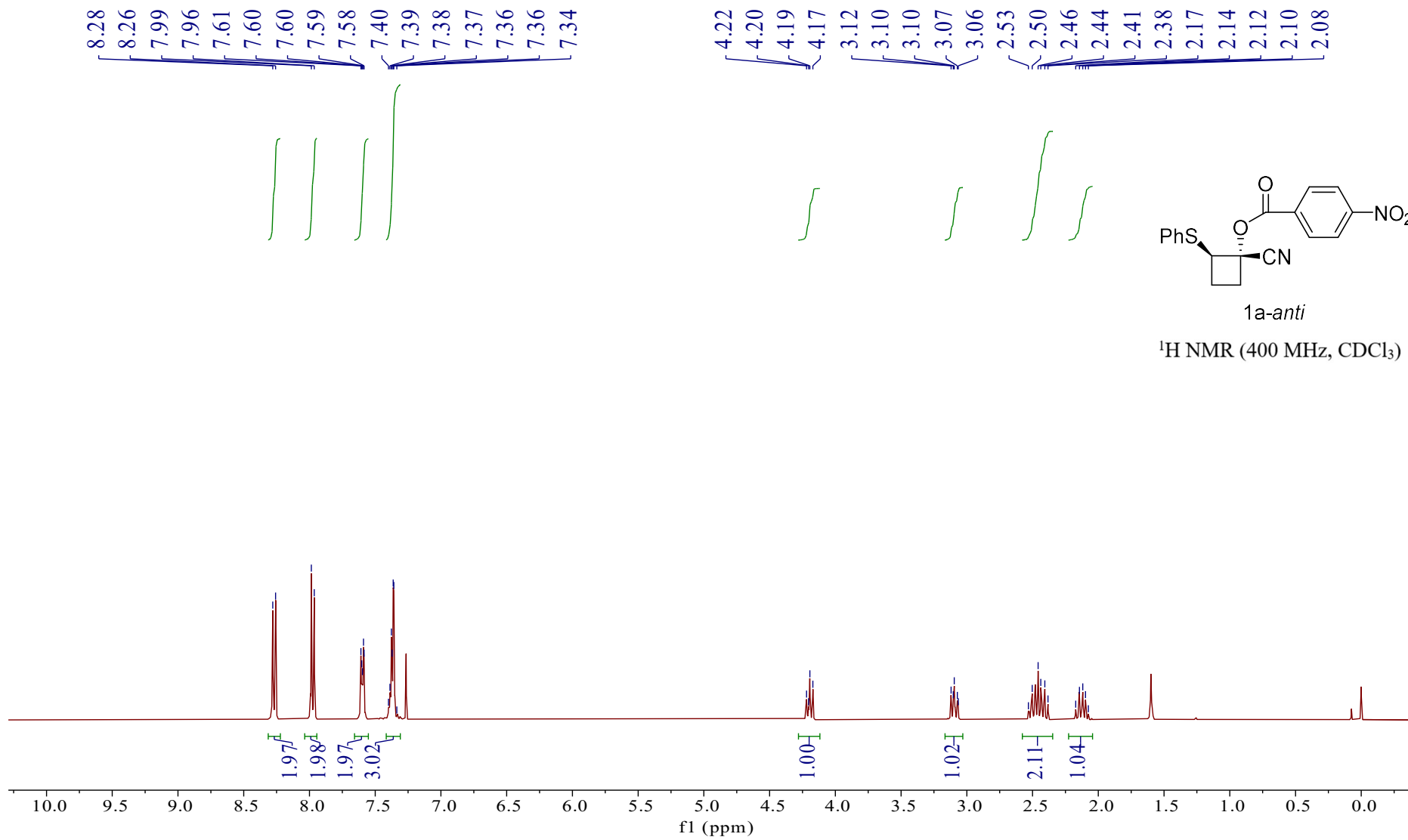


VIII. ^1H and ^{13}C NMR Spectral Copies



NMR-2

- 162.2

- 151.2

133.6

133.5

132.8

131.1

129.4

128.2

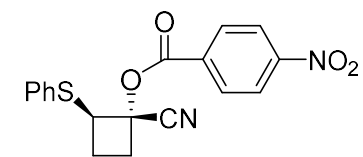
123.8

115.8

50.7
50.7

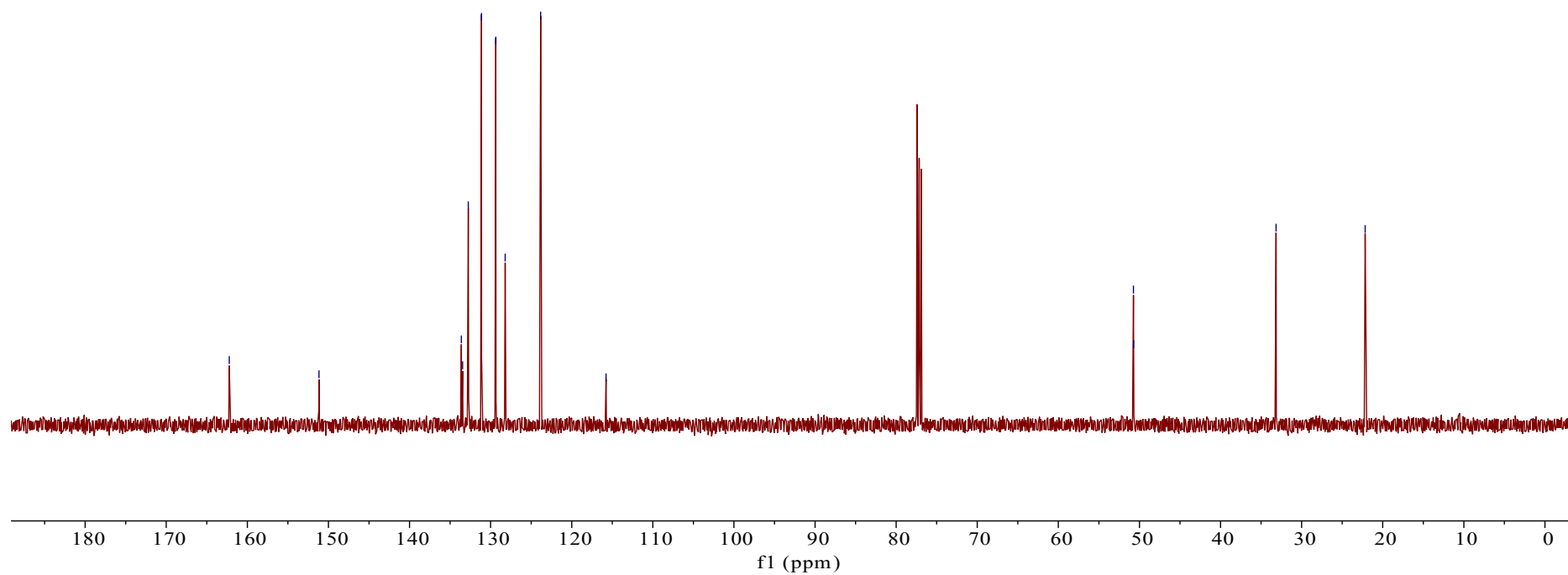
- 33.2

- 22.2

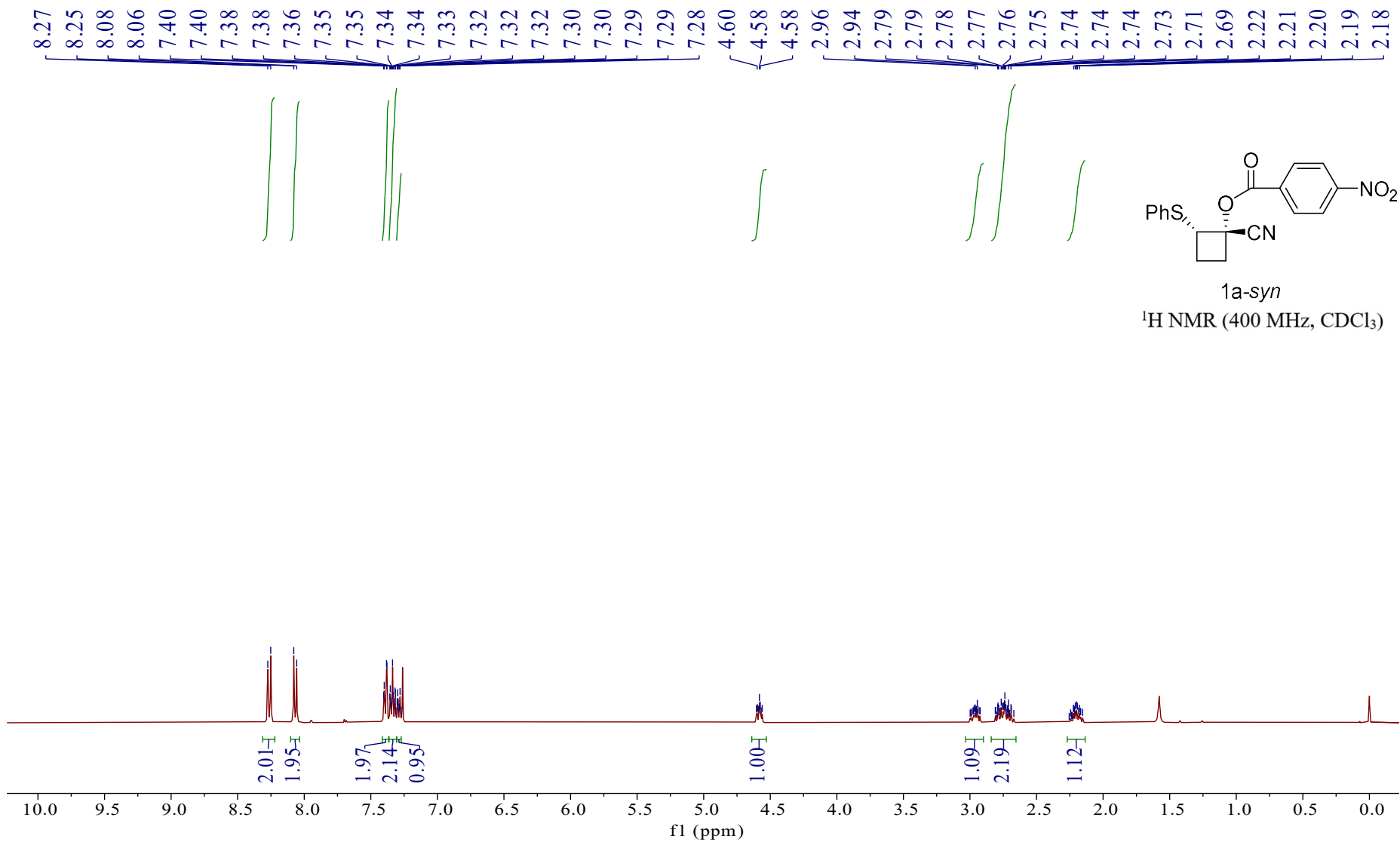


1a-anti

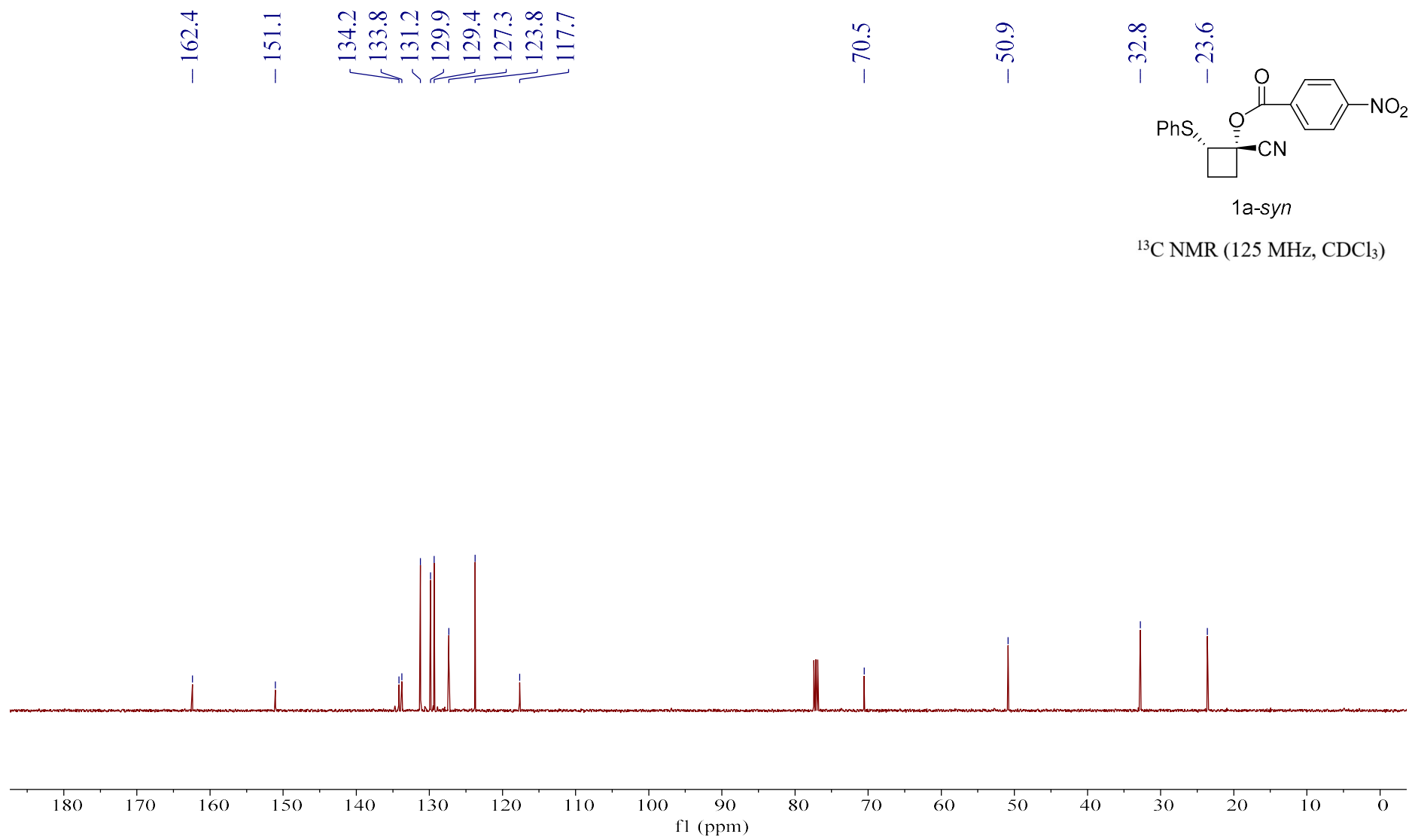
¹³C NMR (125 MHz, CDCl₃)



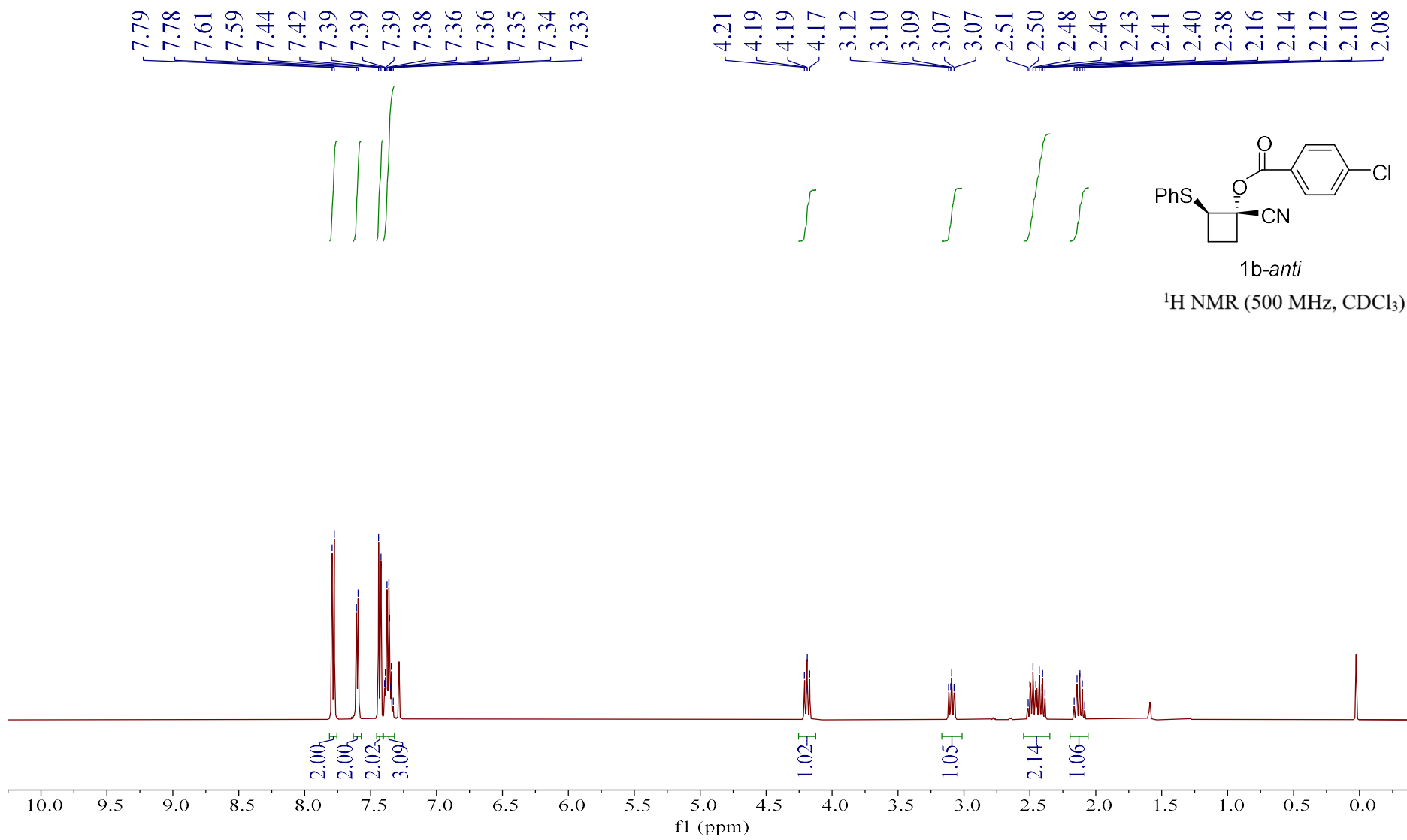
NMR-3



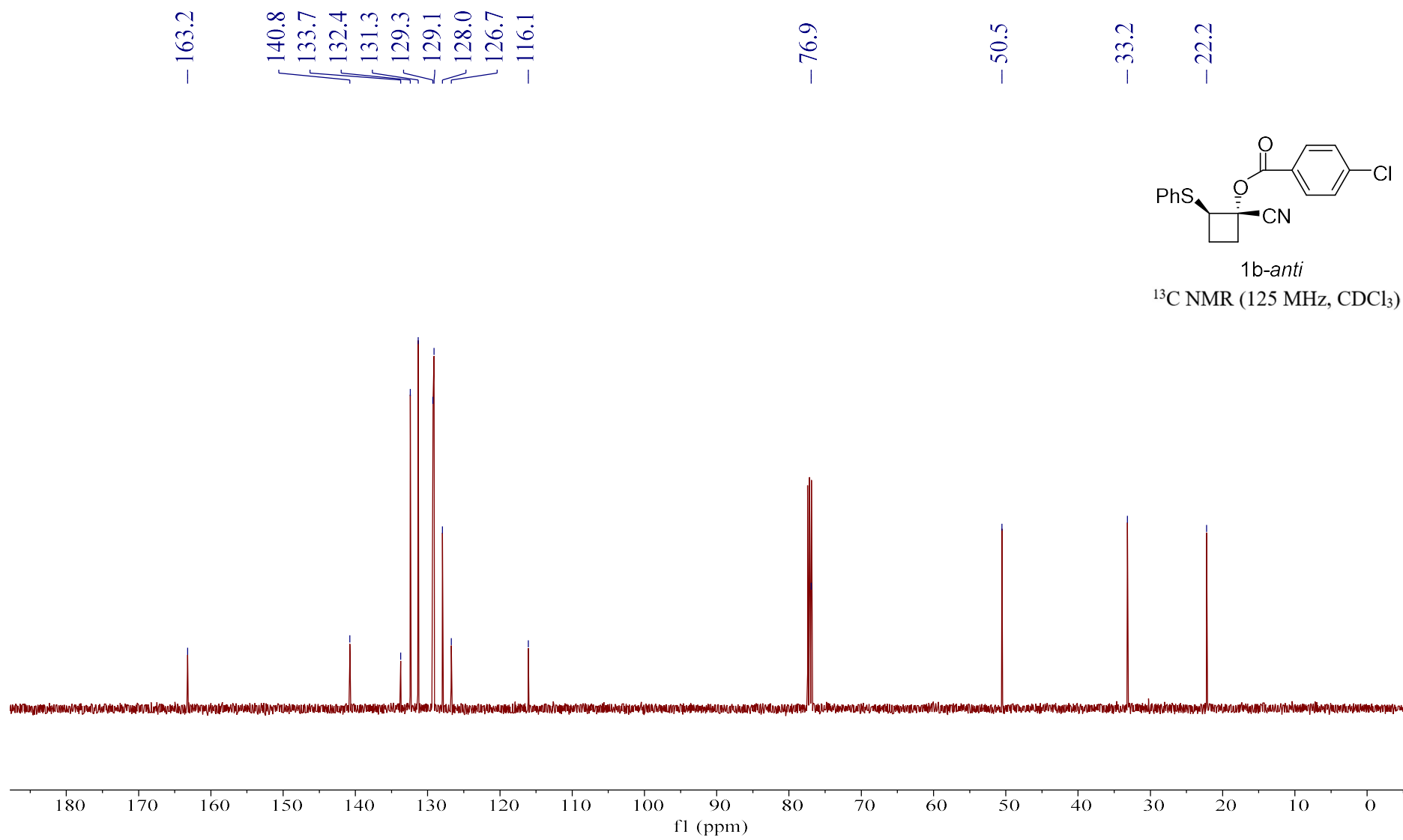
NMR-4



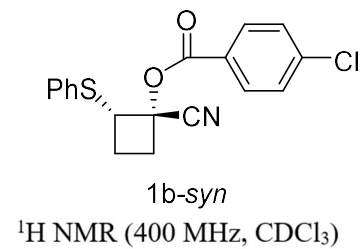
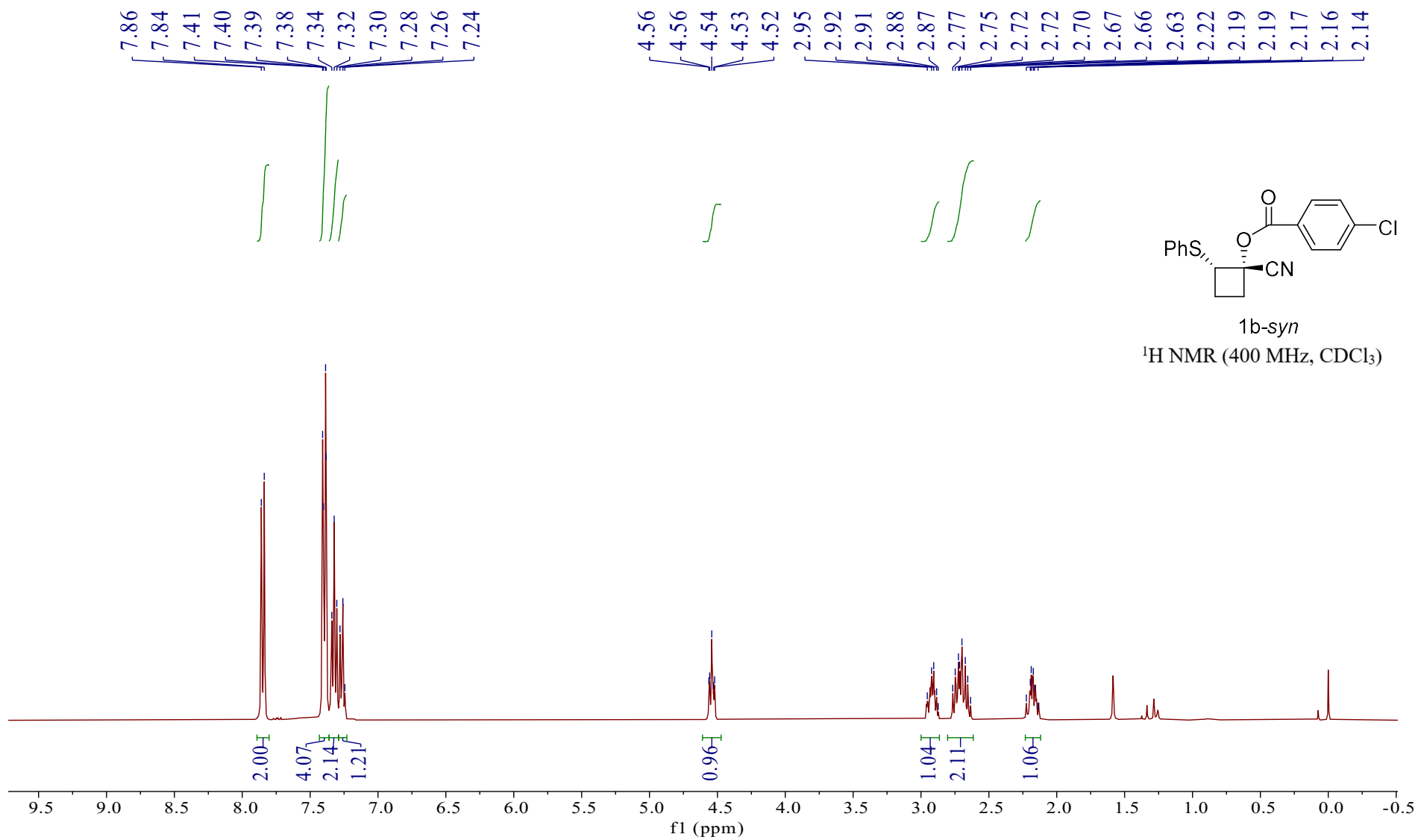
NMR-5



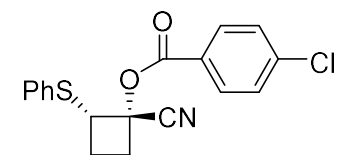
NMR-6



NMR-7

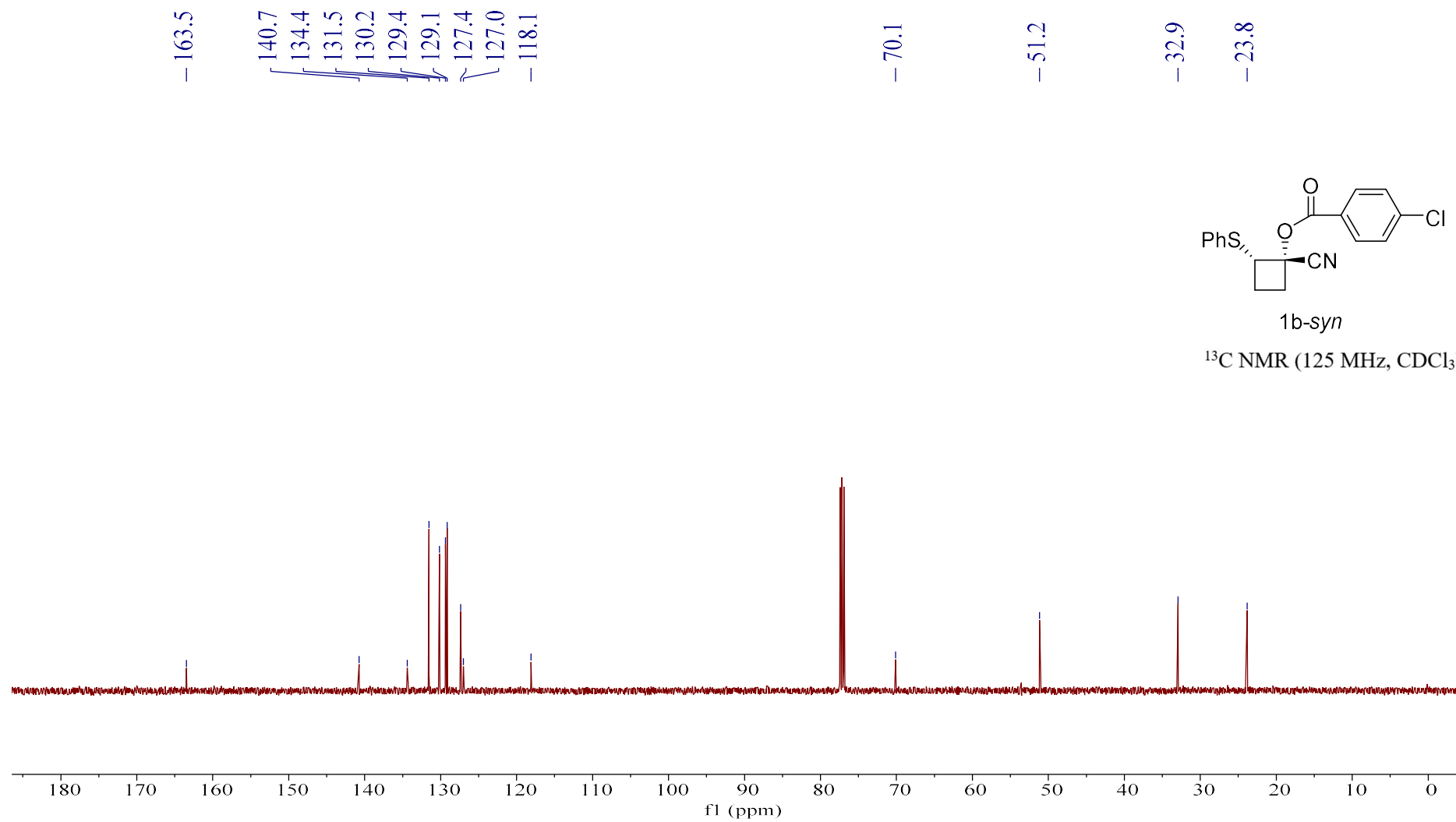


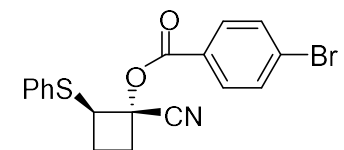
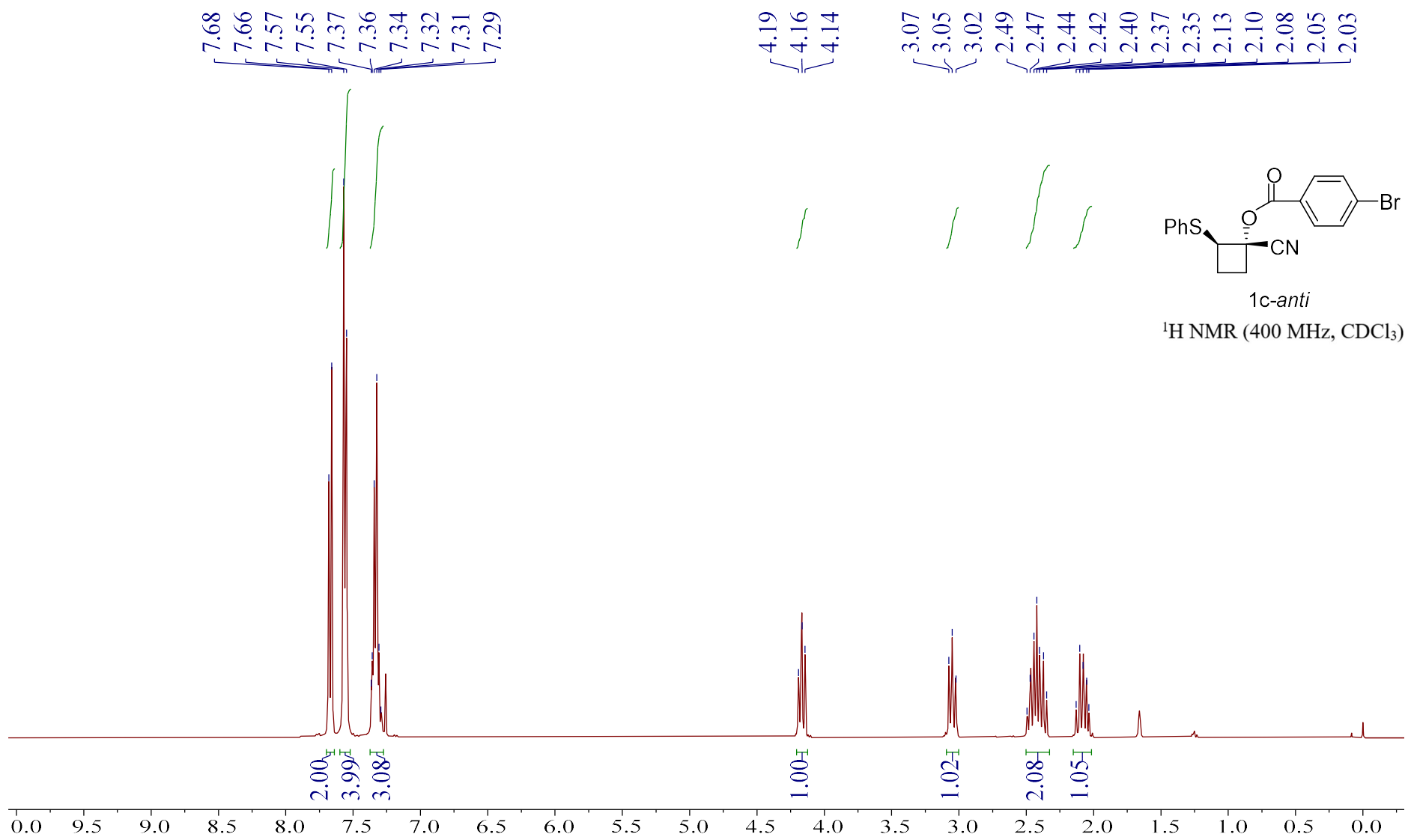
NMR-8



1b-syn

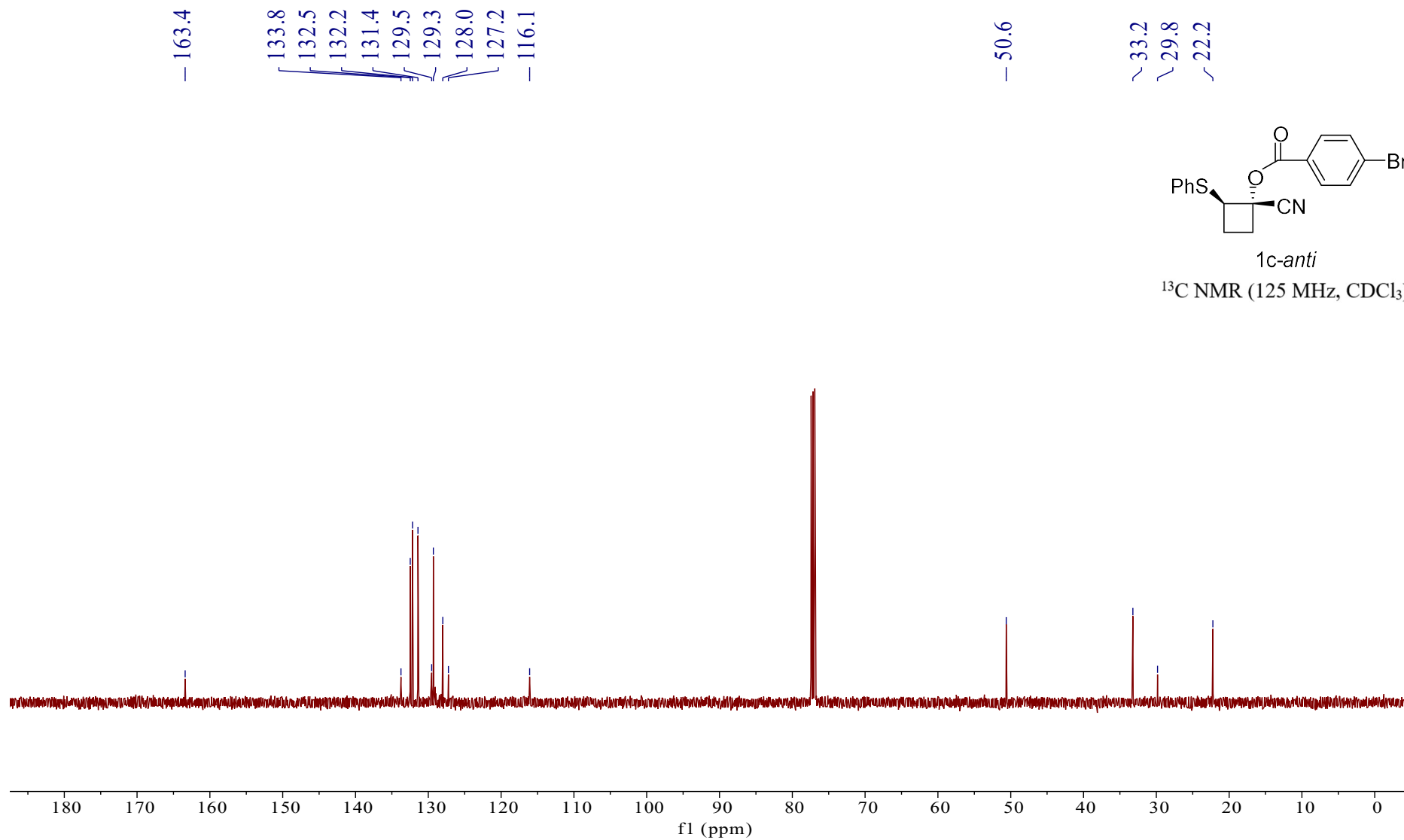
^{13}C NMR (125 MHz, CDCl_3)



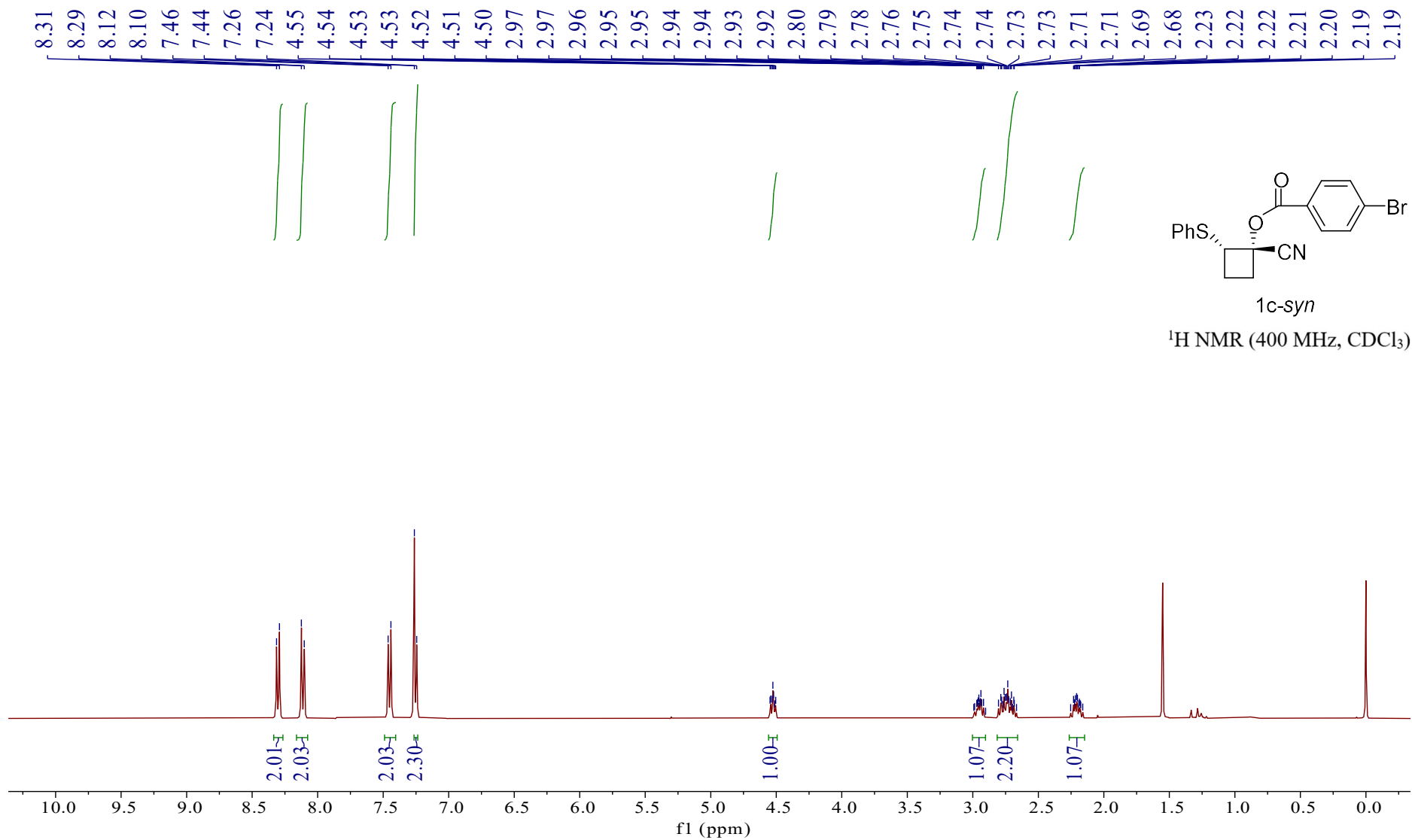


1c-anti

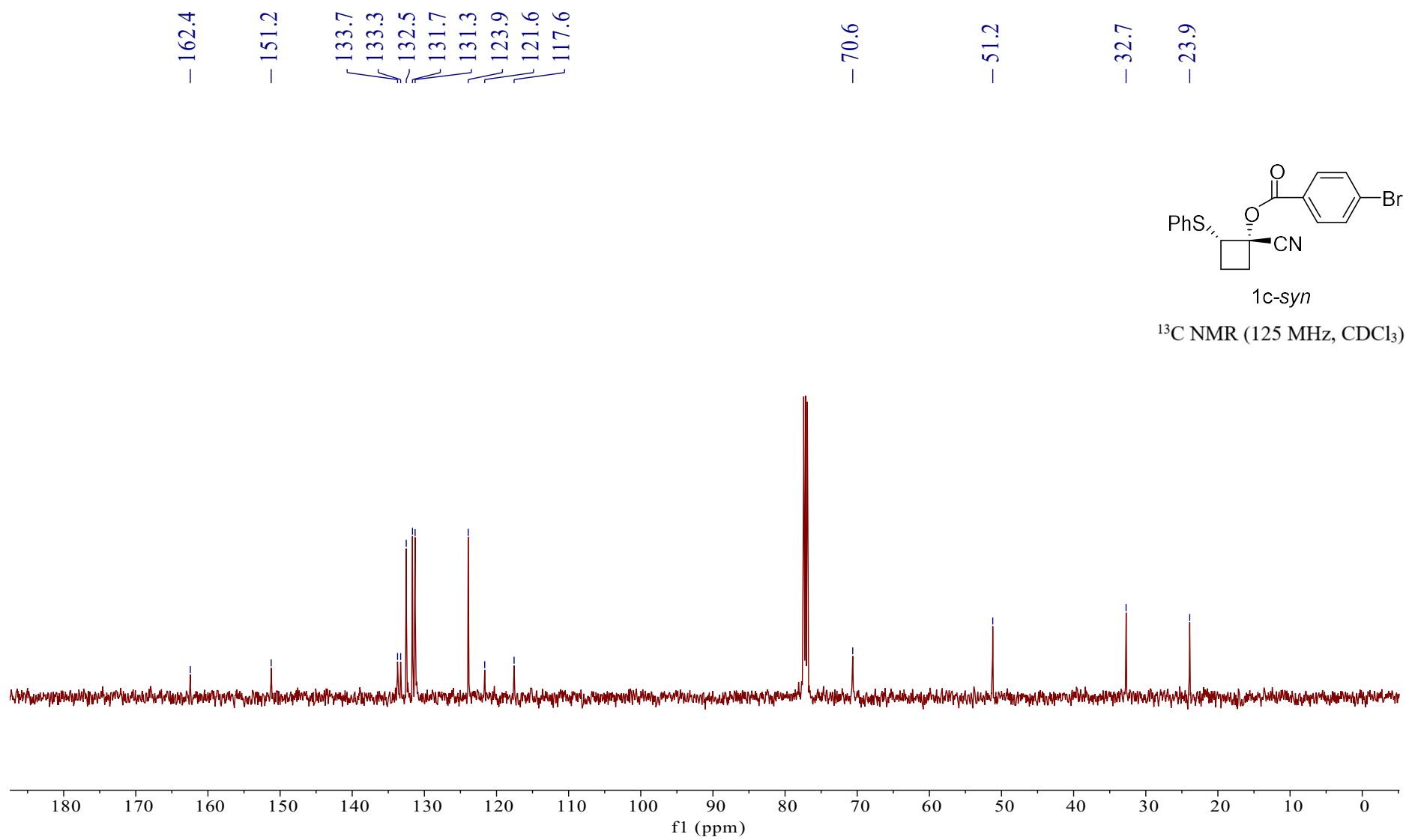
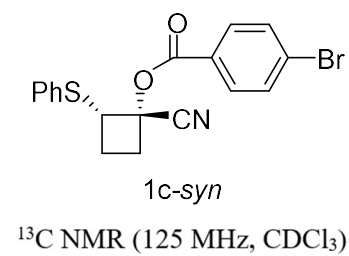
¹H NMR (400 MHz, CDCl₃)



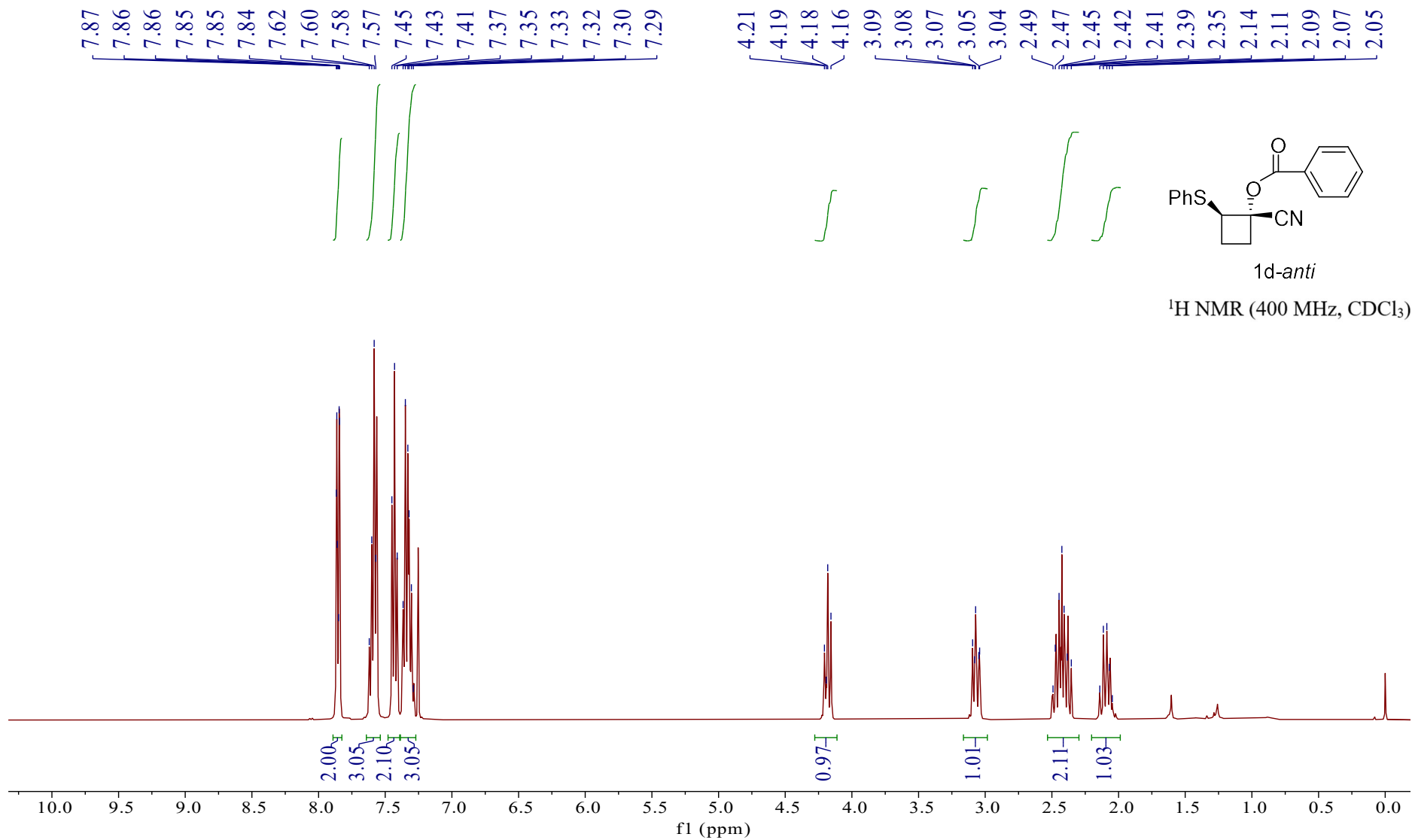
NMR-11



NMR-12



NMR-13



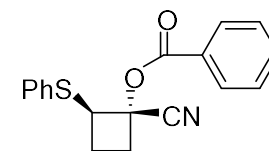
— 164.1
— 134.2
— 133.9
— 132.2
— 130.0
— 129.3
— 128.7
— 128.3
— 127.8
— 116.3

— 76.8

— 50.5

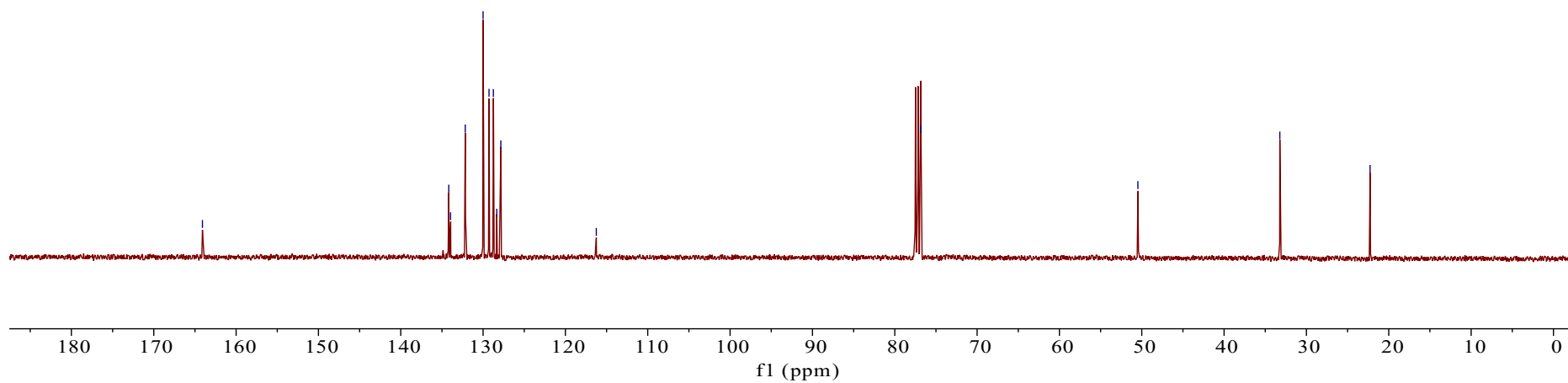
— 33.2

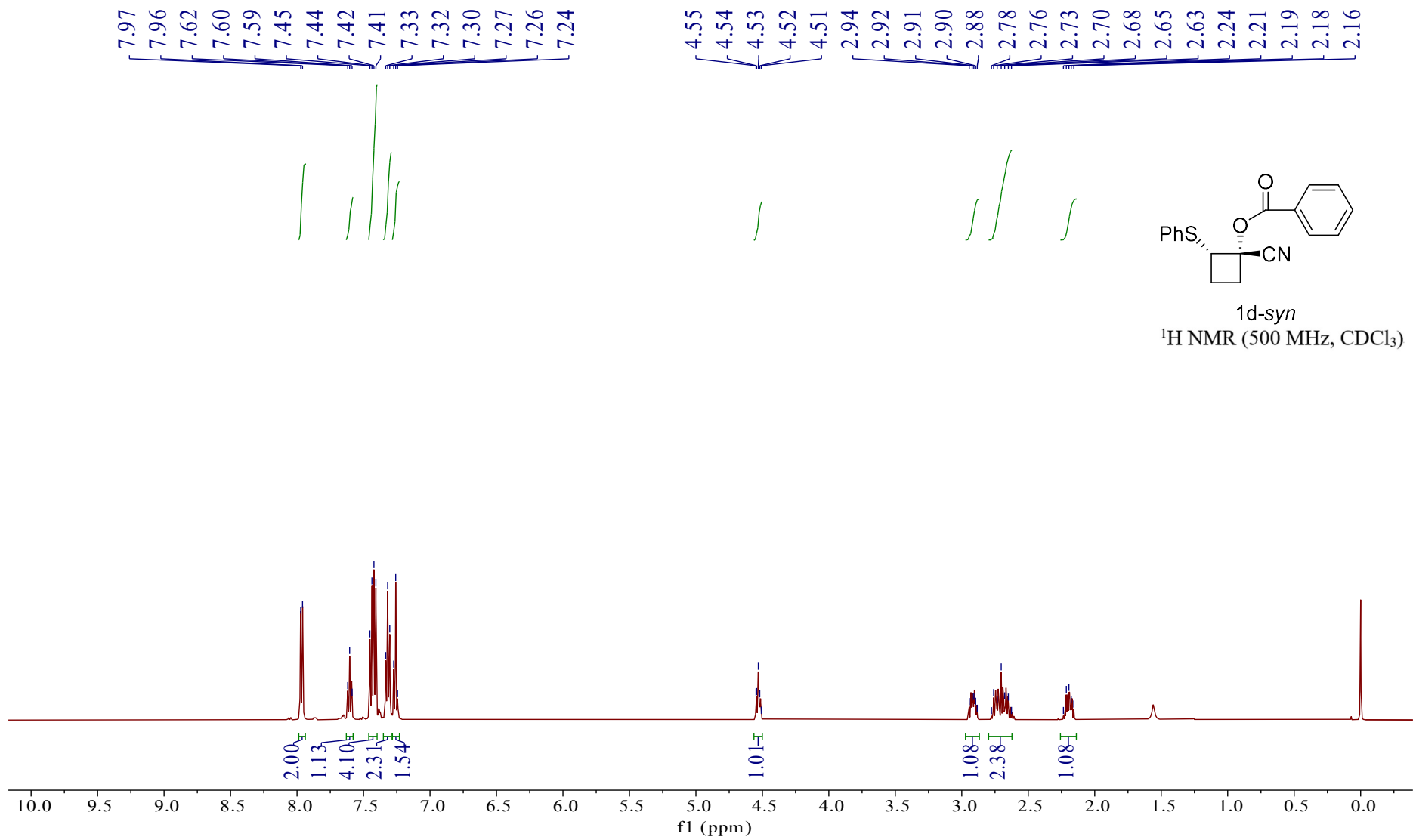
— 22.3



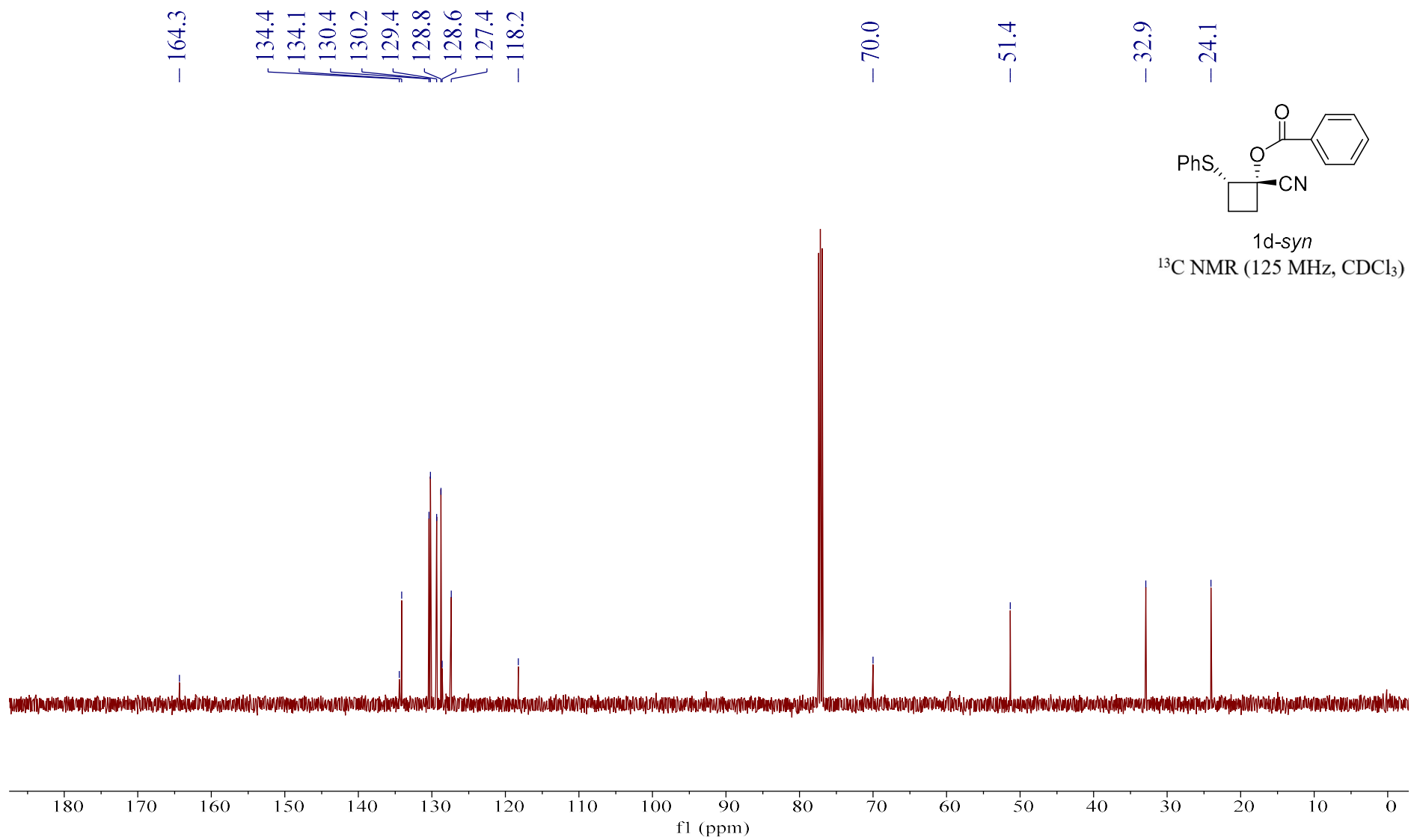
1d-anti

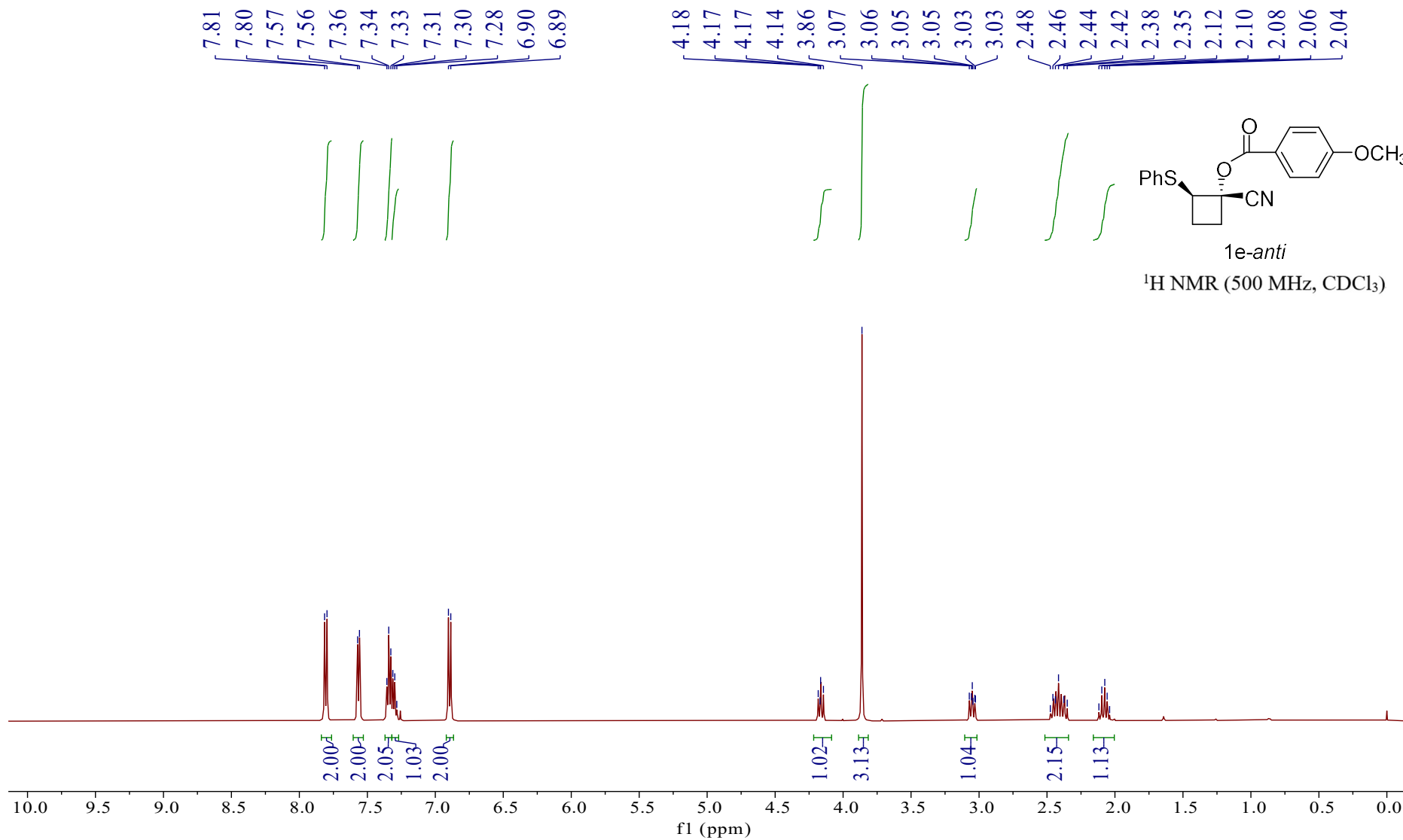
¹³C NMR (100 MHz, CDCl₃)

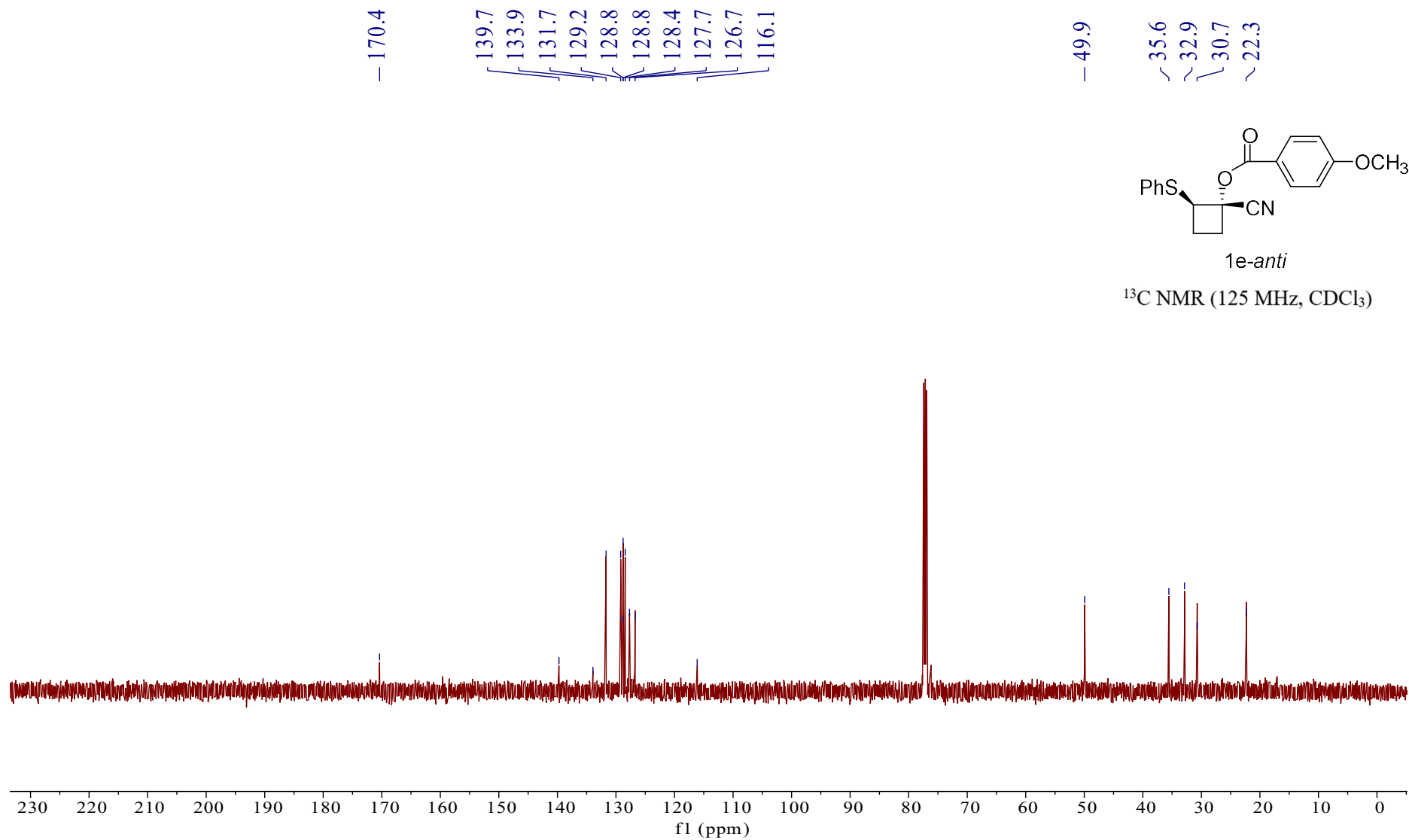




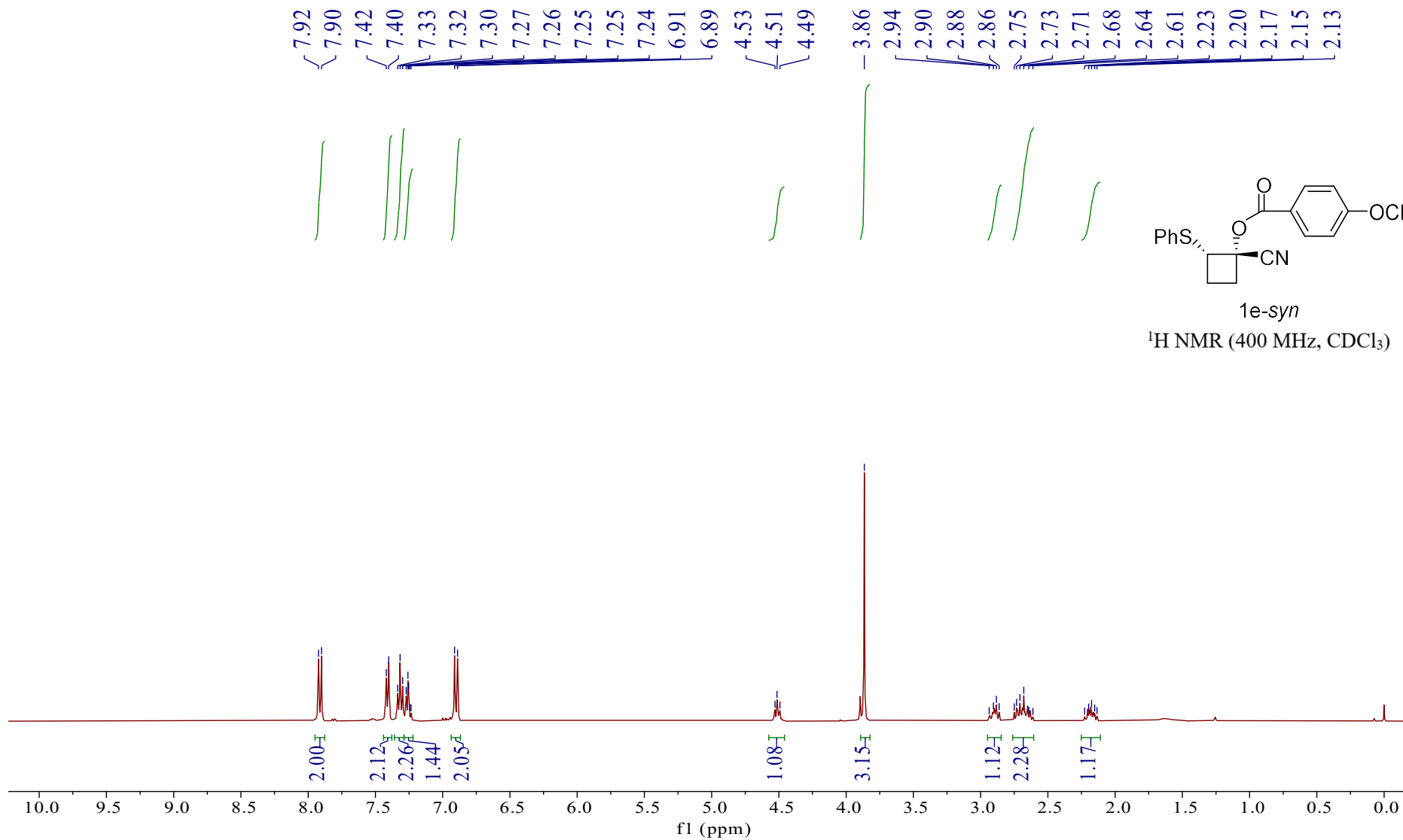
NMR-16



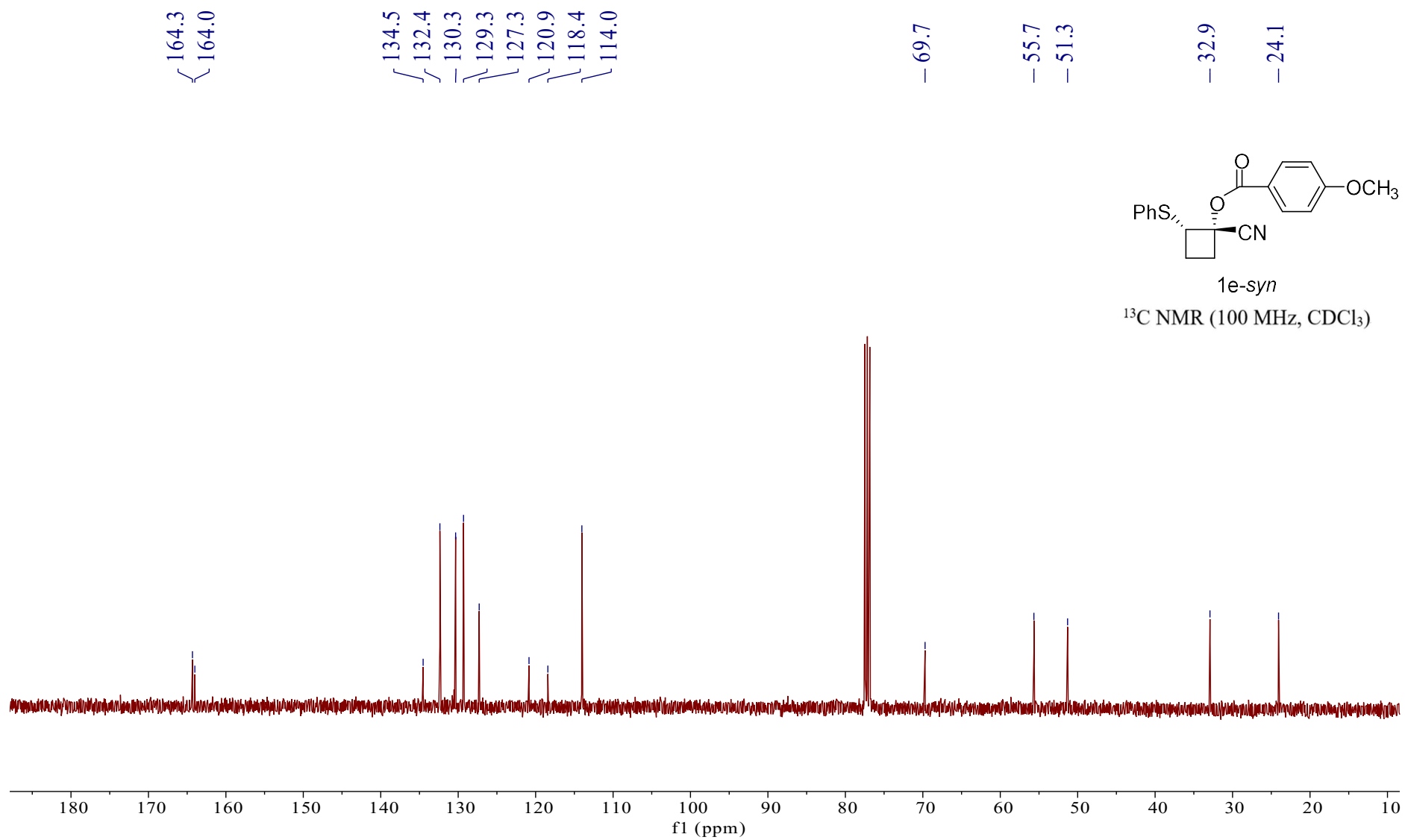




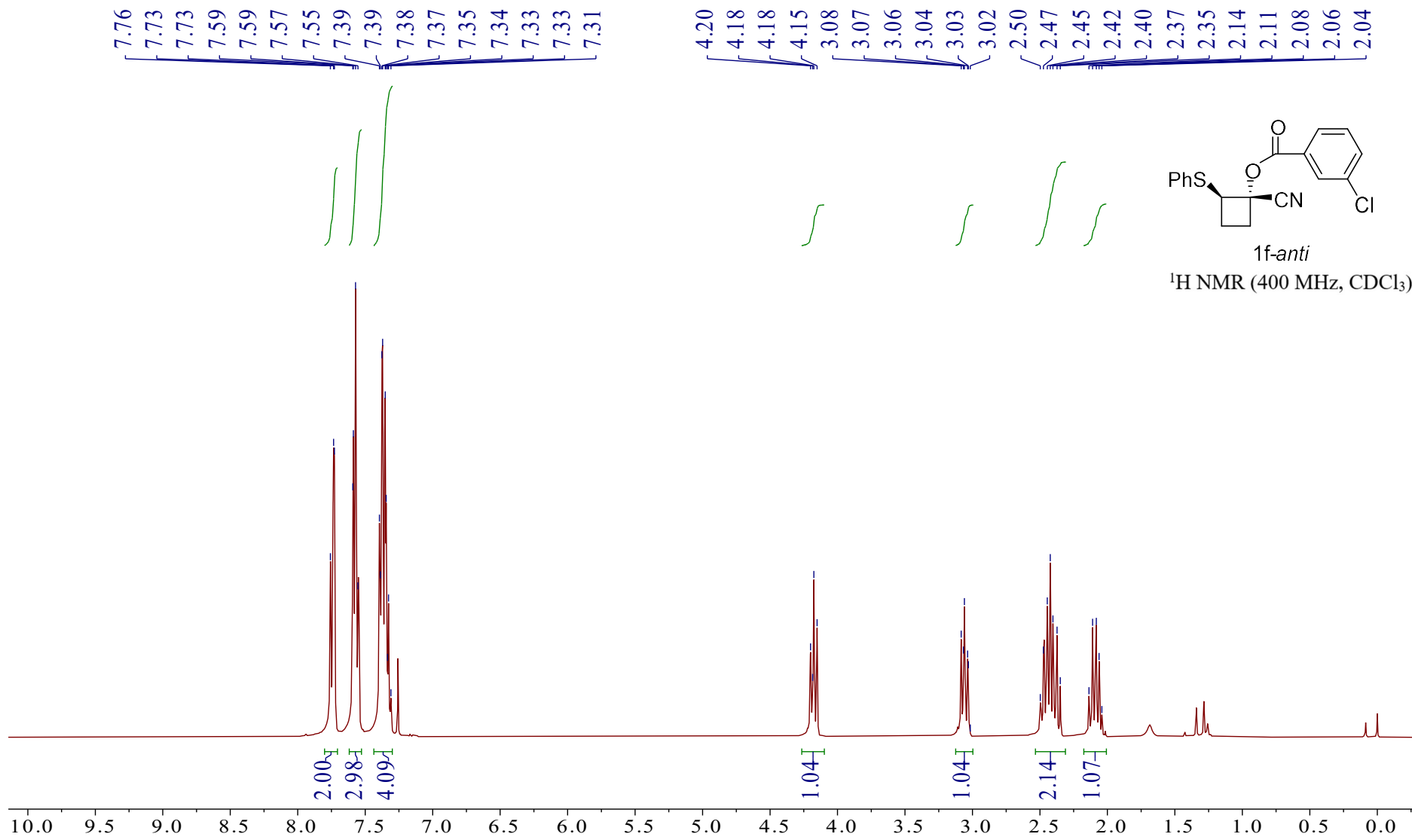
NMR-19

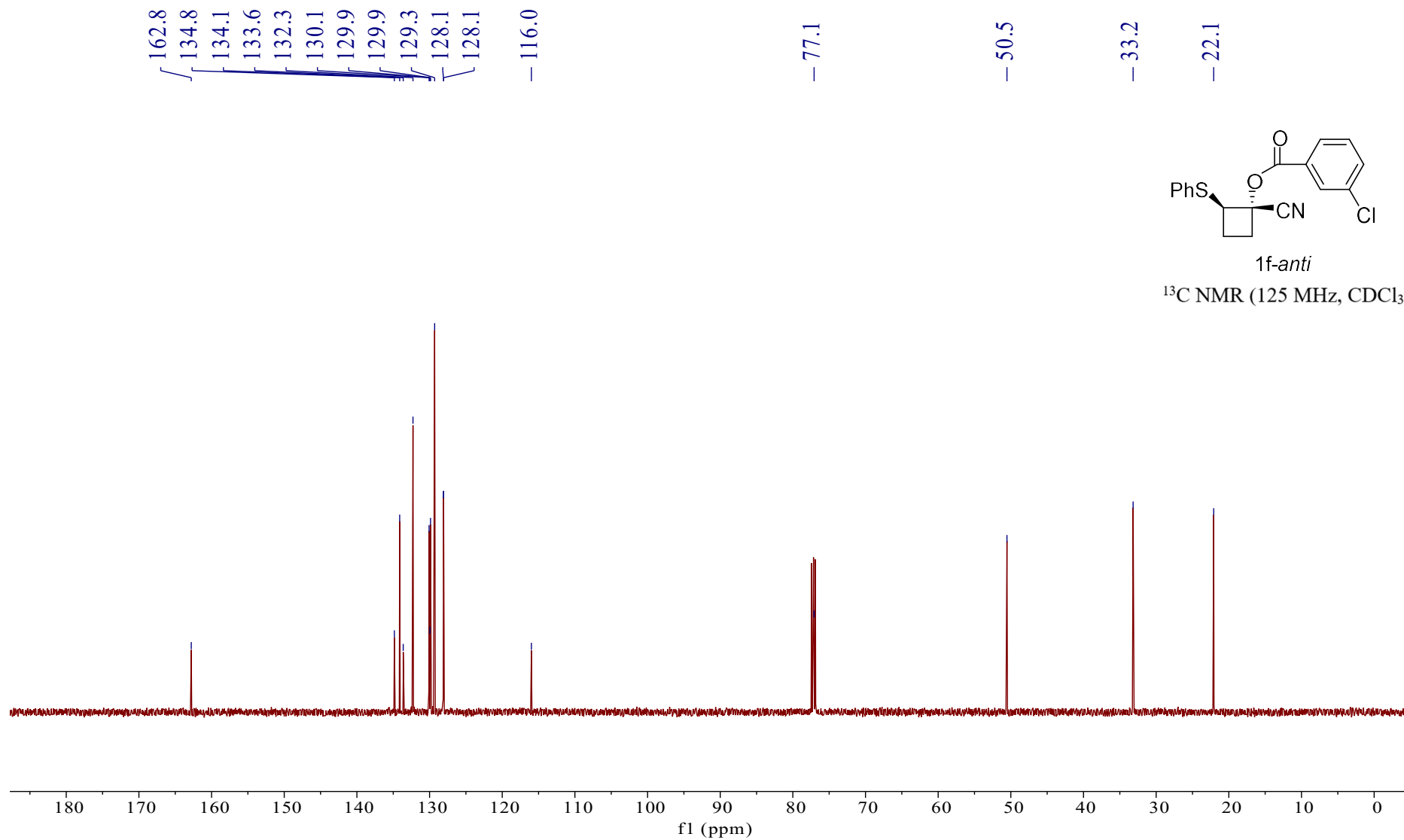


NMR-20

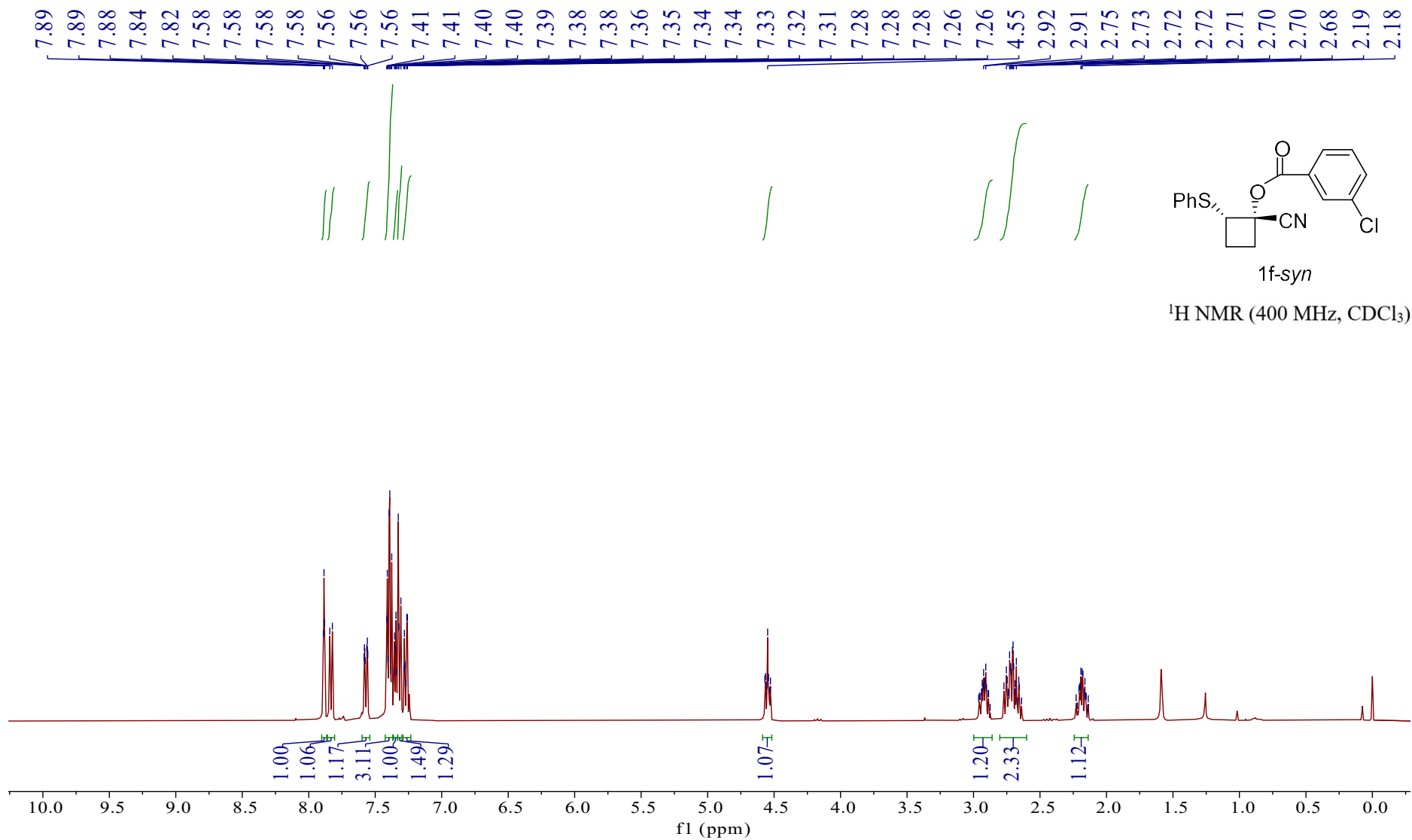


NMR-21

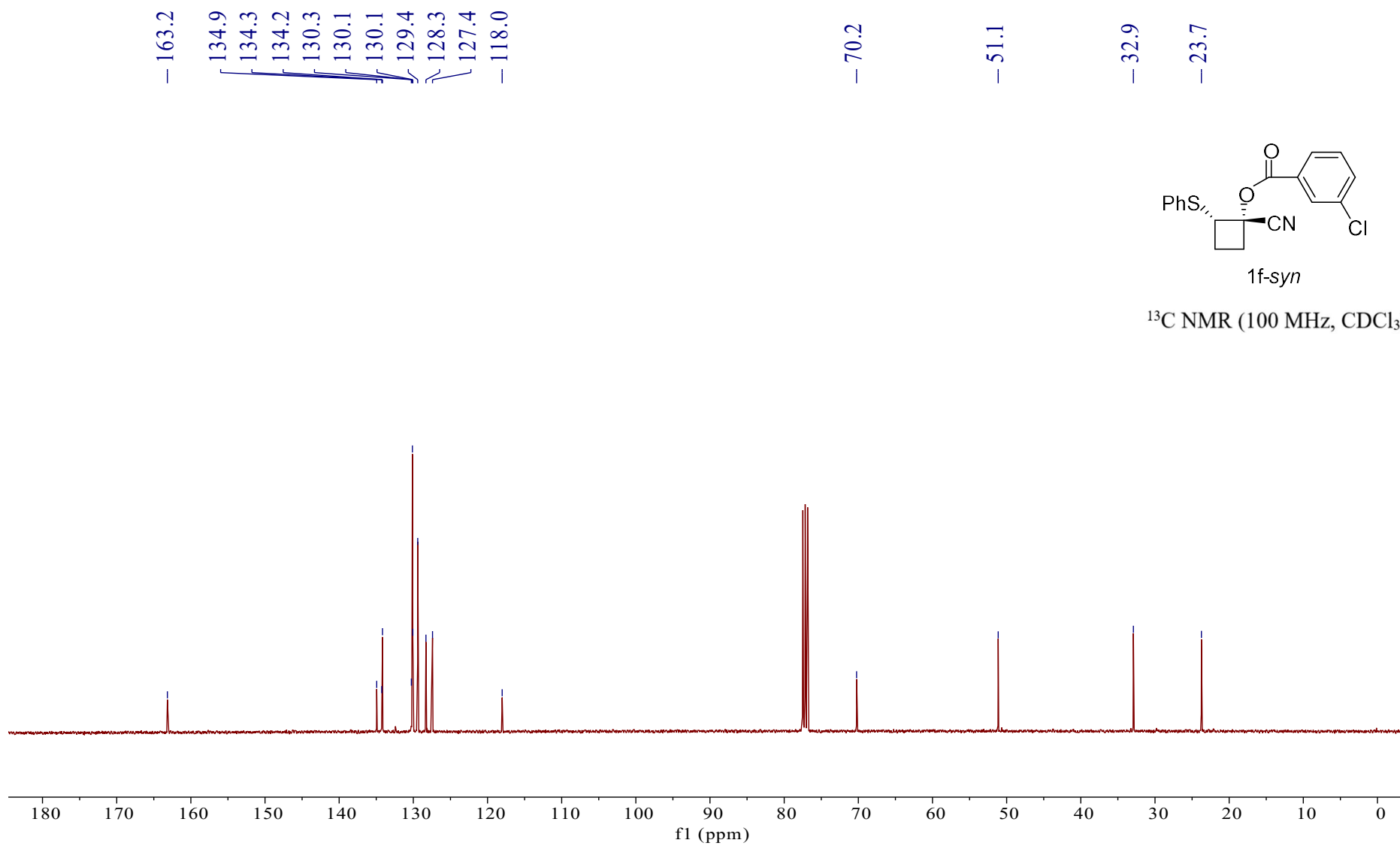




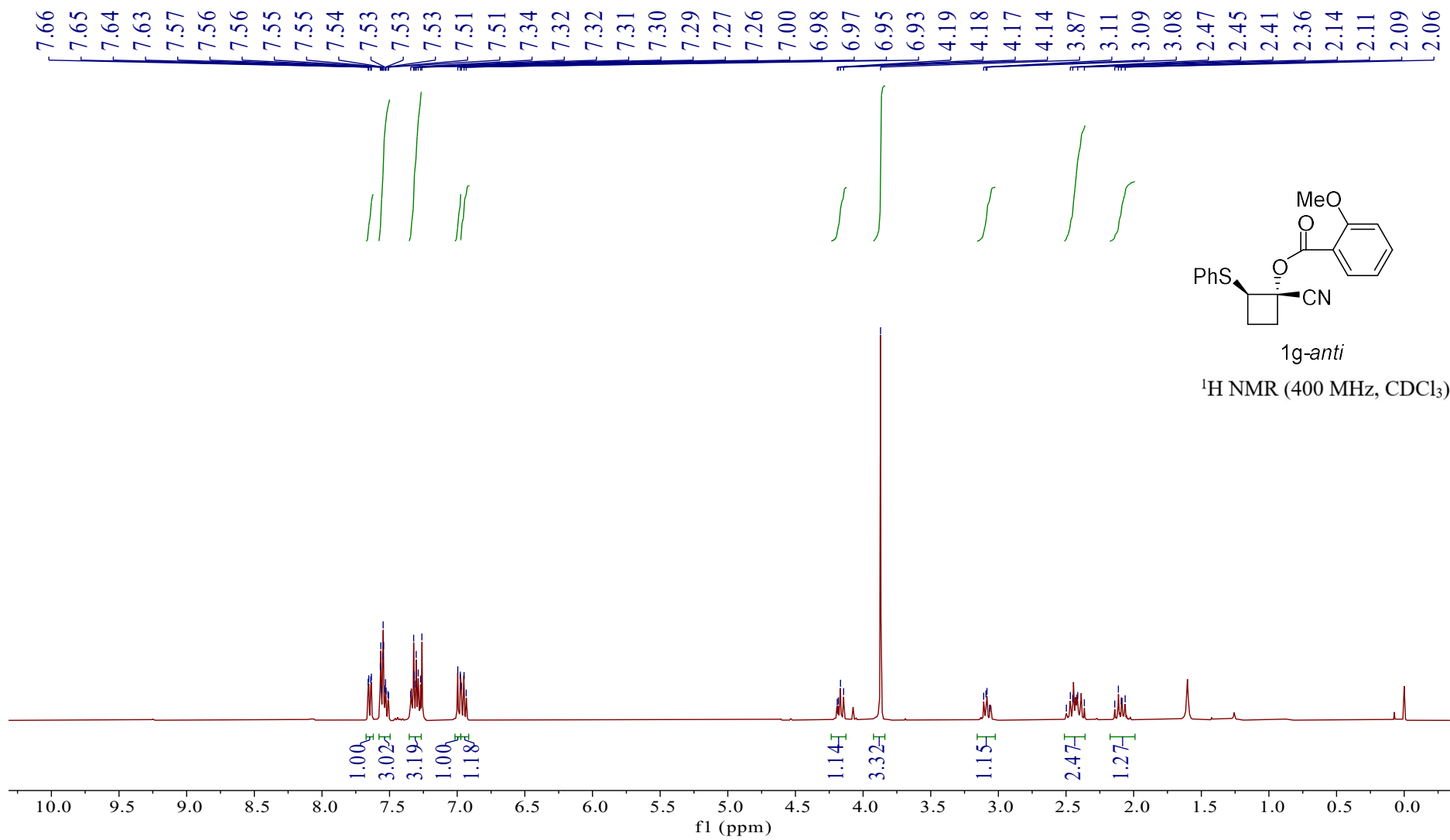
NMR-23

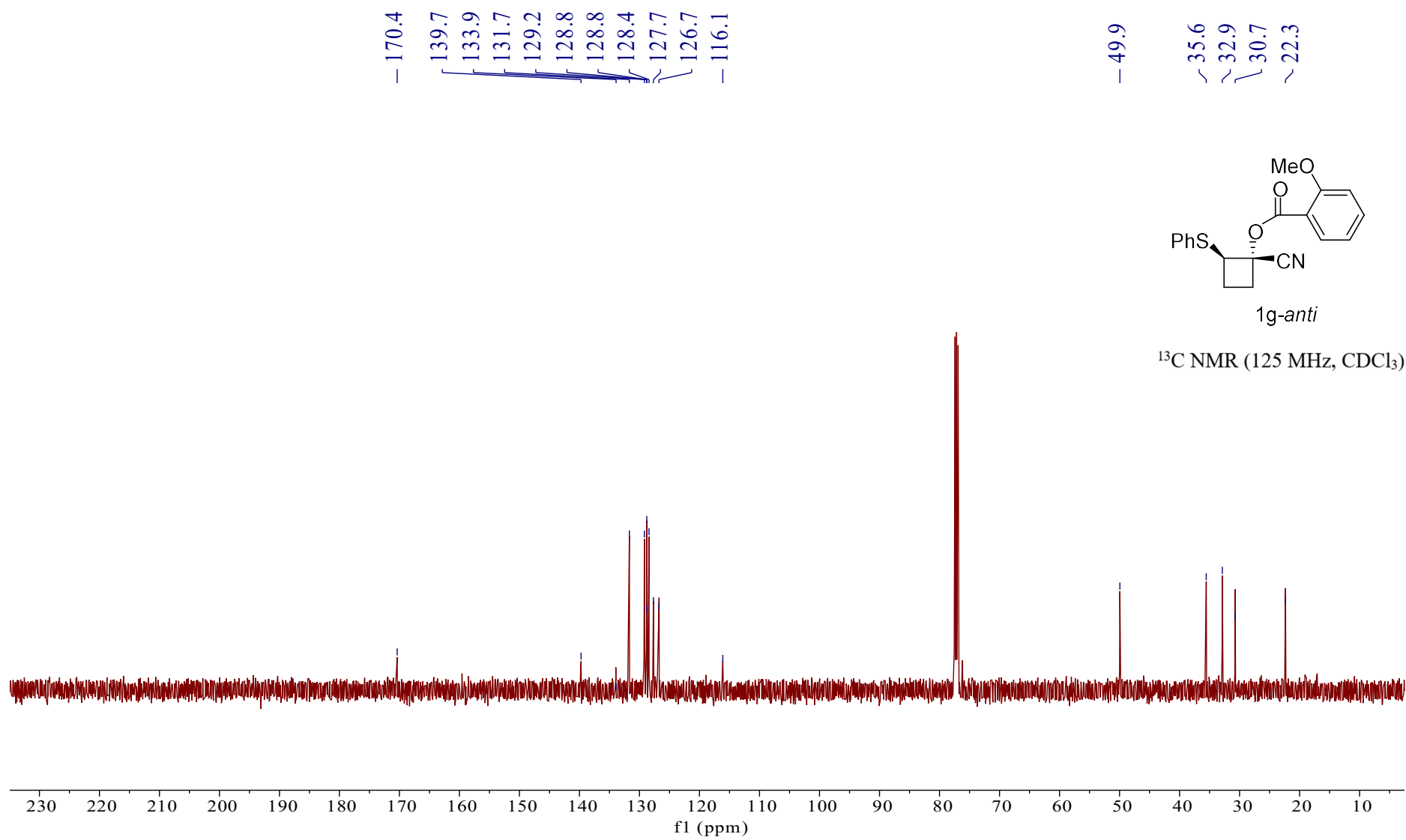


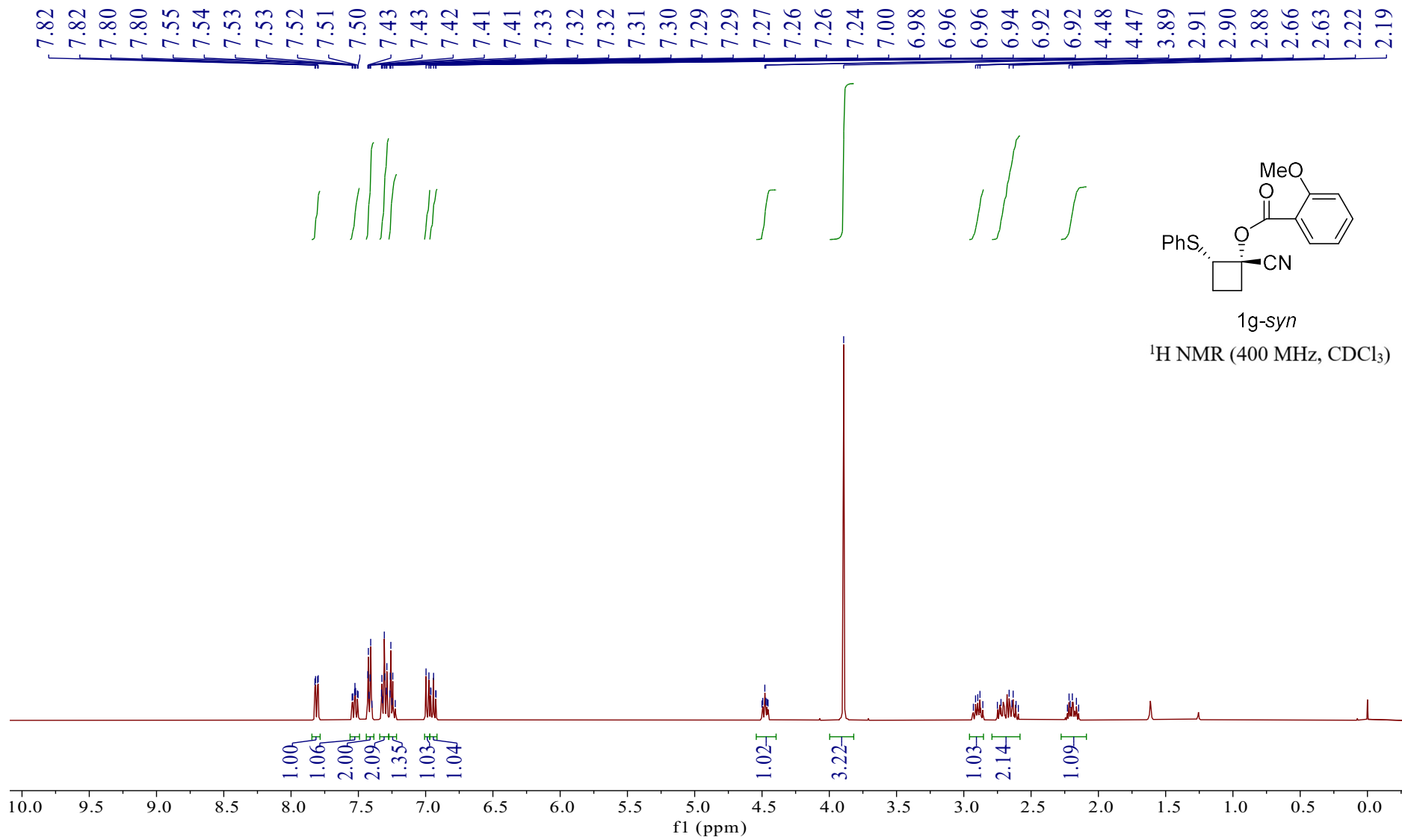
NMR-24



NMR-25







NMR-28

~ 163.2
~ 160.6

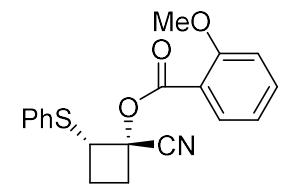
135.2
134.6
132.7
130.5
129.3
127.3
120.3
118.4
117.4
112.2

- 70.0

- 56.0
- 51.4

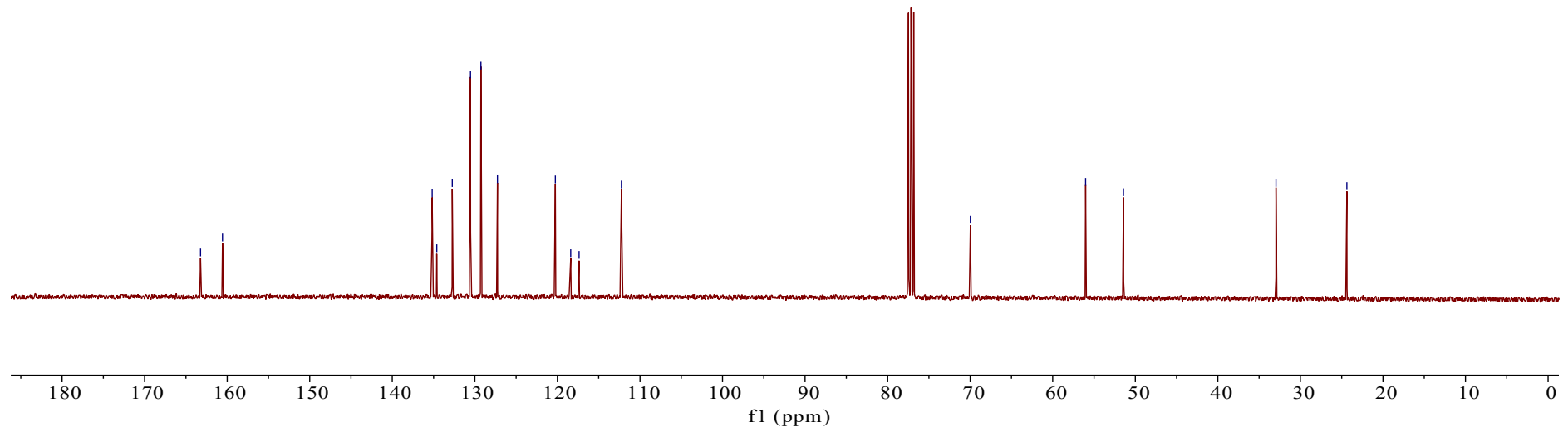
- 33.0

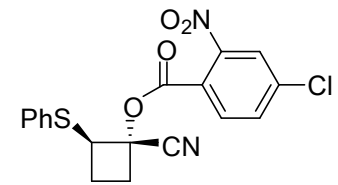
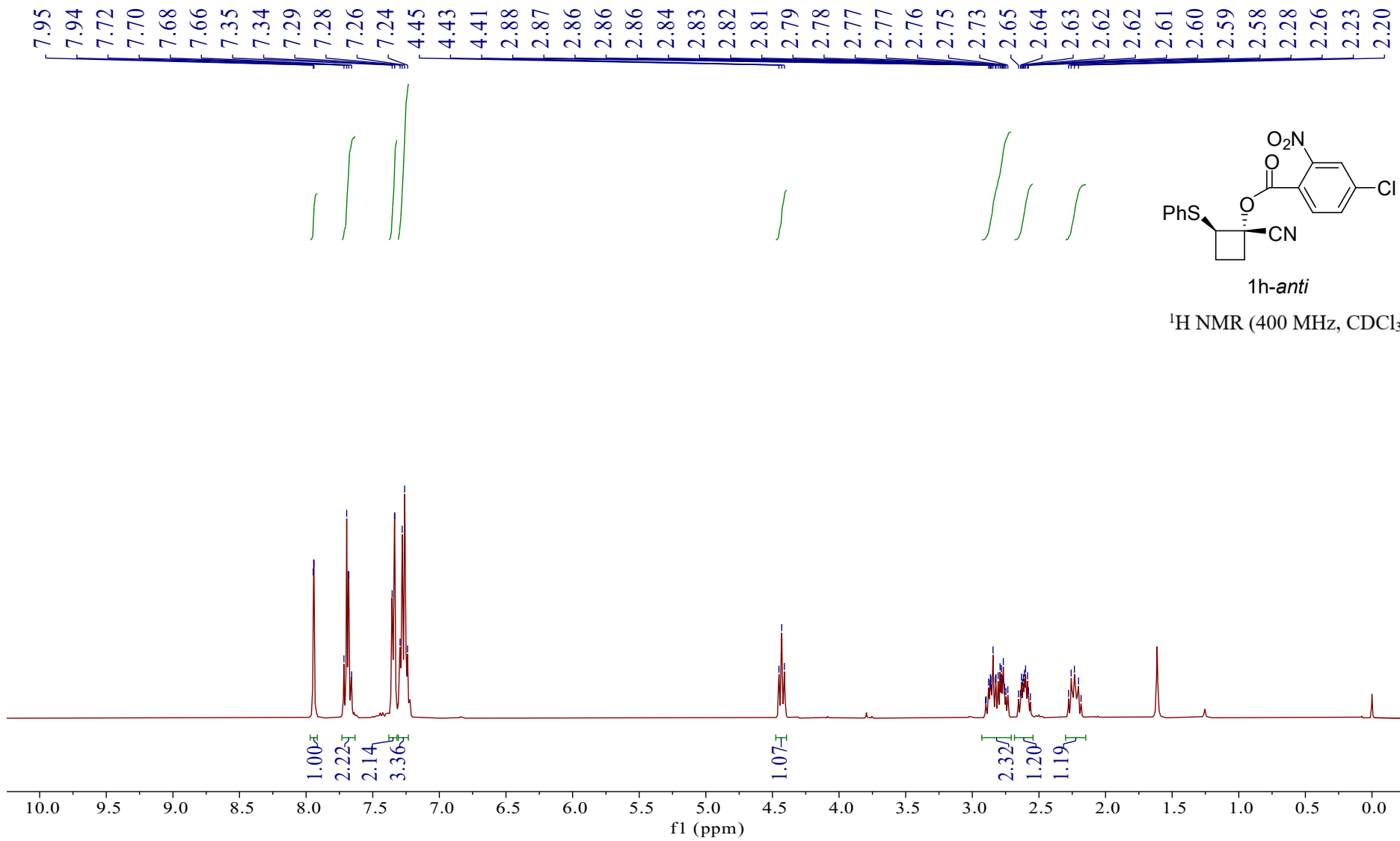
- 24.4



1g-syn

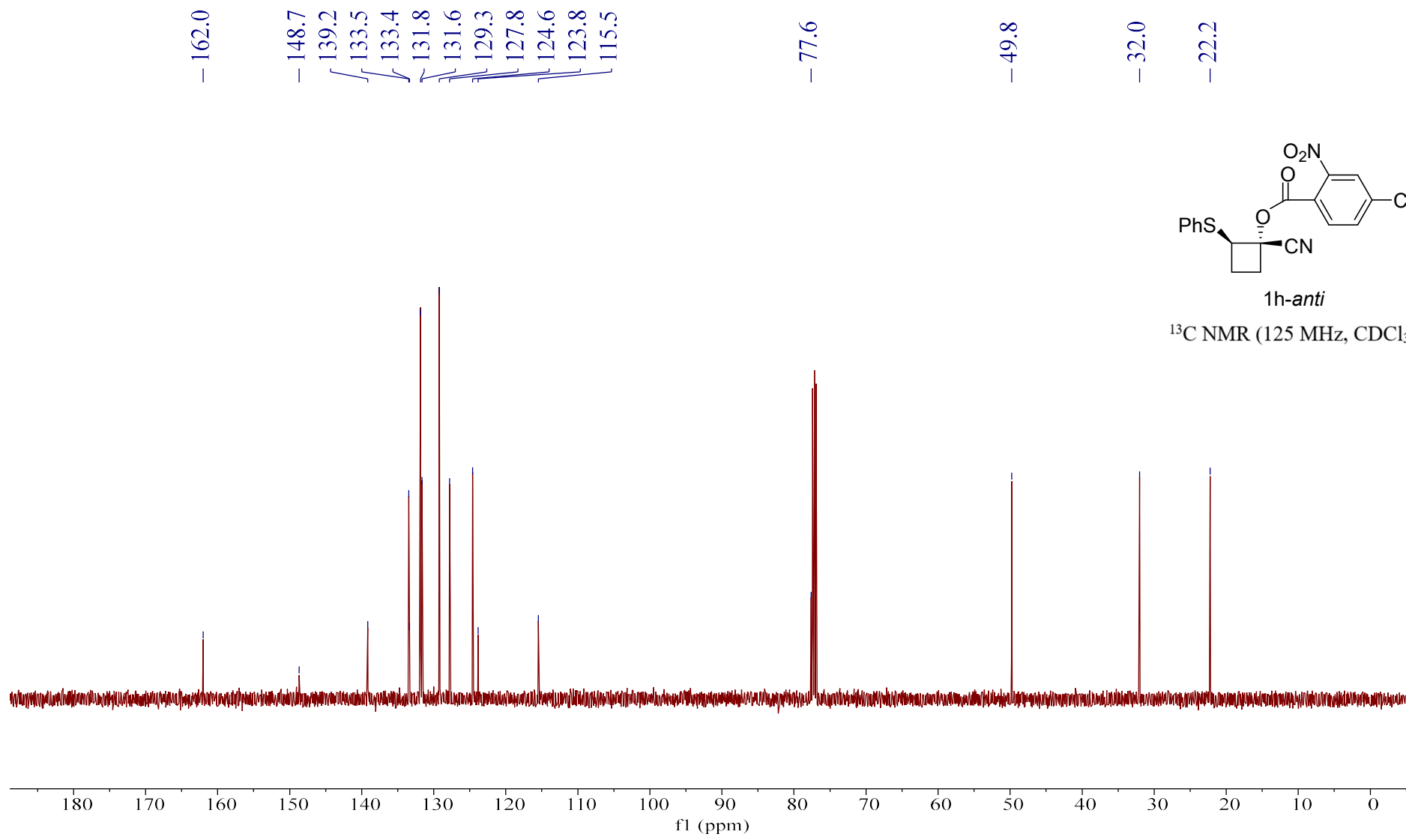
¹³C NMR (100 MHz, CDCl₃)



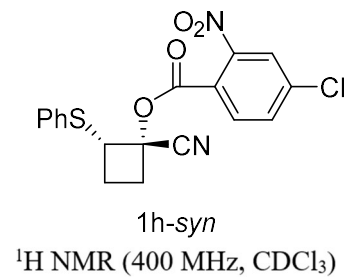
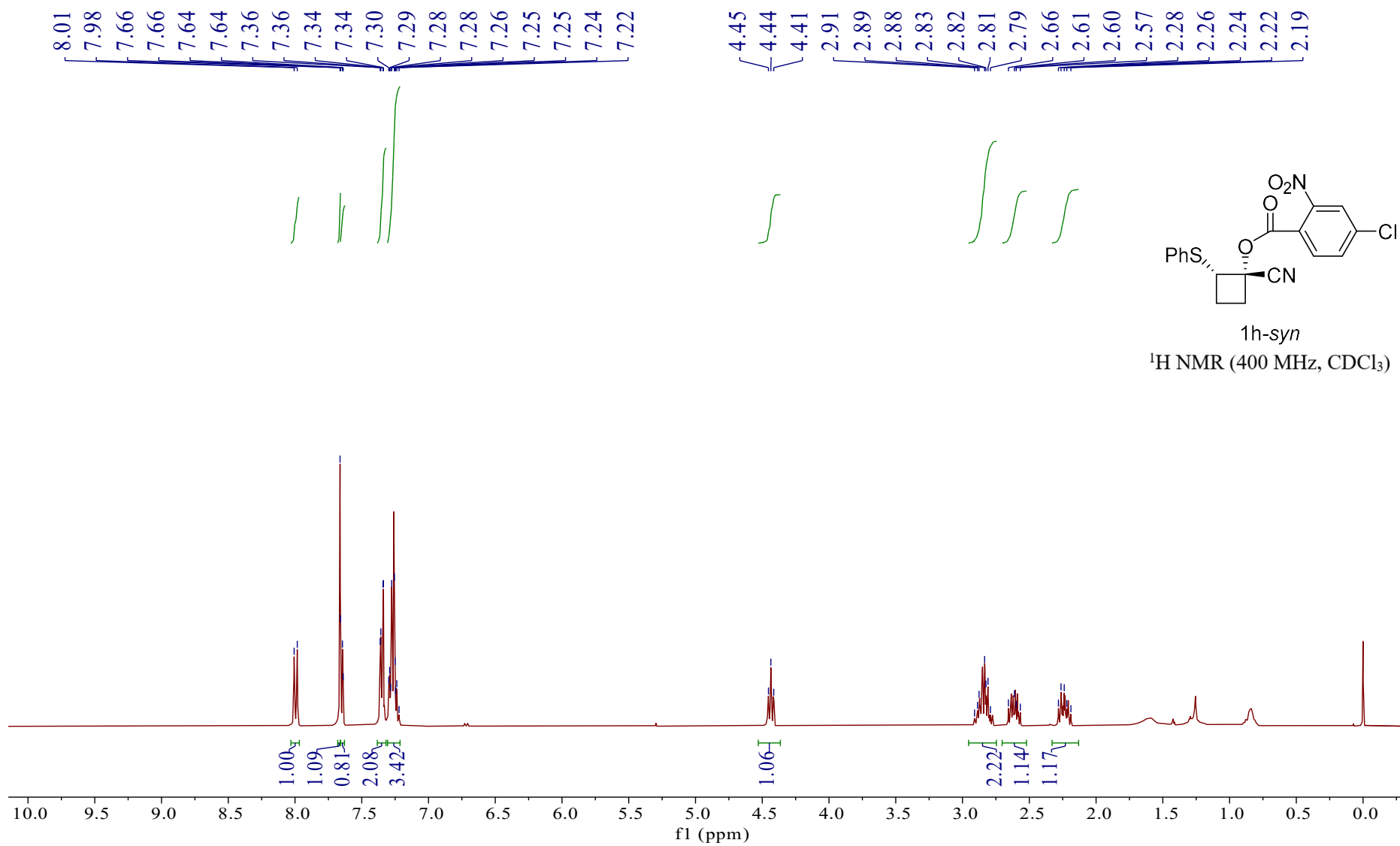


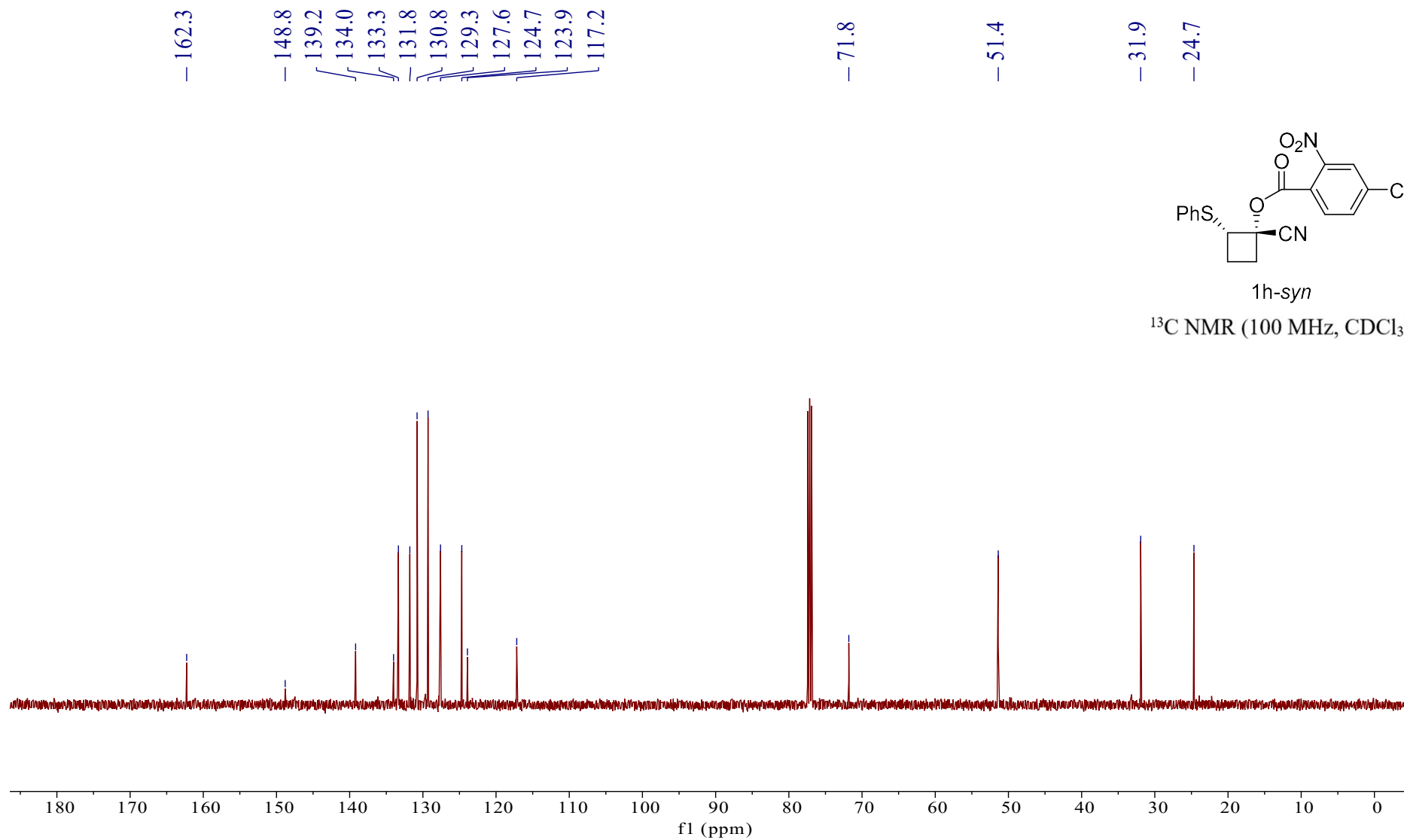
1h-anti

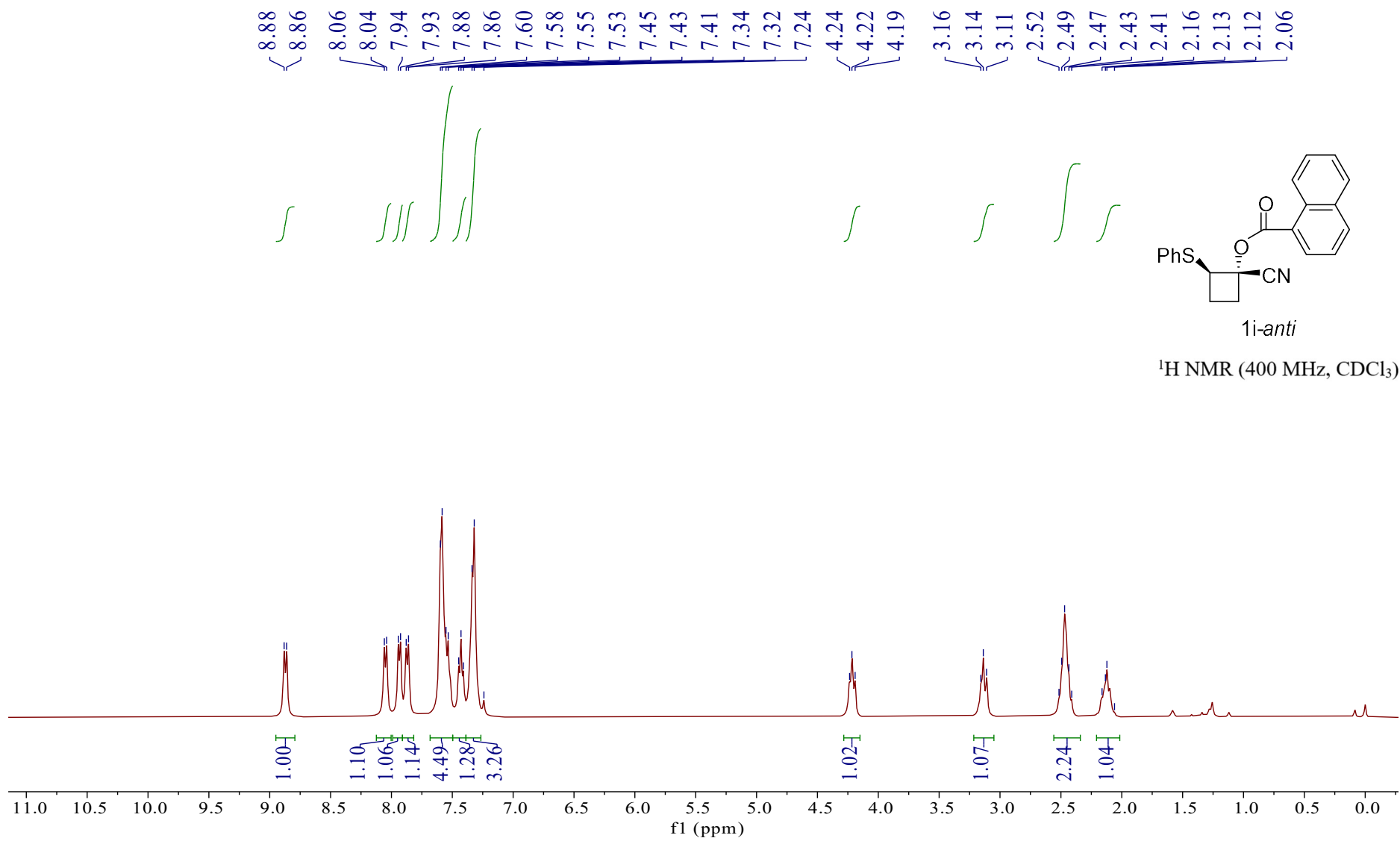
¹H NMR (400 MHz, CDCl₃)



