

Supporting Information

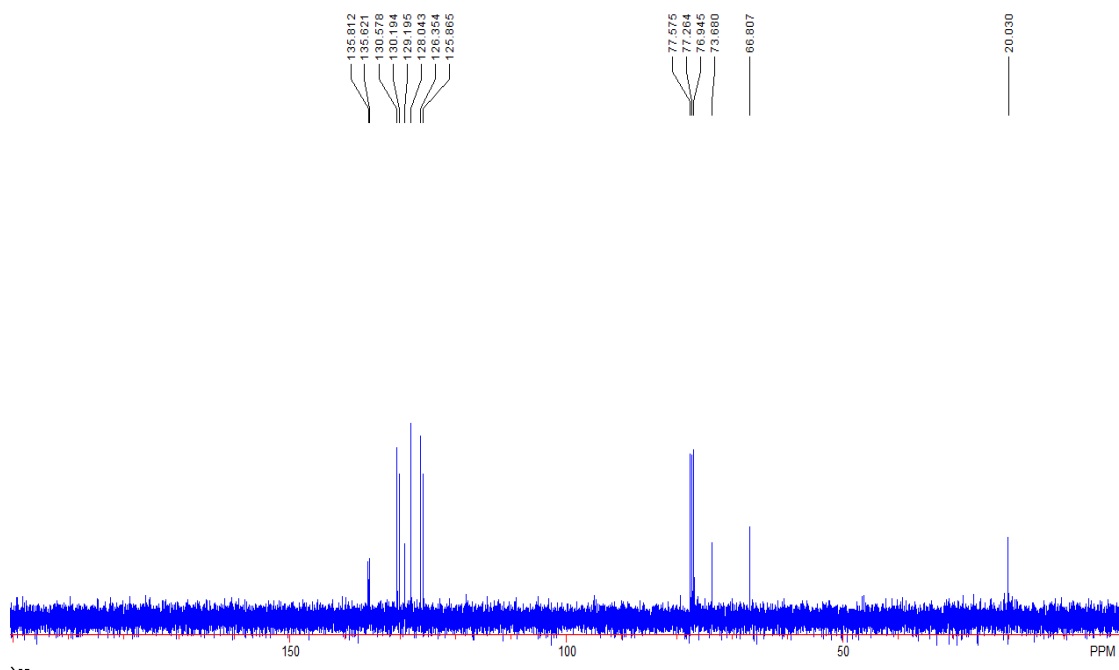
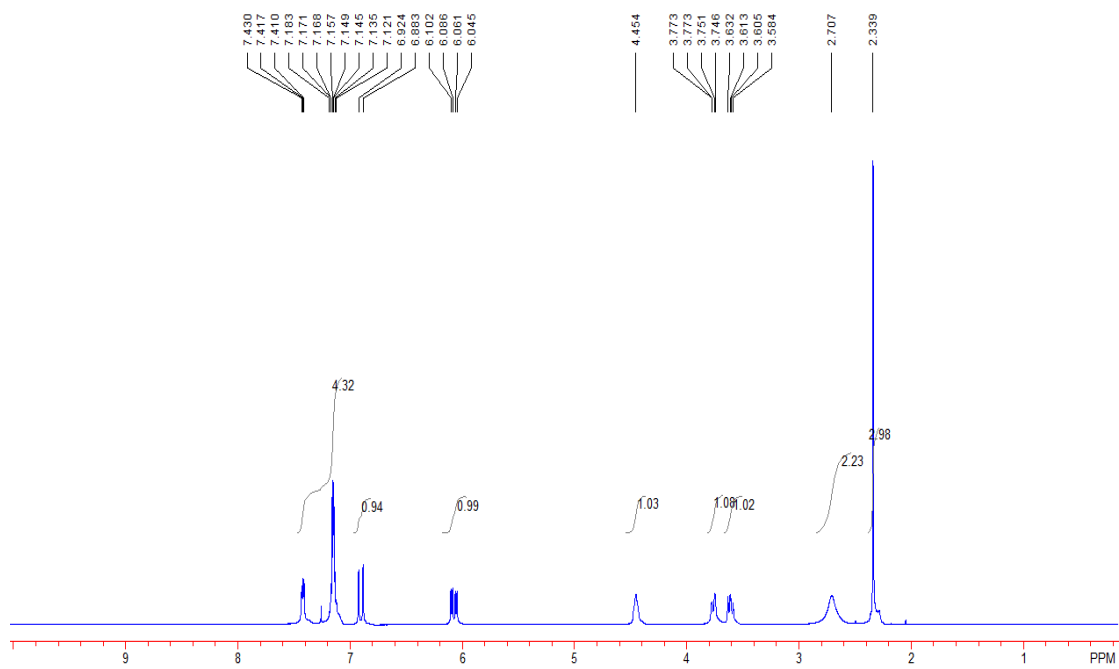
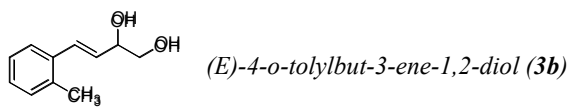
**The synthesis of chiral  $\beta$ -aryl- $\alpha,\beta$ -unsaturated amino alcohols via a Pd-catalyzed asymmetric allylic amination**

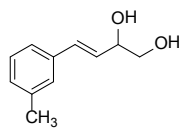
Mao Quan,<sup>a</sup> Nicholas Butt,<sup>a</sup> Jiefeng Shen,<sup>b</sup> Kaiji Shen,<sup>b</sup> Delong Liu<sup>b\*</sup> and Wanbin Zhang<sup>a,b\*</sup>

<sup>a</sup> *School of Chemistry and Chemical Engineering, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China*

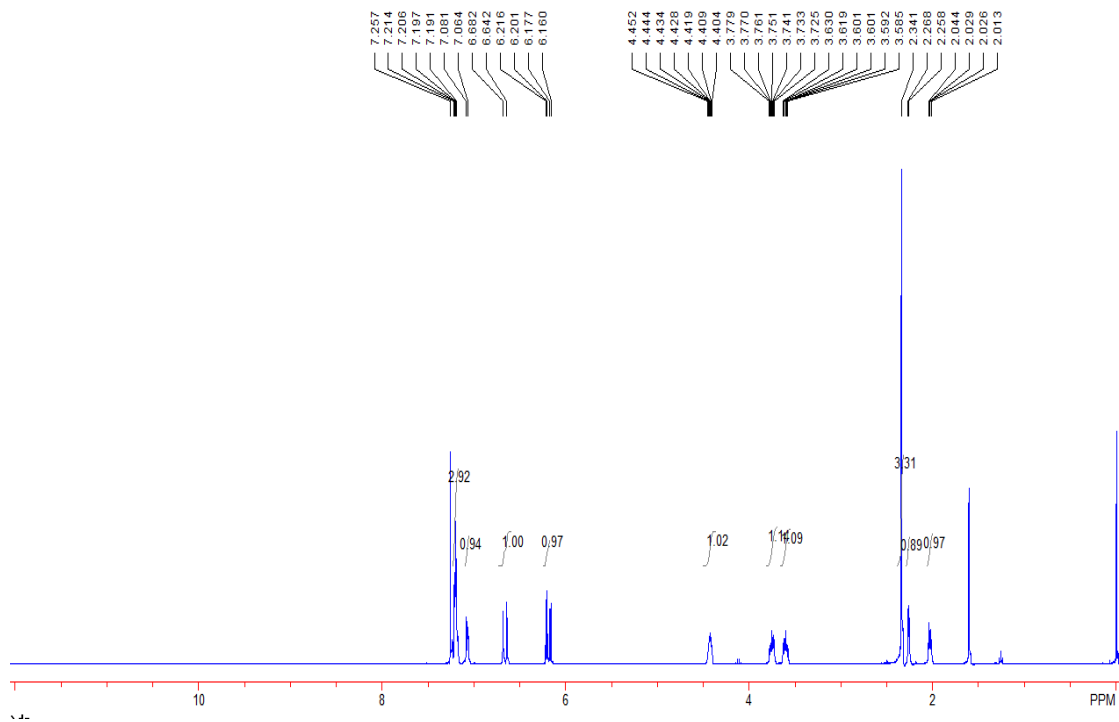
<sup>b</sup> *School of Pharmacy, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China*

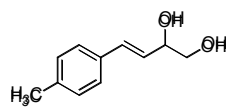
[wanbin@sjtu.edu.cn](mailto:wanbin@sjtu.edu.cn)



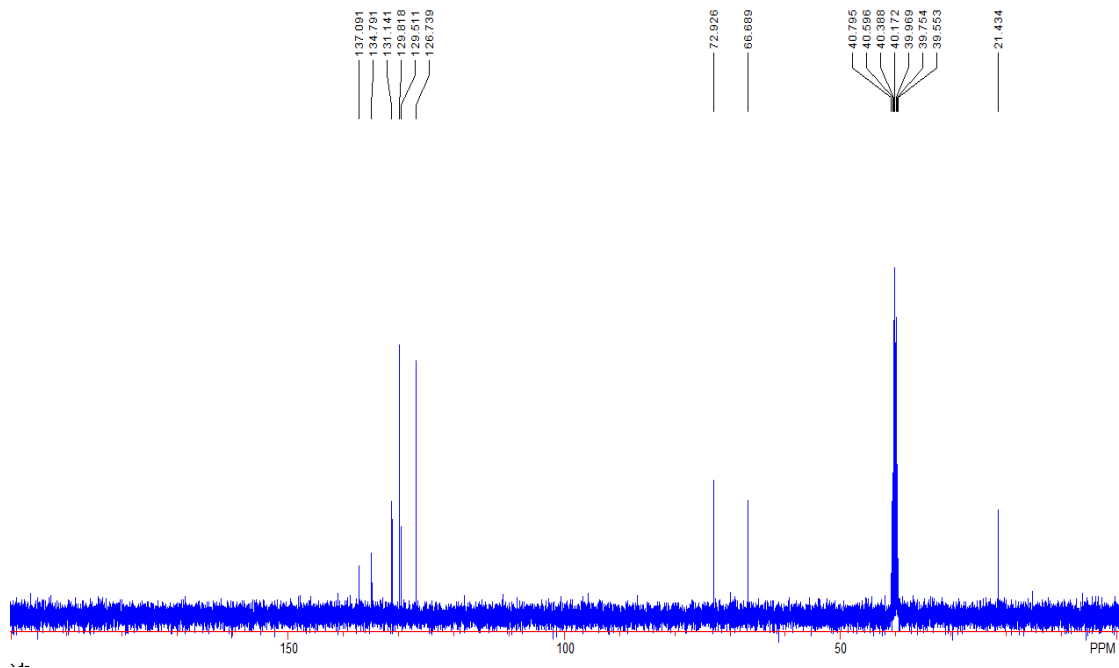
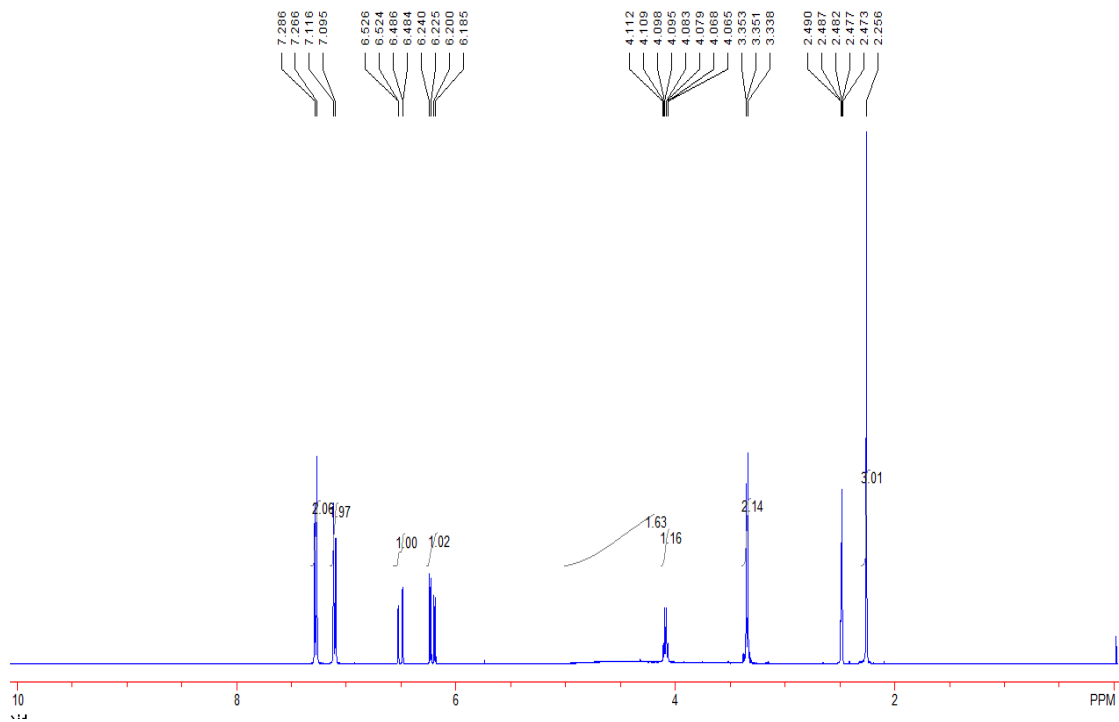


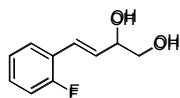
(E)-4-m-tolylbut-3-ene-1,2-diol (3c)



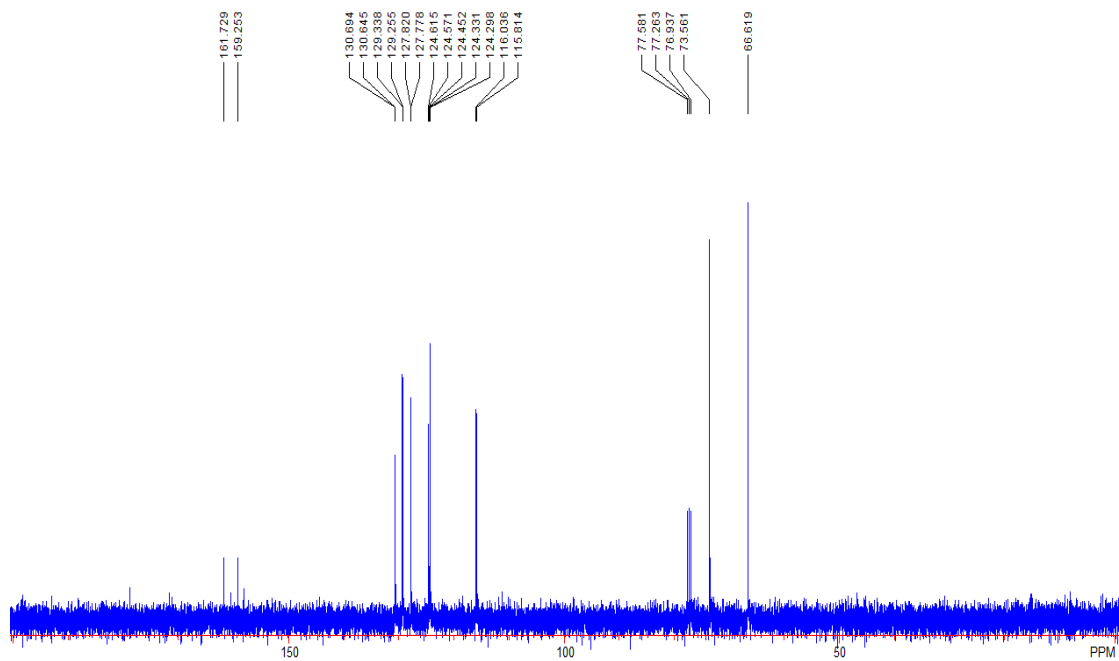
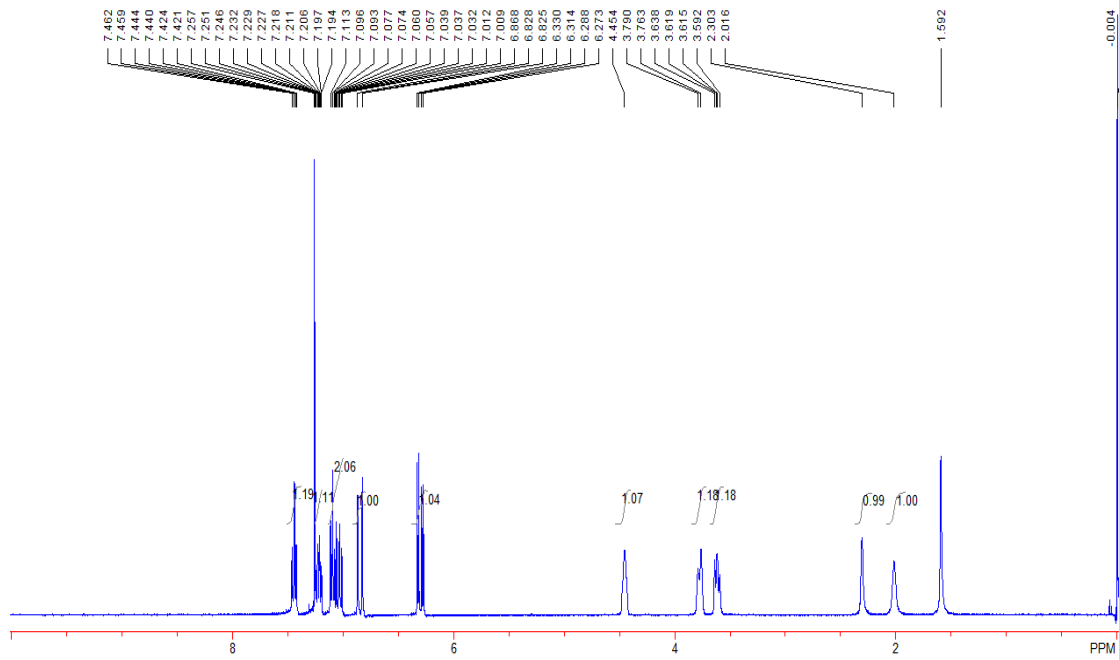


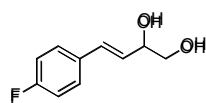
(E)-4-p-tolylbut-3-ene-1,2-diol (**3d**)



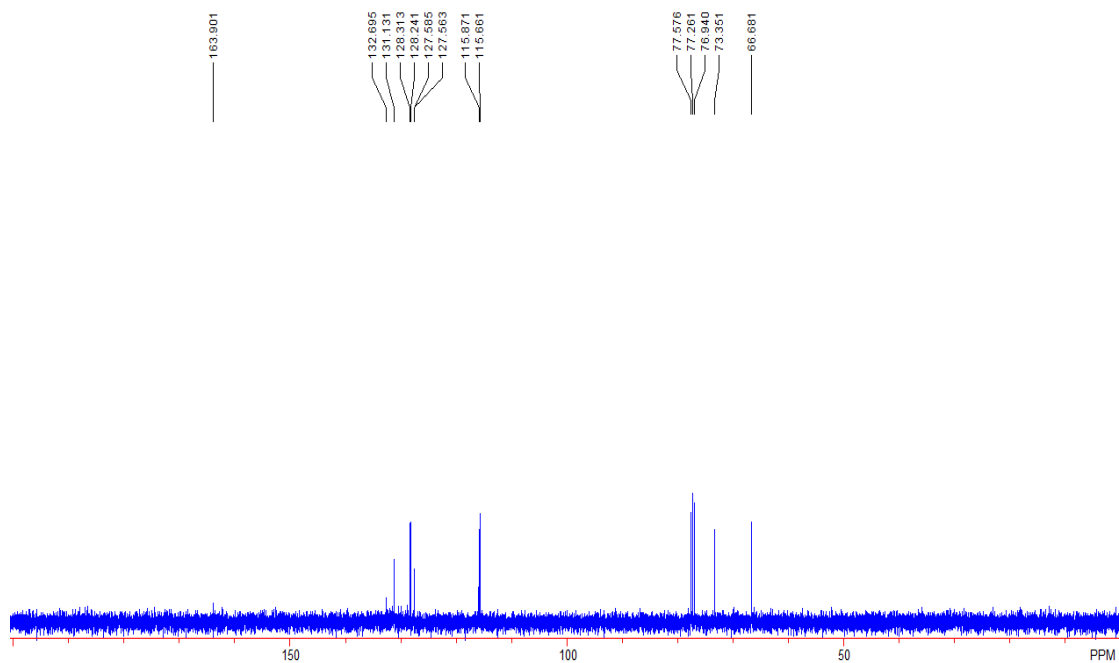
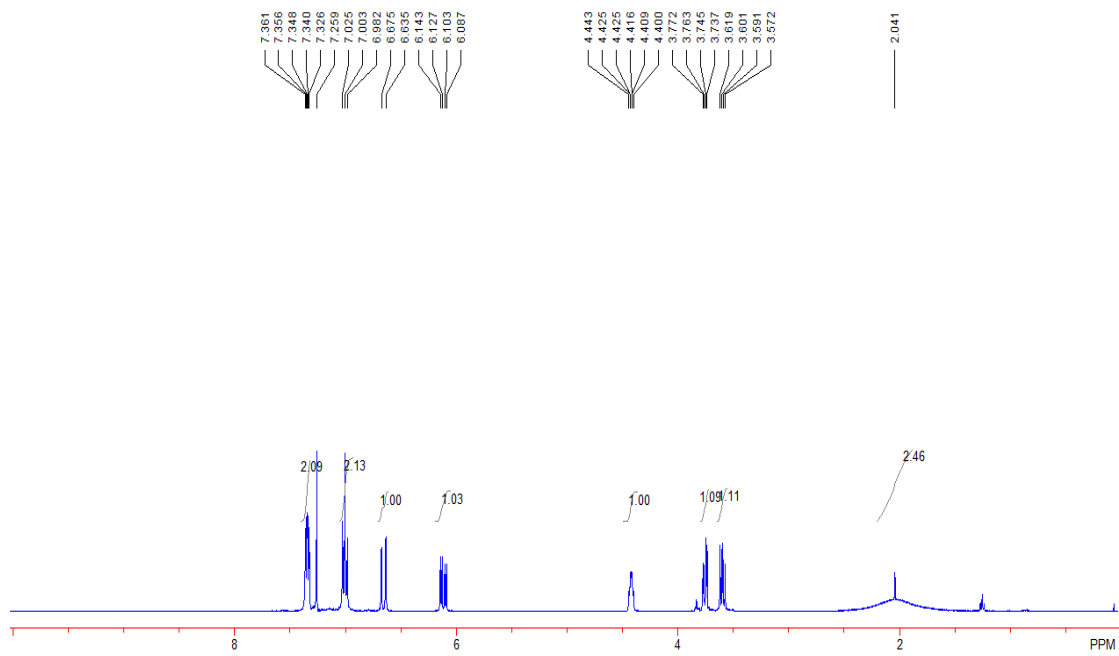


