

Electronic Supplementary Information for

**Synthesis of trifluoroalkyl or difluoroalkyl phenanthridine  
derivatives via cascade reaction using intramolecular cyano group as  
a radical acceptor under photoredox catalysis**

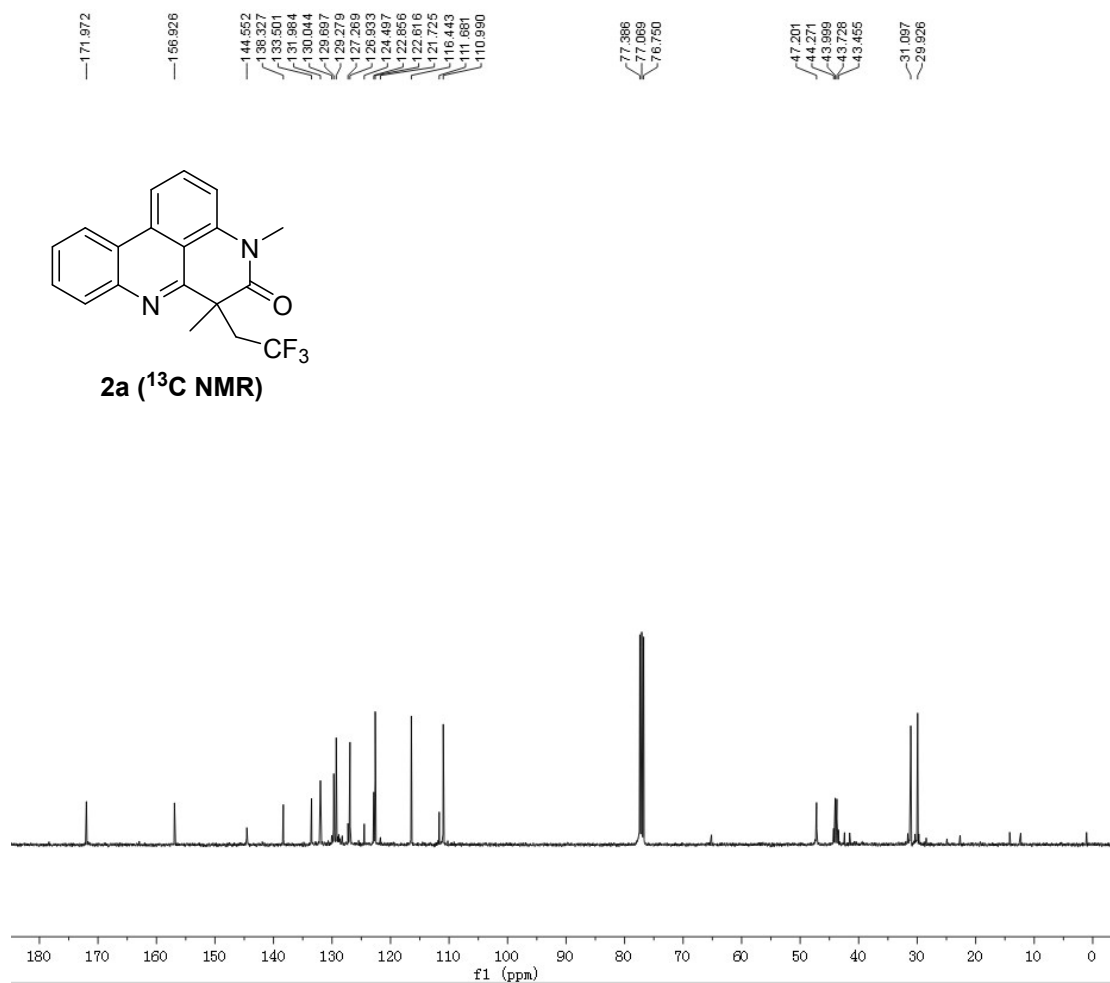
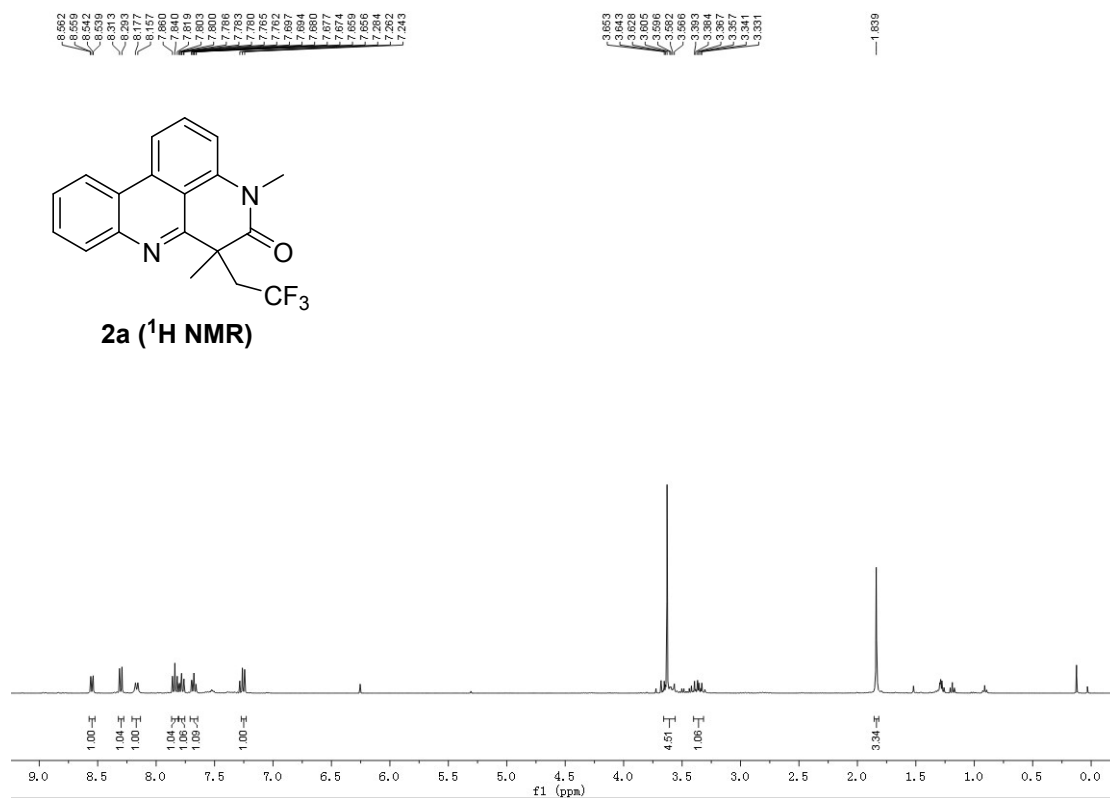
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Cycle Processes and Pollution Control, Jiangsu Collaborative Innovation Center of Biomedical  
Functional Materials, Nanjing Normal University, Nanjing 210023, P. R. China*  
*pingliu@njnu.edu.cn, sunpeipei@njnu.edu.cn*

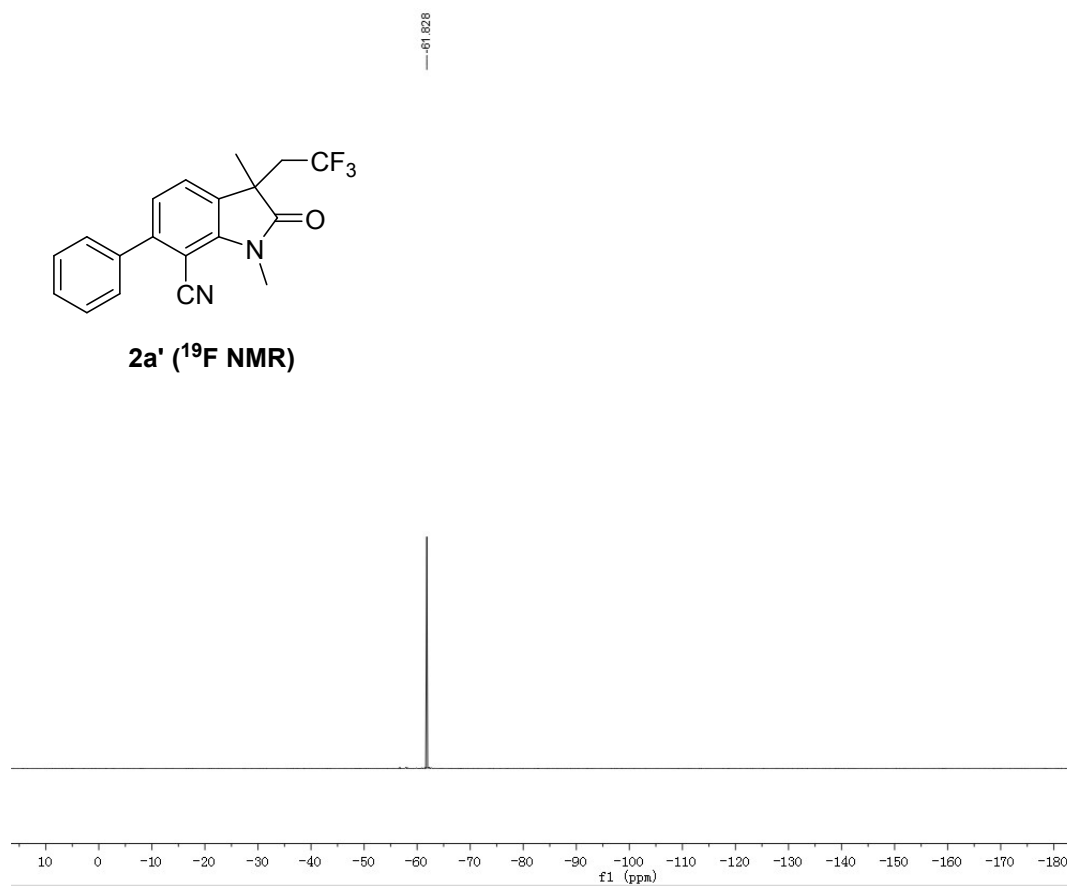
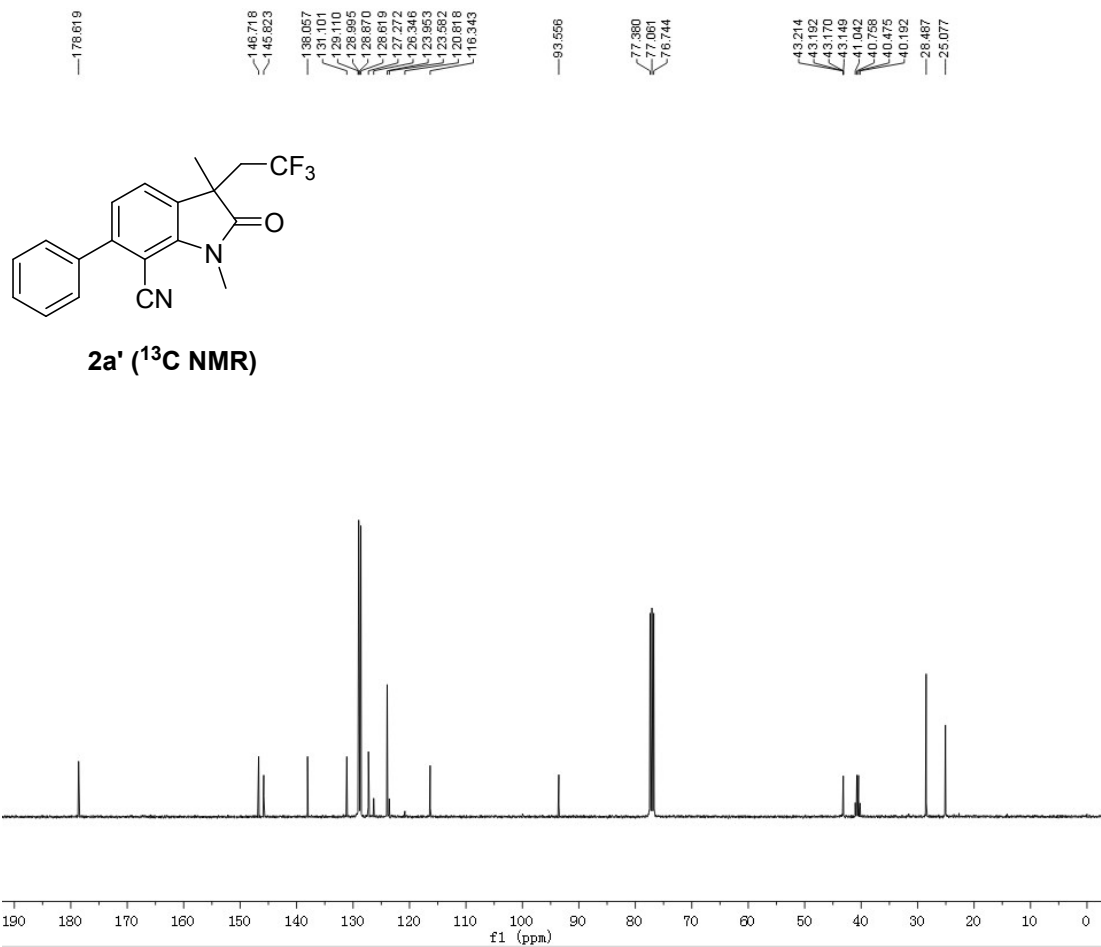
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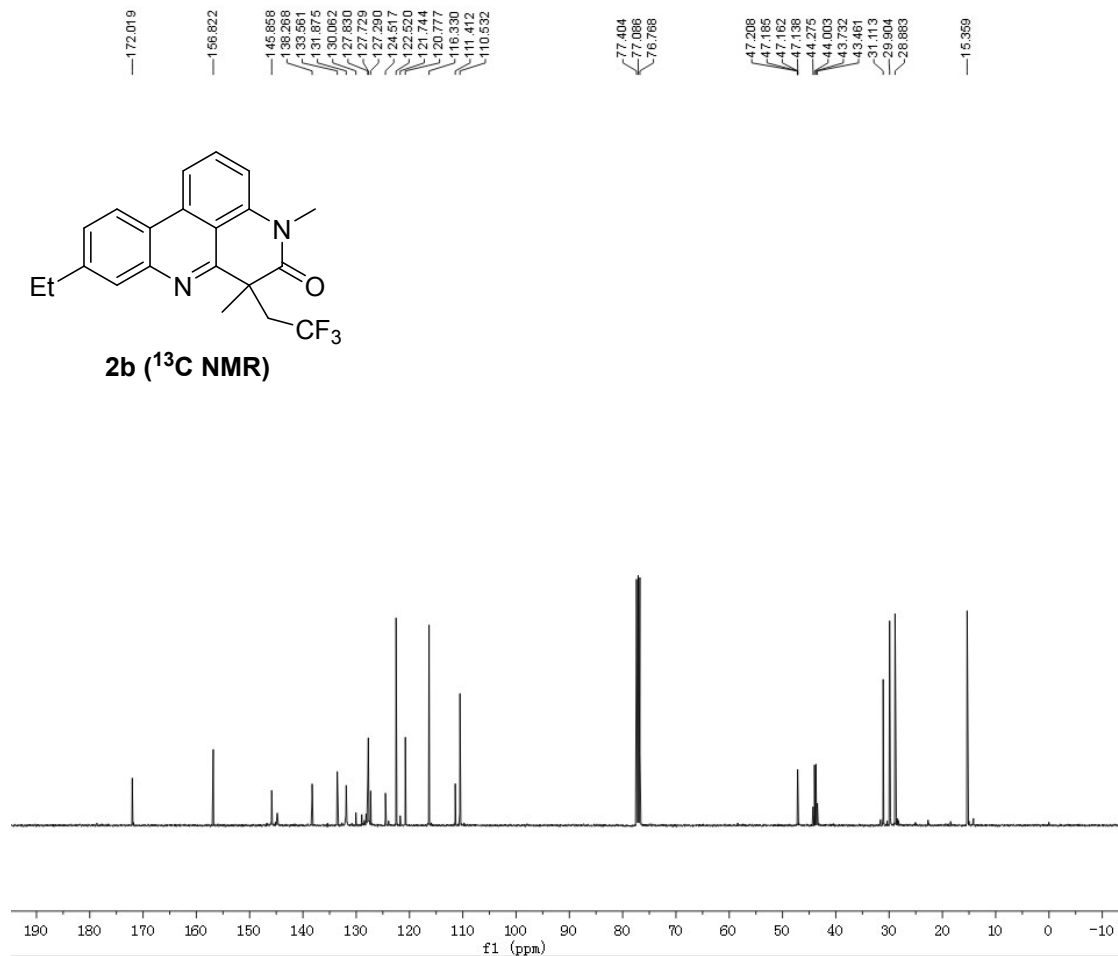
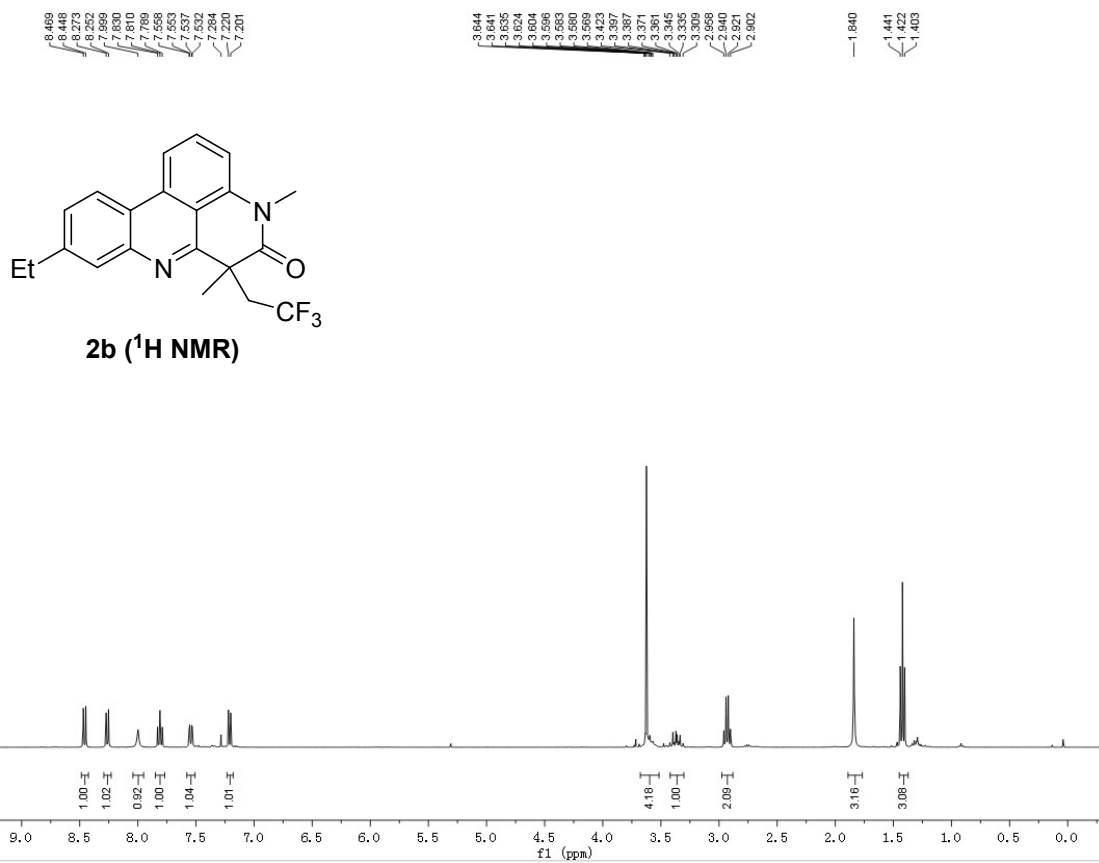
1. NMR spectra of products **2**, **3** and **4**.....S2-S51

# 1. NMR spectra of products 2, 3 and 4

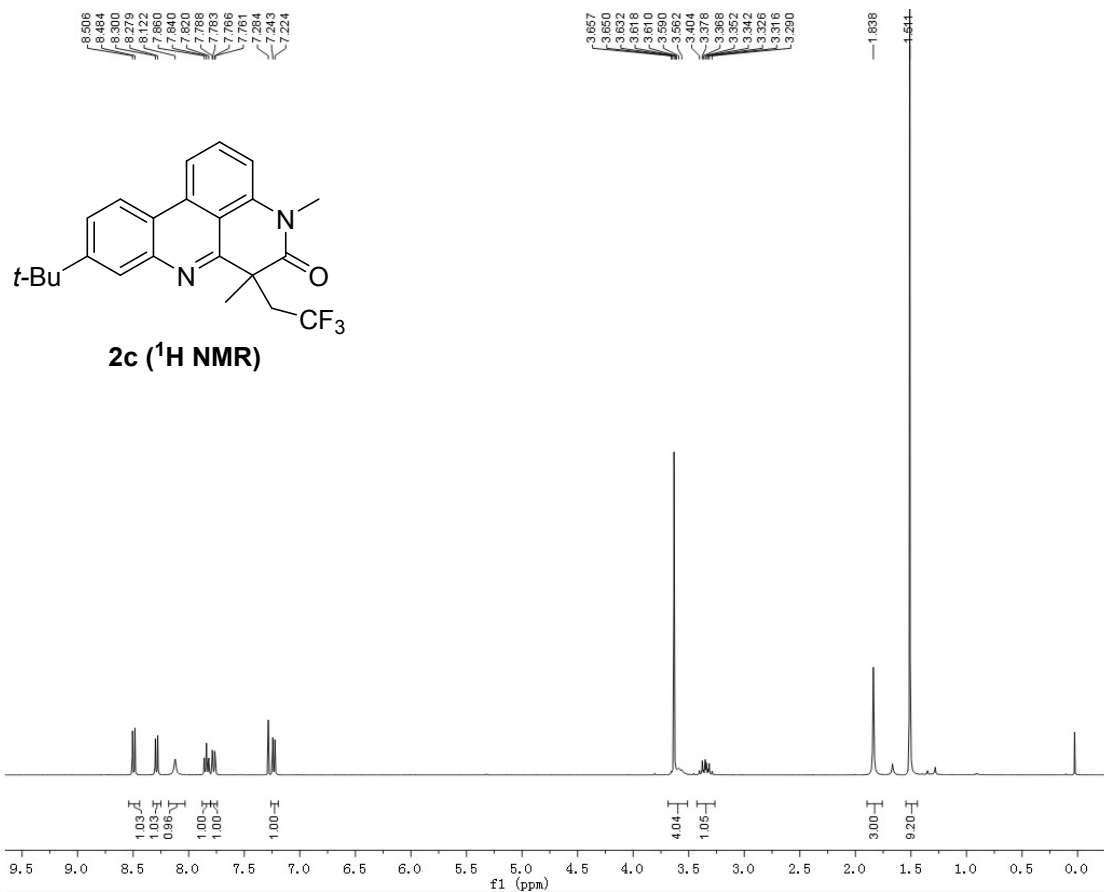
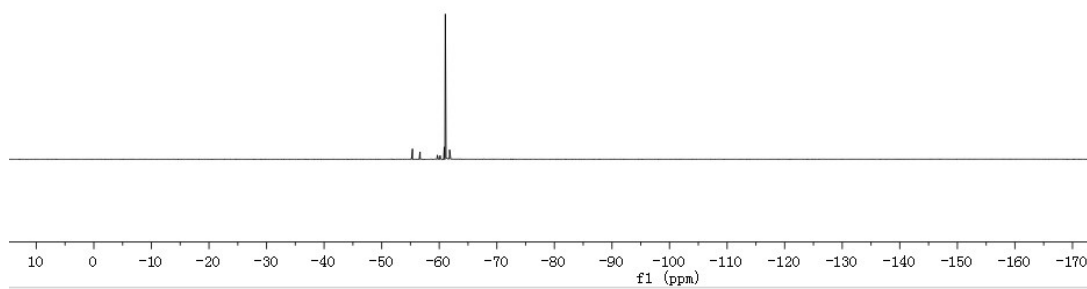
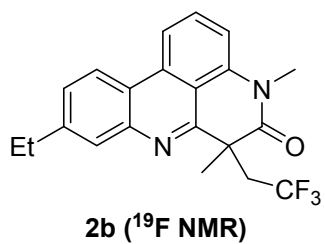


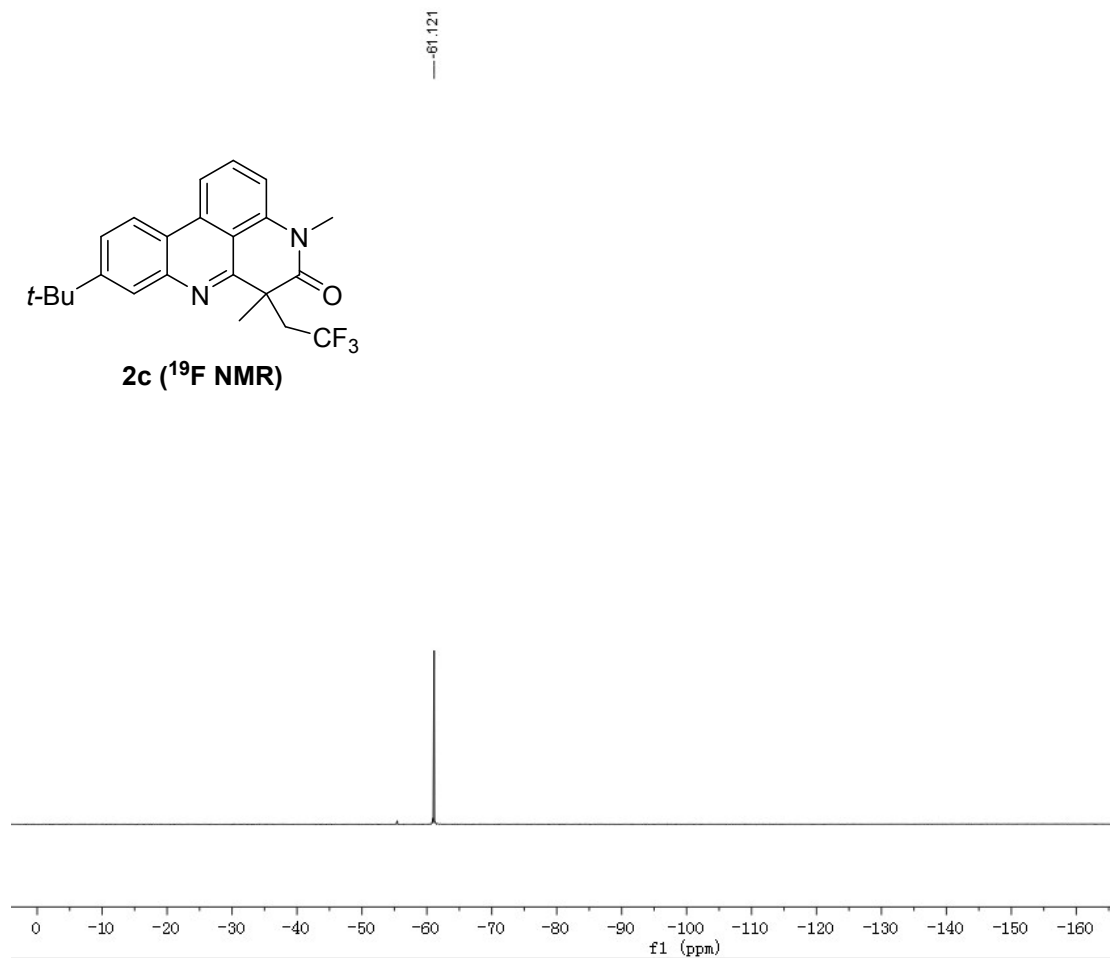
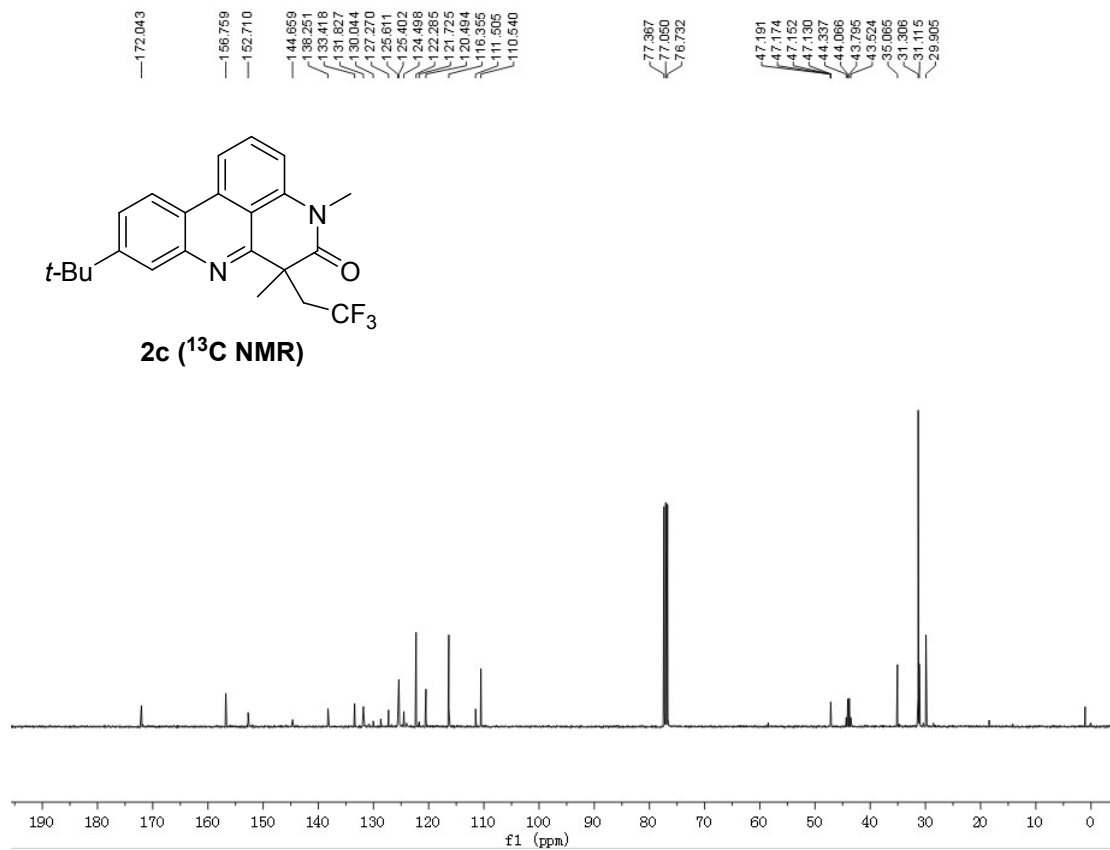


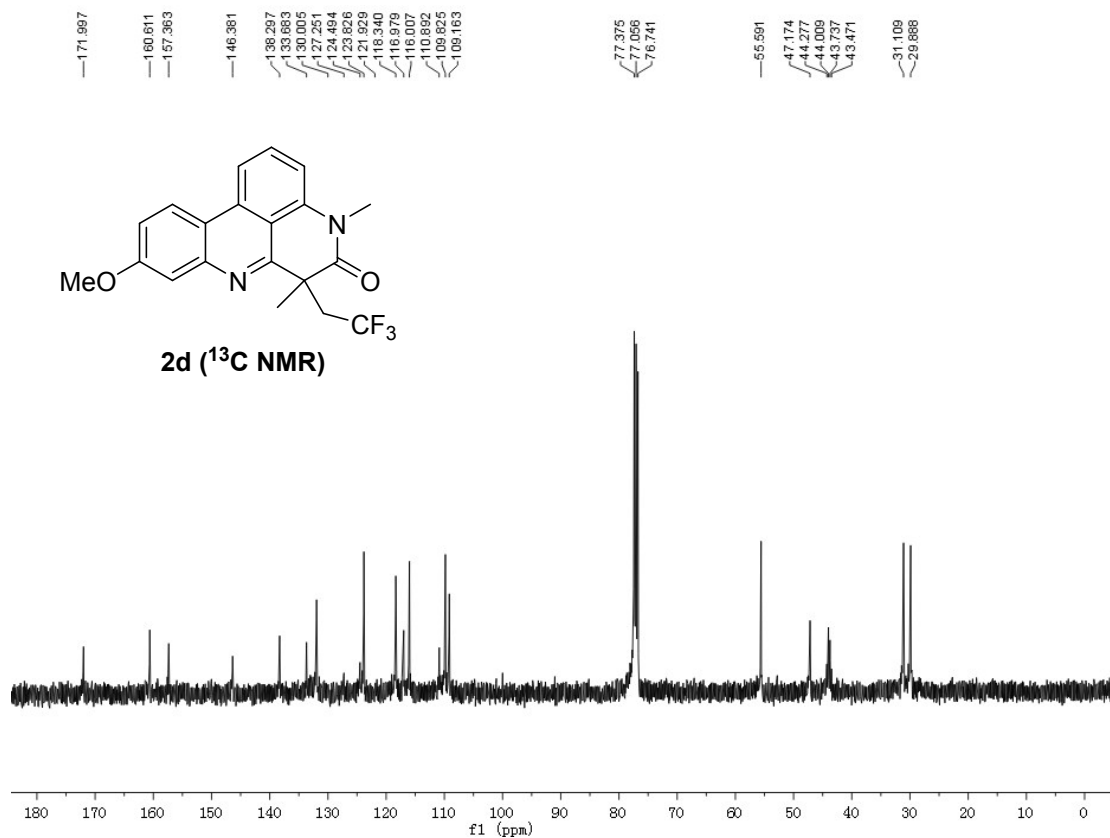
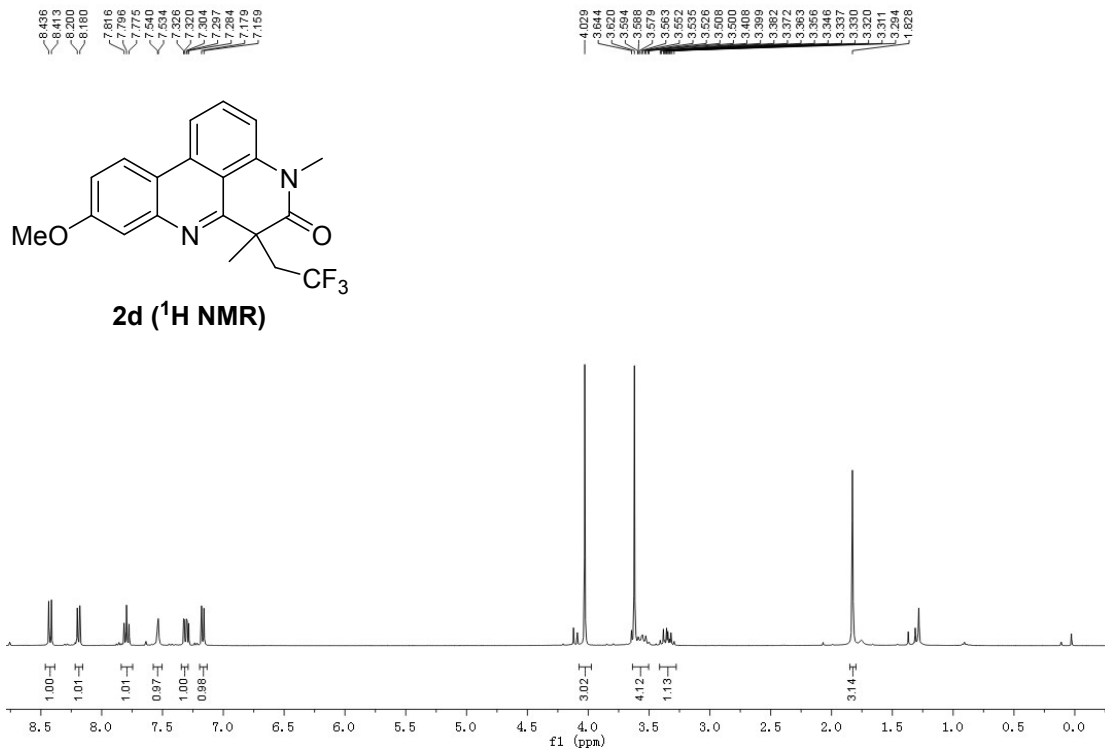