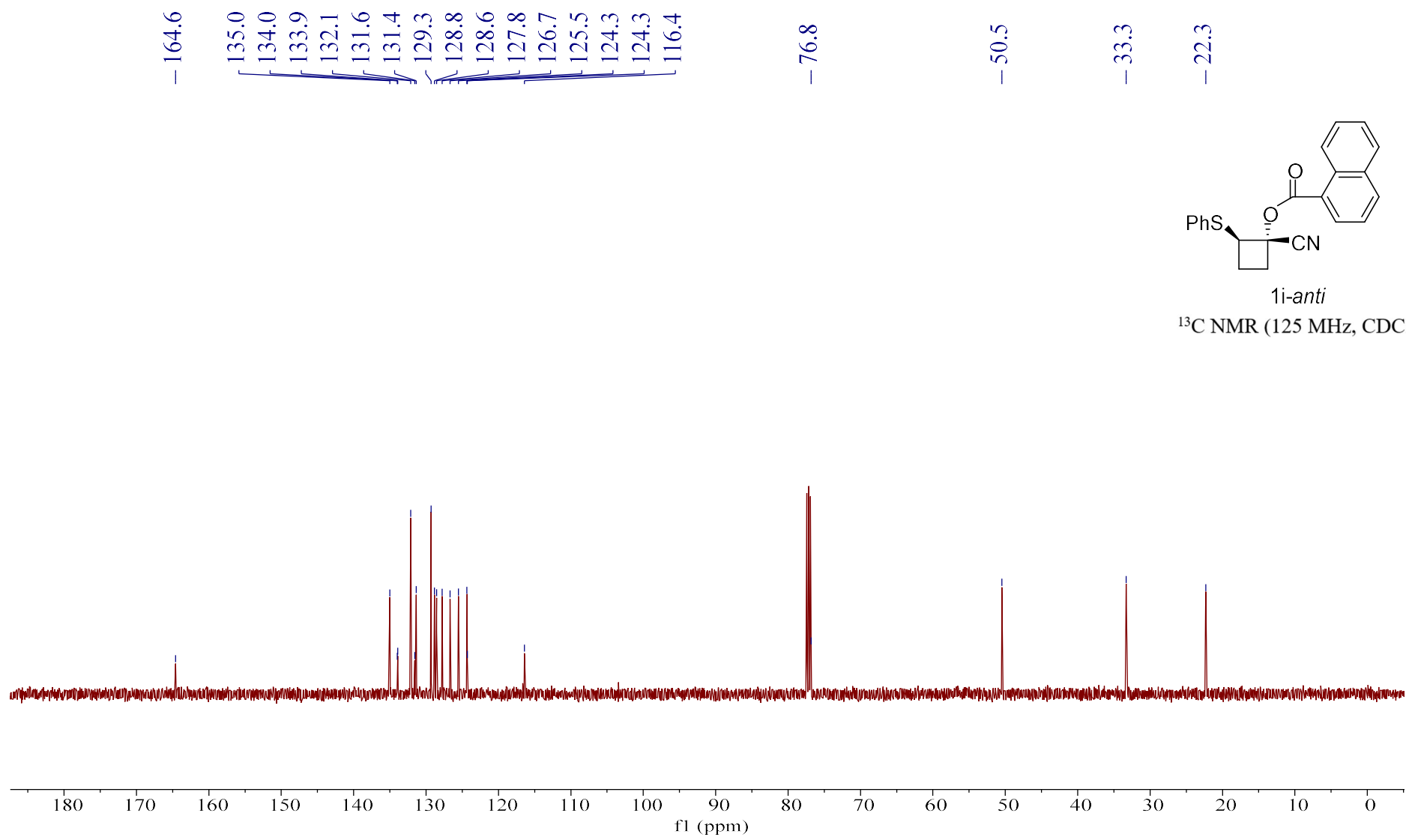
NMR-31

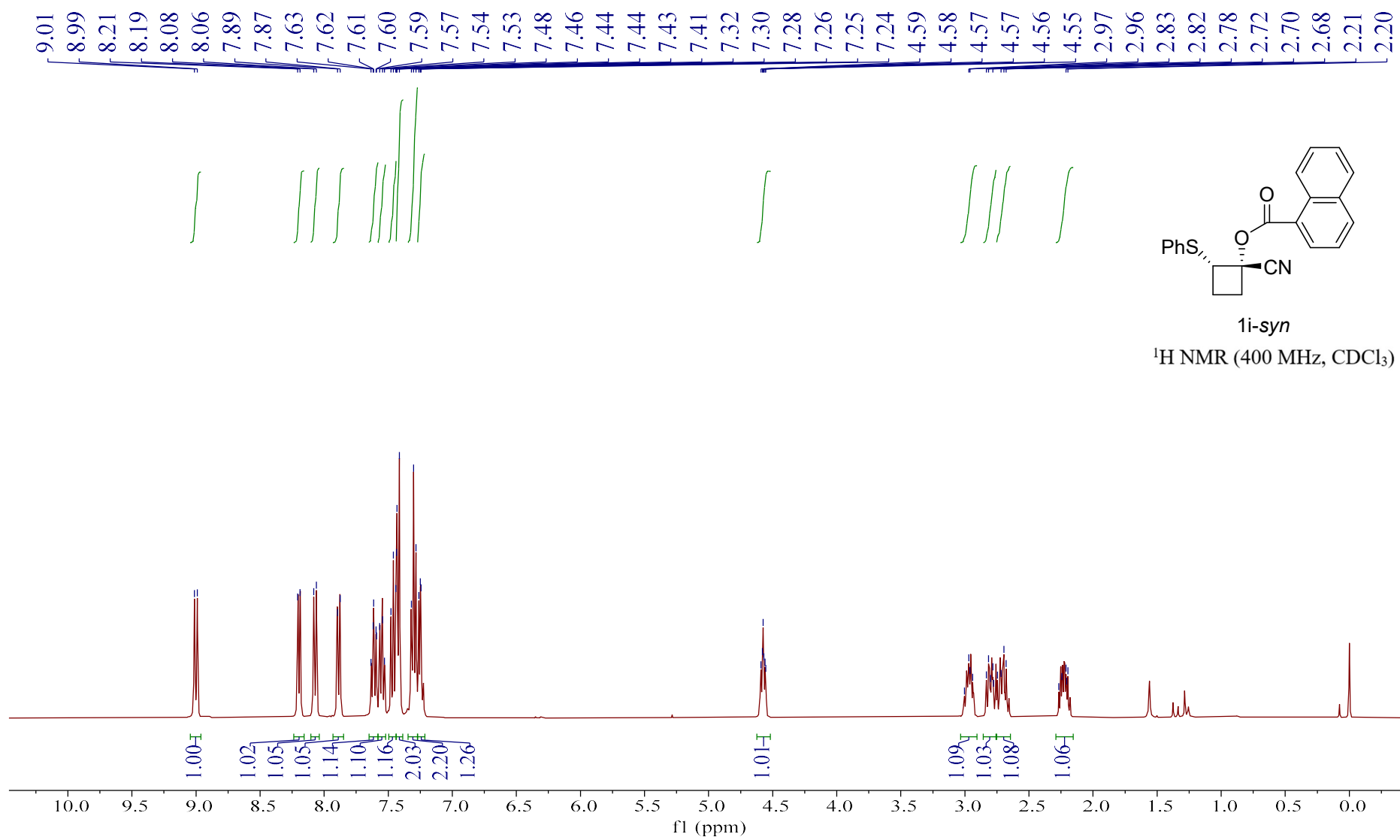


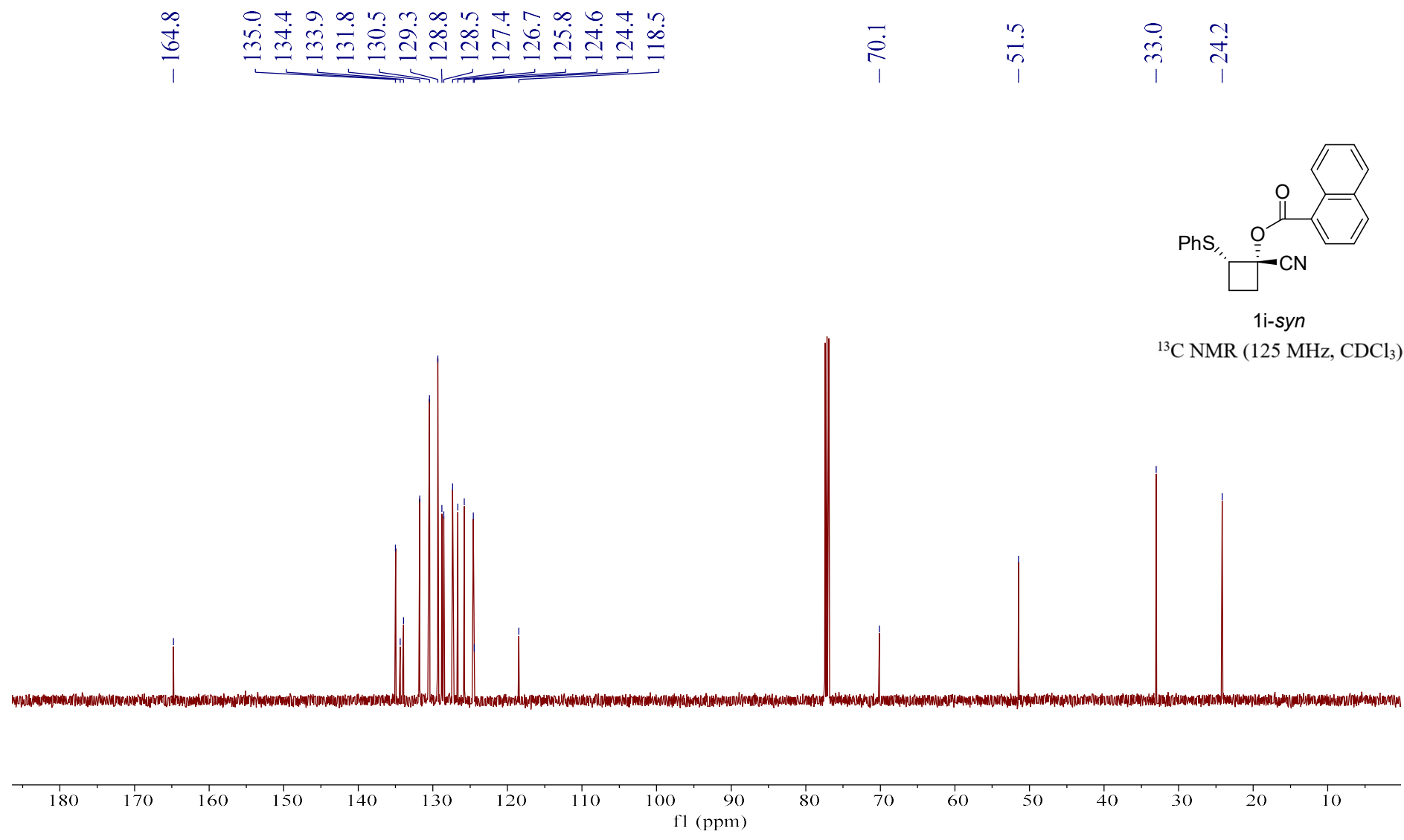


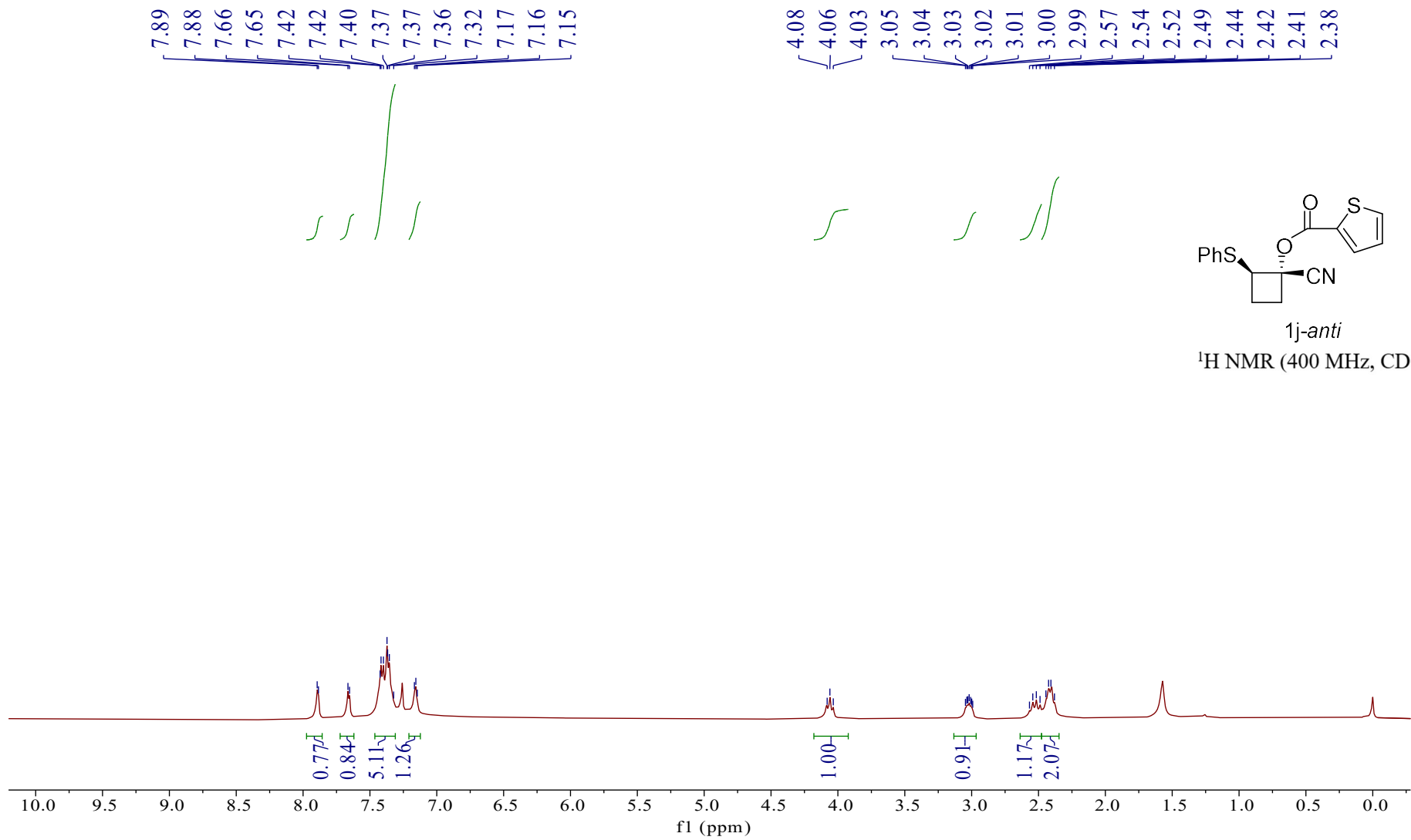


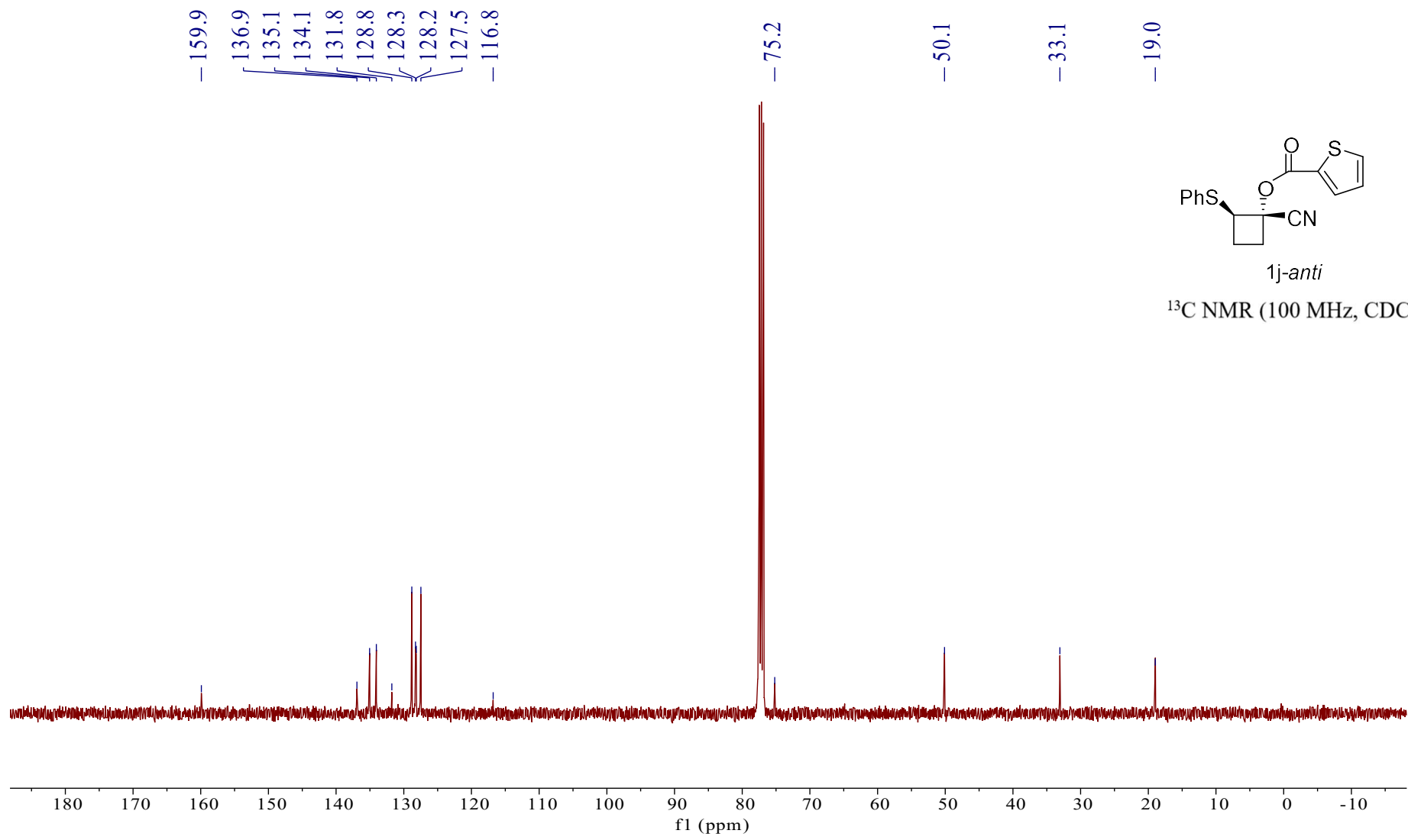
NMR-34



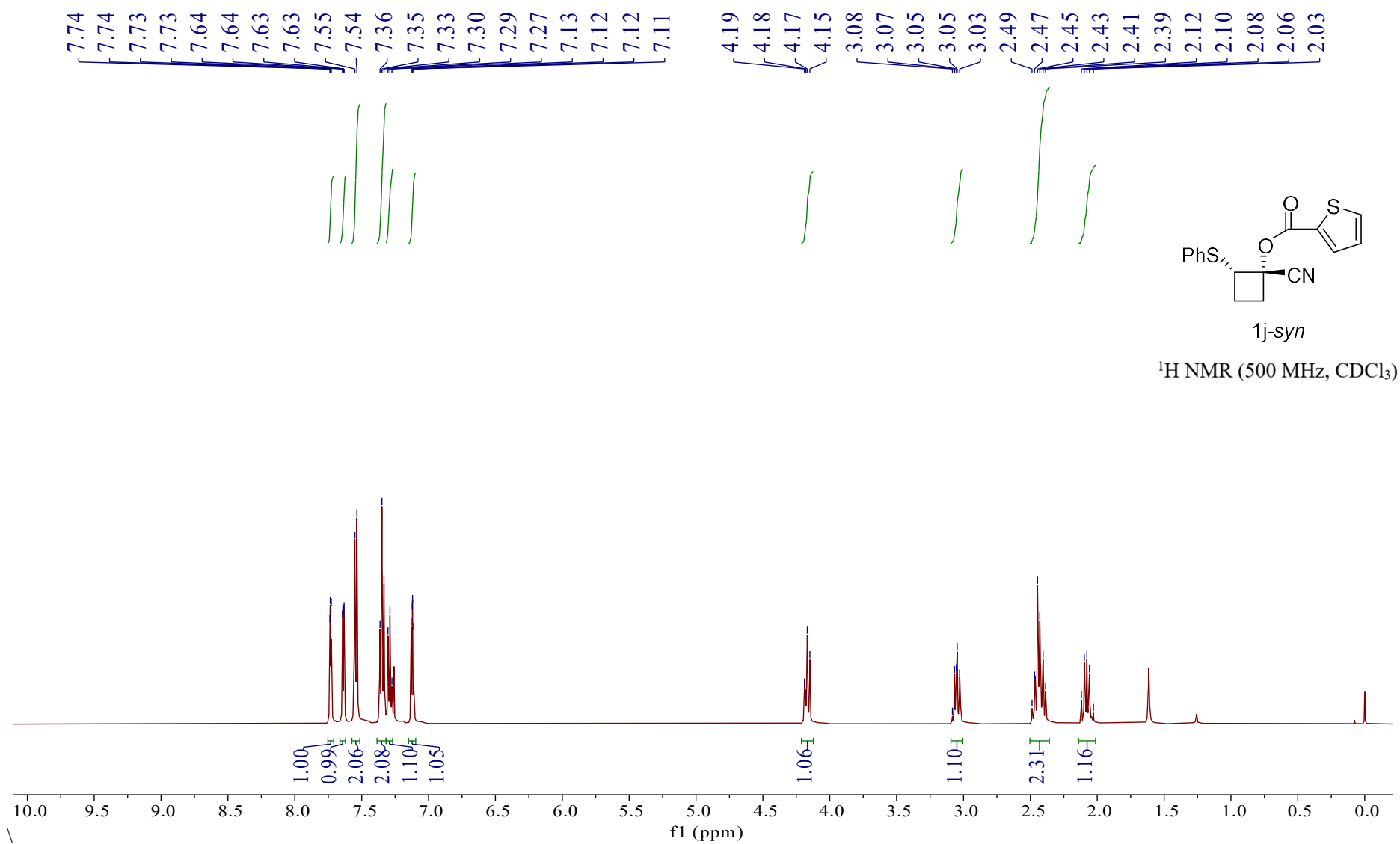


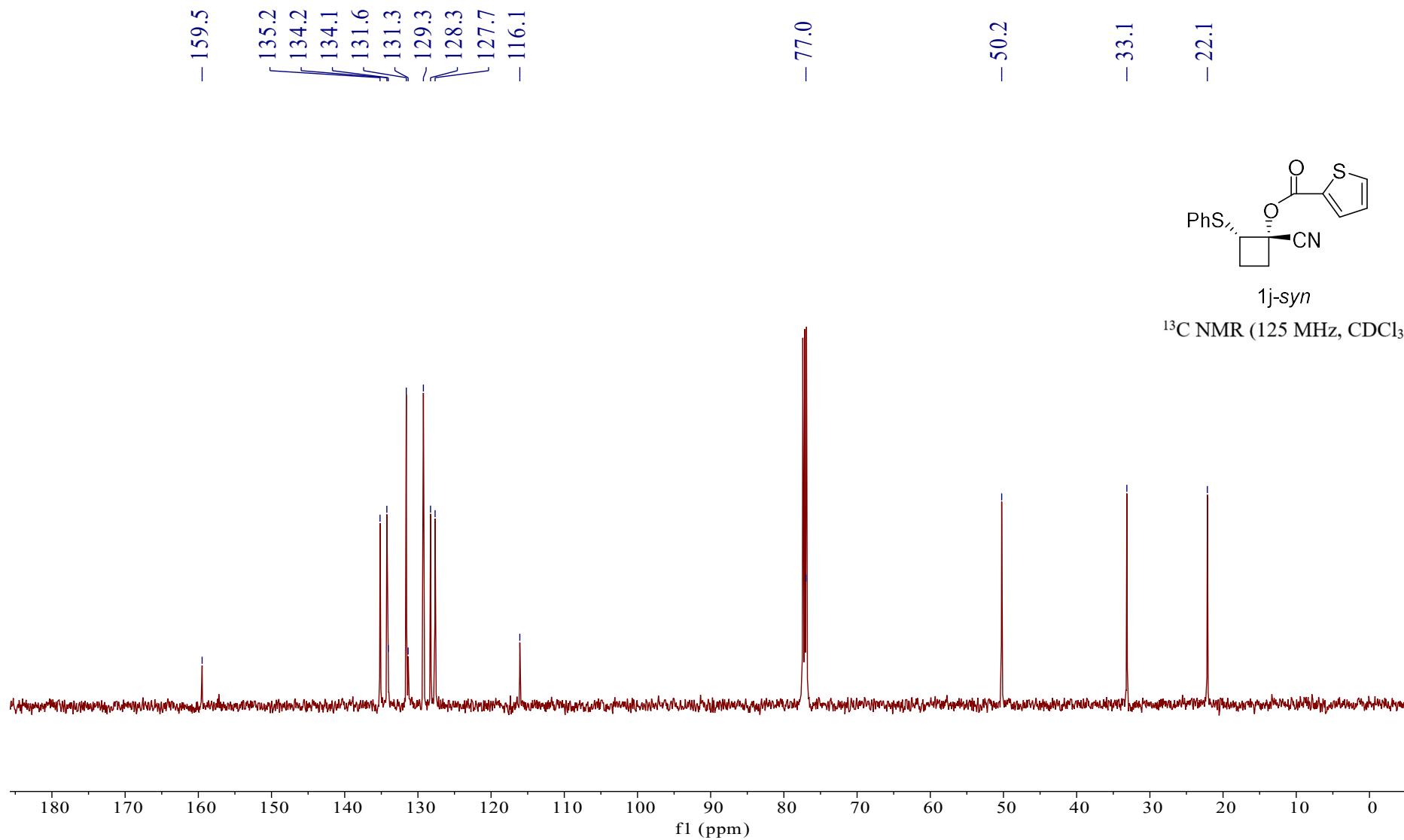




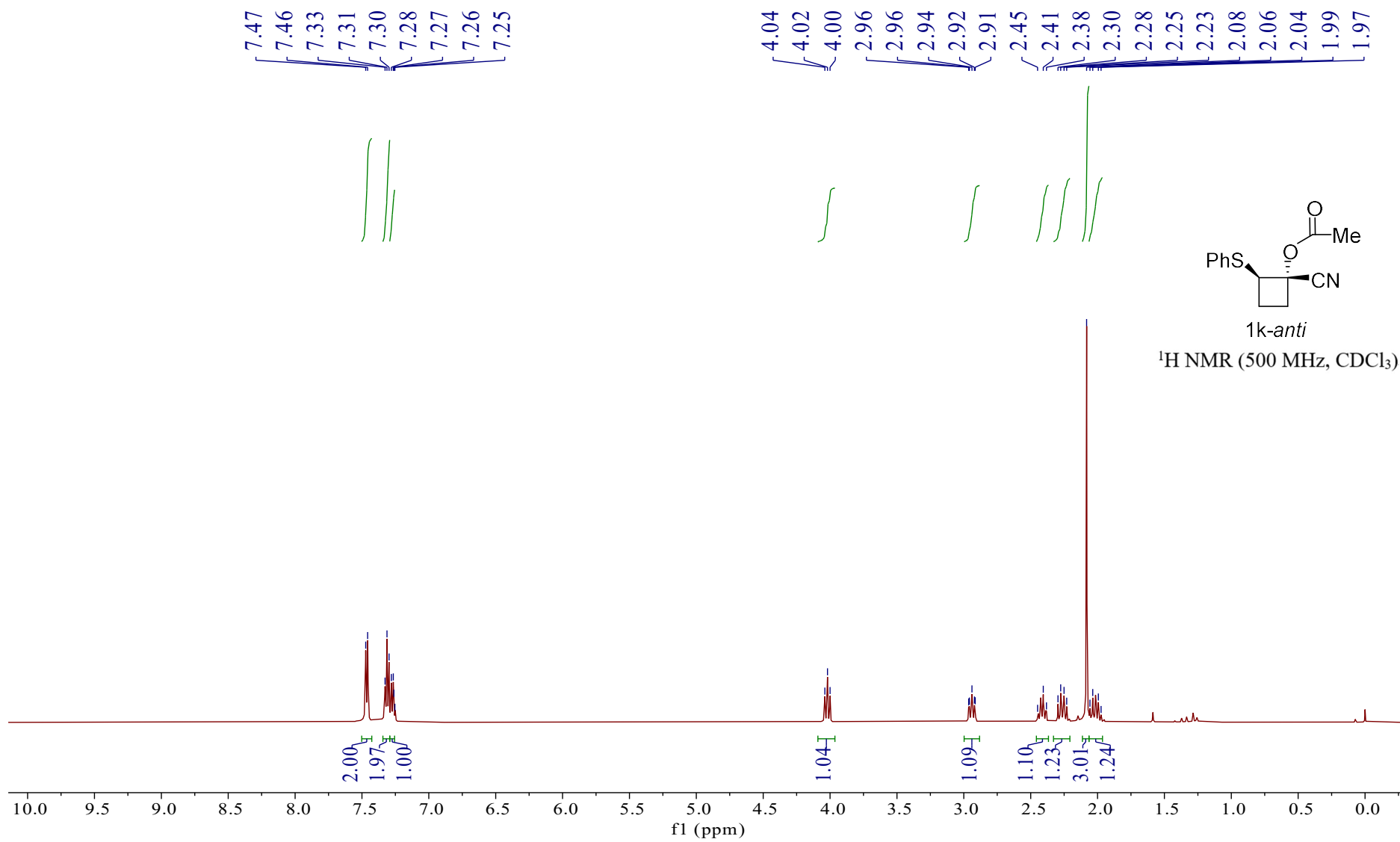


NMR-39





NMR-41



NMR-42

-168.4

133.9

131.6

129.2

127.6

-116.2

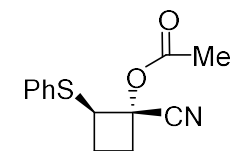
-76.1

-49.8

-32.9

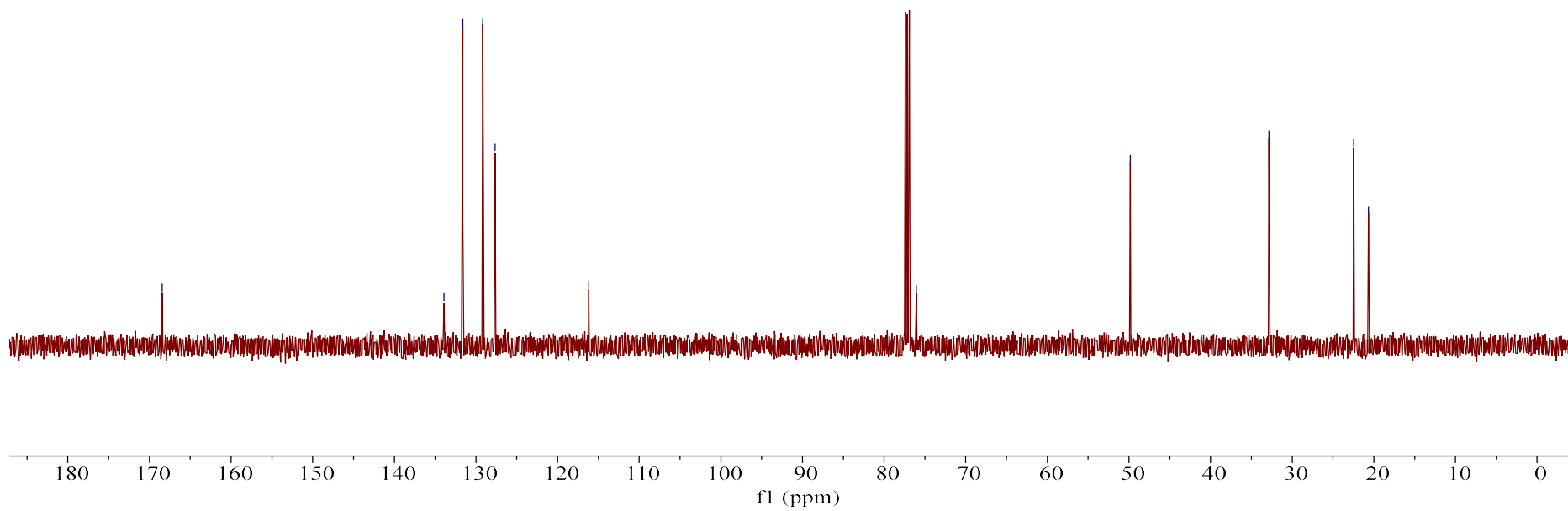
22.5

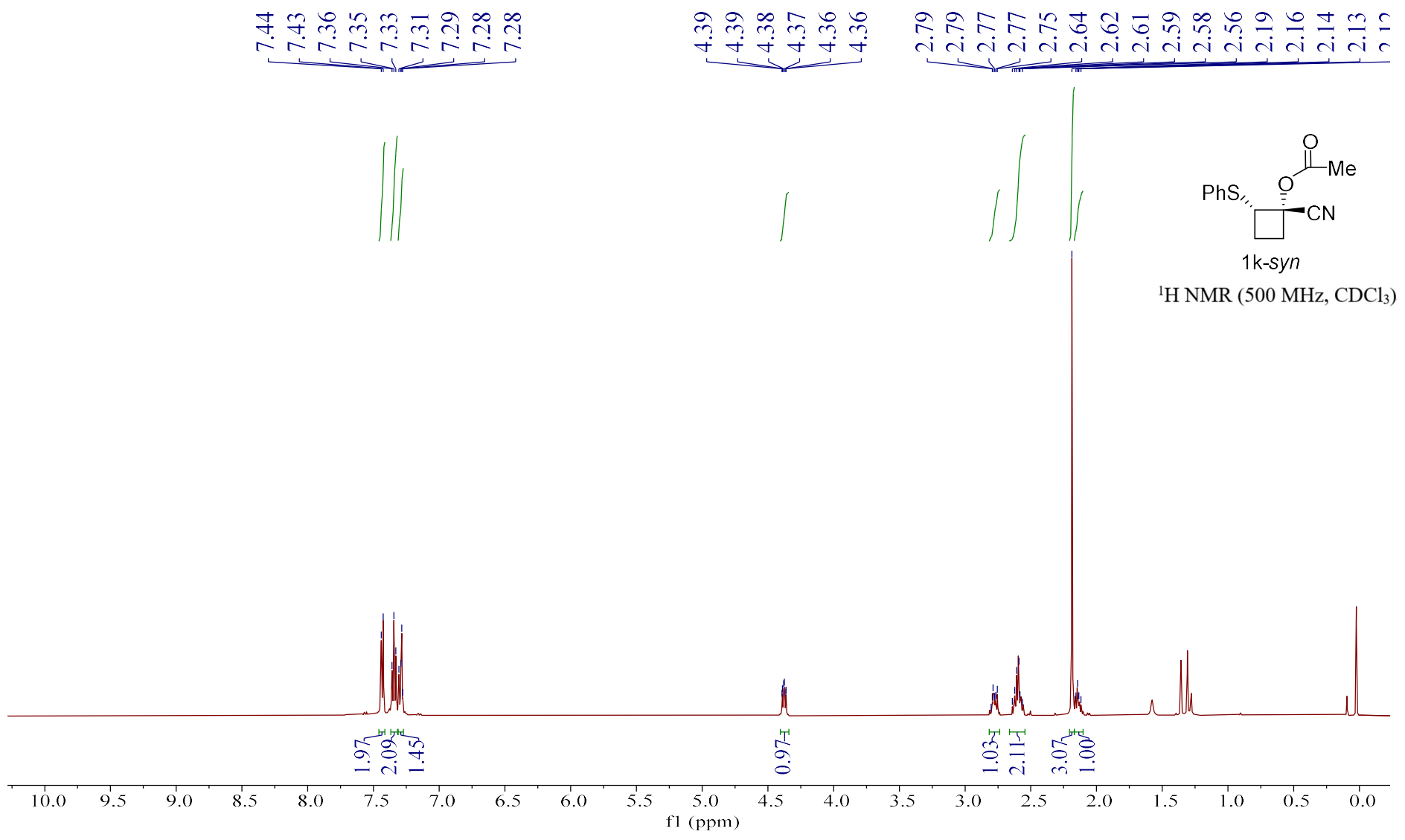
20.6



1k-anti

¹³C NMR (125 MHz, CDCl₃)





-168.7

134.0

131.2

129.3

127.7

-118.2

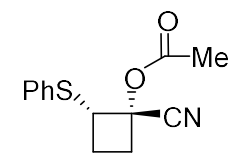
-69.9

-51.6

32.6

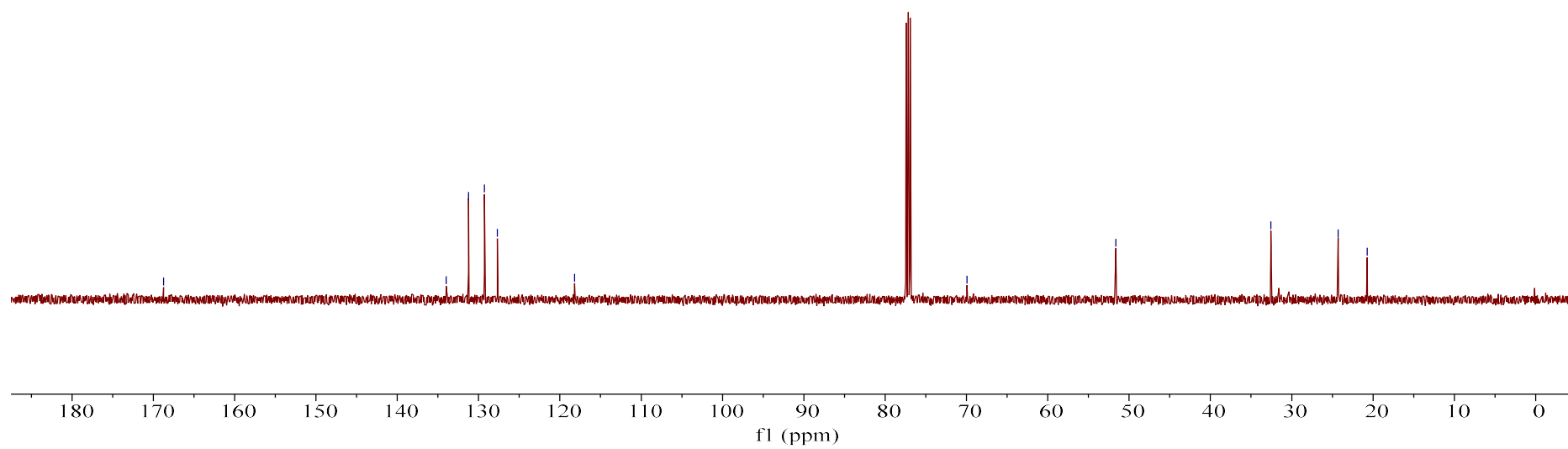
24.3

20.7

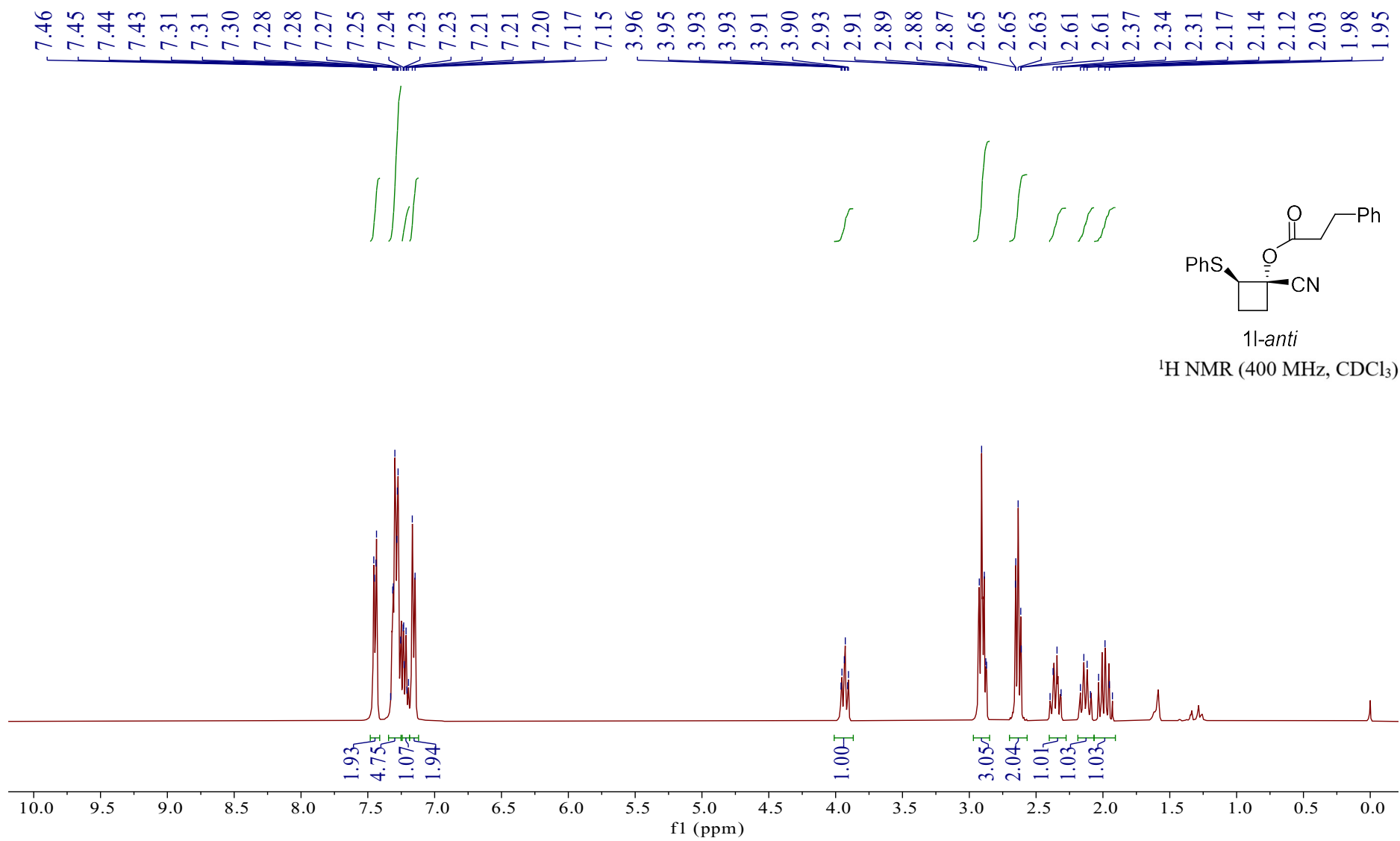


1k-syn

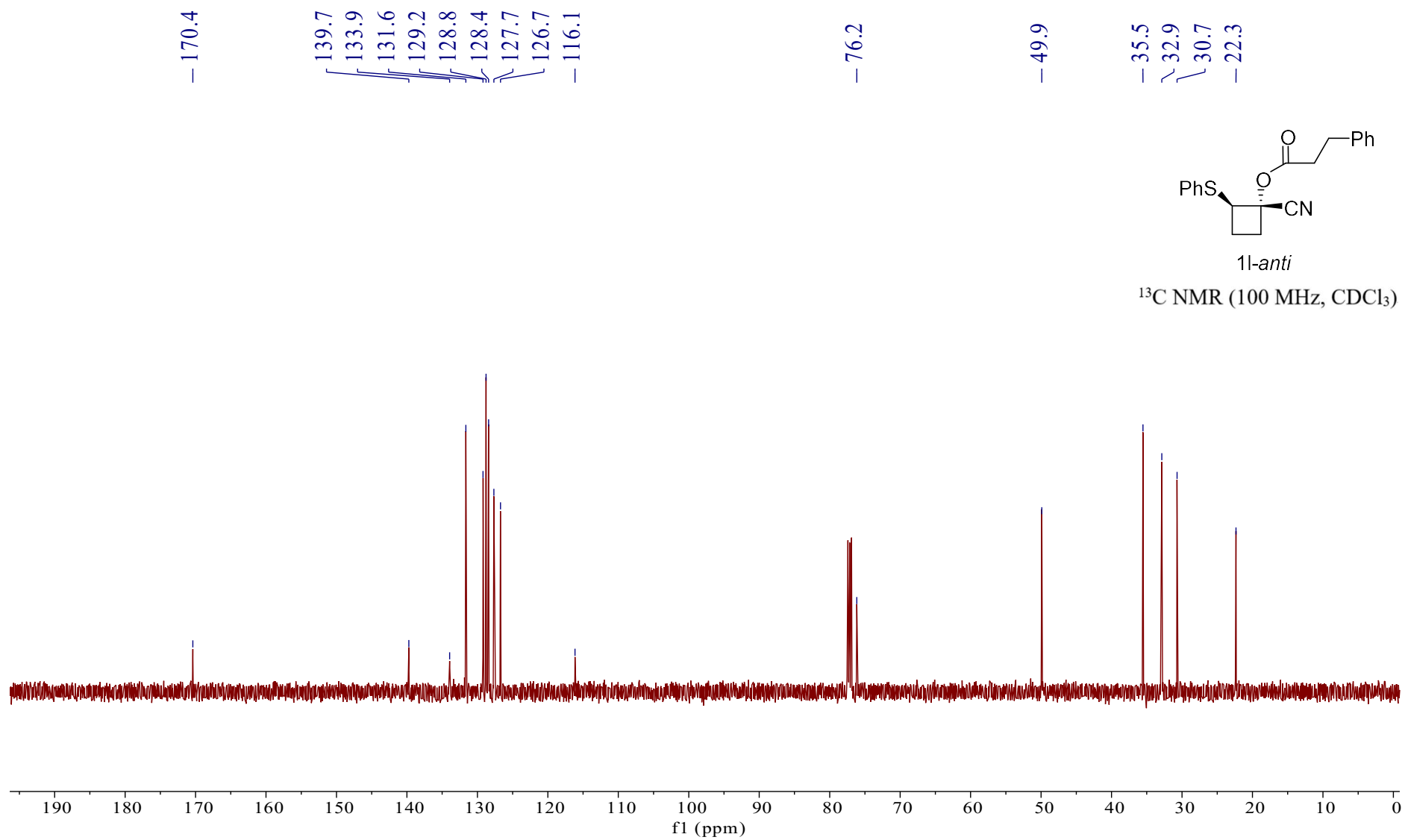
¹³C NMR (125 MHz, CDCl₃)



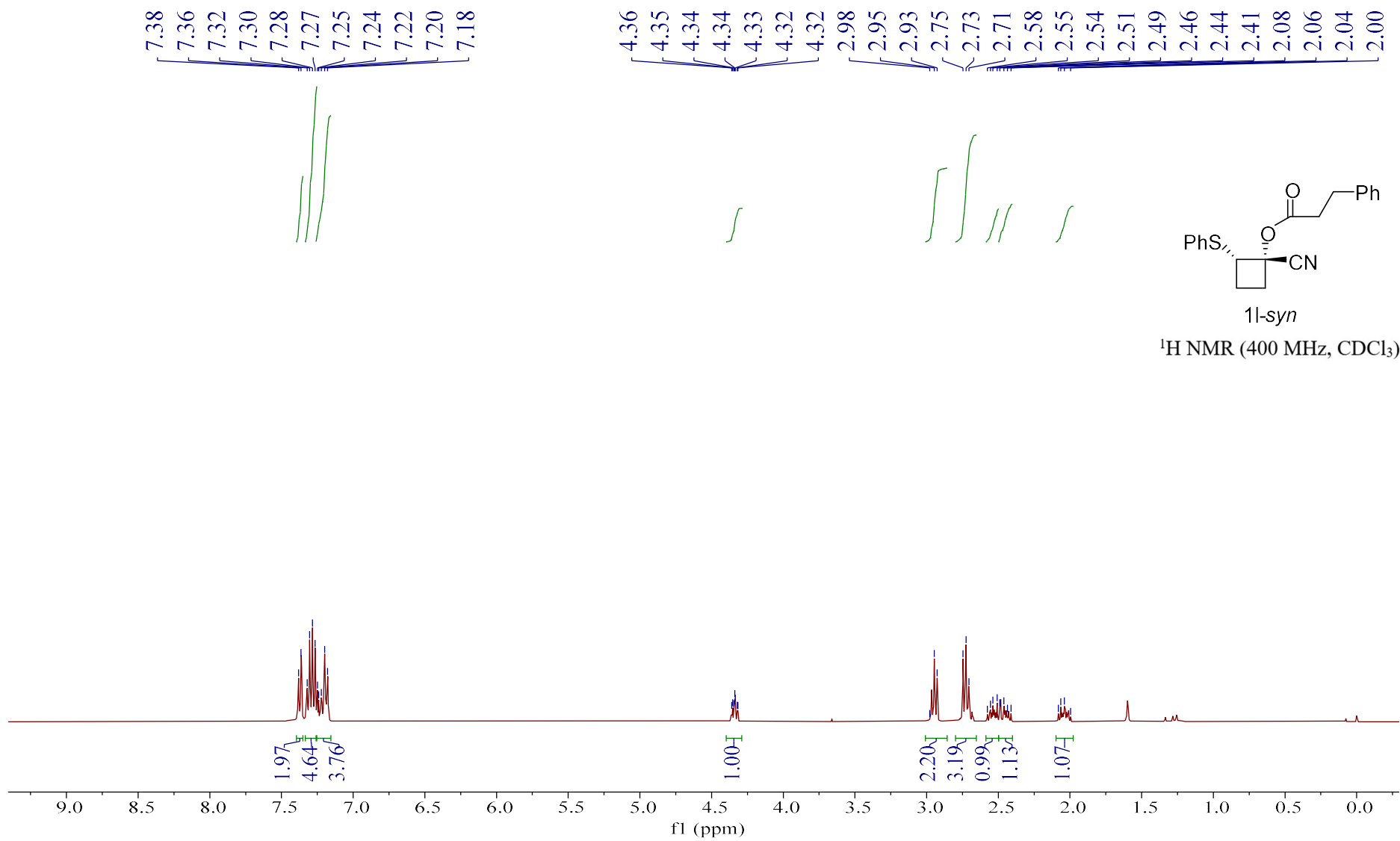
NMR-45



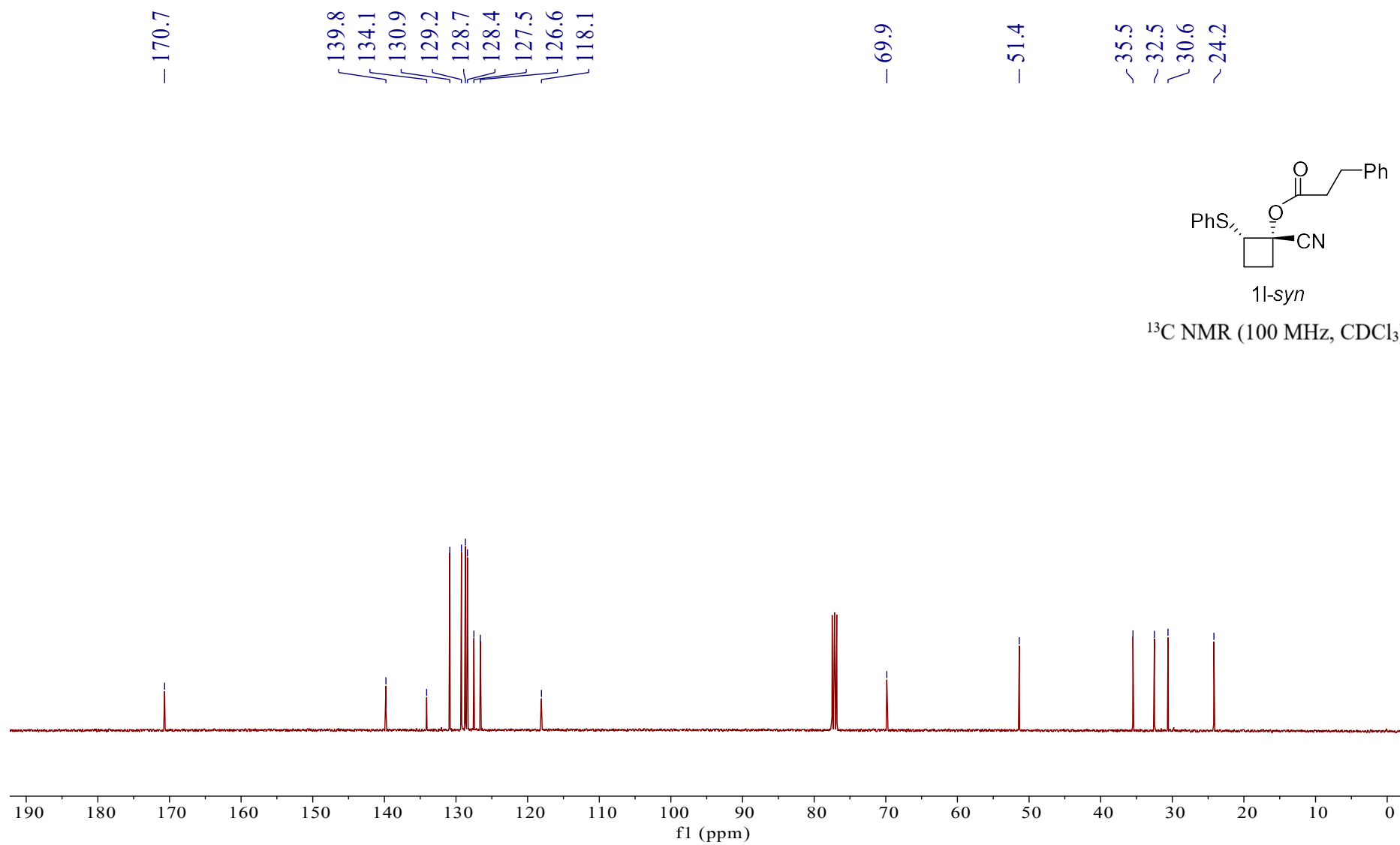
NMR-46

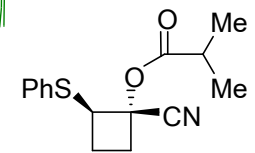
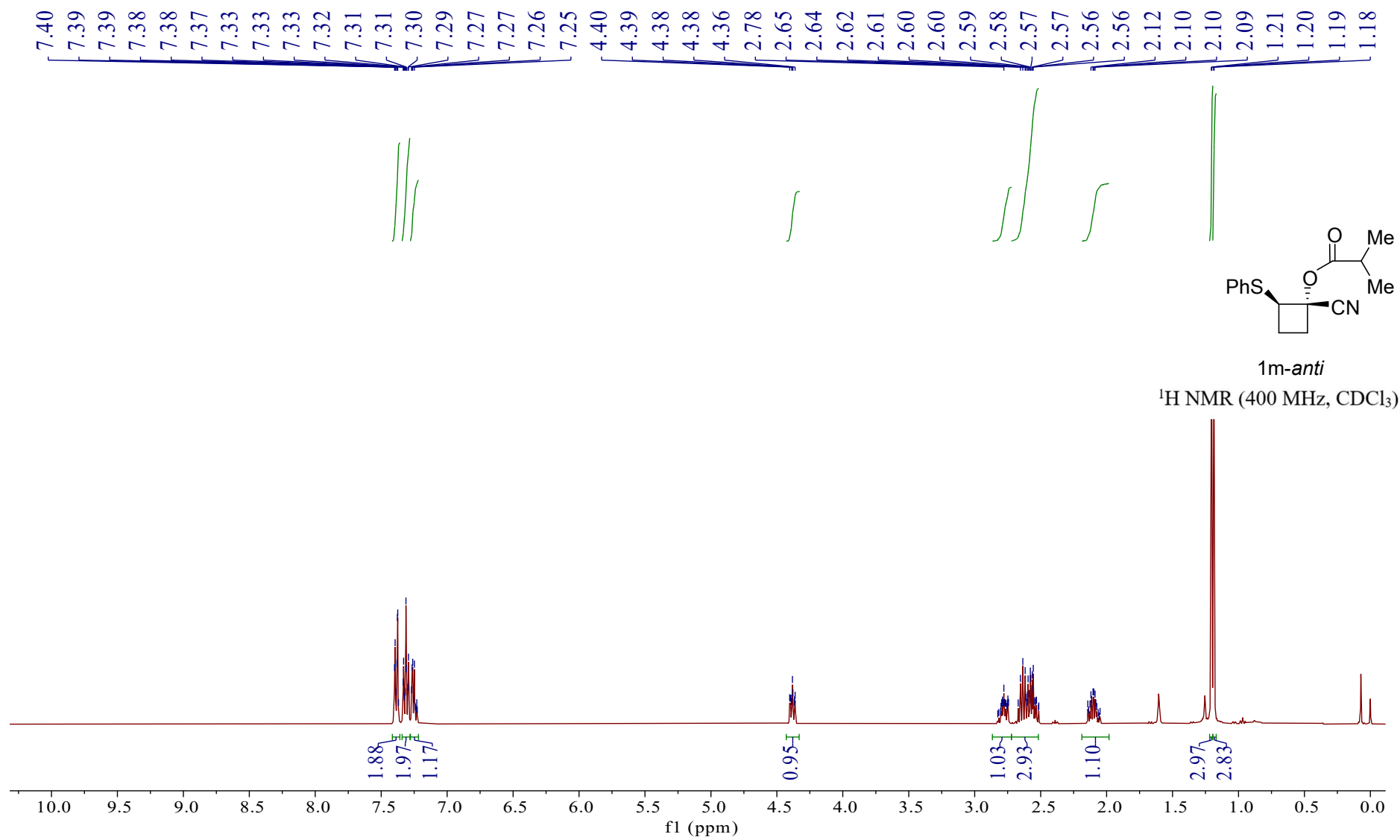


NMR-47



NMR-48





1m-anti

¹H NMR (400 MHz, CDCl₃)

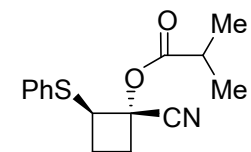
- 174.8

134.3
130.6
129.2
127.4
- 118.3

- 69.5

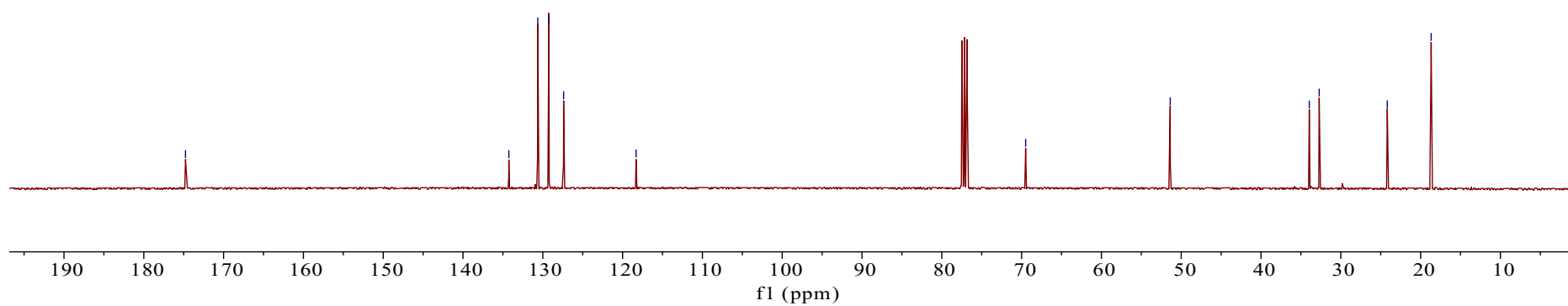
- 51.4

33.9
32.7
- 24.2
18.7

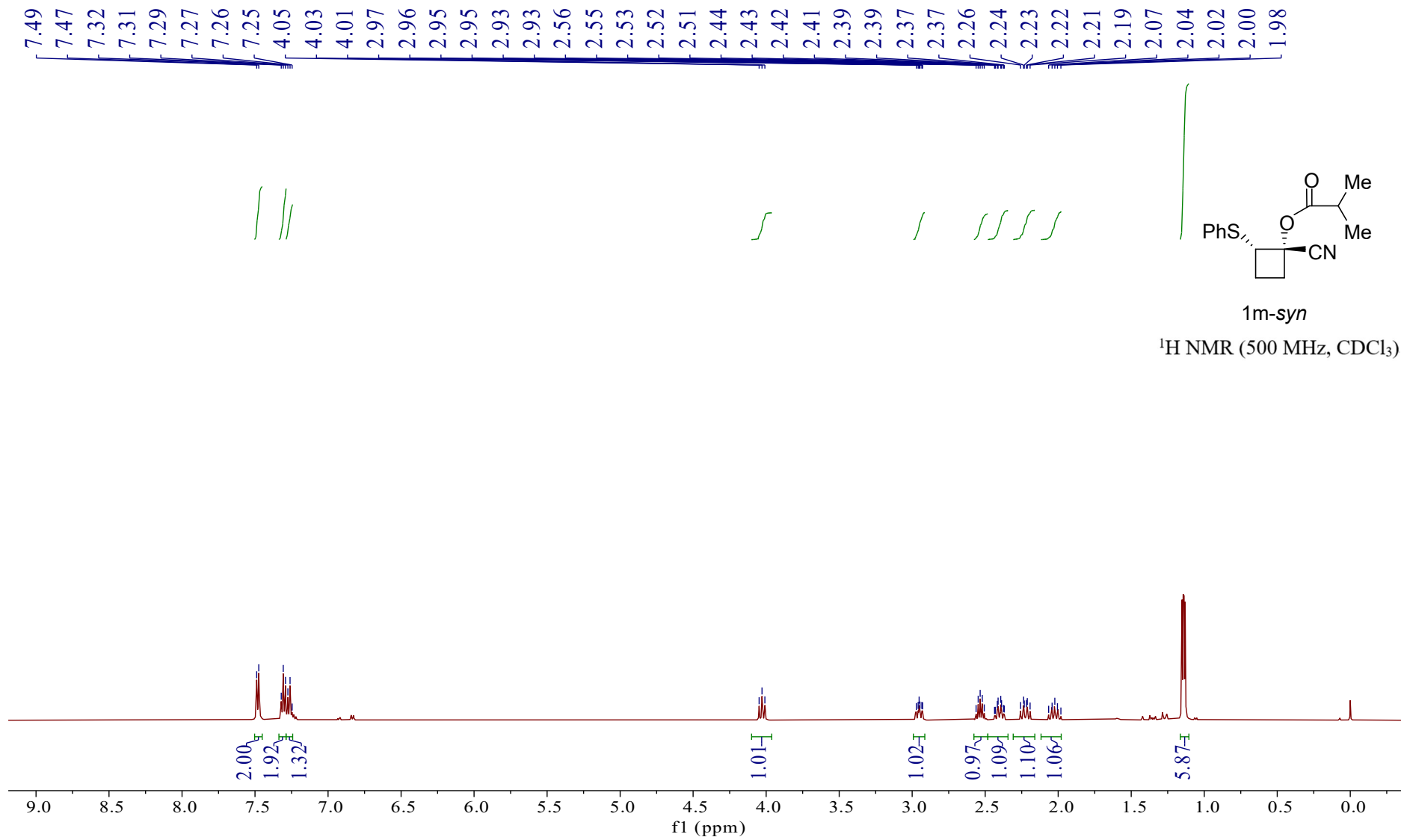


1m-anti

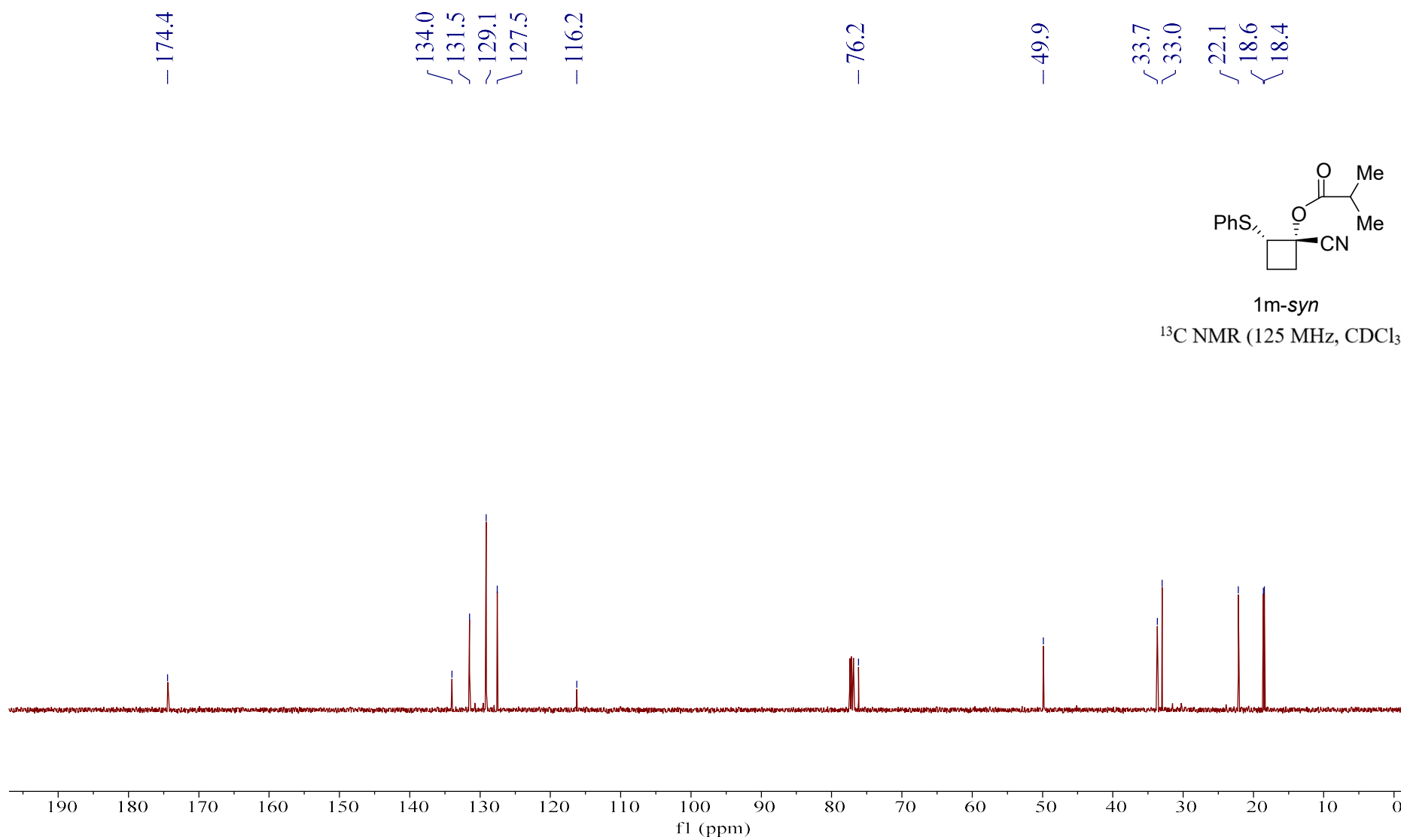
¹³C NMR (100 MHz, CDCl₃)

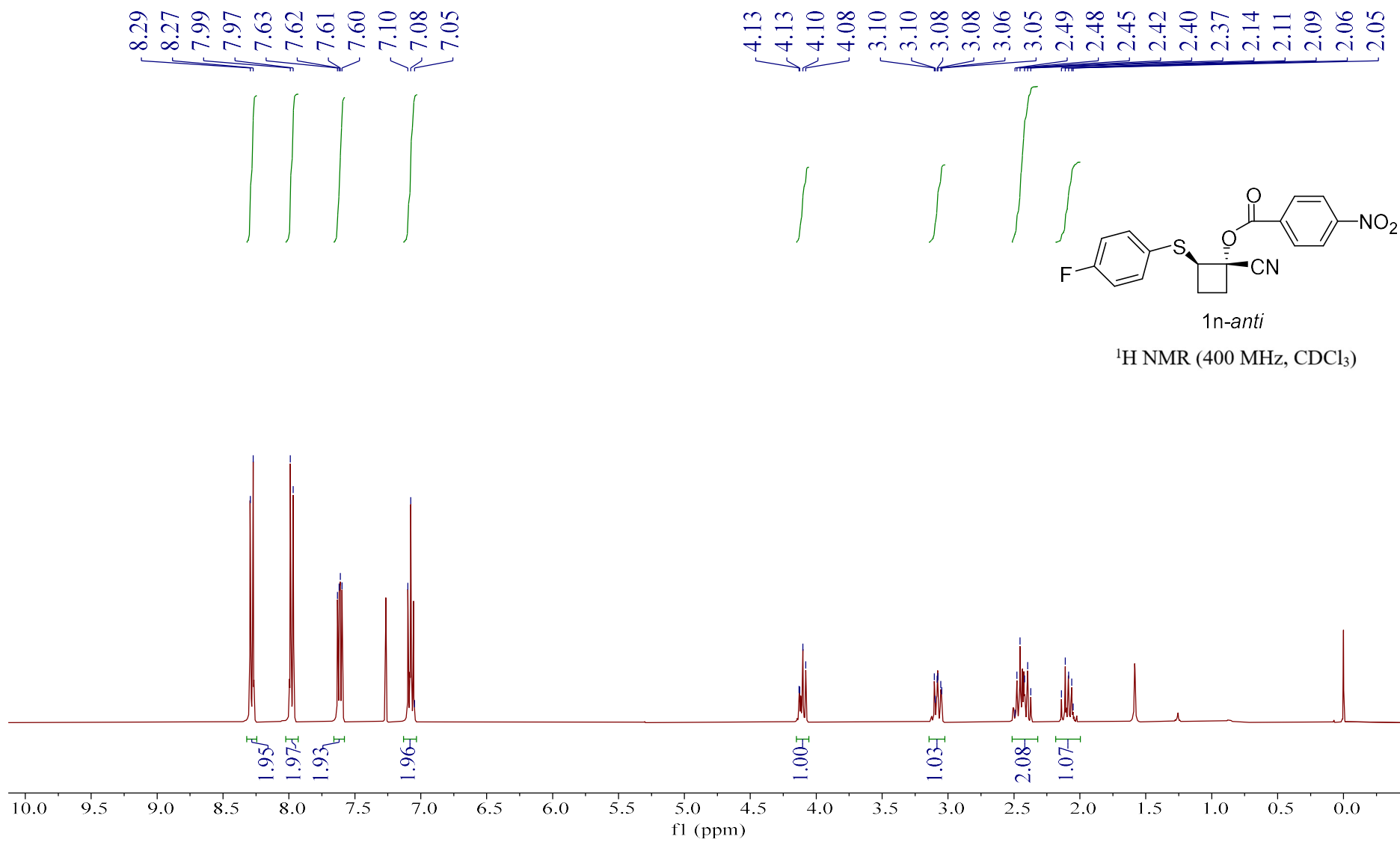


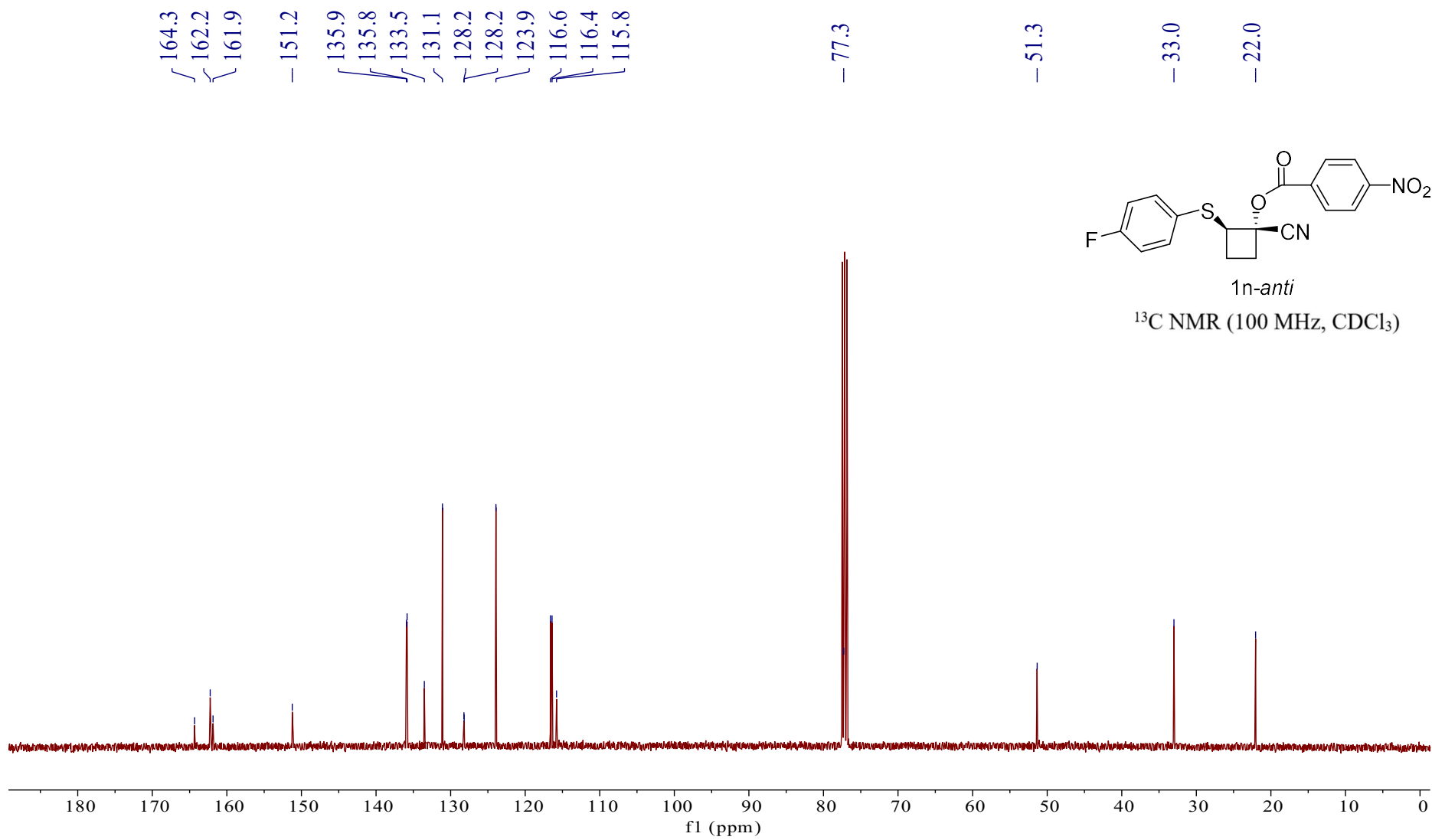
NMR-51

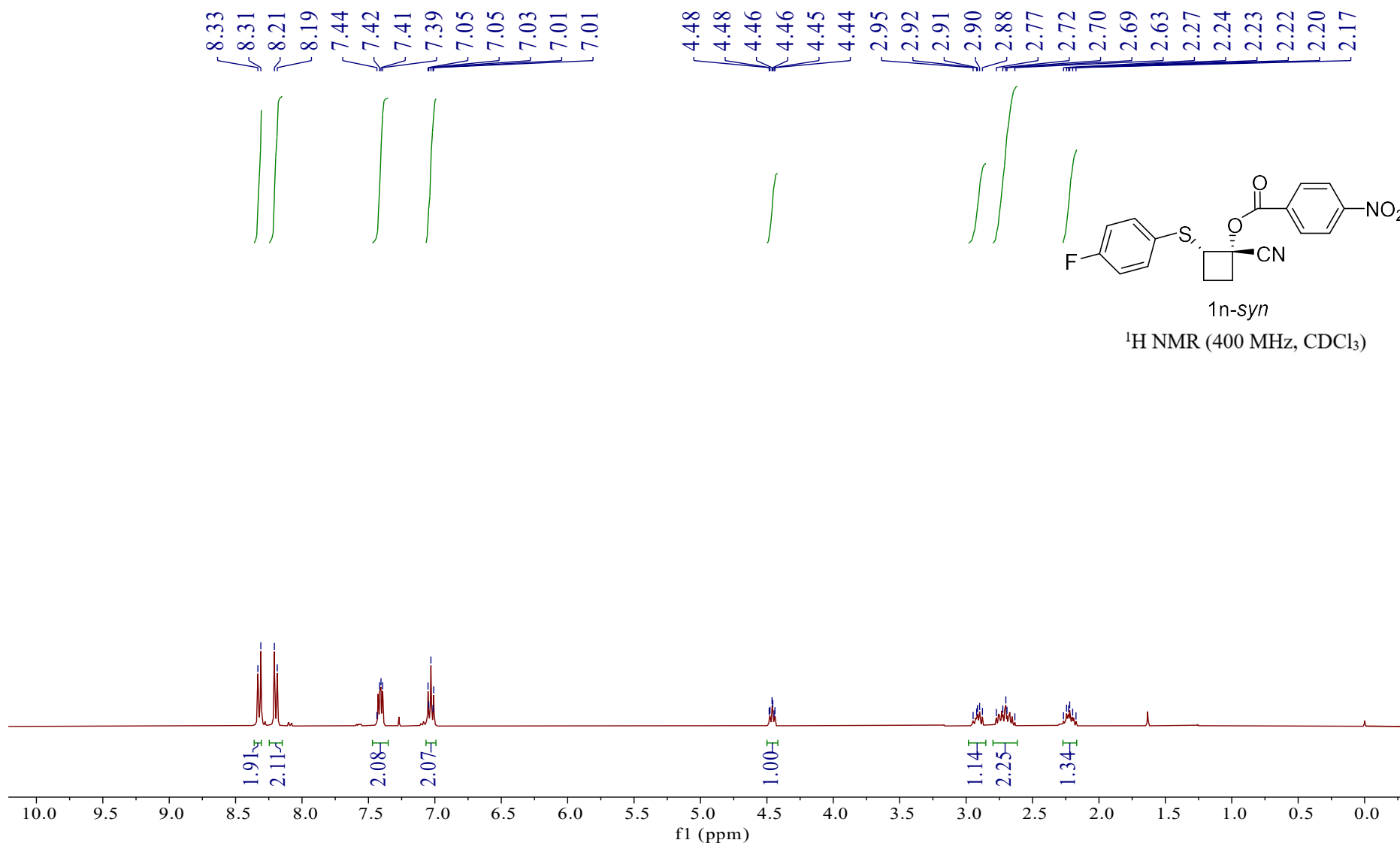


NMR-52









NMR-56

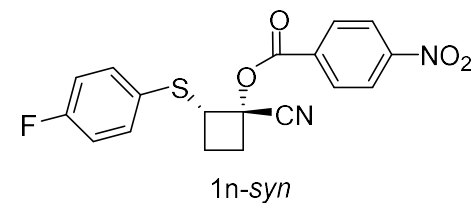
163.8
162.5
161.4
151.2
133.8
133.4
133.3
131.3
128.8
128.8
123.9
117.5
116.7
116.5

-70.7

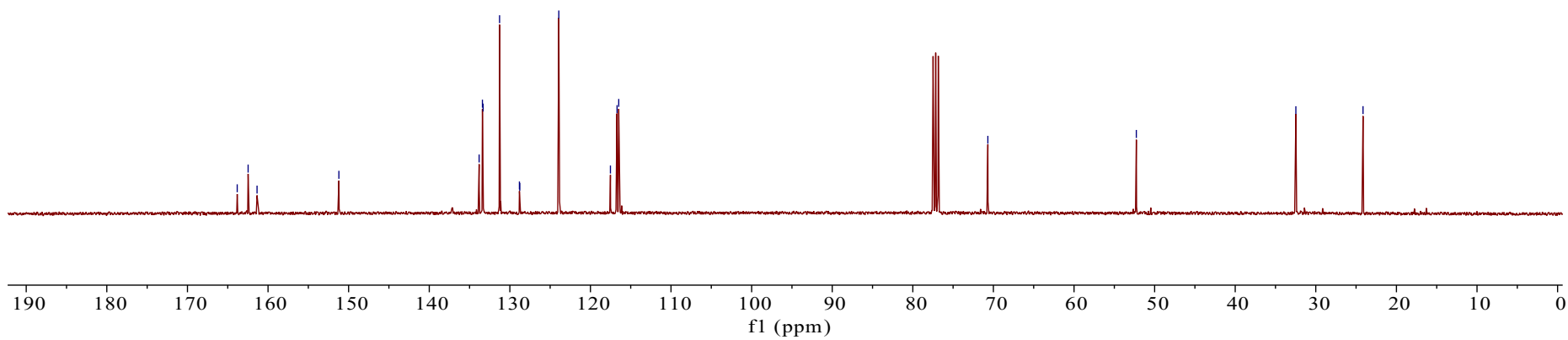
-52.3

-32.5

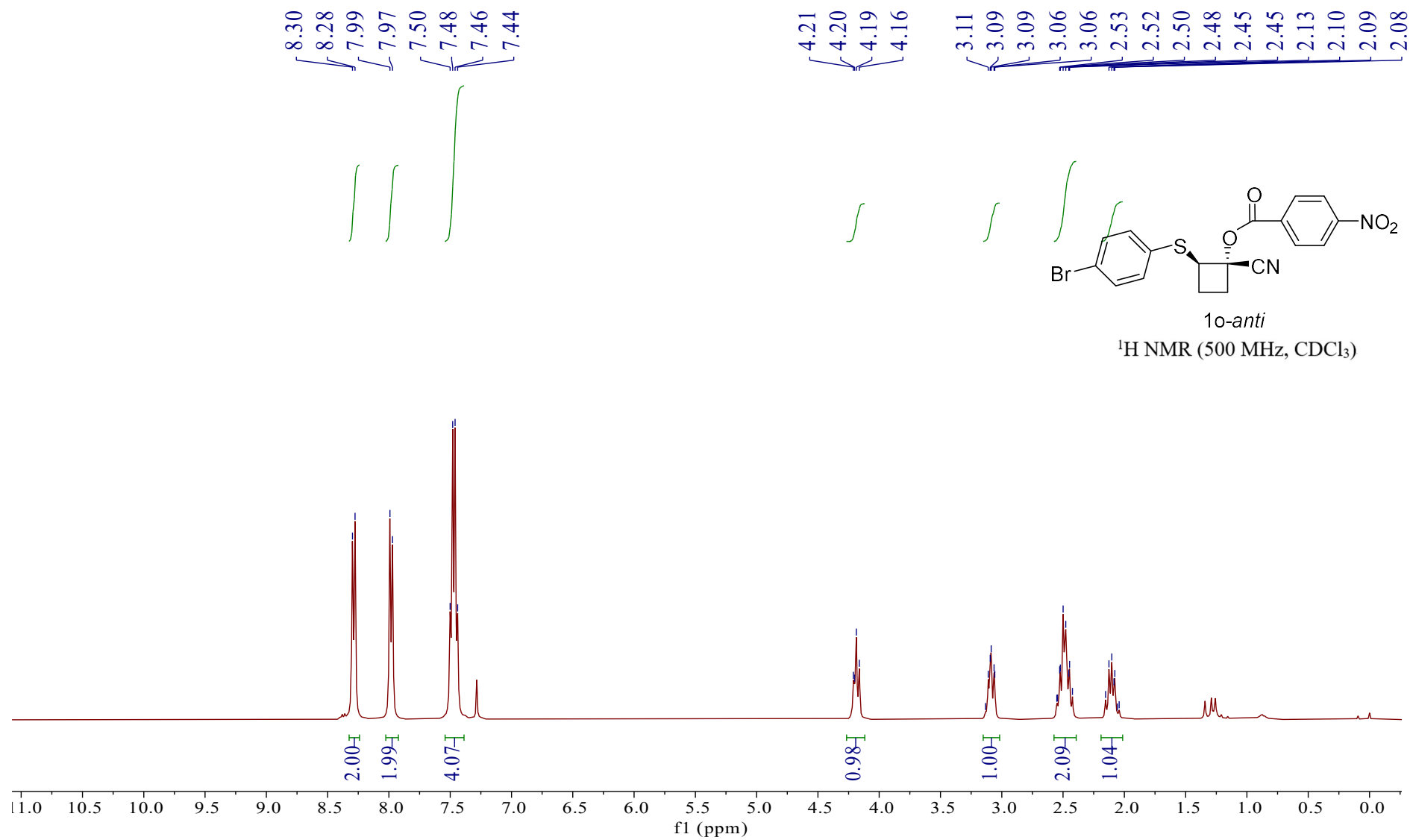
-24.1



¹³C NMR (100 MHz, CDCl₃)



NMR-57



NMR-58

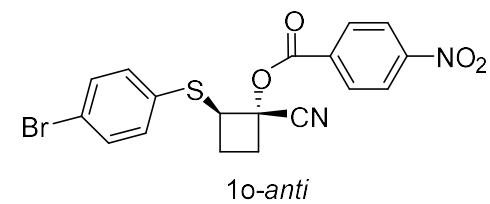
— 162.1
— 151.1
134.1
133.4
132.5
132.4
131.0
123.8
122.4
115.6

— 77.1

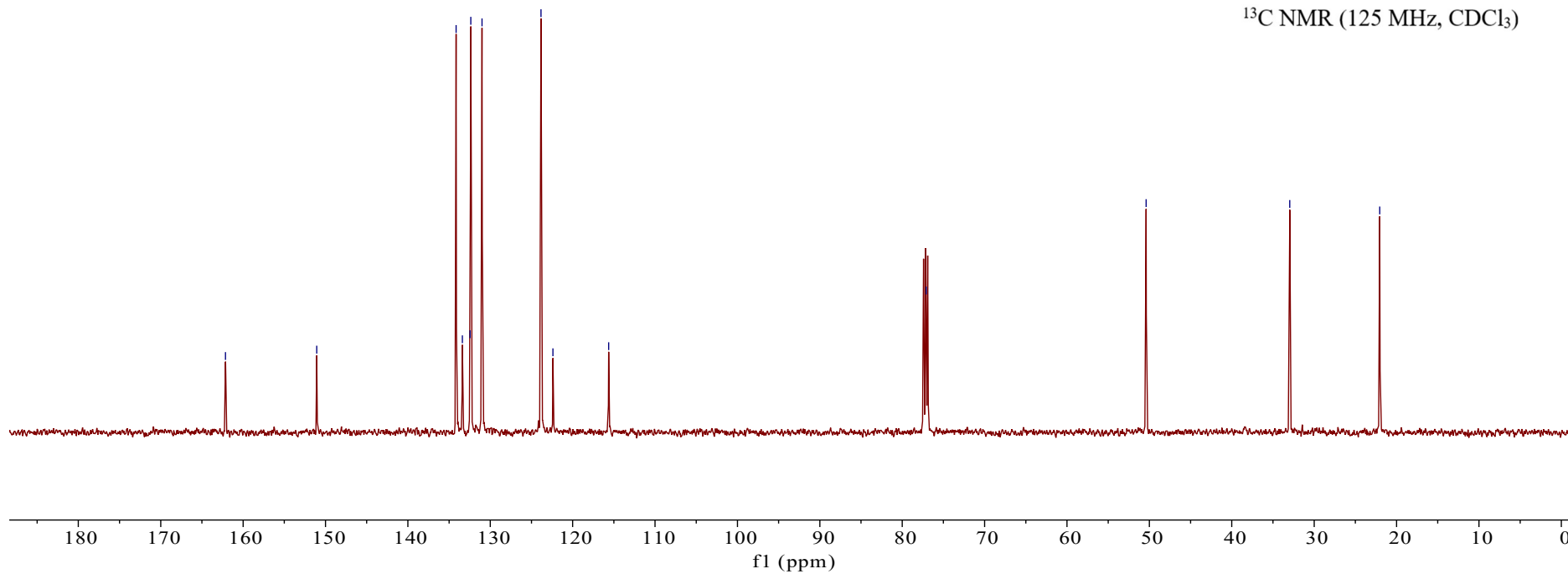
— 50.4

— 33.0

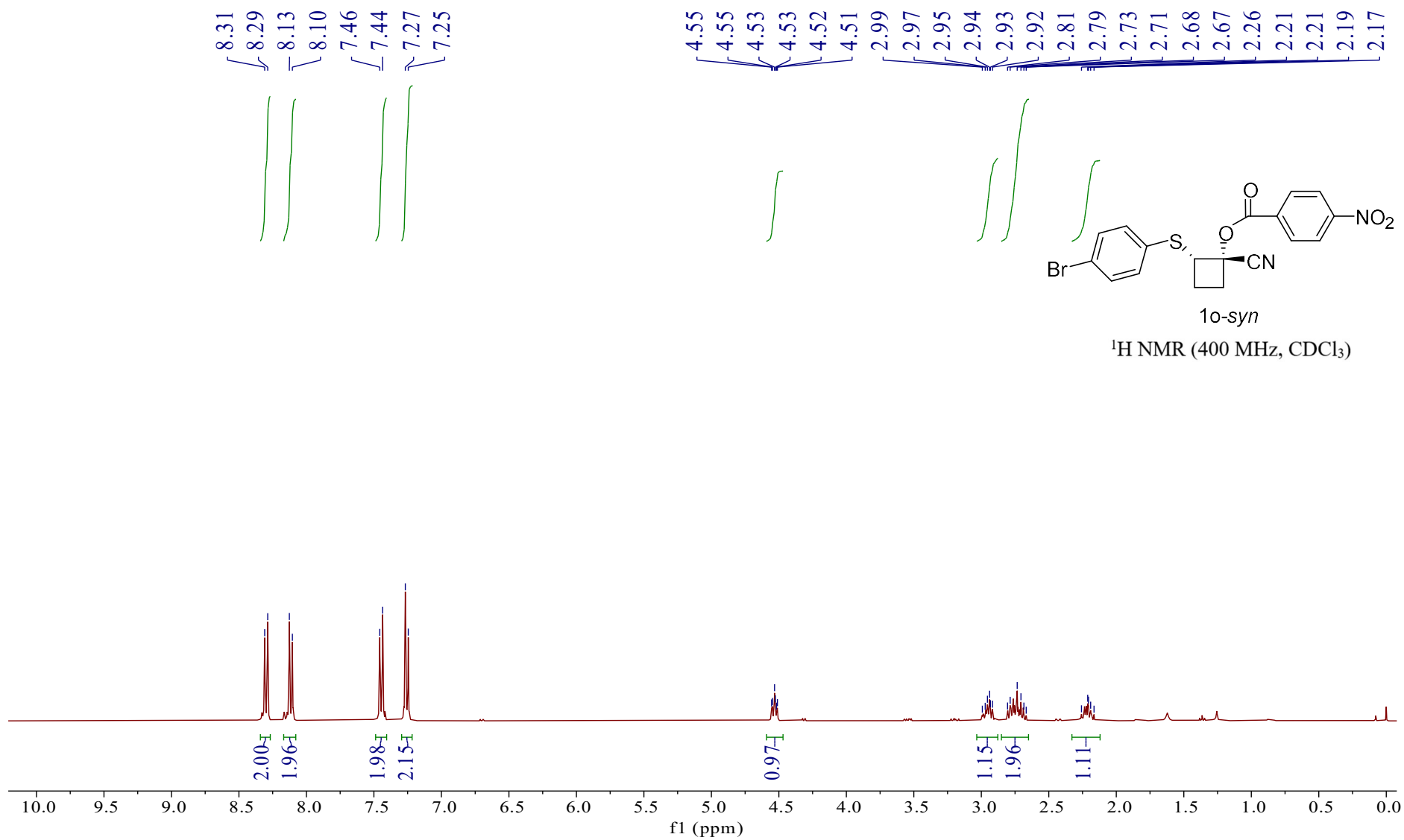
— 22.0



¹³C NMR (125 MHz, CDCl₃)



NMR-59



NMR-60

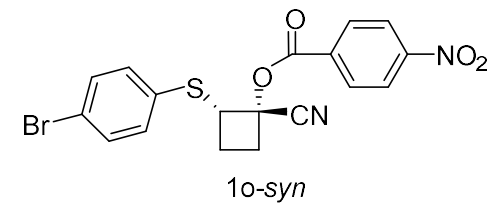
— 162.4
— 151.2
133.7
133.3
132.5
131.7
131.3
123.9
121.6
117.6

— 70.6

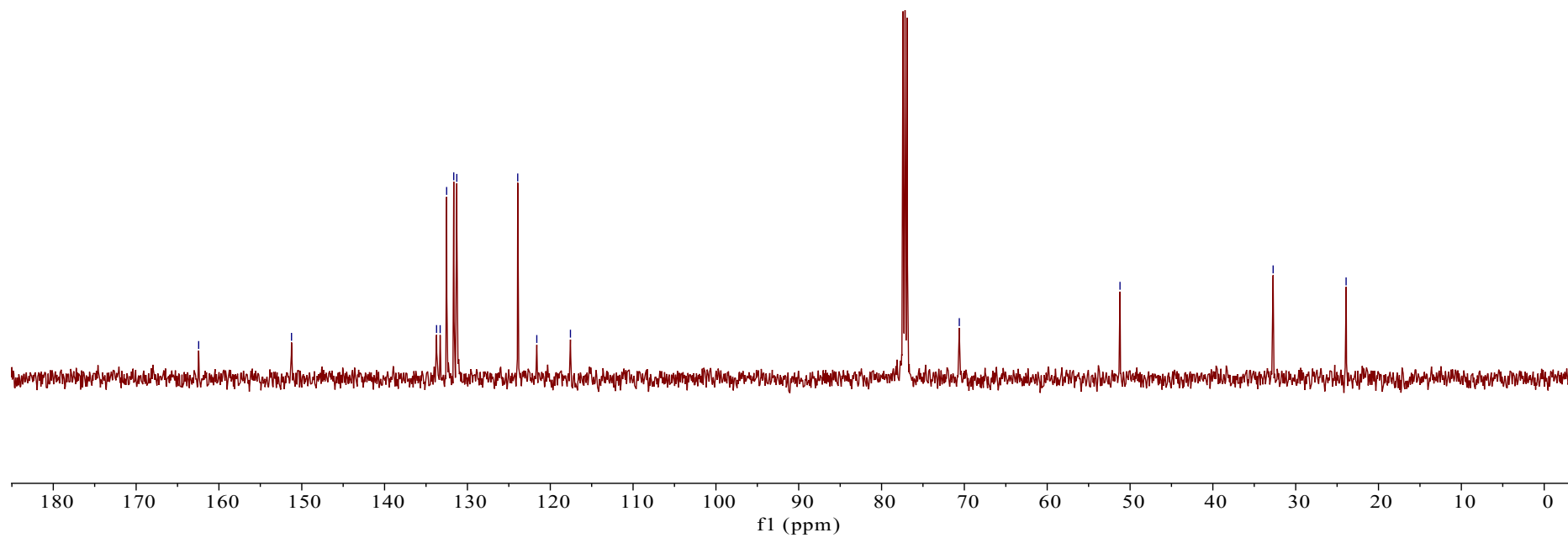
— 51.2

— 32.7

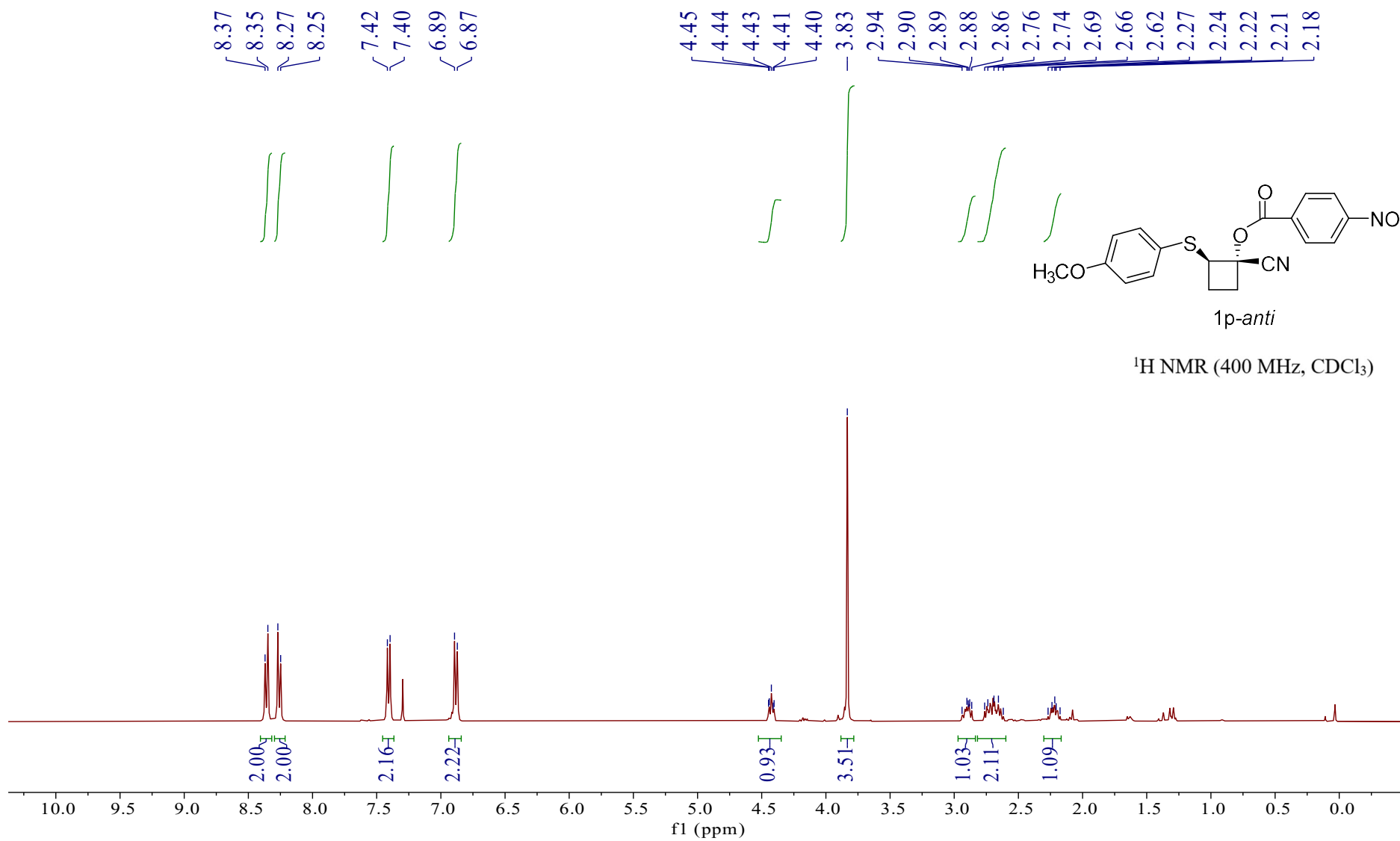
— 23.9



^{13}C NMR (100 MHz, CDCl_3)



NMR-61



~ 162.5
~ 160.0

- 151.2

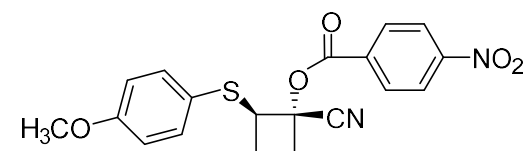
134.1
134.0
131.3
123.9
123.7
117.7
115.0

- 70.8

~ 55.5
~ 52.8

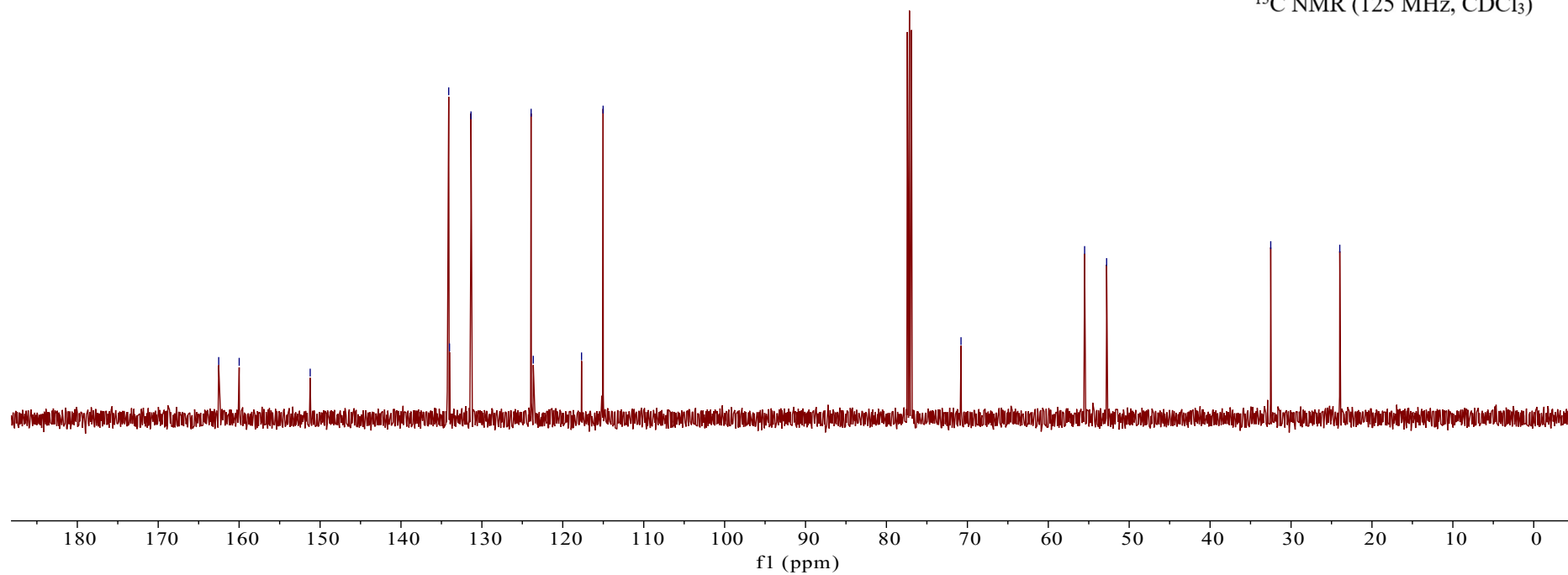
- 32.5

- 24.0

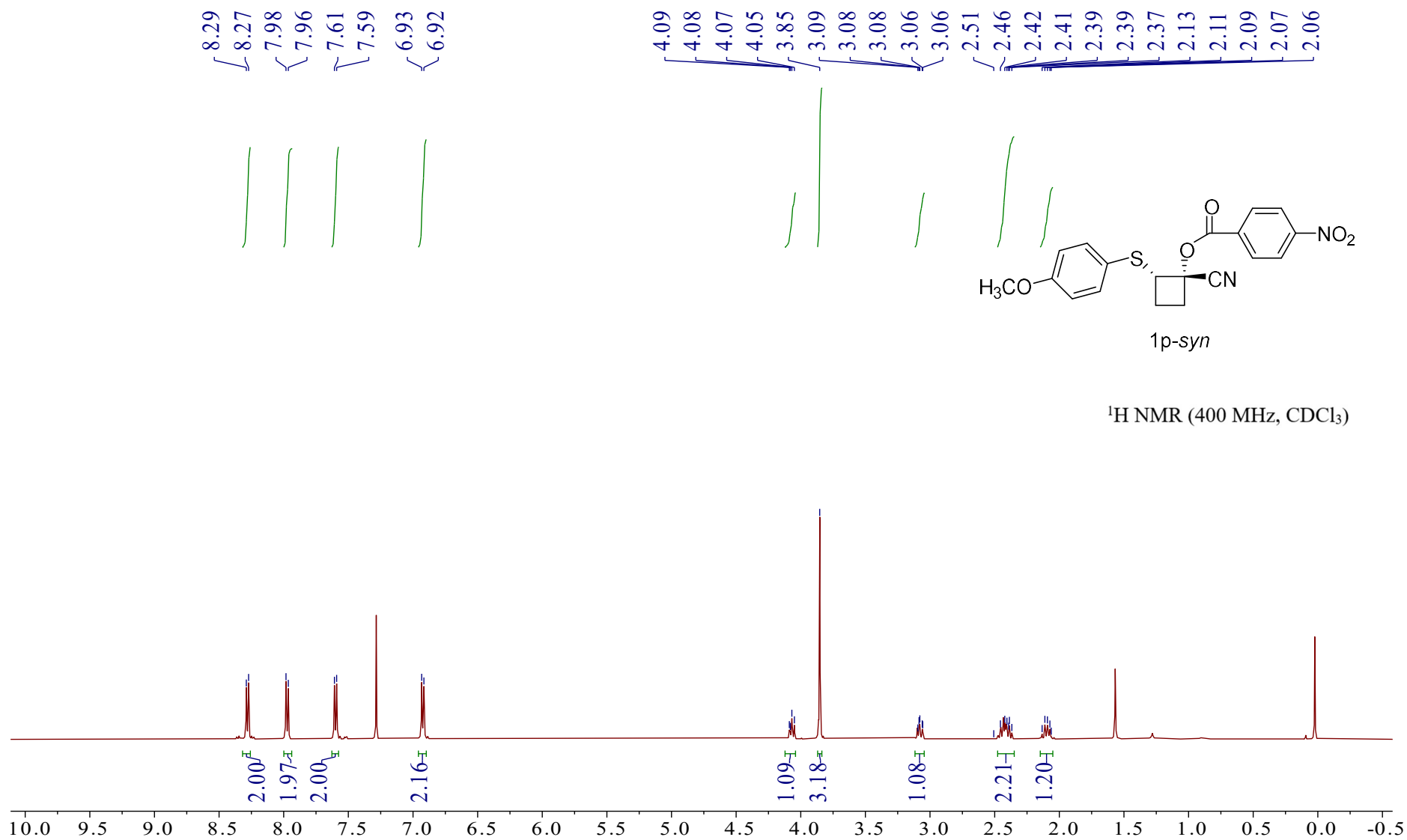


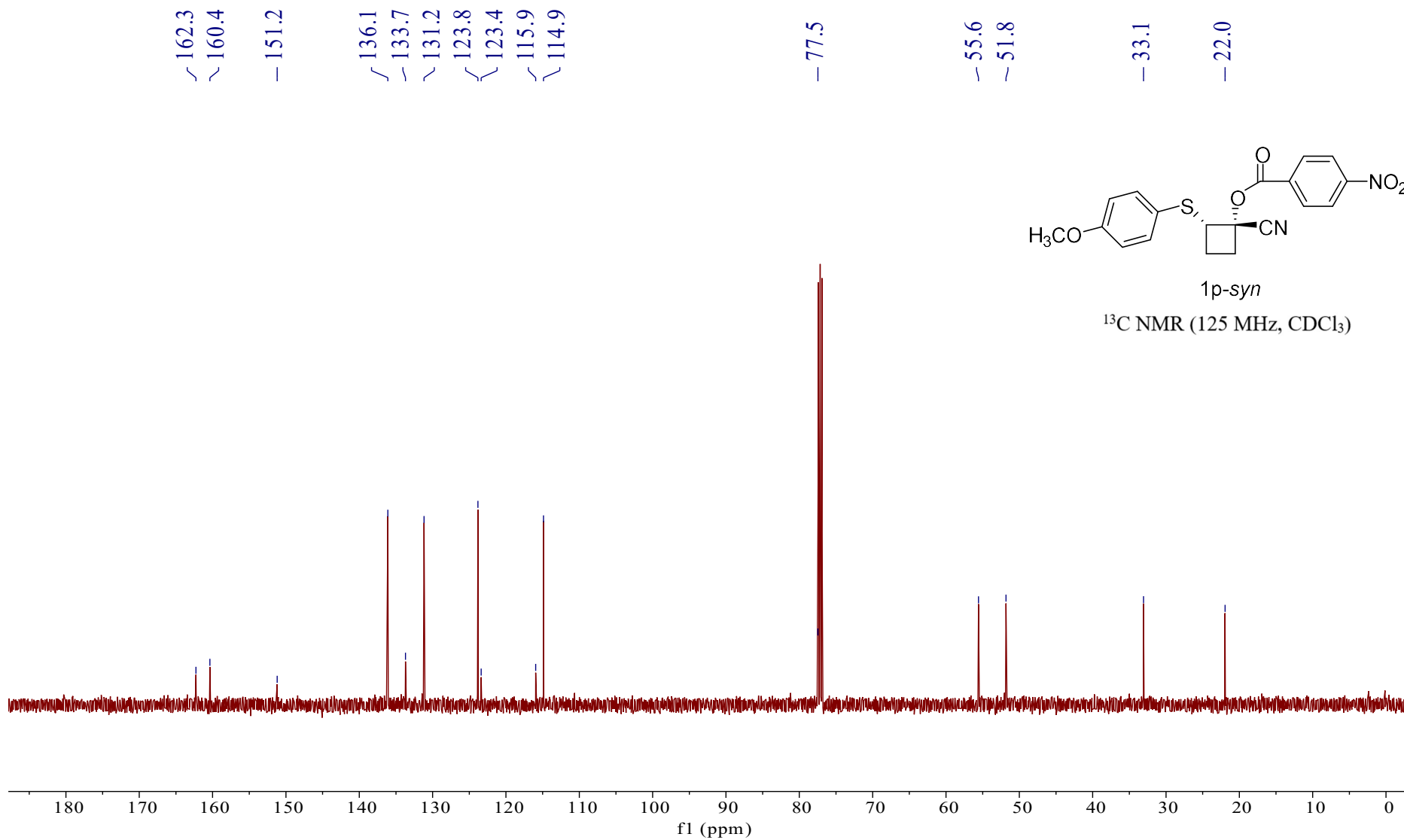
1p-anti

¹³C NMR (125 MHz, CDCl₃)

