

## Supporting Information

### Organocatalytic enantioselective construction of multi-functionalized spiro oxindole dienes

Xiao-Fei Huang, Ya-Fei Zhang, Zheng-Hang Qi, Nai-Kai Li, Zhi-Cong Geng, Kun Li, and

Xing-Wang Wang\*

*Key Laboratory of Organic Synthesis of Jiangsu Province, College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Suzhou 215123, People's Republic of China*

Fax: +(86)512-6588-0378    E-mail: wangxw@suda.edu.cn

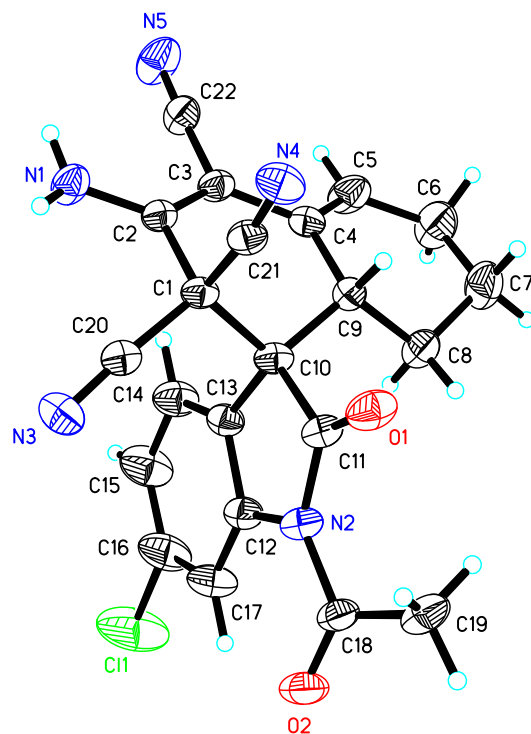
## Table of Contents

|                                                                           |               |
|---------------------------------------------------------------------------|---------------|
| <b>1. X-ray data .....</b>                                                | <b>S2-3</b>   |
| <b>2. Copies of <sup>1</sup>H NMR and <sup>13</sup>C NMR Spectra.....</b> | <b>S4-35</b>  |
| <b>3. Copies of HPLC chromatograms .....</b>                              | <b>S36-59</b> |

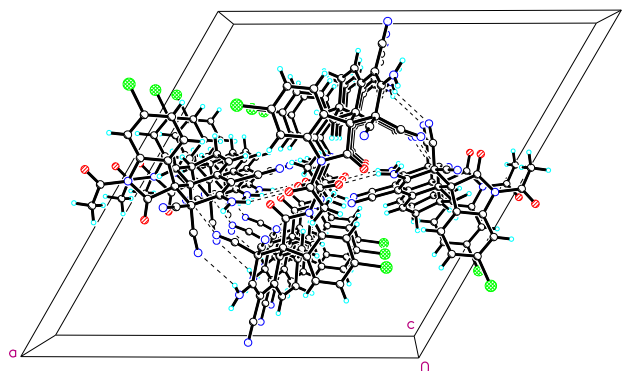
## 1. X-ray data

### X-ray data of **4p**

|                                   |                                                                                                                   |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Empirical formula                 | C <sub>22</sub> H <sub>16</sub> ClN <sub>5</sub> O <sub>2</sub>                                                   |
| Formula weight                    | 417.85                                                                                                            |
| Temperature                       | 293(2) K                                                                                                          |
| Wavelength                        | 0.71073 Å                                                                                                         |
| Crystal system, space group       | Hexagonal, P6(1)                                                                                                  |
| Unit cell dimensions              | a = 21.6553(9) Å    alpha = 90 deg.<br>b = 21.6553(9) Å    beta = 90 deg.<br>c = 9.8316(6) Å    gamma = 120 deg.. |
| Volume                            | 6, 1.043 Mg/m <sup>3</sup>                                                                                        |
| Z, Calculated density             | 4, 1.536 mg/mm <sup>3</sup>                                                                                       |
| Absorption coefficient            | 0.166 mm <sup>-1</sup>                                                                                            |
| F(000)                            | 1296                                                                                                              |
| Crystal size                      | 0.256 x 0.179 x 0.121 mm                                                                                          |
| Theta range for data collection   | 1.09 to 25.99 deg.                                                                                                |
| Limiting indices                  | -22<=h<=0, 0<=k<=26, -10<=l<=12                                                                                   |
| Reflections collected / unique    | 5094 / 5094 [R(int) = 0.0000]                                                                                     |
| Completeness to theta = 25.35     | 100.0 %                                                                                                           |
| Absorption correction             | Empirical                                                                                                         |
| Max. and min. transmission        | 1.00000 and 0.68928                                                                                               |
| Refinement method                 | Full-matrix least-squares on F <sup>2</sup>                                                                       |
| Data / restraints / parameters    | 5094 / 3 / 280                                                                                                    |
| Goodness-of-fit on F <sup>2</sup> | 0.995                                                                                                             |
| Final R indices [I > σ (I)]       | R1 = 0.0527, wR2 = 0.1345                                                                                         |
| R indices (all data)              | R1 = 0.0659, wR2 = 0.1417                                                                                         |
| Absolute structure parameter      | 0.09(10)                                                                                                          |
| Largest diff. peak and hole       | 0.365 and -0.196 e.Å <sup>-3</sup>                                                                                |



**Figure S1.** ORTEP drawing of **4gj**.

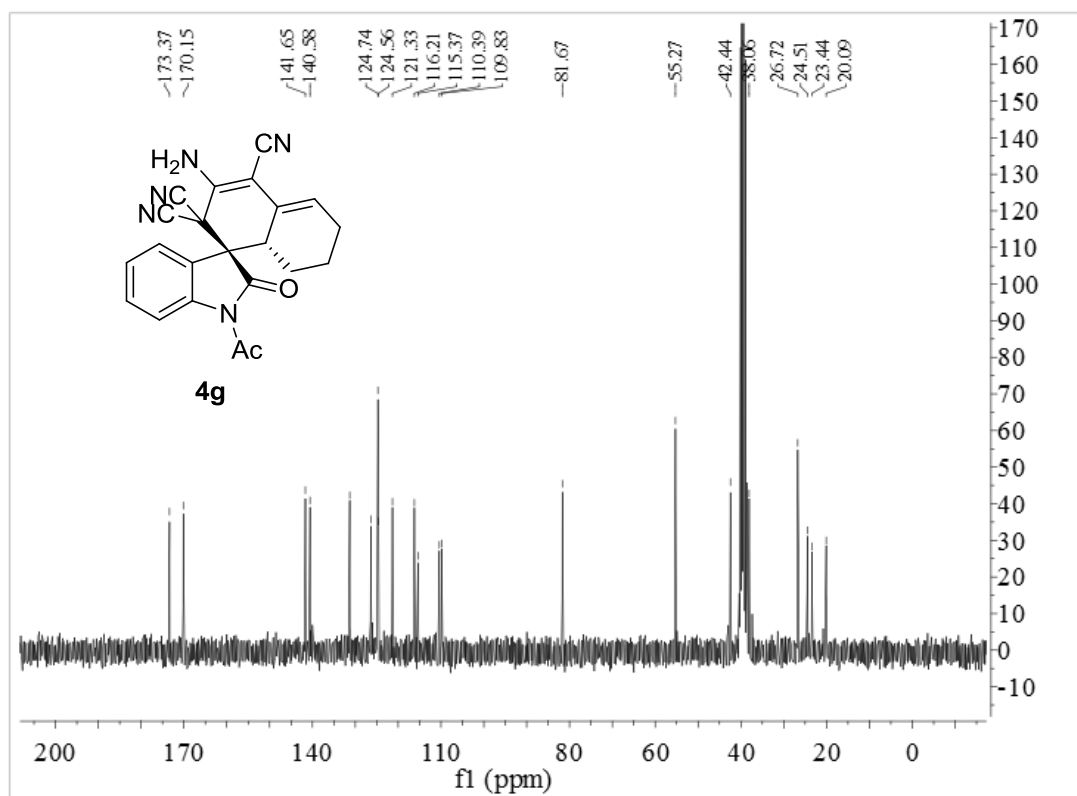
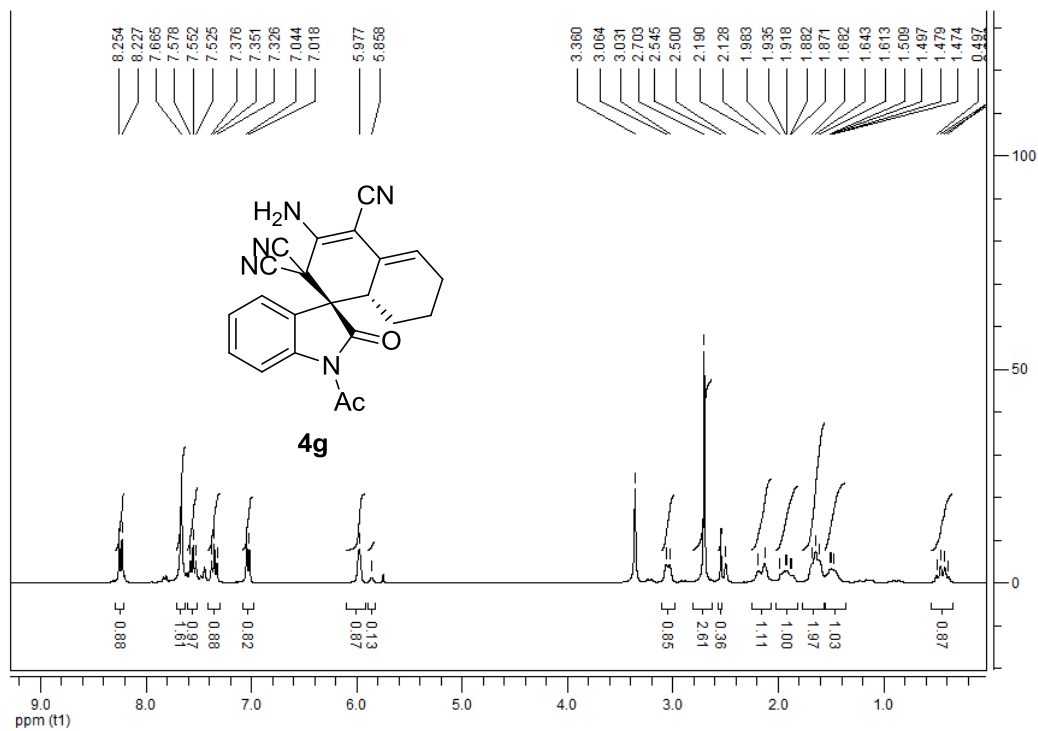


**Figure S2.** Packing of molecules in a unit cell for **4p**

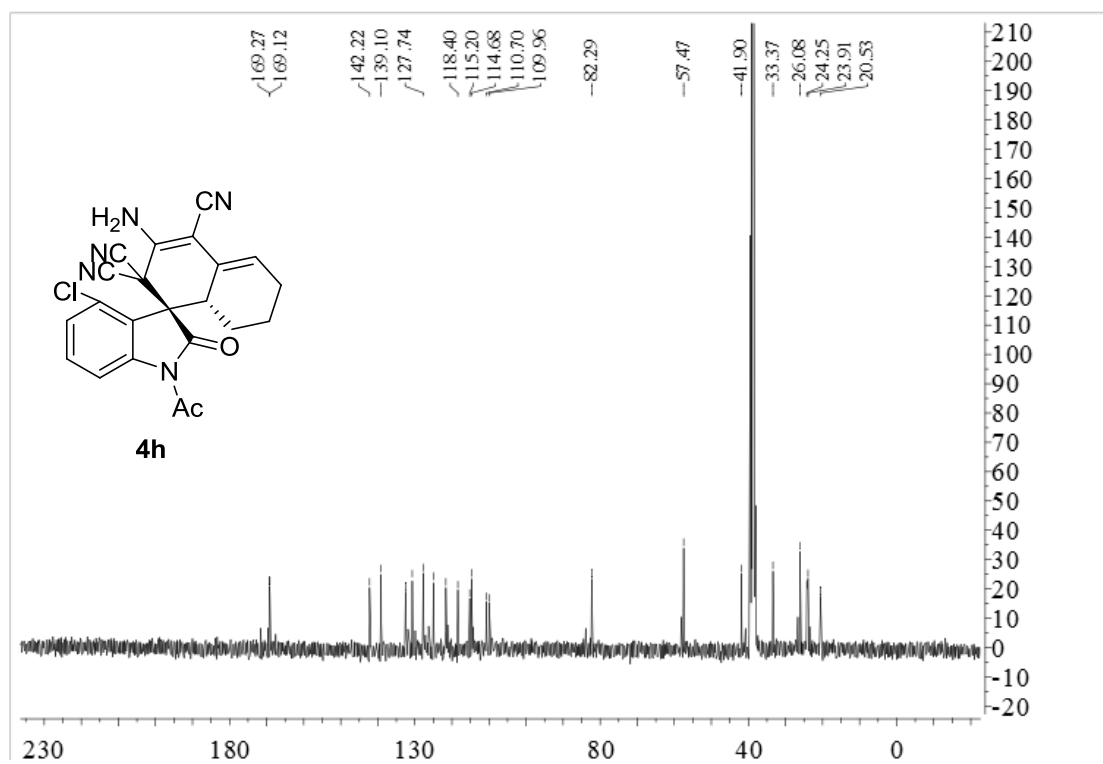
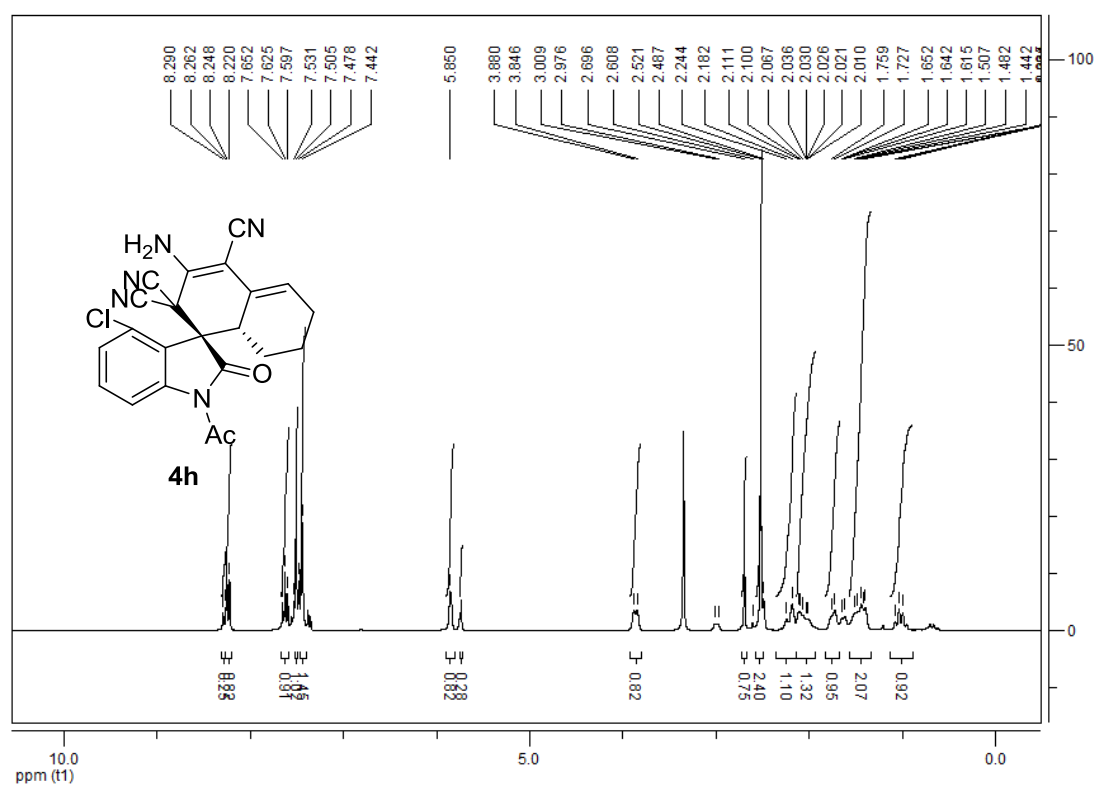
The crystal was prepared from the solution of **4p** in dichloromethane and isopropanol. CCDC 951552 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via [www.ccdc.cam.ac.uk/services/structure\\_deposit/](http://www.ccdc.cam.ac.uk/services/structure_deposit/)

## 2. Copies of $^1\text{H}$ NMR and $^{13}\text{C}$ NMR Spectra

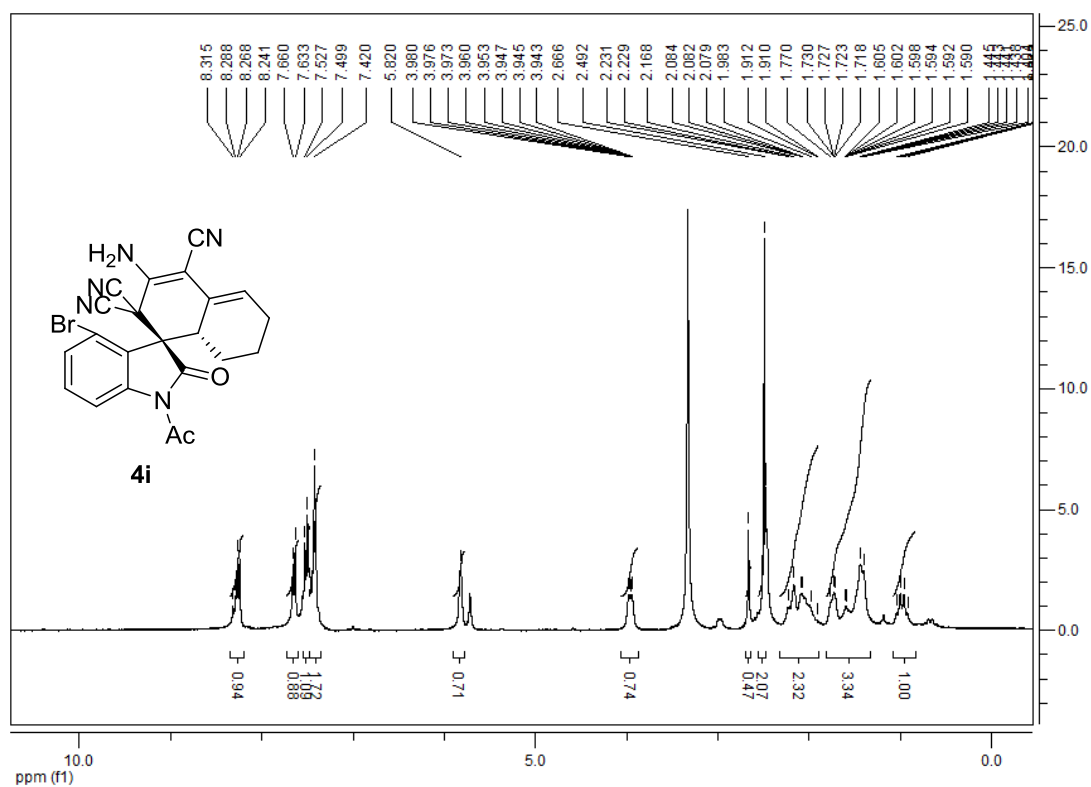
4g



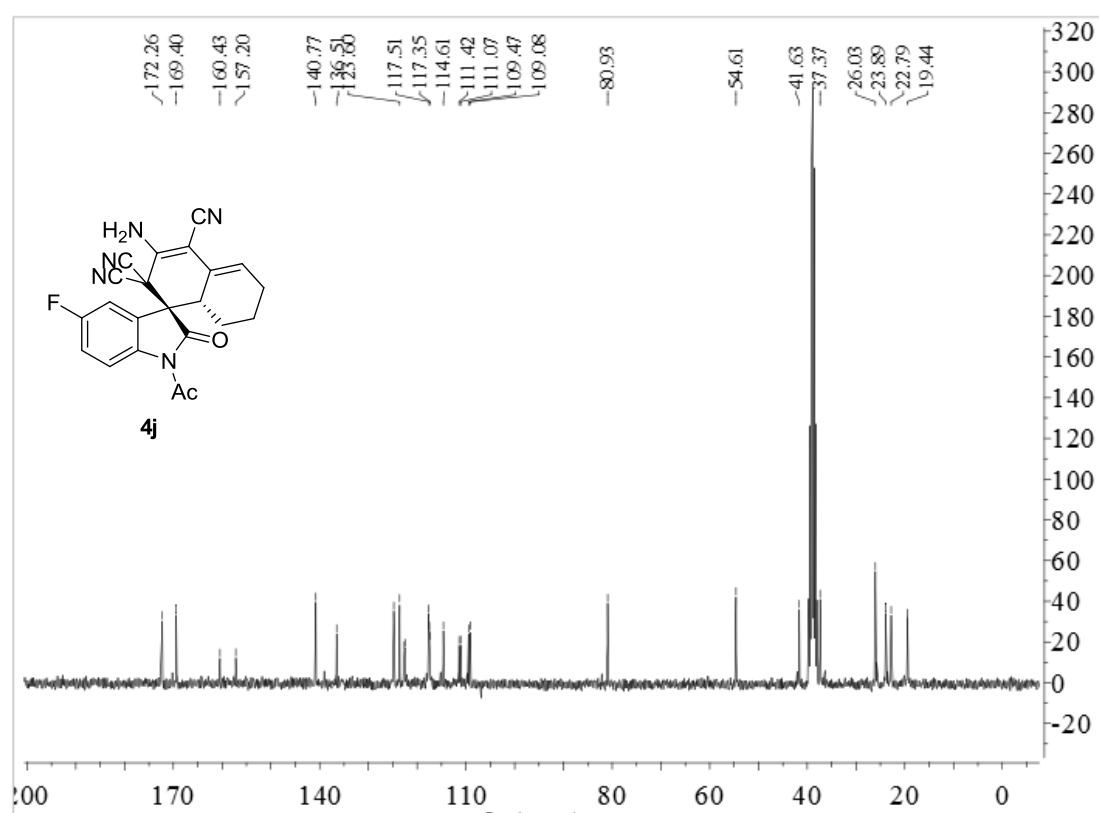
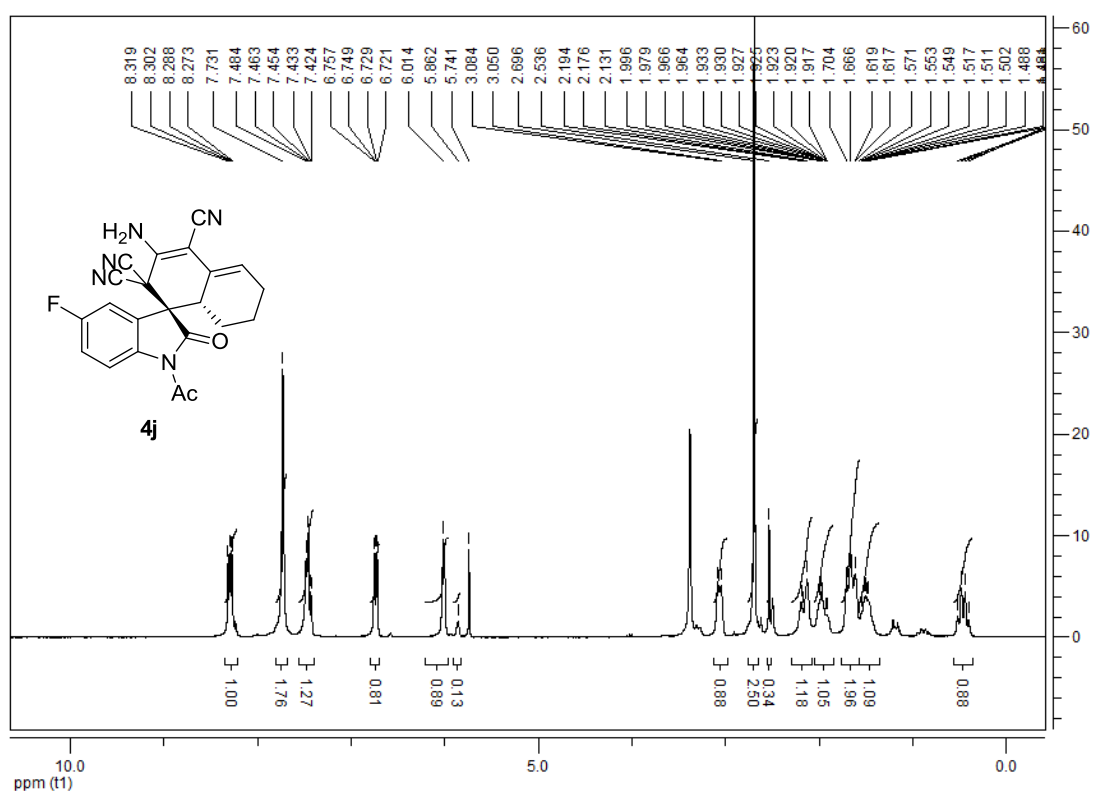
4h



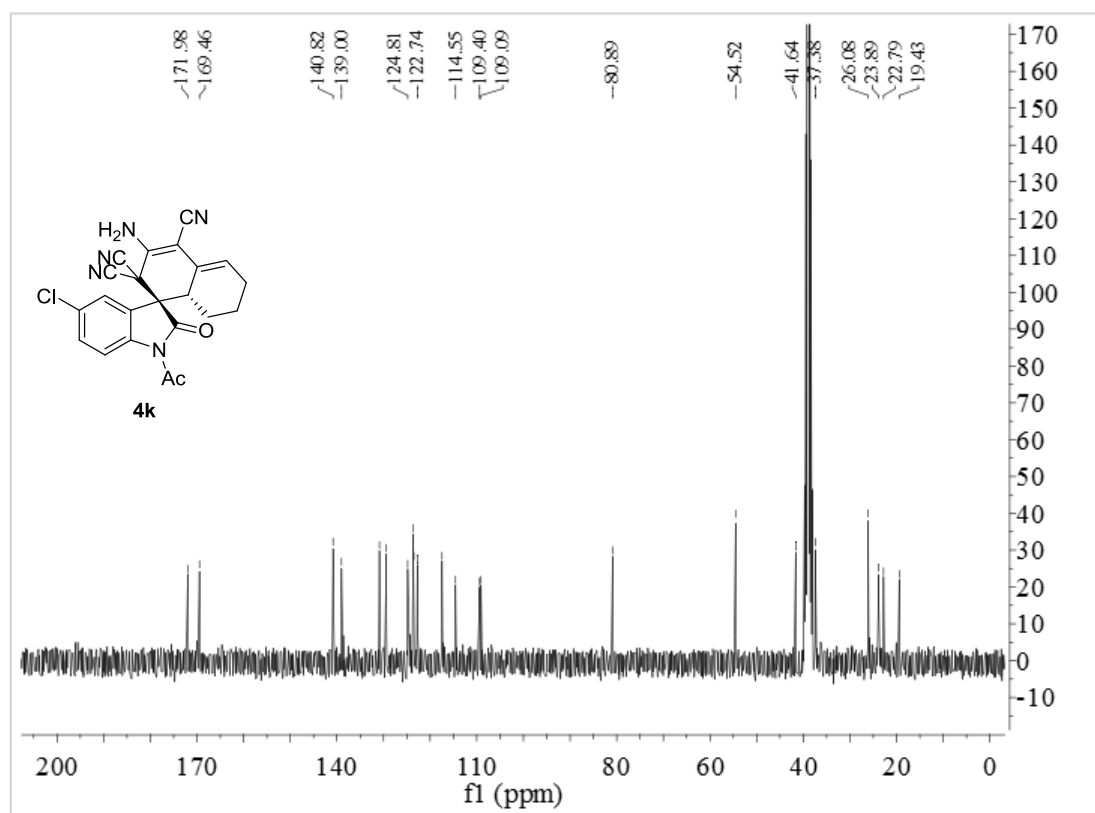
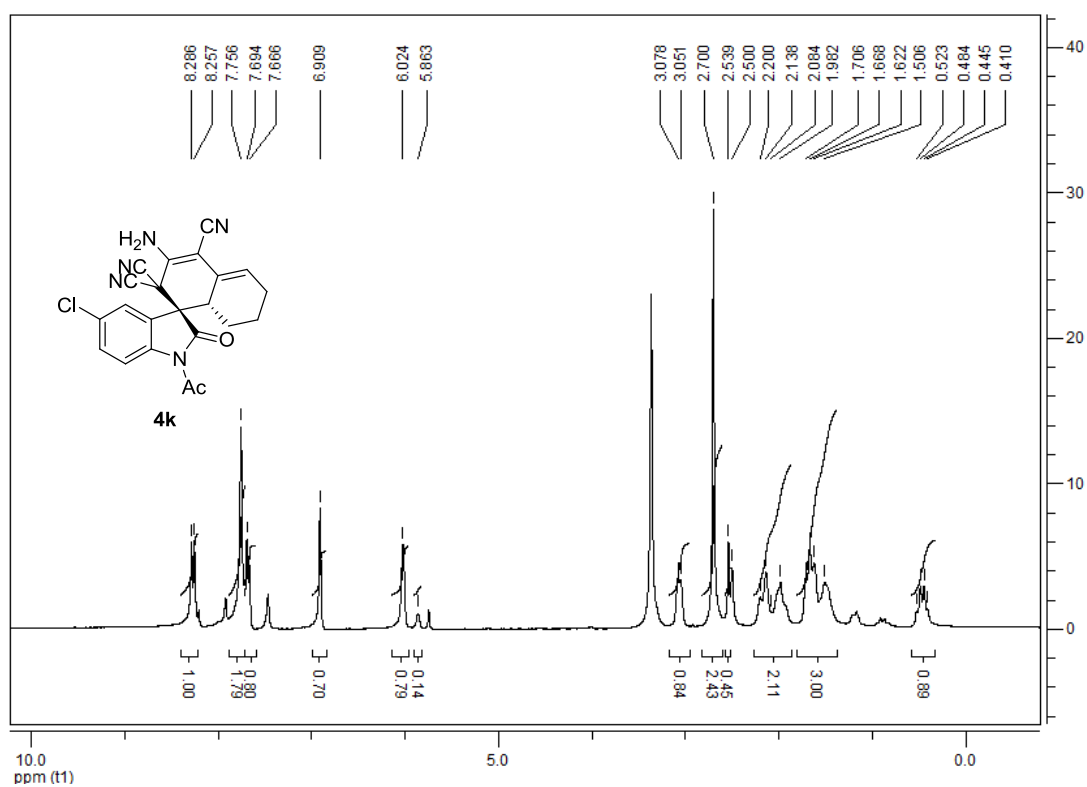
4i



4j

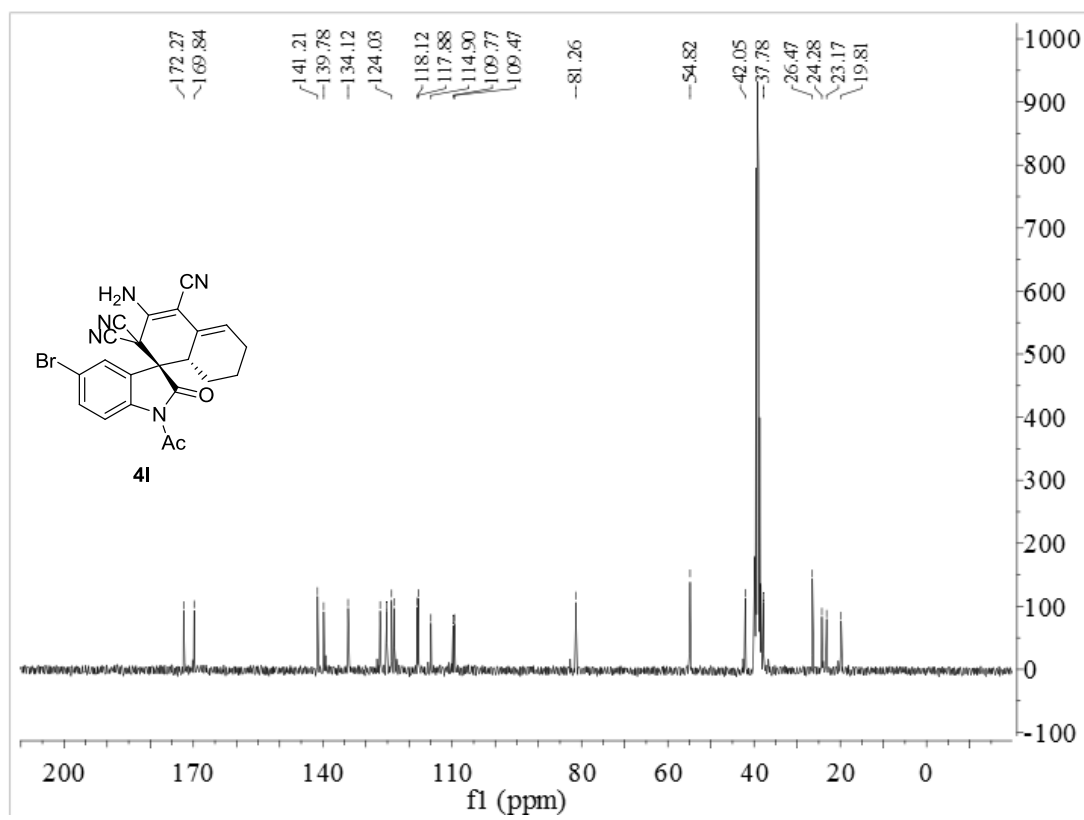
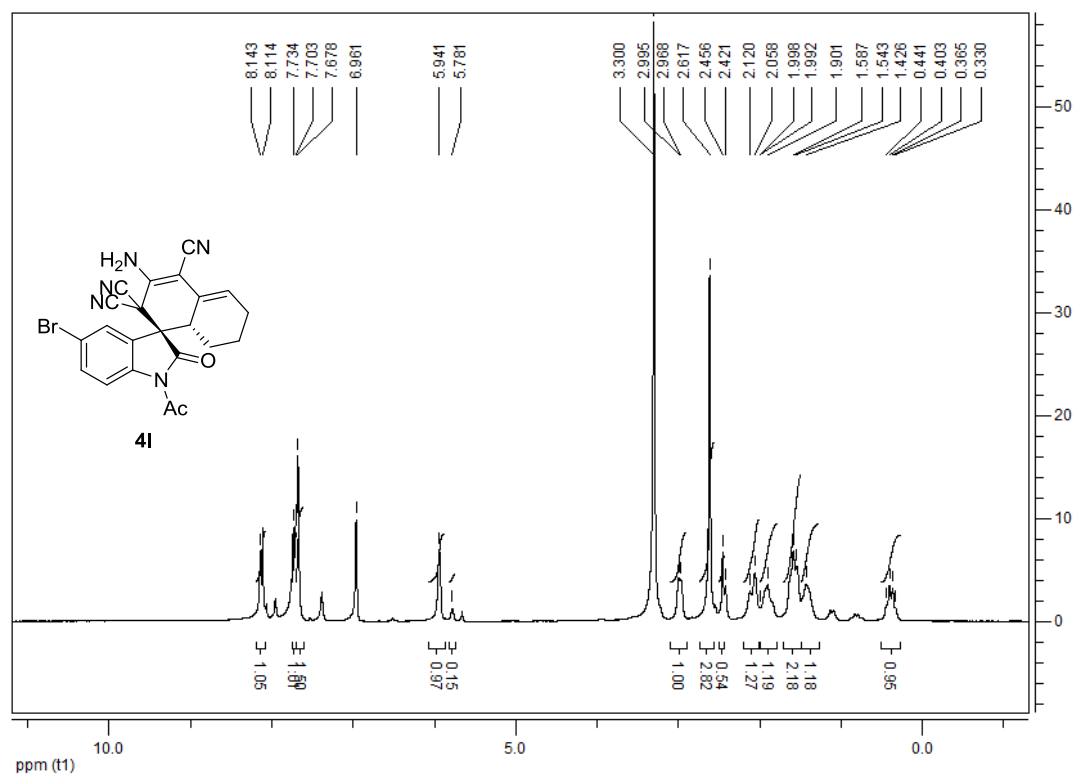