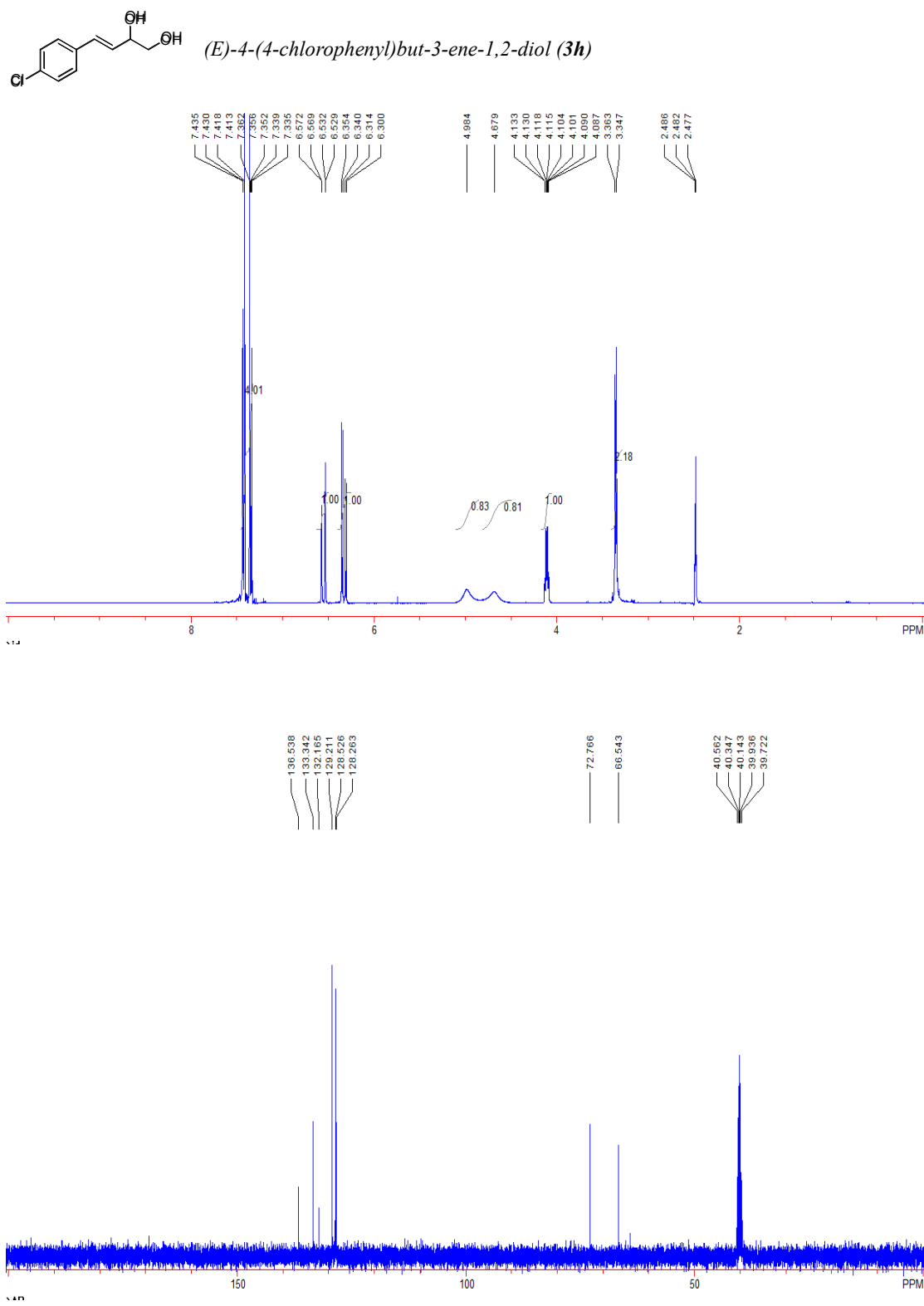
(E)-4-(2-fluorophenyl)but-3-ene-1,2-diol (3f)

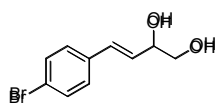




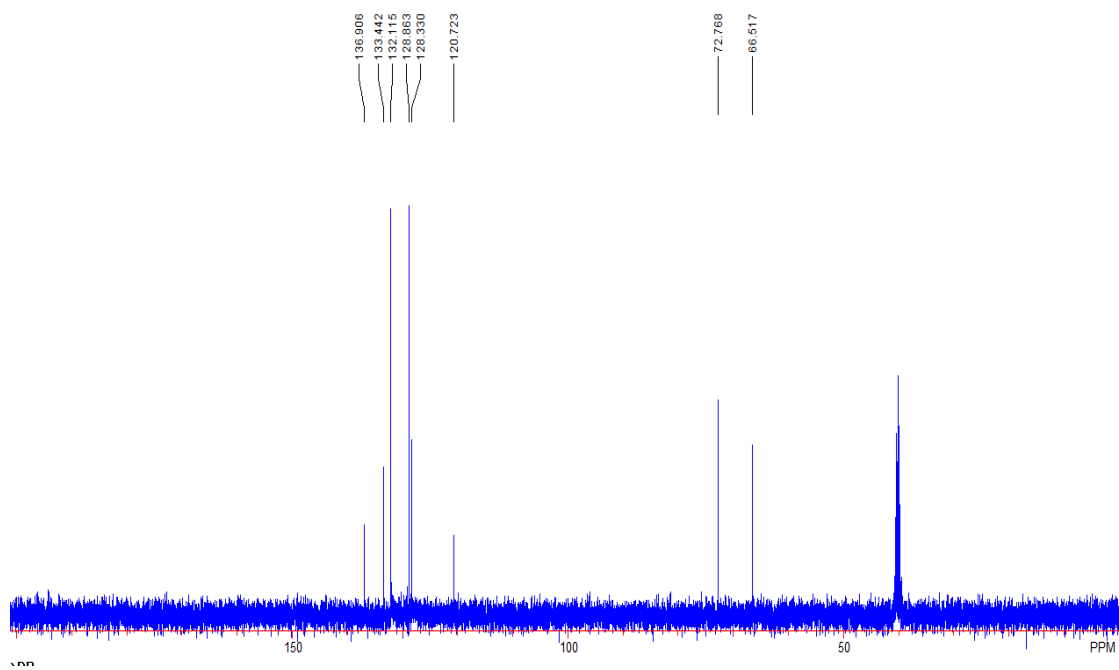
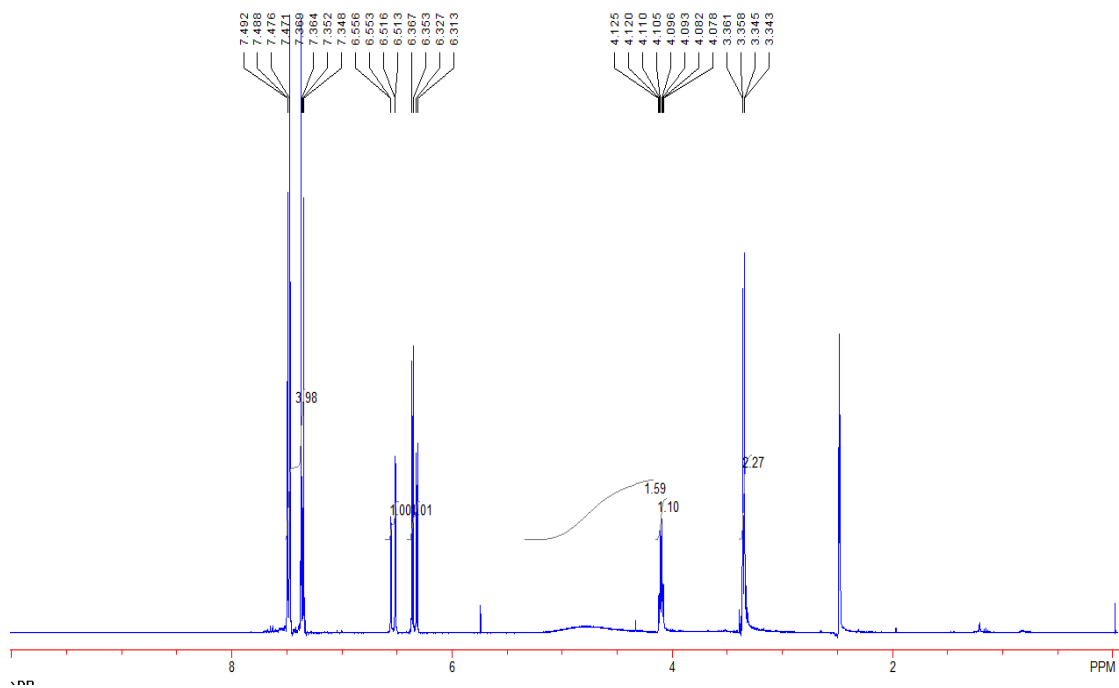
(E)-4-(4-fluorophenyl)but-3-ene-1,2-diol (**3g**)



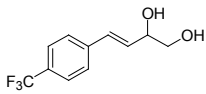




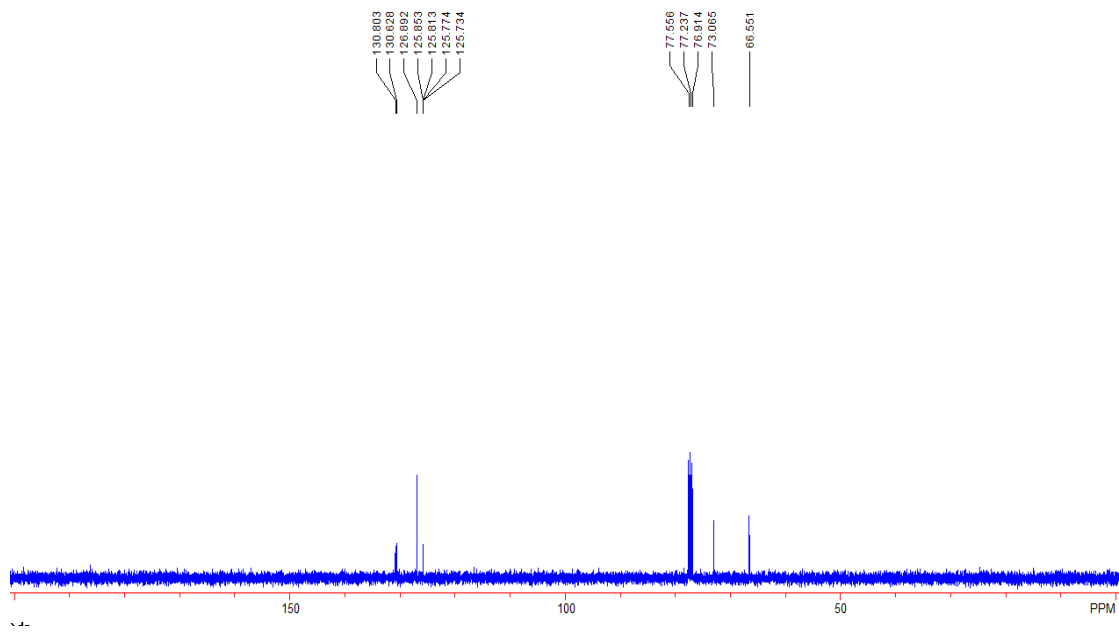
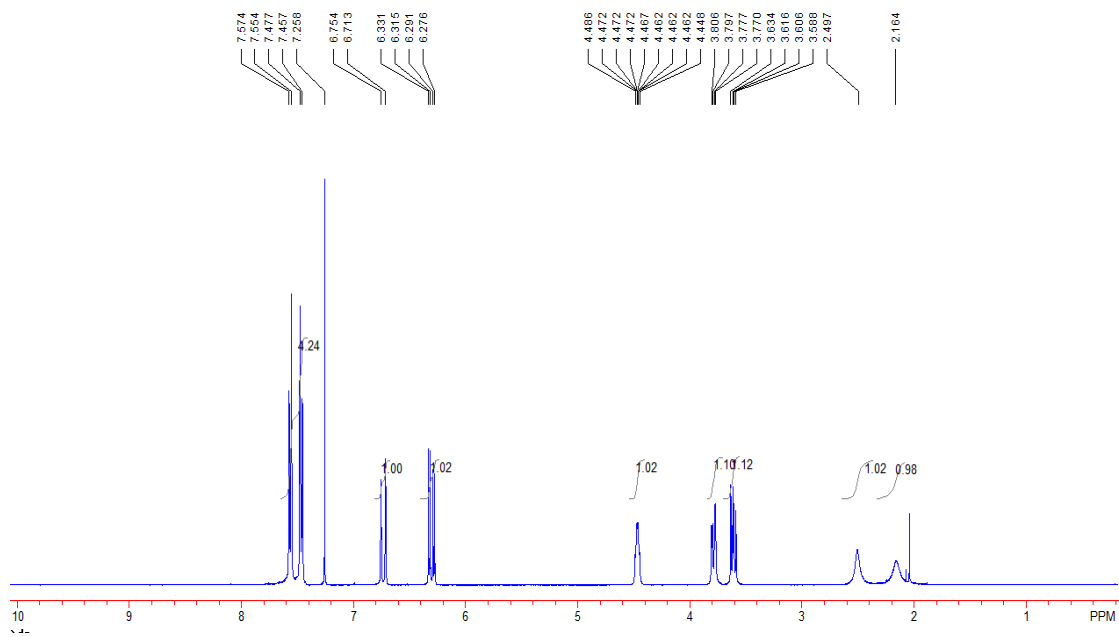
(E)-4-(4-bromophenyl)but-3-ene-1,2-diol (**3i**)

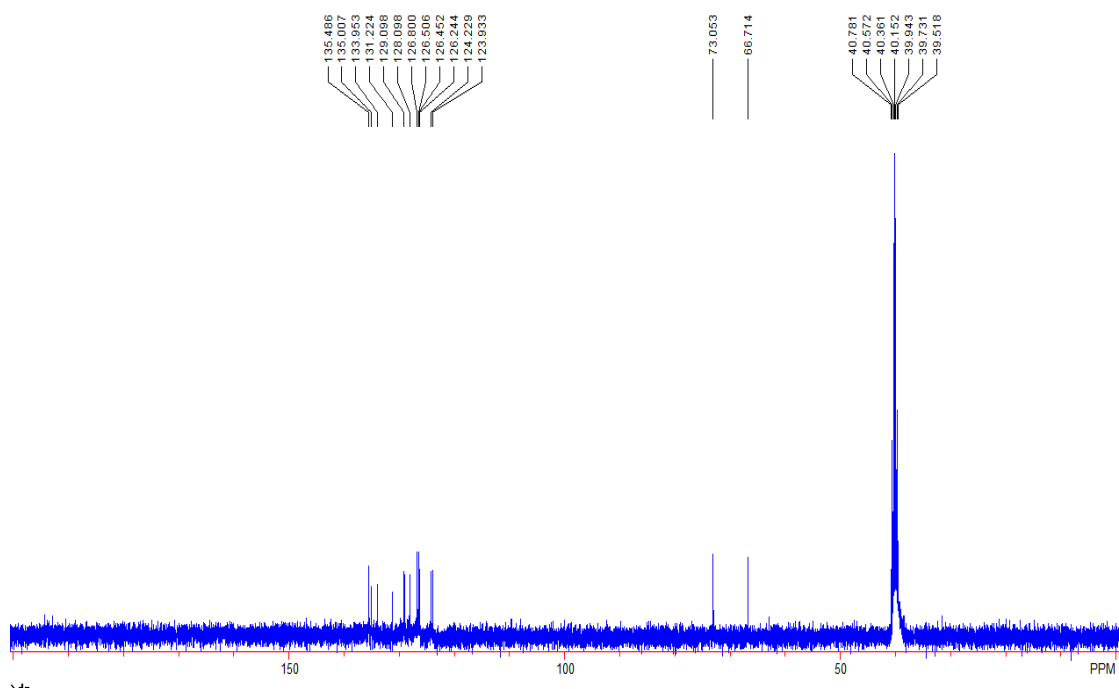
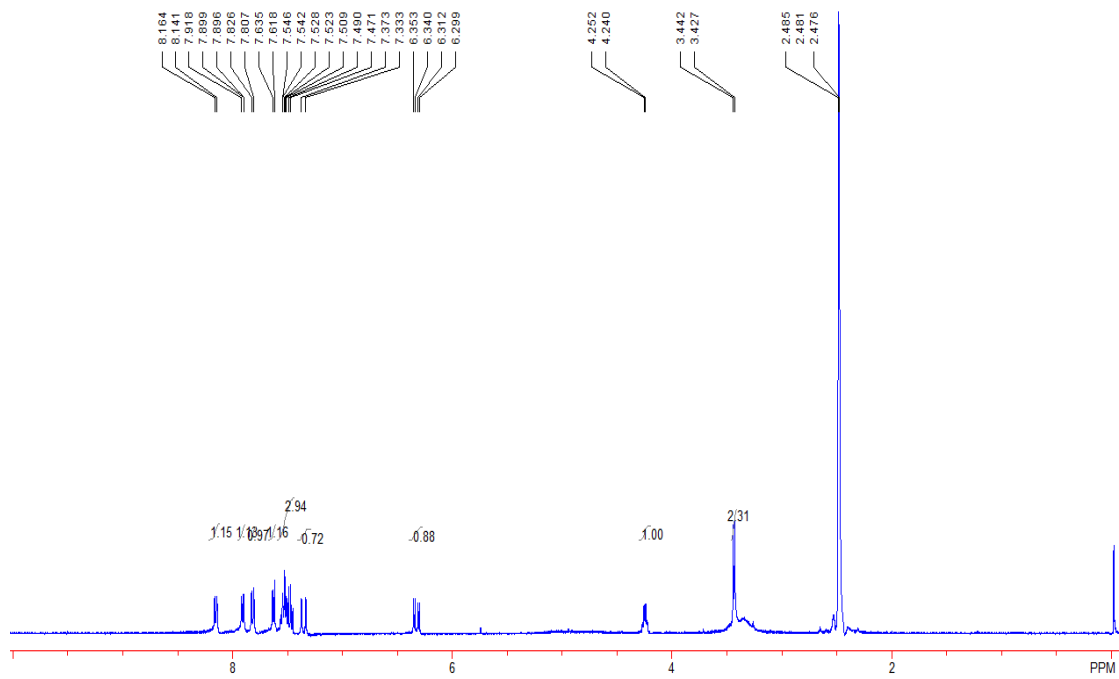


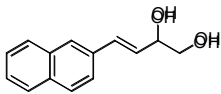




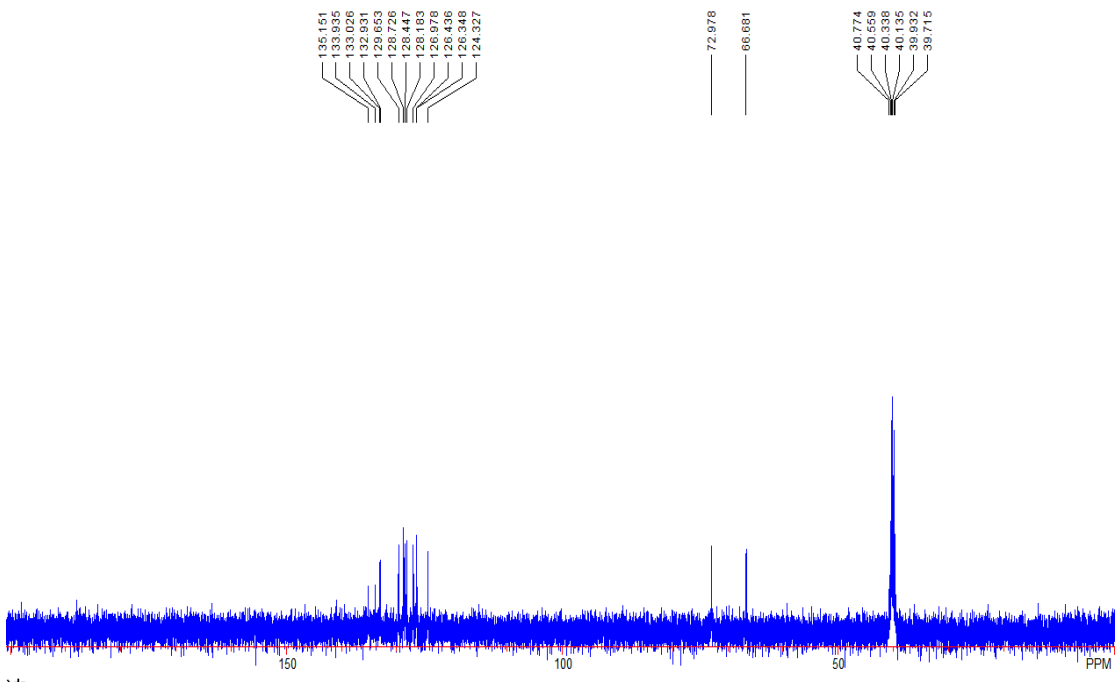
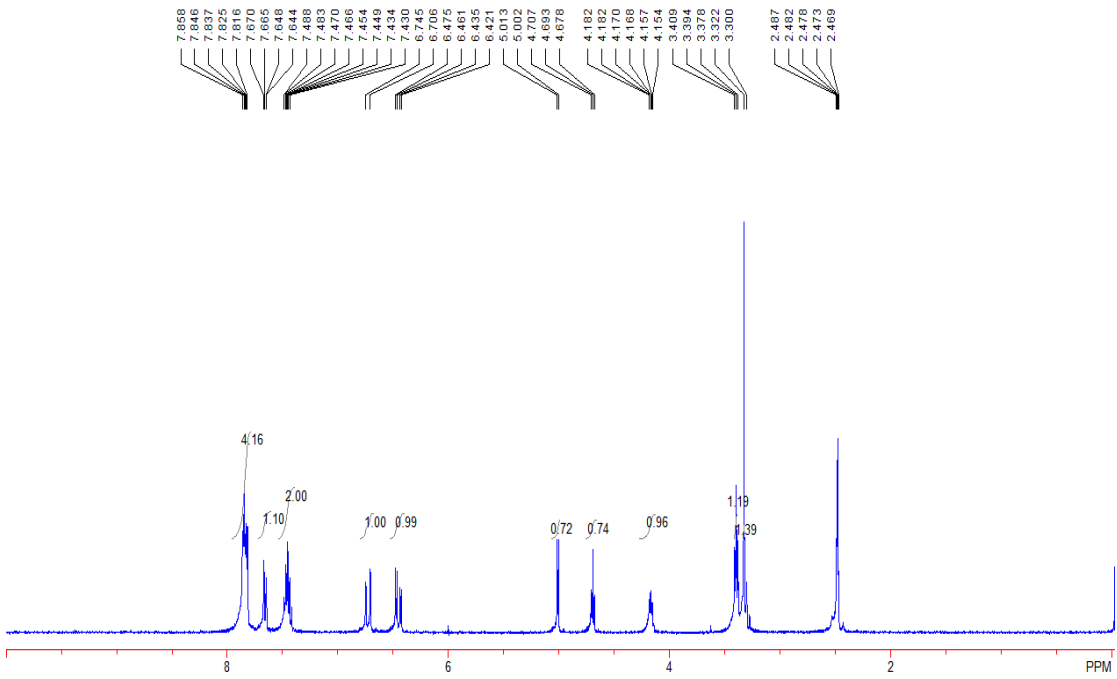
(E)-4-(4-(trifluoromethyl)phenyl)but-3-ene-1,2-diol (**3j**)

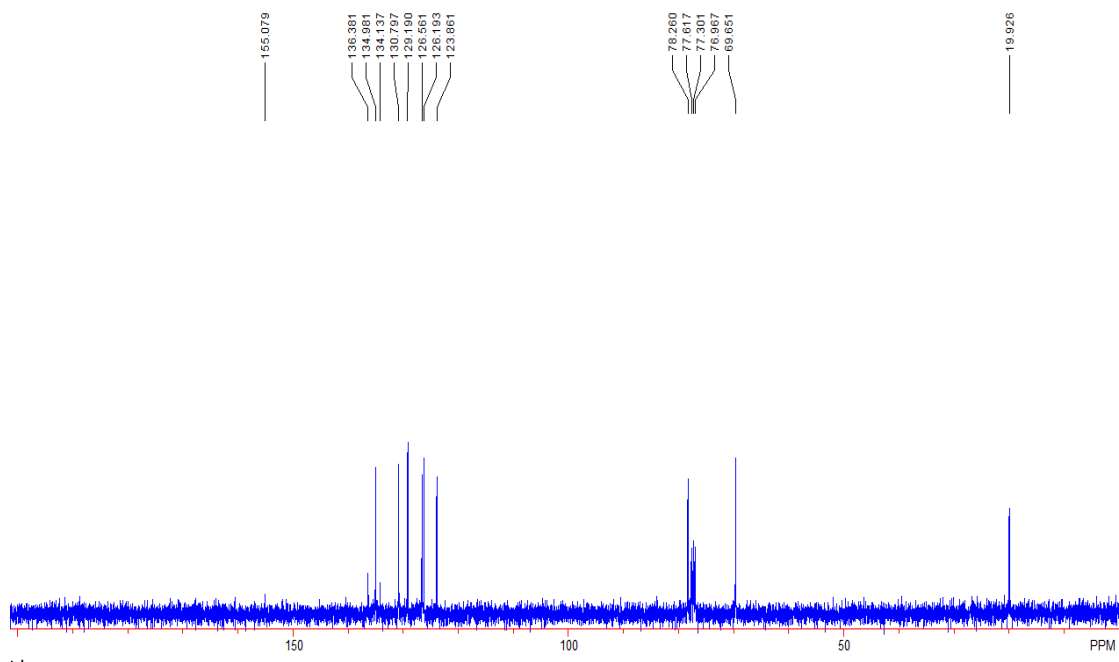
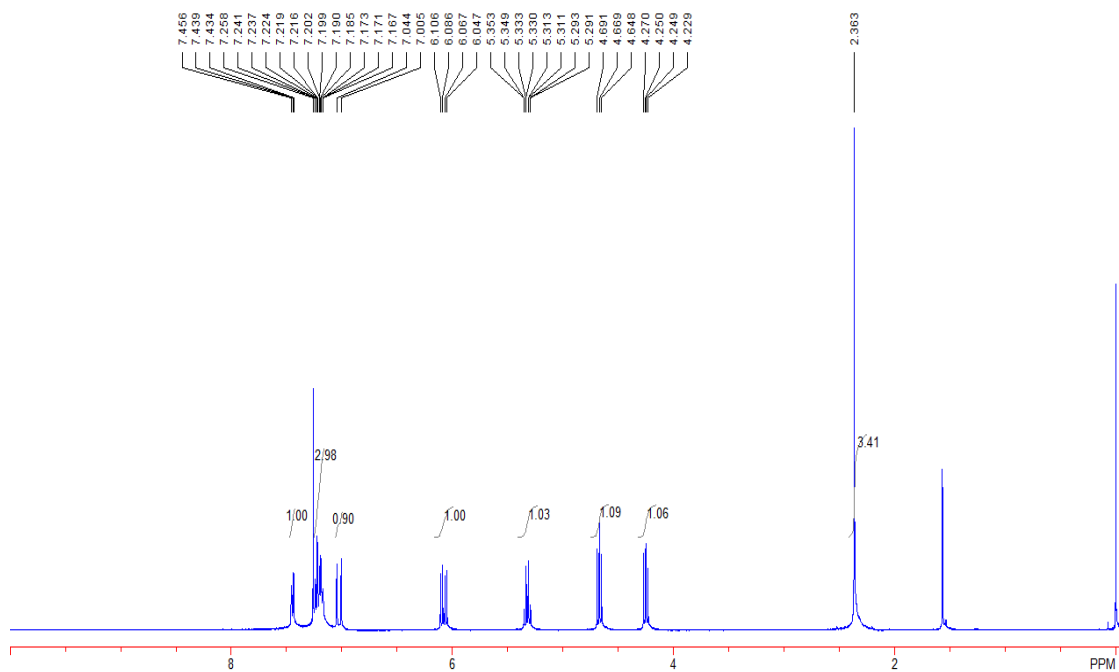
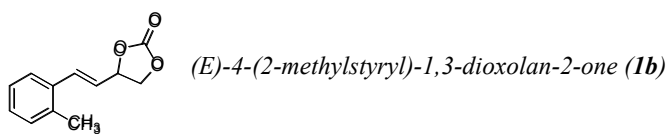