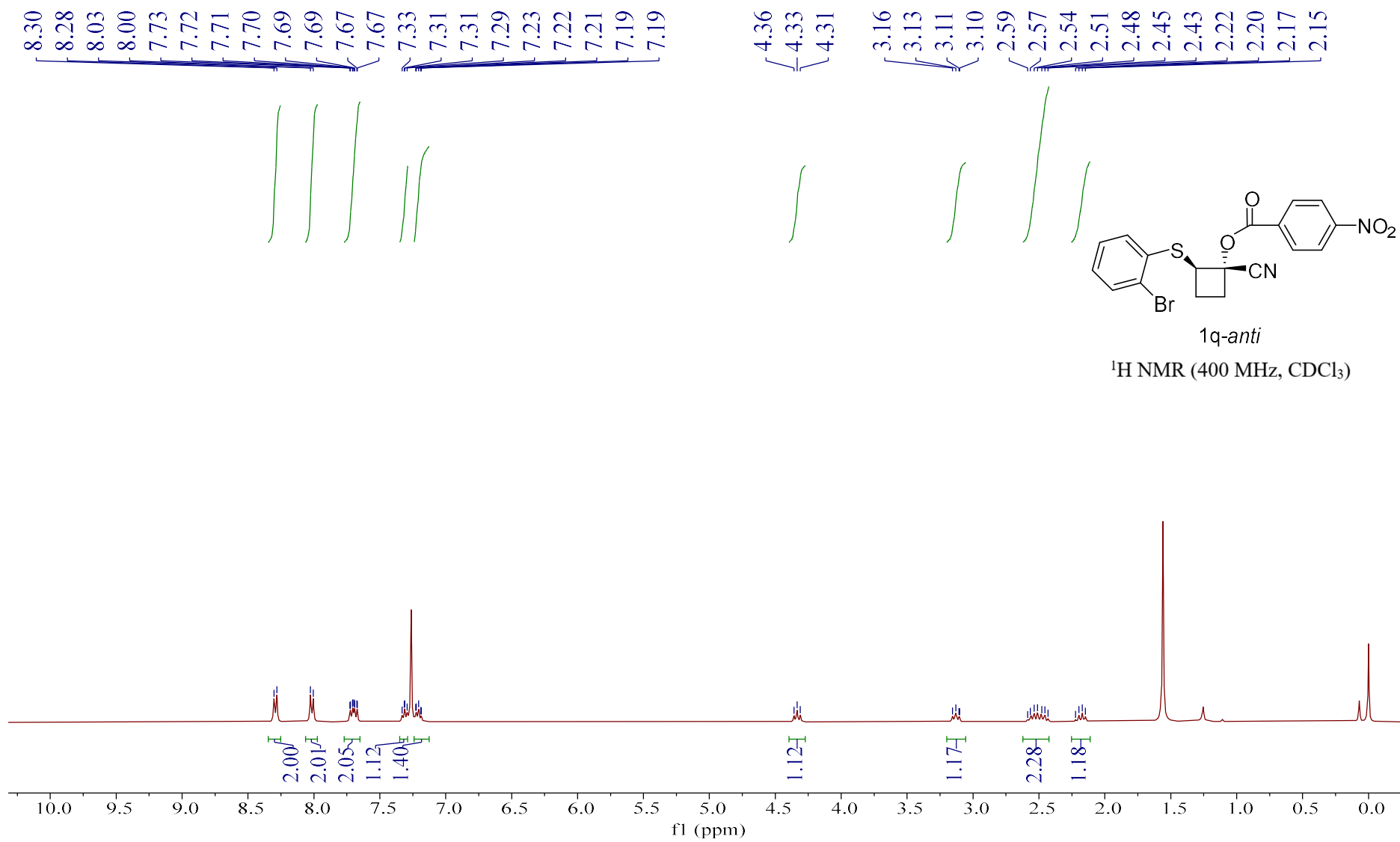


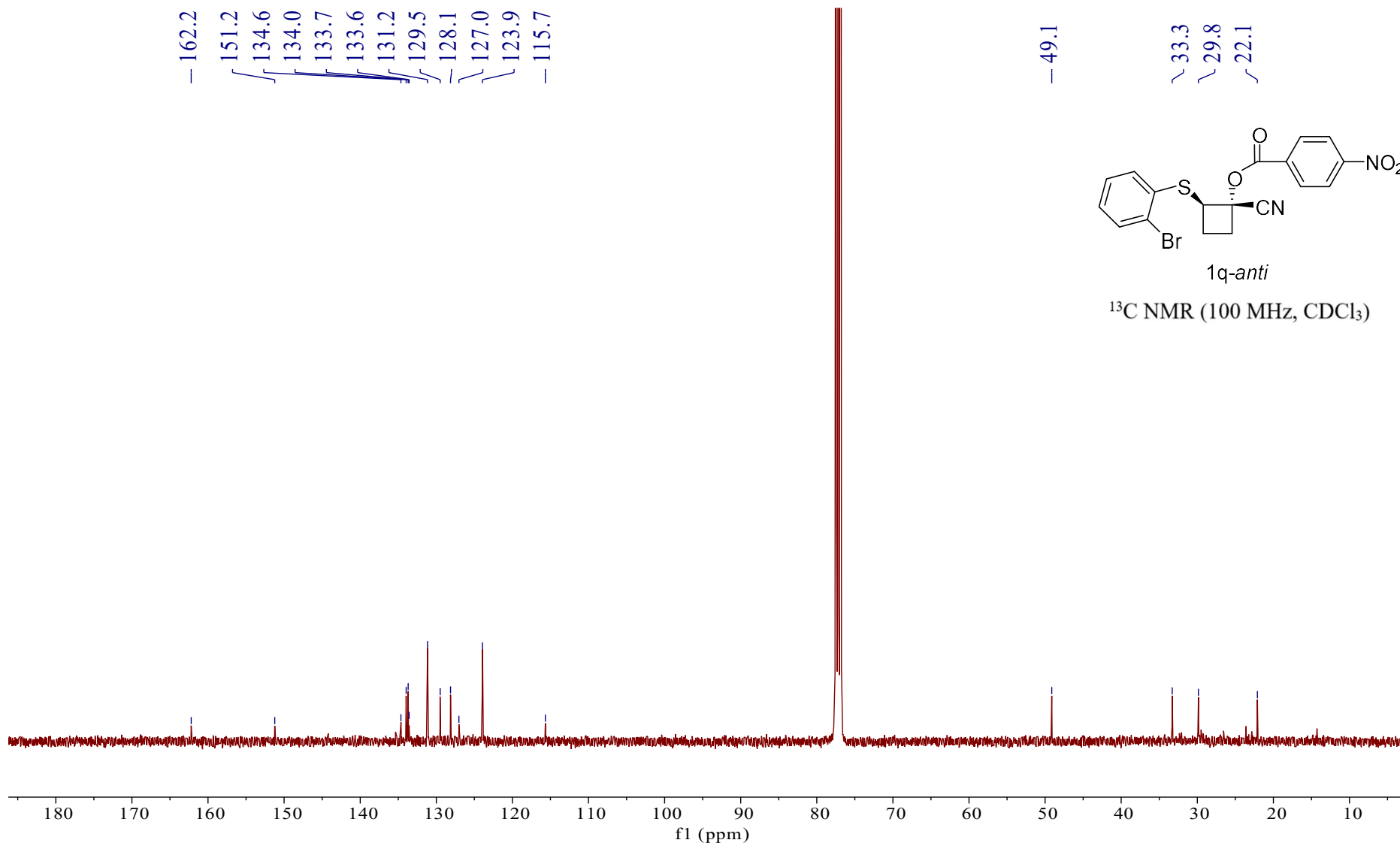
NMR-63



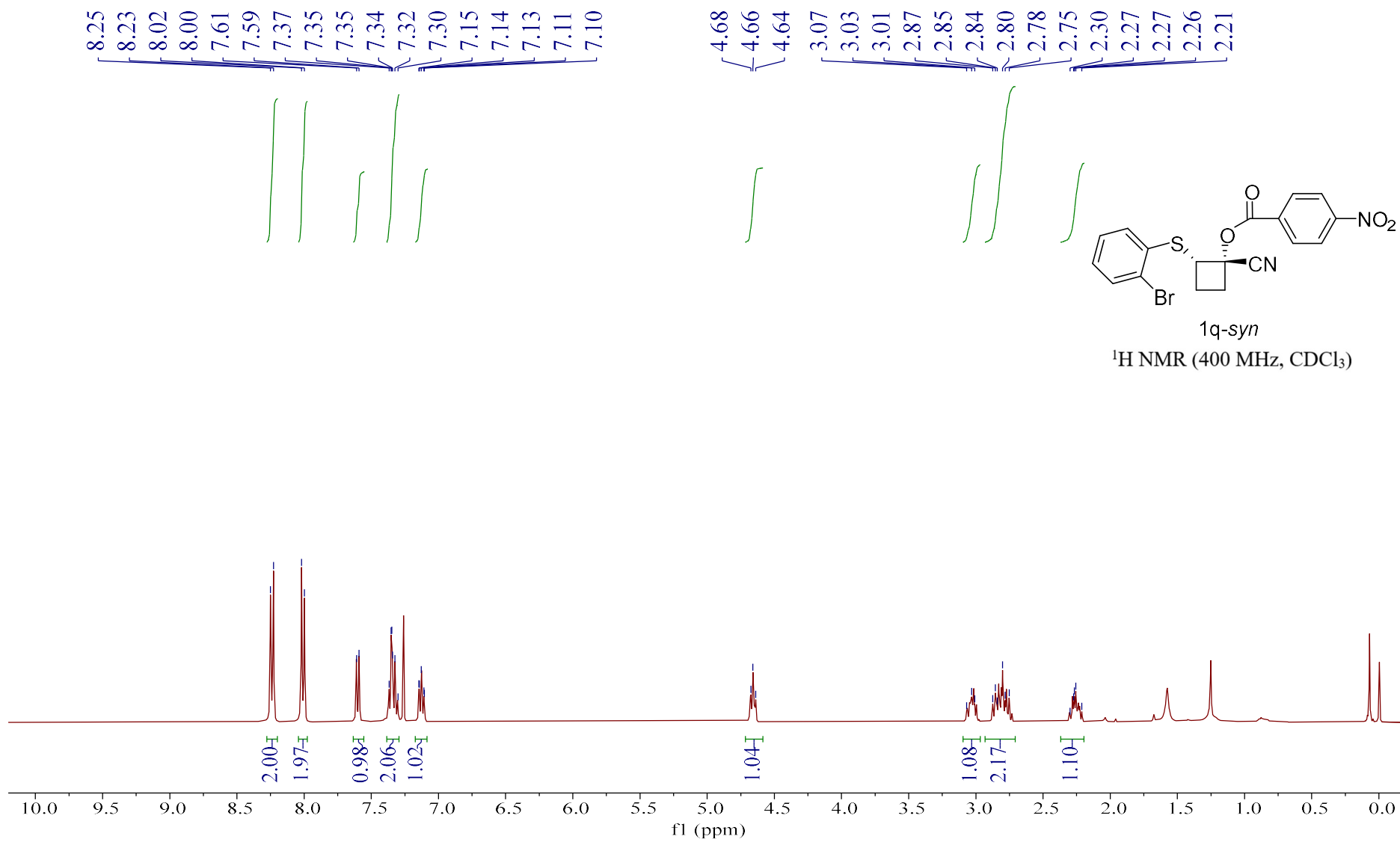


NMR-65

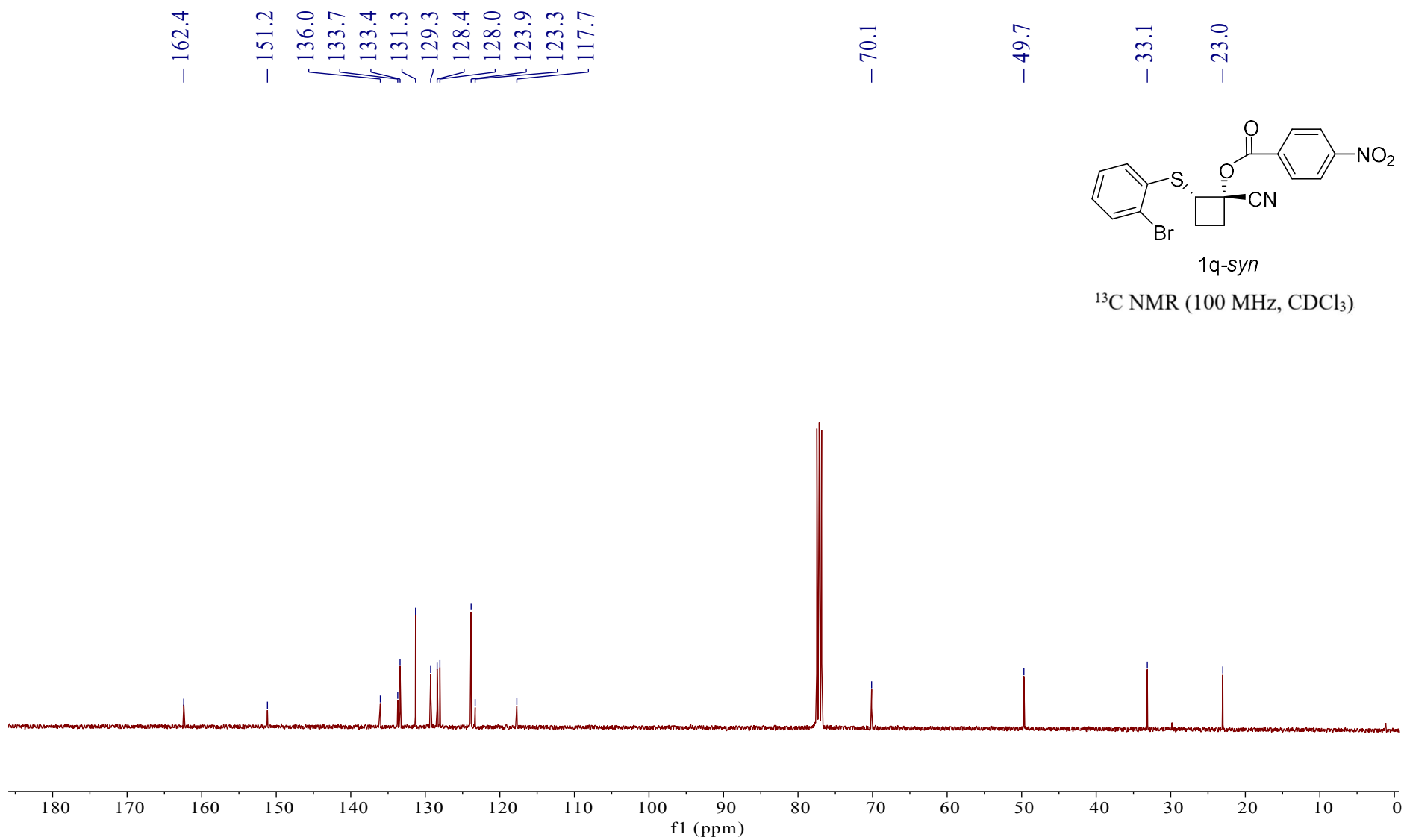




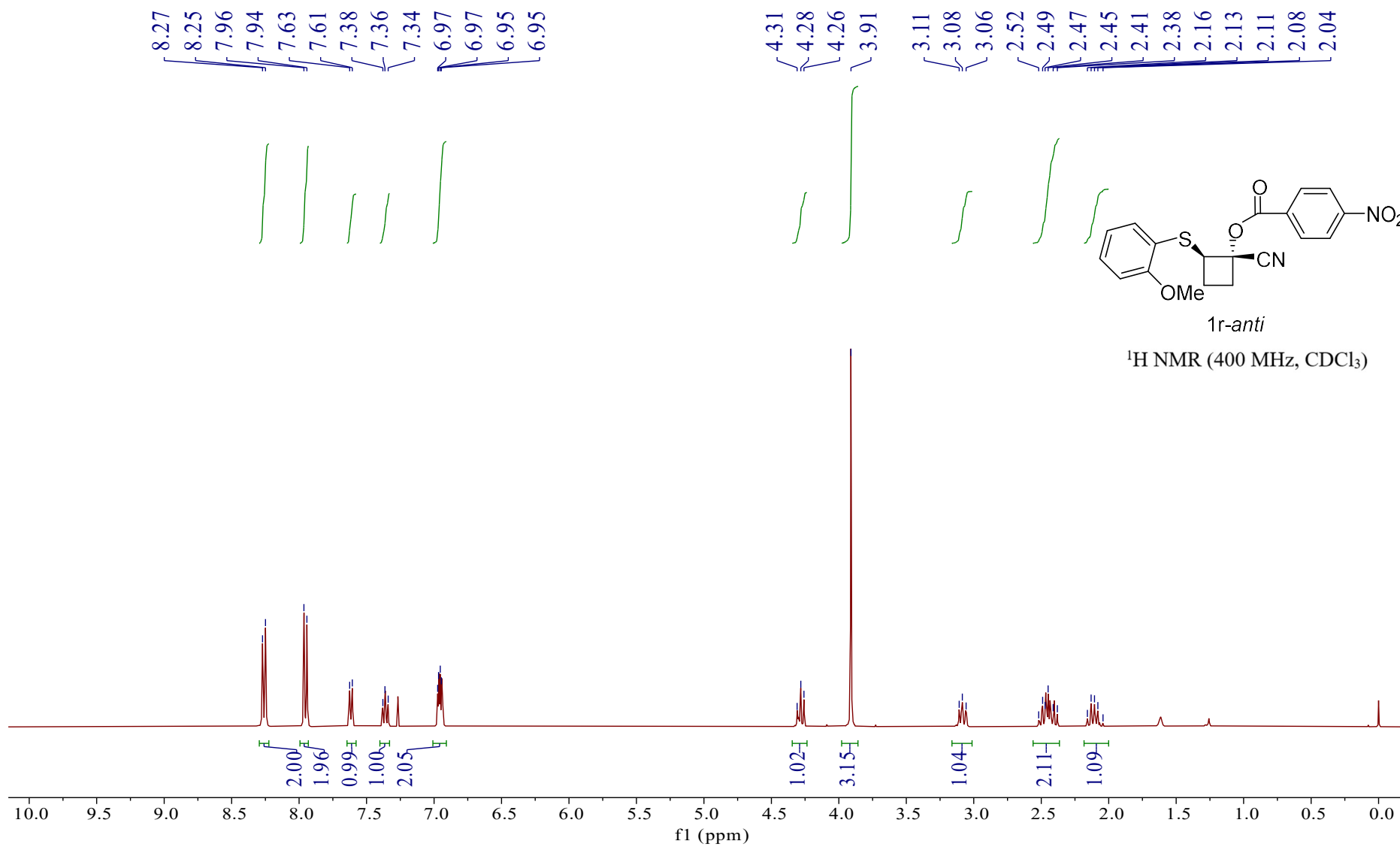
NMR-67



NMR-68



NMR-69



NMR-70

162.2
158.8
151.1

134.6
133.7
131.1
130.0
123.8
121.3
121.1
115.8
111.1

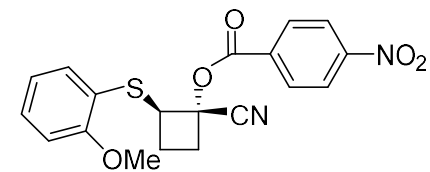
-77.4

-56.0

-48.5

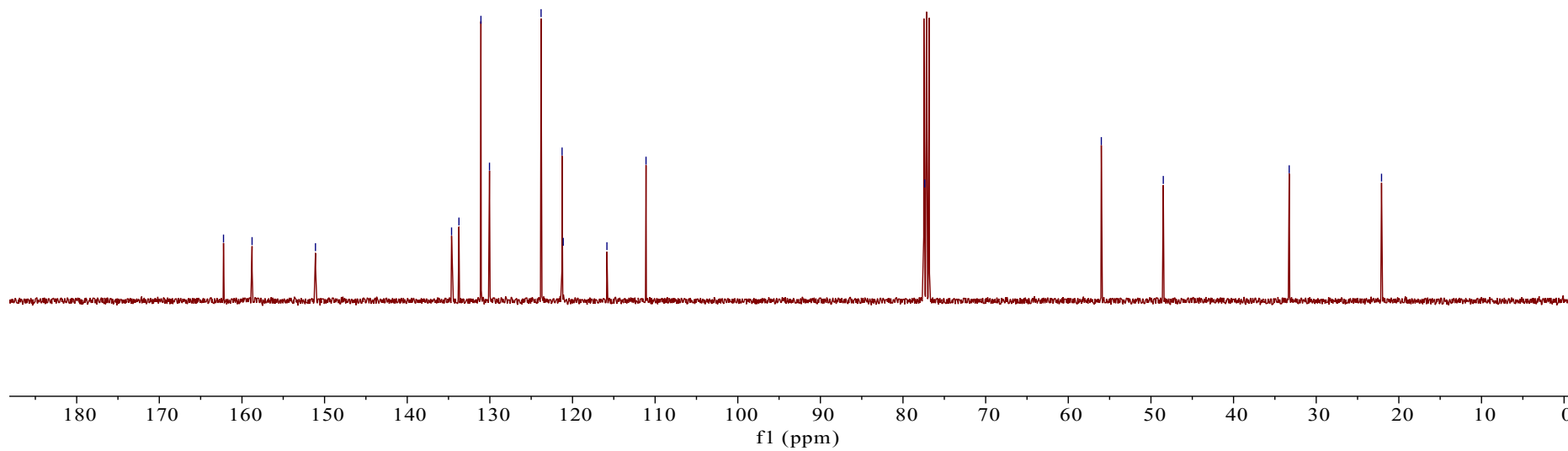
-33.3

-22.1

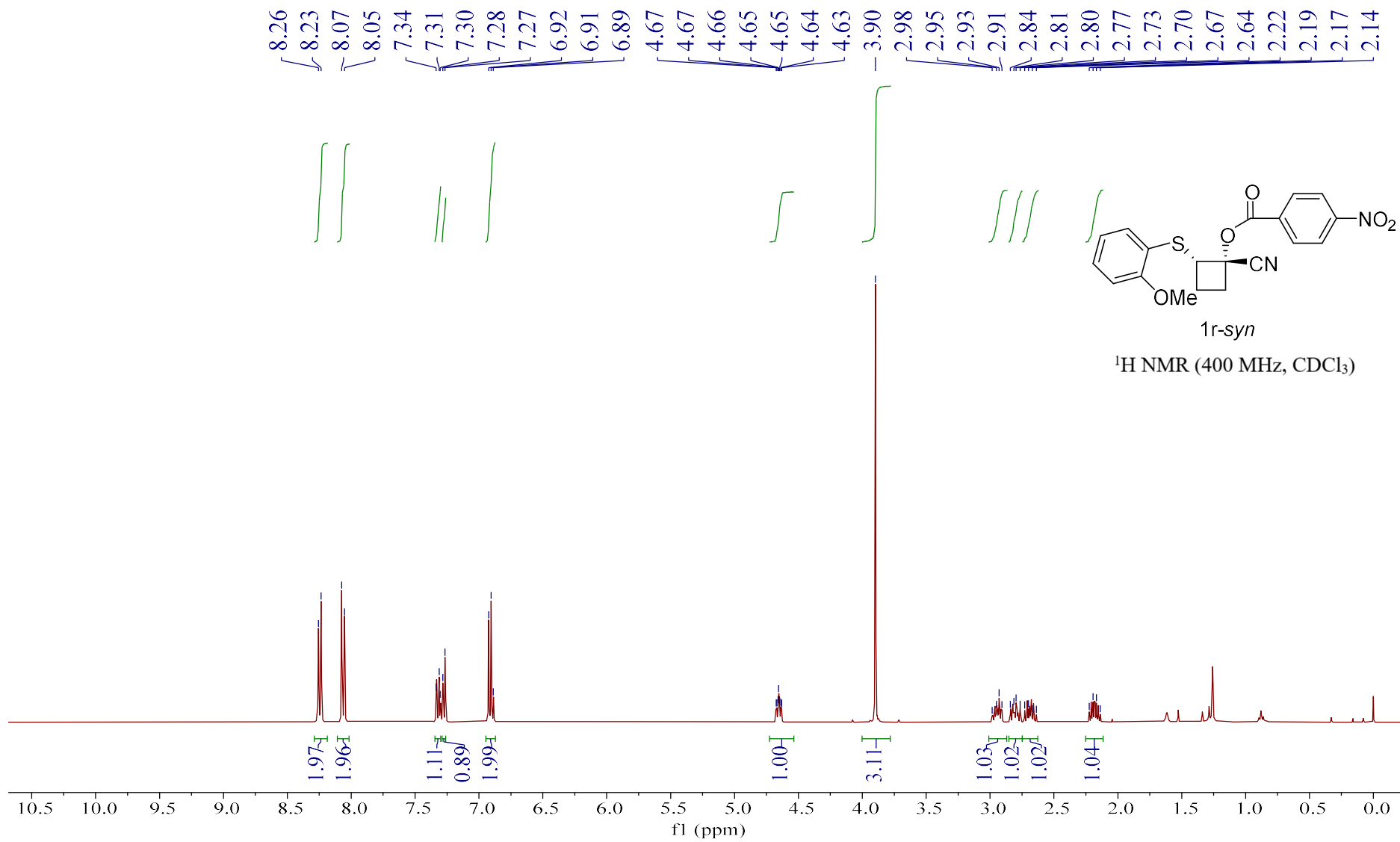


1r-anti

¹³C NMR (100 MHz, CDCl₃)



NMR-71



NMR-72

162.5
157.9
151.1

133.9
131.4
131.3
129.0
123.8
122.0
121.3
117.9
111.0

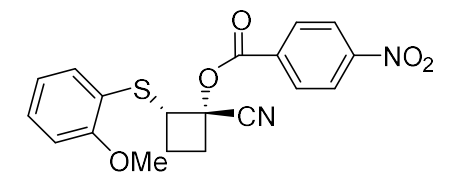
-70.7

-55.9

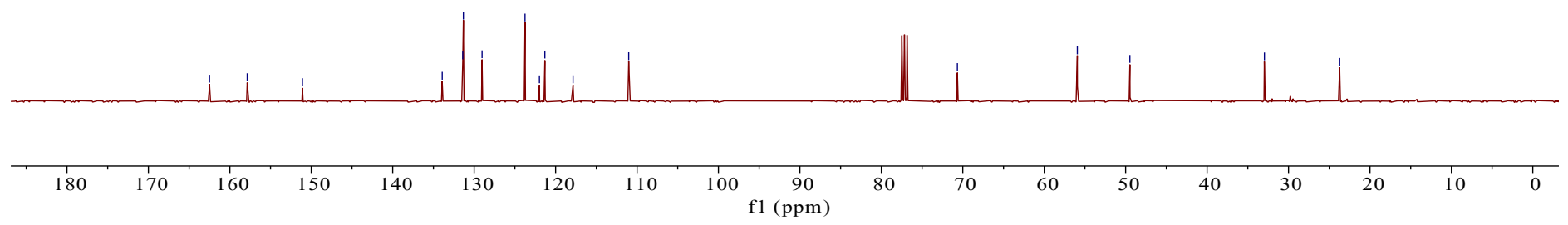
-49.5

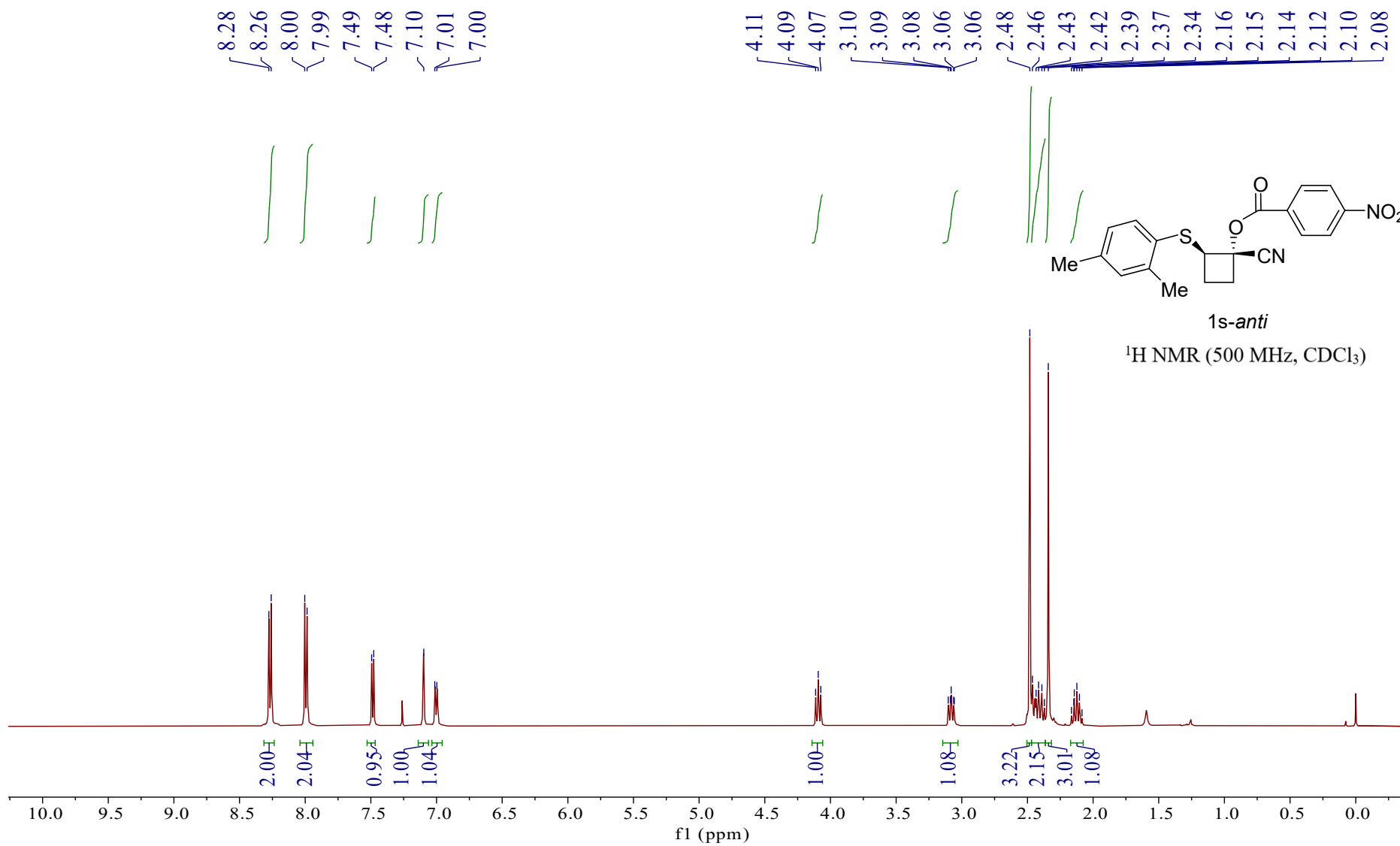
-33.0

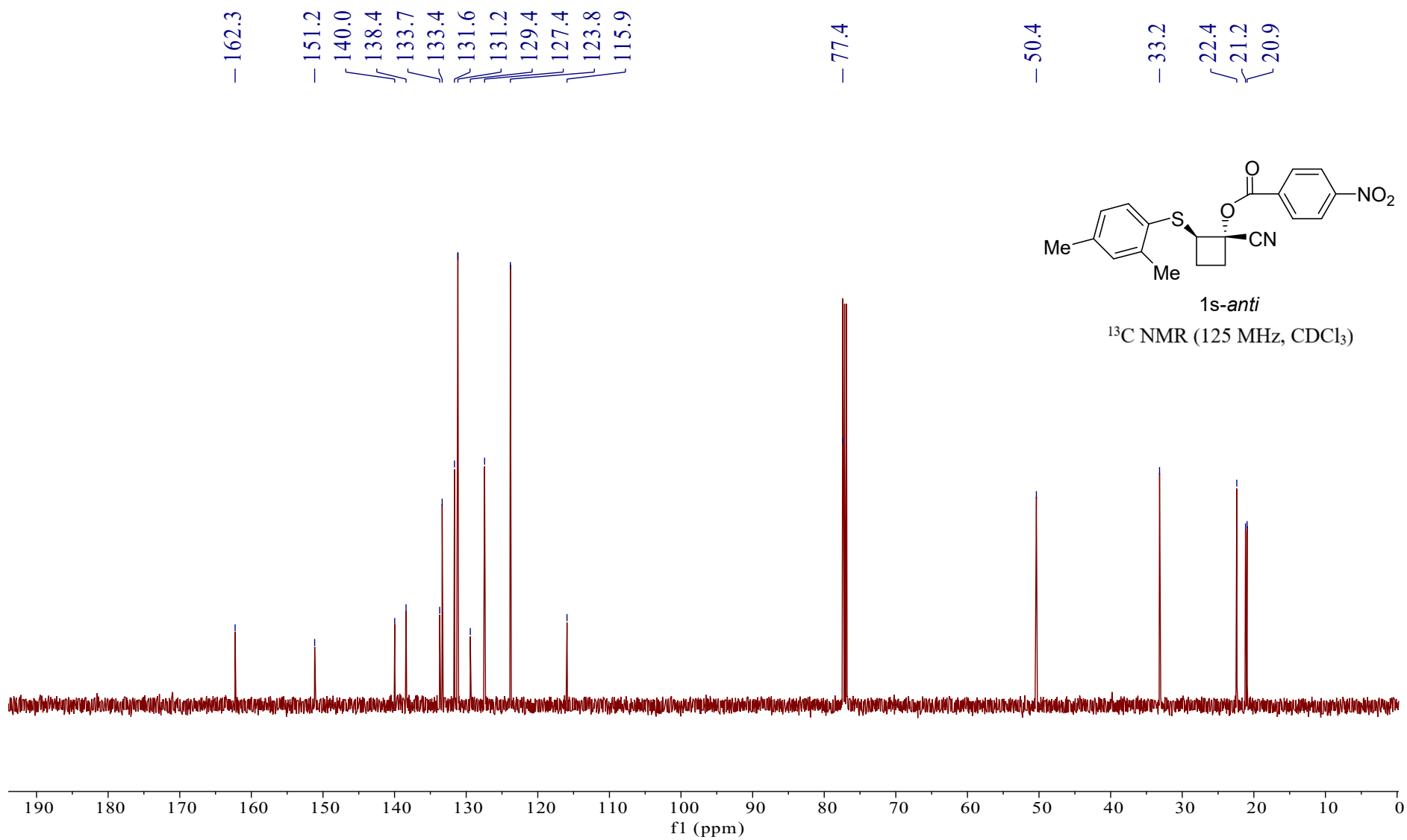
-23.7



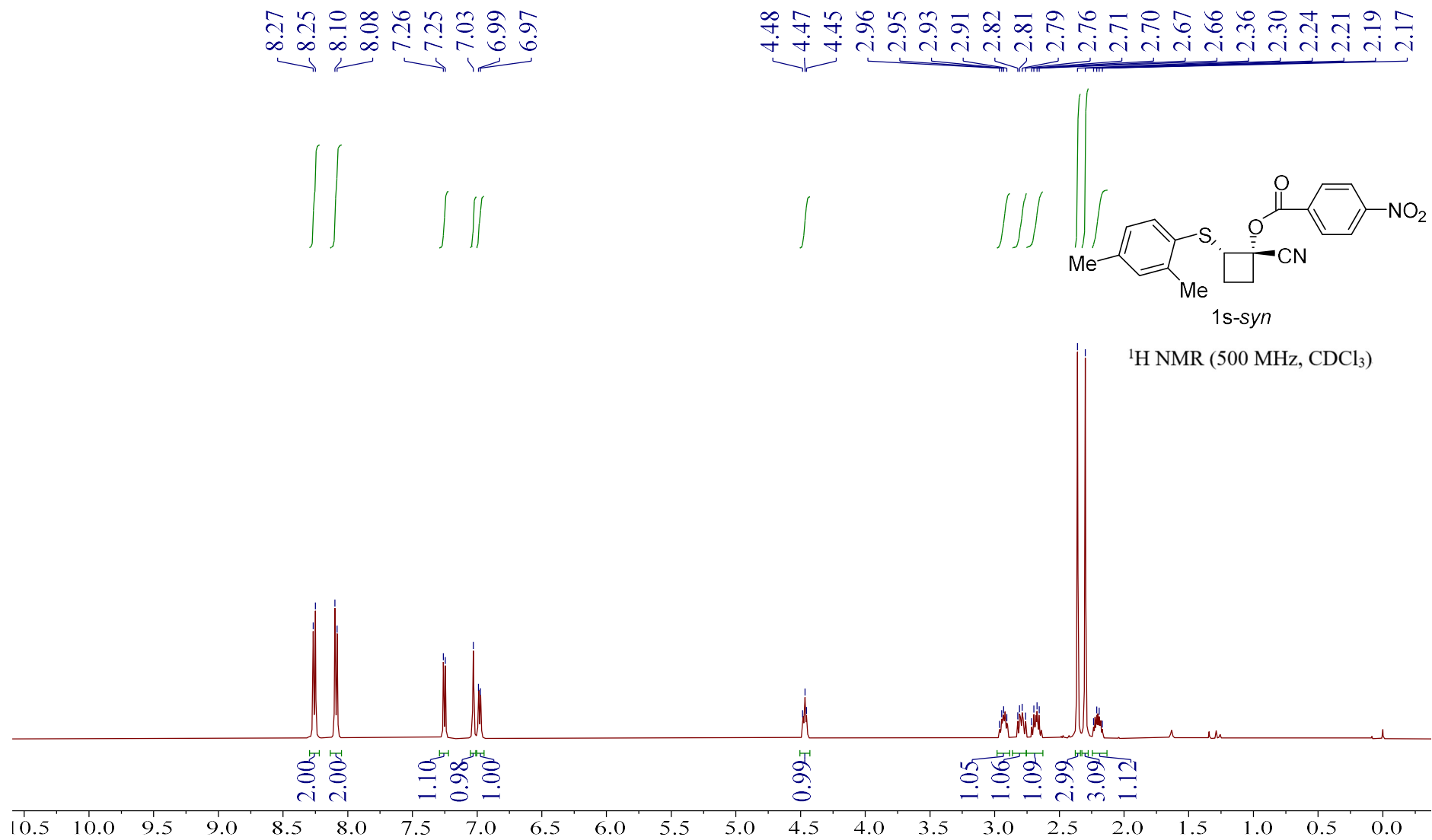
¹³C NMR (100 MHz, CDCl₃)

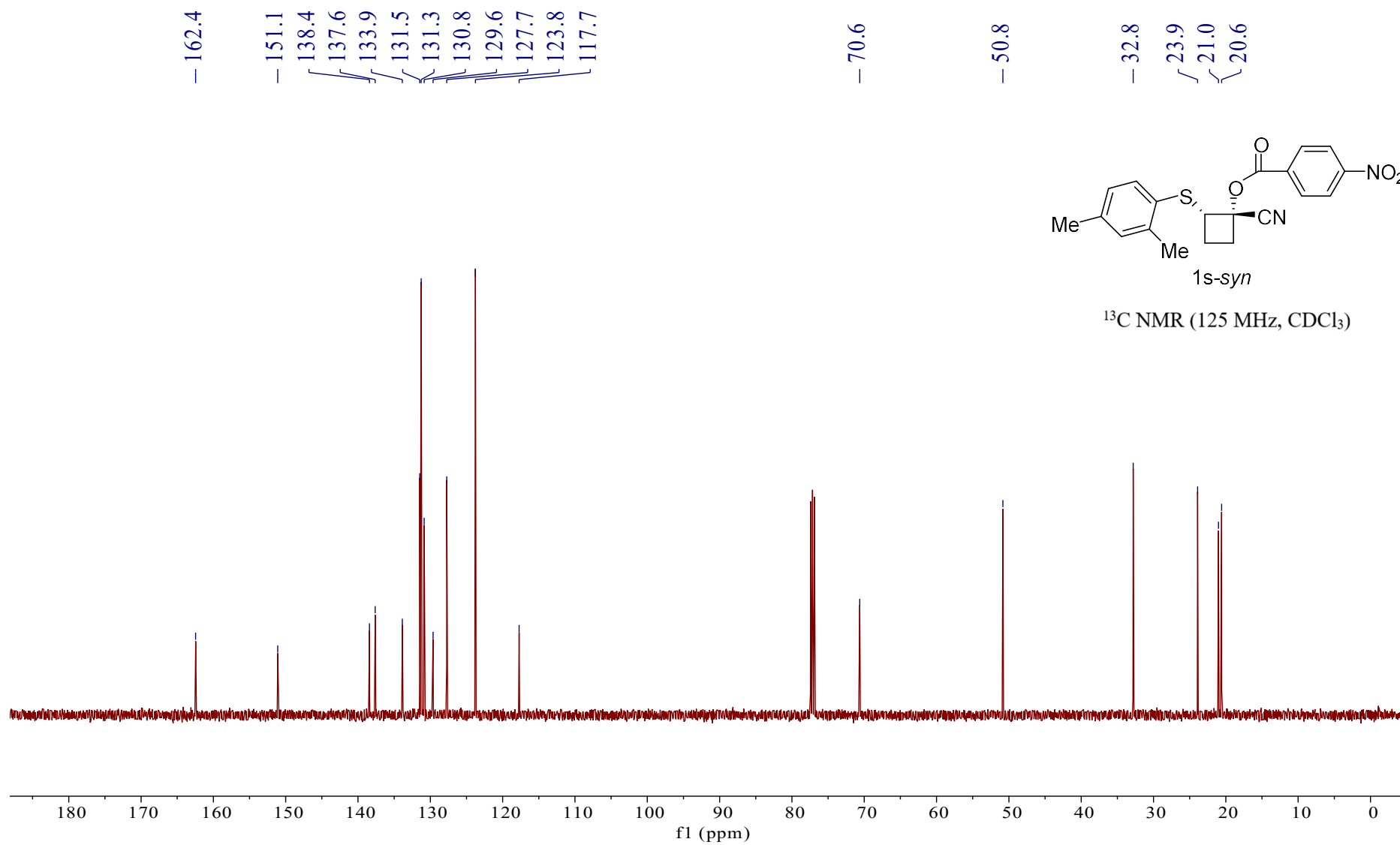




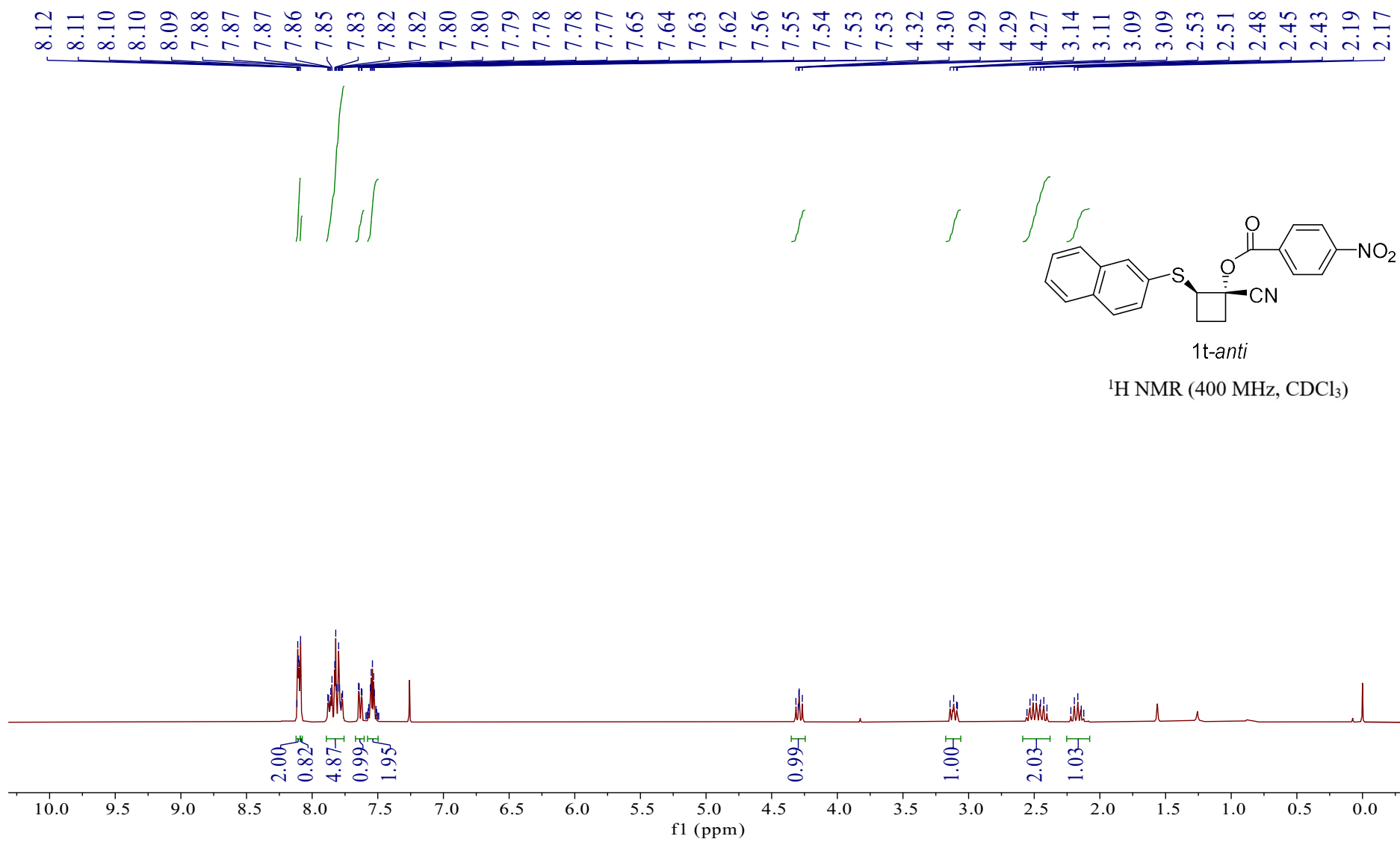


NMR-75

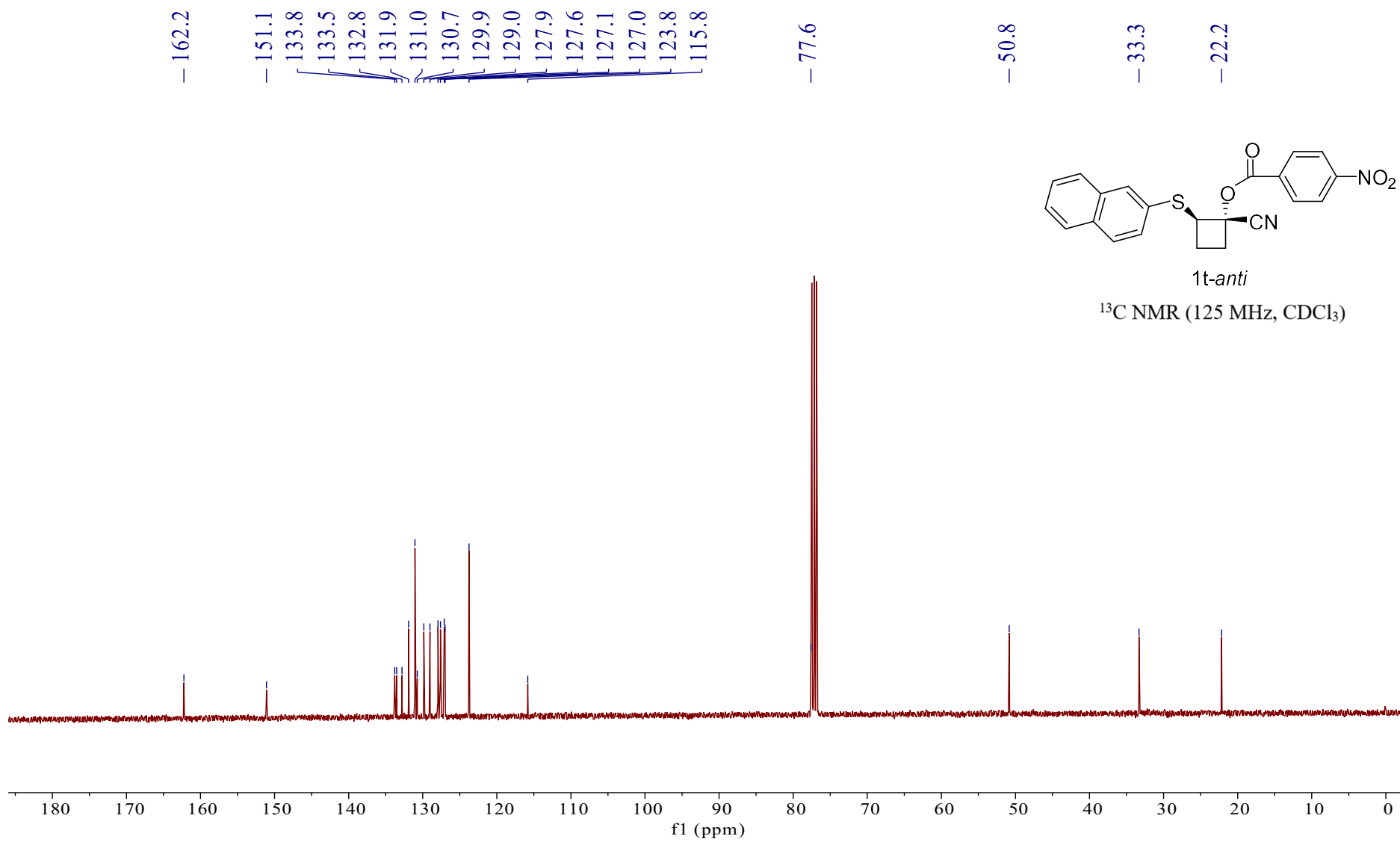




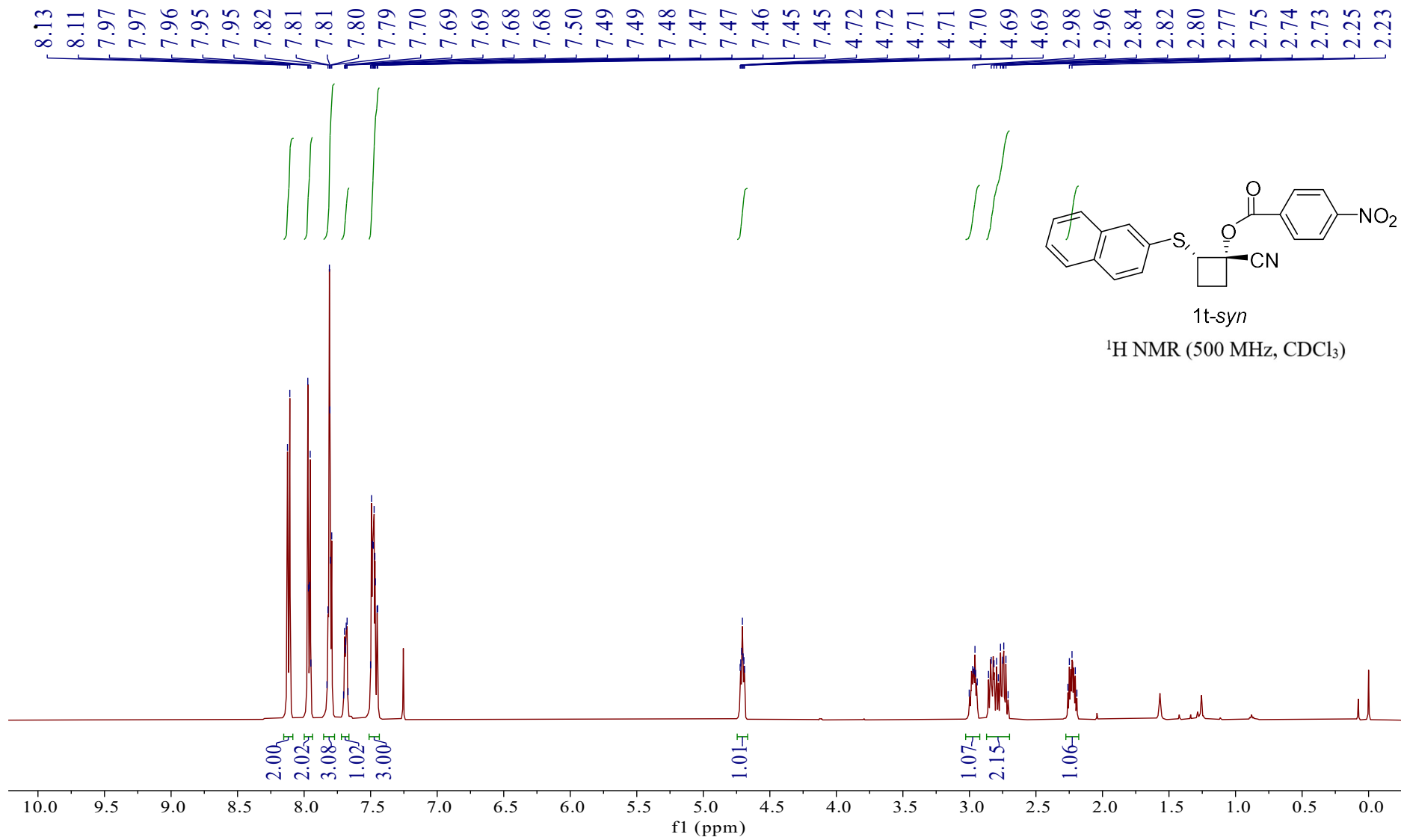
NMR-77



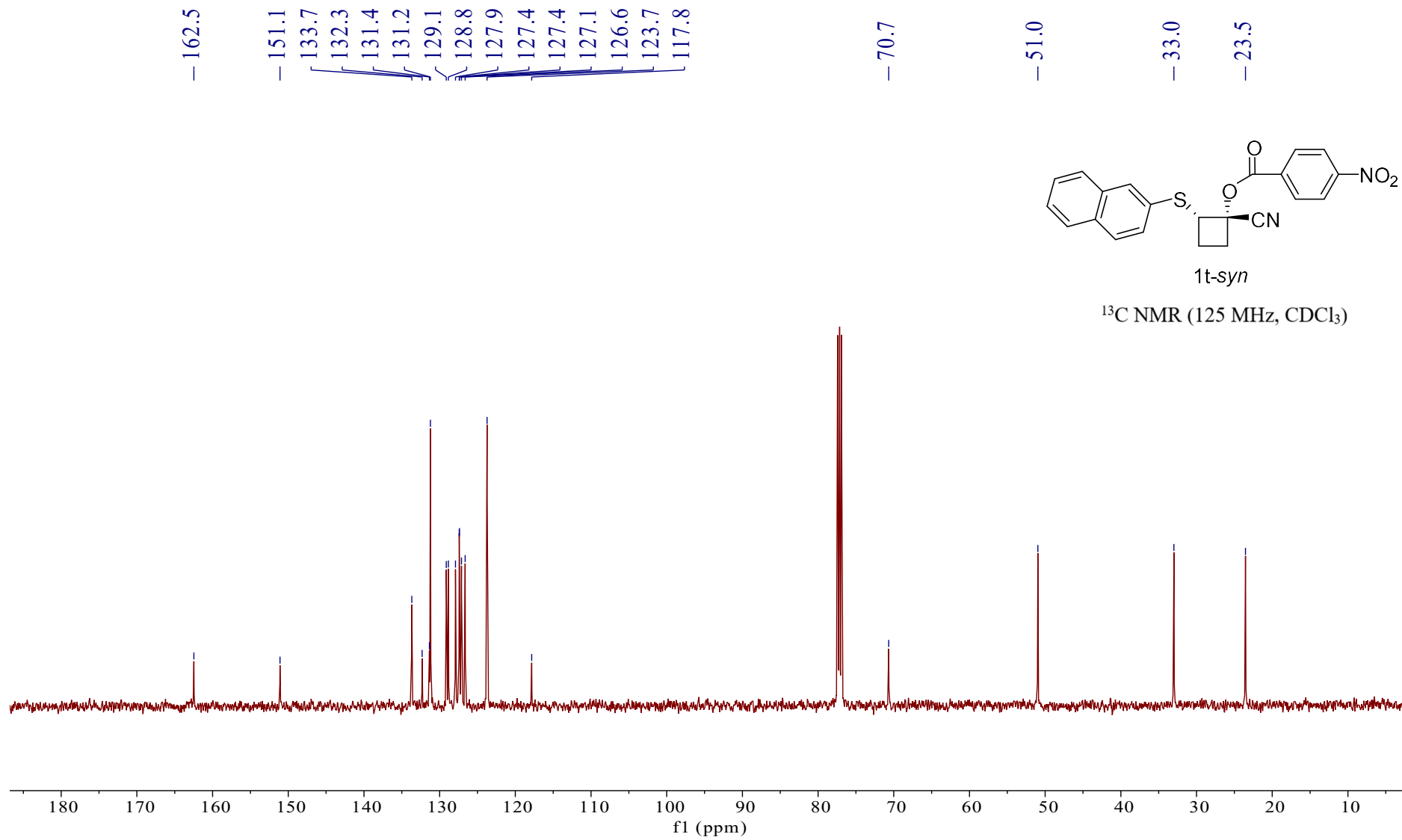
NMR-78



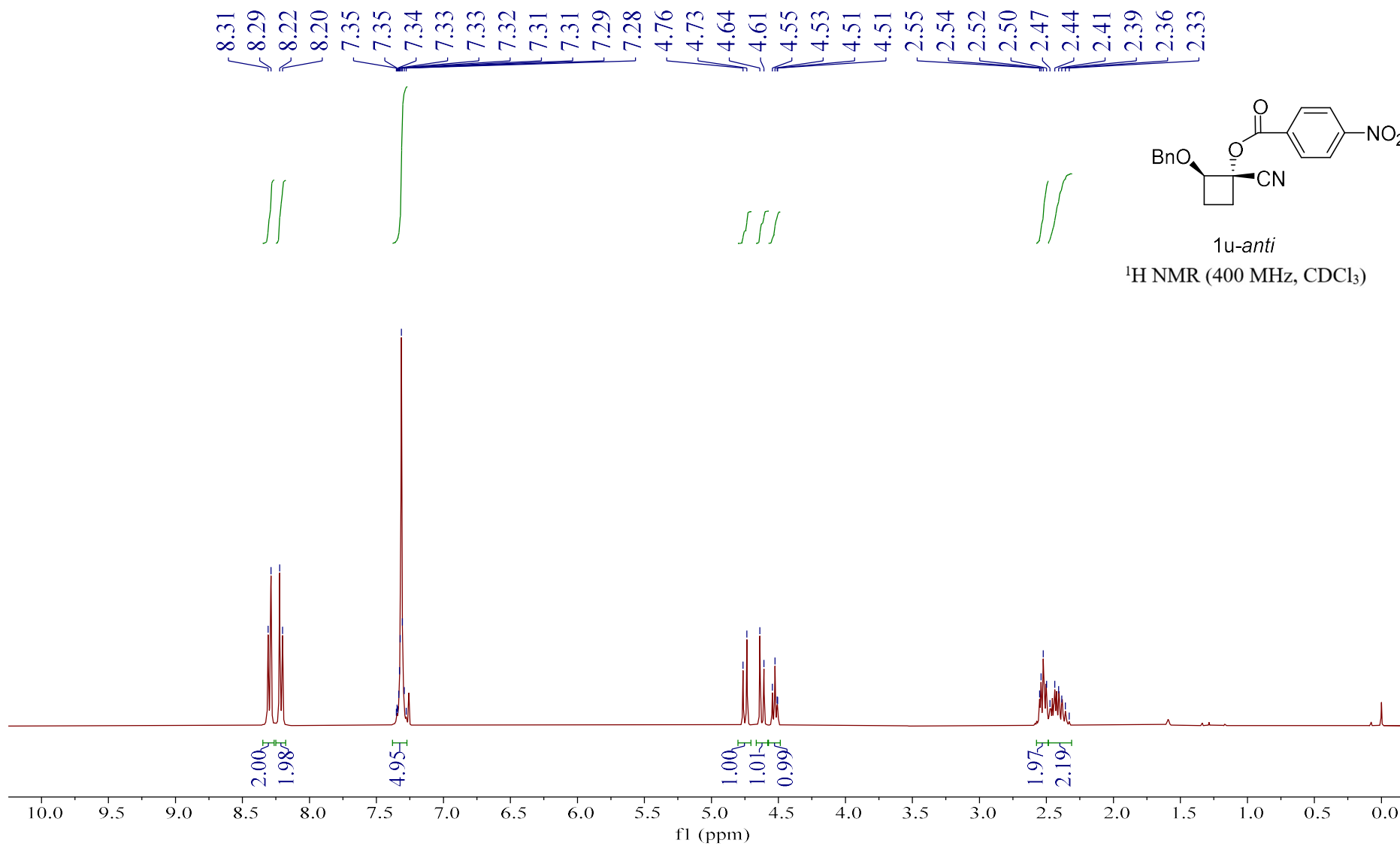
NMR-79



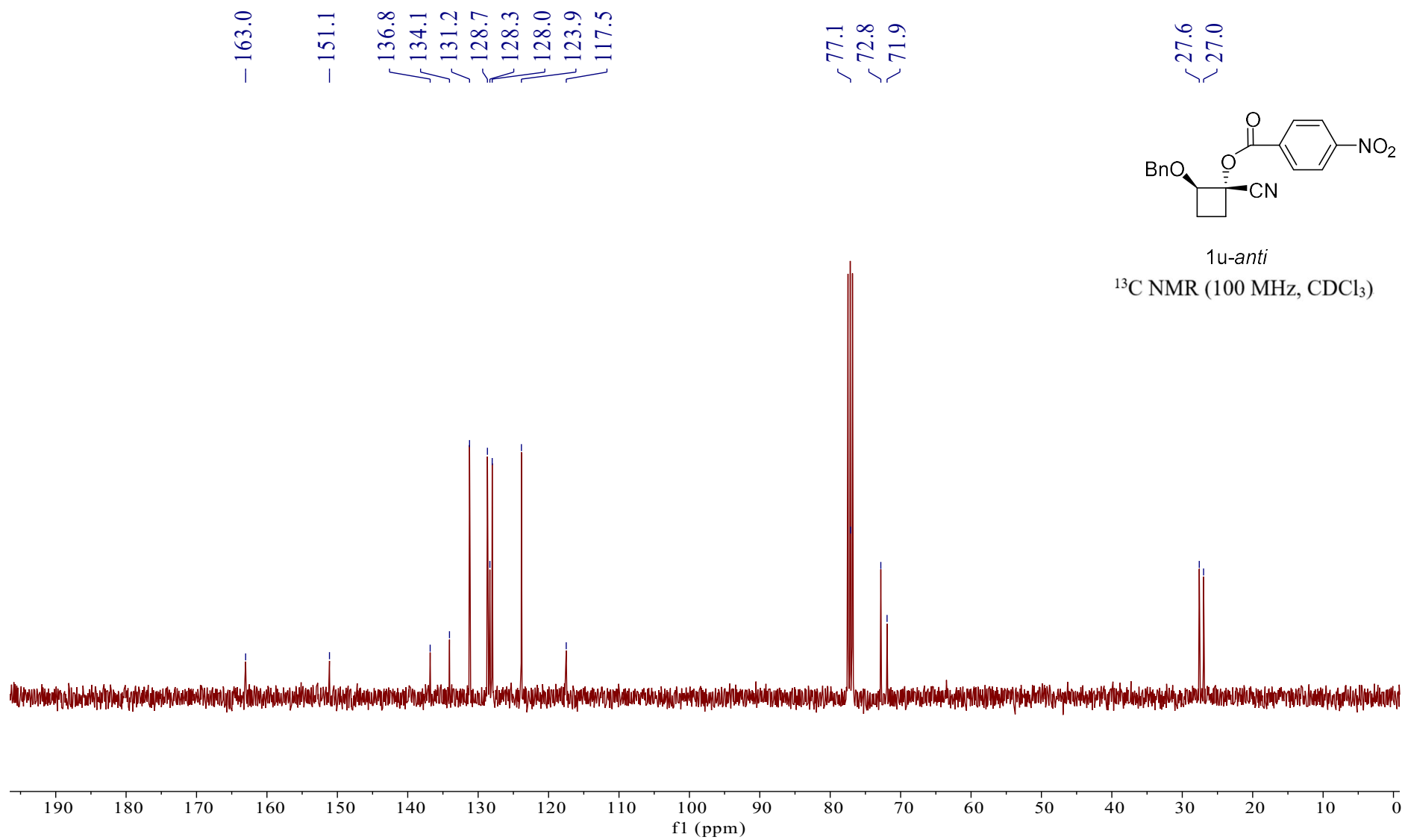
NMR-80



NMR-81



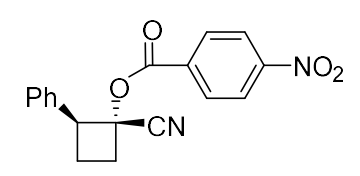
NMR-82



NMR-83

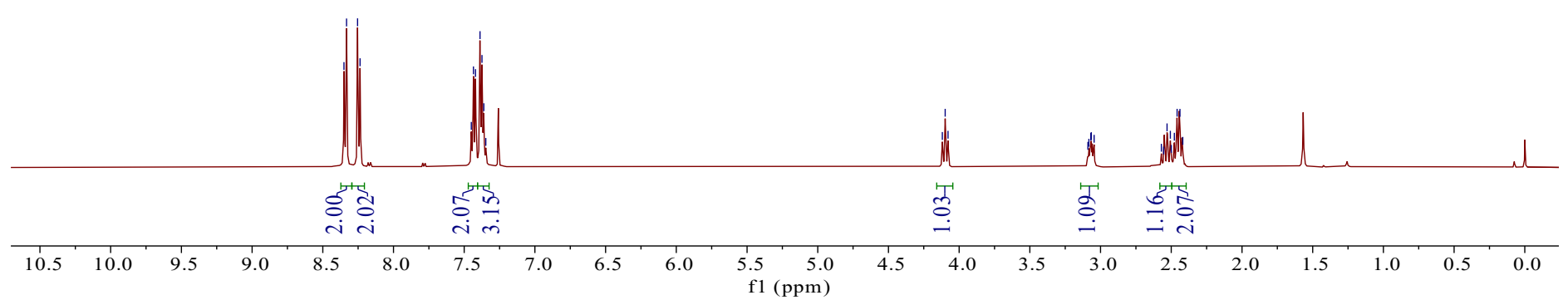
8.35
8.33
8.25
8.24
7.45
7.43
7.42
7.39
7.37
7.36
7.35

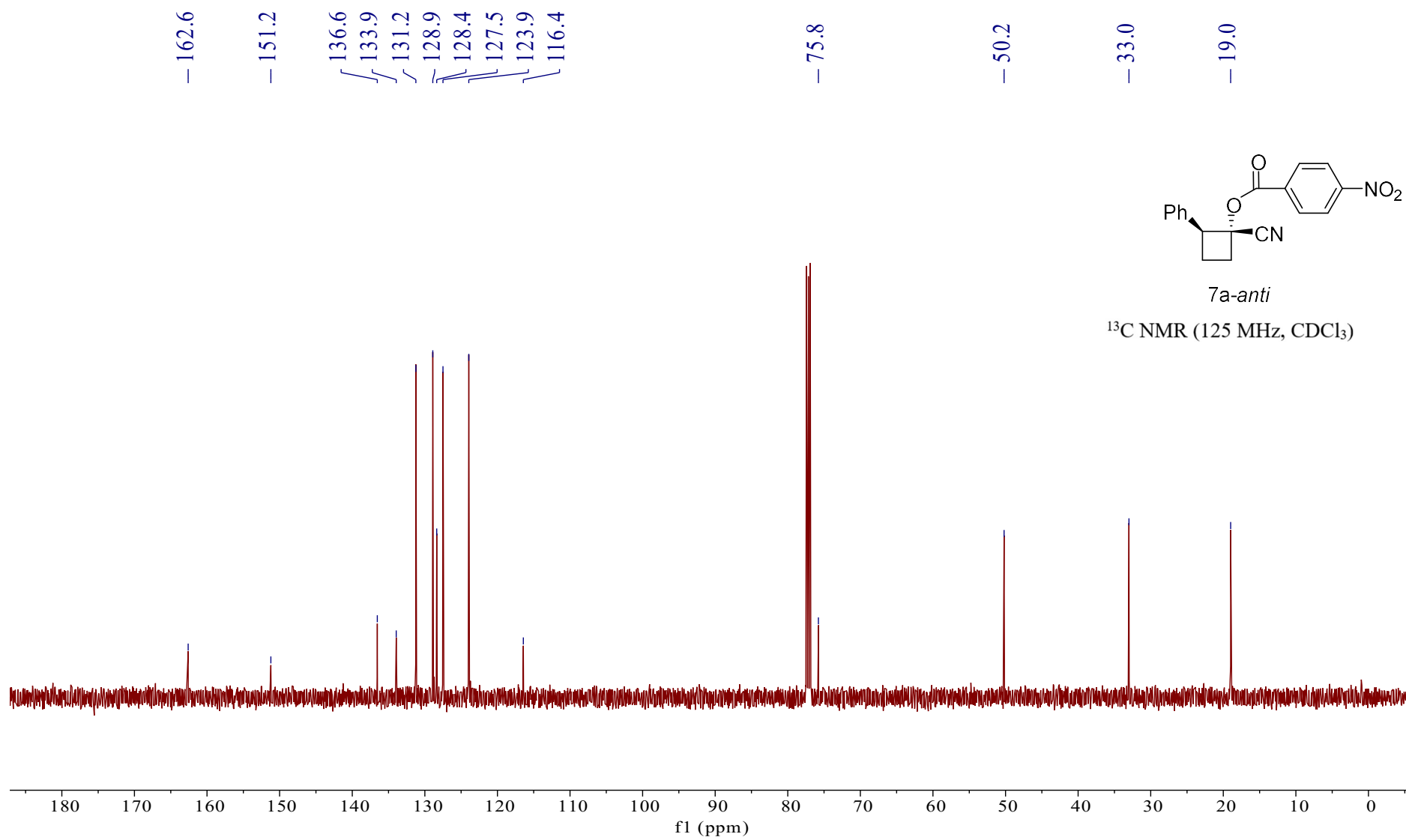
4.12
4.10
4.08
3.09
3.08
3.07
3.07
3.05
2.57
2.55
2.53
2.51
2.50
2.48
2.46
2.44
2.42



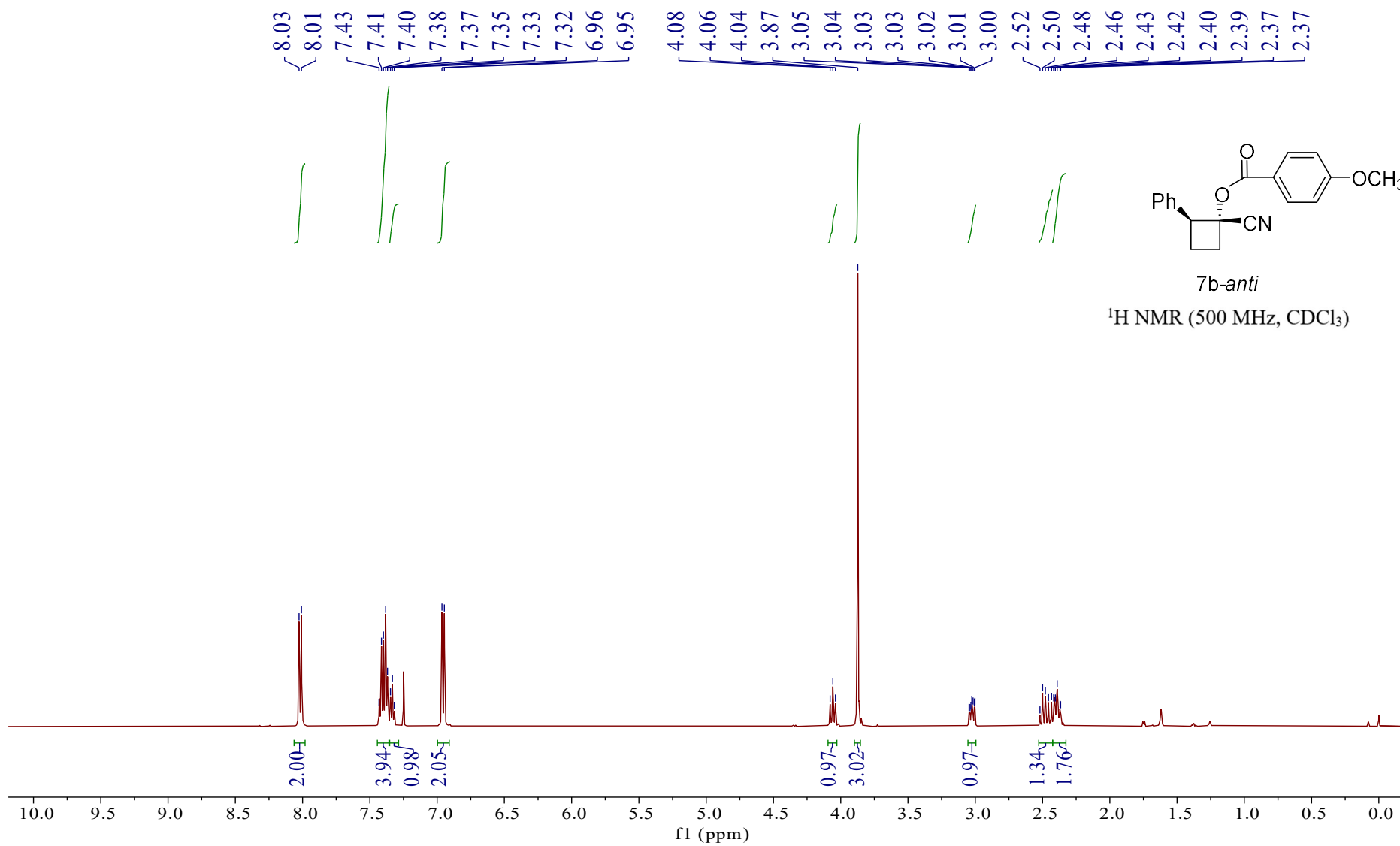
7a-anti

¹H NMR (500 MHz, CDCl₃)





NMR-85



NMR-86

164.2
164.1

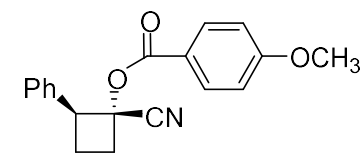
137.1
132.2
128.7
128.0
127.5
120.8
117.1
114.0

-74.8

-55.6
-50.0

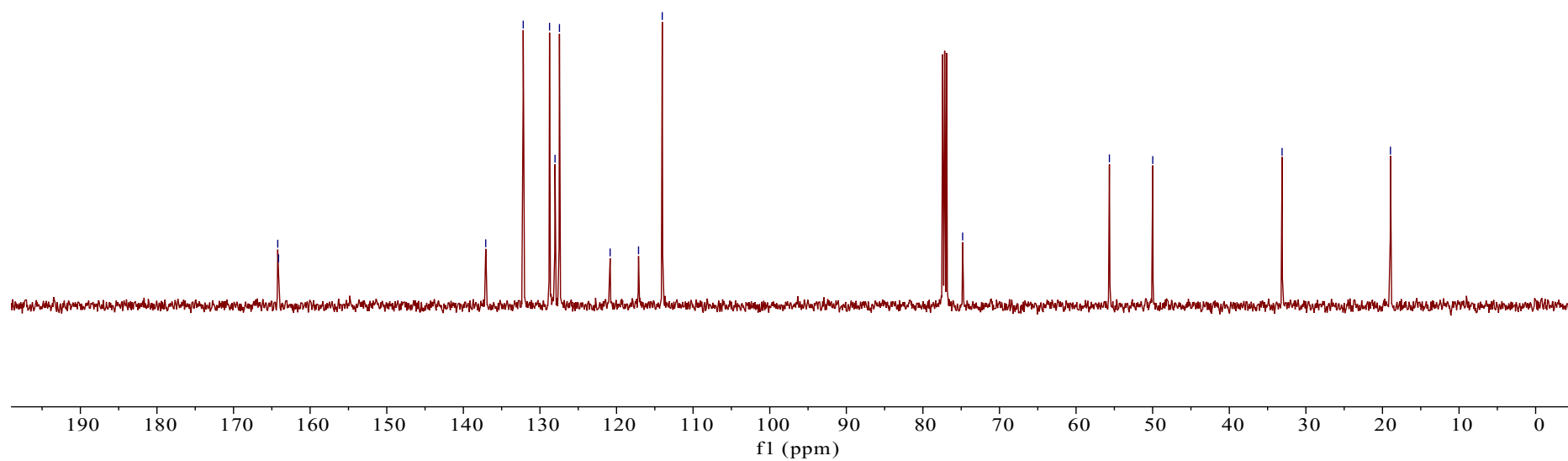
-33.1

-19.0

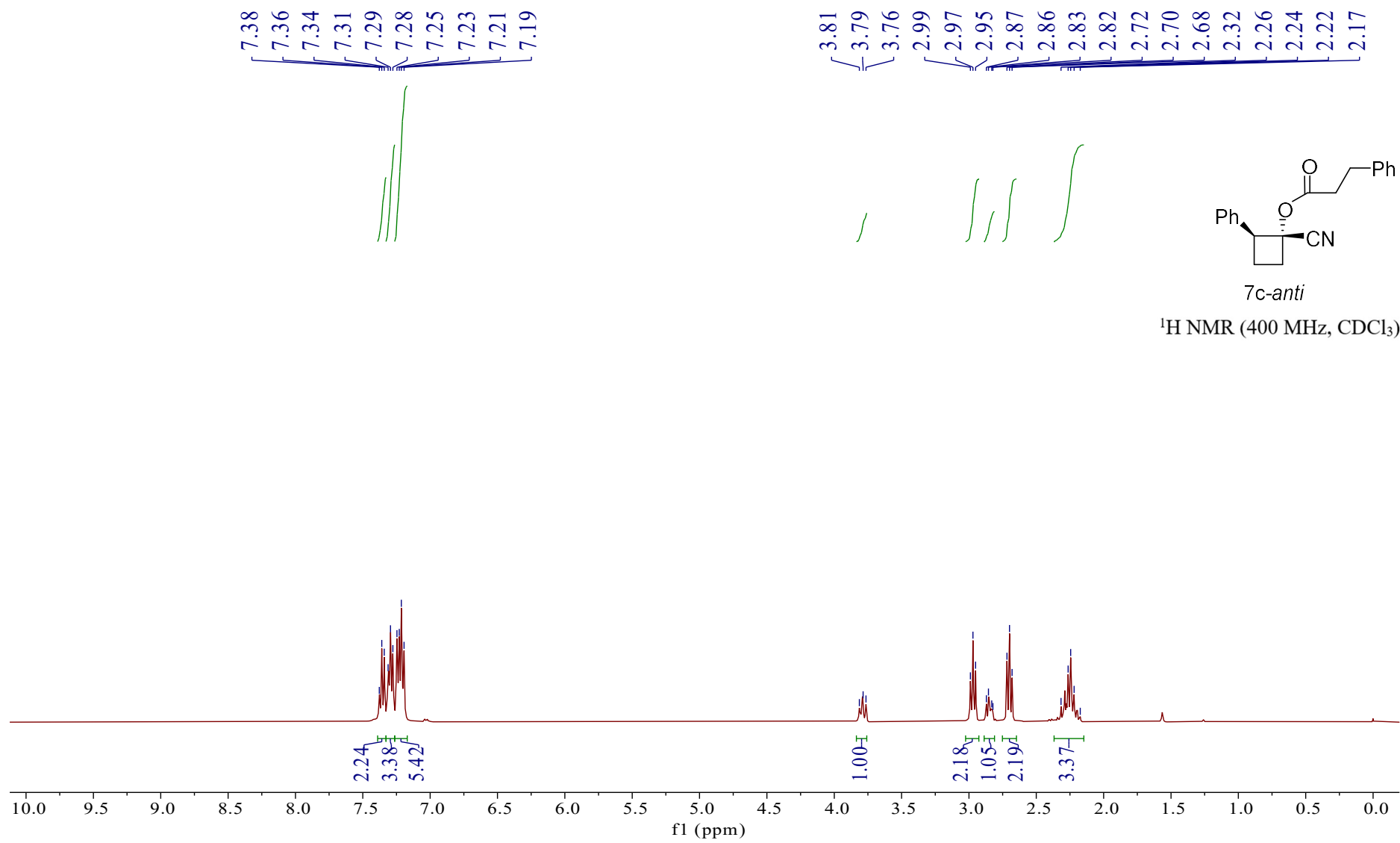


7b-anti

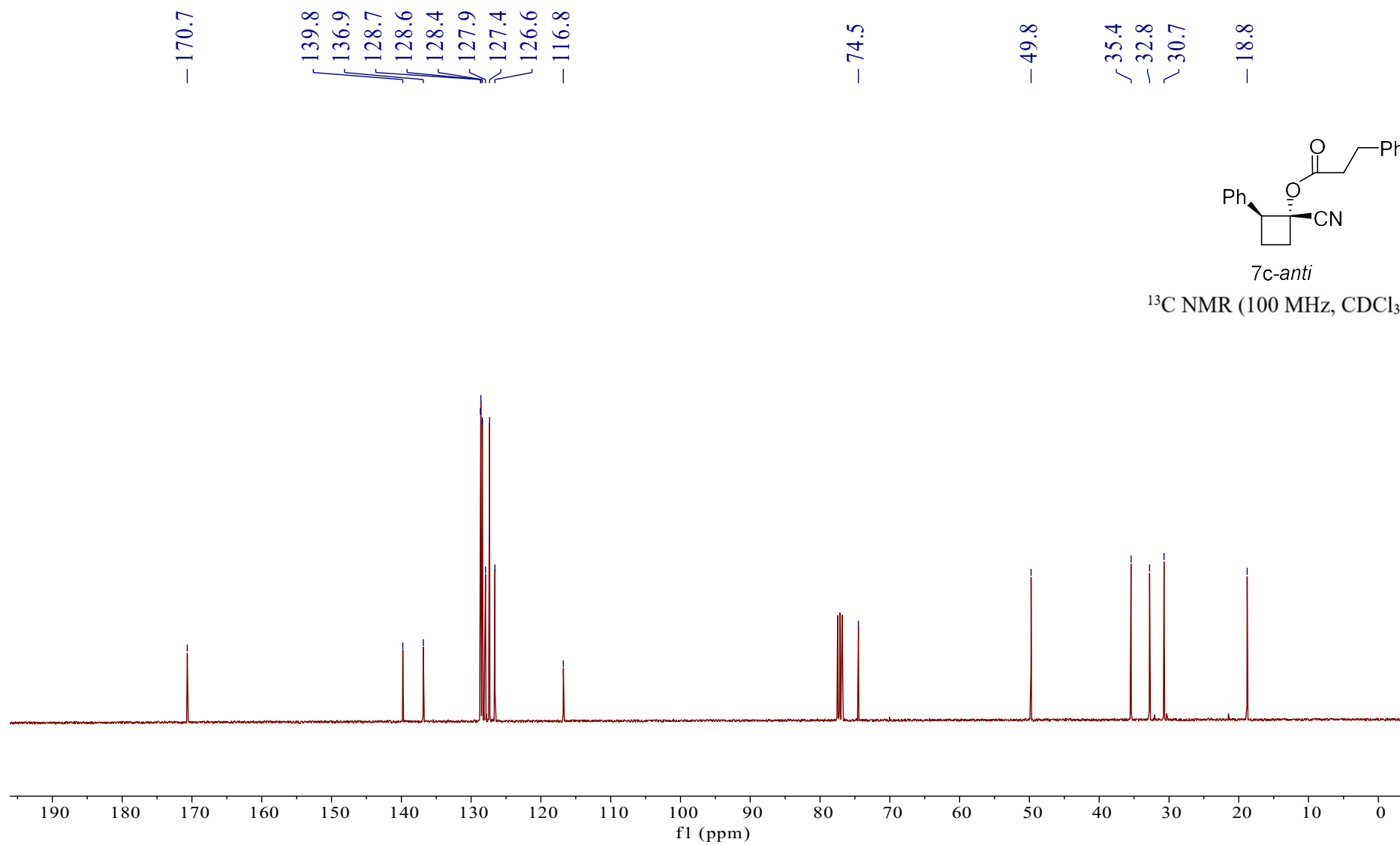
¹³C NMR (125 MHz, CDCl₃)



NMR-87



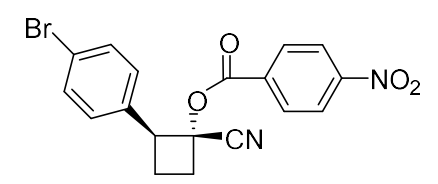
NMR-88



NMR-89

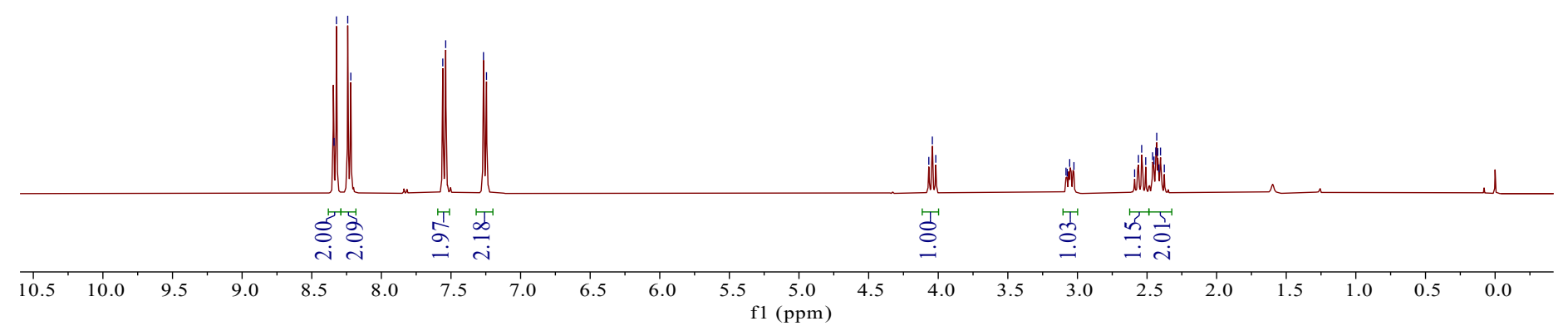
8.34
8.32
8.24
8.22
7.56
7.54
7.27
7.24

4.07
4.04
4.02
3.08
3.07
3.06
3.03
2.59
2.56
2.54
2.51
2.46
2.45
2.44
2.43
2.42
2.41
2.40
2.38



7d-anti

¹H NMR (400 MHz, CDCl₃)



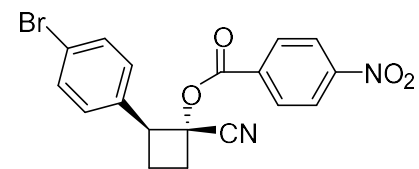
— 162.5
— 151.2
— 135.6
— 133.7
— 132.0
— 131.2
— 129.2
— 123.9
— 122.4
— 116.3

— 75.4

— 49.7

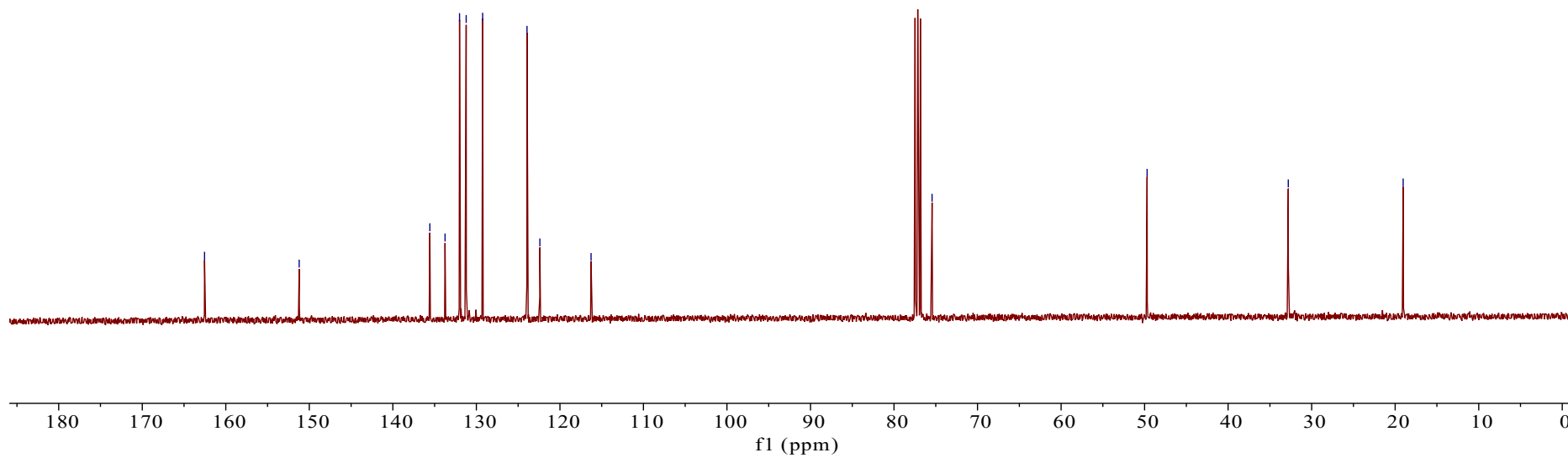
— 32.8

— 19.0

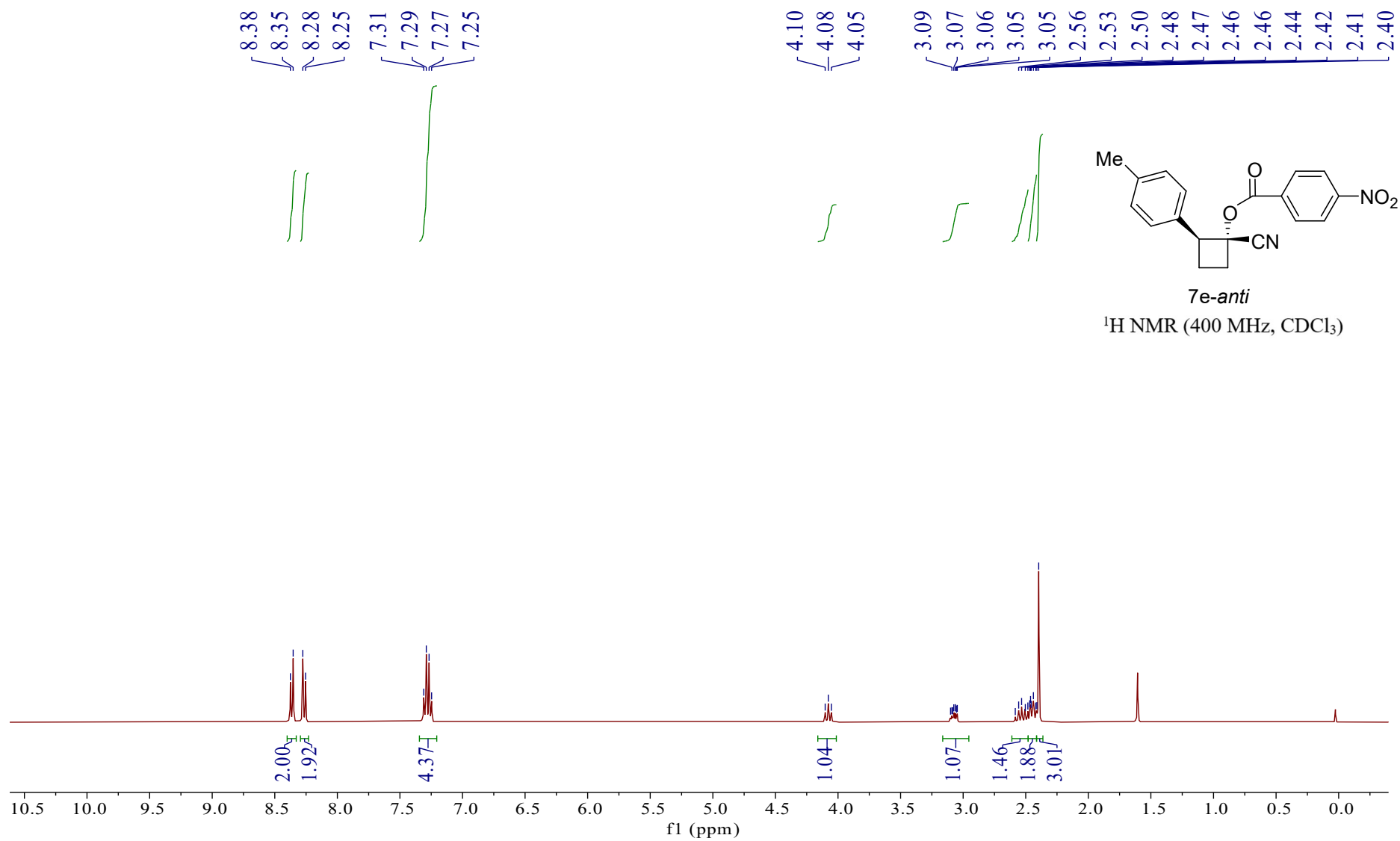


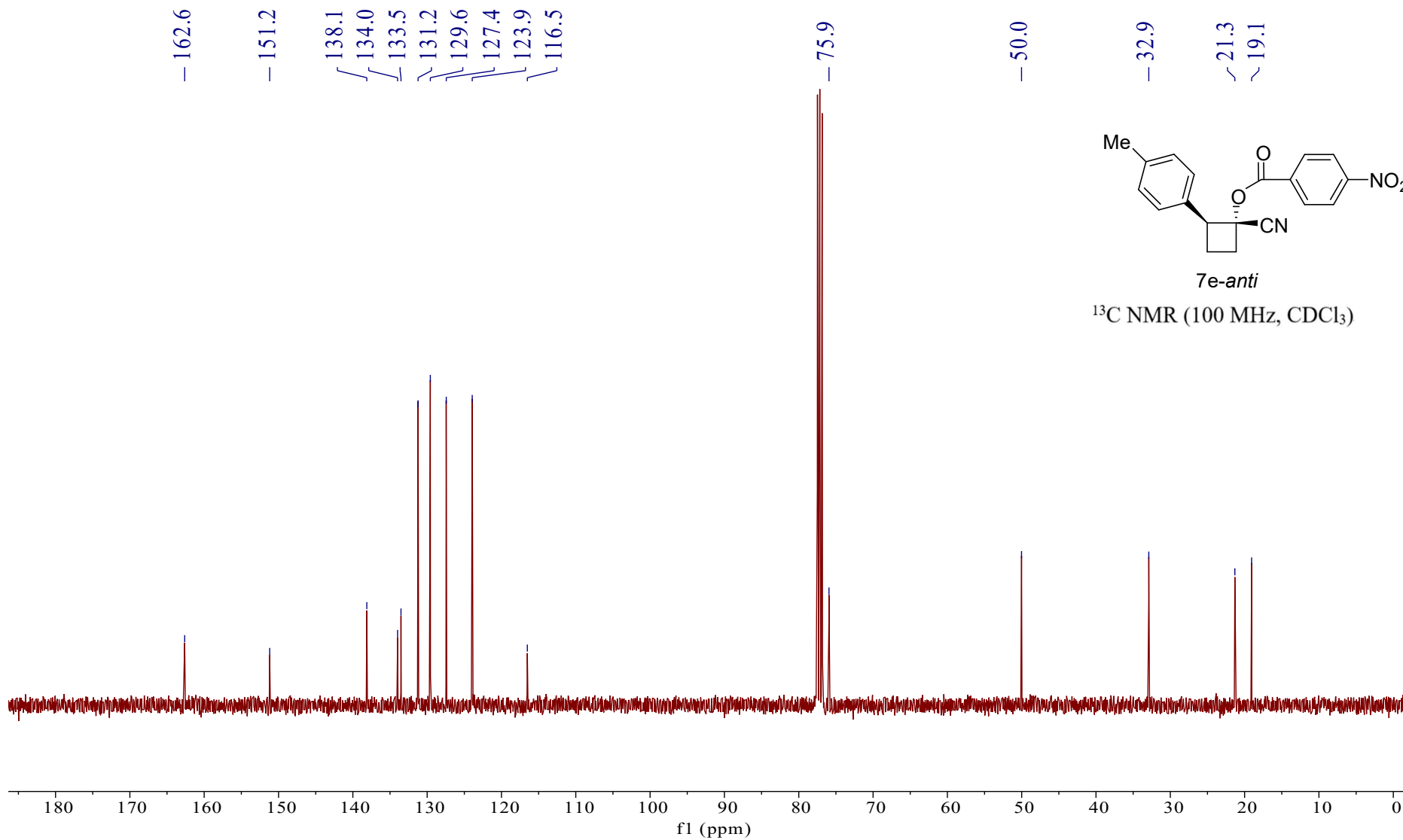
7d-anti

¹³C NMR (100 MHz, CDCl₃)

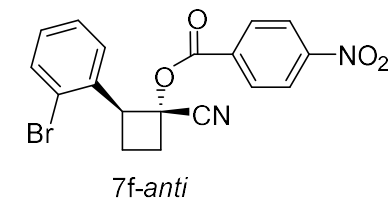
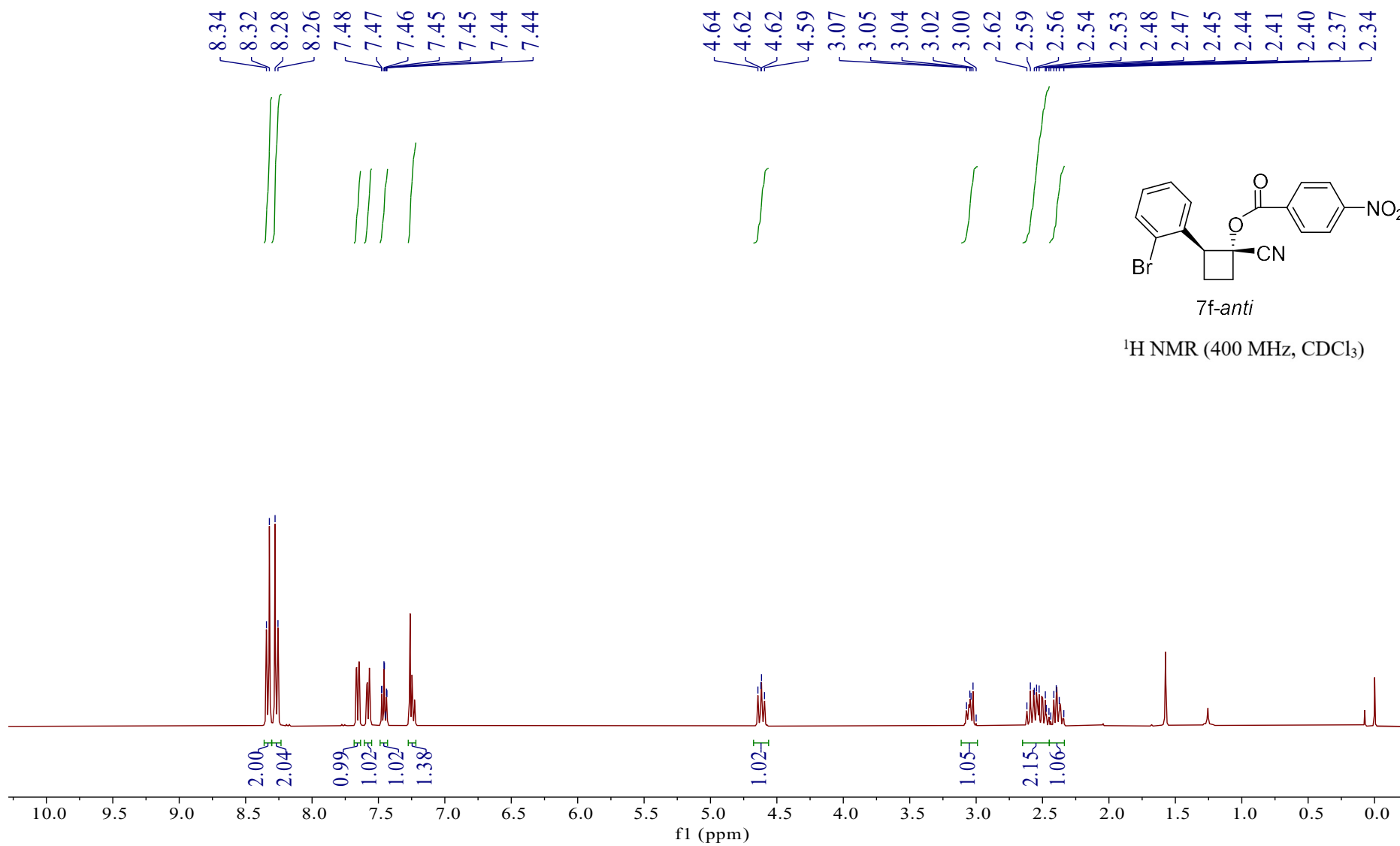


NMR-91

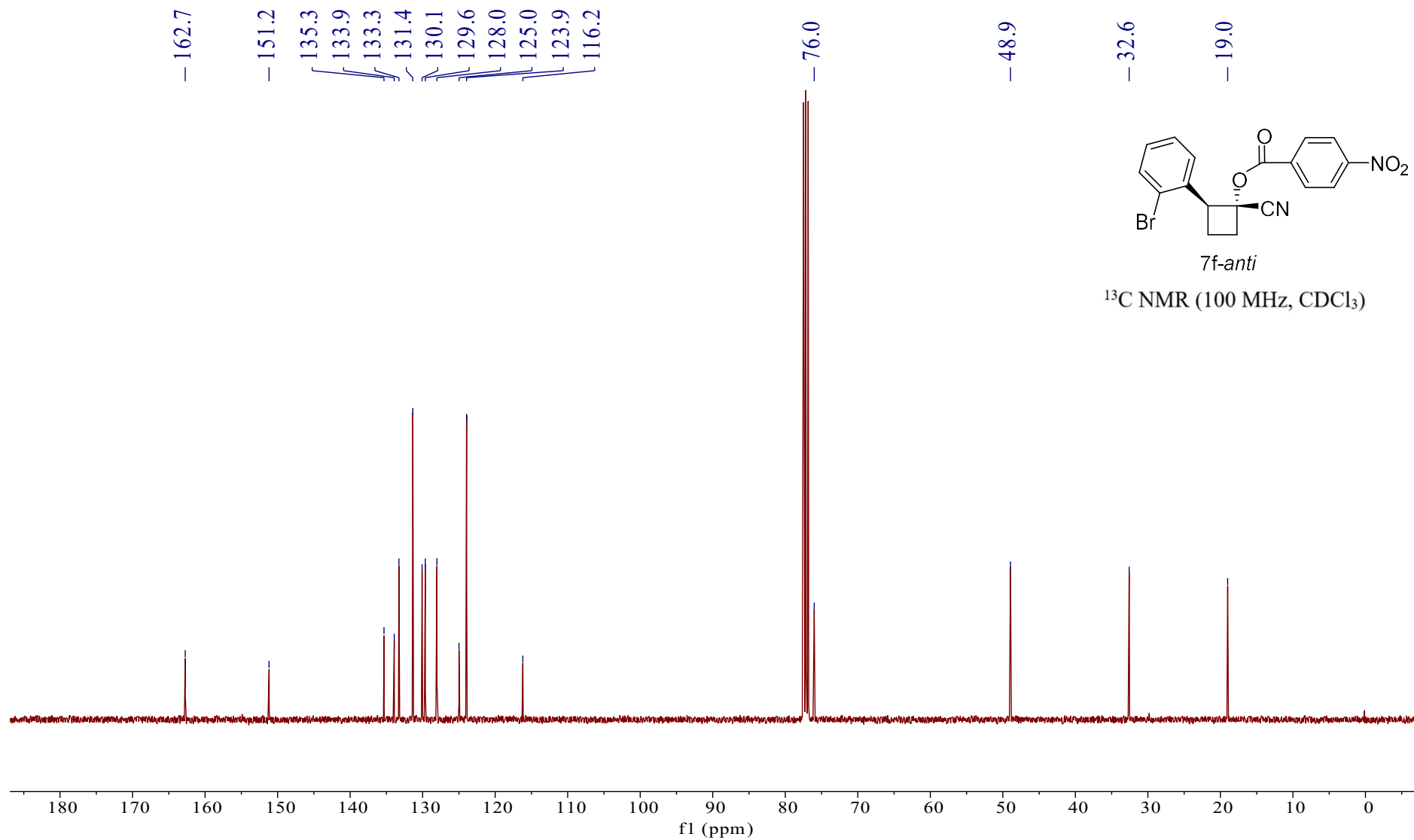




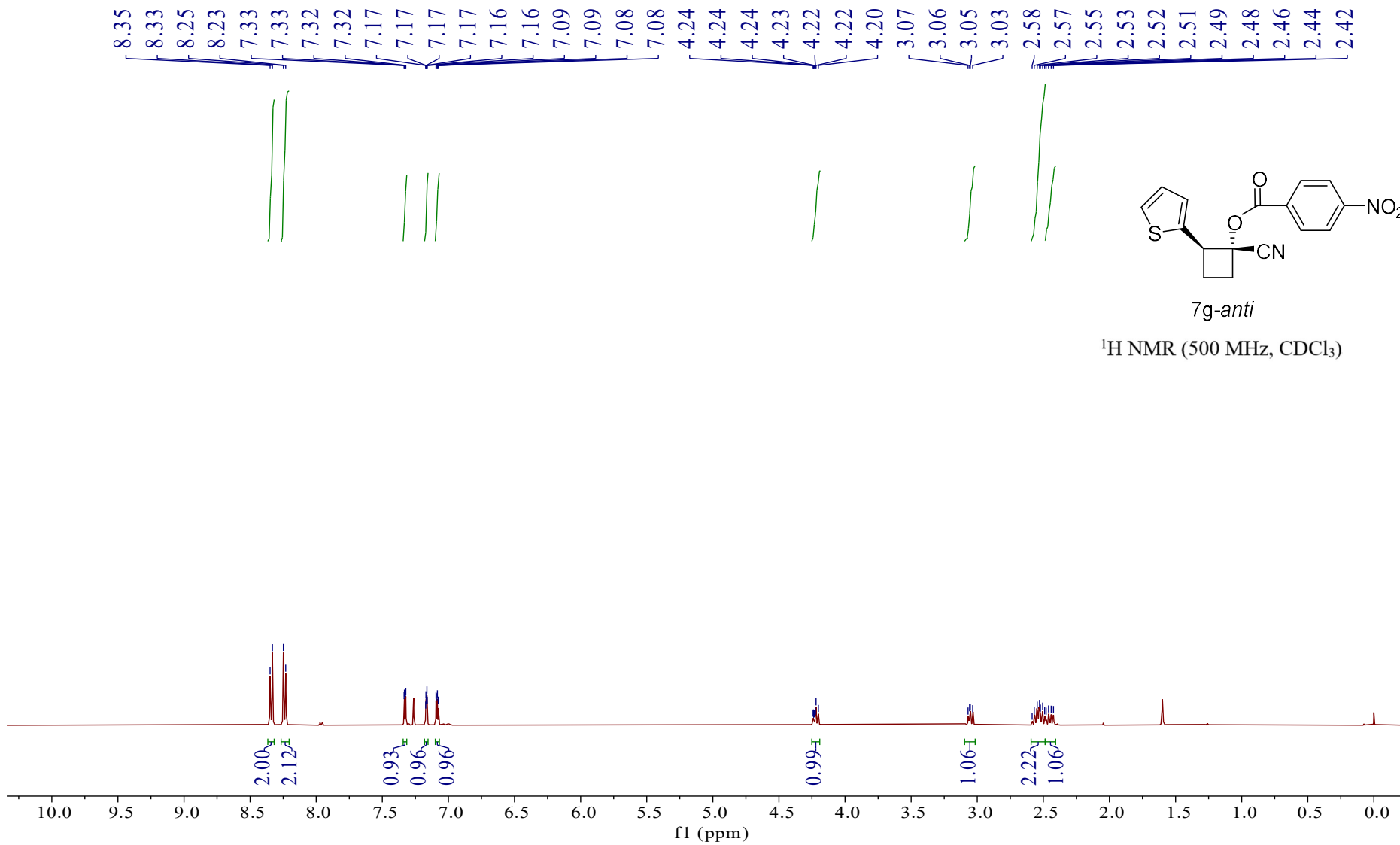
NMR-93



¹H NMR (400 MHz, CDCl₃)



NMR-95



NMR-96

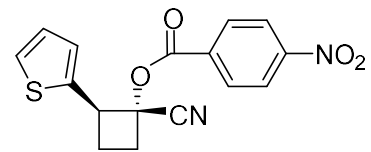
— 162.6
— 151.2
— 139.1
— 133.8
— 131.3
— 127.5
— 126.3
— 125.7
— 123.9
— 116.1

— 76.2

— 45.7

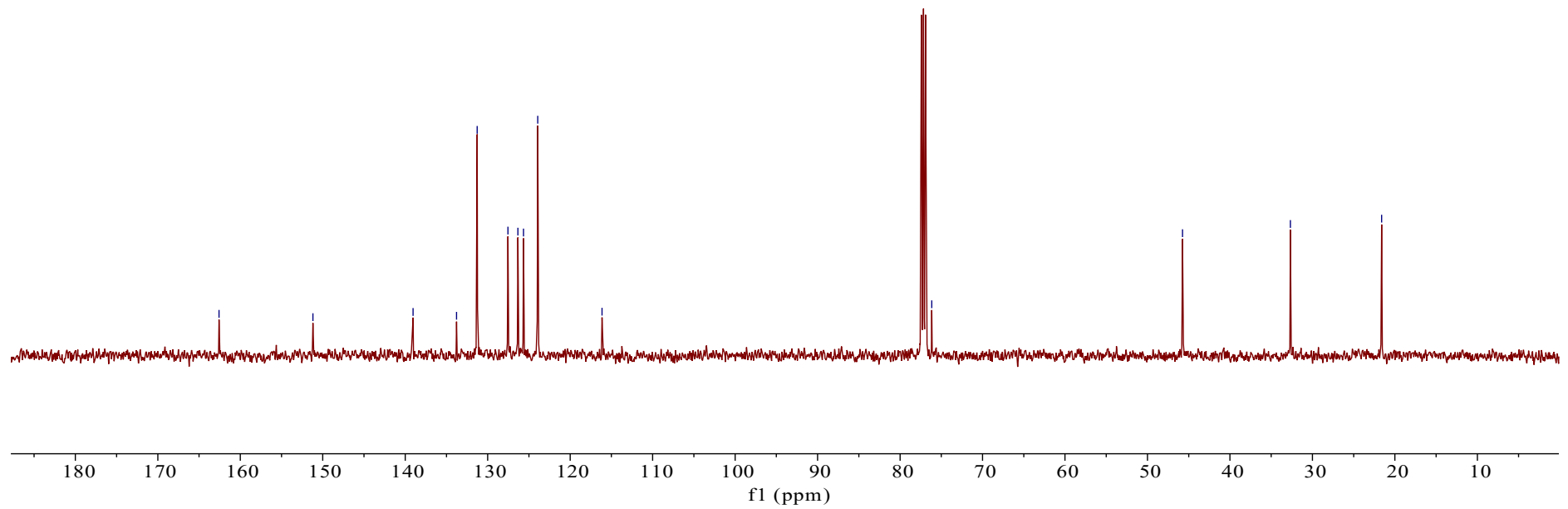
— 32.7

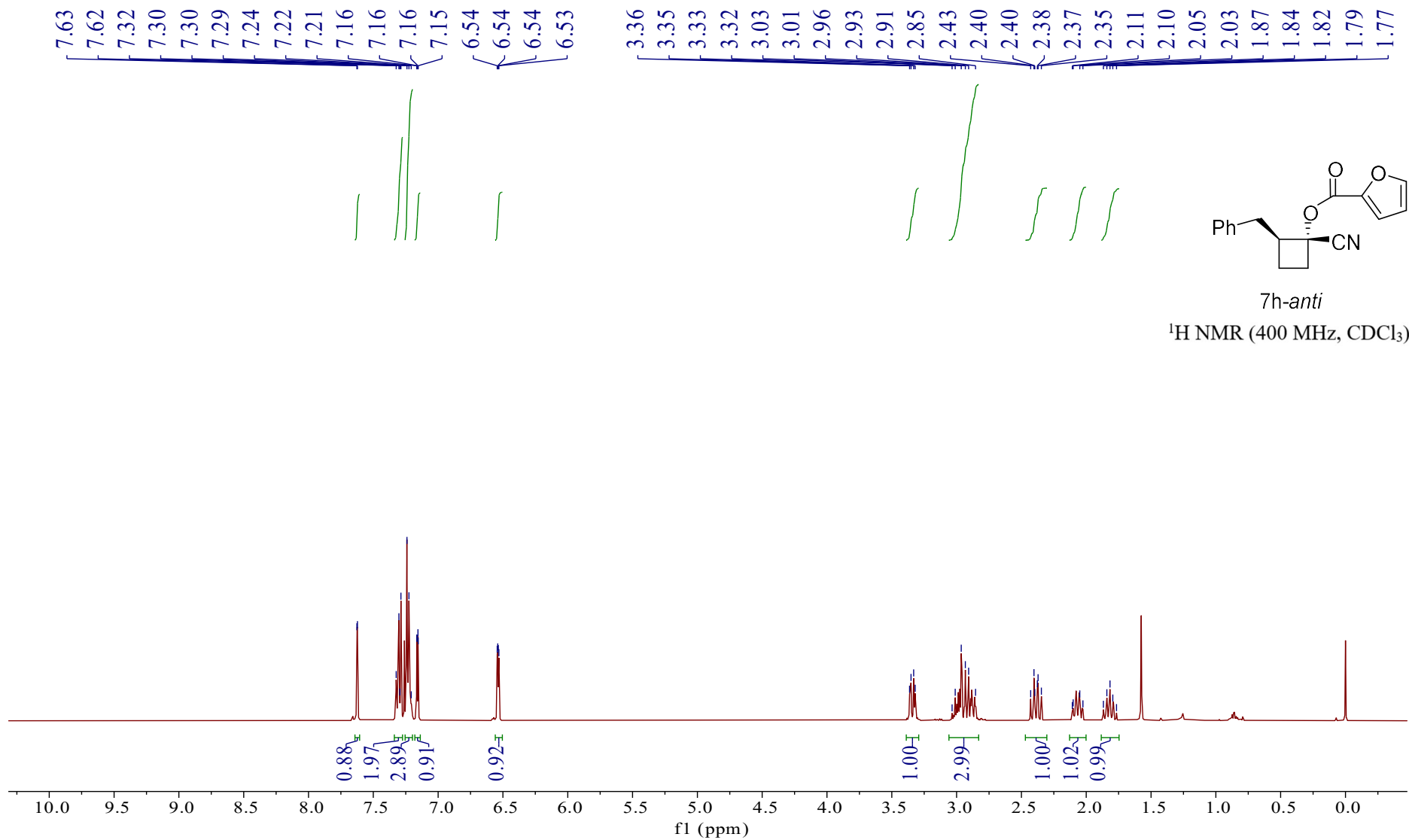
— 21.6



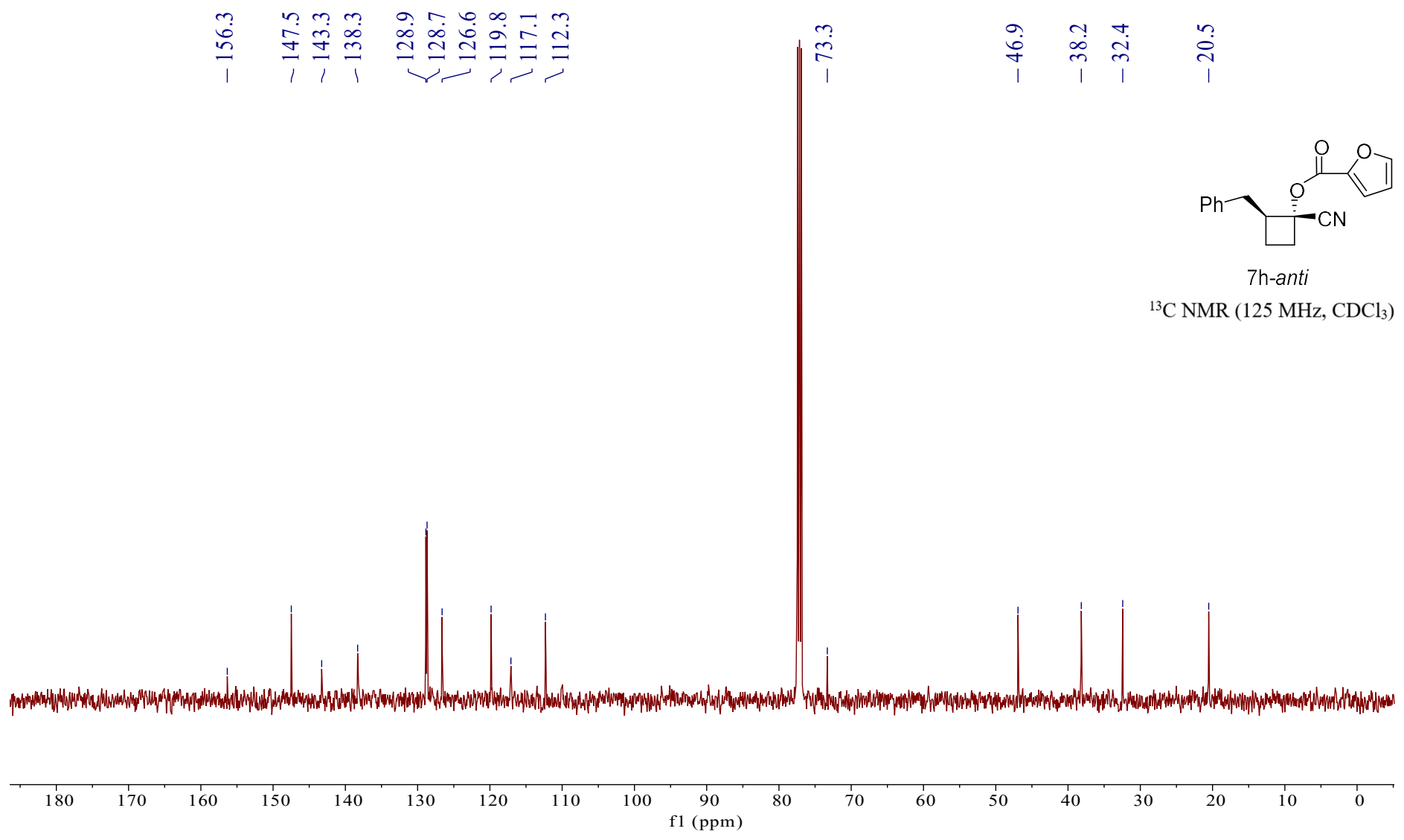
7g-anti

¹³C NMR (125 MHz, CDCl₃)





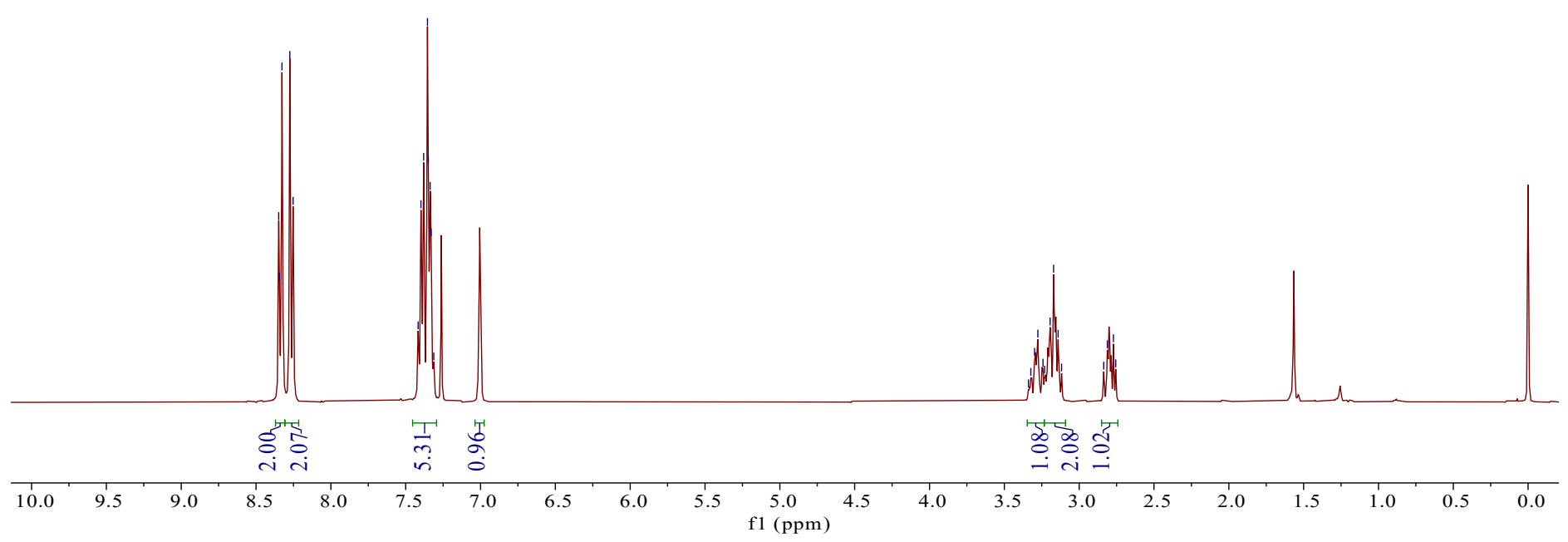
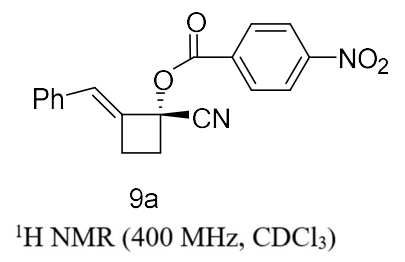
NMR-98

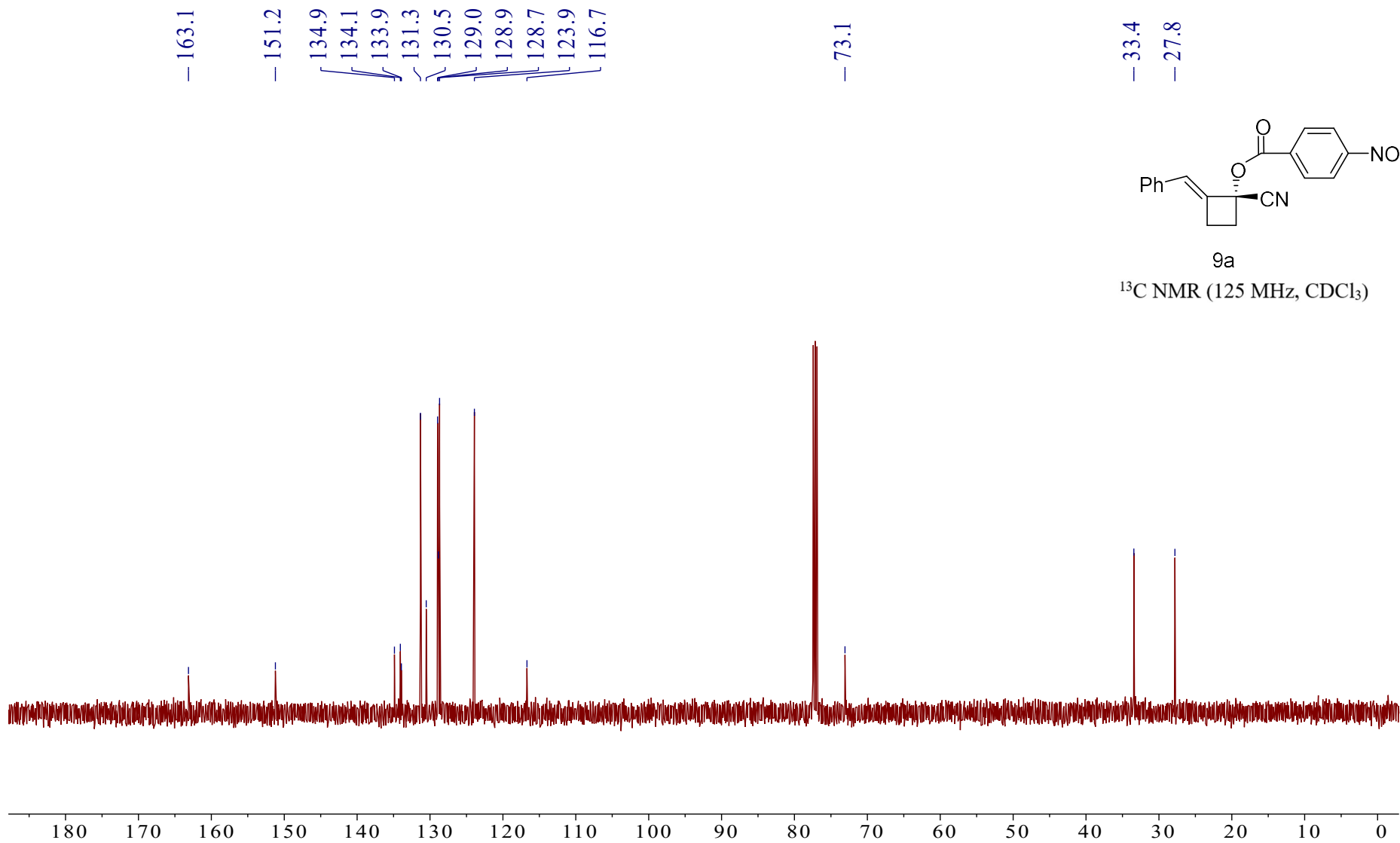


NMR-99

8.35
8.34
8.33
8.27
8.25
7.42
7.40
7.38
7.35
7.35
7.34
7.33
7.31

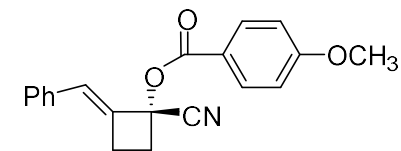
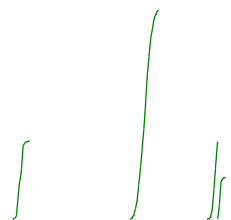
3.34
3.32
3.30
3.28
3.24
3.23
3.19
3.17
3.14
3.12
2.84
2.81
2.77
2.76