4k

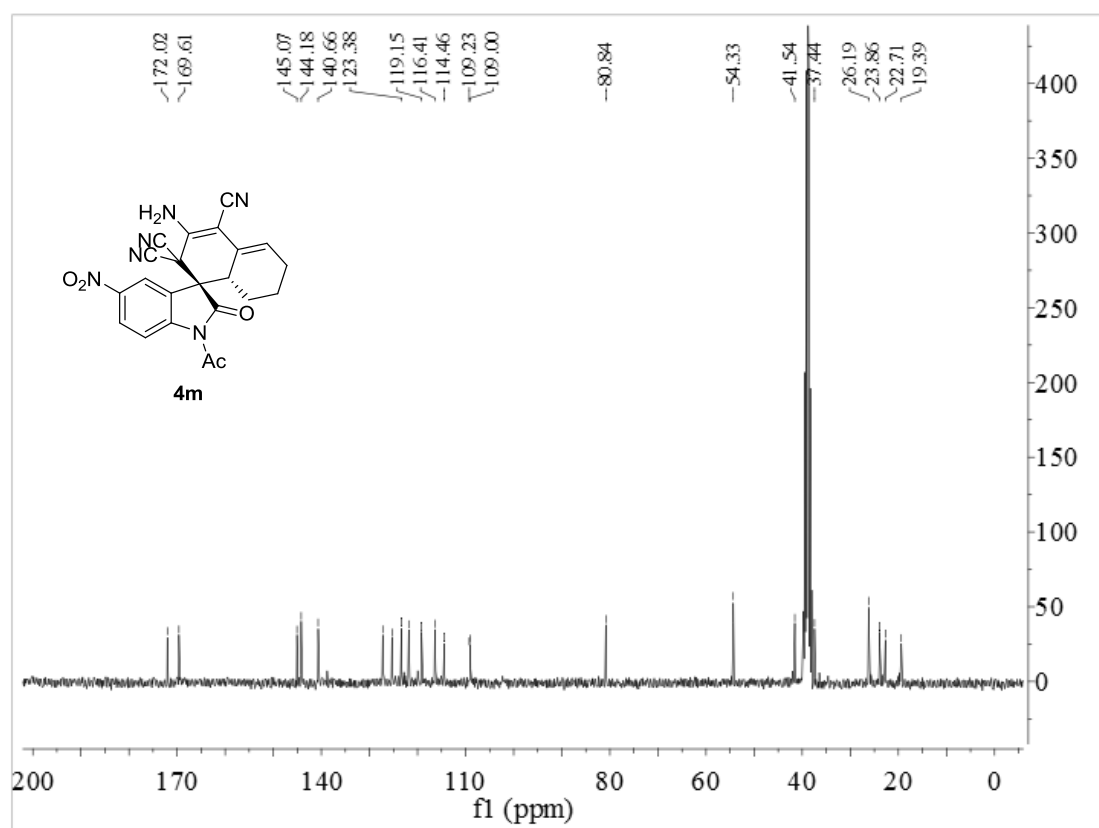
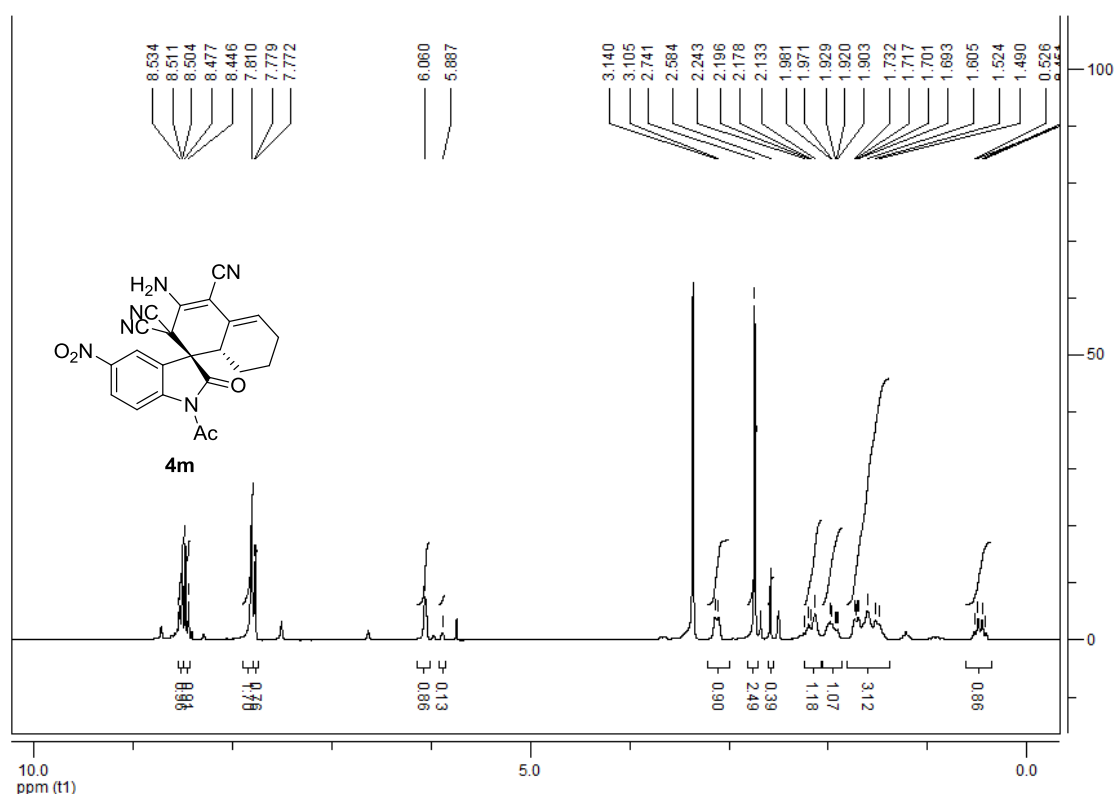




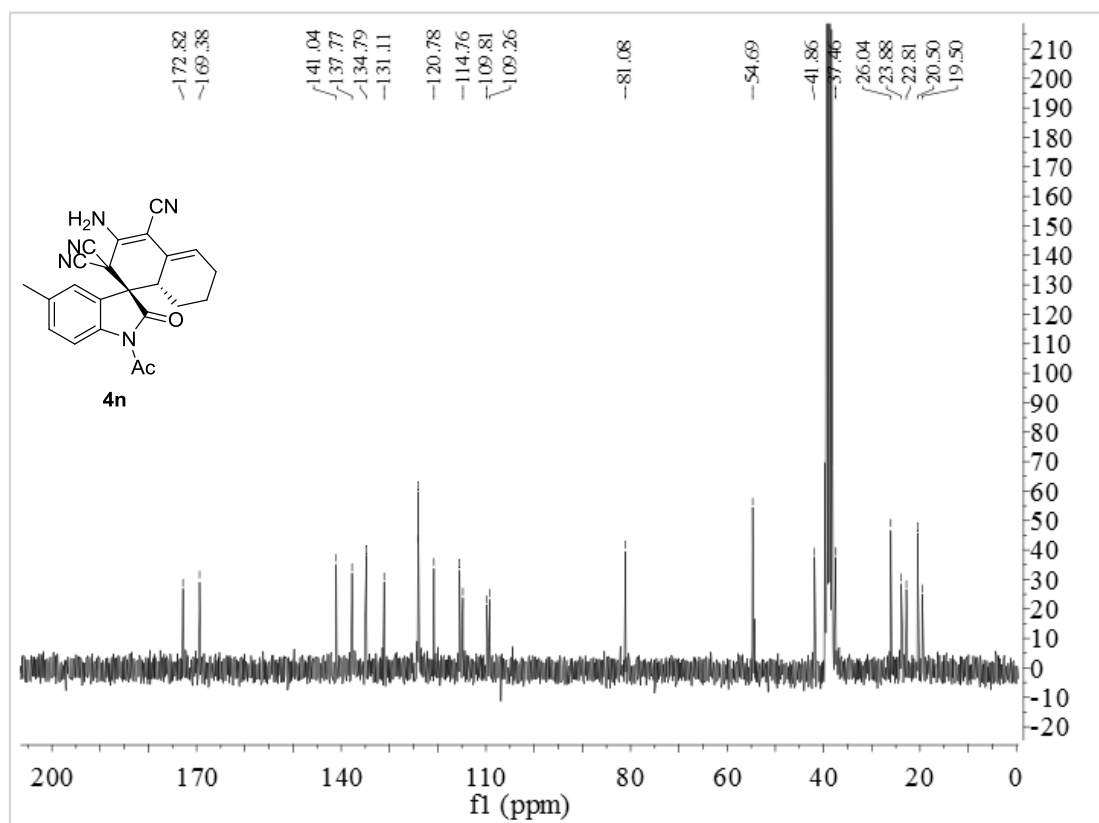
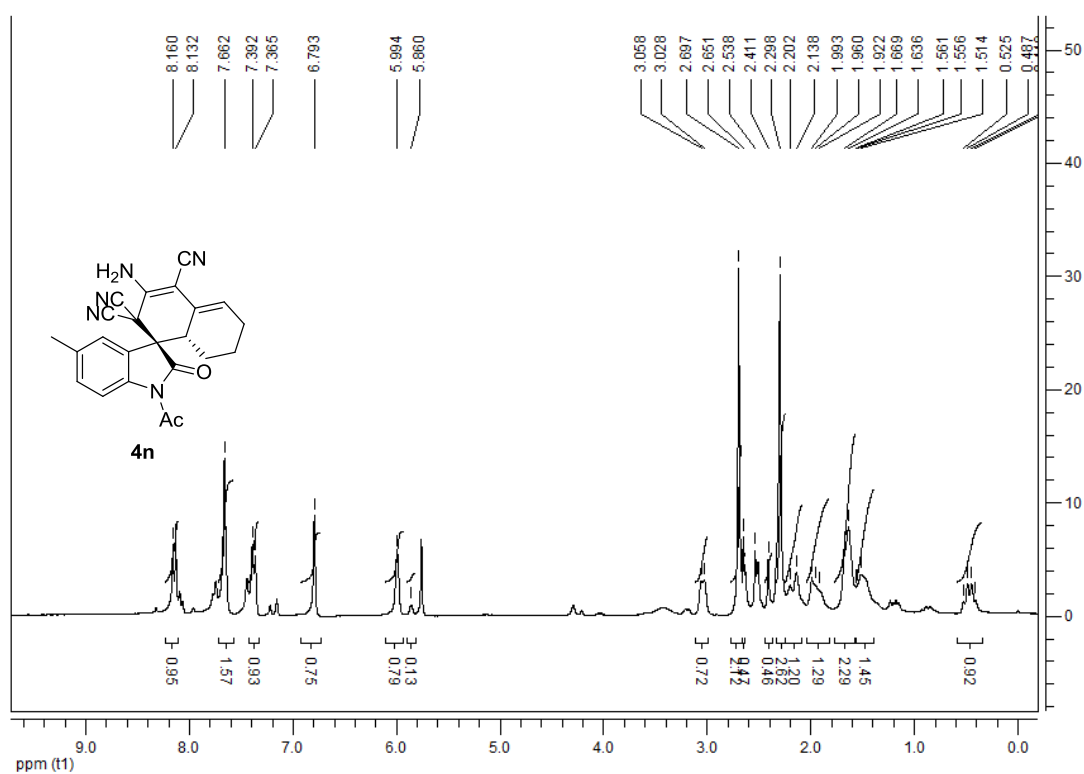
4l



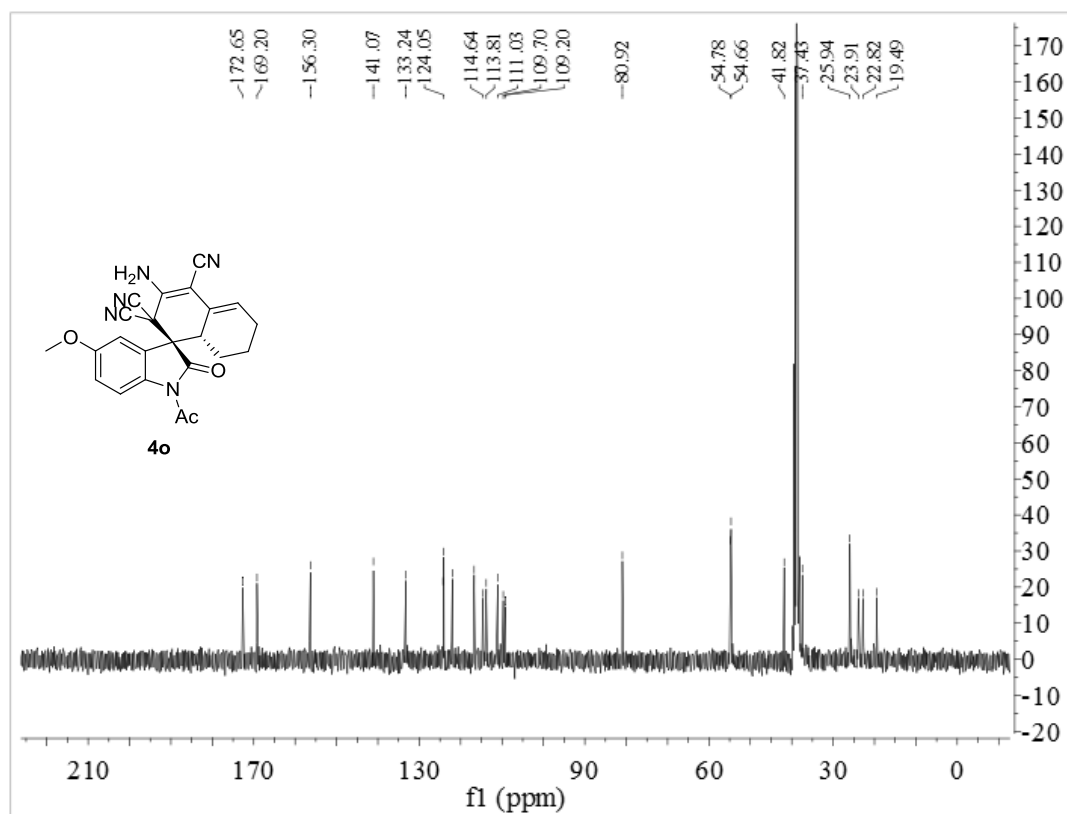
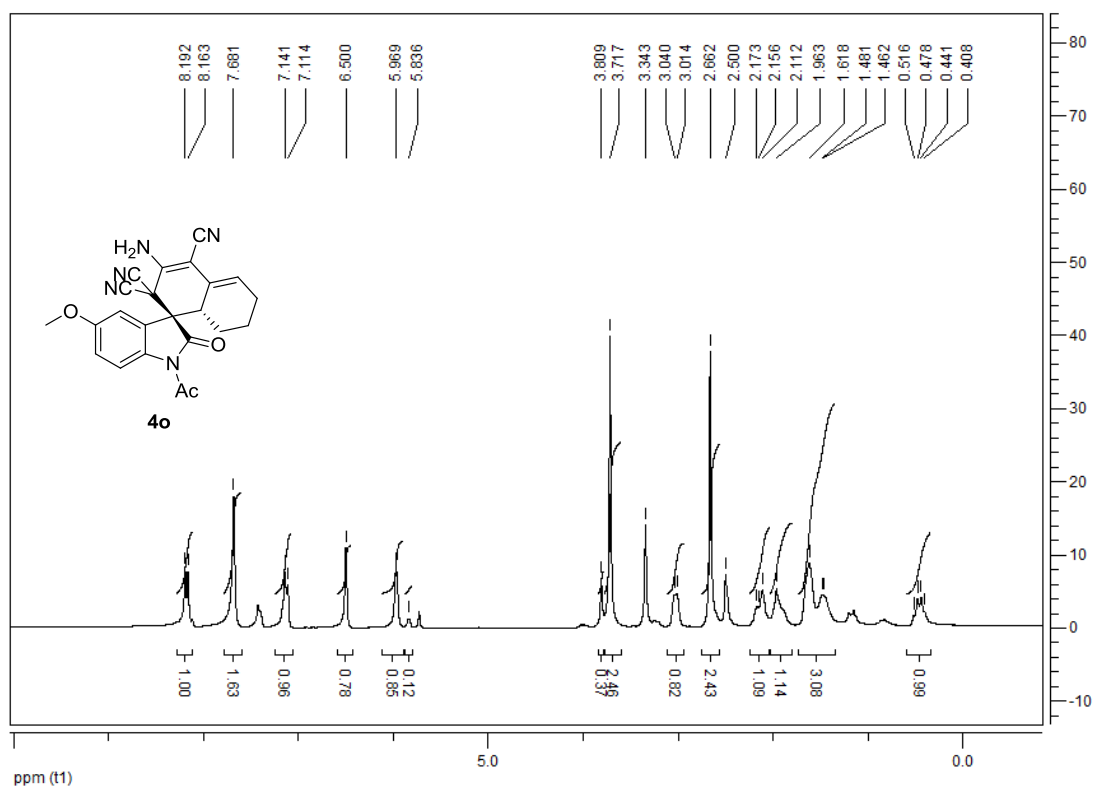
4m



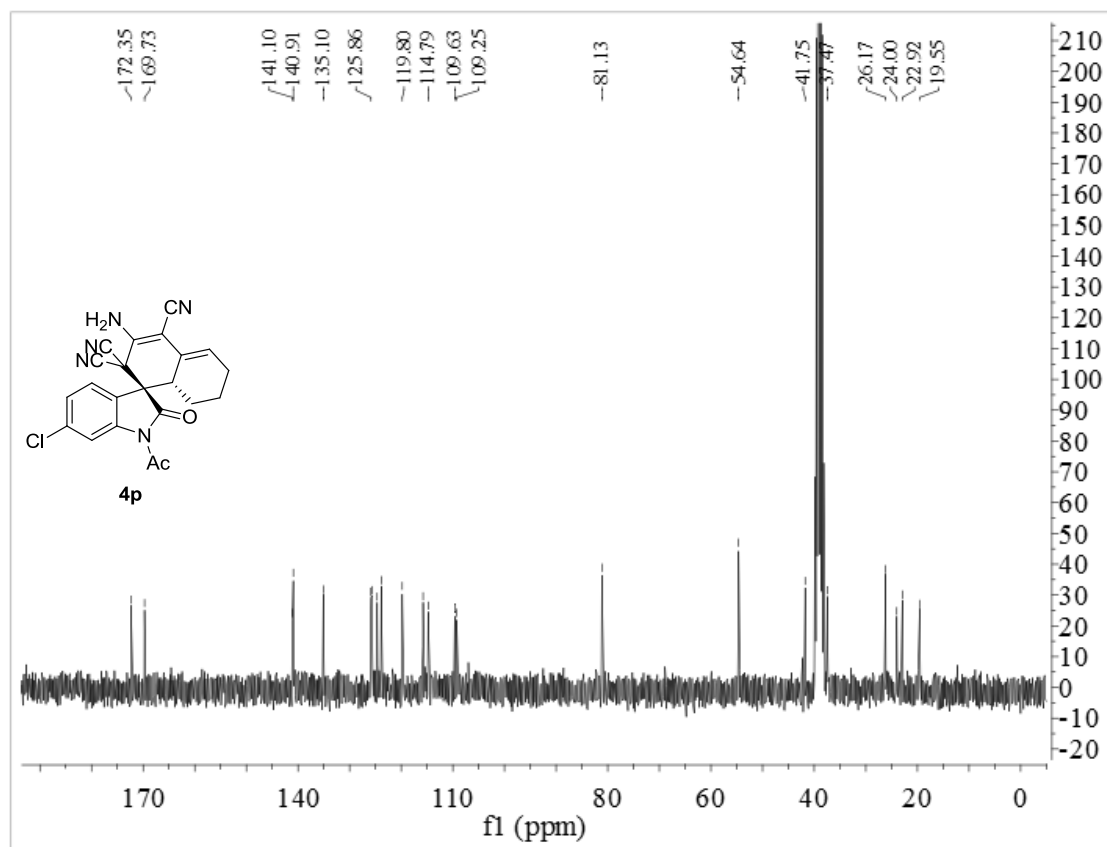
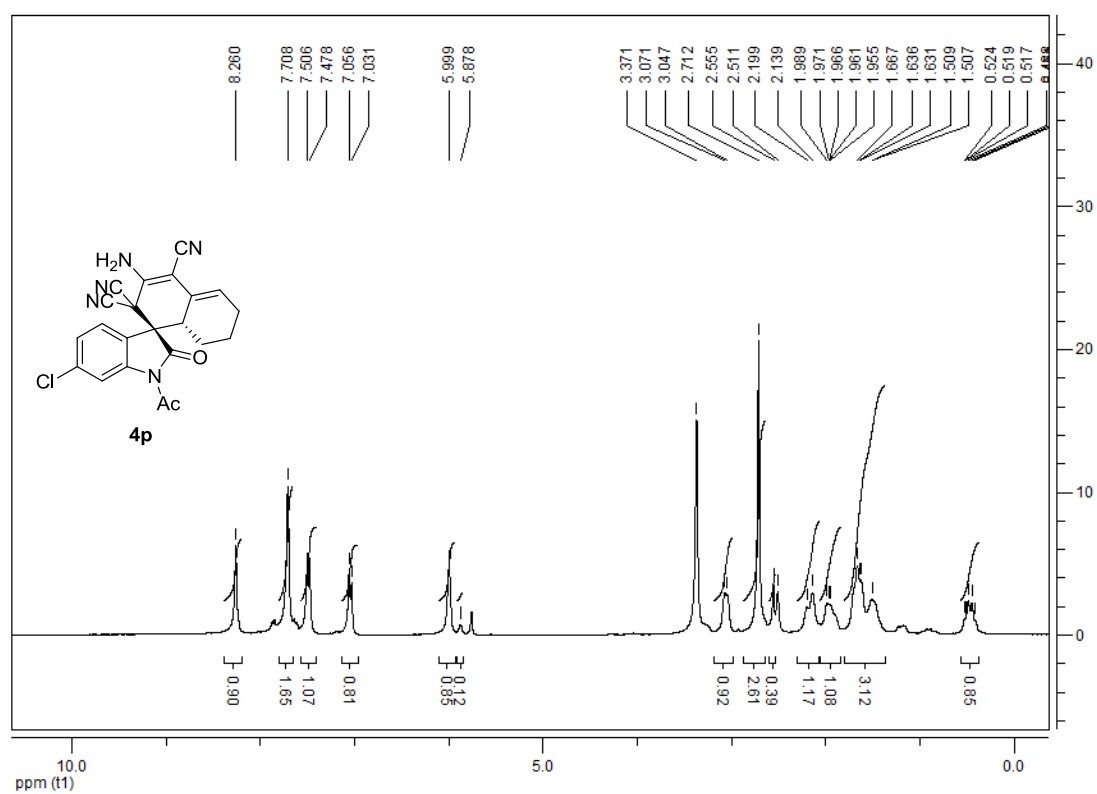
4n



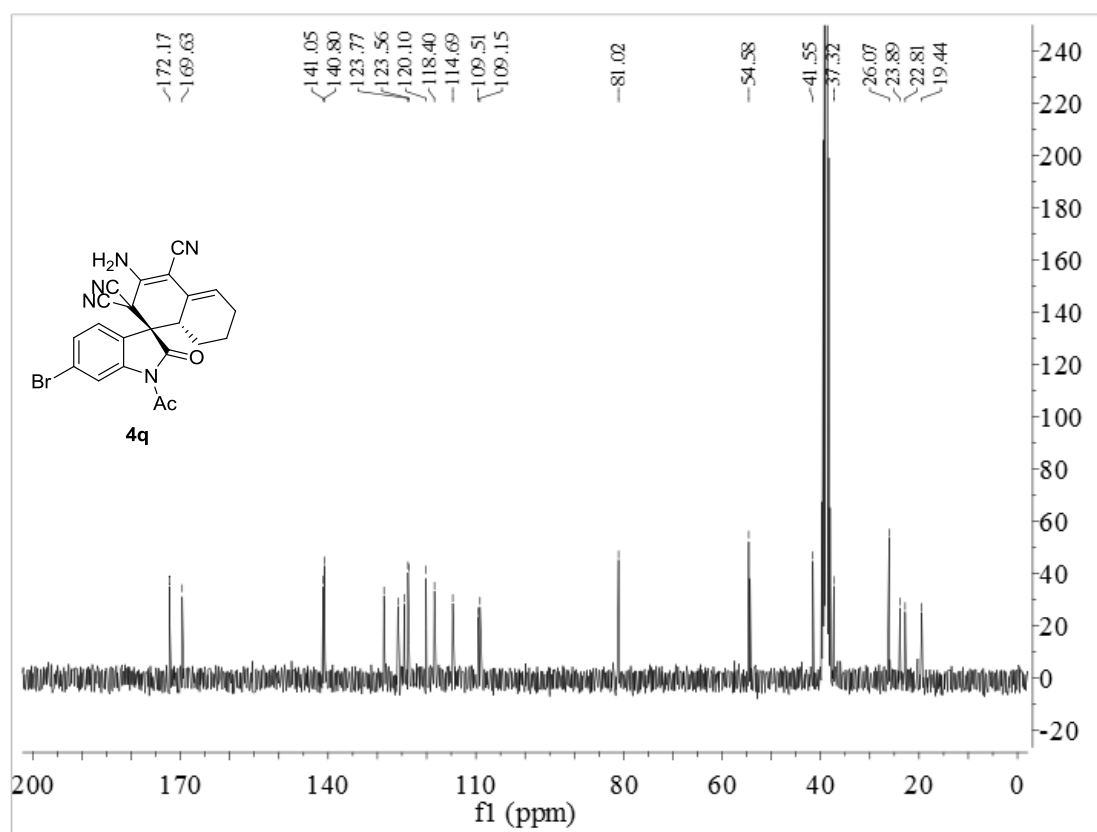
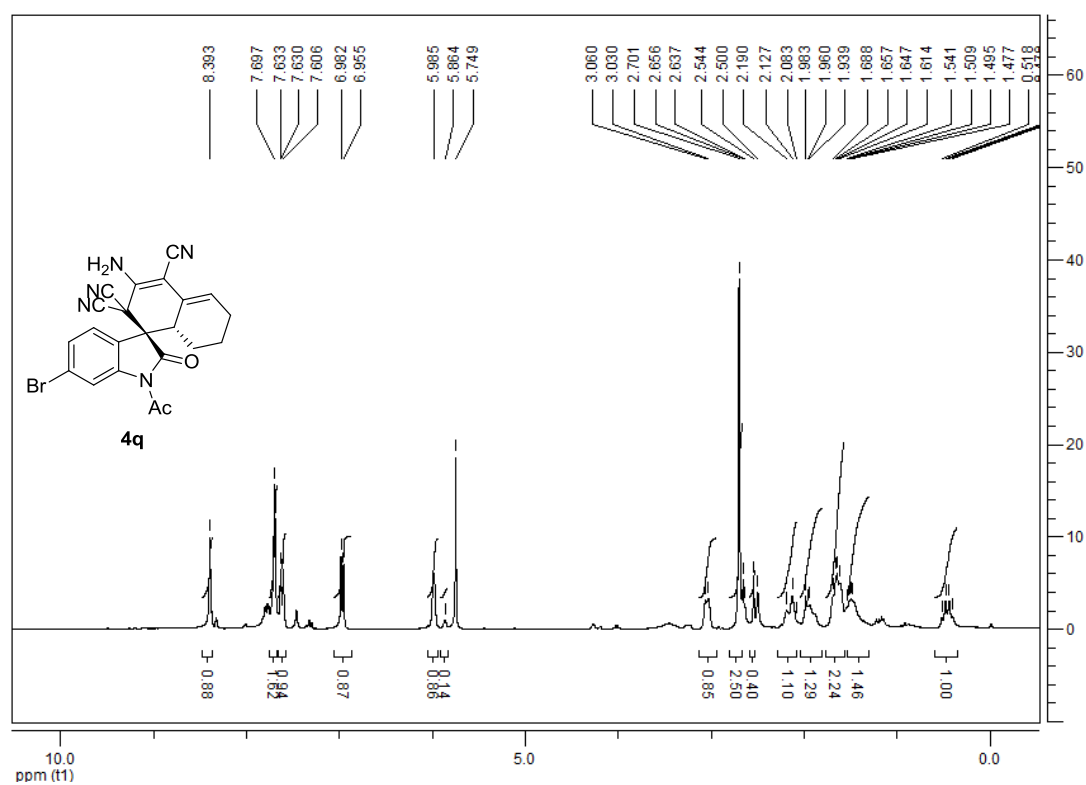
4o



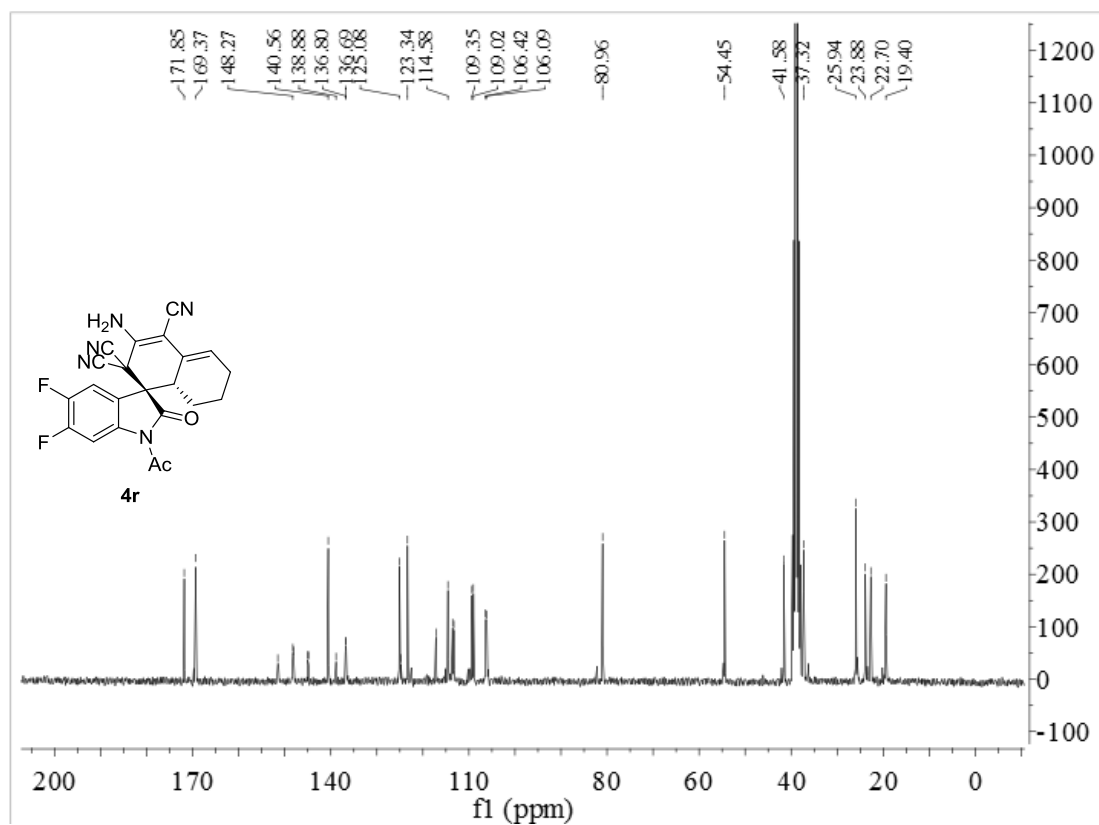
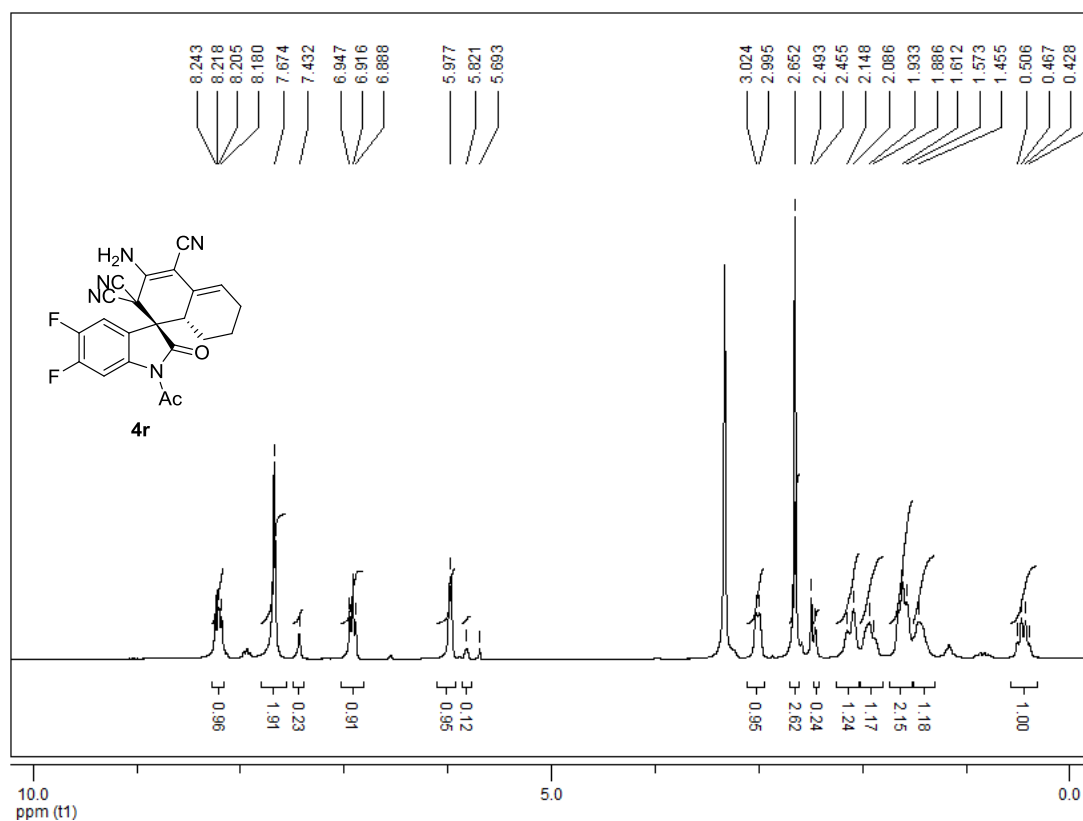
4p