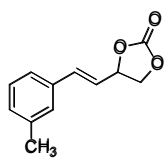




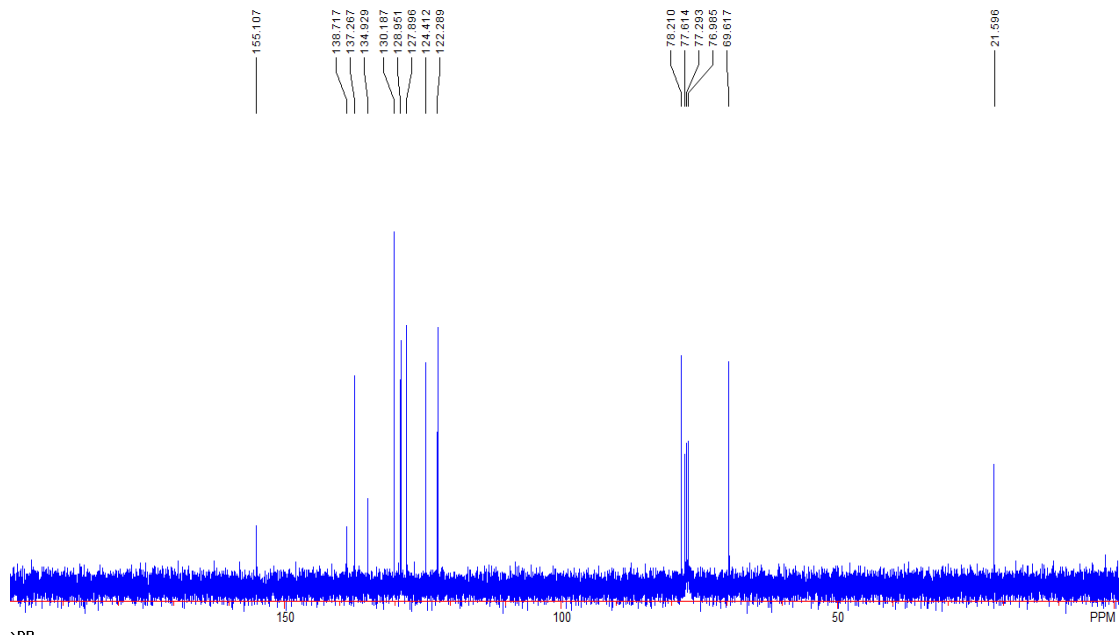
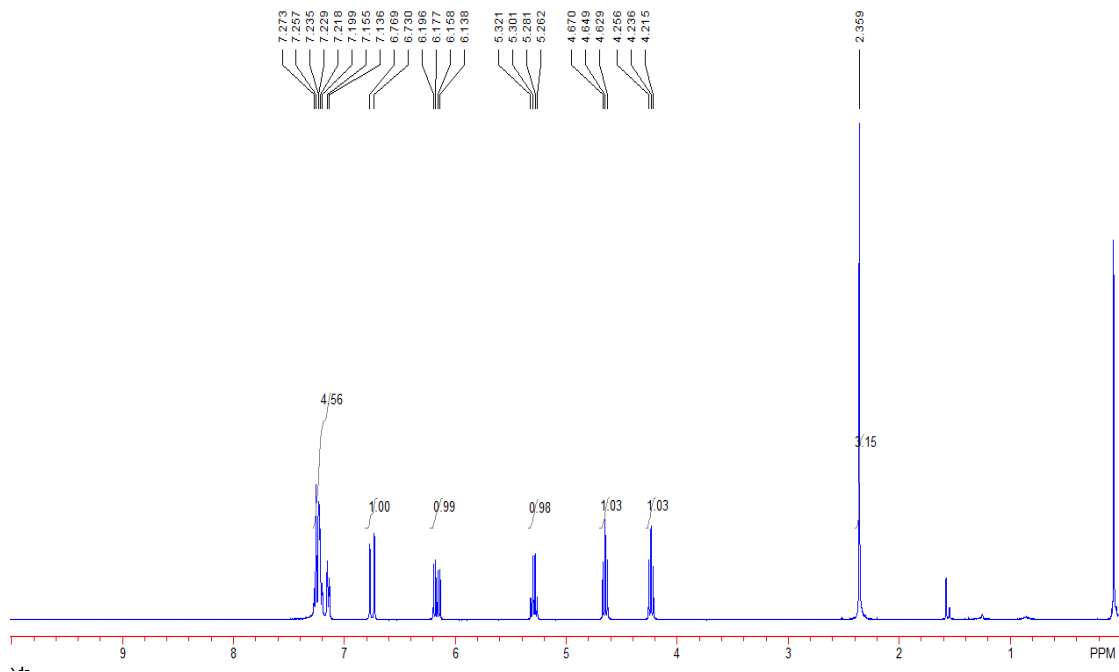
(E)-4-(naphthalen-2-yl)but-3-ene-1,2-diol (**3I**)

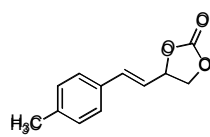




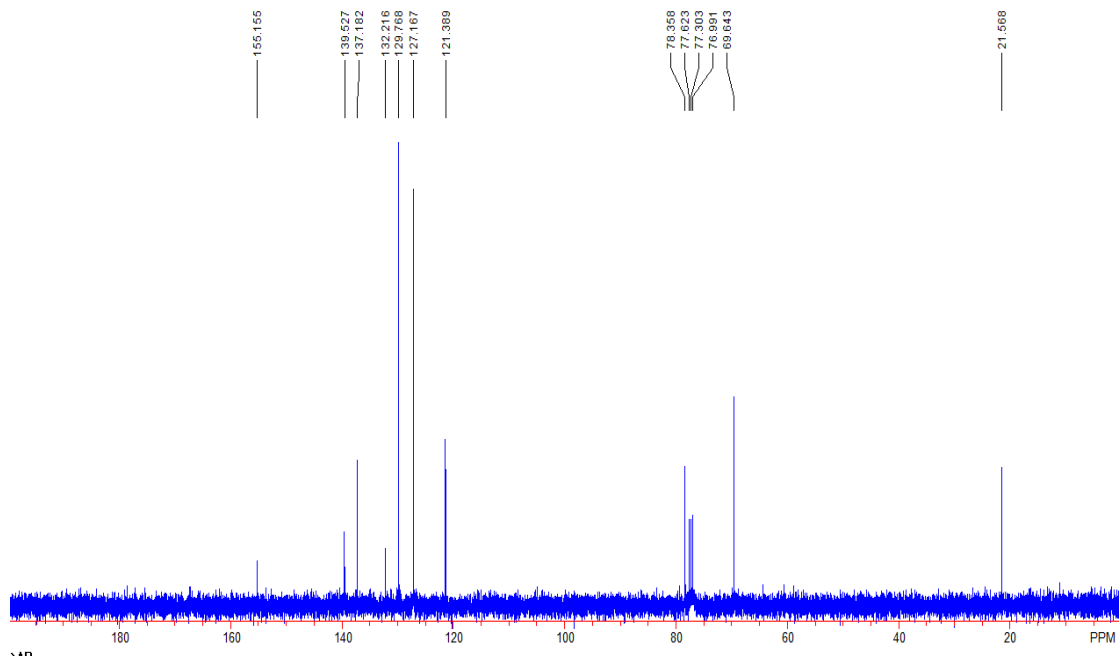
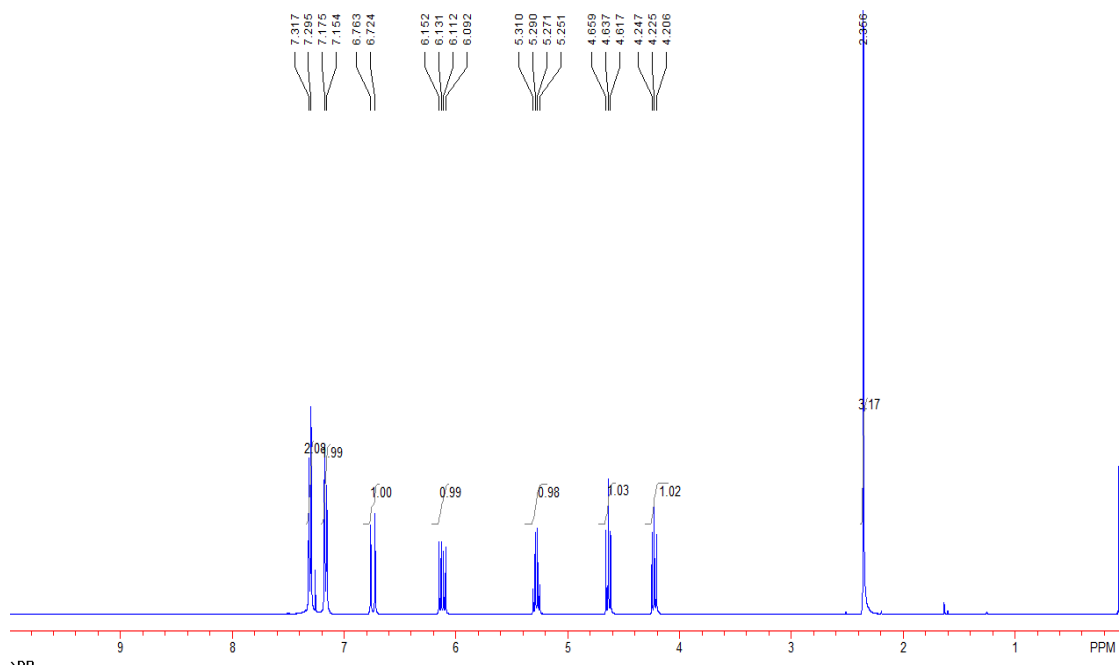


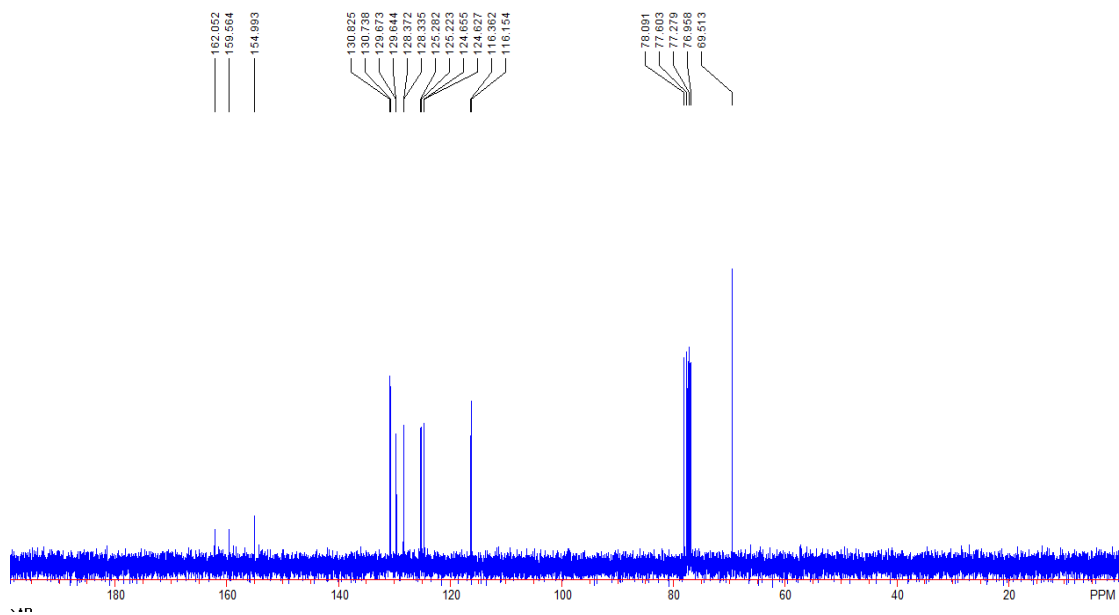
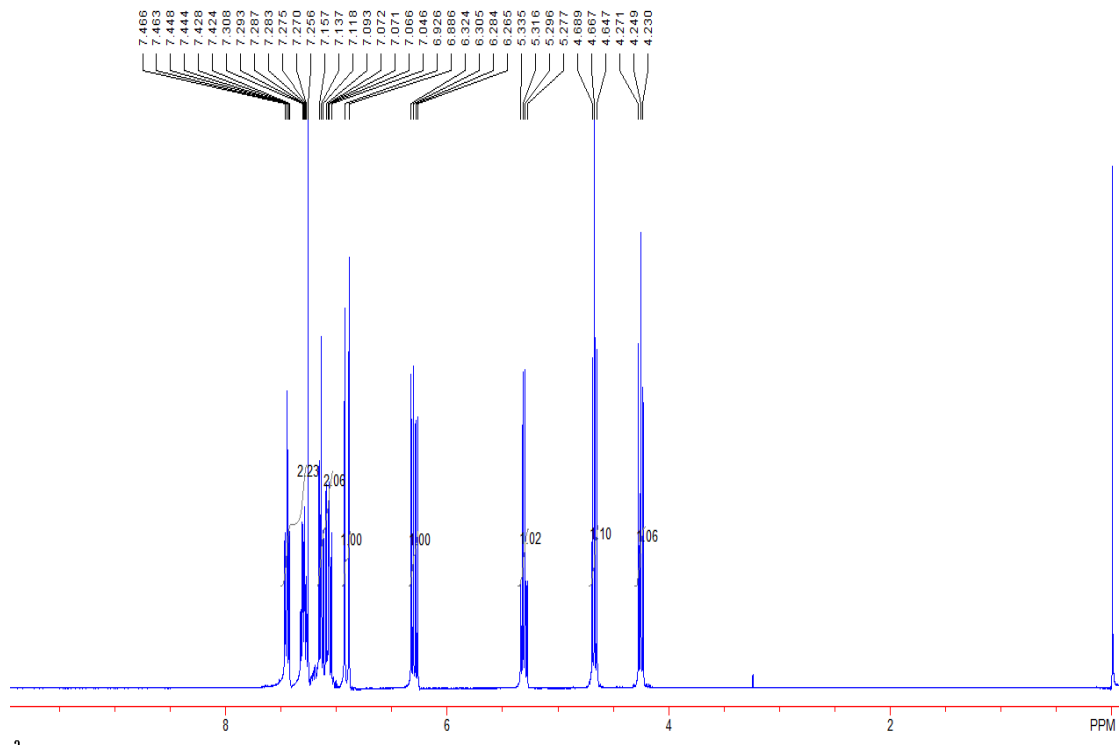
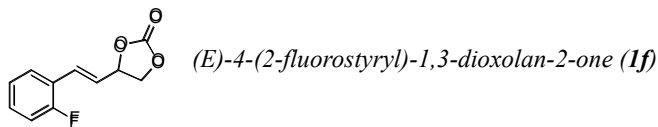
(E)-4-(3-methylstyryl)-1,3-dioxolan-2-one (**1c**)

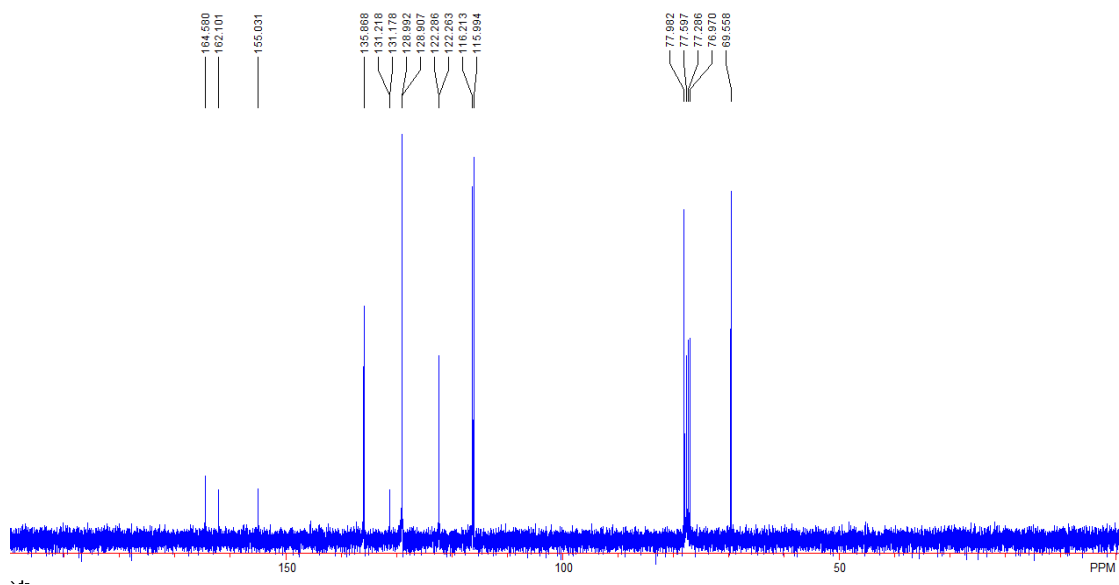
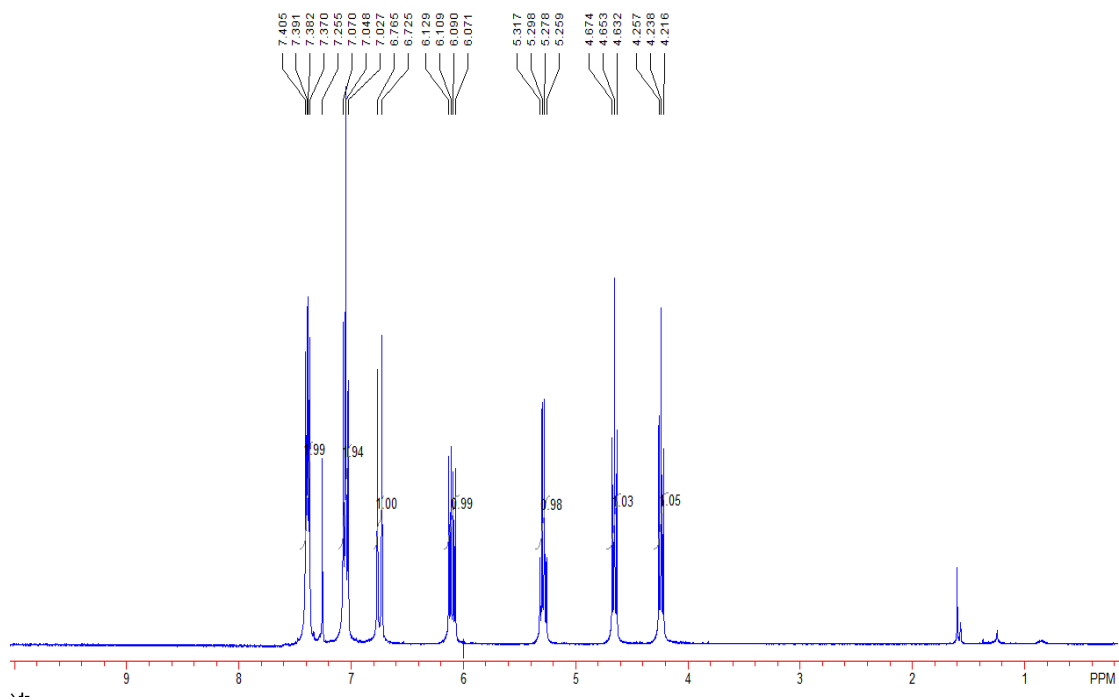
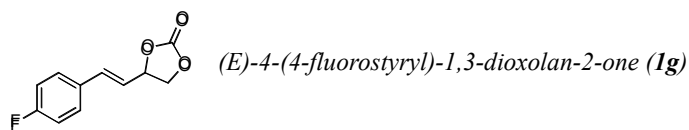




