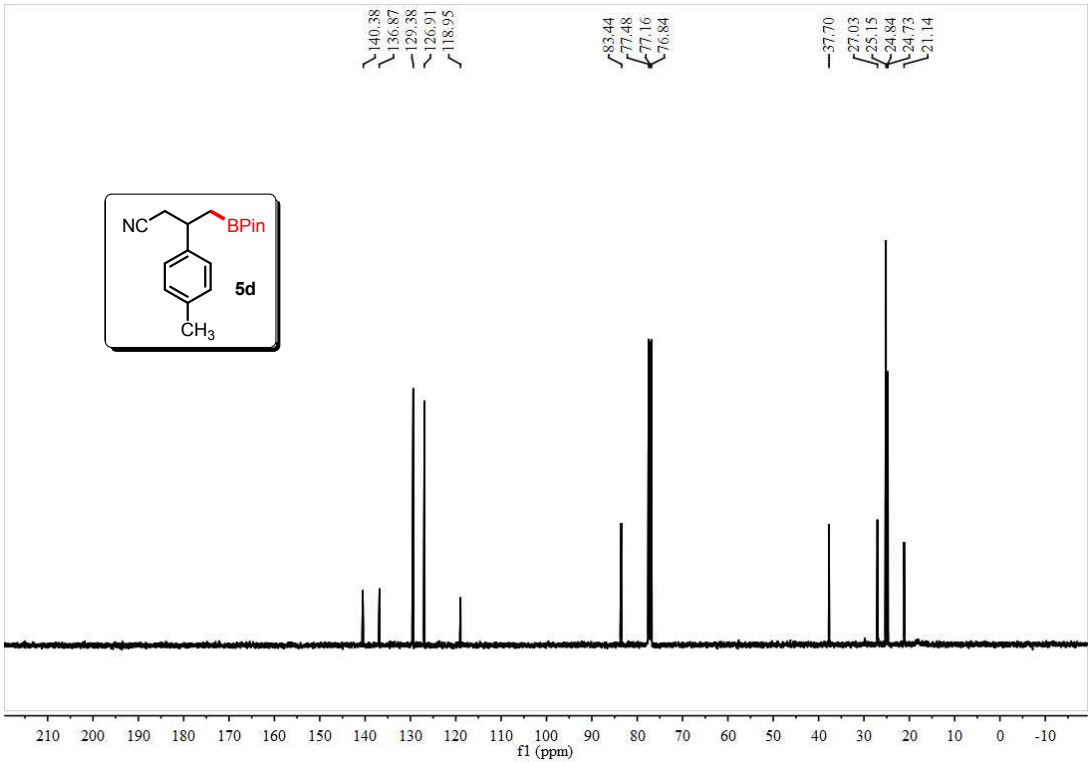

7.26
4.20
4.18
4.16
4.15
2.72
2.71
2.68
2.66
1.66
1.54
1.25
1.23
1.23
NC
Bpin
CO2Et
5b
2.09
1.00
2.06
5.46
12.24
f1 (ppm)