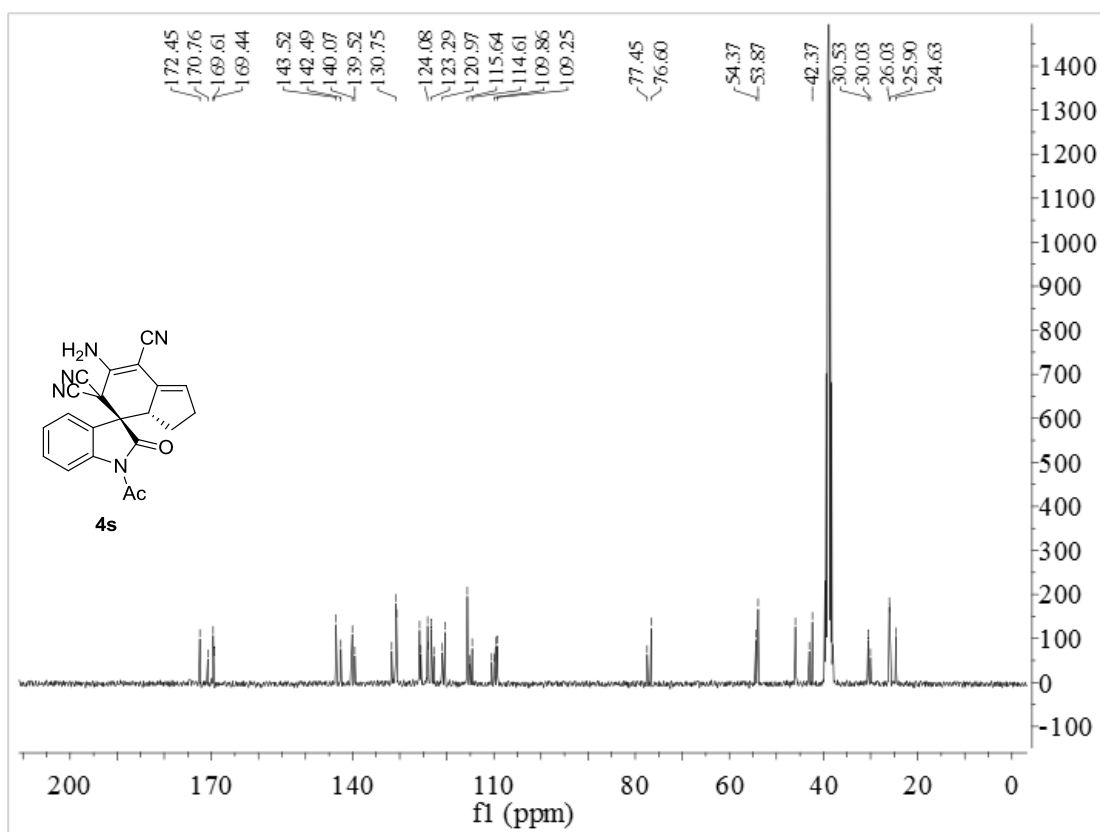
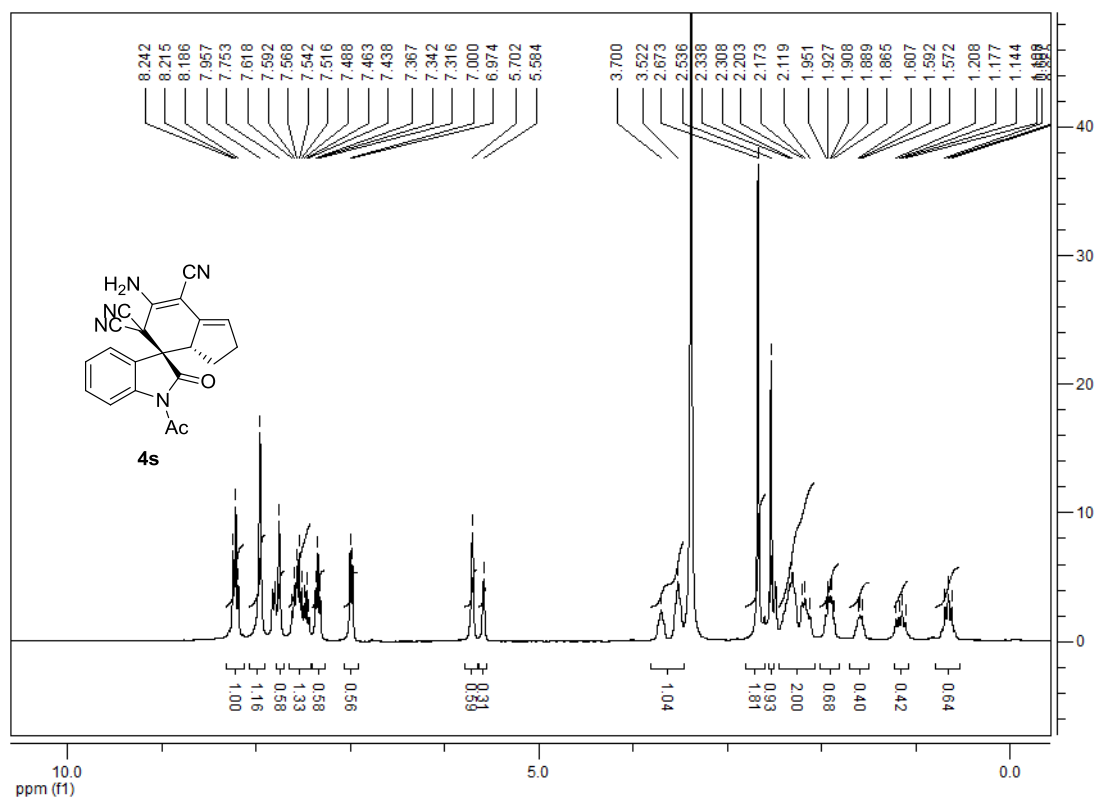
4q



4r

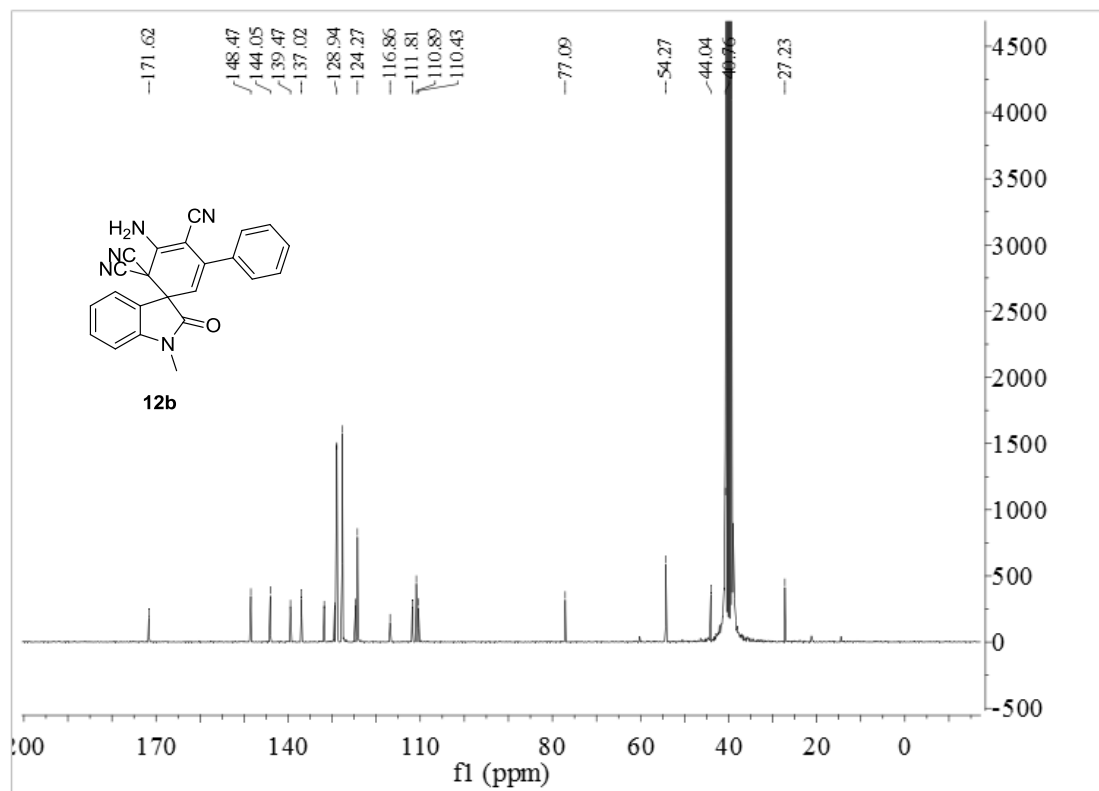
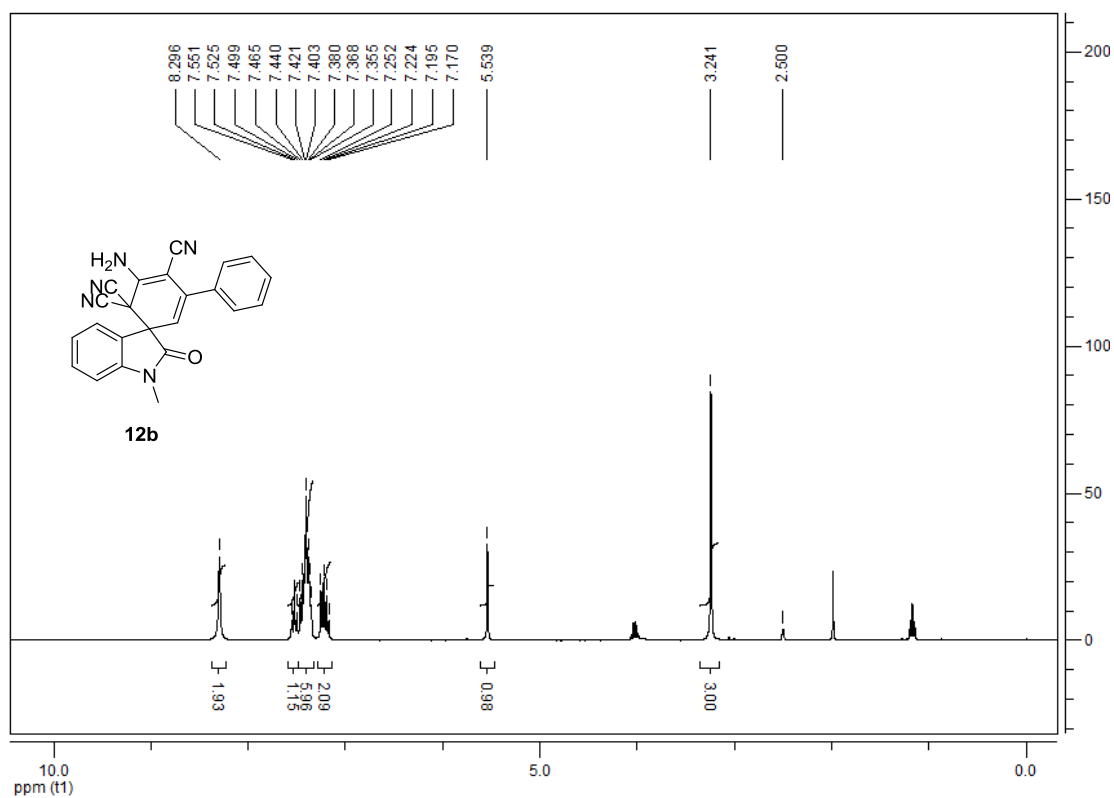


4s

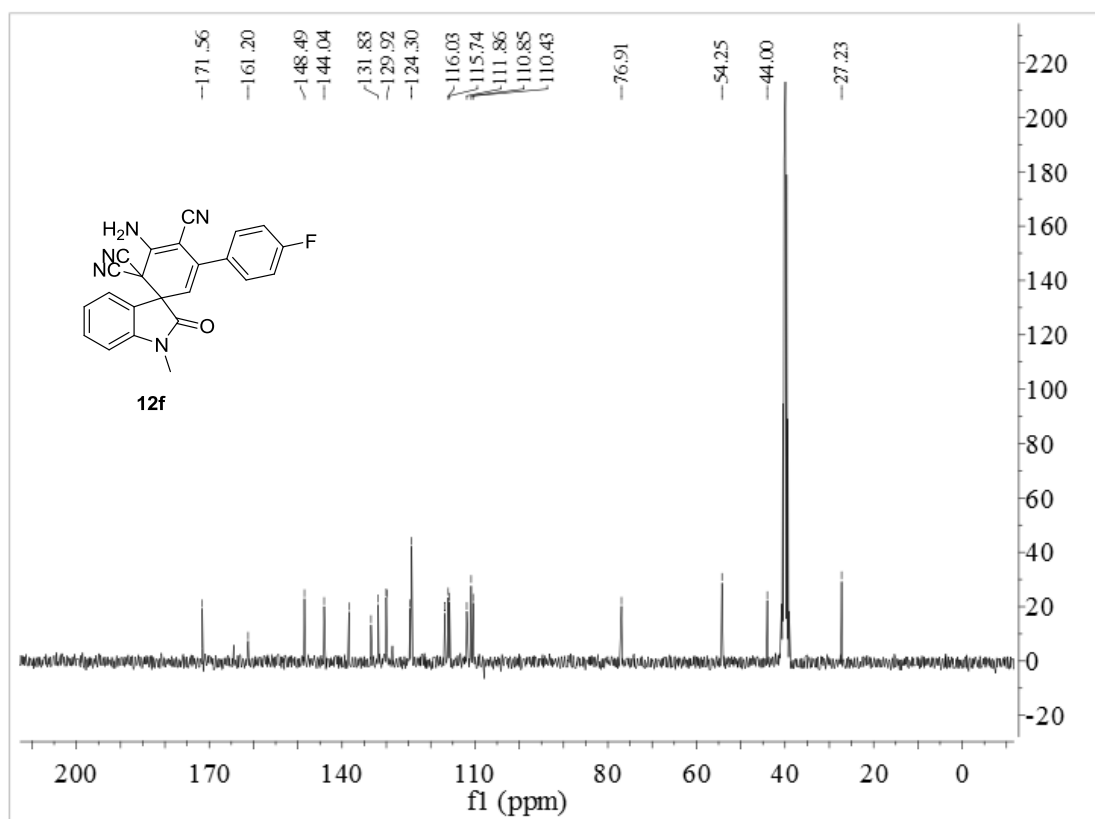
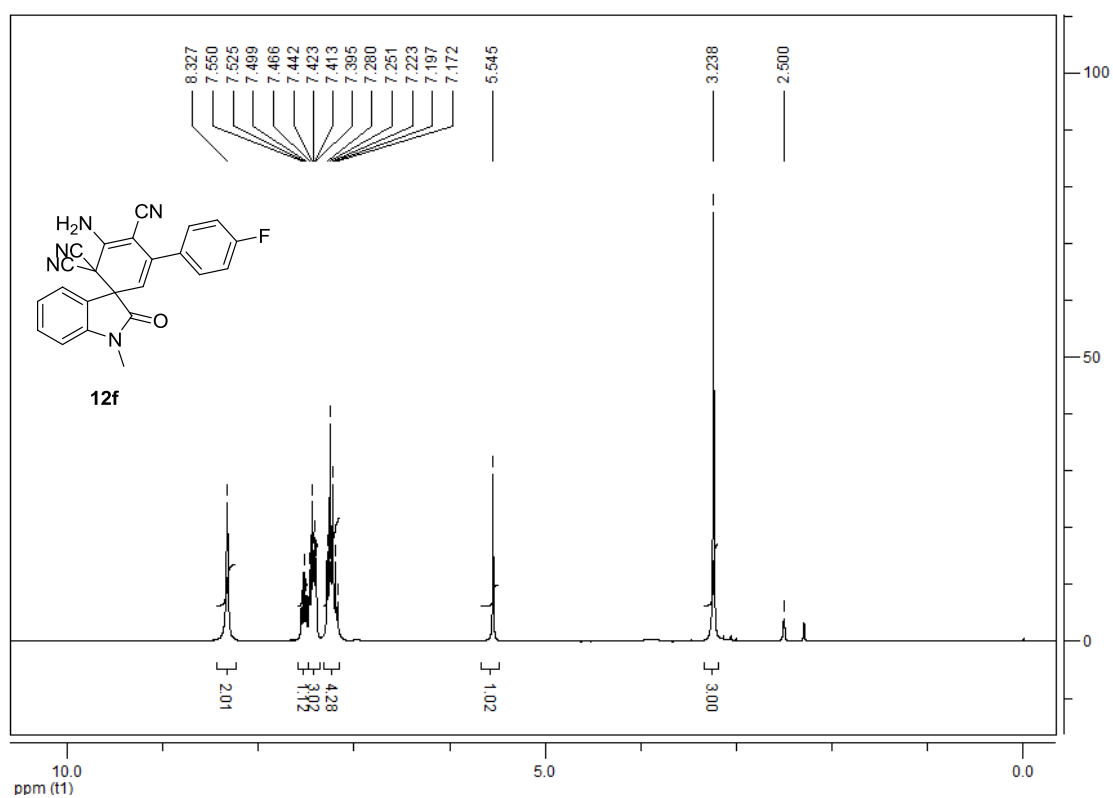




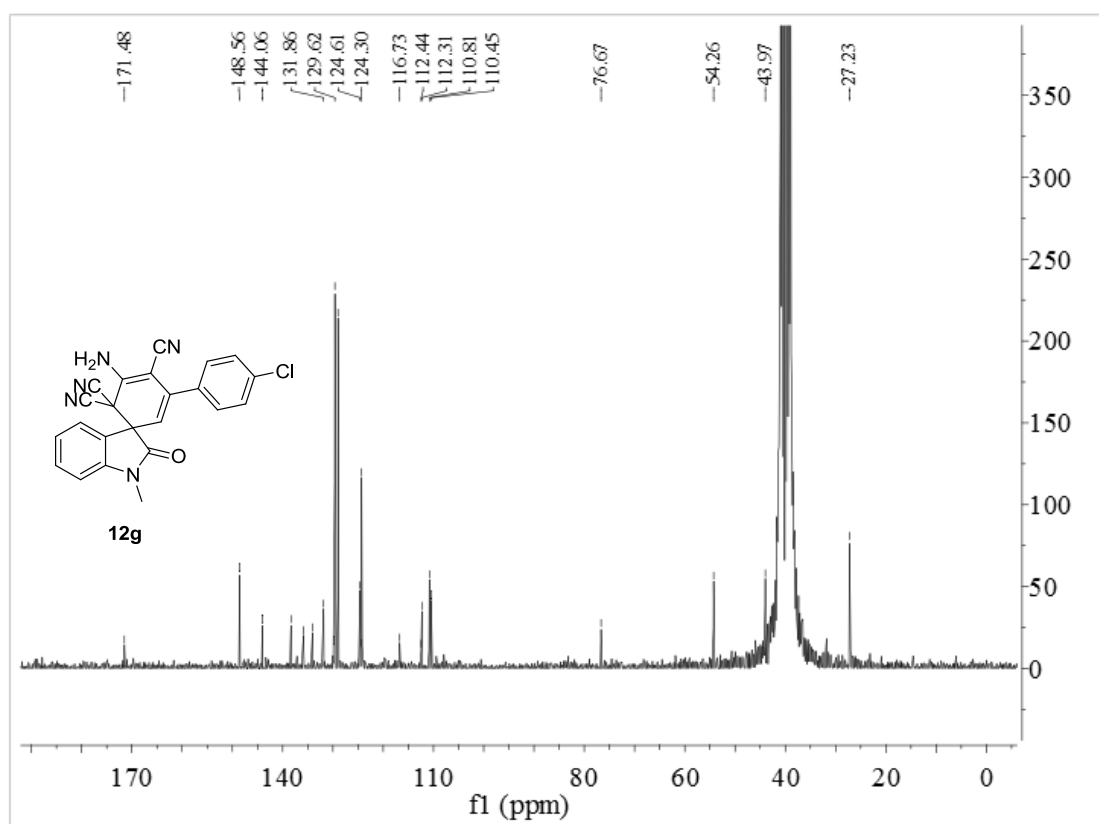
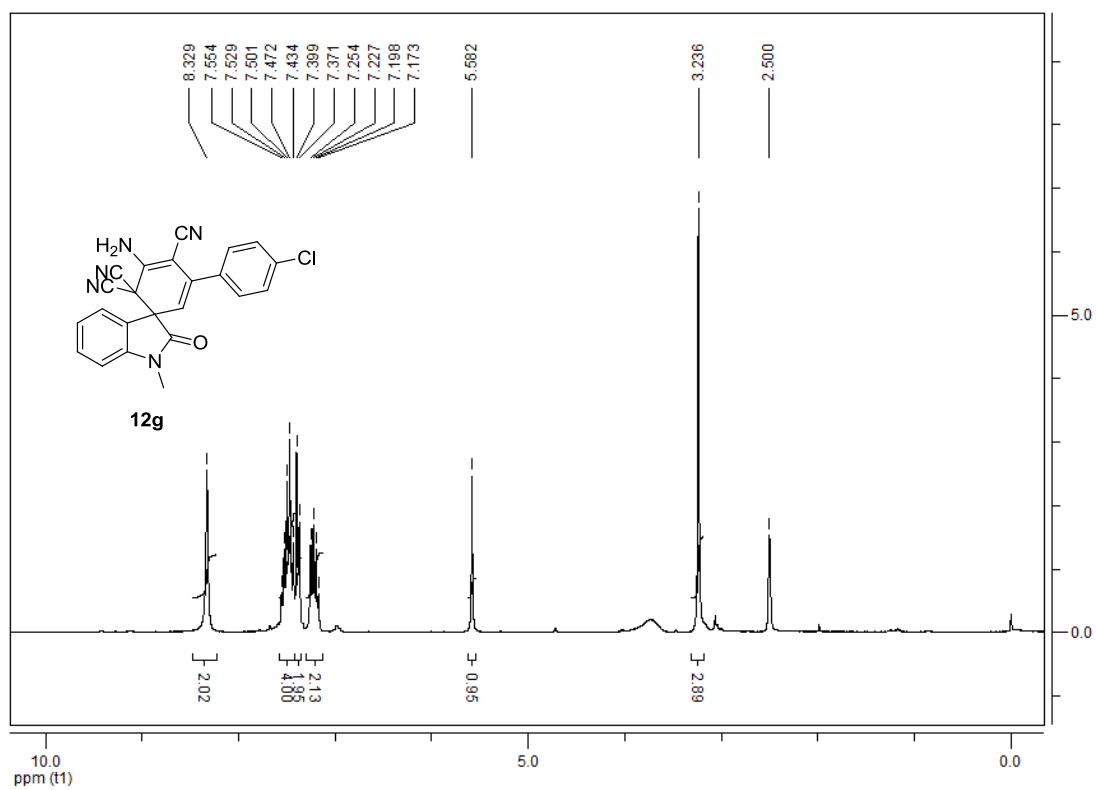
12b



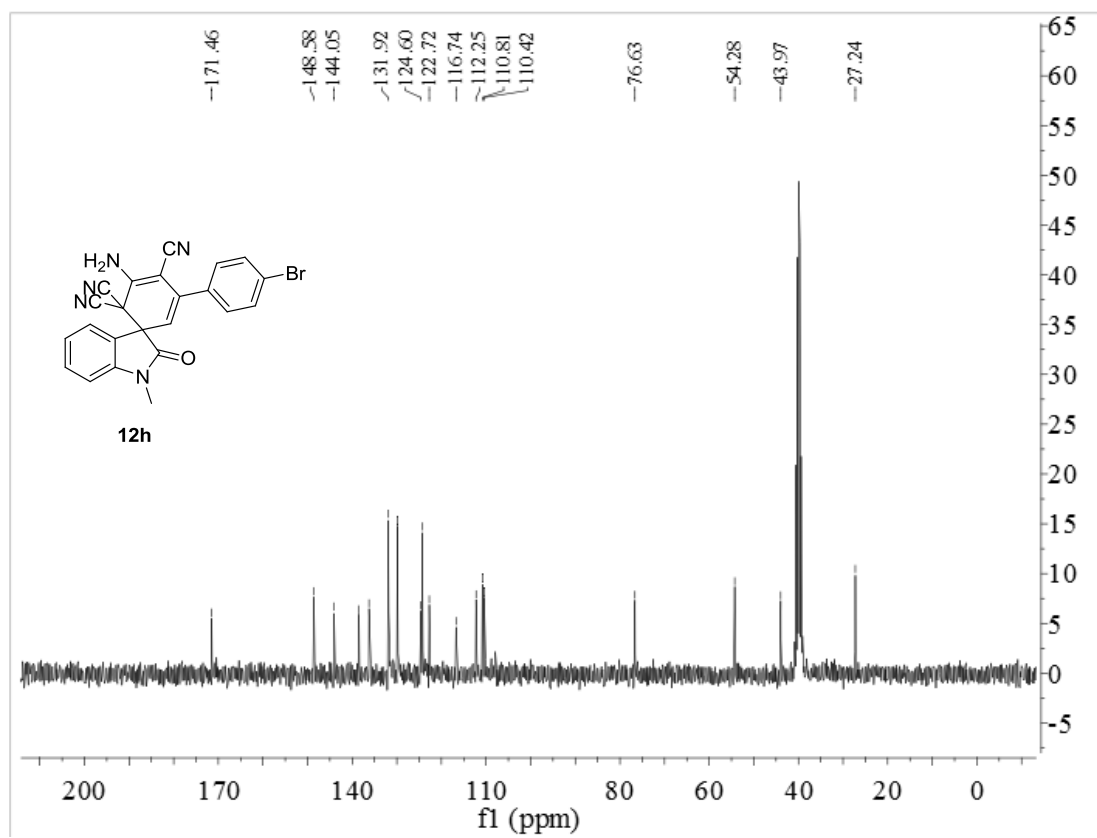
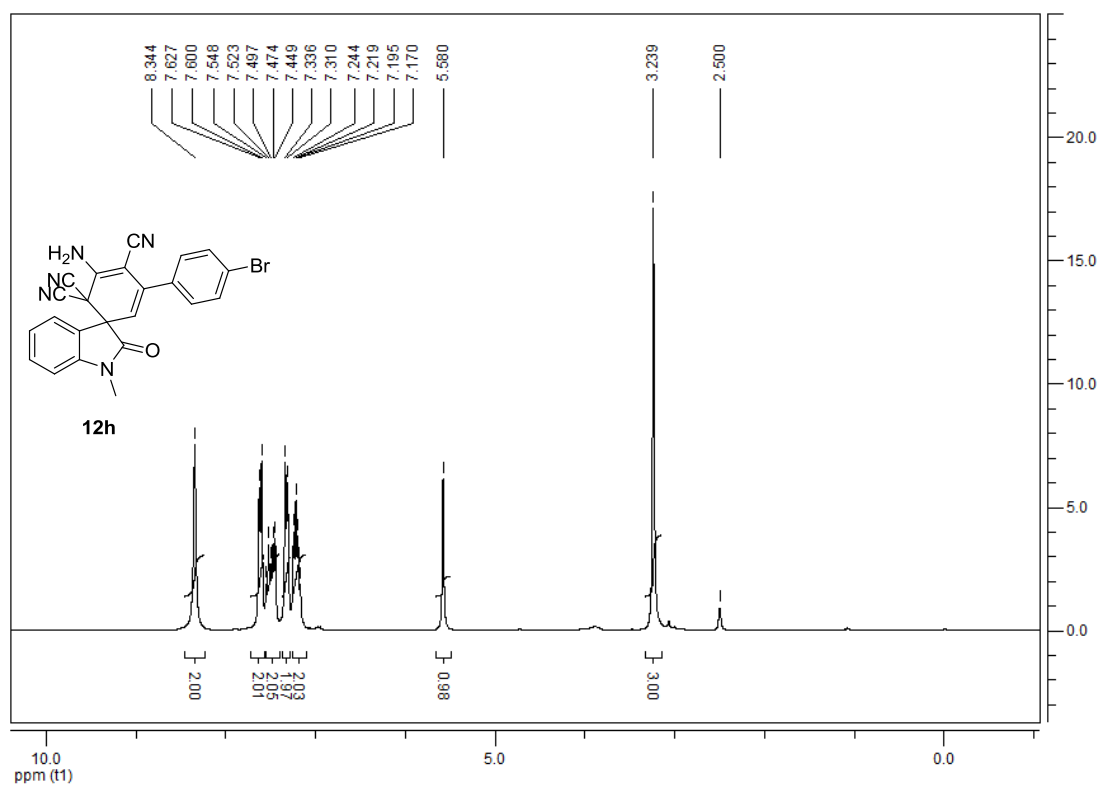
12f



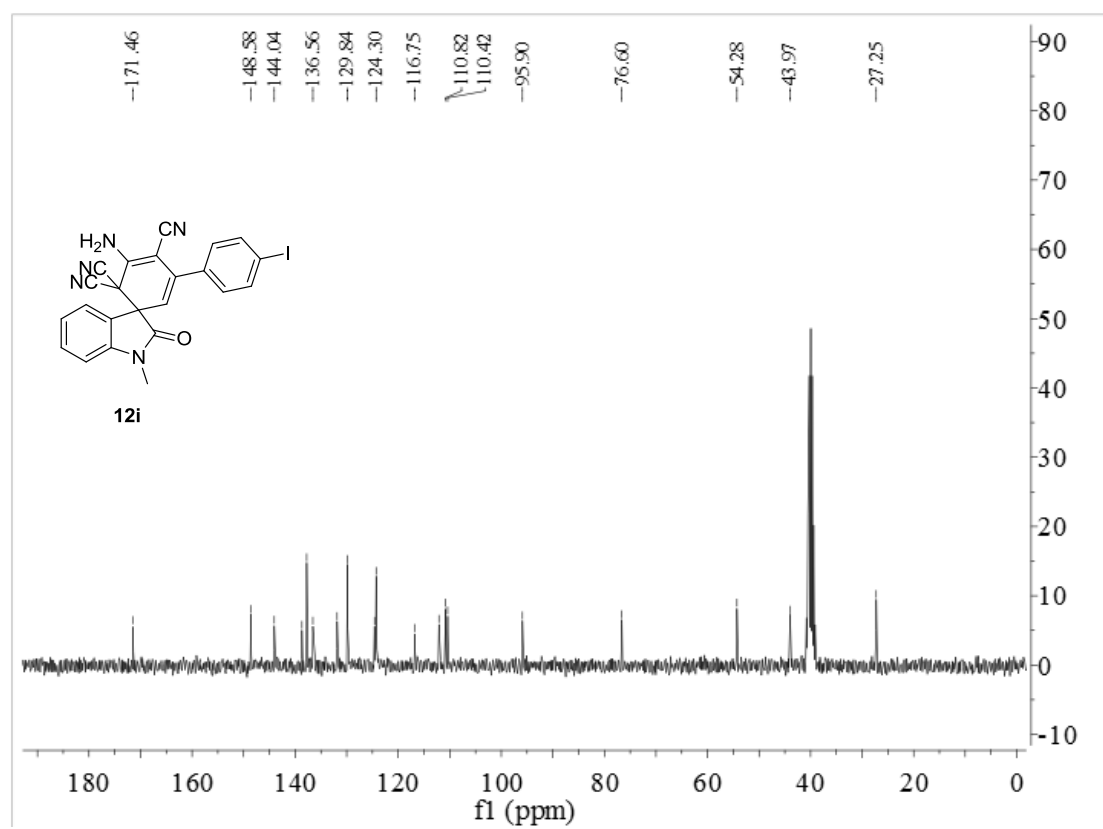
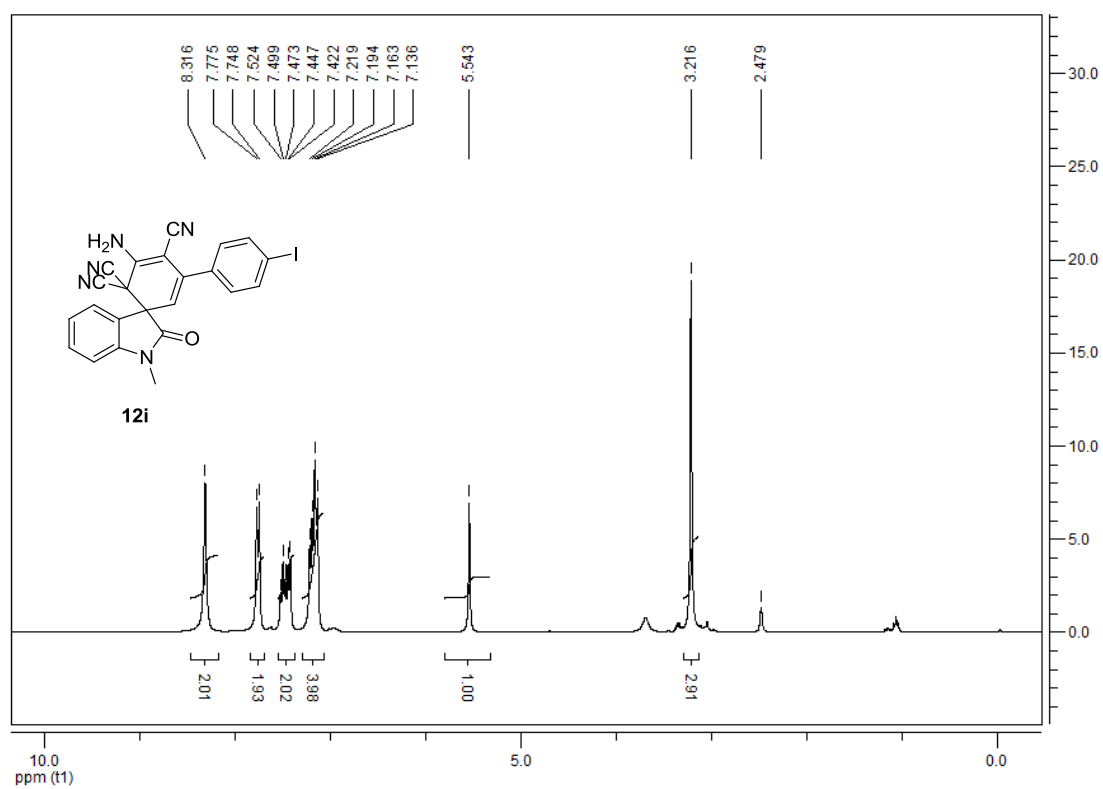
12g