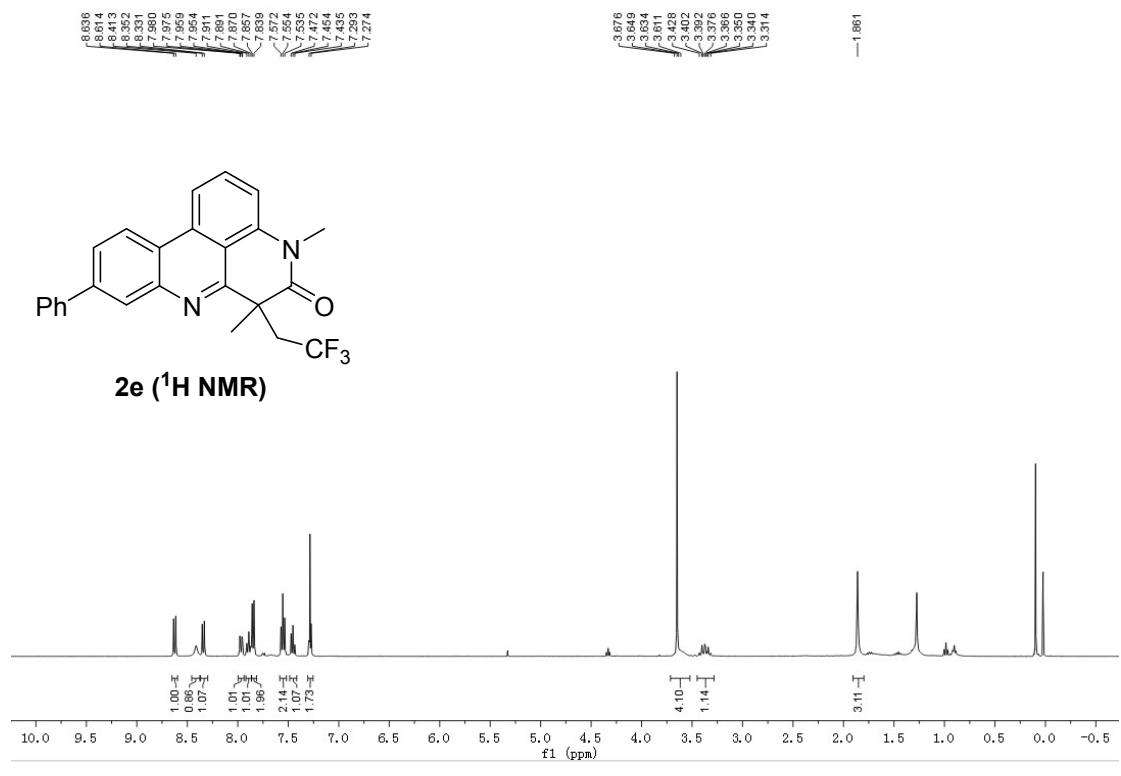
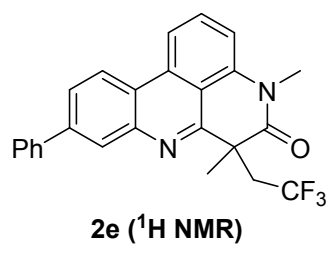
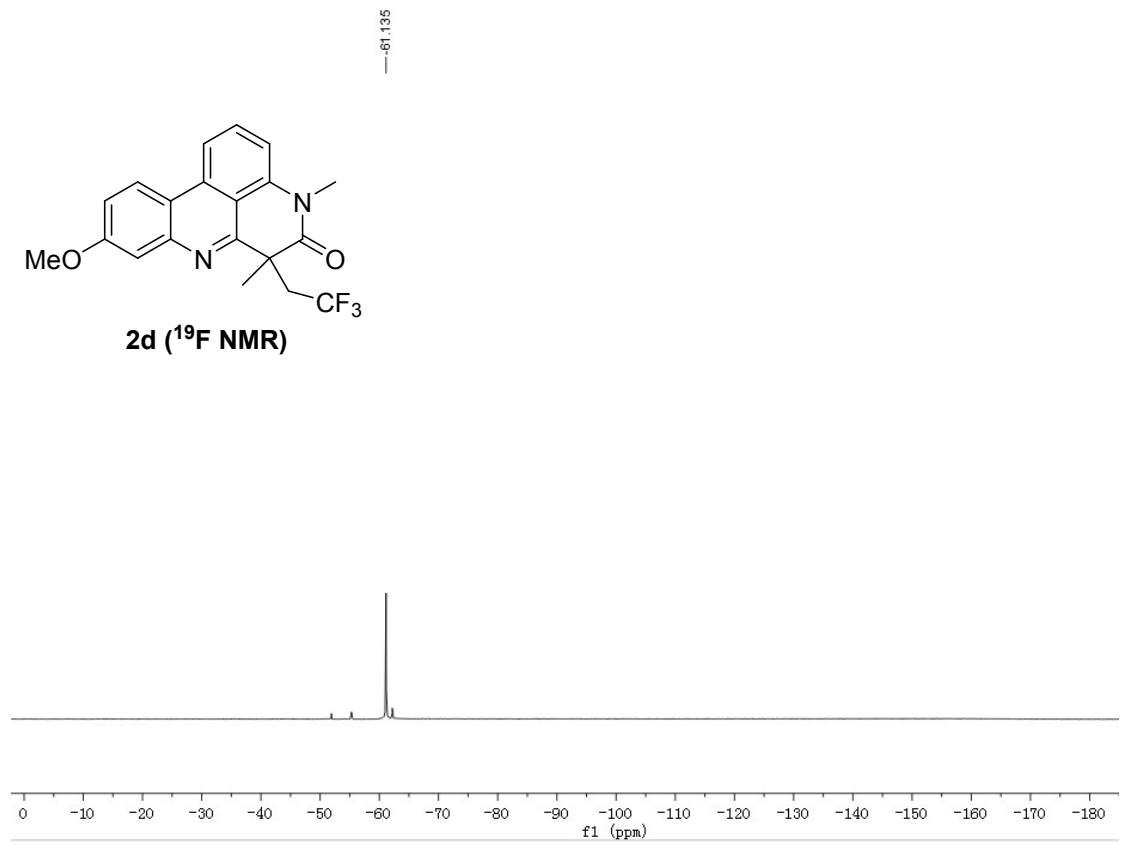
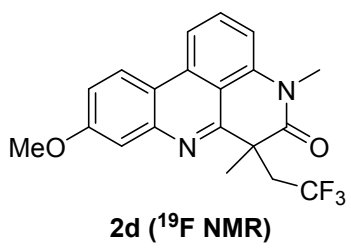
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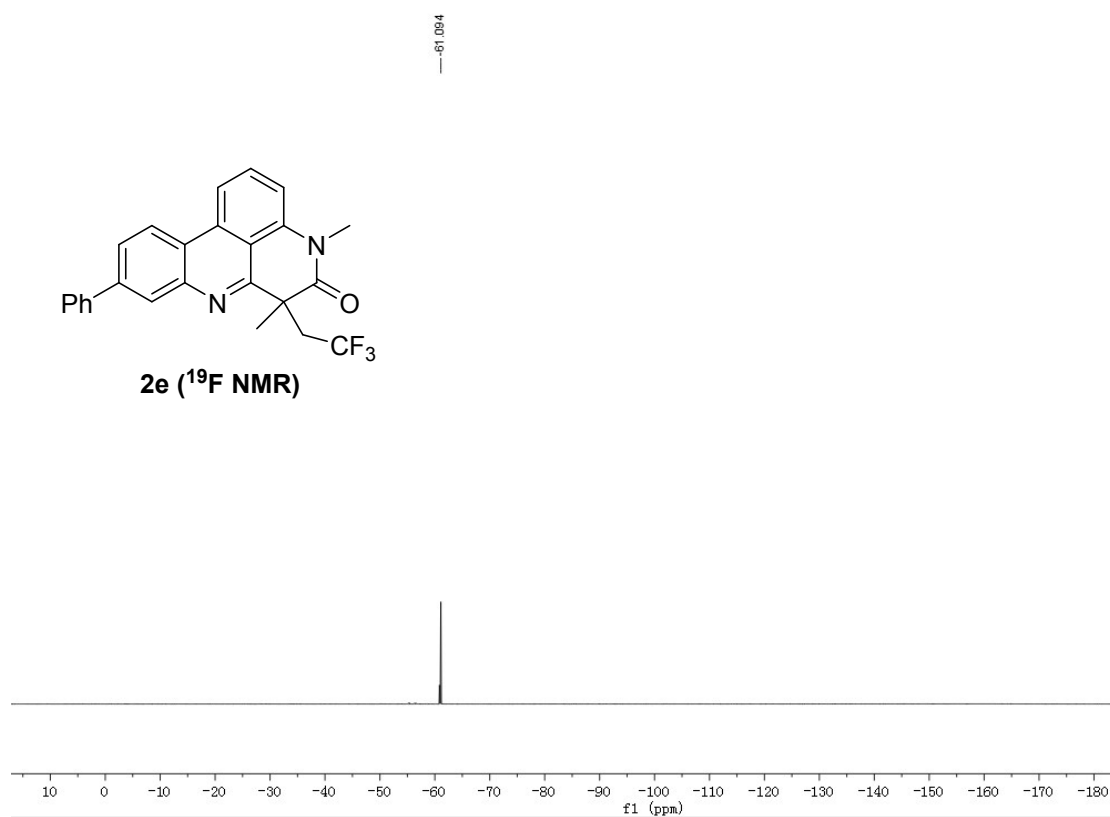
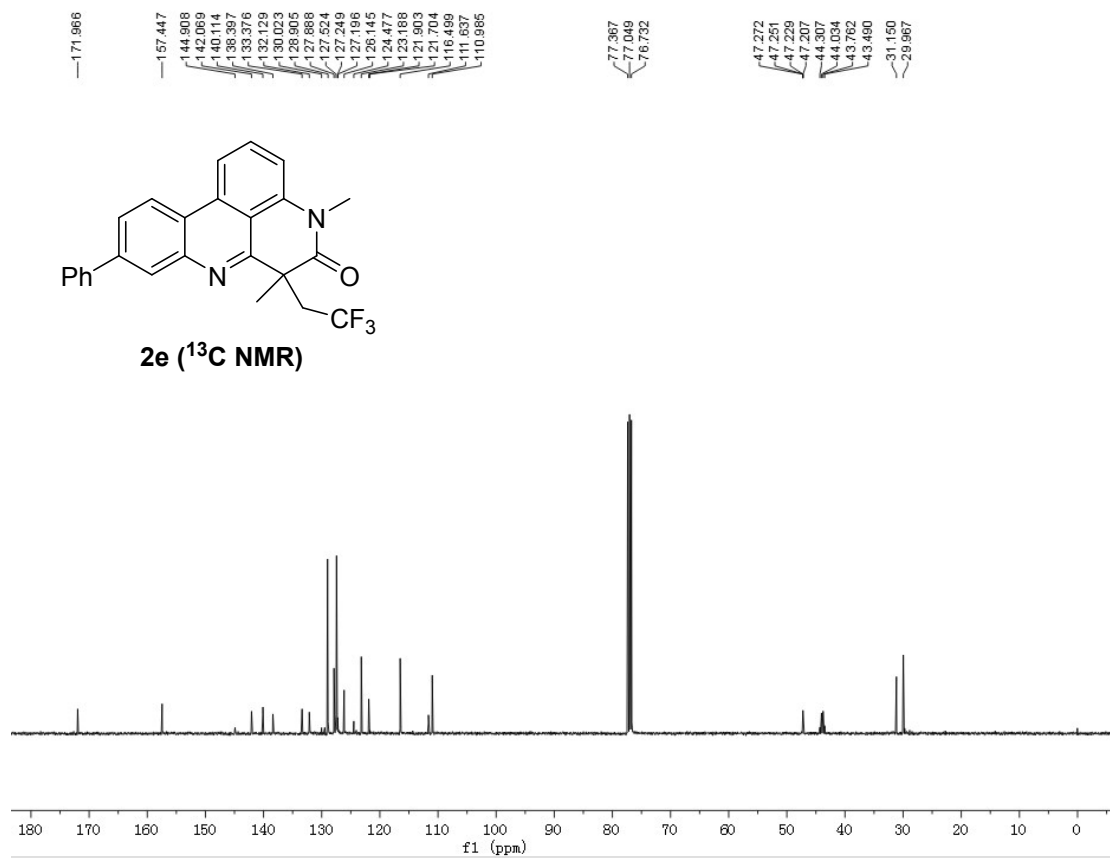


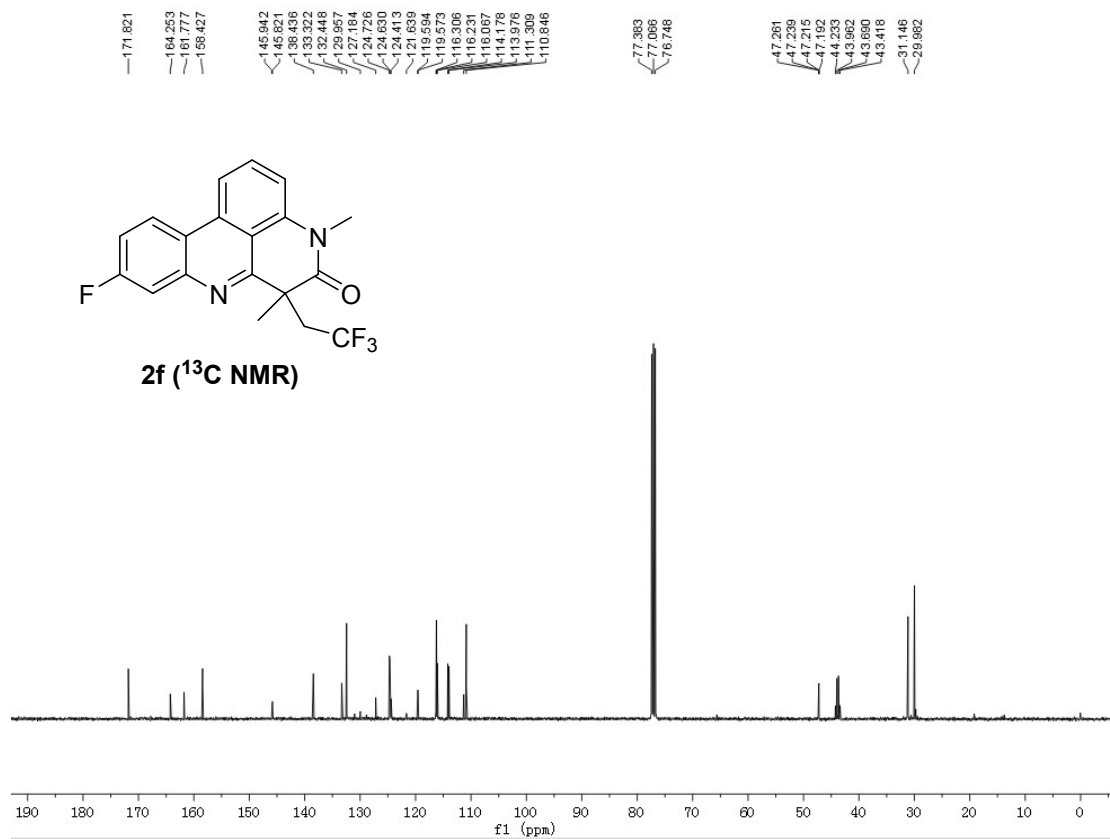
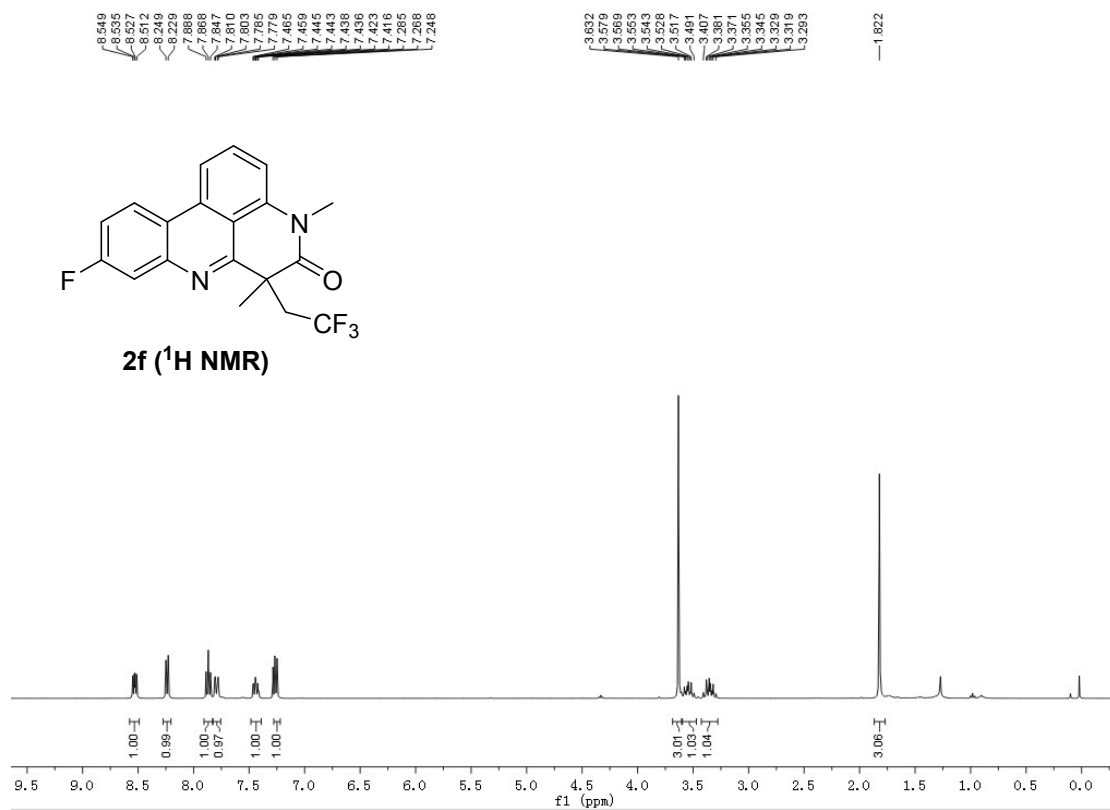


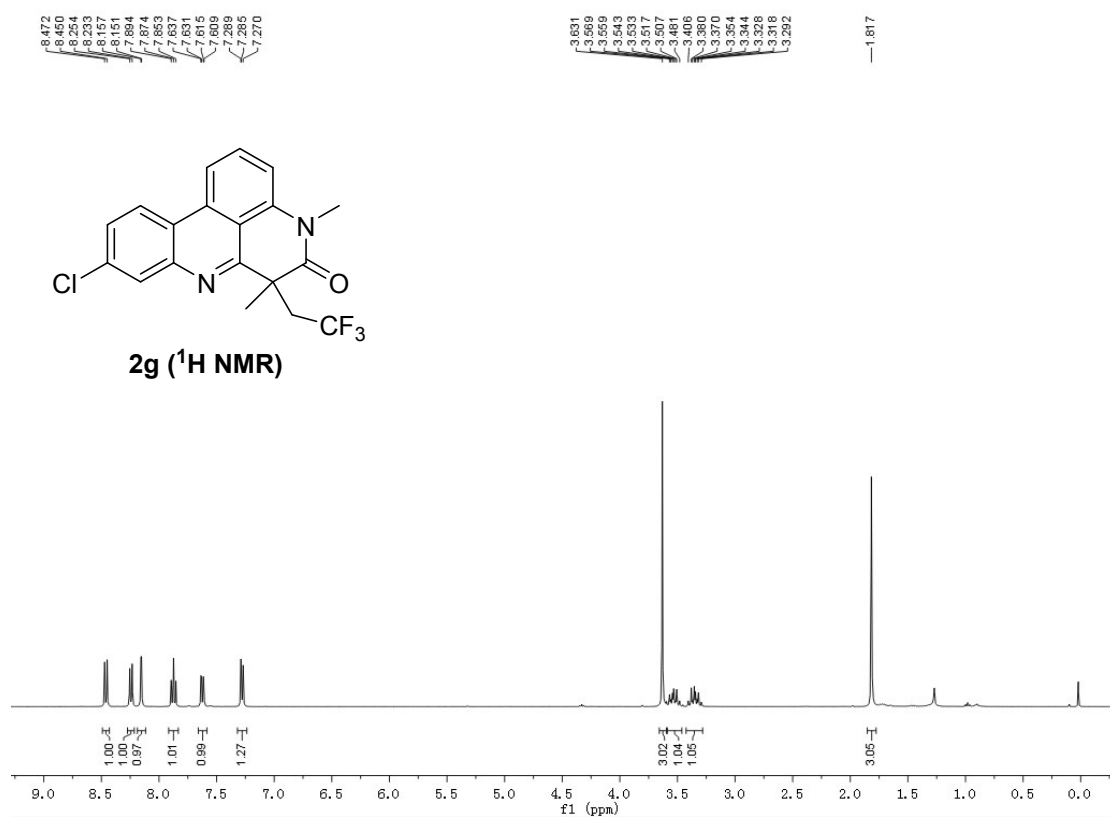
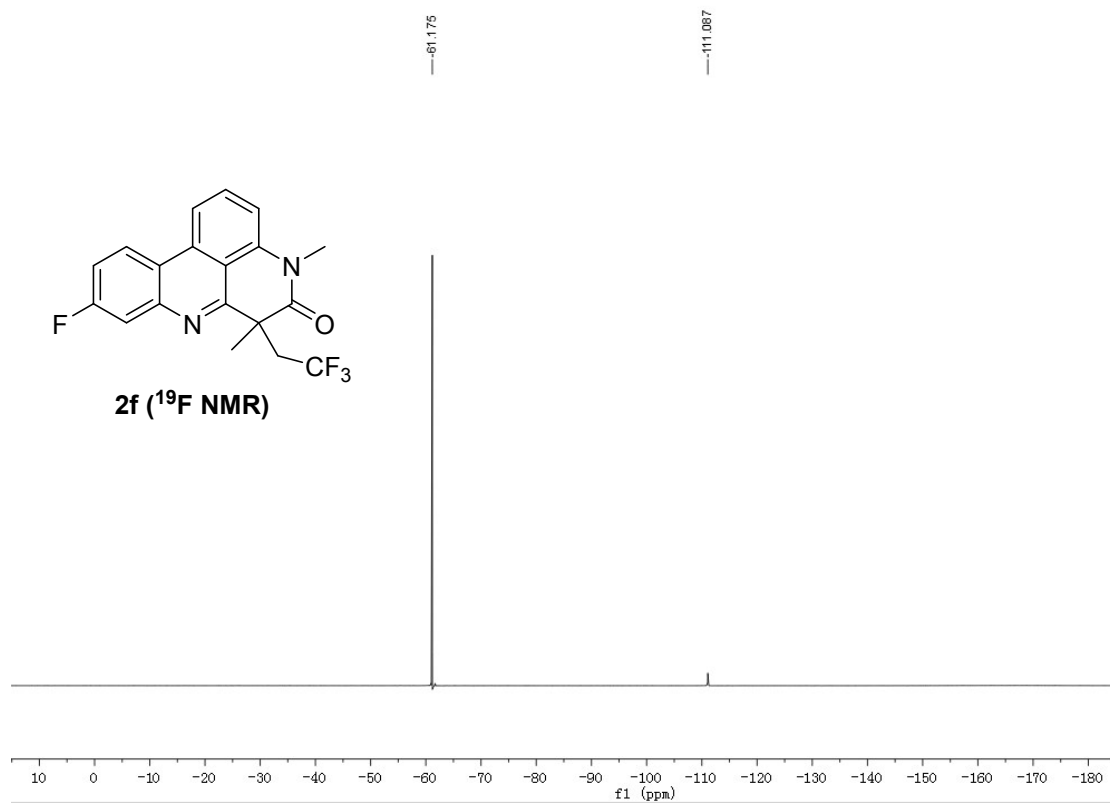


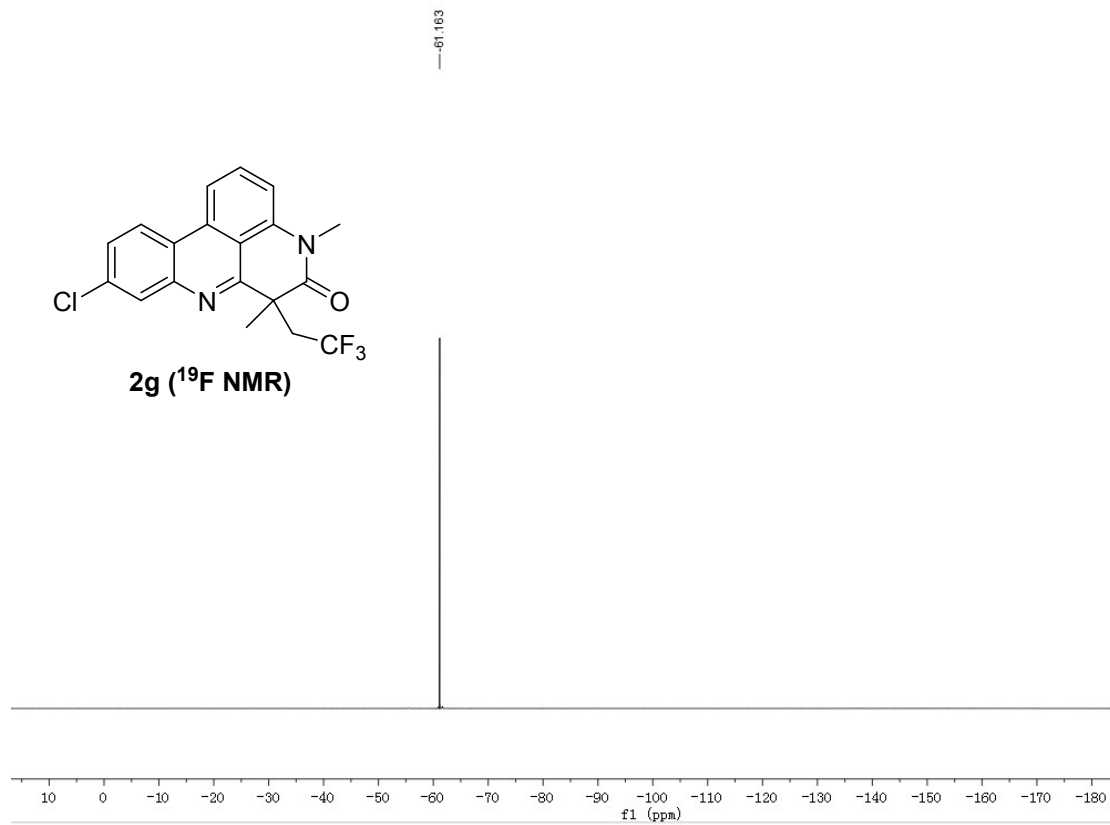
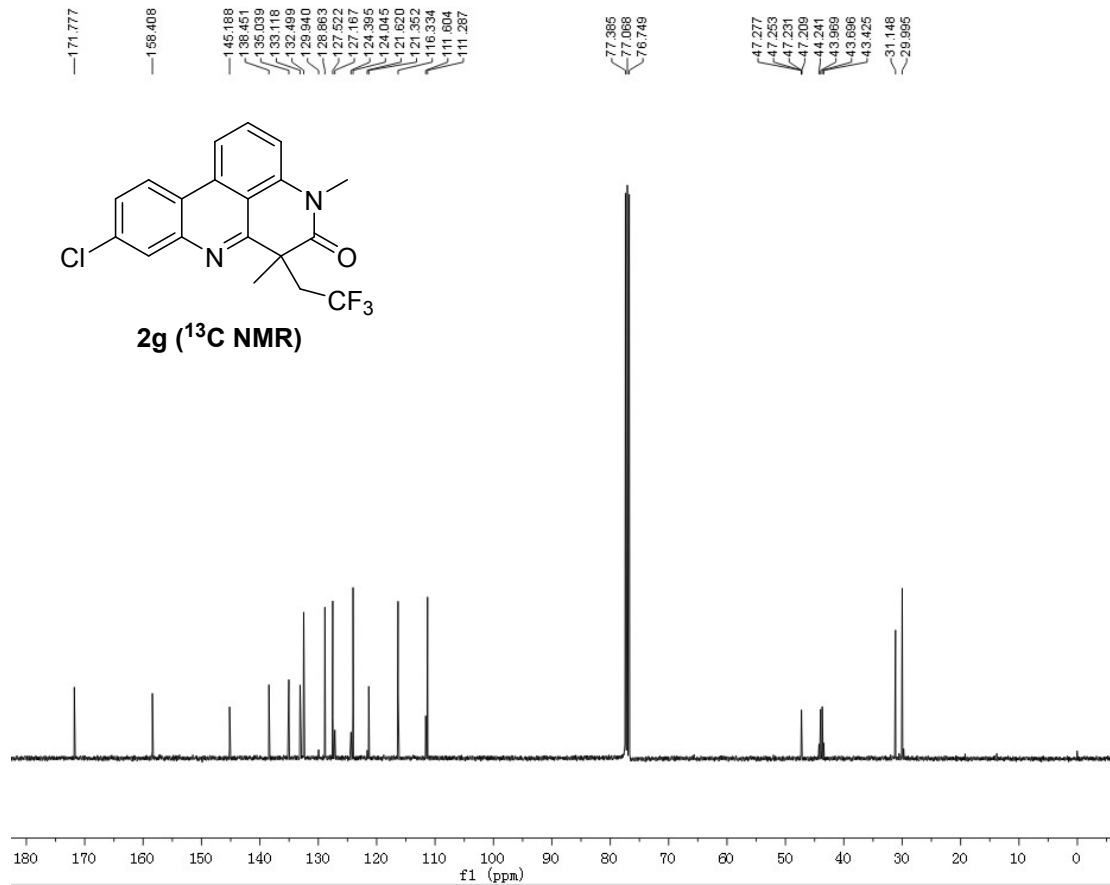