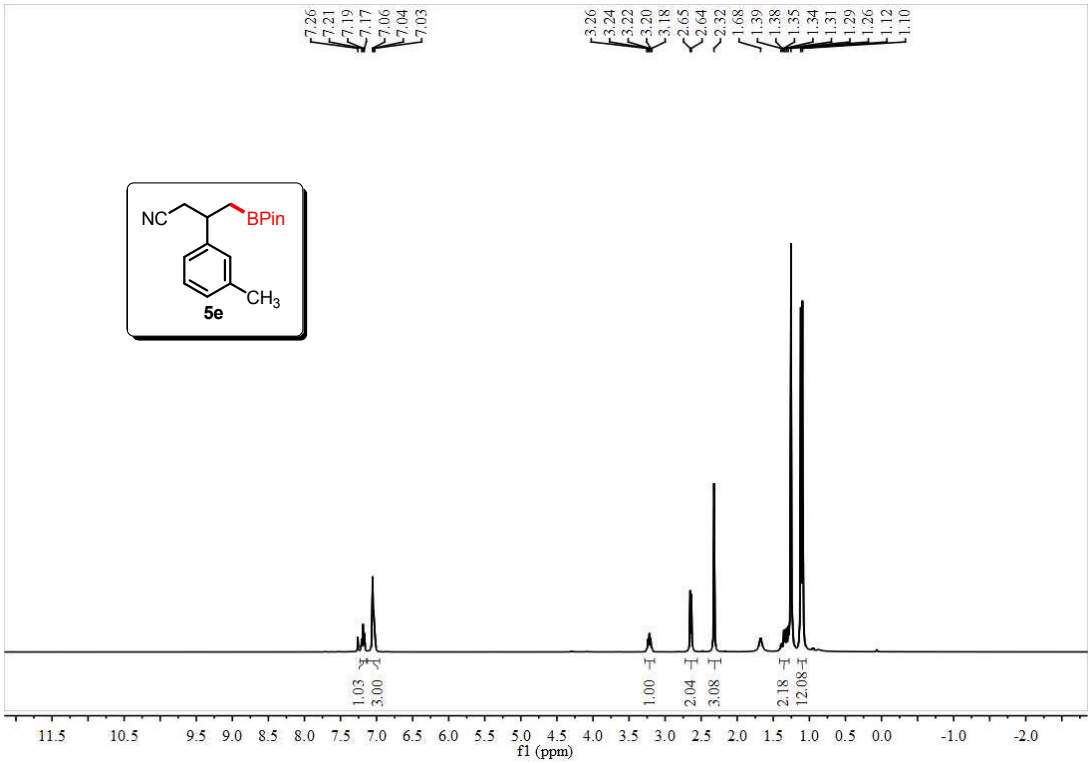

173.16
118.23
83.74
77.48
77.16
76.84
61.50
37.73
24.92
24.87
21.27
14.28
NC
Bpin
CO2Et
5b
f1 (ppm)