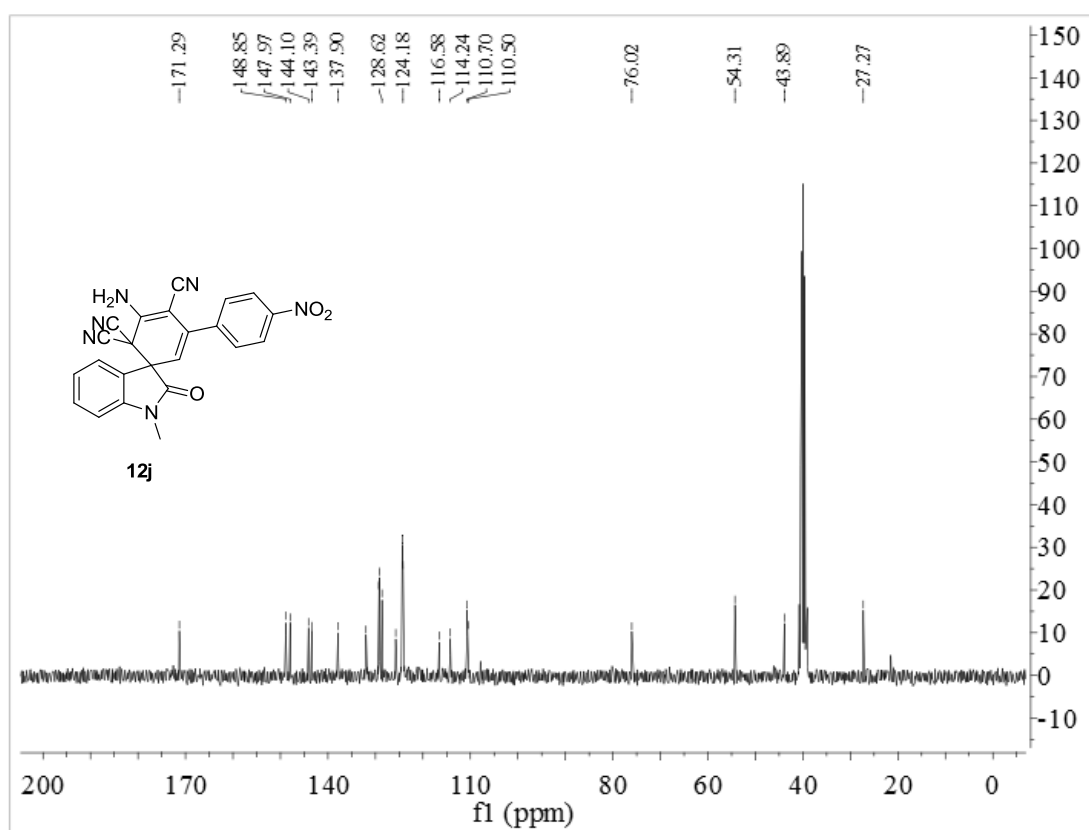
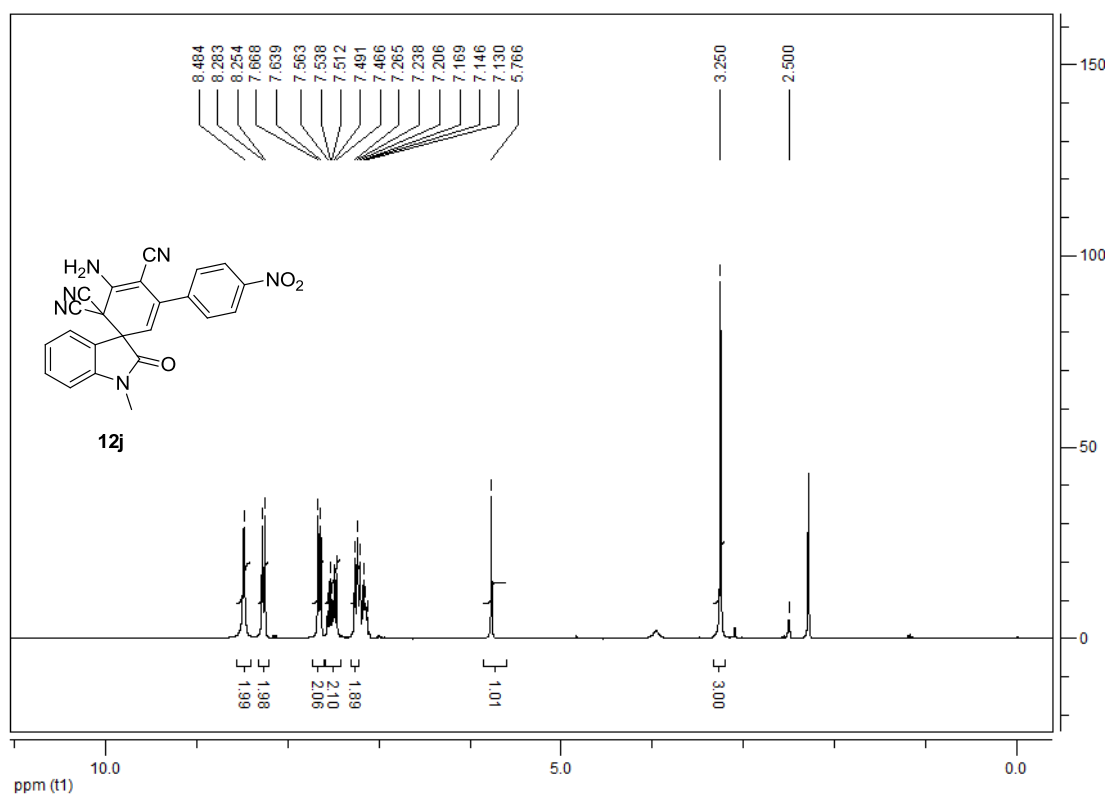
12h



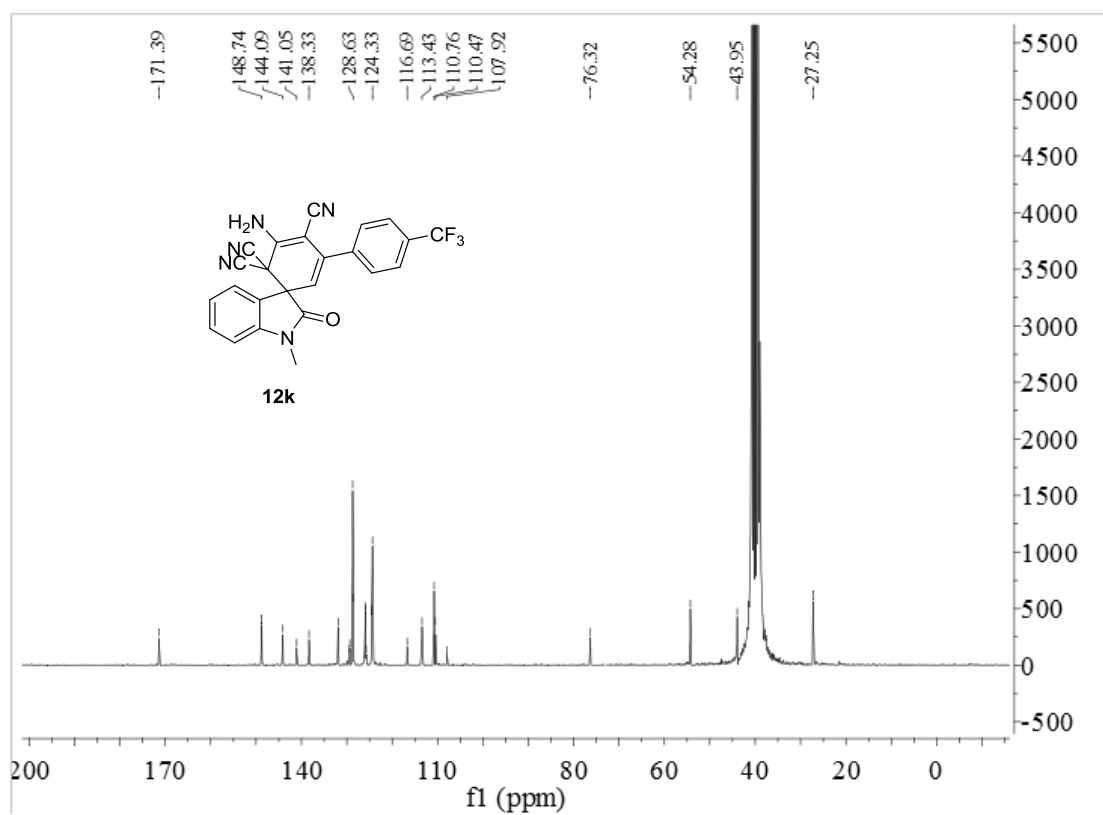
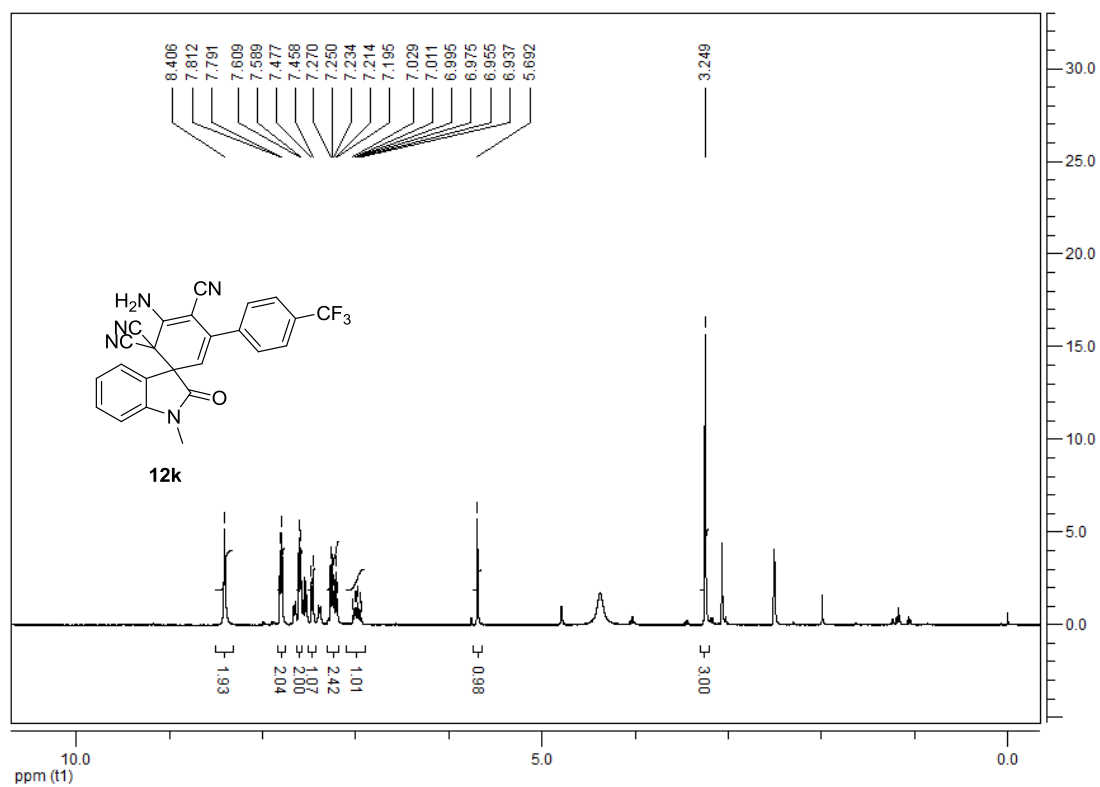
12i



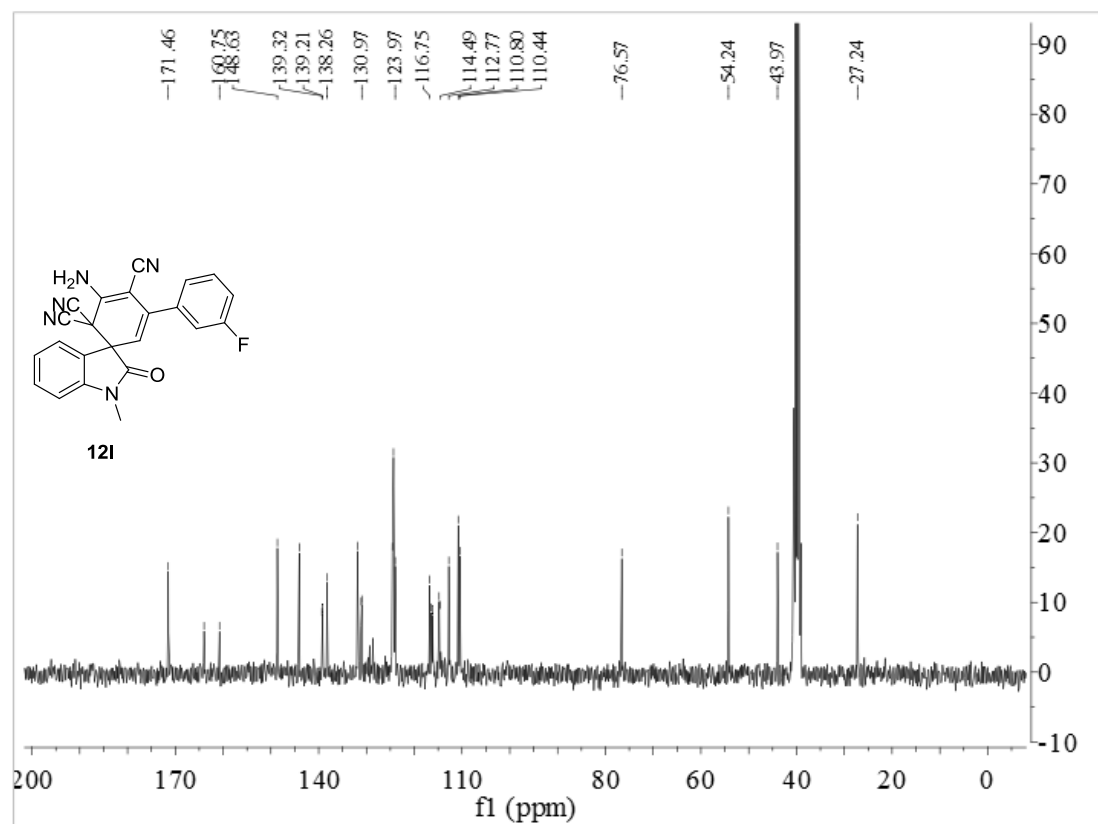
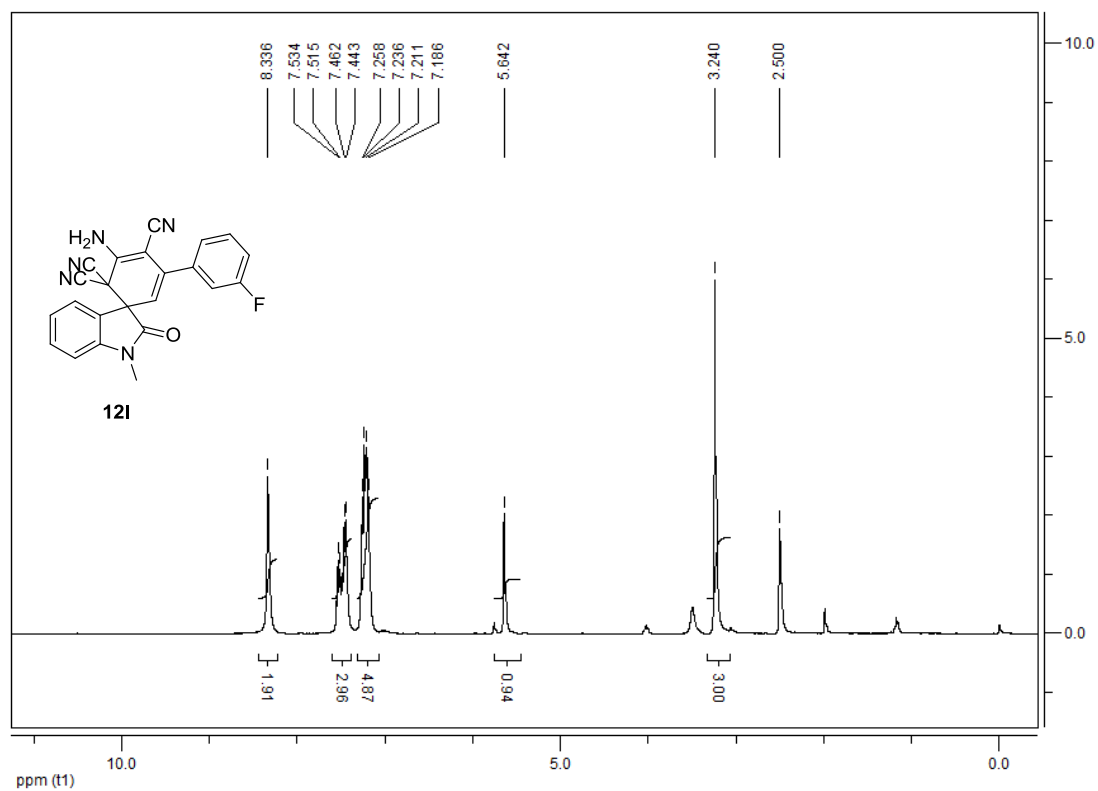
12j



12k

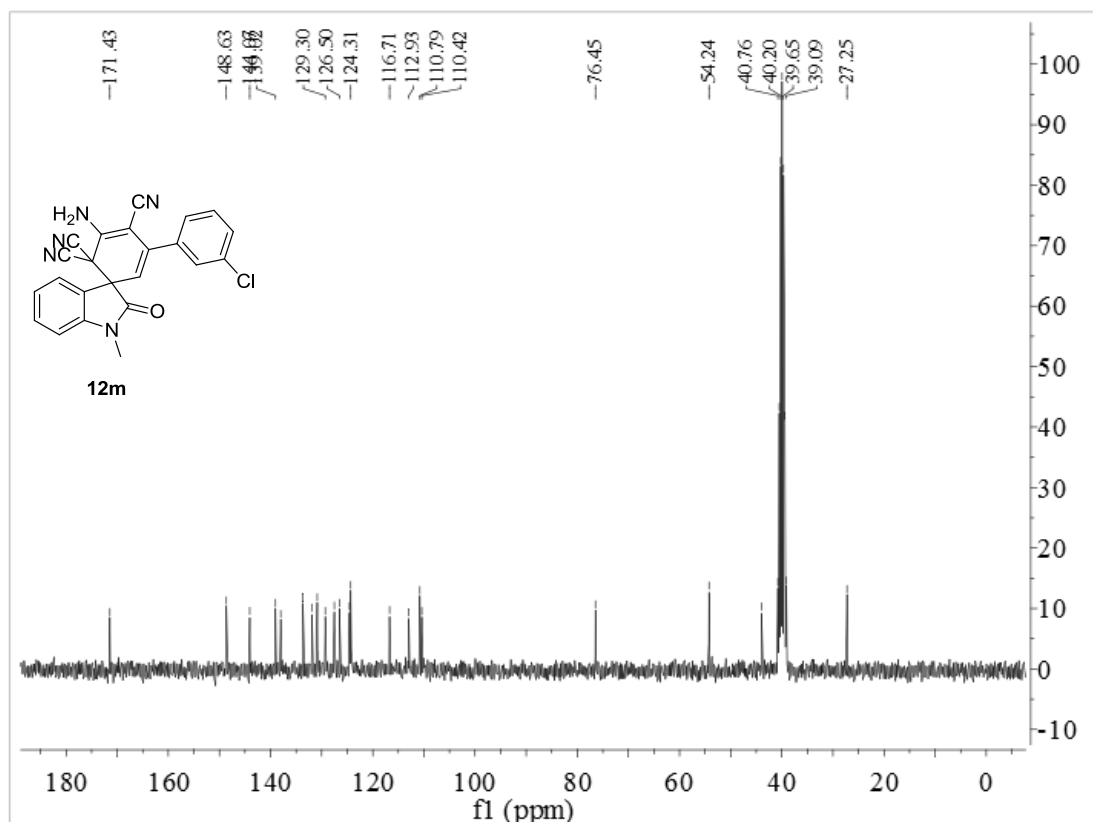
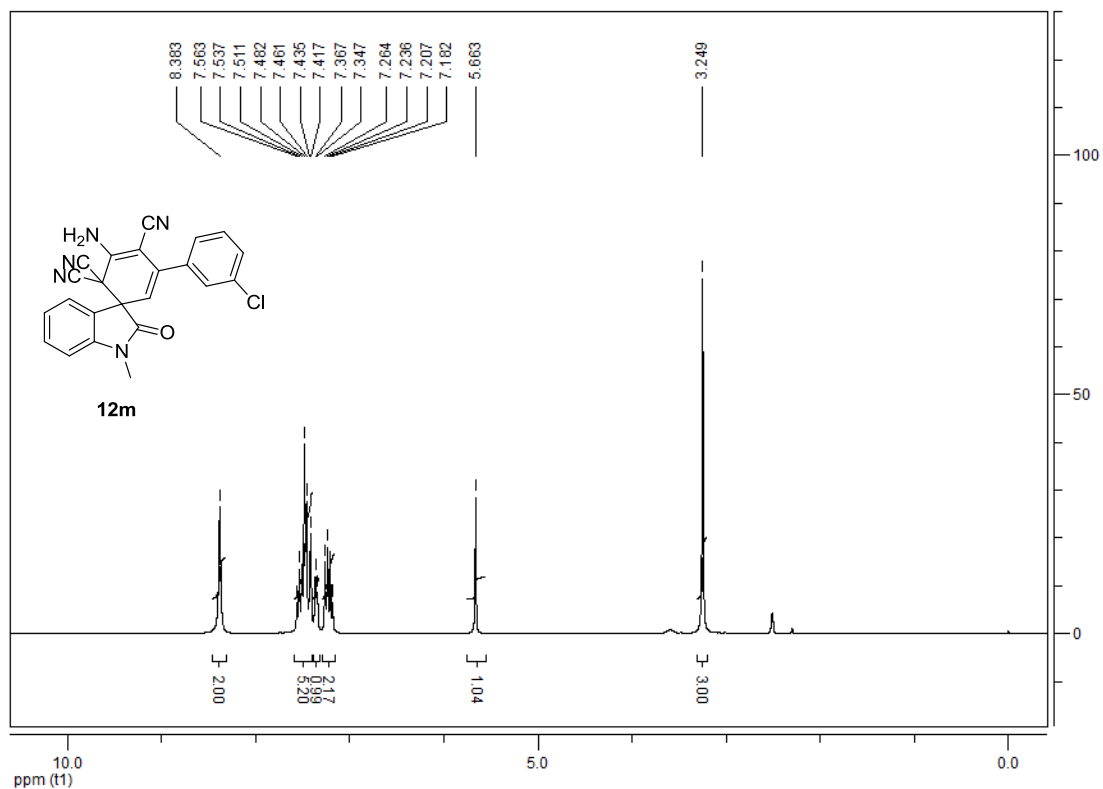


12l

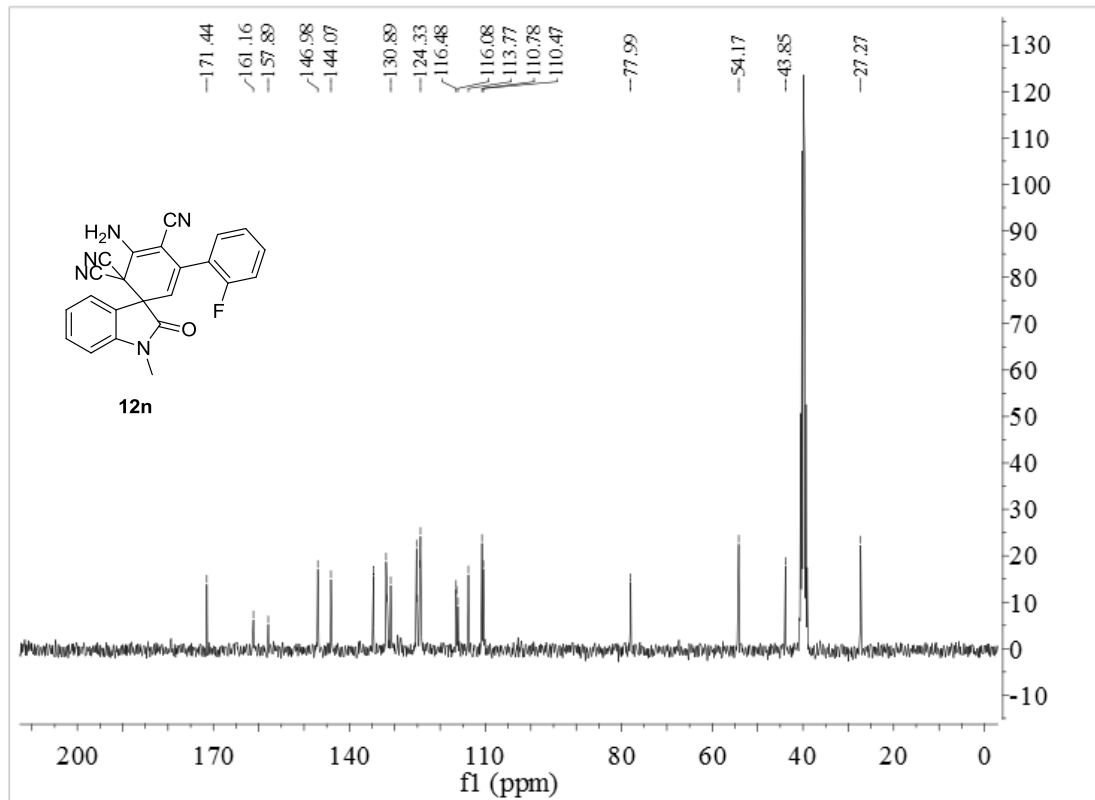
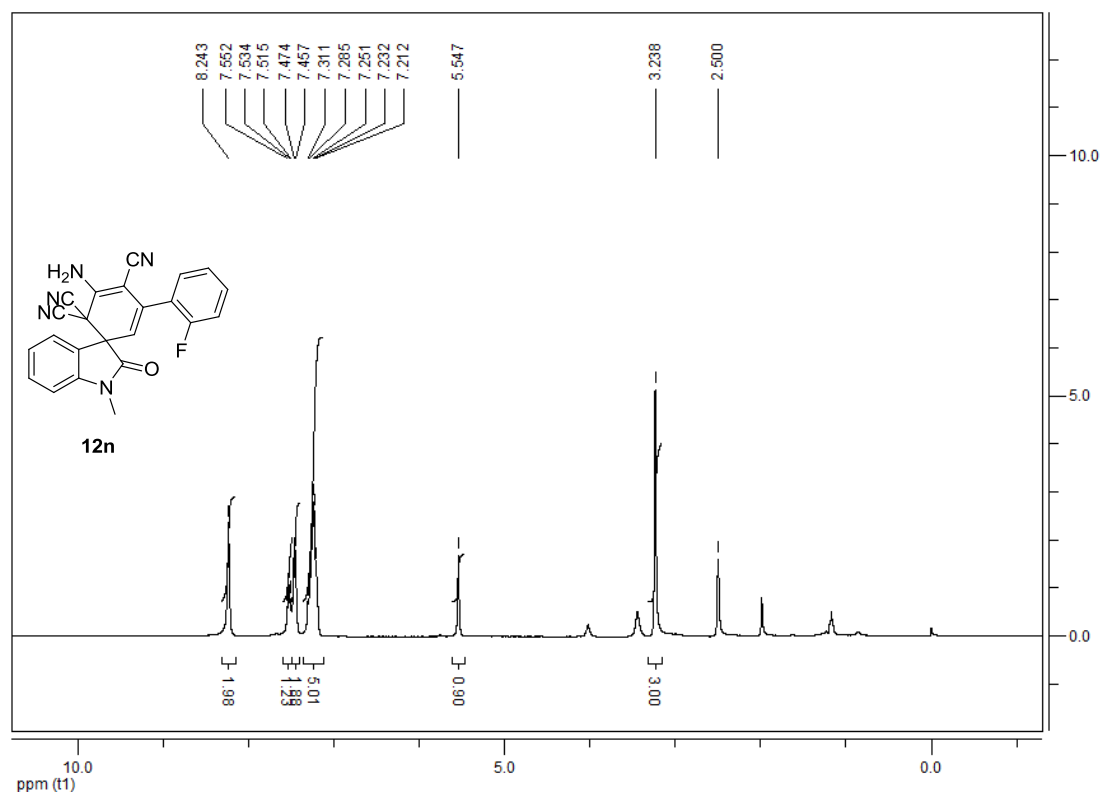




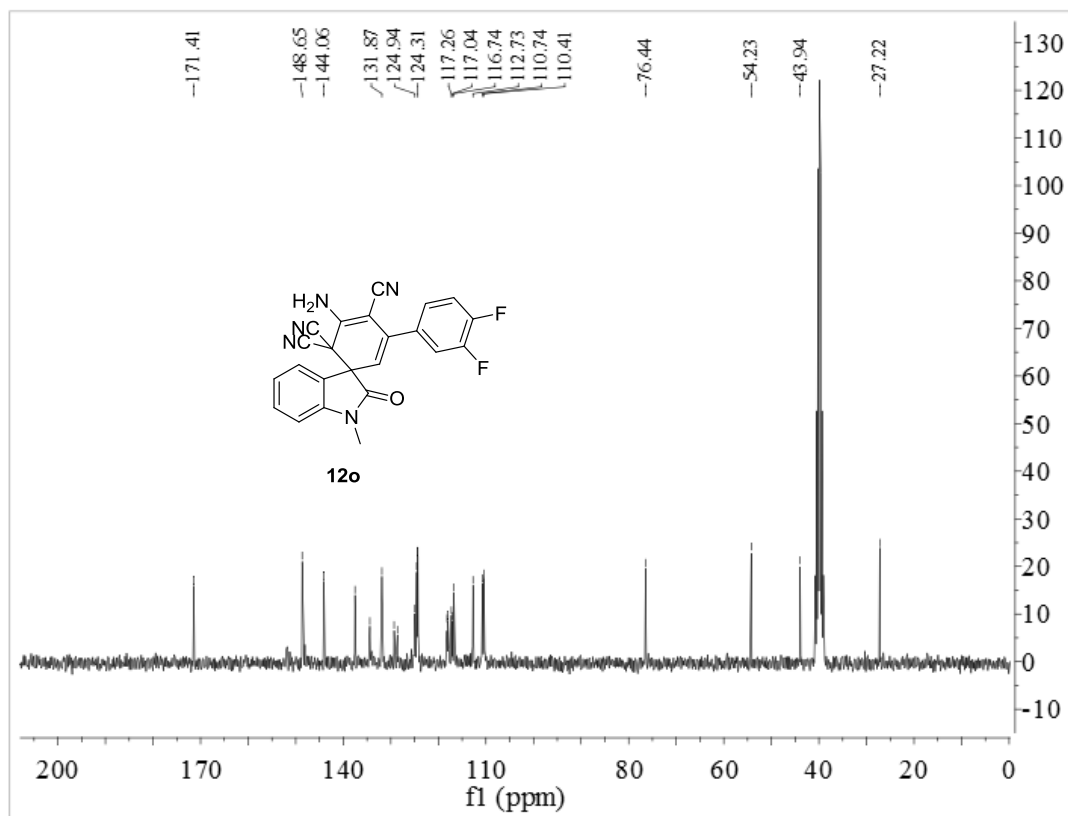
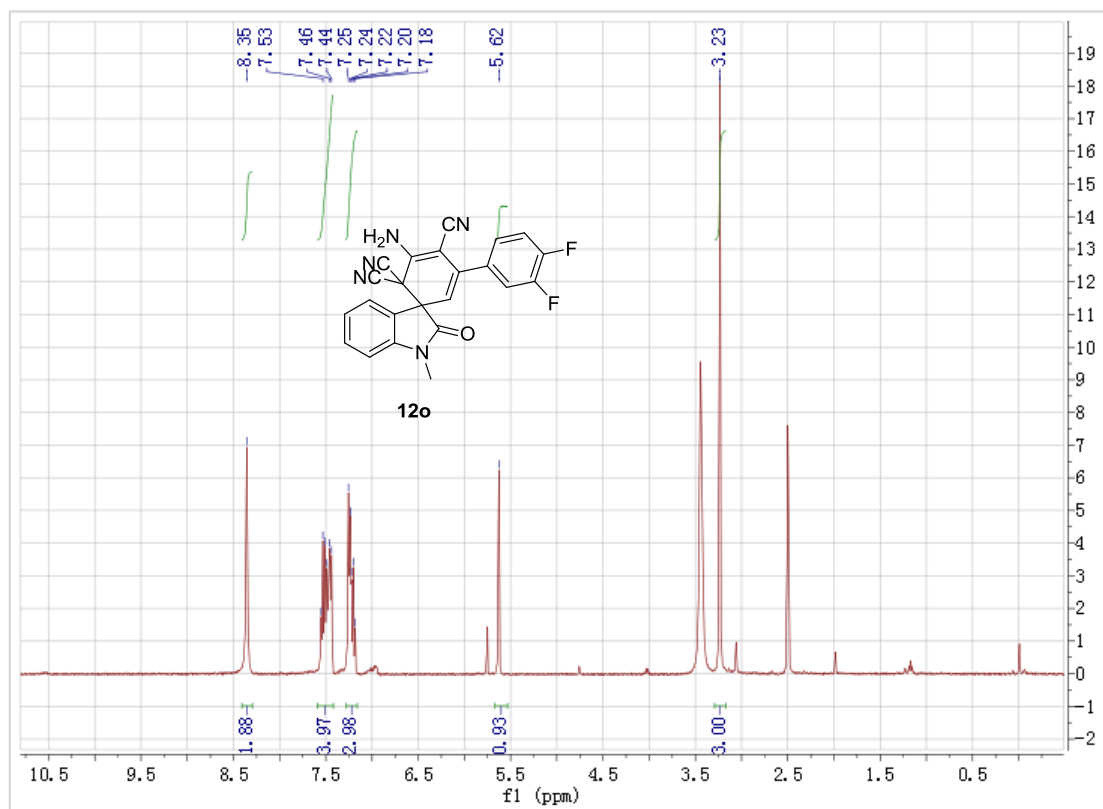
12m