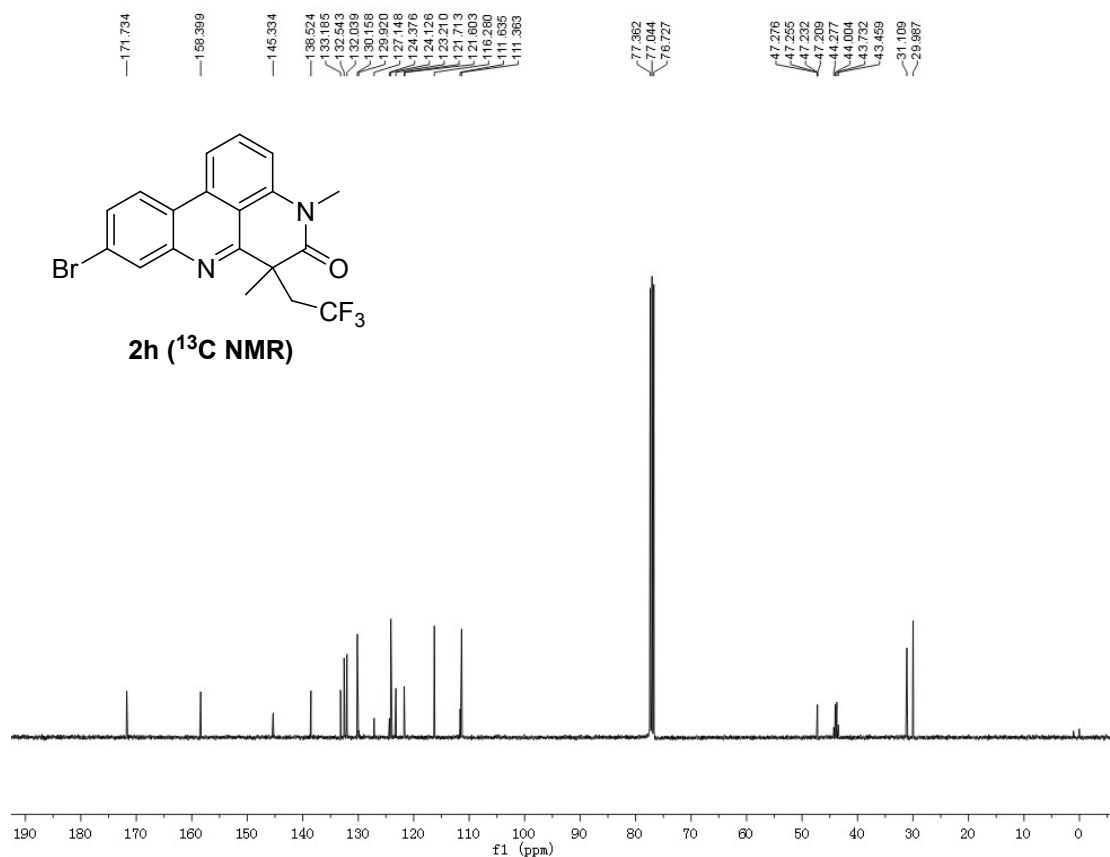
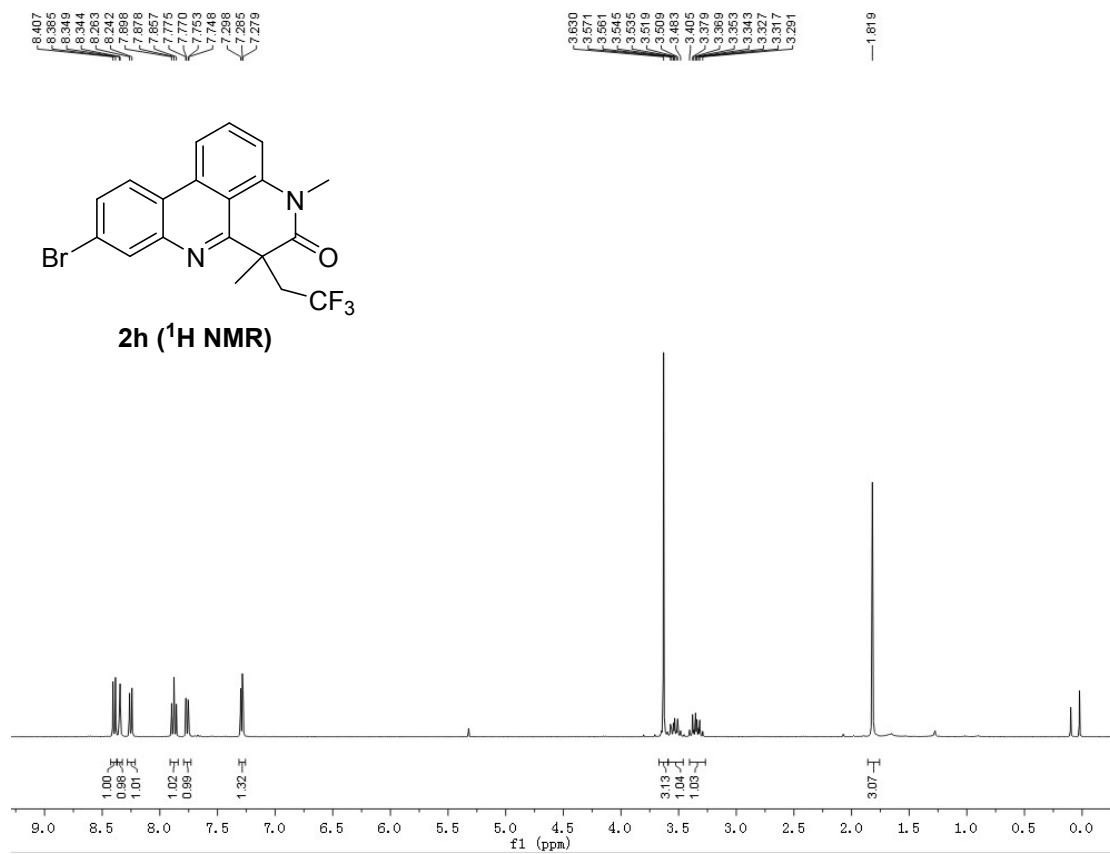


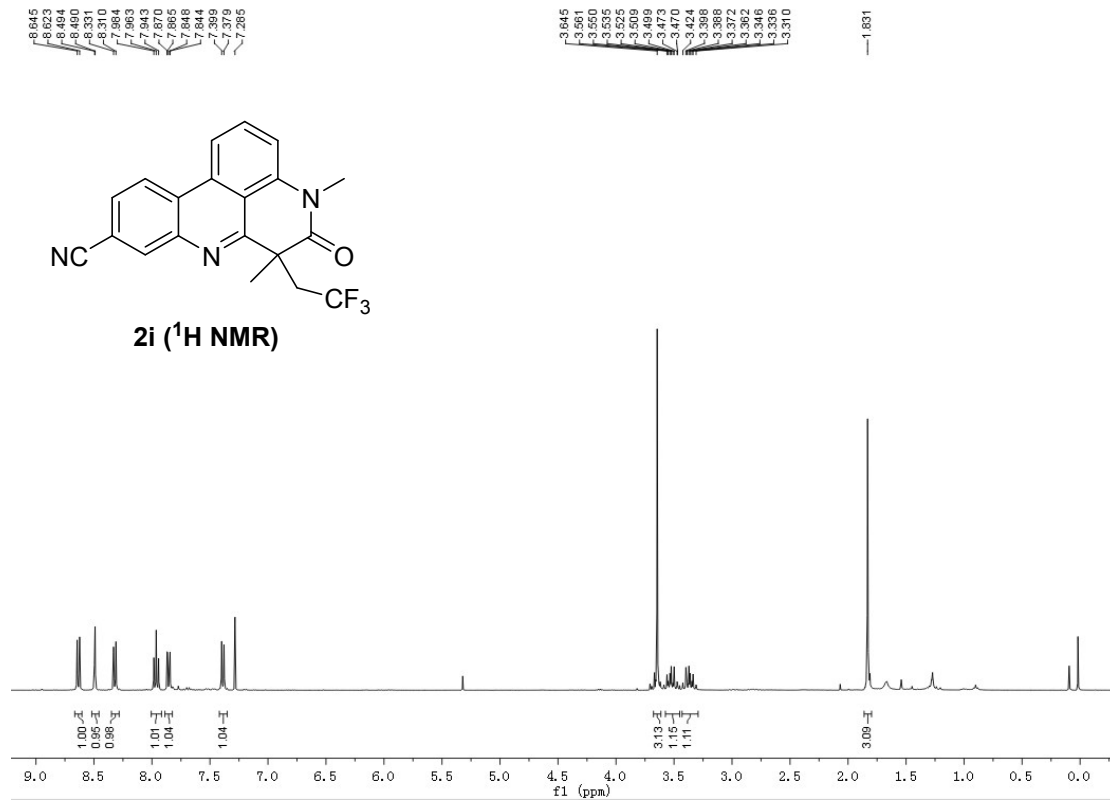
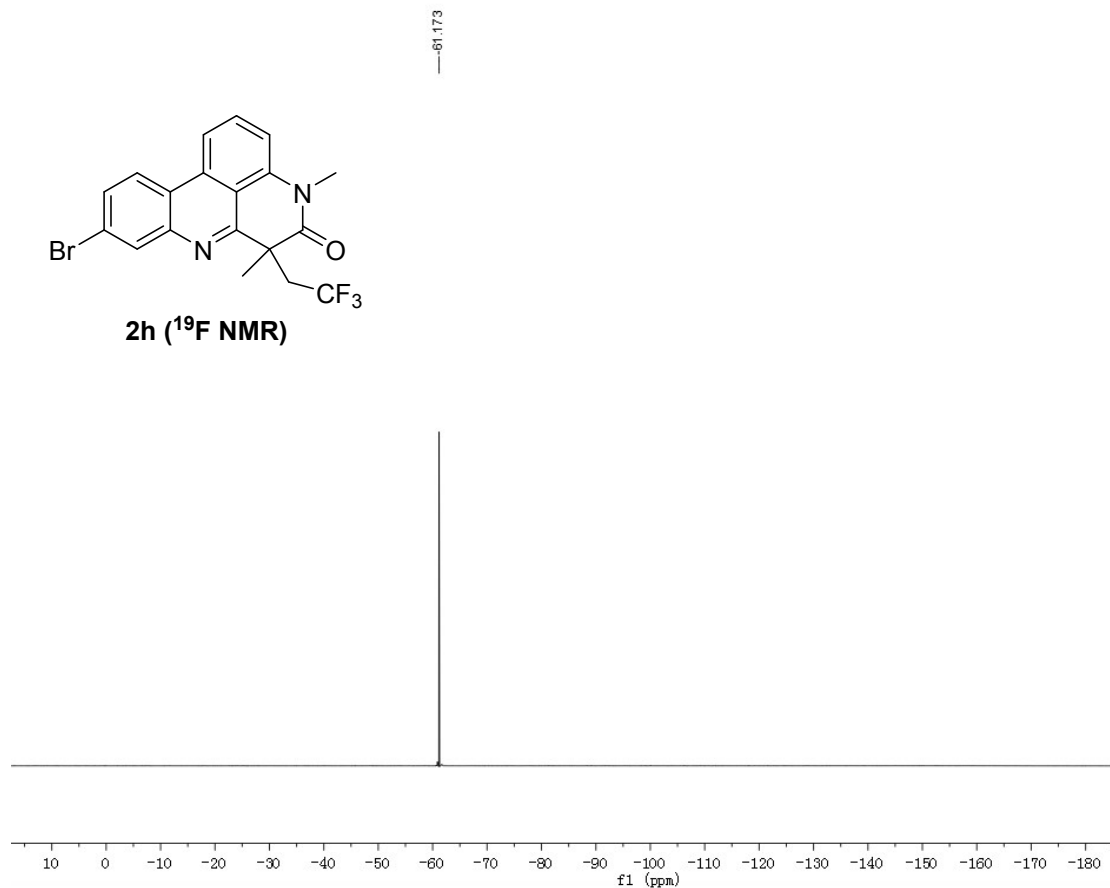


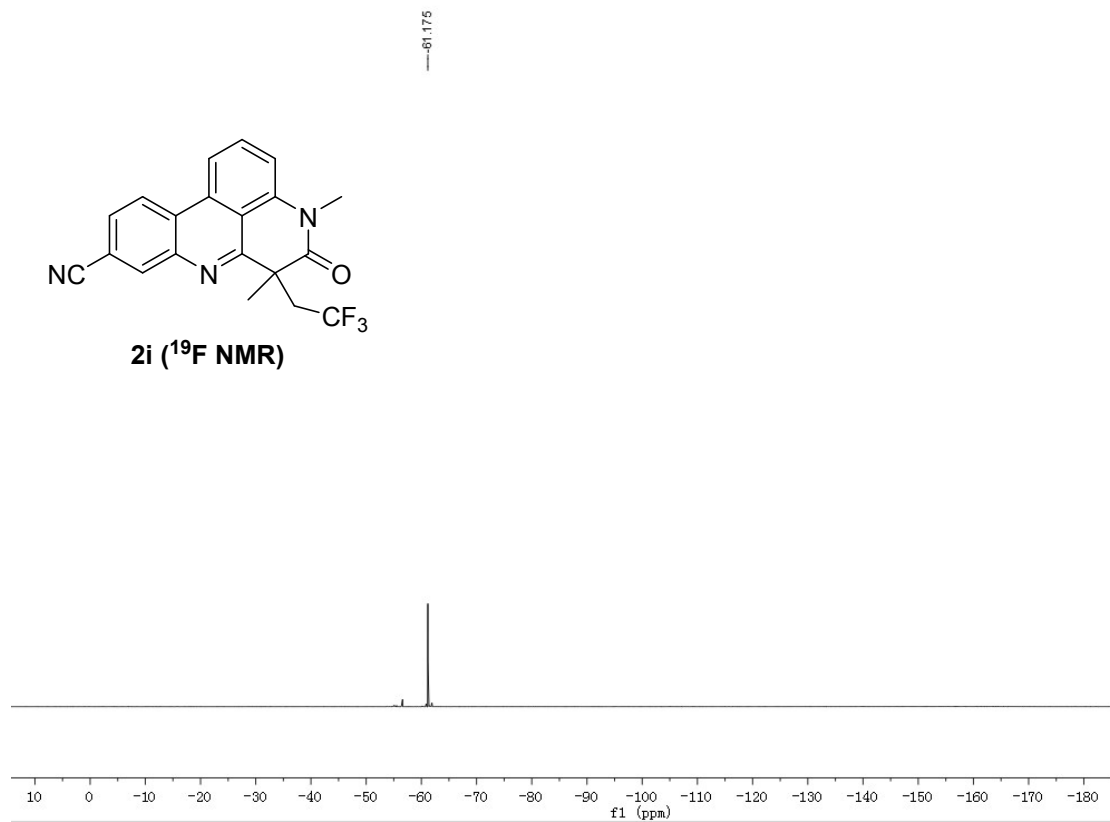
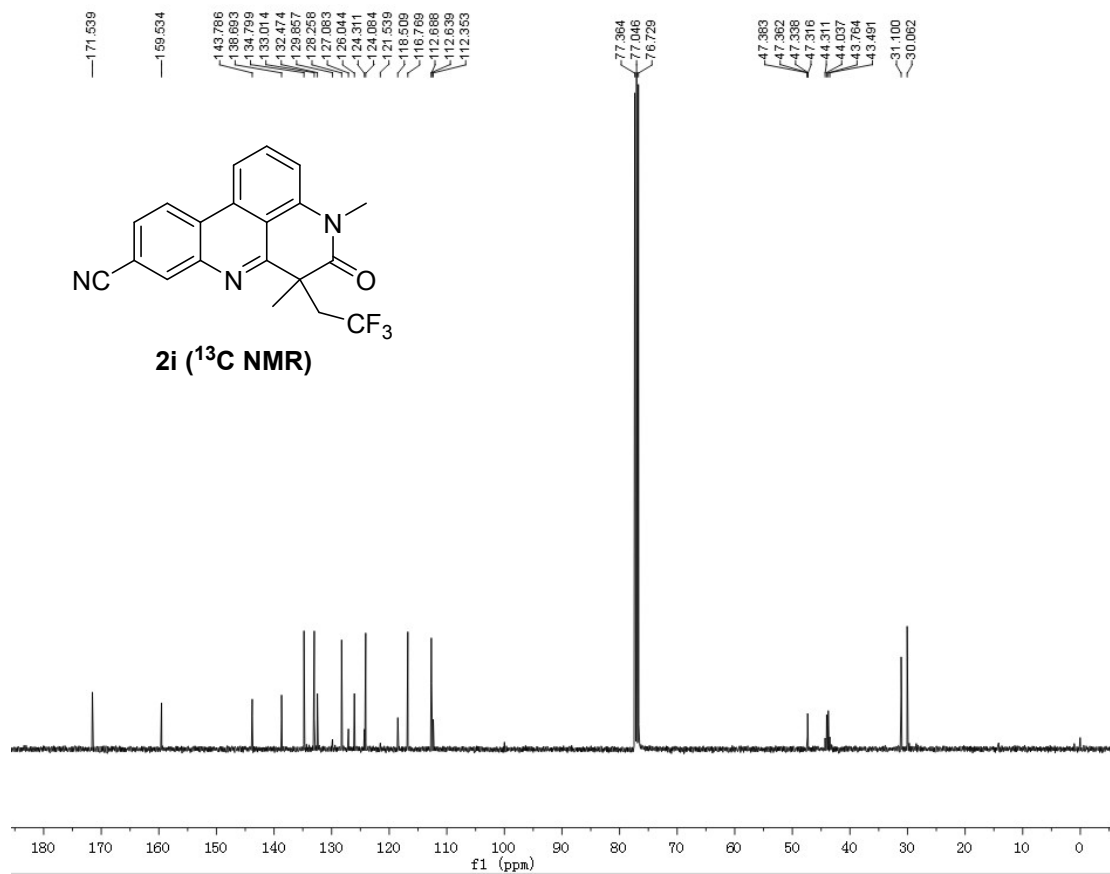




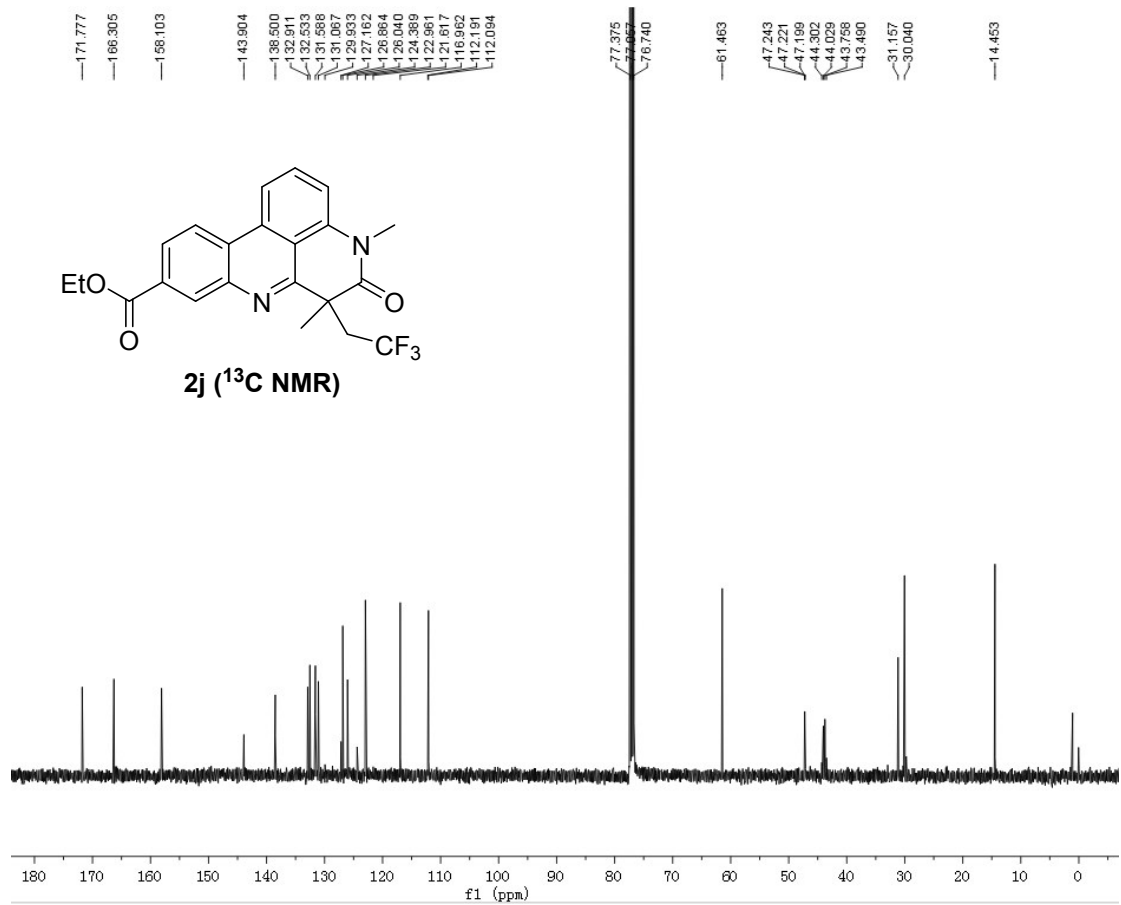
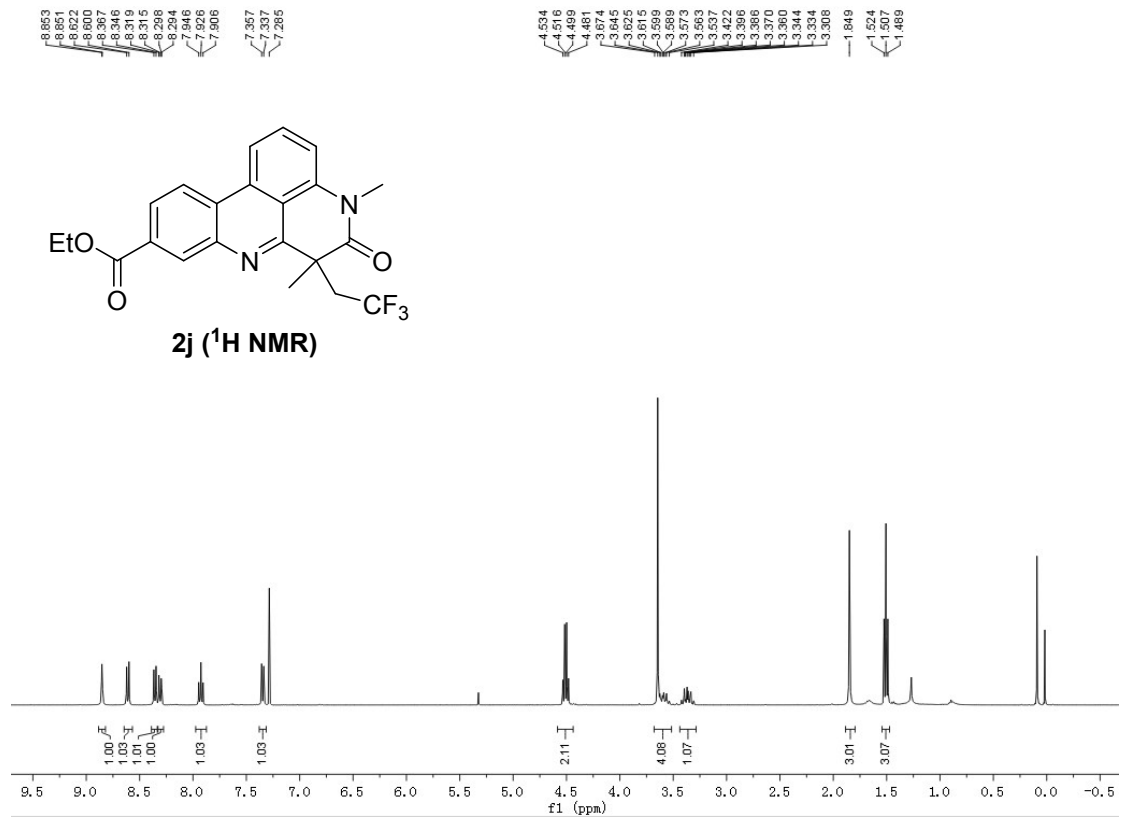


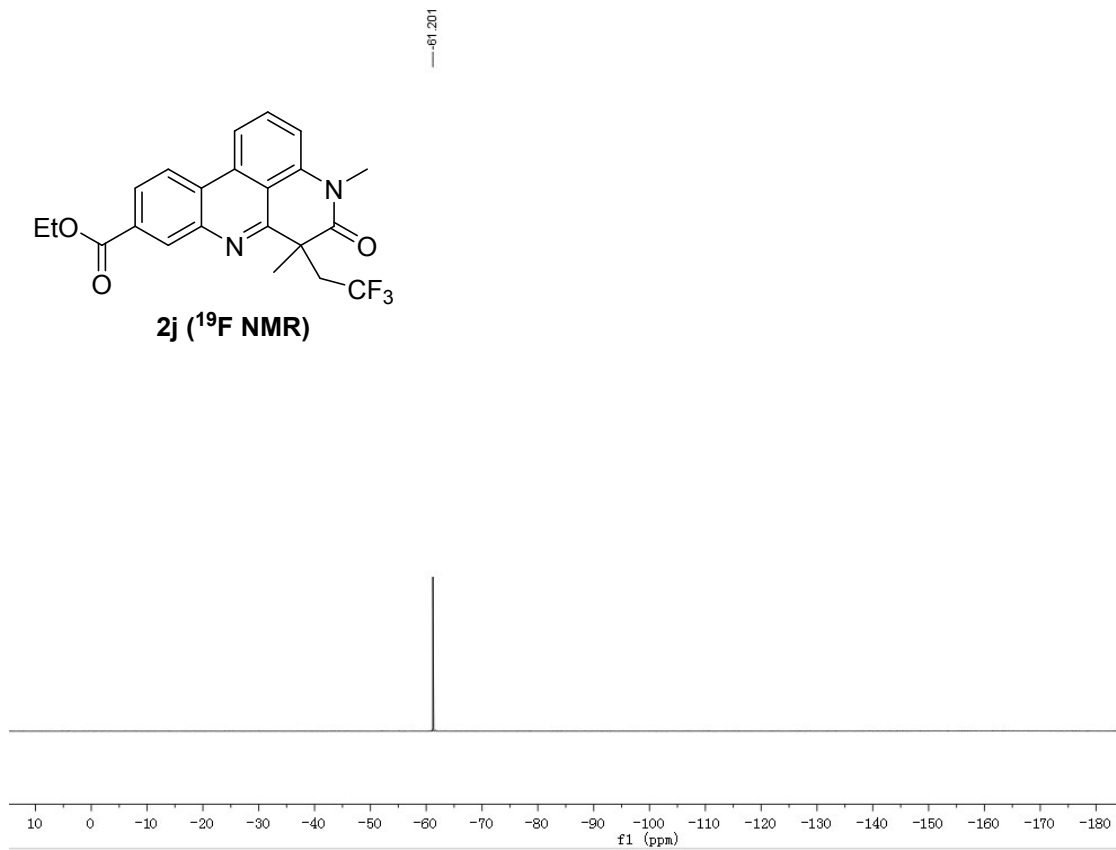
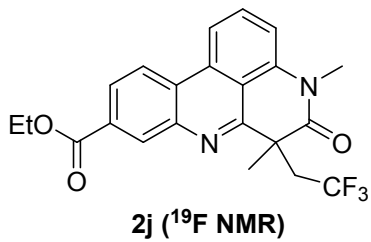








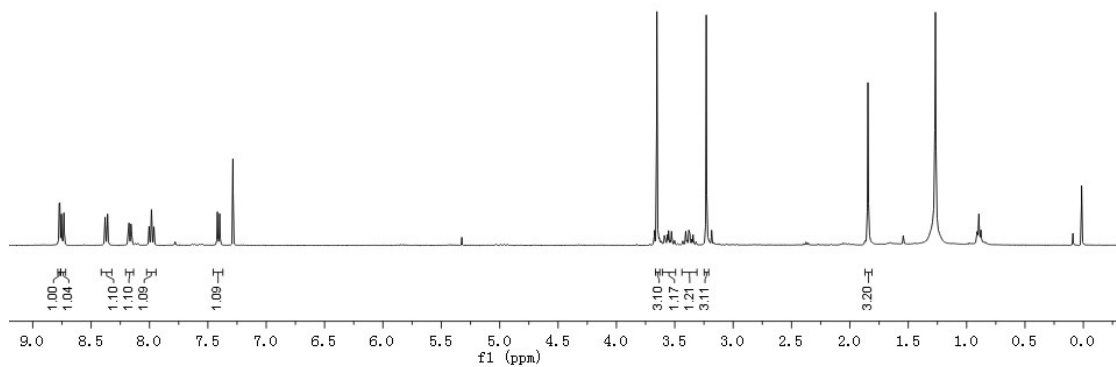
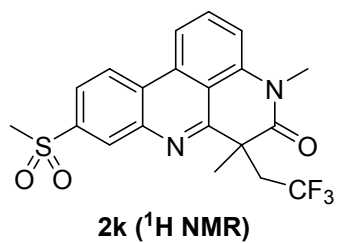


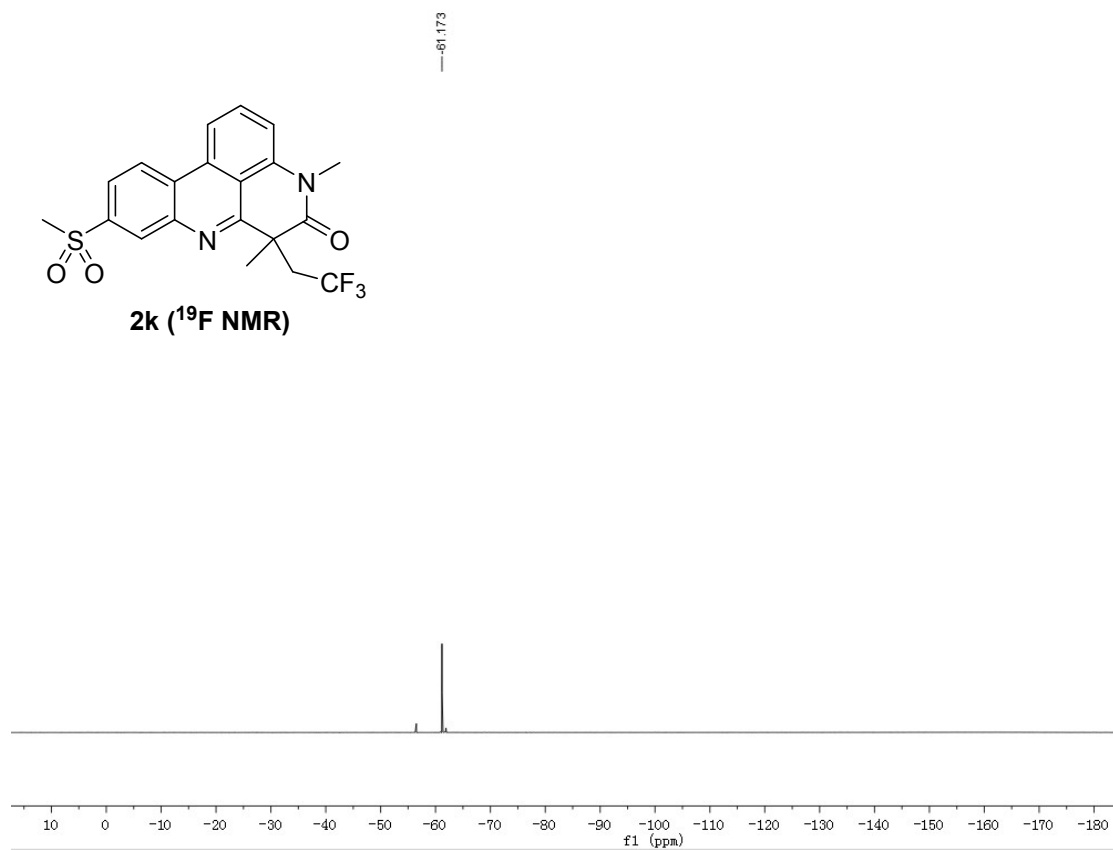
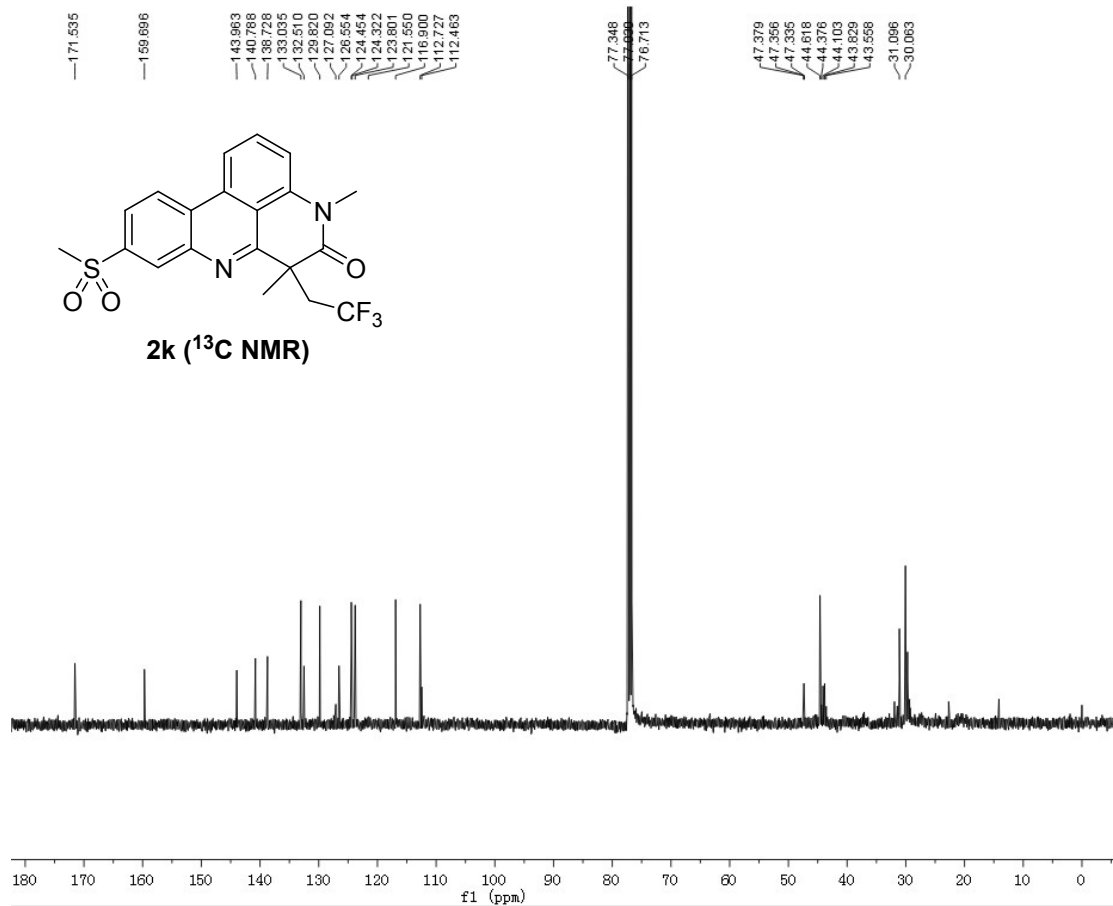