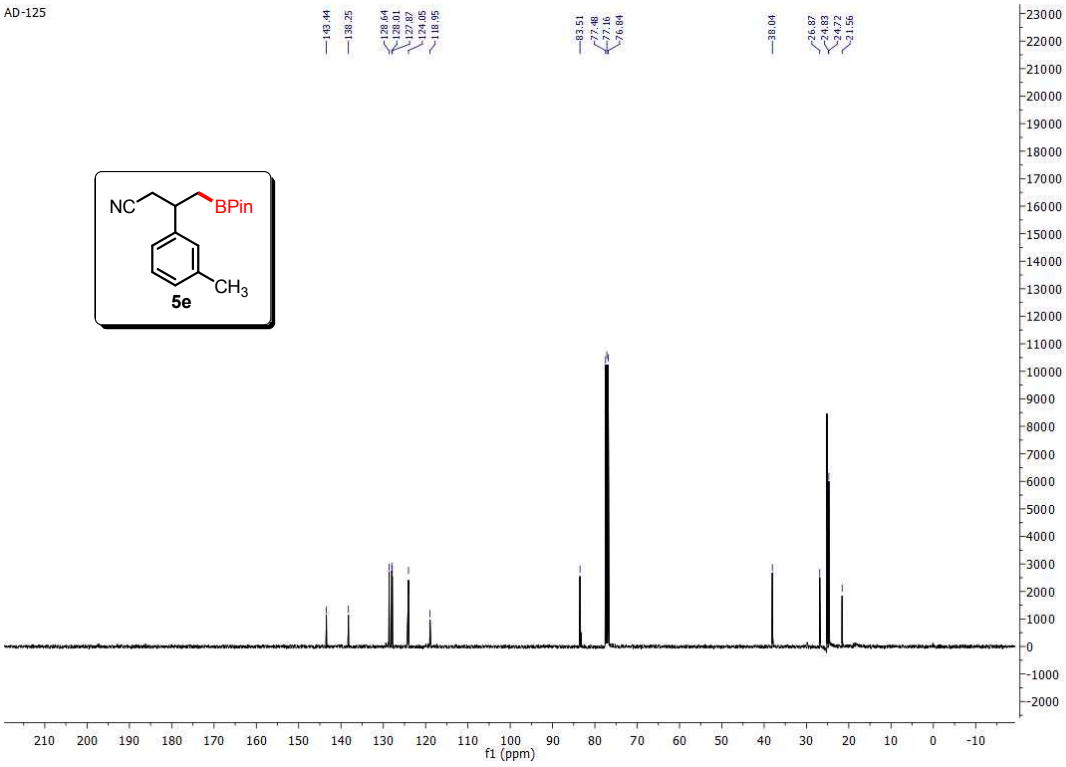

7.28
7.28
7.26
7.25
7.24
7.22
7.21
7.20
7.19
7.18
7.18
7.17
7.17
7.16
7.16
3.25
3.23
3.21
3.21
3.19
3.18
2.61
2.59
1.37
1.35
1.33
1.31
1.30
1.27
1.26
1.23
1.07
1.04
NC
BPin
Ph
5c
5.05
1.00
2.03
2.12
12.11
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0 -1.5
f1 (ppm)

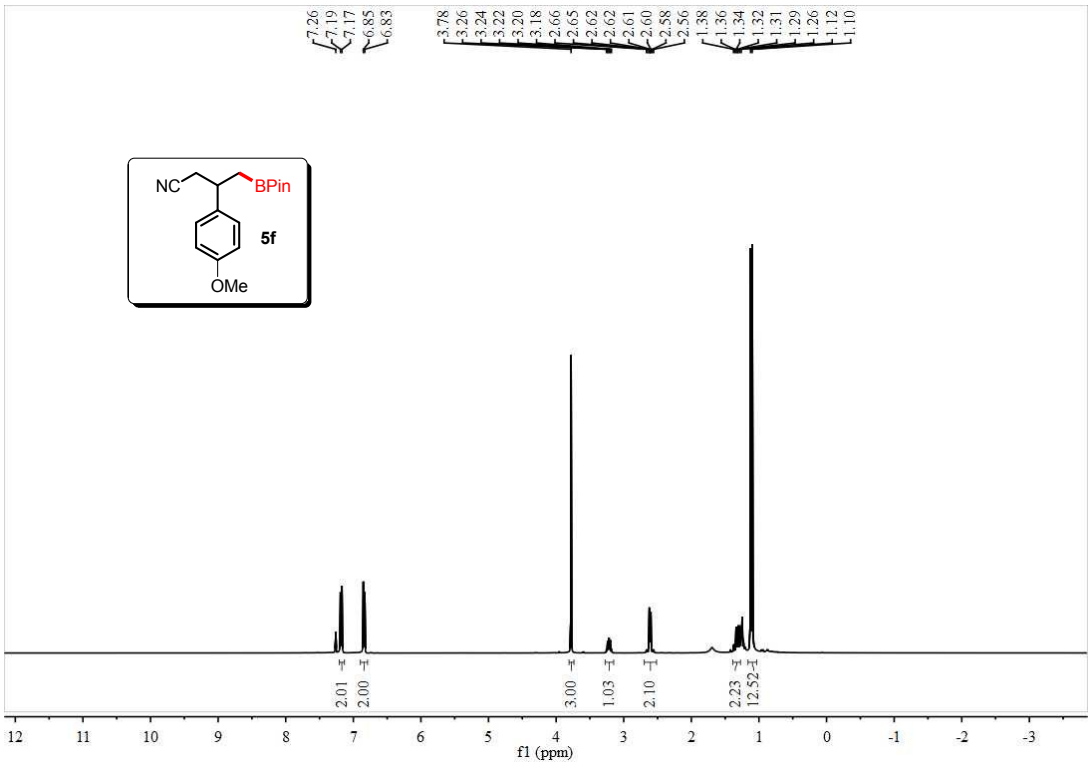

143.47
128.74
127.31
127.09
118.84
83.52
77.48
77.16
76.84
38.10
26.98
25.14
24.81
24.69
NC
BPin
Ph
5c
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