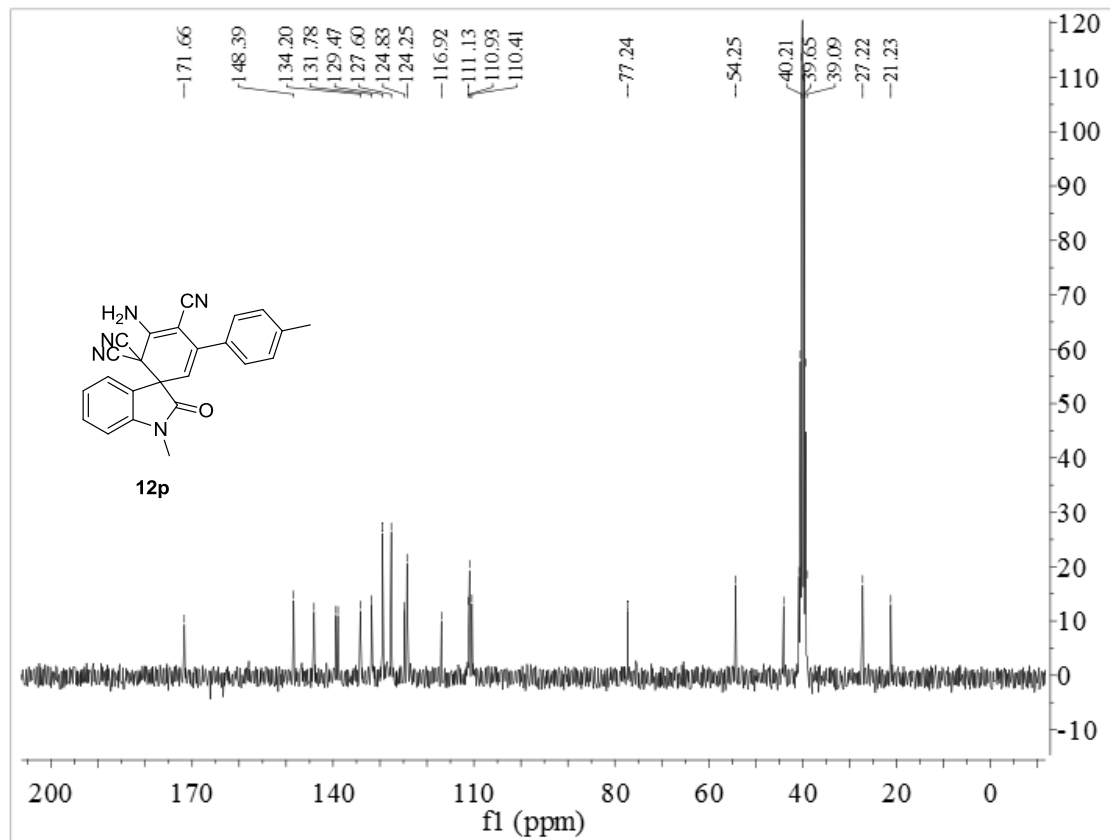
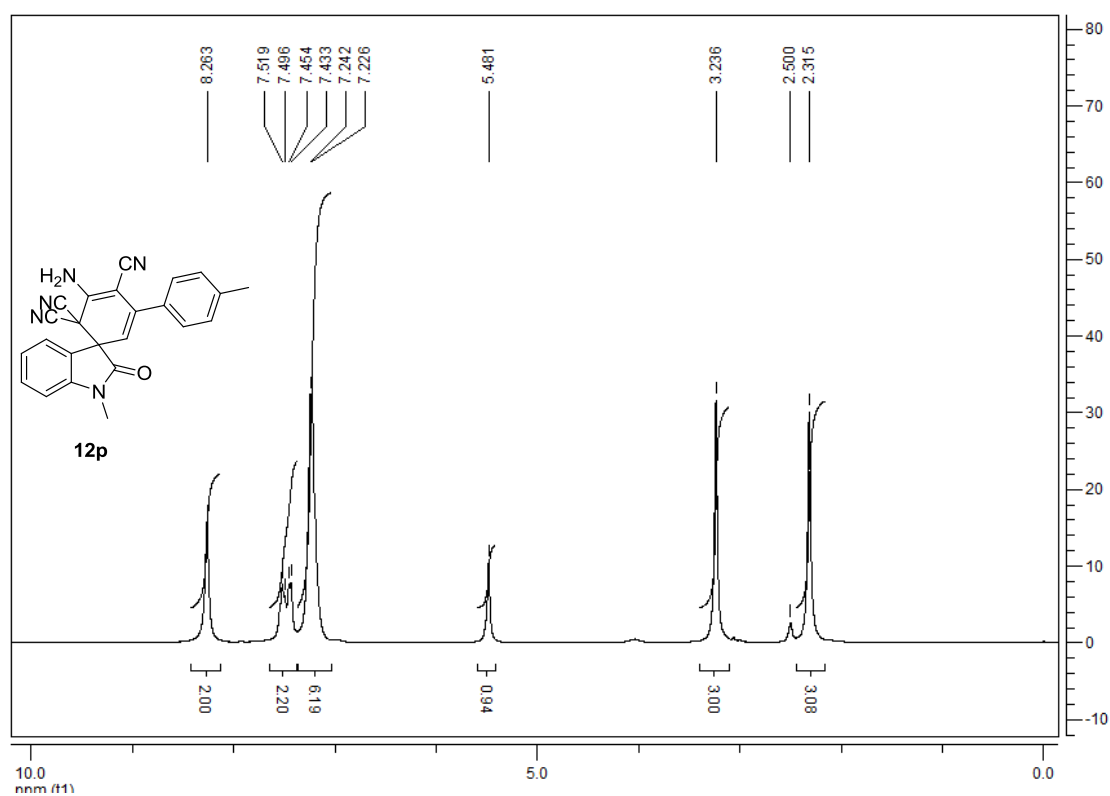
12n



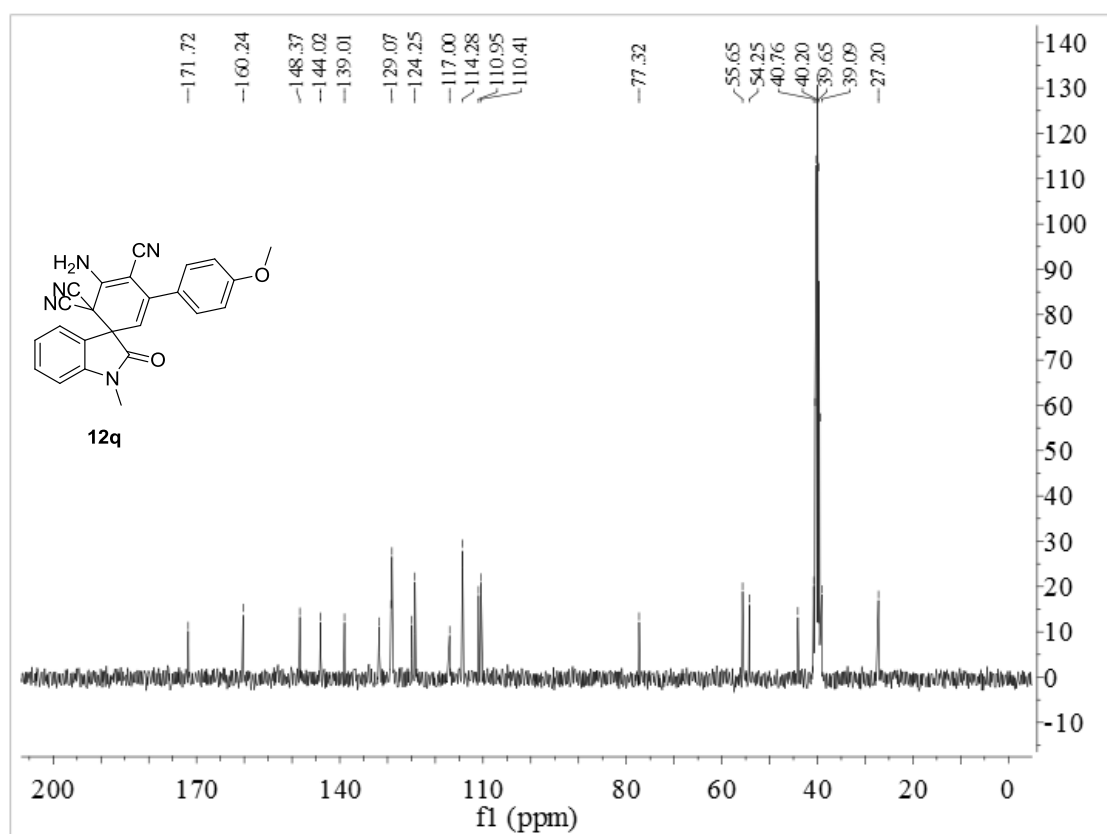
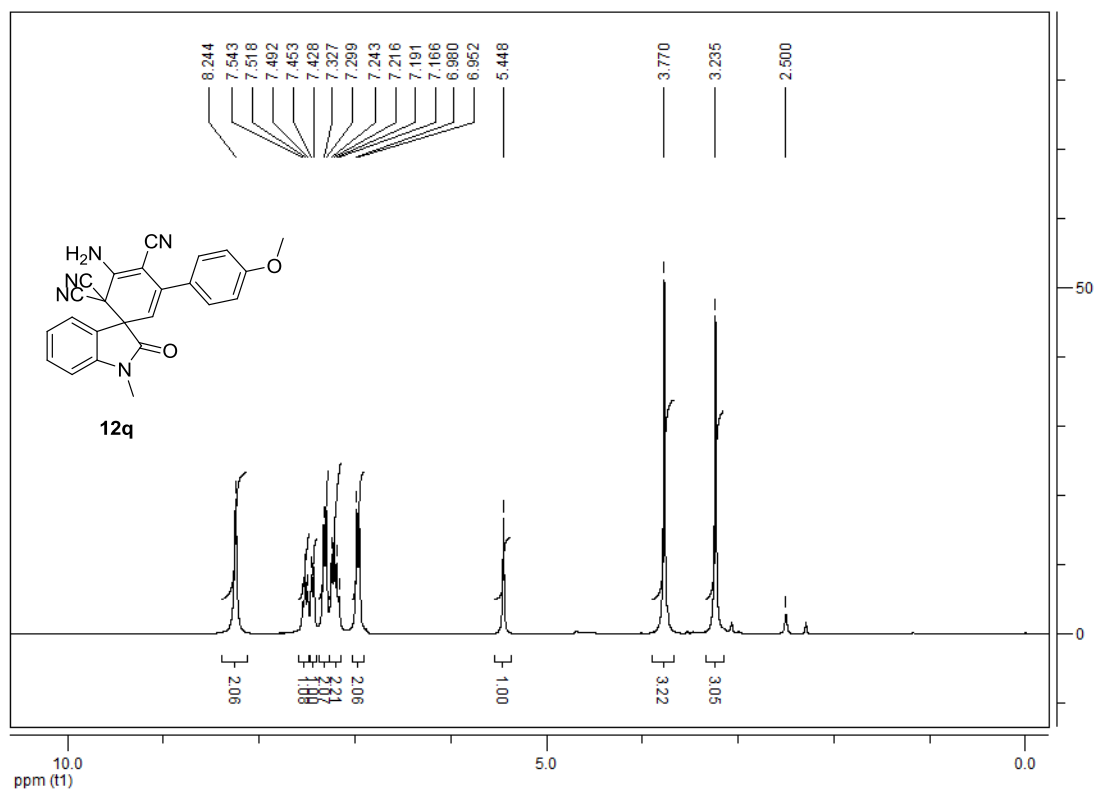
12o



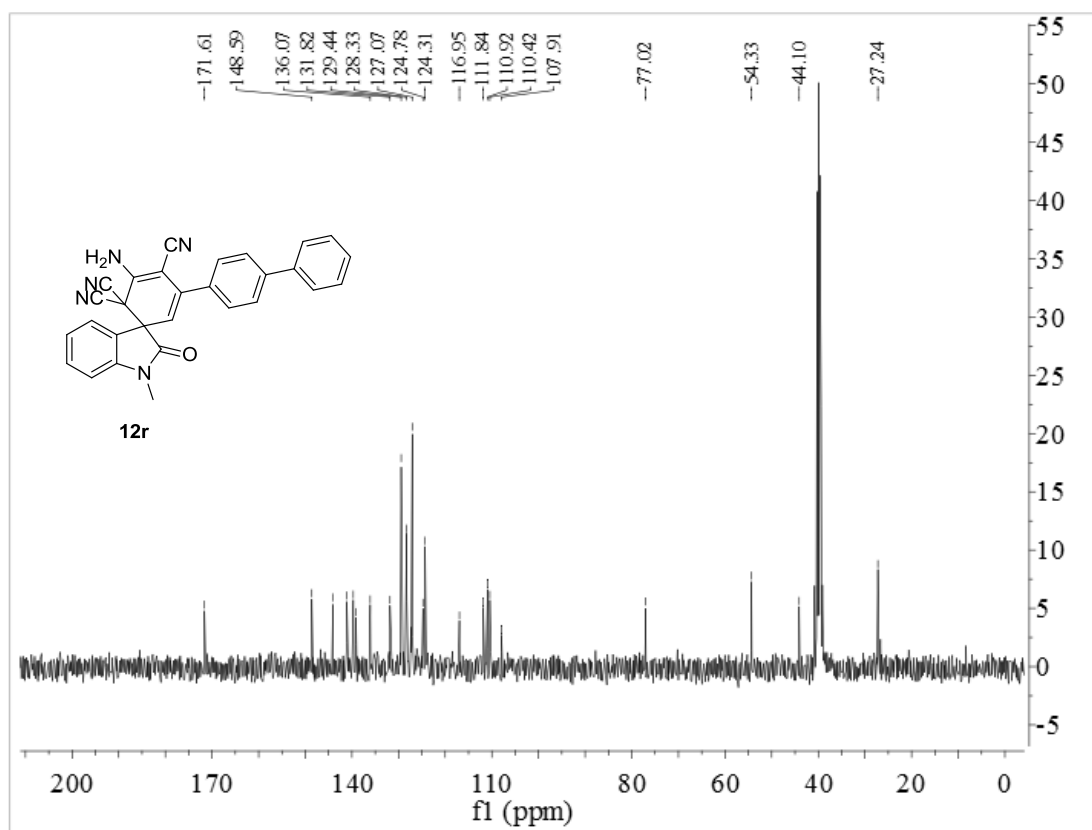
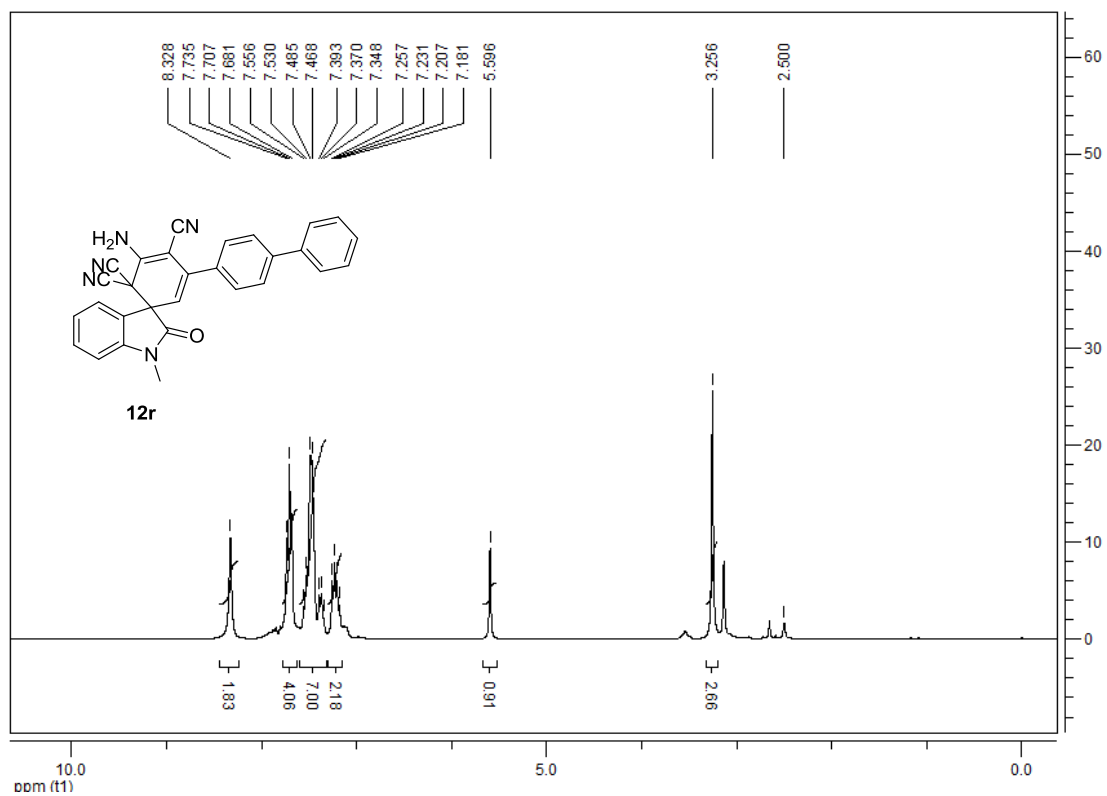
12p



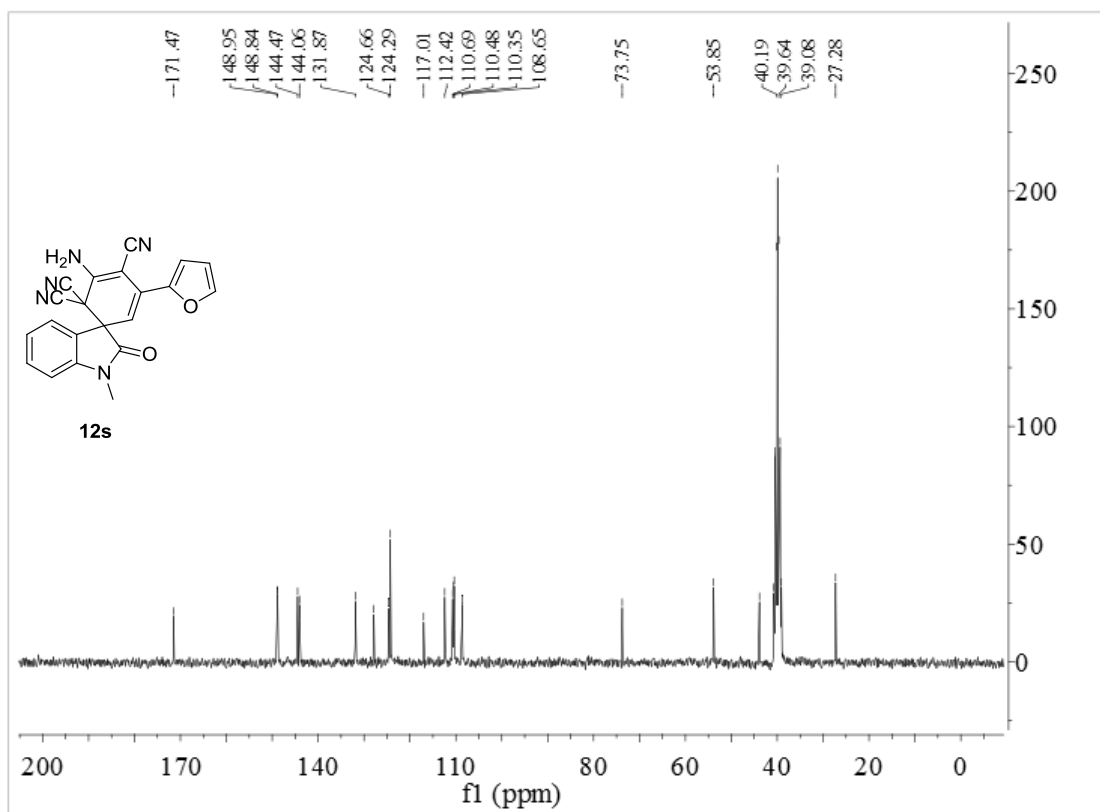
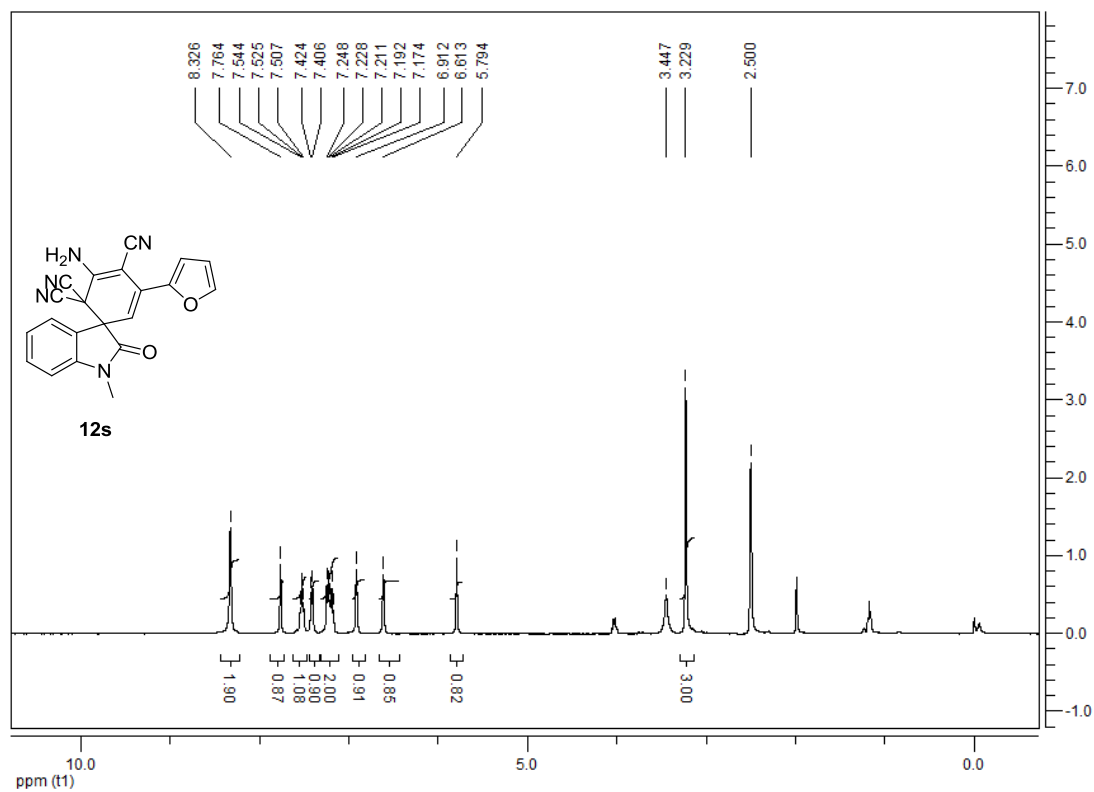
12q



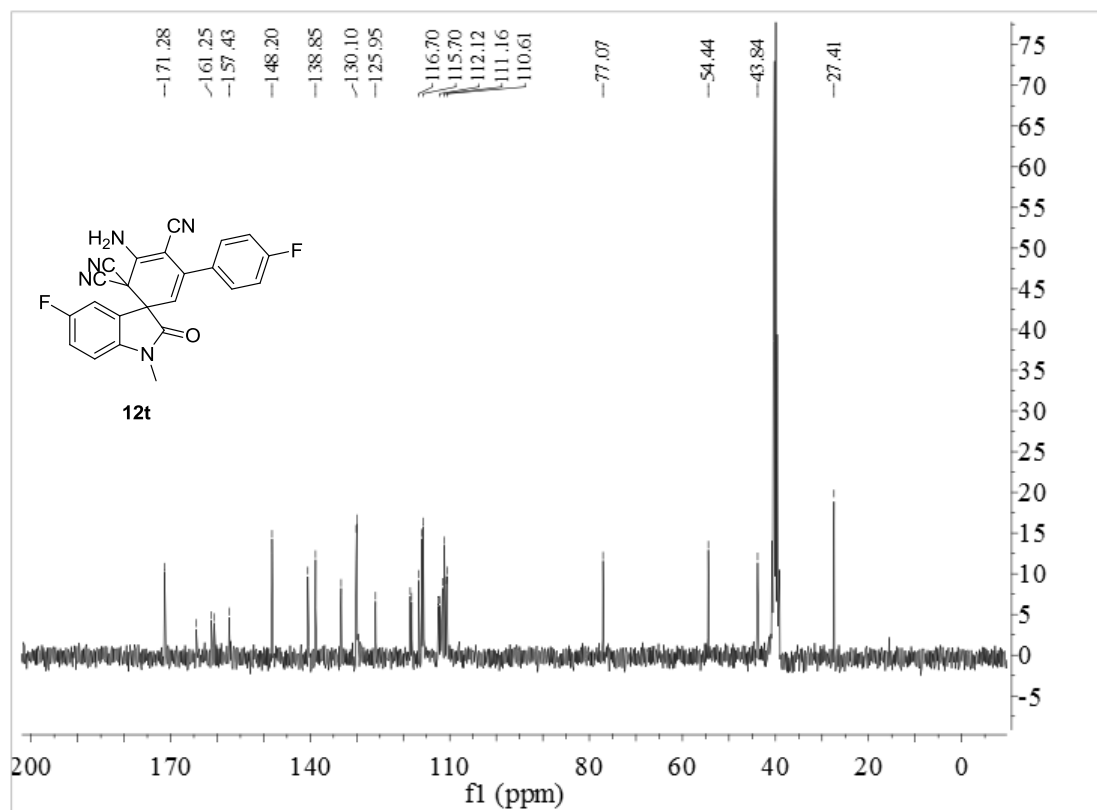
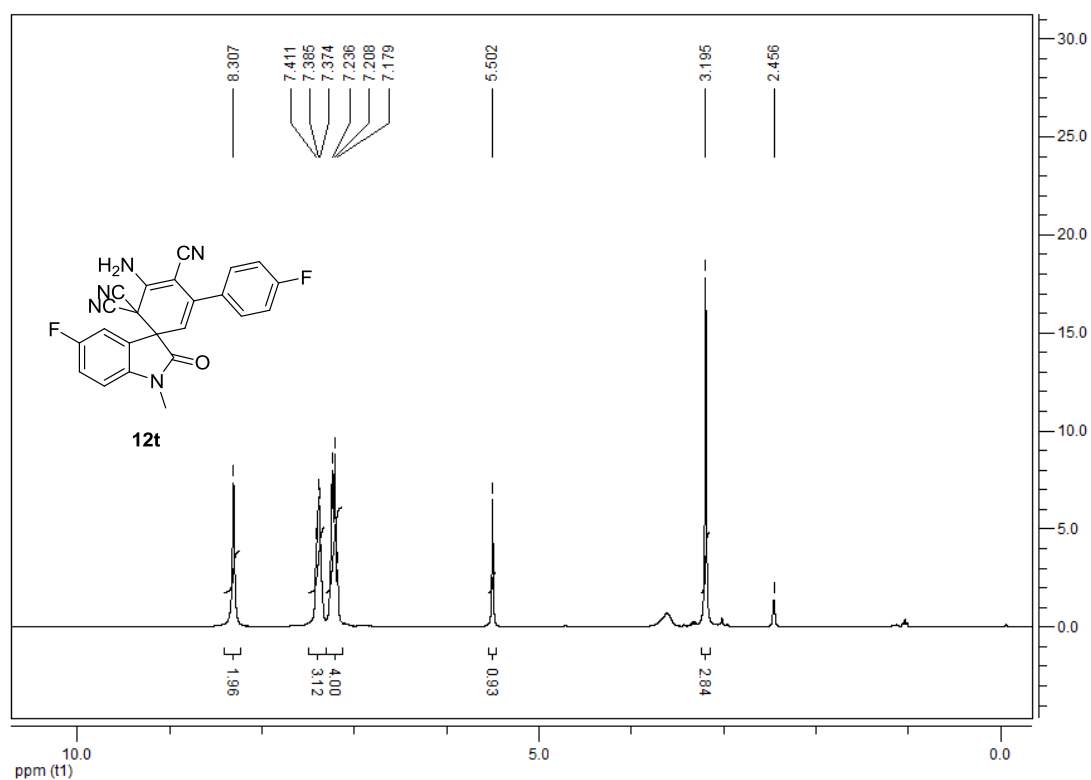
12r



12s

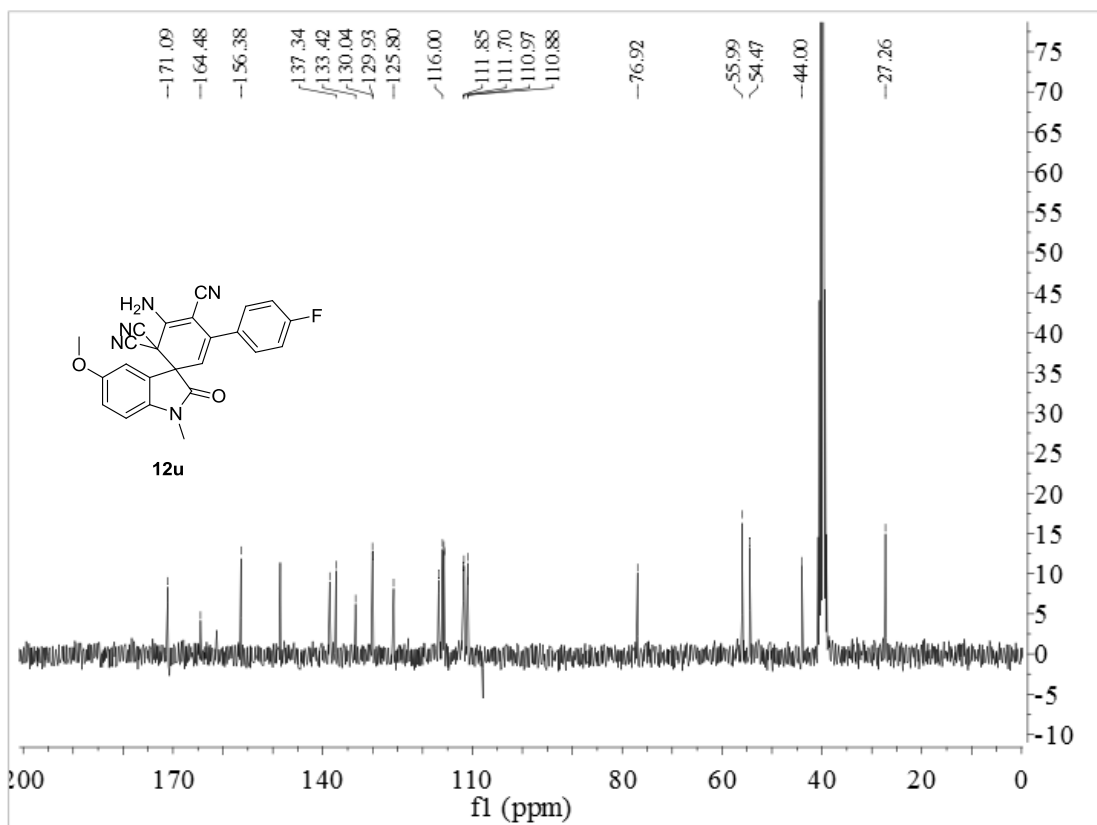
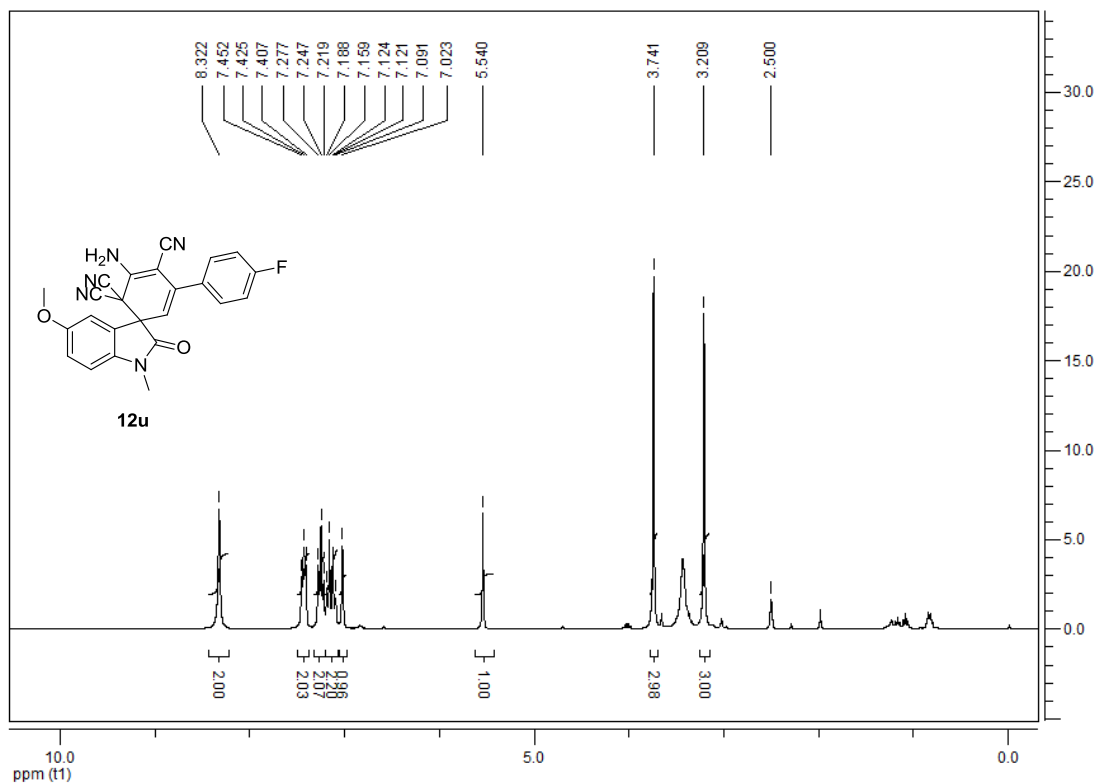