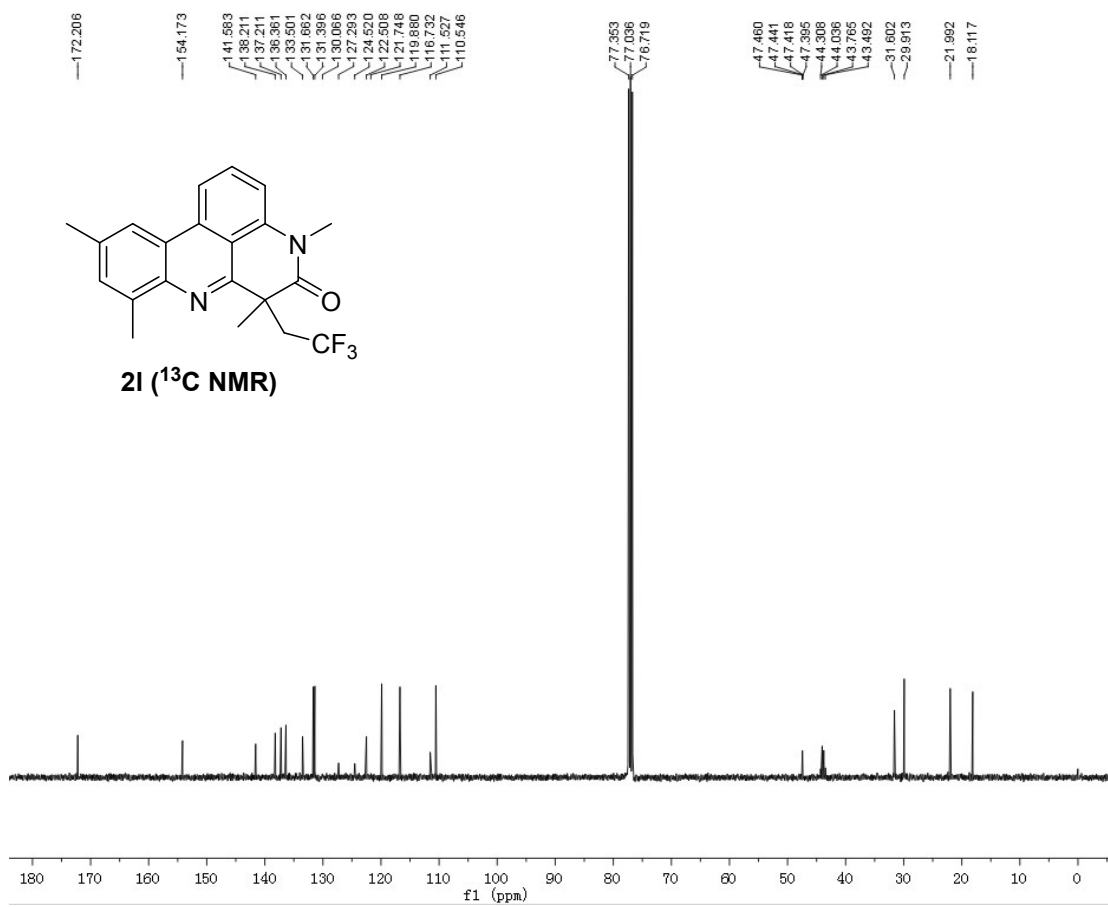
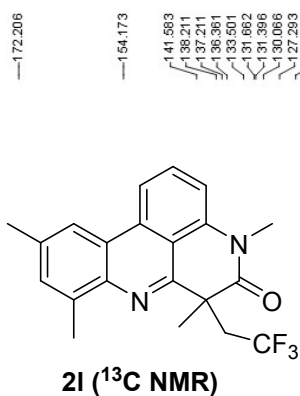
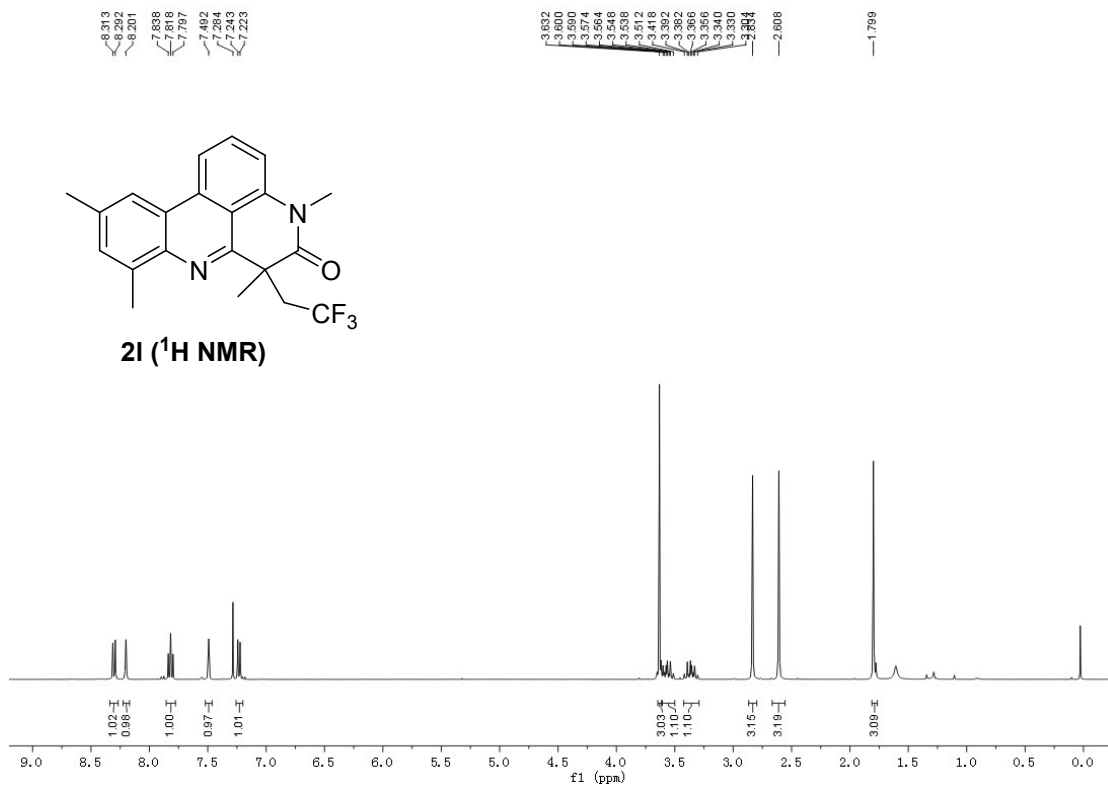
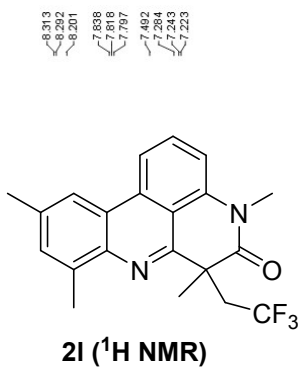
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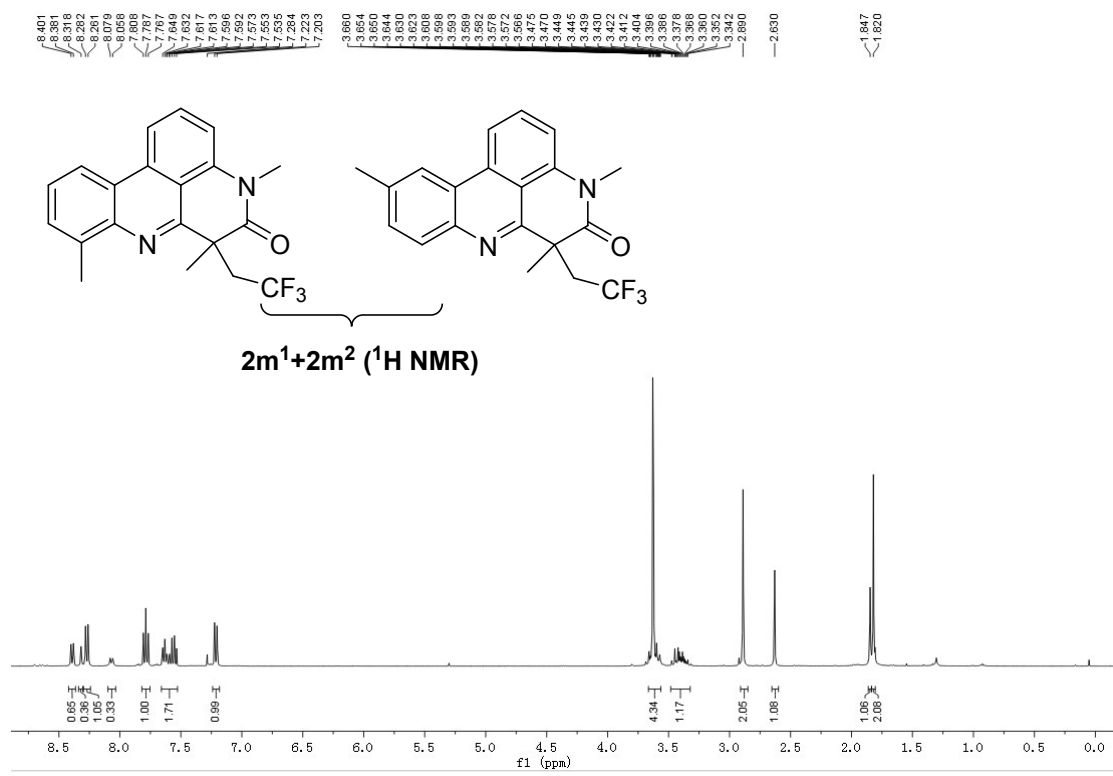
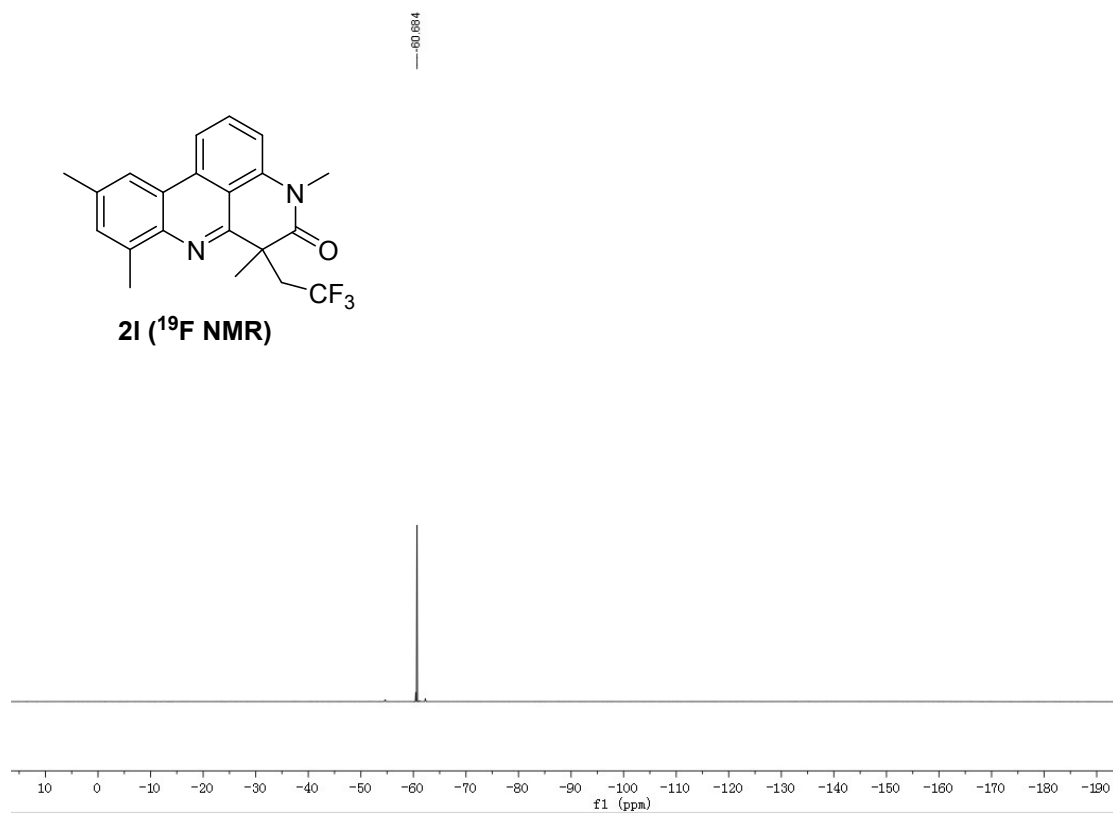
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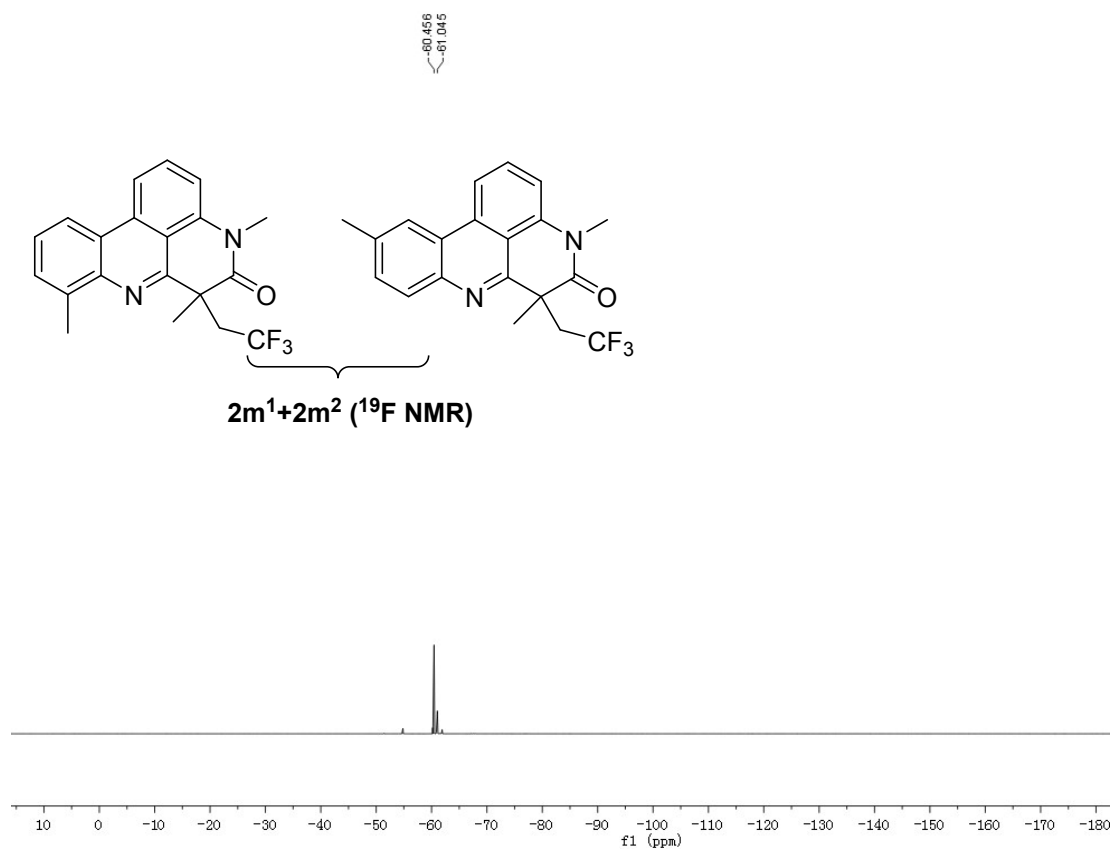
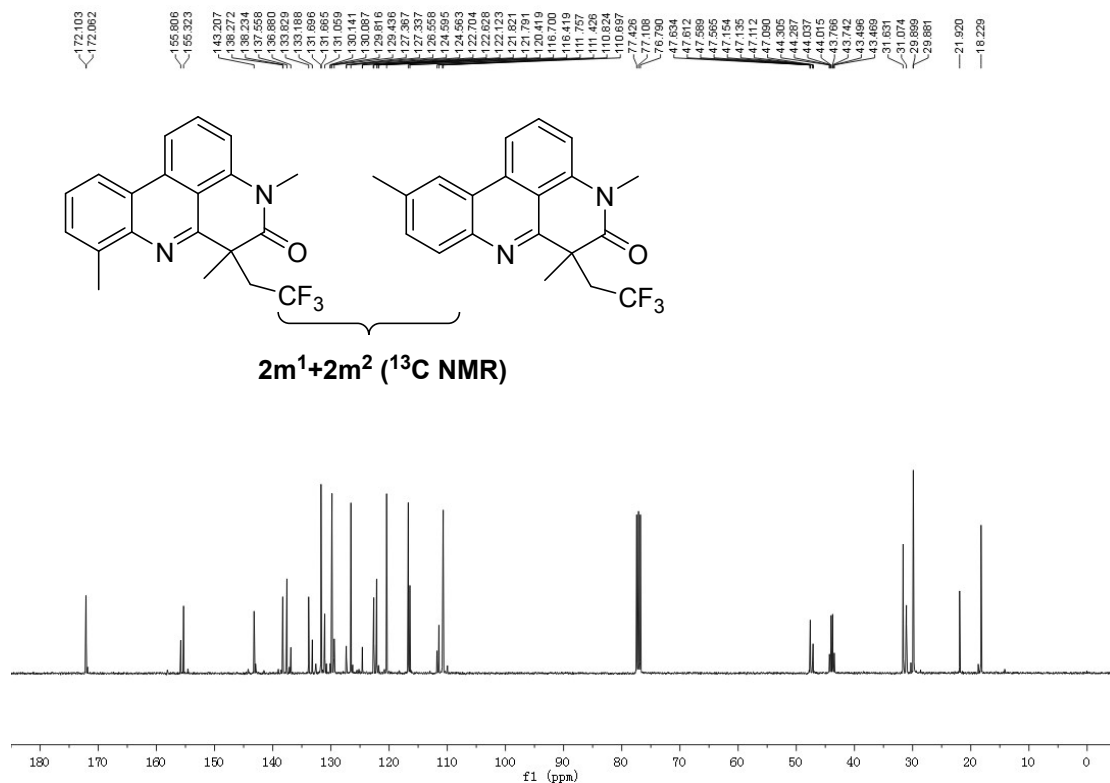
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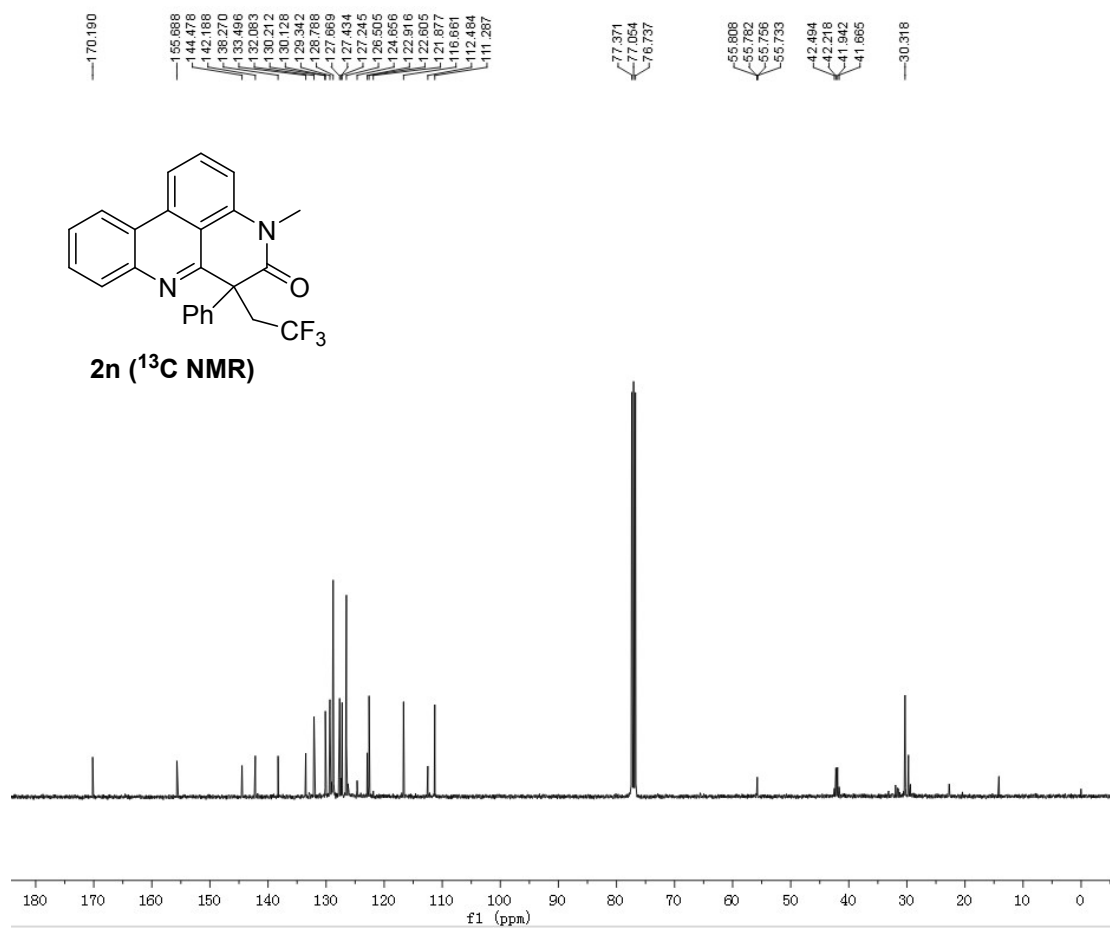
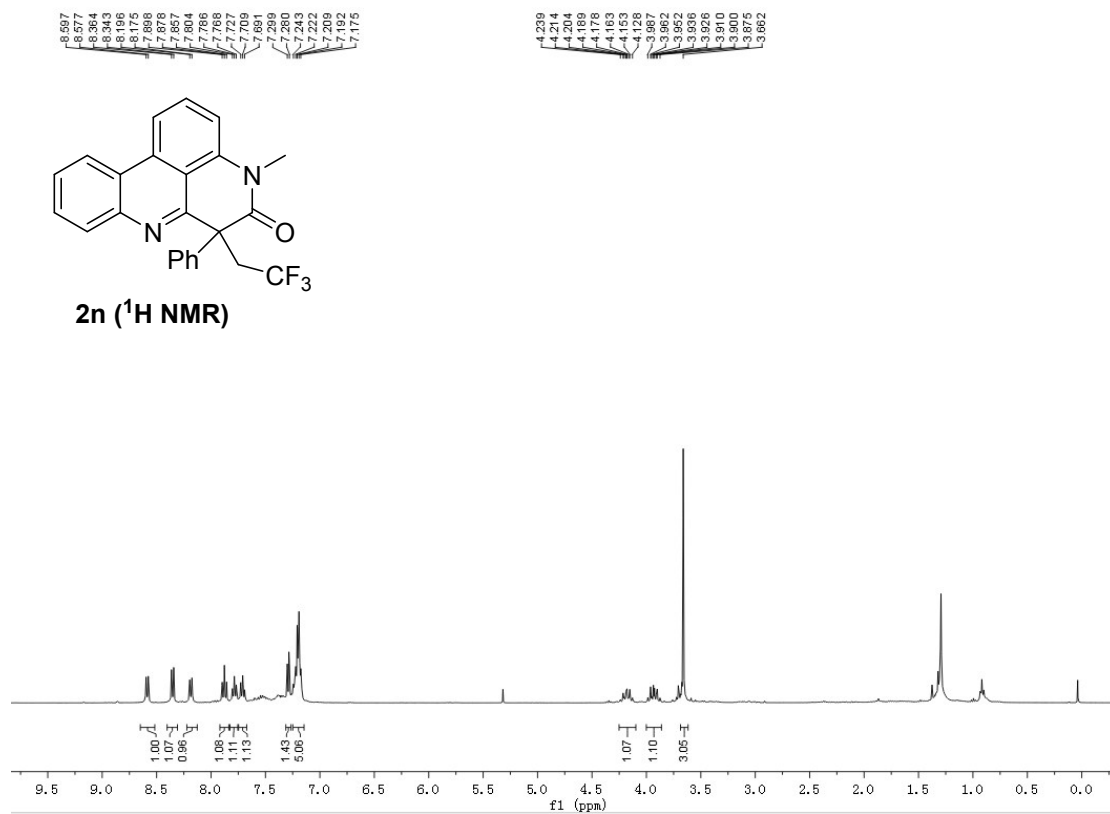


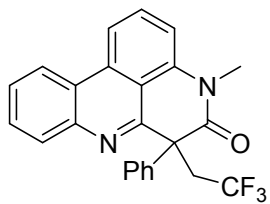




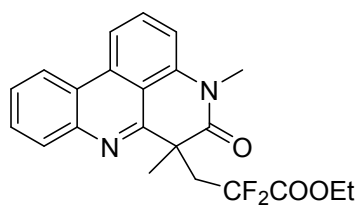
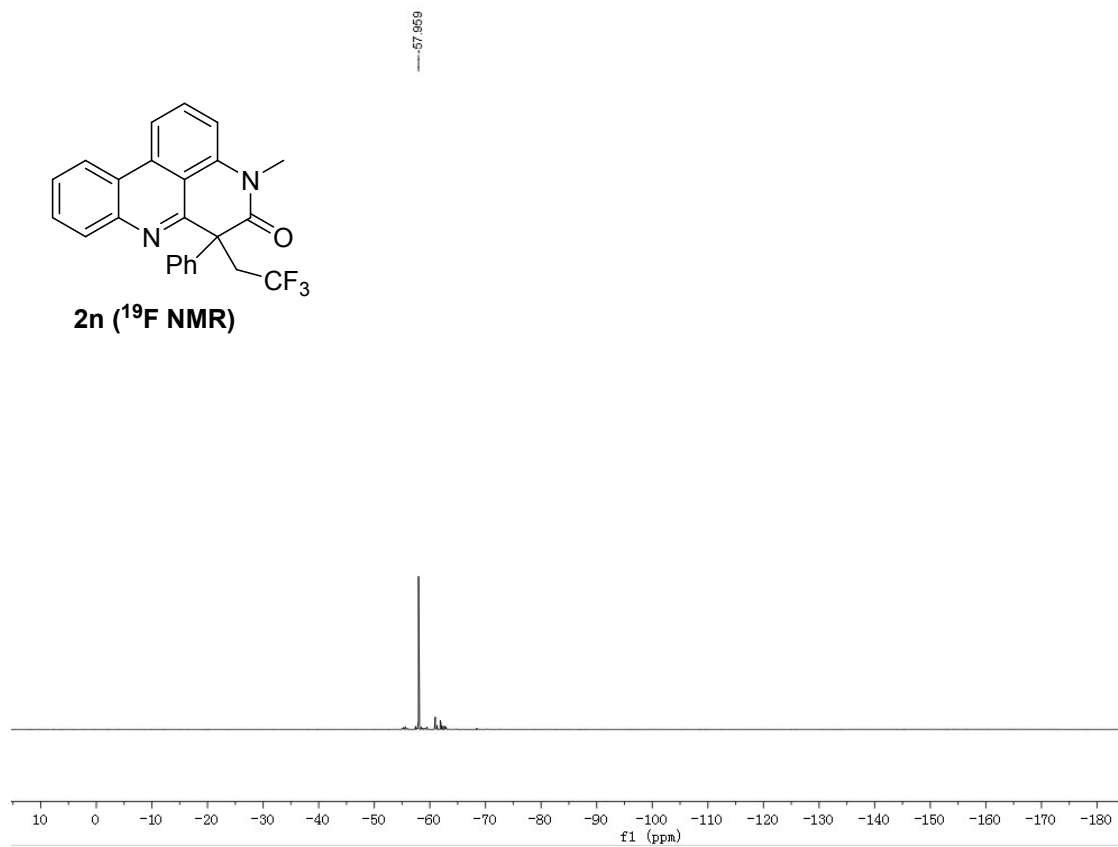




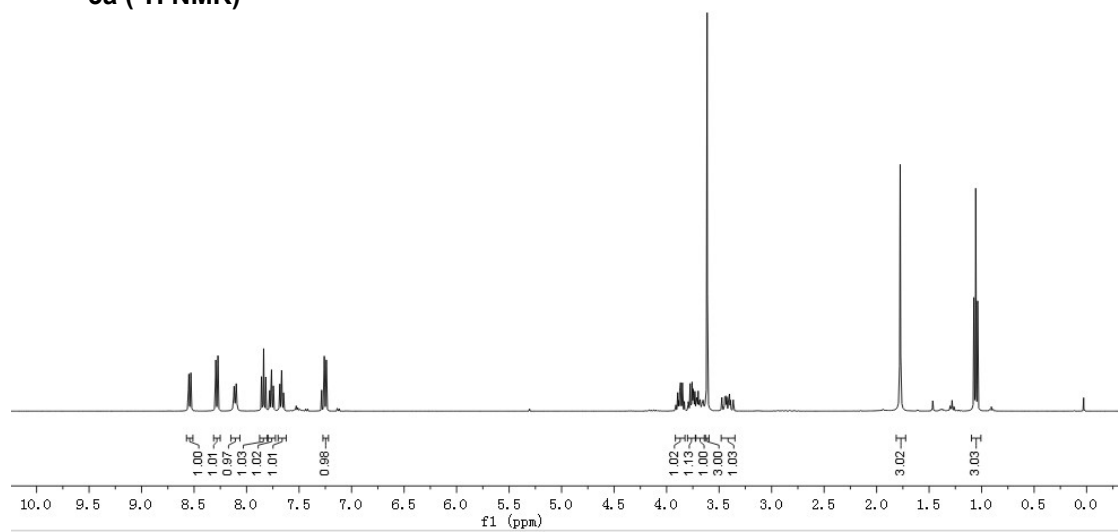




**2n** ( $^{19}\text{F}$  NMR)



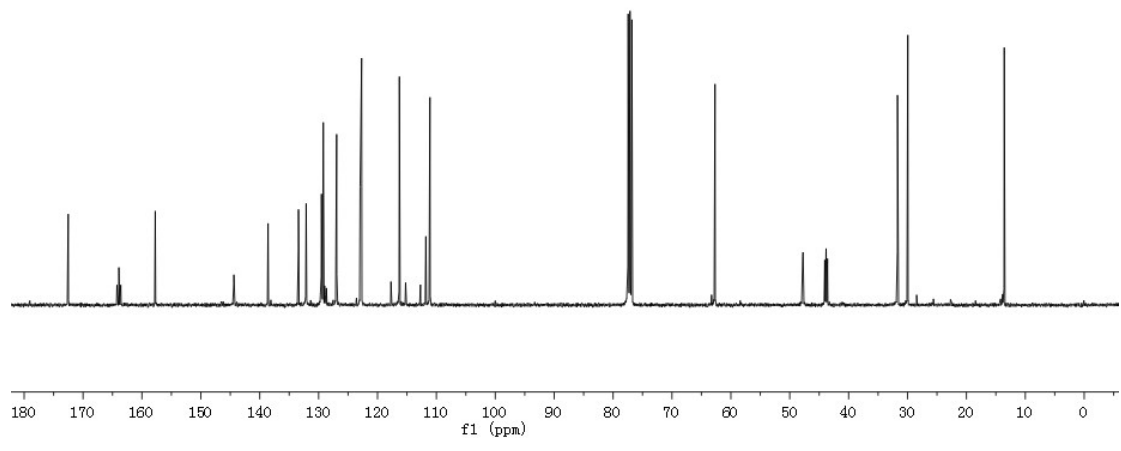
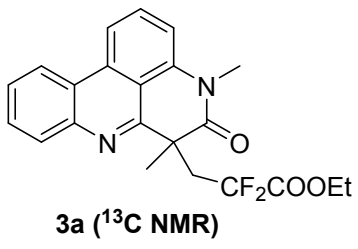
**3a** ( $^1\text{H}$  NMR)



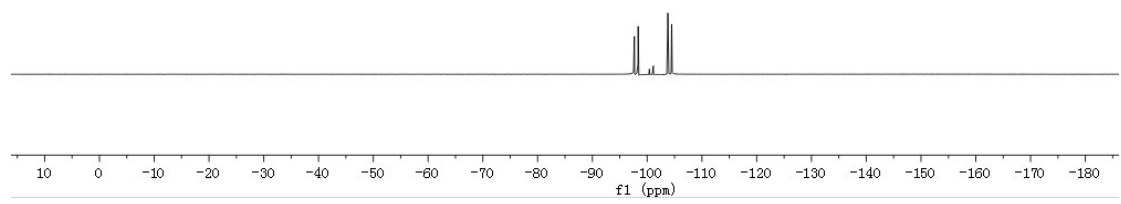
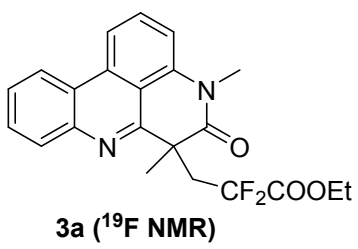