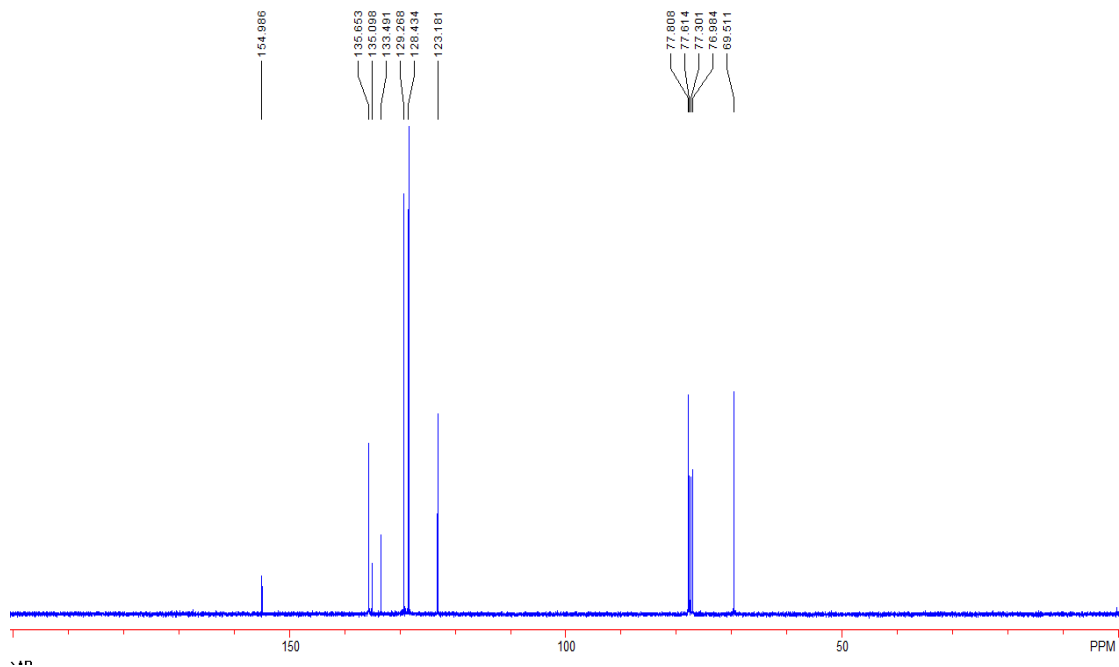
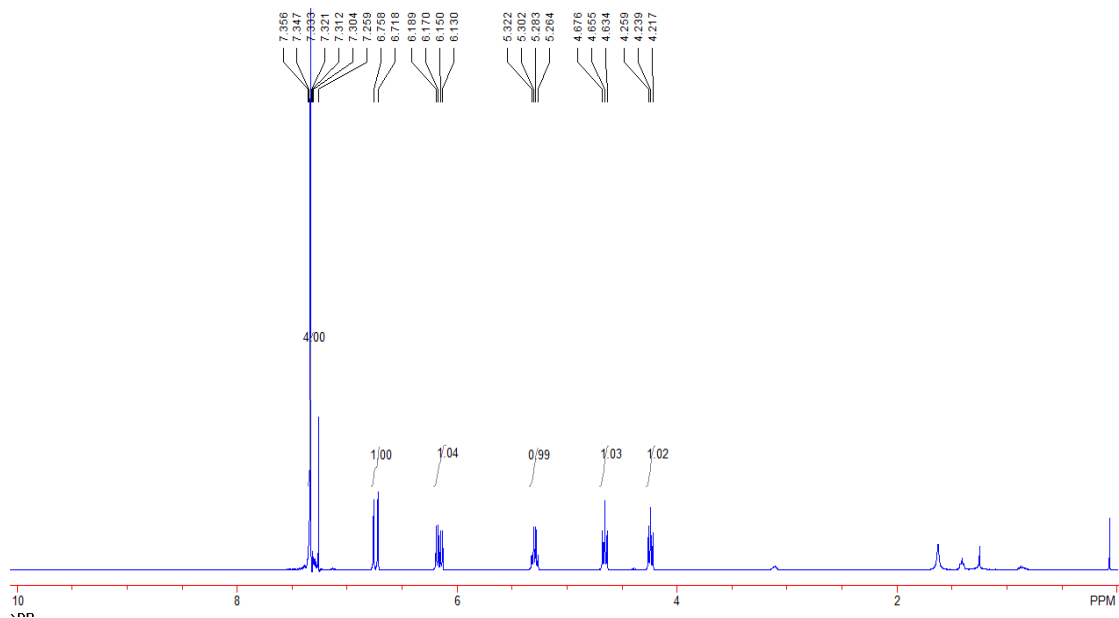
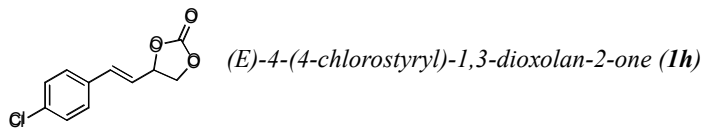
(E)-4-(4-methylstyryl)-1,3-dioxolan-2-one (**1d**)

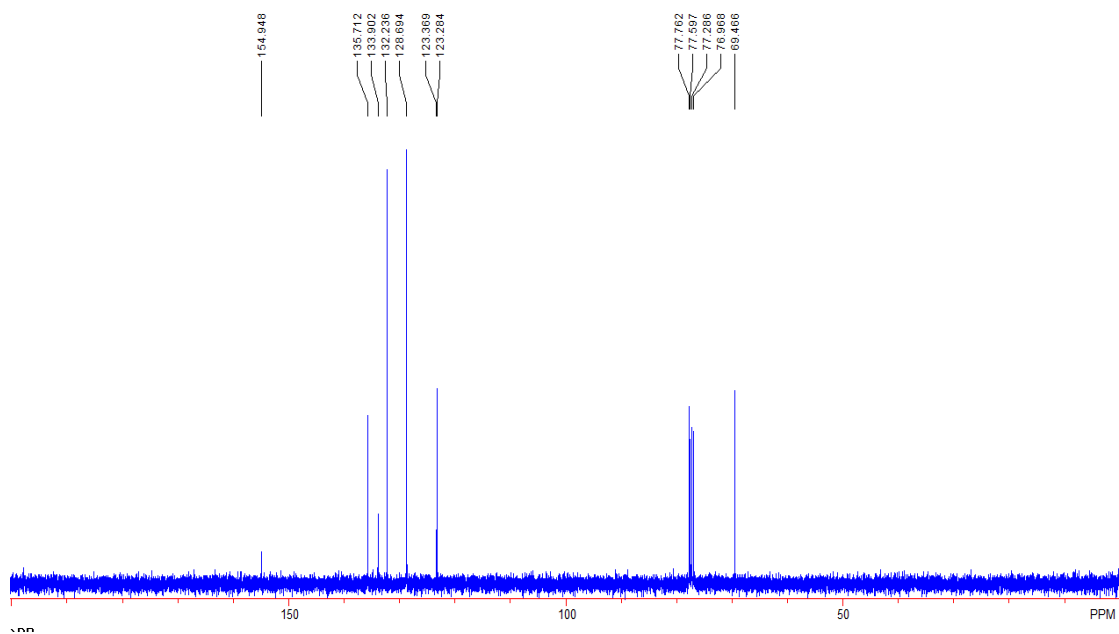
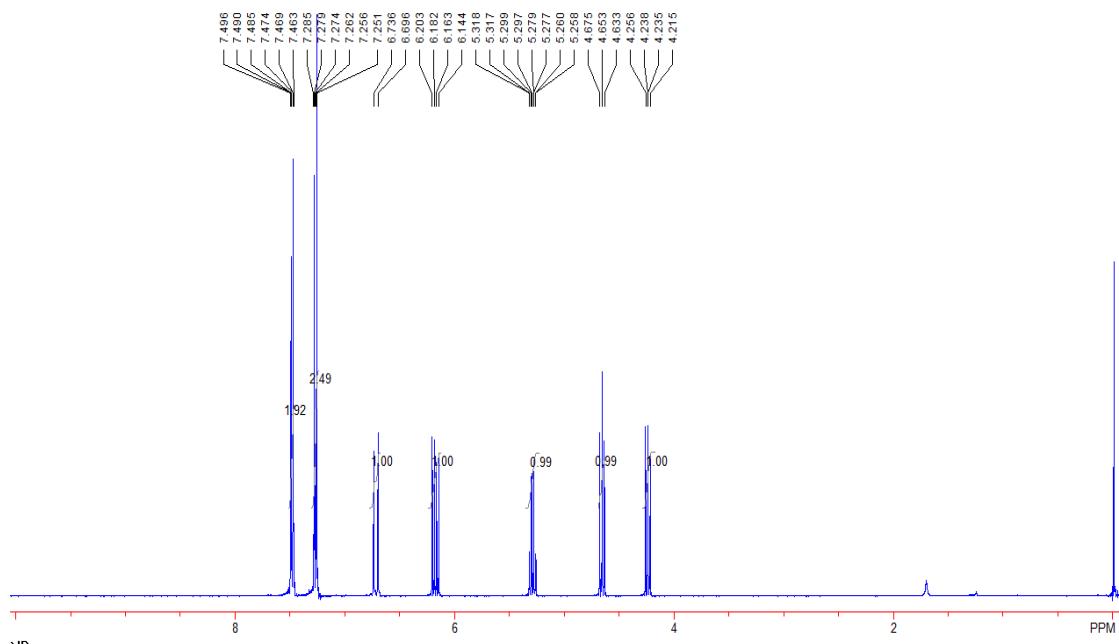
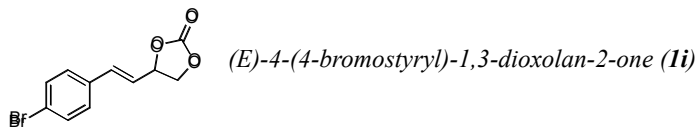


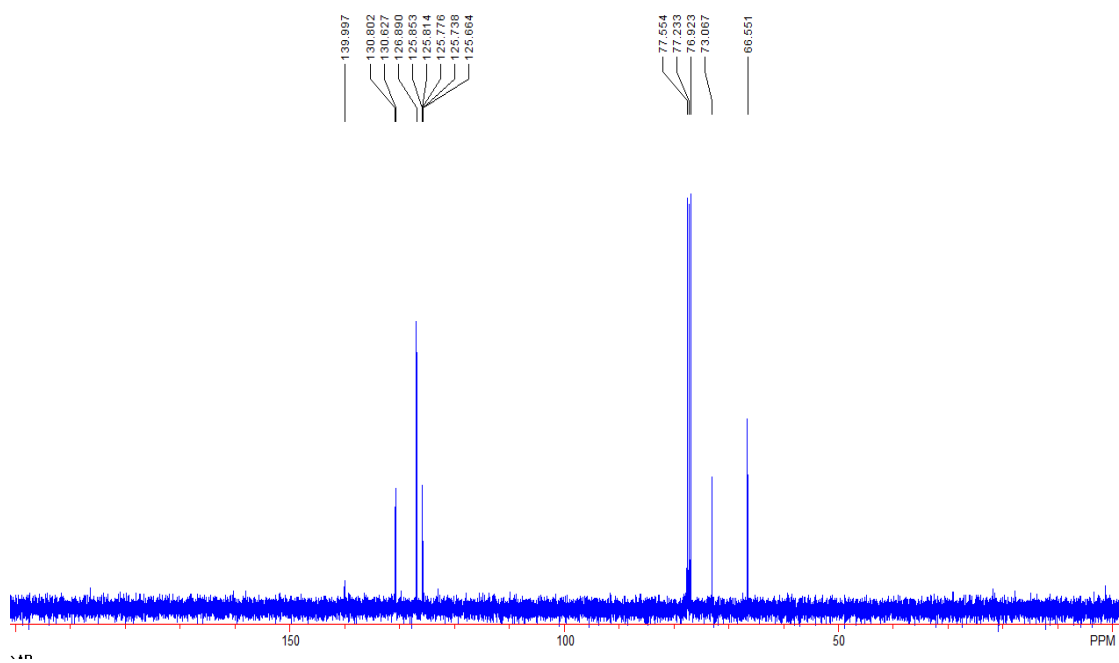
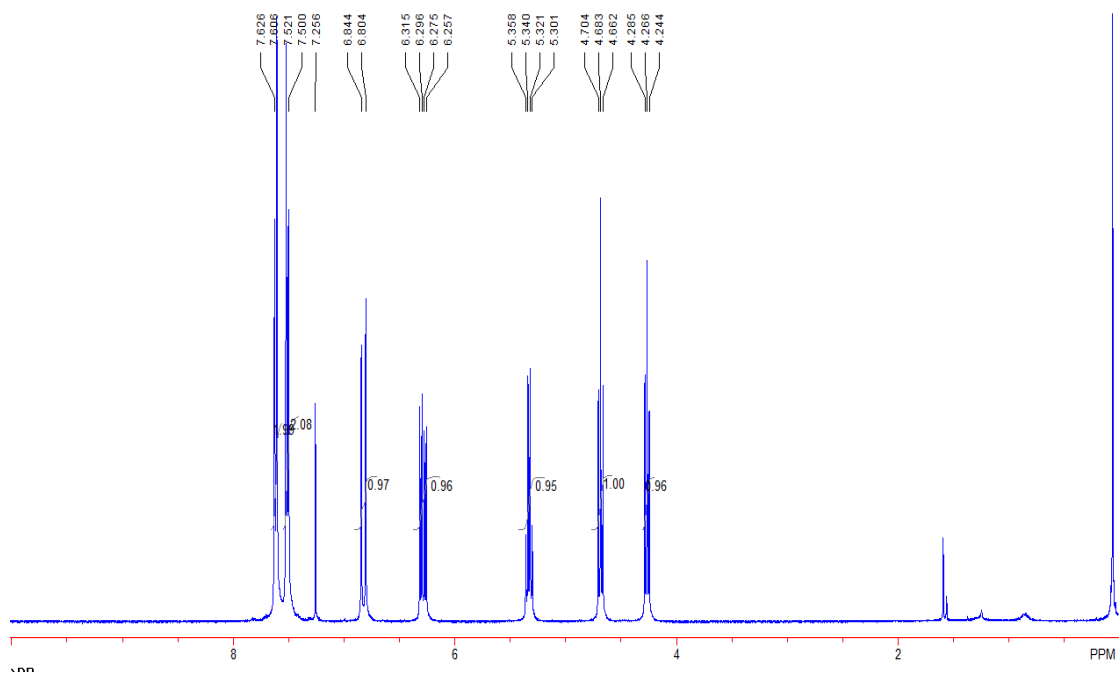
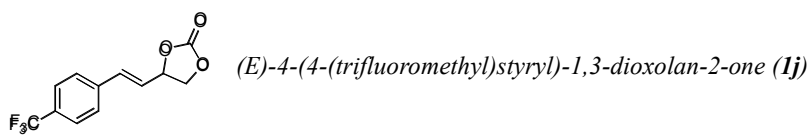


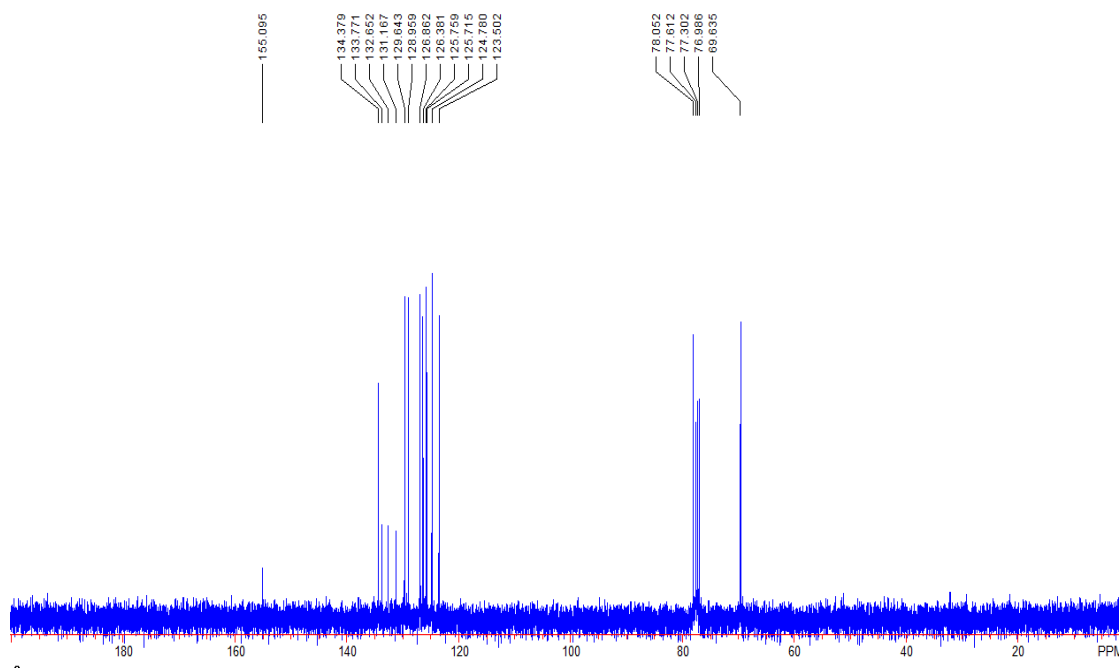
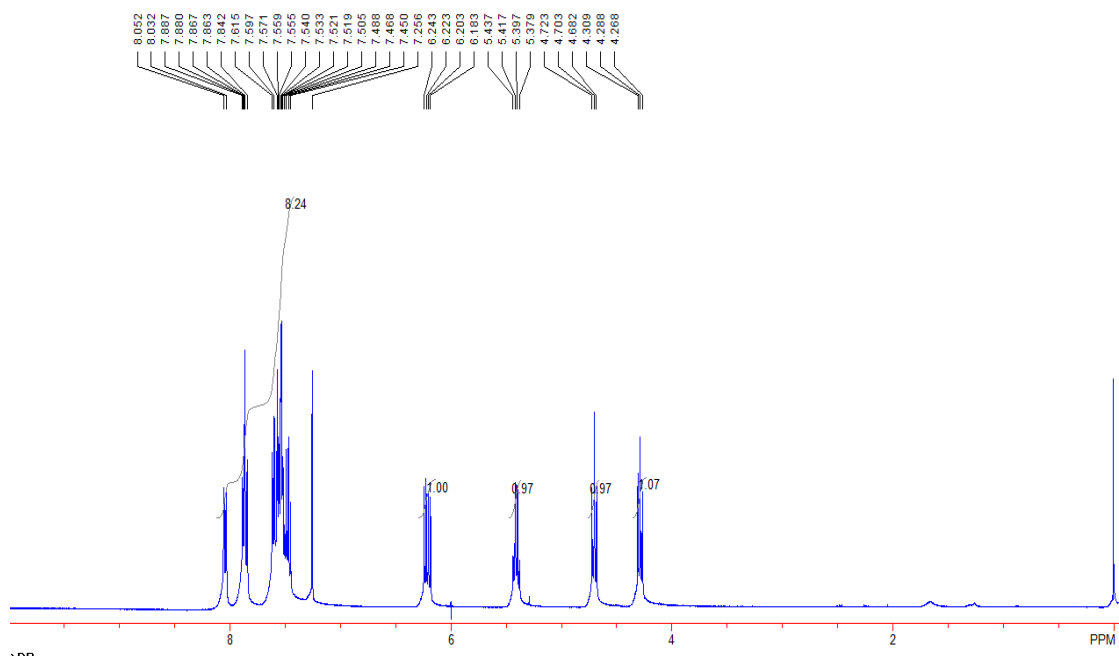
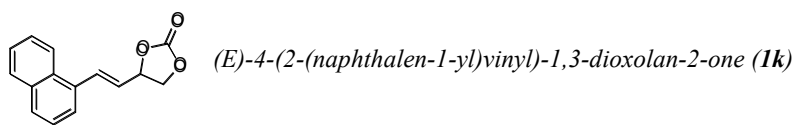


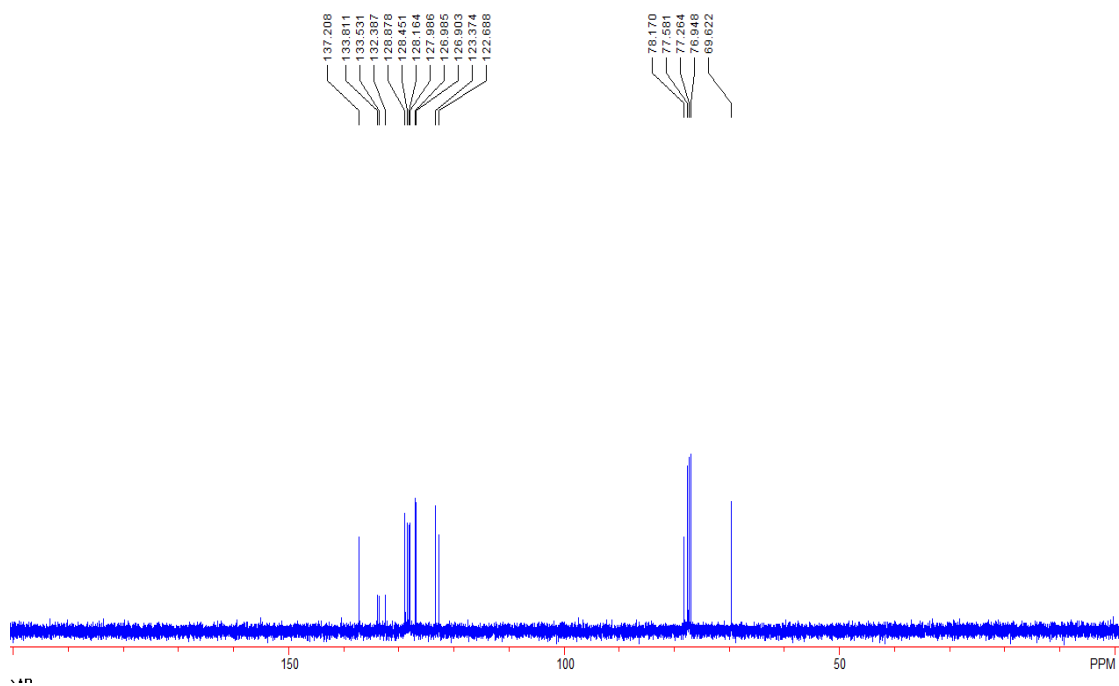
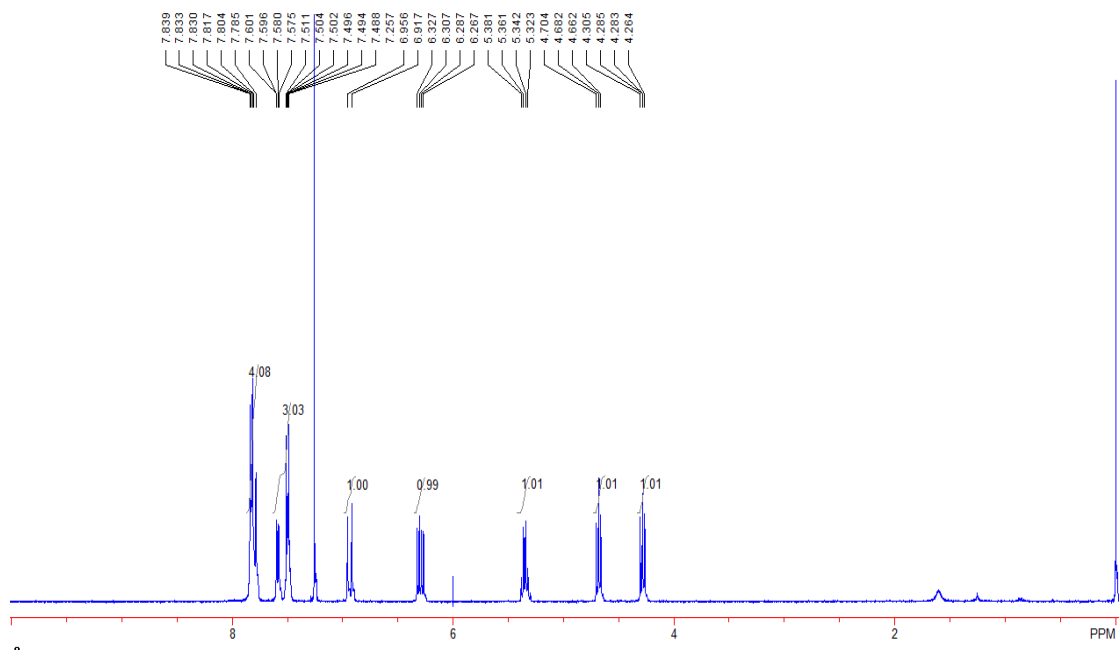