12t

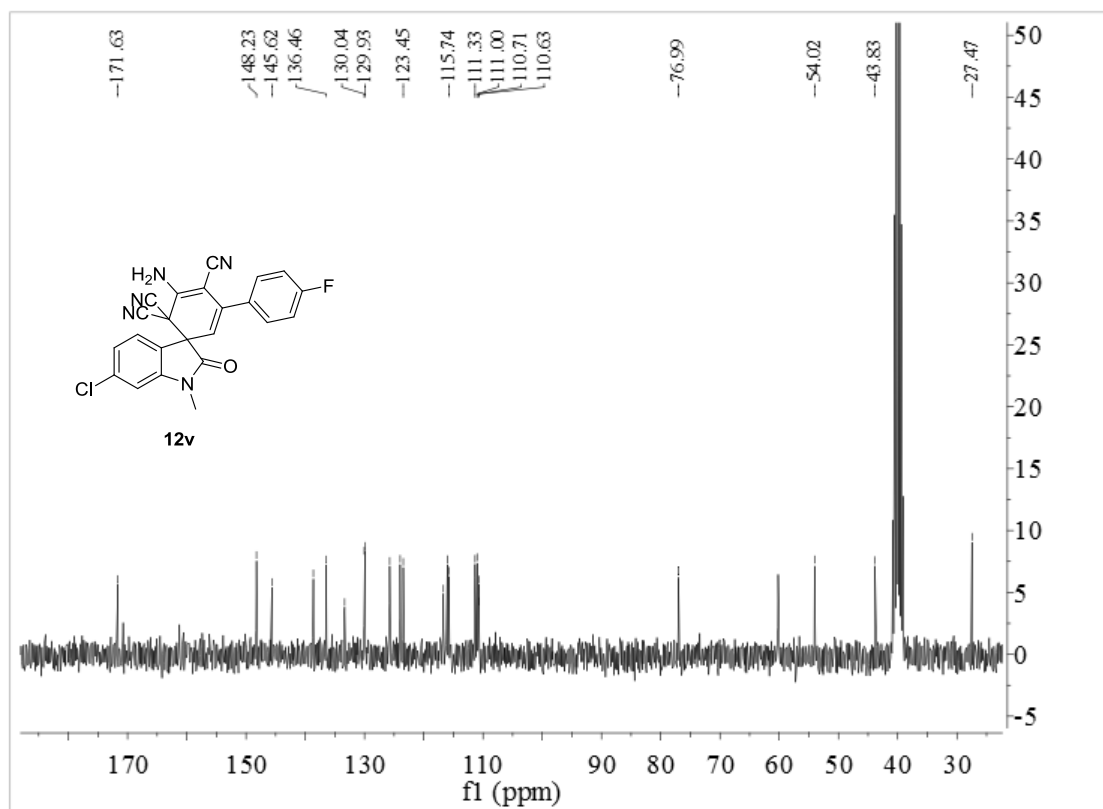
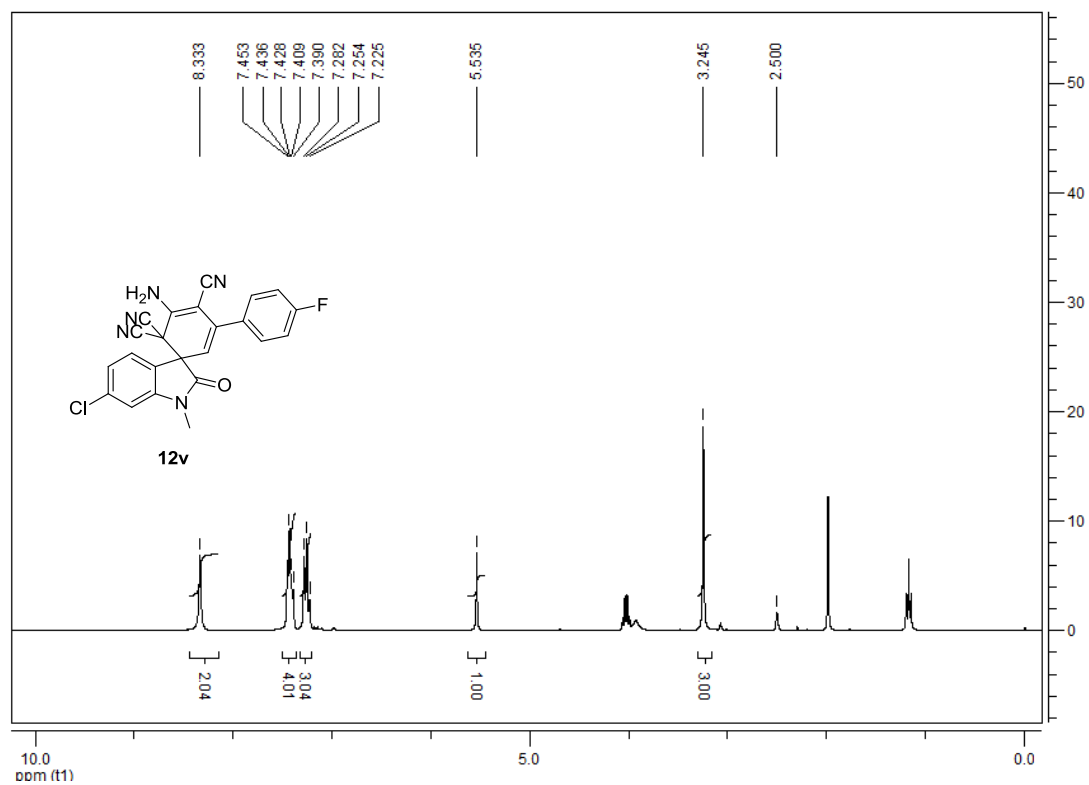




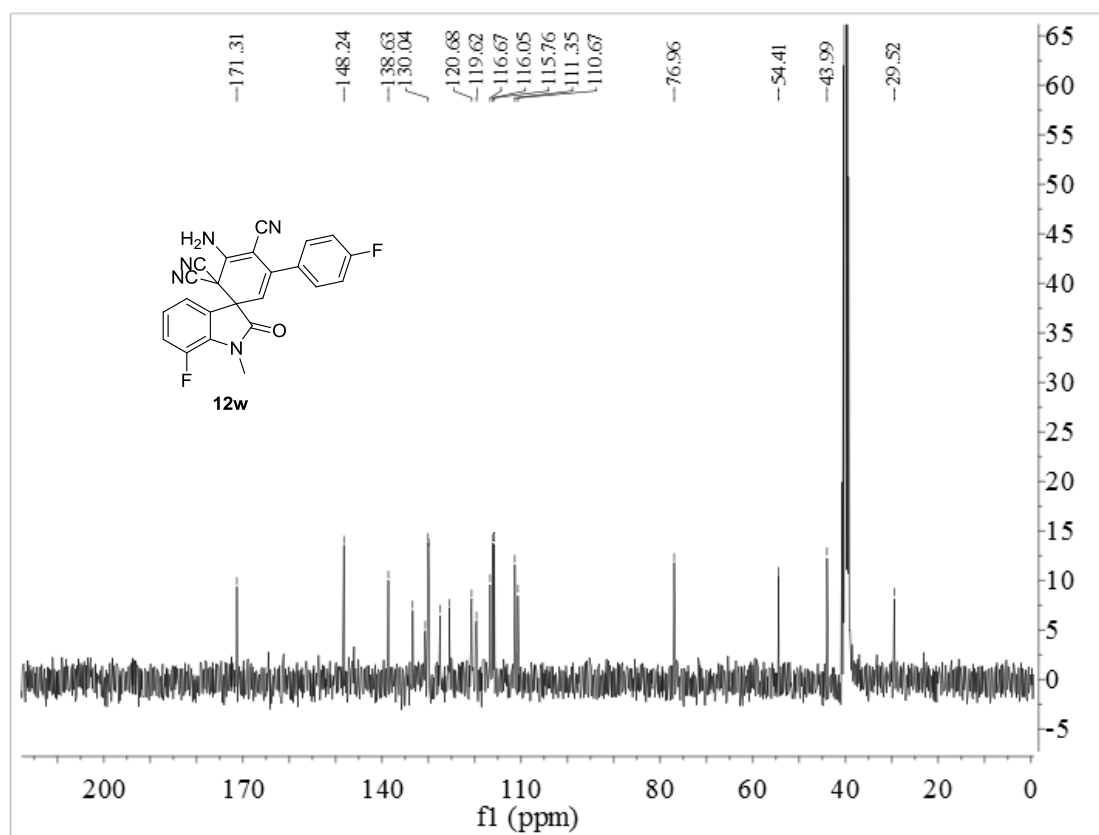
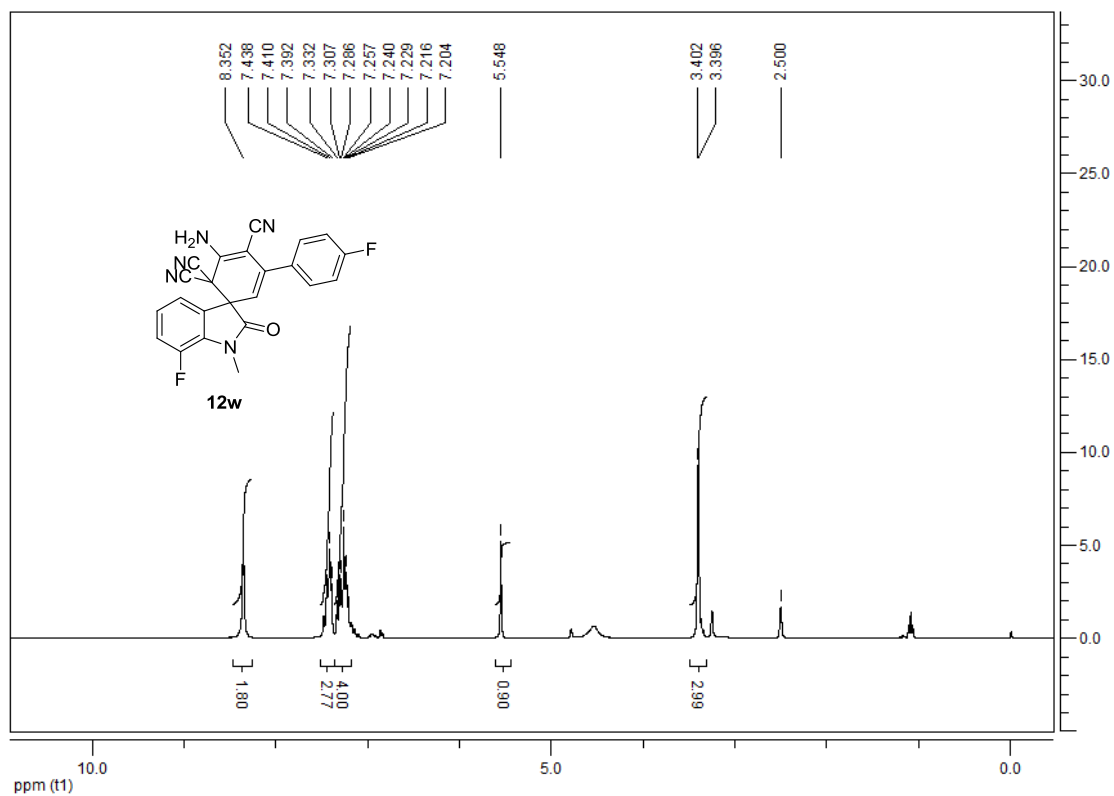
12u



12v

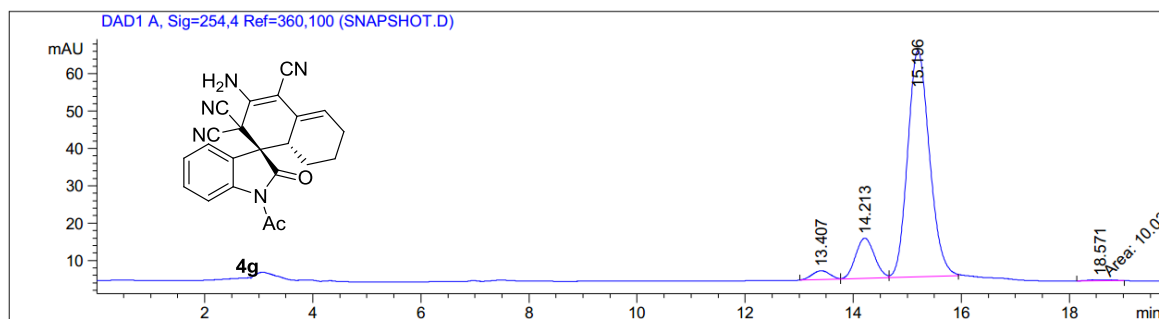
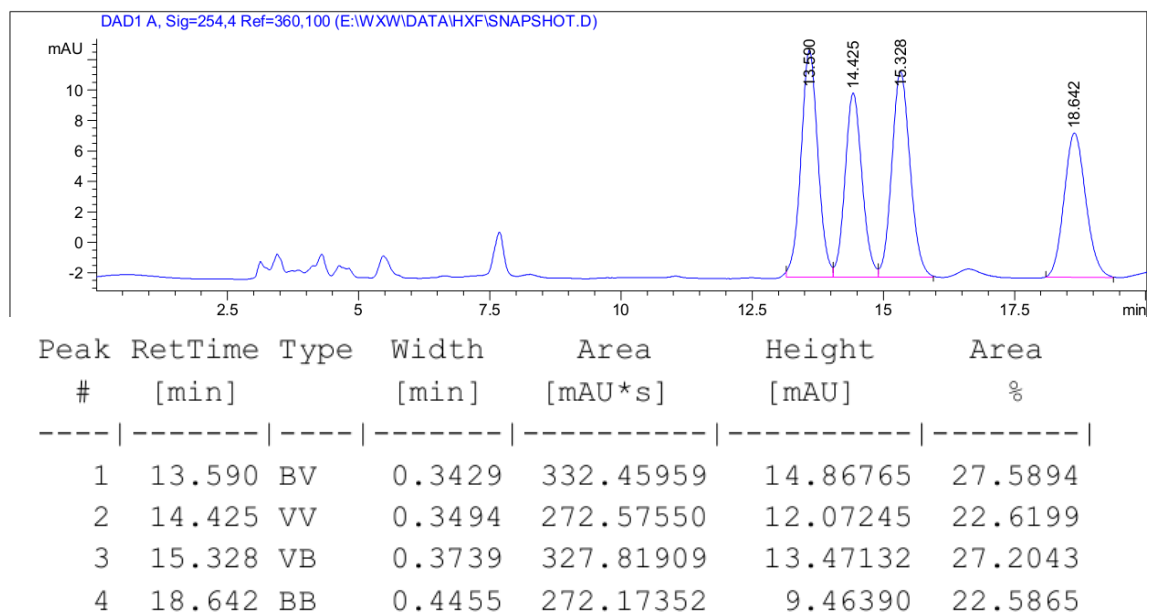


12w

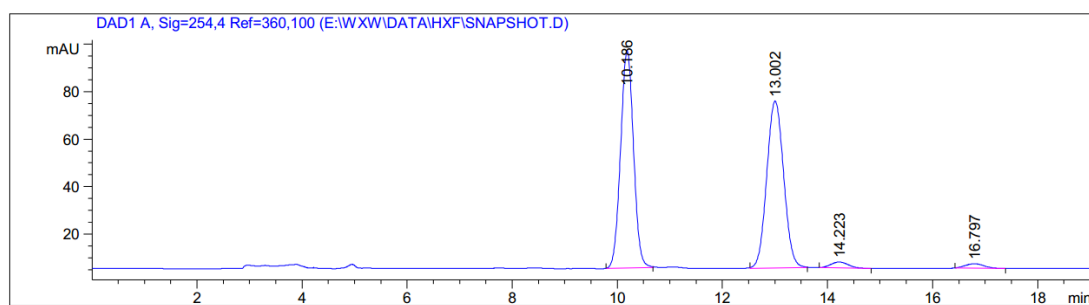


### 3. Copies of HPLC chromatograms

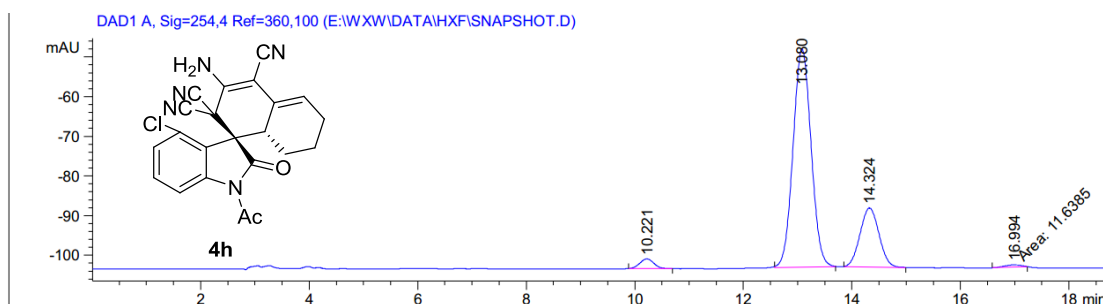
4g



4h

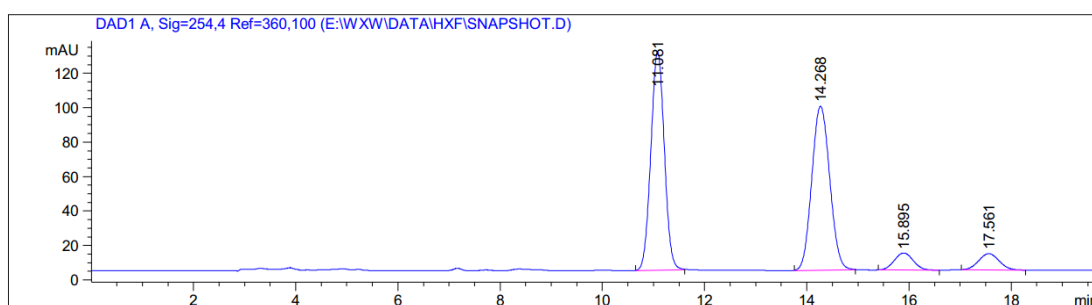


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.186        | BB   | 0.2676      | 1569.15271   | 91.73384     | 48.3530 |
| 2      | 13.002        | BB   | 0.3525      | 1573.36780   | 70.45651     | 48.4829 |
| 3      | 14.223        | BB   | 0.3539      | 56.22044     | 2.48520      | 1.7324  |
| 4      | 16.797        | BB   | 0.3729      | 46.46013     | 1.87639      | 1.4317  |

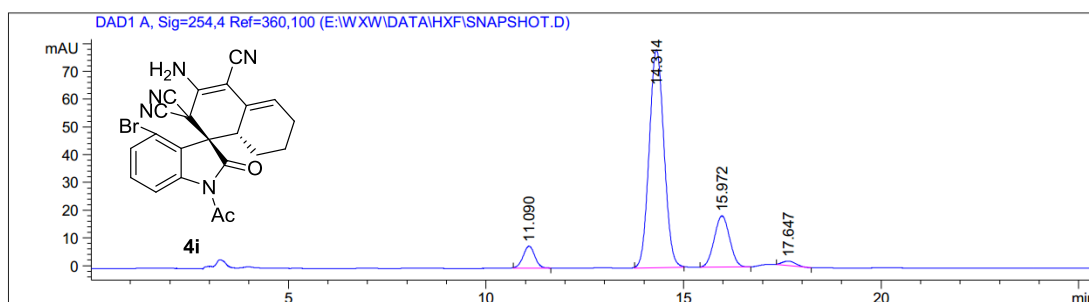


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.221        | BB   | 0.2793      | 44.11460     | 2.45949      | 2.6112  |
| 2      | 13.080        | BB   | 0.3618      | 1272.30225   | 55.01291     | 75.3085 |
| 3      | 14.324        | BB   | 0.3835      | 361.39899    | 14.87186     | 21.3915 |
| 4      | 16.994        | MM   | 0.3471      | 11.63851     | 5.58920e-1   | 0.6889  |

4i

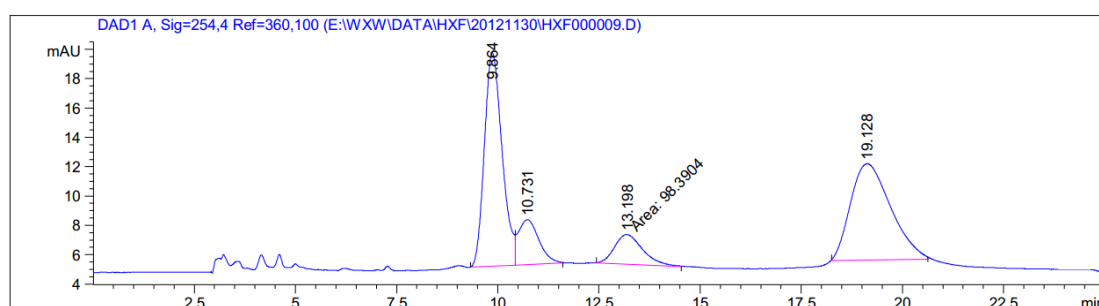


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.081        | BB   | 0.2879      | 2327.26660   | 126.93768    | 44.9386 |
| 2      | 14.268        | BB   | 0.3875      | 2331.64087   | 95.26397     | 45.0230 |
| 3      | 15.895        | BB   | 0.4035      | 254.05875    | 9.89715      | 4.9058  |
| 4      | 17.561        | BB   | 0.4334      | 265.80817    | 9.47123      | 5.1326  |

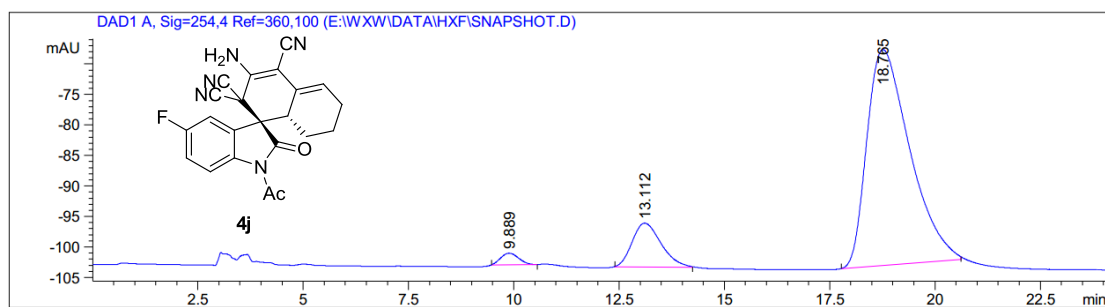


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.090        | BB   | 0.3199      | 160.54993    | 7.87461      | 5.8591  |
| 2      | 14.314        | BB   | 0.4079      | 2043.47192   | 78.43681     | 74.5748 |
| 3      | 15.972        | BB   | 0.4259      | 499.26346    | 18.44005     | 18.2202 |
| 4      | 17.647        | BB   | 0.3522      | 36.87771     | 1.61614      | 1.3458  |

4j

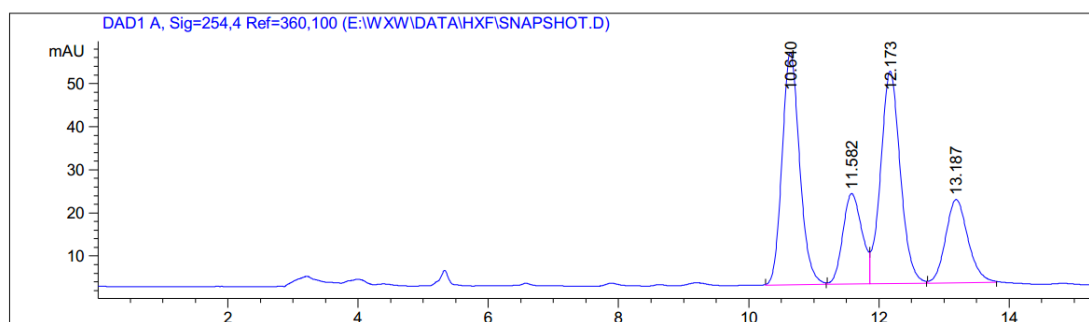


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.864         | BV   | 0.4669      | 442.71375    | 14.55434     | 40.1771 |
| 2      | 10.731        | VB   | 0.4943      | 108.24499    | 3.06273      | 9.8234  |
| 3      | 13.198        | MM   | 0.8102      | 98.39036     | 2.02391      | 8.9291  |
| 4      | 19.128        | BB   | 0.8692      | 452.55609    | 6.57340      | 41.0703 |

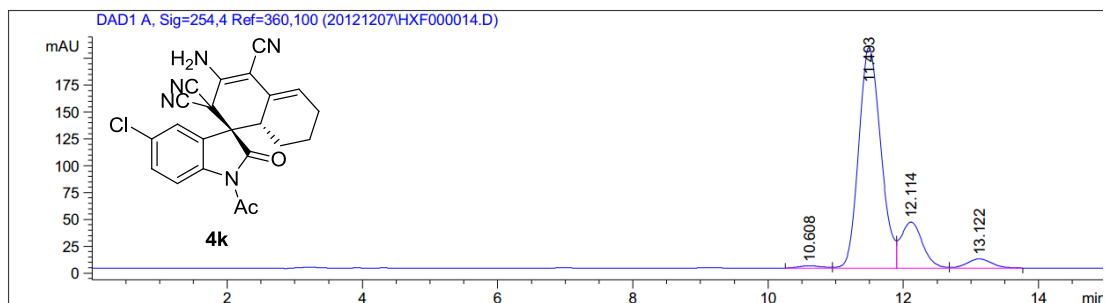


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.889         | BB   | 0.4471      | 57.26731     | 1.92510      | 1.9702  |
| 2      | 13.112        | BB   | 0.6870      | 343.33240    | 7.19092      | 11.8119 |
| 3      | 18.765        | BB   | 1.0484      | 2506.05347   | 35.38046     | 86.2178 |

4k

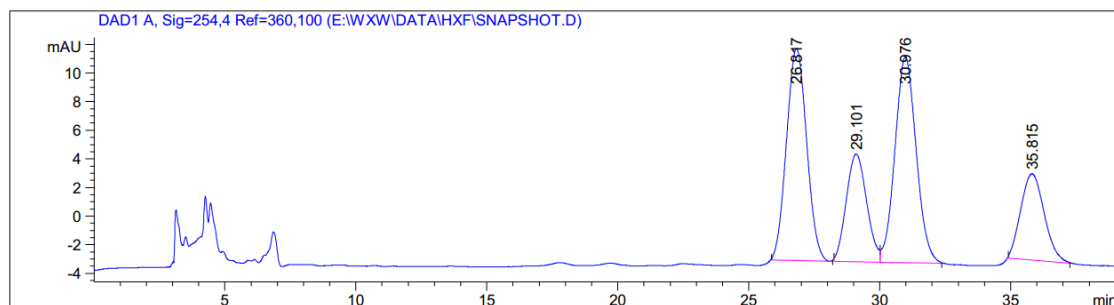


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.640        | BV   | 0.2917      | 2229.25342   | 118.38542    | 35.6181 |
| 2      | 11.582        | VV   | 0.3123      | 836.06299    | 41.27096     | 13.3583 |
| 3      | 12.173        | VB   | 0.3214      | 2276.75073   | 108.24387    | 36.3770 |
| 4      | 13.186        | BB   | 0.3656      | 916.70203    | 38.25476     | 14.6467 |

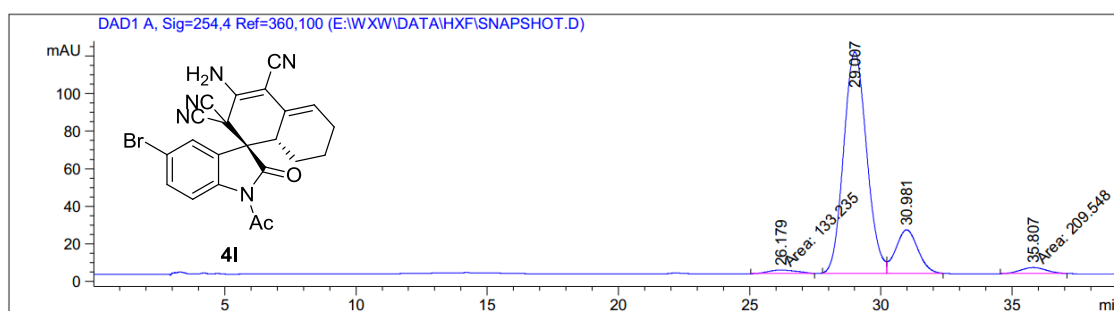


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.608        | BV   | 0.3421      | 49.91293     | 2.17180      | 0.8481  |
| 2      | 11.493        | VV   | 0.3530      | 4663.99512   | 205.30496    | 79.2449 |
| 3      | 12.114        | VB   | 0.3356      | 953.72266    | 42.85936     | 16.2045 |
| 4      | 13.122        | BB   | 0.3928      | 217.91255    | 8.56674      | 3.7025  |

4I



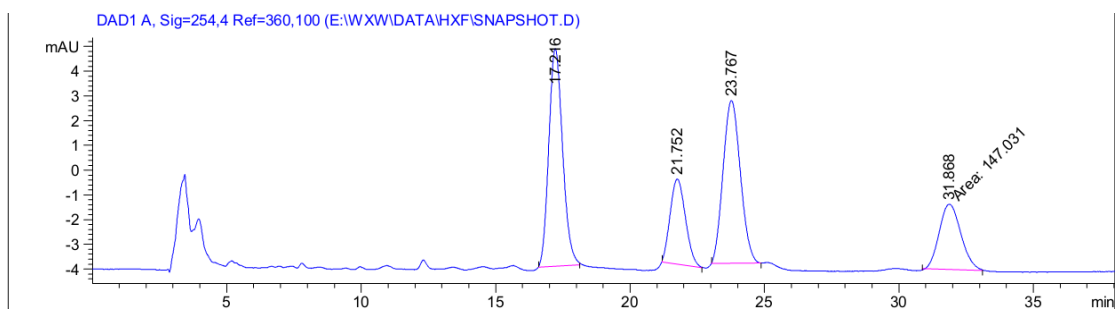
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 26.817        | BB   | 0.8291      | 794.12915    | 14.82060     | 33.2527 |
| 2      | 29.101        | BV   | 0.8073      | 406.57214    | 7.51336      | 17.0245 |
| 3      | 30.976        | VB   | 0.8371      | 812.24756    | 14.37696     | 34.0114 |
| 4      | 35.815        | BB   | 0.8763      | 375.21481    | 6.02715      | 15.7114 |



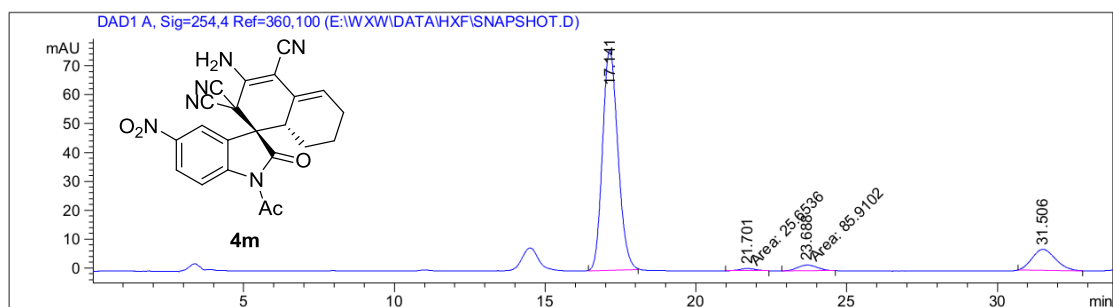
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 26.179        | MM   | 1.2107      | 133.23470    | 1.83405      | 1.4932  |
| 2      | 29.007        | BV   | 0.9581      | 7215.40771   | 117.88414    | 80.8674 |
| 3      | 30.981        | VB   | 0.8940      | 1364.32190   | 23.20246     | 15.2908 |
| 4      | 35.807        | MM   | 1.1027      | 209.54832    | 3.16726      | 2.3485  |