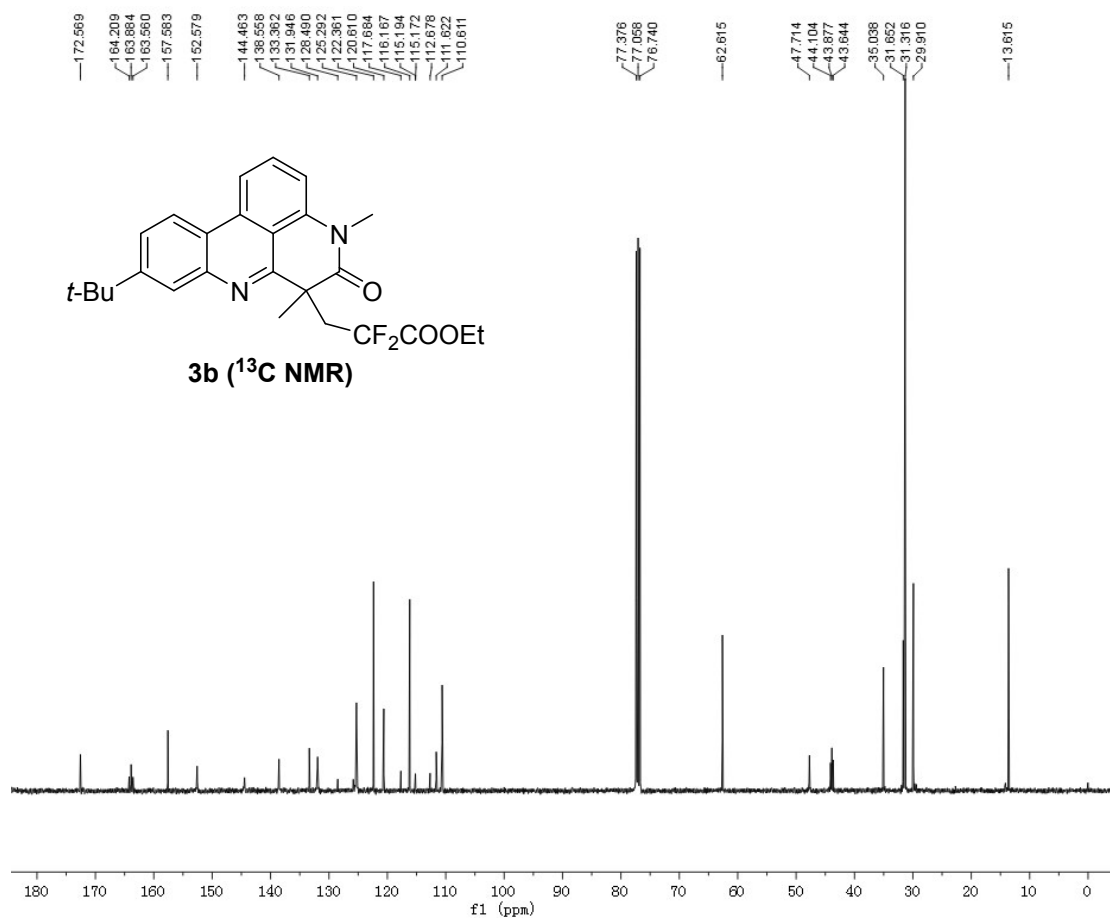
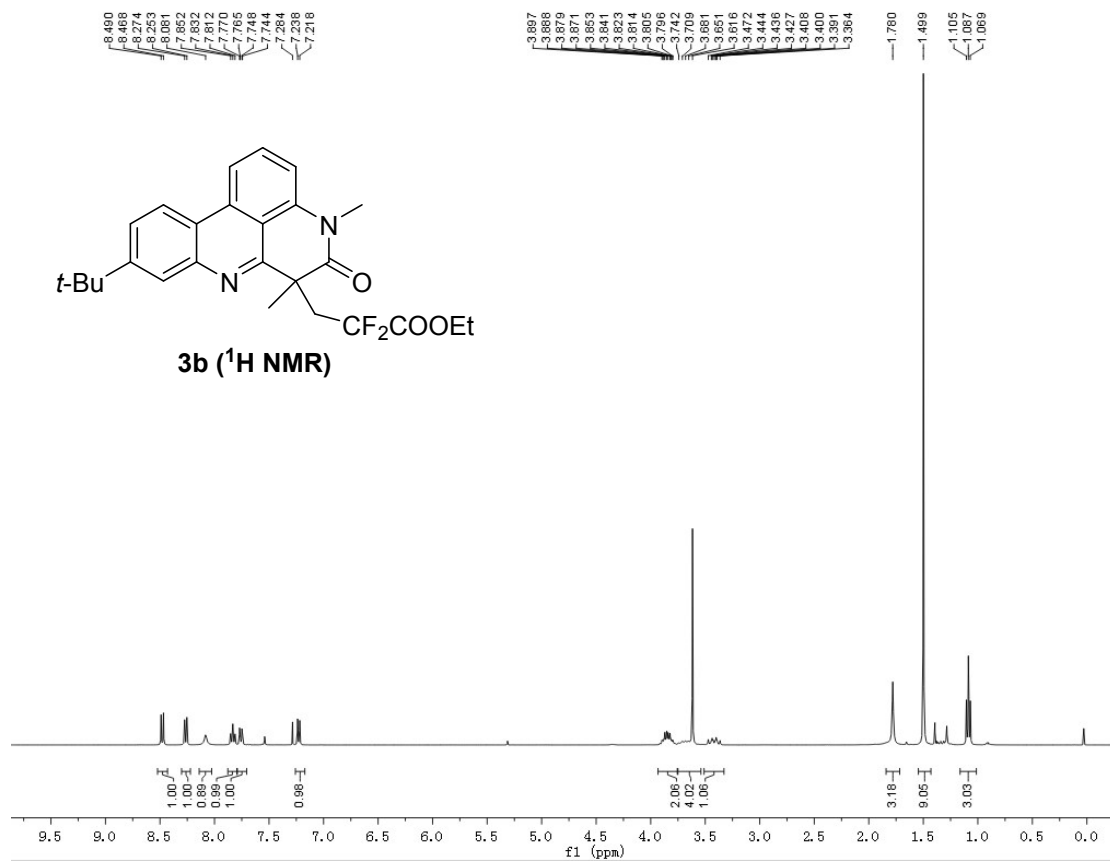
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 111.086

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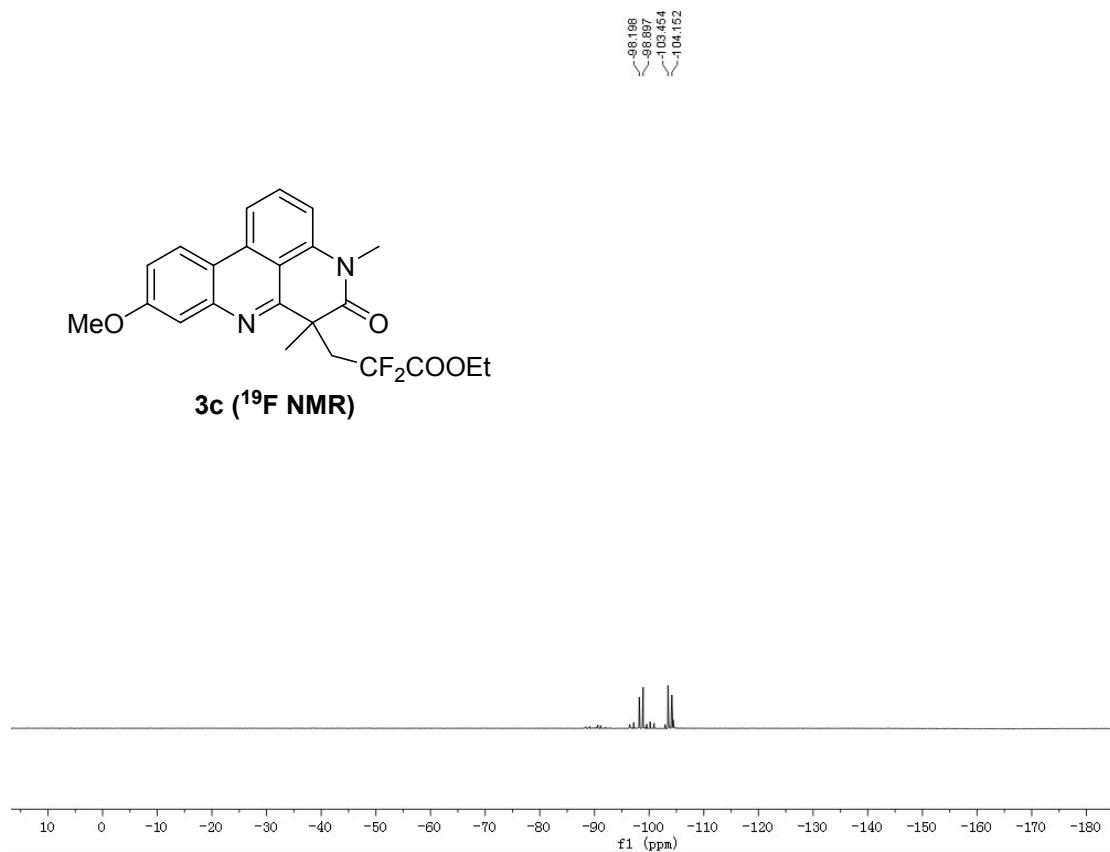
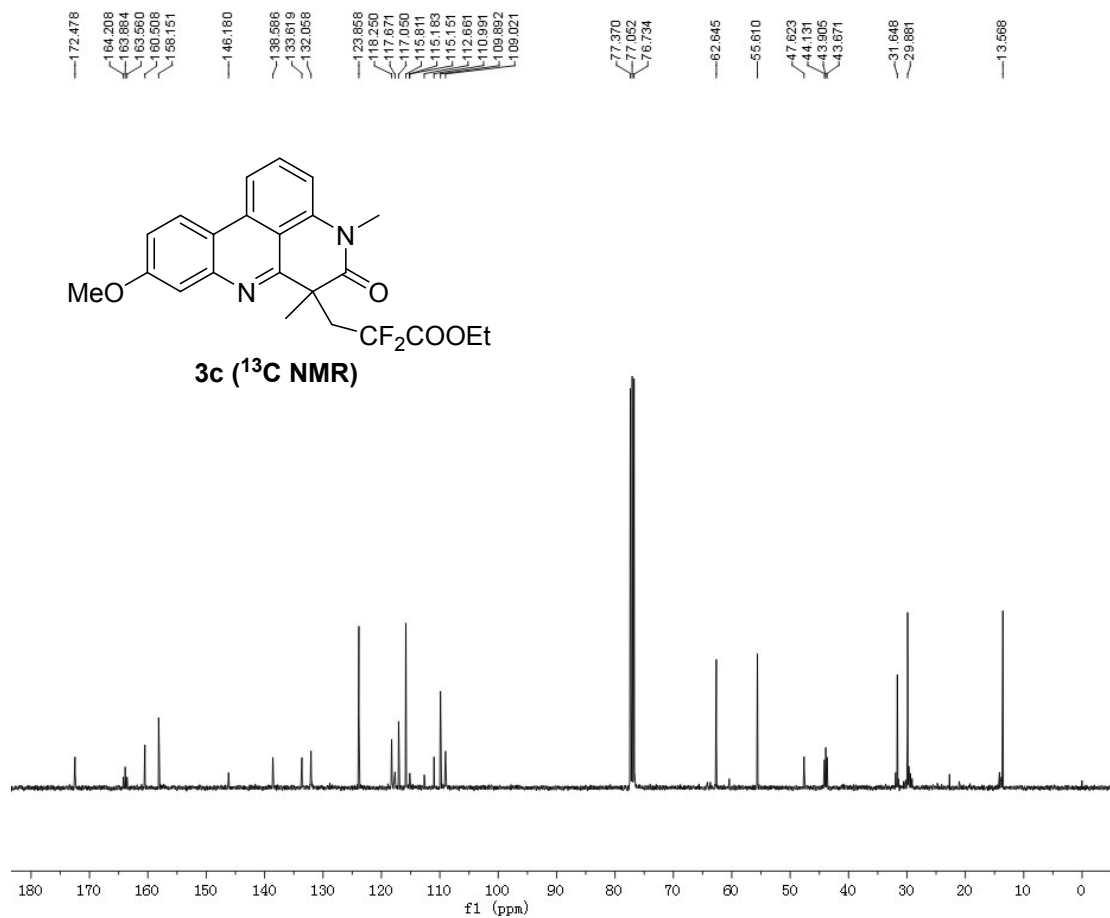


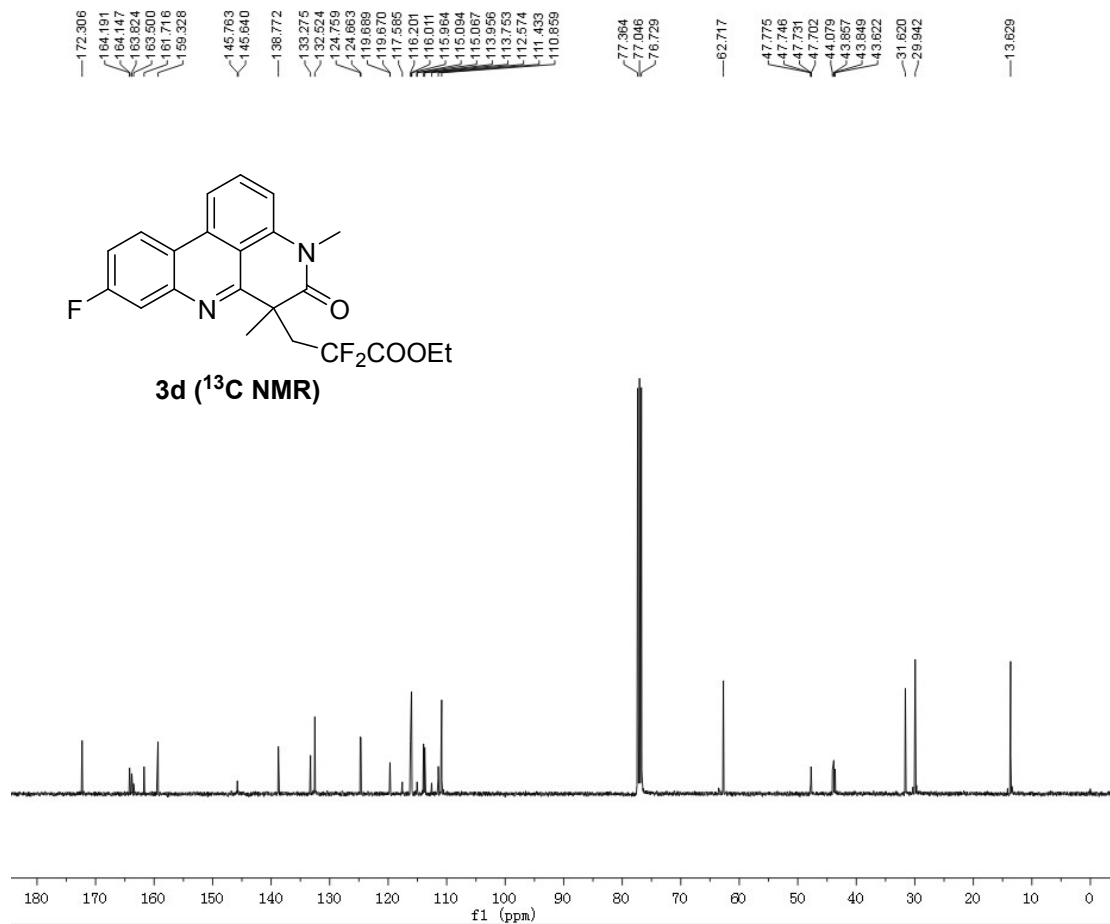
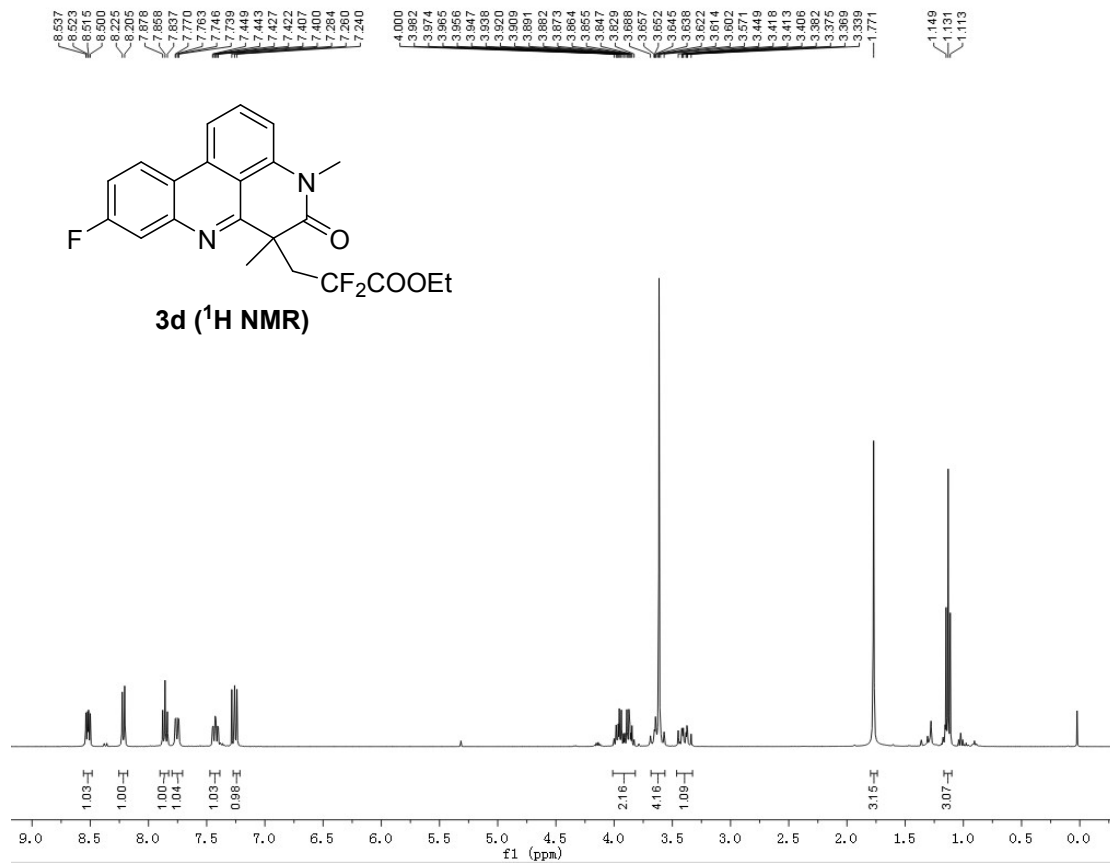
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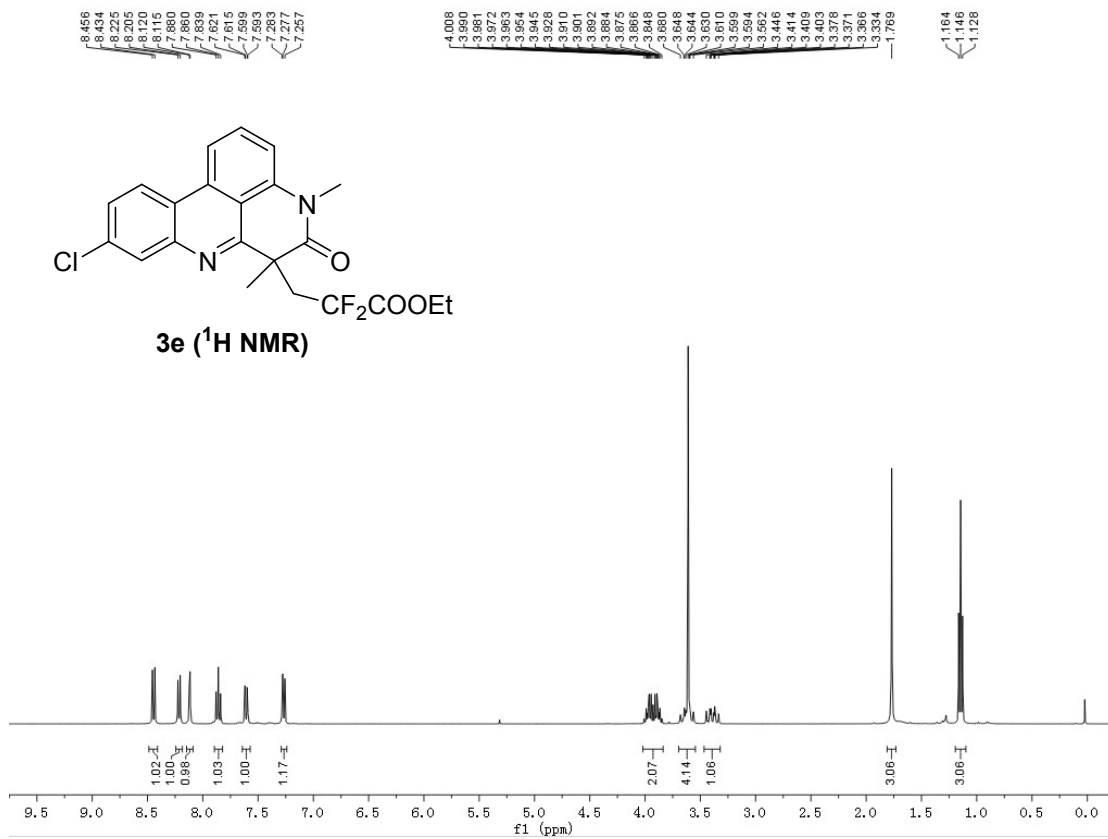
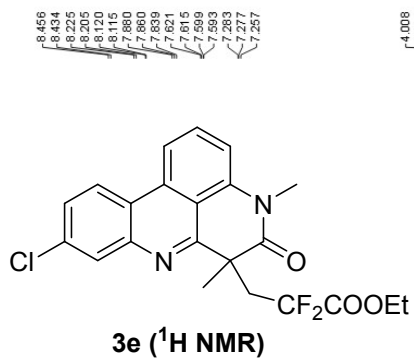
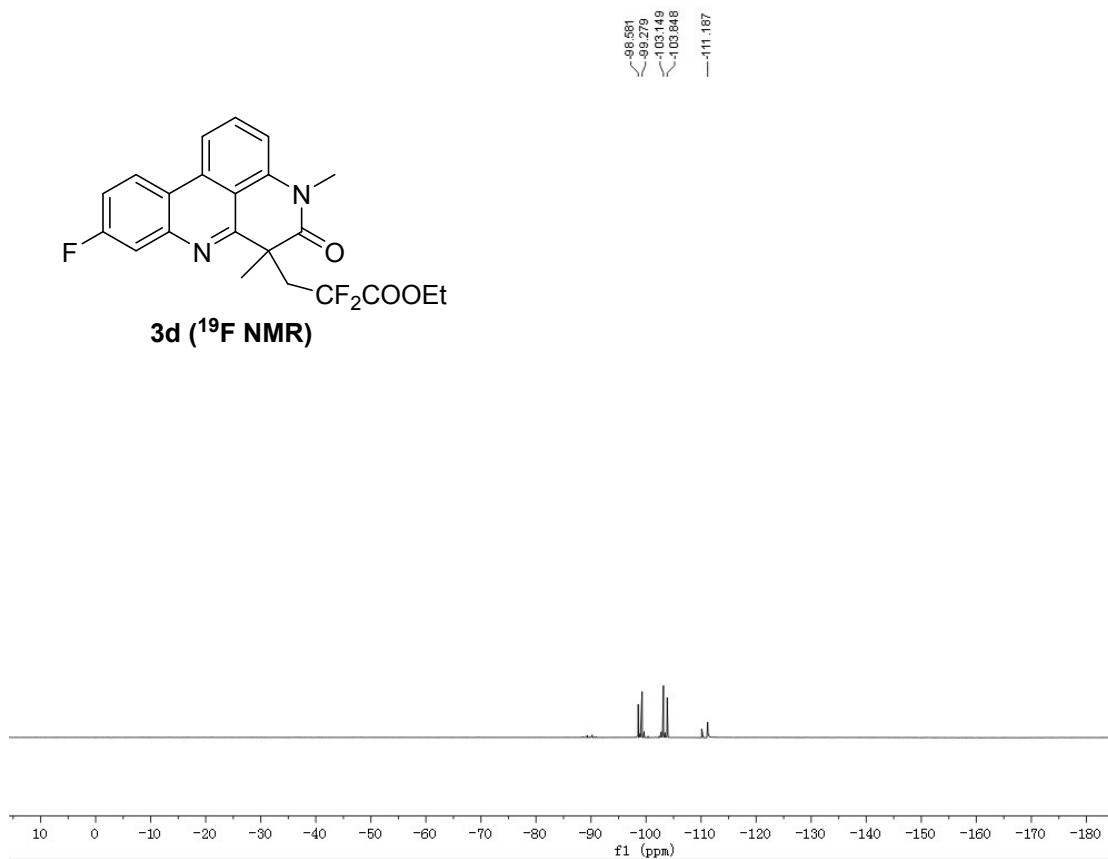
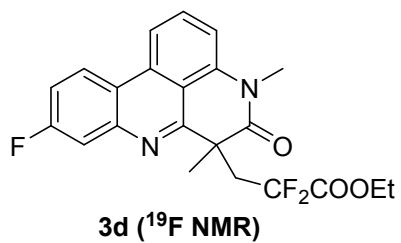


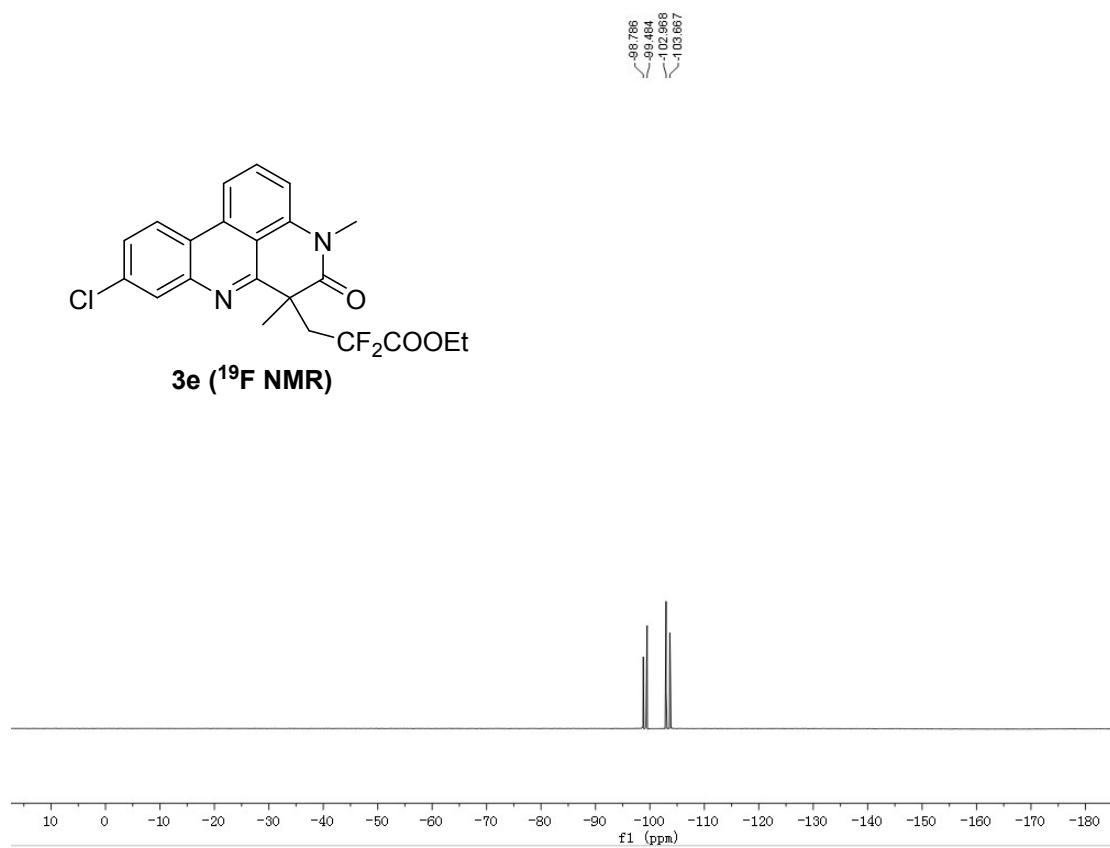
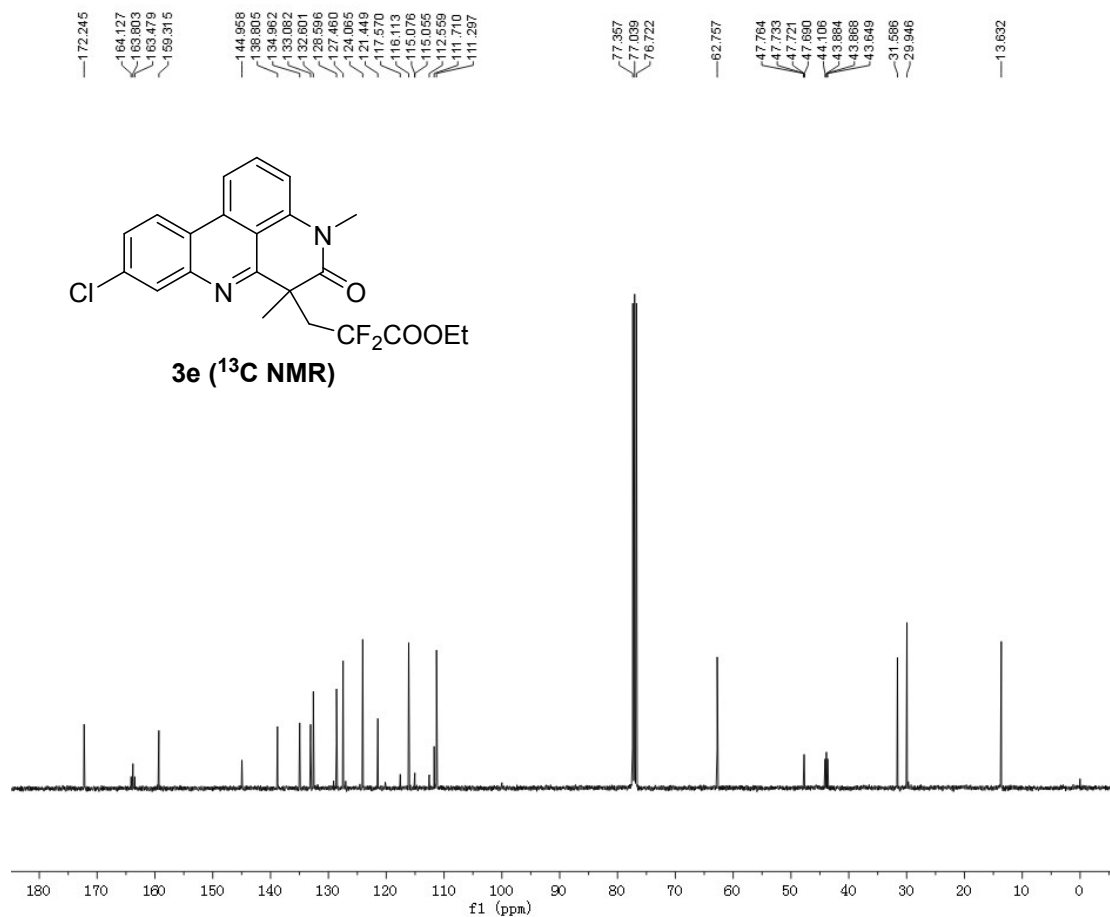


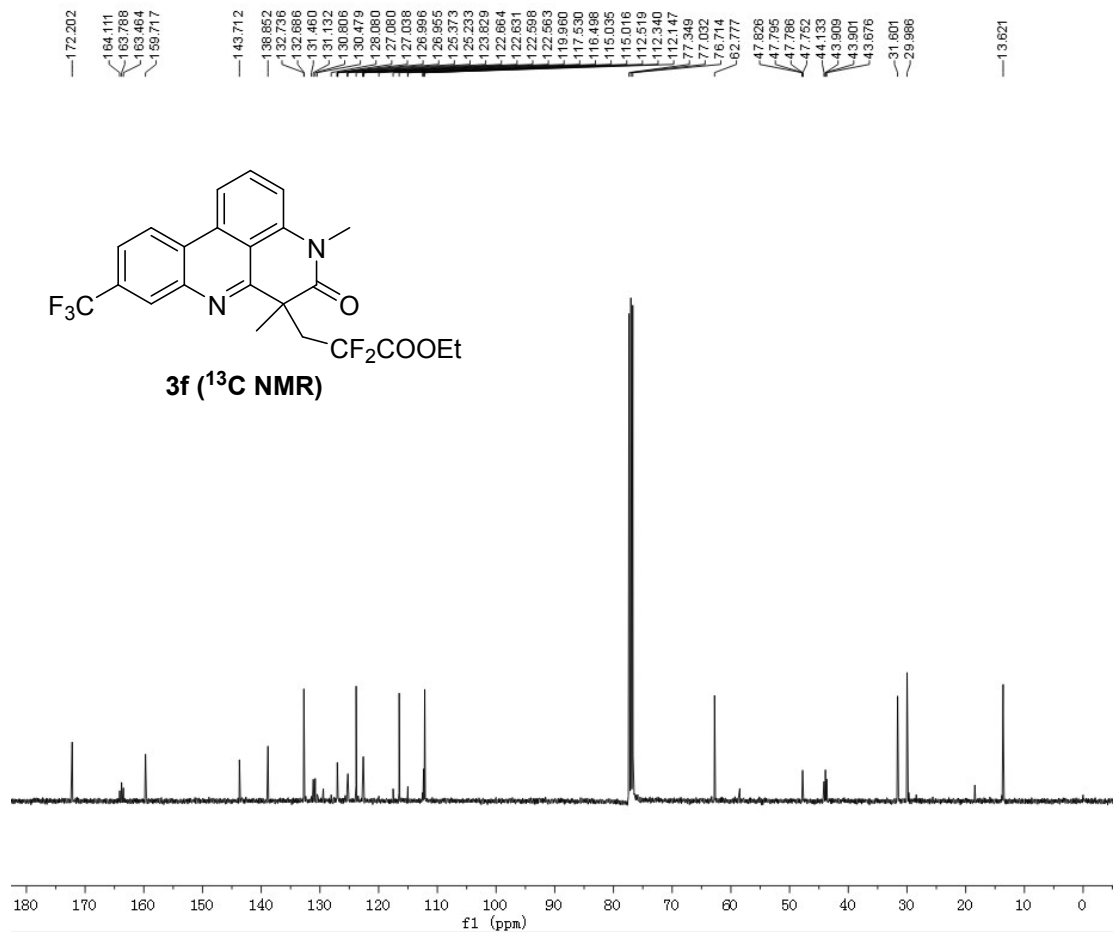
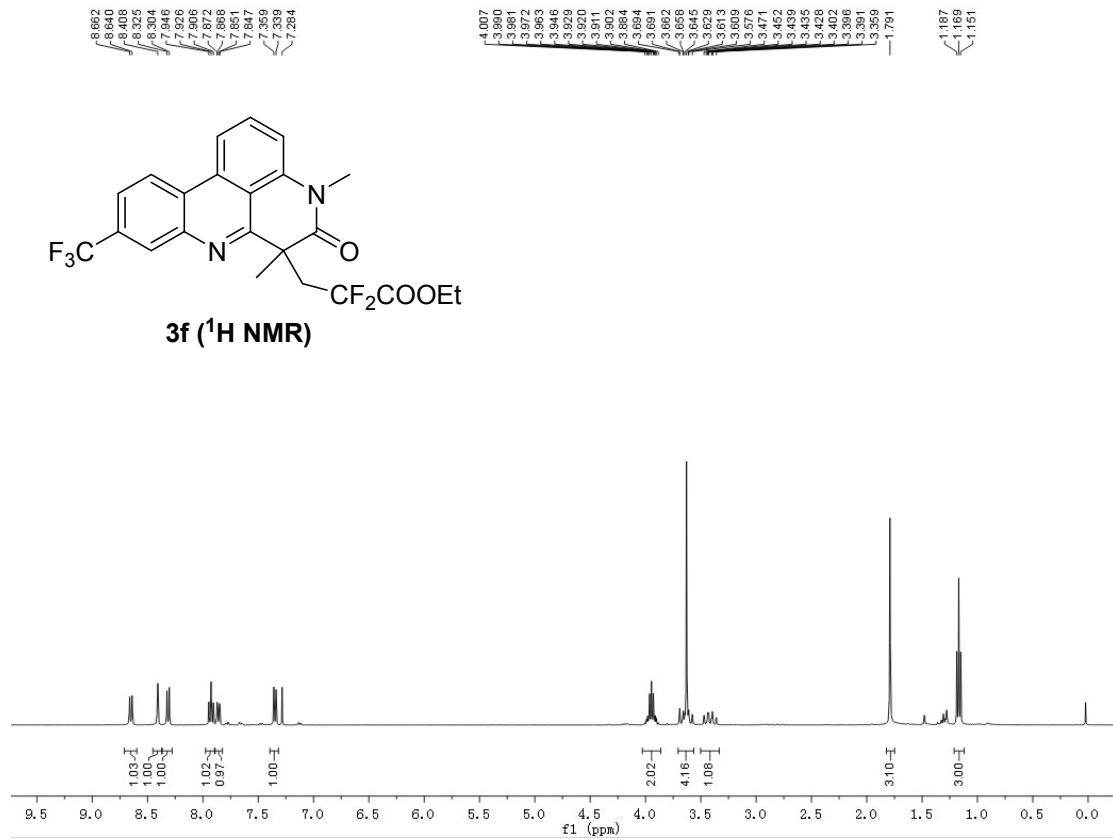