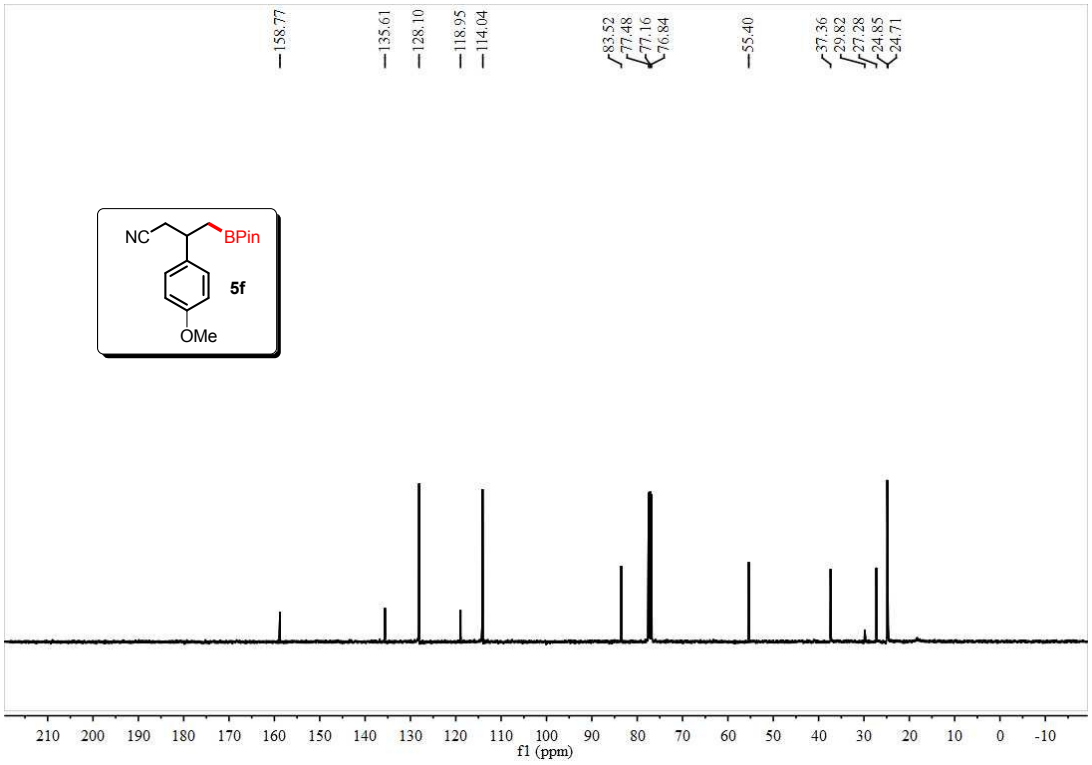

7.26
7.15
7.13
7.12
7.10
3.26
3.24
3.22
3.20
3.19
2.64
2.63
2.62
2.62
2.31
1.65
1.39
1.37
1.35
1.33
1.31
1.29
1.26
1.13
1.11
NC
BPin
5d
CH3
4.00
1.00
2.03
3.02
2.27
12.10
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