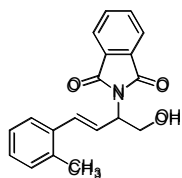




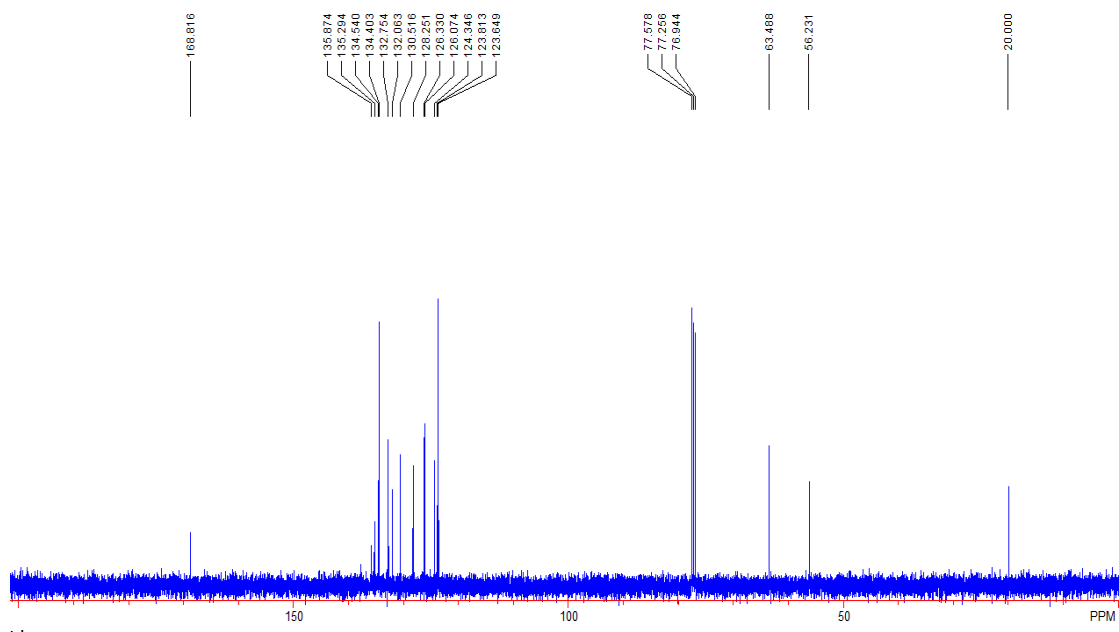
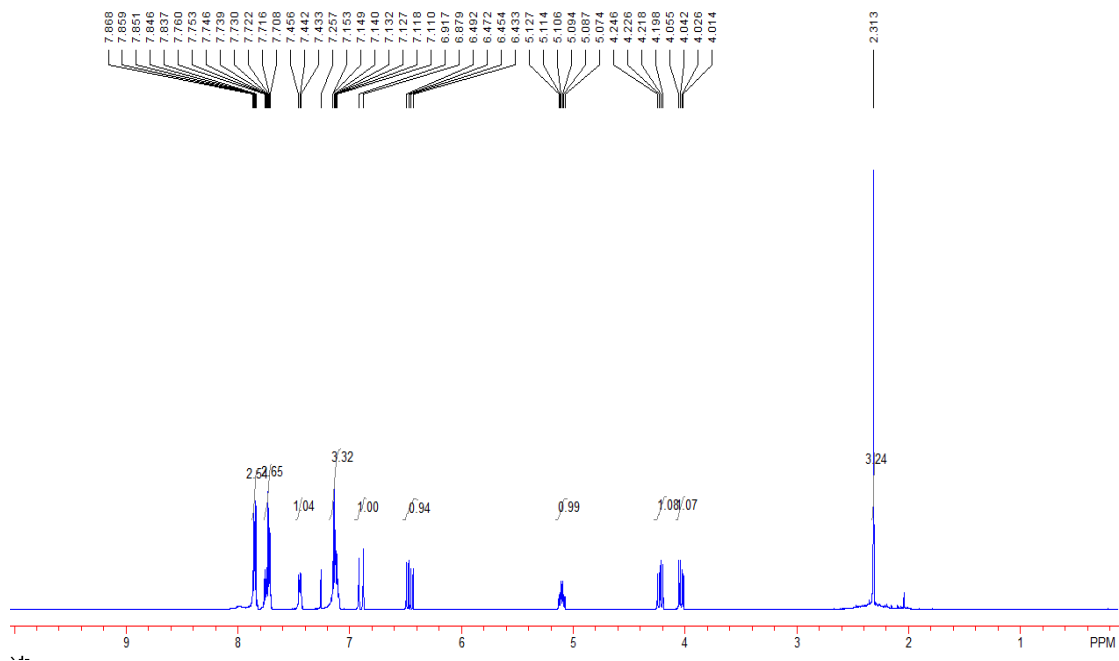


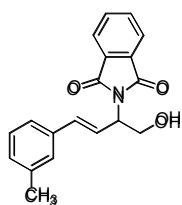




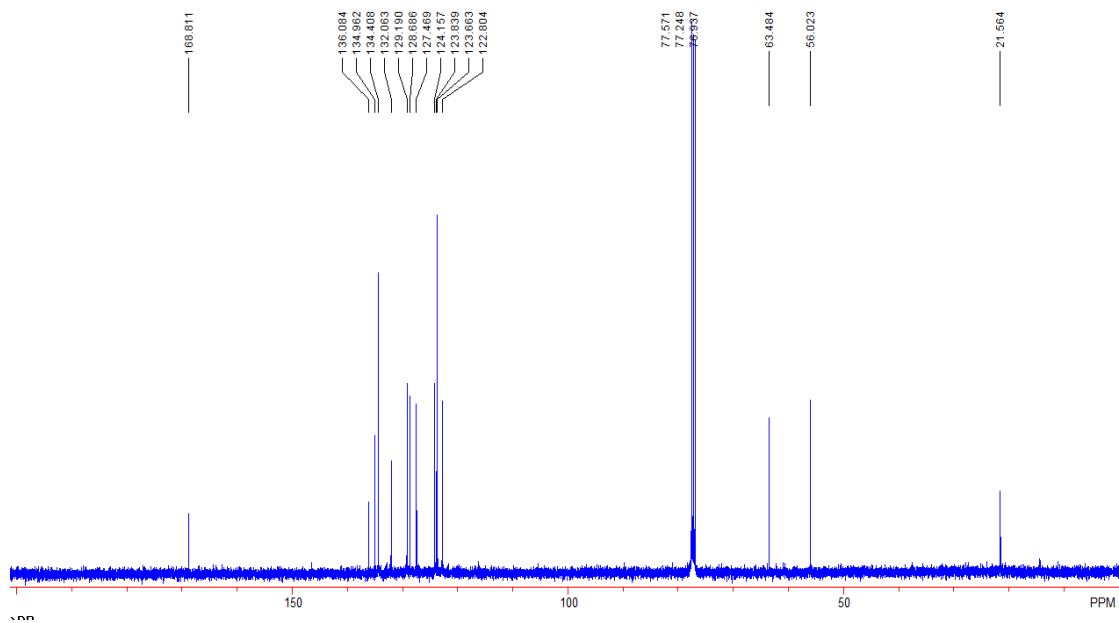
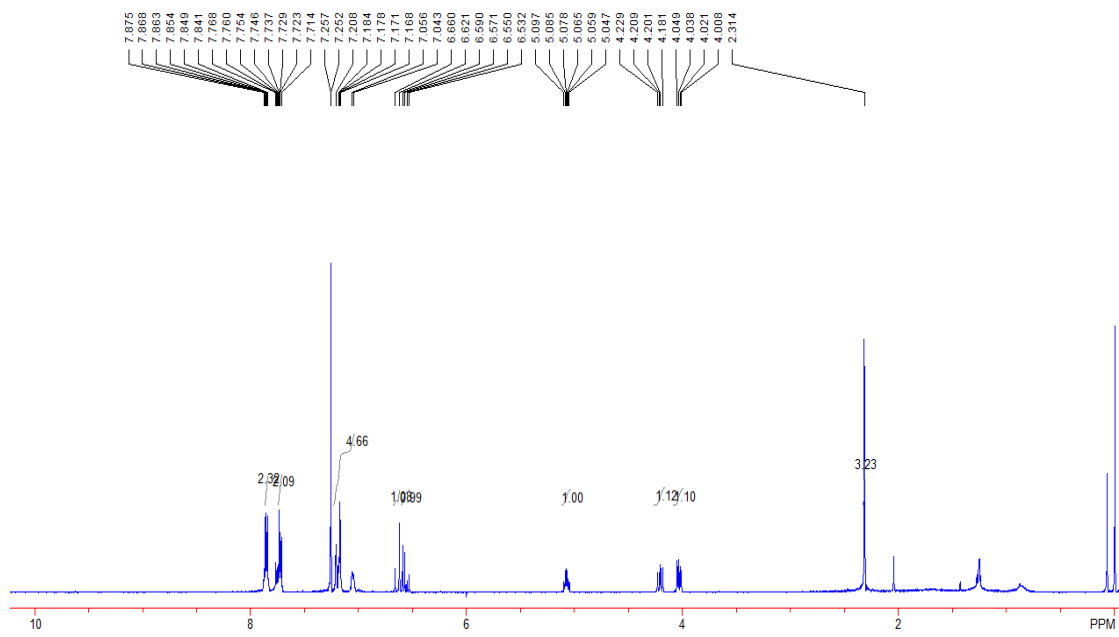


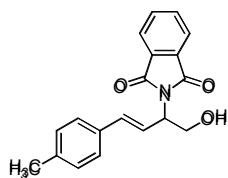
(*E*)-2-(1-hydroxy-4-*o*-tolylbut-3-en-2-yl)isoindoline-1,3-dione (**4b**)



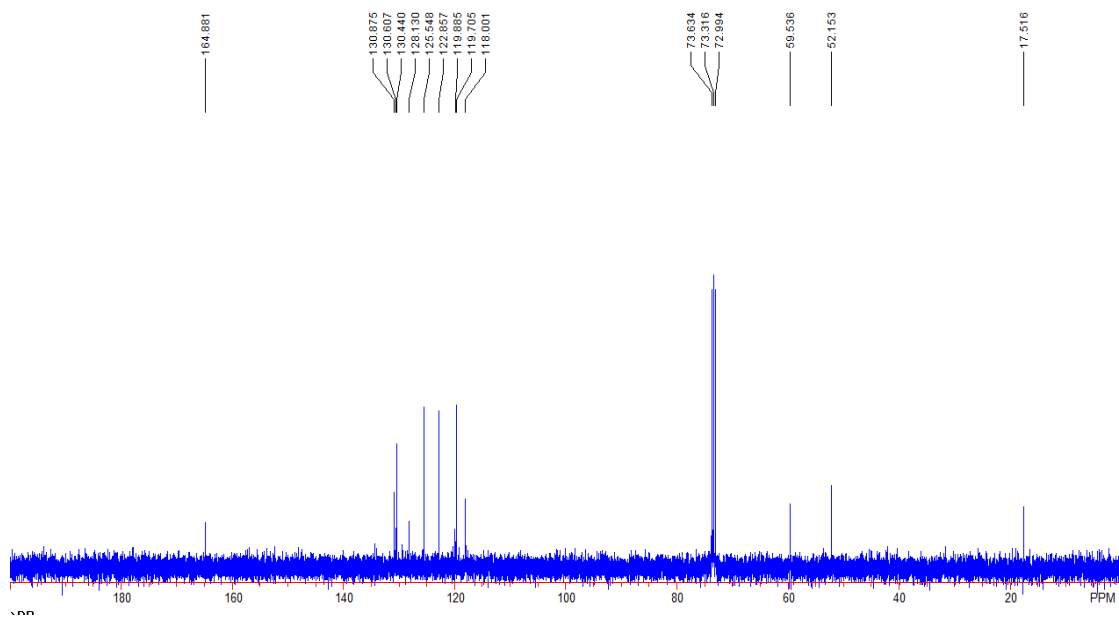
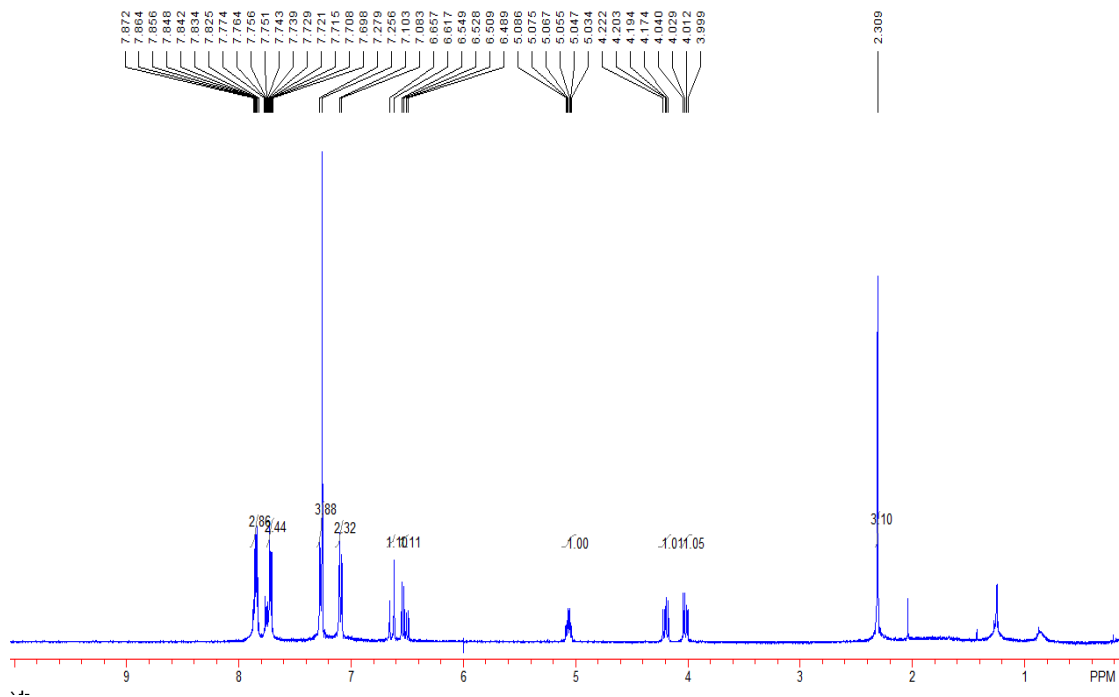


(*E*)-2-(1-hydroxy-4-*m*-tolylbut-3-en-2-yl)isoindoline-1,3-dione (**4c**)

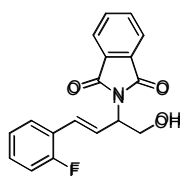




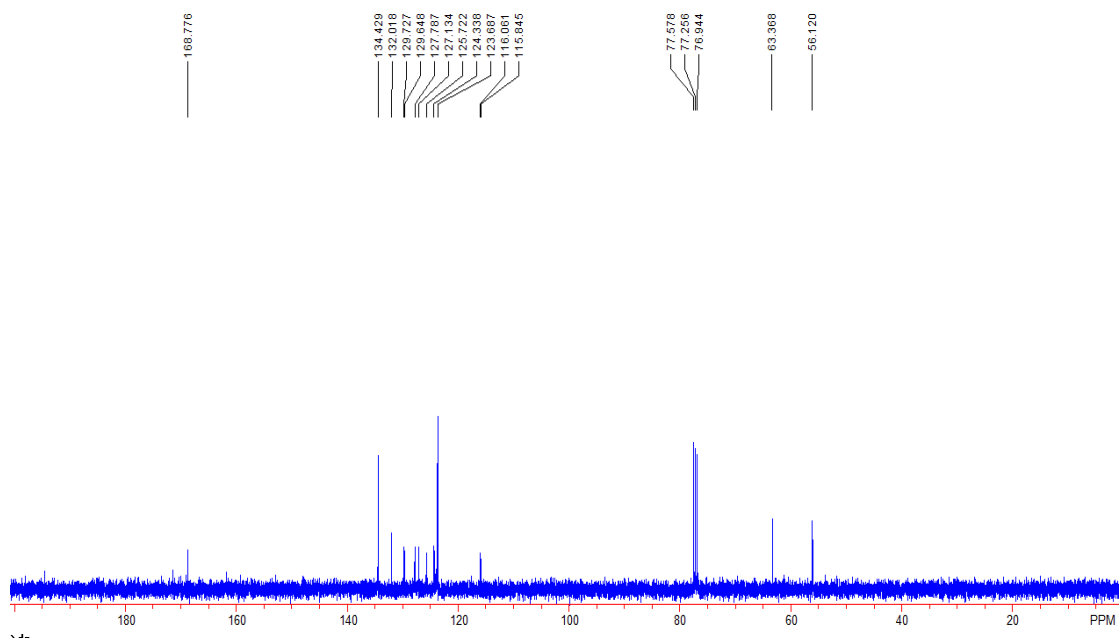
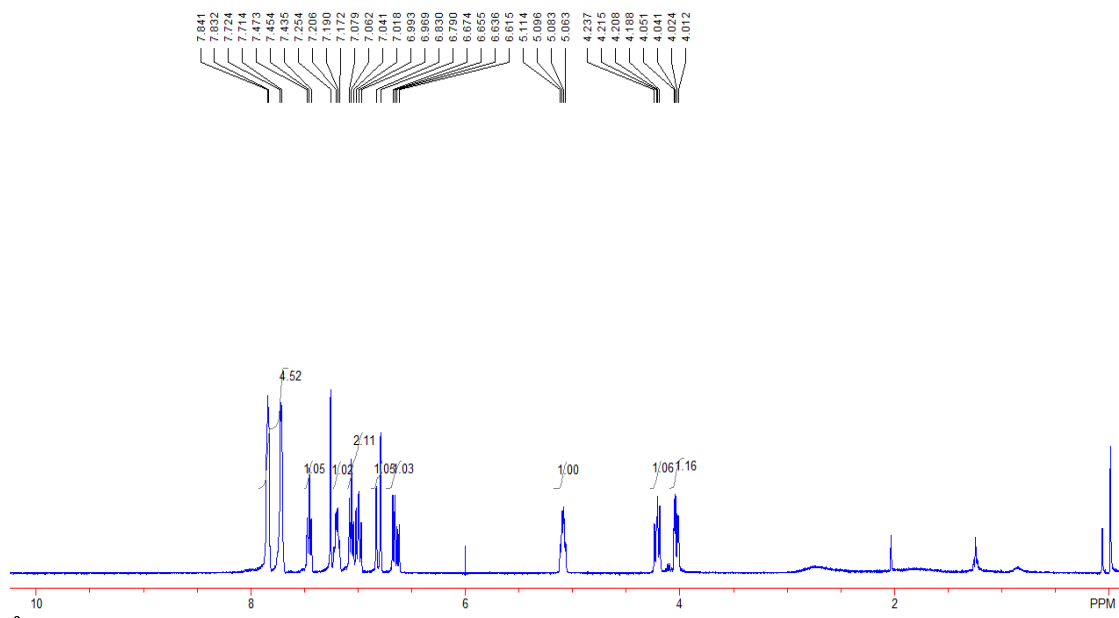
(E)-2-(1-hydroxy-4-p-tolylbut-3-en-2-yl)isoindoline-1,3-dione (**4d**)

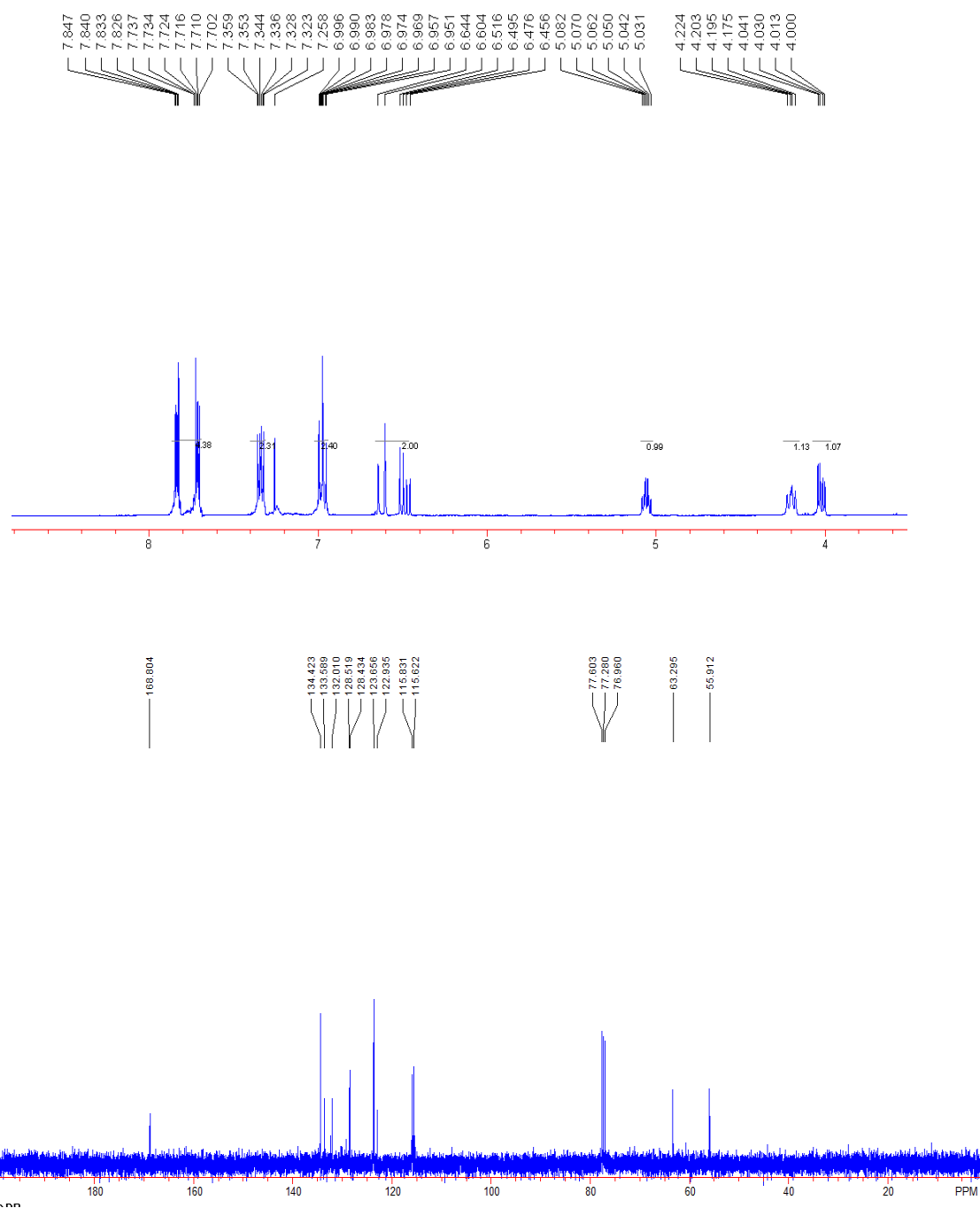
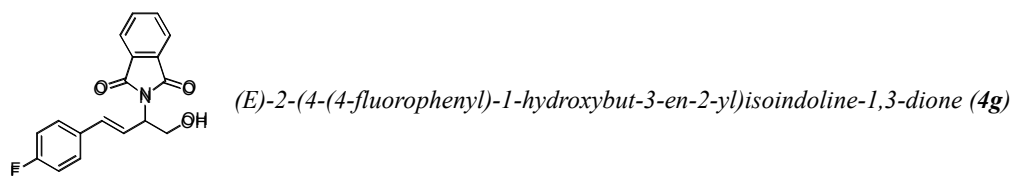


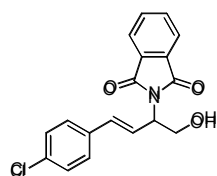




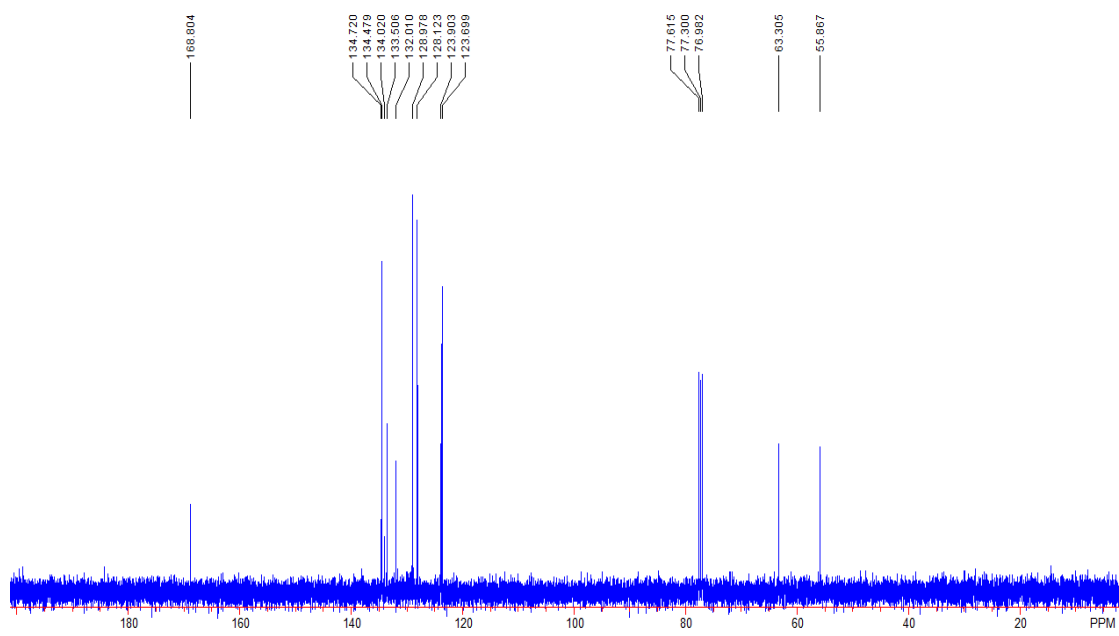
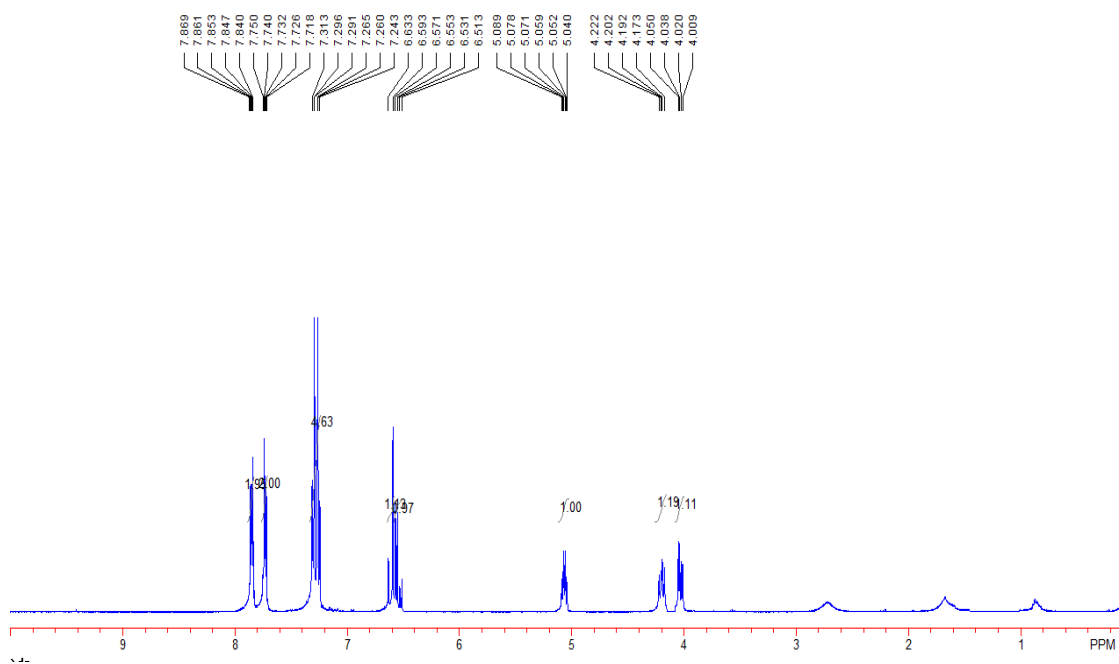
(E)-2-(4-(2-fluorophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (4f)