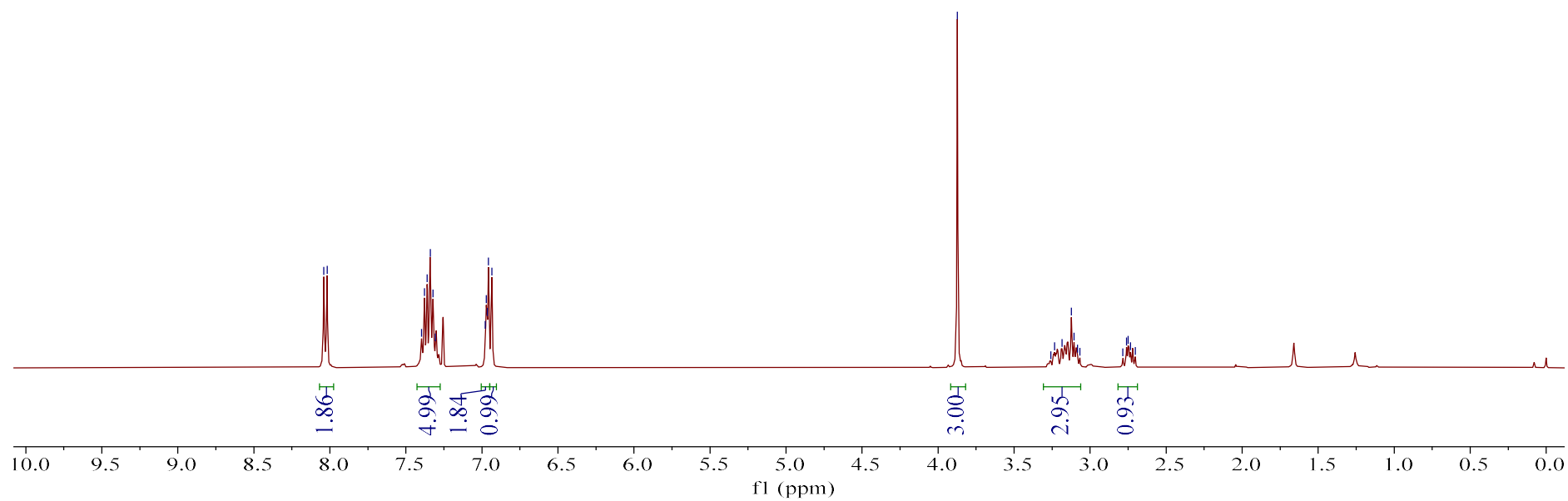
8.04
8.02
7.40
7.38
7.36
7.34
7.32
7.31
6.98
6.97
6.96
6.96
6.94

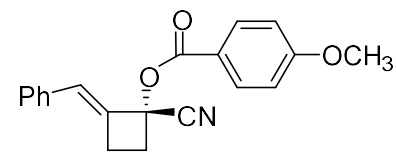
3.87
3.26
3.23
3.18
3.12
3.11
3.08
3.07
2.78
2.76
2.75
2.73
2.70



9b

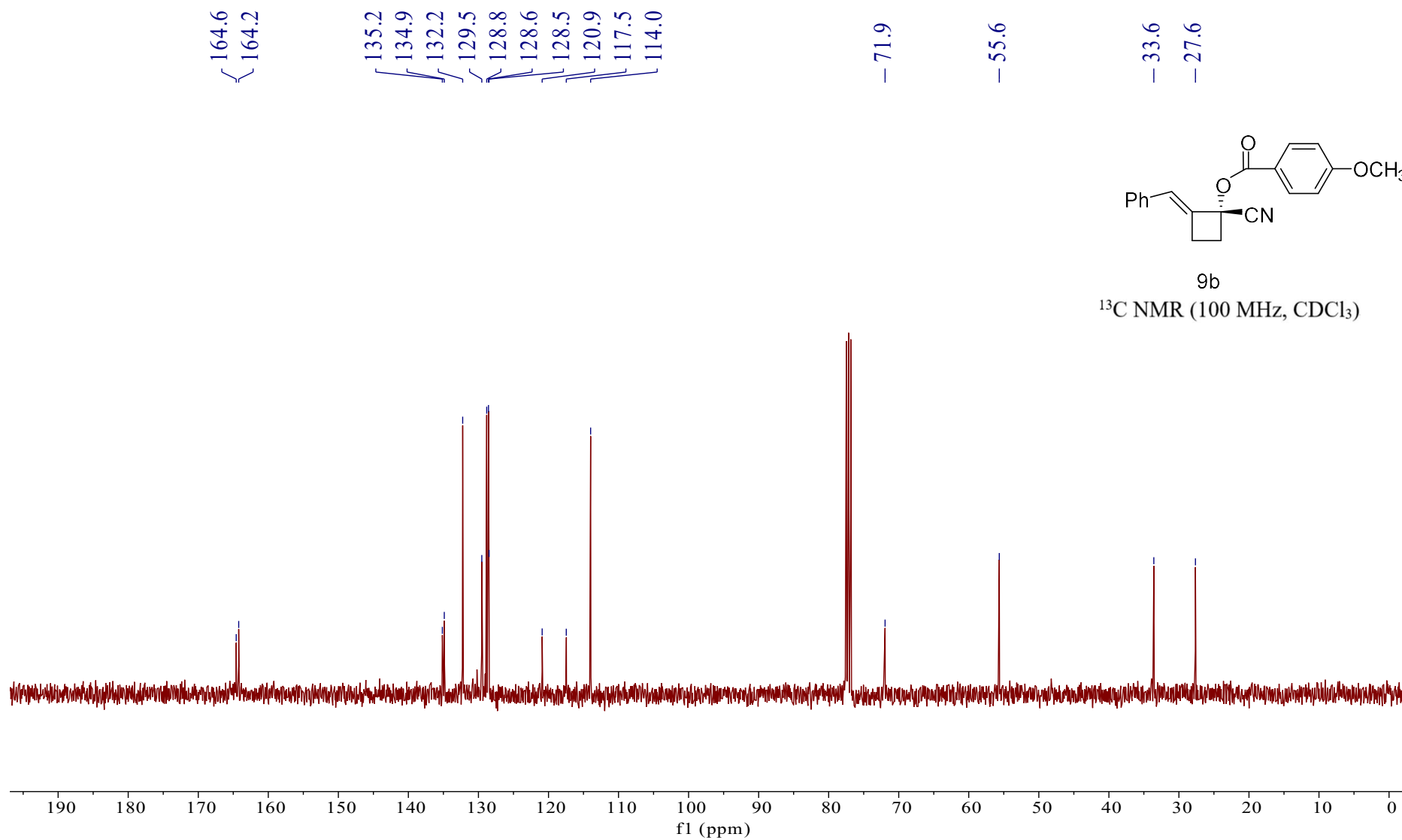
¹H NMR (400 MHz, CDCl₃)



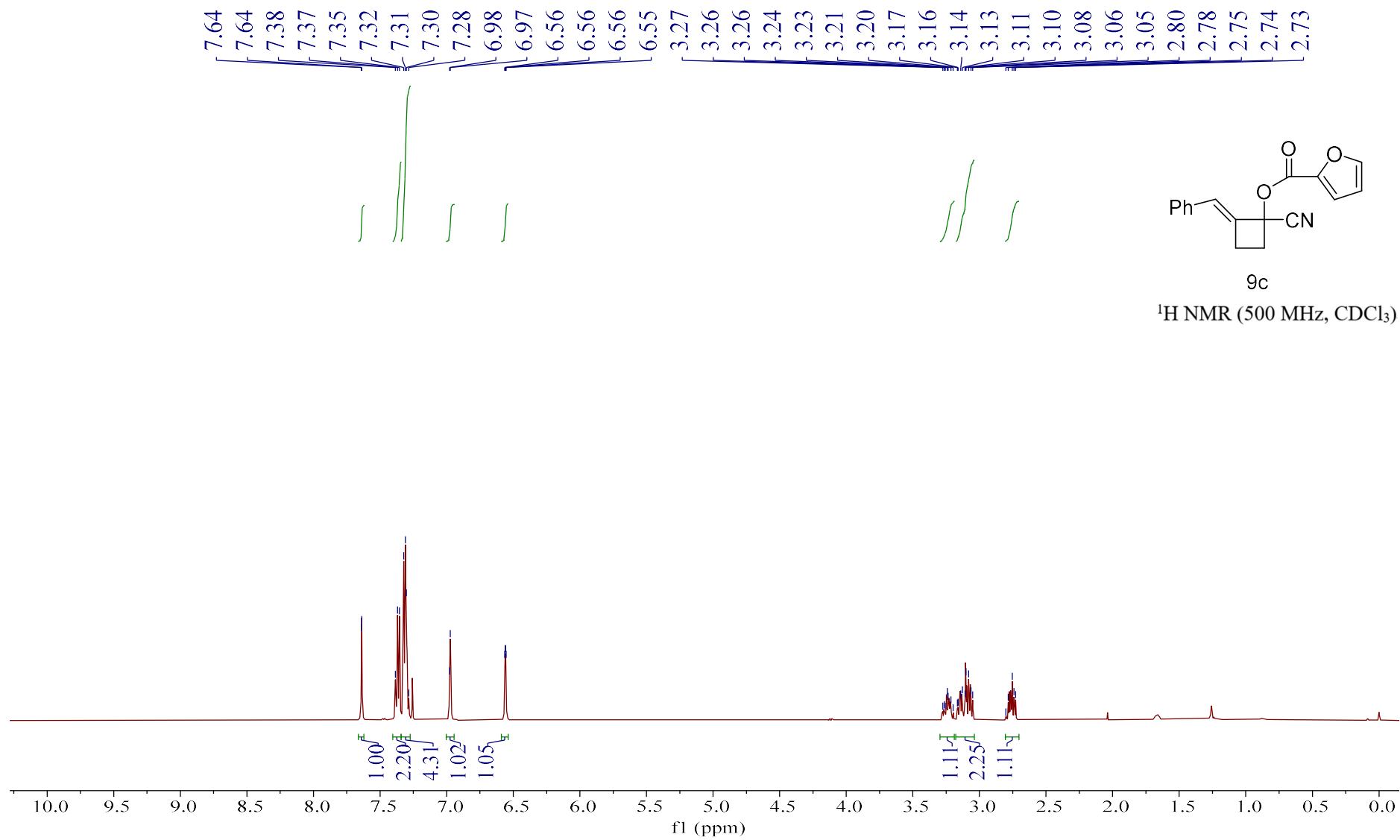


9b

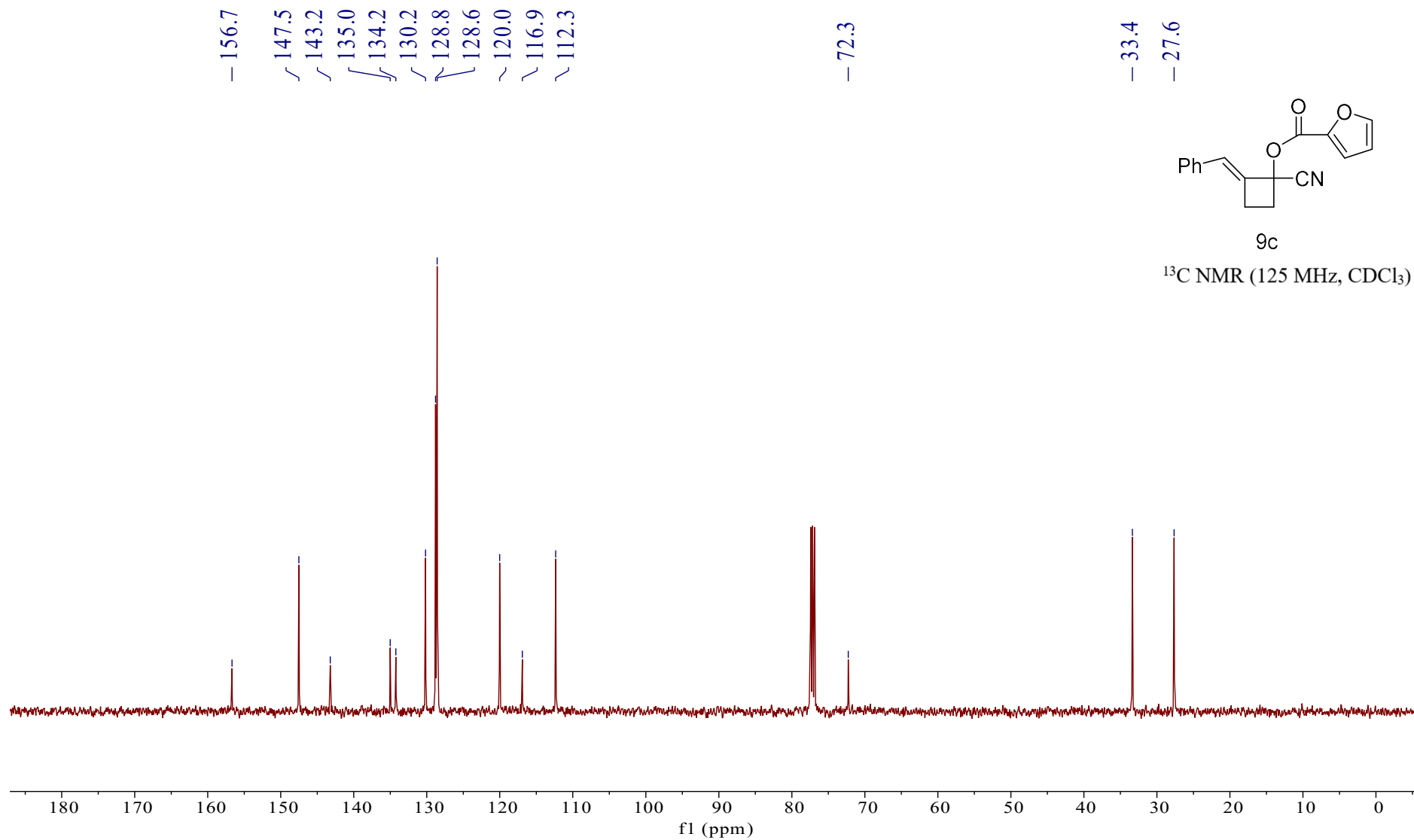
¹³C NMR (100 MHz, CDCl₃)



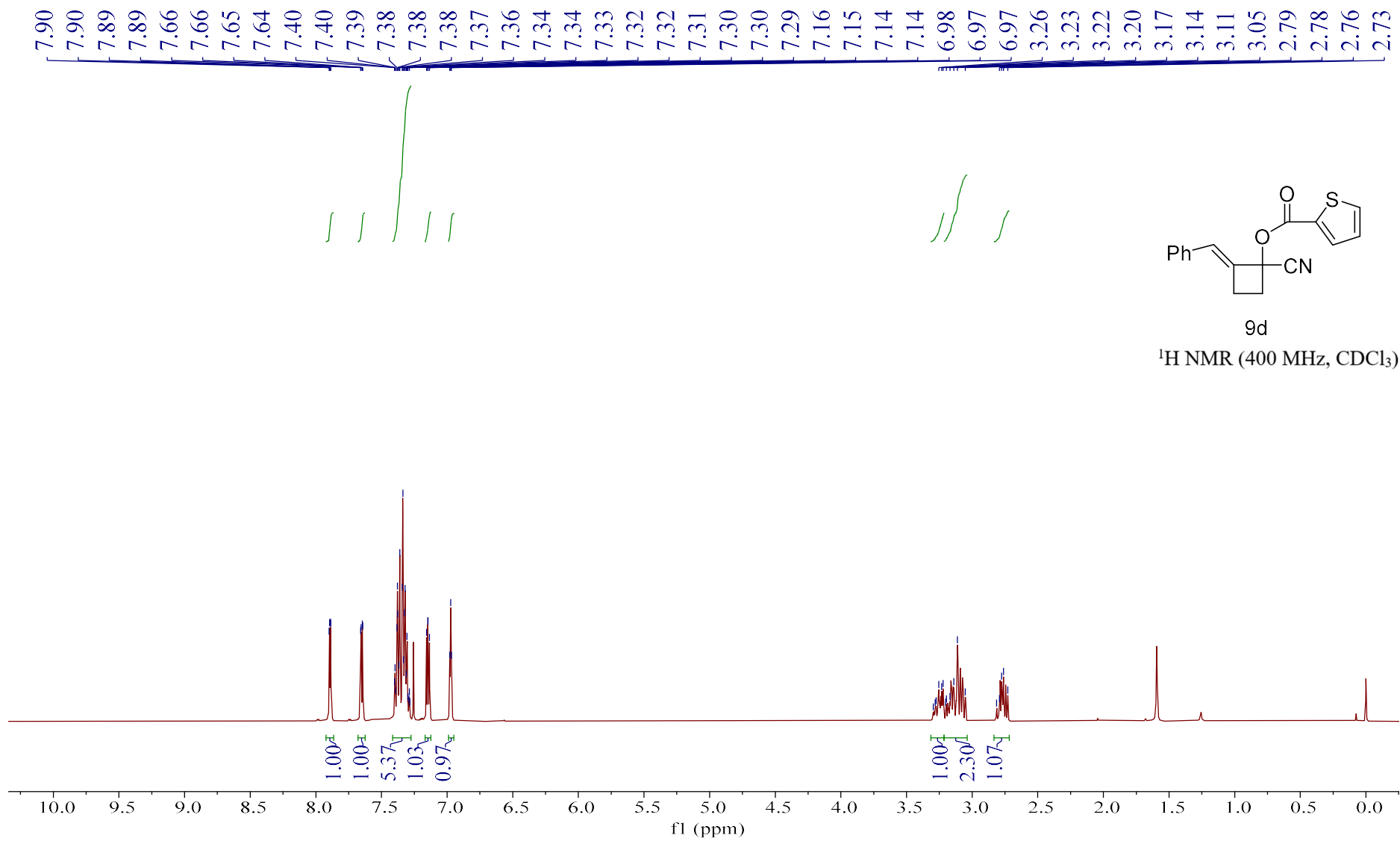
NMR-103



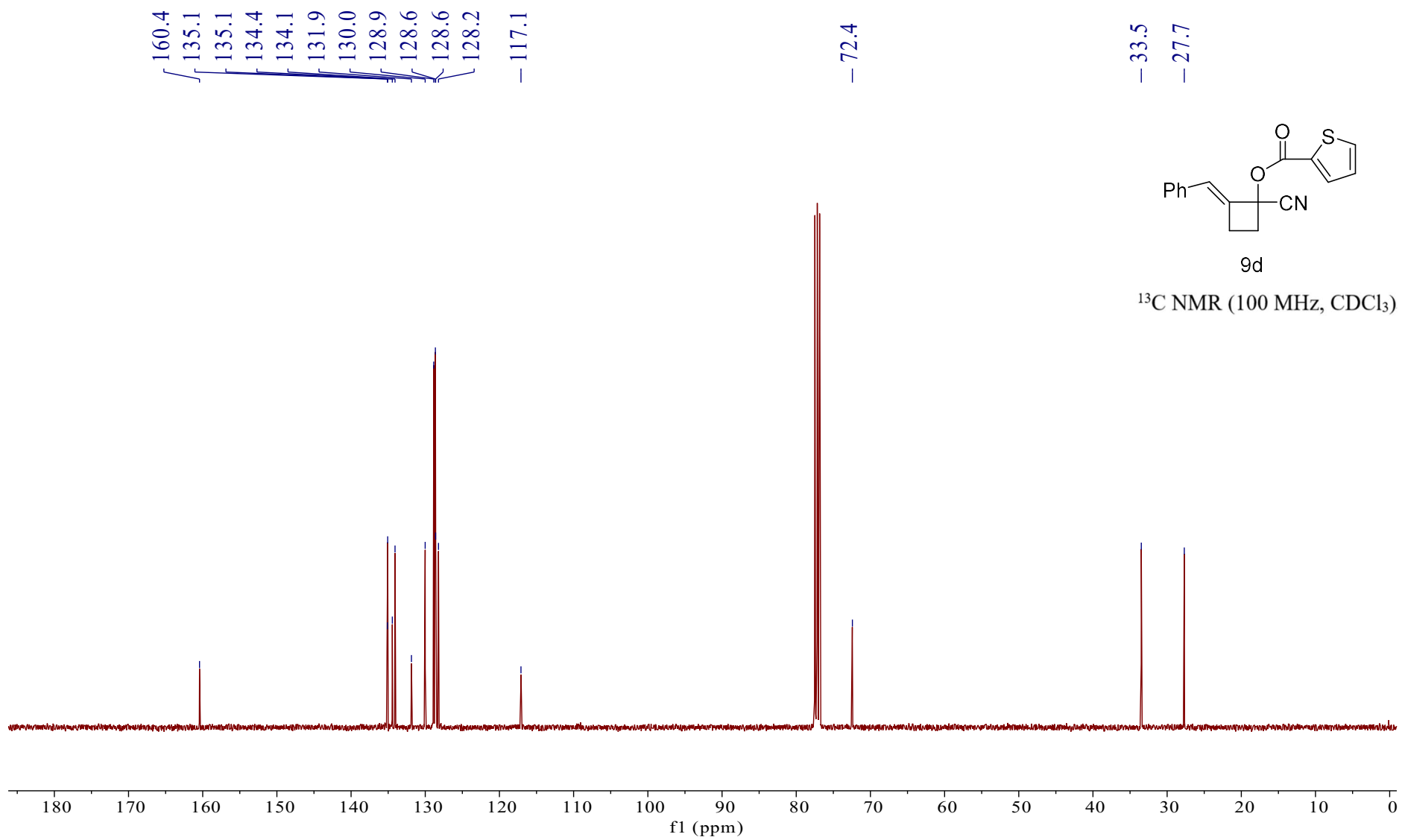
NMR-104



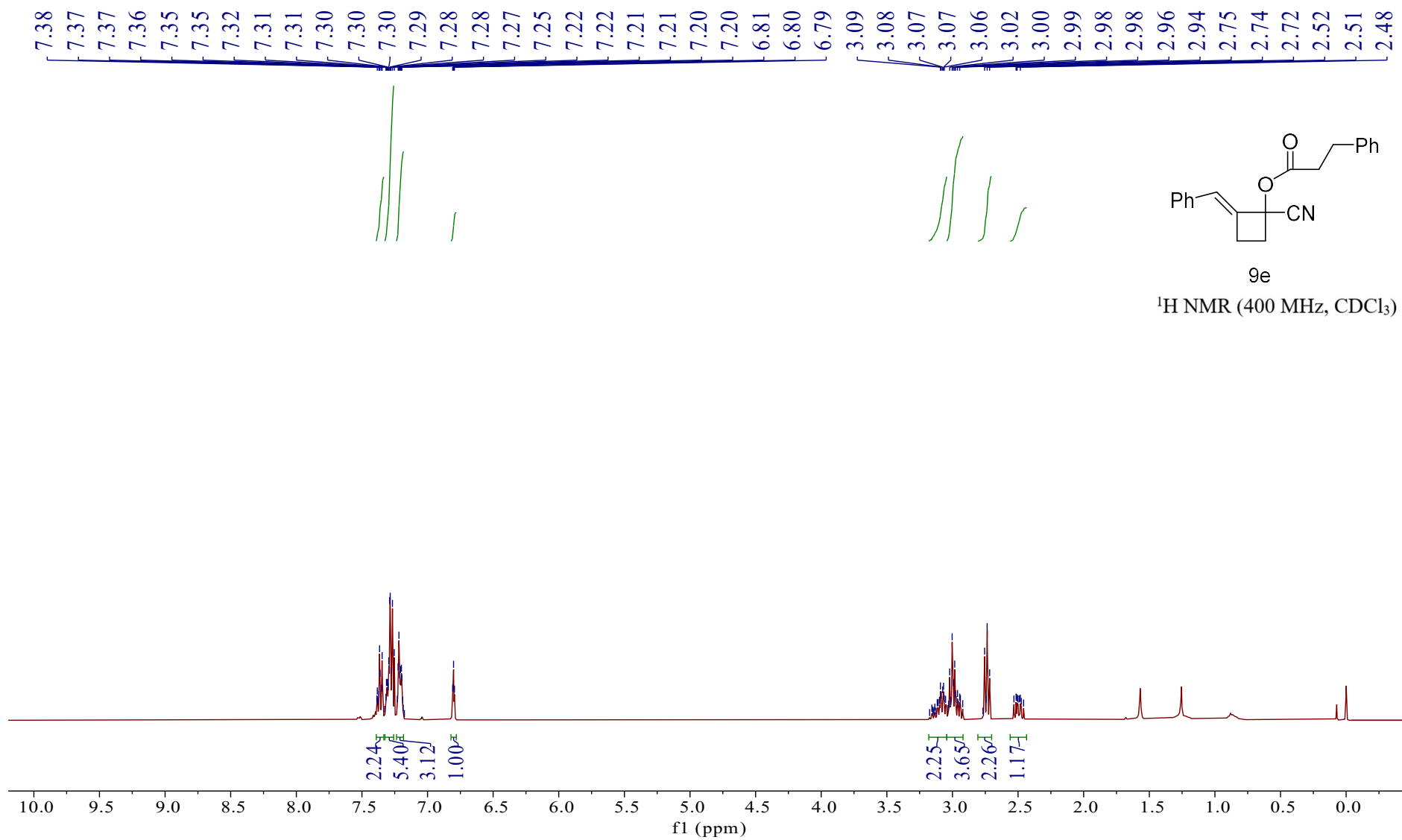
NMR-105



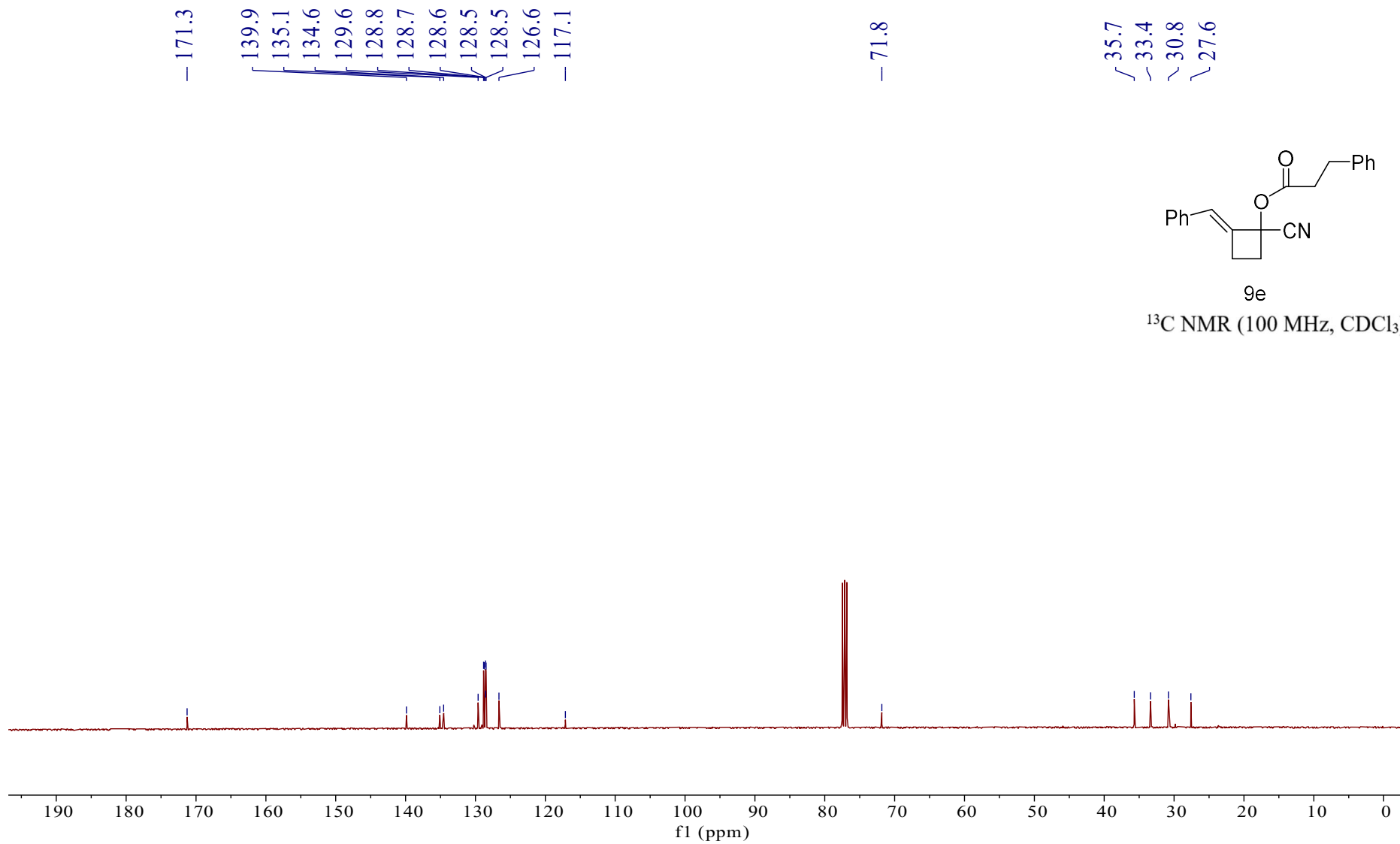
NMR-106



NMR-107



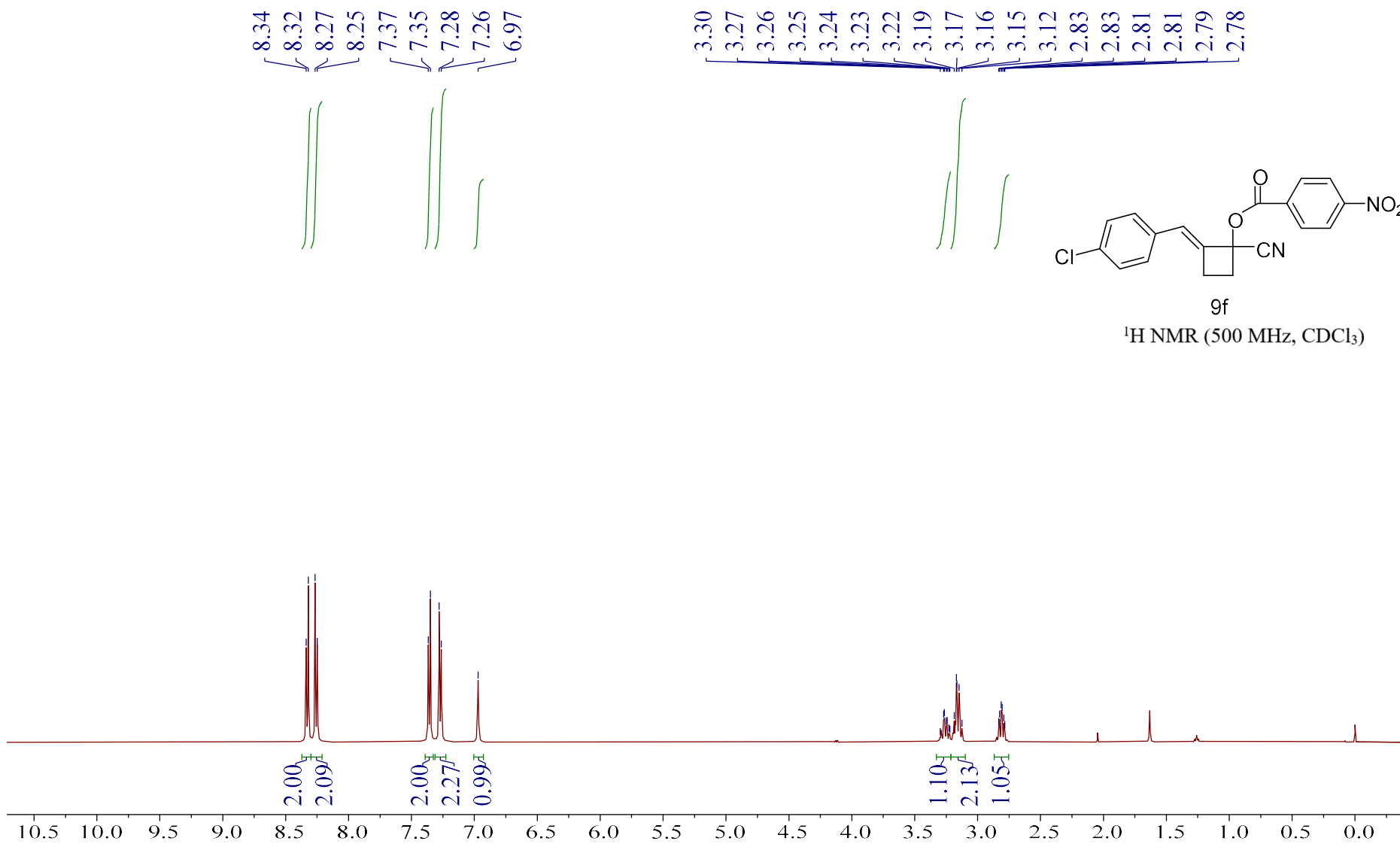
NMR-108



9e

^{13}C NMR (100 MHz, CDCl_3)

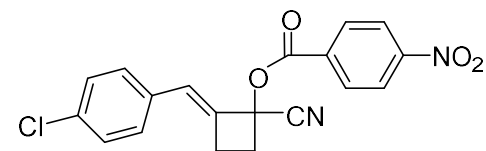
NMR-109



— 163.1
— 151.1
134.7
134.6
133.9
133.3
131.3
129.8
129.3
129.1
123.9
116.5

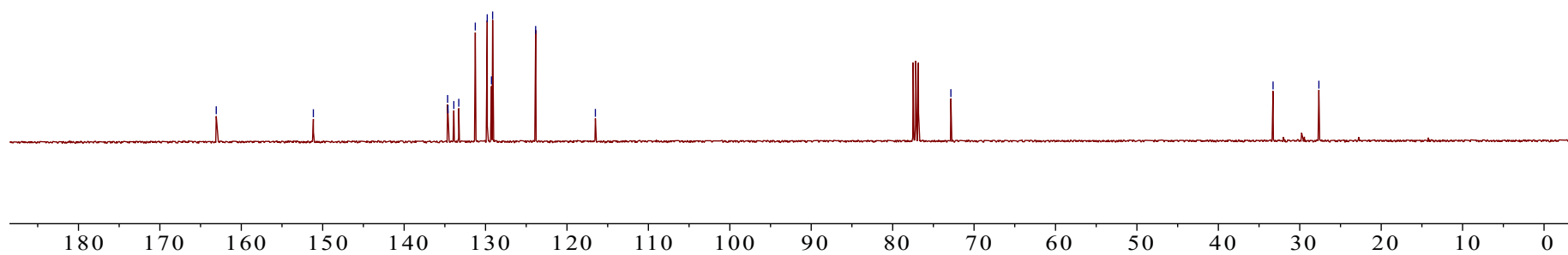
— 72.9

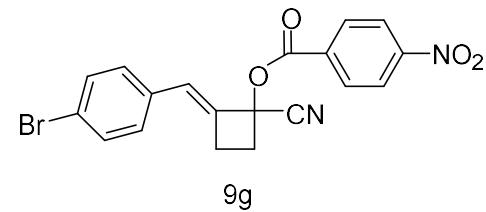
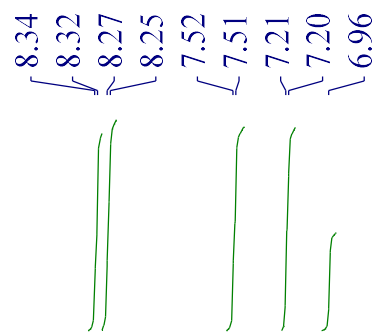
— 33.3
— 27.7



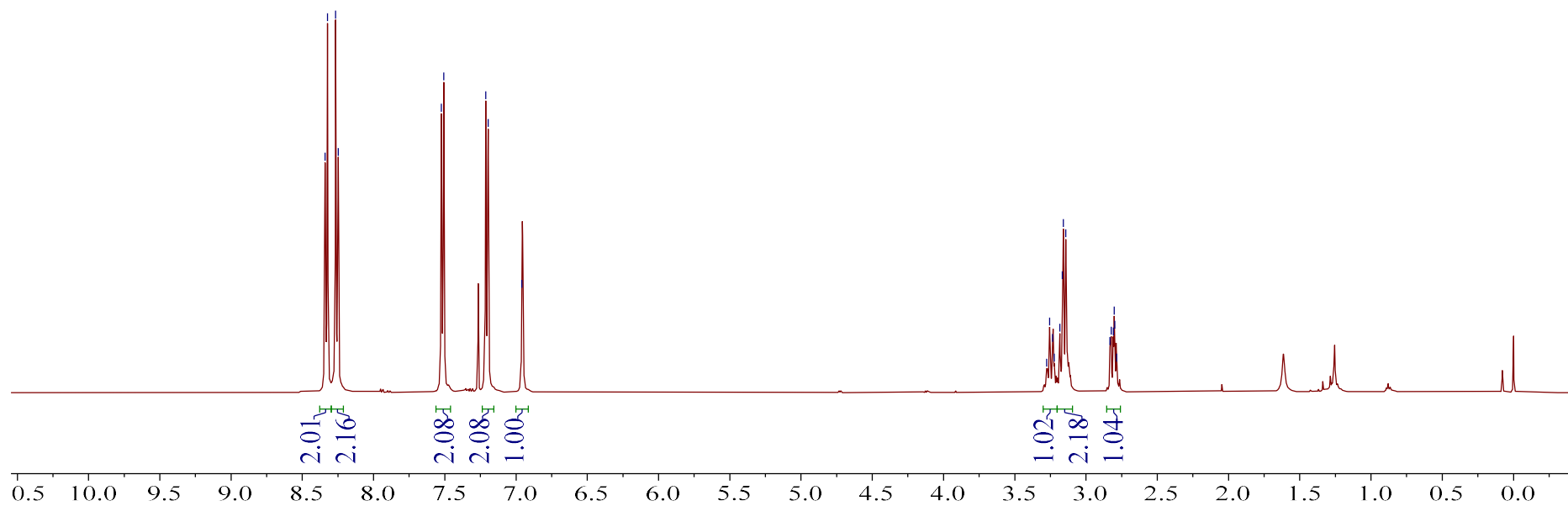
9f

¹³C NMR (100 MHz, CDCl₃)





¹H NMR (500 MHz, CDCl₃)

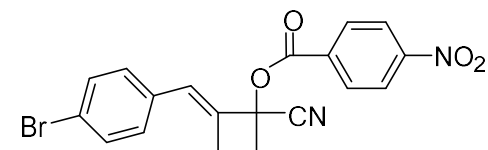


— 163.1
— 151.2
134.8
133.9
133.7
132.2
131.3
130.1
129.4
123.9
123.0
116.5

— 72.9

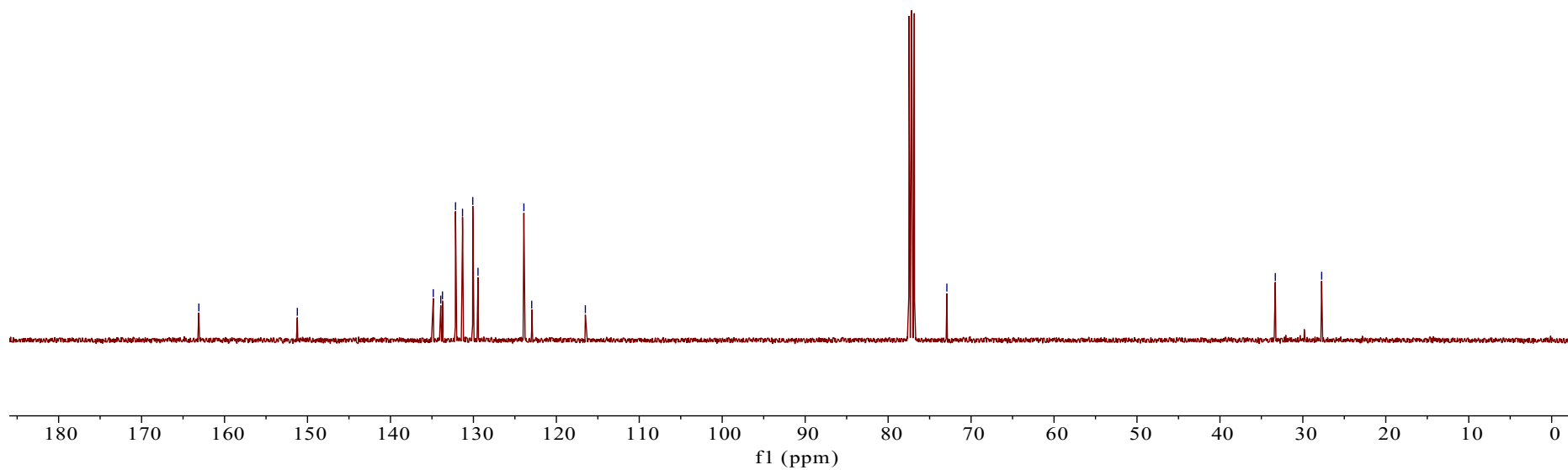
— 33.3

— 27.7

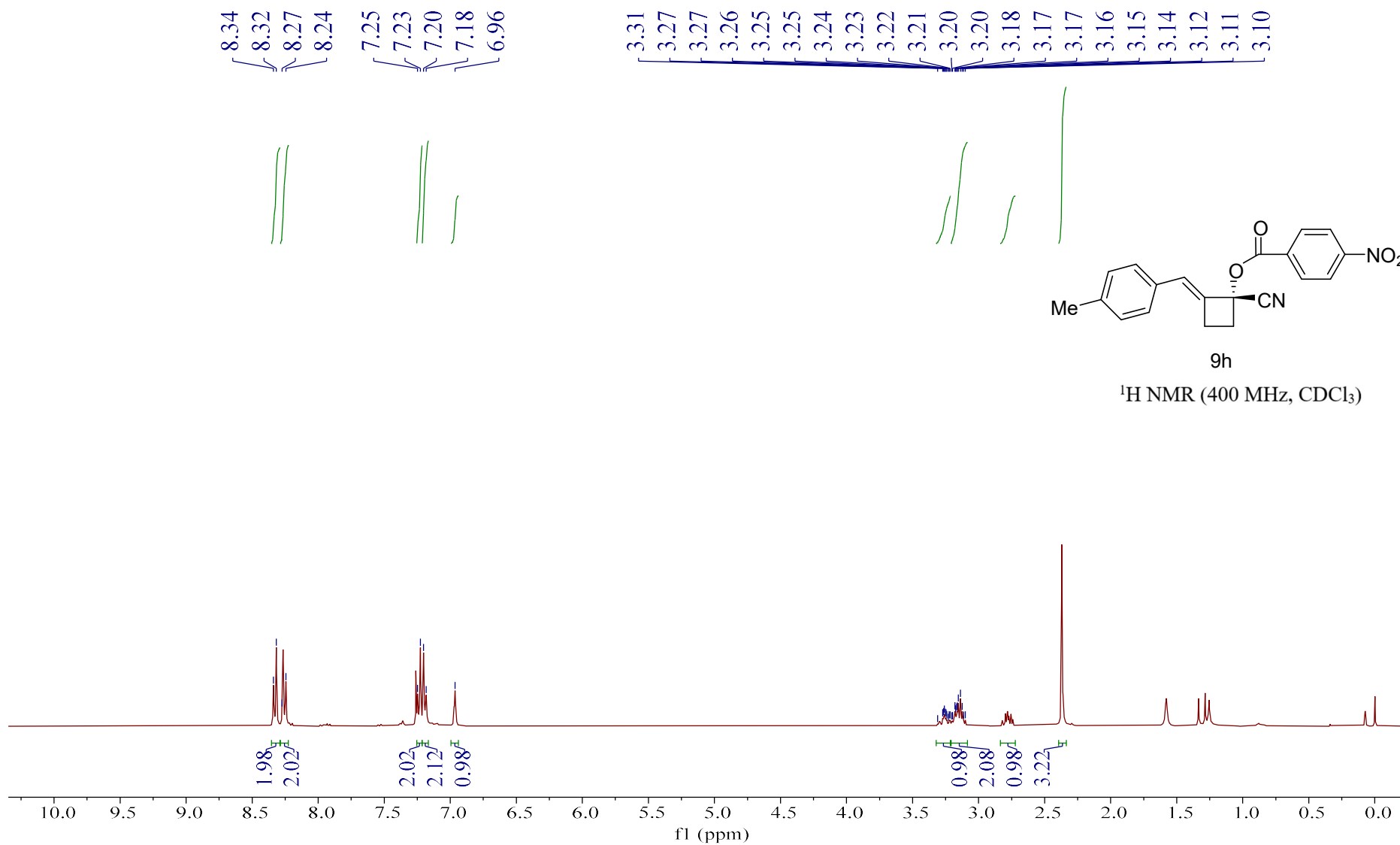


9g

¹³C NMR (100 MHz, CDCl₃)



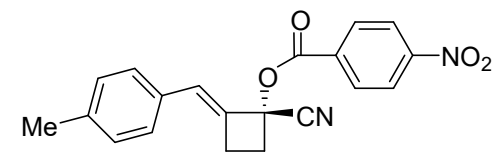
NMR-113



— 163.2
— 151.2
— 139.0
— 134.1
— 132.7
— 132.1
— 131.3
— 130.5
— 129.7
— 128.6
— 123.9
— 116.8

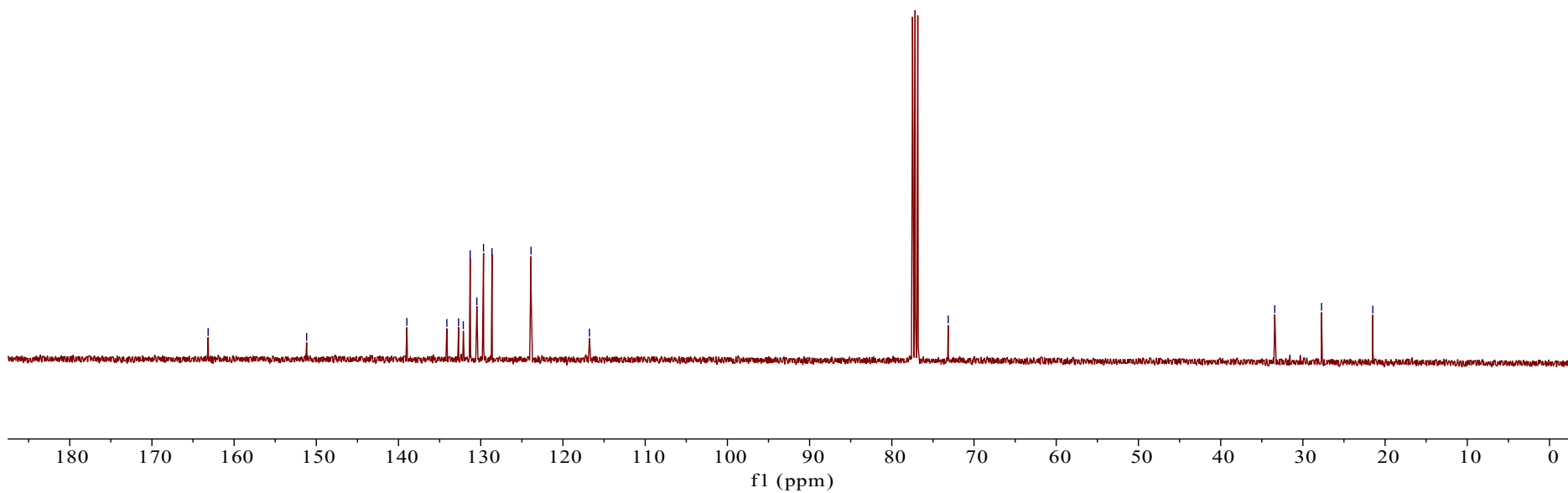
— 73.1

— 33.4
— 27.7
— 21.5

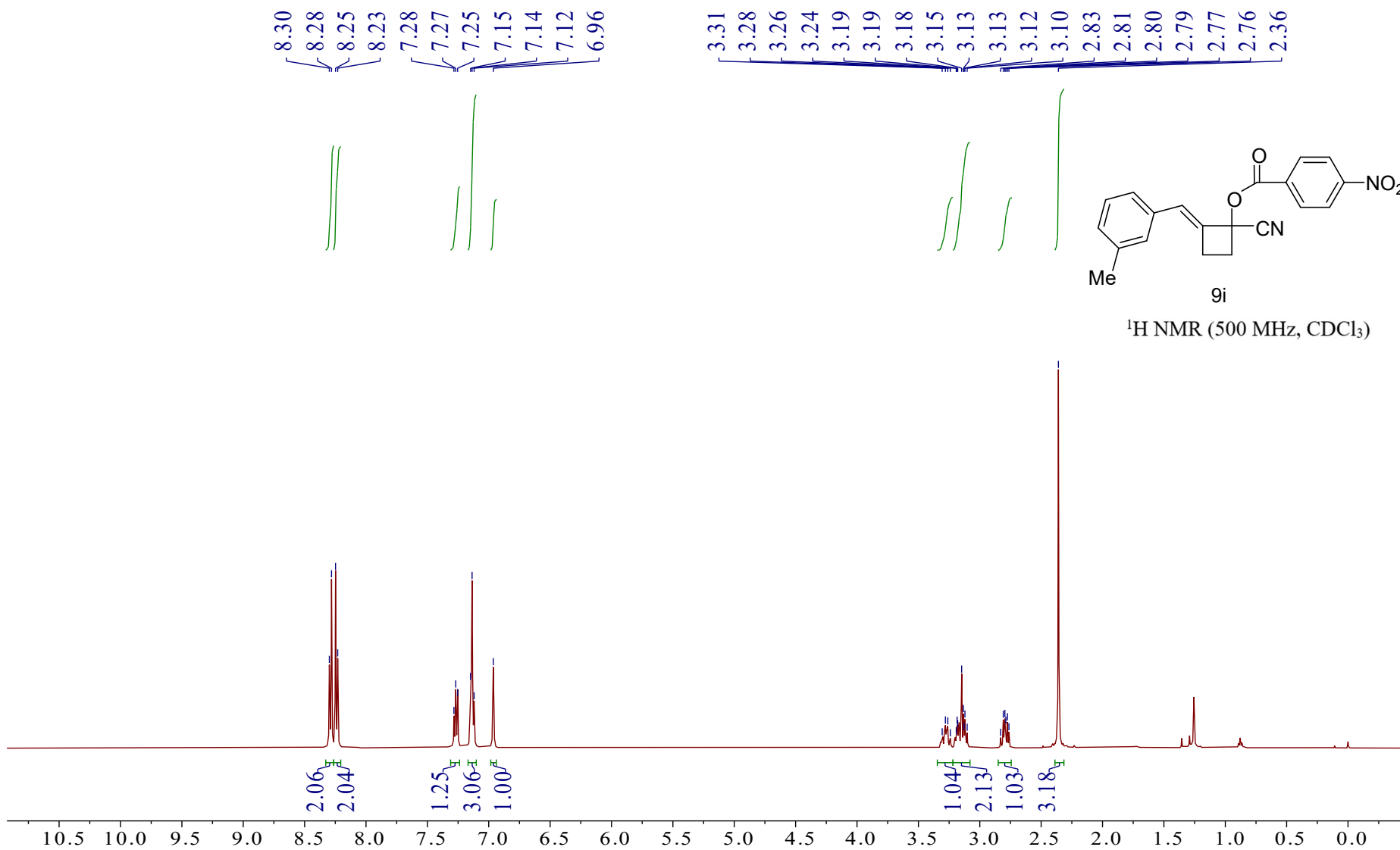


9h

¹³C NMR (100 MHz, CDCl₃)



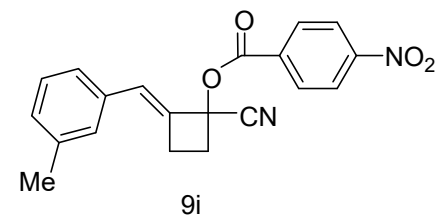
NMR-115



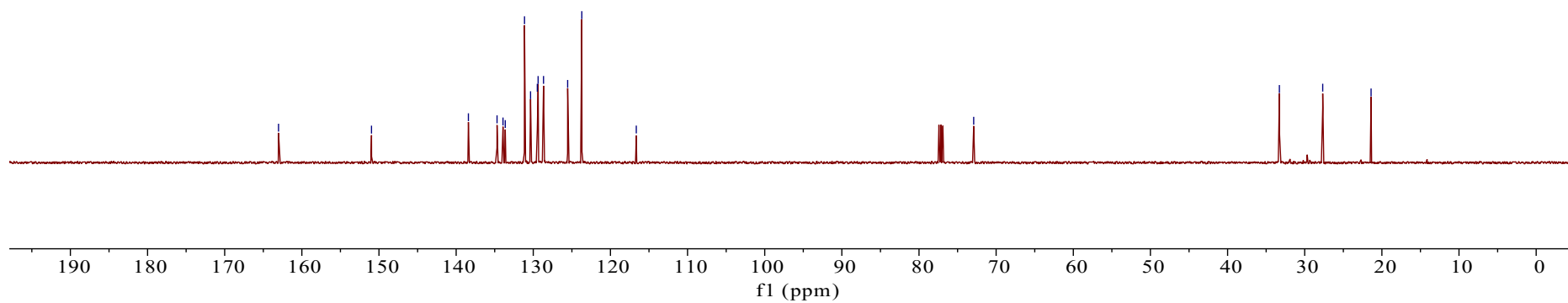
163.0
151.0
138.4
134.7
133.9
133.6
131.1
130.3
129.5
129.4
128.7
125.5
123.7
116.6

72.9

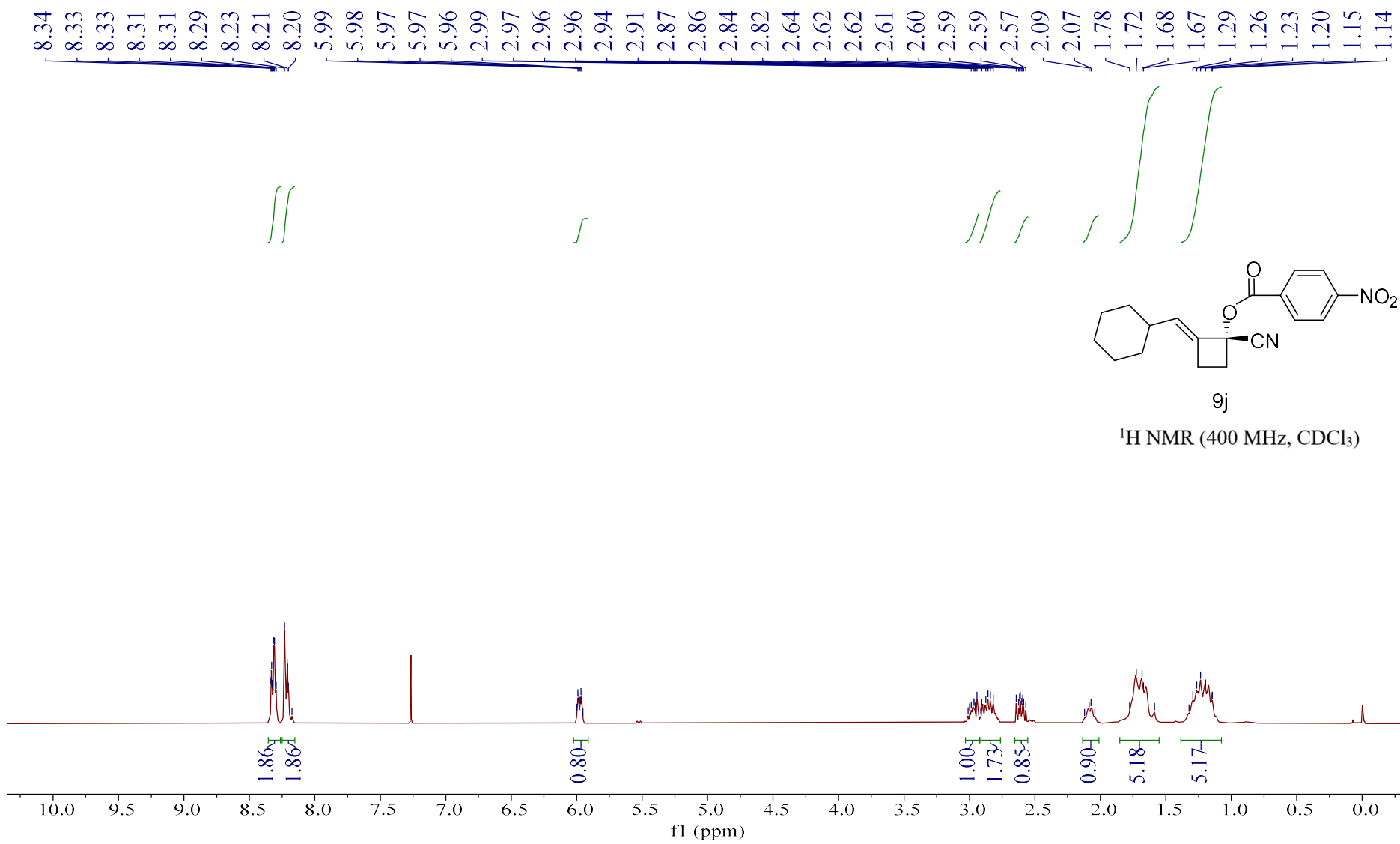
33.3
27.7
21.4



¹³C NMR (125 MHz, CDCl₃)



NMR-117



NMR-118

- 163.1

- 151.1

~ 137.6

~ 134.2

~ 131.2

~ 123.8

~ 117.1

- 72.4

37.8

32.5

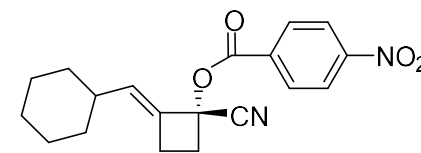
32.4

32.2

25.9

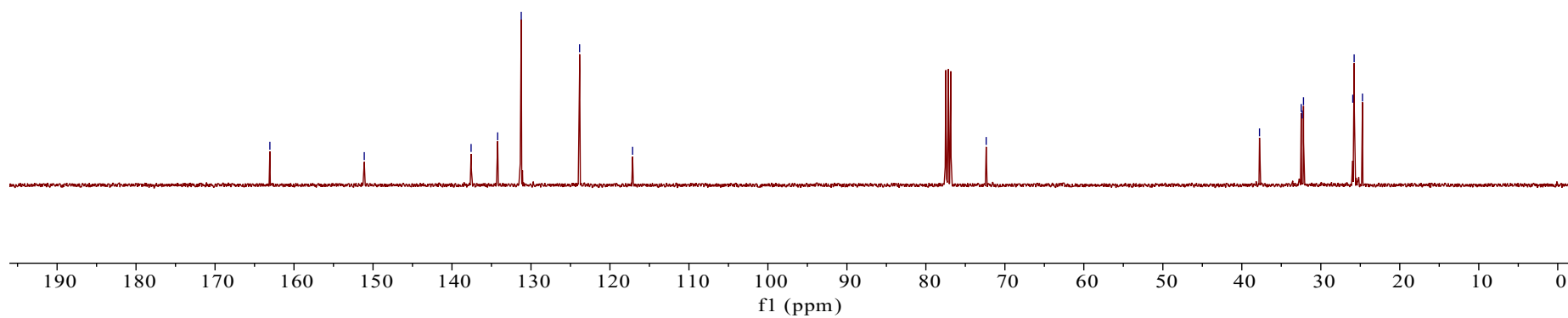
25.8

24.7

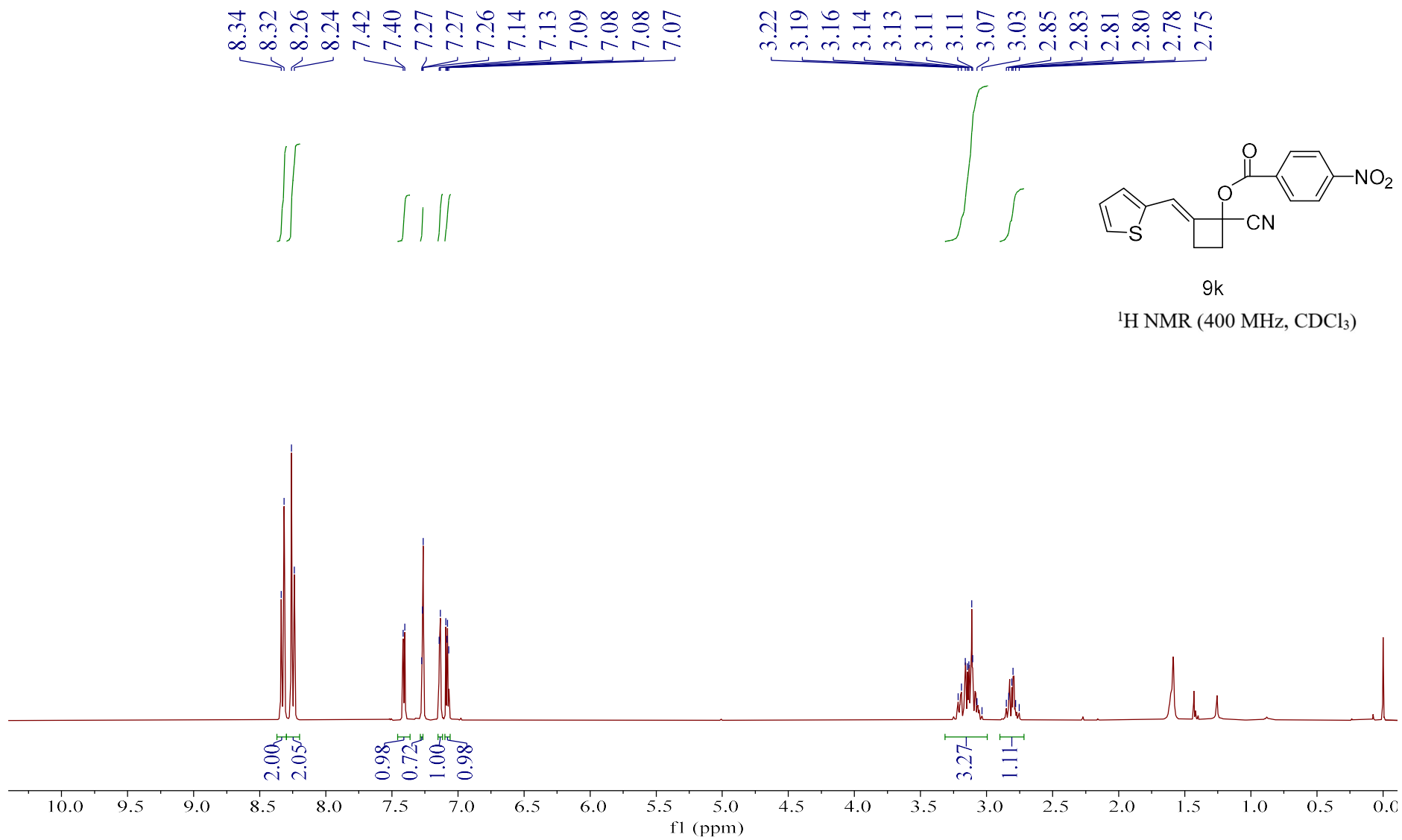


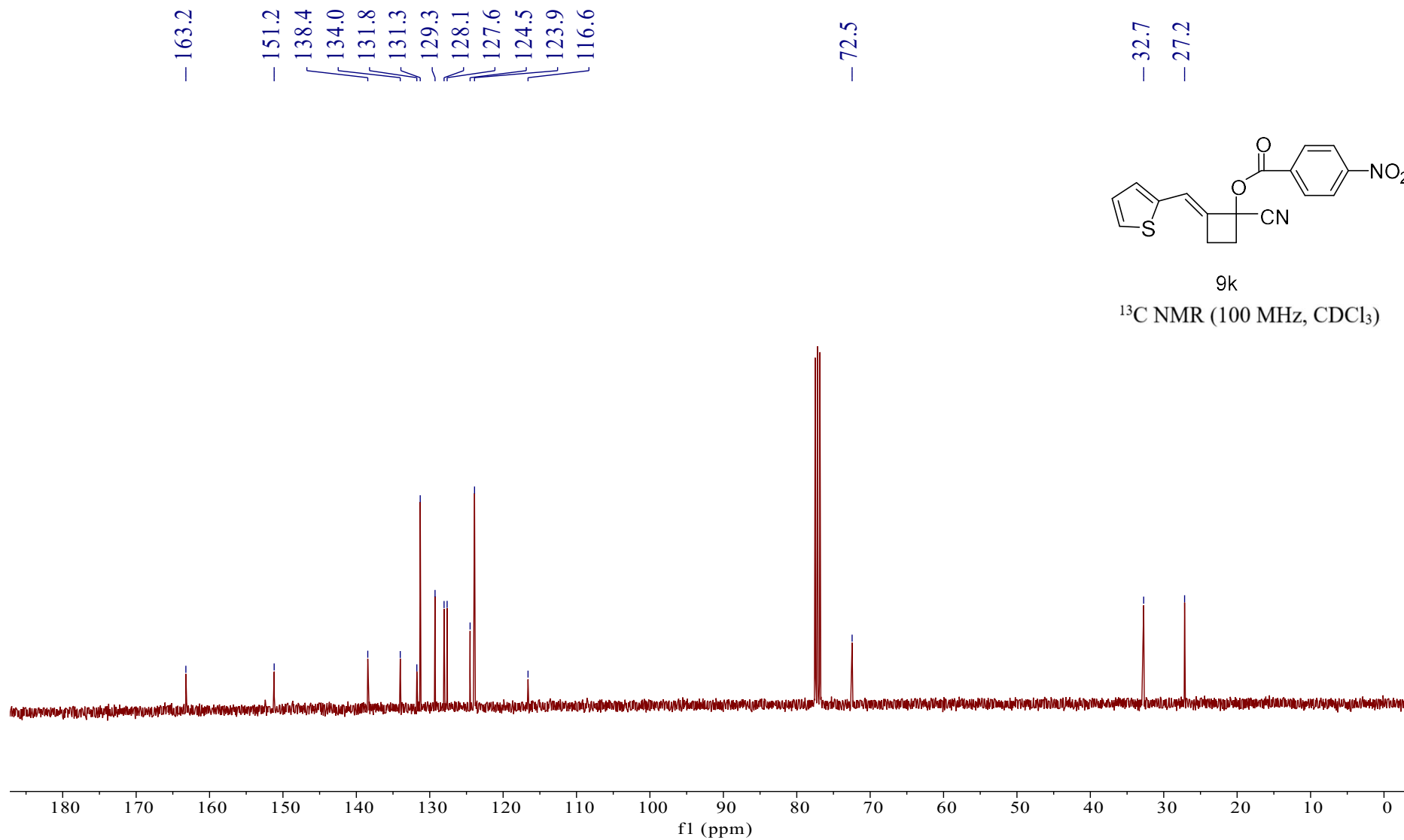
9j

¹³C NMR (100 MHz, CDCl₃)

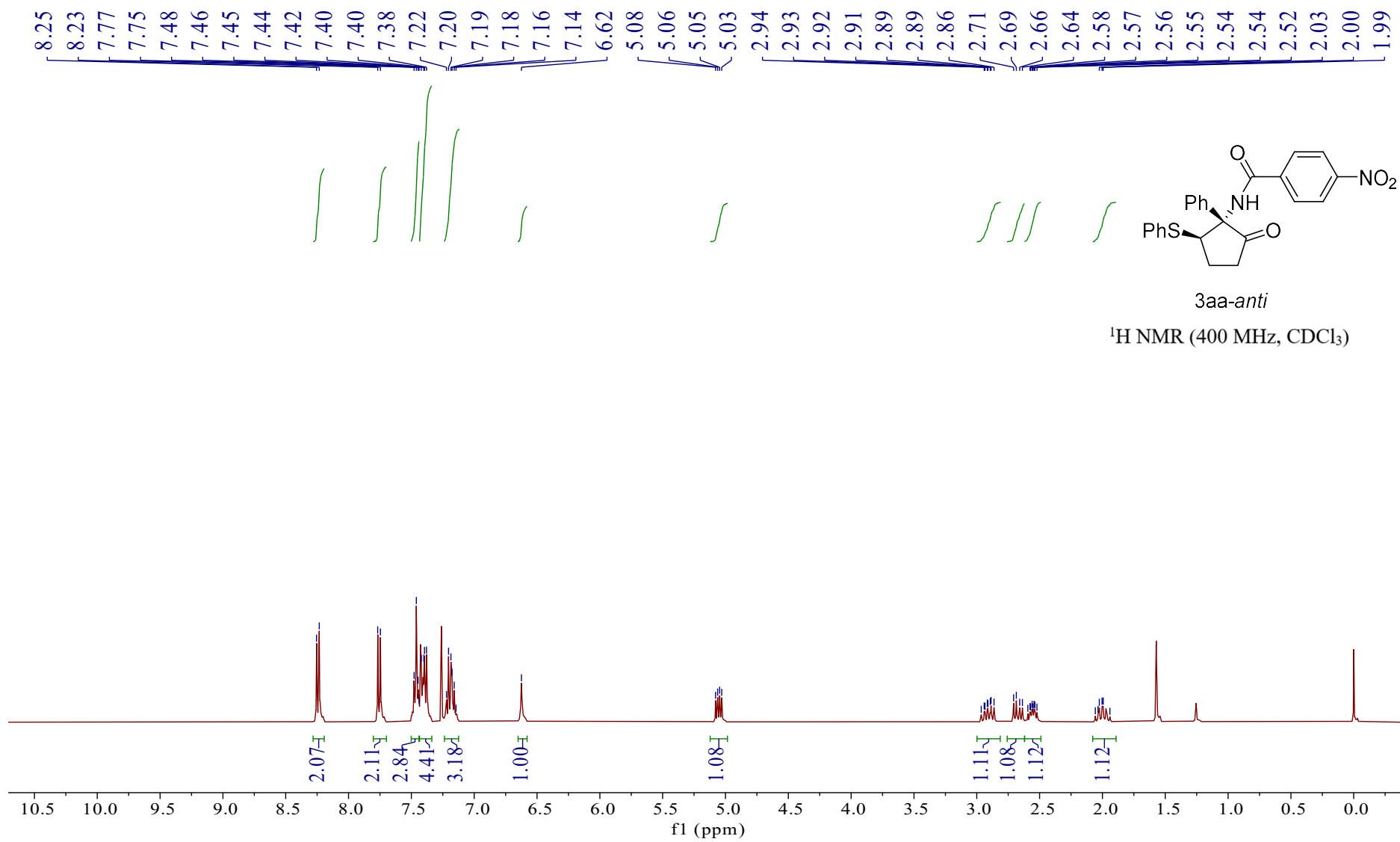


NMR-119

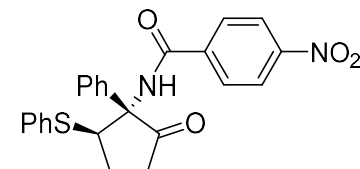
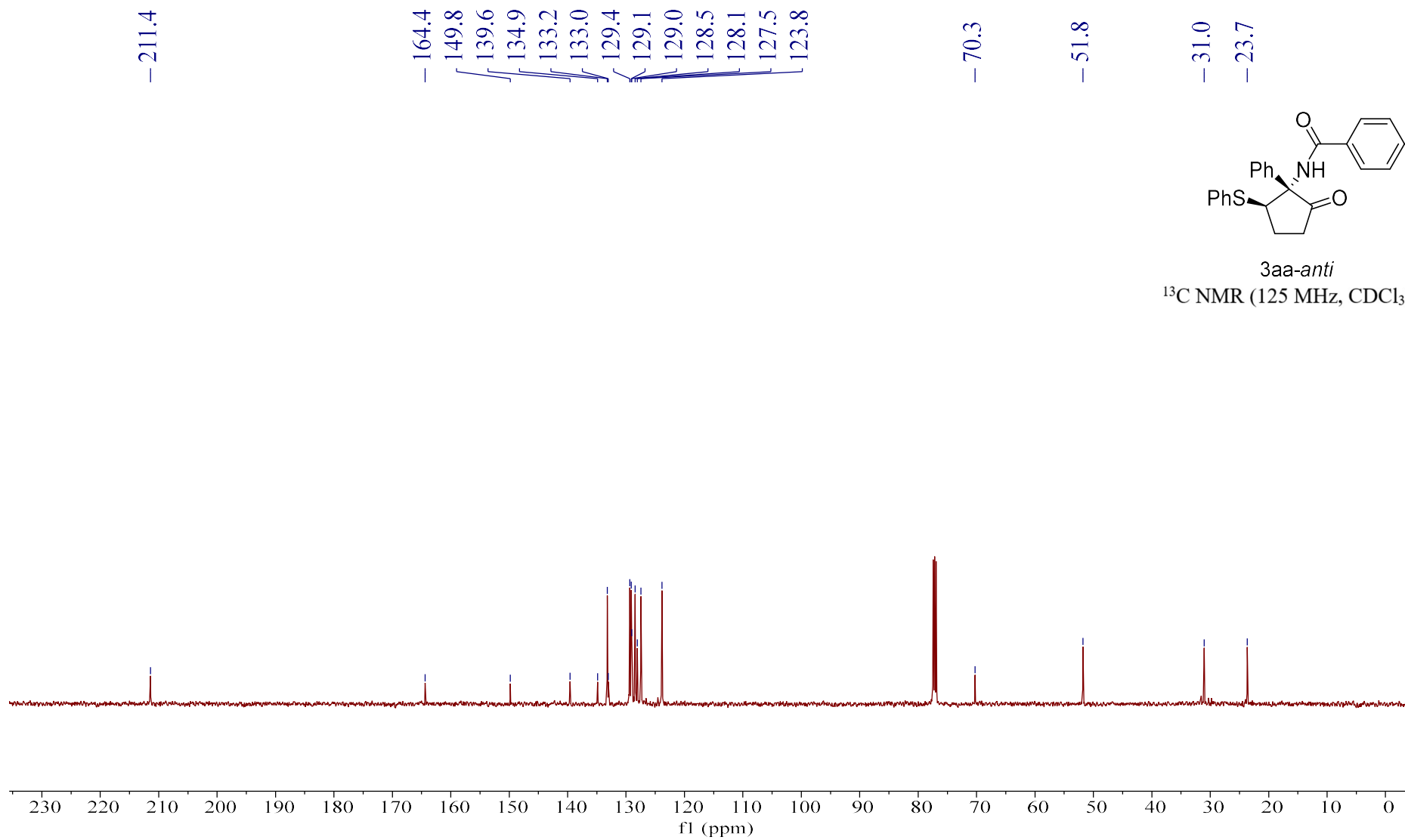




NMR-121

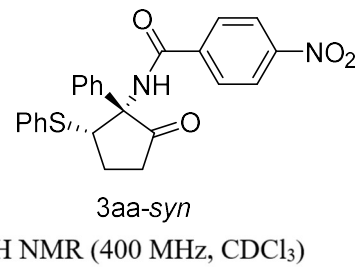
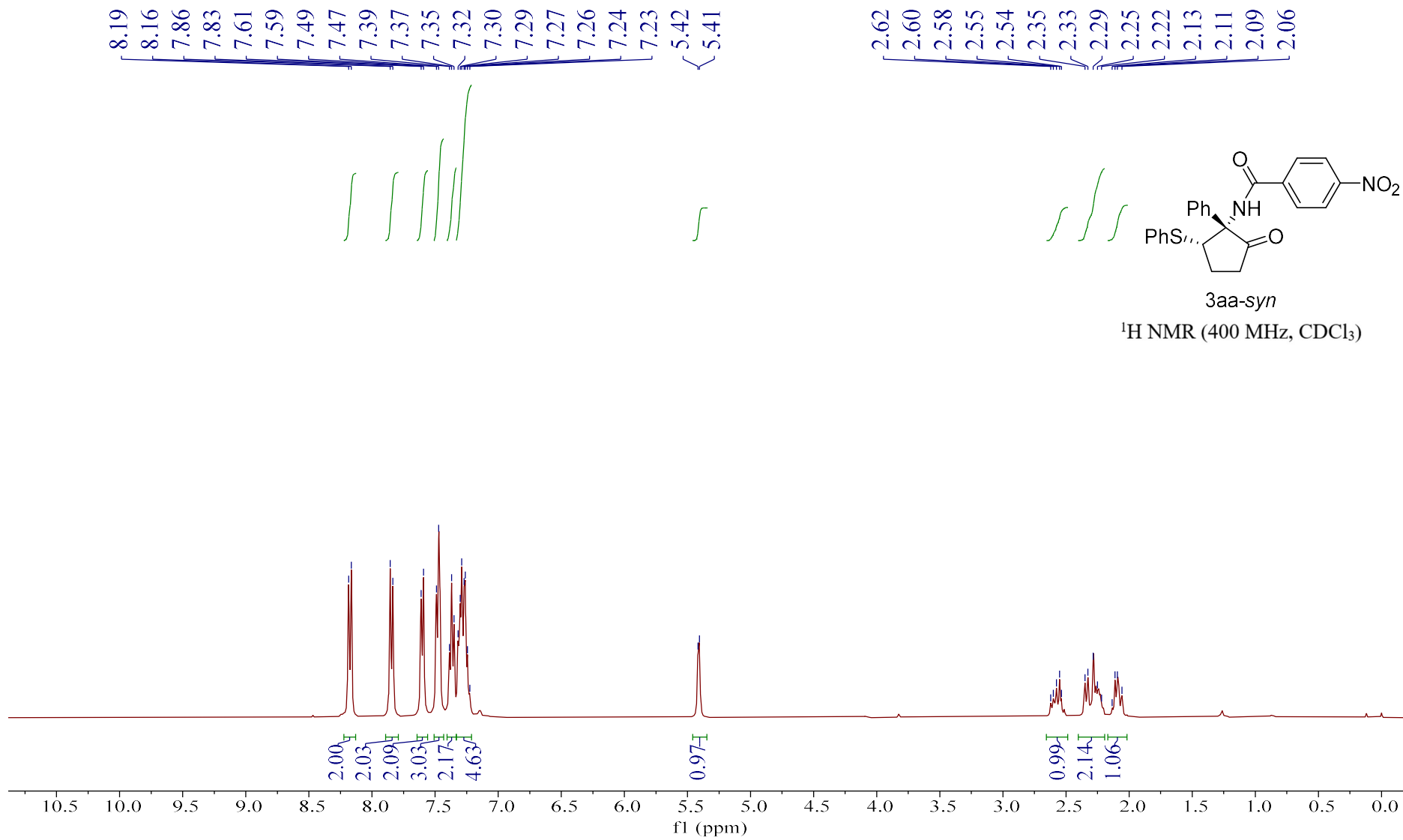


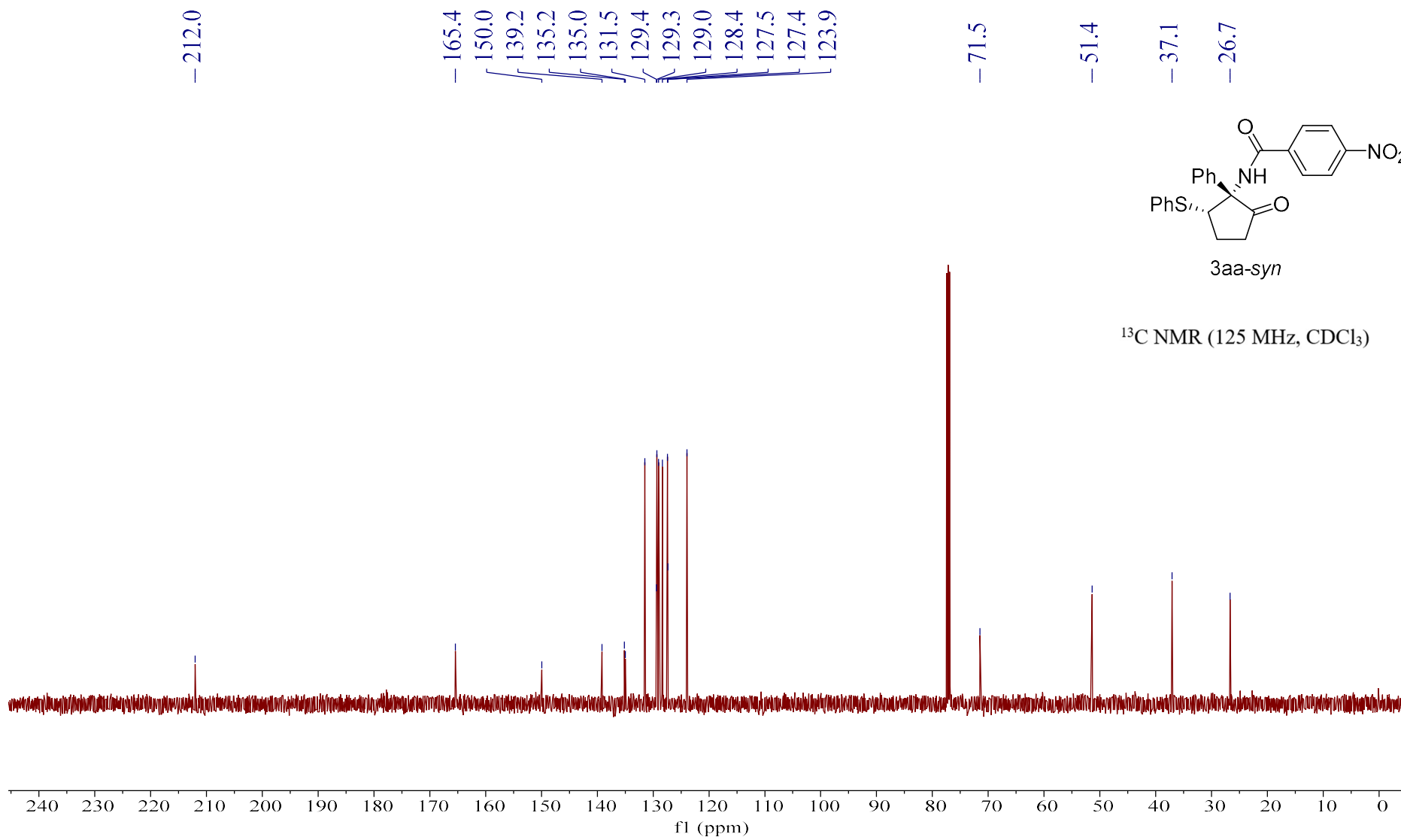
NMR-122



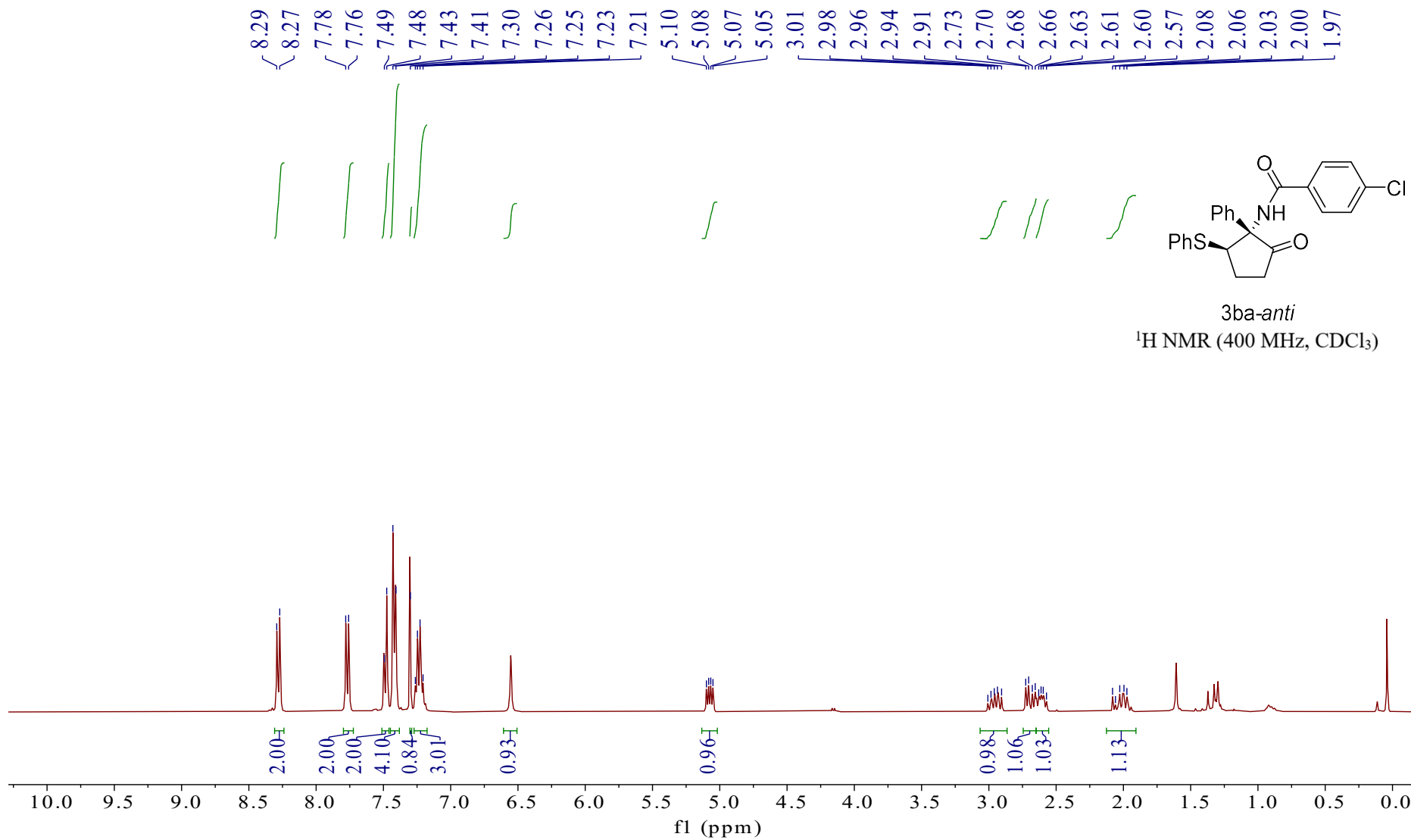
3aa-anti

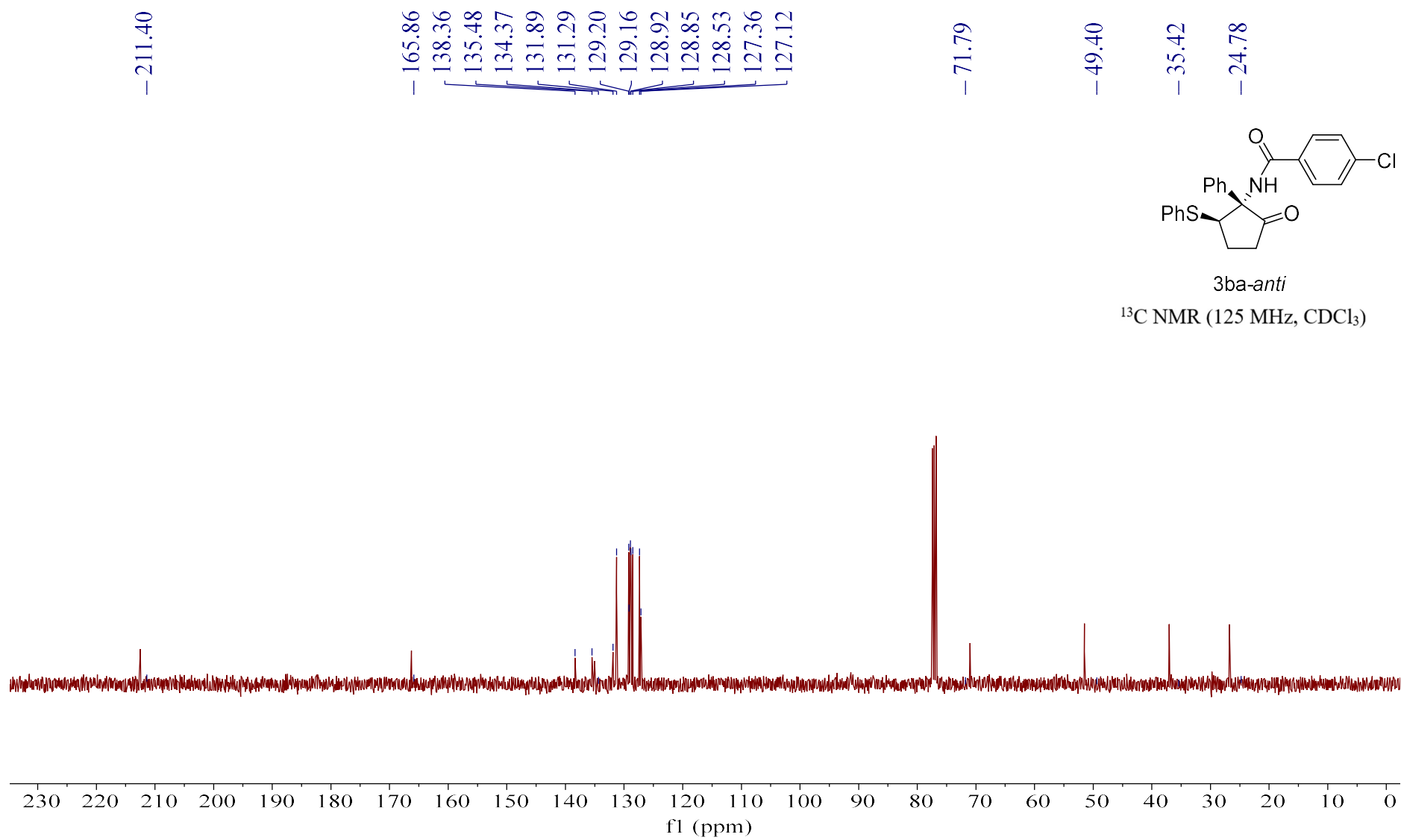
¹³C NMR (125 MHz, CDCl₃)



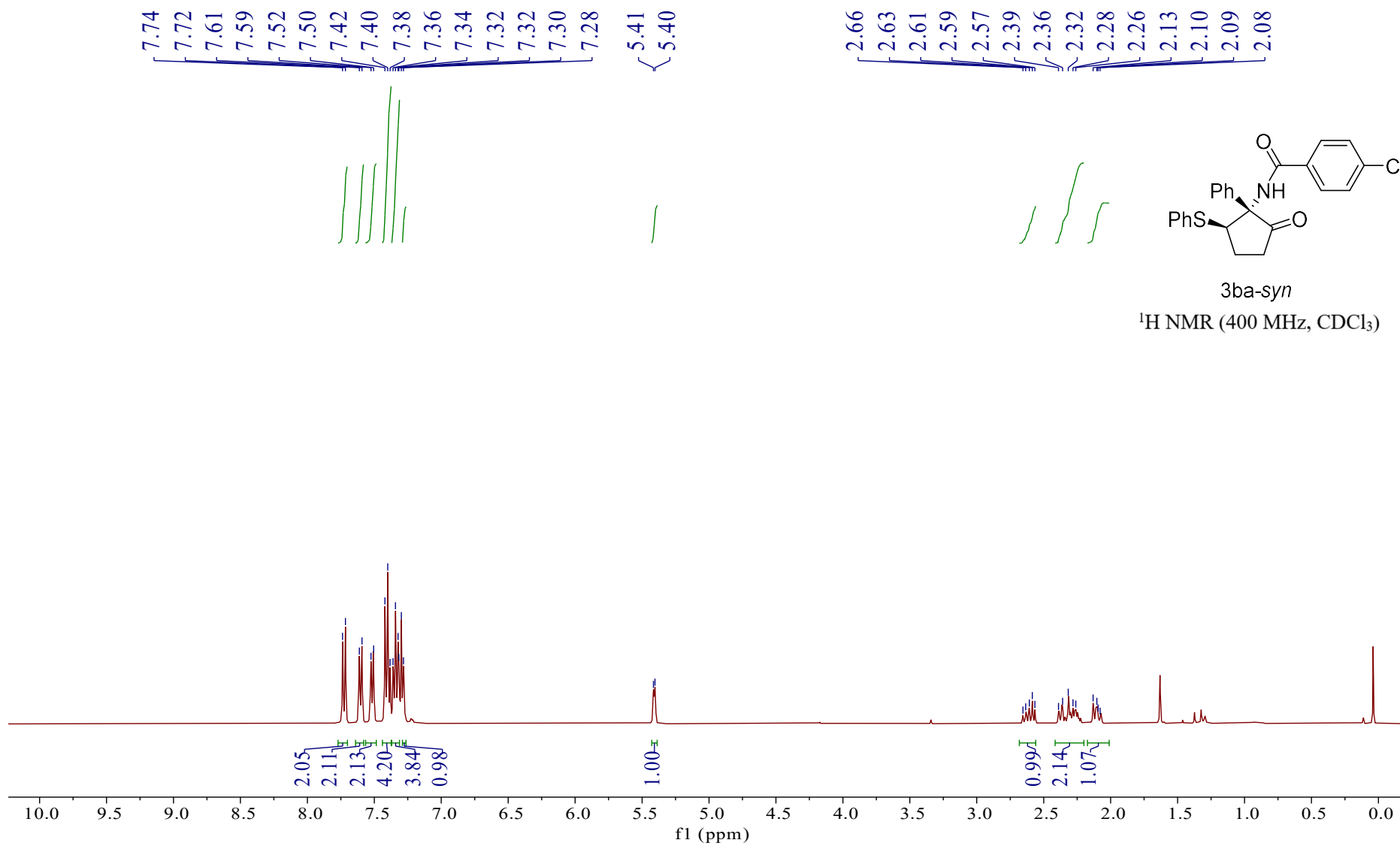


NMR-125

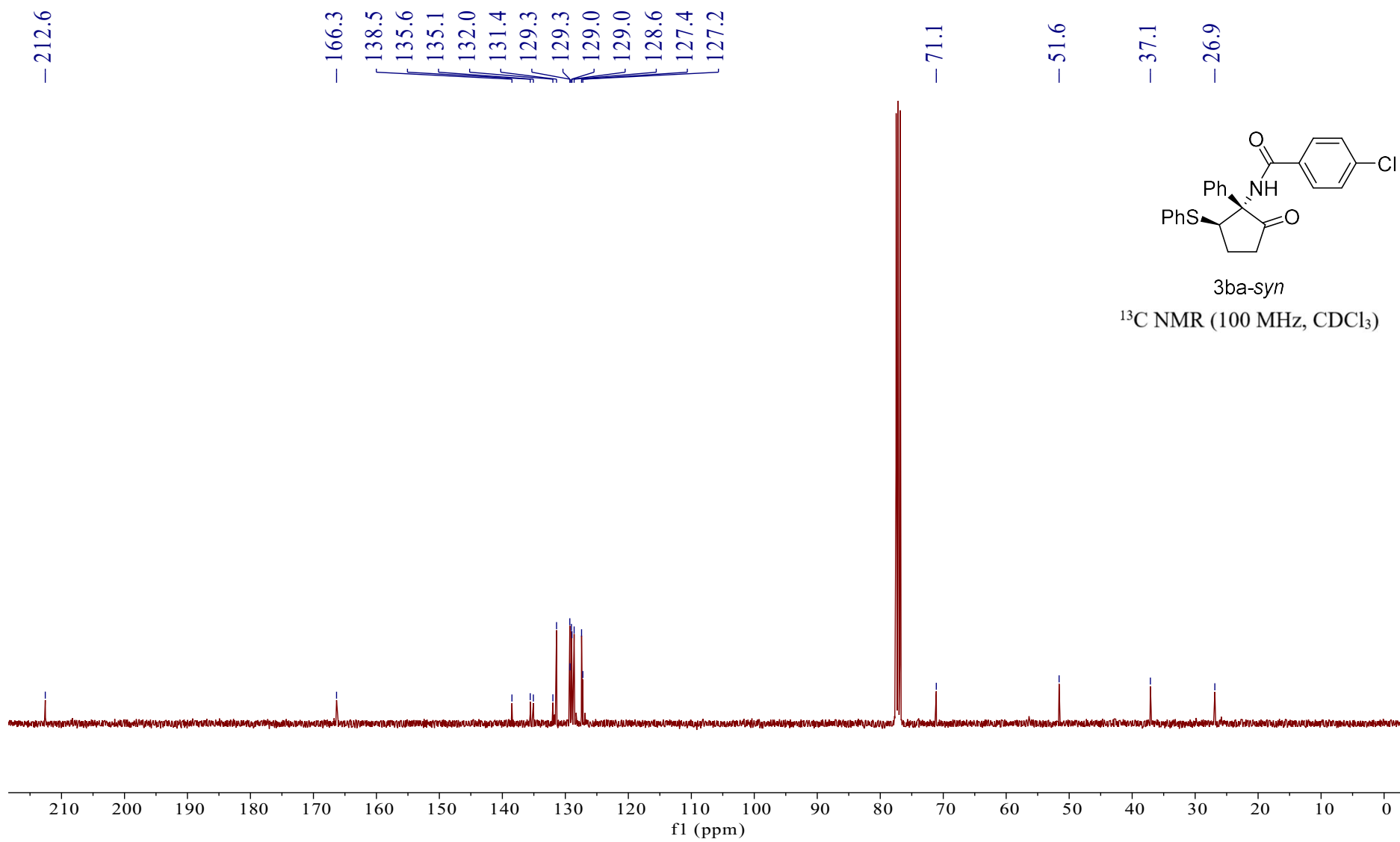


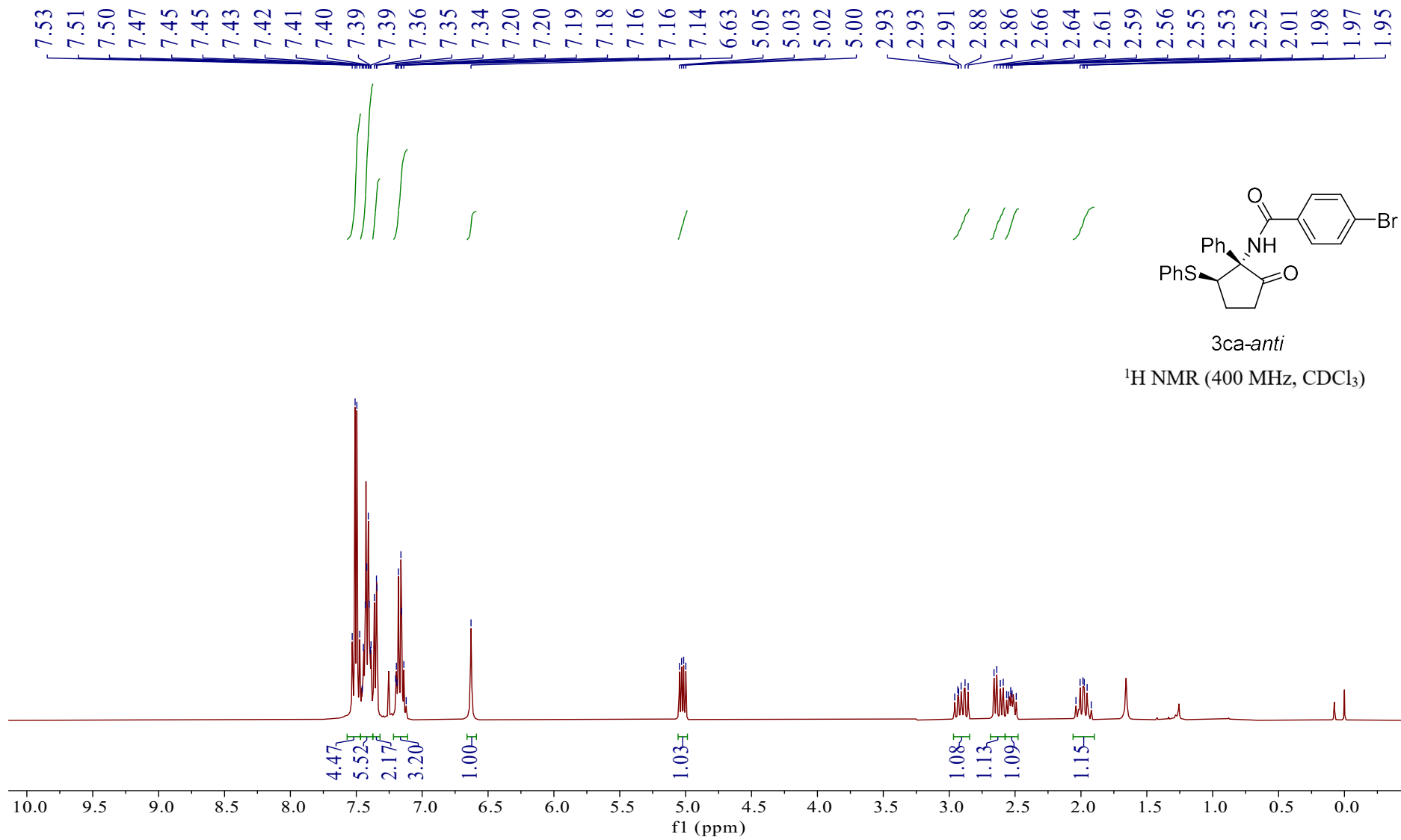


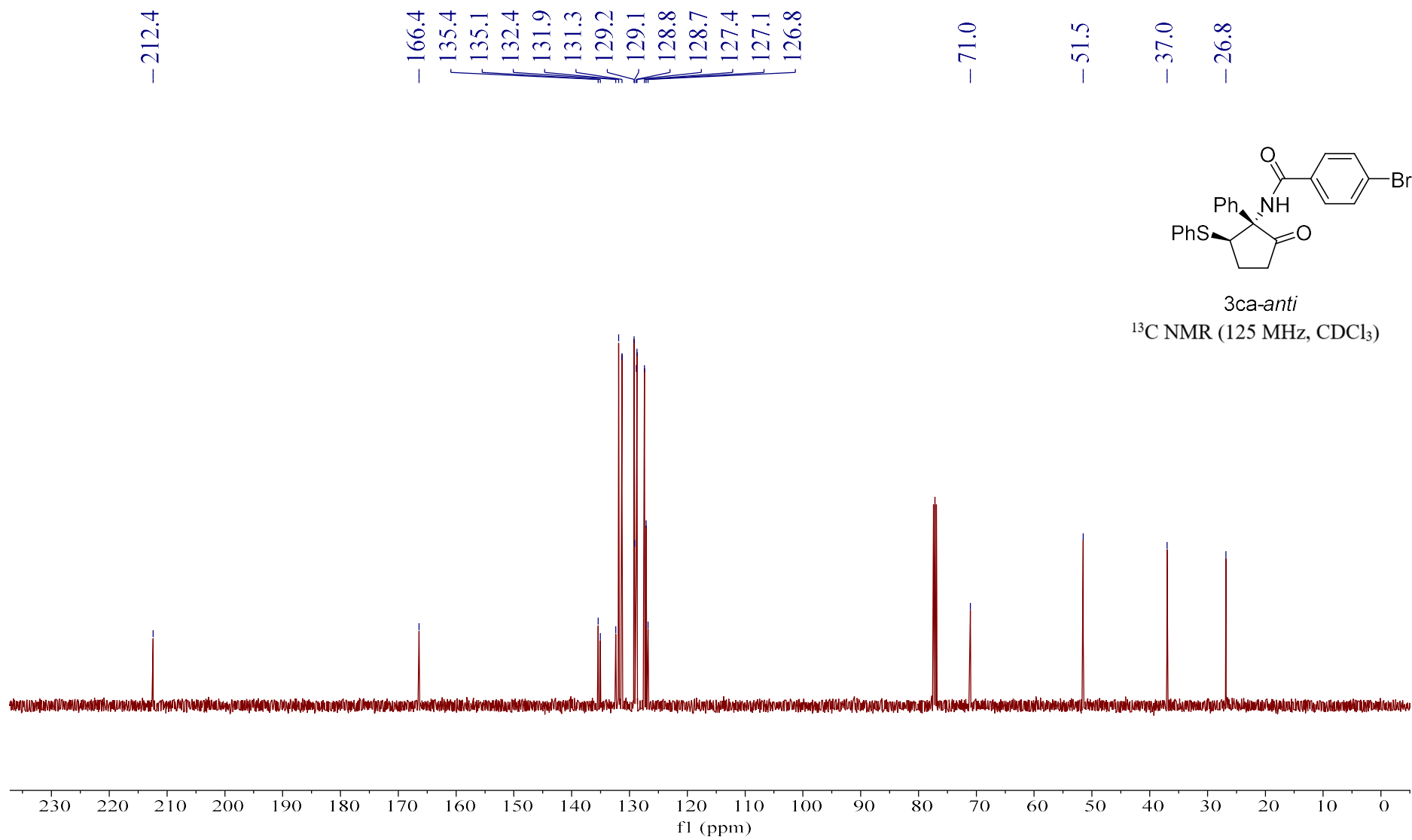
NMR-127



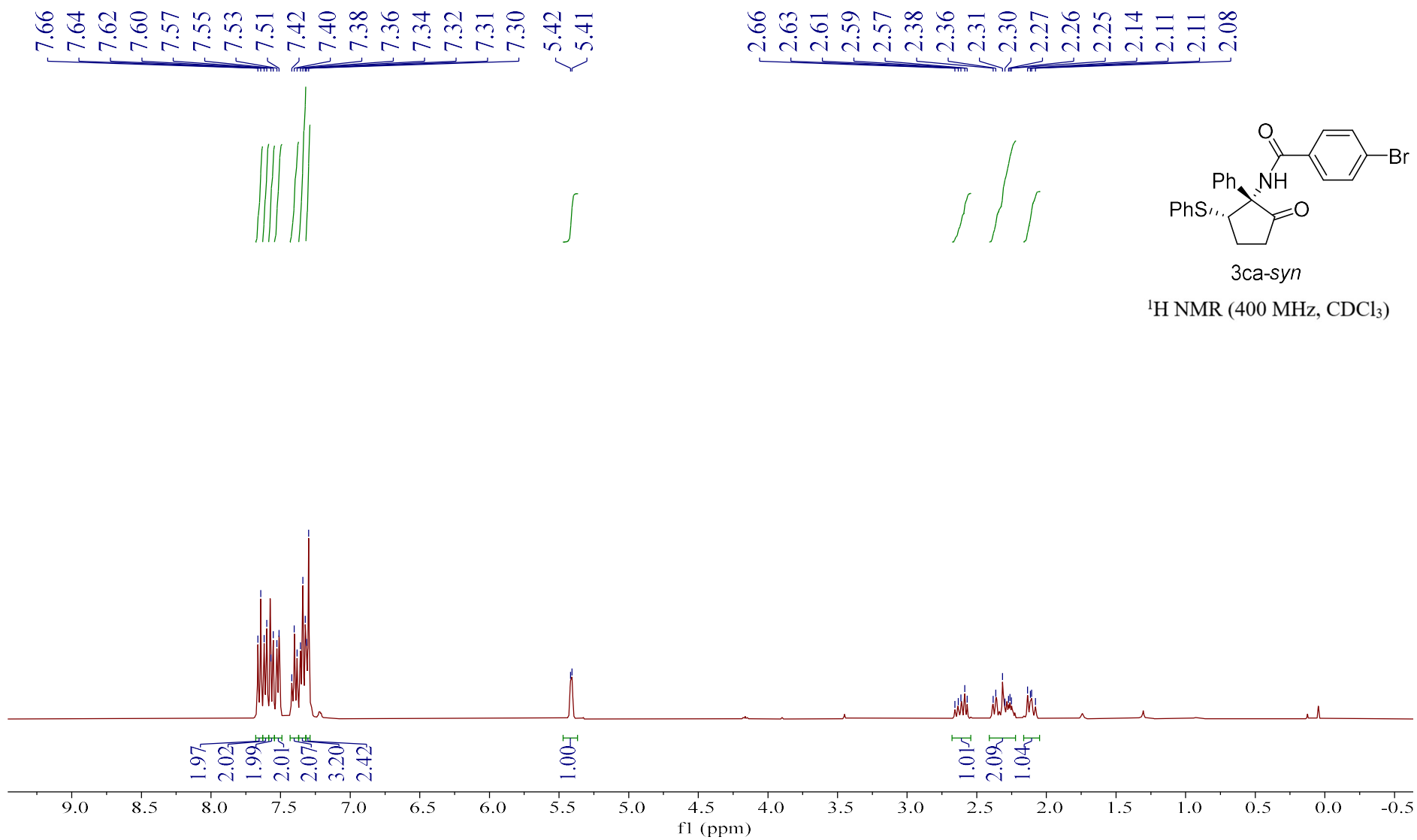
NMR-128

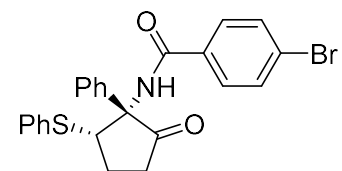
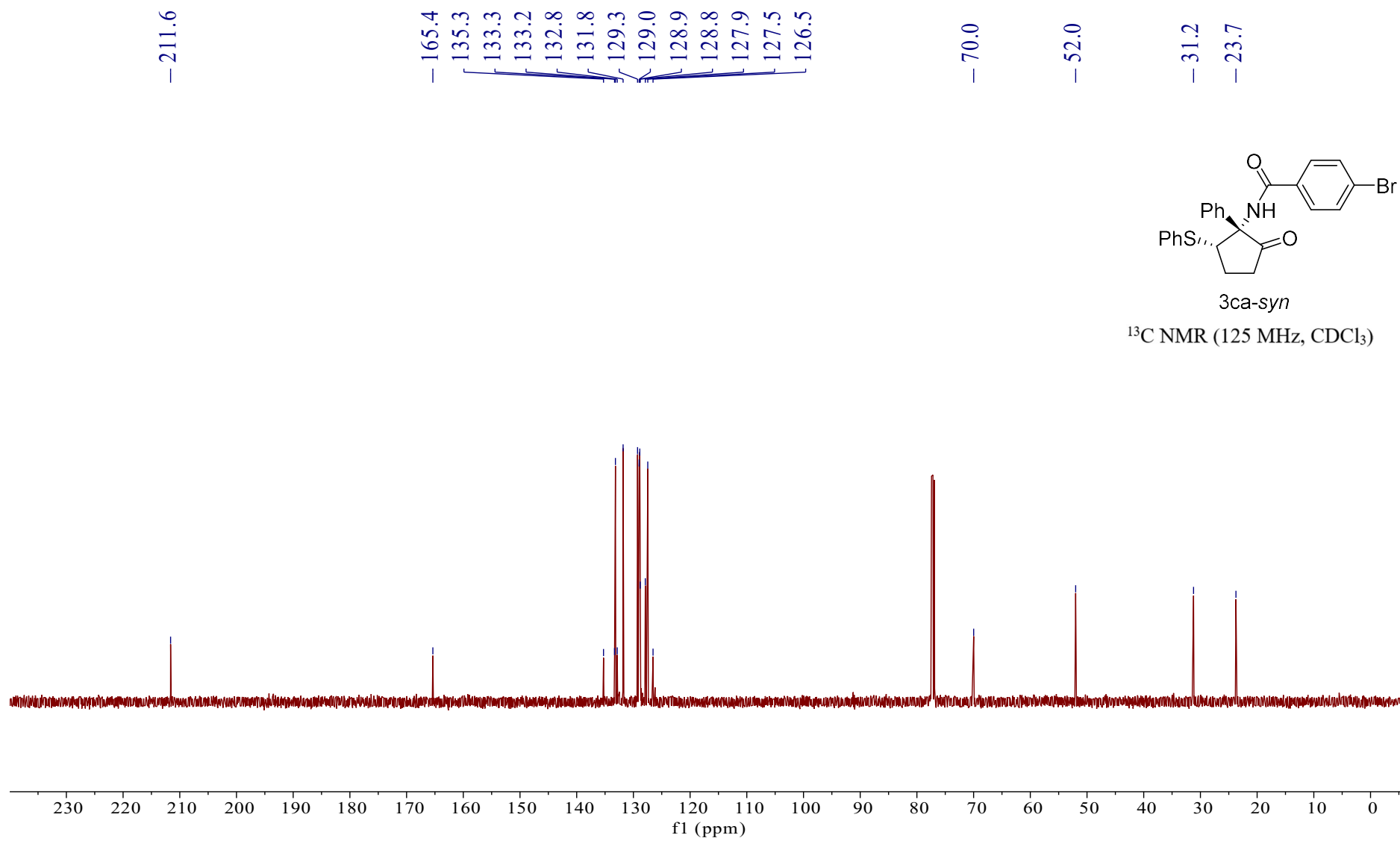