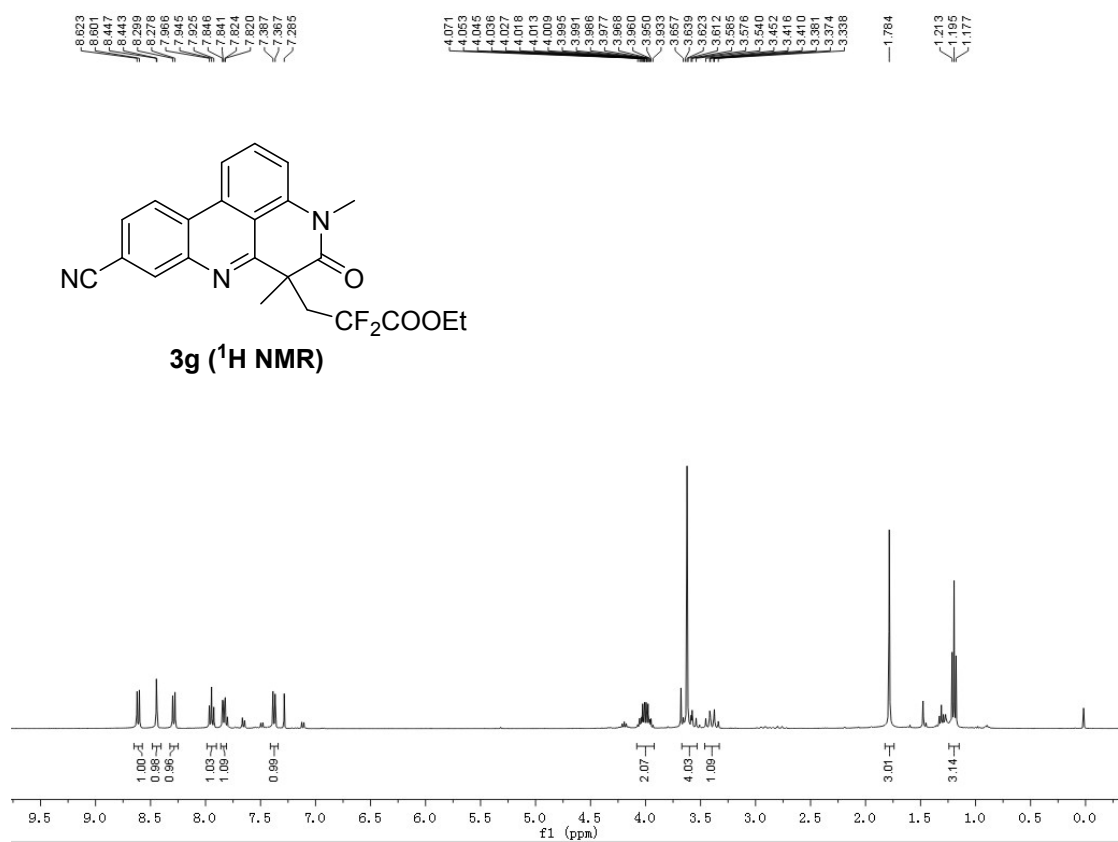
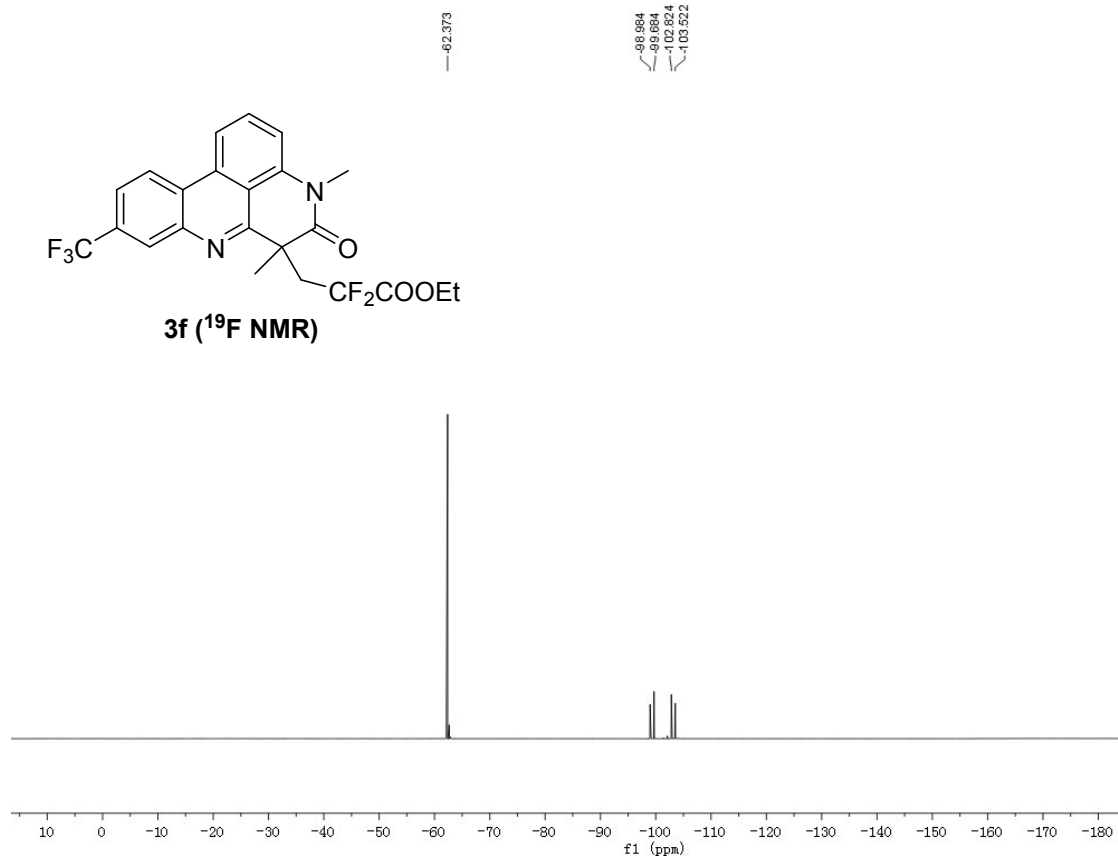






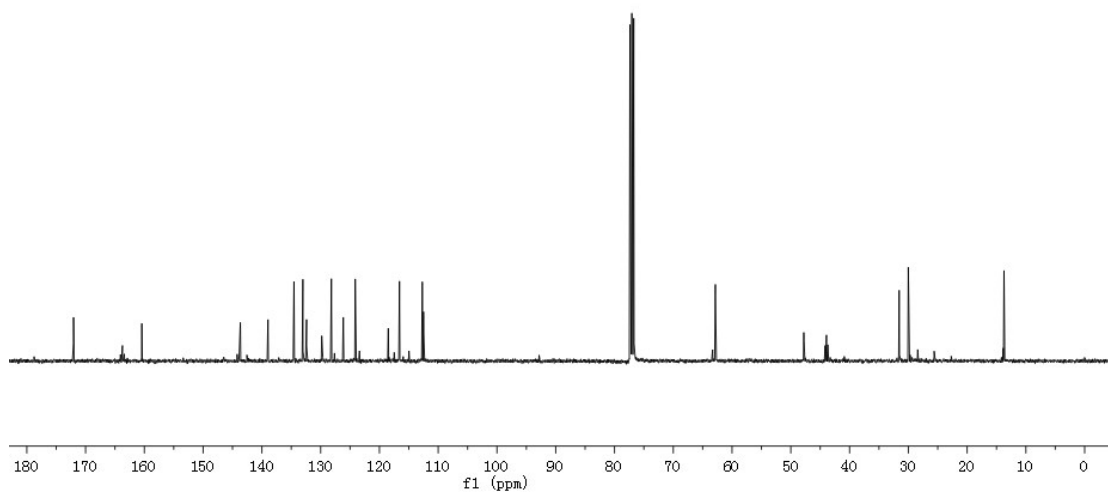
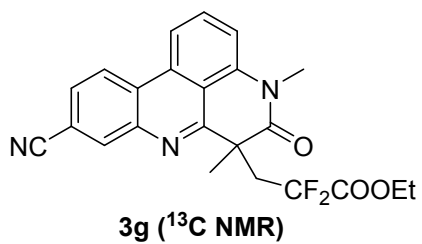




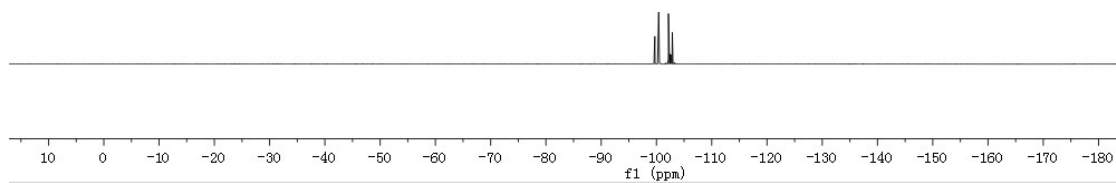
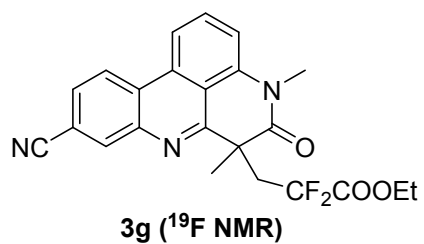


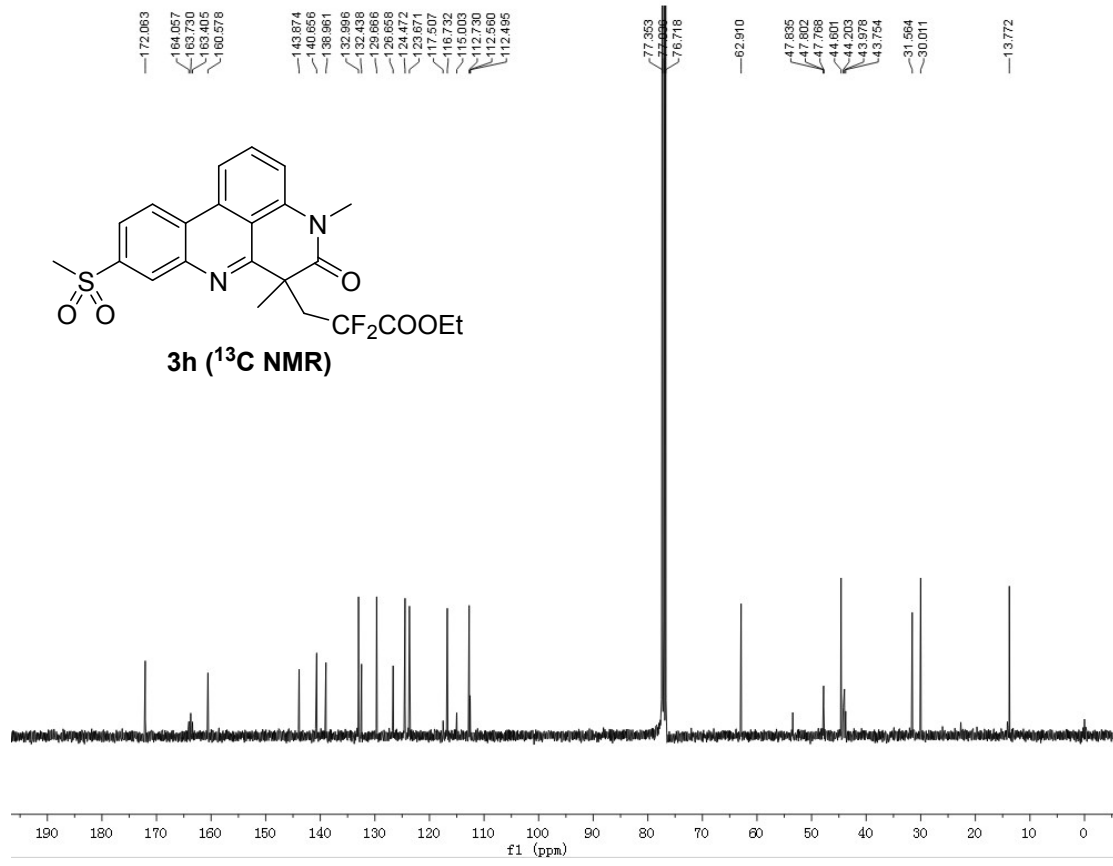
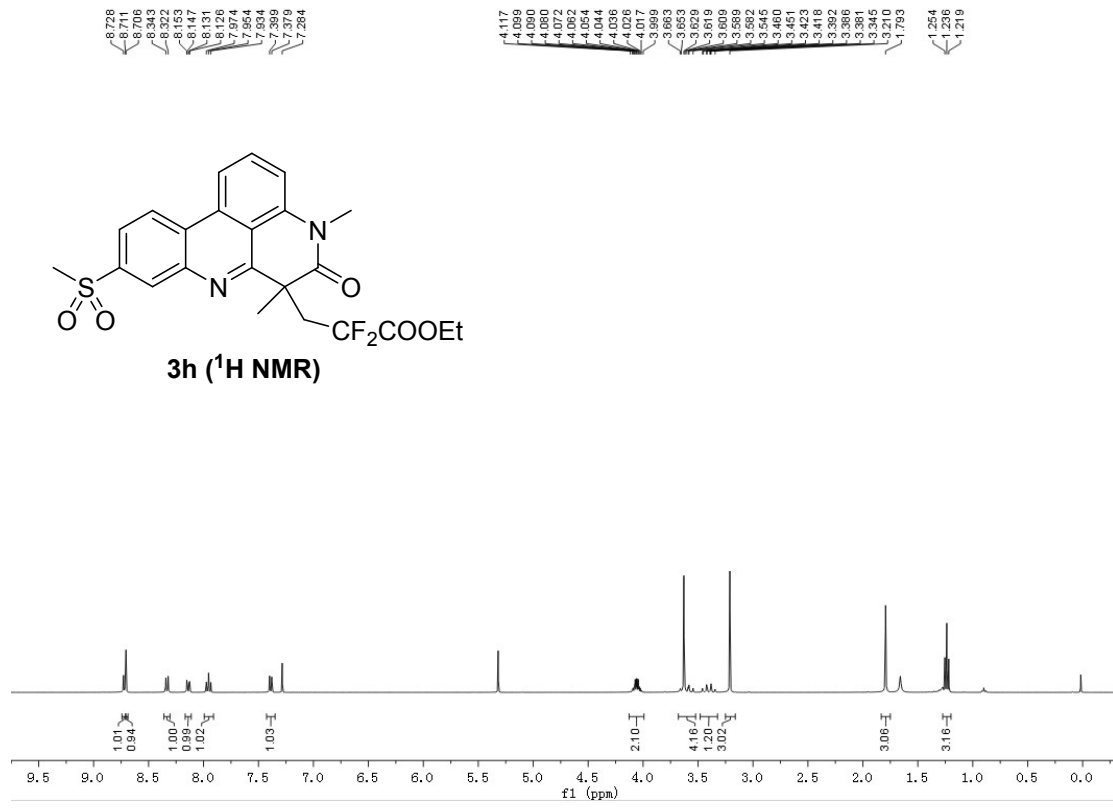
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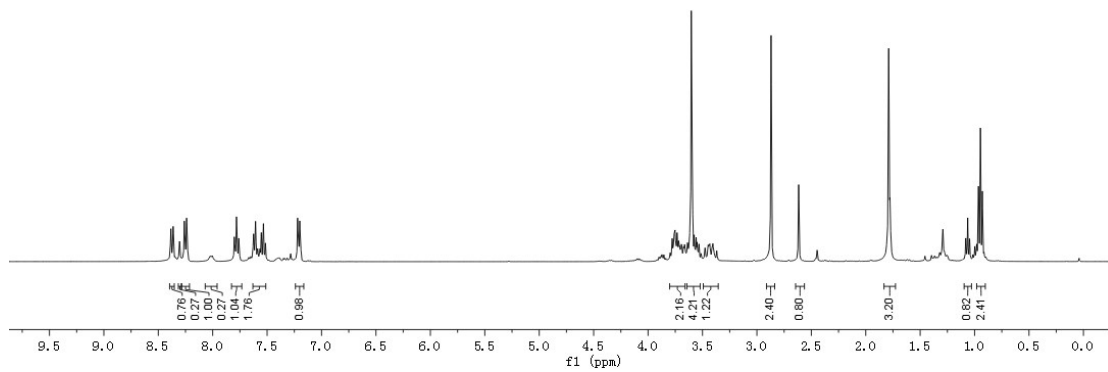
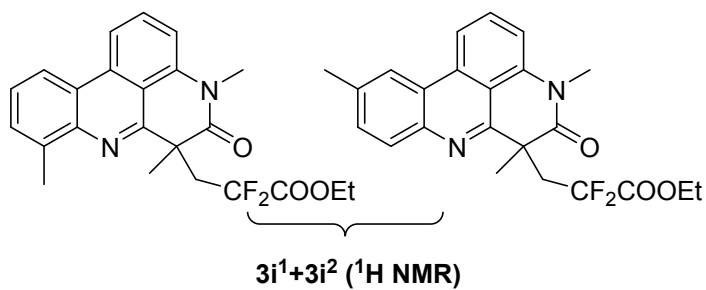
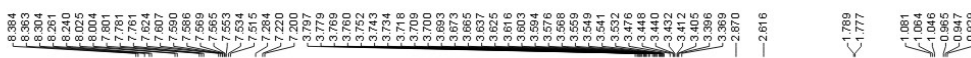
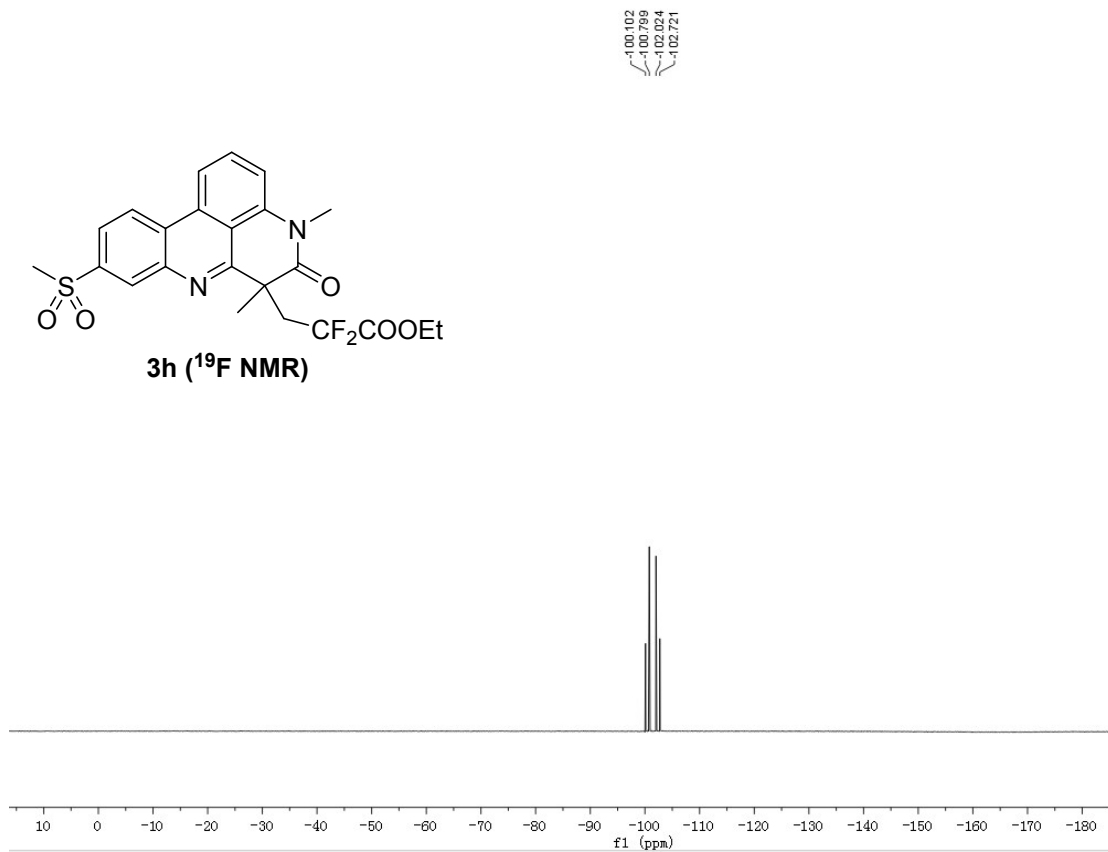
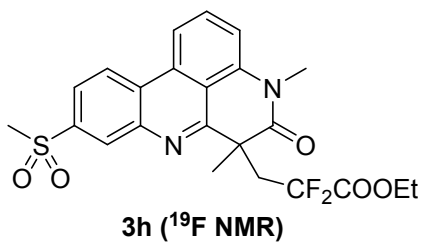
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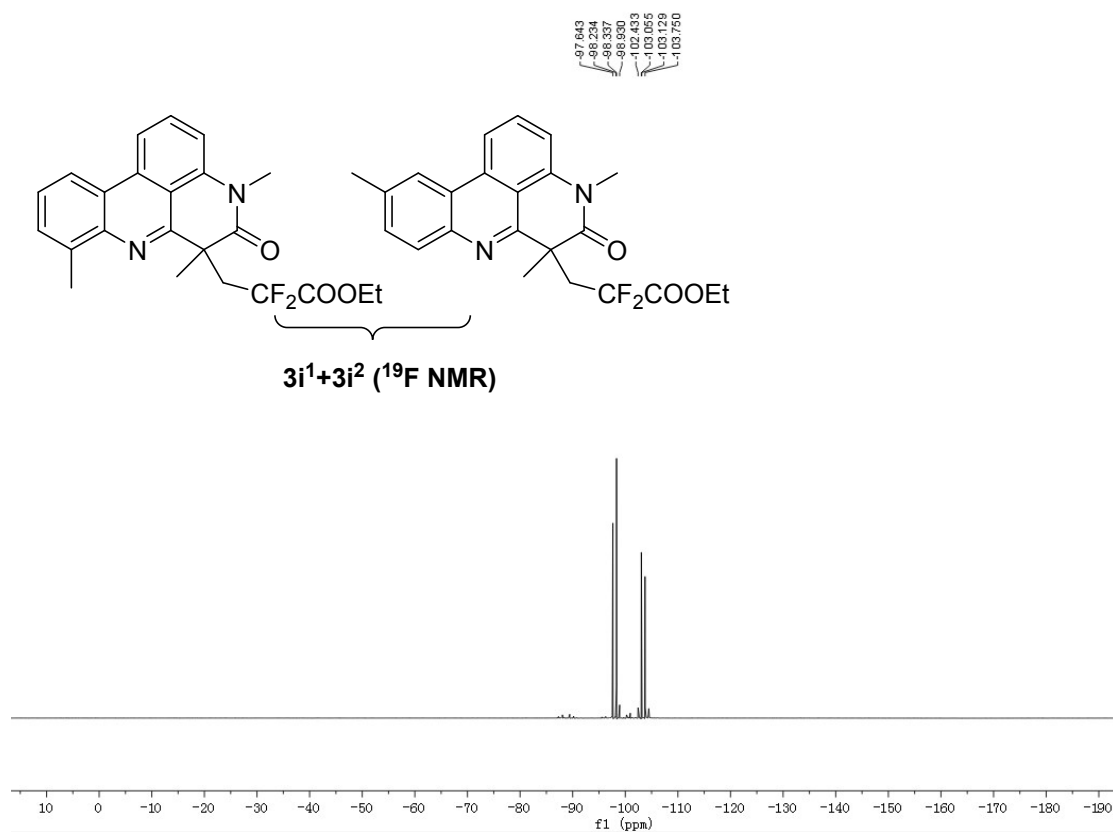
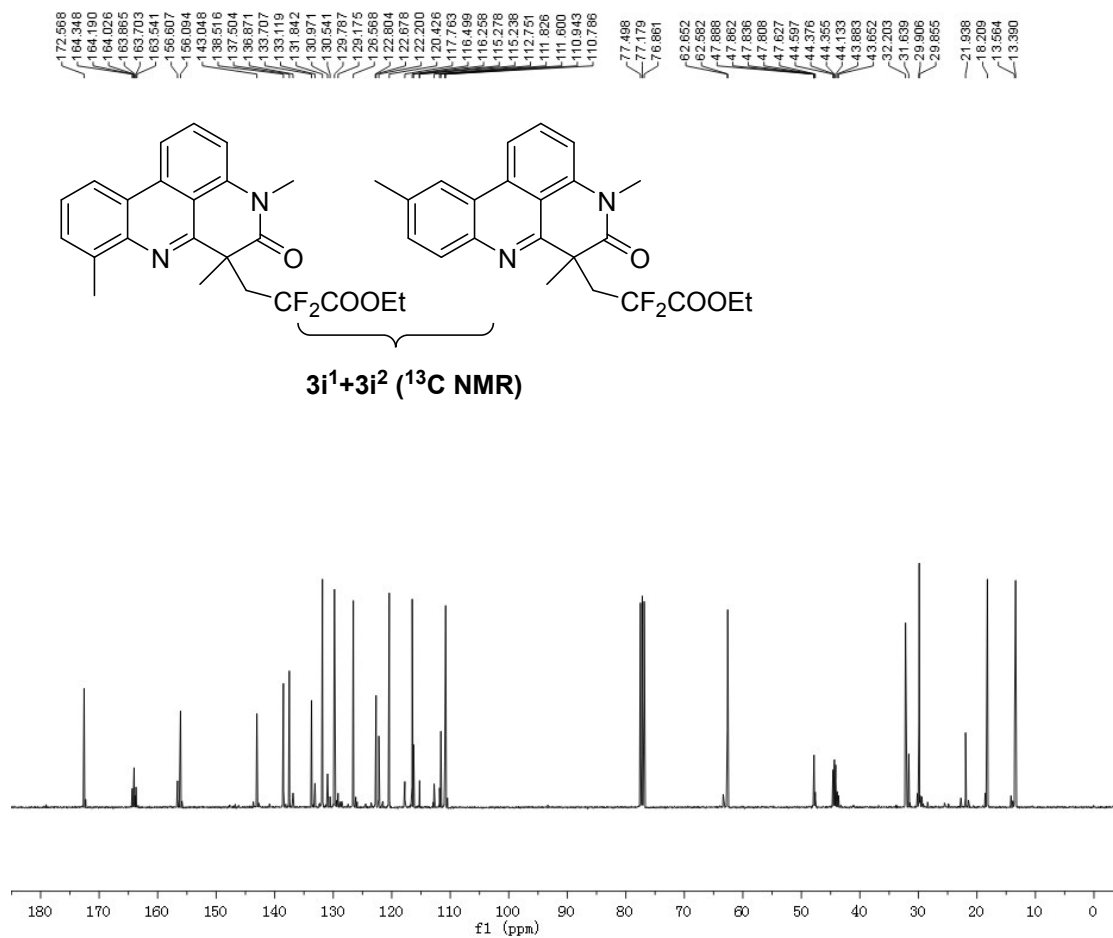


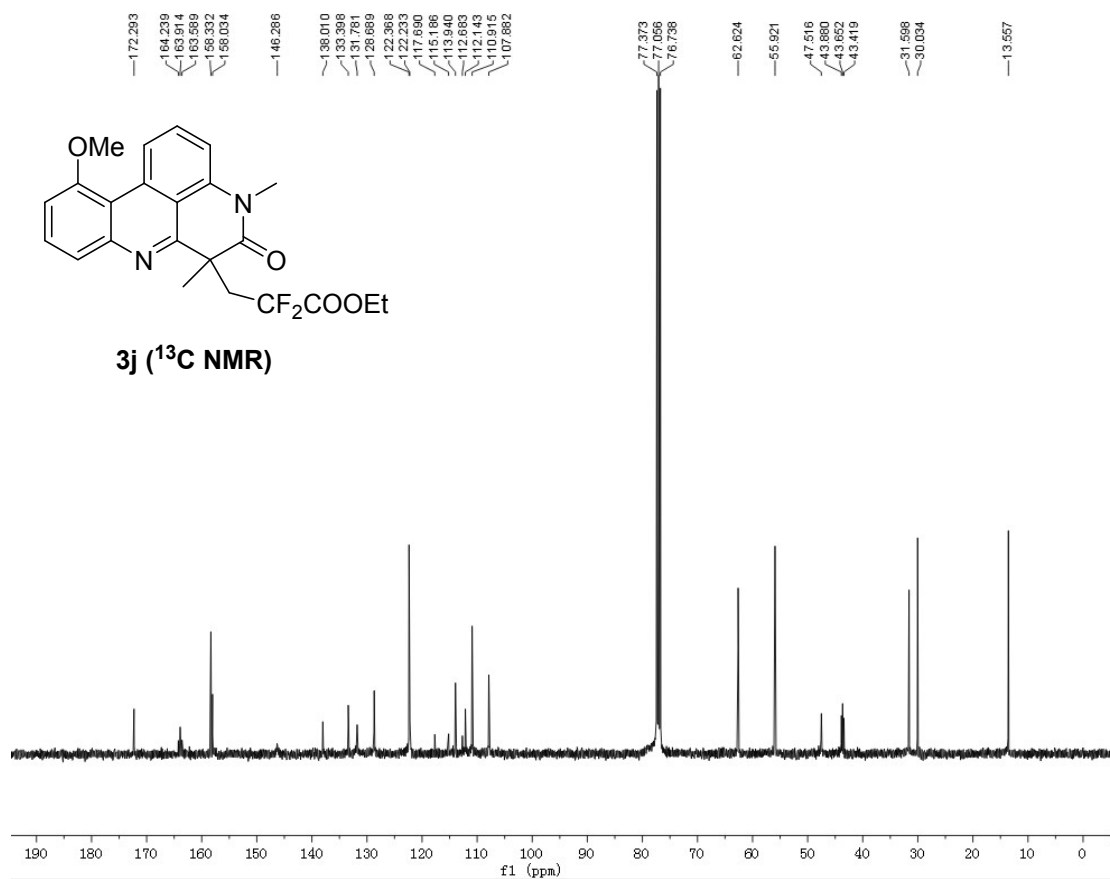
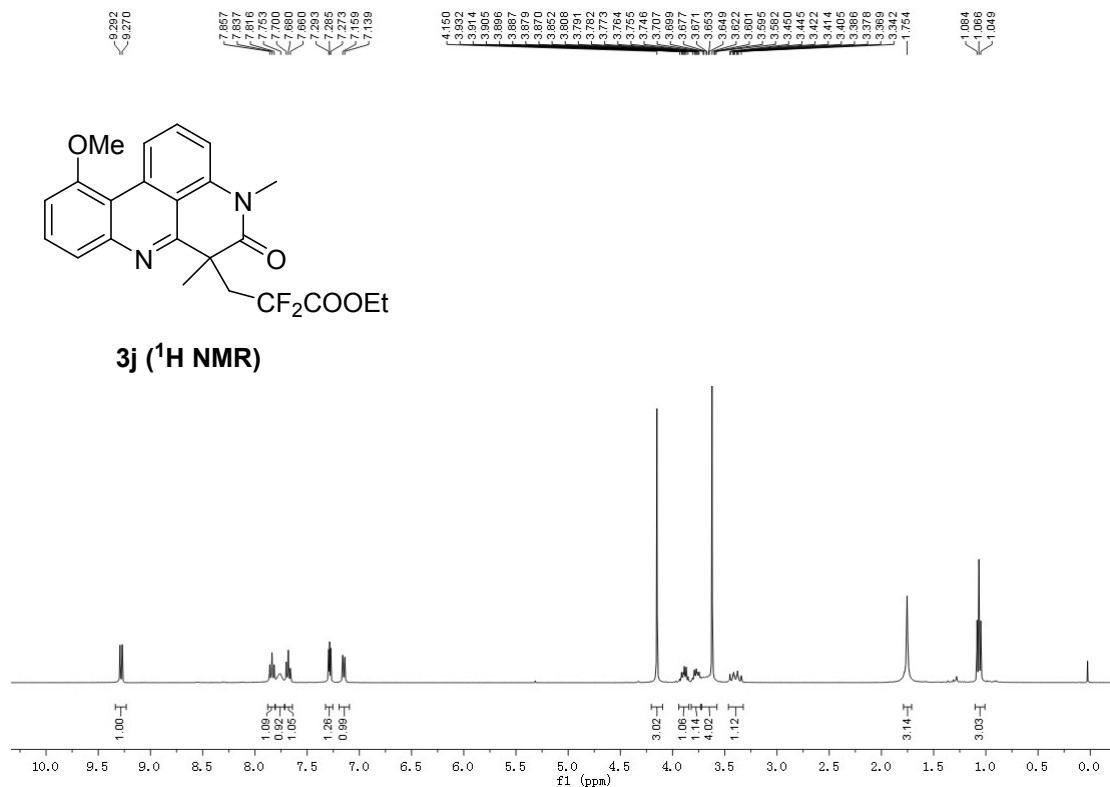
99.709  
 100.408  
 102.172  
 102.871