4m

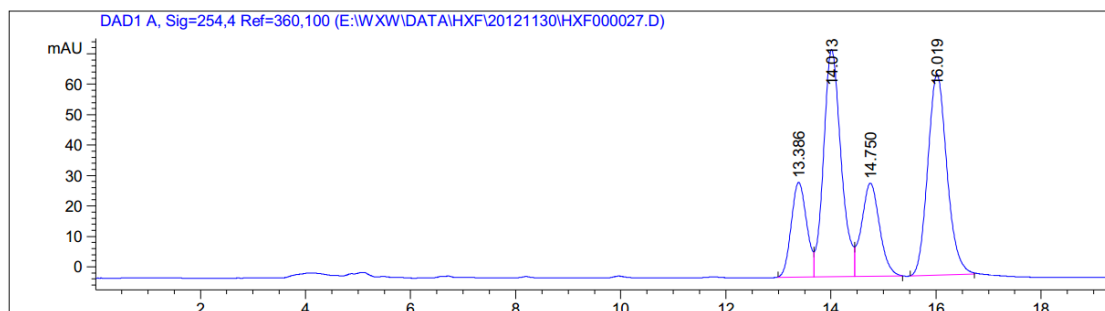


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 17.216        | BB   | 0.5535      | 314.52914    | 8.79003      | 35.2587 |
| 2      | 21.752        | BB   | 0.5523      | 135.73434    | 3.44052      | 15.2158 |
| 3      | 23.767        | BB   | 0.6669      | 294.76761    | 6.57719      | 33.0434 |
| 4      | 31.868        | MM   | 0.9298      | 147.03052    | 2.63550      | 16.4821 |

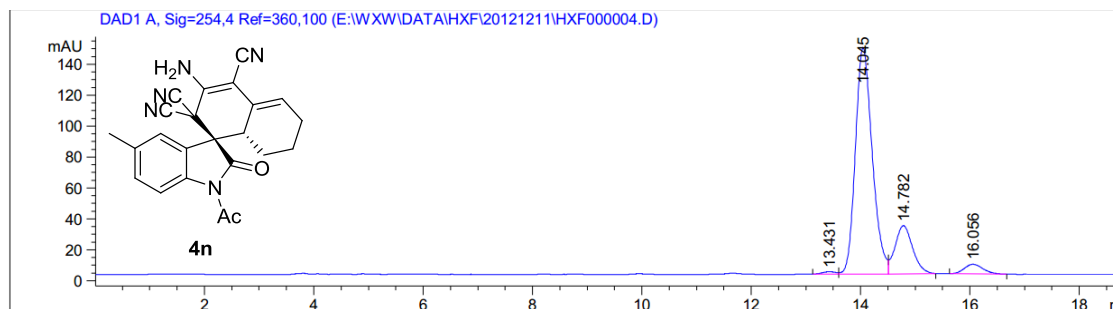


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 17.141        | BB   | 0.5559      | 2717.84155   | 76.23990     | 84.3092 |
| 2      | 21.701        | MM   | 0.6193      | 25.65356     | 6.90435e-1   | 0.7958  |
| 3      | 23.688        | MM   | 0.7318      | 85.91019     | 1.95659      | 2.6650  |
| 4      | 31.506        | BB   | 0.7808      | 394.25241    | 7.24562      | 12.2300 |

4n

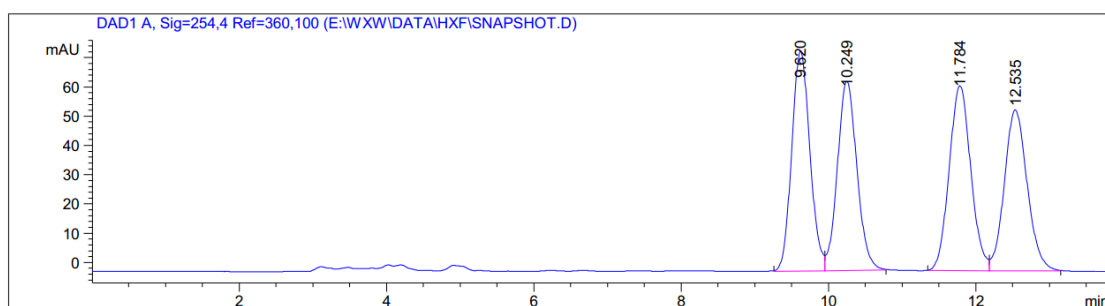


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.386        | BV   | 0.3167      | 638.70233    | 31.21955     | 13.3830 |
| 2      | 14.013        | VV   | 0.3517      | 1726.80676   | 74.69575     | 36.1826 |
| 3      | 14.750        | VB   | 0.3617      | 734.52228    | 30.64265     | 15.3908 |
| 4      | 16.019        | BB   | 0.3895      | 1672.44312   | 66.03322     | 35.0435 |

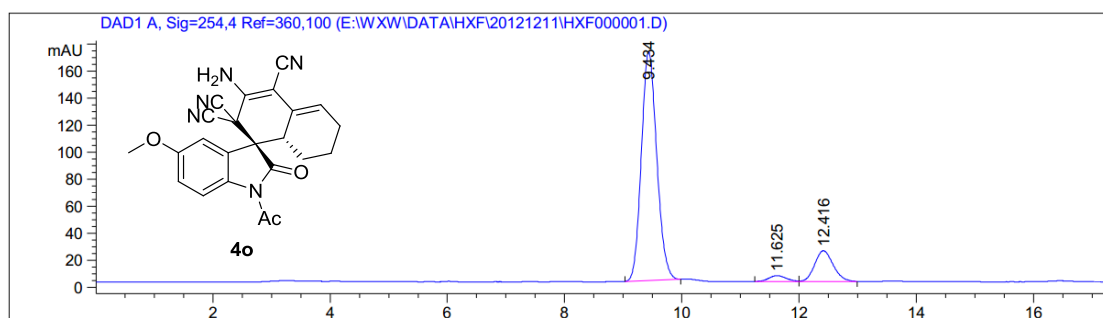


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.431        | BV   | 0.2598      | 25.54179     | 1.50660      | 0.6359  |
| 2      | 14.045        | VV   | 0.3303      | 3139.21558   | 146.30696    | 78.1599 |
| 3      | 14.782        | VB   | 0.3428      | 701.51044    | 31.14771     | 17.4661 |
| 4      | 16.056        | BB   | 0.3698      | 150.13229    | 6.25898      | 3.7380  |

4o

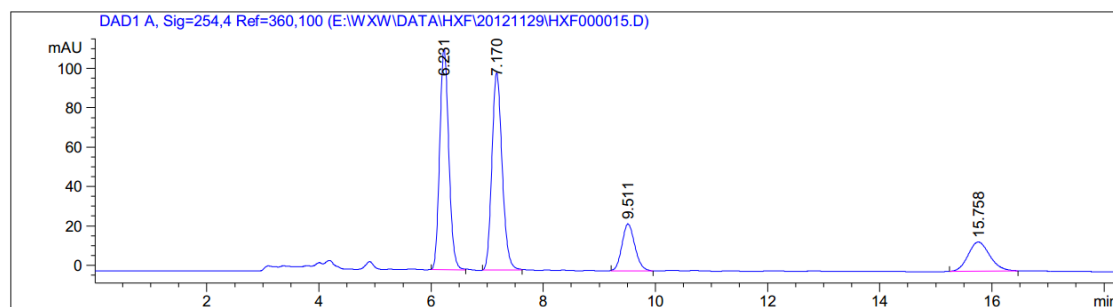


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.620         | BV   | 0.2664      | 1291.09900   | 75.15968     | 25.9632 |
| 2      | 10.249        | VB   | 0.2855      | 1194.38647   | 64.66514     | 24.0184 |
| 3      | 11.784        | BV   | 0.3168      | 1293.47424   | 63.19526     | 26.0109 |
| 4      | 12.535        | VB   | 0.3351      | 1193.84692   | 55.03643     | 24.0075 |

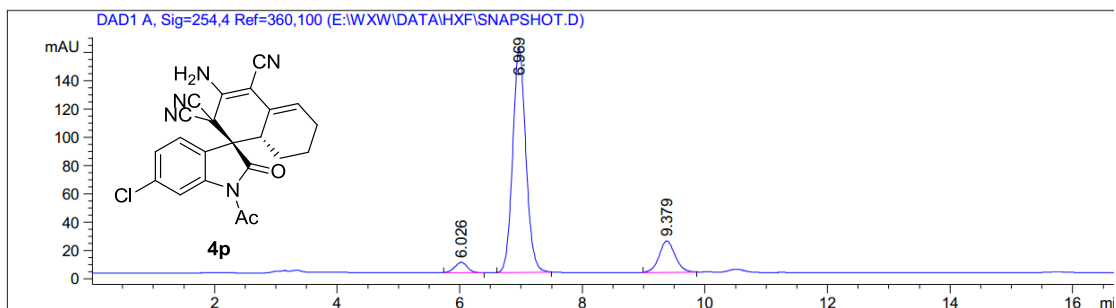


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.434         | BB   | 0.2830      | 3086.44360   | 169.02145    | 83.8510 |
| 2      | 11.625        | BV   | 0.3174      | 89.99201     | 4.34950      | 2.4449  |
| 3      | 12.416        | VB   | 0.3422      | 504.42978    | 22.79395     | 13.7041 |

**4p**

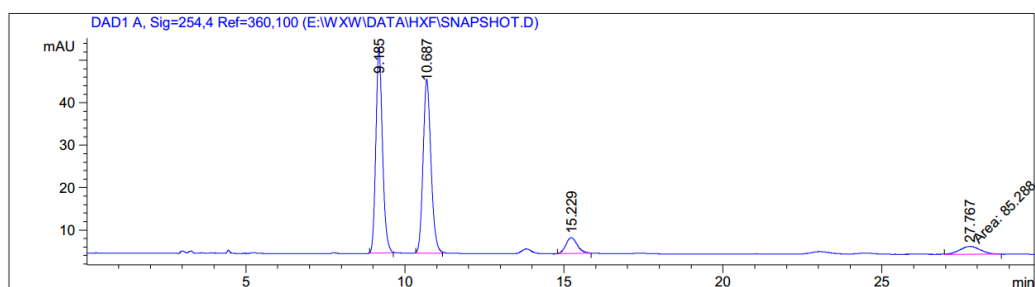


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 6.231         | BB   | 0.1758      | 1265.15027   | 111.95815    | 38.0659 |
| 2      | 7.170         | BB   | 0.1963      | 1273.67590   | 100.21577    | 38.3224 |
| 3      | 9.511         | BB   | 0.2467      | 380.78049    | 23.79464     | 11.4569 |
| 4      | 15.758        | BB   | 0.4181      | 403.97516    | 14.90860     | 12.1548 |

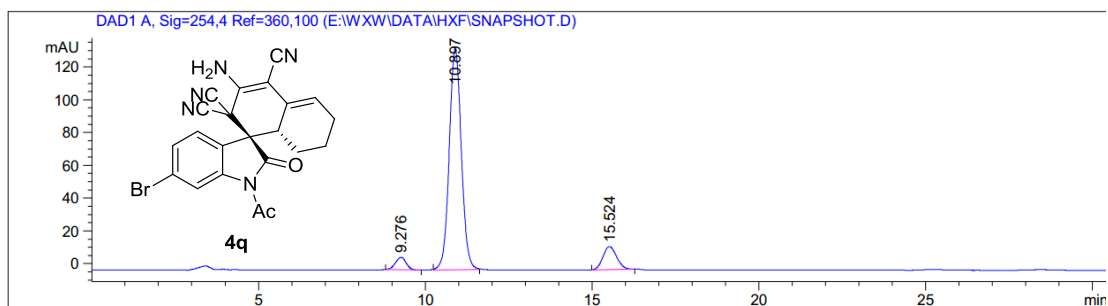


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 6.026         | BB   | 0.2179      | 104.18965    | 7.32623      | 3.6118  |
| 2      | 6.969         | BB   | 0.2288      | 2377.09912   | 158.63734    | 82.4038 |
| 3      | 9.379         | BB   | 0.2759      | 403.40683    | 22.21362     | 13.9844 |

4q

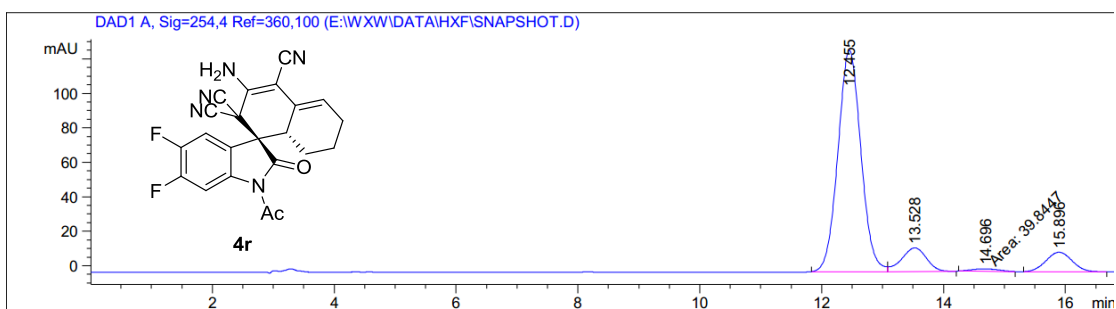
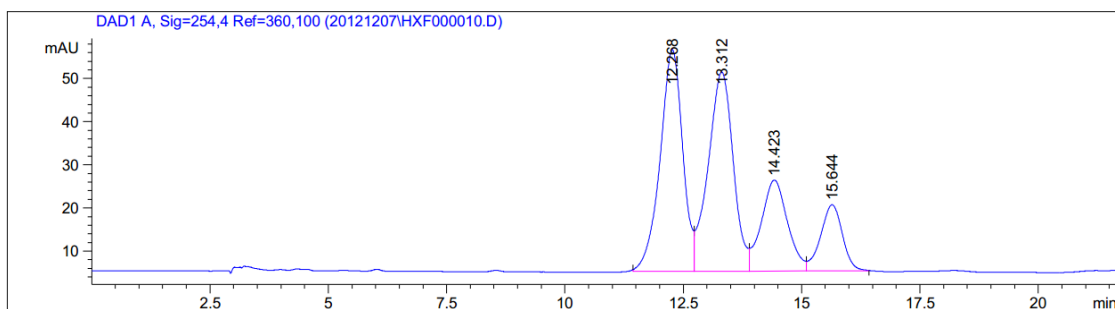


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.185         | BB   | 0.2247      | 706.61017    | 48.30457     | 44.3686 |
| 2      | 10.687        | BB   | 0.2674      | 707.90161    | 41.00079     | 44.4497 |
| 3      | 15.229        | BB   | 0.3856      | 92.79059     | 3.71285      | 5.8264  |
| 4      | 27.767        | MM   | 0.7588      | 85.28800     | 1.87325      | 5.3553  |

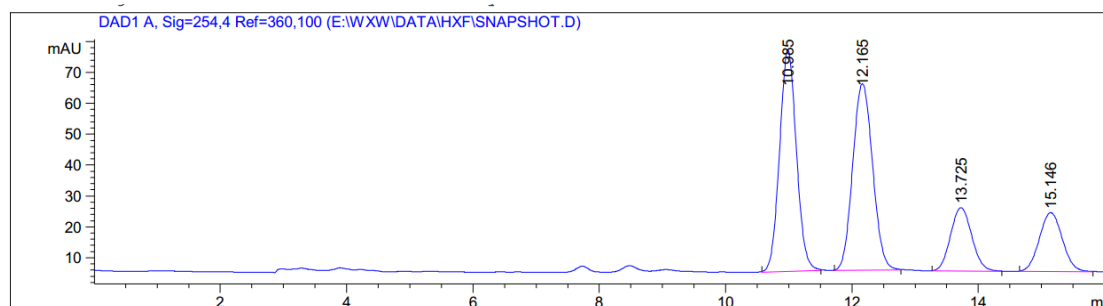


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.276         | BB   | 0.3522      | 170.34120    | 7.57822      | 4.2970  |
| 2      | 10.897        | BB   | 0.3934      | 3388.59326   | 134.72458    | 85.4797 |
| 3      | 15.524        | BB   | 0.4483      | 405.27582    | 14.14569     | 10.2234 |

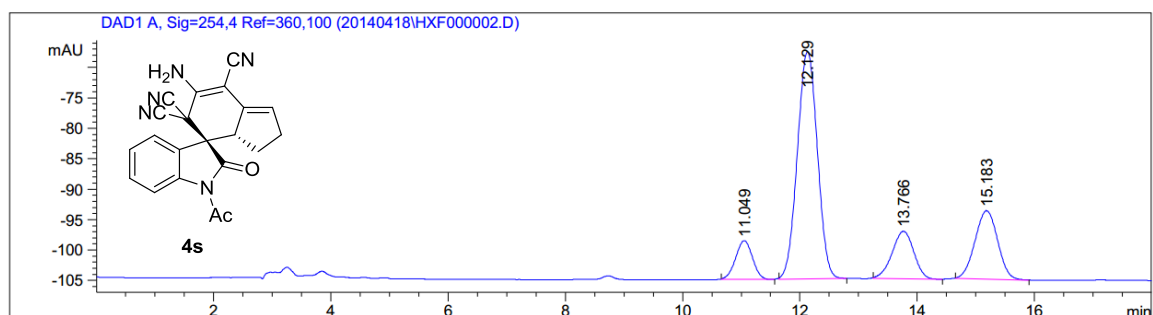
4r



4s

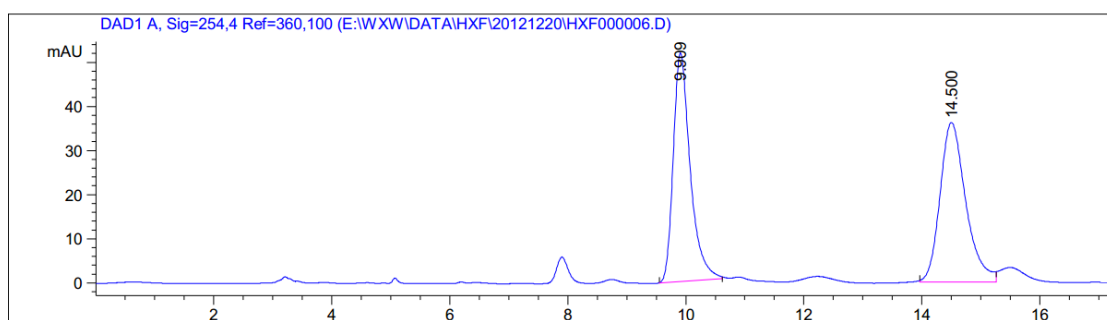


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.985        | BB   | 0.2885      | 1329.35938   | 71.62678     | 36.7923 |
| 2      | 12.165        | BB   | 0.3455      | 1321.72632   | 60.34790     | 36.5810 |
| 3      | 13.725        | BB   | 0.3693      | 480.65448    | 20.51722     | 13.3029 |
| 4      | 15.146        | BB   | 0.3948      | 481.40497    | 19.05180     | 13.3237 |

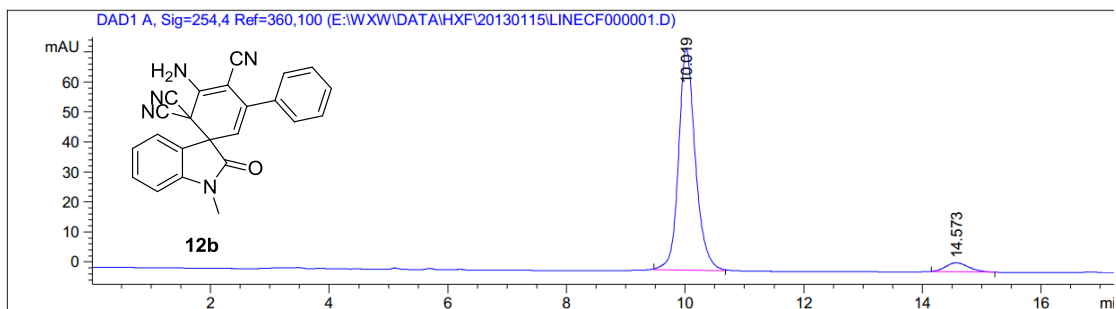


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.049        | BB   | 0.3070      | 127.07534    | 6.36256      | 8.3875  |
| 2      | 12.129        | BB   | 0.3770      | 886.11456    | 37.32615     | 58.4872 |
| 3      | 13.766        | BB   | 0.3930      | 199.34045    | 7.77706      | 13.1573 |
| 4      | 15.183        | BB   | 0.4222      | 302.52649    | 11.23250     | 19.9680 |

12b

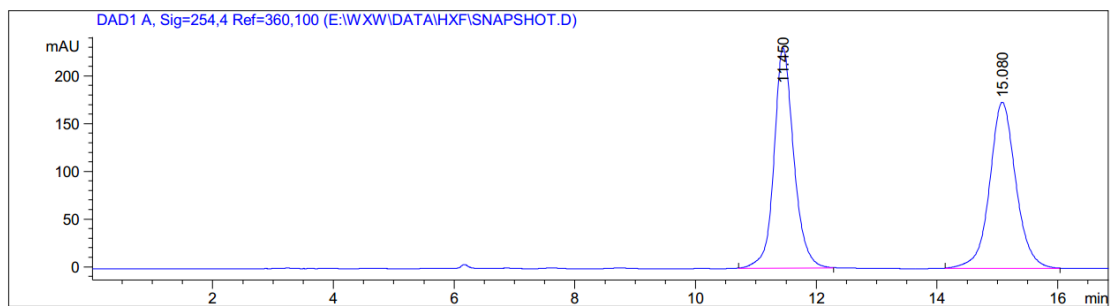


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.909         | BB   | 0.3007      | 1032.80383   | 51.77398     | 48.5789 |
| 2      | 14.500        | BB   | 0.4591      | 1093.22803   | 36.12533     | 51.4211 |

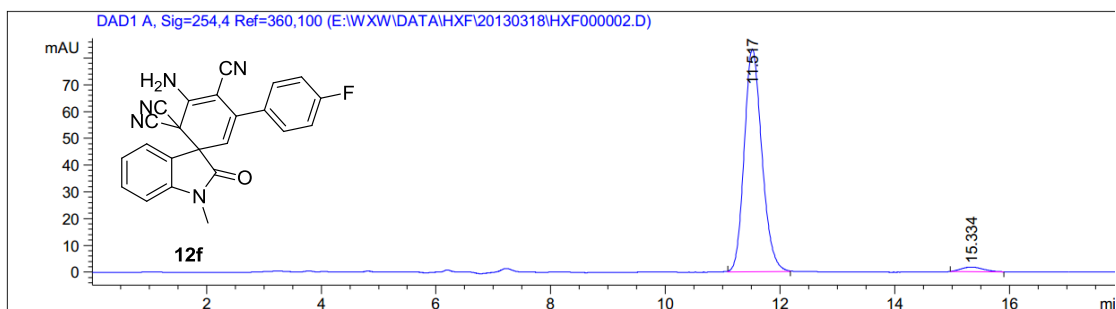


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.019        | BB   | 0.2945      | 1449.85181   | 74.01477     | 94.6742 |
| 2      | 14.573        | BB   | 0.4119      | 81.56068     | 3.01240      | 5.3258  |

## 12f

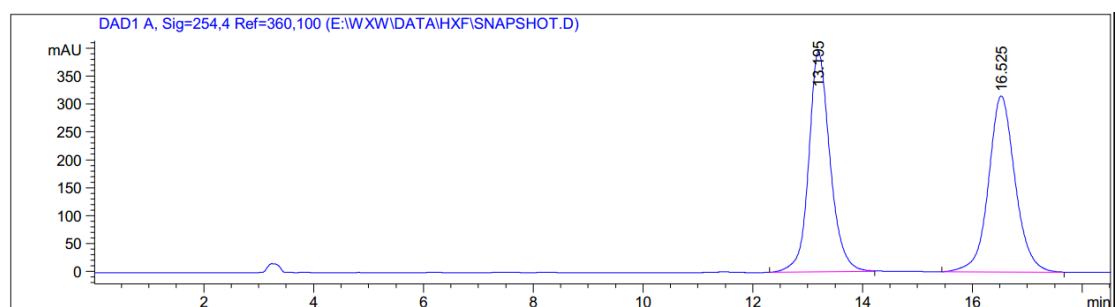


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.450        | BB   | 0.3435      | 5254.80029   | 230.89517    | 49.9312 |
| 2      | 15.080        | BB   | 0.4587      | 5269.28174   | 174.28238    | 50.0688 |

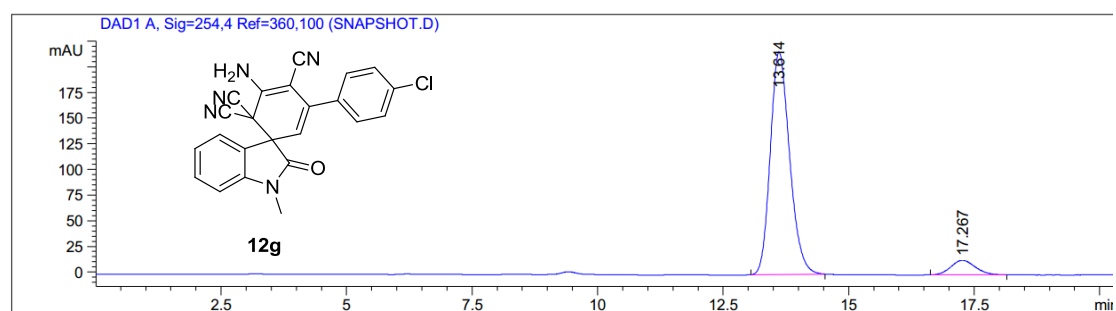


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.517        | BB   | 0.3298      | 1779.88184   | 83.11712     | 97.4202 |
| 2      | 15.334        | BB   | 0.3791      | 47.13292     | 1.74516      | 2.5798  |

12g

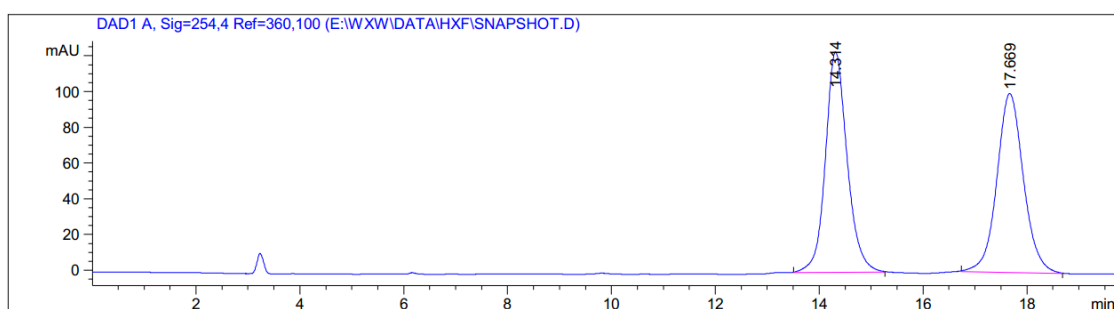


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.195        | BB   | 0.4069      | 1.06469e4    | 394.47754    | 49.9882 |
| 2      | 16.525        | BB   | 0.5119      | 1.06520e4    | 315.53146    | 50.0118 |



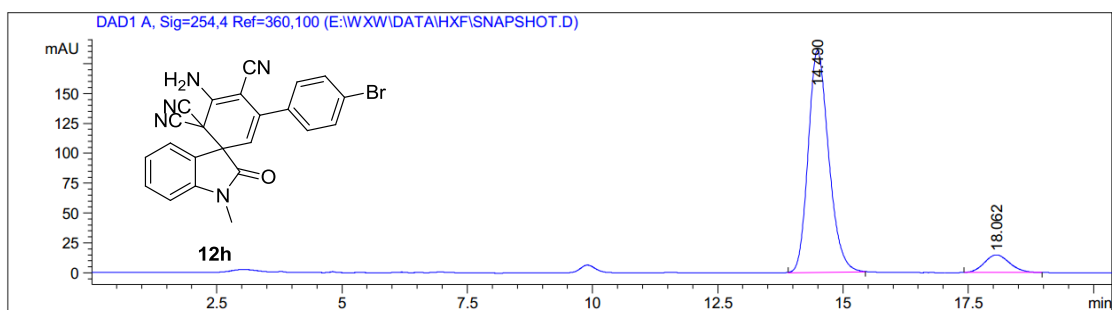
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.614        | BB   | 0.4134      | 5827.83545   | 216.96138    | 92.3838 |
| 2      | 17.267        | BB   | 0.5252      | 480.44940    | 14.18441     | 7.6162  |

12h

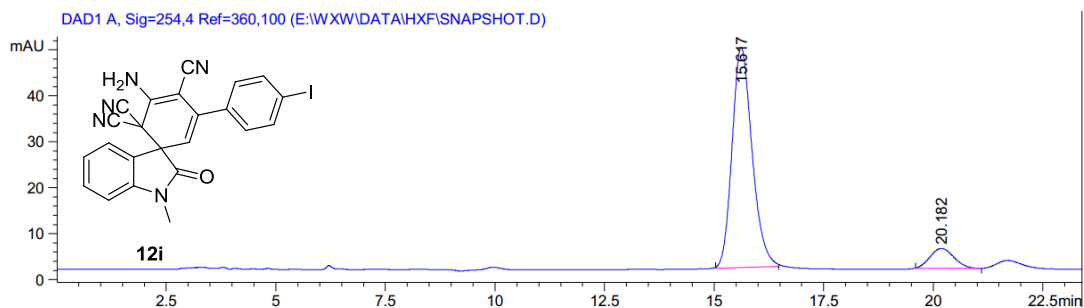
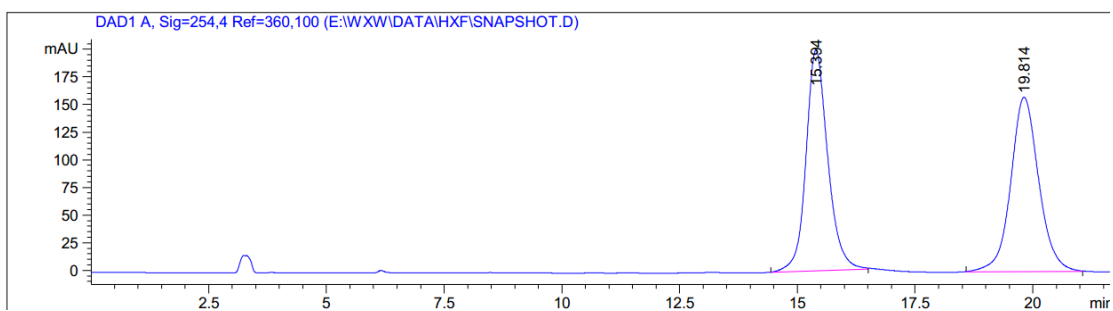


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 14.314        | BB   | 0.4428      | 3603.44238   | 123.35400    | 50.1961 |
| 2      | 17.669        | BB   | 0.5460      | 3575.29175   | 100.26376    | 49.8039 |



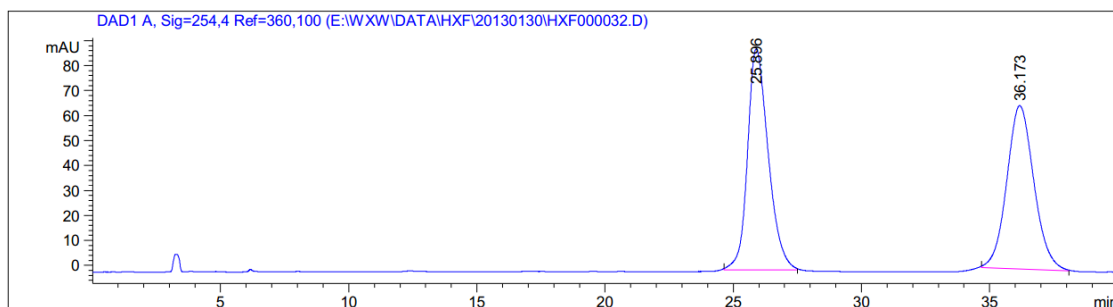


12i

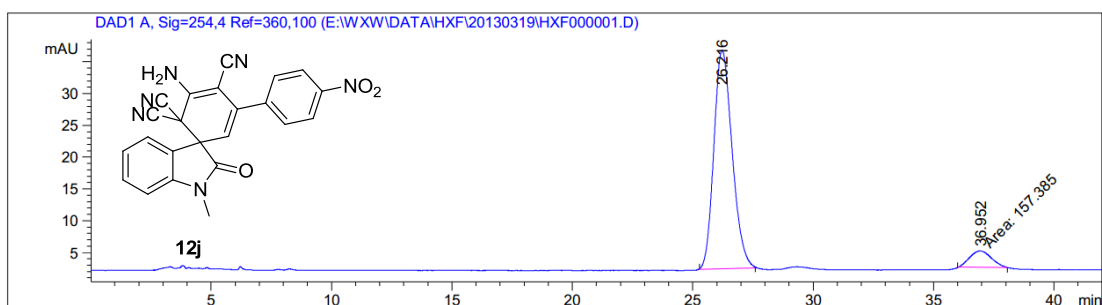


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 15.617        | BB   | 0.4880      | 1517.67578   | 47.85563     | 90.3147 |
| 2      | 20.182        | BB   | 0.5582      | 162.75543    | 4.33344      | 9.6853  |

12j

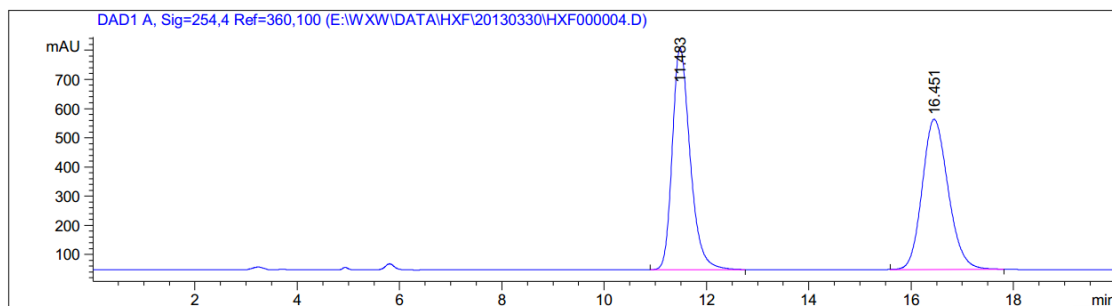


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 25.896        | BB   | 0.8580      | 4977.11084   | 88.52177     | 50.8276 |
| 2      | 36.173        | BB   | 1.1181      | 4815.03760   | 65.46696     | 49.1724 |