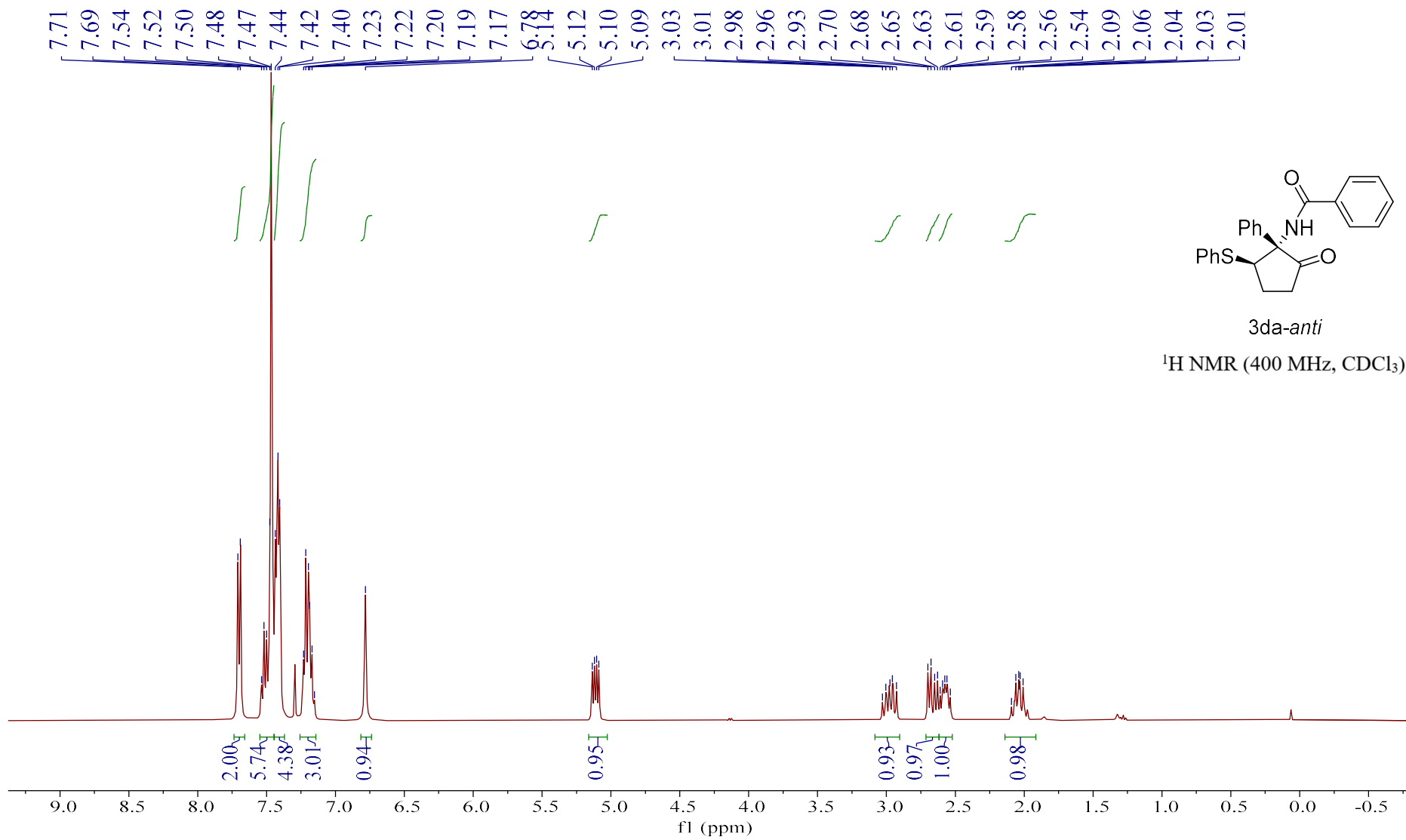
NMR-131

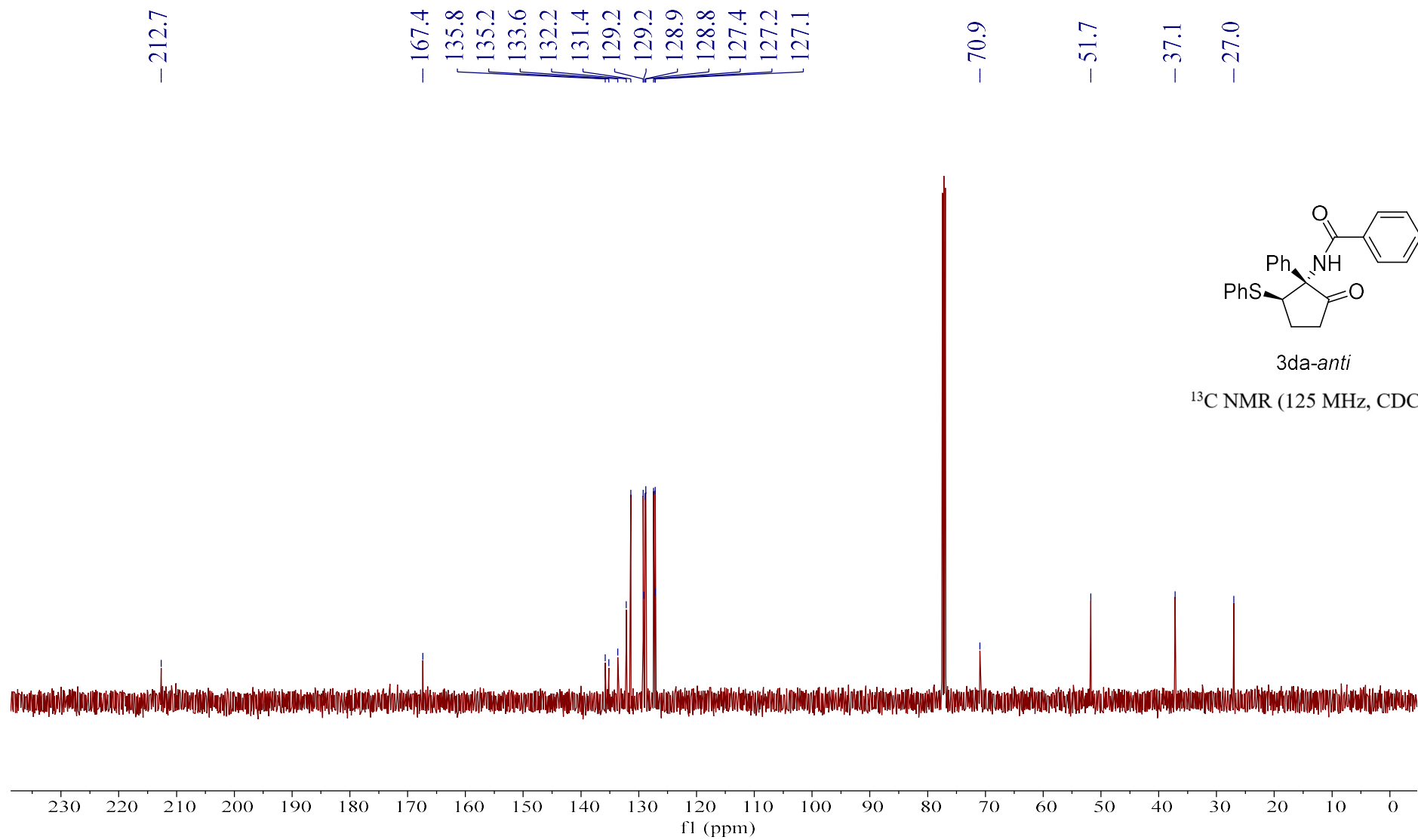


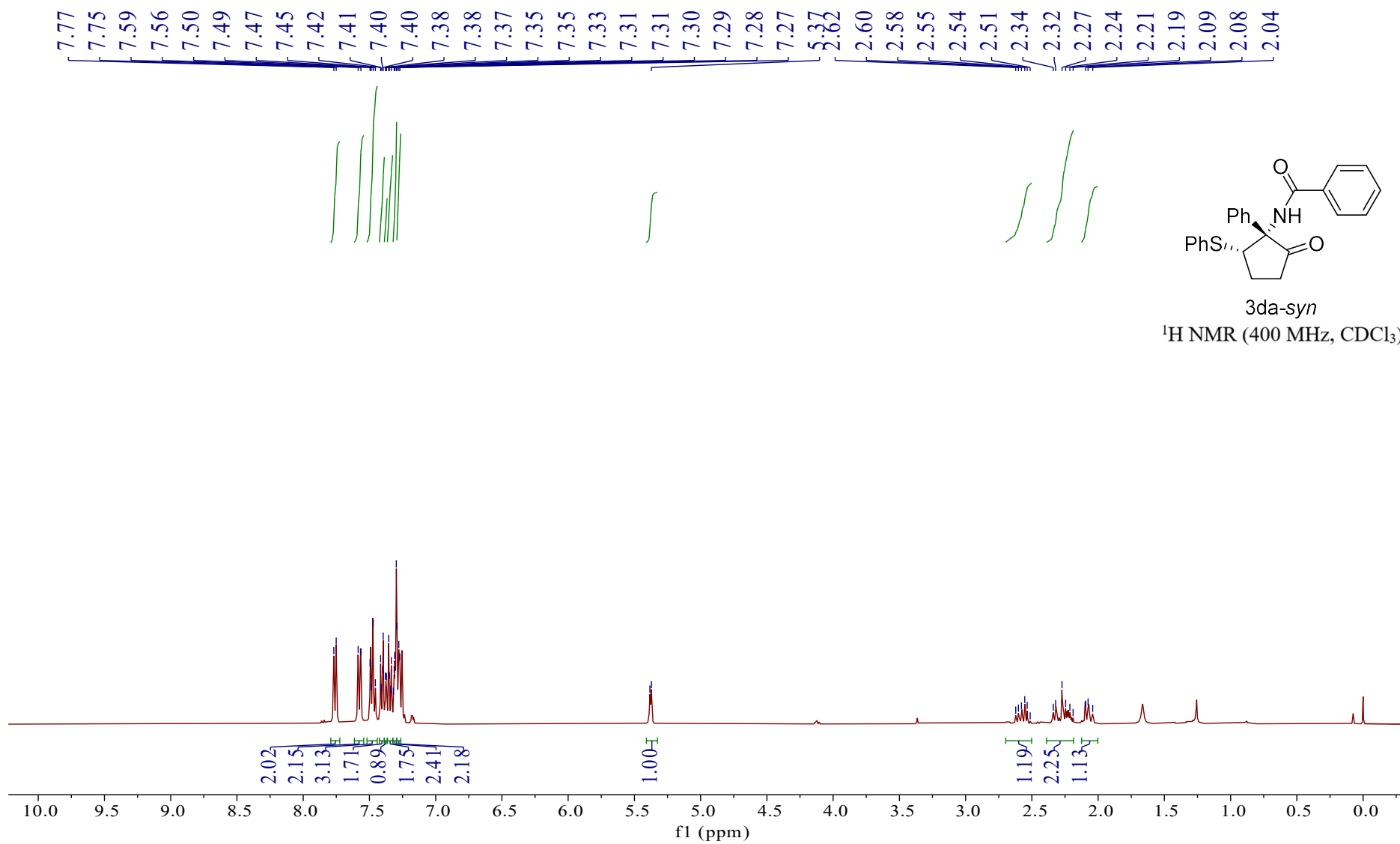


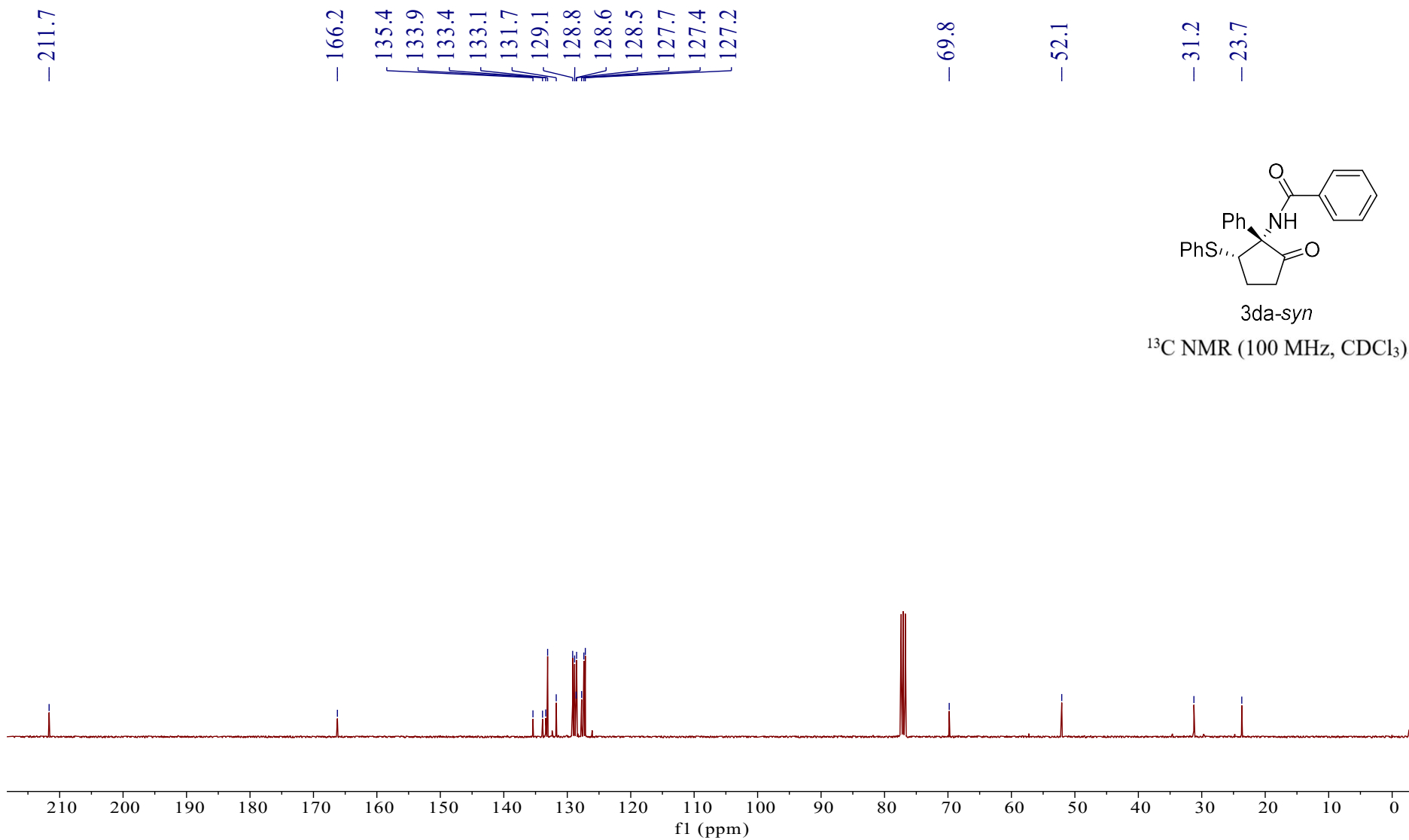
3ca-syn

¹³C NMR (125 MHz, CDCl₃)

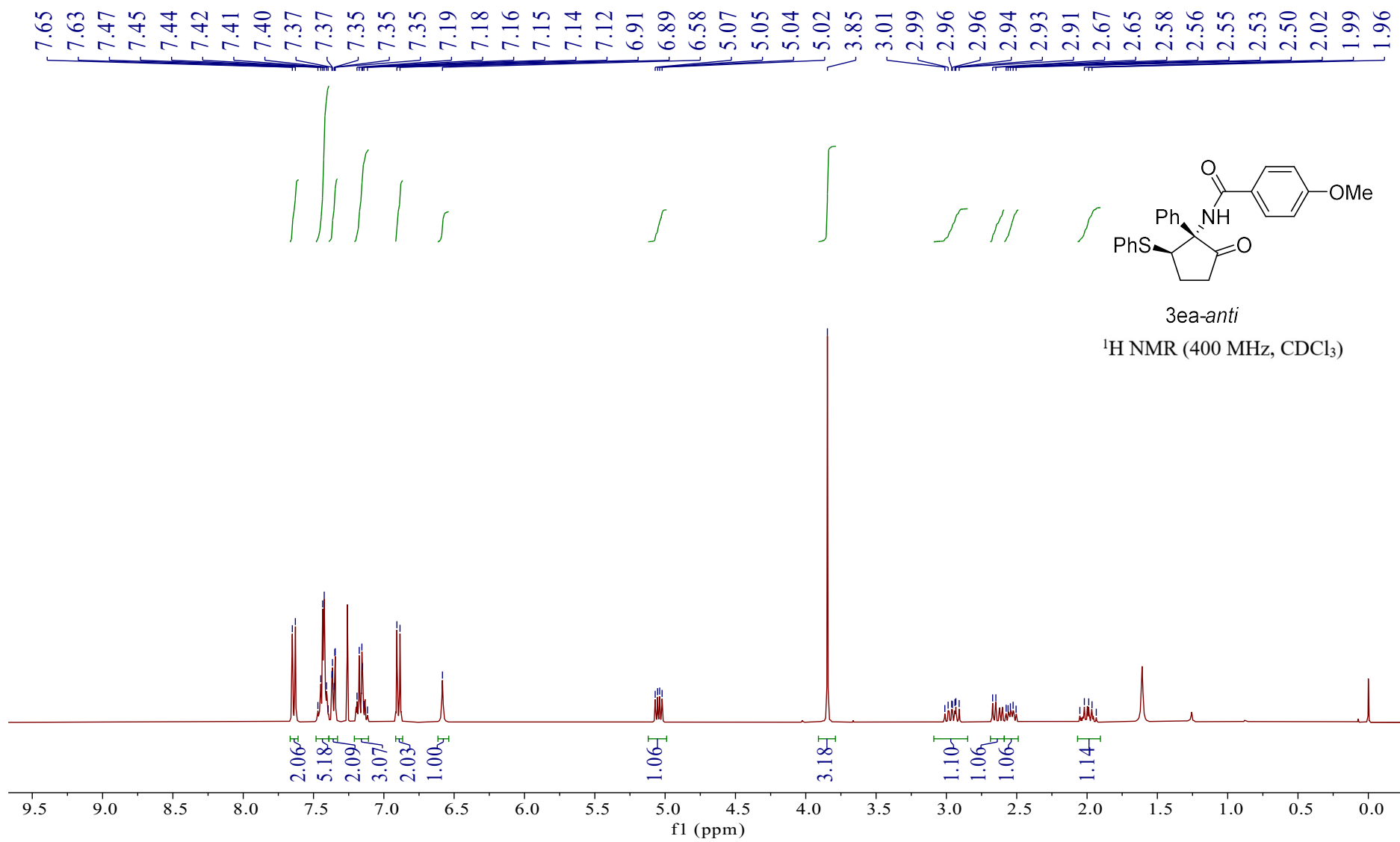


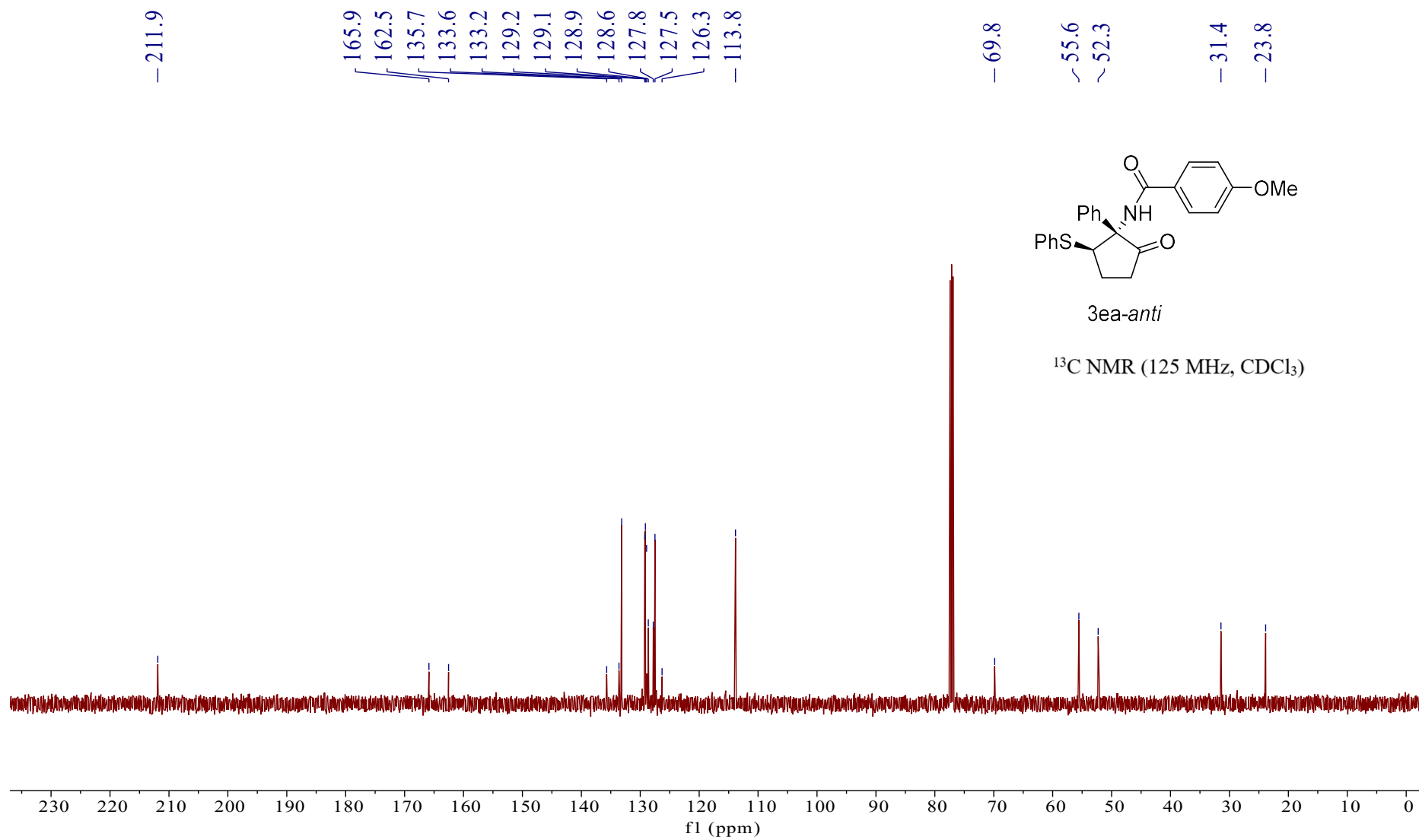


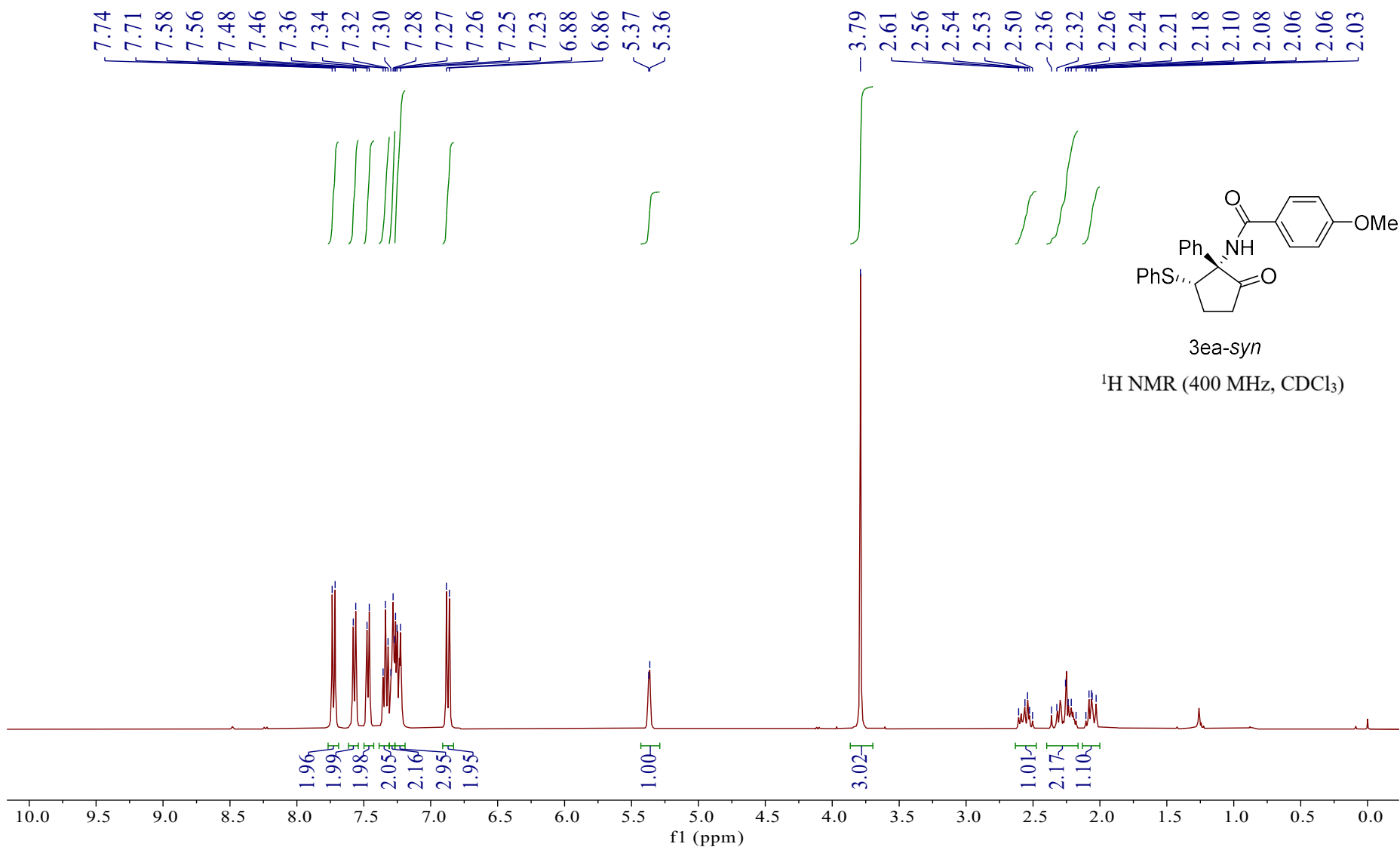


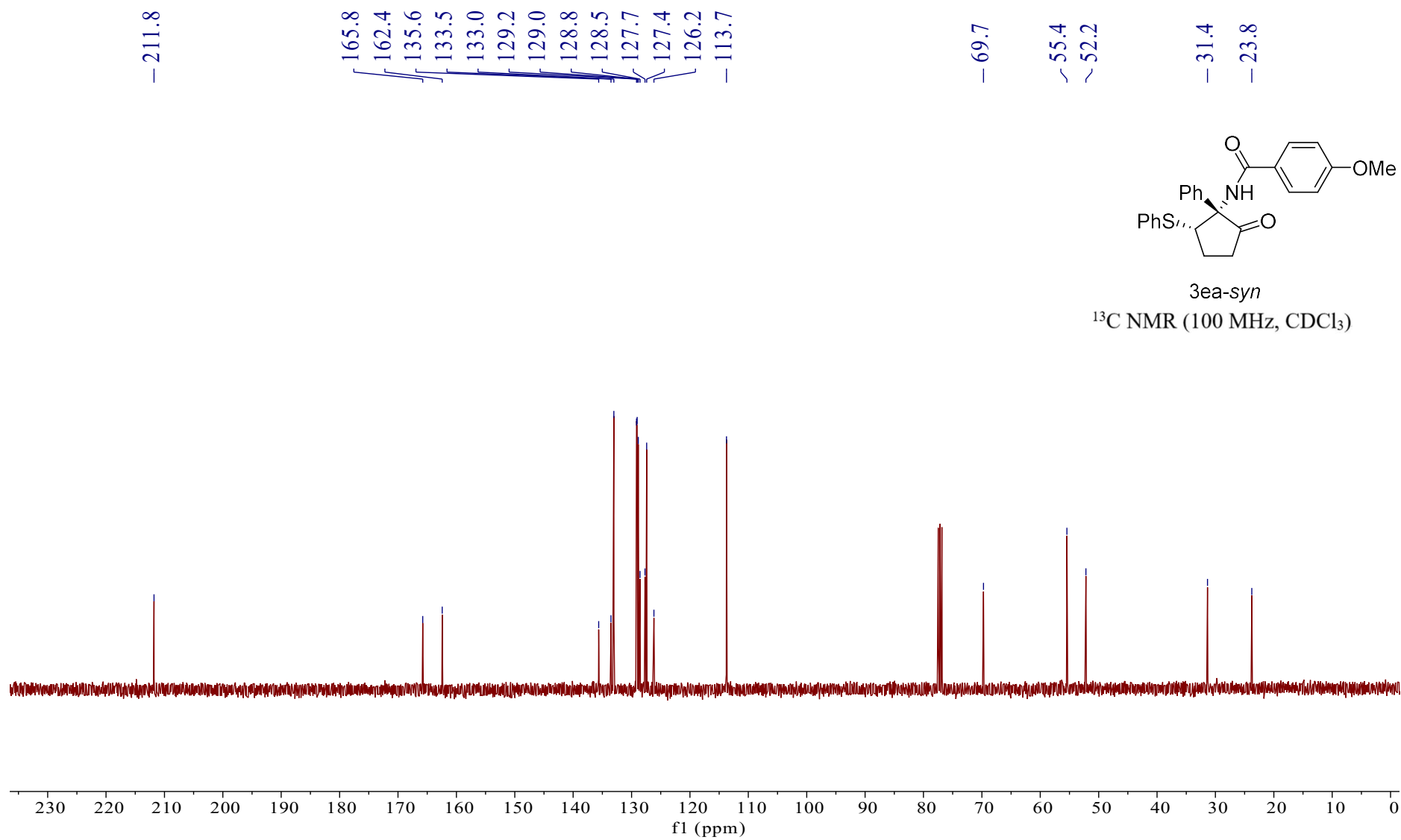


NMR-137

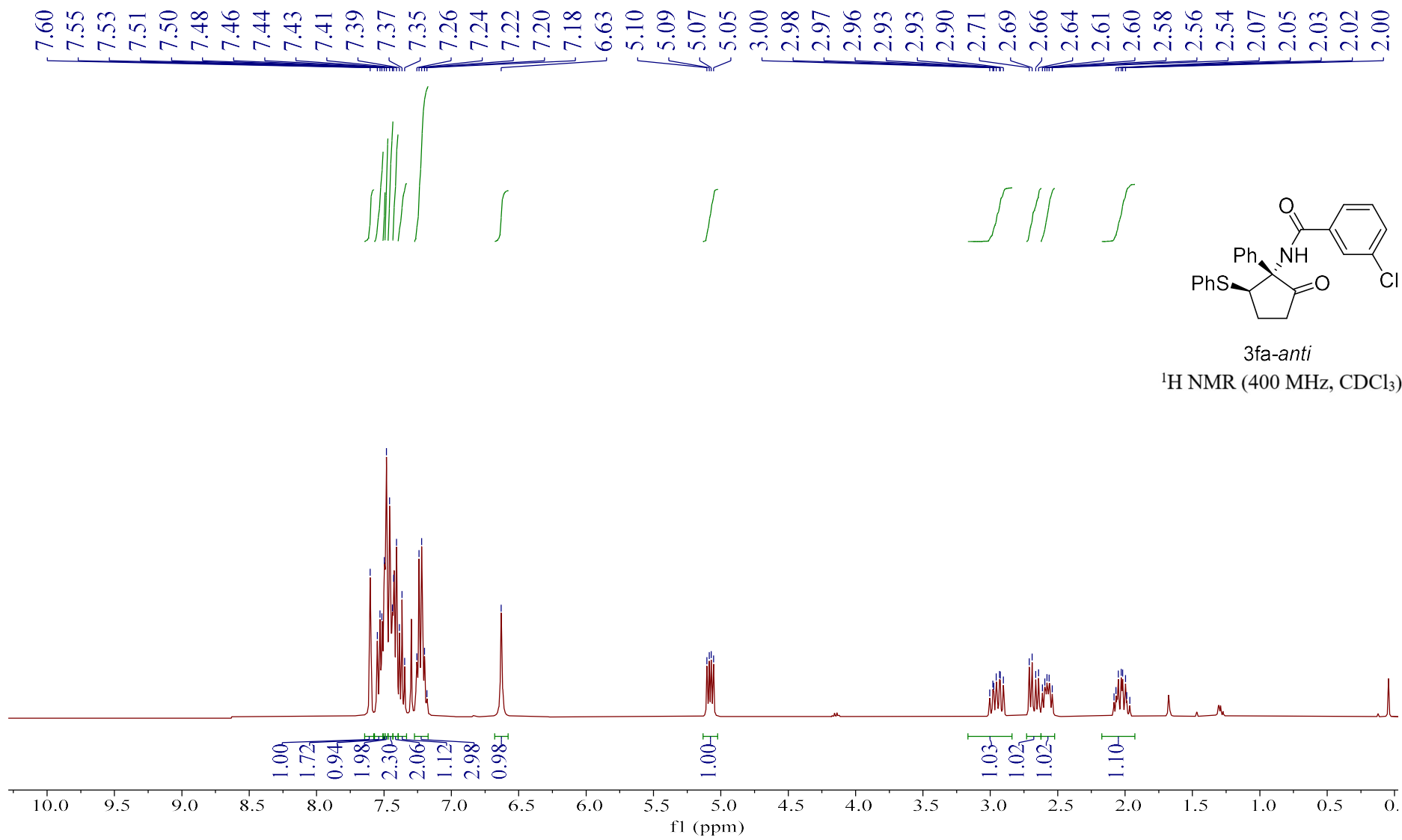


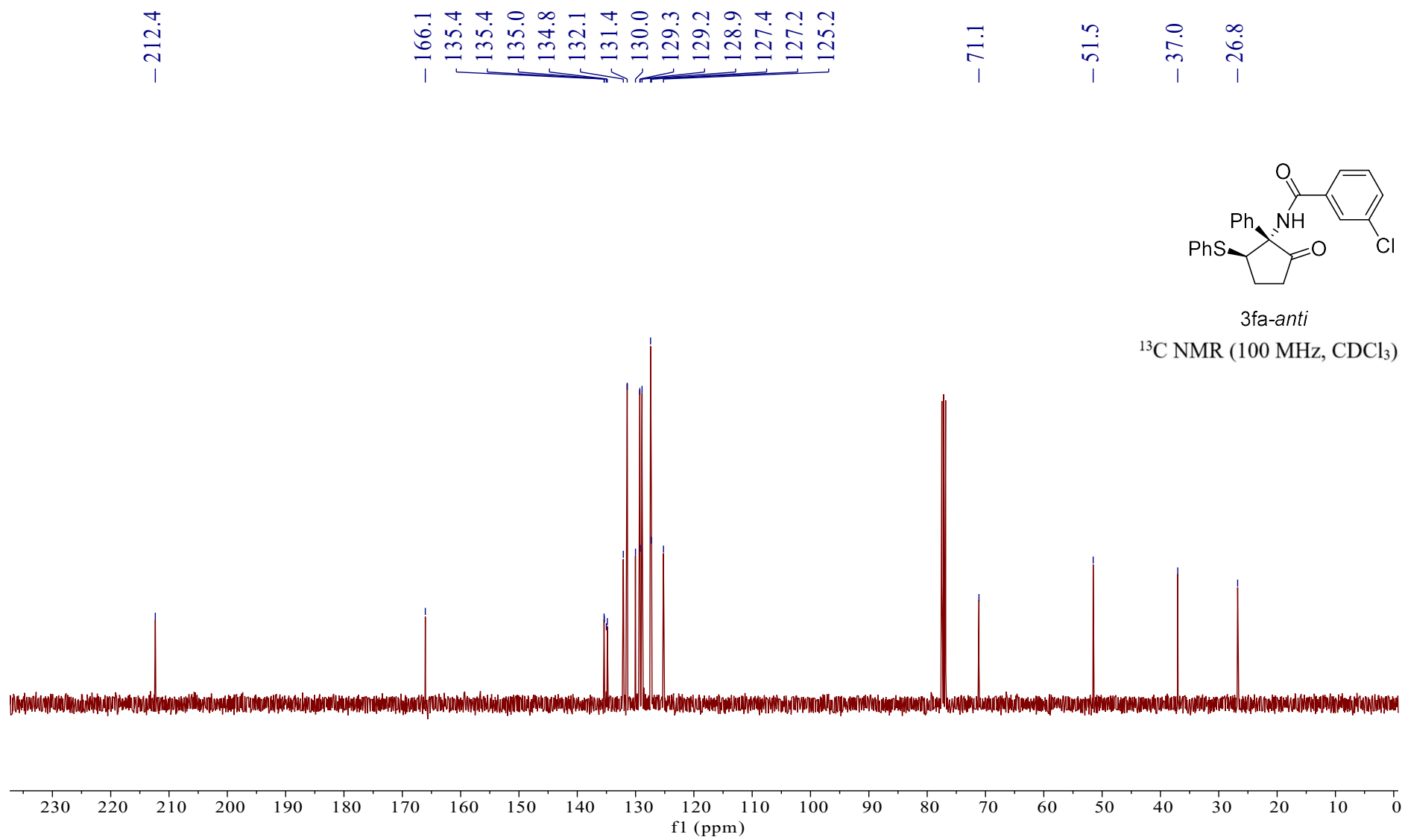




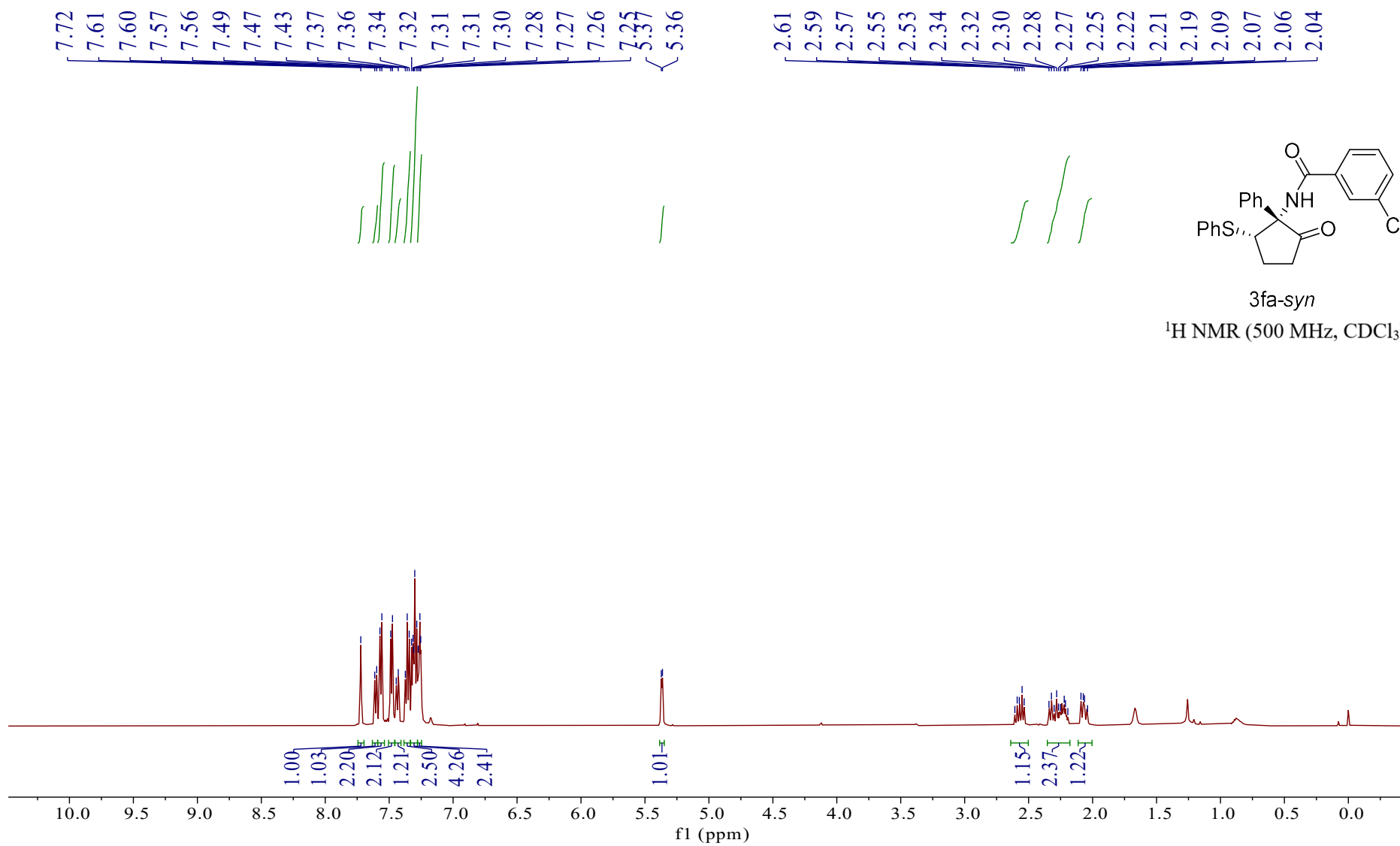


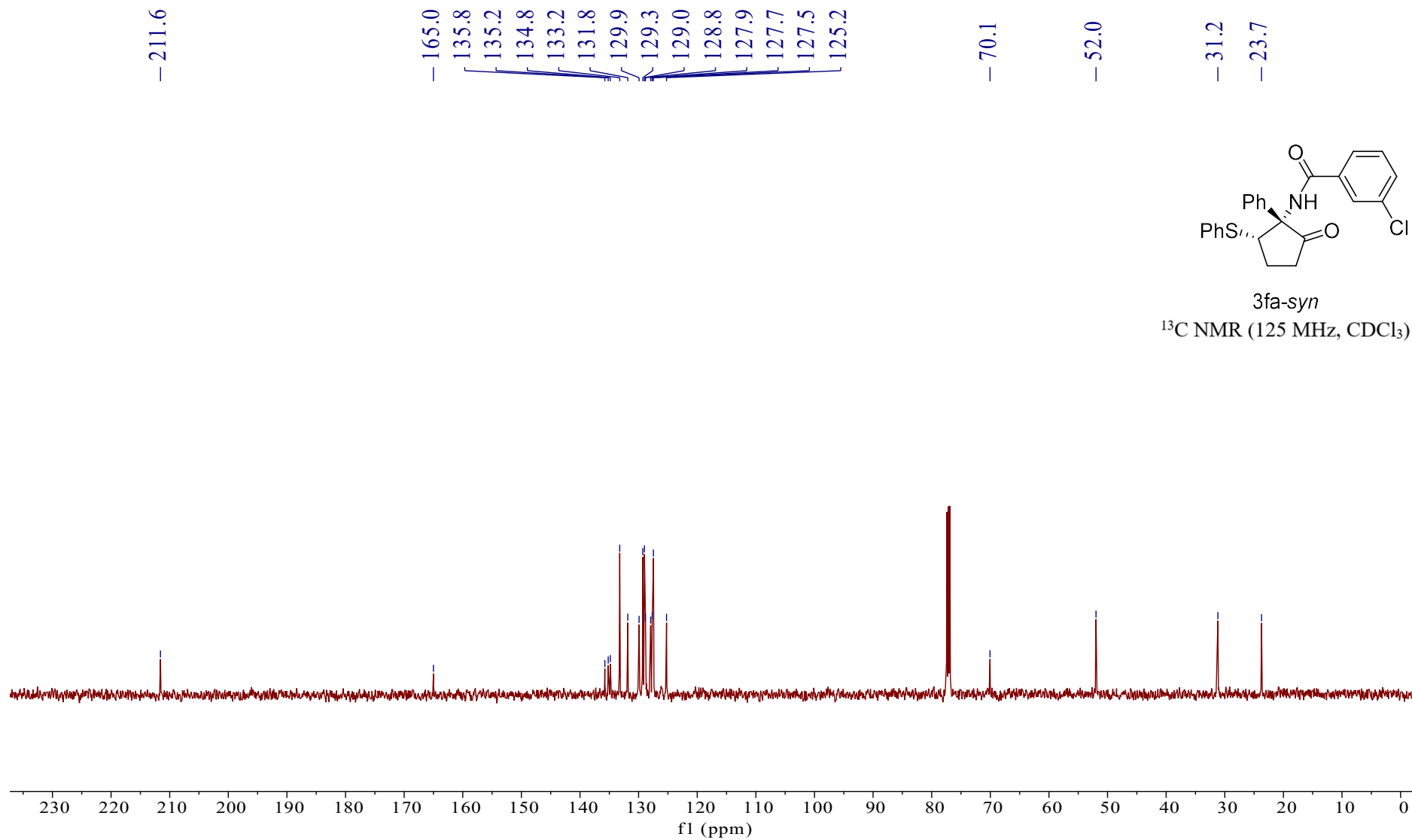
NMR-141



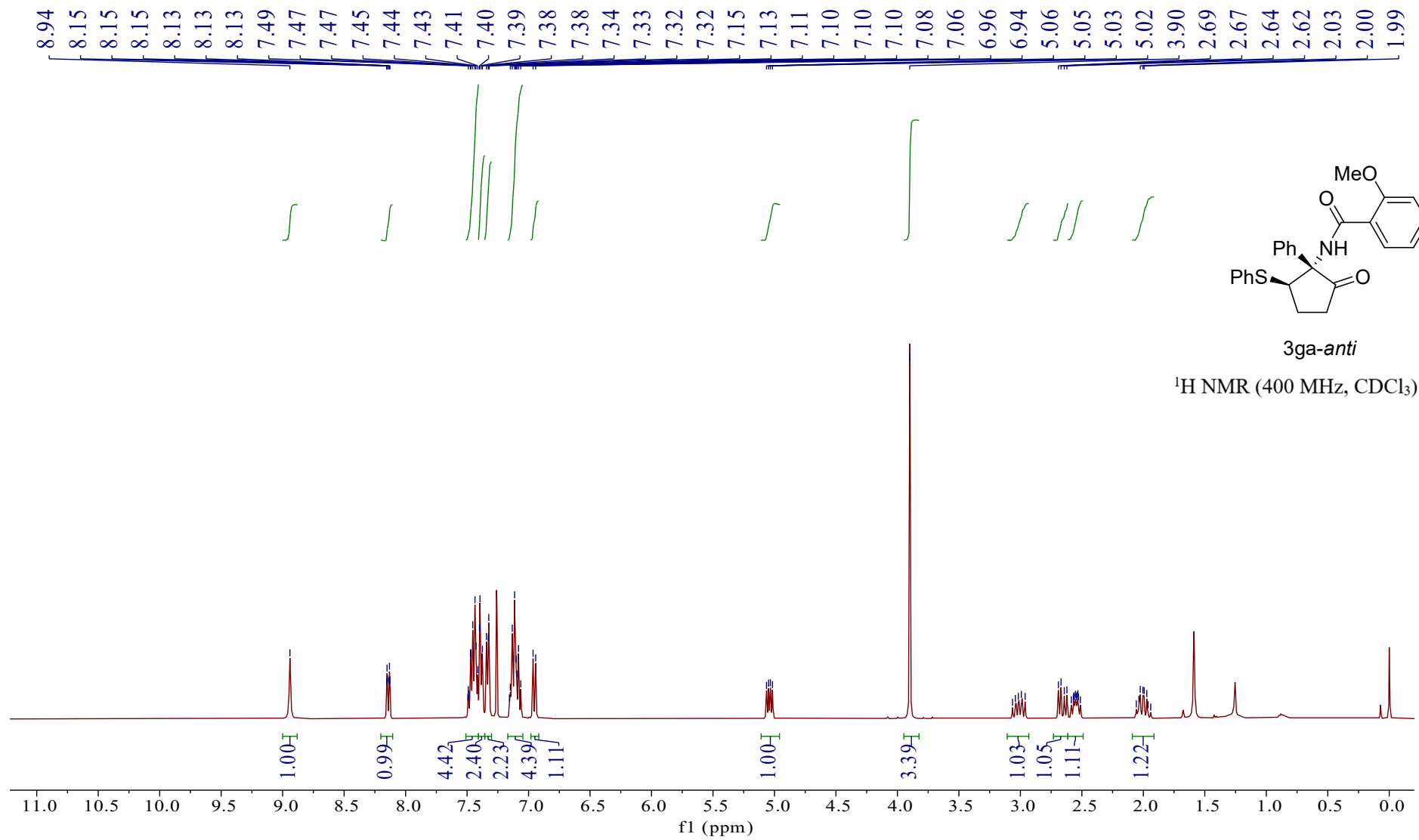


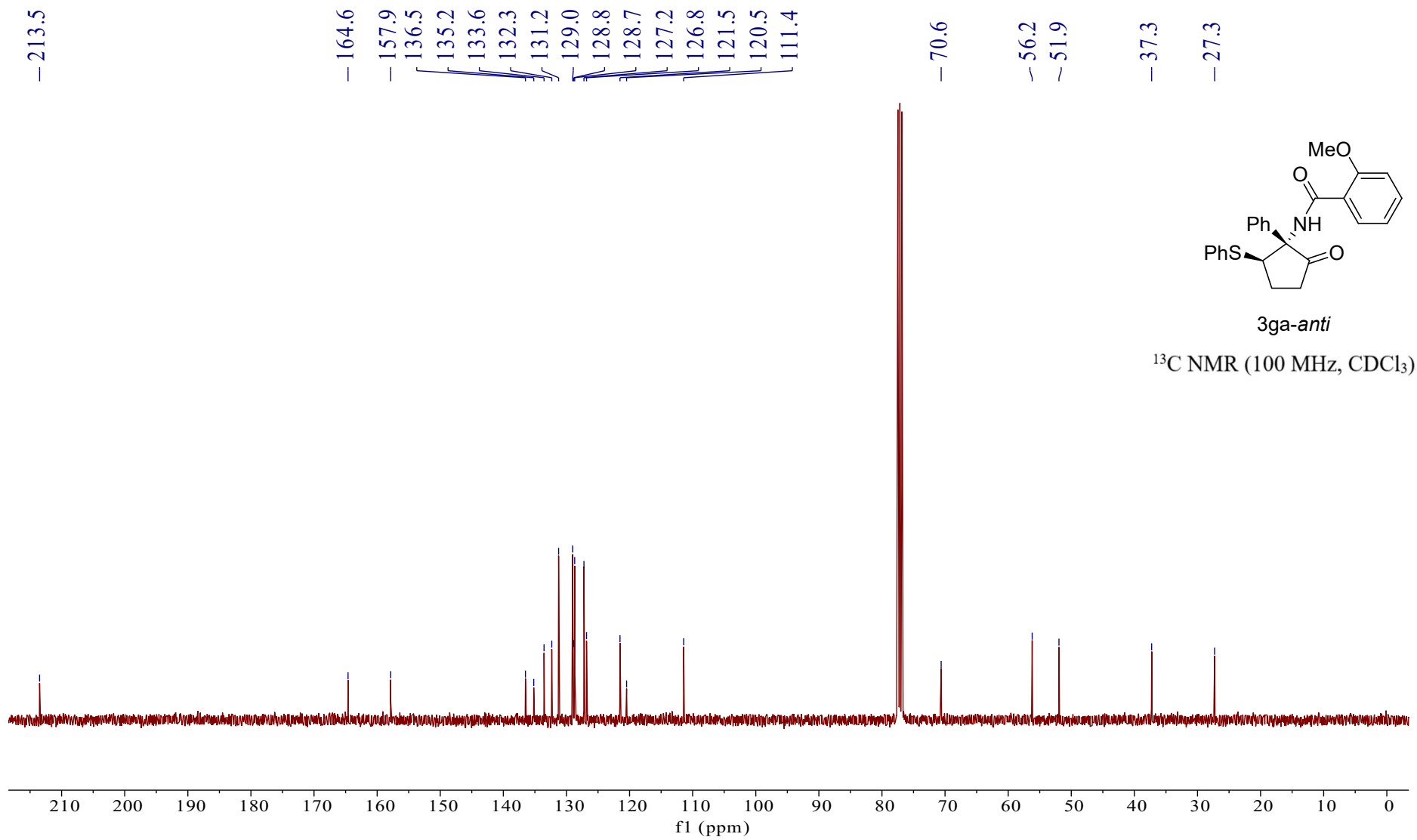
NMR-143

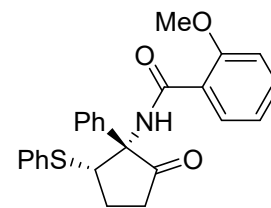
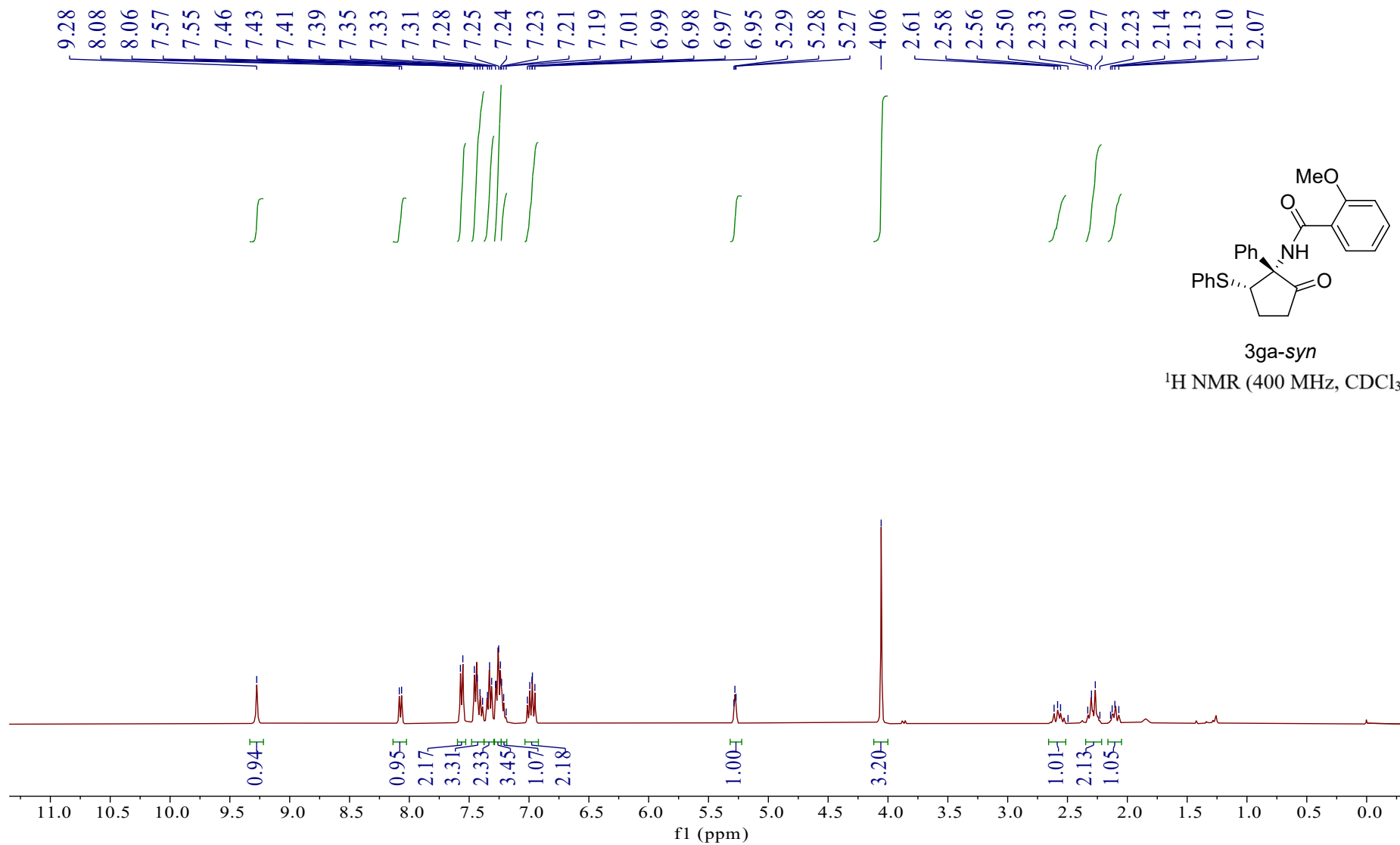




NMR-145

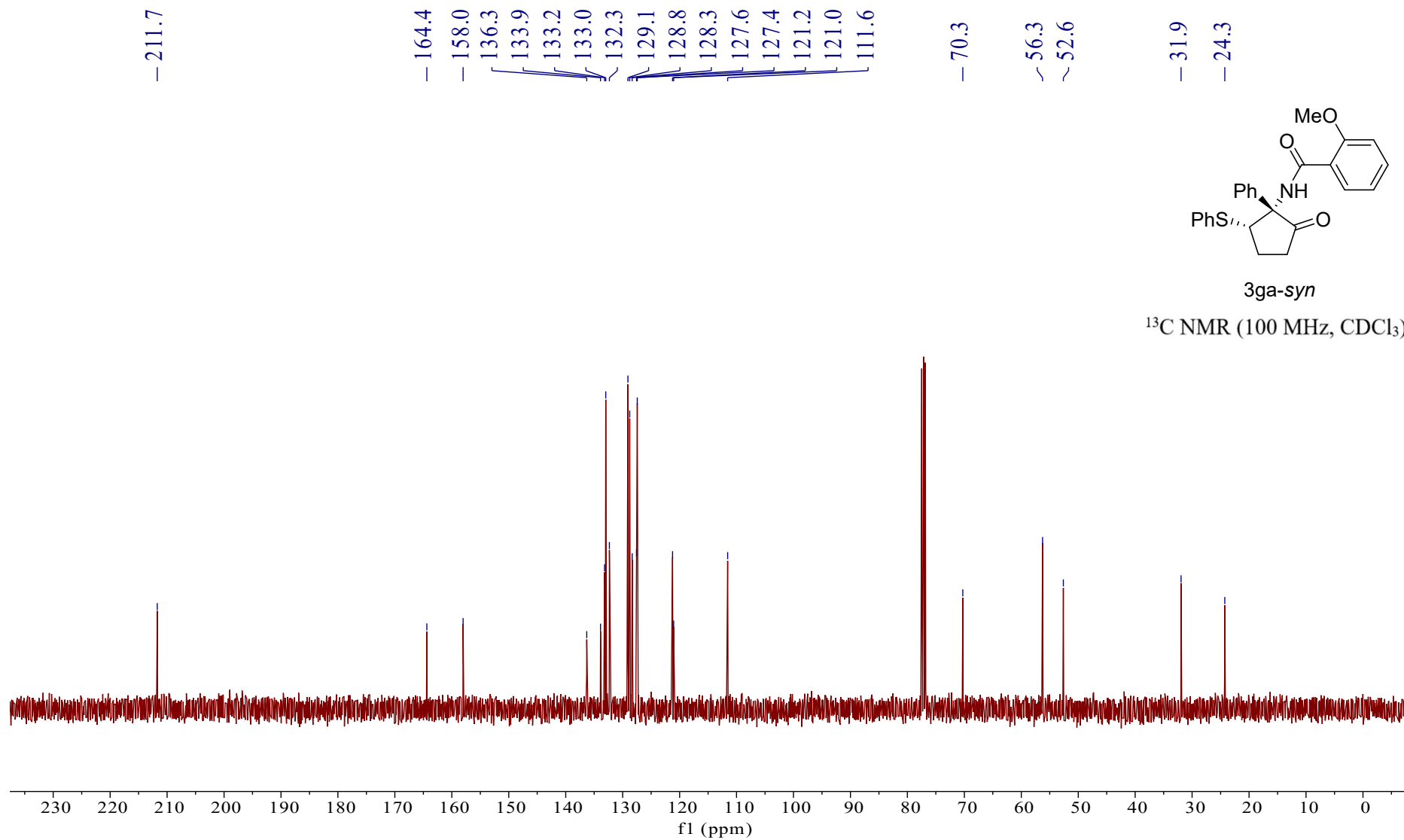


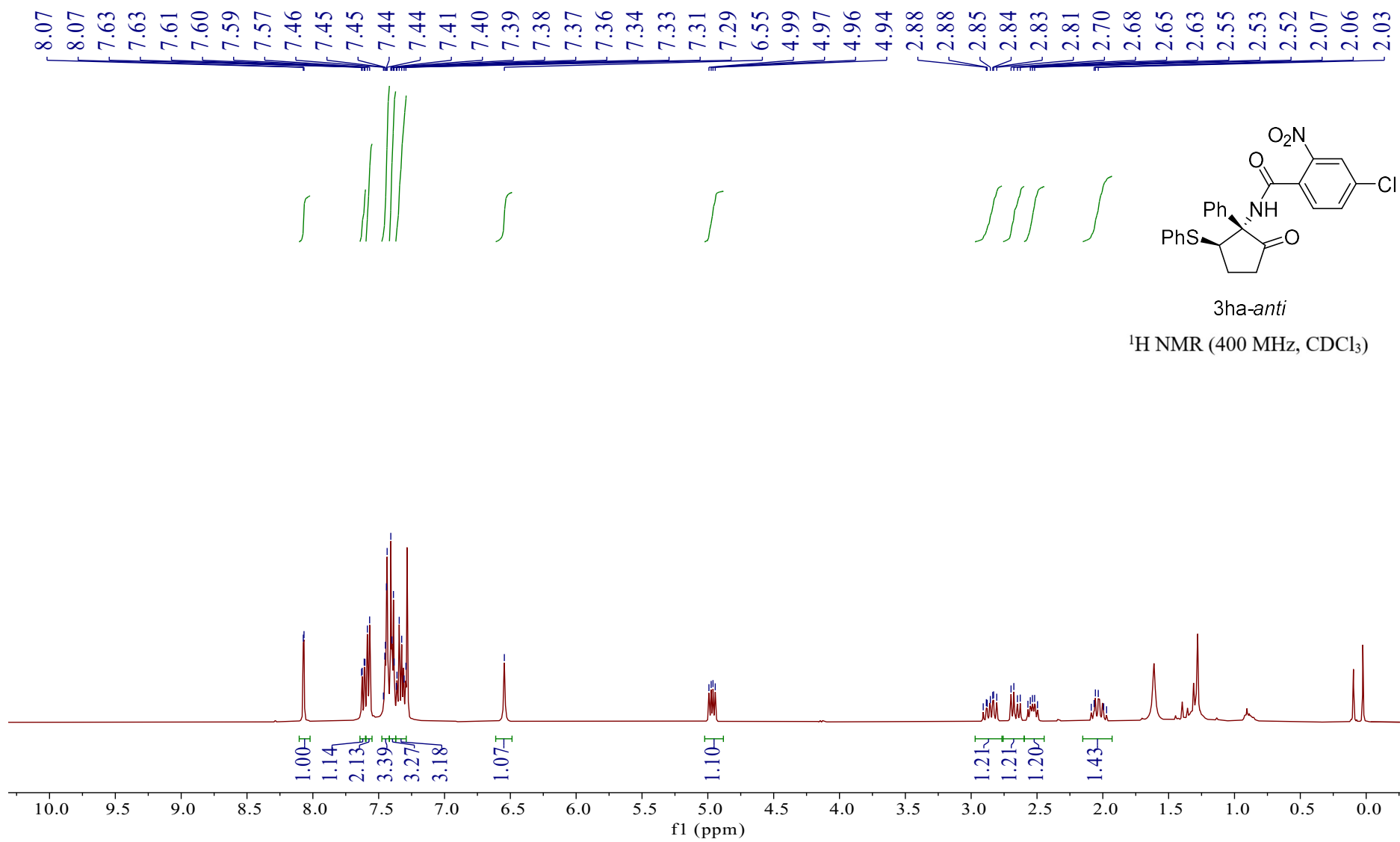




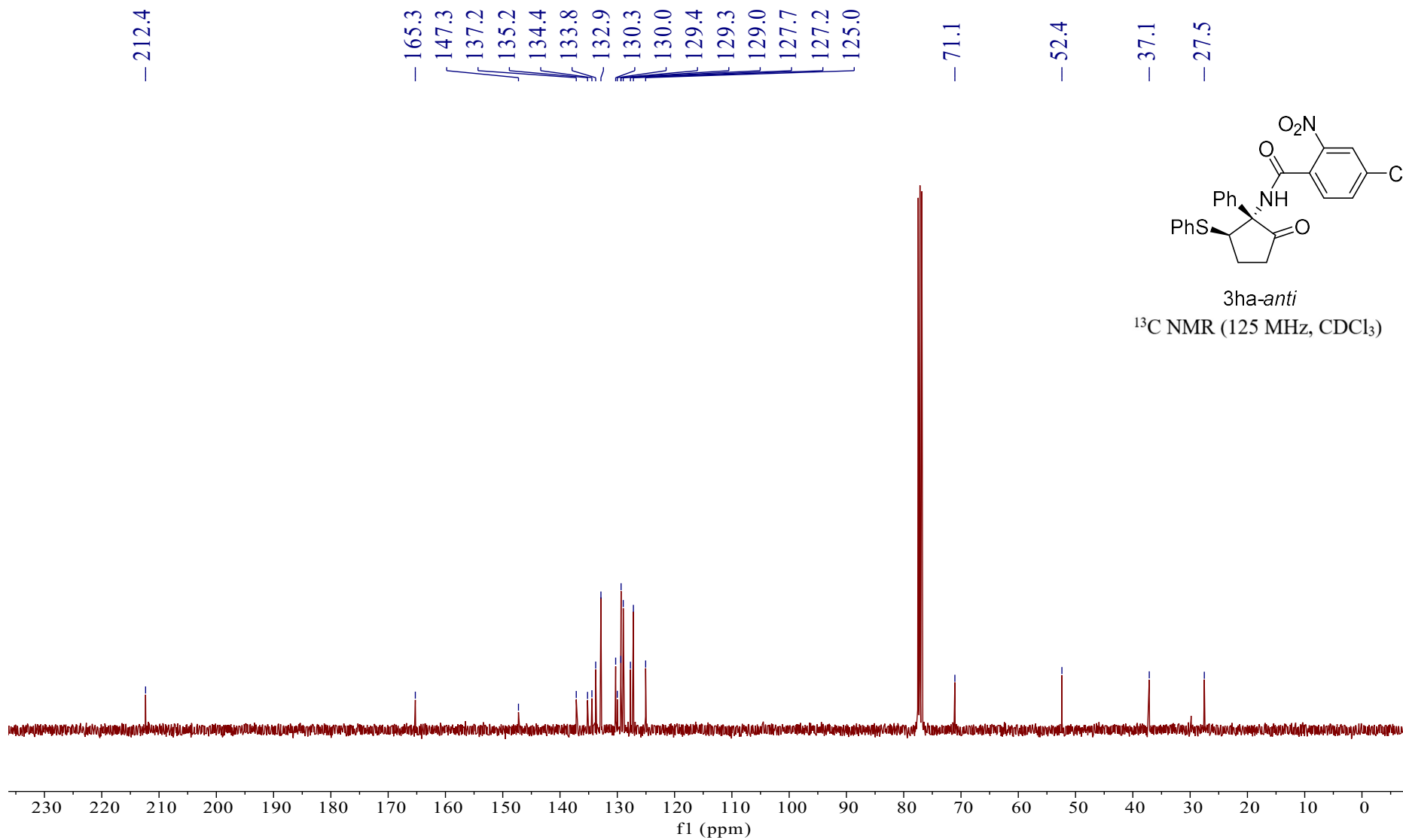
3ga-syn

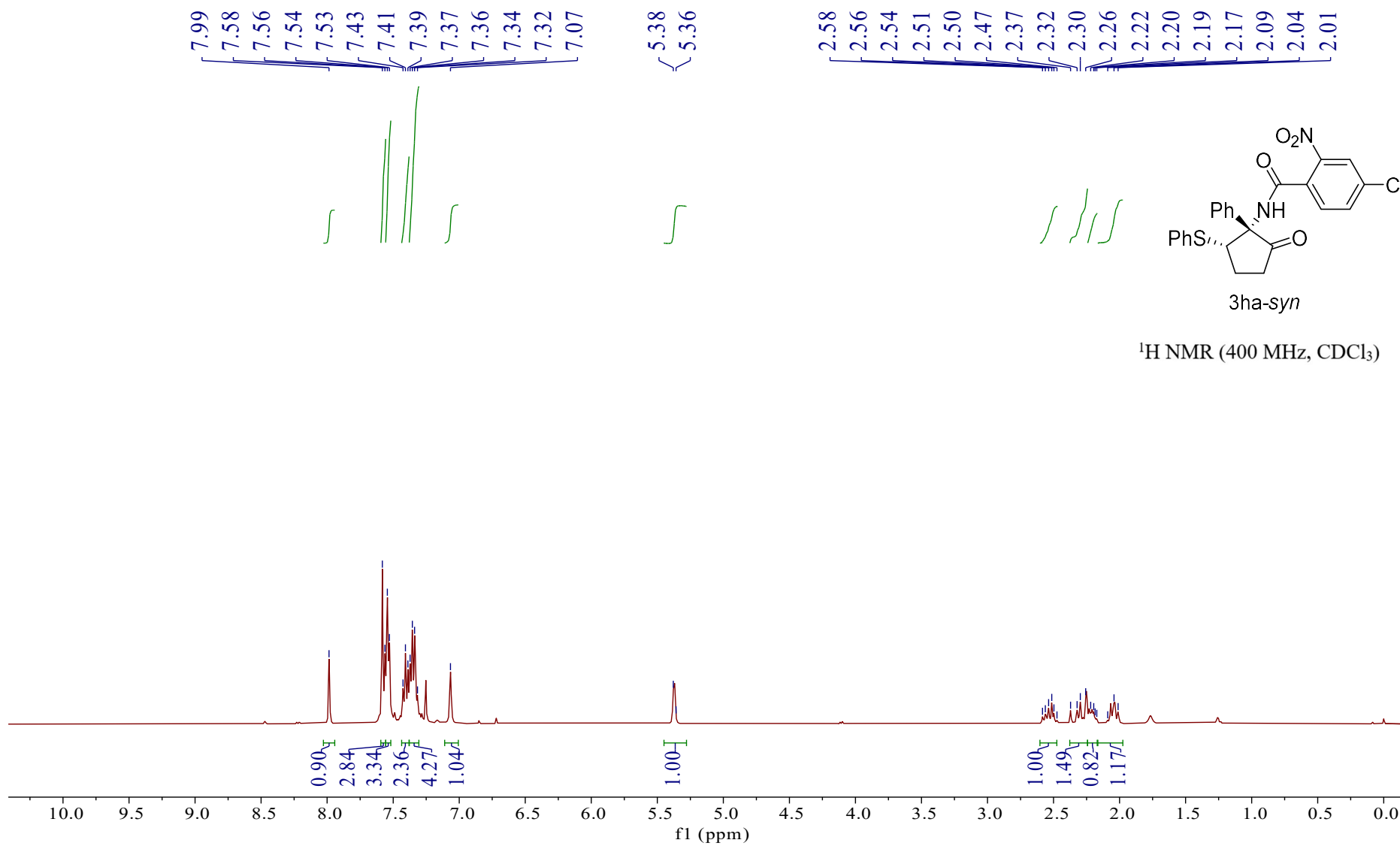
¹H NMR (400 MHz, CDCl₃)

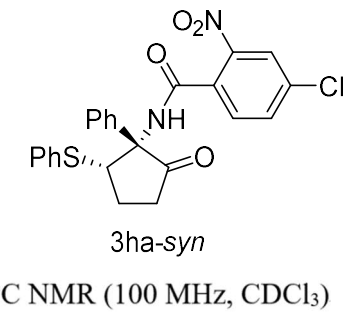
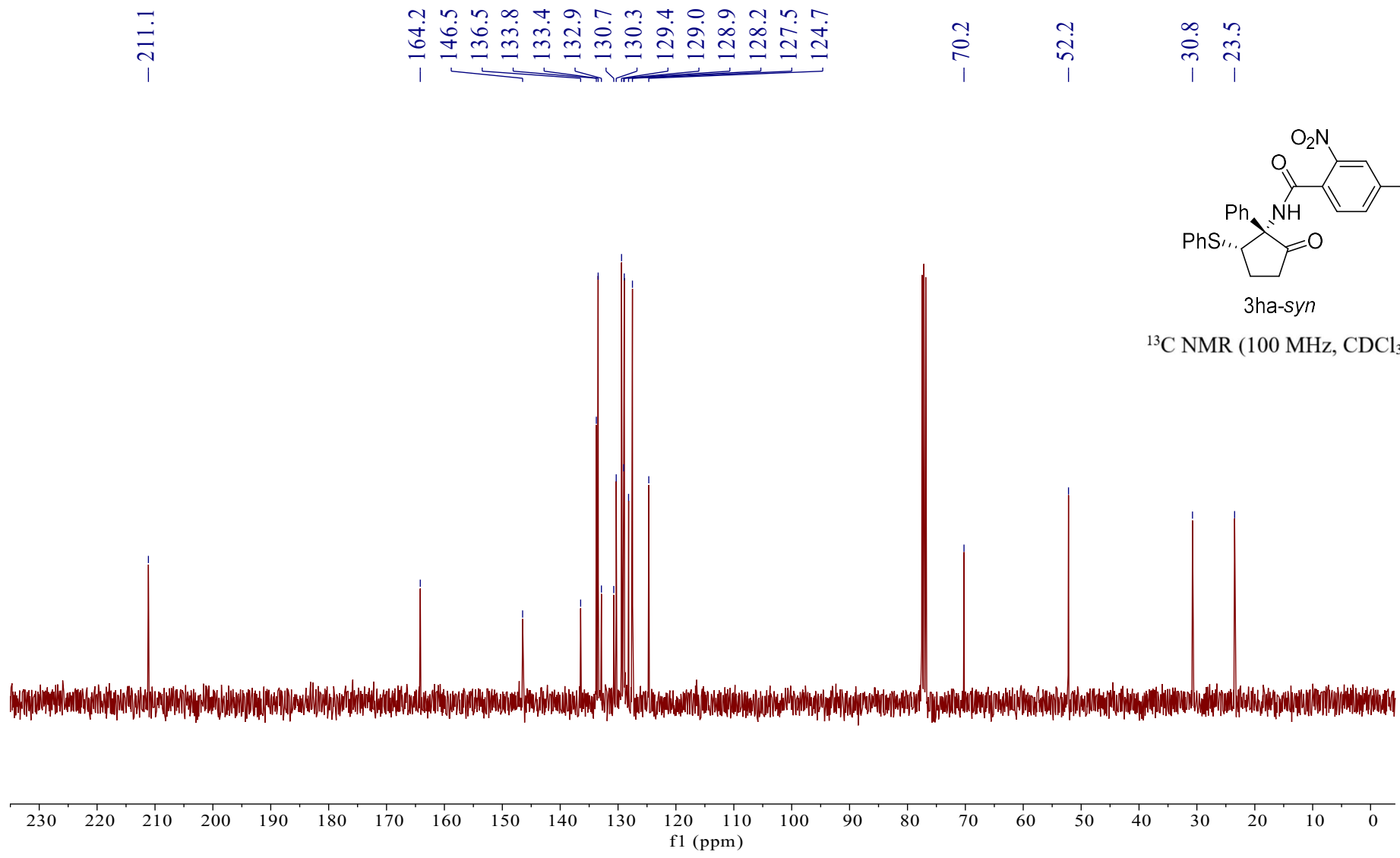


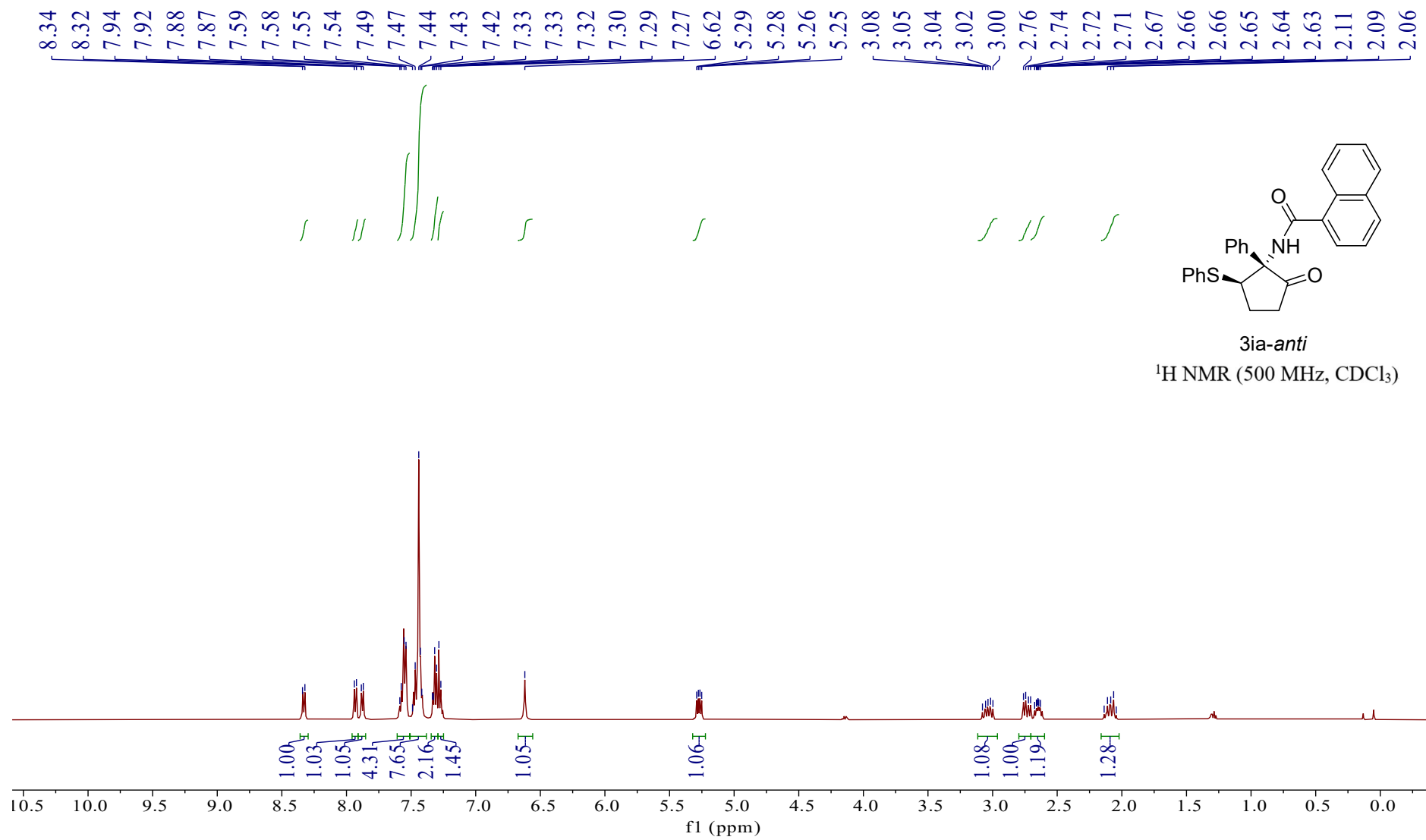


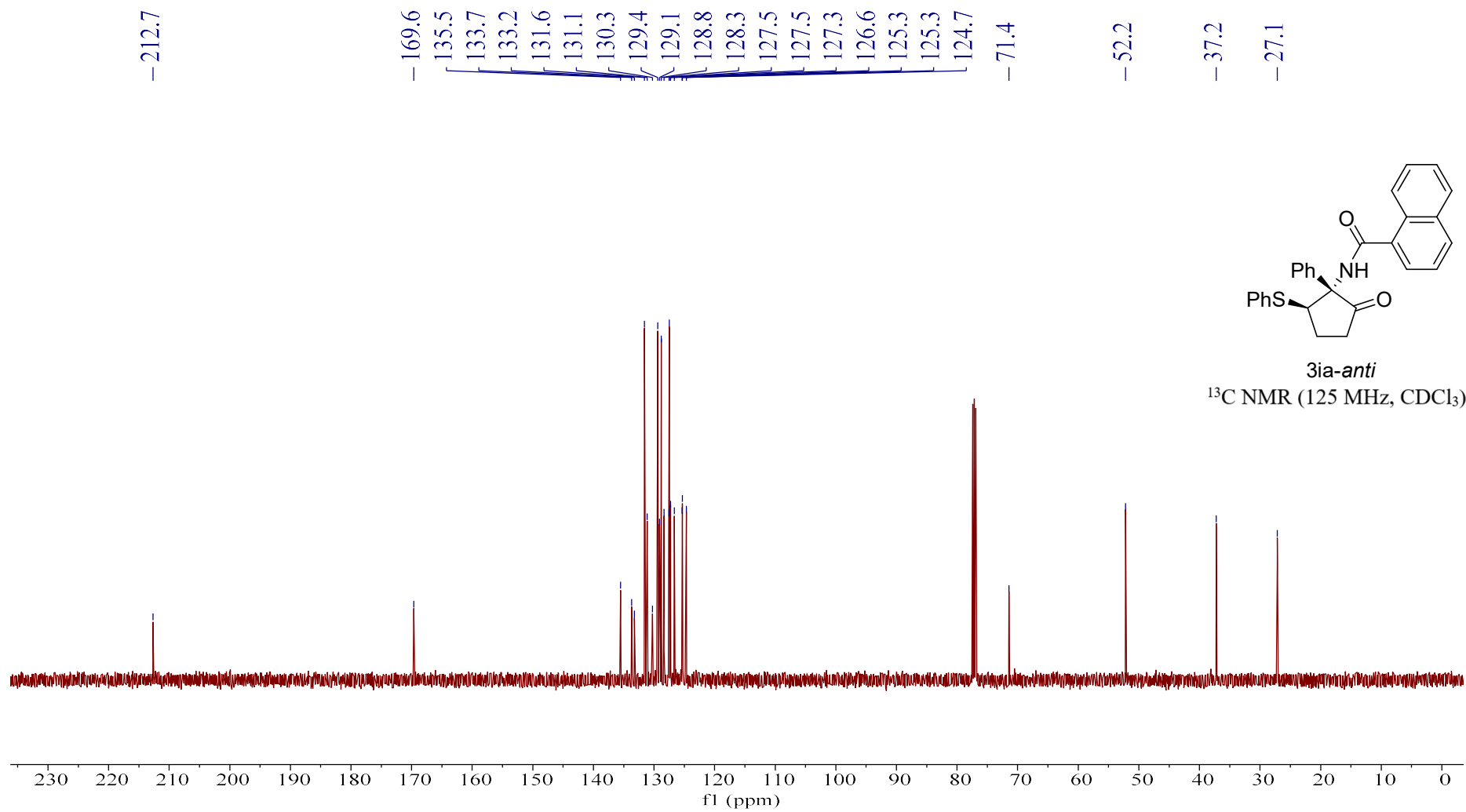
NMR-150

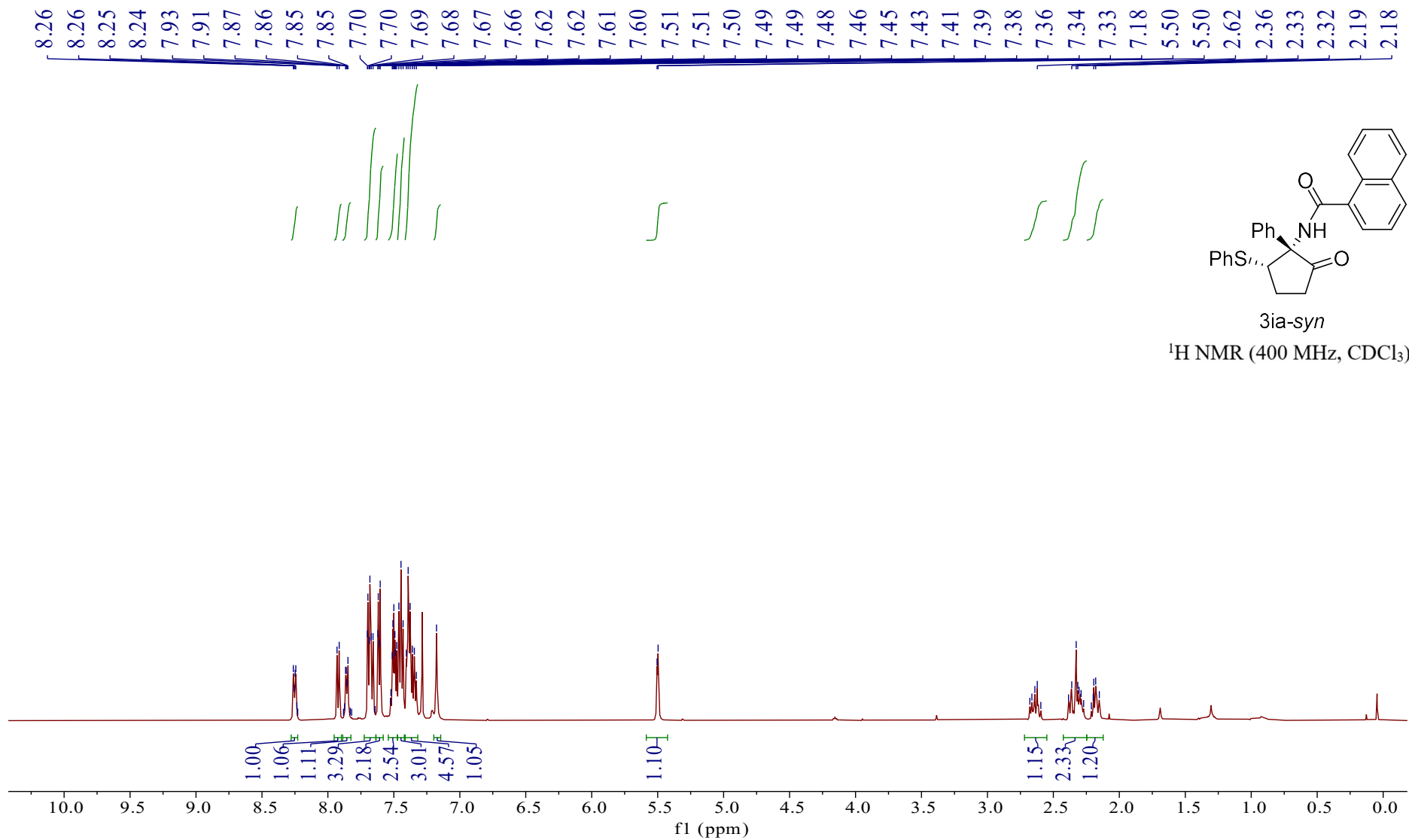




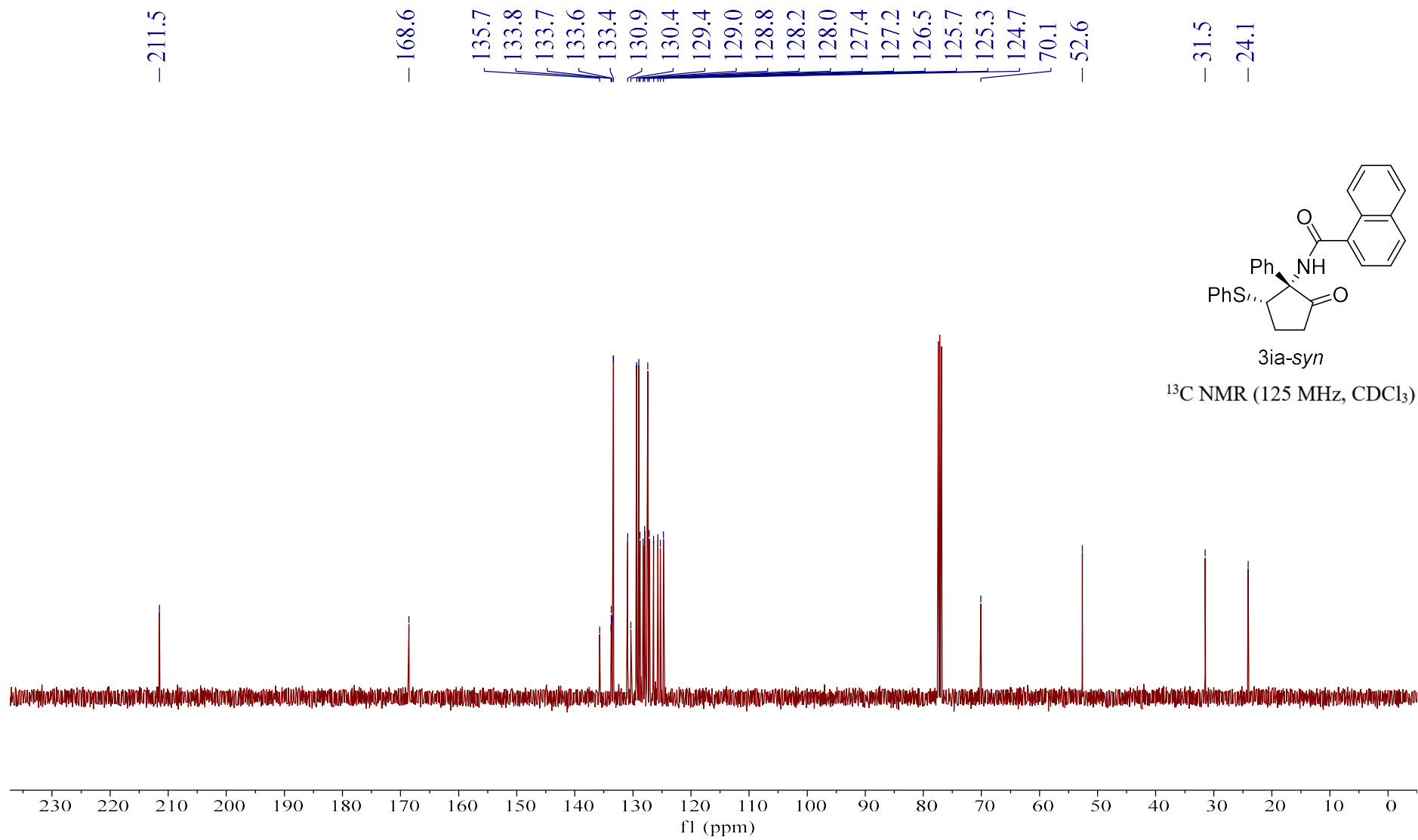






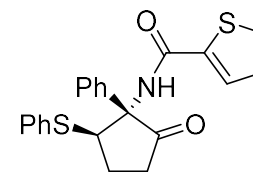


NMR-156



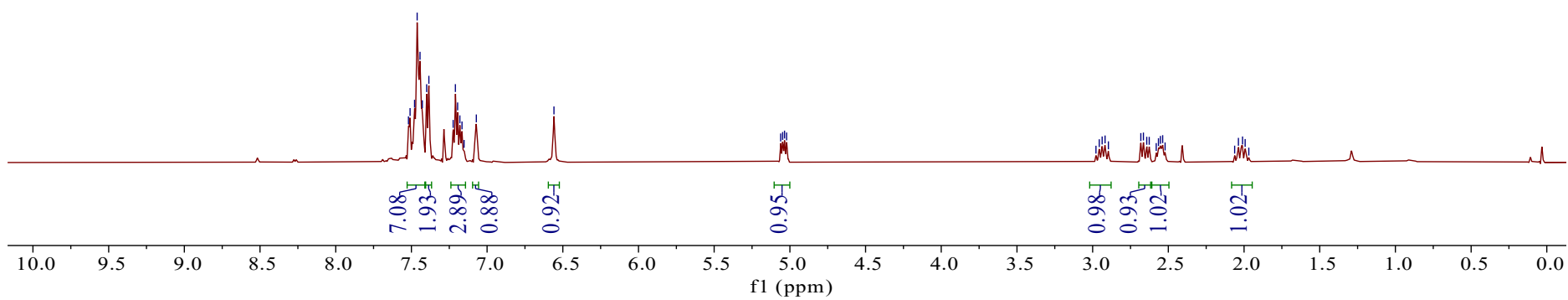
7.52
7.51
7.48
7.46
7.44
7.43
7.40
7.38
7.22
7.21
7.19
7.18
7.17
7.15
7.07
— 6.56

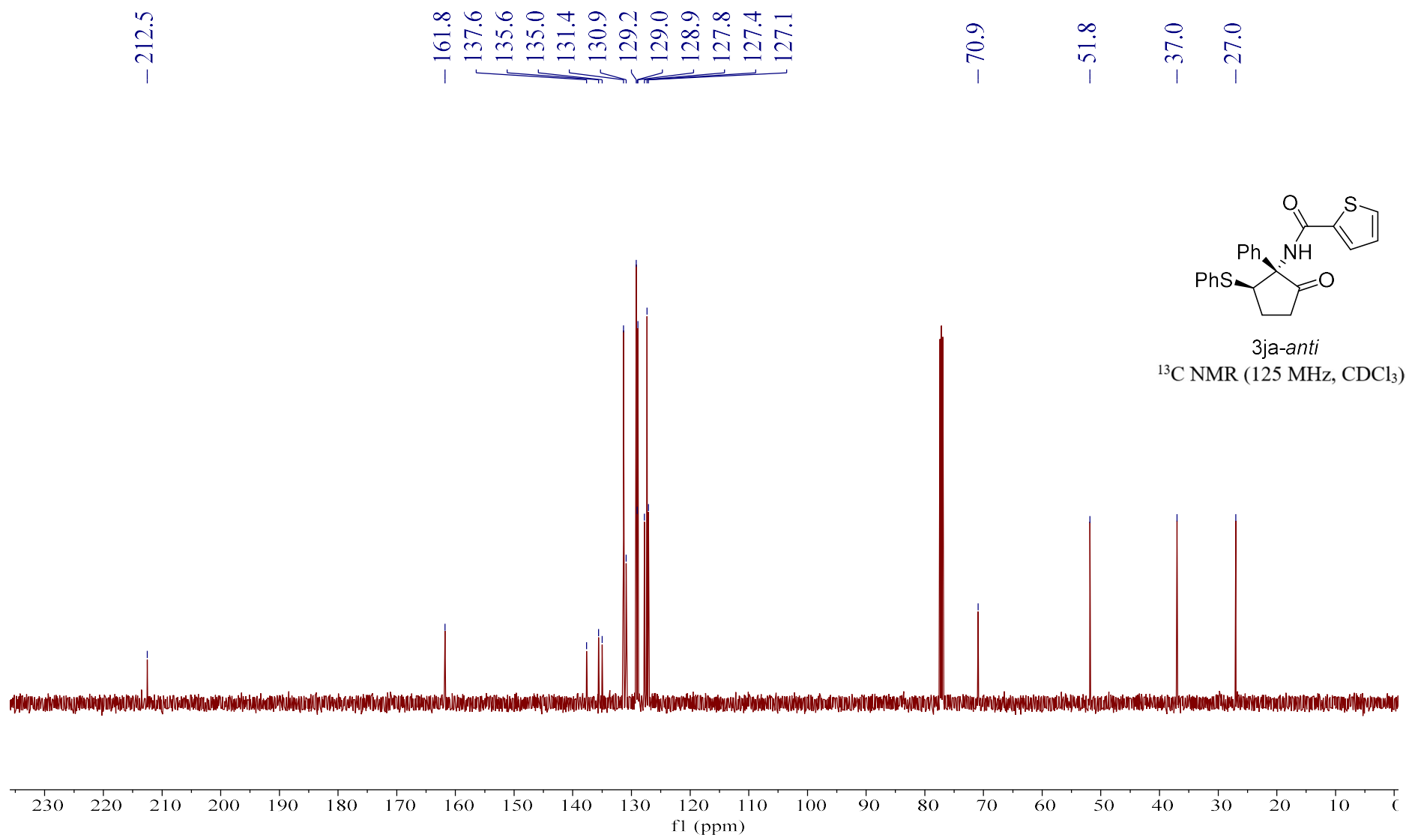
5.06
5.05
5.04
5.02
2.98
2.96
2.94
2.92
2.90
2.68
2.66
2.64
2.63
2.58
2.57
2.55
2.54
2.52
2.06
2.04
2.01
1.99
1.97



3ja-anti

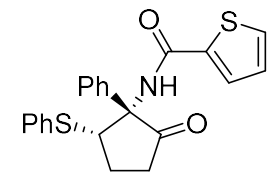
¹H NMR (500 MHz, CDCl₃)





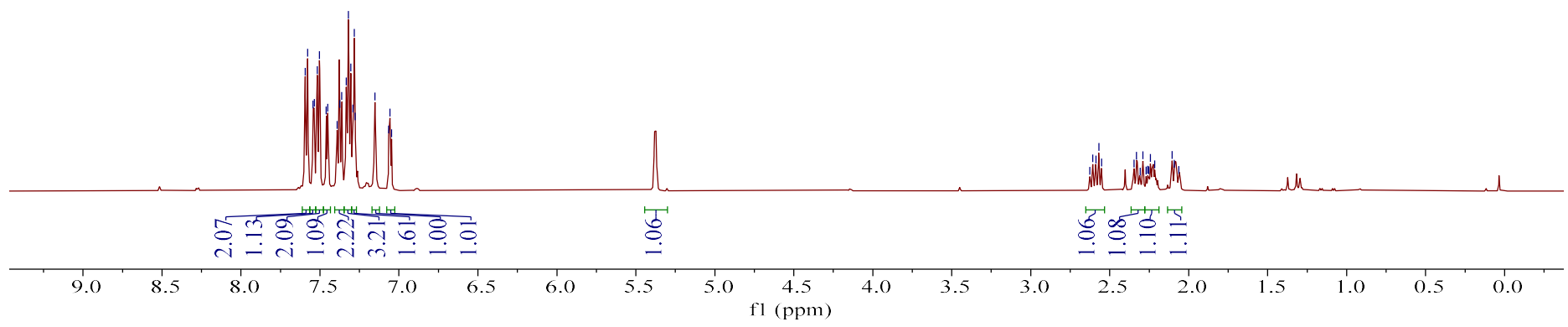
7.59
7.58
7.54
7.54
7.52
7.50
7.46
7.45
7.39
7.37
7.36
7.33
7.32
7.30
7.29
7.28
7.28
7.15
7.06
7.06
7.05

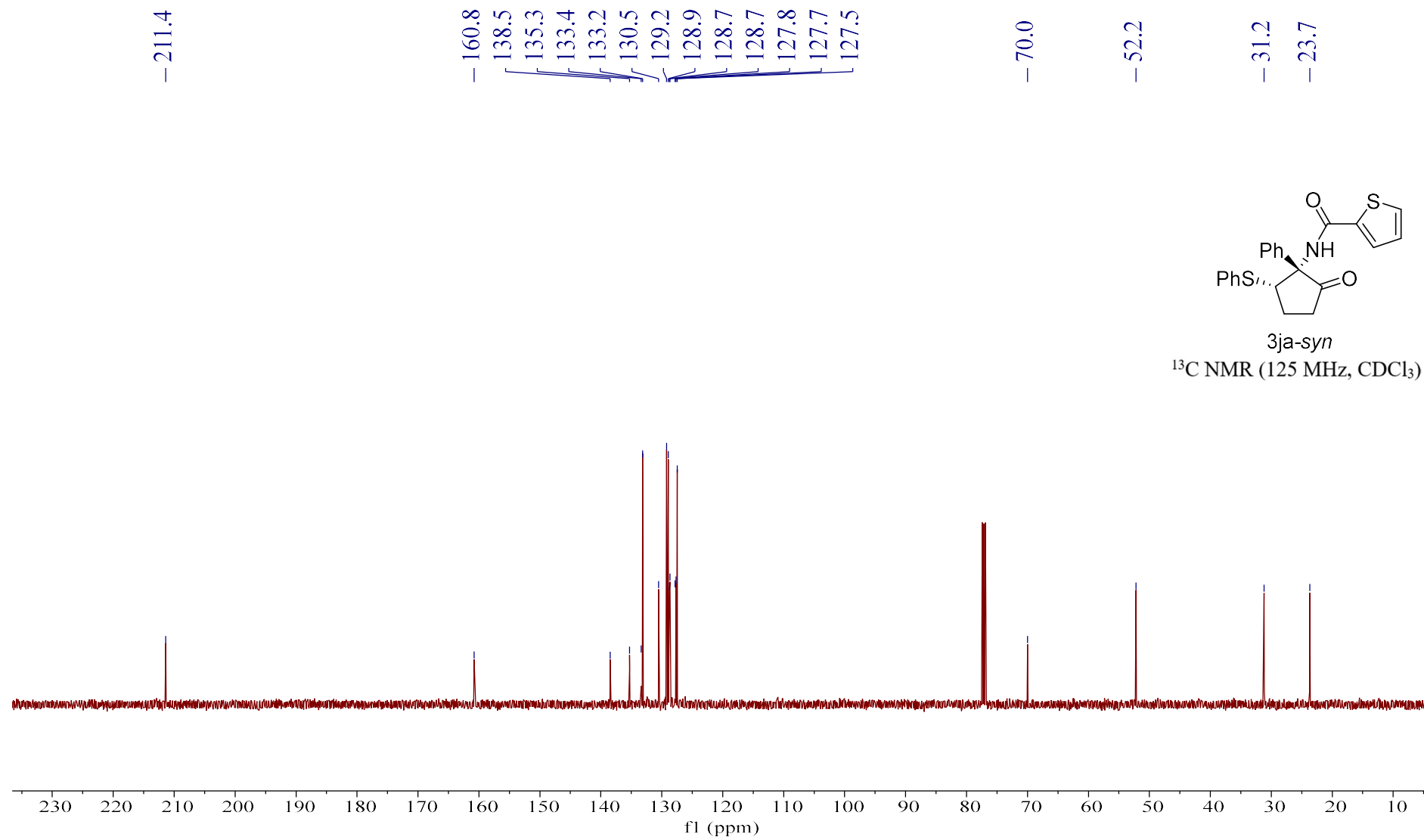
2.63
2.61
2.59
2.57
2.55
2.35
2.33
2.31
2.29
2.27
2.26
2.25
2.24
2.22
2.11
2.09
2.06



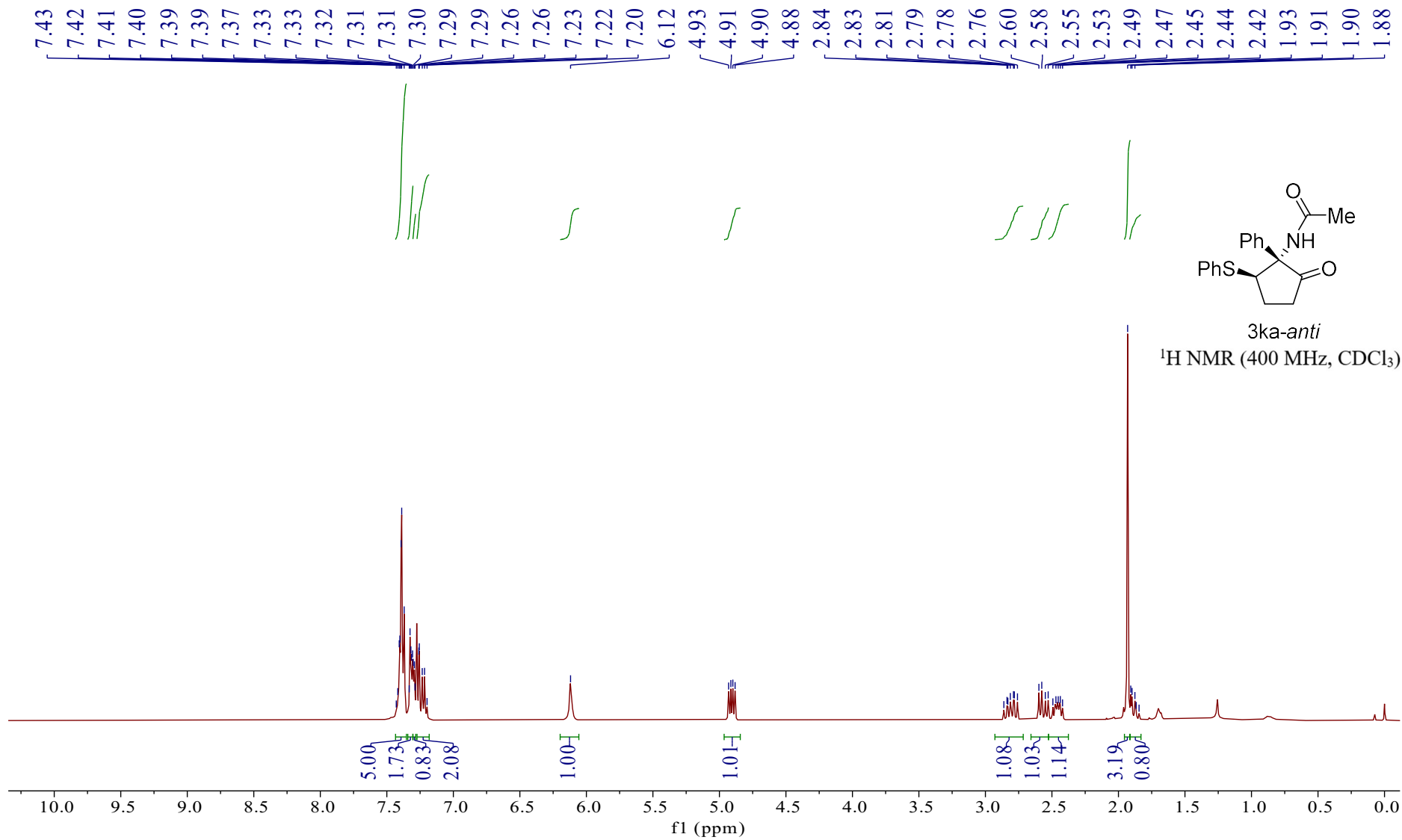
3ja-syn

¹H NMR (500 MHz, CDCl₃)

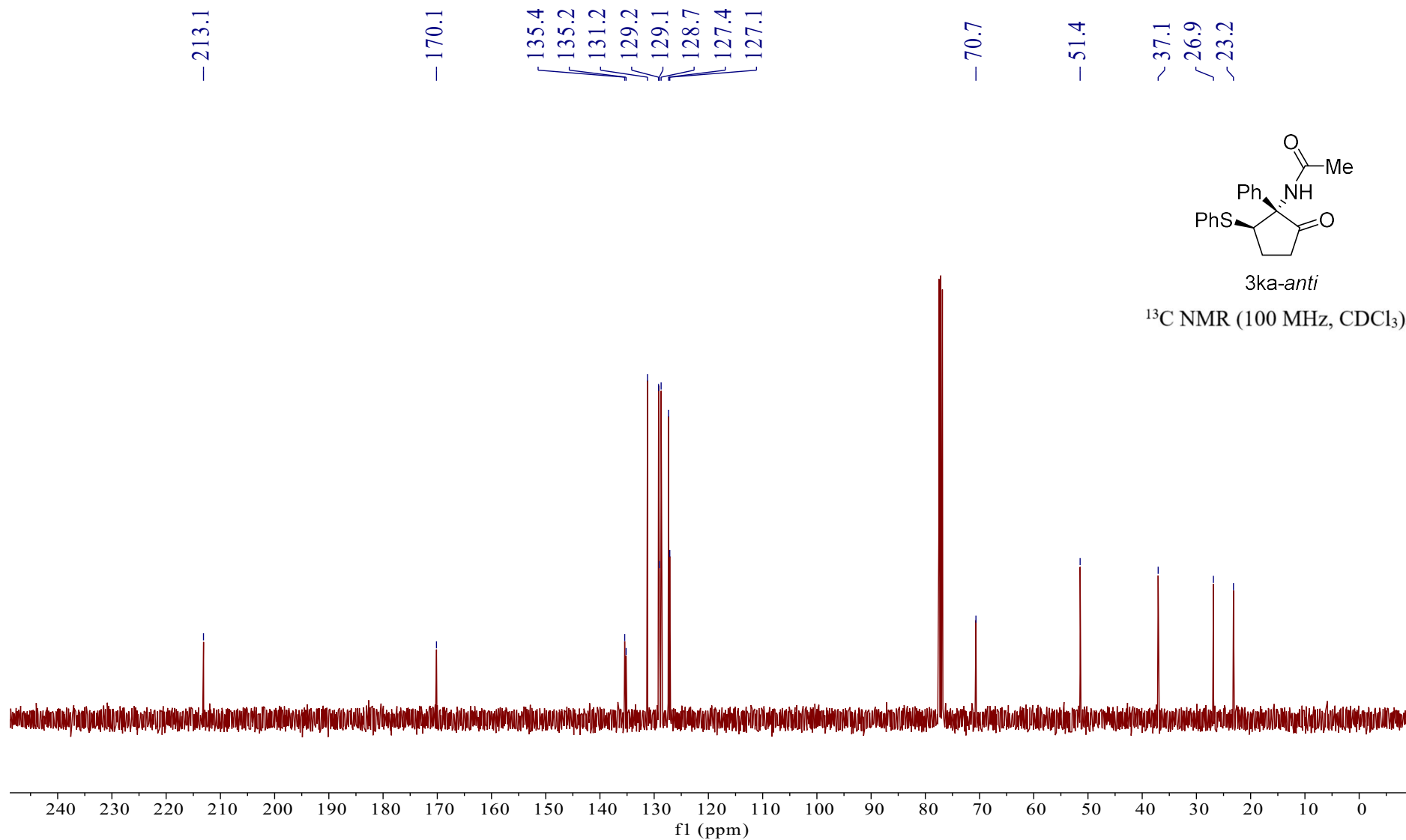




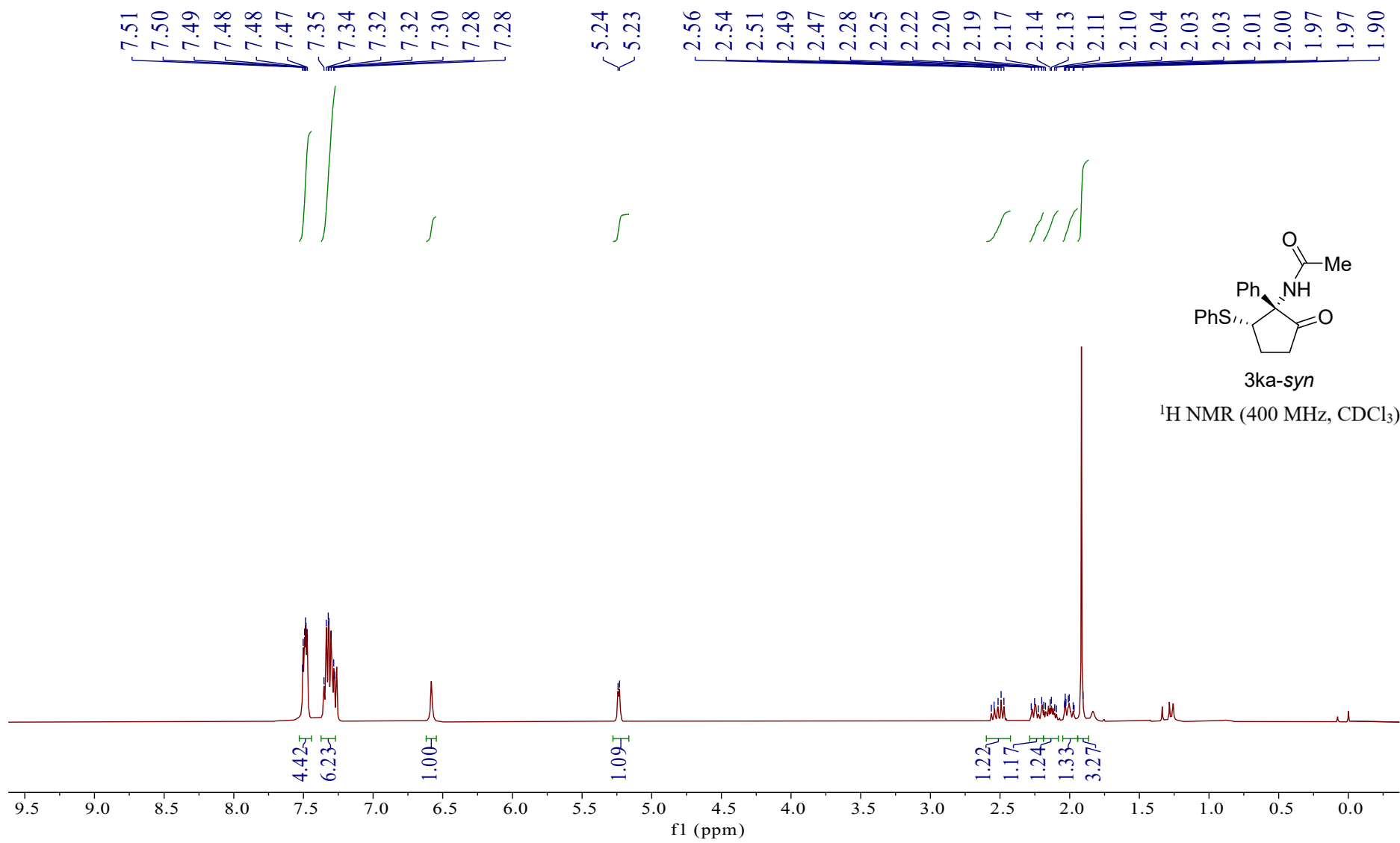
NMR-161

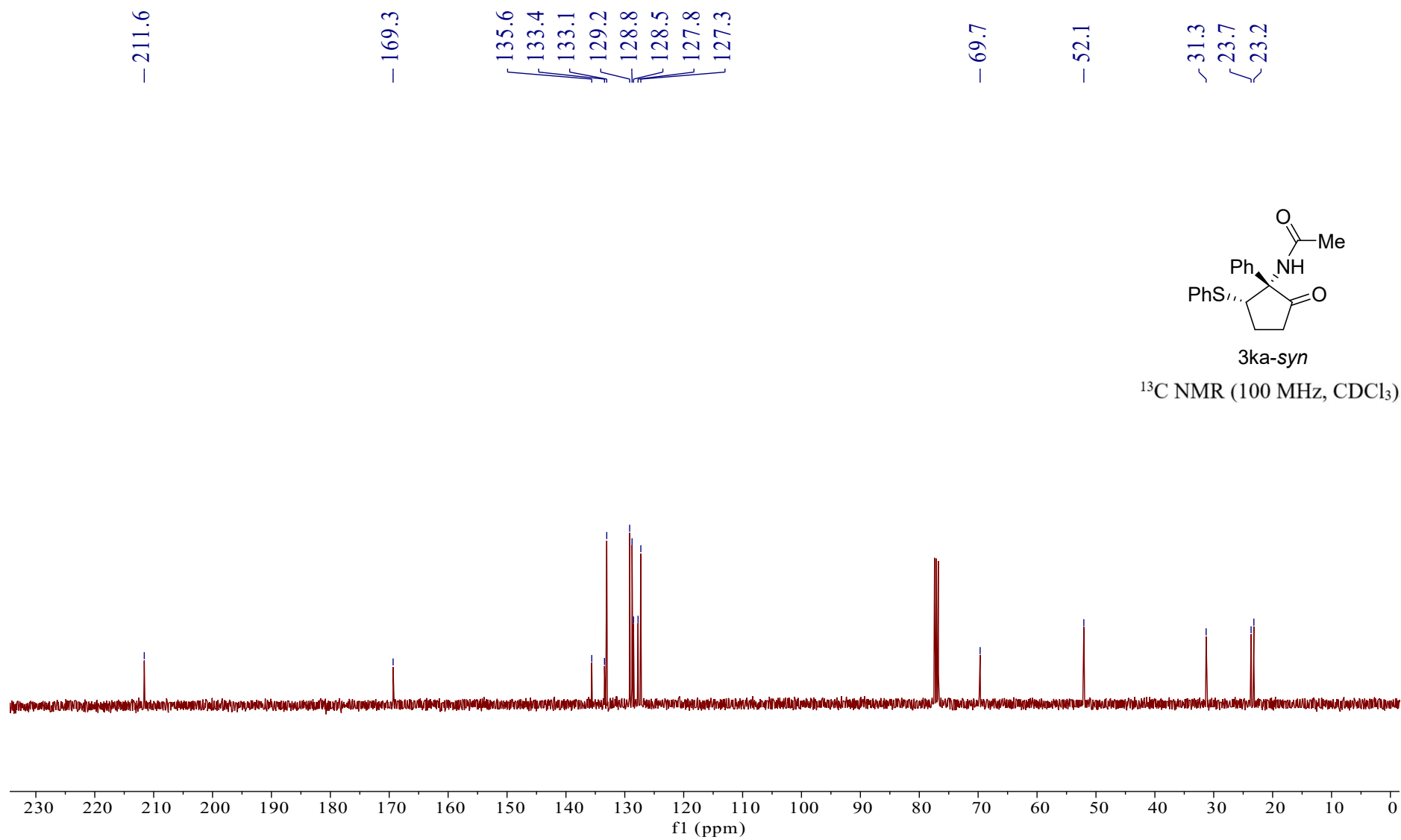


NMR-162

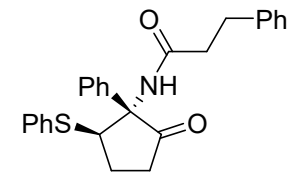
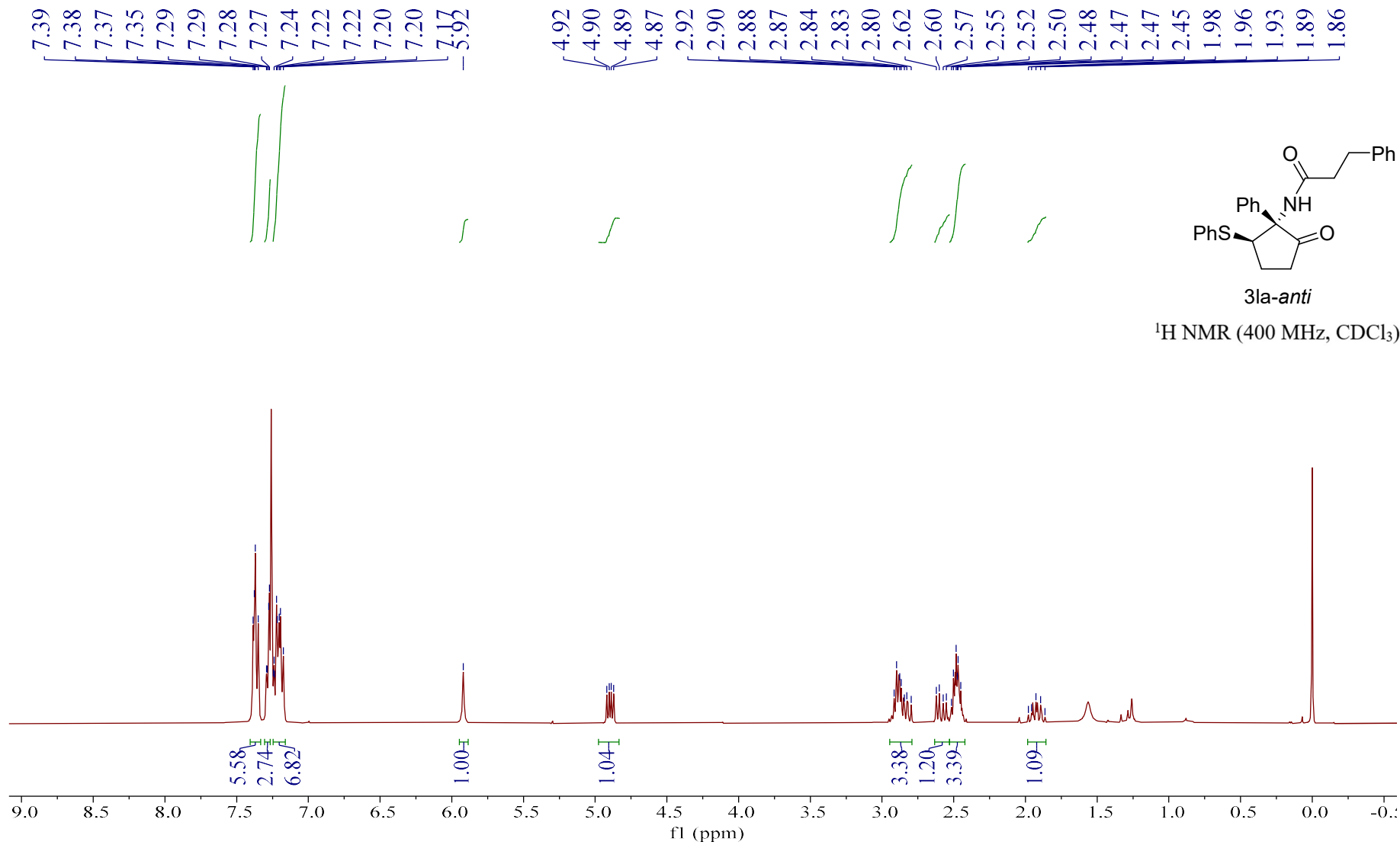