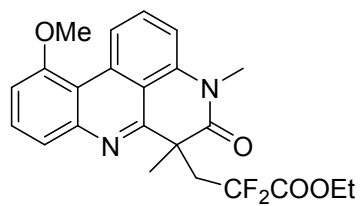




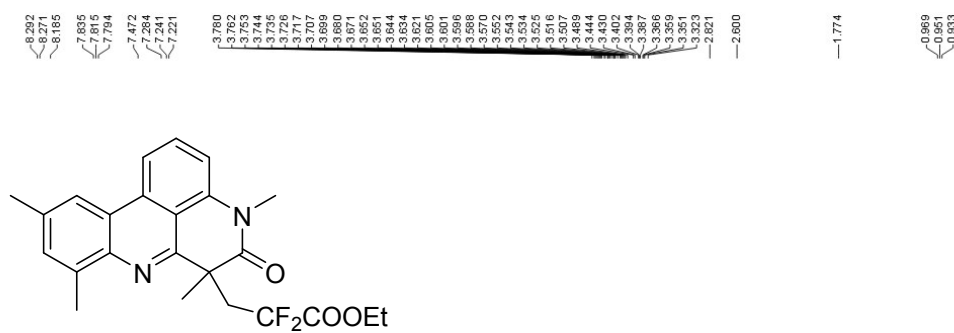
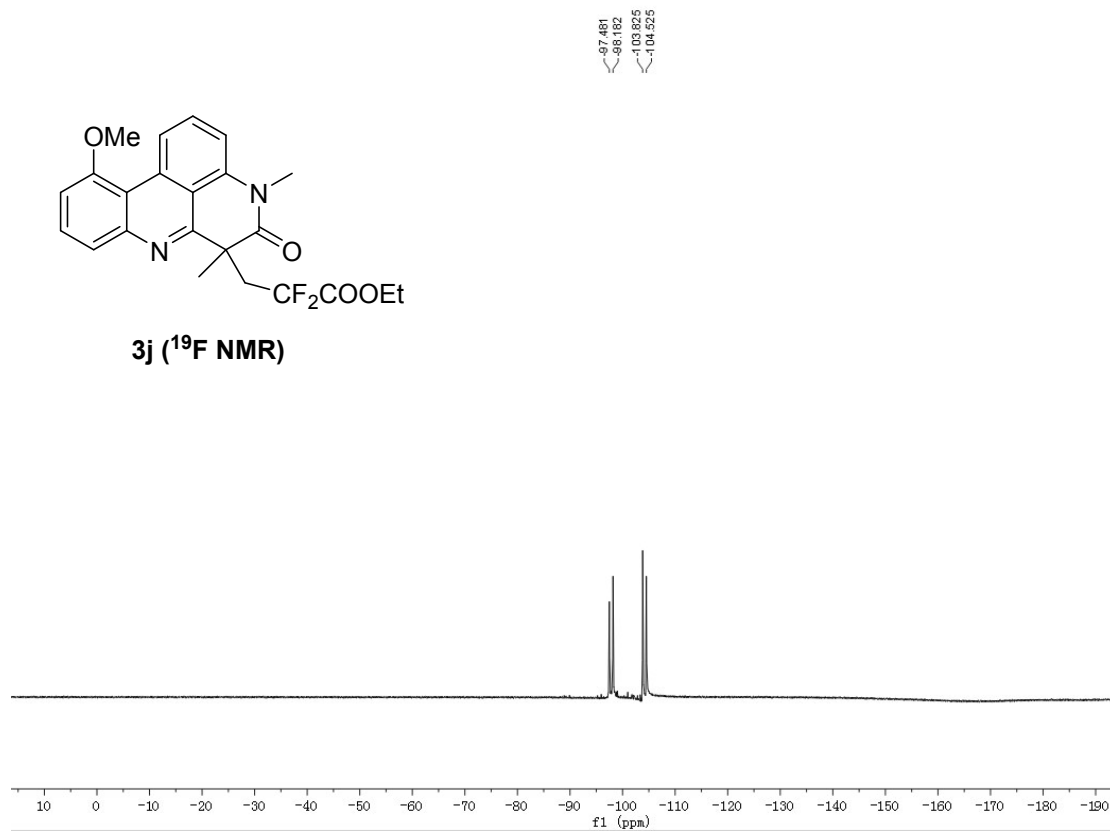




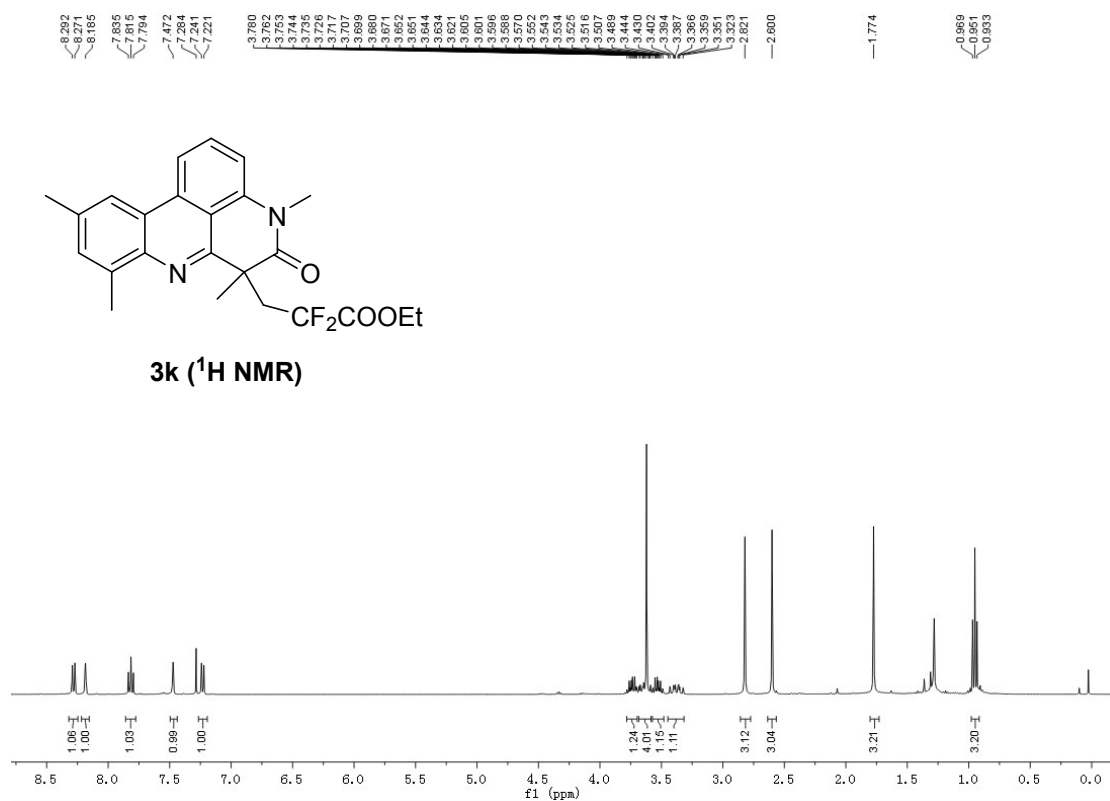


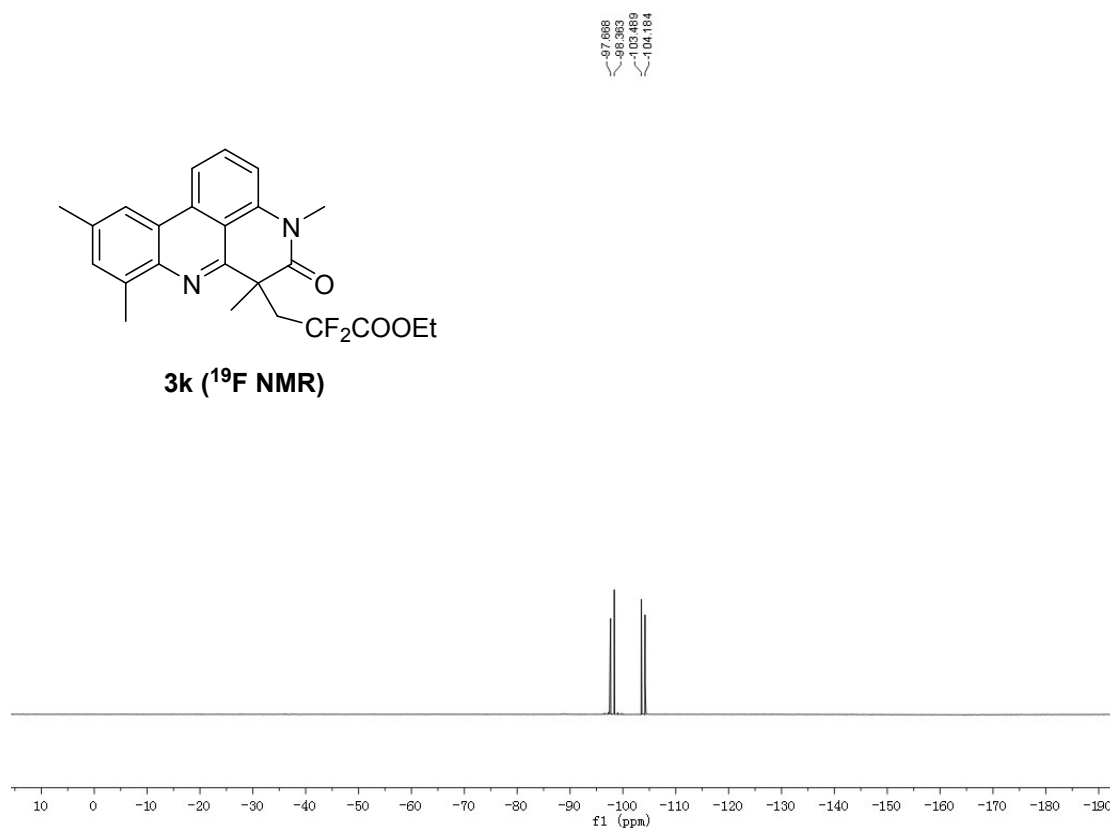
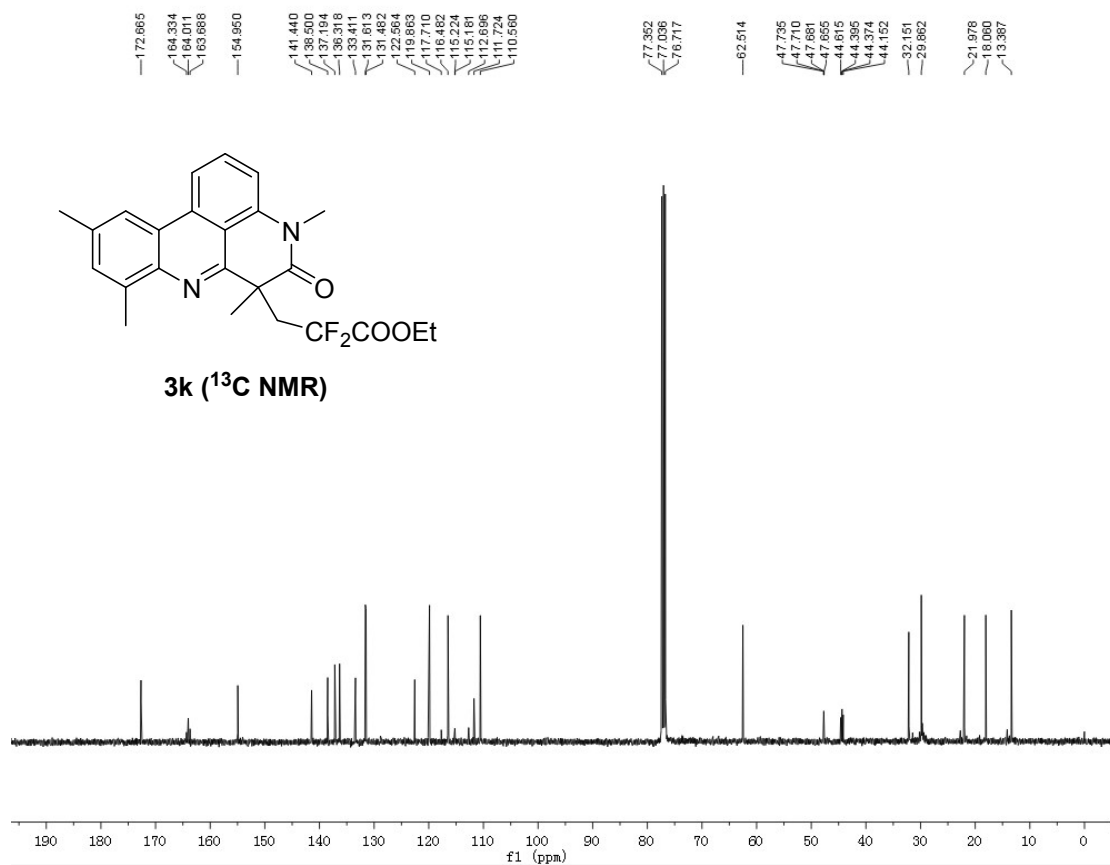


3j (<sup>19</sup>F NMR)

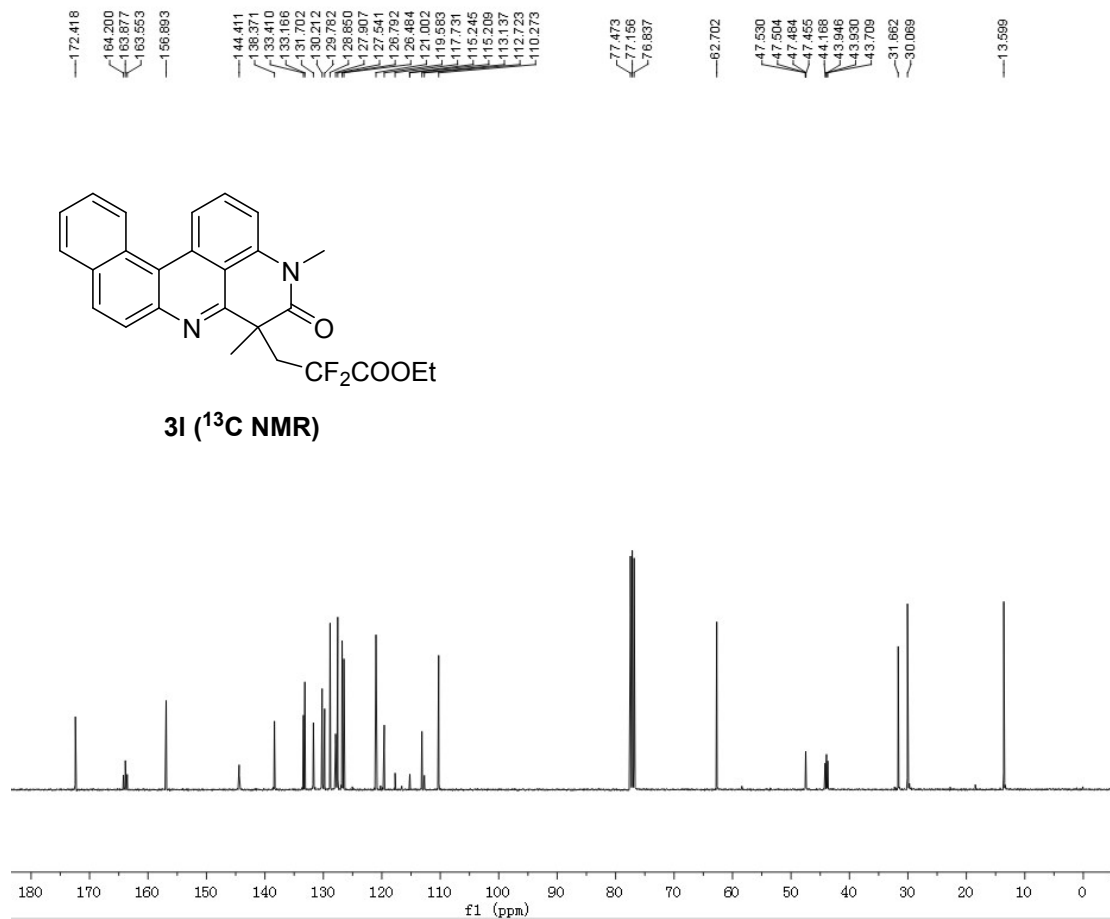
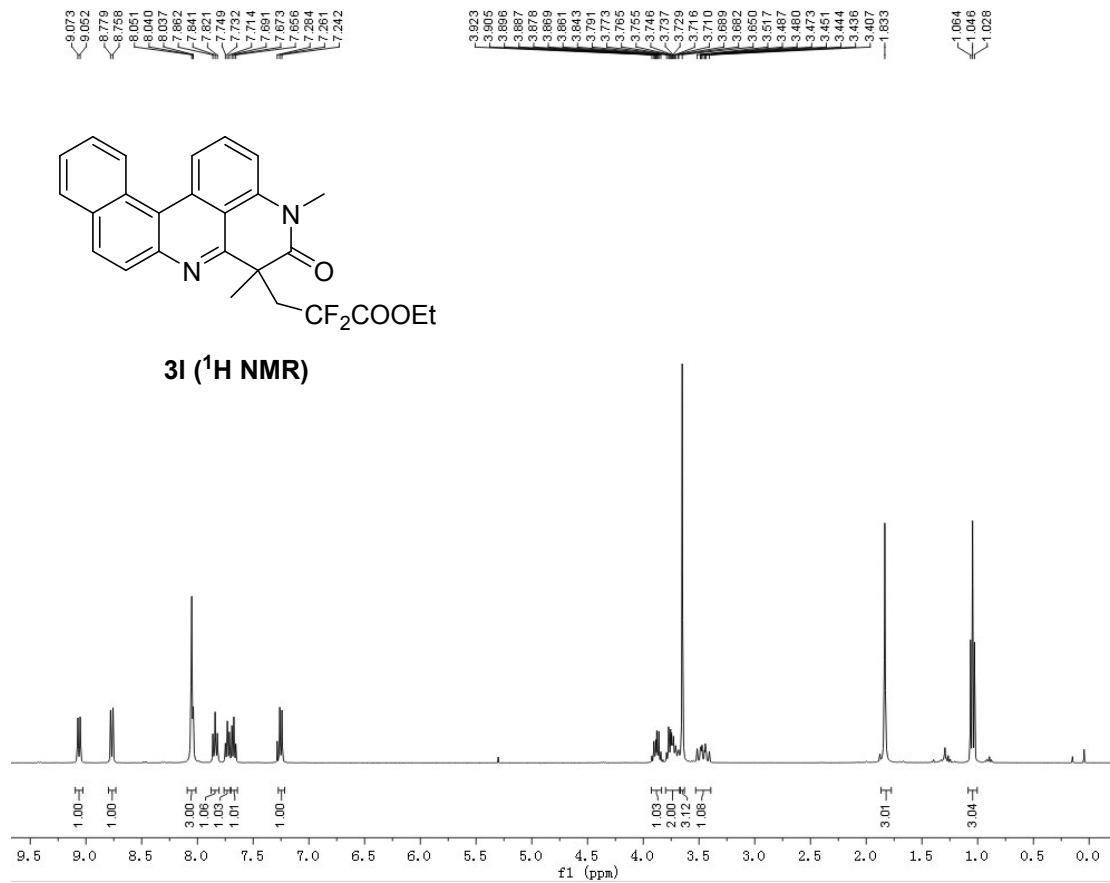


3k (<sup>1</sup>H NMR)

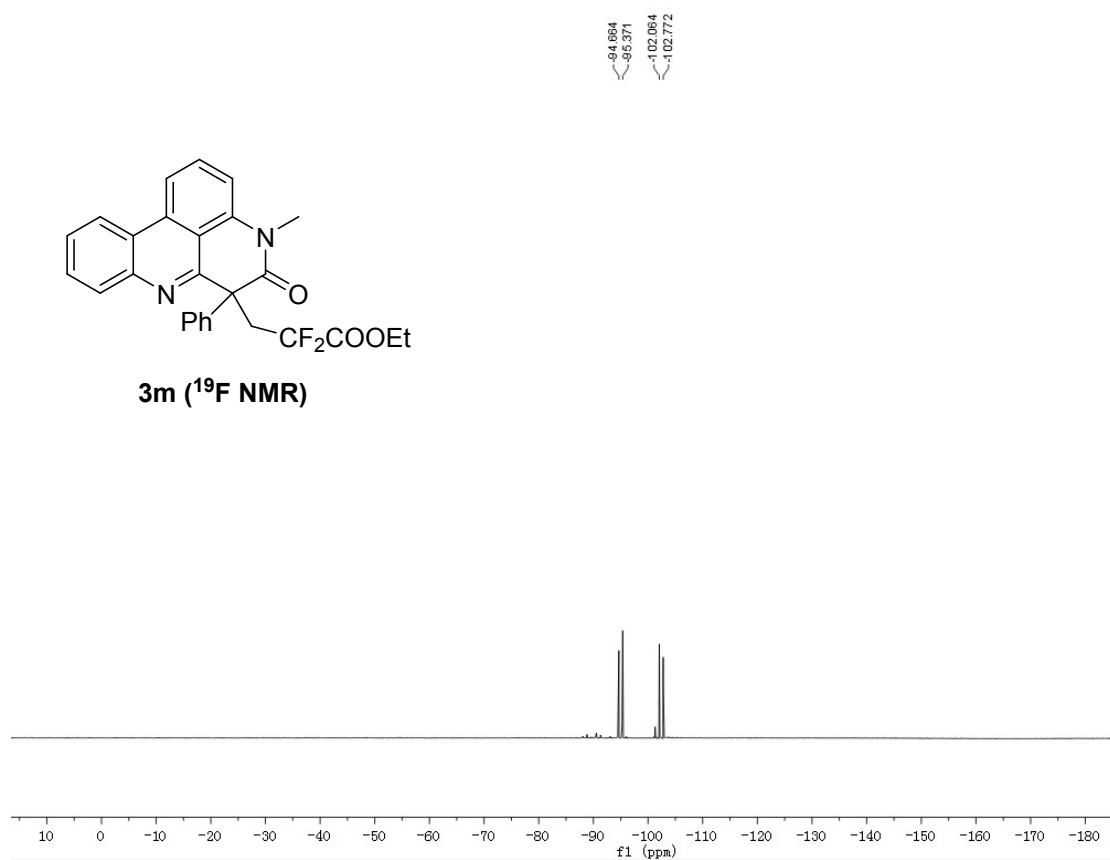
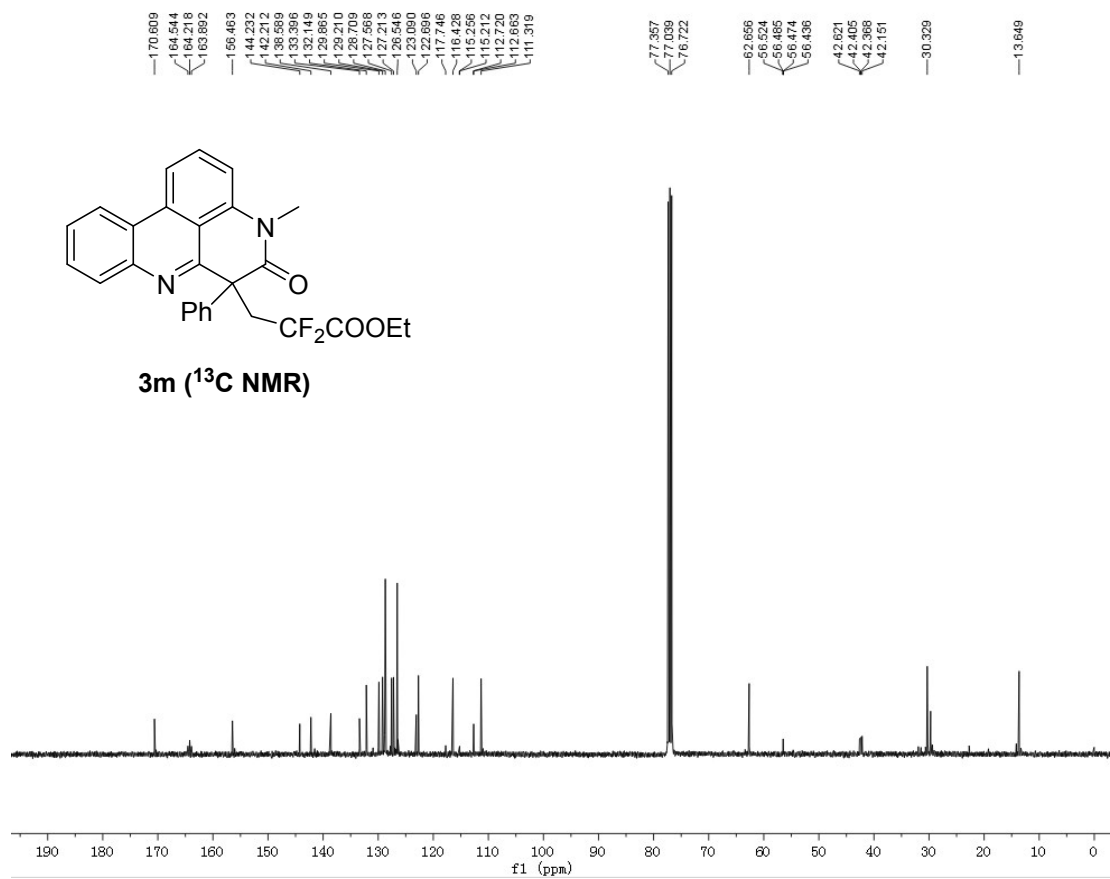


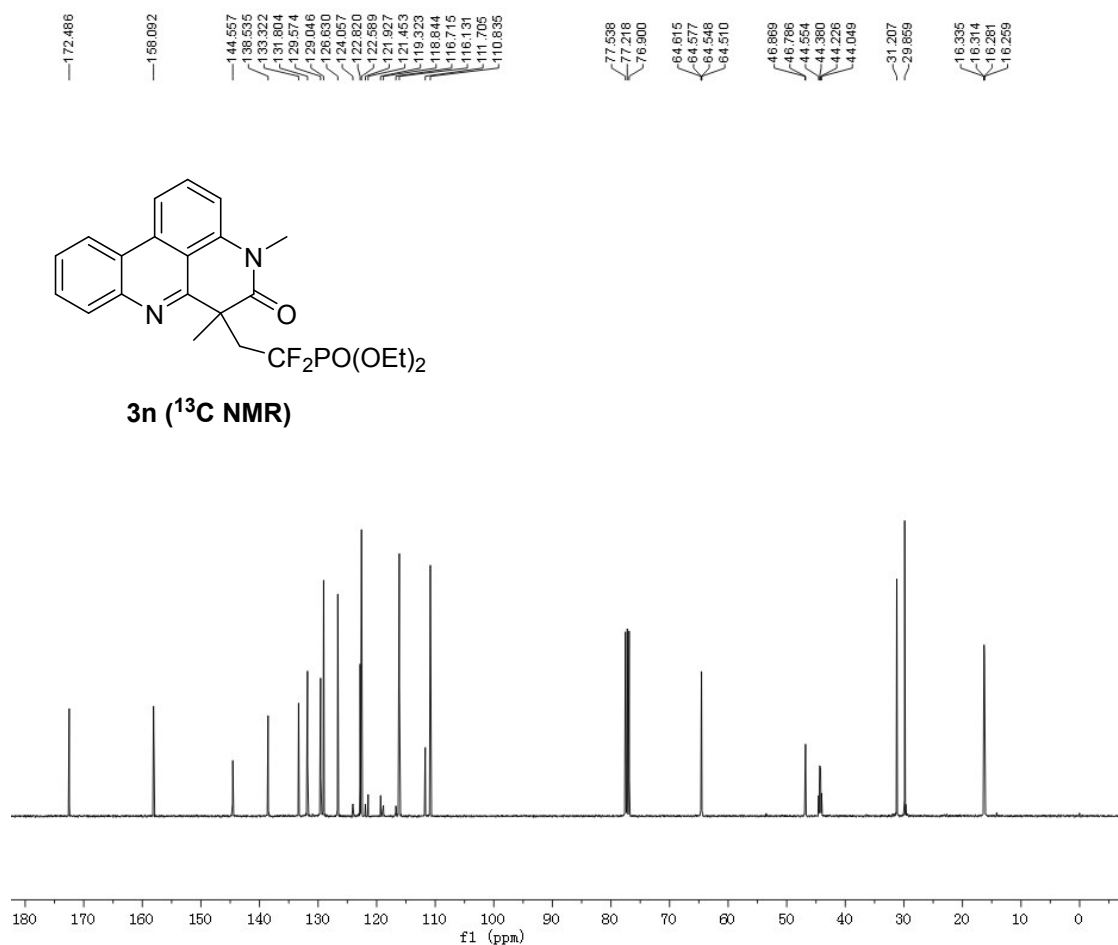
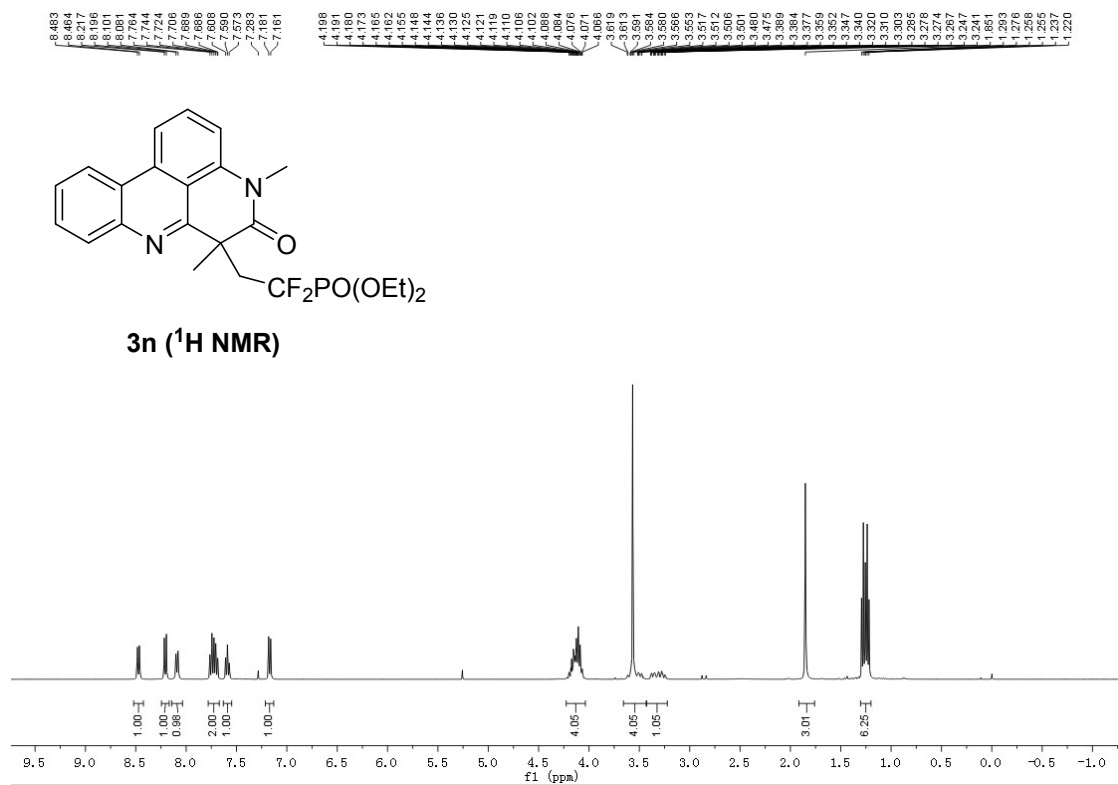


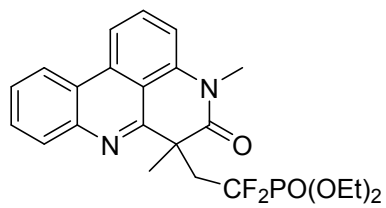




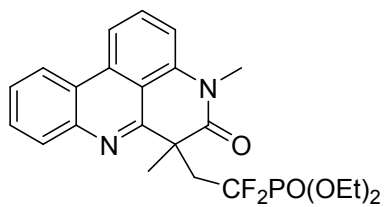
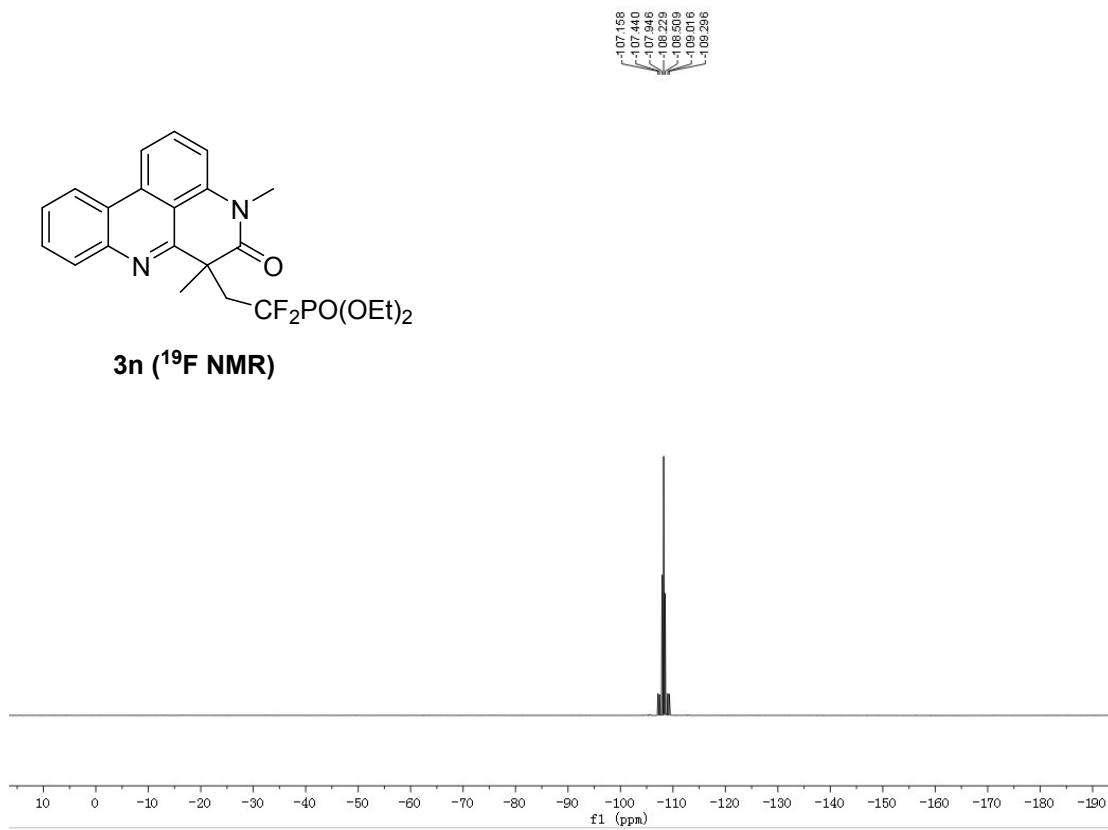