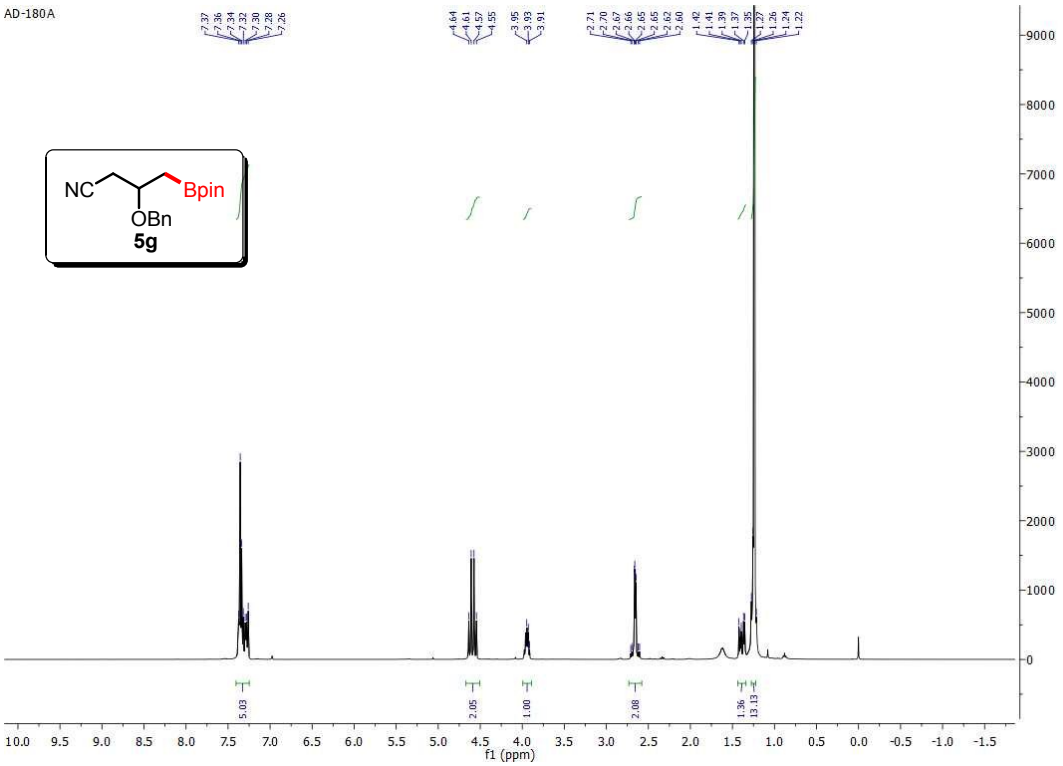

140.38
136.87
129.38
126.91
118.95
83.44
77.48
77.16
76.84
37.70
27.03
25.15
24.84
24.73
21.14
NC
BPin
5d
CH3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