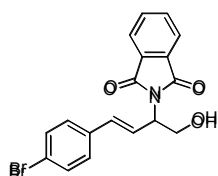




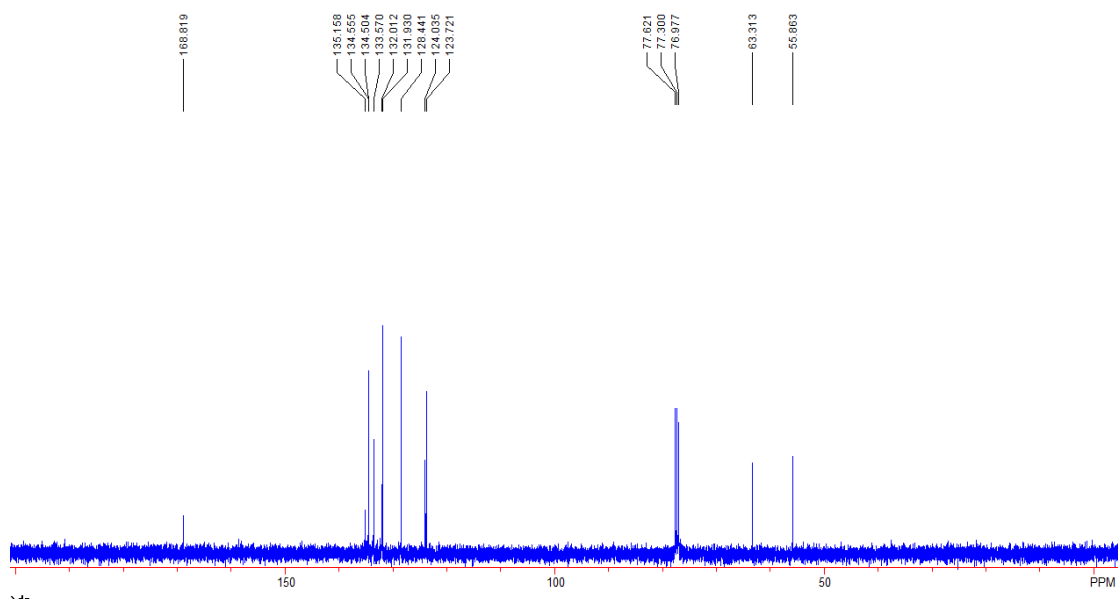
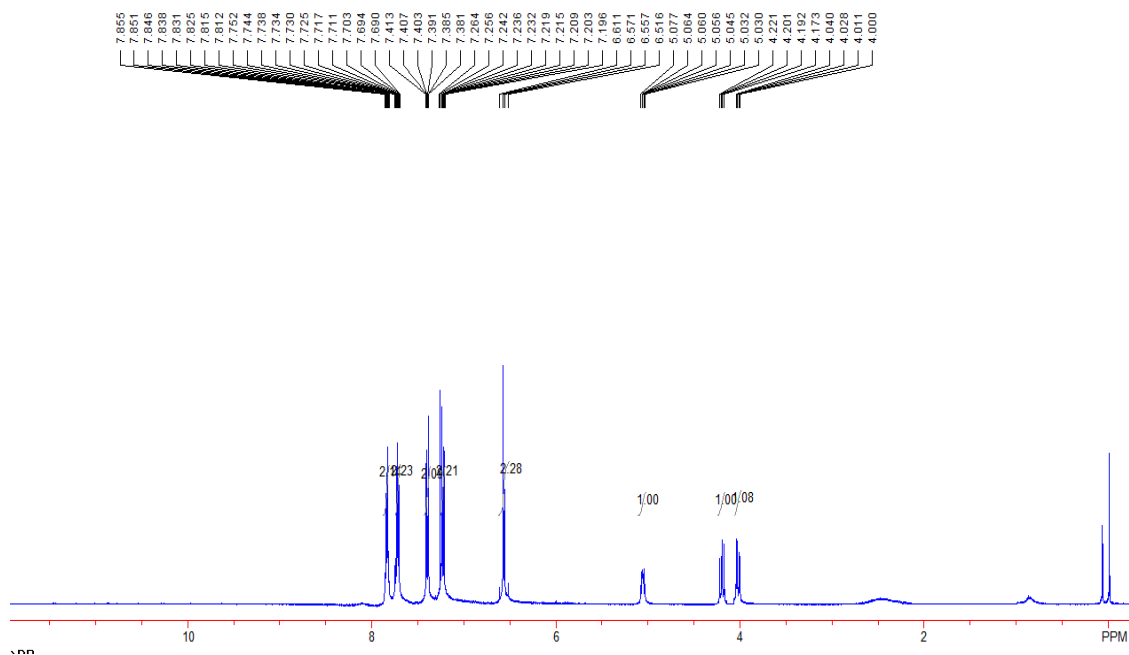


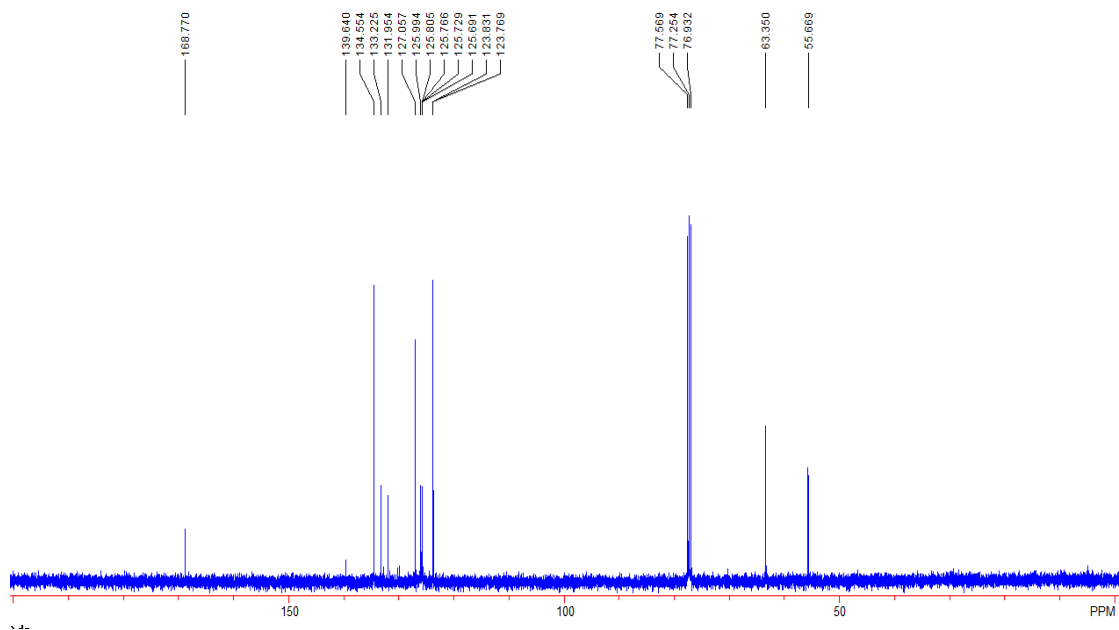
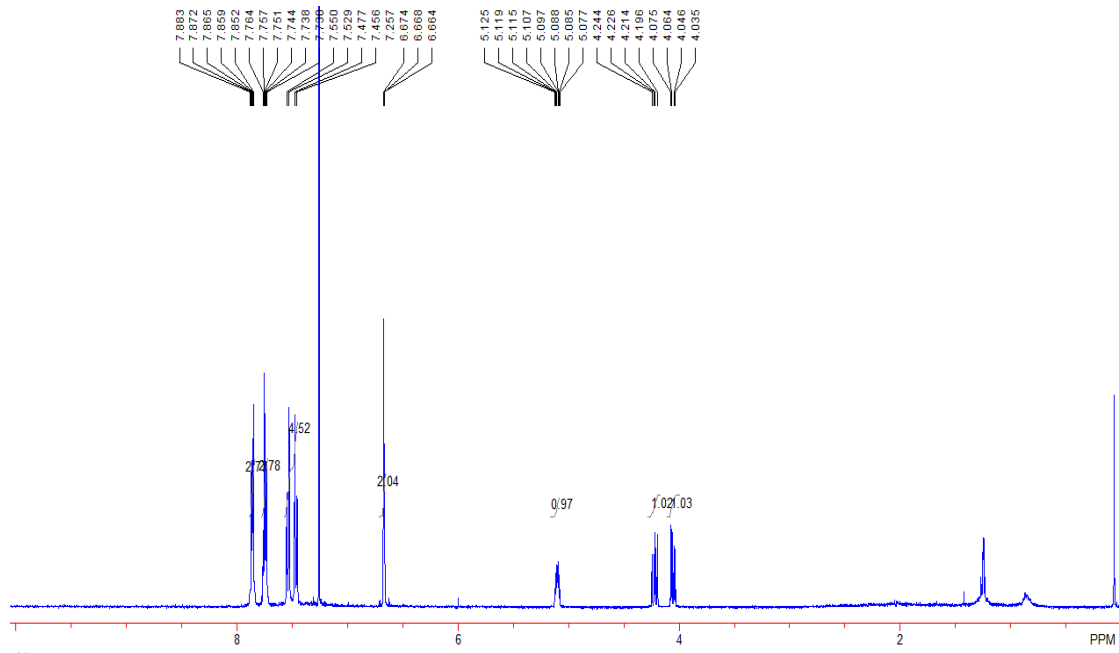
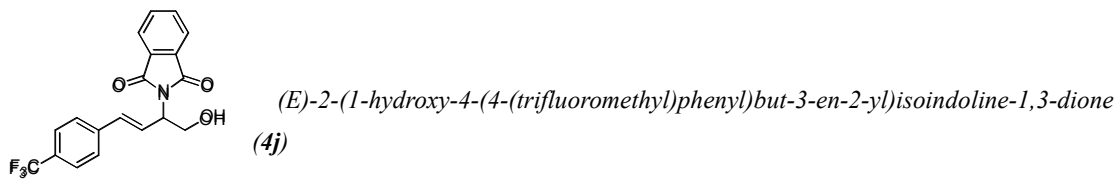
(*E*)-2-(4-(4-chlorophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (**4h**)

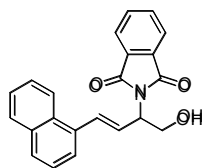




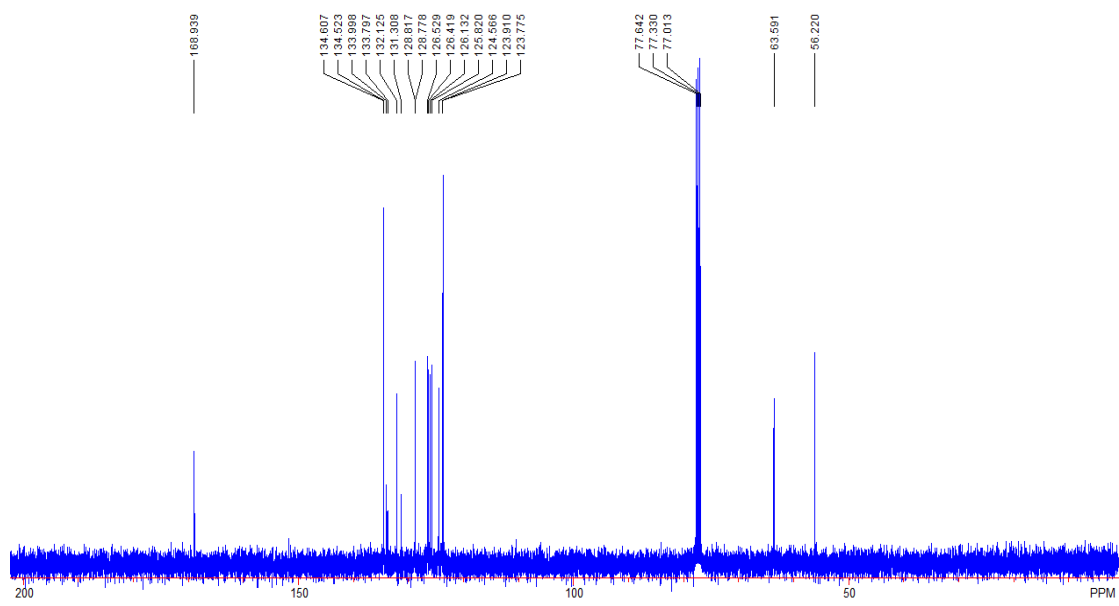
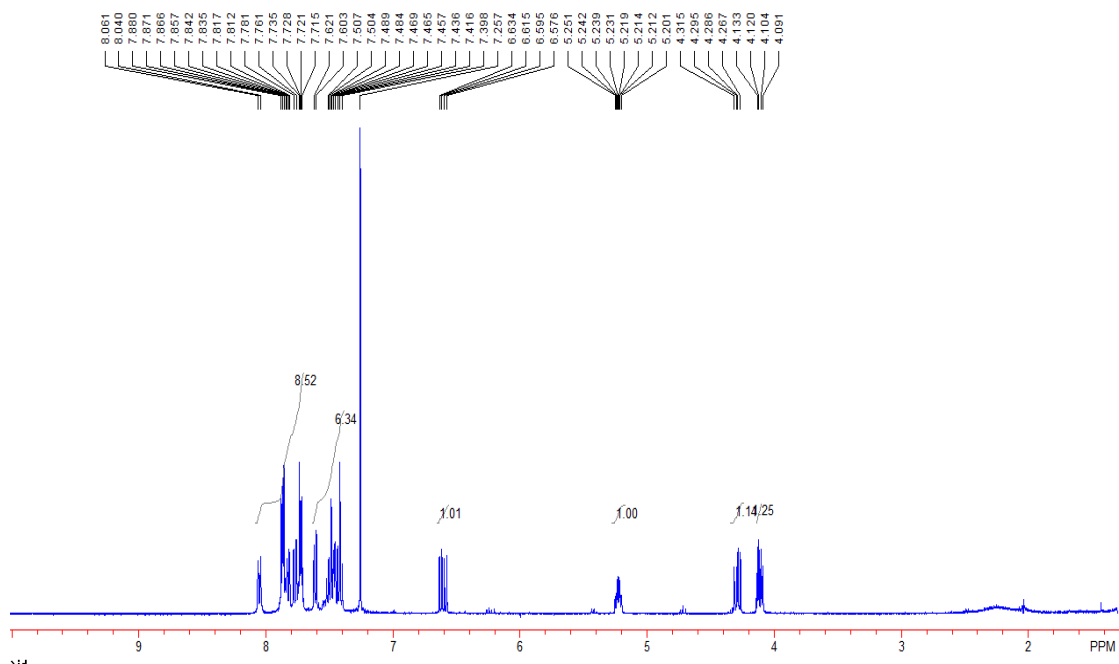
(E)-2-(4-(4-bromophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (**4i**)

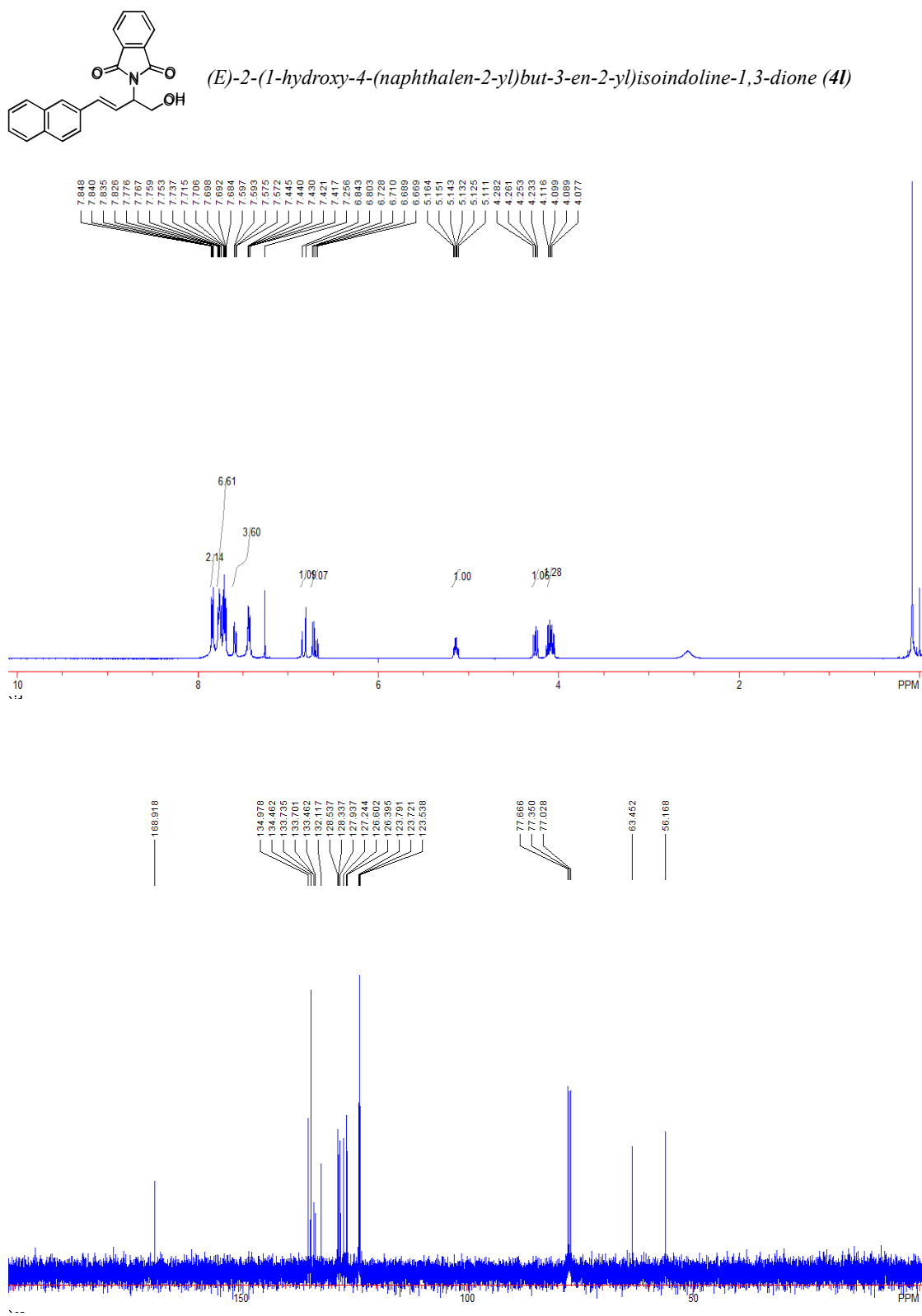


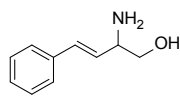




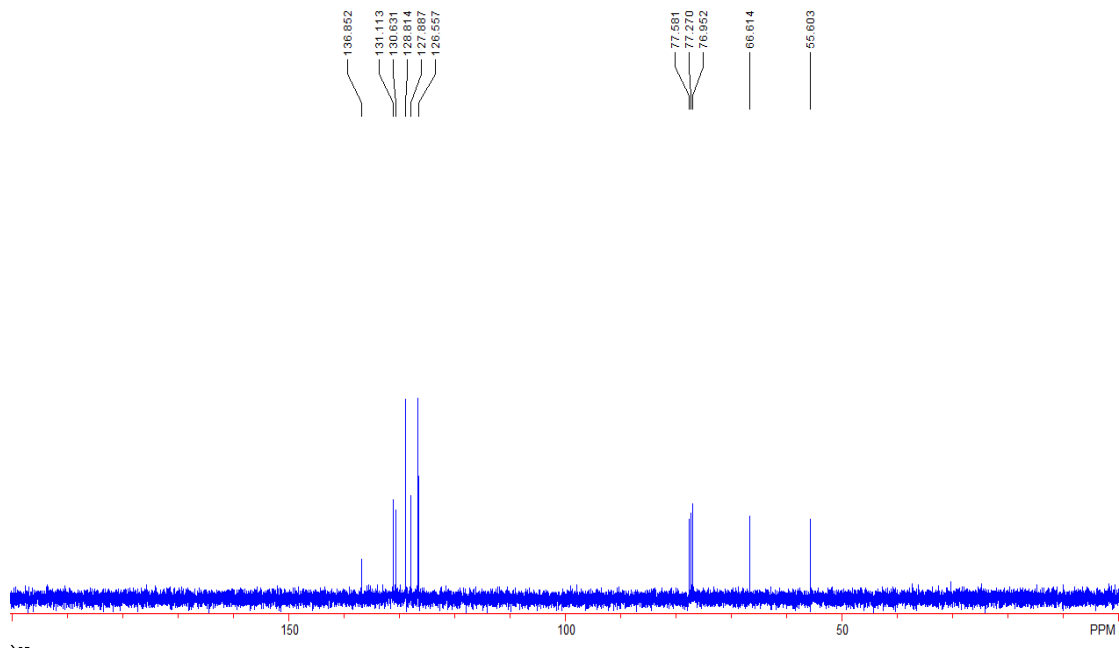
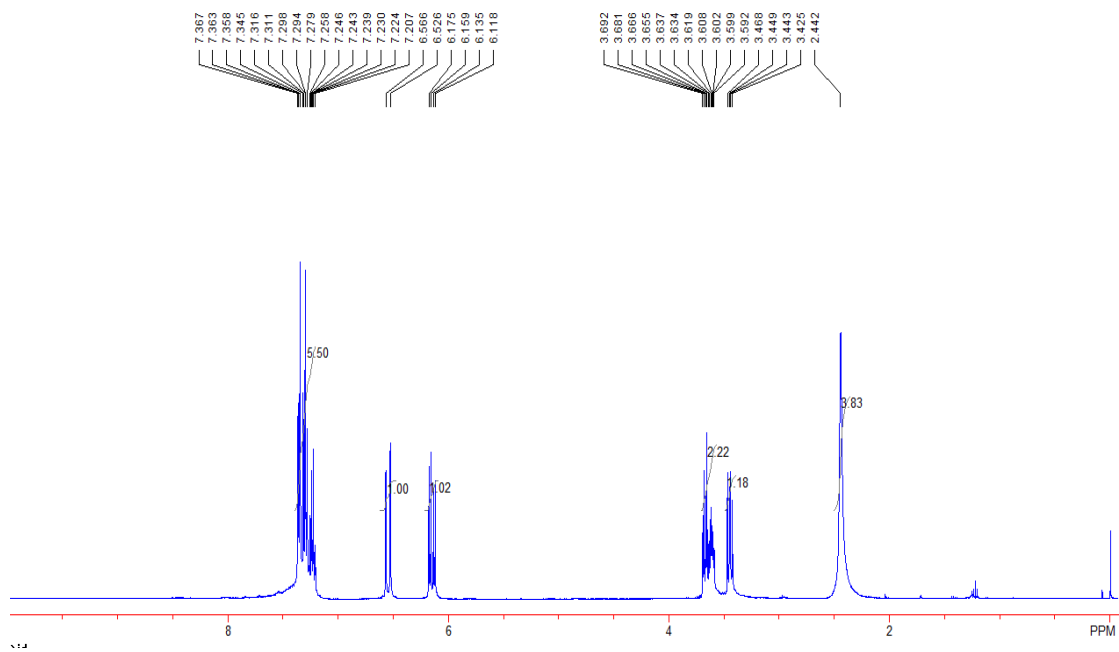
(E)-2-(1-hydroxy-4-(naphthalen-1-yl)but-3-en-2-yl)isoindoline-1,3-dione (**4k**)