NMR-163



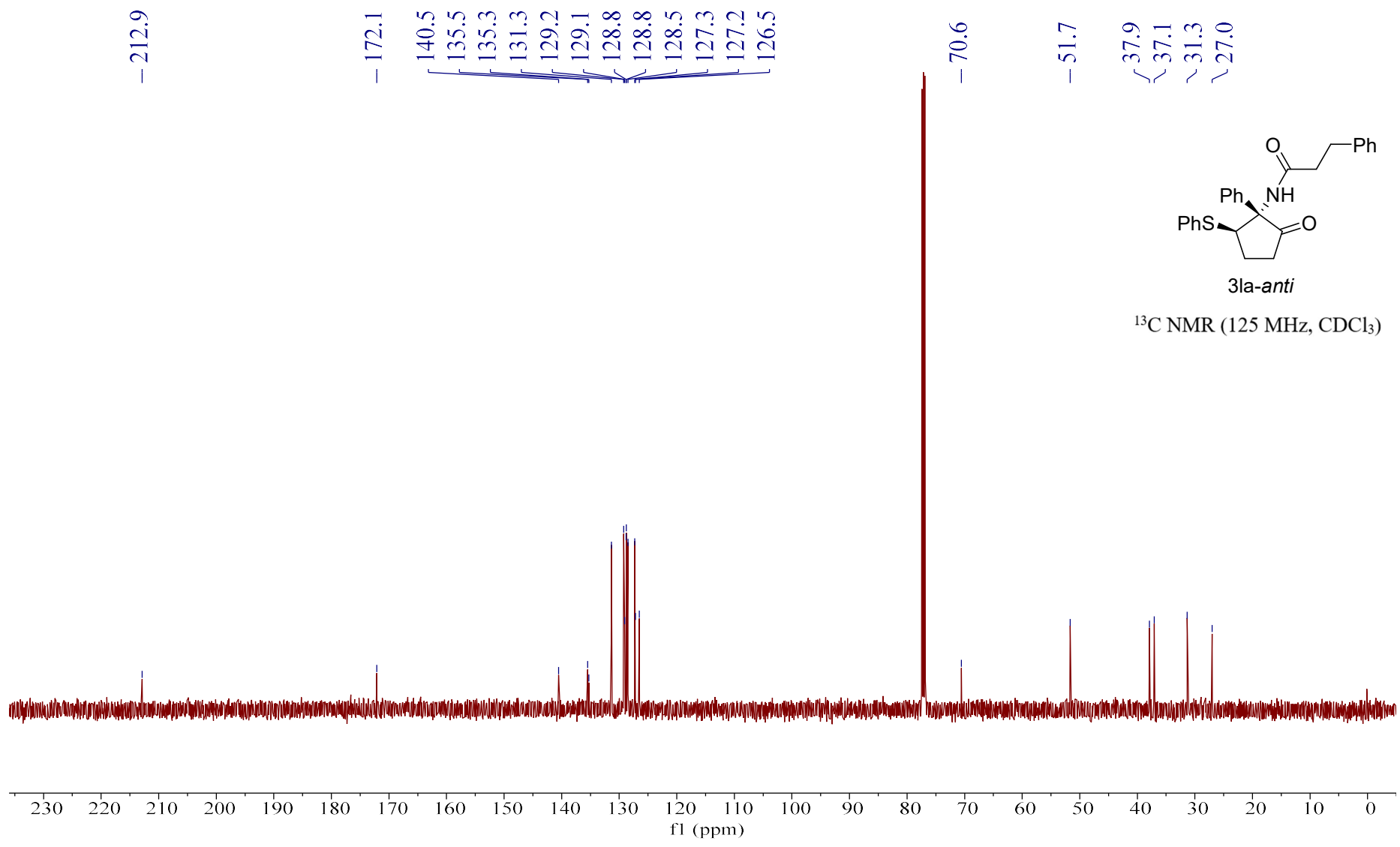


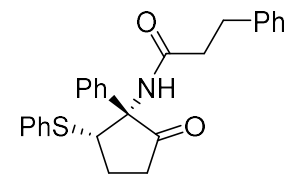
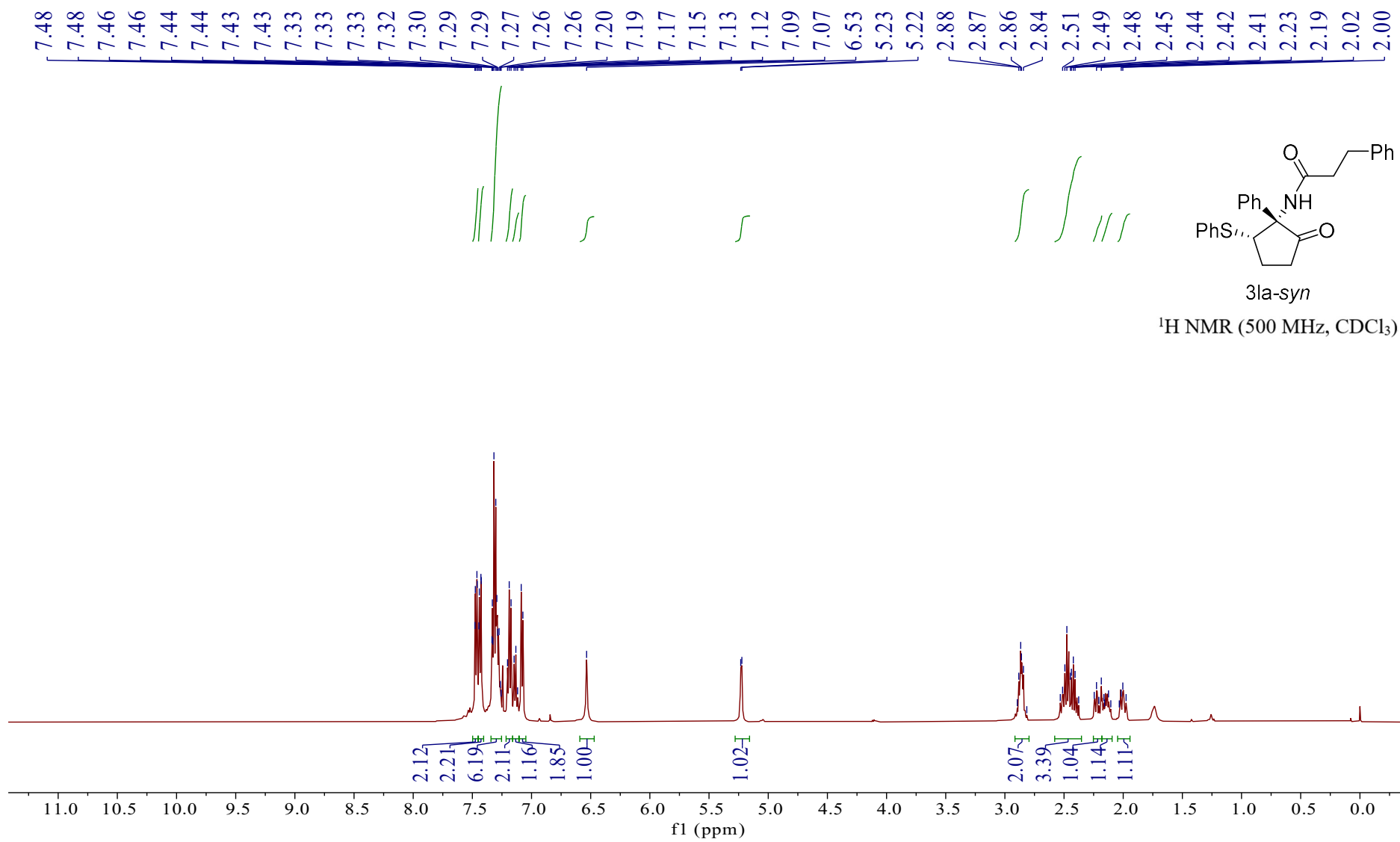
NMR-165



3la-anti

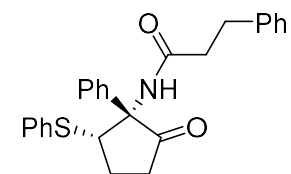
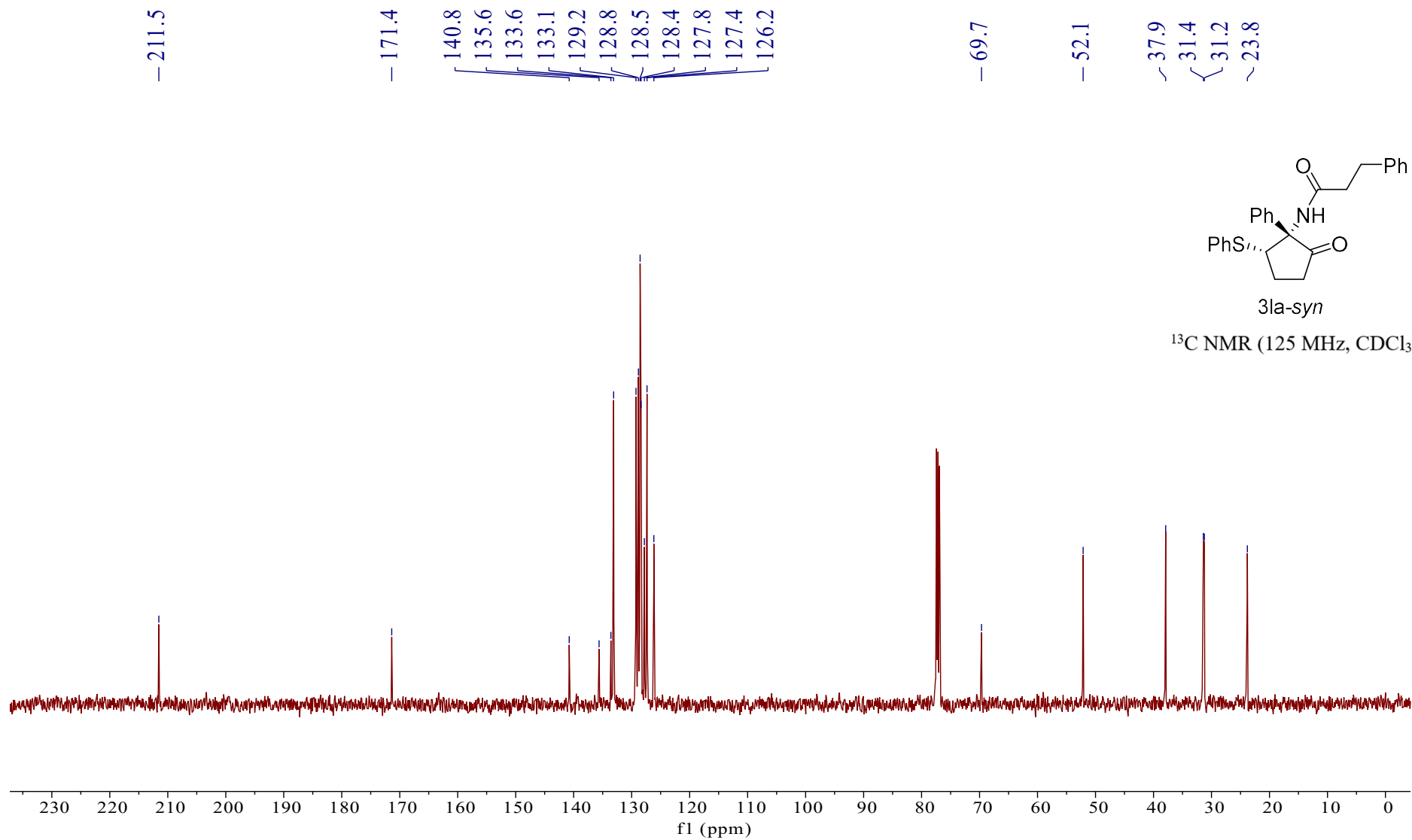
¹H NMR (400 MHz, CDCl₃)





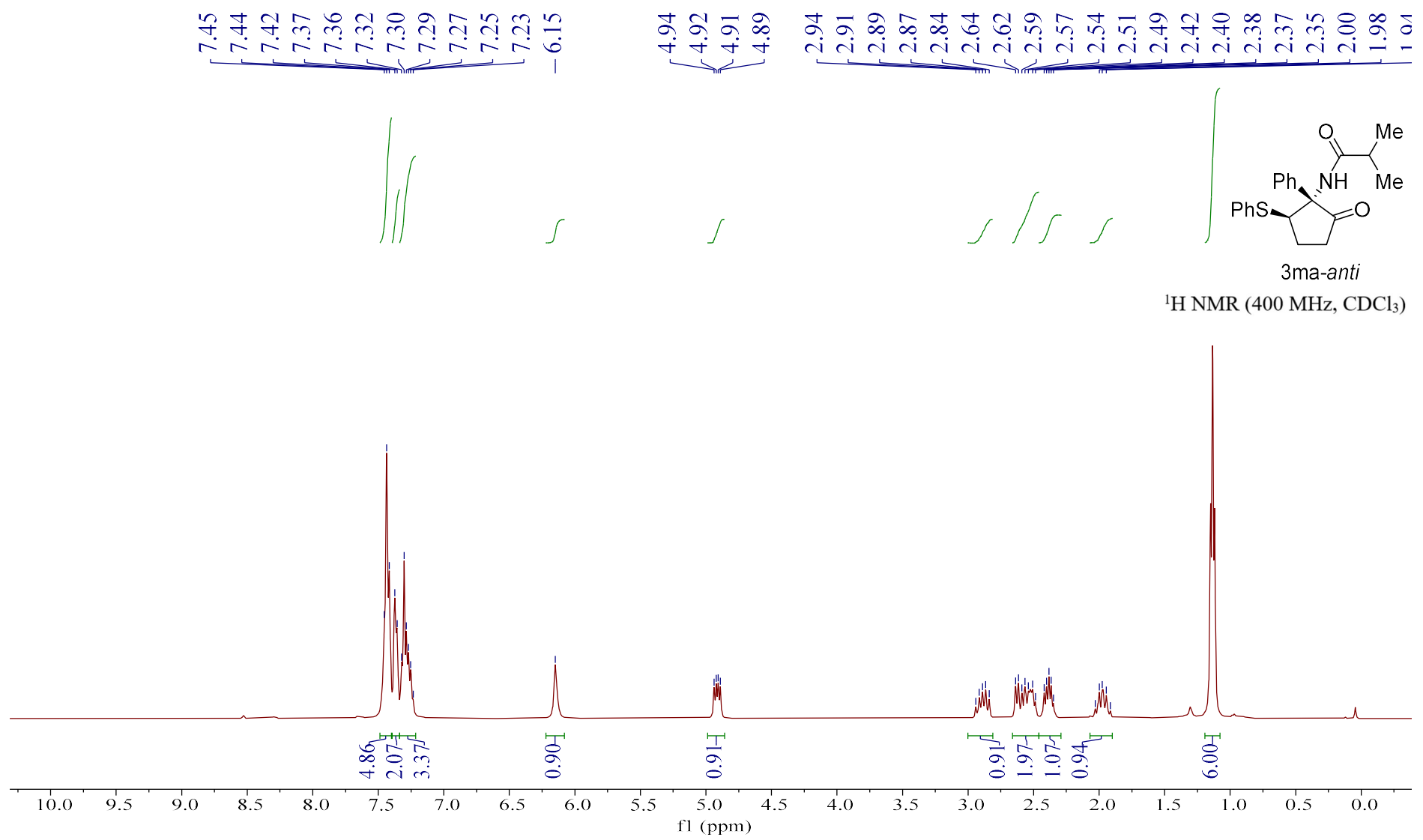
3la-syn

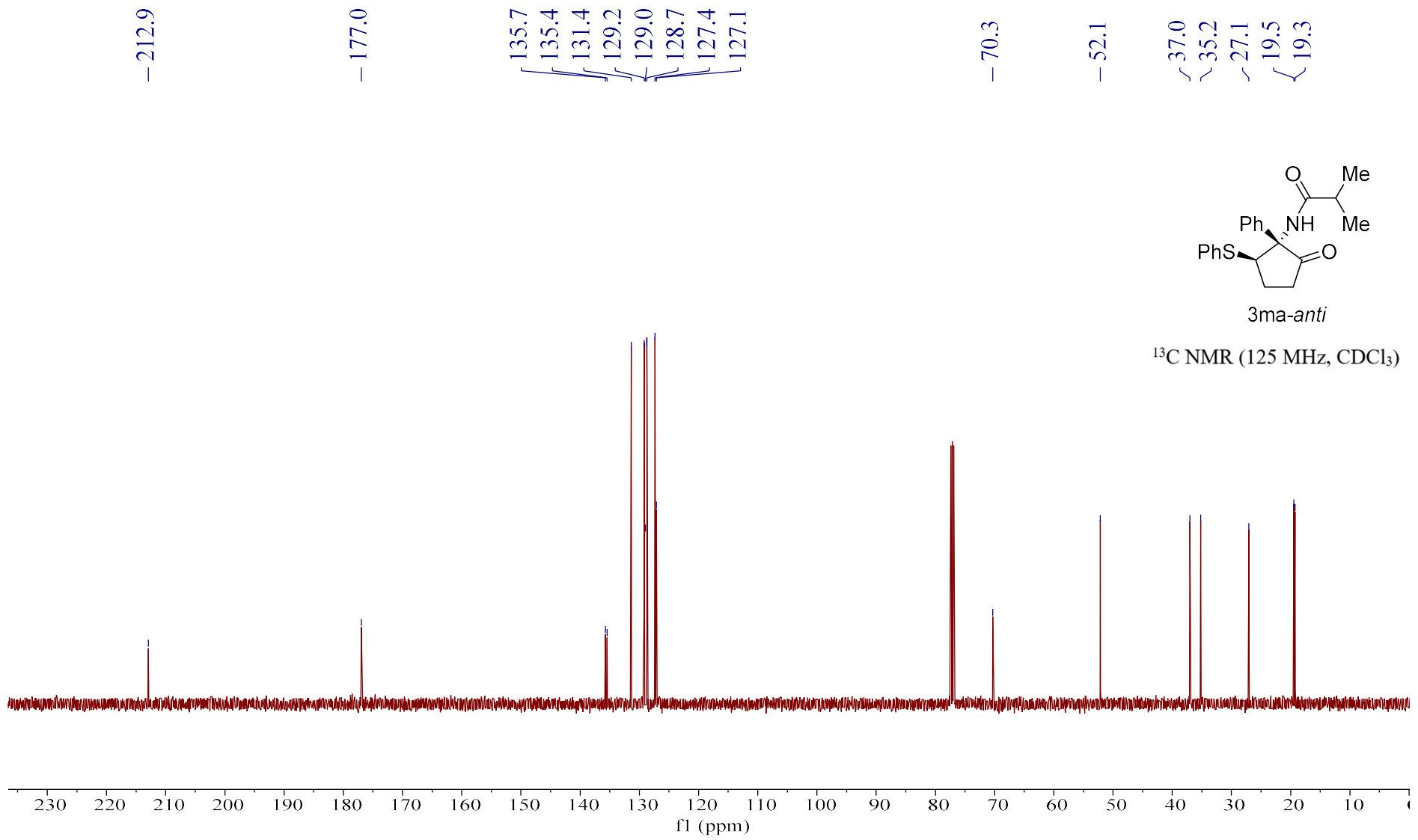
¹H NMR (500 MHz, CDCl₃)

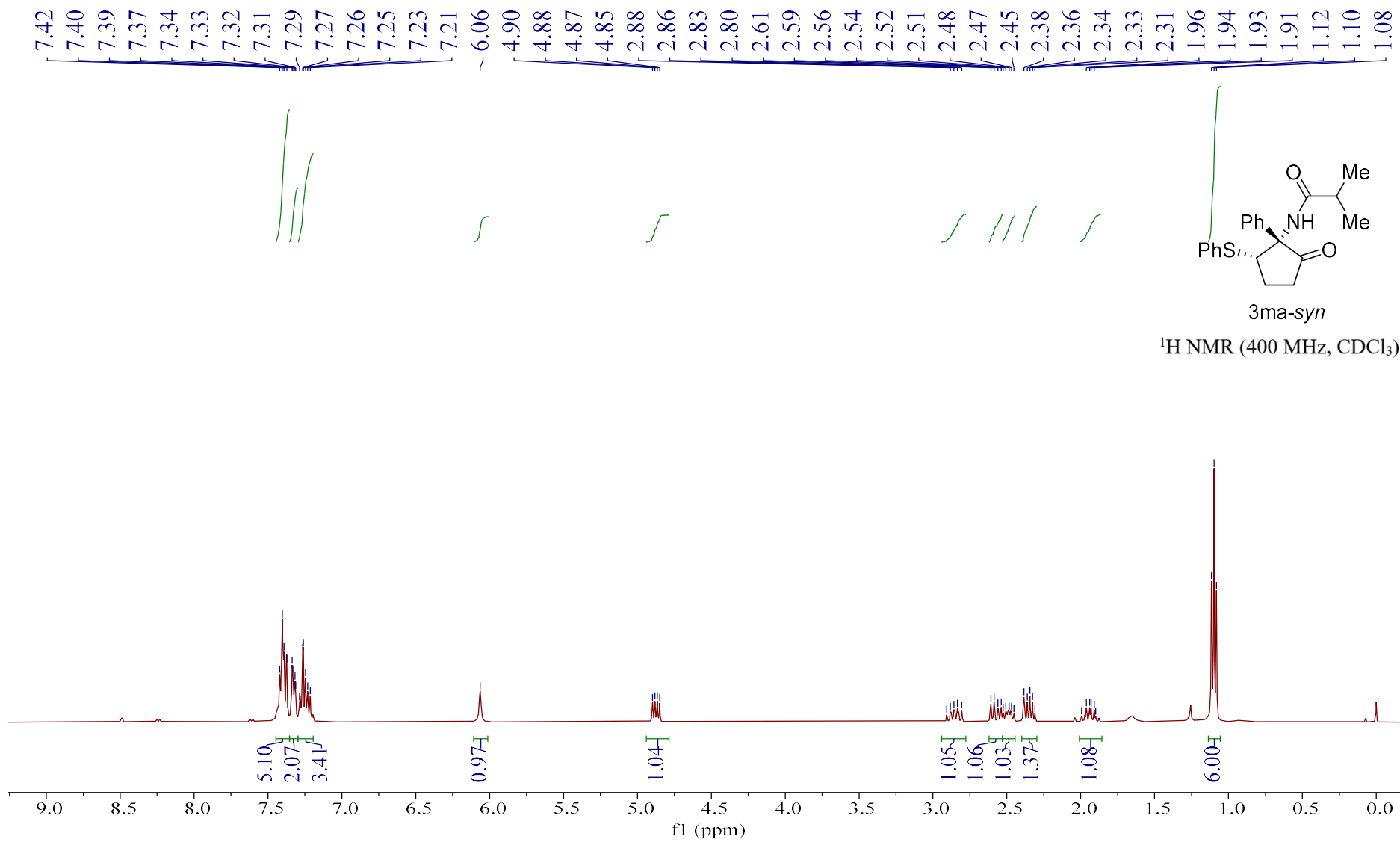


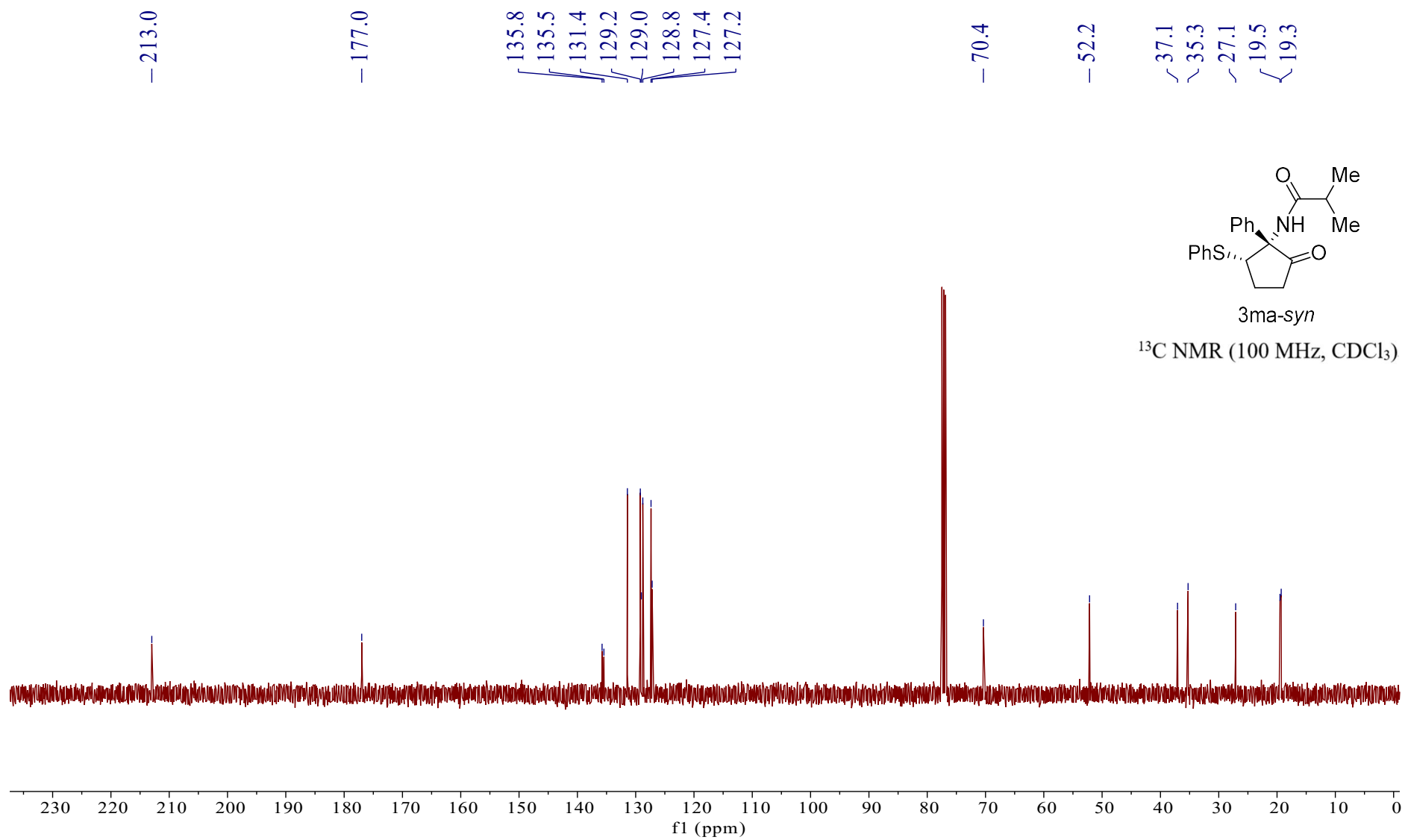
3la-syn

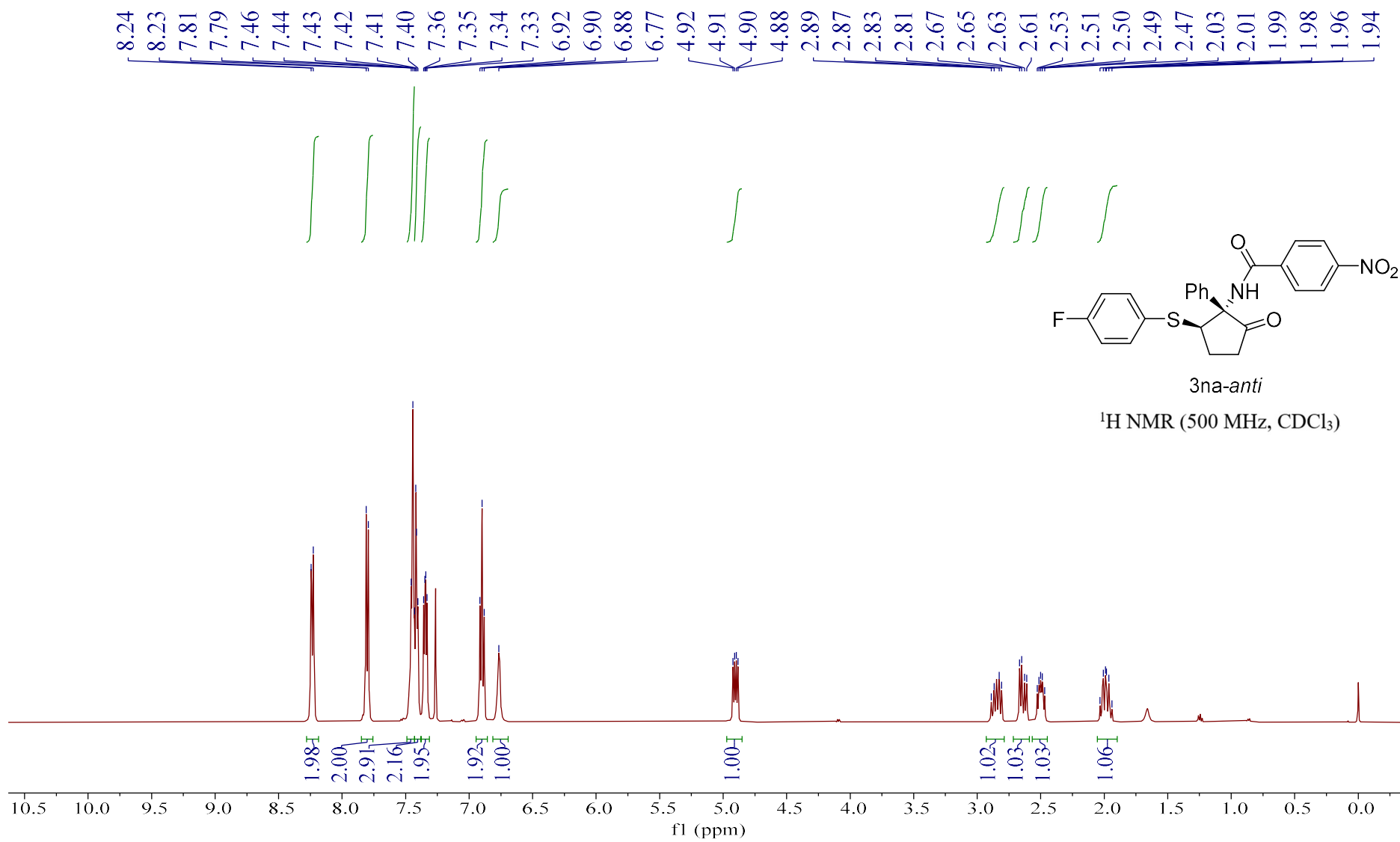
^{13}C NMR (125 MHz, CDCl_3)