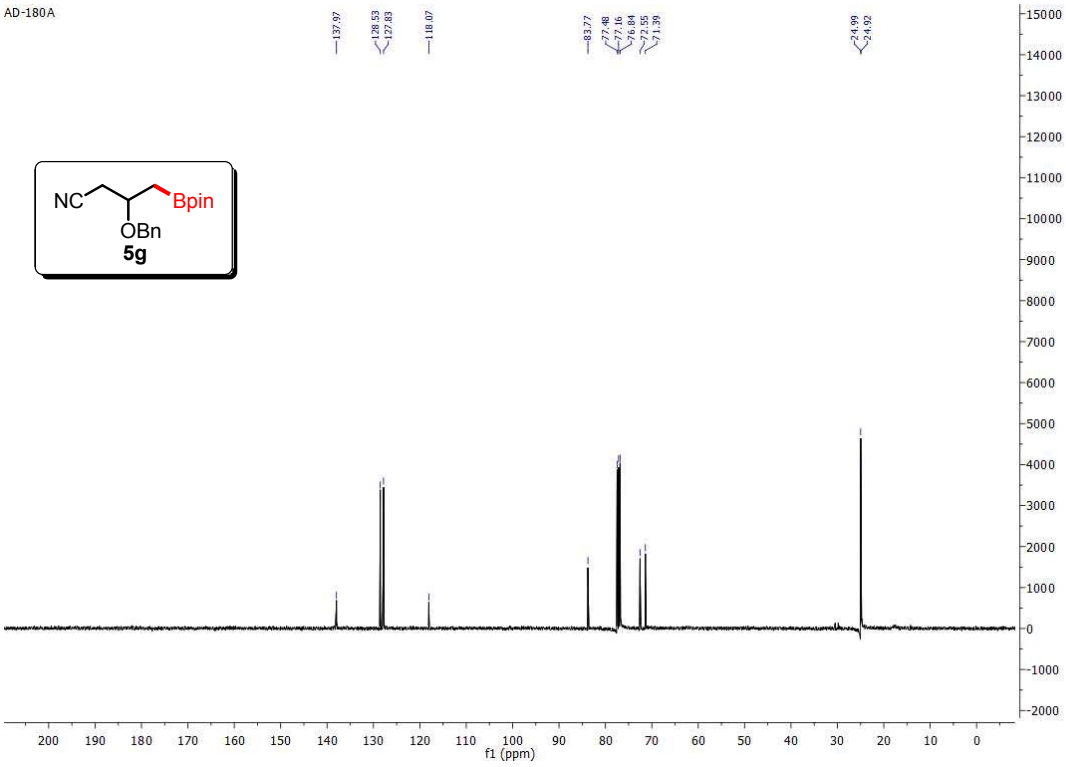

7.26
7.21
7.19
7.17
7.06
7.04
7.03
3.26
3.24
3.22
3.20
3.18
2.65
2.64
2.32
1.68
1.39
1.38
1.35
1.34
1.31
1.29
1.26
1.12
1.10
NC
BPin
CH3
5e
1.03
3.00
1.00
2.04
3.08
2.18
12.08
f1 (ppm)

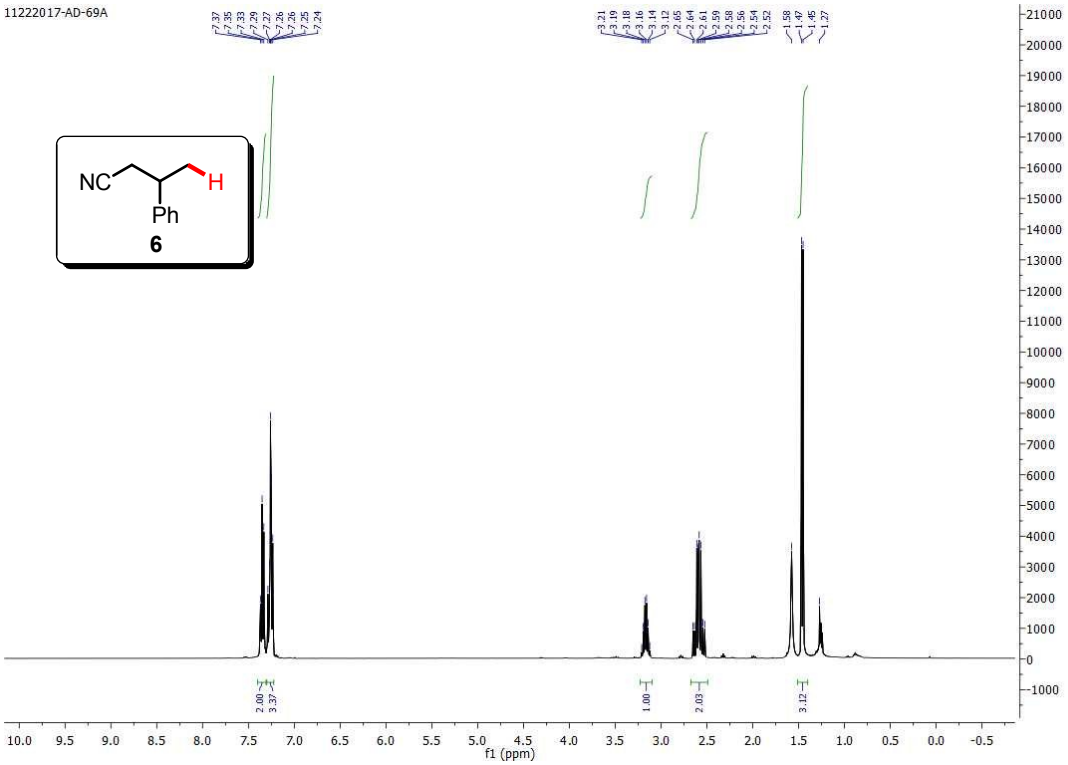

AD-125
143.44
138.25
128.64
128.01
127.87
124.05
118.95
83.51
77.48
77.16
76.84
38.04
26.87
24.83
24.72
21.56
NC
BPin
CH3
5e
f1 (ppm)