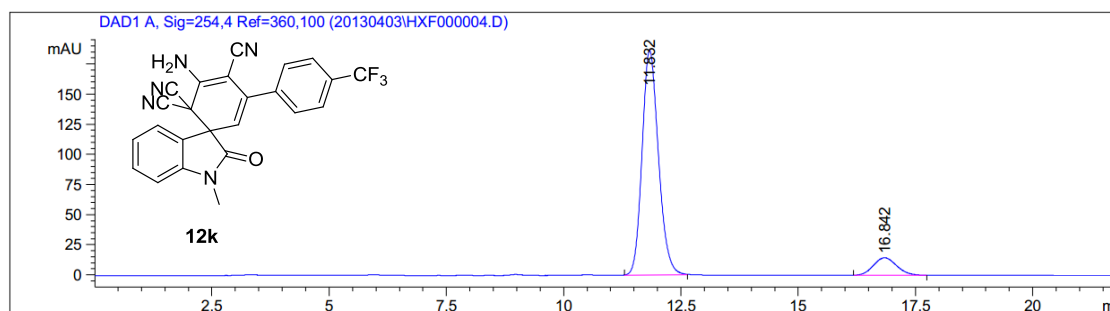


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 26.216        | BB   | 0.8026      | 1818.04688   | 34.40192     | 92.0329 |
| 2      | 36.952        | MM   | 1.0304      | 157.38496    | 2.54563      | 7.9671  |

12k

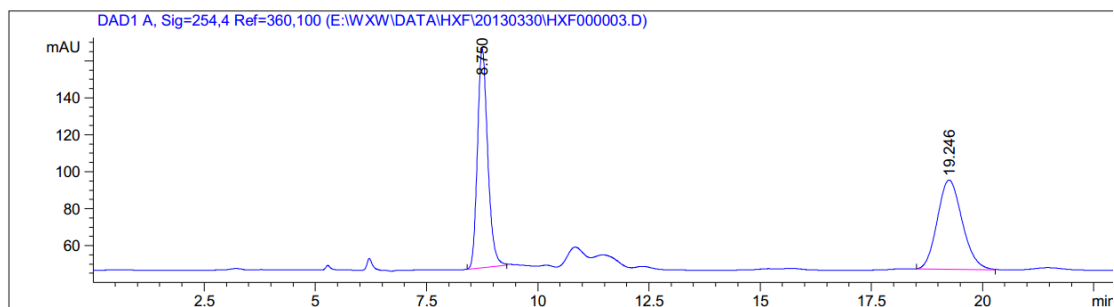


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.483        | BB   | 0.3737      | 1.85069e4    | 761.16736    | 50.4152 |
| 2      | 16.451        | BB   | 0.5459      | 1.82021e4    | 515.52484    | 49.5848 |

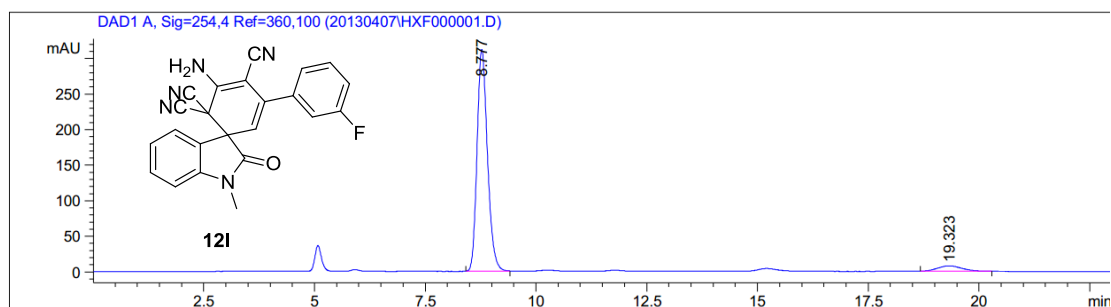


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.832        | BB   | 0.3726      | 4515.53467   | 186.43434    | 89.9632 |
| 2      | 16.842        | BB   | 0.5372      | 503.78003    | 14.57802     | 10.0368 |

12I

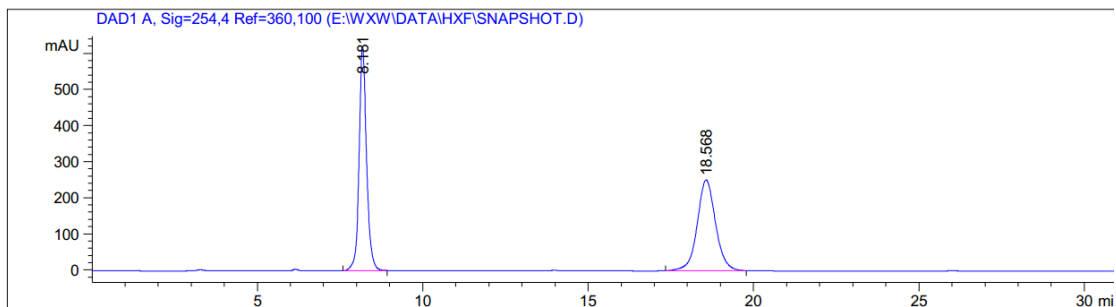


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 8.750         | BB   | 0.2449      | 1900.57373   | 118.65050    | 50.2817 |
| 2      | 19.246        | BB   | 0.5993      | 1879.27881   | 48.37136     | 49.7183 |

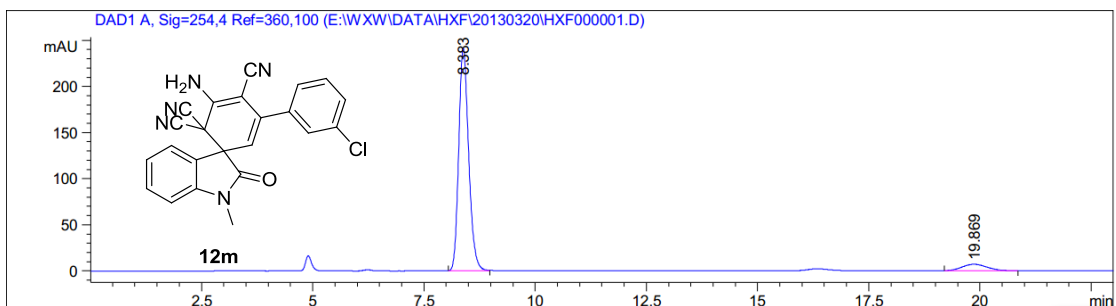


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 8.777         | BB   | 0.2507      | 5097.74219   | 311.81641    | 94.5367 |
| 2      | 19.323        | BB   | 0.5882      | 294.59995    | 7.63368      | 5.4633  |

## 12m

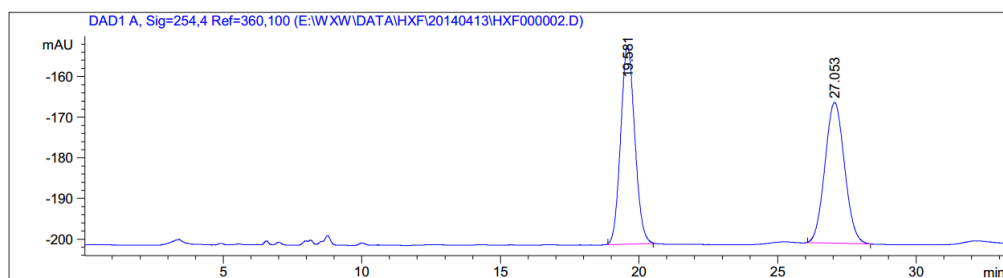


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 8.181         | BB   | 0.2356      | 9753.59570   | 619.91107    | 50.0775 |
| 2      | 18.568        | BB   | 0.5865      | 9723.42578   | 251.78671    | 49.9225 |

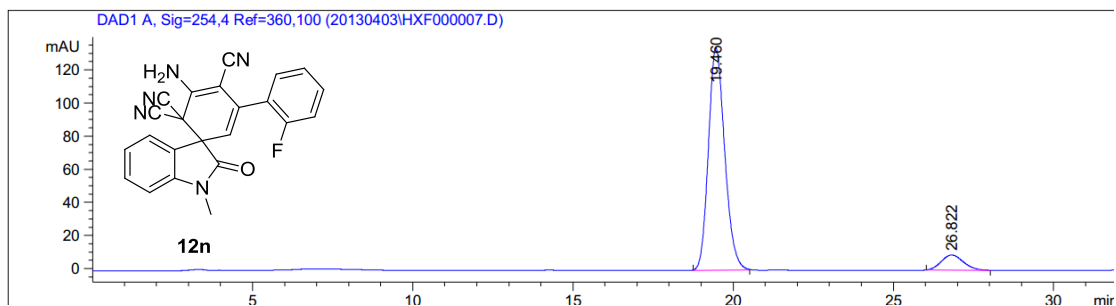


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 8.383         | BB   | 0.2368      | 3741.84814   | 241.41234    | 92.9558 |
| 2      | 19.869        | BB   | 0.6001      | 283.55975    | 7.09762      | 7.0442  |

## 12n

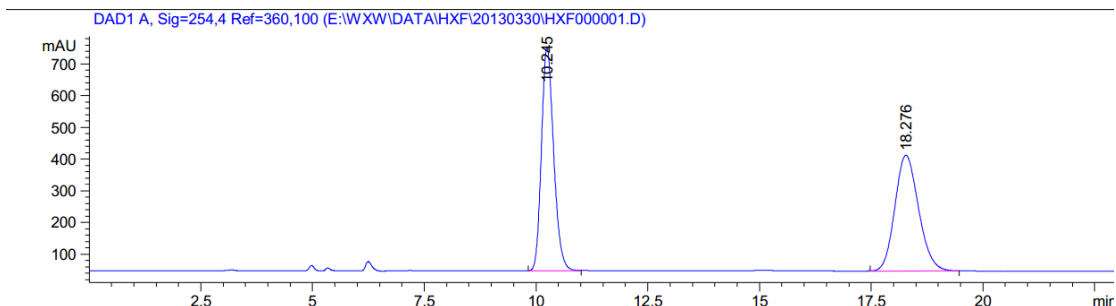


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 19.581        | BB   | 0.5510      | 1726.78076   | 48.78467     | 50.3176 |
| 2      | 27.053        | BB   | 0.7681      | 1704.98340   | 34.64759     | 49.6824 |

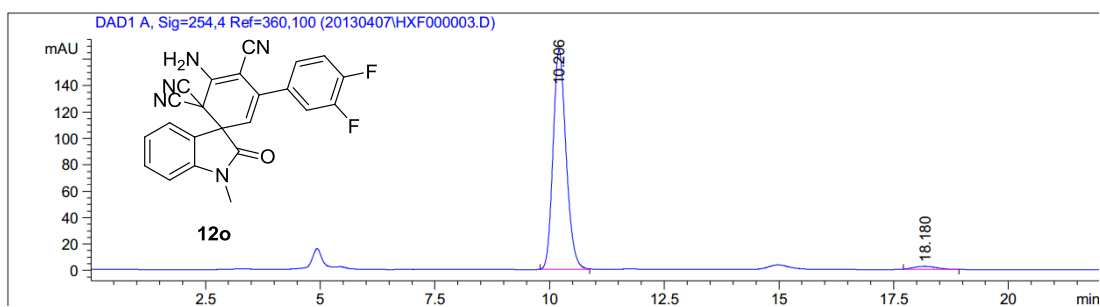


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 19.460        | BB   | 0.5448      | 4748.10205   | 134.19746    | 91.5082 |
| 2      | 26.822        | BB   | 0.7106      | 440.61478    | 9.16895      | 8.4918  |

## 12o

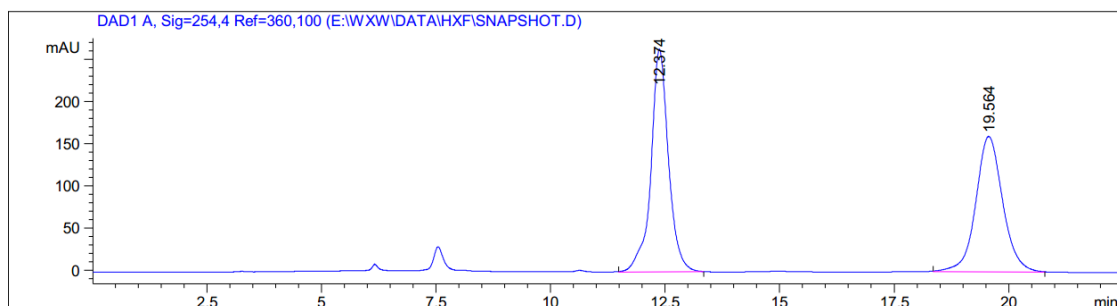


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.245        | BB   | 0.2945      | 1.34523e4    | 705.38153    | 49.9405 |
| 2      | 18.276        | BB   | 0.5704      | 1.34843e4    | 365.52661    | 50.0595 |

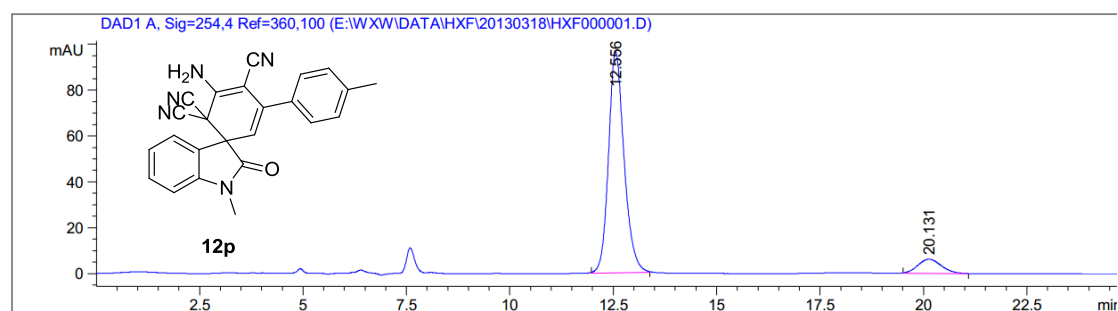


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 10.206        | BB   | 0.3017      | 3272.72778   | 166.20497    | 97.6740 |
| 2      | 18.180        | BB   | 0.4938      | 77.93704     | 2.29727      | 2.3260  |

## 12p

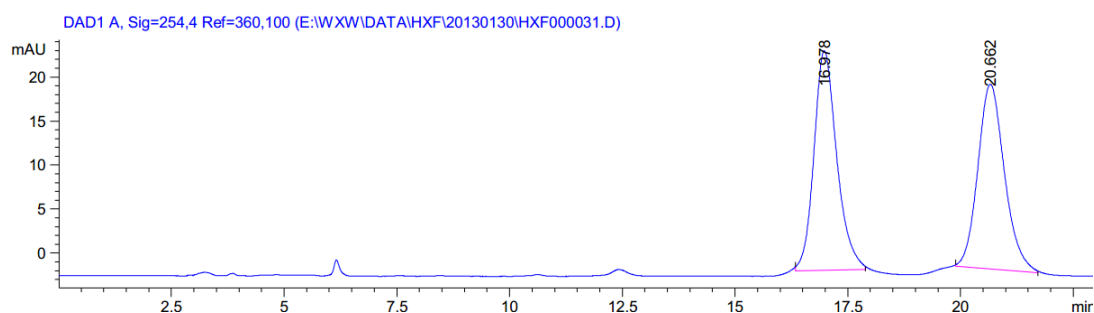


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.374        | BB   | 0.3955      | 7052.02002   | 264.15057    | 51.8871 |
| 2      | 19.564        | BB   | 0.6189      | 6539.07324   | 160.64687    | 48.1129 |



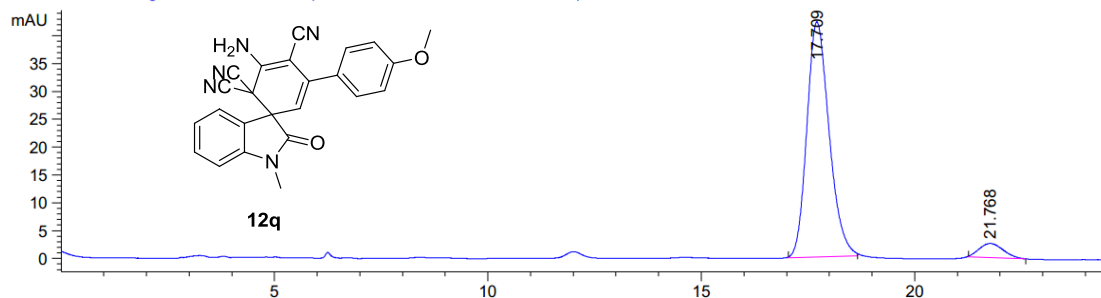
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.556        | BB   | 0.3954      | 2523.11768   | 96.38411     | 91.3538 |
| 2      | 20.131        | BB   | 0.5927      | 238.80046    | 6.12707      | 8.6462  |

## 12q



| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 16.978        | BB   | 0.5336      | 880.11951    | 24.94654     | 50.5654 |
| 2      | 20.662        | BB   | 0.6245      | 860.43744    | 20.97824     | 49.4346 |

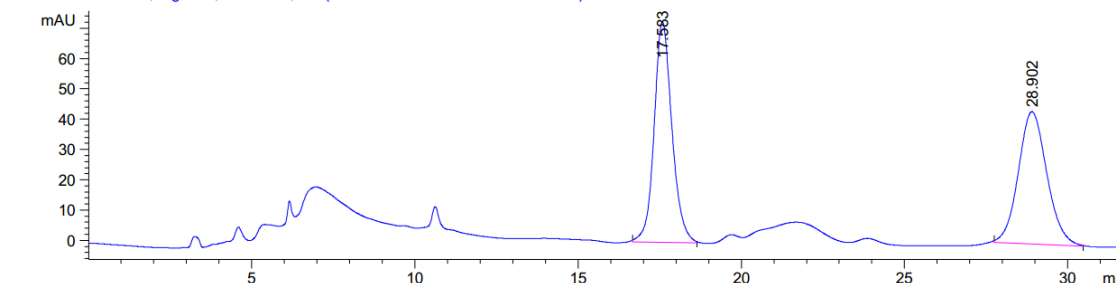
DAD1 A, Sig=254,4 Ref=360,100 (E:\WXW\DATA\HXF\SNAPSHOT.D)



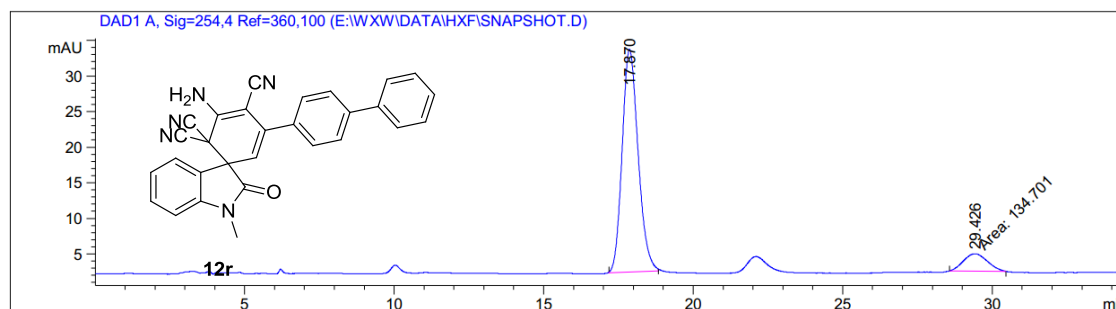
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 17.709        | BB   | 0.5559      | 1526.04272   | 42.20082     | 93.8653 |
| 2      | 21.768        | BB   | 0.5319      | 99.73668     | 2.54094      | 6.1347  |

## 12r

DAD1 A, Sig=254,4 Ref=360,100 (E:\WXW\DATA\HXF\SNAPSHOT.D)

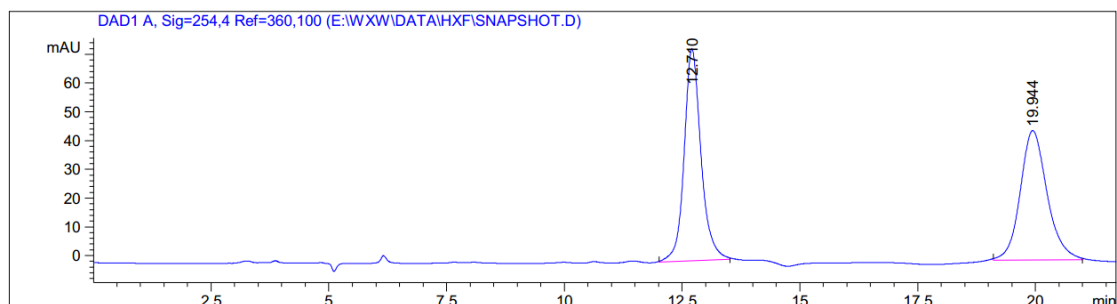


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 17.583        | BB   | 0.5713      | 2748.79248   | 72.67728     | 50.9318 |
| 2      | 28.902        | BB   | 0.9238      | 2648.21069   | 43.65133     | 49.0682 |

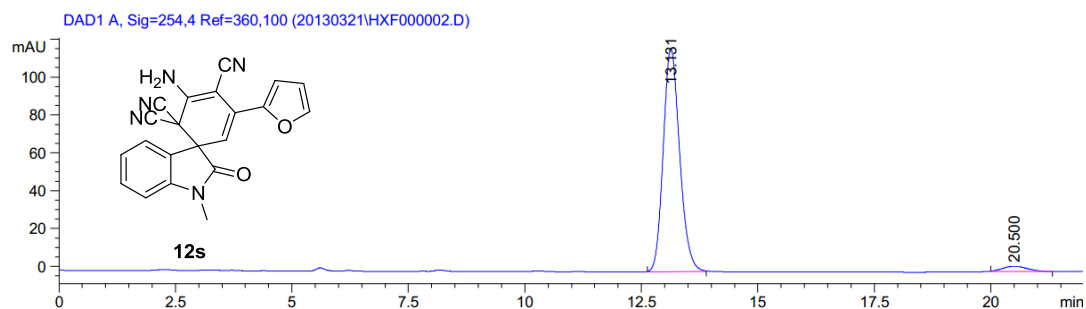


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 17.870        | BB   | 0.5726      | 1159.50195   | 31.26966     | 89.5920 |
| 2      | 29.426        | MM   | 0.9189      | 134.70111    | 2.44324      | 10.4080 |

12s

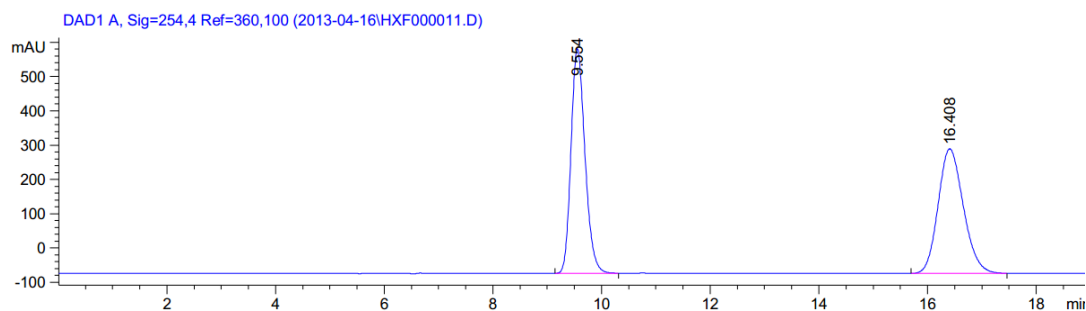


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.710        | BB   | 0.3750      | 1839.03308   | 73.72579     | 50.8000 |
| 2      | 19.944        | BB   | 0.5999      | 1781.10767   | 44.99145     | 49.2000 |



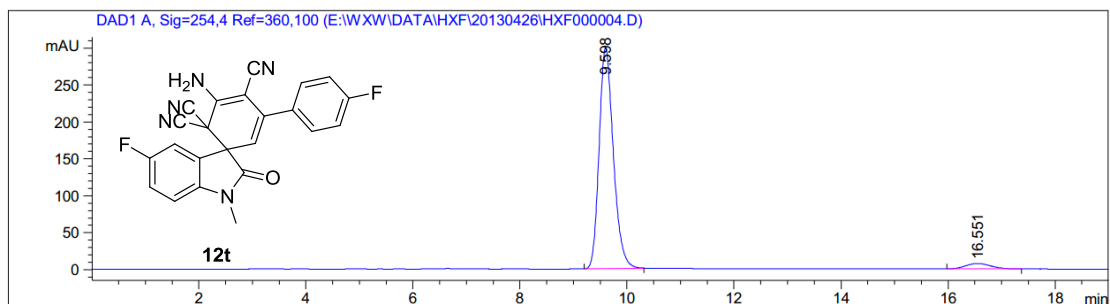
| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.131        | BB   | 0.3768      | 2874.72388   | 117.75316    | 96.6417 |
| 2      | 20.500        | BB   | 0.5381      | 99.89699     | 2.77394      | 3.3583  |

12t



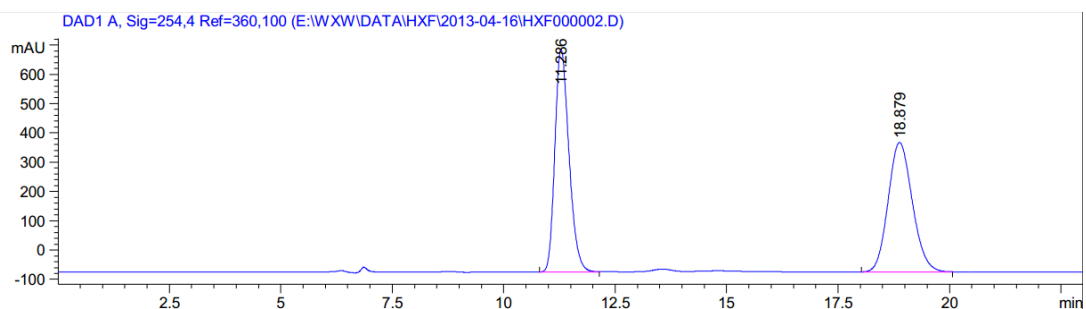


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.554         | BB   | 0.2764      | 1.17234e4    | 656.16235    | 49.9135 |
| 2      | 16.408        | BB   | 0.4992      | 1.17640e4    | 363.89844    | 50.0865 |

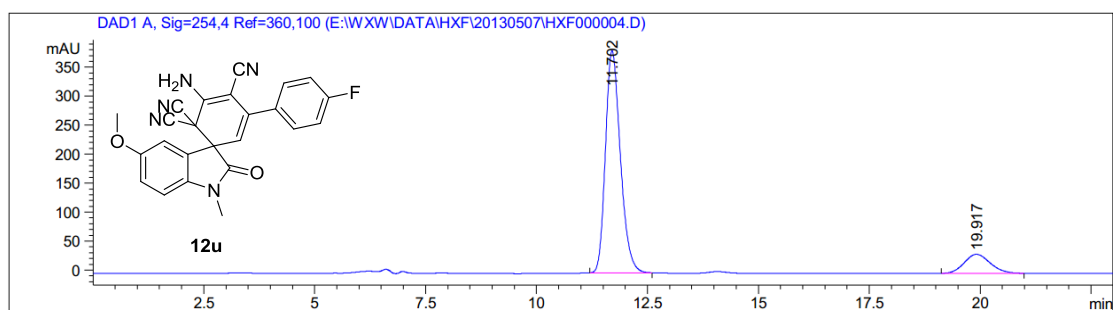


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 9.598         | BB   | 0.2835      | 5523.70459   | 298.99640    | 95.7854 |
| 2      | 16.551        | BB   | 0.4892      | 243.04698    | 7.39924      | 4.2146  |

## 12u

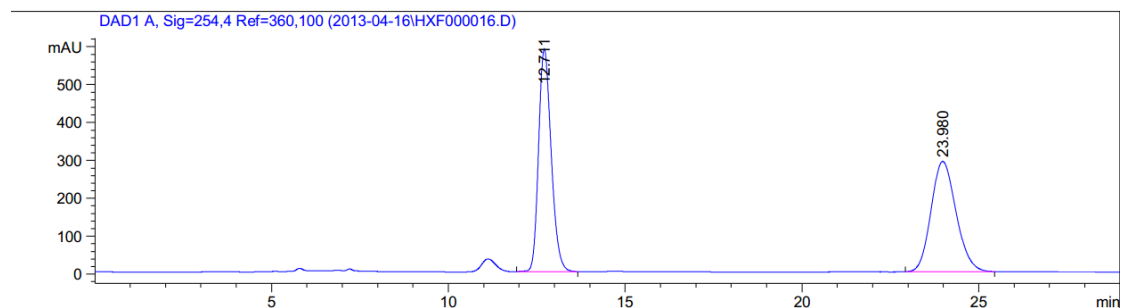


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.286        | BB   | 0.3390      | 1.67459e4    | 760.30884    | 50.0612 |
| 2      | 18.879        | BB   | 0.5847      | 1.67049e4    | 442.25571    | 49.9388 |

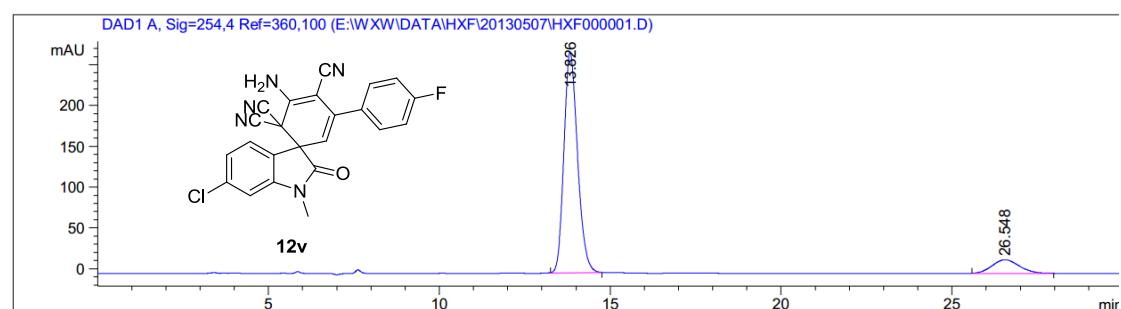


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 11.702        | BB   | 0.3594      | 8986.76855   | 383.47177    | 86.9373 |
| 2      | 19.917        | BB   | 0.6327      | 1350.29553   | 32.90608     | 13.0627 |

12v

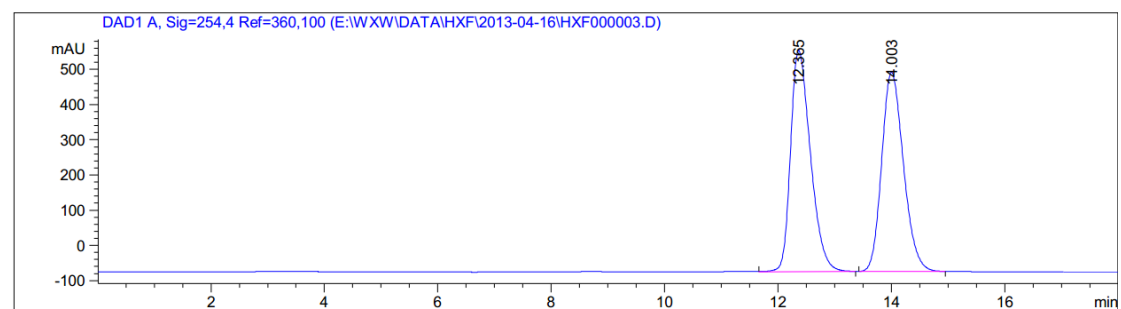


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.711        | BB   | 0.3802      | 1.45210e4    | 587.85138    | 50.2549 |
| 2      | 23.980        | BB   | 0.7632      | 1.43737e4    | 291.55444    | 49.7451 |

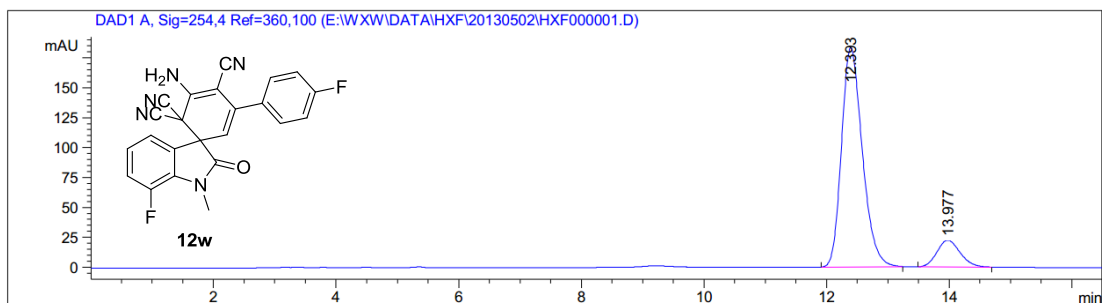


| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 13.826        | BB   | 0.4294      | 7492.10693   | 270.25058    | 89.0955 |
| 2      | 26.548        | BB   | 0.8579      | 916.96338    | 16.61298     | 10.9045 |

12w



| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.365        | VB   | 0.3741      | 1.53148e4    | 628.87872    | 50.3146 |
| 2      | 14.003        | BB   | 0.4133      | 1.51233e4    | 566.73230    | 49.6854 |



| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area %  |
|--------|---------------|------|-------------|--------------|--------------|---------|
| 1      | 12.393        | BB   | 0.3637      | 4335.97607   | 183.48988    | 87.9916 |
| 2      | 13.977        | BB   | 0.4054      | 591.73883    | 22.45910     | 12.0084 |