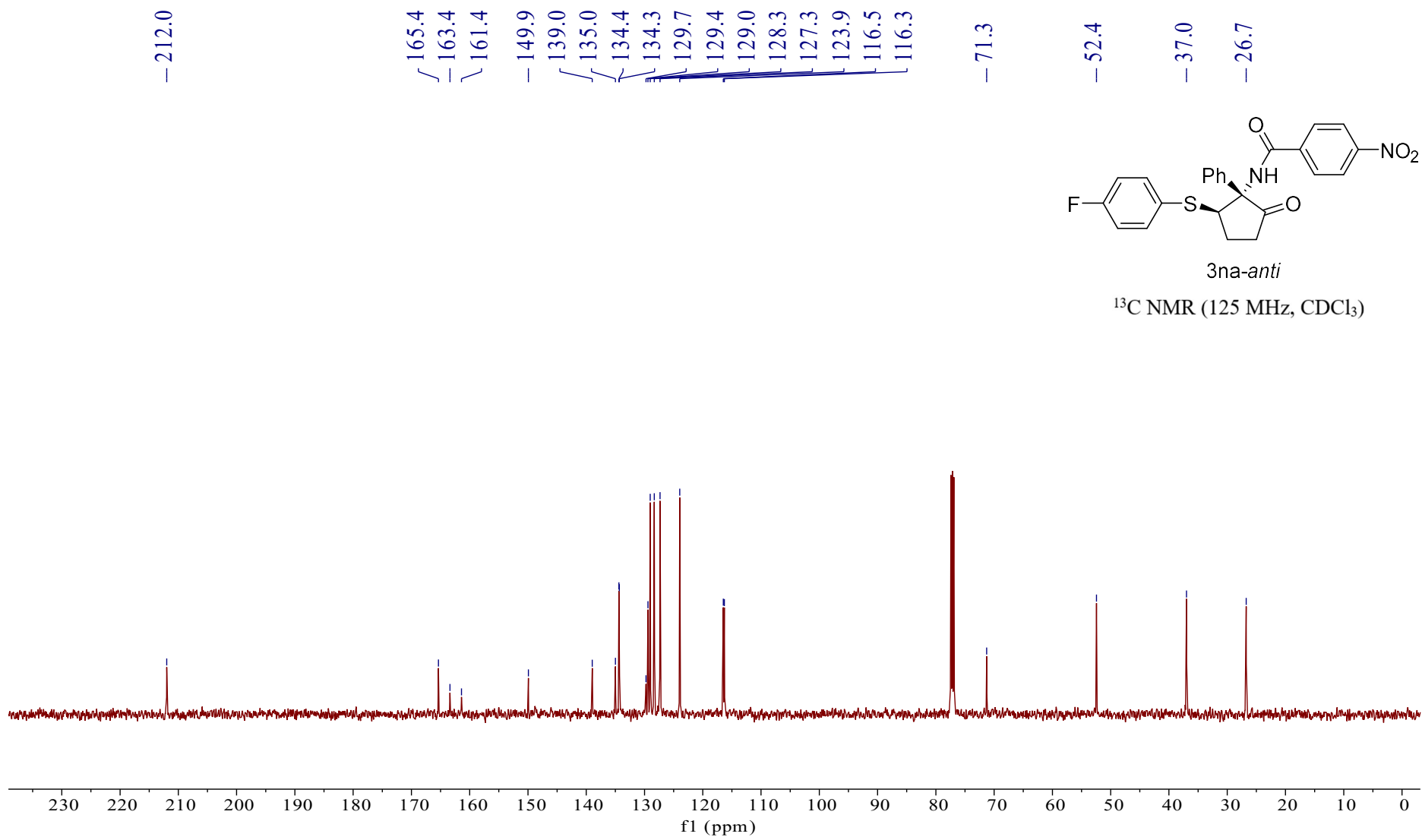




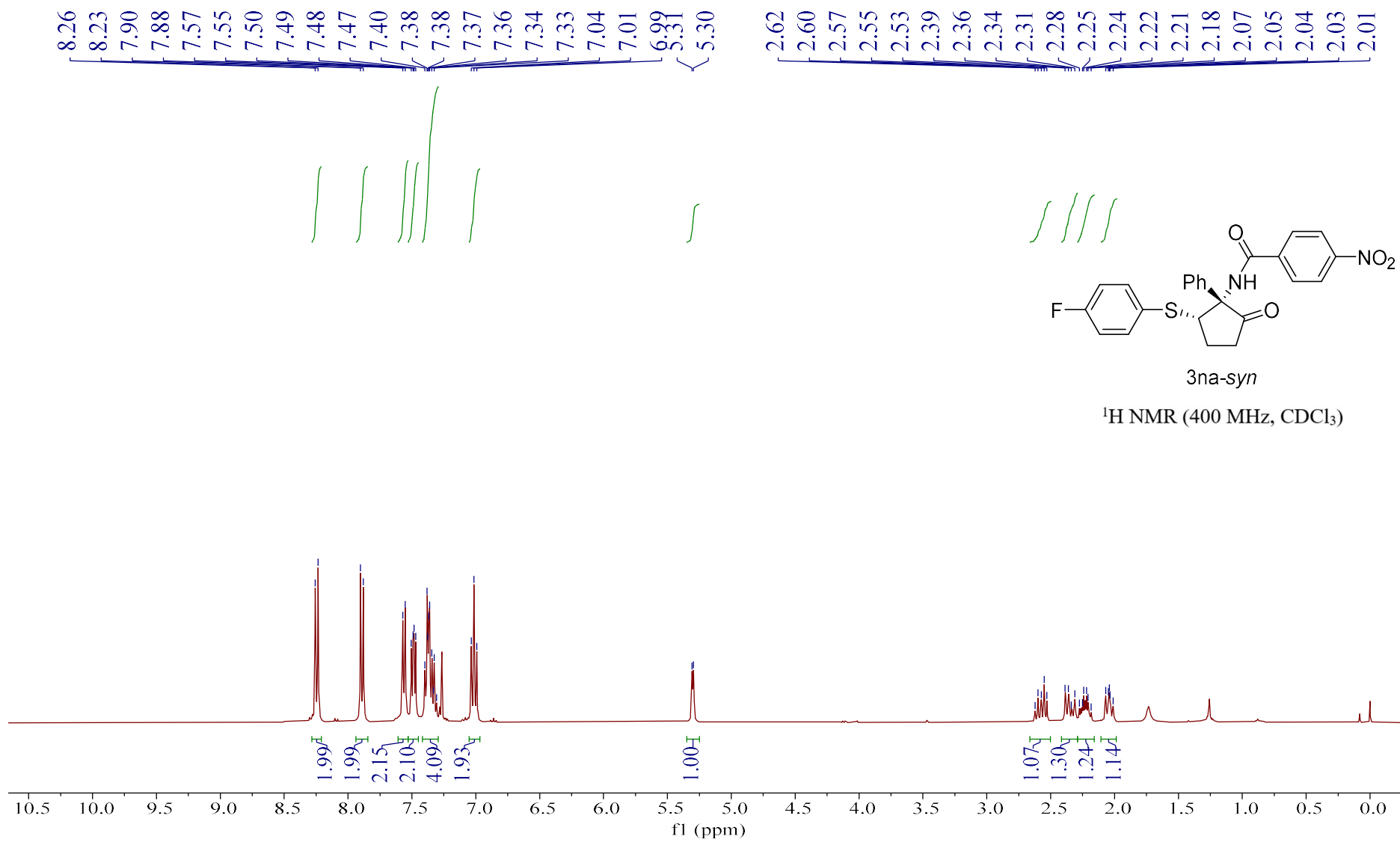


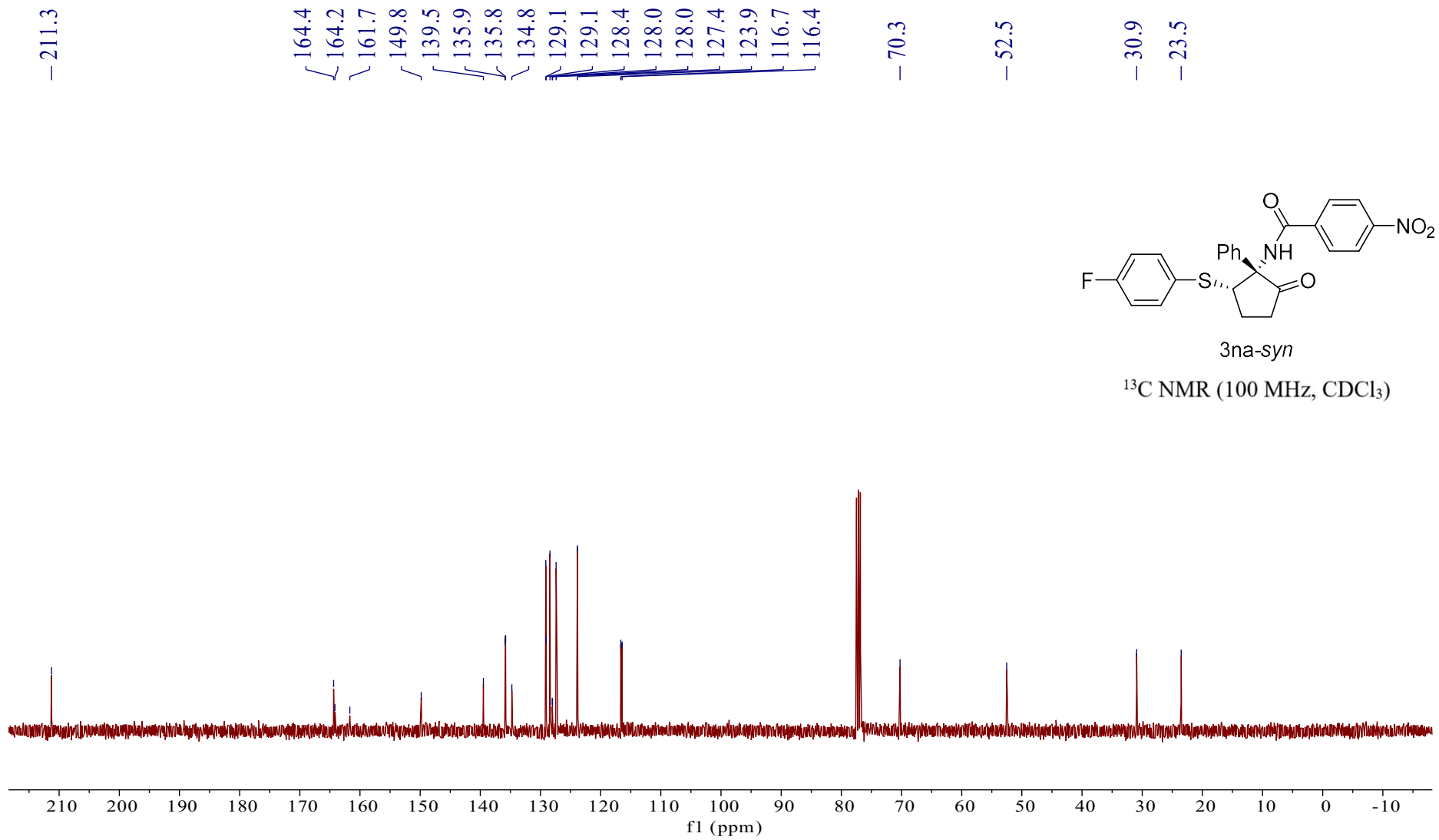


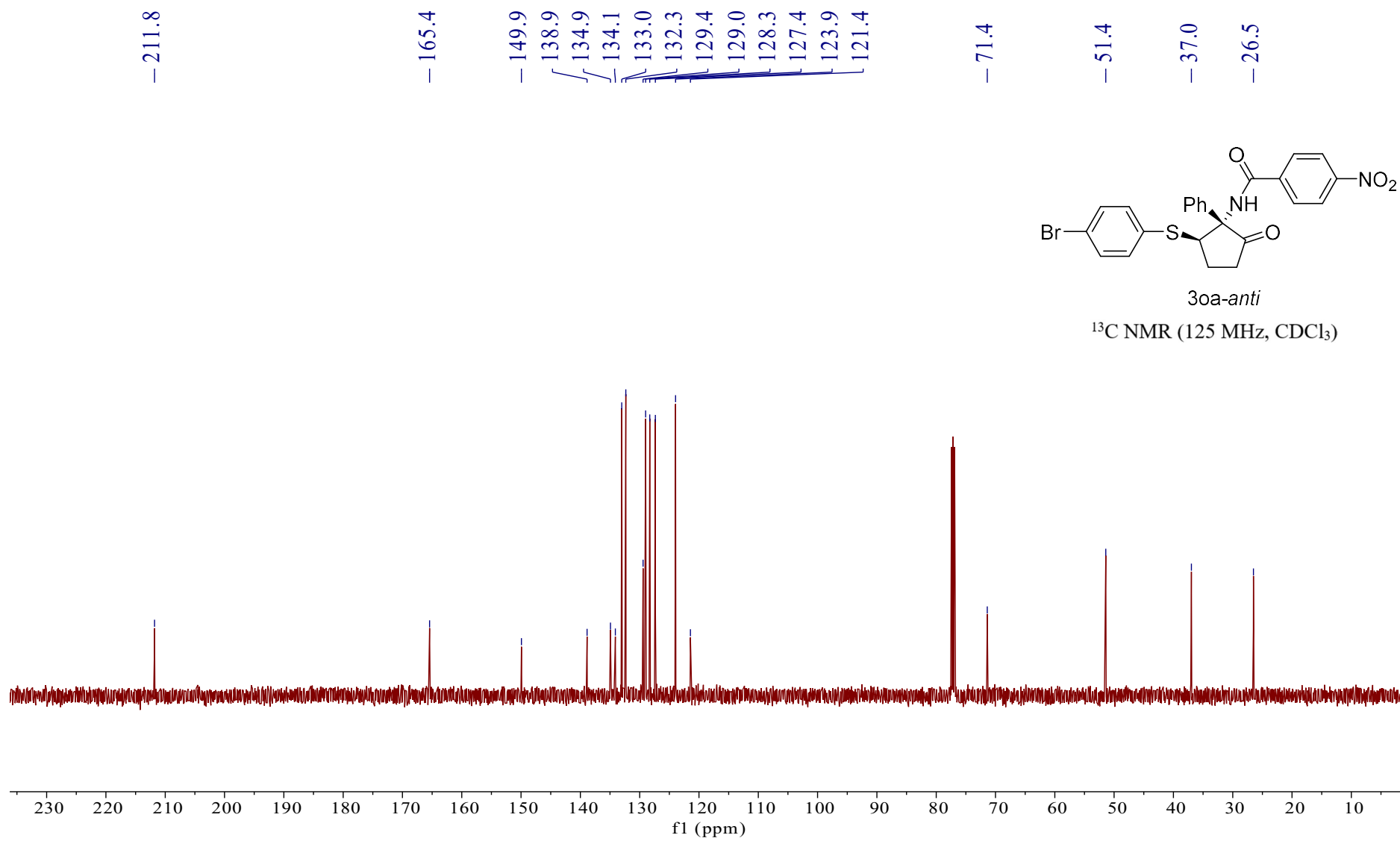


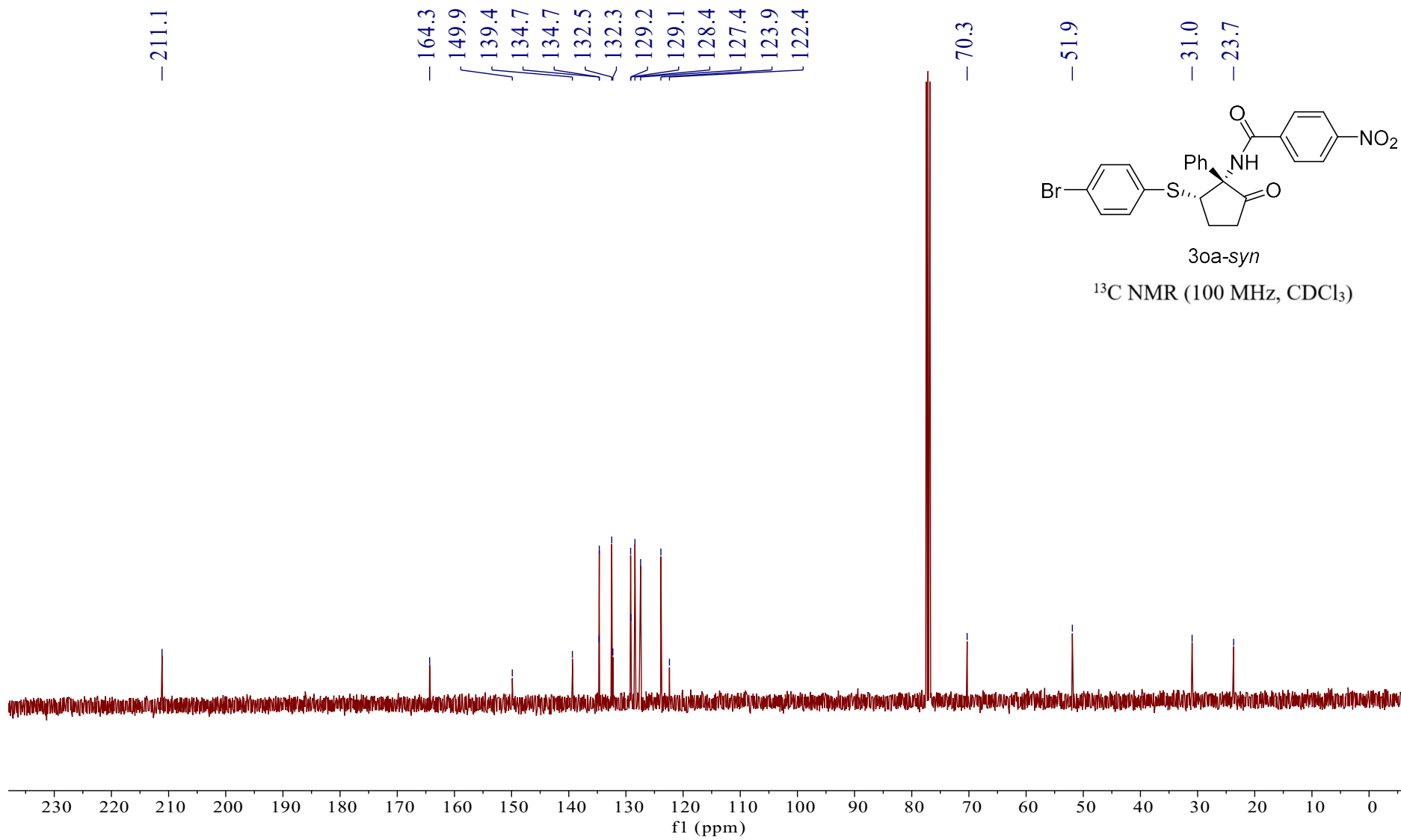


NMR-175

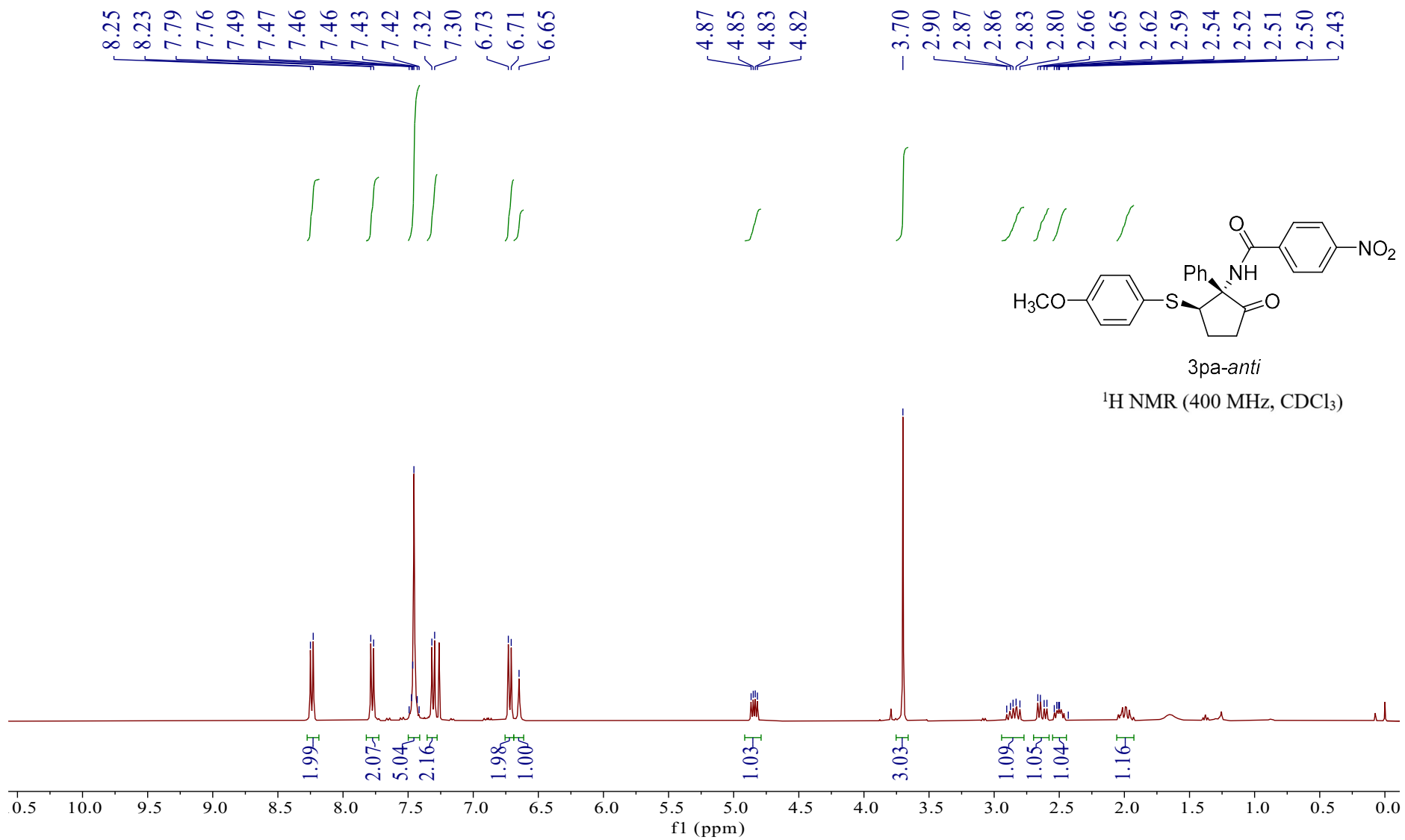


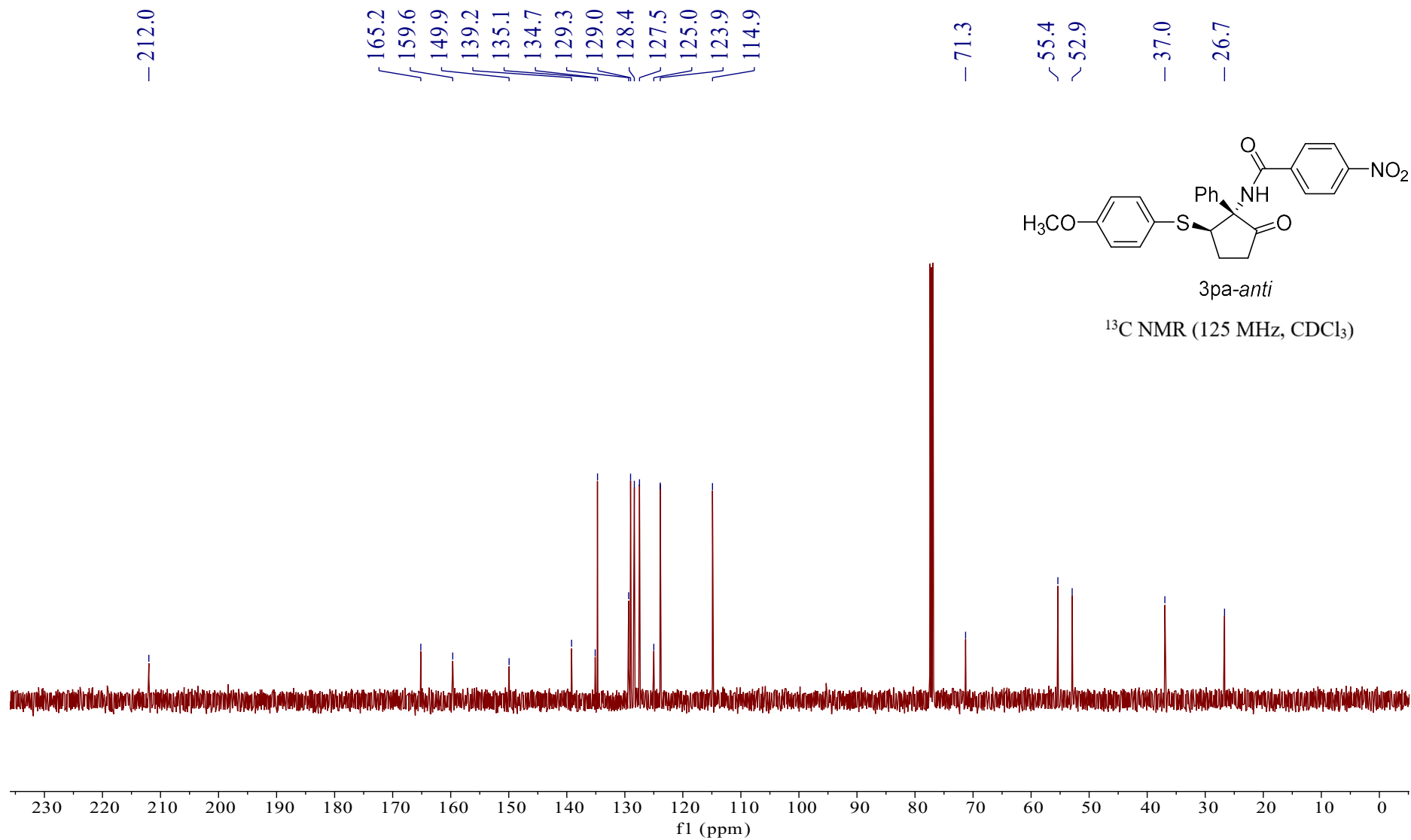




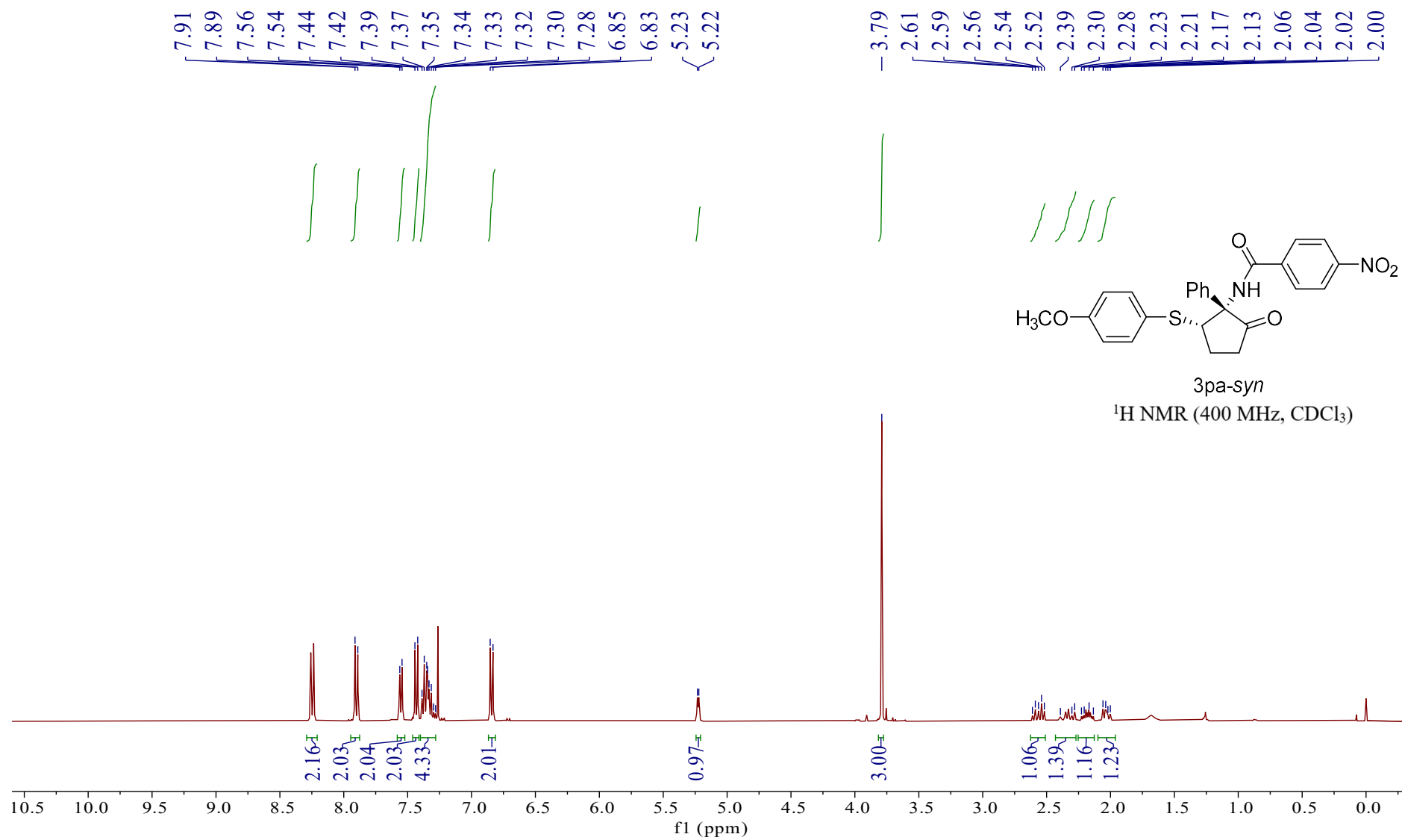


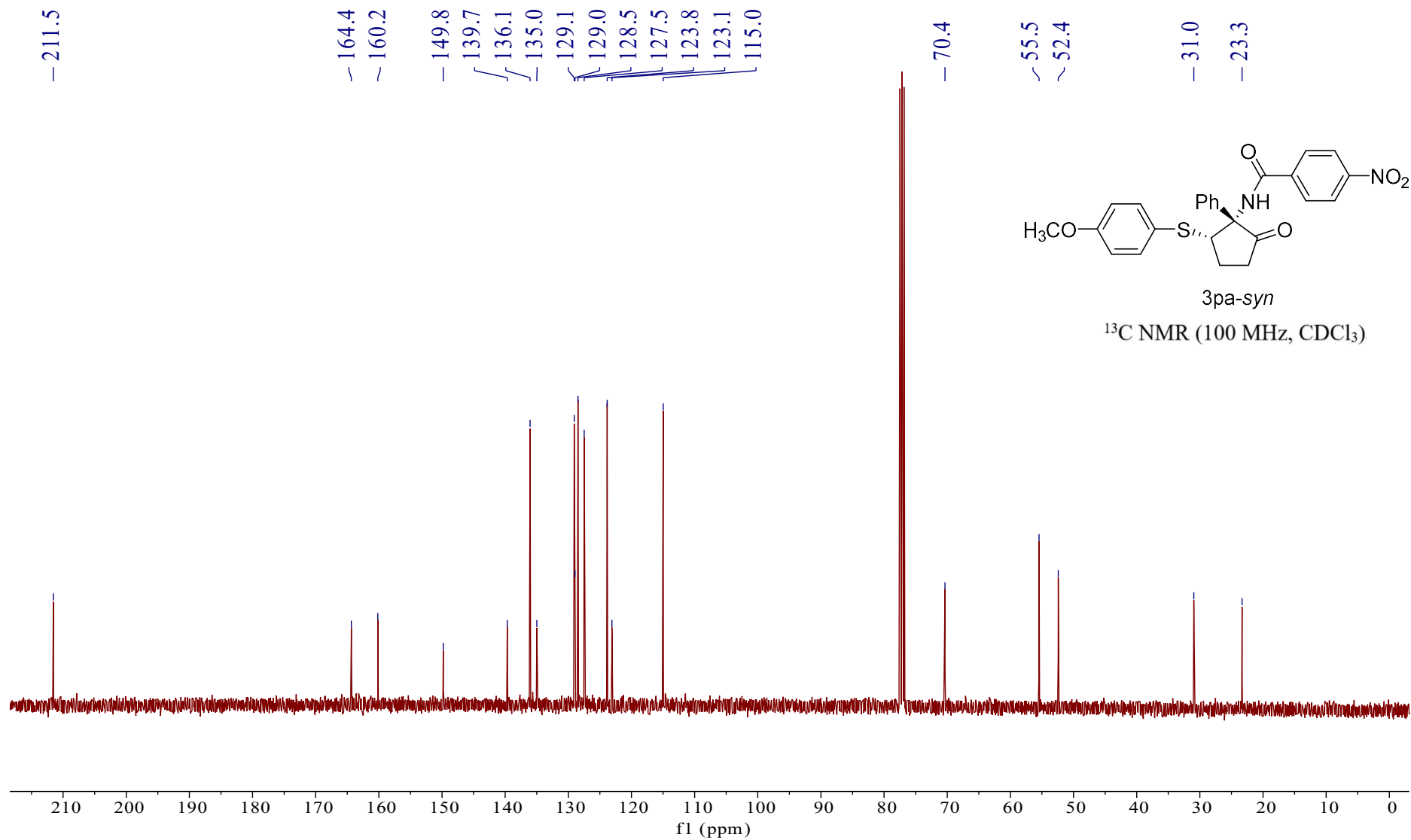
NMR-181

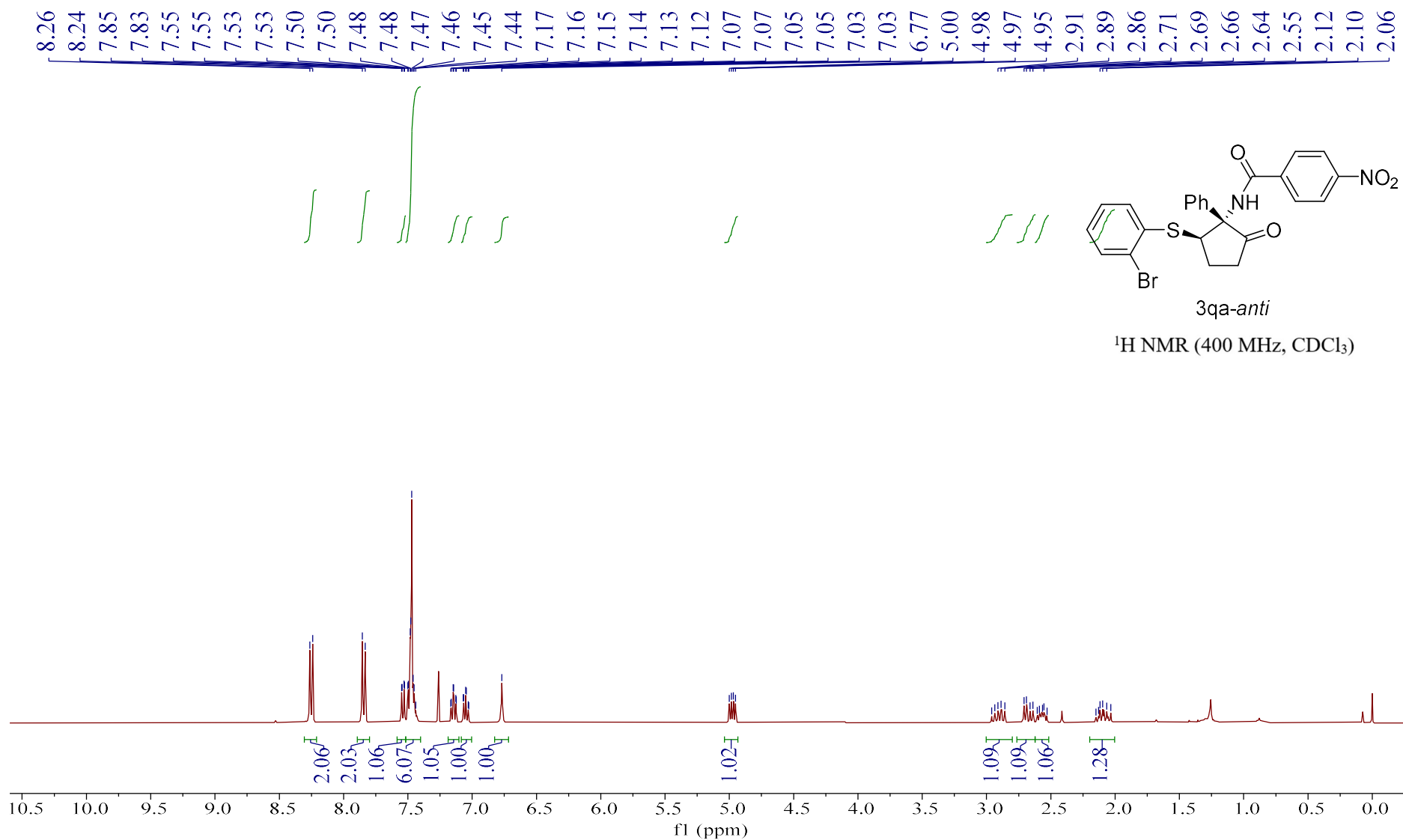




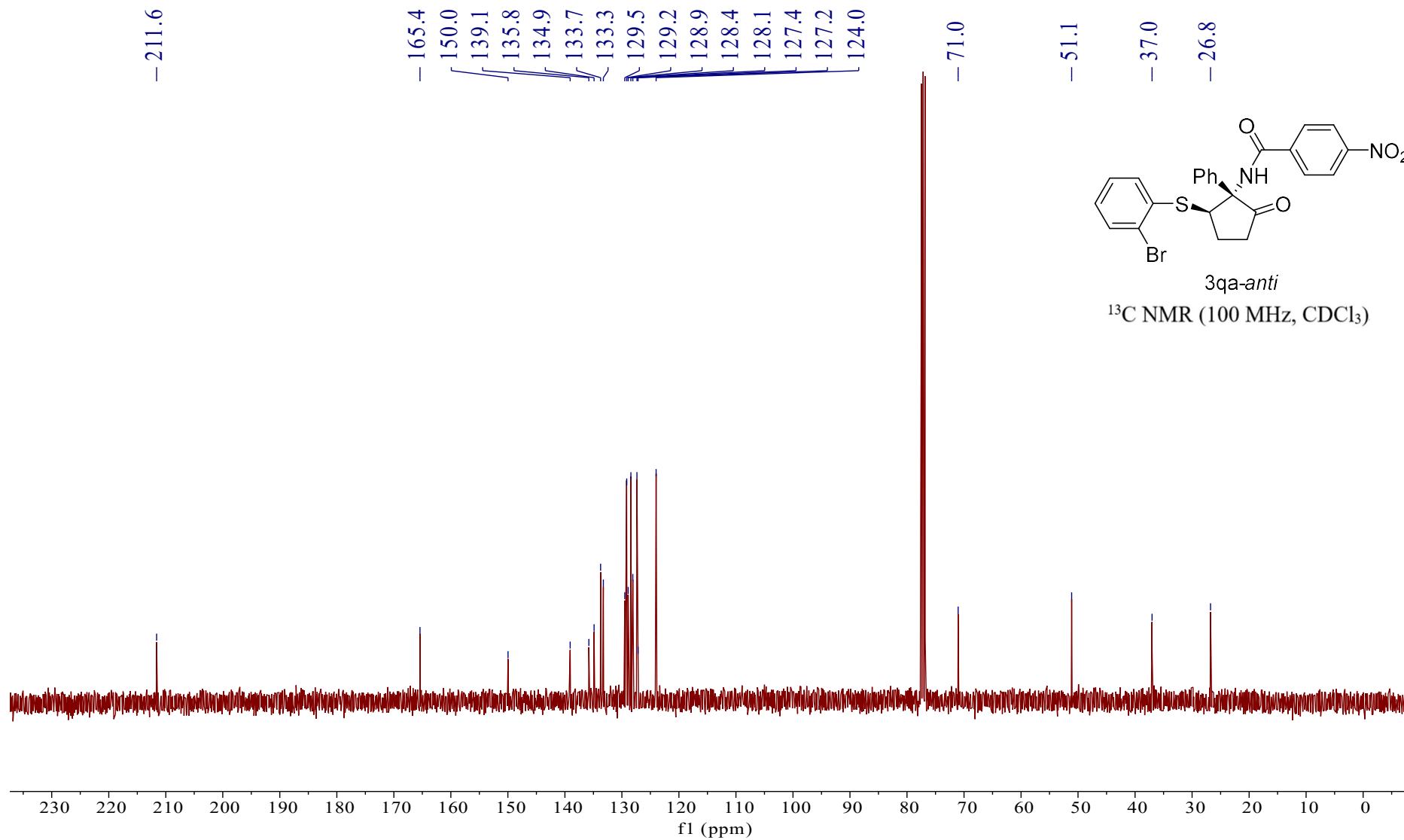
NMR-183

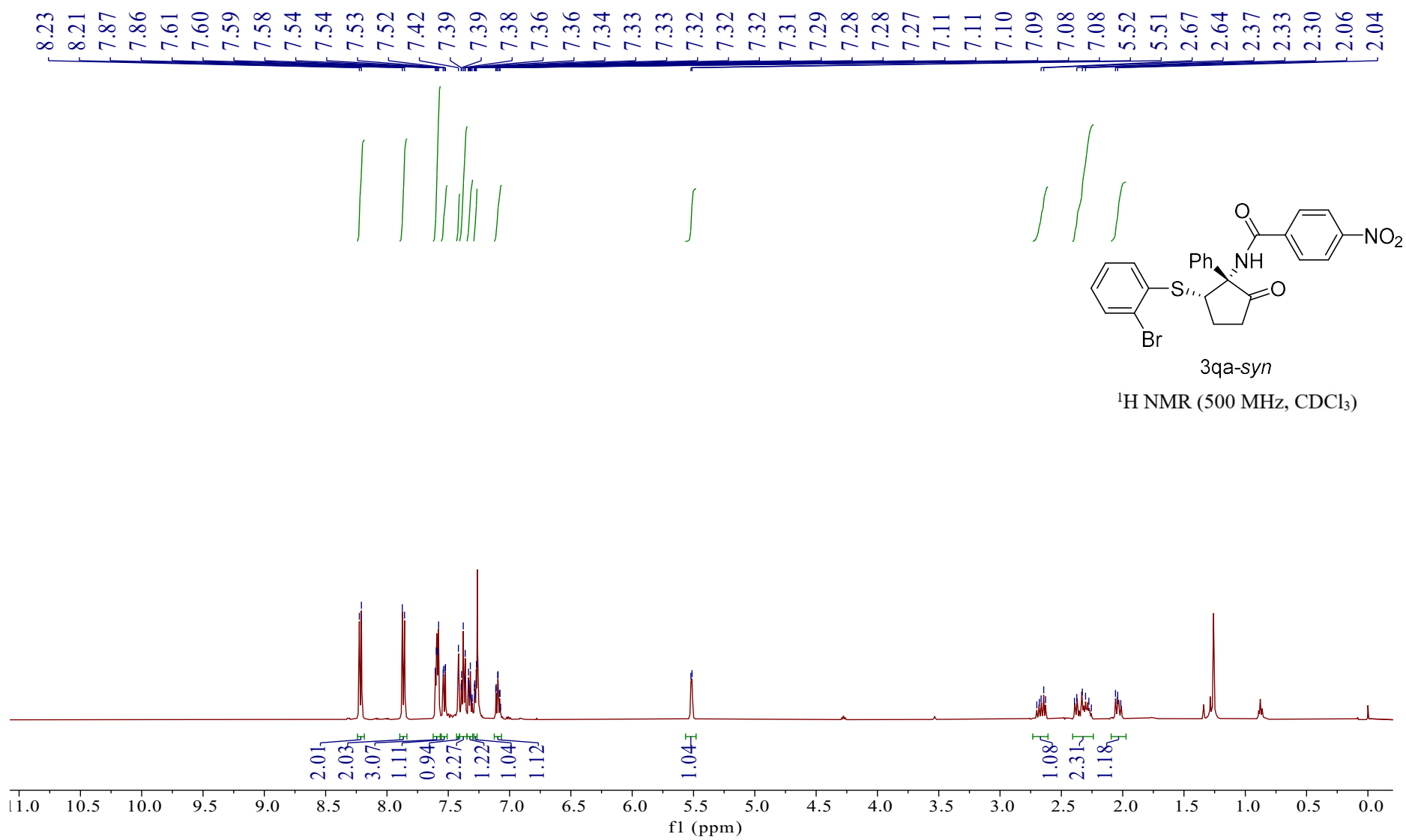


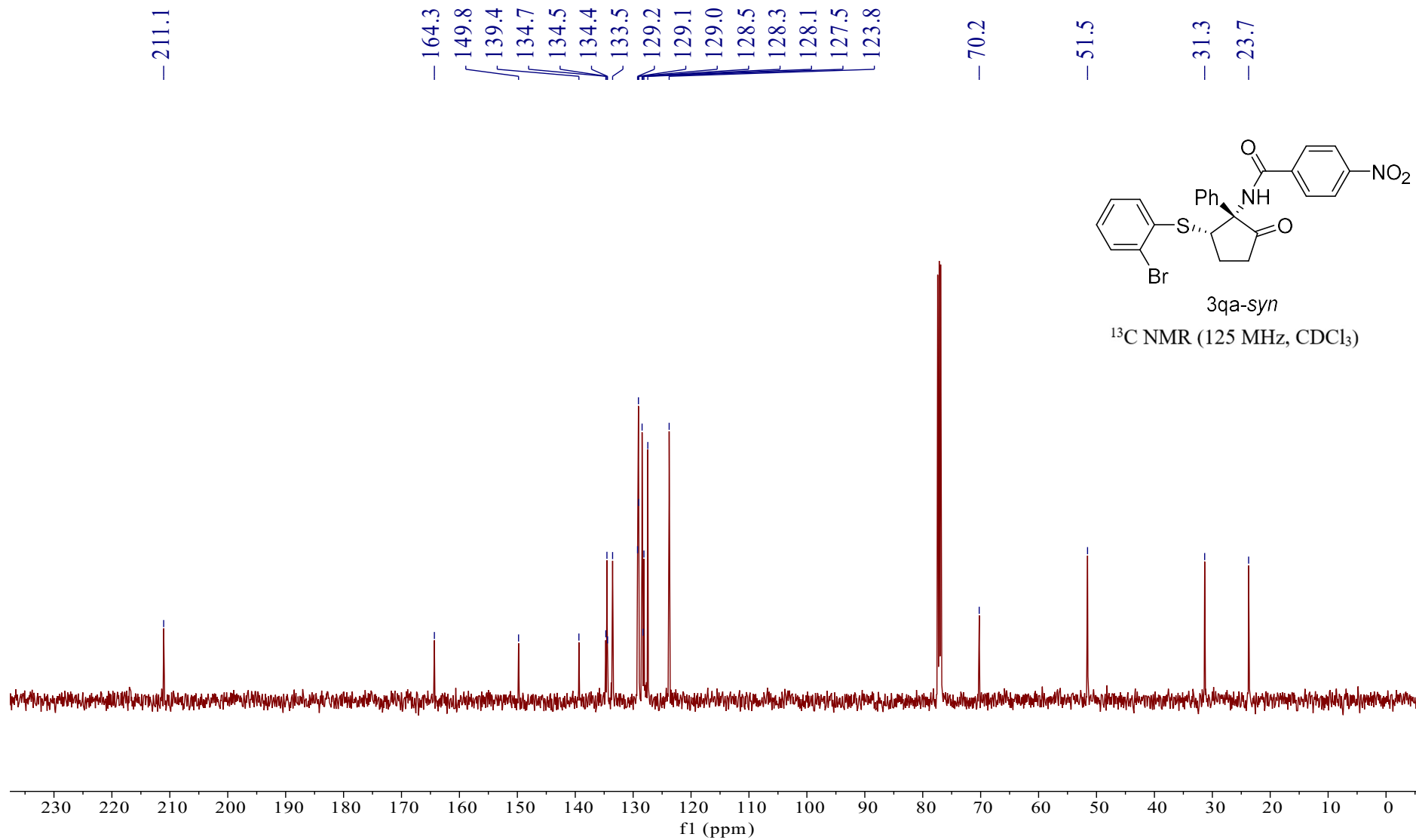




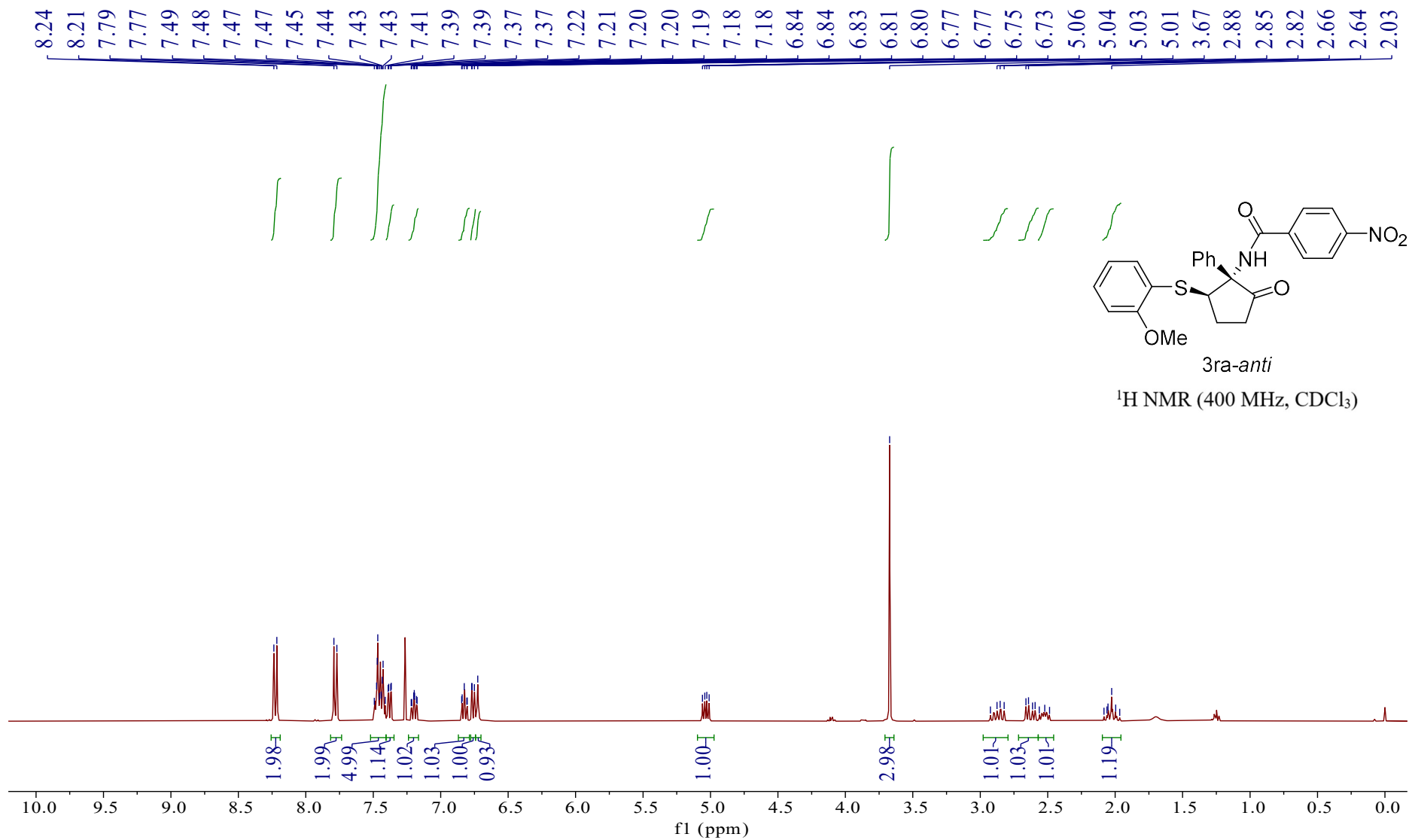
NMR-186



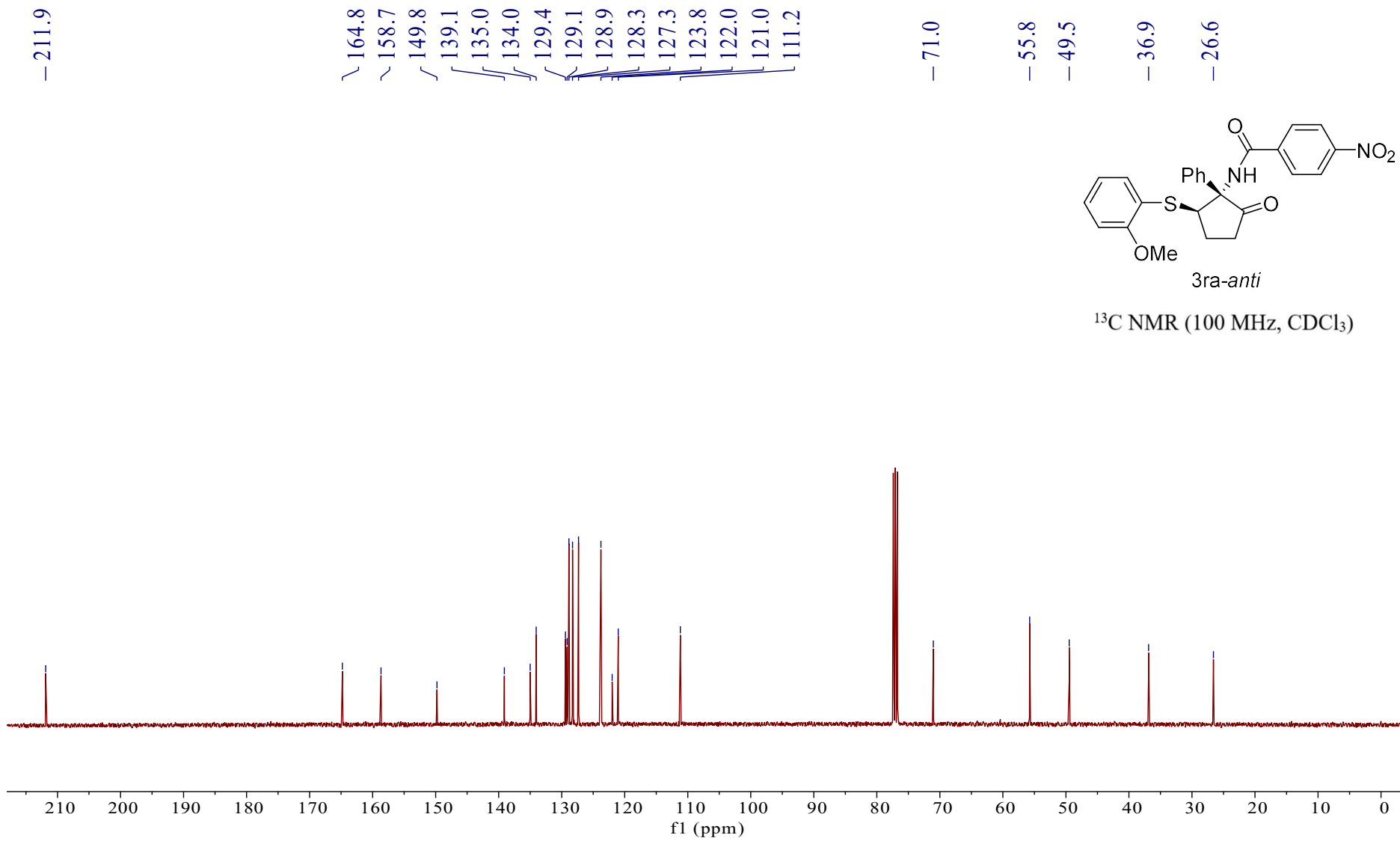




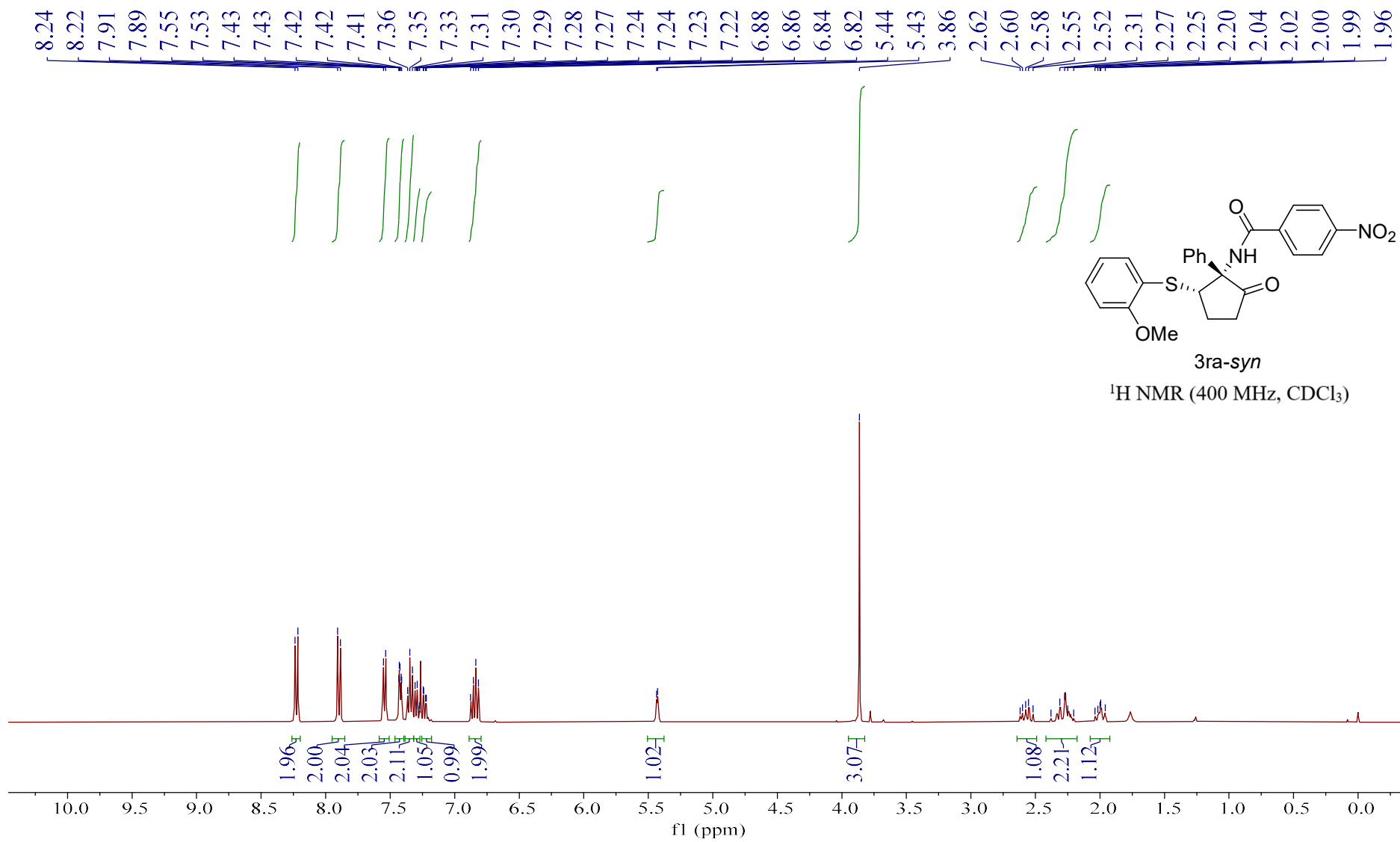
NMR-189

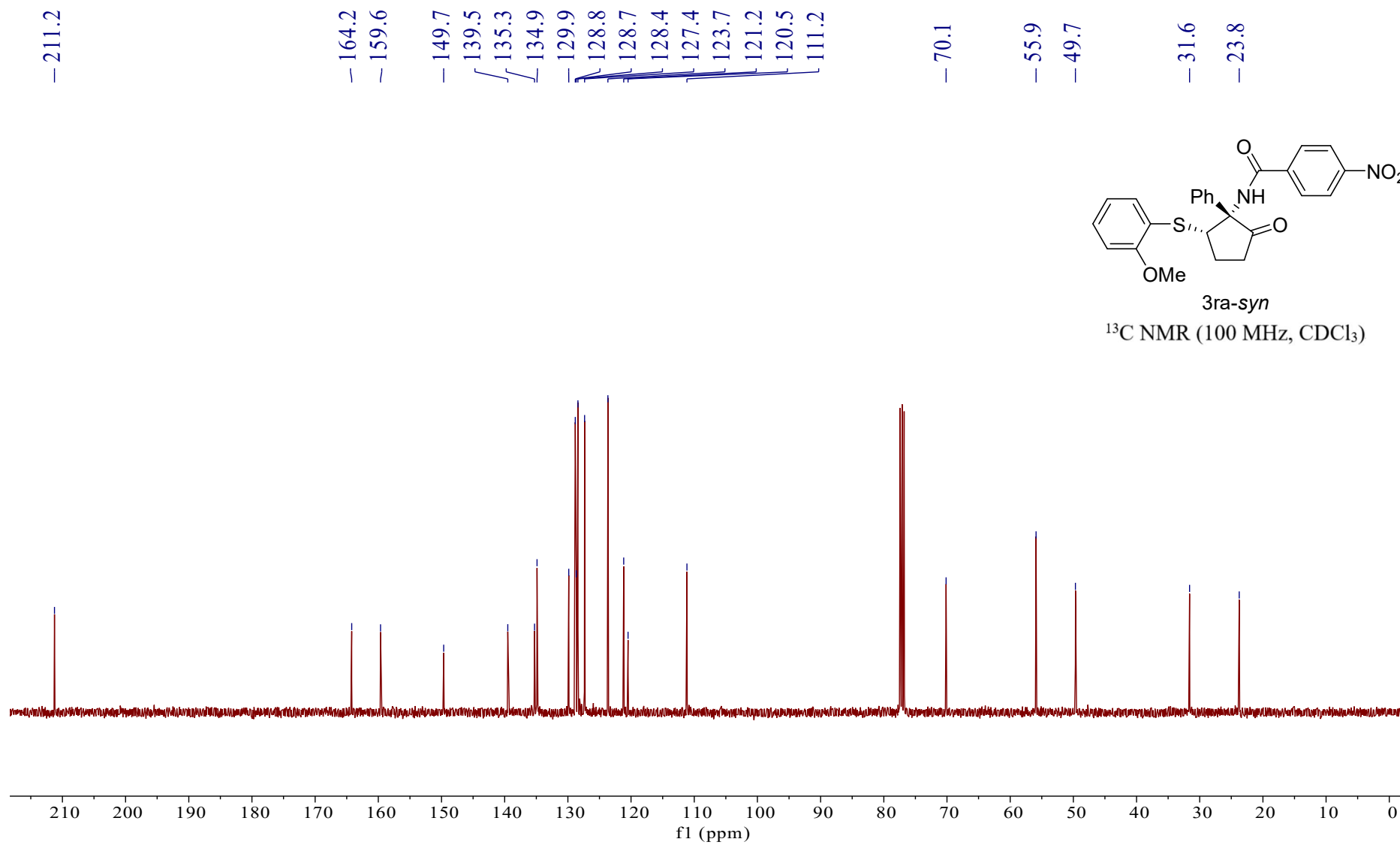


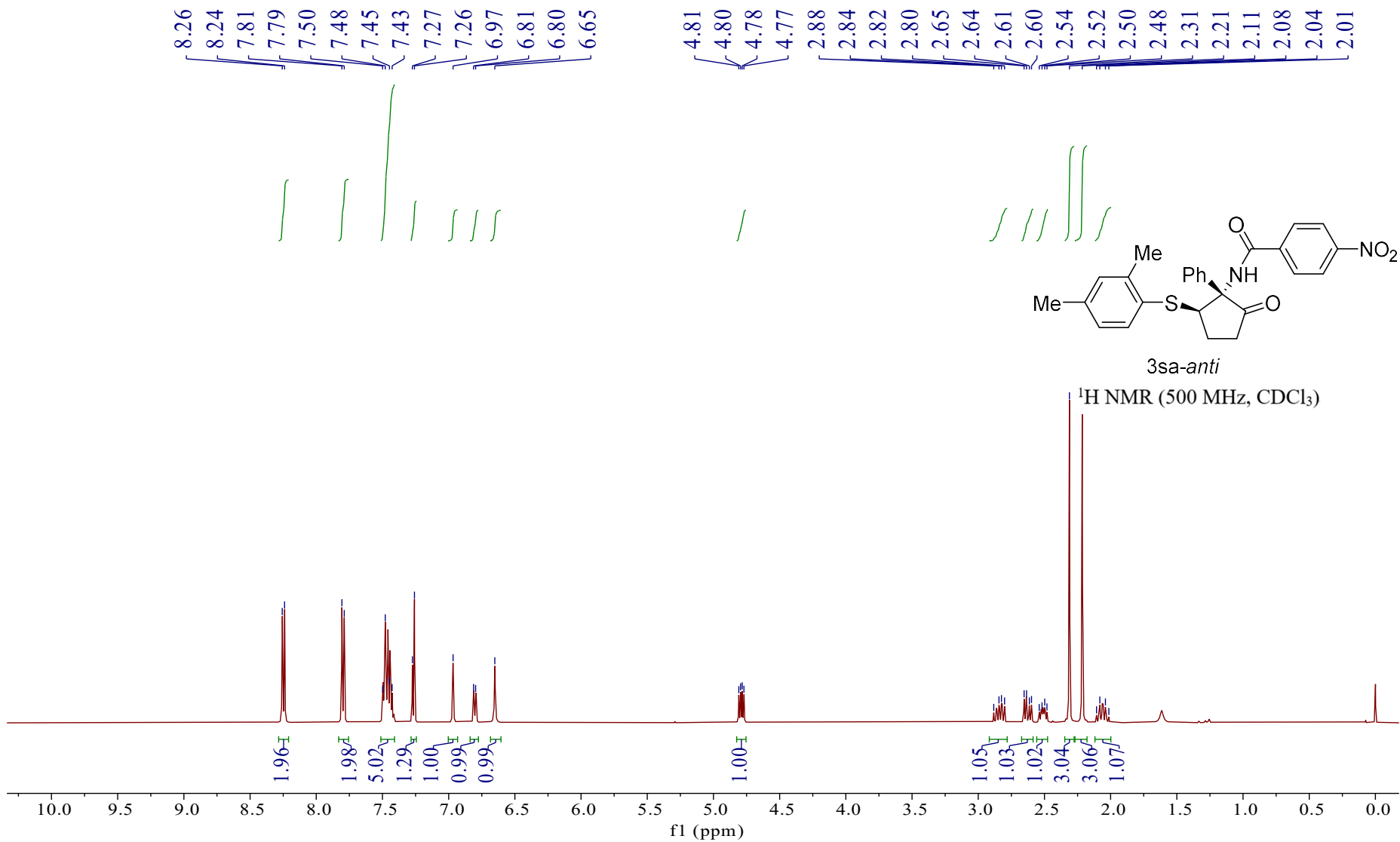
NMR-190



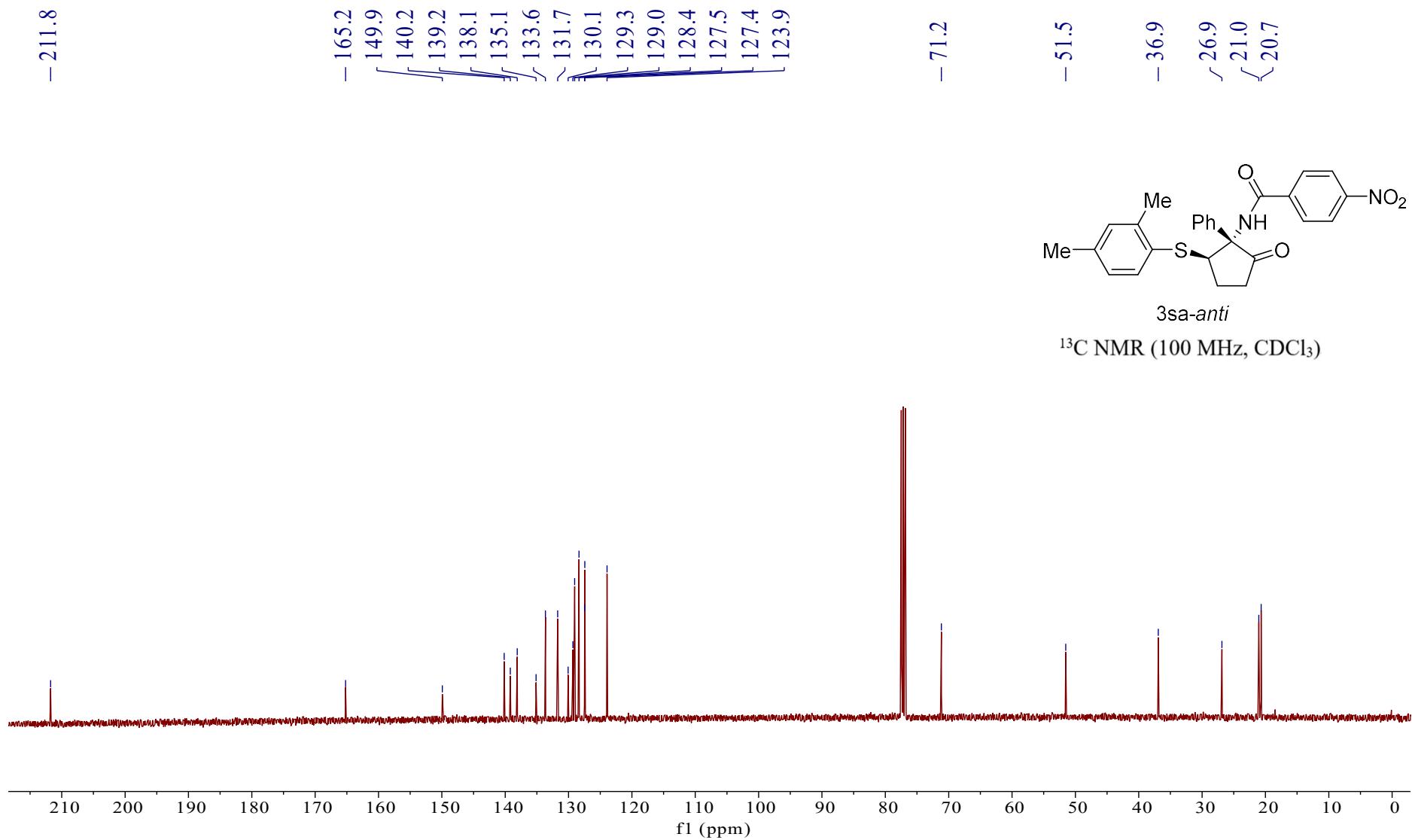
NMR-191



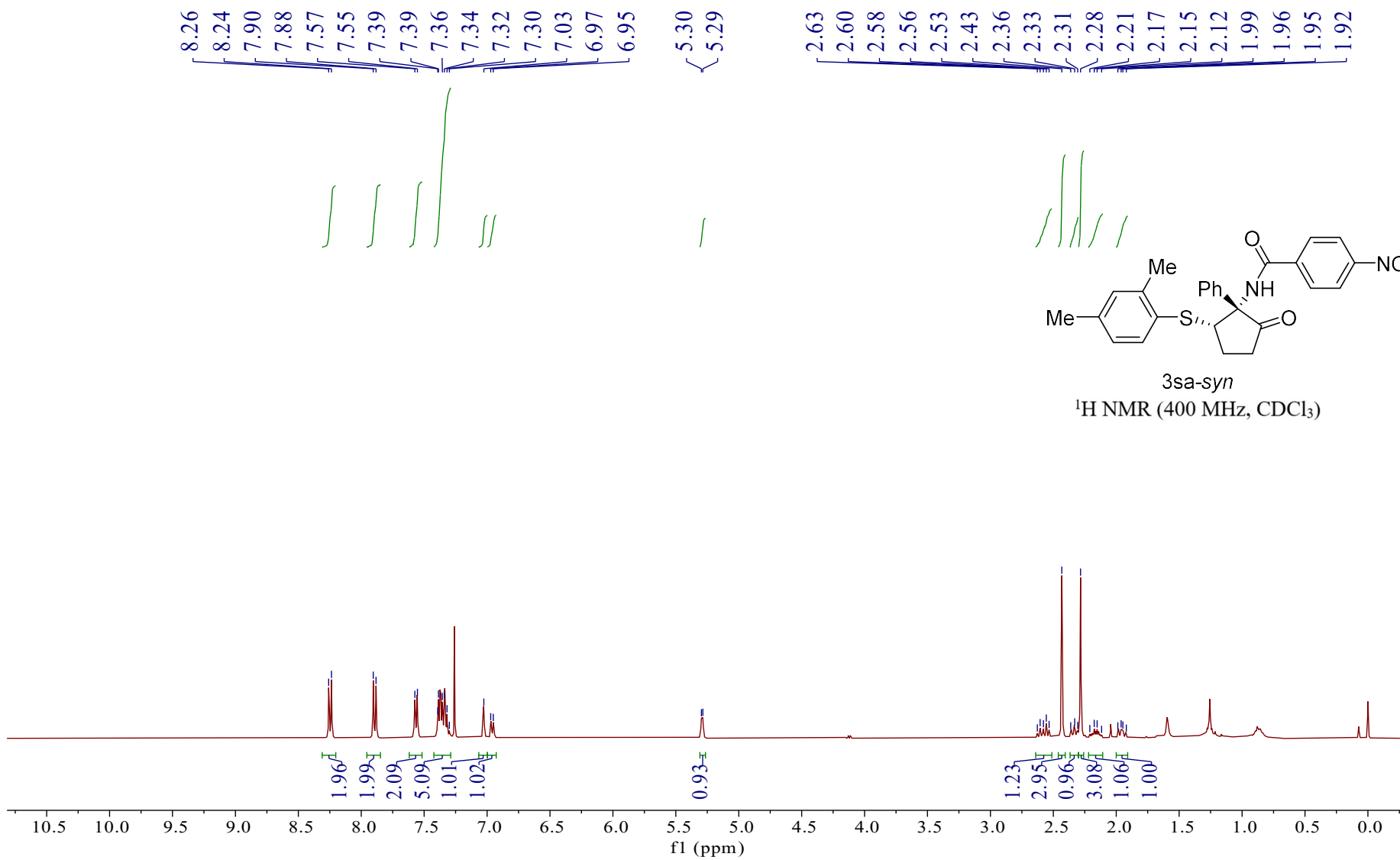




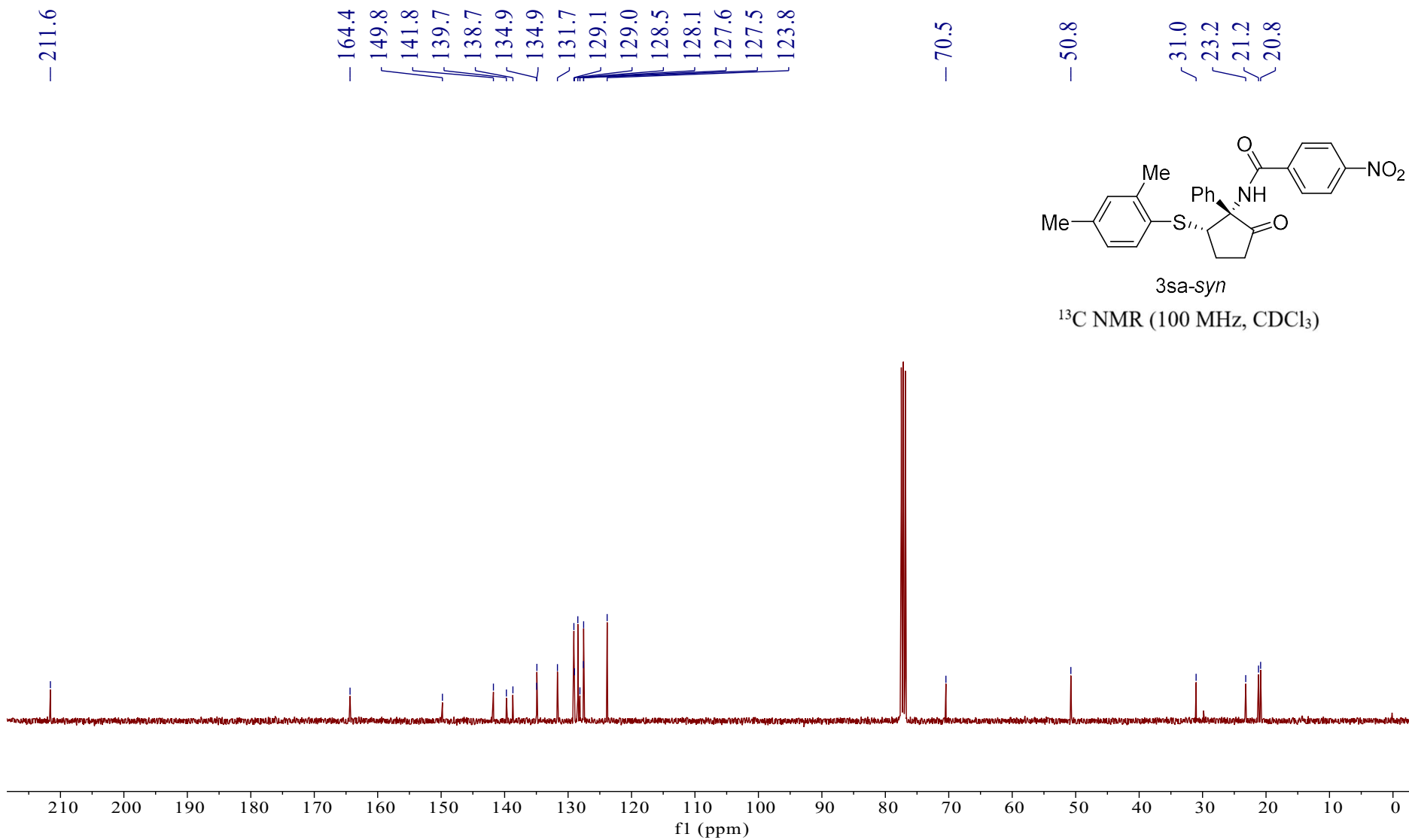
NMR-194



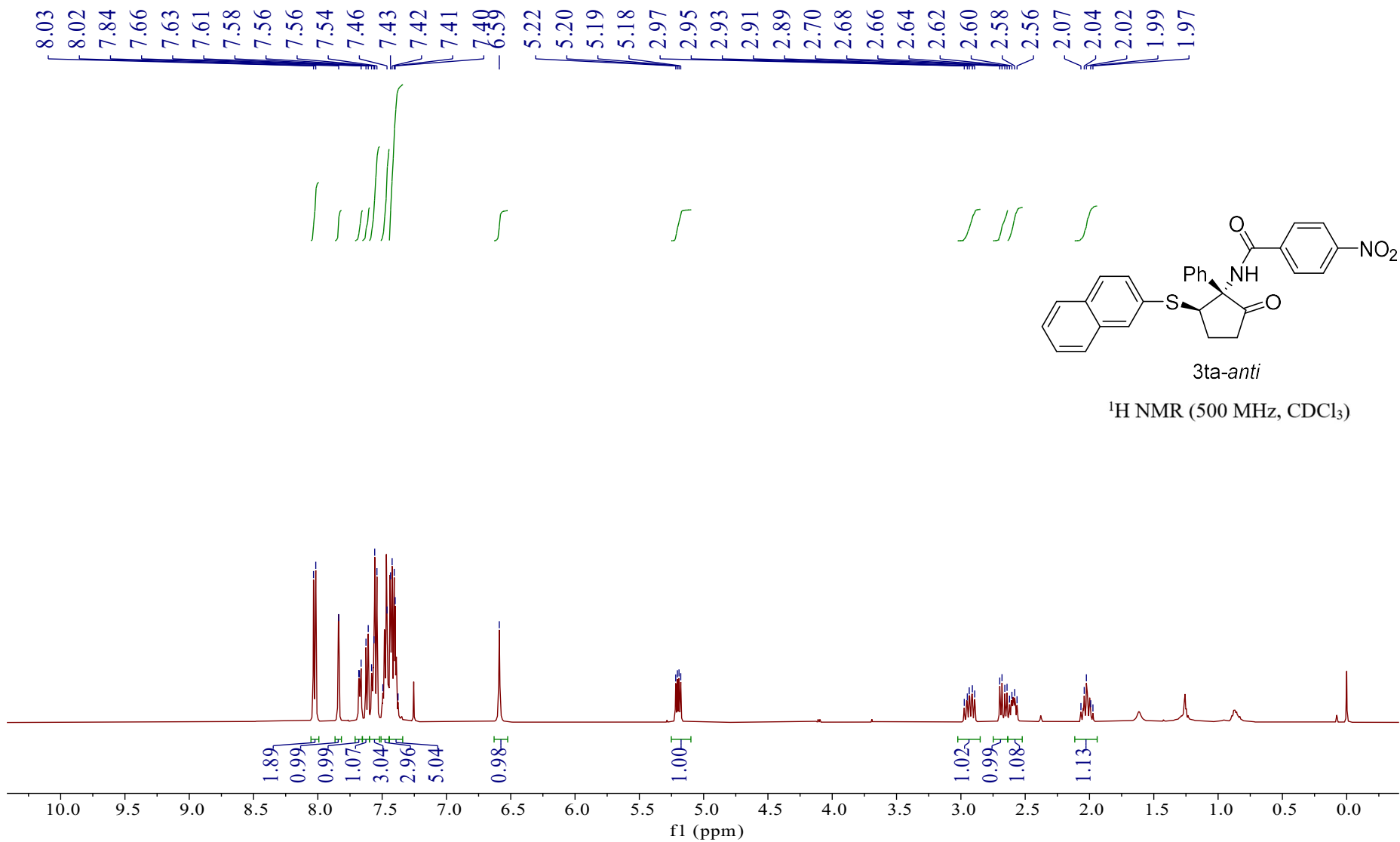
NMR-195



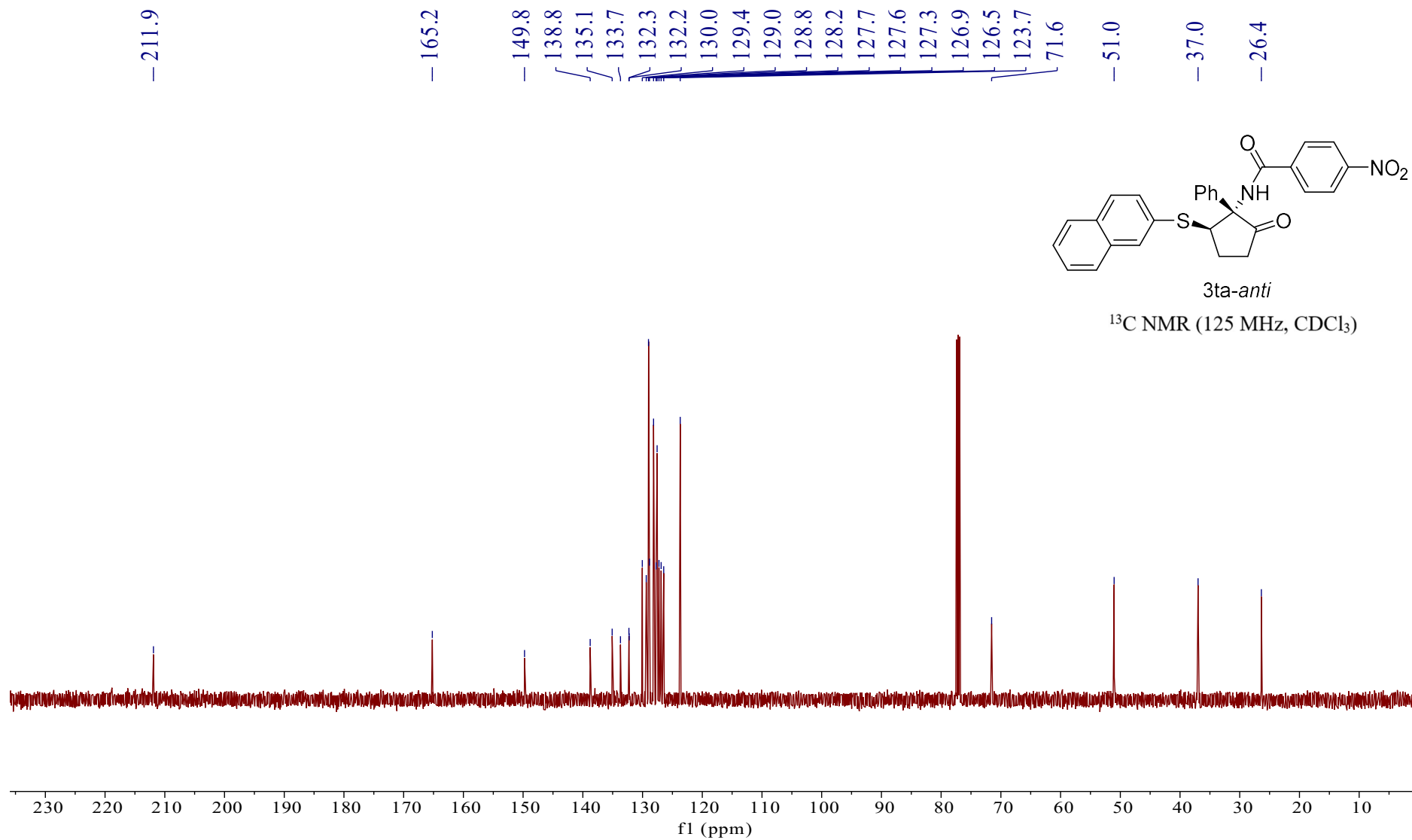
NMR-196



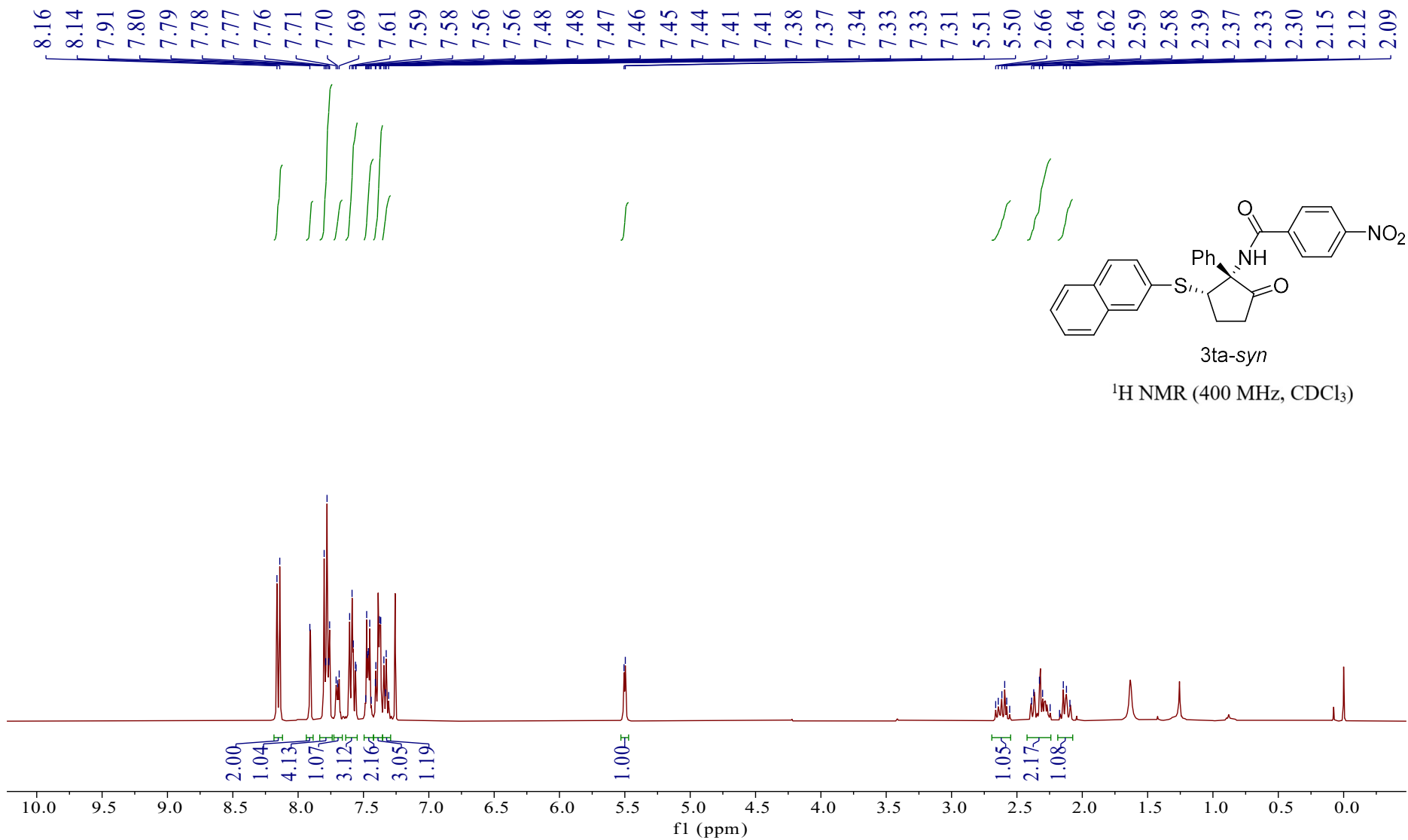
NMR-197



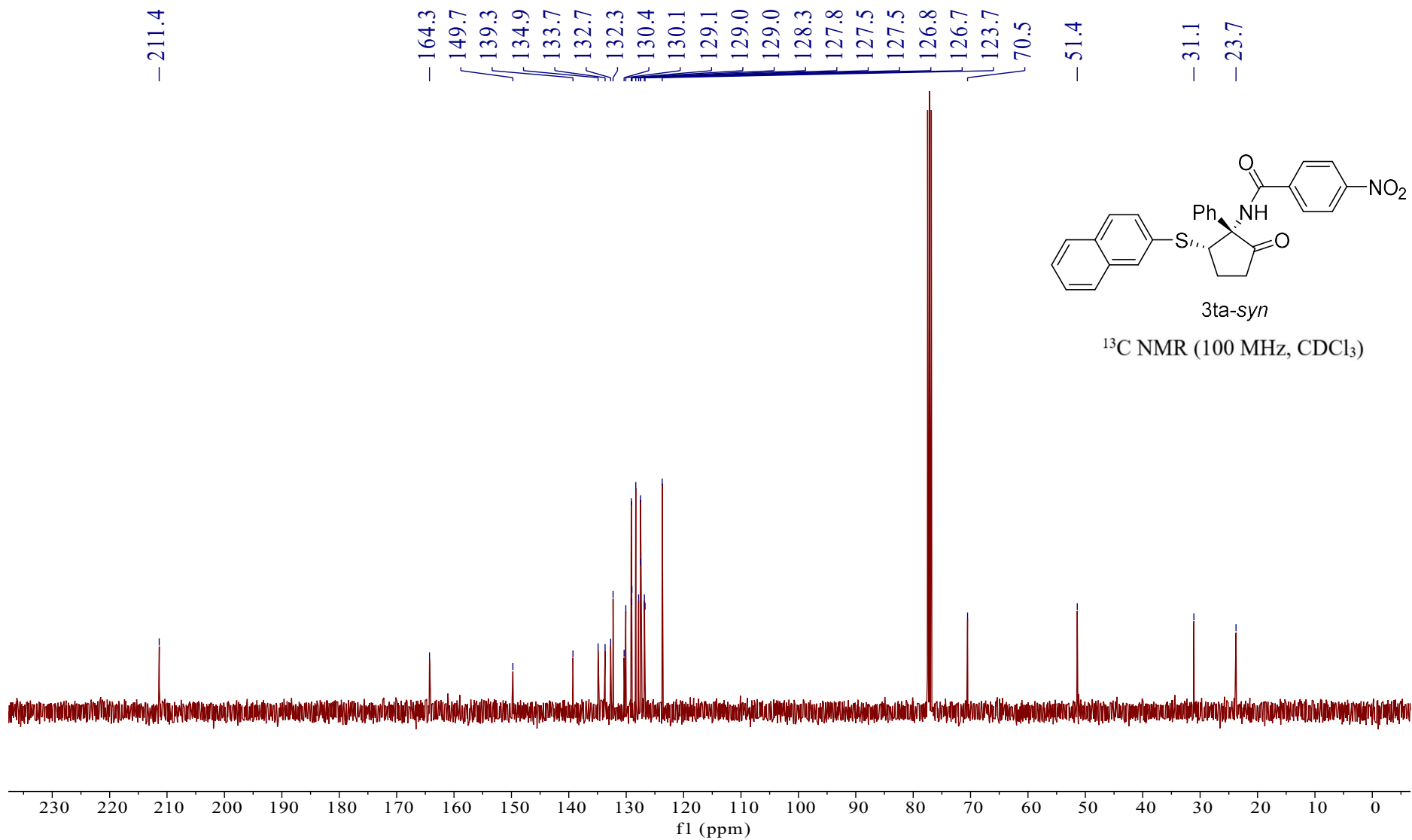
NMR-198



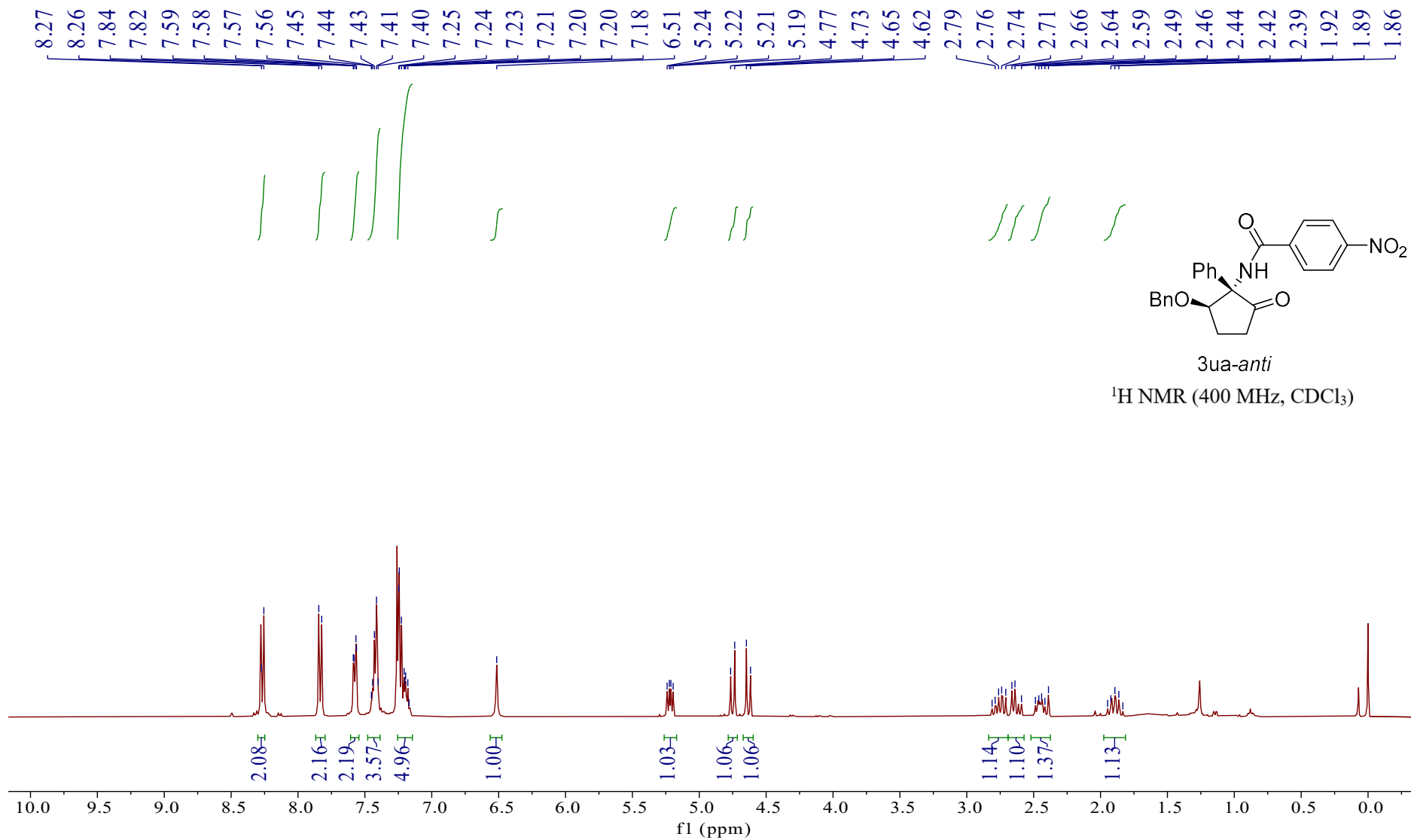
NMR-199



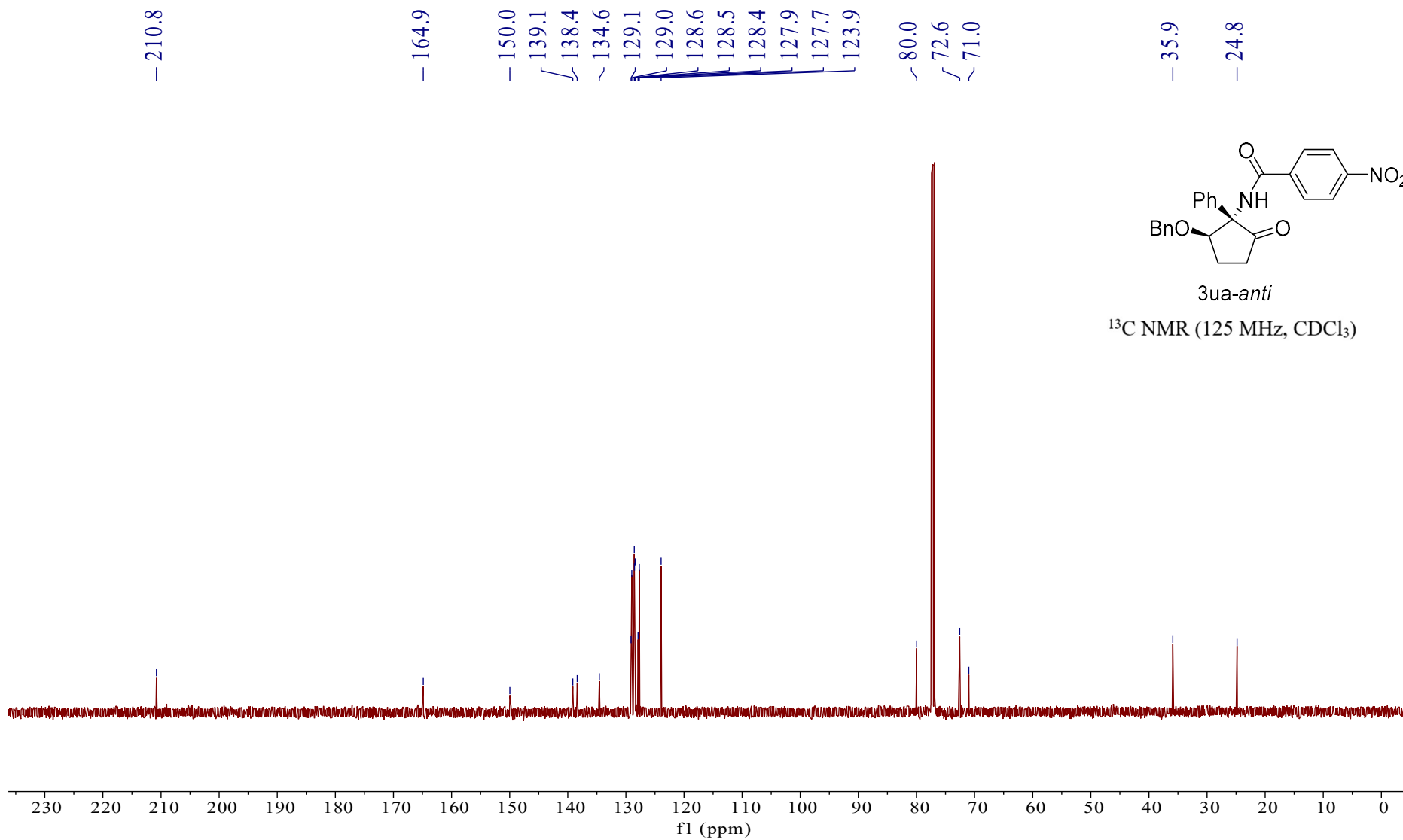
NMR-200



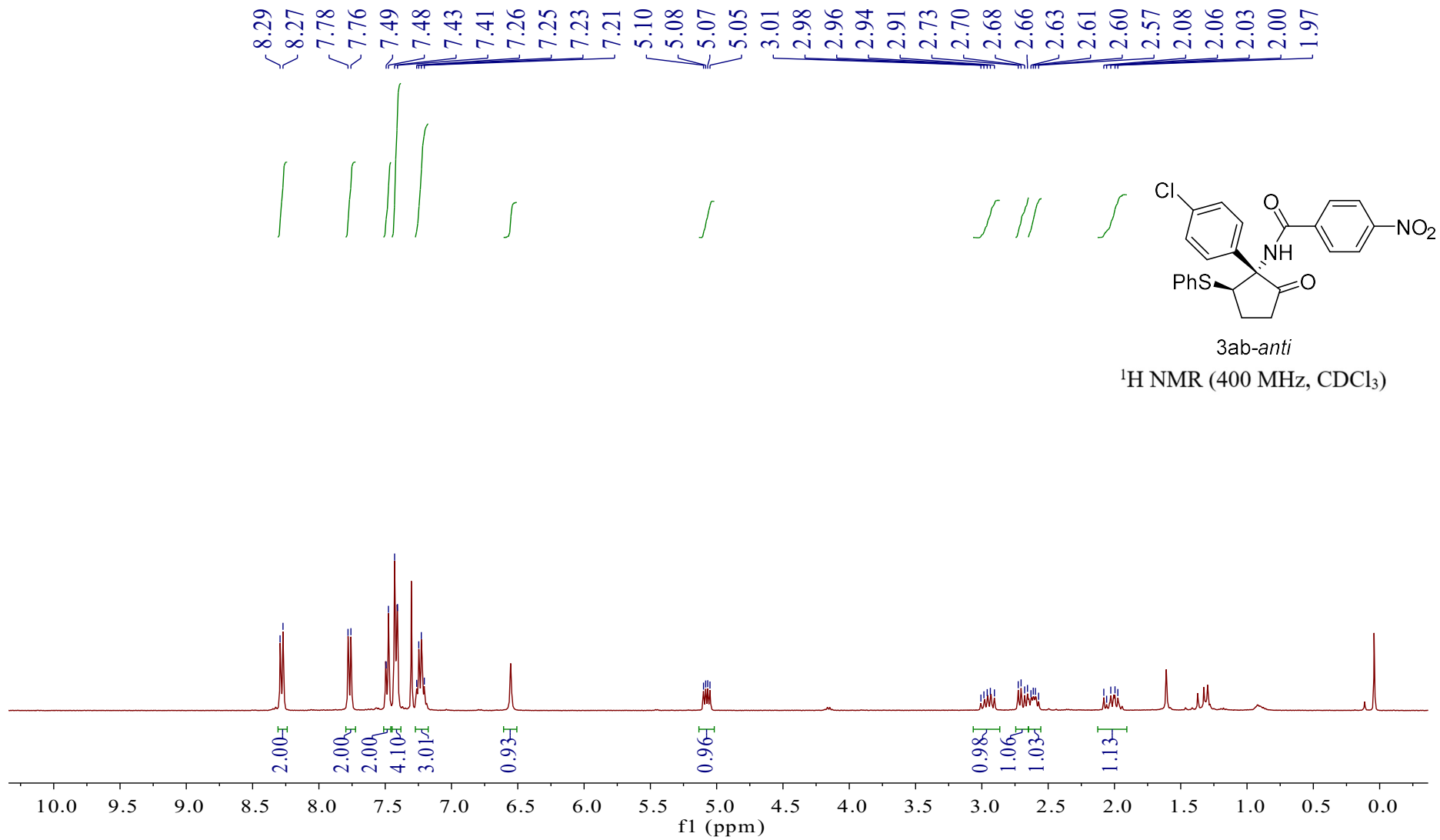
NMR-201



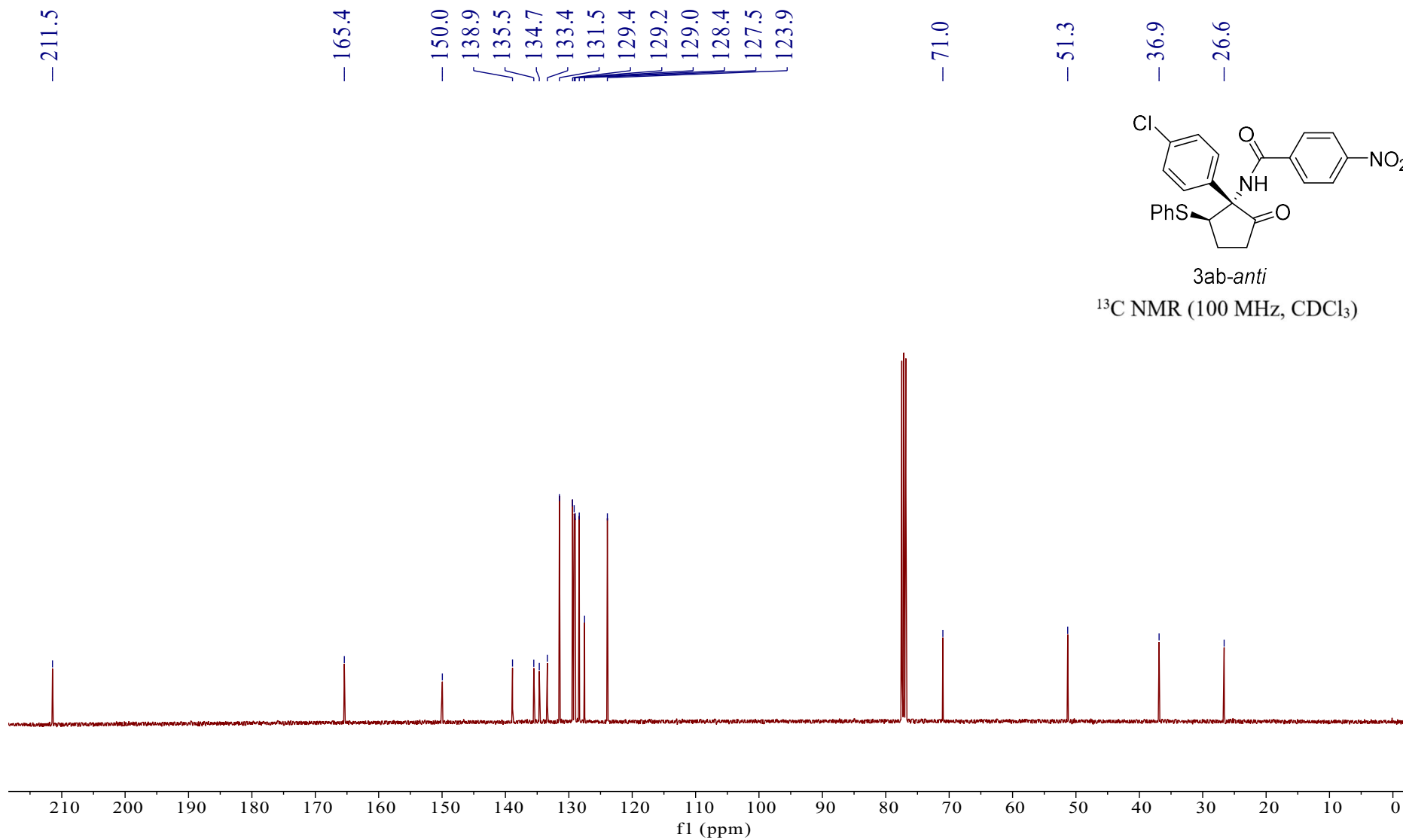
NMR-202



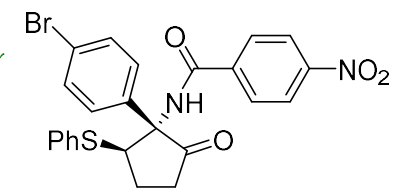
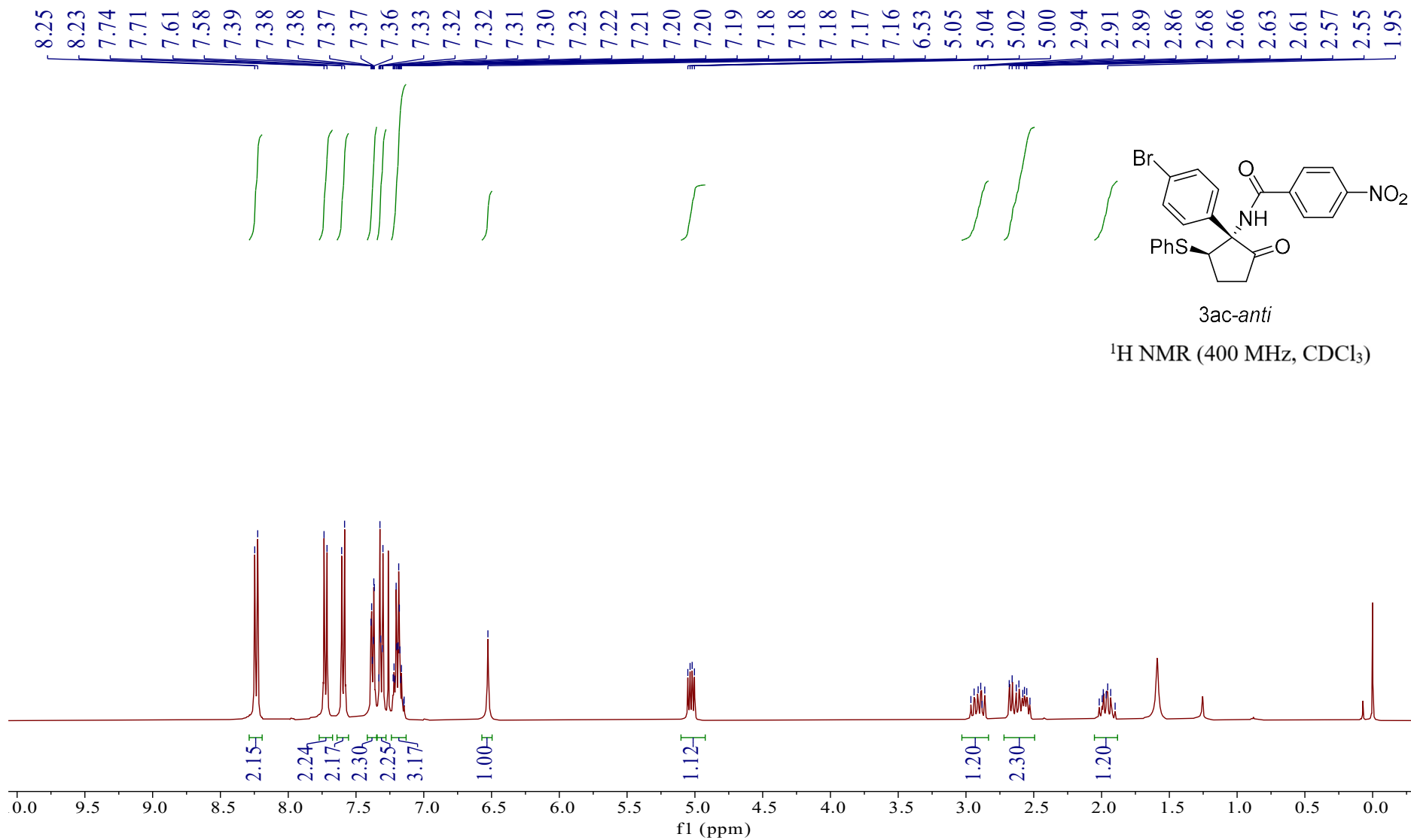
NMR-203



NMR-204

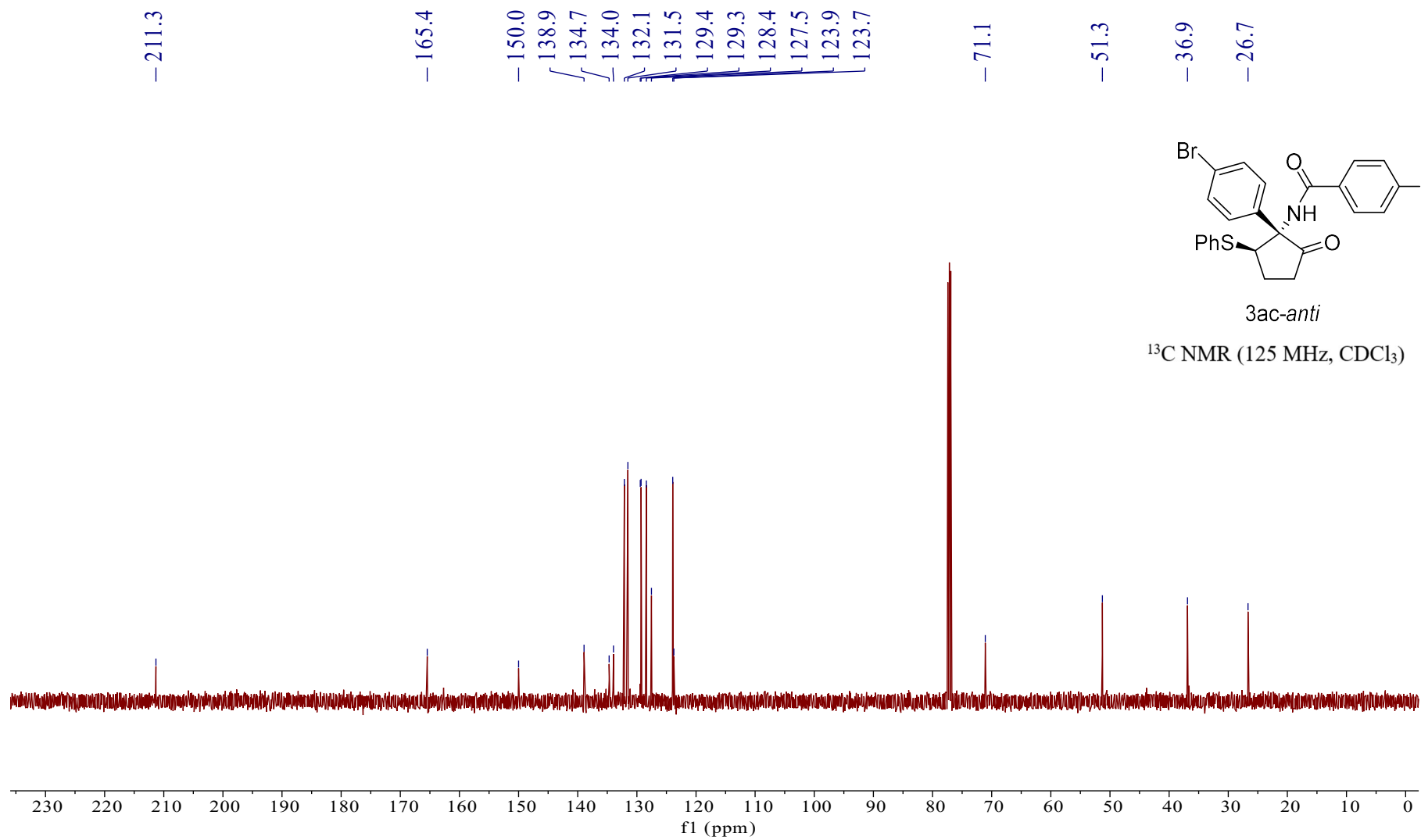


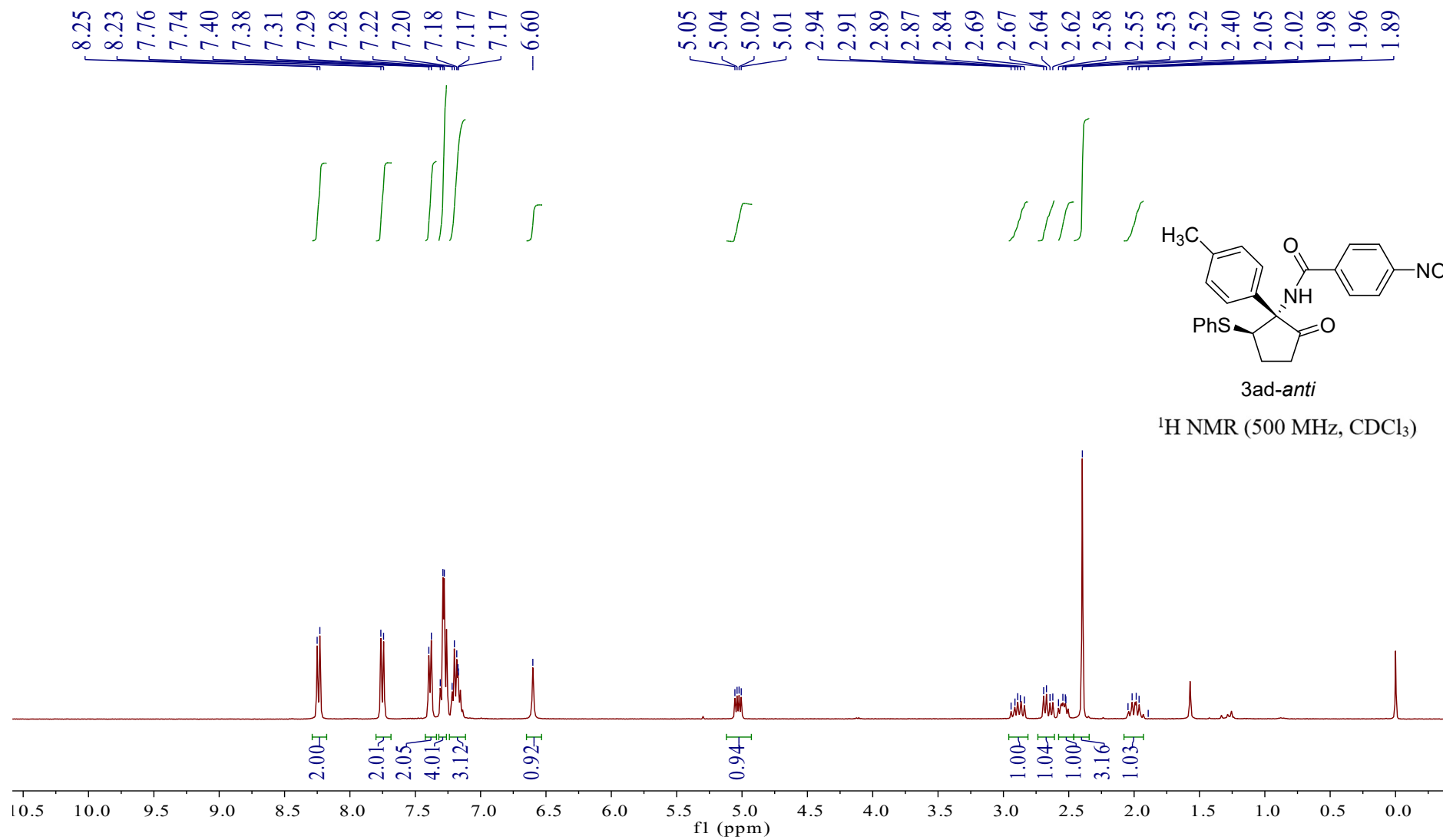
NMR-205

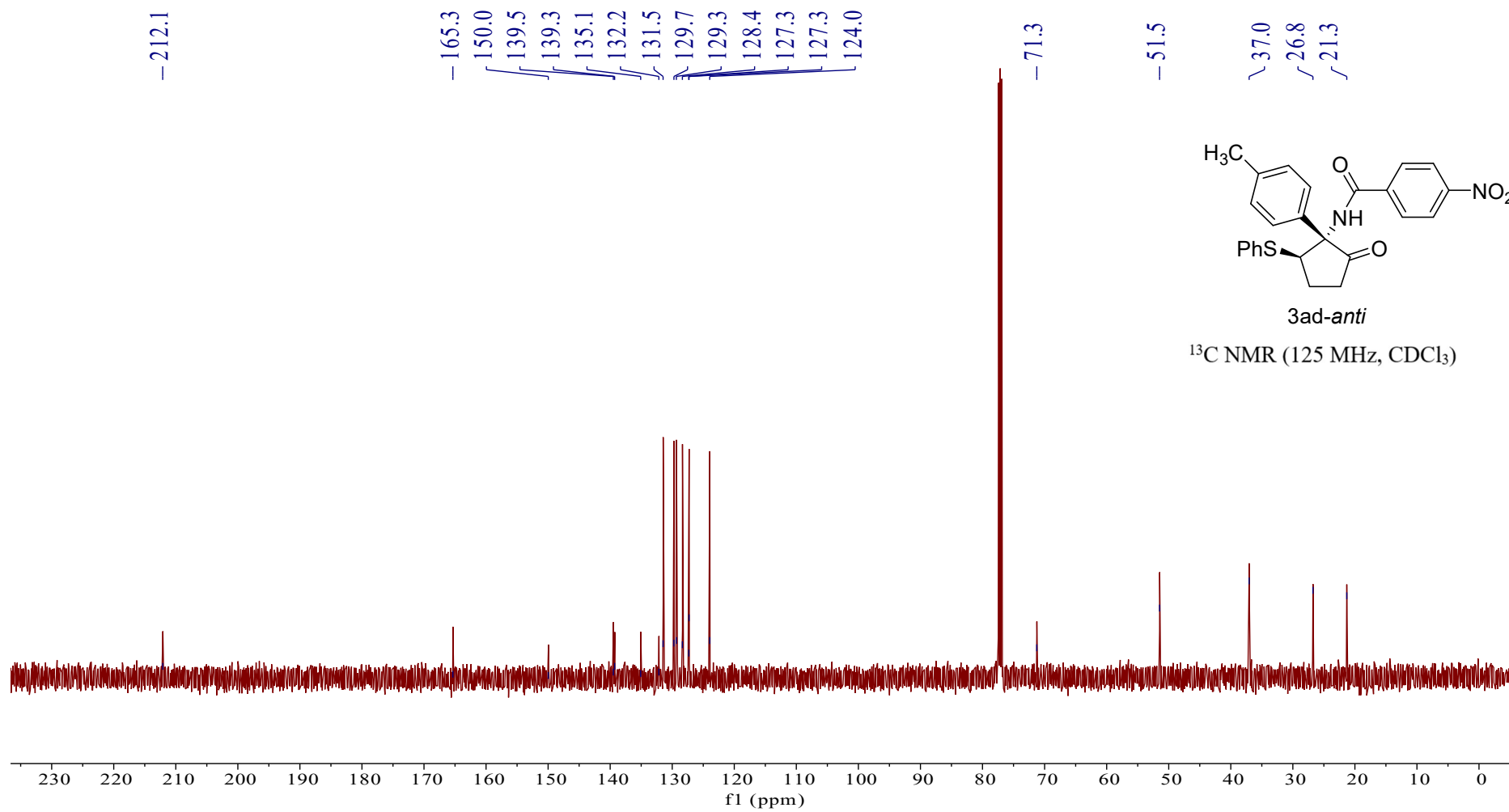


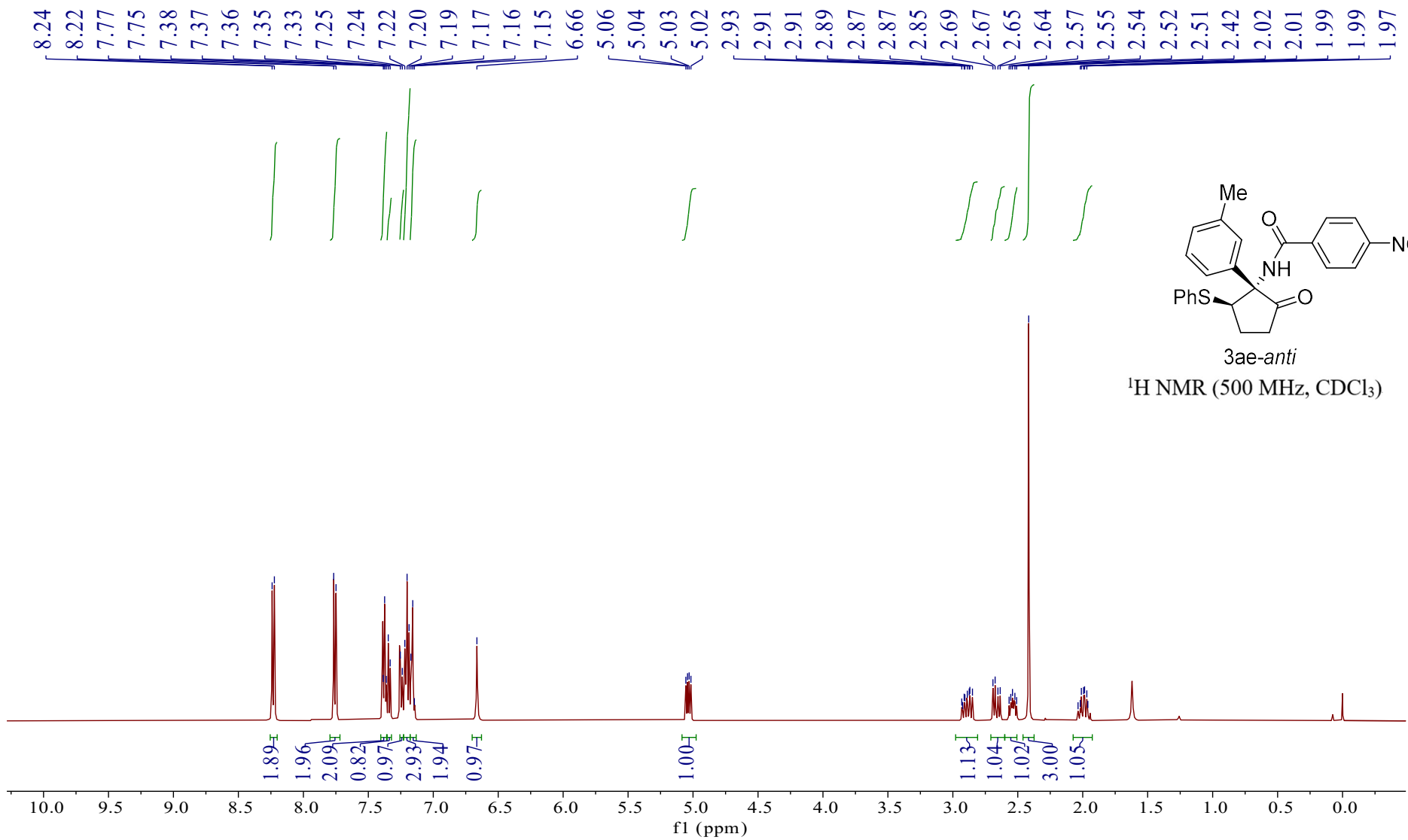
3ac-anti

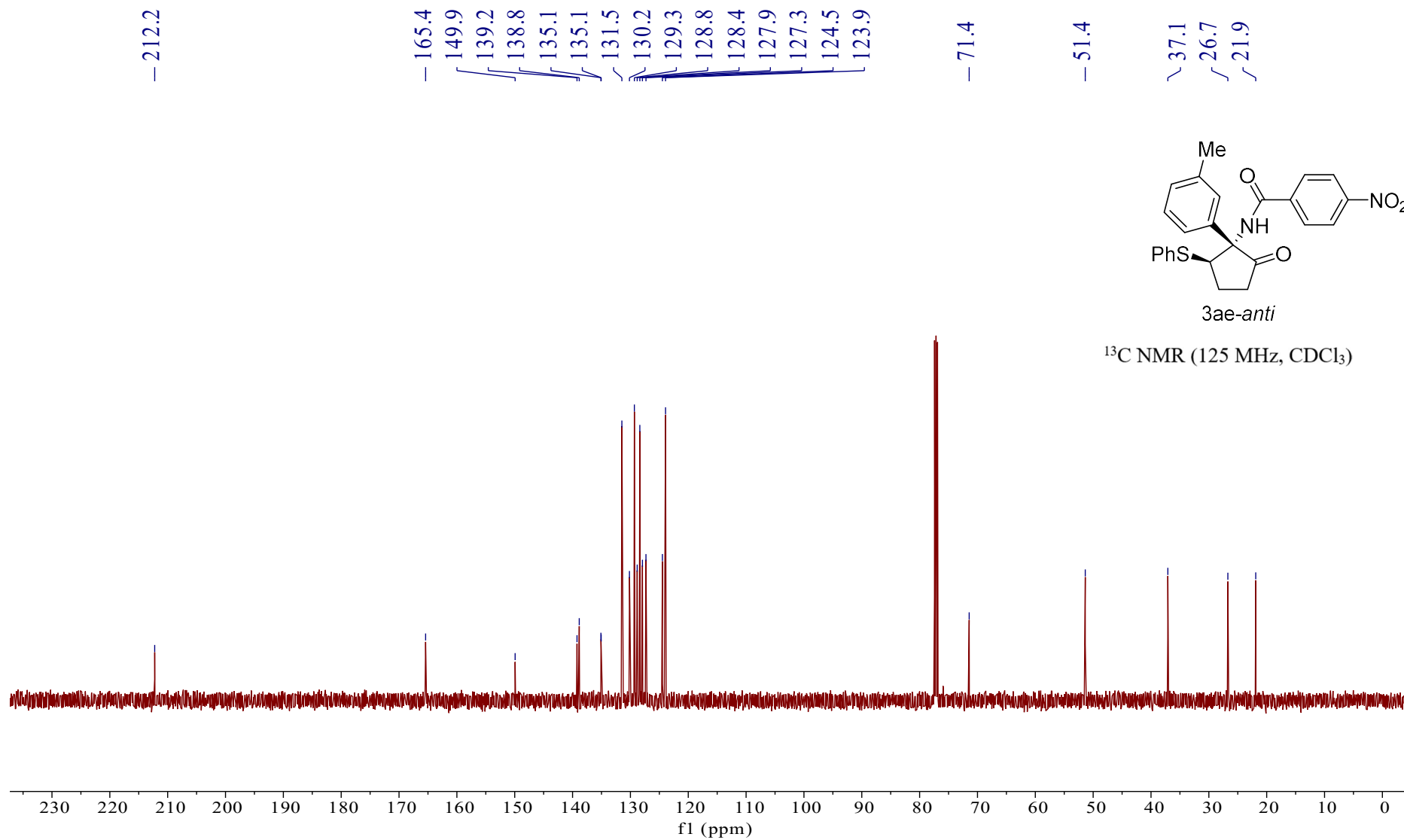
¹H NMR (400 MHz, CDCl₃)





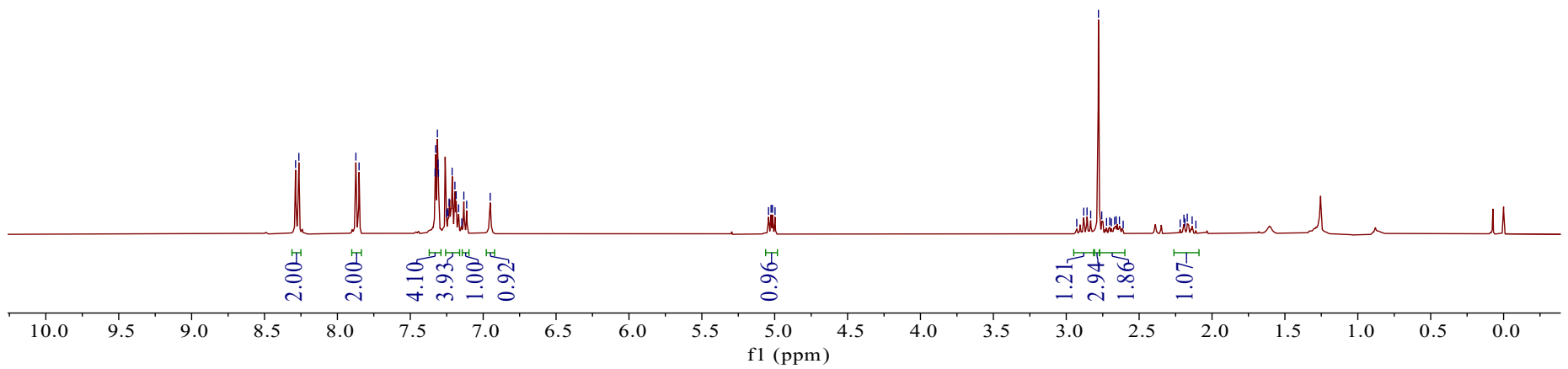
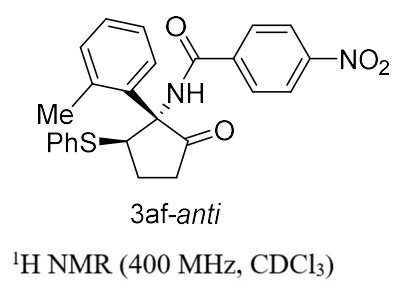


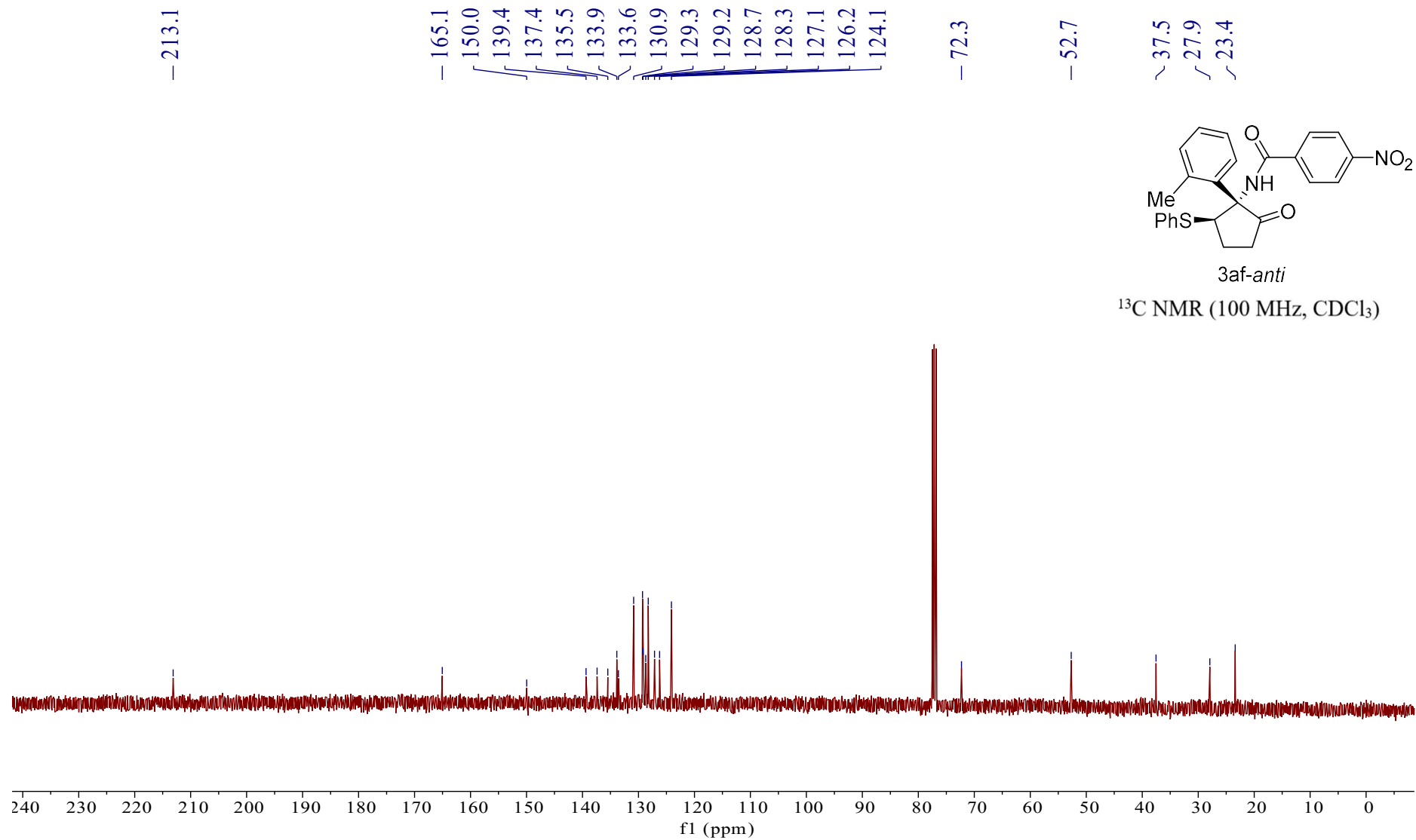




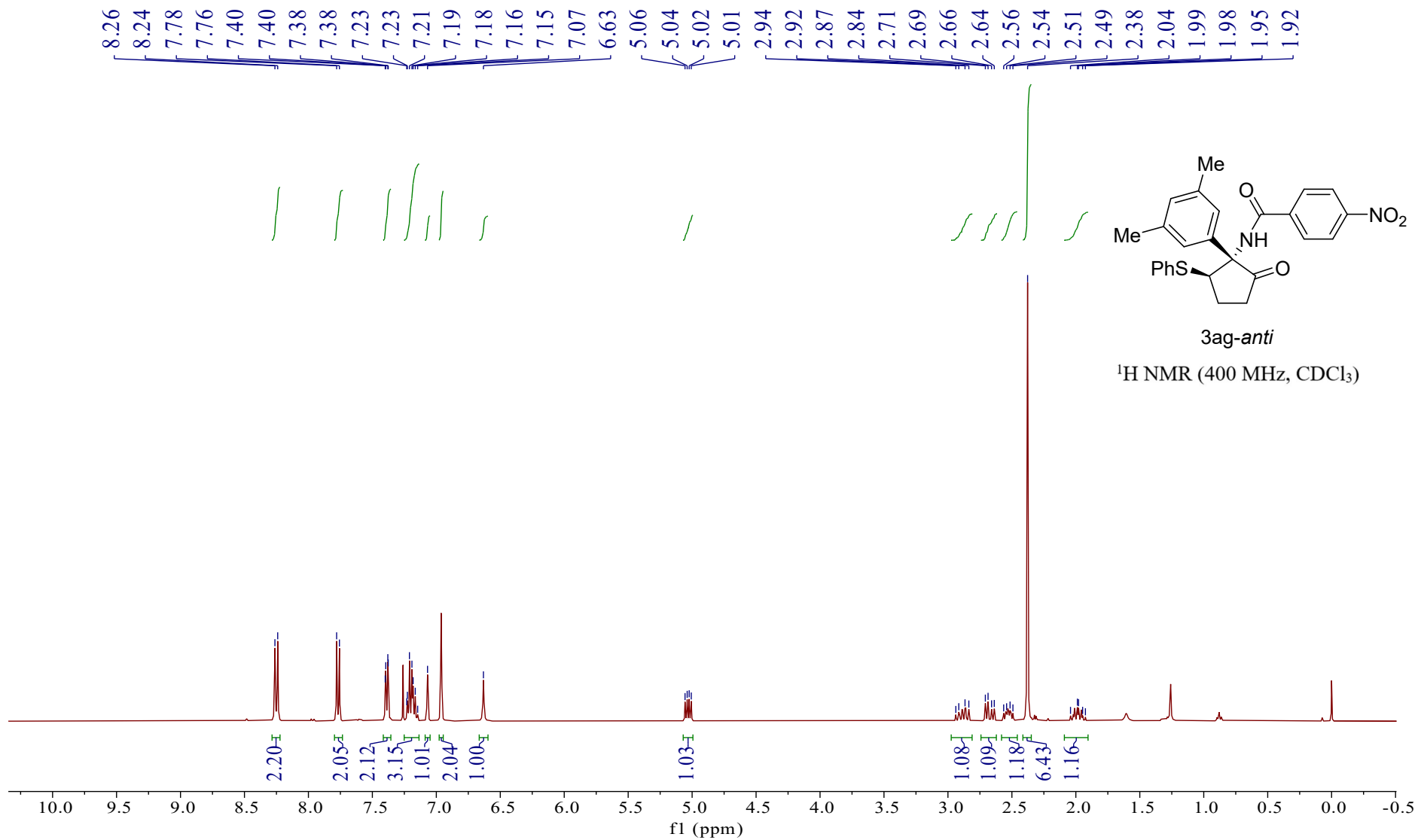
NMR-211

8.29
8.26
7.87
7.85
7.33
7.33
7.31
7.31
7.31
7.25
7.24
7.23
7.21
7.19
7.19
7.17
7.15
7.13
7.11
6.95
5.04
5.02
5.02
5.00
2.93
2.88
2.86
2.83
2.78
2.76
2.72
2.70
2.69
2.67
2.66
2.64
2.61
2.22
2.19
2.19
2.17
2.14
2.11

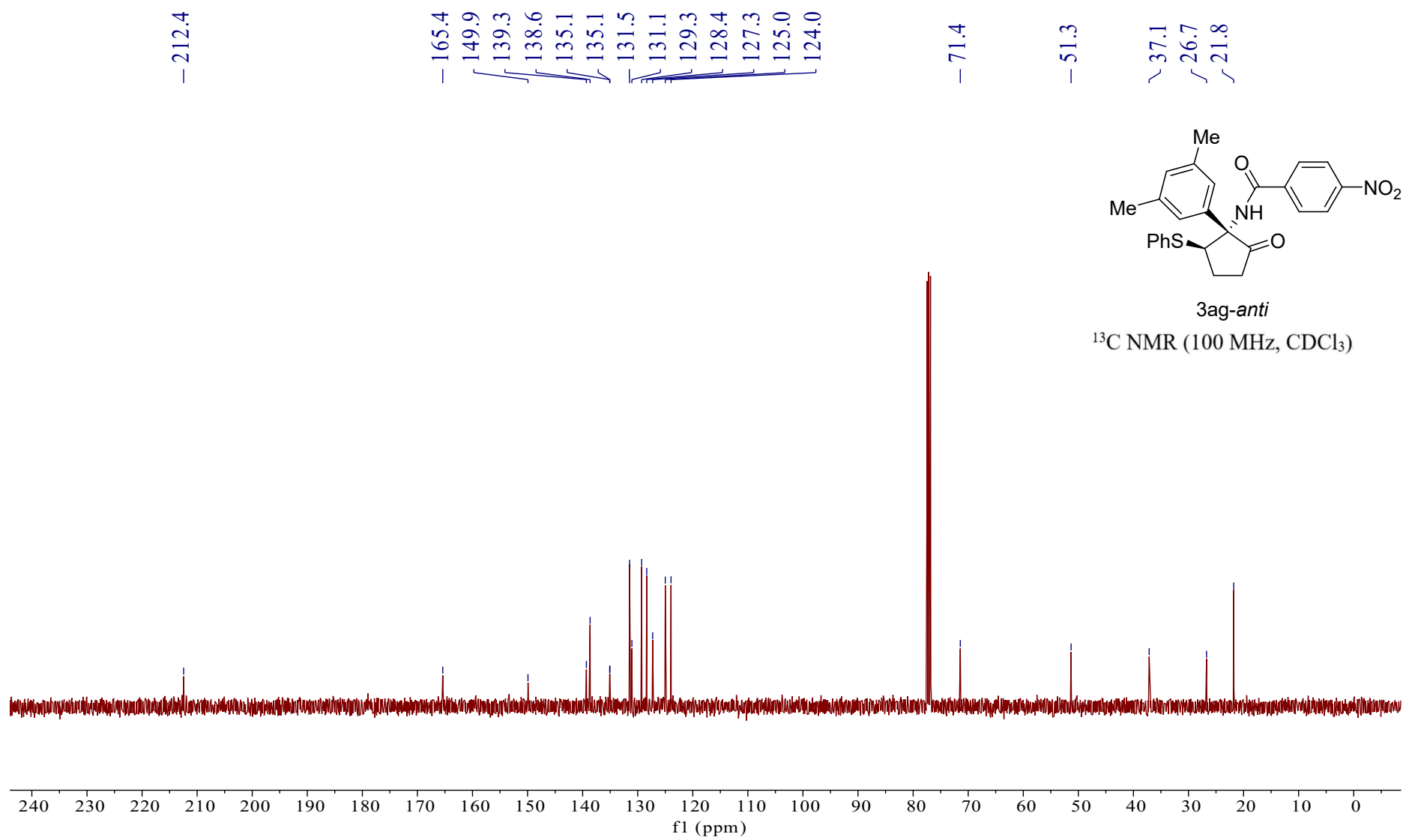


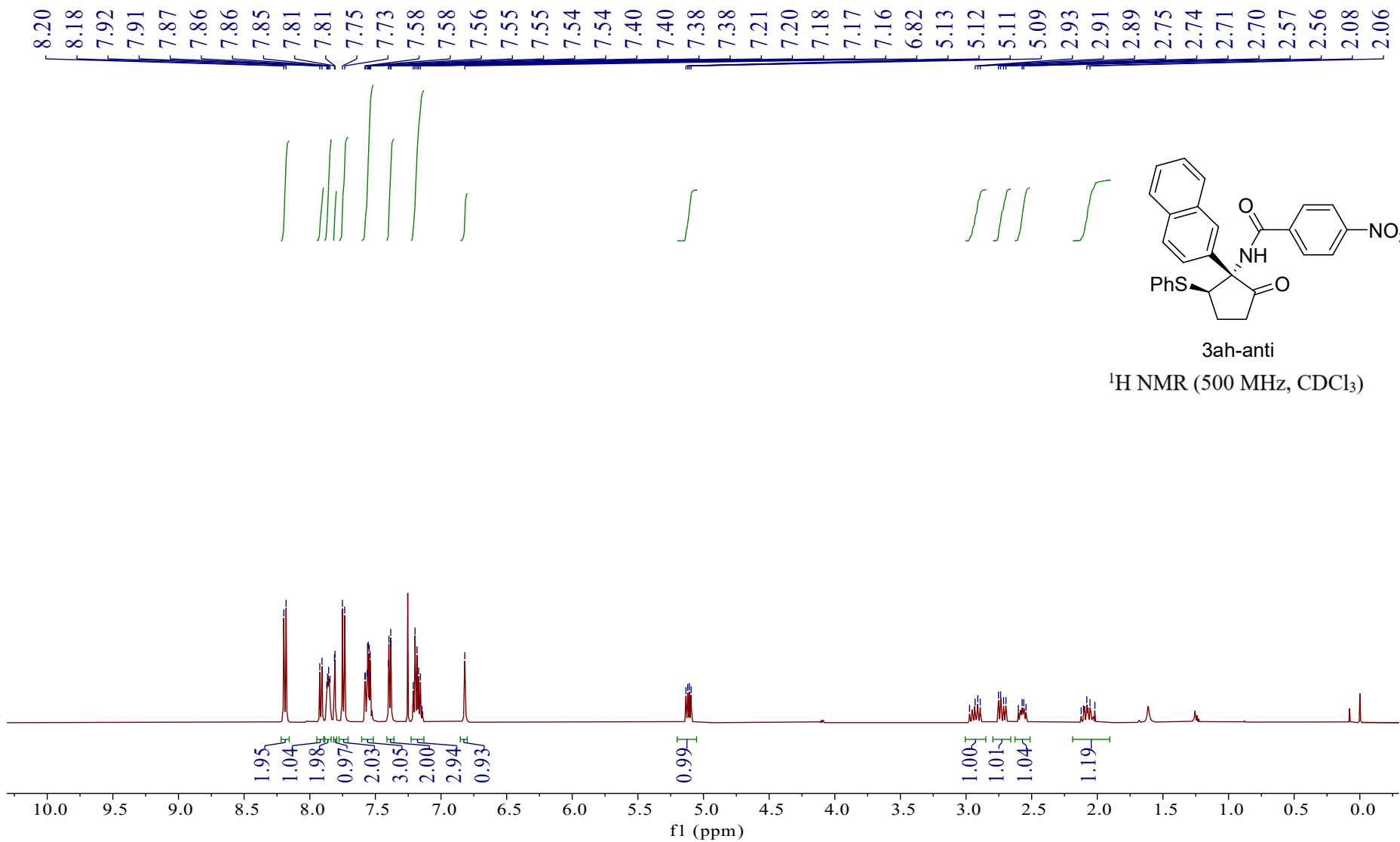


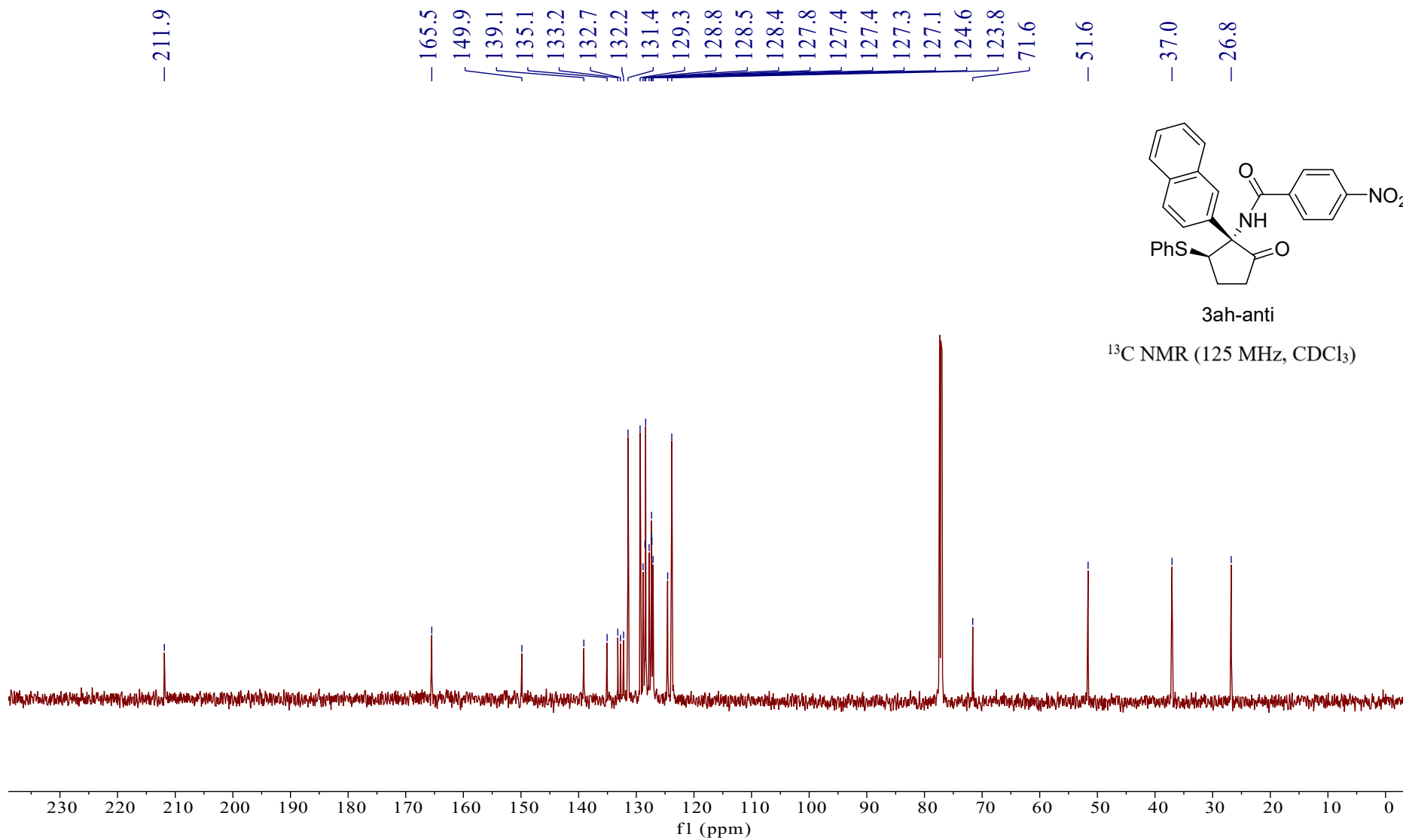
NMR-213



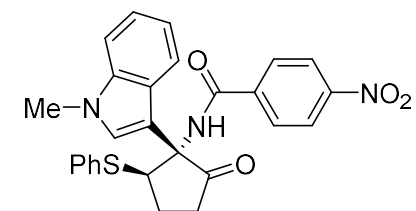
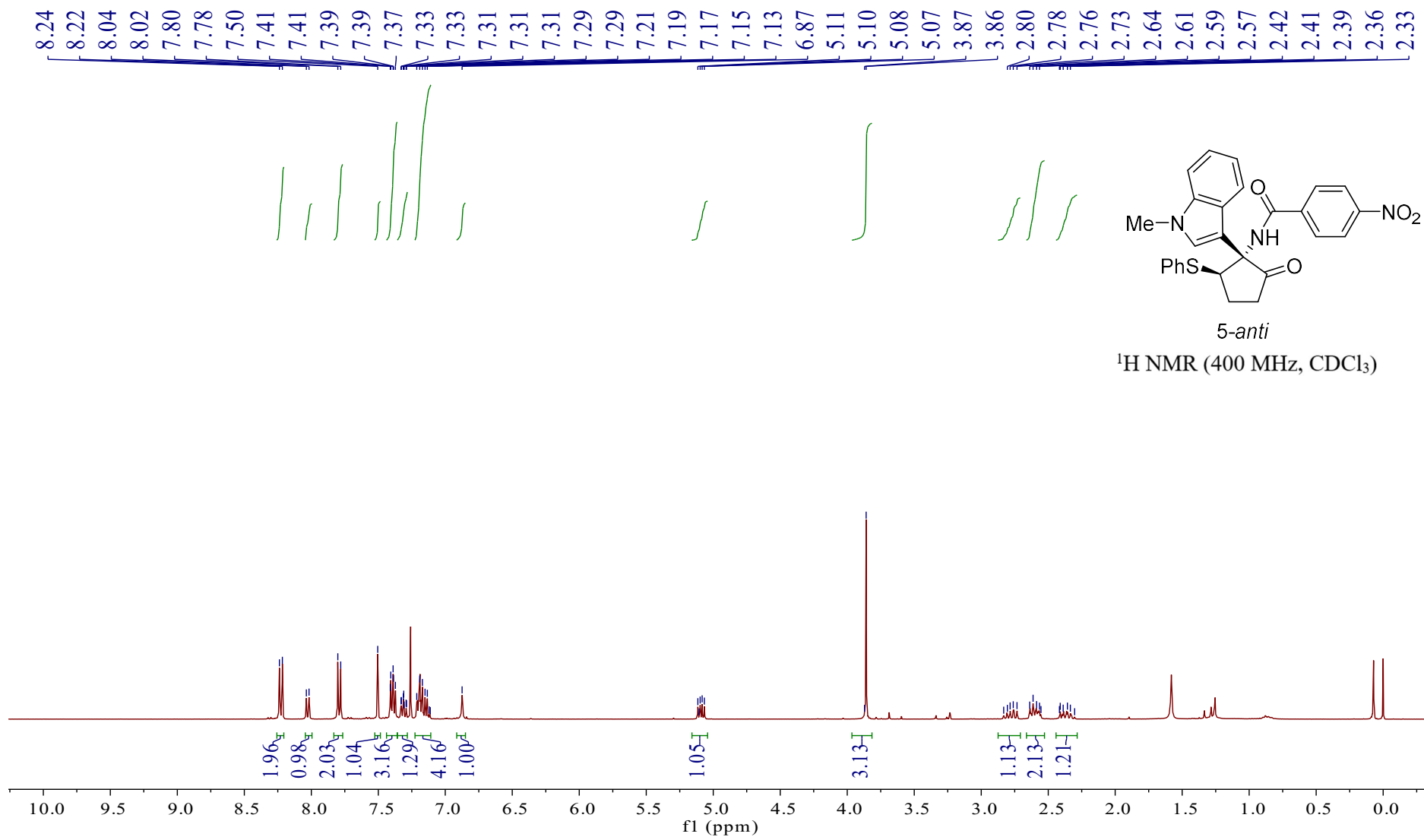
NMR-214





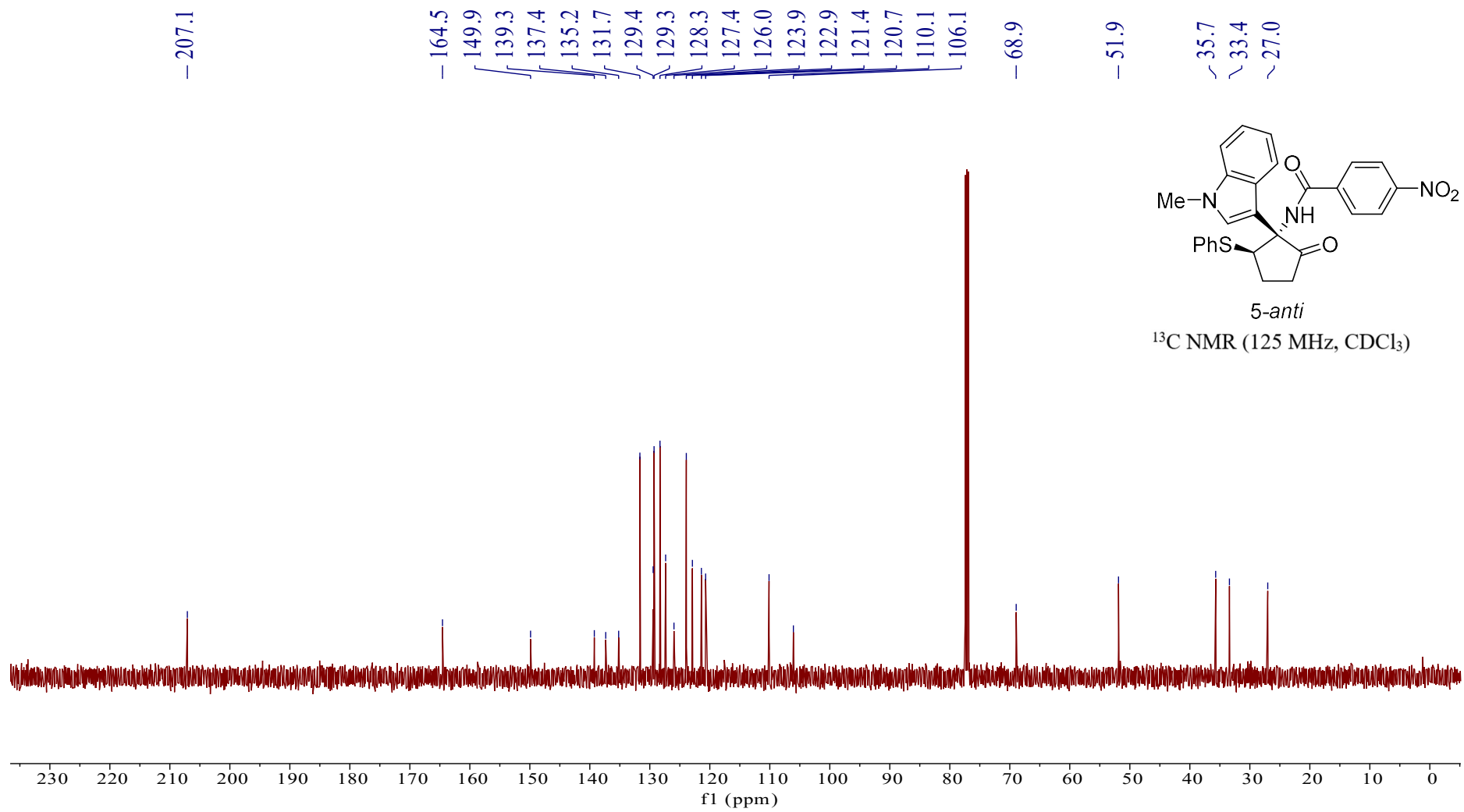


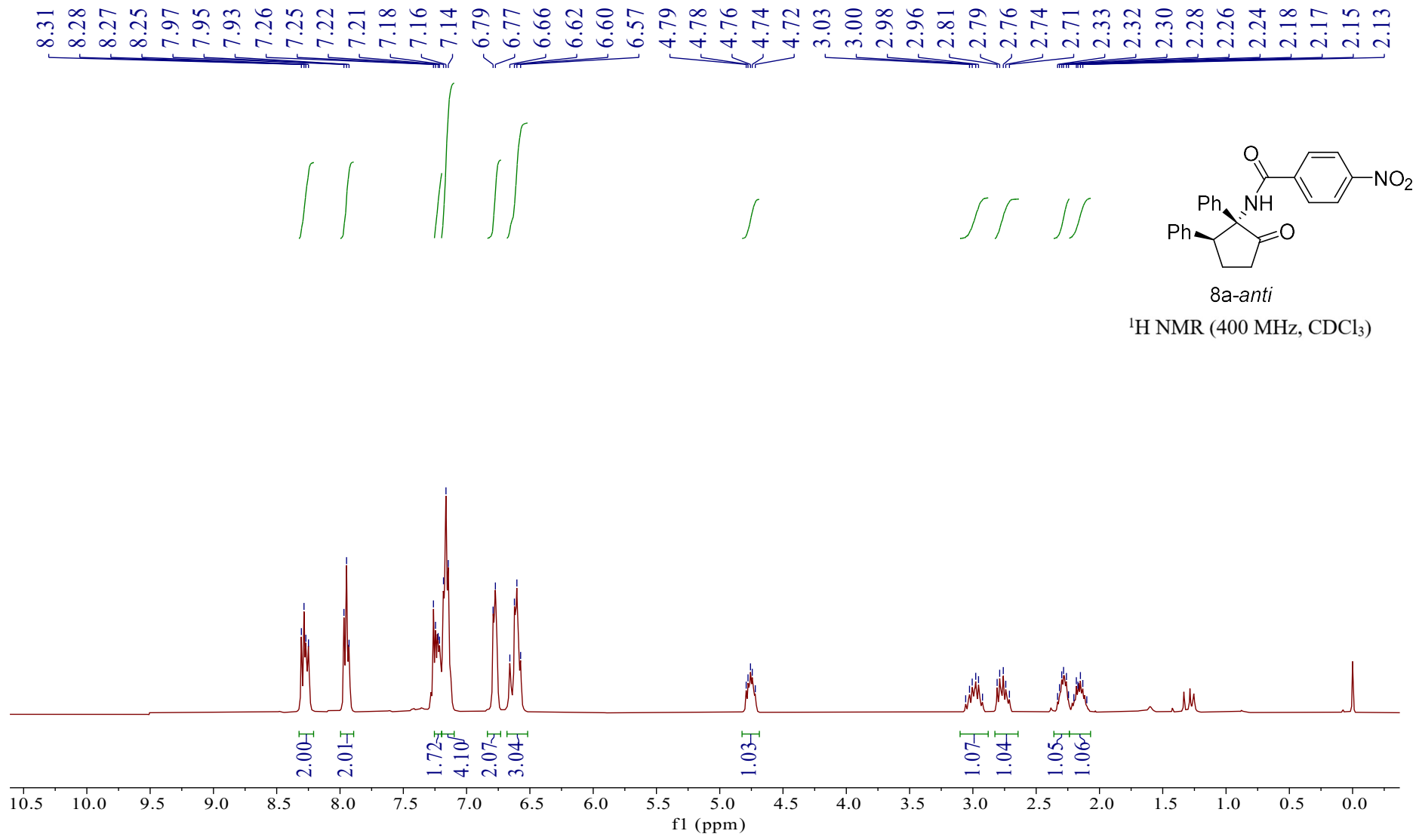
NMR-217

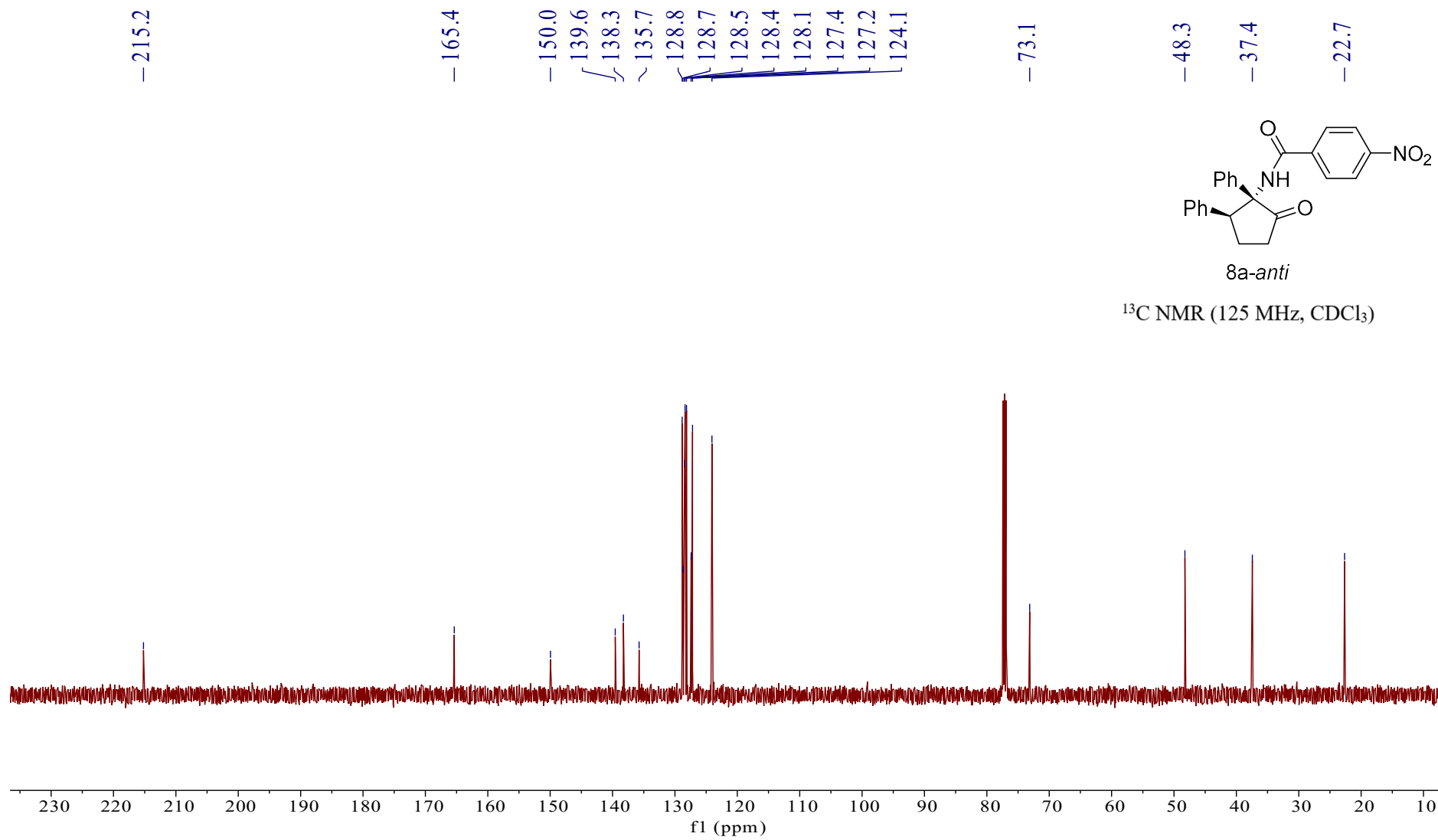


5-anti

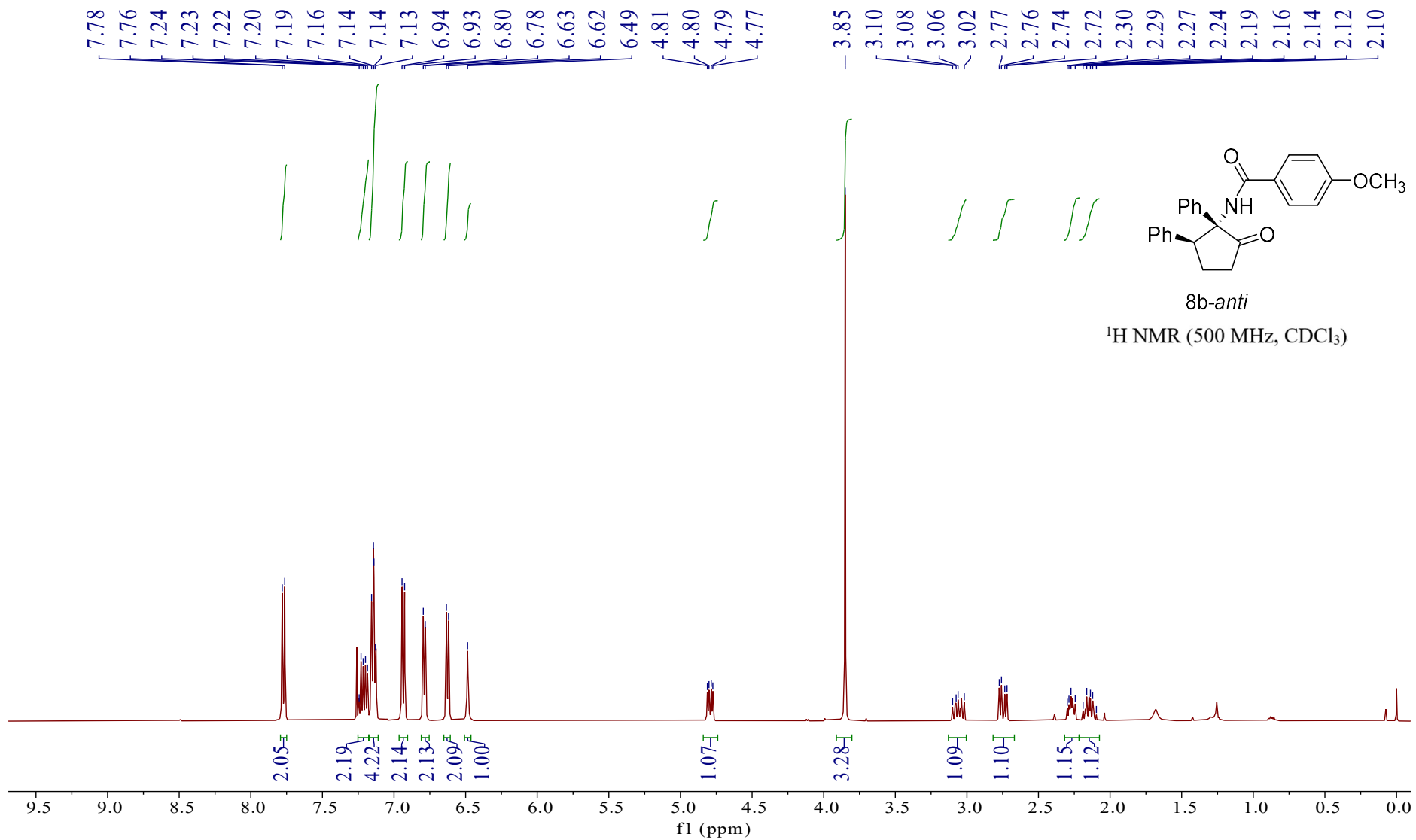
¹H NMR (400 MHz, CDCl₃)



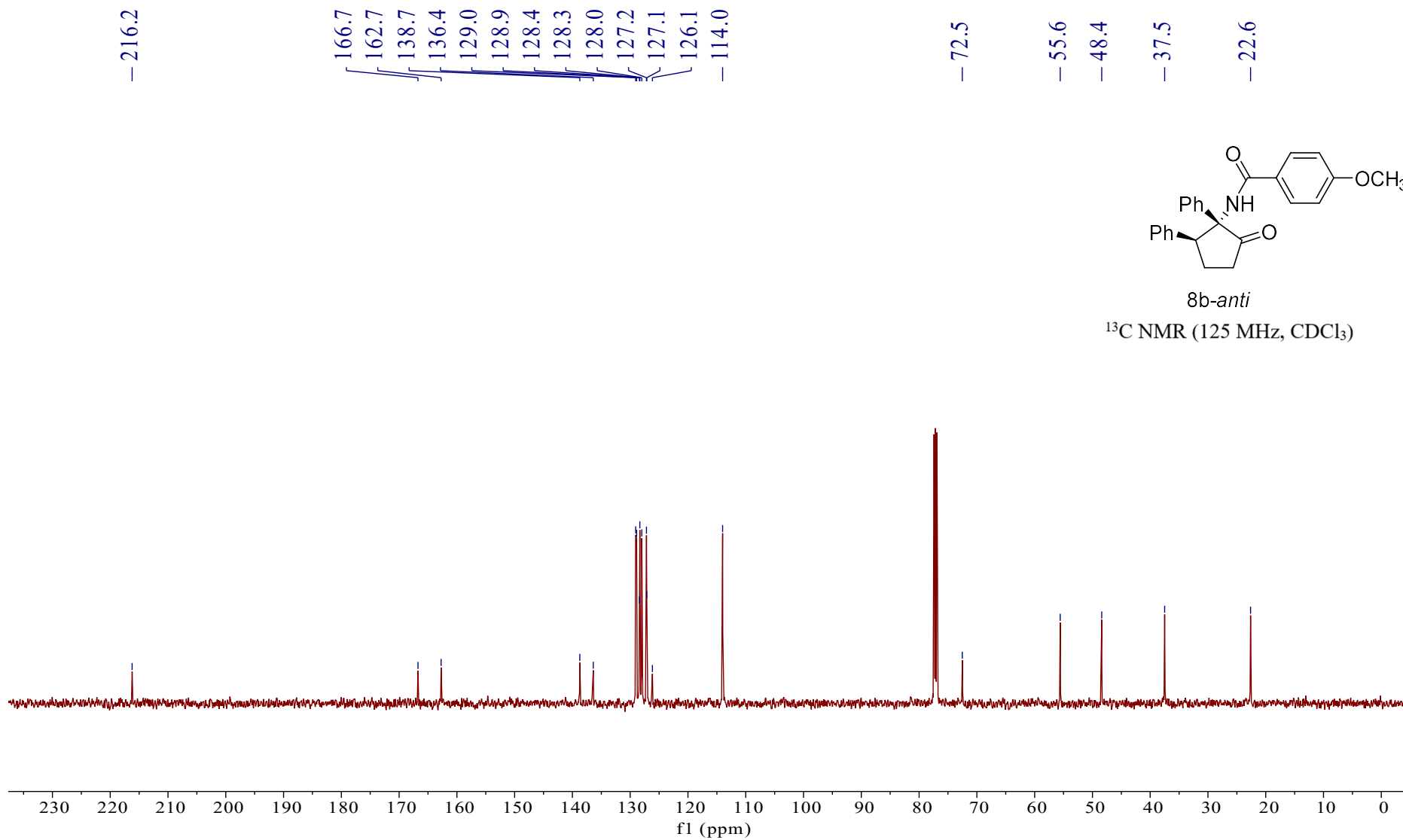




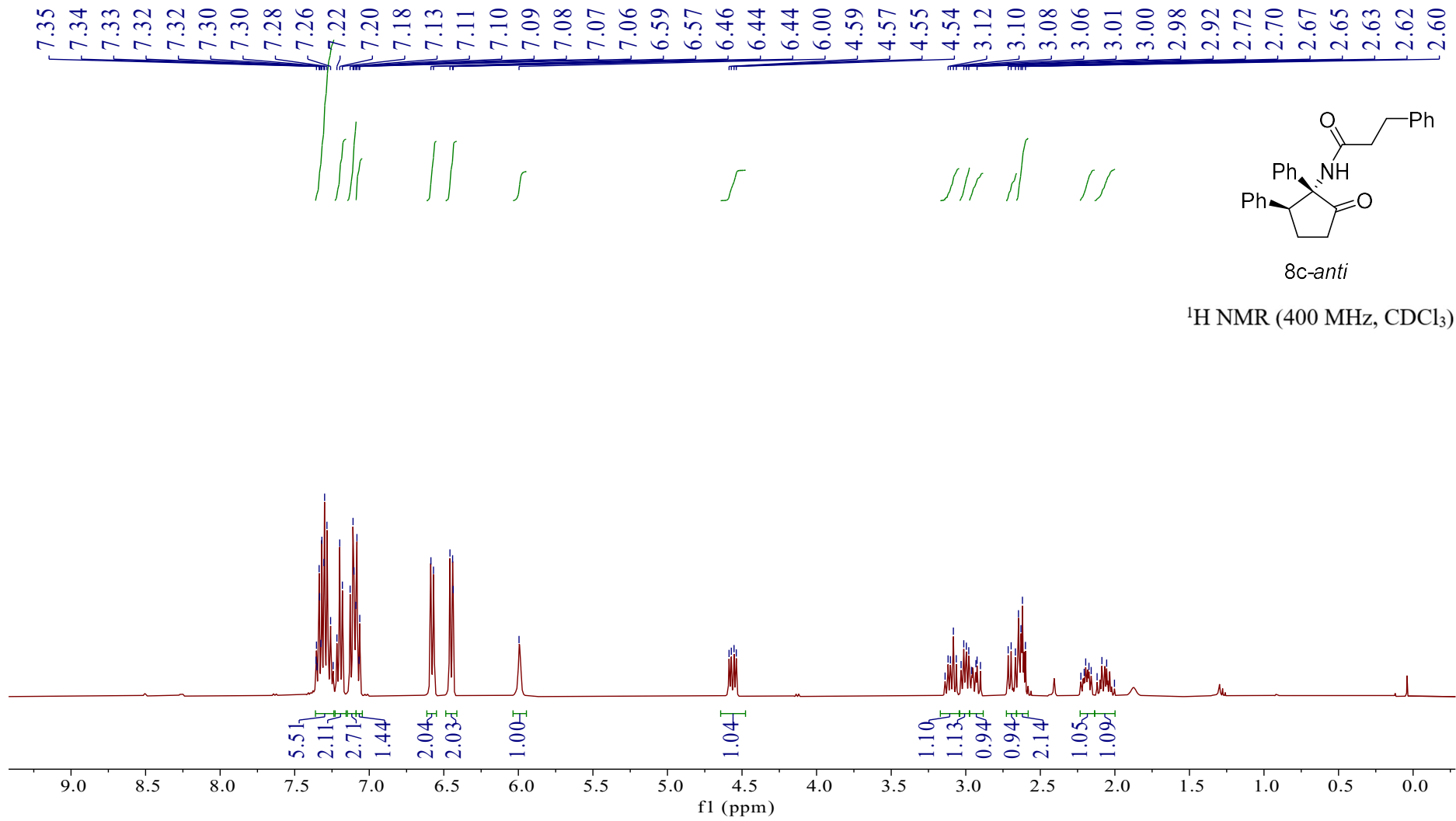
NMR-221

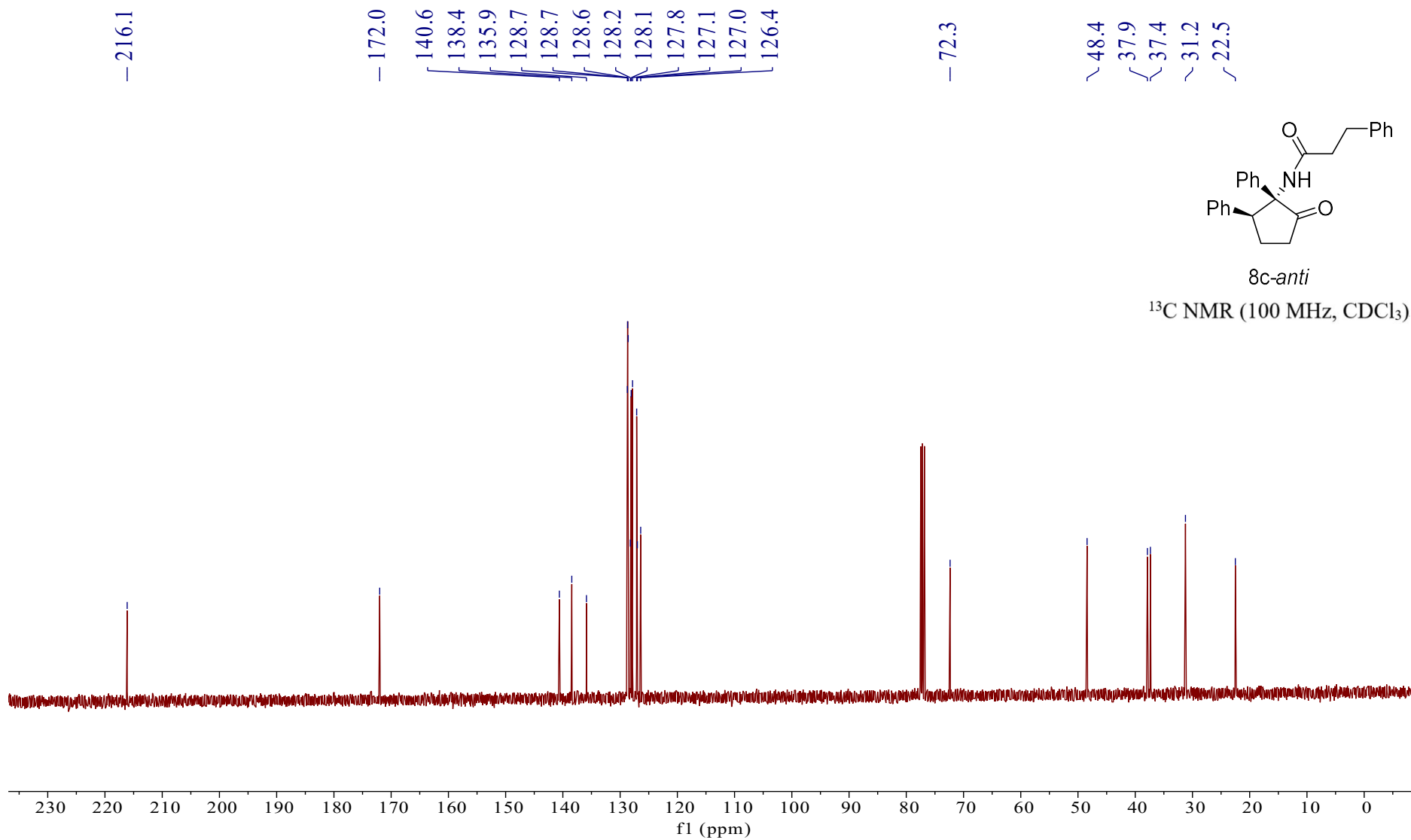


NMR-222

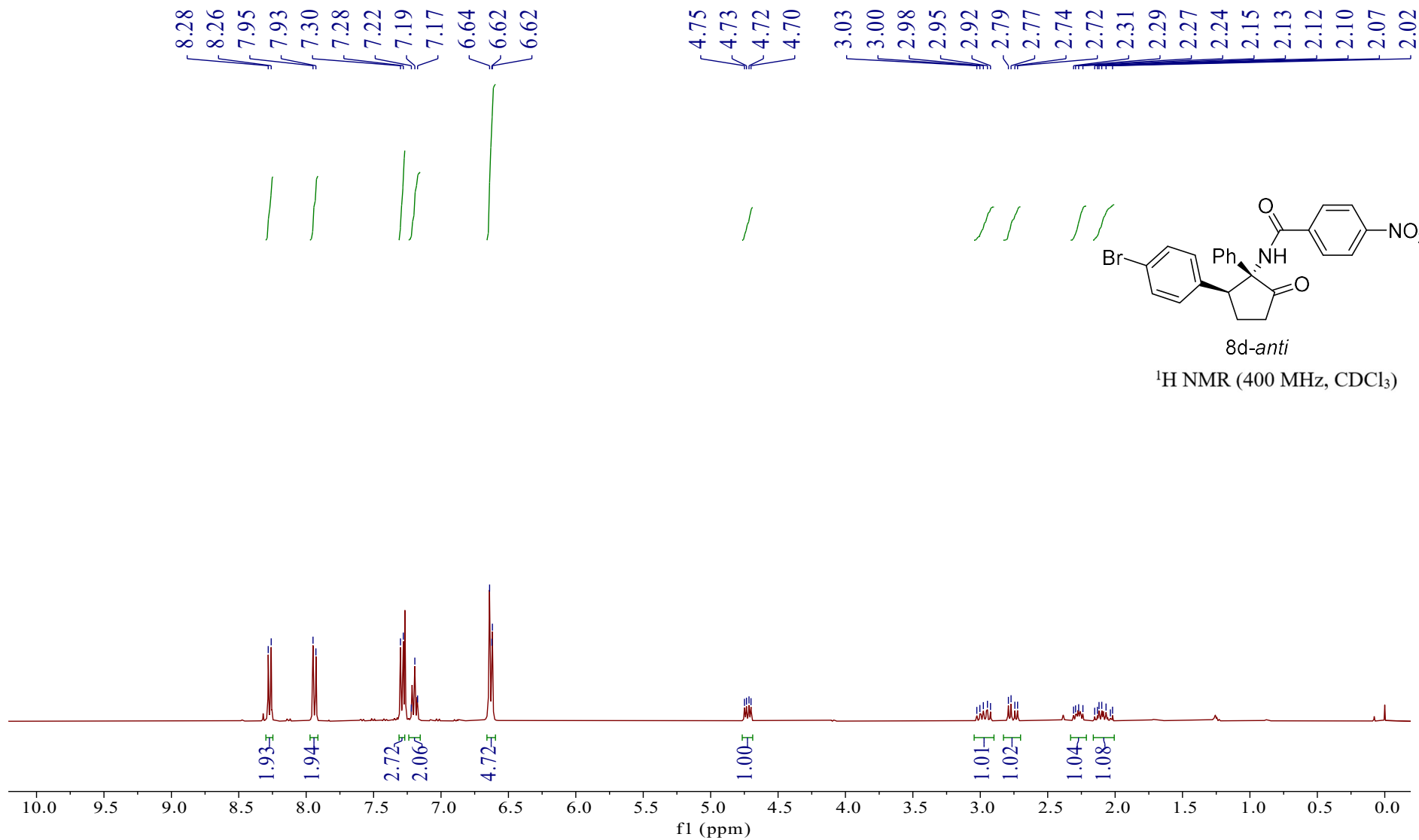


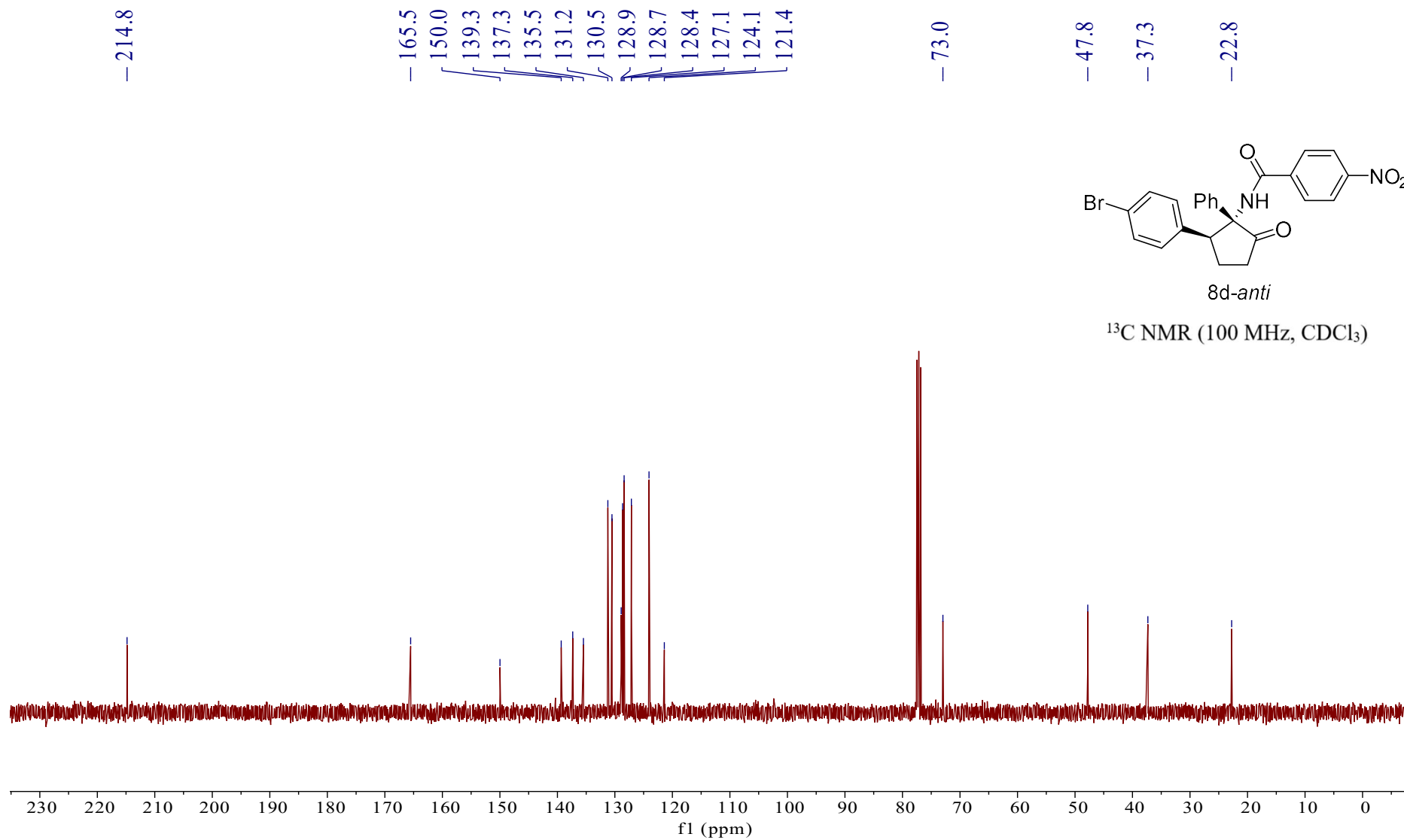
NMR-223



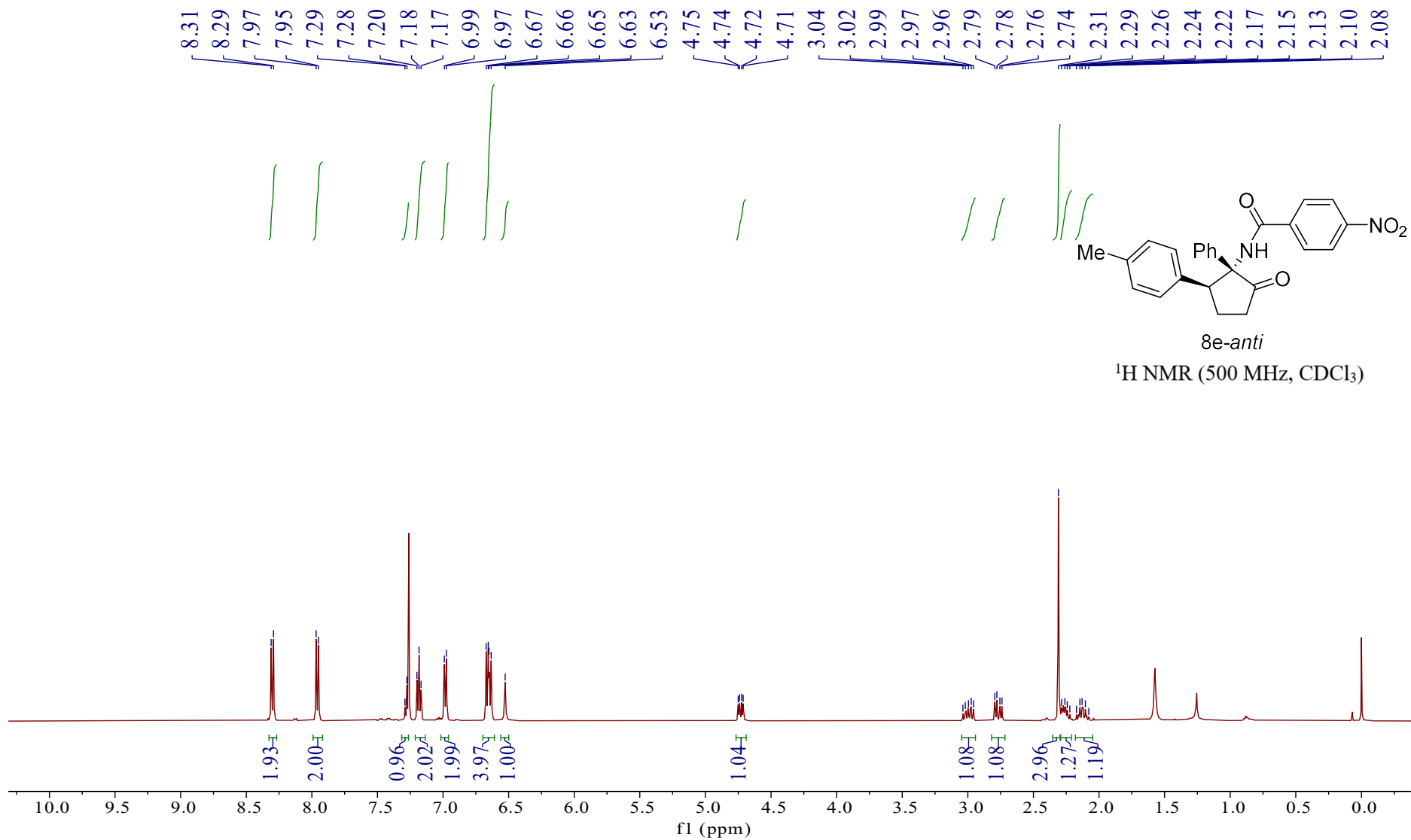


NMR-225





NMR-227



NMR-228

-215.3

-165.3

-149.9

-139.6

-137.0

-135.7

-135.1

-128.8

-128.7

-128.6

-128.4

-127.3

-124.0

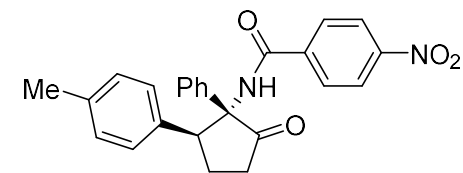
-73.1

-47.9

-37.4

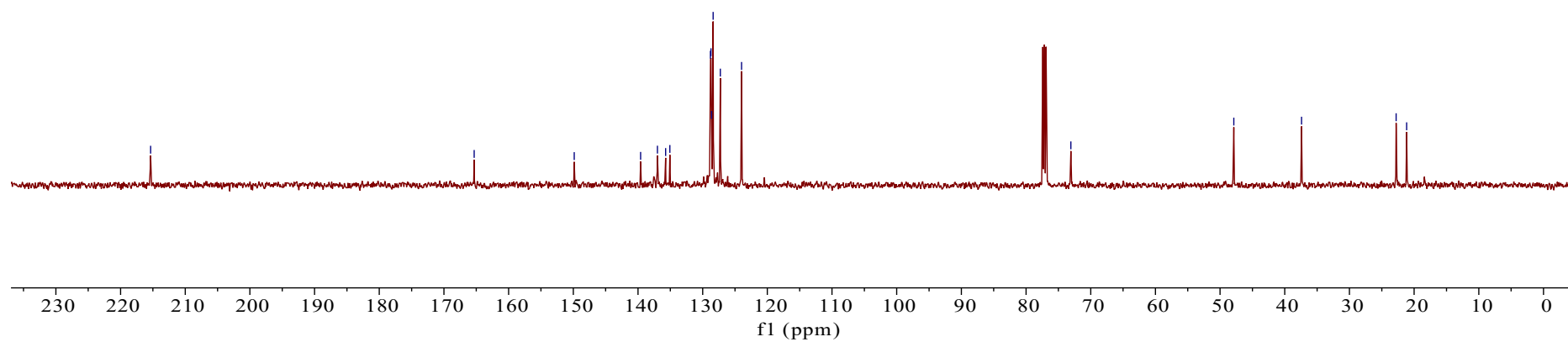
-22.8

-21.2

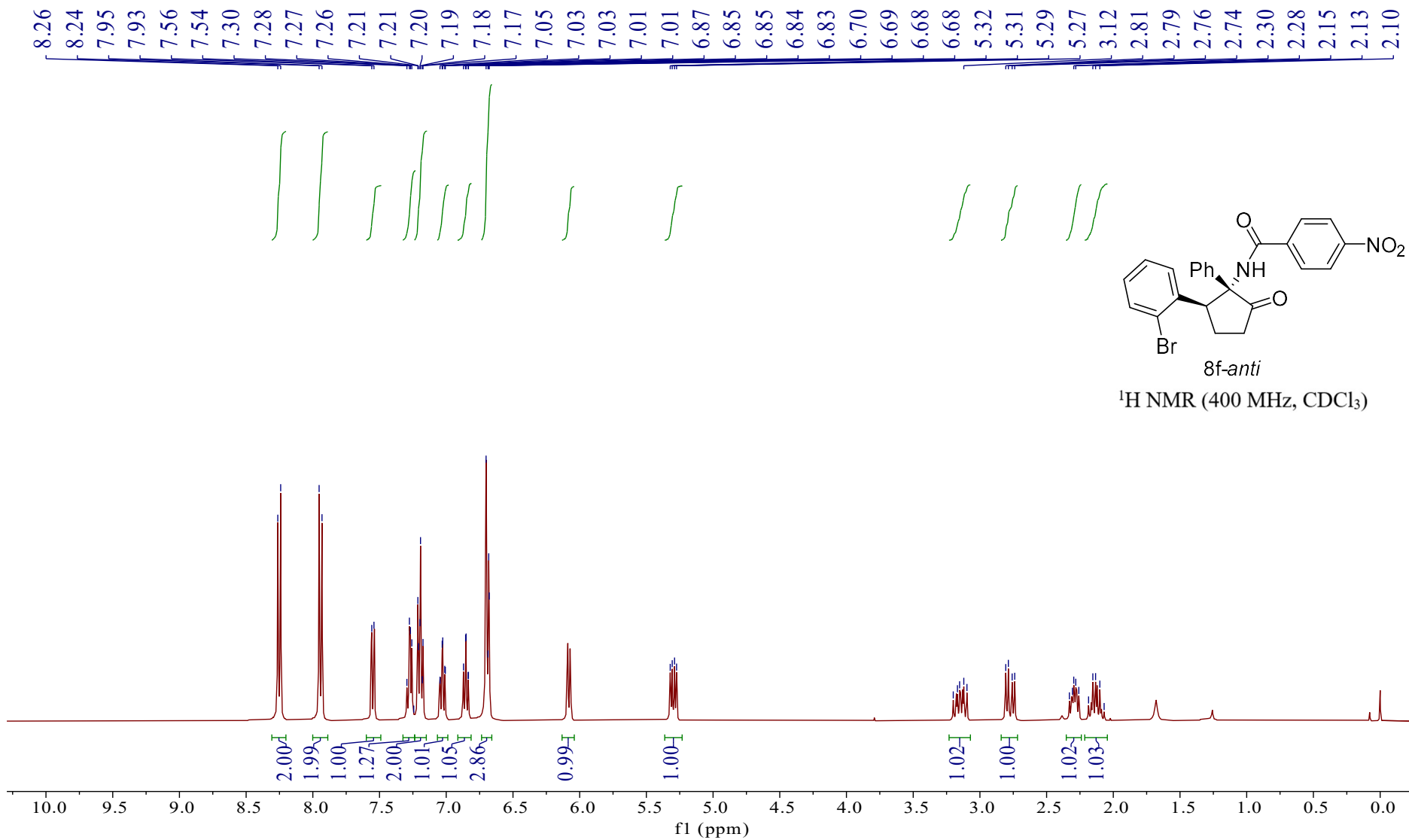


8e-anti

¹³C NMR (125 MHz, CDCl₃)



NMR-229



NMR-230

-215.4

-165.8

-149.8

-139.6

-138.1

-136.1

-133.0

-130.5

-128.8

-128.7

-128.6

-127.2

-126.6

-125.9

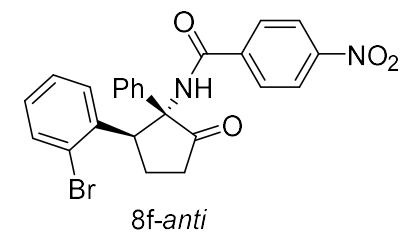
-123.9

-72.8

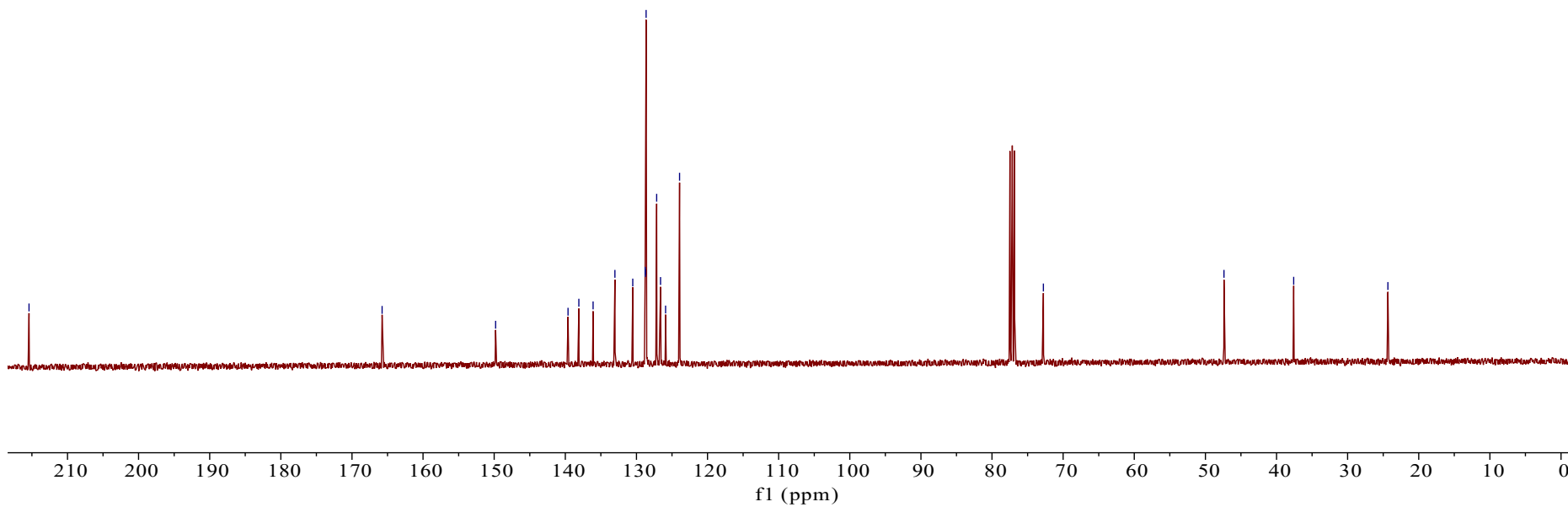
-47.4

-37.6

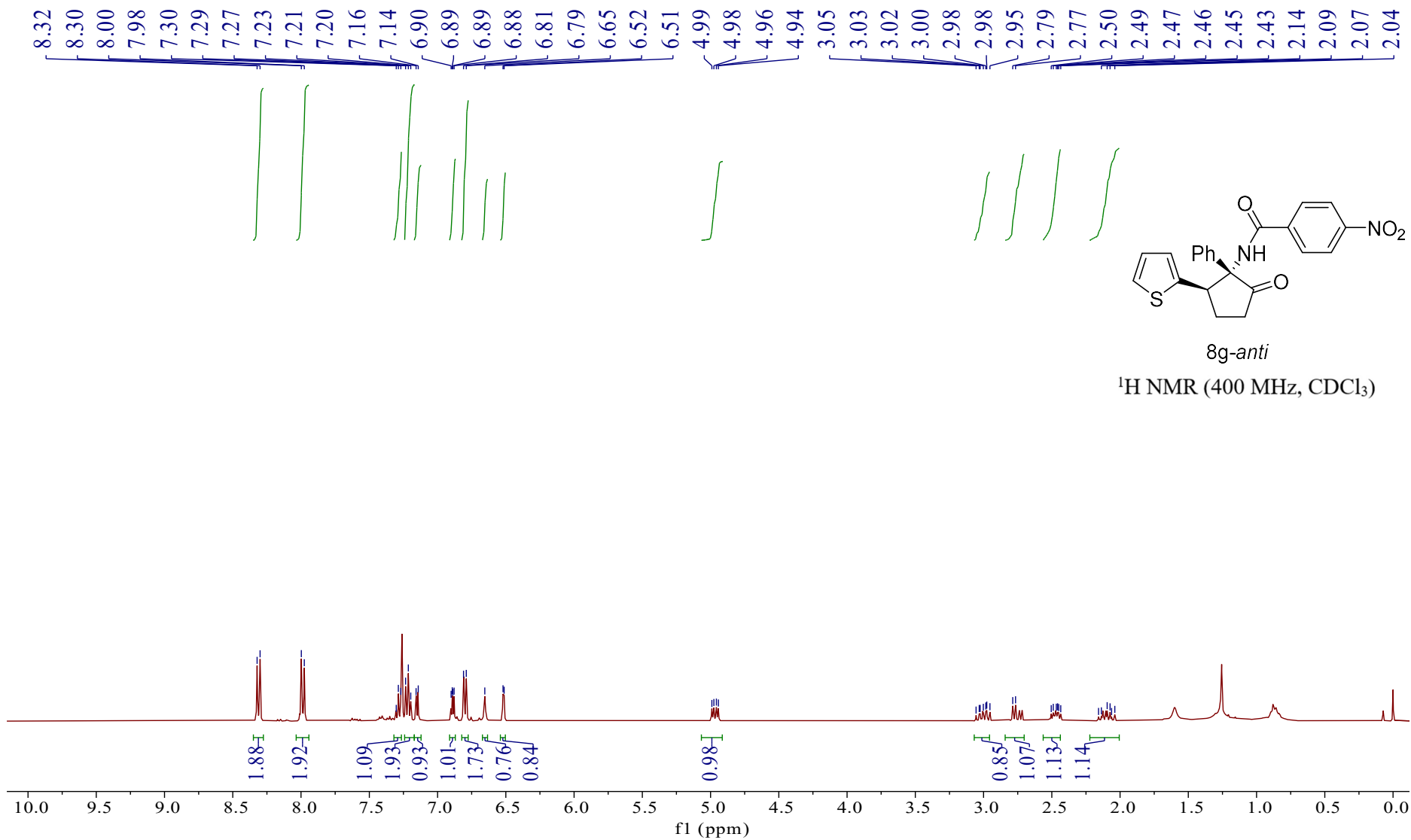
-24.3

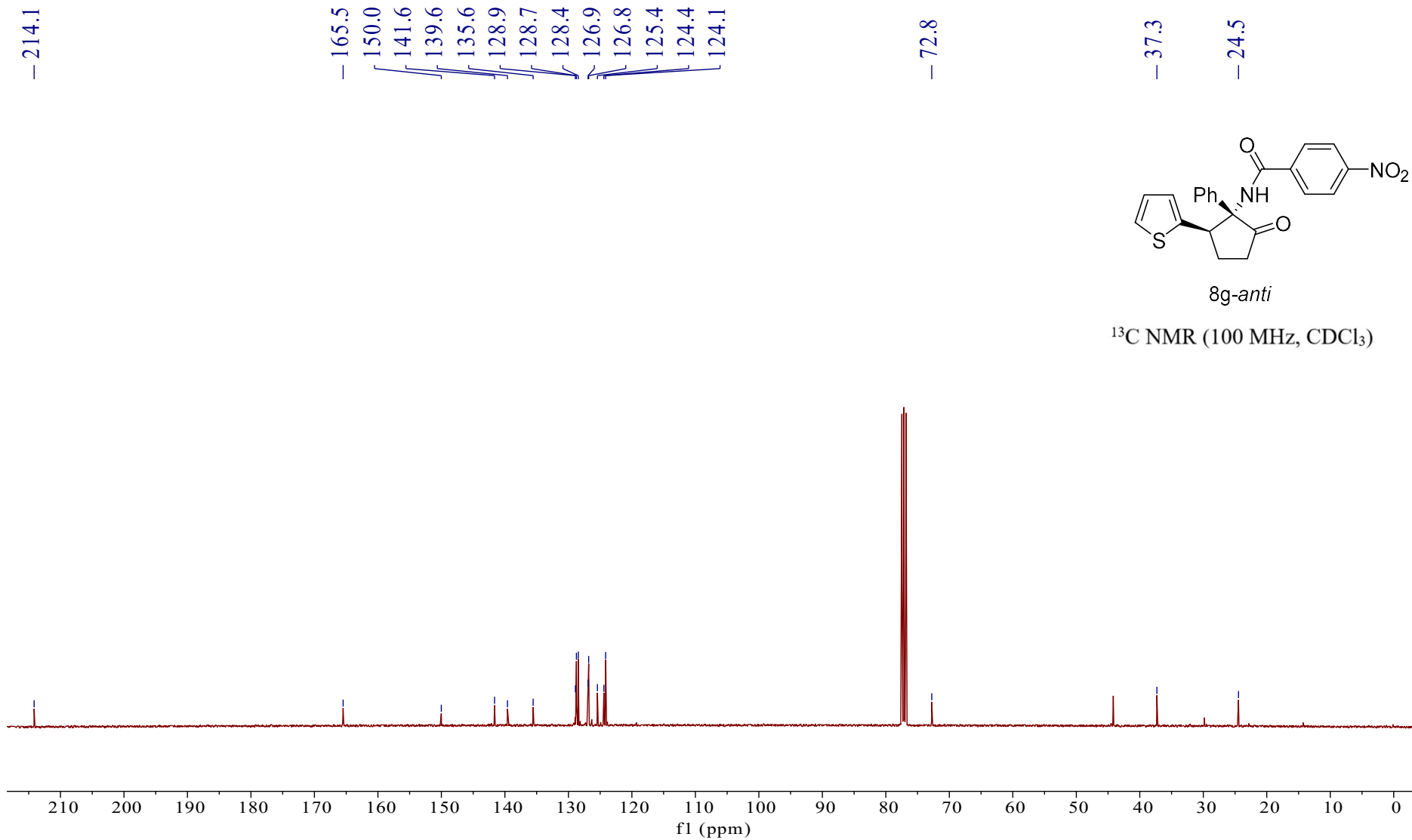


¹³C NMR (100 MHz, CDCl₃)