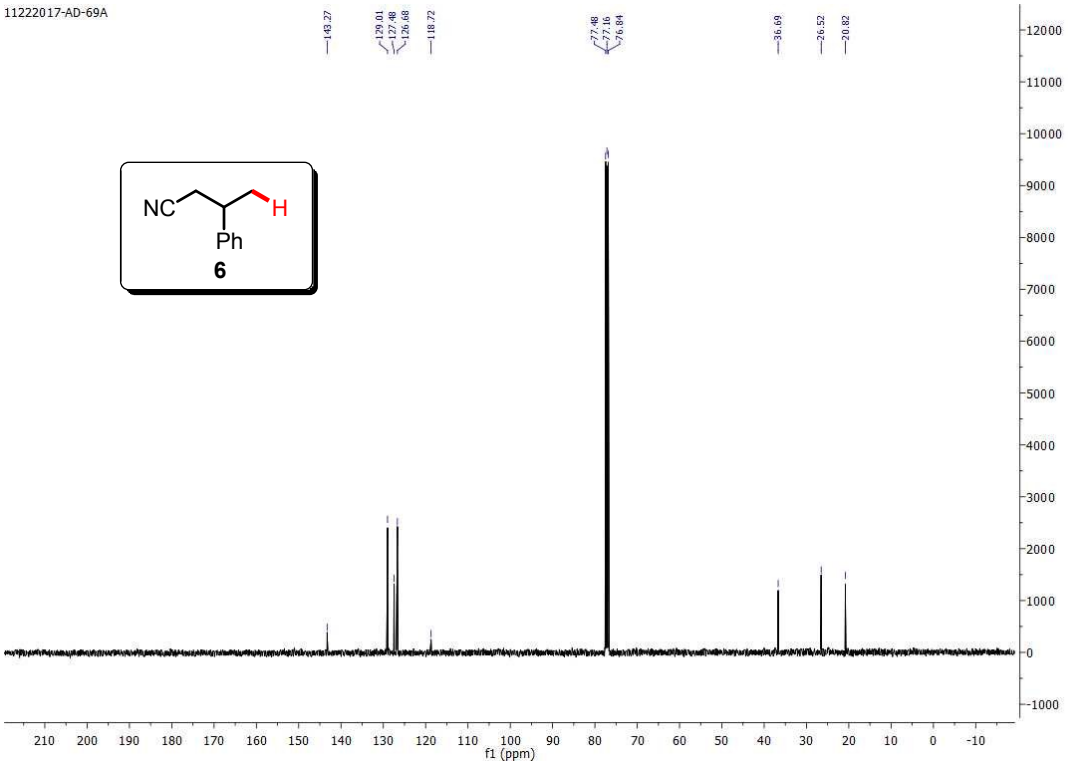

7.26
7.19
7.17
6.85
6.83
3.78
3.26
3.24
3.22
3.20
3.18
2.66
2.65
2.62
2.62
2.61
2.60
2.58
2.56
1.38
1.36
1.34
1.32
1.31
1.29
1.26
1.12
1.10
NC
BPin
5f
OMe
2.01
2.00
3.00
1.03
2.10
2.23
12.52
f1 (ppm)


158.77
135.61
128.10
118.95
114.04
83.52
77.48
77.16
76.84
55.40
37.36
29.82
27.28
24.85
24.71
NC
BPin
5f
OMe
f1 (ppm)


AD-180A
NC
Bpin
OBn
5g
f1 (ppm)


AD-180A
NC
Bpin
OBn
5g
f1 (ppm)


11222017-AD-69A
NC
H
Ph
6
f1 (ppm)


11222017-AD-69A
NC
H
Ph
6
f1 (ppm)