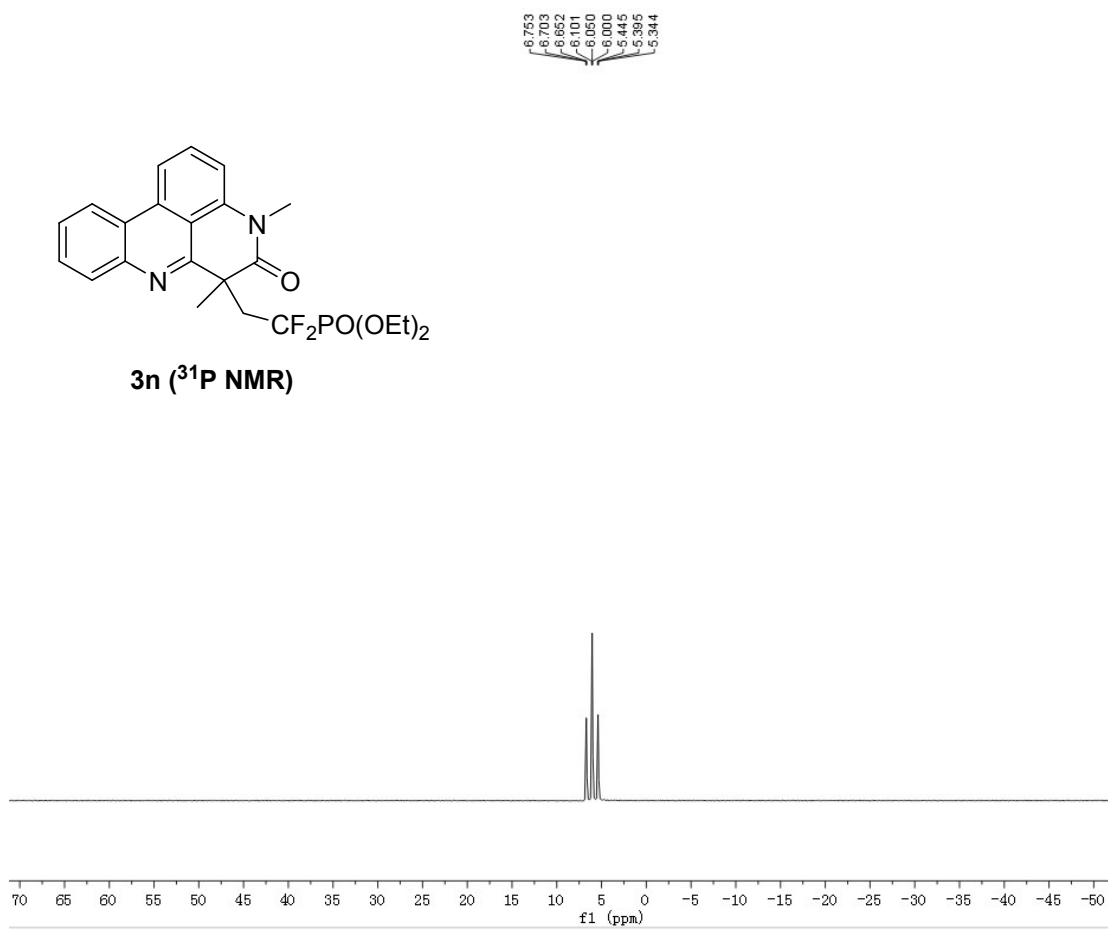


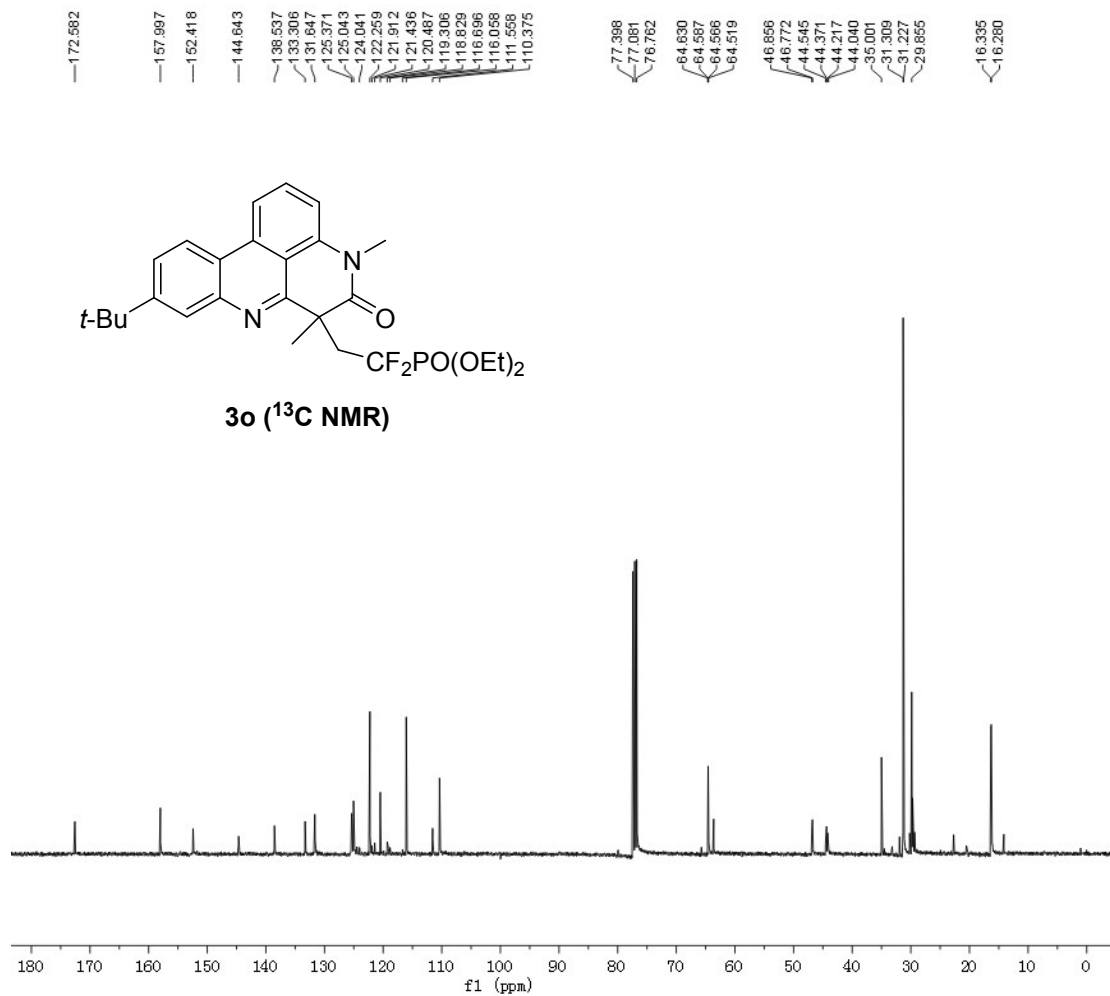
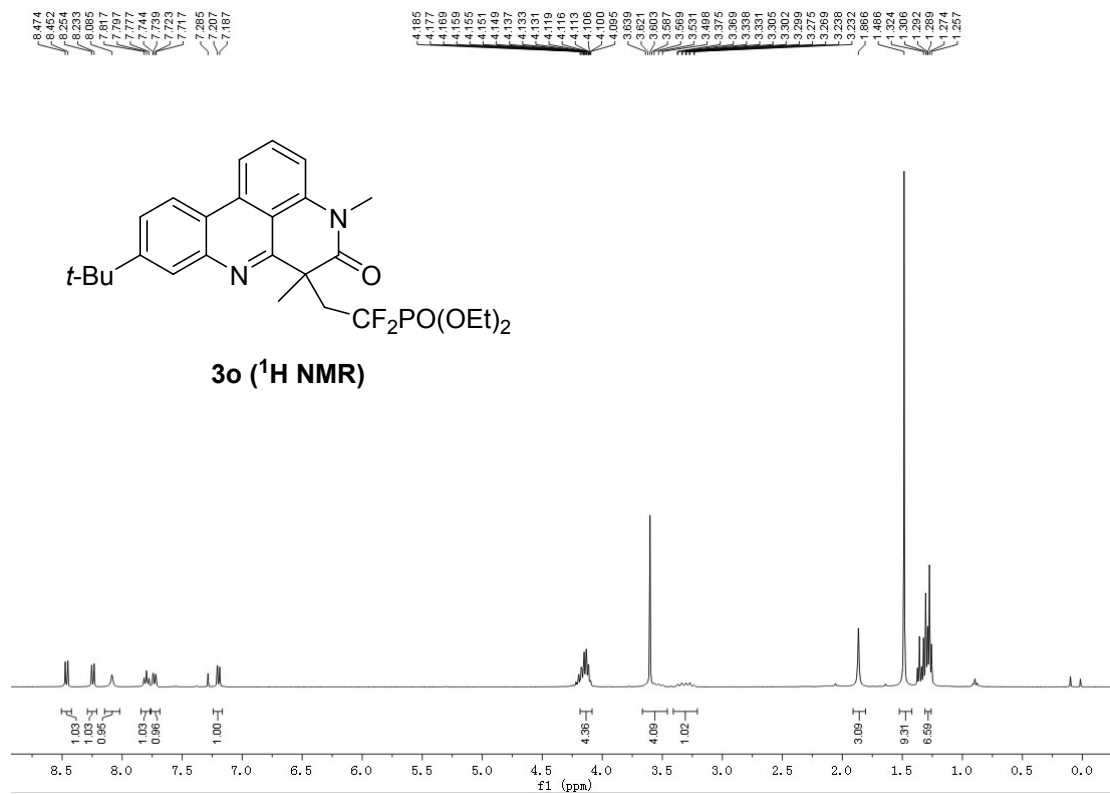


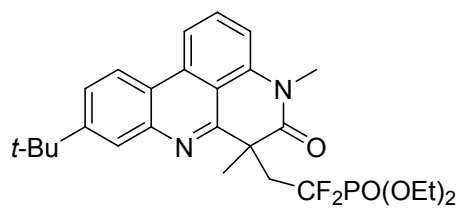
**3n (<sup>19</sup>F NMR)**



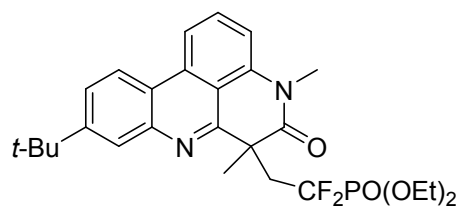
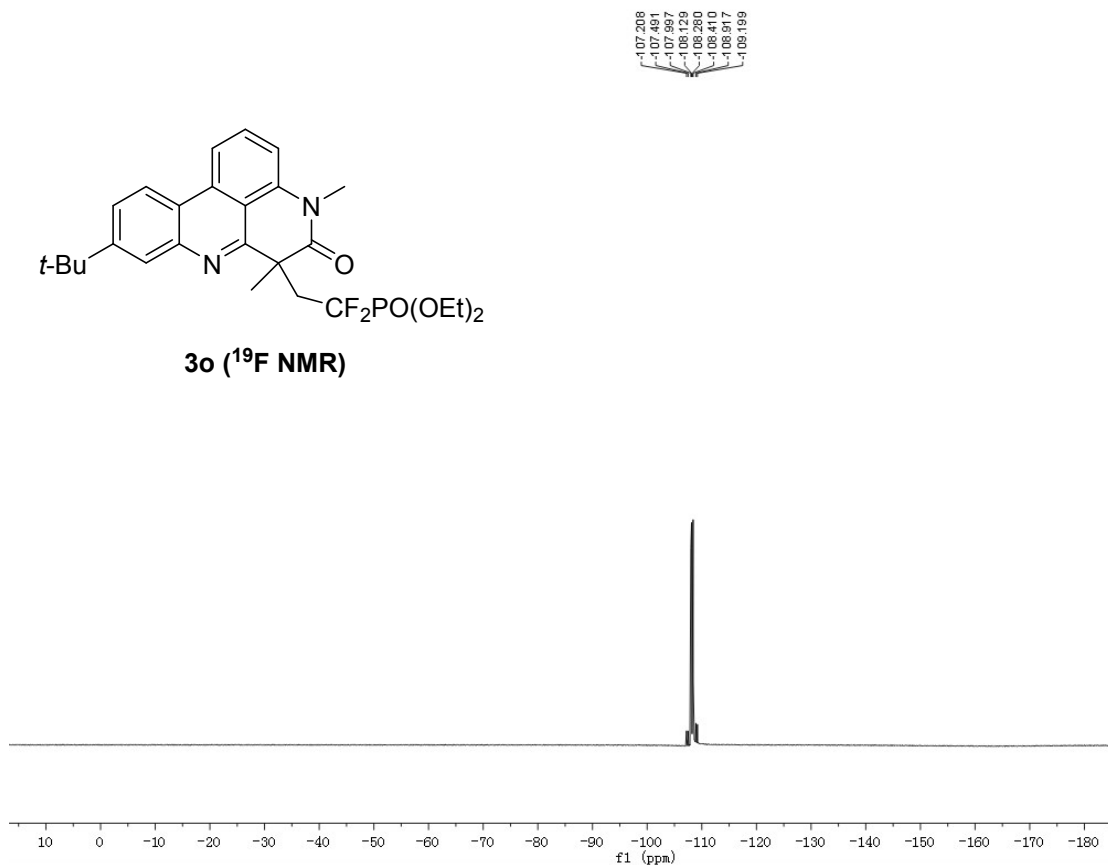
**3n (<sup>31</sup>P NMR)**



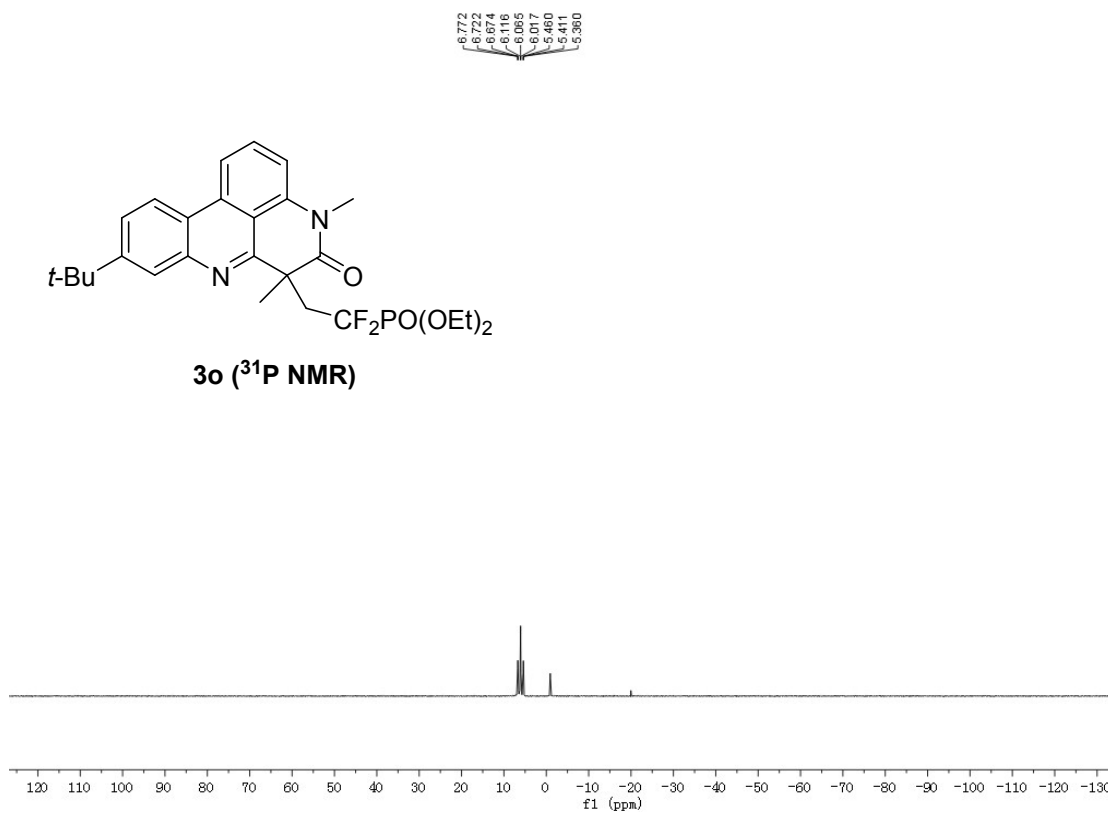


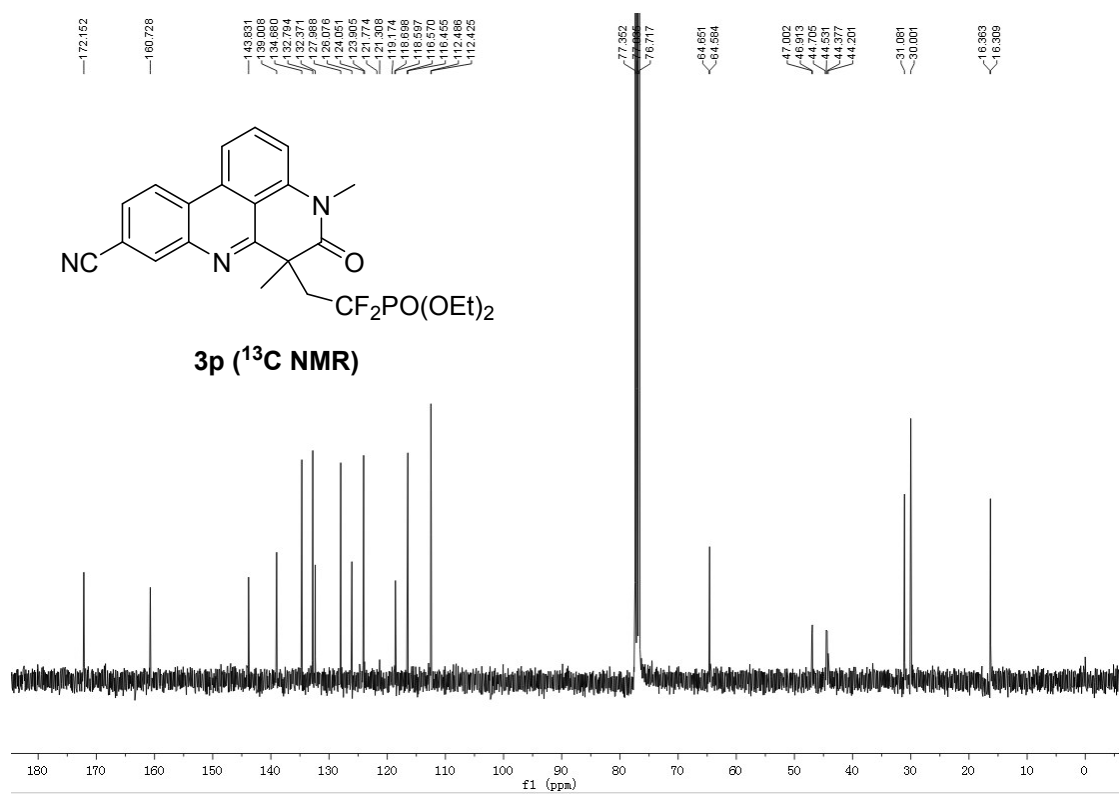
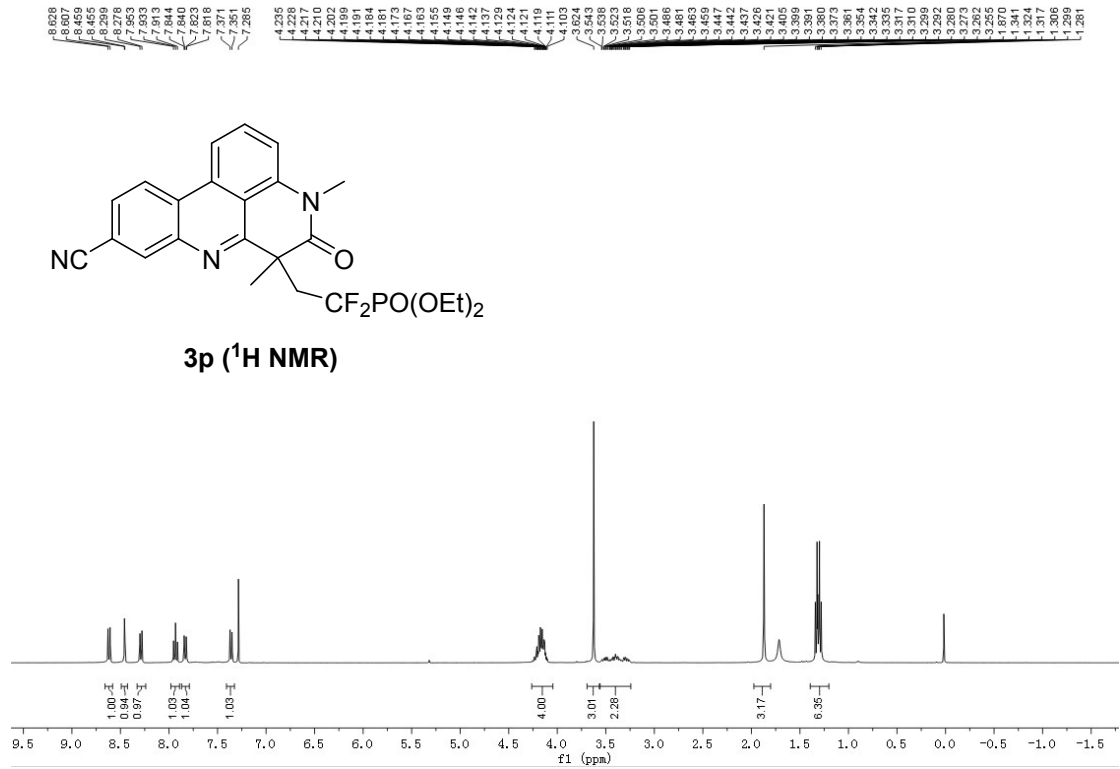


**3o (<sup>19</sup>F NMR)**

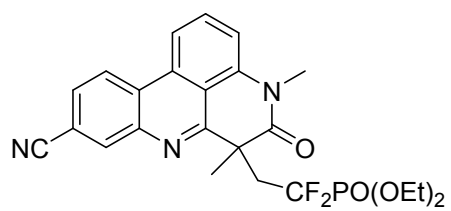


**3o (<sup>31</sup>P NMR)**

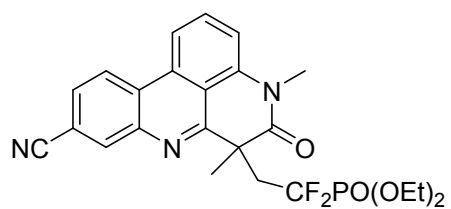
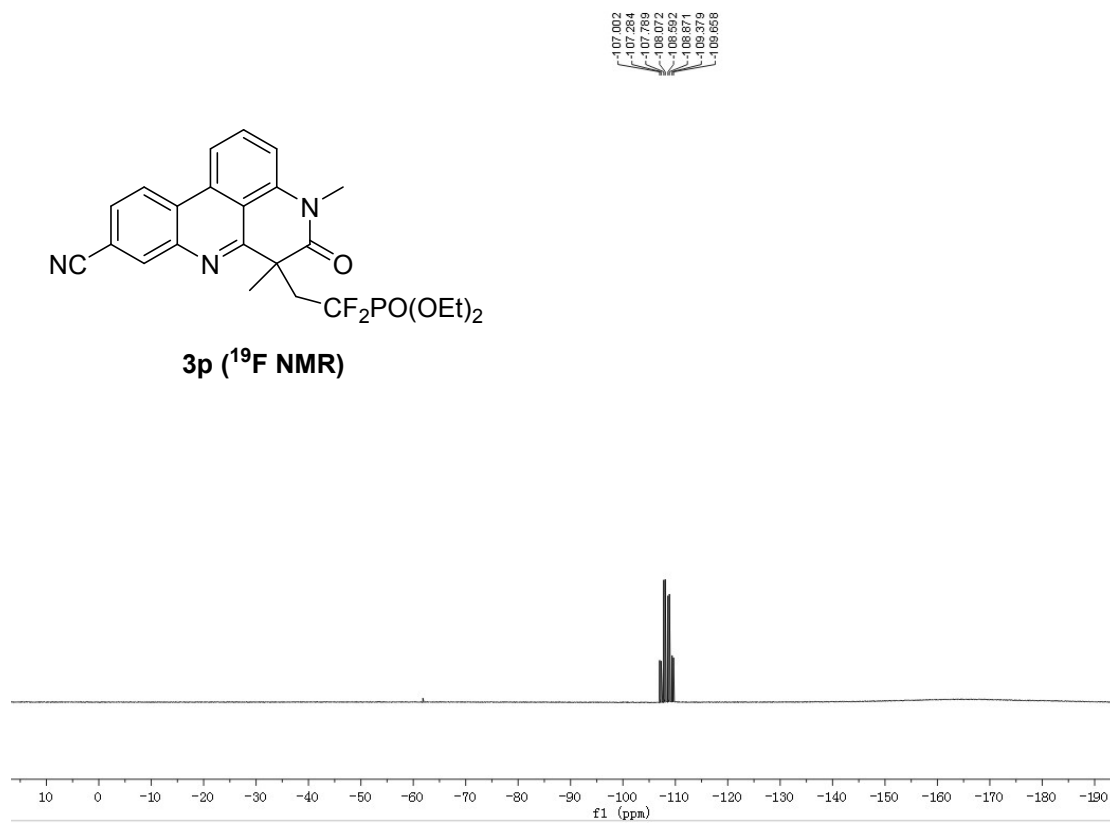




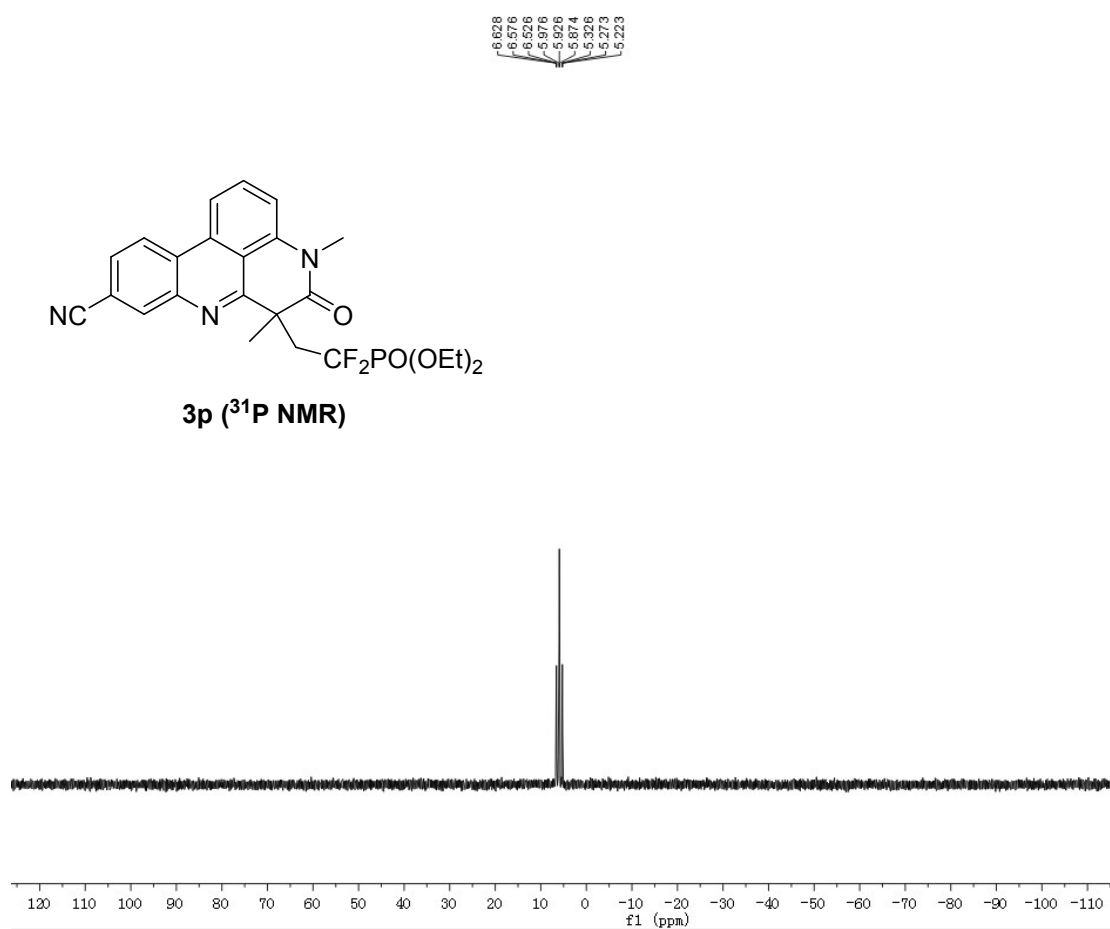




**3p (<sup>19</sup>F NMR)**

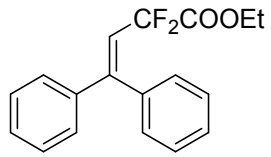


**3p (<sup>31</sup>P NMR)**

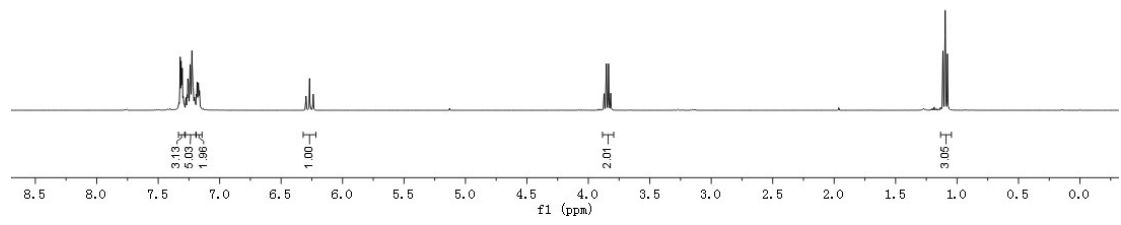


7.331  
7.325  
7.321  
7.316  
7.314  
7.310  
7.307  
7.304  
7.297  
7.293  
7.288  
7.286  
7.283  
7.279  
7.274  
7.272  
7.266  
7.264  
7.258  
7.253  
7.246  
7.240  
7.238  
7.234  
7.231  
7.226  
7.223  
7.220  
7.216  
7.211  
7.208  
7.205  
7.202  
7.199  
7.189  
7.185  
7.177  
7.174  
7.170  
7.168  
7.164  
7.161  
7.156  
7.156  
6.268  
6.239  
3.872  
3.854  
3.836  
3.818

1.115  
1.097  
1.079



4 (<sup>1</sup>H NMR)

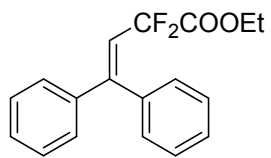


163.804  
163.468  
163.131  
151.237  
151.143  
151.048  
40.521  
37.203  
29.965  
29.251  
28.718  
28.540  
28.138  
27.994  
119.910  
119.627  
119.345  
115.191  
112.757  
110.324

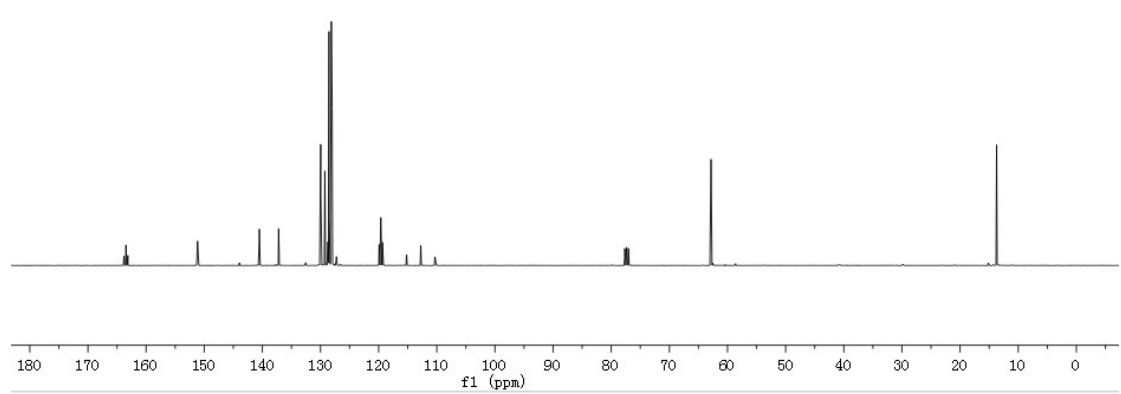
77.672  
77.363  
77.034

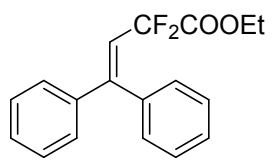
62.834

13.714



4 (<sup>13</sup>C NMR)





4 (<sup>19</sup>F NMR)