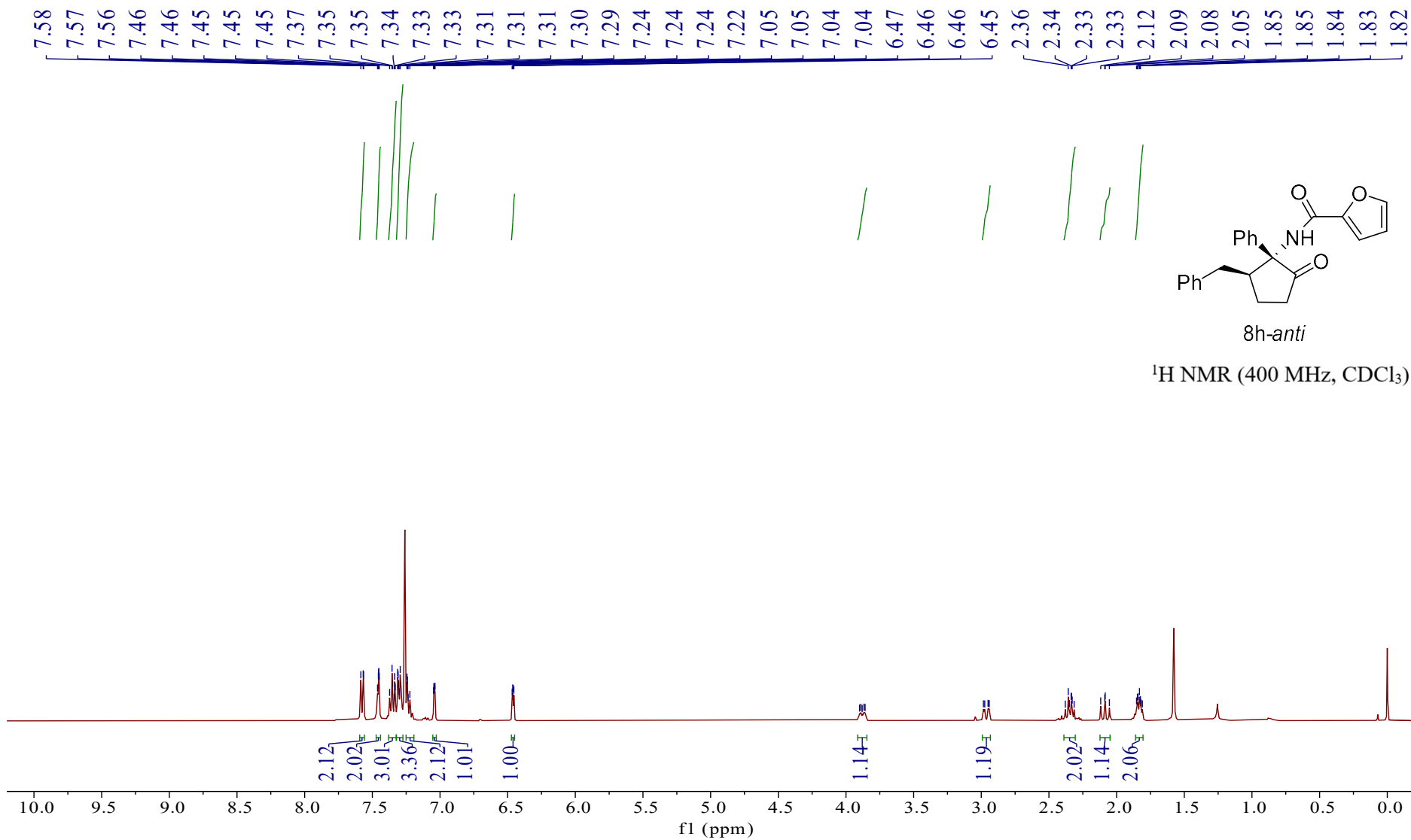


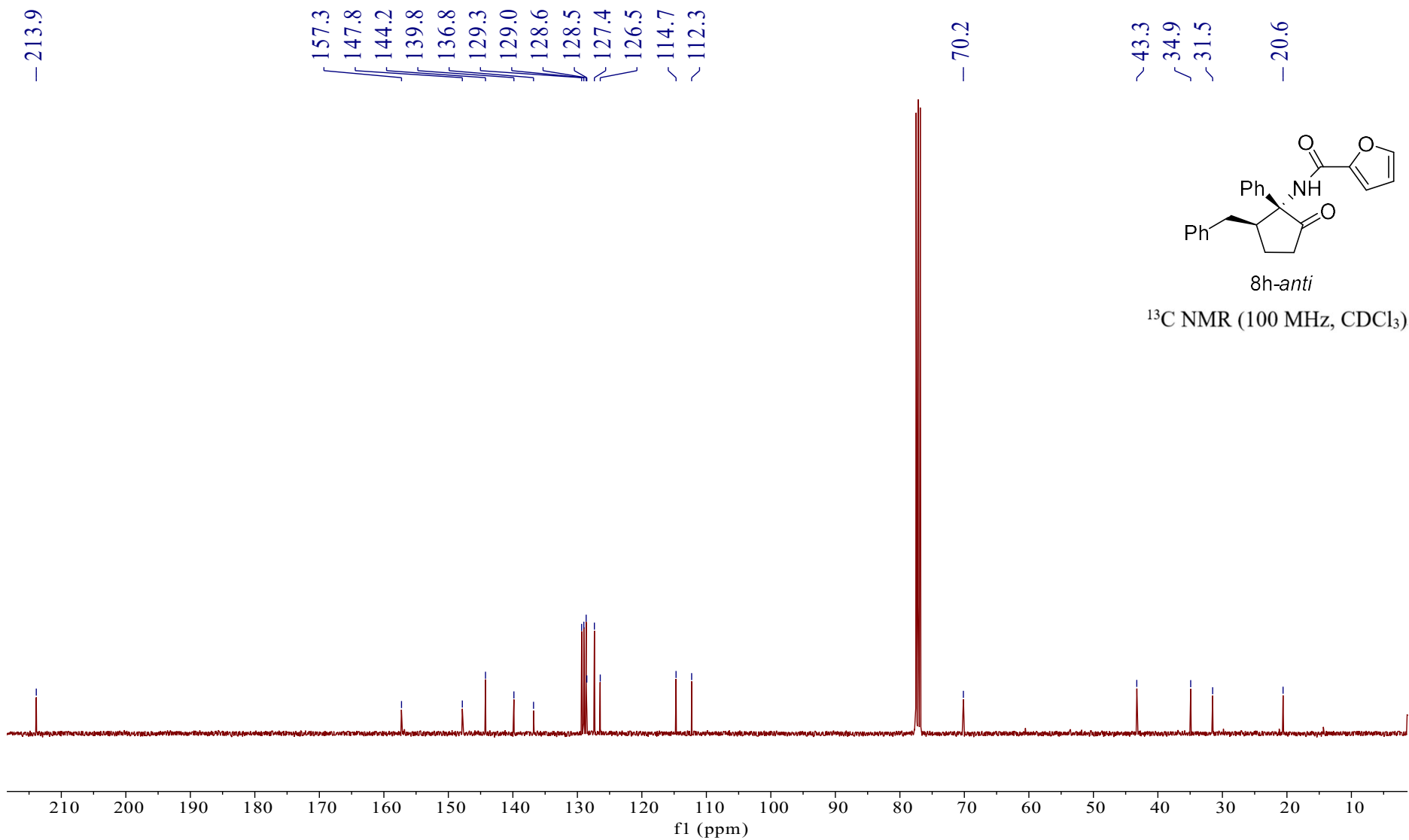
NMR-231



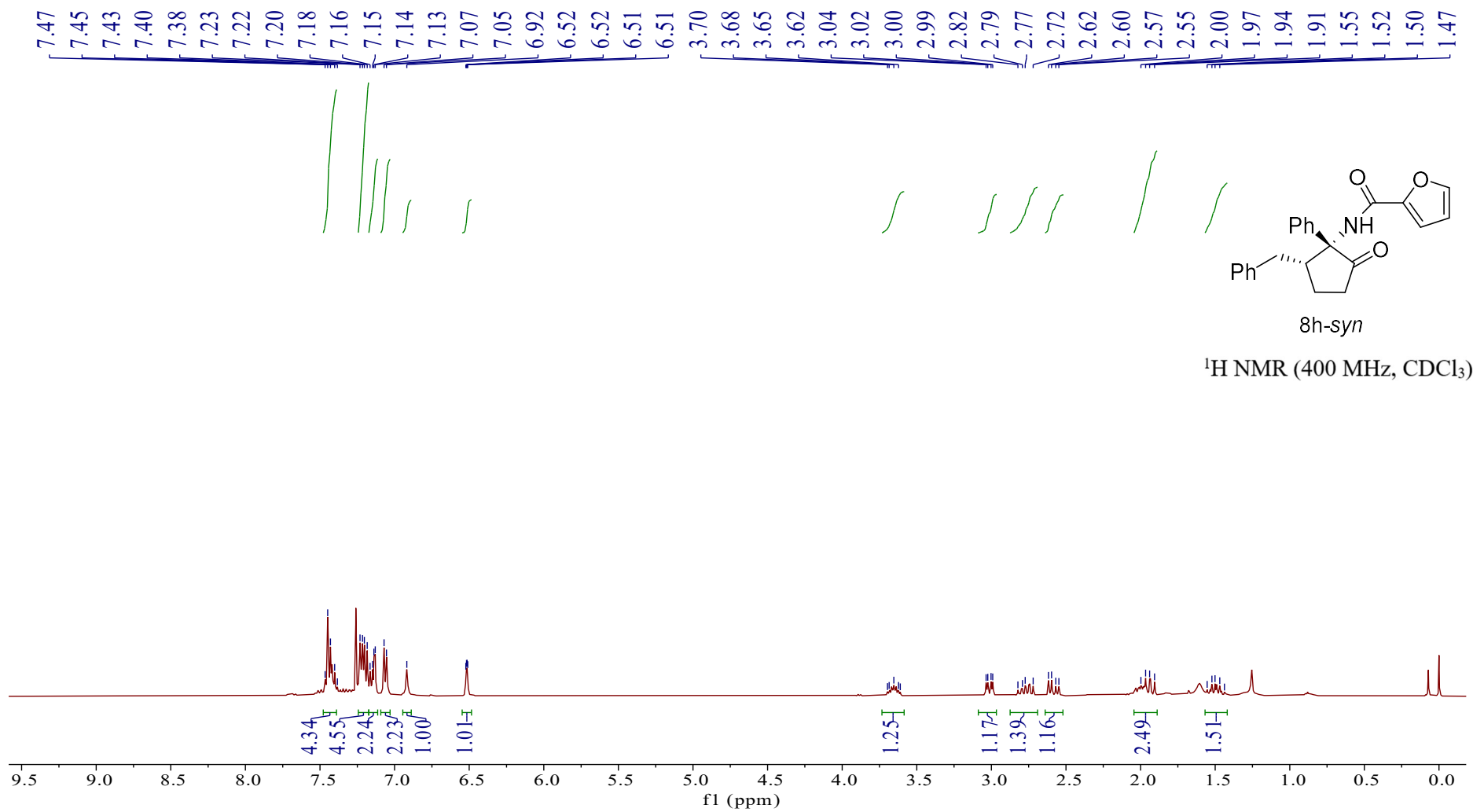


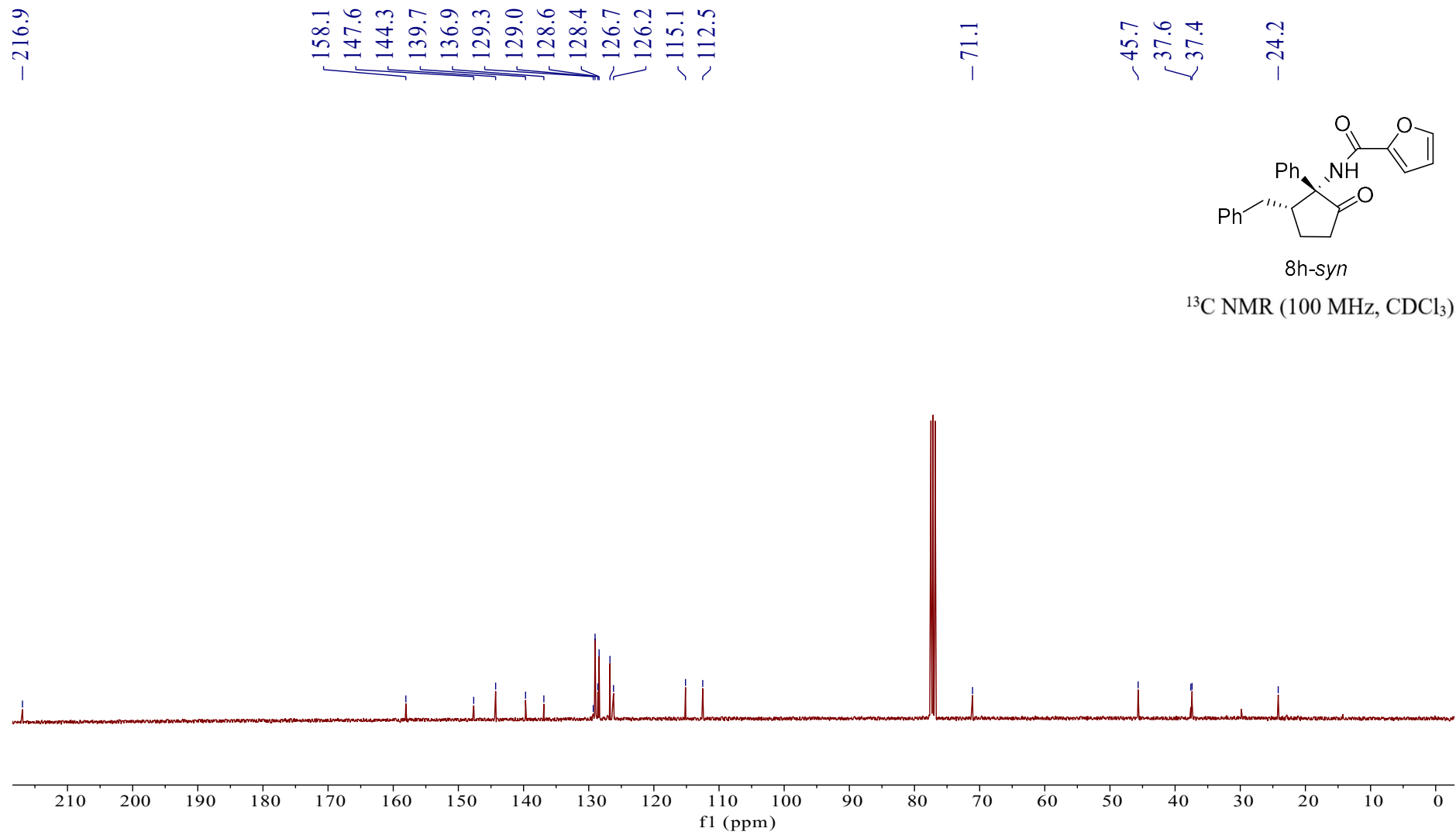
NMR-233

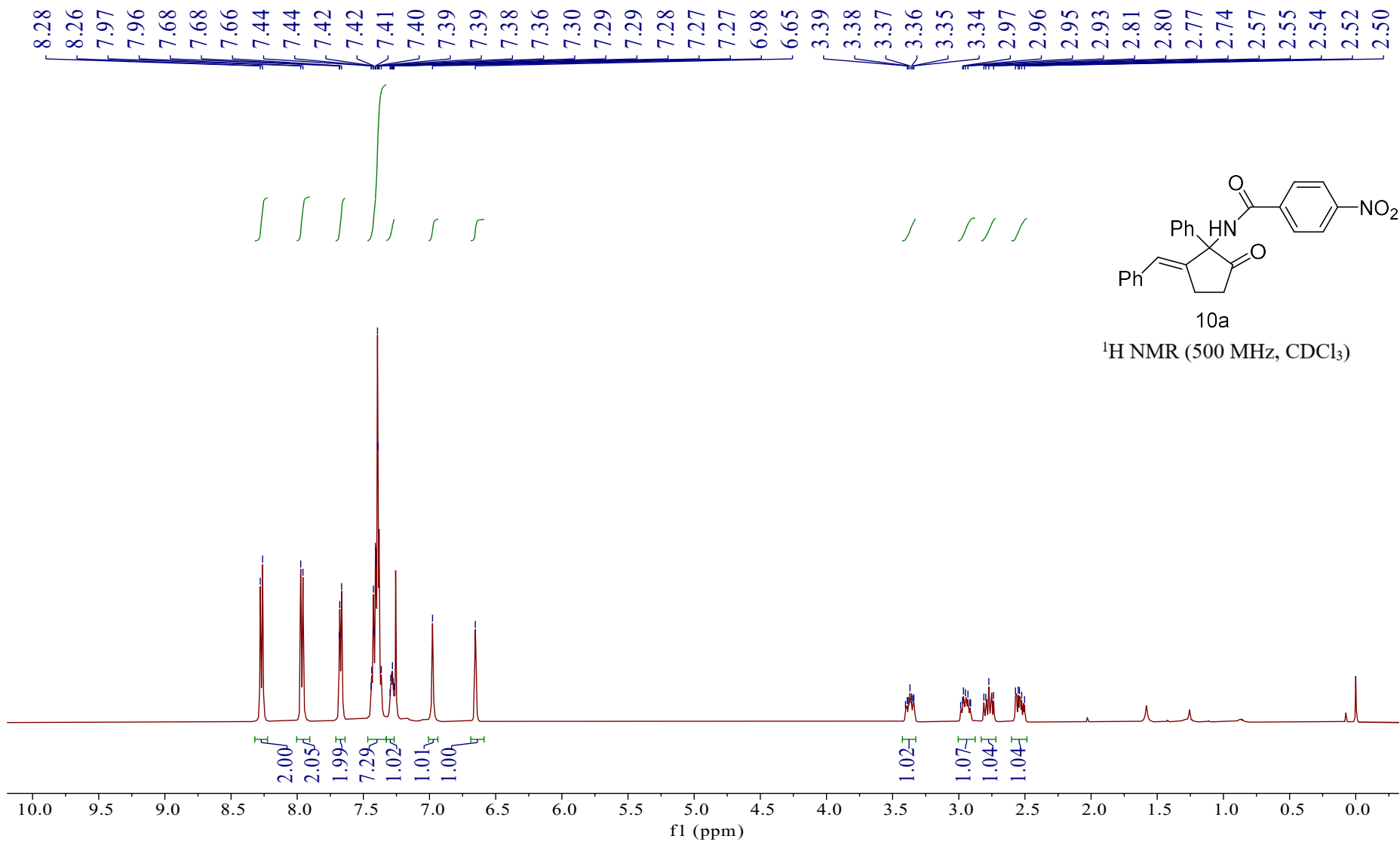


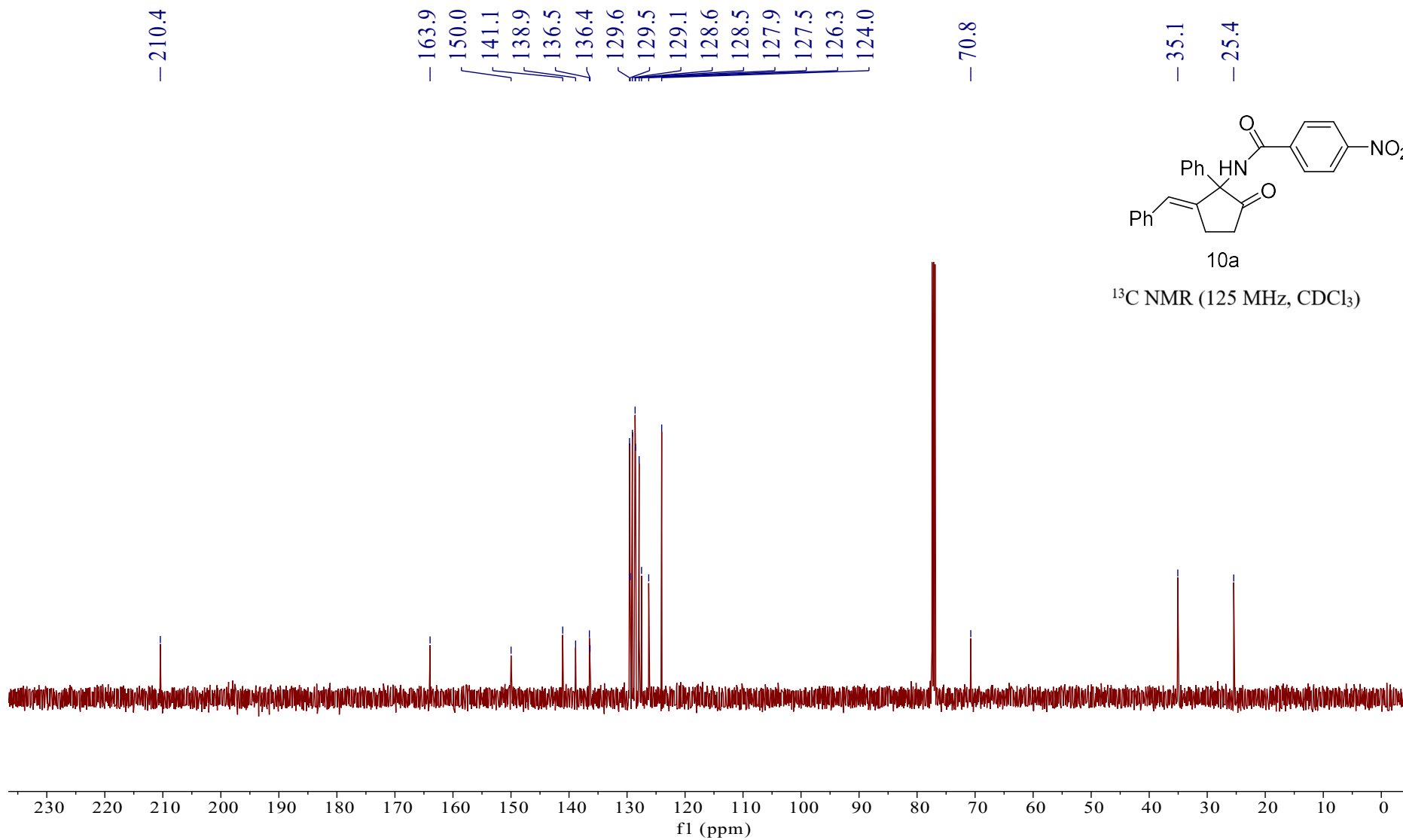


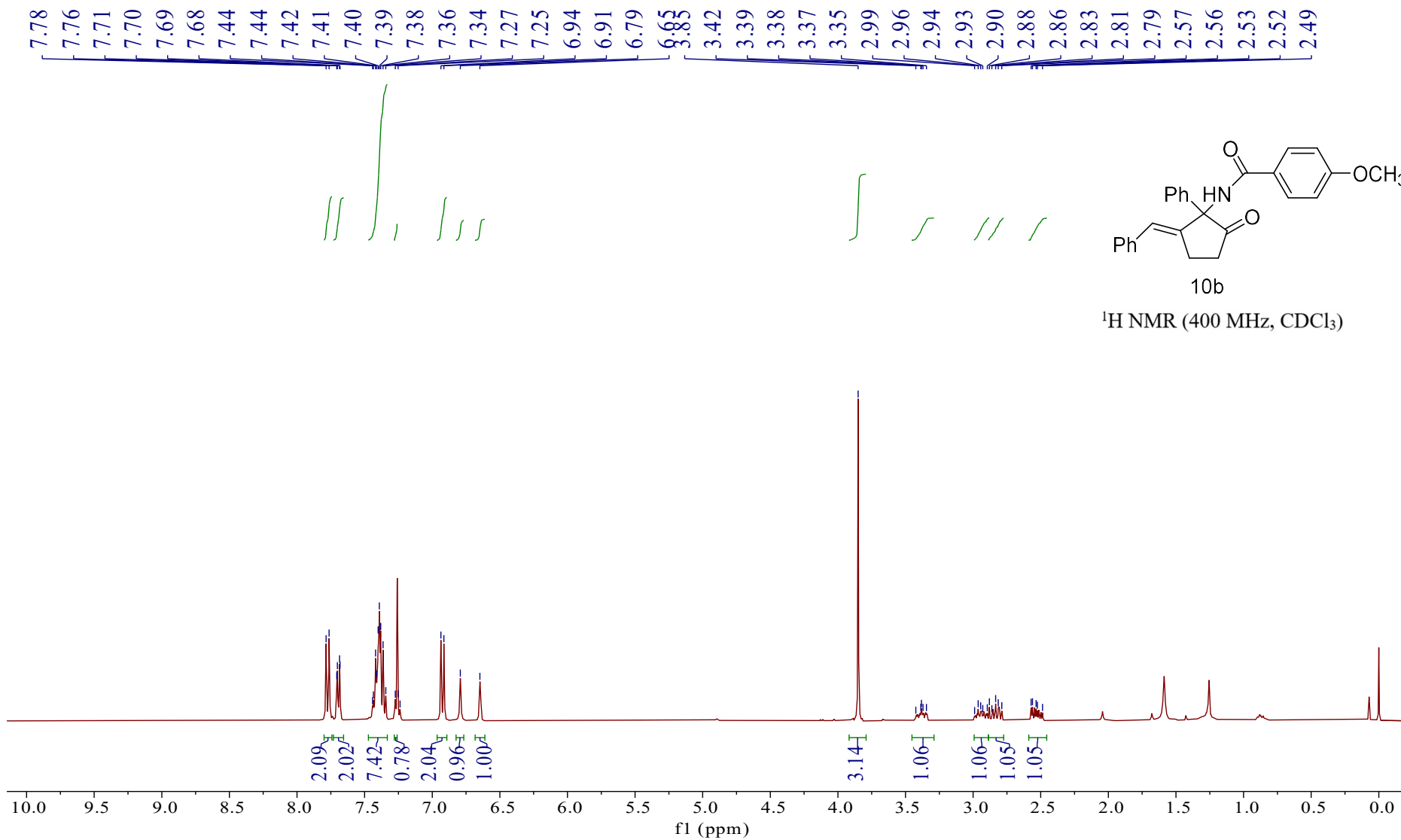
NMR-235



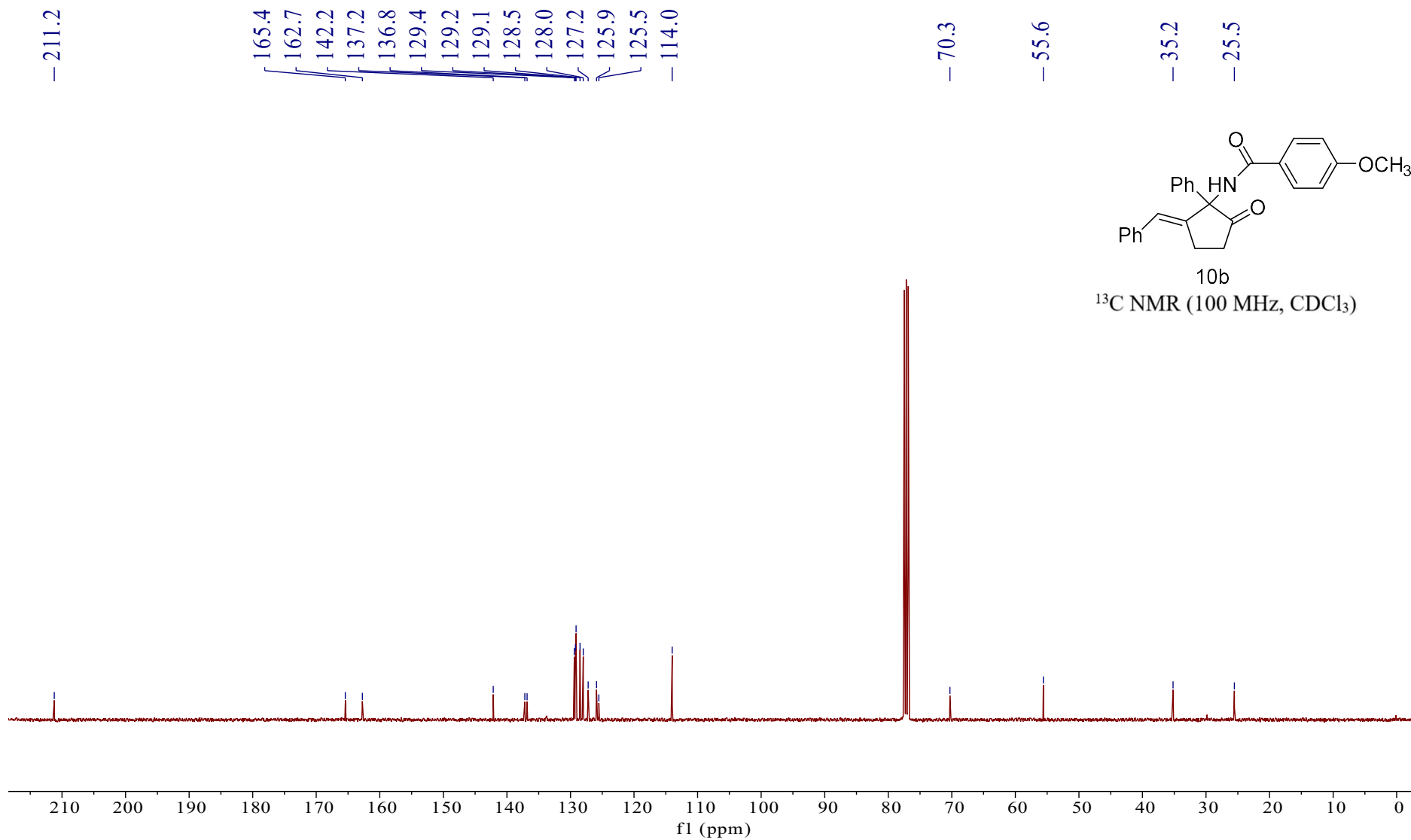




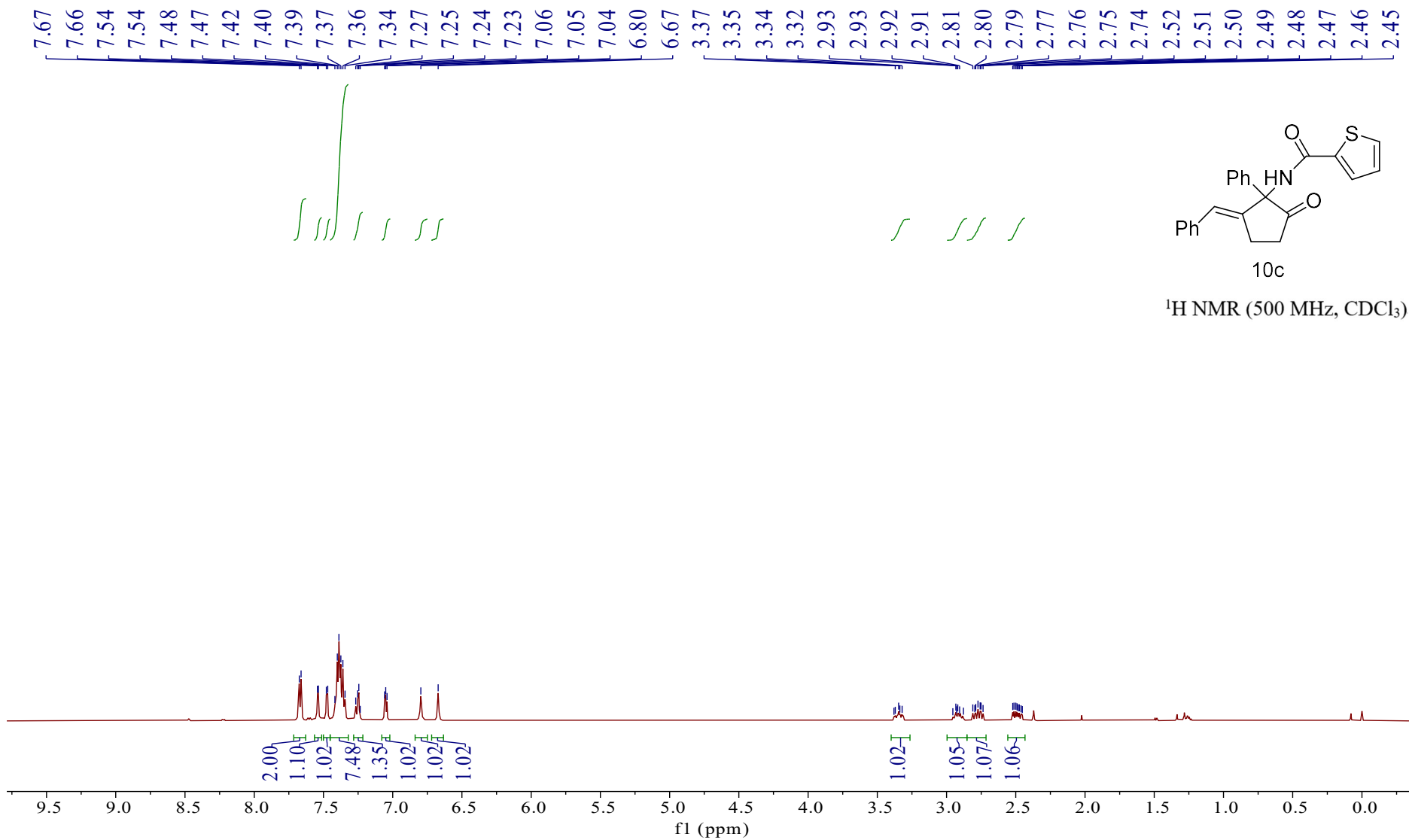


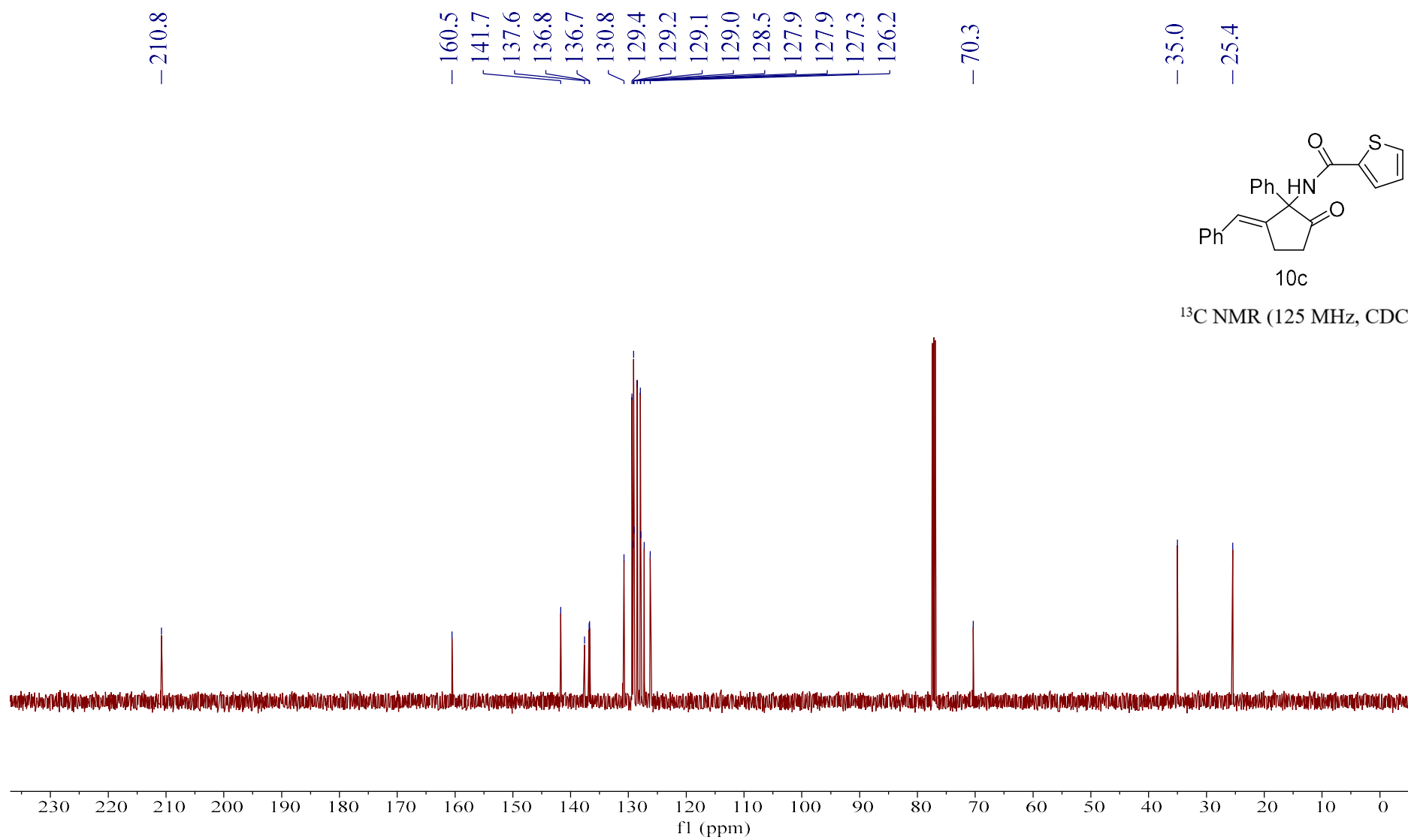


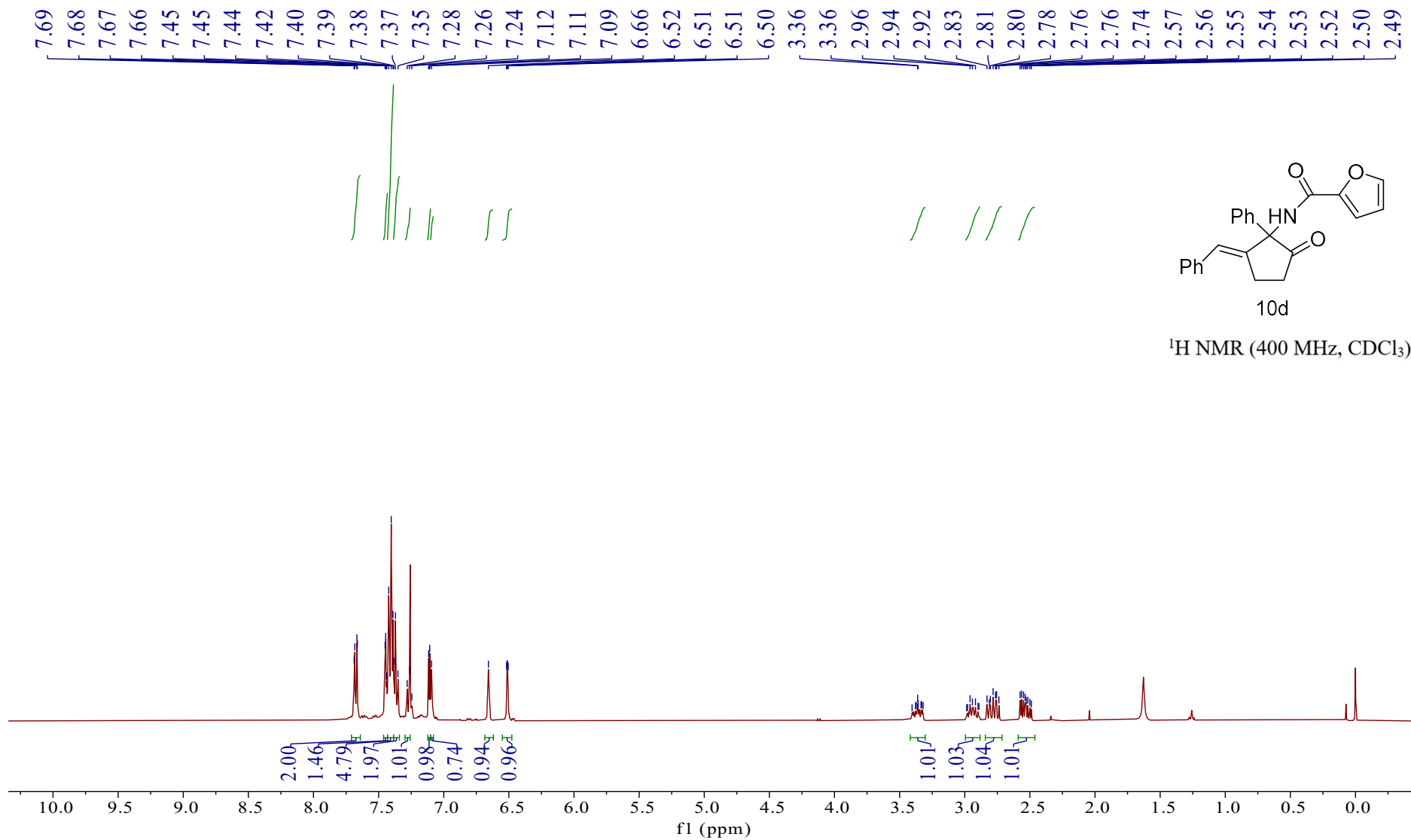
NMR-240



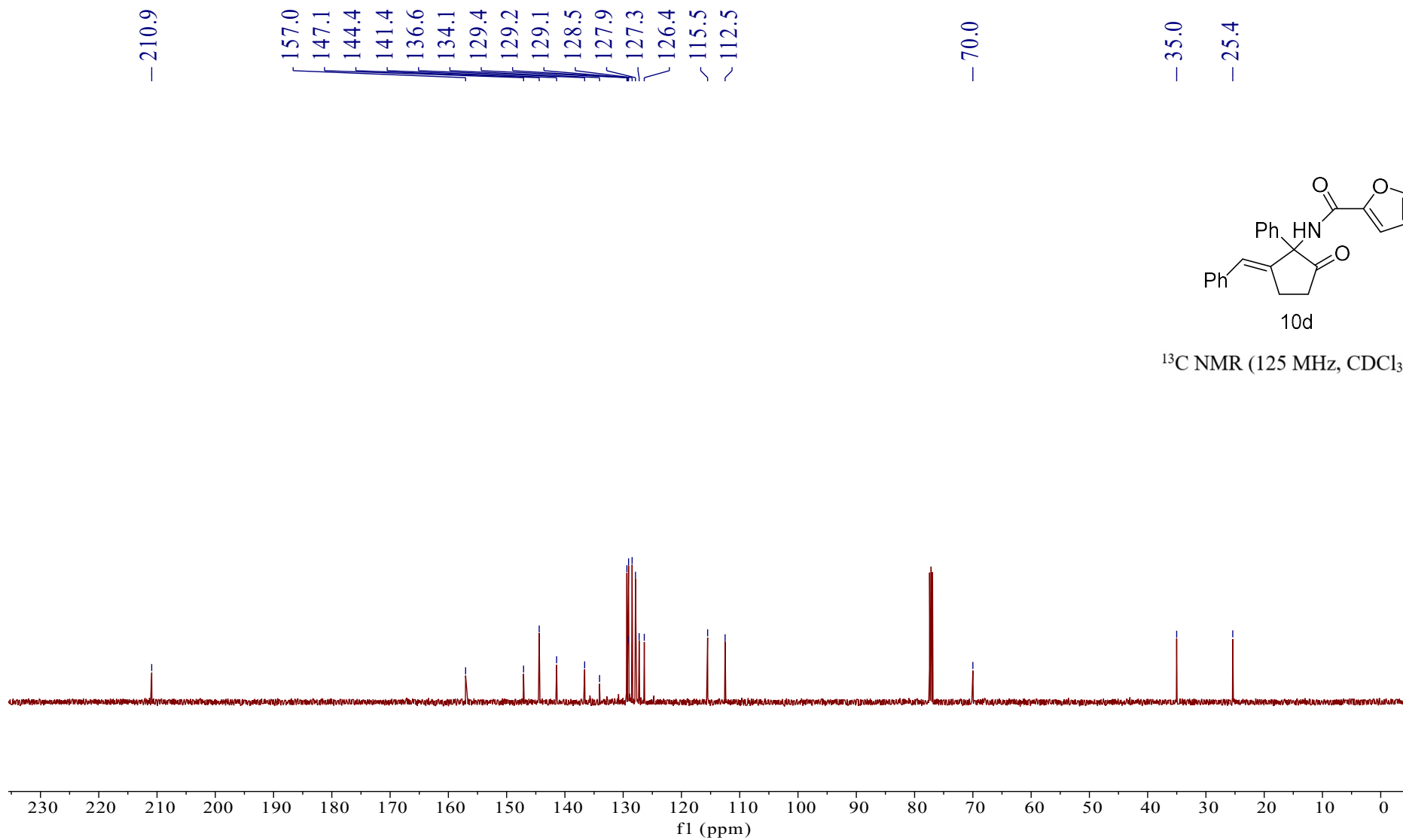
NMR-241



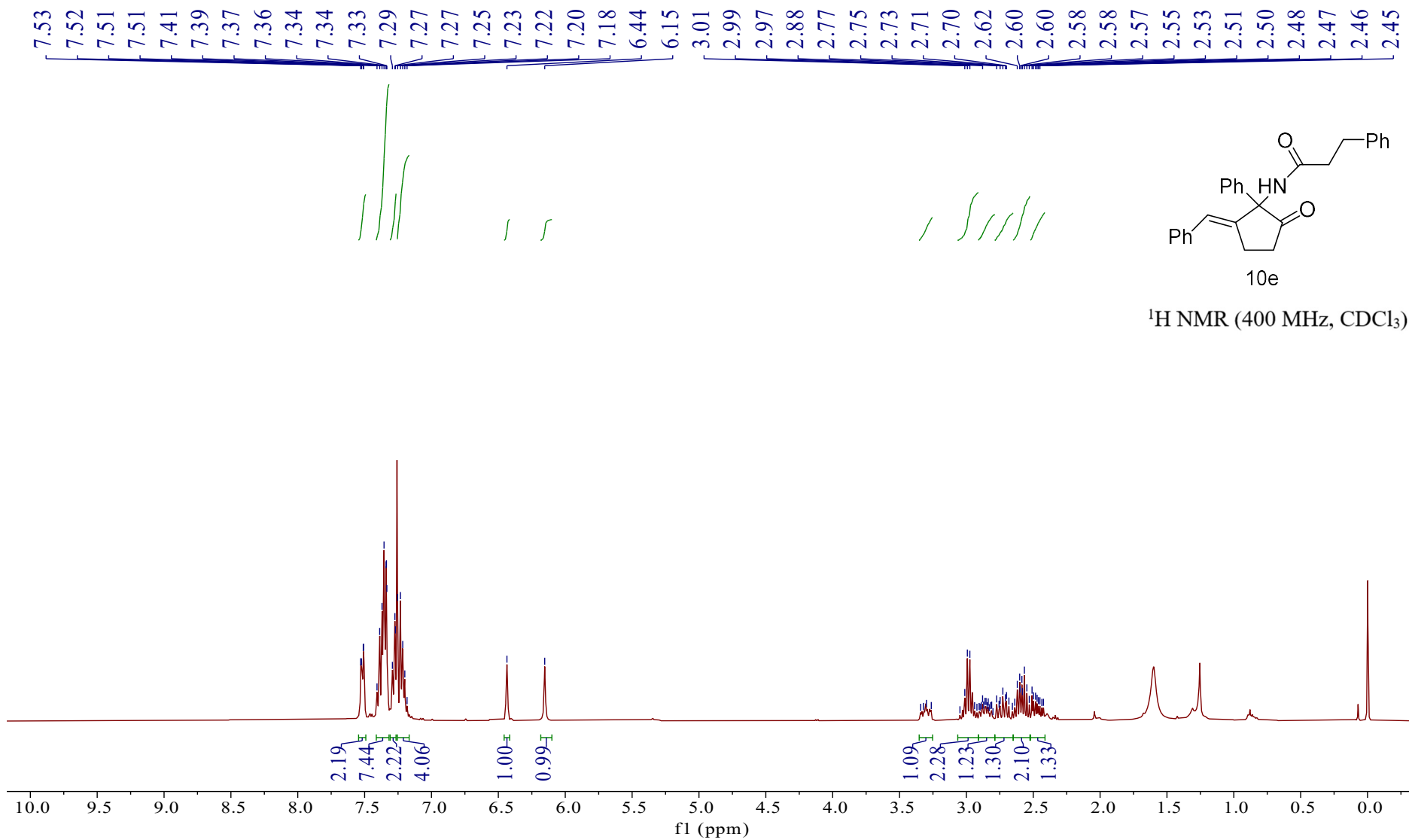


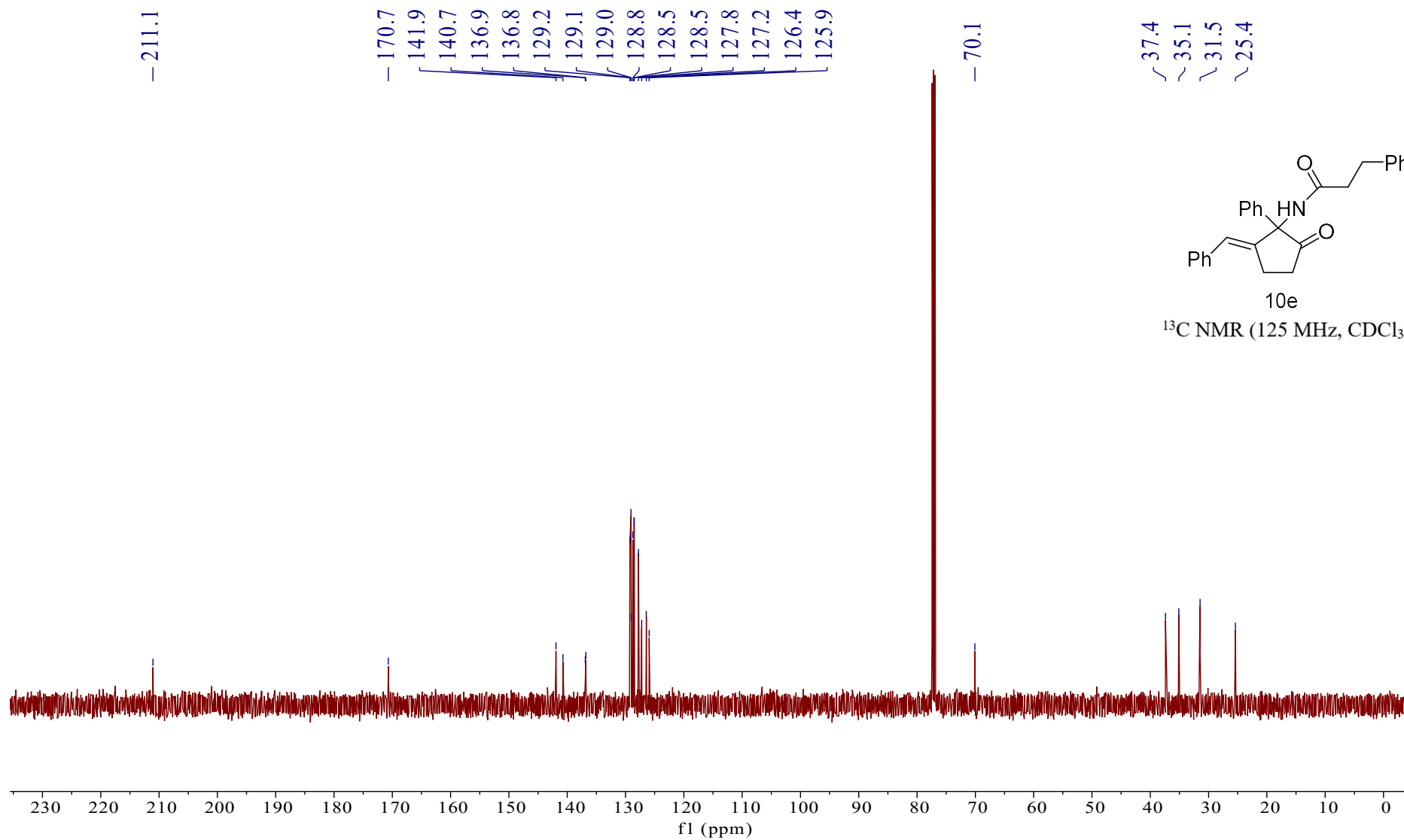


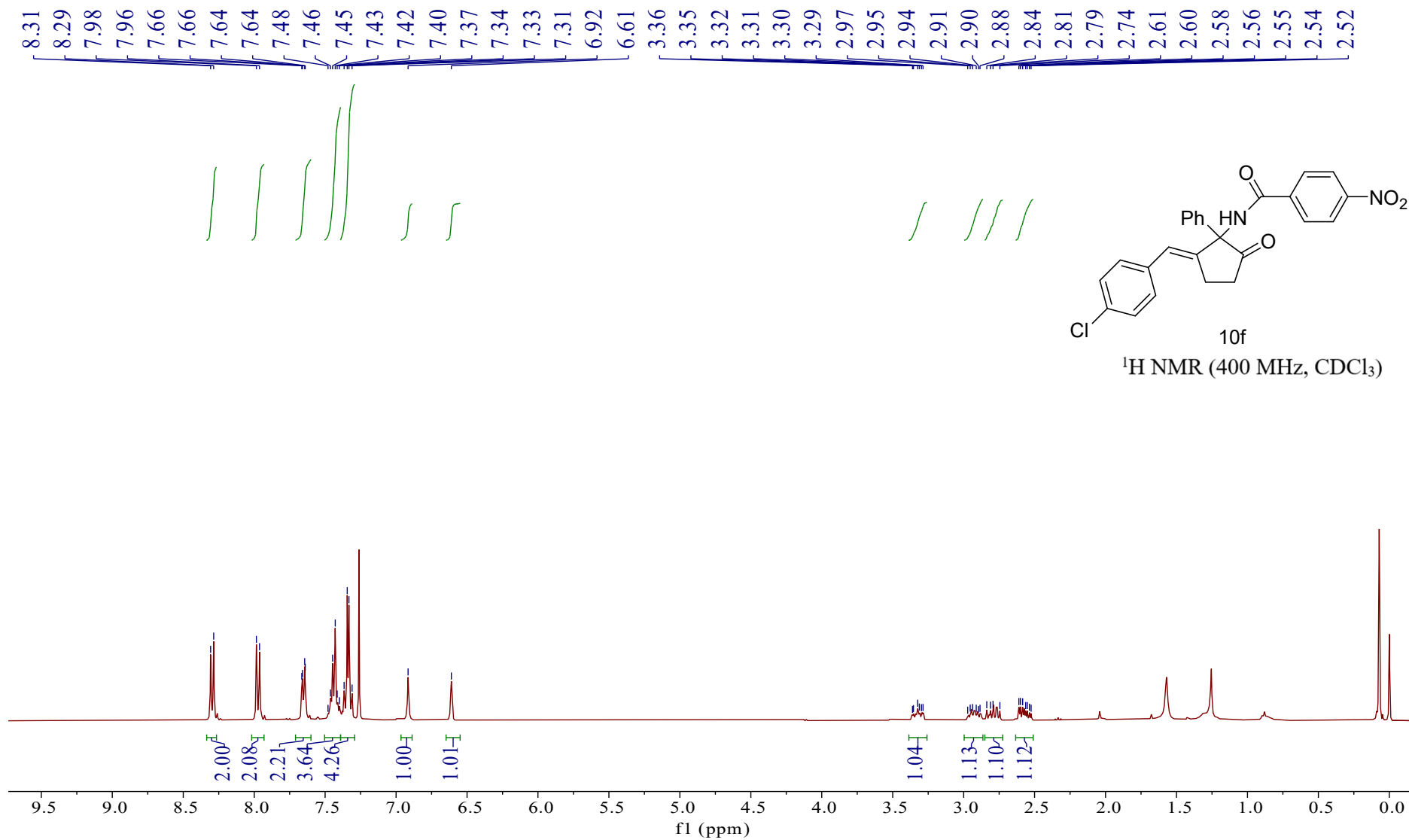
NMR-244



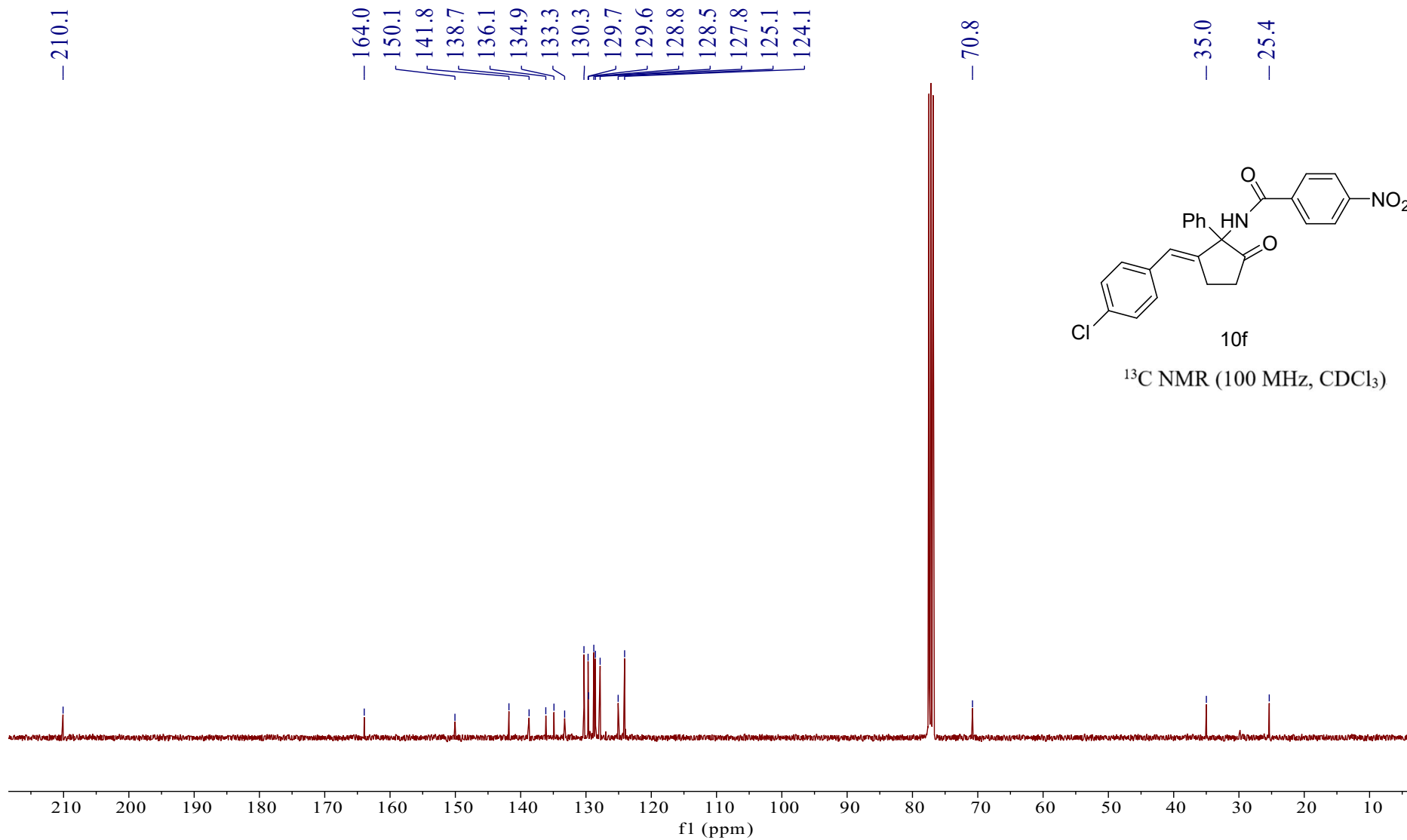
NMR-245

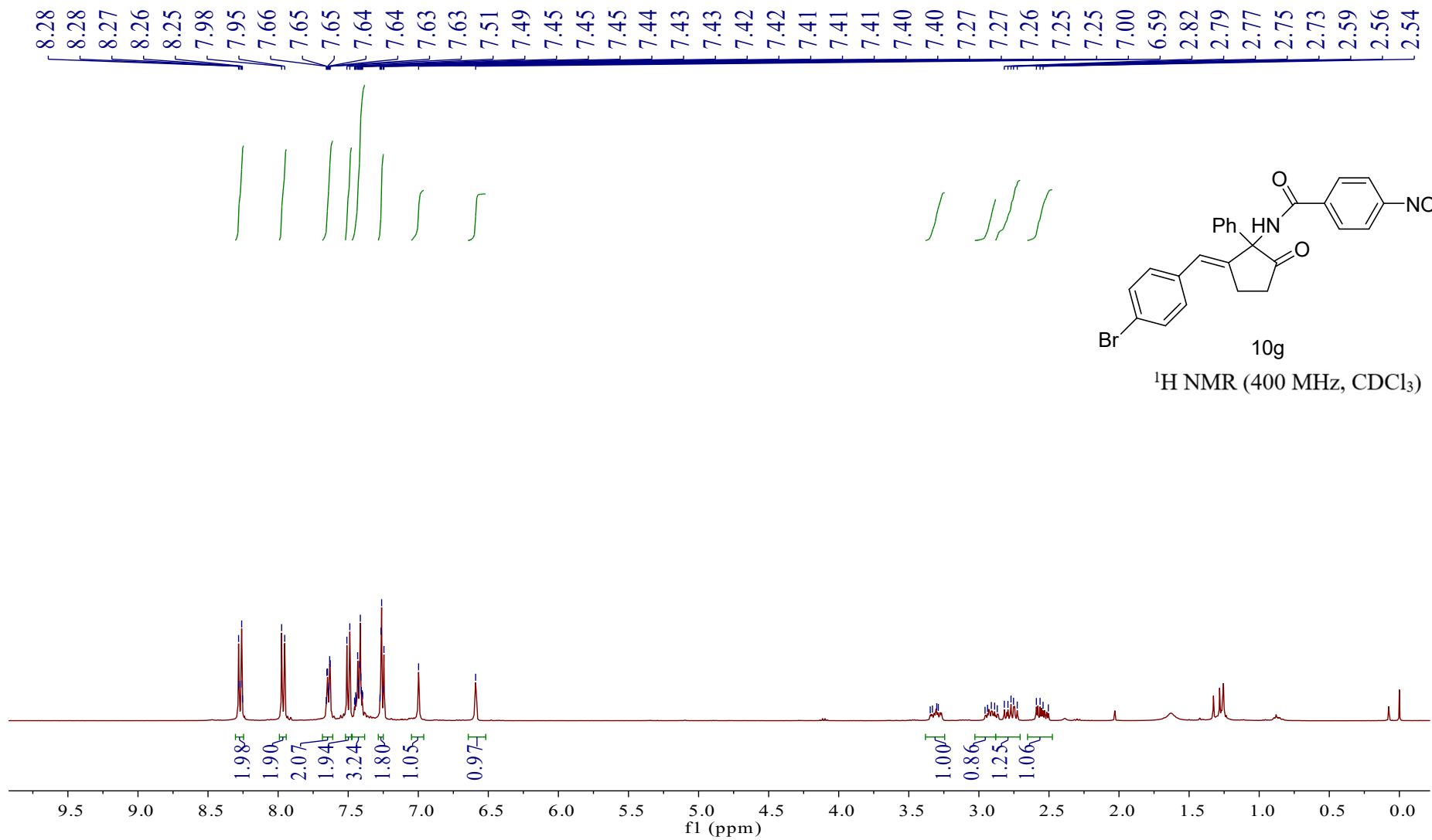


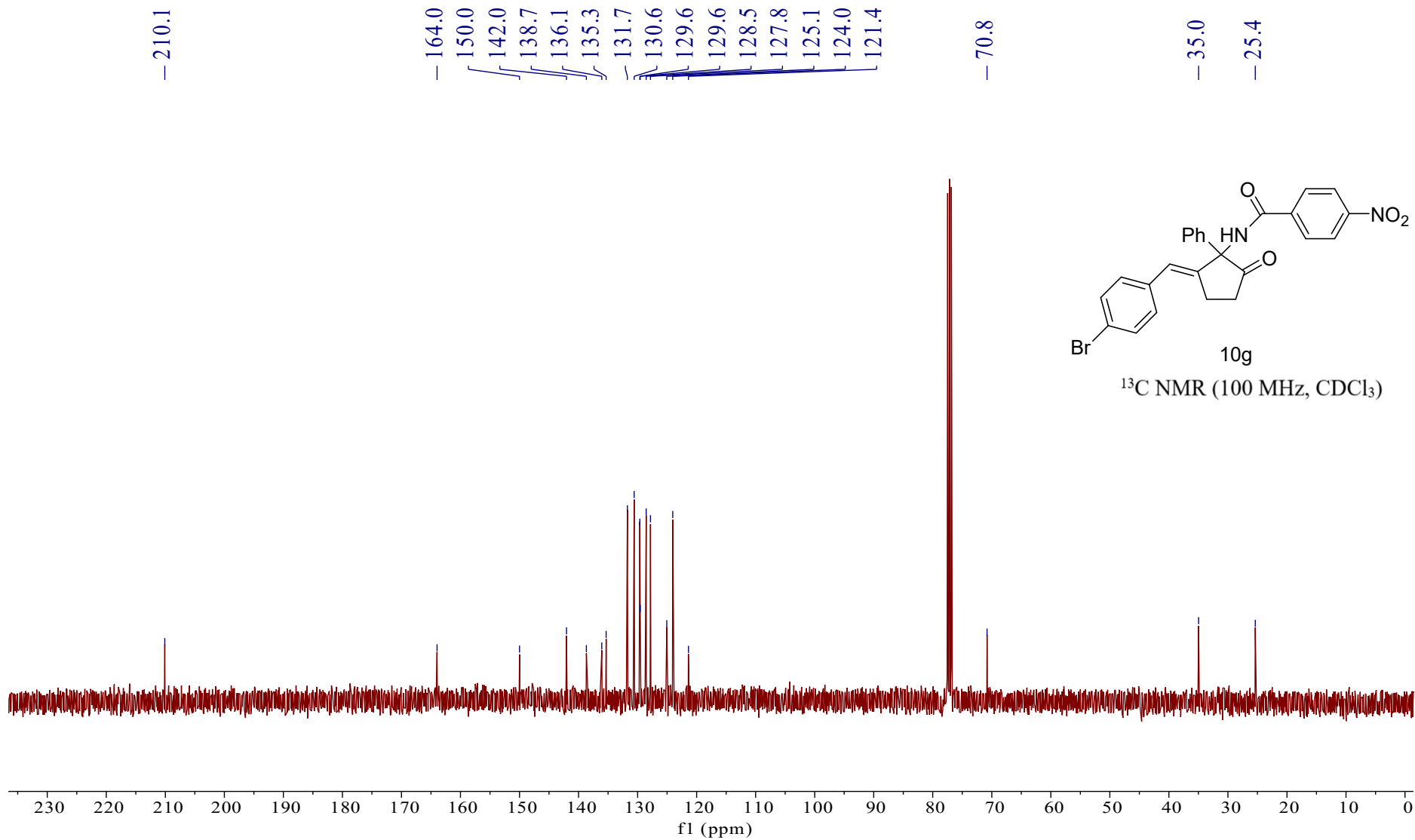




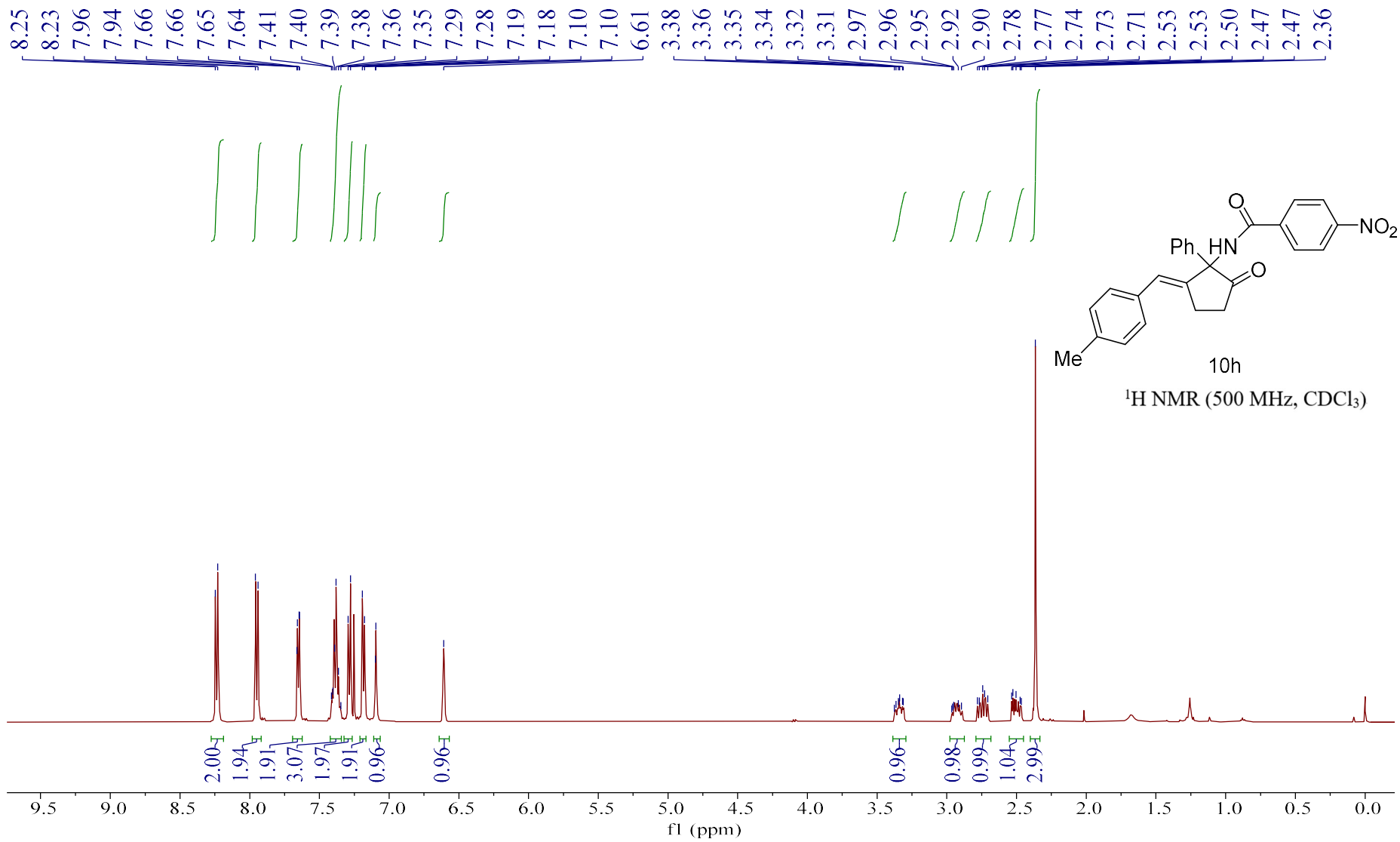
NMR-248

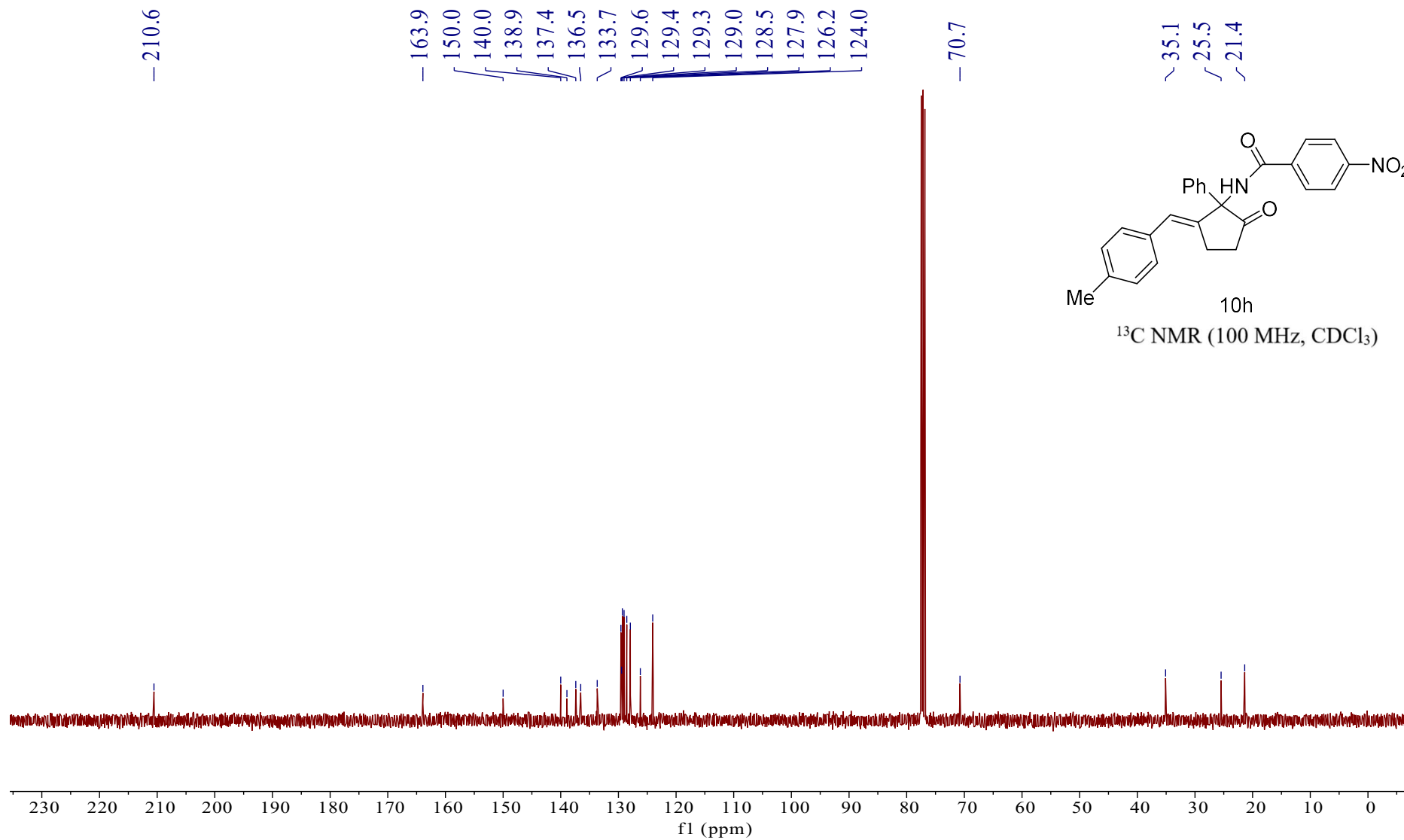




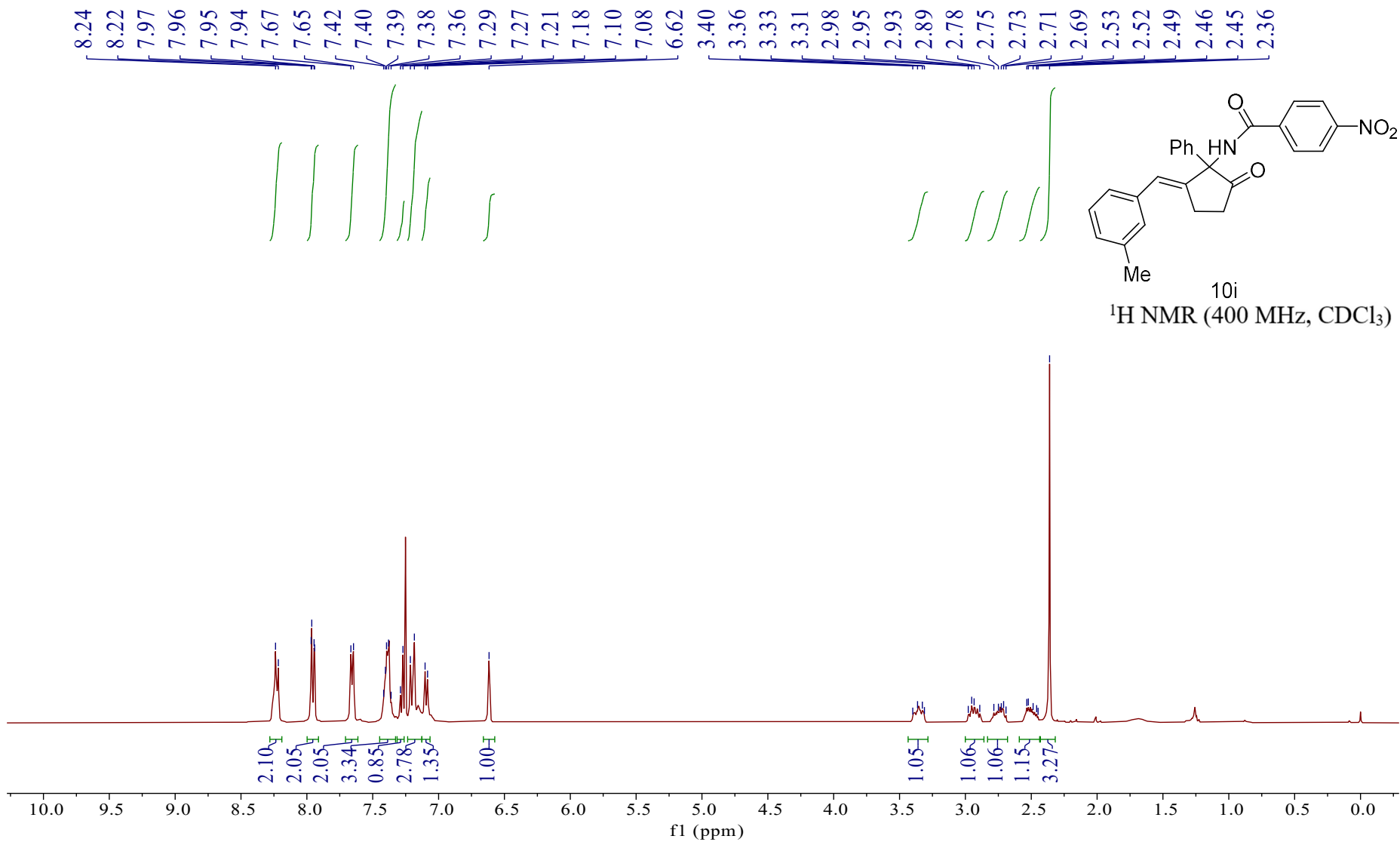


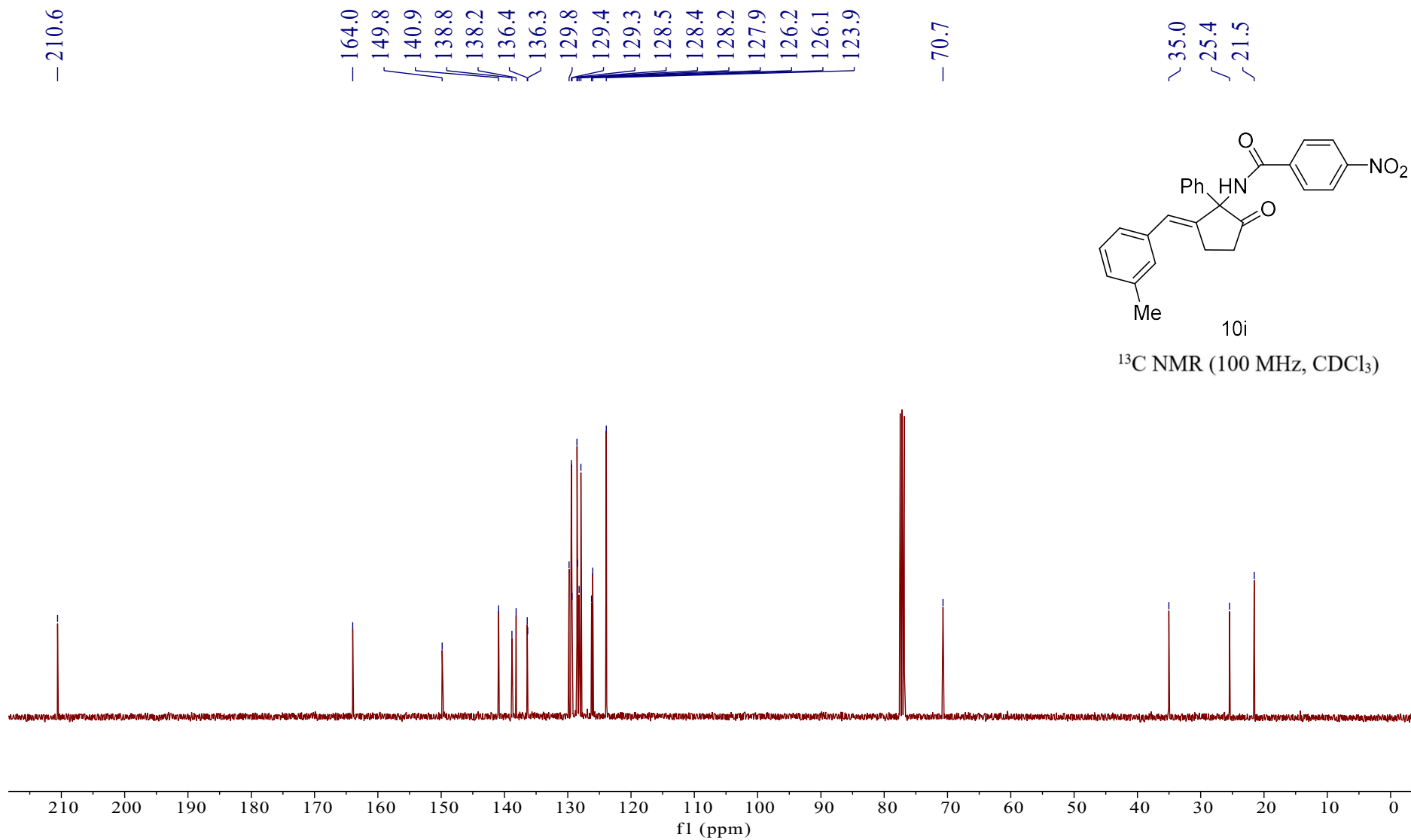
NMR-251



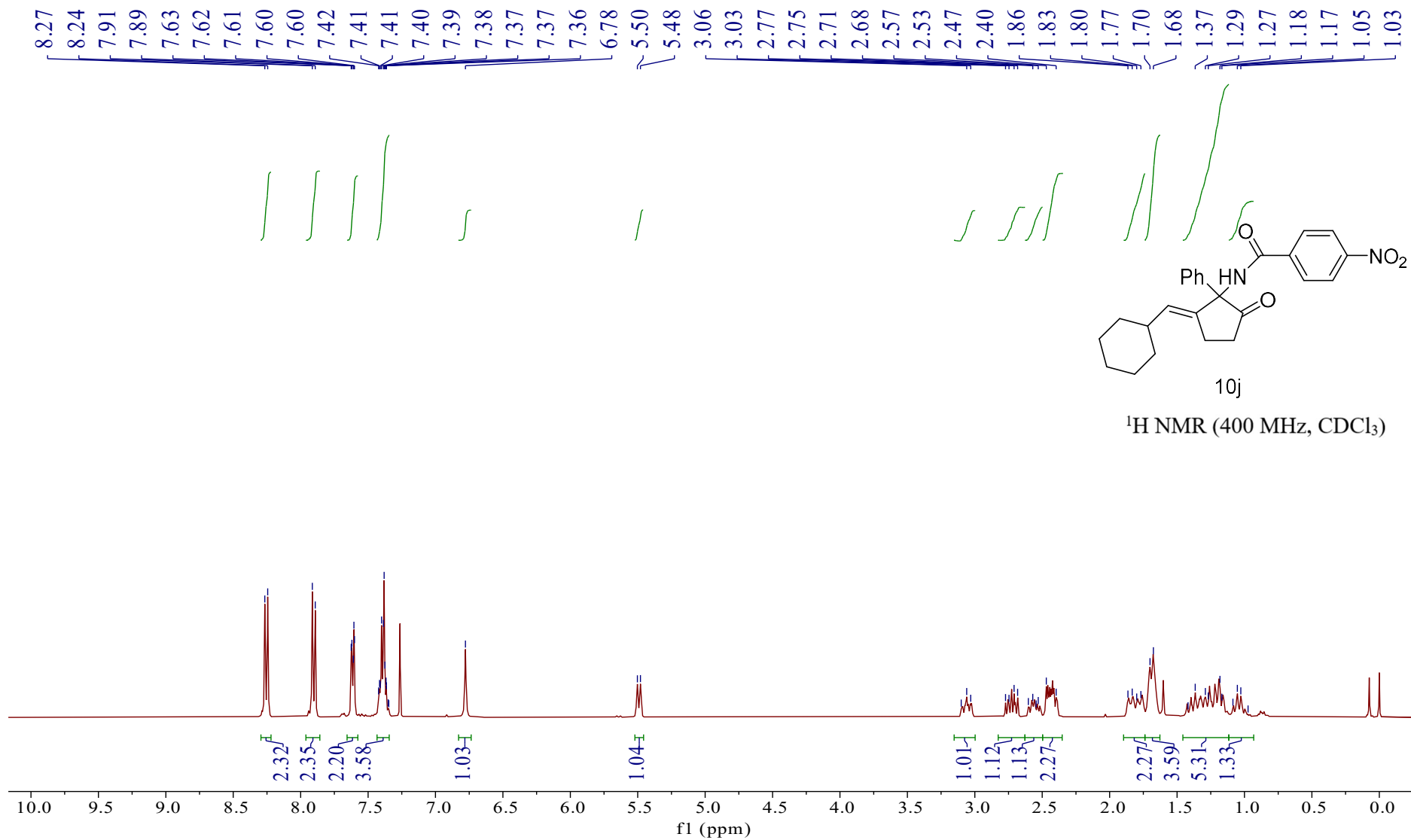


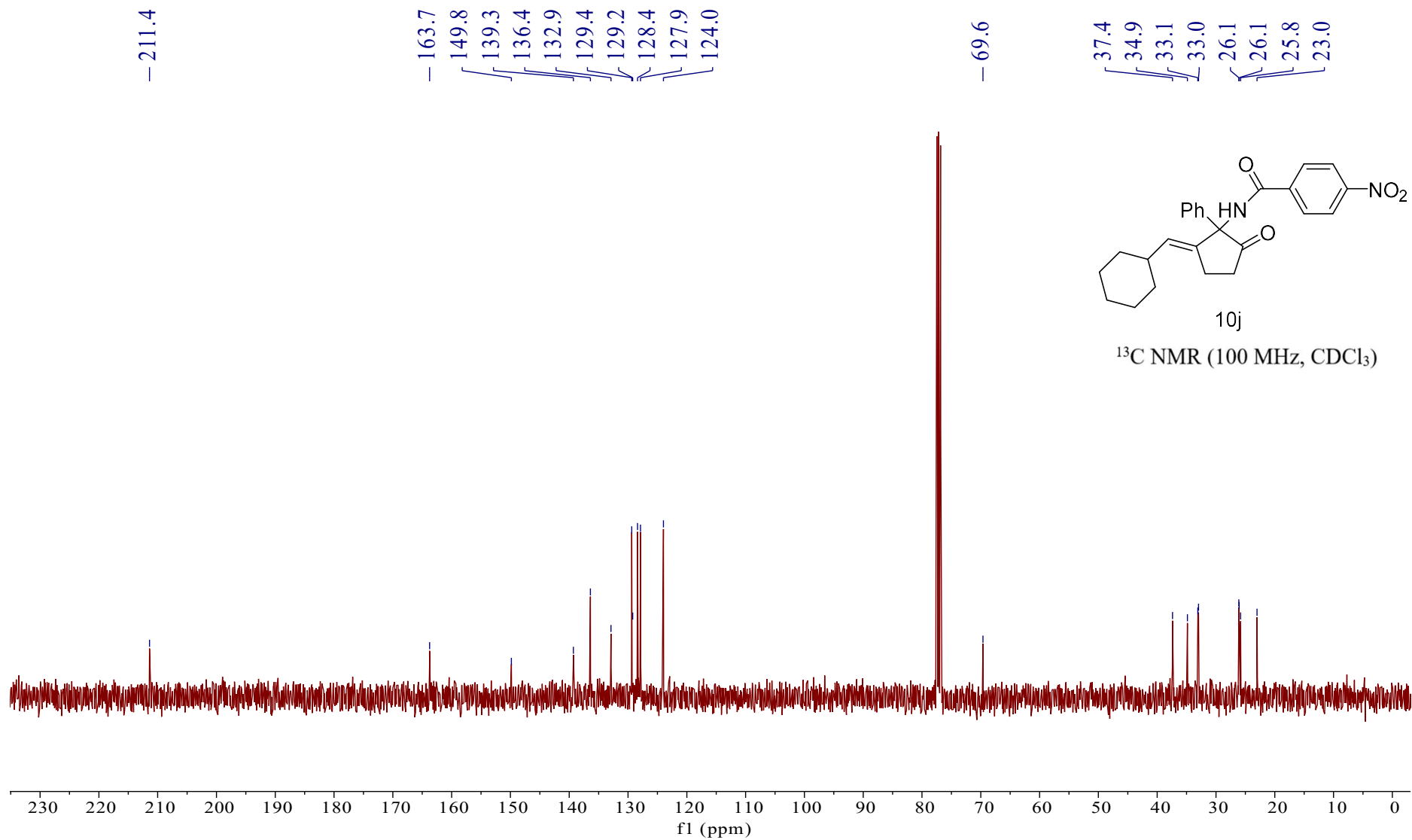
NMR-253

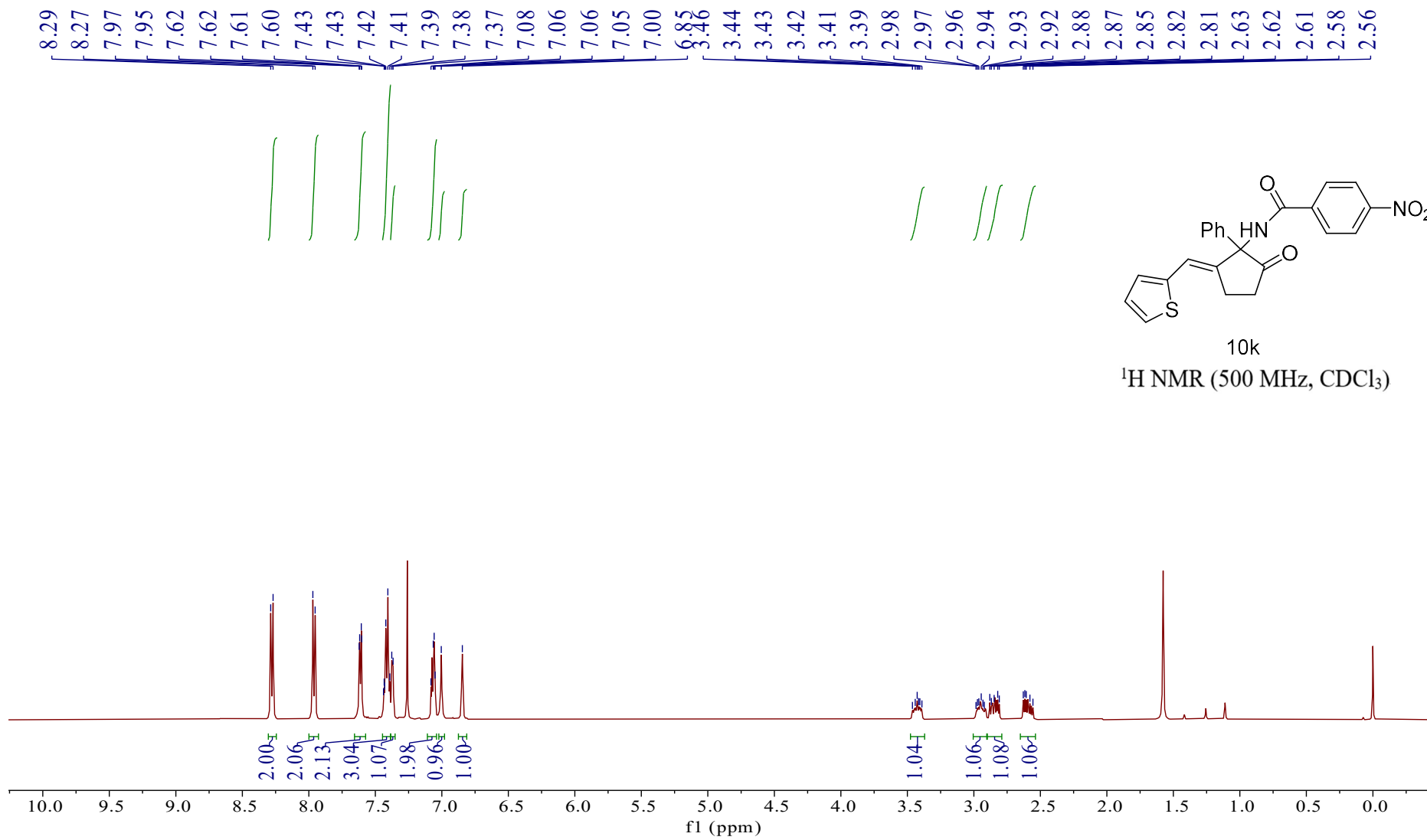


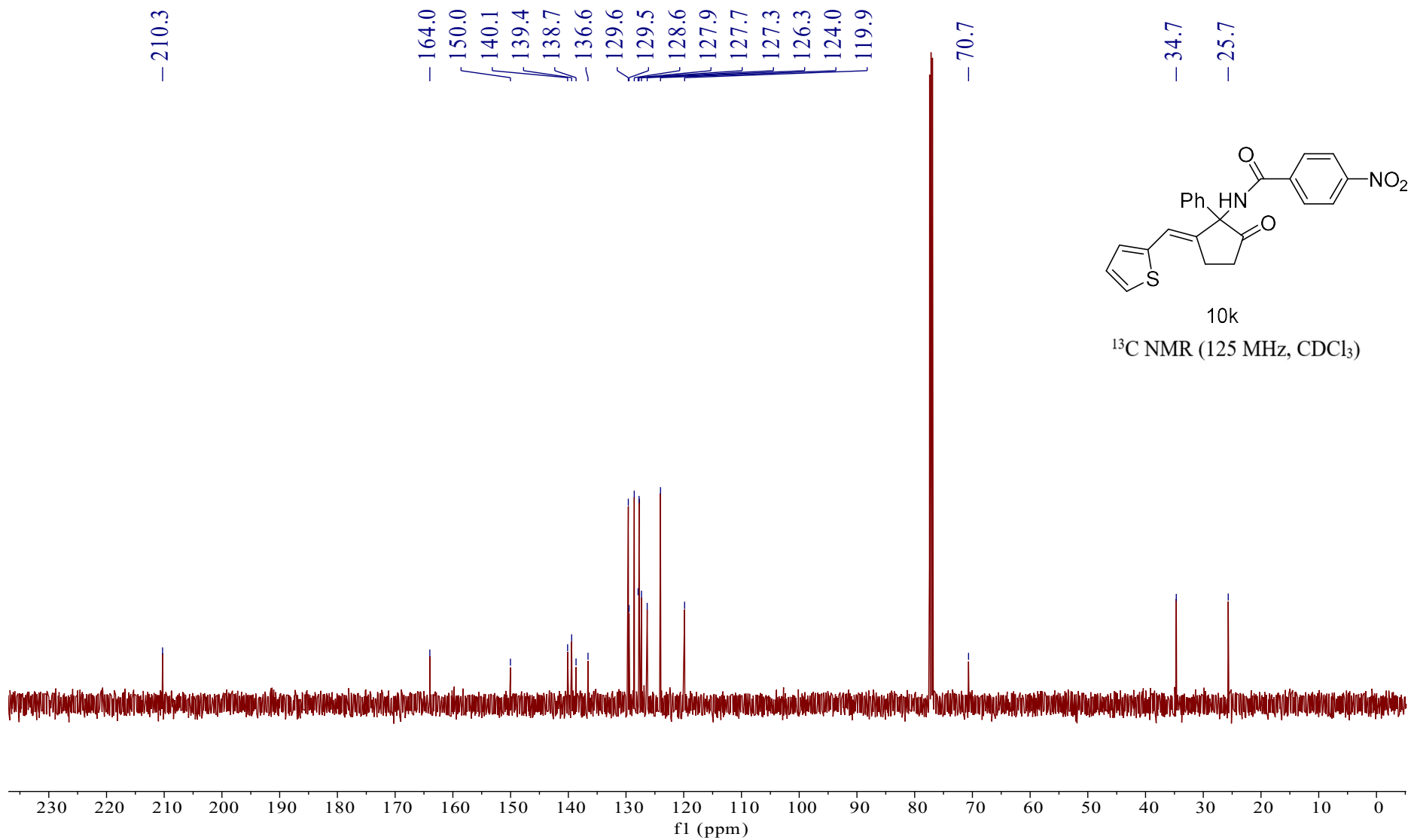


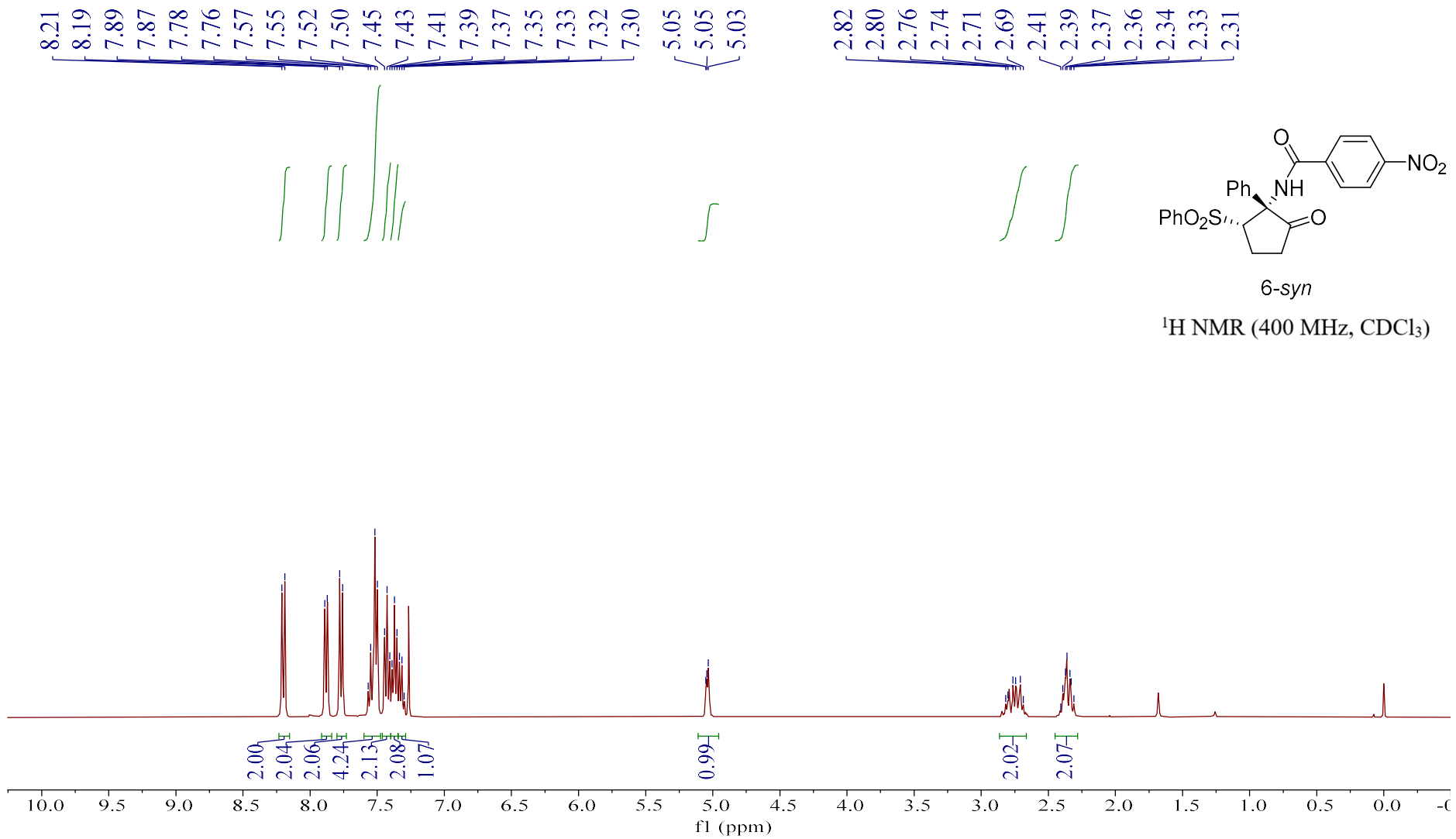
NMR-255



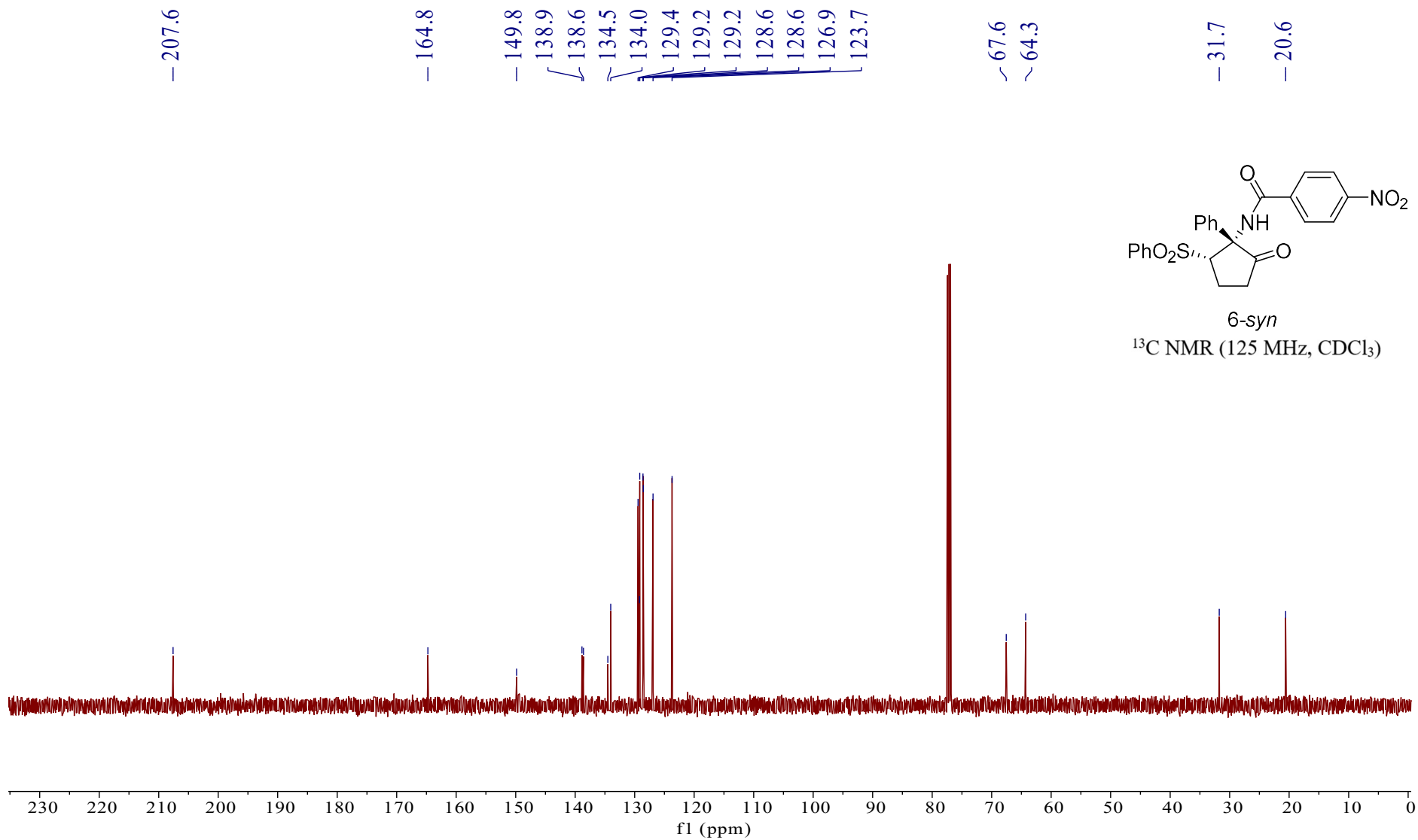




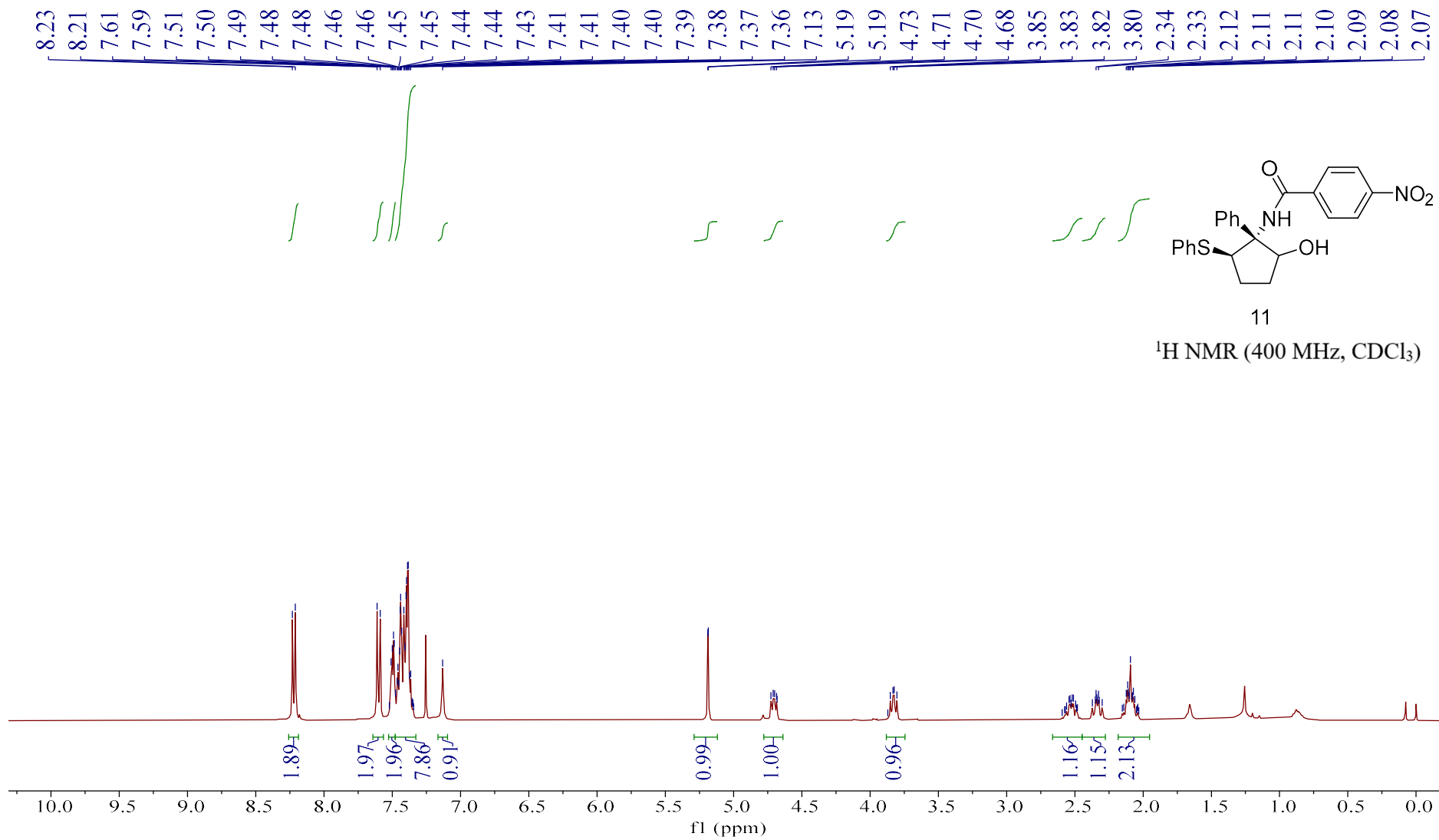




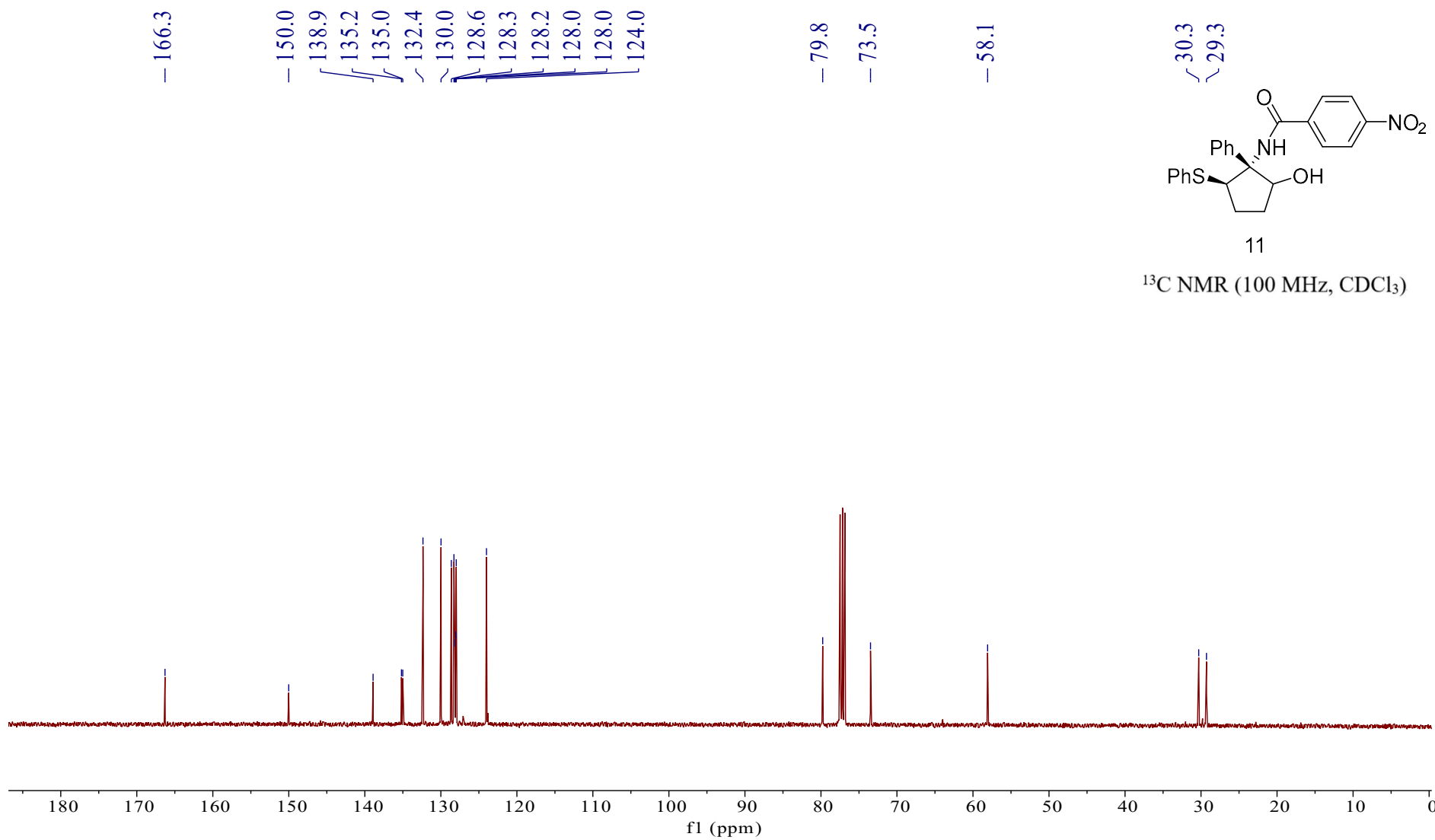
NMR-260



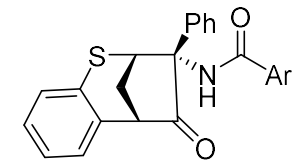
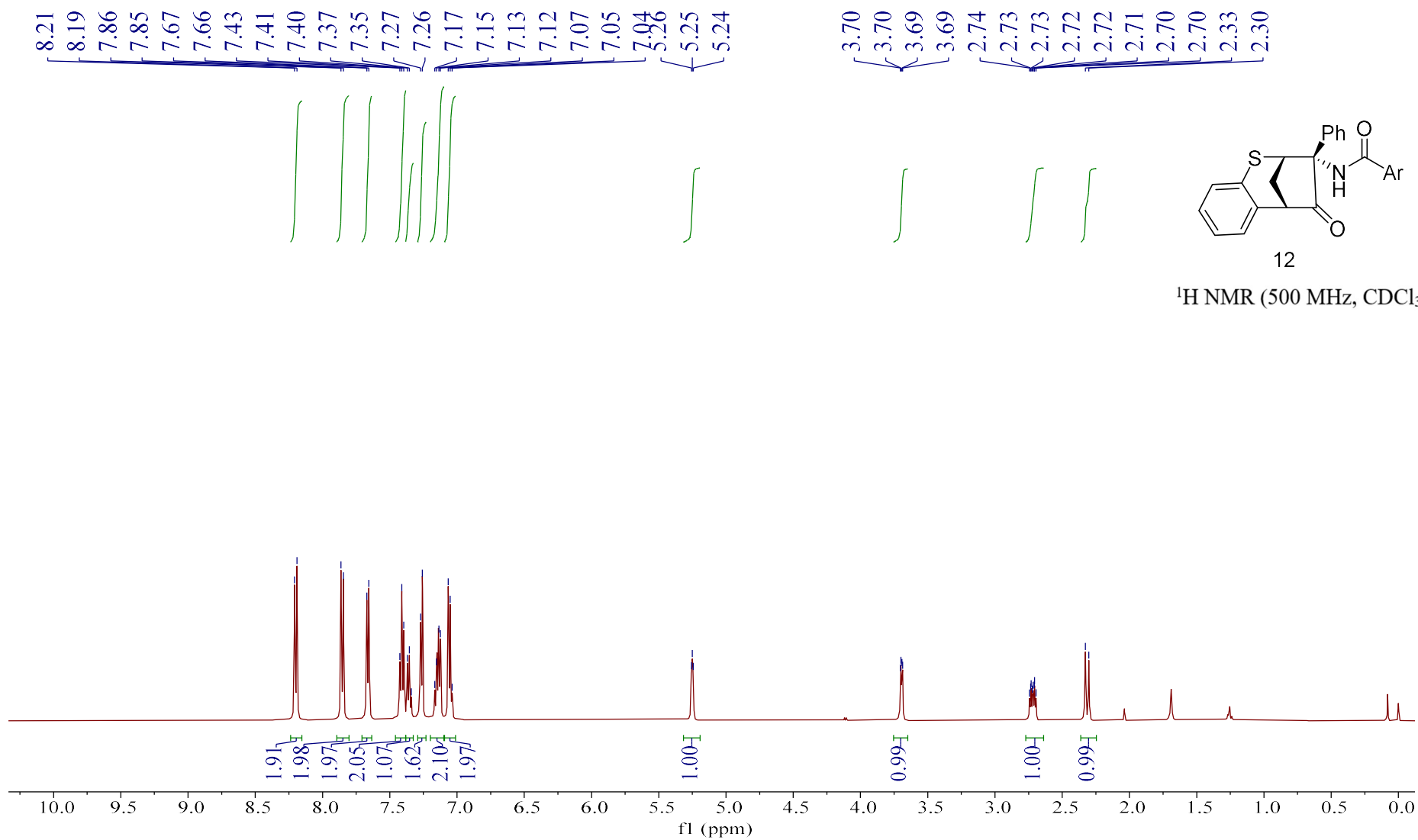
NMR-261



NMR-262

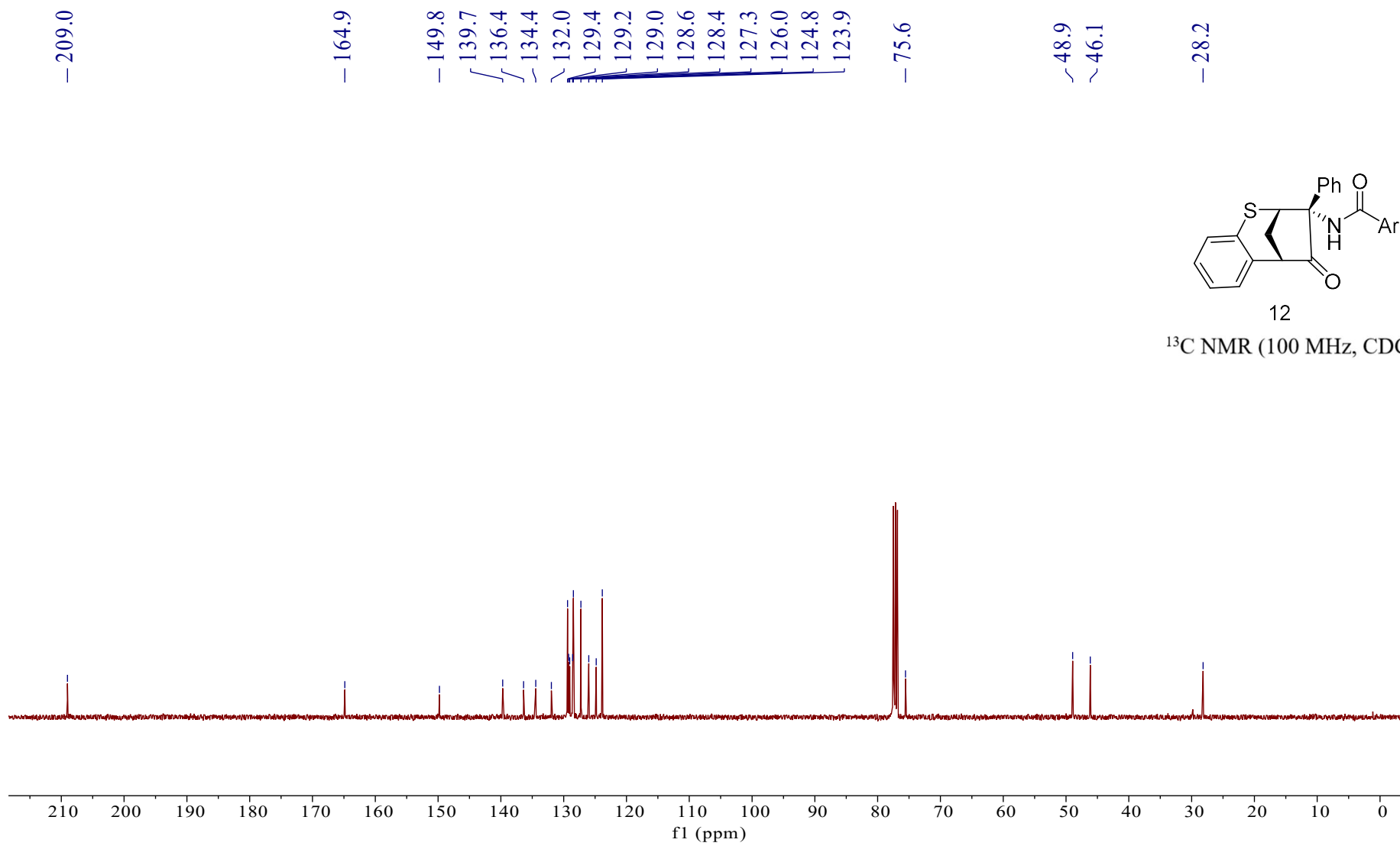


NMR-263



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¹H NMR (500 MHz, CDCl₃)



NMR-265