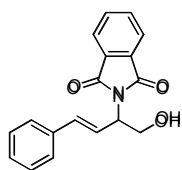




(E)-2-Amino-4-phenylbut-3-en-1-ol (**5a**)

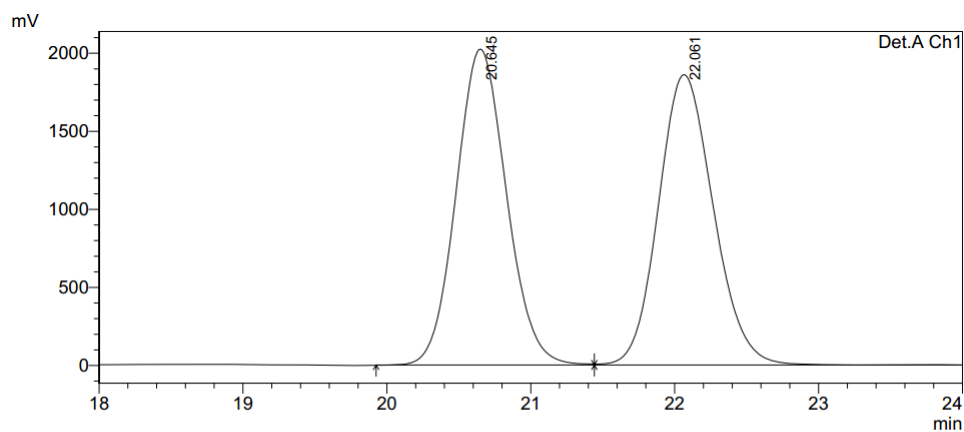






(*E*)-2-(1-hydroxy-4-phenylbut-3-en-2-yl)isoindoline-1,3-dione (**4a**)

Racemate:



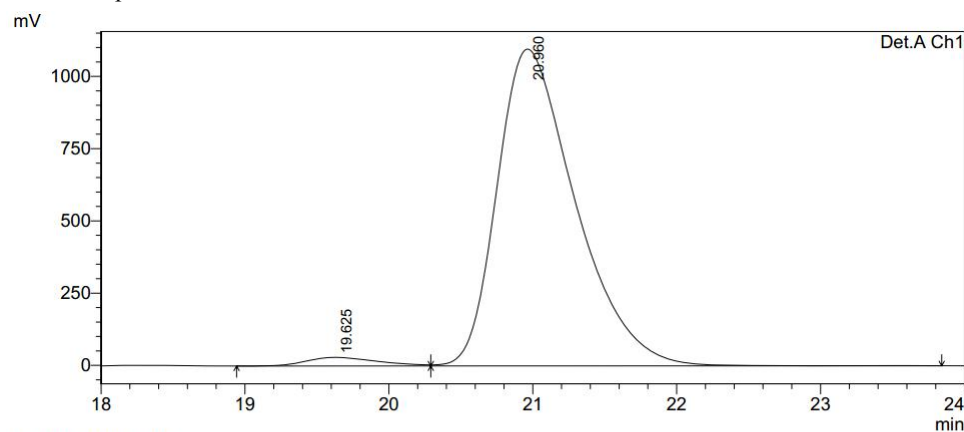
1 Det.A Ch1/254nm

PeakTable

Detector A Ch1 254nm

| Peak# | Ret. Time | Area     | Height  | Area %  | Height % |
|-------|-----------|----------|---------|---------|----------|
| 1     | 20.645    | 49216617 | 2023183 | 49.942  | 52.105   |
| 2     | 22.061    | 49330345 | 1859679 | 50.058  | 47.895   |
| Total |           | 98546962 | 3882862 | 100.000 | 100.000  |

Chiral compound:

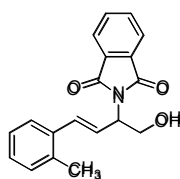


1 Det.A Ch1/254nm

PeakTable

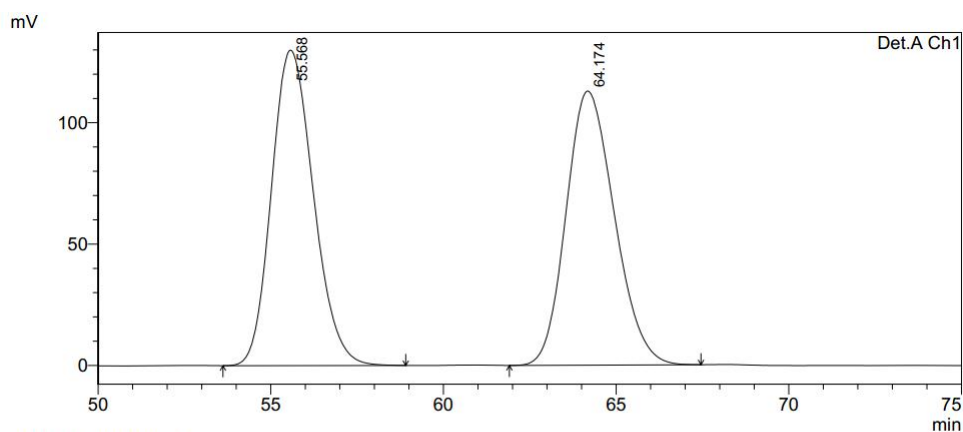
检测器 A Ch1 254nm

| Peak# | Ret. Time | Area     | Height  | Area %  | Height % |
|-------|-----------|----------|---------|---------|----------|
| 1     | 19.625    | 1019308  | 29789   | 2.402   | 2.646    |
| 2     | 20.960    | 41410233 | 1096117 | 97.598  | 97.354   |
| Total |           | 42429541 | 1125906 | 100.000 | 100.000  |



(*E*)-2-(1-hydroxy-4-o-tolylbut-3-en-2-yl)isoindoline-1,3-dione (**4b**)

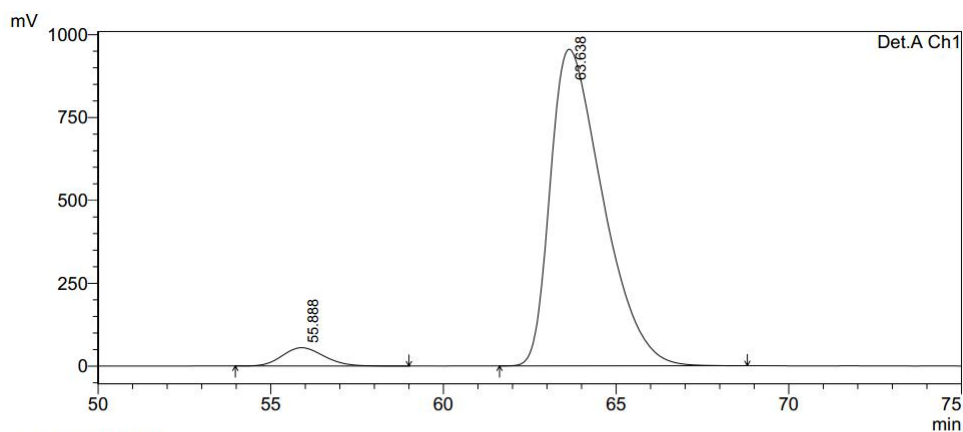
Racemate:



1 Det.A Ch1/254nm

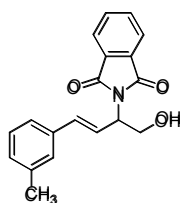
| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 55.568    | 10999207 | 129949 | 50.044  | 53.510   |
| 2               | 64.174    | 10979718 | 112901 | 49.956  | 46.490   |
| Total           |           | 21978925 | 242850 | 100.000 | 100.000  |

Chiral compound:



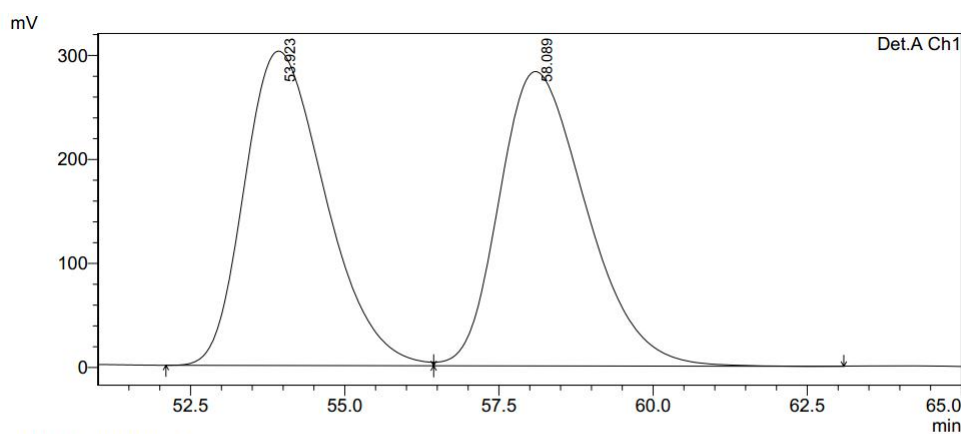
1 Det.A Ch1/254nm

| 检测器 A Ch1 254nm |           |           |         |         |          |
|-----------------|-----------|-----------|---------|---------|----------|
| Peak#           | Ret. Time | Area      | Height  | Area %  | Height % |
| 1               | 55.888    | 4640091   | 55321   | 4.395   | 5.474    |
| 2               | 63.638    | 100946655 | 955281  | 95.605  | 94.526   |
| Total           |           | 105586746 | 1010602 | 100.000 | 100.000  |



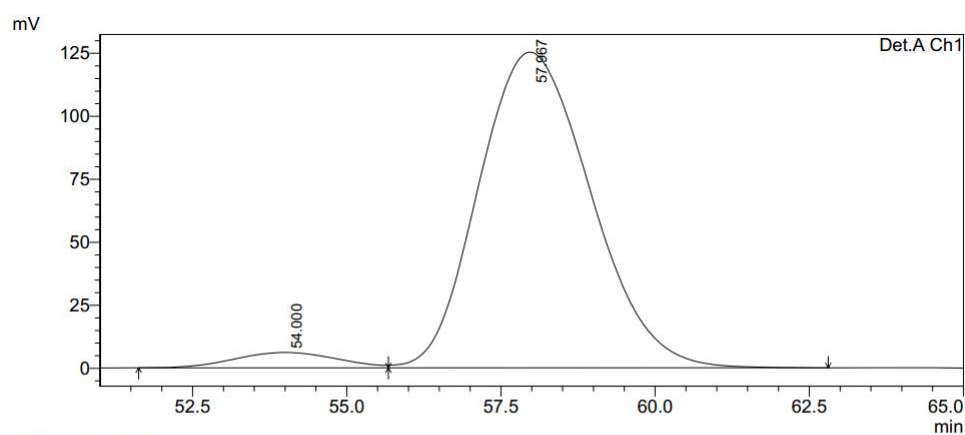
(*E*)-2-(1-hydroxy-4-m-tolylbut-3-en-2-yl)isoindoline-1,3-dione (**4c**)

Racemate:

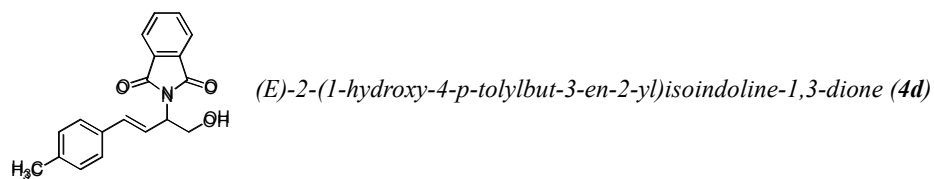


| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| PeakTable       |           |          |        |         |          |
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 53.923    | 27576885 | 302174 | 49.776  | 51.640   |
| 2               | 58.089    | 27825108 | 282980 | 50.224  | 48.360   |
| Total           |           | 55401994 | 585154 | 100.000 | 100.000  |

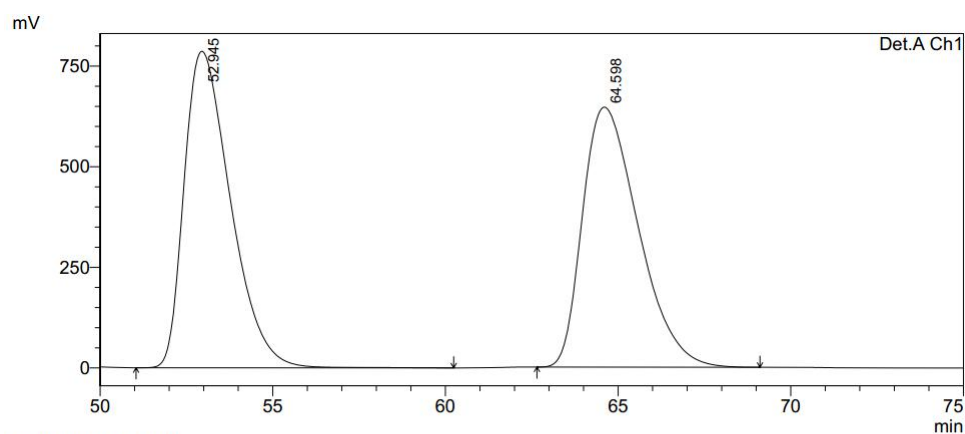
Chiral compound:



| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| PeakTable       |           |          |        |         |          |
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 54.000    | 706577   | 6135   | 4.284   | 4.668    |
| 2               | 57.967    | 15785745 | 125274 | 95.716  | 95.332   |
| Total           |           | 16492321 | 131409 | 100.000 | 100.000  |



Racemate:

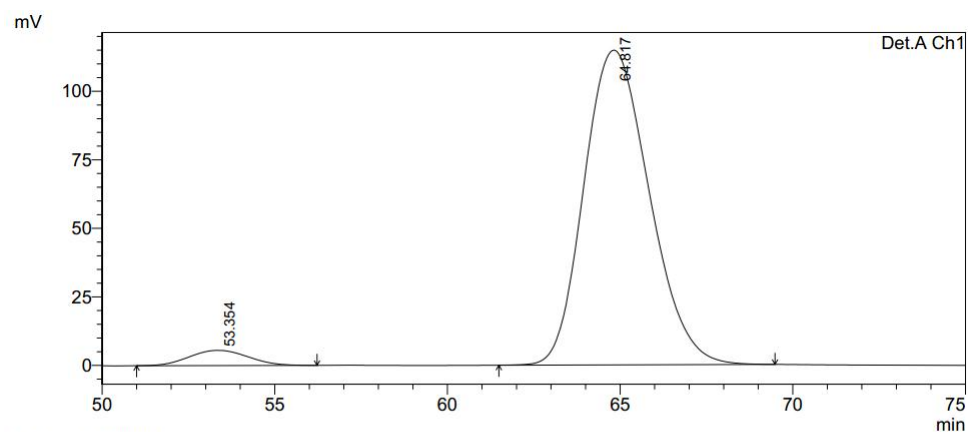


检测器 A Ch1 254nm

| Peak# | Ret. Time | Area      | Height  | Area %  | Height % |
|-------|-----------|-----------|---------|---------|----------|
| 1     | 52.945    | 73441502  | 786606  | 50.249  | 54.909   |
| 2     | 64.598    | 72714263  | 645951  | 49.751  | 45.091   |
| Total |           | 146155765 | 1432557 | 100.000 | 100.000  |

PeakTable

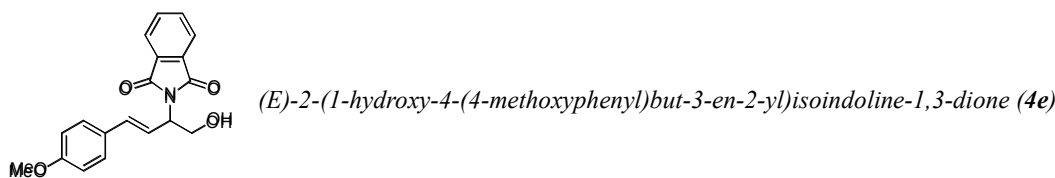
Chiral compound:



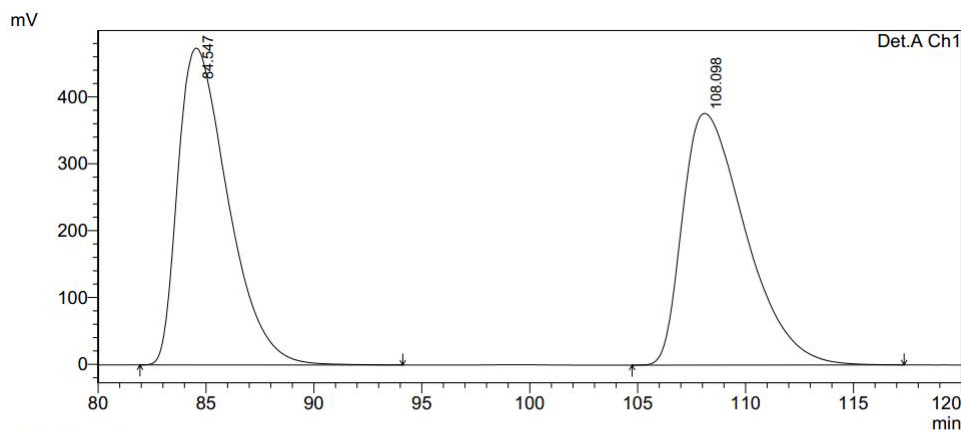
检测器 A Ch1 254nm

| Peak# | Ret. Time | Area     | Height | Area %  | Height % |
|-------|-----------|----------|--------|---------|----------|
| 1     | 53.354    | 659249   | 5553   | 4.183   | 4.613    |
| 2     | 64.817    | 15099950 | 114824 | 95.817  | 95.387   |
| Total |           | 15759199 | 120377 | 100.000 | 100.000  |

PeakTable



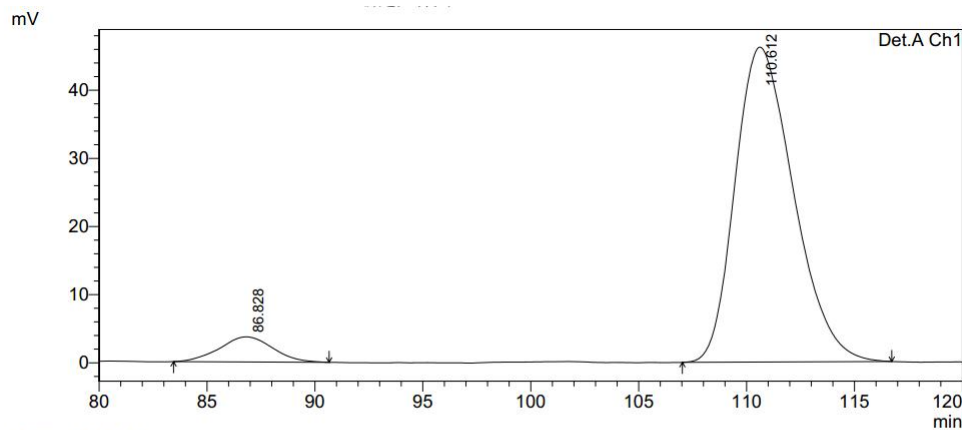
Racemate:



1 Det.A Ch1/254nm

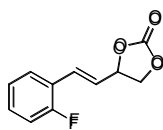
| 检测器 A Ch1 254nm |           |           |        |         |          |
|-----------------|-----------|-----------|--------|---------|----------|
| PeakTable       |           |           |        |         |          |
| Peak#           | Ret. Time | Area      | Height | Area %  | Height % |
| 1               | 84.547    | 76551940  | 473783 | 50.010  | 55.729   |
| 2               | 108.098   | 76519874  | 376367 | 49.990  | 44.271   |
| Total           |           | 153071814 | 850149 | 100.000 | 100.000  |

Chiral compound:



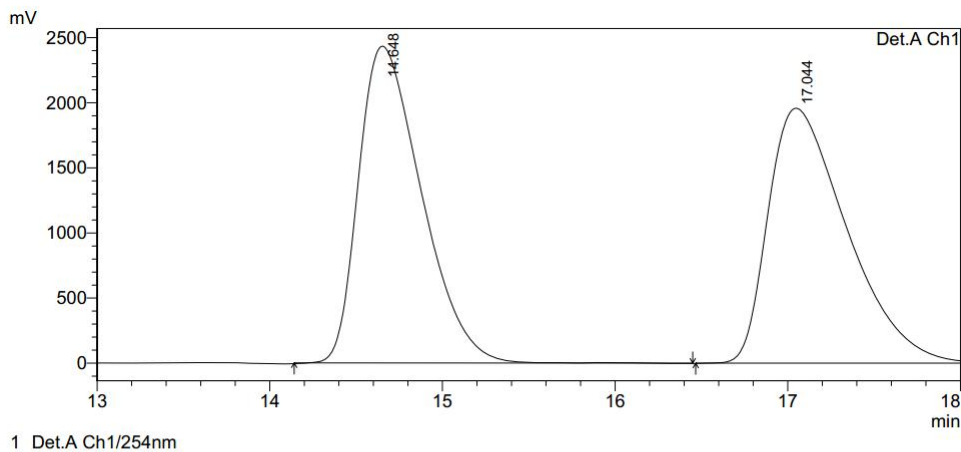
1 Det.A Ch1/254nm

| 检测器 A Ch1 254nm |           |         |        |         |          |
|-----------------|-----------|---------|--------|---------|----------|
| PeakTable       |           |         |        |         |          |
| Peak#           | Ret. Time | Area    | Height | Area %  | Height % |
| 1               | 86.828    | 634147  | 3687   | 6.795   | 7.389    |
| 2               | 110.612   | 8697742 | 46217  | 93.205  | 92.611   |
| Total           |           | 9331889 | 49904  | 100.000 | 100.000  |



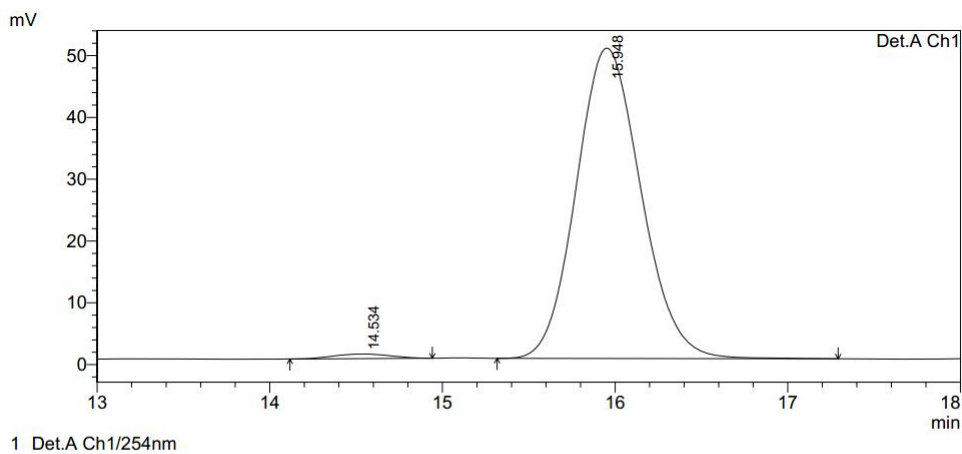
(E)-2-(4-(2-fluorophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (**4f**)

Racemate:

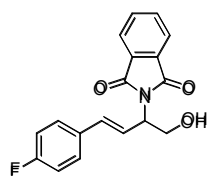


| PeakTable       |           |           |         |         |          |
|-----------------|-----------|-----------|---------|---------|----------|
| 检测器 A Ch1 254nm |           |           |         |         |          |
| Peak#           | Ret. Time | Area      | Height  | Area %  | Height % |
| 1               | 14.648    | 61599082  | 2433148 | 49.850  | 55.423   |
| 2               | 17.044    | 61969177  | 1956981 | 50.150  | 44.577   |
| Total           |           | 123568260 | 4390130 | 100.000 | 100.000  |

Chiral compound:

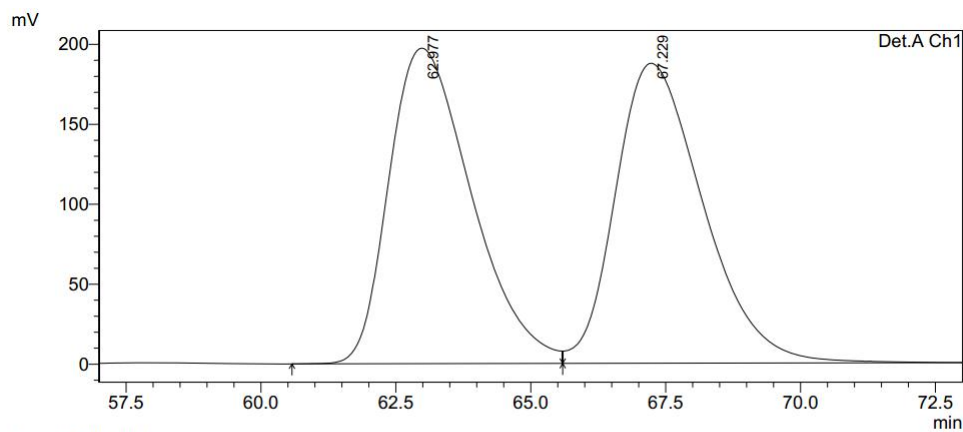


| PeakTable       |           |         |        |         |          |
|-----------------|-----------|---------|--------|---------|----------|
| 检测器 A Ch1 254nm |           |         |        |         |          |
| Peak#           | Ret. Time | Area    | Height | Area %  | Height % |
| 1               | 14.534    | 17199   | 758    | 1.295   | 1.487    |
| 2               | 15.948    | 1310763 | 50231  | 98.705  | 98.513   |
| Total           |           | 1327962 | 50989  | 100.000 | 100.000  |



(E)-2-(4-(4-fluorophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (**4g**)

Racemate:

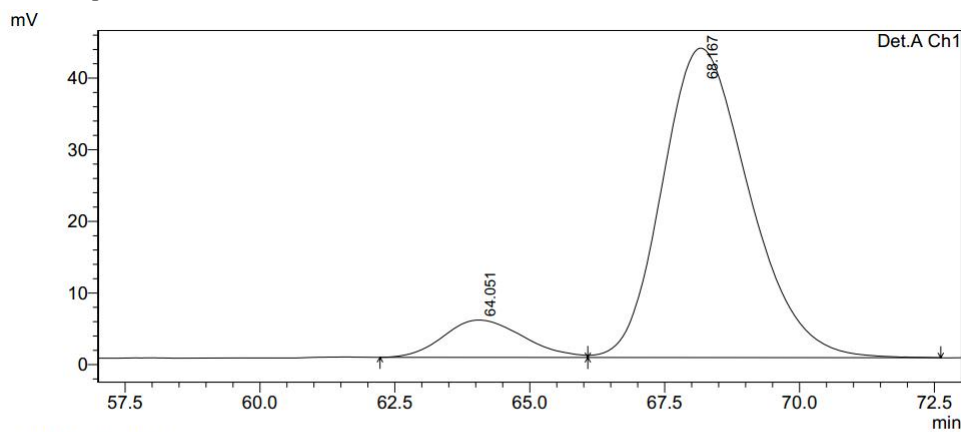


1 Det.A Ch1/254nm

PeakTable

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 62.977    | 20996872 | 197266 | 49.752  | 51.266   |
| 2               | 67.229    | 21206102 | 187526 | 50.248  | 48.734   |
| Total           |           | 42202974 | 384792 | 100.000 | 100.000  |

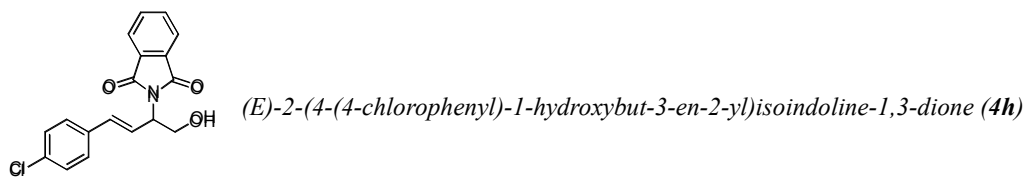
Chiral compound:



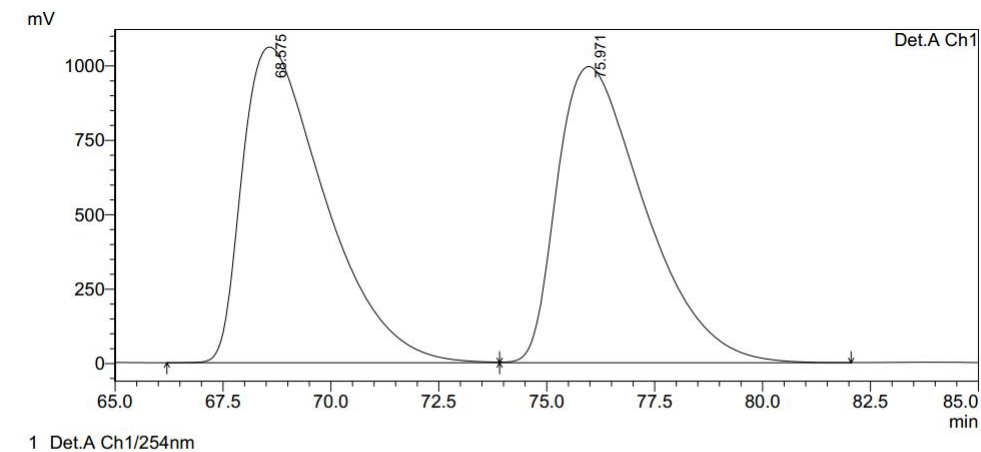
1 Det.A Ch1/254nm

峰表

| 检测器 A Ch1 254nm |        |         |       |         |         |
|-----------------|--------|---------|-------|---------|---------|
| 峰#              | 保留时间   | 面积      | 高度    | 面积 %    | 高度 %    |
| 1               | 64.051 | 535709  | 5210  | 9.963   | 10.762  |
| 2               | 68.167 | 4841541 | 43200 | 90.037  | 89.238  |
| Total           |        | 5377250 | 48410 | 100.000 | 100.000 |

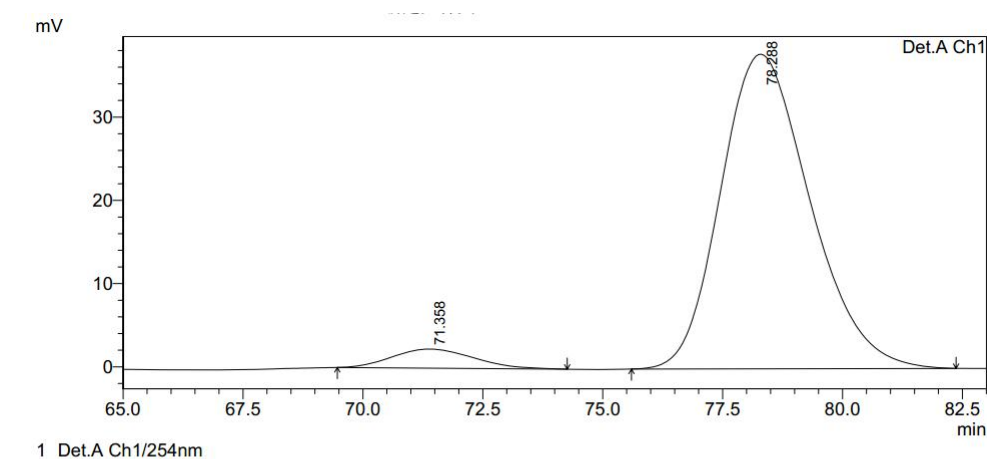


Racemate:



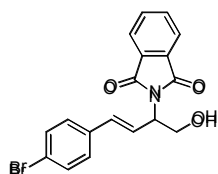
| 检测器 A Ch1 254nm |           |           |         |         |          |
|-----------------|-----------|-----------|---------|---------|----------|
| Peak#           | Ret. Time | Area      | Height  | Area %  | Height % |
| 1               | 68.575    | 141345546 | 1060409 | 50.098  | 51.596   |
| 2               | 75.971    | 140793772 | 994821  | 49.902  | 48.404   |
| Total           |           | 282139318 | 2055230 | 100.000 | 100.000  |

Chiral compound:



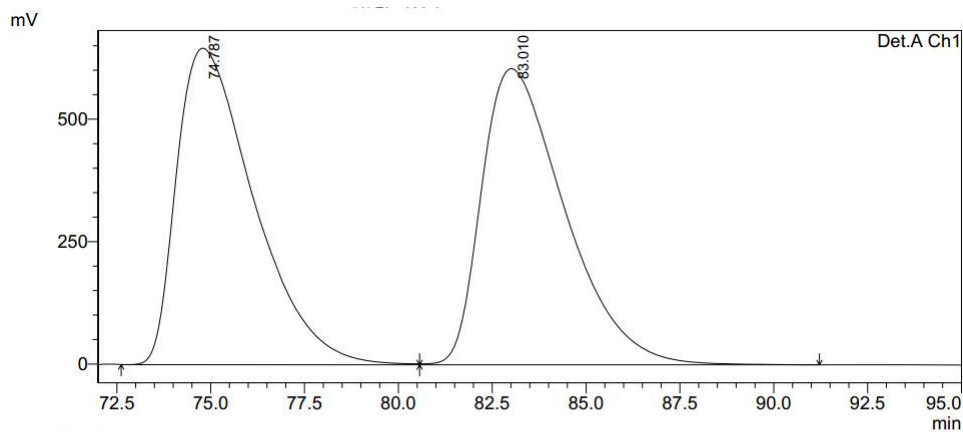
| 检测器 A Ch1 254nm |           |         |        |         |          |
|-----------------|-----------|---------|--------|---------|----------|
| Peak#           | Ret. Time | Area    | Height | Area %  | Height % |
| 1               | 71.358    | 270750  | 2297   | 5.244   | 5.730    |
| 2               | 78.288    | 4891974 | 37792  | 94.756  | 94.270   |
| Total           |           | 5162724 | 40089  | 100.000 | 100.000  |





(E)-2-(4-(4-bromophenyl)-1-hydroxybut-3-en-2-yl)isoindoline-1,3-dione (**4i**)

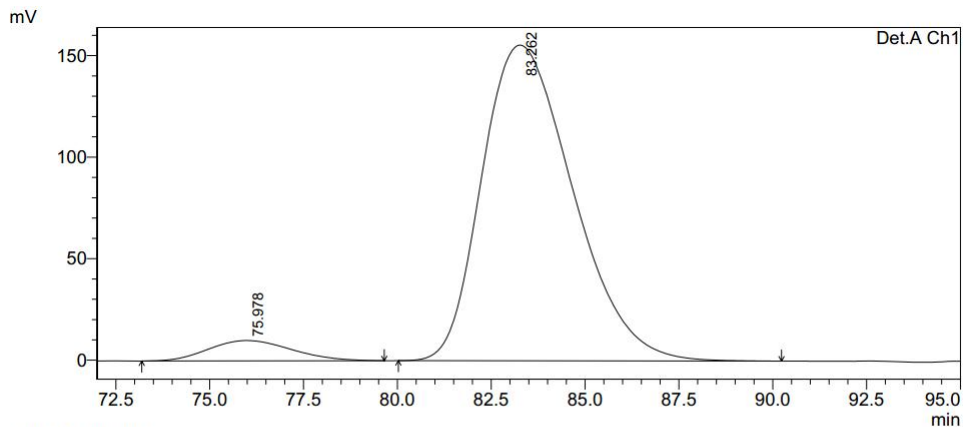
Racemate:



1 Det.A Ch1/254nm

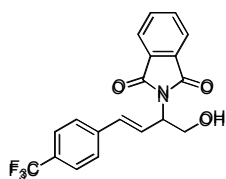
| 检测器 A Ch1 254nm |           |           |         |         |          |
|-----------------|-----------|-----------|---------|---------|----------|
| PeakTable       |           |           |         |         |          |
| Peak#           | Ret. Time | Area      | Height  | Area %  | Height % |
| 1               | 74.787    | 92656034  | 646434  | 49.843  | 51.667   |
| 2               | 83.010    | 93238993  | 604718  | 50.157  | 48.333   |
| Total           |           | 185895027 | 1251153 | 100.000 | 100.000  |

Chiral compound:



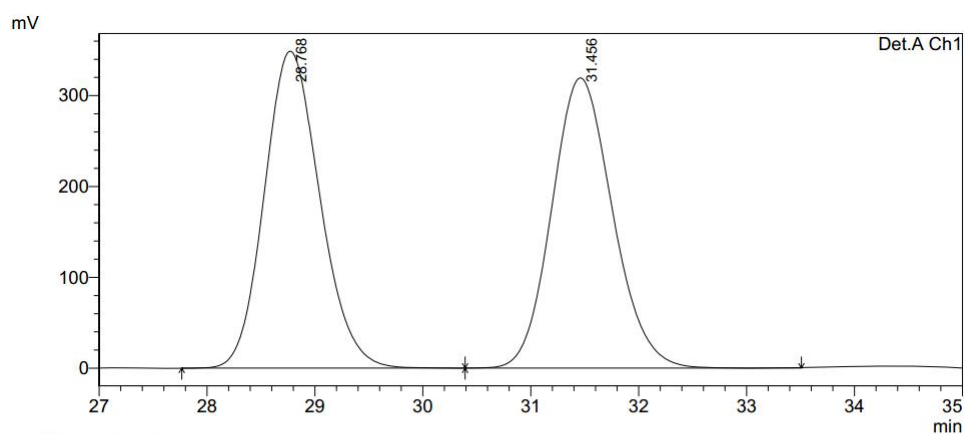
1 Det.A Ch1/254nm

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| PeakTable       |           |          |        |         |          |
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 75.978    | 1539050  | 10022  | 5.549   | 6.056    |
| 2               | 83.262    | 26194813 | 155468 | 94.451  | 93.944   |
| Total           |           | 27733864 | 165489 | 100.000 | 100.000  |



(*E*)-2-(1-hydroxy-4-(4-(trifluoromethyl)phenyl)but-3-en-2-yl)isoindoline-1,3-dione  
(**4j**)

Racemate:

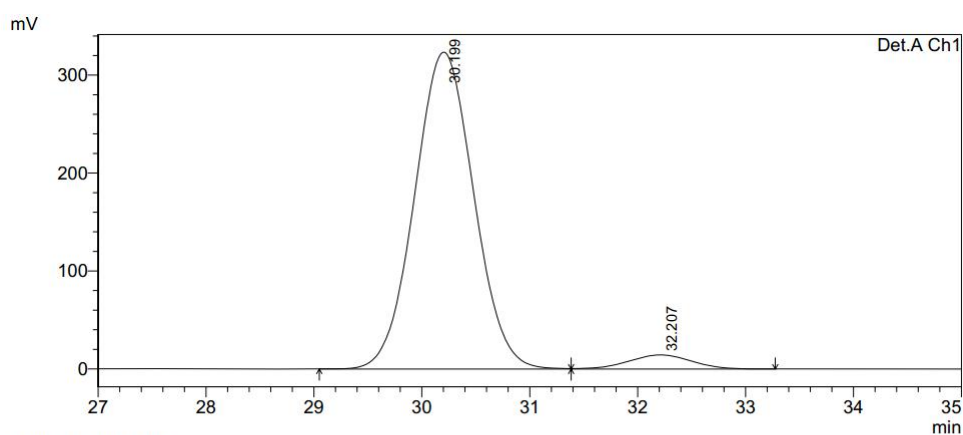


1 Det.A Ch1/254nm

PeakTable

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 28.768    | 12485132 | 348735 | 49.969  | 52.201   |
| 2               | 31.456    | 12500615 | 319322 | 50.031  | 47.799   |
| Total           |           | 24985746 | 668056 | 100.000 | 100.000  |

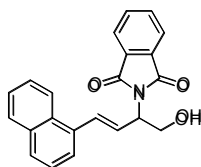
Chiral compound:



1 Det.A Ch1/254nm

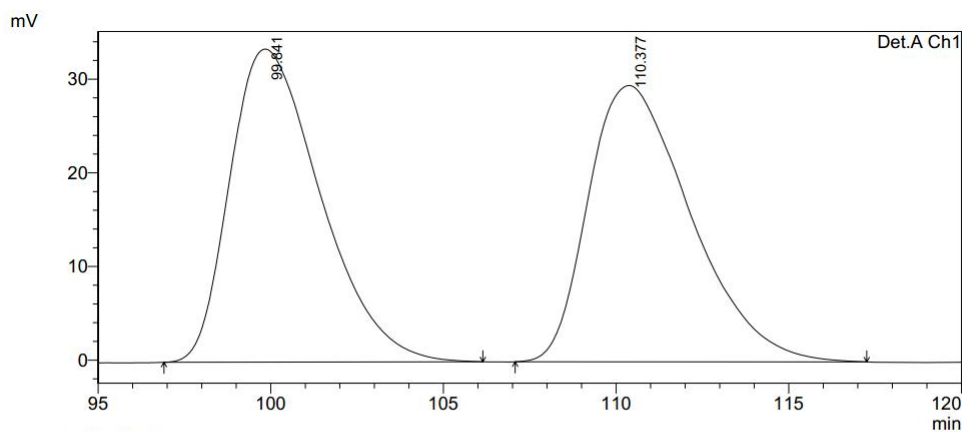
PeakTable

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 30.199    | 12320906 | 323514 | 95.469  | 95.738   |
| 2               | 32.207    | 584700   | 14404  | 4.531   | 4.262    |
| Total           |           | 12905607 | 337918 | 100.000 | 100.000  |



(*E*)-2-(1-hydroxy-4-(naphthalen-1-yl)but-3-en-2-yl)isoindoline-1,3-dione (**2k**)

Racemate:



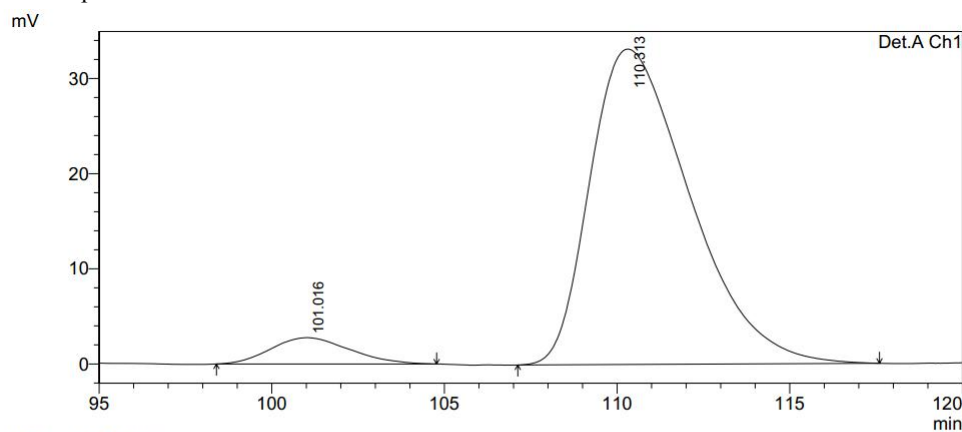
1 Det.A Ch1/254nm

PeakTable

检测器 A Ch1 254nm

| Peak# | Ret. Time | Area     | Height | Area %  | Height % |
|-------|-----------|----------|--------|---------|----------|
| 1     | 99.841    | 6104234  | 33425  | 50.089  | 53.116   |
| 2     | 110.377   | 6082599  | 29504  | 49.911  | 46.884   |
| Total |           | 12186833 | 62930  | 100.000 | 100.000  |

Chiral compound:

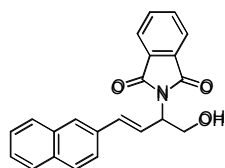


1 Det.A Ch1/254nm

PeakTable

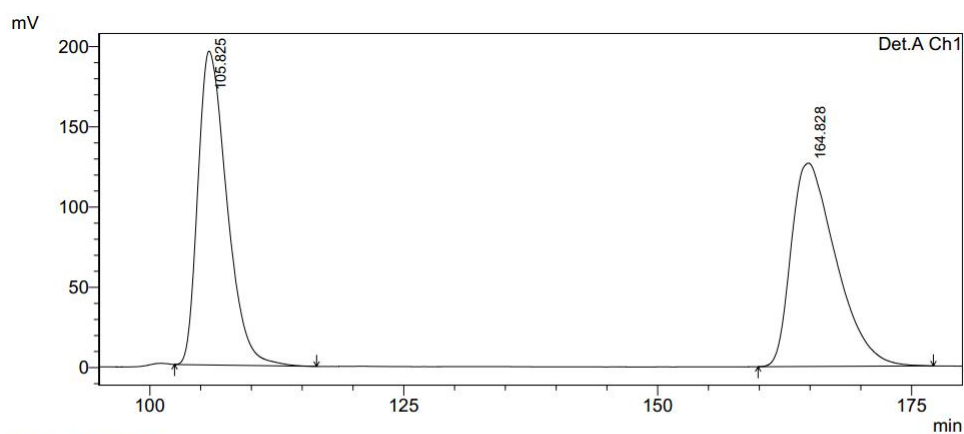
检测器 A Ch1 254nm

| Peak# | Ret. Time | Area    | Height | Area %  | Height % |
|-------|-----------|---------|--------|---------|----------|
| 1     | 101.016   | 438473  | 2761   | 6.173   | 7.690    |
| 2     | 110.313   | 6664768 | 33143  | 93.827  | 92.310   |
| Total |           | 7103241 | 35904  | 100.000 | 100.000  |



(*E*)-2-(1-hydroxy-4-(naphthalen-2-yl)but-3-en-2-yl)isoindoline-1,3-dione (**2I**)

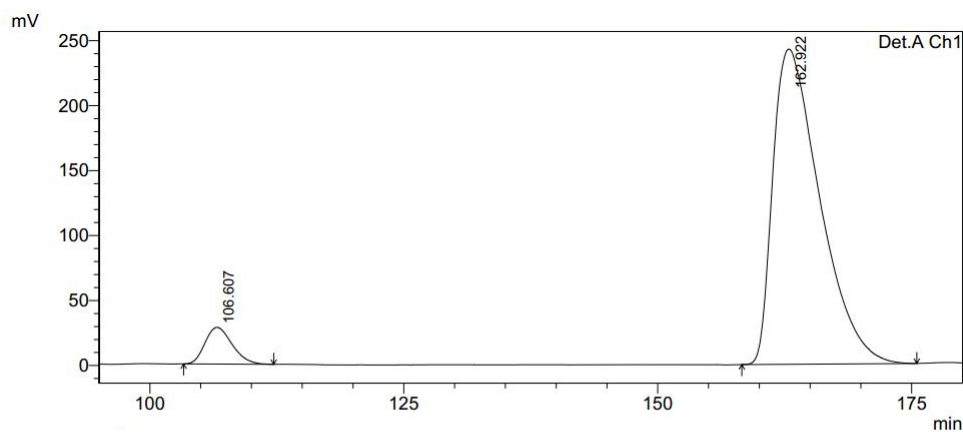
Racemate:



1 Det.A Ch1/254nm

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| PeakTable       |           |          |        |         |          |
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 105.825   | 38847479 | 195551 | 49.934  | 60.686   |
| 2               | 164.828   | 38950102 | 126682 | 50.066  | 39.314   |
| Total           |           | 77797581 | 322232 | 100.000 | 100.000  |

Chiral compound:



1 Det.A Ch1/254nm

| 检测器 A Ch1 254nm |           |          |        |         |          |
|-----------------|-----------|----------|--------|---------|----------|
| PeakTable       |           |          |        |         |          |
| Peak#           | Ret. Time | Area     | Height | Area %  | Height % |
| 1               | 106.607   | 5243391  | 28271  | 6.304   | 10.441   |
| 2               | 162.922   | 77936757 | 242503 | 93.696  | 89.559   |
| Total           |           | 83180149 | 270774 | 100.000 | 100.000  |